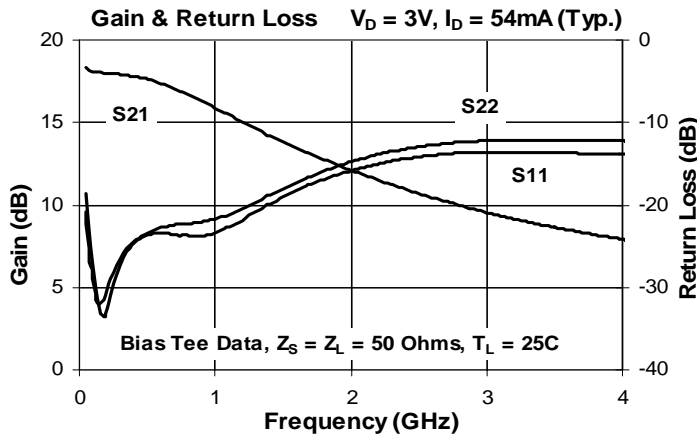




## Product Description

Sirenza Microdevices' SGC-4386Z 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 SGC-4386Z does not require a dropping resistor as compared to typical Darlington amplifiers. The SGC-4386Z is designed for high linearity 3V gain block applications that require small size and minimal external components. It is internally matched to 50 ohms.

The matte tin finish on Sirenza's lead-free "Z" package is applied using a post annealing process to mitigate tin whisker formation and is RoHS compliant per EU Directive 2002/95. The package body is manufactured with green molding compounds that contain no antimony trioxide or halogenated fire retardants.



## Preliminary Information

# SGC-4386Z



## 50-4000 MHz Silicon Germanium Cascadable Gain Block



### Product Features

- Single Fixed 3V Supply
- Supply Dropping Resistor not required
- Patented Self-Bias Circuitry
- P1dB = 12.4 dBm at 1950 MHz
- IP3 = 27 dBm at 1950 MHz
- Robust 1000V ESD, Class 1C HBM

### Applications

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

Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
G	Small Signal Gain	dB	850 MHz		16.4	
			1950 MHz		12.2	
			2400 MHz		10.9	
P <sub>1dB</sub>	Output Power at 1dB Compression	dBm	850 MHz		13.4	
			1950 MHz		12.4	
			2400 MHz		11.8	
OIP <sub>3</sub>	Output Third Order Intercept Point	dBm	850 MHz		29.4	
			1950 MHz		27.0	
			2400 MHz		25.8	
IRL	Input Return Loss	dB	1950 MHz		16.4	
ORL	Output Return Loss	dB	1950 MHz		14.8	
NF	Noise Figure	dB	1930 MHz		3.9	
V <sub>D</sub>	Device Operating Voltage	V			3	
I <sub>D</sub>	Device Operating Current	mA		50	54	58
R <sub>th, j-l</sub>	Thermal Resistance (junction to lead)	°C/W			145	
<b>Test Conditions:</b> $V_D = 3.0V$ $I_D = 54mA \text{ Typ.}$ $T_L = 25^\circ C$ OIP <sub>3</sub> Tone Spacing = 1MHz						
Bias Tee Data $Z_S = Z_L = 50 \text{ Ohms}$ Pout per tone = -5 dBm						

