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DATA SHEET
SE2597L: 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)
- OFDM 2.4 GHz WLAN (IEEE802.11n)
- Access Points, PCMCIA, PC cards

Features

- Single 3.3 V Supply Operation
  - 19 dBm, EVM = 3 %, 802.11g, OFDM 54 Mbps
  - 23 dBm, ACPR < -32 dBc, 802.11b
- 28 dB Gain
- Integrated temperature compensated power detector
- Digital power amplifier enable pin (V_{EN})
- Lead Free, Halogen Free and RoHS compliant
- Small package: 16 pin 3 mm x 3 mm x 0.9 mm QFN, MSL 1

Product Description

The SE2597L 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 SE2597L includes a digital enable control for device on/off control.

The SE2597L 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
SE2597L	16 Pin QFN	Samples
SE2597L-R	16 Pin QFN	Tape and Reel
SE2597L-EK1	Evaluation Kit	Standard

Functional Block Diagram

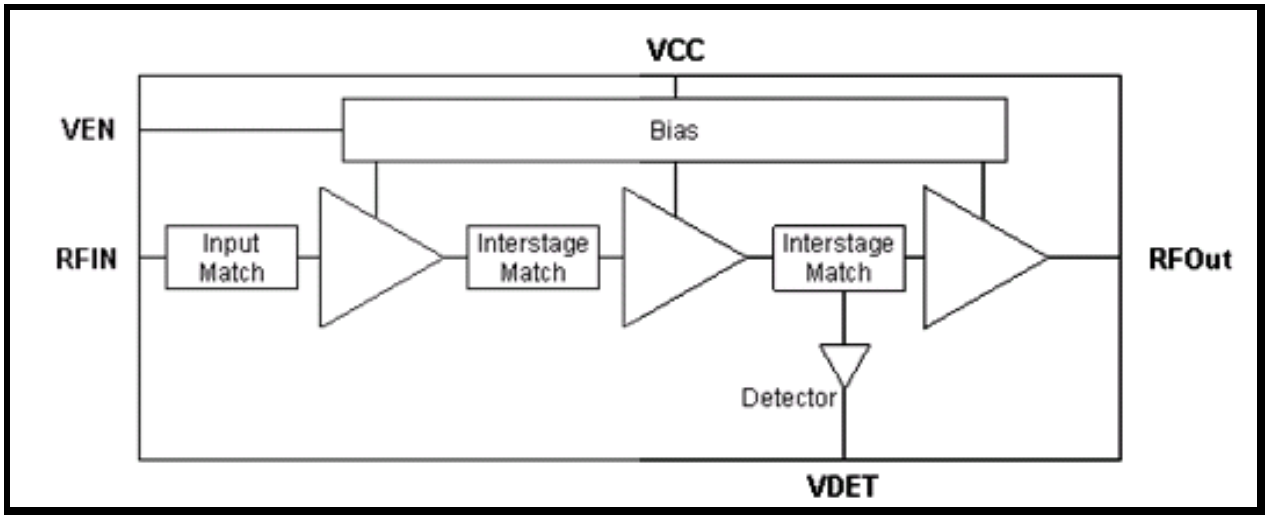


Figure 1: Functional Block Diagram

Pin Out Diagram

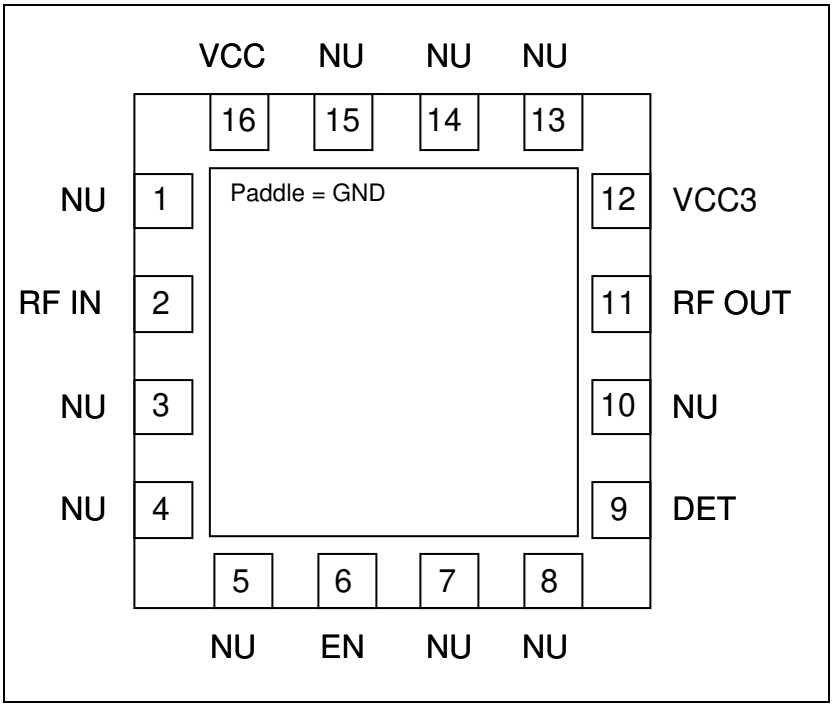


Figure 2: SE2597L Pin-Out Diagram

Pin Out Description

Pin No.	Name	Description
1	NU	No Connect
2	RFin	Power amplifier RF input; DC block required
3,4,5	NU	No Connect
6	EN	Digital pin used to power up and power down the IC
7,8	NU	No Connect
9	DET	Analog power detector output
10	NU	No Connect
11	RFout	Power Amplifier RF output
12	VCC3	Third Stage Collector Voltage
13-15	NU	No Connect
16	VCC	Stages 1, 2 collector supply
Paddle	GND	Exposed die paddle; 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_{CC}	-0.3	4	V
RFout	Supply Voltage on pins V_{CC3} (Note: SE2597L application circuit must be followed for operation above 3.6 V)	-0.3	5.5	V
V_{EN}	Power Amplifier Enable	-0.3	3.6	V
RFin	RF Input Power, RF_OUT terminated into 50Ω match	-	10	dBm
T_{STG}	Storage Temperature Range	-40	150	°C
ESD_{HBM}	JEDEC JESD22-A114 all pins	-	500	V

Recommended Operating Conditions

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply Voltage	3.0	3.6	V
V_{CC3}	Supply Voltage on pins V_{CC3}	3.0	3.6	V
T_A	Ambient Temperature	-40	85	°C

DC Electrical Characteristics

