SGM13001C
Low Noise Amplifier for GNSS

GENERAL DESCRIPTION

The SGM13001C high gain, low noise amplifier (LNA) is dedicated to GPS, GLONASS Galileo and Beidou standards. This product has an extremely low noise figure of 0.83dB, 19.1dB gain and excellent linearity.

The SGM13001C works under a 1.6V to 3.1V single power supply while consumes 6.4mA current, in power down (PD) mode, the power consumption will be reduced to less than 1μA.

The SGM13001C is available in a Green TDFN-1.5×1.0-6L 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: 19.1dB**
- **Low Noise Figure 0.83dB at 1575.42MHz**
- **Low Operation Current: 6.4mA and PD Current Less than 1μA**
- **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 TDFN-1.5×1.0-6L Package**

APPLICATIONS

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

BLOCK DIAGRAM

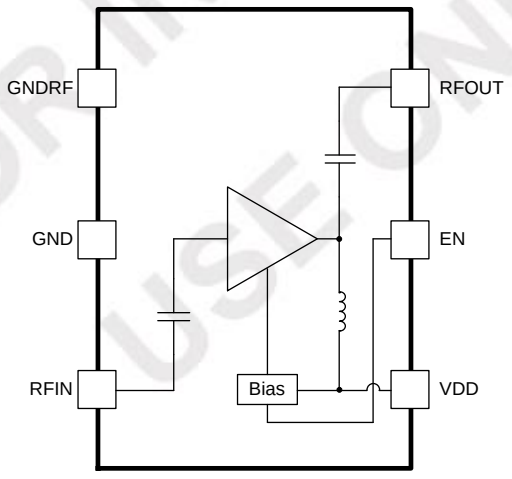


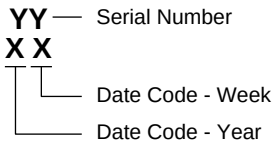
Figure 1. SGM13001C Block Diagram

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM13001C	TDFN-1.5×1.0-6L	-40℃ to +85℃	SGM13001CYTEQ6G/TR	0G XX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XX = Date Code.



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_{DD} ..... -0.3V to 3.6V
Other Pin to GND ..... -0.3V to V_{DD} + 0.3V
RF Input Power, P_{IN} 10dBm
Junction Temperature ..... +150℃
Storage Temperature Range ..... -55℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 3000V
MM 150V
CDM 500V

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range ..... -40℃ to +85℃

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

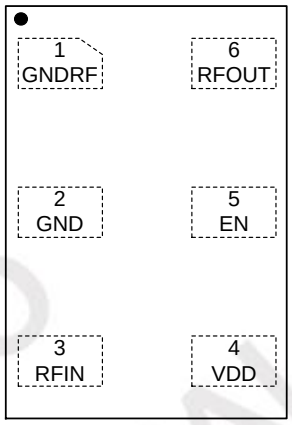
This integrated circuit can be damaged if ESD protections are not considered carefully. PSMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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

(TOP VIEW)



TDFN-1.5×1.0-6L

PIN DESCRIPTION

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

ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC Specifications						
Supply Voltage	V_{DD}		1.6		3.1	V
Supply Current	I_{DD}	EN = High		6.4		mA
	I_{SD}	EN = Low	0	0.2	1	μA
EN Input High	V_{IH}		1.35	1.8	V_{DD}	V
EN Input Low	V_{IL}		0	0	0.45	
AC Specifications						
RF Frequency Range	f_0	None		1575.42		MHz
Power Gain	S21			19.1		dB
Noise Figure	NF			0.83		dB
Input Return Loss	S11			-4		dB
Output Return Loss	S22			-11		dB
Reverse Isolation	S12	Sweep Power -30dBm, 1575.42MHz		-27		dB
Desense	ΔNF	Jammed signal @ 1463MHz and 1712MHz, -20dBm		0.25		dB
Stability	Kf	Frequency range from 500MHz to 5GHz	1			
Input Power 1dB Compression Point	P1dB	1575MHz		-12		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 × P1 + P2 + Gain1575MHz - IM3)/2		3		dBm

ELECTRICAL CHARACTERISTICS (continued)

