



## Description

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Being fully compliant with the S2 Extensions standard for Digital Video Broadcasting over Satellite (DVB-S2X), the OEM satellite modulator board OM6000 offers the following advantages:

- Backward compatible to the former NTC/7029, NTC/7039 and NTC/7139 OEM modulator boards in form-fit-function
- IF or L-band output selectable by software command
- Clean Channel Technology® compliant
- Support for all S2 Extensions modulation schemes and DVB-S, DVB-DSBNG and DVB-S2 standards
- Addition of a simple ASI interface
- RF Carrier ID compliant (fully managed by the OM6000)

ST Engineering iDirect's Satellite OEM Modulator board Supports S2 Extensions and ModCods up to 64APSK and is software upgradeable to the DVB-S2X standard.

This product provides the OEM integrator a smooth upgrade path starting as a drop-in replacement for current functionality (Form Fit Function backward compatible with NTC/7029, NTC/7039 and NTC/7139) and moving towards state of the art technology features. A new logical JSON-RPC based management interface is introduced, replacing the legacy RMCP protocol. This interface can be accessed through a couple of physical interfaces: serial as used for RMCP or serial and Ethernet as used for JSON-RPC, depending on the interposer board.

The board has been designed for both DVB contribution and distribution. It handles symbol rates from 0.05 up to 72 Msps applicable to all modulation schemes compliant to DVB-S2X (acc. DVB document A83-2, excluding VL-SNR), the EN 302307 DVB-S2, EN 301210 DVB-DSNG and EN 300421 DVB-S Standards and S2 Extensions.

Both the high data rate (72 Msps) and the choice of modulation standards and modulation schemes allow it to work in full compliance with the most recent commercially available IRD's and demodulators.

## Applications

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- For use in MPEG encoders with integrated modulators
- Up to 72 Msps data rate transmission for satellite services such as broadcast, distribution or contribution (including Digital Satellite News Gathering) of Digital TV (UHDTV/HDTV/SDTV) signals

The user can upgrade different rate capabilities after ordering the corresponding license file.

The integrated DVB modulator provides a comprehensive range of monitoring and control functions. It has a built-in PRBS pattern generator. When used with iDirect demodulators, this feature enables link testing without additional test equipment.

The R1.1 release has a dedicated interposer board for backward compatibility. Its 50-pin connector guarantees backward compatibility with previous generations of boards but excludes the use of the ASI and Ethernet interfaces. The flat cable is attached to the interface board and has a female 50-pin header. The RMCP protocol supports monitoring & control as well as license upgrades. The JSON-RPC protocol is needed for firmware upgrades.

## Key Features

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- Single Transport Stream modulator with optional MPE encapsulator
- Supports S2 Extensions and ModCods up to 64APSK and the new DVB-S2X standard
- Baud-Rate range: 0.05 – 72 MBaud
- Frequency ranges: 950-2150 MHz (extended L-band) and 50-90 and 100-180 MHz (IF-band), selectable by a software command – see options list
- Best in class spectral purity
- RF Carrier ID (DVB-CID) – see options list
- Legacy RMCP interface for backward compatibility or JSON-RPC alike management interface
- On-board reference

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





## Interfaces

### Traffic Interfaces:

188-byte Transport Streams

Clock offset < 30 ppm

Baseband Synchronous Parallel (DVB-SPI) Interface:

Signals: IFCLK, IFDATA[7:0], IFCE, IFSYNC

Connector: IDC HE-10, 50-pin female  
(interposer board dependent)

Interface rate: 50 kbps – 216 Mbps  
(FEC and interface dependent)

ASI input (if supported on interposer board)

### L-Band Output:

Connector MCX(F) - 50 Ohm

Frequency 950 - 2150 MHz in steps of 10 Hz

Level -35/+5 dBm  
(+/- 2dB) in 0.1 dB steps

Return loss > 15 dB

Stability +/-0.2 dB/10°C

1-dB compression point @ output: >+20 dBm

Switchable 10 MHz reference output: +3 dBm (+/- 3dB) mute <-100 dBm

Spurious performance

Signal related: better than -70 dBc/4kHz over  
-35/+5 dBm output range and >50  
kbaud

