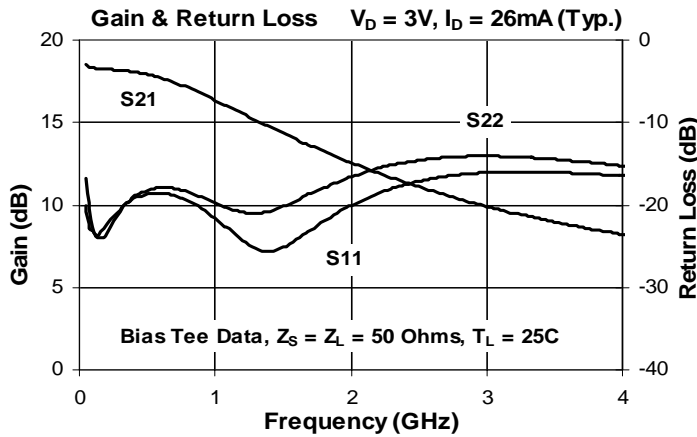




Product Description

Sirenza Microdevices' SGC-2386Z is a high performance SiGe HBT MMIC amplifier utilizing a Darlington configuration with a patented active bias network. The active bias network provides stable current over temperature and process Beta variations. Designed to run directly from a 3V supply, the SGC-2386Z does not require a dropping resistor as compared to typical Darlington amplifiers. The SGC-2386Z is designed for high linearity 3V gain block applications that require small size and minimal external components. It is internally matched to 50 ohms.

The matte tin finish on Sirenza's lead-free "Z" package is applied using a post annealing process to mitigate tin whisker formation and is RoHS compliant per EU Directive 2002/95. The package body is manufactured with green molding compounds that contain no antimony trioxide or halogenated fire retardants.



Preliminary Information

SGC-2386Z RoHS Compliant & Green Package

50-4000 MHz Silicon Germanium Cascadable Gain Block



Product Features

- Single Fixed 3V Supply
- Supply Dropping Resistor not required
- Patented Self-Bias Circuitry
- $P_{1dB} = 10.2 \text{ dBm}$ at 1950 MHz
- $IP_3 = 24.3 \text{ dBm}$ at 1950 MHz
- Robust 1000V ESD, Class 1C HBM

Applications

- PA Driver Amplifier
- Cellular, PCS, GSM, UMTS
- IF Amplifier
- Wireless Data, Satellite

| Symbol | Parameters | Units | Frequency | Min. | Typ. | Max. |
|--|---------------------------------------|---------------|---------------------------------|------|----------------------|------|
| G | Small Signal Gain | dB | 850 MHz 1950 MHz 2400 MHz | | 16.9 12.7 11.4 | |
| P_{1dB} | Output Power at 1dB Compression | dBm | 850 MHz 1950 MHz 2400 MHz | | 10.5 10.2 9.9 | |
| OIP_3 | Output Third Order Intercept Point | dBm | 850 MHz 1950 MHz 2400 MHz | | 23.2 24.3 24.7 | |
| IRL | Input Return Loss | dB | 1950 MHz | | 21.8 | |
| ORL | Output Return Loss | dB | 1950 MHz | | 17.6 | |
| NF | Noise Figure | dB | 1930 MHz | | 3.7 | |
| V_D | Device Operating Voltage | V | | | 3 | |
| I_D | Device Operating Current | mA | | 22 | 26 | 30 |
| Rth, j-l | Thermal Resistance (junction to lead) | $^{\circ}C/W$ | | | 205 | |
| Test Conditions: $V_D = 3.0V$ $I_D = 26mA \text{ Typ.}$ $T_L = 25^{\circ}C$ OIP_3 Tone Spacing = 1MHz | | | | | | |
| Bias Tee Data $Z_S = Z_L = 50 \text{ Ohms}$ Pout per tone = -5 dBm | | | | | | |

