

1. General Description

The ARF2102 is a GaAs pHEMT MMIC power Amplifier operating at 2GHz-4.2GHz, power supply +5V operation, at 110 mA working current, can provide 36.5dB Small Signal Gain, 28.5dBm P3dB. The ARF2102 port impedance is 50 Ω.

2. Features

- 36.5 dB Small Signal Gain
- 28.5 dBm P3dB
- 110 mA @ 5 V
- 16 Pin 3X3 mm QFN Package
- RoHS* Compliant

3. Applications

- 5G m-MIMO
- Mobile Infrastructure
- General Purpose Wireless
- TDD / FDD System

4. Functional Block Diagram

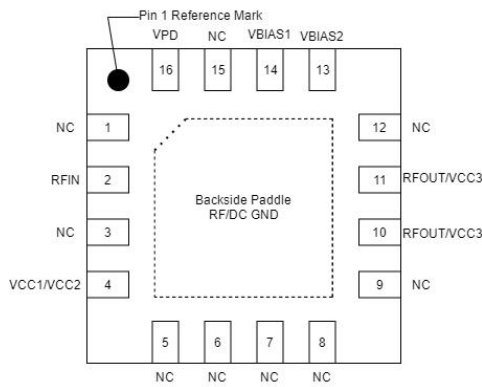


Figure1.

5. Order product model

ARF2102

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
6.3. Timing Requirements	3
7. Absolute Maximum Ratings	4
8. Pin Assignments and Description	5
9. Typical Performance	6
10. Performance Plots	6
11. Application	8
11.1. PCB Evaluation Board	8
11.2. Evaluation Board BOM	8
12. Package Marking and Outline Dimensions	9
13. Notice	10
13.1. Operating protection condition	10
13.2. Operate attention	10
13.3. Solderability	10
13.4. RoHS Compliance	10
13.5. Contact Information	10
Important Notices and disclaimers	11

6. Specifications

6.1. Electrical Specifications

Test Conditions: VCC1、VCC2、RFOUT、VCC3 = +5.0V, VPD = +1.8V, TA=+25°C, (de-embedded data);

Table1. Electrical Specifications

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Frequency Range			2		4.2	GHz
Test Frequency				2.6		GHz
Input Return Loss	S11			11		dB
Output Return Loss	S22			20		dB
Gain	S21			36.5		dB
Gain Flatness		Any 100 MHz BW within band			0.8	dB
OP1dB				27.5		dBm
OP3dB				28.5		dBm
Noise Figure	NF			6		dB
ACPR		Pout=+15 dBm, 2C NR 100MHz, 8dB PAR		-40		dBc
Quiescent Current, ICQ		VPD = HIGH		110		mA
Device Current, OFF		VPD = 0 V		5		mA
VPD, Logic Low			0		0.6	V
VPD, Logic High			1.2		3.6	V

6.2. Handling Ratings

Table2. Handling Ratings

Symbol	Parameter	Min	Typ	Max	Units
T _{STG}	Storage temperature range	-65		+150	°C
θ _{jc}	Thermal Resistance		60		°C/W
V _{ESD}	Human body model (HBM)		700		V
	Charged device model (CDM)		1000		V

6.3. Timing Requirements

Table3. Timing Requirements

Parameter	Conditions	Min	Typ	Max	Units
Switching Time OFF	50% Ctrl to 10/90% RF		500		ns
Switching Time ON	50% Ctrl to 10/90% RF		500		ns

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 (VCC1, VCC2, RFOUT, VCC3)	0	+5	+5.5	V
Enable Voltage (VPD)	1.2		3.6	V
Disable Voltage (VPD)	0		0.6	V
RF Input Power (Pin), CW, 50ohms, TA=25°C			25	dBm
RF Input Power (Pin), CW, Off State, T=25°C			25	dBm
Operating Temperature	-40		+105	°C

