

Applications

- IEEE802.11b DSSS WLAN
- IEEE802.11g OFDM WLAN
- Bluetooth
- Access Points, PCMCIA, PC cards

Features

- Dual Mode IEEE802.11b & IEEE802.11g
- Integrated PA, TX Filter, RX and BT port
- Integrated Positive Slope Power Detector
- 20 dBm Output Power, 802.11b, 11 Mbits, ACPR <-30 dBc
- 17 dBm @ 3.0 % EVM, 802.11g, 54 Mbits
- 3.3 V \pm 10 % supply
- Lead free and RoHS compliant
- Small lead free plated package, 4 mm x 5 mm x 0.9 mm, MSL 3

Ordering Information

| Part No. | Package | Remark |
|-------------|------------|----------------|
| SE2585L | 22 pin QFN | Samples |
| SE2585L-R | 22 pin QFN | Tape and Reel |
| SE2585L-EK1 | N/A | Evaluation kit |

Product Description

The SE2585L is a complete 802.11 b/g WLAN RF front-end module with a Bluetooth port. The device provides all the functionality of the power amplifier, power detector, filter, SP3T switch and associated matching. The SE2585L provides a complete 2.4 GHz WLAN RF solution from the output of the transceiver to the antennas in an ultra compact form factor.

The SE2585L is designed for ease of use, with all the critical matching and harmonic filtering integrated, and offering a simple 50 Ω interface to the antenna. The SE2585L also includes a transmitter power detector with 20 dB of dynamic range and a digital enable control for transmitter power ramp on/off control. The power ramp rise/fall time is 0.5 μ s typical.

The device also provides a 3.2–3.3 GHz notch filter prior to the input of the power amplifier.

