

2016 Product Catalogue

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Unique Broadband Systems Ltd. Company Introduction



Unique Broadband Systems Ltd. is a privately owned and operated company with our head office located in Toronto, Ontario, Canada and sales and support facilities in Beijing, China.

Unique Broadband Systems has been in business since 1990 as Unique Broadband Systems, Inc. In September 2003, through a divestiture by Unique Broadband Systems, Inc., UBS reverted to a privately held company. UBS continues its tradition of unwavering commitment to research and development of wireless technologies that enables companies and individuals to access voice, video and data on an "anywhere – anytime" basis. We continue our philosophy of valuing our relationships with our customers, vendors and employees.

What we do

UBS manufactures equipment, components and complete transmissions systems for:

- Wireless fixed and mobile digital television and radio broadcasting
- MMDS equipment for digital television, voice and data (wireless triple-play)
- Military RF and calibration applications (TACAN/IFF)
- Passive components including filters waveguides and coaxial parts

Technical core competencies

UBS has deployed systems and solutions spanning the globe on five continents. Unique Broadband Systems' staff is a power house of qualified electronic and software engineers, master engineers and Ph.D. level engineers. With such a wealth of technical resources we are capable of handling all the technical and service requirements for any scope of project. Our company will continue to invest heavily in this area in the future to ensure that new products are developed, along with ongoing improvements to existing products.

UBS expertise includes:

- Digital waveform analysis and synthesis
- Solutions for all key international standards:

ISDB-T/TB, ATSC, DVB-T/H, DVB-T2, DVB-SH, DAB/DAB+, T-DMB, DTMB, T-MMB, CMMB

- High power LDMOS Technology
- Embedded Technology: COFDM
- Network and RF coverage analysis and design
- Satellite/Terrestrial SFN and MFN Solutions

UBS has over 25 international patents granted and/or pending with unique IP including:

- SFN Network Null Area Elimination technology
- GPS Receiver Elimination for repeater sites
- Adaptive Pre-Distorter for power amplifier linearization
- Satellite/terrestrial Doppler compensation processes

Company Introduction



Key customer deployments

We at UBS are proud of the many projects that some of the world's most innovative companies have trusted us to participate in.

Some of these customers are:

- XM Radio
- Sirius Satellite Radio
- Eutelsat Communications
- United States Airforce
- Harris Corporation

Industry relationships

UBS is a member of major international engineering and standards bodies, including:

ETSI, ATSC, PMI, IEEE, DVB/DVB-H, CCTA, FLOForum and WorldDMB

UBS maintains strong business and technical relationships with major manufacturers in the digital television, digital radio and mobile multimedia industry.

UBS partners with leading value added resellers and systems integrators around the world to deliver complete network solutions as well as individual products and services.

UBS is also a leading technology and component source for other equipment manufacturers offering them:

- OEM Partnerships and Services
- Custom and custom packaged technologies for OEMs
- Re-brandable solution platforms
- Design-in engineering and consulting services

• UBS enables rapid time to market support for new and emerging broadcast applications and standards





UBS Products

Digital Broadcasting Waveguide and Coaxial Components

Waveguides

Filters, Couplers and Power Dividers

Military Products

Digital Broadcasting

Terrestrial Transmitter/Repeater Systems

120W UHF Transmitter/Repeater DTX 1200U 250W UHF Transmitter/Repeater DTX 2500U 100W S-Band Transmitter DTX 1000S 400W DAB L-BAND Transmitter DAB TX 4000LU Indoor Terrestrial Transmitter/Repeater Outdoor Terrestrial Transmitter/Repeater

Power Amplifiers

120W UHF Amplifier DMPA 120UX 250W UHF Amplifier DHPA 250UX 50W S-Band Amplifier DMPA 2200 50W MMDS-Band Amplifier DMPA 2600-1 50W MMDS-Band Amplifier DMPA 2600-1

High Power 1.450 - 1.500 GHz 280W DHPA 1500 High Power 1.670 - 1.675 GHz 250W DHPA 1670 High Power 1.670 - 1.675 GHz 250W DHPA 1670X High Power 2.170 - 2.200 GHz 200W DHPA 2200 High Power 2.320 - 2.345 GHz 400W DHPA 2300 High Power 2.305 - 2.360 GHz 280W DHPA 2330 High Power 2.590 - 2.680 GHz 200W DHPA 2600

Satellite Uplink Transmitter Solutions

Low Power L/S-Band Amplifier System DSPA4000LSB High Power L/S-Band Amplifier System DHPA16000LSB High Power L/S-Band Amplifier System DHPA30000LSB Low Power L/S-Band Amplifier DSPA2500LSB Medium Power L/S-Band Amplifier DMPA5000LSB Redundant Low Power Ka-Band Amplifier System DSPA3000KAB High Power Ka-Band Amplifier System DHPA12000KAB

Test Equipment

DVB-T/H Portable Test Transmitter (VHF/UHF) DVMP 5000

DVB-T/H Portable Test Transmitter (L-Band) DVMP 5000L

Transmission Equipment

Advanced Z7 Universal Modulator DVU 5000 Advanced Z7 OEM Universal Modulator DVU 2100 Universal Modulator DVU 5000 Universal OEM Modulator DVU 2001, 2002, 2010, 2025 DVB-S2 Modulator DVU 5000 DVB-T2 Modulator DVU 5000 2W UHF-Band Universal Modulator DVU 5000 Dual Band DAB Modulator DVU 5000 Universal Exciter DVX 5000

> Universal Adaptive Precorrector UAP 2011 Universal RF Switch URS 1000

Universal Network Adapter UNA 7000 CMMB Multiplexer UNA 7000 Multi Standard SFN Adapter UNA 7000 ATSC M/H Multiplexer UNA 7000 ATSC DTx Adapter UNA 7000 ISDB-T/TB Multiplexer / Re-multiplexer UNA 7000 DVB-ASI to IP Bridge UNA 7000 DVB-ASI to IP Bridge (OEM) DV-IP-ASI-1G DVB-SH IP Encapsulator DVE 6000S

Transmission Site Monitoring

Site Controller STC 1000 RF Signal Analyzer TSA 5000

Receivers

GPS Receiver GPR 2100, 2110, 2120, 1100 GPS/GLONASS Receiver GPR 2100GL, 2110GL, 2120GL, 1100GL DVB-SH Receiver DVR 8000SH DTMB Receiver DMR 8000





Digital Broadcasting Product Specifications



Model: DVU 5000

Product Features

- Direct RF output from 470 MHz to 860 MHz in 0.1 Hz steps (30 MHz to 1 GHz optional)
- Superior Shoulders and MER
- SFN and MFN Support
- Digital Adaptive Linear and Non-Linear Pre-correction
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Interfaces for Web GUI, SNMP and Telnet remote control, machine to machine interface and software upgrades



New Features

Supports all DVB-T2-Base and DVB-T2 Lite modulation features including T2-MI interface support, single and multiple Physical Layer Pipes (PLPs), MFN/SFN operation and SISI/MISO transmission.

The modulator is equipped with Digital Adaptive Linear and Non-Linear Pre-correctors.

The modulator can also be equipped with an on-board GPS/ GLONASS/BeiDou receiver which provides 10 MHz and 1PPS reference signals.

Standards Supported

- ATSC and ATSC-M/H compliant with A/53, A/54, A/64, A/110 and A/153
- DTMB compliant with GB20600-2006 and GY/T 229.1-2008
- DVB-S2 compliant with EN 302 307
- DVB-T2-Base and DVB-T2-Lite compliant with EN 302 755, TS 102 773 and TS 102 831
- ISDB-T/T^B compliant with ARIB STD-B31, ARIB STD-B10, ABNT NBR 15601:2007, SBTVD N01 and SBTVD N03

Optional Features

- Internal GPS/GLONASS/BeiDou Receiver
- 0 dBm to 10 dBm output

Model: DVU 5000



Description and Application

Overview

The UBS Universal Modulator Series utilizes the innovative UBS Universal Waveform engine, supporting major world digital standards for terrestrial broadcasting, including hybrid satellite/terrestrial systems.

The modular, state of the art design allows transmitter manufacturers and network operators to integrate the modulator into a system/ network with relative ease. This open architecture design enables carriers to take advantage of a proven, robust platform while designing networks to meet current and future broadcast standards.

The Universal Modulator can be factory configured with the necessary hardware to support one, two or all the waveforms listed above. The user can easily switch from one waveform to another through software selection. UBS' modulators can also be upgraded in the field as standards evolve.

Using the latest technology, UBS has developed a direct conversion process that allows the Universal Modulator to provide an RF output from 470 MHz to 860 MHz with superior shoulders and MER. A range of optional RF outputs including 30 MHz to 1 GHz are also available.

This series incorporates all of UBS high performance signal processing stages including adaptive integrated linear and non-linear pre-correctors. Full remote management and control as well as remote firmware and waveform upgrades are provided.

Signal Inputs

The Modulator is provided with two DVB-ASI inputs and an IP input. The DVB-ASI inputs accept a MPEG-2 TS, a T2-MI stream or an ISDB-T multiplex TS.

The Modulator also support a GbE Transport Stream input based on Pro-MEG CoP #3 / SMPTE 2022 protocol.

The DVB-ASI input can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary transport stream in case the primary transport stream source fails (a truly valuable feature for broadcast applications.)

RF Output

The standard RF output covers a frequency range of 470 MHz to 860 MHz in 0.1 Hz steps. A 30 MHz to 1 GHz RF output is also available.

The output level is adjustable from -10 dBm to 0 dBm (o dBm to +10 dBm optional), in 0.1 dB steps and the user can set the polarity of the spectrum to Inverted or Non-inverted as required.

The direct conversion process offers superior performance with Shoulder Levels \leq -60 dBc and MER \geq 52 dB.

Digital Adaptive Linear and Non-linear Pre-correctors

The Adaptive Pre-corrector is used for compensation of non-linear and linear distortions caused by a High Power Amplifier (HPA) and output Band-Pass Filter (BPF). The HPA and BPF feedback signals are down-converted to IF and captured by the pre-corrector. The coefficients are then processed by the modulator board.

Web Interface

This feature allows remote control of the Modulator via an Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the modulator. The Web Interface concept only requires a standard computer with a network interface card (NIC) and a Web browser (Internet Explorer, Firefox, Crome, etc.).

SNMP Client

This feature allows remote control of the Modulator in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Machine to Machine Interface

Depending on the waveform selected, the modulator RS232, RS485 or Ethernet ports can be used as a machine to machine interface. This is a valuable feature when control of an external power amplifier is required.

GPS/GLONASS/BeiDou Receiver (optional)

The DVU 5000 can be equipped with an internal GPS/GLONASS/BeiDou receiver. The user has the option to set the source to an external device or the internal receiver. When the internal receiver is selected, the 10 MHz and 1PPS references are derived from the internal receiver and the 10 MHz and 1PPS ports become user selectable inputs/outputs.

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Model: DVU 5000

Product Specifications | Signal Processing

ATSC Mode

Supported Mode Network Mode Bandwidth

DTMB Mode

FFT Mode Guard Interval Code Rate Constellation Frame Duration Sub-carrier Spacing Time Interleaver Network Mode Bandwidth

ISDB-T/T_B Mode

FFT Mode Guard Interval Code Rate Constellation Hierarchical Mode Carrier Spacing Time Interleaver Network Mode Bandwidth

8VSB, M/H SFN and MFN 6 MHz

3780, Single Carrier 945, 595, 420 symbols 0.4, 0.6, 0.8 QPSK, 4QAM-NR, 16-QAM, 32-QAM, 64-QAM 500 us, 666.67 us or 571.43 us 1.5 kHz, 1.75 kHz, 2 kHz 240, 720 symbols SFN and MFN 8 MHz, 7 MHz, 6 MHz

2k, 4k, 8k 1/4, 1/8, 1/16,1/32 1/2, 2/3, 3/4, 5/6, 7/8 QPSK, 16-QAM, 64-QAM, DQPSK up to 3 layers 1 kHz, 2 kHz, 4 kHz 0 to 16 Hierarchical, SFN (IIP packets) and MFN 6 MHz

DVB-T2 Mode	
FFT Mode	1k, 2k, 4k, 8k, Extended 8k, 16k, Extended 16k, 32k, Extended 32k
Guard Interval	1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4
Code Rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6
PLP Constellation	QPSK, 16-QAM, 64-QAM, 256-QAM (normal or rotated)
L1 Post Constellation	BPSK, QPSK, 16-QAM, 64-QAM
FEC	Short (16k), Normal (64k)
Network Mode	MFN, SFN-SISO, SFN-MISO
Bandwidth	1.7 MHz, 5 MHz, 6 MHz, 7 MHz, 8 MHz, 10 MHz
Time Interleaving	Adjustable
Pilot Pattern	PP1 to PP8
Input	T2-MI control, Input steam monitoring PCR restamping, TS Bit Rate Adaptation
DVB-S2 Mode	
Modes	CCM (Constant Coding and Modulation) VCM (Variable Coding and Modulation)
Constellations	QPSK, 8PSK, 16APSK, 32APSK
FEC	BCH (inner), LDPC (outer)
Short FEC Frames	16200
Normal FEC Frames	64800
Code Rates	QPSK - 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 8PSK - 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 16APSK - 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 32APSK - 3/4, 4/5, 5/6, 8/9, 9/10
Pilots	ON or OFF
Roll-off	35%, 25%, 20%
	FFT Mode Guard Interval Code Rate PLP Constellation L1 Post Constellation FEC Network Mode Bandwidth Time Interleaving Pilot Pattern Input DVB-S2 Mode Modes Constellations FEC Short FEC Frames Normal FEC Frames Code Rates

Up to 37.5 Mbaud, step 1 baud

Document DVU-5000-Z7-S07-02

Symbol Rate

Model: DVU 5000



Product Specifications

Inputs / Outputs		RF Output			
DVB-ASI	BNC (F), 75 Ω	Connector	N-type (F), 50 Ω		
(IN-1, IN-2)	HD BNC (F), 75 Ω optional	Frequency Range	470 MHz - 860 MHz		
GbE Transport Stream	Protocol: Pro-MPEG CoP #3 /		30 MHz - 1 GHz (optional)		
	SMPTE 2022 Connector: RJ45	Frequency Step Size	0.1 Hz		
HPA FB (feedback signal from	Connector: SMA (F), 50 Ω Frequency Range: 470 MHz to 860 MHz	Frequency Stability	Internal reference 0.05ppm / or in accordance with external ref. accuracy		
the amplifier output)	Level: -10 dBm to 0 dBm	Spectrum Polarity	Inverted or non-inverted, selectable		
BPF FB	Connector: SMA (F), 50 Ω	Level	-10 dBm to 0 dBm in 0.1 dB step		
(feedback signal from the filter output)	Frequency Range: 470 MHz to 860 MHz Level: -10 dBm to 0 dBm	Level Stability	± 0.3 dB		
GPS/GLONASS/BeiDou	F-type (F), 75 Ω	Return Loss	> 26 dB		
Clock Reference - 10 MHz	BNC (F), 50 Ω	Shoulder Level	≤ -60 dBc (Note 2)		
(Note 1)	Frequency: 10 MHz	MER	≥ 52 dB (Note 3)		
Time Reference - 1 PPS	Level: 0 dBm to 10 dBm BNC (F), 50 Ω	Spurious Level Outside Channel	< -60 dBm		
(Note 1)	Frequency: 1 PPS Level: TTL Triager Decitive transition	Amplitude Flatness	Center frequency ±3.8 MHz: ±0.3 dB (Note 4)		
	Trigger: Positive transition	Group Delay response	Center frequency ±3.8 MHz: ±10 ns (Note 4)		
Control Interfaces		Phase Noise SSB	10 Hz: < -65 dBc/Hz		
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T	(measured @ 674 MHz)	100 Hz: < -85 dBc/Hz 1 kHz: <-100 dBc/Hz 10 kHz: <-110 dBc/Hz		
USB Interface	Connector: USB Type B		100 kHz: < -130 dBc/Hz		
RS485/RS232 Interface	Connector: DB-9 (F)		1 MHz: < -135 dBc/Hz		
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)	Digital Adaptive Pre-cor	rection		
Web GUI	Internet Explorer, Firefox, Chrome, etc.	Frequency	470 MHz to 860 MHz		
	Connector: Ethernet	Spectral Regrowth Reduction	10 dB ±3 dB (Note 5)		
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided	MER Correction	7 dB ±3 dB (Note 5)		
Alarm Relays	Connector: DB-15 (M)	Power Supply			
	2 Dry Contact Alarm relays, triggered by any major alarm.	Voltage	100 - 240 VAC		
Machine to Machine	Connector: Ethernet for all waveforms	Frequency	50 - 60 Hz		
Interface	or RS485/RS232	Power Consumption	max. 45 VA		
Note 1: The 10 MHz and 1PPS conr when the DVU 5000 is equipped with	nectors become user selectable inputs/outputs an internal GNSS receiver	Mechanical			
	ere performed with Agilent N9030A PXA Series	Dimensions	483mm x 44mm x 366mm		
Spectrum Analyzer.	ere performed with Agrient 199030A FAA Series	(W x H x D)	(19" x 1.73" x 14.43")		
Note 3 : MER measurements were p Spectrum Analyzer	performed with an Agilent N9030A PXA Series	Weight	6 kg (13 lbs)		
speed and margael		Environmental			
	Iz bandwidth, where 0 dB is the level of the carri-	Operating Temperature	0°C to +50°C (+32°F to +122°F)		
ers at the edge of the spectrum. Harm		Storage Temperature	-30°C to +70°C (-22°F to +158°F)		
Note 5: Greater improvement is possible depends upon power level and wavel	sible under particular applications. Performance	Relative Humidity	max. 95%		
acpentas aport power level and waver	10111.	· · · · · · · · · · · · · · · · · · ·			

(specifications are subject to change without notice)



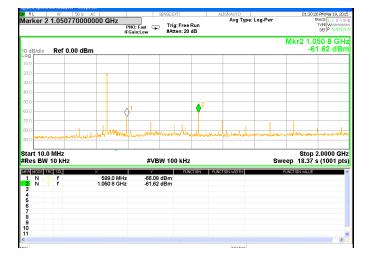
Model: DVU 5000

DVB-T2 Signal Measurements

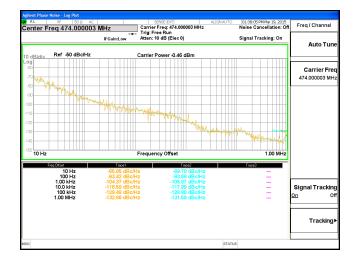
	OΩ AC		SENSE:EXT	ALIGNAUTO		01:14:4	IS PM Mar 1
r 1 ∆ 4.2500	00000 MHz	PNO: Wide 😱 IFGain:Low	Trig: Free Run #Atten: 20 dB	Avg Type: Avg Hold:>			TYPE A V DET S N
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r 474.000 MH 3W 10 kHz	z	#VB	W 100 kHz		Swe	Spar ep 291.9 m	n 10.00 s (100
Alignment Comp				STATUS		•	•

	RF 50 Ω AC q 474.000000 MHz IFGain:L	SRNEEDT ALIGNAUTO 0116:37 PM Mar 19, 2015 CH Freq: 474,000 000 MHz (CH Num: 21) Radio Std: DVBT2 Trig: Periodic Timer #Atten: 20 dB (Elec 0)	Meas Setup Avg/Hold Num
EVM:	0.14 %		On <u>Of</u>
	2.68 % pk	I/Q Measured Polar Graph	
	at carrier 3456		Avg Mode Exp Repea
MER:	57.13 dB		
	31.45 dBpk	080000000000000000000000000000000000000	Auto Detec
	at carrier 3456		<u>On</u> Of
Mag Err:	0.10 %		
	2.56 % pk	010 010 010 010 010 010 010 010 010 010	Demod
	at carrier 3456		
Phase Err:	0.13 deg		
	15.50 deg pk	00000000000000000000000000000000000000	Sync Frame Nov
	at carrier 6633	00000000000000000000000000000000000000	
Freq Err:	-0.3982 Hz		Advanced
Clock Err:	0.12 Hz	000000000000000000000000000000000000000	Auvunccu
Tx Power:	-0.40 dBm		
			More 1 of 2
wsa 🤳 Alignme	ant Completed	PLP ID - 0	

Agilent DVB-T/H - T2 Mod Acc						
Center Freq 474.00		CH Freq:		MHz (CH Num: 21)	01:17:33 PM Mar 19, 2015 Radio Std: DVBT2	View/Display
	IFGain:Low		odic Timer 0 dB (Elec 0)			MER Monitor
	Numeri	c Result	s Sumi	mary		
EVM:	0.14 %	2.78	% pk	at carrier	3456	MER vs. PLPD
MER:	57.06 dB	31.12	dB pk	at carrier	3456	
Mag Err:	0.10 %	2.74	% pk	at carrier	3456	
Phase Err:	0.13 deg	14.57	deg pk	at carrier	3456	Result Metrics
Data	P2 Pilot L	1-pre L1-	post Co	nt Pilot Scat Pilo	t FC Pilot	
EVM: 0.15 %	0.09 % 0.13	\$ % 0.13	3% 0.	08 % 0.10 %	%	BER Results
MER: 56.76 dB	61.15 dB 57.57	dB 57.83	dB 61.	48 dB 60.30 dB	3 dB	DERREsults
Freq Err:	-0.2	143 Hz	Тх	Power: -0.4	0 dBm	
Quad Error:	-0.00	06 deg				
Amptd Imbala	nce: -0.0	001 dB				
Timing Skew:	-5.62528	-07 us				
Trigger Differ	ence: -0.3	203 us				
Clock Err:	C	.12 Hz				
						More
						2 of 2
MSG DEFILE <picture.pi< th=""><th>NG> saved</th><th></th><th></th><th>STATUS</th><th></th><th><u> </u></th></picture.pi<>	NG> saved			STATUS		<u> </u>



GRL	RF 50.Ω AC		SENSE:EXT		LIGNAUTO		01:18:2	1 PM Mar 19, 2015
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avg/Hoi	a Number 10		Trig: Per	riodic Timer	Avg Hold:>	10/10	Radio Sta. L	1012
		IFGain:Low	#Atten: 2	0 dB (Elec 0)				
mptd	Y Ref 35.35 dB	il comicon						
anpea	1 Kei 35.55 05							
		Pk-Pk:		0.08 dB				
15.30								
5.20 5.20								
5.15								
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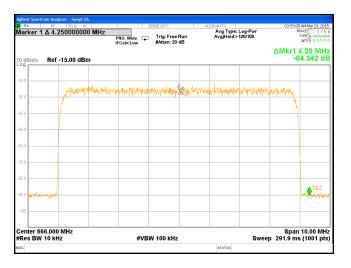
Document DVU-5000-Z7-S07-02

(specifications are subject to change without notice)

Model: DVU 5000



DTMB Signal Measurements

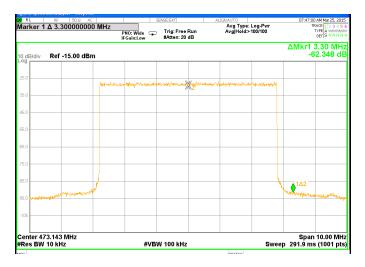


Mech Atten	20 dB	 CH Freq Trig: Fre #Atten: 2	e Run		Hz (CH I Avg		:) 0/10		04:07:57 AM Mar 23, 2 Radio Std: DTMB Mod Format: QAM64 Device: Transmitter
EVM:	0.18 %								
	4.56 % pk			I/Q M	easur	ed Po	lar Gr	aph	
	at carrier 0								
MER:	54.93 dB P	۲	۲	۲	۲	۲	•	۲	•
	26.82 dB pk					~	~		
	at carrier 0	۲	۲	۲	۲	۲	۲	۲	•
Mag Err:	0.14 %	۲	۲	۲	۲	\odot	\odot	۲	•
	4.26 % pk	~	~	~	~	~	~	~	
	at carrier 0	۲	\odot	۲	۲	•	O	۲	•
Phase Err:	0.09 deg	\odot	۲	۲	۲	۲	۲	۲	•
	-0.97 deg pk	\odot	۲	۲	۲	•	۲	۲	•
	at carrier 1762	0	0	0	0	\cup	0	0	~
Freq Err:	0.51 Hz	۲	\odot	۲	۲	٠	۲	۲	•
Tx Power:	-0.44 dBm	۲	\odot	\odot	\odot	\odot	۲	\odot	
		0		~				~	Ŭ

ETSI Compliance

Essential Requirement R&TTE Directive 1995/5/EC	Standard / Specification
Safety	EN 60950-1: 2001, A11: 2004 First Edition
Health	Not Applicable. No Antenna
EMC	EN 301 489-1 V1.8.1
Radio	EN 302 296 V1.1.1 (The technical requirement of Clause 4.3 was substituted for Clause 8.2 of EN 301 489-1 using the Class A limits specified in Table 4.)

ISDB-T/TB Signal Measurements



Senter Fred	F 50 Ω AC 473.142857 MHz	IFGain:Low	C) T		e Run		LIGNAUT Hz (CH		9			26:22 AM Mar 2 td: ISDBT
EVM:	0.14 %											
	1.31 % pk					I/Q M	easur	ed Po	lar Gr	aph		
	at carrier 1404											
MER:	57.38 dB			۲	۲	۲	\odot	\odot	۲	۲	\odot	
	37.65 dB pk									~		
	at carrier 1404			۲	۲	۲	۲	۲	۲	۲	۲	
Mag Err:	0.10 %				\odot	۲	۲	\odot	\odot	۲	۲	
	1.20 % pk			•	•	۲	۲	•	\odot	۲	۲	
	at carrier 1404		0	0	•	•	•	•	•	J	•	0
Phase Err:	0.08 deg			۲	۲	۲	۲		۲	\odot	۲	-
	0.74 deg pk							•	•		\odot	
	at carrier 1505			0		0	0	0	0	0	0	
Freq Err:	0.10 Hz			۲	۲	۲	۲	۲	۲	۲	۲	
Clock Err:	-0.01 Hz			\odot	۲	\odot	۲	۲	۲	\odot	\odot	
Tx Power:	0.92 dBm											

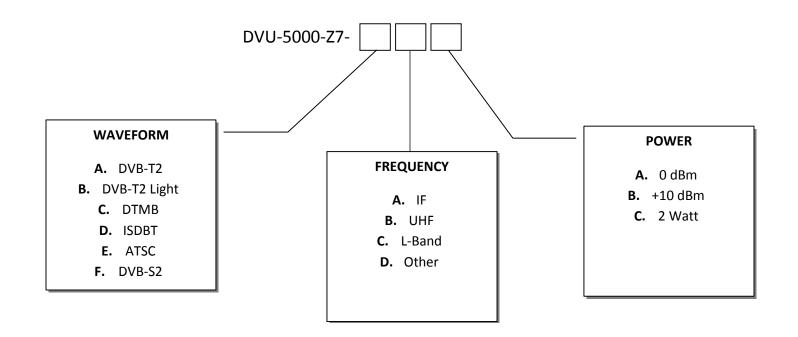
CE Compliance

This equipment is CE Compliant.

(€ 0678**(**)

August 20, 2015

PART ORDERING MATRIX FOR 1 RU ADVANCED MODULATOR





Model: DVU 2100

Product Features

- Direct RF output from 470 MHz to 860 MHz in 0.1 Hz steps (30 MHz to 1 GHz optional)
- Superior Shoulders and MER
- SFN and MFN Support
- Digital Adaptive Linear and Non-Linear Pre-correction
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Interfaces for Web GUI, SNMP and Telnet remote control, machine to machine interface and software upgrades



New Features

Supports all DVB-T2-Base and DVB-T2 Lite modulation features including T2-MI interface support, single and multiple Physical Layer Pipes (PLPs), MFN/SFN operation and SISI/MISO transmission.

The modulator is equipped with Digital Adaptive Linear and Non-Linear Pre-correctors.

The modulator can also be equipped with an on-board GPS/ GLONASS/BeiDou receiver which provides 10 MHz and 1PPS reference signals.

Standards Supported

- ATSC and ATSC-M/H compliant with A/53, A/54, A/64, A/110 and A/153
- DTMB compliant with GB20600-2006 and GY/T 229.1-2008
- DVB-S2 compliant with EN 302 307
- DVB-T2-Base and DVB-T2-Lite compliant with EN 302 755, TS 102 773 and TS 102 831
- ISDB-T/T^B compliant with ARIB STD-B31, ARIB STD-B10, ABNT NBR 15601:2007, SBTVD N01 and SBTVD N03

Optional Features

• Internal GPS/GLONASS/BeiDou Receiver

Model: DVU 2100



Description and Application

Overview

The UBS Universal Modulator Series utilizes the innovative UBS Universal Waveform engine, supporting major world digital standards for terrestrial broadcasting, including hybrid satellite/terrestrial systems.

The modular, state of the art design allows transmitter manufacturers and network operators to integrate the modulator into a system/ network with relative ease. This open architecture design enables carriers to take advantage of a proven, robust platform while designing networks to meet current and future broadcast standards.

The Universal Modulator can be factory configured with the necessary hardware to support one, two or all the waveforms listed above. The user can easily switch from one waveform to another through software selection. UBS' modulators can also be upgraded in the field as standards evolve.

Using the latest technology, UBS has developed a direct conversion process that allows the Universal Modulator to provide an RF output from 470 MHz to 860 MHz with superior shoulders and MER. A range of optional RF outputs including 30 MHz to 1 GHz are also available.

This series incorporates all of UBS high performance signal processing stages including adaptive integrated linear and non-linear pre-correctors. Full remote management and control as well as remote firmware and waveform upgrades are provided.

Signal Inputs

The OEM Modulator is provided with two DVB-ASI inputs and an IP input. The DVB-ASI inputs accept a MPEG-2 TS, a T2-MI stream or an ISDB-T multiplex TS.

The OEM Modulator also support a GbE Transport Stream input based on Pro-MEG CoP #3 / SMPTE 2022 protocol.

The DVB-ASI input can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary transport stream in case the primary transport stream source fails (a truly valuable feature for broadcast applications.)

RF Output

The standard RF output covers a frequency range of 470 MHz to 860 MHz in 0.1 Hz steps. A 30 MHz to 1 GHz RF output is also available.

The output level is adjustable from -10 dBm to 0 dBm in 0.1 dB steps and the user can set the polarity of the spectrum to Inverted or Non-inverted as required.

The direct conversion process offers superior performance with Shoulder Levels \leq -60 dBc and MER \geq 52 dB.

Digital Adaptive Linear and Non-linear Pre-correctors

The Adaptive Pre-corrector is used for compensation of non-linear and linear distortions caused by a High Power Amplifier (HPA) and output Band-Pass Filter (BPF). The HPA and BPF feedback signals are down-converted to IF and captured by the pre-corrector. The coefficients are then processed by the modulator board.

Web Interface

This feature allows remote control of the OEM Modulator via an Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the modulator. The Web Interface concept only requires a standard computer with a network interface card (NIC) and a Web browser (Internet Explorer, Firefox, Crome, etc.).

SNMP Client

This feature allows remote control of the OEM Modulator in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Machine to Machine Interface

Depending on the waveform selected, the modulator RS232, RS485 or Ethernet ports can be used as a machine to machine interface. This is a valuable feature when control of an external power amplifier is required.

GPS/GLONASS/BeiDou Receiver (optional)

The DVU 2100 can be equipped with an internal GPS/GLONASS/BeiDou receiver. The user has the option to set the source to an external device or the internal receiver. When the internal receiver is selected, the 10 MHz and 1PPS references are derived from the internal receiver and the 10 MHz and 1PPS ports become user selectable inputs/outputs.

Document DVU-2100-Z7-S07-02

Wireless Broadband and Broadcasting Solutions



Advanced Z7 OEM Universal Modulator

Model: DVU 2100

Product Specifications | Signal Processing

ATSC Mode

Supported Mode Network Mode Bandwidth

DTMB Mode

FFT Mode Guard Interval Code Rate Constellation Frame Duration Sub-carrier Spacing Time Interleaver Network Mode Bandwidth

ISDB-T/T_B Mode

FFT Mode Guard Interval Code Rate Constellation Hierarchical Mode Carrier Spacing Time Interleaver Network Mode Bandwidth 8VSB, M/H SFN and MFN 6 MHz

3780, Single Carrier 945, 595, 420 symbols 0.4, 0.6, 0.8 QPSK, 4QAM-NR, 16-QAM, 32-QAM, 64-QAM 500 us, 666.67 us or 571.43 us 1.5 kHz, 1.75 kHz, 2 kHz 240, 720 symbols SFN and MFN 8 MHz, 7 MHz, 6 MHz

2k, 4k, 8k 1/4, 1/8, 1/16,1/32 1/2, 2/3, 3/4, 5/6, 7/8 QPSK, 16-QAM, 64-QAM, DQPSK up to 3 layers 1 kHz, 2 kHz, 4 kHz 0 to 16 Hierarchical, SFN (IIP packets) and MFN 6 MHz **DVB-T2 Mode** FFT Mode 1k, 2k, 4k, 8k, Extended 8k, 16k, Extended 16k, 32k, Extended 32k **Guard Interval** 1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4 Code Rate 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 **PLP Constellation** QPSK, 16-QAM, 64-QAM, 256-QAM (normal or rotated) BPSK, QPSK, 16-QAM, 64-QAM L1 Post Constellation FEC Short (16k), Normal (64k) Network Mode MFN, SFN-SISO, SFN-MISO Bandwidth 1.7 MHz, 5 MHz, 6 MHz, 7 MHz, 8 MHz, 10 MHz **Time Interleaving** Adjustable **Pilot Pattern** PP1 to PP8 Input T2-MI control, Input steam monitoring PCR restamping, TS Bit Rate Adaptation **DVB-S2** Mode Modes CCM (Constant Coding and Modulation) VCM (Variable Coding and Modulation) Constellations QPSK, 8PSK, 16APSK, 32APSK FEC BCH (inner), LDPC (outer) Short FEC Frames 16200 Normal FEC Frames 64800 **Code Rates** QPSK - 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6,8/9,9/10 8PSK - 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 16APSK - 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 32APSK - 3/4, 4/5, 5/6, 8/9, 9/10 Pilots ON or OFF Roll-off 35%, 25%, 20%

Up to 37.5 Mbaud, step 1 baud

Document DVU-2100-Z7-S07-02

Symbol Rate

Model: DVU 2100



Product Specifications

Inputs / Outputs		RF Output			
DVB-ASI	BNC (F), 75 Ω	Connector	SMA (F), 5	0 Ω	
(IN-1, IN-2) GbE Transport Stream	HD BNC (F), 75 Ω optional Protocol: Pro-MPEG CoP #3 /	Frequency Range	470 MHz - 30 MHz -	· 860 MHz 1 GHz (optional)	
	SMPTE 2022 Connector: RJ45	Frequency Step Size	0.1 Hz		
HPA FB (feedback signal from	Connector: SMA (F), 50 Ω Frequency Range: 470 MHz to 860 MHz	Frequency Stability	Internal reference 0.05ppm / or accordance with external ref. ac		
the amplifier output)	Level: -10 dBm to 0 dBm	Spectrum Polarity	Inverted c	or non-inverted, selectable	
BPF FB	Connector: SMA (F), 50 Ω	Level	-10 dBm t	o 0 dBm in 0.1 dB step	
(feedback signal from the filter output)	Frequency Range: 470 MHz to 860 MHz Level: -10 dBm to 0 dBm	Level Stability	± 0.3 dB		
GPS/GLONASS/BeiDou	SMA (F), 50 Ω	Return Loss	> 26 dB		
Clock Reference - 10 MHz	SMA (F), 50 Ω	Shoulder Level	≤ -60 dBc	(Note 2)	
(Note 1)	Frequency: 10 MHz	MER	≥ 52 dB (N	lote 3)	
Time Reference - 1 PPS	Level: 0 dBm to 10 dBm SMA (F), 50 Ω	Spurious Level Outside Channel	< -60 dBm		
(Note 1)	Frequency: 1 PPS Level: TTL Trigger Desition to a sitility	Amplitude Flatness	Center frequency ±3.8 MHz: ±0.3 dB (Note 4)		
	Trigger: Positive transition	Group Delay response	Center fre (Note 4)	quency ±3.8 MHz: ±10 ns	
Control Interfaces		Phase Noise SSB (measured @ 674 MHz)	10 Hz: 100 Hz:	< -65 dBc/Hz < -85 dBc/Hz	
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T		1 kHz: 10 kHz:	< -100 dBc/Hz < -110 dBc/Hz	
USB Interface	Connector: Micro USB Type B		100 kHz:	< -130 dBc/Hz	
RS485/RS232 Interface	Molex: 5-pos Micro Blade Header		1 MHz:	< -135 dBc/Hz	
CLI (Command Line Interface)	Connector: Micro USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)	Digital Adaptive Pre-cor	rection		
Web GUI	Internet Explorer, Firefox, Chrome, etc. Connector: Ethernet	Frequency Spectral Regrowth Reduction		o 860 MHz dB (Note 5)	
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided	MER Correction	7 dB ±3 d	B (Note 5)	
Alarm Relays	2 Dry Contact Alarm relays, triggered by any major alarm.	Power Supply			
Machine to Machine	Connector: Ethernet for all waveforms	Voltage	Single 12	VDC	
Interface	or RS485/RS232	Power Consumption	max. 35 V	Vatts (with GPS reciever)	
		Connector	Molex, Eu	rostyle 2-pos Header	
Note 1 : The 10 MHz and 1PPS conr when the DVU 2100 is equipped with	nectors become user selectable inputs/outputs an internal GNSS receiver.	Mechanical			
Note 2 : Shoulder measurements we Spectrum Analyzer.	ere performed with Agilent N9030A PXA Series	Dimensions (W x H x D)		x 3.876cm x 19.014cm .526″ x 7.486″)	
	performed with an Agilent N9030A PXA Series	Weight	0.55kg (1.2	2 lbs.)	
Note 4: Levels are measured in 10 kH	z bandwidth, where 0 dB is the level of the carri-	Environmental Operating Temperature	0°C to +50	0°C (+32°F to +122°F)	
ers at the edge of the spectrum. Harm		Storage Temperature		-70°C (-22°F to +158°F)	
Note 5 : Greater improvement is poss depends upon power level and wavef	ible under particular applications. Performance orm.	Relative Humidity	max. 95%		

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(specifications are subject to change without notice)

August 20, 2015



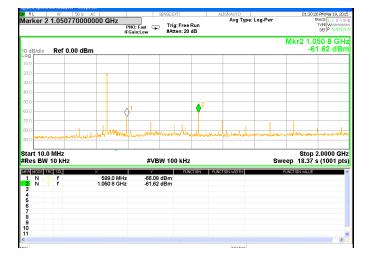
Model: DVU 2100

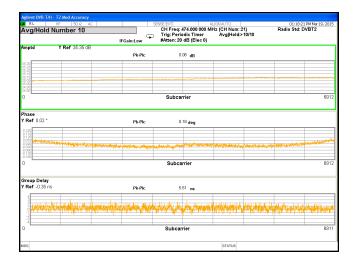
DVB-T2 Signal Measurements

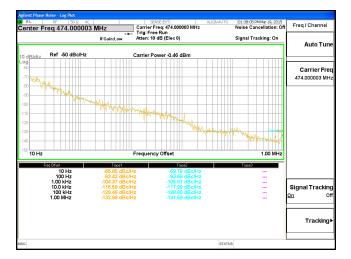
	25000000		PNO: Wide 😱	Trig: Free R #Atten: 20 d	un	Avg Type: Avg Hold:>		Т	S PM Mar 19, 20 RACE 1 2 3 4 TYPE A WWW DET S N N N
IB/div Ref	-15.00 dBn		IFGain:Low	Whiteh. 20 a		1		∆Mkr1	
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									1Δ2
nter 474.000 es BW 10 kH			#VB	W 100 kHz			Swee	Spar p 291.9 m	10.00 M s (1001 p

	RF 50 Ω AC q 474.000000 MHz IFGain	senseerri ALIONAUTO [01:16:37 PM Mar 19, 2015] CH Freq: 474.000 000 MHz (CH Num: 21) Radio Std: DVBT2 Trig: Periodic Timer #Atten: 20 dB (Elec 0)	Meas Setup Avg/Hold Num
EVM:	0.14 %		10 On <u>Of</u>
	2.68 % pk	I/Q Measured Polar Graph	
	at carrier 3456		Avg Mode Exp Repea
MER:	57.13 dB		<u>CAD</u> Repea
	31.45 dBpk		Auto Detec
	at carrier 3456		On Of
Mag Err:	0.10 %	00 00 00 00 00 00 00 00 00	
	2.56 % pk		Demod
	at carrier 3456		
Phase Err:	0.13 deg		
	15.50 deg pk		Sync Frame Nov
	at carrier 6633	ାର ତର ତର ନିର୍ମ୍ମର୍ଭ ନିର୍ବ ତର ତର	
Freq Err:	-0.3982 Hz		Advanced
Clock Err:	0.12 Hz	00000000000000000000000000000000000000	Advanceu
Tx Power:	-0.40 dBm		More
			1 of 2
usg 🕕 Alignme	ant Completed	PLP ID - 0	

Agilent DVB-																
Center F	RF Frea 47		Ω AC	MHz			H Freq: 4			z (CH	ALIGNAU Num: 21)			PM Mar 19, 2015 1: DVBT2	-	View/Display
				IFG	ain:Low	•	Atten: 20	dB (E	lec 0)	arv						MER Monitor
	/M: ER:			.14	% dB		2.78 31.12	% dB	pk	,	at car at car					MER vs. PLPD
	ag Err: nase Eri		0		% deg		2.74 14.57	5	pk pk		at car at car	rier 3	456			Result Metrics
EVM: MER:	D: 0.15 56.76	ata % dB	P2 P 0.09 61.15	%	0.13	pre % dB	0.13	%	0.08	%	Scat F 0.10 60.30	%	FC	Pilot % dB		BER Results
Qu An Tir Tri	eq Err: Jad Erri nptd Im ming Si igger D	bala æw: iffer		-5	-0.000 -0.000 .6252E- -0.32	6 de 01 dl 07 u 03 u	- B S S		Tx Po	wer:		0.40	dBm			
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Document DVU-2100-Z7-S07-02

(specifications are subject to change without notice)

Model: DVU 2100

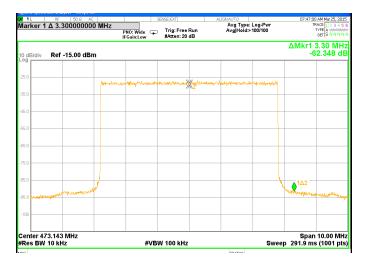


DTMB Signal Measurements

RF	alyzer - Swept SA		5	ENSE:EXT		ALIGNAUTO		03:53:05	AM Mar 23, 20
	.250000000 N	PN	0: Wide 😱 iain:Low	Trig: Free #Atten: 20	Run dB	Avg Type: Avg Hold:>	Log-Pwr 100/100	ΔMkr1 √	TYPE A WWW DET S N N N
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gad years got									102
er 666.00 BW 10 k			#VB	W 100 kHz			Sweep	Span 291.9 ms	10.00 M
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pk er 0 . P pk er 0 pk er 0	0 0 0	© ©	i/Q M • •	easur • •	ed Pol	iar Gra	aph ©	•
er 0 pk er 0	•	•	•	•	۲	۲		
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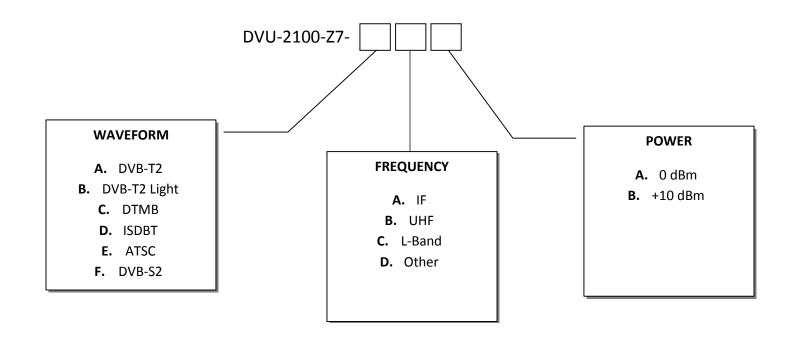
ISDB-T/TB Signal Measurements



	RF 50 Ω AC 473.142857 MHz	IFGain:Low			e Run		LIGN AUT Hz (CH)			7:26:22 AM Mar Std: ISDBT
EVM:	0.14 %											
	1.31 % pk					I/Q M	easur	ed Po	lar Gr	aph		
	at carrier 1404											
MER:	57.38 dB			۲	۲	۲	\odot	\odot	۲	\odot	\odot	
	37.65 dB pk										~	
	at carrier 1404			۲	۲	۲	۲	۲	۲	۲	۲	
Mag Err:	0.10 %			۲	\odot	۲	۲	\odot	\odot	۲	۲	
	1.20 % pk			~	~	~	~	_	_	_	~	
	at carrier 1404			۲	۲	۲	۲	•	\odot	۲	۲	
Phase Err:	0.08 deg		Ĭ	۲	۲	۲	۲	۲	۲	\odot	۲	~
	0.74 deg pk					۲	۲	۲	۲	۲	•	
	at carrier 1505			0	0	٢	0	0	0	0	0	
Freq Err:	0.10 Hz			۲	۲	۲		۲	۲	۲	۲	
Clock Err:	-0.01 Hz			\odot	۲	\odot	۲	۲	۲	\odot	\odot	
Tx Power:	0.92 dBm											

Document DVU-2100-Z7-S07-02

PART ORDERING MATRIX FOR OEM ADVANCED MODULATOR





Model: DVU 5000

Product Features

- Direct RF output from 470 to 860 MHz in 1 Hz steps
- Superior Shoulders and MER
- SFN and MFN Support
- Adaptive Non-linear Pre-corrector
- Manual Linear and Non-linear Digital Pre-correctors
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Interfaces for Web GUI, SNMP and Telnet remote control, machine to machine interface and software upgrades



New Features

DVB-T2, DVB-SHA/SHB

Supports all DVB-T2 modulation features including T2-MI interface support, single and multiple Physical Layer Pipes (PLPs), MFN/SFN operation and SISI/MISO transmission.

Supports all DVB-SHA/SHB modulation features for hybrid satellite/terrestrial broadcasting including SHA COFDM modulation and SHB Time-Division Multiplexing (TDM) as well as intra SHframe time-interleaver compensation to permit code combining at the receiver.

Standards Supported

- ATSC and ATSC-M/H compliant with A/53, A/54, A/64, A/110 and A/153
- CMMB compliant with GY/T 220.1-2006 and 220.2-2006
- DTMB compliant with GB20600-2006 and GY/T 229.1-2008
- DAB, DAB+ and T-DMB compliant with ETSI DAB standards and EU147
- DVB-SH(A) and DVB-SH(B) compliant with ETSI standards
- DVB-T/H compliant with ETSI standards
- DVB-T2 compliant with EN 302 755, TS 102 773 and TS 102 831
- ISDB-T/T^B compliant with ARIB STD-B31, ARIB STD-B10, ABNT NBR 15601:2007, SBTVD N01 and SBTVD N03

Optional Features

- Internal GPS or GPS/GLONASS Receiver
- Adaptive Linear and Non-linear Digital Pre-correctors
- 0 dBm to 10 dBm output
- DVB-SH Code Combing mode
- Optional RF Outputs: 30 MHz 1 GHz, 1452 1492 MHz, 1610 1675 MHz, 1980 2010 MHz, 2560 2690 MHz

Document 56803-UNIV-S07-21

Model: DVU 5000



Description and Application

Overview

The UBS Universal Modulator Series utilizes the innovative UBS Universal Waveform engine, supporting all world digital standards for terrestrial broadcasting, including hybrid satellite/terrestrial systems.

The modular, state of the art design allows transmitter manufacturers and network operators to integrate the DVU 5000 into a system/network with relative ease. This open architecture design enables carriers to take advantage of a proven, robust platform while designing networks to meet current and future broadcast standards.

The Universal Modulator can be factory configured with the necessary hardware to support one, two or all the waveforms listed above. The user can easily switch from one waveform to another through software selection. UBS' modulators can also be upgraded in the field as standards evolve.

Using the latest technology, UBS has developed a direct conversion process that allows the Universal Modulator to provide an RF output from 470 MHz to 860 MHz with superior shoulders and MER. A range of optional RF outputs including L-Band and S-Band frequencies are also available and suitable for a wide range of international frequency assignments for both terrestrial and satellite uplink systems.

This series incorporates all of UBS high performance signal processing stages including integrated linear and non-linear pre-correctors. Full remote management and control as well as remote firmware and waveform upgrades are provided.

Signal Inputs

The DVU 5000 is provided with two serial DVB-ASI inputs and two serial G.703/G.704 inputs. The DVB-ASI inputs accept a MPEG-2 TS, a CMMB multiplex stream, a T2-MI stream or an ISDB-T/TB multiplexed TS. The G.703/G.704 inputs are used in DAB mode and accept either NA or NI signals. Optionally, two serial SMPTE-310M inputs can be installed.

The DVU 5000 also support a GbE Transport Stream input based on Pro-MEG CoP #3 / SMPTE 2022 protocol (DAB excluded).

The DVB-ASI, G.703/G.704 and SMPTE-310M inputs can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary transport stream in case the primary transport stream source fails (a truly valuable feature for broadcast applications.)

RF Output

The standard RF output covers a frequency range of 470 to 860 MHz in 1 Hz steps. 30 MHz to 1 GHz as well as L-Band and S-Band frequencies are optional.

The output level is adjustable from -10 dBm to 0 dBm (0 dBm to 10 dBm optional), in 0.1 dB steps and the user can set the polarity of the spectrum to Inverted or Non-inverted as required.

The direct conversion process offers superior performance with Shoulder Levels \leq -55 dBc and MER \geq 45 dB.

Adaptive Non-linear Pre-corrector

The Adaptive Non-linear Pre-corrector is a superior pre-distortion solution that compensates for RF Power Amplifier non-linearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance.

The complex signal processing is done in the RF domain and supports a fully adaptive operation: the feedback signal (HPA output) is compared to the modulator's RF output signal (HPA input) in order to optimize the correction which will improve the shoulders of the RF output.

The Adaptive Non-Linear Pre-Corrector is not recommended for satellite uplink applications as it can only correct for the signal distortion from the ground-based transmitter and not the full signal path distortion. The Manual Pre-Corrector can be configured for the full system path.

Manual Linear and Non-linear Digital Pre-correctors

The manual linear and non-linear digital pre-correctors are used to maximize the performance of the transmitter in which the modulator is installed.

- The Non-linear pre-corrector balances out gain and phase non-linearity in the transmitter RF power amplifier, thereby significantly reducing the in-band and out of band intermodulation products. Optimizing the transmitter's performance will extend the coverage area. The performance requirement of the transmitter output filter, which is used to suppress radiation in adjacent channels below a maximum allowed level, will also be eased.
- The Linear pre-corrector balances out level and group delay variations that are seen across the channel bandwidth and caused by the transmitter mask filter and/or channel combiner filters. The linear optimization of the transmitter's radiated signal allows the receiver's channel equalizer to focus all of its correction capacity on level and group delay errors originating from the actual transmission path.



Model: DVU 5000

Description and Application

Web Interface

This feature allows remote control of the DVU 5000 via Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the modulator. The Web Interface concept is popular because remote control with this system only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

This feature allows remote control of the DVU 5000 in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Optionally, the DVU 5000 RS232 interface can be dedicated for communication with a 3rd party UPS. In this case, the modulator is configured with an extra set of SNMP parameters and will actively monitor the UPS.

Machine to Machine Interface

Depending on the waveform selected, the Universal Modulator RS232, RS485 or Ethernet ports can be used as a machine to machine interface. This is a valuable feature when control of an external power amplifier is required.

Internal GPS or GPS/GLONASS Receiver (optional)

The DVU 5000 can be equipped with an internal GPS or GPS/GLONASS receiver. In this case, the frequency references for the modulator and upconverter are derived from the internal GPS or GPS/GLONASS receiver.

Product Specifications | Signal Processing

FFT Mode	4K
Guard Interval	1/8
Code Rate (LDPC)	1/2, 3/4
Constellation	BPSK, QPSK, 16-QAM
Byte Interleave	Mode 1, Mode 2, Mode 3
Reed Solomon Coding	RS(240,240); RS(240, 224); RS(240,192); RS(240,176)
Scrambling Modes	0, 1, 2, 3, 4, 5, 6, 7
Number of Time Slots	40
Number of simultaneous multiplexed frames	40
Network Mode	SFN and MFN
Bandwidth	8 MHz
Transmission Time delay	Adjustable, range: ±500 ms, step 100 ns
Input	CMMB Multiplex Stream or GbE TS
Time Information Input	RS232 serial port for GPS TOD Information

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DTMB Mode

Bandwidth

Input

3780, Single Carrier
945, 595, 420 symbols
0.4, 0.6, 0.8
QPSK, 4QAM-NR, 16-QAM, 32-QAM, 64-QAM
500 us, 666.67 us or 571.43 us
1.5 kHz, 1.75 kHz, 2 kHz
240, 720 symbols
SFN and MFN
8 MHz, 7 MHz, 6 MHz
MPEG-2 Transport Stream or GbE TS

Model: DVU 5000



Product Specifications | Signal Processing

DVB-T/H Mode		ATSC Mode	
FFT Mode	2k, 4k, 8k	Supported Mode	8VSB, M/H
Guard Interval	1/4, 1/8, 1/16,1/32	Network Mode	SFN and MFN
Code Rate	1/2, 2/3, 3/4, 5/6, 7/8	Bandwidth	6 MHz
Constellation	QPSK, 16-QAM, 64-QAM	Input	MPEG-2 Transport Stream, SMPTE-310M or
Hierarchical Mode	Alpha - 1, 2 and 4 for 16-QAM and 64-QAM		Gbets
Network Mode	SFN and MFN		
Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz	ISDB-T/TB Mode	
Input	MPEG-2 Transport Stream or GbE TS	FFT Mode	2k, 4k, 8k
		Guard Interval	1/4, 1/8, 1/16,1/32
DVB-T2 Mode		Code Rate	1/2, 2/3, 3/4, 5/6, 7/8
FFT Mode	1k, 2k, 4k, 8k, Extended 8k, 16k,	Constellation	QPSK, 16-QAM, 64-QAM, DQPSK
	Extended 16k, 32k, Extended 32k	Hierarchical Mode	up to 3 layers
Guard Interval	1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4	Carrier Spacing	1 kHz, 2 kHz, 4 kHz
Code Rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6	Time Interleaver	0 to 16
PLP Constellation	QPSK, 16-QAM, 64-QAM, 256-QAM (normal or rotated)	Network Mode	Hierarchical, SFN (IIP packets) and MFN
L1 Post Constellation	BPSK, QPSK, 16-QAM, 64-QAM	Bandwidth	6 MHz
FEC	Short (16k), Normal (64k)	Input	ISDB-T/T₅ Multiplexed Transport Stream or GbE TS
Network Mode	MFN, SFN-SISO, SFN-MISO		GDE 13
Bandwidth	1.7 MHz, 5 MHz, 6 MHz, 7 MHz, 8 MHz,	DADMada	
	10 MHz	DAB Mode	
Time Interleaving	Adjustable	Transmission Mode	I, II, III, IV Automatically selected from the ETI stream
Pilot Pattern	PP1 to PP8		or set via any control interface
Input	T2-MI control Input steam monitoring	Processing Delay	Mode I: 156000 usec, Mode II: 84000 usec Mode III: 84000 usec, Mode IV: 108000 usec
	PCR restamping TS Bit Rate Adaptation	Transmitter Delay	Up to 2.4 sec, step 1 usec
	·	Transmitter Offset Delay	0 to 2047 usec, step 1 usec
DVB-SHA/SHB Mode		Network Padding Delay	0 to 1.5 second
Multiplexing Schemes	ofdm (A), tdm (B)	MNSC Control	Transmitter Identification Information (TII)
OFDM FFT Mode (A)	1k, 2k, 4k, 8k	Input Signal	ETI (NI) 2.048 MHz short haul or ETI (NA) for E1 interface - ETSI 300 799
Guard Interval (A)	1/4, 1/8, 1/16,1/32	Input Selection	Dual NA with seamless switchover
Code Rate (A)	1/2, 1/3, 1/4, 1/5, 2/3, 2/5, 2/7, 2/9		NI or NA with automatic detection
Constellation (A)	QPSK, 16-QAM	Input Error Condition	Manual lock to input 1 or 2 Input CRC violations (User selectable)
Network Mode (A)	SFN and MFN	Test Mode	DAB mode I. II. III. IV. CW mode. Two tone.

DAB mode I, II, III, IV, CW mode, Two tone, 24-tone, 48 tone, 96 tone comb

TDM Mapping (B)

Turbo Code (A & B)

Bandwidth (A & B)

Input (A & B)

TDM Roll-off Factor (B)

Time Interleaver (A & B)

QPSK, 8-PSK, 16-APSK

8 MHz, 7 MHz, 6 MHz, 5 MHz, 1.7 MHz

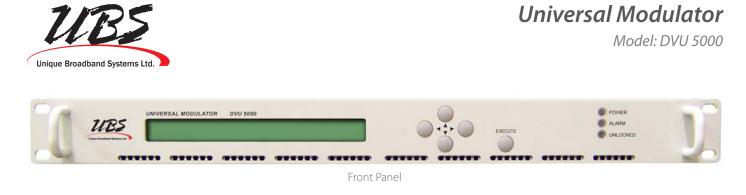
MPEG-2 Transport Stream or GbE TS

From 100 ms to several seconds

0.15, 0.25, 0.35

3GPP2 encoding

(specifications are subject to change without notice)



Product Specifications

Impedance: 50 Ω

Inputs			Control Interfaces			
DVB-ASI	IN-A, IN-B	2 inputs: BNC (F), 75 Ω	Front Panel	LCD display and cursor/ execute keys		
G.703/G.704	IN-A, IN-B	2 inputs: BNC (F), 50 Ω	Ethernet Interface	Connector: 2x RJ45		
SMPTE-310M	IN-A, IN-B	2 inputs (optional): BNC (F), 75 Ω		Speed: 10/100/1000 Base-T		
GbE Transport S	tream	Protocol: Pro-MPEG CoP #3 /	USB Interface	Connector: USB Type B		
(DAB excluded)		SMPTE 2022 Connector: RJ45	RS232 Interface	Connector: 9-pin SUB-D Male Serial port for GPS TOD information		
HPA FB		SMA (F), 50 Ω		(CMMB mode only)		
Clock Reference - 10 MHz		Connector: BNC (F), 50 Ω	RS485 Interface	Connector: 9-pin SUB-D Female		
		Frequency: 10 MHz Level: 0 dBm to 15 dBm	CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)		
Time Reference - 1 PPS		Connector: BNC (F), 50 Ω Frequency: 1 PPS	Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet		
		Level: TTL Trigger: Positive transition	SNMP Control Interface	Connector: Ethernet Note: MIBs are provided		
Time Information Input		Connector: RS232 Interface for GPS TOD information (CMMB mode only)	Alarm Relays	Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm.		
Monitoring C	Dutputs		Machine to Machine	Connector: Ethernet for all waveforms		
DVB-ASI	OUT-A, OUT-B	2 outputs: BNC (F) 75 Ω	Interface	or RS485 for all waveforms or RS232 for all waveforms		
G.703/G.704 (OUT-A, OUT-B	2 outputs: BNC (F), 50 Ω		except CMMB		
RF Monitor		Connector: SMA (F) Impedance: 50 Ω Level: 30 dB below RF output				
Reference Monit	tor	Connector: BNC (F) Frequency: 10 MHz Level: 2 Vpp				

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Model: DVU 5000





Rear Panel

* Agilent 11:09:18 Feb 3, 2010

Product Specifications

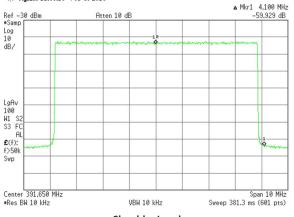
RF Output

Connector	N-type (F), 50 Ω			
Frequency Range	470 MHz - 860 MHz 30 MHz - 1 GHz (optional) 1452 MHz - 1492 MHz (optional) 1610 MHz - 1675 MHz (optional) 1980 MHz - 2010 MHz (optional) 2560 MHz - 2690 MHz (optional)			
Frequency Step Size	1 Hz			
Frequency Stability	Internal reference 0.05ppm / or in accordance with external ref. accuracy			
Spectrum Polarity	Inverted or non-inverted, selectable			
Level	-10 dBm to 0 dBm in 0.1 dB step (optional 0 dBm to 10 dBm)			
Level Stability	± 0.3 dB			
Return Loss	> 20 dB			
Shoulder Level	≤ -55 dBc (Note 2)			
Spurious Level Outside Channel	< -60 dBm			
MER	≥ 45 dB (Note 3) ≥ 42 dB (DVB-T2)			
Amplitude Flatness	Center frequency ±3.8 MHz: ±0.3 dB (Note 4)			
Group delay response:	Center frequency ±3.8 MHz: ±10 ns (Note 4)			
Phase Noise SSB (measured @ 474 MHz)	10 Hz: < -60 dBc/Hz 100 Hz: < -85 dBc/Hz 1 kHz: < -100 dBc/Hz 10 kHz: < -105 dBc/Hz 100 kHz: < -120 dBc/Hz 1 MHz: < -135 dBc/Hz			
DAB Output Spectrum Mask	Compliant with ETS 300 401			

Note 2: Shoulder measurements were performed with Agilent E4443A PSA Series Spectrum Analyzer.

Note 3: MER measurements were performed on a DVB-T waveform with an Agilent E4443A PSA Series Spectrum Analyzer in conjunction with Agilent E9285B Digital Video Analysis Modulation software.

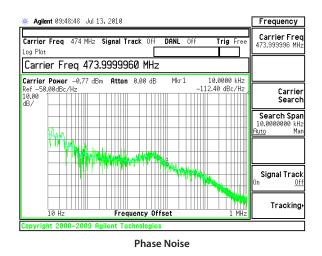
Note 4: Levels are measured in 10 kHz bandwidth, where 0 dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.



Shoulder Level

D: Symbols/Metric							
MER: -53.294 dB EVM: 0.21642 %rms							
Frequency Error: -13.342 Hz							
RMS Mag Error: 0.158 %rms Peak Mag Error: 0.761 %							
RMS Phase Error: 0.109 degrms Peak Phase Error: 0.576 deg							
IQ Gain Imb: 0.00	125 dB IQ Quad Ske	w: 0.039 deg					
0	00060000	070A0203	0306010C				
12	0E020601	06010409	0B0D0C0E				
24	0D0D0301	040F000B	0002 01 0A				
36	030F0C00	0E0B010D	0B0C010B				
48	000E0000	020E0000	0A0A0D01				
60	08060101	0001080D	0E0A0900				

MER



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(specifications are subject to change without notice)



Model: DVU 5000

Product Specifications

Adaptive Non-linear Pre-correction **Power Supply HPA FB Connector** To be coupled from the PA output when 100 - 240 VAC Voltage the Adaptive Pre-corrector is used 50 - 60 Hz Frequency Level -15 dBm to 0 dBm **Power Consumption** max. 45 VA (70 VA with +10 dBm RF 470 MHz to 860 MHz Frequency amplifier and GPS receiver installed) Spectral Regrowth 7 dB ±2 dB (Note 4) Harmonic Correction EN61000-3-2 Reduction Environmental **Manual Digital Pre-Correction** 0°C to +50°C (+32°F to +122°F) **Operating Temperature** Non-Linear Pre-Correction Storage Temperature -30°C to +70°C (-22°F to +158°F) **Curve Formats** S 21 and VO/VI **Relative Humidity** max. 95% (operating/storage) **Amplitude Scale** Linear and Logarithmic Temperature controlled fan to assist natural Cooling **Correction Points** Max. 256, user-defined position convection Spectral Regrowth Max. 12 dB, subject to available headroom Reduction Mechanical Phase Correction -6 to +30 degrees, subject to available headroom Size 1 U of 19" wide cabinet Linear Pre-Correction Dimension (W x H x D) 483mm x 44mm x 521mm (19" x 1.75" x 20.5") **Correction Points** 61 6 kg (13 lbs) Weight 1/60 of nominal spectrum BW Point Spacing Vibration acc. to IEC Publ.68 **Transport and Storage Amplitude Correction** ±10 dB 0.01 dB **Amplitude Resolution ETSI Compliance Group Delay Correction** ±2000 ns **Essential Requirement** Standard / Specification **Group Delay Resolution** 1 ns R&TTE Directive 1995/5/EC Peak Power Clip Level +17 dB to +7 dB EN 60950-1: 2001, A11: 2004 First Edition Safety (peak power relative to average RMS level) Health Not Applicable. No Antenna EN 301 489-1 V1.8.1 EMC Note 5: Greater improvement is possible under particular applications. Performance

Note 5: Greater improvement is possible under particular applications. Performance depends upon power level and waveform.

EN 302 296 V1.1.1 (The technical requirement of Clause 4.3 was substituted for Clause 8.2 of EN 301 489-1 using the Class A limits specified in Table 4.)

CE Compliance This equipment is CE Compliant.

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Radio





Models: DVU 2001 and DVU 2002 (Board versions) DVU 2010 and DVU 2025 (Enclosed versions)

Product Features

- Direct RF output from 470 MHz to 860 MHz in 1 Hz steps (30 MHz to 1 GHz optional)
- Superior Shoulders and MER
- SFN and MFN Support
- Adaptive Non-linear Pre-corrector
- Manual Linear and Non-linear Digital Pre-correction
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Interfaces for Web GUI, SNMP and Telnet remote control, machine to machine interface and software upgrades
- Available in both enclosed and board version

New Features

DVB-T2, DVB-SHA/SHB and Optional GPS Receiver

Supports all DVB-T2 modulation features including T2-MI interface support, single and multiple Physical Layer Pipes (PLPs), MFN/SFN operation and SISI/MISO transmission.

Supports all DVB-SHA/SHB modulation features for hybrid satellite/terrestrial broadcasting including SHA COFDM modulation and SHB Time-Division Multiplexing (TDM) as well as intra SHframe time-interleaver compensation to permit code combining at the receiver.

The modulator can be equipped with an on-board GPS receiver which provides 10 MHz and 1PPS reference signals.

Standards Supported

- ATSC and ATSC-M/H compliant with A/53, A/54, A/64, A/110 and A/153
- CMMB compliant with GY/T 220.1-2006 and 220.2-2006
- DTMB compliant with GB20600-2006 and GY/T 229.1-2008
- DAB, DAB+ and T-DMB compliant with ETSI DAB standards and EU147
- DVB-T/H and DVB-T2 compliant with ETSI standards
- DVB-SH(A) and DVB-SH(B) compliant with ETSI standards
- ISDB-T/T^B compliant with ARIB STD-B31, ARIB STD-B10, ABNT NBR 15601:2007, SBTVD N01 and SBTVD N03



DVU 2001



DVU 2002



DVU 2010



DVU 2025

Models: DVU 2001 and DVU 2002 (Board versions) DVU 2010 and DVU 2025 (Enclosed versions)



Description and Application

Overview

The UBS Universal Modulator Series utilizes the innovative UBS Universal Waveform engine, supporting all world digital standards for terrestrial broadcasting, including hybrid satellite/terrestrial systems.

The modular, state of the art design allows transmitter manufacturers and network operators to integrate the modulator into a system/network with relative ease. This open architecture design enables carriers to take advantage of a proven, robust platform while designing networks to meet current and future broadcast standards.

The Universal Modulator can be factory configured with the necessary hardware to support one, two or all the waveforms listed above. The user can easily switch from one waveform to another through software selection. UBS' modulators can also be upgraded in the field as standards evolve.

Using the latest technology, UBS has developed a direct conversion process that allows the Universal Modulator to provide an RF output from 470 MHz to 860 MHz with superior shoulders and MER. A range of optional RF outputs including 30 MHz to 1 GHz are also available.

This series incorporates all of UBS high performance signal processing stages including integrated linear and non-linear pre-correctors. Full remote management and control as well as remote firmware and waveform upgrades are provided.

Signal Inputs

The OEM Modulators are provided with two serial DVB-ASI inputs and two serial G.703/G.704 inputs. The DVB-ASI inputs accept a MPEG-2 TS, a CMMB multiplex stream, a T2-MI stream or an ISDB-T/TB multiplexed TS. The G.703/G.704 inputs are used in DAB mode and accept either NA or NI signals.

The OEM Modulators also support a GbE Transport Stream input based on Pro-MEG CoP #3 / SMPTE 2022 protocol (DAB excluded).

The DVB-ASI and G.703/G.704 inputs can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary transport stream in case the primary transport stream source fails (a truly valuable feature for broadcast applications.)

RF Output

The standard RF output covers a frequency range of 470 MHz to 860 MHz in 1 Hz steps. 30 MHz to 1 GHz RF output is also available.

The output level is adjustable from -10 dBm to 0 dBm in 0.1 dB steps and the user can set the polarity of the spectrum to Inverted or Non-inverted as required.

