

## DESCRIPTION

Sanland's AG40 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 AG40 does not require a dropping resistor as compared to typical Darlington amplifiers. The AG40 product is designed for high linearity 5V gain block applications that require small size and minimal external components. It is internally matched to 50Ω.

## Major Applications

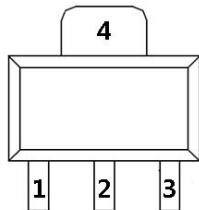
- Wireless system, IF&RF driver amplifier

## KEY FEATURES

- Wideband Flat Gain to 4GHz
- -36 dBm Output IP3 at 1950MHz
- -19.3 dB Gain at 1950MHz
- -19 dBm P1dB at 1950MHz
- 50 ohm Cascadeable
- Lead-free/Green/RoHS compliant SOT89 package
- Single 5V Supply
- ESD 1000V HBM
- MSL: Level 1



## Pin Assignment



SOT89

## Pin Details

Pin Number	Name	Description
1	RF IN	RF input.
2	GND	Ground.
3	RF OUT	RF output.
4	GND	Ground.

**Electrical Characteristics for Application**

(Vc =+5V; unless otherwise noted.)

Parameter	Specification			Units	Notes
	Min	Typ.	Max		
Gain	19.0	21.0	22.5	dB	240MHz
	19.0	20.5	22.0	dB	850MHz
	18.0	19.3	21.5	dB	1950MHz
	17.0	18.5	21.0	dB	2600MHz
P-1dB		20.0		dBm	850MHz
	18.0	19.0		dBm	1950MHz
OIP3	34.0	36.0		dBm	240MHz
	34.0	36.0		dBm	850MHz
	34.0	36.0		dBm	1950MHz
Bandwidth		4000		MHz	
Input return loss		-15	-10	dB	1950MHz
Output return loss		-12	-10	dB	1950MHz
Reverse Isolation		23		dB	1950MHz
NF		3.1	4.0	dB	1950MHz
Vs		5.0	5.5	V	
Is	70	80	90	mA	
Thermal Resistance		65		°C/W	
Test Conditions : Vs=5V Is=80mA Typ. OIP3 Tone Spacing=1MHz, Pout per ton=+5 dBm TL=25°C ZS=ZL=50 Ohms					

**Absolute Maximum Ratings**

<u>Parameter</u>	<u>Rating</u>	<u>Unit</u>
DC Power Supply	+5.5	V
DC Supply Current at Vc	110	mA
RF Input Power	+20	dBm
Max. Operating Dissipated Power	0.66	W
Operating Ambient Temperature	-40 to +85	°C
Max. Storage Temp	+150	°C
Max. Junction Temp. (TJ)	+150	°C
Operation beyond any one of these limits may cause permanent damage.		

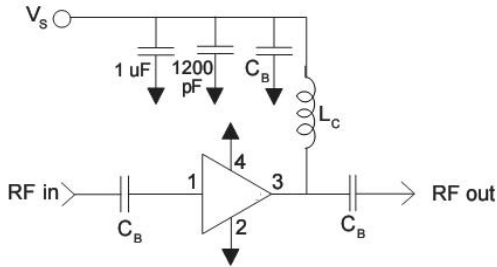
**Important Note:**

The information provided in this datasheet is deemed to be accurate and reliable only at present time. Sanland Technology Corp. reserves the right to make any changes to the specifications in this datasheet without prior notice.



