

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 a 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

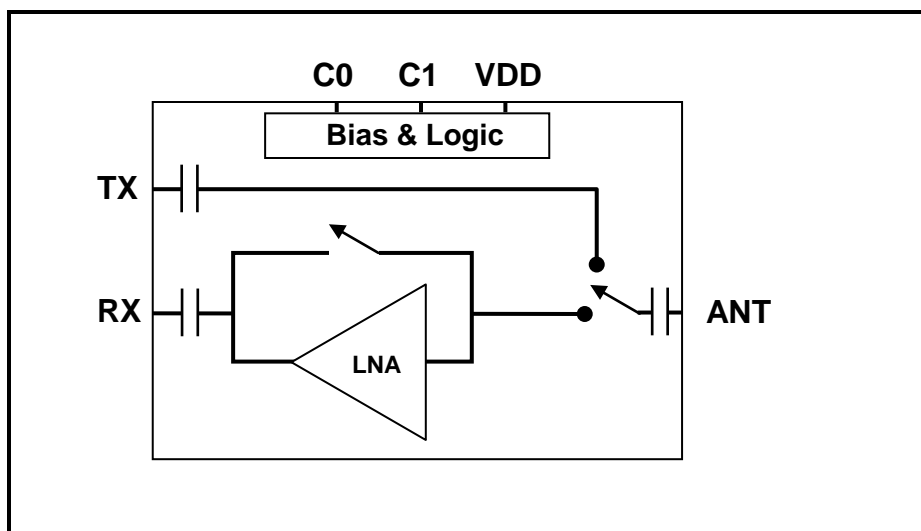


Figure 1: Functional Block Diagram

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

Pin Out Block Diagram

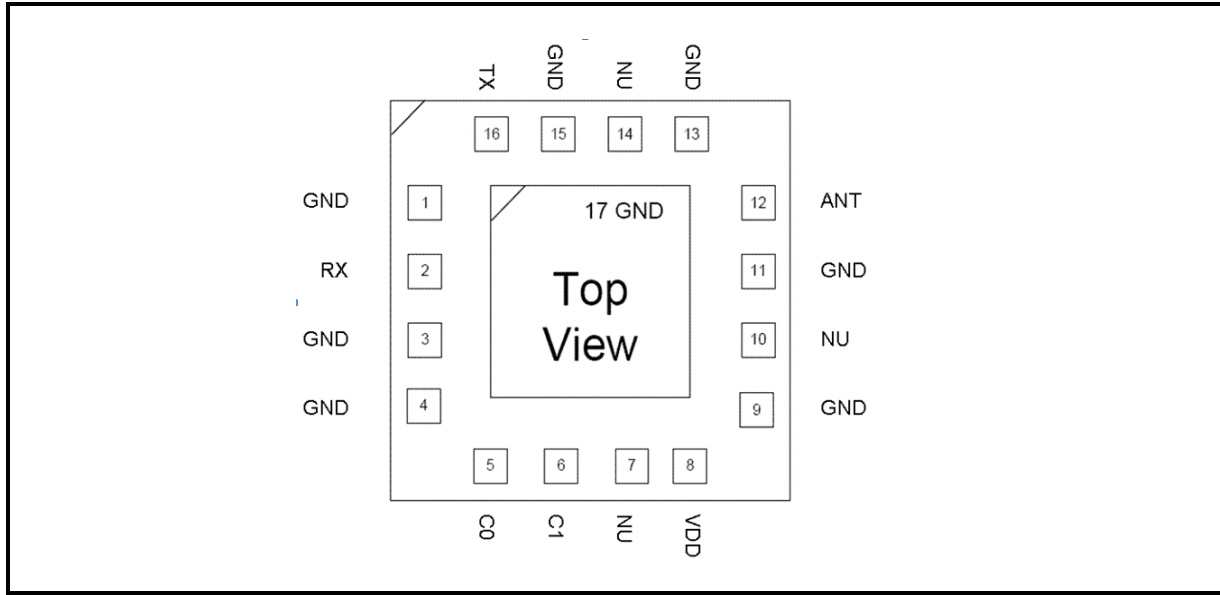


Figure 2: Pin Out Block Diagram

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

DATA SHEET
SE5008L: 5 GHz WLAN Switch/LNA Front-End
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 _{dd}	Supply Voltage on V _{dd}		0	3.6	V
EN _{cc}	DC input on control pins		-0.5	V _{dd} +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	-	V _{dd}	V

DC Electrical Characteristics

Conditions: V_{dd} = 3.3 V, T_A = 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 _{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
V _{IH}	Logic input high		V _{dd} -0.3		3.6	V
V _{IL}	Logic input low		0		0.3	V

DATA SHEET
SE5008L: 5 GHz WLAN Switch/LNA Front-End
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	$EN = 0\text{ V}$	-6	-5	-4	dB

