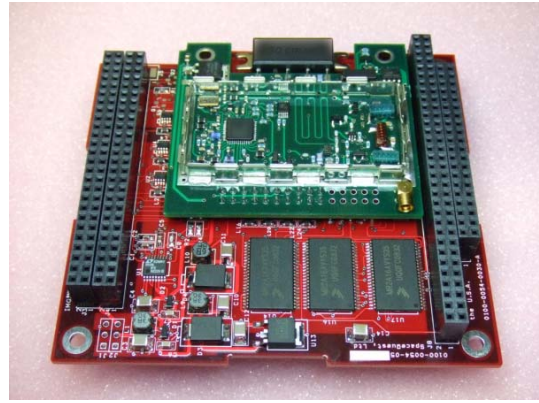


# CTR-450

## CubeSat Transceiver



The CTR-400 is a complete, customizable CubeSat communications system. With build-time options such as AES encryption, telemetry relay, and alarms you can tailor our transceiver to your mission

### General Specifications:

<b>Input Voltage:</b>	7.5V (+/- 1V), 9.6V (+/- 1.5V) or 12V (+/- 2V)
<b>Power Consumption:</b>	<b>Sleep:</b> 20 mW in Sleep Mode <b>RX:</b> 100 mW in Receive mode <b>TX:</b> 4 to 12 W 40% efficiency class A/B amplifier
<b>Connectors:</b>	Standard CubeSat bus 104-pin header SMB Female or RG 316 pigtail
<b>Operating Temperature:</b>	-20°C to +60°C
<b>Vibration:</b>	Survives 15 Grms (20 – 2000 Hz)
<b>Size:</b>	Cubesat form factor
<b>Mass:</b>	~200 grams

### FM Radio Specifications:

<b>Sensitivity:</b>	<b>9600 bps:</b> -115 dB, zero errors <b>154 Kbps:</b> -100 dBm, zero errors
<b>Operating Frequency Band:</b>	370 – 470 MHz in 20 MHz segment (other bands possible)
<b>Operating Frequency:</b>	Fixed Frequency and/or Frequency agility of 300 Hz over the entire band
<b>Output Power:</b>	2, 3, 4 or 5 Watts fixed steps
<b>Noise Figure:</b>	< 2 dB with custom strip line filters
<b>Dynamic Range:</b>	120 dB (-120 dBm to 0 dBm reception)
<b>Max Non-Destructive RF Input:</b>	+5 dBm (+10 dBm for short duration)
<b>Carrier Stability:</b>	2 ppm from -20°C to +60°C

<b>Impedance:</b>	50 Ohm Input and Output
<b>VSWR:</b>	20:1 at all phase angles
<b>Carrier Attack and Delay:</b>	< 10 ms

<b>Modem/FPGA Specifications:</b>	
<b>Modulation Schemes:</b>	FM, FSK, GMSK, GFSK
<b>Data Rates:</b>	1 to 154 kbps (asymmetrical RX/TX rates possible)
<b>Clock and Data Output Level:</b>	3.3 V via UART
<b>Discrete I/O Outputs:</b>	Up to 24 programmable I/O lines (3.3V)
<b>Features:</b>	
<b>Telemetry and Logic:</b>	10 channels ADC 2 channels DAC Up to 24 programmable I/O lines (3.3V)
<b>Data Interface:</b>	Serial UART (3.3V) to host satellite or payload
<b>Sleep Modes:</b>	Processor OFF, Radio LISTENING Processor OFF, Radio OFF
<b>RF Channels and Data Rates:</b>	Fixed or optional user selection of up to 16 combinations
<b>Linear Digital RSSI:</b>	-110 dBm to -50 dBm
<b>AGC and AFC:</b>	Built-in AFC (for automatic RX Doppler control) Built-in Automatic Gain Control
<b>RF and Heat Shield:</b>	Completely shielded multilayer RF board Integrated heat sink
<b>Default Channel Selection:</b>	Ground station can change the default channel
<b>Communications Modes:</b>	<ol style="list-style-type: none"> <li><b>Managed Mode:</b> Processor handles all communications to and from the ground. Flow control lets payload know when to transmit data.</li> <li><b>Store and Forward:</b> Processor buffers all data and transmits when contacted by a ground station.</li> <li><b>Wire Mode:</b> payload uses the RTS to cue the modem when it wishes to transmit. CTS cues the payload when the transmitter is on.</li> </ol>

Specifications subject to change without notice.

# Functional Block Diagram CTR-450 CubeSat Transceiver

