



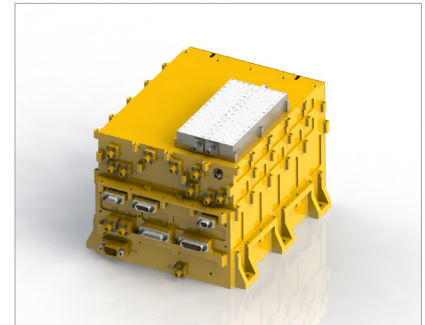
L3HARRIS®
FAST. FORWARD.

UNIVERSAL SPACE TRANSPONDER (UST)

X and UHF Dual-Band

| INPUT CHARACTERISTICS | |
|--|---|
| Data and Clock | LVDS |
| Command and Control | MIL-STD-1553B |
| UHF | |
| RF In | -130 dBm to -70 dBm |
| Rx RF Frequency | 435 to 450 MHz tunable (56 kHz steps) |
| Noise Figure | 4.5 dB (max) |
| X-BAND | |
| RF In | -160 dBm to -60 dBm |
| Rx RF Frequency | 7145 to 7235 MHz tunable (400 kHz steps) |
| Noise Figure | 3.0 dB (max) |
| OPERATING MODES | |
| UHF Full Duplex (FD), X-band FD, UHF and X-band Simultaneous FD, RX Only, TX Only, Standby | |
| Modulation/Demodulation | BPSK, QPSK, OQPSK, residual carrier, subcarrier, etc. |
| Coding | Scrambling, differential, Reed-Solomon (255, 239), FEC (R=1/2, k=7), Manchester, LDPC |
| Decoding | Manchester, Viterbi (soft R=1/2, k=7), differential, descrambling |
| Ranging | Sequential ranging tones, pseudo-noise ranging, delta differential one-way ranging |
| DATA RATE | |
| UHF | Tx (up to 12 Mbps) Rx (up to 10 Mbps) Relay (1, 2, 4, 8, 16, 32, 64, 128, 256, 1024, 2048, 4096 ksps) |
| X-band | Tx (up to 25 Mbps) Rx (up to 14 Mbps) |
| Tracking Range | ±100 KHz minimum |

| OUTPUT CHARACTERISTICS | |
|---------------------------------------|--|
| UHF | |
| RF In | 8.5 W FD (min) 10.7 W HD (min) |
| Rx RF Frequency | UHF 390 to 405 MHz; tunable (56 kHz steps) |
| X-BAND | |
| RF Output Power | 0.01 W (min) |
| RF Output Frequency | 8400 to 8450 MHz; tunable (400 kHz steps) |
| Frequency Source | Internal ±5 ppm |
| UHF and X RF Power TLM | 0 to 5 V analog |
| Secondary V TLM | 0 to 5 V analog |
| Temperature TLM | Thermistor |
| RADIATION | |
| Total Dose | 20 krad 100 mil Al |
| ENVIRONMENTAL SPECIFICATIONS | |
| Temperature | -50 °C to +110 °C (non-operating) -45 °C to +70 °C (operating) |
| Vibration | Random, 7.9 grms, 3-axis |
| Shock | 2,000 G-forces |
| PHYSICAL CHARACTERISTICS | |
| Dimensions | 21.0 cm (8.3") W x 27.0 cm (10.6") D x 16.0 cm (6.3") H |
| Weight | 6 kg (13.23 lb) (typical) |
| POWER REQUIREMENTS | |
| Input Voltage | +22 to +36 VDC |
| Input Power (Worst Case, End of Life) | 94 W X-band and UHF FD; 42 W X-band FD; 87 W UHF FD; 32 W X-band RX only; 32 W UHF RX only; 26 W standby |



The UST is a highly flexible software-defined X and UHF dual-band transponder that uses universal modules to accommodate various frequency bands and mission parameters. The baseline design provides coherent X-Band transmit and receive capability, combined with a UHF proximity relay link.

The software-defined architecture is configurable for a variety of spacecraft communications protocols and links, including direct-to-Earth and spacecraft-to-spacecraft links in cislunar and deep space environments.

The transponder's universal digital processing module and in-flight re-programmability provides mission designers with a multitude of options for waveform, baseband pulse-shaping, encoding and decoding to suit a vast array of operations.

