

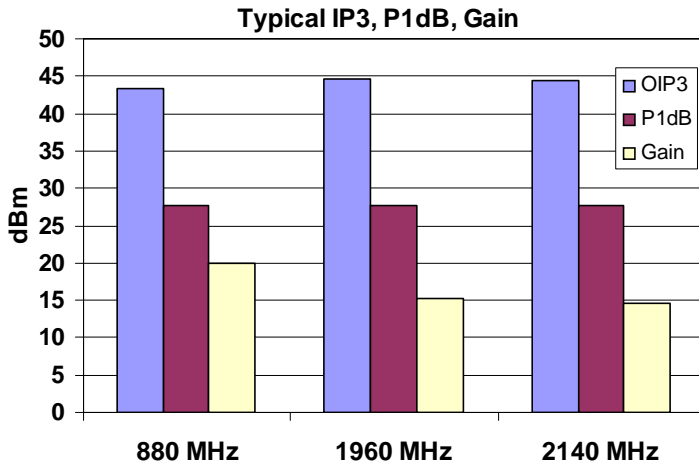


## Product Description

Sirenza Microdevices' SXB-4089 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 400-2500 MHz cellular, ISM, WLL, PCS, W-CDMA applications.

Its high linearity makes it an ideal choice for multi-carrier as well as digital applications.



**Preliminary**

## SXB-4089

## SXB-4089Z



### 400-2500 MHz ½ W Medium Power InGaP/GaAs HBT Amplifier with Active Bias



### Product Features

- On-chip Active Bias Control, Single 5V Supply
- High Output 3rd Order Intercept: +45 dBm typ.
- High P1dB : +28 dBm typ.
- High Gain: +20 dB at 880 MHz
- Low Rth: 25°C/W typ.
- Robust 2000V ESD, Class 2

### Applications

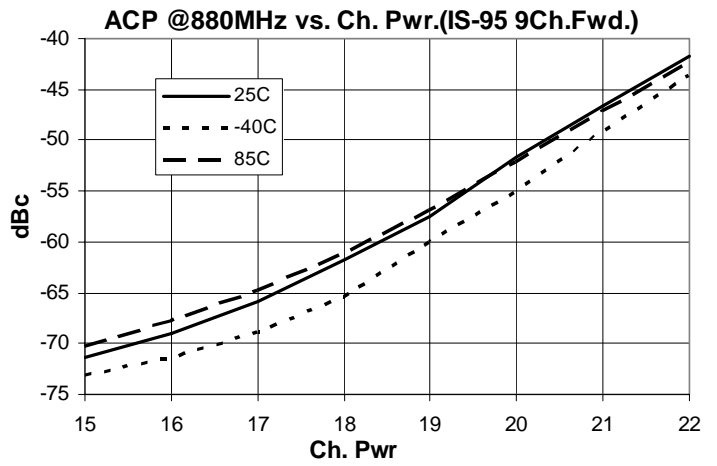
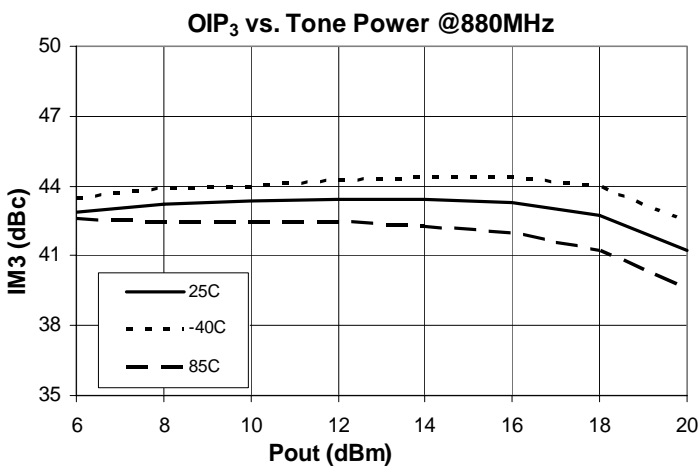
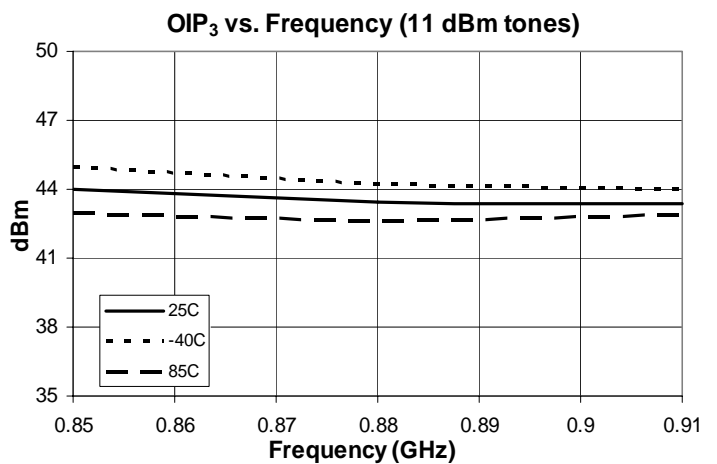
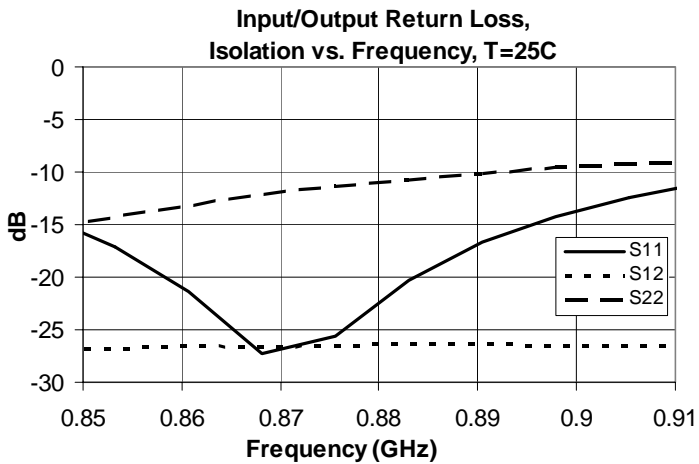
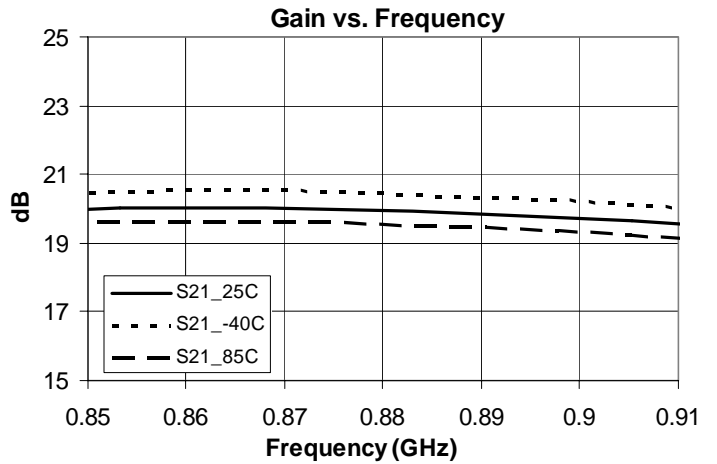
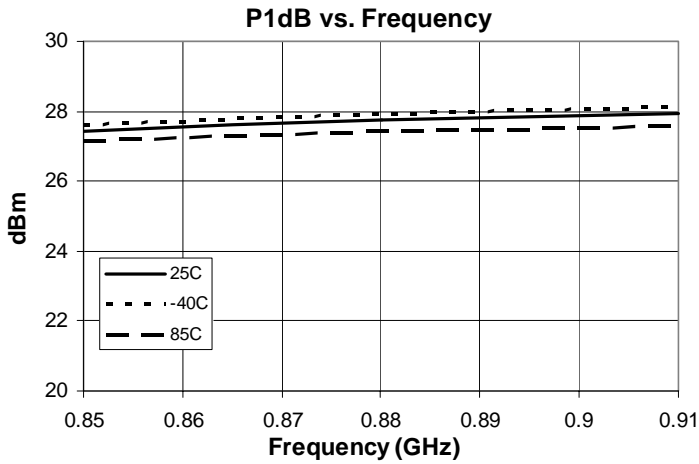
- W-CDMA, PCS, Cellular Systems
- Multi-Carrier Applications

Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
P <sub>1dB</sub>	Output Power at 1 dB Compression	dBm	880 MHz		27.5	
			1960 MHz		27.5	
			2140 MHz		27.5	
S <sub>21</sub>	Small Signal Gain	dBm	880 MHz		20	
			1960 MHz		15	
			2140 MHz	13	14.5	16
S <sub>11</sub>	Input VSWR		880 MHz		1.3:1	
			1960 MHz		1.3:1	
			2140 MHz		1.3:1	
OIP3	Output Third Order Intercept Point (Pout/Tone = +11 dBm, Tone spacing = 1 MHz)	dBm	880 MHz		43.5	
			1960 MHz		44.5	
			2140 MHz		44.5	
NF	Noise Figure	dB	880 MHz		4.9	
			1960 MHz		3.3	
			2140 MHz		3.3	
V <sub>CC</sub>	Device Operating Voltage	V		4.75	5	5.25
I <sub>D</sub>	Device Operating Current	mA		235	260	285
R <sub>TH, j-l</sub>	Thermal Resistance (junction - lead)	°C/W			25.3	

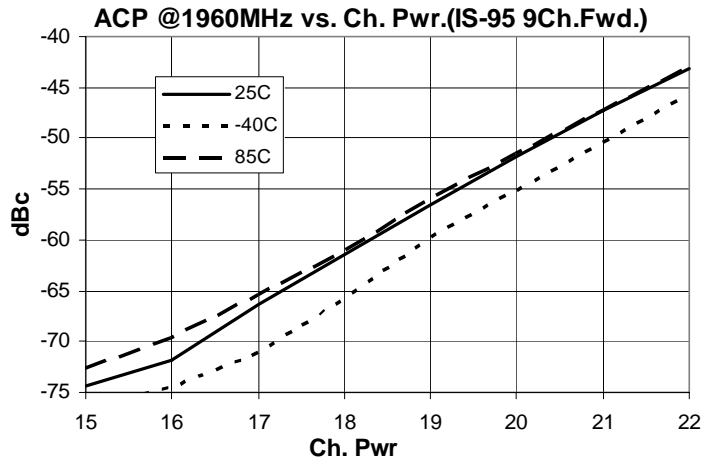
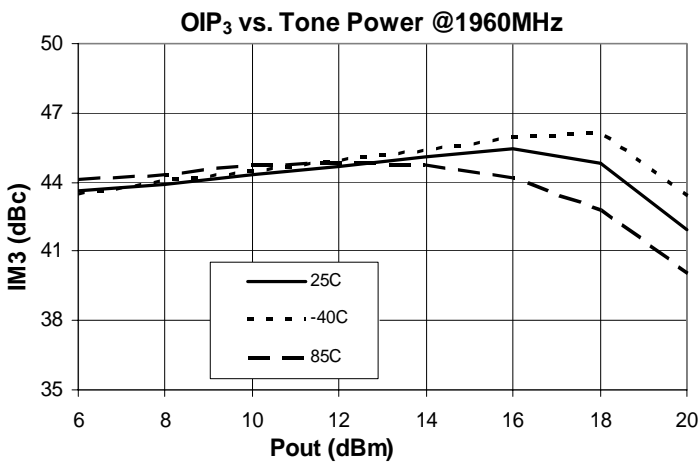
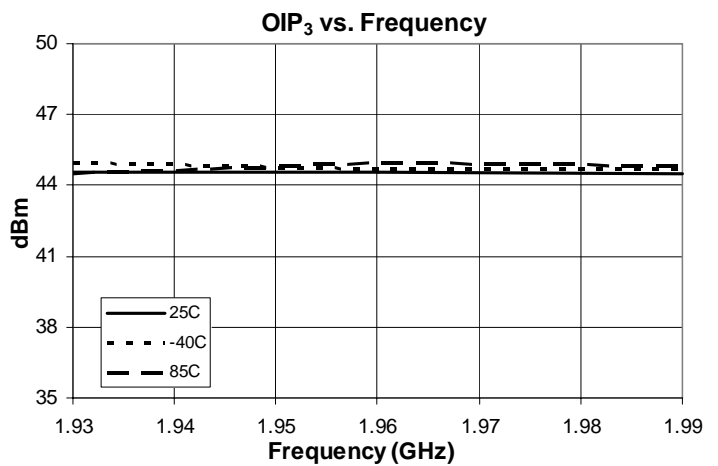
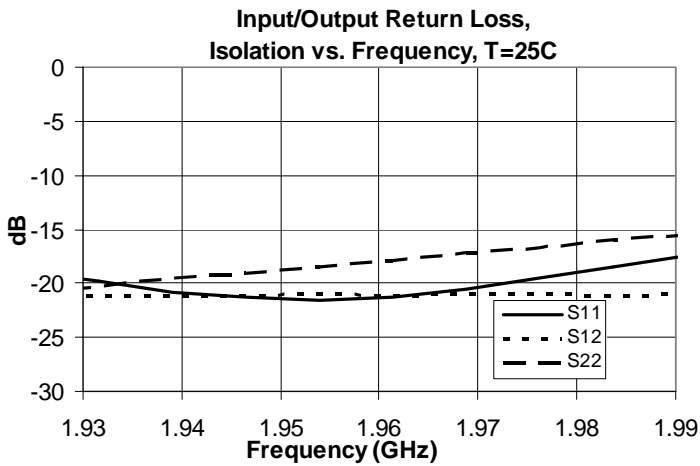
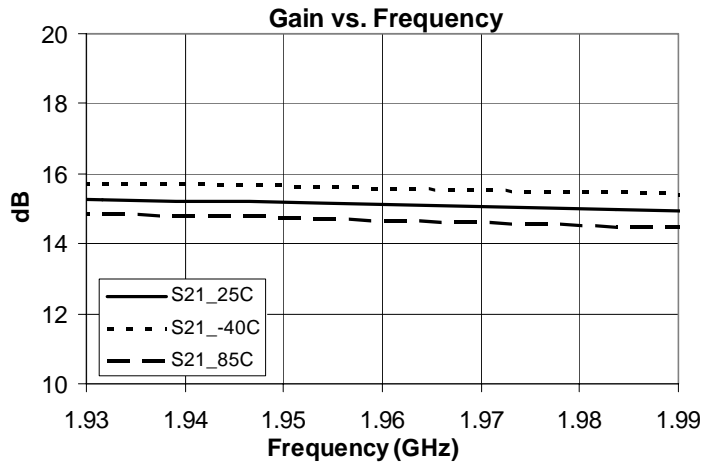
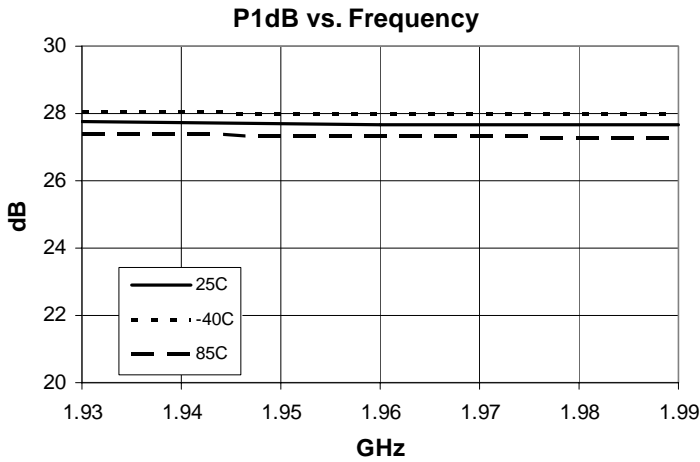
**Test Conditions:** T<sub>a</sub> = 25°C Z<sub>0</sub> = 50 Ohms

