

DATA SHEET

SE2567L: 5 GHz Power Amplifier with Power Detector

Preliminary Information

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

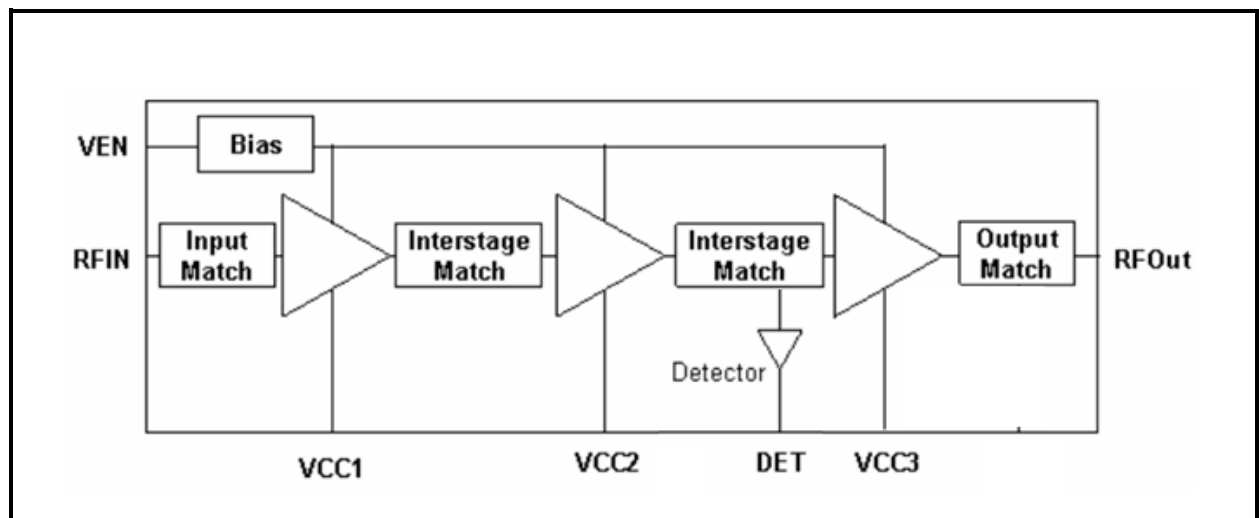


Figure 1: Functional Block Diagram

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Pin Out Diagram

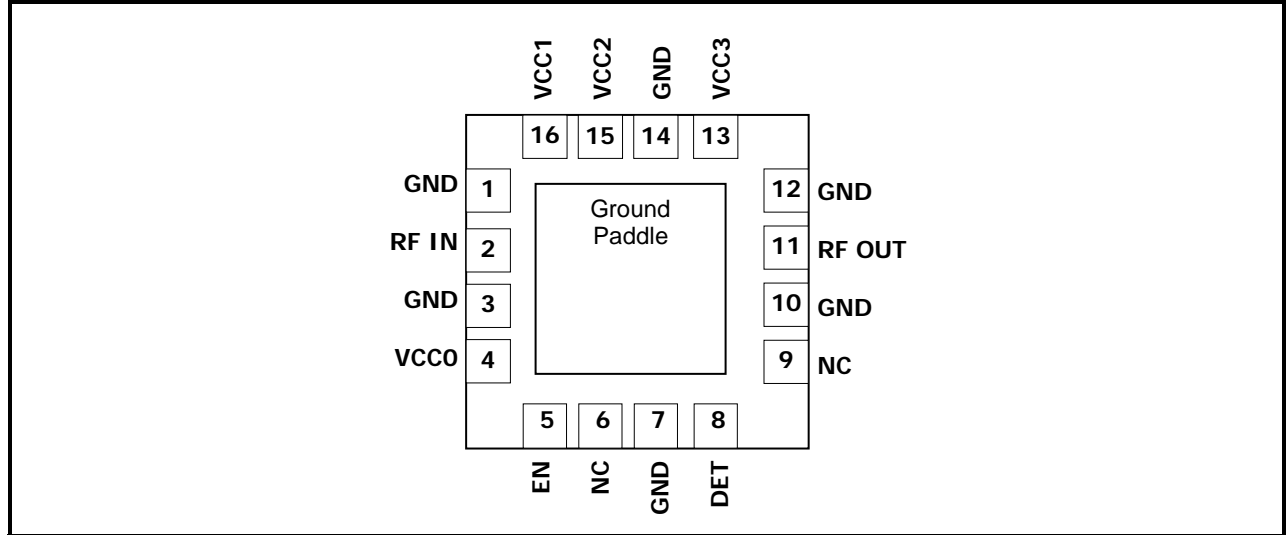


Figure 2: SE2567L Pin-Out Diagram

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 _{CC} | 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 _F IN | RF Input Power, R _F out into 50Ω match | - | 12 | 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 (VCC0, VCC1) | 3.0 | 3.6 | V |
| | Supply Voltage (VCC2, VCC3) | 3.0 | 4.5 | |
| T _A | Ambient Temperature | -40 | 85 | °C |

