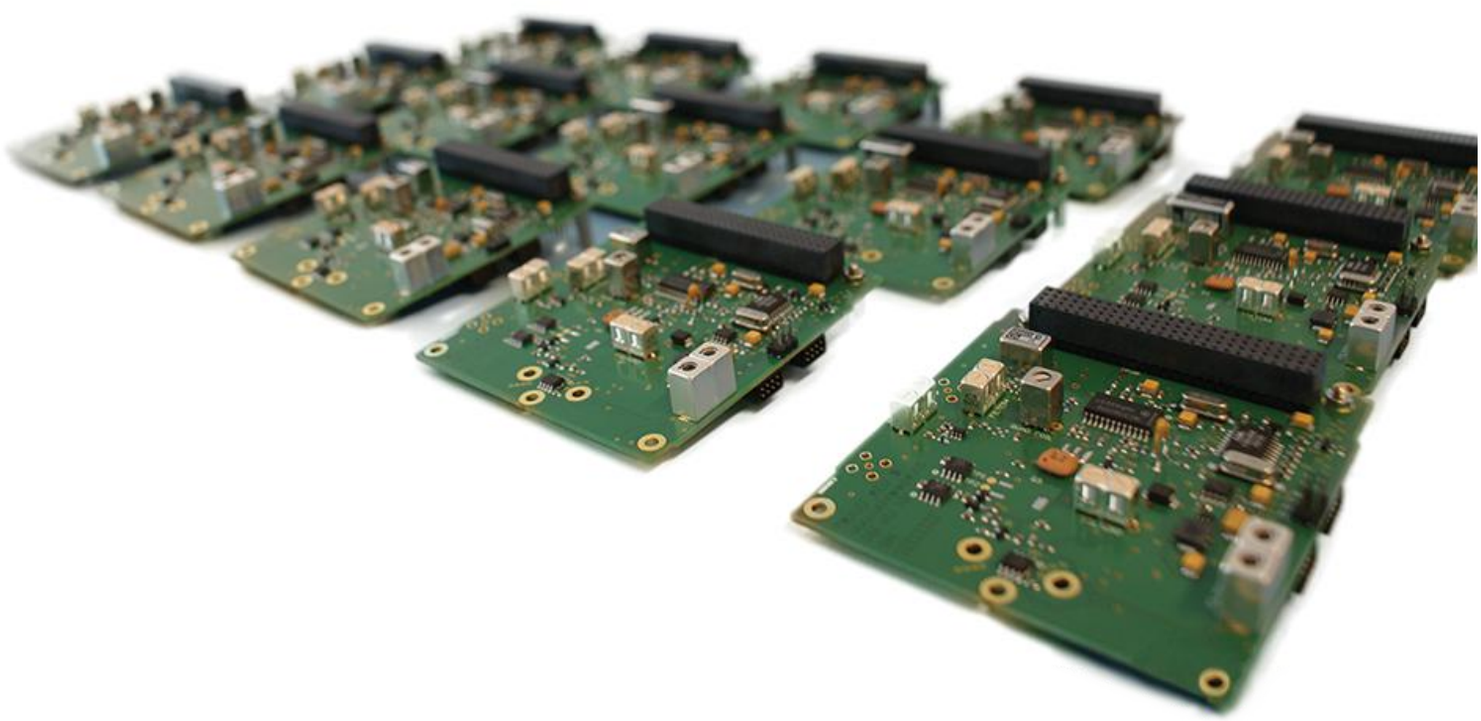
Communication Systems

Flight heritage since 2012



VHF
UHF

S-band

Custom
solutions
on request

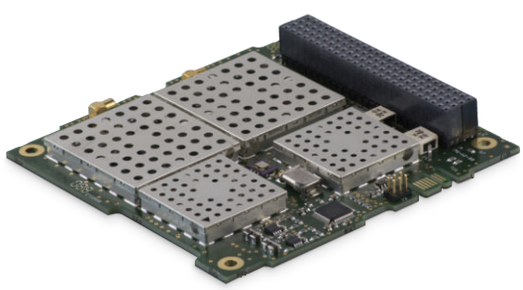
www.isispace.nl

UHF and VHF Band

DESCRIPTION

The ISIS UHF/VHF transceivers are full duplex communication systems for CubeSat TT&C applications. The two variants of this product are TRXUV (UHF uplink/VHF downlink) and TRXVU (VHF uplink/UHF downlink). Both radios can operate in commercial and amateur bands of the VHF/UHF frequency spectrum and are low power, low mass, and highly configurable, offering the flexibility of changing data rates and frequencies in flight. These radios are tailored for CubeSat missions and cross compatible with other subsystems such as on-board computers and antenna systems. Both the TRXUV and the TRXVU are flight proven since 2012 and 2016 respectively, with over 75 units delivered.

