NanoCom
GS2000

Datasheet
Rack mounted S-Band radio for ground station

Product name: NanoCom GS2000

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1   Table of Contents

2 Overview

The NanoCom GS2000 is an S-Band ground station radio built in a standard 2U 19" rack mounted unit.
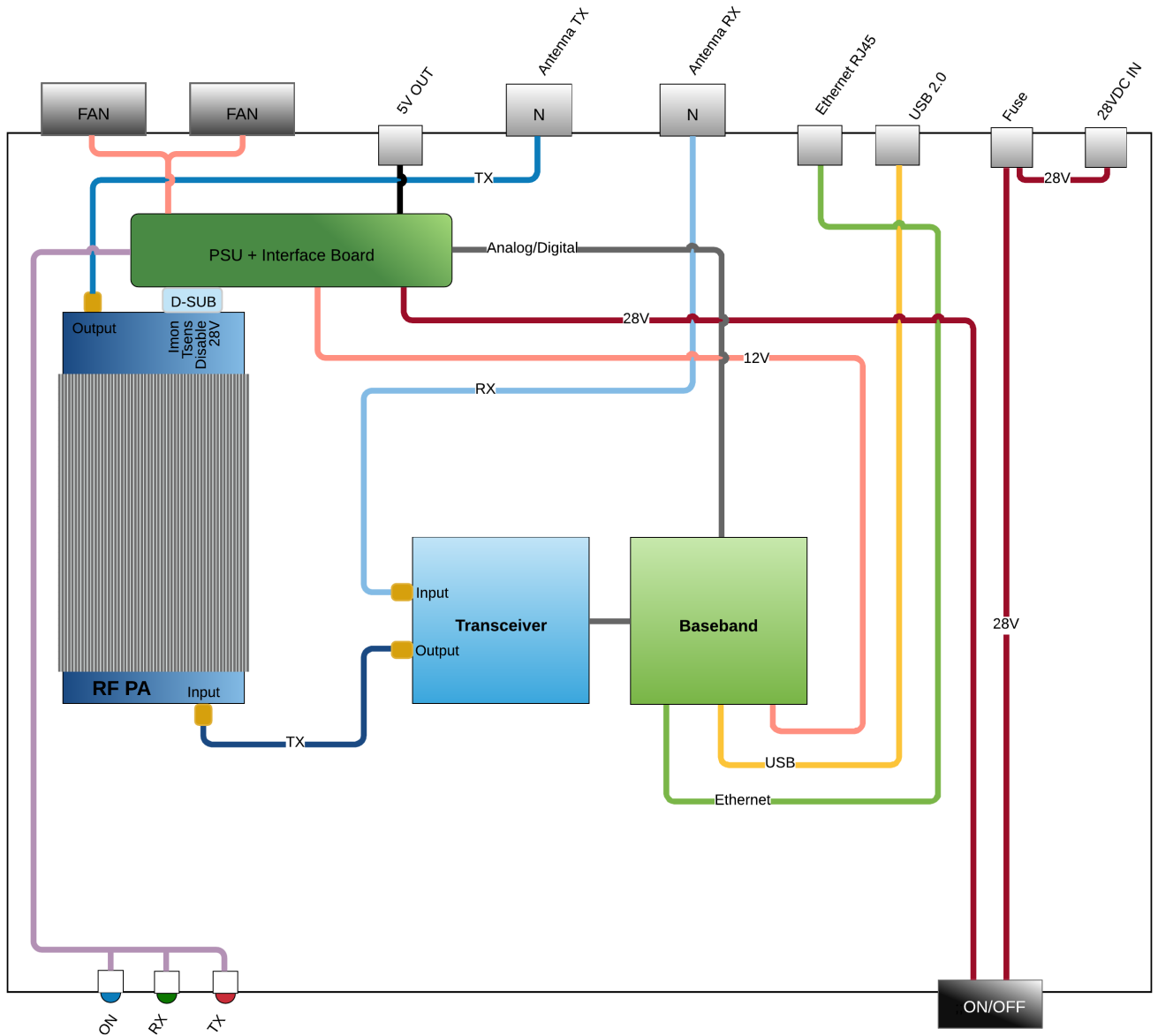
The ground station radio is an important part of a satellite communication infrastructure, responding to CSP (CubeSat Space Protocol) requests, just like the satellite radio. This means that satellite monitoring and configuration software, can be used to control both satellite and the ground station. Furthermore, issuing changes to the radio-link parameters is now as simple as transmitting a new configuration, first to the satellite, then to the ground station. With both radios accepting the same message and configuration format, the time spent on developing ground software is drastically reduced.

