CubeSat VHF / UHF Transceiver – CMC & CMCC

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
  - I^2C 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

MAIN FEATURES

- VHF uplink, UHF downlink
- 140 – 150 MHz receive frequency covering the amateur bands
- 400 – 420 MHz & 430 – 440 MHz transmit frequency covering commercial and amateur bands
- Transmit output power adjustable from 27 to 33 dBm
  - Adjustable in 3 dB steps
- 9600 bps GMSK, and 1200 bps AFSK data rates
  - Full-duplex in 9k6 GMSK
- Implements AX.25 protocol encoding/decoding
- Transparent mode with optional convolutional encoder
- DTMF backdoor
- Low-power Flash-based FPGA
- Simple digital interface
  - I^2C interface for Command, Telemetry and user Data
- Inactivity beacon

CubeSat VHF/UHF Transceiver Overview

The CMC and CMCC are compact telemetry and command radio's designed for CubeSat missions. They are compatible with the CubeSat standard with a CubeSat Kit PC/104 form factor. The transceivers implement full-duplex GMSK uplink and downlink communications. A combination of AFSK and GMSK provides full-duplex communications with data rates of 1200 and 9600 bps respectively. The AFSK does not operate in full-duplex mode exclusively. The CMC and CMCC offer transmit frequencies in the amateur and commercial bands respectively.

The transceivers are ideal for space missions where a low data–rate uplink and downlink is required. The transceivers can also be used 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.

SPECIFICATIONS

Temperature	-25°C to 61°C
Mass	< 100 g
Dimensions	96 mm x 90 mm
Voltage	3.3 V, 5 V
Transmit:	
DC Power	3 – 7 W (27 – 33 dBm)
Frequency	400 – 420 MHz (CMCC) 430 – 440 MHz (CMC)
RF Power	27 – 33 dBm (3 dB steps)
Channel Spacing	25 kHz
Spurious Response	< -65 dBc
Frequency Deviation	3 kHz (FM)
Frequency Stability	± 2.5 ppm
Receive:	
DC Power	< 220 mW
Frequency	140 – 150 MHz
Sensitivity	-117 dBm for 12 dB SINAD
Channel Spacing	12.5 kHz
Noise Figure	< 1.5 dB
Spurious Responses	< -65 dB
Dynamic Range	-117 dBm to -70 dBm
Frequency Stability	± 2.5 ppm

SUPPLIED WITH:

- Flight Board
- User manual
- STEP Model

PRODUCTION BY:

DISTRIBUTION BY:

Available from www.clyde.space

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