OD6000
OEM Satellite Demodulator Board (R2.1)

ST Engineering

Key Features

- DVB-S2X, DVB-S2 and DVB-DSNG/S standard compliant
- QPSK, 8PSK, 16APSK, 32APSK & 64APSK (under license)
- Single Transport Stream output based upon ISI filtering
- Baseband frames output (under license)
- Support of Multistream and VCM operation
- Data rates up to 190 Mbit/s
- Symbol rate up to 60 Msps
- 4 x L-band input
- Automatic MODCOD detection
- Adaptive equalizer
- LNB power and control
- Monitoring and control via I^2C
- Clean Channel Technology

Applications

- Contribution
- Primary distribution
- DSNG
- Trunking
- Data broadcast
- Data monitoring

Markets

Enterprise
Cellular Backhaul
Broadcast

BROADCAST MODEMS
SCPC MODEMS
DIALOG

iDIRECT

Description

Being fully compliant with DVB-S2X, the standard for Digital Video Broadcasting over Satellite, the OEM Satellite Demodulator Board OD6000 R2.1 offers the following advantages:

- Same form factor as the former NTC/7044 OEM demodulator boards
- 4 x L-band input selectable by software command
- Clean Channel Technology® compliant
- Support of the DVB-S, DVB-DSNG, DVB-S2 and DVB-S2X standards
- Single +5V DC power supply
- Single 140-pins or 50-pins legacy connector for power supply, management and data interfaces
- Management over I^2C interface under a Binary Message Format
- SPI interface for enhanced software upload (only with 140-pins connector)

The OD6000 R2.1 board is a state-of–the-art, high-end professional DVB-S2X demodulator board able to process data rates up to 190 Mbit/s and operate in high-order modulation schemes up to 64APSK. Available to third party manufacturers under OEM agreement, the high performance OD6000 R2.1 is the best solution for the demodulation of DVB-S/S2/S2X carriers in IRDs and for all applications requiring Baseband frame outputs.

In its default configuration, the demodulator board is capable of demodulating an MPEG2 transport stream in DVB-S, DVB-DSNG and DVB-S2/S2X. The Multistream, VCM modes of DVB-S2/S2X are also supported. Only one Transport Stream out of a multistream carrier can be output, by defining the ISI marker of the selected stream.

The OD6000 R2.1 has a 4x L-band input (950-2150 MHz). The active input is selectable and can provide DC power and frequency band selection signals compatible with most professional and commercial LNBs.

The demodulator board delivers an MPEG transport stream on a parallel DVB-SPI output. If the demodulated carrier is a multistream signal, the OD6000 R2.1 can filter and output one of the transport streams, and the ISSY (Input Stream Synchroniser) mechanism as defined in the DVB-S2(X) standard is activated to recover the initial data rate. Alternatively, the board can output the Baseband frames on the same parallel DVB-SPI output.

To compensate for linear distortion in the transmission channel, the OD6000 R2.1 is equipped with an adaptive equalizer.

The demodulator board can be controlled via an I^2C link with a comprehensive range of monitoring and control functions.

Clean Channel Technology is available on the demodulator. Clean Channel Technology further improves satellite efficiency by up to 15% compared to the DVB-S2 standard.

Specifications

Input Interfaces

L-BAND INPUT

- Connector Selectable from 4 x F-type (F), 75 ohms
- Carrier Level Maximum -25 dBm
  Minimum (-70+Es/No(thr)+10log(f))dBm QEF degradation<0.1 dB
  (-80+Es/No(thr)+10log(f))dBm: degradation<0.3 dB
  (-90+Es/No(thr)+10log(f))dBm: degradation<3 dB
  where f=symbol rate in Msps and Es/No(thr)=
  Es/No value in dB for QEF reception
- Max. Composite -10 dBm
  <15 dB above 30 Msps carrier
  <30 dB above 1 Msps carrier
- Frequency 950 - 2150 MHz
- Acquisition range
  DVB-S/DSNG >7.5Msps:7.5MHz+Rs/10where Rs = symbol rate
  <7.5 Msps: Rs/10 + user settable range

