

DATA SHEET

SE2527L: 2.4 GHz Power Amplifier with Power Detector

Preliminary Information

Applications

- DSSS 2.4 GHz WLAN (IEEE802.11b)
- OFDM 2.4 GHz WLAN (IEEE802.11g)
- Access Points, PCMCIA, PC cards

Features

- Single 3.3 V Supply Operation
 - 21 dBm, EVM = 3 %, 802.11g, OFDM 54 Mbps
 - 24 dBm, ACPR < -32 dBc, 802.11b
- Dual Supply Operation
 - 23 dBm, EVM = 3 %, 802.11g, OFDM 54 Mbps
 - 25 dBm, ACPR < -32 dBc, 802.11b
- 32 dB Gain
- Pin for pin compatible to the SE2525L
- Integrated temperature compensated power detector
- Integrated power amplifier enable pin (V_{EN})
- Lead Free and RoHS compliant
- Small package: 16 pin 4 mm x 4 mm x 0.9 mm QFN

Product Description

The SE2527L is a 2.4 GHz power amplifier designed for use in the 2.4 GHz ISM band for wireless LAN applications. The device incorporates a power detector for closed loop monitoring of the output power.

The SE2527L also offers a high power mode by operating at 5 V. This provides an extra 2 dB of improved EVM performance.

The SE2527L includes a digital enable control for device on/off control.

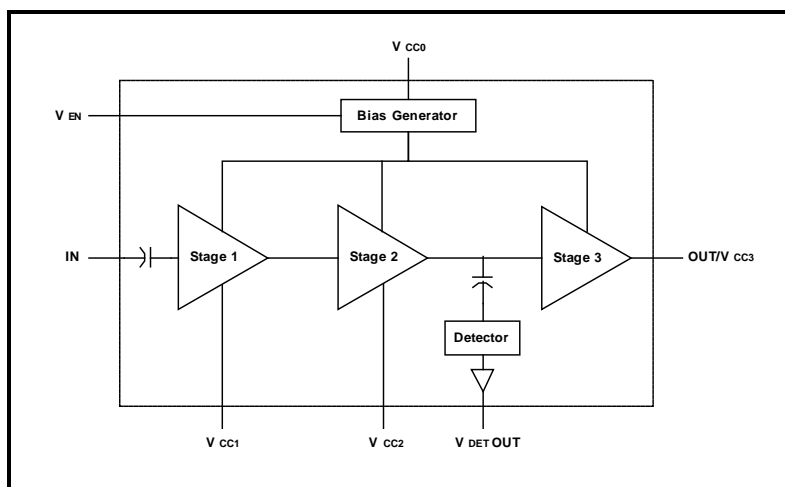
The device is pin for pin compatible to Skyworks' SE2524L, allowing both devices to share the same application board with only a few component changes required. This provides users with both a high and low power solution without changing the layout.

The SE2527L temperature compensated power detector is highly immune to mismatch at its output with less than 1.5 dB of variation with a 2:1 mismatch.

Ordering Information

Part Number	Package	Remark
SE2527L	16 Pin QFN	Samples
SE2527L-R	16 Pin QFN	Tape and Reel
SE2527L-AK1	Application Kit	Standard

Functional Block Diagram



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Figure 1: Functional Block Diagram