Together with a Mission Server, monitor, rotor module, spectrum analyzer and an antenna you should have a complete ground station that can communicate with your satellite.

2.1 Highlighted Features

- S-Band transceiver
- 2U 19" rack-cabinet with external 28 V supply
- 1 Antenna Rx connector
- 1 Antenna Tx connector
- Internal Power Amp
- Ethernet port for data sending/retrieval
- USB port for Linux console
- LED's for Power/RX/TX

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2.2 Block Diagram

3   Interface on the Front
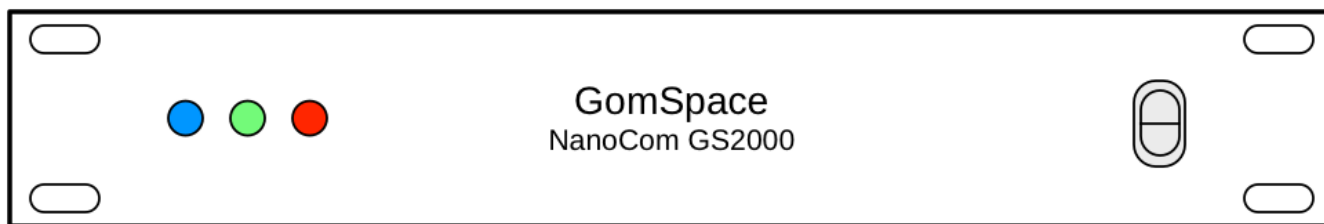
The following sub chapters describe the connectors from left to right.

3.1   Front LED

The interface on the front has been routed to three LED's, which displays the Power/RX/TX status of the primary radio module.

Blue LED   = Power on
Green LED   = RX on
Red LED   = TX on
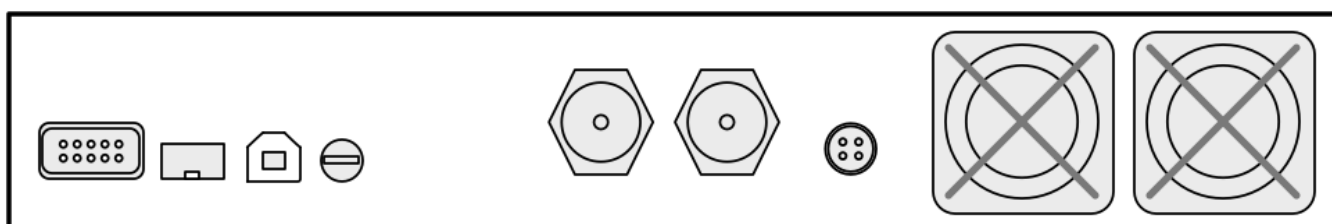
3.2   Power

On the right, there is a switch to turn the GS2000 on/off.

4   Interface on the Back

The following sub chapters describe the connectors from left to right.

4.1   Power Supply

Plug in the external 28 VDC, 300 W power supply that comes with the GS2000.

4.2   Ethernet

Standard RJ45 connector. Used for moving data in and out.

4.3   USB to PC

USB 2.0 Standard B.

4.4   Fuse

Standard 5x20 cartridge replaceable fuse.

4.5   RF/Antenna

The GS2000 has two RF Type N connectors, left is Rx, right is Tx.

4.6   5 V OUT

Hirose LF10WBR-4S connector, 5 V out. Can be used on the NanoCom AS2000 LNA (TMA-D unit).

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4.7 Fans

A control system keeps the PA cooled with two fans.

5 Absolute Maximum Ratings

Symbol	Description	Min.	Max.	Unit
V_{sup}	Supply voltage	26	30	V
P_i	Absolute maximum input power at receiver input		-10	dBm
T_{amb}	Operating Temperature	0	35	°C
T_{stg}	Storage Temperature	-40	85	°C
H	Humidity – none condensing	40	60	%
VSVR	Output Load VSWR		3:1	

6 Electrical Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit
V_{sup}	Supply voltage	26	28	30	V
I_{sup}	Supply current			5	A
Fuse			5		A

7 Physical Characteristics

Description	Value	Unit
Mass	Approx. 5400	g
Size (without power supply)	Standard 19" 2U size 483 x 304 x 88	mm

8 RF Characteristics

For further details view the GomSpace NanoCom SR2000 datasheet (gs-ds-nanocom-sr2000-x.y), it has the same transceiver characteristics.

