

Product Features

Frequency: 30MHz~4.5GHz

Gain: 30.5dB@2GHz

Output Power for 1dB Compression:

19.2dBm@2GHz

Noise Figure: 0.8dB@2GHz

Output Third-Order Interception:

30.6dBm@2GHz

+3.3V/+5V Single Power Supply

93mA@Vdd=5V(Normal Operation Mode)

75mA@Vdd=5V(Low-power Operation Mode)

56mA@Vdd=3.3V(Normal Operation Mode)

45mA@Vdd=3.3V(Low-power Operation

Mode)

Package: QFN16 (3mm×3mm)

General Description

The BR9372FDJ is a wideband MMIC low noise amplifier designed using GaAs process in a small surface-mount QFN16 package. At 2GHz, the amplifier typically provides 30.5dB gain, 0.8dB noise figure, 19.2dBm Output P1dB and 30.6dBm OIP3. The amplifier is powered by a single supply voltage of +5V or +3.3V. The product has the characteristics of low noise and high gain flatness, and supports a low-power mode, which makes it suitable for applications with stringent power consumption requirements.

Application

Radio

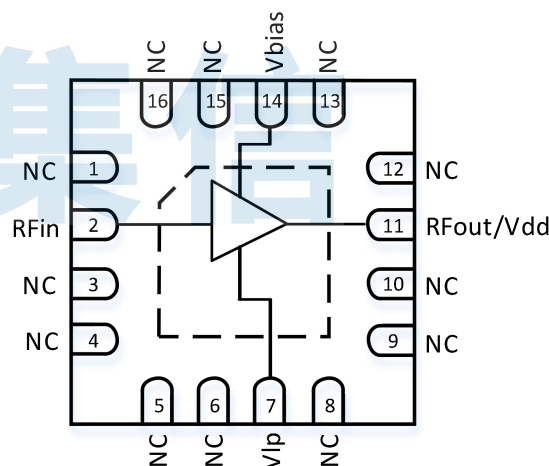
Communication Base Station

Test and measuring equipment

Radar System

Navigation Equipment

Functional Block Diagram



Ordering Information

Part Number	Package	Description
BR9372FDJ	QFN16	30MHz ~ 4.5GHz Low Noise Amplifier

Electrical Specifications

Parameter	Test Condition	Min.	Typ.	Max.	Units
Gain	30MHz	-	29.5	-	dB
	2000MHz	-	30.5	-	
	4000MHz	-	30.3	-	
Input Return Loss	30MHz	-	-12.3	-	dB
	2000MHz	-	-22.8	-	
	4000MHz	-	-11.7	-	
Output Return Loss	30MHz	-	-16.3	-	dB
	2000MHz	-	-29.1	-	
	4000MHz	-	-13.3	-	
Reverse Isolation	30MHz	-	-58.6	-	dB
	2000MHz	-	-42.3	-	
	4000MHz	-	-39.4	-	
Output Power for 1dB Compression	30MHz	-	19.3	-	dBm
	2000MHz	-	19.2	-	
	4000MHz	-	19.8	-	
Output Third-Order Interception	30MHz	-	26.9	-	dBm
	2000MHz	-	30.6	-	
	4000MHz	-	29.7	-	
Noise Figure	30MHz	-	2.2	-	dB
	2000MHz	-	0.8	-	
	4000MHz	-	1.1	-	
Supply Voltage	-	-	5	-	V
Supply Current	-	-	93	-	mA
Test Conditions: Vdd=+5V, I=93mA, OIP3 spacing=1MHz, Pout=5dBm/tone, TA=+25°C					

Absolute Maximum Ratings

Maximum Operating Voltage: +7V

Maximum input Power: +22dBm

Recommended Operating Conditions

Supply Voltage: +5V

Supply Current:

93mA@Vdd=5V (Normal Operation Mode)

Storage Temperature: -65°C ~ +150°C

Operating Temperature: -55°C ~ +125°C

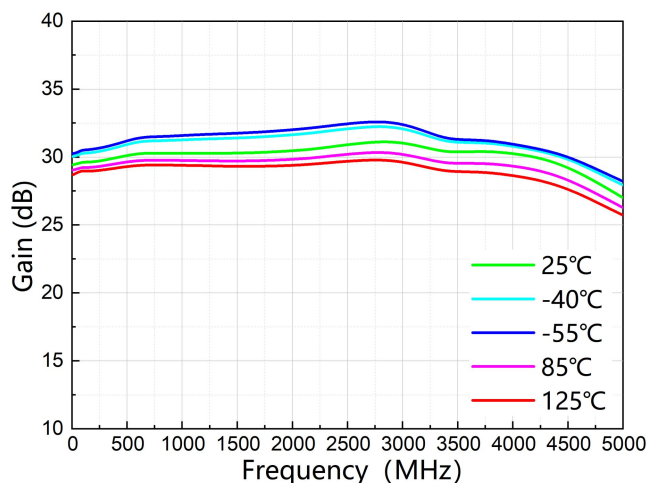
Note: Operation of the device outside the parameter ranges given absolute-maximum-ratings conditions may cause permanent damage, and. exposure to absolute-maximum-ratings conditions for extended periods will affect the reliability.