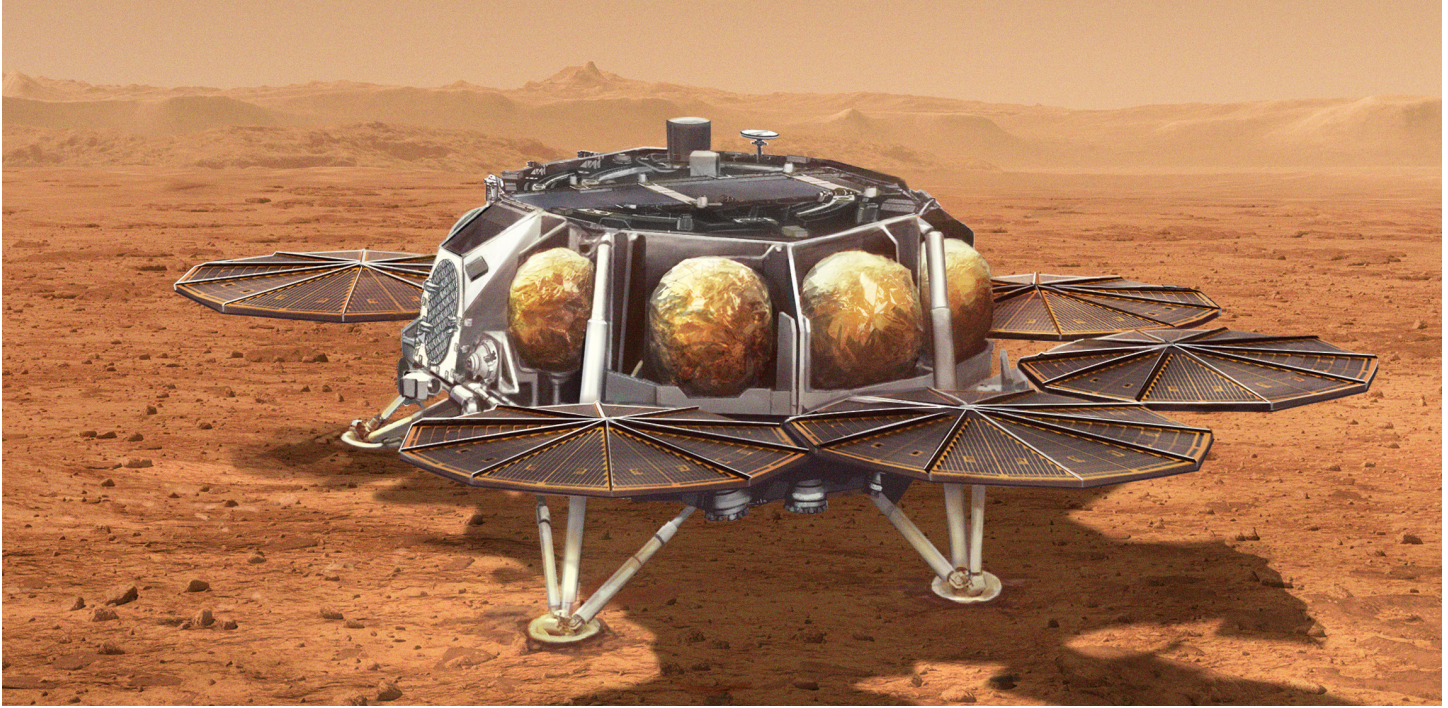


Image Credit: NASA/JPL-Caltech

CCSDS PROXIMITY-1 PROTOCOL

The Consultative Committee for Space Data Systems Proximity-1 Protocol incorporated in this transceiver provides error-free communication by employing an error detection and re-transmission service. Additionally, the Proximity-1 Protocol provides an automatic link establishment feature that allows the primary transceiver to reconfigure the secondary transceiver with no intervention from the secondary spacecraft.

DEEP SPACE NETWORK COMPATIBILITY

The UST is compatible with NASA's Deep Space Network (DSN) operated by JPL. The UST was developed in cooperation with JPL and is compatible with all operating modes for commanding, ranging and tracking and data return.

DECADES OF MISSION SUCCESS

The UST is based on hardware with an extensive heritage of mission success, including every JPL Mars mission since 1998. NASA's upcoming Mars Sample Return mission will use the UST to transmit and receive from the planet. L3Harris' space communication products consistently operate for years beyond their specified lifetime.

Universal Space Transponder (UST)

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L3Harris Technologies is the Trusted Disruptor in the defense industry. With customers' mission-critical needs always in mind, our 50,000 employees deliver end-to-end technology solutions connecting the space, air, land, sea and cyber domains in the interest of national security.



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