

• DESCRIPTION

Being fully compliant to the second standard for Digital Video Broadcasting over Satellite (DVB-S2, EN 302307), the Newtec satellite modulator NTC/2277.xF is one of the first modulators to offer the advantages of DVB-S2:

- 1° much better spectral efficiency than DVB-S thanks to the use of new advanced high-level coding techniques: BCH replaces Reed Solomon and LDPC replaces Viterbi
- 2° new modulation schemes: 16 APSK & 32 APSK
- 3° more roll-off factors (20, 25 & 35 %)

Implementing all these new techniques, DVB-S2 results in a bandwidth saving of up to 30 % in CCM (or 2,5 dB gain margin) compared to DVB-S.

The NTC/2277.xF is also capable of working in DVB-S and DVB-DSNG mode.

Like its predecessor, the NTC/2177 DVB-S modulator, the NTC/2277.xF is a member of the field-proven modular Azimuth series and is designed to packetize, encode and modulate one MPEG Transport Stream. At the output, the signal is converted to an IF band signal (50-180 MHz).

The NTC/2277.xF has been designed for the broadcasting, contribution or distribution of digital television signals as well as the transmission of high-speed TELCO data in backbone infrastructures and data content distribution networks.

The NTC/2277.xF has two physical input interface positions that can be fitted with a range of interface modules: A DVB (ASI, SPI, LVDS) and a TELCO (HSSI/G703) interface module provide a standard data input to the modulator. The ASI concentrator module combines 4 ASI inputs for transportation of multiple ASI streams. The NTC/2277.xF can be fitted with any combinations of these cards. An IP GbE interface is also available. This module has an RJ-45 input and 2 ASI inputs/outputs. (*) For an overview see "Versions & Options" on page 2.

The DVB-S2 modulator NTC/2277.xF handles symbol rates from 0.05 up to 68 Mbaud, using a QPSK, 8PSK, 16APSK or 32 APSK modulation scheme. The roll-off factor is selectable between 0.2, 0.25 or 0.35 in both DVB-S and DVB-S2 mode.

The NTC/2277.xF is standard equipped with an IF-band output. An L-band monitoring output is provided for connection of e.g. an IRD or spectrum analyzer. A programmable digital equalizer is provided to compensate for external amplitude slopes

All Control and Monitoring parameters are available locally on the front panel (LCD display & keyboard) and remotely through a web interface (Http) or through the RS-485/232 port or through the 10/100 Base-T Ethernet port. The last two

use the RMCPv2 protocol. There is optionally an SNMP + MIB agent.

A dual contact closure output is available for 2 types of summary alarms: one contact is operated in case of device alarms, while the other contact opens (or closes) in case of input or output interface alarms.

Inherent to its modular design, the modulator can be SW-upgraded to a higher capability (data rate, modulation schemes, functionalities, etc.) after ordering the corresponding password, which is simply keyed-in by the customer.

• APPLICATIONS

Up to 68 Mbaud data rate transmission of satellite services such as broadcast, distribution or contribution of Digital TV (HDTV / SDTV) signals, Digital Satellite News Gathering, data content distribution, trunking and other professional applications.

• FEATURES

- DVB-S2 compliant (EN 302307)
- DVB-S compliant (EN 300421)
- DVB-DSNG compliant (EN 301210): available DSNG data rates & modulation schemes are coupled on the available DVB-S2 data rates and modulation schemes.
- two optional DVB, TELCO input interface
- CCM (Constant Coding and Modulation)
- Insertion of MPEG Transport Stream framing
- Independent error coding and modulation scheme for each physical or logical input
- 50 kbit/s up to 216 Mbps interface rate (FEC- & interface dependent)
- QPSK, 8PSK, 16APSK and 32APSK for optimal bandwidth efficiency in DVB-S2
- Automatic (redundancy switching) or manual ASI data input switching
- Ovenized 10.0 MHz reference frequency (option)
- External 10.0 MHz reference input/output (option)
- L-band monitoring output (fixed frequency)
- Programmable external LO frequency
- Level indication offset
- Programmable amplitude slope equalizer
- Local & remote M&C access to all menus through a
 - * web interface (Http protocol)
 - * RS-485/RS-232 (RMCP v2 protocol)
 - * 10/100 Base-T Ethernet port (RMCP v2 protocol)
- 50 or 75 Ohm IF output selectable
- User-programmable menu structure
- Action Keys (group of commands under single button)
- Real-time clock for alarm occurrence logging
- Internal test-generator and decoder (PRBS counter)
- Very compact: 1Ru (height: 4.4 cm !)