The direct conversion process offers superior performance with Shoulder Levels \leq -55 dBc and MER \geq 45 dB.

Adaptive Non-linear Pre-corrector

The Adaptive Non-linear Pre-corrector is a superior pre-distortion solution that compensates for RF Power Amplifier non-linearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance.

The complex signal processing is done in the RF domain and supports a fully adaptive operation: the feedback signal (HPA output) is compared to the modulator's RF output signal (HPA input) in order to optimize the correction which will improve the shoulders of the RF output.

The Adaptive Non-Linear Pre-Corrector is not recommended for satellite uplink applications as it can only correct for the signal distortion from the ground-based transmitter and not the full signal path distortion. The Manual Pre-Corrector can be configured for the full system path.

Manual Digital Linear and Non-linear Pre-corrector

The digital linear and non-linear pre-correctors are used to maximize the performance of the transmitter in which the modulator is installed.

- The Non-linear pre-corrector balances out gain and phase non-linearity in the transmitter RF power amplifier, thereby significantly reducing the in-band and out of band intermodulation products. Optimizing the transmitter's performance will extend the coverage area. The performance requirement of the transmitter output filter, which is used to suppress radiation in adjacent channels below a maximum allowed level, will also be eased.
- The Linear pre-corrector balances out level and group delay variations that are seen across the channel bandwidth and caused by the transmitter mask filter and/or channel combiner filters. The linear optimization of the transmitter's radiated signal allows the receiver's channel equalizer to focus all of its correction capacity on level and group delay errors originating from the actual transmission path.



Models: DVU 2001 and DVU 2002 (Board versions) DVU 2010 and DVU 2025 (Enclosed versions)

Description and Application

Web Interface

This feature allows remote control of the OEM Modulator via an Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the modulator. The Web Interface concept only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

This feature allows remote control of the OEM Modulator in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Machine to Machine Interface

Depending on the waveform selected, the modulator RS232, RS485 or Ethernet ports can be used as a machine to machine interface. This is a valuable feature when control of an external power amplifier is required.

Product Specifications | Signal Processing

ATSC Mode		DTMB Mode	
Supported Mode	8VSB, M/H	FFT Mode	3780, Single Carrier
Network Mode	SFN and MFN	Guard Interval	945, 595, 420 symbols
Bandwidth	6 MHz	Code Rate	0.4, 0.6, 0.8
Input	MPEG-2 Transport Stream, SMPTE-310M or	Constellation	QPSK, 4QAM-NR, 16-QAM, 32-QAM, 64-QAM
	GbETS	Frame Duration	500 us, 666.67 us or 571.43 us
		Sub-carrier Spacing	1.5 kHz, 1.75 kHz, 2 kHz
CMMB Mode		Time Interleaver	240, 720 symbols
FFT Mode	4K	Network Mode	SFN and MFN
Guard Interval	1/8	Bandwidth	8 MHz, 7 MHz, 6 MHz
Code Rate (LDPC)	1/2, 3/4	Input	MPEG-2 Transport Stream or GbE TS
Constellation	BPSK, QPSK, 16-QAM		
Byte Interleave	Mode 1, Mode 2, Mode 3	ISDB-T/TB Mode	
Reed Solomon Coding	RS(240,240); RS(240, 224); RS(240,192);	FFT Mode	2k, 4k, 8k
	RS(240,176)	Guard Interval	1/4, 1/8, 1/16,1/32
Scrambling Modes	0, 1, 2, 3, 4, 5, 6, 7	Code Rate	1/2, 2/3, 3/4, 5/6, 7/8
Number of Time Slots	40	Constellation	QPSK, 16-QAM, 64-QAM, DQPSK
Number of simultaneous multiplexed frames	40	Hierarchical Mode	up to 3 layers
Network Mode	SEN and MEN	Carrier Spacing	1 kHz, 2 kHz, 4 kHz
		Time Interleaver	0 to 16
Bandwidth	8 MHz	Network Mode	Hierarchical, SFN (IIP packets) and MFN
Transmission Time delay	Adjustable, range: ±500 ms, step 100 ns	Bandwidth	6 MHz
Input	CMMB Multiplex Stream or GbETS	Input	ISDB-T/TB Multiplexed Transport Stream or
Time Information Input	RS232 serial port for GPS TOD Information	mput	GbE TS

Models: DVU 2001 and DVU 2002 (Board versions) DVU 2010 and DVU 2025 (Enclosed versions)



Product Specifications | Signal Processing

DVB-T/H Mode

FFT Mode Guard Interval Code Rate Constellation Hierarchical Mode Network Mode Bandwidth Input

DVB-T2 Mode

FFT Mode

Guard Interval Code Rate PLP Constellation

L1 Post Constellation FEC Network Mode Bandwidth

Time Interleaving Pilot Pattern Input 2k, 4k, 8k 1/4, 1/8, 1/16,1/32 1/2, 2/3, 3/4, 5/6, 7/8 QPSK, 16-QAM, 64-QAM Alpha - 1, 2 and 4 for 16-QAM and 64-QAM SFN and MFN 8 MHz, 7 MHz, 6 MHz, 5 MHz MPEG-2 Transport Stream or GbE TS

1k, 2k, 4k, 8k, Extended 8k, 16k, Extended 16k, 32k, Extended 32k

QPSK, 16-QAM, 64-QAM, 256-QAM

1.7 MHz, 5 MHz, 6 MHz, 7 MHz, 8 MHz,

BPSK, QPSK, 16-QAM, 64-QAM

Short (16k), Normal (64k) MFN, SFN-SISO, SFN-MISO

1/2, 3/5, 2/3, 3/4, 4/5, 5/6

(normal or rotated)

10 MHz

Adjustable

PP1 to PP8

T2-MI control Input steam monitoring PCR restamping TS Bit Rate Adaptation

1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4

DVB-SHA/SHB Mode

	Multiplexing Schemes	OFDM (A), TDM (B)
	OFDM FFT Mode (A)	1k, 2k, 4k, 8k
	Guard Interval (A)	1/4, 1/8, 1/16,1/32
	Code Rate (A)	1/2, 1/3, 1/4, 1/5, 2/3, 2/5, 2/7, 2/9
1	Constellation (A)	QPSK, 16-QAM
	Network Mode (A)	SFN and MFN
	TDM Mapping (B)	QPSK, 8-PSK, 16-APSK
	TDM Roll-off Factor (B)	0.15, 0.25, 0.35
	Turbo Code (A & B)	3GPP2 encoding
	Bandwidth (A & B)	8 MHz, 7 MHz, 6 MHz, 5 MHz, 1.7 MHz
	Time Interleaver (A & B)	From 100 ms to several seconds
	Input (A & B)	MPEG-2 Transport Stream or GbE TS
	DAB Mode	
	Transmission Mode	I, II, III, IV Automatically selected from the ETI stream or set via any control interface
	Processing Delay	Mode I: 156000 usec, Mode II: 84000 usec Mode III: 84000 usec, Mode IV: 108000 usec
	Transmitter Delay	Up to 2.4 sec, step 1 usec
	Transmitter Offset Delay	0 to 2047 usec, step 1 usec
	Network Padding Delay	0 to 1.5 second
	MNSC Control	Transmitter Identification Information (TII)
	Input Signal	ETI (NI) 2.048 MHz short haul or ETI (NA) for E1 interface - ETSI 300 799
	Input Selection	Dual NA with seamless switchover NI or NA with automatic detection Manual lock to input 1 or 2
	Input Error Condition	Input CRC violations (User selectable)
	Test Mode	DAB mode I, II, III, IV, CW mode, Two tone, 24-tone, 48 tone, 96 tone comb

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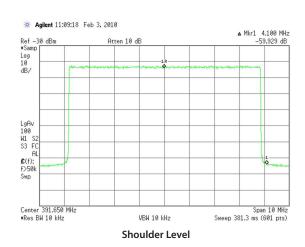


Product Specifications

Inputs			
DVB-ASI	IN-A, IN-B	DVU 2001/2025: BNC (F), 75 Ω DVU 2002/2010: SMA (F), 50 Ω	
G.703/G.704	IN-A, IN-B	DVU 2001/2025: BNC (F), 50 Ω DVU 2002/2010: SMA (F), 50 Ω	
GbE Transport Stre (DAB excluded)	am	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45	
GPS Input		DVU 2001/2002: MCX, 50 Ω DVU 2010/2025: SMA (F), 50 Ω	
HPA FB		DVU 2001/2002: MCX, 50 Ω DVU 2010/2025: SMA (F), 50 Ω	
Clock Reference - 1 (Note 4)	0 MHz	DVU 2001/2025: BNC (F), 50 Ω DVU 2002/2010: SMA (F), 50 Ω Level: 0 dBm to 15 dBm	
Time Reference - 1 (Note 4)	PPS	DVU 2001/2025: BNC (F), 50 Ω DVU 2002/2010: SMA (F), 50 Ω Level: TTL Trigger: Positive transition	
RF Output			
Connector		DVU 2001/2002: SMA (F), 50 Ω or N-type (F), 50 Ω	
		DVU 2010: SMA (F), 50 Ω DVU 2025: N-type (F), 50 Ω	
Frequency Range		470 MHz - 860 MHz 30 MHz - 1 GHz (optional)	
Frequency Step Siz	e	1 Hz	
Frequency Stability	/	Internal reference 0.05ppm / or in accordance with external ref. accuracy	
Spectrum Polarity		Inverted or non-inverted, selectable	
Level		-10 dBm to 0 dBm in 0.1 dB step	
Level Stability		± 0.3 dB	
Return Loss		> 26 dB	
Shoulder Level		≤ -55 dBc (Note 1)	
Spurious Level Out Channel	side	< -60 dBm	
MER		≥ 45 dB (Note 2) ≥ 42 dB (DVB-T2)	
Amplitude Flatness	5	Center frequency ±3.8 MHz: ±0.3 dB (Note 3)	
Group Delay respo	nse	Center frequency ±3.8 MHz: ±10 ns (Note 3)	
Phase Noise SSB (measured @ 474 Mł	Hz)	10 Hz: < -60 dBc/Hz 100 Hz: < -85 dBc/Hz 1 kHz: < -100 dBc/Hz 10 kHz: < -105 dBc/Hz 100 kHz: < -120 dBc/Hz 1 MHz: < -135 dBc/Hz	

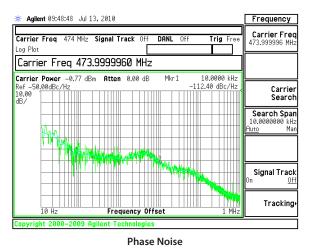
Models: DVU 2001 and DVU 2002 (Board versions) DVU 2010 and DVU 2025 (Enclosed versions)

OEM Universal Modulator



D: Symbols/Metrics MER: -53.294 dB EVM: 0.21642 %rms Frequency Error: -13.342 Hz RMS Mag Error: 0.158 %rms - Peak Mag Error: 0.761 % RMS Phase Error: 0.109 degrms - Peak Phase Error: 0.576 deg IQ Gain Imb: 0.00125 dB - IQ Quad Skew: 0.039 deg 0 00060000 0306010C 0B0D0C0 12 0E020601 24 36 0002010A 1301 C00 48 000E0000 020E0000 0E0A0900 60 08060101





Note 1: Shoulder measurements were performed with Agilent E4443A PSA Series Spectrum Analyzer.

Note 2: MER measurements were performed on a DVB-T waveform with an Agilent E4443A PSA Series Spectrum Analyzer in conjunction with Agilent E9285B Digital Video Analysis Modulation software.

Note 3: Levels are measured in 10 kHz bandwidth, where 0 dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.

Models: DVU 2001 and DVU 2002 (Board versions) DVU 2010 and DVU 2025 (Enclosed versions)



Product Specifications

Monitoring Outputs		Manual Digital Pre-Correction	
DVB-ASI OUT-A, OUT-I	B DVU 2001/2025: BNC (F), 75 Ω DVU 2002/2010: SMA (F), 50 Ω	Non-Linear Pre-Correction	
G.703/G.704 OUT-A, OUT-E		Curve Formats	S 21 and VO/VI
	DVU 2002/2010: SMA (F), 50 Ω	Amplitude Scale	Linear and Logarithmic
RF Monitor	DVU 2001/2002: MCX, 50 Ω or	Correction Points	Max. 256, user-defined position
	SMA (F), 50 Ω DVU 2010/2025: SMA (F), 50 Ω	Gain Correction	Max. 12 dB, subject to available headroom
	Level: 30 dB below RF output	Phase Correction	-6 to +30 degrees, subject to available headroom
Clock Reference - 10 MHz (Note 4)	DVU 2001/2025: BNC (F) DVU 2002/2010: SMA (F)	Linear Pre-Correction	
(1000 4)	Impedance: High Frequency: 10 MHz	Correction Points	61
		Point Spacing	1/60 of nominal spectrum BW
Time Defense 4 DDC	Level: 10 dBm, \pm 2.5 dB sinewave	Amplitude Correction	±10 dB
Time Reference - 1 PPS (Note 4)	DVU 2001/2025: BNC (F) DVU 2002/2010: SMA (F)	Amplitude Resolution	0.01 dB
	Impedance: High	Group Delay Correction	±2000 ns
	Frequency: 1 PPS Level: TTL	Group Delay Resolution	1 ns
	Trigger: Positive transition	Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)
Control Interfaces			
Ethernet Interface	Connector: 2x RJ45 (DVU 2001/2002/2010)	Adaptive Non-linear Pre-correction	
	1x RJ45 (DVU 2025) Speed: 10/100/1000 Base-T	HPA FB Connector	To be coupled from the PA output when the Adaptive Pre-corrector is used
USB Interface	Connector: USB Type B	Level	-15 dBm to 0 dBm
RS232 Interface	Connector: 9-pin SUB-D Male Serial port for GPS TOD information (CMMB mode only)	Frequency	470 MHz to 860 MHz
		Spectral Regrowth Reduction	7 dB ±2 dB (Note 5)
RS485 Interface	Connector: 9-pin SUB-D Female (DVU 2001, 2002 & 2025 only)		
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)		
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet		
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided		
Alarm Relays	Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm.	Note 4 The #10MIL=#are d#1 are # area	
Machine to Machine Interface	Connector: Ethernet for all waveforms or RS485 for all waveforms or RS232 for all waveforms event CMMB	an on-board GPS receivers, where the	inputs, except when the modulator is equipped with y become Monitoring Outputs (high impedance). possible under particular applications. Performance

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depends upon power level and waveform.

except CMMB



Models: DVU 2001 and DVU 2002 (Board versions) DVU 2010 and DVU 2025 (Enclosed versions)

Product Specifications

Power Supply

Voltage	12 VDC
Power Consumption	max. 40 Watts (with GPS reciever)
DVU 2001/2002 Connector	6 Pin Header
DVU 2010 Connector	DC Jack, 2.1mm ID, 5.3mm OD
DVU 2025 Connector	6 Pin Header

Mechanical

DVU 2001 Dimensions (BNC) (W x H x D)
DVU 2002 Dimensions (SMA) (W x H x D)
DVU 2001/2002 Weight
DVU 2010 Dimensions (W x H x D)
DVU 2010 Weight
DVU 2025 Dimensions (W x H x D)
DVU 2025 Weight

Environmental

Operating Temperature		
Storage Temperature		
Relative Humidity		
Cooling		

258.4mm x 38mm x 175mm (10.173" x 1.5" x 6.891") 258.4mm x 19.9mm x 175mm (10.173" x 0.783" x 6.891") 0.25kg (0.5 lbs.) 269.6mm x 29.5mm x 221mm (10.613" x 1.162" x 8.7") 1 kg (2.2 lbs.) 308.457mm x 40.894mm x 191.262mm (12.144" x 1.61" x 7.53") 1 kg (2.2 lbs.)

0°C to +50°C (+32°F to +122°F) -30°C to +70°C (-22°F to +158°F) max. 95% Temperature controlled fan to assist natural convection (DVU 2010 and DVU 2025 only)



DVB-S2 Modulator

Model: DVU 5000

Product Features

- DVB-S2 compliant with EN 302 307
- 50 MHz to 180 MHz IF Output
- Supports QPSK, 8PSK, 16APSK and 32APSK constellations
- Superior MER performance
- WEB GUI, SNMP, Telnet remote control and software upgrade



Optional Features

- L-Band output from 950 MHz to 2150 MHz
- Internal Power Amplifier with 0 dBm to +10 dBm output

Description and Application

Overview

The DVU 5000 DVB-S2 modulator utilizes the innovative UBS Universal Waveform engine, supporting all world standards for satellite, mobile and terrestrial digital broadcasts.

This open architecture design enables carriers to take advantage of a proven, robust platform, while designing networks to meet current and future broadcast standards.

This series incorporates all of UBS high performance signal processing stages including integrated linear and non-linear pre-correctors. Full remote management and control as well as remote firmware and waveform upgrades are provided.

Application

The core function of the DVU 5000 is to modulate a MPEG-2 transport stream (ASI input) onto a DVB-S2 compliant spectrum (output) in accordance with the rules for channel coding and modulation specified in the DVB-S2 standard EN 302 307.

RF Output

Using the latest technology, UBS has developed a direct conversion process that allows the modulator to provide an IF output from 50 MHz to 180 MHz, with superior shoulder and MER. Optionally, the modulator can be configured with an L-Band output from 950 MHz to 2150 MHz.

The output level is adjustable from -10 dBm to 0 dBm (optionally from 0 to +10 dBm) with a step size of 0.1 dB. The user can set the polarity of the spectrum to Inverted or Non-inverted as required.

DVB-S2 Modulator

Model: DVU 5000





Fig.1 - Front Panel

Product Specifications

Signal Processing		IF/RF Output	
Modes	CCM (Constant Coding and Modulation)	Connector	N-type (F), 50 Ω
Constellations	VCM (Variable Coding and Modulation) QPSK, 8PSK, 16APSK, 32APSK	Frequency	50 MHz to 180 MHz, 1 Hz step (optional 950 MHz to 2150 MHz, 1 Hz step)
FEC	BCH (inner), LDPC (outer)	Frequency Stability	Internal reference 0.05ppm / or in accordance with external ref. accuracy
	5/6, 8/9, 9/10 8PSK - 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 16APSK - 2/3, 3/4, 4/5, 5/6, 8/9, 9/10	Spectrum Polarity	Inverted or non-inverted, selectable
Code Rates		Level	-10 dBm to 0 dBm in 0.1 dB step (optional 0 to 10 dBm)
		Level Stability	± 0.3 dB
		Return Loss	> 20 dB
Dilata	32APSK - 3/4, 4/5, 5/6, 8/9, 9/10	Shoulder Level	< -55 dBc
Pilots Roll-off	ON or OFF 35%, 25%, 20%	Spurious Level Outside Channel	< -60 dBm
Symbol Rate	Up to 37.5 Mbaud, step 1 baud	MER	≥ 45 dB
		Amplitude Flatness	±0.5 dB
Inputs		Group delay response	±10 ns
MPEG-2 Transport Stream	2 DVB-ASI inputs: BNC (F), 75 Ω	Phase Noise SSB	100 Hz: < -85 dBc/Hz
Clock Reference - 10 MHz	Connector: BNC (F) Frequency: 10 MHz Level: 100 mV - 3 Vpp Impedance: 50 Ω or High Impedance (user selectable)	(measured @ 474 MHz)	1 kHz: < -90 dBc/Hz 10 kHz: <-105 dBc/Hz 100 kHz: <-120 dBc/Hz 1 MHz: <-135 dBc/Hz
Monitoring Outputs			

Monitoring Outputs

DVB-ASI	OUT-A, OUT-B	2 DVB-ASI outputs: BNC (F) 75 Ω
RF Monitor		Connector: BNC (F) Impedance: 50 Ω Level: 30 dB below RF output
Reference Mor	hitor	Connector: BNC (F) Frequency: 10 MHz Level: 2 Vpp Impedance: 50 Ω

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Model: DVU 5000



Fig.2 - Rear Panel

Product Specifications

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Control Interfaces		Power Supply	
Front Panel Interface	LCD display and cursor/ execute keys	Voltage	100 - 240 VAC
Ethernet Interface	Connector: 2x RJ45	Frequency	50 - 60 Hz
USB Interface	Speed: 10/100/1000 Base-T Connector: USB Type B	Power Consumption	max. 45 VA (70 VA with +10 dBm RF amplifier installed)
RS232 Interface	Connector: 9-pin SUB-D Male	Harmonic Correction	EN61000-3-2
RS485 Interface	Connector: 9-pin SUB-D Female		
CLI	Connector: USB (HyperTerminal) or	Environmental	
(Command Line Interface)	Ethernet (HyperTerminal and Telnet)	Operating Temperature	0°C to +50°C (+32°F to +122°F)
Web Interface	Internet Explorer, FireFox, etc. Connector: Ethernet	Storage Temperature	-30°C to +70°C (-22°F to +158°F)
SNMP Control Interface	Connector: Ethernet Note: MIBs can be provided	Relative Humidity (operating/storage)	max. 95%
Alarm Polayc	Connector: RS232 or RS485	Cooling	Internal fans to assist natural convection
Alarm Relays	2 Dry Contact Alarm relays triggered by any major alarm	Mechanical	
RS485 Interface	Connector: 9-pin SUB-D Female	Size	1 U of 19" wide cabinet
		Dimension (W x H x D)	483mm x 44mm x 521mm (19" x 1.75" x 20.5")
		Weight	6 kg (13 lbs)

ETSI Compliance

Transport and Storage

Safety Health

EMC

Radio

Essential Requirement Standard / Specification R&TTE Directive 1995/5/EC EN 60950-1: 2001, A11: 2004 First Edition Not Applicable. No Antenna

Vibration acc. to IEC Publ.68

EN 301 489-1 V1.8.1 EN 302 296 V1.1.1 (The technical requirement of Clause 4.3 was substituted for Clause 8.2 of EN 301 489-1 using the Class A limits specified in Table 4.)

CE Compliance

This equipment is CE Compliant.

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(specifications are subject to change without notice)



DVB-T2 Modulator

Model: DVU 5000

Product Features

- Direct RF output from 470 MHz to 860 MHz in 1 Hz steps
- Superior Shoulders and MER
- Single and multiple PLP(s)
- MFN and SFN (with full T2-MI support) operation
- SISO/MISO transmission
- Adaptive Non-linear Pre-corrector
- Manual Linear and Non-linear Digital Pre-correctors
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Interfaces for Web GUI, SNMP and Telnet remote control, machine to machine interface and software upgrades
- DVB-T2 compliant with EN 302 755, TS 102 773 and TS 102 831



Optional Features

- Internal GPS or GPS/GLONASS Receiver
- 0 dBm to 10 dBm output
- 30 MHz to 1 GHz output

Description and Application

Overview

The DVU 5000 DVB-T2 modulator utilizes the innovative UBS Universal Waveform engine, supporting all world standards for mobile and terrestrial digital broadcasts.

The modular, state of the art design allows transmitter manufacturers and network operators to integrate the DVU 5000 into their system/net-work with relative ease.

The DVU 5000 supports all DVB-T2 modulation features including T2-MI interface support, single and multiple Physical Layer Pipes (PLPs), MFN/ SFN operation, and SISO/MISO transmission.

Using the latest technology, UBS has developed a direct conversion process that allows the OEM Universal Modulator to provide an RF output from 470 MHz to 860 MHz with superior shoulders and MER.

This DVU 5000 also incorporates UBS' Adaptive Non-linear Pre-corrector and Manual Linear and Non-linear Digital pre-correctors. Full remote management and control as well as remote firmware upgrades are provided.

Signal Inputs

The DVU 5000 is provided with two serial DVB-ASI / T2-MI inputs, which can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary transport stream in case the primary transport stream source fails.

The DVU 5000 also support a GbE Transport Stream input based on Pro-MEG CoP #3 / SMPTE 2022 protocol.

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DVB-T2 Modulator

Model: DVU 5000

Unique Broadband Systems Ltd.

Description and Application

RF Output

The RF output covers a frequency range of 470 MHz to 860 MHz with superior Shoulder Levels and MER performance.

The output level is adjustable from -10 dBm to 0 dBm (0 dBm to 10 dBm optional), in 0.1 dB steps.

Adaptive Non-linear Pre-corrector

The Adaptive Non-linear Pre-corrector is a superior pre-distortion solution that compensates for RF Power Amplifier non-linearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance.

The complex signal processing is done in the RF domain and supports a fully adaptive operation: the feedback signal (HPA output) is compared to the modulator's RF output signal (HPA input) in order to optimize the correction which will improve the shoulders of the RF output.

Note: The Adaptive Non-linear Pre-corrector is a standard feature on the DVU 5000. The customer has the option to have this feature removed if desired.

Manual Linear and Non-linear Digital Pre-correctors

The manual linear and non-linear digital pre-correctors are used to maximize the performance of the transmitter in which the modulator is installed.

- The Non-linear pre-corrector balances out gain and phase non-linearity in the transmitter RF power amplifier, thereby significantly reducing the in-band and out of band intermodulation products. Optimizing the transmitter's performance will extend the coverage area. The performance requirement of the transmitter output filter, which is used to suppress radiation in adjacent channels below a maximum allowed level, will also be eased.
- The Linear pre-corrector balances out level and group delay variations that are seen across the channel bandwidth and caused by the transmitter mask filter and/or channel combiner filters. The linear optimization of the transmitter's radiated signal allows the receiver's channel equalizer to focus all of its correction capacity on level and group delay errors originating from the actual transmission path.

Web Interface

This feature allows remote control of the DVU 5000 via Ethernet (TCP/IP). The system is based on a Web server mounted inside the DVU 5000. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the modulator. The Web Interface concept is popular because remote control with this system only requires a standard PC with a network interface card (NIC) and a Web browser (Microsoft Explorer 6.0+).

SNMP Client

This feature allows remote control of the DVU 5000 in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

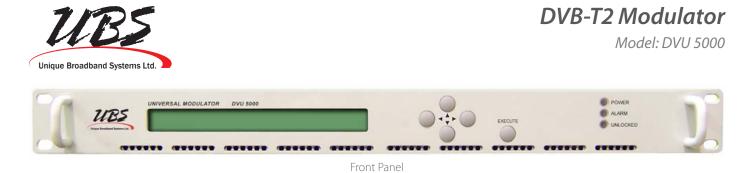
Optionally, the DVU 5000 RS232 interface can be dedicated for communication with a 3rd party UPS. In this case, the modulator is configured with an extra set of SNMP parameters and will actively monitor the UPS.

Machine to Machine Interface

Depending on the waveform selected, the DVB-T2 Modulator RS232, RS485 or Ethernet ports can be used as a machine to machine interface. This is a valuable feature when control of an external power amplifier is required.

Internal GPS or GPS/GLONASS Receiver (optional)

The DVU 5000 can be equipped with an internal GPS or GPS/GLONASS receiver. In this case, the frequency references for the modulator and upconverter are derived from the internal GPS or GPS/GLONASS receiver.



Product Specifications

DVB-T2 Modulation and Signal Processing		Inputs	
FFT Modes	1k, 2k, 4k, 8k, Extended 8k, 16k, Extended 16k, 32k, Extended 32k	DVB-ASI / T2-MI (IN-A, IN-B)	2 DVB-ASI inputs: BNC (F), 75 Ω
Guard Intervals	1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4	GbE Transport Stream	Protocol: Pro-MPEG CoP #3 /
Code Rates	1/2, 3/5, 2/3, 3/4, 4/5, 5/6		SMPTE 2022 Connector: RJ45
PLP Constellations	QPSK, 16-QAM, 64-QAM, 256-QAM (normal or rotated)	HPA FB	SMA (F), 50 Ω
L1 Post Constellations	BPSK, QPSK, 16-QAM, 64-QAM	Clock Reference - 10 MHz (Note 1)	Connector: BNC (F) Frequency: 10 MHz
FEC	Short (16k), Normal (64k)	(Note I)	Level: 0 dBm to 15 dBm
Network Modes	MFN, SFN-SISO, SFN-MISO		Impedance: 50 Ω
Bandwidth	1.7 MHz, 5 MHz, 6 MHz, 7 MHz, 8 MHz, 10 MHz	Time Reference - 1 PPS (Note 1)	Connector: BNC (F) Frequency: 1 PPS Level: TTL
Time Interleaving	Adjustable		Trigger: Positive transition
Pilot Pattern	PP1 to PP8		Impedance: 50 Ω
Test Modes	Single Carrier (CW) Carrier Removal (100 to 800 carriers)	Monitoring Outputs	
Input	Input T2-MI control Input steam monitoring PCR restamping	DVB-ASI / T2-MI (OUT-A, OUT-B)	2 DVB-ASI outputs: BNC (F) 75 Ω
	TS Bit Rate Adaptation	RF Monitor	Connector: SMA (F) Impedance: 50 Ω Level: 30 dB below RF output
Control Interfaces		Reference Monitor	Connector: BNC (F)
Front Panel	LCD display and cursor/ execute keys		Frequency: 10 MHz
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T		Level: 2 Vpp Impedance: 50 Ω
USB Interface	Connector: USB Type B	Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), High Impedance Frequency: 10 MHz
RS232 Interface	Connector: 9-pin SUB-D Male	(Note I)	Level: 10 dBm, ± 2.5 dB sinewave
RS485 Interface	Connector: 9-pin SUB-D Female	Time Reference - 1 PPS	Connector: BNC (F), High Impedance
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)	Lev	Frequency: 1 PPS Level: TTL Trigger: Positive transition
Web GUI	Internet Explorer, Flrefox, etc. Connector: Ethernet		
SNMP Control Interface	Connector: Ethernet Note: MIBs can be provided		inputs, except when the modulator is equipped with eiver, where they become Monitoring Outputs (high
Alarm Relays	Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm.		

Machine to Machine

Interface

Connector: Ethernet, RS232 or RS485

DVB-T2 Modulator

Model: DVU 5000





Rear Panel

Product Specifications

RF Output

Connector	N-type (F), 50 Ω
Frequency Range	470 MHz to 860 MHz (30 MHz to 1 GHz optional)
Frequency Step Size	1 Hz
Frequency Stability	Internal reference 0.05ppm / or in accordance with external ref. accuracy
Spectrum Polarity	Inverted or non-inverted, selectable
Level	-10 dBm to 0 dBm in 0.1 dB step (optional 0 dBm to 10 dBm)
Level Stability	± 0.3 dB
Shoulder Level	≤ -55 dBc (Note 2)
MER	≥ 42 dB (Note 3)
Amplitude Flatness	Center frequency ±3.8 MHz: ±0.3 dB (Note 4)
Phase Noise SSB (measured @ 474 MHz)	10 Hz: < -60 dBc/Hz 100 Hz: < -85 dBc/Hz 1 kHz: < -90 dBc/Hz 10 kHz: < -105 dBc/Hz 100 kHz: < -120 dBc/Hz 1 MHz: < -135 dBc/Hz
Spurious Level Outside Channel	< -60 dBm
Return Loss	> 20 dB

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Note 2: Shoulder measurements were performed with Agilent E4443A PSA Series Spectrum Analyzer.

Note 3: MER measurements were performed on a DVB-T2 waveform with an Agilent E4443A PSA Series Spectrum Analyzer in conjunction with Agilent E9285B Digital Video Analysis Modulation software.

Note 4: Levels are measured in 10 kHz bandwidth, where 0 dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.

Adaptive Non-linear Pre-correction

HPA FB Connector	To be connected to the HPA output when the Adaptive Pre-corrector is used
Level	-15 dBm to 0 dBm
Frequency	470 MHz to 860 MHz
Spectral Regrowth Reduction	7 dB ±2 dB (Note 5)

Manual Digital Pre-Correction

Non-Linear Pre-Correction	
Curve Formats	S 21 and VO/VI
Amplitude Scale	Linear and Logarithmic
Correction Points	Max. 256, user-defined position
Spectral Regrowth Reduction	Max. 12 dB, subject to available headroom
Phase Correction	-6 to +30 degrees, subject to available headroom
Linear Pre-Correction	
Correction Points	61
Point Spacing	1/60 of nominal spectrum BW
Amplitude Correction	±10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	±2000 ns
Group Delay Resolution	1 ns
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)

Note 5: Greater improvement is possible under particular applications. Performance depends upon power level and waveform.

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DVB-T2 Modulator

Model: DVU 5000

Product Specifications

Power Supply

Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 45 VA (70 VA with +10 dBm RF amplifier and GPS receiver installed)
Harmonic Correction	EN61000-3-2
Environmental	
Operating Temperature	0°C to +50°C (+32°F to +122°F)
Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Relative Humidity (operating/storage)	max. 95%
Cooling	Fan to assist natural convection
Mechanical	
Size	1 U of 19" wide cabinet
Dimension (W x H x D)	483mm x 44mm x 521mm (19" x 1.75" x 20.5")
Weight	6 kg (13 lbs)
Transport and Storage	Vibration acc. to IEC Publ.68

ETSI Compliance Essential Requirement

Standard	/ 0	pecification
Standard	/ >	pecification

R&TTE Directive 1995/5/EC	
Safety	EN 60950-1: 2001, A11: 2004 First Edition
Health	Not Applicable. No Antenna
EMC	EN 301 489-1 V1.8.1
Radio	EN 302 296 V1.1.1 (The technical requirement of Clause 4.3 was substituted for Clause 8.2 of EN 301 489-1 using the Class A limits specified in Table 4.)

CE Compliance This equipment is CE Compliant.



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Model: DVU 5000A

Product Features

- Direct RF output from 470 to 860 MHz in 1 Hz steps
- Power Amplifier provides 2 Watt output for broadcast of digital waveforms
- SFN and MFN Support
- Adaptive Non-linear Pre-corrector
- Manual Linear and Non-linear Digital Pre-correctors
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Interfaces for Web GUI, SNMP and Telnet remote control, machine to machine interface and software upgrades
- Occupies only 1 RU of standard 19" cabinet space



New Features

DVB-T2

Supports all DVB-T2 modulation features including T2-MI interface support, single and multiple Physical Layer Pipes (PLPs), MFN/SFN operation and SISO/MISO transmission.

Optional Features

- Internal GPS or GPS/GLONASS Receiver
- Adaptive Linear and Non-linear Digital Pre-correctors
- Optional RF Output: 40 MHz to 1 GHz, DAB Band III

Standards Supported

- ATSC and ATSC-M/H compliant with A/53, A/54, A/64, A/110 and A/153
- CMMB compliant with GY/T 220.1-2006 and 220.2-2006
- DTMB compliant with GB20600-2006 and GY/T 229.1-2008
- DAB, DAB+ and T-DMB compliant with ETSI DAB standards and EU147
- DVB-SH(A) and DVB-SH(B) compliant with ETSI standards
- DVB-T/H compliant with ETSI standards
- DVB-T2 compliant with EN 302 755, TS 102 773 and TS 102 831
- ISDB-T/T^B compliant with ARIB STD-B31, ARIB STD-B10, ABNT NBR 15601:2007, SBTVD N01 and SBTVD N03

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June 03, 2014

Model: DVU 5000A



Description and Application

Overview

The UBS Universal Modulator Series utilizes the innovative UBS Universal Waveform engine, supporting all world digital standards for terrestrial broadcasting, including hybrid satellite/terrestrial systems.

The modular, state of the art design allows transmitter manufacturers and network operators to integrate the DVU 5000A into a system/network with relative ease. This open architecture design enables carriers to take advantage of a proven, robust platform while designing networks to meet current and future broadcast standards.

The Universal Modulator can be factory configured with the necessary hardware to support one, two or all the waveforms listed above. The user can easily switch from one waveform to another through software selection. UBS' modulators can also be upgraded in the field as standards evolve.

Using the latest technology, UBS has developed a direct conversion process that allows the Universal Modulator to provide an RF output from 470 MHz to 860 MHz with a power level up to 2 Watt. Note: Other frequencies available.

This series incorporates all of UBS high performance signal processing stages including integrated linear and non-linear pre-correctors. Full remote management and control as well as remote firmware and waveform upgrades are provided.

Signal Inputs

The DVU 5000A is provided with two serial DVB-ASI inputs and two serial G.703/G.704 inputs. The DVB-ASI inputs accept a MPEG-2 TS, a CMMB multiplex stream, a T2-MI stream or an ISDB-T/TB multiplexed TS. The G.703/G.704 inputs are used in DAB mode and accept either NA or NI signals. Optionally, two serial SMPTE-310M inputs can be installed.

The DVU 5000A also support a GbE Transport Stream input based on Pro-MEG CoP #3 / SMPTE 2022 protocol (DAB excluded).

The DVB-ASI, G.703/G.704 and SMPTE-310M inputs can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary transport stream in case the primary transport stream source fails (a truly valuable feature for broadcast applications.)

RF Output

The standard RF output covers a frequency range of 470 to 860 MHz, in 1 Hz steps with an adjustable output power level from 23 to 33 dBm, in 0.1 dB steps. The user can set the spectrum polarity to Inverted or Noninverted as required.

Optionally, the modulator can be configured with a 40 MHz to 1 GHz output or a DAB Band III output.

Adaptive Non-linear Pre-corrector

The Adaptive Non-linear Pre-corrector is a superior pre-distortion solution that compensates for RF Power Amplifier non-linearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance.

The complex signal processing is done in the RF domain and supports a fully adaptive operation: the feedback signal (HPA output) is compared to the modulator's RF output signal (HPA input) in order to optimize the correction which will improve the shoulders of the RF output.

The Adaptive Non-Linear Pre-Corrector is not recommended for satellite uplink applications as it can only correct for the signal distortion from the ground-based transmitter and not the full signal path distortion. The Manual Pre-Corrector can be configured for the full system path.

Note: The Adaptive Non-linear Pre-corrector only supports a frequency range of 470 MHz to 860 MHz.

Manual Linear and Non-linear Digital Pre-correctors

The manual linear and non-linear digital pre-correctors are used to maximize the performance of the transmitter in which the modulator is installed.

- The Non-linear pre-corrector balances out gain and phase non-linearity in the transmitter RF power amplifier, thereby significantly reducing the in-band and out of band intermodulation products. Optimizing the transmitter's performance will extend the coverage area. The performance requirement of the transmitter output filter, which is used to suppress radiation in adjacent channels below a maximum allowed level, will also be eased.
- The Linear pre-corrector balances out level and group delay variations that are seen across the channel bandwidth and caused by the transmitter mask filter and/or channel combiner filters. The linear optimization of the transmitter's radiated signal allows the receiver's channel equalizer to focus all of its correction capacity on level and group delay errors originating from the actual transmission path.



Model: DVU 5000A

Description and Application

Web Interface

This feature allows remote control of the DVU 5000A via Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the modulator. The Web Interface concept is popular because remote control with this system only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

This feature allows remote control of the DVU 5000A in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Optionally, the DVU 5000A RS232 interface can be dedicated for communication with a 3rd party UPS. In this case, the modulator is configured with an extra set of SNMP parameters and will actively monitor the UPS.

Machine to Machine Interface

Depending on the waveform selected, the Universal Modulator RS232, RS485 or Ethernet ports can be used as a machine to machine interface. This is a valuable feature when control of an external power amplifier is required.

Internal GPS or GPS/GLONASS Receiver (optional)

The DVU 5000A can be equipped with an internal GPS or GPS/GLONASS receiver. In this case, the frequency references for the modulator and upconverter are derived from the internal receiver.

Product Specifications | Signal Processing

СММВ	Mode
CIVIIVID	Mode

FFT Mode	4K	FFT M
Guard Interval	1/8	Guard
Code Rate (LDPC)	1/2, 3/4	Code
Constellation	BPSK, QPSK, 16-QAM	Const
Byte Interleave	Mode 1, Mode 2, Mode 3	Frame
Reed Solomon Coding	RS(240,240); RS(240, 224); RS(240,192); RS(240,176)	Sub-c Time I
Scrambling Modes	0, 1, 2, 3, 4, 5, 6, 7	Netwo
Number of Time Slots	40	Bandv
Number of simultaneous multiplexed frames	40	Input
Network Mode	SFN and MFN	
Bandwidth	8 MHz	
Transmission Time delay	Adjustable, range: ±500 ms, step 100 ns	
Input	CMMB Multiplex Stream or GbE TS	
Time Information Input	RS232 serial port for GPS TOD Information	

DTMB Mode	
FFT Mode	3780, Single Carrier
Guard Interval	945, 595, 420 symbols
Code Rate	0.4, 0.6, 0.8
Constellation	QPSK, 4QAM-NR, 16-QAM, 32-QAM, 64-QAM
Frame Duration	500 us, 666.67 us or 571.43 us
Sub-carrier Spacing	1.5 kHz, 1.75 kHz, 2 kHz
Time Interleaver	240, 720 symbols
Network Mode	SFN and MFN
Bandwidth	8 MHz, 7 MHz, 6 MHz
Input	MPEG-2 Transport Stream or GbE TS

Model: DVU 5000A



Product Specifications | Signal Processing

DVB-T/H Mode		ATSC Mode	
FFT Mode	2k, 4k, 8k	Supported Mode	8VSB, M/H
Guard Interval	1/4, 1/8, 1/16,1/32	Network Mode	SFN and MFN
Code Rate	1/2, 2/3, 3/4, 5/6, 7/8	Bandwidth	6 MHz
Constellation	QPSK, 16-QAM, 64-QAM	Input	MPEG-2 Transport Stream, SMPTE-310M or
Hierarchical Mode	Alpha - 1, 2 and 4 for 16-QAM and 64-QAM		GbETS
Network Mode	SFN and MFN		
Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz	ISDB-T/TB Mode	
Input	MPEG-2 Transport Stream or GbE TS	FFT Mode	2k, 4k, 8k
		Guard Interval	1/4, 1/8, 1/16,1/32
DVB-T2 Mode		Code Rate	1/2, 2/3, 3/4, 5/6, 7/8
FFT Mode	1k, 2k, 4k, 8k, Extended 8k, 16k,	Constellation	QPSK, 16-QAM, 64-QAM, DQPSK
	Extended 16k, 32k, Extended 32k	Hierarchical Mode	up to 3 layers
Guard Interval	1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4	Carrier Spacing	1 kHz, 2 kHz, 4 kHz
Code Rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6	Time Interleaver	0 to 16
PLP Constellation	QPSK, 16-QAM, 64-QAM, 256-QAM	Network Mode	Hierarchical, SFN (IIP packets) and MFN
L1 Post Constellation	(normal or rotated)	Bandwidth	6 MHz
FEC	BPSK, QPSK, 16-QAM, 64-QAM	Input	ISDB-T/TB Multiplexed Transport Stream or
Network Mode	Short (16k), Normal (64k) MFN, SFN-SISO, SFN-MISO		GbETS
Bandwidth	1.7 MHz, 5 MHz, 6 MHz, 7 MHz, 8 MHz,		
Banawiath	10 MHz	DAB Mode	
Time Interleaving	Adjustable	Transmission Mode	I, II, III, IV Automatically selected from the ETI stream
Pilot Pattern	PP1 to PP8		or set via any control interface
Input	T2-MI control Input steam monitoring	Processing Delay	Mode I: 156000 usec, Mode II: 84000 usec Mode III: 84000 usec, Mode IV: 108000 usec
	PCR restamping TS Bit Rate Adaptation	Transmitter Delay	Up to 2.4 sec, step 1 usec
		Transmitter Offset Delay	0 to 2047 usec, step 1 usec
DVB-SHA/SHB Mode		Network Padding Delay	0 to 1.5 second
		MNSC Control	Transmitter Identification Information (TII)
Multiplexing Schemes OFDM FFT Mode (A)	OFDM (A), TDM (B) 1k, 2k, 4k, 8k	Input Signal	ETI (NI) 2.048 MHz short haul or ETI (NA) for E1 interface - ETSI 300 799
Guard Interval (A)	1/4, 1/8, 1/16,1/32	Input Selection	Dual NA with seamless switchover
Code Rate (A)	1/2, 1/3, 1/4, 1/5, 2/3, 2/5, 2/7, 2/9		NI or NA with automatic detection
Constellation (A)	QPSK, 16-QAM	Input Error Condition	Manual lock to input 1 or 2 Input CRC violations (User selectable)
Network Mode (A)	SFN and MFN	Test Mode	
TDM Mapping (B)	ODSK 8-DSK 16-ADSK	lest Mode	DAB mode I, II, III, IV, CW mode, Two tone,

DAB mode I, II, III, IV, CW mode, Two tone, 24-tone, 48 tone, 96 tone comb

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Input (A & B)

TDM Mapping (B)

Turbo Code (A & B)

Bandwidth (A & B)

TDM Roll-off Factor (B)

Time Interleaver (A & B)

QPSK, 8-PSK, 16-APSK

8 MHz, 7 MHz, 6 MHz, 5 MHz, 1.7 MHz

From 100 ms to several seconds

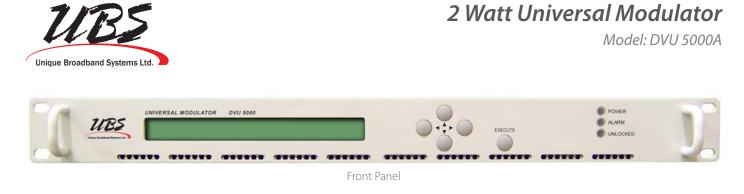
MPEG-2 Transport Stream or GbE TS

0.15, 0.25, 0.35

3GPP2 encoding

(specifications are subject to change without notice)

June 03, 2014



Product Specifications

Inputs			Control Interfaces	
DVB-ASI	IN-A, IN-B	2 inputs: BNC (F), 75 Ω	Front Panel	LCD display and cursor/ execute keys
G.703/G.704	IN-A, IN-B	2 inputs (optional): BNC (F), 50 Ω	Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
SMPTE-310M	IN-A, IN-B	2 inputs (optional): BNC (F), 75 Ω	USB Interface	Connector: USB Type B
GbE Transport St (DAB excluded)	ream	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45	RS232 Interface	Connector: 9-pin SUB-D Male Serial port for GPS TOD information (CMMB mode only)
HPA FB		Connector: SMA (F), 50 Ω Level: -15 dBm to 0 dBm	RS485 Interface	Connector: 9-pin SUB-D Female
Clock Reference - (Note 1)	- 10 MHz	Connector: BNC (F), 50 Ω Frequency: 10 MHz	CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Time Reference -	1 PPS	Level: 0 dBm to 15 dBm Connector: BNC (F), 50 Ω	Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
(Note 1)		Frequency: 1 PPS Level: TTL Trigger: Positive transition	SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
Time Informatior	n Input	Connector: RS232 Interface for GPS TOD information (CMMB mode only)	Alarm Relays	Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm.
Monitoring O	utputs		Machine to Machine Interface	Connector: Ethernet for all waveforms or RS485 for all waveforms
DVB-ASI O	OUT-A, OUT-B	2 outputs: BNC (F) 75 Ω		or RS232 for all waveforms except CMMB
G.703/G.704 O	OUT-A, OUT-B	2 outputs: BNC (F), 50 Ω		
RF Monitor		Connector: SMA (F) Impedance: 50 Ω Level: 63 dB below RF output		
Reference Monito	or	Connector: BNC (F) Frequency: 10 MHz Level: 2 Vpp Impedance: 50 Ω		
Clock Reference - (Note 1)	- 10 MHz	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave		
Time Reference - (Note 1)	1 PPS	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trieser: Pacifics transition		

Note 1: The "10MHz" and "1pps" are inputs, except when the modulator is equipped with an internal GPS or GPS/GLONASS receiver, where they become Monitoring Outputs (high impedance).

Trigger: Positive transition

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Model: DVU 5000A





Rear Panel

Product Specifications

RF Output

N-type (F), 50 Ω		
470 MHz - 860 MHz 40 MHz to 1 GHz (optional) DAB Band III (optional)		
1 Hz		
Internal reference 0.05ppm / or in accordance with external ref. accuracy		
Inverted or non-inverted, selectable		
2 Watt (adjustable from 23 dBm to 33 dBm in 0.1 dB steps)		
± 0.5 dB		
≤ -38 dBc (uncorrected)		
< -40 dBc		
Center frequency ±3.8 MHz: ±0.5 dB (Note 2)		
10 Hz: < -60 dBc/Hz 100 Hz: < -85 dBc/Hz 1 kHz: < -95 dBc/Hz 10 kHz: < -105 dBc/Hz 100 kHz: < -120 dBc/Hz 1 MHz: < -125 dBc/Hz		
> 20 dB		

Adaptive Non-linear Pre-correction

HPA FB Connector	To be coupled from the PA output when the Adaptive Pre-corrector is used
Level	-15 dBm to 0 dBm
Frequency	470 MHz to 860 MHz
Spectral Regrowth Reduction	7 dB ±2 dB (Note 3)

Manual Digital Pre-Correction

-	
Non-Linear Pre-Correction	
Curve Formats	S 21 and VO/VI
Amplitude Scale	Linear and Logarithmic
Correction Points	Max. 256, user-defined position
Spectral Regrowth Reduction	Max. 12 dB, subject to available headroom
Phase Correction	-6 to +30 degrees, subject to available headroom
Linear Pre-Correction	
Correction Points	61
Point Spacing	1/60 of nominal spectrum BW
Amplitude Correction	±10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	±2000 ns
Group Delay Resolution	1 ns
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)

Note 2: Levels are measured in 10 kHz bandwidth, where 0 dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.

Note 3: Greater improvement is possible under particular applications. Performance depends upon power level and waveform.



Model: DVU 5000A

Product Specifications

Power Supply

Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 70 VA
Harmonic Correction	EN61000-3-2
Environmental	
Operating Temperature	0°C to +50°C (+32°F to +122°F)
Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Relative Humidity (operating/storage)	max. 95%
Cooling	Internal fans to assist natural convection
Mechanical	
Size	1 U of 19" wide cabinet
Dimension (W x H x D)	483mm x 44mm x 521mm (19″ x 1.75″ x 20.5″)
Weight	7 kg (15.4 lbs)
Transport and Storage	Vibration acc. to IEC Publ.68

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Dual Band DAB Modulator

Model: DVU 5000

Product Features

- DAB Band III and L-Band RF output
- DAB, DAB+ and T-DMB compliant with EN 300 401 and ETS 300 799
- ETI input redundancy
- Transmission Modes: I, II, III, IV
- Programmable Static Delay up to 2.4 seconds
- MFN and SFN Support
- Manual Linear and Non-linear Digital Pre-correctors
- Interfaces for Web GUI, SNMP and Telnet remote control, machine to machine interface and software upgrades

Optional Features

• Integrated GPS or GPS/GLONASS receiver

Description and Application

Overview

The DVU 5000 DAB Dual Band modulator utilizes the innovative UBS Universal Waveform engine, supporting all world standards for mobile and terrestrial digital broadcasts.

The modular, state of the art design allows transmitter manufacturers and network operators to integrate the DVU 5000 into their system/net-work with relative ease.

The DAB modulator converts a digital coded stream containing several channels of compressed audio to a COFDM modulated RF signal. Using a new direct digital conversion process, the modulator board is able to provide a DAB Band III or L-Band RF output.

The modulator features Manual Linear and Non-linear Digital Pre-correctors and an optional GPS receiver.

Web and SNMP interfaces allow for full remote management and control as well as remote firmware and waveform upgrades .

Inputs

The DVU 5000 is provided with two serial G.703/704 inputs that accept an ETI-NI or ETI-NA data stream. The data is organized as a series of 24 msec frames, each frame consisting of 6144 bytes.

The G.703/704 inputs can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary data stream if the primary data steam source fails. A Dual NA input mode provides seamless switching between inputs.

Processing

Acting on the ETI header inserted by the ensemble multiplexer, the DVU 5000 is able to perform dynamic multiplex management allowing several transmission modes (I, II, III and IV). The Static delay can be incrementally adjusted in service, up to 1.6 seconds for better flexibility when implementing Single Frequency Network (SFN) architecture.

NA or LI timestamps inserted in the ETI by the ensemble multiplexer allow the modulator to automatically manage network delays up to 2.4 seconds.

Dual Band DAB Modulator

Model: DVU 5000

UIBS Unique Broadband Systems Ltd.

Description and Application

Dual Band RF Output

Using the latest technology, UBS has developed a direct conversion process that allows the modulator to provide a Band III or L-Band RF output.

The flexible design allows the user to select the RF channel (or frequency) using direct frequency selection or a pre-defined Band III or L-Band channelized raster.

The Manual Linear and Non-Linear Digital Pre-correctors are used to maximize the performance of the transmitter in which the modulator is installed.

- The Non-linear pre-corrector balances out gain and phase non-linearity in the transmitter RF power amplifier, thereby significantly reducing the in-band and out of band intermodulation products. Optimizing the transmitter's performance will extend the coverage area. The performance requirement of the transmitter output filter, which is used to suppress radiation in adjacent channels below a maximum allowed level, will also be eased.
- The Linear pre-corrector balances out level and group delay variations that are seen across the channel bandwidth and caused by the transmitter mask filter and/or channel combiner filters. The linear optimization of the transmitter's radiated signal allows the receiver's channel equalizer to focus all of its correction capacity on level and group delay errors originating from the actual transmission path.

Web Interface

This feature allows remote control of the DVU 5000 via Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the modulator. The Web Interface concept is popular because remote control with this system only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

This feature allows remote control of the DVU 5000 in accordance with the SNMP v3 protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Machine to Machine Interface

The modulator RS232, RS485 or Ethernet ports can be used as a machine to machine interface. This is a valuable feature when control of an external power amplifier is required.

Optionally, the DVU 5000 RS232 interface can be dedicated for communication with a 3rd party UPS. In this case, the modulator is configured with an extra set of SNMP parameters and will actively monitor the UPS.

Internal GPS or GPS/GLONASS Receiver (optional)

The DVU 5000 can be equipped with an internal GPS or GPS/GLONASS receiver. In this case, the frequency references for the modulator and upconverter are derived from the internal receiver.



Model: DVU 5000



Rear Panel

Control Interfaces

Product Specifications

DAB Signal Processing

7/7

Unique Broadband Systems Ltd.

DAB Signal Processing	9	Control Interfaces	
Transmission Mode	I, II, III, IV	Front Panel	LCD display and cursor/ execute keys
	Automatically selected from the ETI stream or set via any control interface	Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
Processing Delay	Mode I: 156000 usec, Mode II: 84000 usec Mode III: 84000 usec, Mode IV: 108000 usec	USB Interface	Connector: USB Type B
Transmitter Delay	Up to 2.4 sec, step 1 usec	RS232 Interface	Connector: 9-pin SUB-D Male
Transmitter Offset Delay	0 to 2047 usec, step 1 usec	RS485 Interface	Connector: 9-pin SUB-D Female
Network Padding Delay	0 to 1.5 second	CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
MNSC Control	Transmitter Identification Information (TII)	Web GUI	Internet Explorer, Firefox, etc.
Input Signal	ETI (NI) 2.048 MHz short haul or		Connector: Ethernet
Input Selection	ETI (NA) for E1 interface - ETSI 300 799 Dual NA with seamless switchover	SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
	NI or NA with automatic detection Manual lock to input 1 or 2	Alarm Relays	Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered
Input Error Condition	Input CRC violations (User selectable)		by any major alarm.
Test Mode	DAB mode I, II, III, IV, CW mode, Two tone, 24-tone, 48 tone, 96 tone comb	Machine to Machine Interface	Connector: Ethernet, RS232 or RS485
Inputs		Monitoring Outputs	
G.703/G.704 (IN-A, IN-B)	2 inputs: BNC (F), 50 Ω	G.703/G.704 (OUT-A, OUT-B)	2 outputs: BNC (F), 50 Ω
DVB-ASI (IN-A, IN-B)	2 inputs: BNC (F), 75 Ω	DVB-ASI (OUT-A, OUT-B)	2 outputs: BNC (F) 75 Ω
10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm	RF Monitor	Connector: SMA (F) Impedance: 50 Ω Level: 30 dB below RF output
1 PPS (Note 1)	Connector: BNC (F), 50 Ω Frequency: 1 PPS	10 MHz	Connector: BNC (F), High Impedance Frequency: 10 MHz
	Level: TTL	(Note 1)	Level: 10 dBm, \pm 2.5 dB sinewave
	Trigger: Positive transition	1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS
	connectors are inputs, except when the modulator is		Level: TTL Triagar: Positivo transition

Note 1: The 10 MHz and 1 PPS connectors are inputs, except when the modulator is equipped with an internal GPS or GPS/GLONASS receiver. In this case, the connectors become monitoring outputs (high impedance).

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Trigger: Positive transition

Dual Band DAB Modulator

Model: DVU 5000



Product Specifications

Band III Output Performance		L-Band Output Performance	
Connector (RF Output)	N-type (F), 50 Ω	Connector (RF Output)	N-type (F), 50 Ω
Frequency Range	Frequency Selection: 170 MHz to 1500 MHz Channel List: 174.928 MHz to 239.200 MHz	Frequency Range	Frequency Selection: 170 MHz to 1500 MHz Channel List 1: 1452.960 MHz to 1490.624 MHz
Frequency Step Size	1 Hz		Channel List 2: 1452.816 MHz to 1491.184 MHz
Frequency Stability	Internal reference 0.05ppm / or in	Frequency Step Size	1 Hz
	accordance with GPS ref. accuracy	Frequency Stability	Internal reference 0.05ppm / or in
Spectrum Polarity	Inverted or non-inverted, selectable		accordance with GPS ref. accuracy
Level	-10 dBm to 0 dBm, in 0.1 dB step	Spectrum Polarity	Inverted or non-inverted, selectable
Level Stability	± 0.3 dB	Level	-10 dBm to 0 dBm, in 0.1 dB step
Amplitude Flatness	± 0.4 dB	Level Stability	± 0.3 dB
Shoulder Level	≤ -55 dBc	Amplitude Flatness	± 0.4 dB
		Shoulder Level	≤ -50 dBc
Spurious Level	< -60 dBm @ 0 dBm output power	Spurious Level	< -60 dBm @ 0 dBm output power
Phase Noise SSB	10 Hz: < -60 dBc/Hz 100 Hz: < -85 dBc/Hz 1 kHz: < -95 dBc/Hz 10 kHz: < -105 dBc/Hz 100 kHz: < -120 dBc/Hz 1 MHz: < -135 dBc/Hz	Phase Noise SSB	10 Hz: < -60 dBc/Hz 100 Hz: < -75 dBc/Hz 1 kHz: < -80 dBc/Hz 10 kHz: < -95 dBc/Hz 100 kHz: < -120 dBc/Hz 1 MHz: < -135 dBc/Hz
Return Loss	> 20 dB	Return Loss	> 20 dB

Manual Digital Pre-Correction

-	
Non-Linear Pre-Correction	
Curve Formats	S 21 and VO/VI
Amplitude Scale	Linear and Logarithmic
Correction Points	Max. 256, user-defined position
Spectral Regrowth Reduction	Max. 12 dB, subject to available headroom
Phase Correction	-6 to +30 degrees, subject to available headroom
Linear Pre-Correction	
Correction Points	61
Point Spacing	1/60 of nominal spectrum BW
Amplitude Correction	±10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	±2000 ns
Group Delay Resolution	1 ns
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)

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March 7, 2013



Dual Band DAB Modulator

Model: DVU 5000

Product Specifications

Power Supply

Voltage	100 - 240 VAC	
Frequency	50 - 60 Hz	
Power Consumption	max. 60 VA	
Harmonic Correction	EN61000-3-2	
Environmental		
Operating Temperature	0°C to +50°C (+32°F to +122°F)	
Storage Temperature	-30°C to +70°C (-22°F to +158°F)	
Relative Humidity	max. 95%, non-condensing	
(operating/storage)		
Cooling	Internal fans to assist natural convection	
Mechanical		
Size	1 U of 19" wide cabinet	
Dimension (W x H x D)	483mm x 44mm x 521mm	
	(19″ x 1.75″ x 20.5″)	
Weight	6.5 kg (14.3 lbs)	
Transport and Storage	Vibration acc. to IEC Publ.68	

ETSI Compliance

Essential Requirement R&TTE Directive 1995/5/EC	Standard / Specification	
Safety	EN 60950-1: 2001, A11: 2004 First Edition	
Health Not Applicable. No Antenna		
EMC	EN 301 489-1 V1.8.1	
Radio	EN 302 296 V1.1.1 (The technical requirement of Clause 4.3 was substituted for Clause 8.2 of EN 301 489-1 using the Class A limits specified in Table 4.)	

CE Compliance

This equipment is CE Compliant.



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Model: DVU 7000

Product Features

- Digital (Universal) or Analog Modes of operation
- Digital RF output from 470 MHz to 1 GHz; level from 0 dBm to +10 dBm
- Analog RF output from 470 MHz to 862 MHz; level from +4 dBm to +14 dBm
- Superior Shoulders and MER
- SFN and MFN Support
- Adaptive Non-linear Pre-correction of Digital Waveforms
- Manual Linear and Non-linear Digital Pre-correctors
- Analog Pre-correction
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Interfaces for Web GUI, SNMP and Telnet remote control, machine to machine interface and software upgrades

Description and Application

Overview

The UBS Universal Modulator Series utilizes the innovative UBS Universal Waveform engine, supporting all world standards for mobile and terrestrial digital broadcasts.

The modular, state of the art design allows transmitter manufacturers to integrate the DVU 7000 into a system/network with relative ease. This open architecture design enables carriers to take advantage of a proven, robust platform, while designing networks to meet current and future broadcast standards.

The DVU 7000 is a Dual Mode Modulator that features a Universal Digital Modulator platform as well as an Analog Modulator platform supporting TV standards B, D, G, K, M, N and more. Through simple software selection, the user can switch from Digital to Analog, or between digital waveforms. UBS' modulators can also be upgraded in the field as standards evolve.

Full remote management and control as well as remote firmware and waveform upgrades are provided.



Digital Standards Supported

- ATSC and ATSC-M/H compliant with A/53, A/54, A/64, A/110 and A/153
- CMMB compliant with GY/T 220.1-2006 and 220.2-2006
- DTMB compliant with GB20600-2006 and GY/T 229.1-2008
- DAB, DAB+ and T-DMB compliant with ETSI DAB standards and EU147
- DVB-SH(A) and DVB-SH(B) compliant with ETSI standards
- DVB-T/H compliant with ETSI standards
- DVB-T2 compliant with EN 302 755, TS 102 773 and TS 102 831
- ISDB-T/T^B compliant with ARIB STD-B31, ARIB STD-B10, ABNT NBR 15601:2007, SBTVD N01 and SBTVD N03

Document 57146-UNIV-S07-06

June 3, 2014

Model: DVU 7000



Description and Application

Digital Modulator

The DVU 7000 is provided with two serial DVB-ASI inputs and two serial G.703/G.704 inputs. The DVB-ASI inputs accept a MPEG-2 TS, a CMMB multiplex stream, a T2-MI stream or an ISDB-T/TB multiplexed TS. Optionally, two serial SMPTE-310M inputs can be installed. The DVU 5000 also support a GbE Transport Stream input based on Pro-MEG CoP #3 / SMPTE 2022 protocol (DAB excluded).

The DVB-ASI and SMPTE-310M inputs can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary transport stream in case the primary transport stream source fails (a truly valuable feature for broadcast applications.)

Using the latest technology, UBS has developed a direct conversion process that allows the Universal Modulator to provide an RF output from 470 MHz to 1 GHz. The output level is adjustable from 0 dBm to +10 dBm in 0.1 dB steps. The user can set the polarity of the spectrum to Inverted or Non-inverted as required. The direct conversion process offers superior performance with Shoulder Levels \leq -55 dBc and MER \geq 50 dB.

The Adaptive Non-linear Pre-corrector is a superior pre-distortion solution that compensates for RF Power Amplifier non-linearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance.

The complex signal processing is done in the RF domain and supports a fully adaptive operation: the feedback signal (HPA output) is compared to the modulator's RF output signal (HPA input) in order to optimize the correction which will improve the shoulders of the RF output.

The Manual Linear and Non-Linear Digital Pre-correctors are used to maximize the performance of the transmitter in which the modulator is installed.

- The Non-linear pre-corrector balances out gain and phase non-linearity in the transmitter RF power amplifier, thereby significantly reducing the in-band and out of band intermodulation products. Optimizing the transmitter's performance will extend the coverage area. The performance requirement of the transmitter output filter, which is used to suppress radiation in adjacent channels below a maximum allowed level, will also be eased.
- The Linear pre-corrector balances out level and group delay variations that are seen across the channel bandwidth and caused by the transmitter mask filter and/or channel combiner filters. The linear optimization of the transmitter's radiated signal allows the receiver's channel equalizer to focus all of its correction capacity on level and group delay errors originating from the actual transmission path.

Analog Modulator

For analog TV operation, the modulator supports worldwide standards including B, D, G, K, M, N and more.

The modulator accepts a baseband video input and a balanced audio input or composite audio input. The corrected input video input signal is combined with the input audio signal to produce a modulated IF output.

The IF pre-corrector provides Non-linear pre-correction that reduces intermodulation products and Liner pre-distortion that compensates for frequency response and group delay variations.

The upconverter board takes the IF pre-corrector output and converts is to a TV channel in the range of 470 MHz to 862 MHz. The output level is adjustable from 4 dBm to 14 dBm in 0.1 dB steps.

Web Interface

This feature allows remote control of the DVU 7000 via Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the modulator. The Web Interface concept is popular because remote control with this system only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

This feature allows remote control of the DVU 7000 in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Optionally, the DVU 7000 RS232 interface can be dedicated for communication with a 3rd party UPS. In this case, the modulator is configured with an extra set of SNMP parameters and will actively monitor the UPS.

Machine to Machine Interface

Depending on the waveform selected, the Universal Modulator RS232, RS485 or Ethernet ports can be used for as a machine to machine interface. This is a valuable feature when control of an external power amplifier is required.