Pin Out Diagram

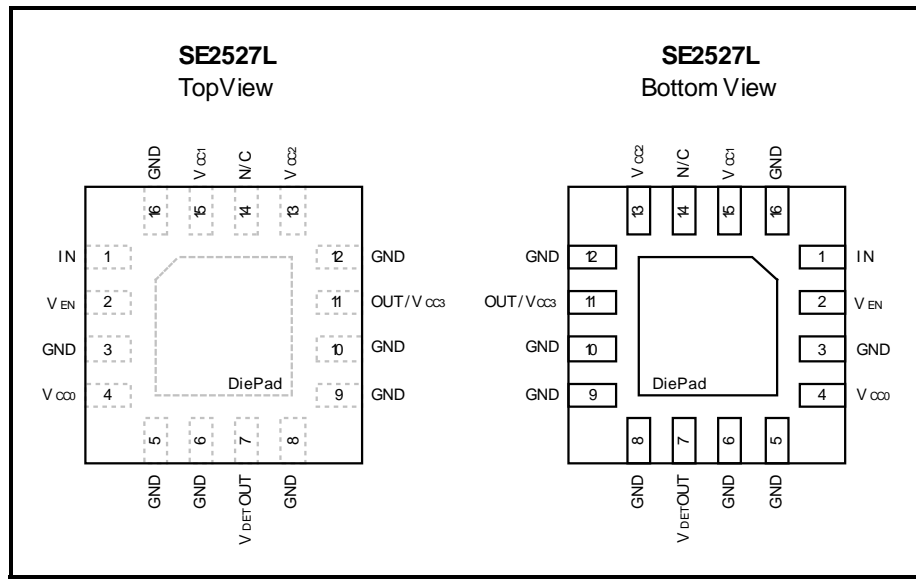


Figure 2: SE2527L Pin-Out Diagram

Pin Out Description

Pin No.	Name	Description
1	IN	Power amplifier RF input; DC block required
2	V _{EN}	Digital pin used to power up and power down the IC
3	GND	Ground
4	V _{CC0}	Bias/control circuit supply voltage
5	GND	Ground
6	GND	Ground
7	V _{DET} OUT	Analog power detector output
8	GND	Ground
9-10	GND	Ground
11	OUT/ V _{CC3}	Power Amplifier RF output and Stage 3 collector supply voltage
12	GND	Ground
13	V _{CC2}	Stage 2 collector supply
14	N/C	No Connect (This pin should <u>NOT</u> be connected to GND or V _{CC})
15	V _{CC1}	Stage 1 collector supply

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16	GND	Ground
Die Pad	GND	Exposed die pad; electrical and thermal ground

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 _{CC}	Supply Voltage on pins V _{CC0} , V _{CC1} , and V _{CC2}	-0.3	4	V
V _{CC3}	Supply Voltage on pins V _{CC3} (Note: SE2527L application circuit must be followed for operation above 3.6 V)	-0.3	5.5	V
V _{EN}	Power Amplifier Enable	-0.3	V _{CC0} + 0.3	V
IN	RF Input Power	-	2	dBm
T _{STG}	Storage Temperature Range	-40	150	°C
T _j	Maximum Junction Temperature	-	150	°C

Recommended Operating Conditions

Symbol	Parameter	Min.	Max.	Unit
V _{CC}	Supply Voltage on pins V _{CC0} , V _{CC1} , V _{CC2}	2.9	3.6	V
V _{CC3}	Supply Voltage on pins V _{CC3} (Note: SE2527L application circuit must be followed for operation above 3.6 V)	2.9	5.5	V
T _A	Ambient Temperature	-20	85	°C

DC Electrical Characteristics

Conditions: V_{CC} = V_{CC3} = V_{EN} = 3.3 V, T_A = 25 °C, as measured on Skyworks Solutions' SE2527L-EV1 evaluation board, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _{CC-802.11b}	Supply Current (Sum of V _{CC0} , V _{CC1} , V _{CC2} , V _{CC3})	P _{OUT} = 24 dBm, 11 Mbps CCK signal, BT = 0.45, V _{CC} = V _{CC3} = 3.3 V	-	300	-	mA
		P _{OUT} = 25 dBm, 11 Mbps CCK signal, BT = 0.45, V _{CC} = 3.3 V, V _{CC3} = 5.0 V	-	375	475	mA
I _{CC-802.11g}	Supply Current (Sum of V _{CC0} ,	P _{OUT} = 21 dBm, 54 Mbps OFDM signal, 64 QAM, V _{CC} = V _{CC3} = 3.3 V	-	230	-	mA

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Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
	$V_{CC1}, V_{CC2}, V_{CC3}$	$P_{OUT} = 23$ dBm, 54 Mbps OFDM signal, 64 QAM, $V_{CC} = 3.3$ V, $V_{CC3} = 5.0$ V	-	290	340	mA
I_{OFF}	Supply Current	$V_{EN} = 0$ V, No RF	-	3	10	μ A
V_{ENH}	Logic High Voltage	-	1.3	-	V_{CC}	V
V_{ENL}	Logic Low Voltage	-	0	-	0.5	V

