SXB-4089
SXB-4089Z

RoHS Compliant & Green Package

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

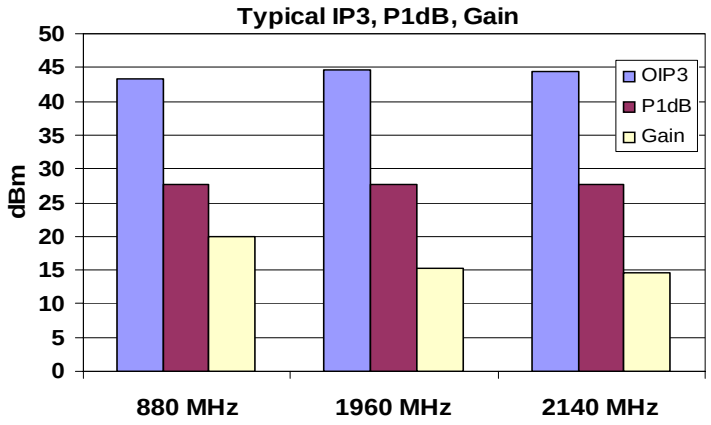
Product Description

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.

The matte tin finish on Sirenza's lead-free package utilizes a post annealing process to mitigate tin whisker formation and is RoHS compliant per EU Directive 2002/95. This package is also manufactured with green molding compounds that contain no antimony trioxide nor halogenated fire retardants.



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

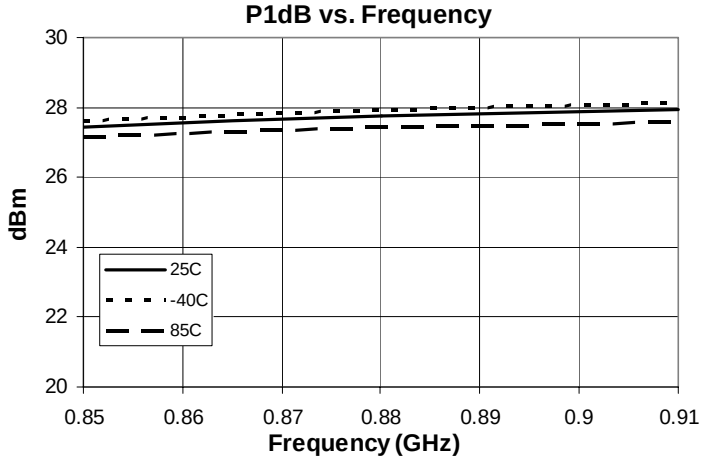
- **W-CDMA, PCS, Cellular Systems**
- **Multi-Carrier Applications**

Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
P_{1dB}	Output Power at 1 dB Compression	dBm	880 MHz 1960 MHz 2140 MHz	 26	27.5 27.5 27.5	
S_{21}	Small Signal Gain	dBm	880 MHz 1960 MHz 2140 MHz	18 12.5	20 15 14	22 15.5
S_{11}	Input VSWR		880 MHz 1960 MHz 2140 MHz		1.3:1 1.3:1 1.3:1	2.0:1
OIP3	Output Third Order Intercept Point (Pout/Tone = +11 dBm, Tone spacing = 1 MHz)	dBm	880 MHz 1960 MHz 2140 MHz	41.5 42.5	43.5 44.5 44.5	
NF	Noise Figure	dB	880 MHz 1960 MHz 2140 MHz		5.6 3.3 3.3	
V_{CC}	Device Operating Voltage	V		4.75	5	5.25
I_D	Device Operating Current	mA		235	265	295
R_{TH}, j-l	Thermal Resistance (junction - lead)	°C/W			25.3	

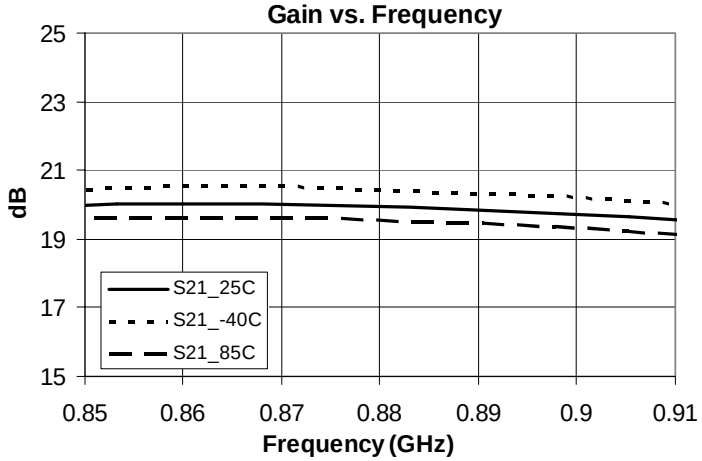
Test Conditions: T_a = 25°C Z_O = 50 Ohms
Measured in Application Circuit