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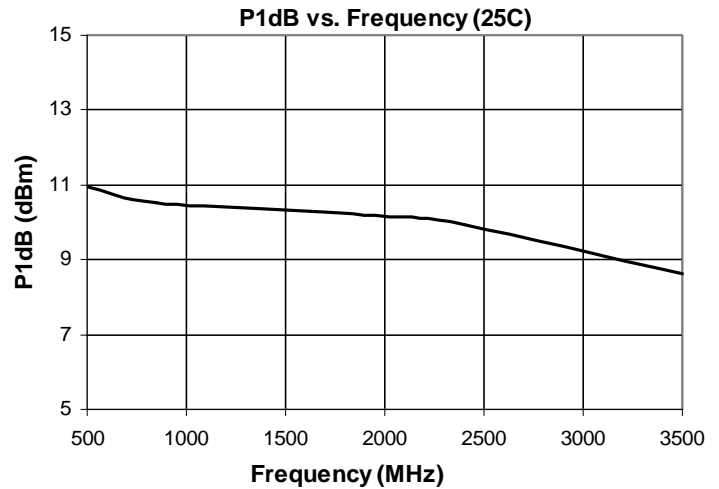
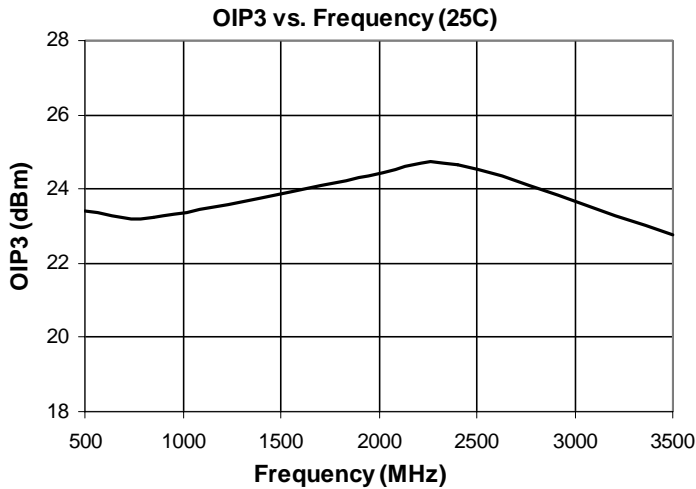
Preliminary Information
SGC-2386Z 0.05-4.0 GHz Cascadeable MMIC Amplifier

Typical RF Performance at Key Operating Frequencies (Bias Tee)

| Symbol | Parameter | Unit | Frequency (MHz) | | | | | |
|------------------|------------------------------------|------|-----------------|------|------|------|------|------|
| | | | 100 | 500 | 850 | 1950 | 2400 | 3500 |
| G | Small Signal Gain | dB | 18.4 | 18.0 | 16.9 | 12.7 | 11.4 | 9.0 |
| OIP ₃ | Output Third Order Intercept Point | dBm | | 23.4 | 23.2 | 24.3 | 24.7 | 22.8 |
| P _{1dB} | Output Power at 1dB Compression | dBm | | 11.0 | 10.5 | 10.2 | 9.9 | 8.6 |
| IRL | Input Return Loss | dB | 24.2 | 18.9 | 20.0 | 21.8 | 18.1 | 15.8 |
| ORL | Output Return Loss | dB | 23.2 | 18.4 | 19.0 | 17.6 | 15.4 | 14.6 |
| S ₁₂ | Reverse Isolation | dB | 20.5 | 21.7 | 22.2 | 20.0 | 19.3 | 18.2 |
| NF | Noise Figure | dB | 2.9 | 3.0 | 3.3 | 3.7 | 3.9 | 4.7 |

Test Conditions: V_D = 3V I_D = 26mA Typ. OIP₃ Tone Spacing = 1MHz, Pout per tone = -5 dBm
T_L = 25°C Z_S = Z_L = 50 Ohms

Typical Performance with Bias Tee, V_D = 3V, I_D = 26mA (Typ.)



Absolute Maximum Ratings

| Parameter | Absolute Limit |
|---|----------------|
| Max Device Current (I _{CE}) | 55 mA |
| Max Device Voltage (V _{CE}) | 4.5 V |
| Max. RF Input Power* (See Note) | +18 dBm |
| Max. Junction Temp. (T _J) | +150°C |
| Operating Temp. Range (T _L) | -40°C to +85°C |
| Max. Storage Temp. | +150°C |

*Note: Load condition, Z_L = 50 Ohms

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Bias Conditions should also satisfy the following expression:

$$I_D V_D < (T_J - T_L) / R_{TH}, \text{ j-l } T_L = T_{LEAD}$$

Reliability & Qualification Information

| Parameter | Rating |
|-------------------------------------|----------|
| ESD Rating - Human Body Model (HBM) | Class 1C |
| Moisture Sensitivity Level | MSL 1 |

