



2016 Product Catalogue

REV " #



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

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 5000A

Dual Band DAB Modulator DVU 5000

Dual Mode Universal Modulator DVU 7000

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

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

50W MMDS-Band Amplifier DMPA 2600-I

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*

Digital Broadcasting Product Specifications

Advanced Z7 Universal Modulator

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 SISO/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.

Optional Features

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

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*

Advanced Z7 Universal Modulator

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 (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 ≤ -60 dBc and MER ≥ 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, Chrome, 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.



Advanced Z7 Universal Modulator

Model: DVU 5000

Product Specifications | Signal Processing

ATSC Mode

Supported Mode	8VSB, M/H
Network Mode	SFN and MFN
Bandwidth	6 MHz

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

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

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 stream 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%
Symbol Rate	Up to 37.5 Mbaud, step 1 baud

Advanced Z7 Universal Modulator

Model: DVU 5000



Product Specifications

Inputs / Outputs

DVB-ASI (IN-1, IN-2)	BNC (F), 75 Ω HD BNC (F), 75 Ω optional
GbE Transport Stream	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
HPA FB (feedback signal from the amplifier output)	Connector: SMA (F), 50 Ω Frequency Range: 470 MHz to 860 MHz Level: -10 dBm to 0 dBm
BPF FB (feedback signal from the filter output)	Connector: SMA (F), 50 Ω Frequency Range: 470 MHz to 860 MHz Level: -10 dBm to 0 dBm
GPS/GLONASS/BeiDou	F-type (F), 75 Ω
Clock Reference - 10 MHz (Note 1)	BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 10 dBm
Time Reference - 1 PPS (Note 1)	BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition

Control Interfaces

Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS485/RS232 Interface	Connector: DB-9 (F)
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Web GUI	Internet Explorer, Firefox, Chrome, etc. Connector: Ethernet
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
Alarm Relays	Connector: DB-15 (M) 2 Dry Contact Alarm relays, triggered by any major alarm.
Machine to Machine Interface	Connector: Ethernet for all waveforms or RS485/RS232

Note 1: The 10 MHz and 1PPS connectors become user selectable inputs/outputs when the DVU 5000 is equipped with an internal GNSS receiver.

Note 2: Shoulder measurements were performed with Agilent N9030A PXA Series Spectrum Analyzer.

Note 3: MER measurements were performed with an Agilent N9030A PXA Series Spectrum Analyzer

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 and waveform.

RF Output

Connector	N-type (F), 50 Ω
Frequency Range	470 MHz - 860 MHz 30 MHz - 1 GHz (optional)
Frequency Step Size	0.1 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	≤ -60 dBc (Note 2)
MER	≥ 52 dB (Note 3)
Spurious Level Outside Channel	< -60 dBm
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 @ 674 MHz)	10 Hz: < -65 dBc/Hz 100 Hz: < -85 dBc/Hz 1 kHz: < -100 dBc/Hz 10 kHz: < -110 dBc/Hz 100 kHz: < -130 dBc/Hz 1 MHz: < -135 dBc/Hz

Digital Adaptive Pre-correction

Frequency	470 MHz to 860 MHz
Spectral Regrowth Reduction	10 dB ± 3 dB (Note 5)
MER Correction	7 dB ± 3 dB (Note 5)

Power Supply

Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 45 VA

Mechanical

Dimensions (W x H x D)	483mm x 44mm x 366mm (19" x 1.73" x 14.43")
Weight	6 kg (13 lbs)

Environmental

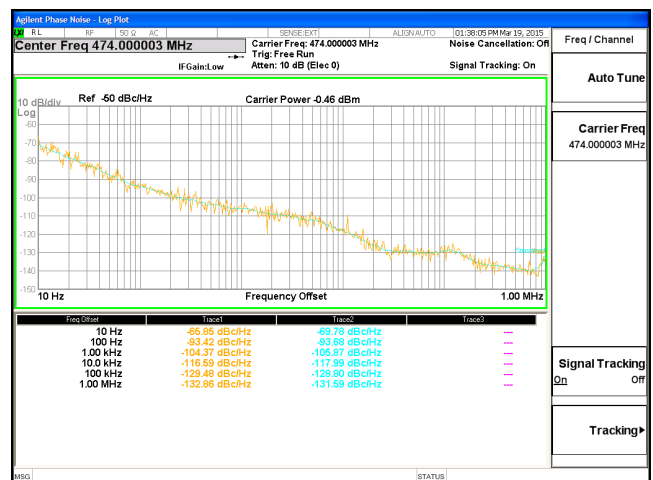
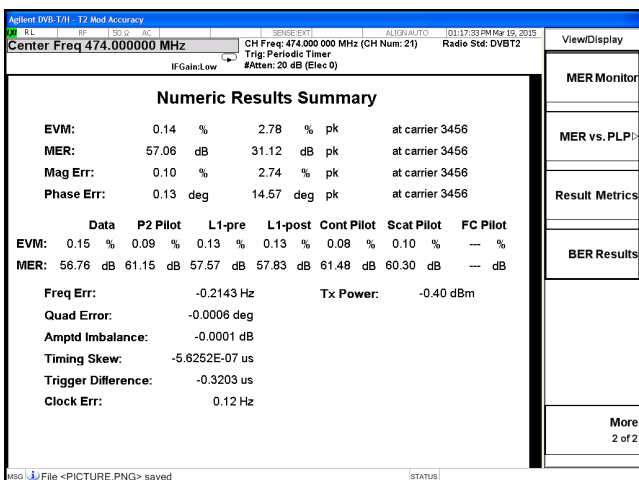
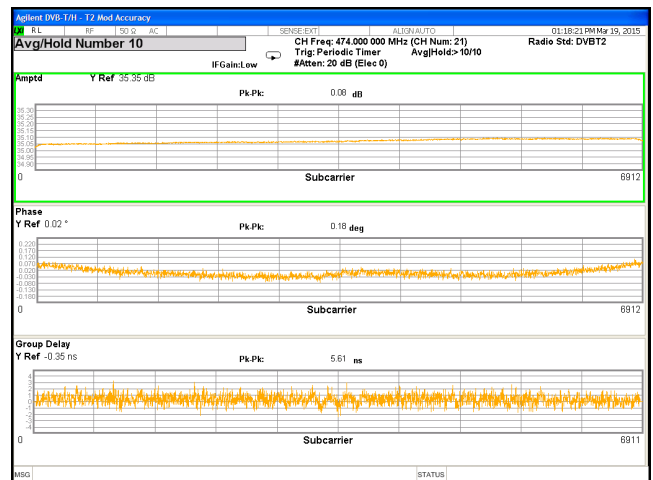
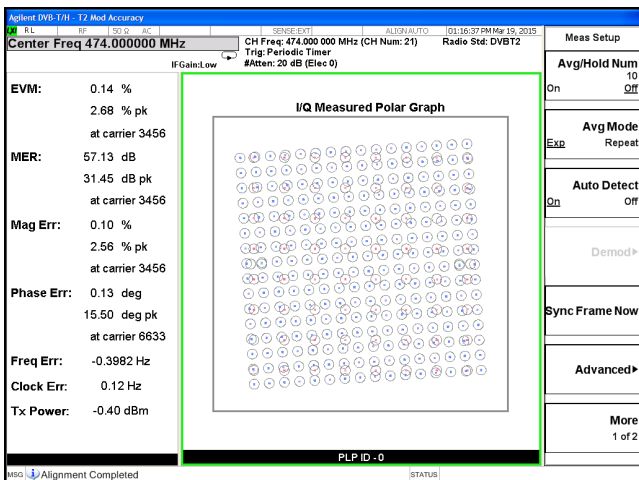
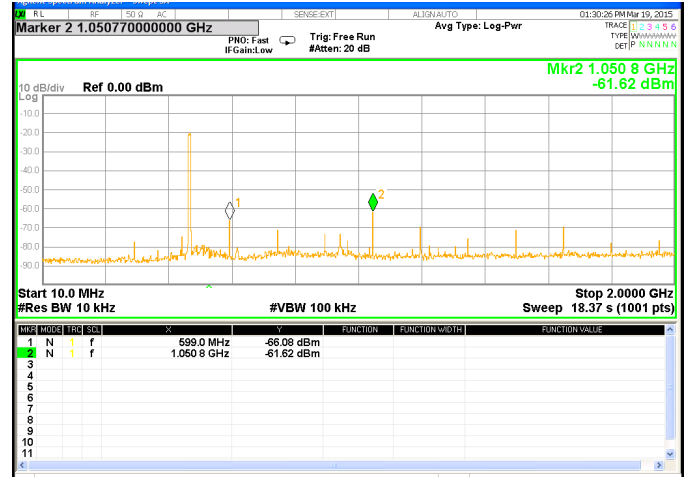
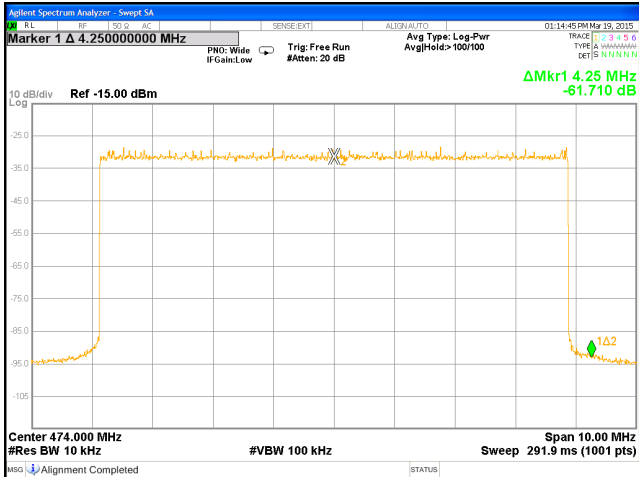
Operating Temperature	0°C to +50°C (+32°F to +122°F)
Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Relative Humidity	max. 95%



Advanced Z7 Universal Modulator

Model: DVU 5000

DVB-T2 Signal Measurements

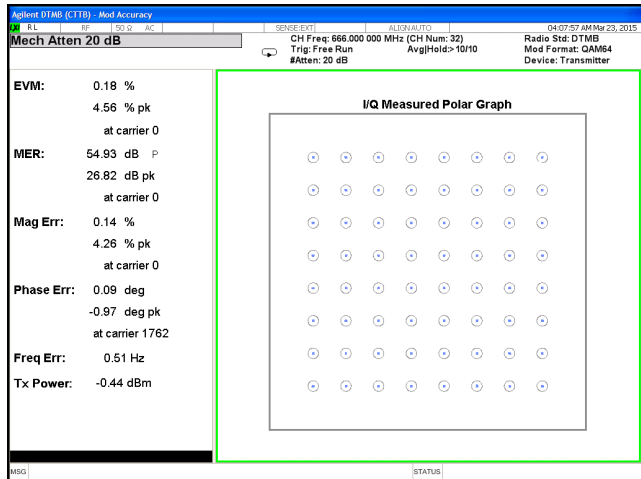
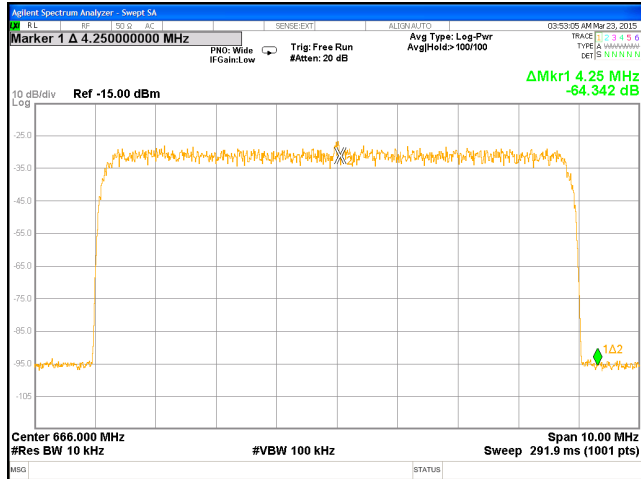


Advanced Z7 Universal Modulator

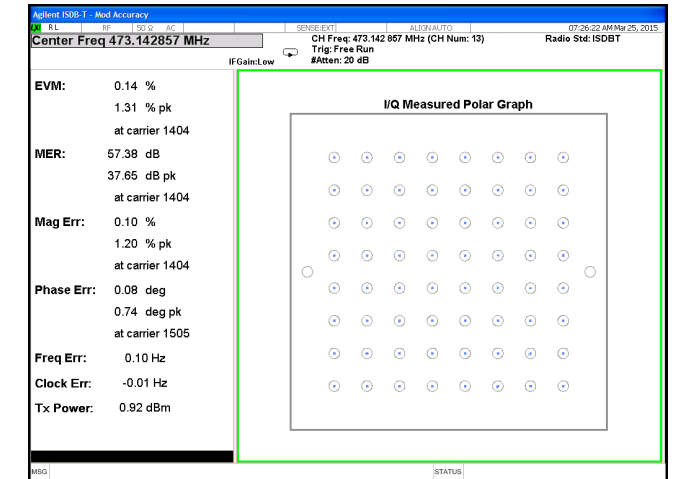
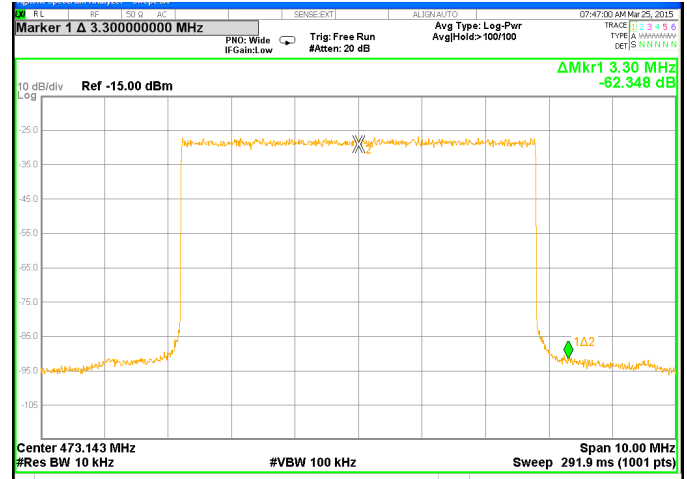
Model: DVU 5000



DTMB Signal Measurements



ISDB-T/Tb Signal Measurements



ETSI Compliance

Essential Requirement
R&TTE Directive 1995/5/EC

Safety

Health

EMC

Radio

Standard / Specification

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

Not Applicable. No Antenna

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.

CE 06780

PART ORDERING MATRIX FOR 1 RU ADVANCED MODULATOR

DVU-5000-Z7- ☐ ☐ ☐

WAVEFORM

- A. DVB-T2
- B. DVB-T2 Light
- C. DTMB
- D. ISDBT
- E. ATSC
- F. DVB-S2

FREQUENCY

- A. IF
- B. UHF
- C. L-Band
- D. Other

POWER

- A. 0 dBm
- B. +10 dBm
- C. 2 Watt

Advanced Z7 OEM Universal 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 SISO/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

Advanced Z7 OEM Universal Modulator

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 ≤ -60 dBc and MER ≥ 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, Chrome, 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.



Advanced Z7 OEM Universal Modulator

Model: DVU 2100

Product Specifications | Signal Processing

ATSC Mode

Supported Mode	8VSB, M/H
Network Mode	SFN and MFN
Bandwidth	6 MHz

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

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

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 stream 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%
Symbol Rate	Up to 37.5 Mbaud, step 1 baud

Advanced Z7 OEM Universal Modulator

Model: DVU 2100



Product Specifications

Inputs / Outputs

DVB-ASI (IN-1, IN-2)	BNC (F), 75 Ω HD BNC (F), 75 Ω optional
GbE Transport Stream	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
HPA FB (feedback signal from the amplifier output)	Connector: SMA (F), 50 Ω Frequency Range: 470 MHz to 860 MHz Level: -10 dBm to 0 dBm
BPF FB (feedback signal from the filter output)	Connector: SMA (F), 50 Ω Frequency Range: 470 MHz to 860 MHz Level: -10 dBm to 0 dBm
GPS/GLONASS/BeiDou	SMA (F), 50 Ω
Clock Reference - 10 MHz (Note 1)	SMA (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 10 dBm
Time Reference - 1 PPS (Note 1)	SMA (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition

Control Interfaces

Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: Micro USB Type B
RS485/RS232 Interface	Molex: 5-pos Micro Blade Header
CLI (Command Line Interface)	Connector: Micro USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Web GUI	Internet Explorer, Firefox, Chrome, etc. Connector: Ethernet
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
Alarm Relays	2 Dry Contact Alarm relays, triggered by any major alarm.
Machine to Machine Interface	Connector: Ethernet for all waveforms or RS485/RS232

Note 1: The 10 MHz and 1PPS connectors become user selectable inputs/outputs when the DVU 2100 is equipped with an internal GNSS receiver.

Note 2: Shoulder measurements were performed with Agilent N9030A PXA Series Spectrum Analyzer.

Note 3: MER measurements were performed with an Agilent N9030A PXA Series Spectrum Analyzer

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 and waveform.

RF Output

Connector	SMA (F), 50 Ω
Frequency Range	470 MHz - 860 MHz 30 MHz - 1 GHz (optional)
Frequency Step Size	0.1 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	≤ -60 dBc (Note 2)
MER	≥ 52 dB (Note 3)
Spurious Level Outside Channel	< -60 dBm
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 @ 674 MHz)	10 Hz: < -65 dBc/Hz 100 Hz: < -85 dBc/Hz 1 kHz: < -100 dBc/Hz 10 kHz: < -110 dBc/Hz 100 kHz: < -130 dBc/Hz 1 MHz: < -135 dBc/Hz

Digital Adaptive Pre-correction

Frequency	470 MHz to 860 MHz
Spectral Regrowth Reduction	10 dB ± 3 dB (Note 5)
MER Correction	7 dB ± 3 dB (Note 5)

Power Supply

Voltage	Single 12 VDC
Power Consumption	max. 35 Watts (with GPS reciever)
Connector	Molex, Eurostyle 2-pos Header

Mechanical

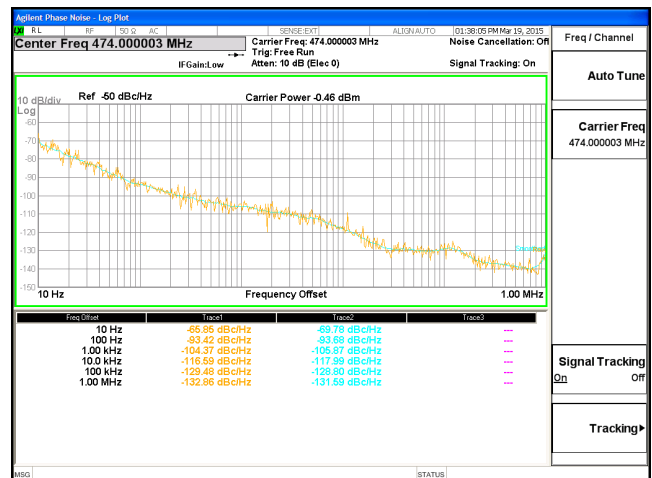
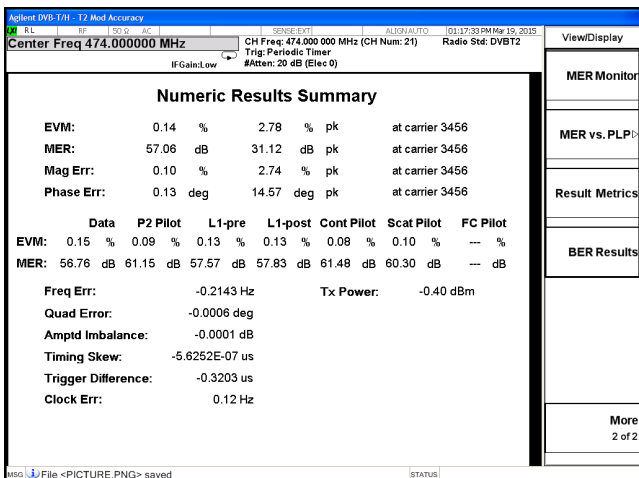
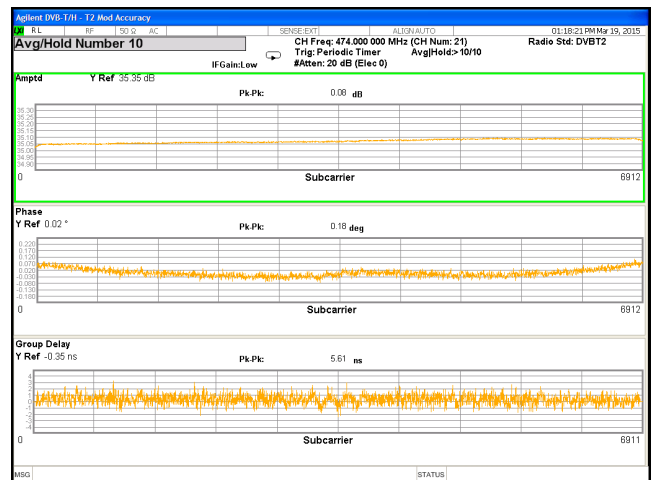
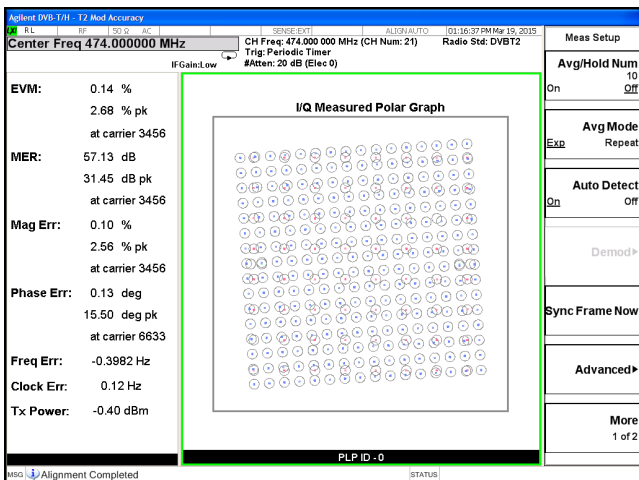
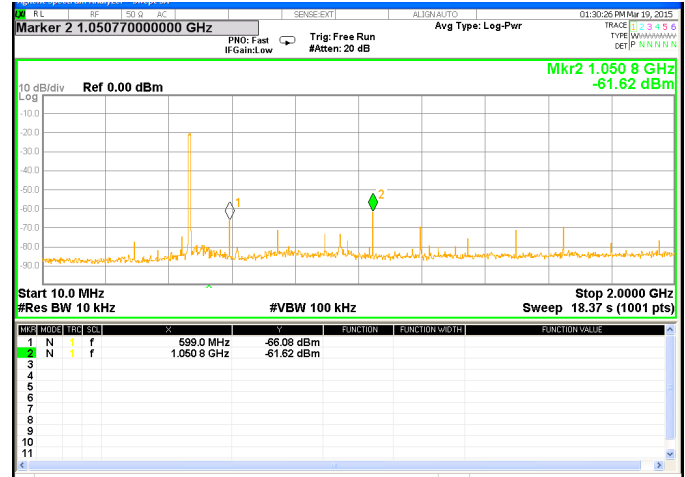
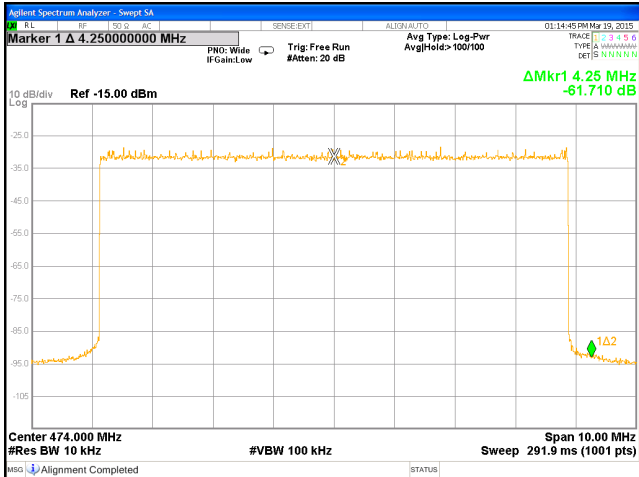
Dimensions (W x H x D)	10.206cm x 3.876cm x 19.014cm (4.018" x 1.526" x 7.486")
Weight	0.55kg (1.2 lbs.)

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%



DVB-T2 Signal Measurements

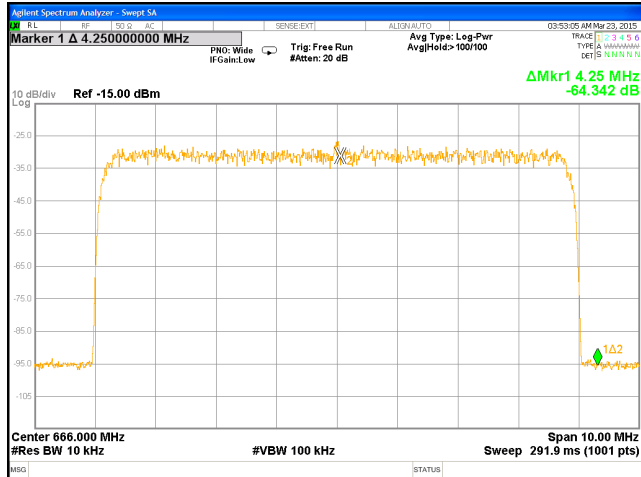


Advanced Z7 OEM Universal Modulator

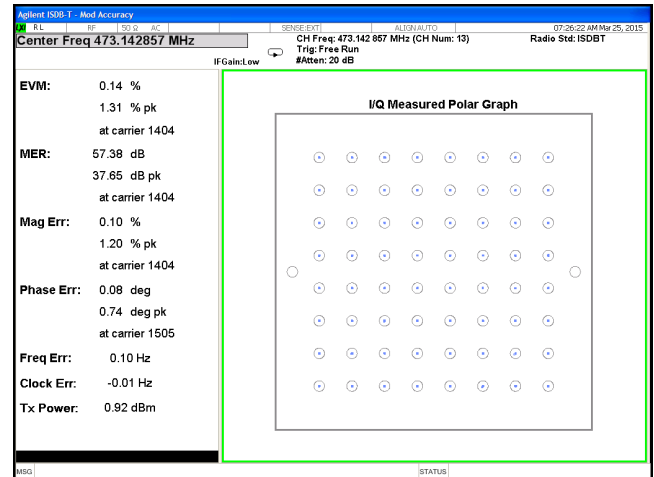
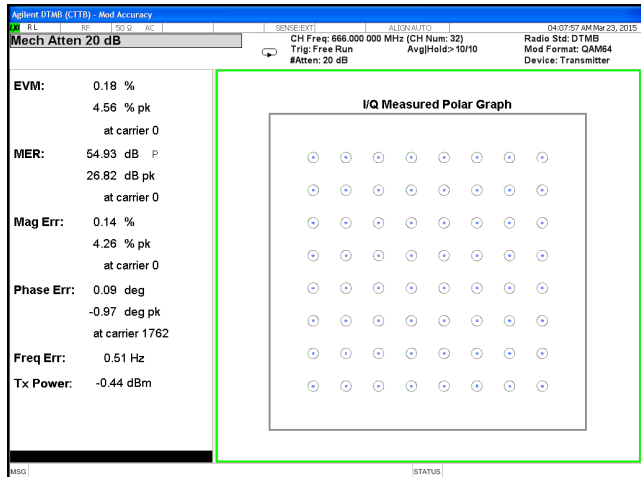
Model: DVU 2100



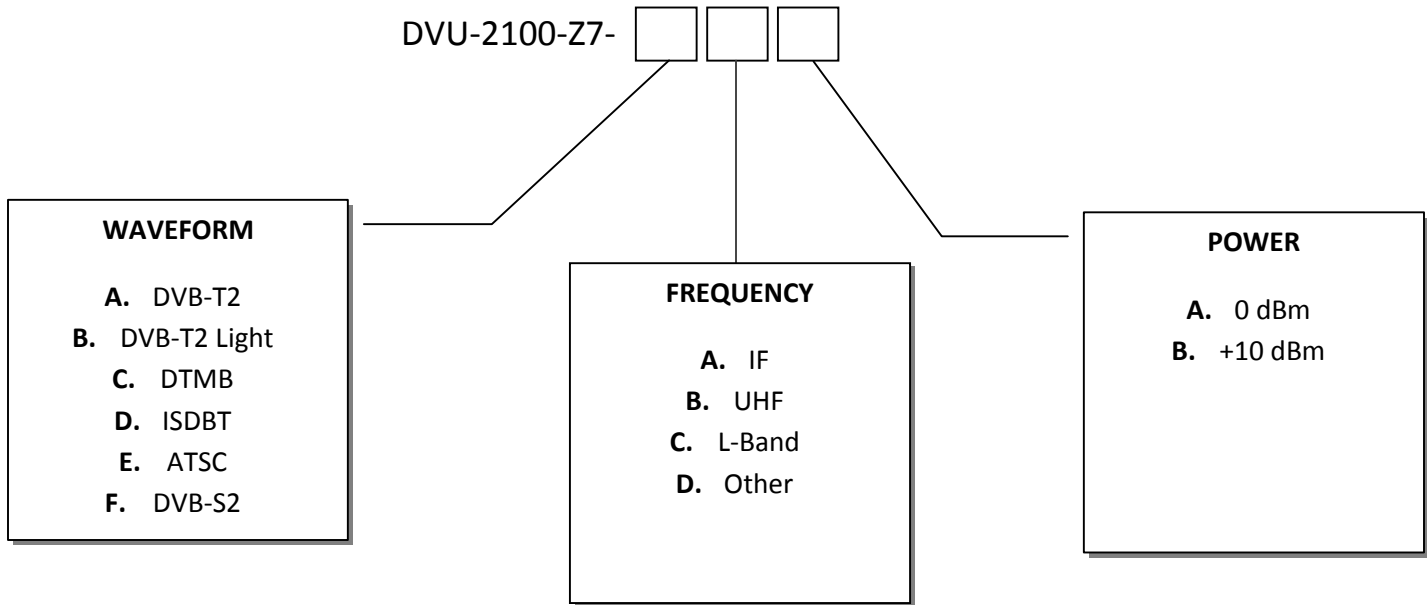
DTMB Signal Measurements



ISDB-T/Tb Signal Measurements



PART ORDERING MATRIX FOR OEM ADVANCED MODULATOR



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 SISO/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 SH-frame time-interleaver compensation to permit code combining at the receiver.

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 Combining mode
- Optional RF Outputs: 30 MHz - 1 GHz, 1452 - 1492 MHz, 1610 - 1675 MHz, 1980 - 2010 MHz, 2560 - 2690 MHz

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

Universal Modulator

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 ≤ -55 dBc and MER ≥ 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.



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 up-converter are derived from the internal GPS or GPS/GLONASS receiver.

Product Specifications | Signal Processing

CMMB Mode

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

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

Universal Modulator

Model: DVU 5000



Product Specifications | Signal Processing

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 stream monitoring PCR restamping TS Bit Rate Adaptation

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
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

ATSC Mode

Supported Mode	8VSB, M/H
Network Mode	SFN and MFN
Bandwidth	6 MHz
Input	MPEG-2 Transport Stream, SMPTE-310M or GbE TS

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/T _B Multiplexed 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



Universal Modulator

Model: DVU 5000



Front Panel

Product Specifications

Inputs

DVB-ASI	IN-A, IN-B	2 inputs: BNC (F), 75 Ω
G.703/G.704	IN-A, IN-B	2 inputs: BNC (F), 50 Ω
SMPTE-310M	IN-A, IN-B	2 inputs (optional): BNC (F), 75 Ω
GbE Transport Stream (DAB excluded)		Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
HPA FB		SMA (F), 50 Ω
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
G.703/G.704	OUT-A, OUT-B	2 outputs: BNC (F), 50 Ω
RF Monitor		Connector: SMA (F) Impedance: 50 Ω Level: 30 dB below RF output
Reference Monitor		Connector: BNC (F) Frequency: 10 MHz Level: 2 Vpp Impedance: 50 Ω

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male Serial port for GPS TOD information (CMMB mode only)
RS485 Interface	Connector: 9-pin SUB-D Female
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.
Machine to Machine Interface	Connector: Ethernet for all waveforms or RS485 for all waveforms or RS232 for all waveforms except CMMB

Universal Modulator

Model: DVU 5000

UBS

Unique Broadband Systems Ltd.



Rear Panel

Product Specifications

RF Output

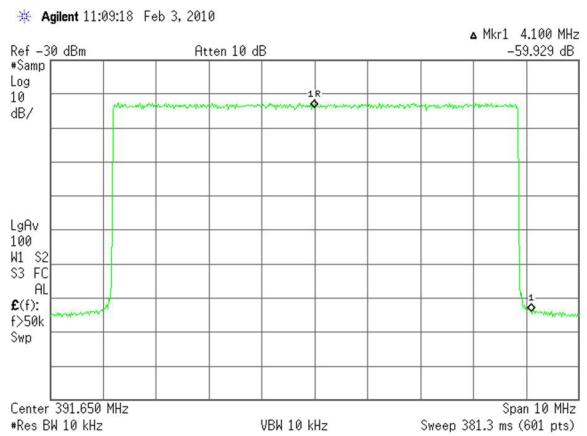
Connector	N-type (F), 50 Ω
Frequency Range	470 MHz - 860 MHz 30 MHz - 1 GHz (optional) 1452 MHz - 1492 MHz (optional) 1610 MHz - 1675 MHz (optional) 1980 MHz - 2010 MHz (optional) 2560 MHz - 2690 MHz (optional)
Frequency Step Size	1 Hz
Frequency Stability	Internal reference 0.05ppm / or in accordance 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.

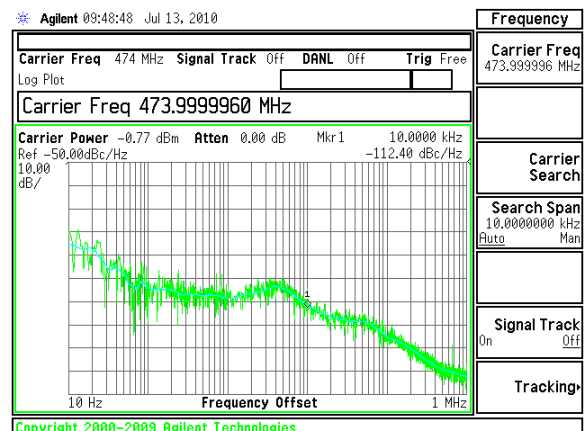
Note 4: Levels are measured in 10 kHz bandwidth, where 0 dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.



Shoulder Level

D: Symbols/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 degms Peak Phase Error: 0.576 deg			
IQ Gain Imb: 0.00125 dB IQ Quad Skew: 0.039 deg			
0	00060000	070A0203	0306010C
12	0E020601	06010409	0B0D0C0E
24	0D0D0301	040F000B	0002010A
36	030F0C00	0E0B010D	0B0C010B
48	000E0000	020E0000	0A0A0D01
60	08060101	0001080D	0E0A0900

MER



Phase Noise



Universal Modulator

Model: DVU 5000

Product Specifications

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 \pm 2 dB (Note 4)

Manual Digital Pre-Correction

Non-Linear Pre-Correction

Curve Formats	S 21 and VO/M
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	\pm 10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	\pm 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.

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	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

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.

CE 06780

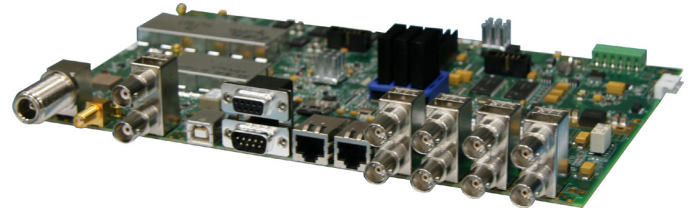
OEM Universal Modulator

Models: DVU 2001 and DVU 2002 (Board versions)

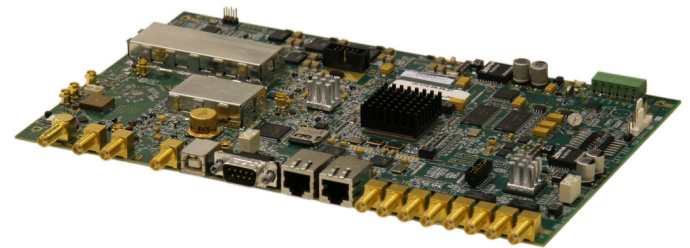
DVU 2010 and DVU 2025 (Enclosed versions)

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



DVU 2001



DVU 2002

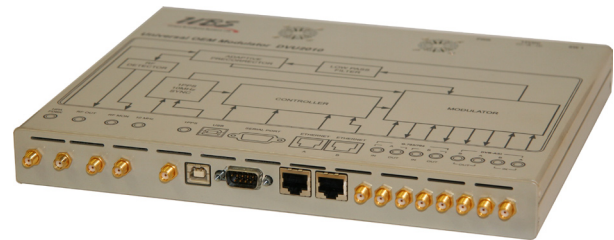
New Features

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 SISO/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 SH-frame 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.