AC Electrical Characteristics

802.11b/g AC Electrical Characteristics (3.3 V)

Conditions: $V_{CC} = V_{CC3} = V_{EN} = 3.3$ V, $f = 2.45$ GHz, $T_A = 25$ °C, as measured on Skyworks Solutions' SE2527L-EV1 evaluation board, unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
f_{L-U}	Frequency Range	-	2400	-	2500	MHz
P_{1dB}	Output 1dB compression point	No modulation	24.5	26.5	-	dBm
S_{21}	Small Signal Gain	$P_{IN} = -25$ dBm	29	33	36	dB
ΔS_{21}	Gain Variation over band	$P_{IN} = -25$ dBm, $f_{IN} = 2400$ to 2500 MHz	-	1	-	dB
ACPR	Adjacent Channel Power Ratio ± 11 MHz offsets from carrier ± 22 MHz offsets from carrier	$P_{OUT} = 24$ dBm, 11 Mbps CCK signal, BT = 0.45	- -	-37 -60	- -	dBc
2f	Harmonic	$P_{OUT} = 24$ dBm, CW	-	-40	-	dBm/MHz
3f			-	-40	-	dBm/MHz
EVM	Error Vector Magnitude	$P_{OUT} = 21$ dBm, 54 Mbps OFDM signal, 64 QAM	-	3.0	-	%
t_r, t_f	Rise and Fall Time	-	-	0.5	-	μ Sec
STAB	Stability	$P_{OUT} = 24$ dBm, 54 Mbps OFDM signal, 64 QAM VSWR = 6:1 All Phases	All non-harmonically related outputs less than -50 dBc/100 kHz			
VSWR	Tolerance to output load mismatching	$P_{OUT} = 24$ dBm, 54 Mbps OFDM signal, 64 QAM VSWR = 10:1 All Phases	No damage			

802.11b/g AC Electrical Characteristics (5 V)

Conditions: $V_{CC} = V_{EN} = 3.3$ V, $V_{CC3} = 5$ V, $f = 2.45$ GHz, $T_A = 25$ °C, as measured on Skyworks Solutions SE2527L-EV1 evaluation board, unless otherwise noted.

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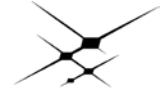
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Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
f _{L-U}	Frequency Range	-	2400	-	2500	MHz
P _{1dB}	Output 1dB compression point	No modulation	26.5	28.5	-	dBm
S ₂₁	Small Signal Gain	P _{IN} = -25 dBm	29	34	36.5	dB
ΔS ₂₁	Gain Variation over band	P _{IN} = -25 dBm, f _{IN} = 2400 to 2500 MHz	-	1	-	dB
ACPR	Adjacent Channel Power Ratio ±11 MHz offsets from carrier ±22 MHz offsets from carrier	P _{OUT} = 25 dBm, 11 Mbps CCK signal, BT = 0.45	- -	-37 -60	- -	dBc
2f	Harmonic	P _{OUT} = 25 dBm, CW	-	-45	-	dBm/MHz
3f			-	-35	-	dBm/MHz
EVM	Error Vector Magnitude	P _{OUT} = 23 dBm, 54 Mbps OFDM signal, 64 QAM	-	3.0	-	%
t _r , t _f	Rise and Fall Time	-	-	0.5	-	μSec
STAB	Stability	P _{OUT} = 25 dBm, 54 Mbps OFDM signal, 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} = 25 dBm, 54 Mbps OFDM signal, 64 QAM VSWR = 10:1 All Phases	No damage			

Power Detector

Conditions: "V_{CC} = V_{CC3} = V_{EN} = 3.3 V" OR "V_{CC} = V_{EN} = 3.3 V, V_{CC3} = 5 V", f = 2.45 GHz, T_A = 25 °C, as measured on Skyworks Solutions' SE2527L-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} = 23 dBm	0.92	1.04	1.16	V
VDET	Detector voltage	P _{OUT} = 21 dBm	0.75	0.88	0.99	V
VDET	Detector voltage	P _{OUT} = NO RF	0.26	0.32	0.36	V
PDZ _{OUT}	Output Impedance	-	250	-	700	Ω
PDZ _{LOAD}	DC load impedance	-	10	-	-	kΩ



