Applications

- IEEE802.11a,n OFDM WLAN

Features

- Integrates SP2T Switch and LNA with by-pass mode
- 14 dB gain,
- 2.0 dB NF
- 0.8 dB loss on TX to ANT path
- 3x3x0.9mm, QFN Package, MSL 1
- 30dBm Maximum power at TX input
- Lead free, Halogen free and RoHS compliant

Product Description

The SE5008L is a single chip integrated front-end module (FEM) with a low noise amplifier and switch to complement WLAN chipsets with an integrated 5GHz Power Amplifier. The Low Noise Amplifier includes a bypass mode to avoid saturation in near-field applications. It is packaged in an compact 3mm x 3mm x 0.9mm QFN package. The LNA output is matched to 50 ohms and all ports are DC blocked.

Ordering Information

Part No.	Package	Remark
SE5008L	QFN	Samples
SE5008L-R	QFN	Tape and Reel
SE5008L-EK1	N/A	Evaluation kit

Functional Block Diagram

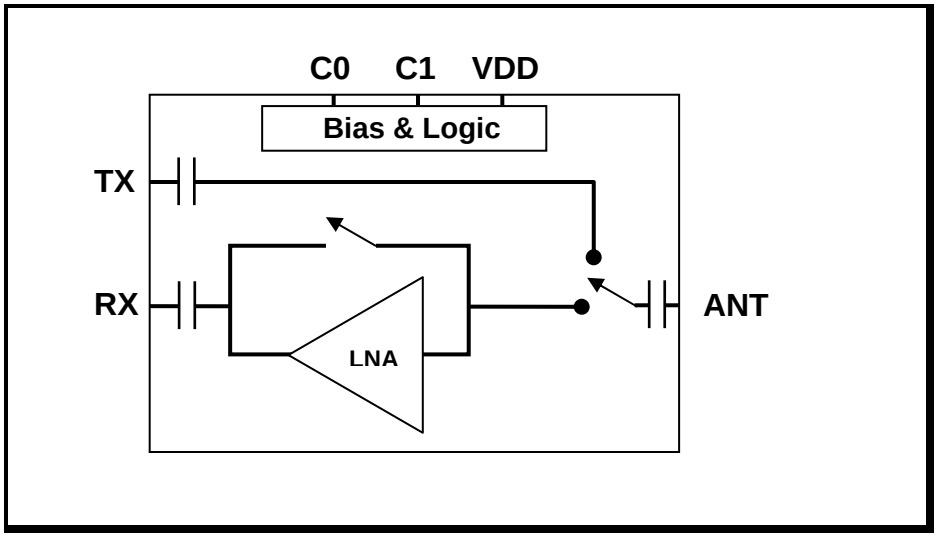

Figure 1: Functional Block Diagram

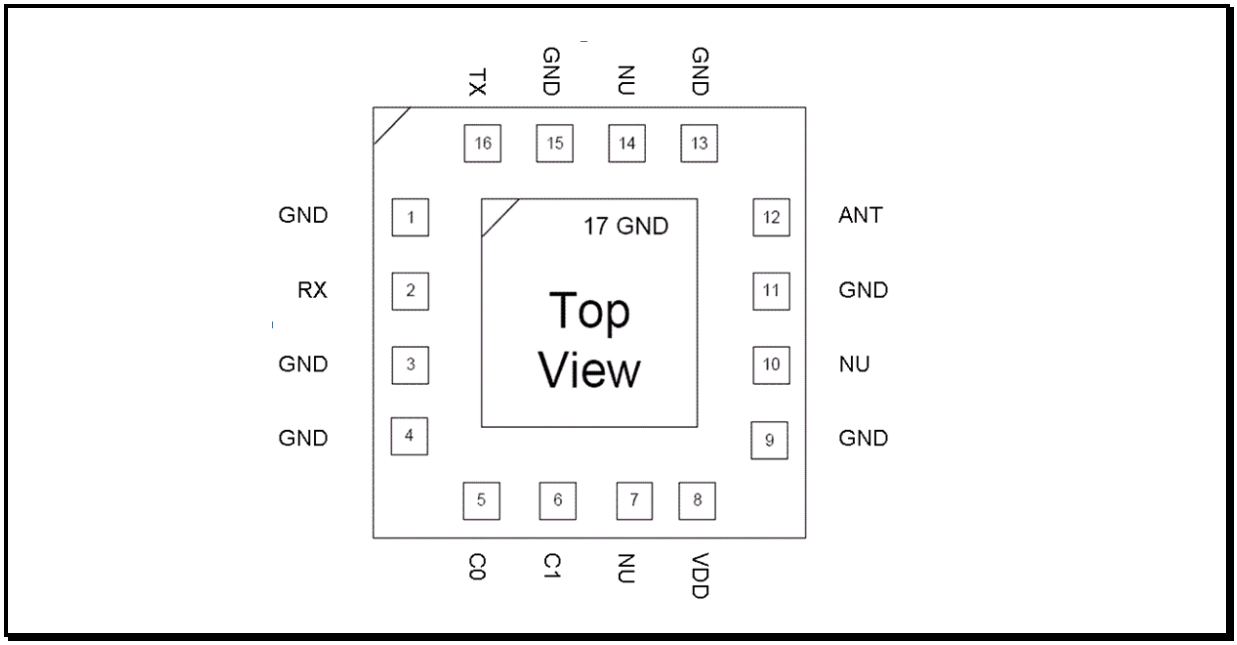

Figure 2: Pin Out Block Diagram

Pin Out Description

Pad	Label	Function
1	GND	Ground
2	RX	WLAN Receive port
3	GND	Ground
4	GND	Ground
5	C0	Switch Control Pin
6	C1	Switch Control Pin
7	NU	Not used (do not connect to signal or GND)
8	VDD	Positive power supply voltage
9	GND	Ground
10	NU	Not used (do not connect to signal or GND)
11	GND	Ground
12	ANT	Antenna Port
13	GND	Ground
14	NU	Not used (do not connect to signal or GND)
15	GND	Ground
