

## DATA SHEET

### SE2537L: 5 GHz Power Amplifier with Power Detector

#### Applications

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

#### Features

- High output power amplifier 19.5dBm
- Only 1 external component required
- Integrated power amplifier enable pin (VEN)
- Buffered, temperature compensated power detector
- 3% EVM, @19.5dBm, 64 QAM, 54 Mbps
- 30 dB Gain
- Lead Free, Halogen Free and RoHS compliant package
- 16 pin 3 mm x 3 mm x 0.9 mm QFN

#### Ordering Information

Part Number	Package	Remark
SE2537L	16 Pin QFN	Samples
SE2537L-R	16 Pin QFN	Tape and Reel
SE2537L-EK1	Evaluation Kit	Standard

#### Product Description

The SE2537L 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 SE2537L offers extreme 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 partial output match, the power detector with 20dB of dynamic range and a 3.2GHz 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 19.5dBm of linear output power.

For high performance applications, the SP1,2 ports are available to connect an optional external capacitor to enhance dynamic EVM performance.

The SE2537L bias control establishes the reference voltage required for proper operation and allows enabling and disabling of the power amplifier.

#### Functional Block Diagram

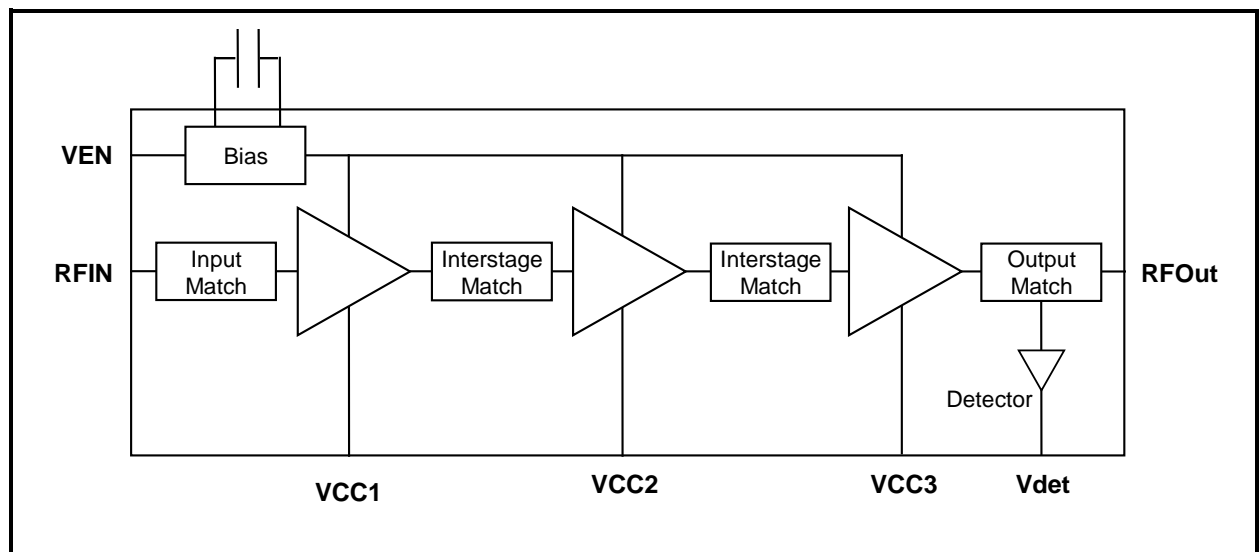
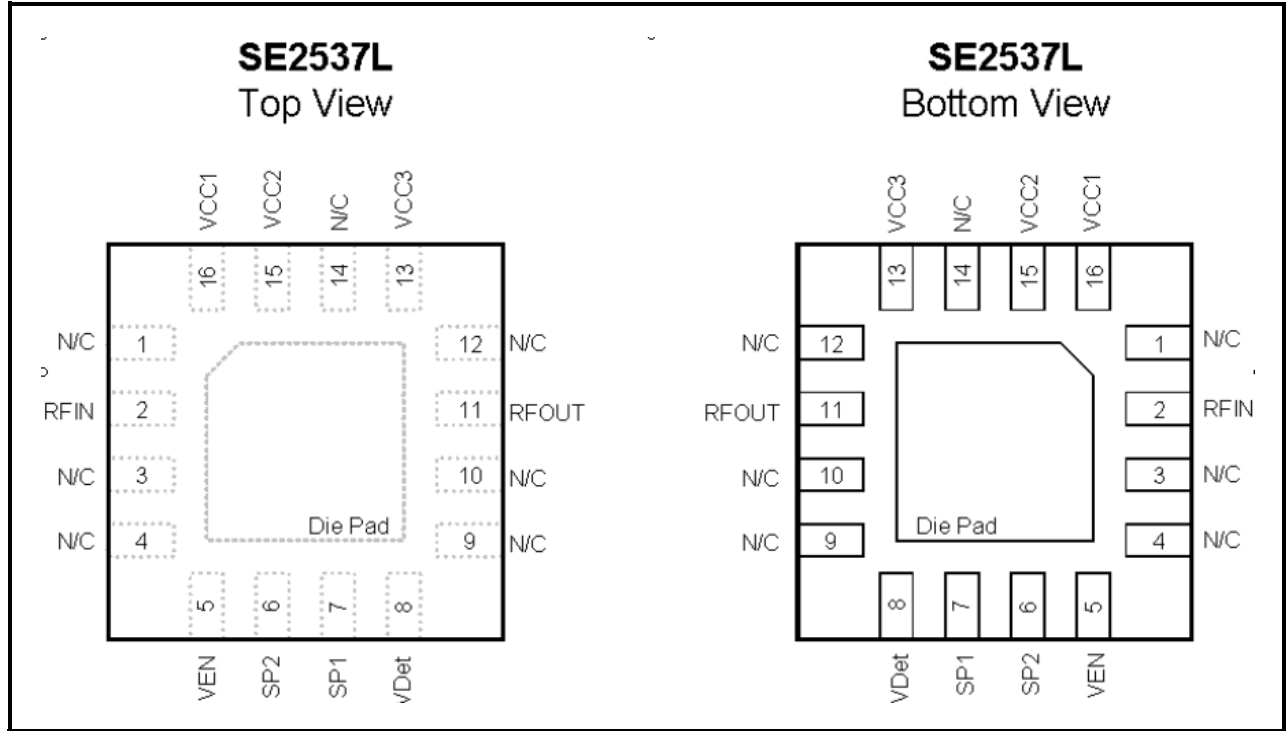