DVU 2010



DVU 2025

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

OEM Universal Modulator

*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 ≤ -55 dBc and MER ≥ 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.



OEM Universal Modulator

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

Supported Mode	8VSB, M/H
Network Mode	SFN and MFN
Bandwidth	6 MHz
Input	MPEG-2 Transport Stream, SMPTE-310M or GbE TS

CMMB Mode

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

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

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/T _B Multiplexed Transport Stream or GbE TS

OEM Universal Modulator

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	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 stream monitoring PCR restamping TS Bit Rate Adaptation

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
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



OEM Universal Modulator

Models: DVU 2001 and DVU 2002 (Board versions)

DVU 2010 and DVU 2025 (Enclosed versions)

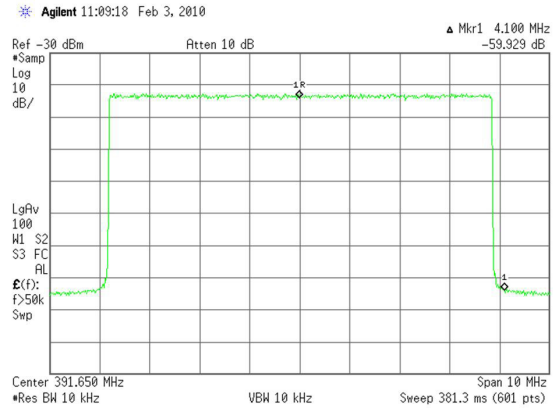
Product Specifications

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 Stream (DAB excluded)		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 - 10 MHz (Note 4)		DVU 2001/2025: BNC (F), 50 Ω DVU 2002/2010: SMA (F), 50 Ω Level: 0 dBm to 15 dBm
Time Reference - 1 PPS (Note 4)		DVU 2001/2025: BNC (F), 50 Ω DVU 2002/2010: SMA (F), 50 Ω Level: TTL Trigger: Positive transition

RF Output

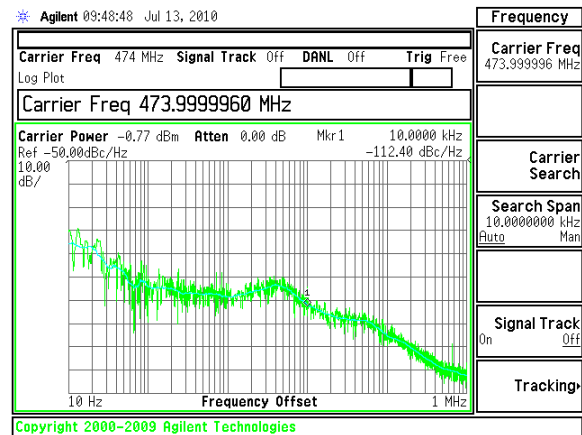
Connector	DVU 2001/2002: SMA (F), 50 Ω or N-type (F), 50 Ω DVU 2010: SMA (F), 50 Ω DVU 2025: N-type (F), 50 Ω
Frequency Range	470 MHz - 860 MHz 30 MHz - 1 GHz (optional)
Frequency Step Size	1 Hz
Frequency Stability	Internal reference 0.05ppm / or in accordance with external ref. accuracy
Spectrum Polarity	Inverted or non-inverted, selectable
Level	-10 dBm to 0 dBm in 0.1 dB step
Level Stability	± 0.3 dB
Return Loss	> 26 dB
Shoulder Level	≤ -55 dBc (Note 1)
Spurious Level Outside Channel	< -60 dBm
MER	≥ 45 dB (Note 2) ≥ 42 dB (DVB-T2)
Amplitude Flatness	Center frequency ± 3.8 MHz: ± 0.3 dB (Note 3)
Group Delay response	Center frequency ± 3.8 MHz: ± 10 ns (Note 3)
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



Shoulder Level

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 degms	Peak Phase Error:	0.576 deg
IQ Gain Imb:	0.00125 dB	IQ Quad Skew:	0.039 deg
0	00060000	070A0203	0306010C
12	0E020601	06010409	0B0D0C0E
24	0D0D0301	040F000B	0002010A
36	030F0C00	0E0B010D	0B0C010B
48	000E0000	020E0000	0A0A0D01
60	08060101	0001080D	0E0A0900

MER



Phase Noise

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.

OEM Universal Modulator

Models: DVU 2001 and DVU 2002 (Board versions)

DVU 2010 and DVU 2025 (Enclosed versions)



Product Specifications

Monitoring Outputs

DVB-ASI	OUT-A, OUT-B	DVU 2001/2025: BNC (F), 75 Ω DVU 2002/2010: SMA (F), 50 Ω
G.703/G.704	OUT-A, OUT-B	DVU 2001/2025: BNC (F), 50 Ω DVU 2002/2010: SMA (F), 50 Ω
RF Monitor		DVU 2001/2002: MCX, 50 Ω or SMA (F), 50 Ω DVU 2010/2025: SMA (F), 50 Ω Level: 30 dB below RF output
Clock Reference - 10 MHz (Note 4)		DVU 2001/2025: BNC (F) DVU 2002/2010: SMA (F) Impedance: High Frequency: 10 MHz Level: 10 dBm, \pm 2.5 dB sinewave
Time Reference - 1 PPS (Note 4)		DVU 2001/2025: BNC (F) DVU 2002/2010: SMA (F) Impedance: High Frequency: 1 PPS Level: TTL Trigger: Positive transition

Control Interfaces

Ethernet Interface	Connector: 2x RJ45 (DVU 2001/2002/2010) 1x RJ45 (DVU 2025) Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male Serial port for GPS TOD information (CMMB mode only)
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.
Machine to Machine Interface	Connector: Ethernet for all waveforms or RS485 for all waveforms or RS232 for all waveforms except CMMB

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
Gain Correction	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	\pm 10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	\pm 2000 ns
Group Delay Resolution	1 ns
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)

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 \pm 2 dB (Note 5)

Note 4: The "10MHz" and "1pps" are inputs, except when the modulator is equipped with an on-board GPS receivers, where they become Monitoring Outputs (high impedance).

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



OEM Universal Modulator

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 receiver)
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)	258.4mm x 38mm x 175mm (10.173" x 1.5" x 6.891")
DVU 2002 Dimensions (SMA) (W x H x D)	258.4mm x 19.9mm x 175mm (10.173" x 0.783" x 6.891")
DVU 2001/2002 Weight	0.25kg (0.5 lbs.)
DVU 2010 Dimensions (W x H x D)	269.6mm x 29.5mm x 221mm (10.613" x 1.162" x 8.7")
DVU 2010 Weight	1 kg (2.2 lbs.)
DVU 2025 Dimensions (W x H x D)	308.457mm x 40.894mm x 191.262mm (12.144" x 1.61" x 7.53")
DVU 2025 Weight	1 kg (2.2 lbs.)

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%
Cooling	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

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%
Symbol Rate	Up to 37.5 Mbaud, step 1 baud

Inputs

MPEG-2 Transport Stream	2 DVB-ASI inputs: BNC (F), 75 Ω
Clock Reference - 10 MHz	Connector: BNC (F) Frequency: 10 MHz Level: 100 mV - 3 Vpp Impedance: 50 Ω or High Impedance (user selectable)

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 Monitor		Connector: BNC (F) Frequency: 10 MHz Level: 2 Vpp Impedance: 50 Ω

IF/RF Output

Connector	N-type (F), 50 Ω
Frequency	50 MHz to 180 MHz, 1 Hz step (optional 950 MHz to 2150 MHz, 1 Hz step)
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 to 10 dBm)
Level Stability	± 0.3 dB
Return Loss	> 20 dB
Shoulder Level	< -55 dBc
Spurious Level Outside Channel	< -60 dBm
MER	≥ 45 dB
Amplitude Flatness	± 0.5 dB
Group delay response	± 10 ns
Phase Noise SSB (measured @ 474 MHz)	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



Unique Broadband Systems Ltd.

DVB-S2 Modulator

Model: DVU 5000



Fig.2 - Rear Panel

Product Specifications

Control Interfaces

Front Panel Interface	LCD display and cursor/ execute keys
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Web Interface	Internet Explorer, FireFox, etc. Connector: Ethernet
SNMP Control Interface	Connector: Ethernet Note: MIBs can be provided
Alarm Relays	Connector: RS232 or RS485 2 Dry Contact Alarm relays triggered by any major alarm
RS485 Interface	Connector: 9-pin SUB-D Female

Power Supply

Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 45 VA (70 VA with +10 dBm RF amplifier 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	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 kg (13 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.

CE 06780

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/network 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-MPEG CoP #3 / SMPTE 2022 protocol.

DVB-T2 Modulator

Model: DVU 5000



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 up-converter are derived from the internal GPS or GPS/GLONASS receiver.



DVB-T2 Modulator

Model: DVU 5000



Front Panel

Product Specifications

DVB-T2 Modulation and Signal Processing

FFT Modes	1k, 2k, 4k, 8k, Extended 8k, 16k, Extended 16k, 32k, Extended 32k
Guard Intervals	1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4
Code Rates	1/2, 3/5, 2/3, 3/4, 4/5, 5/6
PLP Constellations	QPSK, 16-QAM, 64-QAM, 256-QAM (normal or rotated)
L1 Post Constellations	BPSK, QPSK, 16-QAM, 64-QAM
FEC	Short (16k), Normal (64k)
Network Modes	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
Test Modes	Single Carrier (CW) Carrier Removal (100 to 800 carriers)
Input	T2-MI control Input stream monitoring PCR restamping TS Bit Rate Adaptation

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
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 can be provided
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

Inputs

DVB-ASI / T2-MI (IN-A, IN-B)	2 DVB-ASI inputs: BNC (F), 75 Ω
GbE Transport Stream	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
HPA FB	SMA (F), 50 Ω
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω
Time Reference - 1 PPS (Note 1)	Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω

Monitoring Outputs

DVB-ASI / T2-MI (OUT-A, OUT-B)	2 DVB-ASI outputs: BNC (F) 75 Ω
RF Monitor	Connector: SMA (F) Impedance: 50 Ω Level: 30 dB below RF output
Reference Monitor	Connector: BNC (F) Frequency: 10 MHz Level: 2 Vpp Impedance: 50 Ω
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
Time Reference - 1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive 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).

DVB-T2 Modulator

Model: DVU 5000

UBS

Unique Broadband Systems Ltd.



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

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/M
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.



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 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.

CE 06780

2 Watt Universal Modulator

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

2 Watt Universal Modulator

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 Non-inverted 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.



2 Watt Universal Modulator

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 up-converter are derived from the internal receiver.

Product Specifications | Signal Processing

CMMB Mode

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

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

2 Watt Universal Modulator

Model: DVU 5000A



Product Specifications | Signal Processing

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 stream monitoring PCR restamping TS Bit Rate Adaptation

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
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

ATSC Mode

Supported Mode	8VSB, M/H
Network Mode	SFN and MFN
Bandwidth	6 MHz
Input	MPEG-2 Transport Stream, SMPTE-310M or GbE TS

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/T _B Multiplexed 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



2 Watt Universal Modulator

Model: DVU 5000A



Front Panel

Product Specifications

Inputs

DVB-ASI	IN-A, IN-B	2 inputs: BNC (F), 75 Ω
G.703/G.704	IN-A, IN-B	2 inputs (optional): BNC (F), 50 Ω
SMPTE-310M	IN-A, IN-B	2 inputs (optional): BNC (F), 75 Ω
GbE Transport Stream (DAB excluded)		Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
HPA FB		Connector: SMA (F), 50 Ω Level: -15 dBm to 0 dBm
Clock Reference - 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), 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
G.703/G.704	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 Monitor		Connector: BNC (F) Frequency: 10 MHz Level: 2 Vpp Impedance: 50 Ω
Clock Reference - 10 MHz (Note 1)		Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, \pm 2.5 dB sinewave
Time Reference - 1 PPS (Note 1)		Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive 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).

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male Serial port for GPS TOD information (CMMB mode only)
RS485 Interface	Connector: 9-pin SUB-D Female
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.
Machine to Machine Interface	Connector: Ethernet for all waveforms or RS485 for all waveforms or RS232 for all waveforms except CMMB

2 Watt Universal Modulator

Model: DVU 5000A



Rear Panel

Product Specifications

RF Output

Connector	N-type (F), 50 Ω
Frequency Range	470 MHz - 860 MHz 40 MHz to 1 GHz (optional) DAB Band III (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
Digital Average Power Level	2 Watt (adjustable from 23 dBm to 33 dBm in 0.1 dB steps)
Level Stability	± 0.5 dB
Shoulder Level	≤ -38 dBc (uncorrected)
Spurious Level Outside Channel	< -40 dBc
Amplitude Flatness	Center frequency ± 3.8 MHz: ± 0.5 dB (Note 2)
Phase Noise SSB (measured @ 474 MHz)	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
Return Loss	> 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/M
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.



2 Watt Universal Modulator

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

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/network 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 stream 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



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.

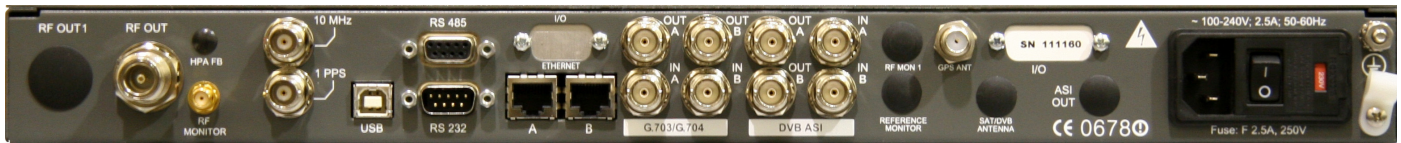
Internal GPS or GPS/GLONASS Receiver (optional)

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



Dual Band DAB Modulator

Model: DVU 5000



Rear Panel

Product Specifications

DAB Signal Processing

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

Inputs

G.703/G.704 (IN-A, IN-B)	2 inputs: BNC (F), 50 Ω
DVB-ASI (IN-A, IN-B)	2 inputs: BNC (F), 75 Ω
10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm
1 PPS (Note 1)	Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive 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).

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
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.
Machine to Machine Interface	Connector: Ethernet, RS232 or RS485

Monitoring Outputs

G.703/G.704 (OUT-A, OUT-B)	2 outputs: BNC (F), 50 Ω
DVB-ASI (OUT-A, OUT-B)	2 outputs: BNC (F) 75 Ω
RF Monitor	Connector: SMA (F) Impedance: 50 Ω Level: 30 dB below RF output
10 MHz (Note 1)	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition

Dual Band DAB Modulator

Model: DVU 5000



Product Specifications

Band III Output Performance

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 Step Size	1 Hz
Frequency Stability	Internal reference 0.05ppm / or in accordance with GPS 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
Amplitude Flatness	± 0.4 dB
Shoulder Level	≤ -55 dBc
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
Return Loss	> 20 dB

L-Band Output Performance

Connector (RF Output)	N-type (F), 50 Ω
Frequency Range	Frequency Selection: 170 MHz to 1500 MHz Channel List 1: 1452.960 MHz to 1490.624 MHz Channel List 2: 1452.816 MHz to 1491.184 MHz
Frequency Step Size	1 Hz
Frequency Stability	Internal reference 0.05ppm / or in accordance with GPS 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
Amplitude Flatness	± 0.4 dB
Shoulder Level	≤ -50 dBc
Spurious Level	< -60 dBm @ 0 dBm output power
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

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)



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 (operating/storage)	max. 95%, non-condensing
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.

CE 06780

Dual Mode Universal Modulator

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*

Dual Mode Universal Modulator

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 ≤ -55 dBc and MER ≥ 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 it 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.



Dual Mode Universal Modulator

Model: DVU 7000

Digital Specifications | Signal Processing

CMMB Mode

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

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

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
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

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 stream 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/T _B 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

Dual Mode Universal Modulator

Model: DVU 7000



Digital Specifications

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male Serial port for GPS TOD information (CMMB mode only)
RS485 Interface	Connector: 9-pin SUB-D Female
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.
Machine to Machine Interface	Connector: Ethernet for all waveforms or RS485 for all waveforms or RS232 for all waveforms except CMMB

Inputs

DVB-ASI (IN-A, IN-B)	2 inputs: BNC (F), 75 Ω
SMPTE-310M (IN-A, IN-B)	2 inputs (optional): BNC (F), 75 Ω
GbE Transport Stream (DAB excluded)	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
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 Level: 30 dB below RF output

Adaptive Non-linear Pre-correction

HPA FB Connector	To be connected to the PA output when the Adaptive Pre-corrector is used
Frequency	470 MHz to 860 MHz
Gain Correction	7 dB \pm 2 dB (Note 1)

Manual Digital Pre-Correction

Non-Linear Pre-Correction

Curve Formats	S 21 and VO/M
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	\pm 10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	\pm 2000 ns
Group Delay Resolution	1 ns
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)

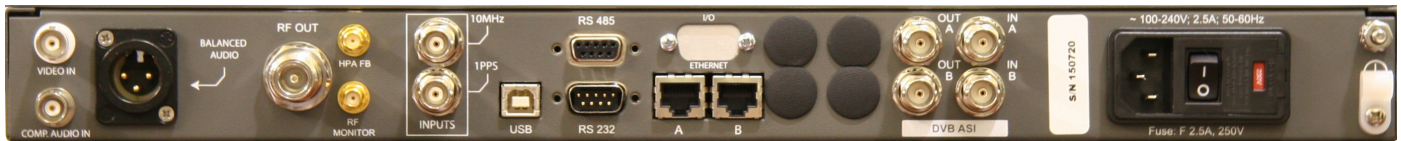
Note 1: Greater improvement is possible under particular applications. Performance depends upon power level and waveform.



Unique Broadband Systems Ltd.

Dual Mode Universal Modulator

Model: DVU 7000



Rear Panel

Digital Specifications

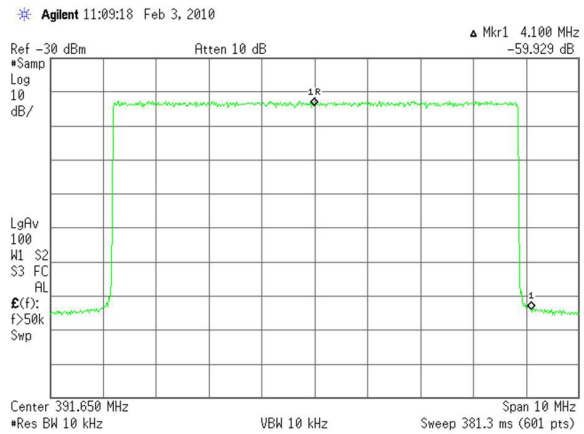
RF Output

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 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.

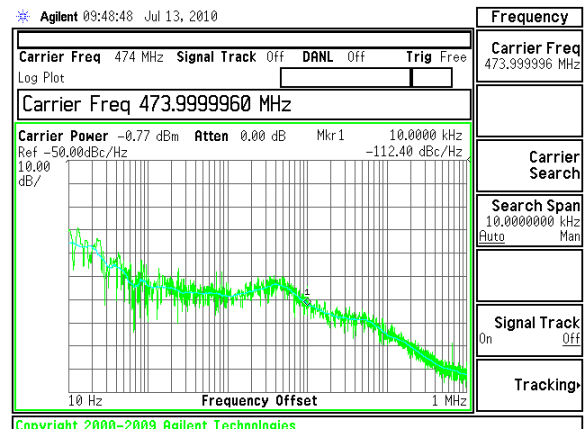
Note 4: Levels are measured in 10 kHz bandwidth, where 0 dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.



Shoulder Level

D: Symbols/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 degrees Peak Phase Error: 0.576 deg			
IQ Gain Imb: 0.00125 dB IQ Quad Skew: 0.039 deg			
0	00060000	070A0203	0306010C
12	0E020601	06010409	0B0D0C0E
24	0D0D0301	040F000B	0002010A
36	030F0C00	0E0B010D	0B0C010B
48	000E0000	020E0000	0A0A0D01
60	08060101	0001080D	0E0A0900

MER



Phase Noise

Dual Mode Universal Modulator

Model: DVU 7000



Analog Specifications

Inputs

Video Input	Connector: BNC (F), 75 Ω Return Loss: 30 dB Level: 1 Vpp \pm 6 dB
Audio Input	XLR (M), 600 Ω Level: 0 dBm \pm 6 dB

Aural Parameters

FM Noise (Baseband input)	-60 dB at 50 kHz deviation
Harmonic Distortion	0.5 % (\pm 50 kHz PAL)
Frequency Response	\pm 0.5 dB (30 Hz - 15 kHz) for mono input
Visual/Aural Separation	\pm 100 kHz from Nominal

Visual Parameters

Amplitude/Frequency Response	\pm 0.5 dB (-0.75 MHz to +4.8 MHz)
Group Delay	\pm 30ns
Differential Phase	$\leq \pm 1.8^\circ$
Differential Gain	$\leq \pm 3$ %
Low Frequency Linearity	$\leq \pm 3$ %
ICPM	$\leq \pm 3$ %
Spurious Emmissions	≤ -47 dB at -5.5 MHz and +11 MHz ≤ -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 %

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	\pm 0.3 dB
Audio to Video Ratio	1:10
Permissible VSWR	< 1.5

Control Interfaces

Web GUI and SNMP	Connector: Ethernet
-------------------------	---------------------

Product Specifications

Power Supply

Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 110 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	4 internal fans to assist natural convection

Mechanical

Size	1 U of 19" wide cabinet
Dimension (W x H x D)	483 mm x 44 mm x 568 mm (19" x 1.73" x 22.37")
Weight	8 kg (17.6 lbs)
Transport and Storage	Vibration acc. to IEC Publ.68

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 SISO/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 SH-frame 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 Combining 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*

Universal Exciter

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' excitors 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.



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 Receiver (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, 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
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

Universal Exciter

Model: DVX 5000



Product Specifications | Signal Processing

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 stream monitoring PCR restamping TS Bit Rate Adaptation

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
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

ATSC Mode

Supported Mode	8VSB, M/H
Network Mode	SFN and MFN
Bandwidth	6 MHz
Input	MPEG-2 Transport Stream, SMPTE-310M or GbE TS

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/T _B Multiplexed 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



Front Panel

Product Specifications

Inputs

DVB-ASI	IN-A, IN-B	2 inputs: BNC (F), 75 Ω
G.703/G.704	IN-A, IN-B	2 inputs: BNC (F), 50 Ω
SMPTE-310M	IN-A, IN-B	2 inputs (optional): BNC (F), 75 Ω
GbE Transport Stream (DAB excluded)		Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
HPA FB		SMA (F), 50 Ω
Clock Reference - 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), 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
G.703/G.704	OUT-A, OUT-B	2 outputs: BNC (F), 50 Ω
RF Monitor		Connector: SMA (F) Impedance: 50 Ω Level: 30 dB below RF output
Reference Monitor		Connector: BNC (F) Frequency: 10 MHz Level: 2 Vpp Impedance: 50 Ω
Clock Reference - 10 MHz (Note 1)		Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
Time Reference - 1 PPS (Note 1)		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).

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male Serial port for GPS TOD information (CMMB mode only)
RS485 Interface	Connector: 9-pin SUB-D Female
I/O Interface	Connector: 9-pin SUB-D Female
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, RS485 and I/O 2 Dry Contact Alarm relays, triggered by any major alarm.
Machine to Machine Interface	Connector: Ethernet for all waveforms or RS485 for all waveforms or RS232 for all waveforms except CMMB

Universal Exciter

Model: DVX 5000



Rear Panel

Product Specifications

RF Output

Connector	N-type (F), 50 Ω
Frequency Range	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
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 @ UHF band (Note 2) ≤ -50 dBc @ other bands
Spurious Level Outside Channel	< -60 dBm
MER	≥ 45 dB (Note 3) ≥ 42 dB for 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.

Adaptive Non-linear Pre-correction

HPA FB Connector	To be coupled from the PA output when the Adaptive Pre-corrector is used
Frequency	470 MHz - 860 MHz 1600 MHz - 2800 MHz
Spectral Regrowth Reduction	7 dB \pm 2 dB (Note 5)

Manual Digital Pre-Correction

Non-Linear Pre-Correction	
Curve Formats	S 21 and VO/M
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 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.



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	Internally connected to the exciter input 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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the exciter input Level: TTL

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

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

GPS/GLONASS 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 / GLONASS - L1 frequency range
32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided tracking)
Tracking Capability	24 simultaneous satellite vehicles
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	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Timing Accuracy	< 100 ns
1 PPS + 10 MHz	
Holdover Time	≤ 2.5 μ sec during 2 hours
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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the exciter input Level: TTL

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	Temperature controlled fan to assist natural convection

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



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

Optional Frequency Range

- 1600 - 2800 MHz

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.

Universal Adaptive Pre-Corrector

Model: UAP 2011



Product Specifications

RF Input

Connector	SMA (F), 50 Ω
Power Level	-10 dBm to 0 dBm

RF Feedback

Connector	SMA (F), 50 Ω
Power Level	-10 dBm to +10 dBm

RF Output

Connector	SMA (F), 50 Ω
Power Level	-10 dBm to 0 dBm (Output level is equal to input level. Down to -20 dBm possible with attenuation offset)

Power Supply

Voltage	12 Vdc
Power Consumption	10 Watts max.

Mechanical

Dimensions (W x H x D)	164.8 mm x 29.5 mm x 92.2 mm (6.45" x 1.162" x 3.63")
Weight	0.5 kg (1.1 lbs.)

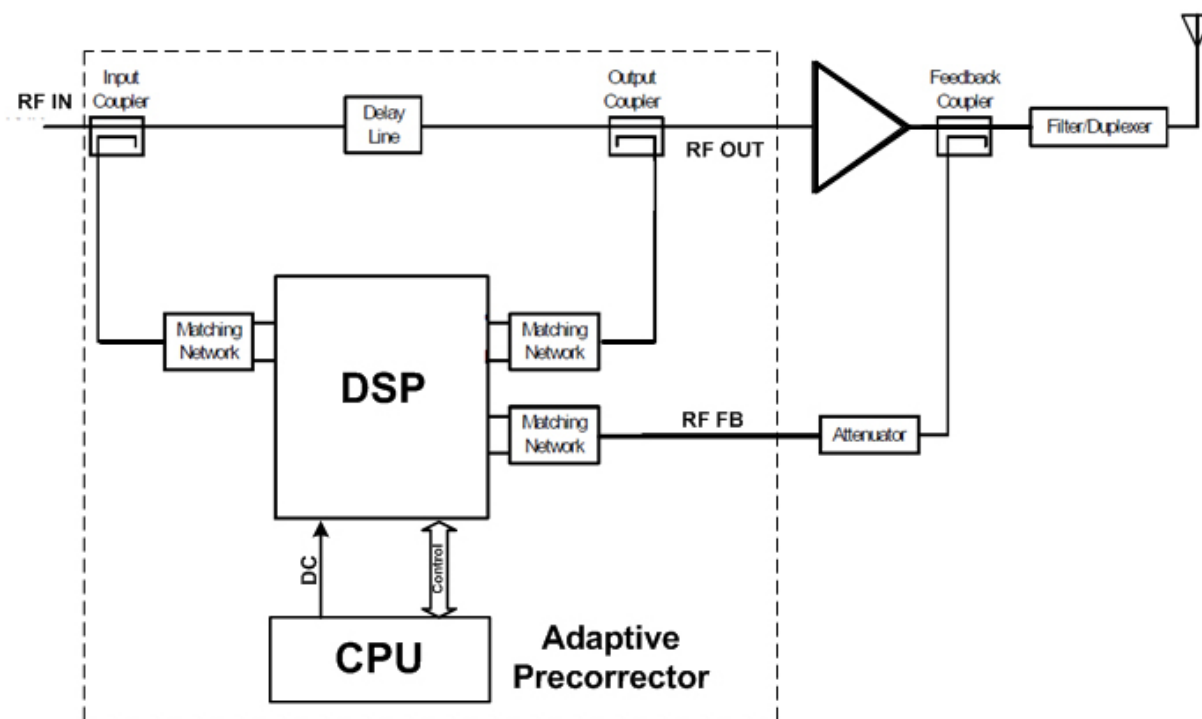
Environmental

Operating Temperature	+5°C to +45°C (+41°F to +113°F)
Storage Temperature	-30°C to +75°C (-22°F to +158°F)
Relative Humidity	max. 95%, non condensing
Cooling	Natural convection

Control and Communication Interfaces

RS232 or RS485	Connector: DB-9 (F) Protocol: UBS Pre-corrector GUI
----------------	--

Application Block Diagram



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.

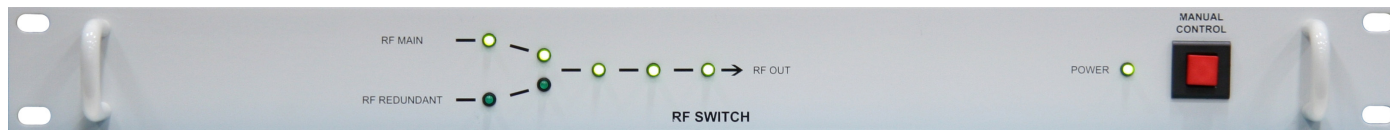
Typically, the URS 1000 RF inputs are connected to the output of main and redundant devices. The main device must be equipped with a dry contact alarm relay, which is connected to the URS 1000 switch control serial port. The main device's alarm relay must be normally open and configured to close when 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.

RF Switch

Model: URS 1000



Front Panel



Rear Panel

Product Specifications

RF Interfaces

Frequency Range	0.3 MHz to 3 GHz
Power Level	25 dBm
RF Main Connector	SMA (F), 50 Ω
RF Redundant Connector	SMA (F), 50 Ω
RF Output Connector	SMA (F), 50 Ω
Isolation	min. 60 dB (0.3 MHz to 900 MHz) min. 35 dB (900 MHz to 3 GHz)
VSWR	max. 1.20 (0.3 MHz to 900 MHz) max. 1.40 (900 MHz to 3 GHz)

Control Interfaces

Front Panel	LED status indicators and manual push button switch control
Ethernet	Connector: RJ-45 Speed: 10/100 Base-T
Web GUI	Internet Explorer, Firefox, etc. Connector: RJ-45 Ethernet
Modbus/TCP	Connector: RJ-45 Ethernet
Serial Switch Control	DB9 (female)

Power Supply

Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 50 VA

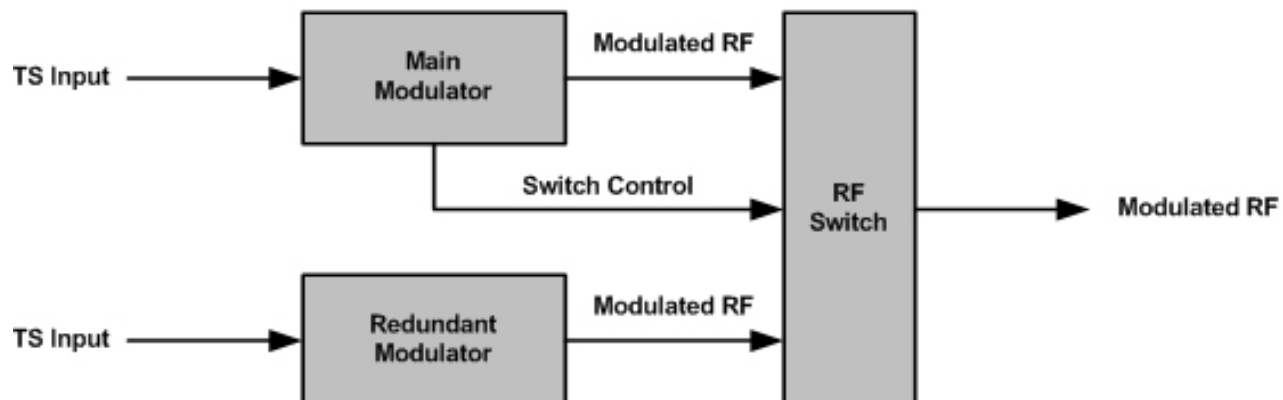
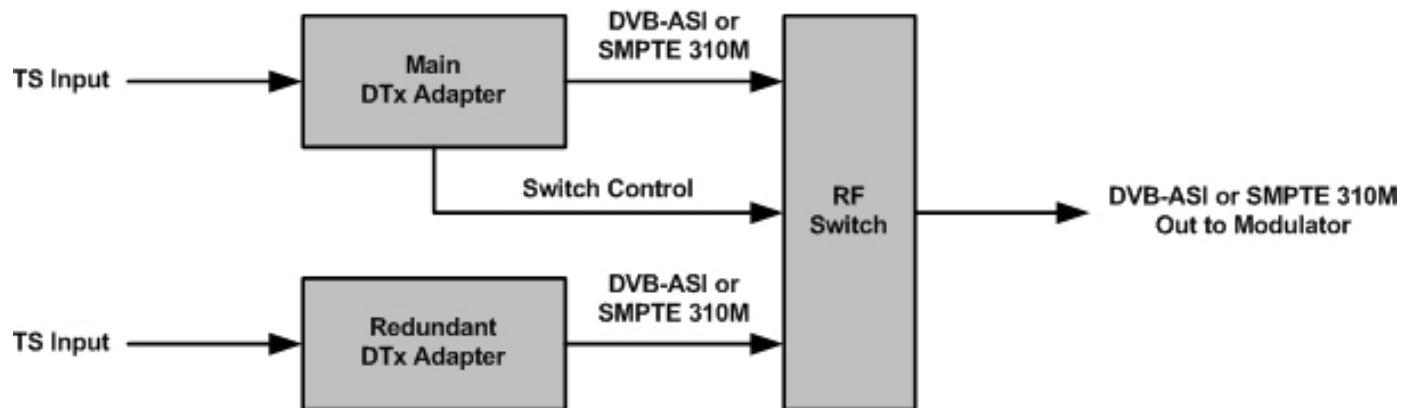
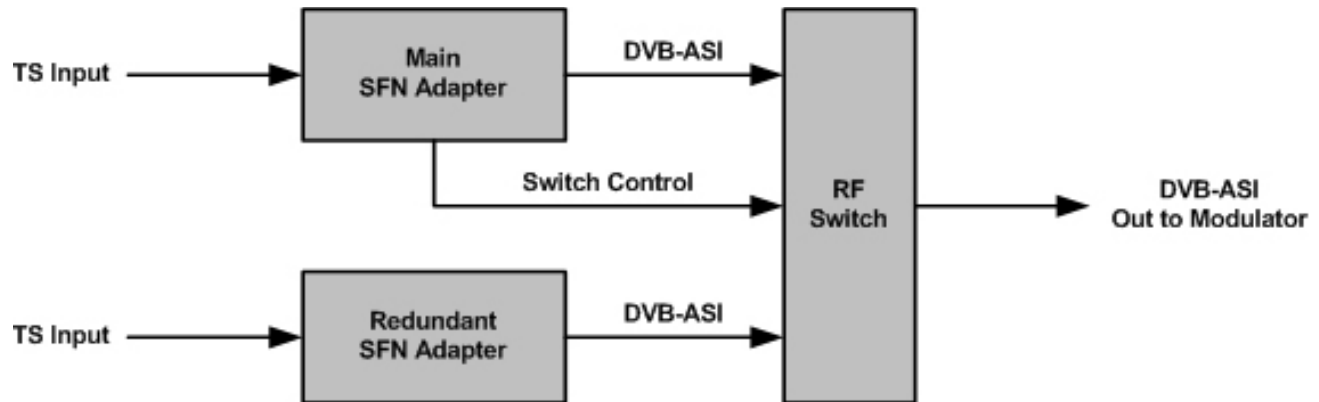
Environmental

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
Cooling	Internal fans to assist natural convection

Mechanical

Size	1 U of 19" wide cabinet
Dimensions (W x H x D)	483mm x 44.5mm x 362mm (19" x 1.75" x 14.25")
Weight	3.6 kg (8 lbs.)

Application Block Diagrams



Universal Network Adapter

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/T_B 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/T_B Multiplexer/Re-multiplexer 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.

Universal Network Adapter

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

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 megafame 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 megafame, 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/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.



Universal Network Adapter

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*
- *$\frac{1}{2}$ and $\frac{3}{4}$ 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*

Universal Network Adapter

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.



