

Product Description

RFMD's SGB2400 is a high performance Darlington SiGe HBT MMIC amplifier with on-chip active bias circuitry. The active bias network provides stable current over temperature and process Beta variations. The SGB2400 is designed to operate directly from a 3V supply. The SGB2400 product is designed for high linearity 3V gain block applications that require small size and minimal external components. The die is internally matched to 50Ω.

RFMD can provide 100% DC screening, visual inspection, and Hi-Rel wafer qualification.

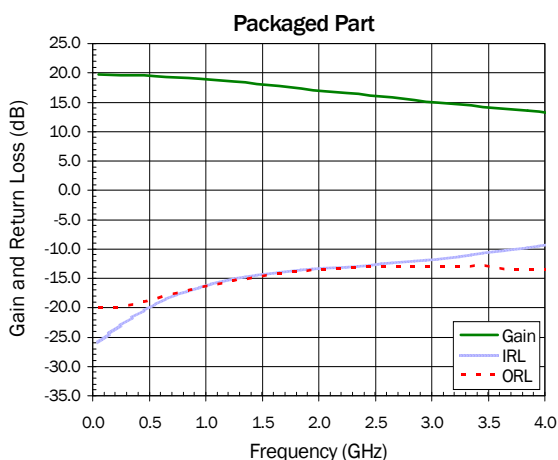
Features

- High Reliability SiGe HBT Technology
- Robust Class 1C ESD
- P1dB = 6.9dBm at 1950MHz
- IP3 = 18.0dBm at 1950MHz
- Die Size: 0.75mm x 0.70mm

Applications

- LO Buffer Amp
- RF Pre-driver and RF Receive Path
- Military Communications
- Test and Instrumentation

Gain and Return Loss - SGB2433Z



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.		
Frequency of Operation	DC		4000	MHz	
Small Signal Gain		19.1		dB	Freq = 850MHz
	15.7	17.2	18.7	dB	Freq = 1950MHz
		16.2		dB	Freq = 2400MHz
Output Power at 1dB Compression		7.7		dBm	Freq = 850MHz
	5.4	6.9		dBm	Freq = 1950MHz
		6.2		dBm	Freq = 2400MHz
Output IP3		19.5		dBm	Freq = 850MHz
	16.0	18.0		dBm	Freq = 1950MHz
		18.0		dBm	Freq = 2400MHz
Input Return Loss	10.0	13.4		dB	Freq = 1950MHz
Output Return Loss	10.0	13.6		dB	Freq = 1950MHz
Current	21	25	29	mA	
Noise Figure		3.5	4.5	dB	Freq = 1950MHz
Thermal Resistance		221		°C/W	Junction to lead (33 pkg.)

Test Conditions: Z₀ = 50Ω, V_{CC} = 3.0V, I_D = 25mA, T = 30 °C. OIP3 P_{OUT,TONE} = -10dBm with 1MHz tone spacing.

Note: Above data for SGB2433Z packaged part.

Absolute Maximum Ratings

Parameter	Rating	Unit
Total Current (I_D)	60	mA
Device Voltage (V_D)	5	V
Power Dissipation	0.2	W
Operating Lead Temperature (T_L)	-40 to +85	°C
RF Input Power	20	dBm
Storage Temperature Range	-55 to +150	°C
Operating Junction Temp (T_J)	+150	°C
ESD Rating - Human Body Model (HBM)	Class 1C	



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.

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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

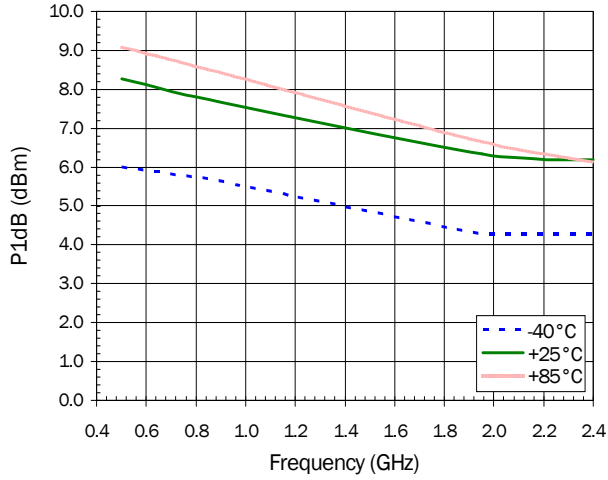
Typical Performance of SGB2433Z Packaged Part: $V_{CC} = 3V$, $I_D = 25mA$, $T = 25^\circ C$, $Z = 50\Omega$