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

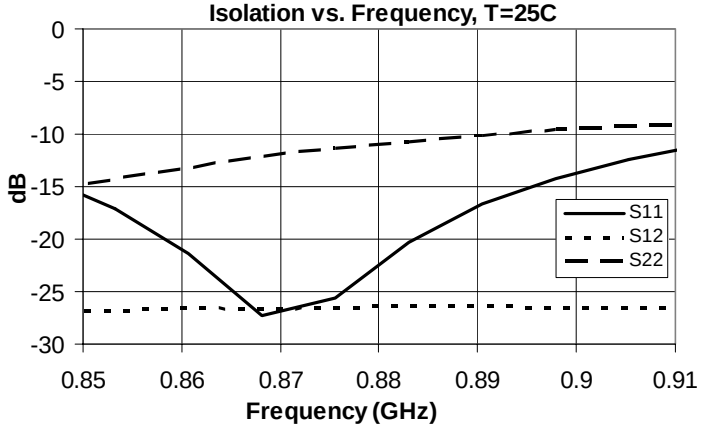
P1dB vs. Frequency



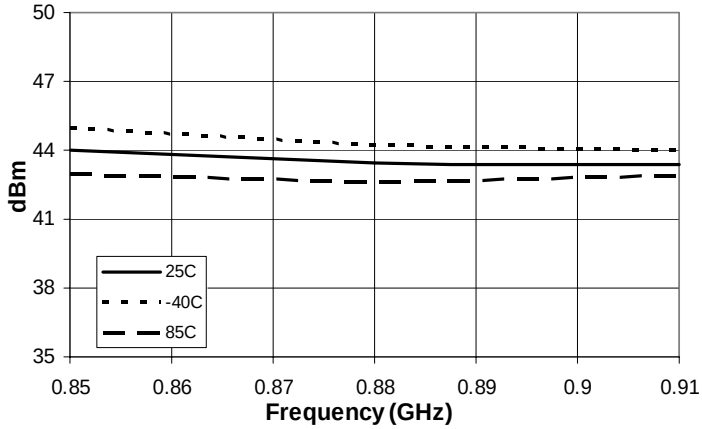
Gain vs. Frequency



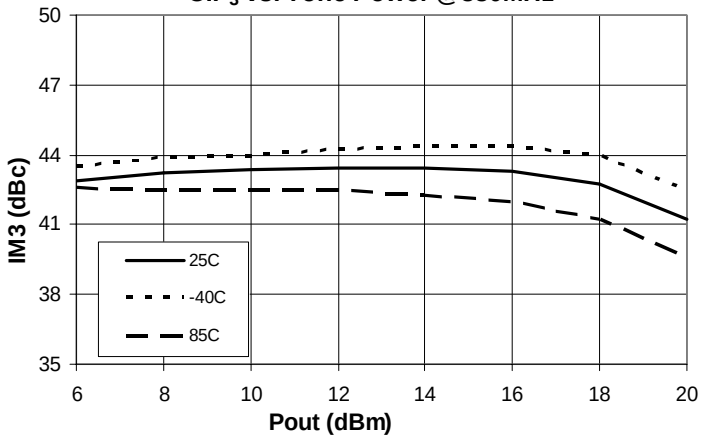
Input/Output Return Loss, Isolation vs. Frequency, T=25C



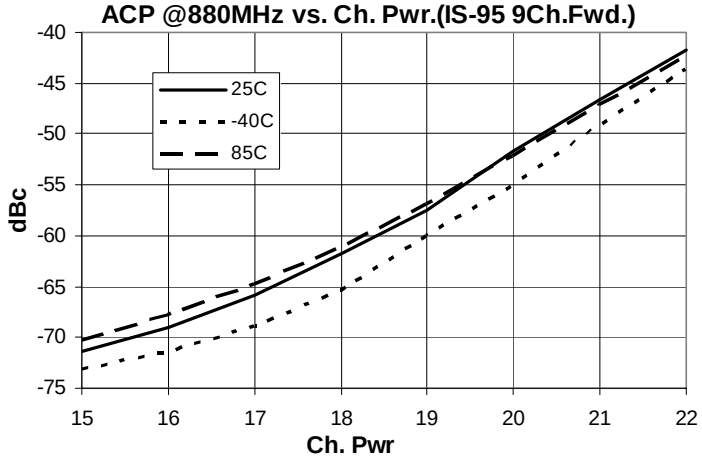
OIP_3 vs. Frequency (11 dBm tones)



