Product Features

Operating Frequency: 2GHz ~ 8GHz

Noise Figure: 1.0dB@5.0GHz

Gain: 26.2dB@5.0GHz

Output Third-Order Interception:

30.0dBm@5.0GHz

Output Power for 1dB Compression:

18.3dBm@5.0GHz

+3.3V/+5V Single Power Supply

Supply Current:

86mA@ Vdd=+5V (Normal Operation Mode)

56mA@ Vdd=+5V (Low-power Operation Mode)

51mA@ Vdd=+3.3V (Normal Operation Mode)

Die Size: 1400um x 850um x 100um

General Description

BR9373LDZ is a MMIC low noise amplifier manufactured using GaAs process which operates between 2GHz and 8GHz. The amplifier is powered by a single-supply operation of +5V or +3.3V. At 5GHz, the amplifier typically provides a noise figure of 1.0dB, gain of 26.2dB, output P1dB of 18.3dB, and output IP3 of 30.0dBm in normal operation mode with +5V power supply. It has been internally matched to 50 ohms and AC coupled, thereby eliminating the need for external DC blocks and RF port matching. The amplifier is ideal for integration into Multi-Chip-Modules (MCMs) due to its small size.

Application

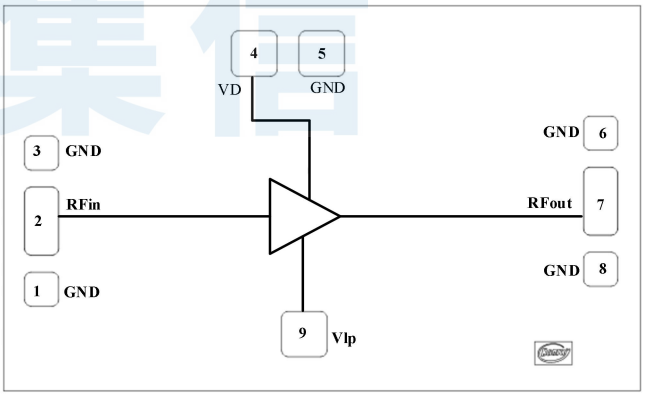
Radar and Electronic Countermeasures

Military and Aerospace

Navigation Equipment

Test Instrumentation

Functional Block Diagram



Ordering Information

Part Number	Package	Description
BR9373LDZ	Die	2GHz ~ 8GHz Low Noise Amplifier

Electrical Specifications

Parameter	Test Condition	Normal Mode with 5V (Typ.)	Low-Power Mode with 5V (Typ.)	Normal Mode with 3.3V (Typ.)	Units
Gain	2000MHz	26.2	25.7	24.7	dB
	5000MHz	26.0	25.2	25.0	
	8000MHz	26.3	25.3	24.7	
Input Return Loss	2000MHz	-14.2	-13.8	-14.3	dB
	5000MHz	-23.7	-23.1	-22.6	
	8000MHz	-14.2	-12.0	-12.6	
Output Return Loss	2000MHz	-9.3	-9.4	-9.2	dB
	5000MHz	-13.1	-13.2	-12.6	
	8000MHz	-15.9	-17.1	-18.5	
Reverse Isolation	2000MHz	-41.5	-40.9	-40.7	dB
	5000MHz	-45.5	-45.2	-44.4	
	8000MHz	-43.4	-43.4	-42.1	
Output Power for 1dB Compression	2000MHz	16.5	17.5	14.1	dBm
	5000MHz	17.8	17.0	15.1	
	8000MHz	17.3	16.8	14.4	
Output Third-Order Interception	2000MHz	29.3	31.3	25.7	dBm
	5000MHz	30.1	28.8	29.5	
	8000MHz	25.8	26.7	28.9	
Noise Figure	2000MHz	1.4	1.4	1.3	dB
	5000MHz	1.0	0.9	0.9	
	8000MHz	1.4	1.2	1.2	
Supply Voltage	-	5	5	3.3	V
Supply Current	-	86	56	51	mA
Test Condition: OIP3 spacing=1MHz, Pout=5dBm/tone, TA=+25℃					

Absolute Maximum Ratings

Recommended Operating Conditions

Maximum Supply Voltage (Vdd): +6V

Maximum RF input Power: +20dBm

Supply Voltage: +3.3V/+5V

Supply Current:

86mA @ Vdd=5V (Normal Operation Mode)

56mA @ Vdd=5V (Low-power Operation Mode)

51mA @ Vdd=3.3V (Normal Operation Mode)

Operating Temperature: -55℃ ~ +125℃

Storage Temperature: -65℃ ~ +150℃

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.

