DATA SHEET
SE2576L: 2.4 GHz High Power Wireless LAN Power Amplifier
Preliminary

Applications

- IEEE802.11b DSSS WLAN
- IEEE802.11g,n OFDM WLAN
- Access Points

Features

- Dual Mode IEEE802.11b, IEEE802.11g, IEEE802.11n
- 26 dBm, EVM = 3%, 802.11g, OFDM 54 Mbps
- 29 dBm, 802.11b mask compliant
- Integrated PA, Input Match, 2.8V reference voltage generator
- Integrated Temperature Compensated, Positive Slope Power Detector
- Pb-free, RoHS compliant and Halogen-free
- 3 mm x 3 mm x 0.9 mm, MSL 3

Product Description

The SE2576L is a high power 802.11bgn WLAN power amplifier module providing the functionality of the power amplifier, power detector, reference voltage generator and input match.

The SE2576L is designed for ease of use and maximum flexibility, with an integrated input match, and external output match to adjust the load line for 5V, 26dBm operation.

The SE2576L includes a temperature compensated transmit power detector with over 20 dB of dynamic range and <1.2dB variation under 3:1 mismatch at the antenna.

The SE2576L includes a digital enable control due to an integrated reference voltage generator. The power ramp rise/fall time is 0.5 µs typical.

Ordering Information

Part No.	Package	Remark
SE2576L	16 pin QFN	Samples
SE2576L-R	16 pin QFN	Tape & Reel
SE2576L-EK1	N/A	Evaluation kit

Functional Block Diagram

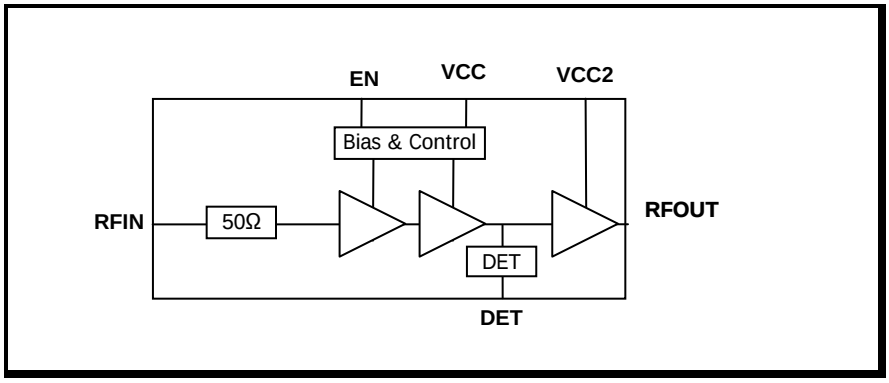


Figure 1: Functional Block Diagram

Pin Out Diagram

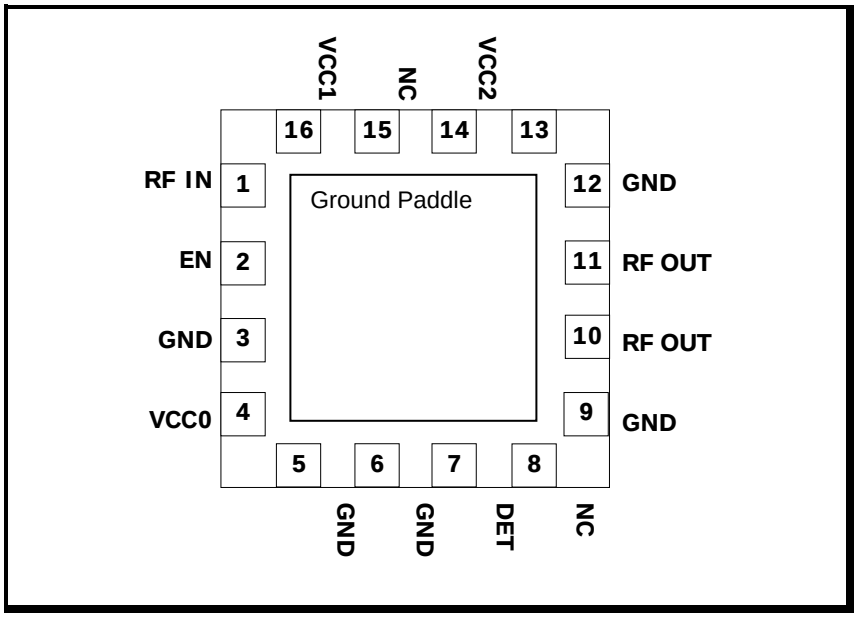


Figure 2: SE2576L Pin Out (Top View Through Package)

