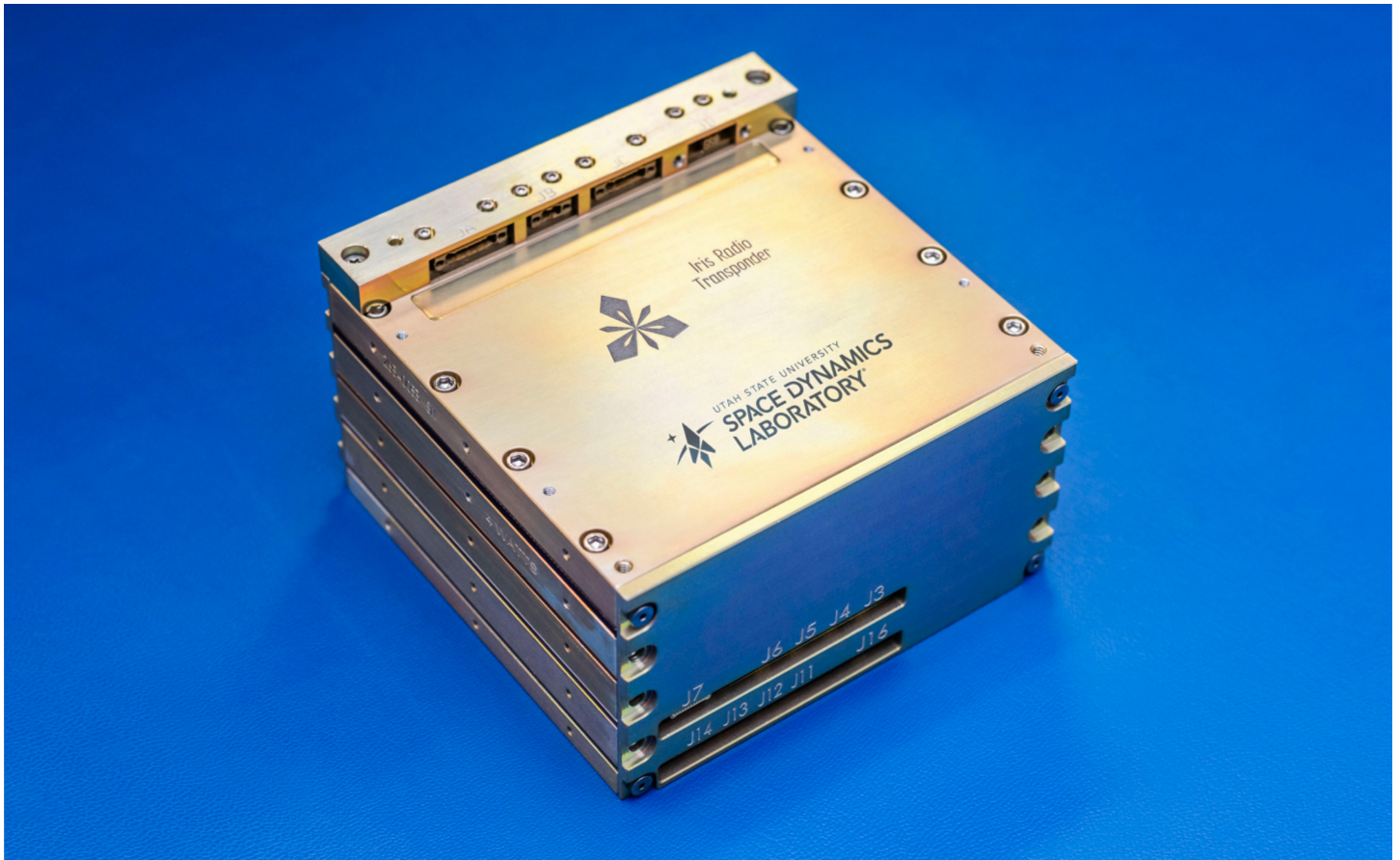


IRIS RADIO VERSION 2.0

Proven Deep Space Communication



Iris Radio, version 2.0.

HERITAGE OF HIGH SUCCESS

TRUSTED MISSION PARTNER

QUALITY, COST-EFFECTIVE SOLUTION

FAST DELIVERY

CUSTOM CONFIGURATIONS

RESPONSIVE, RELIABLE SUPPORT

WINNING TEAM CONTRIBUTOR

REPEAT CUSTOMERS

The Iris Radio is a software-defined telecommunications subsystem designed specifically for orbits beyond LEO, such as MEO, GEO, lunar, and interplanetary missions. Iris uses an environmentally robust architecture, including radiation-tolerant parts for deep space, multi-year missions.

The Space Dynamics Laboratory (SDL) develops, fabricates, and tests Iris Radio technology in our NASA-certified facilities and provides mission support. SDL routinely customizes features and delivers mission-specific configurations.

