

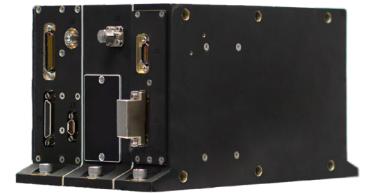


**L3HARRIS®**  
FAST. FORWARD.

# C/TT-524 S/X-BAND TRANSCEIVER

Full-duplex multimode transponder for space communications

TRANSCEIVER	
<b>Transmitter</b>	
Frequency, FTX	X-Band, 8025 to 8500 MHz (selectable; factory preset)
Antenna Impedance	50 Ohms
RF Output Power	-15 dBm to +5 dBm; variable in 0.5 dB steps and compensated over temp
Ground Network Mode (GN)	Modulations: BPSK, QPSK, OQPSK Data rates: 1 kbps to 6 Mbps
<b>Receiver</b>	
Frequency	S-Band, 2025 to 2110 MHz (settable at manufacture)
Noise Figure	2.5 dB max; 3.5 dB EOL
Antenna Impedance	50 Ohms
Dynamic Range	-137 dBm to -17 dBm (+20 dBm max without damage)
Sensitivity	-124 dBm @ 1 x 10 <sup>-5</sup> BER for 2 kbps data rate -137 dBm @ 1 x 10 <sup>-5</sup> BER for 125 bps data rate
Acquisition Range	± 1.5 kHz TDRSS mode ± 110 kHz GN mode
Tracking Range	± 160 kHz
Doppler Rates	TDRSS: 70 Hz/s (125 bps), 380 Hz/s (>1 kbps); GN: 35 kHz/s (CW), 2 kHz/s (LEO)
TDRSS Network Mode (450-SNUG)	Modulations: SS-BPSK, SS-UQPSK Data rates: 125 bps to 300 kbps
Ground Network Mode (GN)	Modulations: BPSK Data rates: 2 kbps to 3 Mbps
Ground Network (GN) Subcarrier Mode	Modulations: BPSK on 8 kHz or 16 kHz subcarrier Data rates: 2 kbps or 4 kbps
Data Format	NRZ-L, NRZ-M
<b>Protocol Processing</b>	
Synchronization and Channel Coding	CCSDS 131.0, CCSDS 231.0
Data Link	CCSDS 132.0, CCSDS 232.0, CCSDS 732.0, CCSDS 355.0
Forward Error Correction	Reed-Solomon, convolutional encoding
Cryptography	AES-256-GCM, AES-256-CTR
<b>Physical</b>	
Volume	8.6 L x 4.1 W x 4.6 H in (without diplexer) 9.5 L x 5.7 W x 4.6 H in (with diplexer)
Weight	6.9 lbs (2.95 kg) (without diplexer) < 9.0 lbs (4.08 kg) (with diplexer)



The C/TT-524 is a highly capable narrowband transceiver which provides S-Band receive and X-Band transmit capabilities over a variety of NASA networks and protocols. Based on our flight-proven C/TT-520 transceiver product line, the C/TT-524 is designed for maximum configurability and can be easily tailored for numerous protocols and mission profiles.

Designed with a traditional EEE Level 2 parts and material program, the C/TT-524 adapts the latest technologies within our proven parts and design methods for absolute mission assurance.

The C/TT-524 is fully qualified and flight proven, with multiple units currently operating in LEO. Much of the C/TT-524's design, including its receiver subassembly, is shared with our parent C/TT-520 product, which has been launched on more than a dozen missions since 2018 with nearly 10 years of cumulative operation time.

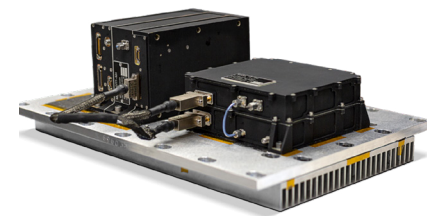
## VERSATILITY

The C/TT-524 is configurable to suit both your mission and your spacecraft bus. Selectable parameters include RF, 1 of 85 gold codes, receive and transmit data rates, receive and transmit modulations, RF output power, encryption/decryption, convolutional encoding, Viterbi decoding and Reed Solomon encoding/decoding. Available interfacing includes RS-422, low-voltage differential signaling and universal asynchronous receiver-transmitter.

## EXPERT SUPPORT

The C/TT-524 is designed, built, assembled and tested all within one facility and is serviced and supported by engineering professionals with decades of spaceflight design experience. Every C/TT-524 delivered is accompanied by domain expertise in parts, materials, radiation analysis, mechanical engineering, power supply design, digital signal processing, radio frequency design and manufacturing engineering. For most applications, we can provide existing data items for review, reducing the analysis and testing required.

TRANSCEIVER	
<b>IO Characteristics</b>	
I/O Type	3.3 V RS-422
Rx Outputs	Redundant command data with clock and lock indicators
Rx Inputs	AUX data
Tx Inputs	Redundant TxData I/Q, clock
Discrete Inputs	Reset
Serial Control/Status	RS-422 UART 2400 baud
Control Commands	Mode select, FEC on/off, Encrypt on/off, Rx Test
Status Telemetry	AGC, frequency offset, temperature, secondary voltage
<b>Power</b>	
Input Voltage	22 to 36 VDC
Input Power Rx Only	<8 W max
<b>Environmental</b>	
Temperature	-40°C to +70°C (nonoperating)
Random Vibration	-20°C to +60°C (operating)
Pyrotechnic Shock	15.7 grms, 3-axis
Altitude	1400 (1 kHz to 10 kHz)
Total Dose	Unlimited
<b>Other</b>	
Export Classification	EAR
SOLID STATE POWER AMPLIFIER (PA-513) AVAILABLE AS SEPARATE UNIT	
Output Power	3 W max
Size	7.3 L x 6.6 W x 2.7 H in
Weight	4.2 lbs
Input Power	30 W max (3 W output), @ 28 VDC



### PA-513 X-Band Solid State Power Amplifier (SSPA)

The C/TT-524 is designed to be optionally paired with our PA-513, a standalone X-Band SSPA. The PA-513 unit provides the pre-drivers, driver and final amplifiers to produce up to 3 watts RF output power when configured for narrowband operation. The SSPA connects directly to the C/TT-524 for power and telemetry with +28V primary power, SSPA On/Off control, as well as RF power, temperature and secondary voltage telemetries.

#### C/TT-524 S/X-Band Transceiver

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