



Product Description

RFMD's SXB4089Z amplifier is a high efficiency InGaP/ GaAs Heterojunction Bipolar Transistor (HBT) MMIC housed in low-cost, surface-mountable plastic package. These amplifiers are specially designed for use as driver devices for infrastructure equipment in the 400MHz to 2500MHz cellular, ISM, WLL, PCS, WCDMA applications. Its high linearity makes it an ideal choice for multi-carrier as well as digital applications.

Features

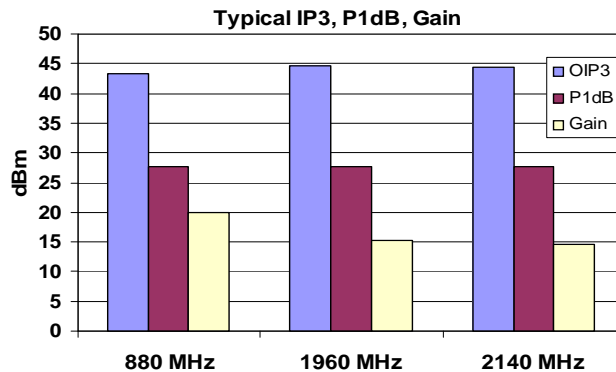
- On-Chip Active Bias Control, Single 5V Supply
- High Output 3rd Order Intercept:
- +45dBm Typ.
- High P_{1dB}: +28dBm Typ.
- High Gain: +20dB at 880MHz
- Low R_{th}: 25°C/W Typ.
- Robust 2000V ESD, Class 2

Applications

- WCDMA, PCS, Cellular Systems
- Multi-Carrier Applications

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



| Parameter | Specification | | | Unit | Condition |
|------------------------------------|---------------|-------|-------|------|----------------------|
| | Min. | Typ. | Max. | | |
| Small Signal Gain | 18.0 | 20.0 | 22.0 | dBm | 880MHz |
| | | 15.0 | | dBm | 1960MHz |
| | | 12.5 | 15.5 | dBm | 2140MHz |
| Output Power at 1dB Compression, | | 27.5 | | dBm | 880MHz |
| | | 27.5 | | dBm | 1960MHz |
| | 26.0 | 27.5 | | dBm | 2140MHz |
| Output Third Order Intercept Point | 41.5 | 43.5 | | dBm | 880MHz |
| | | 44.5 | | dBm | 1960MHz |
| | 42.5 | 44.5 | | dBm | 2140MHz |
| Noise Figure | | 5.6 | | dB | 880MHz |
| | | 3.3 | | dB | 1960MHz |
| | | 3.3 | | dB | 2140MHz |
| Input VSWR | | 1.3:1 | 2.0:1 | | 880MHz |
| | | 1.3:1 | | | 1960MHz |
| | | 1.3:1 | | | 2140MHz |
| Device Operating Voltage | 4.75 | 5.0 | 5.25 | V | |
| Device Operating Current | 235.0 | 265.0 | 295.0 | mA | |
| Thermal Resistance | | 25.3 | | °C/W | junction to backside |

Test Conditions: T_A=25°C, Z₀=50Ω, Measured in Application Circuit, P_{OUT} per tone=+11dBm, Tone Spacing=1MHz

Absolute Maximum Ratings

| Parameter | Rating | Unit |
|---------------------------------------|-------------|------|
| Max Device Current (I_D) | 500 | mA |
| Max Device Voltage (V_D) | 6 | V |
| Max RF Input Power | 1.8 | dBm |
| Max Dissipated Power | 2 | W |
| Max Junction Temperature (T_J) | 165 | °C |
| Operating Temperature Range (T_L) | -40 to + 85 | °C |
| Max Storage Temperature | 150 | °C |
| ESD Rating - Human Body Model (HBM) | Class 2 | |
| Moisture Sensitivity Level | MSL2 | |

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.