  DVB-S2(X) >20 Msps: (1 + Roll-Off) * Rs/2
  <20Msps:usersettablebetweenRs/2and Rs * 1.1
- Return loss >11 dB
- Isolation between inputs >40 dB
- AdjacentsignalLessthan0.5dBdegradationfortwoadj. carriers < (C_0 + 7) dBm/Hz with C_0 = signal level density

LNB POWER & CONTROL

- On the operational L-band input connector
- Current: max 350 mA (on selected L-band input)
- Voltage: 11.5-14 V (vertical polarisation)
  16-19 V (horizontal polarisation)
  & additional 22 KHz ± 4 kHz (band selection according to
  universal LNB for ASTRA satellites) & DiSEqC command transmission

Demodulation

MULTIPLEORSINGLETRANSPORTSTREAMRECEPTION (DVB-S2(X))

SUPPORTED MODULATION SCHEMES AND FEC

- DVB-S/DSNG: acc. EN 300 421 & EN 301 210
  Outer/Inner FEC: Reed Solomon /Viterbi
  MODCODs: QPSK:1/2, 2/3,3/4, 5/6, 7/8;
  8PSK: 2/3, 5/6; 8/9
  16QAM: 3/4, 7/8
- DVB-S2: acc. EN 302 307
  Outer/Inner FEC: BCH/ LDPC
  MODCODS: 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
- DVB-S2X: acc. DVB Doc. A83-2 (exc. VL-SNR)
  Outer/Inner FEC: BCH/ LDPC
  MODCODS: Outer/Inner FEC: BCH/LDPC
  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
  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
  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

MIN-MAX SYMBOL RATES

- DVB-S2 & DVB-S2X
  1-60 Msps
- DVB-S/DSNG
  1-45 Msps

OUTPUT

- Single Transport Stream
  Max. channel bitrate 190 Mbps
  Max. user bitrate 171 Mbps
- Baseband frames
  Max. bitrate 190 Mbps

FRAME LENGTH

- DVB-S2(X) short frames 16200 bits
- DVB-S2(X) normal frames 64800 bits
  Mixingofnormalframes&shortframesnotpossiblein Multistream
- DVB-S/DSNG 188 bytes

ROLL-OFF FACTOR

- DVB-S2X 5%-10%-15%-20%-25%-35%
- DVB-S2 20% - 25% -35%
- DVB-S-DSNG 25% - 35%

CLEAN CHANNEL TECHNOLOGY

- Roll-Off: 5%-10%-15%-20%-25%-35%
- Optimum carrier spacing

QEF Performance

DVB-DSNG/S: E_b/N_0 (dB) SPECIFICATION FOR BER=1E-7 AFTER RS (188 BYTES)

MODCOD	<20 Msps	> 20 Msps
QPSK- 1/2	3.9	3.9
QPSK- 2/3	4.4	4.5
QPSK- 3/4	4.9	5.1
QPSK- 5/6	5.4	5.8
QPSK- 7/8	5.8	6.4
8PSK- 2/3	6.3	6.5
8PSK- 5/6	8.3	8.8
8PSK- 8/9	8.8	9.8
16QAM - 3/4	8.4	8.6
16 QAM- 7/8	10.1	11.1

Remark on the use of pilots off with DVB-S2 and DVB-S2X

We strongly discourage the use of pilots off under following conditions as strong link margin degradation can occur:

- **64APSK MODCODs**
- **QPSK 13/45, 8PSK 7/15, 16APSK 3/5,16APSK 7/15, 16APSK 8/15, 16APSK 23/36, 16APSK 26/45, 16APSK 28/45, 32APSK 2/3-L MODCODS**

For rates below 10 Msps in combination with normal frames:

- **QPSK1/4, QPSK 1/3, QPSK 2/5, QPSK 1/2, 8PSK 3/5, 8PSK 2/3, 16APSK 2/3.**

DVB-S2: E_s/N_0 (dB) SPECIFICATION FOR FECFRAME FER= 10-3

	Normal frames		Short frames	
MODCOD	36 Msps	60 Msps	36 Msps	60 Msps
QPSK 1/4	-2.6	-2.4	-3.1	-2.5
QPSK 1/3	-1.3	-1.1	-1.1	-0.8
QPSK 2/5	-0.3	-0.2	-0.2	-0.1
QPSK 1/2	1.1	1.2	0.6	0.7
QPSK 3/5	2.3	2.4	2.5	2.5
QPSK 2/3	3.2	3.2	3.3	3.4
QPSK 3/4	4.1	4.2	4.3	4.3
QPSK 4/5	4.8	4.8	4.9	4.9
QPSK 5/6	5.3	5.3	5.4	5.4
QPSK 8/9	6.3	6.3	6.5	6.5
QPSK 9/10	6.5	6.5	6	6.2
8PSK 3/5	5.8	6	6.9	7
8PSK 2/3	6.7	6.8	8.2	8.2
8PSK 3/4	8	8.2	9.7	9.7
8PSK 5/6	9.5	9.5	11	11
8PSK 8/9	10.8	10.8	9.3	9.5
8PSK 9/10	11.1	11.1		
16APSK 2/3	9.2	9.4	9.3	9.5
16APSK 3/4	10.4	10.6	10.6	10.6
16APSK 4/5	11.2	11.3	11.3	11.4
16APSK 5/6	11.8	11.9	12	12
16APSK 8/9	13	13.1	13.2	13.3
16APSK 9/10	13.3	13.3		
32APSK 3/4	13.1	13.4	16.1	16.1
32APSK 4/5	13.9	14.2	13.3	13.5
32APSK 5/6	14.6	14.9	14.1	14.2
32APSK 8/9	15.9	16	14.8	14.9
32APSK 9/10	16.2	16.2	16.1	16.1

DVB-S2X: Es/No (dB) SPECIFICATION FOR FECFRAME FER = 10-3

MODCOD	FRAME	36 Msps	60 Msps
QPSK 13/45	Normal	-1.8	-1.7
QPSK 9/20	Normal	0.4	0.5
QPSK 11/20	Normal	1.7	1.7
8APSK 5/9-L	Normal	5	5.2
8APSK 26/45-L	Normal	5.4	5.5
8PSK 23/36	Normal	6.4	6.5
8PSK 25/36	Normal	7.3	7.4
8PSK 13/18	Normal	7.8	7.9
16APSK 1/2-L	Normal	6.4	6.9
16APSK 8/15-L	Normal	7	7.3
16APSK 5/9-L	Normal	7.2	7.6
16APSK 26/45	Normal	8	8.4
16APSK 3/5	Normal	8.2	8.6
16APSK 3/5-L	Normal	7.9	8.4
16APSK 28/45	Normal	8.5	8.8
16APSK 23/36	Normal	8.7	9
16APSK 2/3-L	Normal	8.9	9.3
16APSK 25/36	Normal	9.6	9.9
16APSK 13/18	Normal	10	10.2
16APSK 7/9	Normal	11	11.2
16APSK 77/90	Normal	12.3	12.5
32APSK 2/3-L	Normal	11.6	11.9
32APSK 32/45	Normal	12.3	12.8
32APSK 11/15	Normal	12.7	13.2
32APSK 7/9	Normal	13.5	13.8
64APSK 32/45-L	Normal	14.7	15.4
64APSK 11/15	Normal	15.6	16.2
64APSK 7/9	Normal	16.1	16.6
64APSK 4/5	Normal	16.5	16.9
64APSK 5/6	Normal	17.2	17.5
QPSK 11/45	Short	-2.2	-2.1
QPSK 4/15	Short	-1.8	-1.6
QPSK 14/45	Short	-1.2	-1.1
QPSK 7/15	Short	1	1.2
QPSK 8/15	Short	1.8	2
QPSK 32/45	Short	3.9	4
8PSK 7/15	Short	4.4	4.9
8PSK 8/15	Short	5.2	5.6
8PSK 26/45	Short	5.8	6.1
8PSK 32/45	Short	7.8	7.9
16APSK 7/15	Short	6.8	7.6
16APSK 8/15	Short	7.6	8.2
16APSK 26/45	Short	8.2	8.6
16APSK 3/5	Short	8.5	8.8
16APSK 32/45	Short	10.2	10.4
32APSK 2/3	Short	11.7	12
32APSK 32/45	Short	12.6	13