Non-signal related < -80 dBc @ +5 dBm output

Mute <-100 dBm

DC switchable up to 600 mA/24 V with  
1.5A current limiting Requires DC  
voltage input on 2-pin input  
connector

### IF Output:

Connector MCX(F) - 50 Ohm

Frequency 50 – 90 and 100 – 180 MHz in steps  
of 10 Hz

Level -35/+5 dBm (+/- 2dB) in 0.1 dB steps

Return loss > 16 dB @ 75 Ohm  
>20 dB @ 50 Ohm

Stability +/-0.2 dB/10°C

1-dB compression point @ output: >+20 dBm

Spurious performance:

Signal related: better than -65 dBc/4kHz @ +5 dBm  
output level and > 50 kbaud

Non-signal related: < -80 dBc @ +5 dBm output

Mute <-100 dBm

### L-band Monitoring Output:

Connector MCX (F) - 50 Ohm

Return loss (50 Ohm) >14 dB

Frequencies transmit frequency (L-band output  
selected) or 1050 MHz (IF output  
selected)

Level -45 dBm (+/- 5 dB)

### External Reference Input:

Connector MCX (F) - 50 Ohm

Frequency 1,2, 5 & 10 MHz

Level -3 to +7 dBm

### DC Voltage Input for DC on L-band Output

Voltage up to 24 V

Current up to 600 mA

Connector 2-pin (MOLEX 43650-201 Micro-Fit)

### Internal 10 MHz Reference (VCTCXO)

Stability

± 1.0ppm at 25°C ± 2°C

± 2ppm -30 to 75°C

± 1ppm over the first year

± 3ppm over ten years

Phase Noise

10 Hz < -100 dBc/Hz

100 Hz < -125 dBc/Hz

1 kHz < -140 dBc/Hz

10 kHz < -149 dBc/Hz

100 kHz < -153 dBc/Hz

### Phase Noise (L-band and IF Output)

10 Hz < -70 dBc/Hz

100 Hz < -80 dBc/Hz

1 kHz < -90 dBc/Hz

10 kHz < -95 dBc/Hz

100 kHz < -105 dBc/Hz

1 MHz < -130 dBc/Hz

### Symbol Rate (L-band and IF Output)

0.05 – 72 Msps



## Modulation

### Supported Modulation Schemes and FEC

#### DVB-S - Compliant (EN 300421)

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

#### DVB-DSNG - Compliant (EN 302307)

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
Single Transport Stream/data Input interface	
BaseBand Shaping (roll-off 0.2, 0.25, 0.35)	

#### 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 - Compliant (DVB A83-2)

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
BaseBand Shaping (roll-off 0.05, 0.10, 0.15)	

Not in scope: the VL-SNR Header MODCODs Also excluded are: Super-frame, Extended PL HEADER for wide-band mode and Channel bonding acc. table 1 of DVB Document A83-2

#### Clean Channel Technology

Roll-off :	5%, 10%, 15%, 20%, 25%, 35% for all modulations
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## Generic

### Monitoring and Control Interfaces:

Serial: Async serial TTL link, even parity, 1 start bit, 1 stop bit, Baudrate 115.2 kbaud, RMCP v2 protocol / JSON-RPC protocol
Ethernet (if available on the interposer board) for JSON/RPC protocol

### Control

Physical layer pilot insertion
FEC frame type (normal or short)
Physical layer scrambler signature
Test generator
Interface bitrate and symbol rate
Modulation standard
FEC rate and modulation
Spectrum inversion
Output frequency and level
Transmit ON/OFF

### Monitoring

Occupied bandwidth
Output level
Clock offset
Transmit status
Device temperature

### Alarm - A full set of alarm monitoring, among others:

General device
PLL lock
Input signal
Synthesizer, etc.

## Physical

### Mechanical

Form factor	Single PCB
Dimensions	170x89 mm including interface board with cable

### Temperature

Operational	0°C to 60°C @ airflow 1.5 m/s (17CFM)
Storage	-40° to +70°C (-40°F to +158°F)

### Humidity

Operational	5% to 85% non-condensing
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### Input Voltage Requirements

	5V/1.5 A and 12V/0.6 A
Power dissipation:	<15 W