Product Features

- 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-H Support

Description and Application

Overview
Designed to meet the most demanding requirements of today’s Digital Terrestrial Television Broadcast Market, the DVM 5600 from UBS is ranked number one in its class. A key factor in the product success is the quality of the coding and modulation process. The modular design makes the unit highly flexible and the modulator is easily adaptable to provide the exact features required in a specific application.

Application
The performance and flexibility of the DVM 5600 allows it to excel in any application related to DVB-T/H modulation. The core function of the DVM 5600 is to modulate a MPEG-2 transport stream (input) onto a DVB-T or DVB-H compliant COFDM spectrum (output) in accordance with the rules for channel coding and modulation specified in the DVB-T and/or the DVB-H ETSI Standards.
The user can configure the modulator to any transmission mode listed in ETSI EN 300 744 and/or ETSI EN 302 304 (excluding hierarchical mode and SFN mode.)

Basic Version – IF Output
The basic version of the DVM 5600 delivers the COFDM spectrum on a user defined frequency between 35 and 37 MHz. Inverted/non-inverted spectrum is selected on the front panel. The spectrum bandwidth may be user configured to 8, 7, 6 or 5 MHz as required.
The IF Output can be directly interfaced to a wide range of transmitters and frequency converters.

Inputs
The DVM 5600 Modulator has two MPEG-2 inputs (ASI format). Switching between the two inputs can be done manually and automatically. 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.)
Optional Features

A broad range of optional features allows tailoring the modulator for the specific application.

RF Output
The RF Output is generated by a high performance RF converter, which covers the entire frequency range from 30 MHz to 1 GHz, in steps of just 1 Hz. The output level is adjustable between –110 to 0dBm, step 0.1dB. The user can set the polarity of the spectrum to Inverted or Non-inverted as required. With this converter the DVM 5600 will cover any spectrum application and frequency requirement that you will come across in the field of DVB-T/H.

SFN Option
This option provides the DVM 5600 with market leading SFN performance, with respect to basic timing accuracy and extent of the local delay offset range. Also, even when the SFN option is installed, you can still select MFN mode via the front panel controls. A convenient feature when conducting pre-testing 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 the output if either of these signals is absent).

Hierarchical Modulation option
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**
- **High capacity channel (Low Priority – LP-input) at the expense of ruggedness, for transmission to rooftop antennas**

This option can be used to provide simultaneously two services: DVB-H and DVB-T, where DVB-H service is provided via the HP channel, while DVB-T service via the LP channel. Another typical application is simulcasting of 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 higher than what is available for a two-channel non-hierarchical system, where one RF channel is strictly dedicated to mobile/portable receivers and the other RF channel is strictly dedicated for transmission to rooftop antennas.

6 MHz BW option
DVM 5600 will, in addition to the standard 8 and 7 MHz BW, also support transmission in the 6 MHz bandwidth mode that is intended for applications in North and South America, Korea, Japan and elsewhere where 6 MHz channel raster is standard.

DVB-H option
This option allows the Modulator to generate a DVB-H COFDM signal, in accordance with the ETSI DVB-H standards.

5 MHz BW option
DVM 5600 will, in addition to the standard 8, 7 and 6 MHz BW, also support transmission in the 5 MHz BW, recommended when the DVM 5600 operates in the DVB-H mode. Including this option for T&M and R&D applications is also highly attractive as the user simply executes the switching between the four bandwidths via the instrument front panel (one instrument covers all bandwidths defined by the ETS for DVB-T and/or DVB-H transmission).

Digital Linear and Non-linear Pre-corrector option
This option is recommended in order to maximize the performance of the transmitter in which the modulator is installed.

- **The Non-linear pre-corrector balances out gain and phase non-linearities in the transmitter RF power amplifier, thereby reducing significantly the in-band as well as out of band intermodulation generated by the amplifier.** The optimization of the performance will extend the transmitters coverage area and ease the performance requirement from the transmitter output filter, used for suppressing the radiation in adjacent channels below the maximum allowed level.
- **The Linear pre-corrector balances out level and group delay variations over the channel bandwidth caused by the transmitter antenna filter and/or channel combiner filters.** The linear optimization of the signal radiated from the transmitter means that the channel equalizer of the DVB-T or DVB-H receiver may focus all 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).

