

# SGM13001B

## Low Noise Amplifier for GNSS

### GENERAL DESCRIPTION

The SGM13001B high gain, low noise amplifier (LNA) is dedicated to GPS, GLONASS Galileo and Beidou standards. This product has an extremely low noise figure of 0.9dB, 18.3dB gain and excellent linearity.

The SGM13001B works under a 1.6V to 3.1V single power supply while consumes 6.5mA current, in power down (PD) mode, the power consumption will be reduced to less than 1 $\mu$ A.

The SGM13001B is available in a Green UTDFN-1.1 $\times$ 0.9-6L package, RoHS compliant and halogen free. When no external DC is applied, there is no need for external DC blocking capacitors, thus saving PCB area and cost.

### FEATURES

- **High Gain: 18.3dB**
- **Low Noise Figure 0.9dB at 1575.42MHz**
- **Low Operation Current: 6.5mA and PD Current Less than 1 $\mu$ A**
- **Operating Frequency Range: 1550MHz to 1615MHz**
- **Single Supply Voltage Range: 1.6V to 3.1V**
- **Low Cost BOM**
- **Lead-Free and RoHS Compliant**
- **Available in a Green UTDFN-1.1 $\times$ 0.9-6L Package**

### APPLICATIONS

Automotive Navigation  
 Personal Navigation Device (PND)  
 Cell Phone with GPS  
 MID/PAD with GPS

### BLOCK DIAGRAM

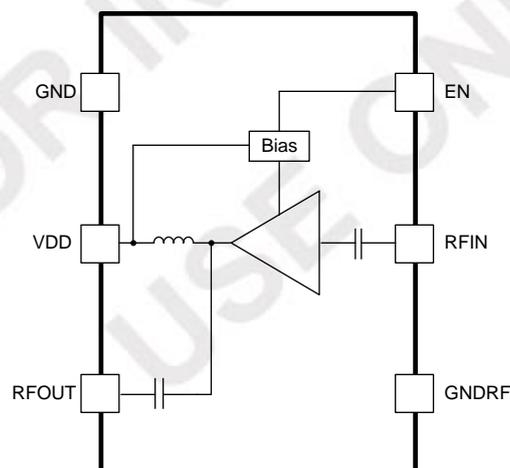


Figure 1. SGM13001B Block Diagram

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM13001B	UTDFN-1.1x0.9-6L	-40°C to +85°C	SGM13001BYUER6G/TR	ZZ	Tape and Reel, 5000

MARKING INFORMATION

NOTE: Fixed character for ZZ.

YY



Green (RoHS & HSF): PS Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your PSMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

- Supply Voltage, V<sub>DD</sub> .....-0.3V to 3.6V
- Other Pin to GND .....-0.3V to V<sub>DD</sub> + 0.3V
- RF Input Power, P<sub>IN</sub> .....10dBm
- Junction Temperature ..... +150°C
- Storage Temperature Range ..... -55°C to +150°C
- Lead Temperature (Soldering, 10s) ..... +260°C
- ESD Susceptibility
- HBM .....1000V
- MM .....100V
- CDM .....500V

RECOMMENDED OPERATING CONDITIONS

- Operating Temperature Range ..... -40°C to +85°C

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

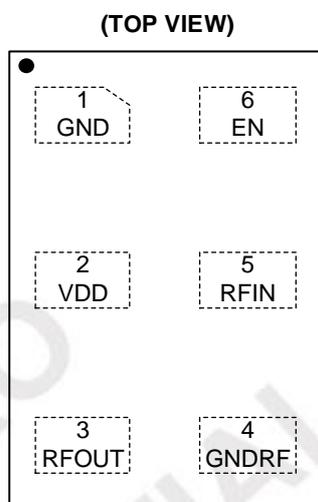
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. PSMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

PS Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

## PIN CONFIGURATION



UTDFN-1.1x0.9-6L

## PIN DESCRIPTION

PIN	NAME	FUNCTION
1	GND	Analog Ground.
2	VDD	Power Supply.
3	RFOUT	LNA Output.
4	GNDRF	RF Ground.
5	RFIN	LNA Input from Antenna.
6	EN	Active High Enable Input for the Device. Pull high enable, pull low into power down mode.

