ST Engineering

M6100
BROADCAST SATELLITE MODULATOR

Description

The M6100 Broadcast Satellite Modulator is the DVB compliant modulator specifically designed for broadcast direct-to-home, primary distribution to headends and contribution of television and radio content. This single Transport Stream modulator supports the updated DVB-S2 and DVB-S2X, next to the legacy DVB-S and DVB-DSNG standards, as well as S2 Extensions in order to achieve barrier-breaking efficiency. The M6100 can be used in conjunction with set-top boxes, professional IRDs or professional satellite demodulators such as the MDM6100.

Delivering the Highest Uptime for Vital Links

Uptime and reliability are essential in the design of the modulator, which plays a vital role in the satellite network. Input source redundancy on ASI or on the GbE ports supporting any IP network configuration and the shortest redundancy switch-over times of modulators, operating both in 1+1 and N+1 topologies, are setting the standard in our industry.

Advanced capabilities are built in, such as an MPEG Transport Stream analyser, support of SMPTE 2022 FEC at the GbE inputs (for distributed IP headends), and native support of Carrier ID, according to the new DVB standard, as well as in the transport stream NIT Table.

ST Engineering iDirect's broadcast satellite modulator is not just a modulator. It's a platform that takes a vital role in your networks, performs the best on the market and helps you evolve your business through ongoing market and technology innovations.

DIALOG

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Special care was taken to cope with jittery transport stream over IP inputs. Two input ASI ports can be used as redundant interfaces while the two output ASI ports provide monitoring. The presence of ECM/EMM messages, essential to paid services in DTH constellations can be monitored and triggers your management system in case of interruptions.

Get the Best Performance and Lower Your Costs

The broadcast satellite modulator performs among the best, offering unmatched bandwidth efficiency optimization options, thereby lowering overall Total Cost of Ownership. The fully automated operation of our field-proven Equalink® 3 pre-distortion technology with its seamless calibration is now available for any satellite transmission application providing up to 10% bandwidth gains for single carrier per transponder constellations.

Clean Channel Technology®, in combination with DVB-S2X or S2 Extensions, improves satellite efficiency by up to 15%, thereby enabling much smaller carrier spacing. through intelligent MAC address learning and advanced header compression (ROHCv2).

Maximum symbol rates up to 72 Msps and modulations up to 256APSK (DVB-S2X standard) combined with VCM (Variable Coding and Modulation) allow for maximum throughput of up to six transport streams in large contribution links. The powerful MPE encapsulator gives access to dual stream communication where live video is combined with file transfer, a service channel or video streaming.

At the output of the broadcast satellite modulator, the signal is available in IF or extended L-band (950 MHz-2150 MHz), providing a compact and cost-effective solution. A built-in Ku-band or C-band upconverter is optional. A switchable 10 MHz reference signal and optional 24 Vdc or 48 Vdc for an outdoor BUC is multiplexed on the L-band interface.

The broadcast satellite modulator can be easily monitored and controlled via a comprehensive front panel menu and advanced web GUI, as well as via SNMP protocol. This enables easy integration into any industry-standard EMS/NMS system.

Evolve Towards Tomorrow's Technology

Built upon flexible and latest generation programmable technology, the M6100 Broadcast Satellite Modulator is a future-proof building block that lets any satellite network evolve to the next level of capabilities. A 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 an upgrade to the new DVB-S2X standard or S2 Extensions is facilitated by simple in-field installation of license keys.

The brand new DVB-CID carrier identifier is already available as a software option on the M6100 and DSNG profiles, as defined by WBU-ISOG, can be easily selected. These profiles define the basic parameters for the most common use cases including the new DVB-S2X standard.

Support Services for Your Professional Equipment

Care Pack Basic and Car Pack Enhanced are the ST Engineering iDirect service and support packages protecting your M6100 equipment over a three-year period.

For more information please contact your Sales Representative at **sales@idirect.net.**

Key Features

- Single Transport Stream modulator with optional MPE encapsulator
- Symbol rate range: 50 ksps – 72 Msps
- Data rates up to 216 Mbit/s
- IF (70-140) and L-Band (950-2150) high power outputs
- Optional integrated RF upconverter (Ku-band or C-band)
- Highest system reliability and service uptime through robust design and industry-leading redundancy solutions
    - Exceptional jitter recovery on TS over IP inputs with SMPTE 2022 FEC
    - Redundant optional ASI or GbE interfaces with support of redundant IP network configurations
    - User configurable alarm table for device redundancy switching
    - Input TS redundancy switch based upon null packet stuffing exceeding a set limit
    - Built-in TS Analyser with
    - TR101 290 priority 1 and 2 error monitoring
    - PID table with rate and PCR jitter measurements
    - Continuity Count error monitoring per PID
    - RFI reduction using optional DVB RF Carrier ID (DVB-CID) and NIT table CID (default)
    - Input rate recovery based upon PCR timestamps
    - Automatic TS rate adaptation
    - L-band monitoring output
    - Market-leading RF purity and performance
    - Programmable amplitude slope equalizer
    - PRBS generator for link performance tests
    - Output level adjust for cable loss compensation
    - Optional high stability internal clock reference
    - Optional dual AC power supply