ESD Warnings**ELECTROSTATIC SENSITIVE DEVICE****OBSERVE HANDLING PRECAUTIONS****ESD Rating: Class 1A**

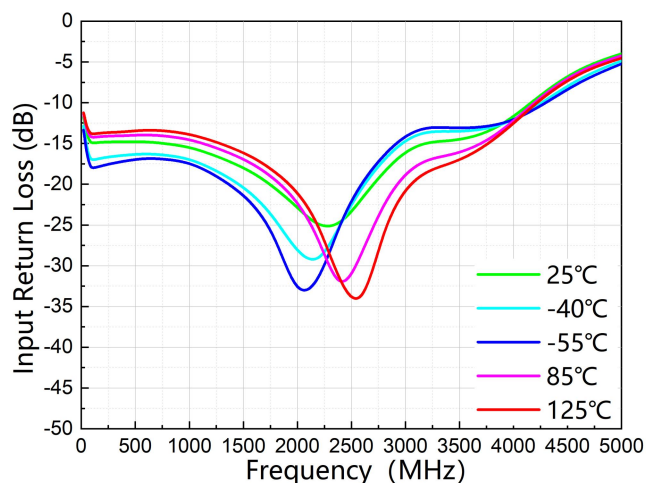
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Typical Performance (EVB test results at +5V supply voltage in normal operation mode)

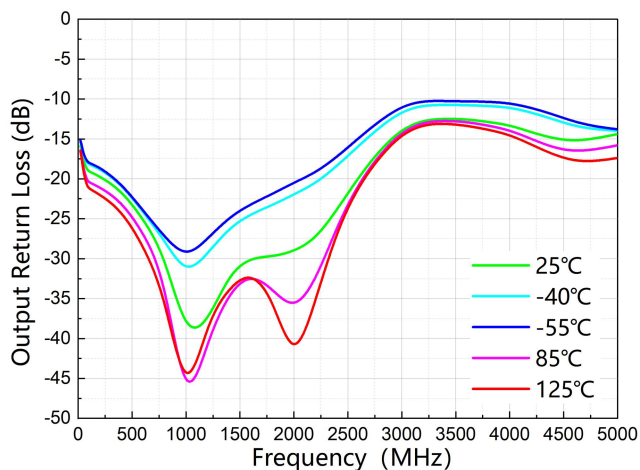
Parameter	Typ.											Units
Frequency	30	50	100	200	400	600	1000	1200	1400	1600	1800	MHz
Gain	29.5	29.5	29.6	29.6	29.9	30.3	30.3	30.3	30.3	30.3	30.4	dB
Input Return Loss	-12.3	-13.9	-15.0	-14.8	-14.8	-14.8	-15.4	-16.3	-17.4	-18.6	-20.5	dB
Output Return Loss	-16.3	-17.8	-19.1	-19.7	-21.5	-24.9	-39.8	-38.0	-31.8	-29.8	-29.7	dB
Reverse Isolation	-58.6	-63.2	-64.4	-58.0	-53.0	-49.4	-46.6	-45.6	-44.7	-43.8	-43.0	dB
Output Power for 1dB Compression	19.3	19.5	19.6	19.6	19.7	19.4	19.6	19.5	19.5	19.4	19.4	dBm
Output Third-Order Interception	26.9	27.9	29.2	29.8	29.9	29.7	30.2	30.2	30.3	30.2	30.4	dBm
Noise Figure	2.2	1.6	1.2	0.9	0.7	0.7	0.8	0.8	0.7	0.8	0.8	dB
Frequency	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4400	MHz
Gain	30.5	30.6	30.8	31.0	31.1	31.1	30.7	30.3	30.4	30.4	29.6	dB
Input Return Loss	-22.8	-25.4	-25.1	-21.7	-18.4	-15.9	-14.8	-14.7	-14.3	-13.4	-7.6	dB
Output Return Loss	-29.1	-27.5	-23.8	-19.8	-16.3	-13.8	-12.6	-12.5	-12.5	-12.9	-14.9	dB
Reverse Isolation	-42.3	-41.7	-41.1	-40.6	-40.1	-40.0	-40.2	-40.3	-40.0	-39.9	-38.4	dB
Output Power for 1dB Compression	19.2	19.1	19.2	19.1	19.2	19.3	19.3	19.4	19.3	19.8	20.1	dBm
Output Third-Order Interception	30.6	30.6	30.8	30.8	30.7	30.5	30.3	30.2	30.0	30.3	29.4	dBm
Noise Figure	0.8	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	1.0	1.0	dB
Test Conditions: Vdd=+5V, I=93mA, OIP3 spacing=1MHz, Pout=5dBm/tone, TA=+25°C												