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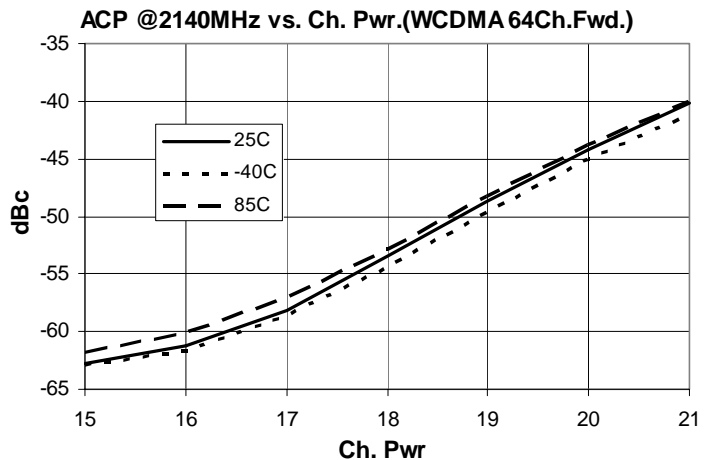
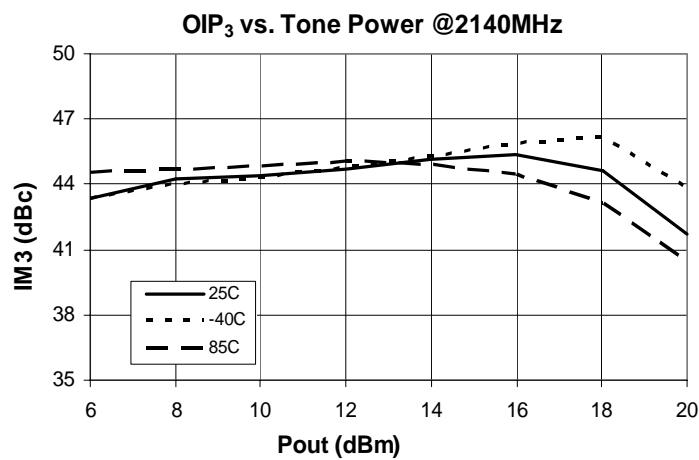
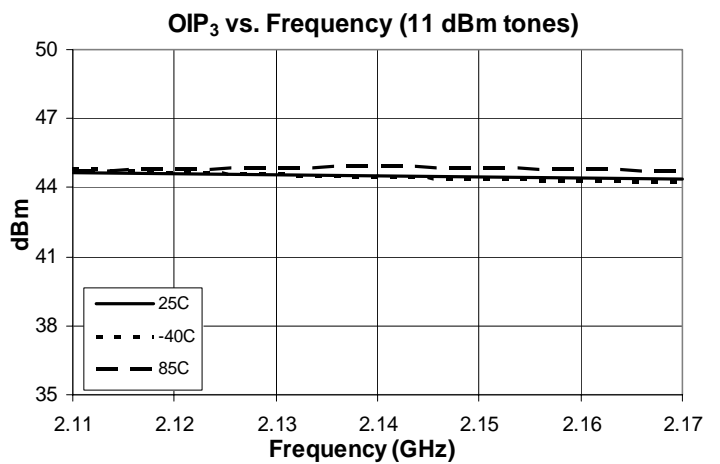
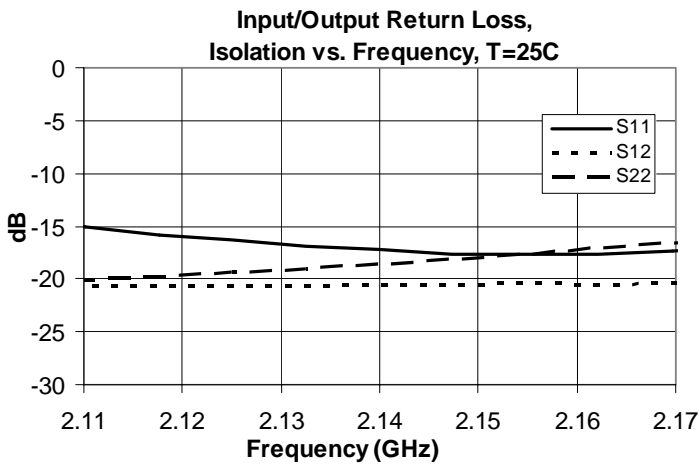
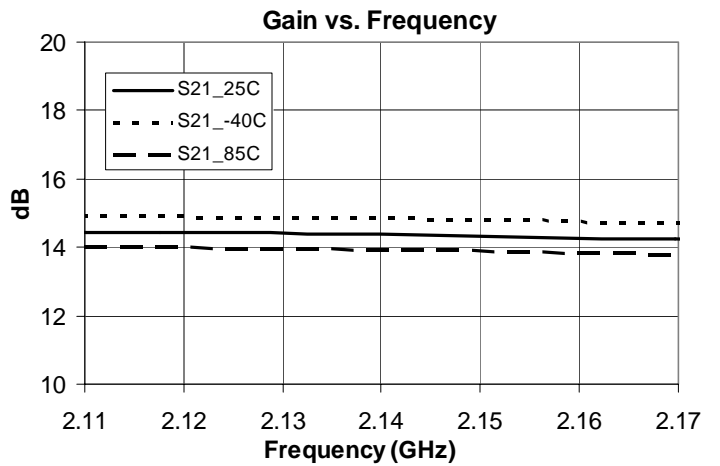
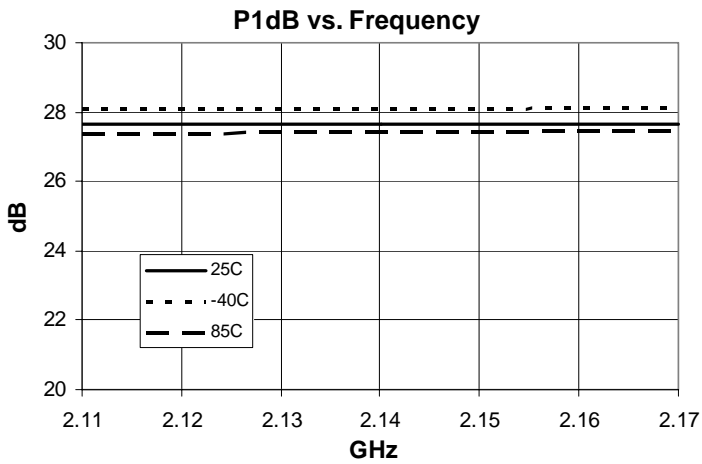
880 MHz Application Circuit Data,  $V_{CC}=5V$ ,  $I_D=270mA$