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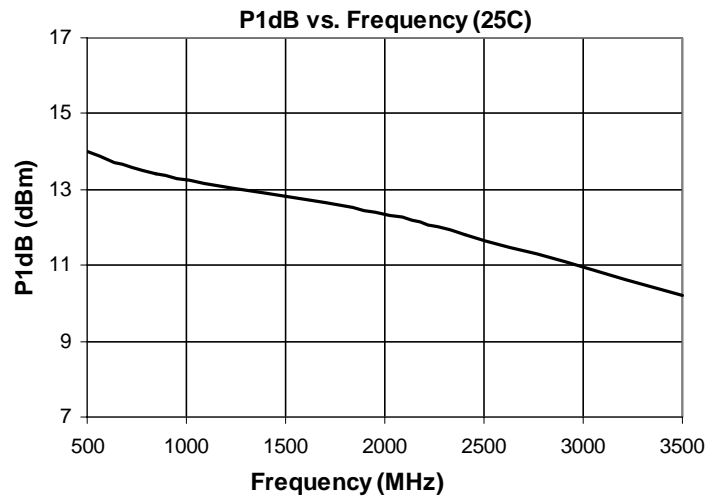
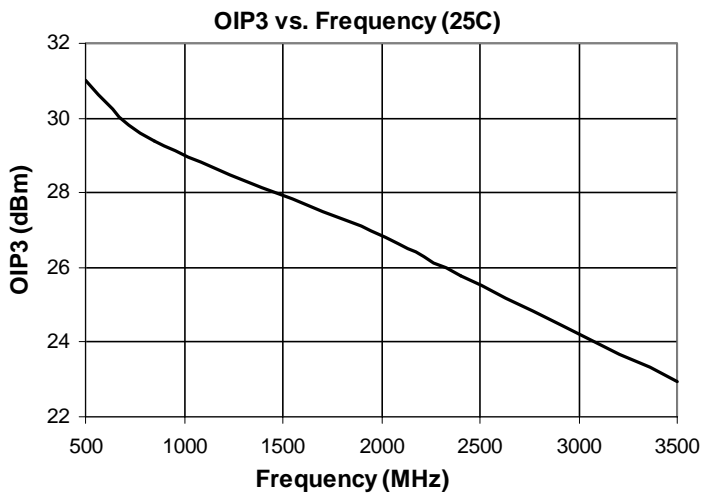
**Preliminary Information**  
**SGC-4386Z 0.05-4.0 GHz Cascadeable MMIC Amplifier**

**Typical RF Performance at Key Operating Frequencies (Bias Tee)**

Symbol	Parameter	Unit	Frequency (MHz)					
			100	500	850	1950	2400	3500
G	Small Signal Gain	dB	18.1	17.6	16.4	12.2	10.9	8.6
OIP <sub>3</sub>	Output Third Order Intercept Point	dBm		31.0	29.4	27.0	25.8	22.9
P <sub>1dB</sub>	Output Power at 1dB Compression	dBm		14.0	13.4	12.4	11.8	10.2
IRL	Input Return Loss	dB	29.2	24.2	24.7	16.4	14.5	13.2
ORL	Output Return Loss	dB	26.9	24.1	22.8	14.8	13.1	12.0
S <sub>12</sub>	Reverse Isolation	dB	20.2	21.3	21.6	19.7	19.1	18.0
NF	Noise Figure	dB	2.9	3.0	3.4	3.9	4.1	5.0

**Test Conditions:** V<sub>D</sub> = 3V I<sub>D</sub> = 54mA Typ. OIP<sub>3</sub> Tone Spacing = 1MHz, Pout per tone = -5 dBm  
 T<sub>L</sub> = 25°C Z<sub>S</sub> = Z<sub>L</sub> = 50 Ohms

**Typical Performance with Bias Tee, V<sub>D</sub> = 3V, I<sub>D</sub> = 54mA (Typ.)**



**Absolute Maximum Ratings**

Parameter	Absolute Limit
Max Device Current (I <sub>CE</sub> )	110 mA
Max Device Voltage (V <sub>CE</sub> )	4.5 V
Max. RF Input Power* (See Note)	+18 dBm
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

\*Note: Load condition, Z<sub>L</sub> = 50 Ohms

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:

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

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**Reliability & Qualification Information**

Parameter	Rating
ESD Rating - Human Body Model (HBM)	Class 1C
Moisture Sensitivity Level	MSL 1

This product qualification report can be downloaded at  
[www.sirenza.com](http://www.sirenza.com)