Functional Block Diagram

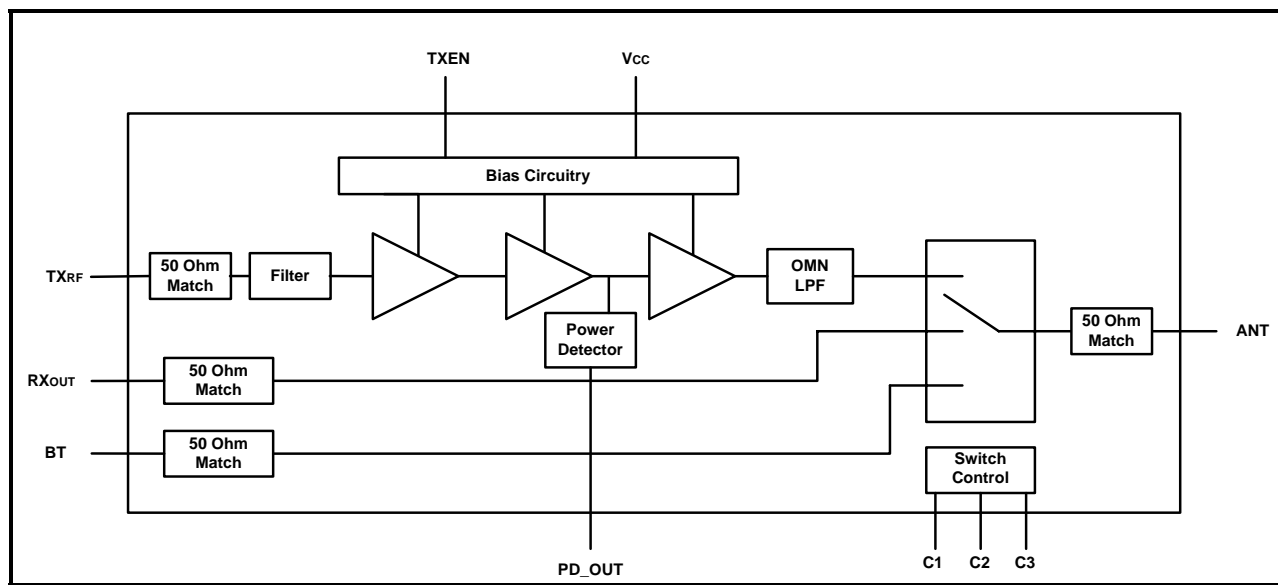


Figure 1: Functional Block Diagram

Pin Out Diagram

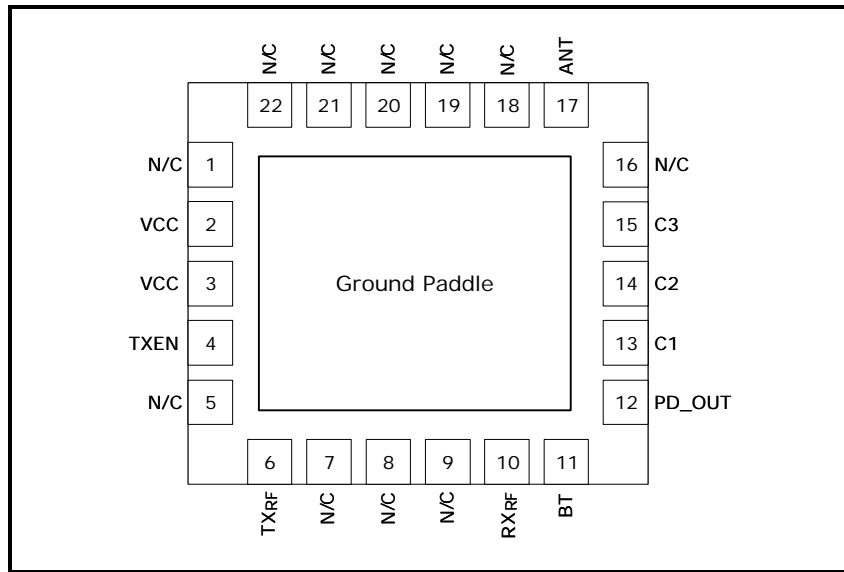


Figure 2: SE2585L Pin Out (Top View Through Package)

Pin Out Description

| Pin No. | Name | Description |
|------------|--------|---|
| 1 | N/C | No Connect |
| 2 | VCC | Power Supply |
| 3 | VCC | Power Supply |
| 4 | TXEN | PA Enable |
| 5 | N/C | No Connect |
| 6 | TXRF | RF input (must be AC coupled) |
| 7-9 | N/C | No Connect |
| 10 | RXRF | Receiver Output (must be AC coupled) |
| 11 | BT | Bluetooth Port (must be AC coupled) |
| 12 | PD_OUT | Detector output |
| 13 | C1 | Antenna Control 1 |
| 14 | C2 | Antenna Control 2 |
| 15 | C3 | Antenna Control 3 |
| 16 | N/C | No Connect |
| 17 | ANT | Antenna A Connection (must be AC coupled) |
| 18-22 | N/C | No Connect |
| 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 |
|------------------|---|------|------|------|
| V _{CC} | Supply Voltage on VCC | -0.3 | 4.0 | V |
| V _{IN} | DC input on TXEN, C1, C2, C3 | -0.3 | 4.0 | V |
| TX _{RF} | RF Input Power, ANT terminated in 50Ω match | - | 10.0 | dBm |
| T _A | Operating Temperature Range | -30 | 85 | °C |
| T _{STG} | Storage Temperature Range | -40 | 150 | °C |

Recommended Operating Conditions

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------------------|------|------|------|------|
| T _A | Ambient temperature | -30 | 25 | 85 | °C |
| V _{CC} | Supply voltage, relative to GND = 0 V | 3.0 | 3.3 | 3.6 | V |

DC Electrical Characteristics

Conditions: V_{CC} = TXEN = 3.5 V, T_A = 25 °C, as measured on SiGe Semiconductor's SE2585L-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 | P _{OUT} = 17 dBm, 54 Mbps OFDM signal, 64QAM | - | 103 | - | mA |
| I _{CC-B} | Total Supply Current | P _{OUT} = 20 dBm, 11 Mbps CCK signal, BT = 0.45 | - | 140 | - | mA |
| I _{CC-OFF} | Total Supply Current | TXEN = 0 V, No RF Applied, C1 = C2 = C3 = 0 V | - | 2 | 10 | μA |