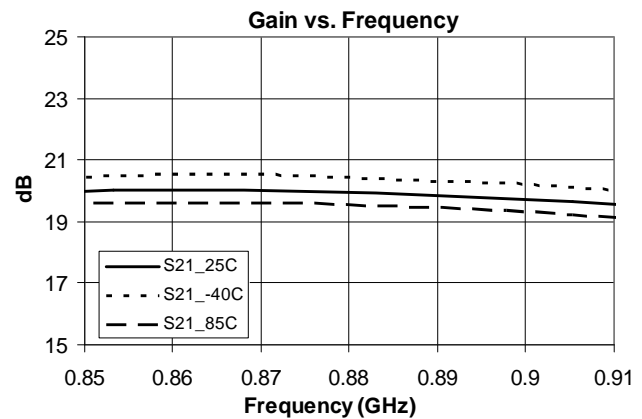
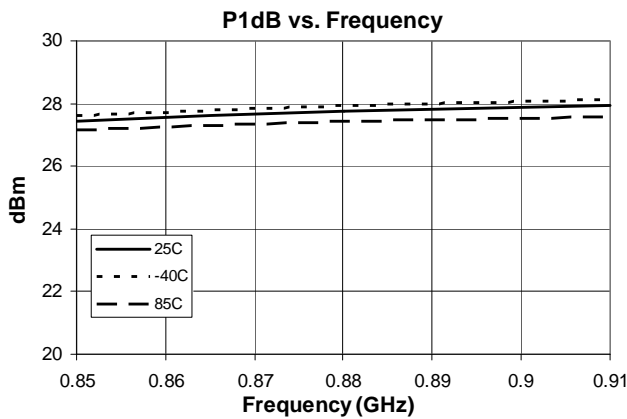
Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute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

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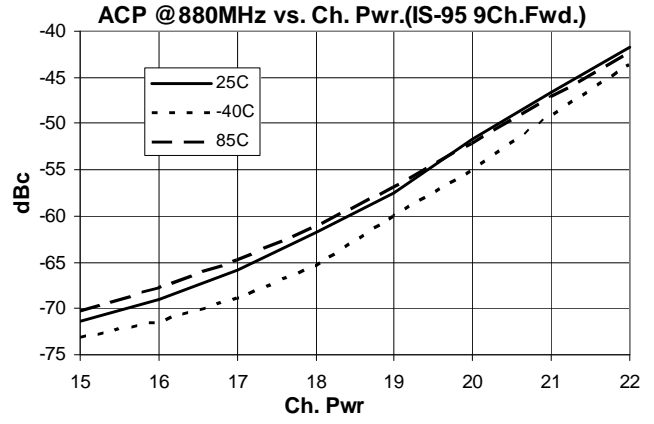
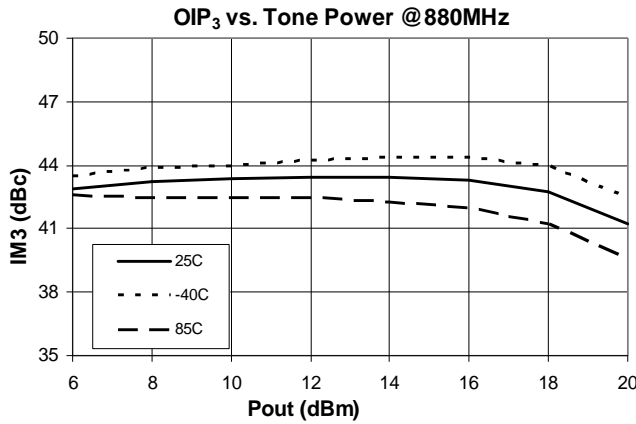
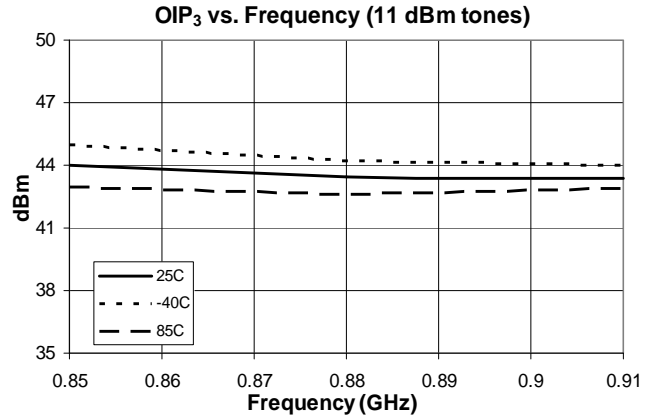
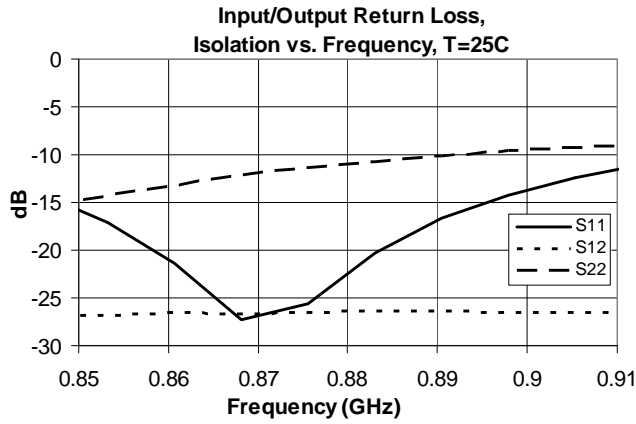


RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

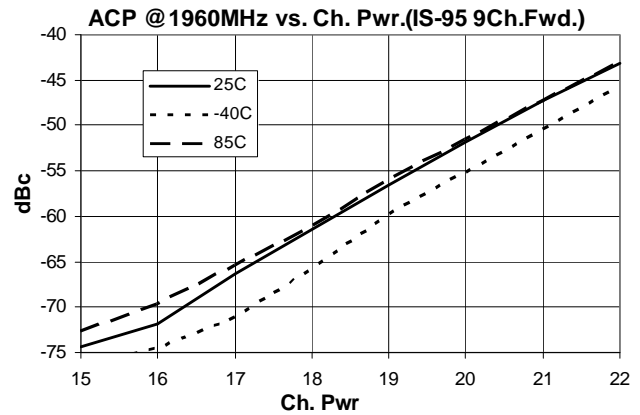
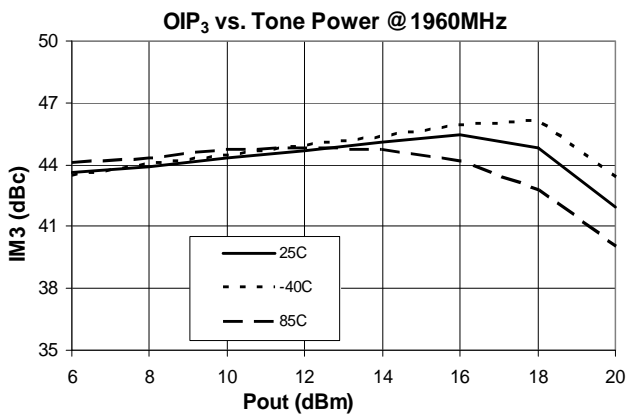
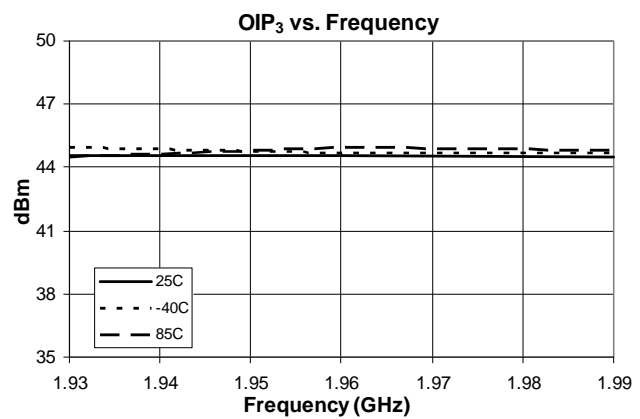
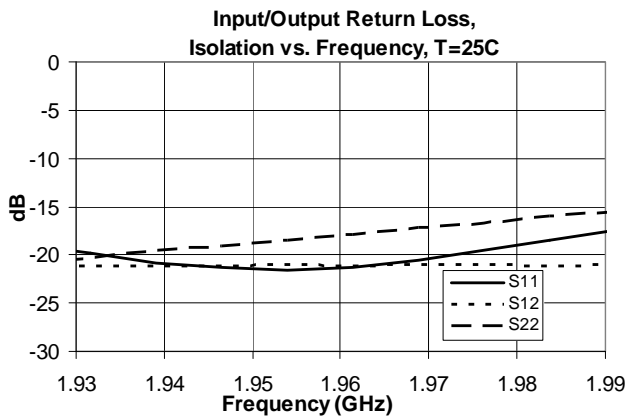
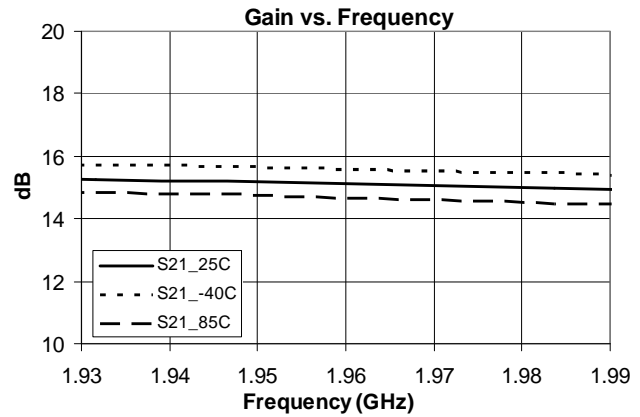
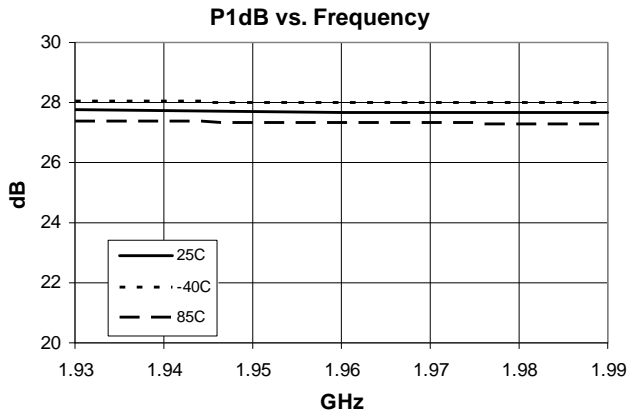
880 MHz Application Circuit Data, $V_{CC}=5V$, $I_D=270mA$