    - DVB-S2X, DVB-S2, DVB-DSNG and DVB-S compliant
    - S2 Extensions
    - QPSK, 8PSK, 16APSK, 32APSK, 64APSK, 128APSK and 256APSK
    - Clean Channel Technology provides up to 15% bandwidth efficiency gains on top of the DVB-S2 standard
    - Optional automated Equalink 3 predistortion provides up to 10% bandwidth gains, higher QoS and geographic coverage
    - Secure front panel, SNMP, HTTP and CLI interfaces
    - Selection of DSNG profiles acc. WBU-ISOG including the new DVB-S2X standard
    - Optional PID Activity Monitoring for ECM/EMM message interruption triggering external management system
- Optional built-in support for opportunistic data insertion up to 20 Mbps, interoperable with IRDs that support Multi Protocol Encapsulation (MPE)
- Supports SFN Networks using transparent TS pass-through
- Optional BISS content protection
- External reference input
- Optional 10 MHz reference output
- Easy integration with industry-leading management systems (EMS/NMS/OSS)
- Feature-based pricing and software upgrades
- Pay-as-you-grow flexible licensing scheme

Applications

- Earth Stations
- Broadcast Direct-to-home (DTH) uplinks
- Digital Satellite News Gathering (DSNG)
- Telco and trunking satellite infrastructures
- VSAT hubs
- Generic satcom applications
- Low Total Cost of Ownership as a result of very high bandwidth efficiency technology options, and ease of monitoring and control

Related Products

MDM6100	Broadcast Satellite Modem (works together with M6100 to perform Equalink 3)
FRC07X0	Frequency Converters portfolio
USS0212	1+1 Modulator Redundancy Switch
USS0202	Universal Redundancy Switch

Related Bandwidth Efficiency Technologies

- Clean Channel Technology
- Fully Automated Equalink 3
- S2 Extensions and DVB-S2X

Data Interfaces

ASI Interface (Optional):

Single stream mode

2 selectable ASI inputs on BNC (F) - 75 Ohm (coax)	
2 x ASI output (loop through) on BNC (F) - 75 Ohm (coax)	
188 or 204 byte mode	
Rate adaptor	
MPTS or SPTS according to ISO/IEC 13818	

ETH Interface

Auto switching 10/100/1000 Base-T Ethernet	
Transport stream over IP interface (UDP/RTP), unicast or multicast	
Forward Error Correction SMPTE 2022-1 and -2	
188 or 204 byte mode	
Rate adapter	
MPTS or SPTS according to ISO/IEC 13818	
Single stream mode	

Content Encryption and Protection

BISS Encryption

Support for BISS-0, BISS-1 and BISS-E	
On one single TS (SPTS or MPTS)	

IP Encapsulation

MPE Encapsulation of IP frames in 1 transport stream	
Max 20 Mbit/s	

Modulation Interfaces

L-band (Configuration Option):

Connector	N(F), 50 Ohm (optional SMA adapter)
Frequency Range	950 - 2150 MHz (1 Hz steps)
Level	-35/+7 dBm (+/- 2 dB)
Return loss	> 14 dB
Reference	Switchable 10 MHz Reference
Spurious performance	
Better than - 65 dBc /4 kHz @ +5 dBmoutput level and > 256 ksps	
Non-signal related:	< - 80 dBc @ +5 dBm output

IF-Band (Configuration Option):

Connector	BNC (F) - 75 Ohm (intermateable with 50 Ohm)

Frequency	50 - 180 MHz (1 Hz steps)
Level	-35/+10 dBm (± 2 dB)
Return loss	50 Ohm : > 14 dB 75 Ohm : > 20 dB
Spurious performance	
Better than - 65 dBc/4 kHz @ +5 dBmoutput level and > 256 ksps	
Non-signal related	- 80 dBc @ +5 dBm output

L-band Monitoring:

Connector	SMA (F), 50 ohms
Frequency	Same as L-Band output frequency or 1050 MHz in case of IF output option only
Level	-45 dBm
Return loss	> 10 dB

RF Band (Optional):

Connector	SMA (F), 50 Ohm
Return loss	> 15 dB
Frequencies	5.85 - 7.05 GHz 13.75 - 14.5 GHz
Level	-25/+7 dBm (+/- 3 dB)

with secondary L-band input:

