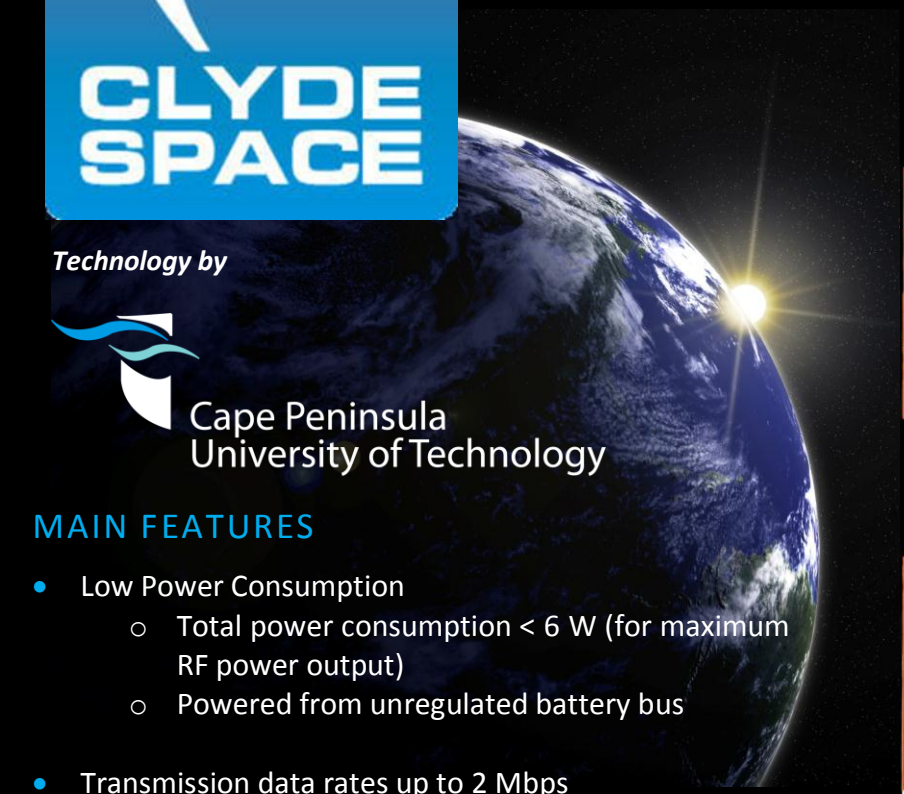
CubeSat S-Band TX and Patch Antenna



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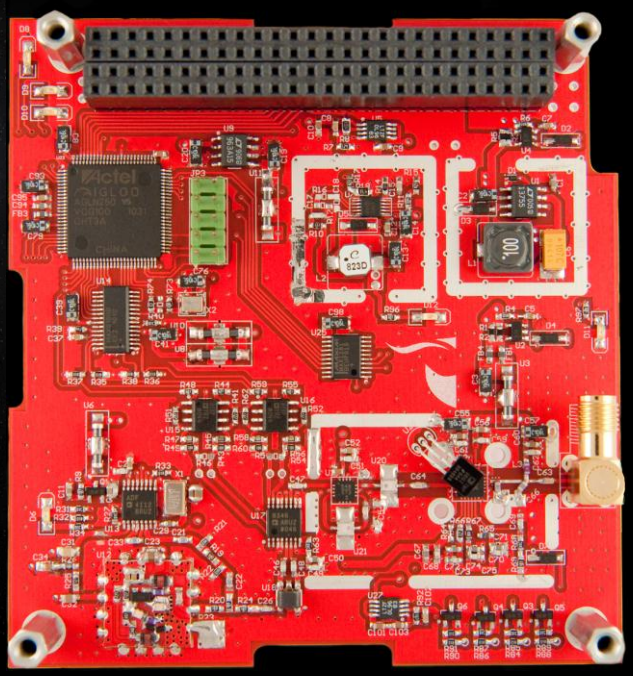
Complete high data-rate S-Band TX; up to 2 Mbps



MAIN FEATURES

- Low Power Consumption
  - Total power consumption < 6 W (for maximum RF power output)
  - Powered from unregulated battery bus
- Transmission data rates up to 2 Mbps
  - With ½, ¼ and ⅛ rate modes
  - Lower data rates as a hardware option
- Support for amateur bands (2.4 - 2.483 GHz) and commercial bands (2.2 - 2.3 GHz)
  - Selected via hardware option
  - User programmable within band
- Industry standard encoding and modulation techniques
  - Compatible with low-cost commercial demodulators
  - Based on IntelSAT and CCSDS standards
  - QPSK or OQPSK
- Simple digital interfaces
  - I2C interface for Control / Telemetry
  - SPI interface for user data
- Transmit output power adjustable from 21 dB to 30 dB
  - Adjustable in 3 dB steps

CubeSat STX Overview

The STX is a compact S-Band Transmitter designed for CubeSat missions. It is compatible with the CubeSat standard, with a CubeSat Kit PC104 form factor. The STX implements QPSK modulation with transmission data rates of up to 2 Mbps.