Conditions: V_{CC} = V_{CC3} = V_{EN} = 3.3 V, T_A = 25 °C, as measured on Skyworks Solutions' SE2597L-EV1 evaluation board, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_{CC-802.11b}$	Supply Current (Sum of V_{CC0}, V_{CC}, V_{CC3})	P_{OUT} = 23 dBm, 11 Mbps CCK signal, BT = 0.45, V_{CC} = V_{CC3} = 3.3 V	-	250	-	mA
$I_{CC-802.11g}$	Supply Current (Sum of V_{CC},V_{CC3})	P_{OUT} = 19 dBm, 54 Mbps OFDM signal, 64 QAM, V_{CC} = V_{CC3} = 3.3 V	-	175	-	mA
I_{CQ}	Supply Current (Sum of V_{CC},V_{CC3})	No RF	-	125	-	mA
I_{OFF}	Supply Current	V_{EN} = 0 V, No RF	-	2	10	µA
V_{ENH}	Logic High Voltage	-	1.3	-	V_{CC}	V
V_{ENL}	Logic Low Voltage	-	0	-	0.5	V
I_{ENH}	Input Current Logic High Voltage	-	-	300	-	µA

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

AC Electrical Characteristics

802.11b/g AC Electrical Characteristics

Conditions: $V_{CC} = V_{CC3} = V_{EN} = 3.3$ V, f = 2.45 GHz, $T_A = 25$ °C, as measured on Skyworks Solutions' SE2597L-EV1 evaluation board, unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
f_{L-U}	Frequency Range	-	2400	-	2500	MHz
POUT	Output Power	54 Mbps OFDM signal, 64 QAM, 3% EVM	-	19	-	dBm
		11 Mbps CCK signal, BT = 0.045, Mask	-	23	-	
		802.11n, HT20, all data rates, Mask	-	23	-	
		802.11n, HT40, all data rates, Mask	-	23	-	
P_{1dB}	Output 1dB compression point	No modulation	24.5	26.5	-	dBm
S_{11}	Input Return Loss		-	-12	-10	dB
S_{21}	Small Signal Gain	P_{IN} = -25 dBm	26	28	34	dB
ΔS_{21}	Gain Variation over band	P_{IN} = -25 dBm, f_{IN}= 2400 to 2500 MHz	-	1	-	dB
2f	Harmonic	P_{OUT} = 23 dBm, CW	-	-50	-	dBm/MHz
3f			-	-50	-	dBm/MHz
t_r, t_f	Rise and Fall Time	-	-	0.5	-	µSec
STAB	Stability	P_{OUT} = 23 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} = 23 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, f = 2.45 GHz, T_A = 25 °C, as measured on Skyworks Solutions' SE2597L-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	-	1.04	-	V
VDET	Detector voltage	P_{OUT} = 21 dBm	-	0.87	-	V
VDET	Detector voltage	P_{OUT} = NO RF	-	0.33	-	V
PDZ_{OUT}	Output Impedance	-	-	2.3	-	KΩ
PDZ_{LOAD}	DC load impedance	-	10	-	-	kΩ