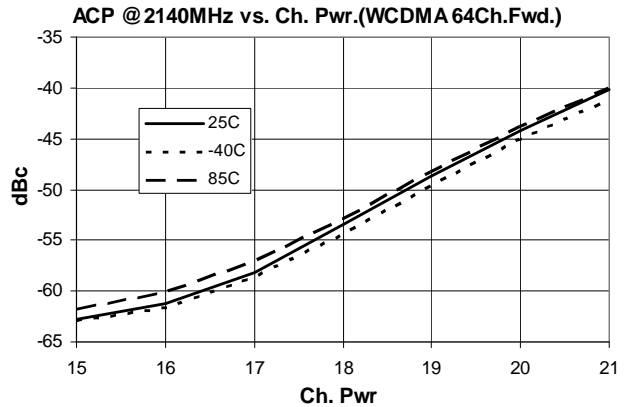
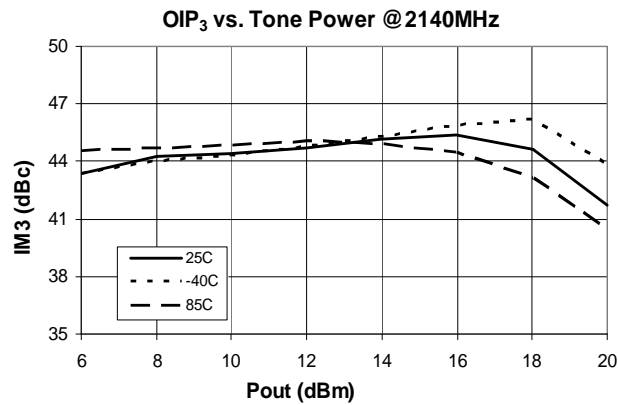
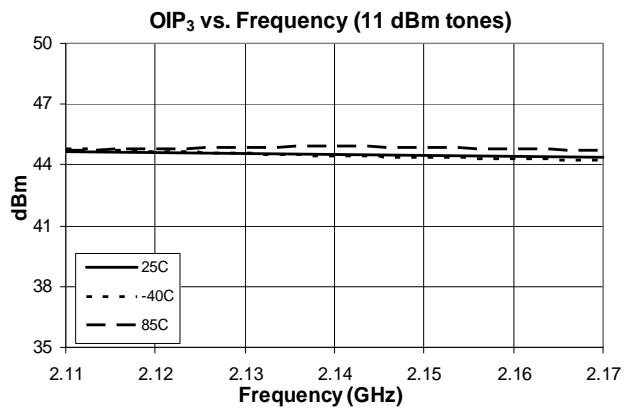
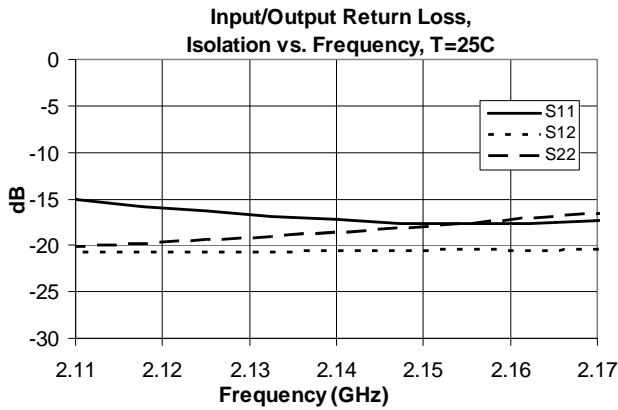
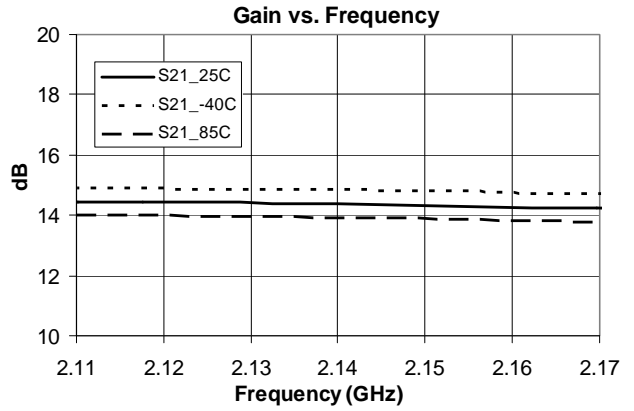
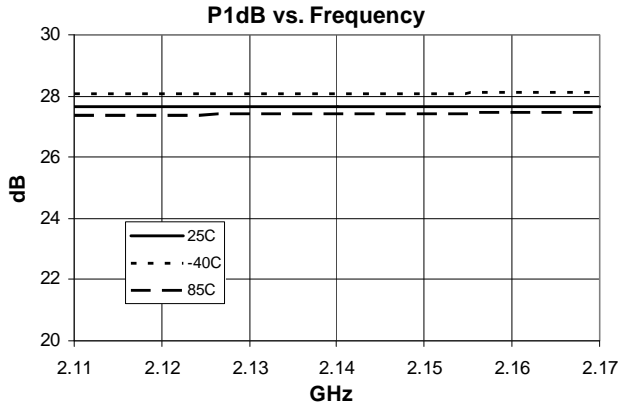
880 MHz Application Circuit Data, $V_{CC}=5V$, $I_D=270mA$