Parameter	Units	100MHz	500MHz	850MHz	1950MHz	2400MHz	3500MHz
Small Signal Gain	dB	19.7	19.5	19.1	17.2	16.2	14.0
Output 3rd Order Intercept Point (Note 1)	dBm		20.0	19.5	18.0	18.0	
Output Power at 1dB Compression	dBm		8.3	7.7	6.9	6.2	
Input Return Loss	dB	25.0	19.9	17.1	13.4	12.7	10.5
Output Return Loss	dB	20.5	18.9	17.1	13.6	13.1	13.0
Reverse Isolation	dB	22.4	22.6	22.9	23.7	23.9	24.5
Noise Figure	dB	3.8	3.2	3.2	3.5	3.9	4.3

Note 1: OIP3 $P_{OUT/TONE} = -10dBm$ with 1MHz tone spacing.

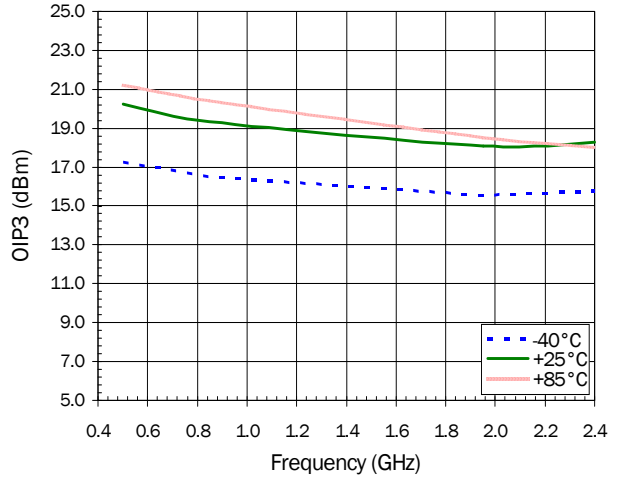
SGB2433Z Bias Tee Data ($V_{CC} = V_{BIAS} = 3.0V$, $I_D = 25mA$)

