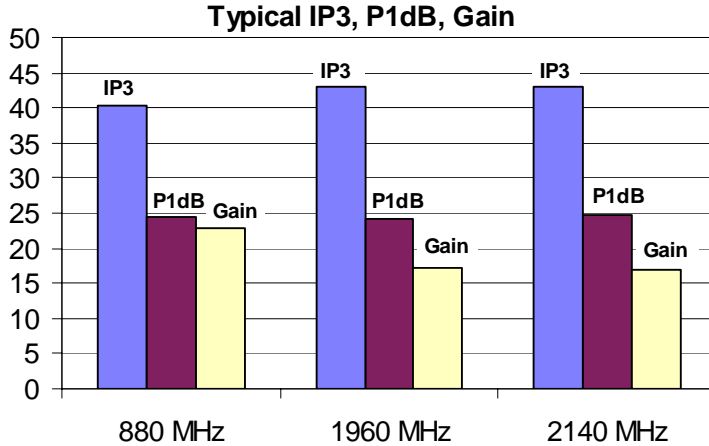




## Product Description

Sirenza Microdevices' SXB-2089Z amplifier is a high linearity InGaP/GaAs Heterojunction Bipolar Transistor (HBT) MMIC housed in a low-cost, surface-mountable plastic package.

These amplifiers are specially designed for use as driver devices for infrastructure equipment in the 5-2500 MHz Cellular, ISM, WLL, PCS & W-CDMA applications. It's high linearity makes it an ideal choice for multi-carrier as well as digital applications.



# SXB-2089Z

## 5-2500 MHz Medium Power InGaP/GaAs HBT Amplifier



### Product Features

- High OIP3: +43dBm at 1960 MHz
- P1dB: 24dBm
- High Linearity/ACP Performance
- Robust 2000V ESD, Class 2
- SOT-89 package
- MSL 1 moisture rating

### Applications

- PA Driver Amplifier
- IF Amplifier
- Cellular, PCS, ISM, WLL, W-CDMA

Symbol	Parameters	Units	Min.	Typ.	Max.	
P <sub>1dB</sub>	Output Power at 1 dB Compression	dBm	450 MHz		24	
			880 MHz	23	24.5	
			1960 MHz	23	24.5	
			2140 MHz		24.5	
S <sub>21</sub>	Small Signal Gain	dBm	450 MHz		25	
			880 MHz	21.5	23	24.5
			1960 MHz	15.5	17	21.5
			2140 MHz		17	
S <sub>11</sub>	Input VSWR		450 MHz		1.1	
			880 MHz		1.4	2.5
			1960 MHz		1.6	
			2140 MHz		1.3	
NF	Noise Figure	dB	450 MHz		4.9	
			880 MHz		4.5	6
			1960 MHz		4.7	
			2140 MHz		4.2	
OIP <sub>3</sub>	Third Order Intercept Point (Pout/tone = +11dBm, Tone spacing = 1MHz)	dBm	450 MHz		40	
			880 MHz	38	41	
			1960 MHz	40	43	
			2140 MHz		43	
ACP	Channel Power IS-95 at 450/880/1960MHz, -55dBc ACP WCDMA at 2140MHz, -50dBc ACP	dBm	450 MHz		16	
			880 MHz		16.3	
			1960 MHz		15.5	
			2140 MHz		15.6	
I <sub>D</sub>	Device Current	mA	V <sub>s</sub> = 8V R <sub>bias</sub> = 20 Ohms V <sub>device</sub> = 5.2V	120	135	150
R <sub>TH, j-l</sub>	Thermal Resistance @ 85C (junction - lead)	°C/W		51.3		

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

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**SXB-2089Z 5-2500MHz InGaP/GaAs HBT Power Amplifier**

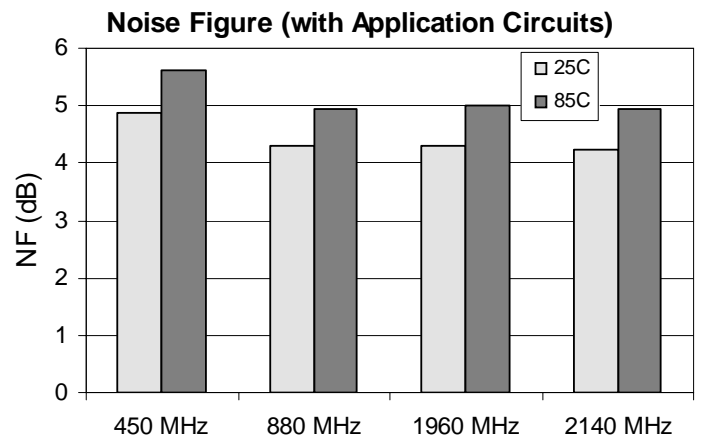
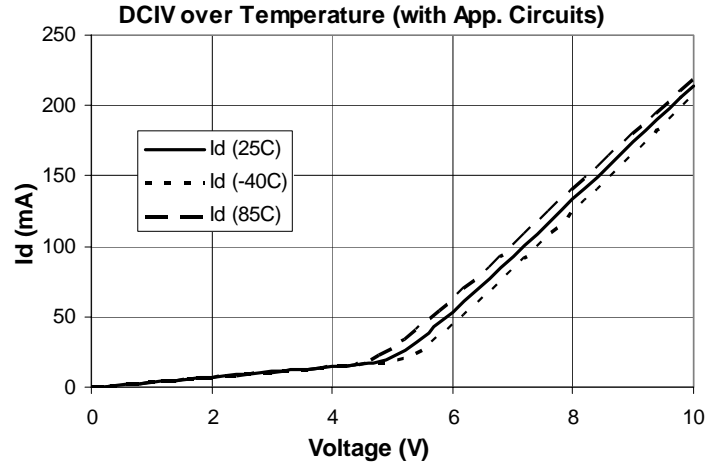
**Absolute Maximum Ratings**