Pin Out Description

Pin No.	Name	Description
1	RF IN	RF Input
2	EN	Power Amplifier Enable
3	GND	Ground
4	VCC0	Power Supply for Bias Circuit
5	GND	Ground
6	GND	Ground
7	DET	Power Detector Output
8	NC	No Connect. May be left floating or grounded.
9	GND	Ground
10	RF OUT	RF Output
11	RF OUT	RF Output
12	GND	Ground
13	VCC2	Power Supply for 2nd Stage
14	NC	No Connect. May be left floating or grounded.
15	VCC1	Power Supply driver stages
16	GND	Ground
Die paddle	GND	Ground

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
VCC0, 1, 2	Supply Voltage on VCC	-0.3	5.5	V
V_{IN}	DC input on EN	-0.3	3.6	V
TX	RF Input Power. RF Out terminated in 50Ω	-	12.0	dBm
T_A	Operating Temperature Range	-40	85	°C
T_{STG}	Storage Temperature Range	-40	150	°C
ESD_{HBM}	JEDEC JESD22-A114 all pins	-	1000	V

Recommended Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
T_A	Ambient temperature	-40	25	85	°C
VCC	Supply voltage, relative to GND = 0 V	4.5	5	5.5	V

DC Electrical Characteristics

Conditions: VCC = 5 V, EN = V_{ENH}, T_A = 25 °C, as measured on Skyworks Solutions' SE2576L-EV1 evaluation board (de-embedded to device), all unused ports terminated with 50 ohms, unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{CC-G}	Total Supply Current	POUT = 26 dBm, 54 Mbps OFDM signal, 64QAM	-	500	-	mA
I_{CC-B}	Total Supply Current	P_{OUT} = 29 dBm, 11 Mbps CCK signal, BT = 0.45	-	650	-	mA
I_{CC_OFF}	Total Supply Current	EN = 0 V, No RF Applied	-	10	100	µA

Logic Characteristics

Conditions: VCC = 5 V, EN = V_{ENH}, T_A = 25 °C, as measured on Skyworks Solutions' SE2576L-EV1 evaluation board (de-embedded to device), all unused ports terminated with 50 ohms, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{ENH}	Logic High Voltage (Module On)	-	1.8	-	3.6	V
V_{ENL}	Logic Low Voltage (Module Off)	-	0	-	0.4	V
I_{ENH}	Input Current Logic High Voltage	-	-	300	-	µA

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{ENL}	Input Current Logic Low Voltage	V_{EN} = 0.4V	-	1	50	µA
Z_{EN}	Enable pin input impedance	Passive Pull Down		10		kΩ

AC Electrical Characteristics

802.11g/n Transmit Characteristics

Conditions: VCC = 5 V, EN = 3.3 V, T_A = 25 °C, as measured on Skyworks Solutions' SE2576L-EV1 evaluation board (de-embedded to device), all unused ports terminated with 50 ohms, unless otherwise noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
F_{IN}	Frequency Range	-	2400	-	2500	MHz
POUT	Output Power	54 Mbps OFDM signal, 64 QAM, 3% EVM	-	26	-	dBm
		1 Mbps CCK signal, BT = 0.045, Mask		29		
		802.11n, HT20, all data rates, Mask		30		
		802.11n, HT40, all data rates, Mask		27		
P_{1dB}	P1dB	-	-	32	-	dBm
S_{21}	Small Signal Gain	-	30	33	-	dB
ΔS_{21}	Small Signal Gain Variation	Gain variation over single 40MHz channel	-	0.5	-	dB
		Gain Variation over band	-	1.0	-	
2f	Harmonics	P_{OUT} = 29 dBm, 1 Mbps, 802.11b	-	-50	-45	dBm/MHz
3f			-	-50	-45	dBm/MHz
t_{dr}, t_{df}	Delay and rise/fall Time	50 % of V_{EN} edge and 90/10 % of final output power level	-	0.5	-	µs
S_{11}	Input Return Loss	-	10	15	-	dB
STAB	Stability	CW, P_{OUT} = 29 dBm 0.1 GHz – 20 GHz Load VSWR = 4:1	All non-harmonically related outputs less than -42 dBm/MHz			
RU	Ruggedness	CW 50% duty cycle, PIN = +12dBm, Load VSWR = 6:1	No permanent damage.			