Universal Network Adapter

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.

Universal Network Adapter

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*

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*

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.



Universal Network Adapter

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*

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

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.



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

Universal Network Adapter

Model: UNA 7000



Front Panel

Multi-Standard SFN Adapter Specifications

DVB-T Signal Processing

Input monitoring	<ul style="list-style-type: none"> • Transport stream presence • Input Data overflow • Sync 188 byte presence • Sync 204 byte presence
FFT Modes	2K, 8K
Guard Intervals	1/4, 1/8, 1/16, 1/32
Code Rates	1/2, 2/3, 3/4, 5/6, 7/8
Constellations	QPSK, 16-QAM, 64-QAM
Channel Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz
Hierarchical Mode	Alpha - 1, 2 and 4 for 16-QAM and 64-QAM
Max Delay (data)	0 - 1.0 sec, resolution 100 ns
Signal Substitution	Output transport stream is replaced with null packets and MIP in case of input data loss

DTMB Signal Processing

Input monitoring	<ul style="list-style-type: none"> • Transport stream presence • Input Data overflow • Sync 188 byte presence
FFT Modes	3780, Single Carrier
Guard Intervals	945, 595, 420 symbols
Code Rates	0.4, 0.6, 0.8
Constellations	QPSK, 4-QAM-NR, 16-QAM, 32-QAM, 64-QAM
Time Interleaver	240, 720 symbols
Channel Bandwidth	8 MHz, 7 MHz, 6 MHz
Frame Duration	500 us, 571.43 us, 666.67 us
Sub-Carrier Spacing	2 kHz, 1.75 kHz, 1.5 kHz
Max Delay (data)	0 - 1.0 sec, resolution 100 ns
Signal Substitution	Output transport stream is replaced with null packets and SIP in case of input data loss

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).

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	2 Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
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.

Signal Inputs

MPEG Transport Stream	2 ASI inputs: BNC (F), 75 Ω
GbE Transport Stream (Optional)	2 Connector: RJ45 Protocol: Pro-MPEG CoP #3
10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm
1 PPS (Note 1)	Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition

Signal Outputs

MPEG Transport Stream	2 ASI outputs: BNC (F), 75 Ω
GbE Transport Stream (Optional)	2 Connector: RJ45 Protocol: Pro-MPEG CoP #3
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
Time Reference - 1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition



Universal Network Adapter

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 main and backup multiplexers.
Clock Reference - 10 MHz	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, \pm 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 between main and backup units. Normal Open, used for remote shutdown.

DTx Adapter Specifications

Signal Inputs

DVB-ASI (IN A, IN B)	2x Connectors: BNC (F) Impedance: 75 Ω
SMPTE 310M (optional) (AUX D)	1x Connector: BNC (F) Impedance: 75 Ω

Signal Outputs

DVB-ASI (OUT A, OUT B)	2x Connectors: BNC (F) Impedance: 75 Ω
SMPTE 310M (optional) (AUX C)	1x Connector: BNC (F) Impedance: 75 Ω

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	2 Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
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.

Universal Network Adapter

Model: UNA 7000



ATSC-M/H Multiplexer Specifications

Signal Inputs

ATSC- M/H IP Input	Service Ethernet Interface Connector: RJ45
ATSC Legacy Transport Stream ASI Input	2 Connectors: BNC (F), 75 Ω
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm
Time Reference - 1 PPS (Note X1)	Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition
GPS Antenna	Connector: F-type (F), 75 Ω

Signal Outputs

ATSC-M/H Transport Stream ASI Output	2 Connectors: BNC (F), 75 Ω Bit Rate: 19.39 Mbps
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, \pm 2.5 dB sinewave
Time Reference - 1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
MGMT Ethernet Interface	Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
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

ISDB-T/Tb Mux/Re-mux Specifications

Signal Input

DVB-ASI	2x Input Connectors: BNC (F) (6x Inputs optional) Impedance: 75 Ω TS Packet Size: 188/204 bytes
GbE Transport Stream (optional)	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
BTS Output	
DVB-ASI	2x Output Connectors: BNC (F) Impedance: 75 Ω
BTS Specification	Based on ARIB STD-B31 and ABNT NBR 15601:2007
Bit Rate	512X4/63 Mbps (~32.508 Mbps)

10 MHz and 1PPS Inputs

10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm
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
Ethernet Interface	2 Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
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

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).



Universal Network Adapter

Model: UNA 7000

DVB-ASI to IP Bridge Specifications

Video Interface

DVB-ASI Input 6 Connectors: BNC (F)
Impedance: 75 Ω

DVB-ASI Output 8 Connectors: BNC (F)
Impedance: 75 Ω

Network Interface

Ethernet 2 Connectors: RJ45
(data and control interchangeable)
Speed: 10/100/1000 Base-T
Protocol: Pro-MPEG CoP #3 / SMPTE 2022

Reference Input

Clock Reference - 10 MHz Connector: BNC (F)
Frequency: 10 MHz
Level: 0 dBm to 15 dBm
Impedance: 50 Ω

Control Interfaces

Front Panel LCD display and cursor/ execute keys

Ethernet Interface 2 Connector: RJ45
Speed: 10/100/1000 Base-T

USB Interface Connector: USB Type B

RS232 Interface Connector: 9-pin SUB-D Male

RS485 Interface Connector: 9-pin SUB-D Female

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

GPS Receiver Specifications

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
100 kHz: < -155 dBc/Hz

1PPS Output Signal Level: TTL

Universal Network Adapter

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
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.



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: $\frac{1}{2}$ and $\frac{3}{4}$
- Internal GPS
- Optional Hot Swapping between main and backup multiplexers



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

Product Description

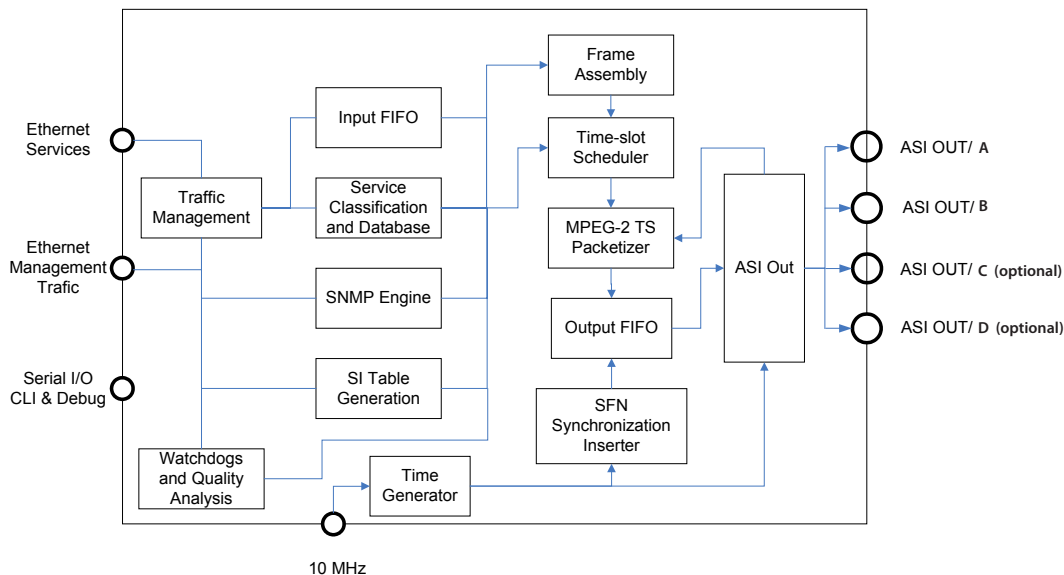
Multiplexing is used to encapsulate multiple Audio, Video, and Data services and Control information in Multiplex Frames (MMB Part 1, 2).

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.

CMMB Multiplexer

Model: UNA 7000



UNA 7000 - CMMB Multiplexer Block Diagram

Product Specifications

Signal Input

Input	Services
Interface	Ethernet 10/100/1000 Base-T (SVC)
Connector	RJ45

Signal Output

Output	CMMB Multiplexed Transport Stream
Interface	ASI
Connector	BNC (F), 75 ohm (x2) Optional 4 output configuration for Hot Swapping between main and backup units.

GPS Antenna

Connector	F-type (F), 75 ohm
------------------	--------------------

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
-------------------------------	--

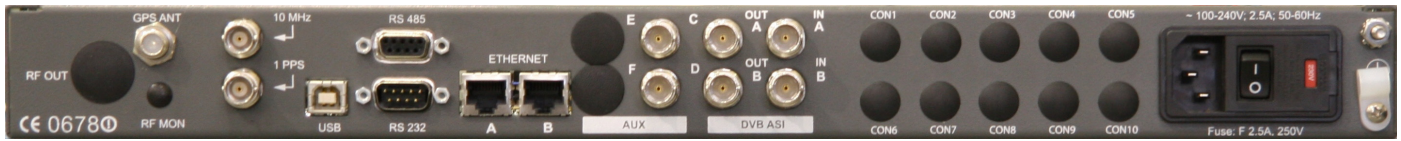
Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface (SVC)	Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
Web Interface	Internet Explorer 6.0+ Connectors: Ethernet (SVC)
SNMP Control Interface	Connectors: Ethernet (SVC) MIB's are provided
CLI	Connector: USB (HyperTerminal) or Ethernet SVC (HyperTerminal or Telnet)
Remote Control (optional)	Connector: DB9 (F) Used for optional Hot Swapping between main and backup units. Normal Open, used for remote shutdown.



CMMB Multiplexer

Model: UNA 7000



Rear Panel

Product Specifications

Power Supply

Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 45 VA

Mechanical

Size	1 U of 19" wide cabinet
Dimensions (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.)

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
Cooling	Temperature controlled fan to assist natural convection

ETSI Compliance

Essential Requirement
R&TTE Directive 1995/5/EC

Safety

Standard / Specification

Health

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

EMC

Not applicable. No antenna.

EN 301 489-1 V1.8.1

CE Compliance

This equipment is CE Compliant.

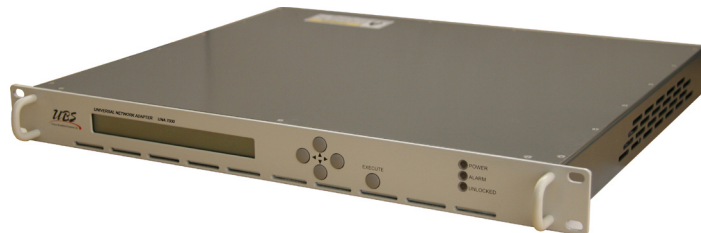


DVB-T/ DTMB SFN Adapter

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)*



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 megafame 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 megafame, 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



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.

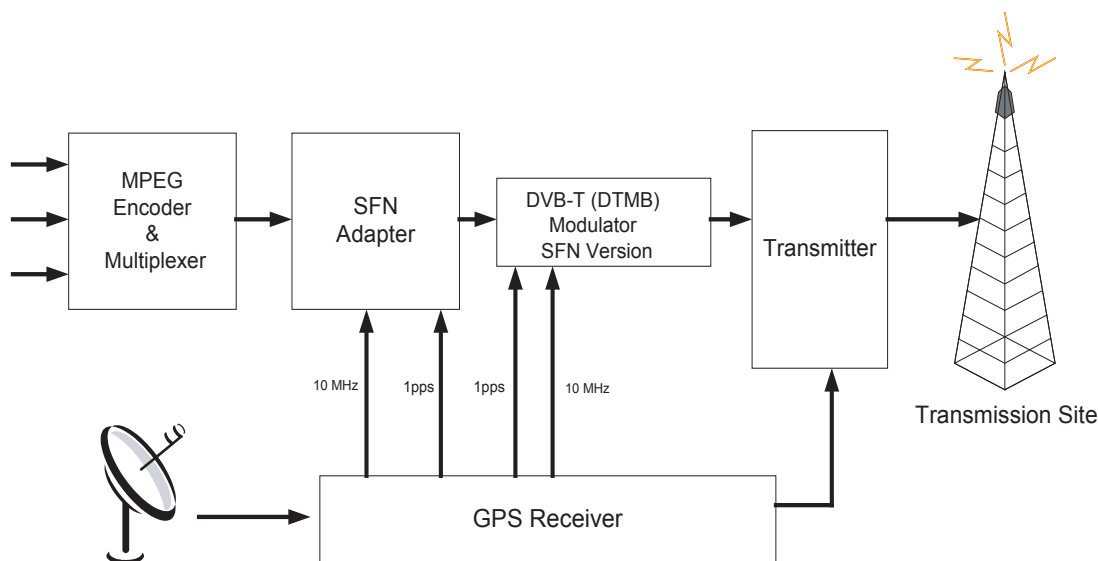
GbE Transport Stream Input/Output (optional)

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





DVB-T/ DTMB SFN Adapter

Model: UNA 7000



Rear Panel

Product Specifications

DVB-T Signal Processing

Input monitoring	<ul style="list-style-type: none"> • Transport stream presence • Input Data overflow • Sync 188 byte presence • Sync 204 byte presence
FFT Modes	2K, 8K
Guard Intervals	1/4, 1/8, 1/16, 1/32
Code Rates	1/2, 2/3, 3/4, 5/6, 7/8
Constellations	QPSK, 16-QAM, 64-QAM
Channel Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz
Hierarchical Mode	Alpha - 1, 2 and 4 for 16-QAM and 64-QAM
Max Delay (data)	0 - 1.0 sec, resolution 100 ns
Signal Substitution	Output transport stream is replaced with null packets and MIP in case of input data loss

DTMB Signal Processing

Input monitoring	<ul style="list-style-type: none"> • Transport stream presence • Input Data overflow • Sync 188 byte presence
FFT Modes	3780, Single Carrier
Guard Intervals	945, 595, 420 symbols
Code Rates	0.4, 0.6, 0.8
Constellations	QPSK, 4-QAM-NR, 16-QAM, 32-QAM, 64-QAM
Time Interleaver	240, 720 symbols
Channel Bandwidth	8 MHz, 7 MHz, 6 MHz
Frame Duration	500 us, 571.43 us, 666.67 us
Sub-Carrier Spacing	2 kHz, 1.75 kHz, 1.5 kHz
Max Delay (data)	0 - 1.0 sec, resolution 100 ns
Signal Substitution	Output transport stream is replaced with null packets and SIP in case of input data loss

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).

Control Interfaces

Front Panel

LCD display and cursor/ execute keys

Ethernet Interface

2 Connector: RJ45
Speed: 10/100/1000 Base-T

USB Interface

Connector: USB Type B

RS232 Interface

Connector: 9-pin SUB-D Male

RS485 Interface

Connector: 9-pin SUB-D Female

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.

Signal Inputs

MPEG Transport Stream

2 ASI inputs: BNC (F), 75 Ω

GbE Transport Stream (Optional)

2 Connectors: RJ45
Protocol: Pro-MPEG CoP #3

10 MHz (Note 1)

Connector: BNC (F), 50 Ω
Frequency: 10 MHz
Level: 0 dBm to 15 dBm

1 PPS (Note 1)

Connector: BNC (F), 50 Ω
Frequency: 1 PPS
Level: TTL
Trigger: Positive transition

Signal Outputs

MPEG Transport Stream

2 ASI outputs: BNC (F), 75 Ω

GbE Transport Stream (Optional)

2 Connector: RJ45
Protocol: Pro-MPEG CoP #3

Clock Reference - 10 MHz (Note 1)

Connector: BNC (F), High Impedance
Frequency: 10 MHz
Level: 10 dBm, ± 2.5 dB sinewave

Time Reference - 1 PPS (Note 1)

Connector: BNC (F), High Impedance
Frequency: 1 PPS
Level: TTL
Trigger: Positive transition

DVB-T/ DTMB SFN Adapter

Model: UNA 7000



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	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	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.





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

ATSC- M/H IP Input	Service Ethernet Interface Connector: RJ45
ATSC Legacy Transport Stream ASI Input	2 Connectors: BNC (F), 75 Ω
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm
Time Reference - 1 PPS (Note X1)	Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition
GPS Antenna	Connector: F-type (F), 75 Ω

Signal Outputs

ATSC-M/H Transport Stream ASI Output	2 Connectors: BNC (F), 75 Ω Bit Rate: 19.39 Mbps
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
Time Reference - 1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
MGMT Ethernet Interface	Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
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

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.



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).



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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Level: TTL

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)	2x Connectors: BNC (F) Impedance: 75 Ω
SMPTE 310M (optional) (AUX D)	1x Connector: BNC (F) Impedance: 75 Ω

Signal Outputs

DVB-ASI (OUT A, OUT B)	2x Connectors: BNC (F) Impedance: 75 Ω
SMPTE 310M (optional) (AUX C)	1x Connector: BNC (F) Impedance: 75 Ω

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	2 Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
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.

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.





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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Level: TTL

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*



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*

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.

ISDB-T/T_B Multiplexer / Re-multiplexer

Model: UNA 7000



Rear Panel

Product Specifications**Signal Input**

DVB-ASI	2x Input Connectors: BNC (F) (6x Inputs optional) Impedance: 75 Ω TS Packet Size: 188/204 bytes
GbE Transport Stream (optional)	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
BTS Output	
DVB-ASI	2x Output Connectors: BNC (F) Impedance: 75 Ω
BTS Specification	Based on ARIB STD-B31 and ABNT NBR 15601:2007
Bit Rate	512X4/63 Mbps (~32.508 Mbps)

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	2 Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
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

10 MHz and 1PPS Inputs

10 MHz (Note 1)	Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm
1 PPS (Note 1)	Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition

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.



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).



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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Level: TTL

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 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 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

DVB-ASI-to-IP Bridge

Model: UNA 7000



Rear Panel

Product Specifications

Video Interface

DVB-ASI Input	6 Connectors: BNC (F) Impedance: 75 Ω
DVB-ASI Output	8 Connectors: BNC (F) Impedance: 75 Ω

Network Interface

Ethernet	Speed: 10/100/1000 Base-T 2 Connectors: RJ45 (data and control interchangeable) Protocol: Pro-MPEG CoP #3 / SMPTE 2022
-----------------	--

Reference Input

Clock Reference - 10 MHz	Connector: BNC (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω
---------------------------------	---

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	2 Connector: RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connector: 9-pin SUB-D Female
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

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
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.

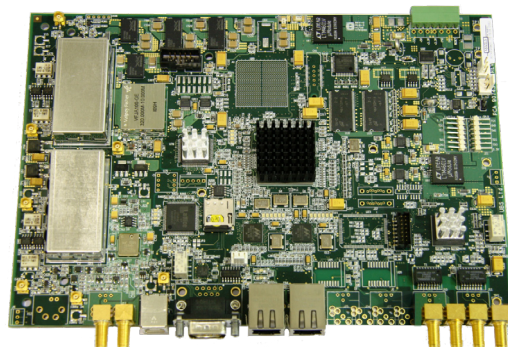


OEM DVB-ASI-to-IP Bridge

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

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 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 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

OEM DVB-ASI-to-IP Bridge

Model: DV-IP-ASI-1G



Product Specifications

Video Interface

DVB-ASI Input	2 Connectors: SMA (F) Impedance: 50 Ω
DVB-ASI Output	2 Connectors: SMA (F) Impedance: 50 Ω

Reference Input

Clock Reference - 10 MHz	Connector: SMA (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω
---------------------------------	---

Network Interface

Ethernet	Speed: 10/100/1000 Base-T 2 Connectors: RJ45 (data and control interchangeable) Protocol: Pro-MPEG CoP #3 / SMPTE 2022
-----------------	--

Control & Management

Ethernet	10/100/1000 Base-T
Web GUI	Live statistics and monitoring
Supervision	Full SNMP v2 support Gets, sets and configurable traps for NMS supervision
Front Panel	LCD display and cursor/ execute keys
Interactive CLI Commands	RS232 (DB9-M), USB

Power Supply

Voltage	12 Vdc: 6 Pin Header (Board) DC Jack, 2.1mm ID, 5.3mm OD (Enclosed)
Power Consumption	max. 27 VA

Mechanical

Board Dimensions (W x H x D)	234mm x 13mm x 163mm (9.2" x 0.5" x 6.4")
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")
Enclosed Weight	1 kg (2.2 lbs.)

Environmental

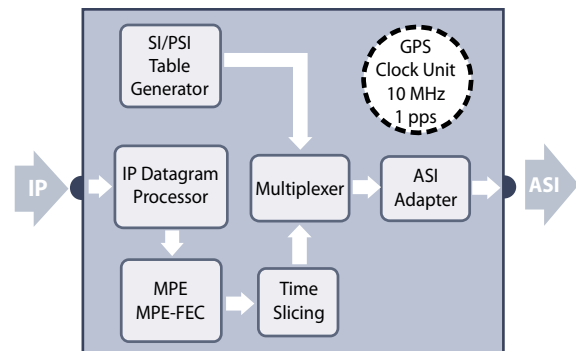
Operating Temperature	0°C to +50°C (+32°F to +122°F)
Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Relative Humidity (operating/storage)	max. 95%
Cooling	Temperature controlled fan to assist natural convection (Enclosed only)

DVB-SH IP Encapsulator

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



DVB-SH IP Encapsulator Functional Diagram

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.

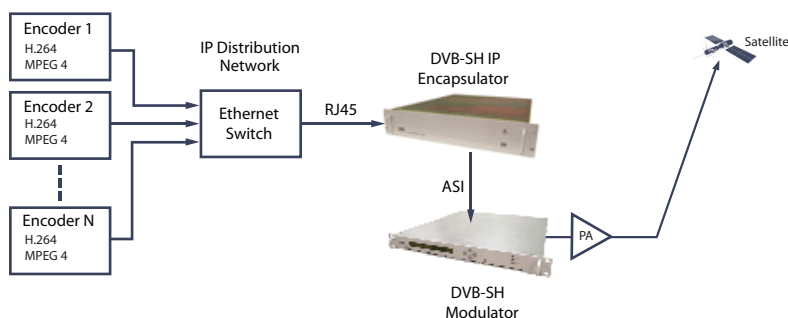
“Slotted allocation” or “static time-slicing” mode is one simple solution to this problem. In this mode, the device allocates constant portions of the time frame for each service and fills the bursts when IP datagrams become available. Obviously, this approach is not efficient and wastes bandwidth during 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.

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.

Typical DVB-SH Network Diagram



DVE 6000S Advantages over competing products



- *Two operational 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:

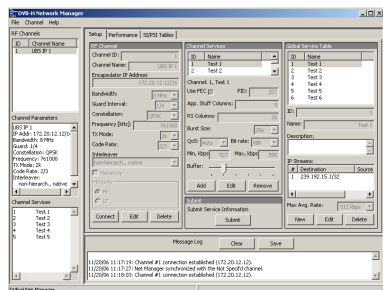
Remote setup and configuration of:

- Encapsulator services and parameters
- Network Topology
- Device Control

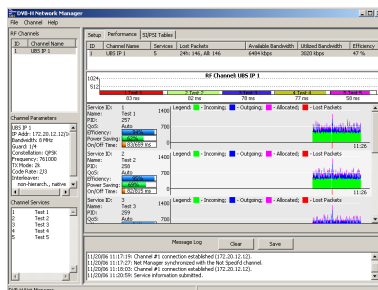
Monitoring of:

- Service Transmission
- Network Efficiency

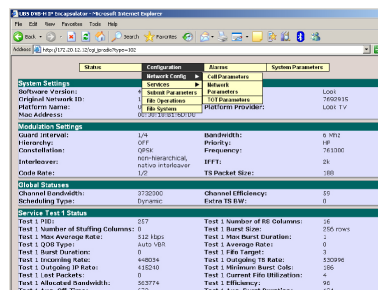
NetManager Setup



NetManager Performance Monitoring



Web GUI Interface





DVB-SH IP Encapsulator

Model: DVE 6000S

DVB-SH IP Encapsulator Features

- User Selectable Reed Solomon: (0 - 64 RS columns)
(0 - 190 Stuffing columns)
- Very accurate time slicing control: ≤ 10 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	CLI (Command Line Interface) Connector: DB9 (M)
RS232 Serial Interface Debug	Reserved for factory test and debug Connector: DB9 (M)

Standards Compliance

ETSI EN 301 192	EN 50083-9
ETSI EN 300 744	ISO/IEC 13818-1
ETSI EN 302 304	ISO/IEC 13818-6
ETSI EN 300 468	DVB Doc A110
ETSI TS 101 191	DVB Doc A111

General Product Specifications

Signal Input

Traffic Input	Ethernet 10/100 Base-T
Connector	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")
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
Cooling	Temperature controlled fan to assist natural convection

(specifications are subject to change without notice)



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.



Unique Broadband Systems Ltd.



Rear Panel

Product Specifications

Transport Stream Analyzer

DVB-ASI Input (IN A, IN B)	2x connectors: BNC (F), 75 Ω
DVB-ASI Output (OUT A, OUT B)	2x connectors: BNC (F), 75 Ω (Input MPEG-2 TS loop-through; no TS modification performed)
Gb Ethernet Input	Connector: 2x RJ45 Speed: 10/100/1000 Base-T

RF Signal Analyzer

RF 1 (HPA feedback input)	Connector: SMA (F), 50 Ω Frequency: 470 MHz to 862 MHz Level: -12 dBm \pm 3 dB
RF 2 (BPF feedback input)	Connector: SMA (F), 50 Ω Frequency: 470 MHz to 862 MHz Level: -12 dBm \pm 3 dB

Optical Media Converter

Fibre Rx (Input)	Connector: ST / Single Mode Interface: 1000Base-LX Wavelength: 1310 nm
Fibre Tx (Output)	Connector: ST / Single Mode Interface: 1000Base-LX Wavelength: 1310 nm

Other Inputs/Outputs

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)
Relay	Connector: 9-pin SUB-D Male Four alarm relays, triggered by any alarm

GPS/GLONASS 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 / GLONASS - L1 frequency range
32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS
Tracking Capability	24 simultaneous satellite vehicles
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	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Timing Accuracy 1 PPS + 10 MHz	< 100 ns
Holdover Time	\leq 2.5 μ sec during 2 hours
10 MHz Output	4x connectors: SMA (F), 50 Ω Level: 10 dBm \pm 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 100 kHz: < -155 dBc/Hz
1PPS Output	2x connectors: SMA (F), 50 Ω Level: TTL

Site Controller

Model: STC 1000



Description and Application

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet WAN	2x connectors: RJ45 Speed: 10/100/1000 Base-T (Connected to Gb Ethernet Switch)
Ethernet LAN	2x connectors: RJ45 Speed: 10/100/1000 Base-T (Connected to Main System Controller)
USB	Connector: 9-pin SUB-D Male
RS-232	Connector: 9-pin SUB-D Male
RS-485 (A)	Connector: 9-pin SUB-D Female
RS-485 (B)	Connector: 9-pin SUB-D Female
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
	Primary interface for configuration and control of all functions including TS Analyzer, RF Signal Analyzer, Modbus interface, etc.
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
Machine-Machine	Connector: Ethernet, RS-232, RS-485

Power Supply

Voltage	90 – 132 / 180 – 264 VAC
Frequency	47 - 63 Hz
Power Consumption	max. 130 VA
Harmonic Correction	EN61000-3-2

Environmental

Operating Temperature	0°C to +50°C (+32°F to +122°F)
Storage Temperature	-10°C to +70°C (14°F to +158°F)
Relative Humidity (operating/storage)	10% to 90%, non-condensing
Cooling	Internal fans to assist natural convection

Mechanical

Size	1 U of 19" wide cabinet
Dimension (W x H x D)	482.6 mm x 43.9 mm x 520.7 mm (19" x 1.73" x 20.5")
Weight	7.75 kg (17 lbs)
Transport and Storage	Vibration acc. to IEC Publ.68

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.

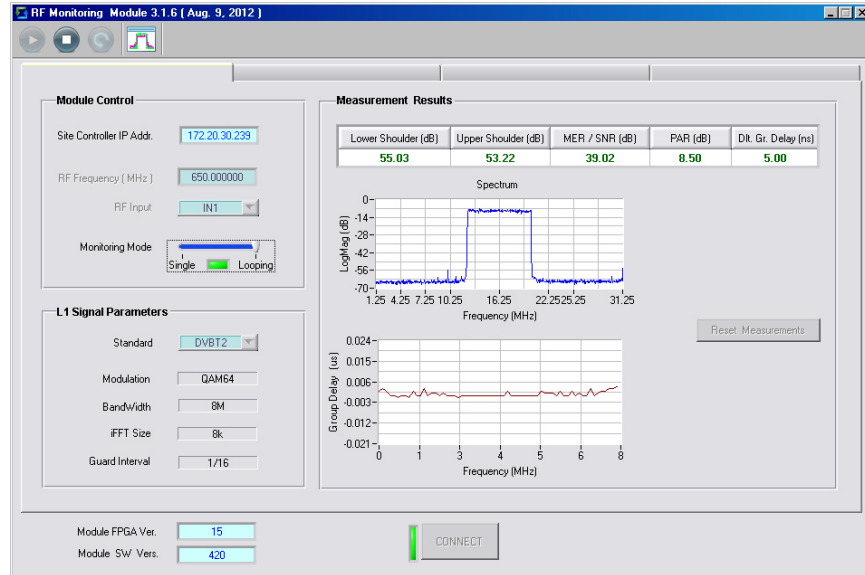
The Signal Analyzer is intended for indoor use and can be fitted with a bracket that allows it to be mounted securely in a 19" wide rack.

RF Signal Analyzer

Model: TSA 5000

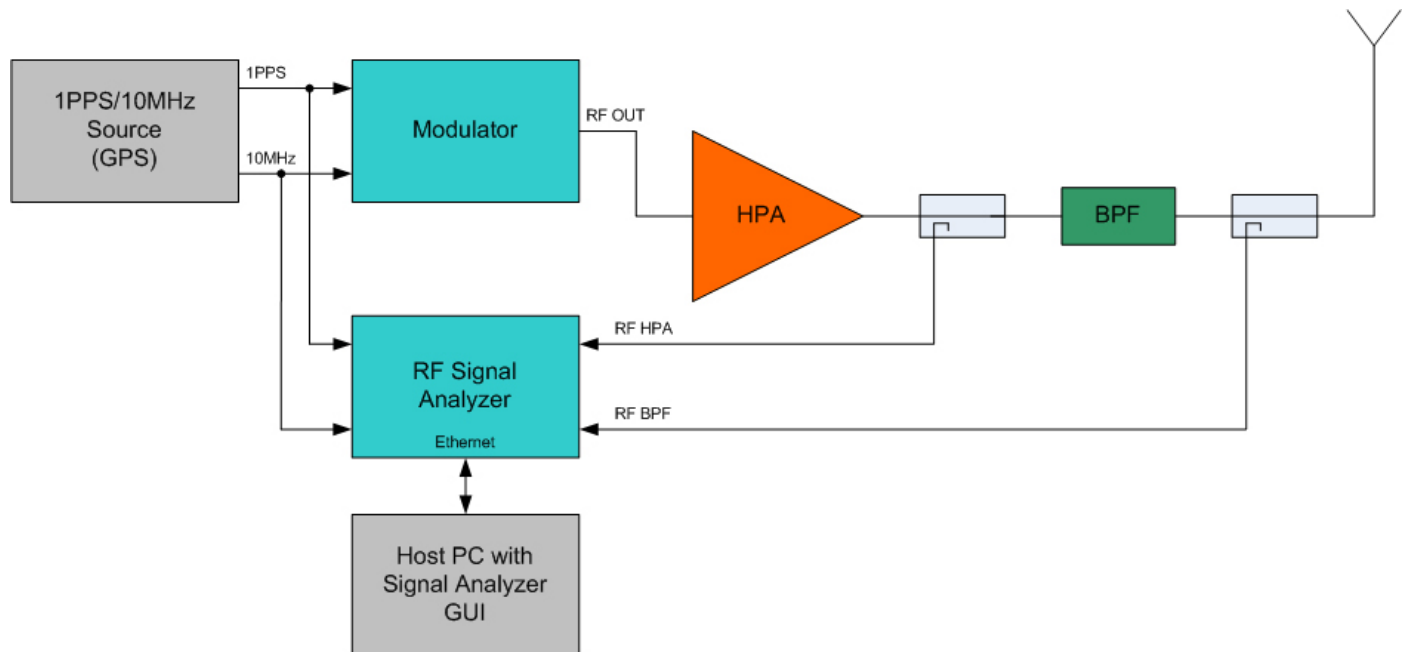


Signal Analyzer PC GUI



PC GUI

Transmitter Block Diagram with RF Signal Analyzer





RF Signal Analyzer

Model: TSA 5000

Product Specifications

Signal Inputs

RF IN1 (HPA Feedback Input)	Connector: SMA (F) Frequency: VHF (170 to 230 MHz) UHF (470 to 862 MHz) (L-Band or S-Band available upon request) Level: -12 dBm \pm 3 dB Impedance: 50 Ω
RF IN2 (BPF Feedback Input)	Connector: SMA (F) Frequency: VHF (170 to 230 MHz) UHF (470 to 862 MHz) (L-Band or S-Band available upon request) Level: -12 dBm \pm 3 dB Impedance: 50 Ω

Reference Frequency Inputs

10MHz IN	Connector: SMA (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω
1PPS IN	Connector: SMA (F) Frequency: 1 Hz Level: TTL Trigger: Positive transition Impedance: 50 Ω

Reference Frequency Outputs

10MHz OUT	Connector: SMA (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω
1PPS OUT	Connector: SMA (F) Frequency: 1 Hz Level: TTL Trigger: Positive transition Impedance: 50 Ω

Control Interfaces

Ethernet Interface	Connector: RJ45 Speed: 10/100 Base-T
USB Interface	Connector: USB Type A
RS-232 Interface	Connector: 9-pin SUB-D Male
Web Interface	Connector: Ethernet
PC GUI	Connector: Ethernet
SNMP Control Interface	Connector: Ethernet Note: MIBs can be provided
Alarm Relays	Connector: RS-232 2 SPDT relays

Power Supply

Voltage	12 VDC
Power Consumption	max. 15 Watts

Mechanical

Dimensions (W x H x D)	261.37mm x 44.894mm x 211.63mm (10.290" x 1.610" x 8.332")
Weight	1 kg (2.2 lbs.)

