

**DATA SHEET**  
**SE5008L: 5 GHz WLAN Switch/LNA Front-End**

**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**

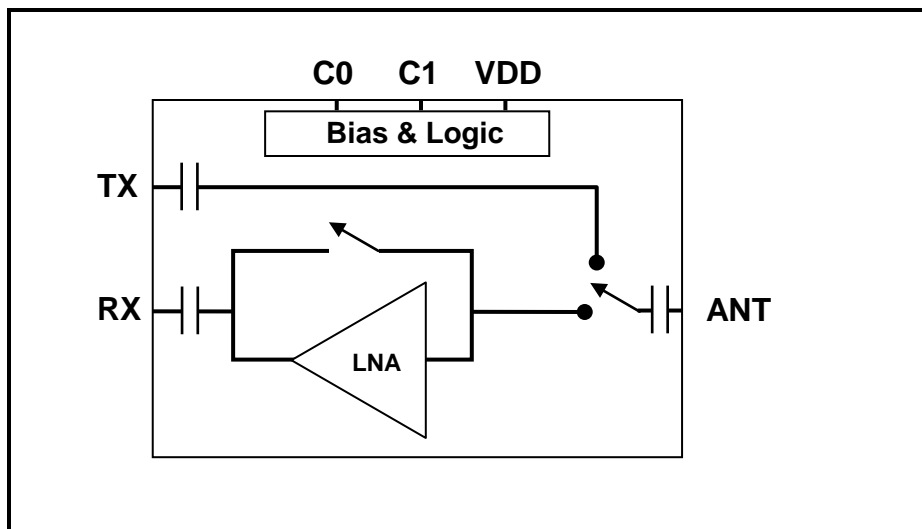
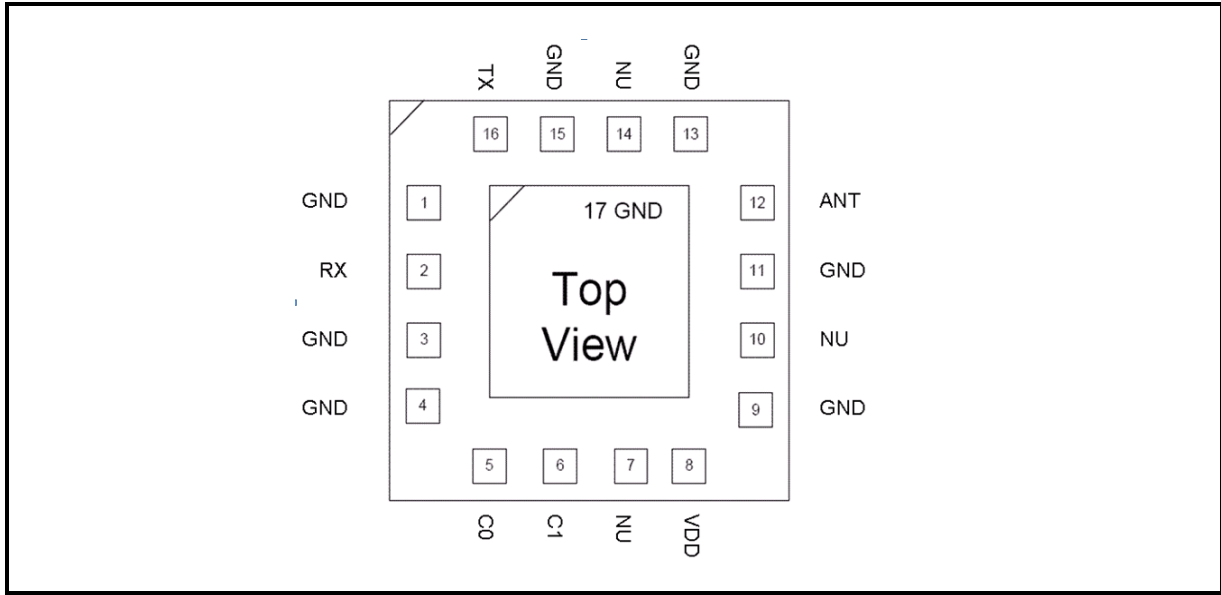


Figure 1: Functional Block Diagram

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**Pin Out 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

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**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	
V <sub>dd</sub>	Supply Voltage on V <sub>dd</sub>	0	3.6	V	
EN <sub>,cc</sub>	DC input on control pins	-0.5	V <sub>dd</sub> +0.5	V	
P <sub>TXIN</sub>	TX Input Power, ANT terminated in 50Ω match	-	30	dBm	
T <sub>A</sub>	Operating Temperature Range	-40	85	°C	
T <sub>STG</sub>	Storage Temperature Range	-40	150	°C	
ESD <sub>HBM</sub>	JEDEC JESD22-A114	Antenna Pin	-	1000	V
		All other pins	-	500	