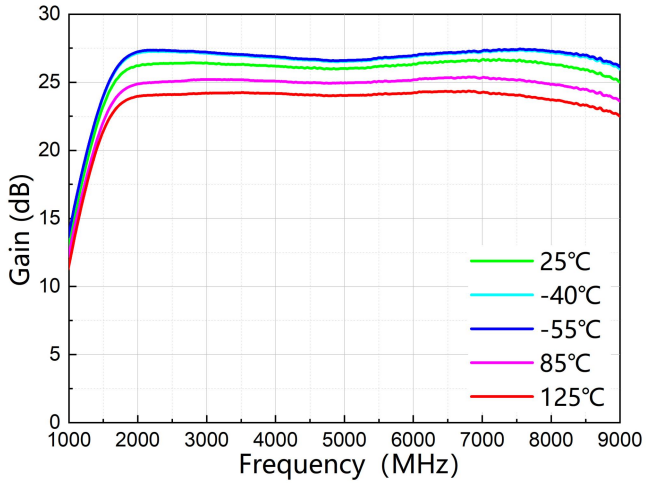
ESD WARNING

ELECTROSTATIC SENSITIVE DEVICE

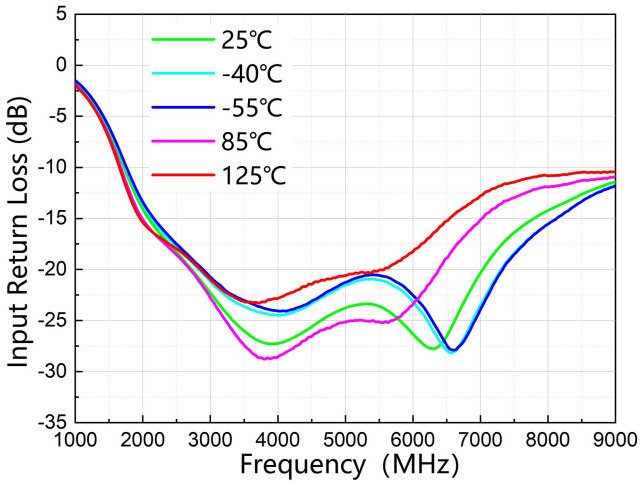
OBSERVE HANDLING PRECAUTIONS

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

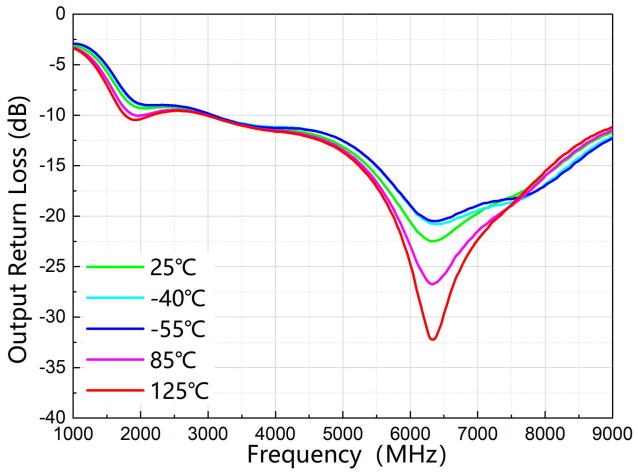
Parameter	Typ.							Units
Frequency	2000	2500	3000	3500	4000	4500	5000	MHz
Gain	26.2	26.4	26.4	26.3	26.2	26.0	26.0	dB
Input Return Loss	-14.2	-18.4	-22.4	-26.1	-27.2	-25.6	-23.7	dB
Output Return Loss	-9.3	-9.2	-9.9	-10.9	-11.4	-11.8	-13.1	dB
Reverse Isolation	-41.5	-48.4	-51.4	-49.1	-47.2	-46.0	-45.5	dB
Output Power for 1dB Compression	16.5	16.6	17.4	18.1	18.0	17.9	17.8	dBm
Output Third-Order Interception	29.3	30.3	31.0	32.3	31.7	30.9	30.1	dBm
Noise Figure	1.4	1.2	1.1	1.1	1.1	1.1	1.0	dB
Frequency	5500	6000	6500	7000	7500	8000	8500	MHz
Gain	26.2	26.4	26.5	26.7	26.5	26.3	25.9	dB
Input Return Loss	-23.6	-26.4	-26.4	-20.2	-16.3	-14.2	-12.6	dB
Output Return Loss	-16.0	-20.6	-22.1	-19.7	-18.1	-15.9	-13.5	dB
Reverse Isolation	-45.3	-45.4	-45.1	-44.7	-43.8	-43.4	-43.4	dB
Output Power for 1dB Compression	17.8	17.9	18.0	17.8	17.4	17.3	17.0	dBm
Output Third-Order Interception	29.0	28.3	27.5	27.0	26.2	25.8	25.5	dBm
Noise Figure	1.1	1.1	1.3	1.3	1.4	1.4	1.5	dB
Test Condition: Vdd=+5V, Idd=86mA, OIP3 spacing=1MHz, Pout=+5dBm/tone, TA=+25℃								



