

## DATA SHEET

### SE2567L: 5 GHz Power Amplifier with Power Detector

#### Applications

- DSSS 5 GHz WLAN (IEEE802.11a)
- Access Points, PCMCIA, PC cards

#### Features

- High output power amplifier 19dBm
- Integrated 50ohm input and output match
- Integrated power amplifier enable pin (VEN)
- Buffered, temperature compensated power detector
- 3% EVM, @19dBm, 64 QAM, 54 Mbps
- 30 dB Gain
- Lead Free and RoHS compliant, halogen free package
- 16 pin 3 mm x 3 mm x 0.9 mm QFN

#### Ordering Information

Part Number	Package	Remark
SE2567L	16 Pin QFN	Samples
SE2567L-R	16 Pin QFN	Tape and Reel
SE2567L-EK1	Evaluation Kit	Standard

#### Product Description

The SE2567L is a 5GHz power amplifier offering high linear power for wireless LAN applications. It incorporates a power detector for closed loop monitoring and control of the output power.

The SE2567L offers a high level of integration for a simplified design, providing quicker time to market and higher application board production yield. The device integrates the input match, the inter-stage match, a temperature compensated, load insensitive power detector with 15dB of dynamic range and a 3.8GHz notch filter. Two external components are required to complete the design.

For wireless LAN applications, the device meets the requirements of IEEE802.11a and delivers approximately 19dBm of linear output power.

The SE2567L integrates the reference voltage generator, allowing for a true CMOS compatible digital EN (enable) function to turn the power amplifier on and off.

#### Functional Block Diagram

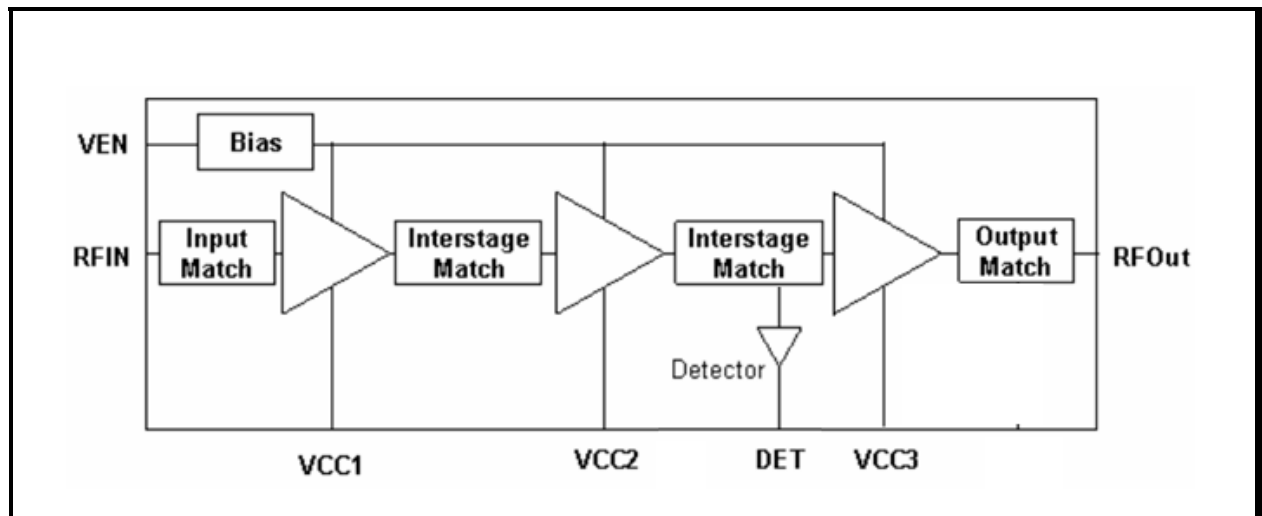
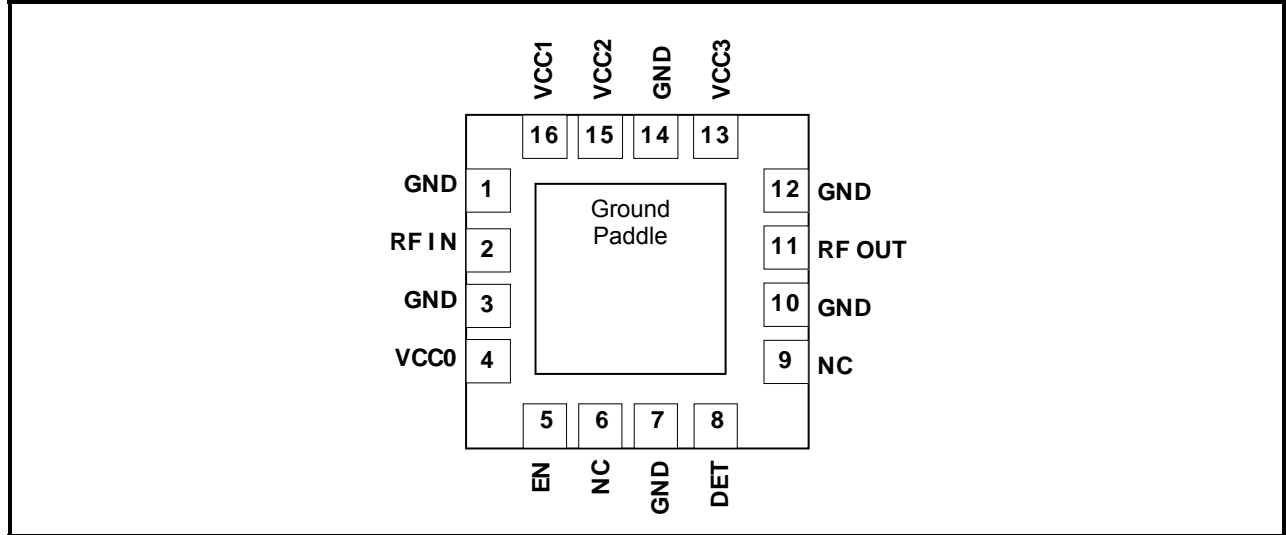