For more information about Iris Radio, please contact the team: iris.support@sdl.usu.edu

IRIS RADIO VERSION 2.0 Proven Deep Space Communication

GENERAL SPECIFICATIONS	
Network Compatibility	All CCSDS networks: DSN, NEN ^[1] , SN ^[1] , LEGS ^[1] , etc.
Design Lifetime	3 years
Frequency Bands	<ul style="list-style-type: none"> X-band UHF receive Ka-band transmit
Operating Temperature	-20°C to +50°C
CPU	Gaisler LEON3-FT
Memory	<ul style="list-style-type: none"> 32 Mbit, non-volatile NOR-Flash (radiation tolerant) 16 Mbit, volatile SRAM (radiation tolerant) 4 Mbit, volatile EDAC SRAM (radiation tolerant)
Interface	SpaceWire or other LVDS protocols
Solid-State Power Amplifier (SSPA)	3 RF paths, dedicated to 3 antennas; path selectable via power switching
Low Noise Amplifier (LNA)	2 RF paths, dedicated to 2 antennas; path selectable via power switching
Reference Oscillator	Internal Temperature Compensated Crystal Oscillator (TCXO): ± 2 ppm
Ranging Modes	<ul style="list-style-type: none"> DDOR and PNDDOR Coherent sequential Coherent regenerative PN
Command/Telemetry Interface	<ul style="list-style-type: none"> Uplink: CCSDS TC Space Data Link protocol Uplink: CCSDS Space Data Link Security protocol (SDLS) Downlink: CCSDS AOS Space Data Link protocol
Telemetry Symbol Rates	7 sps to 12.5 Msps
Telemetry Modulation	<ul style="list-style-type: none"> PCM/PSK/PM (subcarrier) PCM/PM/(Bi-φ) (direct carrier) BPSK, QPSK, OQPSK, GMSK Optional pulse shaping or spectral filter
Telemetry Encoding	<ul style="list-style-type: none"> Uncoded Convolutional: 7-1/2 Reed-Solomon (255, 223) Turbo rates: 1/2, 1/3, 1/6 Turbo block sizes: 1784 or 8920 bits LDPC rates: 1/2, 2/3, 4/5, 7/8 LDPC block sizes: 1024, 4096, or 7136 bits Additional encoding as required
Carrier Acquisition	<ul style="list-style-type: none"> Acquisition range: ±1 MHz Tracking range: ±5 MHz Configurable acquisition/tracking bandwidths (100 Hz acq, 40 Hz trk typical) FFT-assisted acquisition Spacecraft-initiated frequency sweep
Command Symbol Rates	7 sps to 3 Msps
Command Modulation	<ul style="list-style-type: none"> PCM/PSK/PM (subcarrier) PCM/PM/(Bi-φ) (direct carrier) BPSK
Command Encoding	<ul style="list-style-type: none"> Uncoded BCH (SEC/TED) Additional encoding as required
Miscellaneous	<ul style="list-style-type: none"> Over-the-air updates IQ recorder for diagnostics Beacon mode

TRANSPONDER SPECIFICATIONS	
X-Band Uplink Frequency Range	<ul style="list-style-type: none"> 7.145–7.190 GHz (channel assignment programmed in firmware) 7.190–7.235 (near-Earth supported)
X-Band Downlink Frequency Range	<ul style="list-style-type: none"> 8.400–8.450 GHz (channel assignment programmed in firmware) 8.450–8.500 (near-Earth supported)
Other Bands	<ul style="list-style-type: none"> Ka-band transmit: Deep space/near-Earth UHF receive: 390–450 MHz
Coherent Turnaround Ratio	<ul style="list-style-type: none"> X-band: 880/749 or arbitrary ratios Ka-band: Standard or arbitrary ratios Noncoherent mode also supported

RECEIVER SPECIFICATIONS	
Noise Figure	<2.2 dB X-band
Carrier Tracking Signal Range	-70 to -150 dBm
Command Threshold	-134 dBm @ 60 bits/s
Eb/NO Implementation Loss	<0.5 dB

TRANSMITTER SPECIFICATIONS	
8.4 GHz SSPA Output Power	4 W BOL
X-Band Phase Noise	<ul style="list-style-type: none"> 1 Hz: <-20 dBc/Hz 10 Hz: <-40 dBc/Hz 100 Hz–100 kHz: <-60 dBc/Hz
X-Band Spurious & Harmonic Outputs	<-60 dBc

MASS & POWER SPECIFICATIONS		
Transponder Stack Mass	875 g	
LNA Mass	≤125 g	
SSPA Mass	≤230 g	
Transponder Envelope	101 x 101 x 56 mm	
LNA Envelope	114.3 x 46.0 x 15.5 mm	
SSPA Envelope	102.9 x 55.7 x 24.4 mm	
Input Supply Voltage	12–28 VDC	
Input Supply Power	5–35 W	
	Mode	DC Input (W)
	Battery Connect	<0.04
	X-Receive Only	10.3
	X-Transmit Only	29.6
X-Transmit/Receive	33.6	

[1] DSN compatibility has been verified at DTF-21; meets specifications of other CCSDS networks but has not been formally verified.