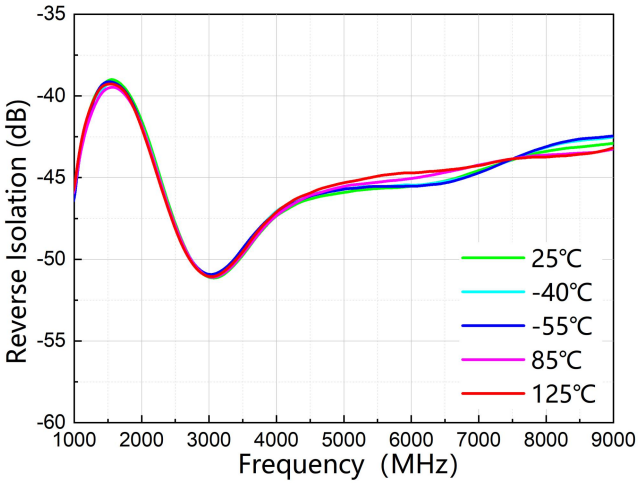
Gain vs. Freq



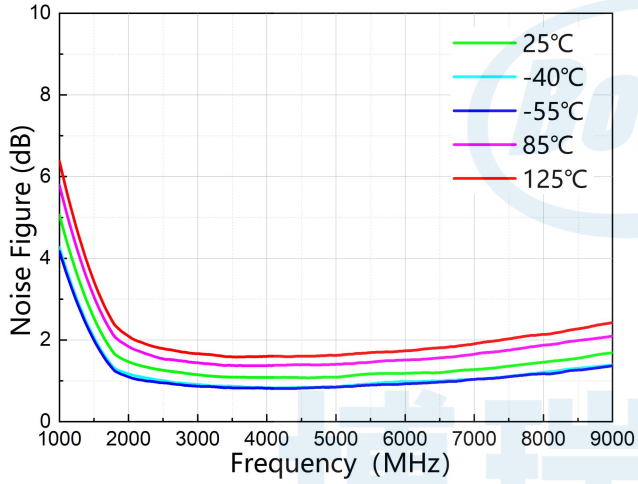
Input Return Loss vs. Freq



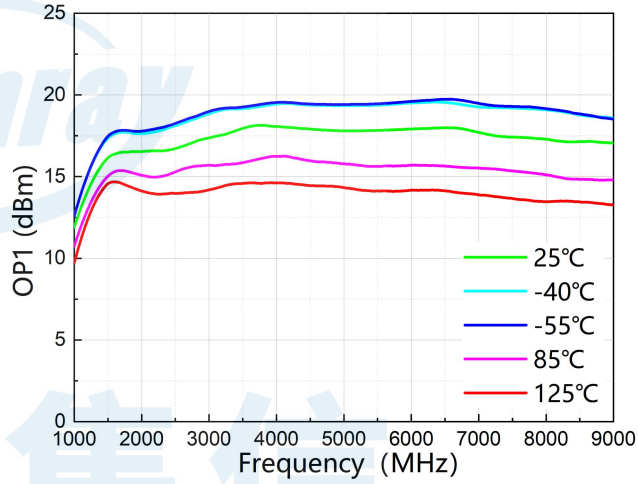
Output Return Loss vs. Freq



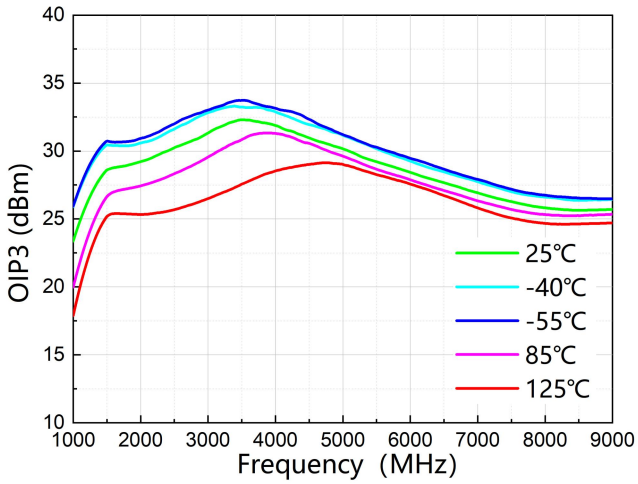
Reverse Isolation vs. Freq