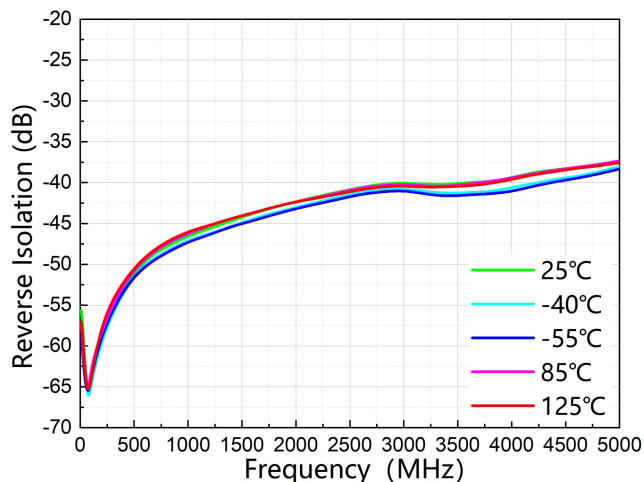
Gain vs. Freq



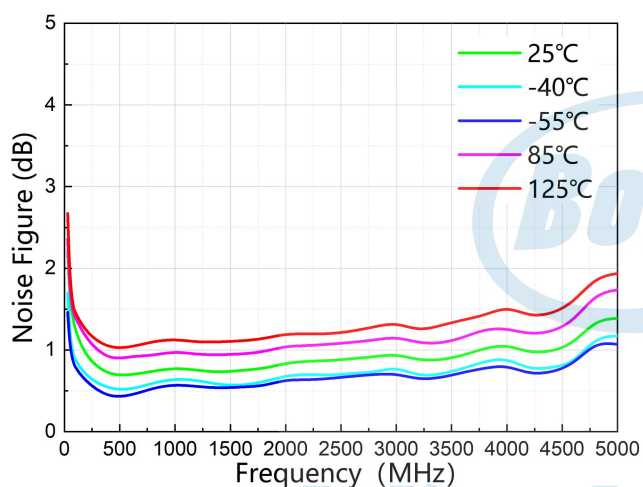
Input Return Loss vs. Freq



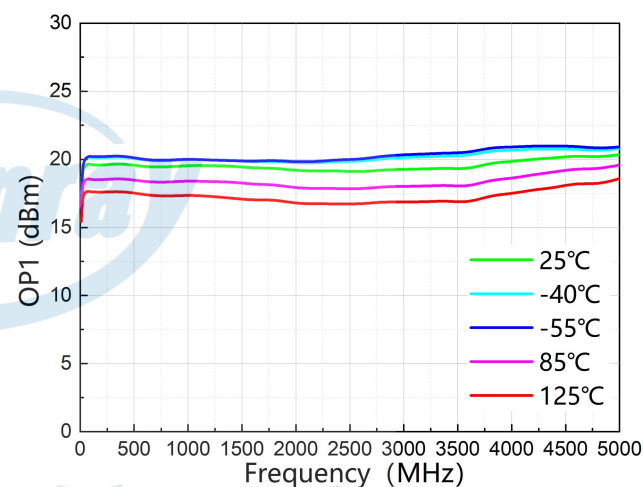
Output Return Loss vs. Freq



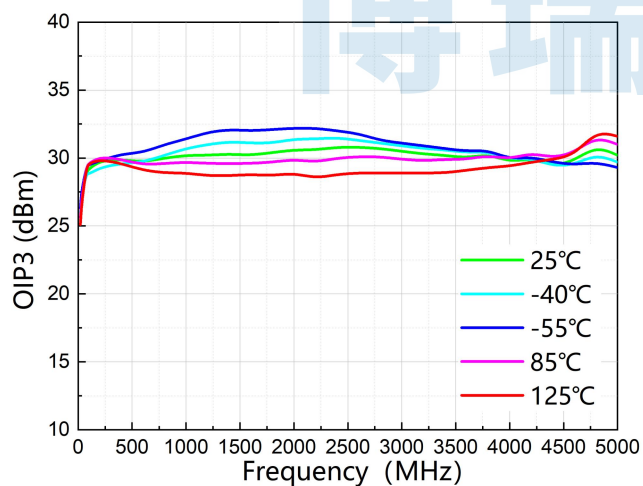
Reverse Isolation vs. Freq



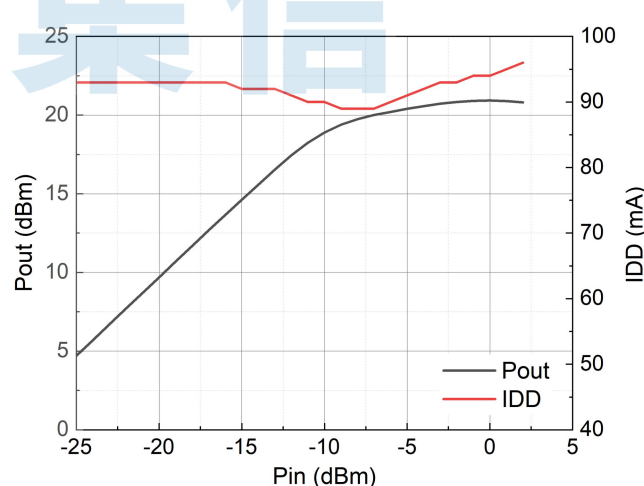
Noise Figure vs. Freq



Output Power for 1dB Compression vs. Freq



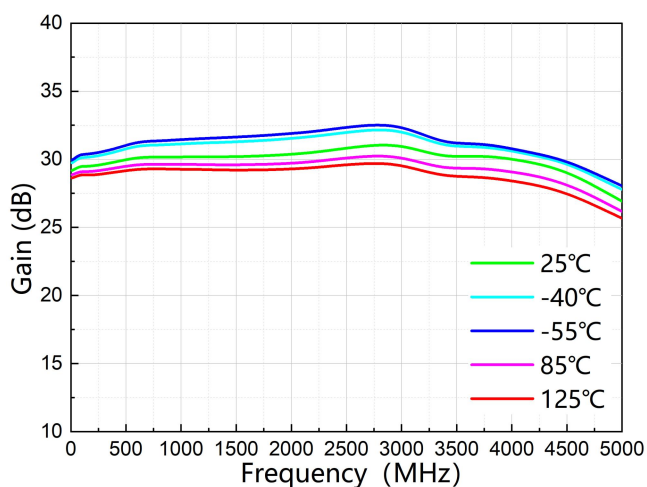
Output Third-Order Interception vs. Freq