8. Pin Assignments and Description

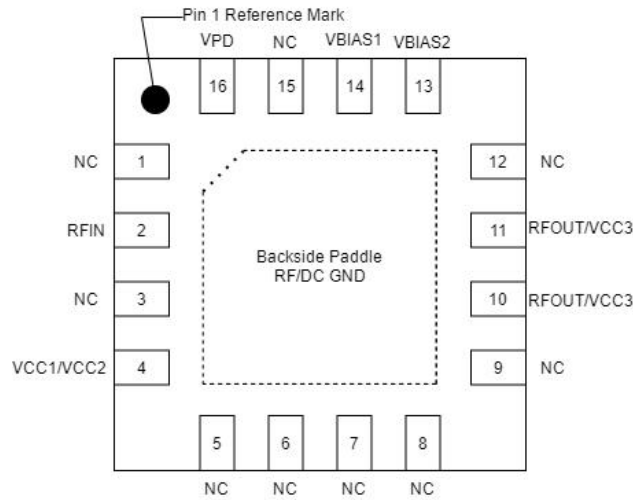


Figure2. Pin Assignments

Table5. Description

Pin No.	Mnemonic	Description
1, 3, 5, 6, 7, 8, 9, 12, 15	NC	No Connection
2	RFIN	RF input port
4	VCC1/VCC2	First and second stage DC supply.
10, 11	RFOUT/VCC3	RF output and third stage DC supply. External choke and DC block capacitor required.
13	VBIAS2	Sets the quiescent current of the AMP.
14	VBIAS1	Sets the quiescent current of the AMP.
16	VPD	PA on/off logic control.
Backside Paddle	GND	RF Ground and DC power supply Ground

9. Typical Performance

Test Conditions: VCC1、VCC2、RFOUT、VCC3 = +5.0V, VPD = +1.8V, TA=+25°C, (de-embedded data);

Table6. Typical Performance

Parameter	Conditions	Units	Typical	
Frequency		MHz	2600	3500
Gain		dB	36.5	38.5
Input Return Loss		dB	11	15
Output Return Loss		dB	20	15
Reverse Isolation		dB	56	52
OP1dB		dBm	27.5	27
OP3dB		dBm	28.5	28
ACPR	Pout=+15 dBm, 2C NR 100MHz, 8.5dB PAR	dBc	-40	-37
Noise Figure		dB	6	5.5

10. Performance Plots

Test Conditions: VCC1、VCC2、RFOUT、VCC3 = +5.0V, VPD = +1.8V, TA=+25°C, (de-embedded data);

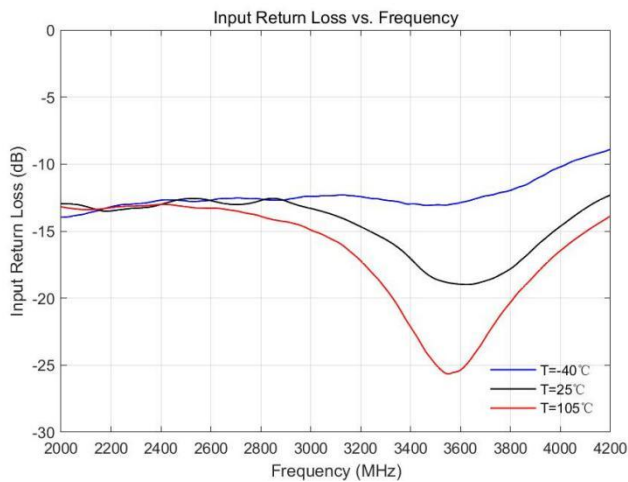


Figure3.

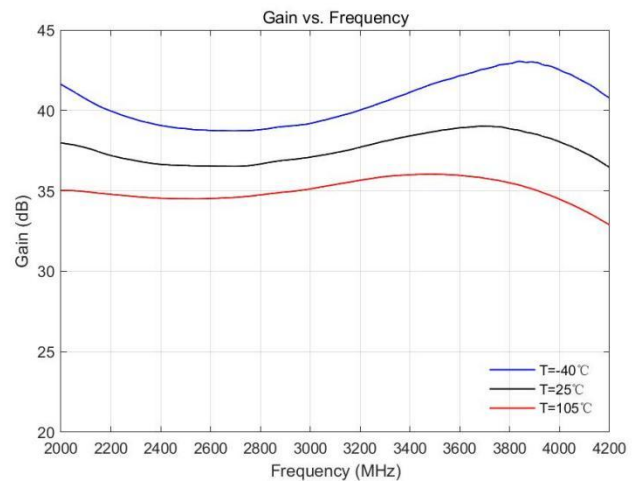


Figure4.

Performance Plots (Cont.)