- highly reliable Newtec design
- CE label
- Dynamic build-up of alarm menu
- Diagnostics generator
- The NTC/2277.xF can also operate in the DVB-S mode: See the datasheet of NTC/2177 for specifications and details
- Support for SNMP alarm trap

• VERSIONS & OPTIONS

The modular architecture opens various possibilities and application fields: Firmware-packages will determine the usage and capabilities of the unit.

1. Baseband Data Interface Module :

The interchangeable baseband data interface modules provide a wide range of input interfaces via coaxial and/or sub-D connectors. Optical inputs and outputs are also available.

- NTC/3453.x.x.x: DVB ASI/SPI/Serial-LVDS interface card
Hardware option: optical ASI in/out plug-in NTC/3453.x.x.A
Firmware options:
* Automatic rate adapter NTC/3453.x.x.B
* BISS 0,1 & E scrambler NTC/3453.x.x.C
* Automatic rate adapter + BISS scrambler NTC/3453.x.x.D
- NTC/3458.Ax.x: TELCO HSSI+2x single rate G703 interface card
* NTC/3458.AA.A: HSSI-G.703 input 2 to 52 Mbps
* NTC/3458.AB.A: HSSI-G.703 output 2 to 52 Mbps
* NTC/3458.AA.B: HSSI-G.703 input 2 to 110 Mbps
* NTC/3458.AB.B: HSSI-G.703 output 2 to 110 Mbps
- NTC/3454.AC.A: ASI concentrator board with 4 coax inputs
- NTC/3454.AD.A: ASI Deconcentrator board with 4 coax outputs
- NTC/7015.xx: IP GbE & ASI in/out interface (under development)

2. Modulator Board:

The Variable Rate IF-band DVB-S2 Modulator is fitted with a modulator board of the NTC/7020 series. The available modulation schemes and maximum baud rates are part of the firmware capabilities, which are password upgradeable :

Available Interface rates:
5, 15, 30, 45 & 68 Mbaud (both in DVB-S2 & DVB-S/DSNG mode)

Available Modulation schemes:
DVB-S2 QPSK
DVB-S2 QPSK / 8PSK
DVB-S2 QPSK / 8PSK / 16APSK
DVB-S2 QPSK / 8PSK / 16APSK / 32APSK

DVB-S/DSNG QPSK
DVB-S/DSNG QPSK / 8PSK
DVB-S/DSNG QPSK / 8PSK / 16QAM

Types to be specified for the modulator when ordering:

NTC/7020/BBxx : CCM mode

NTC/7020/BBAx : QPSK modulation scheme (DVB-S2 mode)
Works also in QPSK in DVB-S/DSNG mode

NTC/7020/BBBx : QPSK+8PSK modulation scheme (DVB-S2-mode)
QPSK+8PSK when working in DVB-S/DSNG mode

NTC/7020/BBCx : QPSK+8PSK+16APSK modulation scheme (DVB-S2 mode)

QPSK+8PSK+16 QAM when working in DVB-S / DSNG mode

NTC/7020/BBDx : QPSK+8PSK+16APSK+32APSK modulation (DVB-S2 mode)

QPSK+8PSK+16 QAM when working in DVB-S / DSNG mode

NTC/7020/BBxA: max 5 Mbaud

NTC/7020/BBxB: max 15 Mbaud

NTC/7020/BBxC: max 30 Mbaud

NTC/7020/BBxD: max 45 Mbaud

NTC/7030/BBxE: max 68 Mbaud

For example, if you want the modulator to work (DVB-S2 mode) in QPSK+8PSK+16APSK at a max baud rate of 45 Mbaud, you have to order the NTC/7020/BBCD.

