

SAC3157Q8

GaAs MMIC Power Amplifier
2.5GHz~8.5GHz 35dBm

Rev 1.2

Features

- Frequency: 2.5GHz~8.5GHz
- Small Signal Gain: 26dB
- Output P_{-1dB}: 35dBm CW
- Supply Voltage: +8V/-V_g
- Packaged: 8.0mm×8.0mm×1.45mm

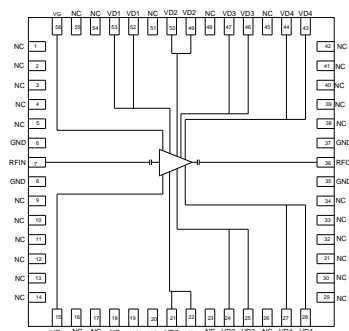
Typical Applications

- S. C-band multifunction radar
- Point-to-Point Radios

General Description

SAC3157Q8 is a S-band and C-band GaAs power amplifier. SAC3157Q8 provides 26 dB of gain, and 35dBm of output power for 1 dB compression (Typ.) from a +8 supply.

Functional Diagram



Electrical Performance

T_A=25°C, V_D=+8V, I_{DQ}=2.2A, Z₀=50Ω, CW

Parameter	Min.	Typ.	Max.	Units
Frequency	2.5	—	8.5	GHz
Small Signal Gain	24	26	—	dB
Small Signal Gain Flatness	—	±2	—	dB
Reverse Isolation	—	-70	—	dB
RF input port VSWR	—	2.5	4.3	:1
RF output port VSWR	—	2.0	2.8	:1
Power-Added Efficiency	—	20	—	%
Output P _{-1dB}	34	35	—	dBm
Drain Voltage (V _D)	—	—	8.5	V
Gate Current	—	20	35	mA
Supply Current (I _D)**	—	2.2	—	A
Thermal Resistance	—	2.5	—	°C/W

*Adjust the V_g voltage (-1 ~ -0.55V) so that the I_{DQ} is about 2.2A, and the typical V_g voltage is -0.6V

Absolute Maximum Ratings

Maximum Input Power	+27dBm	Operating Temperature (Backside)	-55°C~+85°C
Channel Temperature	165°C	Storage Temperature	-55°C~+150°C
Maximum V _D Supply	+8.5V	V _G Range	-1.4V (Pinch Off) ~-0.5V

