1. General Description

The ARF2009 is a low noise amplifier operating at 5900MHz-8500MHz, power supply +5V operation, at 68mA working current, can provide 16dB gain, OP1dB 14.9dBm, noise figure typical value of 1.14dB.The ARF2009 port impedance is 50 Ω.

2. Features

8 Pin 2X2 mm DFN Package

0.01GHz to 5GHz operation

High gain

Ultra-low Noise Figure

3. Applications

Notebooks, netbooks, and tablets

Access points, routers, and gateways

Wireless video systems

4. Functional Block Diagram

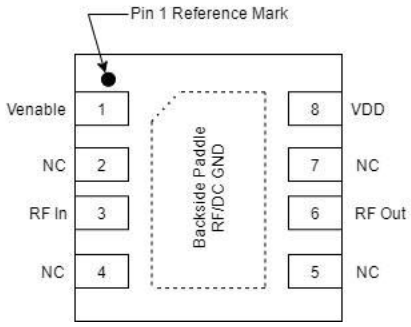


Figure1.

5. Order product model

ARF2009

Directory

6. Specifications

6.1. Electrical Specifications

Test Conditions: 50Ω system, VDD=5V, Venable=5V, Temp=+25℃, (de-embedded data);

Table1. Electrical Specifications

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Frequency Range			5.9		8.5	GHz
Test Frequency				7.1		GHz
Input Return Loss	S11			13.4		dB
Output Return Loss	S22			13.4		dB
Gain	S21			16		dB
Reverse ISO	S12			30.8		dB
OP1dB				14.9		dBm
IIP3		Pin=-25dBm/tone, Δf=1 MHz		11		dBm
Noise Figure	NF			1.14		dB
Drain Current				16		mA

6.2. Handling Ratings

Table2.Handling Ratings

Symbol	Parameter	Min	Typ	Max	Units
T_{STG}	Storage temperature range	-65		+150	℃
V_{ESD}	Human body model (HBM)		1000		V
	Charged device model (CDM)		1000		V

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.

Table4. Absolute Maximum Ratings

Parameter	Min	Typ	Max	Units
DC Supply Voltage (VDD、Venable)	0		5.5	V
RF Input Power (Pin), CW, 50ohms, T=25℃			25	dBm
Operating Temperature	-40		105	℃

8. Pin Assignments and Description

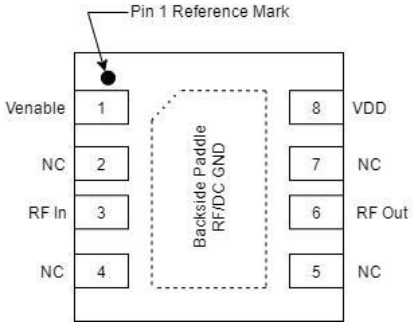


Figure2. Pin Assignments

Table5. Description

Pin No.	Mnemonic	Description
2、4、5、7	NC	No electrical connection. Provide grounded land pads for PCB mounting integrity.
1	Venable	Sets the quiescent current of the LNA.
3	RFIN	RF Input pin, DC Block is required.
6	RFOUT	RF output pin.
8	VDD	supply voltage
Backside Paddle	DC/RF GND	Use recommended via pattern to minimize inductance and thermal resistance.

9. Typical Performance

Test Conditions: 50Ω system, VDD=5V,Temp=+25℃, (de-embedded data);

Table6. Typical Performance

Parameter	Conditions	Units	Typical					
Frequency		MHz	5900	6500	7100	7500	8000	8500
Gain		dB	16.0	16.1	16.1	16.3	16.2	16.0
Input Return Loss		dB	13.4	14.8	15.8	15.8	14.8	13.9
Output Return Loss		dB	11.2	10.0	9.2	9.0	9.1	10.1
Reverse Isolation		dB	30	31	31	30	29	29
Output P1dB	Pin=-25dBm/tone,Δf=1 MHz	dBm	14.5	14.2	13.3	12.2	12.1	10.3
IIP3		dBm	11.0	13.3	12.2	9.5	9.7	7.5
Noise Figure		dB	1.14	1.23	1.18	1.25	1.28	1.32