Power Detector Characteristics

Conditions: VCC = 5 V, EN = VENH, T_A = 25 °C, as measured on Skyworks Solutions' SE2576L-EV1 evaluation board, unless otherwise noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
F_{OUT}	Frequency Range	-	2400	-	2500	MHz
PDR	Power detect range, CW	Measured at RF out	5	-	30	dBm
PDZ_{src}	DC source impedance on PD_OUT	-	-	2.3	-	KΩ
PDZ_{LOAD}	DC load impedance	-	-	26.5	-	KΩ
PDV_{P5}	Output Voltage, P_{OUT} = 5dBm CW	Measured into 26.5KΩ	-	0.33	-	V
PDV_{P26}	Output Voltage, P_{OUT} = 26 dBm CW	Measured into 26.5KΩ	-	0.70	-	V
PDV_{P30}	Output Voltage, P_{OUT} = 30 dBm CW	Measured into 26.5KΩ	-	1.00	-	V
LPF_{-3dB}	Power detect low pass filter -3dB corner frequency	Measured into 26.5KΩ	-	2.0	-	MHz

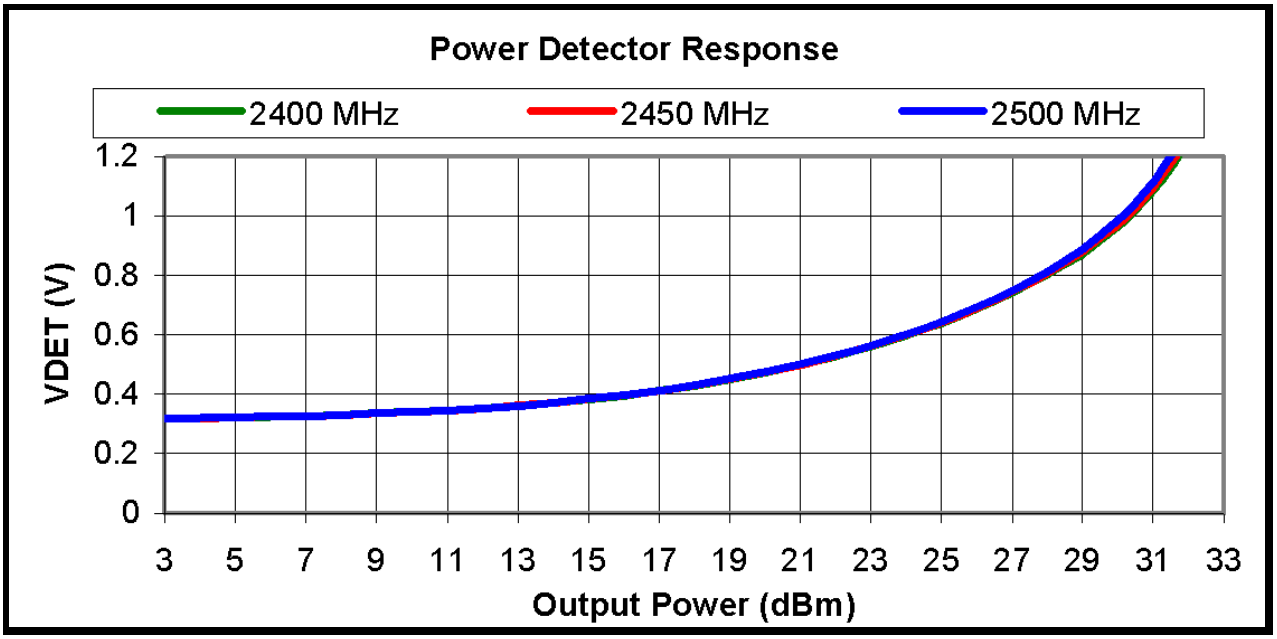
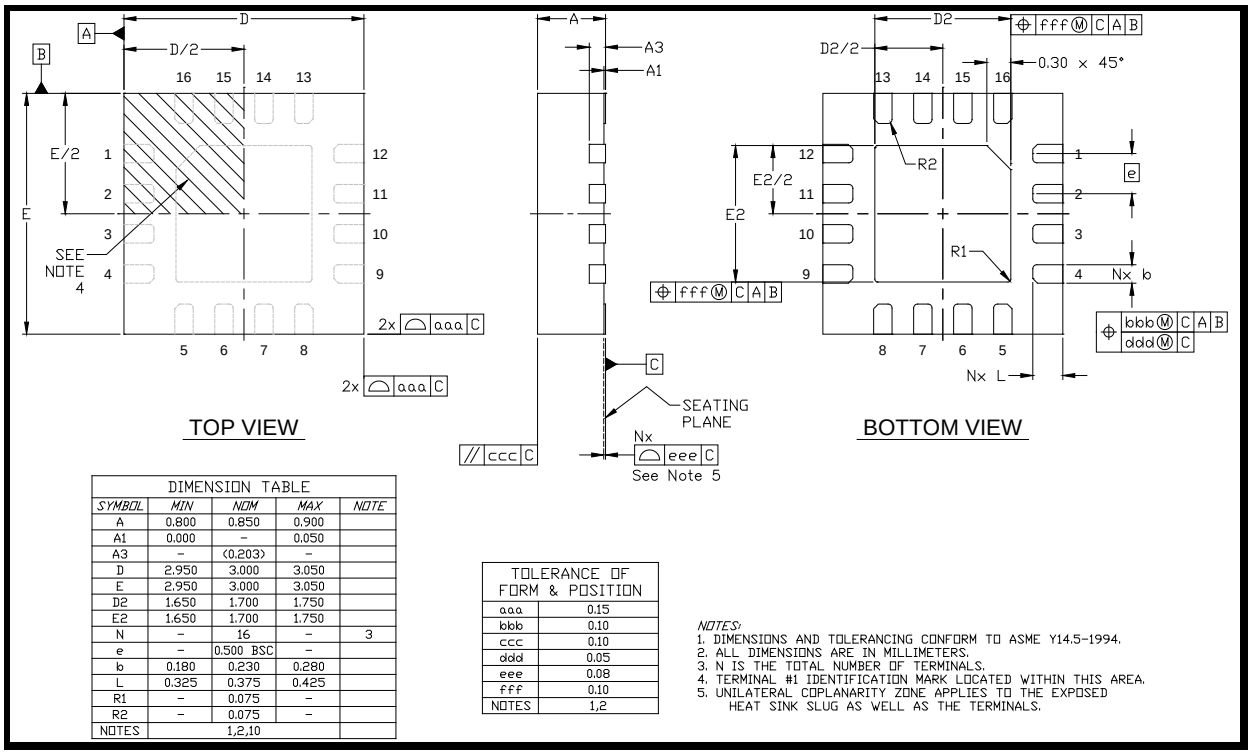