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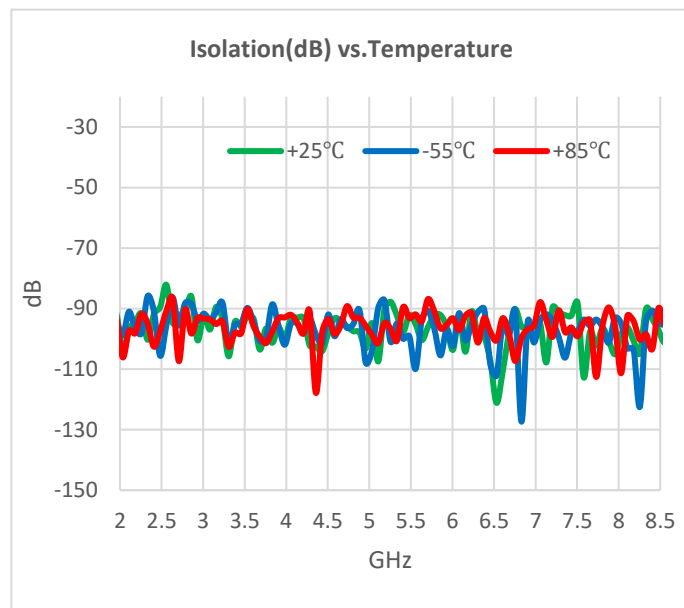
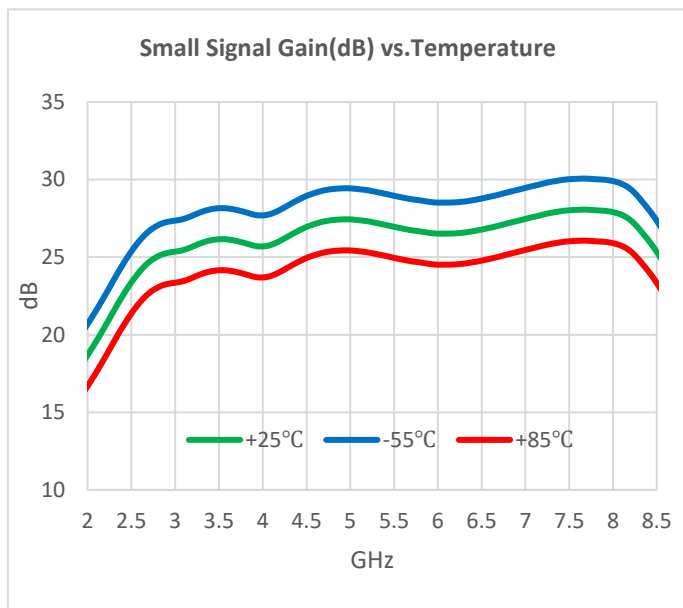
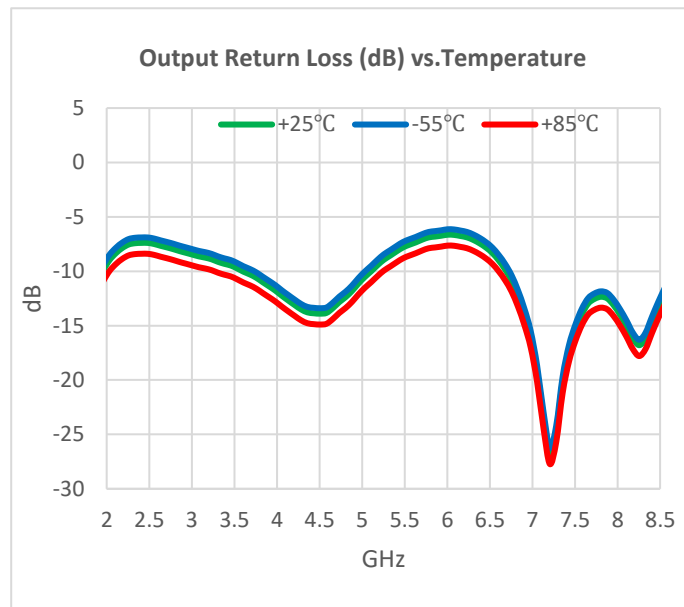
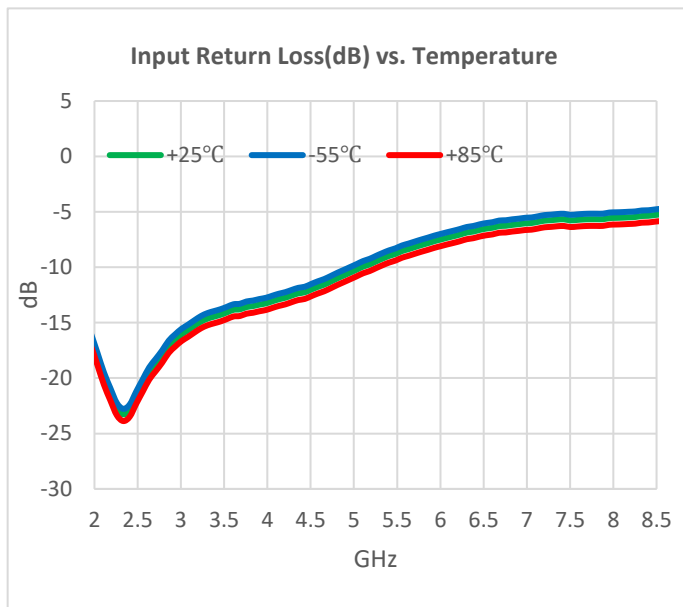


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Typical Performance Curve

The following data are obtained by SAC3157Q8 evaluation board test, $V_D = +8V$, working mode CW, $T_A = +25^\circ C$

