

Product Features

Frequency: 30MHz ~ 4GHz

Gain: 22.3dB@1GHz

Output Power for 1dB Compression:

23.1dBm@1GHz

Noise Figure: 0.7dB@1GHz

Output Third-Order Interception:

29.8dBm@1GHz

Supply Current:

43mA @ Vdd=5V (Normal Operation Mode)

21mA @ Vdd=5V (Low-power Operation Mode)

22mA @ Vdd=3.3V (Normal Operation Mode)

13mA @ Vdd=3.3V (Low-power Operation Mode)

Package: DFN8 (2mm × 2mm)

General Description

The BR9371DAJ is a wideband MMIC low noise amplifier designed using GaAs process in a SOT89 general package. At 1GHz, the amplifier typically provides a gain of 22.3dB, a noise figure of 0.7dB, an output P1dB of 23.1dBm, and an output IP3 of 29.8dBm under the condition of +5V power supply. The product is compatible with low-power operation mode with the characteristics of low noise, high gain flatness, and high input P1dB, which can be applied in system with strict power consumption requirements.

Functional Block Diagram

Application

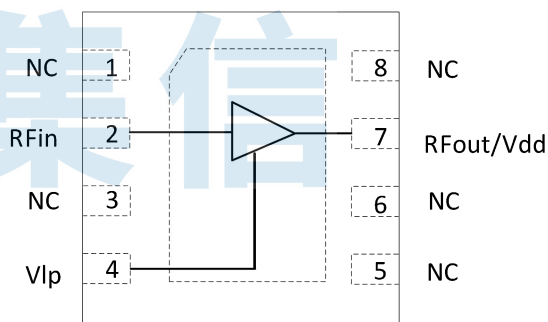
Radio Communications

Communication Base Station

Test and Measurement Equipment

Radar Systems

Navigation Equipment



Ordering Information

Part Number	Package	Description
BR9371DAJ	DFN8	30MHz~ 4GHz Low Noise Amplifier

Electrical Specifications

Parameter	Test Condition	Min.	Typ.	Max.	Units
Gain	30MHz	-	22.9	-	dB
	2000MHz	-	21.0	-	
	4000MHz	-	18.5	-	
Input Return Loss	30MHz	-	-14.2	-	dB
	2000MHz	-	-14.3	-	
	4000MHz	-	-9.2	-	
Output Return Loss	30MHz	-	-11.9	-	dB
	2000MHz	-	-11.8	-	
	4000MHz	-	-10.9	-	
Reverse Isolation	30MHz	-	-26.1	-	dB
	2000MHz	-	-26.7	-	
	4000MHz	-	-30.0	-	
Output Power for 1dB Compression	30MHz	-	22.1	-	dBm
	2000MHz	-	22.8	-	
	4000MHz	-	22.1	-	
Input Power for 1dB Compression	30MHz	-	0.4	-	dBm
	2000MHz	-	3.1	-	
	4000MHz	-	5.3	-	
Output Third-Order Interception	30MHz	-	33.7	-	dBm
	2000MHz	-	28.5	-	
	4000MHz	-	30.4	-	
Noise Figure	30MHz	-	1.5	-	dB
	2000MHz	-	0.8	-	
	4000MHz	-	0.8	-	
Supply Voltage	-	-	5	-	V
Supply Current	-	-	43	-	mA
Power-On/Power-Off Switching Time	ON	-	1.6	-	us
	OFF	-	2.3	-	
Test condition: Vdd=+5V, I=43mA, OIP3 spacing=1MHz, Pout=5dBm/tone, TA=+25°C					

Absolute Maximum Ratings

Maximum Operating Voltage (Vdd): +7V

Maximum RF input Power: +23dBm

Recommended Operating Conditions

Supply Voltage: +5V/3.3V

Supply Current:

43mA @ Vdd=5V (Normal Operation Mode)

21mA @ Vdd=5V (Low-power Operation Mode)

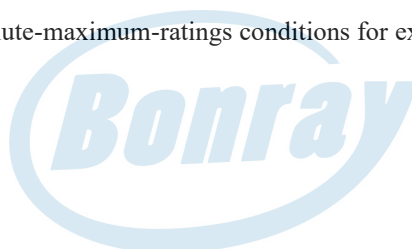
22mA @ Vdd=3.3V (Normal Operation Mode)

13mA @ Vdd=3.3V (Low-power 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 WARNING**

