

SK5119D LNA for Global Navigation Satellite System (GNSS) with High Gain

GENERAL DESCRIPTION

The SK5119D is a high-gain, low-noise amplifier (LNA) designed for GPS, Galileo, Glonass and Beidou GNSS applications. The LNA achieves 23.7dB gain and 0.85dB noise figure at 1.575GHz.

The SK5119D sits on a small form factor PCB space. It can operate from a 1.6V to 3.6V single supply and draws only 6mA DC current. The shutdown leakage current is only 1uA.

The SK5119D is available in DFN1.5X1.0-6 package.

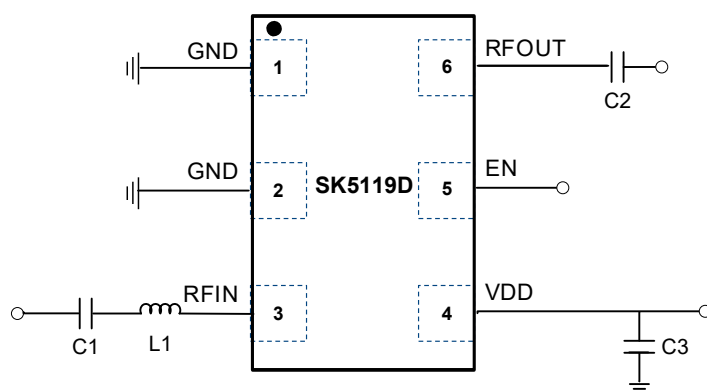
FEATURES

- Working frequency:1550MHz~1620MHz
- High-power gain of 23.7dB
- Ultra-low-noise figure of 0.85dB
- Integrated 50Ω output matching circuit
- Low-power of 6mA operated from a single 1.6V to 3.6V voltage line
- Lead-free and RoHS-compliant package
- High integration with few off-chip BOM and low cost
- Temperature from -40°C to 85°C range

APPLICATIONS

- PNDs (Personal Navigation Devices)
- Location-Enabled MID
- PMPs (Personal Media Players)
- Automobile Navigation Systems
- GNSS tracking systems
- GNSS industrial applications
- Software GPS
- iPad like Mobile PCs

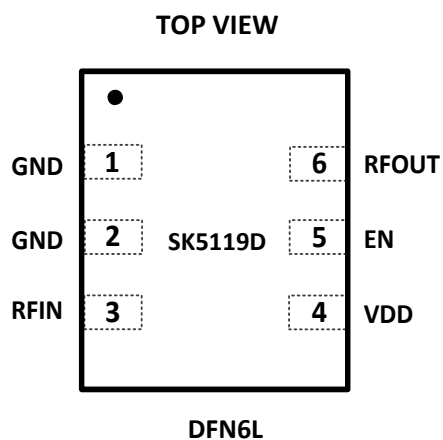
TYPICAL APPLICATION CIRCUIT



Recommended Components	Symbol	Size	Value	Unit
Capacitor	C1	0402	100	pF
Inductor	L1	0402	8.2	nH
Capacitor	C2	0402	100	pF
Capacitor	C3	0402	1.0	uF

These component values are for reference only and are subject to change with customer specific PCB layout design.

PIN CONFIGURATION



PIN DESCRIPTION

Pin No.	Name	Description	Connection
6	RFOUT	RF Output	Requires a DC-blocking capacitor.
5	EN	Enable pin	A logic-low disables the device.
4	VDD	power supply for LNA	Supply Voltage.
3	RFIN	RF Input	Requires a DC-blocking capacitor and external matching components.
2	GND	Ground connection	Main IC GND connection
1	GND	Ground connection	Main IC GND connection

ORDERING INFORMATION

Part Number	Temperature	Package	Tape and Reel
SK5119D	-40°C ~ 85°C	1.5mm x 1.0 mm x 0.55mm DFN-6L	5000

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Test Conditions	Min	Max	Unit
Supply Voltage	VDD	$T_A = +25^{\circ}\text{C}$		4.0	V
Power Down Voltage	V_{PD_EN}	$T_A = +25^{\circ}\text{C}$		4.0	V
LNA Max RF Input Power	P_{in}			10	dBm
ESD: HBM, 150pF/1.5K Ω	-		4.0		kV
Storage Temperature	T_{STG}		-40	+150	$^{\circ}\text{C}$
Solder Reflow Temperature	T_{SLDR}			+260	$^{\circ}\text{C}$

Note: This device should be handled with care within the above stress ratings. This IC has ESD protection circuits within but must be handled and assembled according to the industry practice and at the ESD protected work platforms.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min.	Typ.	Max.	Unit
Ambient Operating Temperature	T_A	-40	+25	+85	$^{\circ}\text{C}$
Supply Voltage	VDD	1.6	2.7	3.6	V
Power Down Turn-on Voltage	V_{PDOn}	1.2	-	VDD	V
Power Down Turn-off Voltage	V_{PDOff}	0	-	0.4	V