Figure 1: Functional Block Diagram

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**SE2567L: 5 GHz Power Amplifier with Power Detector**
**Pin Out Diagram**

**Figure 2: SE2567L Pin-Out Diagram**
**Pin Out Description**

Pin No.	Name	Description
1	GND	Ground
2	RFin	Power Amplifier RF input, DC block required
3	GND	Ground
4	VCC0	Bias Circuit Supply Voltage
5	EN	Reference Voltage and Power Amplifier Enable
6	NC	No Connect
7	GND	Ground
8	DET	Analog Power Detector Output
9	NC	No Connect
10	GND	Ground
11	RFout	Power Amplifier RF Output, no DC block required
12	GND	Ground
13	VCC3	Third Stage Supply Voltage
14	GND	Ground
15	VCC2	Second Stage Supply Voltage
16	VCC1	First Stage Supply Voltage

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**Absolute Maximum Ratings**

These are stress ratings only. Exposure to stresses beyond these maximum ratings for a long period of time 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>CC</sub>	Supply Voltage on pins VCC0, VCC1	-0.3	3.6	V
	Supply Voltage on pins VCC2, VCC3	-0.3	4.9	
EN	DC input on EN	-0.3	3.6	V
R <sub>FIN</sub>	RF Input Power, R <sub>F</sub> out into 50Ω match	-	12	dBm
T <sub>STG</sub>	Storage Temperature Range	-40	150	°C
ESD <sub>HBM</sub>	JEDEC JESD22-A114 all pins	-	500	V

**Recommended Operating Conditions**

Symbol	Parameter	Min.	Max.	Unit
V <sub>CC</sub>	Supply Voltage (VCC0, VCC1)	3.0	3.6	V
	Supply Voltage (VCC2, VCC3)	3.0	4.5	
T <sub>A</sub>	Ambient Temperature	-40	85	°C