Parameter	Absolute Limit
Max Device Current (I <sub>DQ</sub> )	190mA
Max Device Voltage (V <sub>D</sub> )	6 V
Max. RF Input Power	+20 dBm
Max. Operating Dissipated Power (quiescent)	1.0 W
Max. Junction Temp. (T <sub>J</sub> )	+150°C
Operating Temp. Range (T <sub>L</sub> )	-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:

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

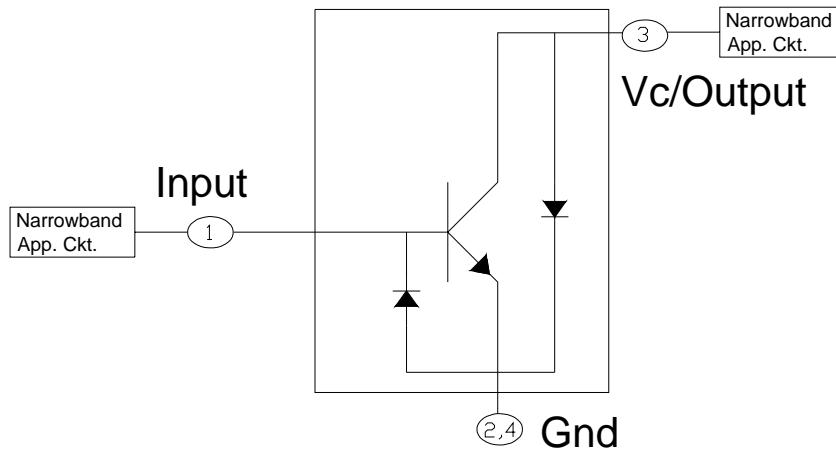


**ESD Class 2, 2000V HBM**

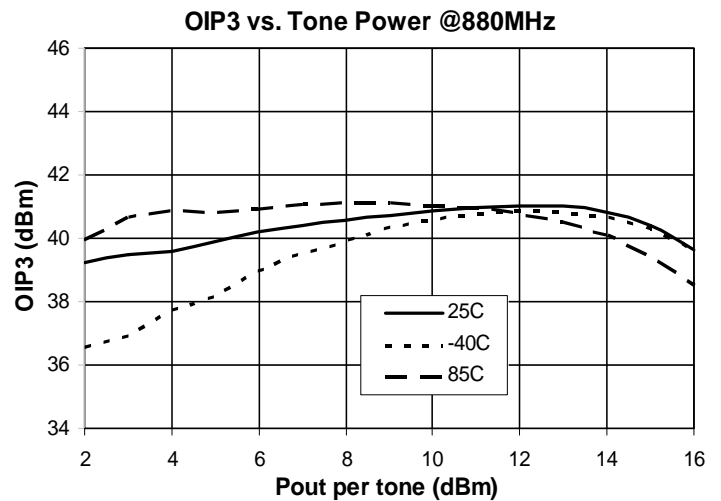
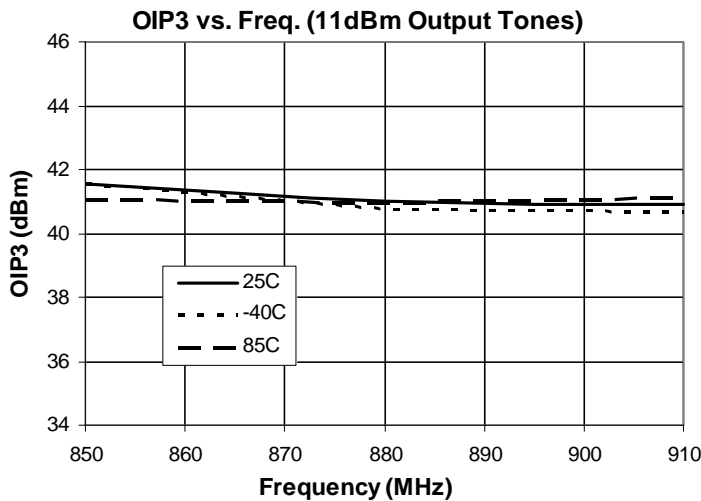
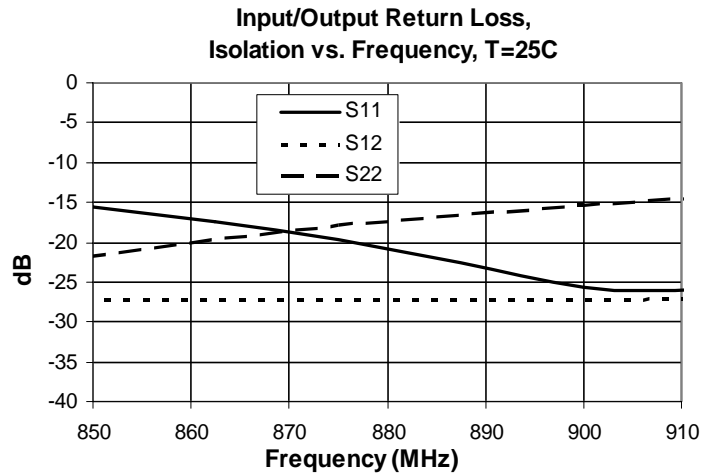
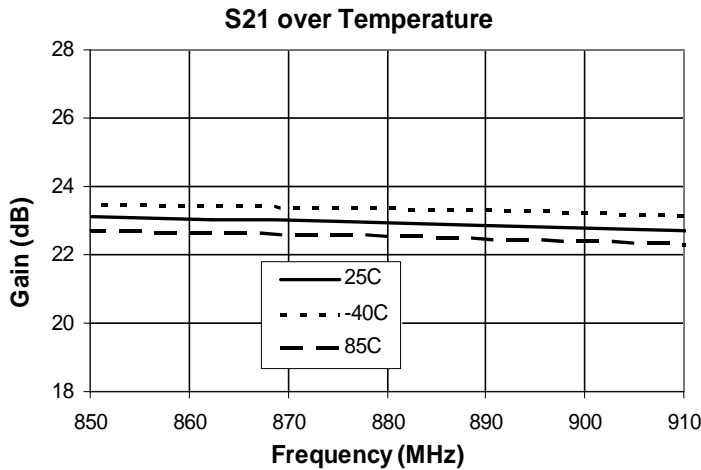
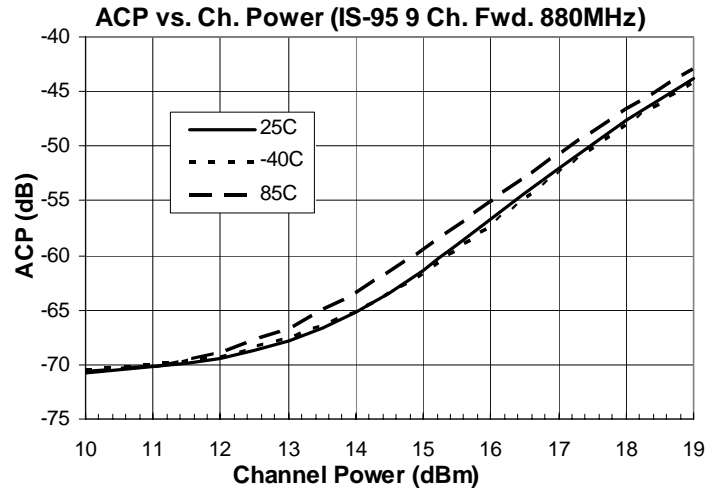
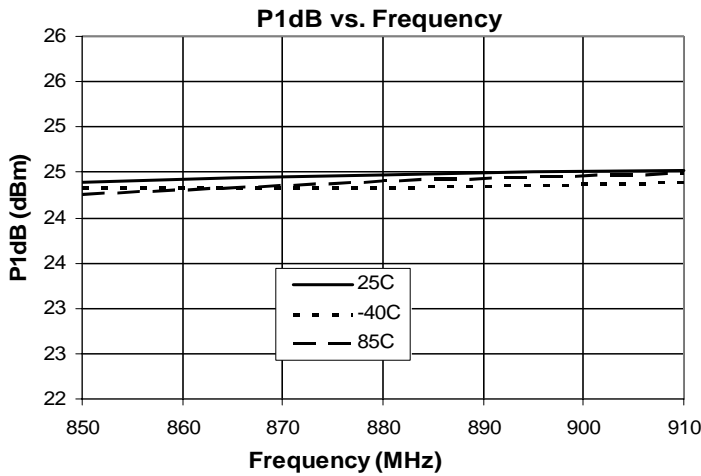
Appropriate precautions in handling, packaging and testing devices must be observed.