**Caution: ESD sensitive**

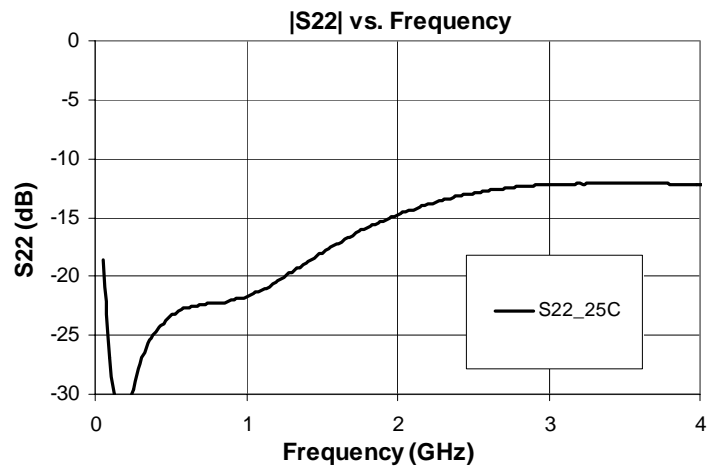
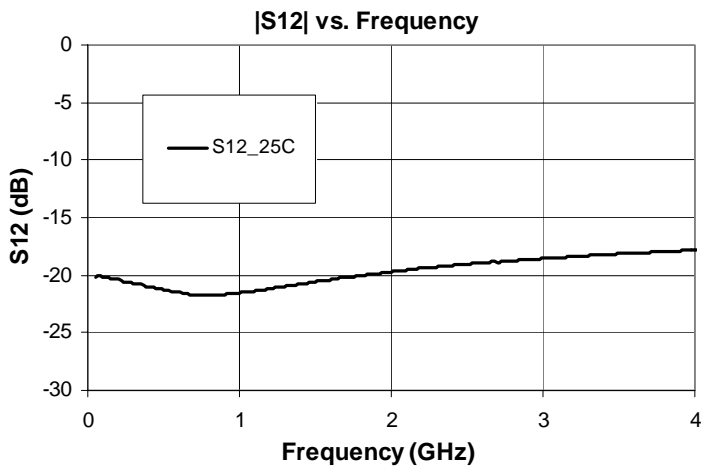
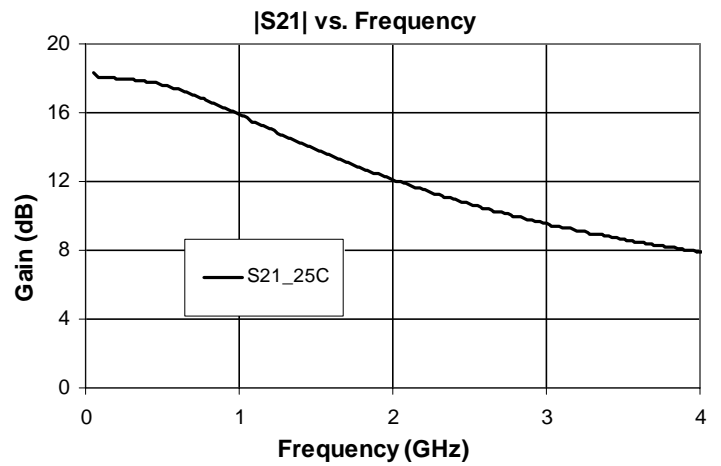
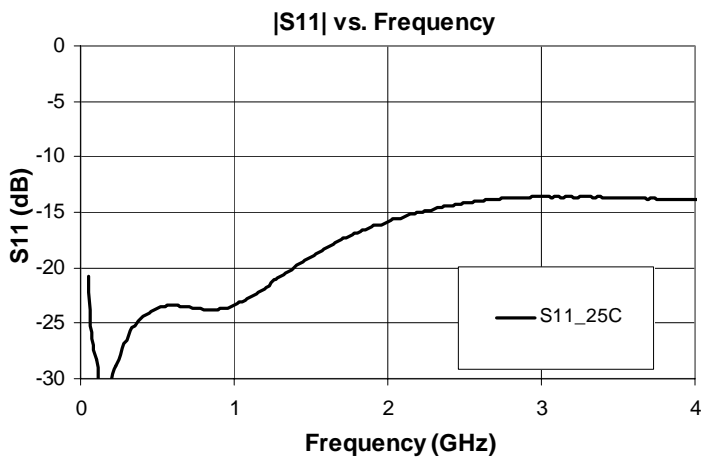
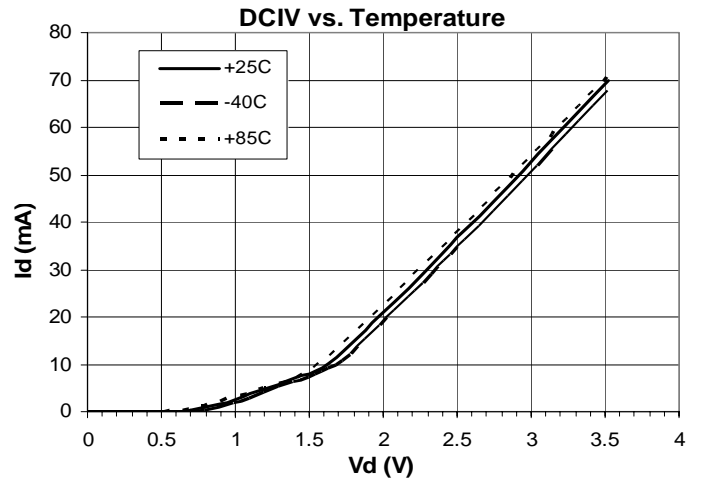
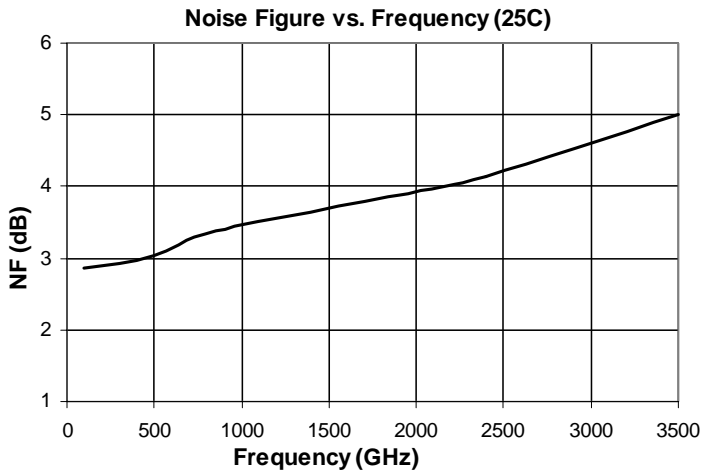
Appropriate precautions in handling, packaging and testing devices must be observed.