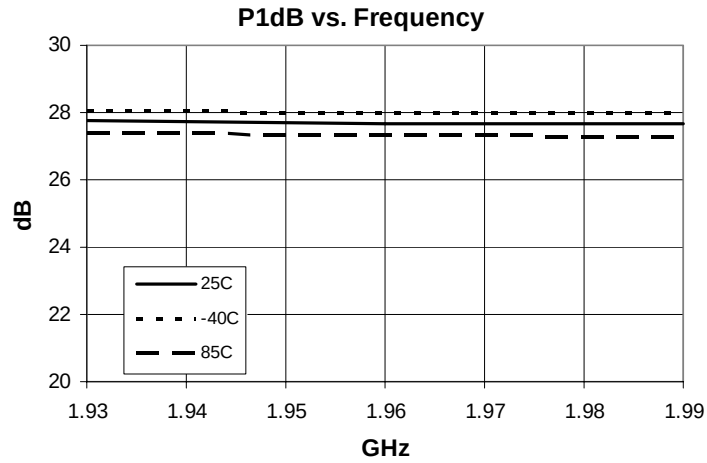
OIP_3 vs. Tone Power @880MHz

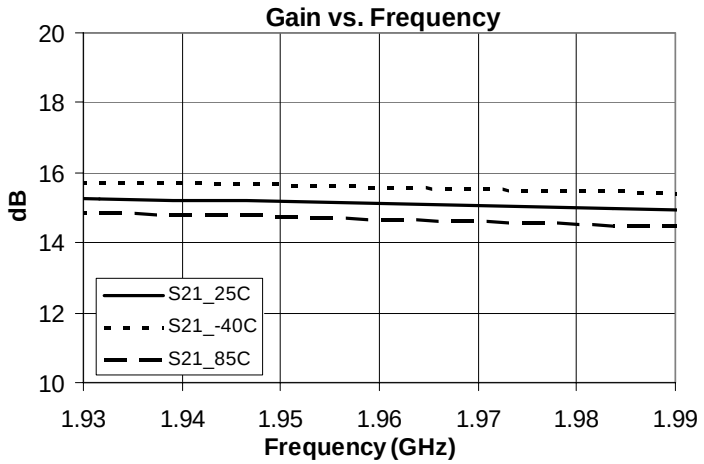


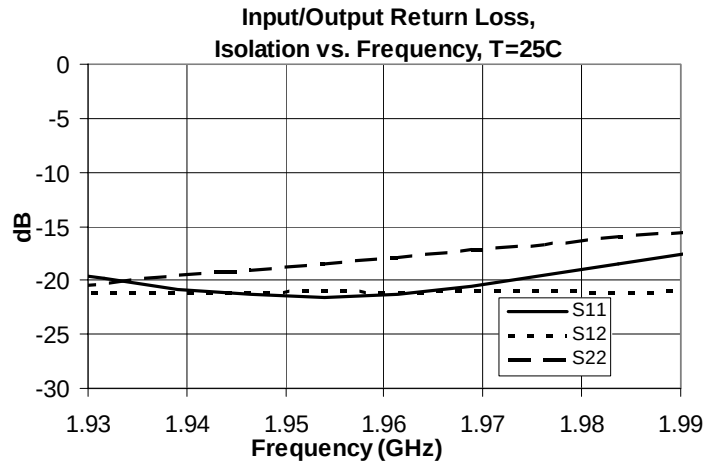
ACP @880MHz vs. Ch. Pwr.(IS-95 9Ch.Fwd.)

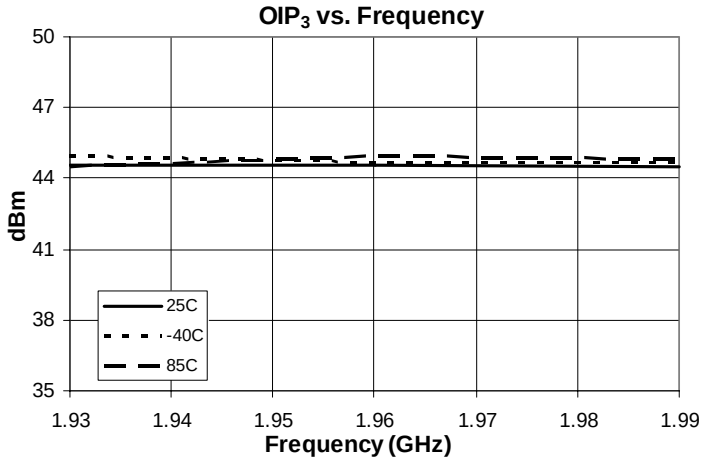


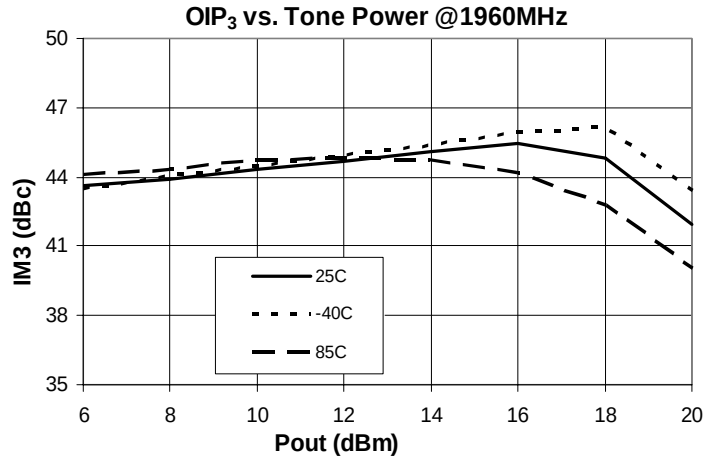
1960 MHz Application Circuit Data, V_{CC}=5V, I_D=270mA