DC Electrical Characteristics

Conditions: V_{CC} = V_{EN} = 3.3 V, T_A = 25 °C, as measured on Skyworks Solutions' SE2567L-EV1 evaluation board, unless otherwise noted.

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

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AC Electrical Characteristics
802.11a AC Electrical Characteristics

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

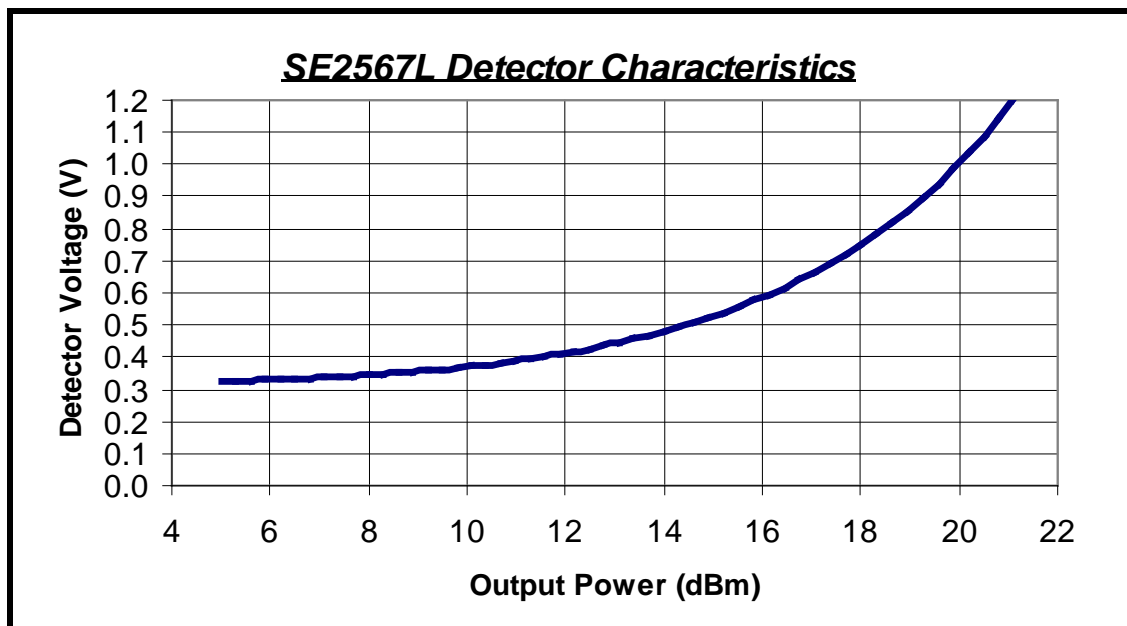
| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------|---|--|--|------|------|---------|
| f_{L-U} | Frequency Range | - | 4.9 | - | 5.9 | GHz |
| P _{OUT} | Output Power, 54 Mbps OFDM signal, 64 QAM, 3% EVM | VCC0,1,2,3 = 3.3V | - | 19 | - | dBm |
| | | VCC0,1 = 3.3V; VCC2,3 = 4.5V | - | 21.5 | - | |
| P _{1dB} | Output 1dB compression point | No modulation | - | 25 | - | dBm |
| S ₁₁ | Input Return Loss | P _{IN} = -25 dBm | 6 | - | - | dB |
| S ₂₁ | Small Signal Gain | P _{IN} = -25 dBm | - | 30 | - | dB |
| ΔS_{21} | Small Signal Gain Variation | Gain variation over single 40MHz channel | - | 0.5 | - | dB |
| | | Gain Variation over band | - | 2.0 | 4.0 | |
| S _{21_3.8} | Out of Band Gain | Gain at 3.8GHz | - | - | 10 | dB |
| 2f | Harmonic | P _{OUT} = 19.0dBm @3.3V or P _{OUT} = 21.5dBm @4.5V | - | -50 | - | dBm/MHz |
| 3f | | | - | -50 | - | dBm/MHz |
| t _r , t _f | Rise and Fall Time | - | - | 0.5 | - | us |
| STAB | Stability | P _{OUT} = 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 _{IN} = 12 dBm, VCC2 = VCC3 = 4.5V, 54 Mbps 64 QAM, 64 QAM, VSWR = 6:1, all phases | No damage | | | |