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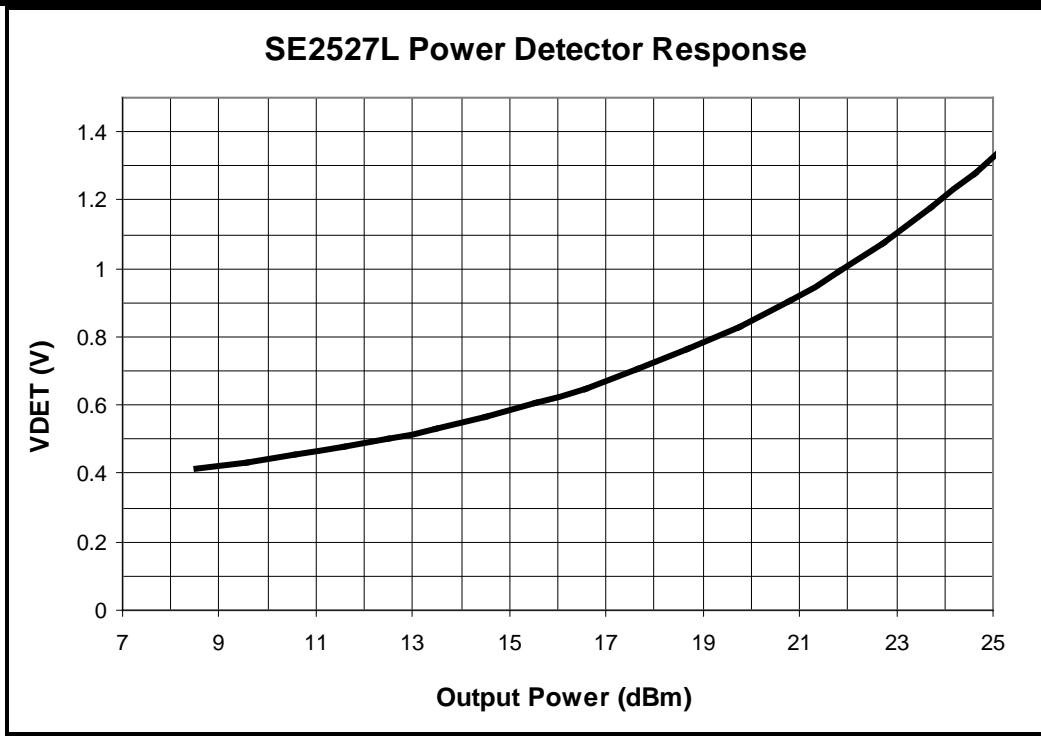


Figure 3: SE2527L Power Detector Characteristic

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Typical 3.3V Performance Characteristics

Conditions: $V_{CC} = V_{CC3} = V_{EN} = 3.3\text{ V}$, $f = 2.45\text{ GHz}$, $T_A = 25\text{ }^\circ\text{C}$, as measured on Skyworks Solutions' SE2527L-EV1 evaluation board, unless otherwise noted

