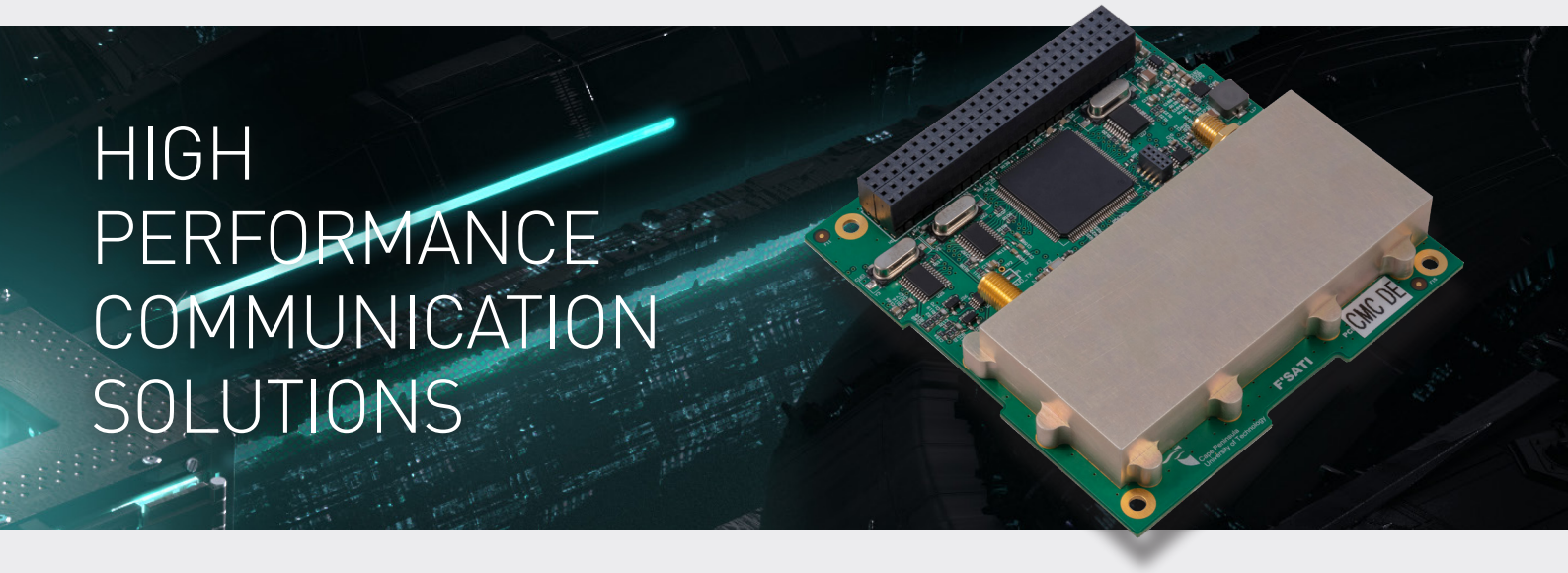
AAC CLYDE SPACE

Cape Peninsula University of Technology

Communications

PULSAR-TMTC



The PULSAR-TMTC is a compact telemetry and command radio designed for nanosatellite missions, compatible with the CubeSat standard with a CubeSat kit PC/104 form factor.

The transceivers are ideal for space missions where a low data–rate uplink and downlink is required as well as a robust lower data-rate back-up radio for a higher data-rate radio. The AX.25 protocol implemented is popular among amateur radio enthusiasts. A transparent downlink mode is available with a CCSDS compatible ½ rate convolutional encoder.

PULSAR-TMTC implements 9600 bps GMSK and 1200 bps AFSK and operates in full-duplex (VHF/UHF) or half-duplex (UHF) mode. A combination of AFSK and GMSK is configurable for transmit and receive. These modes are selected as an I2C command and the default mode will be selected if a reset occurs. The default mode can be requested at time of production. The transceiver offers transmit and receive frequencies covering both amateur and commercial bands.

FREQUENCIES

With VHF uplink, UHF downlink (or UHF uplink & downlink) serving both commercial and amateur frequencies. Full-duplex (or half-duplex for UHF uplink/downlink).

PERFORMANCE

With 9600 bps GMSK and 1200 bps AFSK data rates. Transmit output power adjustable from 27 to 33 dBm. Implements AX.25 protocol encoding/decoding with transparent mode with optional convolutional encoder. With DTMF backdoor, low-power Flash-based FPGA.

RELIABILITY

Featuring a beacon and DTMF backdoor, the PULSAR-TMTC offers unparalleled reliability in flight.

TECHNICAL SPECIFICATIONS

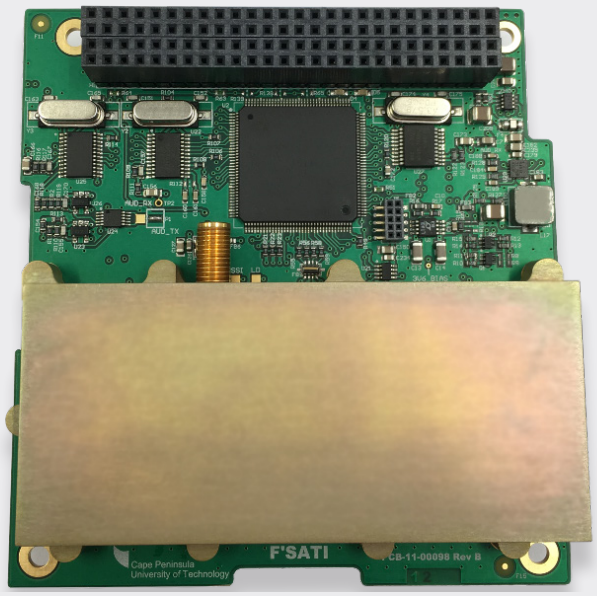
General	
Operating Temperature	-25°C to +61°C
Mass	< 100 g
Voltage	3.3 V, 5 V
Frequency	
VHF	140 – 150 MHz
UHF	400 – 420 MHz (commercial) 430 – 440 MHz (amateur)
Transmit	
DC Power	3– 5.5 W (27–33 dBm)
RF Power	27– 33 dBm (3 dB steps)
Channel Spacing	25 kHz
Spurious Responses	< -65 dBc
Frequency Deviation	3 kHz (FM)
Frequency Stability	± 2.5 ppm
Receive	
DC Power	160 (VUTRX) <240 (UTRX) mW
Sensitivity	-117 (VUTRX) -115 dB (UTRX) dBm for 12 dB SINAD
Channel Spacing	12.5 kHz
Noise Figure	<1.5 (VUTRX) <2.5 (UTRX) dB
Dynamic Range	-117 (VUTRX) -115 (UTRX) to -70 dBm
Frequency Stability	± 2.5 ppm

The AFSK does not operate in full-duplex mode exclusively. PULSAR-TMTC offer transmit frequencies in the amateur and commercial bands.

Performance	
Processing	• Low-power Flash based FPGA • CRC-16-CCITT (AX.25) • Scrambling (GMSK) • Transparent downlink mode • ½ Rate CCSDS convolutional encoding (k=7) available in transparent mode
Interfaces	• I2C Bus – 400 kHz (telemetry, command and user data) • Receive Ready output line • Transmit Ready output line
Modulation & Protocol	• GMSK (9600 baud) • AFSK (1200 baud) • AX.25 Protocol • Transparent mode

Dimensions	
Length	96 mm
Width	90 mm
Height*	16.51 mm

*Height from top of enclosure to lowest component on bottom.



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