This product qualification report can be downloaded at
www.sirenza.com



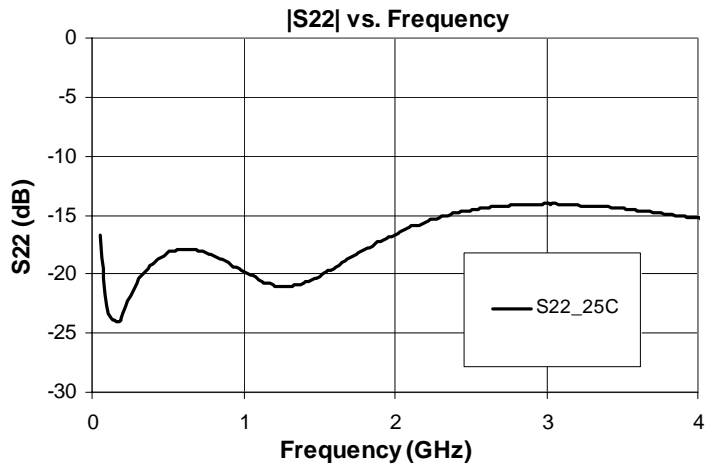
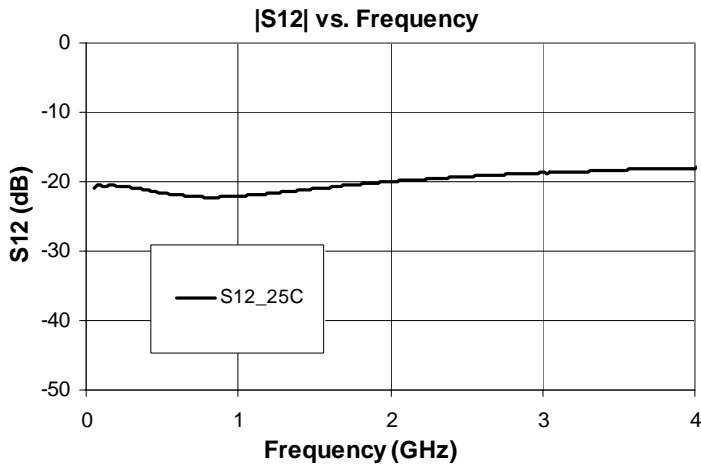
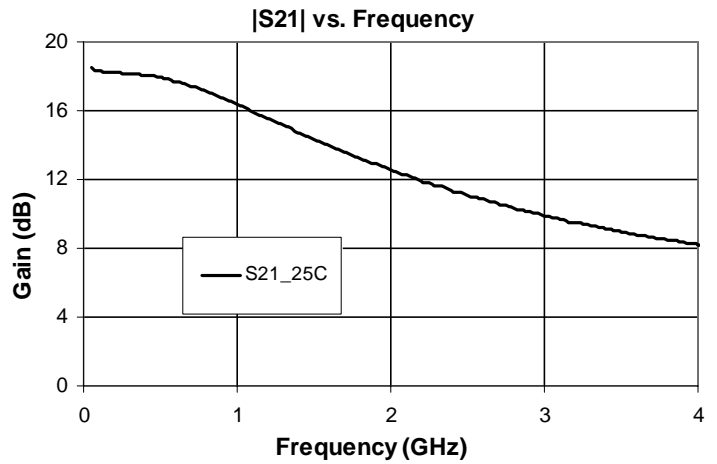
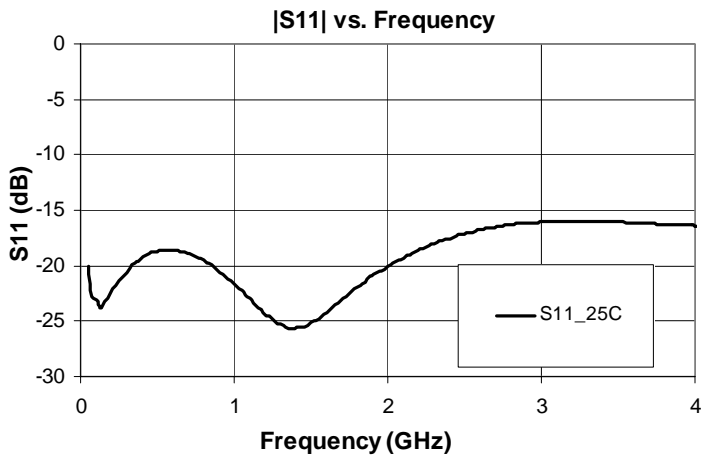
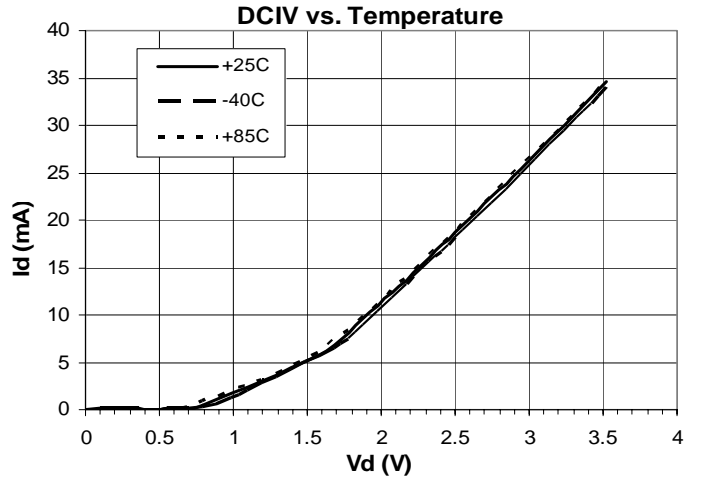
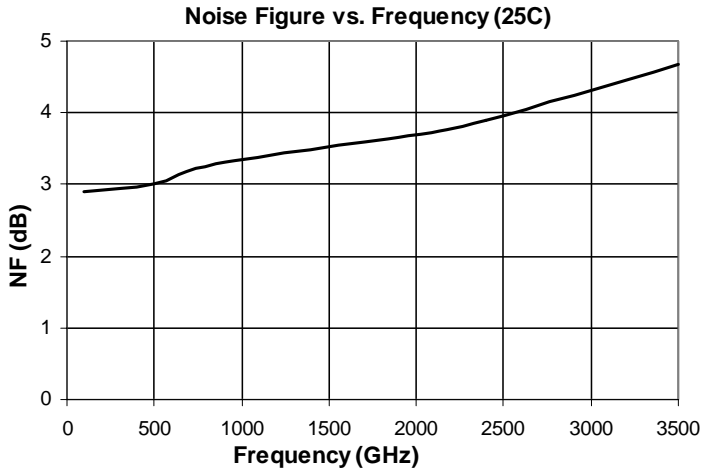
Caution: ESD sensitive

