



- **Compliant with China national standard**
- **10MHz GPS reference input.**
- **Single Carrier and Multicarrier mode of operation**
- **High frequency resolution (in steps of 1 Hz)**
- **High MER**
- **SNMP compatible**

General description of the DTMB modulator MO-280

The **MO-280** is a professional SFN/MFN DTMB modulator fully compliant with the **GB20600-2006** and the GY/T 229. 1-2008 standards contained in a 19" 1U chassis.

The unit has two serial ASI MPEG-2 TS inputs, one 10 MHz GPS reference input and one 1pps GPS reference input. The GPS inputs are used in combination with the Second Frame Initialization Packet (SIP) embedded in the transport streams for SFN synchronisation purposes.

MFN mode

In **MFN mode**, the modulator is locked to either the internal 10 MHz TCXO clock reference or to the external 10 MHz GPS reference. In this mode, the **MO-280** is able to work with any incoming bit rate as long as the net bit rate resulting from dropping all NULL packets present in the stream is strictly lower than the value given in the DTMB specification for the modulation parameters in use. The input TS bit rate is adapted (bit rate adaptation) to the useful bit rate required by the DTMB signal by stuffing the TS with NULL packets (packet stuffing).

This stuffing process alters the sequence of PCR values embedded in the TS. These values have to be re-stamped for the resultant PCR jitter to remain within the limits specified by the DTMB.

SFN mode

In **SFN mode**, the modulator can be locked to either the external 10 MHz GPS reference or to the internal 10 MHz TCXO. A loss of sync with the external 10 MHz reference can be used to trigger a swap of the synchronisation over to the input TS rate. This reduces the number of disruptions to the output IF/RF signals. SIP packets are constantly monitored in the TS input so as to dynamically adjust the delay of the modulator for accurate SFN synchronisation. If required, a positive or negative delay offset with 100-ns resolution can be added locally.

Two test modes are available in the **MO-280**, single tone output and test TS generation.

Control interface

- Pushable rotary control on the front panel with navigation key and LCD display.
- Two LEDs indicating the power and synchronisation status of the equipment.
- RJ45 ethernet interface connector for remote control.

SPECIFICATIONS	MO-280 SFN/MFN DTMB MODULATOR
SYNCHRONISATION GPS Inputs 10 MHz input 1pps input 10 MHz output MFN Internal SFN External	High impedance / 50 Ω female BNC. Min. 50 mV, max. +3.3V. High impedance / 50 Ω female BNC. Selectable active edge (high or low). Minimum 2 V, max. 5 V. LVTTTL 10 MHz TCXO or external 10 MHz GPS reference. Input TS bit rate strictly below the value given in the DTMB specification. Packet stuffing for bit rate adaptation and PCR re-stamping are carried out automatically 10 MHz reference or input TS data rate. Automatic seamless switching between ASI inputs in the event of a sync loss.
MPEG-2 TRANSPORT STREAM INPUT	Two ASI inputs, 75 Ω female BNC. TS packets of length 188 or 204 bytes (automatic detection). Support for burst and continuous packet mode.
IF OUTPUT Frequency range Spectrum polarity Power level (average) In-band amplitude ripple In-band group delay ripple Frequency stability MER	50 Ω BNC female connector. Variable between 31 and 36 MHz in steps of 1 Hz; fixed at 36 MHz when RF output is off. Selectable via front panel controls. 0 dBm (107 dB μ V) fixed. < 0.5 dB. < 10 ns. 2 ppm. > 43 dB.
RF OUTPUT Frequency range Spectrum polarity Power level (average) MER	50 Ω N-type female connector. Adjustable between 45 and 875 MHz in 1 Hz steps. Selectable via front panel controls. Approximately 80 dB μ V with no attenuation. Variable attenuation of 0 to 60 dB in steps of 1 dB. > 38 dB.
DTMB PARAMETERS Carrier Mode Frame Header Length Frame Header Phase FEC rates Constellations Time Interleaving MFN operation	Single, Multicarrier. 420, 595, 945 symbols. Fixed, Rotating. 0.4, 0.6, 0.8. 4QAM-NR, 4QAM, 16QAM, 32QAM, 64QAM. 240, 720. Available.
PROCESSING DELAYS MFN SFN	Static delay adjustable between 0 and 1 s. Resolution given by the DTMB elementary clock period. Dynamic delay automatically calculated from the 10 MHz GPS reference, the 1pps signal and the SIP packet embedded in the TS multiplex. The resolution is 100 ns. A positive or negative local delay offset may be added as long as the total delay is never greater than 1 s or lower than the inherent latency of the modulator. Synchronisation accuracy better than ± 200 ns. Rough estimate of the network delay from the SFN adapter output to the modulator TS inputs
TEST MODES Single carrier (R.M.S Tone) TS packet generation	Generate a single carrier at the channel central frequency whose level equals the average DTMB output power. This is intended for signal level alignment. Internal generation of test TS using PRBS sequences (length 15 / 23 embedded within NULL packets)
CREST FACTOR REDUCTION	Crest Factor range 8 to 11 dB in 0.1 dB steps.
NON-LINEAR PRE-DISTORTER Correction bandwidth Number of correction points AM-AM table AM-PM table	> 24 MHz 2 to 16 using linear interpolation -12 dB to +12 dB (abscissae), -6 dB to +6 dB (ordinates), both in 0.1 dB steps -12 dB to +12 dB (abscissae) in 0.1 dB steps, -30° to +30° (ordinates) in 0.1° steps
ETHERNET INTERFACE	Connector RJ45 with activity indicator LEDs. Standard 10BASE-T or 100BASE-TX (auto-sensing).
POWER SUPPLY	90 - 250 VAC @ 50 - 60 Hz. Consumption 20 W.
MECHANICAL FEATURES	Dimensions 19" (W.) x 1.75" (H.) x 15" (D.). Weight 6.3 kg.