RFMD + TriQuint = Qorvo

SGA2386Z

DC to 5000MHz, CASCADABLE SiGe HBT MMIC AMPLIFIER

Package: SOT-86

Product Description

The SGA2386Z is a high performance SiGe HBT MMIC Amplifier. A Darlington configuration featuring one-micron emitters provides high F_T and excellent thermal performance. The heterojunction increases breakdown voltage and minimizes leakage current between junctions. Cancellation of emitter junction non-linearities results in higher suppression of intermodulation products. Only two DC-blocking capacitors, a bias resistor, and an optional RF choke are required for operation.

Features

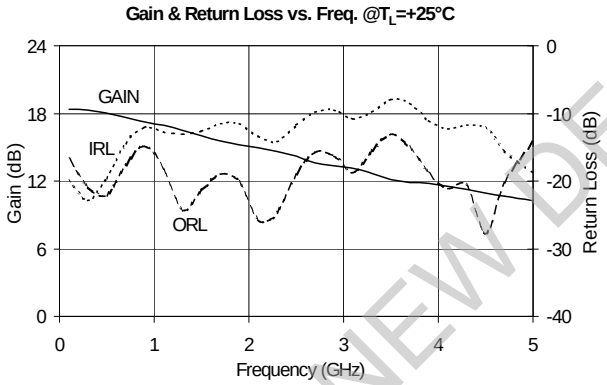
- High Gain: 15.3dB at 1950MHz
- Cascadable 50Ω
- Operates from Single Supply
- Low Thermal Resistance Package

Applications

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

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	15.5	17.2	18.9	dB	850MHz
		15.3		dB	1950MHz
		14.5		dB	2400MHz
Output Power at 1dB Compression		8.5		dBm	850MHz
		7.5		dBm	1950MHz
Output Third Intercept Point		20.5		dBm	850MHz
		19.5		dBm	1950MHz
Bandwidth Determined by Return Loss (>10dB)		2800		MHz	>10dB
Input Return Loss		11.5		dB	1950MHz
Output Return Loss		20.2		dB	1950MHz
Noise Figure		3.2		dB	1950MHz
Device Operating Voltage	2.4	2.7	3.0	V	
Device Operating Current	17	20	23	mA	
Thermal Resistance (Junction - Lead)		97		°C/W	

Test Conditions: V_S=5V, I_D=20mA Typ., OIP_3 Tone Spacing=1MHz, P_{OUT} per tone=-5dBm, R_{BIAS}=120Ω, T_L=25°C, Z_S=Z_L=50Ω

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Absolute Maximum Ratings

Parameter	Rating	Unit
Max Device Current (I_D)	40	mA
Max Device Voltage (V_D)	5	V
Max RF Input Power	+18	dBm
Max Junction Temp (T_J)	+150	°C
Operating Temp Range (T_L)	-40 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

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.

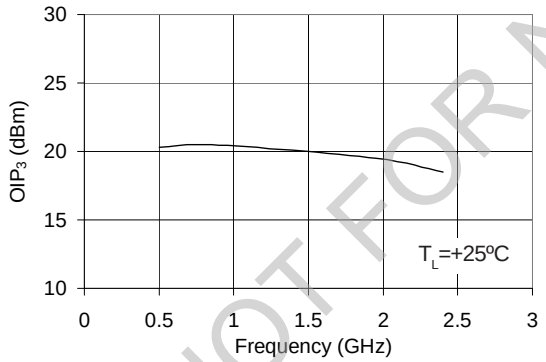
RoHS status based on EUDirective2002/95/EC (at time of this document revision).