**Caution: ESD Sensitive**  
Appropriate precaution in handling, packaging  
And testing devices must be observed.

**Typical Performance (50 ~ 1000MHz Application Circuit)**

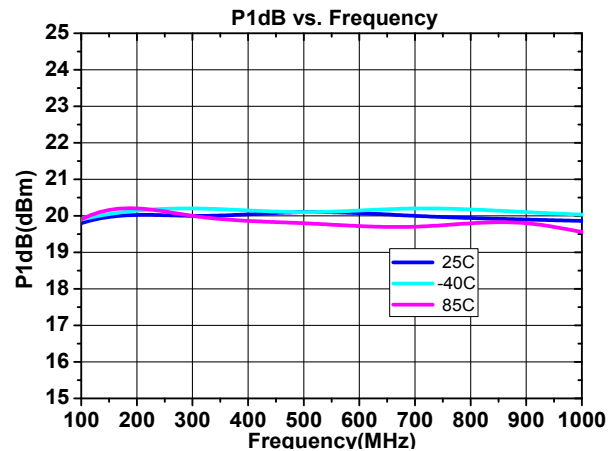
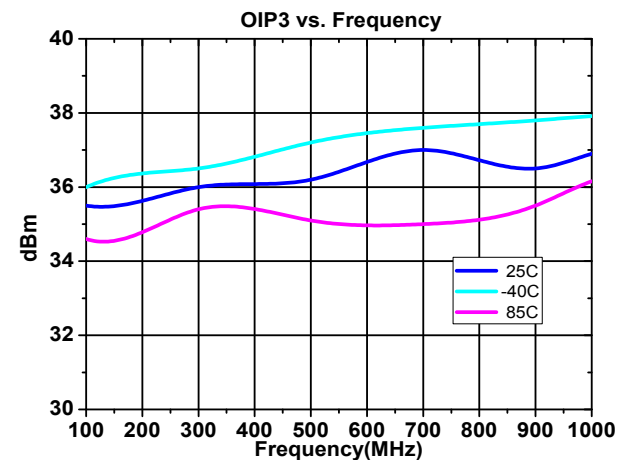
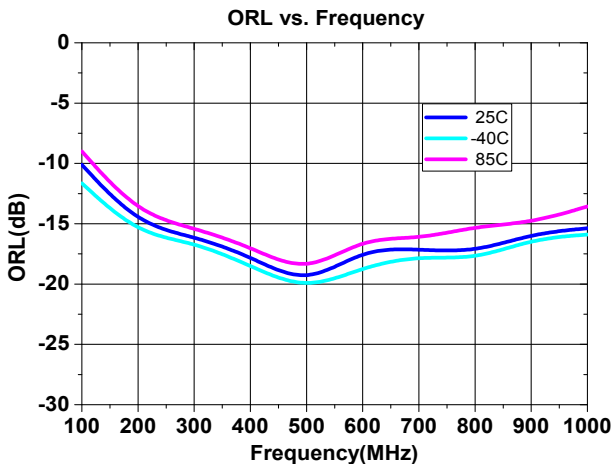
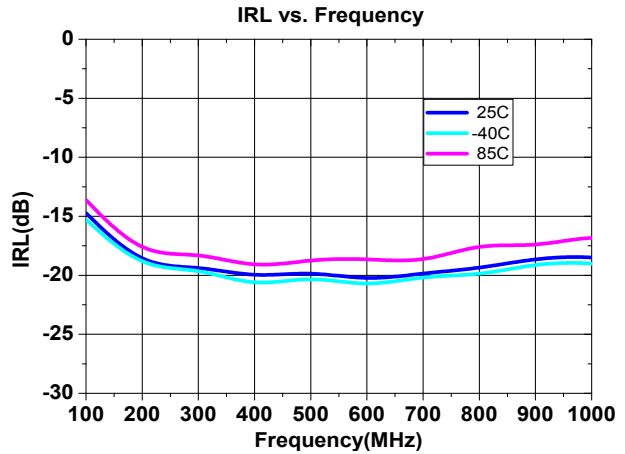
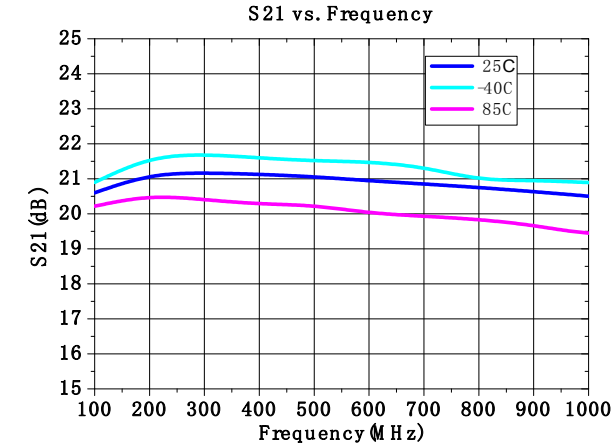


Reference Designator	BOM	Tolerance
$C_B$	8200 pF	±5%
$L_C$	1200 nH	±5%

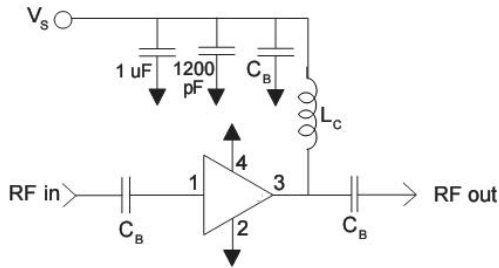
Symbol	Parameter	Unit	Frequency (MHz)					
			50	110	240	400	500	850
G	Small Signal Gain	dB	22	21	21	21	21	20.5
OIP <sub>3</sub>	Output Third Order Intercept Point	dBm	36	36	36	36	36	36
P <sub>1dB</sub>	Output Power at 1dB Compression	dBm	20	20	20	20	20	20
IRL	Input Return Loss	dB	-10	-12	-15	-20	-20	-18
ORL	Output Return Loss	dB	-8	-11	-16	-18	-19	-16
S <sub>12</sub>	Reverse Isolation	dB	24	24	24	24	24	24
NF	Noise Figure	dB	3.5	3.2	3.1	3.0	3.0	3.1