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Power Detector

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 |
|---------------------|---|-----------------------------|------|------|-----------|-----------|
| 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 _{OUT} | Output Impedance | - | - | 2.5 | - | $K\Omega$ |
| PDZ _{LOAD} | 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

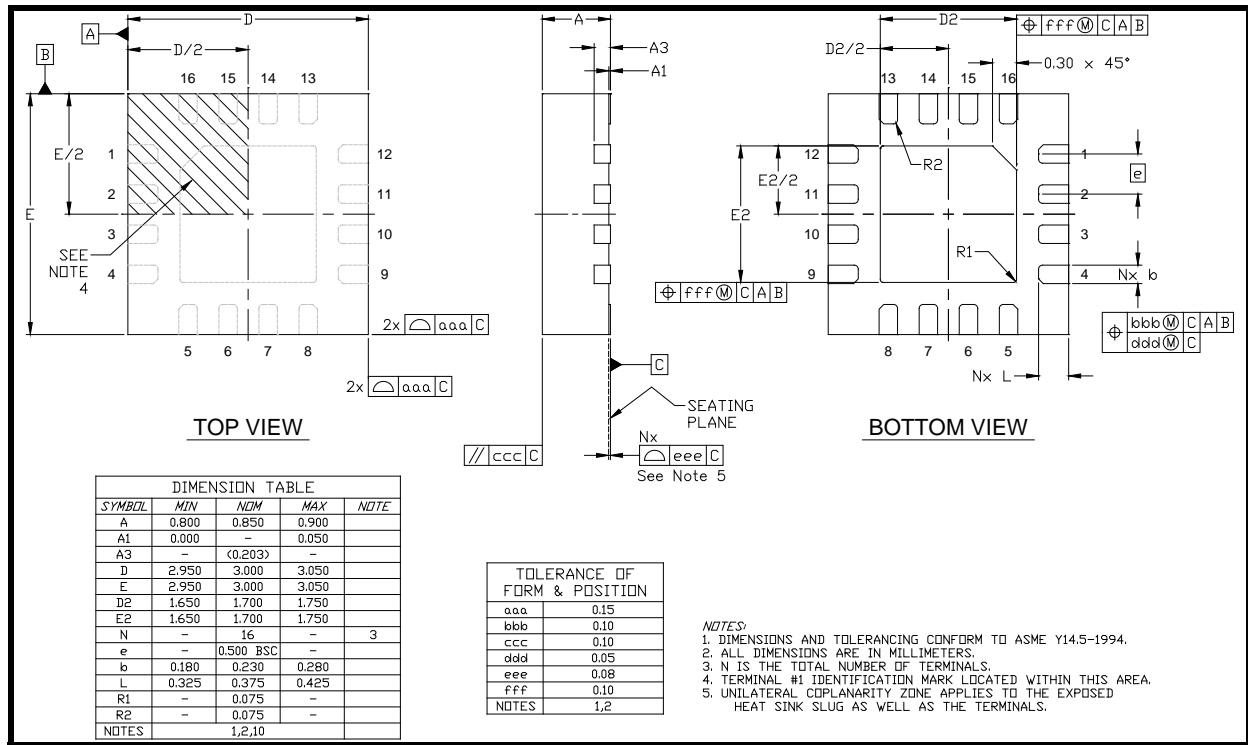


Figure 4: SE2567L Package Diagram

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Recommended Land and Solder Patterns

