

1. General Description

The ARF9002 is a GaAs MMIC Power Amplifier operating at 17GHz-20GHz, power supply +6V operation, at 1600 mA working current, can provide 27dB Small Signal Gain, OP1dB 34dBm. The ARF9002 port impedance is 50 Ω.

2. Features

- 27 dB Small Signal Gain
- 34 dBm OP1dB
- 35 dBm PSAT
- Bias 1600 mA @ 6 V
- 20 Pin 7X7 mm Cavity Package
- Integrated Power Detector
- RoHS* Compliant

3. Applications

- Point-To-Point radio for cellular backhaul applications
- Radar
- General Purpose Wireless

4. Functional Block Diagram

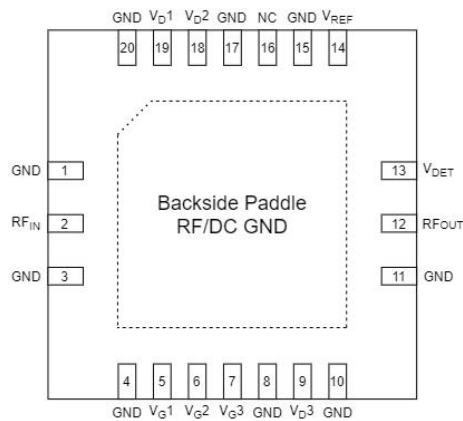


Figure1.

5. Order product model

ARF9002

Directory

1. General Description	1
2. Features	1
3. Applications	1
4. Functional Block Diagram	1
5. Order product model	1
6. Specifications	3
6.1. Electrical Specifications	3
6.2. Handling Ratings	3
7. Absolute Maximum Ratings	4
8. Pin Assignments and Description	5
9. Typical Performance	6
10. Performance Plots	6
11. Package Marking and Outline Dimensions	9
12. Notice	10
12.1. Operating protection condition	10
12.2. Operate attention	10
12.3. Solderability	10
12.4. RoHS Compliance	10
12.5. Contact Information	10
Important Notices and disclaimers	11

6. Specifications

6.1. Electrical Specifications

Test Conditions: VD=6V, Idq=1600mA, TA=+25°C, (de-embedded data);

Table1.Electrical Specifications

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Frequency Range			17		20	GHz
Input Return Loss	S11			-13		dB
Output Return Loss	S22			-12		dB
Gain	S21			27		dB
P1dB				34		dBm
Past				35		dBm
IMD3		+20 dBm SCL, $\Delta f=10\text{MHz}$		-45		dBc
Noise Figure	NF			5		dB

6.2. Handling Ratings

Table2.Handling Ratings

Symbol	Parameter	Min	Typ	Max	Units
T _{STG}	Storage temperature range	-65		+150	°C
V _{ESD}	Human body model (HBM)		250		V
	Charged device model (CDM)		250		V

Table4.Absolute Maximum Ratings

7. Absolute Maximum Ratings

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device.Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Parameter	Min	Typ	Max	Units
DC Supply Voltage (V _D)	0	6	7	V
Gate Voltage (V _G)	-2		0	V
Detector Voltage (V _{DET})			7	V
Detector Reference Voltage (V _{REF})			7	V
Operational Frequency Range	17		20	GHz
RF Input Power (P _{in}), CW, 50ohms, TA=25°C			20	dBm
Operating Temperature	-40		+85	°C