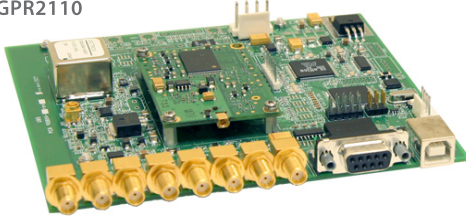
Environmental

Operating Temperature	+5°C to +45°C (+41°F to +113°F)
Storage Temperature	-30°C to +75°C (-22°F to +158°F)
Relative Humidity	max. 95%, non condensing
Cooling	Internal fan to assist natural convection

GPS Receiver

Models: GPR2100, GPR2110, GPR2120, GPR1100

GPR2110



GPR1100



GPR2120



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

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



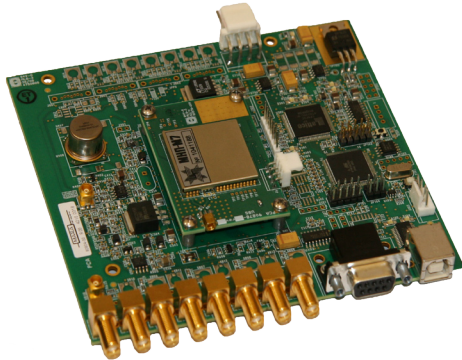
Product Specifications

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 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
	Operating Temperature	0°C to +55°C (32°F to +131°F)
	Storage Temperature	-40°C to +85°C (-40°F to +185°F)
	Relative Humidity	max. 95%, non-condensing
Environmental Characteristics	Altitude	3,048 m (10,000 ft.) maximum
	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)
Mechanical		

GPS/GLONASS Receiver

Models: GPR2100GL, GPR2110GL, GPR2120GL, GPR1100GL

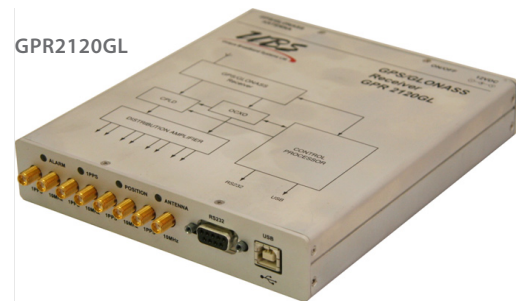
GPR2100GL



GPR1100GL



GPR2120GL



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

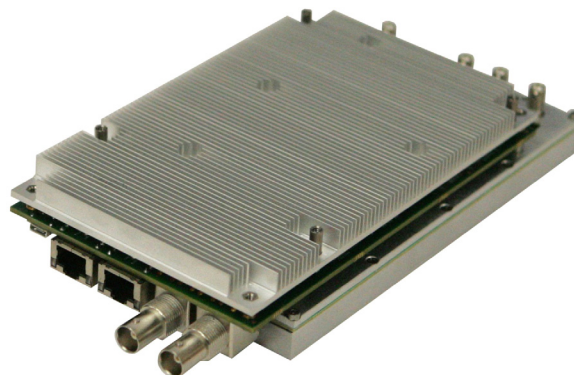
General Characteristics	Receiver Architecture	L1 - 1575.42 MHz / GLONASS - L1 frequency range
	32 parallel channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided tracking)
Performance Characteristics	Tracking Capability	24 simultaneous satellite vehicles
	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	GPS: < 10m / 20m GLONASS: < 10 m / 20m
	Timing Accuracy	< 100 ns
	1 PPS + 10 MHz	
	Holdover Time	≤ 2.5 µsec during 2 hours
	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
Antenna	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 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 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 - 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 only
	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
	Operating Temperature	0°C to +55°C (32°F to +131°F)
	Storage Temperature	-40°C to +85°C (-40°F to +185°F)
	Relative Humidity	max. 95%, non-condensing
Environmental Characteristics	Altitude	18,000 m
	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") - GPR2100GL, GPR2110GL 170.18mm x 30.5mm x 149.9mm (6.7" x 1.2" x 5.9") - GPR2120GL
	Weight	GPR1100GL –3 kg (6 lbs.), GPR2120GL – 0.8kg (1 lb. and 12 oz)
Mechanical		

DVB-SH Receiver

Model: DVR 8000SH

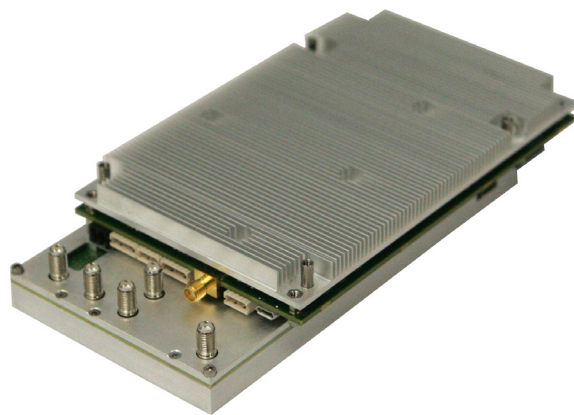
Product Features

- 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



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 combination 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 over-temperature protection.

An advanced level receiver could contain more than 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
RF Frequency Range	2560 MHz to 2590 MHz (Centre frequency can be tuned to any frequency in the range)
RF Bandwidth	1.7 MHz, 2.5 MHz, 3 MHz, 5 MHz
Data Rate	2 Mbps maximum
Modulation - TDM	QPSK, 8 PSK, 16 APSK
Modulation - OFDM	QPSK, 16 QAM
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
Guard Interval Ratio	1/4, 1/8, 1/16, 1/32
Interleaver	Configurable between class -I and class - II as per the standard
Diversity Support and Code Combining	MRC & Code combining between TDM & OFDM
MPE Decapsulator	Integrated MPE Decapsulator with MPE-FEC and IFEC support
Carrier Synchronization	LO offset correction > 20 KHz and 60 KM/H Doppler shift

Control Interfaces

Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: Micro USB Type B
RS485/RS232 Interface	Molex: 5-pos Micro Blade Header
CLI (Command Line Interface)	Connector: Micro USB (HyperTerminal) or Ethernet (Telnet)
Web GUI	Internet Explorer, Firefox, Chrome, etc. Connector: Ethernet
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
Alarm Relays	2 Dry Contact Alarm relays, triggered by any major alarm.
Machine to Machine Interface	Connector: Ethernet or RS485/RS232

Inputs

RF input 1	Connector: SMA (F), 50 Ω Frequency Range: 2560 MHz to 2590 MHz Level: -90 dBm min.
RF input 2	Connector: SMA (F), 50 Ω Frequency Range: 2560 MHz to 2590 MHz Level: -90 dBm min.

Outputs

DVB-ASI (OUT-A, OUT-B)	BNC (F), 75 Ω
GbE Transport Stream	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45

Power Supply

Voltage	Single 12 VDC (35W max.)
----------------	--------------------------

Mechanical

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")
Weight	0.65kg (1.45 lbs.)

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%

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

Modulation	TDS-OFDM
Supported Standards	GB20600-2006
Guard Intervals	PN420, PN595, PN945
FEC Rates	0.4, 0.6, 0.8
Constellations	64-QAM, 32-QAM, 16-QAM, 4QAM, 4QAM-NR
Time De-interleaving	M = 240 or M = 720
Bandwidth	8 MHz

RF Input

Connector	RF DTV, F-type (F), 75 ohm
Operating Frequency Range	UHF Band: 426 MHz - 862 MHz
Level	-87dBm to -20dBm
Frequency Step	1 MHz
Return Loss	≤ - 10 dB

Transport Stream Output

Signal	MPEG-2 Transport Stream - parallel
Connector	SPI: DB25 (F)

Control Interfaces

WEB Interface	Ethernet 10/100 Base-T
SNMP Control Interface	Connector: RJ45
Telnet	
RS232 (Console)	Connector DB9 (M) Protocol: CLI (Command Line Interface)
RS485 Interface	Connector DB9 (F) Reserved for factory use
USB Interface	Reserved for factory use

Power Supply

Voltage	100 - 120 VAC / 200 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 40 VA

Mechanical

Size	1 U of 19" wide cabinet
Dimensions (W x H x D)	483mm x 44mm x 356mm (19.0" x 1.75" x 14.0")
Weight	6 kg (13 lbs.)

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
Cooling	Fan to assist natural convection

120W UHF Transmitter/Repeater

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/T_B 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.

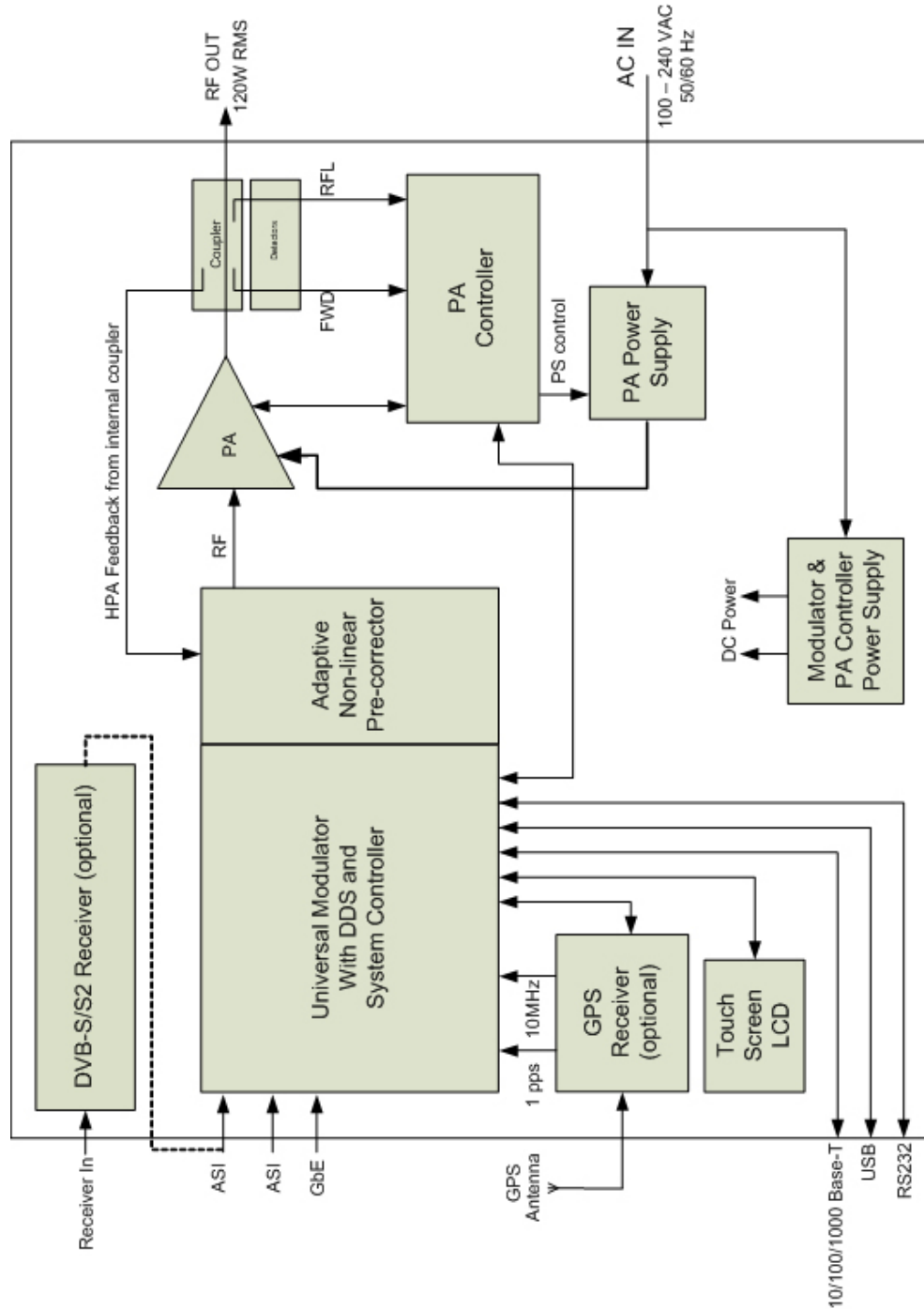
All of the transmitter's components are enclosed in a standard 19" rack mount chassis, occupying only 3 "RU" of cabinet space. The transmitter is forced air cooled using two compact high performance fans, which are installed on the transmitter enclosure front panel.

120W UHF Transmitter/Repeater

Model: DTX 1200U



Block Diagram

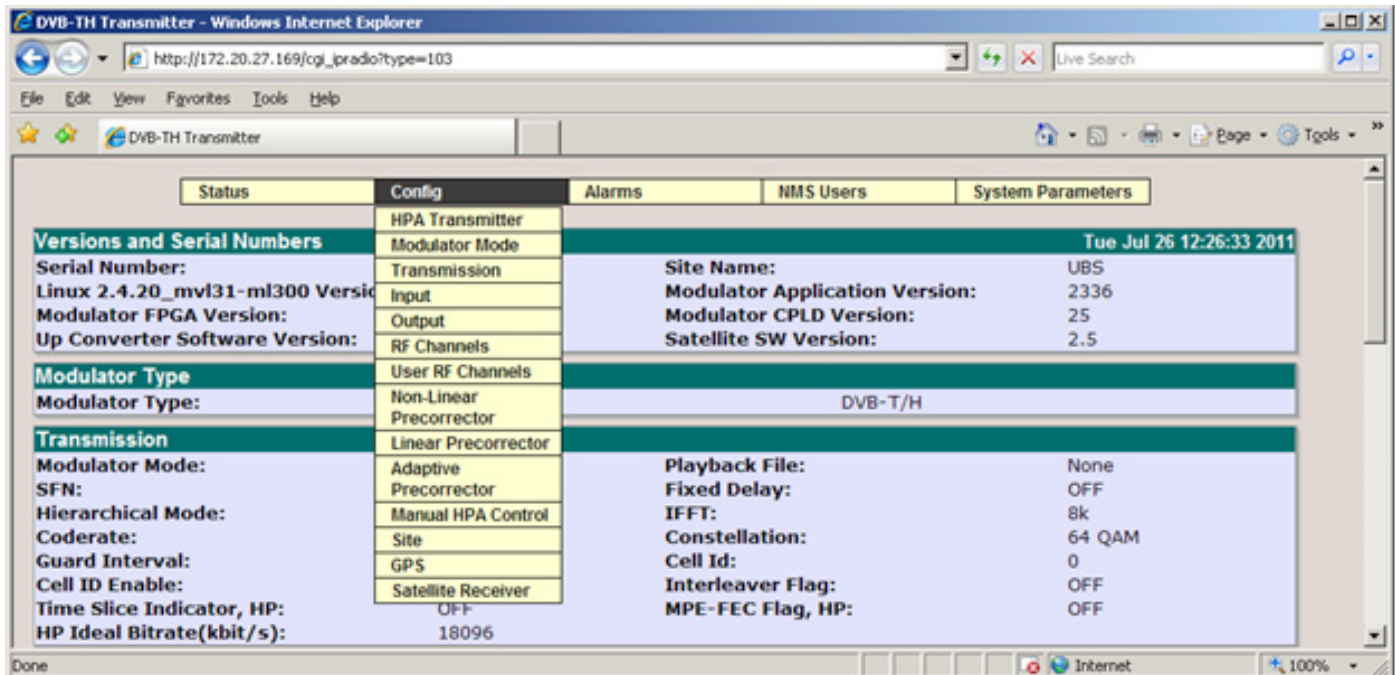




120W UHF Transmitter/Repeater

Model: DTX 1200U

Control Interfaces



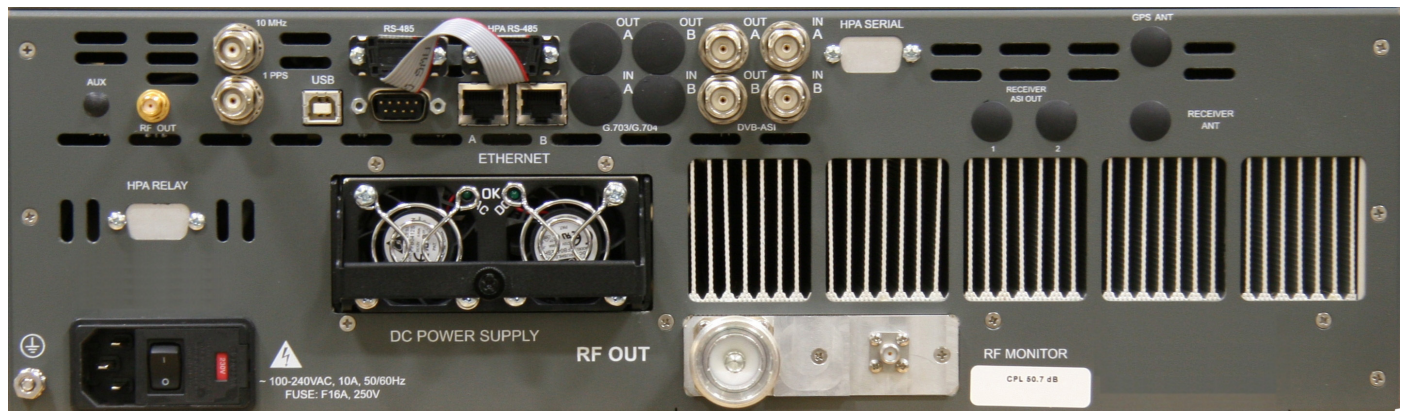
Web Interface



Touch Screen LCD

120W UHF Transmitter/Repeater

Model: DTX 1200U



Rear Panel

Product Specifications

Modulator Inputs

DVB-ASI (IN-A, IN-B)	2 DVB-ASI inputs: BNC (F), 75 Ω
SMPTE-310M (IN-A, IN-B)	2 inputs (optional): BNC (F), 75 Ω
GbE Transport Stream (DAB excluded)	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω
Time Reference - 1 PPS (Note 1)	Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω

Modulator Outputs

DVB-ASI (OUT-A, OUT-B)	2 DVB-ASI outputs: BNC (F) 75 Ω
Modulator RF Monitor	Connector: SMA (F), 50 Ω Level: 30 dB below RF output
Clock Reference - 10 MHz (Note 1)	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
Time Reference - 1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition

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).

Power Amplifier RF Output

RF Output Connector	7/16 DIN-type (F), 50 Ω
Operating Frequency Range	470 MHz - 860 MHz (Note 2)
Frequency Setting Accuracy	1 Hz step over entire operation range
Frequency Stability	1ppm internal, or in accordance with external GPS accuracy
Digital Average Output Power	120 Watts
Output Power Level Accuracy	$\leq \pm 0.25$ dB
Frequency Response	$\leq \pm 0.5$ dB
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)
Phase Noise (SSB)	100 Hz: < -80 dBc/Hz 1 kHz: < -85 dBc/Hz 10 kHz: < -95 dBc/Hz 100 kHz: < -100 dBc/Hz 1 MHz: < -110 dBc/Hz
Output Spurious Level	≤ -70 dBc
Output Harmonics	≤ -55 dBc
Out-of-Band Emissions	Compliant to FCC Part 27 [27.50(F)] requirements when using external mask filter
RF Monitor	Connector: SMA (F), 50 Ω Level: ~ 51 dB below the RF output

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.



120W UHF Transmitter/Repeater

Model: DTX 1200U

Product Specifications

Adaptive Non-linear Pre-correction

Frequency	470 MHz to 860 MHz
Spectral Regrowth Reduction	7 dB \pm 2 dB (Note 3)

Manual Digital Pre-Correction

Non-Linear Pre-Correction

Curve Formats	S 21 and VO/M
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	\pm 10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	\pm 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.

Control Interfaces

Front Panel	Touch screen LCD
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connectors: 9-pin SUB-D Female Must be connected to the HPA RS485 interface
HPA RS485 Interface	Connector: 9-pin SUB-D Female Must be connected to the RS485 interface
HPA Serial (RS232)	Connector: 9-pin SUB-D Male
Web Interface	Internet Explorer, Firefox, etc. Connector: Ethernet
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Alarm Relays	Connector: RS232 2 Dry Contact Alarm relays, triggered by any major alarm.

Power Supply

Voltage	100 - 240 VAC
Frequency	50/60 Hz
Power Consumption	max. 850 Watts
Power Factor	0.96

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
Cooling	Forced air

Mechanical

Size	3 U of 19" wide cabinet
Dimensions (W x H x D)	48.26cm x 13.28cm x 55.68cm (19" x 5.23" x 21.92")
Weight	18.5 kg (40.8 lbs.)

120W UHF Transmitter/Repeater

Model: DTX 1200U



Product Specifications for Option Features

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	Internally connected to the modulator input 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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL

GPS/GLONASS 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 / GLONASS - L1 frequency range
32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided tracking)
Tracking Capability	24 simultaneous satellite vehicles
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	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Timing Accuracy	< 100 ns
1 PPS + 10 MHz	
Holdover Time	≤ 2.5 μ sec during 2 hours
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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the exciter input Level: TTL

250W UHF Transmitter/Repeater

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/T_B 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.

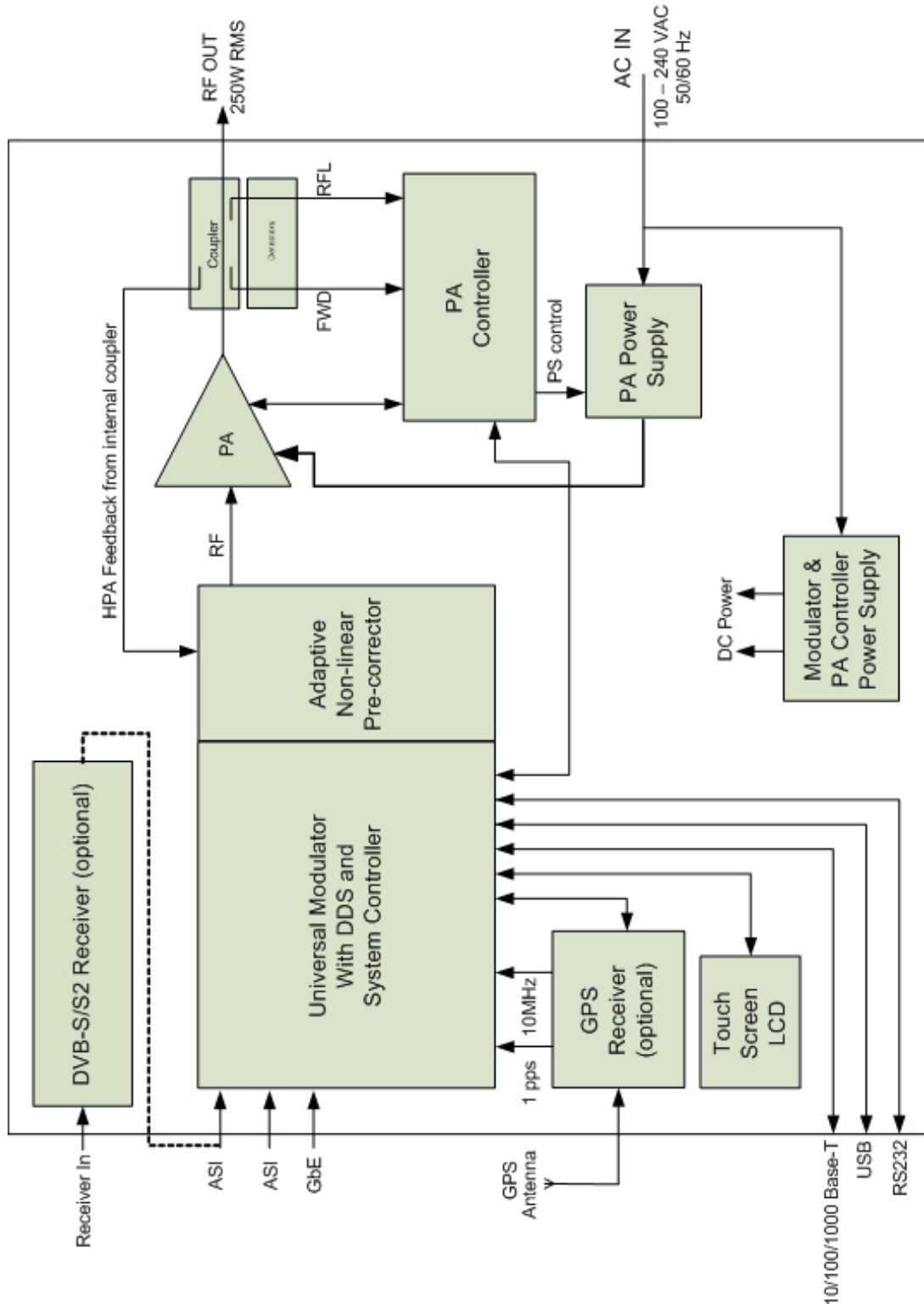
All of the transmitter's components are enclosed in a standard 19" rack mount chassis, occupying only 3 "RU" of cabinet space. The transmitter is forced air cooled using two compact high performance fans, which are installed on the transmitter enclosure front panel.

250W UHF Transmitter/Repeater

Model: DTX 2500U



Block Diagram

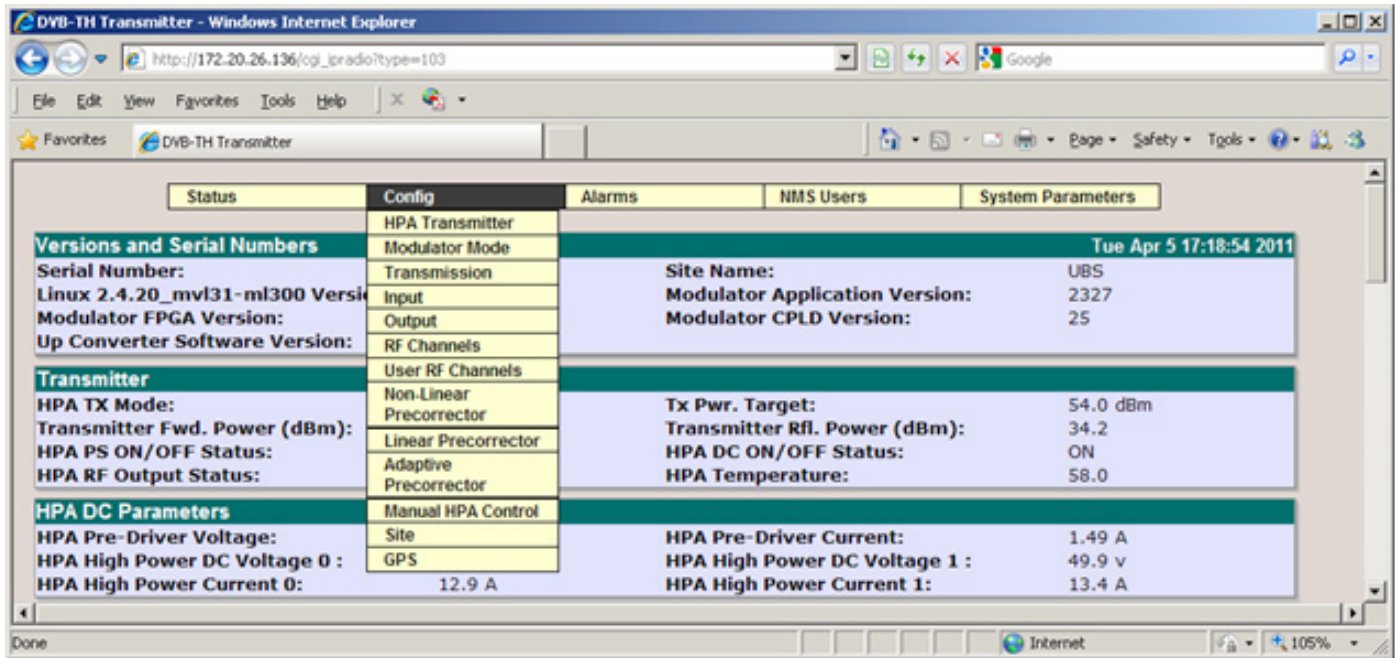




250W UHF Transmitter/Repeater

Model: DTX 2500U

Control Interfaces



Web Interface



Touch Screen LCD

250W UHF Transmitter/Repeater

Model: DTX 2500U



Rear Panel

Product Specifications

Modulator Inputs

DVB-ASI	IN-A, IN-B	2 DVB-ASI inputs: BNC (F), 75 Ω
SMPTE-310M	IN-A, IN-B	2 inputs (optional): BNC (F), 75 Ω
GbE Transport Stream (DAB excluded)		Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
HPA FB		SMA (F), 50 Ω Level: -15 dBm to 0 dBm
Clock Reference - 10 MHz (Note 1)		Connector: BNC (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω
Time Reference - 1 PPS (Note 1)		Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω

Modulator Outputs

DVB-ASI	OUT-A, OUT-B	2 DVB-ASI outputs: BNC (F) 75 Ω
Modulator RF Monitor		Connector: SMA (F), 50 Ω Level: 30 dB below RF output
Clock Reference - 10 MHz (Note 1)		Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
Time Reference - 1 PPS (Note 1)		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).

Power Amplifier RF Output

RF Output Connector	7/16 DIN-type (F), 50 Ω
Operating Frequency Range	470 MHz - 860 MHz (Note 2)
Frequency Setting Accuracy	1 Hz step over entire operation range
Frequency Stability	1ppm internal, or in accordance with external GPS accuracy
Digital Average Output Power	250 Watts
Output Power Set Point Range	10 dB
Output Power Level Accuracy	$\leq \pm 0.25$ dB
Output Level Stability vs. time	$\leq \pm 0.25$ dB/24 hrs max.
In-band IMD	≤ -29 dBc
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
Output Harmonics	≤ -60 dBc (with output filter)
Out-of-Band Emissions	Compliant to FCC Part 27 [27.50(F)] requirements when using external mask filter
RF Monitor	Connector: SMA (F), 50 Ω Level: 53 dB below the RF output

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.



250W UHF Transmitter/Repeater

Model: DTX 2500U

Product Specifications

Control Interfaces

Front Panel	Touch screen LCD
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	2 Connectors: 9-pin SUB-D Female The modulator RS485 interface is used for control of the amplifier
Web Interface	Internet Explorer, Firefox, etc. Connector: Ethernet
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Alarm Relays	Connector: RS232 2 Dry Contact Alarm relays, triggered by any major alarm.

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 \pm 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	\pm 10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	\pm 2000 ns
Group Delay Resolution	1 ns
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)

Power Supply

Voltage	100 - 240 VAC
Frequency	50/60 Hz
Power Consumption	max. 1500 Watts
Fuse	15A, 250V @ 110 VAC 10A, 250V @ 240 VAC

Mechanical

Size	3 U of 19" wide cabinet
Dimensions (W x H x D)	48.26 cm x 13.28 cm x 63.88 cm (19" x 5.23" x 25.15")
Weight	22 kg (48.5 lbs.)

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
Cooling	Forced air

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

250W UHF Transmitter/Repeater

Model: DTX 2500U



Product Specifications for Optional Features

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	Internally connected to the modulator input 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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL

GPS/GLONASS 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 / GLONASS - L1 frequency range
32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided tracking)
Tracking Capability	24 simultaneous satellite vehicles
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	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Timing Accuracy	< 100 ns
1 PPS + 10 MHz	
Holdover Time	≤ 2.5 μ sec during 2 hours
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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the exciter input Level: TTL

100W S-Band Transmitter

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.

100W S-Band Transmitter

Model: DTX 1000S



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.

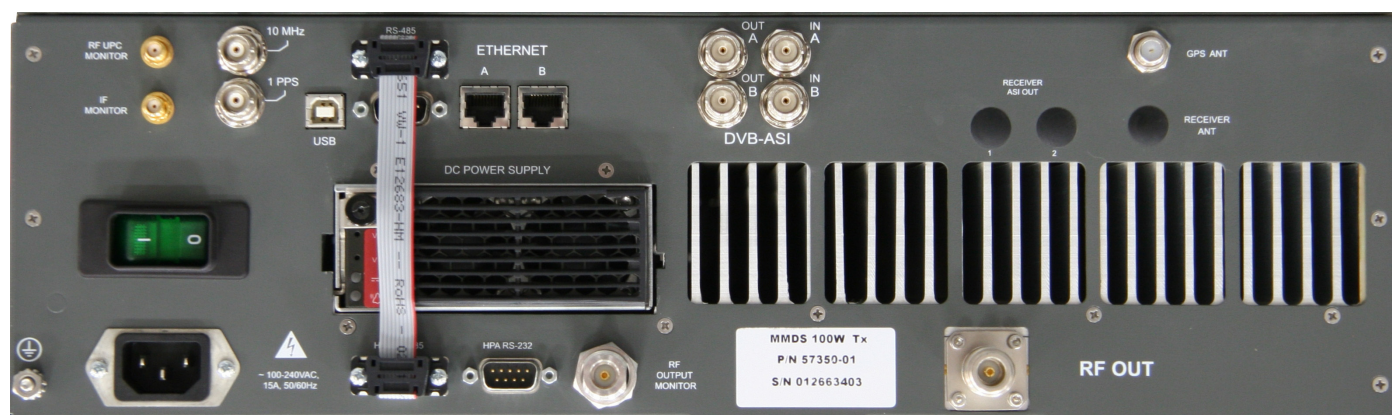
Manual Linear and Non-Linear Digital Pre-correctors

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



100W S-Band Transmitter

Model: DTX 1000S

Product Specifications

Control Interfaces

Front Panel	Touch screen LCD
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	Connectors: 9-pin SUB-D Female Must be connected to the HPA RS485 interface
HPA RS485 Interface	Connector: 9-pin SUB-D Female Must be connected to the RS485 interface
HPA Serial (RS232)	Connector: 9-pin SUB-D Male
Web Interface	Internet Explorer, Firefox, etc. Connector: Ethernet
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Alarm Relays	Connector: RS232 2 Dry Contact Alarm relays, triggered by any major alarm.

Exciter Inputs

DVB-ASI	2 inputs: BNC (F), 75 Ω
DVB-ASI / T2-MI	2 inputs: BNC (F), 75 Ω
GbE Transport Stream	Connector: RJ45 Protocol: Pro-MPEG Forum CoP #3 / SMPTE 2022
10 MHz (Note 1)	Connector: BNC (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω
1 PPS (Note 1)	Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω

Power Amplifier RF Output

RF Output Connector	N-type (F), 50 Ω
Operating Frequency Range	2500 MHz - 2700 MHz
Frequency Setting Accuracy	1 Hz step over entire operation range
Frequency Stability	1 ppm internal, or in accordance with external GPS accuracy
Digital Average Output Power	100 Watts
Output Power Level Accuracy	$\leq \pm 0.25$ dB
Frequency Response	$\leq \pm 0.5$ dB
MER	> 35 dB
In-band IMD	≤ -25 dBc (at rated output power)
Spectral Regrowth	≤ -30 dBc (at rated output power)
Phase Noise (SSB)	100 Hz: < -80 dBc/Hz 1 kHz: < -85 dBc/Hz 10 kHz: < -95 dBc/Hz 100 kHz: < -100 dBc/Hz 1 MHz: < -110 dBc/Hz
Output Spurious Level	≤ -70 dBc
Output Harmonics	≤ -55 dBc
RF Monitor	Connector: N-type (F), 50 Ω Level: 50 dB below the RF output

Exciter Outputs

DVB-ASI	2 outputs: BNC (F), 75 Ω
DVB-ASI / T2-MI	2 outputs: BNC (F), 75 Ω
Modulator RF Monitor	Connector: SMA (F), 50 Ω Level: 30 dB below RF output
10 MHz (Note 1)	Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
1 PPS (Note 1)	Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL 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).

100W S-Band Transmitter

Model: DTX 1000S



Product Specifications

Manual Digital Pre-Correction

Non-Linear Pre-Correction

Curve Formats	S 21 and VO/M
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)

Power Supply

Voltage	100 - 240 VAC
Frequency	50/60 Hz
Power Consumption	max. 1200 Watts
Power Factor	0.96

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
Cooling	Forced air

Mechanical

Size	3 U of 19" wide cabinet
Dimensions (W x H x D)	48.26 cm x 13.28 cm x 63.88 cm (19" x 5.23" x 25.15")
Weight	22 kg (48.5 lbs.)



100W S-Band Transmitter

Model: DTX 1000S

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	Internally connected to the modulator input 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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL

GPS/GLONASS 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 / GLONASS - L1 frequency range
32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided tracking)
Tracking Capability	24 simultaneous satellite vehicles
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	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Timing Accuracy	< 100 ns
1 PPS + 10 MHz	
Holdover Time	≤ 2.5 μ sec during 2 hours
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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the exciter input Level: TTL

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-of-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 for complete information)	Control Interfaces	
DAB Signal Input	ETI (NI) 2.048 MHz or ETI (NA), according to ETSI EN 300 799	Front Panel	LCD display and cursor/ execute keys
Input Connectors	2 inputs: BNC (F), 50 Ω	Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
Signal Processing	DAB transmission modes I, II, III and IV	USB Interface	Connector: USB Type B
RF Output	Any L-band channel, selectable: L1 to L23 and LA to LW Connector: N-type (F), 50 Ω Output Level: -10 dBm to 0 dBm Spectrum Mask compliant with ETSI EN 300 401	RS232 Interface	Connector: 9-pin SUB-D Male
Internal GPS	GPS antenna connector installed on the Universal Modulator	RS485 Interface	Connector: 9-pin SUB-D Female
GPS Antenna	Delivered as part of the DAB Transmitter system	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.
Transmitter RF Performance		Power Supply	
Operating Frequency	1450 MHz to 1500 MHz	Voltage	198 - 244 VAC
Rated Output power	56.0 dBm (before the output filter)	Frequency	50 - 60 Hz
Output Power range	46 dBm to 56 dBm	Power Consumption	max. 2500 Watts
Output Power Set Point Range	10 dB	Environmental	
Output Level Stability vs. time	$\geq \pm 0.30$ dB/24 hrs. max.	Operating Temperature	+0° C to +50° C (+32° F to +122° F)
Output Level Accuracy	# ± 0.5 dB about selected level	Storage Temperature	-40° C to +65° C (-40° F to +149° F)
ALC Range	≥ 10 dB	Relative Humidity	max. 95%, non-condensing
Spectral re-growth	≥ 30 dB at ± 0.97 MHz from the Fc at the rated output power (DAB Mode II, clipping factor 10 dB)	Altitude	3000 m (10000 ft), operating
Output connector	7/16" DIN-type (F), 50 Ω	Cooling	Forced air
Output VSWR	$\geq 1.3:1$	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	120 kg (264 lbs.)



Unique Broadband Systems Ltd.

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)



50W, 100W Transmitter/Repeater



200W 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.)

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/TB 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 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.

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



Unique Broadband Systems Ltd.