802.11g Performance

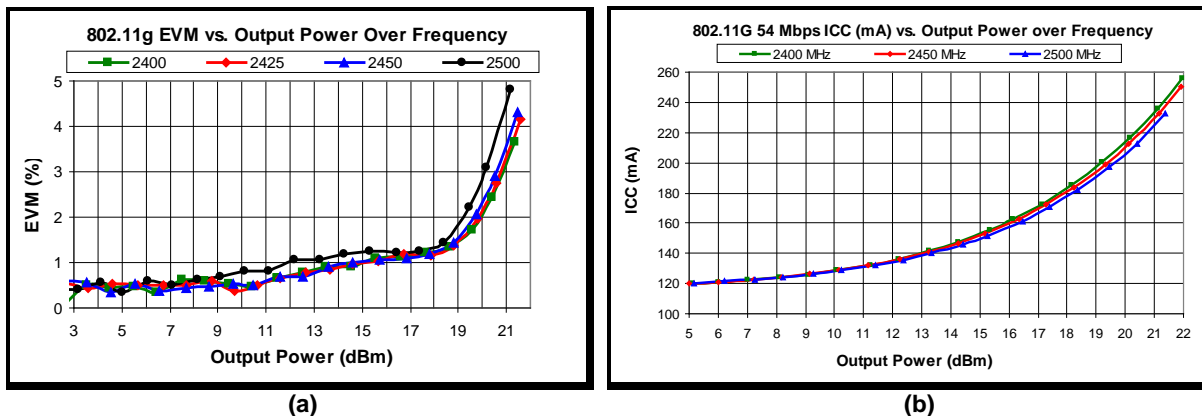
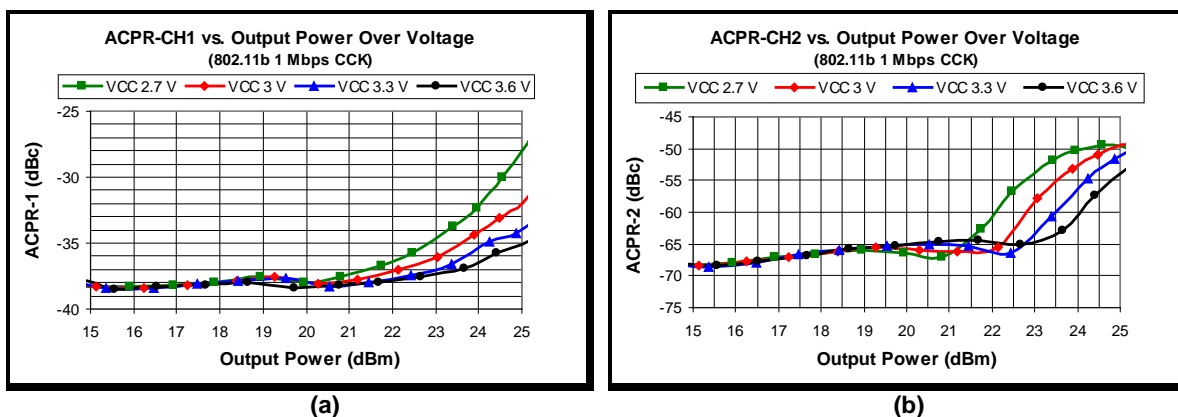


Figure 4: SE2527L 802.11g 54 Mbps Typical Performance over Frequency: (a) EVM vs. Output Power and (b) ICC vs. Output Power

802.11b Performance



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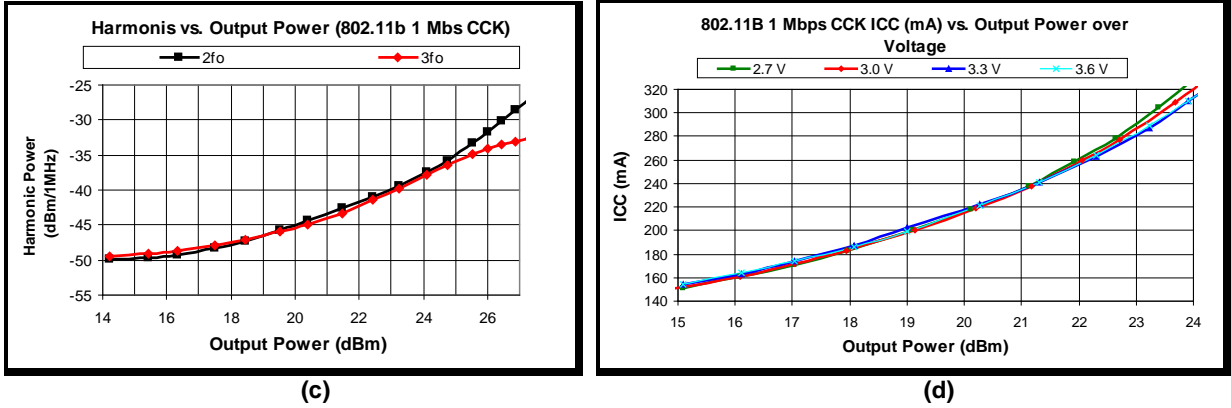