## ELECTRICAL CHARACTERISTICS

( $V_{DD} = 1.6V$  to  $3.1V$ ,  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ ,  $f = 1550MHz$  to  $1615MHz$ , typical values are at  $V_{DD} = 2.8V$ ,  $T_A = +25^{\circ}C$ ,  $f = 1575.42MHz$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>DC Specifications</b>						
Supply Voltage	$V_{DD}$		1.6		3.1	V
Supply Current	$I_{DD}$	EN = High		6.5		mA
	$I_{SD}$	EN = Low	0	0.2	1	$\mu A$
EN Input High	$V_{IH}$		1.35	1.8	$V_{DD}$	V
EN Input Low	$V_{IL}$		0	0	0.45	
<b>AC Specifications</b>						
RF Frequency Range	$f_0$	None		1575.42		MHz
Power Gain	S21		16.4	18.3	20.2	dB
Noise Figure	NF			0.9		dB
Input Return Loss	S11			-4		dB
Output Return Loss	S22			-15		dB
Reverse Isolation	S12	Sweep Power -30dBm, 1575.42MHz		-31		dB
Desense	$\Delta NF$	Jammed signal @ 1463MHz and 1712MHz, -20dBm		0.25		dB
Stability	Kf	Frequency range from 500MHz to 5GHz	1			
Input Power 1dB Compression Point	P1dB	1575.42MHz		-10		dBm
Input In-Band IP3	IIP3_inb	$f_1 = 1574.5MHz$ , $f_2 = 1575.5MHz$ , -30dBm		1		dBm
Input Out-Band IP3	IIP3_outb	$f_1 = 1712.7MHz$ , -20dBm, $f_2 = 1850MHz$ , -65dBm, $IP3 = (2 \times P1 + P2 + Gain_{1575MHz} - IM3)/2$		4		dBm

CONFIDENTIAL  
FOR INTERNAL USE ONLY

**ELECTRICAL CHARACTERISTICS (continued)**

( $V_{DD} = 1.6V$  to  $3.1V$ ,  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ ,  $f = 1550MHz$  to  $1615MHz$ , typical values are at  $V_{DD} = 1.8V$ ,  $T_A = +25^{\circ}C$ ,  $f = 1575.42MHz$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>DC Specifications</b>						
Supply Voltage	$V_{DD}$		1.6		3.1	V
Supply Current	$I_{DD}$	EN = High		6.3		mA
	$I_{SD}$	EN = Low	0	0.01	1	$\mu A$
EN Input High	$V_{IH}$		1.35	1.8	$V_{DD}$	V
EN Input Low	$V_{IL}$		0	0	0.45	
<b>AC Specifications</b>						
RF Frequency Range	$f_0$	None		1575.42		MHz
Power Gain	S21		16.0	17.8	19.6	dB
Noise Figure	NF			0.9		dB
Input Return Loss	S11			-4		dB
Output Return Loss	S22			-13		dB
Reverse Isolation	S12	Sweep Power -30dBm, 1575.42MHz		-30		dB
Desense	$\Delta NF$	Jammed signal @ 1463MHz and 1712MHz, -20dBm		0.25		dB
Stability	Kf	Frequency range from 500MHz to 5GHz	1			
Input Power 1dB Compression Point	P1dB			-15		dBm
Input In-Band IP3	IIP3_inb	$f_1 = 1574.5MHz$ , $f_2 = 1575.5MHz$ , -30dBm		-1		dBm
Input Out-Band IP3	IIP3_outb	$f_1 = 1712.7MHz$ , -20dBm, $f_2 = 1850MHz$ , -65dBm, $IP3 = (2 \times P1 + P2 + Gain_{1575MHz} - IM3)/2$		2		dBm