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



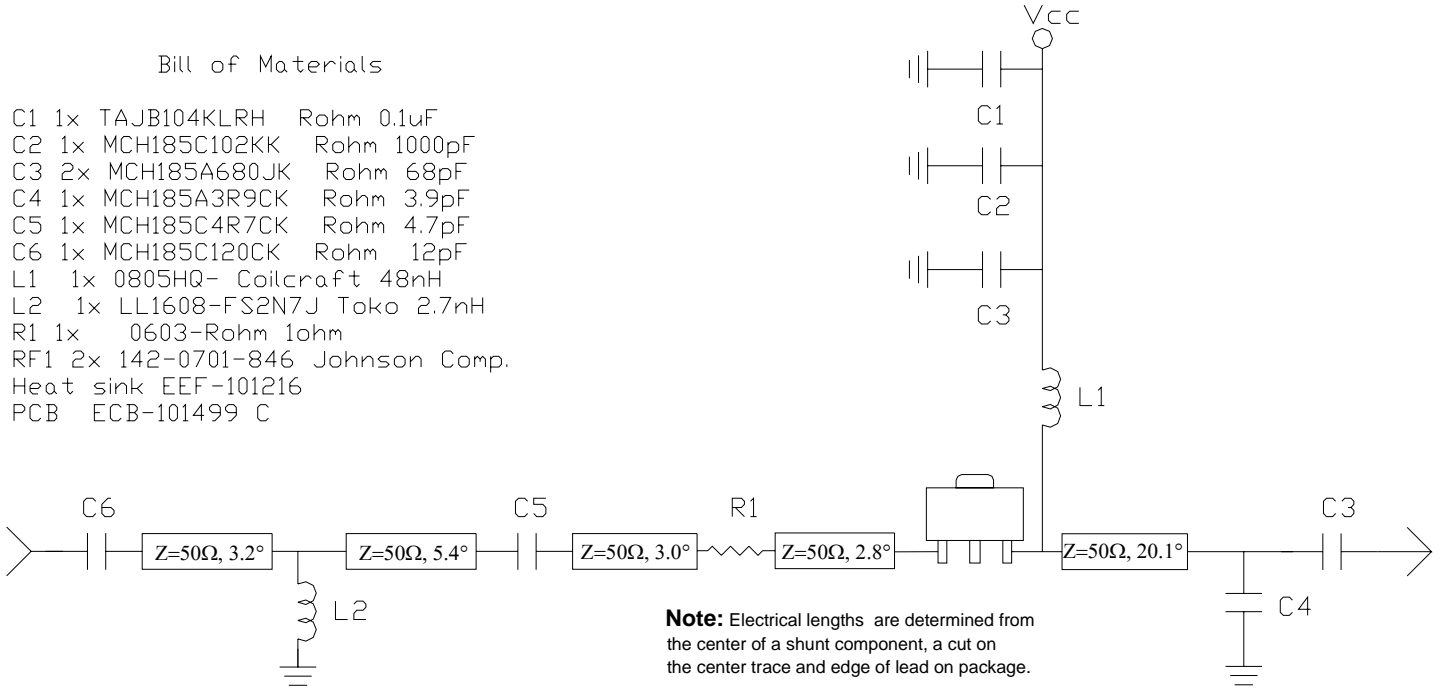
2140 MHz Application Circuit Data,  $V_{CC}=5V$ ,  $I_D=270mA$



