

Satellite Programmable Frequency Transceiver

An Inexpensive Satellite Uplink/Downlink Radio with Programmable Channels and Functionality

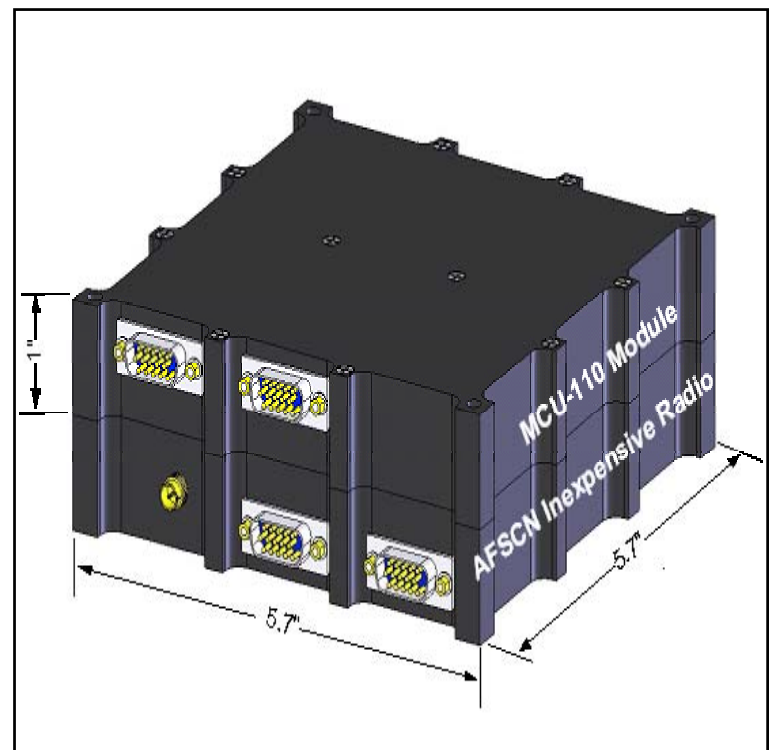
The **Satellite Programmable Frequency Transceiver (SPFT)** enables the user to change channel frequency assignments for both uplink and downlink prior to launch, or (optionally) even during mission via Command & Telemetry interface. Designed for harsh space environments, it can be used in L-band or Unified S-band (USB) for uplink, and S-band for downlink. SPFT has a customizable front-end to fit a multitude of spacecraft antenna configurations, and non-standard frequency bands. It has a flexible digital firmware/software architecture capable of supporting a variety of services. The SPFT features RS422 and SPA (plug & play) Command & Telemetry interfaces to spacecraft computer. Finally, the SPFT is easily interfaced to the NSA certified MCU-110 encryption module enabling secure communications. The SPFT features all this in a low cost implementation.

Transmitter

Freq range: 2200 - 2300 MHz (S-band)
 Data rate: 250 bps - 2 Mbps
 RF out power: 5 watts
 Convolutional encoding optional: (K=7, 1/2 bit per symbol)
 Modulation: BPSK, QPSK (optional)

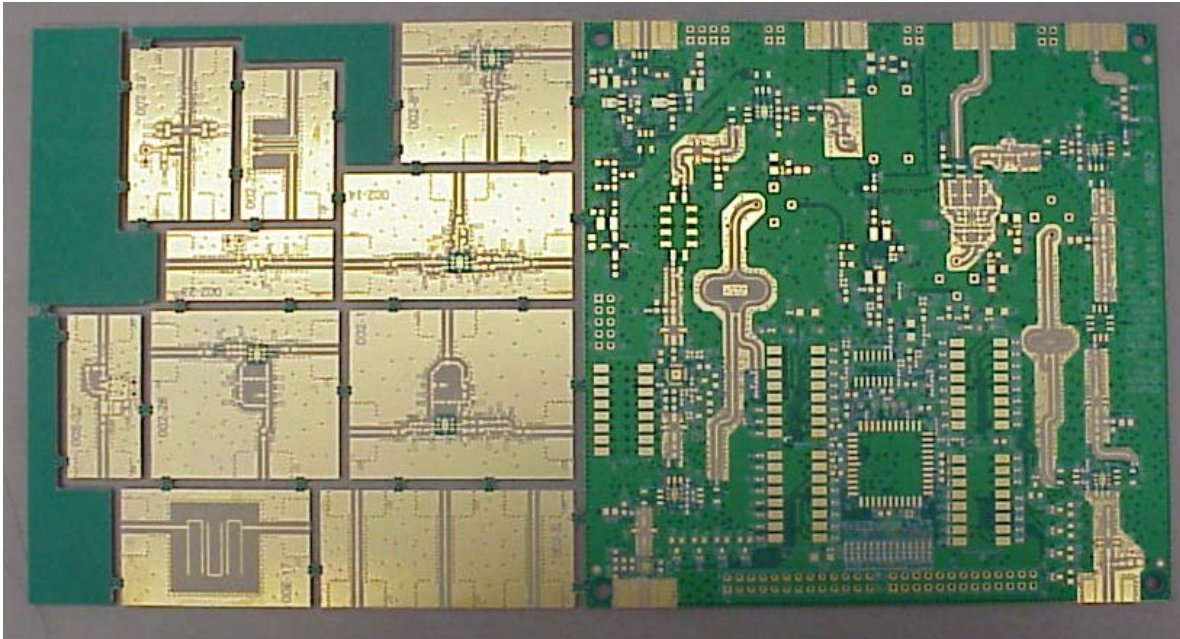
Receiver

Freq range: 1760 - 2120 MHz
 Data rate: 100 bps - 100 kbps
 Sensitivity: -103 dBm (BER=1e-6) at 2 Kbps
 Dynamic range: 45 dB
 Modulation: BPSK, QPSK (optional)



SPFT bare circuit Board

SPFT board is located on the right side of the picture. On the left side are several miscellaneous RF components used on the SPFT (i.e. some are front end filters and some are test fixtures for components on the main board).



PSI's General RF/Microwave Capabilities:

Test Equipment: Spectrum Analyzer
 Signal Generator
 Vector Network Analyzer
 High Speed Oscilloscope
 Function Generator
 PPG/BERT test set
 Precision Power Supply

Design Software: GENESYS
 Empower
 OrCAD Capture CIS
 OrCAD Pspice
 Mathcad
 Matlab

Design Experience: Satcom
 RF/Optical Radar
 UHF Radio systems
 WiFi (802.11a/b/g)
 Lasercomm (OC192 &
 custom)
 RF/MW Components

Rangefinder card (RF part of an RF/optical Radar)
 Part of PSI's Laser Metrology System (LMS)