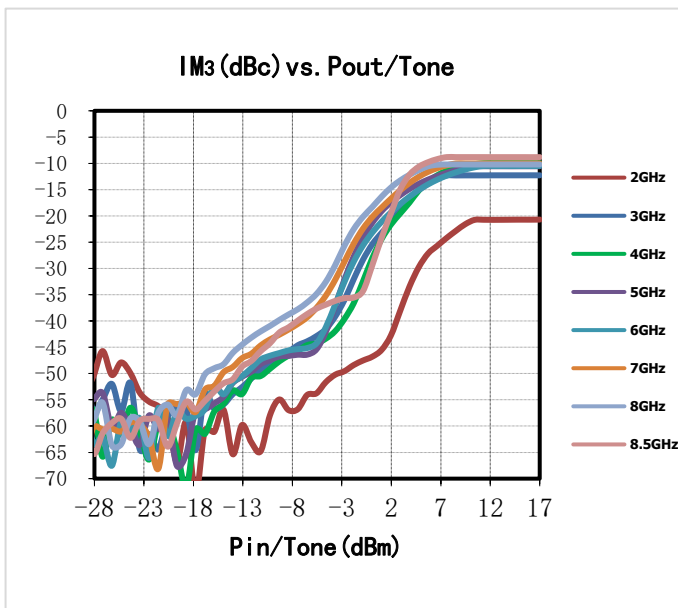
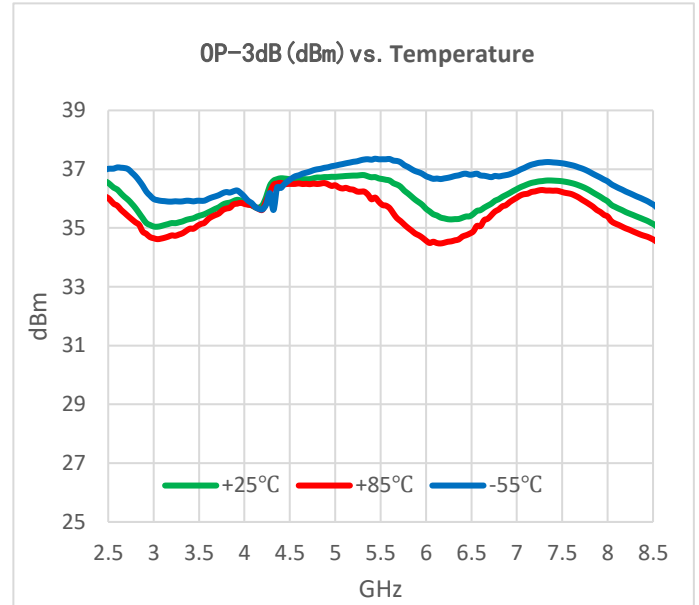
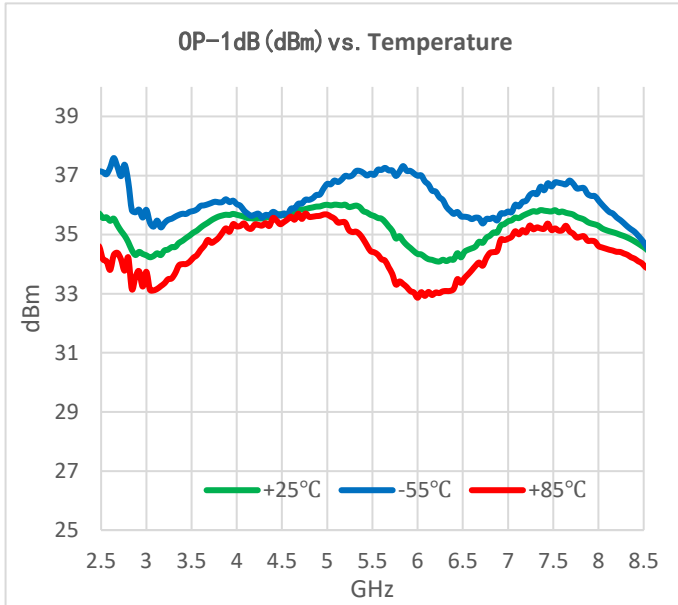


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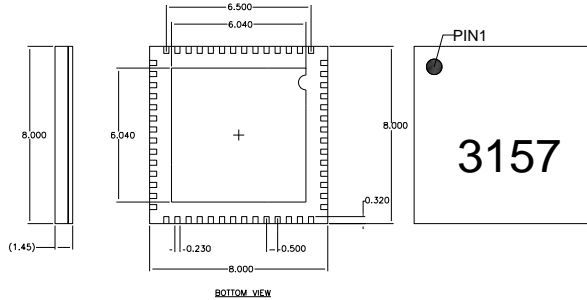
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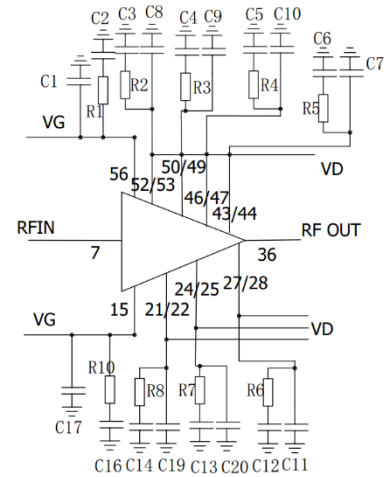
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Outline Drawing