8. Pin Assignments and Description

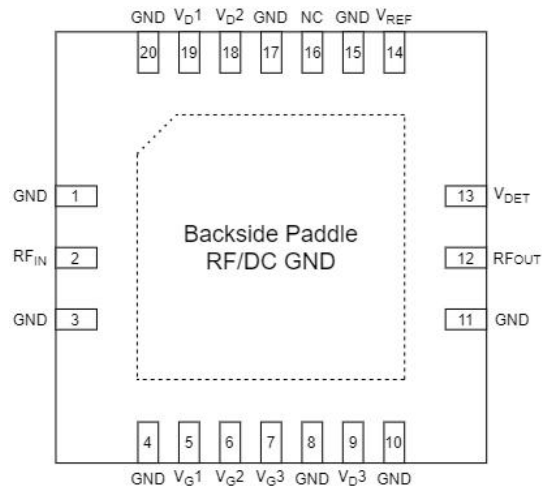


Figure2. Pin Assignments

Table5. Description

Pin No.	Mnemonic	Description
16	NC	No Connection
1,3,4,8,10,11,15,17,20	GND	Ground
2	RFIN	RF Input
12	RFOUT	RF Output
5	VG1	Gates 1 Bias
6	VG2	Gates 2 Bias
7	VG3	Gates 3 Bias
19	VD1	Drain 1 Bias
18	VD2	Drain 2 Bias
9	VD3	Drain 3 Bias
14	VREF	Pwr Det Ref
13	VDET	Pwr Det
Backside Paddle	GND	RF/DC ground connection.

9. Typical Performance

Test Conditions: $V_D=6V$, $I_{dq}=1600mA$, $T_A=+25^\circ C$, (de-embedded data);

Table6. Typical Performance

Parameter	Conditions	Units	Typical							
Freq	—	GHz	17.7	18.1	18.3	18.7	19.1	19.3	19.7	
Small Signal Gain	—	dB	27.2	27.3	27.3	27.4	27.3	27.1	26.4	
Input Return Loss	—	dB	-12	-13	-13	-13	-12	-12	-13	
Output Return Loss	—	dB	-25	-15	-13	-12	-15	-18	-22	
P1dB	—	dBm	33.5	33.7	33.8	34.2	34.5	34.4	34.0	
PSAT	—	dBm	34.5	34.6	34.7	35.0	35.2	35.1	34.5	
IMD3	+20 dBm SCL, $\Delta F=10MHz$	dBc	-45	-44	-45	-44	-45	-45	-45	
Noise Figure	—	dB	4.9	4.9	5.0	5.1	5.3	5.5	5.8	

10. Performance Plots

Test Conditions: $V_D=6V$, $I_{dq}=1600mA$, $T_A=+25^\circ C$, (de-embedded data);

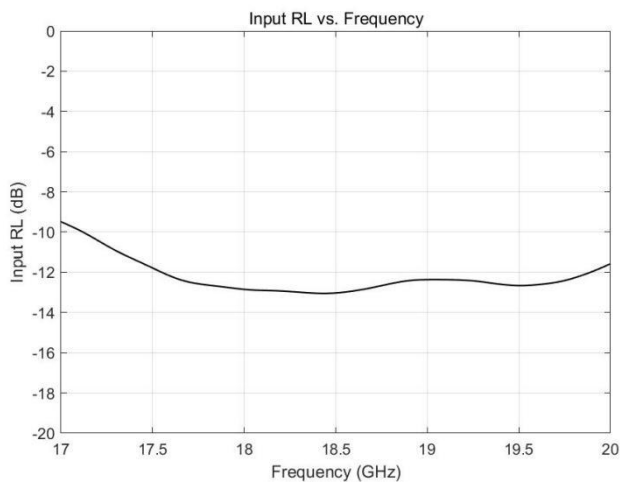


Figure3.

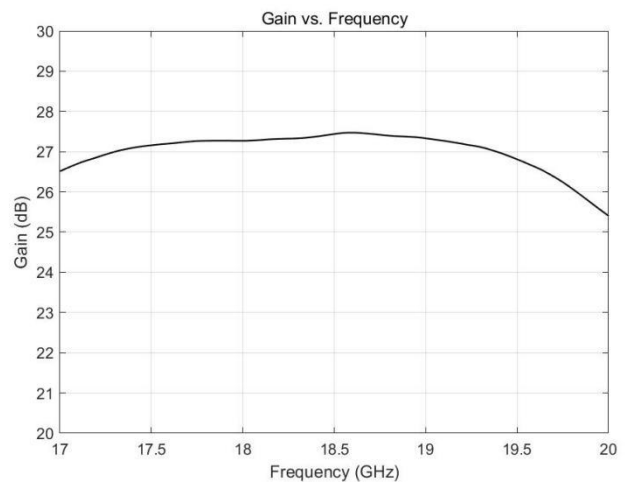


Figure4.

Performance Plots (Cont.)

