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SBB-4000

0.05GHZ TO 6GHZ, CASCADABLE ACTIVE BIAS InGaP HBT MMIC AMPLIFIER

Package: Bare Die

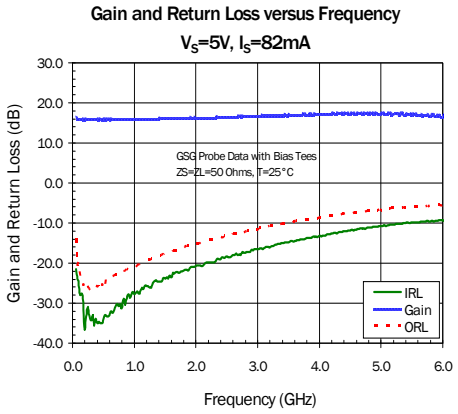
Product Description

RFMD's SBB-4000 is a high performance InGaP HBT MMIC amplifier utilizing a Darlington configuration with an active bias network. The active bias network provides stable current over temperature and process Beta variations. Its efficient operation from a single 5V supply and its compact size (0.59mmx0.70mm) make it ideal for high density multi-chip module applications. It is well-suited for high linearity 5V gain block applications and it is internally matched to 50Ω.

RFMD can provide 100% DC screening, visual inspection, and Hi Rel water qualification. Die can be delivered at the wafer level or picked to gel or waffle paks.

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



Features

- OIP3=36.5dBm at 2000MHz
- P1dB=19.5dBm at 2000MHz
- Single Fixed 5V Supply
- Compact Die Size (0.59mmx0.7mm)
- Patented Thermal Design & Bias Circuit
- Low Thermal Resistance

Applications

- PA Driver Amplifier
- RF Pre-driver and RF Receive Path
- Military Communications
- Test and Instrumentation

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Frequency of Operation	50		6000	MHz	
Small Signal Gain		15.5		dB	Frequency=500Mhz
		16.0		dB	Frequency=2000MHz
		17.0		dB	Frequency=4000MHz
Output Power at 1dB Compression		20.0		dBm	Frequency=500MHz
		19.5		dBm	Frequency=2000MHz
		17.5		dBm	Frequency=4000MHz
Output Third Order Intercept Point		41.5		dBm	Frequency=500MHz
		36.5		dBm	Frequency=2000MHz
		29.0		dBm	Frequency=4000MHz
Input Return Loss		20.5		dB	Frequency=2000MHz
Output Return Loss		15.0		dB	Frequency=2000MHz
Current		82.0		mA	
Noise Figure		4.2		dB	Frequency=2000MHz
Thermal Resistance		69.9		°C/W	Junction to lead (89 pkg)

Test Conditions: Z_0=50Ω, V_D=5V, I_D=82mA, T=25°C, OIP3 Tone Spacing=1MHz, P_{OUT}/tone=0dBm. GSG Probe Data with Bias Tees.

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Absolute Maximum Ratings

Parameter	Rating	Unit
Total Current (I_D)	100	mA
Device Voltage (V_D)	5.5	V
Power Dissipation	0.55	W
Operating Lead Temperature (T_L)	-40 to +85	°C
RF Input Power	+24	dBm
Storage Temperature Range	-55 to +150	°C
Operating Junction Temperature (T_J)	+150	°C
ESD Rating - Human Body Model (HBM)	Class 1C	

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).