**Application Schematic for 880 MHz**

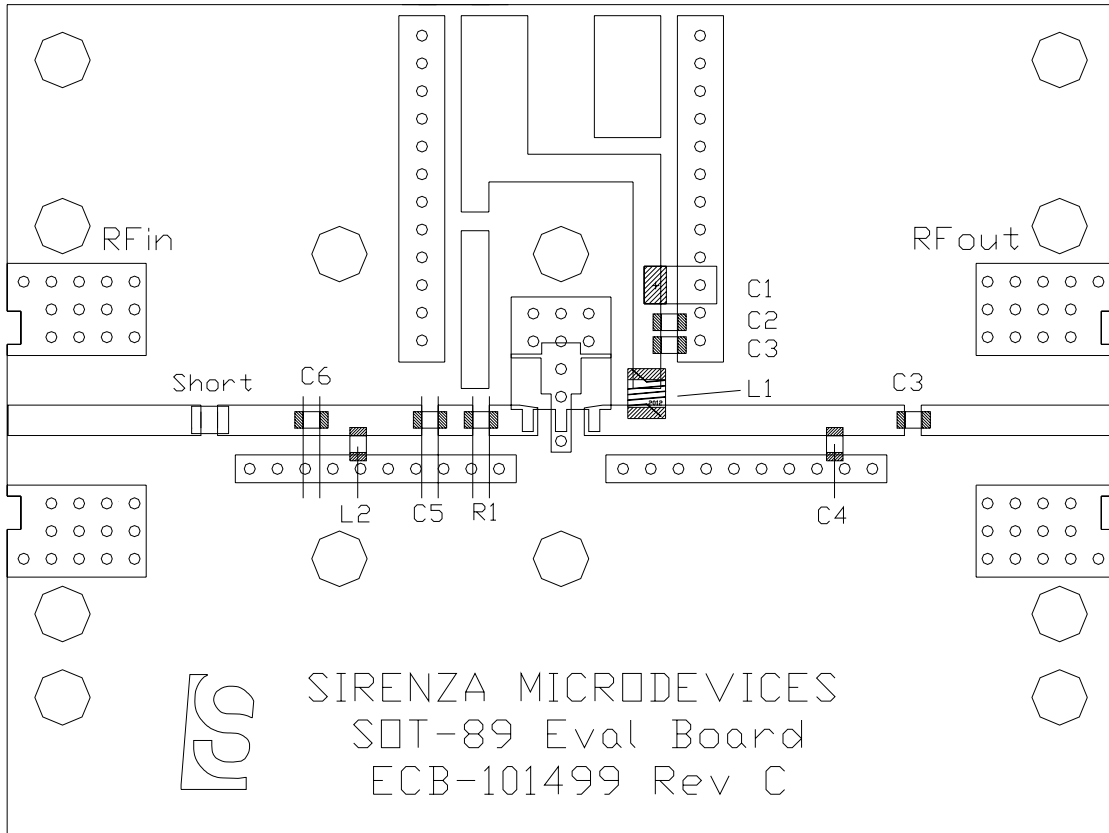
Bill of Materials

- 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



**Note:** Electrical lengths are determined from the center of a shunt component, a cut on the center trace and edge of lead on package.