**DC Electrical Characteristics**

Conditions: V<sub>CC</sub> = V<sub>EN</sub> = 3.3 V, T<sub>A</sub> = 25 °C, as measured on Skyworks Solutions' SE2567L-EV1 evaluation board, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>CC-802.11a</sub>	Supply Current	P <sub>OUT</sub> = 19 dBm, 54 Mbps, 64 QAM	-	220	-	mA
I <sub>QC</sub>	Quiescent Current	No RF	-	150	-	mA
I <sub>OFF</sub>	Supply Current	V <sub>EN</sub> = 0 V, No RF	-	10	100	μA
V <sub>ENH</sub>	Logic High Voltage	-	1.6	-	3.6	V
V <sub>ENL</sub>	Logic Low Voltage	-	0	-	0.5	V
I <sub>ENH</sub>	Input Current Logic High Voltage	-	-	300	-	μA
I <sub>ENL</sub>	Input Current Logic Low Voltage	-	-	<1	-	μA
Z <sub>EN</sub>	Enable pin input impedance	Passive Pull Down		10		kΩ

**DATA SHEET**  
**SE2567L: 5 GHz Power Amplifier with Power Detector**
**AC Electrical Characteristics**
**802.11a AC Electrical Characteristics**

Conditions:  $V_{CC} = V_{EN} = 3.3V$ ,  $f = 5.4\text{ GHz}$ ,  $T_A = 25\text{ }^{\circ}\text{C}$ , as measured on Skyworks Solutions' SE2567L-EV1 evaluation board, unless otherwise noted

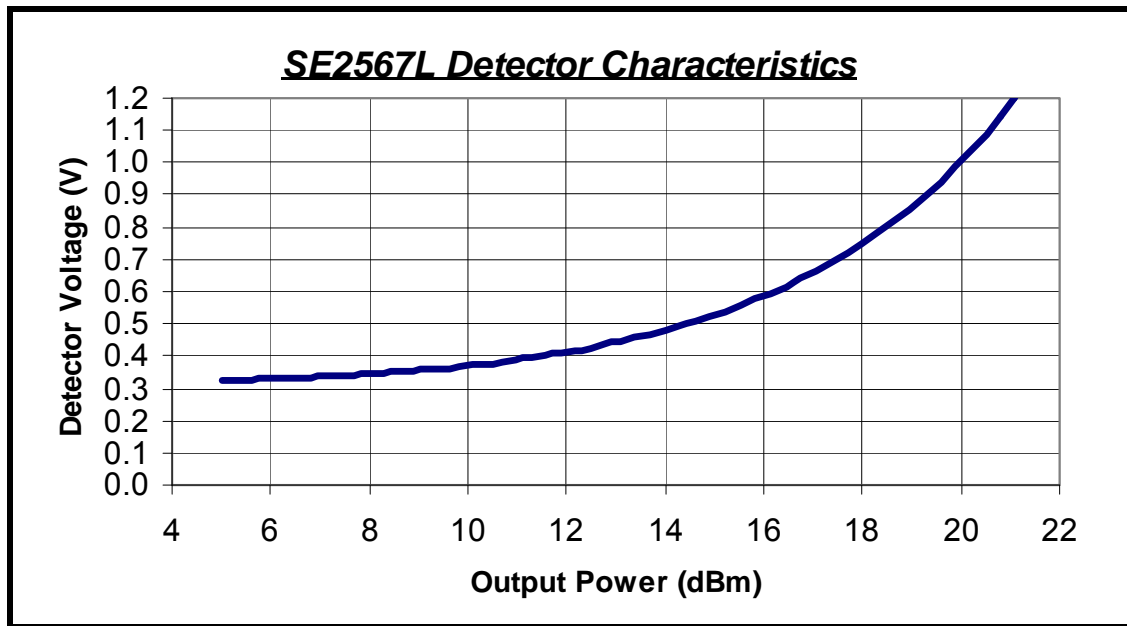
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$f_{L-U}$	Frequency Range	-	4.9	-	5.9	GHz
P <sub>OUT</sub>	Output Power, 54 Mbps OFDM signal, 64 QAM, 3% EVM	$V_{CC0,1,2,3} = 3.3V$	-	19	-	dBm
		$V_{CC0,1} = 3.3V$ ; $V_{CC2,3} = 4.5V$	-	21.5	-	
P <sub>1dB</sub>	Output 1dB compression point	No modulation	-	25	-	dBm
S <sub>11</sub>	Input Return Loss	P <sub>IN</sub> = -25 dBm	6	-	-	dB
S <sub>21</sub>	Small Signal Gain	P <sub>IN</sub> = -25 dBm	-	30	-	dB
$\Delta S_{21}$	Small Signal Gain Variation	Gain variation over single 40MHz channel	-	0.5	-	dB
		Gain Variation over band	-	2.0	4.0	
S <sub>21_3.8</sub>	Out of Band Gain	Gain at 3.8GHz	-	-	10	dB
2f	Harmonic	P <sub>OUT</sub> = 19.0dBm @3.3V or P <sub>OUT</sub> = 21.5dBm @4.5V	-	-50	-	dBm/MHz
3f			-	-50	-	dBm/MHz
t <sub>r</sub> , t <sub>f</sub>	Rise and Fall Time	-	-	0.5	-	us
STAB	Stability	P <sub>OUT</sub> = 19 dBm, 54 Mbps, 64 QAM, VSWR = 6:1, all phases	All non-harmonically related outputs less than -50 dBc/100 kHz			
RU	Ruggedness: Tolerance to output load mismatching	P <sub>IN</sub> = 12 dBm, VCC2 = VCC3 = 4.5V, 54 Mbps 64 QAM, 64 QAM, VSWR = 6:1, all phases	No damage			