Figure 3: SE2576L Detector Characteristics

Package Diagram



DIMENSION TABLE				
SYMBOL	MIN	NOM	MAX	NOTE
A	0.800	0.850	0.900	
A1	0.000	–	0.050	
A3	–	(0.203)	–	
D	2.950	3.000	3.050	
E	2.950	3.000	3.050	
D2	1.650	1.700	1.750	
E2	1.650	1.700	1.750	
N	–	16	–	3
e	–	0.500 BSC	–	
b	0.180	0.230	0.280	
L	0.325	0.375	0.425	
R1	–	0.075	–	
R2	–	0.075	–	
NOTES	1,2,10			

TOLERANCE OF FORM & POSITION	
aaa	0.15
bbb	0.10
ccc	0.10
ddd	0.05
eee	0.08
fff	0.10
NOTES	1,2

NOTES:
1. DIMENSIONS AND TOLERANCING CONFORM TO ASME Y14.5-1994.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. N IS THE TOTAL NUMBER OF TERMINALS.
4. TERMINAL #1 IDENTIFICATION MARK LOCATED WITHIN THIS AREA.
5. UNILATERAL COPLANARITY ZONE APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS.

Figure 4: SE2576L Package Diagram

Recommended Land and Solder Patterns

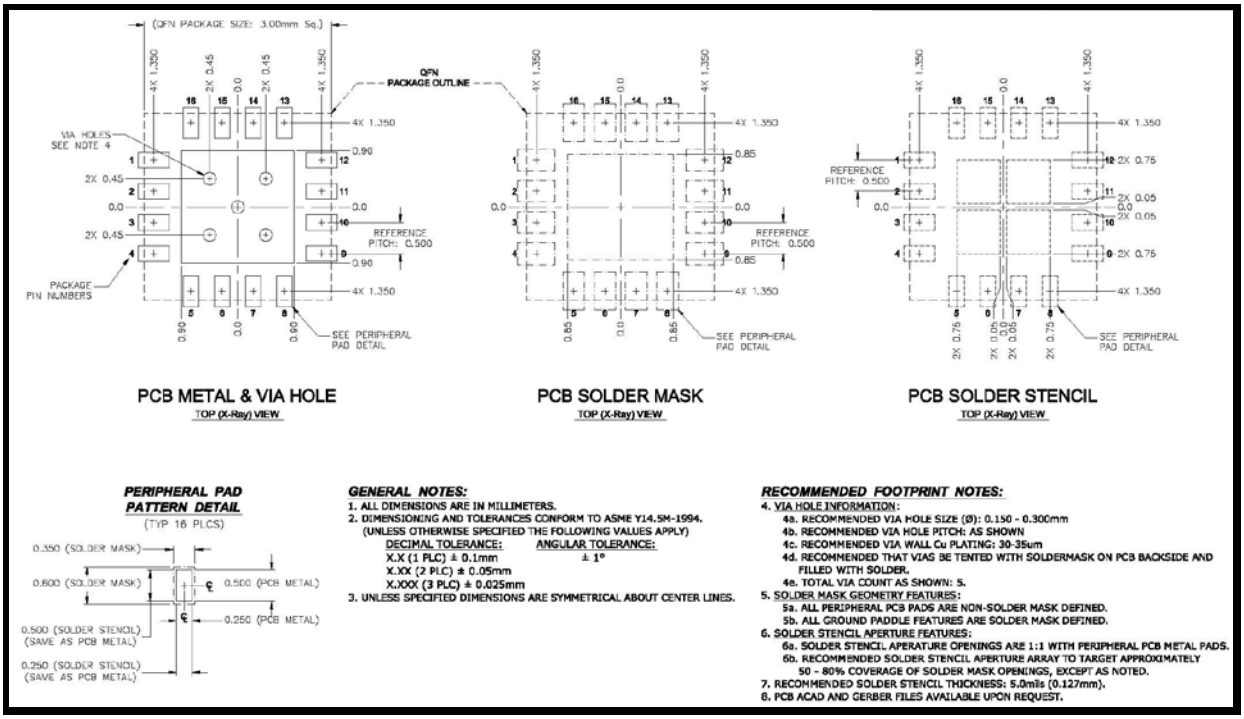


Figure 5: SE2576L Recommended Land and Solder Pattern

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 SE2576L 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 1C ESD sensitive device

