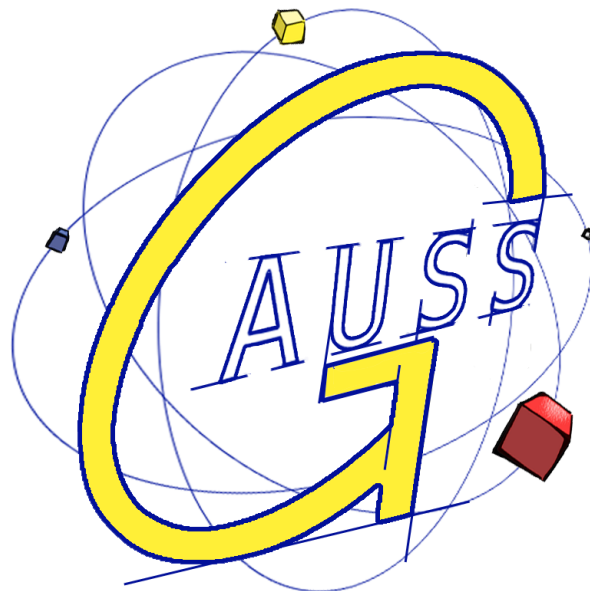


GAUSS Mini Ground Dongle UHF Radio

Datasheet

[Miniground_201802]



Group of Astrodynamics for the Use of Space Systems



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1. Introduction

GAUSS Mini Ground Dongle is a USB low power board to simulate your ground station safely on laboratory conditions.

The USB dongle integrates both a low power UHF transceiver and a TNC, thus miniaturizing common ground station rack systems.

It was designed to have an easy access to TT&C testing during final verifications and pre-integration periods but it can also be used on your ground station if an external power amplifier is added.

It is fully compatible with the GAUSS UHF Radio. The dongle comes with multi-platform software, therefore it can be used with any PC/Mac available at your lab. A special bundle includes both the Radio and the Mini Ground Dongle, for a quick system deployment.

1.1. Features

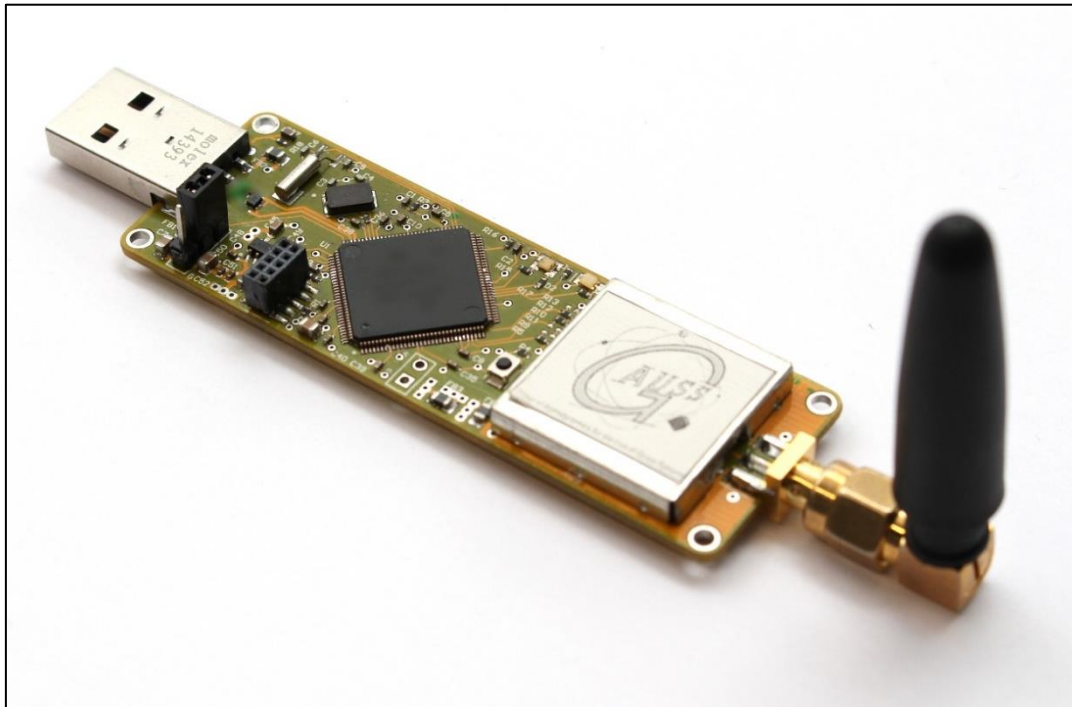


Figure 1 GAUSS Mini Ground Radio



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The primary features of the board are:

- Up to 15dBm of output power;
- UHF frequency band for TT&C;
- USB Interface with software and drivers for Windows, Linux and MAC;
- AX.25 protocol supported;
- FEC Viterbi k4 supported;
- Integrated TNC, radio can be interfaced using KISS;
- Transparent mode supported (radio behaves like the analog fronted and the user implements its own protocols);
- Data-rate: 300bps to 100kbps;
- Sensitivity: -122dBm @1.2kbps, -119dBm @9.6kbps, -109dBm @50kbps;
- GPIO for external output amplifier exciter;
- Firmware can be upgraded from PC;
- FSK/MSK/GFSK/GMSK modulations;
- Off the shelf industrial grade / automotive components;
- Full Compatibility with all GAUSS Radios;
- SMA connector for antenna;
- FEC Viterbi k7 & Reed-Solomon*;
- Speeds up to 250kbps (with 4GFSK)*.

* Features not currently supported but these functionalities will be provided with firmware upgrades.



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1.2. Block Diagram

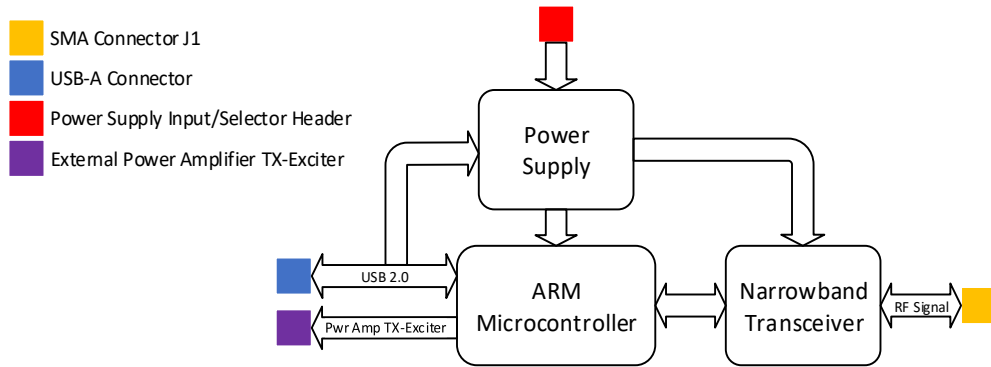


Figure 2 GAUSS Mini Ground Radio General Overview



2. Pinouts

Figure 3 shows the location of each connector, as well as the LEDs (D1 and D2) and the Reset button. Pinout information for these connectors can be found in Table 1.