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

Package Drawing

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

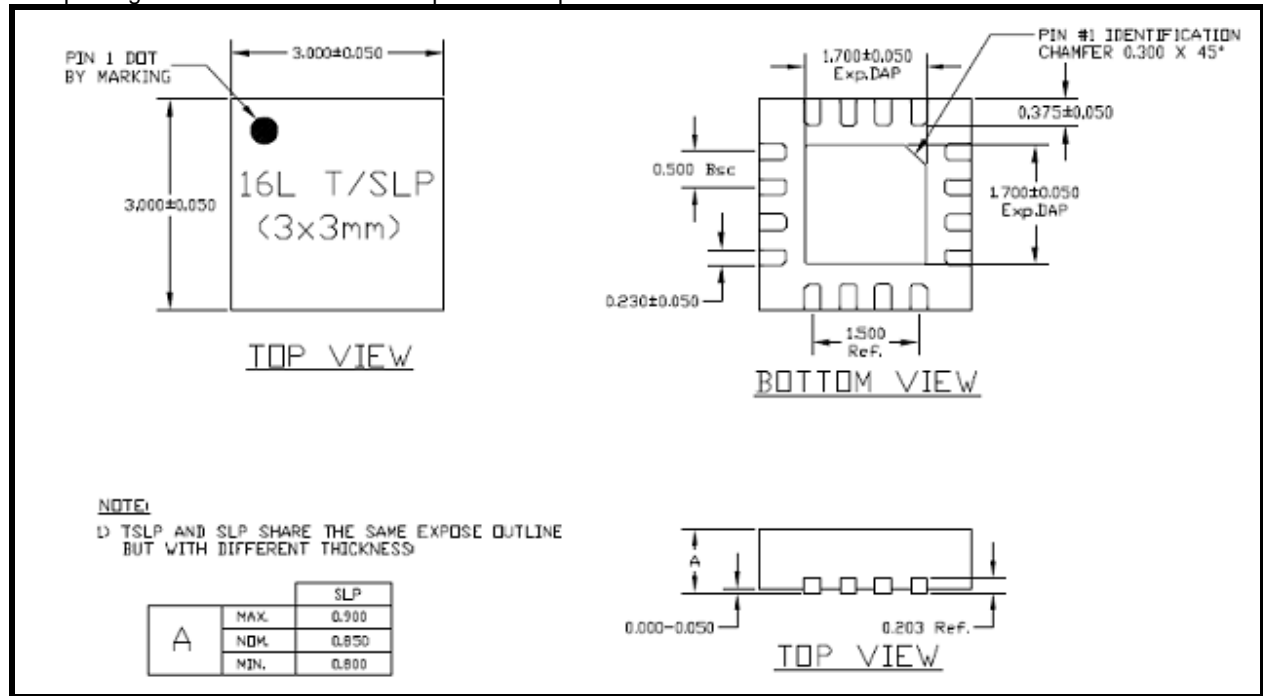


Figure 3: SE5008L Package Diagram

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

Recommended Land and Solder Patterns

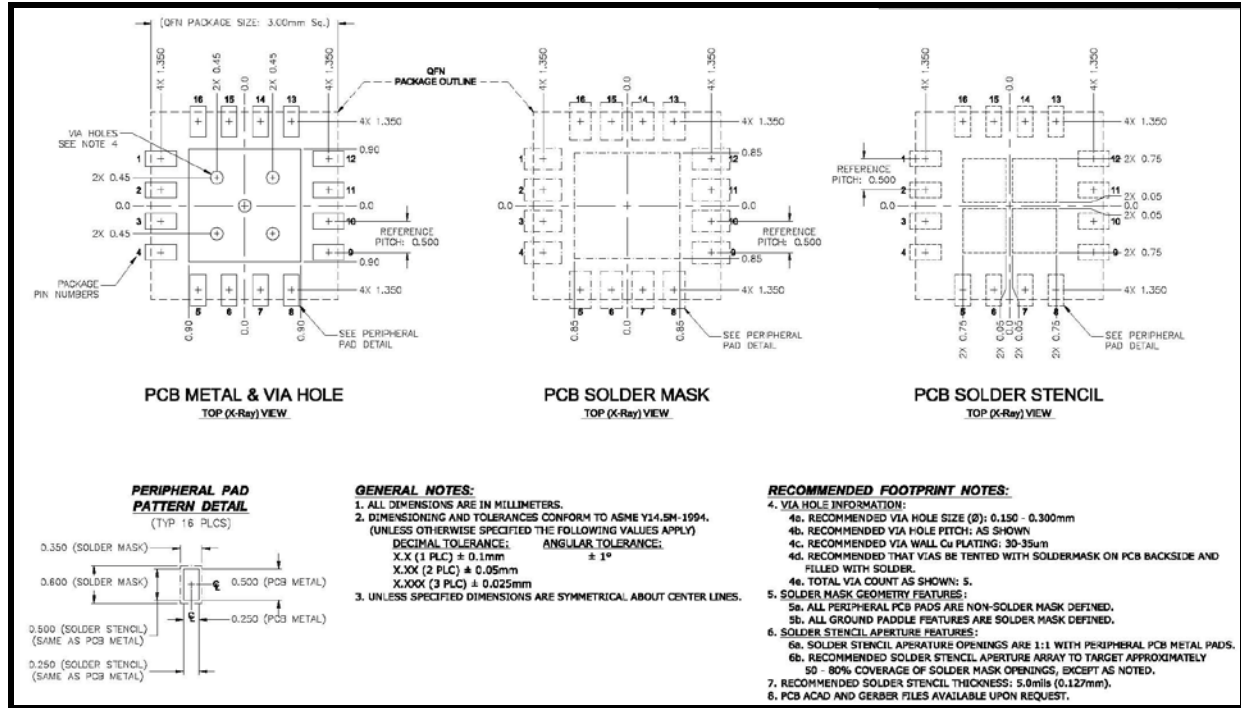


Figure 4: SE5008L Recommended Land and Solder Pattern

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

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

Branding Information

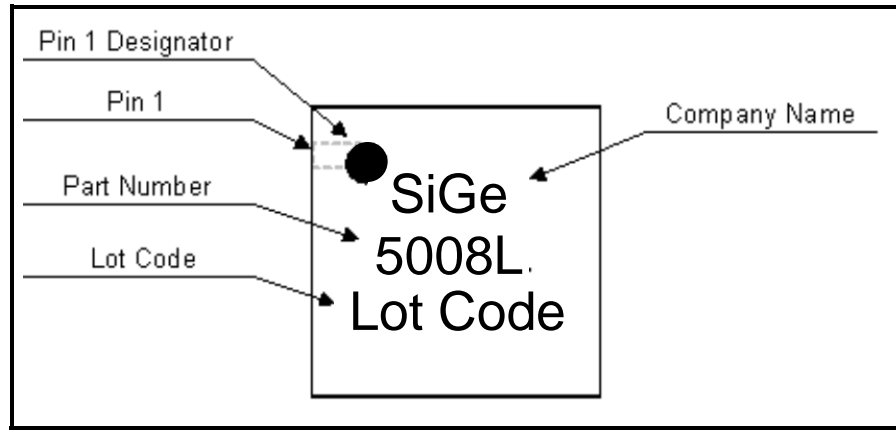


Figure 5: SE5008L Branding

Tape and Reel Information

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

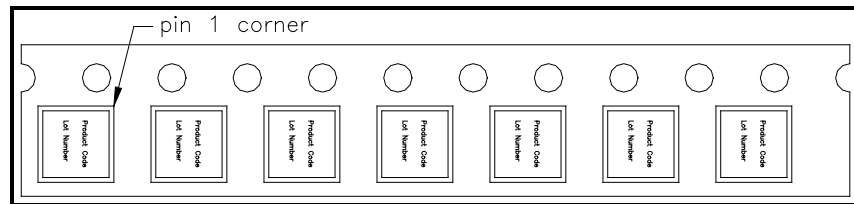


Figure 6: SE5008L-R Tape and Reel Information

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

Copyright © 2012 Skyworks Solutions, Inc. All Rights Reserved.

Information in this document is provided in connection with Skyworks Solutions, Inc. ("Skyworks") products or services. These materials, including the information contained herein, are provided by Skyworks as a service to its customers and may be used for informational purposes only by the customer. Skyworks assumes no responsibility for errors or omissions in these materials or the information contained herein. Skyworks may change its documentation, products, services, specifications or product descriptions at any time, without notice. Skyworks makes no commitment to update the materials or information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from any future changes.

No license, whether express, implied, by estoppel or otherwise, is granted to any intellectual property rights by this document. Skyworks assumes no liability for any materials, products or information provided hereunder, including the sale, distribution, reproduction or use of Skyworks products, information or materials, except as may be provided in Skyworks Terms and Conditions of Sale.