Figure 5: Typical 802.11b Performance (a) ACPR-CH1 vs. Output Power Over Voltage, (b) ACPR-2 vs. Output Power over Voltage, (c) 2nd and 3rd Harmonics vs. Output Power (d) ICC vs. Output Power over Voltage

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Typical 3.3V Performance Characteristics (Continued)

General (CW)

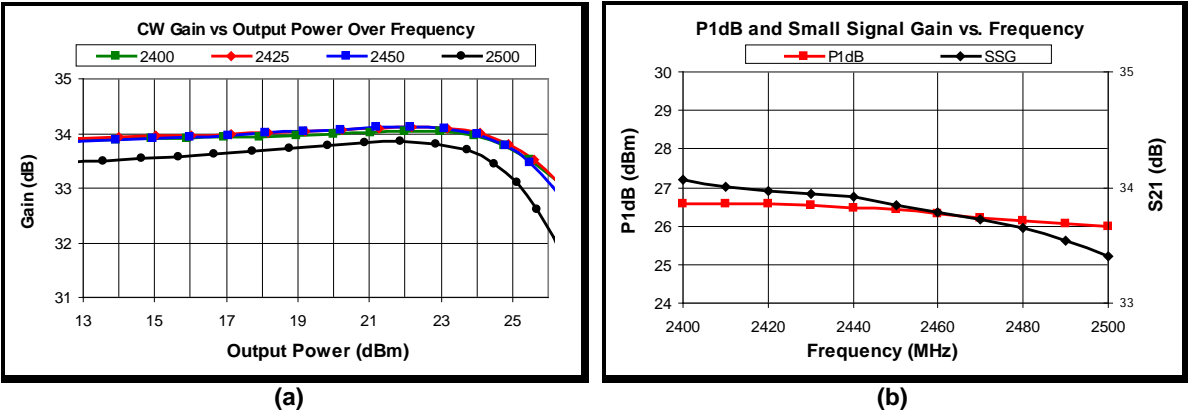


Figure 6: Typical CW Performance (a) Gain vs. Output Power over Frequency and (b) P1db and Small Signal Gain vs. Frequency

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Typical 5 V Performance Characteristics

Conditions: $V_{CC} = V_{EN} = 3.3\text{ V}$, $V_{CC3} = 5\text{ V}$, $f = 2.45\text{ GHz}$, $T_A = 25\text{ }^\circ\text{C}$, as measured on Skyworks Solutions' SE2527L-EV1 evaluation board, unless otherwise noted

802.11g Performance

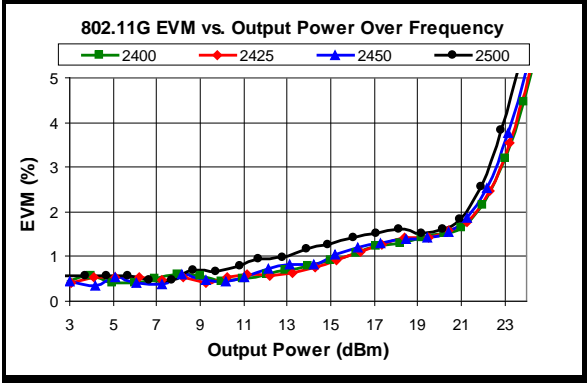


Figure 7: SE2527L 802.11g 54 Mbps EVM

General (CW)

