TXMISSION

Quest™ UAV Onboard Modem

Overview

Our high-performance Quest™ UAV DVB-S2/S2X-compliant Software Defined Radio has been designed for airborne applications, such as aircraft, UAVs and High-Altitude Pseudo-Satellite (HAPS) operating in the stratosphere.

It forms part of our off-the-shelf, end-to-end airborne communications solution covering the airborne vehicle, the ground station and network management systems. The modem can be paired with our Quest™ UAV C-band RF Assembly, which together provide all that is needed for the onboard airborne communications system other than an antenna. Custom solutions for other frequency bands can be provided on request.

Support for numerous electrical interfaces and communications protocols ensure the Quest™ UAV modem can interface to all types of sensors including imaging equipment, radar and 4G/5G networks.

Users can extend the airborne application's functionality by developing and integrating their own software applications for running onboard the modem, using our Software Development Kit.

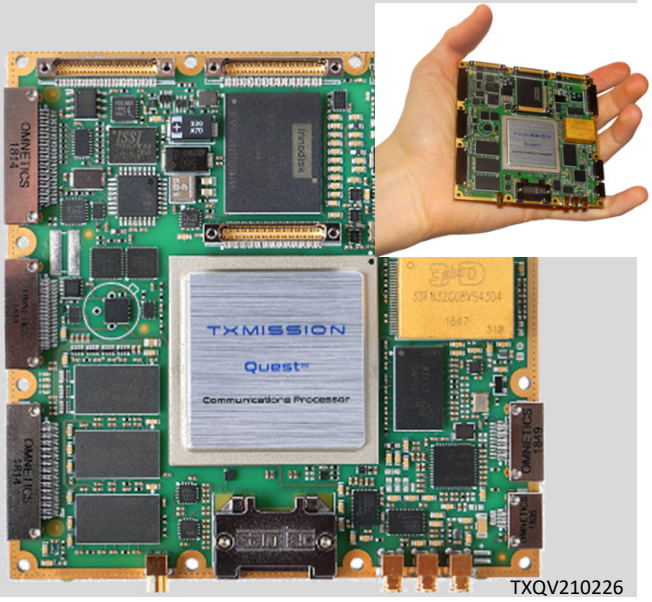
Benefits

DVB-S2/S2X is the most spectrally-efficient waveform available and, compared to alternatives, is much more reliable and robust in high-noise environments.

For applications with imaging payloads, the efficiency of data downloads can be dramatically increased using our onboard hardware H.265 image/video compression engine.

Features

- Data rates up to 1Gbps
- DVB-S2 & DVB-S2X waveforms
- Direct VHF/UHF/IF/L/S/C-band support
- Modulations up to 256APSK
- Full RF solution (SSPA, LNA, duplexer)
- H.265 image & video compression
- 128GB payload mass storage option
- Data interfaces: Gigabit Ethernet, LVDS, SDI/ASI, USB3, SpaceWire, RS485, UART, CAN, I2C & SPI
- Can host third-party apps (5G/IoT/edge computing/cloud computing, etc.)
- Radiation tolerant option
- Unique DVB-S2/S2X OQPSK option for low transmit power
- Transmit predistortion (reduces required power)
- -40°C to +85°C operation



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Key Features

Primary Function	Software Defined Radio (SDR) for airborne applications up to and including the stratosphere
Secondary Functions	• Can host third-party software applications • Can host flight computer function • Can host payload processor (includes support for mass storage device & sensor interfaces)
Waveforms	DVB-S2 (EN 302 307-1) DVB-S2X (EN 302 307-2)
Data Rate (Tx & Rx)	50kbps to 1Gbps
Symbol Rate (Tx & Rx)	100ksps to 119Msps *Maximum occupied carrier bandwidth : 125MHz*
Frequency Range (Tx & Rx)	VHF/UHF/IF/L/S/C-band (75MHz to 6GHz) SMA connectors (Other frequencies via external up/down conversion)
Data Interfaces	Gigabit Ethernet, LVDS, SDI/ASI, USB3, SpaceWire, RS485, UART, CAN, I2C, SPI
Spectral Roll-off	Standard: Root-raised cosine filter provides choice of 5%, 10%, 15%, 20%, 25% & 35% carrier roll-off factors Option: Extended roll-off of 40% (reduces peak-to-average power ratio & amplifier back-off)
DVB-S2/S2X ACM	Varies data rate with aircraft position, maximising throughput for the strength of signal being received
Adaptive Tx Predistorter	Corrects for linear & non-linear distortion in the RF chain; maximises linear output power & minimises required back-off; up to 2dB performance gain
Real-time Video Compression	Hardware compression of sensor image & video data to the H.264/H.265 (HEVC) standards at 4K/Ultra High Definition resolutions & 60Hz frame rate, massively reducing storage requirements & data download
Mass Storage	Option to fit 32GB or 128GB SSD drive for storing sensor data
Radiation Tolerance	Standard: • High-reliability lockstep processors • Automatic memory error correction & scrubbing • Software & PSU integrity maintained by watchdog Options: • Key components for detecting & recovering from a radiation upset are radiation hardened (watchdog timer, watchdog timer PSU, flash memory) • Radiation absorbent conformal coating
Output Power	-5 to –40dBm
Receiver input level	Varies with symbol rate; for a 20MHz carrier, receiver signal level should be between –65dBm & -10dBm (note performance will be degraded below –40dBm)
GPS Receiver	Onboard GPS function (GPS antenna not provided)