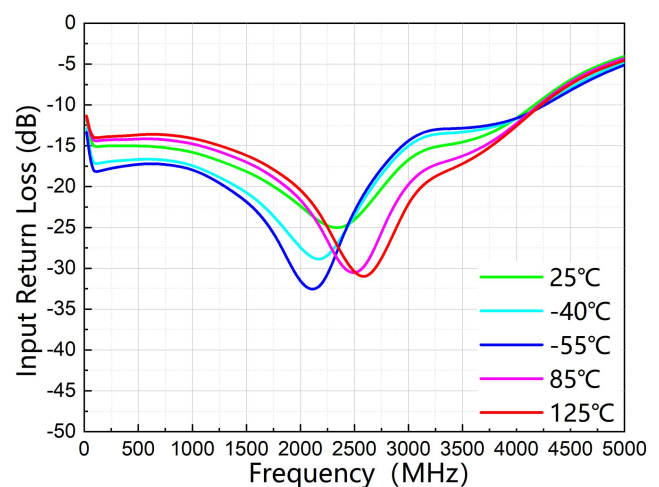
P_{out} , I_{DD} vs. $P_{in}(2GHz)$

Typical Performance (EVB test results at +5V supply voltage in low-power operation mode)

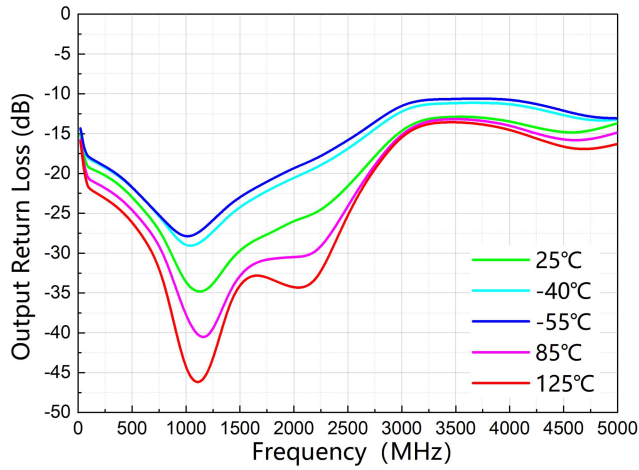
Parameter	Typ.											Units
Frequency	30	50	100	200	400	600	1000	1200	1400	1600	1800	MHz
Gain	29.3	29.3	29.5	29.5	29.8	30.2	30.2	30.2	30.2	30.2	30.3	dB
Input Return Loss	-12.4	-14.0	-15.2	-15.0	-15.0	-15.0	-15.7	-16.6	-17.6	-18.7	-20.4	dB
Output Return Loss	-15.7	-17.6	-19.3	-19.8	-21.5	-24.4	-34.7	-35.3	-30.7	-28.5	-27.4	dB
Reverse Isolation	-60.2	-63.7	-63.7	-58.5	-52.9	-49.7	-46.5	-45.5	-44.5	-43.7	-42.9	dB
Output Power for 1dB Compression	18.3	18.5	18.5	18.4	18.4	18.1	18.1	18.0	18.0	17.8	17.7	dBm
Output Third-Order Interception	27.0	27.9	29.0	29.3	29.3	29.0	29.2	29.1	29.1	29.1	29.2	dBm
Noise Figure	2.3	1.6	1.2	0.9	0.6	0.7	0.8	0.7	0.7	0.8	0.8	dB
Frequency	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4400	MHz
Gain	30.4	30.5	30.7	30.9	31.1	31.0	30.6	30.2	30.2	30.2	29.3	dB
Input Return Loss	-22.3	-24.7	-25.5	-22.8	-19.3	-16.5	-15.1	-14.8	-14.3	-13.3	-7.7	dB
Output Return Losss	-25.8	-25.1	-23.0	-20.2	-17.0	-14.4	-13.1	-12.9	-12.8	-13.0	-14.7	dB
Reverse Isolation	-42.2	-41.5	-41.0	-40.4	-40.0	-39.8	-39.9	-40.1	-40.0	-39.7	-38.4	dB
Output Power for 1dB Compression	17.5	17.3	17.2	17.0	17.2	17.1	17.1	17.1	17.0	17.7	18.8	dBm
Output Third-Order Interception	29.5	29.2	29.6	29.5	29.7	29.6	29.6	29.6	29.8	30.1	31	dBm
Noise Figure	0.8	0.9	0.8	0.9	0.9	1.0	0.8	0.9	0.9	1.0	1.0	dB
Test Conditions: Vdd=+5V, I=75mA, OIP3 spacing=1MHz, Pout=5dBm/tone, TA=+25°C												