Test Conditions: $V_D=6V$, $I_{dq}=1600mA$, $T_A=+25^\circ C$, (de-embedded data);

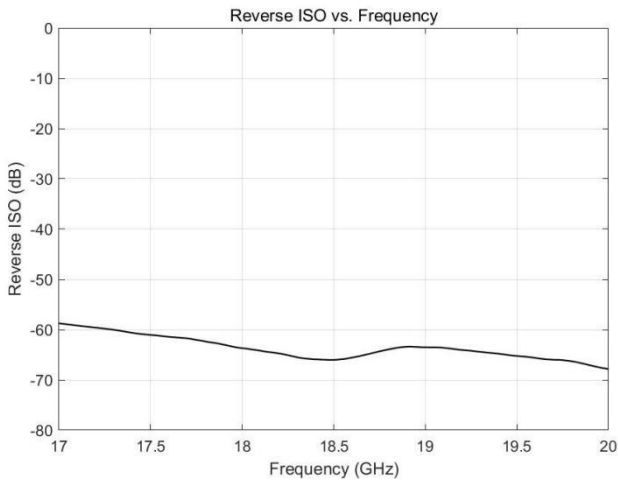


Figure5.

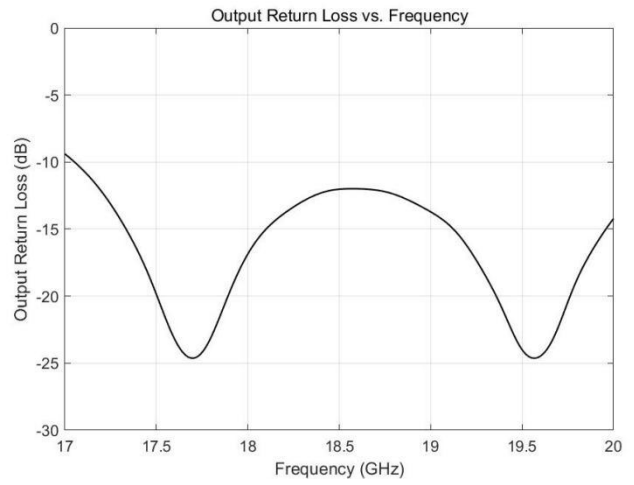


Figure6.

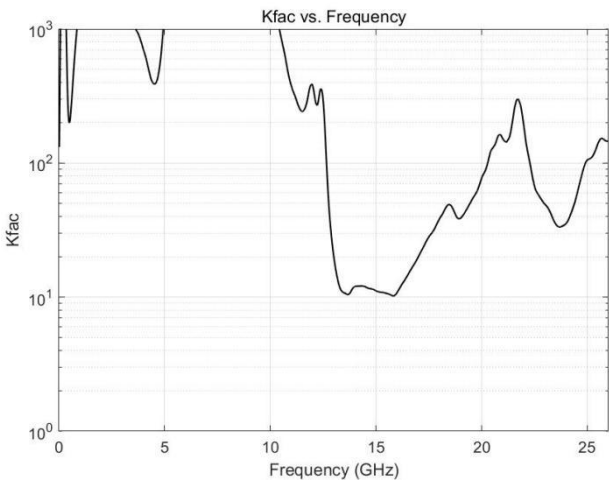


Figure7.

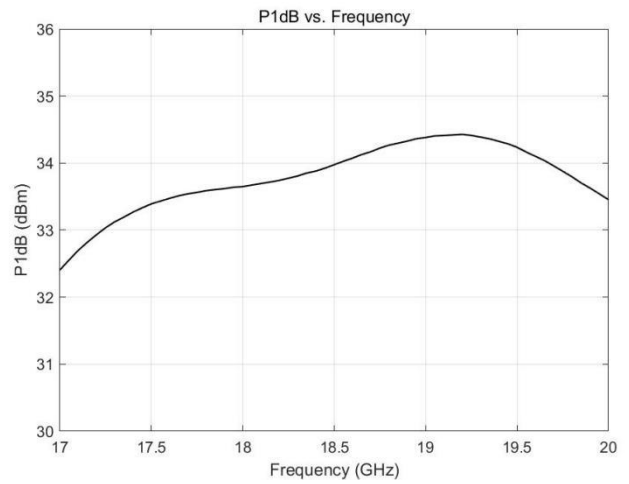


Figure8.