Typical Performance at Key Operating Frequencies

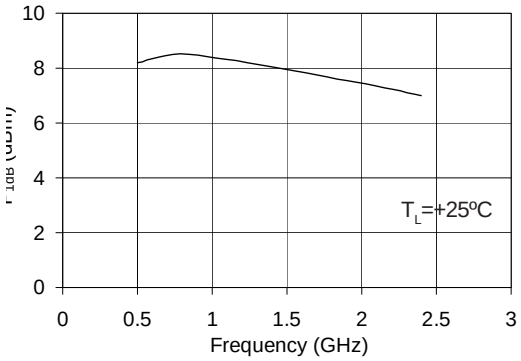
Parameter	Unit	100MHz	500MHz	850MHz	1950MHz	2400MHz
Small Signal Gain	dB	18.4	18.0	17.2	15.3	14.5
Output Third Order Intercept Point	dBm		20.3	20.5	19.5	18.5
Output Power at 1dB Compression	dBm		8.2	8.8	8.0	7.6
Input Return Loss	dB	20.0	19.6	12.0	11.5	13.7
Output Return Loss	dB	16.8	22.1	14.8	20.2	25.2
Reverse Isolation	dB	21.1	21.1	21.4	21.7	21.3
Noise Figure	dB		2.9	2.9	3.5	3.6

Test Conditions: V_S=5V, I_D=20mA Typ., OIP_3 Tone Spacing=1MHz, P_{OUT} per tone=-5dBm, R_{BIAS}=120Ω, T_L=25°C, Z_S=Z_L=50Ω

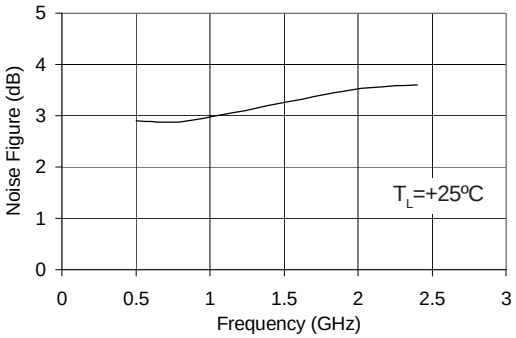
OIP_3 vs. Frequency
V_D= 2.7 V, I_D= 20 mA



P_{1dB} vs. Frequency
V_D= 2.7 V, I_D= 20 mA



Noise Figure vs. Frequency
V_D= 2.7 V, I_D= 20 mA



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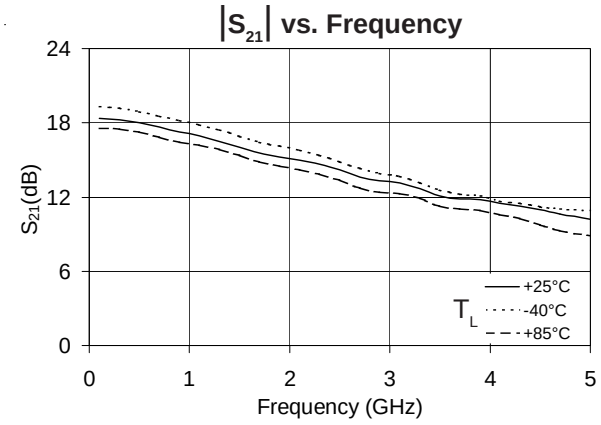
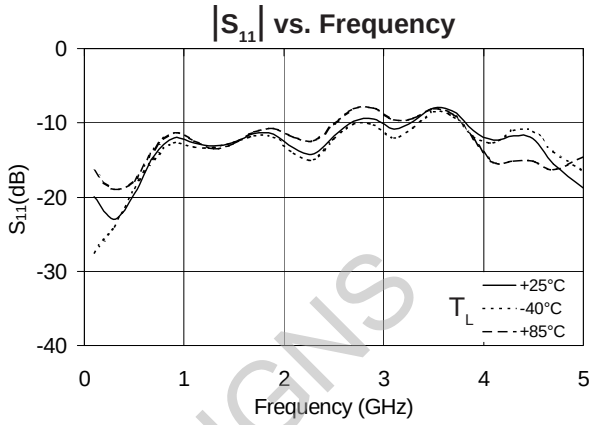
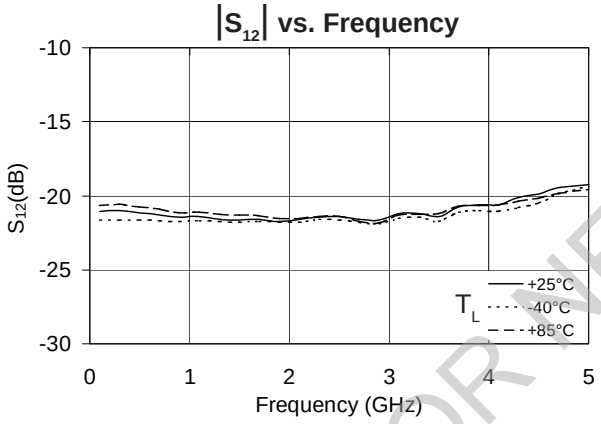
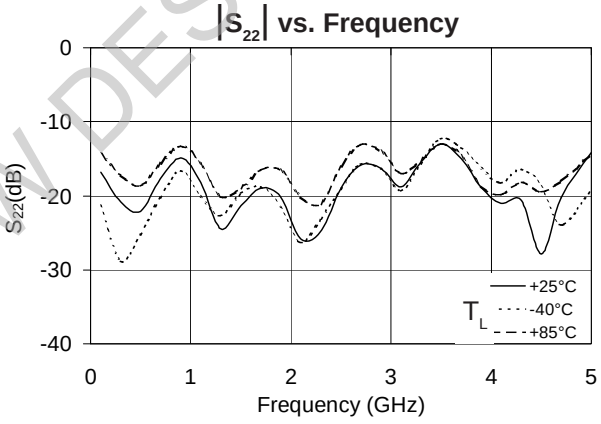
Typical RF Performance Over Temperature (Bias: V_D= 2.7 V, I_D= 20 mA (Typ.))