The STX is ideal for space missions where a high data–rate downlink is needed. The STX uses an open network encoding scheme based on the IntelSAT IESS-308 specification which makes this product compatible with low-cost commercial receivers.

A nadir facing S-Band patch antenna can also be incorporated into the CubeSat design. Its small size, low profile, rugged design and high directionality make it an excellent addition to the system.

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Enabling advanced CubeSat applications

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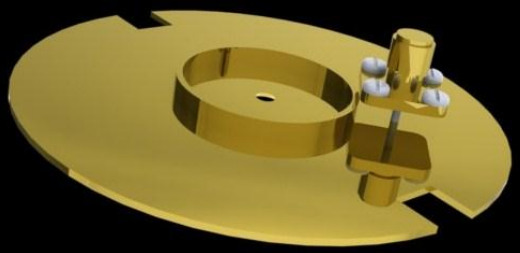
S-Band Configuration

The STX has various modes of operation:
In configuration mode the carrier frequency, power level, data rate and modulation scheme can be selected.
In synchronisation mode synchronisation bytes are sent in order for the ground station receiver to achieve lock. The STX will accept data from the SPI bus and until the FIFO is full.
In data mode data from the FIFO is transmitted to the ground station. Data is written to the FIFO at a suitable rate to prevent buffer under-runs.
The STX will automatically switch off after 15 minutes if not commanded to switch off via I2C.

S-Band Patch Antenna

The S-Band patch antenna can easily be mounted on the nadir facing side of the CubeSat. A wide beamwidth ensures satellite communication from low elevation angles without the need to point the satellite. The antenna exhibits a good input reflection coefficient which allows for efficient radiation of up to 2 W of RF power.



PERFORMANCE

- Processing
  - Low Power Igloo Nano FPGA
  - 24 MHz Clock
- Interfaces
  - Low Speed I2C Bus – 400 kHz (telemetry and control)
  - High Speed SPI Bus – 1 MHz (payload data)
  - High Frequency SMA connector
- Modulation
  - QPSK or OQPSK
  - IntelSAT IESS-308

SPECIFICATIONS

Temperature	-25°C to 85°C (Industrial)
Power	6 W
Mass	< 80 g
Dimensions	96 mm x 90 mm x 16 mm
Voltage	7.4 – 12 V
RF Section	
Frequency	2.4-2.483 GHz or 2.2-2.3 GHz
RF Power	1 Watt (30 dBm)
Channel Spacing	500 kHz
TX SNR	20 dB
Spurious Responce	< -30 dBc

SPECIFICATIONS

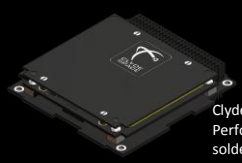
Temperature	-25°C to 85°C (Industrial)
Mass	50 g
Dimensions	76 mm Diameter
Standoff Height	3.8 mm
Frequency Range	2.4-2.483 GHz or 2.2-2.3 GHz
RF Power	2 W (TBC)
Gain	8 dBi
Beamwidth	60°
S_{11}	< -10 dB
Polarisation	Left or Right Hand Circular (hardware selectable)

STX AND PATCH ANTENNA IS SUPPLIED WITH:

- STX Flight Board and Patch antenna with suitable mounting connectors
- User manual
- Hardware manual
- Patch antenna mounting drawings

DESIGN, ASSEMBLY, INTEGRATION AND TEST WITH CLYDE SPACE

To ensure ease of integration with your satellite and mission, Clyde Space provides full electrical and mechanical interface details. Every one of our off-the-shelf satellite subsystems is supported with a detailed 3D model (in .step format) and a detailed user manual. These are available for download from our website http://www.clyde-space.com.



Clyde Space is ISO9001:2008 certified
Perform and inspect conventional and surface-mount solder assembly, repair and modification operations in conformance with;
ECSS-Q-ST-70-08, ECSS-Q-ST-70-28 & ECSS-Q-ST-70-38

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