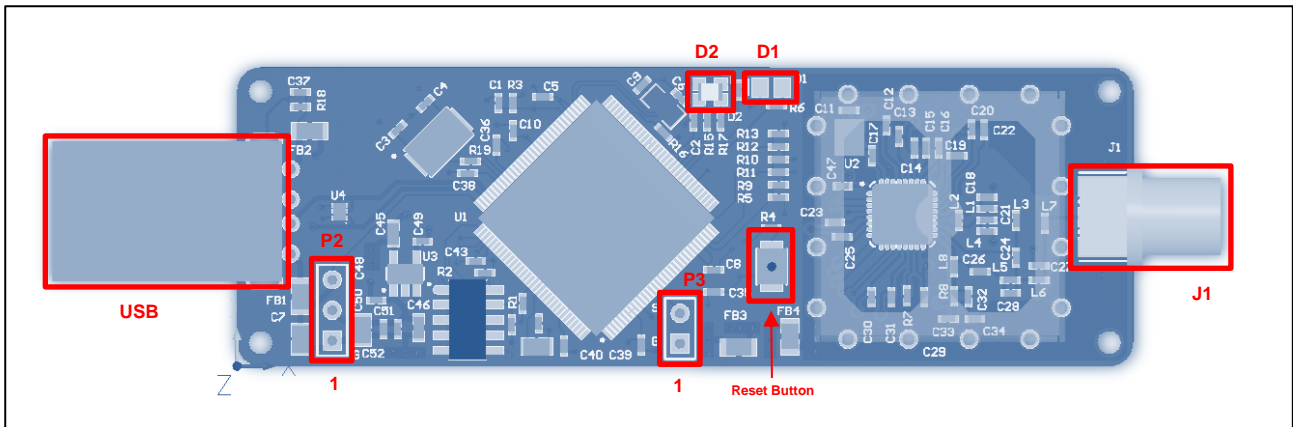


Figure 3 GAUSS Mini Ground Radio Available ports

Power to the Mini Ground Dongle can be provided by the USB port or externally through the power supply connector (P2). The power supply input is located on pin 2 (P2), which allows connection to an external power source (ground reference on pin 1), whereas power from USB is available on pin 3. Therefore, by shorting pins 2 and 3, USB power is routed to the power supply input, thus providing USB power to the Mini Ground Dongle. External Power Amplifier connector (P3) provides a TX-Exciter signal (or PTT) on pin 2, as well as the ground reference, labeled S and G respectively.

Connector	Connector Type	Pin	Board Label	Function
J1	SMA Jack ¹	-	-	RF Signal
J2	USB-A Plug	-	-	USB 2.0
P2	3-pin Header	1	G	Ground
		2	-	Power Supply V_{DD} (Input)
P3	2-pin Header	3	-	USB Power Supply (Output)
		1	G	Ground
		2	S	External Power Amplifier TX-Exciter Signal

Table 1 GAUSS Mini Ground Radio available ports pinout

¹ Standard-polarity SMA Female Connector (jack): female body (outside threads) and female receptacle (sleeve).



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3. Absolute Maximum Ratings

Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

$T_A = 25^{\circ}\text{C}$, unless otherwise noted.

Parameter *	Min	Max	Unit
Power Supply V_{DD} (on P2 connector)	-0.3	+7.0	V
Maximum Power Amplifier TX-Exciter current (on P3 connector)		64	mA
RF input level (on J1 connector)		+10	dBm
Storage temperature range	-40	+85	$^{\circ}\text{C}$

Table 2 GAUSS Mini Ground Radio Absolute Maximum Ratings

* Voltages refer to GND

4. General Recommended Operating Conditions

$T_A = 25^{\circ}\text{C}$, unless otherwise noted.

Parameter *	Min	Typ	Max	Unit
Power Supply V_{CC} (on P2 connector)	+4.0	+5.0	+6.5	V
Power Amplifier TX-Exciter output voltage (on P3 connector)	High-level	+2.4	+3.3	V
	Low-level		0	+0.4
Power Amplifier TX-Exciter current (on P3 connector)			2	mA
Temperature range	-40		+85	$^{\circ}\text{C}$

Table 3 GAUSS Mini Ground Radio Recommended Operating Conditions

* Voltages refer to GND



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5. RF Characteristics

T_A = 25°C, unless otherwise noted.

Parameter		Min	Typ	Max	Unit
Frequency band		390		500	MHz
Frequency Resolution	390-500 MHz		15		Hz
Data rate		0.3		100	kbps
Output Power		-11		+15 ²	dBm
Impedance				50	Ω
Saturation			+10		dBm
Sensitivity	0.3 kbps		-129		dBm
	1.2 kbps		-122		
	9.6 kbps		-119		
	50.0 kbps		-109		

Table 4 RF Characteristics

Conditions		Min	Typ	Max	Unit
300 bps	(adjacent channel) +6.25 kHz		65		dB
	(alternate channel) +12.5 kHz		66		
	±1 MHz		86		
	±2 MHz		90		
	±10 MHz		95		
1.2 kbps	(adjacent channel) +12.5 kHz		60		dB
	(alternate channel) ±25 kHz		61		
	±1 MHz		80		
	±2 MHz		85		
	±10 MHz		91		

Table 5 RF Characteristics - Blocking and Selectivity

² Power @ 433 MHz.