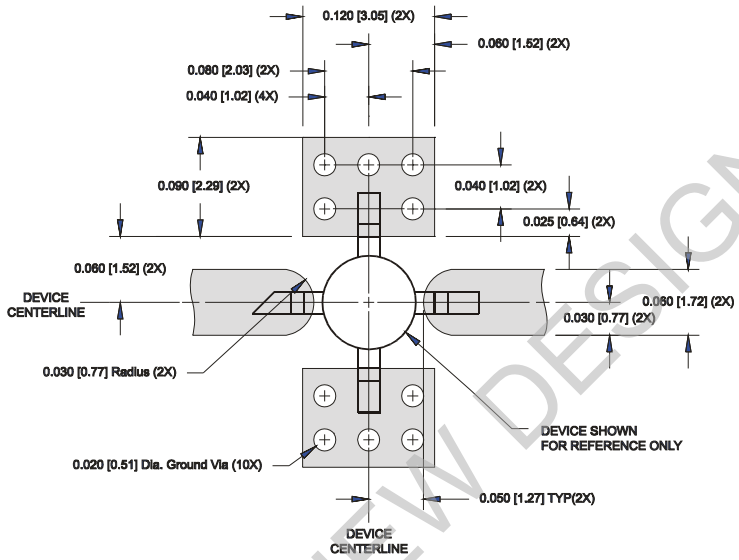






Pin	Function	Description
1	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
2, 4	GND	Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible.
3	RF OUT/BIAS	RF output and bias pin. DC voltage is present on this pin, therefore a DC blocking capacitor is necessary for proper operation.

