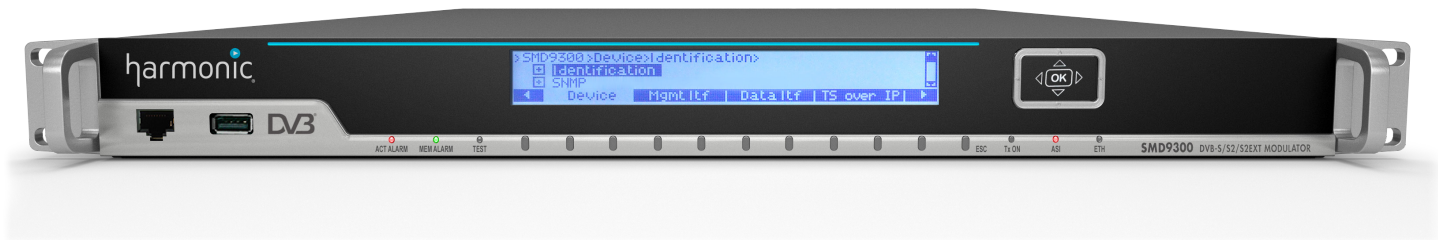


SMD 9300

BROADCAST SATELLITE MODULATOR



The Harmonic SMD 9300 broadcast satellite modulator is a new-generation DVB-S/S2 and DVB-DSNG modulator specifically designed for broadcast direct-to-home, primary distribution to headends, and contribution of television and radio content. The modulator supports S2 extensions to achieve barrier-breaking efficiency, and can be used in conjunction with set-top boxes, Harmonic ProView™ IRDs or professional satellite demodulators such as the Newtec MDM6100 and AZ910.

Up-time and reliability are essential in the design of the SMD 9300, enabling the modulator to play a vital role in your satellite network. Input source redundancy and the shortest redundancy switch-over times for modulators, operating both in 1+1 and N+1 topologies, set new standards in the satellite industry. Advanced capabilities are built in, including MPEG transport stream analysis, support of SMPTE 2022 FEC at the GbE inputs (for distributed IP headends), and native support of Carrier ID. Special care is taken to cope with jittery transport streams over IP inputs. Six ASI ports allow for monitoring as well as operations.

The SMD 9300 offers unmatched bandwidth efficiency optimization to lower overall total cost of ownership (TCO). The fully automated operation of the field-proven Equalink® pre-distortion technology provides up to 10% bandwidth gains for single-carrier-per-transponder constellations. Clean Channel Technology™, in combination with DVB-S2 extensions, improves satellite efficiency by up to 15%, thereby enabling much smaller carrier spacing.

HIGHLIGHTS

- Highest system reliability and service up-time through robust design and industry-leading redundancy
- Low TCO through very high-bandwidth efficiency technology options, and ease of monitoring and control
- Secure front panel, SNMP, HTTP and CLI interfaces
- Optional built-in support for opportunistic data insertion up to 20 Mbps, interoperable with IRDs that support MPE
- Support for SFN networks using transparent TS pass-through
- RFI reduction using optional DVB-CID or default NIT table CID
- Optional BISS content protection
- Monitoring and control via front panel, web GUI or Harmonic NMX Digital Service Manager
- Hardware-ready for multi-stream transmission
- Feature-based pricing and software upgrades
- Pay-as-you-grow flexible licensing scheme



Maximum symbol rates up to 72 Mbaud and modulations up to 64 APSK (S2 extensions), combined with VCM (Variable Coding and Modulation), allow for maximum throughput in large contribution links. The availability of a DVB-S2 mode adaptation input interface (baseband frames), combined with a Newtec AZ810 stream aggregator, allows for the uplinking of up to six transport streams. Output of the SMD 9300 is available in IF or extended L-band (950-2150 MHz), providing a compact and cost-effective solution. A switchable 10-MHz reference signal and optional 24V or 48V DC for an outdoor BUC is multiplexed on the L-band interface.

The SMD 9300 can be easily monitored and controlled via a comprehensive front panel menu or advanced web GUI, as well as via the Harmonic NMX™ Digital Service Manager video network management system.* Built upon flexible and latest-generation programmable technology, the SMD 9300 is a future-proof building block that lets any satellite network evolve to the next level of capabilities. Its scalable, pay-as-you-grow, licensing and software upgrade mechanism facilitates the launch of new services, or last-minute network design changes, without rebuilding the entire network infrastructure. Migration from ASI to GbE and IF to L-band, or to upgrade to S2 extensions, is enabled by simple in-field installation of license keys.

Additional capabilities such as the DVB-S2x standard, are expected to become available on the platform as standardization efforts materialize in the near future. The new DVB-CID carrier identifier is available as a software option.

