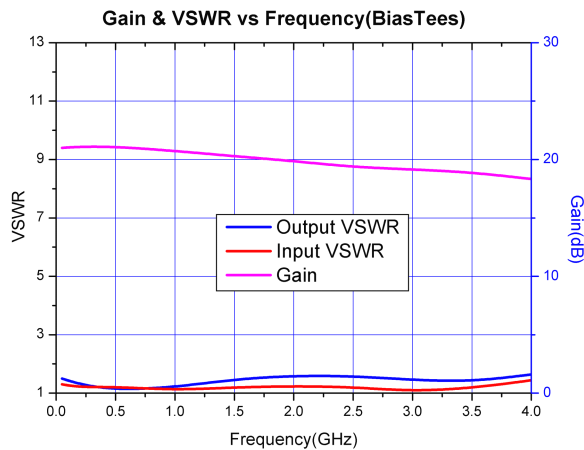


### Product Description

SG850 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. Designed to run directly from a 5V supply, the SG850 does not require a dropping resistor as compared to typical Darlington amplifiers. The SG850 product is designed for high linearity 5V gain block applications that require small size and minimal external components.



**SG850** RoHS Compliant & Green Package

**0.05-4GHz, Cascadable**  
**Active Bias InGaP/GaAs HBT Amplifier**



**Product Features:**

- Wideband Flat Gain to 4GHz
- IP3=38dBm @ 1950MHz
- P1dB=20dBm@1950MHz
- Single +5V Supply
- 1000V ESD, Class 1C
- MSL 1 moisture rating

**Applications:**

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

Symbol	Parameter	Units	Frequency	Min.	Typ.	Max.
G	Small Signal Gain	dB	240MHz	19.3	20.8	22.2
			850MHz	19.3	20.5	22.2
			1950MHz	18.5	19.7	21.5
			2500MHz	18.0	19.5	21.0
P <sub>1dB</sub>	Output Power at 1dB Compression	dBm	850MHz		20.4	
			1950MHz	19.0	20.0	
OIP <sub>3</sub>	Third Order Intercept Point	dBm	240MHz	36	38.0	
			850MHz	38	40.0	
			1950MHz	36	38.1	
Bandwidth	VSWR: Maximum 2.0	MHz			4000	
Input VSWR	Input Return Loss	Ratio	1950MHz		1.2	1.6
Output VSWR	Output Return Loss	Ratio	1950MHz		1.6	2.0
S <sub>12</sub>	Reverse Isolation	dB	1950MHz		23	
NF	Noise Figure	dB	1950MHz		3	4.0
V <sub>D</sub>	Device Operating Voltage	V			5.0	5.5
I <sub>D</sub>	Device Operating Current	mA		70	80	90
R <sub>TH, j-l</sub>	Thermal Resistance	°C/W			68	