1960 MHz Application Circuit Data, $V_{CC}=5V$, $I_D=270mA$

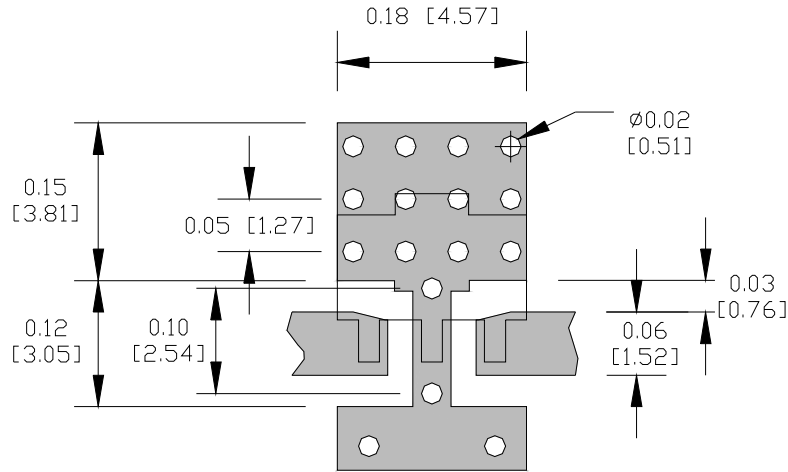


2140 MHz Application Circuit Data, $V_{CC}=5V, I_D=270mA$



| 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 for best performance to reduce lead inductance as close to ground leads as possible. |
| 3 | RF OUT/Bias | RF output and bias pin. DC voltage is present on this pin, therefore a DC blocking capacitor is necessary for proper operation. |

