**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.

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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.
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.

For more information please contact your Sales Representative at [sales@idirect.net](mailto:sales@idirect.net).

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**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.
Key Features

• Single Transport Stream modulator with optional MPE encapsulator
• Symbol rate range: 50 ksps – 72 Msp
• 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

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

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDM6100</td>
<td>Broadcast Satellite Modem (works together with M6100 to perform Equalink 3)</td>
</tr>
<tr>
<td>FRC07X0</td>
<td>Frequency Converters portfolio</td>
</tr>
<tr>
<td>USS0212</td>
<td>1+1 Modulator Redundancy Switch</td>
</tr>
<tr>
<td>USS0202</td>
<td>Universal Redundancy Switch</td>
</tr>
</tbody>
</table>

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 adaptor
  - 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 (10 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 dBm output level and > 256 kbps
  - Non-signal related: < -80 dBc @ +5 dBm output

IF-Band (Configuration Option):
- Connector: BNC (F) - 75 Ohm (intermateable with 50 Ohm)

For more information please contact your Sales Representative at sales@idirect.net.
## 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, 3/6, 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)
        - 8PSK-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

#### DVB-S2V2 CVM mode

- **Symbol Rate Range**
  - DVB-S2, DVB-S2X & S2 Extensions: 50 kbps - 72 Msps
  - DVB-S: 50 kbps - 72 Msps

- **Frame Length**
  - DVB-S: 188 bytes
  - DVB-S2, DVB-S2X & S2 Extensions:
    - Short Frames: 16200 bits
    - 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)

### Carrier ID NIT Table

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

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## 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**

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## Physical

### Size

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Height 1RU, width 19&quot;, depth 51 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>5.8 kg</td>
</tr>
</tbody>
</table>

### Temperature

<table>
<thead>
<tr>
<th>Operational</th>
<th>0°C to +50°C (±32°F to +122°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage</td>
<td>-40°C to +70°C (-40°F to +158°F)</td>
</tr>
</tbody>
</table>

### Humidity

| Operational | 5% to 85% non-condensing |

### Power Supply

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