Model: DVU 7000

June 3, 2014

Digital Specifications | Signal Processing

4K

40

CMMB Mode

FFT Mode Guard Interval Code Rate (LDPC) Constellation Byte Interleave Reed Solomon Coding

Scrambling Modes Number of Time Slots Number of simultaneous multiplexed frames Network Mode Bandwidth Transmission Time delay Input Time Information Input

DTMB Mode

FFT Mode Guard Interval Code Rate Constellation Frame Duration Sub-carrier Spacing Time Interleaver Network Mode Bandwidth Input

DVB-SHA/SHB Mode Multiplexing Schemes OFDM FFT Mode (A) Guard Interval (A) Code Rate (A) Constellation (A) Network Mode (A) TDM Mapping (B) TDM Roll-off Factor (B) Turbo Code (A & B) Bandwidth (A & B) Time Interleaver (A & B) Input (A & B)

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1/8 1/2, 3/4 BPSK, QPSK, 16-QAM Mode 1, Mode 2, Mode 3 RS(240,240); RS(240, 224); RS(240,192); RS(240,176) 0, 1, 2, 3, 4, 5, 6, 7 40

SFN and MFN 8 MHz Adjustable, range: ±500 ms, step 100 ns CMMB Multiplex Stream or GbE TS RS232 serial port for GPS TOD Information

3780, Single Carrier 945, 595, 420 symbols 0.4, 0.6, 0.8 QPSK, 4QAM-NR, 16-QAM, 32-QAM, 64-QAM 500 us, 666.67 us or 571.43 us 1.5 kHz, 1.75 kHz, 2 kHz 240, 720 symbols SFN and MFN 8 MHz, 7 MHz, 6 MHz MPEG-2 Transport Stream or GbE TS

OFDM (A), TDM (B) 1k, 2k, 4k, 8k 1/4, 1/8, 1/16,1/32 1/2, 1/3, 1/4, 1/5, 2/3, 2/5, 2/7, 2/9 QPSK, 16-QAM SFN and MFN QPSK, 8-PSK, 16-APSK 0.15, 0.25, 0.35 3GPP2 encoding 8 MHz, 7 MHz, 6 MHz, 5 MHz, 1.7 MHz From 100 ms to several seconds MPEG-2 Transport Stream or GbE TS **DVB-T/H Mode** FFT Mode 2k, 4k, 8k **Guard Interval** 1/4, 1/8, 1/16,1/32 **Code Rate** 1/2, 2/3, 3/4, 5/6, 7/8 Constellation QPSK, 16-QAM, 64-QAM **Hierarchical Mode** Alpha - 1, 2 and 4 for 16-QAM and 64-QAM **Network Mode** SFN and MFN Bandwidth 8 MHz, 7 MHz, 6 MHz, 5 MHz Input MPEG-2 Transport Stream or GbE TS **DVB-T2 Mode** FFT Mode 1k. 2k. 4k. 8k. Extended 8k. 16k. Extended 16k, 32k, Extended 32k **Guard Interval** 1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4 Code Rate 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 **PLP Constellation** QPSK, 16-QAM, 64-QAM, 256-QAM (normal or rotated) L1 Post Constellation BPSK, QPSK, 16-QAM, 64-QAM FEC Short (16k), Normal (64k) Network Mode MFN, SFN-SISO, SFN-MISO Bandwidth 1.7 MHz, 5 MHz, 6 MHz, 7 MHz, 8 MHz, 10 MHz **Time Interleaving** Adjustable **Pilot Pattern** PP1 to PP8 Input T2-MI control, Input steam monitoring. PCR restamping, TS Bit Rate Adaptation ISDB-T/T_B Mode FFT Mode 2k, 4k, 8k Guard Interval 1/4, 1/8, 1/16,1/32 Code Rate 1/2, 2/3, 3/4, 5/6, 7/8 Constellation QPSK, 16-QAM, 64-QAM, DQPSK **Hierarchical Mode** up to 3 layers **Carrier Spacing** 1 kHz, 2 kHz, 4 kHz **Time Interleaver** 0 to 16 Network Mode Hierarchical, SFN (IIP packets) and MFN Bandwidth 6 MHz Input ISDB-T/TB Multiplexed TS or GbE TS ATSC Mode Supported Mode 8VSB, M/H Network Mode SFN and MFN Bandwidth 6 MHz Input MPEG-2 TS, SMPTE-310M or GbE TS

(specifications are subject to change without notice)

Model: DVU 7000



Digital Specifications

Control Interfaces		Adaptive Non-linear P	Pre-correction
Front Panel	LCD display and cursor/ execute keys	HPA FB Connector	To be connected to the PA output when
Ethernet Interface	Connector: 2x RJ45		the Adaptive Pre-corrector is used
	Speed: 10/100/1000 Base-T	Frequency	470 MHz to 860 MHz
USB Interface	Connector: USB Type B	Gain Correction	7 dB ±2 dB (Note 1)
RS232 Interface	Connector: 9-pin SUB-D Male Serial port for GPS TOD information (CMMB mode only)	Manual Digital Pre-Co	prrection
RS485 Interface	Connector: 9-pin SUB-D Female	Non-Linear Pre-Correction	
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)	Curve Formats Amplitude Scale	S 21 and VO/VI Linear and Logarithmic
Web GUI	Internet Explorer, Firefox, etc.	Correction Points	Max. 256, user-defined position
	Connector: Ethernet	Spectral Regrowth	Max. 12 dB, subject to available headroom
SNMP Control Interface	Connector: Ethernet	Reduction	
Alarm Balaya	Note: MIBs are provided Connector: RS232 and RS485	Phase Correction	-6 to +30 degrees, subject to available
Alarm Relays	2 Dry Contact Alarm relays, triggered by any major alarm.	Linear Pre-Correction	headroom
Machine to Machine	Connector: Ethernet for all waveforms	Correction Points	61
Interface	or RS485 for all waveforms	Point Spacing	1/60 of nominal spectrum BW
	or RS232 for all waveforms except CMMB	Amplitude Correction	±10 dB
		Amplitude Resolution	0.01 dB
		Group Delay Correction	±2000 ns
Inputs		Group Delay Resolution	1 ns
DVB-ASI (IN-A, IN-B)	2 inputs: BNC (F), 75 Ω	Peak Power Clip Level	+17 dB to +7 dB
SMPTE-310M (IN-A, IN-B)	2 inputs (optional): BNC (F), 75 Ω		(peak power relative to average RMS level)
GbE Transport Stream (DAB excluded)	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45	Note 1 : Greater improvement is possible under particular applications. Perform depends upon power level and waveform.	
HPA FB	SMA (F), 50 Ω Level: -15 dBm to 0 dBm		
Clock Reference - 10 MHz	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm		
Time Reference - 1 PPS	Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition		
Time Information Input	Connector: RS232 Interface for GPS TOD information (CMMB mode only)		
Monitoring Outputs			
DVB-ASI (OUT-A, OUT-B)	2 outputs: BNC (F) 75 Ω		
RF Monitor	Connector: SMA (F) Impedance: 50 Ω Loval: 20 dB below PE output		

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Level: 30 dB below RF output

June 3, 2014



Model: DVU 7000



Rear Panel

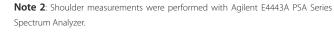
Digital Specifications

RF Output

TIR

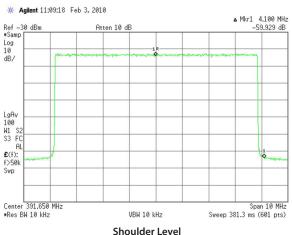
Unique Broadband Systems Ltd.

1			
Connector	N-type (F), 50 Ω		
Frequency Range	470 MHz to 1 GHz 1452 MHz to 1492 MHz (optional)		
Frequency Step Size	1 Hz		
Frequency Stability	Internal reference 0.05ppm / or in accordance with external ref. accuracy		
Spectrum Polarity	Inverted or non-inverted, selectable		
Level	0 dBm to +10 dBm in 0.1 dB step		
Level Stability	± 0.3 dB		
Return Loss	> 20 dB		
Shoulder Level	≤ -55 dBc (Note 2)		
Spurious Level Outside Channel	< -60 dBm		
MER	≥ 50 dB (Note 3)		
Amplitude Flatness	Center frequency ±3.8 MHz: ±0.3 dB (Note 4)		
Group delay response:	Center frequency ±3.8 MHz: ±10 ns (Note 4)		
Phase Noise SSB (measured @ 474 MHz)	10 Hz: < -60 dBc/Hz 100 Hz: < -85 dBc/Hz 1 kHz: < -100 dBc/Hz 10 kHz: < -105 dBc/Hz 100 kHz: < -120 dBc/Hz 1 MHz: < -135 dBc/Hz		



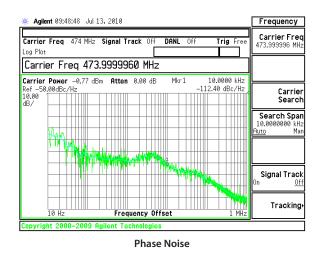
Note 3: MER measurements were performed on a DVB-T waveform with an Agilent E4443A PSA Series Spectrum Analyzer in conjunction with Agilent E9285B Digital Video Analysis Modulation software.

Note 4: Levels are measured in 10 kHz bandwidth, where 0 dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.



D: Symbols/Metri			
	EVM: 0.21642 %rms		
Frequency Error:	-13.342 Hz		
RMS Mag Error: ().158 %rms Peak Ma	g Error: 0.761 %	
RMS Phase Error	: 0.109 degrms Peak	Phase Error: 0.576 c	leg
IQ Gain Imb: 0.00	125 dB - IQ Quad Ske	w: 0.039 deg	
0	00060000	070A0203	0306010C
12	0E020601	06010409	0B0D0C0E
24	0D0D0301	040F000B	0002 01 0A
36	030F0C00	0E0B010D	0B0C010B
48	000E0000	020E0000	0A0A0D01
60	08060101	0001080D	0E0A0900

MER



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Model: DVU 7000



Analog Specifications

Inputs		Power Supply	
Video Input	Connector: BNC (F), 75 Ω	Voltage	100 - 240 VAC
	Return Loss: 30 dB Level: 1 Vpp ±6 dB	Frequency	50 - 60 Hz
Audio Input	XLR (M), 600 Ω	Power Consumption	max. 110 VA
·	Level: 0 dBm ±6 dB	Harmonic Correction	EN61000-3-2
Aural Parameters		Environmental	
FM Noise (Baseband input)	-60 dB at 50 kHz deviation	Operating Temperature	0°C to +50°C (+32°F to +122°F)
Harmonic Distortion	0.5 % (±50 kHz PAL)	Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Frequency Response	±0.5 dB (30 Hz - 15 kHz) for mono input	Relative Humidity	max. 95%
Visual/Aural Separation	±100 kHz from Nominal	(operating/storage)	
		Cooling	4 internal fans to assist natural convection
Visual Parameters			
Amplitude/Frequency	±0.5 dB (-0.75 MHz to +4.8 MHz)	Mechanical	
Response		Size	1 U of 19" wide cabinet
Group Delay	±30ns	Dimension (W x H x D)	483 mm x 44 mm x 568 mm (19" x 1.73" x 22.37")
Differential Phase	$\leq \pm 1.8^{\circ}$	Weight	8 kg (17.6 lbs)
Differential Gain	$\leq \pm 3 \%$	5	Vibration acc. to IEC Publ.68
Low Frequency Linearity	$\leq \pm 3 \%$	Transport and Storage	VIDIATION ACC. TO TEC PUDI.08
ICPM	$\leq \pm 3$ %		
Spurious Emmissions	\leq -47 dB at -5.5 MHz and +11 MHz \leq -50 dB at all other frequencies		
Video SNR	≤ -55 dB (unweighted) ≤ -60 dB (weighted)		
Harmonics	≤ -50 dB		
K-Factor	≤ 2 %		
Intermodulation Products (red field)	≤ -60 dB		
Line Tilt	≤ 2 %		
Field Tilt	≤ 2 %		

Product Specifications

RF Output

Connector	N-type (F), 50 Ω
Frequency Range	470 MHz to 862 MHz
Frequency Step Size	1 MHz
Frequency Stability	< 0.5ppm per 6 months
Level	4 dBm to 14 dBm in 0.1 dB step
Level Stability	±0.3 dB
Audio to Video Ratio	1:10
Permissable VSWR	< 1.5

Control Interfaces Web GUI and SNMP

Connector: Ethernet

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(specifications are subject to change without notice)



Model: DVX 5000

Product Features

- Superior Shoulders and MER
- SFN and MFN Support
- Manual Linear and Non-linear Digital Pre-correctors
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Interfaces for Web GUI, SNMP and Telnet remote control, machine to machine interface and software upgrades
- Control interfaces for HPA and RF (forward and reflected) power monitoring



New Features

DVB-T2, DVB-SHA/SHB

Supports all DVB-T2 modulation features including T2-MI interface support, single and multiple Physical Layer Pipes (PLPs), MFN/SFN operation and SISI/MISO transmission.

Supports all DVB-SHA/SHB modulation features for hybrid satellite/terrestrial broadcasting including SHA COFDM modulation and SHB Time-Division Multiplexing (TDM) as well as intra SHframe time-interleaver compensation to permit code combining at the receiver.

Optional Features

- Adaptive Non-linear Pre-corrector
- Integrated GPS Receiver or GPS/GLONASS Receiver
- Integrated DVB-S/S2 Receiver
- 0 dBm to 10 dBm output
- DVB-SH Code Combing mode
- SNMP parameter set for monitoring of third party UPS

Standards Supported

- ATSC and ATSC-M/H compliant with A/53, A/54, A/64, A/110 and A/153
- CMMB compliant with GY/T 220.1-2006 and 220.2-2006
- DTMB compliant with GB20600-2006 and GY/T 229.1-2008
- DAB, DAB+ and T-DMB compliant with ETSI DAB standards and EU147
- DVB-T/H and DVB-T2 compliant with ETSI standards
- DVB-SH(A) and DVB-SH(B) compliant with ETSI standards
- ISDB-T/T^B compliant with ARIB STD-B31, ARIB STD-B10, ABNT NBR 15601:2007, SBTVD N01 and SBTVD N03
- Proprietary (Sirius | XM Radio)

Frequency Bands

- 470 MHz 860 MHz
- 30 MHz 1000 MHz
- 1452 MHz 1492 MHz
- 1610 MHz 1675 MHz
- 1980 MHz 2010 MHz
- 2100 MHz 2300 MHz
- 2500 MHz 2700 MHz

Model: DVX 5000



Description and Application

Overview

The UBS Universal Exciter Series utilizes the innovative UBS Universal Waveform engine, supporting all world digital standards for terrestrial broadcasting, including hybrid satellite/terrestrial systems.

The modular, state of the art design allows transmitter manufacturers and network operators to integrate the DVX 5000 into a system/network with relative ease. This open architecture design enables carriers to take advantage of a proven, robust platform while designing networks to meet current and future broadcast standards.

The Universal Exciter can be factory configured with the necessary hardware to support one, two or all the waveforms listed above. The user can easily switch from one waveform to another through software selection. UBS' exciters can also be upgraded in the field as standards evolve.

Using the latest technology, UBS has developed a direct conversion process that allows the Universal Exciter to provide an RF output from 470 MHz to 860 MHz with superior shoulders and MER. A range of optional RF outputs including L-Band and S-Band frequencies are also available and suitable for a wide range of international frequency assignments for both terrestrial and satellite uplink systems.

Optionally, the DVX 5000 RS232 interface can be dedicated for communication with a 3rd party UPS. In this case, the exciter is configured with an extra set of SNMP parameters and will actively monitor the UPS.

This series incorporates all of UBS high performance signal processing stages including integrated linear and non-linear pre-correctors. Full remote management and control as well as remote firmware and waveform upgrades are provided.

Signal Inputs

The DVX 5000 is provided with two serial DVB-ASI inputs and two serial G.703/G.704 inputs. The DVB-ASI inputs accept a MPEG-2 TS, a CMMB multiplex stream or an ISDB-T/TB multiplexed TS. The G.703/G.704 inputs are used in DAB mode and accept either NA or NI signals. Optionally, two serial SMPTE-310M inputs can be installed.

The DVX 5000 also supports a GbE Transport Stream input based on Pro-MEG CoP #3 / SMPTE 2022 protocol (DAB and DVB-T2 excluded).

The DVB-ASI, G.703/G.704 and SMPTE-310M inputs can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary transport stream in case the primary transport stream source fails (a truly valuable feature for broadcast applications).

RF Output

The standard RF output covers a frequency range of 470 to 860 MHz in 1 Hz steps. 30 MHz to 1 GHz as well as L-Band and S-Band frequencies are available.

The output level is adjustable from -10 dBm to 0 dBm (0 dBm to 10 dBm optional), in 0.1 dB steps and the user can set the polarity of the spectrum to Inverted or Non-inverted as required.

Adaptive Non-linear Pre-corrector

The Adaptive Non-linear Pre-corrector is a superior pre-distortion solution that compensates for RF Power Amplifier non-linearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance.

The complex signal processing is done in the RF domain and supports a fully adaptive operation: the feedback signal (HPA output) is compared to the exciter's RF output signal (HPA input) in order to optimize the correction which will improve the shoulders of the RF output.

The Adaptive Non-Linear Pre-Corrector is not recommended for satellite uplink applications as it can only correct for the signal distortion from the ground-based transmitter and not the full signal path distortion. The Manual Pre-Corrector can be configured for the full system path.

Manual Linear and Non-linear Digital Pre-correctors

The manual linear and non-linear digital pre-correctors are used to maximize the performance of the transmitter in which the exciter is installed.

- The Non-linear pre-corrector balances out gain and phase non-linearity in the transmitter RF power amplifier, thereby significantly reducing the in-band and out of band intermodulation products. Optimizing the transmitter's performance will extend the coverage area. The performance requirement of the transmitter output filter, which is used to suppress radiation in adjacent channels below a maximum allowed level, will also be eased.
- The Linear pre-corrector balances out level and group delay variations that are seen across the channel bandwidth and caused by the transmitter mask filter and/or channel combiner filters. The linear optimization of the transmitter's radiated signal allows the receiver's channel equalizer to focus all of its correction capacity on level and group delay errors originating from the actual transmission path.

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Model: DVX 5000

Description and Application

Web Interface

This feature allows remote control of the DVX 5000 via Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the exciter. The Web Interface concept is popular because remote control with this system only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

This feature allows remote control of the DVX 5000 in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Optionally, the DVX 5000 RS232 interface can be dedicated for communication with a 3rd party UPS. In this case, the exciter is configured with an extra set of SNMP parameters and will actively monitor the UPS.

Machine to Machine Interface

Depending on the waveform selected, the Universal Exciter RS232, RS485 or Ethernet ports can be used as a machine to machine interface. This is a valuable feature when control of an external power amplifier is required.

Internal GPS Receiver or GPS/GLONASS Reciver (optional)

The DVX 5000 can be equipped with an internal GPS or GPS/GLONASS receiver. In this case, the frequency references for the exciter and upconverter are derived from the internal GPS or GPS/GLONASS receiver.

DVB-S/S2 Receiver (optional)

With the addition of an integrated DVB-S/S2 Receiver, the DVX 5000 can demodulate an incoming signal and rebroadcast at a different frequency.

Product Specifications | Signal Processing

CMMB Mode	
FFT Mode	4K
Guard Interval	1/8
Code Rate (LDPC)	1/2, 3/4
Constellation	BPSK, QPSK
Byte Interleave	Mode 1, Mo

K, 16-QAM Mode 1, Mode 2, Mode 3 **Reed Solomon Coding** RS(240,240); RS(240, 224); RS(240,192); RS(240,176) 0, 1, 2, 3, 4, 5, 6, 7 Number of Time Slots 40 Number of simultaneous 40 SFN and MFN 8 MHz **Transmission Time delay** Adjustable, range: ±500 ms, step 100 ns CMMB Multiplex Stream or GbE

RS232 serial port for GPS TOD Information

DTMB Mode FFT Mode

FFT Mode	3780, Single Carrier
Guard Interval	945, 595, 420 symbols
Code Rate	0.4, 0.6, 0.8
Constellation	QPSK, 4QAM-NR, 16-QAM, 32-QAM, 64-QAM
Frame Duration	500 us, 666.67 us or 571.43 us
Sub-carrier Spacing	1.5 kHz, 1.75 kHz, 2 kHz
Time Interleaver	240, 720 symbols
Network Mode	SFN and MFN
Bandwidth	8 MHz, 7 MHz, 6 MHz
Input	MPEG-2 Transport Stream or GbE TS

Time Information Input

Scrambling Modes

multiplexed frames Network Mode

Bandwidth

Input

Model: DVX 5000



Product Specifications | Signal Processing

DVB-T/H Mode		ATSC Mode	
FFT Mode	2k, 4k, 8k	Supported Mode	8VSB, M/H
Guard Interval	1/4, 1/8, 1/16,1/32	Network Mode	SFN and MFN
Code Rate	1/2, 2/3, 3/4, 5/6, 7/8	Bandwidth	6 MHz
Constellation	QPSK, 16-QAM, 64-QAM	Input	MPEG-2 Transport Stream, SMPTE-310M or
Hierarchical Mode	Alpha - 1, 2 and 4 for 16-QAM and 64-QAM		GbE TS
Network Mode	SFN and MFN		
Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz	ISDB-T/TB Mode	
Input	MPEG-2 Transport Stream or GbE TS	FFT Mode	2k, 4k, 8k
		Guard Interval	1/4, 1/8, 1/16,1/32
DVB-T2 Mode		Code Rate	1/2, 2/3, 3/4, 5/6, 7/8
FFT Mode	1k, 2k, 4k, 8k, Extended 8k, 16k,	Constellation	QPSK, 16-QAM, 64-QAM, DQPSK
	Extended 16k, 32k, Extended 32k	Hierarchical Mode	up to 3 layers
Guard Interval	1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4	Carrier Spacing	1 kHz, 2 kHz, 4 kHz
Code Rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6	Time Interleaver	0 to 16
PLP Constellation	QPSK, 16-QAM, 64-QAM, 256-QAM	Network Mode	Hierarchical, SFN (IIP packets) and MFN
L1 Post Constellation	(normal or rotated)	Bandwidth	6 MHz
FEC	BPSK, QPSK, 16-QAM, 64-QAM	Input	ISDB-T/TB Multiplexed Transport Stream or
Network Mode	Short (16k), Normal (64k) MFN, SFN-SISO, SFN-MISO		GbETS
Bandwidth	1.7 MHz, 5 MHz, 6 MHz, 7 MHz, 8 MHz,		
banawiath	10 MHz	DAB Mode	
Time Interleaving	Adjustable	Transmission Mode	I, II, III, IV Automatically selected from the ETI stream
Pilot Pattern	PP1 to PP8		or set via any control interface
Input	T2-MI control Input steam monitoring	Processing Delay	Mode I: 156000 usec, Mode II: 84000 usec Mode III: 84000 usec, Mode IV: 108000 usec
	PCR restamping TS Bit Rate Adaptation	Transmitter Delay	Up to 2.4 sec, step 1 usec
		Transmitter Offset Delay	0 to 2047 usec, step 1 usec
DVB-SHA/SHB Mode		Network Padding Delay	0 to 1.5 second
Multiplexing Schemes	ofdm (A), Tdm (B)	MNSC Control	Transmitter Identification Information (TII)
OFDM FFT Mode (A)	1k, 2k, 4k, 8k	Input Signal	ETI (NI) 2.048 MHz short haul or ETI (NA) for E1 interface - ETSI 300 799
Guard Interval (A)	1/4, 1/8, 1/16,1/32	Input Selection	Dual NA with seamless switchover
Code Rate (A)	1/2, 1/3, 1/4, 1/5, 2/3, 2/5, 2/7, 2/9		NI or NA with automatic detection Manual lock to input 1 or 2
Constellation (A)	QPSK, 16-QAM	Input Error Condition	Input CRC violations (User selectable)
Network Mode (A)	SFN and MFN	Test Mode	

DAB mode I, II, III, IV, CW mode, Two tone, 24-tone, 48 tone, 96 tone comb

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Input (A & B)

TDM Mapping (B)

Turbo Code (A & B)

Bandwidth (A & B)

TDM Roll-off Factor (B)

Time Interleaver (A & B)

QPSK, 8-PSK, 16-APSK

8 MHz, 7 MHz, 6 MHz, 5 MHz, 1.7 MHz

MPEG-2 Transport Stream or GbE TS

From 100 ms to several seconds

0.15, 0.25, 0.35

3GPP2 encoding

(specifications are subject to change without notice)

Test Mode



Front Panel

Product Specifications

Inputs			Control Interfaces	
DVB-ASI	IN-A, IN-B	2 inputs: BNC (F), 75 Ω	Front Panel	LCD display and cursor/ execute keys
G.703/G.704 SMPTE-310M	IN-A, IN-B IN-A, IN-B	2 inputs: BNC (F), 50 Ω 2 inputs (optional): BNC (F), 75 Ω	Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
	,	Protocol: Pro-MPEG CoP #3 /	USB Interface	Connector: USB Type B
GbE Transport St (DAB excluded)	iream	SMPTE 2022 Connector: RJ45	RS232 Interface	Connector: 9-pin SUB-D Male Serial port for GPS TOD information (CMMB mode only)
HPA FB		SMA (F), 50 Ω	RS485 Interface	Connector: 9-pin SUB-D Female
Clock Reference (Note 1)	- 10 MHz	Connector: BNC (F), 50 Ω Frequency: 10 MHz	I/O Interface	Connector: 9-pin SUB-D Female
(Note I)		Level: 0 dBm to 15 dBm	.,	,
Time Reference -	1 PPS	Connector: BNC (F), 50 Ω	CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
(Note 1)		Frequency: 1 PPS Level: TTL Trigger: Positive transition	Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
Time Information	n Input	Connector: RS232 Interface for GPS TOD information (CMMB mode only)	SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
Monitoring O	outputs		Alarm Relays	Connector: RS232, RS485 and I/O 2 Dry Contact Alarm relays, triggered by any major alarm.
-	DUT-A, OUT-B	2 outputs: BNC (F) 75 Ω	Machine to Machine	Connector: Ethernet for all waveforms
G.703/G.704 C	OUT-A, OUT-B	2 outputs: BNC (F), 50 Ω	Interface	or RS485 for all waveforms or RS232 for all waveforms
RF Monitor		Connector: SMA (F) Impedance: 50 Ω Level: 30 dB below RF output		except CMMB
Reference Monit	or	Connector: BNC (F) Frequency: 10 MHz Level: 2 Vpp Impedance: 50 Ω		
Clock Reference (Note 1)	- 10 MHz	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave		
Time Reference - (Note 1)	1 PPS	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition		

Note 1: The "10MHz" and "1pps" are inputs, except when the exciter is equipped with an internal GPS receivers, where they become Monitoring Outputs (high impedance).

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June 16, 2014

Model: DVX 5000





Rear Panel

Product Specifications

RF Output

RF Output		Adaptive Non-linear Pre	e-correction	
Connector	N-type (F), 50 Ω	HPA FB Connector	To be coupled from the PA output	
Frequency Range	470 MHz - 860 MHz 30 MHz - 1000 MHz		when the Adaptive Pre-corrector is used	
	1452 MHz - 1492 MHz 1610 MHz - 1675 MHz	Frequency	470 MHz - 860 MHz 1600 MHz - 2800 MHz	
	1980 MHz - 2010 MHz 2100 MHz - 2300 MHz 2500 MHz - 2700 MHz	Spectral Regrowth Reduction	7 dB ±2 dB (Note 5)	
Frequency Step Size	1 Hz			
Frequency Stability	Internal reference 0.05ppm / or in	Manual Digital Pre-Correction		
	accordance with external ref. accuracy	Non-Linear Pre-Correction		
Spectrum Polarity	Inverted or non-inverted, selectable	Curve Formats	S 21 and VO/VI	
Level	-10 dBm to 0 dBm in 0.1 dB step (optional 0 dBm to 10 dBm)	Amplitude Scale	Linear and Logarithmic	
Level Stability	$\pm 0.3 \text{ dB}$	Correction Points	Max. 256, user-defined position	
Return Loss	> 20 dB	Spectral Regrowth Reduction	Max. 12 dB, subject to available headroom	
Shoulder Level	≤ -55 dBc @ UHF band (Note 2) ≤ -50 dBc @ other bands	Phase Correction	-6 to +30 degrees, subject to available headroom	
Spurious Level Outside Channel	< -60 dBm	Linear Pre-Correction		
MER	≥ 45 dB (Note 3)	Correction Points	61	
	\geq 42 dB for DVB-T2	Point Spacing	1/60 of nominal spectrum BW	
Amplitude Flatness	Center frequency ±3.8 MHz: ±0.3 dB	Amplitude Correction	±10 dB	
	(Note 4)	Amplitude Resolution	0.01 dB	
Group delay response:	Center frequency ±3.8 MHz: ±10 ns (Note 4)	Group Delay Correction	±2000 ns	
Phase Noise SSB	10 Hz: < -60 dBc/Hz	Group Delay Resolution	1 ns	
(measured @ 474 MHz)	100 Hz: < -85 dBc/Hz 1 kHz: < -100 dBc/Hz 10 kHz: < -105 dBc/Hz 100 kHz: < -120 dBc/Hz 10 kHz: < -120 dBc/Hz 1 MHz: < -135 dBc/Hz	Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)	
DAB Output Spectrum	Compliant with ETS 300 401			

Note 2: Shoulder measurements were performed with Agilent E4443A PSA Series Spectrum Analyzer.

Note 3: MER measurements were performed on a DVB-T waveform with an Agilent E4443A PSA Series Spectrum Analyzer in conjunction with Agilent E9285B Digital Video Analysis Modulation software.

Note 4: Levels are measured in 10 kHz bandwidth, where 0 dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.

Note 5: Greater improvement is possible under particular applications. Performance depends upon power level, frequency and waveform.

Document DVX-5000-S07-08

Mask

(specifications are subject to change without notice)



Model: DVX 5000

Product Specifications

GPS Receiver		GPS/GLONASS Receive	r
Input Connector	F-type (F), 75 Ω 5 Vdc biased	Input Connector	F-type (F), 75 Ω 5 Vdc biased
Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent	Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent
Receiver Architecture	L1 1575.42 MHz	Receiver Architecture	L1 - 1575.42 MHz / GLONASS - L1 frequency range
12 Parallel Channels	C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking)	32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided
Tracking Capability	12 simultaneous satellite vehicles		tracking)
Acquisition Time (Time To First Fix, TTFF)	< 15 seconds typical TTFF-hot (with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)	Tracking Capability Acquisition Time (Time To First Fix, TTFF) (Tested at –40°C to +85°C)	24 simultaneous satellite vehicles < 15 s typical TTFF-hot (with current almanac, position, time and ephemeris) < 40 s typical TTFF-warm (with current almanac, position, time)
Positioning Accuracy	< 5 m, 1 - sigma < 10 m, 2 - sigma		< 150 s typical TTFF-cold (No stored information)
Timing Accuracy	< 2 ns, 1 - sigma < 6 ns, 6 - sigma	Positioning Accuracy	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Holdover Time	±1 usec during 2 hours	Timing Accuracy	< 100 ns
10 MHz Output Signal	Internally connected to the exciter input	1 PPS + 10 MHz	
	Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -40 dBc max.	Holdover Time	\leq 2.5 µsec during 2 hours
	Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz	10 MHz Output Signal	Internally connected to the exciter input Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -30 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz
1PPS Output Signal	Internally connected to the exciter input Level: TTL		10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz
		1PPS Output Signal	Internally connected to the exciter input Level: TTL
Power Supply		Environmental	
Voltage	100 - 240 VAC	Operating Temperature	0°C to +50°C (+32°F to +122°F)
Frequency	50 - 60 Hz	Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Power Consumption	max. 45 VA (70 VA with +10 dBm RF amplifier and GPS receiver installed)	Relative Humidity (operating/storage)	max. 95%
Harmonic Correction	EN61000-3-2	Cooling	Temperature controlled fan to assist natural convection
Mechanical			
Size	1 U of 19" wide cabinet		
Dimension (W x H x D)	483mm x 44mm x 521mm (19" x 1.75" x 20.5")		
Weight	6 kg (13 lbs)		
Transport and Storage	Vibration acc. to IEC Publ.68		

Document DVX-5000-S07-08

(specifications are subject to change without notice)

June 16, 2014



Wireless Broadband and Broadcasting Solutions

Universal Adaptive Pre-Corrector

Model: UAP 2011

Product Features

- Fully Adaptive Compensation
- Linearization of Class A/AB and Doherty amplifiers with one or more input carriers
- 470 MHz 860 MHz operating frequency range
- Supports an input signal bandwidth up to 60 MHz
- Support input Peak-to-Average ratios of 10 dB
- Up to 26 dB ACLR improvement
- Low power consumption
- Highly informative PC GUI included



Optional Frequency Range

• 1600 - 2800 MHz

Supported Standards

- ATSC, ATSC-M/H, ISDB-T/T^B, DVB-T/H, DVB-T2, DVB-SHA/ SHB, CMMB, DTMB and MediaFLO
- DAB, DAB+ and T-DMB
- WiMax and LTE
- WCDMA, TD-SCDMA, CDMA2000 and Multi-carrier GSM

Product Description

The standalone Universal Adaptive Pre-corrector is an RF-in / RF-out predistortion solution that compensates for RF Power Amplifier non-linearities including AM/AM and AM/PM distortion, spectral regrowth, and error vector magnitude (EVM).

With the UAP 2011, the complex signal processing is done in the RF domain and offers a wide signal bandwidth, broad frequency of operation, and very low power consumption.

Applicable across a broad range of signals including 2G, 3G, 4G wireless, and other modulation types, the powerful pre-corrector engine is capable of linearizing the most efficient power amplifier topologies. The UAP 2011 is a true RF-in / RF-out solution, supporting modular power amplifier designs that are independent of the baseband and transceiver subsystems.

The Universal Adaptive Pre-corrector is a fully-adaptive device that compares the power amplifier's input signal to its output feedback signal so that the correction function can be optimized. The correction function is applied to the transmit signal, solely using RF-domain analog signal processing and is controlled by embedded firmware.

The standalone design allows operators to retrofit existing systems without having to replace any equipment.

The Universal Adaptive Pre-corrector has a PC GUI application and RS232 (RS485 optional) ports for monitoring functions.

Document 57149-01-S07-02

Universal Adaptive Pre-Corrector

Model: UAP 2011



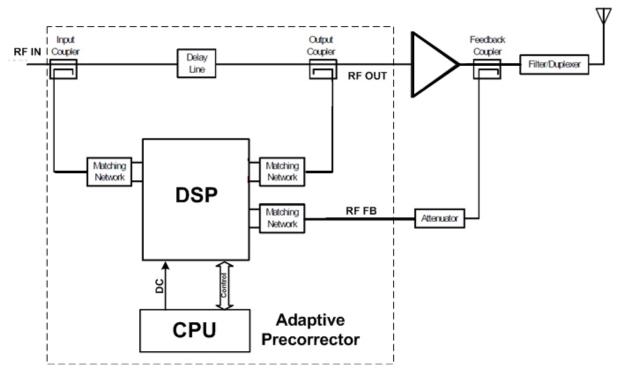
Product Specifications

RF Input		Power Supply	
Connector	SMA (F), 50 Ω	Voltage	12 Vdc
Power Level	-10 dBm to 0 dBm	Power Consumption	10 Watts max.
RF Feedback		Mechanical	
Connector	SMA (F), 50 Ω	Dimensions	164.8 mm x 29.5 mm x 92.2 mm
Power Level	-10 dBm to +10 dBm	(W x H x D)	(6.45" x 1.162" x 3.63")
		Weight	0.5 kg (1.1 lbs.)
RF Output			
Connector	SMA (F), 50 Ω	Environmental	
Power Level	-10 dBm to 0 dBm	Operating Temperature	+5°C to +45°C (+41°F to +113°F)
	(Output level is equal to input level. Down to	Storage Temperature	-30°C to +75°C (-22°F to +158°F)
	-20 dBm possible with attenuation offset)	Relative Humidity	max. 95%, non condensing
		Cooling	Natural convection
Control and Commur	ication Interfaces		

RS232 or RS485

Connector: DB-9 (F) Protocol: UBS Pre-corrector GUI

Application Block Diagram





RF Switch Model: URS 1000

Product Features

- 0.3 MHz to 3 GHz operating frequency range
- Web GUI interface allow for automatic or manual switching
- Serial interface allows for automatic switching via dry contacts
- Front panel push button provides manual switching override
- Front panel LED's indicate the switch's position
- Web GUI provide remote or local control and monitoring



Product Description

The URS 1000 RF Switch is a single pole, two position RF switch designed to operate in a transmitter system where a redundant device (Modulator, SFN Adapter, DTx Adapter, etc.) is required. The URS 1000 RF inputs accept a modulated RF signal, DVB-ASI signal or SMPTE 310M signal.

Typically, the URS 1000 RF inputs are connected to the output of main and redundant devices. The main device must be equipped with a dry contact alarm relay, which is connected to the URS 1000 switch control serial port. The main device's alarm relay must be normally open and configured to close when a user defined device alarm occurs. This will force the URS 1000 to switch to the redundant input. Upon removal of the alarm (closing of the alarm relay), the URS 1000 would be automatically switched back to the main input.

The front panel includes a Manual Control push button, allowing the user to switch between main and redundant RF inputs and a set of front panel LED's which indicate the switch's current position. The URS 1000 can also be equipped with optional redundant AC-DC power supplies. In the event that one power supply should fail, the second power supply will continue to provide DC power to the internal sub-assemblies.

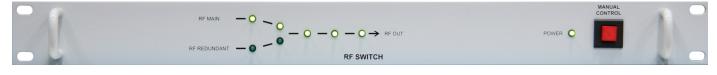
The URS 1000 can be controller remotely using a standard Web browser, a text based XML page or Modbus/TCP.

Document 55506-04-S07-01

RF Switch

Model: URS 1000





Front Panel



Rear Panel

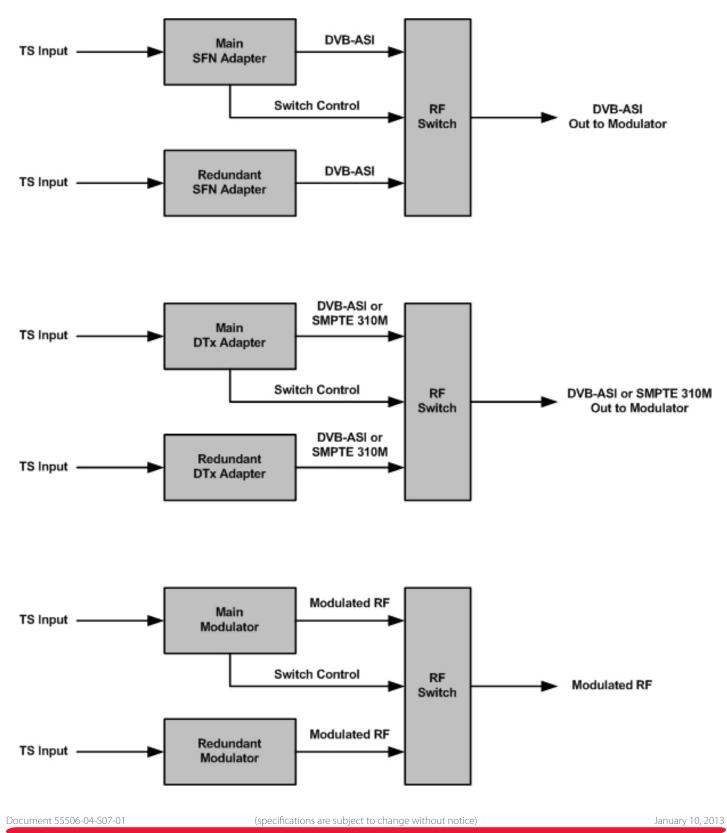
Product Specifications

RF Interfaces		Power Supply	
Frequency Range	0.3 MHz to 3 GHz	Voltage	100 - 240 VAC
Power Level	25 dBm	Frequency	50 - 60 Hz
RF Main Connector	SMA (F), 50 Ω	Power Consumption	max. 50 VA
RF Redundant Connector	SMA (F), 50 Ω		
RF Output Connector	SMA (F), 50 Ω	Environmental	
Isolation	min. 60 dB (0.3 MHz to 900 MHz)	Operating Temperature	0°C to +50°C (32°F to +122°F)
VCMD	min. 35 dB (900 MHz to 3 GHz)	Storage Temperature	-30°C to +70°C (-22°F to +158°F)
VSWR	max. 1.20 (0.3 MHz to 900 MHz) max. 1.40 (900 MHz to 3 GHz)	Relative Humidity	max. 95%, non condensing
		Cooling	Internal fans to assist natural convec- tion
Control Interfaces			
Front Panel	LED status indicators and manual push button switch control	Mechanical	
Ethernet	Connector: RJ-45	Size	1 U of 19" wide cabinet
	Speed: 10/100 Base-T	Dimensions (W x H x D)	483mm x 44.5mm x 362mm
Web GUI	Internet Explorer, Firefox, etc. Connector: RJ-45 Ethernet		(19" × 1.75" × 14.25")
Modbus/TCP	Connector: RJ-45 Ethernet	Weight	3.6 kg (8 lbs.)
Serial Switch Control	DB9 (female)		



RF Switch Model: URS 1000

Application Block Diagrams





Model: UNA 7000

Product Features

- Multi-Standard (DVB-T or DTMB) SFN Adapter option
- CMMB Multiplexer option
- DTx Adapter option
- ATSC-M/H Multiplexer option
- ISDB-T/TB Multiplexer/Re-multiplexer option
- DVB-ASI to IP Bridge option
- Front Panel, Web GUI, CLI, Telnet and SNMP interfaces provided for local or remote control and software upgrades



Description and Application

Overview

Based on Advanced UBS Technology, the new Universal Network Adapter can be configured as a Multi-Standard SFN Adapter, CMMB Multiplexer, DTx Adapter, ATSC-M/H Multiplexer, ISDB-T/TB Multiplexer/Re-multipler or DVB-ASI to IP Bridge.

The new Advanced design allows UBS to manufacture the Universal Network Adapter in less time and with even greater reliability and serviceability. None of the features known to the individual products will be sacrificed.

This open architecture design enables users to take advantage of a state of the art design, while planning networks to meet current and future broadcast needs.

Web Interface

This feature allows local and/or remote control of the UNA 7000 via an Ethernet interface and is based on an internal Web server.

The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for monitoring the status and modifying the UNA 7000 parameters. The Web pages are customized for each individual product option.

The Web Interface concept is popular as remote control only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

This feature allows remote control of the UNA 7000 in accordance with SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Model: UNA 7000

Multi-Standard SFN Adapter

Features

- DVB-T or DTMB waveform support
- DVB-T waveform supports MIP insertions and hierarchical mode
- DTMB waveform supports SIP insertion
- SFN time and frequency synchronization

Description and Application

Overview

For the operation of digital terrestrial TV networks (DVB-T or DTMB), where several transmitters broadcast the same programs on the same RF channel frequencies (Single Frequency Networks), the transmitters require precise frequency and time synchronization. The frequency (10 MHz) and time (1PPS) reference signals can be obtained from a GPS receiver at each transmission site.

The SFN Adapter fulfils the task of inserting "synchronization marks" (MIP or SIP packets) in a MPEG transport stream in full accordance with DVB-T and DTMB standards.

The basic functions performed by the SFN Adapter are:

- Insert a megaframe or second frame initialization packet (MIP or SIP) into an MPEG transport stream
- Adjust the bitrate of the transport stream to be synchronous with an external reference, and in accordance with the chosen transmission mode
- Provides signaling/mode data for the control of individual transmitters or modulators

Compliant with ETSI standards: EN 300 744 and TS 101 191 Compliant with Chinese standards: GB20600-2006, GY/T 229.1-2008

MIP Insertion (DVB-T Mode)

MIP insertion occurs once per megaframe, with a time interval dependent on the selected guard interval.

The MIP indicates when the first packet in a mega-frame (Synchronization Time Stamp, STS) begins transmitting.

The time reference is an external 1 pulse per second signal, obtained from a GPS receiver.

- Selectable ASI inputs and outputs
- Bit rates adjusted with transmission mode
- GbE transport stream input/output (optional)
- Dual channel operation (optional)
- Internal GPS (optional)

SIP Insertion (DTMB mode)

SIP insertion occurs once per second and is synchronized with the 1PPS signal from a GPS receiver. The SIP contains the transmission parameters for the modulator and the SFN maximum delay.

Bitrate Adaptation

The SFN Adapter is provided with two serial (ASI) inputs that accept an MPEG transport stream according to DVB recommendations (188 or 204 byte packets). The output may be configured as either 188 or 204 byte packets for DVB-T/H mode. In DTMB mode, only 188 byte packets are supported.

Note: the maximum bitrate has to include the inserted MIP or SIP, which means the input net bitrate must be slightly lower than the output bitrate.

The SFN Adapter removes null packets from the input signal and inserts MIP or SIP packets. New null packets are then added to produce a precise output bitrate, which is required for the selected transmission mode (dependent on code rate, constellation and guard band). The maximum allowable net bitrate is governed by the selected transmission mode. As the transport rate is modified, the SFN adaptor performs PCR re-stamping.

GbE Transport Stream Input/Output (optional)

The IP-ASI/ASI-IP Bridge option allows the UNA 7000 to accept a GbE transport stream on either of its Ethernet ports and/or provide a GbE transport stream output (with MIPs) on either of its Ethernet ports according to Pro-MPEG Forum CoP #3 / SMPTE 2022.

Dual Channel Operation (optional)

Dual Channel operation allows the UNA 7000 to process two transport streams, on separate logical channels (CH_A and CH_B), at the same time.

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Model: UNA 7000

CMMB Multiplexer

Features

- The CMMB Multiplexer provides frame generation that is compliant with Mobile Multimedia Broadcasting specifications
- One or two frequencies, user configured Upgradable to up to 6 frequencies
- Up to 160 services
- IPv4 and IPv6 support
- Control Information Table generation: NIT, CMCT, CSCT, SMCT, SSCT, ESG Basic Description Table, Urgent Broadcast Table and Conditional Access Table
- 8 MHz Bandwidth
- Three modes of interleaving
- 1/2 and 3/4 LDPC Code Rates
- Internal GPS (optional)
- Hot Swapping between main and backup multiplexers (optional)

Description and Application

Multiplexing is used to encapsulate multiple Audio, Video, and Data services and Control information in Multiplex Frames (MMB Part 1, 2).

The main functions of the multiplexer are to receive the incoming data, prepare control and service information tables, encapsulate the data in frames depending on the data type and classification criteria, schedule time slots maintaining appropriate FIFO levels and distribute the multiplexed service and control tables as MPEG-2 TS packets to modulators through ASI interfaces.

The multiplexer can be used in two possible scenarios: at the Head-End as a central multiplexer of global services, simultaneously multiplexing one or two networks (1), or locally as a multiplexer of local content (2). The multiplexer is designed to satisfy the requirements in both scenarios and operate in either of them with minimal configuration.

Standards Compliance

- Mobile Multimedia Broadcasting Part 1: Framing Structure, Channel Coding and Modulation for Broadcasting Channel, CMMB
- Mobile Multimedia Broadcasting Part 2: Multiplexing, CMMB Technical Working Group
- Mobile Multimedia Broadcasting Part 3: ESG Guide
- Mobile Multimedia Broadcasting Part 4: Urgent Broadcast
- Mobile Multimedia Broadcasting Part 5: Data Broadcast
- Mobile Multimedia Broadcasting Part 6: Conditional Access
- Mobile Multimedia Broadcasting System Multiplexer Technical Requirement V2.10
- Mobile Multimedia Broadcasting System: Encryption & Authorization Multiplexing V2.01
- H.264 Final Draft, ISO/IEC 14496-10 AVC
- Internet Protocol, RFC 0760
- Internet Protocol, Version 6 (IPv6), RFC 2460
- User Datagram Protocol, IEN-88
- RTP: A Transport Protocol for Real-Time Applications, RFC 3550
- SDP Session Description Protocol, RFC 2327
- RTP Payload Format for H.264 Video, RFC 3984
- RTP Payload Format for AC-3 Audio, RFC 4184
- RTP Profile for Audio and Video Conferences with Minimal Control, RFC 1890
- ISO/IEC 13818-1

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Model: UNA 7000

DTx Adapter



Features

- Fully compliant with ATSC standard A/110:2011
- ASI and SMPTE 310M (optional) inputs and outputs
- Integrated GPS Receiver provides 10 MHz and 1 PPS reference signals
- Optional SMPTE 310M inputs and outputs allow for ASI to SMPTE 310M conversion or SMPTE 310M to ASI conversion
- Web, SNMP and Command Line Interfaces are provided for local and remote control and software upgrades

Description and Application

The UNA 7000 design is based on the UBS Advanced Universal Modulator board, customized to operate as an ATSC Distributed Transmission (DTx) Adapter, according to ATSC standard A/110:2011.

The basic function of the DTx Adapter is to insert Cadence Sync Points (CSP), Transmitter Control Packets (TCP) and optionally Dummy Data Bytes Channel and the Field-Rate Side Channel into an MPEG-2 transport stream. The result is an MPEG-2 transport stream output that can be used to synchronize multiple transmitters operating in a single frequency network (SFN).

The DTx Adapter also includes an internal GPS receiver that provides 10 MHz and 1PPS reference signals needed for transport stream generation.

Optional SMPTE 310M inputs and outputs allow the user to configure the DTx Adapter as an ASI to SMPTE 310M or SMPTE 310M to ASI converter.



Model: UNA 7000

ATSC-M/H Multiplexer

Features

- Fully compliant with ATSC-M/H Standard A/153
- Carries DTV services for mobile/pedestrian/handheld receiving devices
- ATSC M/H is backward-compatible with existing digital TV receivers
- Carries ATSC legacy DTV services
- Input M/H data is delivered over the IP datagrams
- Input M/H traffic support for IPv4, IPv6
- Supports constant and variable IP sources
- Packet filtering based on IP Address and port
- Reed-Solomon and SCCC Encoding user specified
- Easy integration into an SFN network
- Loss free handover using SFN
- Provides "burst mode" for M/H data transmission (i.e. enables the receiver to save energy by cycling power)
- Provides signaling data for M/H receivers
- Transport stream recording and playback
- Integrated GPS Receiver provides 10 MHz and 1 PPS reference signals

Description and Application

The ATSC-M/H Multiplexer provides DTV services to mobile/pedestrian/ handheld receivers. It is a fully ATSC-M/H Standard compliant device that supports all ATSC-M/H modes.

The multiplexer processes both the IP traffic (carrying M/H services for mobile, pedestrian and handheld M/H receivers) and the existing legacy ATSC services into one combined ATSC-M/H compliant MPEG-2 ASI output transport stream.

The multiplexer provides mobile/pedestrian/handheld broadcasting DTV services using a portion of the ~19.39 Mbps ATSC 8-VSB payload, while the remainder is available for HD and/or multiple SD television services.

The ATSC-M/H Multiplexer consists of two sections:

1. ATSC M/H Pre-Processor 2. ATSC M/H Exciter (post-processing and transmission)

The ATSC M/H Pre-Processor represents the first stage of the M/H data processing and receives two different types of input streams:

- The legacy service (main) MPEG-2 transport stream packets are delivered to the multiplexer through the ASI input interface.
- The M/H video and audio IP datagrams are delivered to the multiplexer through the Ethernet interface.

The ATSC M/H Pre-Processor combines both of these streams and forms an MPEG-2 ASI transport stream, which is subject further processing and modulation by the ATSC-M/H Exciter.

The M/H data delivered to the ATSC M/H Pre-Processor is partitioned into Ensembles, each of which contains one or more services. Each Ensemble uses an independent RS Frame, and furthermore, each Ensemble may be coded to a different level of error protection using Reed Solomon and SCCC coding.

M/H encoding includes FEC at both the packet and trellis levels, plus the insertion of the long and regularly spaced training sequences into the M/H data. Robust and reliable control data is also inserted into the output stream by the Pre-Processor for use by the mobile/pedestrian/ handheld M/H receivers.

The ATSC M/H Pre-Processor supports the "burst mode" of M/H data transmission, which allows the M/H receivers to save energy by power cycling their tuners and demodulators.

Model: UNA 7000

ISDB-T/TB Multiplexer/Re-multiplexer



Product Features

- Multiplexes streams compatible with MPEG-2 TS
- Compatible with TS (188 bytes) and BTS (204 bytes) inputs
- PSI/SI information generation with data descriptors insertion
- Allows configuration of PSI/SI tables and the respective transmission layer definition
- Stored PSI/SI tables transmission
- Filtering and remapping of input PIDs and PCR correction
- SFN Network configuration
- Compliant with ABNT NBR 15601 recommendations
- ISDB-T and ISDB-T^B compliant
- Allows GINGA interactivity transmission generated by external functions implementer
- Allows Closed Caption transmission generated by external functions implementer
- Allows EPG transmission generated by external functions implementer
- Allows OAD transmission generated by external functions implementer
- Management and updating are performed remotely using an embedded Web server

Description and Application

The UNA 7000 is a Multiplexer and Re-multiplexer developed for ISDB-T and ISDB-T^B digital television standards.

The UNA 7000 supports multi-programming according to the needs of the broadcaster. Additionally, it allows editing of PSI/SI tables, IIP packet generation and Single Frequency Network (SFN) operation.

The multiplexer has 2 input channels (ASI) and 2 copies of the BTS output channel (ASI). Additional ASI inputs (up to a total of 6 input) and 2 IP inputs could be supported as an option.

System management and upgrades are performed remotely over the network via Ethernet.

Optional Features

- GbE (IP) input according to Pro-MPEG CoP #3 / SMPTE 2022
- 4 additional ASI inputs
- Integrated GPS Receiver which provides 10 MHz and 1 PPS reference signals



Model: UNA 7000

DVB-ASI to IP Bridge

Features

- DVB-ASI-to-IP and IP-to-DVB-ASI modes of operation
- Forward Error Correction support according to Pro-MPEG Forum CoP #3 / SMPTE 2022
- SFN Network preservation (SFN over IP)
- Internal or external 10 MHz reference clock and drift correction
- Low induced PCR jitter
- Low processing latency
- Protection against IP network jitter
- Configurable input buffer size for IP packets

Description and Application

In today's broadcast environment, IP networks have become a very important part in the distribution of digital video streams.

The DVB-ASI-to-IP Bridge is designed to achieve the highest performance, while satisfying all requirements of MPEG transport stream distribution in SFN networks. It provides DVB-ASI-to-IP or IP-to-DVB-ASI conversion and can be used to transfer a MPEG transport stream through an IP network.

The unit supports full DVB-ASI bandwidth operation (up to 216 Mbps) on both Ethernet ports and simultaneous operation in both directions.

Different combinations of four DVB-ASI ports and two Gigabit Ethernet ports are possible. Data and Control IP streams can be applied to either Ethernet port.

Characteristics

- 6x DVB-ASI inputs
- 8x DVB-ASI outputs
- 2x Gigabit Ethernet ports (Control and/or Data)
- Software selectable configurations
- Throughput limited by the maximum DVB-ASI bandwidth of 216 Mbps
- Each Ethernet port can support the combined bandwidth of 8 DVB-ASI ports
- Automatic input MPEG TS packet size detection (188/204 bytes)
- 1 to 7 MPEG TS packets per IP packet
- IP Packet loss and re-ordering recovery with Forward Error Correction according to Pro-MPEG Forum CoP #3 / SMPTE 2022
- High protection against Jitter and Delay
- Regulation for SFN networks
- Unicast or multicast support
- RTP / UDP support
- Full SNMP v2 support
- Embedded HTTP server
- Real-time monitoring
- Optional 10 MHz external reference



An OEM version of the DVB-ASI to IP Bridge is also available (UBS P/N 54849-02) with 2 DVB-ASI inputs and 2 DVB-ASI outputs

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Model: UNA 7000





Front Panel

Multi-Standard SFN Adapter Specifications

DVB-T Signal Processing		Control Interfaces	
Input monitoring	Transport stream presence	Front Panel	LCD display and cursor/ execute keys
	 Input Data overflow Sync 188 byte presence Sync 204 byte presence 	Ethernet Interface	2 Connector: RJ45 Speed: 10/100/1000 Base-T
FFT Modes	2K, 8K	USB Interface	Connector: USB Type B
Guard Intervals	1/4, 1/8, 1/16, 1/32	RS232 Interface	Connector: 9-pin SUB-D Male
Code Rates	1/2, 2/3, 3/4, 5/6, 7/8	RS485 Interface	Connector: 9-pin SUB-D Female
Constellations	QPSK, 16-QAM, 64-QAM	CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Channel Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz		
Hierarchical Mode	Alpha - 1, 2 and 4 for 16-QAM and	Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
Hierarchical Mode	64-QAM	SNMP Control Interface	Connector: Ethernet
Max Delay (data)	0 - 1.0 sec, resolution 100 ns	SNMP COntrol Interface	Note: MIBs are provided
Signal Substitution	Output transport stream is replaced with null packets and MIP in case of input data loss	Alarm Relays	Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm.
DTMB Signal Processing		Signal Inputs MPEG Transport Stream	2 ASI inputs: BNC (F), 75 Ω
Input monitoring	Transport stream presence Input Data overflow Sync 188 byte presence	GbE Transport Stream (Optional)	2 Connector: RJ45 Protocol: Pro-MPEG CoP #3
FFT Modes	3780, Single Carrier	10 MHz	Connector: BNC (F), 50 Ω
Guard Intervals	945, 595, 420 symbols	(Note 1)	Frequency: 10 MHz Level: 0 dBm to 15 dBm
Code Rates	0.4, 0.6, 0.8	1 PPS	Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL
Constellations	QPSK, 4-QAM-NR, 16-QAM, 32-QAM, 64-QAM	(Note 1)	
Time Interleaver	240, 720 symbols		Trigger: Positive transition
Channel Bandwidth	8 MHz, 7 MHz, 6 MHz		
Frame Duration	500 us, 571.43 us, 666.67 us	Signal Outputs	
Sub-Carrier Spacing	2 kHz, 1.75 kHz, 1.5 kHz	MPEG Transport Stream	2 ASI outputs: BNC (F), 75 Ω
Max Delay (data)	0 - 1.0 sec, resolution 100 ns	GbE Transport Stream	2 Connector: RJ45
Signal Substitution	Output transport stream is replaced with null packets and SIP in case of input data loss	(Optional) Clock Reference - 10 MHz (Note 1)	Protocol: Pro-MPEG CoP #3 Connector: BNC (F), High Impedance Frequency: 10 MHz
	1055		Level: 10 dBm, \pm 2.5 dB sinewave
		Time Reference - 1 PPS	Connector: BNC (F), High Impedance

Note 1: The "10MHz" and "1 pps" are inputs, except when the UNA 7000 is equipped with an internal GPS receivers, where they become Monitoring Outputs (high impedance).

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(Note 1)

Frequency: 1 PPS Level: TTL

Trigger: Positive transition



Model: UNA 7000

CMMB Multiplexer Specifications

Signal Inputs

IP Services Input	Services Ethernet Interface (SVC) Connector: RJ45
GPS Antenna	Connector: F-type (F), 75 Ω
Signal Outputs	
CMMB Multiplexed Transport Stream ASI Output	2 Connectors: BNC (F), 75 Ω Optional 4 output configuration for Hot Swapping between manin and backup multiplexers.
Clock Reference - 10 MHz	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
Time Reference - 1 PPS	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition
Control Interfaces	
Front Panel	LCD display and cursor/ execute keys
SVC Ethernet Interface	Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or SVC Ethernet (HyperTerminal or Telnet)
Web GUI	Internet Explorer , Firefox, etc. Connectors: Ethernet (SVC)
SNMP Control Interface	Connectors: Ethernet (SVC) MIB's are provided
Remote Control (optional)	Connector: DB9 (F) Used for optional Hot Swapping be- tween main and backup units. Normal

Open, used for remote shutdown.

DTx Adapter Specifications

Signal Inputs DVB-ASI (IN A, IN B) SMPTE 310M (optional) (AUX D)

Signal Outputs

DVB-ASI (OUT A, OUT B)

SMPTE 310M (optional) (AUX C)

Control Interfaces

Front Panel Ethernet Interface

USB Interface

RS232 Interface

RS485 Interface CLI (Command Line Interface) Web GUI

SNMP Control Interface

Alarm Relays

2x Connectors: BNC (F) Impedance: 75 Ω 1x Connector: BNC (F) Impedance: 75 Ω

2x Connectors: BNC (F) Impedance: 75 Ω 1x Connector: BNC (F) Impedance: 75 Ω

LCD display and cursor/ execute keys 2 Connector: RJ45 Speed: 10/100/1000 Base-T

Connector: USB Type B

Connector: 9-pin SUB-D Male

Connector: 9-pin SUB-D Female

Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)

Internet Explorer, Firefox, etc. Connector: Ethernet

Connector: Ethernet Note: MIBs are provided

Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm.

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Model: UNA 7000



ATSC-M/H Multiplexer Specifications

ISDB-T/TB Mux/Re-mux Specifications

Signal Inputs		Signal Input	
ATSC- M/H IP Input	Service Ethernet Interface Connector: RJ45	DVB-ASI	2x Input Connectors: BNC (F) (6x Inputs optional)
ATSC Legacy Transport Stream ASI Input	2 Connectors: BNC (F), 75 Ω		Impedance: 75 Ω TS Packet Size: 188/204 bytes
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm	GbE Transport Stream (optional)	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
Time Reference - 1 PPS (Note X1	Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition	BTS Output DVB-ASI	2x Output Connectors: BNC (F)
GPS Antenna	Connector: F-type (F), 75 Ω	BTS Specification	Impedance: 75 Ω Based on ARIB STD-B31 and ABNT NBR 15601:2007
Signal Outputs		Bit Rate	512X4/63 Mbps (~32.508 Mbps)
ATSC-M/H Transport Stream ASI Output	2 Connectors: BNC (F), 75 Ω Bit Rate: 19.39 Mbps	10 MHz and 1DDC loguite	
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave	10 MHz and 1PPS Inputs 10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm
Time Reference - 1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition	1 PPS (Note 1)	Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition
Control Interfaces			
Front Panel	LCD display and cursor/ execute keys	Control Interfaces	
MGMT Ethernet Interface	Connector: RJ45	Front Panel	LCD display and cursor/ execute keys
	Speed: 10/100/1000 Base-T	Ethernet Interface	2 Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B	USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male	RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female	RS485 Interface	Connector: 9-pin SUB-D Female
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)	CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet	Web GUI	Internet Explorer, Firefox, etc.
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided	SNMP Control Interface	Connector: Ethernet Connector: Ethernet Note: MIBs are provided

Note 1: The "10MHz" and "1pps" are inputs, except when the unit is equipped with an internal GPS receivers, where they become monitoring outputs (high impedance).



Model: UNA 7000

DVB-ASI to IP Bridge Specifications

GPS Receiver Specifications

Video Interface		Input Connector	F-type (F), 75 Ω 5 Vdc biased
DVB-ASI Input	6 Connectors: BNC (F) Impedance: 75 Ω	Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent
DVB-ASI Output	8 Connectors: BNC (F) Impedance: 75 Ω	Receiver Architecture 12 Parallel Channels	L1 1575.42 MHz C/A code (1.023 MHz chip rate)
Network Interface			Code plus carrier tracking (carrier aided tracking)
Ethernet	2 Connectors: RJ45 (data and control interchangeable)	Tracking Capability	12 simultaneous satellite vehicles
D. f	(data and control interchangeable) Speed: 10/100/1000 Base-T Protocol: Pro-MPEG CoP #3 / SMPTE 2022	Acquisition Time (Time To First Fix, TTFF)	< 15 seconds typical TTFF-hot (with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)
Reference Input Connector: BNC (F) Frequency: 10 MHz Evel: 0 dBm to 15 dBm Impedance: 50 Ω D		Positioning Accuracy	< 5 m, 1 - sigma < 10 m, 2 - sigma
	Level: 0 dBm to 15 dBm	Timing Accuracy	< 2 ns, 1 - sigma < 6 ns, 6 - sigma
		Holdover Time	±1 usec during 2 hours
Control Interfaces Front Panel Ethernet Interface	LCD display and cursor/ execute keys 2 Connector: RJ45	10 MHz Output Signal	Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -40 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz
	Speed: 10/100/1000 Base-T		100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz
USB Interface RS232 Interface	Connector: USB Type B		10 kHz: < -155 dBc/Hz
RS485 Interface	Connector: 9-pin SUB-D Male Connector: 9-pin SUB-D Female	1DDC Output Cinnel	100 kHz: < -155 dBc/Hz Level: TTL
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)	1PPS Output Signal	Level: TTL
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet		
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided		

Model: UNA 7000



Common Product Specifications

Power Supply

Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 45 VA
Harmonic Correction	EN61000-3-2
Environmental	
Operating Temperature	0°C to +50°C (+32°F to +122°F)
Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Relative Humidity (operating/storage)	max. 95%
Cooling	Internal fans to assist natural convection
Mechanical	
Size	1 U of 19" wide cabinet
Dimension (W x H x D)	48.3cm x 4.39cm x 42.7cm (19″ x 1.73″ x 16.8″)
Weight	4.5 kg (10 lbs)
Transport and Storage	Vibration acc. to IEC Publ.68

ETSI Compliance Essential Requirement

R&TTE Directive 1995/5/EC

Standard / Specification

EN 60950-1: 2001, A11: 2004 First Edition
Not applicable. No antenna.
EN 301 489-1 V1.8.1

CE Compliance

This equipment is CE Compliant.

Safety Health EMC



CMMB Multiplexer

Model: UNA 7000

Product Features

- The CMMB Multiplexer option provides frame generation that is compliant with Mobile Multimedia Broadcasting specifications
- One or two frequencies, user configured Upgradable to up to 6 frequencies
- Up to 160 services
- IPv4 and IPv6 support
- Control Information Table generation: NIT, CMCT, CSCT, SMCT, SSCT, ESG Basic Description Table, Urgent Broadcast Table and Conditional Access Table
- Bandwidth: 8 MHz
- Three modes of interleaving
- LDPC Code Rate: 1/2 and 3/4
- Internal GPS
- Optional Hot Swapping between main and backup multiplexers

Product Description

Multiplexing is used to encapsulate multiple Audio, Video, and Data services and Control information in Multiplex Frames (MMB Part 1, 2).

The main functions of the multiplexer are: receive the incoming data; prepare control and service information tables; encapsulate the data in frames depending on the data type and classification criteria; schedule time slots maintaining appropriate FIFO levels; and distribute the multiplexed service and control tables as MPEG-2 TS packets to modulators through ASI interfaces.

The multiplexer can be used in two possible scenarios: at the Head-End as a central multiplexer of global services, simultaneously multiplexing one or two networks (1), or locally as a multiplexer of local content (2). The multiplexer is designed to satisfy the requirements in both scenarios and operate in either of them with minimal configuration.



Standards Compliance

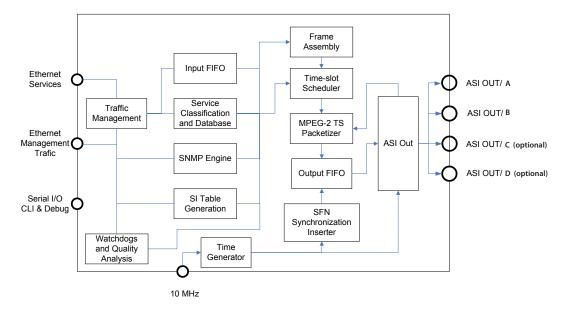
- Mobile Multimedia Broadcasting Part 1: Framing Structure, Channel Coding and Modulation for Broadcasting Channel, CMMB
- Mobile Multimedia Broadcasting Part 2: Multiplexing, CMMB Technical Working Group
- Mobile Multimedia Broadcasting Part 3: ESG Guide
- Mobile Multimedia Broadcasting Part 4: Urgent Broadcast
- Mobile Multimedia Broadcasting Part 5: Data Broadcast
- Mobile Multimedia Broadcasting Part 6: Conditional Access
- Mobile Multimedia Broadcasting System Multiplexer Technical Requirement V2.10
- Mobile Multimedia Broadcasting System: Encryption & Authorization Multiplexing V2.01
- H.264 Final Draft, ISO/IEC 14496-10 AVC
- Internet Protocol, RFC 0760
- Internet Protocol, Version 6 (IPv6), RFC 2460
- User Datagram Protocol, IEN-88
- RTP: A Transport Protocol for Real-Time Applications, RFC 3550
- SDP Session Description Protocol, RFC 2327
- RTP Payload Format for H.264 Video, RFC 3984
- RTP Payload Format for AC-3 Audio, RFC 4184
- RTP Profile for Audio and Video Conferences with Minimal Control, RFC 1890
- ISO/IEC 13818-1

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CMMB Multiplexer

Model: UNA 7000





UNA 7000 - CMMB Multiplexer Block Diagram

Product Specifications

Signal Input		Control Interfaces	
Input	Services	Front Panel	LCD display and cursor/ execute keys
Interface	Ethernet 10/100/1000 Base-T (SVC)	Ethernet Interface (SVC)	Connector: RJ45 Speed: 10/100/1000 Base-T
Connector	RJ45	USB Interface	Connector: USB Type B
Signal Output		Web Interface	Internet Explorer 6.0+ Connectors: Ethernet (SVC)
Output Interface	CMMB Multiplexed Transport Stream ASI	SNMP Control Interface	Connectors: Ethernet (SVC) MIB's are provided
Connector	Optional 4 output configuration for Hot Swapping between main and backup units.	CLI	Connector: USB (HyperTerminal) or Ethernet SVC (HyperTerminal or Telnet)
GPS Antenna		Remote Control (optional)	Connector: DB9 (F) Used for optional Hot Swapping be- tween main and backup units. Normal Open, used for remote shutdown.
Connector	F-type (F), 75 ohm		open, used for remote shatdown.
Monitoring Outputs			
10 MHz - Clock Reference	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave		
1 PPS - Time Reference	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition		

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(specifications are subject to change without notice)

May 10, 2012



Model: UNA 7000



Product Specifications

100 - 240 VAC

50 - 60 Hz

max. 45 VA

6 kg (13 lbs.)

1 U of 19" wide cabinet

48.3cm x 4.39cm x 42.7cm (19" x 1.73" x 16.8")

0°C to 50°C (32°F to 122°F)

-30°C to 70°C (-22°F to 158°F)

Temperature controlled fan to assist

max. 95%, non condensing

natural convection

Power Supply

TIF

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Voltage Frequency Power Consumption

Mechanical

Size Dimensions (W x H x D)

Weight

Environmental

Operating Temperature

Storage Temperature Relative Humidity

(operating/storage) Cooling Rear Panel

ETSI Compliance

Essential Requirement
R&TTE Directive 1995/5/EC
Safety
Health
EMC

Standard / Specification

EN 60950-1: 2001, A11: 2004 First Edition Not applicable. No antenna. EN 301 489-1 V1.8.1

CE Compliance This equipment is CE Compliant.

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Model: UNA 7000

Product Features

- DVB-T or DTMB waveform support
- DVB-T waveform supports MIP insertions and hierarchical mode
- DTMB waveform supports SIP insertion
- SFN time and frequency synchronization
- Selectable ASI inputs and outputs
- Bit rates adjusted with transmission mode
- GbE transport stream input/output (optional)
- Dual channel operation (optional)
- Internal GPS (optional)



Overview

For the operation of digital terrestrial TV networks (DVB-T or DTMB), where several transmitters broadcast the same programs on the same RF channel frequencies (Single Frequency Networks), the transmitters require precise frequency and time synchronization. The frequency (10 MHz) and time (1PPS) reference signals can be obtained from a GPS receiver at each transmission site.

The SFN Adapter fulfils the task of inserting "synchronization marks" (MIP or SIP packets) in a MPEG transport stream in full accordance with DVB-T and DTMB standards.

The basic functions performed by the SFN Adapter are:

- Insert a megaframe or second frame initialization packet (MIP or SIP) into an MPEG transport stream
- Adjust the bitrate of the transport stream to be synchronous with an external reference, and in accordance with the chosen transmission mode
- Provides signaling/mode data for the control of individual transmitters or modulators

Compliant with ETSI standards: EN 300 744 and TS 101 191 Compliant with Chinese standards: GB20600-2006, GY/T 229.1-2008

MIP Insertion (DVB-T Mode)

MIP insertion occurs once per megaframe, with a time interval dependent on the selected guard interval.