Logic Characteristics

Conditions: $V_{CC} = TXEN = 3.5\text{ V}$, $T_A = 25\text{ }^{\circ}\text{C}$, as measured on SiGe Semiconductor's SE2585L-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) | - | 2.0 | - | V_{CC} | V |
| V_{ENL} | Logic Low Voltage (Module Off) | - | 0 | - | 0.8 | V |
| I_{ENH} | Input Current Logic High Voltage | - | - | <1 | - | μA |
| I_{ENL} | Input Current Logic Low Voltage | - | - | <1 | - | μA |

Switch Characteristics

Conditions: $V_{CC} = TXEN = 3.5\text{ V}$, $T_A = 25\text{ }^{\circ}\text{C}$, as measured on SiGe Semiconductor's SE2585L-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_{CTL_ON} | Control Voltage (On State) | - | 3.0 | - | 3.6 | V |
| V_{CTL_OFF} | Control Voltage (OFF State) | - | 0.0 | - | 0.2 | V |
| SW_{ON} | Low Loss Switch Control Voltage | High State = $V_{CTL_ON} - V_{CTL_OFF}$ | 2.5 | - | V_{CC} | V |
| SW_{OFF} | High Loss Switch Control Voltage | Low State = $V_{CTL_OFF} - V_{CTL_OFF}$ | 0 | - | 0.3 | V |
| I_{CTL_ON} | Switch Control Bias Current (RF Applied) | On pin (C1,C2,C3) being driven high. RF Applied | - | - | 100 | μA |
| I_{CTL_ON} | Switch Control Bias Current (No RF) | On pin (C1,C2,C3) being driven high. No RF | - | - | 30 | μA |
| C_{CTL} | Control Input Capacitance | - | - | - | 100 | pF |

Switch Control Logic Table

| Operational Mode | | | | | |
|------------------------|------------------------|------------------------|------------------------|-------------------------|-----------|
| C1 | C2 | C2 | TX _{RF} – ANT | RX _{OUT} – ANT | BT – ANT |
| SW_{ON} | SW _{OFF} | SW _{OFF} | ON | OFF | OFF |
| SW _{OFF} | SW_{ON} | SW _{OFF} | OFF | ON | OFF |
| SW _{OFF} | SW _{OFF} | SW_{ON} | OFF | OFF | ON |
| SW _{OFF} | SW _{OFF} | SW _{OFF} | OFF | OFF | OFF |

AC Electrical Characteristics

802.11g Transmit Characteristics

Conditions: $V_{CC} = TXEN = 3.5\text{ V}$, $T_A = 25\text{ }^{\circ}\text{C}$, as measured on SiGe Semiconductor's SE2585L-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 |
| EVM | EVM | $P_{OUT} = 17\text{ dBm}$, 54 Mbps OFDM signal, 64 QAM | - | 3 | - | % |
| ACPR | Adjacent Channel Power Ratio $\pm 11\text{ MHz}$ offset $\pm 22\text{ MHz}$ offset | $P_{out} = 20\text{ dBm}$, 11Mbps CCK, BT = 0.45 | - | -37 -52 | - | dBc |
| OOB | Out of Band Emissions | $P_{out} = 17\text{ dBm}$, 54Mbps OFDM signal, 64 QAM $P_{out} = 20\text{ dBm}$, 11Mbps CCK, BT = 0.45 | - | -40 -42 | - | dBc |
| P_{1dB} | P1dB | - | - | 22.0 | - | dBm |
| S_{21} | Small Signal Gain | - | 27 | 30 | 33 | dB |
| ΔS_{21} | Small Signal Gain Variation Over Band | - | - | 1.0 | 2.0 | dB |
| $S_{213.2}$ | Gain @ 3.260 GHz to 3.267 GHz | - | - | -5.0 | -4.0 | dB |
| 2f | Harmonics | $P_{OUT} = 20\text{ dBm}$, 1 Mbps, 802.11b | - | -47 | -43 | dBm/MHz |
| 3f | | | - | -52 | -43 | 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, $P_{OUT} = 20\text{ dBm}$ 0.1 GHz – 20 GHz Load VSWR = 6:1 | All non-harmonically related outputs less than -42 dBm/MHz | | | |