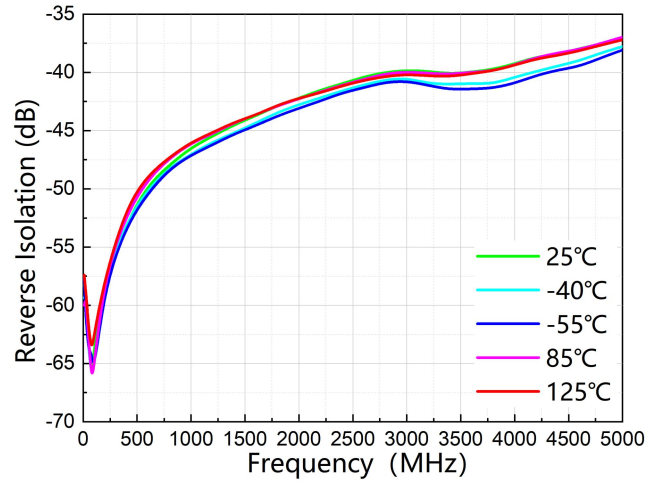
Gain vs. Freq



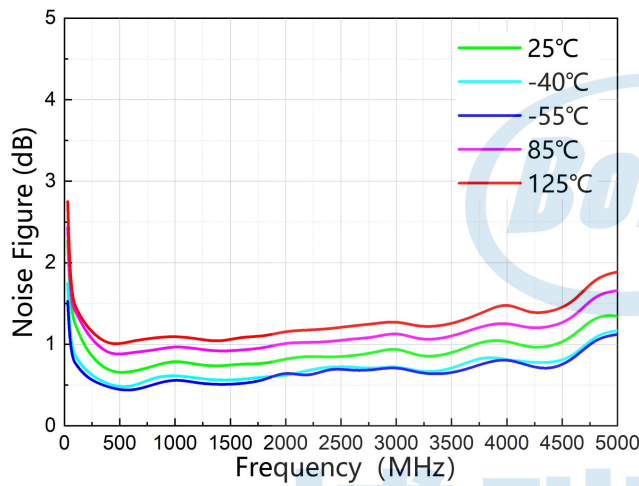
Input Return Loss vs. Freq



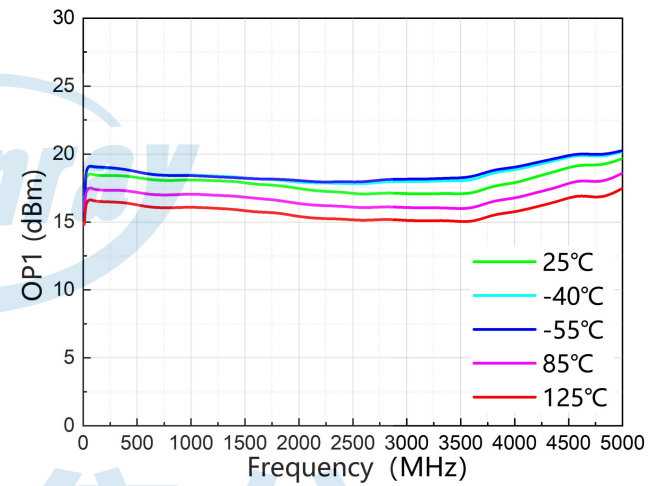
Output Return Loss vs. Freq



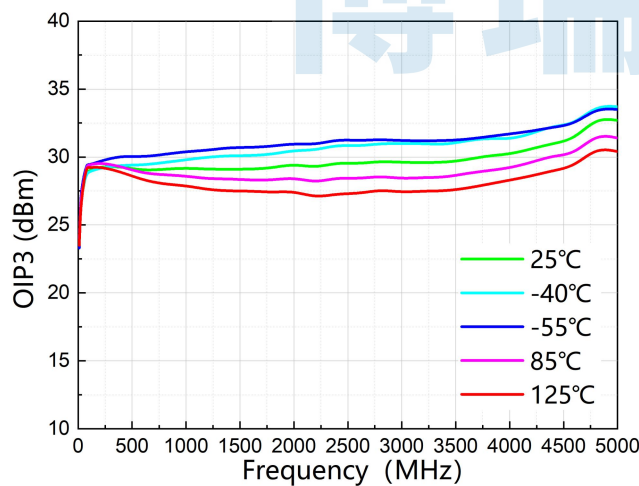
Reverse Isolation vs. Freq



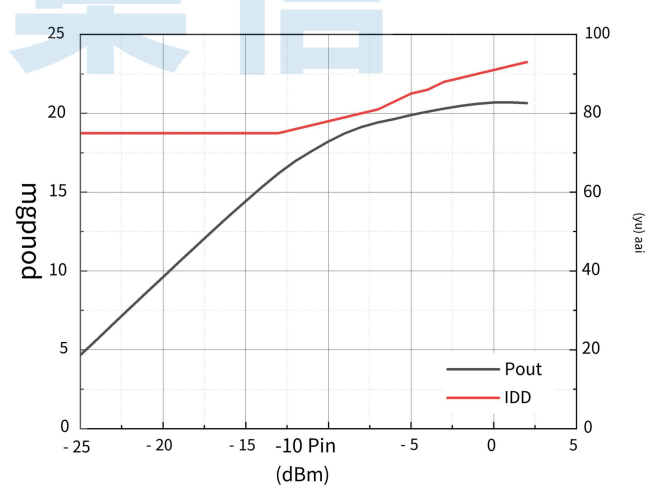
Noise Figure vs. Freq



Output Power for 1dB Compression vs. Freq



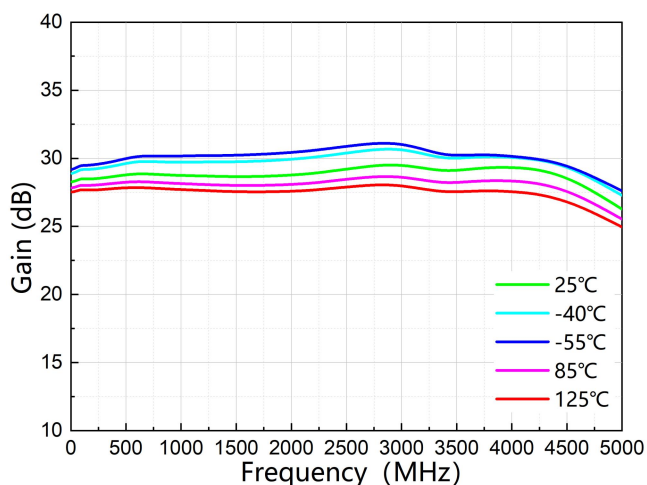
Output Third-Order Interception vs. Freq



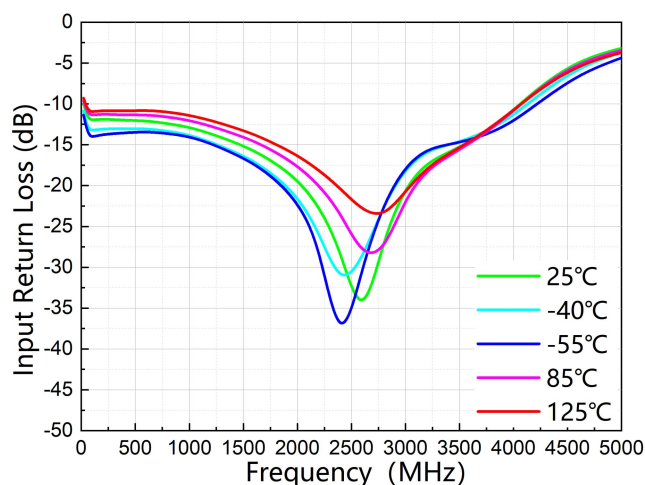
P_{out}, IDD vs. P_{in} (2GHz)

Typical Performance (EVB test results at +3.3V supply voltage in normal operation mode)

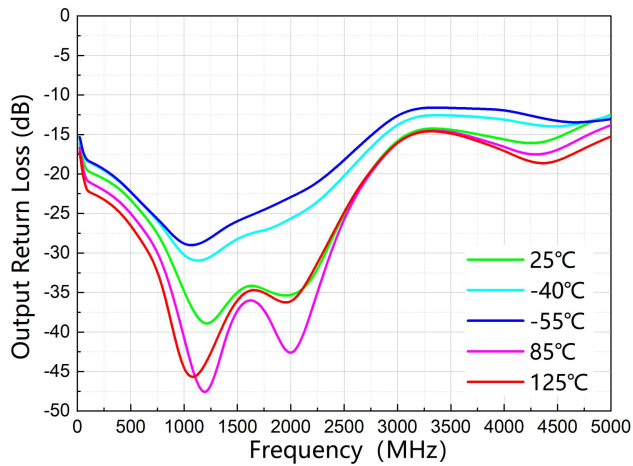
Parameter	Typ.											Units
Frequency	30	50	100	200	400	600	1000	1200	1400	1600	1800	MHz
Gain	28.3	28.4	28.5	28.5	28.7	28.9	28.7	28.7	28.7	28.7	28.7	dB
Input Return Loss	-10.3	-11.3	-12.0	-11.8	-12.0	-12.1	-12.8	-13.7	-14.6	-15.7	-17.3	dB
Output Return Loss	-16.7	-18.3	-19.7	-20.2	-21.7	-24.8	-35.1	-40.5	-36.2	-33.5	-35.0	dB