Web Interface option
This option allows remote control of the DVM 5600 via Ethernet (TCP/IP). The system is based on a Web server mounted inside the DVM 5600. 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 option
This option allows remote control of the DVM 5600 in accordance with the SNMP protocol (Get, Set and SNMP traps). This remote control option 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.
## 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 Option**
- 16-QAM & 64-QAM in alpha-1,2 & 4

**Network Mode**
- SFN & MFN

**Bandwidth**
- 8 MHz, 7 MHz, 6 MHz, 5 MHz

### Inputs

**MPEG-2**
- 2 ASI inputs, BNC, 75 ohm

**Clock Reference**
- Connector: BNC
  - Frequency: 10MHz
  - Level: 100mV-3Vpp
  - Impedance: 50ohm/>1kohm, user selectable

**Time Reference**
- Connector: BNC
  - Frequency: 1 PPS
  - Level: TTL
  - Trigger: Positive transition
  - Impedance: 50ohm/>1kohm, user selectable

### IF Output (standard version)

**Connector Type**
- 50 ohm BNC

**Centre Frequency**
- 36 MHz

**Adjustable Frequency**
- 36 - 37 MHz in steps of 1 Hz

**Frequency Stability**
- Internal ref 1 ppm / or in accordance with extern 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**
- (+/-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 (optional)

**Connector**
- N-type female, 50 ohm

**Frequency**
- Adjustable 30MHz to 1GHz, in 1Hz step

**Frequency Stability**
- Internal ref 1 ppm / or in accordance with extern ref accuracy

**Spectrum Polarity**
- Inverted and non-inverted, selectable via front panel menu

**Level**
- -10 dBm - 0 dBm in 0.1 dB step

**Level Stability**
- ±0.3 dB

**Return Loss**
- >20 dB

**Shoulder Level**
- < -48 dBc

**Spurious Level Outside Channel**
- < -55 dBm

**Amplitude Flatness (Note 1)**
- Center frequency ± 3.8MHz ± 0.5dB

**Group delay response:**
- Center frequency ± 3.8MHz ± 10ns

**Phase Noise SSB**
- 10Hz: < -56dBc/Hz
- 110Hz: < -86dBc/Hz
- 3kHz: < -86dBc/Hz
- 1MHz: < -130dBc/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 replaced by a single carrier at centre frequency. The level of the single carrier is equivalent to average RMS level of normal COFDM spectrum. The signal is intended for level alignment.

**TS-Stuffing**
- PRBS sequence in accordance with ETR 290 paragraph 9.16.1

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**Note 1:**
Frequencies are relative to centre frequency for 8MHz version (scale down by 7/8, 6/8 and 5/8 for 7MHz, 6 MHz and 5 MHz versions respectively). Levels are measured in 10kHz bandwidth, where 0dB is the level of the carriers at the edge of the spectrum. Harmonics and spurious are not included.
**Product Specifications** (specifications are subject to change without notice)

### Precorrection

**Non-Linear Pre-Correction**
- **Curve Formats**: S 21 and VO/Vl
- **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**: 21
- **Point Spacing**: 1/20 of nominal spectrum BW
- **Amplitude Correction**: ±10 dB
- **Amplitude Resolution**: 0.01 dB
- **Group Delay Correction**: ±1000 ns
- **Group Delay Resolution**: 1 ns
- **Peak Power Clip Level**: +17dB to +7dB (peak power relative to average RMS level)

### Control Interface

- **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+
  Connector: RJ45 10/100 Base T
- **SNMP Control Interface (optional)**: Ethernet 10/100 Base T
  Connector: RJ45
- **Alarm interface**: 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

- **Voltage**: 90-264VAC
- **Frequency**: 47-63Hz
- **Consumption**: Max. 45VA
- **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)
- **Humidity operating/storage**: max 90% RH
- **Cooling**: Temperature controlled fan to assist natural convection

### Mechanical

- **Width**: 483 mm (19")
- **Height**: 44 mm (1.75")
- **Depth**: 483 mm (19")
- **Weight**: 6 kg (13 lbs)

### Transport and Storage

- **Vibration acc. to IEC Publ.68**

### Compliance

- **EMC**: EN50081-1, EN50082-1, EN50081-2, EN50082-2
- **Safety**: EN60950

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**Ordering Information**

**Basic Model**
- **DVM 5600** with IF Output

**Options**
- **DVB-T-OPT-RF**: DVB-T/H RF Converter
- **DVB-T-OPT-130**: DVB-T/H WEB Interface
- **DVB-T-OPT-150**: DVB-T/H Pre-Corrector
- **DVB-T-OPT-160**: DVB-T/H SFN support
- **DVB-T-OPT-170**: DVB-T/H Hierarchical Modulation
- **DVB-T-OPT-180**: DVB-T/H 6MHz BW select
- **DVB-H-OPT-190**: DVB-T/H 5MHz Bandwidth
- **DVB-H-OPT-200**: DVB-T/H DVBT-H Mode
- **DVB-T-OPT-210**: DVB-T/H SNMP option

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**DIGITAL VIDEO BROADCASTING**

**DVB-T/H Modulator**

**Model: DVM 5600**

**Unique Broadband Systems Ltd.**