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6. Electrical Characteristics

Considering $V_{cc} = 5V$. $T_A = 25^\circ C$, unless otherwise noted.

Parameter	Condition	Peak	Unit
Current	Stand-by/Reception	85	mA
	Transmission @ 15 dBm	130	mA

Table 6 GAUSS Mini Ground Radio Electrical Characteristics

* With the provided test program



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7. Physical Characteristics and Drawings

Measure	Value
Mass including all connectors	14 g
External size including all connectors	75 x 25 x 12 mm

Table 7 GAUSS Mini Ground Radio Physical Characteristics

All dimensions are in mm.

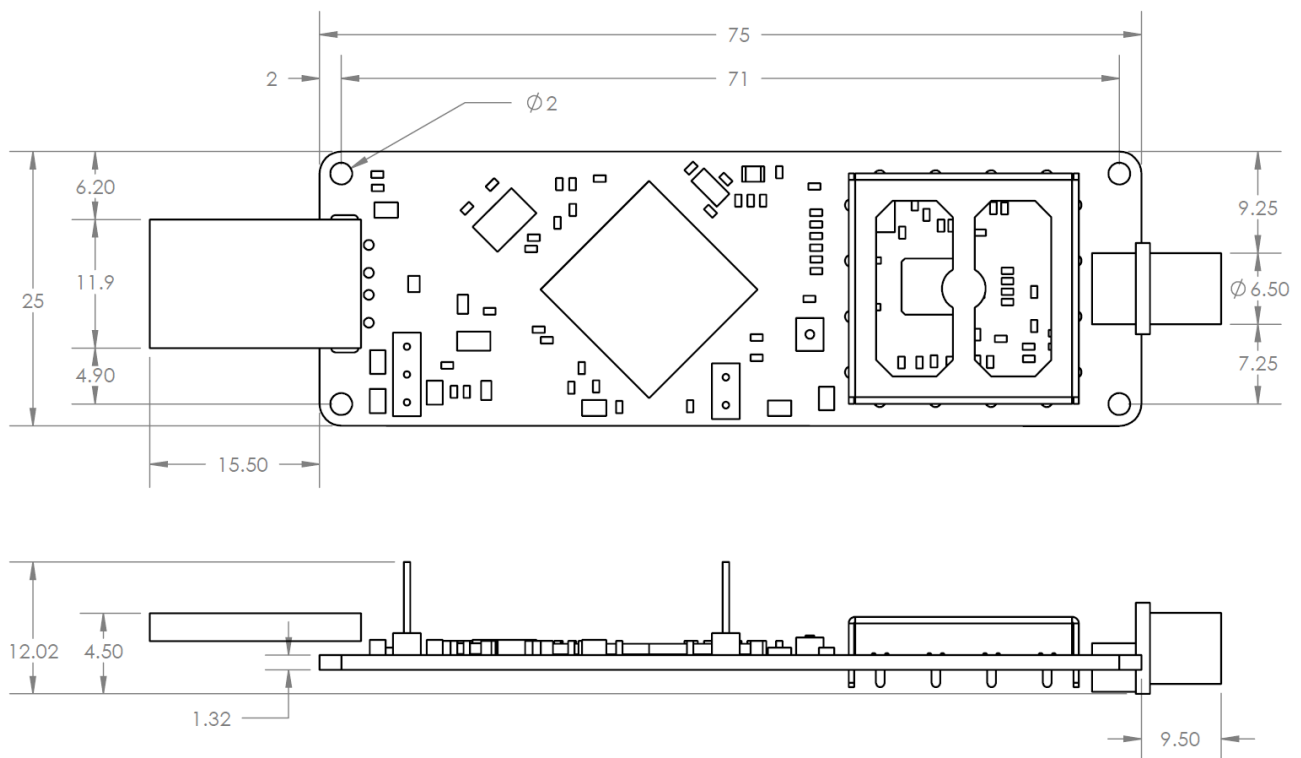


Figure 4 GAUSS Mini Ground Radio Physical Dimensions