Receive Characteristics

Conditions: $V_{CC} = 3.5\text{ V}$, $TXEN = 0\text{ V}$, $T_A = 25\text{ }^{\circ}\text{C}$, as measured on SiGe Semiconductor's SE2585L-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_{OUT} | Frequency Range | - | 2400 | - | 2500 | MHz |
| RX_{IL} | Insertion Loss | RX Port | - | 1.1 | 1.3 | dB |
| BT_{IL} | Insertion Loss | BT Port | - | 1.2 | 1.5 | dB |
| RX_{RL} | Return Loss | - | 10 | 15 | - | dB |

Power Detector Characteristics

Conditions: $V_{CC} = TXEN = 3.5\text{ V}$, $T_A = 25\text{ }^{\circ}\text{C}$, as measured on SiGe Semiconductor's SE2585L-EV1 evaluation board (de-embedded to device), unless otherwise noted.

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|---------------------|--|-----------------------------------|------|------|------|----------|
| F_{OUT} | Frequency Range | - | 2400 | - | 2500 | MHz |
| PDR | Power detect range, CW | Measured at ANT_A or ANT_B | 0 | - | 22 | dBm |
| PDZ _{LOAD} | Output Impedance | - | 250 | - | 700 | Ω |
| PDV _{NoRF} | Output Voltage, $P_{OUT} = \text{No RF}$ | Measured in to $1\text{ M}\Omega$ | - | 0.30 | - | V |
| PDV _{p18} | Output Voltage, $P_{OUT} = 18\text{ dBm CW}$ | Measured in to $1\text{ M}\Omega$ | - | 0.75 | - | V |
| PDV _{p20} | Output Voltage, $P_{OUT} = 20\text{ dBm CW}$ | Measured in to $1\text{ M}\Omega$ | - | 0.9 | - | V |

