Unique Broadband Systems Ltd.

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.

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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.

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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.

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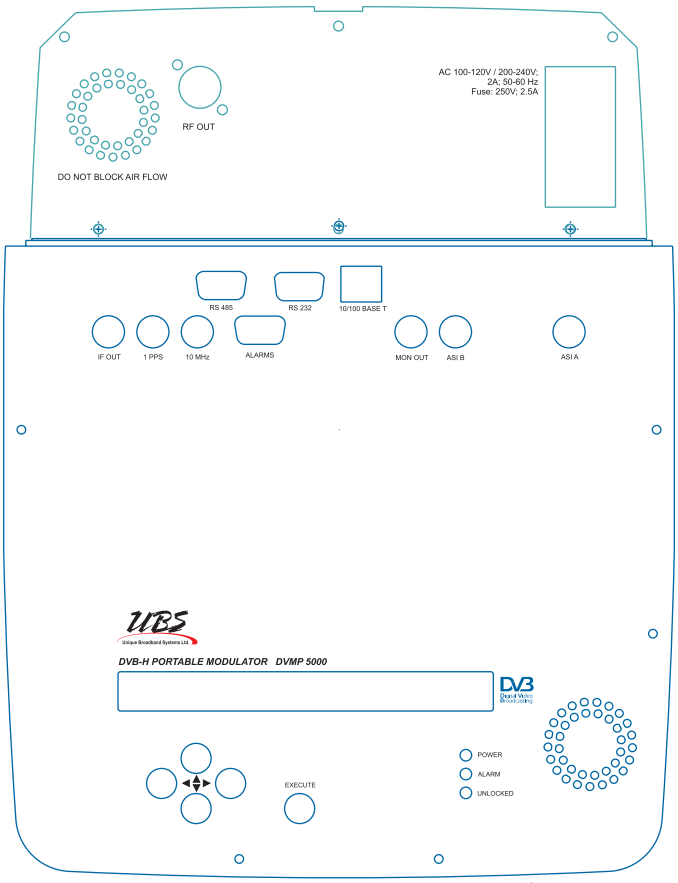
Product Specifications

Pre-Correction

Non-Linear Pre-Correction	
Curve Formats	S 21 and VO/VI
Amplitude Scale	Linear and Logarithmic
Correction Points	Max. 256, user-defined position
Gain Correction	Max. 12 dB, subject to available 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)

Front Panel View



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

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