Test Conditions: Vs=5V I<sub>D</sub>=80mA OIP3 Tone Spacing=1MHz, Pout per tone=5 dBm  
T<sub>1</sub>=25°C Z<sub>S</sub>=Z<sub>L</sub>=50 Ohms

**Performance Plots (50~1000MHz Application Circuit)**



**Typical Performance (0.5 ~ 3.5GHz Application Circuit)**

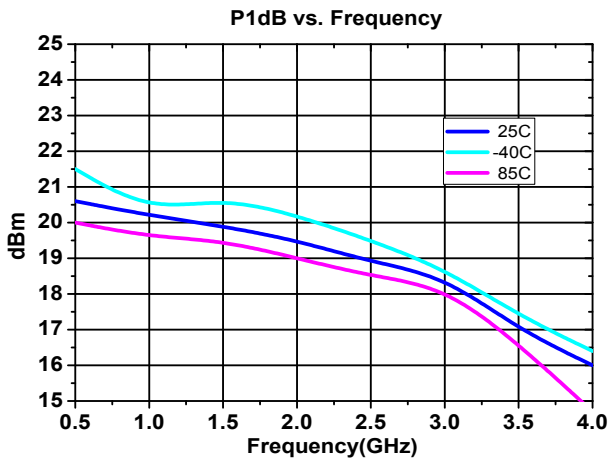
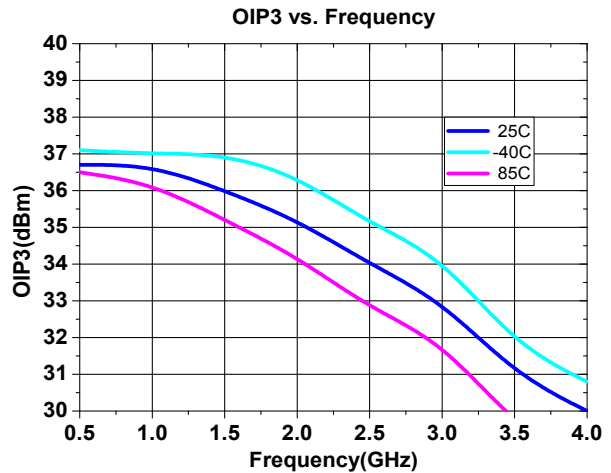
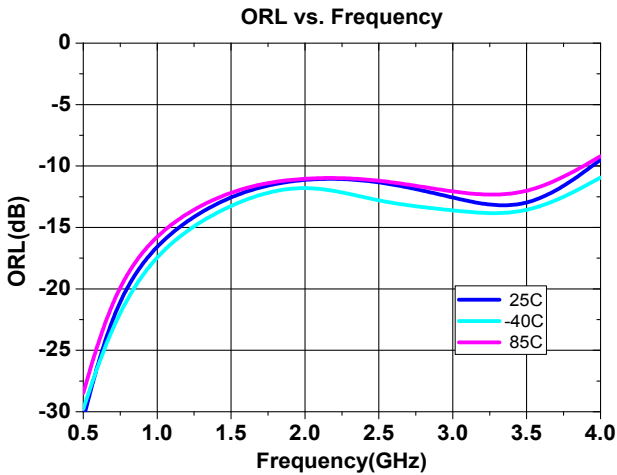
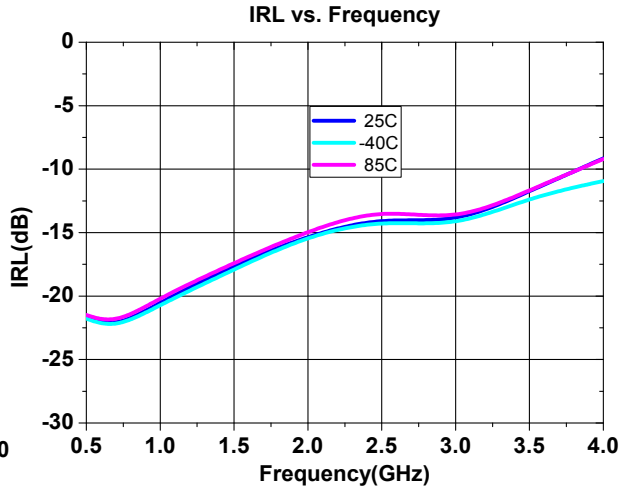
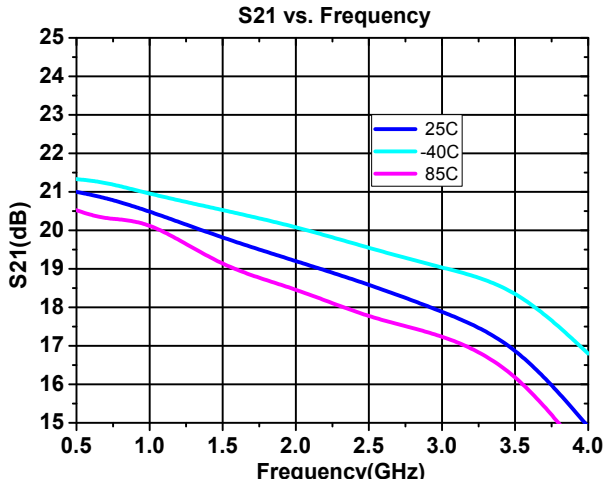