Figure 1: Functional Block Diagram

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**Pin Out Diagram**



**Figure 2: SE2537L Pin-Out Diagram**

**Pin Out Description**

Pin No.	Name	Description
1	N/C	No Connect
2	RFin	Power Amplifier RF input, DC block required
3,4	N/C	No Connect
5	VEN	Reference Voltage and Power Amplifier Enable
6	SP2	Ports for optional capacitor to improve dynamic EVM
7	SP1	
8	Vdet OUT	Analog Power Detector Output
9,10	N/C	No Connect
11	RFout	Power Amplifier RF Output, no DC block required
12	N/C	No Connect
13	VCC3	Third Stage Supply Voltage
14	N/C	No Connect
15	VCC2	Second Stage Supply Voltage

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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 VCC1, VCC2, VCC3	-0.3	+6	V
V <sub>EN</sub>	Power Amplifier Enable	-0.3	+6	V
R <sub>FIN</sub>	RF Input Power, RF <sub>out</sub> into 50Ω match	-	10	dBm
T <sub>STG</sub>	Storage Temperature Range	-40	150	°C
T <sub>j</sub>	Maximum Junction Temperature	-	150	°C

**Recommended Operating Conditions**

Symbol	Parameter	Min.	Max.	Unit
V <sub>CC</sub>	Supply Voltage	3.0	3.6	V
V <sub>EN</sub>	Reference Voltage in TX active condition	2.75	2.85	V
T <sub>A</sub>	Ambient Temperature	-10	85	°C