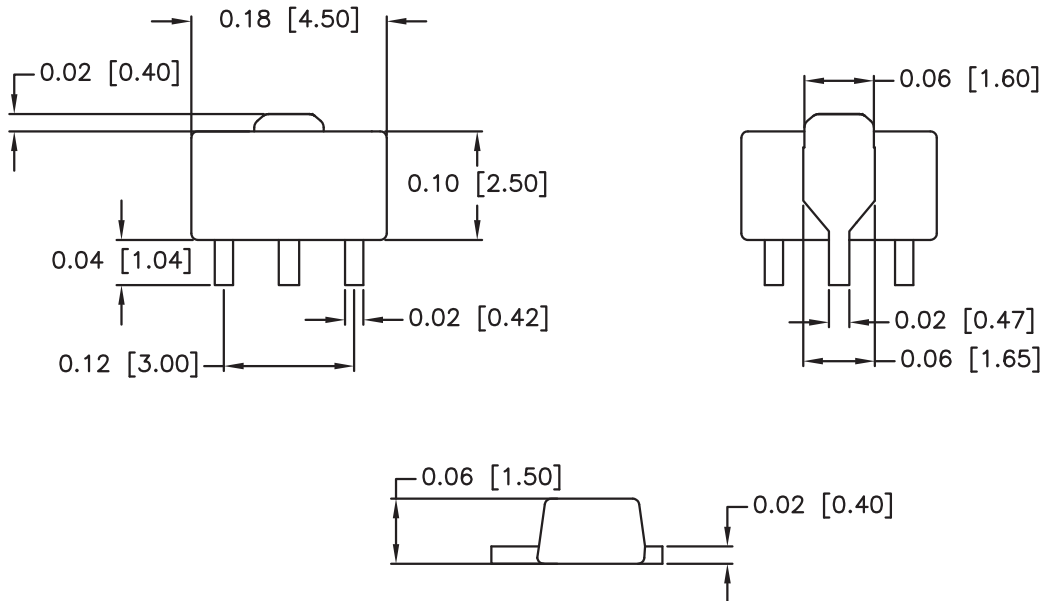
Suggested Pad Layout



Package Drawing

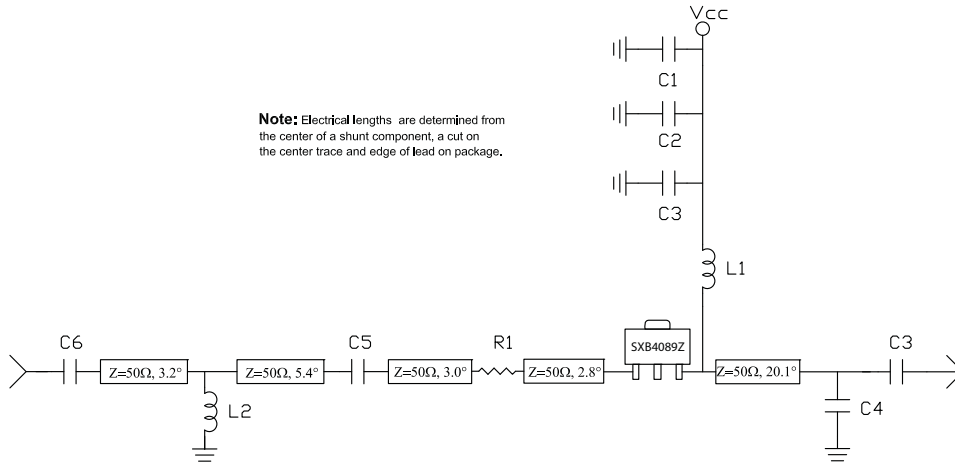
Dimensions in inches (millimeters)

Refer to drawing posted at www.rfmd.com for tolerances.