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**SE2567L: 5 GHz Power Amplifier with Power Detector**
**Power Detector**

Conditions:  $V_{CC} = V_{EN} = 3.3V$ ,  $f = 5.4 \text{ GHz}$ ,  $T_A = 25^\circ\text{C}$ , as measured on Skyworks Solutions' SE2567L-EV1 evaluation board, unless otherwise noted

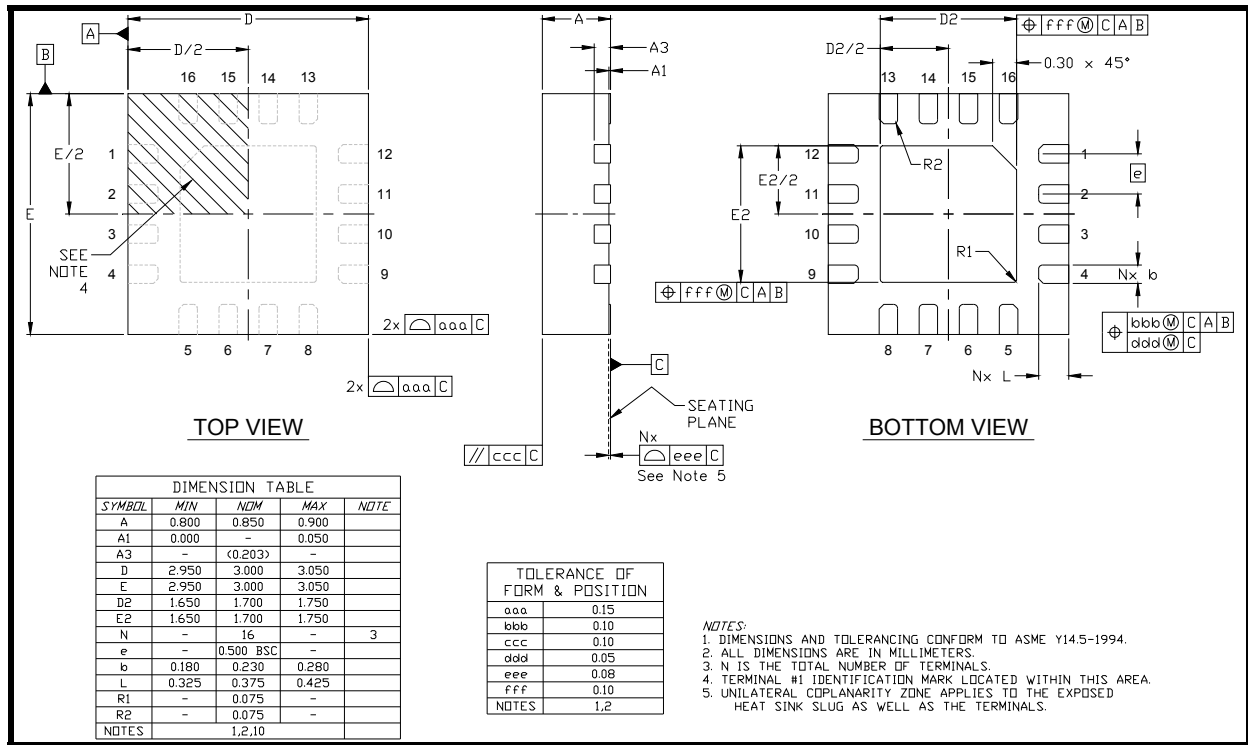
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
PDR	$P_{OUT}$ detect range	-	0	-	$P_{1dB}$	dBm
VDET	Detector voltage, $P_{OUT} = 20\text{dBm}$	Measured into 26.5K $\Omega$	-	1.00	-	V