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

**Simplified Device Schematic with ESD diodes**

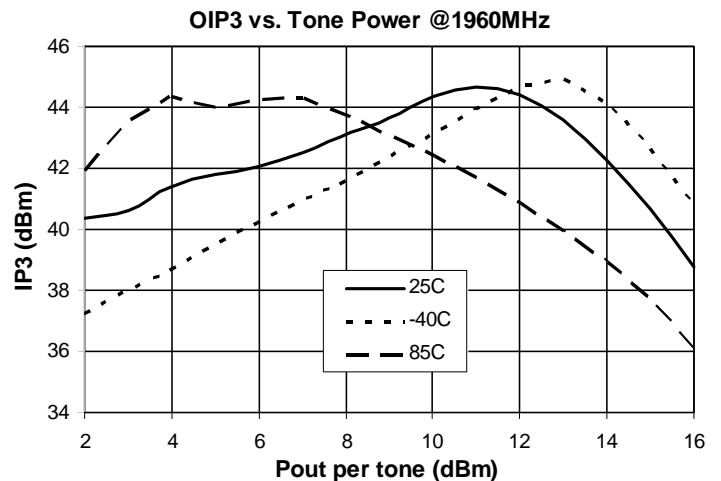
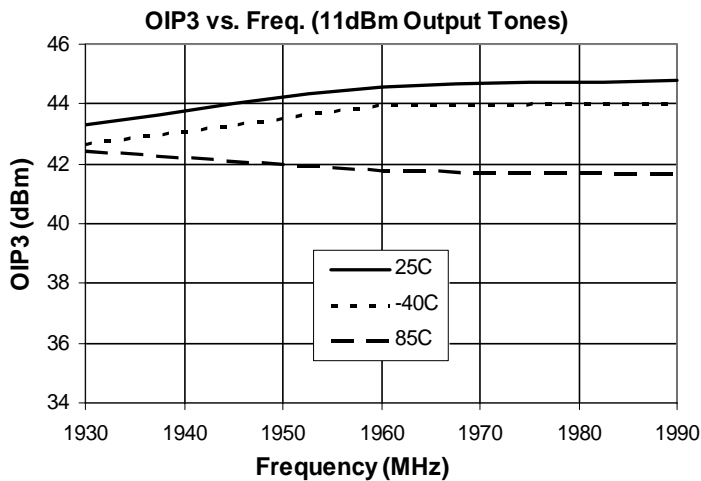
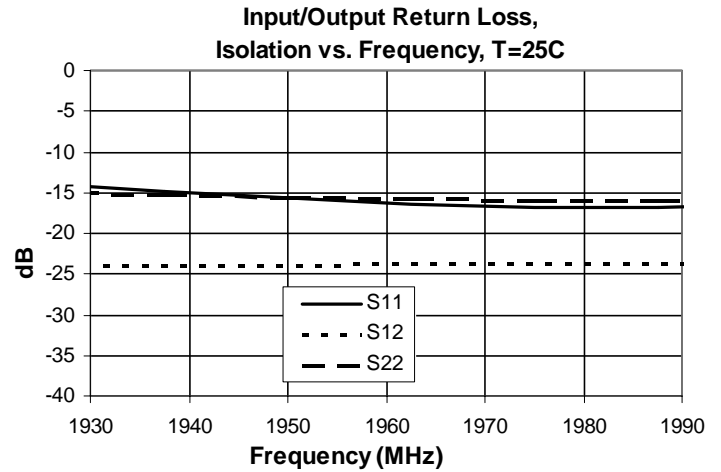
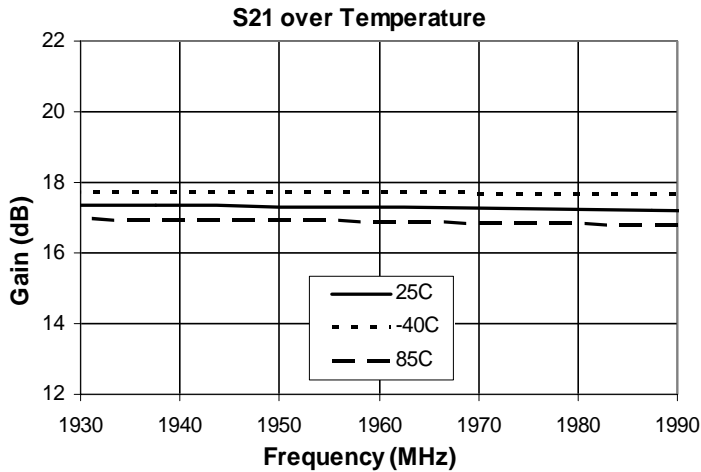
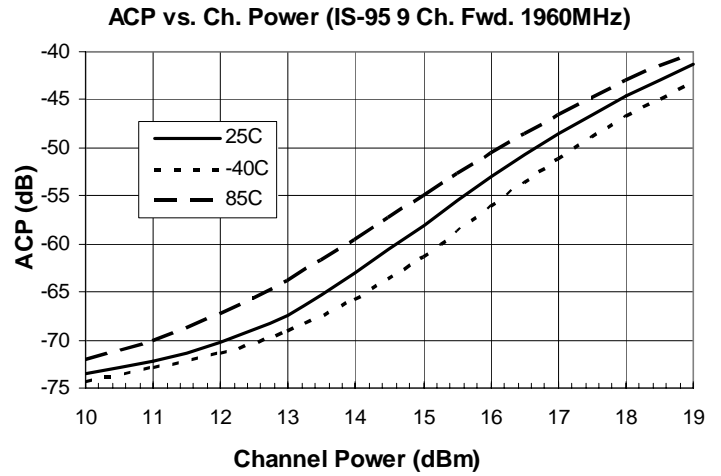
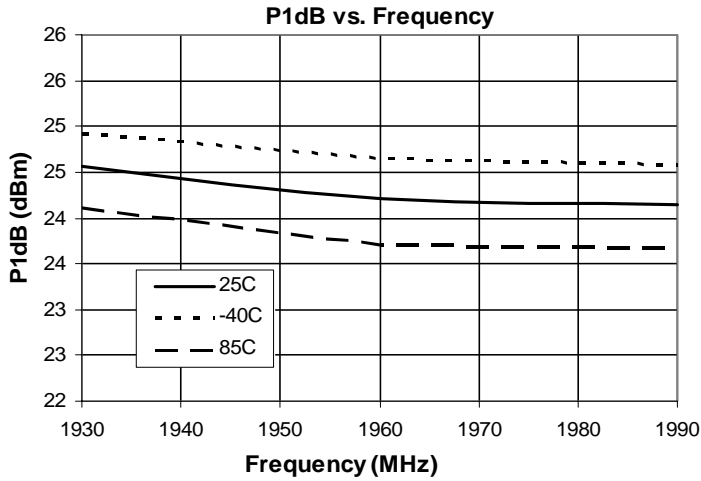