Features

- Baud rate range: 0.05–72 Mbaud
- Data rates up to 380 Mbps (with Mode Adaptation input)
- Data rates up to 216 Mbps (with ASI or TS over IP inputs)
- IF (70/140) and L-Band (950-2150) high power outputs
- DVB-S2, DVB-DSNG and DVB-S compliant
- S2 Extensions and MODCODs
- QPSK, 8PSK, 16APSK, 32APSK and 64 APSK
- Up to six TS mux on ASI interfaces
- Automatic TS rate adaptation
- L-band monitoring output
- Programmable amplitude slope equalizer
- PRBS generator for link performance tests
- Optional dual AC power supply
- Optional high stability internal clock reference
- External reference input
- Optional 10-MHz reference output

Applications

- Broadcast DTH
- Primary Distribution
- Broadcast Contribution
- Upgrade of Distribution Networks for S2 Extensions

* Not all features listed in this document can be controlled/managed by NMX. Please check availability.

SPECIFICATIONS

DATA INTERFACES

ASI	Two selectable ASI inputs on BNC (F) – 75 Ω (coax) Two ASI output (loop through) on BNC (F) – 75 Ω (coax) 188 or 204 byte mode Rate adapter MPTS or SPTS according to ISO/IEC 13818
ETH	Auto switching 10/100/1000 Base-T Ethernet interface Transport stream over IP interface (UDP/RTP) Forward Error Correction SMPTE 2022-1 and -2 188 or 204 byte mode Rate adapter MPTS or SPTS according to ISO/IEC 13818 Baseband frame over IP interface per DVB-S2 mode adaptation input interface with in-band signaling

CONTENT ENCRYPTION AND PROTECTION

BISS Encryption	Support for BISS-0, BISS-1 and BISS-E Single TS (MPTS or SPTS)
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IP ENCAPSULATION

Multi-Protocol Encapsulation (MPE) of IP packets in one transport stream
Max: 20 Mbps

MODULATION SCHEMES AND FEC

DVB-S	
Outer/Inner FEC	Reed Solomon/Viterbi
QPSK	1/2, 2/3, 3/4, 5/6, 7/8
DVB-DSNG	
Outer/Inner FEC	Reed Solomon/Viterbi
8PSK	2/3, 5/6, 8/9
16QAM	3/4, 7/8
DVB-S2	
Outer/Inner FEC	BCH/LDPC
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
S2 Extensions	
Outer/Inner FEC	BCH/LDPC
QPSK	45/180, 60/180, 72/180, 80/180, 90/180, 100/180, 108/180, 114/180, 120/180, 26/180, 135/180, 144/180, 150/180, 160/180, 162/180
8PSK	80/180, 90/180, 100/180, 108/180, 114/180, 120/180, 126/180, 135/180, 144/180, 150/180
16APSK	80/180, 90/180, 100/180, 108/180, 114/180, 120/180, 126/180, 135/180, 144/180, 150/180, 160/180, 162/180
32APSK	100/180, 108/180, 114/180, 120/180, 126/180, 135/180, 144/180, 150/180, 160/180, 162/180
64APSK	90/180, 100/180, 108/180, 114/180, 120/180, 126/180, 135/180, 144/180, 150/180, 160/180, 162/180
8PSK-L	80/180, 90/180, 100/180, 108/180, 114/180, 120/180
16APSK-L	80/180, 90/180, 100/180, 108/180, 114/180, 120/180, 126/180, 135/180, 144/180, 150/180, 160/180, 162/180
64APSK-L	90/180, 100/180, 108/180, 114/180, 120/180, 126/180, 135/180, 144/180, 150/180, 160/180, 162/180
DVB-S2 VCM mode	Supported

MODULATION SCHEMES AND FEC (CONT.)

Baud Rate Range	
DVB-S2 & S2 Extensions	0,050-72 Mbaud
DVB-S	0,050-72 Mbaud
Frame Length	
DVB-S	188 bytes
DVB-S2 Short Frames	16,200 bits
DVB-S2 Normal Frames	64,800 bits
Clean Channel Technology	Roll-off: 5%, 10%, 15%, 20%, 25%, 35% Optimum carrier spacing Advanced filter technology
Carrier Interference Reduction	DVB RF Carrier ID (DVB-CID) • Spread Spectrum Modulator (BPSK) • Supports user data • Compliant to DVB standard Carrier ID NIT Table

MODULATION INTERFACES

L-Band (Configuration Option)	
Connector	N female, 50 Ω (optional SMA adapter)
Frequency	950-2150 MHz (10 Hz steps)
Level	-35/+7 dBm (+/- 2 dB)
Return Loss	> 14 dB
Reference	10 MHz switchable
Spurious Performance	Better than -65 dBc/4 kHz @ +5 dBm output level and > 256 kBaud Non-signal related: < -80 dBc @ +5 dBm output