VDET	Detector voltage, $P_{OUT} = 5\text{dBm}$	Measured into 26.5K $\Omega$	-	0.33	-	V
PDZ <sub>OUT</sub>	Output Impedance	-	-	2.5	-	K $\Omega$
PDZ <sub>LOAD</sub>	DC load impedance	-	-	26.5	-	K $\Omega$
LPF	Power detector low pass filter - 3dB corner frequency	Measured into 26.5K $\Omega$	-	2.0	-	MHz

Figure 3: SE2567L Power Detector Characteristic



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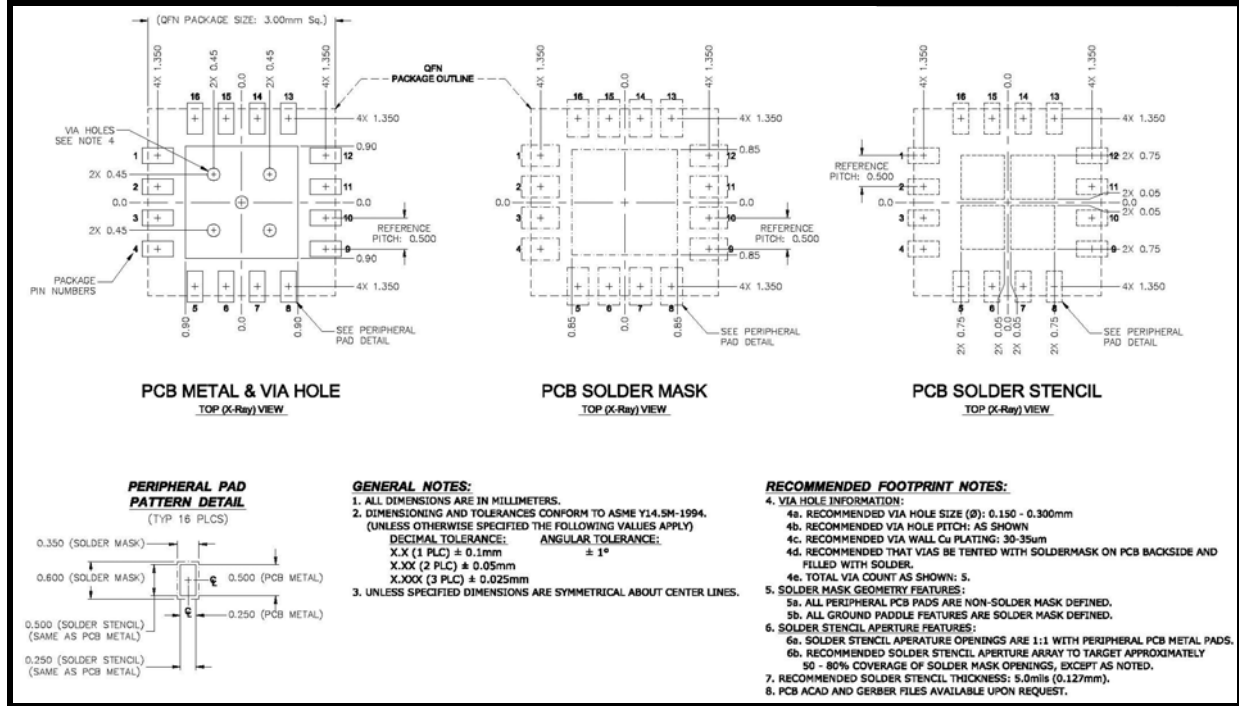
**Package Diagram**