16	TX	WLAN Transmit Port

Absolute Maximum Ratings

These are stress ratings only. Exposure to stresses beyond these maximum ratings may cause permanent damage to, or affect the reliability of the device. Avoid operating the device outside the recommended operating conditions defined below. This device is ESD sensitive. Handling and assembly of this device should be at ESD protected workstations.

Symbol	Definition		Min.	Max.	Unit
Vdd	Supply Voltage on Vdd		0	3.6	V
$EN_{, cc}$	DC input on control pins		-0.5	Vdd+0.5	V
P_{TXIN}	TX Input Power, ANT terminated in 50Ω match		-	30	dBm
T_A	Operating Temperature Range		-40	85	°C
T_{STG}	Storage Temperature Range		-40	150	°C
ESD_{HBM}	JEDEC JESD22-A114	Antenna Pin	-	1000	V
		All other pins	-	500	

Recommended Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
T_A	Ambient temperature	-40	25	85	°C
V_{dd}	Supply voltage, relative to GND = 0 V	3.0	3.3	3.6	V
C0, C1	Control voltage, relative to GND = 0 V	0	-	Vdd	V

DC Electrical Characteristics

Conditions: V_{dd} = 3.3 V, T_A = 25 °C, as measured on SiGe SE5008L EK1 evaluation board (de-embedded to device), all unused ports terminated with 50 ohms, unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{dd}	LNA current	Gain mode	-	13	16	mA
I_{dd}	LNA current	Bypass mode		19	70	µA
I_{ON}	LNA control current	C0, C1	-	1	5	uA
VIH	Logic input high		Vdd-0.3		3.6	V
VIL	Logic input low		0		0.3	V

