KG-150 (CXS-2000/C)
DUAL-BAND, MULTI-MODE TRANSPONDER

L3's CXS-2000/C is a dual-band, multi-mode, high performance transponder designed for satellite TT&C applications.



NSA CERTIFIED



L3 Telemetry & RF Products (L3 T&RF) CXS-2000/C is a dual-band, multi-mode, high performance transponder designed for satellite TT&C applications. The CXS-2000/C is the high-reliability U.S. Department of Defense (U.S. DoD) standard for programs requiring both SGLS and Unified S-Band (USB)-compatible transponders and provides Telemetry, Tracking and Command (TT&C) between U.S. Air Force satellite control facilities and military satellites.

The CXS-2000/C transponder builds upon L3 T&RF's strong flight heritage and continues the tradition of meeting high-reliability and radiation-hardening mission requirements with more than 100,000 hours of successful on-orbit operation.

The CXS-2000/C is a TRL-9 design, currently in orbit on several successful programs. The CXS-2000/C implements a space-qualified, radiation-hardened FGPA based design to provide a fully configurable architecture while maintaining a reduced mass, power consumption, footprint and improved performance. The CXS-2000/C can be provided either with embedded encryption and decryption, or compatible with external encryption devices such as L3 T&RF's MCU-110B.

The transponder operates directly at L- and S-Band, with ranging, coherency, convolutional encoding, direct modulation, BPSK and subcarrier modulation all offered as standard features. A 1553 interface for commands and telemetry is also available within the same mechanical envelope.

FEATURES

- Dual-band USB/SGLS Transponder
- NSA certified Type 1 design
- Embedded encryption/decryption (optional)
- 1553 interface (optional)
- Multi-mode PM, FSK/AM, BPSK (QPSK optional)
- Flight proven
- High-reliability, radiation-hardened
- 15-year mission life
- Triplexer (optional)

Use of U.S. DoD visual information does not imply or constitute DoD endorsement.

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SPECIFICATIONS

RECEIVER/DEMODULATOR

Receive frequency	1760 to 1840 and 2025 to 2120 MHz
Carrier tracking range	± 100 kHz

CARRIER ACQUISITION

Threshold (with modulation)	SGLS -113 dBm	USB -119 dBm

ACQUISITION TIME

SGLS or USB mode	0.5 s maximum
SGLS & USB mode	2.0 s maximum (Search Mode)
Noise figure	5 dB maximum

RANGING CHANNEL

SGLS/USB

Type	PRN or Tone
Delay	3.5 µsec
Delay variation	± 120 nsec
Turnaround ratio	1:1

COMMAND CHANNEL

Command Channel	SGLS	USB
Modulation types	AM/FSK/PM	BPSK/PM
Modulation index	1.0 radians	1.0 radians
PM Subcarrier frequency	NA	16 kHz
FSK Tone frequencies	65, 76, 95 kHz	NA
Data rate	1 or 2 kbps	1, 2 or 4 kbps
Threshold (10^{-6} BER)	-110 dBm at 2 kbps	
SGLS & USB	Direct BPSK modulation available for data rates to 1 Mbps	

OUTPUT INTERFACE

CMOS or RS-422

Outputs	“S”, “0”, “1”, clock, Data clock, ramp lock, CDU lock

TRANSMITTER/BASEBAND

Transmit frequency	2200 to 2300 MHz	
Coherent Turnaround Ratio	SGLS 256/205	USB 240/221
Frequency stability	± 20 ppm	
RF Power	5 W minimum, low power port (-5 dBm)	
Output protection	No damage; open or short circuit	
IPM (100 Hz to 1 MHz)	< 2° rms (ambient) non-coherent < 3.5° rms coherent	
IAM	< 2%	

TELEMETRY CHANNEL

Peak Phase deviation	3 radians maximum
Subcarrier frequencies	1.024 and/or 1.7 MHz
Subcarrier stability	± 0.005%
Direct carrier modulation	8 Msps (NRZ) maximum

SUBCARRIER BPSK

Modulation rates	1.024 MHz: 128 kbps maximum, 1.7 MHz: 256 kbps maximum
Convolutional encoding	R = 1/2, K = 7 (CCSDS or JPL type)

INPUT INTERFACE

RS-422

POWER REQUIREMENTS

Input voltage	+28 VDC or +70 VDC
*Power consumption (SGLS/USB mode)	
Receive only	12 to 16 W maximum
Transmit and receive	46 to 56 W maximum
Over/Reverse voltage	provided
Current limiting	provided
Command inputs	28 V latching relay

GENERAL

Dimensions	7 in. L x 6 in. W x 4 in. H (4.5 secure)
* Weight	8.0 to 8.6 lb.

ENVIRONMENTAL

Temperature	-29 °C to +66 °C
Vibration	15 Grms
Altitude	Unlimited
EMI	MIL-STD-461E (tailored)
Radiation	100 krads (chassis)
TEMPEST	NACSIM 5100A-compliant

OPTIONS

MIL-STD-1553 serial interface for command and/or telemetry data with COMSEC

Triplexer - *Power consumption and weight varies with options selected.

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