Noise Figure vs. Freq



Output Power for 1dB Compression vs. Freq

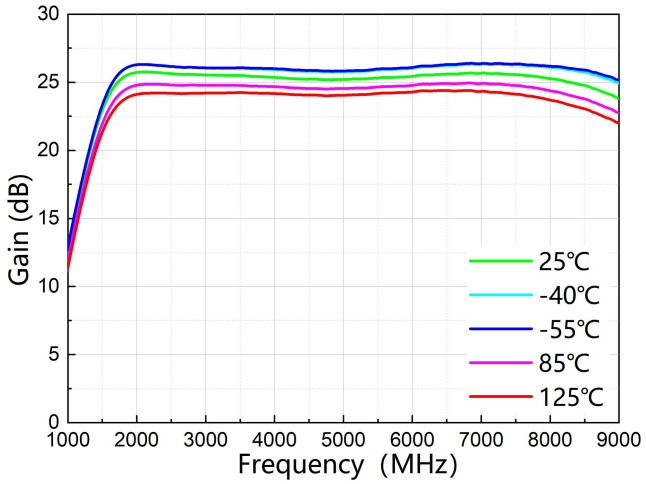


Output Third-Order Interception vs. Freq

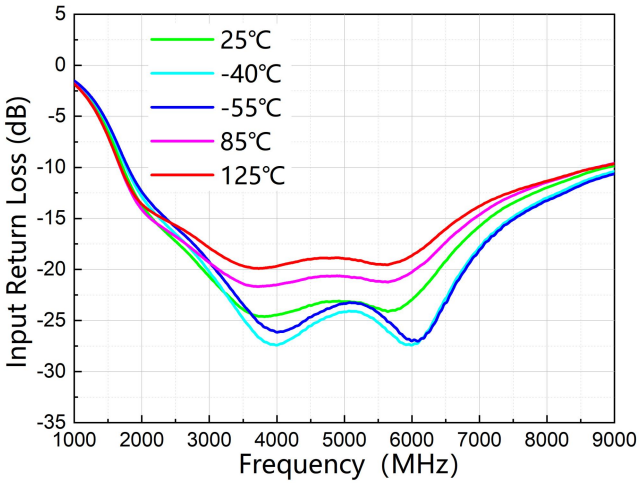
Typical Performance (Probe test results at +5V supply voltage in low-power operation mode)