ELECTROSTATIC SENSITIVE DEVICE

OBSERVE HANDLING PRECAUTIONS

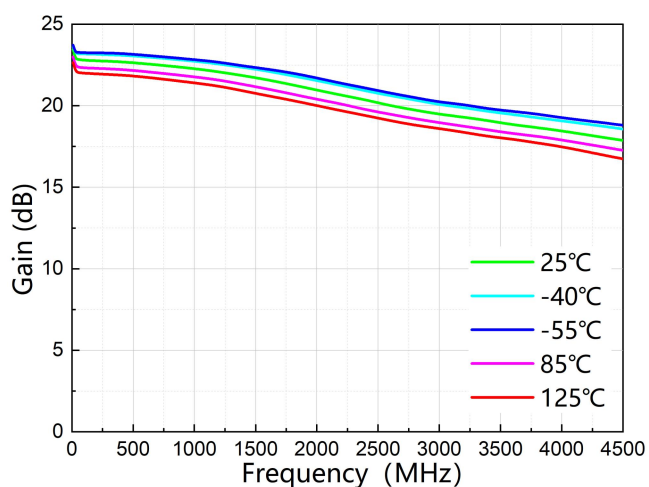
ESD Rating: Class 1A

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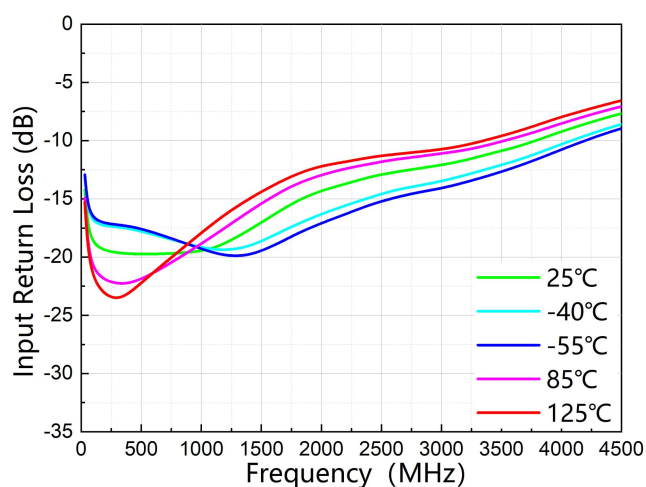
Typical Performance (EVB test results at +5V supply voltage in normal operation mode)

Parameter	Typ.											Units
Frequency	30	50	100	300	500	1000	1200	1400	1600	1800	2000	MHz
Gain	22.9	22.8	22.8	22.7	22.7	22.3	22.1	21.8	21.6	21.3	21.0	dB
Input Return Loss	-14.2	-17.0	-19.2	-19.7	-19.8	-19.6	-18.8	-17.7	-16.4	-15.1	-14.3	dB
Output Return Loss	-11.9	-12.5	-12.7	-12.9	-13.7	-14.7	-14.7	-14.4	-13.7	-12.7	-11.8	dB
Reverse Isolation	-26.1	-25.9	-25.8	-25.6	-25.6	-25.7	-25.8	-25.9	-26.2	-26.4	-26.7	dB
Output Power for 1dB Compression	22.1	22.4	22.8	23.1	23.2	23.1	23.2	23.0	23.0	23.0	22.8	dBm
Output Third-Order Interception	33.7	35.1	32.8	32.1	31.4	29.8	28.9	28.4	28.3	27.9	28.5	dBm
Noise Figure	1.5	1.2	1.0	0.7	0.6	0.7	0.8	0.7	0.7	0.7	0.8	dB
Input Power for 1dB Compression	0.4	0.7	1.1	1.5	1.7	2.0	2.3	2.4	2.7	3.0	3.1	dBm
Frequency	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	-	MHz
Gain	20.6	20.4	20.0	19.7	19.5	19.3	19.1	18.8	18.7	18.5	-	dB
Input Return Loss	-13.7	-13.1	-12.7	-12.4	-12.1	-11.7	-11.1	-10.6	-10.0	-9.2	-	dB
Output Return Loss	-11.1	-10.4	-10.0	-9.7	-9.7	-9.7	-10.0	-10.4	-10.6	-10.9	-	dB
Reverse Isolation	-26.9	-27.2	-27.5	-27.8	-28.2	-28.5	-28.8	-29.2	-29.5	-30.0	-	dB
Output Power for 1dB Compression	22.6	22.7	22.6	22.6	22.6	22.4	22.4	22.2	22.6	22.1	-	dBm
Output Third-Order Interception	28.2	28.9	28.9	28.9	28.8	29.3	29.2	30.0	30.0	30.4	-	dBm
Noise Figure	0.9	0.8	0.9	0.8	0.8	0.9	0.9	1.0	0.9	0.8	-	dB
Input Power for 1dB Compression	3.3	3.6	3.9	4.2	4.5	4.5	4.8	4.9	5.5	5.3	-	dBm
Test Condition: Vdd=+5V, I=43mA, OIP3 spacing=1MHz, Pout=5dBm/tone, TA=+25°C												

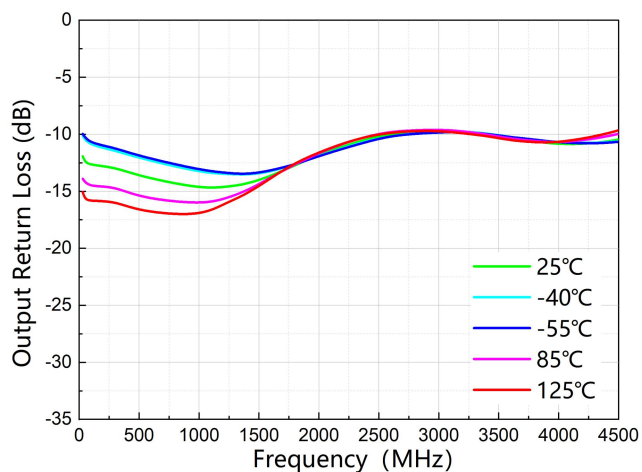
Test Condition: Vdd=+5V, I=43mA, OIP3 spacing=1MHz, Pout=5dBm/tone, TA=+25°C