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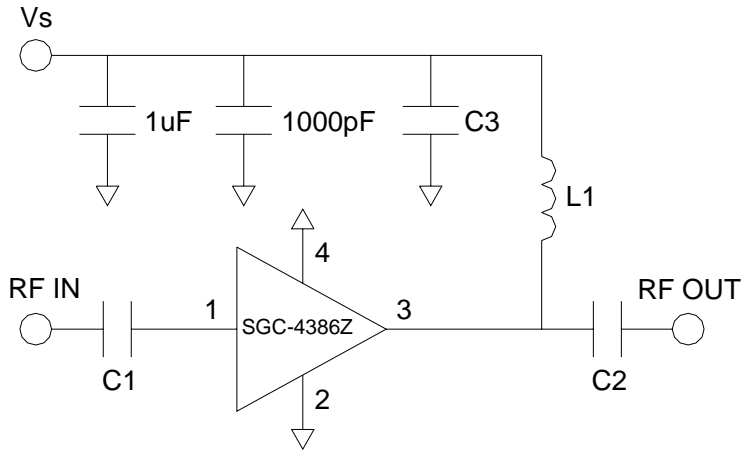


**Preliminary Information**  
**SGC-4386Z 0.05-4.0 GHz Cascadeable MMIC Amplifier**

Typical Performance with Bias Tee,  $V_D = 3V$ ,  $I_D = 54mA$  (Typ.)