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Typical Performance (GSG Probe Data with Bias Tees) V_D=5V, I_D=82mA, T=25°C, Z=50Ω

Parameter	Units	500MHz	1000MHz	1500MHz	2000MHz	3000MHz	4000MHz
Small Signal Gain	dB	15.5	15.9	16.0	16.0	16.5	17.0
Output 3rd Order Intercept Point (see note 1)	dBm	41.5	40.8	39.7	36.5	32.5	29.0
Output Power at 1dB Compression	dBm	20.0	19.8	19.8	19.5	18.5	17.5
Input Return Loss	dB	34.0	27.5	24.0	20.5	16.5	13.0
Output Return Loss	dB	24.0	20.5	17.5	15.0	11.5	8.5
Reverse Isolation	dB	18.4	18.5	18.6	18.4	18.6	18.8
Noise Figure	dB	4.2	4.4	4.3	4.2	4.4	4.3

Note 1: 0dBm/tone, 1MHz spacing

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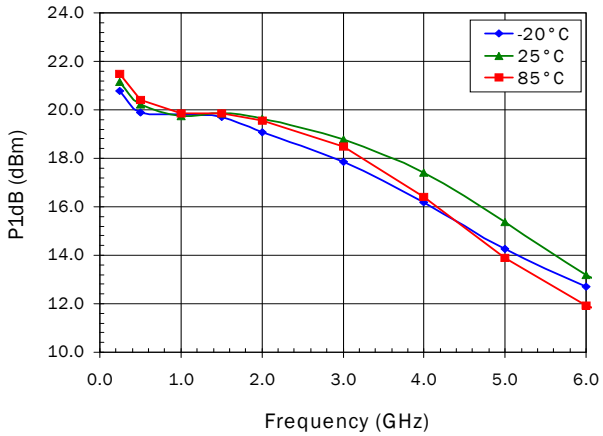
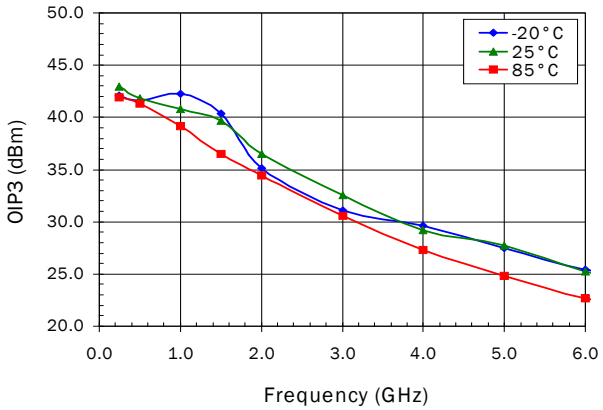
Typical Performance (GSG Probe Data with Bias Tees) V_D=5.0V, I_D=82mA

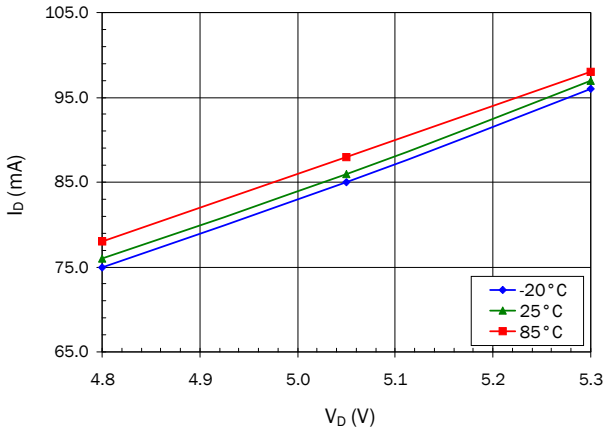
P1dB versus Frequency



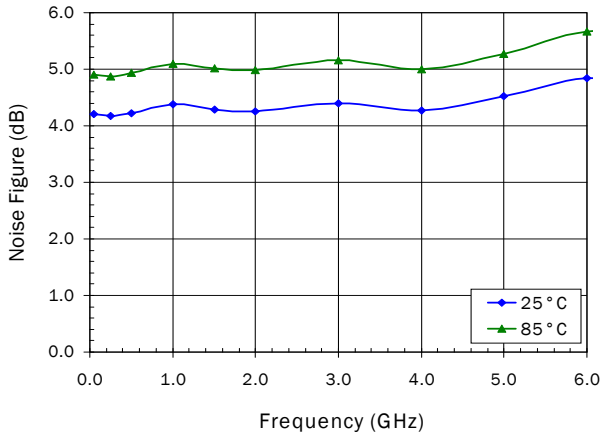
OIP3 vs. Frequency (0dBm/Tone, 1MHz Spacing)