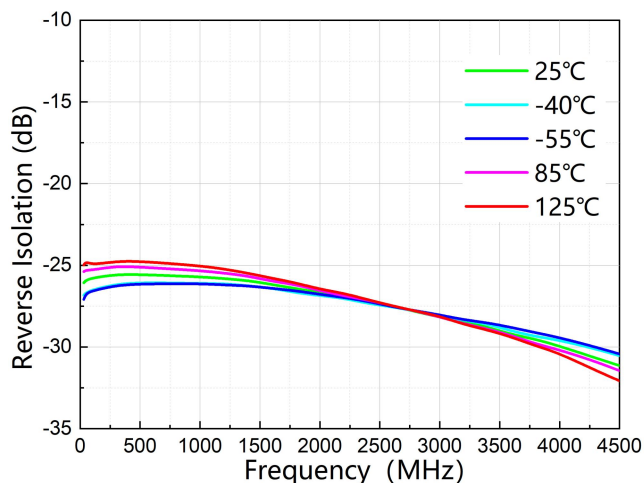
Gain vs. Freq



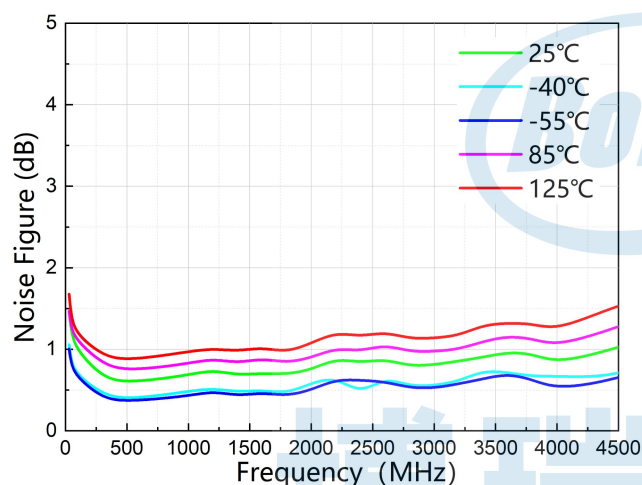
Input Return Loss vs. Freq



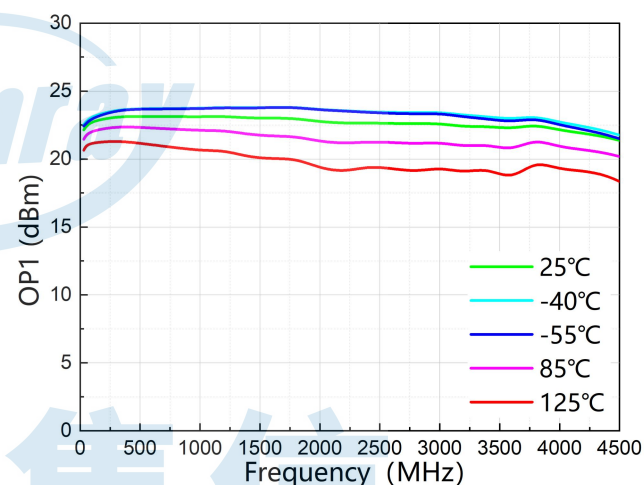
Output Return Loss vs. Freq



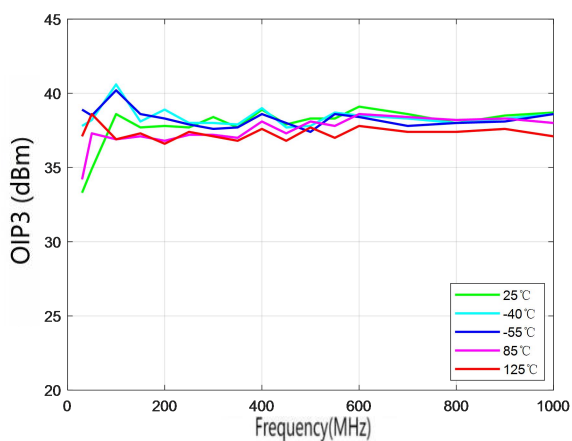
Reverse Isolation vs. Freq



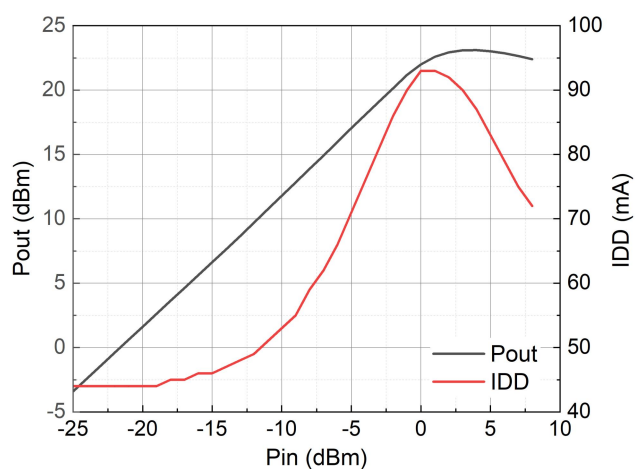
Noise Figure vs. Freq



Output Power for 1dB Compression vs. Freq



Output Third-Order Interception vs. Freq

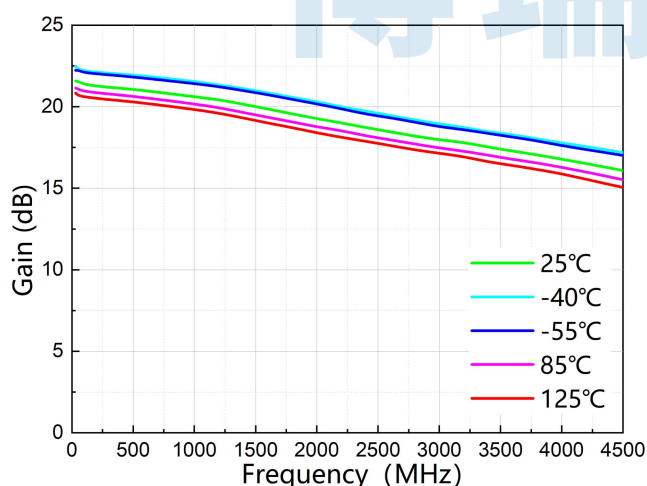


P_{out} and IDD vs. P_{in} (1GHz)