**DC Electrical Characteristics**

Conditions: V<sub>CC</sub> = 3.3 V, V<sub>EN</sub> = 2.8V, T<sub>A</sub> = 25 °C, as measured on Skyworks Solutions' SE2537L-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> = 19.5 dBm, 54 Mbps, 64 QAM	-	195	-	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	-	0.5	10	μA
I <sub>EN</sub>	Bias Control Current	V <sub>EN</sub> = 2.8V	-	16	-	mA
V <sub>ENH</sub>	Logic High Voltage	-	1.3	-	V <sub>CC</sub>	V
V <sub>ENL</sub>	Logic Low Voltage	-	0	-	0.5	V

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**SE2537L: 5 GHz Power Amplifier with Power Detector**
**AC Electrical Characteristics**
**802.11a AC Electrical Characteristics**

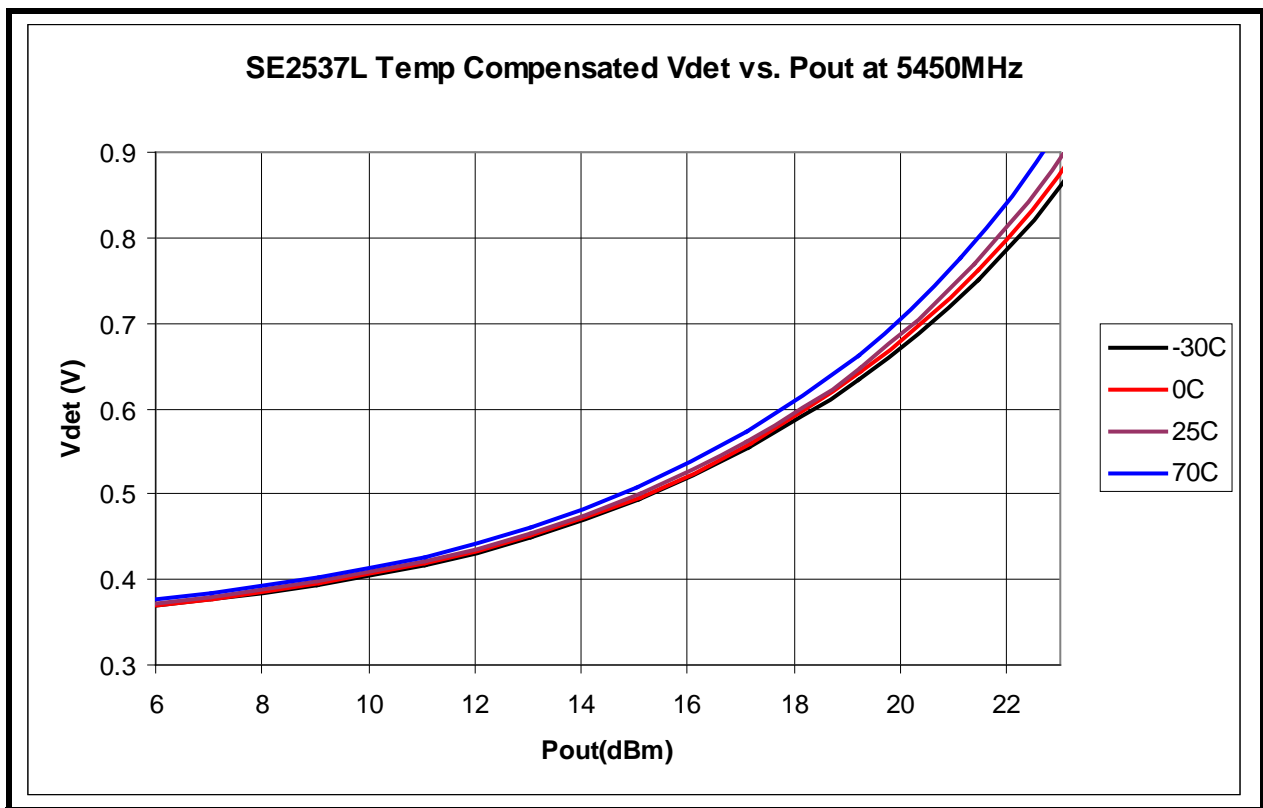
Conditions:  $V_{CC} = 3.3\text{ V}$ ,  $V_{EN} = 2.8\text{ V}$ ,  $f = 5.4\text{ GHz}$ ,  $T_A = 25\text{ }^{\circ}\text{C}$ , as measured on Skyworks Solutions' SE2537L-EV1 evaluation board, unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$f_{L-U}$	Frequency Range	-	4.9	-	5.9	GHz
$P_{1dB}$	Output 1dB compression point	No modulation	-	25	-	dBm
$S_{21}$	Small Signal Gain	$P_{IN} = -25\text{ dBm}$	-	28	-	dB
$\Delta S_{21}$	Gain Variation over band	$P_{IN} = -25\text{ dBm}$ , $f_{IN} = 4900\text{ to }5900\text{ MHz}$	-	1	-	dB
2f	Harmonic	$P_{OUT} = 19.5\text{ dBm}$	-	-75	-	dBc
3f			-	-60	-	dBc
EVM	Error Vector Magnitude	$P_{OUT} = 19.5\text{ dBm}$ , 54 Mbps 64 QAM signal	-	3.0	-	%
$t_r, t_f$	Rise and Fall Time	-	-	0.5	-	us
STAB	Stability	$P_{OUT} = 19.5\text{ dBm}$ , 54 Mbps, 64 QAM, VSWR = 6:1, all phases	All non-harmonically related outputs less than -50 dBc/100 kHz			
VSWR	Tolerance to output load mismatching	$P_{OUT} = 19.5\text{ dBm}$ , 54 Mbps 64 QAM, 64 QAM, VSWR = 6:1, all phases	No damage			

