

TXMISSION

Connect™ Ground Station Modem

Overview

The Connect™ ground station modem is a high data rate DVB-S2/S2X and CCSDS-compliant modem that has been designed specifically for use with smallsats. It forms part of our suite of products that covers everything from onboard and ground communications to network management systems.

The popular CCSDS message protocol can optionally be used with all our waveforms, meaning that existing CCSDS solutions can be upgraded to use the latest technology without having to change any of the system data processing elements.

Benefits

DVB-S2/S2X maximises the error-free data rate that can be achieved for a given transmit power level and is widely accepted as the most efficient waveform technology available anywhere.

For missions where even lower power consumption on the satellite is required, we can provide our proprietary OQPSK extension to DVB-S2/S2X, which lowers the peak-to-average transmitted power level, thereby reducing or eliminating any distortion to the signal.

In addition, the use of ACM ensures that the maximum amount of data can be downloaded during each satellite pass by continuously adapting the transmitted data rate to match the available received signal level. This can even be used without feedback from the ground to the satellite, since the position of the satellite relative to the earth (and hence the signal level) is always known.

Features

- **Data rates up to 500Mbps (over 100Msps)**
- **Direct S-band RF frequency support (other bands supported via the use of external up/down conversion)**
- **DVB-S2 & DVB-S2X waveforms**
- **CCSDS telemetry standard with Viterbi-RS & DVB-S/S2/S2X**
- **H.265 (HEVC) video decompression**
- **Handles high doppler frequencies**
- **Demodulated data output via Ethernet or high data rate serial interface**
- **Can be controlled via a web browser or via our MissionSpan™ NMS**
- **Dynamically varying data rate (ACM)**
- **Unique DVB-S2/S2X OQPSK option for low satellite transmit power**
- **Our products are designed for earth observation, telecoms, space research, IOT/5G, intelligence gathering and other smallsat/LEO applications**



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Key Features

Function	CubeSat/smallsat ground station modem
Waveforms	DVB-S2 (EN 302 307-1) DVB-S2X (EN 302 307-2) CCSDS DVB-S2 (CCSDS 131.3-B-1) CCSDS DVB-S2X (proprietary CCSDS extension) CCSDS Viterbi/Reed-Solomon (CCSDS 131.0-B-1) CCSDS 4TCM (CCSDS 401)
Data Rate (Tx & Rx)	DVB-S2/DVB-S2X: 50kbps to 500Mbps Viterbi/Reed-Solomon: 9.6kbps to 50Mbps
Symbol Rate (Tx & Rx)	DVB-S2/DVB-S2X: 100ksps to 125Msps Viterbi/Reed-Solomon: 9.6ksps to 40Msps
Frequency	IF/L-band/S-band (75MHz to 2.45GHz) via Tx/Rx SMA connectors; separate Rx monitor connector
Data Interfaces	Gigabit Ethernet, LVDS, ASI, USB
Spectral Roll-off	Root-raised cosine filter provides choice of 5%, 10%, 15%, 20%, 25%, 35% & 40% carrier roll-off factors
DVB-S2/S2X ACM	Varies data rate with satellite position during a satellite pass, maximising throughput for the strength of signal being received
Adaptive Tx Predistorter	Corrects for linear and non-linear distortion in the RF chain; maximises linear output power & minimises required back-off; up to 2dB performance gain
Real-time Video Decompression	Hardware video decompression of video data to the H.264/H.265 (HEVC) standards at 4K/Ultra High Definition resolutions and 60Hz frame rate, massively reducing storage requirements and size of data download

Telemetry, Tracking and Command (TT&C)

Telnet	A command line interface can be used to securely log in to the satellite modem over the TT&C uplink. This can be used to monitor and configure every aspect of the modem
Web User Interface	The satellite modem supports a built-in web server that serves web pages to any web browser for TT&C purposes. This may be useful for both pre-deployment testing and in-orbit operational use
MissionSpan NMS	This application forms part of the ground station control network. It allows all modems (in orbit and on the ground) to be monitored and controlled through a single application

