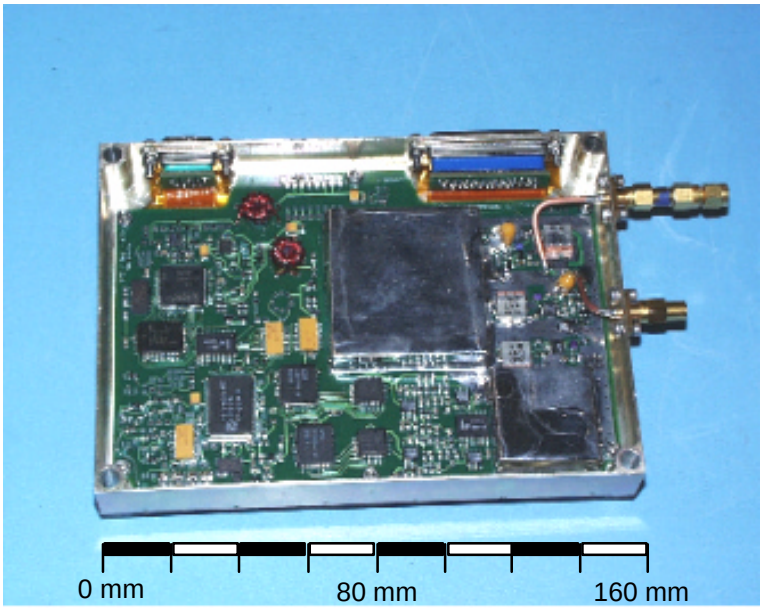
SSTL S-Band Transmitter Module

The S-band transmitter module is a miniature module suitable for all classes of satellite missions. It provides a low power output, can be configured for a wide range of data rates and supports BPSK and QPSK modulation schemes.

SSTL's S-Band transmitter is designed for a variety of low-cost nanosatellite, microsatellite and enhanced microsatellite applications. The S-band transmitter is completely reusable for any mission, as it can be build-time configured to implement varying amounts of electronic options. Various inputs options are possible including LVDS and TTL, the fixed RF frequency can be selected from either the commercial band (2.2 - 2.3 GHz) or the amateur band (2.4 - 2.45 GHz), and two data rates cab be selected within the 9.6 kbps - 8 Mbps range.



Features:

- Highly miniaturised
- Low power
- Serial TT&C interface based on CAN (ISO-11898, ISO11519-1).
- Very good spectral purity using miniature, low-loss bandpass filters, and baseband analogue anti-alias filters.
- Baseband Nyquist bit shaping with root-raised-cosine spectral distribution (for optimal noise performance using matched filtering).
- Data Processing and logical interfacing implemented in Field Programmable Gate Array (FPGA).
- NRZ-L to NRZ-M Differential encoder and ½ rate, k=7 Convolutional encoder are both implemented in the FPGA.

Specifications

- Frequency is pre-set in range 2.2 - 2.3 & 2.4 - 2.4 5GHz
- BPSK / QPSK modulation schemes selectable via the TT&C
- Data rates from 9.6 kbps to 8 Mbps, choice of 2 selectable over the TT&C
- CCITT V.35 & Intelsat scramblers switchable via the TT&C
- Differential and convolutional Viterbi encoding employed
- RF output power 150 mW (rms)
- Alpha roll-off value of 0.6

Applications

- NanoSatellites, deep space or volume limited missions
- Space Operations band low rate and high rate TT&C downlink.
- Amateur band low rate and high rate TT&C downlink
- Amateur band low rate and high rate Store and Forward downlink
- X-band downlinks in conjunction with an upconverter

Qualification

- First flown on the SNAP-1 nanosatellite, launched 6-2000
- Baselined for BiltenSat, RapidEye, TOPSAT, and DMC constellation

Physical Characteristics

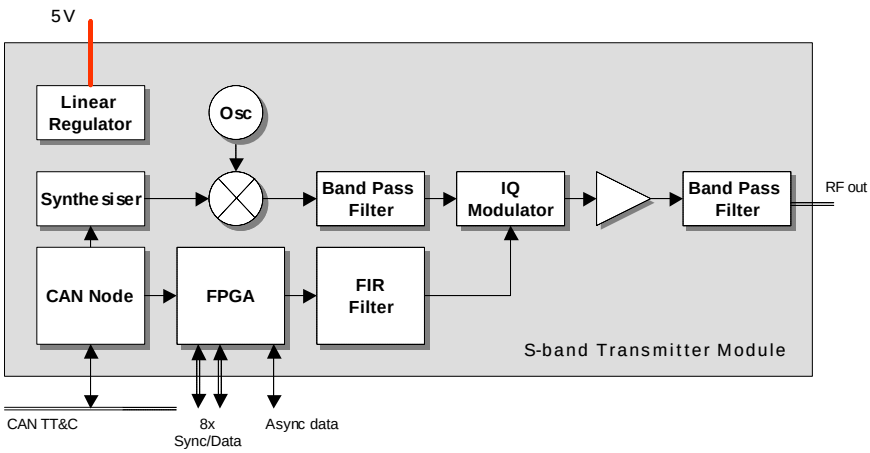
- Dimensions: 160 x 120 x 20 mm
- Mass: 500 g
- Connector Interface:
  - 15-pin D-type (Power/CAN)
  - 44-pin D-type (Data/Clock)
  - 3.5mm SMA (RF)

Power Supply

- Power Supply: 5 V, 680 mA

SSTL S-Band Transmitter Module

An FPGA forms the heart of the transmitter, and performs functions that would need a much larger, non-reusable PCB if implemented using discrete logic ICs. It also has the advantage that it is re-programmable while in circuit.



S-band Transmitter Module Block Diagram

The data and clock inputs feed in from either an On-Board-Computer or Receiver. They can employ LVDS or TTL inputs. Multiplexers internal to the FPGA allow interfacing with up to 8 data sources and clocks.

Other SSTL Products

- **Spaceborne communications systems**: antennas, receivers, transmitters and transceivers in UHF/VHF, L-band, S-band and X-band
- **Ground segment communications**: turn-key ground stations and mission control centres
- **Sub-systems** for C&DH, Power, Comms, ADCS and ODCS sub-systems and various Payloads
- **Space missions**: From platform provision to turn-key commercial and science space missions from LEO to GEO, in the 5 to 500 kg range
- **Know-how transfer** programmes, including academic and industrial training of entire teams in real mission environments
- **Space Consultancy** for Insurance, Investment and Industrial sectors

affordable access to space

Environmental (Acceptance Level)

- Random Vibration: 15g
- Thermal: -20ºC to +50ºC

Options

- Frequency: Fixed frequency within the 2.2 - 2.3 GHz and 2.4 2.45 GHz bands
- Data Rates between 9.6 kbps and 20 Mbps
- Power Amplifier 4W RF (linear) or custom modules available

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