Mechanical/Environmental

Size	90 x 90 x 23mm (in enclosure: 95 x 123 x 30mm)
Weight	150g (400g including enclosure)
Power Consumption	5W to 30W depending on data rate & options
Input Voltage	Board product: 5V (non-regulated) In enclosure: 12V (non-regulated)
Emissions & Immunity	Emissions: EN 55032:2015 Immunity: EN 55024:2010, A1
Enclosure	Option: Clamshell enclosure (aluminium; provides 2mm of shielding; weight: 250gms)
Conformal Coating	Option: PCB conformal coating
Testing	Environmental testing: functional, electrical, vibration, shock, thermal, vacuum, EMC (including ionising dose)
Temperature	Operation & storage: -40 to +85ºC

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, 77/90 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 128APSK 3/4, 7/9 256APSK 32/45, 3/4 256APSK-L 29/45, 2/3, 31/45, 11/15 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)	Normal Frame: 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 Short Frame: QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9 8PSK 3/5, 2/3, 3/4, 5/6, 8/9 16APSK 2/3, 3/4, 4/5, 5/6, 8/9 32APSK 3/4, 4/5, 5/6, 8/9

Monitor & Control (M&C)

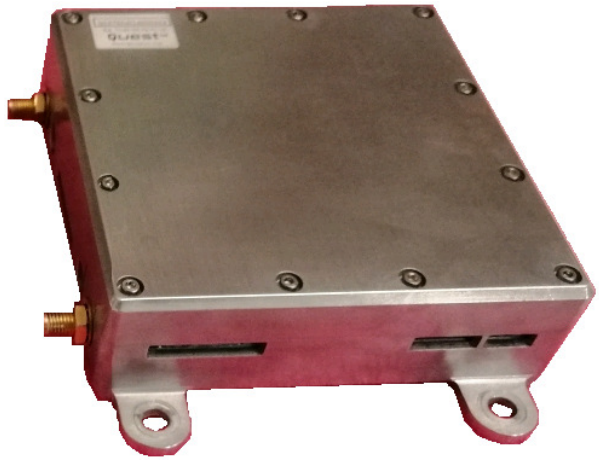
SSH/Telnet/ Serial	A command line interface allows secure login to the modem over the uplink channel & can be used to monitor & configure every aspect of the modem
Web User Interface	The satellite modem supports a built-in web server that serves web pages to any web browser
MissionSpan™ NMS	As part of the ground station control network, it allows all modems (onboard & on the ground) to be monitored & controlled through a single application

Ethernet Functionality

- Functions as Layer 2 switch
- DVB-S2/S2X GSE packet enscapsulation
- DiffServ DSCP-class based traffic shaping
- Optional AES-256 packet encryption (export controlled)

General Description

- High-performance, low-SWaP modem suitable for airborne applications up to and including the stratosphere
- Powerful 1.5GHz multi-core processing engine
- Optimised for low power operation; various power saving modes



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

Feature		Options	Description
Hardware Platform	Select 1 option	A (High Performance)	Provides radiation tolerance, video compression & 128GB mass storage; meets all other specifications provided the relevant feature options are selected
		B (Low Cost)	No radiation hardening, no video compression & only 32GB mass storage; meets all other specifications provided the relevant feature options are selected
RF	Select 1 option	None	Provides a high-speed digital I/O interface to the user's own RF solution
		VHF/UHF/IF/L/S/C-band	All frequencies between 75MHz & 6GHz are supported through a plug-in mezzanine card (requires external power amplification); other frequencies (X, Ku, Ka, etc. require external up/down frequency conversion & amplification)
Data Rate	Select 1 option	100Mbps	Tx & Rx data rates to 100Mbps (50Msps)
		300Mbps	Tx & Rx data rates to 300Mbps (100Msps)
		500Mbps	Tx & Rx data rates to 500Mbps (119Msps)
		1Gbps	Tx & Rx data rates to 1Gbps (119Msps)
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% spectral roll-offs
		DVB-S2X	DVB-S2X QPSK, 8PSK, 8APSK, 16APSK, 32APSK, 64APSK, 128APSK & 256APSK operation per EN 302 307-2. Includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs
ACM		DVB-S2/S2X ACM	Adaptive Coding & Modulation (ACM) mode for use with DVB-S2 & DVB-S2X
Compression		Video Compression	H.264/H.265 (HEVC) hardware image & video compression (included as standard when Hardware Platform A is selected)
Predistortion		Adaptive Tx Predistorter	Predistorts the Tx output in order to compensate for linear & non-linear distortion in the received signal
Enclosure		Clamshell Enclosure	Aluminium; provides 2mm of shielding; weight:: 250gms
Extended Roll-off		Extended Roll-off	Extends carrier roll-offs to include 40%
AES-256 Encryption		AES-256	Encapsulates all inter-modem TCP/IP packets within a secure VPN tunnel using AES-256 encryption (this feature is subject to export control)

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