Current versus Voltage



Noise Figure versus Frequency



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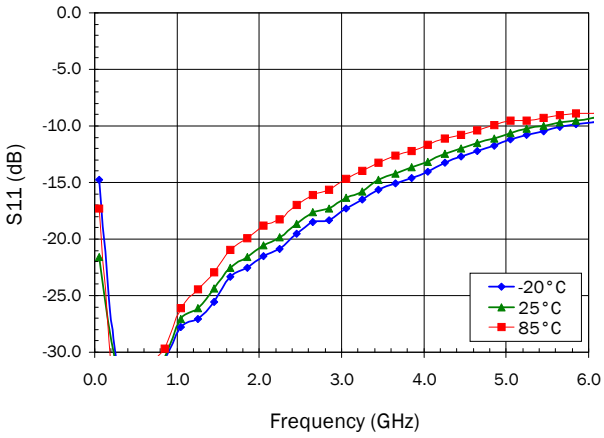
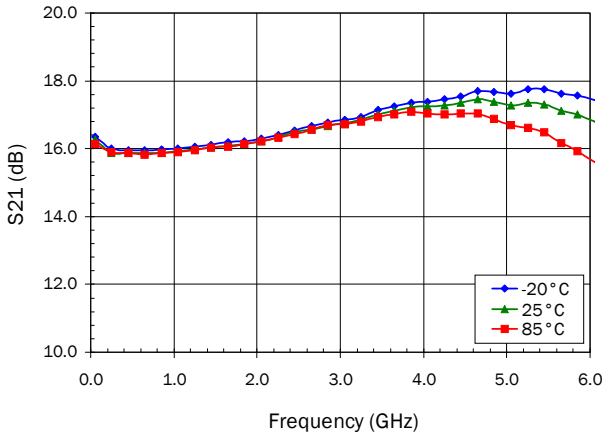
Typical Performance (GSG Probe Data with Bias Tees) V_D=5.0V, I_D=82mA