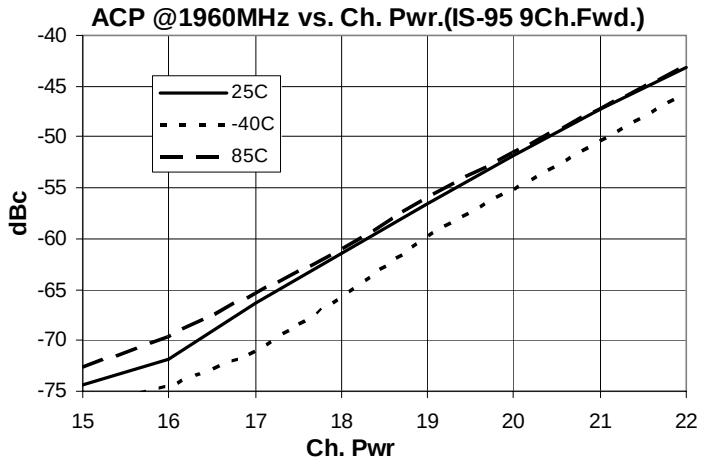






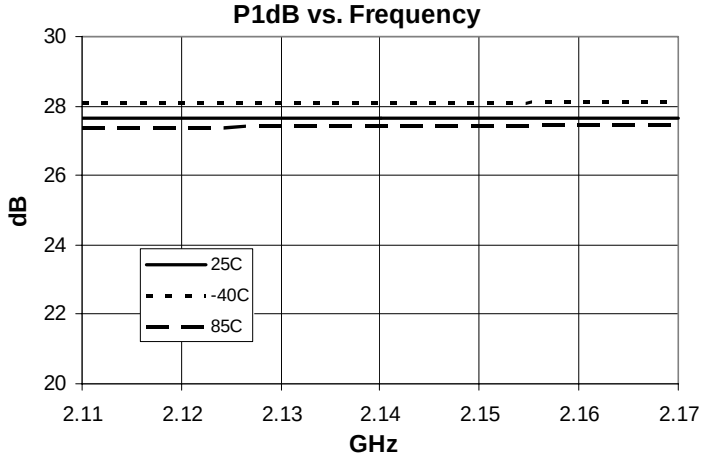




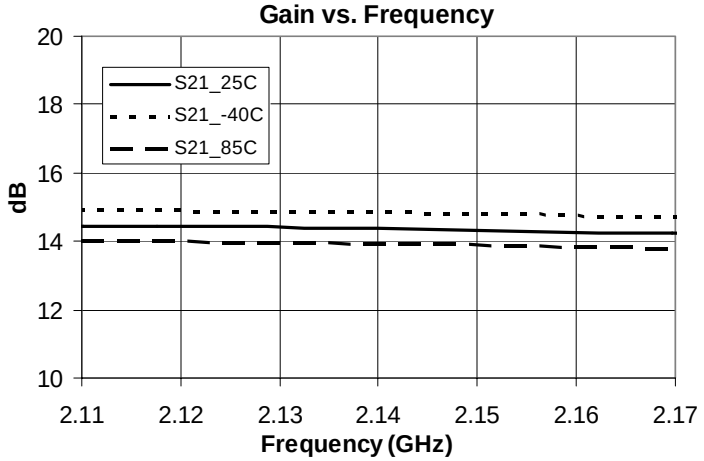


2140 MHz Application Circuit Data, V_{CC}=5V, I_D=270mA

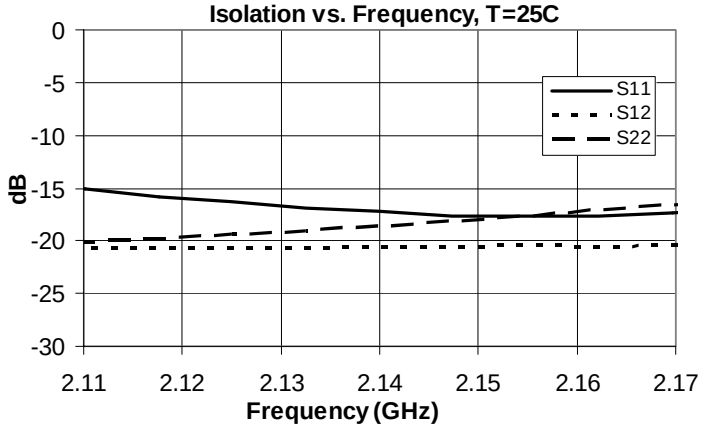
P1dB vs. Frequency



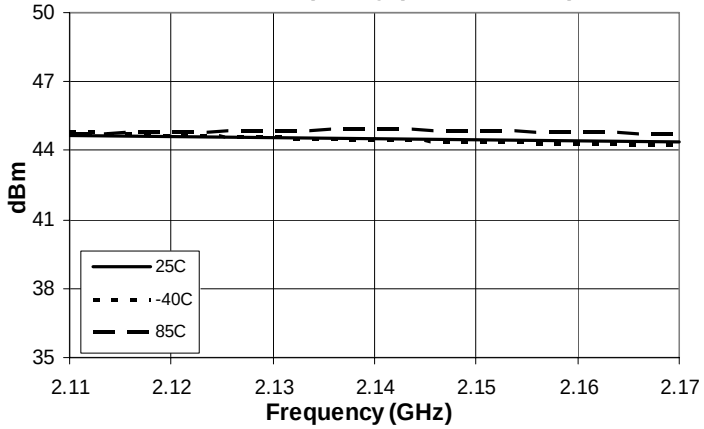
Gain vs. Frequency



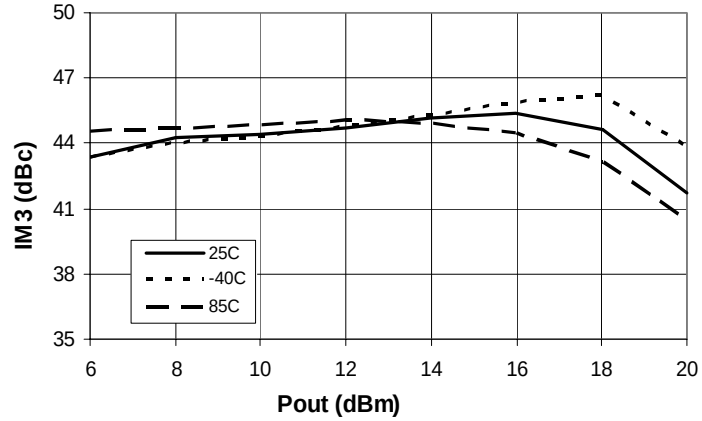
Input/Output Return Loss, Isolation vs. Frequency, T=25C



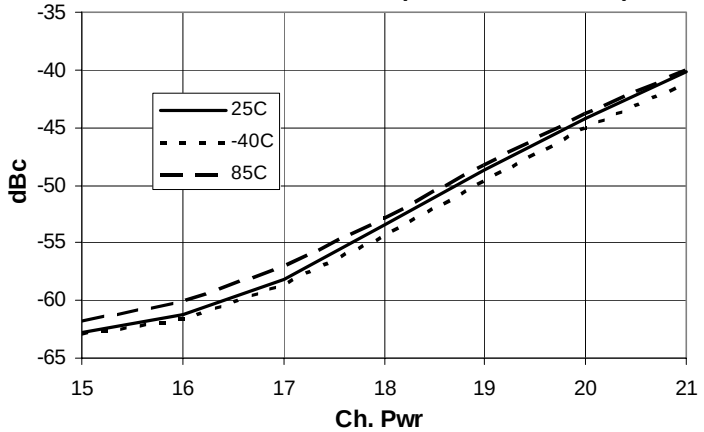
OIP_3 vs. Frequency (11 dBm tones)