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**SE2537L: 5 GHz Power Amplifier with Power Detector**
**Power Detector**

Conditions:  $V_{CC} = 3.3\text{ V}$ ,  $V_{EN} = 2.8\text{ V}$ ,  $f = 5.4\text{ GHz}$ ,  $T_A = 25\text{ }^{\circ}\text{C}$ , as measured on Skyworks Solutions' SE2537L-EV1 evaluation board, unless otherwise noted

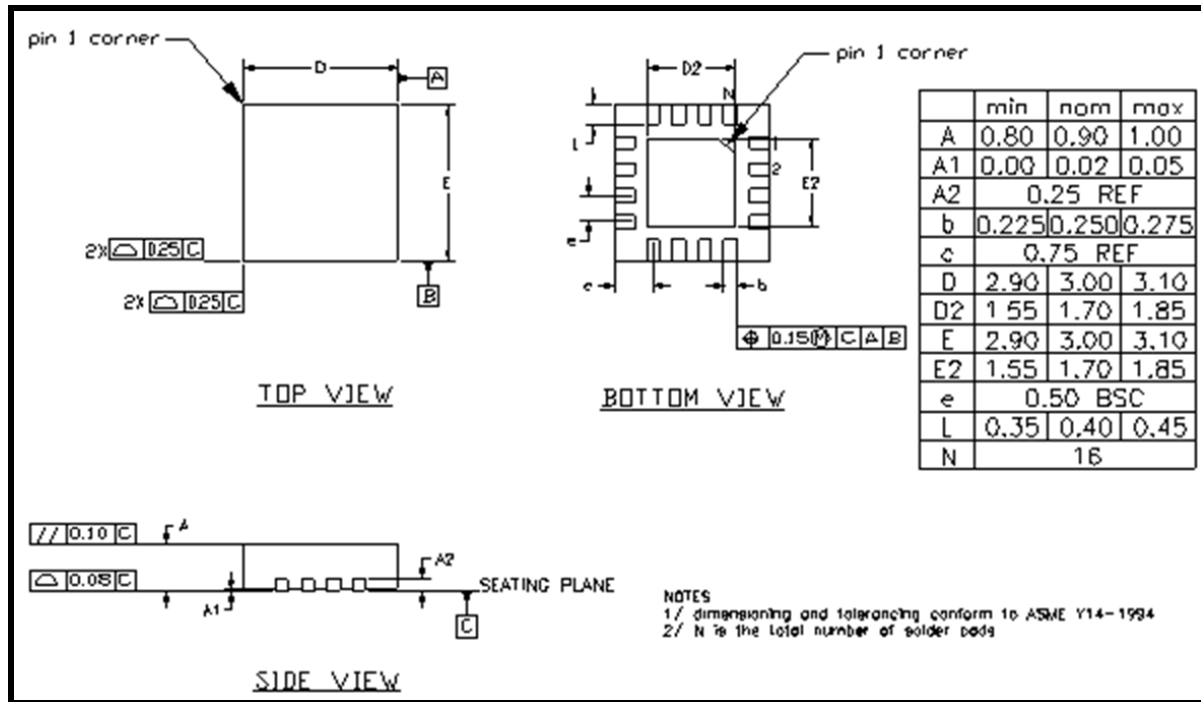
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
PDR	P <sub>OUT</sub> detect range	-	0	-	P <sub>1dB</sub>	dBm