Indoor Terrestrial Transmitter / Repeater

Product Specifications

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D (M)
RS485 Interface	Connector: 9-pin SUB-D (F)
I/O Interface	Connector: 9-pin SUB-D (F)
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
CLI (Command Line)	Connector: USB (Hyperterminal) or Ethernet (HyperTerminal and Telnet)
SNMP Control Interface	Ethernet 10/100/1000 Base-T MIBs are provided
Alarm Relays	Connector: RS232, RS485 and I/O 2 Dry Contact Alarm relays, triggered by any major alarm

Exciter Inputs

DVB-ASI	2x BNC (F), 75 Ω
G.703/G.704	2x BNC (F), 50 Ω
SMPTE-310M	2x BNC (F), 75 Ω (optional)
GbE Transport Stream (DAB excluded)	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45

Exciter Monitoring Outputs

DVB-ASI	2x BNC (F), 75 Ω
G.703/G.704	2x BNC (F), 50 Ω
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

Amplifier RF Output

Output Frequency:	TBD
Connector	N-type (F), 50 Ω or 7/16" DIN (F), 50 Ω
Digital Average Output Power	50W, 100W or 200W
Gain Variation over Temperature	$\leq \pm 1$ dB
Gain Variation over the Signal BW	≤ 0.5 dB
In-band IMD	≤ -27 dBc (without pre-correction)
Spectral Regrowth (at rated output power)	≤ -30 dBc (without pre-correction) ≤ -36 dBc (with pre-correction)
Frequency Stability	Internal reference 0.3ppm / or in accordance with external ref. accuracy

Exciter RF Output

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	> 20 dB
Shoulder Level	< -50 dBc
Spurious Level Outside Channel	< -60 dBm
MER	≥ 45 dB ≥ 45 dB (DVB-T2)
Amplitude Flatness Center frequency ± 3.8 MHz:	± 0.3 dB
Group delay response: Center frequency ± 3.8 MHz:	± 10 ns
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 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).

Indoor Terrestrial Transmitter / Repeater



Product Specifications

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)

Adaptive Non-linear Pre-Correction

HPA FB Connector	To be coupled from the PA output when the Adaptive Pre-corrector is used
Frequency	470 - 860 MHz 1600 MHz - 2800 MHz
Spectral Regrowth Reduction	7 dB ±2 dB (Note 2)

Note 2: Greater improvement is possible under particular conditions. Performance depends upon power level, frequency and waveform.

Power Supply (50W Transmitter/Repeater)

Voltage	100 – 240 VAC
Frequency	50 – 60 Hz
Power Consumption	400 W (S-Band), 800 W (MMDS)

Power Supply (100W Transmitter/Repeater)

Voltage	100 – 240 VAC
Frequency	50/60 Hz
Power Consumption	1 kW (S-Band), 1.5 kW (MMDS)

Power Supply (200W Transmitter/Repeater)

Voltage	198 – 242 VAC (220 VAC ±10%)
Frequency	50/60 Hz
Power Consumption	1.9 kW (typical)

Mechanical (50W and 100W Transmitter/Repeater)

Dimensions (W x H x D)	59 cm x 49.3 cm x 66 cm (23.2" x 19.4" x 26.0")
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.)

Mechanical (200W Transmitter/Repeater)

Dimensions (W x H x D)	59 cm x 79.1 cm x 84.2 cm (23.2" x 31.4" x 33.2")
Weight (with 1 Exciter, no BPF, no UPS)	107 kg (236 lbs.)
Weight (with 1 Exciter, BPF and UPS)	127 kg (280 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
Cooling	Forced air



Unique Broadband Systems Ltd.

Indoor Terrestrial Transmitter / Repeater

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	Internally connected to the exciter input 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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL

UPS

Height	1RU
Power	280 Watts / 450 VA
Backup Time	10 Minutes (Exciter Only)

GPS/GLONASS 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 / GLONASS - L1 frequency range
32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided tracking)
Tracking Capability	24 simultaneous satellite vehicles
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	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Timing Accuracy 1PPS + 10MHz	< 100 ns
Holdover Time	≤ 2.5 μ sec during 2 hours
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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL



Unique Broadband Systems Ltd.

Outdoor Terrestrial Transmitter / Repeater

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



Transmitter/Repeater

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)

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)

Outdoor Terrestrial Transmitter / Repeater



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 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.

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 light-weight 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.



Outdoor Terrestrial Transmitter / Repeater

Product Specifications

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D (M)
RS485 Interface	Connector: 9-pin SUB-D (F)
I/O Interface	Connector: 9-pin SUB-D (F)
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
CLI (Command Line)	Connector: USB (Hyperterminal) or Ethernet (HyperTerminal and Telnet)
SNMP Control Interface	Ethernet 10/100/1000 Base-T MIBs are provided
Alarm Relays	Connector: RS232, RS485 and I/O 2 Dry Contact Alarm relays, triggered by any major alarm

Exciter Inputs

DVB-ASI	2x BNC (F), 75 Ω
G.703/G.704	2x BNC (F), 50 Ω
SMPTE-310M	2x BNC (F), 75 Ω (optional)
GbE Transport Stream (DAB excluded)	Protocol: Pro-MPEG CoP #3 / SMPTE-2022 Connector: RJ45

Exciter Monitoring Outputs

DVB-ASI	2x BNC (F), 75 Ω
G.703/G.704	2x BNC (F), 50 Ω
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

Amplifier RF Output

Output Frequency:	TBD
Connector	N-type (F), 50 Ω or 7/16" DIN (F), 50 Ω
Digital Average Output Power	50W, 100W or 200W
Gain Variation over Temperature	$\leq \pm 1$ dB
Gain Variation over the Signal BW	≤ 0.5 dB
In-band IMD	≤ -27 dBc (without pre-correction)
Spectral Regrowth (at rated output power)	≤ -30 dBc (without pre-correction) ≤ -36 dBc (with pre-correction)
Frequency Stability	Internal reference 0.3ppm / or in accordance with external ref. accuracy

Exciter RF Output

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	> 20 dB
Shoulder Level	< -50 dBc
Spurious Level Outside Channel	< -60 dBm
MER	≥ 45 dB ≥ 42 dB (DVB-T2)
Amplitude Flatness Center frequency ± 3.8 MHz:	± 0.3 dB
Group delay response: Center frequency ± 3.8 MHz:	± 10 ns
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 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).

Outdoor Terrestrial Transmitter / Repeater



Product Specifications

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)

Adaptive Non-linear Pre-Correction

HPA FB Connector	To be coupled from the PA output when the Adaptive Pre-corrector is used
Frequency	470 MHz - 860 MHz 1600 MHz - 2800 MHz
Spectral Regrowth Reduction	7 dB ±2 dB (Note 2)

Note 2: Greater improvement is possible under particular conditions. Performance depends upon power level, frequency and waveform.

Power Supply (50W Transmitter/Repeater)

Voltage	198 – 242 VAC (220 VAC ±10%)
Frequency	50/60 Hz
Power Consumption	800 W (typical) (1.8 kW with heater on)

Power Supply (100W Transmitter/Repeater)

Voltage	198 – 240 VAC (220 VAC ±10%)
Frequency	50/60 Hz
Power Consumption	1.3 kW (typical) (2.3 kW with heater on)

Power Supply (200W Transmitter/Repeater)

Voltage	198 – 242 VAC (220 VAC ±10%)
Frequency	50/60 Hz
Power Consumption	2.2 kW (typical) (3.2 kW with heater on)

Mechanical (50W Transmitter/Repeater)

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.)
Weight (with 1 Exciter, BPF and UPS)	107 – 117 kg (236 – 258 lbs.)

Mechanical (100W and 200W Transmitter/Repeater)

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)	116 kg (256 lbs.)
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
Cooling	Forced air



Outdoor Terrestrial Transmitter / Repeater

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	Internally connected to the exciter input 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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL

UPS

Height	1RU
Power	280 Watts / 450 VA
Backup Time	10 Minutes (Exciter Only)

GPS/GLONASS 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 / GLONASS - L1 frequency range
32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided tracking)
Tracking Capability	24 simultaneous satellite vehicles
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	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Timing Accuracy 1PPS + 10MHz	< 100 ns
Holdover Time	≤ 2.5 μ sec during 2 hours
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 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL

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.

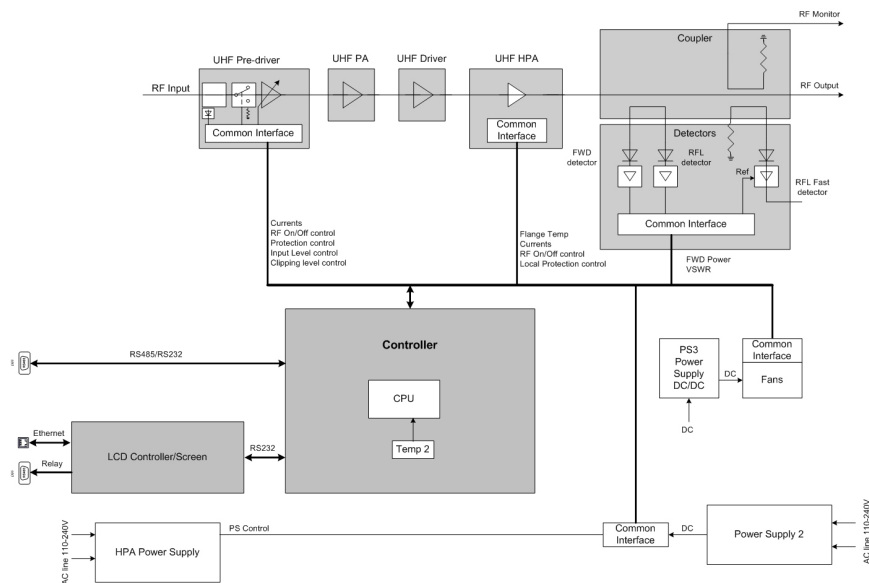
The amplifier is forced air cooled using four high performance fans, which are installed on the amplifier enclosure front panel.

Standalone UHF-Band Medium Power Amplifier

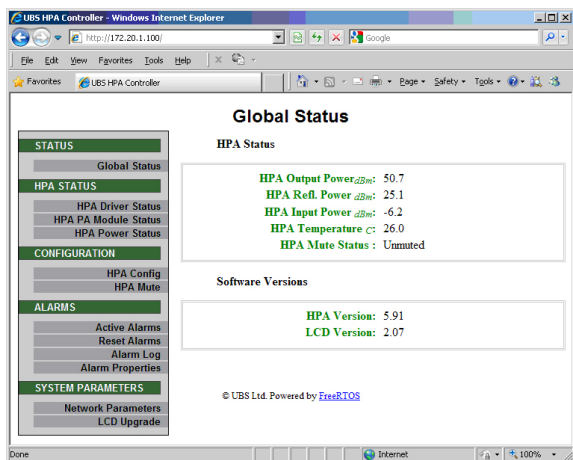
Model: DMPA 120UX



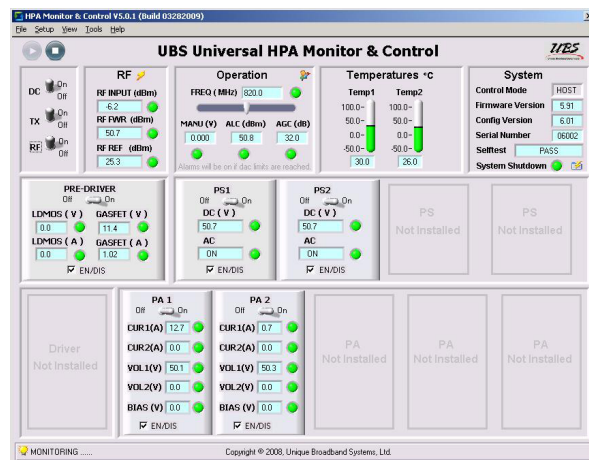
Block Diagram (subject to change without notice)



Control Interfaces (subject to change without notice)



Web GUI



HPA Monitor GUI

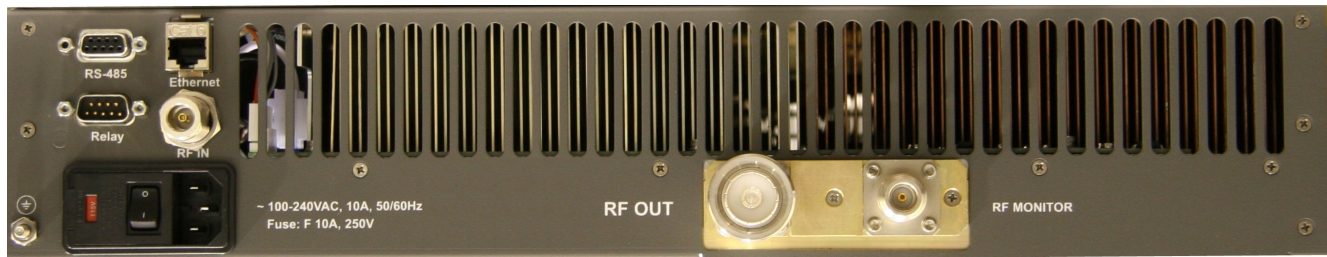


Touch Screen LCD



Standalone UHF-Band Medium Power Amplifier

Model: DMPA 120UX



Rear Panel

Product Specifications (specifications are subject to change without notice)

RF Input

Connector	N-type (F), 50 Ω
Frequency Range	470 MHz - 860 MHz
Level	-7 dBm to 1 dBm
Return Loss	≤ -15 dB

RF Output

Connector	7'-16" DIN-type (F), 50 Ω
Frequency Range	470 MHz - 860 MHz
Digital Average Output Power	120 Watts (50.8 dBm)
Power Level Accuracy	± 0.25 dB
Gain	58 dB max.
Gain Variation over 8 MHz BW	$\leq \pm 0.25$ dB
Gain Variation over entire BW	$\leq \pm 2$ dB
In-band IMD	≤ -27 dBc
Spectral Regrowth (Shoulder Level)	≤ -30 dBc (at rated output power, uncorrected)
Output Harmonics	≤ -60 dBc (with output filter)
RF Monitor	Connector: SMA (F), 50 Ω Level: 53 dB ± 1 dB below the rated output power level (± 2 dB across the entire frequency range)

Control Interfaces

Front Panel	Touch screen LCD
Ethernet	Connector: RJ45 Speed: 10/100 Base-T
RS485	Connector: 9-pin SUB-D Female
Relay	Connector: 9-pin SUB-D Male
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
HPA Monitor GUI	RS485
Machine-Machine	RS485

Power Supply

Voltage	100 - 240 VAC
Frequency	50/60 Hz
Power Consumption	max. 850 Watts
Power Factor	0.96

Mechanical

Size	2 U of 19" wide cabinet
Dimensions (W x H x D)	483mm x 89mm x 546mm (19.0" x 3.5" x 21.5")
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.

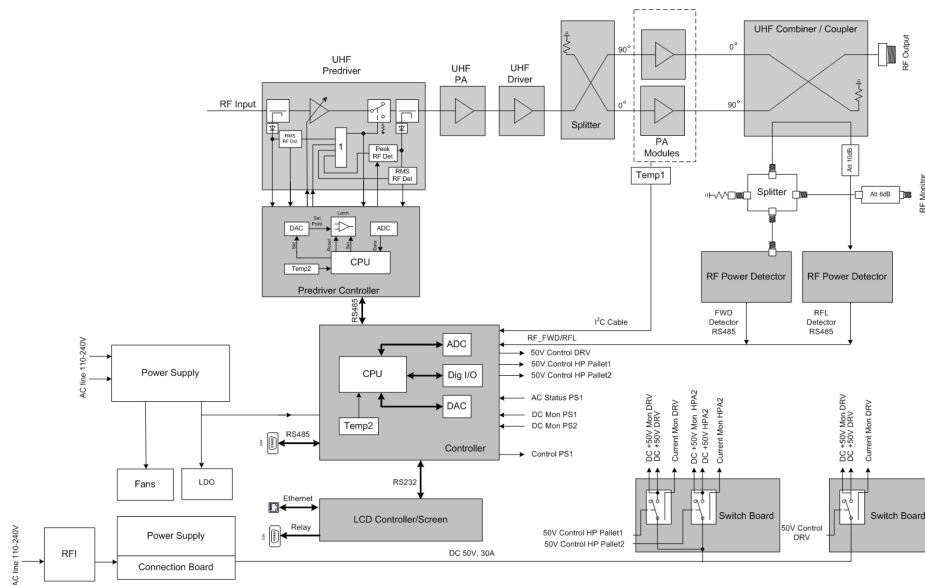
All of the amplifier's components are enclosed in a standard 19" rack mount chassis, occupying only 3 RU of cabinet space.

Standalone UHF-Band High Power Amplifier

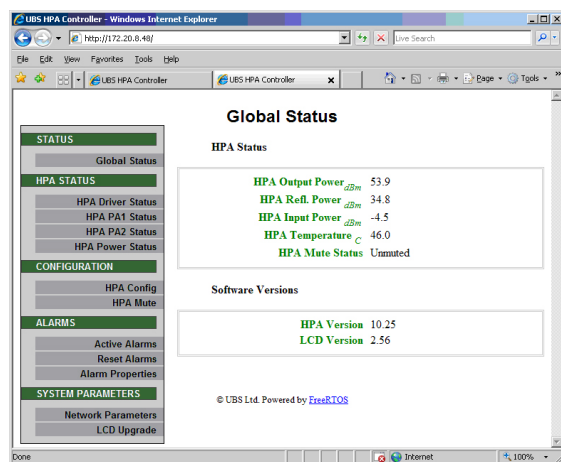
Model: DHPA 250UX



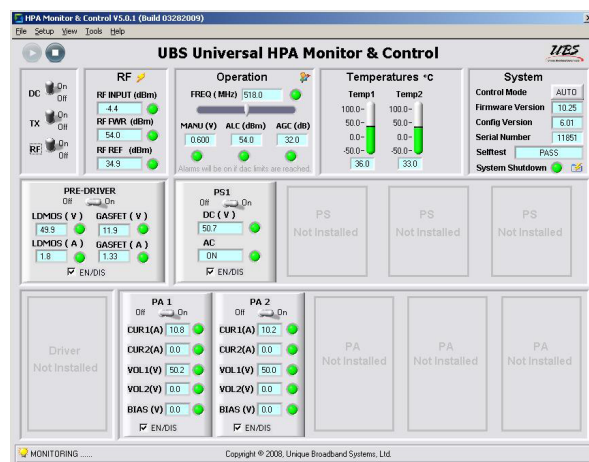
Block Diagram



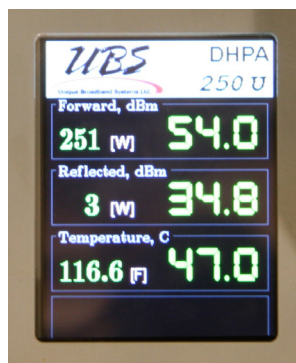
Control Interfaces (subject to change without notice)



Web GUI



HPA Monitor GUI

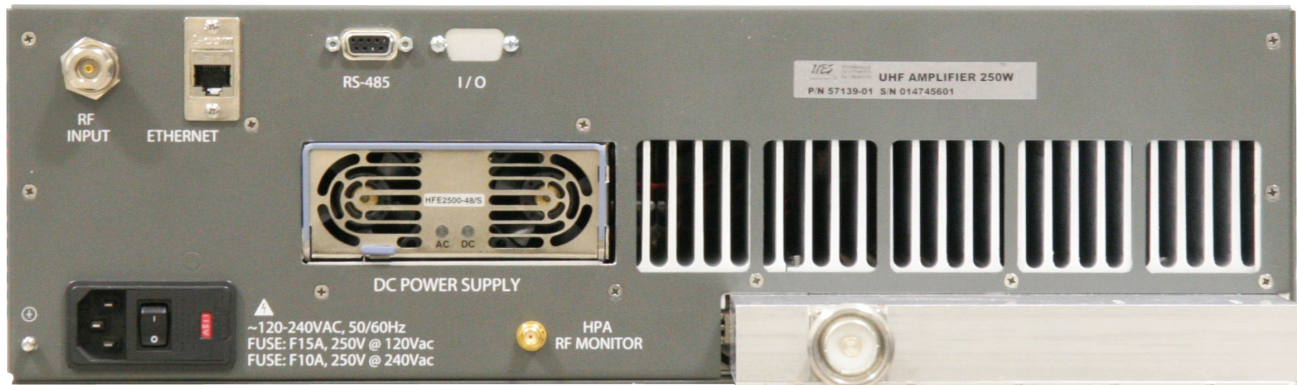


Touch Screen LCD



Standalone UHF-Band High Power Amplifier

Model: DHPA 250UX



Rear Panel

Product Specifications

RF Input

Connector	N-type (F), 50 Ω
Frequency Range	470 MHz - 860 MHz
Level	-6 dBm to 1 dBm
Return Loss	≤ -15 dB

RF Output

Connector	7'-16" DIN-type (F), 50 Ω
Frequency Range	470 MHz - 860 MHz
Digital Average Output Power	250 Watts (54 dBm)
Power Level Accuracy	± 0.25 dB
Gain	60 dB max.
Gain Variation over 8 MHz BW	$\leq \pm 0.25$ dB
Gain Variation over entire BW	$\leq \pm 2$ dB
In-band IMD	≤ -27 dBc
Spectral Regrowth (Shoulder Level)	≤ -30 dBc (at rated output power, uncorrected)
Output Harmonics	≤ -60 dBc (with output filter)
RF Monitor	Connector: SMA (F), 50 Ω Level: 54 dB below the rated output power level

Control Interfaces

Front Panel	Touch screen LCD
Ethernet	Connector: RJ45 Speed: 10/100 Base-T
RS485	Connector: 9-pin SUB-D Female
Relay	Connector: 9-pin SUB-D Male
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
HPA Monitor GUI	RS485
Machine-Machine	RS485

Power Supply

Voltage	100 - 240 VAC
Frequency	50/60 Hz
Power Consumption	max. 1500 Watts

Mechanical

Size	3 U of 19" wide cabinet
Dimensions (W x H x D)	482.6mm x 132.8mm x 644.7mm (19.0" x 5.23" x 25.38")
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

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	Mechanical	
VSWR	1.50 : 1	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	Environmental	
Digital Average Output Power	50 Watts (47 dBm)	Operating Temperature	-10°C to +45°C (+14°F to +113°F)
Power Level Accuracy	± 0.25 dB	Storage Temperature	-40°C to +70°C (-40°F to +158°F)
Gain	48 dB max.	Relative Humidity	max. 95%, non condensing
Gain Variation over Temperature	$\leq \pm 1$ dB	Cooling	Forced air
Gain Variation over 8 MHz BW	$\leq \pm 0.25$ dB	ETSI Compliance	
In-band IMD	≤ -25 dBc	Essential Requirement	Standard / Specification
Spectral Regrowth (uncorrected)	≤ -30 dBc (at rated output power) (a minimum 5 dB improvement can be seen with Pre-correction applied)	R&TTE Directive 1995/5/EC	
Spurious Level (outside channel)	≤ -60 dBm	Safety	EN 60950-1: 2001, A11: 2004 First Edition
RF Monitor	Connector: SMA (F), 50 Ω Level: 52 dB ± 1 dB below the rated output power level	Health	Not Applicable. No Antenna
Control Interfaces		EMC	EN 301 489-1 V1.8.1
RS232	Connector: 9-pin SUB-D Male	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.
RS485	Connector: 9-pin SUB-D Female	Radio	EN 301 390 V1.2.1 All technical requirements relevant to receiver measurements were excluded.
HPA Monitor GUI	RS232	CE Compliance	
Machine-Machine	RS485	This equipment is CE Compliant.	

CE 06780

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.

Standalone MMDS-Band Medium Power Amplifier

Model: DMPA 2600



Fig.1 - Rear Panel

Product Specifications

RF Input

Connector	N-type (F), 50 Ω
Frequency Range	2500 MHz - 2700 MHz
Level	-8 dBm to 3 dB,
VSWR	1.50 : 1

RF Output

Connector	N-type (F), 50 Ω
Frequency Range	2500 MHz - 2700 MHz
Digital Average Output Power	50 Watts (47 dBm)
Power Level Accuracy	± 0.25 dB
Gain	55 dB max.
Gain Variation over Temperature	$\leq \pm 1$ dB
Gain Variation over 8 MHz BW	$\leq \pm 0.25$ dB
In-band IMD	≤ -30 dBc
Spectral Regrowth (uncorrected)	≤ -35 dBc (at rated output power) (a minimum 5 dB improvement can be seen with Pre-correction applied)
Spurious Level (outside channel)	≤ -60 dBm
RF Monitor	Connector: SMA (F), 50 Ω Level: 53 dB ± 1 dB below the rated output power level (± 2 dB across the entire frequency range)

Control Interfaces

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

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 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.

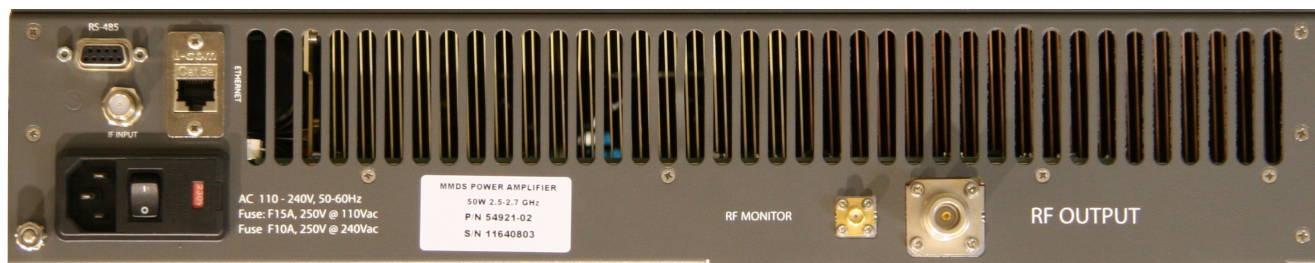
The amplifier's operational parameters can be monitored and controlled locally or remotely through the Web Interface or locally using the HPA Monitor GUI.

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.

Standalone MMDS-Band Medium Power Amplifier

Model: DMPA 2600-I



Rear Panel

Product Specifications

IF Input

Operating Frequency Range	222 MHz - 422 MHz
Level	-15 dBm to -5 dBm
Connector	F-type (F), 75 Ω
RF Input VSWR	1.50 : 1

RF Output

Operating Frequency Range	2500 MHz - 2700 MHz
Digital Average Output Power	50 Watts
Output Power Level Accuracy	± 0.25 dB
Output Level Variation over 8 MHz BW	$\leq \pm 0.2$ dB
Output Level Variation over the Entire Bandwidth	$\leq \pm 1.5$ dB
In-band IMD	≤ -27 dBc
Spectral Regrowth (uncorrected)	≤ -30 dBc (at rated output power)
Spurious Level (outside channel)	≤ -60 dBm
Harmonics	≤ -60 dBc (with output filter)
RF Output 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

Power Supply

Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Power Consumption	max. 1350 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	21.5 kg (47.5 lbs.)

Environmental

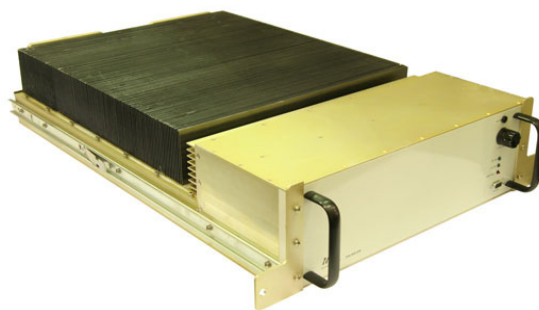
Operating Temperature	-10°C to +45°C (+14°F to +113°F)
Storage Temperature	-40°C to +70°C (-40°F to +158°F)
Relative Humidity	max. 95%, non condensing
Cooling	Forced air

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.

High Power Amplifier Module

Model: DHPA 2200



Product Specifications (specifications are subject to change without notice)

Parameters

Output Frequency Range	2170 MHz - 2200 MHz
Digital Average Output Power	200 Watts
Power Gain	55 dB typical
Gain Variation Over Temperature	±1 dB max.
Gain Variation Over the Signal BW	0.5 dB max.
In-band Emissions	≤ -30 dBc
Spectral Regrowth	≤ -35 dBc (at rated output power)
RF Input VSWR	1.50 : 1
Signal Bandwidth	5 MHz

Interfaces

RF Input Connector	N-type (female), 50 ohm
RF Output Connector	7/16 DIN-type (female), 50 ohm
RF Monitor Connector	N-Type (female), 50 ohm
Control Interface	RS232, DB9 (female) - HPA GUI local control RS485, DB9 (female) - remote control

Power Supply

Voltage	198 - 242 VAC
Frequency	50/60 Hz
Power Consumption	1900 Watts (at rated output power)

Mechanical

Size	3 U of 19" wide cabinet
Dimensions (W x H x D)	430mm x 133mm x 781mm (16.93" x 5.25" x 30.75")
Weight	40 kg (88 lbs.)

Environmental

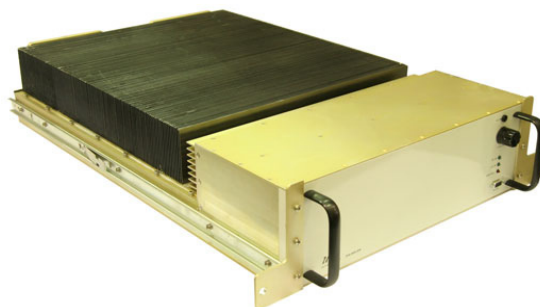
Operating Temperature	-25°C to +55°C (-13°F to +131°F)
Storage Temperature	-40°C to +70°C (-40°F to +158°F)
Relative Humidity	max. 95%, non condensing
Cooling	1000 CFM of forced air must be provided. 2x EBM-Papst Tubeaxial W2E200 Series fans are recommended.

High Power Amplifier Module

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.

High Power Amplifier Module

Model: DHPA 1500



Product Specifications (specifications are subject to change without notice)

Parameters

Output Frequency Range	1450 MHz - 1500 MHz
Digital Average Output Power	280 Watts
Power Gain	55 dB typical
Gain Variation Over Temperature	±1 dB max.
Gain Variation Over the Signal BW	0.5 dB max.
In-band Emissions	≤ -24 dBc
Spectral Regrowth	≤ -28 dBc (at rated output power)
RF Input VSWR	1.50 : 1
Signal Bandwidth	1.54 MHz

Interfaces

RF Input Connector	N-type (female), 50 ohm
RF Output Connector	7/16 DIN-type (female), 50 ohm
RF Monitor Connector	N-Type (female), 50 ohm
Control Interface	RS232, DB9 (female) - HPA GUI local control RS485, DB9 (female) - remote control

Power Supply

Voltage	198 - 242 VAC
Frequency	50/60 Hz
Power Consumption	1800 Watts (at rated output power)

Mechanical

Size	3 U of 19" wide cabinet
Dimensions (W x H x D)	430mm x 133mm x 781mm (16.93" x 5.25" x 30.75")
Weight	40 kg (88 lbs.)

Environmental

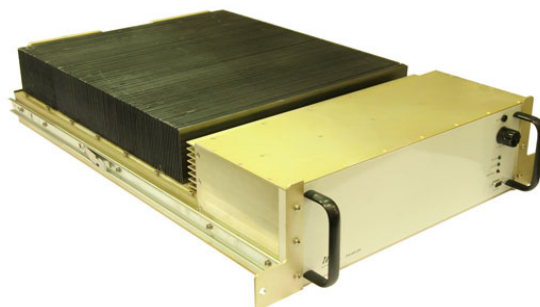
Operating Temperature	-25°C to +55°C (-13°F to +131°F)
Storage Temperature	-40°C to +70°C (-40°F to +158°F)
Relative Humidity	max. 95%, non condensing
Cooling	1000 CFM of forced air must be provided. 2x EBM-Papst Tubeaxial W2E200 Series fans are recommended.

High Power Amplifier Module

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.

High Power Amplifier Module

Model: DHPA 1670



Product Specifications (specifications are subject to change without notice)

Parameters

Output Frequency Range	1670 MHz - 1675 MHz
Digital Average Output Power	250 Watts
Power Gain	55 dB typical
Gain Variation Over Temperature	±1 dB max.
Gain Variation Over the Signal BW	0.5 dB max.
In-band Emissions	≤ -27 dBc
Spectral Regrowth	≤ -32 dBc (at rated output power)
RF Input VSWR	1.50 : 1
Signal Bandwidth	5 MHz

Interfaces

RF Input Connector	N-type (female), 50 ohm
RF Output Connector	7/16 DIN-type (female), 50 ohm
RF Monitor Connector	N-Type (female), 50 ohm
Control Interface	RS232, DB9 (female) - HPA GUI local control RS485, DB9 (female) - remote control

Power Supply

Voltage	198 - 242 VAC
Frequency	50/60 Hz
Power Consumption	1800 Watts (at rated output power)

Mechanical

Size	3 U of 19" wide cabinet
Dimensions (W x H x D)	430mm x 133mm x 781mm (16.93" x 5.25" x 30.75")
Weight	40 kg (88 lbs.)

Environmental

Operating Temperature	-25°C to +55°C (-13°F to +131°F)
Storage Temperature	-40°C to +70°C (-40°F to +158°F)
Relative Humidity	max. 95%, non condensing
Cooling	1000 CFM of forced air must be provided. 2x EBM-Papst Tubeaxial W2E200 Series fans are recommended.

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.

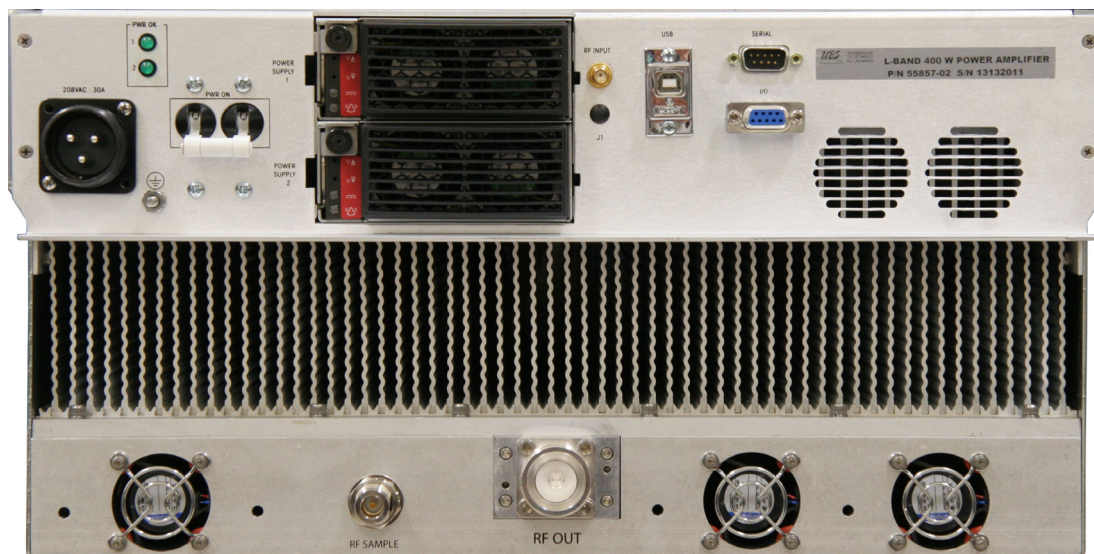
The amplifier's operational parameters are monitored and controlled by an embedded system controller that can be accessed from the RS485 and USB interfaces.

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

RF Input

Connector	SMA (F), 50 Ω
Frequency Range	1670 MHz to 1675 MHz
Level	-5 dBm to +5 dBm
VSWR	$\leq 1.9:1$

RF Output

Connector	7-16" DIN-type (F), 50 Ω
Frequency Range	1670 MHz - 1675 MHz
Digital Average Output Power	400 Watts (56 dBm)
Power Level Accuracy	± 0.5 dB
Gain	61 dB max.
Gain Variation Over Temperature	$\leq \pm 1$ dB
Gain Variation Over 5 MHz Bandwidth	$\leq \pm 0.5$ dB
In-band IMD	≤ -27 dBc
Spectral Regrowth (Shoulder Level)	≤ -30 dBc (at rated output power)
Output Harmonics	≤ -60 dBc (with output filter)
VSWR	$\leq 1.2:1$
RF Monitor	Connector: N-type (F), 50 Ω Coupling Factor: 45dB ± 1 dB

Control Interfaces

Front Panel	LCD
USB	Connector: USB Type B
Serial (RS485)	Connector: 9-pin SUB-D, Male
I/O	Connector: 9-pin SUB-D, Female
HPA Monitor GUI	USB
Machine-Machine	RS485

Power Supply

Voltage	195 - 240 VAC (220 VAC $\pm 10\%$)
Frequency	50 - 60 Hz
Power Consumption	2500 Watts

Mechanical

Size	5 U of 19" wide cabinet
Dimensions (W x H x D)	48.3 cm x 22.2 cm x 78.2 cm (19" x 8.72" x 30.8")
Weight	35 kg (77 lbs.)