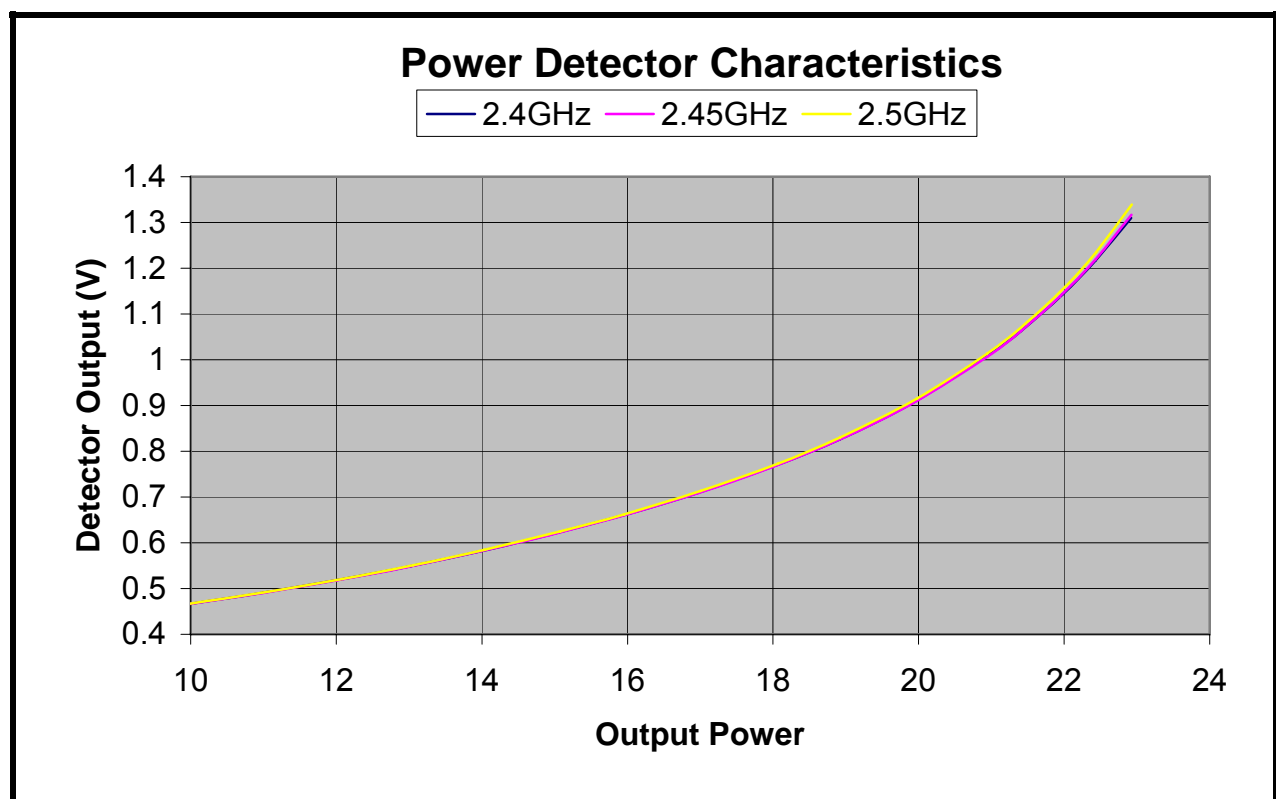


Figure 3: Power Detector Characteristic

Typical Performance Data

Conditions: $V_{CC} = TXEN = 3.5\text{ V}$, $T_A = 25\text{ }^{\circ}\text{C}$, Frequency = 2.45 GHz; as measured on SiGe Semiconductor's SE2585L-EV1 evaluation board, unless otherwise noted.