VDET	Detector voltage	P <sub>OUT</sub> = 19.5 dBm	-	0.63	-	V
VDET	Detector voltage	P <sub>OUT</sub> = 17.5 dBm	-	0.55	-	V
VDET	Detector voltage	P <sub>OUT</sub> = NO RF	-	0.35	-	V
PDZ <sub>OUT</sub>	Output Impedance	-	250	-	700	$\Omega$
PDZ <sub>LOAD</sub>	DC load impedance	-	10	-	-	k $\Omega$



**Figure 3: SE2537L Power Detector Characteristic over Frequency**

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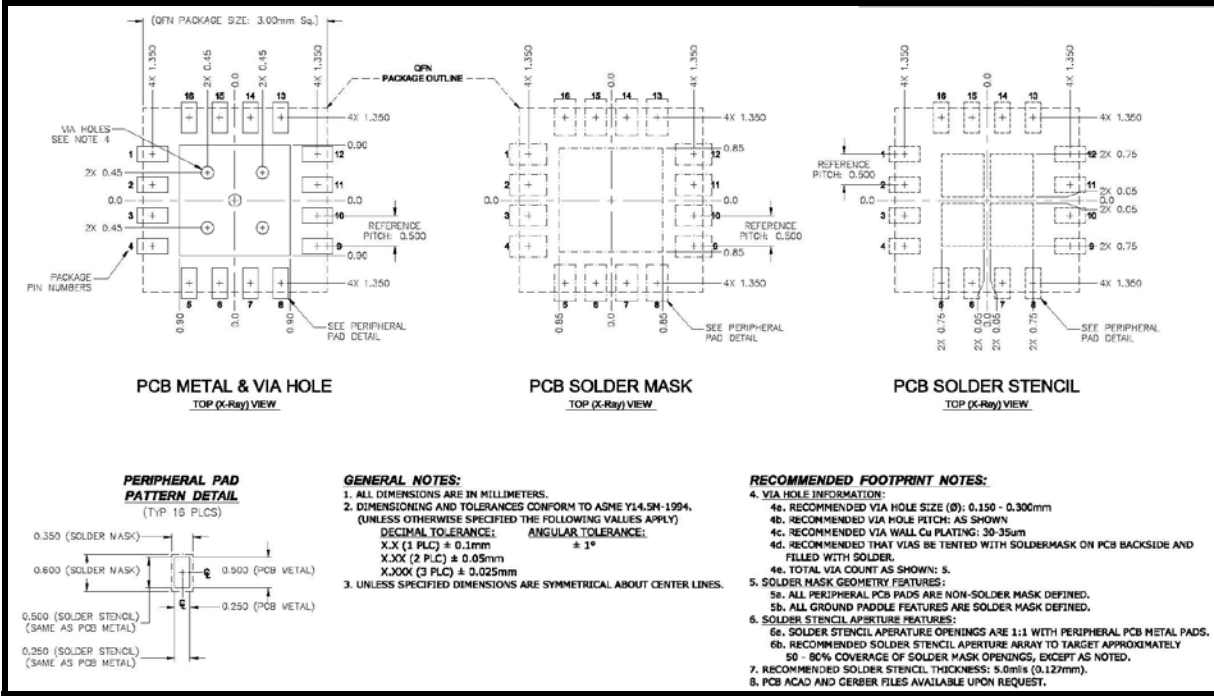
**Package Diagram**