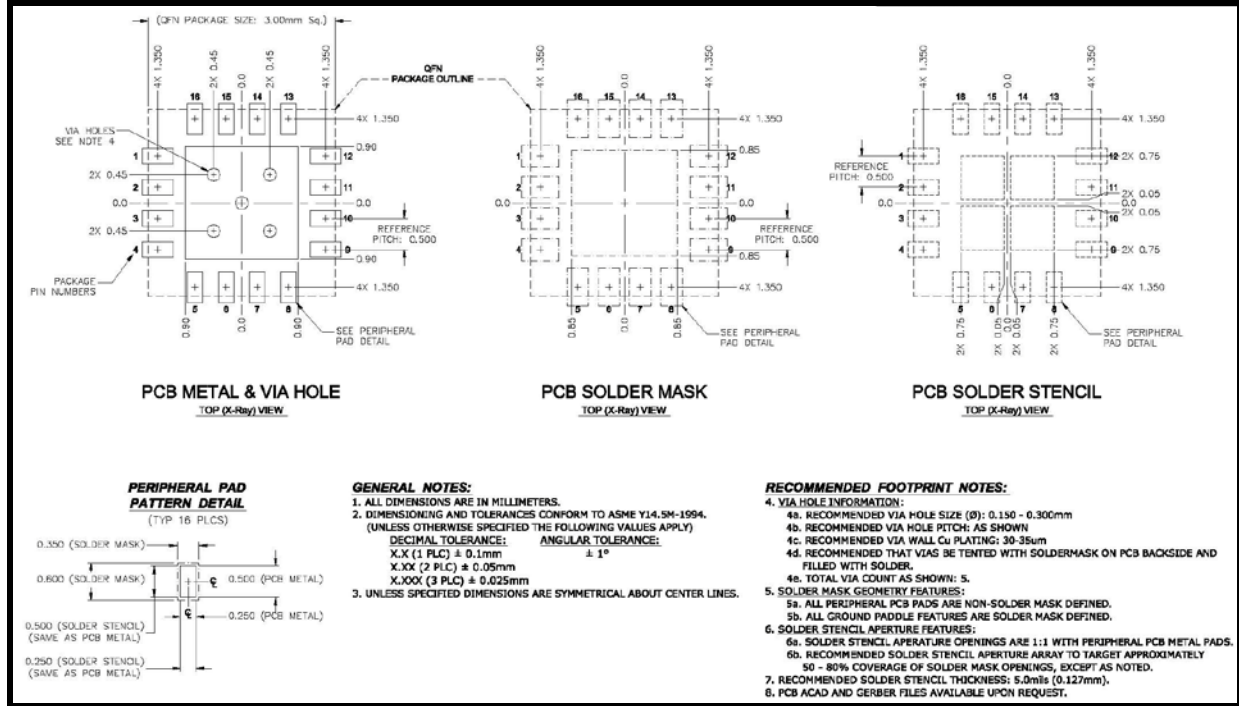


Figure 5: SE2567L Recommended Land and Solder Pattern

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 SE2567L 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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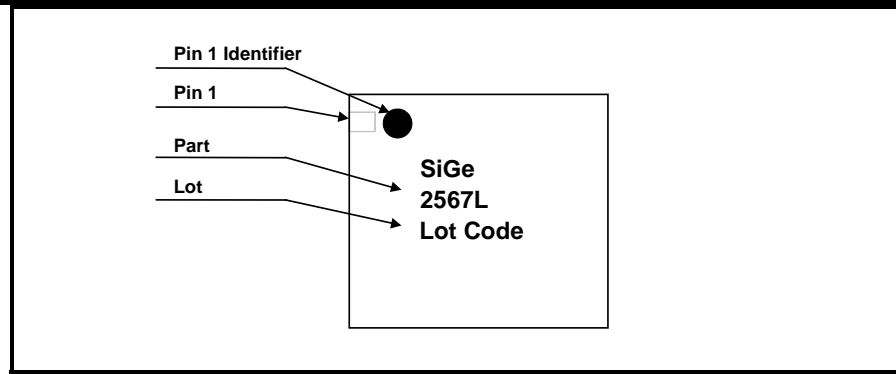


Figure 4: SE2567L Branding

Tape and Reel Information

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

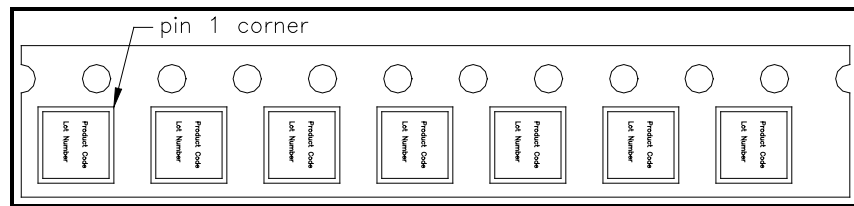


Figure 5: SE2567L-R Tape and Reel Information

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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