Appropriate precautions in handling, packaging and testing devices must be observed.

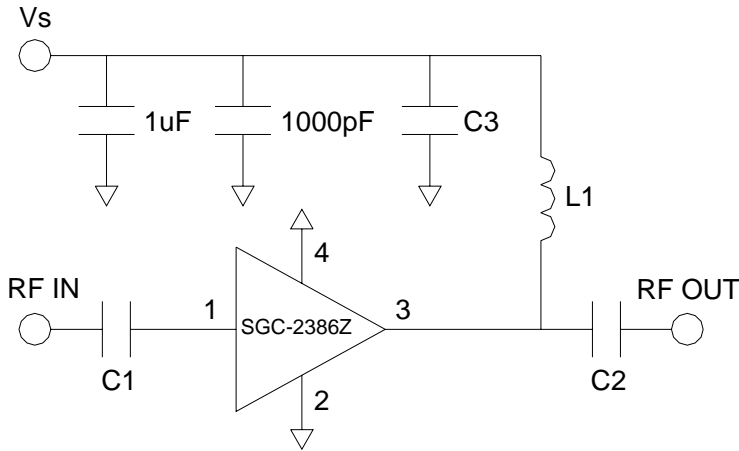


Preliminary Information
SGC-2386Z 0.05-4.0 GHz Cascadeable MMIC Amplifier

Typical Performance with Bias Tee, $V_D = 3V$, $I_D = 26mA$ (Typ.)