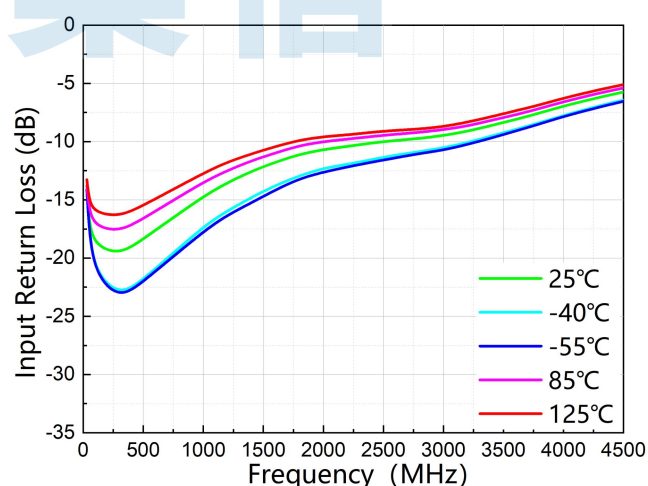
Typical Performance (EVB test results at +5V supply voltage in low-power operation mode)

Parameters	Typ.											Units
Frequency	30	50	100	300	500	1000	1200	1400	1600	1800	2000	MHz
Gain	21.6	21.6	21.4	21.2	21.1	20.6	20.4	20.2	19.9	19.6	19.3	dB
Input Return Loss	-14.2	-17.2	-18.9	-19.8	-18.4	-14.7	-13.5	-12.6	-11.8	-11.1	-10.7	dB
Output Return Loss	-18.2	-19.4	-21.8	-22.6	-22.6	-18.4	-16.3	-14.5	-13.1	-11.8	-11.1	dB
Reverse Isolation	-24.4	-24.5	-24.3	-24.0	-24.0	-24.3	-24.6	-24.9	-25.2	-25.5	-25.8	dB
Output Power for 1dB Compression	22.1	22.3	22.7	22.8	22.8	22.6	22.7	22.4	22.3	22.4	22.1	dBm
Output-Third-Order Interception	30.0	31.5	28.2	25.2	24.2	22.8	22.0	21.5	21.5	21.1	21.2	dBm
Noise Figure	1.6	1.3	1.1	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	dB
Input Power for 1dB Compression	1.6	1.9	2.5	2.7	2.8	3.1	3.5	3.5	3.7	4.1	4.1	dBm
Frequency	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	-	MHz
Gain	19.0	18.7	18.5	18.2	18.0	17.8	17.5	17.3	17.0	16.8	-	dB
Input Return Loss	-10.4	-10.1	-9.9	-9.7	-9.5	-9.1	-8.6	-8.1	-7.5	-6.9	-	dB
Output Return Loss	-10.4	-9.8	-9.6	-9.5	-9.4	-9.5	-9.7	-9.9	-9.9	-9.8	-	dB
Reverse Isolation	-26.1	-26.5	-26.9	-27.2	-27.6	-28.0	-28.4	-29.0	-29.5	-30.0	-	dB
Output Power for 1dB Compression	21.7	22.0	21.8	21.3	21.3	20.6	20.8	19.9	20.8	19.9	-	dBm
Output-Third-Order Interception	21.4	21.9	22.0	21.9	21.7	22.0	21.9	22.3	22.6	22.6	-	dBm
Noise Figure	1.0	1.0	1.0	0.9	0.9	0.9	1.0	1.1	1.1	1.0	-	dB
Input Power for 1dB Compression	4.0	4.6	4.6	4.4	4.7	4.3	4.8	4.1	5.3	4.7	-	dBm

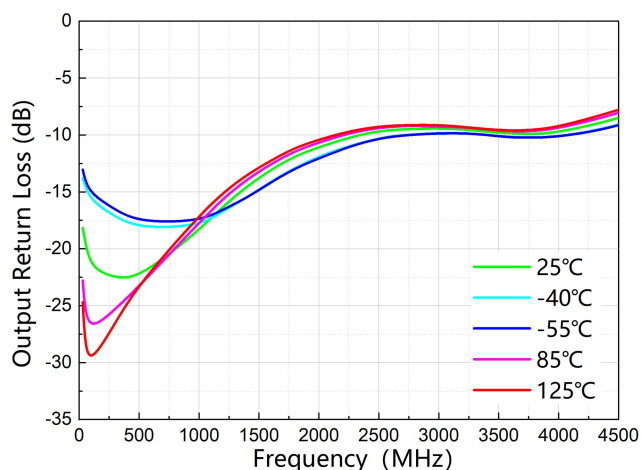
Test Condition: Vdd=+5V, I=21mA, OIP3 spacing=1MHz, Pout=5dBm/tone, TA=+25°C



