

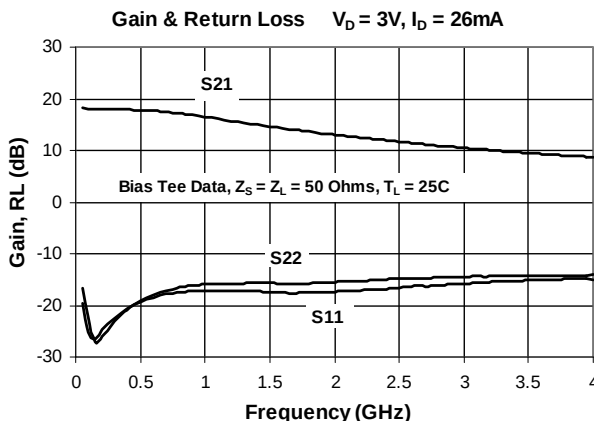


### Product Description

RFMD's SGC2363Z 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 SGC2363Z does not require a dropping resistor as compared to typical Darlington amplifiers. The SGC2363Z is designed for high linearity 3V gain block applications that require small size and minimal external components. It is internally matched to 50Ω.

#### Optimum Technology Matching® Applied

- ☐ GaAs HBT
- ☐ GaAs MESFET
- ☐ InGaP HBT
- ☐ SiGe BiCMOS
- ☐ Si BiCMOS
- ☒ SiGe HBT
- ☐ GaAs pHEMT
- ☐ Si CMOS
- ☐ Si BJT
- ☐ GaN HEMT
- ☐ RF MEMS



### Features

- Single, Fixed 3V Supply
- No Dropping Resistor Required
- Patented Self-Bias Circuitry
- $P_{1dB} = 10.1\text{dBm}$  at 1950MHz
- $OIP_3 = 23\text{dBm}$  at 1950MHz
- Robust 1000V ESD, Class 1C HBM

### Applications

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

| Parameter                          | Specification |      |      | Unit                      | Condition       |
|------------------------------------|---------------|------|------|---------------------------|-----------------|
|                                    | Min.          | Typ. | Max. |                           |                 |
| Small Signal Gain                  | 15.5          | 17.0 | 18.5 | dB                        | 850MHz          |
|                                    | 11.6          | 13.1 | 14.6 | dB                        | 1950MHz         |
|                                    |               | 12.3 |      | dB                        | 2400MHz         |
| Output Power at 1dB Compression    |               | 10.4 |      | dBm                       | 850MHz          |
|                                    | 9.1           | 10.1 |      | dBm                       | 1950MHz         |
|                                    |               | 9.6  |      | dBm                       | 2400MHz         |
| Output Third Order Intercept Point |               | 23.0 |      | dBm                       | 850MHz          |
|                                    | 21.0          | 23.0 |      | dBm                       | 1950MHz         |
|                                    |               | 24.0 |      | dBm                       | 2400MHz         |
| Input Return Loss                  | 12.0          | 15.0 |      | dB                        | 1950MHz         |
| Output Return Loss                 | 10.5          | 14.5 |      | dB                        | 1950MHz         |
| Noise Figure                       |               | 3.7  | 4.8  | dB                        | 1930MHz         |
| Thermal Resistance                 |               | 255  |      | $^\circ\text{C}/\text{W}$ | junction - lead |
| Device Operating Voltage           |               | 3.0  |      | V                         |                 |
| Device Operating Current           | 22.0          | 26.0 | 30.0 | mA                        |                 |

Test Conditions:  $V_D = 3V, I_D = 26\text{mA}$  Typ.,  $OIP_3$  Tone Spacing = 1MHz,  $P_{OUT}$  per tone = -5dBm,  $T_L = 25^\circ\text{C}, Z_S = Z_L = 50\Omega$

## Absolute Maximum Ratings

| Parameter                           | Rating     | Unit |
|-------------------------------------|------------|------|
| Device Current ( $I_{CE}$ )         | 55         | mA   |
| Device Voltage ( $V_{CE}$ )         | 4          | V    |
| RF Input Power* (See Note)          | 12         | dBm  |
| Junction Temp ( $T_J$ )             | +150       | °C   |
| Operating Temp Range ( $T_L$ )      | -40 to +85 | °C   |
| Storage Temp                        | +150       | °C   |
| ESD Rating - Human Body Model (HBM) | Class 1C   |      |
| Moisture Sensitivity Level          | MSL 1      |      |

\*Note: Load condition  $Z_L = 50\Omega$ .