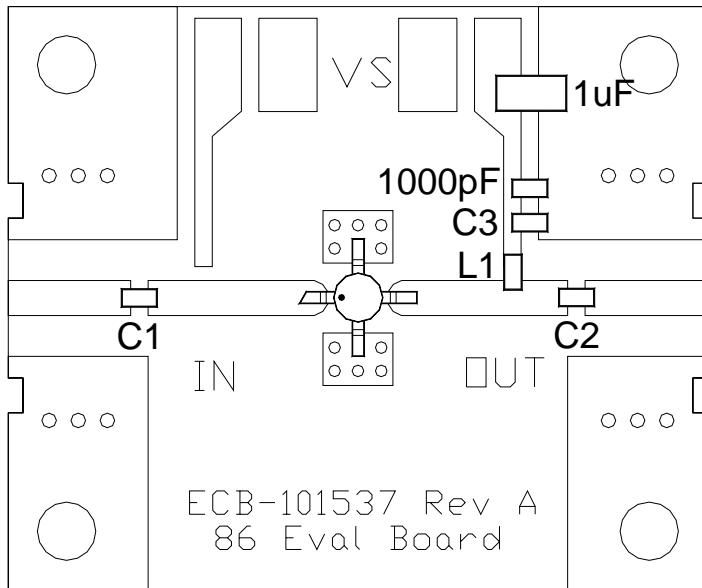
Application Circuit Schematic



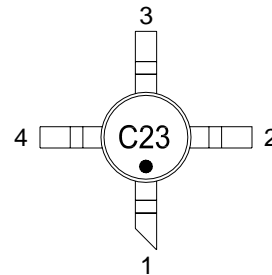
| Application Circuit Element Values | | |
|------------------------------------|-------------|--------------|
| Reference Designator | 100-2000MHz | 2000-4000MHz |
| C1 | 1000pF | 2.7pF |
| C2 | 100pF | 6.8pF |
| C3 | 100pF | 6.8pF |
| L1 | 150nH | 39nH |

Mounting Instructions

1. Use a large ground pad area under device pins 2 and 4 with many plated through-holes as shown.
2. We recommend 1 or 2 ounce copper. Measurements for this data sheet were made on a 31 mil thick FR-4 board with 1 ounce copper on both sides.



Part Identification Marking & Pinout



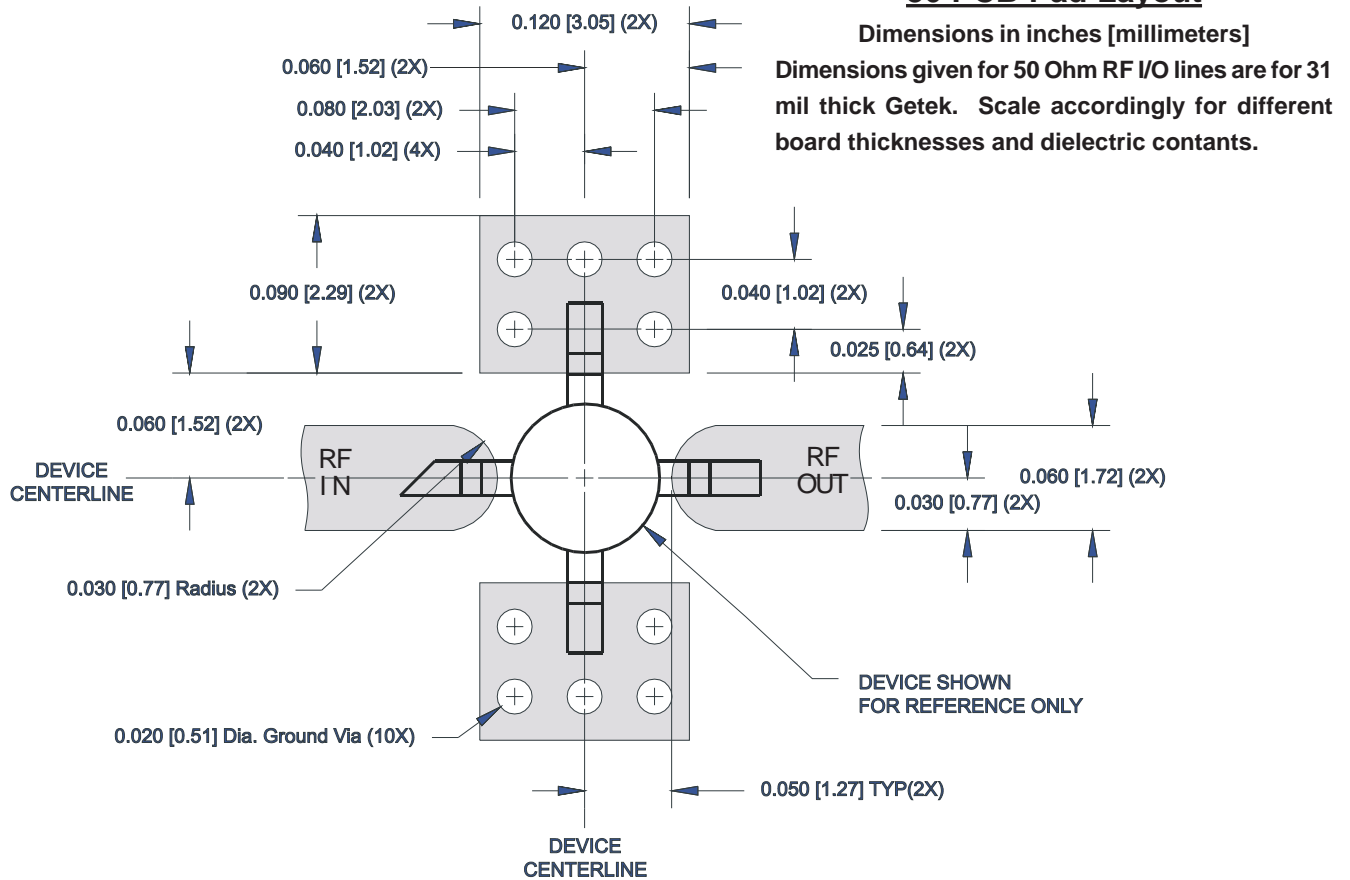
| Pin # | Function | Description |
|-------|------------------|--|
| 1 | RF IN | RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation |
| 2,4 | GND | Connection to ground. Use via holes as close to the device ground leads as possible to reduce ground inductance and achieve optimum RF performance |
| 3 | RF OUT / DC BIAS | RF output and bias pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation. |