880MHz Application Schematic

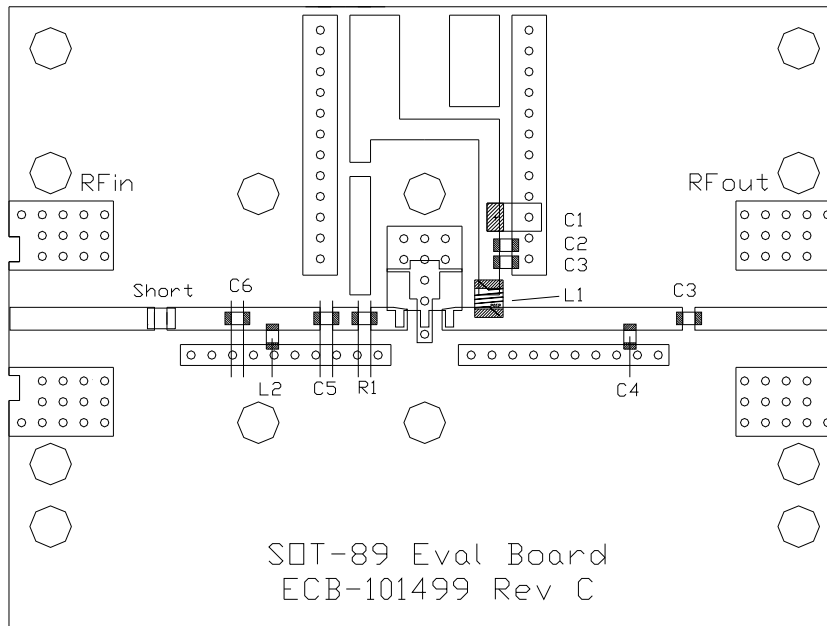
880 MHz Demo Board



Bill of Materials

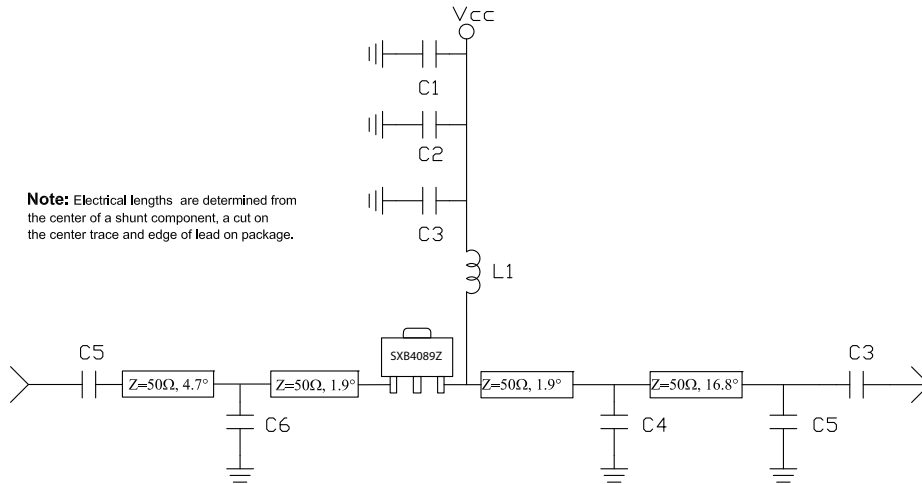
| | | | | |
|-----|----|---------------|---------------|--------|
| C1 | 1x | TAJB104KLRH | Rohm | 0.1uF |
| C2 | 1x | MCH185C102KK | Rohm | 1000pF |
| C3 | 2x | MCH185A680JK | Rohm | 68pF |
| C4 | 1x | MCH185A3R9CK | Rohm | 3.9pF |
| C5 | 1x | MCH185C4R7CK | Rohm | 4.7pF |
| C6 | 1x | MCH185C120CK | Rohm | 12pF |
| L1 | 1x | 0805HQ- | Coilcraft | 48nH |
| L2 | 1x | LL1608-FS2N7J | Toko | 2.7nH |
| R1 | 1x | 0603- | Rohm | 1ohm |
| RF1 | 2x | 142-0701-846 | Johnson Comp. | |
| | | Heat sink | EEF-101216 | |
| PCB | | ECB-101499 | C | |