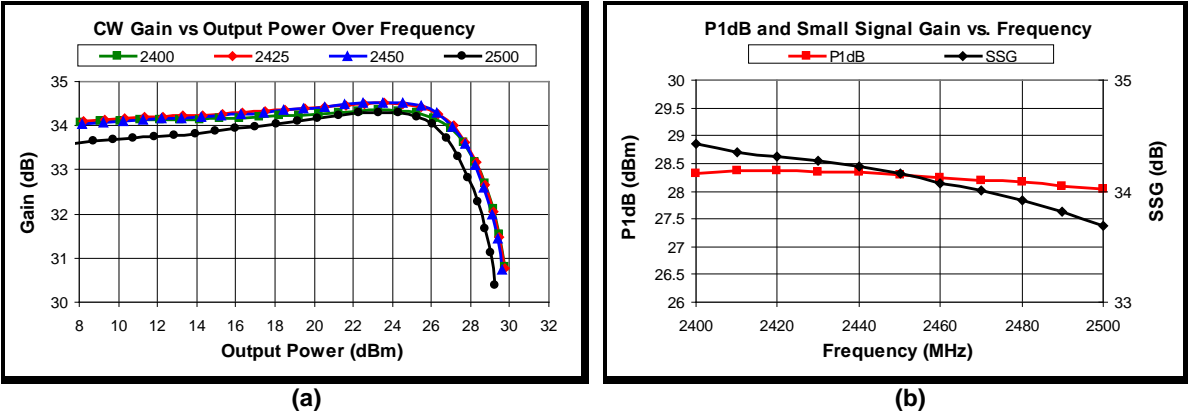


Figure 8: CW Typical Performance (a) Gain vs. Output Power over Frequency and (b) P1db and Small Signal Gain vs. Frequency

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Application Circuit

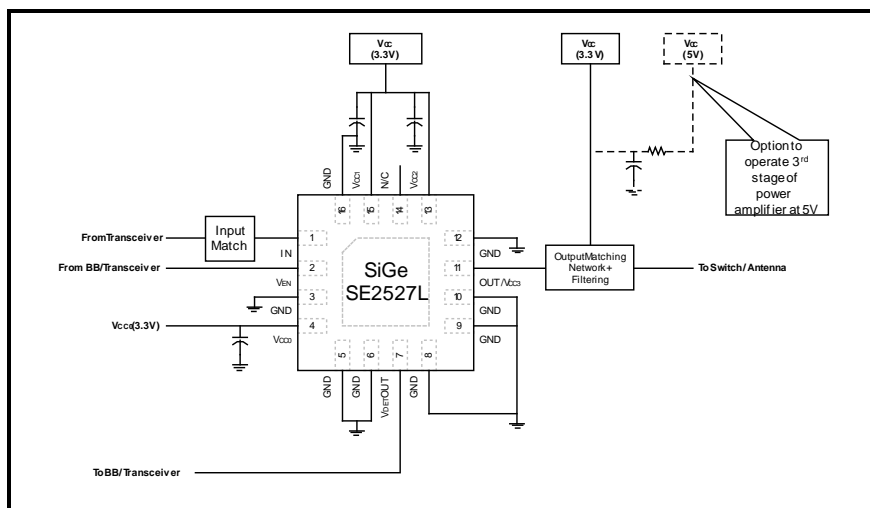


Figure 9: SE2527L Application Circuit

Branding Information

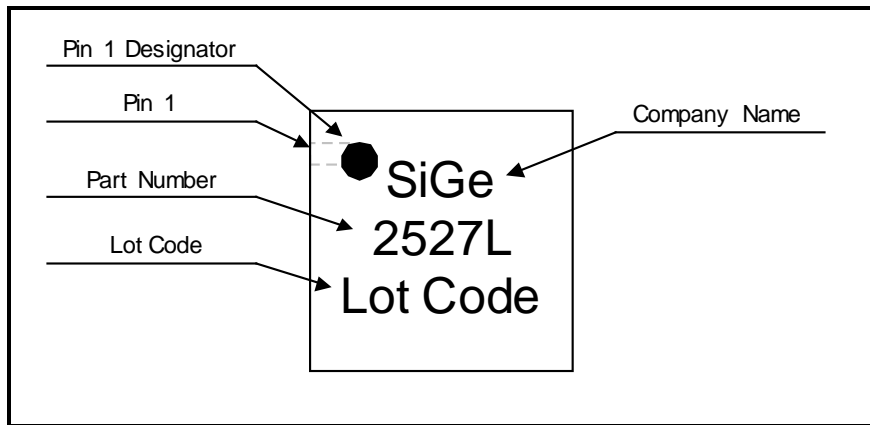


Figure 10: SE2527L Branding Information

Tape and Reel Information

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

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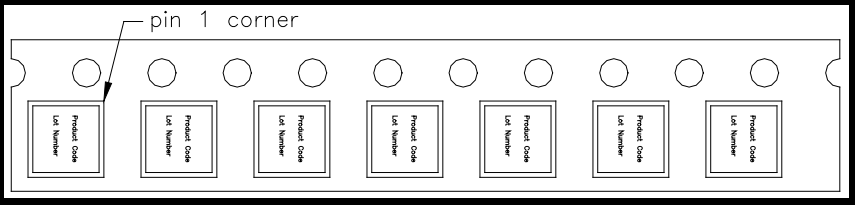