8.1 Transmitter

Symbol	Description	Min.	Typ.	Max.	Unit
f	Frequency range[1]	2025		2110	MHz
R$_S$	Symbol data rate[2]	500		2000	kBaud
R$_b$	Bit data rate[3]	500		2000	kbps
P$_{out}$	Output power at RF connector		36		dBm
H	Harmonics @ P$_{out}$ = 20 W		-20	-15	dBc
Spur	Spurious Signals		-70	-60	dBc

8.2 Receiver

Symbol	Description	Min.	Typ.	Max.	Unit
f	Frequency range[4]	2200		2290	MHz
L$_{impl}$	Demodulator implementation loss[5][6]			0.35	dB
R$_S$	Symbol data rate[7]	500		2000	kBaud
R$_b$	Bit data rate[8]	500		2000	kbps
	Layer-3 UDP throughput[9]			1510	kbps (FDD)
	Layer-3 UDP throughput[10]			620	kbps (TDD)
	Round trip time[11]	34	40	57	ms (FDD)
	Round trip time[12]	44	152	272	ms (TDD)
R$_{AFC}$	AFC pull-in range	-R$_s$/4		+R$_s$/4	

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[1] For other frequency ranges, please contact GomSpace sales

[2] For other symbol rates, please contact GomSpace sales

[3] At a symbol rate of 2 MBaud

[4] For other frequency ranges, please contact GomSpace sales

[5] For $Eb/N0 \in [0, 12]$

[6] For Doppler 0 Hz/s

[7] For other symbol rates, please contact GomSpace sales

[8] At a symbol rate of 2 MBaud

[9] At a symbol rate of 2 MBaud

[10] At a symbol rate of 2 MBaud

[11] At a symbol rate of 2 MBaud

[12] At a symbol rate of 2 MBaud

9   GS2000 with other GomSpace Products

GomSpace offers a complete ground station system. The NanoCom AS100/AS2000 combined with the radio rack unit NanoCom GS100/GS2000 and the computer rack unit NanoCom MS100 is everything you need to connect and control your LEO satellite.
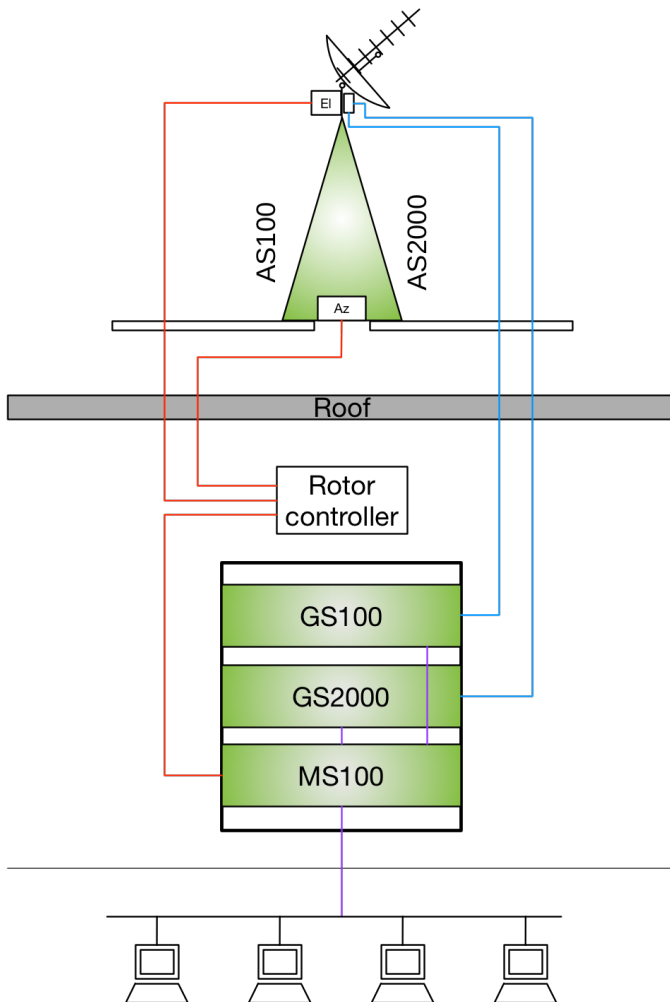
NanoCom AS100 or AS2000
GomSpace has two rooftop antennas, the AS100 with VHF and UHF and the AS2000 with UHF and S-Band

NanoCom GS100 and GS2000
Each of the rooftop antennas has their own 19" rack mounted radio unit that contains radio modules, placed on a special carrier board.

NanoCom MS100
A 19" rack mounted PC containing software relevant to controlling and communicating with a satellite. The unit has ethernet interface for remote access.

Software includes:
- Linux OS
- Rotor controller
- GSWeb – tools for housekeeping (optional)
- Tracker software to control antenna movement
- Doppler compensation for the radio
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