The MIP indicates when the first packet in a mega-frame (Synchronization Time Stamp, STS) begins transmitting.

The time reference is an external 1 pulse per second signal, obtained from a GPS receiver.

SIP Insertion (DTMB mode)

SIP insertion occurs once per second and is synchronized with the 1PPS signal from a GPS receiver. The SIP contains the transmission parameters for the modulator and the SFN maximum delay.

Bitrate Adaptation

The SFN Adapter is provided with two serial (ASI) inputs that accept an MPEG transport stream according to DVB recommendations (188 or 204 byte packets). The output may be configured as either 188 or 204 byte packets for DVB-T mode. In DTMB mode, only 188 byte packets are supported.

Note: the maximum bitrate has to include the inserted MIP or SIP, which means the input net bitrate must be slightly lower than the output bitrate.

The SFN Adapter removes null packets from the input signal and inserts MIP or SIP packets. New null packets are then added to produce a precise output bitrate, which is required for the selected transmission mode (dependent on code rate, constellation and guard band). The maximum allowable net bitrate is governed by the selected transmission mode. As the transport rate is modified, the SFN adaptor performs PCR re-stamping.





DVB-T/DTMB SFN Adapter

Model: UNA 7000

UIBS Unique Broadband Systems Ltd.

Description and Application

Hierarchical Mode (DVB-T mode)

Hierarchical modulation allows simultaneous transmission of two MPEG transport streams. The compromise between data rate and ruggedness can be set differently between the two virtual channels.

Web Interface

This feature allows local and/or remote control of the UNA 7000 via an Ethernet interface and is based on an internal Web server.

The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the network adapter. The Web pages are customized for each individual product option.

The Web Interface concept is popular as remote control only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

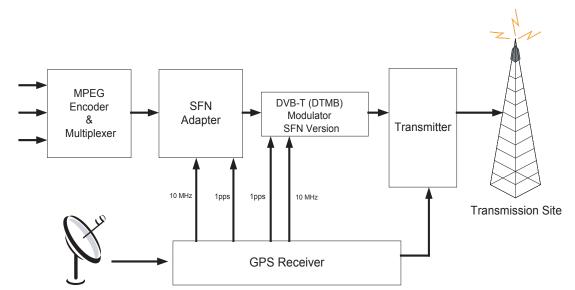
This feature allows remote control of the UNA 7000 in accordance with SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

GbE Transport Stream Input/Output (optional)

The IP-ASI/ASI-IP Bridge option allows the UNA 7000 to accept a GbE transport stream on either of its Ethernet ports and/or provide a GbE transport stream output (with MIPs) on either of its Ethernet ports according to Pro-MPEG Forum CoP #3 / SMPTE 2022.

Dual Channel Operation (optional)

Dual Channel operation allows the UNA 7000 to process two transport streams, on separate logical channels (CH_A and CH_B), at the same time.



SFN Block Diagram



Model: UNA 7000



Rear Panel

Control Interfaces

Product Specifications

DVB-T Signal Processing

7/1

Unique Broadband Systems Ltd.

-	5		
Input monitoring	Transport stream presence	Front Panel	LCD display and cursor/ execute keys
	 Input Data overflow Sync 188 byte presence Sync 204 byte presence 	Ethernet Interface	2 Connector: RJ45 Speed: 10/100/1000 Base-T
FFT Modes	2K, 8K	USB Interface	Connector: USB Type B
Guard Intervals	1/4, 1/8, 1/16, 1/32	RS232 Interface	Connector: 9-pin SUB-D Male
Code Rates	1/2, 2/3, 3/4, 5/6, 7/8	RS485 Interface	Connector: 9-pin SUB-D Female
Constellations	QPSK, 16-QAM, 64-QAM	CLI	Connector: USB (HyperTerminal) or
Channel Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz	(Command Line Interface)	Ethernet (HyperTerminal and Telnet)
Hierarchical Mode	Alpha - 1, 2 and 4 for 16-QAM and	Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
Therarchical Mode	64-QAM	SNMP Control Interface	Connector: Ethernet
Max Delay (data)	0 - 1.0 sec, resolution 100 ns	Shimr Control Interface	Note: MIBs are provided
Signal Substitution	Output transport stream is replaced with null packets and MIP in case of input data loss	Alarm Relays	Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm.
DTMB Signal Process	ing	Signal Inputs	
Input monitoring	Transport stream presence	MPEG Transport Stream	2 ASI inputs: BNC (F), 75 Ω
	Infission stream presence Input Data overflow Sync 188 byte presence	GbE Transport Stream (Optional)	2 Connectors: RJ45 Protocol: Pro-MPEG CoP #3
FFT Modes	3780, Single Carrier	10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm
Guard Intervals	945, 595, 420 symbols		
Code Rates	0.4, 0.6, 0.8	1 PPS	Connector: BNC (F), 50 Ω
Constellations	QPSK, 4-QAM-NR, 16-QAM, 32-QAM, 64-QAM	(Note 1)	Frequency: 1 PPS Level: TTL
Time Interleaver	240, 720 symbols		Trigger: Positive transition
Channel Bandwidth	8 MHz, 7 MHz, 6 MHz		
Frame Duration	500 us, 571.43 us, 666.67 us	Signal Outputs	
Sub-Carrier Spacing	2 kHz, 1.75 kHz, 1.5 kHz	MPEG Transport Stream	2 ASI outputs: BNC (F), 75 Ω
Max Delay (data)	0 - 1.0 sec, resolution 100 ns	GbE Transport Stream	2 Connector: RJ45
Signal Substitution	Output transport stream is replaced with null packets and SIP in case of input data loss	(Optional) Clock Reference - 10 MHz (Note 1)	Protocol: Pro-MPEG CoP #3 Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm ± 2.5 dB sinewaye

Note 1: The "10MHz" and "1pps" are inputs, except when the UNA 7000 is equipped with an internal GPS receivers, where they become Monitoring Outputs (high impedance).

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Time Reference - 1 PPS

(Note 1)

Level: 10 dBm, \pm 2.5 dB sinewave

Frequency: 1 PPS Level: TTL

Trigger: Positive transition

Connector: BNC (F), High Impedance

DVB-T/DTMB SFN Adapter

Model: UNA 7000



Product Specifications

Power Supply

Voltage Frequency Power Consumption Harmonic Correction 100 - 240 VAC 50 - 60 Hz max. 45 VA EN61000-3-2

Environmental

Operating Temperature Storage Temperature Relative Humidity (operating/storage) Cooling 0°C to +50°C (+32°F to +122°F) -30°C to +70°C (-22°F to +158°F) max. 95% Temperature controlled fan to assist natural convection

Mechanical

Size	1 U of 19" wide cabinet
Dimension (W x H x D)	48.3cm x 4.39cm x 42.7cm (19" x 1.73" x 16.8")
Weight	6 kg (13 lbs)
Transport and Storage	Vibration acc. to IEC Publ.68

ETSI Compliance

Essential Requirement R&TTE Directive 1995/5/EC Safety Health EMC

EN 60950-1: 2001, A11: 2004 First Edition

Standard / Specification

Not applicable. No antenna.

EN 301 489-1 V1.8.1

CE Compliance

This equipment is CE Compliant.





ATSC M/H Multiplexer

Model: UNA 7000



Product Features

- Fully compliant with ATSC-M/H Standard A/153
- Carries DTV services for mobile/pedestrian/handheld receiving devices
- ATSC M/H is backward-compatible with existing digital TV receivers
- Carries ATSC legacy DTV services
- Input M/H data is delivered over the IP datagrams
- Input M/H traffic support for IPv4, IPv6
- Supports constant and variable IP sources
- Packet filtering based on IP Address and port
- Reed-Solomon and SCCC Encoding user specified
- Easy integration into an SFN network
- Loss free handover using SFN
- Provides "burst mode" for M/H data transmission (i.e. enables the receiver to save energy by cycling power)
- Provides signaling data for M/H receivers
- Transport stream recording and playback
- Integrated GPS Receiver provides 10 MHz and 1 PPS reference signals

Description and Application

The ATSC-M/H Multiplexer provides DTV services to mobile/pedestrian/ handheld receivers. It is a fully ATSC-M/H Standard compliant device that supports all ATSC-M/H modes.

The multiplexer processes both the IP traffic (carrying M/H services for mobile, pedestrian and handheld M/H receivers) and the existing legacy ATSC services into one combined ATSC-M/H compliant MPEG-2 ASI output transport stream.

The multiplexer provides mobile/pedestrian/handheld broadcasting DTV services using a portion of the ~19.39 Mbps ATSC 8-VSB payload, while the remainder is available for HD and/or multiple SD television services.

The ATSC-M/H Multiplexer consists of two sections:

1. ATSC M/H Pre-Processor 2. ATSC M/H Exciter (post-processing and transmission)

The ATSC M/H Pre-Processor represents the first stage of the M/H data processing and receives two different types of input streams:

- The legacy service (main) MPEG-2 transport stream packets are delivered to the multiplexer through the ASI input interface.
- The M/H video and audio IP datagrams are delivered to the multiplexer through the Ethernet interface.

The ATSC M/H Pre-Processor combines both of these streams and forms an MPEG-2 ASI transport stream, which is subject further processing and modulation by the ATSC-M/H Exciter.

The M/H data delivered to the ATSC M/H Pre-Processor is partitioned into Ensembles, each of which contains one or more services. Each Ensemble uses an independent RS Frame, and furthermore, each Ensemble may be coded to a different level of error protection using Reed Solomon and SCCC coding.

M/H encoding includes FEC at both the packet and trellis levels, plus the insertion of the long and regularly spaced training sequences into the M/H data. Robust and reliable control data is also inserted into the output stream by the Pre-Processor for use by the mobile/pedestrian/ handheld M/H receivers.

The ATSC M/H Pre-Processor supports the "burst mode" of M/H data transmission, which allows the M/H receivers to save energy by power cycling their tuners and demodulators.

ATSC M/H Multiplexer

Model: UNA 7000





Rear Panel

Product Specifications

Signal Inputs		Power Supply	
ATSC- M/H IP Input	Service Ethernet Interface		100 2401/46
	Connector: RJ45	Voltage -	100 - 240 VAC
ATSC Legacy Transport	2 Connectors: BNC (F), 75 Ω	Frequency	50 - 60 Hz
Stream ASI Input		Power Consumption	max. 45 VA
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz	Harmonic Correction	EN61000-3-2
	Level: 0 dBm to 15 dBm	Environmental	
Time Reference - 1 PPS	Connector: BNC (F), 50 Ω	Operating Temperature	0°C to +50°C (+32°F to +122°F)
(Note X1	Frequency: 1 PPS Level: TTL	Storage Temperature	-30°C to +70°C (-22°F to +158°F)
	Trigger: Positive transition	Relative Humidity	max. 95%
GPS Antenna	Connector: F-type (F), 75 Ω	(operating/storage)	
		Cooling	Internal fans to assist natural convection
Signal Outputs		Mechanical	
ATSC-M/H Transport	2 Connectors: BNC (F), 75 Ω	Size	1 U of 19" wide cabinet
Stream ASI Output	Bit Rate: 19.39 Mbps		
Clock Reference - 10 MHzConnector: BNC (F), High Impedance(Note 1)Frequency: 10 MHz		Dimension (W x H x D)	48.3cm x 4.39cm x 42.7cm (19″ x 1.73″ x 16.8″)
(Level: 10 dBm, \pm 2.5 dB sinewave	Weight	6.0 kg (13.2 lbs)
Time Reference - 1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition	ETSI Compliance	
		ETSI Compliance	
		Essential Requirement R&TTE Directive 1995/5/EC	Standard / Specification
Control Interfaces		Safety	EN 60950-1: 2001, A11: 2004 First Edition
Front Panel		Health	Not applicable. No antenna.
	LCD display and cursor/ execute keys	EMC	EN 301 489-1 V1.8.1
MGMT Ethernet Interface	Connector: RJ45 Speed: 10/100/1000 Base-T		
USB Interface	Connector: USB Type B	CE Compliance	
RS232 Interface	Connector: 9-pin SUB-D Male	This equipment is CE Compliant.	
RS485 Interface	Connector: 9-pin SUB-D Female	CE	
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)		
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet		
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided		re inputs, except when the unit is equipped with an

internal GPS receivers, where they become monitoring outputs (high impedance).



ATSC M/H Multiplexer

Model: UNA 7000

Product Specifications

GPS Receiver	
Input Connector	F-type (F), 75 Ω 5 Vdc biased
Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent
Receiver Architecture	L1 1575.42 MHz
12 Parallel Channels	C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking)
Tracking Capability	12 simultaneous satellite vehicles
Acquisition Time (Time To First Fix, TTFF)	< 15 seconds typical TTFF-hot (with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)
Positioning Accuracy	< 5 m, 1 - sigma < 10 m, 2 - sigma
Timing Accuracy	< 2 ns, 1 - sigma < 6 ns, 6 - sigma
Holdover Time	±1 usec during 2 hours
10 MHz Output Signal	Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -40 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz
1PPS Output Signal	Level: TTL

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ATSC DTx Adapter

Model: UNA 7000

Product Features

- Fully compliant with ATSC standard A/110:2011
- ASI and SMPTE 310M (optional) inputs and outputs
- Integrated GPS Receiver provides 10 MHz and 1 PPS reference signals
- Optional SMPTE 310M inputs and outputs allow for ASI to SMPTE 310M conversion or SMPTE 310M to ASI conversion
- Web, SNMP and Command Line Interfaces are provided for local and remote control and software upgrades



Description and Application

The UNA 7000 design is based on the UBS Advanced Universal Modulator board, customized to operate as an ATSC Distributed Transmission (DTx) Adapter, according to ATSC standard A/110:2011.

The basic function of the DTx Adapter is to insert Cadence Sync Points (CSP), Transmitter Control Packets (TCP) and optionally Dummy Data Bytes Channel and the Field-Rate Side Channel into an MPEG-2 transport stream. The result is an MPEG-2 transport stream output that can be used to synchronize multiple transmitters operating in a single frequency network (SFN).

The DTx Adapter also includes an internal GPS receiver that provides 10 MHz and 1PPS reference signals needed for transport stream generation.

Optional SMPTE 310M inputs and outputs allow the user to configure the DTx Adapter as an ASI to SMPTE 310M or SMPTE 310M to ASI converter.

Web Interface

This feature allows local or remote control of the DTx Adapter via an Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for monitoring the status and setting the parameters of the DTx Adapter. The Web Interface concept is popular because remote control with this system only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

This feature allows remote control of the DTx Adapter in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

ATSC DTx Adapter

Model: UNA 7000





Rear Panel

Product Specifications

Signal Inputs

DVB-ASI (IN A, IN B) SMPTE 310M (optional) (AUX D)

Signal Outputs DVB-ASI (OUT A, OUT B)

SMPTE 310M (optional) (AUX C)

Control Interfaces

Front Panel Ethernet Interface

USB Interface

RS232 Interface

RS485 Interface CLI (Command Line Interface)

Web GUI

SNMP Control Interface

Alarm Relays

2x Connectors: BNC (F) Impedance: 75 Ω 1x Connector: BNC (F) Impedance: 75 Ω

2x Connectors: BNC (F) Impedance: 75 Ω 1x Connector: BNC (F) Impedance: 75 Ω

LCD display and cursor/ execute keys
2 Connector: RJ45 Speed: 10/100/1000 Base-T
Connector: USB Type B
Connector: 9-pin SUB-D Male
Connector: 9-pin SUB-D Female
Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Internet Explorer, Firefox, etc. Connector: Ethernet
Connector: Ethernet Note: MIBs are provided
C

Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm.

Power Supply	
Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 45 VA
Harmonic Correction	EN61000-3-2
Environmental	
Operating Temperature	0°C to +50°C (+32°F to +122°F)
Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Relative Humidity (operating/storage)	max. 95%
Cooling	Internal fans to assist natural convection
Mechanical	
Size	1 U of 19" wide cabinet
Dimension (W x H x D)	48.3cm x 4.39cm x 42.7cm (19" x 1.73" x 16.8")
Weight	6.0 kg (13.2 lbs)
ETSI Compliance	
Essential Requirement R&TTE Directive 1995/5/EC	Standard / Specification
Safety	EN 60950-1: 2001, A11: 2004 First Edition
Health	Not applicable. No antenna.
EMC	EN 301 489-1 V1.8.1

CE Compliance

This equipment is CE Compliant.

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ATSC DTx Adapter

Model: UNA 7000

Product Specifications

GPS Receiver		
Input Connector	F-type (F), 75 Ω 5 Vdc biased	
Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent	
Receiver Architecture	L1 1575.42 MHz	
12 Parallel Channels	C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking)	
Tracking Capability	12 simultaneous satellite vehicles	
Acquisition Time (Time To First Fix, TTFF)	< 15 seconds typical TTFF-hot (with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)	
Positioning Accuracy	< 5 m, 1 - sigma < 10 m, 2 - sigma	
Timing Accuracy	< 2 ns, 1 - sigma < 6 ns, 6 - sigma	
Holdover Time	±1 usec during 2 hours	
10 MHz Output Signal	Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -40 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz	
1PPS Output Signal	Level: TTL	

Document 56477-10-S07-01

December 10, 2012



Wireless Broadband and Broadcasting Solutions

ISDB-T/T_B Multiplexer / Re-multiplexer

Model: UNA 7000

Product Features

- Multiplexes streams compatible with MPEG-2 TS
- Compatible with TS (188 bytes) and BTS (204 bytes) inputs
- PSI/SI information generation with data descriptors insertion
- Allows configuration of PSI/SI tables and the respective transmission layer definition
- Stored PSI/SI tables transmission
- Filtering and remapping of input PIDs and PCR correction
- SFN Network configuration
- Compliant with ABNT NBR 15601 recommendations
- ISDB-T and ISDB-T^B compliant
- Allows GINGA interactivity transmission generated by external functions implementer
- Allows Closed Caption transmission generated by external functions implementer
- Allows EPG transmission generated by external functions implementer
- Allows OAD transmission generated by external functions implementer
- Management and updating are performed remotely using an embedded Web server

Description and Application

The UNA 7000 is a Multiplexer and Re-multiplexer developed for ISDB-T and ISDB-T^B digital television standards.

The UNA 7000 supports multi-programming according to the needs of the broadcaster. Additionally, it allows editing of PSI/SI tables, IIP packet generation and Single Frequency Network (SFN) operation.

The multiplexer has 2 input channels (ASI) and 2 copies of the BTS output channel (ASI). Additional ASI inputs (up to a total of 6 input) and 2 IP inputs could be supported as an option.

System management and upgrades are performed remotely over the network via Ethernet.



Optional Features

- GbE (IP) input according to Pro-MPEG CoP #3 / SMPTE 2022
- 4 additional ASI inputs
- Integrated GPS Receiver which provides 10 MHz and 1 PPS reference signals

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ISDB-T/T_B Multiplexer / Re-multiplexer

Frequency: 10 MHz Level: 0 dBm to 15 dBm

Frequency: 1 PPS

Connector: BNC (F), 50 Ω

Trigger: Positive transition

Model: UNA 7000





Rear Panel

Product Specifications

Signal Input **Power Supply** DVB-ASI 2x Input Connectors: BNC (F) Voltage 100 - 240 VAC (6x Inputs optional) 50 - 60 Hz Frequency Impedance: 75 Ω TS Packet Size: 188/204 bytes **Power Consumption** max. 45 VA **GbE Transport Stream** Protocol: Pro-MPEG CoP #3 / Harmonic Correction EN61000-3-2 SMPTE 2022 (optional) Connector: RJ45 Environmental **Operating Temperature** 0°C to +50°C (+32°F to +122°F) **BTS Output** Storage Temperature -30°C to +70°C (-22°F to +158°F) DVB-ASI 2x Output Connectors: BNC (F) **Relative Humidity** max. 95% Impedance: 75 Ω (operating/storage) Based on ARIB STD-B31 and **BTS Specification** Cooling Internal fans to assist natural convection ABNT NBR 15601:2007 Bit Rate 512X4/63 Mbps (~32.508 Mbps) Mechanical Size 1 U of 19" wide cabinet **Control Interfaces** Dimension (W x H x D) 48.3cm x 4.39cm x 42.7cm (19" x 1.73" x 16.8") Front Panel LCD display and cursor/ execute keys **Ethernet Interface** 2 Connector: RJ45 Weight 6.0 kg (13.2 lbs) Speed: 10/100/1000 Base-T **USB** Interface Connector: USB Type B **ETSI Compliance RS232 Interface** Connector: 9-pin SUB-D Male **Essential Requirement** Standard / Specification R&TTE Directive 1995/5/EC **RS485** Interface Connector: 9-pin SUB-D Female Safety EN 60950-1: 2001, A11: 2004 First Edition CLI Connector: USB (HyperTerminal) or (Command Line Interface) Ethernet (HyperTerminal and Telnet) Health Not applicable. No antenna. Internet Explorer, Firefox, etc. Web GUI EMC EN 301 489-1 V1.8.1 Connector: Ethernet **SNMP Control Interface** Connector: Ethernet **CE** Compliance Note: MIBs are provided This equipment is CE Compliant. 10 MHz and 1PPS Inputs CE 10 MHz Connector: BNC (F), 50 Ω

Note 1: The "10MHz" and "1 pps" are inputs, except when the UNA 7000 is equipped with an internal GPS receivers, where they become Monitoring Outputs (high impedance).

(Note 1)

1 PPS

(Note 1)

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ISDB-T/T_B Multiplexer / Re-multiplexer

Model: UNA 7000

Product Specifications

Optional GPS Receiver		
Input Connector	F-type (F), 75 Ω 5 Vdc biased	
Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent	
Receiver Architecture	L1 1575.42 MHz	
12 Parallel Channels	C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking)	
Tracking Capability	12 simultaneous satellite vehicles	
Acquisition Time (Time To First Fix, TTFF)	< 15 seconds typical TTFF-hot (with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)	
Positioning Accuracy	< 5 m, 1 - sigma < 10 m, 2 - sigma	
Timing Accuracy	< 2 ns, 1 - sigma < 6 ns, 6 - sigma	
Holdover Time	±1 usec during 2 hours	
10 MHz Output Signal	Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -40 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz	
1PPS Output Signal	Level: TTL	



DVB-ASI-to-IP Bridge

Model: UNA 7000

Product Features

- DVB-ASI-to-IP and IP-to-DVB-ASI modes of operation
- Forward Error Correction support according to Pro-MPEG Forum CoP #3 / SMPTE 2022
- SFN Network preservation (SFN over IP)
- Internal or external 10 MHz reference clock and drift correction
- Low induced PCR jitter
- Low processing latency
- Protection against IP network jitter
- Configurable input buffer size for IP packets
- Front Panel, Web GUI, Telnet, CLI and SNMP support
- Remote upgrade support

Description and Application

Overview

In today's broadcast environment, IP networks have become a very important part in the distribution of digital video streams.

The DVB-ASI-to-IP Bridge is designed to achieve the highest performance, while satisfying all requirements of MPEG transport stream distribution in SFN networks. It provides DVB-ASI-to-IP or IP-to-DVB-ASI conversion and can be used to transfer a MPEG transport stream though an IP network.

The unit supports full DVB-ASI bandwidth operation (up to 216 Mbps) on both Ethernet ports and simultaneous operation in both directions.

Different combinations of six to eight DVB-ASI ports and two Gigabit Ethernet ports are possible. Data and Control IP streams can be applied to either Ethernet port.

Characteristics

- 6x DVB-ASI inputs
- 8x DVB-ASI outputs
- 2x Gigabit Ethernet ports (Control and/or Data)
- Software selectable configurations
- Throughput limited by the maximum DVB-ASI bandwidth of 216 Mbps
- Each Ethernet port can support the combined bandwidth of 8 DVB-ASI ports
- Automatic input MPEG TS packet size detection (188/204 bytes)
- 1 to 7 MPEG TS packets per IP packet
- IP Packet loss and re-ordering recovery with Forward Error Correction according to Pro-MPEG Forum CoP #3 / SMPTE 2022
- High protection against Jitter and Delay
- Regulation for SFN networks
- Unicast or multicast support
- RTP / UDP support
- Full SNMP v2 support
- Embedded HTTP server
- Real-time monitoring
- Optional 10 MHz external reference

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DVB-ASI-to-IP Bridge

Model: UNA 7000





Rear Panel

Product Specifications

Video Interface		Power Supply	
DVB-ASI Input DVB-ASI Output	6 Connectors: BNC (F) Impedance: 75 Ω 8 Connectors: BNC (F) Impedance: 75 Ω	Voltage Frequency Power Consumption Harmonic Correction	100 - 240 VAC 50 - 60 Hz max. 45 VA EN61000-3-2
Network Interface Ethernet	Speed: 10/100/1000 Base-T 2 Connectors: RJ45 (data and control interchangeable) Protocol: Pro-MPEG CoP #3 / SMPTE 2022	Environmental Operating Temperature Storage Temperature Relative Humidity (operating/storage)	0°C to +50°C (+32°F to +122°F) -30°C to +70°C (-22°F to +158°F) max. 95%
Reference Input Clock Reference - 10 MHz	Connector: BNC (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω	Cooling Mechanical Size Dimension (W x H x D)	Internal fans to assist natural convection 1 U of 19" wide cabinet 48.3cm x 4.39cm x 42.7cm
Control Interfaces Front Panel Ethernet Interface	LCD display and cursor/ execute keys 2 Connector: RJ45 Speed: 10/100/1000 Base-T	Weight Transport and Storage	(19" x 1.73" x 16.8") 4.5 kg (10 lbs) Vibration acc. to IEC Publ.68
USB Interface RS232 Interface RS485 Interface CLI (Command Line Interface) Web GUI	Connector: USB Type B Connector: 9-pin SUB-D Male Connector: 9-pin SUB-D Female Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet) Internet Explorer, Firefox, etc. Connector: Ethernet	ETSI Compliance Essential Requirement R&TTE Directive 1995/5/EC Safety Health EMC	Standard / Specification EN 60950-1: 2001, A11: 2004 First Edition Not applicable. No antenna. EN 301 489-1 V1.8.1
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided	CE Compliance This equipment is CE Compliar	nt.

CE

Wireless Broadband and Broadcasting Solutions



OEM DVB-ASI-to-IP Bridge

Model: DV-IP-ASI-1G

Product Features

- DVB-ASI-to-IP and IP-to-DVB-ASI modes of operation
- Forward Error Correction support according to Pro-MPEG Forum CoP #3 / SMPTE 2022
- SFN Network preservation (SFN over IP)
- Internal or external 10 MHz reference clock and drift correction
- Low induced PCR jitter
- Low processing latency
- Protection against IP network jitter
- Configurable input buffer size for IP packets
- Web GUI, Telnet, CLI and SNMP support
- Remote upgrade support
- Available in both enclosed and board version

Description and Application

Overview

Document 54849-02-S07-05

In today's broadcast environment, IP networks have become a very important part in the distribution of digital video streams.

The OEM DVB-ASI-to-IP Bridge is designed to achieve the highest performance, while satisfying all requirements of MPEG transport stream distribution in SFN networks. It provides DVB-ASI-to-IP or IP-to-DVB-ASI conversion and can be used to transfer a MPEG transport stream though an IP network.

The unit supports full DVB-ASI bandwidth operation (up to 216 Mbps) on both Ethernet ports and simultaneous operation in both directions.

Different combinations of two DVB-ASI ports and two Gigabit Ethernet ports are possible. Data and Control IP streams can be applied to either Ethernet port.

Characteristics

- 2x DVB-ASI outputs
- 2x Gigabit Ethernet ports (Control and/or Data)
- Software selectable configurations
- Throughput limited by the maximum DVB-ASI bandwidth of 216 Mbps
- Each Ethernet port can support the combined bandwidth of two
 DVB-ASI ports
- Automatic input MPEG TS packet size detection (188/204 bytes)
- 1 to 7 MPEG TS packets per IP packet
- IP Packet loss and re-ordering recovery with Forward Error Correction according to Pro-MPEG Forum CoP #3 / SMPTE 2022
- High protection against Jitter and Delay
- Regulation for SFN networks
- Unicast or multicast support
- RTP / UDP support
- Full SNMP v2 support
- Embedded HTTP server
- Real-time monitoring
- Optional 10 MHz external reference

(specifications are subject to change without notice)

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OEM DVB-ASI-to-IP Bridge

Model: DV-IP-ASI-1G



Product Specifications

Video Interface		Power Supply		
DVB-ASI Input	2 Connectors: SMA (F) Impedance: 50 Ω	Voltage	12 Vdc: 6 Pin Header (Board) DC Jack, 2.1mm ID, 5.3mm OD	
DVB-ASI Output	2 Connectors: SMA (F) Impedance: 50 Ω	Power Consumption	(Enclosed) max. 27 VA	
Reference Input		Mechanical		
Clock Reference - 10 MHz	Connector: SMA (F) Frequency: 10 MHz	Board Dimensions (W x H x D)	234mm x 13mm x 163mm (9.2" x 0.5" x 6.4")	
	Level: 0 dBm to 15 dBm Impedance: 50 Ω	Board Weight	0.25kg (0.5 lbs.)	
		Enclosed Dimensions (W x H x D)	247mm x 30.5mm x 203mm (9.7" x 1.2" x 8.0")	
Network Interface		Enclosed Weight	1 kg (2.2 lbs.)	
Ethernet	Speed: 10/100/1000 Base-T 2 Connectors: RJ45 (data and control interchangeable) Protocol: Pro-MPEG CoP #3 / SMPTE 2022	Environmental		
		Operating Temperature	0°C to +50°C (+32°F to +122°F)	
Control & Management		Storage Temperature	-30°C to +70°C (-22°F to +158°F)	
Ethernet	10/100/1000 Base-T	Relative Humidity (operating/storage)	max. 95%	
Web GUI	Live statistics and monitoring	Cooling	Temperature controlled fan to assist	
Supervision	Full SNMP v2 support Gets, sets and configurable traps for NMS supervision	NMS		
Front Panel	LCD display and cursor/ execute keys			
Interactive CLI Commands	RS232 (DB9-M), USB			

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Model: DVE 6000S



Product Features

- Fully compliant with DVB-SH standards
- Reed Solomon Encoding user specified
- Accurate time slicing control
- Two independent operational modes: "Dynamic" and "Slotted Allocation" burst scheduling
- Dynamic burst scheduling maximizes bandwidth utilization
- Easy integration into an SFN network
- Loss free handover
- Input stream support for IPv4, IPv6
- Supports constant and variable IP sources
- SI/PSI table generation (PAT, PMT, INT, NIT, SDT, EIT, TDT, TOT)
- SHIP insertion
- Accurate bit rate generation, based on Modulator settings
- Web GUI, SNMP and CLI control interfaces
- Up to 32 Mbps throughput covering all possible DVB-SH modes
- Net Manager Application for managing multiple encapsulators
- Packet filtering based on IP Addresses and ports
- Transport stream recording and playback
- Optional IP transport stream output
- Complete support for DVB-SH signaling: TPS bits for OFDM and signaling field for TDM

Product Description

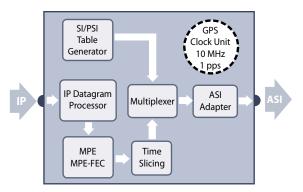
The DVE 6000S encapsulator is a fully compliant, DVB-SH standard device, designed to cover all possible DVB-SH modes. The encapsulator processes registered IP traffic, called services, into a DVB-SH compliant MPEG-2 ASI stream.

One of the main functions is to prepare and schedule bursts of MPE-FEC frames, according to the parameters of the registered services. This is not an easy task, especially if bandwidth utilization is a priority.

"Slotted allocation" or "static time-slicing" mode is one simple solution to this problem. In this mode, the device allocates constant portions of the time frame for each service and fills the bursts when IP datagrams become available. Obviously, this approach is not efficient and wastes bandwidth during lower bit rate periods and service interruptions. It can even lead to packet loss if the service bit-rate increases and the additional slots required are already allocated in portions of the time frame.

"Dynamic time-slicing allocation" mode is the other, more complex and efficient solution. The encapsulator allocates future bursts for the service based on the incoming IP traffic rate of that service.





DVB-SH IP Encapsulator Functional Diagram

If a service has a higher bit rate at one moment in time, it will occupy a larger portion of the available bandwidth. Since our solution uses a built in SFN adapter, the output bit rate generated by the encapsulator is an exact match to the bit rate of the modulators in the SFN network. The bitrate is determined by the bandwidth, constellation, code rate, and guard interval.

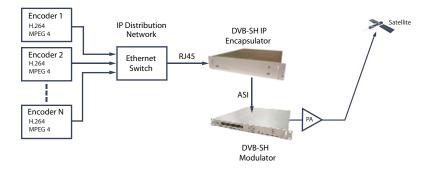
The DVE 6000S implements two independent "Dynamic Allocation" and "Slotted Allocation" modes. Depending on the services, system integrators may choose the appropriate scheme. "Slotted Allocation" can be used, for example, in a network with a large number of low bit rate CBR services, where it is necessary to preserve uniform delivery of the content in static time slots and intervals. "Slotted Allocation" can also be used for channels where the latency needs to be minimized. In most cases, we believe broadcasters will choose the "Dynamic Time-Slicing" mode, which will better utilize the bandwidth and will allow delivery of CBR and VBR content reliably and efficiently without dropping packets.

DVB-SH IP Encapsulator

Model: DVE 6000S



Typical DVB-SH Network Diagram



DVE 6000S Advantages over competing products

COMPETITION

- Two operationa	l modes: dynamic	time-slice allocation	and static allocation
------------------	------------------	-----------------------	-----------------------

- SFN adapter, part of the encapsulator
- Automatic SI/PSI table generation
- Transport stream player and recorder
- Packet filtering
- Single compact unit

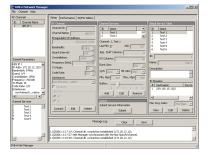
User Friendly Setup and Monitoring

- Control Interfaces: Intuitive WEB GUI interface, SNMP, CLI on Telnet, CLI on RS232
- DVB-SH Net Manager Application:
- Remote setup and configuration of:
- Encapsulator services and parameters
- Network Topology

- Monitoring of: • Service Transmission
- Network Efficiency

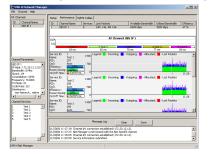
Device Control

NetManager Setup



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NetManager Performance Monitoring



Web GUI Interface



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DVB-SH IP Encapsulator

Model: DVE 6000S

DVB-SH IP Encapsulator Features

User Selectable Reed Solomon:

Unique Broadband Systems Ltd.

(0 - 64 RS columns)

(0 - 190 Stuffing columns)

- Very accurate time slicing control: $\leq 10 \text{ ms}$
- Two independent Dynamic Burst Scheduling and Slotted Allocation Scheduling modes
- Packet filtering based on IP Addresses and Ports
- MPEG-2 TS playback and recording
- SI/PSI table generation (PAT, PMT, INT, NIT, SDT, EIT, TDT, TOT)
- SFN Synchronization.
- Up to 32 Mbps throughput

DVB-SH Signal Processing

- Supported modes, IFFT: 1k, 2k, 4k, 8k
- Guard intervals: 1/4, 1/8, 1/16, 1/32
- Code rates: 1/5, 2/9, 1/4, 2/7, 1/3, 2/5, 1/2, 2/3
- Constellations: QPSK, 16-QAM
- Max. delay data: 0 1.0 sec, resolution 100 ns
- Bandwidth: 8 MHz, 7 MHz, , 6 MHz, 5 MHz, 1.7 MHz
- SHIP insertion
- Accurate Bit rate generation, based on the Modulator settings

Management Interfaces

 Management
 Ethernet 10/100 Base-T

 Web GUI, SNMP, Telnet, Network Manager

 Connector: RJ45

 RS232 Serial Interface

 Console

 Connector: DB9 (M)

 RS232 Serial Interface

 Debug

 Connector: DB9 (M)

Standards Compliance

 ETSI EN 301 192
 EN 500

 ETSI EN 300 744
 ISO/IEC

 ETSI EN 302 304
 ISO/IEC

 ETSI EN 300 468
 DVB Do

 ETSI TS 101 191
 DVB Do



General Product Specifications

Signal Input Traffic Input Connector	Ethernet 10/100 Base-T RJ45
Signal Output	
Transport Stream Output	ASI, (IP output is optional)
Connector	BNC (F), 75 Ω (x2) (RJ45 optional)
Clock Reference	
Frequency	10 MHz
Connector	BNC (F), 50 Ω
Level	100 mV - 3 Vpp
Time Reference Input	
Connector	BNC (F), 50 Ω
Frequency	1 pps
Amplitude	TTL, triggered on positive transition
Monitoring Output	
MIP Sync OUT	
Connector	BNC (F), 50 Ω
TTL Level	High coincides with MIP packet
Operating System	Linux Based
Power Supply	
Voltage	90 - 250 VAC
Frequency	47 - 63 Hz
Power Consumption	max. 100 VA
Mechanical	
Size	2 U of 19" wide cabinet
Dimensions (W x H x D)	483mm x 89mm x 483mm (19" x 3.5" x 19 <i>"</i>)
Weight	6kg max. (13 lbs.)
Environmental	
Operating Temperature	5°C to 50°C (32°F to 122°F)
Storage Temperature	-30°C to 70°C (-22°F to 158°F)
Relative Humidity (operating/storage)	max. 95%, non condensing
Casting	To provide the construction of four to provide

Temperature controlled fan to assist natural convection

(specifications are subject to change without notice)



March 22, 2010

Cooling



Site Controller

Model: STC 1000

Product Features

- Remote RF site monitoring and control
- Transport Stream Analyzer
- RF Signal Analyzer supporting CMMB, DTMB, DVB-T/H, DVB-T2 and ISDB-T/TB waveforms
- Analog inputs and relay contacts
- Web and SNMP interfaces provide remote control as well as remote software upgrades



Optional Features

- GPS/GLONASS Receiver
- Optical Media Converter
- Modbus to SNMP Gateway
- Remote SNMP Polling Agent opens communications link to network SNMP server when an event occurs
- Command interface to control an external Dial-up/GSM Modem
- Communication with third party web camera allows operator to view live images and save images on alarm
- Battery back-up
- Hot/Standby redundancy configuration using two units

Product Description

Overview

The STC 1000 Site Controller is a feature-rich remote monitoring and control platform optimized for TV and radio broadcast sites.

The unit supports multiple interfaces including Ethernet, USB, RS-232, RS-485, Optical and DVB-ASI. Using expansion modules, additional interfaces including analog inputs and Form C relay contacts are available.

Armed with multiple interfaces and numerous control features, the STC 1000 is a complete solution for remote management of broadcast sites.

Transport Stream Analyzer

The STC 1000 is equipped with two serial DVB-ASI inputs that can be used for the analysis of an ASI stream to discover its program table structure. The user has the ability to filter the TS PIDs as well as record (and temporarily save) TS clips to DDR memory. This will be useful for remote verification of the signal input into a TV transmitter.

Optionally, one of the Site Controller's Ethernet ports can be dedicated as a GbE transport stream input (according to Pro-MEPG Forum CoP #3 / SMPTE 2022 standards) and the transport stream recovered from the IP input can be directed to the analysis engine.

RF Signal Analyzer

The RF Signal Analyzer is a highly informative tool that can be used to evaluate the output performance of a UHF Transmitter or Repeater.

The RF Signal Analyzer consists of two boards: a downconverter and a capture card. High power amplifier and band pass filter feedback signals (between 470 MHz and 862 MHz) are downconverted to 25 MHz IF for processing in the capture card. The capture card processes the downconverted feedback signals and communicates directly with the main system controller to display MER, PAPR and Group Delay measurements in real time.

The Site Controller can be configured to send alarm based SNMP traps in the event that a measurement reaches its minimum threshold value.

Site Controller

Model: STC 1000

Product Description

GPS/GLONASS Receiver (Optional)

The internal GPS/GLONASS receiver provides accurate, high quality 10 MHz and 1PPS reference signals required to synchronize multiple devices. The GPS/GLONASS distribution system allows the Site Controller to provide 10 MHz and 1PPS reference signals for internal components as well as four 10 MHz and two 1 PPS reference signal outputs.

Optical Media Converter (Optional)

The internal Optical Media Converter supports conversion between 1000Base-LX10 and 10/100/1000Base-T networks.

The STC 1000 is equipped with ST type connectors that allow for a typical link distance of 10 km over a pair of single-mode fibre. The media converter 10/100/1000Base-T Ethernet port is connected to an internal switch for communication with the Site Controller's internal components as well as a LAN/WAN.

Analog Inputs and Relay Contacts

The STC 1000 features eight analog inputs which are monitored by the main system controller permitting the user to set the polarity and voltage threshold that trigger an alarm. Additionally, four (normally closed) alarm relay contacts can be set to trigger on a specific alarm.

Web Interface

This feature allows remote control of the STC 1000 via the Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for status monitoring and parameter configuration. The Web Interface concept is popular because remote control with this system only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

This feature allows remote control of the STC 1000 in accordance with SNMP v3 protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Modbus SNMP Agent (Optional)

Among its control features is a SNMP agent engine to support equipment with a Modbus TCP or Modbus RTU interface. The unit is fully programmable and can map Modbus registers to SNMP MIB objects (get/set registers & I/O). As part of its monitoring capability the SNMP agent can set threshold rules to generate SNMP traps.

External Dial-up/GSM Modem Control Interface (Optional)

The STC 1000 web interface includes a control interface to manage an external dial-up or GSM modem using industry standard AT commands. Supported modem interfaces are Ethernet, RS-232 and RS-485. With this feature the external modem can be controlled as either a backup link or as a primary connection that is only engaged for certain user-defined events.

Remote SNMP Polling Agent (Optional)

For many sites the communications link may be a dial-up or GSM modem connection that is only intended to be activated when an event is in progress. When the communications link is inactive the STC 1000 can fill in for the network SNMP server by continuing to poll the site equipment and to monitor all equipment for SNMP messages being sent to the server. Based on a set of user-defined rules, the STC 1000 can be programmed to reopen communications to the central SNMP server and forward trap messages for specific events. The remote polling agent feature is very useful as it only upload status changes or alerts when required. This is a very efficient way of polling a site and helps reduce communication link fees for the site.

Machine to Machine Interface

Upon request, one of the RS-232 or RS-485 ports can be used for a proprietary machine to machine interface. For legacy equipment that may employ a proprietary control interface (usually via a serial connector) the STC 1000 can be programmed with a custom control interface for remote management of the device. This is a valuable feature for control of a UPS, legacy transmitter, etc.

Battery Back-up

The STC 1000 is equipped with back-up battery system that provides the main system controller, Ethernet Switch and Optical Media Converter with approximately 1 minute of back-up power. This will be enough time to store parameters in volatile memory, send SNMP traps to the network management center and safely shut down the Site Controller.

Hot/Standby Redundancy Configuration

To ensure a reliable 24/7 network monitoring solution, the STC 1000 supports a live/standby redundancy configuration. The backup unit continually monitors the primary unit and in the event of a failure, automatically takes over all monitoring functions. Through the standby controller feature, operators can continue to monitor their network if the primary system is disabled through system failure, human error or other unforeseen circumstances.

Document 57351-01-S07-05



Rear Panel

GPS/GLONASS Receiver

Product Specifications

Transport	Stream	Analyzer
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mansport Stream Analyze	1	di 5/deona55 necenter	
DVB-ASI Input (IN A, IN B)	2x connectors: BNC (F), 75 Ω	Input Connector	F-type (F), 75 Ω 5 Vdc biased
DVB-ASI Output (OUT A, OUT B)	2x connectors: BNC (F), 75 Ω (Input MPEG-2 TS loop-through; no TS	Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent
Gb Ethernet Input	modification performed) Connector: 2x RJ45	Receiver Architecture	L1 - 1575.42 MHz / GLONASS - L1 frequency range
	Speed: 10/100/1000 Base-T	32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS
RF Signal Analyzer		Tracking Capability	24 simultaneous satellite vehicles
RF 1 (HPA feedback input)	Connector: SMA (F), 50 Ω Frequency: 470 MHz to 862 MHz Level: -12 dBm \pm 3 dB	Acquisition Time (Time To First Fix, TTFF) (Tested at –40°C to +85°C)	< 15 s typical TTFF-hot (with current almanac, position, time and ephemeris) < 40 s typical TTFF-warm (with current almanac, position, time)
RF 2 (BPF feedback input	Connector: SMA (F), 50 Ω Frequency: 470 MHz to 862 MHz Level: -12 dBm ± 3 dB		< 150 s typical TTFF-cold (No stored information)
		Positioning Accuracy	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Optical Media Converter		Timing Accuracy 1 PPS + 10 MHz	< 100 ns
Fibre Rx (Input)	Connector: ST / Single Mode Interface: 1000Base-LX Wavelength: 1310 nm	Holdover Time	\leq 2.5 µsec during 2 hours
Fibre Tx (Output) Other Inputs/Outputs	Connector: ST / Single Mode Interface: 1000Base-LX Wavelength: 1310 nm	10 MHz Output	4x connectors: SMA (F), 50 Ω Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -30 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz
Analog In	Connector: 9-pin SUB-D (M) Pin 1 to Pin 4 Voltage: 0 to 10 VDC (analog input – pull down) Pin 5 to Pin 8 Voltage: 5 VDC (analog input – pull up)	1PPS Output	100 kHz: < -155 dBc/Hz 2x connectors: SMA (F), 50 Ω Level: TTL
Relay	Connector: 9-pin SUB-D Male Four alarm relays, triggered by any alarm		

Site Controller

Model: STC 1000



Description and Application

Control Interfaces		Power Supply	
Front Panel	LCD display and cursor/ execute keys	Voltage	90 – 132 / 180 – 264 VAC
Ethernet WAN	2x connectors: RJ45	Frequency	47 - 63 Hz
	Speed: 10/100/1000 Base-T (Connected to Gb Ethernet Switch)	Power Consumption	max. 130 VA
Ethernet LAN	2x connectors: RJ45 Speed: 10/100/1000 Base-T	Harmonic Correction	EN61000-3-2
	(Connected to Main System Controller)	Environmental	
USB	Connector: 9-pin SUB-D Male	Operating Temperature	0°C to +50°C (+32°F to +122°F)
RS-232	Connector: 9-pin SUB-D Male	Storage Temperature	-10°C to +70°C (14°F to +158°F)
RS-485 (A)	Connector: 9-pin SUB-D Female	Relative Humidity	10% to 90%, non-condensing
RS-485 (B)	Connector: 9-pin SUB-D Female	(operating/storage)	
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet	Cooling	Internal fans to assist natural convection
	Drimony interface for configuration and	Mechanical	
	Primary interface for configuration and control of all functions including TS	Size	1 U of 19" wide cabinet
Analyzer, RF Signal Analyzer, Modbus interface, etc.		Dimension (W x H x D)	482.6 mm x 43.9 mm x 520.7 mm (19" x 1.73" x 20.5")
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)	Weight	7.75 kg (17 lbs)
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided	Transport and Storage	Vibration acc. to IEC Publ.68

Connector: Ethernet, RS-232, RS-485

Machine-Machine

Document 57351-01-S07-05

April 24, 2013



RF Signal Analyzer

Model: TSA 5000

Product Features

- Can be used as a receiver for remote monitoring of the transmitted signal quality
- Supports ATSC, CMMB, DTMB, DVB-T and DVB-T2 waveform measurements
- Covers VHF (170 to 230 MHz) and UHF (470 to 862 MHz) frequency bands (L-Band or S-Band available on request)
- Highly informative GUI with extensive transmitted signal quality measurements:
 - Spectrum
 - MER/SNR
 - PAR
 - Constellation
 - Spectral Regrowth (Shoulders)
 - Group Delay
- Web and SNMP interfaces provide local/remote monitoring and control



Front Panel



Rear Panel

Product Description

The new RF Signal Analyzer from UBS is a highly informative tool that can be used to evaluate the output performance of a UHF Transmitter or Repeater. The RF Signal Analyzer can be used as a receiver for remote transmitter signal quality monitoring.

The RF Signal Analyzer supports ATSC, CMMB, DTMB, DVB-T and DVB-T2 waveform measurements across VHF (170 to 230 MHz) and UHF (470 to 862 MHz) frequency bands. L-Band or S-Band frequency ranges are available upon request.

Using a PC GUI application installed on a laptop or PC, the RF Signal Analyzer will display a Spectrum measurement along with MER/SNR, PAR, Constellation, Spectral Regrowth (Shoulders) and Group Delay measurements. Active modulation parameters are also displayed.

Web and SNMP interfaces provide local/remote monitoring and control. A set of alarm relays can be activated upon alarm.

The Signal Analyzer is intended for indoor use and can be fitted with a bracket that allows it to be mounted securely in a 19" wide rack.

Document 57176-01-S07-07

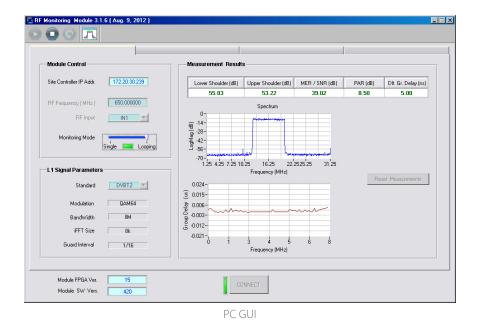
April 24, 2013

RF Signal Analyzer

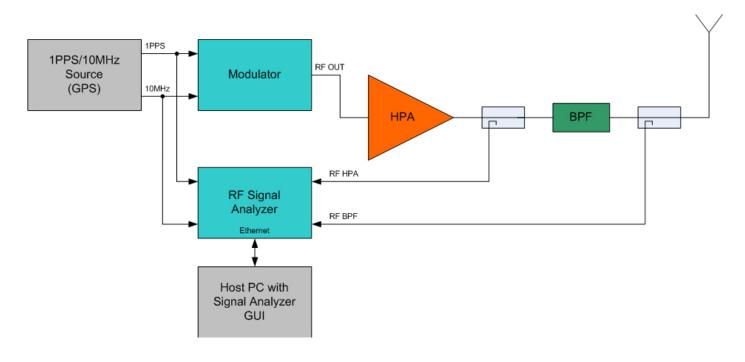
Model: TSA 5000



Signal Analyzer PC GUI



Transmitter Block Diagram with RF Signal Analyzer



Document 57176-01-S07-07



RF Signal Analyzer

Model: TSA 5000

Product Specifications

Signal Inputs		Control Interfaces	
	Connector: SMA (F) Frequency: VHF (170 to 230 MHz)	Ethernet Interface	Connector: RJ45 Speed: 10/100 Base-T
	UHF (470 to 862 MHz) (L-Band or S-Band available	USB Interface	Connector: USB Type A
	upon request)	RS-232 Interface	Connector: 9-pin SUB-D Male
	Level: -12 dBm \pm 3 dB Impedance: 50 Ω	Web Interface	Connector: Ethernet
RF IN2	Connector: SMA (F)	PC GUI	Connector: Ethernet
(BPF Feedback Input)	Frequency: VHF (170 to 230 MHz) UHF (470 to 862 MHz)	SNMP Control Interface	Connector: Ethernet Note: MIBs can be provided
	(L-Band or S-Band available upon request) Level: -12 dBm <u>+</u> 3 dB Impedance: 50 Ω	Alarm Relays	Connector: RS-232 2 SPDT relays
		Power Supply	
Reference Frequency Inpu	uts	Voltage	12 VDC
10MHz IN	Connector: SMA (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm	Power Consumption	max. 15 Watts
	Impedance: 50 Ω	Mechanical	
1PPS IN	Connector: SMA (F) Frequency: 1 Hz Level: TTL	Dimensions (W x H x D)	261.37mm x 44.894mm x 211.63mm (10.290" x 1.610" x 8.332")
	Trigger: Positive transition Impedance: 50 Ω	Weight	1 kg (2.2 lbs.)
		Environmental	
Reference Frequency Out	puts	Operating Temperature	+5°C to +45°C (+41°F to +113°F)
10MHz OUT	Connector: SMA (F)	Storage Temperature	-30°C to +75°C (-22°F to +158°F)
	Frequency: 10 MHz Level: 0 dBm to 15 dBm	Relative Humidity	max. 95%, non condensing
	Impedance: 50 Ω	Cooling	Internal fan to assist natural convection
1PPS OUT	Connector: SMA (F) Frequency: 1 Hz Level: TTL Trigger: Positive transition Impedance: 50 Ω		



GPR1100

GPS Receiver

Models: GPR2100, GPR2110, GPR2120, GPR1100



Available Models

GPR2100 - OEM board with BNC connectors GPR2110 - OEM board with SMA connectors GPR2120 - Enclosed OEM board GPR1100 - 1RU unit with display and keypad, Ethernet and SNMP

Product Features

- Up to eight 10 MHz Outputs
- Up to eight 1pps Outputs
- Optional RS232 TOD output for CMMB applications
- High performance design, utilizing an ovenized quartz oscillator
- Antenna cable length compensation
- Serial port for local console interface
- PC GUI control software available for GPR2100, GPR2110 and GPR2120
- WEB GUI and SNMP control over Ethernet for GPR1100

Description and Application

The second the

GPR2120

Based on a M12MT receiver module, the UBS GPS receiver is a compact, cost effective, GPS locked timing reference.

Designed for applications where 10MHz/1pps clock sources are required to synchronize multiple transmission devices, this module provides an accurate high quality signal set. Multiple outputs enable all base station/site equipment to share a single accurate and stable reference source.

Optionally, UBS GPS receivers provide TOD information via a serial RS232 port, compliant with CMMB standard requirements.

UBS GPS receivers are available in three basic models: OEM board (GPR2100 and 2110), enclosed OEM board (GPR2120) and 1U unit (GPR1100), equipped with LCD display, keypad and Ethernet connection.

The GPS receiver unit includes a GPS receiver, as well as a 10 MHz and 1pps distribution system.

GPR1100 also includes a controller module, supporting WEB GUI and SNMP interfaces over an Ethernet connection.

GPS Receiver

Models: GPR2100, GPR2110, GPR2120, GPR1100



Product Specifications

General Characteristics	Receiver Architecture 12 parallel channels	L1 1575.42 MHz C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking)
	Tracking Capability	12 simultaneous satellite vehicles
Performance Characteristics	Acquisition Time (Time To First Fix, TTFF) (Tested at –40°C to +85°C)	< 15 s typical TTFF-hot (with current almanac, position, time and ephemeris) < 40 s typical TTFF-warm (with current almanac, position, time) < 150 s typical TTFF-cold (No stored information)
	Positioning Accuracy	< 5 m, 1-sigma < 10 m, 2-sigma
	Timing Accuracy 1 PPS + 10 MHz	< 2 ns, 1-sigma < 6 ns, 6-sigma
	Holdover Time	±1 µsec during 2 hours
Antenna	Antenna Requirements	Active antenna module powered by receiver module (80mA max) 10 dB to 50 dB external antenna gain measured at receiver input 5 Vdc antenna power provided via header connector (3 Vdc can be provided on demand) Recommended 5 Vdc antenna: Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent
	Connector	SMA (F), 50 Ω (F-type optional) - models GPR2120, GPR1100 MMCX RF – models GPR2100, 2110
Serial Communication	Output Messages	Motorola Binary Protocol UBS Proprietary Protocol - Binary protocol 9600, 8,N,1
Electrical Characteristics	Output Signal: 10MHz	10 dBm +/-2.5 dBm, Sinewave Harmonic Level: -40 dBc max Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz 200 kHz: < -155 dBc/Hz Connector: BNC (F), 50 Ω (SMA optional), up to 8 outputs
	Output Signal: 1PPS	1PPS, TTL Connector: BNC (F), 50 Ω (SMA optional)
	Serial TOD (optional):	TOD information on RS232 port - for CMMB applications Connector: DB9 (F)
	Control Interfaces	1 x RS232 - all models, 1 x RS485 - all models, 1 x USB1.1 - GPR2100, GPR2110, GPR2120 only Ethernet 10/100 Base-T on RJ45 - GPR1100 only
	Alarm Relay	Dry Contact Alarm Relay available on RS485 connector - GPR1100 only
	External Power Supply Models GPR2100, 2110, 2120	12 Vdc; 50 mVp-p ripple (max); max 600 mA
	AC Power – Model GPR1100	100 - 240 VAC, 50 - 60 Hz; max 60 VA
Environmental	Operating Temperature	0°C to +55°C (32°F to +131°F)
Characteristics	Storage Temperature	-40°C to +85°C (-40°F to +185°F)
	Relative Humidity	max. 95%, non-condensing
	Altitude	3,048 m (10,000 ft.) maximum
Mechanical	Dimensions (W x H x D)	483 mm x 44mm x 330mm (19″ x 1RU x 13″) – GPR1100 140mm x 25.5mm x 140mm (5.5″ x 1″ approximately x 5.5″) - GPR2100, GPR2110 170mm x 30.5mm x 150mm(6.7″ x 1.2″ x 5.9″) - GPR2120
	Weight	GPR1100 – 3 kg (6 lbs.), GPR2120 – 0.8kg (1 lb. and 12 oz)

Document 54570-02R-S07-01

May 19, 2011



Wireless Broadband and Broadcasting Solutions

GPS/GLONASS Receiver

Models: GPR2100GL, GPR2110GL, GPR2120GL, GPR1100GL

GPR2100GL



Available Models

- GPR2100GL OEM board with BNC connectors
- GPR2110GL OEM board with SMA connectors
- GPR2120GL Enclosed OEM board
- GPR1100GL 1RU unit with display and keypad, Ethernet and SNMP



Product Features

- Up to eight 10 MHz Outputs
- Up to eight 1pps Outputs
- Optional RS232 TOD output for CMMB applications
- High performance design, utilizing an ovenized quartz oscillator
- Serial port for local console interface
- PC GUI control software available for GPR2100GL, GPR2110GL and GPR2120GL
- WEB GUI and SNMP control over Ethernet for GPR1100GL

Description and Application

Based on a GPS/GLONASS receiver module, the UBS GPS/ GLONASS receiver is a compact, cost effective, GPS/GLONASS locked timing reference.

Designed for applications where 10MHz/1pps clock sources are required to synchronize multiple transmission devices, this module provides an accurate high quality signal set. Multiple outputs enable all base station/site equipment to share a single accurate and stable reference source.

Optionally, UBS GPS/GLONASS receivers provide TOD information via a serial RS232 port, compliant with CMMB standard requirements.

UBS GPS/GLONASS receivers are available in three basic models: OEM board (GPR2100GL and 2110GL), enclosed OEM board (GPR2120GL) and 1U unit (GPR1100GL), equipped with LCD display, keypad and Ethernet connection.

The GPS/GLONASS receiver unit includes a GPS/GLONASS receiver, as well as a 10 MHz and 1pps distribution system.

GPR1100GL also includes a controller module, supporting WEB GUI and SNMP interfaces over an Ethernet connection.

GPS/GLONASS Receiver

Models: GPR2100GL, GPR2110GL, GPR2120GL, GPR1100GL



Product Specifications

General Characteristics	Receiver Architecture	L1 - 1575.42 MHz / GLONASS - L1 frequency range	
	32 parallel channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNO Code plus carrier tracking (carrier aided tracking)	S
	Tracking Capability	24 simultaneous satellite vehicles	
Performance Characteristics	Acquisition Time (Time To First Fix, TTFF) (Tested at –40°C to +85°C)	< 15 s typical TTFF-hot (with current almanac, position, time and ephen < 40 s typical TTFF-warm (with current almanac, position, time) < 150 s typical TTFF-cold (No stored information)	neris)
	Positioning Accuracy	GPS: < 10m / 20m GLONASS: < 10 m / 20m	
	Timing Accuracy	< 100 ns	
	1 PPS + 10 MHz		
	Holdover Time	\leq 2.5 µsec during 2 hours	
Antenna	Antenna Requirements	Active antenna module powered by receiver module (80mA max) 10 dB to 50 dB external antenna gain measured at receiver input 5 Vdc antenna power provided via header connector (3 Vdc can be prov Recommended 5 Vdc antenna: Bullet III GPS antenna - Trimble model no	
	Connector	SMA (F), 50 Ω (F-type optional) - models GPR2120GL, GPR1100GL MMCX RF – models GPR2100GL, GPR2110GL	
Serial Communication	Output Messages	MNP Binary Protocol, UBS Proprietary Protocol - Binary protocol	
Electrical Characteristics	Output Signal: 10MHz	10 dBm +/-2.5 dBm, Sinewave Harmonic Level: -30 dBc max Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 10 kHz: < -135 dBc/Hz 100 kHz: < -155 dBc/Hz 200 kHz: < -155 dBc/Hz	
	Output Signal: 1PPS	1PPS, TTL Connector: BNC (F), 50 Ω (SMA optional)	
	Serial TOD (optional):	TOD information on RS232 port - for CMMB applications Connector: DB9 (F)	
	Control Interfaces	1 x RS232 - all models, 1 x RS485 - all models, 1 x USB1.1 - GPR2100GL, GPR2110GL and GPR2120GL only Ethernet 10/100 Base-T on RJ45 - GPR1100GL only	
	Alarm Relay	Dry Contact Alarm Relay available on RS485 connector - GPR1100GL on	ly
	External Power Supply GPR2100GL, 2110GL, 2120GL	12 Vdc; 50 mVp-p ripple (max); max 600 mA	
	AC Power – Model GPR1100GL	100 - 240 VAC, 50 - 60 Hz; max 60 VA	
Environmental	Operating Temperature	0°C to +55°C (32°F to +131°F)	
Characteristics	Storage Temperature	-40°C to +85°C (-40°F to +185°F)	
	Relative Humidity	max. 95%, non-condensing	
	Altitude	18,000 m	
Mechanical	Dimensions (W x H x D)	482.6 mm x 44mm x 330.2mm (19" x 1RU x 13") – GPR1100GL 139.7mm x 25.4mm x 139.7mm (5.5" x 1" approximately x 5.5") - GPR210 170.18mm x 30.5mm x 149.9mm (6.7" x 1.2" x 5.9") - GPR2120GL	0GL, GPR2110GL
	Weight	GPR1100GL –3 kg (6 lbs.), GPR2120GL – 0.8kg (1 lb. and 12 oz)	



DVB-SH Receiver

Model: DVR 8000SH

Product Features

- Supports up to 2, direct conversion, S-band RF receive channels
- Data path consists of a Demodulator, LPF, ADC and digital filters
- Flexible Interfaces for Web GUI, SNMP and Telnet remote control, machine to machine interface and software upgrades
- MRC and Code Combining Feature (optional)
- Low Latency Feature (optional)
- Internal temperature monitoring and built in over temperature protection

Standard Supported

• EN 302 583, TS 102 584





Document 59815-01-S07-02

DVB-SH Receiver

Model: DVR 8000SH

Product Description

Overview

The UBS DVB-SH S-band professional receiver was developed based on the innovative UBS hardware platform, and supports all the latest features of the DVB-SH Standard.

Together with UBS' DVB-SH modulator and DVB-SH encapsulator, the receiver provides a complete line of equipment, necessary for DVB-SH hybrid digital broadcasting system, consisting of a Satellite Component (SC) and a Complementary Ground Component (CGC).

The DVB-SH hybrid system architecture offers several advantages:

- Large territorial coverage by virtue of the SC.
- Increased Quality of Service for urban areas through the combina tion of CGC and SC.

The DVB-SH receiver can be factory configured with the necessary hardware and software options.

A base level receiver contains one TDM and one OFDM demodulator. The receiver supports Maximal Ratio Combining (MRC) and Code Combining modes between TDM and OFDM demodulators.

The receiver is software configurable between Class 1 and Class 2 type of receivers.

The receiver is implemented as an embedded module with a heat sink and contains an internal temperature monitoring function and overtemperature protection.

An advanced level receiver could contain more then one TDM/OFDM demodulator, support extended frequency range, bandwidth, FFT size, input bitrate, etc. (subject to fpga hardware limitation, populated on the digital board).

Additional optional features include Low Latency, MRC and Code Combining feature between TDM/TDM channels (when OFDM demodulator is replaced by second TDM demodulator), as well as an extended operation temperature range.

Signal Inputs

An S-band RF input is applied to one of two RF inputs, which are software configurable to be TDM or OFDM.

Output

A demodulated MPEG-TS output is available on DVB-ASI connectors. An MPEG output stream is also available, in form of IP packets, through the Ethernet port.

Web Interface

This feature allows for remote control of the receiver via an Ethernet interface and is based on an internal Web server. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for monitoring the status and setting the parameters of the receiver. The Web Interface concept only requires a standard computer with a network interface card (NIC) and a Web browser (Internet Explorer, Firefox, Chrome, etc.).

SNMP Client (optional)

This feature allows for remote control of the receiver in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Machine to Machine Interface (optional)

Depending on the software selection, the receiver's RS232/RS485 or Ethernet ports can be used as a machine to machine interface.





DVB-SH Receiver

Model: DVR 8000SH

Product Specifications | Base Profile

Multiplexing Mode	TDM for Satellite and OFDM for Terrestrial	Inputs	
RF Frequency Range	2560 MHz to 2590 MHz (Centre frequency can be tuned to any frequency in the range)	RF input 1	Connector: SMA (F), 50 Ω Frequency Range: 2560 MHz to 2590 MHz
RF Bandwidth	1.7 MHz, 2.5 MHz, 3 MHz, 5 MHz		Level: -90 dBm min.
Data Rate	2 Mbps maximum	RF input 2	Connector: SMA (F), 50 Ω Frequency Range: 2560 MHz to
Modulation - TDM	QPSK, 8 PSK , 16 APSK		2590 MHz
Modulation - OFDM	QPSK, 16 QAM		Level: -90 dBm min.
Roll Off Factor	0.15, 0.25, 0.35		
FEC Coderate	1/5, 2/9, 1/4, 2/7, 1/3, 2/5, 1/2, 2/3	Outputs	
Guard Interval Ratio	1/4, 1/8, 1/16, 1/32	DVB-ASI	BNC (F), 75 Ω
Interleaver	Configurable between class -I and class – II as per the standard	(OUT-A, OUT-B GbE Transport Stream	Protocol: Pro-MPEG CoP #3 /
Diversity Support and Code Combining	MRC & Code combining between TDM & OFDM		SMPTE 2022 Connector: RJ45
MPE Decapsulator	Integrated MPE Decapsulator with MPE-FEC and IFEC support	Power Supply	
Carrier Synchronization	LO offset correction > 20 KHz and 60 KM/H Doppler shift	Voltage	Single 12 VDC (35W max.)
		Mechanical	
Control Interfaces		Dimensions (w/o connectors) (W x H x D)	10cm x 3.96cm x 21.08 cm (3.94" x 1.56" x 8.3")
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T	Weight	0.65kg (1.45 lbs.)
USB Interface	Connector: Micro USB Type B		
RS485/RS232 Interface	Molex: 5-pos Micro Blade Header	Environmental	
CLI (Command Line Interface)	Connector: Micro USB (HyperTerminal) or	Operating Temperature Storage Temperature	0°C to +50°C (+32°F to +122°F) -30°C to +70°C (-22°F to +158°F)
	Ethernet (Telnet)	Polativo Humidity	
Web GUI	Ethernet (Telnet) Internet Explorer, Firefox, Chrome, etc. Connector: Ethernet	Relative Humidity	max. 95%
Web GUI SNMP Control Interface	Internet Explorer, Firefox, Chrome, etc.	Relative Humidity	
	Internet Explorer, Firefox, Chrome, etc. Connector: Ethernet Connector: Ethernet	Relative Humidity	

Connector: Ethernet or RS485/RS232

Machine to Machine Interface

Document 59815-01-S07-02

September 09, 2015



DTMB Professional Receiver

Model: DMR 8000

Product Features

- Optimized GB20600-2006 compliant single chip demodulator
- Supports both Multi-carrier and Single-carrier modes
- Supports 64QAM, 32QAM, 16QAM, 4QAM and 4QAM-NR modulation for both fixed and mobile applications.
- FEC rates of 0.4, 0.6 and 0.8
- Guard intervals of PN420, PN595 and PN945
- *Time de-interleaving: M* = 240 or *M* = 720
- MPEG-2 Transport Stream parallel output
- Automatic parameter discovery and update
- Integrated BER (bit error rate) monitoring
- Average Noise Magnitude monitoring
- Channel Bandwidth: 8 MHz
- Optimized for maximum signal resiliency in all conditions (impulse noise, echoes, fading, etc)

Description and Application

The DMR 8000 is a DTMB receiver and demodulator, fully compliant with the GB20600-2006 standard. The receiver is based on a specialized ASIC single chip demodulator. The demodulator supports both Multi-carrier and Single-carrier modes.

Designed for digital terrestrial reception of high definition, standard definition and other multi-media-based services, the demodulator is intended for indoor, outdoor, fixed, portable and automotive applications.

The DTMB receiver input signal is connected to a UHF tuner, which converts it to IF.

The ASIC demodulator chip receives the analog or digital IF input signal and converts it to baseband. It then performs the necessary demodulation and FEC (forward error correction) decoding and provides a parallel MPEG-2 transport stream output.