IF-Band (Configuration Option)	
Connector	BNC female, 75 Ω (intermateable with 50 ohms)
Frequency	50-180 MHz (10 Hz steps)
Level	-35/+10 dBm (± 2 dB)
Return Loss	50 Ω: > 14 dB, 75 Ω: > 20 dB
Spurious Performance	Better than -65 dBc/4 kHz @ +5 dBm output level and > 256 kBaud Non-signal related: < -80 dBc @ +5 dBm output

L-Band Monitoring	
Connector	SMA female, 50 Ω
Frequency	Same as L-Band output frequency or 1050 MHz in case of IF output option only
Level	-45 dBm
Return Loss	> 10 dB

10 MHz Reference Input	
Connector	BNC female, 50 Ω
Input Level	-3 dBm up to +7 dBm
Frequencies	1, 2, 5, 10, 20 MHz

10 MHz Reference Output (Optional)	
Connector	BNC female, 50 Ω
Output Level	+3 dBm (+/- 2 dB)

BUC Power (Optional)	
Max Current	3.8 A
Voltage	24 V, 48 V (software controlled)

SPECIFICATIONS

INTERNAL 10-MHZ REFERENCE FREQUENCY

Standard Stability	
Stability	+/- 2,000 ppb over 0 to 70° C
Ageing	+/- 1,000 ppb/year
High Stability (Optional)	
Stability	+/- 50 ppb over 0 to 70°C
Ageing	+/- 300 ppb/year
Very High Stability (Optional)	
Stability	+/- 2 ppb over 0 to 65°C
Ageing	+/- 500 ppb/10 year

GENERAL

Monitor and Control Interfaces	Web server GUI (HTTP) via web browser Diagnostics report, alarm log (HTTP) SNMP v2c
Alarm Interface	Electrical dual contact closure alarm contacts Connector 9-pin sub-D, female Logical interface and general device alarm

POWER

Input Voltage Range	90-130 & 180-260 VAC 125 VA
Frequency Range	47-63 Hz

PHYSICAL

Dimensions (W x H x D)	19 in x 1.75 in x 20 in (1 RU) 48.3 cm x 4.4 cm x 50.8 cm
Weight	12.75 lbs/5.8 kg

ENVIRONMENTAL

Operating Temperature Range	+32° to +122° F 0° to +50° C
Storage Temperature Range	-40° to +158° F -40° to +70° C
Operating Humidity	5-85% non-condensing
Electromagnetic Compliance	CE and UL

ORDERING INFORMATION

CONFIGURATION OPTIONS

Hardware Platform	Chassis Type 01 (Modulator)
Operating Software	SMD 9300 Major Software R1*
Main Power Supply Units	PSU Single AC 110/240 V PSU Dual Redundant AC 110/240 V
Video Package	Video TS, Carrier-ID (NIT), TS Analyzer*
Data Package	Baseband frame input*†
Video Interface	GbE TSoIP, SMPTE-2022 DEC (req. Video Package)* ASI (six connectors) (req. Video Package) GbE TSoIP + ASI (six) (req. Video Package)
Modulator Output Interface	L-band with switchable 10 MHz output* IF (50-180 MHz)* IF + L-band with switchable 10 MHz out* L-band + 10 MHz output + 24/48V BUC* IF+L-band + 10 MHz output + 24/48V BUC†
Modulation Standard and Coding (includes Multistream Support)	DVB-S Q/8PSK* DVB-S/S2 QPSK* DVB-S/S2 Q/8PSK* DVB-S/S2 Q/8PSK 16QAM 16APSK* DVB-S/S2 Q/8PSK 16QAM 16/32APSK* DVB-S/S2/Ext Q/8PSK* DVB-S/S2/Ext Q/8PSK 16QAM 16APSK* DVB-S/S2/Ext Q/8PSK 16QAM 16/32APSK* DVB-S/S2/Ext Q/8PSK 16QAM 16/32/64APSK*
Modulation Maximum Symbol Rates	5 Mbaud* 15 Mbaud* 36 Mbaud* 54 Mbaud* 72 Mbaud*
Internal Reference Clock	Standard 10 MHz High Stability 10 MHz† Very High Stability 10 MHz†

ADDITIONAL OPTIONS

Reference Clock Output	10 MHz Reference Output (BNC)*
Modulator Output Connector	L-Band output N to SMA output adapter†
Clean Channel Technology	Clean Channel Technology for 5 Mbaud* Clean Channel Technology for 15 Mbaud* Clean Channel Technology for 36 Mbaud* Clean Channel Technology for 54 Mbaud* Clean Channel Technology for 72 Mbaud*
Pre-Distortion	Automated Equalink®*
DVB-CID	DVB RF Carrier Identifier*
MPE Insertion	MPE Data insertion in TS (req. Video Package)*†
Encryption	BISS (0-1-E) single TS (req. Video Package)*†

* Selectable via license key
† Not controlled by NMX