**880 MHz Application Circuit Data,  $I_D=135mA$ ,  $T=+25C$ ,  $R_{Bias}=20\text{ Ohm}$ ,  $V_S=8V$**



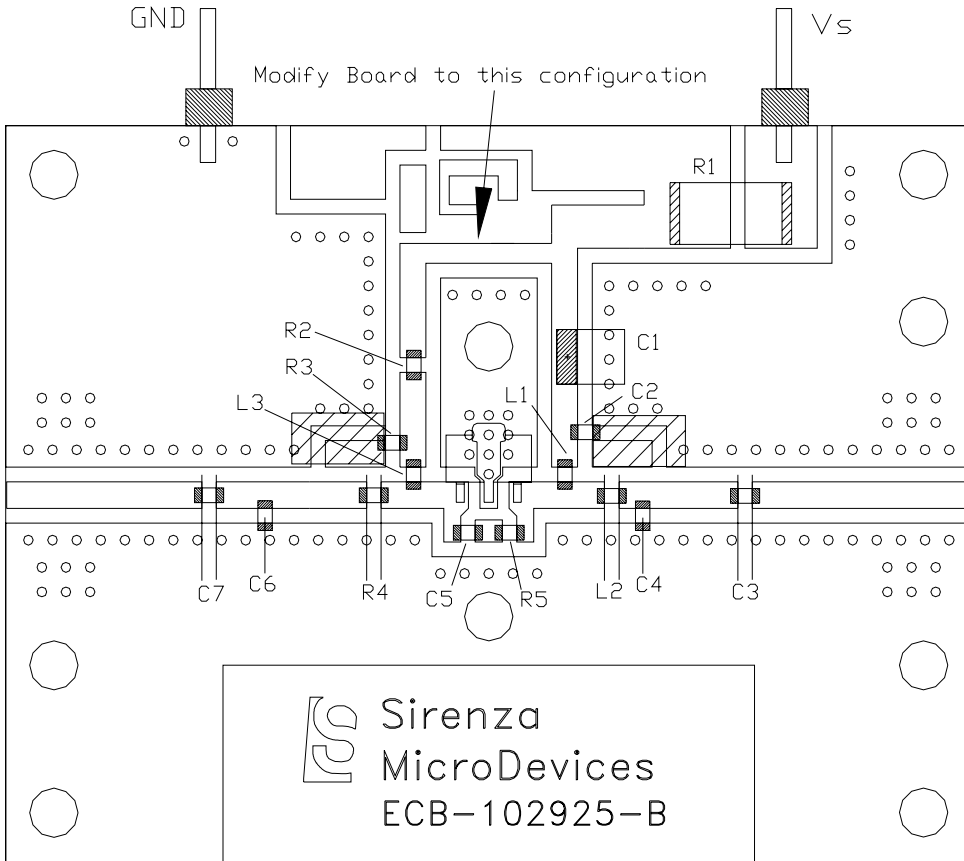
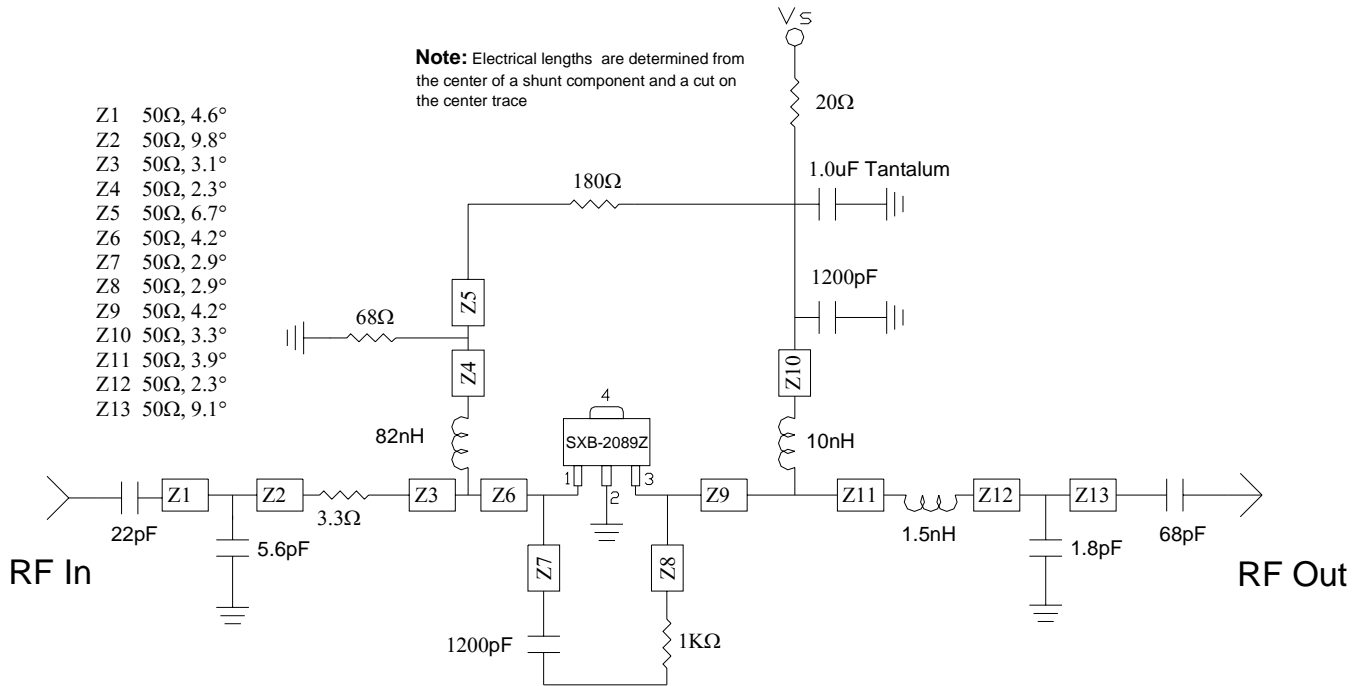
**450 MHz & 2140MHz Application Circuits available in Application Note AN-078 at [www.sirenza.com](http://www.sirenza.com)**