**Figure 4: SE2537L Package Diagram**

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**Recommended Land and Solder Patterns**



**Figure 5: Recommended Land and Solder Patterns**

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## 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 SE2537L 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*
- “ESD Control Policy”, *Document Number SQ03-0062*



Caution! Class 0 ESD sensitive device

## Branding

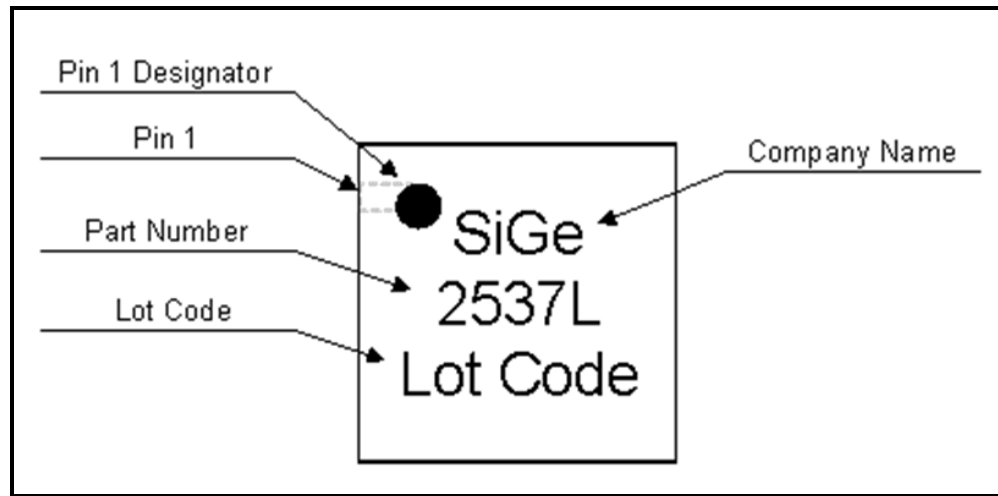


Figure 6: SE2537L Branding

## Tape and Reel Information

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

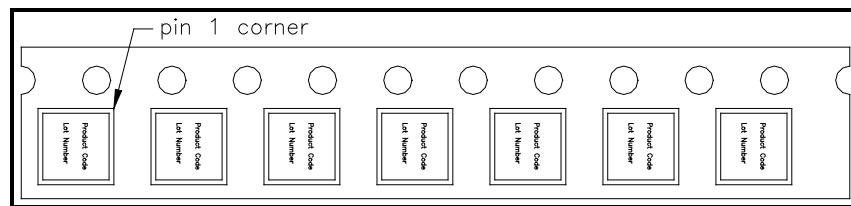


Figure 7: SE2537L-R Tape and Reel Information



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**Document Change History**

Revision	Date	Notes
1.0	Jul 24, 2007	Created
1.1	Sep 20, 2007	Updated application schematic Updated detector characteristics
1.2	Sep 22, 2008	Updated for Halogen Free Updated to include Recommended Landing Pattern Updated to include Tape and Reel Information Updated for ESD warning
1.3	May 26, 2009	Amended back page to include ISO label
1.4	Jul 7, 2009	Updated to correct $V_{EN}$ settings in "Conditions" statement
1.5	Mar 22, 2010	Updated Figure 4 Added reference to QAD-00163 to the package handling information
1.6	Mar 28, 2012	Updated with Skyworks logo and disclaimer statement

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