NewSpace GNSS Receivers [PRELIMINARY]

Rakon's NewSpace GNSS Receivers are easy to customise multi-constellation and multi-frequency GNSS receivers. They are compliant with Galileo and GPS signal requirements off-the-shelf, and their design can be adjusted to take into account new constellations on request (Beidou, GLONASS, SBAS, GBAS, DGPS, and QZSS).

The NewSpace GNSS Receiver has a built in IMU (3D accelerometer and gyroscope), which is an option that can be used to extrapolate the position (<8 cm in LEO) and minimize the reacquisition time (<3 s). Because the equipment uses SDR[1] based design, the subsystem can be easily configured and customised. The flexibility and advanced capabilities make Rakon's NewSpace GNSS receiver the ideal choice for smallsats and re-usable launchers where high accuracy is required.

Rakon provides two NewSpace GNSS Receivers products; >1-year equipment for short missions and >5-year equipment for long missions.

Key Features

- Multi-constellation, multi-frequency
- Warm/Cold TTFF**: <10s / < 100s**
- Position accuracy (800 km): <5 m
- Up to 48 channels
- 1PPS signal output
- Power consumption: up to 5 W
- Supply voltage: 5 V

Configuration and Options

- Short or long missions
- IMU (accelerometer and gyroscope)
- High position accuracy (800 km): <8 cm
- Internal LNA or supply to external LNA
- Can be provided with customised card sizes and standards

95 x 95 x 20 mm

Image coming soon

Signals

Parameter	Condition / Remarks	
GPS		L1 C/A; L5 (data & pilot)
GALILEO		E1B & C; E5A
GLONASS, BEIDOU		Available on demand
SBAS, GBAS, DGPS, QZSS		Available on demand

Performance

Parameter	Condition / Remarks	
Channels		Up to 48 (4x12)
RF input channels		1 or 2
TTFF cold start		See table hereafter
Restart fix (warm)		Typ. <10 s (<3 s with IMU)
Trajectories		LEO, GEO, launchers
Antenna		Active antenna, typ. 3.3 V DC
PVT update rate	Can be more if required	1 or 10 Hz

Accuracy in LEO

Signals	Position (m)		Velocity (cm/s)	Timing (ns)	
	Real-time 1-sigma per axis	Post-processing 1-sigma per axis	Real-time 1-sigma per axis	Real-time 1-sigma per axis	Post-processing 1-sigma per axis
L1C/A	2.45	0.59	8.8	5.6	1.35
L1C/A, E1	0.93	0.21	4.2	2.6	0.6
L1C/A, E1, E5a	0.82	0.10	3.6	2.4	0.4
L1C/A, E1, E5a, L5	0.80	0.08	3.3	2.3	0.2

[1] SRD: Software-defined radios

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TTFF (Independent)

Parameter	Condition / Remarks	LEO (s)
L1C/A		42
E1		72
E5a		93
L5		71

RF Input

Parameter	Condition / Remarks	
Frequency range		1~100 MHz to 1~610 MHz
RF bandwidth (each band)		20 MHz

Mechanical Specifications

Parameter	Condition / Remarks	
Antenna		SMA
Power supply		5V jack 2.1
Power consumption	Depending on the signals used	Up to 5 W
UART		SUB D 15 pin
USB		USB-C (USB3) or Micro USB
1PPS signal		Sub-D
Mass		250*g* (TBC)
Dimensions		95 x 95 x 20 mm

Environmental Conditions

Parameter	Condition / Remarks	Short missions	Long missions
Operating temperature		-40°C to +85°C	
Total Ionizing Dose (TID)		> 1 year	50 kRad
SEE		> 1 year	No SEL up to LET = 43 MeV/mg/cm²
Lifetime		> 1 year	10 years

Qualification and Acceptance testing for Short & Long mission variants

Test	Condition / Remarks	Qualification testing	Acceptance testing
Functional		✓	✓
Vibration		✓	-
Mechanical shocks		✓	-
Thermal cycling		✓	✓
Thermal vacuum		✓	-

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