P1dB versus Frequency

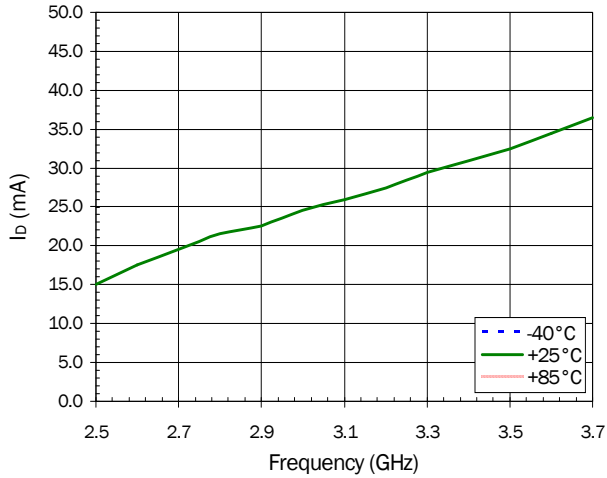


OIP3 versus Frequency

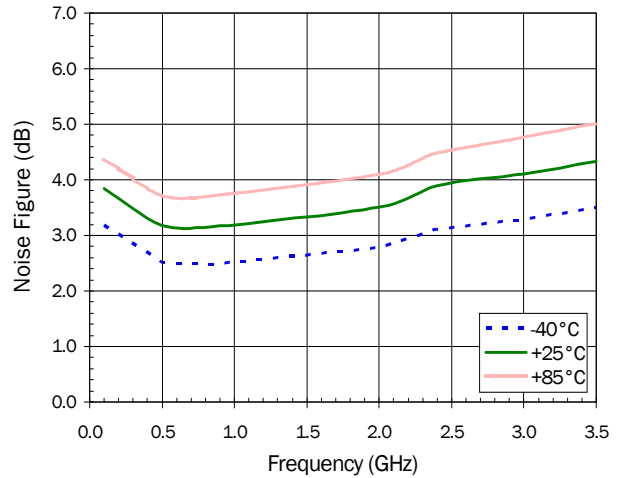
($P_{OUT/TONE} = -10dBm$, 1MHz Spacing)



Current versus Voltage

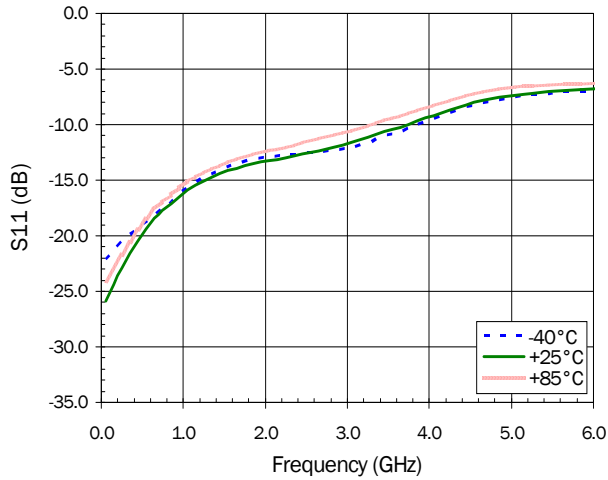


Noise Figure versus Frequency

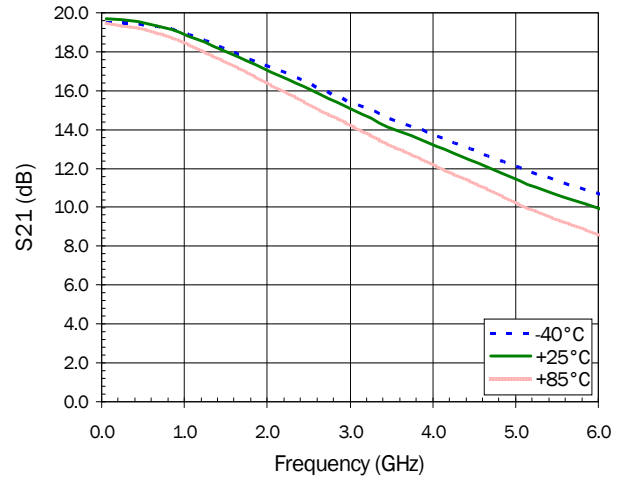


SGB2433Z Bias Tee Data ($V_{CC} = V_{BIAS} = 3.0V$, $I_D = 25mA$)