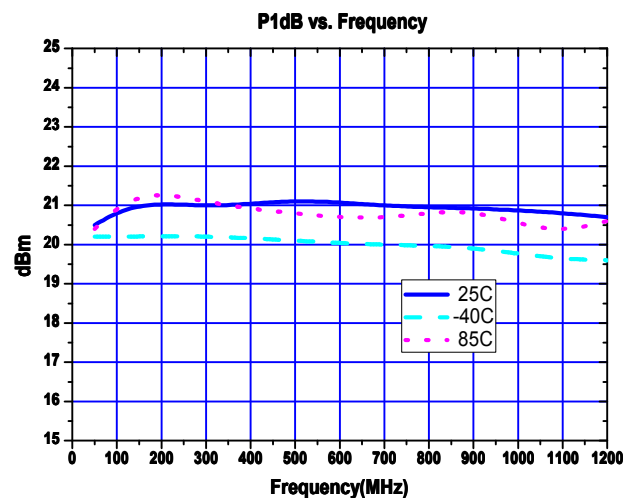
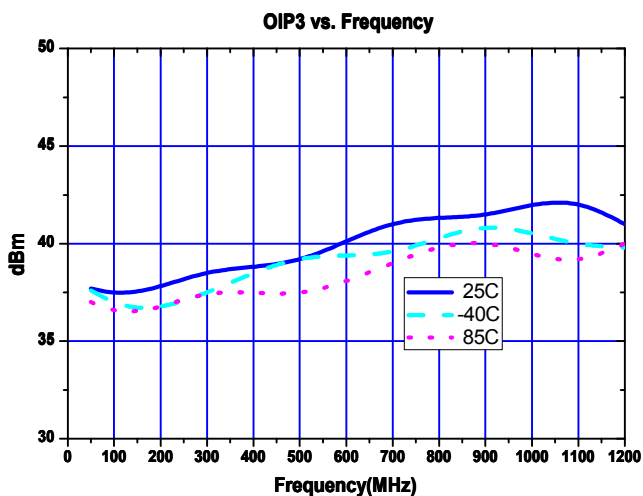
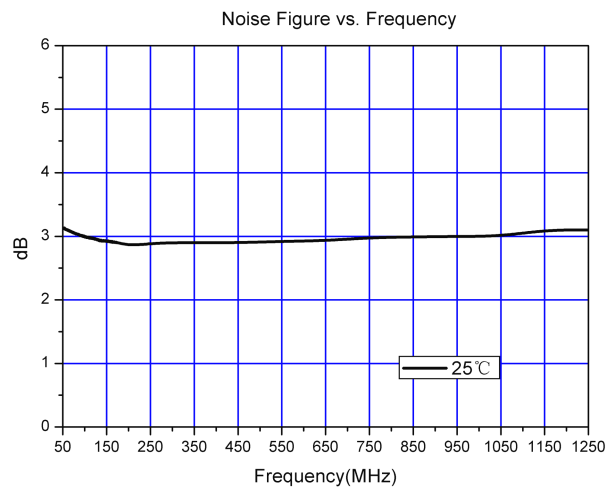
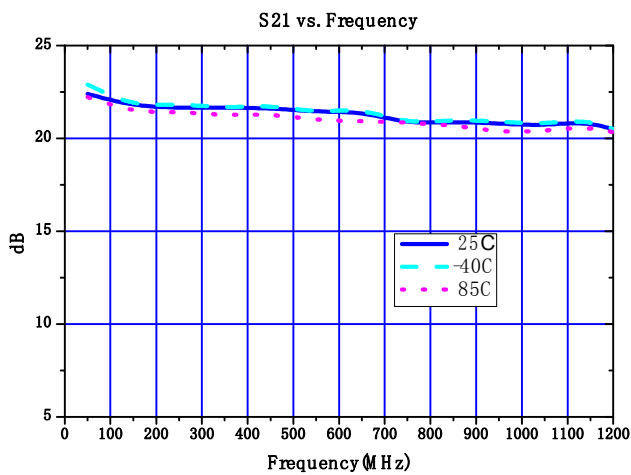
Test Conditions: V<sub>s</sub>=5V I<sub>D</sub>=80mA Typ. OIP<sub>3</sub> Tone Spacing=1MHz, P<sub>out</sub> per ton=5 dBm  
 T<sub>L</sub>=25°C Z<sub>S</sub>=Z<sub>L</sub>=50 Ohms

**Typical RF Performance at Key Operating Frequencies (With 50~500MHz Application Circuit)**

Symbol	Parameter	Unit	Frequency (MHz)					
			50	110	240	400	500	850
G	Small Signal Gain	dB	22	21.5	21.3	21.3	21.2	20.5
OIP <sub>3</sub>	Output Third Order Intercept Point	dBm	37.7	38.0	38.0	39.0	39.2	40.2
P <sub>1dB</sub>	Output Power at 1dB Compression	dBm	20.5	21.0	21.0	21.0	21.0	20.4
Input VSWR	Input Return Loss		1.29	1.20	1.17	1.16	1.16	1.18
Output VSWR	Output Return Loss		1.18	1.20	1.14	1.20	1.24	1.36
S <sub>12</sub>	Reverse Isolation	dB	24	24	24	24	24	23.3
NF	Noise Figure	dB	3.1	2.9	2.9	2.9	2.9	2.9

Test Conditions: V<sub>s</sub>=5V I<sub>D</sub>=80mA Typ OIP<sub>3</sub> Tone Spacing=1MHz, Pout per ton=5 dBm  
 T<sub>L</sub>=25°C Z<sub>S</sub>=Z<sub>L</sub>=50 Ohms