OIP_3 vs. Tone Power @2140MHz



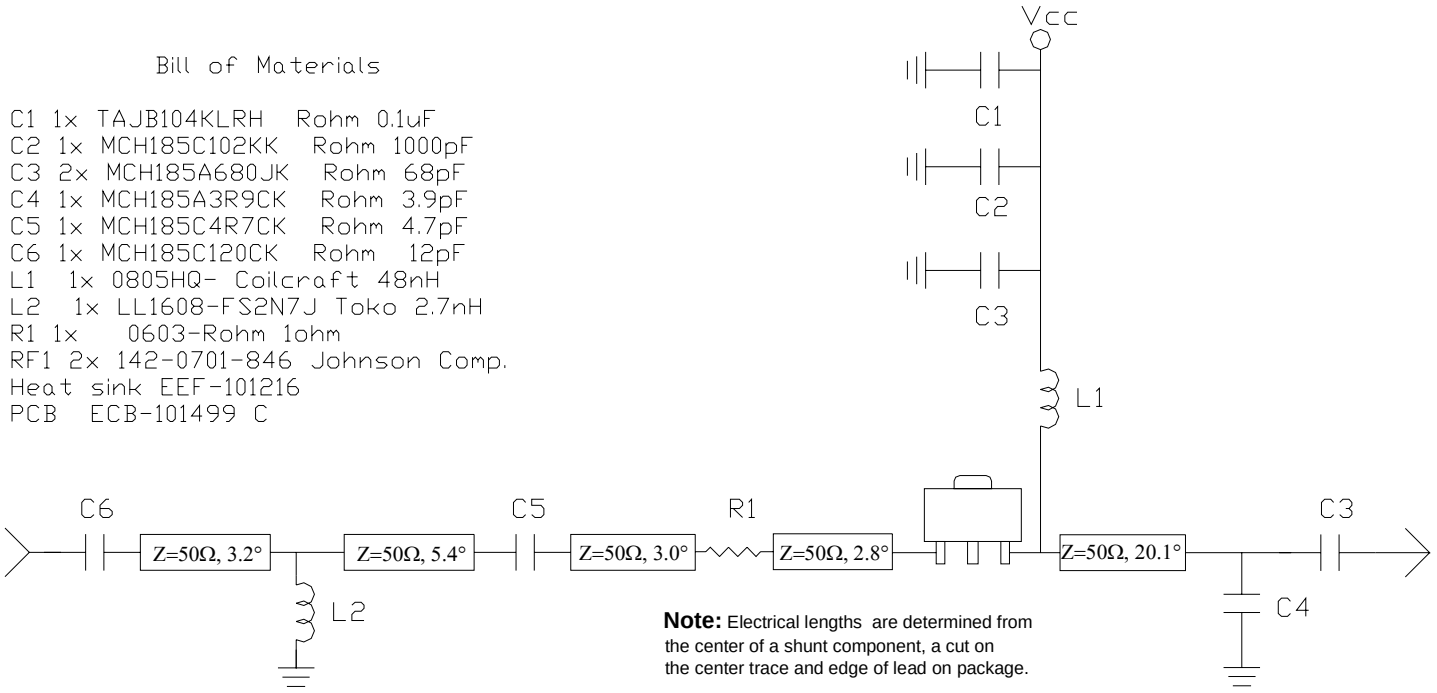
ACP @2140MHz vs. Ch. Pwr.(WCDMA 64Ch.Fwd.)