Test Conditions: VCC1、VCC2、RFOUT、VCC3 = +5.0V, VPD = +1.8V, TA=+25°C, (de-embedded data);

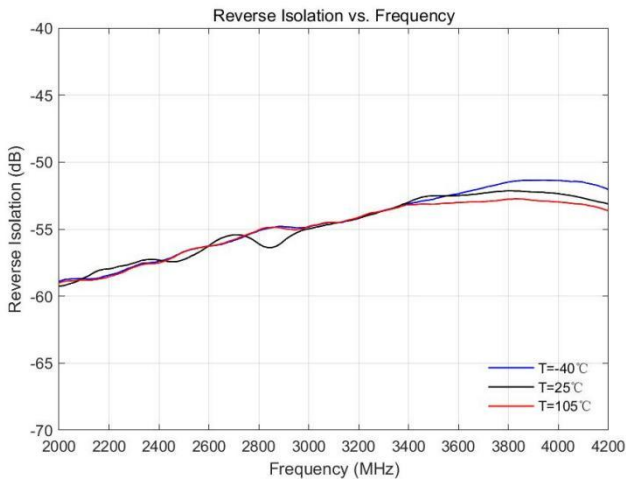


Figure5.

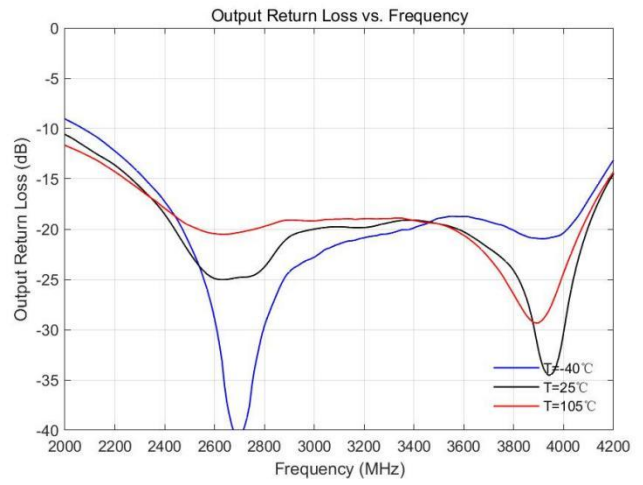


Figure6.

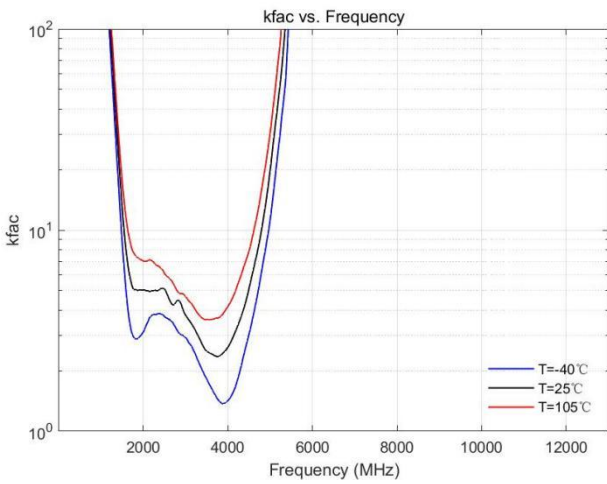


Figure7.

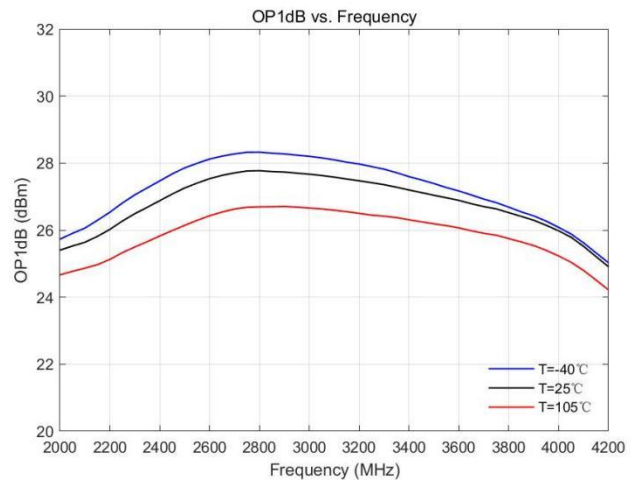


Figure8.