(All dimensions in mm)



Assembly Diagram



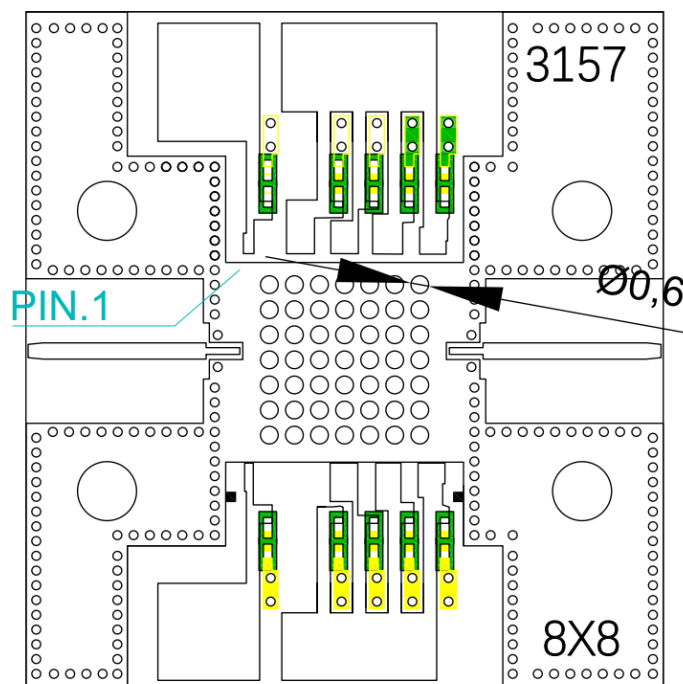
Pin Descriptions

Pin No.	Function	Pin No.	Function
6	GND	46	VD3
7	RF Input, DC blocked	47	VD3
8	GND	49	VD2
15	VG	50	VD2
21	VD2	52	VD1
22	VD2	53	VD1
24	VD3	56	VG
25	VD3		
27	VD4		
28	VD4		
35	GND		
36	RF Output, DC blocked		
37	GND		
43	VD4		
44	VD4		

Components List

Reference Des.	Value	Part Number	Manuf.	Size
C1, C7, C11, C17	4.7uF	CHIP CAPACITOR	—	—
C2, C3, C4, C5, C6, C12, C13, C14, C16	0.1uF	CHIP CAPACITOR	—	—
C8, C9, C10, C18, C19, C20	2.2uF	CHIP CAPACITOR	—	—
R1,R2,R3,R4,R5, R6,R7,R8,R10	1 Ω	CHIP RESISTOR	—	—

Evaluation Board



Superapex recommend the PCB fabricated using Rogers 4350b t=0.254 and using best practices for high frequency RF design. The RF input and RF output traces should have a 50 Ω characteristic impedance.

The bottom center pad of SAC3157Q8 is used for RF grounding and heat dissipation. For best heat dissipation, copper-filled vias are highly recommended, SAC3157Q8 is high power dissipation surface mount components and require a well-designed thermal mount. All the heat generated by the device is expected to be removed through the bottom heat slug with a low thermal resistance path to the chassis.

The use of multiple copper-filled vias or solder-filled vias under the package's heat slug while using a indium foil between the PCB and chassis provides a low thermal resistance mount, Insufficient number of

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vias or insufficient solder filling will significantly affect the heat dissipation process of the device, and then reduce the performance or even damage the device.

Notes

1. SAC3157Q8 requires VDx and VGx bias.
Turn-on: Apply VGx, Apply VDx, Apply RFIN signal.
Turn-off: Remove RFIN signal, Decrease VG to -1.5 V(pinch-off), Decrease VD to 0 V
2. The moisture resistant grade of products is 2a, the storage environment $\leq 30^{\circ}\text{C}/60\% \text{RH}$, the surrounding workshop life is 4 weeks;
3. After un-packing, it is necessary to bake the parts for 6 hours in $125\pm 5^{\circ}$ environment before soldering;
4. GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly, and test;
5. Ultrasonic cleaning is prohibited;

Revision History

Revision	Date	Comment
1.0	FEB 2, 2024	First Release
1.1	FEB 21, 2024	Add temperature data
1.2	MAR 11, 2024	Add Evaluation Board data, Corrected maximum voltage, Correct IM3 chart

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