802.11g Transmit Characteristics

Conditions: 54Mbps 802.11g OFDM Signal

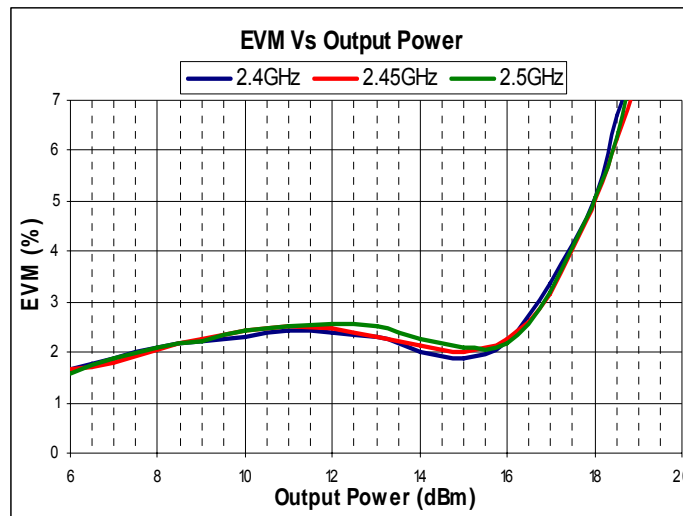


Figure 4: SE2585L 802.11g EVM vs. Output Power Over Frequency

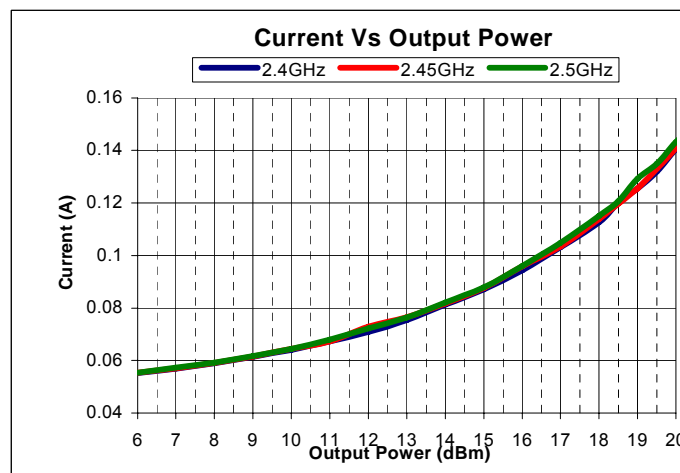


Figure 5: SE2585L 802.11g ICC vs. Output Power Over Frequency & Voltage

CW Transmit Characteristics

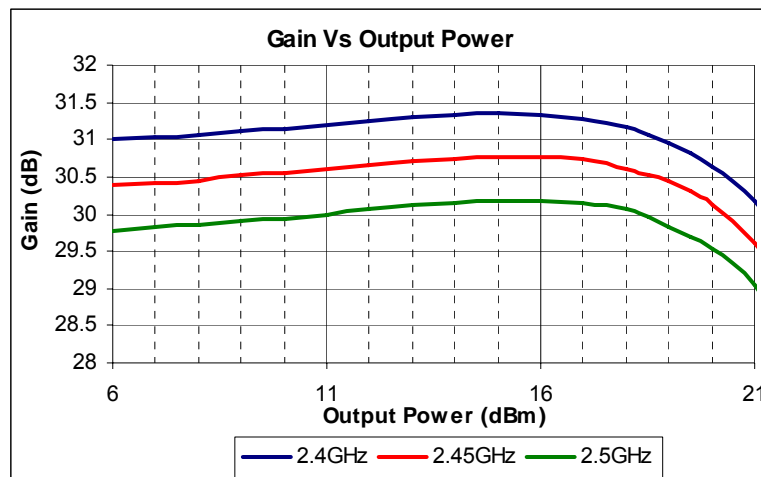


Figure 9: SE2585L 802.11b Gain vs Output Power Over Frequency

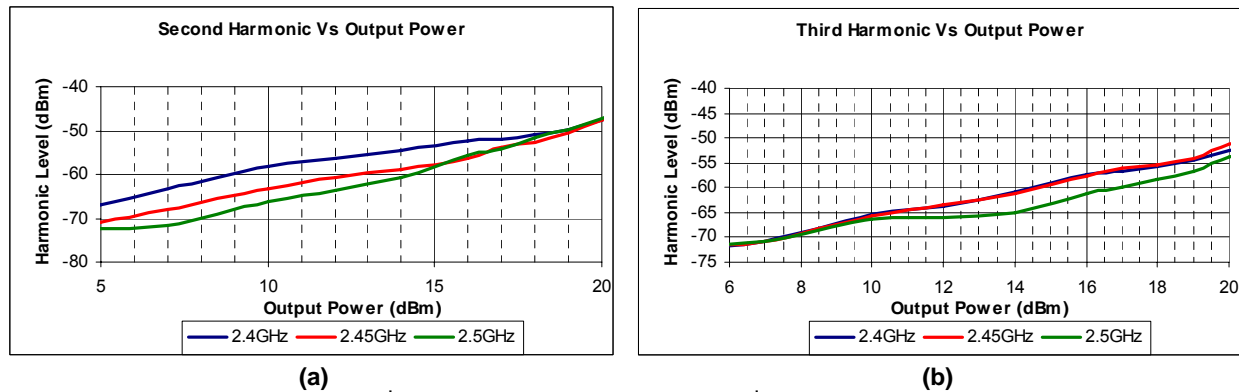


Figure 10: SE2585L 802.11b (a) 2nd Harmonic vs Output Power (b) 3rd Harmonic vs Output Power Over Frequency

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 SE2585L 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 by SiGe, please refer to:

- SiGe's Application Note: "Land Grid Array Module Solder Reflow & Rework Information", *Document Number 69-APP-01*.
- SiGe's Application Note: "Handling, Packing, Shipping and Use of Moisture Sensitive LGA", *Document Number 69-APP-02*.

Branding Information

The device branding is shown in Figure 5.