**Data on Charts taken with 50~500MHz Application Circuit**

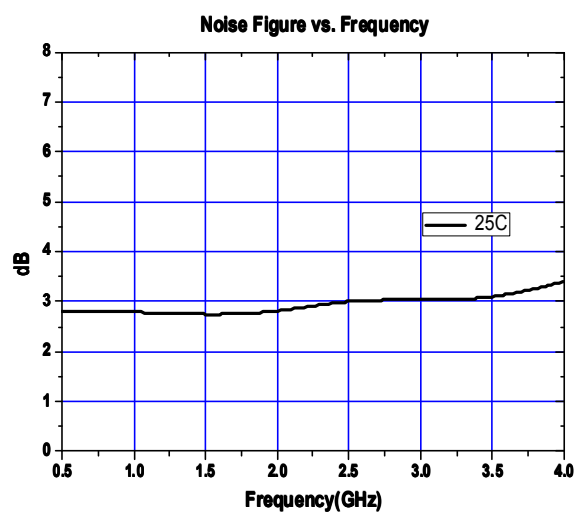
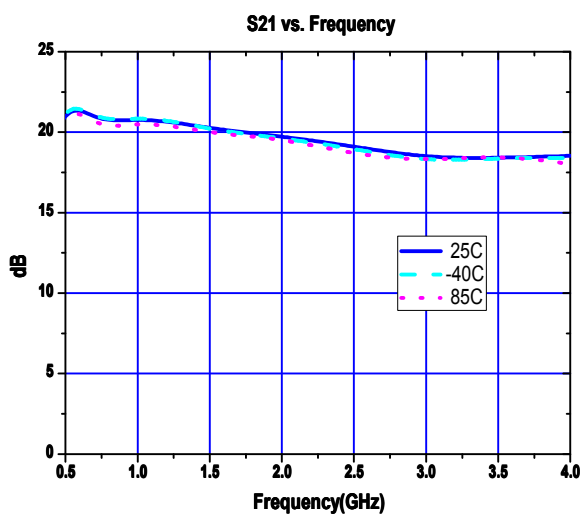
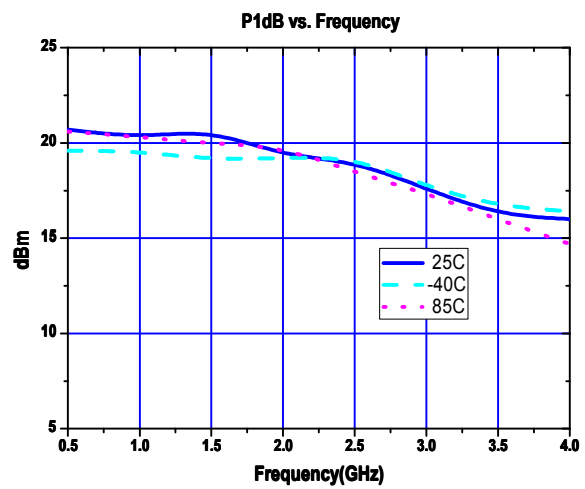
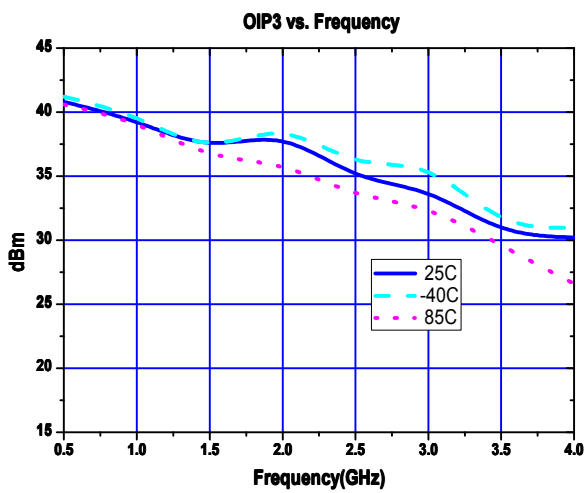