Application Schematic for 880 MHz

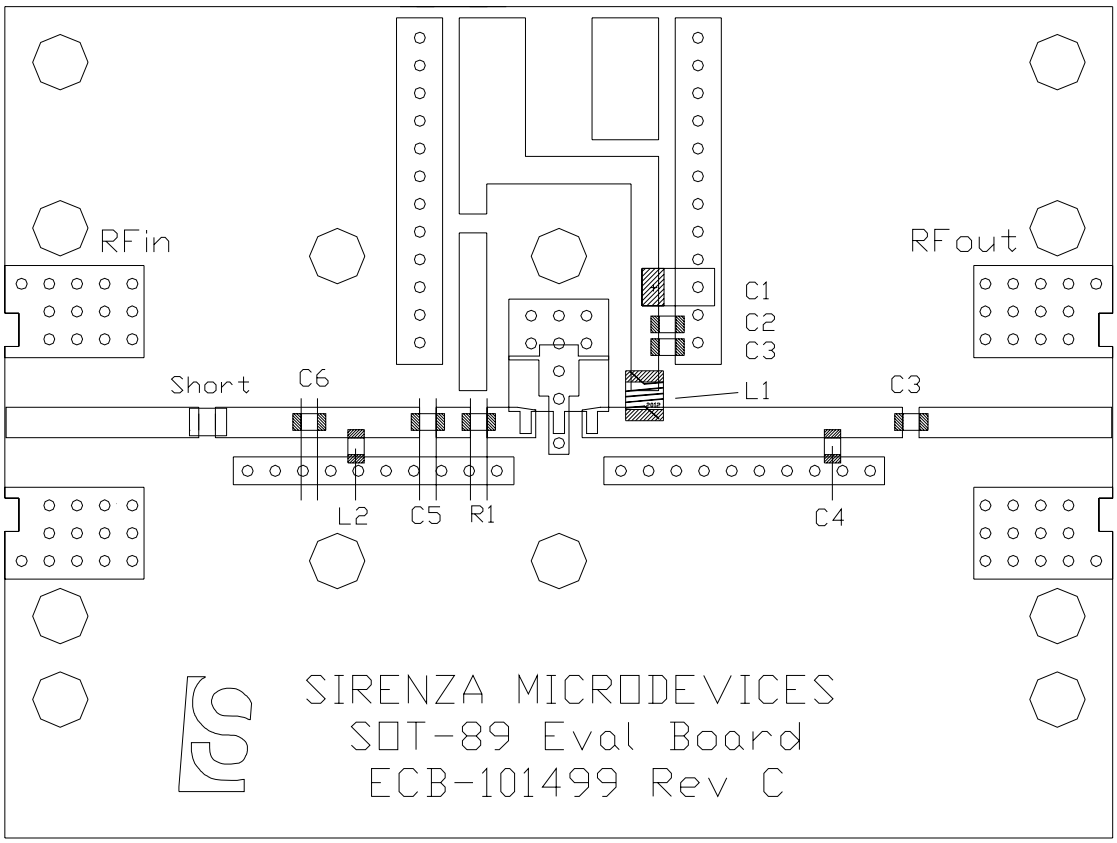
Bill of Materials

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.