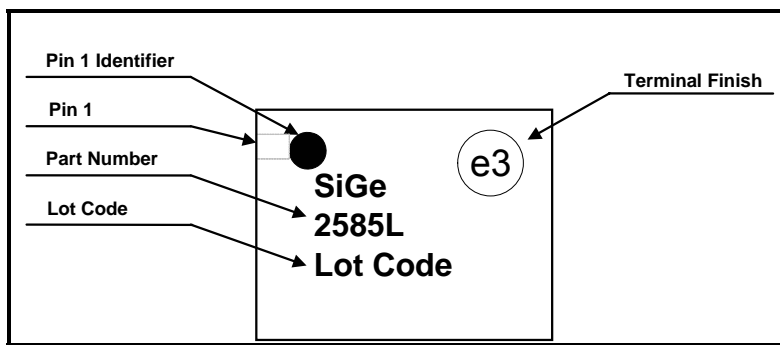


Figure 5: SE2585L Branding and Pin 1 Location

Package Diagram

The package diagram is shown in Figure 6.

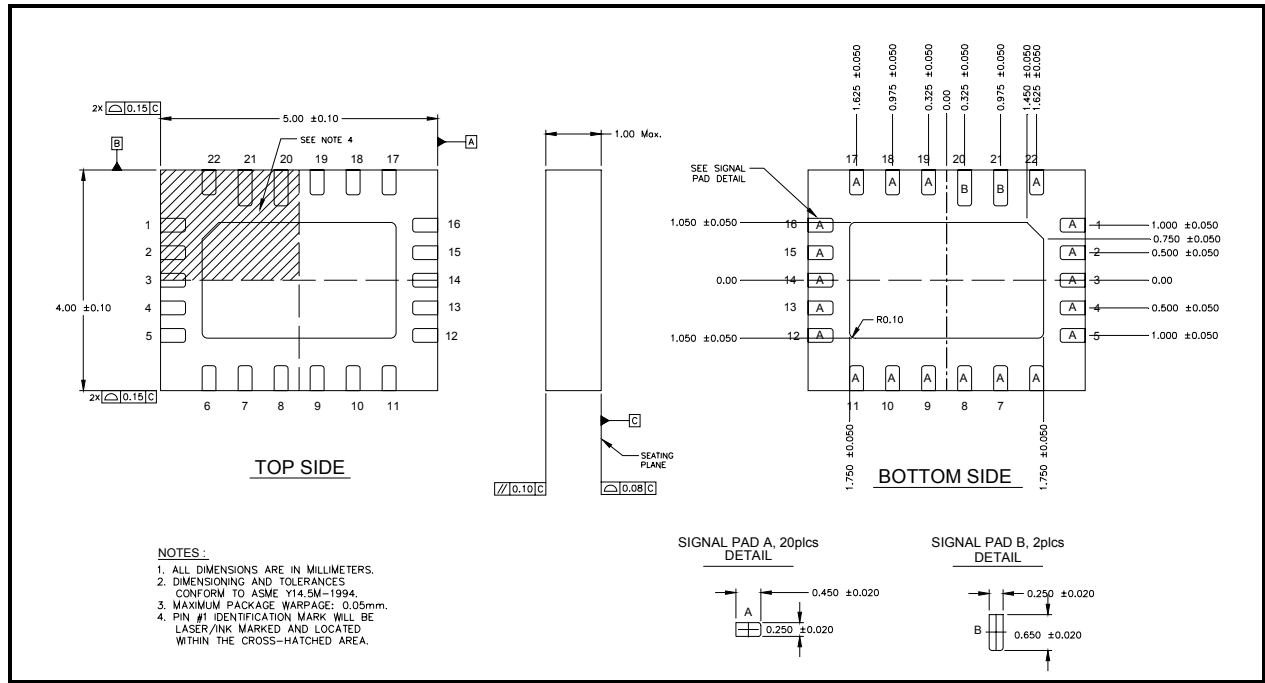


Figure 6: SE2585L Package Diagram

Tape and Reel

Production quantities of this product are shipped in a standard tape-and-reel format. Specific tape and reel dimensions and sizing is shown in Table 1 and Figure 7.

