

# CADET

## UHF & UHF PLUS S-BAND RADIOS

With the increase in Government-funded and industry small satellites missions, the need for a more robust communication infrastructure is critical for the CubeSat community. As part of the solution, SDL provides the Cadet U and Cadet PLUS radios as powerful communications tools ideal for small satellites. These affordable solutions are available in both UHF (Cadet U) and UHF plus S-Band (Cadet PLUS) configurations. The Cadet radios are compact, power efficient, high data rate transceivers. SDL optimized the design, from the electronics to the modes of operation, for low power consumption.

SDL partnered with L-3 Communications to develop the Cadet U radio for the Dynamic Ionosphere CubeSat Experiment (DICE) mission, which launched in 2011. It provided the first high speed communications system for a CubeSat and was proven on orbit to be robust and reliable. In 2016, SDL again partnered with L-3 Communications to improve the performance of the Cadet radio, resulting in the Cadet PLUS for next generation CubeSats.

### KEY FEATURES

- Up to 3.2 Mbps data rates, depending on configuration
- Scalable software-defined architecture
- Real time & store-&-forward technique for downlink
- Low power design for minimum power consumption
- Bandwidth-efficient modulation & FEC techniques
- Extensible to air, ground, & maritime micro platforms
- AES 256 encryption

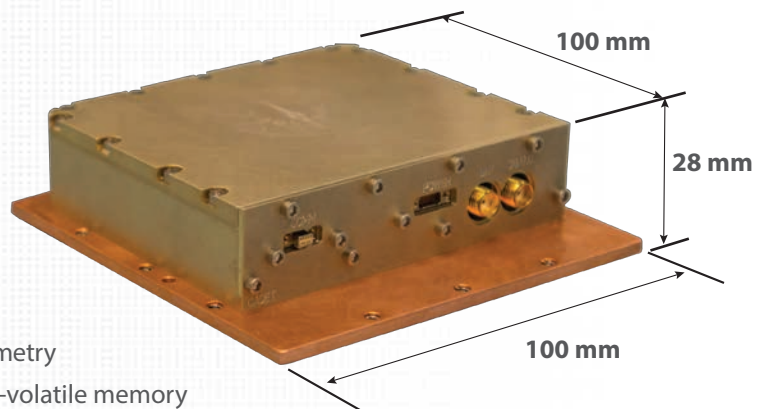
### HOW CADET WORKS

- Cadet radios use a real-time & store-&-forward architecture
- Ground users control data transmissions, downlink priority, & data deletion
- A large 32 GB memory buffer is used to store mission data & telemetry
- Data is collected from the spacecraft & stored in the radio's non-volatile memory
- Optimized size, weight, & power (SWaP)

PARAMETER	Cadet U
<b>DOWNLINK</b>	UHF; 460 - 470 MHz; 2 W RF power out; $\leq 3.0$ Mbps; OQPSK
<b>UPLINK</b>	UHF; 450 - 460 MHz; $\leq 9.6$ kbps; FSK
<b>MASS</b>	~200 g
<b>DIMENSIONS</b>	69 x 74 x 14 mm
<b>C&amp;DH INTERFACE</b>	LVTTTL UART
<b>POWER CONSUMPTION</b>	0.3 W receive, 12 W transmit
<b>DATA LATENCY</b>	Store-&-forward architecture
<b>GROUND STATION</b>	NASA Wallops/Morehead State/SDL

PARAMETER	Cadet PLUS
<b>DOWNLINK</b>	S-Band: 2.2 - 2.9 GHz; 2 W RF power out; up to 3.2 Mbps; OQPSK
<b>UPLINK</b>	UHF; 449.75 - 450.25 MHz; $\leq 50$ kbps; GFSK
<b>MASS</b>	~630 g
<b>DIMENSIONS</b>	100 x 100 x 28 mm
<b>C&amp;DH INTERFACE</b>	RS-422 & CAN
<b>POWER CONSUMPTION</b>	0.7 W receive; 8 W transmit
<b>DATA LATENCY</b>	Real-time & store-&-forward architecture
<b>GROUND STATION</b>	MC3 (6 CONUS nodes including SDL)

CADET PLUS



**Space Dynamics**  
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