Control Logic Table

Mode#	Mode Description	C0	C1
0	RX Bypass	0	0
1	LNA Enable	0	1
2	TX Enable	1	0
3	All Off	1	1

AC Electrical Characteristics

Transmit Characteristics (ANT-TX port)

Conditions: V_{dd} = C0 = 3.3 V, C1 = 0V, T_A = 25 °C, as measured on SiGe Semiconductor's SE5008L EK1 evaluation board (de-embedded to device), all unused ports terminated with 50 ohms, unless otherwise noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
F_{OUT}	Frequency Range	-	4900	-	5850	MHz
TX_{IL}	Insertion Loss	-	-	0.8	0.9	dB
P_{IN}	Maximum Input power	Harmonic Contribution from SW or LNA < -50dBm/Mhz OFDM, 54Mbps	-	-	30	dBm
S_{11}	Input Return Loss	-	-	-13	-10	dB
S_{22}	Output Return Loss	-	-	-13	-10	dB
$ISOL_{SW}$	Switch Isolation	TX to RX Isolation, Bypass mode	-	36	-	dB
IP1dB	Input P1dB	-	35		-	dBm

Receive Characteristics (RF- RX port)

Conditions: V_{dd} = C1 = 3.3 V, C0 = 0 V, T_A = 25 °C, as measured on SiGe Semiconductor's SE5008L EK1 evaluation board, all unused ports terminated with 50 ohms, unless otherwise noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
F_{OUT}	Frequency Range	-	4900	-	5850	MHz
S_{21}	Receive Gain, LNA enabled.		13	14	-	dB
NF	Noise Figure	De-embedded to device	-	2.2	2.5	dB
S_{11}	Input Return Loss		-	-9	-7.5	dB
S_{22}	Output Return Loss		-	-10	-6	dB
IP1dB	Input P1dB		-5	-3	-	dBm
Rx_2.4int	Max 2.4Ghz interferer power	1 dB degradation of IP1DB	-	-	0	dBm
S21-BYP	Receive Gain, LNA bypassed	EN = 0 V	-6	-5	-4	dB

Package Drawing

This package is Pb free and RoHS compliant. The product is also rated MSL1.