The operation parameters of the DTMB receiver are monitored and controlled by the embedded system controller.



The receiver control interfaces are the front panel display, the local RS232 serial port (supporting CLI – control line interface) and the 10/100 Base-T Ethernet port (protocols supported: WEB, Telnet and SNMP).

The DTMB receiver system is enclosed in a standard 1RU, 19" rack mount chassis. The receiver is cooled with forced air, using compact high performance fans installed on the receiver enclosure side panels.

DTMB Professional Receiver

Model: DMR 8000





Fig.1 - Rear Panel

Product Specifications (specifications are subject to change without notice)

Signal Processing		Control Interfaces	
Modulation	TDS-OFDM	WEB Interface	Ethernet 10/100 Base-T
Supported Standards	GB20600-2006	SNMP Control Interface Telnet	Connector: RJ45
Guard Intervals	PN420, PN595, PN945	RS232 (Console)	Connector DB9 (M)
FEC Rates	0.4, 0.6, 0.8		Protocol: CLI (Command Line Interface)
Constellations	64-QAM, 32-QAM, 16-QAM, 4QAM, 4QAM-NR	RS485 Interface	Connector DB9 (F) Reserved for factory use
Time De-interleaving	M = 240 or M = 720	USB Interface	Reserved for factory use
Bandwidth	8 MHz		
RF Input		Power Supply	
Connector	RF DTV, F-type (F), 75 ohm	Voltage	100 - 120 VAC / 200 - 240 VAC
Operating Frequency Range		Frequency	50 - 60 Hz
Level	-87dBm to -20dBm	Power Consumption	max. 40 VA
Frequency Step	1 MHz	Mechanical	
Return Loss	≤ - 10 dB	Size	1 U of 19" wide cabinet
Transport Stream Outpo		Dimensions (W x H x D)	483mm x 44mm x 356mm (19.0" x 1.75" x 14.0")
Signal	MPEG-2 Transport Stream - parallel	Weight	6 kg (13 lbs.)
Connector	SPI: DB25 (F)	neight	0 19 (13 153.)
		Environmental	
		Operating Temperature	0°C to +50°C (+32°F to +122°F)
		Storage Temperature	-30°C to +70°C (-22°F to +158°F)
		Relative Humidity (operating/storage)	max. 95%, non condensing

Fan to assist natural convection

Cooling





Model: DTX 1200U

Product Features

- 470 MHz 860 MHz Broadband Transmitter/Repeater
- LDMOS Power Amplifier provides 120 Watt output for ATSC, ATSC-M/H, CMMB, DTMB, DVB-T/H, DVB-T2, DVB-SH, ISDB-T/T_B, DAB, DAB+ and T-DMB waveforms
- SFN and MFN support
- Adaptive Non-linear Pre-corrector
- Manual Linear and Non-linear Digital Pre-correctors
- Touch screen display for real time user interface
- Remote control and self monitoring via Ethernet and RS485 interfaces
- Built in web server accessible through Ethernet connector with Internet Explorer
- Remotely manageable via SNMP
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Occupying only 3 RU of standard 19" cabinet space



Optional Features

- Integrated GPS or GPS/GLONASS Receiver
- Integrated DVB-S/S2 Receiver
- Adaptive Linear and Non-linear Digital Pre-correctors

Product Description

The DTX 1200U is a compact, solid-state transmitter, designed for digital terrestrial television broadcasting over a UHF frequency range of 470 MHz to 860 MHz.

Using the latest technology, the DTX 1200U converts an input transport stream (MPEG-2, CMMB Multiplex TS, T2-MI stream or ISDB-T/TB Multiplex TS) to a modulated RF signal. UBS has developed a Direct Digital Synthesis (DDS) process that allowing the Universal Modulator board to provide the amplifier portion of the transmitter with an RF signal.

The modulator board RF output is amplified to a digital average output power level of 120 Watts by a highly efficient power amplifier, built using LD-MOS transistor technology. The power level stability at the transmitter's RF output is maintained by an internal automatic level control loop.

The PA employs its own microcontroller, which monitors the operation parameters of the PA, provides protection against abnormal operation conditions and communicates with the system controller.

The Adaptive Pre-corrector is a superior pre-distortion solution that compensates for RF Power Amplifier non-linearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance. The manual Linear and Non-linear Digital Pre-correctors can also be used to maximize transmitter performance.

With the addition of an integrated DVB-S/S2 Receiver, the DTX 2500U can be configured as a terrestrial repeater. The input data stream is received and re-broadcast as a COFDM or 8VSB waveform.

The transmitter's operational parameters are monitored and controlled by an embedded system controller that can be accessed from the front panel touch screen LCD or by using one of the remote control interfaces (Ethernet, SNMP, USB or RS232).

Optionally, the DTX 1200U RS232 interface can be dedicated for communication with a 3rd party UPS. In this case, the transmitter is configured with an extra set of SNMP parameters and will actively monitor the UPS.

All of the transmitter's components are enclosed in a standard 19" rack mount chassis, occupying only 3 "RU" of cabinet space. The transmitter is forced air cooled using two compact high performance fans, which are installed on the transmitter enclosure front panel.

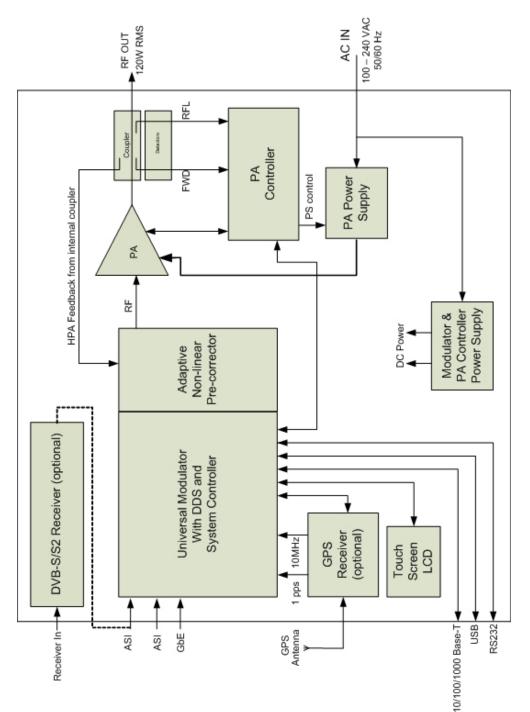
Document 56058-UNIV-S07-11

(specifications are subject to change without notice)

Model: DTX 1200U



Block Diagram





Model: DTX 1200U

Control Interfaces

🖉 DVB-TH Transmitter - Windows Internet Ex	plorer			
🕒 🕒 + 🙋 http://172.20.27.169/cgi_pradic	Ptype=103		💌 🐓 🗙 Live Search	P •
Ele Edit View Favorites Iools Help				
🙀 🐼 🄏 DVB-TH Transmitter			🚹 • 🔝 - 🖶 • 📴 Bage	- 🕜 Tgols - **
Status	Config	Alarms NMS Users	System Parameters	<u> </u>
	HPA Transmitter			
Versions and Serial Numbers	Modulator Mode		Tue Jul 26 12:26:33	2011
Serial Number:	Transmission	Site Name:	UBS	
Linux 2.4.20_mvl31-ml300 Versio	Input	Modulator Applicatio	n Version: 2336	
Modulator FPGA Version:	Output	Modulator CPLD Vers	sion: 25	
Up Converter Software Version:	RF Channels	Satellite SW Version	2.5	
Modulator Type	User RF Channels			
Modulator Type:	Non-Linear	DVE	8-T/H	
	Precorrector			
Transmission	Linear Precorrector			
Modulator Mode:	Adaptive	Playback File:	None	
SFN:	Precorrector	Fixed Delay:	OFF	
Hierarchical Mode:	Manual HPA Control	IFFT:	8k	
Coderate:	Site	Constellation:	64 QAM	
Guard Interval:	GPS	Cell Id:	0	
Cell ID Enable:	Satellite Receiver	Interleaver Flag:	OFF	
Time Slice Indicator, HP:	OFF	MPE-FEC Flag, HP:	OFF	
HP Ideal Bitrate(kbit/s):	18096			
Done			👩 🕒 Internet	₹ 100% ·

Web Interface



Touch Screen LCD

Model: DTX 1200U





Rear Panel

Product Specifications

Modulator Inputs		Power Amplifier RF Outpu	t
DVB-ASI (IN-A, IN-B)	2 DVB-ASI inputs: BNC (F), 75 Ω	RF Output Connector	7/16 DIN-type (F), 50 Ω
SMPTE-310M (IN-A, IN-B)	2 inputs (optional): BNC (F), 75 Ω	Operating Frequency Range	470 MHz - 860 MHz (Note 2)
GbE Transport Stream	Protocol: Pro-MPEG CoP #3 /	Frequency Setting Accuracy	1 Hz step over entire operation range
(DAB excluded)	SMPTE 2022 Connector: RJ45	Frequency Stability	1ppm internal, or in accordance with external GPS accuracy
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F) Frequency: 10 MHz	Digital Average Output Power	120 Watts
(Note I)	Level: 0 dBm to 15 dBm	Output Power Level Accuracy	$\leq \pm 0.25 \text{ dB}$
	Impedance: 50 Ω	Frequency Response	≤ ±0.5 dB
Time Reference - 1 PPS (Note 1)	Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω	MER	> 35 dB
		In-band IMD	≤ -35 dBc (at rated output power, with adaptive non-linear pre-correction)
		Spectral Regrowth	≤ -37 dBc (at rated output power, with adaptive non-linear pre-correction)
Modulator Outputs		Phase Noise (SSB)	100 Hz: < -80 dBc/Hz 1 kHz: < -85 dBc/Hz
DVB-ASI (OUT-A, OUT-B)	2 DVB-ASI outputs: BNC (F) 75 Ω		10 kHz: < -95 dBc/Hz 100 kHz: <-100dBc/Hz
Modulator RF Monitor	Connector: SMA (F), 50 Ω Level: 30 dB below RF output		1 MHz: < -110dBc/Hz
Clock Reference - 10 MHz	Connector: BNC (F), High Impedance	Output Spurious Level	≤ -70 dBc
(Note 1)	Frequency: 10 MHz	Output Harmonics	≤ -55 dBc
Time Reference - 1 PPS	Level: 10 dBm, ± 2.5 dB sinewave Connector: BNC (F), High Impedance	Out-of-Band Emissions	Compliant to FCC Part 27 [27.50(F)] requirements when using external
(Note 1)	Frequency: 1 PPS Level: TTL Trigger: Positive transition	RF Monitor	mask filter Connector: SMA (F), 50 Ω Level: ~ 51 dB below the RF output

Note 1: The "10MHz" and "1 PPS" are inputs, except in the units equipped with internal GPS receivers, where they become Monitoring Outputs (high impedance).

Note 2: The DTX 1200U is designed to support the entire UHF range of 470 MHz to 860 MHz, however, each DTX 1200U is factory configured and aligned to operate on a specific RF channel. The RF output frequency is indicated on a label placed near the RF output connector and it is also displayed on the control modulator front panel. Administrative access is required to change the frequency through the Web Interface.

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(specifications are subject to change without notice)



0° C to +50° C (+32° F to +122° F)

-30° C to +70° C (-22° F to +158° F)

max. 95%, non condensing

3 U of 19" wide cabinet

18.5 kg (40.8 lbs.)

48.26cm x 13.28cm x 55.68cm (19" x 5.23" x 21.92")

Forced air

Model: DTX 1200U

Product Specifications

Adaptive Non-linear	Pre-correction	Control Interfaces	
Frequency	470 MHz to 860 MHz	Front Panel	Touch screen LCD
Spectral Regrowth Reduction	7 dB ±2 dB (Note 3)	Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
		USB Interface	Connector: USB Type B
Manual Digital Pre-C	orrection	RS232 Interface	Connector: 9-pin SUB-D Male
Non-Linear Pre-Correction	1	RS485 Interface	Connectors: 9-pin SUB-D Female
Curve Formats	S 21 and VO/VI		Must be connected to the HPA RS485 interface
Amplitude Scale	Linear and Logarithmic	HPA RS485 Interface	Connector: 9-pin SUB-D Female
Correction Points	Max. 256, user-defined position		Must be connected to the RS485 interface
Spectral Regrowth Reduction	Max. 12 dB, subject to available headroom	HPA Serial (RS232)	Connector: 9-pin SUB-D Male
Phase Correction	-6 to +30 degrees, subject to available headroom	Web Interface	Internet Explorer, Firefox, etc. Connector: Ethernet
Linear Pre-Correction		SNMP Control Interface	Connector: Ethernet
Correction Points	61		Note: MIBs are provided
Point Spacing	1/60 of nominal spectrum BW	CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Amplitude Correction	±10 dB	Alarm Relays	Connector: RS232
Amplitude Resolution	0.01 dB		2 Dry Contact Alarm relays, triggered by any
Group Delay Correction	±2000 ns		major alarm.
Group Delay Resolution	1 ns		
Peak Power Clip Level	+17 dB to +7 dB	Power Supply	
	(peak power relative to average RMS level)	Voltage	100 - 240 VAC
		Frequency	50/60 Hz
Note 3: Greater improvement is depends upon power level and w	s possible under particular applications. Performance	Power Consumption	max. 850 Watts
depends upon power level and w	avelom.	Power Factor	0.96
		Environmental	
		Environmental	

Operating Temperature

Dimensions (W x H x D)

Storage Temperature Relative Humidity

Cooling

Size

Weight

Mechanical

Model: DTX 1200U



Product Specifications for Option Features

GPS Receiver		GPS/GLONASS Receiver	
Input Connector	F-type (F), 75 Ω 5 Vdc biased	Input Connector	F-type (F), 75 Ω 5 Vdc biased
Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent	Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent
Receiver Architecture	L1 1575.42 MHz	Receiver Architecture	L1 - 1575.42 MHz / GLONASS - L1 frequency range
12 Parallel Channels	C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking)	32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided
Tracking Capability	12 simultaneous satellite vehicles		tracking)
Acquisition Time	< 15 seconds typical TTFF-hot	Tracking Capability	24 simultaneous satellite vehicles
(Time To First Fix, TTFF)	(with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)	Acquisition Time (Time To First Fix, TTFF) (Tested at –40°C to +85°C)	< 15 s typical TTFF-hot (with current almanac, position, time and ephemeris) < 40 s typical TTFF-warm (with current almanac, position, time)
Positioning Accuracy	< 5 m, 1 - sigma < 10 m, 2 - sigma		< 150 s typical TTFF-cold (No stored information)
Timing Accuracy	< 2 ns, 1 - sigma < 6 ns, 6 - sigma	Positioning Accuracy	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Holdover Time	±1 usec during 2 hours	Timing Accuracy	< 100 ns
10 MHz Output Signal	Internally connected to the modulator	1 PPS + 10 MHz	
	input Level: 10 dBm ±2.5 dBm, sine wave	Holdover Time	\leq 2.5 µsec during 2 hours
	Harmonic Level: -40 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz	10 MHz Output Signal	Internally connected to the exciter input Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -30 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL	1PPS Output Signal	100 kHz: < -155 dBc/Hz Internally connected to the exciter input Level: TTL





Model: DTX 2500U

Product Features

- 470 MHz 860 MHz Broadband Transmitter/Repeater
- LDMOS Power Amplifier provides 250 Watt output for ATSC, ATSC-M/H, CMMB, DTMB, DVB-T/H, DVB-T2, DVB-SH, ISDB-T/T_B, DAB, DAB+ and T-DMB waveforms
- SFN and MFN support
- Adaptive Non-linear Pre-corrector
- Manual Linear and Non-linear Digital Pre-correctors
- Touch screen display for real time user interface
- Remote control and self monitoring via Ethernet and RS485 interfaces
- Built in web server accessible through Ethernet connector with Internet Explorer
- Remotely manageable via SNMP
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Occupying only 3 RU of standard 19" cabinet space



Optional Features

- Integrated GPS or GPS/GLONASS Receiver
- Integrated DVB-S/S2 Receiver
- Adaptive Linear and Non-linear Digital Pre-correctors

Product Description

The DTX 2500U is a compact, solid-state transmitter, designed for digital terrestrial television broadcasting over a UHF frequency range of 470 MHz to 860 MHz.

Using the latest technology, the DTX 2500U converts an input transport stream (MPEG-2, CMMB Multiplex TS, T2-MI stream or ISDB-T/TB Multiplex TS) to a modulated RF signal. UBS has developed a Direct Digital Synthesis (DDS) process that allowing the Universal Modulator board to provide the amplifier portion of the transmitter with an RF signal.

The modulator board RF output is amplified to a digital average output power level of 250 Watts by a highly efficient power amplifier, built using LD-MOS transistor technology. The power level stability at the transmitter's RF output is maintained by an internal automatic level control loop.

The PA employs its own microcontroller, which monitors the operation parameters of the PA, provides protection against abnormal operation conditions and communicates with the system controller.

The Adaptive Pre-corrector is a superior pre-distortion solution that compensates for RF Power Amplifier non-linearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance. The manual Linear and Non-linear Digital Pre-correctors can also be used to maximize transmitter performance.

With the addition of an integrated DVB-S/S2 Receiver, the DTX 2500U can be configured as a terrestrial repeater. The input data stream is received and re-broadcast as a COFDM or 8VSB waveform.

The transmitter's operational parameters are monitored and controlled by an embedded system controller that can be accessed from the front panel touch screen LCD or by using one of the remote control interfaces (Ethernet, SNMP, USB or RS232).

Optionally, the DTX 2500U RS232 interface can be dedicated for communication with a 3rd party UPS. In this case, the transmitter is configured with an extra set of SNMP parameters and will actively monitor the UPS.

All of the transmitter's components are enclosed in a standard 19" rack mount chassis, occupying only 3 "RU" of cabinet space. The transmitter is forced air cooled using two compact high performance fans, which are installed on the transmitter enclosure front panel.

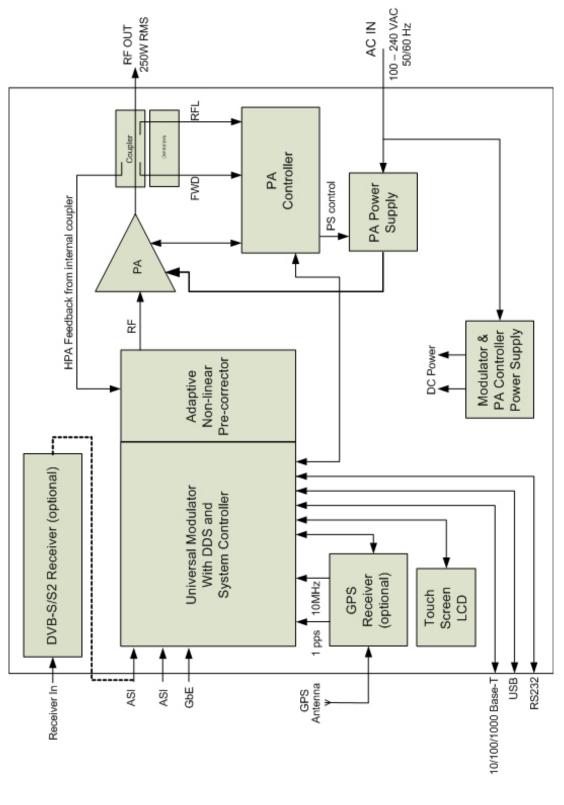
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(specifications are subject to change without notice)

Model: DTX 2500U



Block Diagram



(specifications are subject to change without notice)



Model: DTX 2500U

Control Interfaces

DVB-TH Transmitter - Windows Internet E	plorer		
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Ele Edit Yew Favorites Icols Help] x 🔩 •		
Favorites 🔏 DVB-TH Transmitter		💁 • 🔂 - 🖻 🖷 • Bage • Safety • To	jols • 🔞 • 🚉 🖪
Status	Config	Alarms NMS Users System Parameters	÷
Status	HPA Transmitter	Additis Nills Users System Parameters	
Versions and Serial Numbers	Modulator Mode	Tue Apr 5 17:18	110013
Serial Number:		Site Name: UBS	2011
Linux 2.4.20 mvl31-ml300 Versi	Transmission		-
Modulator FPGA Version:	in provi	Modulator Application Version: 2327 Modulator CPLD Version: 25	
Up Converter Software Version:	Output	Modulator CPLD Version: 25	
up converter software version:	RF Channels		
Transmitter	User RF Channels		
HPA TX Mode:	Non-Linear	Tx Pwr. Target: 54.0 dBm	
Transmitter Fwd. Power (dBm):	Precorrector	Transmitter Rfl. Power (dBm): 34.2	
HPA PS ON/OFF Status:	Linear Precorrector	HPA DC ON/OFF Status: ON	
HPA RF Output Status:	Adaptive	HPA Temperature: 58.0	
	Precorrector		
HPA DC Parameters	Manual HPA Control		
HPA Pre-Driver Voltage:	Site	HPA Pre-Driver Current: 1.49 A	
HPA High Power DC Voltage 0 :	GPS	HPA High Power DC Voltage 1 : 49.9 v	
HPA High Power Current 0:	12.9 A	HPA High Power Current 1: 13.4 A	
ne		S Internet	a · • 105% ·

Web Interface



Touch Screen LCD

Model: DTX 2500U





Rear Panel

Power Amplifier PE Output

Product Specifications

Modulator Inputs

Modulator I	nputs		Power Amplifier RF Outpu	t
DVB-ASI	IN-A, IN-B	2 DVB-ASI inputs: BNC (F), 75 Ω	RF Output Connector	7/16 DIN-type (F), 50 Ω
SMPTE-310M	IN-A, IN-B	2 inputs (optional): BNC (F), 75 Ω	Operating Frequency Range	470 MHz - 860 MHz (Note 2)
GbE Transport S		Protocol: Pro-MPEG CoP #3 /	Frequency Setting Accuracy	1 Hz step over entire operation range
(DAB excluded))	SMPTE 2022 Connector: RJ45	Frequency Stability	1ppm internal, or in accordance with external GPS accuracy
HPA FB		SMA (F), 50 Ω Level: -15 dBm to 0 dBm	Digital Average Output Power	250 Watts
Clock Reference	e - 10 MHz	Connector: BNC (F)	Output Power Set Point Range	10 dB
(Note 1)		Frequency: 10 MHz	Output Power Level Accuracy	$\leq \pm 0.25 \text{ dB}$
		Level: 0 dBm to 15 dBm Impedance: 50 Ω	Output Level Stability vs. time	$\leq \pm 0.25$ dB/24 hrs max.
Time Reference - 1 PPS Connector: BNC (F) (Note 1) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω			In-band IMD	≤ -29 dBc
		Frequency: 1 PPS Level: TTL Trigger: Positive transition	Spectral Regrowth	≤ -32 dBc (at rated output power, without pre-correction) ≤ -40 dBc (at rated output power, with adaptive non-linear pre-correction)
			Output Spurious Level	≤ -60 dBm
Modulator C	Dutputs		Output Harmonics	\leq -60 dBc (with output filter)
DVB-ASI	OUT-A, OUT-B	2 DVB-ASI outputs: BNC (F) 75 Ω	Out-of-Band Emissions	Compliant to FCC Part 27 [27.50(F)] requirements when using external
Modulator RF N	Aonitor	Connector: SMA (F), 50 Ω Level: 30 dB below RF output		mask filter
Clock Reference (Note 1)	e - 10 MHz	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave	RF Monitor	Connector: SMA (F), 50 Ω Level: 53 dB below the RF output
Time Reference (Note 1)	e - 1 PPS	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition		

Note 1: The "10MHz" and "1PPS" are inputs, except in the units equipped with internal GPS receivers, where they become Monitoring Outputs (high impedance).

Note 2: The DTX 2500U is designed to support the entire UHF range of 470 MHz to 860 MHz, however, each DTX 2500U is factory configured and aligned to operate on a specific RF channel. The RF output frequency is indicated on a label placed near the RF output connector and it is also displayed on the control modulator front panel. Administrative access is required to change the frequency through the Web Interface.

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(specifications are subject to change without notice)



Model: DTX 2500U

Product Specifications

Control Interfaces		Power Supply	
Front Panel	Touch screen LCD	Voltage	100 - 240 VAC
Ethernet Interface	Connector: 2x RJ45	Frequency	50/60 Hz
	Speed: 10/100/1000 Base-T	Power Consumption	max. 1500 Watts
USB Interface	Connector: USB Type B	Fuse	15A, 250V @ 110 VAC
RS232 Interface	Connector: 9-pin SUB-D Male		10A, 250V @ 240 VAC
RS485 Interface	2 Connectors: 9-pin SUB-D Female The modulator RS485 interfaceis used for		
	control of the amplifier	Mechanical	
Web Interface	Internet Explorer, Firefox, etc.	Size	3 U of 19" wide cabinet
	Connector: Ethernet	Dimensions (W x H x D)	48.26 cm x 13.28 cm x 63.88 cm
SNMP Control Interface			(19" x 5.23" x 25.15")
	Note: MIBs are provided	Weight	22 kg (48.5 lbs.)
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)		
Alarm Relays	Connector: RS232	Environmental	
	2 Dry Contact Alarm relays, triggered by any major alarm.	Operating Temperature	0° C to +50° C (+32° F to +122° F)
		Storage Temperature	-30° C to +70° C (-22° F to +158° F)
		Relative Humidity	max. 95%, non condensing
Adaptive Non-linear P	Pre-correction	Cooling	Forced air

Adaptive Non-linear Pre-correction

HPA FB Connector	Connected to the PA output monitoring port when the Adaptive Pre-corrector is used
Frequency	470 MHz to 860 MHz
Spectral Regrowth Reduction	7 dB ±2 dB (Note 3)

Manual Digital Pre-Correction

Non-Linear Pre-Correction	
Curve Formats	S 21 and VO/VI
Amplitude Scale	Linear and Logarithmic
Correction Points	Max. 256, user-defined position
Spectral Regrowth Reduction	Max. 12 dB, subject to available headroom
Phase Correction	-6 to +30 degrees, subject to available headroom
Linear Pre-Correction	
Correction Points	61
Point Spacing	1/60 of nominal spectrum BW
Amplitude Correction	±10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	±2000 ns
Group Delay Resolution	1 ns
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)

Note 3: Greater improvement is possible under particular applications. Performance depends upon power level and waveform.

Model: DTX 2500U



Product Specifications for Optional Features

GPS Receiver		GPS/GLONASS Receiver	
Input Connector	F-type (F), 75 Ω 5 Vdc biased	Input Connector	F-type (F), 75 Ω 5 Vdc biased
Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent	Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent
Receiver Architecture	L1 1575.42 MHz	Receiver Architecture	L1 - 1575.42 MHz / GLONASS - L1
12 Parallel Channels	C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking)	32 Parallel Channels	frequency range GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided
Tracking Capability	12 simultaneous satellite vehicles		tracking)
Acquisition Time	< 15 seconds typical TTFF-hot	Tracking Capability	24 simultaneous satellite vehicles
(Time To First Fix, TTFF)	(with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)	Acquisition Time (Time To First Fix, TTFF) (Tested at –40°C to +85°C)	< 15 s typical TTFF-hot (with current almanac, position, time and ephemeris) < 40 s typical TTFF-warm (with current almanac, position, time)
Positioning Accuracy	< 5 m, 1 - sigma < 10 m, 2 - sigma		< 150 s typical TTFF-cold (No stored information)
Timing Accuracy	< 2 ns, 1 - sigma < 6 ns, 6 - sigma	Positioning Accuracy	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Holdover Time	±1 usec during 2 hours	Timing Accuracy	< 100 ns
10 MHz Output Signal	Internally connected to the modulator	1 PPS + 10 MHz	
	input Level: 10 dBm ±2.5 dBm, sine wave	Holdover Time	\leq 2.5 µsec during 2 hours
	Harmonic Level: -40 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz	10 MHz Output Signal	Internally connected to the exciter input Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -30 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL	1PPS Output Signal	100 kHz: < -155 dBc/Hz Internally connected to the exciter input Level: TTL





Model: DTX 1000S

Product Features

- 2500 MHz 2700 MHz Broadband Transmitter
- LDMOS Power Amplifier provides 100 Watt output for broadcast of digital waveforms
- Universal exciter supports DVB-T and DVB-T2 waveforms
- DVB-T/H SFN, MFN and Hierarchical support
- DVB-T2 Single and Multiple PLP support, MFN and SFN (with T2-MI support) operation, SISO/MISO transmission
- Manual Linear and Non-linear Digital Pre-correctors
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3 / SMPTE 2022
- Automatic power-up following an AC interruption
- High power efficiency and low operating cost
- Touch screen display for real time user interface
- Remote manageable via Web GUI and SNMP
- Integrated GPS or GPS/GLONASS Receiver (optional)
- Occupying only 3 RU of standard 19" cabinet space



Product Description

Overview

The DTX 1000S is a compact, solid-state transmitter, designed for digital terrestrial television broadcasting over a S-Band frequency range of 2500 MHz to 2700 MHz.

The medium power design provides up to 100 Watts of output power for broadcast of DVB-T and DVB-T2 waveforms.

The DTX 1000S transmitter includes a universal exciter module, 100W power amplifier and integrated AC/DC power supply.

All of the transmitter's components are enclosed in a standard 19" rack mount chassis, occupying only 3 "RU" of cabinet space. The transmitter is forced air cooled using two compact high performance fans, which are installed on the transmitter enclosure front panel.

Universal Exciter

The exciter utilizes the innovative UBS universal waveform engine, supporting world-wide digital standards for terrestrial broadcasting.

The exciter can be factory configured with the necessary hardware to support one or both of the waveforms listed above, allowing the user to easily switch from one waveform to another. The exciter can also be upgraded in the field as standards evolve.

The exciter includes two ASI inputs or two ASI / T2-MI inputs (DVB-T2) and two GbE TS inputs.

Using the latest technology, the exciter converts an input transport stream to a COFDM modulated RF signal. UBS has developed a Direct Digital Synthesis (DDS) process that allows the exciter to provide the amplifier portion of the transmitter with a modulated RF signal.

For SFN operation, the exciter provides signal synchronization with external (optional internal) 10 MHz and 1PPS reference signals.

Model: DTX 1000S

UIBS Unique Broadband Systems Ltd.

Product Description

Power Amplifier

The power amplifier architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 2500 MHz to 2700 MHz.

The PA employs its own microcontroller, which monitors the operating parameters of the PA and provides protection against abnormal operation conditions (reflected power, current overloads and high temperature). The PA microcontroller communicates with the main system controller for parameter and alarm reporting.

Each power amplifier module includes an internal AC/DC power supply and two internal fans that provide forced air cooling.

Control and Monitoring

The exciter serves as the main system controller responsible for configuration and management of the entire transmitter.

The exciter and PA are linked by a RS-485 serial cable for control and monitoring. The system controller supports transmitter operation, configuration, management and status reporting. System control includes power up, power down, RF control processes, control commands for status requests and operating parameters, etc.

The DTX 1000S features an intuitive Web interface allowing the user to access the current transmitter status and configure the operational parameters. The Web interface uses a simple hierarchical menu structure which provides access to all transmitter parameters. The Web interface can be accessed locally or remotely via an IP network using a standard web browser.

The SNMP v3 interface provides the means for remote management of the transmitter in accordance with SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Manual Linear and Non-Linear Digital Pre-correctors

The manual linear and non-linear digital pre-correctors are used to maximize the performance of the transmitter in which the exciter is installed.

- The Non-linear pre-corrector balances out gain and phase non-linearity in the transmitter RF power amplifier, thereby significantly reducing the in-band and out of band intermodulation products. Optimizing the transmitter's performance will extend the coverage area. The performance requirement of the transmitter output filter, which is used to suppress radiation in adjacent channels below a maximum allowed level, will also be eased.
- The Linear pre-corrector balances out level and group delay variations that are seen across the channel bandwidth and caused by the transmitter mask filter and/or channel combiner filters. The linear optimization of the transmitter's radiated signal allows the receiver's channel equalizer to focus all of its correction capacity on level and group delay errors originating from the actual transmission path.

Internal GPS or GPS/GLONASS Receiver Option

The exciter can be equipped with an internal receiver that provides the 10 MHz and 1PPS reference signals needed for SFN synchronization.



Rear Panel

Document 57350-DVB-S07-04

June 13, 2014



Model: DTX 1000S

Product Specifications

Control Interfaces		Power Amplifier RF Output	t
Front Panel	Touch screen LCD	RF Output Connector	N-type (F), 50 Ω
Ethernet Interface	Connector: 2x RJ45	Operating Frequency Range	2500 MHz - 2700 MHz
	Speed: 10/100/1000 Base-T	Frequency Setting Accuracy	1 Hz step over entire operation range
USB Interface	Connector: USB Type B	Frequency Stability	1ppm internal, or in accordance with
RS232 Interface	Connector: 9-pin SUB-D Male		external GPS accuracy
RS485 Interface	Connectors: 9-pin SUB-D Female Must be connected to the HPA RS485 interface	Digital Average Output Power	100 Watts
		Output Power Level Accuracy	≤ ±0.25 dB
HPA RS485 Interface	Connector: 9-pin SUB-D Female	Frequency Response	≤ ±0.5 dB
	Must be connected to the RS485	MER	> 35 dB
	interface	In-band IMD	\leq -25 dBc (at rated output power)
HPA Serial (RS232)	Connector: 9-pin SUB-D Male	Spectral Regrowth	\leq -30 dBc (at rated output power)
Web Interface	Internet Explorer, Firefox, etc. Connector: Ethernet	Phase Noise (SSB)	100 Hz: < -80 dBc/Hz 1 kHz: < -85 dBc/Hz 10 kHz: < -95 dBc/Hz
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided		100 kHz: < -100dBc/Hz 1 MHz: < -110dBc/Hz
CLI	Connector: USB (HyperTerminal) or	Output Spurious Level	≤ -70 dBc
(Command Line Interface)	Ethernet (HyperTerminal and Telnet)	Output Harmonics	≤ -55 dBc
Alarm Relays	Connector: RS232 2 Dry Contact Alarm relays, triggered by any major alarm.	RF Monitor	Connector: N-type (F), 50 Ω Level: 50 dB below the RF output
Exciter Inputs		Exciter Outputs	
DVB-ASI	2 inputs: BNC (F), 75 Ω	DVB-ASI	2 outputs: BNC (F), 75 Ω
DVB-ASI/T2-MI	2 inputs: BNC (F), 75 Ω	DVB-ASI / T2-MI	2 outputs: BNC (F), 75 Ω
GbE Transport Stream	Connector: RJ45 Protocol: Pro-MPEG Forum CoP #3 /	Modulator RF Monitor	Connector: SMA (F), 50 Ω Level: 30 dB below RF output
	SMPTE 2022	10 MHz	Connector: BNC (F), High Impedance
10 MHz (Note 1)	Connector: BNC (F) Frequency: 10 MHz	(Note 1)	Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
	Level: 0 dBm to 15 dBm Impedance: 50 Ω	1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL
1 PPS (Note 1)	Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω		Trigger: Positive transition

Note 1: The 10 MHz and 1PPS connectors are inputs, except when the exciter is equipped with internal GPS receiver. In this case, the 10 MHz and 1PPS connectors become monitoring outputs (high impedance).

Document 57350-DVB-S07-04

June 13, 2014

Model: DTX 1000S



Product Specifications

Manual Digital Pre-Correction		Power Supply	
Non-Linear Pre-Correction		Voltage	100 - 240 VAC
Curve Formats	S 21 and VO/VI	Frequency	50/60 Hz
Amplitude Scale	Linear and Logarithmic	Power Consumption	max. 1200 Watts
Correction Points	Max. 256, user-defined position	Power Factor	0.96
Spectral Regrowth	Max. 12 dB, subject to available headroom		
Reduction		Environmental	
Phase Correction -6 to +30 degrees, subject to available headroom	Operating Temperature	0° C to +50° C (+32° F to +122° F)	
Linear Pre-Correction		Storage Temperature	-30° C to +70° C (-22° F to +158° F)
Correction Points	61	Relative Humidity	max. 95%, non condensing
Point Spacing	1/60 of nominal spectrum BW	Cooling	Forced air
Amplitude Correction	±10 dB		
Amplitude Resolution	0.01 dB	Mechanical	
Group Delay Correction	±2000 ns	Size	3 U of 19" wide cabinet
Group Delay Resolution	1 ns	Dimensions (W x H x D)	48.26 cm x 13.28 cm x 63.88 cm (19″ x 5.23″ x 25.15″)
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)	Weight	22 kg (48.5 lbs.)



Model: DTX 1000S

Product Specifications

GPS Receiver		GPS/GLONASS Receiver		
Input Connector	F-type (F), 75 Ω 5 Vdc biased	Input Connector	F-type (F), 75 Ω 5 Vdc biased	
Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent	Recommended Antenna	Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent	
Receiver Architecture	L1 1575.42 MHz	Receiver Architecture	L1 - 1575.42 MHz / GLONASS - L1	
12 Parallel Channels	C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking)	32 Parallel Channels	frequency range GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided	
Tracking Capability	12 simultaneous satellite vehicles		tracking)	
Acquisition Time	< 15 seconds typical TTFF-hot	Tracking Capability	24 simultaneous satellite vehicles	
(Time To First Fix, TTFF)	me To First Fix, TTFF) (with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)		< 15 s typical TTFF-hot (with current almanac, position, time and ephemeris) < 40 s typical TTFF-warm (with current almanac, position, time)	
Positioning Accuracy	< 5 m, 1 - sigma < 10 m, 2 - sigma		< 150 s typical TTFF-cold (No stored information)	
Timing Accuracy	< 2 ns, 1 - sigma < 6 ns, 6 - sigma	Positioning Accuracy	GPS: < 10m / 20m GLONASS: < 10 m / 20m	
Holdover Time	±1 usec during 2 hours	Timing Accuracy	< 100 ns	
10 MHz Output Signal	Internally connected to the modulator	1 PPS + 10 MHz		
	input Level: 10 dBm ±2.5 dBm, sine wave	Holdover Time	\leq 2.5 µsec during 2 hours	
Harmonic Level: -40 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz	10 MHz Output Signal	Internally connected to the exciter input Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -30 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz		
1PPS Output Signal	Internally connected to the modulator input Level: TTL	1PPS Output Signal	100 kHz: < -155 dBc/Hz Internally connected to the exciter input Level: TTL	



DIGITAL AUDIO BROADCASTING

DAB L-Band 400W Transmitter

Model: DAB TX 4000LU

Transmitter Includes:

- Universal Modulator with DAB waveform and integrated GPS receiver
- 400W LDMOS Power Amplifier
- Bandpass Filter



Product Description

Overview

The DABTX 4000LU from UBS is a modular, solid-state transmitter system designed to meet present and future market demands.

The modular transmitter configuration enables UBS to meet all DAB system requirements with future upgrade capabilities. System trouble shooting and module replacement is straightforward as interconnects are readily accessible.

The DAB TX 4000LU contains the following building blocks:

The Universal Modulator performs input signal processing, generates the DAB L-Band RF output waveform and provides complete transmitter monitoring and control.

The High Power Amplifier (HPA) amplifies the signal received from the modulator to an output level of 400 Watts RMS.

The HPA architecture is based on a solid state design operating in Class A/AB linear mode. The amplifier is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self correction, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The Bandpass Filter is designed specifically for each L-band RF channel and rejects out-off-band spectrum components. The filter is installed at the output of the high power amplifier.

DAB L-Band 400W Transmitter

Model: DAB TX 4000LU



Product Specifications

Universal Modulator	(see the DVU 5000 Modulator Data sheet	Control Interfaces	
	for complete information)	Front Panel	LCD display and cursor/ execute keys
DAB Signal Input	ETI (NI) 2.048 MHz or ETI (NA), according to ETSI EN 300 799	Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
Input Connectors	2 inputs: BNC (F), 50 Ω	USB Interface	Connector: USB Type B
Signal Processing	DAB transmission modes I, II, III and IV	RS232 Interface	Connector: 9-pin SUB-D Male
RF Output	Any L-band channel, selectable:	RS485 Interface	Connector: 9-pin SUB-D Female
	Connector: N-type(F), 50 Ω	CLI	Connector: USB (HyperTerminal) or
	Output Level: -10 dBm to 0 dBm Spectrum Mask compliant with ETSI EN	(Command Line Interface)	Ethernet (HyperTerminal and Telnet)
	300 401	Web GUI	Internet Explorer, Flrefox, etc. Connector: Ethernet
Internal GPS	GPS antenna connector installed on the Universal Modulator	SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
GPS Antenna	Delivered as part of the DAB Transmitter system	Alarm Relays	Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm.
Transmitter RF Performa	nce		
Operating Frequency	1450 MHz to 1500 MHz	Power Supply	
Rated Output power	56.0 dBm (before the output filter)	Voltage	198 - 244 VAC
Output Power range	46 dBm to 56 dBm	Frequency	50 - 60 Hz
Output Power Set Point Range	10 dB	Power Consumption	max. 2500 Watts
Output Level Stability vs. time	$\geq \pm 0.30 \text{ dB}/24 \text{ hrs. max.}$	Environmental	
Output Level Accuracy	# ±0.5 dB about selected level	Operating Temperature	+0° C to +50° C (+32° F to +122° F)
ALC Range	≥ 10 dB	Storage Temperature	-40° C to +65° C (-40° F to +149° F)
Spectral re-growth	\geq 30 dB at ±0.97 MHz from the Fc at the rated output power (DAB Mode II, clipping factor 10 dB)	Relative Humidity	max. 95%, non-condensing
		Altitude	3000 m (10000 ft), operating
Output connector	7/16" DIN-type (F), 50 Ω	Cooling	Forced air
Output VSWR	≥1.3:1		
		Mechanical	
		Construction	19" Rack mount transport case
		Dimension (W x H x D)	53.3cm x 77.5cm x 80cm (21″ x 30.5″ x 31.5″)

Weight

February 01, 2011

120 kg (264 lbs.)



Indoor Terrestrial Transmitter / Repeater

Product Features

- Compact, self-contained cabinet
- Forced air cooling system
- Modular construction for easy maintenance
- Scalable design supporting 1 multiplex with optional hardware upgrade to 2 or 3 multiplexes
- Universal platform supports multiple waveforms
- Exciter module includes modulator/controller, upconverter, band pass filter, GPS or GPS/GLONASS receiver (optional) and DVB-S/S2 receiver (optional)
- High performance LDMOS power amplifier
- RF overdrive, high VSWR and over-temperature protection
- DVB-ASI, IP (based on Pro-MPEG Forum CoP #3), G.703/G.704, SMPTE-310M and DVB-S/S2 input interfaces supported
- Linear and Non-linear Digital Pre-correction
- Remote control and self monitoring via Web GUI
- SNMP for network management

Optional Features

- Adaptive Non-linear Pre-correction
- Output band pass filter, coupler and RF detectors
- UPS allows alarm reporting and remote access for several minutes following a power outage

Frequency Bands

1452 MHz - 1492 MHz 1610 MHz - 1675 MHz 1980 MHz - 2010 MHz 2100 MHz - 2300 MHz) 2500 MHz - 2700 MHz) (custom frequencies available upon request)

Output Power Level

50W, 100W and 200W (400W optional)

Waveforms Supported

ATSC, ATSC-M/H, CMMB, DTMB, DVB-T, DVB-T2, DVB-H, DVB-SH(A), DVB-SH(B), DAB, DAB+, T-DMB, ISDB-T/T $_B$ and Proprietary (XM, SIRIUS, etc.)



50W, 100W Transmitter/Repeater



200W Transmitter/Repeater

Indoor Terrestrial Transmitter / Repeater



Transmitter/Repeater Overview

The Indoor Transmitter/Repeater cabinet includes an Exciter and High Power Amplifier (HPA), with an optional Bandpass Filter, Coupler and RF Detectors. In addition to a Modulator, the Exciter system includes an internal Upconverter, Controller, optional GPS Receiver and optional DVB-S/S2 Receiver.

The Universal Exciter can receive a structured MPEG-2 TS, CMMB multiplex TS, T2-MI stream or ISDB-T/T_B multiplexed TS on its ASI inputs. G.703/G.704 inputs are used in DAB mode and accept either NA or NI signals. Optionally, two serial SMPTE-310M inputs can be supplied. The Exciter is also accepts an IP encapsulated MPEG-2 structured Transport Stream on the RJ-45 Ethernet port. The IP input is protected using an MPEG PRO CoP #3 FEC / SMPTE 2022 protocol.

The Exciter modulator board converts the digital ASI, NA, NI or IP input stream into a digital waveform and creates a single analog RF output suitable for amplification in the Power Amplifier (PA). The coding and modulation of the data depends on the selected waveform.

The System Controller supports transmitter/repeater operation, configuration, management and status reporting. The site control includes power up, power down, RF control processes, control commands for status requests and operating parameters, etc.

The transmitter/repeater identity (name, password, local IP address, SNMP, etc.) can be configured remotely or locally. Remote upgrade of the transmitter/repeater software is supported.

The Exciter supports a web interface (Web GUI) for its user interface and is responsible for software and configuration management. Remote control of the transmitter/repeater is typically managed via an SNMP agent.

The GPS or GPS/GLONASS Receiver, located in the exciter chassis, supplies 10 MHz and 1PPS for synchronization purposes.

The DVB-S/S2 receiver demodulates an incoming satellite signal and provides an output ASI signal.

The PA is designed to operate as a final amplification stage for the indoor transmitter/repeater system. It amplifies the Exciter output signal to a power level of 50, 100 or 200 Watts, while maintaining acceptable output emission levels.

The PA architecture is based on a solid state design operating in the Class A/AB linear mode and is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self-correcting, allowing restoration of the amplifier to the normal operational state upon removal of the fault condition.

The Output Bandpass Filter is constructed using high performance dielectric resonator (DR) coupled cavities. The DR design minimizes the size and weight of the filter, while maintaining low insertion loss and providing high rejection of out-of-band components.

The Output Coupler provides sample ports for output signal level control and monitoring. It employs coaxial air line design for low losses and high directivity. **The RF Detectors** provide accurate forward and reverse RMS power level measurements from the Output Coupler. The power level measurement is waveform and temperature independent.

Digital Linear and Non-linear Pre-correctors (pre-distorters) significantly improve the performance of the Power Amplifier. The Non-linear pre-corrector compensates for the HPA non-linearity and is able to provide separate adjustment for the low and high frequency shoulders of the wide channel spectrum. The Linear pre-corrector compensates for the the group delay created by an output filter.

The Adaptive Non-linear Pre-corrector is a superior predistortion solution that compensates for RF Power Amplifier nonlinearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance. The complex signal processing is done in the RF domain and supports a fully adaptive operation: the feedback signal (HPA output) is compared to the exciter's RF output signal (HPA input) in order to optimize the correction which will improve the shoulders of the RF output.

An optional UPS (80 Watt / 450 VA) is intended to supply backup power to the Exciter. This will ensure site monitoring will continue during a power outage as well as signal generation to ensure a fast recovery time once power is restored. The HPA includes redundant power supplies.



200W Transmitter/Repeater with Additional multiplexes (Exciters) and UPS

June 12, 2014





Product Specifications

Control Interfaces		Amplifier RF Output	
Front Panel	LCD display and cursor/	Output Frequency:	TBD
Ethernet Interface	execute keys Connector: 2x RJ45	Connector	N-type (F), 50 Ω or 7/16" DIN (F), 50 Ω
	Speed: 10/100/1000 Base-T	Digital Average Output Power	50W, 100W or 200W
USB Interface	Connector: USB Type B	Gain Variation over Temperature	≤±1 dB
RS232 Interface	Connector: 9-pin SUB-D (M)	Gain Variation over the Signal BW	≤ 0.5 dB
RS485 Interface	Connector: 9-pin SUB-D (F)	In-band IMD	≤ -27 dBc (without pre-correction)
I/O Interface	Connector: 9-pin SUB-D (F)	Spectral Regrowth (at rated output power)	≤ -30 dBc (without pre-correction) ≤ -36 dBc (with pre-correction)
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet	Frequency Stability	Internal reference 0.3ppm / or in accordance with
CLI (Command Line)	Connector: USB (Hyperterminal) or Ethernet (HyperTerminal and Telnet)	Exciter RF Output	external ref. accuracy
SNMP Control Interface	Ethernet 10/100/1000 Base-T	Spectrum Polarity	Inverted or non-inverted,
	MIBs are provided	Spectrum Folanty	selectable
Alarm Relays	Connector: RS232, RS485	Level	-10 dBm to 0 dBm in 0.1 dB step
	and I/O 2 Dry Contact Alarm relays,	Level Stability	± 0.3 dB
	triggered by any major alarm	Return Loss	> 20 dB
		Shoulder Level	< -50 dBc
Exciter Inputs		Spurious Level Outside Channel	< -60 dBm
DVB-ASI	2x BNC (F), 75 Ω	MER	≥ 45 dB
G.703/G.704	2x BNC (F), 50 Ω		≥ 45 dB (DVB-T2)
SMPTE-310M	2x BNC (F), 75 Ω (optional)	Amplitude Flatness Center frequency ±3.8 MHz:	±0.3 dB
GbE Transport Stream (DAB excluded)	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45	Group delay response: Center frequency ±3.8 MHz:	±10 ns
	Connector: RJ45	Phase Noise SSB (measured @ 474 MHz)	10 Hz: < -60 dBc/Hz 100 Hz: < -85 dBc/Hz
Exciter Monitoring Outputs			1 kHz: < -100 dBc/Hz
DVB-ASI	2x BNC (F), 75 Ω		10 kHz: < -105 dBc/Hz 100 kHz: < -120 dBc/Hz
G.703/G.704	2x BNC (F), 50 Ω		1 MHz: < -135 dBc/Hz
RF Monitor	SMA (F), 50 Ω		
Reference Monitor	BNC (F), 50 Ω Frequency: 10 MHz Level: 2 Vpp		
10 MHz (Clock Reference) (Note 1)	BNC (F), High Impedance Level: 10dBm ±2.5 dB sinewave		

1PPS (Time Reference) (Note 1) BNC (F), High Impedance Level: TTL Trigger: Positive transition **Note 1:** The 10MHz and 1PPS connectors are inputs, except when the exciter is equipped with an internal GPS receiver. In this case, the 10MHz and 1PPS connector become monitoring outputs (high impedance).



Product Specifications

Manual Digital Pre-Correction	on	Power Supply (50W Transmitter/Repeater)	
Non-Linear Pre-Correction		Voltage	100 – 240 VAC
Curve Formats	S 21 and VO/VI	Frequency	50 – 60 Hz
Amplitude Scale	Linear and Logarithmic	Power Consumption	400 W (S-Band), 800 W (MMDS)
Correction Points	Max. 256, user-defined position	Power Supply (100W Trans	smitter/Repeater)
Spectral Regrowth	Max. 12 dB, subject to	Voltage	100 – 240 VAC
Reduction	available headroom	Frequency	50/60 Hz
Phase Correction	 -6 to +30 degrees, subject to available headroom 	Power Consumption	1 kW (S-Band), 1.5 kW (MMDS)
Linear Pre-Correction			
Correction Points	61	Power Supply (200W Trans	• •
Point Spacing	1/60 of nominal spectrum BW	Voltage	198 – 242 VAC (220 VAC ±10%)
Amplitude Correction	±10 dB	Frequency	50/60 Hz
		Power Consumption	1.9 kW (typical)
Amplitude Resolution	0.01 dB		
Group Delay Correction	±2000 ns	Mechanical (50W and 100W	• •
Group Delay Resolution	1 ns	Dimensions (W x H x D)	59 cm x 49.3 cm x 66 cm (23.2" x 19.4" x 26.0")
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)	Weight (with 1 Exciter, no BPF, no UPS)	50 – 60 kg (110 – 132 lbs.)
		Weight (with 1 Exciter, BPF and UPS)	70 – 80 kg (154 – 176 lbs.)
•	Adaptive Non-linear Pre-Correction		
HPA FB Connector	To be coupled from the PA output when the Adaptive Pre-	Mechanical (200W Transmitter/Repeater)	
	corrector is used	Dimensions (W x H x D)	59 cm x 79.1 cm x 84.2 cm (23.2" x 31.4" x 33.2")
Frequency	470 - 860 MHz 1600 MHz - 2800 MHz	Weight (with 1 Exciter, no BPF, no UPS)	107 kg (236 lbs.)
Spectral Regrowth Reduction	7 dB ±2 dB (Note 2)	Weight (with 1 Exciter, BPF and UPS)	127 kg (280 lbs.)
Note 2: Greater improvement is possible un power level, frequency and waveform.	der particular conditions. Performance depends upon	Environmental	
		Operating Temperature	+0° C to +50° C (+32° F to +122° F)
		Storage Temperature	-30° C to +65° C (-22° F to +149° F)
		Relative Humidity	max. 95%, non condensing
		Cooling	Forced air

Document UNIV-ITR-S07-06

June 12, 2014



Product Specifications

GPS Receiver		GPS/GLONASS Receive	er
Input Connector	F-type (F), 75 Ω 5 Vdc biased	Input Connector	F-type (F), 75 Ω 5 Vdc biased
Recommended Antenna	Bullet III GPS antenna – Trimble model no. 57860-10 or equivalent	Recommended Antenna	Bullet III GPS antenna – Trimble model no. 57860-10 or equivalent
Receiver Architecture	L1 1575.42 MHz	Receiver Architecture	L1 - 1575.42 MHz / GLONASS - L1 requency range
12 Parallel Channels Tracking Capability	C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking) 12 simultaneous satellite vehicles	32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided tracking)
Acquisition Time	< 15 seconds typical TTFF-hot	Tracking Capability	24 simultaneous satellite vehicles
(Time To First Fix, TTFF)	(with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)	Acquisition Time (Time To First Fix, TTFF) (Tested at –40°C to +85°C)	< 15 s typical TTFF-hot (with current almanac, position, time and ephemeris) < 40 s typical TTFF-warm (with current almanac, position, time) < 150 s typical
Positioning Accuracy	< 5 m, 1 – sigma < 10 m, 2 – sigma		TTFF-cold (No stored information)
Timing Accuracy	< 2 ns, 1 – sigma < 6 ns, 6 – sigma	Positioning Accuracy	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Holdover Time	±1 usec during 2 hours	Timing Accuracy 1PPS + 10MHz	< 100 ns
10 MHz Output Signal	Internally connected to the exciter input Level: 10 dBm ±2.5 dBm, sine wave	Holdover Time	\leq 2.5 µsec during 2 hours
	Harmonic Level: -40 dBc max.	10 MHz Output Signal	Internally connected to the exciter input
Phase Noise:	1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz		Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -30 dBc max.
	1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz	Phase Noise:	1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL		10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz
		1PPS Output Signal	Internally connected to the modulator input
UPS			Level: TTL
Height	1RU		
Power	280 Watts / 450 VA		

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Backup Time

10 Minutes (Exciter Only)

June 12, 2014



Product Features

- Compact, outdoor, self-contained unit
- Environmentally protected light-weight cabinet
- Thermal electric and forced air cooling system with easily replaceable air filter
- Internal heater
- Front and rear hinged doors for access to various test ports
- Protected AC output for powering external test equipment
- Modular construction for easy maintenance
- Scalable design supporting 1 multiplex with optional hardware upgrade to 2 or 3 multiplexes
- Universal platform supports multiple waveforms
- Exciter module includes modulator/controller, upconverter, band pass filter, GPS or GPS/GLONASS receiver (optional) and DVB-S/S2 receiver (optional)
- High performance LDMOS power amplifier
- RF overdrive, high VSWR and over-temperature protection
- DVB-ASI, IP (based on Pro-MPEG Forum CoP #3), G.703/G.704, SMPTE-310M and DVB-S/S2 input interfaces supported
- Linear and Non-linear Digital Pre-correction
- Remote control and self monitoring via Web GUI
- SNMP for network management

Optional Features

- Adaptive Non-linear Pre-correction
- Output band pass filter, coupler and RF detectors
- UPS allows alarm reporting and remote access for several minutes following a power outage

Frequency Bands

1452 MHz - 1492 MHz 1610 MHz - 1675 MHz 1980 MHz - 2010 MHz 2100 MHz - 2300 MHz) 2500 MHz - 2700 MHz) (custom frequencies available upon request)



Transmitter/Repeater

Waveforms Supported

ATSC, ATSC-M/H, CMMB, DTMB, DVB-T, DVB-T2, DVB-H, DVB-SH(A), DVB-SH(B), DAB, DAB+, T-DMB, ISDB-T/T_B and Proprietary (XM, SIRIUS, etc.)

Output Power Level

50W, 100W and 200W (400W optional)

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Transmitter/Repeater Overview

The Outdoor Transmitter/Repeater is a compact, outdoor, weatherproof cabinet that includes an Exciter, High Power Amplifier (HPA) and Power Distribution unit, with an optional Bandpass Filter, Coupler and RF Detectors. In addition to a Modulator, the Exciter system includes an internal Upconverter, Controller, optional GPS Receiver and optional DVB-S/S2 Receiver.

The Universal Exciter can receive a structured MPEG-2 TS, CMMB multiplex TS, T2-MI stream or ISDB-T/T_B multiplexed TS on its ASI inputs. G.703/G.704 inputs are used in DAB mode and accept either NA or NI signals. Optionally, two serial SMPTE-310M inputs can be supplied. The Exciter is also accepts an IP encapsulated MPEG-2 structured Transport Stream on the RJ-45 Ethernet port. The IP input is protected using an MPEG PRO CoP #3 FEC protocol.

The Exciter modulator board converts the digital ASI, NA, NI or IP input stream into a digital waveform and creates a single analog RF output suitable for amplification in the Power Amplifier (PA). The coding and modulation of the data depends on the selected waveform.

The System Controller supports transmitter/repeater operation, configuration, management and status reporting. The site control includes power up, power down, RF control processes, control commands for status requests and operating parameters, etc.

The transmitter/repeater identity (name, password, local IP address, SNMP, etc.) can be configured remotely or locally. Remote upgrade of the transmitter/repeater software is supported.

The Exciter supports a web interface (Web GUI) for its user interface and is responsible for software and configuration management. Remote control of the transmitter/repeater is typically managed via an SNMP agent.

The GPS or GPS/GLONAS Receiver, located in the exciter chassis, supplies 10 MHz and 1PPS for synchronization purposes.

The DVB-S/S2 receiver demodulates an incoming satellite signal and provides an output ASI signal.

The PA is designed to operate as a final amplification stage for the indoor transmitter/repeater system. It amplifies the Exciter output signal to a power level of 50, 100 or 200 Watts, while maintaining acceptable output emission levels.

The PA architecture is based on a solid state design operating in the Class A/AB linear mode and is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self-correcting, allowing restoration of the amplifier to the normal operational state upon removal of the fault condition. **The Output Bandpass Filter** is constructed using high performance dielectric resonator (DR) coupled cavities. The DR design minimizes the size and weight of the filter, while maintaining low insertion loss and providing high rejection of out-of-band components.

The Output Coupler provides sample ports for output signal level control and monitoring. It employs coaxial air line design for low losses and high directivity. **The RF Detectors** provide accurate forward and reverse RMS power level measurements from the Output Coupler. The power level measurement is waveform and temperature independent.

Digital Linear and Non-linear Pre-correctors (pre-distorters) significantly improve the performance of the Power Amplifier. The Non-linear pre-corrector compensates for the HPA non-linearity and is able to provide separate adjustment for the low and high frequency shoulders of the wide channel spectrum. The Linear pre-corrector compensates for the the group delay created by an output filter.

The Adaptive Non-linear Pre-corrector is a superior predistortion solution that compensates for RF Power Amplifier nonlinearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance. The complex signal processing is done in the RF domain and supports a fully adaptive operation: the feedback signal (HPA output) is compared to the exciter's RF output signal (HPA input) in order to optimize the correction which will improve the shoulders of the RF output.

An optional UPS (80 Watt / 450 VA) is intended to supply backup power to the Exciter. This will ensure site monitoring will continue during a power outage as well as signal generation to ensure a fast recovery time once power is restored. The HPA includes redundant power supplies.

The Power Distribution Unit (PDU), mounted on the bottom of the cabinet, receives ~ 220 VAC and distributes the required power to each transmitter/repeater sub-module. The PDU includes 7 circuit breakers, 2 surge suppressors, 2 RFI power line filters, 2 latching relays, 40 two-stage feed-through terminal blocks and 1 double grounding terminal.

The Outdoor Cabinet is weatherproof and made out of lightweight aluminum. It includes a heater, thermal electric cooler and fans for cooling. Front and rear hinged doors allow for easy access to repeater sub-modules.

The cabinet is divided into lower and upper compartments. The lower compartment air flow is provided by the Exciter fans while the upper compartment air flow is provided by rear door and HPA heat sink fans.

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June 16, 2014



Product Specifications

Control Interfaces		Amplifier RF Output	
Front Panel	LCD display and cursor/	Output Frequency:	TBD
Ethernet Interface	execute keys Connector: 2x RJ45	Connector	N-type (F), 50 Ω or 7/16" DIN (F), 50 Ω
	Speed: 10/100/1000 Base-T	Digital Average Output Power	50W, 100W or 200W
USB Interface	Connector: USB Type B	Gain Variation over Temperature	≤±1 dB
RS232 Interface	Connector: 9-pin SUB-D (M)	Gain Variation over the Signal BW	≤ 0.5 dB
RS485 Interface	Connector: 9-pin SUB-D (F)	In-band IMD	≤ -27 dBc (without pre-correction)
I/O Interface	Connector: 9-pin SUB-D (F)	Spectral Regrowth (at rated output power)	 ≤ -30 dBc (without pre-correction) ≤ -36 dBc (with pre-correction)
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet	Frequency Stability	Internal reference 0.3ppm / or in accordance with
CLI (Command Line)	Connector: USB (Hyperterminal) or Ethernet (HyperTerminal and Telnet)	Exciter RF Output	external ref. accuracy
SNMP Control Interface	Ethernet 10/100/1000 Base-T	Spectrum Polarity	Inverted or non-inverted,
	MIBs are provided	opectrum rolanty	selectable
Alarm Relays	Connector: RS232, RS485	Level	-10 dBm to 0 dBm in 0.1 dB step
	and I/O 2 Dry Contact Alarm relays,	Level Stability	± 0.3 dB
	triggered by any major alarm	Return Loss	> 20 dB
		Shoulder Level	< -50 dBc
Exciter Inputs		Spurious Level Outside Channel	< -60 dBm
DVB-ASI	2x BNC (F), 75 Ω	MER	≥ 45 dB
G.703/G.704	2x BNC (F), 50 Ω		≥ 42 dB (DVB-T2)
SMPTE-310M	2x BNC (F), 75 Ω (optional)	Amplitude Flatness Center frequency ±3.8 MHz:	±0.3 dB
GbE Transport Stream (DAB excluded)	Protocol: Pro-MPEG CoP #3 / SMPTE-2022 Connector: RJ45	Group delay response: Center frequency ±3.8 MHz:	±10 ns
	Connector: KJ45	Phase Noise SSB (measured @ 474 MHz)	10 Hz: < -60 dBc/Hz 100 Hz: < -85 dBc/Hz
Exciter Monitoring Outputs			1 kHz: < -100 dBc/Hz
DVB-ASI	2x BNC (F), 75 Ω		10 kHz: < -105 dBc/Hz 100 kHz: < -120 dBc/Hz
G.703/G.704	2x BNC (F), 50 Ω		1 MHz: < -135 dBc/Hz
RF Monitor	SMA (F), 50 Ω		
Reference Monitor	BNC (F), 50 Ω Frequency: 10 MHz Level: 2 Vpp		
10 MHz (Clock Reference) (Note 1)	BNC (F), High Impedance Level: 10dBm ±2.5 dB sinewave		

1PPS (Time Reference) (Note 1) **Note 1:** The 10MHz and 1PPS connectors are inputs, except when the exciter is equipped with an internal GPS receiver. In this case, the 10MHz and 1PPS connector become monitoring outputs (high impedance).

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BNC (F), High Impedance

Trigger: Positive transition

Level: TTL

Wireless Broadband and Broadcasting Solutions

Outdoor Terrestrial Transmitter / Repeater



Product Specifications

Manual Digital Pre-Correct	ion	Power Supply (50W Transmitter/Repeater)	
Non-Linear Pre-Correction		Voltage	198 – 242 VAC (220 VAC ±10%)
Curve Formats	S 21 and VO/VI	Frequency	50/60 Hz
Amplitude Scale	Linear and Logarithmic	Power Consumption	800 W (typical) (1.8 kW with heater on)
Correction Points	Max. 256, user-defined position		(
Spectral Regrowth	Max. 12 dB, subject to	Power Supply (100W Trans	smitter/Repeater)
Reduction	available headroom	Voltage	198 – 240 VAC (220 VAC ±10%)
Phase Correction	-6 to +30 degrees, subject to available headroom	Frequency	50/60 Hz
Linear Pre-Correction		Power Consumption	1.3 kW (typical) (2.3 kW with heater on)
Correction Points	61		
Doint Spacing	1/60 of nominal anostrum PW/	Power Supply (200W Trans	smitter/Repeater)
Point Spacing	1/60 of nominal spectrum BW	Voltage	198 – 242 VAC (220 VAC ±10%)
Amplitude Correction	±10 dB	Frequency	50/60 Hz
Amplitude Resolution	0.01 dB	Power Consumption	2.2 kW (typical)
Group Delay Correction	±2000 ns		(3.2 kW with heater on)
Group Delay Resolution	1 ns	Mechanical (50W Transmiti	ter/Popostor)
Peak Power Clip Level	+17 dB to +7 dB	-	
	(peak power relative to average RMS level)	Dimensions (W x H x D)	69.53 cm x 86.4 cm x 120.65 cm (27.375" x 34.0" x 47.5")
		Weight (with 1 Exciter, no BPF, no UPS)	87 – 97 kg (192 – 214 lbs.)
Adaptive Non-linear Pre-Co	prrection		
HPA FB Connector	To be coupled from the PA output when the Adaptive Pre- corrector is used	Weight (with 1 Exciter, BPF and UPS)	107 – 117 kg (236 – 258 lbs.)
		Mechanical (100W and 200	W Transmitter/Repeater)
Frequency	470 MHz - 860 MHz 1600 MHz - 2800 MHz	Dimensions (W x H x D)	69.53 cm x 86.4 cm x 120.65 cm (27.375" x 34.0" x 47.5")
Spectral Regrowth Reduction	7 dB ±2 dB (Note 2)	Weight (with 1 Exciter, no BPF, no UPS)	116 kg (256 lbs.)
Note 2: Greater improvement is possible up power level, frequency and waveform.	nder particular conditions. Performance depends upon	Weight (with 1 Exciter, BPF and UPS)	136 kg (300 lbs.)
		Environmental	
		Operating Temperature	+0° C to +50° C (+32° F to +122° F)
		Storage Temperature	-30° C to +65° C (-22° F to +149° F)
		Relative Humidity	max. 95%, non condensing

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Cooling

Forced air

June 16, 2014



Product Specifications

GPS Receiver		GPS/GLONASS Receive	er
Input Connector	F-type (F), 75 Ω 5 Vdc biased	Input Connector	F-type (F), 75 Ω 5 Vdc biased
Recommended Antenna	Bullet III GPS antenna – Trimble model no. 57860-10 or equivalent	Recommended Antenna	Bullet III GPS antenna – Trimble model no. 57860-10 or equivalent
Receiver Architecture	L1 1575.42 MHz	Receiver Architecture	L1 - 1575.42 MHz / GLONASS - L1 requency range
12 Parallel Channels	C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking)	32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided
Tracking Capability	12 simultaneous satellite vehicles		tracking)
Acquisition Time	< 15 seconds typical TTFF-hot	Tracking Capability	24 simultaneous satellite vehicles
(Time To First Fix, TTFF)	(with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)	Acquisition Time (Time To First Fix, TTFF) (Tested at –40°C to +85°C)	< 15 s typical TTFF-hot (with current almanac, position, time and ephemeris) < 40 s typical TTFF-warm (with current almanac, position, time) < 150 s typical
Positioning Accuracy	< 5 m, 1 – sigma		TTFF-cold (No stored information)
	< 10 m, 2 – sigma	Positioning Accuracy	GPS: < 10m / 20m
Timing Accuracy	< 2 ns, 1 – sigma < 6 ns, 6 – sigma		GLONASS: < 10 m / 20m
Holdover Time	±1 usec during 2 hours	Timing Accuracy 1PPS + 10MHz	< 100 ns
10 MHz Output Signal	Internally connected to the exciter input Level: 10 dBm ±2.5 dBm, sine wave	Holdover Time	\leq 2.5 µsec during 2 hours
	Harmonic Level: -40 dBc max.	10 MHz Output Signal	Internally connected to the exciter input
Phase Noise:	1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz		Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -30 dBc max.
	1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz	Phase Noise:	1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL		10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz
		1PPS Output Signal	Internally connected to the modulator input
UPS			Level: TTL
Height	1RU		
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Document UNIV-OTR-S07-05

Power

Backup Time

June 16, 2014

280 Watts / 450 VA

10 Minutes (Exciter Only)



Standalone UHF-Band Medium Power Amplifier

Model: DMPA 120UX

Product Features

- 470 MHz 860 MHz Broadband Amplifier
- Digital ready LDMOS PA provides 120 Watt output for broadcast of digital waveforms
- ALC or AGC mode of operation
- Touch screen display for real time user interface
- Remote control and self monitoring via Ethernet and RS485 interfaces
- Built in web server accessible through RJ45 connector with Internet Explorer
- Integrated AC/DC power supply



Product Description

The DMPA 120UX is designed to operate as a final amplification stage for a terrestrial UHF transmitter or repeater system. It amplifies an UHF-Band input signal to a digital average output power level of 120 Watts, while maintaining its linear characteristics.