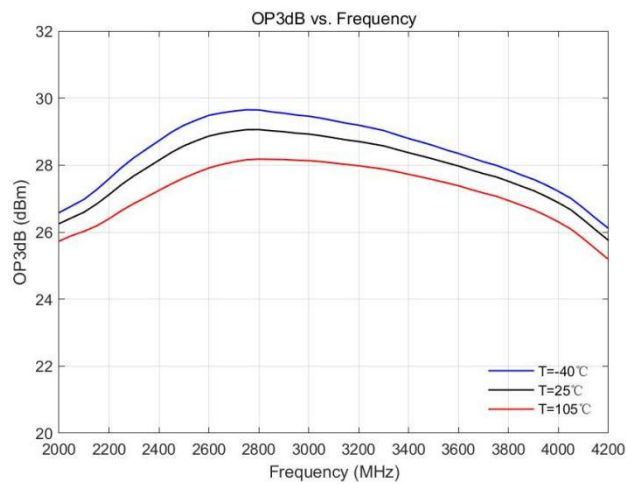


Figure9.

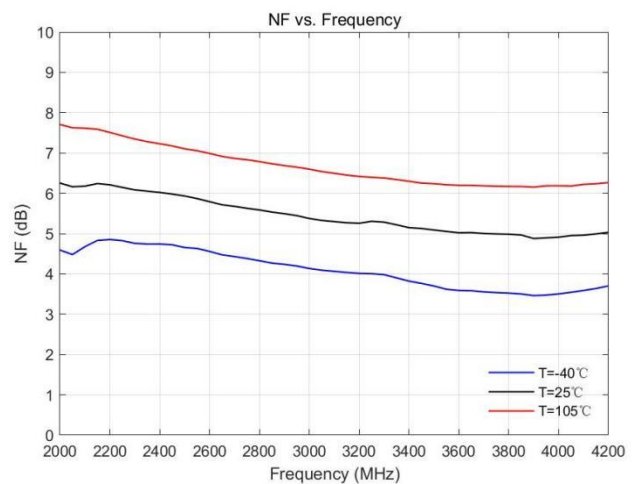


Figure10.

11. Application

11.1. PCB Evaluation Board

The ARF2102 device is typically placed in a system like the one shown below Figure11.

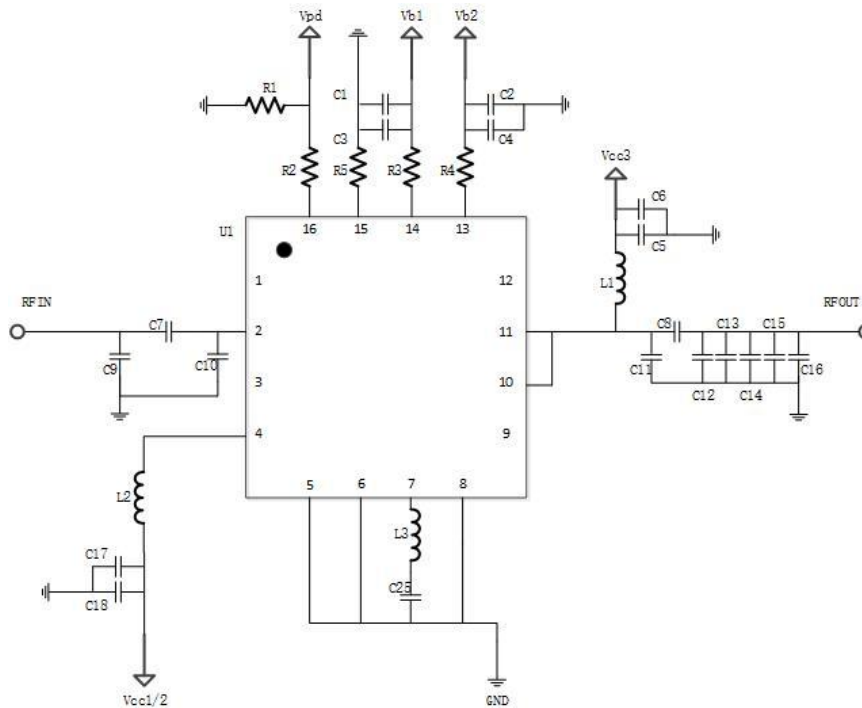


Figure11.