10. Performance Plots

Test Conditions: 50Ω system, VDD=5V, Temp=+25℃, (de-embedded data);

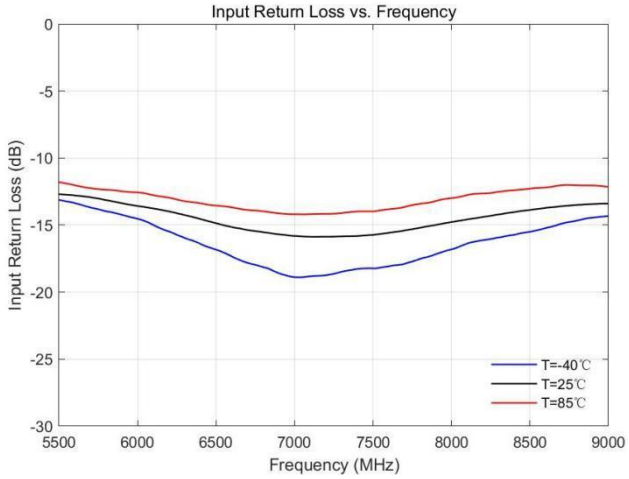


Figure3.

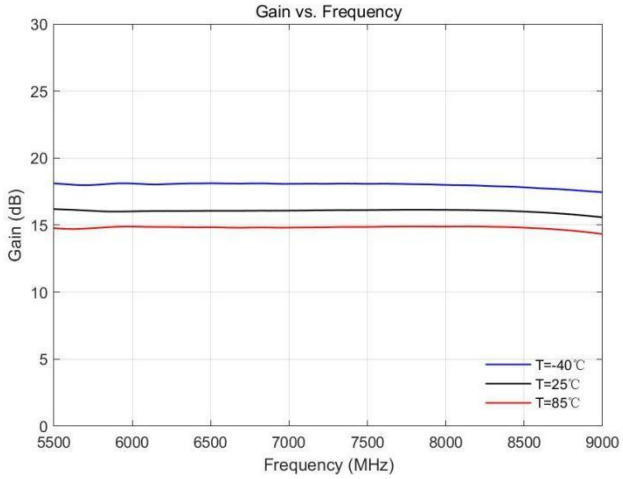


Figure4.

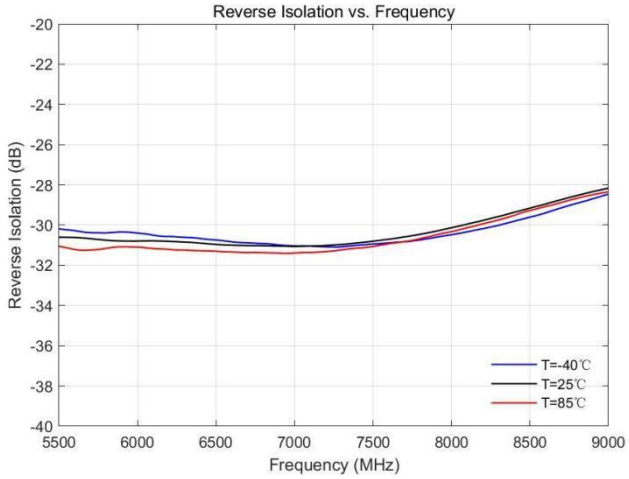


Figure5.