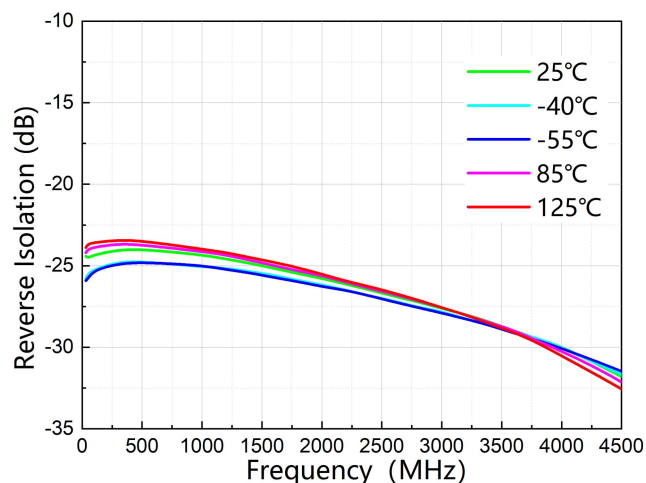
Gain vs. Freq



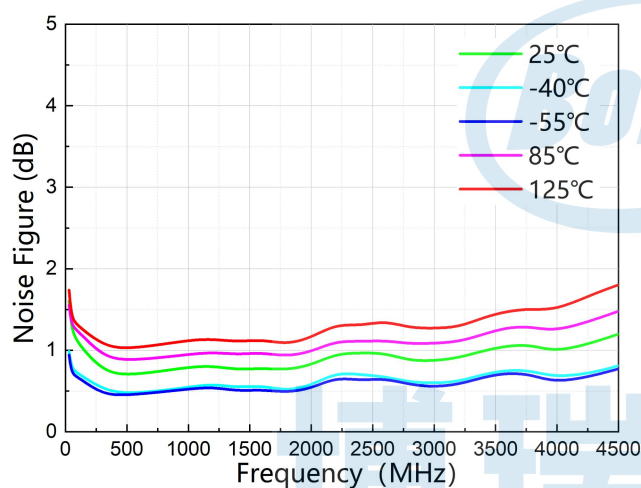
Input Return Loss vs. Freq



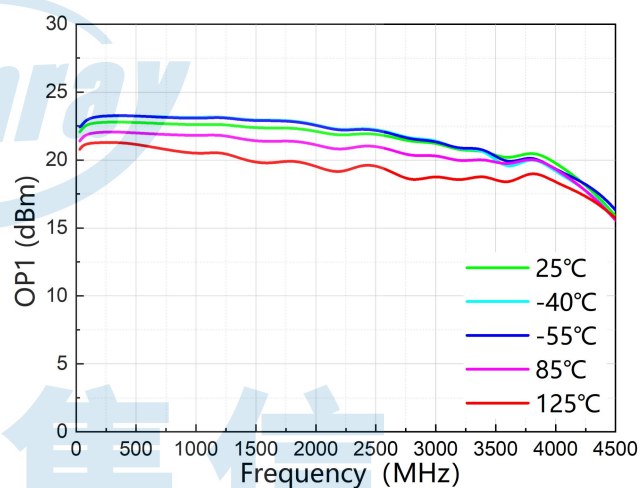
Output Return Loss vs. Freq



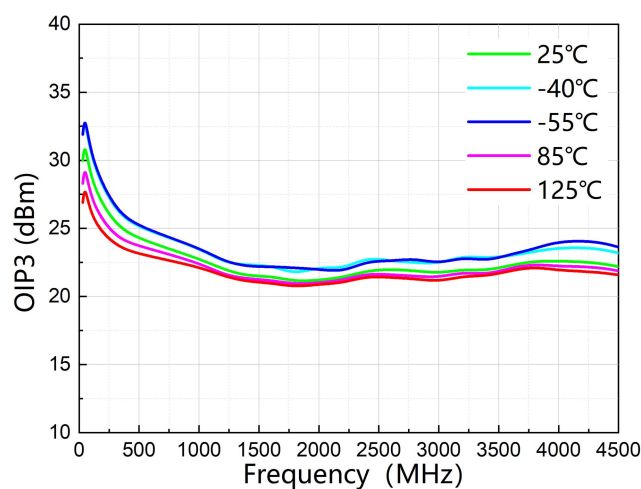
Reverse Isolation vs. Freq



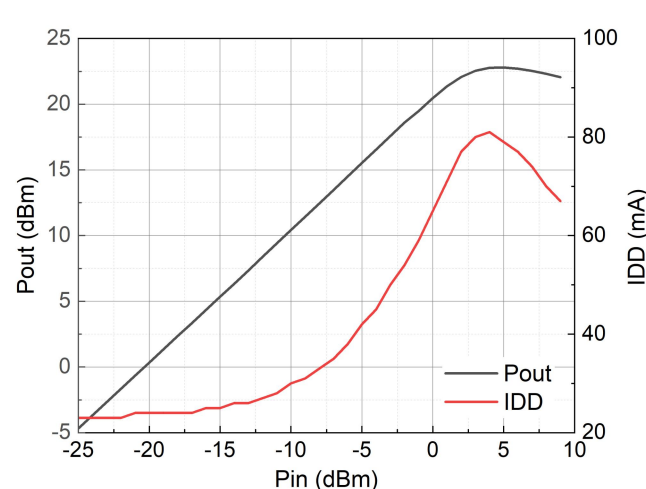
Noise Figure vs. Freq



Output Power for 1dB Compression vs. Freq



Output Third-Order Interception vs. Freq

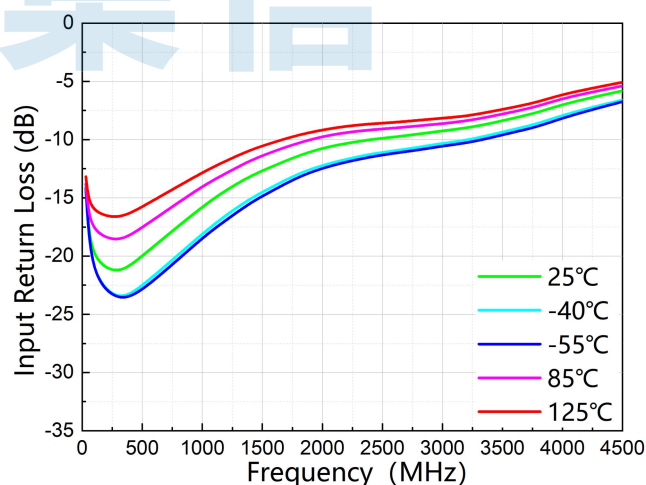
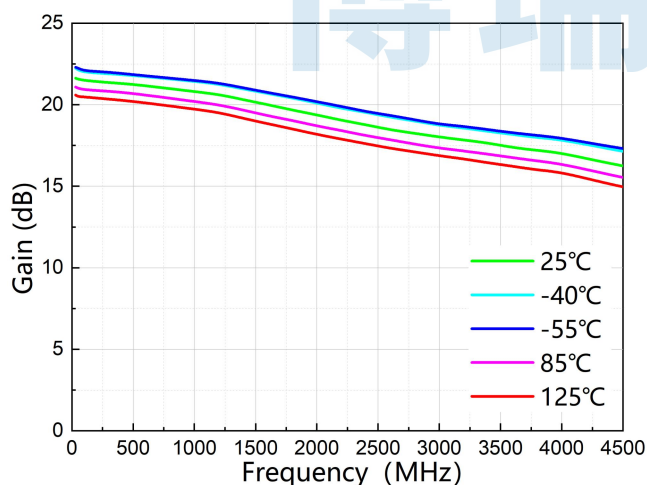


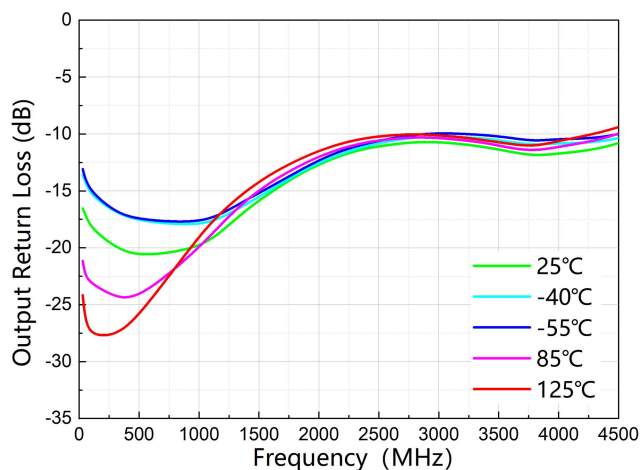
P_{out}, IDD vs. P_{in} (1GHz)

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

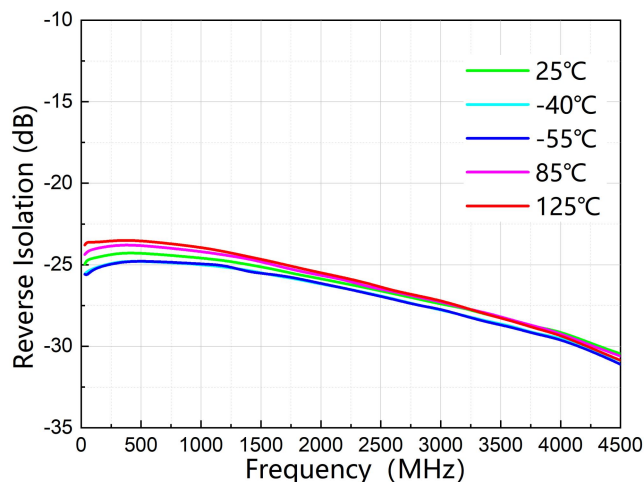
Parameter	Typ.											Units
Frequency	30	50	100	300	500	1000	1200	1400	1600	1800	2000	MHz
Gain	21.6	21.6	21.5	21.4	21.3	20.8	20.6	20.3	20.0	19.7	19.4	dB
Input Return Loss	-14.4	-17.6	-20.4	-21.7	-20.0	-15.7	-14.3	-13.1	-12.2	-11.4	-10.7	dB
Output Return Loss	-16.5	-17.1	-18.3	-20.0	-20.8	-20.1	-18.5	-16.6	-15.1	-13.7	-12.7	dB
Reverse Isolation	-25.0	-24.7	-24.6	-24.3	-24.3	-24.6	-24.7	-25.0	-25.3	-25.6	-25.9	dB