Connector	SMA (F), 50 Ohm
Return loss	>12 dB
Range	-35/-3 dBm
Maximum input power for no damage	+13 dBm

with L-band output:

Connector	SMA (F), 50 Ohm
Return loss	>12 dB
Level	-35/-3 dBm (+/- 3 dB)++

10 MHz Reference Input:

Connector	BNC (F), 50 Ohm
Input level	-3 dBm up to + 7 dBm
Frequencies	1, 2, 5, 10, 20 MHz

10 MHz Reference Output (Optional):

Connector	BNC (F), 50 Ohm
Output level	+3 dBm (+/- 2 dB)

BUC Power (Optional)

Max. Currentl	4 Amps
Voltagel	24V, 48V

Internal 10 MHz Reference Frequency

Standard Stabiliity:

Stability	± 2000 ppb over 0 to 70°C
Ageing	± 1000 ppb/year

Very High Stability (optional)

Stability	± 2 ppb over 0 to 65°C
Ageing	± 500 ppb/10 year

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Modulation

Supported Modulation Schemes and FEC

DVB-S

Outer/Inner FEC:	Reed Solomon / Viterbi
MODCODS	
QPSK:	1/2, 2/3, 3/4, 5/6, 7/8

DVB-DSNG

Outer / Inner FEC:	Reed Solomon / Viterbi
MODCODS	
8PSK:	2/3, 5/6, 8/9
16QAM:	3/4, 7/8

DVB-S2 (acc. ETSI EN 302 307 v1.2.1)

Outer/Inner FEC: BCH/LDPC	BCH/LDPC
52 MODCODs (short & normal frames)	
QPSK:	from 1/4 to 9/10
8PSK:	from 3/5 to 9/10
16APSK:	from 2/3 to 9/10
32APSK:	from 3/4 to 9/10

S2 Extensions

Outer/Inner FEC:	BCH/LDPC
54 MODCODs	
QPSK:	from 45/180 to 144/180
8PSK:	from 80/180 to 150/180
16APSK:	from 80/180 to 162/180
32APSK:	from 100/180 to 162/180
64APSK:	from 90/180 to 162/180
29 Linear MODCODs	
8PSK-L:	from 80/180 to 120/180
16APSK-L:	from 80/180 to 162/180
64APSK-L:	from 90/180 to 162/180

DVB-S2X standard

Outer/Inner FEC:	BCH/LDPC
53 MODCODs (normal frames)	
QPSK:	from 1/4 to 9/10
8PSK:	from 3/5 to 9/10
16APSK:	from 26/45 to 9/10
32APSK:	from 32/45 to 9/10
64APSK:	from 11/15 to 5/6
128APSK:	3/4; 7/9
256APSK:	32/45; 3/4
13 Linear MODCODs (normal frames)	
8APSK-L:	5/9; 26/45
16APSK-L:	from 1/2 to 2/3
32APSK-L:	2/3
64APSK-L:	32/45
256APSK-L:	29/45 to 11/15

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41 MODCODs (short frames)	
QPSK:	from 11/45 to 8/9
8PSK:	from 7/15 to 8/9
16APSK:	from 7/15 to 8/9
32APSK:	from 2/3 to 8/9

Support of DVB-S2 VCM mode

Symbol Rate Range

DVB-S2, DVB-S2X & S2 Extensions	50 ksps - 72 Msps
DVB-S	50 ksps - 72 Msps

Frame Length

DVB-S	188 bytes
DVB-S2, DVB-S2X & S2 Extensions	
Short Frames	16200 bits
DVB-S2, DVB-S2X & S2 Extensions	
Normal Frames	64800 bits

Clean Channel Technology

Roll-off :	5% -10% -15% -20% - 25% - 35%
Optimum carrier spacing	
Advanced filter technology	

Equalink 3

Predistortion for all MODCODs

Carrier Interference Reduction

DVB RF Carrier ID (DVB-CID)
Spread Spectrum Modulator (BPSK)
Supports User Data
Compliant to ETSI 103 129 v1.1.1 (2013-05)
Carrier ID NIT Table

Generic

Monitoring and Control Interfaces:

Web server GUI (HTTP) via web browser
M&C connectivity via separate Ethernet links
Diagnostics report, alarm log (HTTP)
SNMP v2c

Alarm Interface

Electrical dual contact closure alarm contacts
Connector 9-pin sub-D (F)
Logical interface and general device alarm

Physical

Size

Dimensions	Height 1RU, width: 19", depth 51 cm
Weight	5.8 kg

Tempurature

Operational	0°C to +50°C (+32°F to +122°F)
Storage	-40° to +70°C (-40°F to +158°F)

Humidity

Operational	5% to 85% non-condensing

Power Supply

90-130 & 180-260 Vac, 125 VA, 47-63 Hz

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