11.2. Evaluation Board BOM

Table7. Bill of Materials for Evaluation PCB

Item	Conditions	Value	Manuf.	Part Num.
PCB		N/A	ARF	ARF2102_Demo
U1		N/A	ARF	ARF2102
C10、C14		0.5pF	Muerta	0402
C11		1.5pF	Muerta	0402
C3、C4、C5、C17		100pF	Muerta	0402
C1、C2、C6、C18		4.7uF	Muerta	0402
C7、C8		1nF	Muerta	0402
R2、L2		0Ω	Muerta	0402
R3		1.3kΩ	Muerta	0402
R4		1.2kΩ	Muerta	0402
L1		2.2nH	LQG	0402

12. Package Marking and Outline Dimensions

- 1) All dimensions are in millimeters.
- 2) QFN 16 pin 3x3x0.85mm Package.
- 3) Marking: Part number - 2102
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.

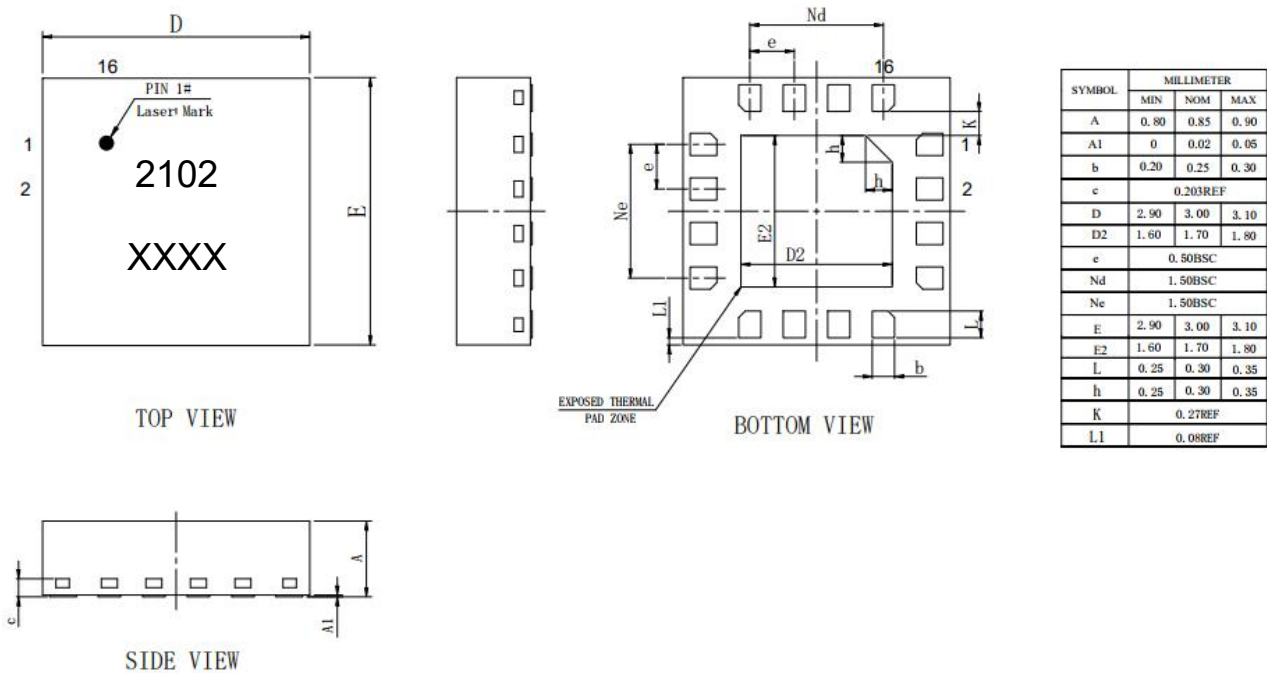


Figure12. Package Marking and Outline Dimensions

13. Notice

13.1. 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.

13.2. 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.

13.3. Solderability

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

13.4. RoHS Compliance

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

13.5. Contact Information

Telephone: 65-31580333 / 65-80673575

Email: sales@arf-semi.com

Website: www.arf-semi.com

Address: 3E Gambas Crescent Singapore 757033

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