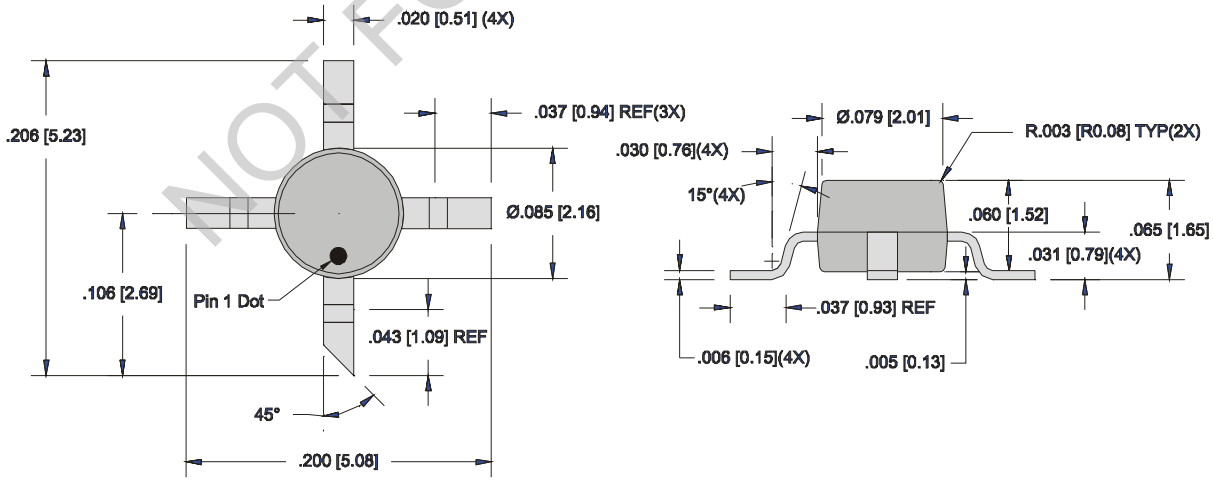
Suggested Pad Layout



Package Drawing

Dimensions in inches (millimeters)

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



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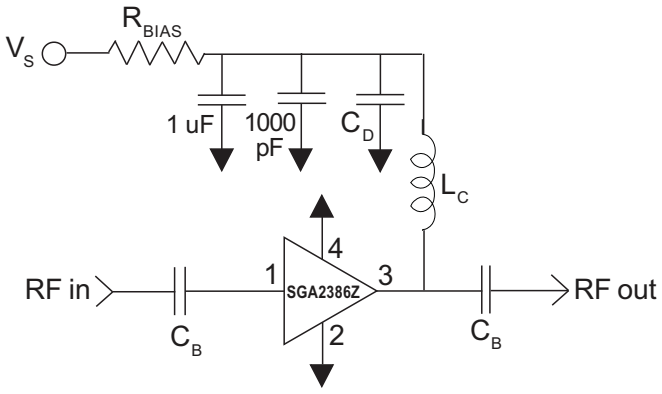
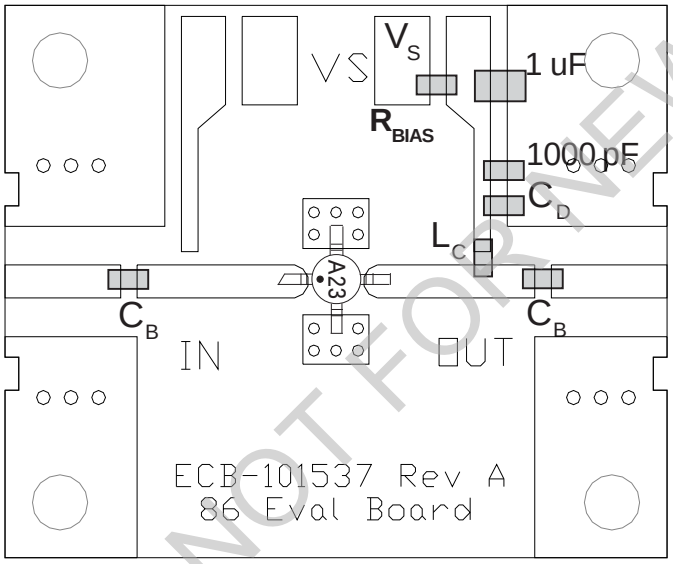
Application Schematic



Reference Designator	Frequency (Mhz) 500	850	1950	2400	3500
C_B	220 pF	100 pF	68 pF	56 pF	39 pF
C_D	100 pF	68 pF	22 pF	22 pF	15 pF
L_C	68 nH	33 nH	22 nH	18 nH	15 nH

Recommended Bias Resistor Values for I_D=20mA $R_{BIAS}=(V_S-V_D)/I_D$				
Supply Voltage(V_S)	5 V	6 V	8 V	10 V
R_{BIAS}	120 Ω	160 Ω	270Ω	360 Ω
Note: R_{BIAS} provides DC bias stability over temperature.				

Evaluation Board Layout



Mounting Instructions

1. Use a large ground pad area under device pins 2 and 4 with many plated through-holes as shown.

3. 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.

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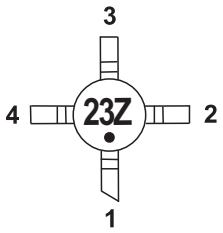
Part Identification



Ordering Information

Ordering Code	Description
SGA2386Z	13" Reel with 3000 pieces
SGA2386ZSQ	Sample bag with 25 pieces
SGA2386ZSR	7” Reel with 100 pieces
SGA2386ZPCK1	850MHz, 5V Operation PCBA with 5-piece sample bag

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