| Parameter | Value |
|------------------|-----------|
| Devices Per Reel | 3000 |
| Reel Diameter | 13 inches |

Table 1: Tape and Reel Dimensions

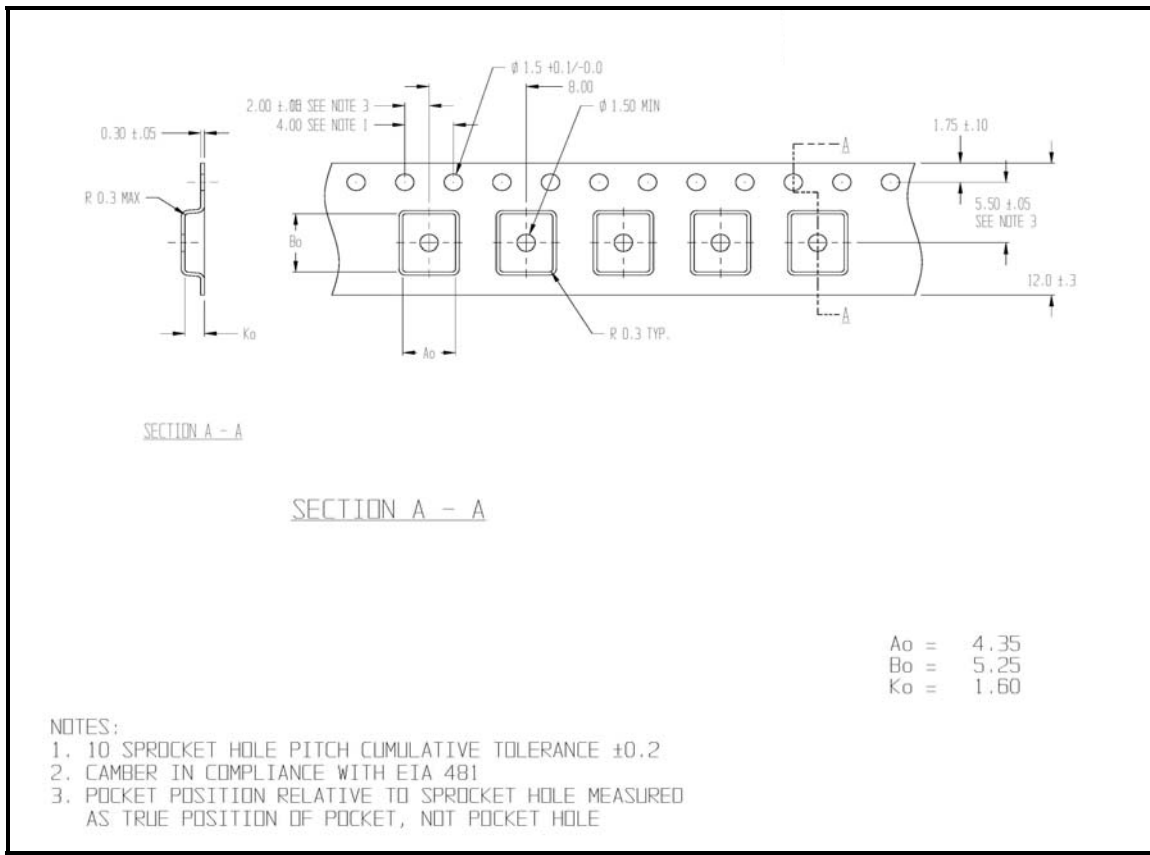


Figure 7: SE2585L Tape and Reel Dimensions

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Product Preview

The datasheet contains information from the product concept specification. SiGe Semiconductor, Inc. reserves the right to change information at any time without notification.

Preliminary Information

The datasheet contains information from the design target specification. SiGe Semiconductor, Inc. reserves the right to change information at any time without notification.

Production testing may not include testing of all parameters.

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