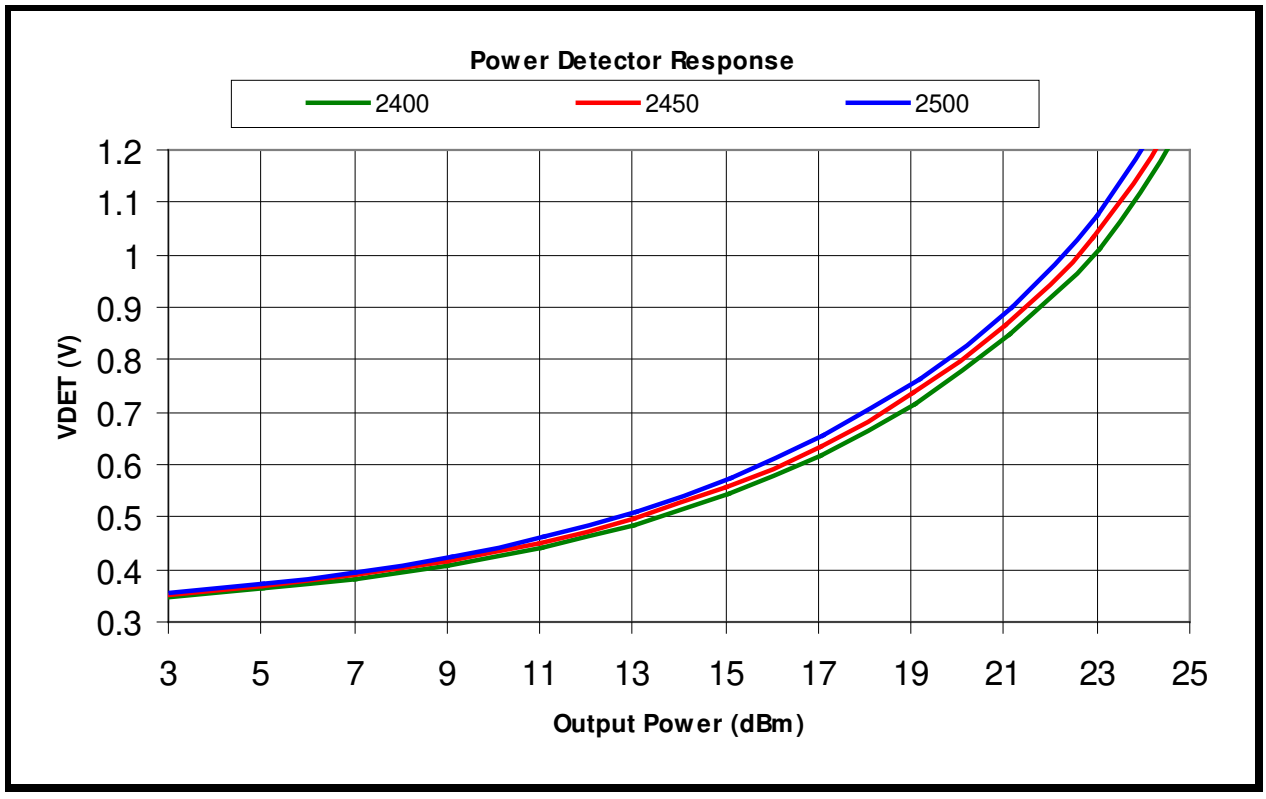