Output Power for 1dB Compression	18.3	18.4	18.8	19.7	19.9	20.0	20.1	20.1	20.0	20.0	19.9	dBm
Output Third-Order Interception	27.7	28.8	26.6	25.7	24.7	23.2	22.1	21.9	21.8	21.4	21.5	dBm
Noise Figure	1.6	1.3	1.1	0.7	0.6	0.8	0.8	0.8	0.7	0.7	0.9	dB
Input Power for 1dB Compression	-2.2	-2.1	-1.7	-0.5	-0.2	0.4	0.7	1.0	1.3	1.6	1.8	dBm
Frequency	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	-	MHz
Gain	19.0	18.8	18.5	18.2	18.0	17.8	17.7	17.4	17.2	17.0	-	dB
Input Return Loss	-10.3	-10.0	-9.8	-9.5	-9.2	-9.0	-8.6	-8.1	-7.7	-7.0	-	dB
Output Return Loss	-11.8	-11.2	-10.9	-10.7	-10.7	-10.9	-11.2	-11.6	-11.9	-11.7	-	dB
Reverse Isolation	-26.2	-26.4	-26.8	-27.1	-27.4	-27.7	-28.1	-28.4	-28.8	-29.1	-	dB
Output Power for 1dB Compression	19.7	19.7	19.5	19.0	19.1	18.6	18.5	18.0	18.5	17.4	-	dBm
Output Third-Order Interception	21.4	22.1	22.0	22.0	21.7	21.9	21.4	22.2	22.6	22.7	-	dBm
Noise Figure	0.9	1.1	1.1	0.9	0.9	0.9	1.0	1.1	1.1	0.9	-	dB
Input Power for 1dB Compression	1.9	2.2	2.3	2.1	2.5	2.3	2.3	2.1	2.8	2.0	-	dBm