ELECTRICAL CHARACTERISTICS

$T_A = +25^{\circ}\text{C}$, VDD = $V_{PD_EN} = 2.7\text{V}$, $f_{in} = 1575.42\text{MHz}$, unless otherwise specified

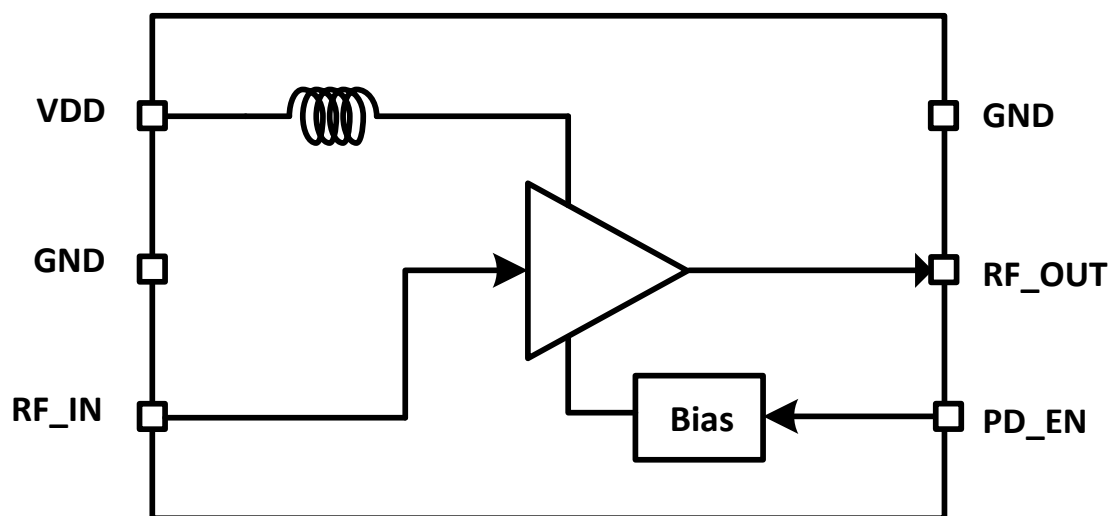
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
circuit current	I_{cc}	No Signal	5.0	6.0	7.5	mA
Power Gain	G_p	$P_{in} = -35\text{dBm}$	22.0	23.7	25.5	dB
Noise Figure	NF		-	0.85	1.25	dB
Input Return Loss	RL_{in}		-	8.5	-	dB
Output Return Loss	RL_{out}		-	10	-	dB

STANDARD CHARACTERISTICS FOR REFERENCE

($T_A = +25^{\circ}\text{C}$, VDD = $V_{PD_EN} = 2.7\text{V}$, $f_{in} = 1575.42\text{MHz}$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Reference	Unit
Isolation	ISL		47	dB
Input 3rd Order Distortion Intercept Point	IIP3	$f_{in1} = 1575\text{MHz}$, $f_{in2} = 1$	-12	dBm
Gain 1 dB Compression Input Power	$P_{in}(1\text{dB})$	574 MHz	-23	dBm

BLOCK DIAGRAM



RECOMMENDED REFLOW PROFILE

Profile Feature	Pb-Free Assembly
Preheat & Soak	
Temperature min (T _{min})	150°C
Temperature max (T _{max}) Time	200°C
(T _{min} to T _{max})(ts)	60-120 seconds
Average ramp-up rate (T _{max} to T _p)	3°C/second max.
Liquidous temperature	217°C
(TL) Time at liquidous (tL)	60-150 seconds
Peak package body temperature (T _p) *	See classification temp in Table 1
Time (tp)** within 5°C of the specified classification temperature (T _c)	30**seconds
Average ramp-down rate (T _p to T _{max})	6°C/second max.
Time 25°C to peak temperature	8 minutes max.

Note:

- (1)Tolerance for peak profile temperature (TP) is defined as a supplier minimum and a user maximum.
 (2)Tolerance for time at peak profile temperature (tp) is defined as a supplier minimum and a user maximum.