**Recommended Operating Conditions**

Symbol	Parameter	Min.	Typ.	Max.	Unit
T <sub>A</sub>	Ambient temperature	-40	25	85	°C
V <sub>dd</sub>	Supply voltage, relative to GND = 0 V	3.0	3.3	3.6	V
C0, C1	Control voltage, relative to GND = 0 V	0	-	V <sub>dd</sub>	V

**DC Electrical Characteristics**

Conditions: V<sub>dd</sub> = 3.3 V, T<sub>A</sub> = 25 °C, as measured on Skyworks 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 <sub>dd</sub>	LNA current	Gain mode	-	13	16	mA
I <sub>dd</sub>	LNA current	Bypass mode		19	70	μA
I <sub>ON</sub>	LNA control current	C0, C1	-	1	5	uA
V <sub>IH</sub>	Logic input high		V <sub>dd</sub> -0.3		3.6	V
V <sub>IL</sub>	Logic input low		0		0.3	V

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**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:  $V_{dd} = C0 = 3.3\text{ V}$ ,  $C1 = 0\text{ V}$ ,  $T_A = 25\text{ }^\circ\text{C}$ , as measured on Skyworks Solutions' 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)**

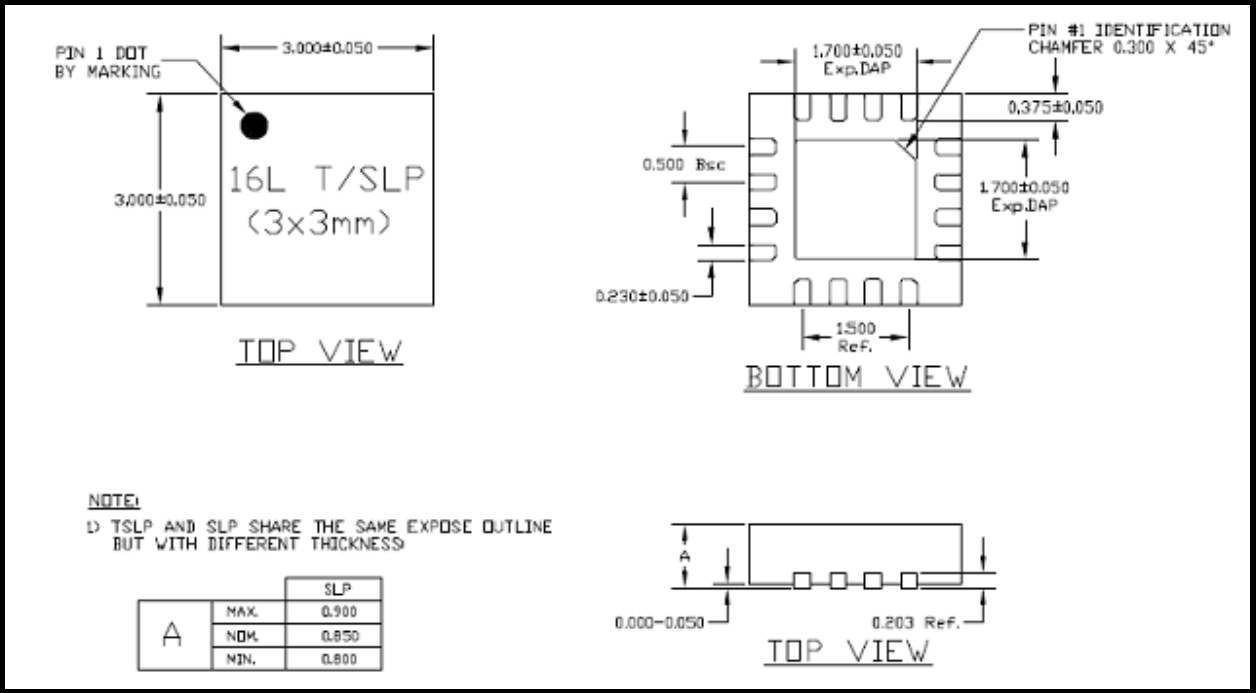
Conditions:  $V_{dd} = C1 = 3.3\text{ V}$ ,  $C0 = 0\text{ V}$ ,  $T_A = 25\text{ }^\circ\text{C}$ , as measured on Skyworks Solutions' SE5008L EK1 evaluation board, all unused ports terminated with 50 ohms, unless otherwise noted.

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
$S_{21-BYP}$	Receive Gain, LNA bypassed	EN = 0 V	-6	-5	-4	dB

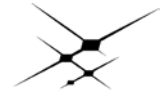
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**Package Drawing**

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



**Figure 3: SE5008L Package Diagram**



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Recommended Land and Solder Patterns