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:

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



**Caution!** ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

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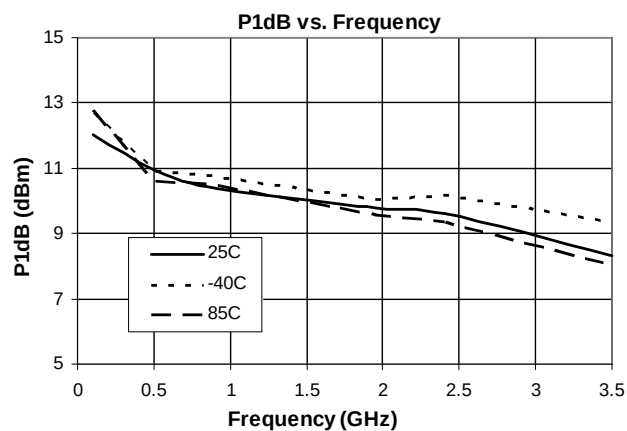
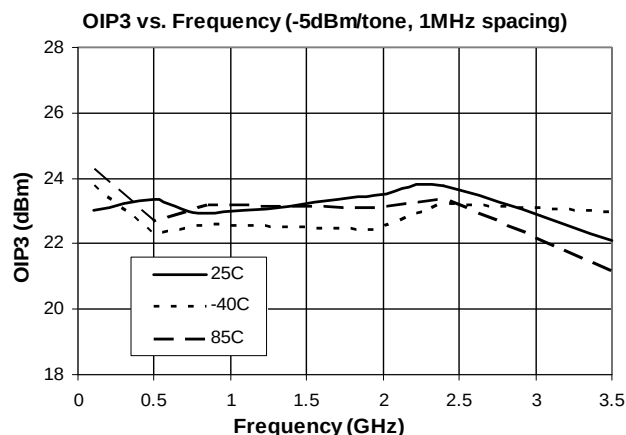


RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

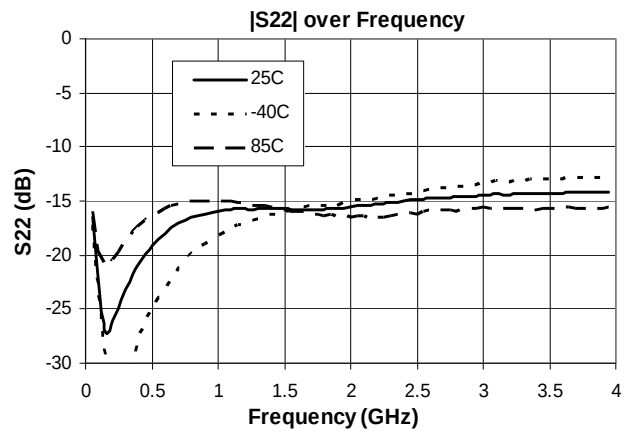
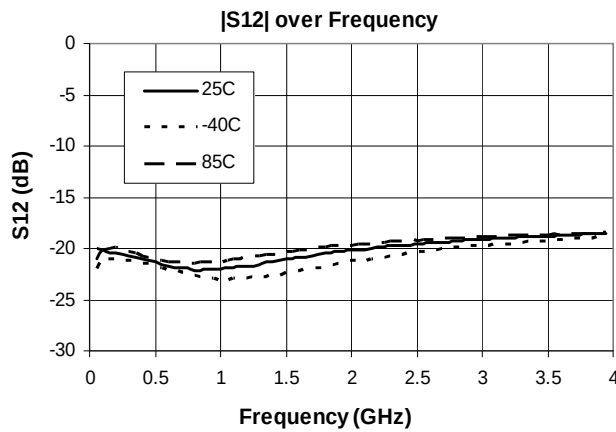
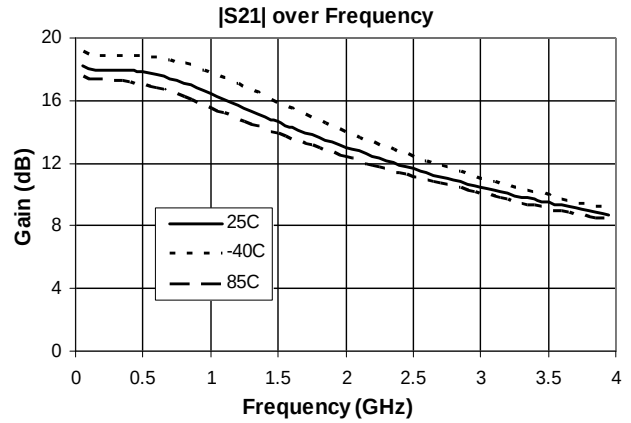
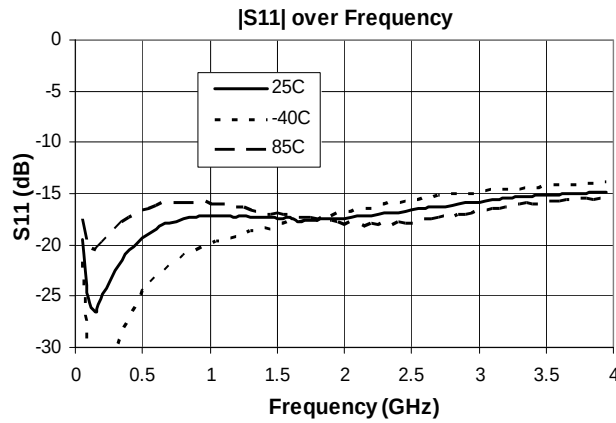
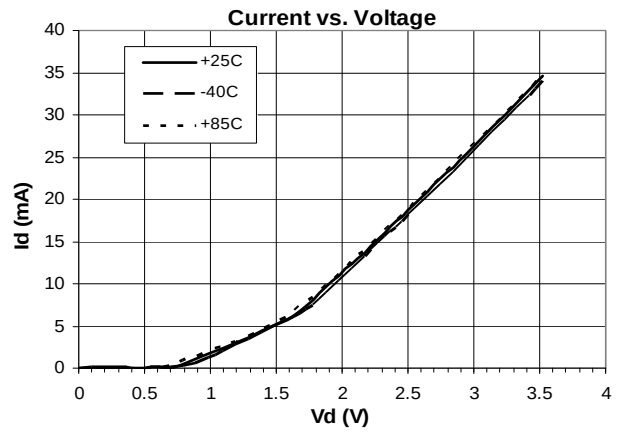
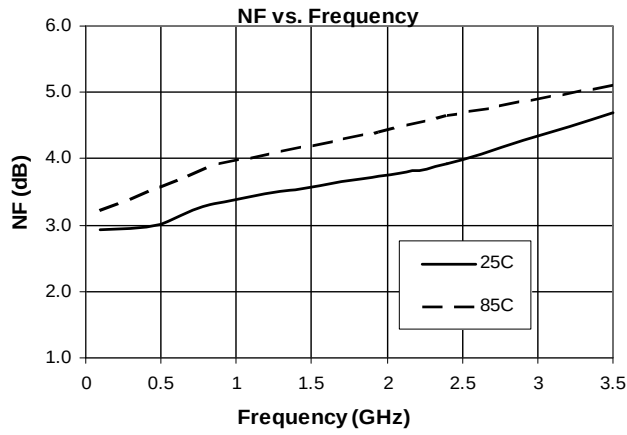
## Typical RF Performance with Application Circuit at Key Operating Frequencies

| Parameter                                              | Unit | 100 MHz | 500 MHz | 850 MHz | 1950 MHz | 2400 MHz | 3500 MHz |
|--------------------------------------------------------|------|---------|---------|---------|----------|----------|----------|
| Small Signal Gain (G)                                  | dB   | 18.4    | 18.1    | 17.0    | 13.1     | 12.3     | 9.8      |
| Output Third Order Intercept Point (OIP <sub>3</sub> ) | dBm  | 23.0    | 23.5    | 23.0    | 23.0     | 24.0     | 22.0     |
| Output Power at 1dB Compression (P <sub>1dB</sub> )    | dBm  | 12.1    | 11.0    | 10.4    | 10.1     | 9.6      | 8.3      |
| Input Return Loss (IRL)                                | dB   | 23.5    | 19.0    | 18.0    | 15.0     | 16.5     | 14.0     |
| Output Return Loss (ORL)                               | dB   | 22.5    | 18.5    | 16.5    | 14.5     | 13.0     | 12.5     |
| Reverse Isolation (S <sub>12</sub> )                   | dB   | 20.5    | 21.5    | 22.0    | 20.5     | 20.0     | 19.0     |
| Noise Figure (NF)                                      | dB   | 2.9     | 3.0     | 3.3     | 3.7      | 3.9      | 4.7      |

Test Conditions:  $V_D = 3V$ ,  $I_D = 26mA$  Typ. OIP<sub>3</sub> Tone Spacing = 1MHz, P<sub>OUT</sub> per tone = -5dBm  
 $T_L = 25^\circ C$ ,  $Z_S = Z_L = 50\Omega$