Output interface

DATA AND CLOCK OUTPUT

- Connector 140-pins IDE connector type FCI 61083-141402LF
- Electrical DVB-SPI with synthesized output clock
- Clock The recovered TS clock, max. 27 MHz
  Single stream reception: byte rate
  Multistream reception: at TS rate

Physical

- Mechanical Single PCB, 160 x 100 x 1.6 mm
- Component height <15 mm at top, <4 mm at bottom side

- Power supply On same connector as Data output
  +5V ±5% at 3A max. for maximum rate (no LNB current)
  provides max. 350 mA LNB current
- Temperature
  - Operational: 0°C to 50°C (0 to 95% non-condensing) & minimal airflow of 1.5 m/s
  - Storage: -40 to +70°C (0 to 95% non-condensing)

Generic

MONITOR AND CONTROL INTERFACES

- On same connector as Data output
- I^2C (@ 100 kbps on 5V)
- Protocol in a Binary Message Format

SOFTWARE UPLOAD INTERFACE

- On same connector as Data output
- I^2C (@ 100 kbps on 5V) and SPI (on 3.3V) (on 140-pins connector only)
- In background with back-up and roll-back mechanism

CONTROL

- Standard selection
- Interface and symbol rate
- Roll-off factor: manual or automatic
- Decoding & demodulation mode
- TS output selection, based upon ISI filtering
- Spectrum Inversion On/Off/Auto
- Acquisition range
- LNB band and polarisation selection (13/18V and 22kHz)
- L-band input selection
- Global reset

MONITORING

- All control parameters
- Input level, carrier & clock frequency offset
- Uncorrectable base-band frames count (DVB-S2/S2X)
- Es/No (DVB-S2/S2X)
- Link margin (DVB-S2/S2X)
- Eb/No (DVB-S/DSNG)
- Uncorrectable TS packets count (DVB-S/DSNG)
- Estimated BER after decoding (DVB-S/DSNG)
- Sync status, alarms
- Board + firmware version

Specifications

OD6000 R2.1 OEM Satellite Demodulator Board		Ordering n°
Configuration Options Category		**OD6000**
		Select 1 option
Hardware	OD6000 Hardware R1.0 (140-pins connector)	HW-10
	OD6000 Hardware R1.1 (50-pins connector)	HW-11
		Select 1 option
Operating Software	OD6000 Major Software R1*	MS-10
		Select 1 option
Output streams	Single Video TS*	VP-01
	Baseband frames*	BB-01
	Baseband frames incl. padding*	BB-02
		Select 1 option
Output Interface	DVB-SPI*	SP-01
		Select 1 option
Demodulation Standard and Coding (includes multistream support)	DVB-S/S2/S2X Q/8PSK*	DC-10
	DVB-S/S2/S2X Q/8PSK 16QAM 16APSK*	DC-11
	DVB-S/S2/S2X Q/8PSK 16QAM 16/32APSK*	DC-12
	DVB-S/S2/S2X Q/8PSK 16QAM 16/32APSK/64APSK*	DC-14
		Select 1 option
Demodulation Maximum Symbol Rates	Demodulation Symbol Rate 36 Msps*	DR-36
	Demodulation Symbol Rate 54 Msps*	DR-54
	Demodulation Symbol Rate 60 Msps*	DR-60

(*) Selectable via license key

Newtec iDirect