This modulator NTC/7020/BBCCD will also work in DVB-S/DSNG mode (QPSK+8PSK+ 16QAM at 45 Mbaud)

3. 10 MHz Reference Board :

One of the following 10 MHz ref. boards is always required whenever an external 10 MHz reference input and/or output is required.

- NTC/3462.AB.A : 10 MHz OCXO reference Oscillator (normal use)
Stability: 0,05 ppm
- NTC/3462.AA..A : 10 MHz OCXO High Stability Ref. Oscillator (recommended only with carriers < 1MHz)
Stability: 0,002 ppm)

4. SNMP agent and MIB library

Needed whenever the unit needs to be controlled over Ethernet via proprietary NMS,

- NTC/2280.xx.xB.

• DATA SUMMARY

DATA INTERFACE

- ASI/SPI/serial-LVDS (see data sheet NTC/3453.x.xx) and/or
- Single rate G703 w. Ext. clock + HSSI (see data sheet NTC/3458.Ax.x), and/or
- P Gigabit Ethernetcard (see datasheet NTC/7015.xx).

IF-BAND OUTPUT

Operational output

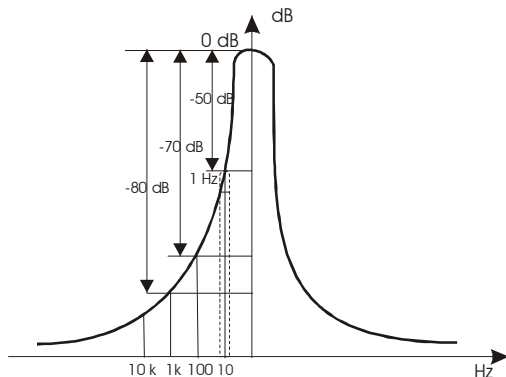
Level	: -30/+5 dBm (± 3 dB)
frequency	: 50 - 180 MHz
connector	: BNC (F) - 75 Ohm (BNC - 50 Ohm on request)
return loss	: 50 Ohm : > 14 dB
	75 Ohm : > 20 dB

L-BAND MONITORING OUTPUT

level	: -45 dBm
frequency	: 1080 MHz (fixed frequency)
connector	: SMA (F) - 50
return loss (50):	> 7 dB

PHASE NOISE

10 Hz	: < -50 dBc/Hz
100 Hz	: < -70 dBc/Hz
1 kHz	: < -80 dBc/Hz
10 kHz	: < -85 dBc/Hz
100 kHz	: < -95 dBc/Hz



SPURIOUS

better than 65 dBc @ -10 dBm

INNER FEC CODING (LDPC)

1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4
4/5, 5/6, 8/9, 9/10
16200 and 64800 bit blocks

BIT MAPPING

QPSK, 8PSK, 16APSK, 32APSK

DVB-S2 COMPLIANT (EN 302307)

Single Transport Stream/data Input interface
Null-packet deletion
CRC8 Encoding
BaseBand Signaling
BaseBand Scrambling
Outer FEC coding (BCH)
Bit Interleaving
Physical Layer Framing

INTERNAL REFERENCE FREQUENCY

- standard : ± 5 ppm
Ageing : ± 5 ppm/10 years
- optional 10 MHz reference board :
see datasheet NTC/3462.Ax.A
AA.A version: ± 0.002 ppm
AB.A versions: ± 0.05 ppm

EXTERNAL 10.0 MHz REFERENCE (option):

Input level	: -3 dBm up to +7 dBm
Output level	: +7 dBm
connector	: BNC (F) - 50

MONITOR & CONTROL INTERFACES :

- a) protocol : http (via web browser)
- connector : RJ-45
- electrical : Ethernet 10 base-T
- b) protocol : RMCP **version 2 only**
- connector : 9 pin sub-D female
- electrical : RS-485 / RS-232
- c) protocol : RMCP **version 2 only** over TCP-IP or UDP, SNMP
- connector : RJ-45
- electrical : Ethernet 10 base-T

ALARM INTERFACE :

- connector : 9 pin sub-D (F)
- electrical : interface + device alarms

MECHANICAL :

19" subrack, height: 1RU, weight 6 kg, depth 51 cm

POWER SUPPLY :

90-130/180-260V, 105VA, 47-63 Hz

TEMPERATURE:

- operational : 0° up to +40°C
- storage : -40° up to +70°C

Control

Physical input selection, logical input selection (VLAN tag or MAC address), interface rate (1 bit/s resol.) and symbol rate (1 baud resol.), data framing (MPEG TS internal/external, generic mode, Data Piping), rate adaptation, input buffer size, FEC-rate, Modulation scheme, IF frequency (95 Hz resol.), 10.0 MHz source (internal or external), internal PRBS generator/detector

• PERFORMANCE

Interface bit rate vs. satellite baud rate in DVB-S mode :

Satellite baud rate: 50 kbaud to 68 Mbaud

Interface Rate - 188 byte

MPEG frames (Mbps)				Bandw./interf.R 35% roll-off	
Modul.	FEC	50 kbaud	1 Mbaud	60 Mbaud	
QPSK	1/2	0.046	0.922	55.294	1.085 1.465
QPSK	2/3	0.061	1.229	73.725	0.814 1.099
QPSK	3/4	0.069	1.383	82.941	0.723 0.977
QPSK	5/6	0.077	1.536	92.156	0.651 0.879
QPSK	6/7	0.079	1.580	94.789	0.633 0.855
QPSK	7/8	0.081	1.613	96.764	0.620 0.837
QPSK	N.A.	0.092	1.844	110.588	0.543 0.732
8PSK	2/3	0.092	1.844	82.941	0.543 0.678
8PSK	5/6	0.115	2.304	103.676	0.434 0.509
16QAM	3/4	0.138	2.765	124.412	0.362 0.452
16QAM	7/8	0.161	3.226	145.147	0.310 0.388

This table indicates for a certain modulation scheme the input bitstream needed to obtain an output symbol rate of 1Mbaud (also shown for an output symbol rate of 0,05 and 68 Mbaud)

For example: modulation is in 8PSK 2/3, to obtain an output stream of 1Mbaud, the input stream has to be 1,844 Mbit/s. This means a spectral efficiency of 1,844 bits/Hz. For your convenience the table also mentions the input stream to obtain output streams of resp 0,05 Mbaud and 30 Mbaud (these symbol rate limits of the modulator

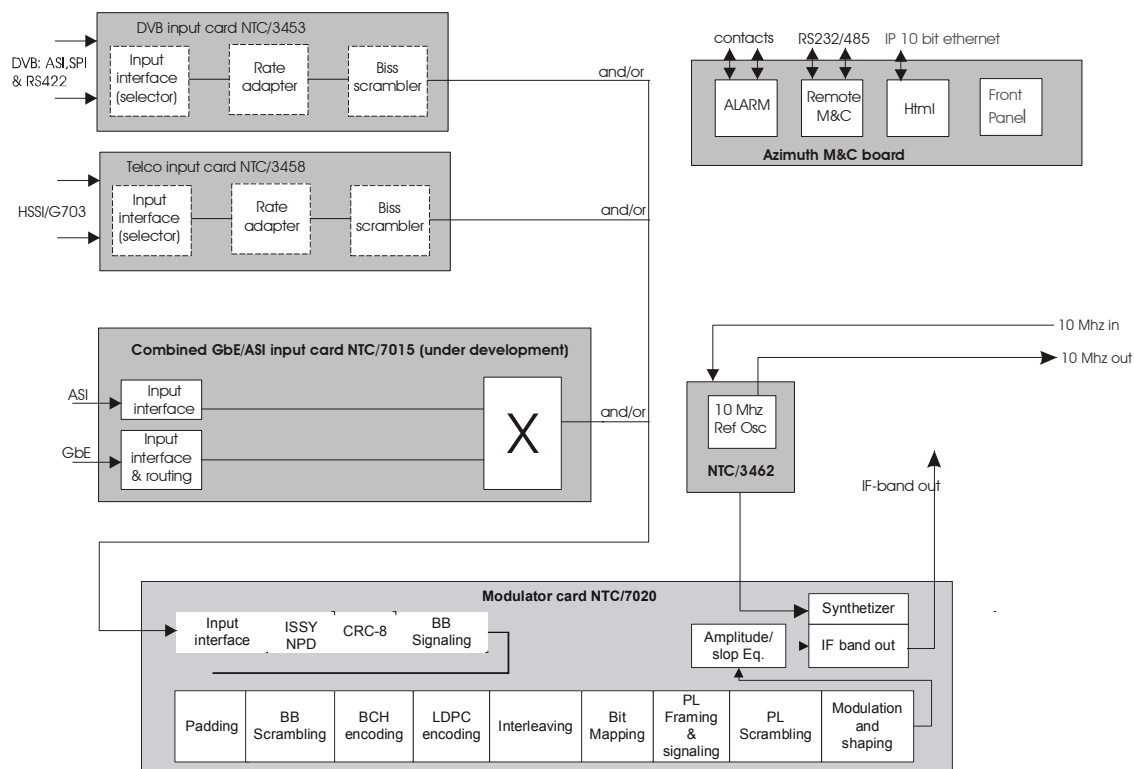
Interface bit rate vs. satellite baud rate in DVB-S2 mode