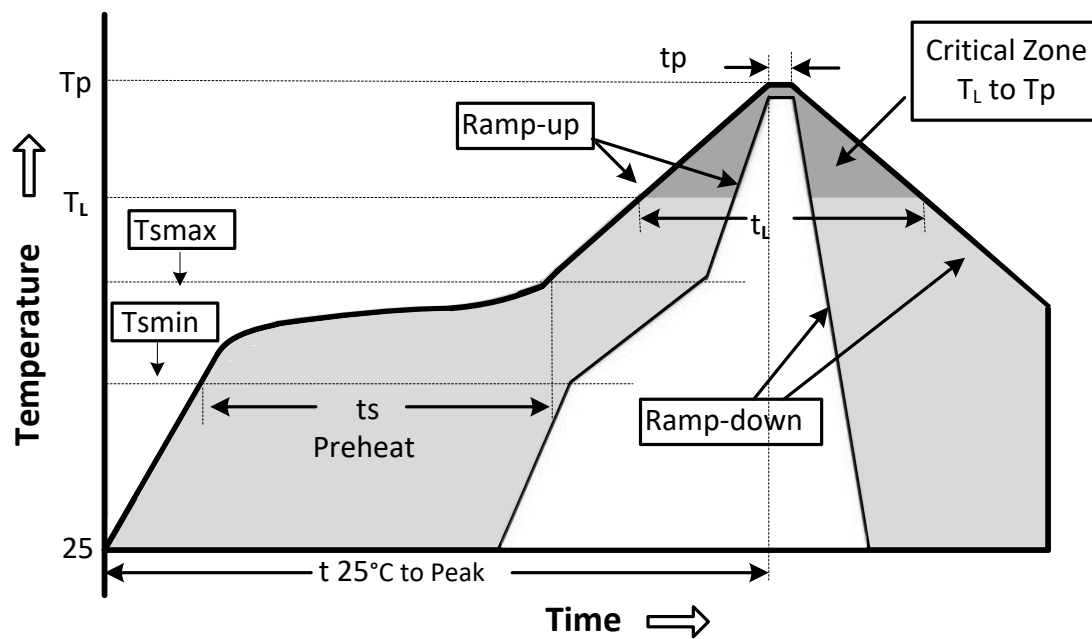
Remark:

- (1)All temperatures refer to the package body surface temperature. The highest temperature of reflow profile can not exceed 265°C.
 (2)All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow (e.g., live-bug). If parts are reflowed in other than the normal live-bug assembly reflow orientation (i.e., dead-bug), T_p shall be within ±2°C of the live-bug T_p and still meet the T_c requirements, otherwise, the profile shall be adjusted to achieve the latter. To accurately measure actual peak package body temperatures refer to JEP140 for recommended thermocouple use.
 (3)Reflow profiles in this document are for classification/preconditioning and are not meant to specify board assembly profiles. Actual board assembly profiles should be developed based on specific process needs and board designs and should not exceed the parameters.
 (4)All components in the test load shall meet the classification profile requirements.
 (5)SMD packages classified to a given moisture sensitivity level by using Procedures or Criteria defined within any previous version of J-STD-020, JESD22-A112 (rescinded), IPC-SM-786 (rescinded) do not need to be reclassified to the current revision unless a change in classification level or a higher peak classification temperature is desired.

Table1. Pb-Free Process – Classification Temperatures (T_c)

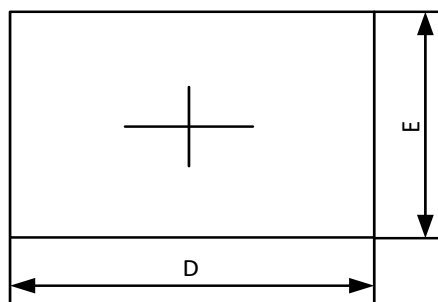
Package Thickness	Volume mm ³ < 350	Volume mm ³ 350 - 2000	Volume mm ³ > 2000
< 1.6 mm	260°C	260°C	260°C
1.6 mm - 2.5 mm	260°C	250°C	245°C
> 2.5 mm	250°C	245°C	245°C

REFLOW PROFILE

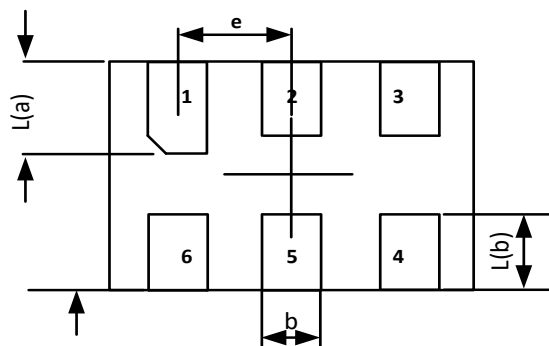


The reflow profile shown above should not be exceeded, since excessive temperatures or transport times during reflow can damage the chip.

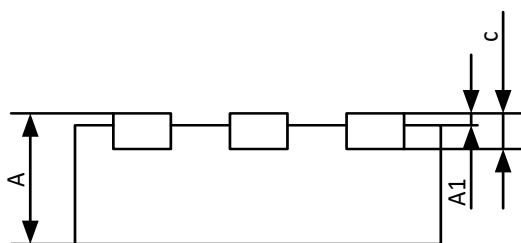
PACKAGE DIMENSIONS: DFN1.5X1.0-6L



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Unit: mm

symbol	Dimensions In Millimeters		
	Min.	Nor.	Max.
A	-	0.550	-
A1	-	0.025	-
D	-	1.500	-
E	-	1.000	-
L(a)	-	0.400	-
L(b)	-	0.350	-
c	0.05		
b	-	0.200	-
e	0.500		