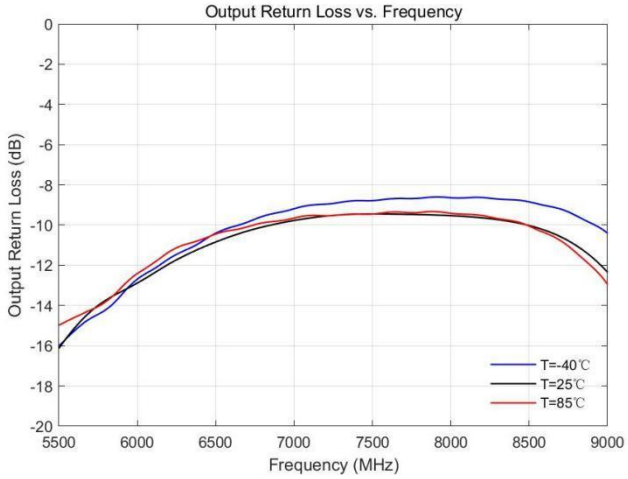


Figure6.

Performance Plots (Cont.)

Test Conditions: 50Ω system, VDD=5V, Temp=+25℃, (de-embedded data);

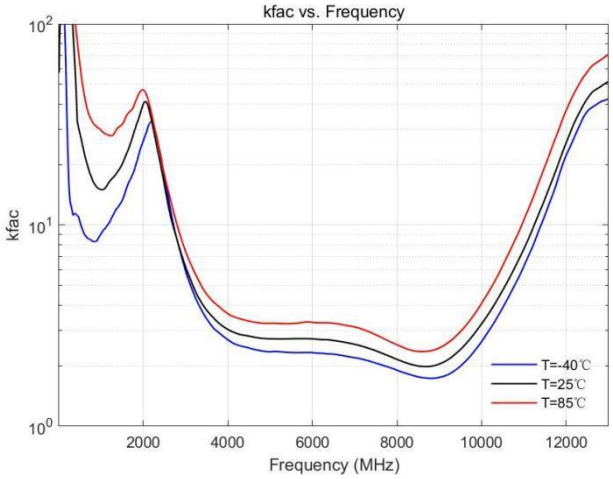


Figure7.

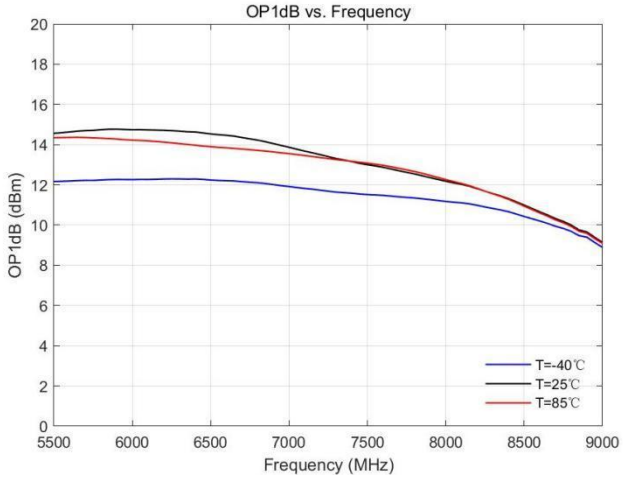


Figure8.

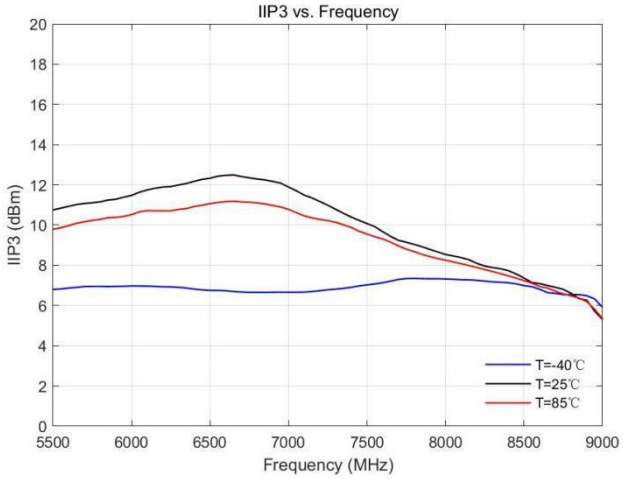


Figure9.

