KU/KA/X-BAND HIGH RATE TRANSMITTER (HRT150)

High-performance, TDRSS or direct-to-Earth data delivery

Features

- High-Rate, 150 Mbps SQPSK Modulation for Space Applications
- Compatible with TDRSS KuSAR Ground Station Equipment
- Ku-Band Frequency: 15.0034 GHz
- Optional Ka- and X-Band Output Frequencies Support TDRSS or Direct-to-Earth Applications
- Designed for Moving Large Amounts of Data Efficiently
- High Reliability, Space Qualified
- Forward Error Correcting Encoders Included
  - 8-parallel rate-1/2 Convolutional
  - Reed-Solomon
- Direct X-Band Modulation for Small Size and Weight
- Internal DRO/TCXO Frequency Source
- Radiation and SEU Tolerant
- Mass Less than 5 Pounds
- Envelope Less than 169 Cubic Inches
- Qualified over -34 to +71°C
- Internal High Efficiency Power Converter Accepts 22 to 34 VDC Input Range
- Internal 2 W Power Amplifier for Driving Phased-Array Antenna or High-Power Amplifier
  - Optional Higher Power Available

General Dynamics' HRT150 Ku-Band Transmitter provides a solution for delivering large amounts of data from a spacecraft in one small package. Standard operation is Tracking and Data Relay Satellite System (TDRSS) Ku-Band, with options available for X-Band and Ka-Band. The transmitter is compatible with NASA's TDRSS KuSAR high-rate return link receiving systems.

The transmitter design makes use of years of General Dynamics research in high-rate bandwidth-efficient modulation and the latest FPGA, ASIC and GaAs MMIC technology. These strengths, combined with space-proven designs from our line of transponders, results in a high-performance and reliable unit with very small size and mass.

The internal frequency source is a DRO loop derived from a TCXO, which develops an extremely stable, very low phase-noise carrier source. The transmitter includes an integral 2 Watt Ku-Band solid state power amplifier to provide needed drive for antennas and high power stages.

High Rate Transmitter (HRT150)

Performance Characteristics

RF

- Output Frequencies: Ku-Band: 15.0034 GHz

- Optional X-Band and Ka-Band capability

- Output Power: 2 Watts minimum

- Modulation: SQPSK

- Data Rate:

    - 150 Mbps R-1/2 convolutional code only

    - 125 Mbps R-1/2 convolutional plus Reed-Solomon coded

Data Encoding/Formatting

- Convolutional Code: 8-parallel inner code compatible with NASA TDRSS, SNUG 450, DG2 mode, alternating I/Q, rate-1/2, k=7

- Reed-Solomon Code: (255/223) Reed-Solomon outer code with interleave depth I=5. Code can be selected at time of manufacture to any code (255-i/223-i) for any integer i=0 to 222, and to any interleave depth I = 1 to 8.

- Framing ASM Word: 1A, CF, FC, 1D hex

- Frame Length: 1115 bytes data, 160 check bytes (frame length can be modified if alternate Reed-Solomon code is chosen)

- Optional Code: Near Earth (8158,7136) Low Density Parity Check (LDPC) Code

- Formatting: Independent NRZ-L to M conversion on I and Q

- Pulse Shaping: Custom analog pre-modulation filtering.

User Interfaces

- Data Inputs: Differential ECL data & clock, SMA-F

- RF Output Connector: SMA-F

- DC Input Connector: 9-pin receptacle, micro miniature-D

- Telemetry Output Connector: 25-pin plug, micro miniature-D

- Telemetry Content: Voltage, forward power, temperature, PLL lock, TX on/off

Input Power

- Operating Voltage: 22 - 34 VDC

- Input Power: 47 W max; 1.2 W standby

General

- Mass: 5 pounds maximum

- Size: 8.0"L x 6.6"W x 3.2"H maximum envelope

- Temperature: -34° C to +71° C (Qualification)
              -24° C to +61° C (Acceptance)

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