Waveforms / Forward Error Correction

DVB-S2X (EN 302 307-2)	Normal Frame: QPSK 13/45, 9/20, 11/20 8PSK 23/36, 25/36, 13/18 8APSK-L 5/9, 26/45 16APSK 26/45, 3/5, 28/45, 23/36, 25/36, 13/18, 7/9, 7/90 16APSK-L 5/9, 8/15, 1/2, 3/5, 2/3 32APSK 32/45, 11/15, 7/9 32APSK-L 2/3 64APSK 11/15, 7/9, 4/5, 5/6 64APSK-L 32/45 Short Frame: QPSK 11/45, 4/15, 14/45, 7/15, 8/15, 32/45 8PSK 7/15, 8/15, 26/45, 32/45 16APSK 7/15, 8/15, 26/45, 3/5, 32/45 32APSK 2/3, 32/45
DVB-S2 (EN 302 307-1)	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
Proprietary Extension to DVB-S2/S2X	OQPSK 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 (OQPSK reduces the peak-to-average-power ratio of the transmitted signal compared to QPSK, reducing the required back-off and allowing a higher transmit power to be used without impairing the Signal) Viterbi: BPSK, QPSK & OQPSK 1/2, 2/3, 3/4, 5/6, 7/8 Reed-Solomon: Symbols per codeword: 255 Error correction values: 8 & 16 Codes include (255, 233) & (255, 239) plus shortened codeblocks Interleaver depth: 1, 2, 3, 4, 5 & 8
CCSDS-compliant Viterbi & Reed-Solomon (CCSDS 131.0-B-1)	
CCSDS-compliant 4TCM (CCSDS 401)	CCSDS 4D 8PSK TCM 3/4, 8/9, 9/10, 10/11, 11/12

Mechanical/Environmental

Size	200mm x 180mm x 90mm
Weight	1kg
Power Supply	90 to 264V AC input (external adaptor)
Compliances	FCC, CE and RoHS compliant
Safety	EN 62368-1
Emissions & Immunity	Emissions: EN 55032:2015 Immunity: EN 55024:2010, A1
Operating Temperature	0°C to +50°C



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Ordering Information: Please select from the following options when placing an order

Feature		Options	Description
Hardware Platform	✓	Provided as standard	Chassis and all datasheet features <u>other than those specified below</u> are provided as standard
Data Rate	Select 1 option	100Mbps	Tx and Rx data rates to 100Mbps (50Msps)
		300Mbps	Tx and Rx data rates to 300Mbps (100Msps)
		500Mbps	Tx and Rx data rates to 500Mbps (125Msps)
Waveforms	Select at least 1 option	DVB-S2	DVB-S2 QPSK, 8PSK, 16APSK & 32APSK operation per EN 302 307-1. Includes 5%, 10%, 15%, 20%, 25%, 35% & 40% spectral roll-offs
		DVB-S2X	DVB-S2X QPSK, 8PSK, 8APSK, 16APSK, 32APSK & 64APSK operation per EN 302 307-2. Includes 5%, 10%, 15%, 20%, 25%, 35% & 40% spectral roll-offs
		CCSDS DVB-S2/S2X	Note: requires the selection of the DVB-S2 and/or the DVB-S2X option CCSDS DVB-S2 per CCSDS 131.3-B-1 CCSDS DVB-S2X (proprietary CCSDS extension)
		CCSDS Viterbi/RS	CCSDS Viterbi/Reed-Solomon (CCSDS 131.0-B-1)
		DVB-S2/S2X OQPSK	Proprietary extension to DVB-S2/S2X to provide OQPSK modulation
		CCSDS 4TCM	CCSDS 4D 8PSK TCM (CCSDS 401)
ACM		DVB-S2/S2X ACM	Adaptive Coding and Modulation (ACM) mode for use with DVB-S2 and DVB-S2X
Decompression		Video Decompression	H.264/H.265 (HEVC) hardware video decompression
Predistortion		Adaptive Tx Predistorter	Predistorts the Tx output in order to compensate for linear and non-linear distortion in the received signal

For more information, including pricing, or to place an order, please contact us directly at:

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