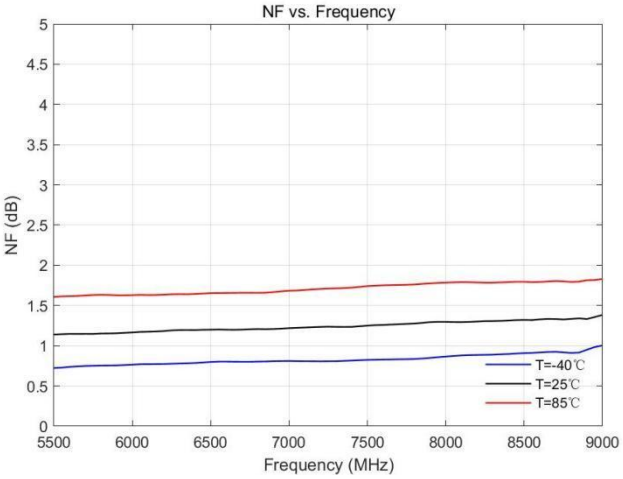


Figure10.

11. Application

11.1. PCB Evaluation Board

The ARF2009 device is typically placed in a system like the one shown below Figure11.

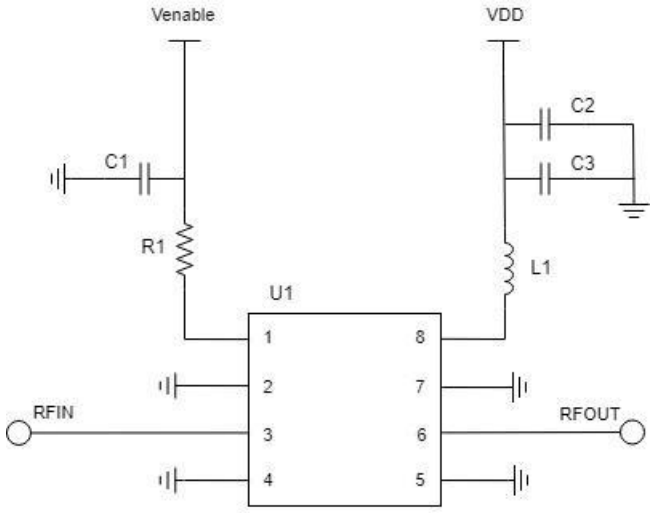


Figure11.