Figure 11: SE2527L-R Tape and Reel Information

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Package Information

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

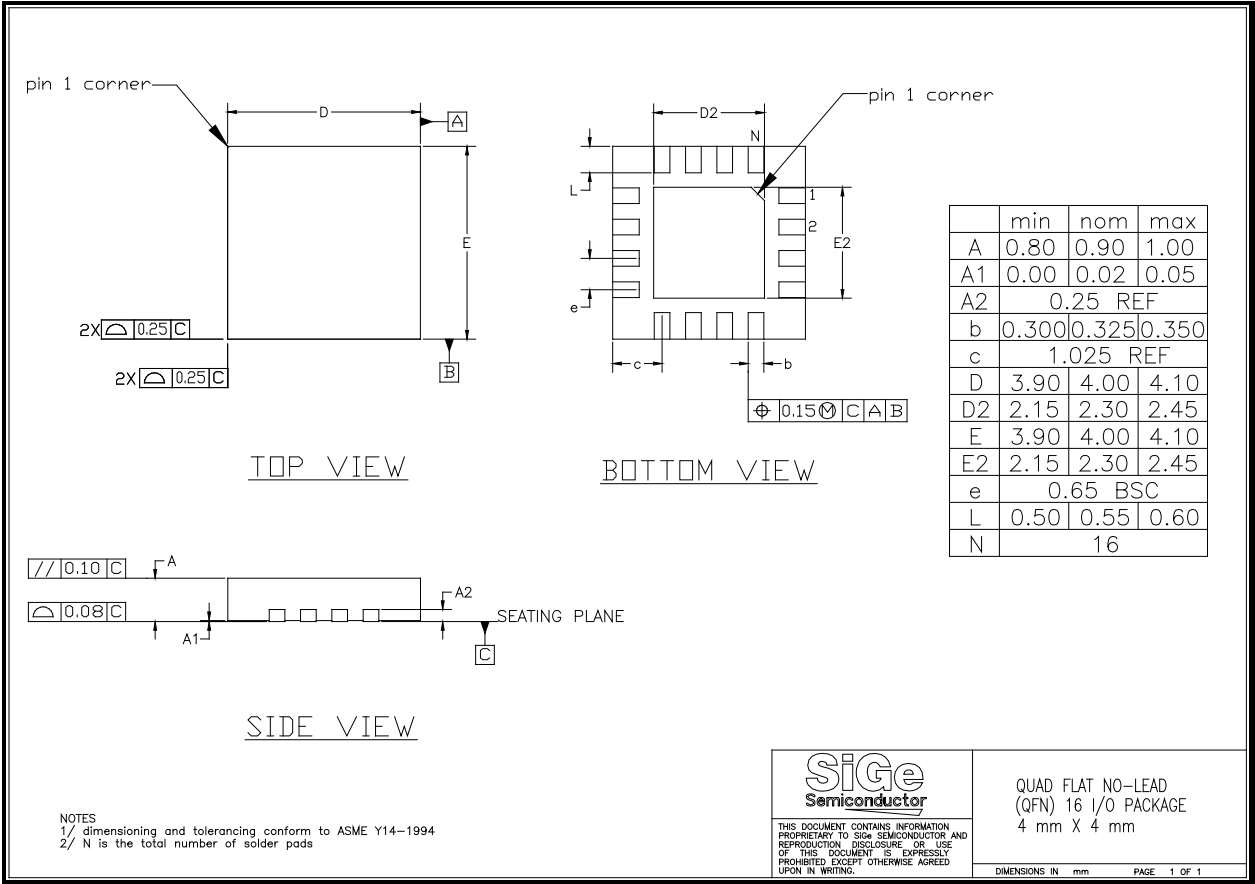


Figure 12: SE2527L Package Drawing



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