| Part Number | Package / Lead Composition | Reel Size | Devices / Reel |
|-------------|----------------------------|-----------|----------------|
| SGC-2386Z | Lead Free, RoHs Compliant | 13" | 3000 |



Preliminary Information
SGC-2386Z 0.05-4.0 GHz Cascadeable MMIC Amplifier

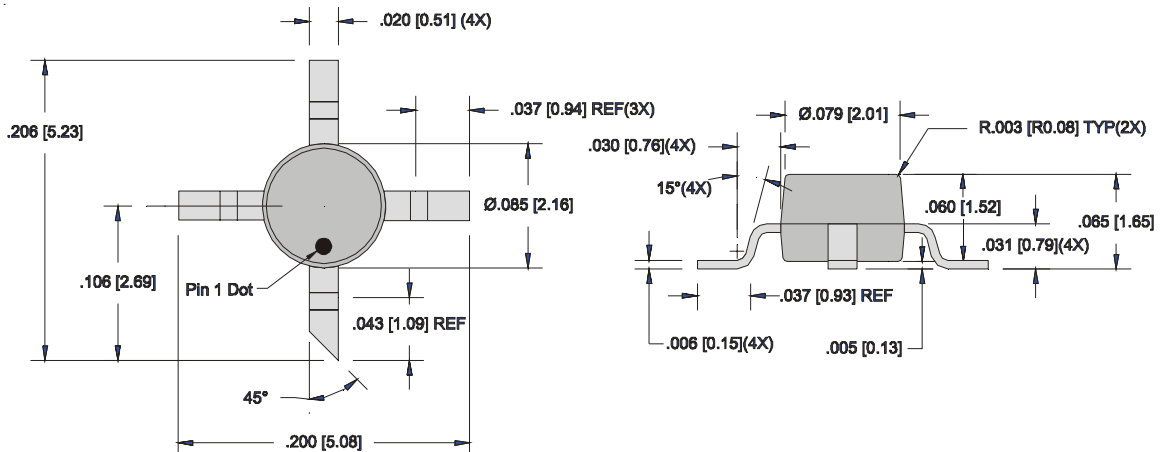
86 PCB Pad Layout



86 Nominal Package Dimensions

Dimensions in inches [millimeters]

A link to the 86 package outline drawing with full dimensions and tolerances may be found on the product web page at www.sirenza.com.



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