The DMPA 120UX architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 470 MHz to 860 MHz. The amplifier is protected against input overdrive and overheating. The protection circuits are all self correcting, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DMPA 120UX incorporates an internal automatic self leveling loop to maintain constant gain over the life of the equipment. The automatic level control (ALC) circuit will compensate for the input signal level variations and the gain variations caused by changes in temperature as well as for the gain change due to devices aging. Depending on the application, the amplifier can be configured to operate in AGC mode, maintaining a constant gain value. The amplifier's operational parameters are monitored and controlled by an embedded system controller that can be accessed from the touch screen LCD, Ethernet or RS 485 interfaces.

The DMPA 120UX is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation.

All of the amplifier's components are enclosed in a standard 19" rack mount chassis, occupying only "2RU" of cabinet space.

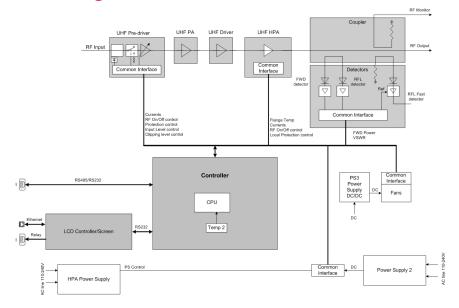
The amplifier is forced air cooled using four high performance fans, which are installed on the amplifier enclosure front panel.

Standalone UHF-Band Medium Power Amplifier

Model: DMPA 120UX



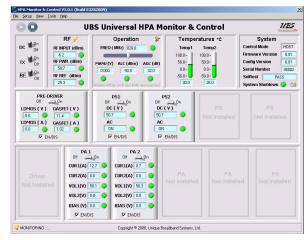
Block Diagram (subject to change without notice)



Control Interfaces (subject to change without notice)



Web GUI



HPA Monitor GUI



Document 55857-02-S07-02

Touch Screen LCD (specifications are subject to change without notice)

September 02, 2011

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Wireless Broadband and Broadcasting Solutions



Standalone UHF-Band Medium Power Amplifier

Model: DMPA 120UX



Rear Panel

Product Specifications (specifications are subject to change without notice)

RF Input		Control Interfaces	
Connector	N-type (F), 50 Ω	Front Panel	Touch screen LCD
Frequency Range	470 MHz - 860 MHz	Ethernet	Connector: RJ45
Level	-7 dBm to 1 dBm		Speed: 10/100 Base-T
Return Loss	≤ -15 dB	RS485	Connector: 9-pin SUB-D Female
		Relay	Connector: 9-pin SUB-D Male
RF Output		Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
Connector	7′-16″ DIN-type (F), 50 Ω	HPA Monitor GUI	RS485
Frequency Range	470 MHz - 860 MHz	Machine-Machine	RS485
Digital Average Output Power	120 Watts (50.8 dBm)		
Power Level Accuracy	±0.25 dB	Power Supply	
Gain	58 dB max.	Voltage	100 - 240 VAC
Gain Variation over 8 MHz BW	≤ ±0.25 dB	Frequency	50/60 Hz
Gain Variation over entire BW	$\leq \pm 2 dB$	Power Consumption	max. 850 Watts
In-band IMD	≤ -27 dBc	Power Factor	0.96
Spectral Regrowth (Shoulder Level)	≤ -30 dBc (at rated output power, uncorrected)	Mechanical	
Output Harmonics	\leq -60 dBc (with output filter)	Size	2 U of 19" wide cabinet
RF Monitor	Connector: SMA (F), 50 Ω Level: 53 dB ±1 dB below the rated	Dimensions (W x H x D)	483mm x 89mm x 546mm (19.0" x 3.5" x 21.5")
	output power level (±2 dB across the entire frequency range)	Weight	20 kg (44 lbs.)
		Environmental	
		Operating Temperature	-10°C to +50°C (+14°F to +122°F)
		Storage Temperature	-30°C to +75°C (-22°F to +167°F)
		Relative Humidity	max. 95%, non condensing

Cooling

Forced air



Standalone UHF-Band High Power Amplifier

Model: DHPA 250UX

Product Features

- 470 MHz 860 MHz Broadband Amplifier
- Digital ready LDMOS PA provides 250 Watt output for broadcast of digital waveforms
- ALC or AGC mode of operation
- Touch screen display for real time user interface
- Remote control and self monitoring via Ethernet and RS485 interfaces
- Built in web server accessible through RJ45 connector with Internet Explorer
- Integrated AC/DC power supply



Product Description

The DHPA 250UX is designed to operate as a final amplification stage for a terrestrial UHF transmitter or repeater system. It amplifies an UHF-Band input signal to a digital average output power level of 250 Watts, while maintaining its linear characteristics.

The DHPA 250UX architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 470 MHz to 860 MHz. The amplifier is protected against input overdrive and overheating. The protection circuits are all self correcting, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DHPA 250UX incorporates an internal automatic self leveling loop to maintain constant gain over the life of the equipment. The automatic level control (ALC) circuit will compensate for the input signal level variations and the gain variations caused by changes in temperature as well as for the gain change due to devices aging. Depending on the application, the amplifier can be configured to operate in AGC mode, maintaining a constant gain value. The amplifier's operational parameters are monitored and controlled by an embedded system controller that can be accessed from the touch screen LCD, Ethernet or RS 485 interfaces.

The DHPA 250UX is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation. The amplifier is forced air cooled using four high performance fans, which are installed on the amplifier enclosure front panel.

All of the amplifier's components are enclosed in a standard 19" rack mount chassis, occupying only 3 RU of cabinet space.

Document 57139-01-S07-02

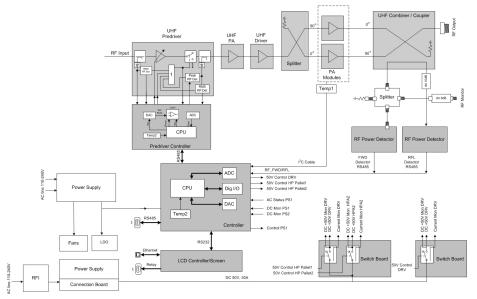
February 24, 2014

Standalone UHF-Band High Power Amplifier

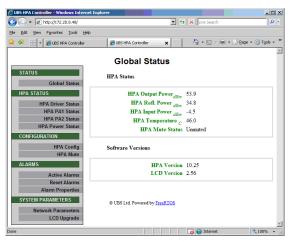
Model: DHPA 250UX



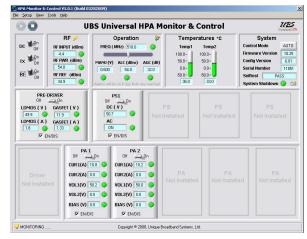
Block Diagram



Control Interfaces (subject to change without notice)



Web GUI



HPA Monitor GUI



Document 57139-01-S07-02

Touch Screen LCD

(specifications are subject to change without notice)

February 24, 2014

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Standalone UHF-Band High Power Amplifier

Model: DHPA 250UX



Rear Panel

Product Specifications

RF Input		Control Interfaces	
Connector	N-type (F), 50 Ω	Front Panel	Touch screen LCD
Frequency Range	470 MHz - 860 MHz	Ethernet	Connector: RJ45 Speed: 10/100 Base-T
Level Return Loss	-6 dBm to 1 dBm < -15 dB	RS485	Connector: 9-pin SUB-D Female
Return Loss	≤ -15 QB	Relay	Connector: 9-pin SUB-D Male
RF Output		Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
Connector	7'-16" DIN-type (F), 50 Ω	HPA Monitor GUI	RS485
Frequency Range	470 MHz - 860 MHz	Machine-Machine	RS485
Digital Average Output Power	250 Watts (54 dBm)		
Power Level Accuracy	±0.25 dB	Power Supply	
Gain	60 dB max.	Voltage	100 - 240 VAC
Gain Variation over 8 MHz BW	≤ ±0.25 dB	Frequency	50/60 Hz
Gain Variation over entire BW	≤ ±2 dB	Power Consumption	max. 1500 Watts
In-band IMD	≤ -27 dBc		
Spectral Regrowth	\leq -30 dBc (at rated output power,	Mechanical	
(Shoulder Level)	uncorrected)	Size	3 U of 19" wide cabinet
Output Harmonics	\leq -60 dBc (with output filter)	Dimensions (W x H x D)	482.6mm x 132.8mm x 644.7mm (19.0" x 5.23" x 25.38")
RF Monitor	Connector: SMA (F), 50 Ω Level: 54 dB below the rated output power level	Weight	22 kg (49 lbs.)
		Environmental	
		Operating Temperature	-10°C to +50°C (+14°F to +122°F)
		Storage Temperature	-30°C to +75°C (-22°F to +167°F)
		Relative Humidity	max. 95%, non condensing
		Cooling	Forced air



Standalone S-Band Medium Power Amplifier

Model: DMPA 2200

Product Features

- 2100 MHz 2300 MHz Broadband Amplifier
- High linearity PA provides 50 Watt output for broadcast of digital waveforms
- Single or Multiple OFDM, QAM or QPSK/BPSK channel support
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Remote control and self monitoring via RS485 interface
- HPA Monitor GUI software available for local PC control via RS232 interface (CD included)
- Integrated AC/DC power supply



Product Description

The DMPA 2200 is designed to operate as a final amplification stage for a terrestrial S-Band transmitter or repeater system. It amplifies an input S-Band signal to a digital average output power level of 50 Watts, while maintaining its linear characteristics.

The DMPA 2200 architecture is an LDMOS based solid state design operating in Class A/AB linear mode over a frequency range of 2100 MHz to 2300 MHz. The amplifier is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self correction, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DMPA 2200 incorporates an internal automatic self leveling loop to maintain constant gain over the life of the equipment. The automatic level control (ALC) circuit will compensate for the input signal level variations and the gain variations caused by changes in temperature as well as for the gain change due to devices aging. Depending on the application, the amplifier can be configured to operate in AGC mode, maintaining a constant gain value. The amplifier's operational parameters are monitored and controlled by an embedded system controller that can be accessed from the RS232 interface using the GUI software provided.

The DMPA 2200 is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation.

All of the amplifier's components are enclosed in a standard 19" rack mount chassis, occupying only "2RU" of cabinet space.

The amplifier is forced air cooled using four high performance fans, which are installed on the amplifier enclosure front panel.

Standalone S-Band Medium Power Amplifier

Model: DMPA 2200





Fig.1 - Rear Panel

Product Specifications

DEL			
RF Input		Power Supply	
Connector	N-type (F), 50 Ω	Voltage	100 - 240 VAC
Frequency Range	2100 MHz - 2300 MHz	Frequency	50 - 60 Hz
Level	-1 dBm to 3 dBm	Power Consumption	max. 400 Watts (at rated output power)
Instantaneous Bandwidth	Up to 50 MHz		
VSWR	1.50 : 1	Mechanical	
		Size	2 U of 19" wide cabinet
RF Output		Dimensions (W x H x D)	483mm x 89mm x 527mm (19.0" x 3.5" x 20.75")
Connector	N-type (F), 50 Ω	Weight	12 kg (26 lbs.)
Frequency Range	2100 MHz - 2300 MHz		. 2
Digital Average Output Power	50 Watts (47 dBm)	Environmental	
Power Level Accuracy	±0.25 dB	Operating Temperature	-10°C to +45°C (+14°F to +113°F)
Gain	48 dB max.	Storage Temperature	-40°C to +70°C (-40°F to +158°F)
Gain Variation	$\leq \pm 1 \text{ dB}$	Relative Humidity	max. 95%, non condensing
over Temperature		Cooling	Forced air
Gain Variation over 8 MHz BW	≤ ±0.25 dB	ETSI Compliance	
In-band IMD	≤ -25 dBc	Essential Requirement	Standard / Specification
Spectral Regrowth	\leq -30 dBc (at rated output power)	R&TTE Directive 1995/5/EC	
(uncorrected)	(a minimum 5 dB improvement can be	Safety	EN 60950-1: 2001, A11: 2004 First Edition
	seen with Pre-correction applied)	Health	Not Applicable. No Antenna
Spurious Level (outside channel)	≤ -60 dBm	EMC	EN 301 489-1 V1.8.1
RF Monitor	Connector: SMA (F), 50 Ω Level: 52 dB ± 1 dB below the rated output power level	Radio	EN 302 296 V1.1.1 Testing was exclusive to Clause 4.2.2; limits per Table 4.3; 8 MHz channel, non-critical cases only.
Control Interfaces		Radio	EN 301 390 V1.2.1 All technical requirements relevant to
RS232	Connector: 9-pin SUB-D Male		receiver measurements were excluded.
RS485	Connector: 9-pin SUB-D Female		
HPA Monitor GUI	RS232	CE Compliance	
Machine-Machine	RS485	This equipment is CE Complian	t.

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Document 54204-01-S07-11

(specifications are subject to change without notice)

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Standalone MMDS-Band Medium Power Amplifier

Model: DMPA 2600

Product Features

- 2500 MHz 2700 MHz Broadband Amplifier
- High linearity PA provides 50 Watt output for broadcast of digital waveforms
- Multiple COFDM channel support
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Remote control and self monitoring via RS485 interface
- HPA Monitor GUI software available for local PC control via RS232 interface (CD included)
- Integrated AC/DC power supply



Product Description

The DMPA 2600 is designed to operate as a final amplification stage for a terrestrial MMDS-Band transmitter or repeater system. It amplifies an input MMDS-Band signal to a digital average output power level of 50 Watts, while maintaining its linear characteristics.

The DMPA 2600 architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 2500 MHz to 2700 MHz. The amplifier is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self correction, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DMPA 2600 incorporates an internal automatic self leveling loop to maintain a constant output over the life of the equipment. The automatic level control (ALC) circuit will compensate for the input signal level variations and the gain variations caused by changes in temperature as well as for the gain change due to devices aging. Depending on the application, the amplifier can be configured to operate in AGC mode, maintaining a constant gain value.

The amplifier's operational parameters are monitored and controlled by an embedded system controller that can be accessed from the RS232 interface using the GUI software provided.

The DMPA 2600 is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation.

All of the amplifier's components are enclosed in a standard 19" rack mount chassis, occupying only "2RU" of cabinet space.

The amplifier is forced air cooled using four high performance fans, which are installed on the amplifier enclosure front panel.

May 10, 2011

Standalone MMDS-Band Medium Power Amplifier

Model: DMPA 2600





Fig.1 - Rear Panel

Product Specifications

RF Input Connector **Frequency Range** Level VSWR

RF Output

Connector

Frequency Range Digital Average

Output Power

Power Level Accuracy

Gain

Gain Variation over Temperature

Gain Variation over 8 MHz BW

In-band IMD

Spectral Regrowth (uncorrected)

Spurious Level (outside channel)

RF Monitor

N-type (F), 50 Ω 2500 MHz - 2700 MHz

N-type (F), 50 Ω

-8 dBm to 3 dB,

1.50:1

2500 MHz - 2700 MHz

50 Watts (47 dBm)

±0.25 dB 55 dB max. ≤±1 dB

 $\leq \pm 0.25 \text{ dB}$

≤ -30 dBc

≤ -35 dBc (at rated output power) (a minimum 5 dB improvement can be seen with Pre-correction applied)

≤ -60 dBm

Connector: SMA (F), 50 Ω Level: 53 dB ± 1 dB below the rated output power level (±2 dB across the entire frequency range)

Control internaces	Control	Interfaces
--------------------	---------	------------

RS232 RS485 **HPA Monitor GUI** Machine-Machine Connector: 9-pin SUB-D Male Connector: 9-pin SUB-D Female RS232 RS485

Power Supply	
Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 800 Watts (at rated output power)
Mechanical	
Size	2 U of 19" wide cabinet
Dimensions (W x H x D)	483mm x 89mm x 527mm (19.0" x 3.5" x 20.75")
Weight	21 kg (46 lbs.)
Environmental	
Operating Temperature	-10°C to +45°C (+14°F to +113°F)
Storage Temperature	-40°C to +70°C (-40°F to +158°F)
Relative Humidity	max. 95%, non condensing
Cooling	Forced air

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May 10, 2011

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Standalone MMDS-Band Medium Power Amplifier

Model: DMPA 2600-I

Product Features

- 2500 MHz 2700 MHz Broadband Output
- 222 MHz 422 MHz Input
- High linearity PA provides 50 Watt output for broadcast of digital waveforms
- Multiple COFDM channel support
- Fully protected against over temperature and output load VSWR conditions
- •Web Interface provides local and remote control via Ethernet interface
- HPA Monitor GUI software available for local PC control via RS485 interface (CD included)
- Integrated AC/DC power supply



Product Description

The DMPA 2600-I is designed to convert an input signal (222 MHz The amplifier's operational parameters can be monitored and and 422 MHz) to a MMDS-Band output signal with a digital average output power level of 50 Watts, while maintaining its linear characteristics.

The DMPA 2600-I architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 2500 MHz to 2700 MHz. The amplifier is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self correction, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DMPA 2600-I incorporates an internal automatic self leveling loop to maintain a constant output power level over the life of the amplifier. The automatic level control circuit will compensate for input signal variations caused by changes in temperature and device aging.

controlled locally or remotely through the Web Interface or locally using the HPA Monitor GUI.

The DMPA 2600 is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation. The amplifier is forced air cooled using four high performance fans, which are installed on the amplifier enclosure front panel.

All of the amplifier's components are enclosed in a standard 19" rack mount chassis, occupying only "2RU" of cabinet space.

June 03, 2011

Standalone MMDS-Band Medium Power Amplifier

Model: DMPA 2600-I





Rear Panel

Product Specifications

IF Input		Power Supply	
Operating Frequency Range	222 MHz - 422 MHz	Voltage	100 - 240 VAC
Level	-15 dBm to -5 dBm	Frequency	50 - 60 Hz
Connector	F-type (F), 75 Ω	Power Consumption	max. 1350 Watts (at rated output power)
RF Input VSWR	1.50 : 1		
		Mechanical	
RF Output		Size	2 U of 19" wide cabinet
Operating Frequency Range	2500 MHz - 2700 MHz	Dimensions (W x H x D)	483mm x 89mm x 527mm
Digital Average Output Power	50 Watts		(19.0" x 3.5" x 20.75")
Output Power Level Accuracy	±0.25 dB	Weight	21.5 kg (47.5 lbs.)
Output Level Variation	≤ ±0.2 dB		
over 8 MHz BW		Environmental	
Output Level Variation	$\leq \pm 1.5 \text{ dB}$	Operating Temperature	-10°C to +45°C (+14°F to +113°F)
over the Entire Bandwidth		Storage Temperature	-40°C to +70°C (-40°F to +158°F)
In-band IMD	$\leq -27 \text{dBc}$	Relative Humidity	max. 95%, non condensing
Spectral Regrowth (uncorrected)	\leq -30 dBc (at rated output power)	Cooling	Forced air
Spurious Level (outside channel)	≤ -60 dBm		
Harmonics	\leq -60 dBc (with output filter)		
RF Ouput Connector	N-type (F), 50 Ω		
RF Monitor Connector	SMA (F), 50 Ω		
Control Interfaces			
Ethernet Interface	Connector: RJ45 Speed: 10/100 Base-T		
RS485 Interface	Connector: 9-pin SUB-D Female		
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet		
HPA Monitor GUI	Connector: RS485		
Machine to Machine Interface	Connector: RS485		



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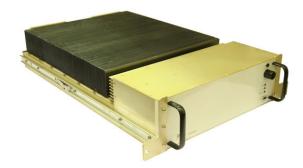
High Power Amplifier Module

Model: DHPA 2200

Product Features

- High linearity PA for broadcast of DVB-SH waveforms
- Multiple COFDM channel support
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Integrated AC/DC power supply
- Remote control and self monitoring via RS485 interface
- HPA Monitor GUI software available for local PC control via RS232 interface (CD included)
- Minimum operational life expectancy of 10 years





Frequency Band

S-Band: 2170 MHz - 2200 MHz

Product Description

The DHPA 2200 is designed to operate as a final amplification stage for a terrestrial S-Band transmitter or repeater system. It amplifies an input S-Band signal from an exciter to a digital average output power level of 200 Watts, while maintaining acceptable output emission levels.

The DHPA 2200 architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 2170 MHz to 2200 MHz. The amplifier is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self correction, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DHPA 2200 incorporates an internal automatic self leveling loop to maintain constant gain over the life of the equipment. The automatic gain control circuit will compensate for gain variations caused by changes in temperature and device aging. Depending on the application, the amplifier could be configured to operate in ALC mode, maintaining a constant output power level. The DHPA 2200 is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation. The modular design facilitates aggregating multiple units into high power or even redundant configurations.

High performance carbon finned heat sinks ensure reliable cooling. Fans must be installed above the heat sinks and are required to provide an air flow of 1000 CFM to help dissipate the heat.

Model: DHPA 2200



Product Specifications (specifications are subject to change without notice)

Parameters

Output Frequency Range Digital Average Output Power Power Gain Gain Variation Over Temperature Gain Variation Over the Signal BW In-band Emissions Spectral Regrowth RF Input VSWR Signal Bandwidth 2170 MHz - 2200 MHz 200 Watts 55 dB typical ±1 dB max. 0.5 dB max. ≤ -30 dBc ≤ -35 dBc (at rated output power) 1.50 : 1 5 MHz

Power Supply Voltage Frequency Power Consumption

Mechanical Size Dimensions (W x H x D)

Weight

Environmental

Operating Temperature Storage Temperature Relative Humidity Cooling

198 - 242 VAC 50/60 Hz 1900 Watts (at rated output power)

3 U of 19" wide cabinet

430mm x 133mm x 781mm (16.93" x 5.25" x 30.75") 40 kg (88 lbs.)

-25C to +55°C (-13°F to +131°F)

-40°C to +70°C (-40°F to +158°F)

max. 95%, non condensing

1000 CFM of forced air must be provided. 2x EBM-Papst Tubeaxial W2E200 Series fans are recommended.

Interfaces

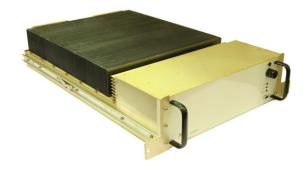
RF Input Connector RF Output Connector RF Monitor Connector Control Interface N-type (female), 50 ohm 7/16 DIN-type (female), 50 ohm N-Type (female), 50 ohm RS232, DB9 (female) - HPA GUI local control RS485, DB9 (female) - remote control



Model: DHPA 1500

Product Features

- High linearity PA for broadcast of DAB waveforms
- Multiple COFDM channel support
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Integrated AC/DC power supply
- Remote control and self monitoring via RS485 interface
- HPA Monitor GUI software available for local PC control via RS232 interface (CD included)
- Minimum operational life expectancy of 10 years



Frequency Band

L-Band: 1450 MHz - 1500 MHz

Product Description

The DHPA 1500 is designed to operate as a final amplification stage for a terrestrial L-Band transmitter or repeater system. It amplifies an input L-Band signal from a modulator or exciter to a digital average output power level of 280 Watts, while maintaining acceptable output emission levels.

The DHPA 1500 architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 1450 MHz to 1500 MHz. The amplifier is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self correction, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DHPA 1500 incorporates an internal automatic self leveling loop to maintain constant gain over the life of the equipment. The automatic gain control circuit will compensate for gain variations caused by changes in temperature and device aging. Depending on the application, the amplifier could be configured to operate in ALC mode, maintaining a constant output power level. The DHPA 1500 is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation. The modular design facilitates aggregating multiple units into high power or even redundant configurations.

High performance carbon finned heat sinks ensure reliable cooling. Fans must be installed above the heat sinks and are required to provide an air flow of 1000 CFM to help dissipate the heat.

Model: DHPA 1500



Product Specifications (specifications are subject to change without notice)

Parameters

Output Frequency Range Digital Average Output Power Power Gain Gain Variation Over Temperature Gain Variation Over the Signal BW In-band Emissions Spectral Regrowth RF Input VSWR Signal Bandwidth 1450 MHz - 1500 MHz 280 Watts 55 dB typical ±1 dB max. 0.5 dB max. ≤ -24 dBc ≤ -28 dBc (at rated output power) 1.50 : 1 1.54 MHz Power Supply Voltage Frequency Power Consumption

Mechanical Size Dimensions (W x H x D)

Weight

Environmental

Operating Temperature Storage Temperature Relative Humidity Cooling 198 - 242 VAC 50/60 Hz 1800 Watts (at rated output power)

3 U of 19" wide cabinet

430mm x 133mm x 781mm (16.93" x 5.25" x 30.75") 40 kg (88 lbs.)

-25C to +55°C (-13°F to +131°F)

-40°C to +70°C (-40°F to +158°F)

max. 95%, non condensing

1000 CFM of forced air must be provided. 2x EBM-Papst Tubeaxial W2E200 Series fans are recommended.

Interfaces

RF Input Connector RF Output Connector RF Monitor Connector Control Interface N-type (female), 50 ohm 7/16 DIN-type (female), 50 ohm N-Type (female), 50 ohm RS232, DB9 (female) - HPA GUI local control RS485, DB9 (female) - remote control

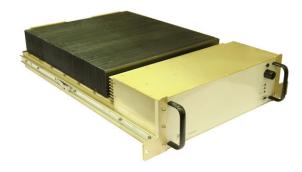
VER 1.1 August 28, 2009



Model: DHPA 1670

Product Features

- High linearity PA for broadcast of DVB-H waveforms
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Integrated AC/DC power supply
- Remote control and self monitoring via RS485 interface
- HPA Monitor GUI software available for local PC control via RS232 interface (CD included)
- Minimum operational life expectancy of 10 years



Frequency Band

L-Band: 1670 MHz - 1675 MHz

Product Description

The DHPA 1670 is designed to operate as a final amplification stage for a terrestrial L-Band transmitter or repeater system. It amplifies an input L-Band signal from an exciter to a digital average output power level of 250 Watts, while maintaining acceptable output emission levels.

The DHPA 1670 architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 1670 MHz to 1675 MHz. The amplifier is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self correction, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DHPA 1670 incorporates an internal automatic self leveling loop to maintain constant gain over the life of the equipment. The automatic gain control circuit will compensate for gain variations caused by changes in temperature and device aging. Depending on the application, the amplifier could be configured to operate in ALC mode, maintaining a constant output power level. The DHPA 1670 is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation. The modular design facilitates aggregating multiple units into high power or even redundant configurations.

High performance carbon finned heat sinks ensure reliable cooling. Fans must be installed above the heat sinks and are required to provide an air flow of 1000 CFM to help dissipate the heat.

Model: DHPA 1670



Product Specifications (specifications are subject to change without notice)

Parameters

Output Frequency Range Digital Average Output Power Power Gain Gain Variation Over Temperature Gain Variation Over the Signal BW In-band Emissions Spectral Regrowth RF Input VSWR Signal Bandwidth 1670 MHz - 1675 MHz 250 Watts 55 dB typical ±1 dB max. 0.5 dB max. ≤ -27 dBc ≤ -32 dBc (at rated output power) 1.50 : 1 5 MHz

Power Supply Voltage Frequency Power Consumption

Mechanical Size Dimensions (W x H x D)

Weight

Environmental

Operating Temperature Storage Temperature Relative Humidity Cooling 198 - 242 VAC 50/60 Hz 1800 Watts (at rated output power)

3 U of 19" wide cabinet 430mm x 133mm x 781mm (16.93" x 5.25" x 30.75") 40 kg (88 lbs.)

-25C to +55°C (-13°F to +131°F)

-40°C to +70°C (-40°F to +158°F)

max. 95%, non condensing

1000 CFM of forced air must be provided. 2x EBM-Papst Tubeaxial W2E200 Series fans are recommended.

Interfaces

RF Input Connector RF Output Connector RF Monitor Connector Control Interface N-type (female), 50 ohm 7/16 DIN-type (female), 50 ohm N-Type (female), 50 ohm RS232, DB9 (female) - HPA GUI local control RS485, DB9 (female) - remote control

VER 1.1 August 28, 2009



L-Band High Power Amplifier

Model: DHPA 1670X

Product Features

- Digital ready LDMOS PA provides 400 Watt output for broadcast of digital waveforms
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Integrated AC/DC power supply
- Variable speed DC fans
- Remote control and self monitoring via RS485 interface
- Minimum operational life expectancy of 10 years



Frequency Band

L-Band: 1670 MHz - 1675 MHz

Product Description

The DHPA 1670X is designed to operate as a final amplification stage for a terrestrial L-Band transmitter or repeater system. It amplifies an L-Band input signal to a digital average output power level of 400 Watts, while maintaining its linear characteristics.

The DHPA 1670X architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 1670 MHz to 1675 MHz. The amplifier is protected against input overdrive and overheating. The protection circuits are all self correcting, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DHPA 1670X incorporates an internal automatic self leveling loop to maintain constant a constant output power level over the life of the equipment. The automatic level control (ALC) circuit will compensate for the input signal level variations and the gain variations caused by changes in temperature as well as for the gain change due to devices aging. Depending on the application, the amplifier can be configured to operate in AGC mode, maintaining a constant gain value. The amplifier's operational parameters are monitored and controlled by an embedded system controller that can be accessed from the RS485 and USB interfaces.

The DHPA 1670X is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation. The amplifier is forced air cooled using two high performance variable speed (temperature controlled) fans, which are installed on the amplifier enclosure front panel.

All of the amplifier's components are enclosed in a standard 19" rack mount chassis, occupying 5 RU of cabinet space.

L-Band High Power Amplifier

Model: DHPA 1670X





Rear Panel

Product Specifications

DE la sect		Control Interfaces	
RF Input			
Connector	SMA (F), 50 Ω	Front Panel	LCD
Frequency Range	1670 MHz to 1675 MHz	USB	Connector: USB Type B
Level	-5 dBm to +5 dBm	Serial (RS485)	Connector: 9-pin SUB-D, Male
VSWR	≤ 1.9:1	I/O	Connector: 9-pin SUB-D, Female
		HPA Monitor GUI	USB
RF Output		Machine-Machine	RS485
Connector	7-16" DIN-type (F), 50 Ω		
Frequency Range	1670 MHz - 1675 MHz	Power Supply	
Digital Average	400 Watts (56 dBm)	Voltage	195 - 240 VAC (220 VAC ±10%)
Output Power		Frequency	50 - 60 Hz
Power Level Accuracy	±0.5 dB	Power Consumption	2500 Watts
Gain	61 dB max.		
Gain Variation Over Temperature	$\leq \pm 1 \text{ dB}$	Mechanical	
Gain Variation Over 5 MHz Bandwidth	$\leq \pm 0.5 \text{ dB}$	Size	5 U of 19" wide cabinet
In-band IMD	≤ -27 dBc	Dimensions (W x H x D)	48.3 cm x 22.2 cm x 78.2 cm (19″ x 8.72″ x 30.8″)
Spectral Regrowth (Shoulder Level)	≤ -30 dBc (at rated output power)	Weight	35 kg (77 lbs.)
Output Harmonics	≤ -60 dBc (with output filter)		
VSWR	≤ 1.2:1	Environmental	
RF Monitor	Connector: N-type (F), 50 Ω Coupling Factor: 45dB ±1 dB	Operating Temperature	+5° C to +45° C (+41° F to +113° F)
		Storage Temperature	-40° C to +65° C (-40° F to +149° F)
		Relative Humidity	max. 95%, non condensing
		Cooling	Forced air

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S-Band High Power Amplifier

Model: DHPA 2300

Product Features

- High linearity LDMOS PA provides 400 Watt output for broadcast of digital waveforms
- Adaptive non-linear pre-corrector
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Remote control and self monitoring via RS485 or RS422 interfaces
- Minimum operational life expectancy of 10 years



Frequency Band

S-Band: 2320 MHz - 2345 MHz

Product Description

The DHPA 2300 is designed to operate as the final amplification stage for a terrestrial S-Band transmitter or repeater system.

It utilizes highly efficient, LDMOS transistor technology to amplify an S-band input signal to a power level of 400W (56 dBm), while maintaining its linear characteristics. This solid-state design operates in a Doherty configuration over a frequency range of 2320 MHz to 2345 MHz.

The amplifier incorporates an internal ALC loop to maintain a constant output power level. The automatic level control (ALC) circuit will compensate for the input signal level variations and the gain variations caused by changes in temperature as well as for the gain change due to devices aging.

The amplifier includes an adaptive non-linear pre-corrector, which effectively pre-distorts the input drive signal to minimize amplifier distortion and reduce spectral regrowth. The amplifier is fully protected against input overdrive, output load VSWR and temperature faults. The protection circuits are all self-correcting, allowing restoration of the HPA to its normal operational state upon removal of the fault condition.

The amplifier's operational parameters are monitored and controlled by an embedded system controller that can be accessed from an RS485 or RS422 interface.

The DHPA 2300 is a field replaceable system component that is designed for indoor installation. The amplifier requires an external 30 VDC power supply and must be forced air cooled using fans which provide an air flow of 700 CFM.

> 20.8 dB

S-Band High Power Amplifier

Model: DHPA 2300



Product Specifications

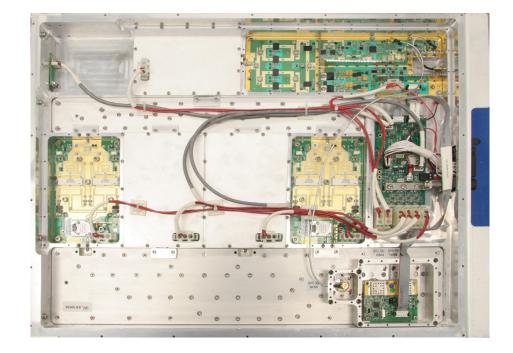
RF Input		Control Interfaces	
Connector	7/8" Blind Mate (F), 50 Ω	RS485	Connector: High current Elcon Drawer
Frequency Range	2320 MHz to 2345 MHz	(Full duplex or half duplex)	Connector
Input Power Range	-11 dBm to +3 dBm	RS422	Connector: High current Elcon Drawer Connector
Return Loss	> 14.0 dB	USB	Connector: High current Elcon Drawer Connector
RF Output			
Connector	7/8" Blind Mate (F), 50 Ω	Power Supply	
Frequency Range	2320 MHz to 2345 MHz	Voltage	30 VDC
Digital Average Output Power Range	43 dBm to 56 dBm (20 Watts to 400 Watts)	Power Consumption	1500 Watts (at 56 dBm output power level)
Power Level Accuracy	±0.2 dB		
Gain	43 dB to 66 dB	Mechanical	
Gain Flatness	\leq 0.5 dB (across the operating bandwidth)	Dimensions (W x H x D)	48.9 cm x 57.7 cm x 13.0 cm (19.250" x 22.725" x 5.110")
Gain Slope	\leq 0.2 dB/MHz	Weight	25 kg (55 lbs.)
Spectral Regrowth	≥ 30 dBc (at 56 dBm output power level with pre-correction enabled)	Environmental	
In-band Carrier to Interference	≥ 27 dBc	Operating Temperature	-20° C to +65° C (-4° F to +149° F)
	(at 56 dBm output power level with pre-correction enabled)	Storage Temperature	-30° C to +75° C (-22°F to +167°F)
Output Harmonics	> 60 dBc	Relative Humidity	5% to 95%, non condensing
	(at 56 dBm output power level)	Altitude	max. 1676m (5500 ft.)
Output Spurios Emissions	≥ 60 dBc (at 56 dBm output power level)	Cooling	Forced Air, 700 CFM
Group Delay	<u>≤</u> 10 ns		
Noise Figure	\leq 10 dB		

Return Loss

S-Band High Power Amplifier

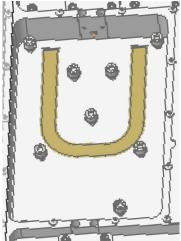
Model: DHPA 2300



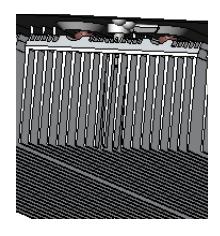




Heat Pipes - Base Plate Bottom



Heat Pipes - Base Plate Top (Below Power Module)



Heat Sink Fins

Document DHPA-2300-S07-02

October 22, 2015

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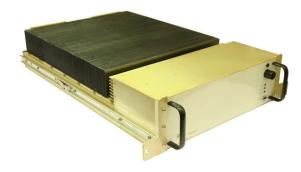
Wireless Broadband and Broadcasting Solutions

High Power Amplifier Module

Model: DHPA 2330

Product Features

- High linearity PA for broadcast of DVB-T/H, DMB, CMMB, DTMB and ATSC waveforms
- Multiple COFDM channel support
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Integrated AC/DC power supply
- Remote control and self monitoring via RS485 interface
- HPA Monitor GUI software available for local PC control via RS232 interface (CD included)
- Minimum operational life expectancy of 10 years



Frequency Band

S-Band: 2305 MHz - 2360 MHz

Product Description

The DHPA 2330 is designed to operate as a final amplification stage for a terrestrial S-Band transmitter or repeater system. It amplifies an input S-Band signal from an exciter to a digital average output power level of 280 Watts, while maintaining acceptable output emission levels.

The DHPA 2330 architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 2305 MHz to 2360 MHz. The amplifier is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self correction, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DHPA 2330 incorporates an internal automatic self leveling loop to maintain constant gain over the life of the equipment. The automatic gain control circuit will compensate for gain variations caused by changes in temperature and device aging. Depending on the application, the amplifier could be configured to operate in ALC mode, maintaining a constant output power level. The DHPA 2330 is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation. The modular design facilitates aggregating multiple units into high power or even redundant configurations.

High performance carbon finned heat sinks ensure reliable cooling. Fans must be installed above the heat sinks and are required to provide an air flow of 1000 CFM to help dissipate the heat.

Model: DHPA 2330



Product Specifications (specifications are subject to change without notice)

Parameters

Output Frequency Range Digital Average Output Power Power Gain Gain Variation Over Temperature Gain Variation Over the Signal BW In-band Emissions Spectral Regrowth RF Input VSWR Signal Bandwidth 2305 MHz - 2360 MHz 280 Watts 55 dB typical ±1 dB max. 0.5 dB max. ≤ -25 dBc ≤ -30 dBc (at rated output power) 1.50 : 1 4 - 8 MHz

Power Supply Voltage Frequency Power Consumption

Mechanical Size Dimensions (W x H x D)

Weight

Environmental

Operating Temperature Storage Temperature Relative Humidity Cooling

198 - 264 VAC 50/60 Hz 1900 Watts (at rated output power)

3 U of 19" wide cabinet

430mm x 133mm x 781mm (16.93" x 5.25" x 30.75") 40 kg (88 lbs.)

-25C to +55°C (-13°F to +131°F)

-40°C to +70°C (-40°F to +158°F)

max. 95%, non condensing

1000 CFM of forced air must be provided. 2x EBM-Papst Tubeaxial W2E200 Series fans are recommended.

Interfaces

RF Input Connector RF Output Connector RF Monitor Connector Control Interface N-type (female), 50 ohm 7/16 DIN-type (female), 50 ohm N-Type (female), 50 ohm RS232, DB9 (female) - HPA GUI local control RS485, DB9 (female) - remote control

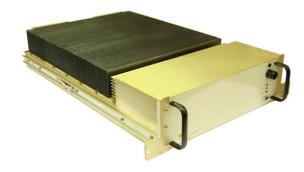
VER 1.1 August 28, 2009



Model: DHPA 2600

Product Features

- High linearity PA provides 200 Watt output for broadcast of digital waveforms
- Multiple COFDM channel support
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Integrated AC/DC power supply
- Remote control and self monitoring via RS485 interface
- HPA Monitor GUI software available for local PC control via RS232 interface (CD included)



Frequency Band

MMDS-Band: 2500 MHz - 2700 MHz

Product Description

The DHPA 2600 is designed to operate as a final amplification stage for a terrestrial MMDS-Band transmitter or repeater system. It amplifies an input MMDS-Band signal from an exciter to a digital average output power level of 200 Watts, while maintaining its linear characteristics.

The DHPA 2600 architecture is based on a solid state design operating in Class A/AB linear mode over a frequency range of 2590 MHz to 2680 MHz. The amplifier is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self correction, allowing the amplifier to be restored to its normal operating state upon removal of the fault condition.

The DHPA 2600 incorporates an internal automatic self leveling loop to maintain constant gain over the life of the equipment. The automatic gain control circuit will compensate for gain variations caused by changes in temperature and device aging. Depending on the application, the amplifier could be configured to operate in ALC mode, maintaining a constant output power level. The DHPA 2600 is a field replaceable system component that includes an integrated AC/DC power supply and is designed for indoor installation. The modular design facilitates aggregating multiple units into high power or even redundant configurations.

High performance carbon finned heat sinks ensure reliable cooling. Fans must be installed above the heat sinks and are required to provide an air flow of 1000 CFM to help dissipate the heat.

Document 53942-01-S07-05

Model: DHPA 2600



Product Specifications (specifications are subject to change without notice)

Parameters

Interfaces

RF Input Connector

RF Output Connector

RF Monitor Connector

Control Interface

Operating Frequency Range
Digital Average Output Power
Power Gain
Gain Variation over Temperature
Gain Variation over the Signal BW
In-band IMD
Spectral Regrowth (uncorrected)
RF Input VSWR

RF Input VSWR Instantaneous Bandwidth

2500 MHz - 2700 MHz 200 Watts 55 dB typical $\leq \pm 1$ dB ≤ 0.5 dB ≤ -27 dBc ≤ -30 dBc (at rated output power) 1.50 : 1 Up to 25 MHz

N-type (F), 50 Ω

N-Type (F), 50 Ω

7/16 DIN-type (F), 50 Ω

RS232: DB9 (F) - HPA GUI local control

RS485: DB9 (F) - remote control

Power Supply Voltage Frequency Power Consumption

Mechanical Size Dimensions (W x H x D)

Weight

Environmental

Operating Temperature Storage Temperature Relative Humidity Cooling

50/60 Hz 1900 Watts (at rated output power)

3 U of 19" wide cabinet

198 - 264 VAC

430mm x 133mm x 781mm (16.93" x 5.25" x 30.75") 40 kg (88 lbs.)

-25C to +55°C (-13°F to +131°F)

-40°C to +70°C (-40°F to +158°F)

max. 95%, non condensing

1000 CFM of forced air must be provided. 2x EBM-Papst Tubeaxial W2E200 Series fans are recommended.



Wireless Broadband and Broadcasting Solutions

Low Power L/S Band Amplifier System

Models: DSPA4000LSB

Product Features

- L/S-band amplifier modules built using GaN transistor technology
- Dual-redundant amplifier system
- Modular design
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Integrated Modular AC/DC power supply
- Local and remote gain adjustment
- Remote control and monitoring via RS485 interface
- HPA GUI software available for local and remote PC control
- Liquid or air cooled systems available upon request
- Exceptional operational life expectancy



Frequency Band

L/S-Band: 1500 MHz – 3000 MHz

Product Description

The low power, L/S-Band, redundant (1:1) amplifier system provides up to 54 dBm (250 Watts CW) of RF power over an operating frequency range of 1500 MHz to 3000 MHz. By combing the output of the main and redundant amplifier cabinets, an output power level of 56 dBm (400 Watts CW) can be achieved.

The modular design includes a system controller, amplifier driver, and amplifier chassis with two amplifier modules, two power supplies chassis with hot-swappable AC-DC power supply modules, an amplifier cooling system and a harmonic filter.

The L/S-Band amplifier module is built using gallium-nitride (GaN) transistor technology. Two amplifier modules are placed in a single amplifier chassis in a redundant configuration to provide an output power level up to 54 dBm (250 Watts CW). High efficiency, hot-swappable AC-DC switchable power supplies are used to power the amplifier modules.

The amplifier system includes a System Controller which is responsible for configuration and management of the entire amplifier system and sub-modules. The System Controller also provides user interfaces for local and remote control.

Document 57706-01-S07-02

Models: DSPA4000LSB



Product Specifications

Radio Frequency Parameters	
Input frequency band	1500 MHz – 3000 MHz
Output frequency band	1500 MHz – 3000 MHz
Output power in redundancy mode (1:1)	54 dBm (250 Watts CW)
Output power in combining mode (1+1)	56 dBm (400 Watts CW)
Input power	0 dBm max.
Power gain	57 dB at minimum attenuator reading
Gain flatness	±2 dB max., in all bands
Gain variation vs. temperature 0° to +50°	±2 dB max.
Gain adjustment	20 dB min., with 0.5 dB step size
Third order Intermodulation (IMD3)	-33 dBc, with 4 dB backoff for two carriers with 1 MHz separation
Spurious harmonics	-55 dB max., relative to carrier (at all power readings)
Spurious	-60 dB max., relative to carrier in all bands
Input signal monitoring port	-10 dB max., relative to carrier, with the indication on a display in dBm
Output signal monitoring port (test load)	-50 dB relative to carrier, with calibration chart and display indication in Watts
Input signal source VSWR	1.5:1 max.
Load VSWR	1.5:1 max.
Residual radiation average power at 1m distance from the test load (with maximum power on the load)	No more than minus 64.88 dBm
Control and Indication	
AC power on/off (power supply units indication)	Switch (mechanical)

Menu selection on/off RF power Menu selection: 20 dB, with 0.5 dB step size At chassis temperature from +80 ° C to +85° C Output power display indication in Watts Centigrade ° C monitor temperature indication

ConnectorsRF inputN -type (fRF output1-5/8 (fenDigital local interface
(for servicing)DB-9 (fenInterface RS-485DB-9 (fenOutput RF signal monitoring portN-type (fenChassis groundingGroundin

N –type (female) 1-5/8 (female) DB-9 (female), front panel of every power amplifier module DB-9 (female) rear panel N-type (female), rear panel Grounding wire in power supply cable and grounding connector on chassis

Document 57706-01-S07-02

Power interlock

Output RF power

Gain adjustment range Overheating protection

Amplifier temperature, hottest spot

(specifications are subject to change without notice)

March 14, 2014

Models: DSPA4000LSB



Product Specifications

Power Supply	
Voltage and Frequency	190 VAC to 240 VAC, 50 Hz to 60 Hz.
Power factor (cos φ)	0.98
Power consumption, max	2.5 kW max.
Power supply cooling	Forced air
Power Cable	Three wire cable (one phase, neutral and ground). Cable length to be confirmed.
Mechanical Parameters	
Outlay	1 (one) 19 , 42U high cabinets with amplifiers; central microcontroller and spare parts, assembly with the redundant and combined system
Amplifier Cooling	Forced liquid
Environmental Specifications	
Operating Temperature	0°C to +50°C
Storage Temperature	-50°C to +85°C
Humidity	+5% to 95% non-Condensing
Altitude	3000M above sea level

Document 57706-01-S07-02





Models: DHPA16000LSB

Product Features

- L/S-band amplifier modules built using GaN transistor technology
- Modular design supports 1 to 4 power amplifier modules
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Integrated Modular AC/DC power supply
- Local and remote gain adjustment
- Built in LCD display for easy navigation and control
- Remote control and monitoring via RS485 interface
- HPA GUI software available for local and remote PC control menu
- Liquid or air cooled systems available upon request
- Exceptional operational life expectancy



Frequency Band

L/S-Band: 1500 MHz – 3000 MHz

Product Description

The high power, L/S-Band amplifier system provides up to 62 dBm (1600 Watts CW) of RF power over an operating frequency range of 1500 MHz to 3000 MHz when configured with four power amplifier modules. The scalable design allows the amplifier system to operate at lower RF power levels when configured with 3, 2 or 1 amplifier modules.

The modular design includes a system controller, amplifier driver, and amplifier chassis with up to four amplifier modules, two power supplies chassis with hot-swappable AC-DC power supply modules, an amplifier cooling system and a harmonic filter.

The L/S-Band amplifier module is built using gallium-nitride (GaN) transistor technology. Up to four amplifier modules are placed in a single amplifier chassis and combined to provide an output power level up to 62 dBm (1600 Watts CW). High efficiency, hot-swappable AC-DC switchable power supplies are used to power the amplifier modules.

The high power, L/S-Band amplifier system includes a System Controller which is responsible for configuration and management of the entire amplifier system and sub-modules. The System Controller also provides user interfaces for local and remote control.

Document 58157-01-S07-02

Models: DHPA16000LSB



Product Specifications

Power Amplifier Modules	1	2	3	4
Output Power	56 dBm (400 Watts CW)	59 dBm (800 Watts CW)	60.8 dBm (1200 Watts CW)	62 dBm (1600 Watts CW)
Minimum Gain	65 dB min.	65 dB min.	65 dB min.	65 dB min.
Power Consumption	2.5 kW max.	5 kW max.	7.5 kW max.	10 kW max.
Radio Frequency Parameters				
Input frequency band		1500	MHz – 3000 MHz	
Output frequency band		1500	MHz – 3000 MHz	
Input power		() dBm max.	
Gain flatness		±2.5dB	max., in all bands	
Gain variation vs. temperature 0° to +50°		E	E2.5dB max.	
Gain adjustment		30 dB min.	, with 0.5 dB step size	
Third order Intermodulation (IMD3)		-33 dBc, with 3 dB backoff f	for two carriers with 1 MHz sepa	ration
Spurious harmonics		-55 dB max., relative	to carrier (at all power readings)	
Spurious		-60 dB max., rel	ative to carrier in all bands	
Input return loss			12 dB max.	
Output return loss			17 dB max.	
Input signal monitoring port		-10 dB max., relative to carrier	r, with the indication on a displa	y in dBm
Output signal monitoring port (test load)	-6	0 dB relative to carrier, with cali	bration chart and display indica	tion in Watts
Input signal source VSWR			1.5:1 max.	
Load VSWR			1.5:1 max.	
Residual radiation average power at 1m distance from the test load (with maximum power on the load)		No more th	nan minus 64.88 dBm	
Control and Indication				
AC power on/off (power supply units indication)		Swite	ch (mechanical)	
Power interlock		Menu seleo	ction on/off RF power	
Gain adjustment range		Menu selection:	30 dB, with 0.5 dB step size	
Overheating protection		At chassis temper	ature from +80 ° C to +85° C	
Output RF power		Output powe	r display indication in W	
Amplifier temperature, hottest spot		Centigrade ° C mo	onitor temperature indication	

Models: DHPA16000LSB



Product Specifications

Connectors RF input N -type (female) RF output 1-5/8 (female) Digital local interface (for servicing) DB-9 (female), front panel of every power amplifier module Interface RS-485 DB-9 (female) rear panel	
RF output 1-5/8 (female) Digital local interface (for servicing) DB-9 (female), front panel of every power amplifier module	
Digital local interface DB-9 (female), front panel of every power amplifier module (for servicing) DB-9 (female), front panel of every power amplifier module	
(for servicing)	
Interface PS-485 DR-0 (female) rear panel	
intenace no-roo	
Output RF signal monitoring port N-type (female), rear panel	
Chassis grounding Grounding wire in power supply cable and grounding connector on chassis	
Power Supply	
Voltage and FrequencySingle phase voltage, 200 VAC to 240 VAC, 50 Hz to 60 Hz.	
Power factor (cos φ) 0.98	
Power supply cooling Forced air	
Power CableThree wire cable (one phase 220 VAC, neutral and ground).Cable length to be confirmed.	
Mechanical Parameters	
Outlay 1 (one) 19 ^{°′} , 42U high cabinet with amplifiers; central microcontroller and spare p redundant and combined system	parts, assembly with the
Amplifier Cooling Forced liquid	
Environmental Specifications	
Operating Temperature 0°C to +50°C	
Storage Temperature -50°C to +85°C	
Humidity +5% to 95% non-Condensing	
Altitude 3000M above sea level	



Wireless Broadband and Broadcasting Solutions

High Power L/S Band Amplifier System

Models: DHPA30000LSB

Product Features

- L/S-band amplifier modules built using GaN transistor technology
- Dual-redundant amplifier system
- Modular design
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Integrated Modular AC/DC power supply
- Local and remote gain adjustment
- Built in LCD display for easy navigation and control
- Remote control and monitoring via RS485 interface
- HPA GUI software available for local and remote PC control
- Liquid or air cooled systems available upon request
- Exceptional operational life expectancy



Frequency Band

L/S-Band: 1500 MHz – 3000 MHz

Product Description

The high power, L/S-Band, redundant (1:1) amplifier system provides up to 62 dBm (1600 Watts CW) of RF power over an operating frequency range of 1500 MHz to 3000 MHz. By combing the output of the main and redundant amplifier cabinets, an output power level of 65 dBm (3000 Watts CW) can be achieved.

The modular design includes a system controller, amplifier driver, and amplifier chassis with up to four amplifier modules, two power supplies chassis with hot-swappable AC-DC power supply modules, an amplifier cooling system and a harmonic filter.

The L/S-Band amplifier module is built using gallium-nitride (GaN) transistor technology. Up to four amplifier modules are placed in a single amplifier chassis and combined to provide an output power level up to 62 dBm (1600 Watts CW). High efficiency, hot-swappable AC-DC switchable power supplies are used to power the amplifier modules.

The amplifier system includes a System Controller which is responsible for configuration and management of the entire amplifier system and sub-modules. The System Controller also provides user interfaces for local and remote control.

Document 57705-01-S07-07

Models: DHPA30000LSB



Product Specifications

Radio Frequency Parameters	
Input frequency band	1500 MHz – 3000 MHz
Output frequency band	1500 MHz – 3000 MHz
Output power in redundancy mode (1:1)	62 dBm (1600 Watts CW)
Output power in combining mode (1+1)	65 dBm (3000 Watts CW)
Input power	0 dBm max.
Power gain	65 dB at minimum attenuator reading
Gain flatness	±2.5dB max., in all bands
Gain variation vs. temperature 0° to +50°	±2.5dB max.
Gain adjustment	30 dB min., with 0.5 dB step size
Third order Intermodulation (IMD3)	-33 dBc, with 3 dB backoff for two carriers with 1 MHz separation
Spurious harmonics	-55 dB max., relative to carrier (at all power readings)
Spurious	-60 dB max., relative to carrier in all bands
Input return loss	-10 dB max.
Output return loss	-17 dB max.
Input signal monitoring port	-10 dB max., relative to carrier, with the indication on a display in dBm
Output signal monitoring port (test load)	-60 dB relative to carrier, with calibration chart and display indication in Watts
Input signal source VSWR	1.5:1 max.
Load VSWR	1.5:1 max.
Residual radiation average power at 1m distance from the test load (with maximum power on the load)	No more than minus 64.88 dBm
Control and Indication	
AC power on/off (power supply units indication)	Switch (mechanical)
Power interlock	Menu selection on/off RF power
Gain adjustment range	Menu selection: 30 dB, with 0.5 dB step size
Overheating protection	At chassis temperature from +80 ° C to +85° C
Output RF power	Output power display indication in W
Amplifier temperature, hottest spot	Centigrade ° C monitor temperature indication
Connectors	
RF input	N –type (female)
RF output	1-5/8 (female)
Digital local interface (for servicing)	DB-9 (female), front panel of every power amplifier module
Interface RS-485	DB-9 (female) rear panel
Output RF signal monitoring port	N-type (female), rear panel
Chassis grounding	Grounding wire in power supply cable and grounding connector on chassis
	(specifications are subject to change without notice)

Models: DHPA30000LSB



Product Specifications

Power Supply	
Voltage and Frequency	Single phase voltage, 200 VAC to 240 VAC, 50 Hz to 60 Hz.
Power factor (cos φ)	0.98
Power consumption, max	20 kW max.
Power supply cooling	Forced air
Power Cable	220 VAC, three wire cable with 6 AWG cross section (one phase 220 VAC, neutral and ground). Cable length to be confirmed.
Mechanical Parameters	
Outlay	2 (two) 19 , 42U high cabinets with amplifiers; central microcontroller and spare parts, assembly with the redundant and combined system
Amplifier Cooling	Forced liquid
Environmental Specifications	
Operating Temperature	0°C to +50°C
Storage Temperature	-50°C to +85°C
Humidity	+5% to 95% non-Condensing
Altitude	3000M above sea level



Wireless Broadband and Broadcasting Solutions

Low Power L/S Band Amplifier

Model: DSPA2500LSB

Product Features

- L/S-band amplifier module built using GaN transistor technology
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Signal pre-corrector provides improved 3rd order intermodulation
- Remote control and self monitoring via RS485 interface
- Liquid cooled (air cooled option available upon request)
- Exceptional operational life expectancy

Frequency Band

L/S-Band: 1500 MHz – 3000 MHz

Product Description

The L/S-Band amplifier module is built using gallium-nitride (GaN) transistor technology. Two amplifier pallets are placed on a single coldplate heatsink board and are combined to provide an output power level up to 54 dBm (250 Watts CW).

The amplifier includes a microcontroller, controlled phase shifter and attenuator which allows for easy output power combining with other amplifier modules in a transmitter configuration. The amplifier also includes a pre-corrector, which can imporve the Third Order Intermodulation (IMD3) to -33 dBc.

Liquid cooling enables stable and reliable operation over a wide range of outside air temperatures.



Low Power L/S Band Amplifier

Model: DSPA2500LSB



Product Specifications

Radio Frequency Parameters

Radio Frequency Parameters	
Input frequency band	1500 MHz – 3000 MHz
Output frequency band	1500 MHz – 3000 MHz
Output power	54 dBm (250 Watts CW)
Input power	0 dBm max.
Power gain	57 dB at minimum attenuator reading
Gain flatness	±2.5 dB max., in all bands
Gain variation vs. temperature 0° to +50°	±2.5 dB max.
Gain adjustment	30 dB min., with 0.5 dB step size
Third order Intermodulation (IMD3)	-33 dBc, with 4 db backoff for two carriers with 1 MHz separation (with pre-correction)
Harmonics (without filters)	-25 dBc max., 1500 MHz to 1800 MHz (at all power readings) -40 dBc max., 1800 MHz to 30000 MHz
Spurious	-55 dBc max., in all bands
Input return loss	-10 dB, max.
Input signal monitoring port	-10 dBc max., with display indication in dBm
Output signal monitoring port	-60 dBc, with calibration chart and display indication in dBm
Input signal source VSWR	1.5:1 max.
Load VSWR	1.5:1 max.
Connectors	
RF input	N-type (female)
RF output	N-type (female)
USB Interface (for servicing)	USB (Type B), front panel
RS-485 Interface	DB-9 (female) rear panel
Output RF signal monitoring port	BNC-type (female), front panel
Power Supply	
Input Voltage	48V DC
Power consumption, max	1.5 kW max.
Mechanical Parameters	
Outlay	Rack mountable
Cooling	Forced liquid
Environmental Specifications	
Operating Temperature	0°C to +50°C
Storage Temperature	-50°C to +85°C
Humidity	+5% to 95% non-Condensing
Altitude	3000M above sea level

Document 57008-01-S07-03

(specifications are subject to change without notice)

March 14, 2014



Medium Power L/S Band Amplifier

Model: DMPA5000LSB

Product Features

- L/S-band amplifier module built using GaN transistor technology
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Signal pre-corrector provides improved 3rd order intermodulation
- Remote control and self monitoring via RS485 interface
- Liquid cooled (air cooled option available upon request)
- Exceptional operational life expectancy

Frequency Band

L/S-Band: 1500 MHz – 3000 MHz

Product Description

The L/S-Band amplifier module is built using gallium-nitride (GaN) transistor technology. Four amplifier pallets are placed on a single coldplate heatsink board and are combined to provide an output power level up to 57 dBm (500 Watts CW).

The amplifier includes a microcontroller, controlled phase shifter and attenuator which allows for easy output power combining with other amplifier modules in a transmitter configuration. The amplifier also includes a pre-corrector, which can imporve the Third Order Intermodulation (IMD3) to -33 dBc.

Liquid cooling enables stable and reliable operation over a wide range of outside air temperatures.

Medium Power L/S Band Amplifier

Model: DMPA5000LSB



Product Specifications

Radio Frequency Parameters		
Input frequency band	1500 MHz – 3000 MHz	
Output frequency band	1500 MHz – 3000 MHz	
Output power	57 dBm (500 Watts CW)	
Input power	0 dBm to +4 dBm	
Power gain	60 dB at minimum attenuator reading	
ALC mode	Integrated automatically	
ALC adjustment	20 dB, with 0.5 dB step size	
Output power level flatness (ALC mode)	±0.5 dB	
Third order Intermodulation (IMD3)	-23 dBc, with 6 dB backoff for two carriers with 1 MHz separation (without pre-correction) -33 dBc, with 6 dB backoff for two carriers with 1 MHz separation (with pre-correction)	
Harmonics (without filters)	-25 dBc max., 1500 MHz to 1800 MHz (at all power readings) -40 dBc max., 1800 MHz to 30000 MHz	
Spurious	-60 dBc, in all bands	
Input return loss	-10 dB, max.	
Input signal monitoring port	-10 dBc, with the indication on a display in dBm	
Output signal monitoring port	-60 dBc, with calibration chart and display indication in dBm	
Input signal source VSWR	1.5:1 max.	
Load VSWR	1.5:1 max.	
Connectors		
RF input	N –type (female)	
RF output	7/8" (female)	
USB Interface (for servicing)	USB (Type B), front panel	
RS-485 Interface	DB-9 (female) rear panel	
Output RF signal monitoring port	N-type (female), front panel	
Power Supply		
Input Voltage	48 VDC	
Power consumption, max	3.0 kW max.	
Mechanical Parameters		
Outlay	Rack mountable	
Cooling	Forced liquid	
Environmental Specifications		
Operating Temperature	0°C to +50°C	
Storage Temperature	-50°C to +85°C	
Humidity	+5% to 95% non-Condensing	
Altitude	3000M above sea level	
ument 57707-01-S07-03	(specifications are subject to change without notice)	March 14, 2014

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Wireless Broadband and Broadcasting Solutions

Redundant Ka Band Amplifier System

Model: DSPA3000KAB

Product Features

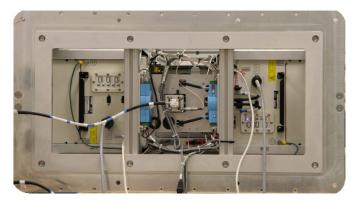
- Redundant 300 Watt Ka-band TWT power amplifier system
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Remote control and self monitoring via RS485 interface
- HPA GUI provides easy navigation and control
- Exceptional operational life expectancy



Ka-Band: 27500 MHz – 31000 MHz



Amplifier System



Product Description

The low power, Ka-Band, amplifier system provides up to 300 Watts (54.8 dBm) of RF power over an operating frequency range of 27500 MHz to 31000 MHz. Two amplifier modules provide a fully redundant RF output.

The modular design includes an input signal distribution system, output power switch and amplifier chassis to house two amplifier modules.

The Ka-Band amplifier module is built as a self-contained unit, based on a travelling wave tube (TWT) design. Each module contains an integrated air cooling system. Two amplifier modules are placed in a single amplifier chassis to provide an output power level up to 300 Watts (54.8 dBm) with full redundancy.

The amplifier system includes a System Controller which is responsible for configuration and management of the entire amplifier system and its modules. The System Controller also provides user interfaces for local and remote control.



Control Cabinet

Document 58236-01-S07-07

April 04, 2014

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Redundant Ka Band Amplifier System

Model: DSPA3000KAB



Product Specifications

Radio Frequency Parameters	
Input frequency band	27500 MHz – 31000 MHz
Output frequency band	27500 MHz – 31000 MHz
Output power	54.8 dBm (300 Watts CW)
Input power	0 dBm ±3 dB
Power gain	57 dB at minimum attenuator reading
Gain flatness	±2.5dB max., in the whole range
Gain variation vs. temperature -40°C to +50°C	±1.0 dB max.
Gain adjustment	30 dB min., with 0.5 dB step size
Third order Intermodulation (IMD3)	-29 dBc, with 3 dB backoff for two carriers with 20 MHz separation
Spurious Harmonics	-53 dB max., relative to carrier (over the whole gain adjustment range)
Spurious	-49 dB max., relative to carrier in all bands
Output reflection level to activate protection	-10 dB
Input signal monitoring port	-20 dB max., relative to carrier, with indication on the display in Watts
Output signal monitoring port	-50 dB relative to carrier, with calibration chart and display indication in Watts
Control and Indication	
AC power on/off	AC on/off control from the remote access computer
(power supply units indication)	
Gain adjustment range	Menu selection: 30 dB, with 0.5 dB step size
Output RF power	Output power indication in Watts on remote access computer display
Connectors	
RF input	WR34G
RF output	WR34G
Digital local interface (for servicing)	DB-9 (female), front panel of every power amplifier module
RS-485 Interface	DB-9 (female) rear panel
Chassis grounding	Pin 10-32UNF-28
Power Supply	
Voltage and Frequency	Single phase voltage, 200 VAC to 240 VAC, 50 Hz to 60 Hz.
Power factor ($\cos \varphi$)	0.95
Power consumption, max	3 kW max. Forced air
Power supply cooling Power Cable	Forced air 220 VAC, three wire cable with 6 AWG cross section (one phase 220 VAC, neutral and ground).
	220 with, three whe caple when a new cross section (one phase 220 vith, neutral and ground).

Redundant Ka Band Amplifier System

Model: DSPA3000KAB



Product Specifications

Mechanical Parameters	
Outlay	Outdoor housing to accommodate four amplifiers with combining system
Cooling	Forced air
Environmental Specifications	
Operating Temperature	-40°C to +55°C
Storage Temperature	-40°C to +75°C
Operating Humidity	5% to 95% at 40°C
Storage Humidity	0% to 100% at 65°C
Altitude	3000M above sea level



Model: DHPA12000KAB

Product Features

- Power combined 1.2 kW Ka-band TWT power ampifier system
- Outdoor, weather proof design
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Remote control and monitoring via RS485 interface
- HPA GUI provides easy navigation and control
- Exceptional operational life expectancy



Amplifier System

Frequency Band

Ka-Band: 27500 MHz – 31000 MHz

Product Description

The high power, Ka-Band, amplifier system provides up to 1200 Watts (60.8 dBm) of RF power over an operating frequency range of 27500 MHz to 31000 MHz. The 1200 Watts output power level is achieved by combining the output of four amplifier modules.

The modular design includes an input power splitter, output power combiner and amplifier chassis to house four amplifier modules.

The Ka-Band amplifier module is built as a self-contained unit based on a travelling wave tube (TWT) design. Each module contains an air cooling system. Up to four amplifier modules are placed in a single amplifier chassis and combined to provide an output power level up to 1200 Watts (60.8 dBm).

The amplifier system includes a System Controller which is responsible for configuration and management of the entire amplifier system and its modules. The System Controller also provides user interfaces for local and remote control.



Control Cabinet

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Model: DHPA12000KAB



Product Specifications

Radio Frequency Parameters	
Input frequency band	27500 MHz – 31000 MHz
Output frequency band	27500 MHz - 31000 MHz
Combined output power	60.8 dBm (1200 Watts CW)
Input power	0 dBm + 3 dB
Power gain	65 dB minimum attenuator reading
Gain flatness	±2.5 dB max., in the whole range
Gain variation vs. temperature -40°C to +50°C	±1.0 dB max.
Gain adjustment	30 dB min., with 0.5 dB step size
Third order Intermodulation (IMD3)	-29 dBc, with 3 dB backoff for two carriers with 20 MHz separation
Spurious Harmonics	-55 dB max., relative to carrier (over the whole gain adjustment range)
Spurious	-50 dB max., relative to carrier in all bands
Output reflection level to activate protection	-10 dB
Input signal monitoring port	-20 dB max., relative to carrier, with indication on the display in Watts
Output signal monitoring port	-50 dB relative to carrier, with calibration chart and display indication in Watts
Control and Indication	
AC power on/off (power supply units indication)	AC on/off control from the remote access computer
Gain adjustment range	Menu selection: 30 dB, with 0.5 dB step size
Output RF power	Output power indication in Watts on remote access computer display
Power Supply	
Voltage and Frequency	Single phase voltage, 200 VAC to 240 VAC, 50 Hz to 60 Hz.
Power factor (cos φ)	0.95
Power consumption, max	6 kW max.
Power supply cooling	Forced air
Power Cable	220 VAC, three wire cable with 6 AWG cross section (one phase 220 VAC, neutral and ground).
Connectors	
RF input	WR34G
RF output	WR34G WR34G
RF output Digital local interface (for servicing)	WR34G DB-9 (female), front panel of every power amplifier module
RF output	WR34G

April 04, 2014

Model: DHPA12000KAB



Product Specifications

Mechanical Parameters	
Outlay	Outdoor housing to accommodate four amplifiers with combining system
Cooling	Forced air
Environmental Specifications	
Operating Temperature	-40°C to +55°C
Storage Temperature	-40°C to +75°C
Operating Humidity	5% to 95% at 40°C
Storage Humidity	0% to 100% at 65°C
Altitude	3000M above sea level



Model: DVMP 5000

Product Features

- Portable Design
- Durable Enclosure
- 30 MHz to 1 GHz RF Output
- Full hierarchical mode support
- SFN and MFN support
- Near seamless switching between inputs
- Superior MER performance
- Outstanding Linear and Non-linear Digital Pre-correction
- Web browser remote control
- SNMP Remote Control
- Full DVB-T/H Support



Description and Application

Overview

The DVMP 5000 from UBS is a compact, test solution, for the development and quality control of DVB-T and/or DVB-H systems. A key factor in the product's success is the quality of its coding and modulation process. The modular design makes the unit highly flexible and easily adaptable to provide the exact features required in a specific application.