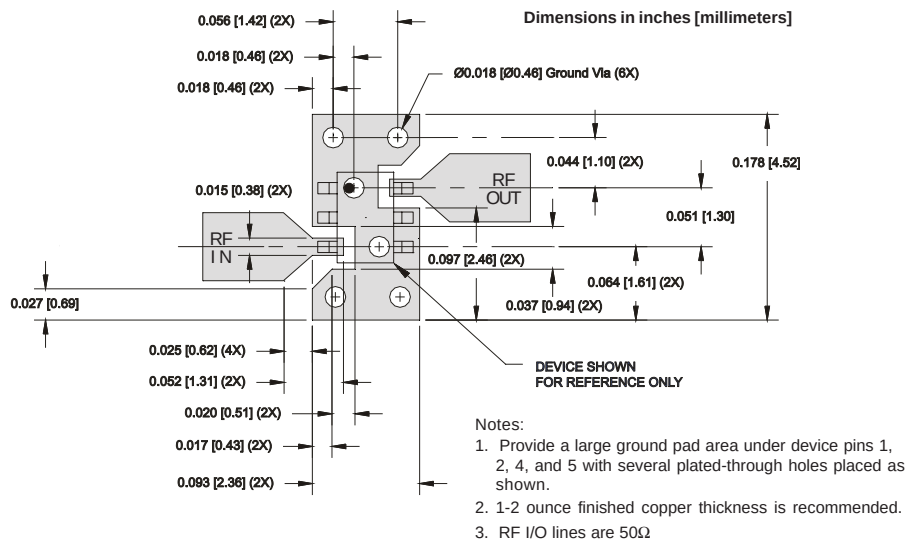
Typical Performance with Bias Tee,  $V_D = 3V$ ,  $I_D = 26mA$ 

Typical Performance with Bias Tee,  $V_D = 3V$ ,  $I_D = 26mA$



| Pin        | Function       | Description                                                                                                                                   |
|------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 3          | RF IN          | RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.                           |
| 1, 2, 4, 5 | GND            | Connection to ground. Use via holes as close to the device ground as possible to reduce ground inductance and achieve optimum RF performance. |
| 6          | 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.                 |