Parameter	Typ.							Units
Frequency	2000	2500	3000	3500	4000	4500	5000	MHz
Gain	25.7	25.6	25.5	25.5	25.3	25.2	25.2	dB
Input Return Loss	-13.8	-17.3	-20.8	-24.1	-24.4	-23.3	-23.1	dB
Output Return Loss	-9.4	-9.2	-9.9	-10.8	-11.3	-11.8	-13.2	dB
Reverse Isolation	-40.9	-47.8	-51.2	-48.7	-46.6	-45.6	-45.2	dB
Output Power for 1dB Compression	17.5	17.1	16.9	17.3	17.3	17.1	17.0	dBm
Output Third-Order Interception	31.3	30.9	30.4	30.2	29.9	29.5	28.8	dBm
Noise Figure	1.4	1.2	1.1	1.0	1.0	1.0	0.9	dB
Frequency	5500	6000	6500	7000	7500	8000	8500	MHz
Gain	25.3	25.5	25.6	25.7	25.5	25.3	24.8	dB
Input Return Loss	-23.9	-23.0	-19.1	-15.7	-13.4	-12.0	-10.8	dB
Output Return Loss	-16.4	-21.7	-24.5	-21.9	-20.2	-17.1	-14.3	dB
Reverse Isolation	-44.9	-44.7	-44.5	-44.2	-43.8	-43.4	-42.9	dB
Output Power for 1dB Compression	16.8	16.6	16.9	16.7	16.8	16.8	16.9	dBm
Output Third-Order Interception	28.6	28.1	27.7	27.3	26.9	26.7	26.7	dBm
Noise Figure	1.0	1.1	1.1	1.1	1.2	1.2	1.3	dB

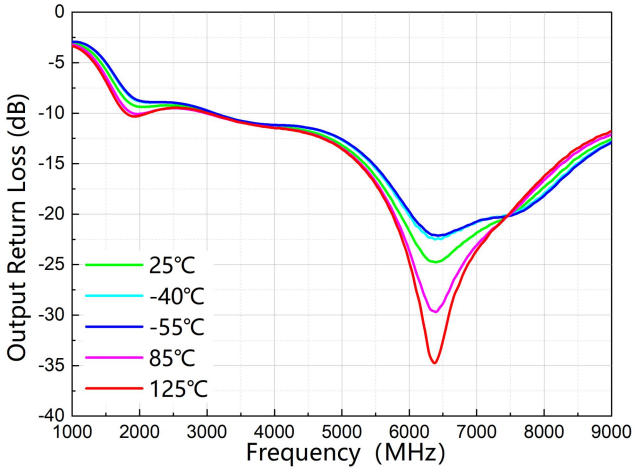
Test Condition: Vdd=+5V, Idd=56mA, OIP3 spacing=1MHz, Pout=+5dBm/tone, TA=+25℃