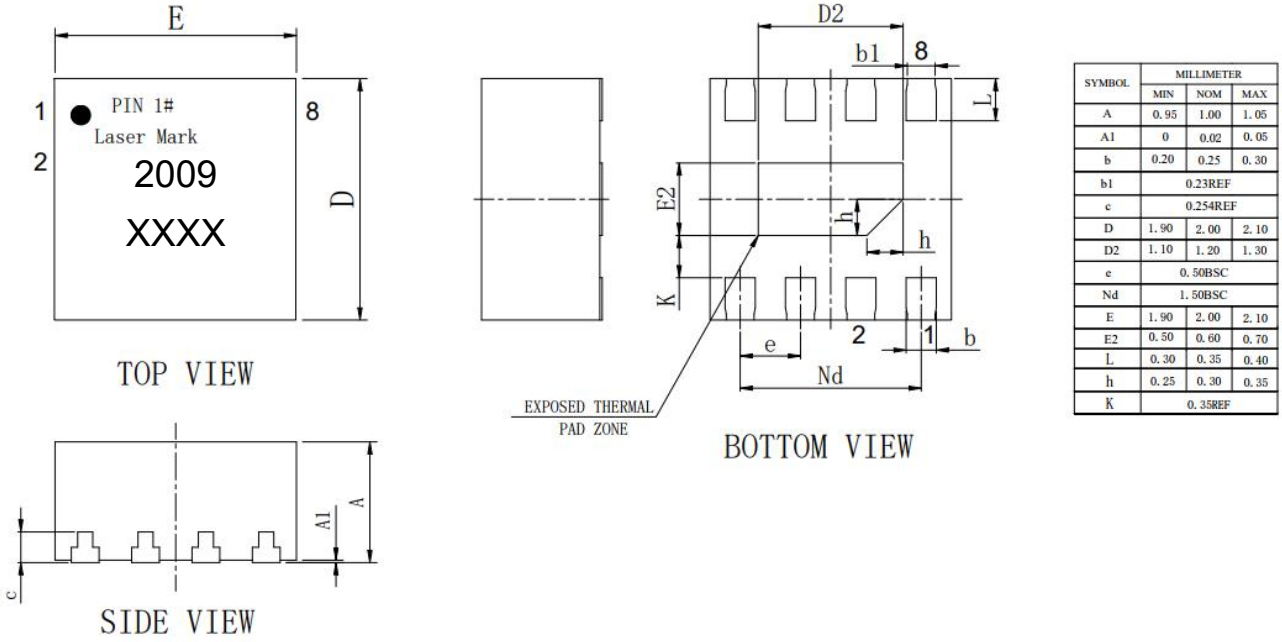
11.2. Evaluation Board BOM

Table7. Bill of Materials for Evaluation PCB

Item	Conditions	Value	Manuf.	Part Num.
PCB	N/A	N/A	ARF	ARF2009_Demo
U1	N/A	N/A	ARF	ARF2009
R1	N/A	1.5kohm	Various	0402
C1	N/A	1uF	murata	0402
C2	N/A	4.7uF	murata	0402
C3	N/A	100nF	murata	0402

12. Package Marking and Outline Dimensions

1) All dimensions are in millimeters.
2) DFN 8 pin 2x2x1mm Package.
3) Marking: Part number - 2009
   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.



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.95	1.00	1.05
A1	0	0.02	0.05
b	0.20	0.25	0.30
b1	0.23REF		
c	0.254REF		
D	1.90	2.00	2.10
D2	1.10	1.20	1.30
e	0.50BSC		
Nd	1.50BSC		
E	1.90	2.00	2.10
E2	0.50	0.60	0.70
L	0.30	0.35	0.40
h	0.25	0.30	0.35
K	0.35REF		

Figure12. Package Marking and Outline Dimensions

13. PCB Mounting Pattern

1) All dimensions are in millimeters.
2) Vias are required under the backside paddle of this device for proper RF/DC grounding and thermal dissipation.

