µSGLS-100 Transponder

SPACE MICRO

FEATURES

- Low power consumption

- Coherency

- Ranging

- Frequency Agile, Channel can be programmed ~8 weeks prior to delivery.

- Compatible with MCU-110 NSA Type 1 cryptographic unit, KG-237 NSA Type 1 cryptographic unit

- Frequency Stability
  - ±20 ppm standard
  - ±0.3ppm available

- Radiation hardened (TID, SEU, SEL)

- Part level options from Commercial Space to Full Military Class S

Space Micro's expanding RF product line includes SGLS/STDN Transponders/Transceivers, X/Ku/Ka-Band Transmitters and various other custom RF and power amplifier products. These units feature software defined architecture with parts program levels available up to NASA level 1/Military Class S. The µSTDN-100 (STDN Transponder) successfully launched on both the NASA IRIS and LADEE missions and has been recently selected for another deep space mission. Our high data rate µKaTX-300 (Ka-Band Transmitter), is also in production on two different programs.

Space Micro's uSGLS-100 Transponder, very similar to the uSTDN-100 architecturally, provides critical telemetry, tracking and command links between AFSCN ground stations and military satellites. The receiver/detector section detects and locks to the uplink signal, demodulates the telecommand signal, and outputs command data and bit timing. The transmitter section receives data from the C&DH unit, encodes and modulates it on an internal subcarrier or directly on the carrier. Ranging/coherency are standard on the uSGLS-100. The transmitter data rates go up to 5 Mbps.

PHYSICAL CHARACTERISTICS

Dimensions	5" x 5" x 4"
Mass	4.6 lbs (2.1 kg, Transponder Only)
Environmental Conditions	
Radiation	100 krads (Chasis)
Vibration	20 Grms
Pressure	10E-5 Torr to 1 Atmosphere
Temperature	-30°C to + 65°C

TRANSMITTER SECTION

Operating Frequency	2200 — 2300 MHz
Coherent Turnaround Ratio	256/205
Frequency Stability	$\pm$ 20 ppm standard ($\pm$ 0.3 ppm available)
RF Power	2 (min) to 10 (max) Watts
Output Protection	No damage, open or short circuit
Peak Phase Deviation	3 radians max
Telemetry Channel	Normal: 1.024 MHz (512 kbps)
Bandwidth Format Modulation	100Hz-10MHz
Data Interface	RS422
Direct Carrier Modulation	4Msps max
Carrier Suppression	≥ 30 dBc
Subcarrier Modulation	256 kbps max
Subcarrier Frequency	1.024 MHz or 1.7 MHz
Control Inputs	Ranging On/Off
	SCO On/Off
	Encoder On/Off
	Coherent Mode Override
	Transmitter On/Off
Encoding	Non encoded
	Convolutional
	Reed Solomon (K=7, Rate = 1/2)
	NRZ-L to NRS-M convenience
	CCSDS randomization
Control & Status Interface	Serial RS422
Status Outputs	Temperature
	RF Power Out
	Secondary Voltages
	Index set acknowledgement
Power Requirements	
Voltage	+28 $\pm$ 6 VDC
Power Consumption	35 W max at 5W RF power
Reverse Polarity Protection	No damage down to -50 V
Overvoltage	No damage up to 40 VDC
Isolation	1 Mega-Ohm min between power or return to chassis

Specifications Subject to Change Without Notice
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RECEIVER SECTION

Operating Frequency	1760 -1840 MHz
Carrier Tracking Range	$\pm$ 140 kHz
Carrier Acquisition	-125 dBm
Carrier Tracking Threshold	-127 dBm
Noise Figure	3 dB max
Dynamic Range	60 dB min
Max Input Signal	+10 dBm
Spurious Response	>60 dB below desired response with diplexer
Ranging Channel	
Bandwidth	$\leq$ 2.048 MHz
Delay	2.5 µs max
Delay Variation	$\pm$40 ns max with $\pm$5 ns uncertainty
Turnaround Ratio	205/256
Uplink Data Rate	1 kbps, 2 kbps
Bit Error Rate (BER)	<10^{-9}@ -118 dBm at 2000 bits/s, 1.00 radian mod index
Outputs	Data Clock and Demod Lo
Output Interface	Differential RS-422 (other formats optional)
Status Outputs	Serial RS422 on analog Signal Strength Frequency Offset Converter Voltage Receiver Lock CDU Lock
Power Requirements	
Voltage	+28 $\pm$ 6 VDC
Power	6 W max
Reverse Polarity Protection	No damage down to –50 VDC
Overvoltage Protection	No damage up to +40 VDC
Isolation	1 Mega-Ohm min between power or return to chassis