1960 MHz Application Circuit Data,  $I_D=135mA$ ,  $T=+25C$ ,  $R_{Bias}=20\text{ Ohm}$ ,  $V_S=8V$



450 MHz & 2140MHz Application Circuits available in Application Note AN-078 at [www.sirenza.com](http://www.sirenza.com)

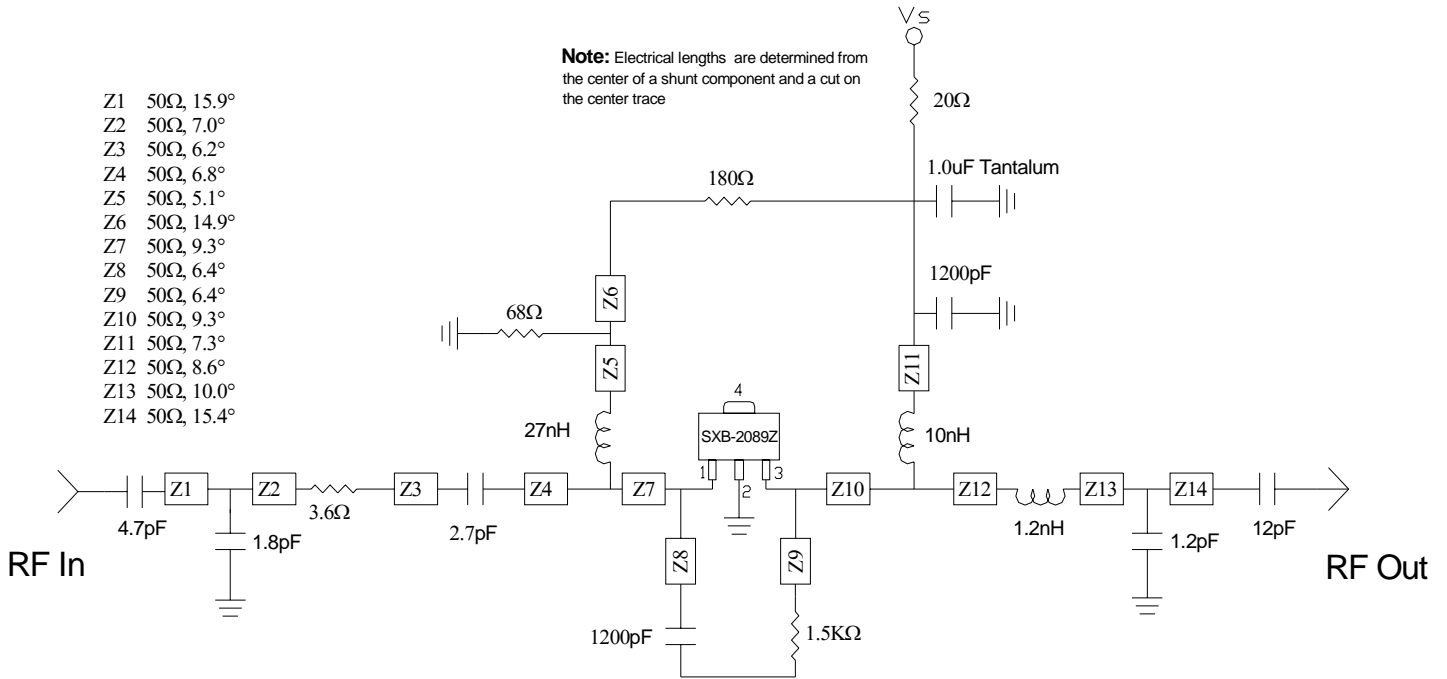
**Application Schematic & Assembly Drawing 880MHz Circuit**



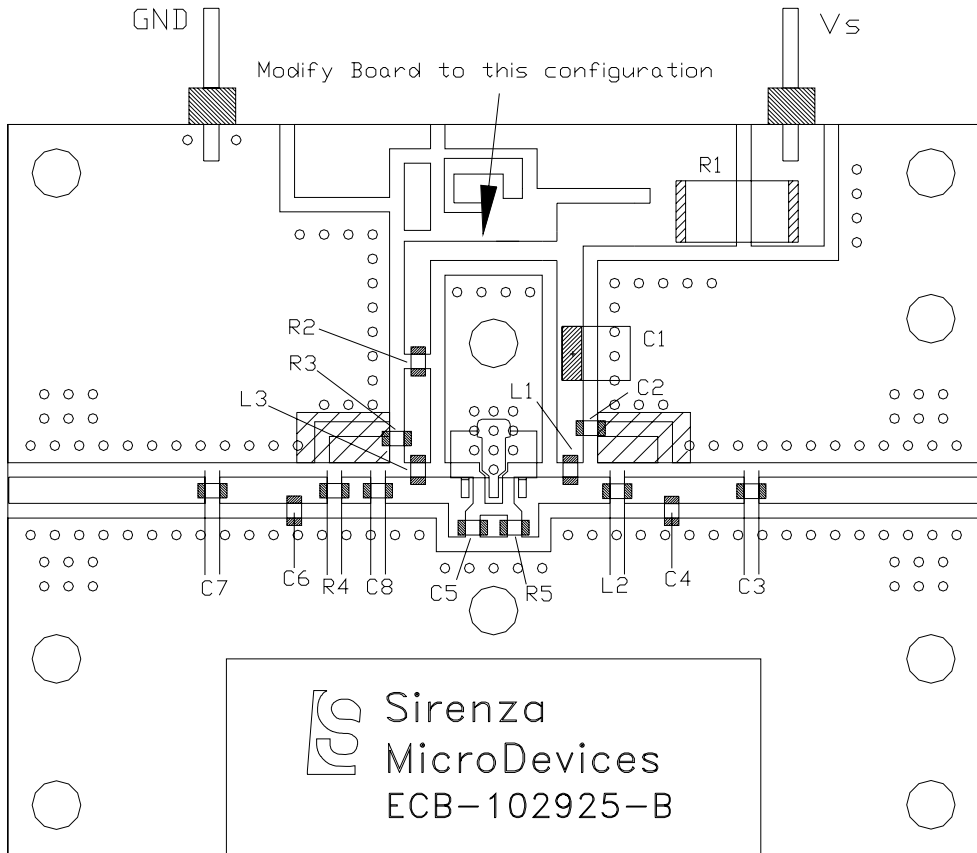
**Bill of Materials**

C1	TAJB105KLRH	Rohm	1.0uF
C2,C5	MCH185C122KK	Rohm	1200pF
C3	MCH185A680JK	Rohm	68pF
C4	MCH185A1R8CK	Rohm	1.8pF
C6	MCH185A5R6DK	Rohm	5.6pF
C7	MCH185A220JK	Rohm	22pF
L1	LL1608-FS10NJ	Toko	10nH
L2	LL1608-FS1N5S	Toko	1.5nH
L3	LL1608-FSR82NJ	Toko	82nH
R1	20Ω	2515 res	(1%)
R2	180Ω	0603 res	(5%)
R3	68Ω	0603 res	(5%)
R4	3.3Ω	0603 res	(5%)
R5	1KΩ	0603 res	(5%)
Connectors	2x PSF-S01-1mm GigaLane Co.		
Heat sink	EEF-101407		
PCB	ECB-102925-B		