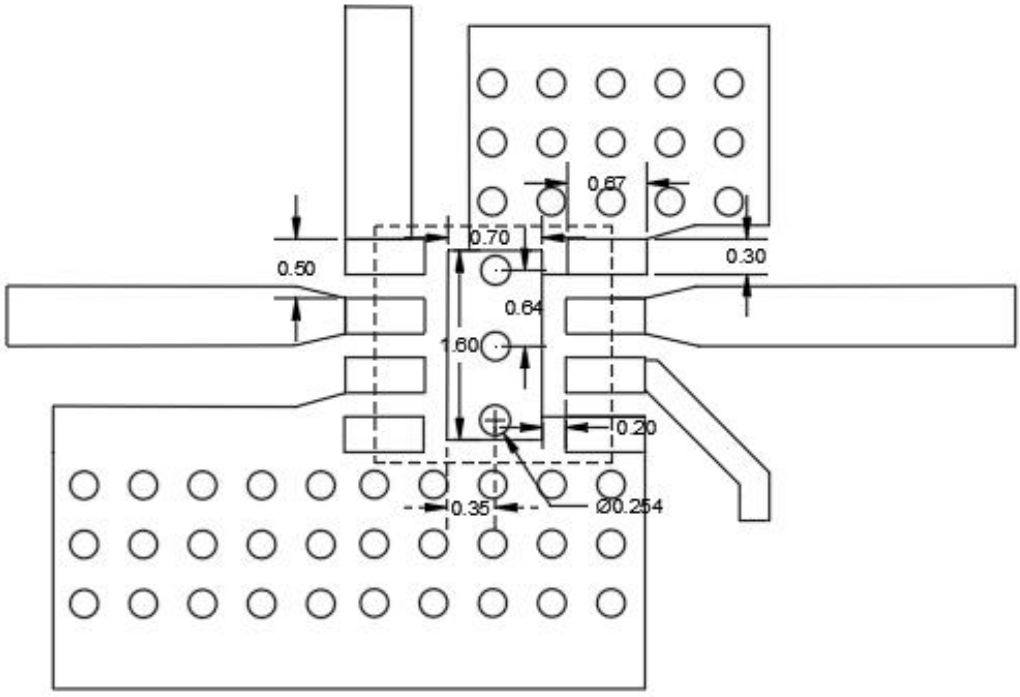


Figure13. PCB Layout Footprint (Top View)

14. Tape and Reel Information

14.1. Carrier and Cover Tape Dimensions

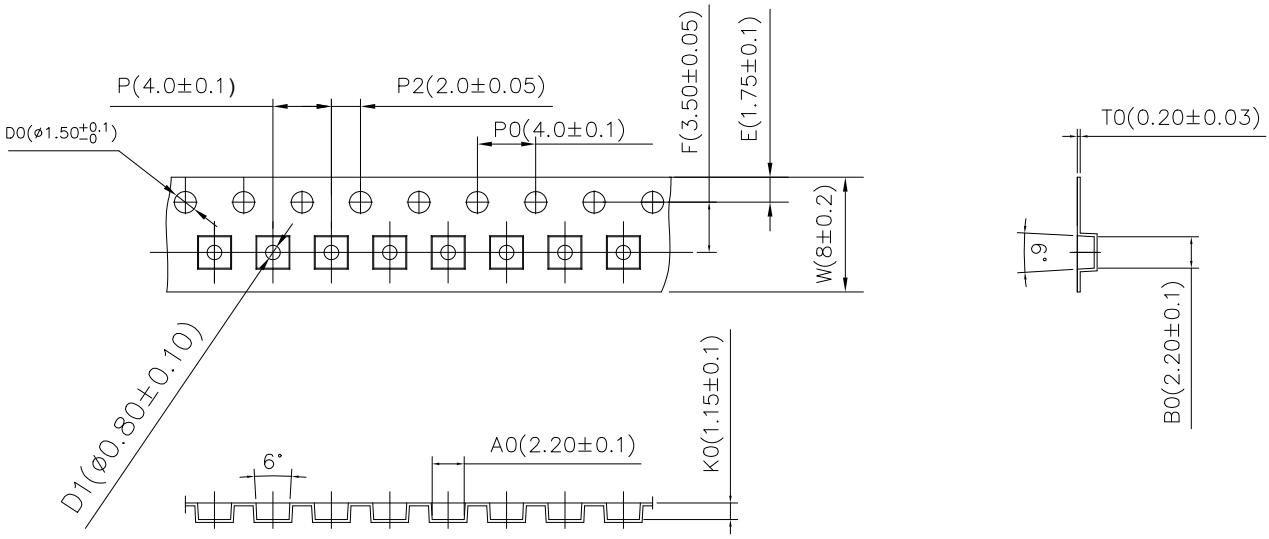


Figure14. Carrier and Cover Tape Dimensions

14.2. Reel Dimensions

Standard T/R size=3,000 pieces on a 7" rell.

15. Notice

15.1. 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.

15.2. 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.

15.3. Solderability

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

15.4. RoHS Compliance

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

15.5. Contact Information

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