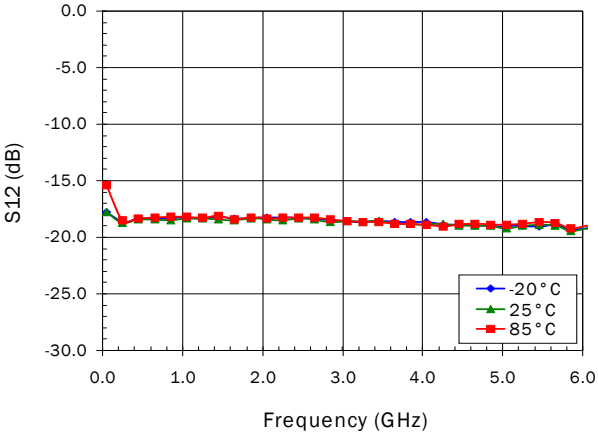
S11 versus Frequency



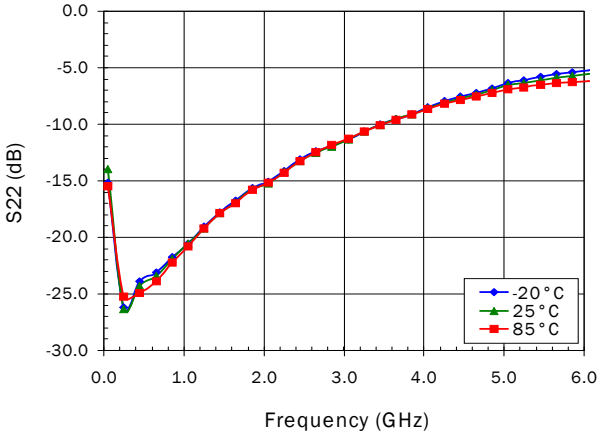
S21 versus Frequency



S12 versus Frequency



S22 versus Frequency



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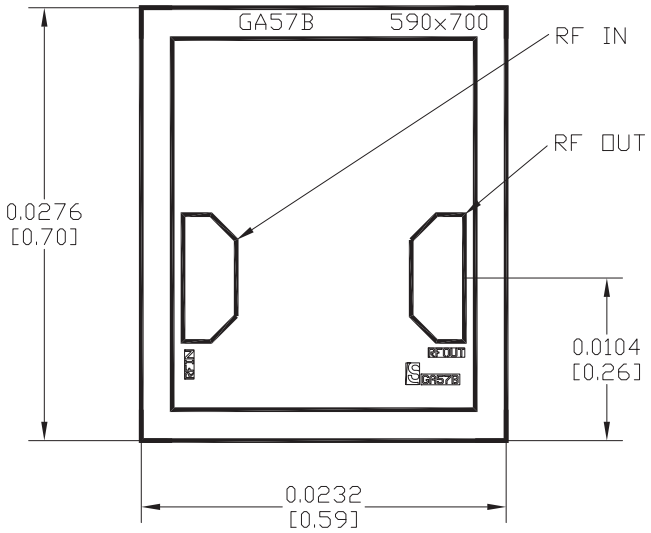
Pin	Function	Description
	RF IN	This pad is DC coupled and matched to 50Ω. An external DC block is required.
	RF OUT	This pad is DC coupled and matched to 50Ω. DC bias is applied through this pad.
	DIE BACKSIDE	Die backside must be connected to RF/DC ground using silver filled conductive epoxy.

Notes:
1. All dimensions in inches [millimeters].
2. Die thickness is 0.004 [0.100].
3. Typical bond pad is 0.003x0.006
4. Backside metallization: Gold.
5. Bond pad metallization: Gold.
6. Backside is ground.

Die Dimensions



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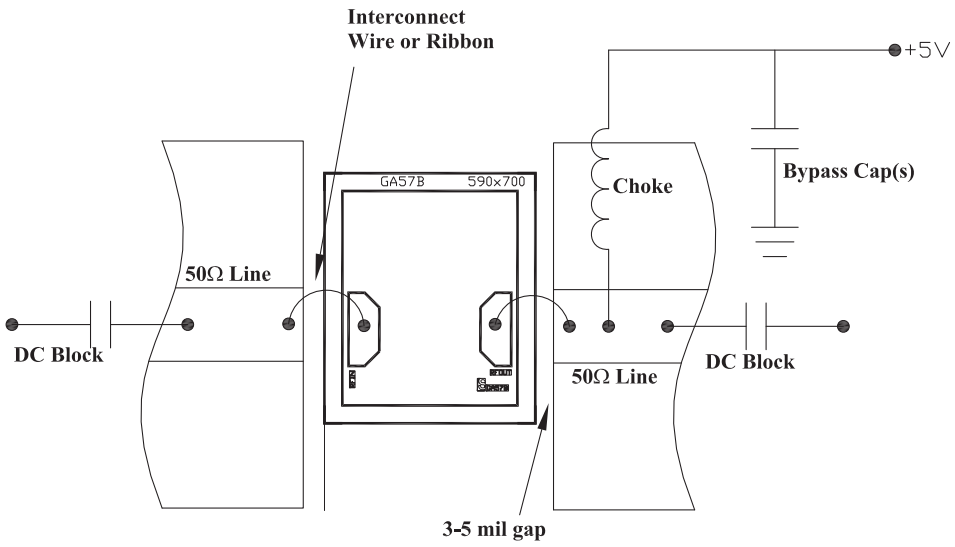
Device Assembly



Ordering Information

Part Number	Description	Devices/Container
SBB-4000	Bare Die	

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