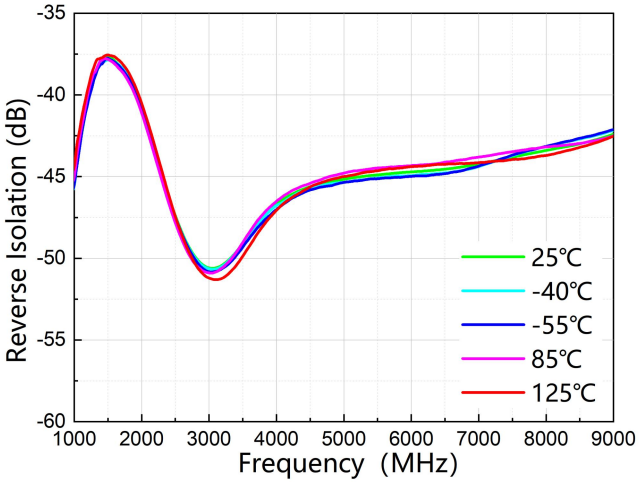
Gain vs. Freq



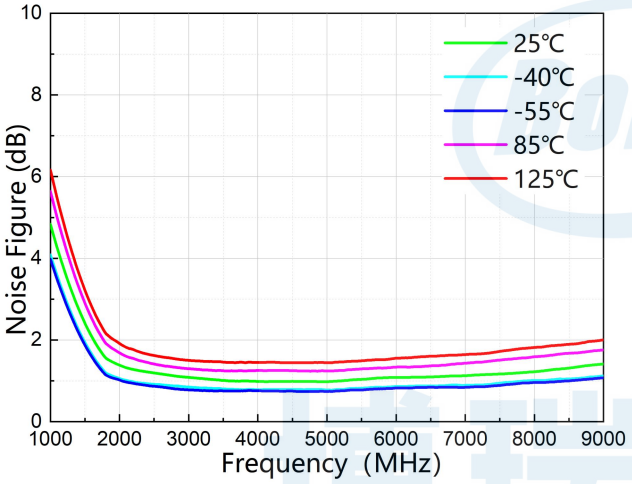
Input Return Loss vs. Freq



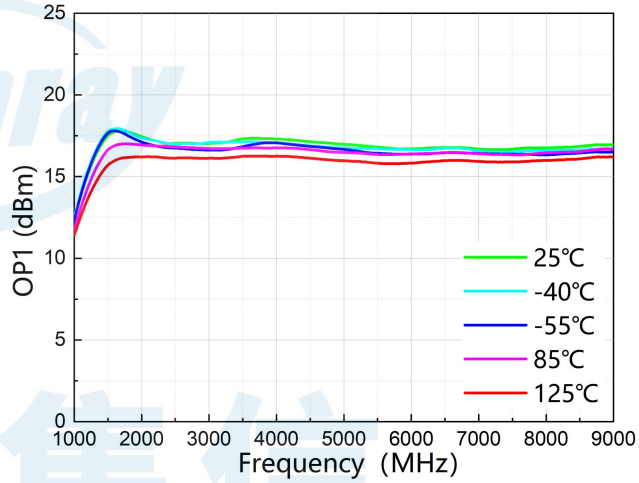
Output Return Loss vs. Freq



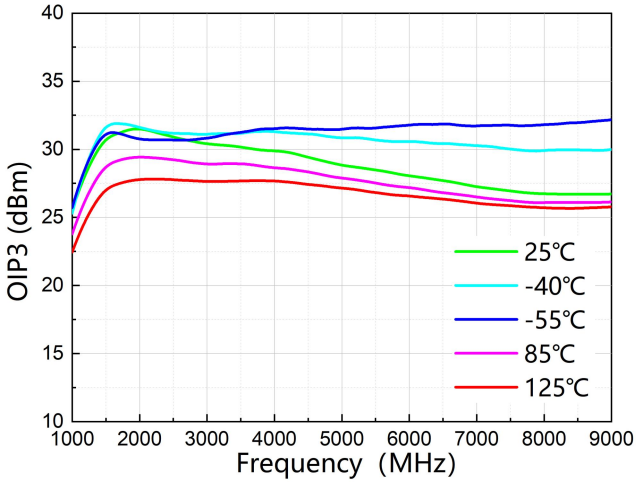
Reverse Isolation vs. Freq



Noise Figure vs. Freq



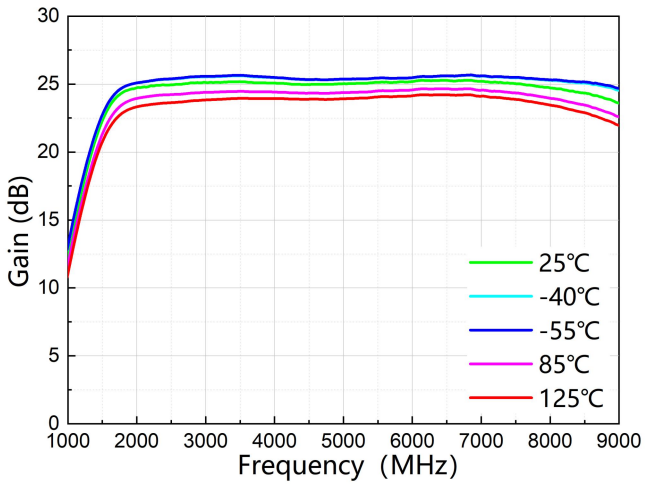
Output Power for 1dB Compression vs. Freq



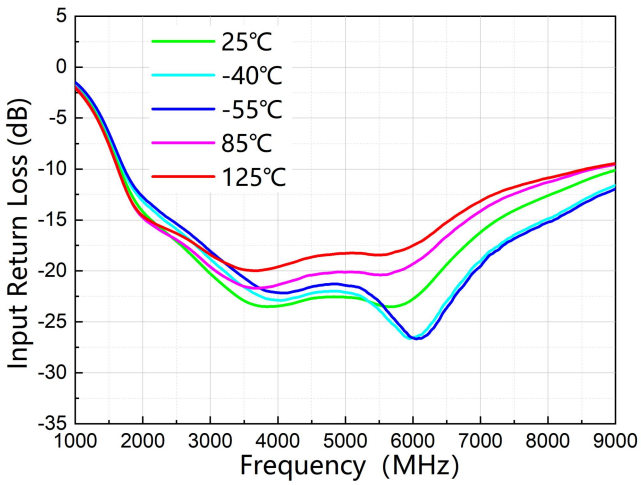
Output Third-Order Interception vs. Freq