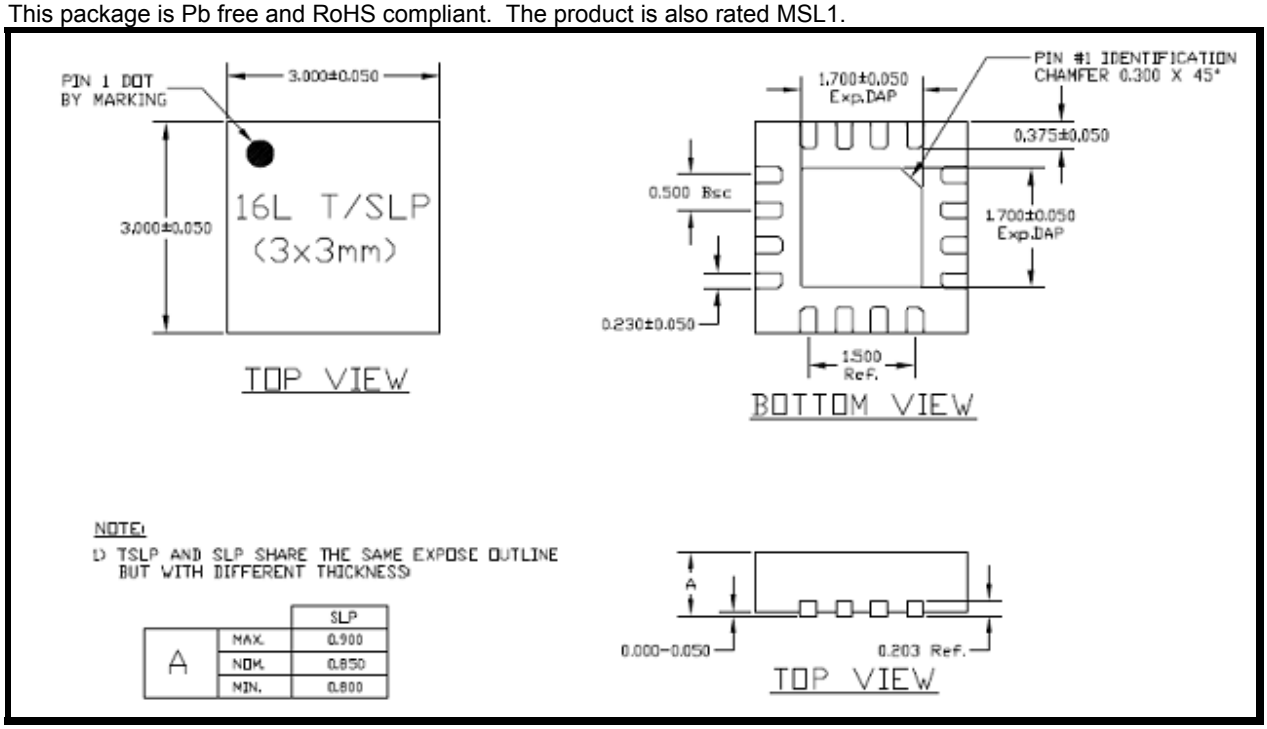

Figure 3: SE5008L Package Diagram

Recommended Land and Solder Patterns

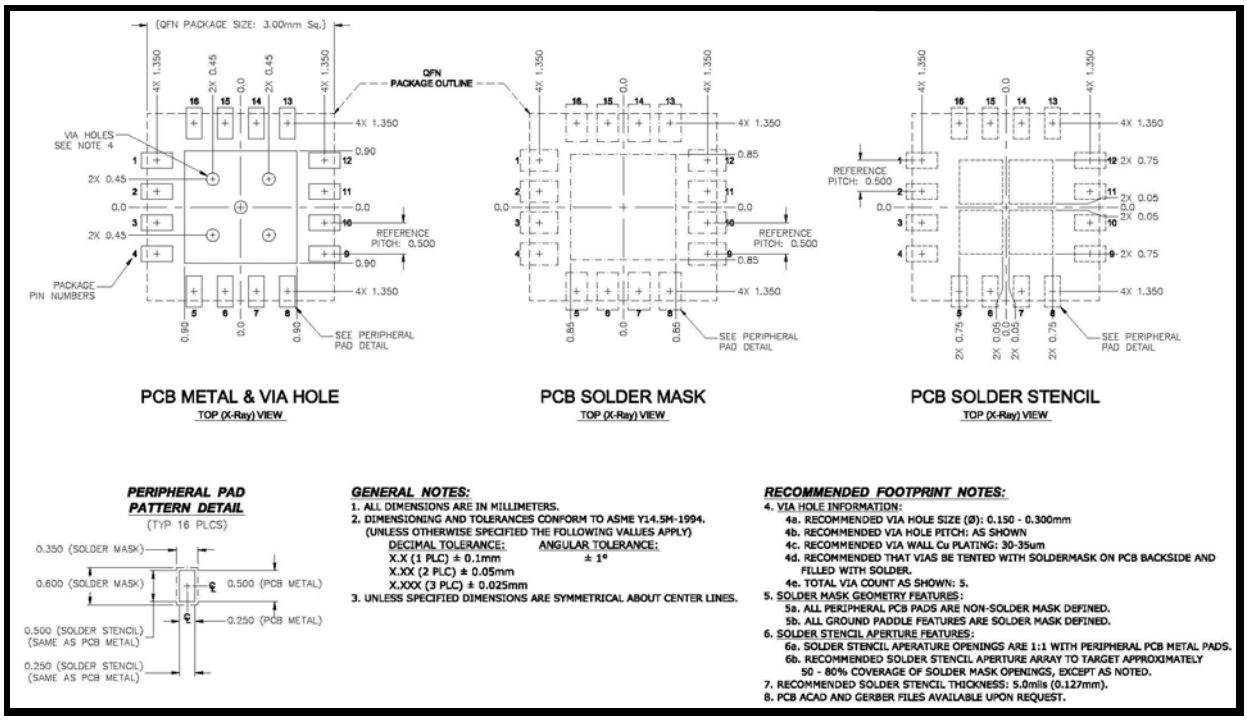

Figure 4: SE5008L Recommended Land and Solder Pattern

Package Handling Information

Because of its sensitivity to moisture absorption, instructions on the shipping container label must be followed regarding exposure to moisture after the container seal is broken, otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly. The SE5008L is capable of withstanding a Pb free solder reflow. Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. If the part is manually attached, precaution should be taken to insure that the device is not subjected to temperatures above its rated peak temperature for an extended period of time. For details on both attachment techniques, precautions, and handling procedures recommended by SiGe, please refer to:

- SiGe's Application Note: "Quad Flat No-Lead Module Solder Reflow & Rework Information", *Document Number QAD-00045*
- SiGe's Application Note: "Handling, Packing, Shipping and Use of Moisture Sensitive QFN", *Document Number QAD-00044*

Caution! Class 1B ESD sensitive device

Branding Information

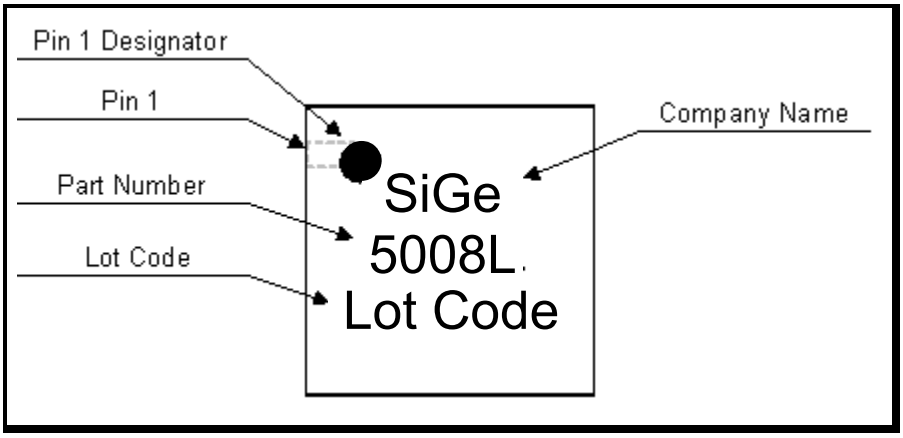

Figure 5: SE5008L Branding

Tape and Reel Information

Parameter	Value
Devices Per Reel	3000
Reel Diameter	13 inches
Tape Width	12 millimeters

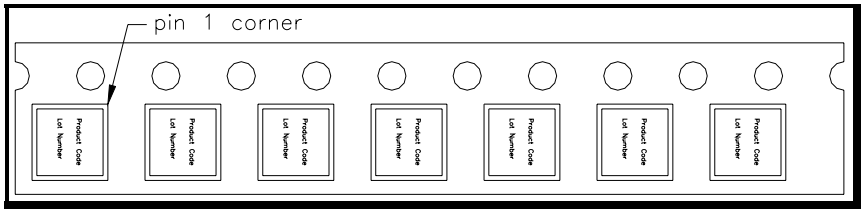

Figure 6: SE5008L-R Tape and Reel Information

Document Change History

Revision	Date	Notes
1.0	Jun 28, 2010	Created
1.1	Feb 03, 2011	Updated ESD rating. Update specifications to comply with the DVT results.
1.2	Apr 5, 2011	Added Maximum Input Power
1.3	Oct 29, 2011	Update max input power Update max 2.4Ghz interferer power

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