

# Spacecraft Systems

## SN-200 Smallsat: Flight-Proven

Sierra Nevada Corporation's (SNC) Space Systems, a business area of aerospace and defense company SNC, SN-200 bus was flight-proven on the successful U.S. Air Force Research Laboratory's (AFRL) TacSat-2 program and is the basis for AFRL's Demonstration and Science Experiment (DSX), currently completing integration. The SN-200 provides a flexible, affordable platform for payloads up to 200 kg.



**TacSat-2**

The SN-200 provides the Department of Defense (DoD) with a reliable testbed for a host of advanced technologies and in a variety of orbits. Demonstrating the flexibility of the SN-200 design, this bus was used for both TacSat-2 as a three-axis stabilized free-flyer in low-Earth orbit (LEO) and DSX, an Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA) ring mounted bus and science package destined for medium-Earth orbit (MEO). Both configurations feature the ability to integrate bus and payloads in parallel, dramatically reducing integration schedules.

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### TacSat-2: AFRL

The first flight demonstration program under the DoD's TacSat initiative, featured 13 imaging and signal detection hosted payload experiments conducted during the 12-month mission. The successful 2006 launch of TacSat-2 demonstrated SNC's ability to provide a high-performance small satellite delivering tactical utility for a very competitive price. SNC designed, built and environmentally qualified the satellite bus and was responsible for two advanced solar array experiments.

### Demonstration and Science Experiment (DSX): AFRL

The DSX spacecraft researches technologies needed to significantly advance DoD capability to operate spacecraft in the harsh radiation environment of MEO. SNC adapted the SN-200 bus to fly this unique ESPA ring configuration. The satellite was integrated by SNC, delivered to AFRL for final payload integration, and is scheduled to launch in 2016.



Credit: Air Force Research Laboratory

## SN-200 Smallsat Features

- High payload mass fraction - can accommodate multiple payloads
- On-board theater command, control and data dissemination-demonstrated on TacSat-2
- Navigation: On-board GPS receiver or vector upload via transponder
- Attitude Determination: Sun sensor/magnetometer and star tracker
- Enhanced reliability through safe mode features
- Continuous fault monitoring capability
- Adaptable to new mission requirements
- Software update via ground command
- Customized solar arrays using triple junction cell technology
- Adaptable for flight in geosynchronous orbits

## SN-200 Smallsat Capabilities

*SN-200 Platform Supports a Variety of Mission Types*

		LEO Tactical/Technical Demonstration Mission (TacSat-2 Variant)	MEO Technical Demonstration Science Mission (DSX Variant)
<b>Life</b>	Years	5	5
<b>Payload Mass</b>	Kilograms	200	170
<b>Bus Mass</b>	Kilograms	155	155 (plus ESPA Ring)
<b>Bus Power (OAP)</b>	Watts	150	260
<b>P/L Power Available</b>	Watts	200	350
<b>Pointing Control</b>	Degrees	±0.1	1.0
<b>Pointing Knowledge</b>	Degrees	±0.05	1.0
<b>Slew Rate</b>	Degrees/Second	0.3-0.6	0.25-1.0
<b>Comm Up/Downlink Band</b>	Kilobits Per Second	Uplink (SGLS): L-Band (2 kbps) Downlink (SGLS): S-Band (1,000 kbps) P/L Uplink: 200 kbps (X-band) P/L Downlink: 274 Mbps (X-band)	Uplink: SGLS L-Band (2 kbps) Downlink: SGLS S-Band (2 Mbps)
<b>Propulsion Type, Propellant Mass</b>	Type, Kilograms	Xenon HET (TacSat 2), 4.5	None
<b>Launch Vehicle Compatibility</b>		Minotaur 1 and above	EELV, Falcon 9 (ESPA-based bus platform design)

Sierra Nevada Corporation's Space Systems  
1722 Boxelder Street, Louisville, CO 80027  
Phone: (303) 530-1925 • Fax: (303) 530-2401  
Email: [ssg@sncorp.com](mailto:ssg@sncorp.com)  
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