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

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC Specifications						
Supply Voltage	V_{DD}		1.6		3.1	V
Supply Current	I_{DD}	EN = High		6.3		mA
	I_{SD}	EN = Low	0	0.1	1	μA
EN Input High	V_{IH}		1.35	1.8	V_{DD}	V
EN Input Low	V_{IL}		0	0	0.45	
AC Specifications						
RF Frequency Range	f_0	None		1575.42		MHz
Power Gain	S21			18.6		dB
Noise Figure	NF			0.84		dB
Input Return Loss	S11			-4		dB
Output Return Loss	S22			-11		dB
Reverse Isolation	S12	Sweep Power -30dBm, 1575.42MHz		-27		dB
Desense	ΔNF	Jammed signal @ 1463MHz and 1712MHz, -20dBm		0.25		dB
Stability	Kf	Frequency range from 500MHz to 5GHz	1			
Input Power 1dB Compression Point	P1dB			-17		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 × P1 + P2 + Gain1575MHz - IM3)/2		1		dBm

TYPICAL APPLICATION CIRCUIT

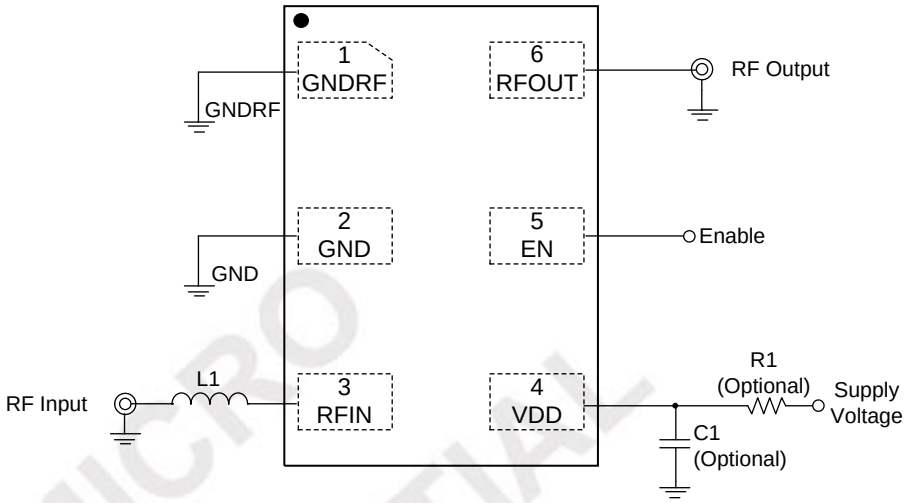


Figure 2. SGM13001C Typical Application Circuit

Table 1. SGM13001C Function Table

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

EVALUATION BOARD LAYOUT

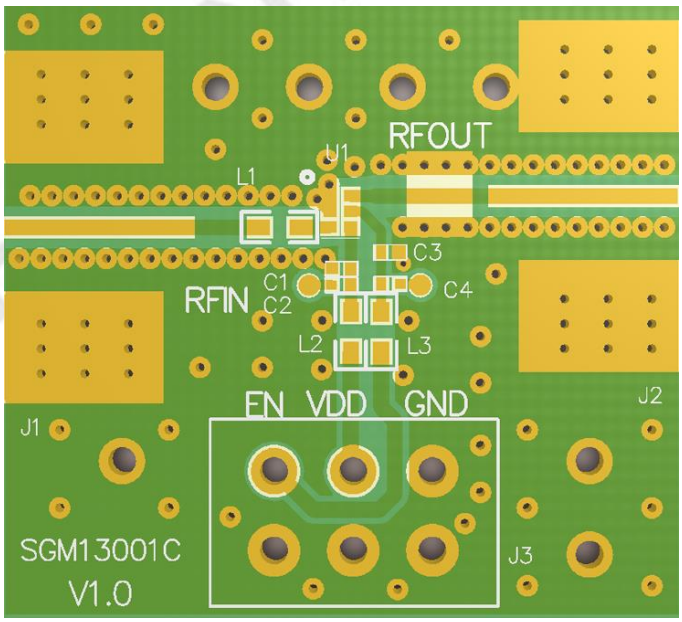


Figure 3. SGM13001C Evaluation Board Layout

For the latest specifications or product information:

Website: www.ps-micro.com.cn

Phone: 86-21-50772230

Email: info@ps-micro.com.cn