

EXHIBIT 1

S-Band Tx: A pre-modulation filter limits the 99% power bandwidth to 15 MHz.

Ku Band Tx: A bandpass post-modulation filter limits the 99% power bandwidth to 120 MHz.

EXHIBIT 2

1.0 A

1.1 Description

CMC Electronics Cincinnati proposes to conduct testing of a TDRSS compatible transmitter(s). The equipment to be used is based on CMC Model T-715 TDRSS compatible Transmitter. Two separate transmitters will be tested for waveform compatibility with TDRSS. One transmitter operates at S band and the other transmitter operates at Ku Band. The function of the transmitter is to transmit simulated telemetry data across the NASA Tracking and Data Relay Satellite System (TDRSS).

1.2 Modulation Formats

The S-band transmitter supports data in either BPSK or QPSK formats at rates up to 3 MBPS.

The Ku Band transmitter supports data in a QPSK format at rates up to 40 Msps.

1.3 Frequency Generation /Modulation

Both the S-Band Tx(s) and the Ku-Band Tx use a low phase noise temperature compensated crystal oscillator for the frequency source.

1.4 Power Amplifier

The Solid State Power Amplifier (SSPA) employs high efficiency GaAs FET power devices to generate 10 Watts (nominal) RF Power. Design of the SSPA minimizes compression of the shaped signals over all environments.

2.0 B

2.1 Objective

The objective is to verify link margin analysis and waveform compatibility over the TDRSS link with encoded data.

3.0 C

3.1 Value

These transmitters are new transmitters for CMC Electronics. The link testing is a risk reduction activity that provides evidence of compatibility prior to integration on a satellite.