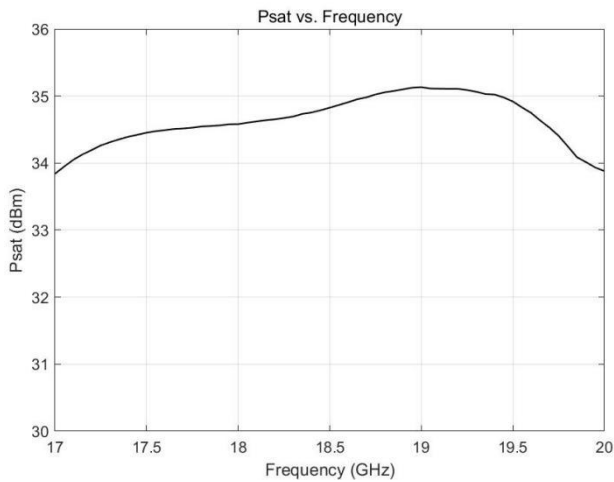


Figure9.

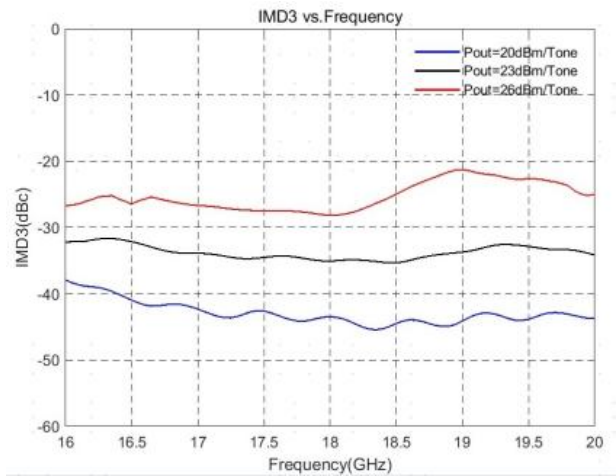


Figure10.

Performance Plots (Cont.)

Test Conditions: $V_D=6V$, $I_{dq}=1600mA$, $T_A=+25^\circ C$, (de-embedded data);