Application

The performance and flexibility of the DVMP 5000 allows it to excel in any application related to DVB-T/H modulation.

The core function of the DVMP 5000 is to modulate a MPEG-2 transport stream (input) onto an DVB-T/H compliant OFDM spectrum (output) in accordance with the rules for channel coding and modulation specified in the ETSI DVB-T and/or the DVB-H standards (EN 300 744 and/or ETSI EN 302 304).

RF Output - Standard Version

The RF output is generated by a high performance RF converter, which covers an entire frequency range from 30 MHz to 1 GHz, in steps of just 1 Hz. The output level is adjustable from -10 dBm to 0 dBm with a step size of 0.1 dB.

The user can set the polarity of the spectrum to Inverted or Non-inverted as required and the spectrum bandwidth may be user configured to 8, 7, 6 or 5 MHz as required. With this converter the DVMP 5000 will cover any spectrum application and frequency requirement that you will come across in the field of DVB-T/H transmission.

Inputs

The DVMP 5000 has two MPEG-2 inputs (ASI format)), which can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary transport stream in case the primary transport stream source fails (a truly valuable feature for broadcast applications).

IF Output

The basic version of the DVMP 5000 delivers the COFDM spectrum on a user defined frequency between 35 MHz and 37 MHz. Inverted/noninverted spectrum is selected on the front panel. The IF output can be directly interfaced to a wide range of transmitters and frequency converters.

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(specifications are subject to change without notice)

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Model: DVMP 5000

Ungue Broadband Systems Ltd.

Optional Features

A broad range of optional features allow the modulator to be tailored for a specific application.

DVB-H Mode

This option allows the DVMP 5000 to generate a DVB-H waveform in accordance with the ETSI DVB-H standards.

SFN Mode

This option provides the DVMP 5000 with market leading SFN performance, with respect to basic timing accuracy and the extent of the local delay offset range. The user can select either the SFN or MFN mode via the control interfaces.

MFN Mode

The ability to select MFN mode is a convenient feature when conducting pre-tests and alignment of RF parameters on transmitter installations before the timing references and transport stream with MIP are in place (as a general rule, SFN modulators must mute their output if either of these signals is absent).

Hierarchical Modulation

Hierarchical modulation allows simultaneous transmission of two MPEG-2 transport streams. The compromise between data rate and ruggedness can be set differently between the two virtual channels. For example:

- Highly protected channel (High Priority HP- input) for transmission to mobile and/or portable receivers and
- High capacity channel (Low Priority LP input), at the expense of ruggedness, for transmission to rooftop antennas.

This option can be used to provide two services simultaneously: DVB-H and DVB-T, where the DVB-H service is provided via the HP channel, while the DVB-T service is provided via the LP channel.

Another typical application is simulcasting the same program in high definition resolution and standard definition resolution.

A significant benefit of hierarchical modulation is that the total data-rate available in a system with two hierarchically modulated RF channels is greater than what is available in a two-channel, non-hierarchical system, where one RF channel is strictly dedicated for transmission to mobile/ portable receivers and the other RF channel is strictly dedicated for transmission to rooftop antennas.

6 MHz Bandwidth

In addition to the standard 8 MHz and 7 MHz BW, the DVMP 5000 will also support transmission with a 6 MHz bandwidth that is intended for applications in North and South America, Korea, Japan and elsewhere, where the 6 MHz channel raster is standard.

5 MHz Bandwidth

The DVMP 5000 will also support transmission with a 5 MHz BW, recommended when the DVMP 5000 operates in the DVB-H mode.

This option is highly attractive for T&M and R&D applications as the user can simply switch between the four bandwidths via the instrument front panel (one instrument covers all bandwidths defined by the ETSI for DVB-T and/or DVB-H transmission).

Web Interface

This feature allows remote control of the DVMP 5000 via Ethernet (TCP/IP). The system is based on a Web server mounted inside the DVMP 5000. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the modulator. The Web Interface concept is popular because remote control with this system only requires a standard PC with a network interface card (NIC) and a Web browser (Microsoft Explorer 6.0+).

SNMP client

This feature allows remote control of the DVMP 5000 in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Digital Linear and Non-linear Pre-corrector

The digital linear and non-linear pre-correctors are used to maximize the performance of the transmitter in which the modulator is installed.

- The Non-linear pre-corrector balances out gain and phase non-linearity in the transmitter RF power amplifier, thereby significantly reducing the in-band and out of band intermodulation products. Optimizing the transmitter's performance will extend the coverage area. The performance requirement of the transmitter output filter, which is used to suppress radiation in adjacent channels below a maximum allowed level, will also be eased.
- The Linear pre-corrector balances out level and group delay variations that are seen across the channel bandwidth and caused by the transmitter mask filter and/or channel combiner filters. The linear optimization of the transmitter's radiated signal allows the receiver's channel equalizer to focus all of its correction capacity on level and group delay errors originating from the actual transmission path.

The characteristics of the linear and non-linear pre-correction curves are set by means of an easy to use and highly intuitive graphical user interface, the UBS Corrector GUI software package (Windows compatible) system.



Model: DVMP 5000

Product Specifications

Signal Processing		RF Output	
Supported Modes	IFFT: 2K, 4K, 8K	Connector	N-type (F), 50 Ω
Guard Intervals	1/4, 1/8, 1/16, 1/32	Return Loss	> 20 dB
Code Rates	1/2, 2/3, 3/4, 5/6, 7/8	Frequency	Adjustable: 30 MHz to 1 GHz in 1 Hz steps
Constellations Hierarchical Modes	QPSK, 16-QAM, 64-QAM Alpha - 1, 2 and 4 for 16-QAM & 64-QAM	Frequency Stability	Intern ref. 1ppm / or in accordance with external ref. accuracy
Network Mode		Spectrum Polarity	Inverted and non-inverted, selectable
Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz	Level	-10 dBm to 0 dBm in 0.1 dB step 0 dBm to +10 dBm optional
lumente		Level Stability	±0.3 dB
Inputs		Shoulder Level	< -51 dBc
MPEG-2 Clock Reference - 10 MHz	2 DVB-ASI inputs: BNC (F), 75 Ω Connector: BNC (F)	Harmonic and Spurious Emissions	< -55 dBc
	Frequency: 10 MHz Level: 100 mV - 3 Vpp	Amplitude Flatness (Note 1)	Center frequency ±3.8 MHz: ±0.5 dB
	Impedance: 50 Ω or High Impedance (user selectable)	Group Delay Response: (note 1)	Center frequency ± 3.8 MHz: ± 10 ns
Time Reference - 1 PPS	Connector: BNC (F)	MER	≥ 37 dB
	Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω or High Impedance (user selectable)	Phase Noise SSB	10 Hz: < -55 dBc/Hz 100 Hz: < -86 dBc/Hz 1 kHz: < -95 dBc/Hz 10 kHz < -100 dBc/Hz 100 kHz < -105 dBc/Hz 1 MHz: < -110 dBc/Hz
IF Output			
Connector	BNC (F), 50 Ω	Test Modes	
Centre Frequency	36 MHz	Removal of One Carrier	Movable one-carrier hole for noise test
Adjustable Frequency	35 MHz - 37 MHz in steps of 1 Hz	Removal of 50 Carriers	Movable 50-carrier hole for test of
Frequency Stability	Internal ref 1ppm / or in accordance with external ref accuracy	Single Carrier	Intermodulation and quantization noise COFDM spectrum is replaced by a single
Spectrum Polarity	Inverted and non-inverted (user selectable)	-	carrier at the centre frequency. The level of the single carrier is equivalent to the
Level	-8 dBm to 2 dBm in 0.1 dB steps		average RMS level of a normal COFDM spectrum. The signal is intended for level
Level Stability	±0.2 dB		alignment.
Return Loss	> 26 dB	TS-Stuffing	PRBS sequence in accordance with ETR 290
Spectrum Outside Band(note1)	±3.8 MHz: 0 dBc ±4.25 MHz: < 48 dBc ±5.25 MHz: < 56 dBc		paragraph 9.16.1
Harmonics and Spurious	< 60 dB relative to the total output power		he centre frequency for an 8 MHz version (scale down
MER	≥ 43 dB		and 5 MHz versions respectively). Levels are measured the level of the carriers at the edge of the spectrum.

Harmonics and spurious are not included.

Model: DVMP 5000



Product Specifications

Pre-Correction	
Non-Linear Pre-Correction	
Curve Formats	S 21 and VO/VI
Amplitude Scale	Linear and Logarithmic
Correction Points	Max. 256, user-defined position
Gain Correction	Max. 12 dB, subject to available h
Phase Correction	-6 to +30 degrees, subject to ava headroom
Linear Pre-Correction	
Correction Points	61
Point Spacing	1/60 of nominal spectrum BW
Amplitude Correction	±10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	±2000 ns
Group Delay Resolution	1 ns
Peak Power Clip Level	+17dB to +7dB (peak power relative to average l

	Front	Panel V	/iew	
	0	0		0
	DO NOT BLOCK AIR FLOW		AC 100-120V / 200-240V 2A; 50-80 Hz Fuse: 250V; 2.5A	
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	Control Interface (Basic v	ersion)
	Front Panel	LCD display and cursor/ execute keys
sition	RS232 Interface	Connector: 9-pin SUB-D Male Command protocol: SCPI based (note: the RS232 interface is also used for uploading Pre-correction when installed)
ilable headroom to available	RS485 Interface	Connector: 9-pin SUB-D Female Command protocol: Interactive CLI commands
	Web Interface (optional)	Internet Explorer 6.0+ Ethernet 10/100 Base-T Connector: RJ45
BW	SNMP Control Interface (optional)	Ethernet 10/100 Base-T Connector: RJ45
	Alarm Interface	
	Connector	9-pin SUB-D Female
erage RMS level)	Output	Two user programmable alarms via separate floating relay contacts Contact Rating: 60V / 0.2A (5W max)
	Input	Separate Reset control and Output muting control, activated by ground closure.
0	Power Supply	
200-240V; ;50-60 Hz ;50/: 2.5A	Voltage	90 - 264 VAC
250V; 2.5A	Frequency	47 - 63 Hz
	Consumption	max. 45 VA
	Harmonic Correction	EN61000-3-2

Environmental

Environmental	
Operating Temperature	0°C to +50°C (+32°F to +122°F)
Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Relative Humidity (operating/storage)	max. 90%
Cooling	Temperature controlled fan to assist natural convection
Mechanical	
Length	309mm (12.150")
Width	377mm (14.850")
Height	157mm (6.180")
Weight	4.9 kg (11 lbs.)
Transport and Storage	Vibration acc. to IEC Publ.68
Compliance	
Safety	EN60950

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Model: DVMP 5000L

Product Features

- Portable Design
- Durable Enclosure
- L-Band RF Output
- Full hierarchical mode support
- SFN and MFN support
- Near seamless switching between inputs
- Superior MER performance
- Outstanding Linear and Non-linear Digital Pre-correction
- Web browser remote control
- SNMP Remote Control
- Full DVB-T/H Support



Description and Application

Overview

The DVMP 5000L from UBS is a compact, test solution, for the development and quality control of DVB-T and/or DVB-H systems. A key factor in the product's success is the quality of its coding and modulation process. The modular design makes the unit highly flexible and easily adaptable to provide the exact features required in a specific application.

Application

The performance and flexibility of the DVMP 5000L allows it to excel in any application related to DVB-T/H modulation.

The core function of the DVMP 5000L is to modulate a MPEG-2 transport stream (input) onto an DVB-T/H compliant OFDM spectrum (output) in accordance with the rules for channel coding and modulation specified in the ETSI DVB-T and/or the DVB-H standards (EN 300 744 and/or ETSI EN 302 304)

RF Output - L-Band Version

The DVMP 5000L delivers the COFDM spectrum on a user defined L-Band frequency from 1665 MHz to 1680 MHz, in steps of just 1 Hz. The output level is adjustable from -10 dBm to 0 dBm with a step size of 0.2 dB.

The user can set the polarity of the spectrum to Inverted or Non-inverted as required. The spectrum bandwidth may be user configured to 8, 7, 6 or 5 MHz as required

Inputs

The DVMP 5000L has two MPEG-2 inputs (ASI format)), which can be automatically selected, or assigned by the user. The automatic switching provides near seamless switching to a secondary transport stream in case the primary transport stream source fails (a truly valuable feature for broadcast applications).

IF Output

The DVMP 5000L has an IF output, where the same COFDM signal is available at 36 MHz (default), or at a user defined frequency between 35 MHz and 48 MHz. The IF output can be directly interfaced to a wide range of transmitters and frequency converters.

Model: DVMP 5000L

Optional Features

DVB-H Mode

This option allows the DVMP 5000L to generate a DVB-H waveform in accordance with the ETSI DVB-H standards.

SFN Mode

This option provides the DVMP 5000L with market leading SFN performance, with respect to basic timing accuracy and the extent of the local delay offset range. The user can select either the SFN or MFN mode via the control interfaces.

The ability to select MFN mode is a convenient feature when conducting pre-tests and alignment of RF parameters on transmitter installations before the timing references and transport stream with MIP are in place (as a general rule, SFN modulators must mute their output if either of these signals is absent).

Hierarchical Modulation

Hierarchical modulation allows simultaneous transmission of two MPEG-2 transport streams. The compromise between data rate and ruggedness can be set differently between the two virtual channels. For example:

- Highly protected channel (High Priority HP- input) for transmission to mobile and/or portable receivers and
- High capacity channel (Low Priority LP input), at the expense of ruggedness, for transmission to rooftop antennas.

This option can be used to provide two services simultaneously: DVB-H and DVB-T, where the DVB-H service is provided via the HP channel, while the DVB-T service is provided via the LP channel.

Another typical application is simulcasting the same program in high definition resolution and standard definition resolution.

A significant benefit of hierarchical modulation is that the total data-rate available in a system with two hierarchically modulated RF channels is greater than what is available in a two-channel, non-hierarchical system, where one RF channel is strictly dedicated for transmission to mobile/ portable receivers and the other RF channel is strictly dedicated for transmission to rooftop antennas.

6 MHz Bandwidth

In addition to the standard 8 MHz and 7 MHz BW, the DVMP 5000L will also support transmission with a 6 MHz bandwidth that is intended for applications in North and South America, Korea, Japan and elsewhere, where the 6 MHz channel raster is standard.

5 MHz Bandwidth

The DVMP 5000L will also support transmission with a 5 MHz BW, recommended when the DVMP 5000L operates in the DVB-H mode.

This option is highly attractive for T&M and R&D applications as the user can simply switch between the four bandwidths via the instrument front panel (one instrument covers all bandwidths defined by the ETSI for DVB-T and/or DVB-H transmission).

Web Interface

This feature allows remote control of the DVMP 5000L via Ethernet (TCP/IP). The system is based on a Web server mounted inside the DVMP 5000L. The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the modulator. The Web Interface concept is popular because remote control with this system only requires a standard PC with a network interface card (NIC) and a Web browser (Microsoft Explorer 6.0+).

SNMP client

This feature allows remote control of the DVMP 5000L in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Digital Linear and Non-linear Pre-corrector

The digital linear and non-linear pre-correctors are used to maximize the performance of the transmitter in which the modulator is installed.

- •The Non-linear pre-corrector balances out gain and phase non-linearity in the transmitter RF power amplifier, thereby significantly reducing the in-band and out of band intermodulation products. Optimizing the transmitter's performance will extend the coverage area. The performance requirement of the transmitter output filter, which is used to suppress radiation in adjacent channels below a maximum allowed level, will also be eased.
- The Linear pre-corrector balances out level and group delay variations that are seen across the channel bandwidth and caused by the transmitter mask filter and/or channel combiner filters. The linear optimization of the transmitter's radiated signal allows the receiver's channel equalizer to focus all of its correction capacity on level and group delay errors originating from the actual transmission path.

The characteristics of the linear and non-linear pre-correction curves are set by means of an easy to use and highly intuitive graphical user interface, the UBS Corrector GUI software package (Windows compatible) system.

Null Eliminator (patented)

This option allows the network designer to shift the stationary nulls in a typical DVB-H SFN environment to eliminate dead reception areas.

GPS Elimination Software

For large network deployments (patented).

Transmitter Control

This option allows the DVMP 500L to control the Transmitter output power with a closed loop power control mechanism.

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Model: DVMP 5000L

Product Specifications (specifications are subject to change without notice)

Signal Processing		RF Output		
Supported Modes	IFFT: 2K, 4K, 8K	Connector	N-type (F), 50 c	hm
Guard Intervals		Frequency	21	55 MHz to 1680 MHz in
Code Rates	1/4, 1/8, 1/16, 1/32	requercy	500 Hz steps	55 WILL TO 1000 WILL TH
Code Rates Constellations	1/2, 2/3, 3/4, 5/6, 7/8 QPSK, 16-QAM, 64-QAM	Frequency Stability	Intern ref. 1ppr external ref. ac	n / or in accordance with curacy
Hierarchical Modes	Alpha - 1, 2 and 4 for 16-QAM & 64-QAM	Spectrum Polarity	Inverted and n	on-inverted, selectable
Network Mode	SFN & MFN	Level	-10 dBm to 0 d	Bm in 0.2 dB step
Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz	Level Stability	±0.3 dB	·
		Return Loss	> 20 dB	
Inputs		Shoulder Level	< -50 dBc	
MPEG-2 Clock Reference - 10 MHz	2 DVB-ASI inputs: BNC (F), 75 Ω Connector: BNC (F)	Spurious Level Outside Channel	< -60 dBm	
	Frequency: 10 MHz		Contor froquer	
	Level: 100 mV - 3 Vpp Impedance: 50 Ω or High Impedance	Amplitude Flatness (Note 1)		ncy ±3.8 MHz: ±0.5 dB
	(user selectable)	Group delay response: (note 1)	Center frequer	ncy ±3.8 MHz: ±25 ns
Time Reference - 1 PPS	Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω or High Impedance (user selectable)	Phase Noise SSB	100 Hz: 1 kHz: 10 kHz: 100 kHz:	< -80dBc/Hz < -85dBc/Hz < -95dBc/Hz < -120dBc/Hz
		Test Modes		
IF Output		Removal of One Carrier	Movable one-o	carrier hole for noise test
Connector	BNC (F), 50 Ω	Removal of 50 Carriers		rrier hole for test of on and quantization noise
Centre Frequency	36 MHz	Single Carrier		rum is replaced by a single
Adjustable Frequency	35 MHz - 48 MHz in steps of 1 Hz		carrier at the	centre frequency. The level
Frequency Stability	Internal ref 1ppm / or in accordance with external ref accuracy		average RMS	carrier is equivalent to the level of a normal COFDM e signal is intended for level
Spectrum Polarity	Inverted and non-inverted (user selectable)	TC Chaffer a	alignment.	5
Level	-8 dBm to 2 dBm in 0.1 dB steps	TS-Stuffing	paragraph 9.16	e in accordance with ETR 290 5.1
Level Stability	±0.2 dB			
Return Loss	> 26 dB			
Spectrum Outside Band(note1)	±3.8 MHz: 0 dBc ±4.25 MHz: < 48 dBc ±5.25 MHz: < 56 dBc			
Harmonics and Spurious	< 60 dB relative to the total output power	Note 1 : Frequencies are relative to th		
MER	\geq 43 dB	by 7/8, 6/8 and 5/8 for 7 MHz, 6 MHz a in 10kHz bandwidth, where 0 dB is t		

Harmonics and spurious are not included.

Model: DVMP 5000L



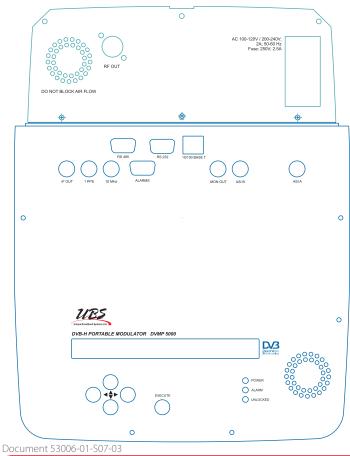
Product Specifications (specifications are subject to change without notice)

Pre-Correction Non-Linear Pre-Correction Curve Formats Amplitude Scale Correction Points Gain Correction Phase Correction Linear Pre-Correction Correction Points Point Spacing

Amplitude Correction Amplitude Resolution Group Delay Correction Group Delay Resolution Peak Power Clip Level

S 21 and VO/VI
Linear and Logarithmic
Max. 256, user-defined position
Max. 12 dB, subject to available headroom
-6 to +30 degrees, subject to available headroom
61
1/60 of nominal spectrum BW
±10 dB
0.01 dB
±2000 ns
1 ns
+17dB to +7dB (peak power relative to average RMS level)

Front Panel View



Front Panel	LCD display and cursor/ execute keys
RS232 Interface	Connector: 9-pin SUB-D Male
	Command protocol: SCPI based
	(note: the RS232 interface is also used for uploading Pre-correction when installed)
RS485 Interface	Connector: 9-pin SUB-D Female
	Command protocol:
	Interactive CLI commands
Web Interface (optional)	Internet Explorer 6.0+ Ethernet 10/100 Base-T
	Connector: RJ45
SNMP Control Interface	Ethernet 10/100 Base-T
(optional)	Connector: RJ45
Alarm Interface	
Connector	9-pin SUB-D Female
Output	Two user programmable alarms via separate
	floating relay contacts Contact Rating: 60V / 0.2A (5W max)
Input	Separate Reset control and Output mutine
	control, activated by ground closure.
Power Supply	
Voltage	90 - 264 VAC
Frequency	47 - 63 Hz
Consumption	max. 45 VA
Harmonic Correction	EN61000-3-2
Environmental	
Operating Temperature	0°C to +50°C (+32°F to +122°F)
Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Relative Humidity (operating/storage)	max. 90%
Cooling	Temperature controlled fan to assist natura convection
Mechanical	
Length	309mm (12.150")
Width	377mm (14.850")
Height	157mm (6.180")
Weight	4.9 kg (11 lbs.)
Transport and Storage	Vibration acc. to IEC Publ.68
Compliance	

May 21, 2010

Head Office - 400 Spinnaker Way - Vaughan - Ontario - Canada - L4K 5Y9 - Tel: 905 669 8533 - North America Toll Free: 1 877 669 8533 - www.uniquesys.com - Email: sales@uniquesys.com

SECTION INDEX





Waveguides

RECTANGULAR WAVEGUIDE PRODUCT LINE 111 TWIST (WITH FLANGES) SERIES NO. 112 TRANSITIONS (FLANGED) SERIES NO. 113 SHORTING PLATES SERIES NO.114 **PRESSURE WINDOWS SERIES NO.115 PRESSURE INSERTER SERIES NO.116** BRACKETS AND HANGERS FLANGE HARDWARE KITS SERIES NO.117 **TWISTABLE FLEXIBLE WAVEGUIDE SERIES NO.118 STEP TWIST SERIES NO.119** ADAPTER (WAVEGUIDE TO COAX) SERIES NO. 121 END LAUNCH ADAPTER (WAVEGUIDE TO COAX) SERIES NO. 121E **TERMINATION (LOW POWER PRECISION) SERIES NO. 131 TERMINATION (LOW POWER) SERIES NO. 132 TERMINATION (LOW POWER SHORT-LENGTH) SERIES NO. 133 TERMINATION (MEDIUM POWER) SERIES NO. 134 TERMINATION (MEDIUM POWER, SHORT LENGTH) SERIES NO. 135 TERMINATION (HIGH POWER) SERIES NO. 136 TERMINATION (RAM) SERIES NO. 137 TERMINATION (FERRITE) SERIES NO. 138 BROADWALL DIRECTIONAL COUPLER SERIES NO. 141 DUAL BROADWALL DIRECTION COUPLER SERIES NO. 142 BROADWALL DIRECTIONAL COUPLER SERIES NO. 143** DUAL BROADWALL DIRECTIONAL COUPLER (COAX SECONDARIES) SERIES NO. 144 **CROSS GUIDE COUPLER SERIES NO. 145** DUAL CROSS GUIDE COUPLER SERIES NO. 145D MAGIC TEE SERIES NO. 146 LOOP COUPLER SERIES NO. 147 **POWER SAMPLERS SERIES NO. 148** MMDS OUADRATURE HYBRID SERIES NO. 149



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Waveguides

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Waveguide Product Specifications



Rectangular Waveguide

Series No: 111

Rectangular Waveguide Product Line

UBS stocks rectangular waveguide raw materials in sizes ranging from WR-28 to WR-650. UBS is also able to manufacture products from other industry standard waveguide sizes upon request. In addition to the standard line of waveguide products offered in this catalogue, UBS also is a supplier of OEM products to the military and commercial communications industry. UBS has the experienced staff and the resources to develop and manufacture waveguide components specific to your OEM application.

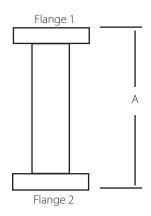
Rectangular Waveguide Section Numbering System

The UBS rectangular waveguide section numbering system, allows the end user to specify the exact waveguide section(s) required.

Example 1

- You require a WR-42 straight section(S), 12" long.
- The waveguide material selected is bronze(B).
- Flange 1 is to be grooved(G) to accept a gasket
- Flange 2 at the other end is to be flat cover(C).
- The flange mounting holes are to be threaded(T2).

Part number - 111 – WR42 – B – S – 12.00 – X – X – G – T2 – C – T2
Series No
Section Shape
Dimension B
Dimension C
Flange 1
Flange 1 Mounting
Flange 2
Flange 2 Mounting



NOTE: Dimensions "B" and "C" do not apply and are left as "X" in the part number.

Materials

Straight and complex sections can be specified from a choice of high conductivity copper, bronze or aluminum. Flexible waveguide is manufactured from a convoluted beryllium-copper alloy material that is fully pressurizable and is flexible in both the E and H planes. Longitudinal twists are not possible with this type of flexible waveguide. If a rigid longitudinal twist section is required, a suitable one can be specified from the UBS 112 series. For longitudinal twist use the 118 series of flexible twistable waveguides.

Section Dimensions

The maximum length of rigid waveguide is 6 ft, flexible waveguide is 2 ft, and flexible twistable waveguide is 4 ft.

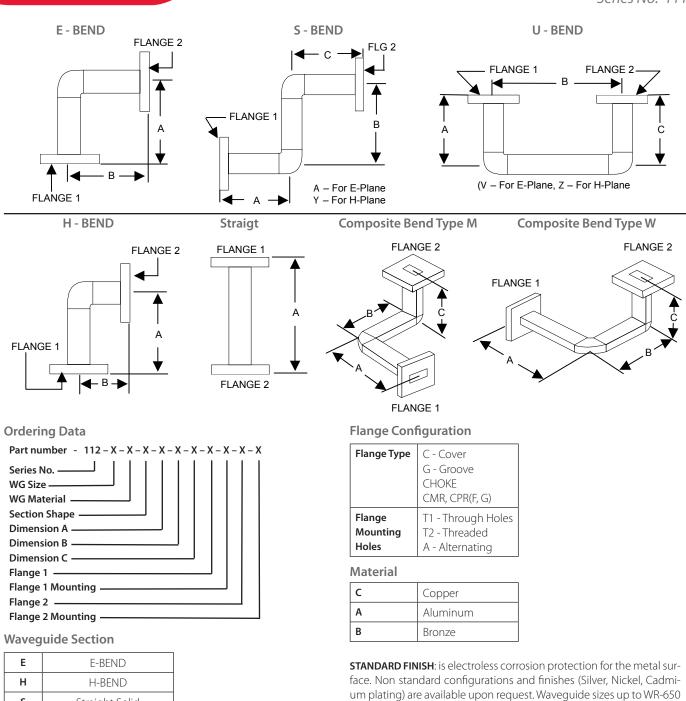
Tips and Suggestions

Large sections manufactured from copper should be avoided. Instead use bronze for additional strength. It is strongly recommended that a single large complex section be constructed by specifying several smaller and less complicated sections for assembly by the user on site

You are advised to contact UBS for assistance in specifying large complex sections to best meet your requirements.



Series No: 111



Unique Broadband Systems Ltd.

S

F

Α

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z

W

М

Straight Solid

Straight Flex

S-BEND E-PLANE

S-BEND H-PLANE

U-BEND E-PLANE

U-BEND H-PLANE

Composite Bend Type W

Composite Bend Type M

VER 1.0 November 19, 2015

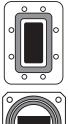
available. Contact our sales department with your requirements.



Rectangular Waveguide

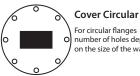
Series No: 111

Standard Flange Types

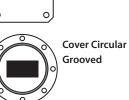


O Choke

CPR-Grooved



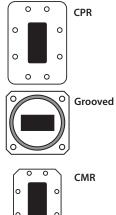
Cover Circular For circular flanges number of holes depends on the size of the waveguide



Cover

0

Contact Groved



North American (EIA Standard)

C IG-599/U	CIRCULAR	CHOKE	CPR CC FLAT	ONTACT	CMR	SQUARE		CD001/5D	FLAT	1	
	C	СНОКЕ	FLAT			JQUIIIL	CIRCULAR	GROOVED	FLAI	GROOVED	
	с	CHOKE	L	GROOVED							
IG-599/U			CONTACT-F	CONTACT-G	CMR	с	c	G	F	G	CMR
		UG-600A/U				•		•			
					UG-1530/U	•		•			
IG-595/U IG-597/U		UG-596A/U UG-598A/U				•		•			
						•		•			
IG-419/U G-1665/U		UG-541A/U				•		•			
						•		•	•	•	
JG-39/U IG-135/U		UG-40B/U UG-136B/U	UG-1736/U UG-1737/U	UG-1360/U UG-1361/U	UG-1478/U UG-1483/U	•		•	•	•	٠
JG-51/U IG-138/U		UG-52B/U UG-137B/U	UG-1734/U UG-1735/U	UG-1358/U UG-1359/U	UG-1477/U UG-1482/U	•		•	•	•	•
	UG-344/U UG-441/U	UG-343B/U UG-440B/U	UG-1732/U UG-1733/U	UG-1356/U UG-1357/U	UG-1476/U UG-1481/U		•	•	٠	•	•
			UG-1730/U UG-1731/U	UG-1354/U UG-1355/U			•	•	٠	•	•
	UG-149A/U UG-407/U	UG-148C/U UG-406B/U	UG-1728/U UG-1729/U	UG-1352/U UG-1353/U	UG-1475/U UG-1480/U		•	•	•	•	•
			UG-1726/U UG-1727/U	UG-1350/U UG-1351/U			•	•	٠	•	•
	UG-53/U UG-584/U	UG-54B/U UG-585/U	UG-1724/U UG-1725/U	UG-1348/U UG-1349/U	UG-1479/U UG-1484/U		•	•	٠	•	•
			UG-1712/U UG-1713/U	UG-1346/U UG-1347/U					•	•	
			UG-1716/U UG-1711/U	UG-1344/U UG-1345/U					٠	•	
									•	•	
		1		·		L	1	II		I	
	- Materi	UG-149A/U UG-407/U UG-53/U	UG-149A/U UG-148C/U UG-407/U UG-406B/U UG-53/U UG-54B/U UG-584/U UG-585/U UG-584/U UG-585/U	WR90 UG-1730/U UG-1731/U UG-149A/U UG-407/U UG-148C/U UG-148C/U UG-1729/U UG-1728/U UG-1729/U UG-1728/U UG-407/U UG-148C/U UG-1729/U UG-1728/U UG-1729/U UG-535/U UG-538/U UG-54B/U UG-585/U UG-1724/U UG-1712/U UG-5712/U UG-1712/U UG-1713/U UG-1712/U UG-1711/U	UG-149A/U UG-149A/U UG-407/U UG-148C/U UG-406B/U UG-1728/U UG-1729/U UG-1355/U UG-1355/U UG-407/U UG-406B/U UG-1728/U UG-1729/U UG-1352/U UG-1353/U UG-535/U UG-54B/U UG-584/U UG-1724/U UG-1725/U UG-1348/U UG-1348/U UG-5584/U UG-54B/U UG-585/U UG-1722/U UG-1725/U UG-1348/U UG-1346/U UG-5712/U UG-1346/U UG-1713/U UG-1344/U UG-1345/U UG UG UG-1711/U UG-1345/U UG UG UG-1711/U UG-1345/U	UG-149A/U UG-149A/U UG-4007/U UG-148C/U UG-406B/U UG-1729/U UG-1354/U UG-1355/U UG-1475/U UG-1355/U UG-149A/U UG-4007/U UG-148C/U UG-406B/U UG-1728/U UG-1729/U UG-1352/U UG-1353/U UG-1480/U UG-545/U UG-535/U UG-54B/U UG-585/U UG-1726/U UG-1725/U UG-1348/U UG-1351/U UG-1480/U UG-553/U UG-584/U UG-54B/U UG-585/U UG-1724/U UG-1725/U UG-1348/U UG-1349/U UG-1484/U UG-573/U UG-584/U UG-54B/U UG-5712/U UG-1712/U UG-1713/U UG-1346/U UG-1345/U UG-1484/U UG-1711/U UG-1716/U UG-1345/U UG-1345/U UG-1345/U UG-1345/U WR90 UG-39/U Hass/Copper Brass/Copper UG-148/U	UG-1730/U UG-1730/U UG-1354/U UG-149A/U UG-148C/U UG-1731/U UG-1355/U UG-149A/U UG-148C/U UG-1728/U UG-1352/U UG-1475/U UG-407/U UG-406B/U UG-1729/U UG-1353/U UG-1480/U UG-1480/U UG-533/U UG-548/U UG-1727/U UG-1351/U UG-1480/U UG-1480/U UG-553/U UG-548/U UG-1727/U UG-1351/U UG-1484/U UG-1484/U UG-584/U UG-585/U UG-1712/U UG-1346/U UG-1484/U UG-1484/U UG-1713/U UG-1713/U UG-1347/U UG-1484/U UG-1484/U UG-1484/U UG-1711/U UG-1347/U UG-1345/U UG-1345/U UG-1345/U UG-1345/U WR90 UG-39/U Hass/Copper Brass/Copper UG-1345/U UG-1345/U UG-1345/U	UG-1730/U UG-1730/U UG-149A/U UG-149A/U UG-4007/U UG-1730/U UG-148C/U UG-1728/U UG-1729/U UG-1354/U UG-1355/U UG-1355/U UG-1475/U UG-1480/U UG-149A/U UG-4007/U UG-148C/U UG-406B/U UG-1728/U UG-1729/U UG-1355/U UG-1353/U UG-1475/U UG-1480/U • UG-535/U UG-538/U UG-54B/U UG-585/U UG-1722/U UG-1722/U UG-1348/U UG-1348/U UG-1479/U UG-1484/U • UG-584/U UG-54B/U UG-585/U UG-1712/U UG-1713/U UG-1346/U UG-1345/U UG-1484/U • UG-1711/U UG-1716/U UG-1345/U UG-1345/U UG-1345/U • • WR90 UG-39/U Hass/Copper Brass/Copper • •	UG-1730/U UG-1354/U UG-1354/U UG-1354/U UG-149A/U UG-148C/U UG-1728/U UG-1355/U UG-1475/U UG-4067/U UG-148C/U UG-1728/U UG-1352/U UG-1480/U • UG-4068/U UG-1729/U UG-1352/U UG-1480/U • • UG-53/U UG-1726/U UG-1351/U UG-1480/U • • UG-53/U UG-548/U UG-1727/U UG-1351/U UG-1484/U • • UG-53U UG-548/U UG-172/U UG-1348/U UG-1484/U • • • UG-531/U UG-548/U UG-172/U UG-1348/U UG-1484/U •	UG-149A/U UG-1730/U UG-1730/U UG-1354/U UG-1354/U UG-1354/U UG-1354/U UG-1354/U UG-1354/U UG-1354/U UG-1354/U UG-1355/U Image: Constraint of the state of t	UG-173/U UG-173/U UG-1354/U UG-1355/U Image: Construction of the state

2. For flanges not found in this table please contact our sales department

VER 1.0 November 19, 2015

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Rectangular Waveguide

Series No: 111



Standard Flange Types

PDR

CBR

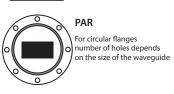


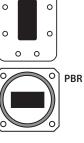


CAR For circular flanges number of holes depends on the size of the waveguide



0





UDR

0 0



European (IEC Standard)

Way	veguide S	ize	UBR	UAR	UDR	UER	PAR	PBR	PDR	CBR	CAR
EIA	RCSC	IEC	с	с	CPR	CMR	G	G	CPR-G	CHOKE	CHOKE
WR28	WG22	R320	UBR320					PBR320			
WR34	WG21	R260	UBR260					PBR260			
WR42	WG20	R220	UBR220					PBR220		CBR220	
WR51	WG19	R180	UBR180					PBR180			
WR62	WG18	R140	UBR140					PBR140		CBR140	
WR75	WG17	R120	UBR120		UDR120			PBR120	PDR120	CBR120	
WR90	WG16	R100	UBR100		UDR100	UER100		PBR100	PDR100	CBR100	
WR112	WG15	R84	UBR84		UDR84	UER84	PAR84	PBR84	PDR84	CBR84	
WR137	WG14	R70		UAR70	UDR70	UER70	PAR70		PDR70		CAR70
WR159	WG13	R58		UAR58	UDR58	UER58	PAR58		PDR58		CAR58
WR187	WG12	R48		UAR48	UDR48	UER48	PAR48		PDR48		CAR48
WR229	WG11A	R40			UDR40	UER40			PDR40		
WR284	WG10	R32		UAR32	UDR32	UER32	PAR32		PDR32		CAR32
WR340	WG9A	R26			UDR26				PDR26		
WR430	WG8	R22			UDR22				PDR22		
WR650	WG6	R14			UDR14				PDR14		

Notes

1. Holes in EIC flanges are to accomodate metric hardware

VER 1.0 November 19, 2015



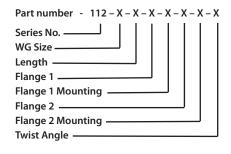
Twist (with flanges)

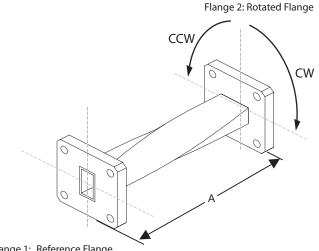
Series No: 112

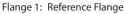
Part Description

UBS offers a custom product line of formed twist sections covering waveguide sizes from WR-28 through WR-650. Insertion loss is equivalent to straight waveguide sections. Please specify the length.

Ordering Data







Specifications

Size	Frequency GHz	Minimum Dimension Available for 90° Twist
WR28	26.50 - 40.00	1.00
WR34	22.00 - 33.00	1.00
WR42	18.00 - 26.00	1.00
WR51	15.00 - 22.00	1.00
WR62	12.40 - 18.00	1.50
WR75	10.00 - 15.00	1.50
WR90	8.20 - 12.40	1.50
WR112	7.05 - 10.00	2.00
WR137	5.85 - 8.20	2.00
WR159	4.09 - 7.05	3.00
WR187	3.95 - 5.85	3.00
WR229	3.30 - 4.90	3.00
WR284	2.60 - 3.95	6.00
WR340	2.20 - 3.30	8.00
WR430	1.70 - 2.60	9.00
WR650	1.12 - 1.70	15.00

Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating
Twist Angle	1 - 90° Twist 2 - 45° Twist

Electrical Specification

VSWR	< 1.06 - 1.10 (length dependent)	
vsuu		

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

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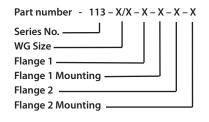
Transitions

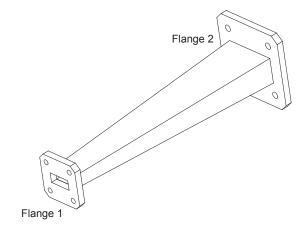
Series No: 113

Part Description

UBS standard product line of fabricated waveguide transitions are designed to interconnect different size waveguide components in a minimum space. The standard rectangular sizes from WR-28 through WR-284 are shown on this data sheet.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - THreaded A - Alternating

Electrical Specification

VSWR 1.10 max.

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Specifications

Size	Frequency GHz
WR28/34	26.50 - 33.00
WR34/42	22.00 - 26.50
WR42/51	18.00 - 22.00
WR51/62	15.00 - 18.00
WR62/75	12.40 - 15.00
WR75/90	10.00 - 12.40
WR90/112	8.20 - 10.00
WR112/137	7.05 - 10.00
WR137/159	5.85 - 8.20
WR159/187	4.09 - 7.05
WR187/229	3.95 - 5.85
WR229/284	3.30 - 4.90



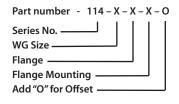
Shorting Plates

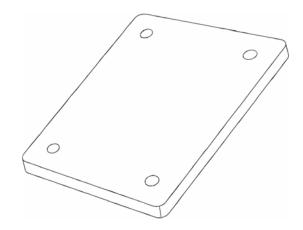
Series No: 114

Part Description

Unique Broadband Systems offers a line of shorting plates to mate with standard waveguide flanges. In addition to the popular standard flanges listed, UBS offers a more complete line of industry standard flange styles upon request.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - THreaded A - Alternating

Specifications

Size	С	G	CMR	CPR
WR28	•	•		
WR34	•	•		
WR42	•	•		
WR51	•	•		
WR62	•	•		
WR75	•	•	•	•
WR90	•	•	•	•
WR112	•	•	•	•
WR137	•	•	•	•
WR159	•	•	•	•
WR187	•	•	•	•
WR229	•	•	•	•
WR284	•	•	•	•
WR340	•	•	•	•
WR430	•	•	•	•
WR650	•	•	•	•



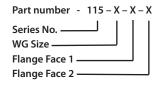
Pressure Windows

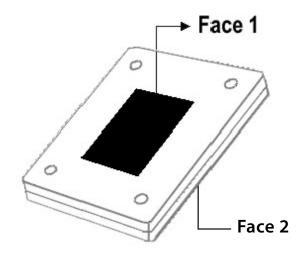
Series No: 115

Part Description

UBS offers a line of pressure windows to mate with all standard waveguide flanges. In addition to the popular standard flanges listed, UBS offers a more complete line of industry standard flange styles upon request. All pressure windows are manufactured from 0.0625" material and are designed to be used up to a maximum pressure of 10 psi (3-5 psi typical). These pressure windows are for low power Tx/ Rx application (below 250 Watts average power) and do not have pressure inlets or gasket grooves. Holes for attachment hardware are drilled clear.

Ordering Data





Flange Configuration

Flamma Tama	
Flange Type	C - Cover
	G - Groove
	СНОКЕ
	CMR
	CPR (F, G)

Electrical Specification

VSWR	< 1.1 may
VSWK	< 1.1 max.

Size	с	G	СНОКЕ	CMR	CPR
WR28	•	•	•		
WR34	•	•	•		
WR42	•	•	•		
WR51	•	•	•		
WR62	•	•	•		
WR75	•	•	•	•	•
WR90	•	•	•	•	•
WR112	•	•	•	•	•
WR137	•	•	•	•	•
WR159	•	•	•	•	•
WR187	•	•	•	•	•
WR229	•	•	•	•	•
WR284	•	•	•	•	•
WR340	•	•	•	•	•
WR430	•	•	•	•	•
WR650	•	•	•	٠	•



Pressure Inserter

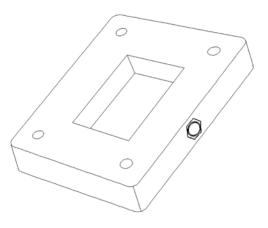
Series No: 116

Part Description

UBS offers a line of pressure inserters to mate with all standard waveguide flanges. In addition to the popular standard flanges listed, UBS offers a more complete line of industry standard flange styles upon request. All pressure inserters are manufactured from aluminum alloy that has been chemically cleaned and coated to prevent corrosion. The pressure inlet has 1/8" female pipe thread and is shipped with a sealed 1/8" male pipe thread plug installed. Thickness 0.375". Holes for attachment hardware are drilled clear.

Ordering Data

Part number -	116 – X – X
Series No. ——	
WG Size ———	
Flange ——	



Flange Configuration

	C. Cover
Flange Type	C - Cover
	G - Groove
	CHOKE
	CMR
	CPR (F, G)

Electrical Specification

VSWR	< 1.1 max.

Size	с	G	CHOKE	CMR	CPR
WR28	•	•	•		
WR34	•	•	•		
WR42	•	•	•		
WR51	•	•	•		
WR62	•	•	•		
WR75	•	•	•	•	•
WR90	•	•	•	•	•
WR112	•	•	•	•	•
WR137	•	•	•	•	•
WR159	•	•	•	•	•
WR187	•	•	•	•	•
WR229	•	•	•	•	•
WR284	•	•	•	•	•
WR340	•	•	•	•	•
WR430	•	•	•	•	•
WR650	•	•	•	•	•



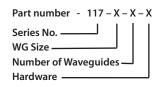
Brackets and Hangers, Flange Hardware Kits

Series No: 117

Part Description

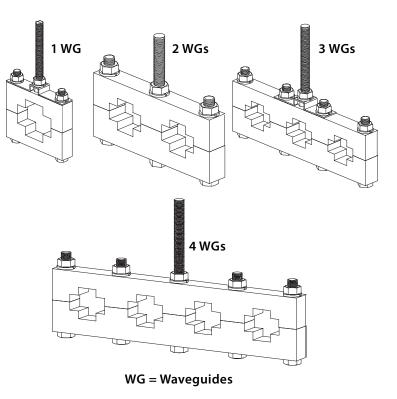
The rectangular waveguide hangers offered by UBS are designed to allow suspension of rectangular waveguide in any position and are suitable for both indoor and outdoor applications. Available in single, double, triple or quadruple waveguide configurations.

Ordering Data



Note

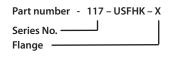
Diagram shown with optional thread rod kit Wavguide sizes up to WER-650 are available. Contact our sales department with your requirements.



Flange Hardware Kit

The flange hardware kits offered by UBS include all required stainless steel fasteners including nuts, flat washers and lock washers. Gaskets supplied are half, full or double thickness as required.

Ordering Data





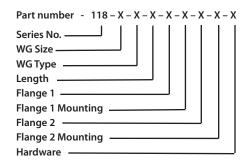
Twistable Flexible Waveguide

Series No: 118

Part Description

UBS offers a line of twistable flexible or flexible waveguide sections. These sections are manufactured from spiral-wound silver plated conductors covered with a protective, pressure tight black neoprene or silicone rubber jacket. All standard waveguide flanges are available. In addition to the popular standard line of flanges listed, UBS offers a more complete line of industry standard flange styles upon request. Please specify the length that is required.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Hardware	1 - Required 0 - Not Required
Twistable Flexible	А
Flexible	В

Size	с	G	CHOKE	CMR	CPR	MATCHING WG INTERNAL DIMENSIONS	OPERATIONAL FREQUENCY BAND (GHz)	NOMINAL TEST FREQ. FOR ATTENUATION	MAXIMUM IL ATTENUATION (dB/ft)	MAXIMUM VSWR	MAXIMUM VSWR	Power Handling (W)
						(in)		(GHz)		< 36" >	< 36" >	
WR28	•	•	•			0.280 x 0.140	26.50 - 40.00	34.00	1.00	1.30 - 3	86" max	75
WR42	•	•	•			0.420 x 0.170	18.00 - 26.50	22.00	0.70	1.18 1.23	1.20 1.25	100
WR51	•	•	•			0.510 x 0.255	15.00 - 22.00	18.50	0.55	1.15 1.18	1.17 1.20	400
WR62	•	•	•			0.622 x 0.311	12.40 - 18.00	14.00	0.28	1.10 1.13	1.13 1.16	400
WR75	•	•	•			0.750 x 0.375	10.00 - 15.00	13.70	0.18	1.08 1.10	1.10 1.13	750
WR90	•	•	•	•	•	0.900 x 0.400	8.20 - 12.40	9.40	0.15	1.07 1.10	1.10 1.13	1000
WR112	•	•	•	•	•	1.122 x 0.497	7.05 - 10.00	9.40	0.12	1.07 1.10	1.10 1.13	1500
WR137	•	•	•	•	•	1.372 x 0.622	5.85 - 8.20	6.45	0.09	1.05 1.09	1.09 1.10	2000
WR159	•	•	•	•	•	1.590 x 0.795	4.90 - 7.05	5.90	0.08	1.05 1.08	1.08 1.10	2500
WR187	•	•	•	•	•	1.872 x 0.872	3.95 - 5.85	4.75	0.05	1.05 1.07	1.07 1.10	3000
WR229	•	•	•	•	•	2.290 x 1.145	3.30 - 4.90	3.85	0.04	1.05 1.07		4000
WR284	•	•	•	•	•	2.840 x 1.340	2.60 - 3.95	3.15	0.04	1.04 1.07	1.07 1.10	4000

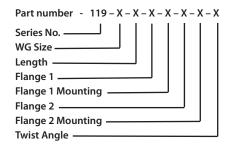


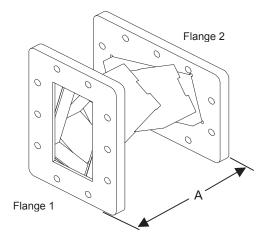
Step Twist Series No: 119

Part Description

Unique Broadband Systems offers a custom product line of Electroformed step twist covering waveguide sizes from WR-90 through WR-650. Insertion loss is equivalent to straight waveguide sections.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating
Twist Angle	1 - 90° Twist 2 - 45° Twist

Electrical Specification

VSWR < 1.2 max.

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Size	Frequency GHz	Minimum Dimension Available for 90° Twist (inches)	Minimum Dimension Available for 45° Twist (inches)
WR90	8.20 - 12.40	2.00	1.50
WR112	7.05 - 10.00	2.00	1.50
WR137	5.85 - 8.20	2.00	1.50
WR159	4.09 - 7.05	3.00	2.00
WR187	3.95 - 5.85	3.00	2.00
WR229	3.30 - 4.90	3.00	2.00
WR284	2.60 - 3.95	6.00	5.00
WR340	2.20 - 3.30	6.00	5.00
WR430	1.70 - 2.60	6.00	5.00
WR650	1.12 - 1.70	9.00	8.00





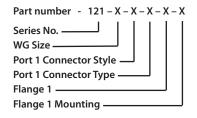
Adapter (Waveguide to Coaxial)

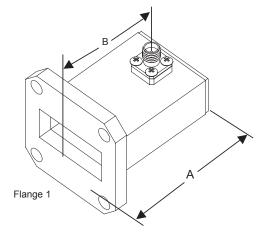
Series No: 121

Part Description

UBS offers a standard product line of precision rectangular waveguide-to-coax adapters covering waveguide sizes from WR-28 through WR-430.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Connector Style

Style	SMA
	N
	2.9 mm (K)
	3.5 mm
	2.4 mm
Туре	M - Male
	F - Female

Electrical Specification

VSWR < 1.10 typ.

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

			Dimer	nsions	
Size	Frequency	SMA	-Туре	N-T	ype
	GHz	A	В	A	В
WR28	26.50 - 40.00	-	-	-	-
WR34	22.00 - 33.00	-	-	-	-
WR42	18.00 - 26.00	1.00	0.75	-	-
WR51	15.00 - 22.00	1.12	0.82	-	-
WR62	12.40 - 18.00	1.01	0.79	1.67	1.42
WR75	10.00 - 15.00	1.01	0.65	1.38	1.09
WR90	8.20 - 12.40	1.07	0.72	1.65	1.24
WR112	7.05 - 10.00	1.42	1.03	1.88	1.45
WR137	5.85 - 8.20	1.57	1.03	2.13	1.61
WR159	4.09 - 7.05	2.00	1.40	2.38	1.76
WR187	3.95 - 5.85	3.50	2.80	2.41	1.65
WR229	3.30 - 4.90	3.50	2.70	2.41	1.47
WR284	2.60 - 3.95	4.00	2.70	2.66	1.46
WR340	2.20 - 3.30	-	-	3.52	2.12
WR430	1.70 - 2.60	-	-	4.50	2.62



Termination (Low Power Precision)

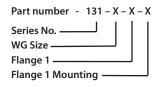
Series No: 131

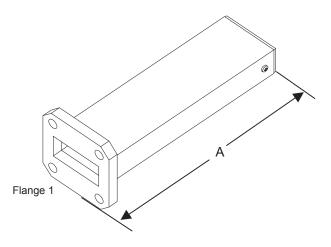
Part Description

UBS' standard product line of precision low power terminations use spear load elements for optimum electrical performance. Maximum power handling capacity:

0.5 watt for waveguide sizes WR-28 to WR-42, 1 watt for WR-51 and WR-62, 2 watts for waveguide sizes WR-75 to WR-650.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

-		
VSWR	< 1.02 max.	

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Size	Frequency GHz	Dimensions (inches) A (min)
WR28	26.50 - 40.00	2.50
WR34	22.00 - 33.00	2.50
WR42	18.00 - 26.00	2.59
WR51	15.00 - 22.00	3.25
WR62	12.40 - 18.00	3.43
WR75	10.00 - 15.00	4.30
WR90	8.20 - 12.40	4.31
WR112	7.05 - 10.00	3.58
WR137	5.85 - 8.20	4.23
WR159	4.09 - 7.05	3.00
WR187	3.95 - 5.85	3.00
WR229	3.30 - 4.90	7.50
WR284	2.60 - 3.95	11.00
WR340	2.20 - 3.30	11.18
WR430	1.70 - 2.60	-
WR650	1.12 - 1.70	-



Termination (Low Power)

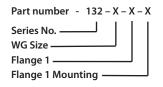
Series No: 132

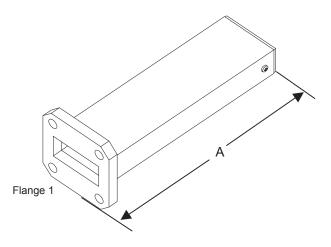
Part Description

UBS' standard product line of precision low power terminations use spear load elements for optimum electrical performance. Maximum power handling capacity:

0.5 watt for waveguide sizes WR-28 to WR-42, 1 watt for WR-51 and WR-62, 2 watts for waveguide sizes WR-75 to WR-650.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

-		Ļ
VSWR	< 1.10 max.	

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Size	Frequency GHz	Dimensions (inches) A (min)
WR28	26.50 - 40.00	2.00
WR34	22.00 - 33.00	2.00
WR42	18.00 - 26.00	3.00
WR51	15.00 - 22.00	3.00
WR62	12.40 - 18.00	4.00
WR75	10.00 - 15.00	4.00
WR90	8.20 - 12.40	6.00
WR112	7.05 - 10.00	6.00
WR137	5.85 - 8.20	6.50
WR159	4.09 - 7.05	7.50
WR187	3.95 - 5.85	8.50
WR229	3.30 - 4.90	10.00
WR284	2.60 - 3.95	10.50
WR340	2.20 - 3.30	-
WR430	1.70 - 2.60	-
WR510	1.45 - 2.02	-
WR650	1.12 - 1.70	-



Termination (Low Power short-length)

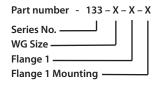
Series No: 133

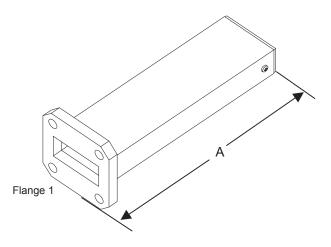
Part Description

UBS' standard product line of precision low power terminations use spear load elements for optimum electrical performance. Maximum power handling capacity:

0.5 watt for waveguide sizes WR-28 to WR-42, 1 watt for WR-51 and WR-62, 2 watts for waveguide sizes WR-75 to WR-650.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

· ·		Ļ
VSWR	< 1.15 max.	

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Size	Frequency GHz	Dimensions (inches) A (min)
WR28	26.50 - 40.00	1.00
WR34	22.00 - 33.00	1.00
WR42	18.00 - 26.00	1.00
WR51	15.00 - 22.00	1.40
WR62	12.40 - 18.00	1.80
WR75	10.00 - 15.00	2.00
WR90	8.20 - 12.40	3.00
WR112	7.05 - 10.00	3.28
WR137	5.85 - 8.20	3.50
WR159	4.09 - 7.05	3.50
WR187	3.95 - 5.85	4.00
WR229	3.30 - 4.90	5.00
WR284	2.60 - 3.95	6.00
WR340	2.20 - 3.30	-
WR430	1.70 - 2.60	-
WR510	1.45 - 2.02	-
WR650	1.12 - 1.70	-



Termination (Medium Power)

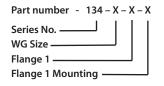
Series No: 134

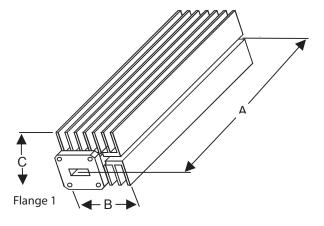
Part Description

UBS' standard product line of medium power terminations are constructed of normal wall waveguide tubing and extruded heat sink material. The load elements are custom ground silicon carbide spears tapered for an optimum VSWR response of 1.10 max. Maximum power handling capacity:

25 watts for waveguide sizes WR-28 to WR-62, 50 watts for waveguide sizes WR-75 to WR-430.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

VSWR	< 1.10 max.	ľ

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Size	Frequency GHz	Dimensions (inches)			
		A	В	с	
WR28	26.50 - 40.00	5.00	2.30	3.40	
WR34	22.00 - 33.00	5.00	2.30	3.40	
WR42	18.00 - 26.00	5.00	2.30	3.40	
WR51	15.00 - 22.00	5.00	2.30	3.40	
WR62	12.40 - 18.00	5.00	3.40		
WR75	10.00 - 15.00	7.00	2.30	3.40	
WR90	8.20 - 12.40	7.00	2.30	3.40	
WR112	7.05 - 10.00	7.00	2.30	3.40	
WR137	5.85 - 8.20	7.00	2.30	3.40	
WR159	4.09 - 7.05	8.50	2.30	3.40	
WR187	3.95 - 5.85	8.50	2.30	3.40	
WR229	3.30 - 4.90	9.00	2.30	3.40	
WR284	2.60 - 3.95	12.00	2.30	3.40	
WR340	2.20 - 3.30	-	-	-	
WR430	1.70 - 2.60	-	-	-	

VER 1.0 November 19, 2015





Termination (Medium Power, short-length)

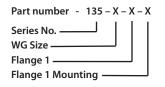
Series No: 135

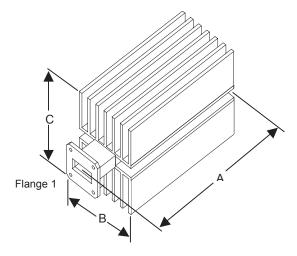
Part Description

UBS' standard product line of medium power terminations are constructed of normal wall waveguide tubing and extruded heat sink material. The load elements are custom ground silicon carbide spears tapered for an optimum VSWR response of 1.15 max.

Specifications

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

VSWR	< 1.15 max.	
		- H

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Notes

1. All dimensions are for reference only

2. Depending on waveguide size and power requirements, the termination may require a heatsink. If required, UBS will advise and quote the termination with the heatsink included

3. All heatsinks selected based on natural convection cooling. For Forced air cooling, contact factory

Size	Frequency GHz	D	imensior (inches)	ıs	Average Power
		A	В	с	Watts
WR28	26.50 - 40.00	3.00	2.30	3.40	50
WR34	22.00 - 33.00	3.00	2.30	3.40	50
WR42	18.00 - 26.00	3.00	2.30	3.40	80
WR51	15.00 - 22.00	3.00	2.30	3.40	100
WR62	12.40 - 18.00	3.00	2.30	3.40	150
WR75	10.00 - 15.00	4.00	2.30	3.40	80
WR90	8.20 - 12.40	5.00	2.30	3.40	150
WR112	7.05 - 10.00	5.00	2.30	3.40	250
WR137	5.85 - 8.20	5.00	2.30	3.40	350
WR159	4.09 - 7.05	5.00	2.30	3.40	300
WR187	3.95 - 5.85	5.50	2.30	3.40	450
WR229	3.30 - 4.90	6.00	2.30	3.40	300
WR284	2.60 - 3.95	7.50	2.30	3.40	500
WR340	2.20 - 3.30	-	-	-	700
WR430	1.70 - 2.60	-	-	-	450



Termination (High Power)

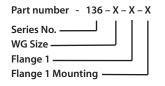
Series No: 136

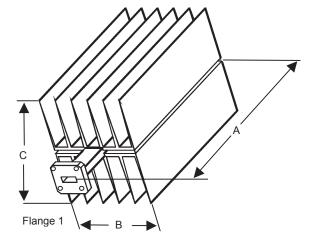
Part Description

UBS' standard product line of short length high power terminations are constructed similar to the medium power terminations.

Specifications

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

VSWR	< 1.10 max.	ľ
		- F

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Notes

1. All dimensions are for reference only

2. Depending on waveguide size and power requirements, the termination may require a heatsink. If required, UBS will advise and quote the termination with the heatsink included

3. All heatsinks selected based on natural convection cooling. For Forced air cooling, contact factory

Size	Frequency	Dimensions		Average	
	GHz		(inches)		Power
		A	В	С	Watts
WR28	26.50 - 40.00	5.00	2.30	3.40	50
WR34	22.00 - 33.00	5.00	2.30	3.40	75
WR42	18.00 - 26.00	5.00	2.30	3.40	150
WR51	15.00 - 22.00	5.00	2.30	3.40	110
WR62	12.40 - 18.00	5.00	2.30	3.40	200
WR75	10.00 - 15.00	8.00	5.20	5.15	200
WR90	8.20 - 12.40	8.00	5.20	5.15	225
WR112	7.05 - 10.00	8.00	5.20	5.15	425
WR137	5.85 - 8.20	8.00	5.20	5.15	500
WR159	4.09 - 7.05	9.00	5.20	5.15	625
WR187	3.95 - 5.85	9.50	5.20	5.15	750
WR229	3.30 - 4.90	1200	5.20	5.15	1000
WR284	2.60 - 3.95	13.00	5.20	5.15	1200
WR340	2.20 - 3.30	-	-	-	-
WR430	1.70 - 2.60	-	-	-	-



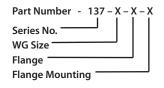
Termination (RAM)

Series No: 137

Part Description

Unique Broadband Systems offers a line of RAM terminations to mate with standard waveguide flanges. In addition to the popular standard flanges listed, UBS offers a more complete line of industry standard flange styles upon request.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CMR CPR (F, G)
Flange Mounting Holes	T1 - Through Holes T2 - THreaded A - Alternating

Electrical Specification

VSWR	≤ 1.925

Specifications

Size	Frequency GHz
WR28	26.50 - 40.00
WR34	22.00 - 33.00
WR42	18.00 - 26.00
WR51	15.00 - 22.00
WR62	12.40 - 18.00
WR75	10.00 - 15.00
WR90	8.20 - 12.40
WR112	7.05 - 10.00
WR137	5.85 - 8.20
WR159	4.09 - 7.05
WR187	3.95 - 5.85
WR229	3.30 - 4.90
WR284	2.60 - 3.95
WR340	2.20 - 3.30
WR430	1.70 - 2.60
WR650	1.12 - 1.70



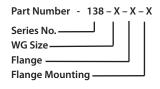
Termination (Ferrite)

Series No: 138

Part Description

Unique Broadband Systems offers a line of Ferrite terminations to mate with standard waveguide flanges. In addition to the popular standard flanges listed, UBS offers a more complete line of industry standard flange styles upon request.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CMR CPR (F, G)
Flange Mounting Holes	T1 - Through Holes T2 - THreaded A - Alternating

Electrical Specification

VSWR	<u>≤</u> 1.1
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Specifications

Size	Frequency GHz
WR28	26.50 - 40.00
WR34	22.00 - 33.00
WR42	18.00 - 26.00
WR51	15.00 - 22.00
WR62	12.40 - 18.00
WR75	10.00 - 15.00
WR90	8.20 - 12.40
WR112	7.05 - 10.00
WR137	5.85 - 8.20
WR159	4.09 - 7.05
WR187	3.95 - 5.85
WR229	3.30 - 4.90
WR284	2.60 - 3.95
WR340	2.20 - 3.30
WR430	1.70 - 2.60
WR650	1.12 - 1.70



WAVEGUIDE AND COAXIAL

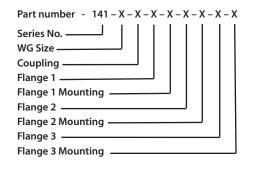
Broadwall Directional Coupler

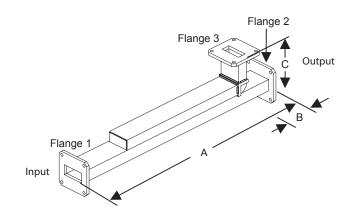
Series No: 141

Part Description

UBS offers a standard product line of multi-hole waveguide broadwall directional couplers covering waveguide sizes from WR-28 through WR-284. The optimum electrical characteristics of high directivity and coupling flatness are achieved utilizing a precision machined Tchebyscheff coupling hole distribution and a precision ground tapered load element in the secondary arm.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

VSWR	1.08 max. primary line 1.12 max. secondary line
Coupling	± 1.0 dB mean
Directivity	35 dB min.

Dimension Size Frequency (inches) GHz В А WR28 26.50 - 40.00 1.00 1.20 WR34 22.00 - 33.00 1.00 1.50 WR42 1.50 18.00 - 26.00 1.00 WR51 15.00 - 22.00 1.75 1.50 WR62 12.40 - 18.00 1.95 1.50 WR75 10.00 - 15.00 1.95 2.00 WR90 8.20 - 12.40 2.00 2.00 WR112 7.05 - 10.00 2.00 2.00 WR137 2.50 5.85 - 8.20 2.20 WR159 4.09 - 7.05 2.50 2.80 WR187 3.95 - 5.85 2.50 2.80 WR229 3.30 - 4.90 3.00 2.80 WR284 2.60 - 3.95 3.00 3.00

Coupling

Specifications

6,10, 20, 30, 40 and 50 dB

STANDARD FINISH: is electroless corrosion protection for the metal surface, plus "Admiralty Gray" epoxy top coat. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

VER 1.0 March 20, 2014





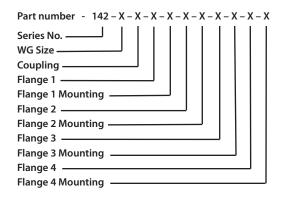
Dual Broadwall Directional Coupler

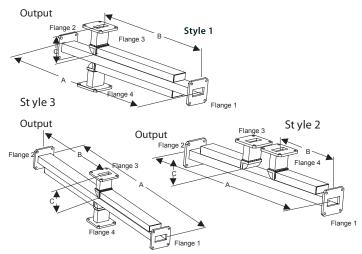
Series No: 142

Part Description

UBS offers a standard product line of dual arm multi-hole broadwall directional couplers covering waveguide sizes from WR-28 through WR-284 and configured similar to the single arm models.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

VSWR	1.08 max. primary line 1.15 max. secondary line
Coupling	± 1.0 dB mean
Directivity	35 dB min.

STANDARD FINISH: is electroless corrosion protection for the metal surface, plus "Admiralty Gray" epoxy top coat. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Specifications

Size	Frequency	Dimension (inches)
	GHz	С
WR28	26.50 - 40.00	1.20
WR34	22.00 - 33.00	1.50
WR42	18.00 - 26.00	1.50
WR51	15.00 - 22.00	1.50
WR62	12.40 - 18.00	1.50
WR75	10.00 - 15.00	2.00
WR90	8.20 - 12.40	2.00
WR112	7.05 - 10.00	2.00
WR137	5.85 - 8.20	2.50
WR159	4.09 - 7.05	2.80
WR187	3.95 - 5.85	2.80
WR229	3.30 - 4.90	2.80
WR284	2.60 - 3.95	3.00

Coupling

6,10, 20, 30, 40 and 50 dB



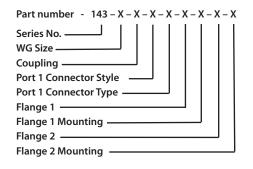
Broadwall Directional Coupler

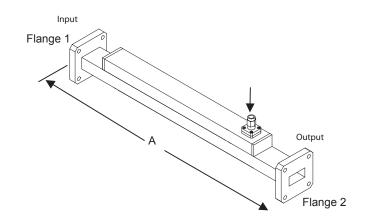
Series No: 143

Part Description

UBS offers a standard product line of multi-hole coax secondary broadwall couplers covering waveguide sizes from WR-28 through WR-284. The optimum electrical characteristics of high directivity and coupling flatness are achieved utilizing a precision machined Tchebyscheff coupling hole distribution and a precision ground tapered load element in the secondary arm.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE, CMR, CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Port Configuration

	SMA, N, 2.9 mm(K), 3.5 mm, 2.4mm
Connector Type	M - Male, F - Female

Electrical Specification

VSWR	1.08 max. primary line 1.30 max. secondary line
Coupling	± 1.0 dB mean
Directivity	35 dB min.