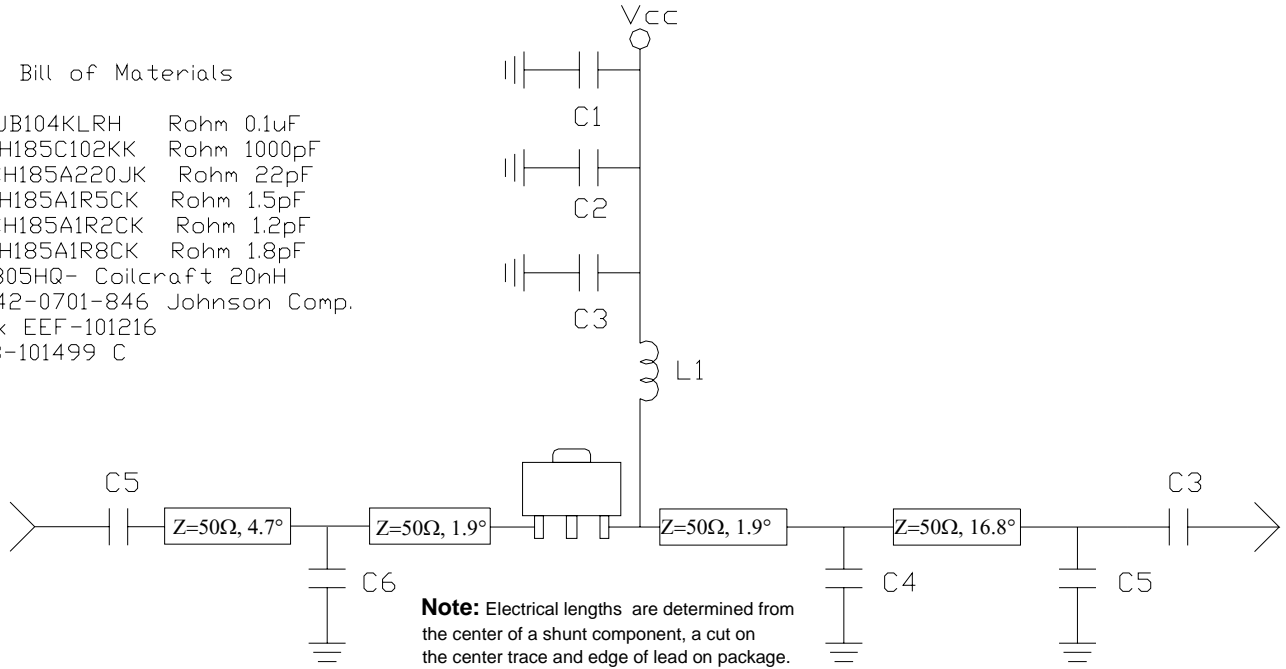
**Evaluation Board Layout for 880 MHz**



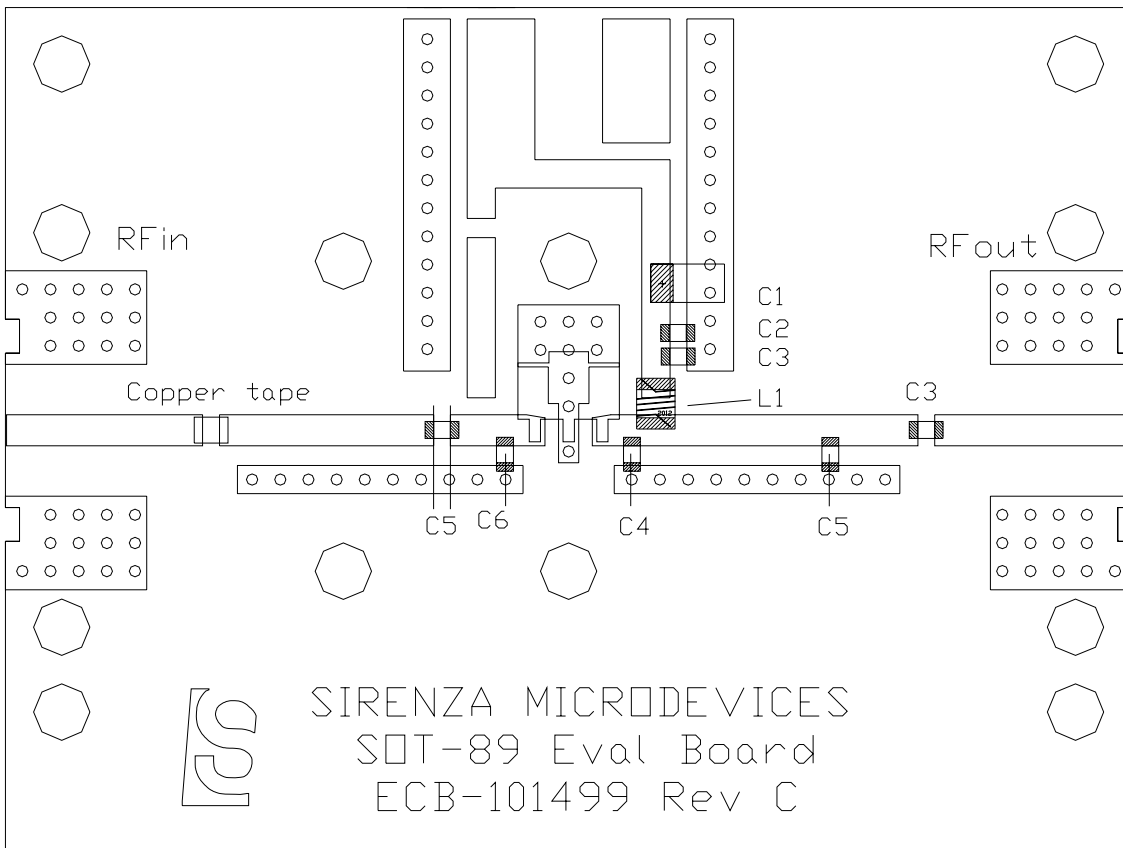
**Application Schematic for 