Reverse Isolation	-59.7	-63.5	-63.9	-57.0	-51.8	-49.0	-45.4	-44.4	-43.5	-42.8	-42.1	dB
Output Power for 1dB Compression	14.9	15.0	15.0	14.9	15.2	14.9	15.2	15.1	15.1	15.0	15.0	dBm
Output Third-Order Interception	26.4	27.3	27.0	27.0	26.9	26.6	26.4	26.2	26.2	26.2	26.2	dBm
Noise Figure	2.4	1.7	1.3	1.0	0.7	0.8	0.9	0.8	0.8	0.8	0.8	dB
Frequency	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4400	MHz
Gain	28.8	28.9	29.1	29.3	29.5	29.5	29.3	29.0	29.2	29.3	28.9	dB
Input Return Loss	-19.3	-22.5	-27.8	-37.4	-26.3	-20.1	-17.2	-15.9	-14.6	-12.9	-6.4	dB
Output Return Loss	-35.7	-33.8	-27.7	-22.5	-18.6	-15.6	-14.2	-14.2	-14.6	-15.1	-16.0	dB
Reverse Isolation	-41.4	-40.8	-40.2	-39.7	-39.2	-39.0	-39.1	-39.0	-38.7	-38.5	-37.1	dB
Output Power for 1dB Compression	14.9	14.9	14.9	14.9	15.0	14.9	14.9	14.9	14.4	15.4	16.2	dBm
Output Third-Order Interception	26.4	26.3	26.5	26.5	26.4	26.1	25.9	26.0	26.0	26.4	26.7	dBm
Noise Figure	0.9	0.9	1.0	1.0	1.0	1.0	0.9	0.9	1.0	1.1	1.0	dB
Test Conditions: Vdd=+3.3V, I=56mA, OIP3 spacing=1MHz, Pout=5dBm/tone, TA=+25°C												