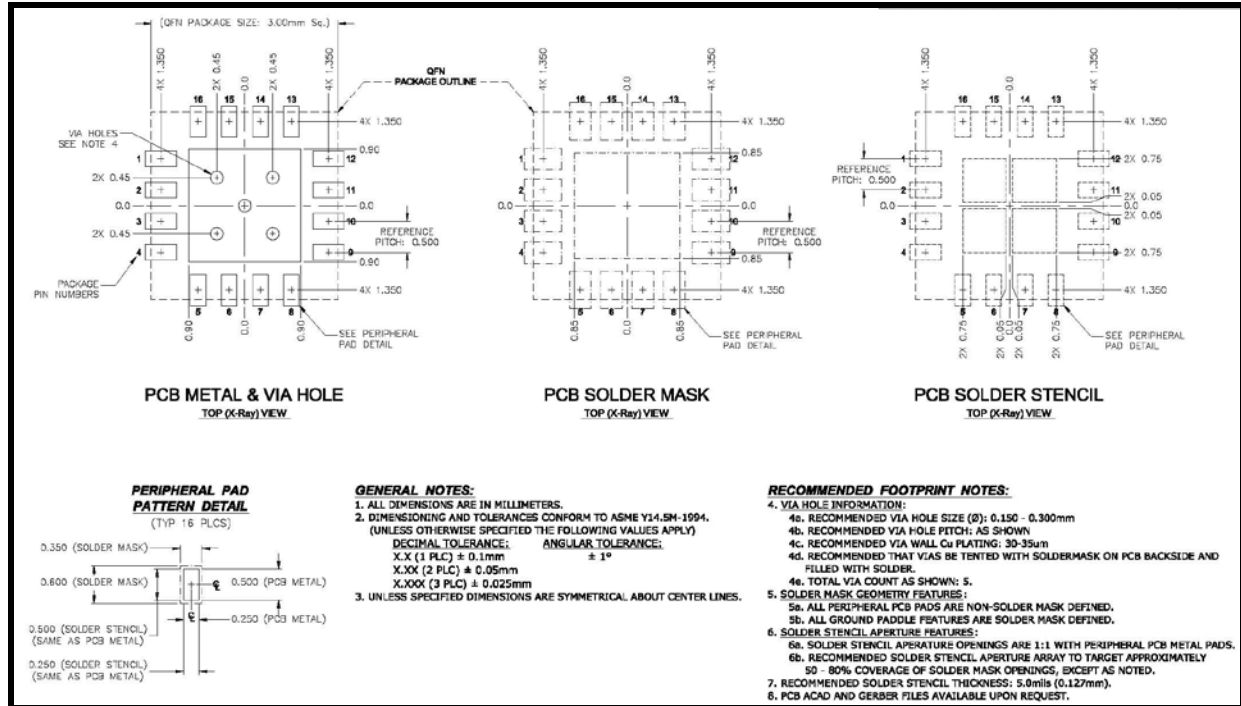


Figure 4: SE5008L Recommended Land and Solder Pattern

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, please refer to:

- "Quad Flat No-Lead Module Solder Reflow & Rework Information", Document Number QAD-00045
- "Handling, Packing, Shipping and Use of Moisture Sensitive QFN", Document Number QAD-00044



Caution! Class 1B ESD sensitive device

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**Branding Information**

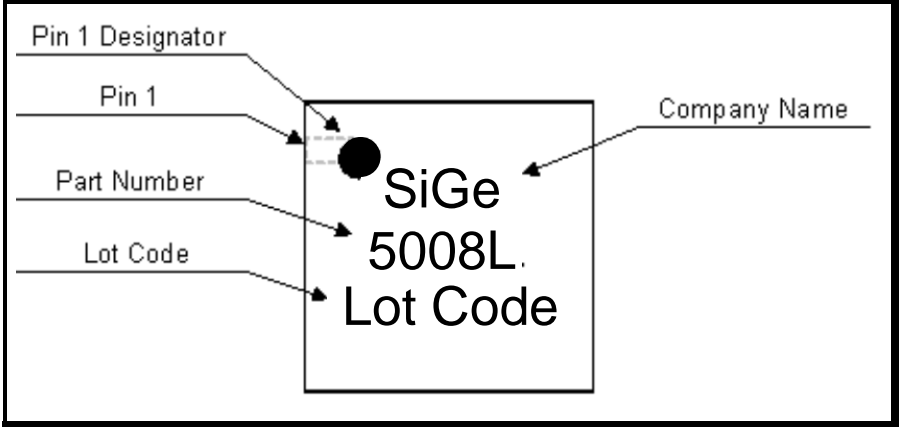


Figure 5: SE5008L Branding

**Tape and Reel Information**

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

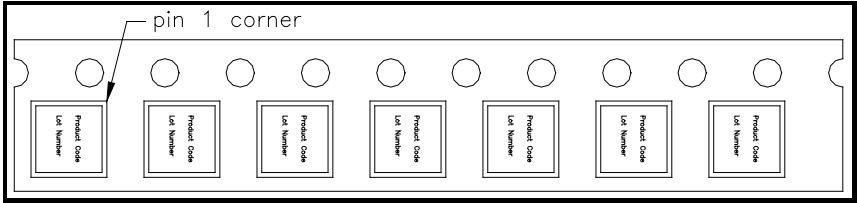


Figure 6: SE5008L-R Tape and Reel Information

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**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
1.4	Apr 03, 2012	Updated with Skyworks logo and disclaimer statement

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