Test Condition: Vdd=+3.3V, I=22mA, OIP3 spacing=1MHz, Pout=5dBm/100MHz, TA=+25°C

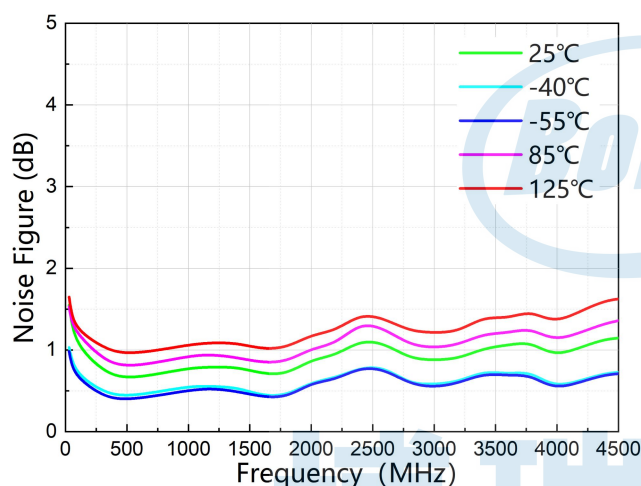




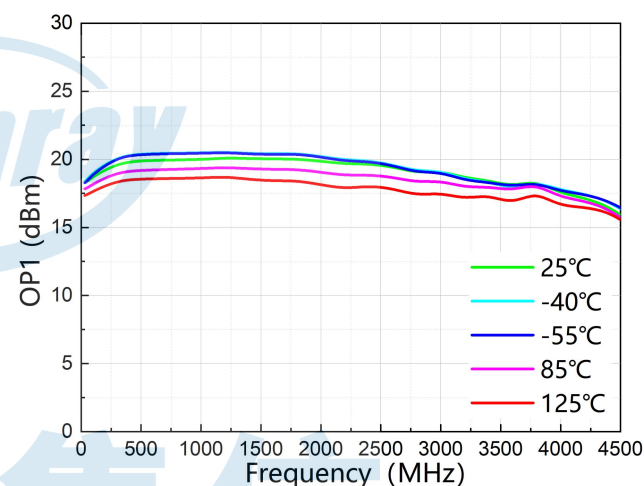
Output Return Loss vs. Freq



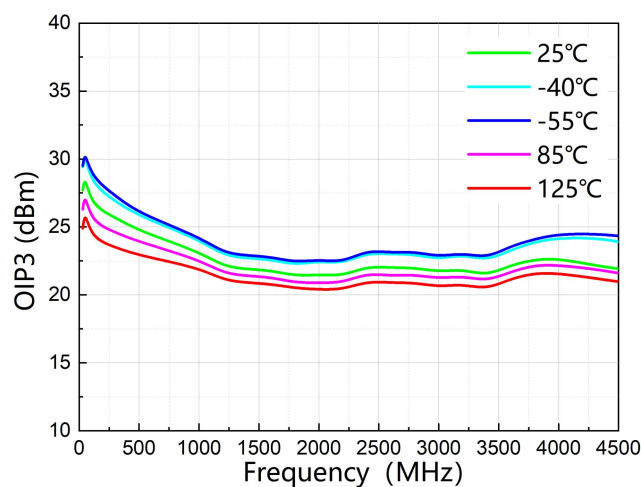
Reverse Isolation vs. Freq



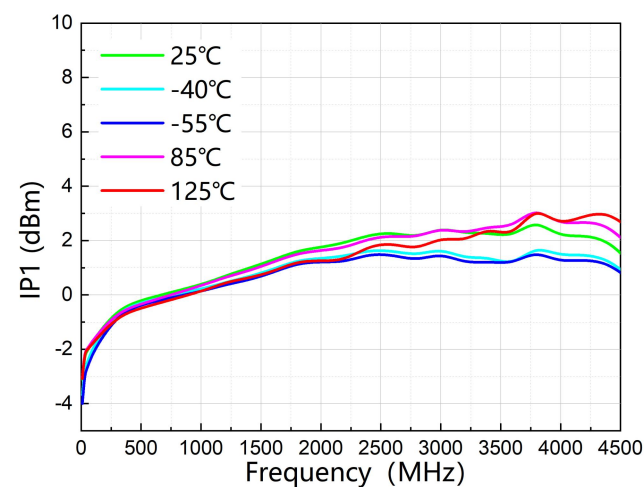
Noise Figure vs. Freq



Output Power for 1dB Compression vs. Freq

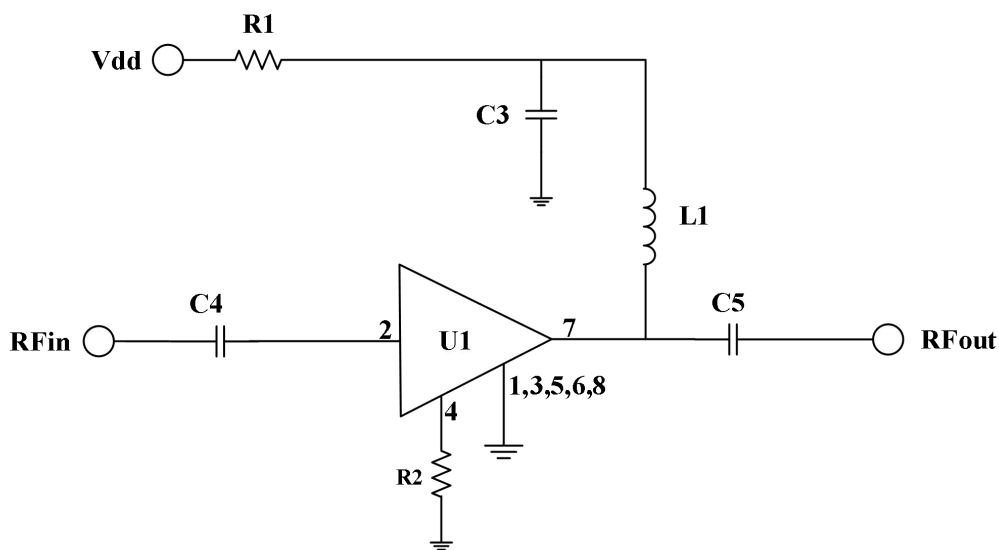


Output Third-Order Interception vs. Freq



Input Power for 1dB Compression vs. Freq

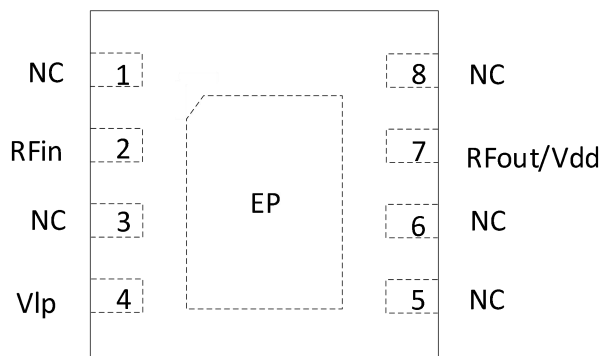
Typical Application Schematic



Bill of Material

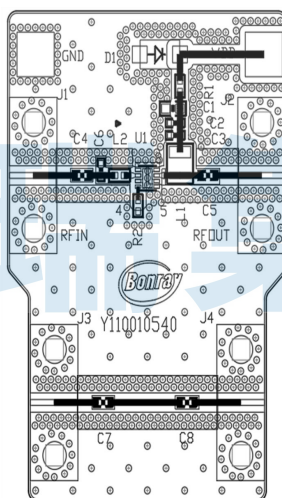
Reference Designator	Package	Value	P/N
U1	DFN8	Low noise amplifier	BR9371DAJ
L1	1008	1.1uH	1008AF-112XJRB
C3	0402	10nF	GRM155R71H103JA88D
C4, C5	0402	1000pF	GRM155R71C102KA88
R1	0402	0 Ω	RC0402FR-070RL