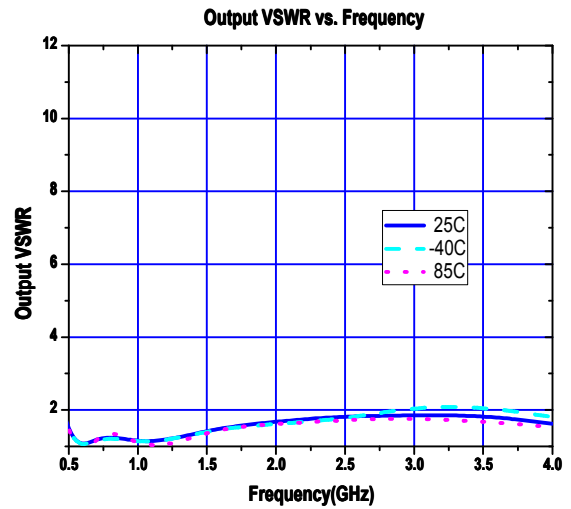
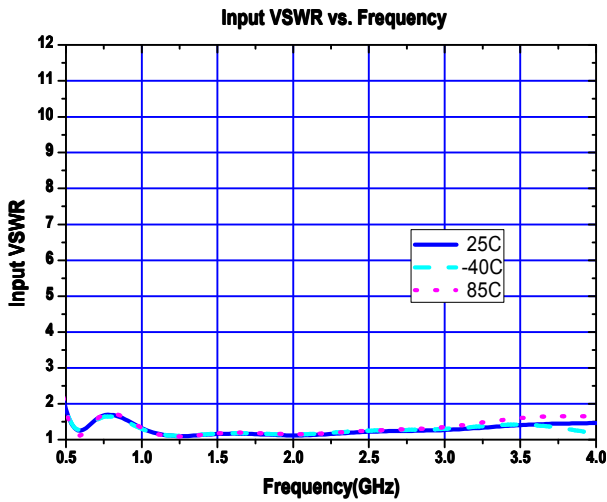
**Typical RF Performance at Key Operating Frequencies (With 0.5~3.5GHz Application Circuit)**

Symbol	Parameter	Unit	Frequency (MHz)					
			500	850	1950	2500	3500	4000
G	Small Signal Gain	dB	21.0	20.8	19.6	19.1	18.4	18.4
OIP <sub>3</sub>	Output Third Order Intercept Point	dBm	40.8	40.0	38.0	35.2	31.0	30.2
P <sub>1dB</sub>	Output Power at 1dB Compression	dBm	20.7	20.4	20.0	18.9	16.4	16
Input VSWR	Input Return Loss		1.84	1.4	1.12	1.22	1.4	1.46
Output VSWR	Output Return Loss		1.50	1.16	1.60	1.8	1.81	1.61
S <sub>12</sub>	Reverse Isolation	dB	24.2	23.3	23.1	22.8	21.2	22
NF	Noise Figure	dB	2.8	2.8	2.8	3.0	3.1	3.4

Test Conditions: V<sub>s</sub>=5V I<sub>D</sub>=80mA Typ OIP<sub>3</sub> Tone Spacing=1MHz, P<sub>out</sub> per ton=5 dBm  
 T<sub>L</sub>=25°C Z<sub>S</sub>=Z<sub>L</sub>=50 Ohms

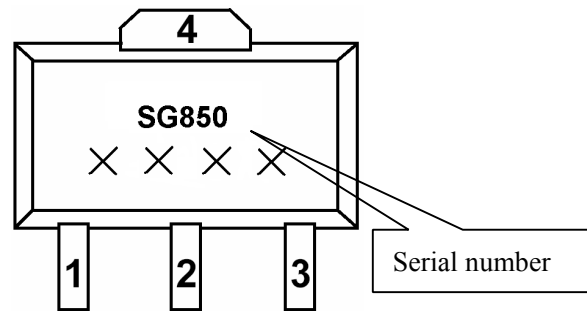
**Data on Charts taken with 0.5~3.5 GHz Application Circuit**



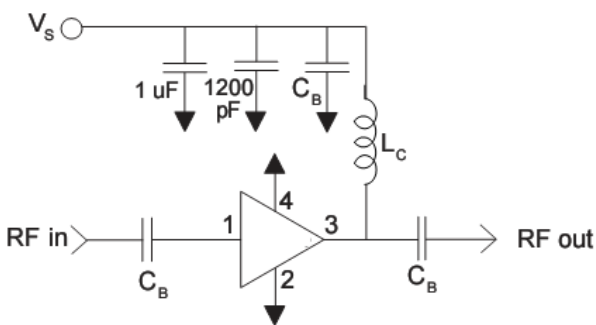


Pin	Function	Description
1	RF IN	RF input pin. This pin requires an external DC blocking capacitor.
2, 4	GND	Connecting to ground. Use via holes for best performance to reduce lead inductance.
3	RF OUT / BIAS	RF output and bias pin. DC blocking capacitor is necessary for proper operating.