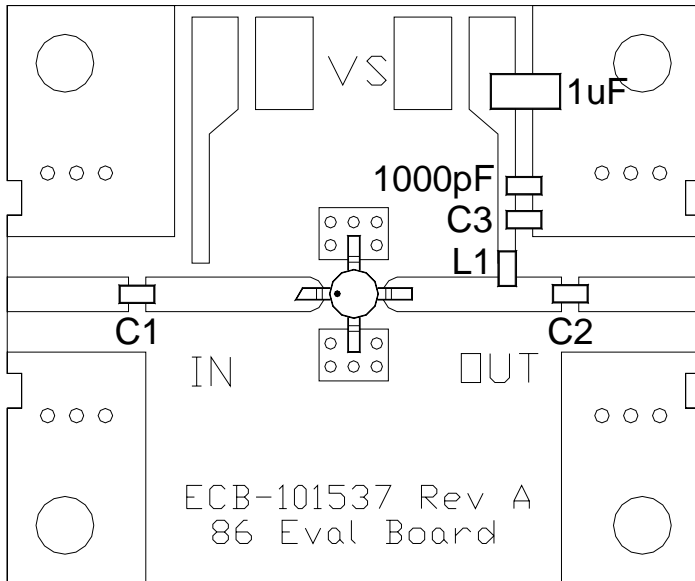
**Application Circuit Schematic**



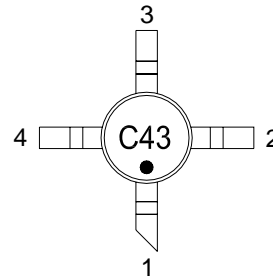
Application Circuit Element Values		
Reference Designator	100-2000MHz	2000-4000MHz
C1	1000pF	2.7pF
C2	100pF	6.8pF
C3	100pF	6.8pF
L1	120nH	39nH

**Mounting Instructions**

1. Use a large ground pad area under device pins 2 and 4 with many plated through-holes as shown.
2. We recommend 1 or 2 ounce copper. Measurements for this data sheet were made on a 31 mil thick FR-4 board with 1 ounce copper on both sides.



**Part Identification Marking & Pinout**



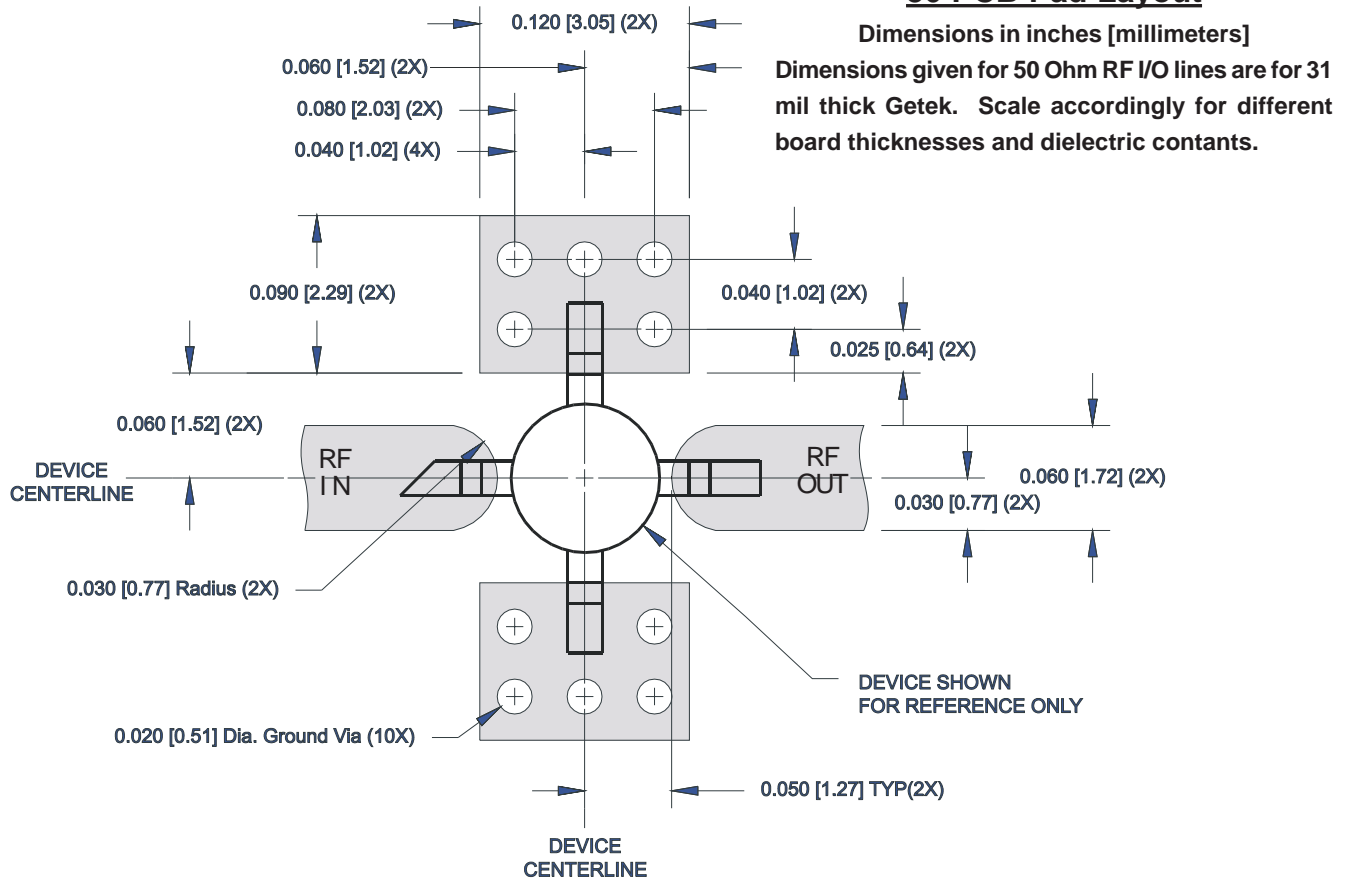
Pin #	Function	Description
1	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation
2,4	GND	Connection to ground. Use via holes as close to the device ground leads as possible to reduce ground inductance and achieve optimum RF performance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