1960 MHz**

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



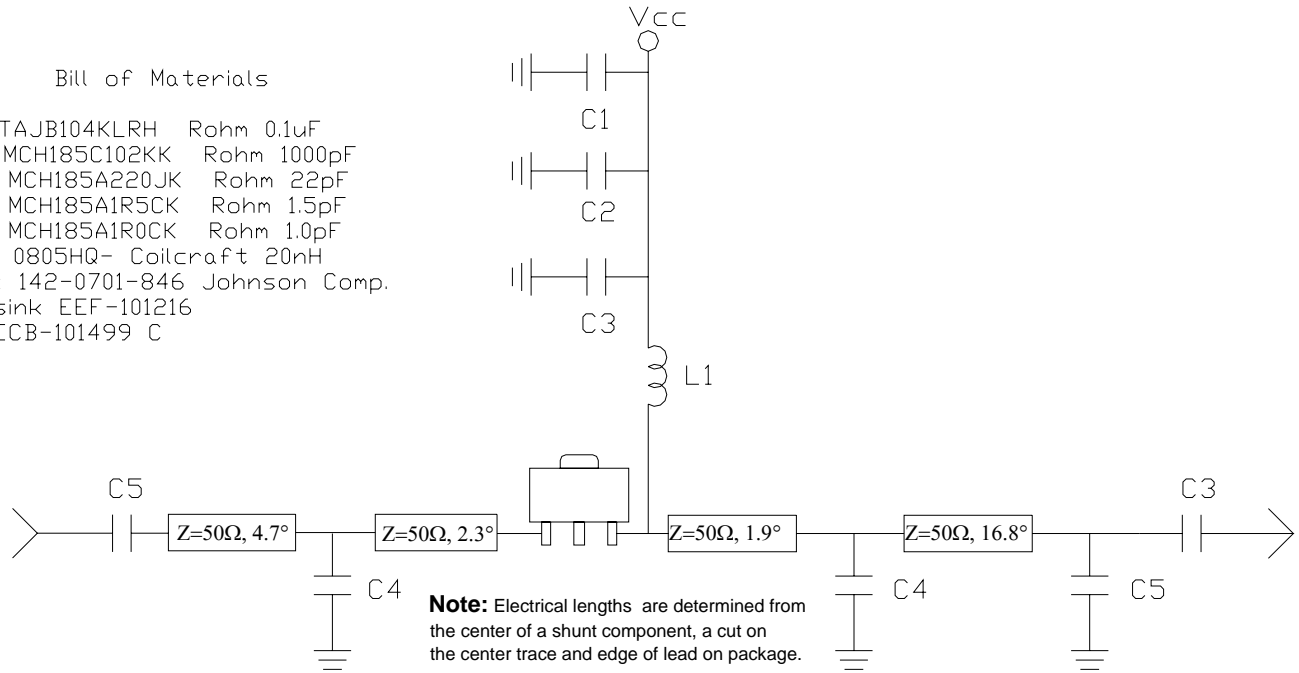
**Evaluation Board Layout for 1960 MHz**