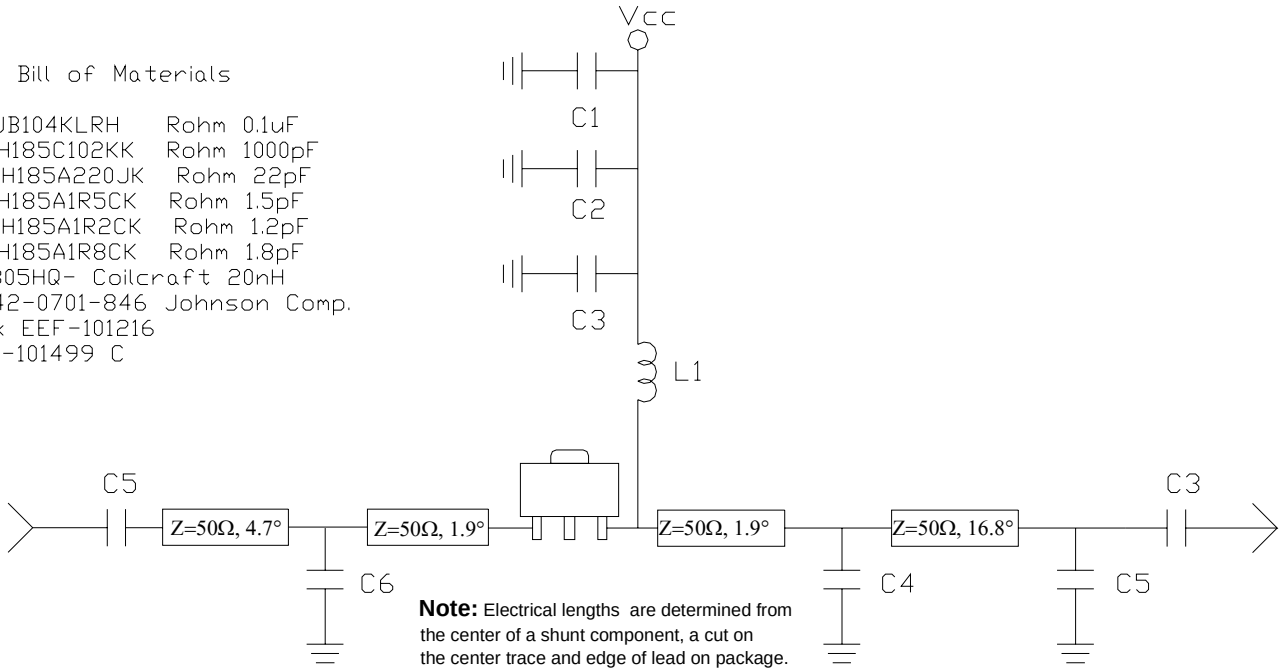
Evaluation Board Layout for 880 MHz



Application Schematic for 1960 MHz

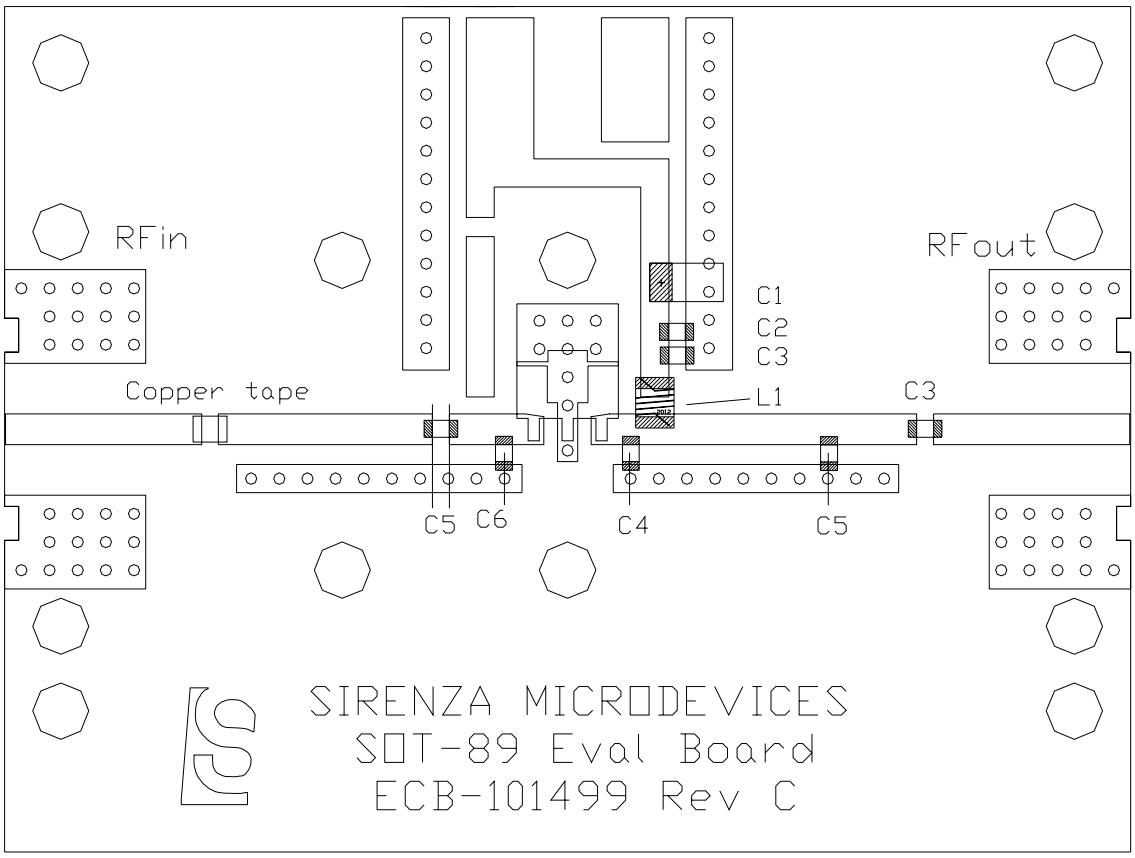
Bill of Materials

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



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

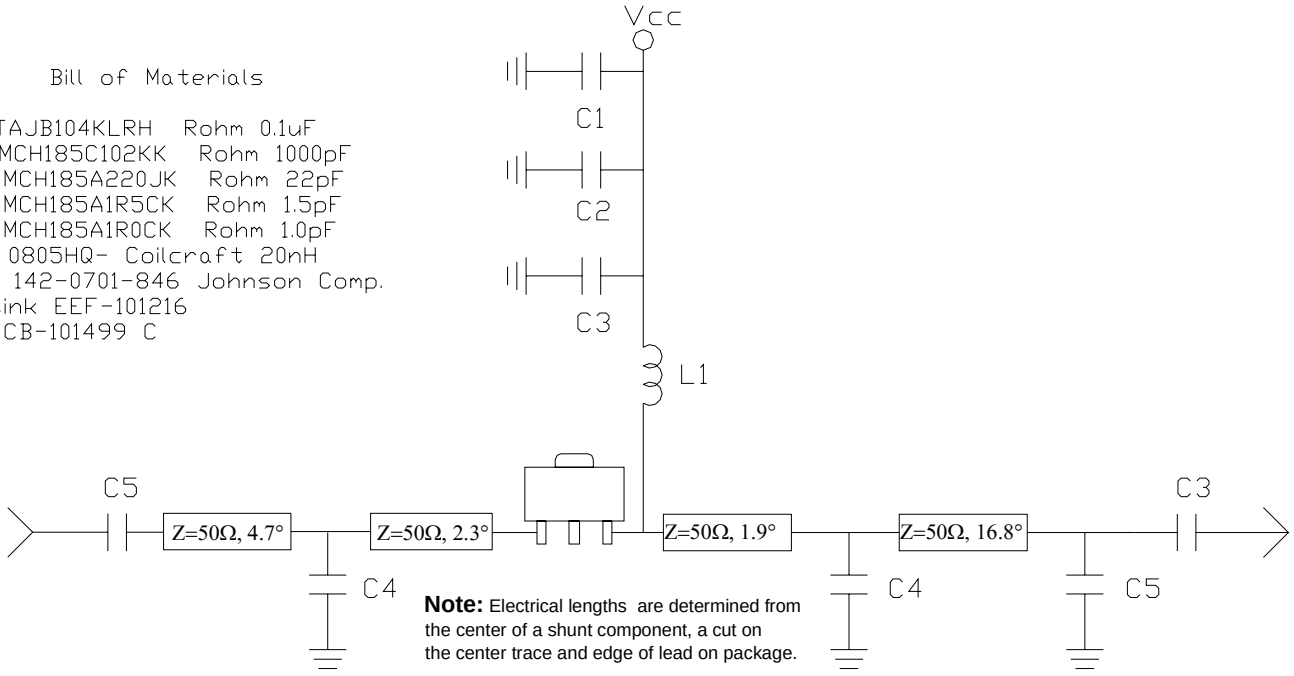
Evaluation Board Layout for 1960 MHz



Application Schematic for 2140 MHz

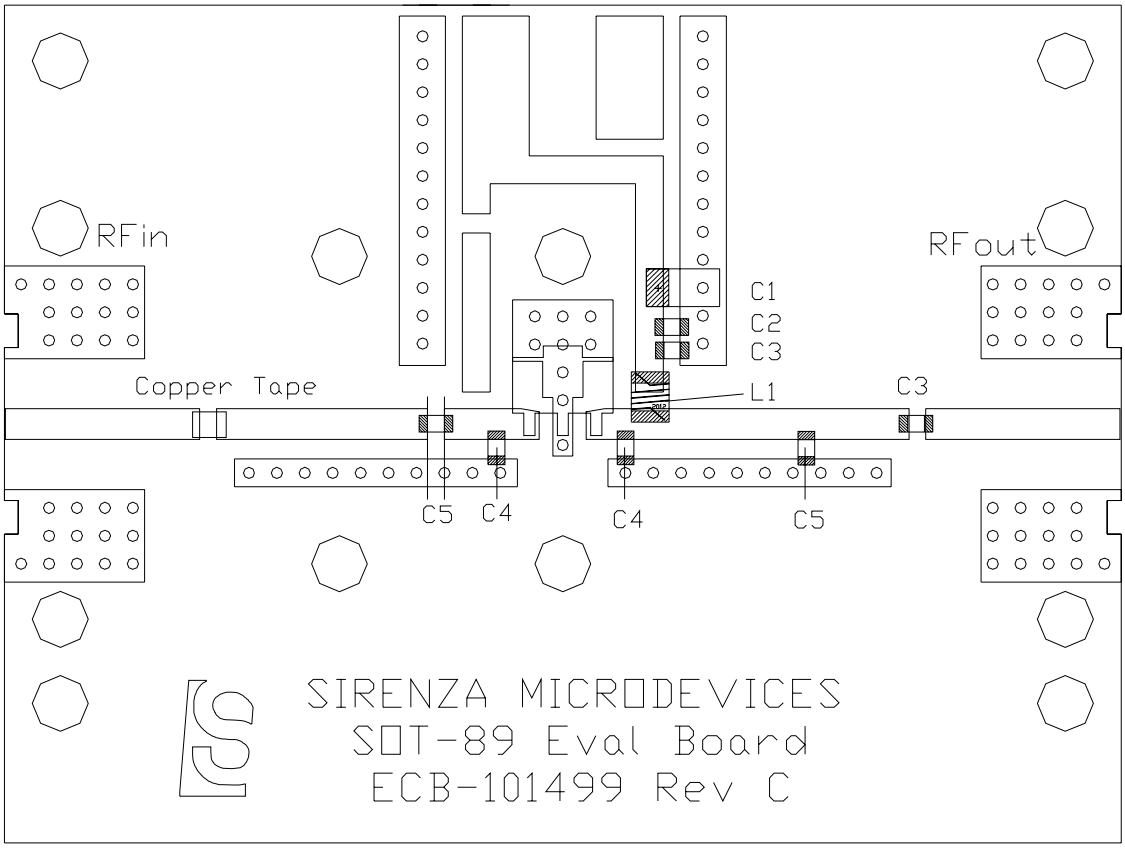
Bill of Materials

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



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

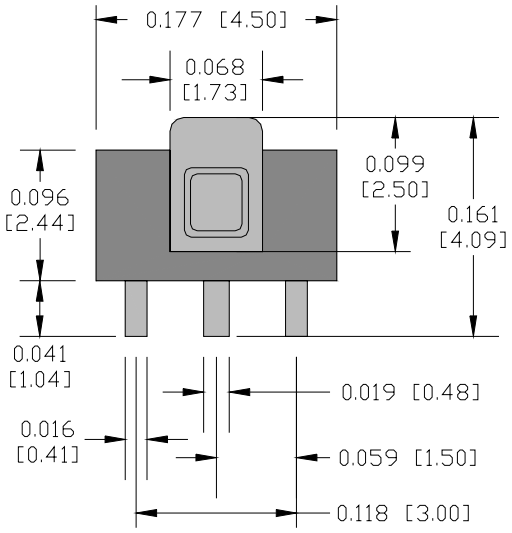
Evaluation Board Layout for 2140 MHz



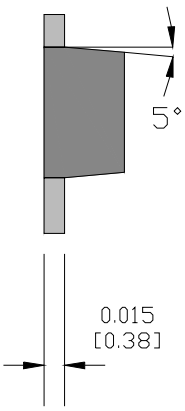
Nominal Package Dimensions

Dimensions in inches (millimeters)