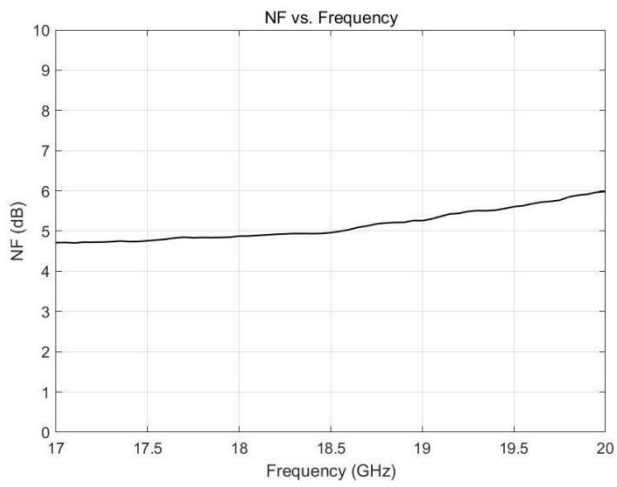
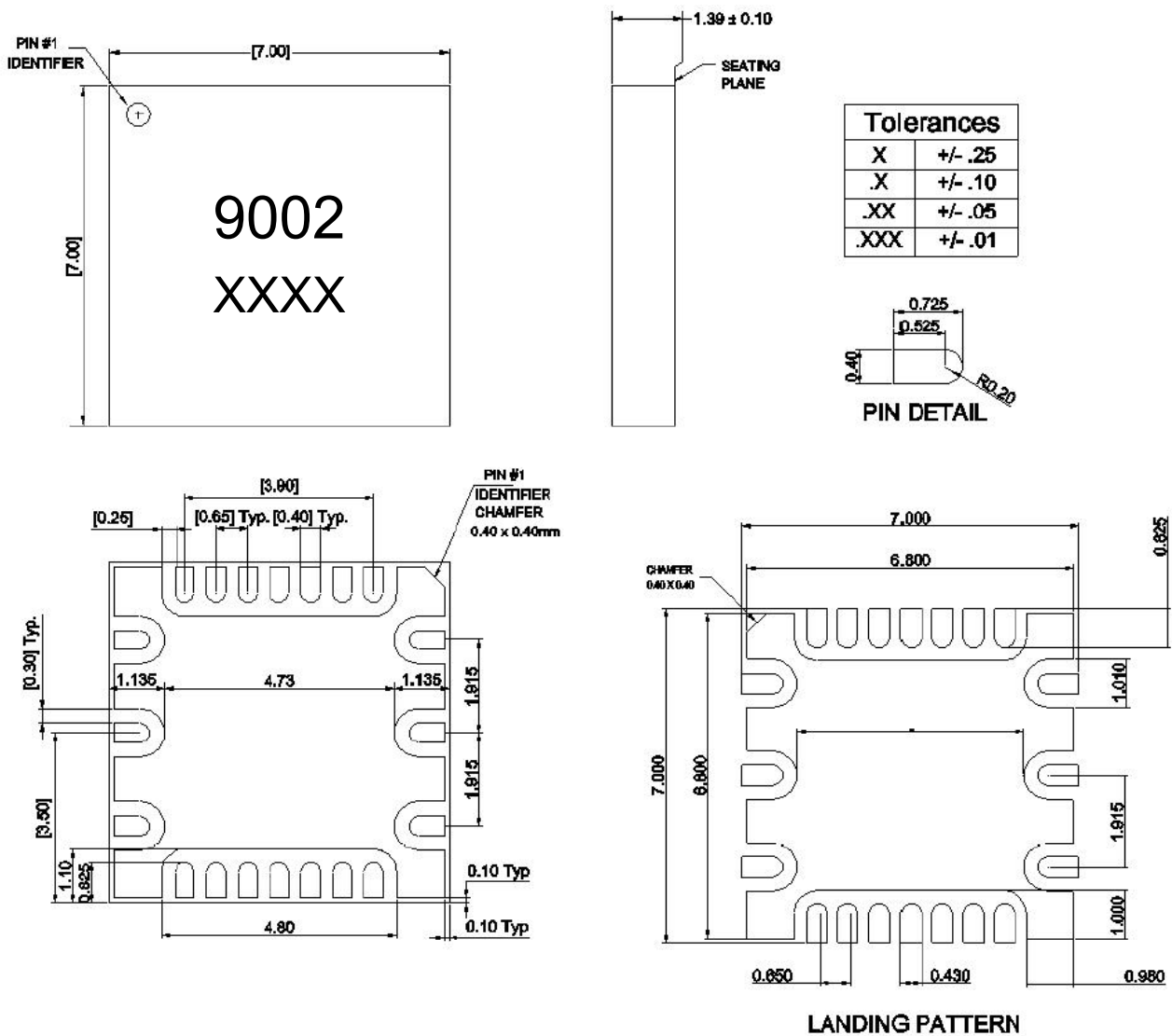


Figure11.

11. Package Marking and Outline Dimensions

- 1) All dimensions are in millimeters.
- 2) 20 pin 7x7x1.39mm Cavity Package.
- 3) Marking: Part number – 9002
Lot code - XXXX
- 4) Coplanarity applies to the exposed heat sink slug as well as the terminals.
- 5) The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.



12. Notice

12.1. Operating protection condition



Devices and circuit boards may be undetected. Although this product has an ESD protection circuit, the device may be damaged when encountering high energy ESD. Therefore, appropriate ESD prevention measures should be taken to avoid deterioration of device performance or loss of function.

12.2. Operate attention

1. Must be placed in a container with electrostatic protection function, dry environment, conditions permit the best storage nitrogen environment.
2. Please strictly comply with the ESD protection requirements to avoid electrostatic damage.
3. Use vacuum clamps or tweezers to avoid tools or fingers touching the product surface.

12.3. Solderability

Compatible with lead-free (260 °C maximum reflow temperature) soldering processes.

12.4. RoHS Compliance

This product is compliant with the EU RoHs2.0, EU Directive 2015/863.

12.5. Contact Information

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Important Notices and disclaimers

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