STANDARD FINISH: is electroless corrosion protection for the metal surface, plus "Admiralty Gray" epoxy top coat. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Specifications

Size	Frequency GHz
WR28	26.50 - 40.00
WR34	22.00 - 33.00
WR42	18.00 - 26.00
WR51	15.00 - 22.00
WR62	12.40 - 18.00
WR75	10.00 - 15.00
WR90	8.20 - 12.40
WR112	7.05 - 10.00
WR137	5.85 - 8.20
WR159	4.09 - 7.05
WR187	3.95 - 5.85
WR229	3.30 - 4.90
WR284	2.60 - 3.95

Coupling

6,10, 20, 30, 40 and 50 dB

Note

For 60 dB coupling, an attenuator will be used on coaxial port and coupling mean is ± 1.0 dB frequency response.





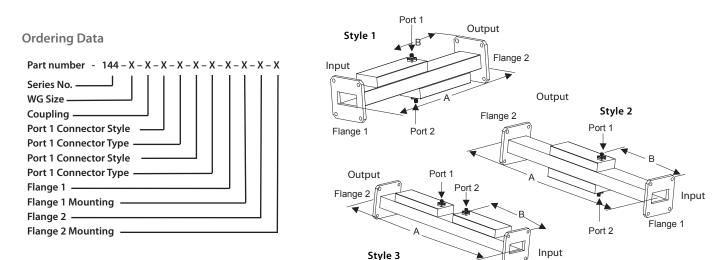
Dual Broadwall Directional Coupler

Coax Secondaries

Series No: 144

Part Description

UBS offers a standard product line of dual arm multi-hole coax dual directional couplers covering waveguide sizes from WR-28 through WR-284 and configured similar to the single arm models.



Specifications

Flange Configuration

Flange Type	C - Cover G - Groove CHOKE, CMR, CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Port Configuration (Style 3 Only)

Connector Style	SMA, N, 2.9 mm(K), 3.5 mm, 2.4mm
Connector Type	M - Male, F - Female

Electrical Specification

VSWR	1.08 max. primary line 1.30 max. secondary line
Coupling	± 1.0 dB mean ± 0.50 dB freq. response
Directivity	35 dB min.

Size	Frequency GHz
WR28	26.50 - 40.00
WR34	22.00 - 33.00
WR42	18.00 - 26.00
WR51	15.00 - 22.00
WR62	12.40 - 18.00
WR75	10.00 - 15.00
WR90	8.20 - 12.40
WR112	7.05 - 10.00
WR137	5.85 - 8.20
WR159	4.09 - 7.05
WR187	3.95 - 5.85
WR229	3.30 - 4.90
WR284	2.60 - 3.95

Flange 1

Coupling

10, 20, 30, 40 and 50 dB

Note

For Connector Style, contact factory for 2.9mm, 3.5mm, and 2.4mm

STANDARD FINISH: is electroless corrosion protection for the metal surface, plus "Admiralty Gray" epoxy top coat. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.



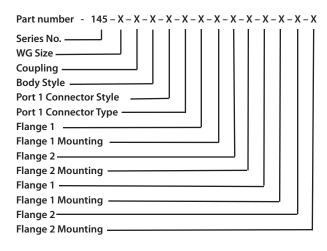
Cross Guide Coupler

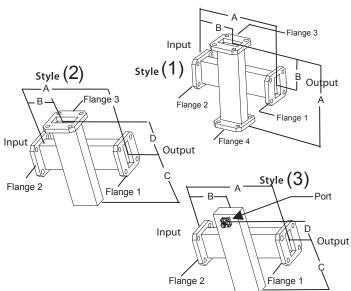
Series No: 145

Part Description

UBS directional crossguide couplers utilize an ultra-flat coupling technique that exhibits high power handling characteristics, while maintaining optimum electrical performance parameters over the full waveguide bandwidth.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE, CMR, CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Port Configuration (Style 3 Only)

	SMA, N, 2.9 mm(K), 3.5 mm, 2.4mm
Connector Type	M - Male, F - Female

Electrical Specification

VSWR	1.08 max. primary line 1.30 max. secondary line
Coupling	±1.0dB max for 10% of WG Band
Directivity	20 dB min.

STANDARD FINISH: is electroless corrosion protection for the metal surface, plus "Admiralty Gray" epoxy top coat. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Specifications

	_	Dimensions (inches)			
Size	Frequency GHz	Α	В	с	D
WR28	26.50 - 40.00	3.00	1.50	3.50	0.75
WR34	22.00 - 33.00	3.00	1.50	3.50	0.75
WR42	18.00 - 26.00	3.00	1.50	3.50	0.75
WR51	15.00 - 22.00	3.00	1.50	3.50	0.75
WR62	12.40 - 18.00	3.00	1.50	3.50	0.75
WR75	10.00 - 15.00	3.00	1.50	3.80	1.00
WR90	8.20 - 12.40	3.50	1.75	3.80	1.00
WR112	7.05 - 10.00	4.00	2.00	5.20	1.25
WR137	5.85 - 8.20	4.00	2.00	4.50	2.00
WR159	4.09 - 7.05	5.00	2.50	6.00	2.25
WR187	3.95 - 5.85	5.50	2.75	6.50	2.25
WR229	3.30 - 4.90	6.00	3.00	8.00	2.50
WR284	2.60 - 3.95	7.00	3.50	10.00	3.00

Coupling

20, 30, 40, 50 and 60 dB

Note

For connector style, contact factory for 2.9 mm(K), 3.5 mm, 2.4 mm



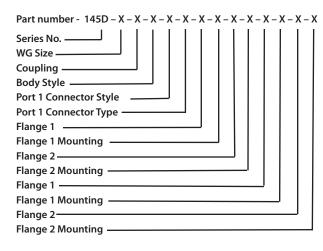
Dual Cross Guide Coupler

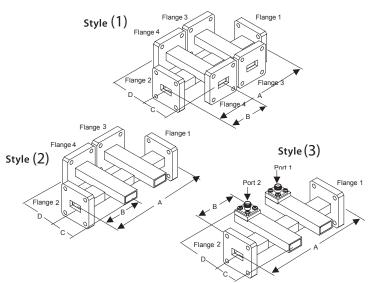
Series No: 145D

Part Description

UBS directional crossguide couplers utilize an ultra-flat coupling technique that exhibits high power handling characteristics, while maintaining optimum electrical performance parameters.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE, CMR, CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Port Configuration (Style 3 Only)

	SMA, N, 2.9 mm(K), 3.5 mm, 2.4mm
Connector Type	M - Male, F - Female

Electrical Specification

VSWR	1.08 max. primary line 1.30 max. secondary line
Coupling	±1.0dB max for 10% of WG Band
Directivity	20 dB min.

STANDARD FINISH: is electroless corrosion protection for the metal surface, plus "Admiralty Gray" epoxy top coat. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Specifications

	_	Dimensions (inches)			
Size	Frequency GHz	Α	В	с	D
WR28	26.50 - 40.00	3.00	1.50	3.50	0.75
WR34	22.00 - 33.00	3.00	1.50	3.50	0.75
WR42	18.00 - 26.00	3.00	1.50	3.50	0.75
WR51	15.00 - 22.00	3.00	1.50	3.50	0.75
WR62	12.40 - 18.00	3.00	1.50	3.50	0.75
WR75	10.00 - 15.00	3.00	1.50	3.80	1.00
WR90	8.20 - 12.40	3.50	1.75	3.80	1.00
WR112	7.05 - 10.00	4.00	2.00	5.20	1.25
WR137	5.85 - 8.20	4.00	2.00	4.50	2.00
WR159	4.09 - 7.05	5.00	2.50	6.00	2.25
WR187	3.95 - 5.85	5.50	2.75	6.50	2.25
WR229	3.30 - 4.90	6.00	3.00	8.00	2.50
WR284	2.60 - 3.95	7.00	3.50	10.00	3.00

Coupling

20, 30, 40, 50 and 60 dB

Note

For connector style, contact factory for 2.9 mm(K), 3.5 mm, 2.4 mm



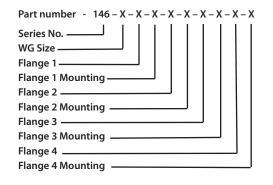
Magic Tee

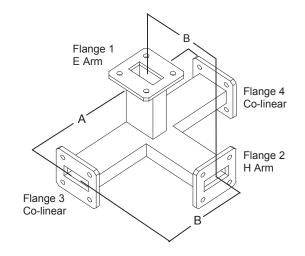
Series No: 146

Part Description

Unique Broadband Systems offers a standard product line of isolated four-port hybrid power dividers covering waveguide sizes from WR-28 through WR-340.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

VSWR	1.3 nom.
	1.5 max.

Isolation

E to H	30 dB min.
Co-Linear	15 dB min.
Power Split Variation	+/- 0.3 dB

STANDARD FINISH: is electroless corrosion protection for the metal surface, plus "Admiralty Gray" epoxy top coat. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Specifications

Size	Frequency		nsion hes)
	GHz	Α	В
WR28	26.50 - 40.00	2.50	1.25
WR34	22.00 - 33.00	2.50	1.25
WR42	18.00 - 26.00	2.50	1.25
WR51	15.00 - 22.00	2.50	1.25
WR62	12.40 - 18.00	2.50	1.25
WR75	10.00 - 15.00	2.50	1.25
WR90	8.20 - 12.40	2.50	1.25
WR112	7.05 - 10.00	3.50	1.25
WR137	5.85 - 8.20	4.50	2.25
WR159	4.09 - 7.05	5.00	2.50
WR187	3.95 - 5.85	5.00	2.50
WR229	3.30 - 4.90	6.00	3.00
WR284	2.60 - 3.95	6.00	3.00
WR340	2.20 - 3.30	-	-

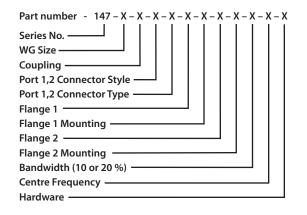


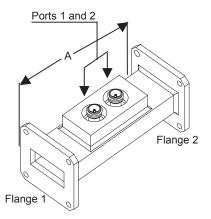
Loop Coupler Series No: 147

Part Description

UBS series of waveguide loop couplers offers a new dimension in high directivity couplers. They are available over a coupling range of 30-70 dB. These couplers are engineered to perform with a minimum of waveguide length making them the smallest of any waveguide couplers available.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE, CMR, CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Port Configuration

Connector Style	SMA, N, 2.9 mm(K), 3.5 mm, 2.4mm
Connector Type	M - Male, F - Female

Electrical Specification

VSWR - Mainline	1.05 max
Coupling	\pm 1dB max for 20% of WG Band
Directivity	30 dB typ. for 10% of WG Band 25 dB typ. for 20% of WG Band

STANDARD FINISH: is electroless corrosion protection for the metal surface, plus "Admiralty Gray" epoxy top coat. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Specifications

Size	Frequency GHz	Dimension (inches) A
WR90	8.20 - 12.40	2.50
WR102	7.00 - 11.00	2.50
WR112	7.05 - 10.00	2.50
WR137	5.85 - 8.20	3.50
WR159	4.09 - 7.05	3.50
WR187	3.95 - 5.85	3.50
WR229	3.30 - 4.90	5.00
WR284	2.60 - 3.95	5.00
WR340	2.20 - 3.30	-
WR430	1.70 - 2.60	5.00
WR650	1.12 - 1.70	-

Coupling

30 dB, 40 dB, 50 dB, 60 dB and 70 dB



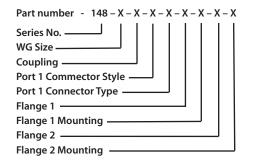
Power Samplers

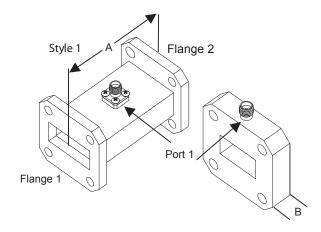
Series No: 148

Part Description

Unique Broadband Systems power samplers offers a low cost approach to monitoring power in matched waveguide systems where high directi-vity is not a concern. Standard coupling values are available from 20 dB to 90 dB with coupling flatness maintained at +/- 1.0 dB.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE, CMR, CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Port Configuration

Connector Style	SMA, N, 2.9 mm(K), 3.5 mm, 2.4mm
Connector Type	M - Male, F - Female

Electrical Specification

Specifications

		Dimensio	on (inches)
Size	Frequency GHz	A	В
WR28	26.50 - 40.00	2.00	0.75
WR34	22.00 - 33.00	2.00	0.75
WR42	18.00 - 26.00	2.00	0.75
WR51	15.00 - 22.00	2.00	0.75
WR62	12.40 - 18.00	2.00	0.75
WR75	10.00 - 15.00	2.00	0.75
WR90	8.20 - 12.40	2.00	0.75
WR112	7.05 - 10.00	2.00	0.75
WR137	5.85 - 8.20	2.50	0.75
WR159	4.09 - 7.05	2.50	-
WR187	3.95 - 5.85	3.00	-
WR229	3.30 - 4.90	3.00	-
WR284	2.60 - 3.95	3.00	-

STANDARD FINISH: is electroless corrosion protection for the metal surface, plus "Admiralty Gray" epoxy top coat. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Coupling

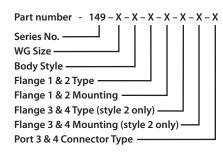
30 to 40dB



MMDS Quadrature Hybrid

Series No: 149

Ordering Data



Specifications

Frequency Bandwidth	2.5 to 2.7 GHz
VSWR	1.25:1 max.
Insertion Loss	0.25 dB typ.
Isolation	18 dB max.
Unbalance	+/- 0.25 dB

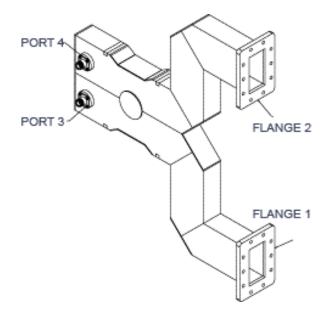
Flange Configuration

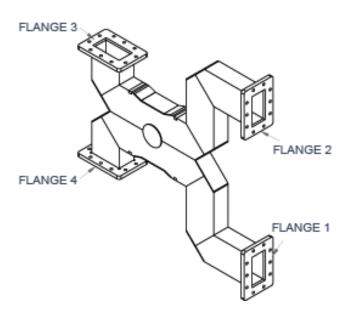
Flange Type	C - Cover G - Groove CHOKE CMR CPR (F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Port Configuration

Connector Style	N-Type, 7/16 DIN-Type, 7/8 EIA
Connector Type	M - Male, F - Female

STANDARD FINISH: is electroless corrosion protection for the metal surface, plus "Admiralty Gray" epoxy top coat. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.







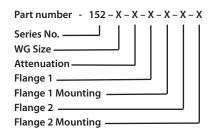
Fixed Attenuator

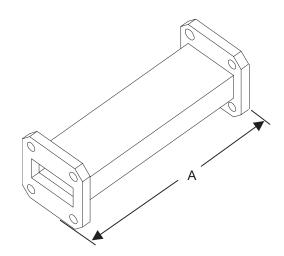
Series No: 152

Part Description

UBS offers a series of rectangular waveguide precision attenuators covering waveguide sizes from WR-28 through WR-284. The assembly construction includes a precision ground observing elements for optimum electrical performance. Attenuation flatness is +/- 0.5 dB over the 30% bandwidth and +/- 1.5 dB Full Band. The max. power rating for all waveguide sizes is 1 watt WR-28 to WR-62.

Ordering Data





Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

Attenuation	1 - 60 dB	
VSWR	< 1.10 max.	

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Size	Frequency GHz	Minimum Dimension
WR28	26.50 - 40.00	2.00
WR34	22.00 - 33.00	2.00
WR42	18.00 - 26.00	2.00
WR51	15.00 - 22.00	2.50
WR62	12.40 - 18.00	2.50
WR75	10.00 - 15.00	3.00
WR90	8.20 - 12.40	3.00
WR112	7.05 - 10.00	3.50
WR137	5.85 - 8.20	3.50
WR159	4.09 - 7.05	3.50
WR187	3.95 - 5.85	4.00
WR229	3.30 - 4.90	4.00
WR284	2.60 - 3.95	4.00



Waveguide Bulkhead Feed Assembly

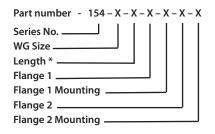
Series No: 154

Part Description

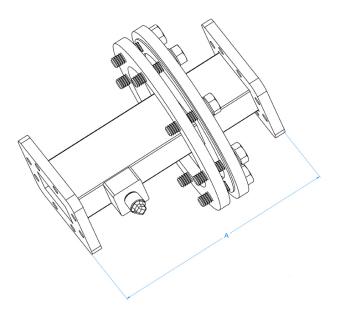
The 154 series Waveguide Bulkhead Feed Assembly was designed for use as a wall feed-through in assemblies. A gasket is provided on the panel mount side for weather resistance and the adapter is finished in a baked enamel paint .

These adapters operate over the full waveguide bandwidths and are available for WR75 to WR137 waveguide sizes. Standard lengths are 5.00 inches with custom lengths and a wide variety of flange types available upon request.

Ordering Data



* Customer requested Length (contact Sales for more information)



Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Size	Frequency (GHz)	Length (inches)
WR75	10.00 - 15.00	5.00
WR90	8.20 - 12.40	5.00
WR112	7.05 - 10.00	5.00
WR137	5.85 - 8.20	5.00



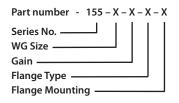
Horn Antenna Series

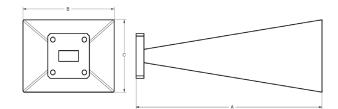
Series No: 155

Part Description

UBS offers a series of precision horn antennas covering waveguide sizes from WR-28 through WR-650. The assembly construction includes precision ground observing elements for optimum electrical performance.

Ordering Data





Flange Configuration

C - Cover
G - Groove
CHOKE
CMR
CPR
CPR(F, G)
T1 - Through Holes
T2 - Threaded
A - Alternating

Electrical Specification

VSWR	1.15 max.
Gain	10 dB, 15 dB, 20 dB
Gain Variance	± 2.0 dB

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Size	Frequency GHz	Dimensions (inches)								
		10 dB		15 dB		20 dB				
		Α	В	с	Α	В	с	A	В	с
WR28	26.50 - 40.00									
WR34	22.00 - 33.00									
WR42	18.00 - 26.00	1.24	0.62	0.43	2.35	1.15	0.84	4.09	2.13	1.56
WR51	15.00 - 22.00									
WR62	12.40 - 18.00	1.15	1.10	0.62	2.41	1.67	1.32	5.92	2.88	2.11
WR75	10.00 - 15.00	1.95	1.62	0.93	4.65	2.23	1.32	8.32	4.04	2.97
WR90	8.20 - 12.40	2.07	1.51	1.12	5.44	2.63	1.92	10.2	5.16	3.75
WR112	7.05 - 10.00									
WR137	5.85 - 8.20	3.12	2.03	1.44	6.53	3.45	2.51	12.33	6.71	4.70
WR159	4.09 - 7.05									
WR187	3.95 - 5.85									
WR229	3.30 - 4.90									
WR284	2.60 - 3.95									
WR340	2.20 - 3.30									
WR430	1.70 - 2.60									
WR650	1.12 - 1.70									

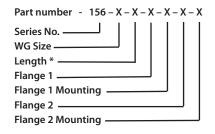


DC Block Series No: 156

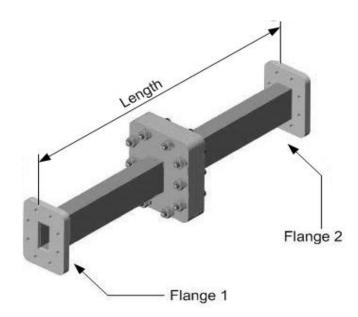
Part Description

UBS offers a series of DC Blocks covering waveguide sizes from WR-28 through WR-650. The assembly construction includes precision ground elements for optimum electrical performance.

Ordering Data



* Customer requested Length (contact Sales for more information)



Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Electrical Specification

VSWR	1.15 max.
Insertion Loss	0.15 dB max.

STANDARD FINISH: is electroless corrosion protection for the metal surface. Non standard configurations and finishes (Silver, Nickel, Cadmium plating) are available upon request. Waveguide sizes up to WR-650 available. Contact our sales department with your requirements.

Specifications

Size	Frequency GHz	с	G	CHOKE	CMR	CPR
WR28	26.50 - 40.00	•	•	•		
WR34	22.00 - 33.00	•	•	•		
WR42	18.00 - 26.00	•	•	•		
WR51	15.00 - 22.00	•	•	•		
WR62	12.40 - 18.00	•	•	•		
WR75	10.00 - 15.00	•	•	•	•	•
WR90	8.20 - 12.40	•	•	•	•	•
WR112	7.05 - 10.00	•	•	•	•	•
WR137	5.85 - 8.20	•	•	•	•	•
WR159	4.09 - 7.05	•	•	•	•	•
WR187	3.95 - 5.85	•	•	•	•	•
WR229	3.30 - 4.90	•	•	•	•	•
WR284	2.60 - 3.95	•	•	•	•	•
WR340	2.20 - 3.30	•	•	•	•	•
WR430	1.70 - 2.60	•	•	•	•	•
WR650	1.12 - 1.70	•	•	•	•	•



Waveguide and Coaxial Components

Filters, Couplers, Combiners and Power Dividers

DAB L-Band Dual-Mode Bandpass Filters S-Band Dual Mode Bandpass Filters 18 GHz Dual Mode Bandpass Filters UHF DTV Bandpass Filters Combline Bandpass Filters Waveguide Bandpass Filters Waveguide Bandstop (Notch) Filters Harmonic Reject Filters DR Ceramic Filters MMDS Directional Channel Filters/Combiners 18 GHz/27 GHz Semi-Adjacent Multi-Channel Combiners

> UHF Loop Coupler Triple Arm Coaxial Coupler UHF High-Power (Quadrature) Hybrid

L-Band 6-Way Radial Combiner Broadband Wilkinson Combiners/Dividers 2-way Low Power Divider 2-way High Power Divider



Filter, Coupler, Combiner and Power Divider Product Specifications



DAB L-Band Dual-Mode Bandpass Filter

Product Features

- Low loss
- High power (Up to 2 kW)
- Compact dual-mode design
- Invar construction for stable performance
- Compliant with Eureka 147 mask specifications



Overview

UBS' DAB L-band bandpass filters are custom designed for channelized applications requiring high levels of rejection near the operating band of interest.

The cavities are fabricated from Invar to provide excellent temperature stability and are silver plated for low loss.

Our DAB L-Band filters have been designed to meet the Eureka 147 mask specifications.

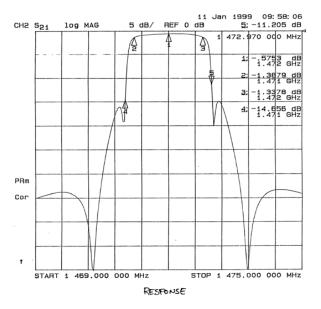
Available models include; four, six and eight-pole dual mode designs.

L-Band Filter Specifications

Center Frequency	1452 MHz - 1492 MHz
Insertion Loss: at Center Frequency at ±0.77 MHz	0.7 dB max 1.0 dB max.
Rejection at ± 1.8 MHz	30 dB min.
VSWR	1.20:1
Average Power Handling	Up to 2 kW (connector dependent)
Connectors	7/16 DIN-type, 7/8' or 5/8'
Dimensions	17" (L) x 9" (OD) (excludes connectors)

(specifications are subject to change without notice)

Typical Frequency Response



General Filter Specifications

Center Frequency	2 to 20 GHz
Number of Cavities	2 to 4
Passband	2 MHz to 30 MHz
Insertion Loss	0.3 to 1.2 dB typ.
Rejection	Consult Factory
Input/Output Ports	Coaxila Connectors or WG flanges

VER 2.0 November 25, 2009

Head Office - 400 Spinnaker Way - Vaughan - Ontario - Canada - L4K 5Y9 - Tel: 905 669 8533 - North America Toll Free: 1 877 669 8533 - www.uniquesys.com - Email: sales@uniquesys.com



S-Band Dual-Mode Bandpass Filter

Product Features

- Low loss
- High power (Up to 3 kW)
- Compact dual-mode design
- Invar construction for stable performance
- Compliant with FCC mask specifications



Overview

UBS Dual Mode filters are custom designed for channelized applications requiring high levels of rejection near the operating band of interest.

The cavities are fabricated from Invar to provide excellent temperature stability and are silver plated for low loss.

Our DARS S-Band filters have been designed to meet the FCC mask requirements for Digital Audio Radio Service Systems.

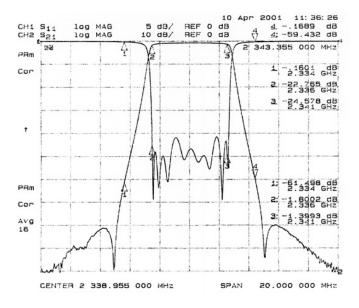
Available models include; four, six and eight-pole dual mode designs.

S-Band Filter Specifications

Center Frequency	2300 MHz - 2345 MHz
Insertion Loss at Center Frequency at ±2.53 MHz	0.85 dB max. 1.6 dB max.
Rejection at ±1.8 MHz	38 dB min.
VSWR	1.20:1
Average Power Handling	Up to 3 kW
Connectors	WR340
Dimensions	38"L x 8"OD (excludes iris)

(specifications are subject to change without notice)

Typical Frequency Response



General Filter Specifications

Center Frequency	2 to 20 GHz
Number of Cavities	2 to 4
Passband	2 MHz to 30 MHz
Insertion Loss	0.3 to 1.2 dB typ.
Rejection	Consult Factory
Input/Output Ports	Coaxila Connectors or WG flanges

VER 2.0 November 25, 2009



18 GHz Dual-Mode Bandpass Filter

Product Features

- Low loss
- Compact dual-mode design
- Invar construction for stable performance



Overview

UBS Dual-Mode filters are custom designed for channelized applications requiring high levels of rejection near the operating band of interest.

The cavities are fabricated from Invar to provide excellent temperature stability and are silver plated for low loss.

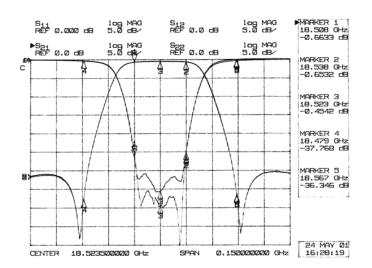
Available models include; four, six and eight-pole dual mode designs.

18 GHz Filter Specifications

Center Frequency	18,508 MHz - 18,567 MHz
Insertion Loss: at Center Frequency at ±15 MHz	0.8 dB max. 1.0 dB max.
Rejection at ±45 MHz	30 dB min.
VSWR	1.20:1
Average Power Handling	20 W (higher power versions also available)
Connectors	WR51
Dimensions	2.7" (L) x 1.5" (OD)

(specifications are subject to change without notice)

Typical Frequency Response



General Filter Specifications

Center Frequency	2 to 20 GHz
Number of Cavities	2 to 4
Passband	2 MHz to 30 MHz
Insertion Loss	0.3 to 1.2 dB typ.
Rejection	Consult Factory
Input/Output Ports	Coaxila Connectors or WG flanges

VER 2.0 November 25, 2009



UHF DTV Bandpass Filter

Model: 8CF-8-500

Product Features

- 500 Watt maximum input power
- Chebyshev response
- DTV non-critical mask applications
- 19" rack mountable
- Very compact and lightweight



Description and Application

UBS offers a line of compact, low-loss bandpass filters for analogue and DTV system applications.

The filter is designed in combline filter technology for small size, and consists of 8 screened resonators for effective spurious suppression. The inductive couplings between the resonators permit low operating voltages within the filter. The resonators are silver-plated for low insertion loss.

The filters are constructed from lightweight aluminum that provides solid mechanical and temperature stability, and come complete with the necessary hardware and test data.

Product Specifications

Center Frequency Range	Tunable from 470 MHz - 860 MHz
Passband width	8 MHz
Type of Electrical Response	Bandpass Chebyshev
Number of Poles	8
Material	Aluminum
Interface	7/16 DIN-type
Technology	Screened combline resonators in rectangular cavities
VSWR	1:1.23 typ.
Insertion Loss Fc = 10.0 MHz	0.85 dB @ Fc 2.3 dB @ Fc ±4 MHz
Rejection	60 dB @ Fc ±8 MHz
Group Delay variation across passband (peak-to-peak)	375380 ns
Size	8" x 5"" x 15" (without tuning screws and connectors)
Weight	9 kg
Power	500 Watts

(specifications are subject to change without notice)



Combline Bandpass Cavity Filter

Product Features

- Direct-coupled resonator design
- Very good rejection and spurious characteristics
- Low pass band insertion loss
- Lightweight, compact and economical
- Robust construction

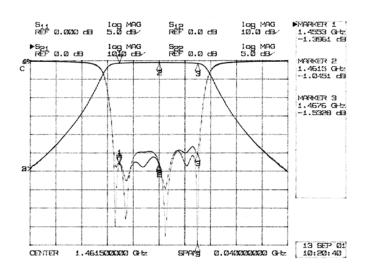


Overview

UBS Combline filter designs incorporate high "Q" structures enabling the realization of high skirt selectivity and very low pass-band insertion loss. This makes them ideally suited for critical receiver front-end or transmitter applications. Increased selectivity is accomplished by the addition of more resonators to the design.

The filter housing is generally made from lightweight aluminum and may be silver-plated for improved electrical characteristics. Temperature related frequency shifting is minimized through the use of proprietary design techniques and strict process control. UBS Combline filters are available from 2 to 14 resonator sections with bandwidths up to 30% and operating frequencies from 1GHz to 18 GHz. Please consult our sales department for further details.

Typical Frequency Response



Product Specifications

Frequency Range	1 GHz - 18 GHz
Available Bandwidth	Up to 30%
Insertion Loss	0.5 dB – 2.0 dB (dependant on # of sections)
Stop Band Attenuation	Consult Factory
Number of Resonator Sections Available	2 to 14
VSWR	1.50:1 (Standard) 1.20:1 (Premium)
Connectors	SMA or N-type
Dimensions	Consult Factory

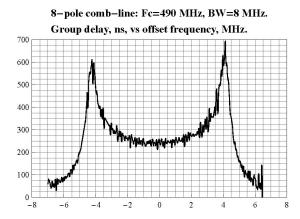
(specifications are subject to change without notice)

UHF DTV Bandpass Filter

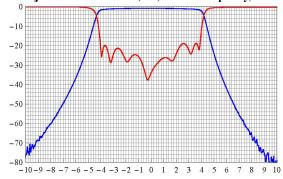


Sample Measurement

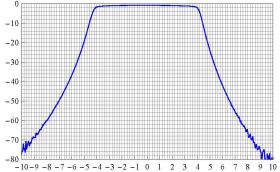
Parameter	486 MHz - 494 MHz
Center Frequency (Fc)	490 MHz
Passband width	8 MHz
Insertion Loss	0.82 dB @ Fc 2.28 dB @ Fc ±4 MHz
Return Loss	20 dB typ. 18.5 dB worst case



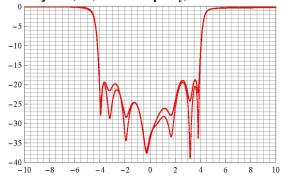
8-pole comb-line filter: Fc=480 MHz, BW=8 MHz. Rejection and return loss, dB, vs offset frequency, MHz.



8-pole comb-line filter: Fc=490 MHz, BW=8 MHz. Rejection, dB, vs offset frequency, MHz.



8-pole comb-line filter: Fc=490 MHz, BW=8 MHz. Rejection, dB, vs offset frequency, MHz.



VER 1.0 November 26, 2009



Waveguide Bandpass Filter

Product Features

- Wide range of waveguide sizes
- Excellent out-of-band rejection
- Low pass band insertion loss



Overview

Our bandpass filters exhibit excellent out-of-band rejection while maintaining a very low pass-band insertion loss. This makes them ideally suited for critical receiver front-end or transmitter applications. Increased selectivity is simply accomplished by the addition of more resonator sections to the design. Our designs can incorporate 2 to 17 resonator sections to satisfy the most stringent requirements.

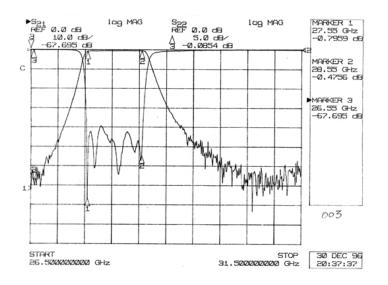
Available construction material includes bronze, aluminum or invar and may be folded to comply to a specified mechanical configuration. Please consult our sales department for further details.

Product Specifications

Frequency Range	1.14 GHz – 40 GHz
Available Bandwidth	Up to 12%
Insertion Loss	0.5 dB – 2.0 dB (dependant on # of sections)
Stop Band Attenuation	Consult Factory
Number of Resonator Sections Available	2 to 17
VSWR	1.50:1
Connectors	WR28 to WR650
Dimensions	Consult Factory

(specifications are subject to change without notice)

Typical Frequency Response



VER 2.0 November 25, 2009



Waveguide Bandstop (Notch) Filter

Product Features

- Wide range of waveguide sizes
- High bandstop rejection
- Low pass band insertion loss



Overview

UBS offers bandstop filters in available waveguide sizes from WR28 to WR650 covering the frequency spectrum from 1.14 GHz to 40 GHz.

Our bandstop designs exhibit high notch attenuation while maintaining low pass-band insertion loss. Increased notch attenuation is simply accomplished by the addition of more resonator sections to the design. Our designs can incorporate 3 to 11 resonator sections to satisfy the most stringent requirements.

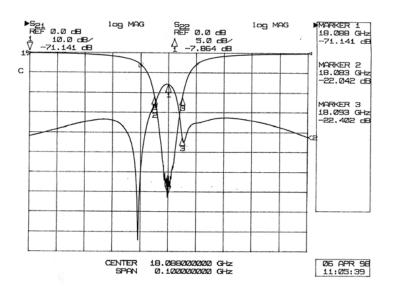
Available construction material includes bronze, aluminum or invar. Please consult our sales department for further details.

Product Specifications

Frequency Range	1.14 GHz – 40 GHz
Available Bandwidth	Up to 12%
Insertion Loss	0.5 – 2.0 dB (dependant on # of sections)
Stop Band Attenuation	Consult Factory
Number of Resonator Sections Available	3 to 11
VSWR	1.30:1
Connectors	WR28 to WR650
Dimensions	Consult Factory

(specifications are subject to change without notice)

Typical Frequency Response



VER 2.0 November 25, 2009



Harmonic Reject Filter

Product Features

- Wideband spurious free performance
- Excellent harmonic suppression
- Low pass band insertion loss
- Evanescent-Mode ridged waveguide design
- Integrated waveguide-to-coax adapters



Overview

UBS Harmonic Reject filters are designed for wideband applications requiring low pass-band insertion loss and high harmonic stopband rejection. The design incorporates cost-saving integrated waveguide-to-coax adapters for connectorized applications. Designs with waveguide flanges are also available.

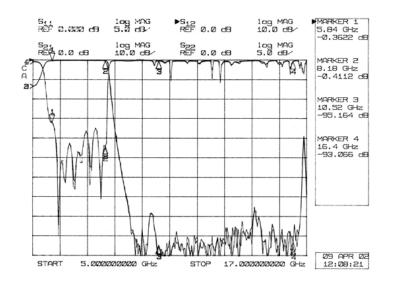
The illustration and specifications shown herein are for a full WR-137 band harmonic reject filter. Other full waveguide band designs are also available with bandwidths ranging from 10-100% of the waveguide frequency range. Please consult our sales department to discuss your specific application.

Product Specifications

Pass Band Frequency	5.85 GHz - 8.2 GHz (other bands available)
Pass Band Insertion Loss	0.3 dB max. (0.2 dB typ.)
Stop Band Frequency	10.5 GHz - 16.4 GHz
Stop Band Attenuation	> 70 dB
VSWR	1.40:1 (full band)
Connectors	SMA, N-type or WG
Dimensions	7.3" x 1.8" x 1.2" (excludes connectors)

(specifications are subject to change without notice)

Typical Frequency Response



VER 2.0 November 26, 2009



Dielectric Resonant Filter

Product Features

- Low loss filter design
- Robust and compact
- High RF Power handling capacity
- Low pass-band frequency drift



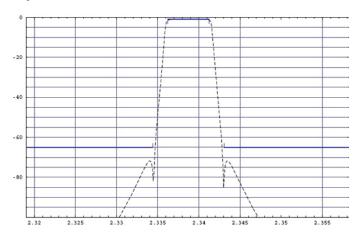
Overview

The high performance Dielectric Resonant band-pass filter is based on coupled cavities design and has exceptional performance characteristics. A key quality is its ability to provide significant out-of-band attenuation in very close proximity to the filter's pass-band, while providing a low loss path for the transmit signal.

The output filter is robust and compact. The High-Q values of the ceramic materials permit the use of small cavity structures keeping the weight and size of the filter to a minimum. The ceramic materials are also very stable in relation to temperature, resulting in minimal frequency shifting over a broad temperature range.

Typical Frequency Response

Rejection, dB



Product Specifications

Center Frequency of pass band	2326.25 MHz
Bandwidth	4.012 MHz
Insertion Loss at Band Edges (Fc ± 2.006 MHz)	1.2 dB max.
Attenuation:	
Fc ± 2.5 MHz	3 dB
Fc ± 3.0 MHz	23 dB
Fc ± 3.5 MHz	38 dB
$Fc \pm 4.5 MHz$	48 dB
$Fc \pm 5.5 MHz$	74 dB
$Fc \pm 6.5 MHz$	80 dB
Fc ± 7.0 MHz	85 dB
Fc ± 10.0 MHz	100 dB
VSWR	1.20:1
Input Power	300 W (avg.)
(referenced at input port)	1000 W (pk.)
Connectors	7/16 DIN-type (F)
Operating Temperature	55 ° C to -25 ° C

(specifications are subject to change without notice)

VER 2.0 November 25, 2009



MMDS Directional Channel Filter/Combiner

Product Features

- Semi-adjacent/adjacent channel applications
- Analog/Digital ready MMDS Systems
- High channel isolation
- Low pass band insertion loss
- Easy installation



Description and Application

UBS offers a line of directional, semi-adjacent and adjacent channel filter/combiners for both analog and digital MMDS system applications. The analog version consists of three resonator filter sections, while the digital ready version incorporates four.

The channel filter/combiner is used to cascade the output of several transmitters into a common waveguide (transmission line) while providing protection to the transmitters against transmission line mismatches.

The filters can be used to add transmitters to an existing network or can be configured to combine up to 16 arbitrary nonadjacent channels or up to 31 adjacent channels.

The filters are constructed from lightweight aluminum for easy installation and come complete with the necessary hardware and test data.

Product Specifications

Standard Frequency	2500 MHz - 2686 MHz (2 GHz - 4 GHz available)
Insertion Loss (transmitter-to-antenna port)	< 0.8 dB (semi-adjacent analog combiner) < 1.0 dB (semi-adjacent digital ready combiner) < 1.5 dB video carrier (adjacent combiner) < 2.0 dB audio carrier (adjacent combiner)
VSWR	< 1.25:1 (transmitter port) < 1.10:1 (waveguide input port)
Channel Isolation	30 dB (semi-adjacent analog combiner) 45 dB (semi-adjacent digital ready combiner)
Channel Formats	NTSC, PAL, SECAM
Connectors	N-type Female (transmitter port) CPR340 (waveguide port)
Operating Temperature	10 ℃ to 32 ℃

**Additional Loss due to transit through multiple channels is approximately 0.025 dB per channel combiner.

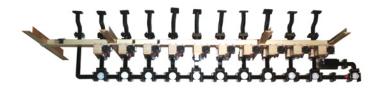
(specifications are subject to change without notice)



18 GHz / 27 GHz Semi-Adjacent Multi-Channel Combiner

Product Features

- Low loss, high power design
- Excellent output VSWR
- Complete integral system



Overview

The UBS Multi-Channel Combiner is designed for terrestrial point-to-multipoint and satellite systems providing analog and/ or digital services.

The combiner network comes complete with all necessary hardware including dual-mode channel filters, channel circulators, electro-mechanical shorting switches (for redundant agile configurations), RF output monitoring port and a wideband high power output isolator for protection against high load VSWR conditions.

Product Specifications

Frequency	18 GHz / 27 GHz
Insertion Loss**	1.0 dB
Output VSWR	1.2:1
Channel Isolation	> 30 dB
Transmitter / Antenna Interface	WR42 or WR51 for 18 GHz Combiner WR28 or WR34 for 27 GHz Combiner
Power Handling	20 Watts (higher power versions available)

**Additional loss due to transit through multiple channels is approx. 0.3 dB per channel.

(specifications are subject to change without notice)



UHF Loop Coupler

Product Features

- Standard interface: 1-5/8" connector at the primary ports, SMA connector at the (coupled) ports
- 1 kW maximum power at the primary ports
- Operating temperature range of -15°C to +60°C
- 50 ohm nominal impedance
- Custom options include special coupling values and frequency ranges, alternate connector styles, coupling configurations and plating methods



Description and Application

UBS designs and manufactures a variety of directional couplers optimized for accurate power measurements in air-line coaxial transmission lines.

The series of UHF couplers covers all DTV channels from 470 MHz to 860 MHz. They are ideally suited for DTV and wireless applications by virtue of their high power capability, lowest insertion loss, high directivity and excellent matching with the prime line.

The available from stock couplers include models to cover the entire frequency range of 470 MHz to 860 MHz, as well as specialized models perfected for a particular set of DTV channels. These models are available in a single-probe configuration (for monitoring the power flow in one direction) and a dual-probe configuration (for sampling both incident and reflected power), for the standard coupling values of 30 dB, 40 dB and 50 dB.

Product Specifications

Frequency Range	ATSC DTV channles: 18 (494 MHz - 500 MHz) 45 (656 MHz - 662 MHz) 73 (824 MHz - 830 MHz)
Configuration	Dual-probe, external terminations, non-silver plated
Maximum Power (at a primary port)	1 kW
Return Loss (at a primary port)	> 25 dB
Directivity	> 30 dB
Coupling	50 dB
Dimensions (with connectors)	10" × 4.5" × 2.6"
Weight	2 kg
Interface: Primary Line Coupled Ports	Connector: 1-5/8" Connector: SMA

(specifications are subject to change without notice)

Ordering Information

LCC-X1-X2-X3-X4-X5-X6

- X1 Nominal coupling value (dB)
- X2 Lower operating frequency (MHz)
- X2 Upper operating frequency (MHz)
- X4 Number of probes (1 for a single-probe, 2 for a dual-probe)
- X5 (for custom connector) Primary port connector
- X6 (for custom connector) Coupled (probe) port connector

VER 1.1 November 25, 2009



Triple Arm Coaxial Coupler

Product Features

- High power handling capability
- Rugged mechanical design



Product Specifications

Operating Frequency	2.0 GHz - 3.0 GHz
Continous Power Handling	400 Watts
Capacity	
VSWR Main Line Output	1.15:1
VSWR Coupled Ports	1.2:1
Directivity	25 dB min.
Coupling ports Accuracy	± 0.5 dB max
Input/Output ports	7/16 DIN-type (F) (other options available)
Coupled Ports	SMA (F)
Dimensions (L x W x H)	5.35" x 2.10" x 1.80"

(specifications are subject to change without notice)

VER 1.1 November 25, 2009



UHF High-Power (Quadrature) Hybrid

Product Features

- Adjacent and crossover configurations
- Equipped with 7/16" DIN connectors; custom connector styles are possible
- Can be supplied with a built-in bidirectional 60 dB coupler for power monitoring and VSWR alarms
- Power rating of 500 Watts
- 50 ohm impedance



Description and Application

A hybrid, or 3-dB 90-degree directional coupler is one of the core devices in microwave and wireless networks. It can be used to produce power combiners/dividers, directional filters, attenuators, phase shifters, and for a variety of other demanding purposes.

The UHF hybrid coupler from UBS covers a frequency range of 470 MHz to 860 MHz. The robust and reliable single-section stripline design provides excellent impedance match at all ports, superior amplitude and phase balance, low dissipative loss, and has been specifically optimized for power levels up to 500 Watts.

Product Specifications

Frequency Range	470 MHz - 860 MHz
Configuration	Crossover hybrid, external matched load
Maximum Power	500 Watts
Return Loss (at the input port)	30 dB min.
Directivity	29 dB min.
Amplitude Balance	±0.26 dB
Phase Balance	±1.4°
Dimensions (without connectors)	2.25" x 2.1" x 6.9"
Interface	Connectors: 7/16"

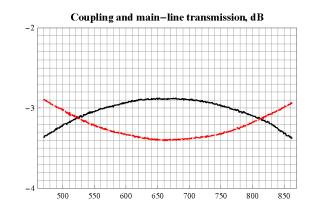
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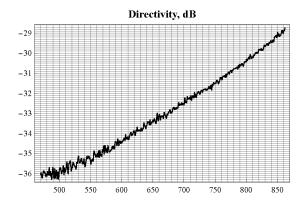
UHF High-Power (Quadrature) Hybrid



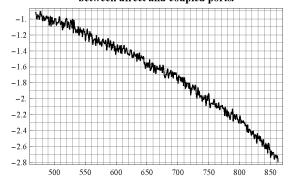
Product Specifications (specifications are subject to change without notice)







Phase unbalance, deg, between direct and coupled ports.



VER 1.2 November 25, 2009



L-Band 6-Way Radial Combiner

Product Features

- 2, 4, 6 or 8 collecting (input) ports; other combining orders are possible
- 0.5 kW maximum input power
- 1-5/8" or 7/8" connectors at the common port, 7/16" or N-type connectors at the collecting ports
- 19" rack mountable, easy installation
- Designed to cover T-DAB and S-DAB bands
- Custom designs can be developed to meet specific electrical and mechanical requirements



Description and Application

The UBS L-band radial power combiners present a unique blend of reliability and high power handling capability in a compact housing.

Radial combiners, by their nature, tend to be very efficient for summing a large number of amplifiers. The analysis technique employed at UBS allows for very accurate prediction and careful optimization of combiner performance.

A superior mechanical design provides an excellent electrical symmetry thus improving their amplitude and phase stability. All this ensures that UBS' radial combiners have low insertion loss, excellent amplitude and phase balance over a wide frequency range, as well as graceful degradation characteristics.

Product Specifications

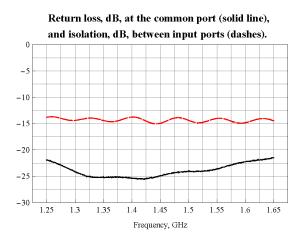
Frequency Range	1250 MHz - 1650 MHz
Maximum Power (at the input port)	0.5 kW
Insertion Loss (of a combiner)	0.75 dB
Return Loss (at the common port)	20 dB min., 22 dB typical
Isolation (between input ports)	13.5 dB min.
Amplitude Unbalance	±0.75 dB worst case
Phase Unbalance	±1.5° worst case
Size	Diameter of the base 6" Height 3.5"
Weight	3 kg
Interface: Common Port Collecting Port	Connector: 1-5/8" Connector: 7/16"

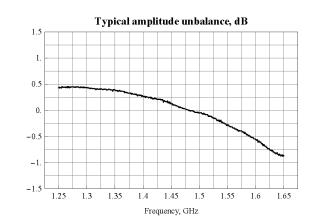
(specifications are subject to change without notice)

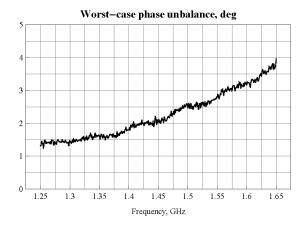
L-Band 6-Way Radial Combiner



Product Specifications (specifications are subject to change without notice)







VER 1.1 November 25, 2009



Broadband Wilkinson Combiners/Dividers

Product Features

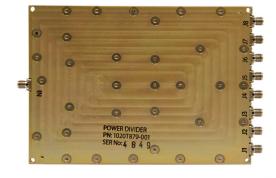
- Broadband 500 MHz to 3000 MHz frequency range
- Can be used in both power combiner and divider applications
- In-phase, equal power division
- 2, 4, 6, or 8-way configurations
- Power rating of 20 Watts
- Passes DC to all ports
- Furnished with SMA female connectors
- Custom designs are possible, focusing on specific frequency range, electrical performance, power and connector style requirements

Description and Application

UBS offers a unique solution to broadband power combining and division with an innovative line of 2-way through 8-way Wilkinson combiners/dividers.

A well-known advantage of Wilkinson dividers lies in providing improved input and output VSWR performance and superior isolation between the collecting ports. An outstanding feature of our design is that it is optimized for broadband operation over all wireless frequency bands from 500 MHz to 3000 MHz. This has been achieved by invoking a multi-section stripline construction together with a judicious electromagnetic optimization with the help of the state-of-the art 3D modeling software.

Other distinctive features include excellent amplitude and phase balance, low insertion loss, and power handling capability of up to 20 Watts at the common port.



8-Way Combiner/Divider

Model	Part Number	Description
1020T879-001	54890-01	8-Way Combiner/Divider
Model	Part Number	Description

54893-01

1020T877-001

6-Way Combiner/Divider

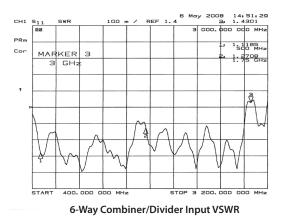
Broadband Wilkinson Combiners/Dividers



6-Way Combiner/Divider Product Specifications (specifications are subject to change without notice)

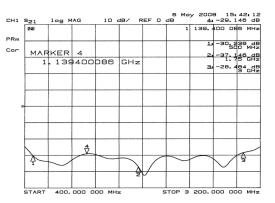
Number of Output Ports	б
Power Division	1:6 Uniform Distribution
Frequency Band of Operation	0.5 GHz - 3.0 GHz
Input Power *	20 Watts
Insertion Loss	≤ 1.3 dB
Input VSWR	≤ 1.4:1 (0.5 GHz - 2.8 GHz) ≤ 1.55:1 (2.8 GHz - 3.0 GHz)
Amplitude Unbalance	$\leq \pm 0.5 \text{ dB}$
Phase Unbalance	$\leq \pm 5^{\circ}$
Isolation	≥ 13 dB
Interface	Connectors: SMA (F)

* All of the six output ports should be terminated with a load VSWR of 1.5:1 or better.



2008 чy CH1 log MAG 000. 000 одо мна PR -8.1429 dB 500 MHz Co MARKER 3 -8.5991 dB GHz з 4 ₹ Ā STAR 400.000 000 STO 200.000 000

6-Way Combiner/Divider Transmission, dB



6-Way Combiner/Divider Isolation, dB

VER 1.1 November 25, 2009

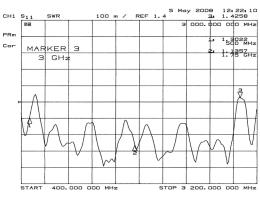
Broadband Wilkinson Combiner/Divider



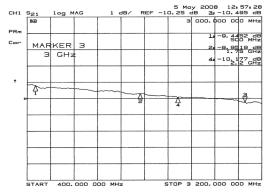
8-Way Combiner/Divider Product Specifications (specifications are subject to change without notice)

Number of Output Ports	8
Power Division	1:8 Uniform Distribution
Frequency Band of Operation	0.5 GHz - 3.0 GHz
Input Power *	20 Watts
Insertion Loss	≤ 1.25 dB (0.5 GHz to 2.1 GHz) ≤ 1.65 dB (2.1 GHz to 3.0 GHz)
Input VSWR	≤ 1.4:1 (0.7 GHz - 2.8 GHz) ≤ 1.55:1 (0.5 GHz - 0.7 GHz) and (2.8 GHz - 3.0 GHz)
Amplitude Unbalance	$\leq \pm 0.3 \text{ dB}$
Phase Unbalance	$\leq \pm 3^{\circ}$
Isolation	20 dB (typical), 17 dB (minimum)
Interface	Connectors: SMA (F)

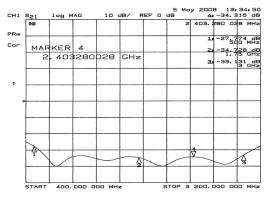
* All of the eight output ports should be terminated with a load VSWR of 2.0:1 or better.



8-Way Combiner/Divider Input VSWR



8-Way Combiner/Divider Transmission, dB



8-Way Combiner/Divider Isolation, dB

VER 1.1 November 25, 2009



Power Divider Model: 242W-NFNF-25

Product Features

- Low insertion loss
- High operational power
- Weatherproof aluminum housing



Product Specifications

Frequency	2.2 GHz - 2.5 GHz
Insertion Loss ¹	0.4 dB
Isolation ²	> 21 dB
VSWR	Input Port: 1.3:1 Output Port J1: 1.3:1 Output Port J2: 1.3:1
Phase Unbalance	±2°
Amplitude Unbalance ³	0.1 dB max.
Input Power ⁴	25 W
Connectors	Input: N-type (F) Output: N-type (F)
Dimensions (W x L x H)	2.4" × 3" × 0.8"

(specifications are subject to change without notice)

Notes

- 1. Insertion loss excludes coupled power losses (3 dB).
- 2. Isolation between output ports J1 and J2. Input port terminated to 50 ohm load VSWR < 1.3:1 $\,$
- 3. The maximum level difference, expressed in dB, between the two output ports, J1 and J2.
- 4. The maximum allowable average power applied to the input port with the output ports, J1 and J2, terminated to a 50 ohm load exhibiting a VSWR not exceeding 2.0:1. For load VSWRs exceeding 2.0:1, the maximum allowable input power is derated to 10 watts



Power Divider Model: 232S-EFNF-400

Product Features

- Star configuration
- Low low insertion losses
- High power handling capacity
- Rigid weatherproof design



Product Specifications

Frequency	2.1 GHz - 2.5 GHz
Insertion Loss ¹	< 0.2 dB
Isolation ²	6 dB typ.
Input Return Loss	> 21 dB
Phase Unbalance	±2°
Amplitude Unbalance ³	0.2 dB max.
Input Power ⁴	400 W
Connectors	Input: 7/16 DIN-type (F) Output: N-type (F)
Dimensions (W x L x H)	5.75" x 5.75" x 1.12"

(specifications are subject to change without notice)

Notes

- 1. Insertion loss excludes coupled power losses (3 dB).
- 2. Isolation between output ports J1 and J2. Input port terminated to 50 ohm load. VSWR < 1.3:1
- 3. The maximum level difference, expressed in dB, between the two output ports, J1 and J2.
- 4. The maximum allowable average power applied to the input port with the output ports, J1 and J2, terminated to a 50 ohm load exhibiting a VSWR not exceeding 2.0:1.

VER 1.0 November 25, 2009





Military Products

IFF TACAN Test Set Calibration Source 2770

UHF Solid State Power Amplifiers 22/40/100LNDM 22/40/100LNM 225/400/100SNC 225/400/100SNC-A 240/318/100LNF-01 240/318/100LNF-A 240/318/100LNF-A 240/318/100LNF-A 240/318/70LNF-A TWT Replacement SSPA Kit Dual Directional Coupler 0°/180° Power Combiner/Splitter Mixer Diplexer



Military Product Specifications



IFF and TACAN Test Set Calibration Source

Model: SCITTS 2770

Product Features

- Field Alignment Option
- High and Low Power Amplitude
- Pulse Shaping Control
- Portable Package
- Variable Replacement for Vacuum Equipment
- Delivers Reliability and Product Longevity



Description and Application

Military Aircraft technicians use various Test Sets to check and certify proper operation of the aircraft's TACAN and IFF pulsed RF transmitters. To avoid errant aircraft transmitter operation, these Test Sets must be calibrated with a high accuracy, stable source of properly shaped RF pulses. The UBS' SCITTS Calibration Source provides military aircraft service technicians with such capabilities. The SCITTS is a modern, solid-state bench top power source that produces the same type and shape of RF pulses as the aircraft's RF transmitter for IFF and TACAN.

ITAR Statement

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VER 1.2-ITAR August 17, 2011



Model: US 22/40/100LNDM

Product Features

- Constant Output Power
- Military Approved Design
- SATCOM DAMA Application
- Rugged Construction
- Wide Operating Temperature Range



Description and Application

Unique Broadband Systems Ltd. manufactures a complete line of UHF SATCOM DAMA SSPA Solid State UHF power amplifiers.

The US 22/40/100LNDM is designed to be used in conjunction with multi-band radios operating.

The UHF SATCOM DAMA SSPA is rugged in its construction to permit operation at elevations from sea level up to 25,000 feet over a wide temperature range.

A unique feature of this amplifier is its Solid-State switching circuit that serves several functions:

- Protective power reduction in the event of excessive operating conditions
- Response to transmitter keying and transmit blanking

ITAR Statement

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Document 50483-01-S07-06-ITAR



Model: US 22/40/100LNM

Product Features

- Constant Gain
- Military Approved Design
- SATCOM DAMA Application
- Rugged Construction
- Wide Operating Temperature Range



Description and Application

Unique Broadband Systems Ltd. manufactures a complete line of UHF SATCOM DAMA SSPA Solid State UHF power amplifiers.

The US 22/40/100LNM is designed to be used in conjunction with multi-band radios.

The UHF SATCOM DAMA SSPA is rugged in its construction to permit operation at elevations from sea level up to 25,000 feet over a wide temperature range.

A unique feature of this amplifier is its Solid-State switching circuit that serves several functions:

- Protective power reduction in the event of excessive operating conditions
- Response to transmitter keying and transmit blanking

ITAR Statement

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Document 52435-01-S07-06-ITAR



Model: US 225/400/100SNC

Product Features

- Constant Output Power
- Military Approved Design
- SATCOM DAMA Application
- Rugged Construction
- Wide Operating Temperature Range



Description and Application

Unique Broadband Systems Ltd. manufactures a complete line of UHF SATCOM DAMA SSPA Solid State UHF power amplifiers.

The US 225/400/100SNC is designed to be used in conjunction with multi-band radios.

The UHF SATCOM DAMA SSPA is rugged in its construction to permit operation at elevations from sea level up to 25,000 feet over a wide temperature range.

A unique feature of this amplifier is its Solid-State switching circuit that serves several functions:

- Protective power reduction in the event of excessive operating conditions
- Response to transmitter keying and transmit blanking

ITAR Statement

This UBS product is included on the U.S. Munitions List as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR 120. As such, direct download of technical data referred to at this website is not authorized. Please contact a UBS Sales Representative to request a copy of the technical data related to this product. The requested document(s) will be sent via encrypted e-mail upon receipt and confirmation of a valid .mil e-mail address (size permitting). If e-mail transmission is not feasible, the requested document(s) will be provided on Compact Disc and will be sent only to a valid U.S. Military installation or U.S. Government contractor.

Document 52677-01-S07-05-ITAR



Model: US 225/400/100SNC-A

Product Features

- Constant Output Power
- Military Approved Design
- SATCOM DAMA Application
- Rugged Construction
- Wide Operating Temperature Range
- EMI Filter



Description and Application

Unique Broadband Systems Ltd. manufactures a complete line of UHF SATCOM DAMA SSPA Solid State UHF power amplifiers.

The US 225/400/100SNC-A is designed to be used in conjunction with multi-band radios.

The UHF SATCOM DAMA SSPA is rugged in its construction to permit operation at elevations from sea level up to 25,000 feet over a wide temperature range.

A unique feature of this amplifier is its Solid-State switching circuit that serves several functions:

- Protective power reduction in the event of excessive operating conditions
- Response to transmitter keying and transmit blanking

ITAR Statement

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Document 52677-02-S07-05-ITAR



Model: US 240/318/100LNF-01

Product Features

- Constant Gain
- Military Approved Design
- SATCOM DAMA Application
- Rugged Construction
- Wide Operating Temperature Range



Description and Application

Unique Broadband Systems Ltd. manufactures a complete line of UHF SATCOM DAMA SSPA Solid State UHF power amplifiers.

The US 240/318/100LNF-01 is designed to be used in conjunction with multi-band radios.

The UHF SATCOM DAMA SSPA is rugged in its construction to permit operation at elevations from sea level up to 25,000 feet over a wide temperature range.

A unique feature of this amplifier is its Solid-State switching circuit that serves several functions:

- Protective power reduction in the event of excessive operating conditions
- Response to transmitter keying and transmit blanking

ITAR Statement

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Document 53292-01-S07-06-ITAR



Model: US 240/318/100LNF-A

Product Features

- Constant Output Power
- Military Approved Design
- SATCOM DAMA Application
- Rugged Construction
- Wide Operating Temperature Range



Description and Application

Unique Broadband Systems Ltd. manufactures a complete line of UHF SATCOM DAMA SSPA Solid State UHF power amplifiers.

The US 240/318/100LNF is designed to be used in conjunction with multi-band radios.

The UHF SATCOM DAMA SSPA is rugged in its construction to permit operation at elevations from sea level up to 25,000 feet over a wide temperature range.

A unique feature of this amplifier is its Solid-State switching circuit that serves several functions:

- Protective power reduction in the event of excessive operating conditions
- Response to transmitter keying and transmit blanking

ITAR Statement

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Document 50750-01-S07-06-ITAR



Model: US 240/318/100LNF-B

Product Features

- Constant Output Power
- Military Approved Design
- SATCOM DAMA Application
- Rugged Construction
- Wide Operating Temperature Range



Description and Application

Unique Broadband Systems Ltd. manufactures a complete line of UHF SATCOM DAMA SSPA Solid State UHF power amplifiers.

The US 240/318/100LNF is designed to be used in conjunction with multi-band radios.

The UHF SATCOM DAMA SSPA is rugged in its construction to permit operation at elevations from sea level up to 25,000 feet over a wide temperature range.

A unique feature of this amplifier is its Solid-State switching circuit that serves several functions:

- Protective power reduction in the event of excessive operating conditions
- Response to transmitter keying and transmit blanking

ITAR Statement

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Document 55284-01-S07-04-ITAR



Model: US 240/318/140LNF-A

Product Features

- Constant Output Power
- SATCOM DAMA Application
- Rugged Construction
- Wide Operating Temperature Range



Description and Application

Unique Broadband Systems Ltd. manufactures a complete line of UHF SATCOM DAMA SSPA Solid State UHF power amplifiers.

The US 240/318/140LNF-A is designed to be used in conjunction with multi-band radios.

The UHF SATCOM DAMA SSPA is rugged in its construction to permit operation at elevations from sea level up to 25,000 feet over a wide temperature range.

A unique feature of this amplifier is its Solid-State switching circuit that serves several functions:

- Protective power reduction in the event of excessive operating conditions
- Response to transmitter keying and transmit blanking

ITAR Statement

This UBS product is included on the U.S. Munitions List as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR 120. As such, direct download of technical data referred to at this website is not authorized. Please contact a UBS Sales Representative to request a copy of the technical data related to this product. The requested document(s) will be sent via encrypted e-mail upon receipt and confirmation of a valid .mil e-mail address (size permitting). If e-mail transmission is not feasible, the requested document(s) will be provided on Compact Disc and will be sent only to a valid U.S. Military installation or U.S. Government contractor.



Model: US 240/318/70LNF-A

Product Features

- Constant Output Power
- Military Approved Design
- SATCOM DAMA Application
- Rugged Construction
- Wide Operating Temperature Range



Description and Application

Unique Broadband Systems Ltd. manufactures a complete line of UHF SATCOM DAMA SSPA Solid State UHF power amplifiers.

The US 240/318/70LNF is designed to be used in conjunction with multi-band radios.

The UHF SATCOM DAMA SSPA is rugged in its construction to permit operation at elevations from sea level up to 25,000 feet over a wide temperature range.

A unique feature of this amplifier is its Solid-State switching circuit that serves several functions:

- Protective power reduction in the event of excessive operating conditions
- Response to transmitter keying and transmit blanking

ITAR Statement

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Document 50750-02-S07-02-ITAR





Model: NSN-5985-01-324-0709

Product Features

Unique Broadband Systems Ltd.

- Military Approved Design
- High Reliability SSPA
- Integrated DC-DC Power Converter
- Form, Fit and Functional Package
- Used in Terrestrial PTP Radios



Ordering Information

NSN-5985-01-324-0709

Description and Application

UBS manufactures a complete line of solid-state retrofit kits designed to be a direct form, fit and function replacement for TWTs and their associated high voltage power supplies commonly found in present day terrestrial point-to-point microwave radio transmitters.

The kit includes a solid-state power amplifier (SSPA) with an integrated DC-DC power converter, mounting hardware, RF cables (if required) and complete installation instructions. No cutting or drilling modifications to the existing radio chassis are required. The SSPA depicted above is for a retrofit kit for the AN/ FRC-17X microwave radio.

ITAR Statement

This UBS product is included on the U.S. Munitions List as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR 120. As such, direct download of technical data referred to at this website is not authorized. Please contact a UBS Sales Representative to request a copy of the technical data related to this product. The requested document(s) will be sent via encrypted e-mail upon receipt and confirmation of a valid .mil e-mail address (size permitting). If e-mail transmission is not feasible, the requested document(s) will be provided on Compact Disc and will be sent only to a valid U.S. Military installation or U.S. Government contractor.

VER 1.1-ITAR August 17, 2011



Dual Directional Coupler

Model: NSN-5985-01-048-7881

Product Features

- Military Approved Design
- High Directivity
- Multi-Octave Performance
- Precision Connectors
- Ideal for Reflectometer Applications



Description and Application

This product is built and tested to comply with the military requirement M15370/11-001. This product is a laboratory-grade, dual-directional coupler, designed to provide continuous monitoring of incident and reflected power in RF/Microwave measurement applications, particularly those involving swept measurement techniques.

Ordering Information

NSN-5985-01-048-7881

ITAR Statement

This UBS product is included on the U.S. Munitions List as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR 120. As such, direct download of technical data referred to at this website is not authorized. Please contact a UBS Sales Representative to request a copy of the technical data related to this product. The requested document(s) will be sent via encrypted e-mail upon receipt and confirmation of a valid .mil e-mail address (size permitting). If e-mail transmission is not feasible, the requested document(s) will be provided on Compact Disc and will be sent only to a valid U.S. Military installation or U.S. Government contractor.



0°/180° Power Combiner / Splitter

Model: NSN-5985-01-036-2651

Product Features

- Military Approved Design
- Excellent Phase and Amplitude Balance
- Full-Octave Performance
- High Isolation
- Configurable for 0°/180° Operation



Description and Application

This product is designed, manufactured, and tested to comply with the applicable military standards. This product is a four port, two-way power combiner/divider, providing either an inphase (0°) or out-of-phase (180°) difference between the two output ports. For in-phase operation, the input signal is applied to the "H" port and the "E" port is terminated to an external 50 ohm load. For out-of-phase operation, the input signal is applied to the "E" port and the "H" port is terminated to an external 50 ohm load. In each case, the input signal is equally divided in amplitude between the two outputs with the only difference being their relative phase difference.

Ordering Information

NSN-5985-01-036-2651

ITAR Statement

This UBS product is included on the U.S. Munitions List as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR 120. As such, direct download of technical data referred to at this website is not authorized. Please contact a UBS Sales Representative to request a copy of the technical data related to this product. The requested document(s) will be sent via encrypted e-mail upon receipt and confirmation of a valid .mil e-mail address (size permitting). If e-mail transmission is not feasible, the requested document(s) will be provided on Compact Disc and will be sent only to a valid U.S. Military installation or U.S. Government contractor.



Mixer Diplexer

Model: NSN-5985-01-287-8855

Product Features

- Military Approved Design
- PIN Diode Modulator
- Rugged Construction
- Overload Protection





Description and Application

This product is a custom stripline modulator-duplexer, designed for use in military test set conforming to MIL-T-28800, Type I, Class 2 requirements. Its rugged construction enables it to operate in ambient temperatures from -40 °C to 75 °C at altitudes up to 40,000 ft.

The modulator-duplexer incorporates a PIN diode modulator for the purpose of amplitude-modulating a CW signal applied to the appropriate input port. The resultant output signal is a series of RF pulses conforming to specified requirements. Protection against input signals in excess of the normal operating conditions is provided through the use of a limiter-diode circuit in conjunction with integrated bandpass filters.

ITAR Statement

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Ordering Information

NSN-5985-01-287-8855