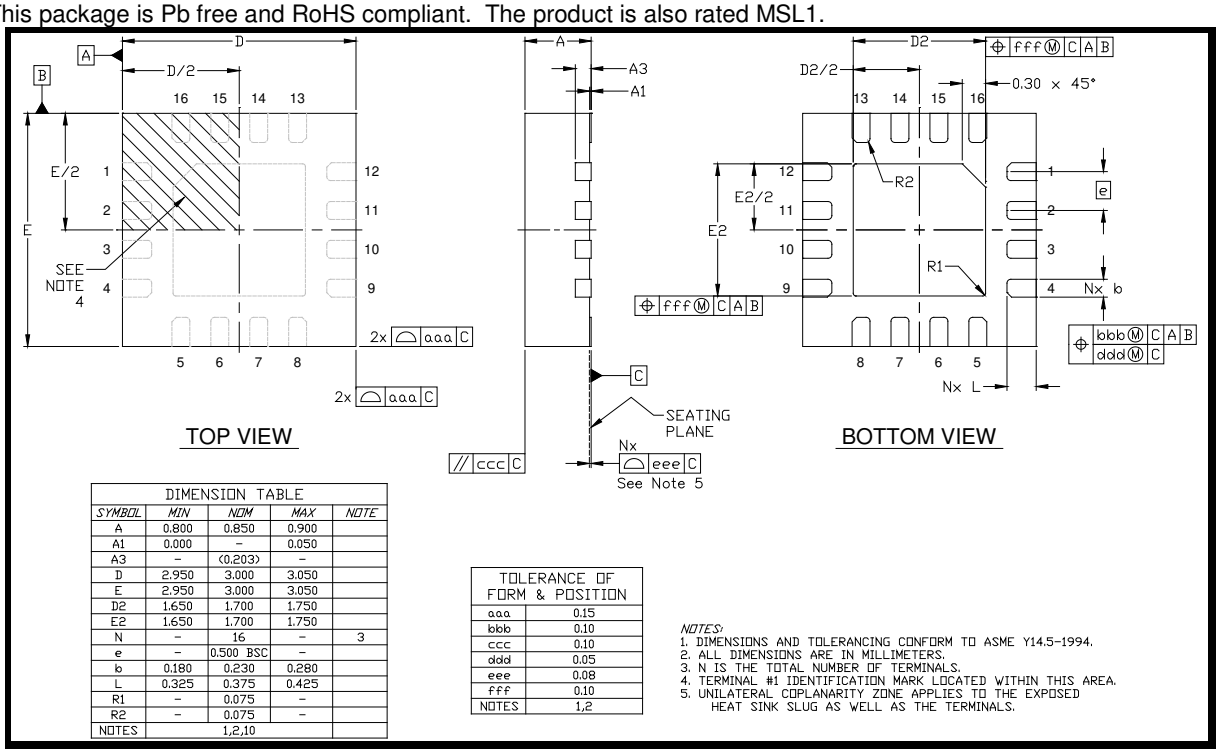