Part Number	Package / Lead Composition	Reel Size	Devices / Reel
SGC-4386Z	Lead Free, RoHs Compliant	13"	3000



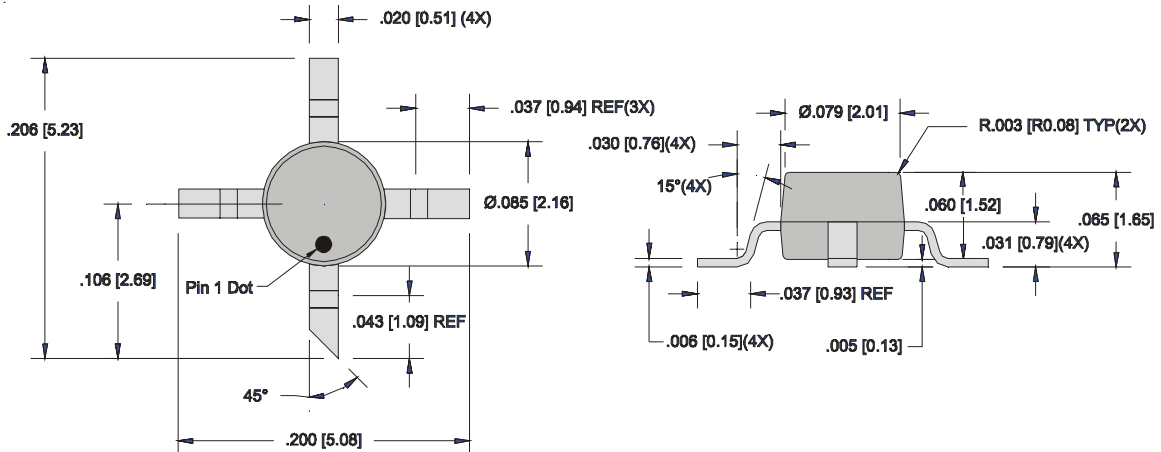
**Preliminary Information**  
**SGC-4386Z 0.05-4.0 GHz Cascadeable MMIC Amplifier**

**86 PCB Pad Layout**



**86 Nominal Package Dimensions**

Dimensions in inches [millimeters]  
 A link to the 86 package outline drawing with full dimensions and tolerances may be found on the product web page at [www.sirenza.com](http://www.sirenza.com).



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