



GEMINI GPS RECEIVER & ANTENNA



The NSS GPS Receivers are a 12-channel, hardware-based receiver which utilises a well-established GPS chipset. This GPS chipset has been successfully own by a number of organisations over many years. Targeted towards low-cost SmallSat constellations, it has been adapted for space altitude and velocity through the use of custom software modifications. The NSS GPS-01 includes an unregulated, isolated 28V power input and differential interfaces. They employ latch-up detection/ protection and a watchdog timer for increased reliability and robustness.

GEMINI - GPS RECEIVERS

PERFORMANCE	GEMINI-R28 [NGPS-01-422]	GEMINI-R5 [NGPS-03-422]
FUNCTIONAL CHARACTERISTICS		
Position accuracy [1 σ]	<10 m	<10 m
Velocity accuracy [1 σ]	<50 cm/s	<50 cm/s
Update rate	1 Hz	1 Hz
Operating frequency	L1 (1575.42 MHz)	L1 (1575.42 MHz)
PHYSICAL CHARACTERISTICS		
Dimensions	155 mm x 76 mm x 34mm (excluding connectors)	96 mm x 91 mm x 18 mm
Mass	<500 g	<130 g
Power	1.5 W (excluding active antenna)	1 W (excluding active antenna)

ENVIRONMENTAL CHARACTERISTICS

Thermal (acceptance)	-10 °C to +50 °C	-10 °C to +50 °C
Mechanical Tests (Qualification)	17.28 gRMS (random)	14 gRMS (random)
Radiation (TID) (Qualification)	10 krad (component level)	10 krad (component level)

INTERFACES

Power supply	24 VDC to 36 VDC unregulated (isolated)	5 VDC
Data	RS-422 UART	RS-422 or TTL UART
Connector	SMA Female (antenna), D-Sub standard density 9-pin (power) & D-Sub high density 26-pin (communication)	SMA Female (antenna), 15-pin Nano-D
Mechanical	4 x M4 mounting holes	4 x M3 on Cubesat PC104 footprint



FUTURE: Gemini-FR28: a software-defined, improved performance receiver that is Fugro SpaceStar® enabled.

ACCEPTANCE TESTING: All FM parts undergo random vibration (10 rms) as well as thermal cycling (four-cycle ambient pressure) to five degrees beyond operational thermal specifications. However, NewSpace can perform additional environmental testing if required by a client.

CONFIGURATION MANAGEMENT: Specifications are subject to change. Please refer to the latest version.

FEATURES

- 12-channel L1 receiver
- Small size and low mass
- Radiation tolerant COTS
- Simple to interface

APPLICATIONS

- Accurate determination of orbital position
- Accurate knowledge of time
- Orbit maneuvers
- Time and/or position stamping of payload data

QUALIFICATION

The NewSpace Systems (NSS) GPS Receivers utilise the well-known Zarlink chipset, which has been flying for more than a decade. To date, >60 Receivers and >70 Antennae have been delivered globally to a variety of international missions and constellation programmes. Baselined on 4 constellations, the NSS GPS Receiver and Antenna is TRL 9 with in-orbit heritage.



FUNCTIONAL CHARACTERISTICS

Frequency	1575.42 MHz
Bandwidth	20 MHz
-3 dB beamwidth	$\geq 100^\circ$ ($\phi = 0^\circ$); $\geq 100^\circ$ ($\phi = 90^\circ$)
Return loss	≤ -5 dB
Impedance	50 Ohm (matched)
Active gain	≥ 16 dBiC (@ Zenith)
Polarization	Right Hand Circular (RHCP)
Noise figure	< 2 dB
Axial Ratio	< 10 dB (@ Zenith)

PHYSICAL CHARACTERISTICS

Dimensions	54 mm x 54 mm x 14.1 mm
Mass	< 80 g
Power	< 80 mW

ENVIRONMENTAL CHARACTERISTICS

Thermal (operational)	-25 °C to +55 °C operating, -30 °C to +60 °C non-operating
Vibration (qualification)	17.28 gRMS (random)
Radiation (TID)	10 krad (component level)

INTERFACES

Power supply	5 VDC nominal
Connector	50 Ω SMA female
Mechanical	4 x M3 through hole