Reference Designator	BOM	Tolerance
$C_B$	68 pF	±5%
$L_c$	82 nH	±5%

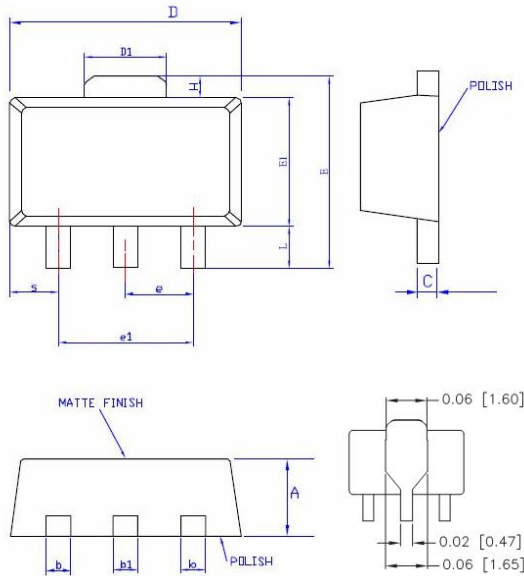
Symbol	Parameter	Unit	Frequency (MHz)					
			500	850	1950	2600	3500	4000
G	Small Signal Gain	dB	21	20.5	19.3	18.5	17	15
OIP <sub>3</sub>	Output Third Order Intercept Point	dBm	36.5	36.5	35.3	34	31	30
P <sub>1dB</sub>	Output Power at 1dB Compression	dBm	20.5	20	19.3	19	18	16
IRL	Input Return Loss	dB	-22	-20	-15	-14	-12	-10
ORL	Output Return Loss	dB	-20	-16	-11	-12	-13	-10
S <sub>12</sub>	Reverse Isolation	dB	24.2	23.3	23.1	22.8	21.2	22
NF	Noise Figure	dB	3.0	3.0	3.1	3.2	3.3	3.4

Test Conditions: Vs=5V Is=80mA OIP3 Tone Spacing=1MHz, Pout per tone=5 dBm  
T<sub>1</sub>=25°C Z<sub>s</sub>=Z<sub>l</sub>=50 Ohms

**Performance Plots (0.5~3.5GHz Application Circuit)**



**Package Outline**



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

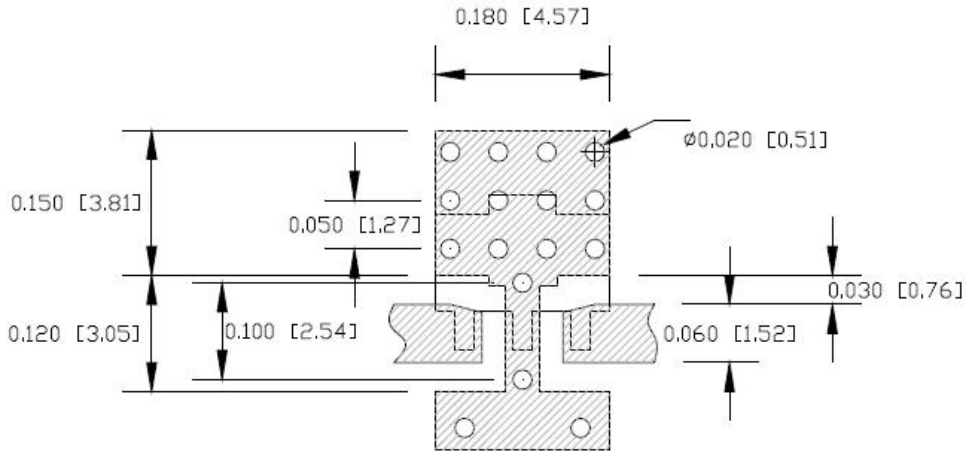
For informational purpose only and is subject to change without notice

**Note :**

1. Dimension and tolerance conform to ASME Y14.5M-1994.
2. Refer to JEDEC STD. MO-220 WEED-2 ISSUE B



**Suggested PCB Layout**



**NOTES:**

1. Dimensions are in inch [millimeter].
2. Use 1 oz. copper minimum for top and bottom layer metal.
3. Vias are required under GND(2,4) pin for proper RF/DC grounding and thermal dissipation. Via holes could reduce lead inductance as close to ground as possible.
4. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.