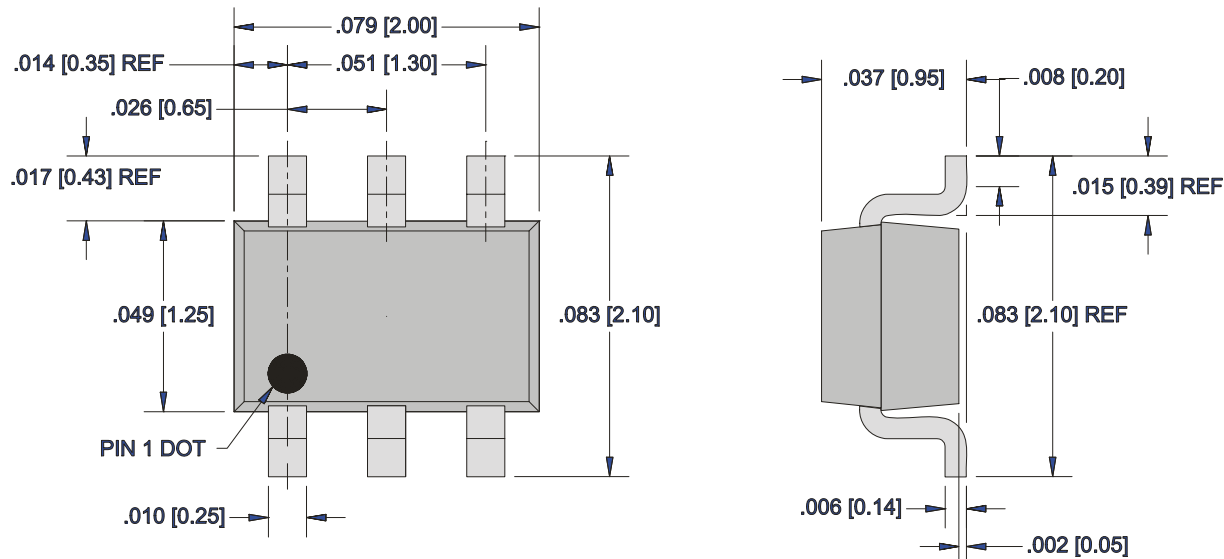
## SOT-363 PCB Pad Layout



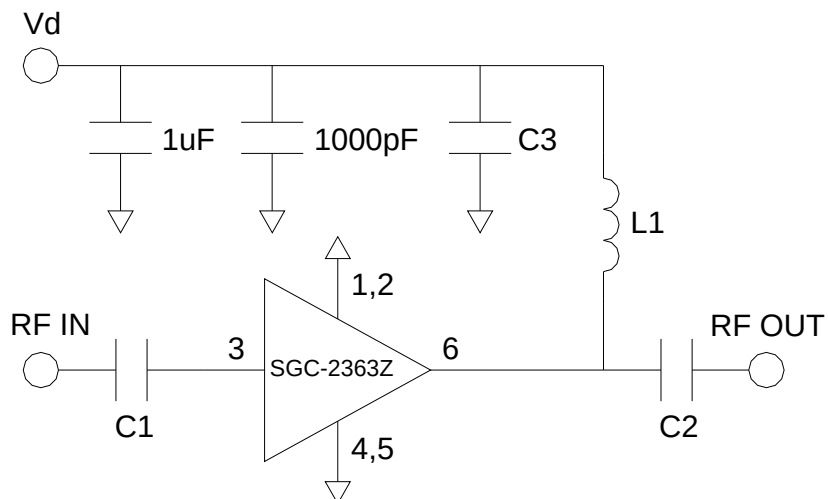
## Package Drawing

Dimensions in inches (millimeters)

Refer to drawing posted at [www.rfmd.com](http://www.rfmd.com) for tolerances.

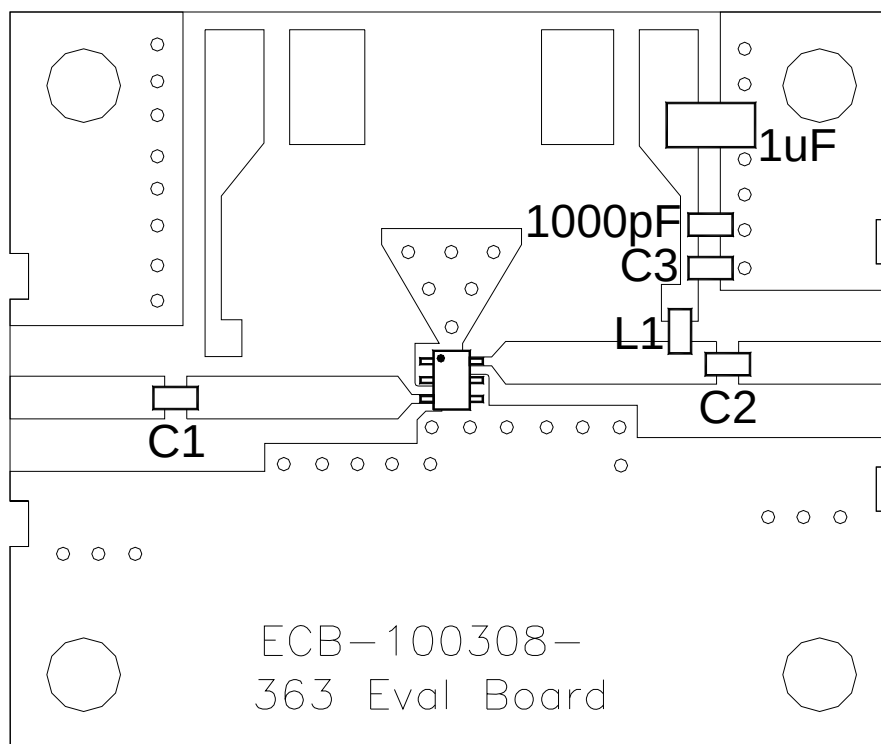


## Application Schematic

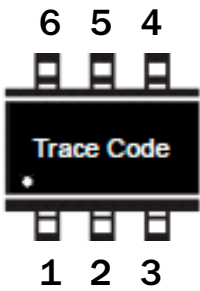


| Application Circuit Element Values |             |              |
|------------------------------------|-------------|--------------|
| Reference Designator               | 100-2000MHz | 2000-4000MHz |
| C1                                 | 1000pF      | 2.7pF        |
| C2                        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

## Evaluation Board Layout



Part Identification



Ordering Information

| Ordering Code | Description                                     |
|---------------|-------------------------------------------------|
| SGC2363Z      | 7" Reel with 3000 pieces                        |
| SGC2363ZSQ    | Sample Bag with 25 pieces                       |
| SGC2363ZSR    | 7" Reel with 100 pieces                         |
| SGC2363ZPCK1  | 100MHz to 2000MHz PCBA with 5-piece sample bag  |
| SGC2363ZPCK2  | 2000MHz to 4000MHz PCBA with 5-piece sample bag |