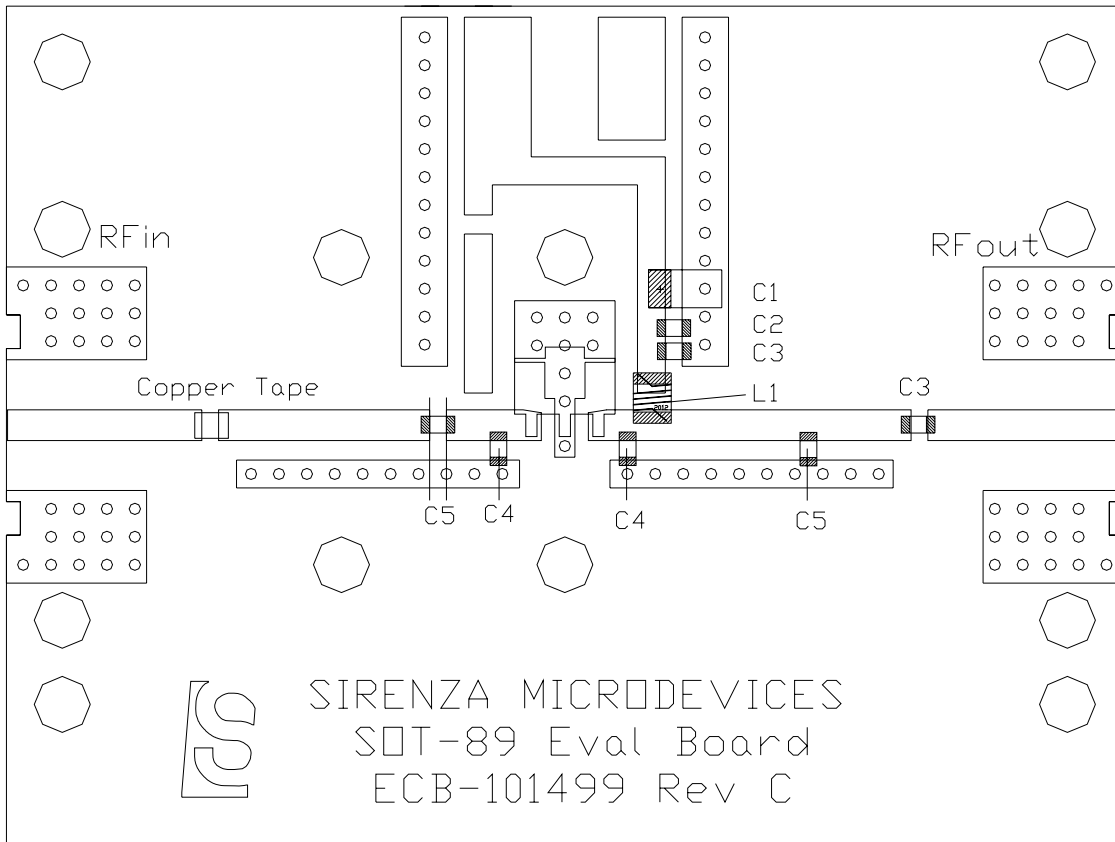
**Application Schematic for 2140 MHz**

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

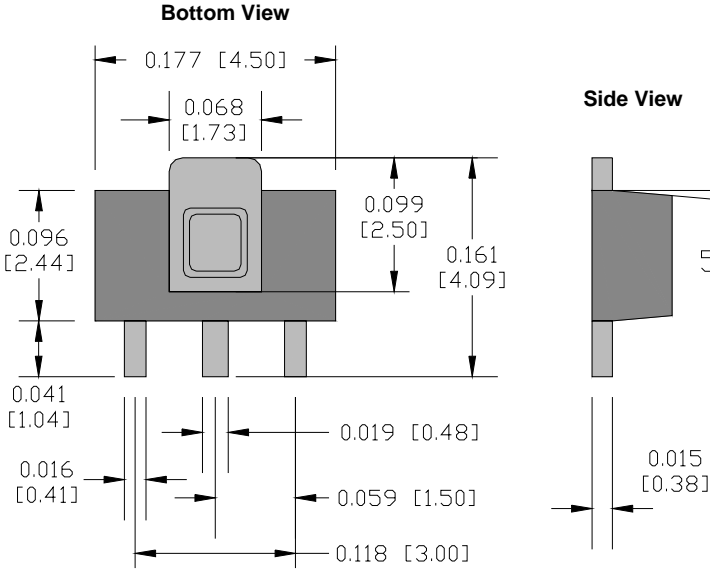


**Evaluation Board Layout for 2140 MHz**



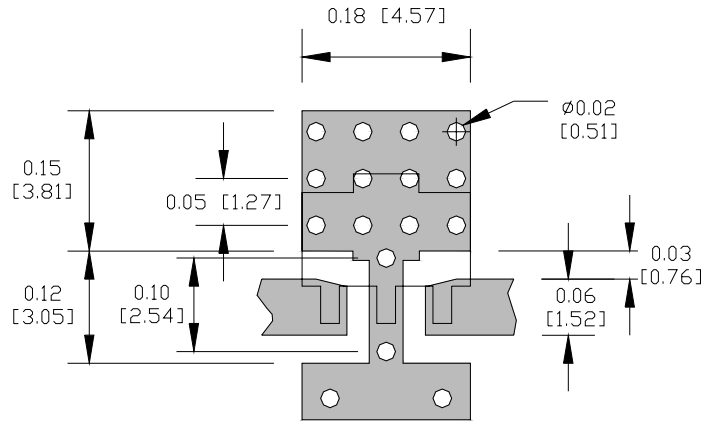
**Nominal Package Dimensions**

Dimensions in inches (millimeters)  
Refer to package drawing posted at [www.sirenza.com](http://www.sirenza.com) for tolerances



**Suggested PCB Pad Layout**

Dimensions in inches [millimeters]



**Part Number Ordering Information**

Part Number	Reel Size	Devices / Reel
SXB-4089	7"	1000
SXB-4089Z	7"	1000

**Absolute Maximum Ratings**

Parameter	Absolute Limit
Max Device Current ( $I_D$ )	500 mA
Max Device Voltage ( $V_D$ )	6 V
Max. RF Input Power	60mW
Max. Dissipated Power	2W
Max. Junction Temp. ( $T_J$ )	+165°C
Operating Temp. Range ( $T_L$ )	-40°C to +85°C
Max. Storage Temp.	+150°C

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:

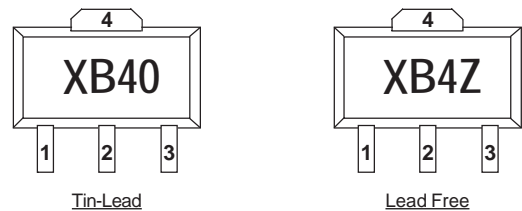
$$I_D V_D < (T_J - T_L) / R_{TH, j-l} \quad T_L = T_{LEAD}$$



**ESD: Class 2** (Passes 2000V ESD Pulse)  
Appropriate precautions in handling, packaging and testing devices must be observed.

**MSL (Moisture Sensitivity Level) Rating: Level 1**

**Package Marking**



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.