880MHz Evaluation Board Layout



1960 MHz Application Schematic

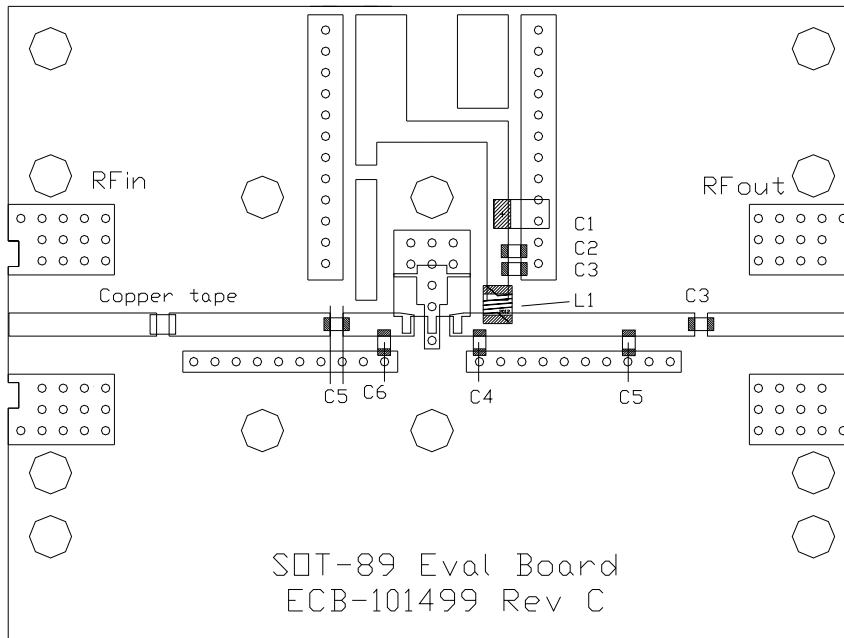
1960 MHz Demo Board



Bill of Materials

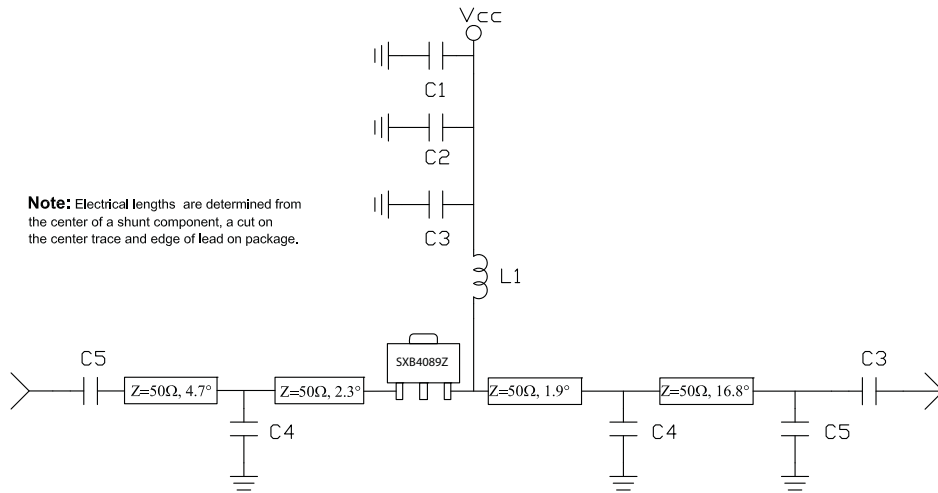
| | | | | |
|-----|----|--------------|---------------|--------|
| C1 | 1x | TAJB104KLRH | Rohm | 0.1uF |
| C2 | 1x | MCH185C102KK | Rohm | 1000pF |
| C3 | 2x | MCH185A220JK | Rohm | 22pF |
| C4 | 1x | MCH185A1R5CK | Rohm | 1.5pF |
| C5 | 2x | MCH185A1R2CK | Rohm | 1.2pF |
| C6 | 1x | MCH185A1R8CK | Rohm | 1.8pF |
| L1 | 1x | 0805HQ- | Coilcraft | 20nH |
| RF1 | 2x | 142-0701-846 | Johnson Comp. | |
| | | Heat sink | EEF-101216 | |
| | | PCB | ECB-101499 C | |

1960 MHz Evaluation Board Layout



2140 MHz Application Schematic

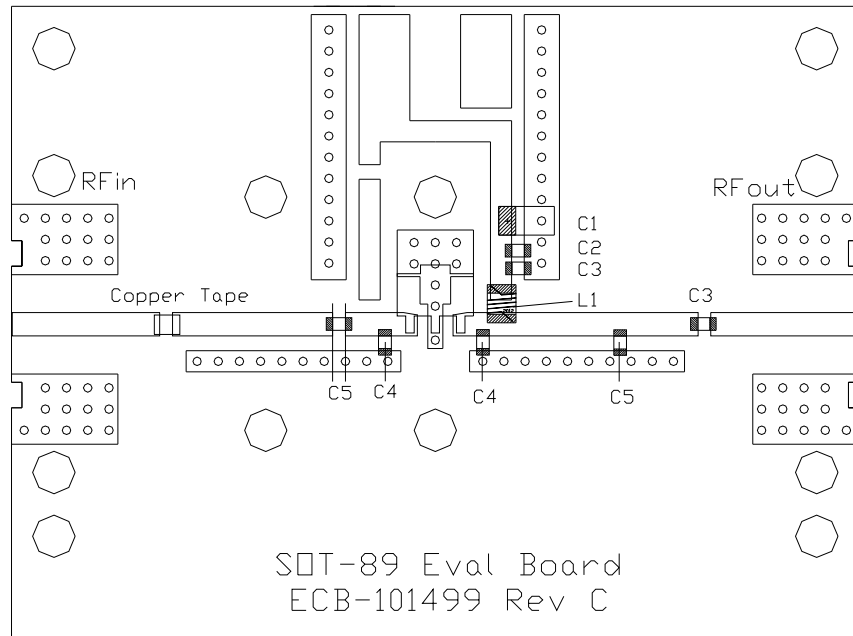
1240 MHz Demo Board



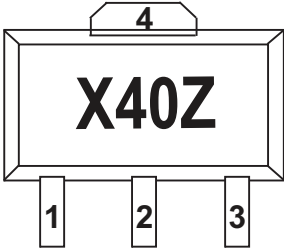
Bill of Materials

- C1 1x TAJB104KLRH Rohm 0.1uF
- C2 1x MCH185C102KK Rohm 1000pF
- C3 2x MCH185A220JK Rohm 22pF
- C4 2x MCH185A1R5CK Rohm 1.5pF
- C5 2x MCH185A1R0CK Rohm 1.0pF
- L1 1x 0805HQ- Coilcraft 20nH
- RF1 2x 142-0701-846 Johnson Comp.
- Heat sink EEF-101216
- PCB ECB-101499 C

2140 MHz Evaluation Board Layout



Part Identification



Alternate marking: "SXB4089Z" on line 1 with Trace Code on line 2.

Ordering Information

| Ordering Code | Description |
|---------------|----------------------------|
| SXB4089Z | 7" Reel with 1000 pieces |
| SXB4089ZSQ | Sample Bag with 25 pieces |
| SXB4089ZSR | 7" Reel with 100 pieces |
| SXB4089Z-EVB1 | 880MHz, 5V Operation PCBA |
| SXB4089Z-EVB2 | 1960MHz, 5V Operation PCBA |
| SXB4089Z-EVB3 | 2140MHz, 5V Operation PCBA |