R2 (Normal operation mode)	/	Idle	/
R2 (Low-Power operation mode)	0402	0 Ω	RC0402FR-070RL

Pin Configuration and Description

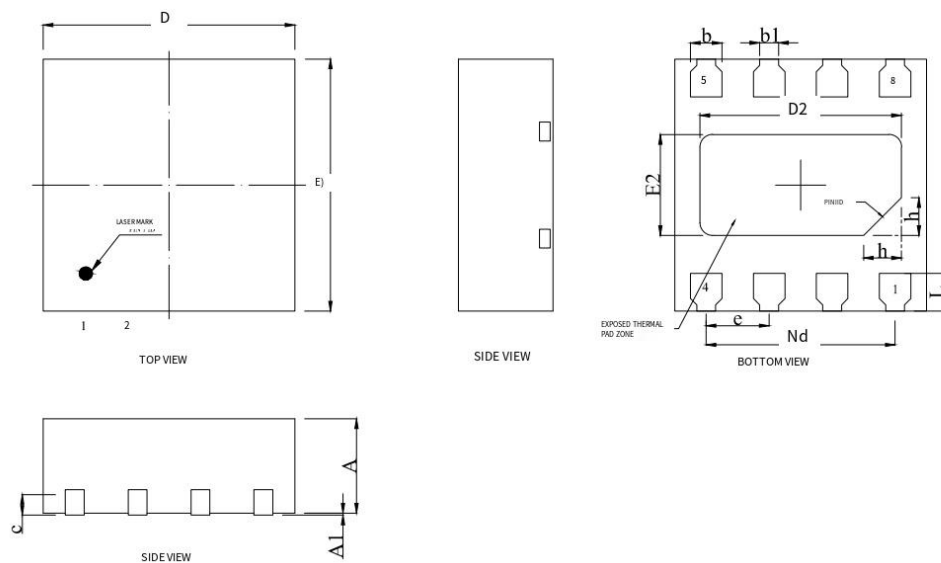


Pin Number	Pin Name	Description
2	RFIn	RF Input pin. A DC Block is required.
4	Vlp	Operation modes setting pin. This pin is idle in normal operation mode and grounded in low-power operation mode.
7	RFout/Vdd	RF Output and supply pin. DC bias will also need to be injected through a RF bias choke/inductor for operation.
1,3,5,6,8	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



Package Dimensions (mm)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	—	0.02	0.05
b	0.20	0.25	0.30
b1	0.15REF		
c	0.20REF		
D	1.90	2.00	2.10
D2	1.50	1.60	1.70
e	0.50BSC		
Nd	1.50BSC		
E	1.90	2.00	2.10
E2	0.70	0.80	0.90
h	0.20	0.30	0.40
h	0.20	0.30	0.40



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