Environmental

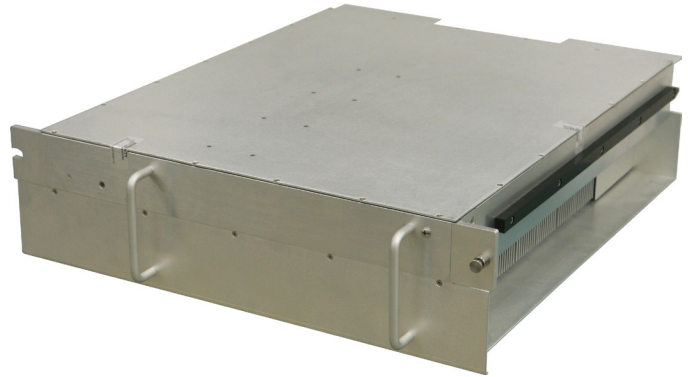
Operating Temperature	+5° C to +45° C (+41° F to +113° F)
Storage Temperature	-40° C to +65° C (-40° F to +149° F)
Relative Humidity	max. 95%, non condensing
Cooling	Forced air

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.

S-Band High Power Amplifier

Model: DHPA 2300



Product Specifications

RF Input

Connector	7/8" Blind Mate (F), 50 Ω
Frequency Range	2320 MHz to 2345 MHz
Input Power Range	-11 dBm to +3 dBm
Return Loss	> 14.0 dB

RF Output

Connector	7/8" Blind Mate (F), 50 Ω
Frequency Range	2320 MHz to 2345 MHz
Digital Average Output Power Range	43 dBm to 56 dBm (20 Watts to 400 Watts)
Power Level Accuracy	± 0.2 dB
Gain	43 dB to 66 dB
Gain Flatness	≤ 0.5 dB (across the operating bandwidth)
Gain Slope	≤ 0.2 dB/MHz
Spectral Regrowth	≥ 30 dBc (at 56 dBm output power level with pre-correction enabled)
In-band Carrier to Interference	≥ 27 dBc (at 56 dBm output power level with pre-correction enabled)
Output Harmonics	≥ 60 dBc (at 56 dBm output power level)
Output Spurious Emissions	≥ 60 dBc (at 56 dBm output power level)
Group Delay	≤ 10 ns
Noise Figure	≤ 10 dB
Return Loss	> 20.8 dB

Control Interfaces

RS485 (Full duplex or half duplex)	Connector: High current Elcon Drawer Connector
RS422	Connector: High current Elcon Drawer Connector
USB	Connector: High current Elcon Drawer Connector

Power Supply

Voltage	30 VDC
Power Consumption	1500 Watts (at 56 dBm output power level)

Mechanical

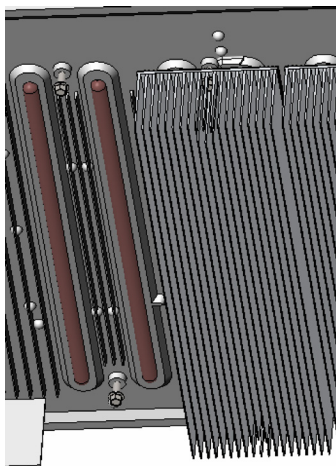
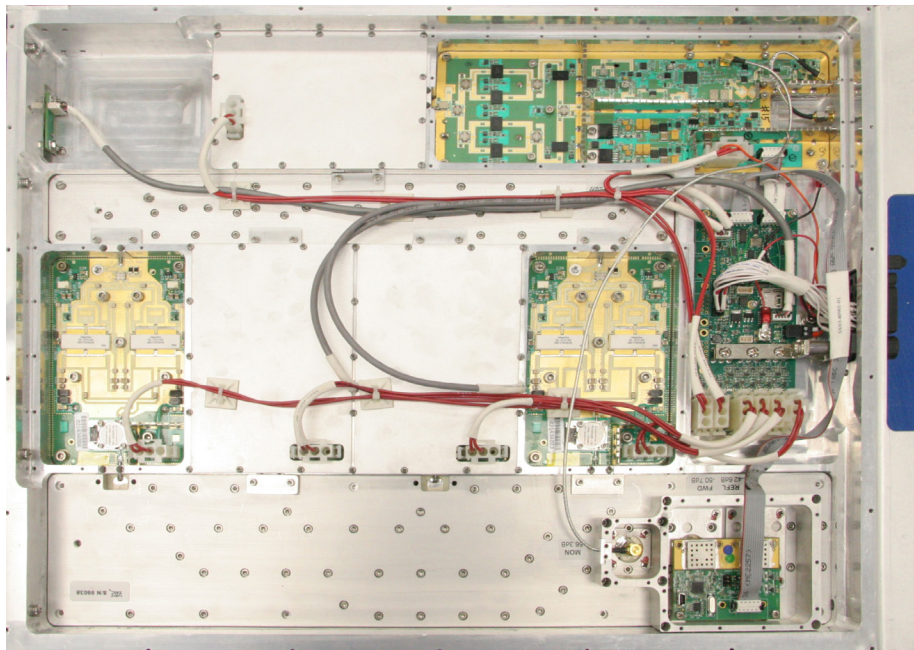
Dimensions (W x H x D)	48.9 cm x 57.7 cm x 13.0 cm (19.250" x 22.725" x 5.110")
Weight	25 kg (55 lbs.)

Environmental

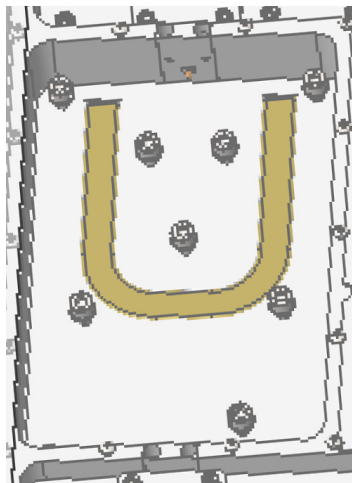
Operating Temperature	-20° C to +65° C (-4° F to +149° F)
Storage Temperature	-30° C to +75° C (-22° F to +167° F)
Relative Humidity	5% to 95%, non condensing
Altitude	max. 1676m (5500 ft.)
Cooling	Forced Air, 700 CFM

S-Band High Power Amplifier

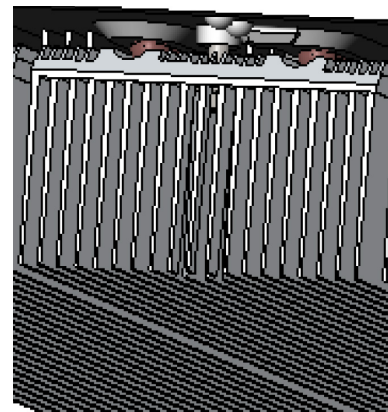
Model: DHPA 2300



Heat Pipes - Base Plate Bottom



Heat Pipes - Base Plate Top
(Below Power Module)



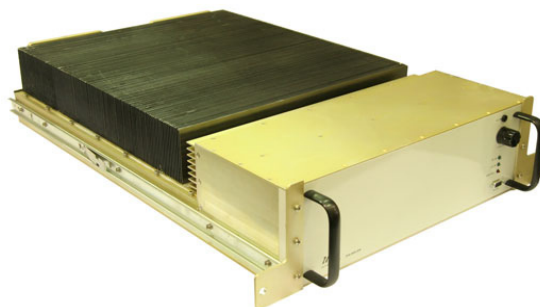
Heat Sink Fins

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.

High Power Amplifier Module

Model: DHPA 2330



Product Specifications (specifications are subject to change without notice)

Parameters

Output Frequency Range	2305 MHz - 2360 MHz
Digital Average Output Power	280 Watts
Power Gain	55 dB typical
Gain Variation Over Temperature	±1 dB max.
Gain Variation Over the Signal BW	0.5 dB max.
In-band Emissions	≤ -25 dBc
Spectral Regrowth	≤ -30 dBc (at rated output power)
RF Input VSWR	1.50 : 1
Signal Bandwidth	4 - 8 MHz

Interfaces

RF Input Connector	N-type (female), 50 ohm
RF Output Connector	7/16 DIN-type (female), 50 ohm
RF Monitor Connector	N-Type (female), 50 ohm
Control Interface	RS232, DB9 (female) - HPA GUI local control RS485, DB9 (female) - remote control

Power Supply

Voltage	198 - 264 VAC
Frequency	50/60 Hz
Power Consumption	1900 Watts (at rated output power)

Mechanical

Size	3 U of 19" wide cabinet
Dimensions (W x H x D)	430mm x 133mm x 781mm (16.93" x 5.25" x 30.75")
Weight	40 kg (88 lbs.)

Environmental

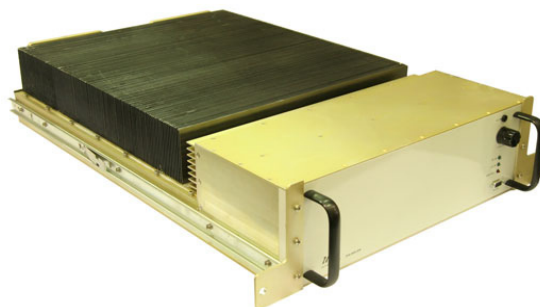
Operating Temperature	-25°C to +55°C (-13°F to +131°F)
Storage Temperature	-40°C to +70°C (-40°F to +158°F)
Relative Humidity	max. 95%, non condensing
Cooling	1000 CFM of forced air must be provided. 2x EBM-Papst Tubeaxial W2E200 Series fans are recommended.

High Power Amplifier Module

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.

High Power Amplifier Module

Model: DHPA 2600



Product Specifications (specifications are subject to change without notice)

Parameters

Operating Frequency Range	2500 MHz - 2700 MHz
Digital Average Output Power	200 Watts
Power Gain	55 dB typical
Gain Variation over Temperature	$\leq \pm 1$ dB
Gain Variation over the Signal BW	≤ 0.5 dB
In-band IMD	≤ -27 dBc
Spectral Regrowth (uncorrected)	≤ -30 dBc (at rated output power)
RF Input VSWR	1.50 : 1
Instantaneous Bandwidth	Up to 25 MHz

Interfaces

RF Input Connector	N-type (F), 50 Ω
RF Output Connector	7/16 DIN-type (F), 50 Ω
RF Monitor Connector	N-Type (F), 50 Ω
Control Interface	RS232: DB9 (F) - HPA GUI local control RS485: DB9 (F) - remote control

Power Supply

Voltage	198 - 264 VAC
Frequency	50/60 Hz
Power Consumption	1900 Watts (at rated output power)

Mechanical

Size	3 U of 19" wide cabinet
Dimensions (W x H x D)	430mm x 133mm x 781mm (16.93" x 5.25" x 30.75")
Weight	40 kg (88 lbs.)

Environmental

Operating Temperature	-25°C to +55°C (-13°F to +131°F)
Storage Temperature	-40°C to +70°C (-40°F to +158°F)
Relative Humidity	max. 95%, non condensing
Cooling	1000 CFM of forced air must be provided. 2x EBM-Papst Tubeaxial W2E200 Series fans are recommended.

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 combining 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.

Low Power L/S Band Amplifier System

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)
Power interlock	Menu selection on/off RF power
Gain adjustment range	Menu selection: 20 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 Watts
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

Low Power L/S Band Amplifier System

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

High Power L/S Band Amplifier System

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.

High Power L/S Band Amplifier System

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	0 dBm max.			
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	-12 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			

High Power L/S Band Amplifier System

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
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 Frequency	Single phase voltage, 200 VAC to 240 VAC, 50 Hz to 60 Hz.
Power factor ($\cos \varphi$)	0.98
Power supply cooling	Forced air
Power Cable	Three 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 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

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 combining 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.

High Power L/S Band Amplifier System

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)

High Power L/S Band Amplifier System

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

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 inter-modulation*
- *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 improve 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

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

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 inter-modulation*
- *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 improve 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

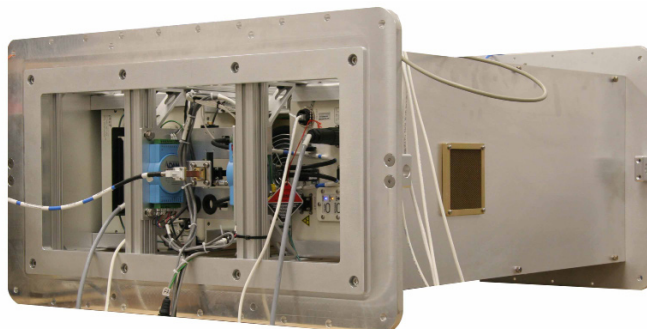
Operating Temperature	0°C to +50°C
Storage Temperature	-50°C to +85°C
Humidity	+5% to 95% non-Condensing
Altitude	3000M above sea level

Redundant Ka Band Amplifier System

Model: DSPA3000KAB

Product Features

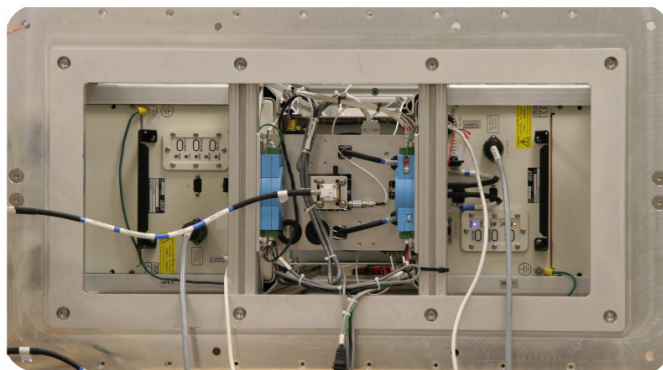
- Redundant 300 Watt Ka-band TWT power amplifier system
- Fully protected against input overdrive, temperature and output load VSWR conditions
- Remote control and self monitoring via RS485 interface
- HPA GUI provides easy navigation and control
- Exceptional operational life expectancy



Amplifier System

Frequency Band

Ka-Band: 27500 MHz – 31000 MHz



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

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 \pm 3 dB
Power gain	57 dB at minimum attenuator reading
Gain flatness	\pm 2.5dB max., in the whole range
Gain variation vs. temperature -40°C to +50°C	\pm 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 (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

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 ($\cos \phi$)	0.95
Power consumption, max	3 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).

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

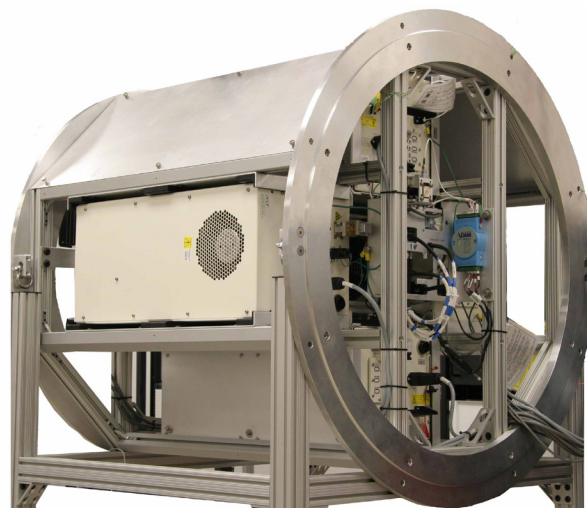
Operating Temperature	-40°C to +55°C
Storage Temperature	-40°C to +75°C
Operating Humidity	5% to 95% at 40°C
Storage Humidity	0% to 100% at 65°C
Altitude	3000M above sea level

High Power Ka Band Amplifier System

Model: DHPA12000KAB

Product Features

- Power combined 1.2 kW Ka-band TWT power amplifier 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

High Power Ka Band Amplifier System

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 \pm 3 dB
Power gain	65 dB minimum attenuator reading
Gain flatness	\pm 2.5 dB max., in the whole range
Gain variation vs. temperature -40°C to +50°C	\pm 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 ($\cos \phi$)	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
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

High Power Ka Band Amplifier System

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

DVB-T/H Portable Test Transmitter

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/non-inverted spectrum is selected on the front panel. The IF output can be directly interfaced to a wide range of transmitters and frequency converters.

DVB-T/H Portable Test Transmitter

Model: DVMP 5000



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.



DVB-T/H Portable Test Transmitter

Model: DVMP 5000

Product Specifications

Signal Processing

Supported Modes	IFFT: 2K, 4K, 8K
Guard Intervals	1/4, 1/8, 1/16, 1/32
Code Rates	1/2, 2/3, 3/4, 5/6, 7/8
Constellations	QPSK, 16-QAM, 64-QAM
Hierarchical Modes	Alpha - 1, 2 and 4 for 16-QAM & 64-QAM
Network Mode	SFN & MFN
Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz

Inputs

MPEG-2	2 DVB-ASI inputs: BNC (F), 75 Ω
Clock Reference - 10 MHz	Connector: BNC (F) Frequency: 10 MHz Level: 100 mV - 3 Vpp Impedance: 50 Ω or High Impedance (user selectable)
Time Reference - 1 PPS	Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω or High Impedance (user selectable)

IF Output

Connector	BNC (F), 50 Ω
Centre Frequency	36 MHz
Adjustable Frequency	35 MHz - 37 MHz in steps of 1 Hz
Frequency Stability	Internal ref 1ppm / or in accordance with external ref accuracy
Spectrum Polarity	Inverted and non-inverted (user selectable)
Level	-8 dBm to 2 dBm in 0.1 dB steps
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
MER	≥ 43 dB

RF Output

Connector	N-type (F), 50 Ω
Return Loss	> 20 dB
Frequency	Adjustable: 30 MHz to 1 GHz in 1 Hz steps
Frequency Stability	Intern ref. 1ppm / or in accordance with external ref. accuracy
Spectrum Polarity	Inverted and non-inverted, selectable
Level	-10 dBm to 0 dBm in 0.1 dB step 0 dBm to +10 dBm optional
Level Stability	± 0.3 dB
Shoulder Level	< -51 dBc
Harmonic and Spurious Emissions	< -55 dBc
Amplitude Flatness (Note 1)	Center frequency ± 3.8 MHz: ± 0.5 dB
Group Delay Response: (note 1)	Center frequency ± 3.8 MHz: ± 10 ns
MER	≥ 37 dB
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

Test Modes

Removal of One Carrier	Movable one-carrier hole for noise test
Removal of 50 Carriers	Movable 50-carrier hole for test of Intermodulation and quantization noise
Single Carrier	COFDM spectrum is replaced by a single carrier at the centre frequency. The level of the single carrier is equivalent to the average RMS level of a normal COFDM spectrum. The signal is intended for level alignment.
TS-Stuffing	PRBS sequence in accordance with ETR 290 paragraph 9.16.1

Note 1: Frequencies are relative to the centre frequency for an 8 MHz version (scale down by 7/8, 6/8 and 5/8 for 7 MHz, 6 MHz and 5 MHz versions respectively). Levels are measured in 10kHz bandwidth, where 0 dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.

DVB-T/H Portable Test Transmitter

Model: DVMP 5000



Product Specifications

Pre-Correction

Non-Linear Pre-Correction

Curve Formats	S 21 and VO/M
Amplitude Scale	Linear and Logarithmic
Correction Points	Max. 256, user-defined position
Gain Correction	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	+17dB to +7dB (peak power relative to average RMS level)

Control Interface (Basic version)

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 (optional)	Ethernet 10/100 Base-T 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 muting 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 natural convection

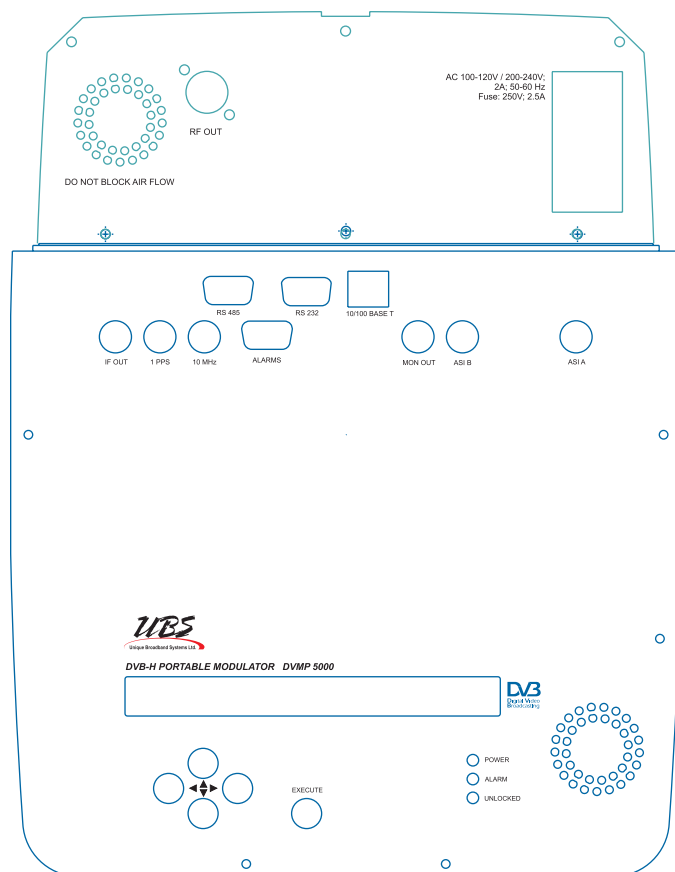
Mechanical

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
---------------	---------

Front Panel View



DVB-T/H Portable Test Transmitter

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.

DVB-T/H Portable Test Transmitter

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.



DVB-T/H Portable Test Transmitter

Model: DVMP 5000L

Product Specifications (specifications are subject to change without notice)

Signal Processing

Supported Modes	IFFT: 2K, 4K, 8K
Guard Intervals	1/4, 1/8, 1/16, 1/32
Code Rates	1/2, 2/3, 3/4, 5/6, 7/8
Constellations	QPSK, 16-QAM, 64-QAM
Hierarchical Modes	Alpha - 1, 2 and 4 for 16-QAM & 64-QAM
Network Mode	SFN & MFN
Bandwidth	8 MHz, 7 MHz, 6 MHz, 5 MHz

Inputs

MPEG-2	2 DVB-ASI inputs: BNC (F), 75 Ω
Clock Reference - 10 MHz	Connector: BNC (F) Frequency: 10 MHz Level: 100 mV - 3 Vpp Impedance: 50 Ω or High Impedance (user selectable)
Time Reference - 1 PPS	Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω or High Impedance (user selectable)

IF Output

Connector	BNC (F), 50 Ω
Centre Frequency	36 MHz
Adjustable Frequency	35 MHz - 48 MHz in steps of 1 Hz
Frequency Stability	Internal ref 1ppm / or in accordance with external ref accuracy
Spectrum Polarity	Inverted and non-inverted (user selectable)
Level	-8 dBm to 2 dBm in 0.1 dB steps
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
MER	≥ 43 dB

RF Output

Connector	N-type (F), 50 ohm
Frequency	Adjustable: 1665 MHz to 1680 MHz in 500 Hz steps
Frequency Stability	Intern ref. 1ppm / or in accordance with external ref. accuracy
Spectrum Polarity	Inverted and non-inverted, selectable
Level	-10 dBm to 0 dBm in 0.2 dB step
Level Stability	± 0.3 dB
Return Loss	> 20 dB
Shoulder Level	< -50 dBc
Spurious Level Outside Channel	< -60 dBm
Amplitude Flatness (Note 1)	Center frequency ± 3.8 MHz: ± 0.5 dB
Group delay response: (note 1)	Center frequency ± 3.8 MHz: ± 25 ns
Phase Noise SSB	100 Hz: < -80dBc/Hz 1 kHz: < -85dBc/Hz 10 kHz: < -95dBc/Hz 100 kHz: < -120dBc/Hz

Test Modes

Removal of One Carrier	Movable one-carrier hole for noise test
Removal of 50 Carriers	Movable 50-carrier hole for test of Intermodulation and quantization noise
Single Carrier	COFDM spectrum is replaced by a single carrier at the centre frequency. The level of the single carrier is equivalent to the average RMS level of a normal COFDM spectrum. The signal is intended for level alignment.
TS-Stuffing	PRBS sequence in accordance with ETR 290 paragraph 9.16.1

Note 1: Frequencies are relative to the centre frequency for an 8 MHz version (scale down by 7/8, 6/8 and 5/8 for 7 MHz, 6 MHz and 5 MHz versions respectively). Levels are measured in 10kHz bandwidth, where 0 dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.

DVB-T/H Portable Test Transmitter

Model: DVMP 5000L



Product Specifications (specifications are subject to change without notice)

Pre-Correction

Non-Linear Pre-Correction

Curve Formats	S 21 and VO/M
Amplitude Scale	Linear and Logarithmic
Correction Points	Max. 256, user-defined position
Gain Correction	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	+17dB to +7dB (peak power relative to average RMS level)

Control Interface (Basic version)

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 (optional)	Ethernet 10/100 Base-T 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 muting 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 natural convection

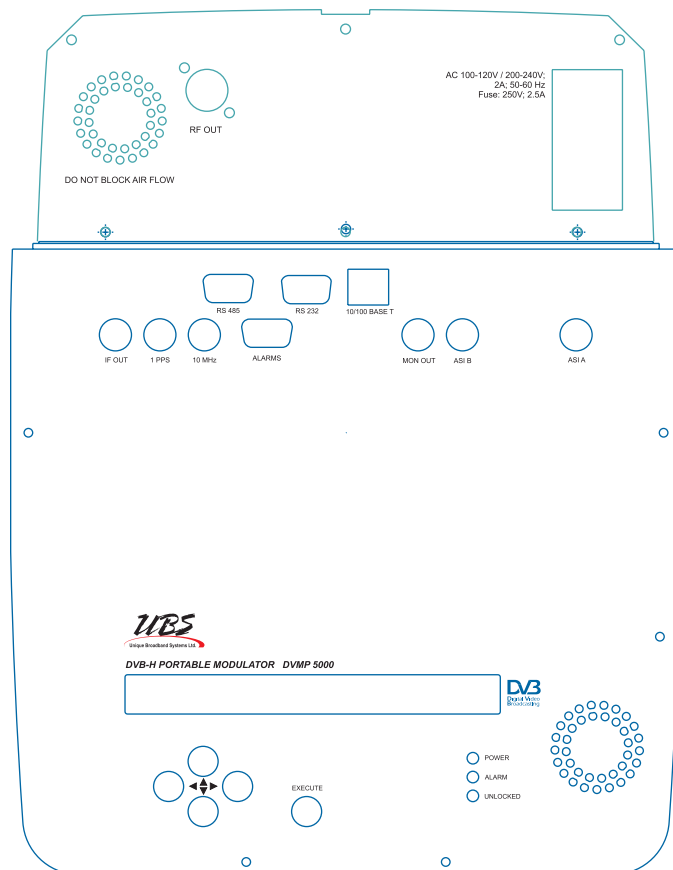
Mechanical

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
--------	---------

Front Panel View



Waveguide and Coaxial Components

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 QUADRATURE HYBRID SERIES NO.	149

Waveguide and Coaxial Components

Waveguides

FIXED ATTENUATOR SERIES NO. 152

WAVEGUIDE BULKHEAD FEED ASSEMBLY SERIES NO. 154

HORN ANTENNA SERIES NO. 155

DC BLOCK NO. 156

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.

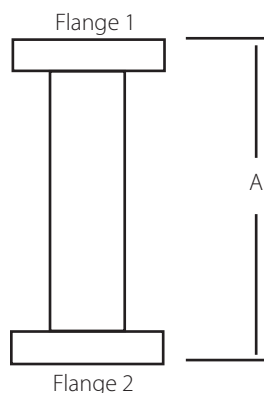
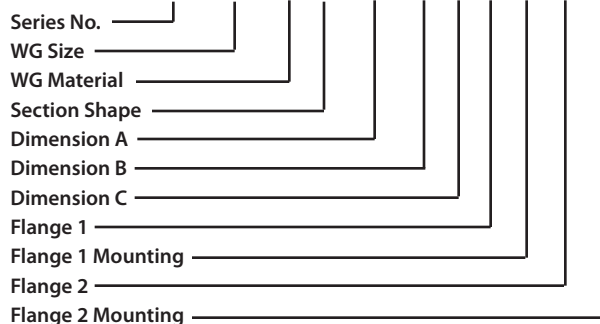
Rectangular Waveguide Section Numbering System

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



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

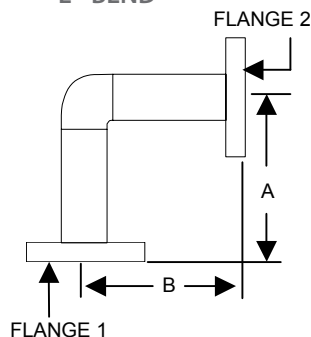
Large sections manufactured from copper should be avoided. Instead use bronze for additional strength. It is strongly recommended that a single large complex section be constructed by specifying several smaller and less complicated sections for assembly by the user on site

You are advised to contact UBS for assistance in specifying large complex sections to best meet your requirements.

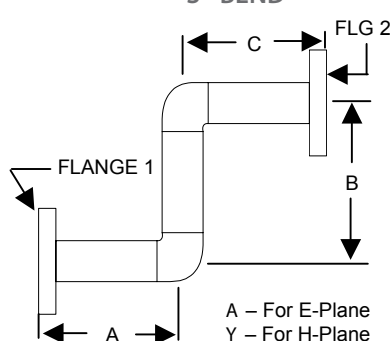
Rectangular Waveguide

Series No: 111

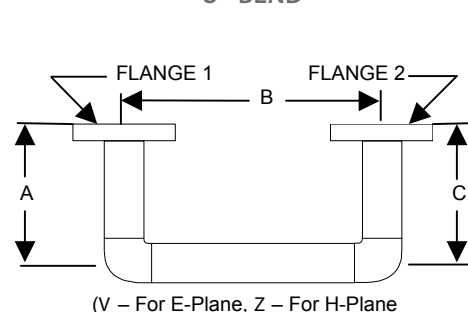
E - BEND



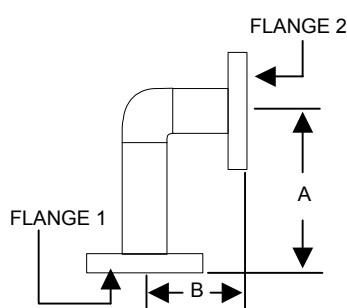
S - BEND



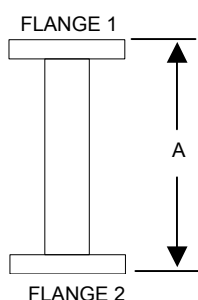
U - BEND



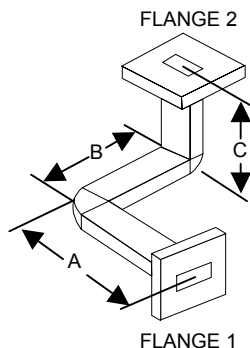
H - BEND



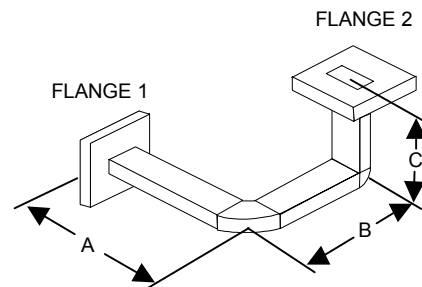
Straight



Composite Bend Type M



Composite Bend Type W



Ordering Data

Part number - 112 - X - X - X - X - X - X - X - X - X - X

Series No. _____
WG Size _____
WG Material _____
Section Shape _____
Dimension A _____
Dimension B _____
Dimension C _____
Flange 1 _____
Flange 1 Mounting _____
Flange 2 _____
Flange 2 Mounting _____

Waveguide Section

E	E-BEND
H	H-BEND
S	Straight Solid
F	Straight Flex
A	S-BEND E-PLANE
Y	S-BEND H-PLANE
V	U-BEND E-PLANE
Z	U-BEND H-PLANE
W	Composite Bend Type W
M	Composite Bend Type M

Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR, CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Material

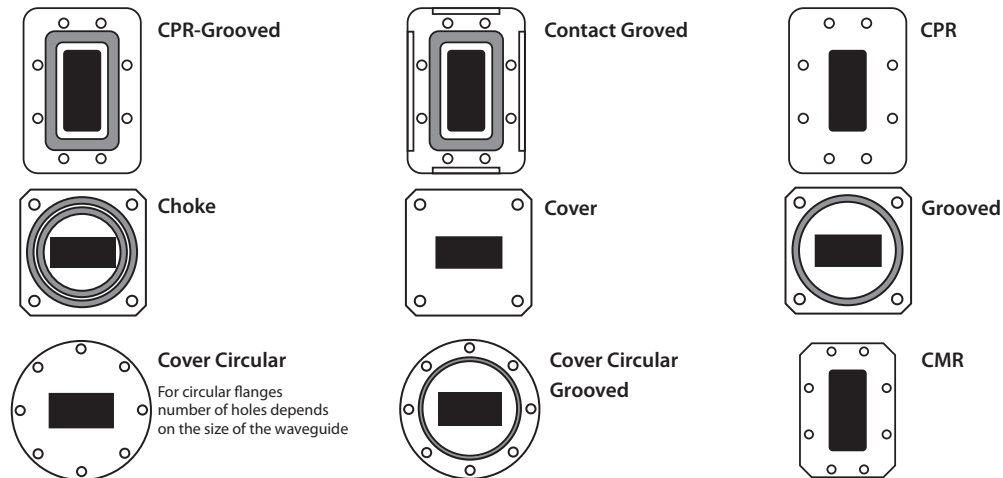
C	Copper
A	Aluminum
B	Bronze

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.