**Marking and Pin Definition**



**Application Schematic**



**Application Circuit Element Values**

Reference Designator	Frequency (GHz)	
	0.05-0.5	0.5-3.5
CB	8200 pF	68 pF
LC	1200 nH	82 nH

**Mounting Instructions**

1. Solder the copper pad on the backside of the device package to the ground plane.
2. Use a large ground pad area with many plated through-holes.
3. Measurement for this data sheet is made on 0.5 mm thick FR-4 board with 3.38 dielectric constant.

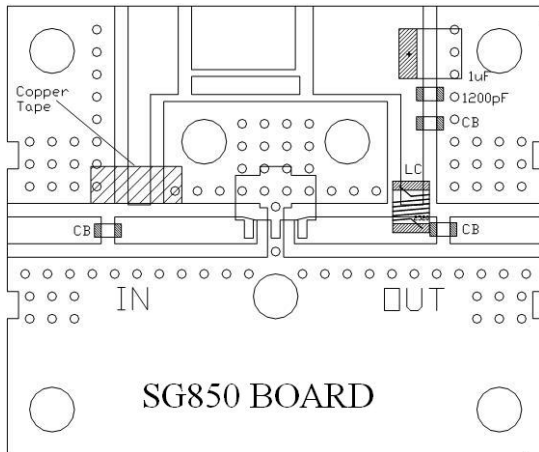


**ESD Class 1C**

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

**Moisture Sensitivity Level Rating: Level 1**

### Evaluation Board Layout

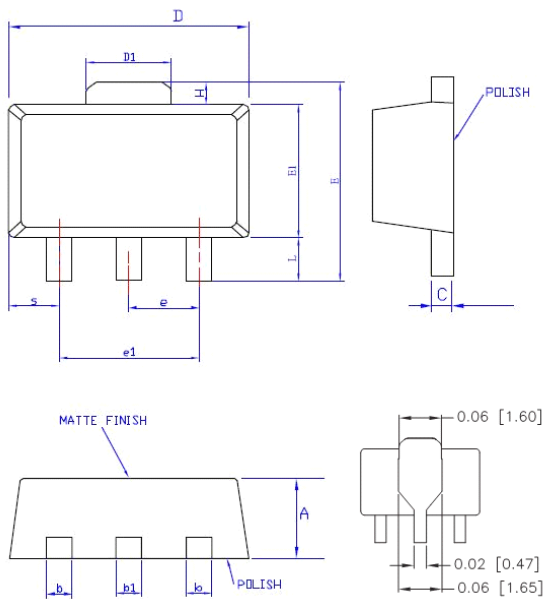


### Absolute Maximum Ratings

Parameter	Absolute Limit
Max. Device Current (ID)	110 mA
Max. Device Voltage (VD)	5.5V
Max. RF Input Power	20 dBm
Max. Junction Temp. (TJ)	+150°C
Max. Operating Dissipated Power	0.66 W
Operating Temp. Range (TL)	-40°C to +85°C
Max. Storage Temp.	+150°C

Operation beyond any one of these limits may cause permanent damage.

### SOT89 Packaging



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.40	1.50	1.60	0.055	0.059	0.063
L	0.89	1.04	1.20	0.0350	0.041	0.047
b	0.36	0.42	0.48	0.014	0.016	0.018
b1	0.41	0.47	0.53	0.016	0.018	0.020
C	0.38	0.40	0.43	0.014	0.015	0.017
D	4.40	4.50	4.60	0.173	0.177	0.181
D1	1.40	1.60	1.75	0.055	0.062	0.069
E	3.94	—	4.25	0.155	—	0.167
E1	2.40	2.50	2.60	0.094	0.098	0.102
e1	2.90	3.00	3.10	0.114	0.118	0.122
H	0.35	0.40	0.45	0.014	0.016	0.018
S	0.65	0.75	0.85	0.026	0.030	0.034
e	1.40	1.50	1.60	0.054	0.059	0.063

For informational purpose only and is subject to change without notice