Figure 3: SE2597L Power Detector Characteristic

Package Drawing

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



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: SE2597L Package Drawing: Topside

Recommended Land and Solder Patterns

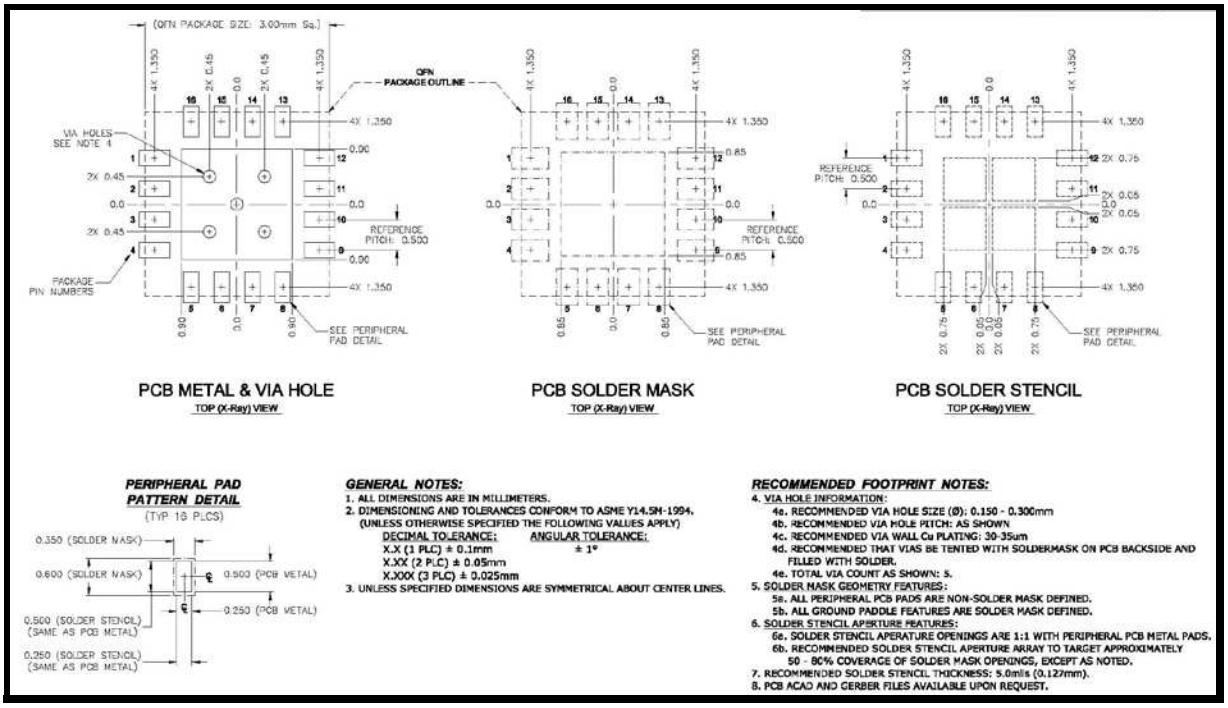


Figure 5: Recommended Land and Solder Patterns

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

Branding Information

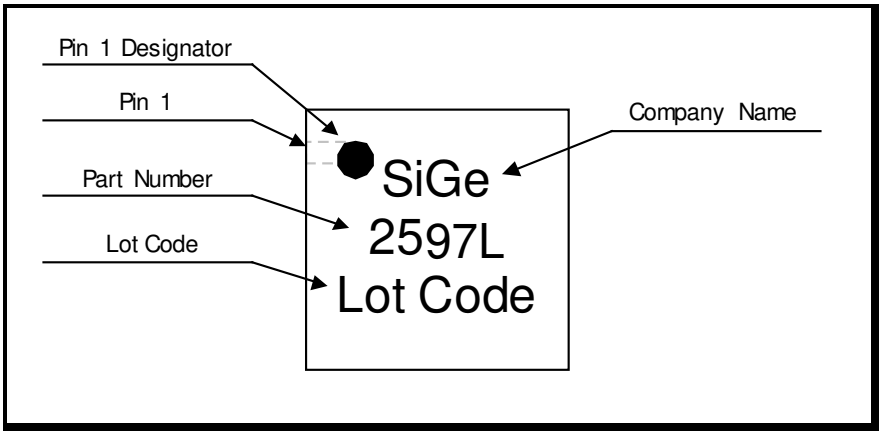


Figure 6: SE2597L Branding Information

Tape and Reel Information

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

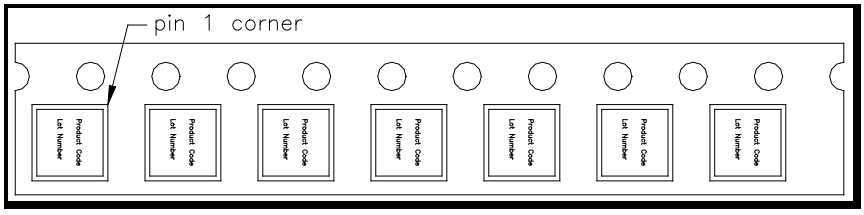


Figure 7: SE2597L-R Tape and Reel Information

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Document Change History

Revision	Date	Notes
1.0	May 28, 2008	Created
1.1	Aug 25, 2008	Updated application schematic Added recommended land and solder patterns Updated detector characteristics
1.2	Mar 23, 2009	Replace AK1 (application kit) with EK1 (evaluation kit) on page 1
1.3	May 26, 2009	Amended back page
1.4	Oct 14, 2009	Updated Package Outline Drawing
1.5	Feb 3, 2010	Added reference to 0 ESD device handling application note.
1.6	Dec 18, 2010	Updated ESD rating Added OFDM Mask Compliance Extended recommended operating temperature to -40C to +85C
1.7	Apr 03, 2012	Updated with Skyworks logo and disclaimer statement