Rectangular Waveguide

Series No: 111

Standard Flange Types



North American (EIA Standard)

Size	UG Style						COVER			CPR		CMR
	SQUARE	CIRCULAR	CHOKE	CPR CONTACT		CMR	SQUARE	CIRCULAR	GROOVED	FLAT	GROOVED	
	C	C	CHOKE	CONTACT-F	CONTACT-G	CMR	C	C	G	F	G	CMR
WR28	UG-599/U		UG-600A/U				•		•			
WR34						UG-1530/U	•		•			
WR42	UG-595/U UG-597/U		UG-596A/U UG-598A/U				•		•			
WR51							•		•			
WR62	UG-419/U UG-1665/U		UG-541A/U				•		•			
WR75							•		•	•	•	
WR90	UG-39/U UG-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	•		•	•	•	•
WR112	UG-51/U UG-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	•		•	•	•	•
WR137		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		•	•	•	•	•
WR159				UG-1730/U UG-1731/U	UG-1354/U UG-1355/U			•	•	•	•	•
WR187		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		•	•	•	•	•
WR229				UG-1726/U UG-1727/U	UG-1350/U UG-1351/U			•	•	•	•	•
WR284		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		•	•	•	•	•
WR340				UG-1712/U UG-1713/U	UG-1346/U UG-1347/U					•	•	
WR430				UG-1716/U UG-1711/U	UG-1344/U UG-1345/U					•	•	
WR650										•	•	

Notes

1. UG Style W/G Material

WR90	UG-39/U	Brass/Copper
	UG-135/U	Aluminum Alloy

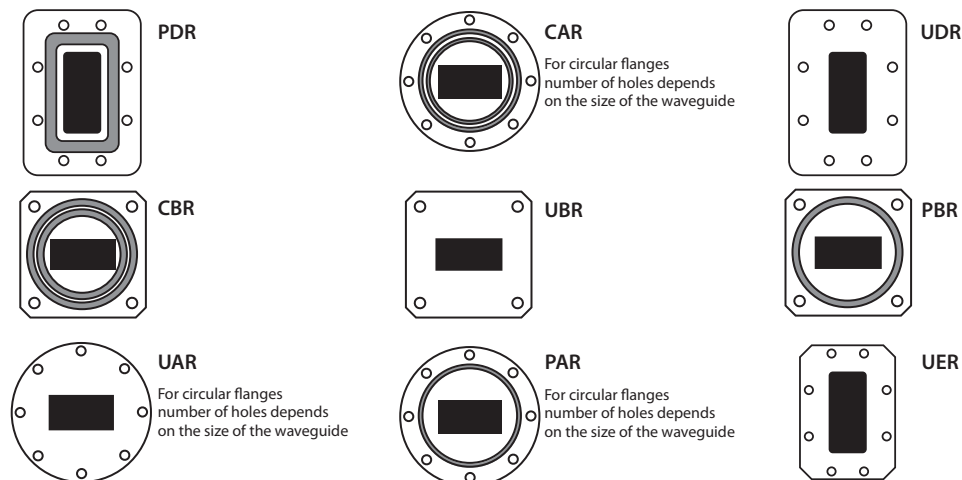
2. For flanges not found in this table please contact our sales department

VER 1.0 November 19, 2015

Rectangular Waveguide

Series No: 111

Standard Flange Types



European (IEC Standard)

Waveguide Size			UBR	UAR	UDR	UER	PAR	PBR	PDR	CBR	CAR
EIA	RCSC	IEC	C	C	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 accommodate metric hardware

Twist (with flanges)

Series No: 112

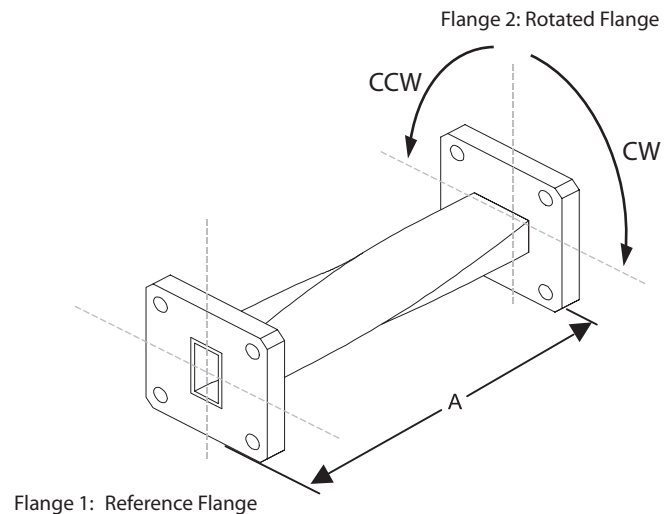
Part Description

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

Part number - 112 - X - X - X - X - X - X - X

Series No.	
WG Size	
Length	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	
Twist Angle	



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)
------	----------------------------------

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	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

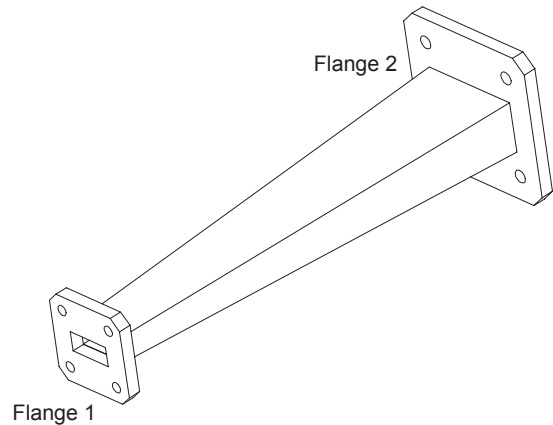
Part Description

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

Part number - 113 - X/X - X - X - X - X

Series No. _____
 WG Size _____
 Flange 1 _____
 Flange 1 Mounting _____
 Flange 2 _____
 Flange 2 Mounting _____



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

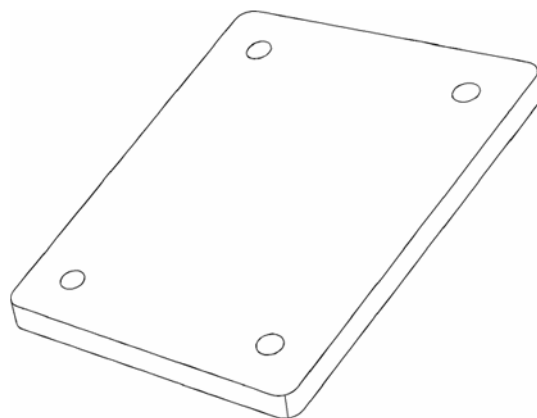
Part Description

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

Part number - 114 - X - X - X - O

Series No. _____
 WG Size _____
 Flange _____
 Flange Mounting _____
 Add "O" for Offset _____



Flange Configuration

Flange Type	C - Cover G - Groove CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - THreaded A - Alternating

Specifications

Size	C	G	CMR	CPR
WR28	•	•		
WR34	•	•		
WR42	•	•		
WR51	•	•		
WR62	•	•		
WR75	•	•	•	•
WR90	•	•	•	•
WR112	•	•	•	•
WR137	•	•	•	•
WR159	•	•	•	•
WR187	•	•	•	•
WR229	•	•	•	•
WR284	•	•	•	•
WR340	•	•	•	•
WR430	•	•	•	•
WR650	•	•	•	•

Pressure Windows

Series No: 115

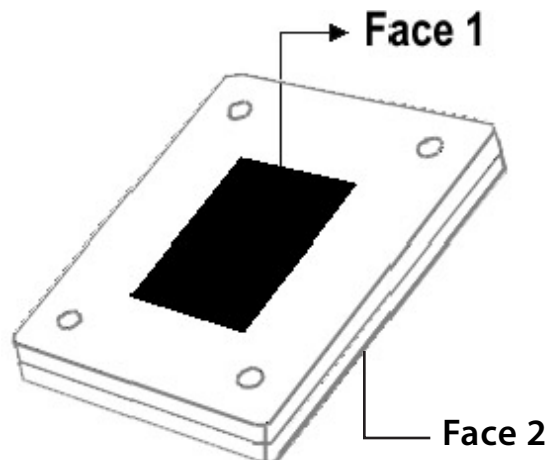
Part Description

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

Part number - 115 - X - X - X

Series No. _____
 WG Size _____
 Flange Face 1 _____
 Flange Face 2 _____



Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR (F, G)
-------------	---

Electrical Specification

VSWR	< 1.1 max.
------	------------

Specifications

Size	C	G	CHOKE	CMR	CPR
WR28	•	•	•		
WR34	•	•	•		
WR42	•	•	•		
WR51	•	•	•		
WR62	•	•	•		
WR75	•	•	•	•	•
WR90	•	•	•	•	•
WR112	•	•	•	•	•
WR137	•	•	•	•	•
WR159	•	•	•	•	•
WR187	•	•	•	•	•
WR229	•	•	•	•	•
WR284	•	•	•	•	•
WR340	•	•	•	•	•
WR430	•	•	•	•	•
WR650	•	•	•	•	•

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.

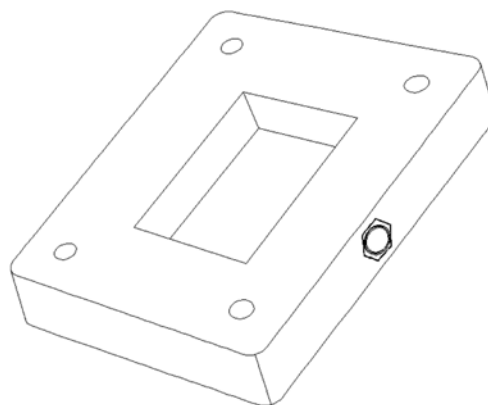
Ordering Data

Part number - 116 - X - X

Series No. _____

WG Size _____

Flange _____



Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR (F, G)
-------------	---

Electrical Specification

VSWR	< 1.1 max.
------	------------

Specifications

Size	C	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

Part number - 117 - X - X - X

Series No. _____

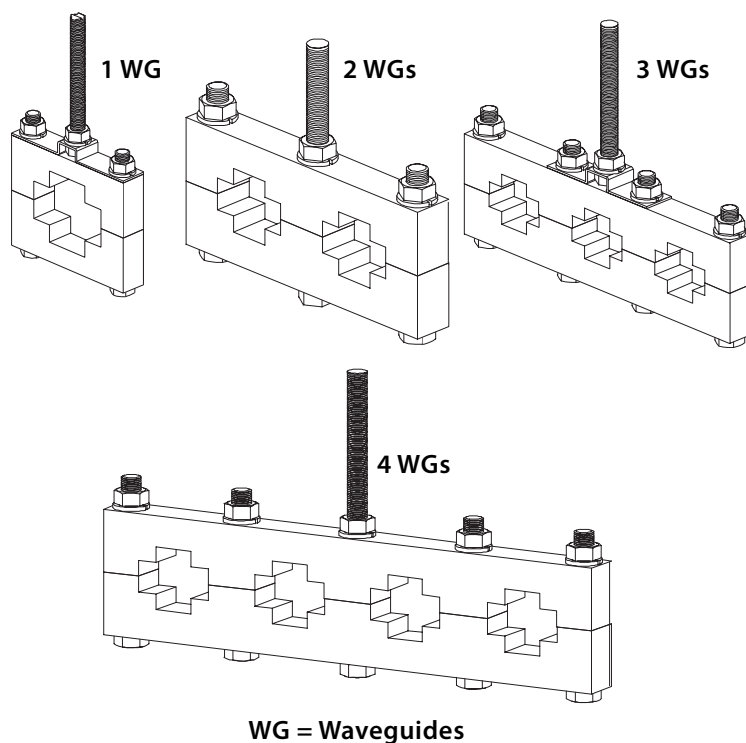
WG Size _____

Number of Waveguides _____

Hardware _____

Note

Diagram shown with optional thread rod kit
Waveguide 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

Part number - 117 - USFHK - X

Series No. _____

Flange _____

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

Part number - 118 - X - X - X - X - X - X - X - X

Series No.	
WG Size	
WG Type	
Length	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	
Hardware	



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	A
Flexible	B

Specifications

Size	C	G	CHOKE	CMR	CPR	MATCHING WG INTERNAL DIMENSIONS (in)	OPERATIONAL FREQUENCY BAND (GHz)	NOMINAL TEST FREQ. FOR ATTENUATION (GHz)	MAXIMUM IL ATTENUATION (dB/ft)	MAXIMUM VSWR < 36" >	MAXIMUM VSWR < 36" >	Power Handling (W)
WR28	•	•	•			0.280 x 0.140	26.50 - 40.00	34.00	1.00	1.30 - 36" max		75
WR42	•	•	•			0.420 x 0.170	18.00 - 26.50	22.00	0.70	1.18	1.23	100
WR51	•	•	•			0.510 x 0.255	15.00 - 22.00	18.50	0.55	1.15	1.18	400
WR62	•	•	•			0.622 x 0.311	12.40 - 18.00	14.00	0.28	1.10	1.13	400
WR75	•	•	•			0.750 x 0.375	10.00 - 15.00	13.70	0.18	1.08	1.10	750
WR90	•	•	•	•	•	0.900 x 0.400	8.20 - 12.40	9.40	0.15	1.07	1.10	1000
WR112	•	•	•	•	•	1.122 x 0.497	7.05 - 10.00	9.40	0.12	1.07	1.10	1500
WR137	•	•	•	•	•	1.372 x 0.622	5.85 - 8.20	6.45	0.09	1.05	1.09	2000
WR159	•	•	•	•	•	1.590 x 0.795	4.90 - 7.05	5.90	0.08	1.05	1.08	2500
WR187	•	•	•	•	•	1.872 x 0.872	3.95 - 5.85	4.75	0.05	1.05	1.07	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	4000

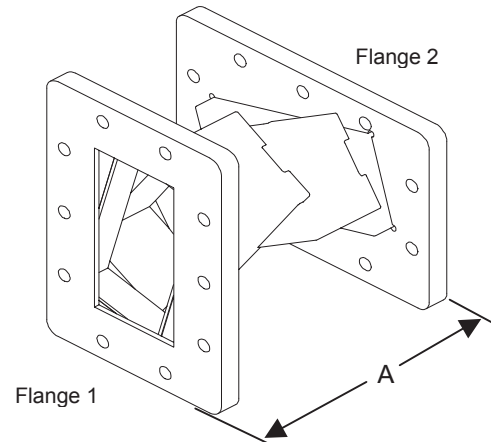
Part Description

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

Part number - 119 - X - X - X - X - X - X - X

Series No. _____
 WG Size _____
 Length _____
 Flange 1 _____
 Flange 1 Mounting _____
 Flange 2 _____
 Flange 2 Mounting _____
 Twist Angle _____



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.

Specifications

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

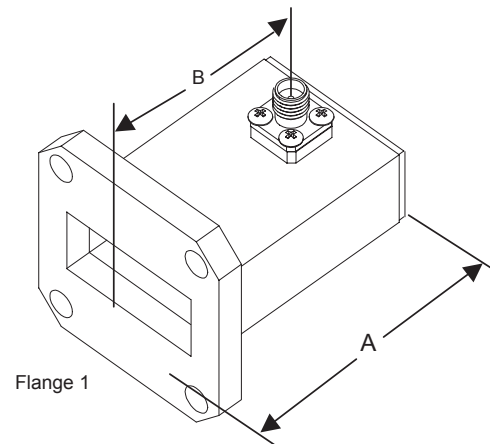
Part Description

UBS offers a standard product line of precision rectangular waveguide-to-coax adapters covering waveguide sizes from WR-28 through WR-430.

Ordering Data

Part number - 121 - X - X - X - X - X

Series No. _____
 WG Size _____
 Port 1 Connector Style _____
 Port 1 Connector Type _____
 Flange 1 _____
 Flange 1 Mounting _____



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
Type	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.

Specifications

Size	Frequency GHz	Dimensions			
		SMA-Type		N-Type	
		A	B	A	B
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

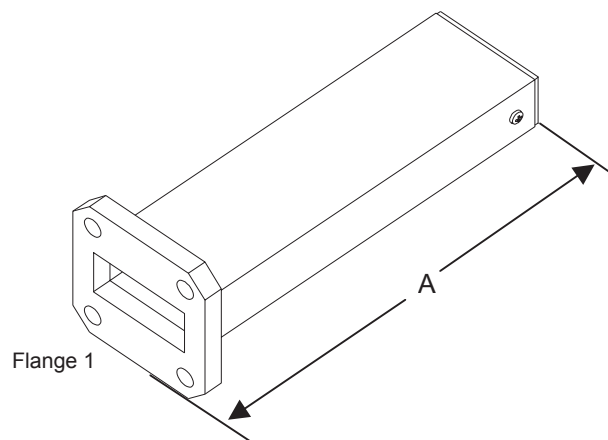
Part number - 131 - X - X - X

Series No. _____

WG Size _____

Flange 1 _____

Flange 1 Mounting _____



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.

Specifications

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

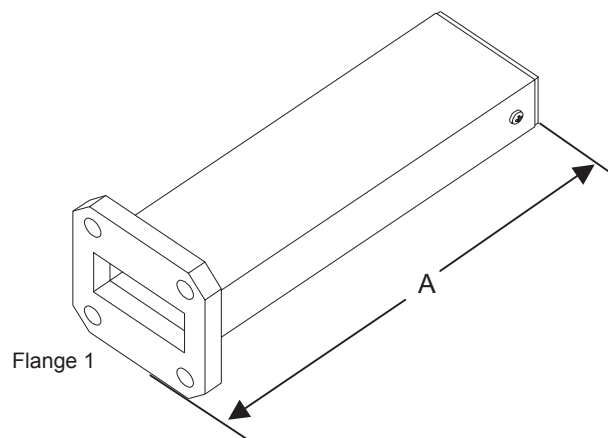
Part Description

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

Part number - 132 - X - X - X

Series No. _____
WG Size _____
Flange 1 _____
Flange 1 Mounting _____



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 (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	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

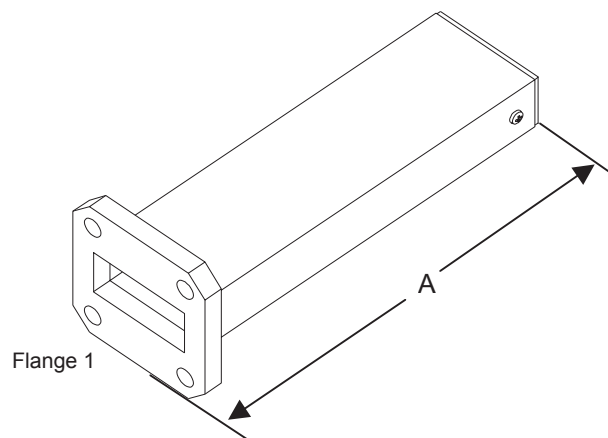
Part Description

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

Part number - 133 - X - X - X

Series No. _____
WG Size _____
Flange 1 _____
Flange 1 Mounting _____



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.
------	-------------

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.

Specifications

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

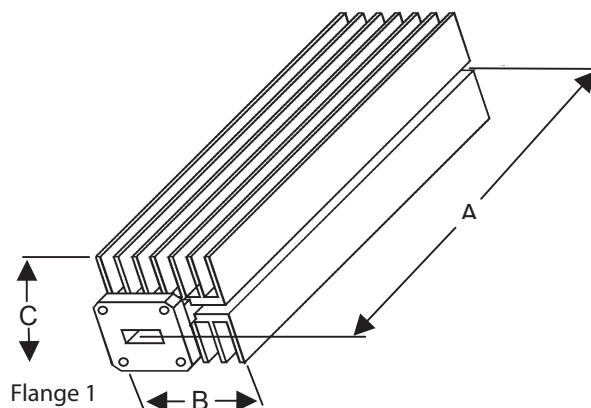
Part number - 134 - X - X - X

Series No. _____

WG Size _____

Flange 1 _____

Flange 1 Mounting _____



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 (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	Dimensions (inches)		
		A	B	C
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	2.30	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	-	-	-

Termination (Medium Power, short-length)

Series No: 135

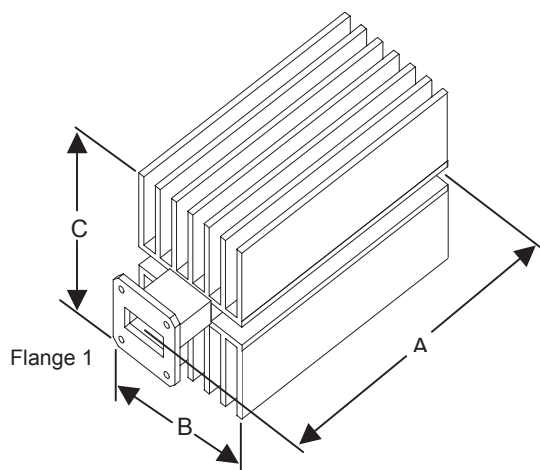
Part Description

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.

Ordering Data

Part number - 135 - X - X - X

Series No. _____
 WG Size _____
 Flange 1 _____
 Flange 1 Mounting _____



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.
------	-------------

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

Specifications

Size	Frequency GHz	Dimensions (inches)			Average Power Watts
		A	B	C	
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.

Ordering Data

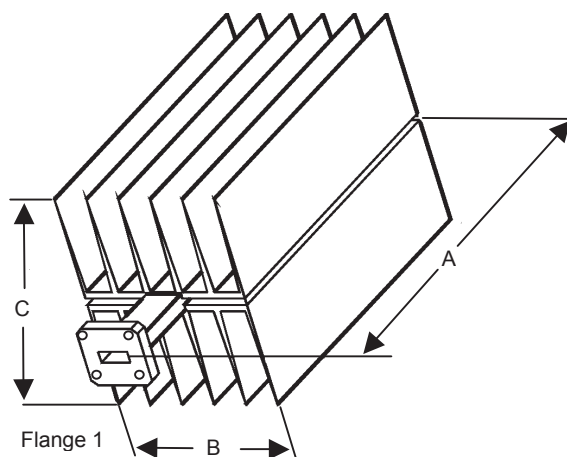
Part number - 136 - X - X - X

Series No. _____

WG Size _____

Flange 1 _____

Flange 1 Mounting _____



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.

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

Specifications

Size	Frequency GHz	Dimensions (inches)			Average Power Watts
		A	B	C	
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	12.00	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

Part Number - 137 - X - X - X
 Series No. _____
 WG Size _____
 Flange _____
 Flange Mounting _____



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

Part Number - 138 - X - X - X

Series No. _____
 WG Size _____
 Flange _____
 Flange Mounting _____



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	≤ 1.1
------	------------

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

Broadwall Directional Coupler

Series No: 141

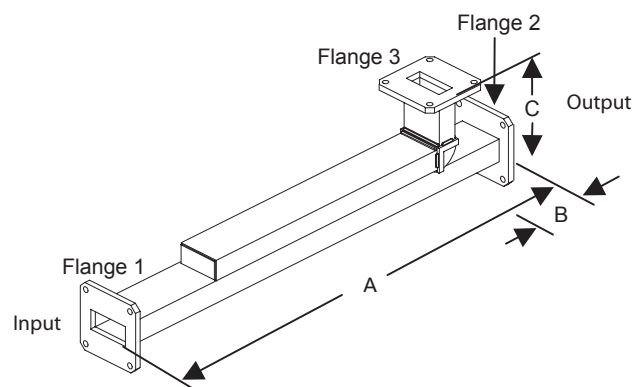
Part Description

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

Part number - 141 - X - X - X - X - X - X - X - X

Series No.	
WG Size	
Coupling	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	
Flange 3	
Flange 3 Mounting	



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.

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	B
WR28	26.50 - 40.00	1.00	1.20
WR34	22.00 - 33.00	1.00	1.50
WR42	18.00 - 26.00	1.00	1.50
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	5.85 - 8.20	2.20	2.50
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

6, 10, 20, 30, 40 and 50 dB

Dual Broadwall Directional Coupler

Series No: 142

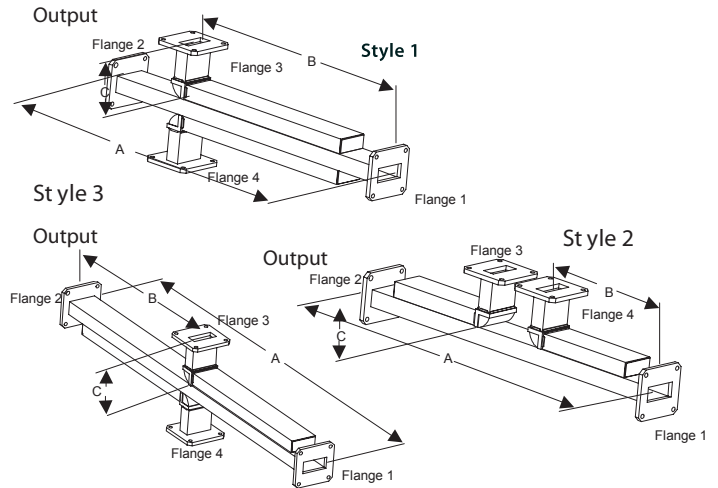
Part Description

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

Part number - 142 - X - X - X - X - X - X - X - X - X - X

Series No.	
WG Size	
Coupling	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	
Flange 3	
Flange 3 Mounting	
Flange 4	
Flange 4 Mounting	



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 GHz	Dimension (inches)
		C
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

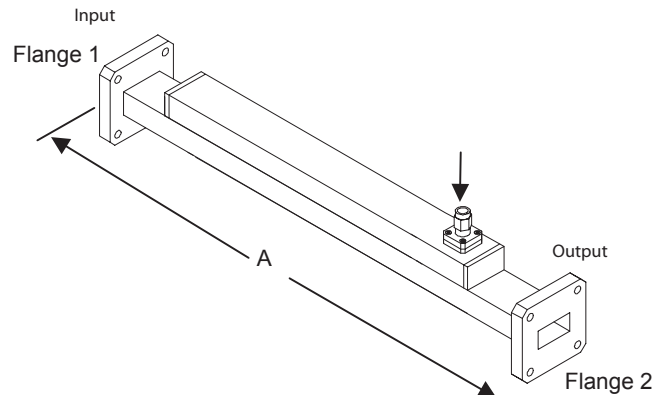
Part Description

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

Part number - 143 - X - X - X - X - X - X - X - X

Series No.	
WG Size	
Coupling	
Port 1 Connector Style	
Port 1 Connector Type	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	



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	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

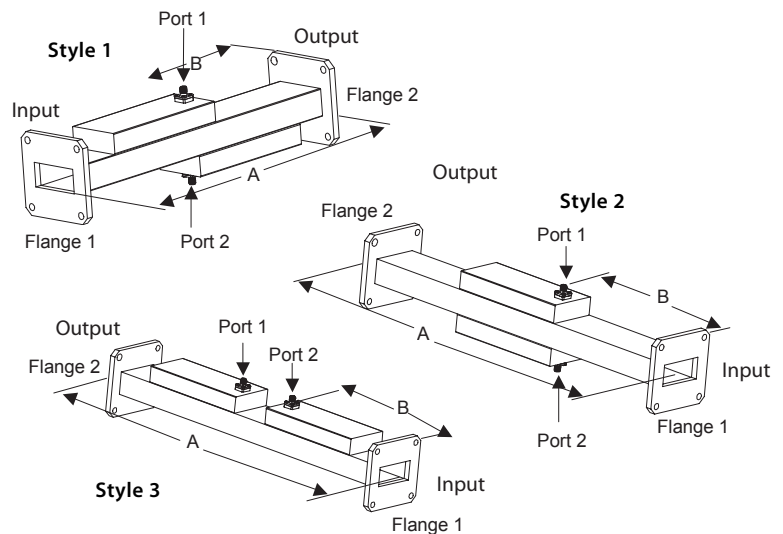
Series No: 144

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.

Ordering Data

Part number	- 144 - X - X - X - X - X - X - X - X - X - X
Series No.	
WG Size	
Coupling	
Port 1 Connector Style	
Port 1 Connector Type	
Port 1 Connector Style	
Port 1 Connector Type	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	



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.

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

10, 20, 30, 40 and 50 dB

Note

For Connector Style, contact factory for 2.9mm, 3.5mm, and 2.4mm

Cross Guide Coupler

Series No: 145

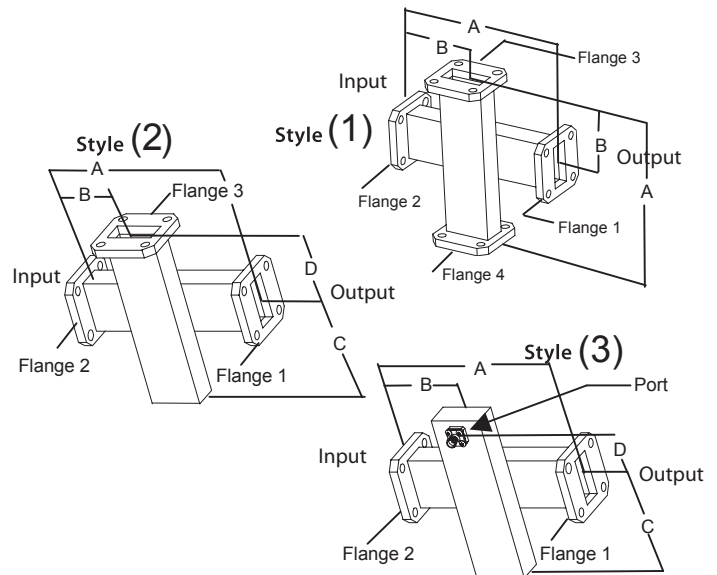
Part Description

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

Part number - 145 - X - X - X - X - X - X - X - X - X - X - X - X - X

Series No.	
WG Size	
Coupling	
Body Style	
Port 1 Connector Style	
Port 1 Connector Type	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	



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	±1.0dB 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

Size	Frequency GHz	Dimensions (inches)			
		A	B	C	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

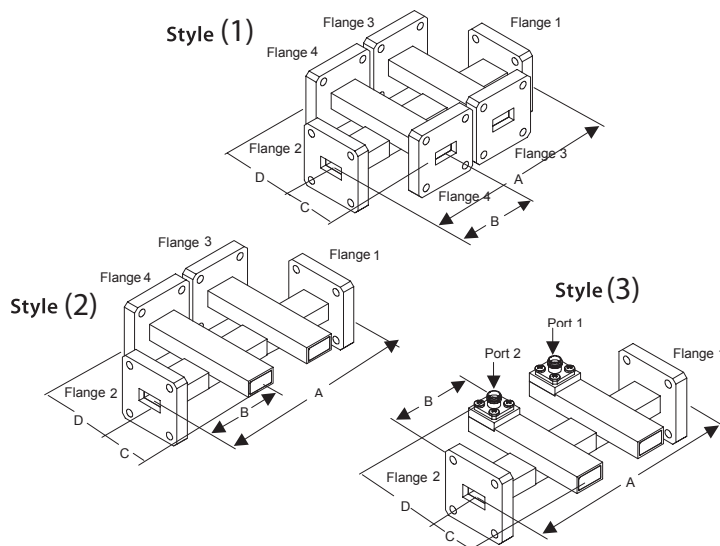
Part Description

UBS directional crossguide couplers utilize an ultra-flat coupling technique that exhibits high power handling characteristics, while maintaining optimum electrical performance parameters.

Ordering Data

Part number - 145D - X - X - X - X - X - X - X - X - X - X - X - X - X

Series No.	
WG Size	
Coupling	
Body Style	
Port 1 Connector Style	
Port 1 Connector Type	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	



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	±1.0dB 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

Size	Frequency GHz	Dimensions (inches)			
		A	B	C	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

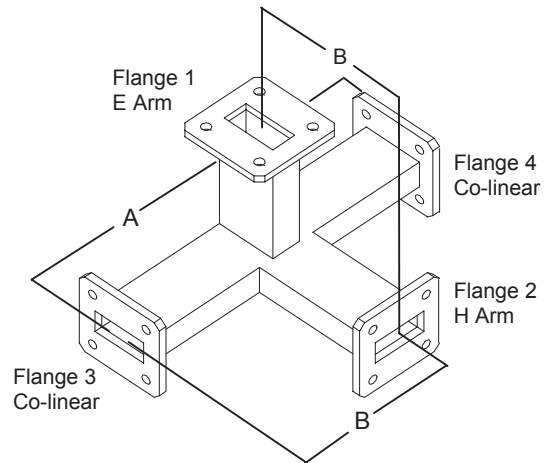
Part Description

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

Part number - 146 - X - X - X - X - X - X - X - X - X

Series No.	
WG Size	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	
Flange 3	
Flange 3 Mounting	
Flange 4	
Flange 4 Mounting	



Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Specifications

Size	Frequency GHz	Dimension (inches)	
		A	B
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	-	-

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.

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

Part number - 147 - X - X - X - X - X - X - X - X - X - X - X

Series No. _____

WG Size _____

Coupling _____

Port 1,2 Connector Style _____

Port 1,2 Connector Type _____

Flange 1 _____

Flange 1 Mounting _____

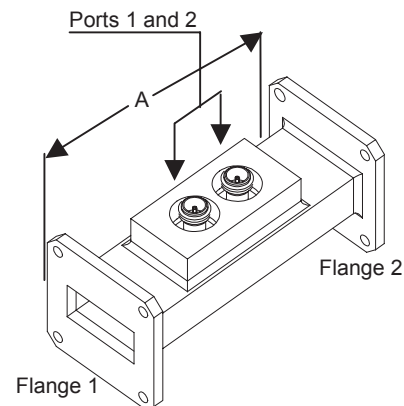
Flange 2 _____

Flange 2 Mounting _____

Bandwidth (10 or 20 %) _____

Centre Frequency _____

Hardware _____



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	± 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

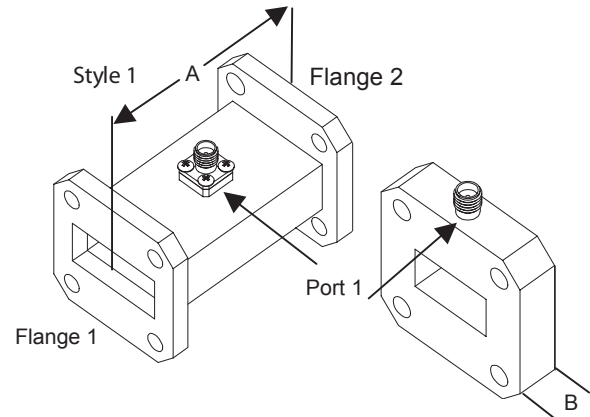
Part Description

Unique Broadband Systems power samplers offers a low cost approach to monitoring power in matched waveguide systems where high directivity 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

Part number - 148 - X - X - X - X - X - X - X - X

Series No.	
WG Size	
Coupling	
Port 1 Connector Style	
Port 1 Connector Type	
Flange 1	
Flange 1 Mounting	
Flange 2	
Flange 2 Mounting	



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	1.10 max.
-----------------	-----------

Specifications

Size	Frequency GHz	Dimension (inches)	
		A	B
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

Part number - 149 - X - X - X - X - X - X - X

Series No. _____

WG Size _____

Body Style _____

Flange 1 & 2 Type _____

Flange 1 & 2 Mounting _____

Flange 3 & 4 Type (style 2 only) _____

Flange 3 & 4 Mounting (style 2 only) _____

Port 3 & 4 Connector Type _____

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

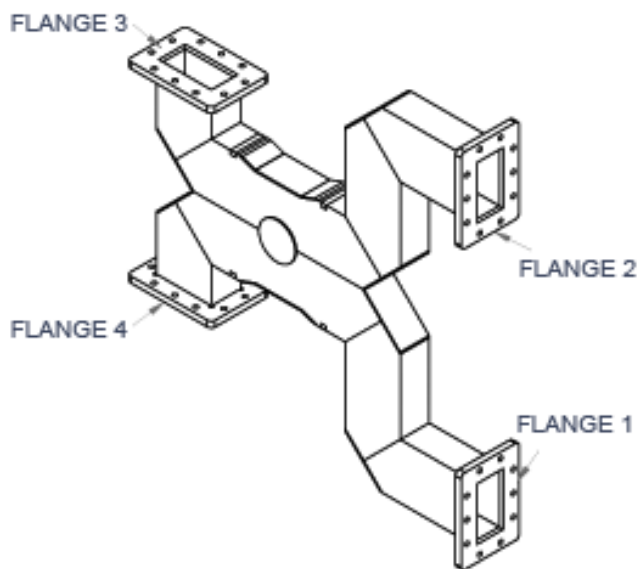
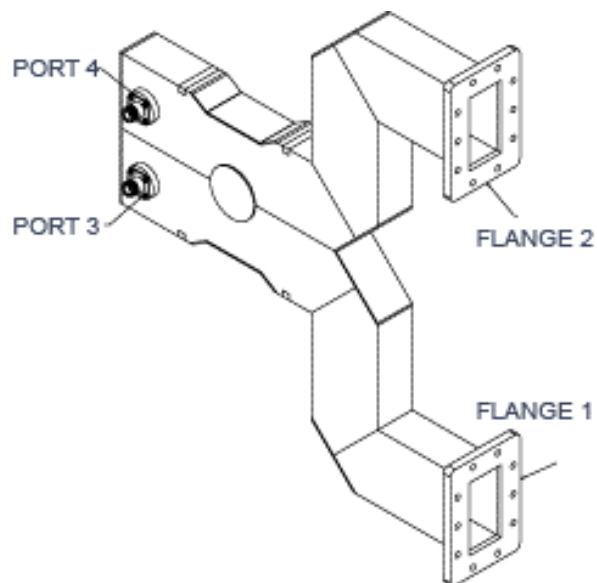
Flange Configuration

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

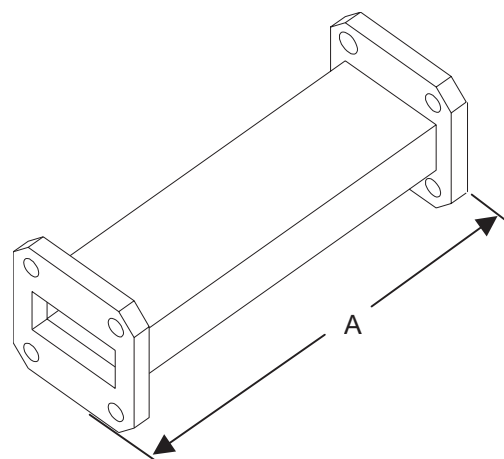
Part Description

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

Part number - 152 - X - X - X - X - X - X

Series No. _____
 WG Size _____
 Attenuation _____
 Flange 1 _____
 Flange 1 Mounting _____
 Flange 2 _____
 Flange 2 Mounting _____



Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Specifications

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

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.

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.

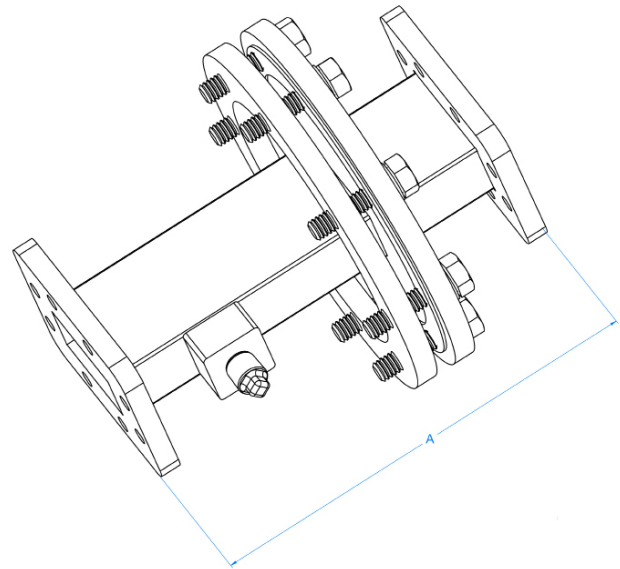
These adapters operate over the full waveguide bandwidths and are available for WR75 to WR137 waveguide sizes. Standard lengths are 5.00 inches with custom lengths and a wide variety of flange types available upon request.