Interface Rate (Mbps) (64800 bit FEC frames)				Bandw./Interf.R. (35% Roll-off)	
Modul.	FEC	50kBaud	1MBaud	65MBaud	
QPSK	1/4	0,025	0,490	31,866	2,040 2,754*
QPSK	1/3	0,033	0,656	42,669	1,523 2,057*
QPSK	2/5	0,039	0,789	51,312	1,267 1,710
QPSK	1/2	0,049	0,989	64,276	1,011 1,365
QPSK	3/5	0,059	1,188	77,240	0,842 1,136
QPSK	2/3	0,066	1,322	85,946	0,756 1,021
QPSK	3/4	0,074	1,487	96,686	0,672 0,908
QPSK	4/5	0,079	1,587	103,168	0,630 0,851
QPSK	5/6	0,083	1,655	107,553	0,604 0,816
QPSK	8/9	0,088	1,766	114,819	0,566 0,764
QPSK	9/10	0,089	1,789	116,260	0,559 0,755
8PSK	3/5	0,089	1,780	115,699	0,562 0,758
8PSK	2/3	0,099	1,981	128,741	0,505 0,682
8PSK	3/4	0,111	2,228	144,828	0,449 0,606
8PSK	5/6	0,124	2,479	161,107	0,403 0,545
8PSK	8/9	0,132	2,646	171,991	0,378 0,510
8PSK	9/10	0,134	2,679	174,148	0,373 0,504
16APSK	2/3	0,132	2,637	171,418	0,379 0,512+
16APSK	3/4	0,148	2,967	192,837	0,337 0,455+
16APSK	4/5	0,158	3,166	205,765	0,316 0,426+
16APSK	5/6	0,165	3,300	214,512	0,303 0,409+
16APSK	8/9	0,176	3,523	229,004	0,284 0,383+
16APSK	9/10	0,178	3,567	231,877	0,280 0,378+

+ = no verification above 45 Mbaud

Formulas : see ETSI EN 302 307 v1.1.1 (2004-01) table 5 & 11
Efficiency taken into account the BB header (80 bits) and the PL frame header (1 slot per PLFRAME) without pilots.

• BLOCK DIAGRAM



Max 2 interface boards can be installed from which max one can be a Gigabit Ethernet interface card.

If one installs two Gigabit Ethernet interface cards it is not possible anymore to install a RF frequency up converter.

• TECHNICAL LITERATURE & REFERENCES (ALSO AVAILABLE ON OUR WEBSITE)

Other related products

NTC/2137	Transport stream ASI concentrator-deconcentrator
NTC/2263	DVB-S2 L-band satellite demodulator
NTC/2280	DVB-S2 L-band satellite modulator
NTC/3453	SI/SPI/serial LVDS DVB interface board
NTC/3458	Dual rate G.703/HSSI data interface board
NTC/3462	10 MHz reference frequency module
NTC/3474/AA	IF to L-band agile frequency converter
NTC/7015	Combined GbE/ASI input/output card (under development)
NTC/7020	DVB-S2 IF-band modulator board
NTC/7030	DVB-S2 L-band modulator board

Application notes and technical publications

NTC/2280/APN01 Comparison between DVB-S2 (ACM) and DVB-S

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