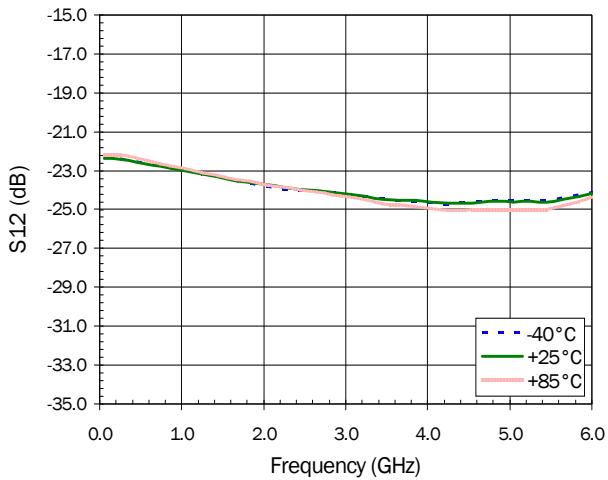
S11 versus Frequency



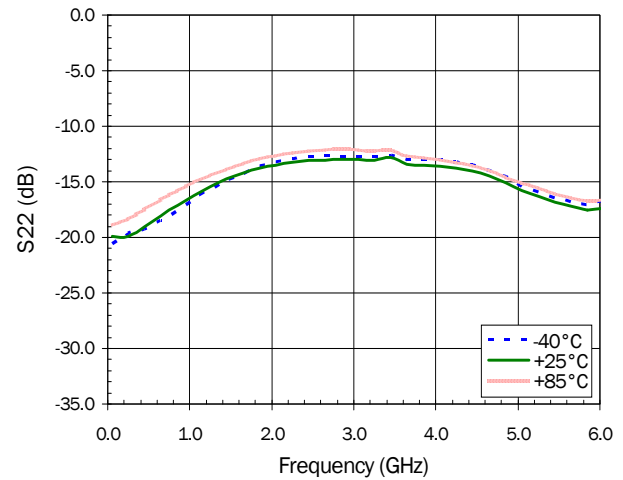
S21 versus Frequency



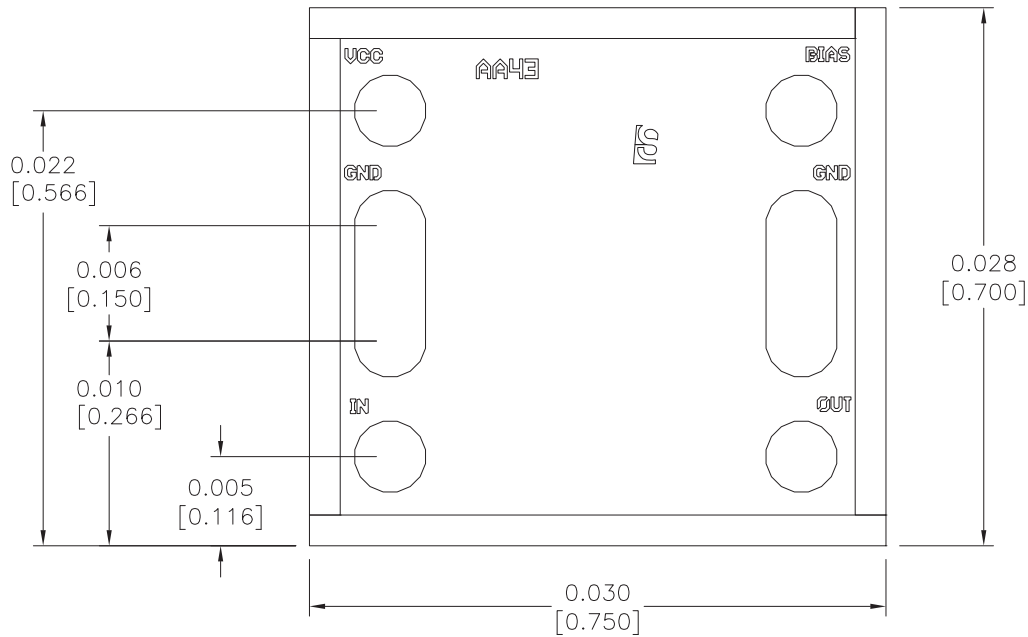
S12 versus Frequency



S22 versus Frequency



Pad Description



Bond Pad Description

Bond Pad	Function/Description
VCC	Supply voltage for the active bias circuit.
Bias	This pad sources current from the active bias circuit. Connect the "BIAS" pad to the "OUT" pad through a choke inductor.
GND	DC and RF ground returns for the circuit. These pads must be downbonded to system ground.
IN	RF input pad. A DC block is required as voltage is present on this pad.
OUT	RF output pad. A DC block is required as the Darlington pair is biased through this pad.

Notes:

1. All dimensions in inches [millimeters].
2. Die Thickness is 0.008 [0.203].
3. Typical bond pad is 0.004 (0.100) round.
4. Backside metallization: none.
5. Bond pad metallization: Aluminum.

Ordering Information

Part Number	Description	Devices/Container	Quantity
SGB2400	Bare Die	Gel Pak	10