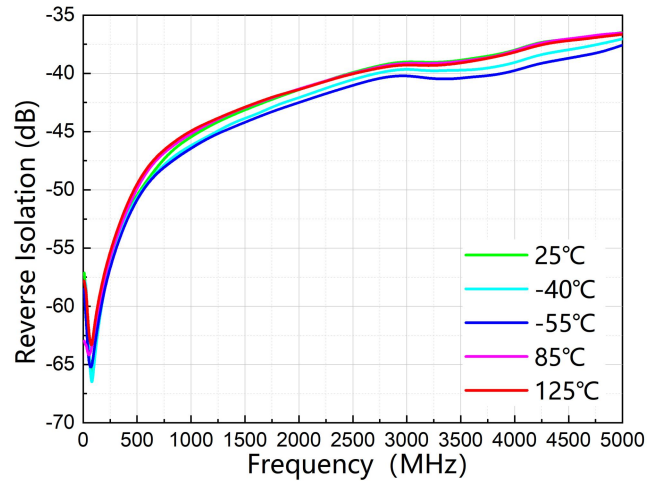
Gain vs. Freq



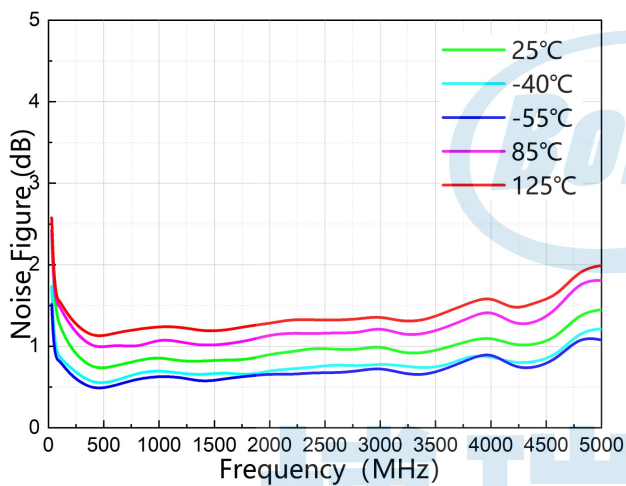
Input Return Loss vs. Freq



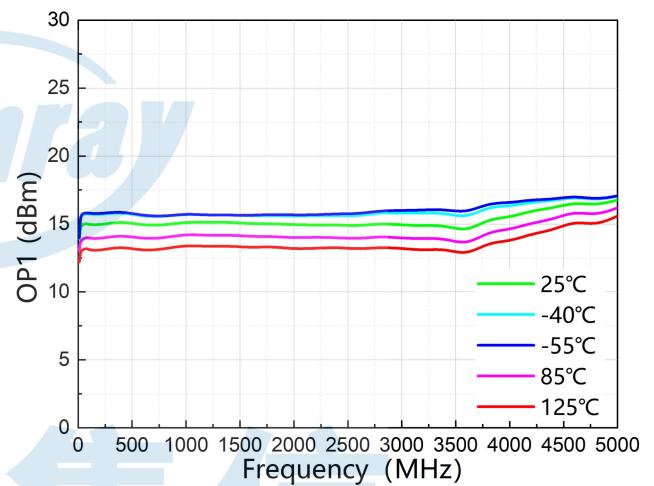
Output Return Loss vs. Freq



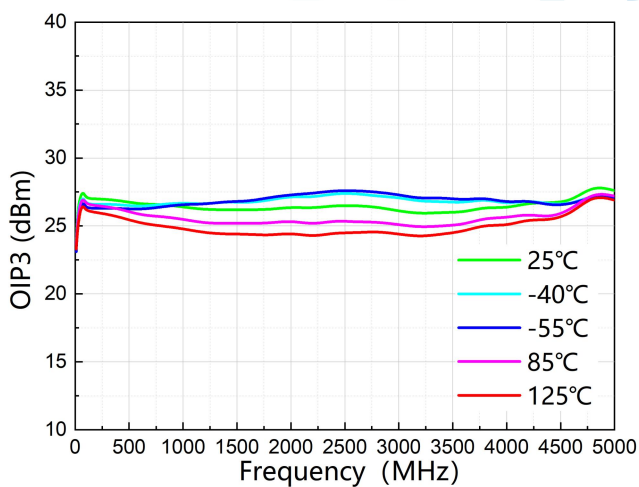
Reverse Isolation vs. Freq



Noise Figure vs. Freq

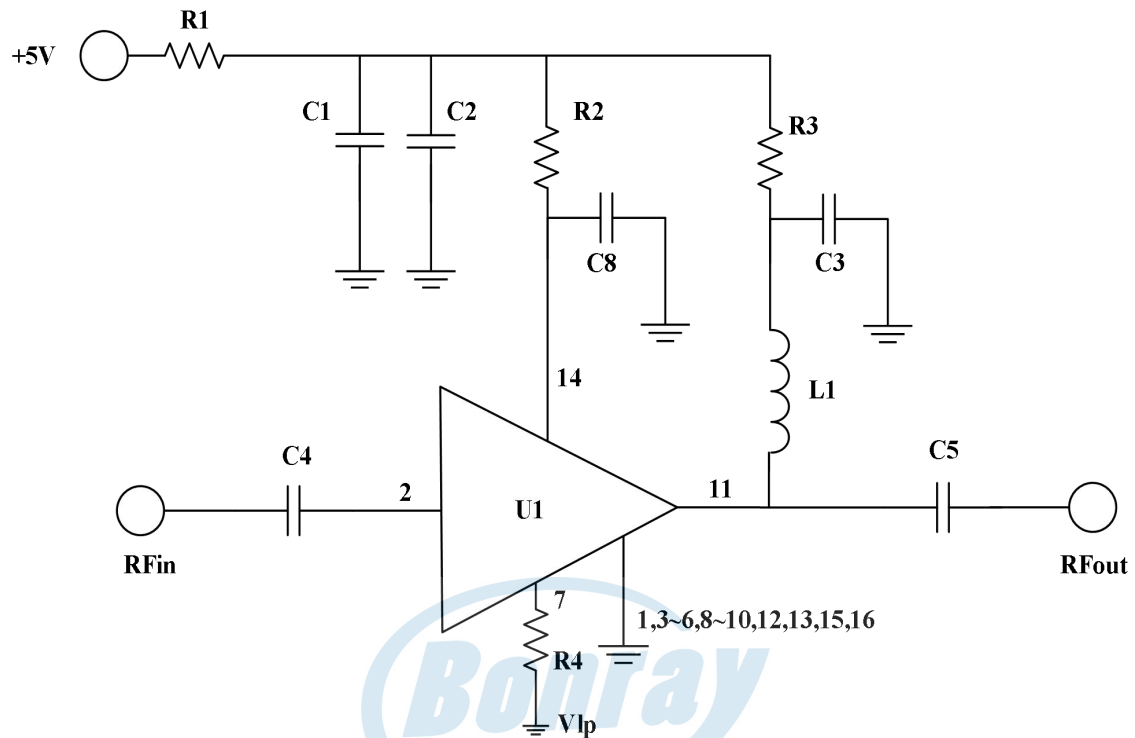


Output Power for 1dB Compression vs. Freq



Output Third-Order Interception vs. Freq

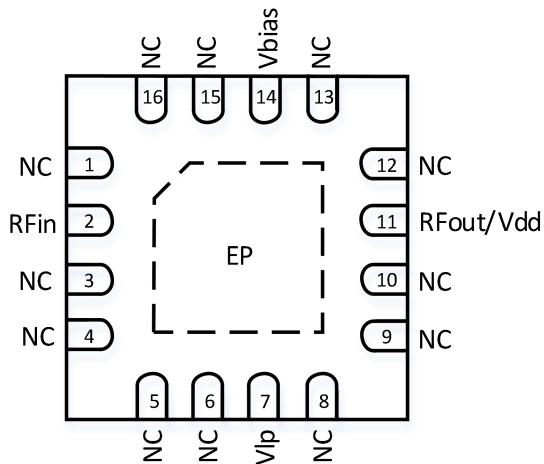
Typical Application Schematic



Bill of Material

Reference Designator	Package	Value	P/N
U1	QFN16	30MHz~4.5GHz Low noise amplifier	BR9372FDJ
C3, C4, C5, C8	0402	1nF, 50V, ±5%	GRM1555C1H102JA01D
L1	1008	1.1uH ±5% 1200mA	1008AF-112XJRB
C1	0402	10V, 1uF, 10%	GRM155Z71A105KE01D
C2	0402	100nF 50V ±10%	GRM155R71H104KE14D
R1, R2, R3	0402	±5% 0Ω 1/16W	RC0402JR-070RL
R4 (Normal operation mode)	/	Idle	/
R4 (Low power operation mode)	0402	±5% 0Ω 1/16W	RC0402JR-070RL

Pin Configuration and Description



Pin Number	Pin Name	Description
2	RFin	RF input pin. A DC Block is required.
7	Vlp	Operation modes set pin. This pin is suspended in normal operation mode and grounded in low-power operation mode.
11	RFout/Vdd	RF output and power supply pin. DC bias will also need to be injected through a RF bias choke/inductor for operation.
14	Vbias	Bias pin. This pin is used to set the I_{cq} bias point for the device.
1,3,4,5,6,8,9,10,12,13,15,16	NC	No electrical connection. These pins should be connected to ground
-	EP	Exposed pin. The exposed pad must be connected to RF/DC ground.

PCB Evaluation Board