UHF uplink/VHF downlink



VHF uplink/UHF downlink

	UHF uplink/VHF downlink	VHF uplink/UHF downlink
FLIGHT HERITAGE	Since 2012	Since 2016
FEATURES		
	Full duplex communication	Full duplex communication
	Data rate re-configurable in-flight	Data rate re-configurable in-flight
	Receiver loopback mode	FM transponder mode available
	Safety watchdog	Safety watchdog
	Low power consumption	Low power consumption
	Single PCB radio	Single PCB radio
	Single board Telemetry, Telecommand and Beacon capabilities	Single board Telemetry, Telecommand and Beacon capabilities
		Frequency re-configuration in-flight
PROPERTIES		
Dimensions:	90 x 96 x 15 mm	90 x 96 x 15 mm
Mass:	85g	75g
Supply voltage range:	6.5 – 12.5 V DC	6.5 – 20 V DC
Power consumption:	0.2W (receiver only)	0.48W (receiver only)
	1.7 W (transmitter on)	4 W (transmitter on)
Operating temperature:	-20 to +60 deg C	-20 to +60 deg C
RF interfaces:	MMCX (50 ohm)	MMCX (50 ohm)
Data interfaces:	I²C	I²C

PERFORMANCE

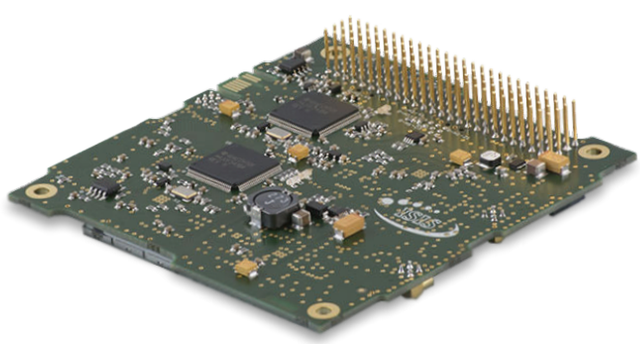
	UHF uplink/VHF downlink	VHF uplink/UHF downlink
TRANSMITTER		
Frequency range:	145.8 – 146 MHz (amateur-satellite VHF allocation). Other ranges available on request	435 – 438 MHz (amateur-satellite UHF allocation). Other ranges available on request
Transmit power:	23 dBm	27 dBm
Modulation options:	Binary Phase Shift Keying (BPSK)	Binary Phase Shift Keying (BPSK) with G3RUH scrambling
		Gaussian Minimum Shift Keying (GMSK) with G3RUH scrambling
Data rate selectable:	1200, 2400, 4800 and 9600 bps	1200, 2400, 4800 and 9600 bps
Data link layer protocol:	AX.25	AX.25 or HDLC
RECEIVER		
Frequency range:	435 MHz – 438 MHz	145.8 MHz – 146 MHz
Modulation:	Audio Frequency Shift Keying (AFSK)	Audio Frequency Shift Keying (AFSK)
		Gaussian Minimum Shift Keying (GMSK) with G3RUH scrambling
		Frequency Shift Keying (FSK) with G3RUH scrambling
Data rate:	1200 bps	1200, 9600 bps
Sensitivity:	-104 dBm Sensitivity for BER 1E-5	-104 dBm Sensitivity for BER 1E-5
Data link layer protocol:	AX.25	AX.25

CONFIGURATION

Receiver/Transmitter operating frequency	Receiver/Transmitter operating frequency
Downlink data rate	Downlink data rate
Custom beacon message (AX.25 or CW)	Custom beacon message (AX.25)
CSKB connector type and location	CSKB connector type and location
RF connector position and orientation	RF connector position and orientation
I²C watchdog implementation	I²C watchdog implementation

QUALIFICATION TESTING

Test	QT	AT
Functional	✓	✓
Vibration	✓	-
Mechanical Shock	✓	-
Thermal Cycling	✓	✓
Thermal Vacuum	✓	-
Total Ionizing Dose	✓	-



ISIS high data rate S-band transmitter

DESCRIPTION

The ISIS High Data-rate S-band Transmitter is a CubeSat compatible Transmitter designed to meet the needs of high data-rate downlinks of up to 3.4 Mbps (information bit-rate at CCSDS transfer frame level). The transmitter can be used for both TT&C or PDT downlinks. The S-band transmitter is as robust as it is flexible, implementing CCSDS as datalink layer protocol and allowing in-flight configuration of data-rate and RF output power.

FEATURES

- Operates in EESS/SRS/SOS allocation band
- CCSDS compliant
- Data-rate and RF power re-configurable in-flight.
- SFCG Spectral mask compliant (Recommendation: SFCG-21-2R4)
- Safety watchdog.
- Adjustable RF output power from 27 to 33dBm (0.5dB steps)
- RF output tolerant to full mismatch
- RF power control loop to maintain constant RF power over the temperature range and Frequency band.

CONFIGURATION

- Transmitter operating frequency
- Downlink data rate
- RF output power
- RF connector mounting position and orientation
- I²C and CAN watchdog implementation

PERFORMANCE

Frequency range:	2200-2290 MHz (EESS/SRS/SOS allocations)
Transmit power:	27 to 33 dBm
Modulation options:	Offset Quadrature Phase-shift Keying (OQPSK)
Pulse shaping:	Square Root Raised Cosine, Roll-off 0.5, 0.35 (other options on request)
Channel coding:	Concatenated Reed Solomon and Convolutional coding [C(7, ½) and RS (255, 223)]
Data rate selectable:	3.4 Mbps (½ , ¼ and 1/8)
Data link layer protocol:	CCSDS

PROPERTIES

Transmit power:	27 to 33dBm
Dimensions:	90 x 96 x 33 mm
Mass:	<300g
Supply voltage range:	6,5 – 20 V DC
Power consumption:	9,2W
Operating temperature:	-40 to +60 deg C
Interfaces:	
Data:	o Housekeeping: I²C, CAN (optional)
	o Payload: SPI over LVDS (CCSDS transfer frames)
Power:	6-20V DC
RF output:	SMA (50 ohm)

QUALIFICATION TESTING

Test	QT	AT
Functional	✓	✓
Vibration	✓	-
Mechanical Shock	✓	-
Thermal Cycling	✓	✓
Thermal Vacuum	✓	-
Total Ionizing Dose	✓	-

Coming in 2018

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