Branding Information

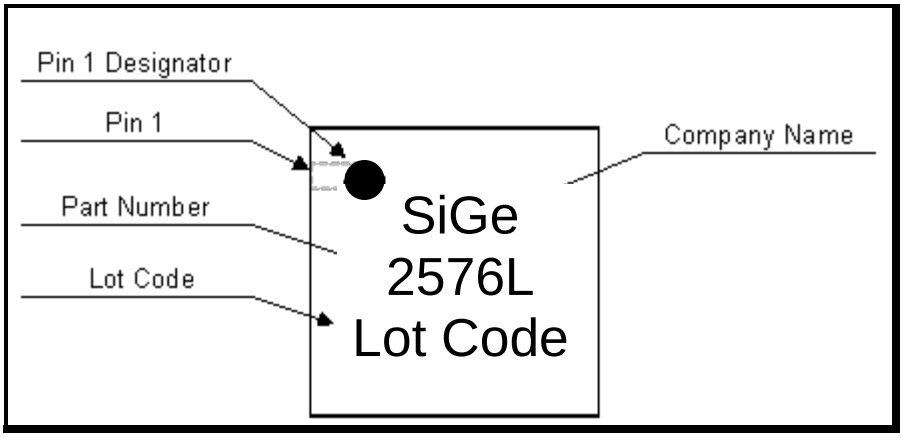


Figure 6: SE2576L Branding

Tape and Reel Information

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

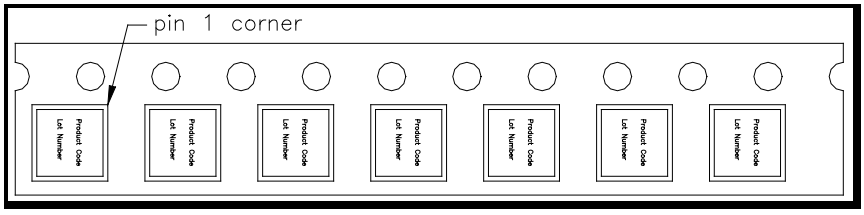


Figure 7: SE2576L-R Tape and Reel Information

Document Change History

Revision	Date	Notes
1.0	Jan 10, 2009	Created
1.1	May 8, 2009	Updated PA Control Logic Characteristics Updated POD for SE2576L datasheet.
1.2	Jul 8, 2009	Updated to correct pins 8 & 14 definitions.
1.3	Aug 2, 2009	Updated detector characteristics
1.4	Sep 24, 2009	Updated current consumption
1.5	Oct 25, 2009	Updated detector plot
1.6	Jan 25, 2010	Updated Off-State Leakage current

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Revision	Date	Notes
1.7	Jun 22, 2010	Extended operating temperature to Industrial limits
1.8	Dec 18, 2010	Updated ESD rating Added OFDM Mask Compliance
1.9	Apr 10, 2012	Updated with Skyworks logo and disclaimer statement