**Figure 4: SE2567L Package Diagram**

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**Recommended Land and Solder Patterns**



**Figure 5: SE2567L 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 SE2597L 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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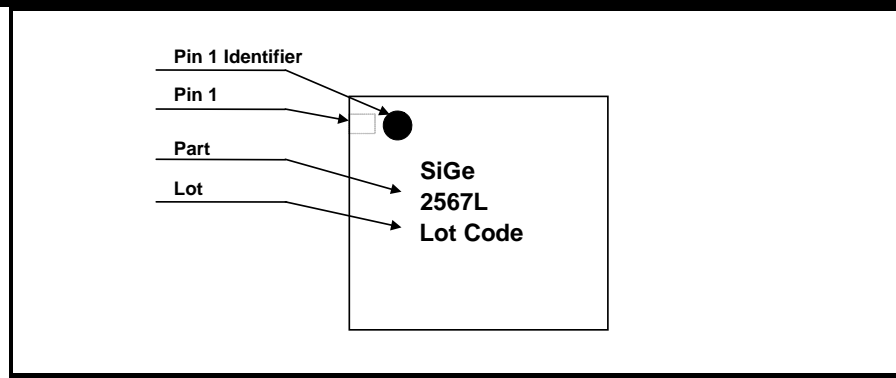


Figure 4: SE2567L Branding

### Tape and Reel Information

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

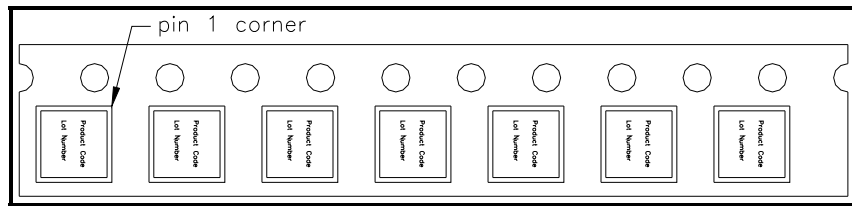


Figure 5: SE2567L-R Tape and Reel Information

### Document Change History

Revision	Date	Notes
1.0	August 2, 2009	Created
1.1	February 3, 2010	Updated off-state leakage current. Added reference to "Class 0 ESD Device Handling"
1.2	March 30, 2010	Updated to include 4.5V operation
1.3	November 15, 2010	Updated Ruggedness Specification Updated Recommended Operating Temperature Updated ESD rating Updated marking diagram to remove terminal finish indicator
1.4	April 10, 2012	Updated with Skyworks logo and disclaimer statement





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