TYPICAL APPLICATION CIRCUIT

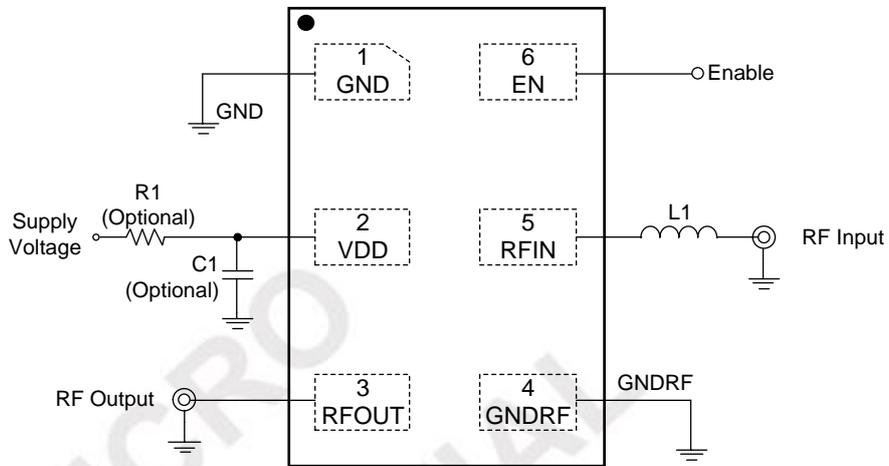


Figure 2. SGM13001B Typical Application Circuit

Table 1. SGM13001B Function Table

Component	Vendor	Type	Part Number & value
L1	Murata	Wired inductor, high Q	LQW15AN9N1, 9.1nH

EVALUATION BOARD LAYOUT

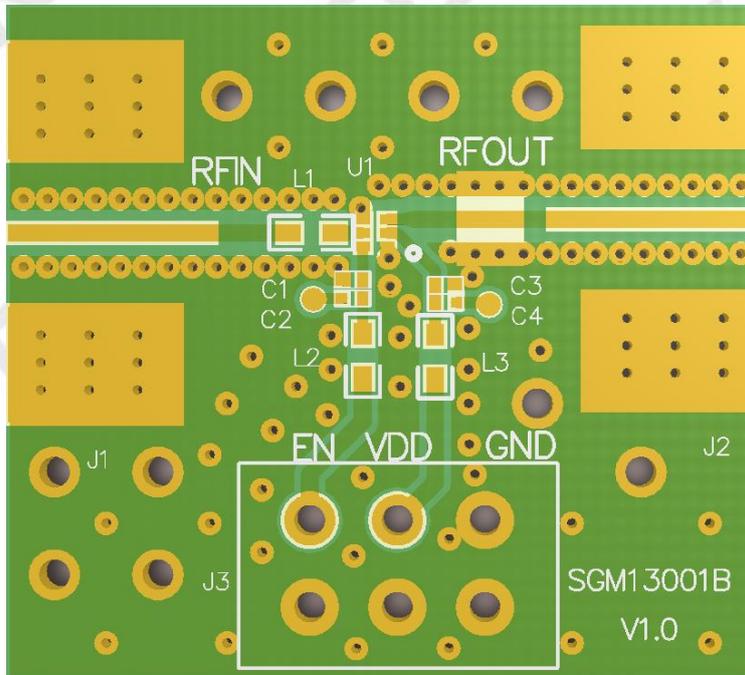


Figure 3. SGM13001B Evaluation Board Layout



For the latest specifications or product information:

**Website:** [www.ps-micro.com.cn](http://www.ps-micro.com.cn)

**Phone:** 86-21-50772230

**Email:** [info@ps-micro.com.cn](mailto:info@ps-micro.com.cn)

THE INFORMATION CONTAINED HEREIN IS BELIEVED TO BE RELIABLE. PSMICRO MAKES NO WARRANTIES REGARDING INFORMATION CONTAINED HEREIN. PSMICRO ASSUMES NO RESPONSIBILITIES OR LIABILITIES FOR THE USE OF THE INFORMATION CONTAINED HEREIN. THE INFORMATION CONTAINED HEREIN IS PROVIDED "AS IS, WHERE IS", AND THE ENTIRE RISK ASSOCIATED WITH SUCH INFORMATION IS ENTIRELY WITH THE USER. ALL INFORMATION CONTAINED HEREIN IS SUBJECT TO CHANGE WITHOUT NOTICE. THE INFORMATION CONTAINED HEREIN OR ANY USE OF SUCH INFORMATION DOES NOT GRANT, EXPLICITLY OR IMPLICITLY TO ANY PARTY ANY PATENT RIGHTS, LICENSES, OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS, WHETHER WITH REGARD TO SUCH INFORMATION ITSELF OR ANYTHING DESCRIBED BY SUCH INFORMATION.

PSMICRO products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.

Copyright 2021, 2022 © PS Micro Corp | All rights reserved | Weedspread is a registered trademark of PS Micro Corp

PSMICRO  
CONFIDENTIAL  
FOR INTERNAL  
USE ONLY