Refer to package drawing posted at www.sirenza.com for tolerances

Bottom View

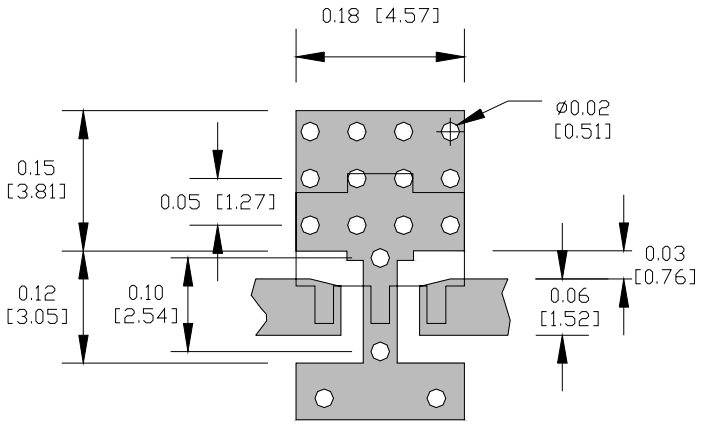


Side View



Suggested PCB Pad Layout

Dimensions in inches [millimeters]



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:

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

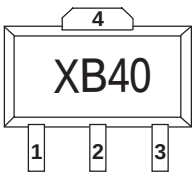
ESD: Class 2 (Passes 2000V ESD Pulse)
Appropriate precautions in handling, packaging and testing devices must be observed.

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

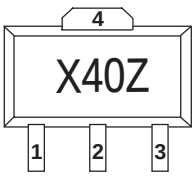
Part Number Ordering Information

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

Package Marking



Tin-Lead



Lead Free

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.