Ordering Data

Part number - 154 - X - X - X - X - X - X

Series No. _____
 WG Size _____
 Length * _____
 Flange 1 _____
 Flange 1 Mounting _____
 Flange 2 _____
 Flange 2 Mounting _____

* 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

Specifications

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

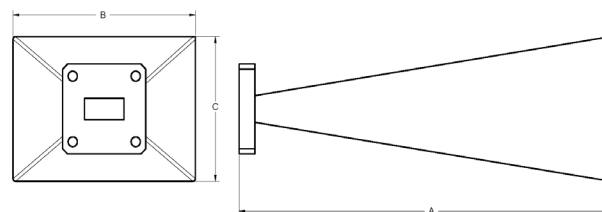
Part Description

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

Part number - 155 - X - X - X - X

Series No. _____
 WG Size _____
 Gain _____
 Flange Type _____
 Flange Mounting _____



Flange Configuration

Flange Type	C - Cover G - Groove CHOKE CMR CPR CPR(F, G)
Flange Mounting Holes	T1 - Through Holes T2 - Threaded A - Alternating

Specifications

Size	Frequency GHz	Dimensions (inches)								
		10 dB			15 dB			20 dB		
		A	B	C	A	B	C	A	B	C
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									

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.

Part Description

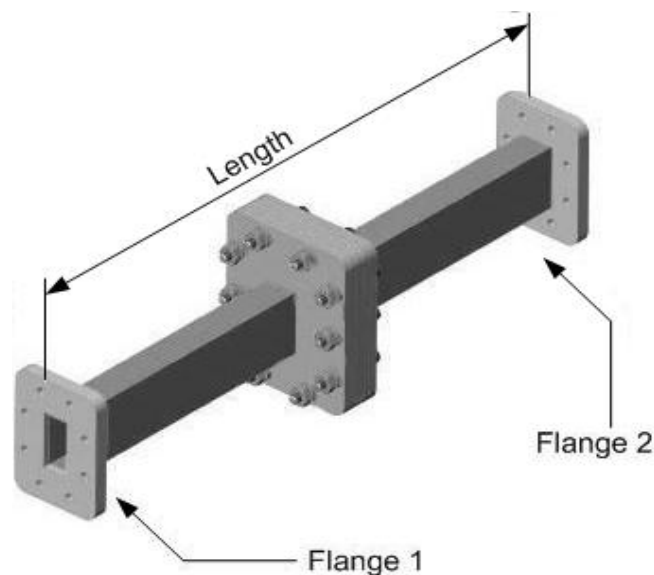
UBS offers a series of DC Blocks covering waveguide sizes from WR-28 through WR-650. The assembly construction includes precision ground elements for optimum electrical performance.

Ordering Data

Part number - 156 - X - X - X - X - X - X

Series No.	_____
WG Size	_____
Length *	_____
Flange 1	_____
Flange 1 Mounting	_____
Flange 2	_____
Flange 2 Mounting	_____

* 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	C	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

Combine 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.

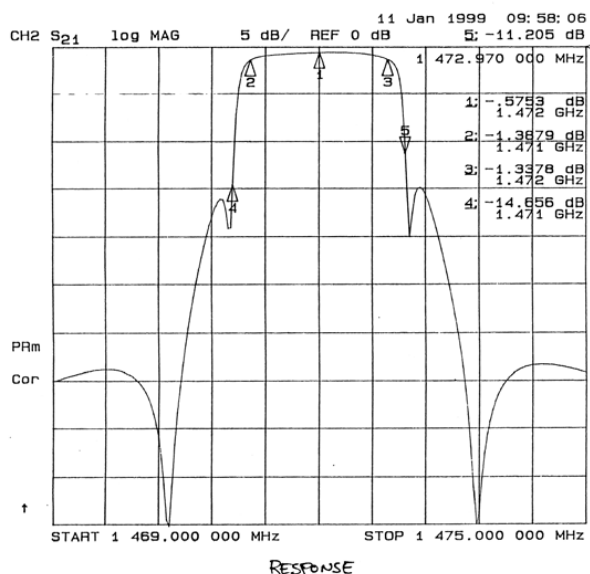
Available models include; four, six and eight-pole dual mode designs.

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	Coaxial Connectors or WG flanges

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.

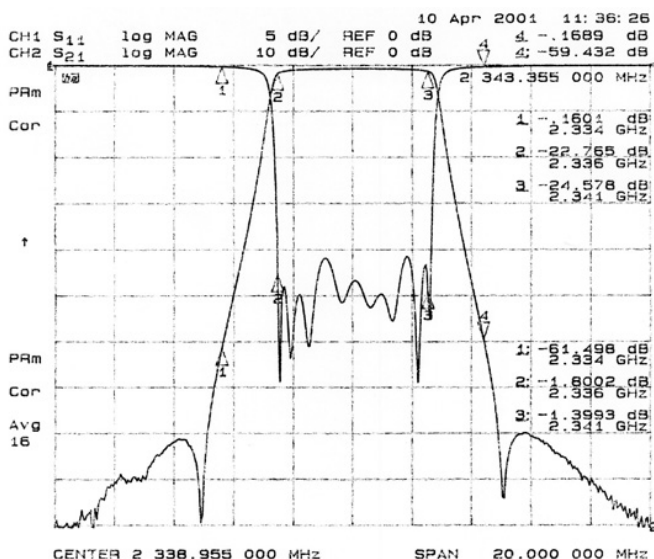
Available models include; four, six and eight-pole dual mode designs.

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



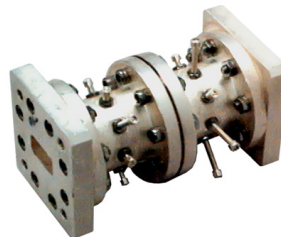
General Filter Specifications

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	Coaxial Connectors or WG flanges

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.

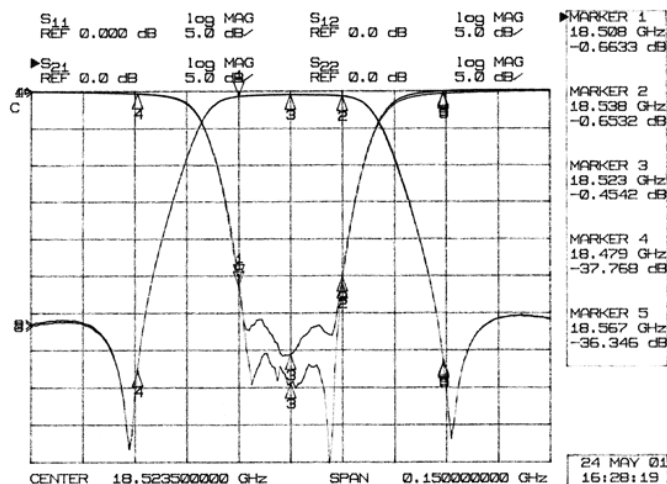
Available models include; four, six and eight-pole dual mode designs.

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	Coaxial Connectors or WG flanges

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 combine 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

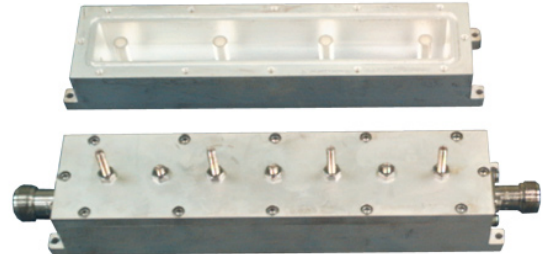
Center Frequency Range	Tunable from 470 MHz - 860 MHz
Passband width	8 MHz
Type of Electrical Response	Bandpass Chebyshev
Number of Poles	8
Material	Aluminum
Interface	7/16 DIN-type
Technology	Screened combine resonators in rectangular cavities
VSWR	1:1.23 typ.
Insertion Loss Fc = 10.0 MHz	0.85 dB @ Fc 2.3 dB @ Fc \pm 4 MHz
Rejection	60 dB @ Fc \pm 8 MHz
Group Delay variation across passband (peak-to-peak)	375...380 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)

Comblines 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*



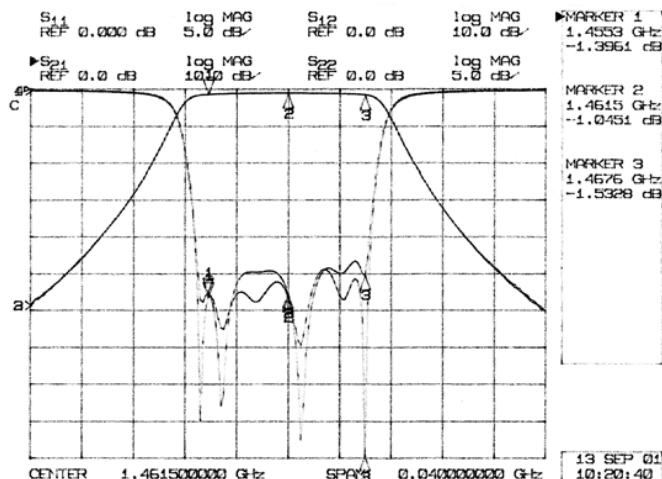
Overview

UBS Comblines 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 Comblines 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)

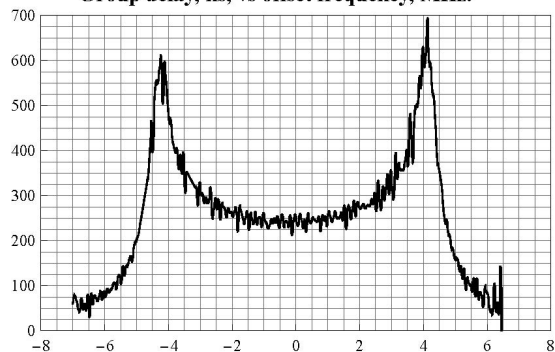
UHF DTV Bandpass Filter



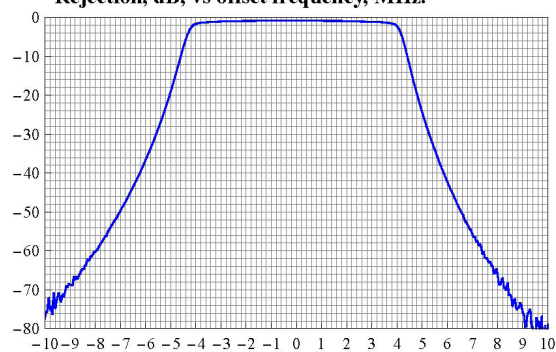
Sample Measurement

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

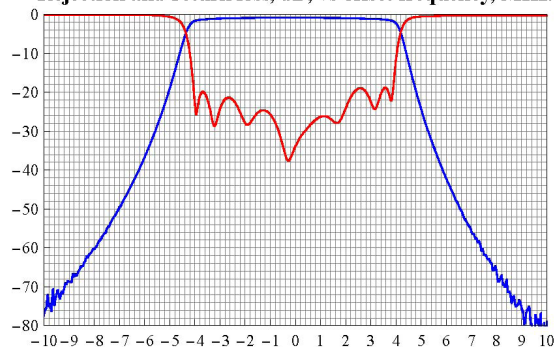
8-pole comb-line: Fc=490 MHz, BW=8 MHz.
Group delay, ns, vs offset frequency, MHz.



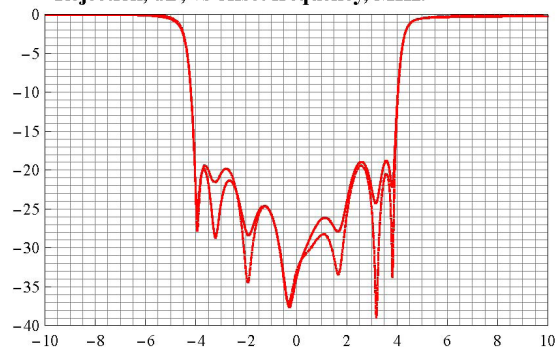
8-pole comb-line filter: Fc=490 MHz, BW=8 MHz.
Rejection, dB, vs offset frequency, MHz.



8-pole comb-line filter: Fc=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.



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.

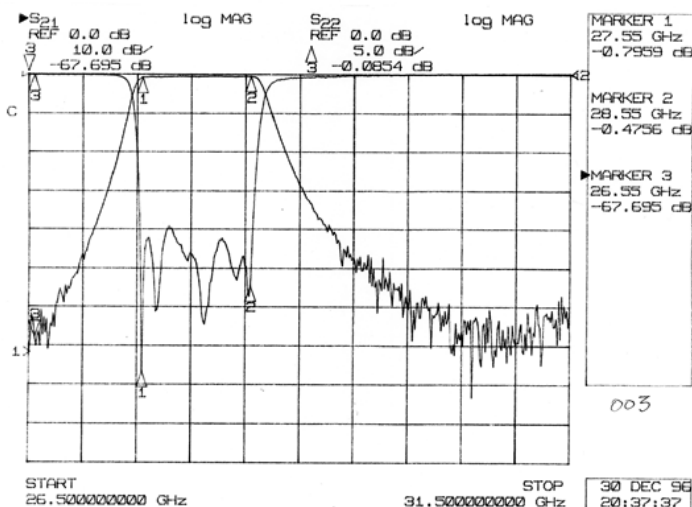
Available construction material includes bronze, aluminum or invar and may be folded to comply to a specified mechanical configuration. Please consult our sales department for further details.

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)

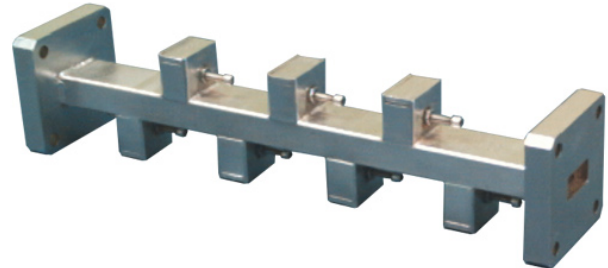
Typical Frequency Response



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.

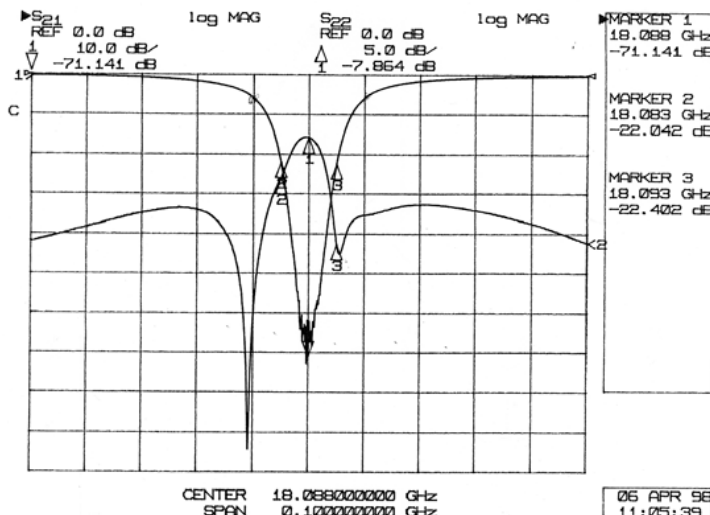
Available construction material includes bronze, aluminum or invar. Please consult our sales department for further details.

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)

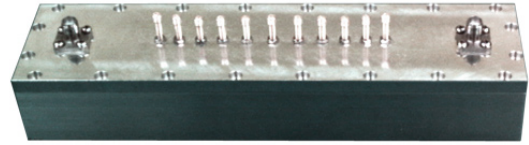
Typical Frequency Response



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.

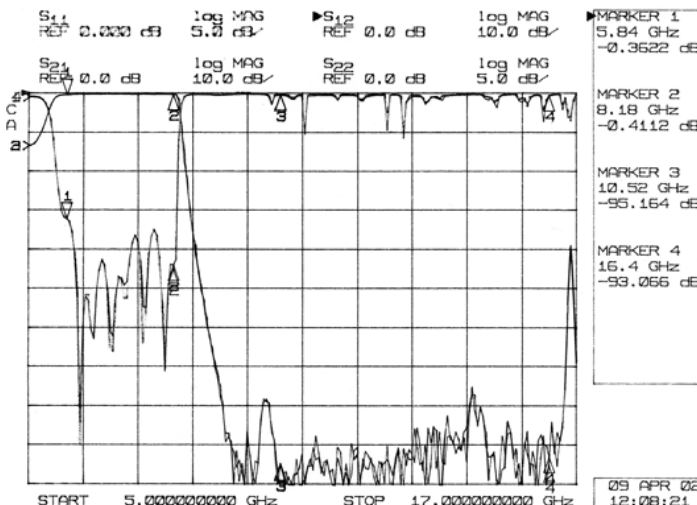
The illustration and specifications shown herein are for a full WR-137 band harmonic reject filter. Other full waveguide band designs are also available with bandwidths ranging from 10-100% of the waveguide frequency range. Please consult our sales department to discuss your specific application.

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



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.

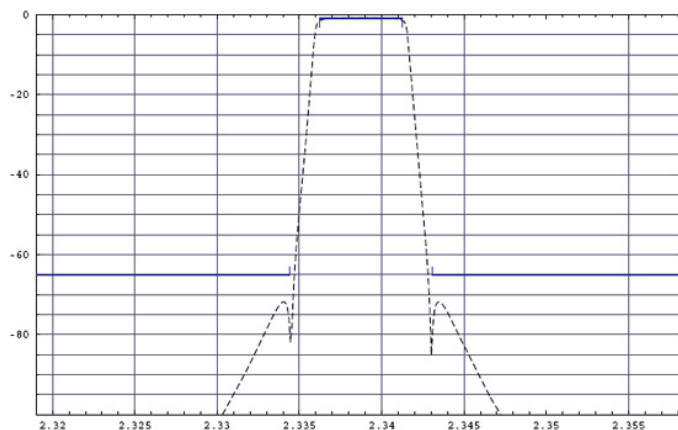
Product Specifications

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 ± 4.5 MHz	48 dB
Fc ± 5.5 MHz	74 dB
Fc ± 6.5 MHz	80 dB
Fc ± 7.0 MHz	85 dB
Fc ± 10.0 MHz	100 dB
VSWR	1.20:1
Input Power (referenced at input port)	300 W (avg.) 1000 W (pk.)
Connectors	7/16 DIN-type (F)
Operating Temperature	55 °C to -25 °C

(specifications are subject to change without notice)

Typical Frequency Response

Rejection, dB



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 non-adjacent 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 °C to 32 °C

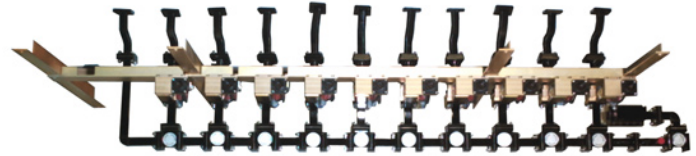
**Additional Loss due to transit through multiple channels is approximately 0.025 dB per channel combiner.

(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

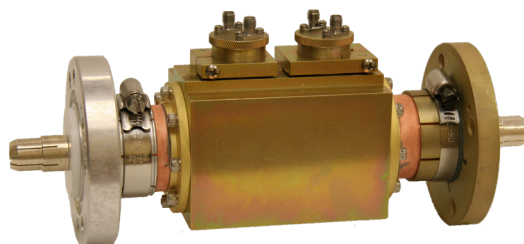
Frequency	18 GHz / 27 GHz
Insertion Loss**	1.0 dB
Output VSWR	1.2:1
Channel Isolation	> 30 dB
Transmitter / Antenna Interface	WR42 or WR51 for 18 GHz Combiner WR28 or WR34 for 27 GHz Combiner
Power Handling	20 Watts (higher power versions available)

**Additional loss due to transit through multiple channels is approx. 0.3 dB per channel.

(specifications are subject to change without notice)

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 channels: 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" x 4.5" x 2.6"
Weight	2 kg
Interface:	
Primary Line	Connector: 1-5/8"
Coupled Ports	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)

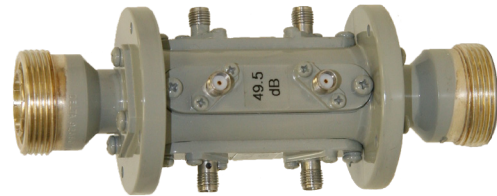
X5 (for custom connector) - Primary port connector

X6 (for custom connector) - Coupled (probe) port connector

Triple Arm Coaxial Coupler

Product Features

- *High power handling capability*
- *Rugged mechanical design*



Product Specifications

Operating Frequency	2.0 GHz - 3.0 GHz
Continuous Power Handling Capacity	400 Watts
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)

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

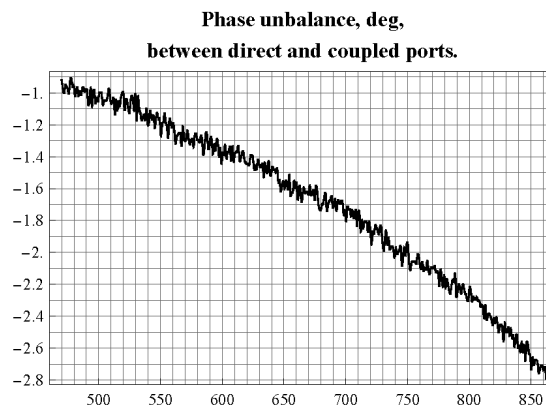
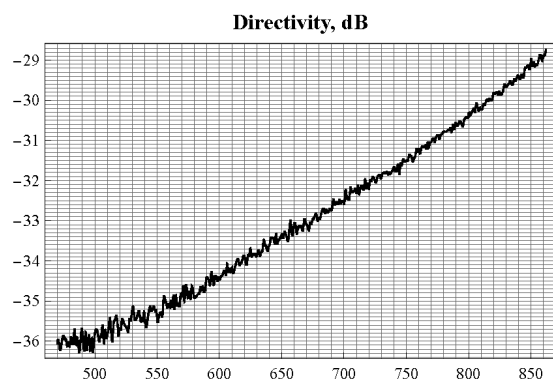
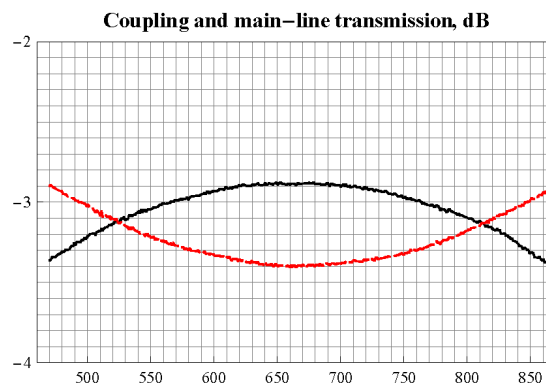
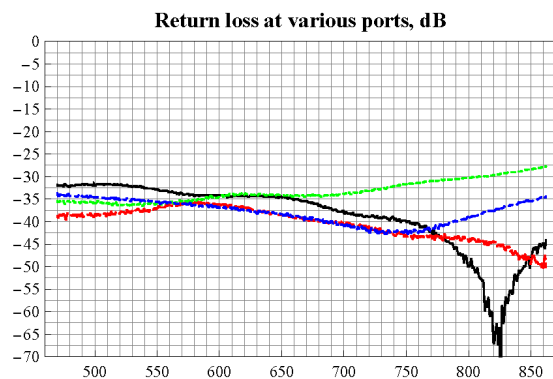
Frequency Range	470 MHz - 860 MHz
Configuration	Crossover hybrid, external matched load
Maximum Power	500 Watts
Return Loss (at the input port)	30 dB min.
Directivity	29 dB min.
Amplitude Balance	±0.26 dB
Phase Balance	±1.4°
Dimensions (without connectors)	2.25" x 2.1" x 6.9"
Interface	Connectors: 7/16"

(specifications are subject to change without notice)

UHF High-Power (Quadrature) Hybrid



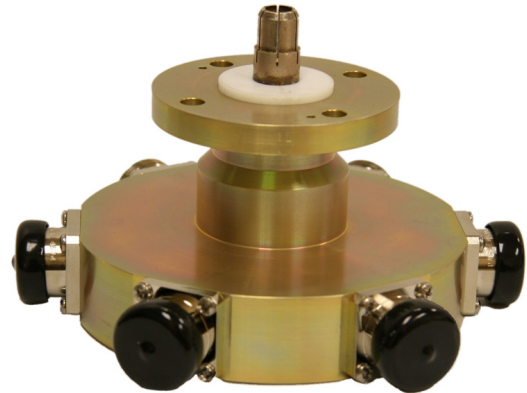
Product Specifications (specifications are subject to change without notice)



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

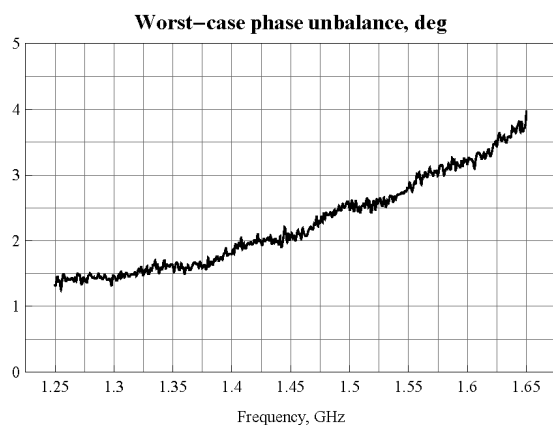
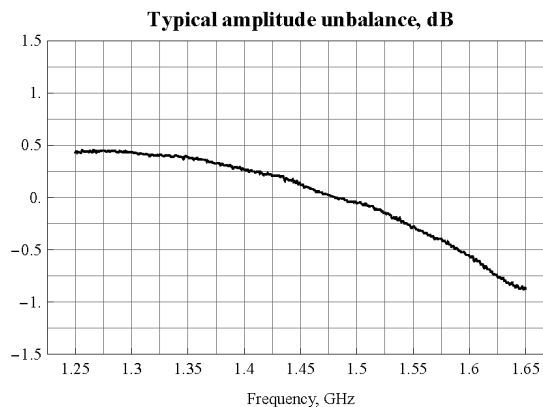
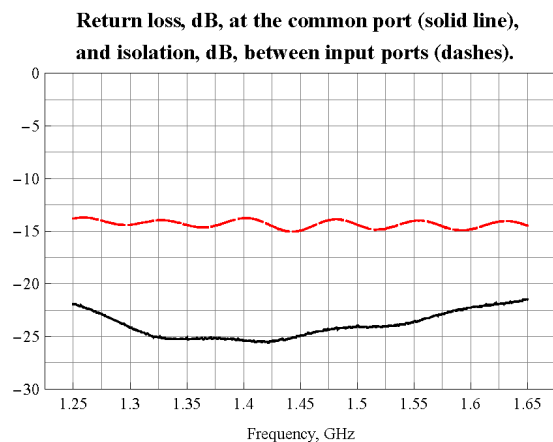
Frequency Range	1250 MHz - 1650 MHz
Maximum Power (at the input port)	0.5 kW
Insertion Loss (of a combiner)	0.75 dB
Return Loss (at the common port)	20 dB min., 22 dB typical
Isolation (between input ports)	13.5 dB min.
Amplitude Unbalance	±0.75 dB worst case
Phase Unbalance	±1.5° worst case
Size	Diameter of the base 6" Height 3.5"
Weight	3 kg
Interface:	
Common Port	Connector: 1-5/8"
Collecting Port	Connector: 7/16"

(specifications are subject to change without notice)

L-Band 6-Way Radial Combiner



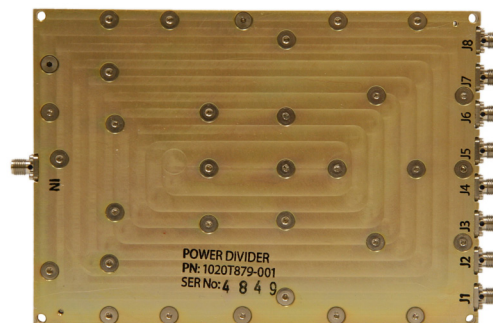
Product Specifications (specifications are subject to change without notice)



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



8-Way Combiner/Divider

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.

Model	Part Number	Description
1020T879-001	54890-01	8-Way Combiner/Divider

Model	Part Number	Description
1020T877-001	54893-01	6-Way Combiner/Divider

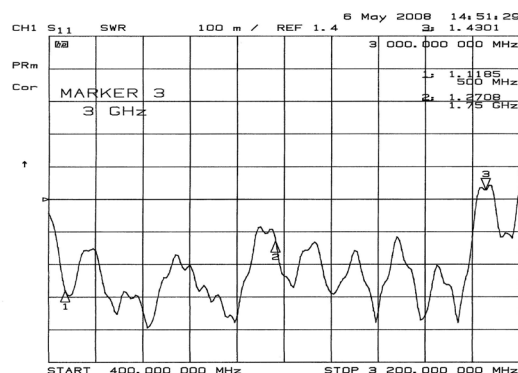
Broadband Wilkinson Combiners/Dividers



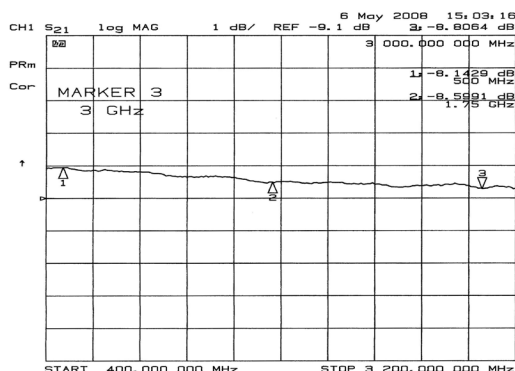
6-Way Combiner/Divider Product Specifications (specifications are subject to change without notice)

Number of Output Ports	6
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	$\leq 1.4:1$ (0.5 GHz - 2.8 GHz) $\leq 1.55:1$ (2.8 GHz - 3.0 GHz)
Amplitude Unbalance	$\leq \pm 0.5$ dB
Phase Unbalance	$\leq \pm 5^\circ$
Isolation	≥ 13 dB
Interface	Connectors: SMA (F)

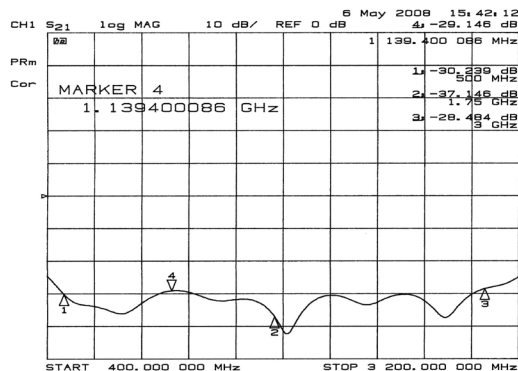
* All of the six output ports should be terminated with a load VSWR of 1.5:1 or better.



6-Way Combiner/Divider Input VSWR



6-Way Combiner/Divider Transmission, dB



6-Way Combiner/Divider Isolation, dB

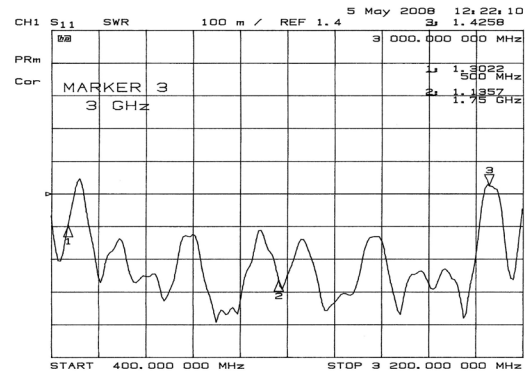


Broadband Wilkinson Combiner/Divider

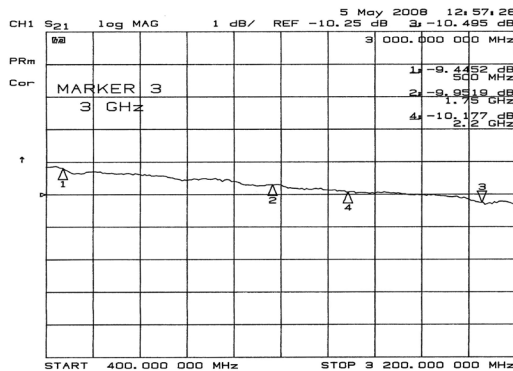
8-Way Combiner/Divider Product Specifications (specifications are subject to change without notice)

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	$\leq 1.4:1$ (0.7 GHz - 2.8 GHz) $\leq 1.55:1$ (0.5 GHz - 0.7 GHz) and (2.8 GHz - 3.0 GHz)
Amplitude Unbalance	$\leq \pm 0.3$ dB
Phase Unbalance	$\leq \pm 3^\circ$
Isolation	20 dB (typical), 17 dB (minimum)
Interface	Connectors: SMA (F)

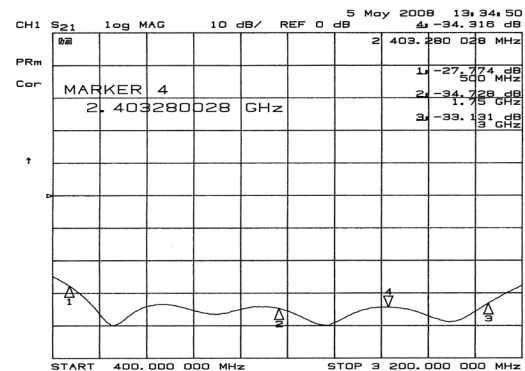
* All of the eight output ports should be terminated with a load VSWR of 2.0:1 or better.



8-Way Combiner/Divider Input VSWR



8-Way Combiner/Divider Transmission, dB



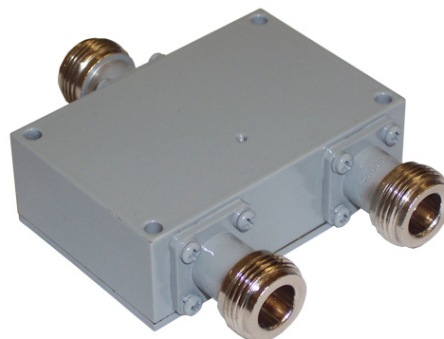
8-Way Combiner/Divider Isolation, dB

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 Loss¹	0.4 dB
Isolation²	> 21 dB
VSWR	Input Port: 1.3:1 Output Port J1: 1.3:1 Output Port J2: 1.3:1
Phase Unbalance	$\pm 2^\circ$
Amplitude Unbalance³	0.1 dB max.
Input Power⁴	25 W
Connectors	Input: N-type (F) Output: N-type (F)
Dimensions (W x L x H)	2.4" x 3" x 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.

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-B

240/318/140LNF-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

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.

UHF Solid State Power Amplifier

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

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.

UHF Solid State Power Amplifier

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

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.

UHF Solid State Power Amplifier

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.

UHF Solid State Power Amplifier

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

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.

UHF Solid State Power Amplifier

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

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.

UHF Solid State Power Amplifier

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

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.

UHF Solid State Power Amplifier

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

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.

UHF Solid State Power Amplifier

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.

UHF Solid State Power Amplifier

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

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.

TWT Replacement SSPA Kit

Model: NSN-5985-01-324-0709

Product Features

- *Military Approved Design*
- *High Reliability SSPA*
- *Integrated DC-DC Power Converter*
- *Form, Fit and Functional Package*
- *Used in Terrestrial PTP Radios*



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.

Ordering Information

NSN-5985-01-324-0709

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.

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 in-phase (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

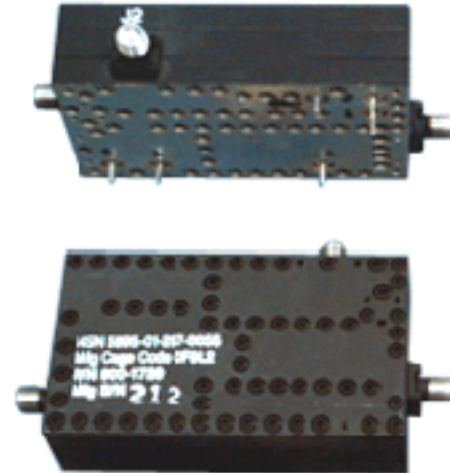
This UBS product is included on the U.S. Munitions List as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR 120. As such, direct download of technical data referred to at this website is not authorized. Please contact a UBS Sales Representative to request a copy of the technical 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.

Ordering Information

NSN-5985-01-287-8855

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.