THE MATERIALS, PRODUCTS AND INFORMATION ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT; ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED. SKYWORKS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. SKYWORKS SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SPECIAL, INDIRECT, INCIDENTAL, STATUTORY, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THE MATERIALS OR INFORMATION, WHETHER OR NOT THE RECIPIENT OF MATERIALS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Skyworks products are not intended for use in medical, lifesaving or life-sustaining applications, or other equipment in which the failure of the Skyworks products could lead to personal injury, death, physical or environmental damage. Skyworks customers using or selling Skyworks products for use in such applications do so at their own risk and agree to fully indemnify Skyworks for any damages resulting from such improper use or sale.

Customers are responsible for their products and applications using Skyworks products, which may deviate from published specifications as a result of design defects, errors, or operation of products outside of published parameters or design specifications. Customers should include design and operating safeguards to minimize these and other risks. Skyworks assumes no liability for applications assistance, customer product design, or damage to any equipment resulting from the use of Skyworks products outside of stated published specifications or parameters.

Skyworks, the Skyworks symbol, and "Breakthrough Simplicity" are trademarks or registered trademarks of Skyworks Solutions, Inc., in the United States and other countries. Third-party brands and names are for identification purposes only, and are the property of their respective owners. Additional information, including relevant terms and conditions, posted at www.skyworksinc.com, are incorporated by reference.