**Application Schematic & Assembly Drawing 1960MHz Circuit**



- Z1 50Ω, 15.9°
- Z2 50Ω, 7.0°
- Z3 50Ω, 6.2°
- Z4 50Ω, 6.8°
- Z5 50Ω, 5.1°
- Z6 50Ω, 14.9°
- Z7 50Ω, 9.3°
- Z8 50Ω, 6.4°
- Z9 50Ω, 6.4°
- Z10 50Ω, 9.3°
- Z11 50Ω, 7.3°
- Z12 50Ω, 8.6°
- Z13 50Ω, 10.0°
- Z14 50Ω, 15.4°

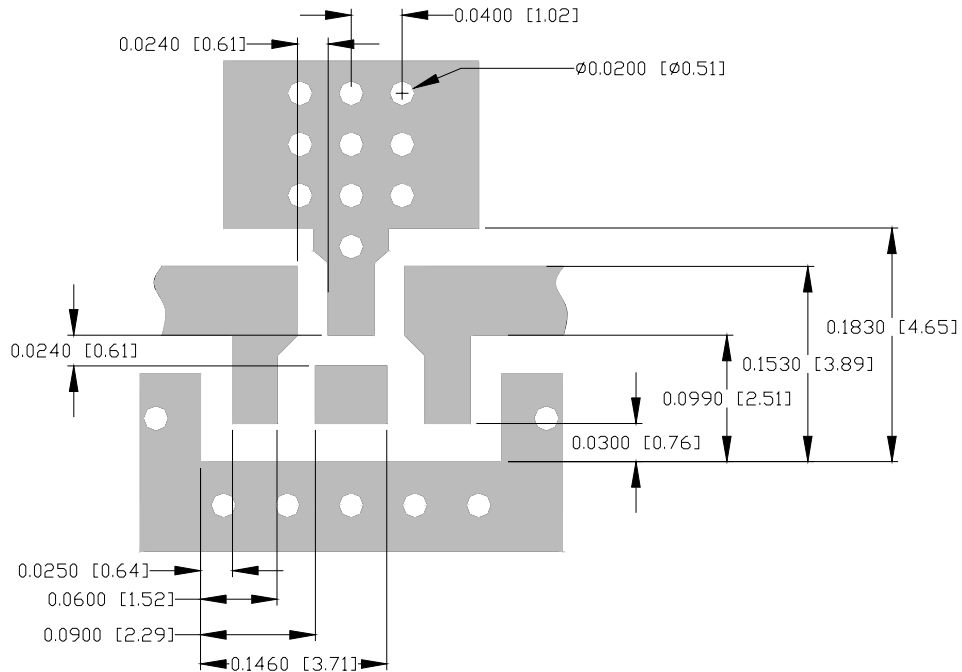


**Bill of Materials**

- C1 TAJB105KLRH Rohm 1.0uF
- C2,C5 MCH185C122KK Rohm 1200pF
- C3 MCH185A120JK Rohm 12pF
- C4 MCH185A1R2CK Rohm 1.2pF
- C6 MCH185A1R8CK Rohm 1.8pF
- C7 MCH185A4R7CK Rohm 4.7pF
- C8 MCH185A2R7CK Rohm 2.7pF
- L1 LL1608-FS10NJ Toko 10nH
- L2 LL1608-FS1N2S Toko 1.2nH
- L3 LL1608-FS270JK Toko 27nH
- R1 20Ω 2512 res (1%)
- R2 180Ω 0603 res (5%)
- R3 68Ω 0603 res (5%)
- R4 3.6Ω 0603 res (5%)
- R5 1.5KΩ 0603 res (5%)
- Connectors 2x PSF-S01-1mm GigaLane Co.
- Heat sink EEF-101407
- PCB ECB-102925-B

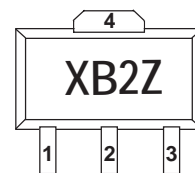
**Suggested PCB Pad Layout**

Dimensions in inches [millimeters]



Pin #	Function	Description
1	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor and matching components 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 pin. This pin requires the use of an external DC blocking capacitor, choke and matching components as shown in the Application Schematic.

**Package Marking**



**Part Number Ordering Information**

Part Number	Reel Size	Devices / Reel
SXB-2089Z	7"	1000

**Package Dimensions**

(Refer to Application Note AN075 at [www.sirenza.com](http://www.sirenza.com))