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

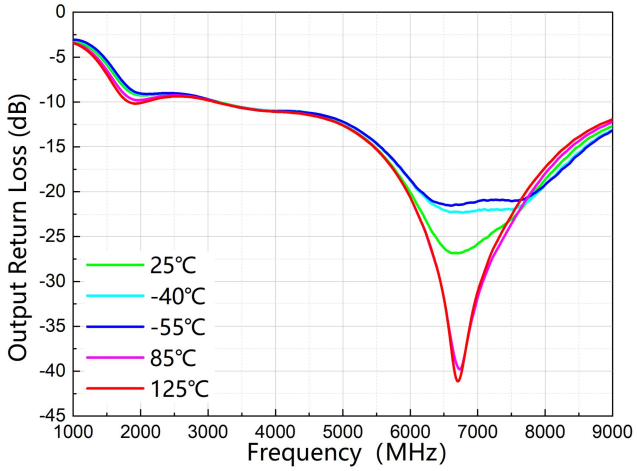
Parameter	Typ.							Units
Frequency	2000	2500	3000	3500	4000	4500	5000	MHz
Gain	24.7	25.0	25.2	25.2	25.1	25.0	25.0	dB
Input Return Loss	-14.3	-17.1	-20.3	-23.0	-23.4	-22.7	-22.6	dB
Output Return Loss	-9.2	-9.1	-9.7	-10.6	-11.0	-11.4	-12.6	dB
Reverse Isolation	-40.7	-47.8	-49.7	-47.4	-45.4	-45.1	-44.4	dB
Output Power for 1dB Compression	14.1	14.7	15.4	15.4	15.3	15.1	15.1	dBm
Output Third-Order Interception	25.7	26.4	27.5	28.6	29.3	29.5	29.5	dBm
Noise Figure	1.3	1.1	1.0	1.0	1.0	0.9	0.9	dB
Frequency	5500	6000	6500	7000	7500	8000	8500	MHz
Gain	25.2	25.2	25.3	25.2	25.1	24.7	24.5	dB
Input Return Loss	-23.4	-22.7	-19.3	-16.1	-14.0	-12.6	-11.2	dB
Output Return Loss	-15.2	-20.2	-26.3	-25.9	-23.0	-18.5	-14.9	dB
Reverse Isolation	-44.1	-44.1	-43.2	-43.7	-42.6	-42.1	-41.9	dB
Output 1dB Compression Point	15.1	15.2	14.9	14.8	14.7	14.4	14.1	dBm
Output Third-Order Interception	29.7	29.9	30.1	29.3	28.9	28.9	28.4	dBm
Noise Figure	1.0	1.0	1.0	1.0	1.1	1.2	1.2	dB
Test Conditions: Vdd=+3.3V, Idd=51mA, OIP3 spacing=1MHz, Pout=+5dBm/tone, TA=+25℃								



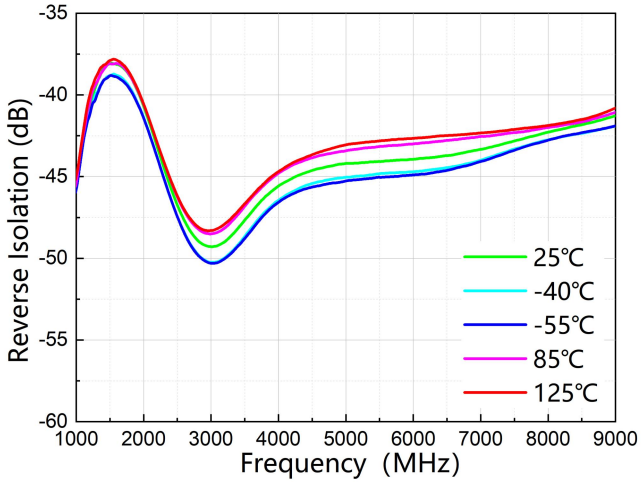
Gain vs. Freq



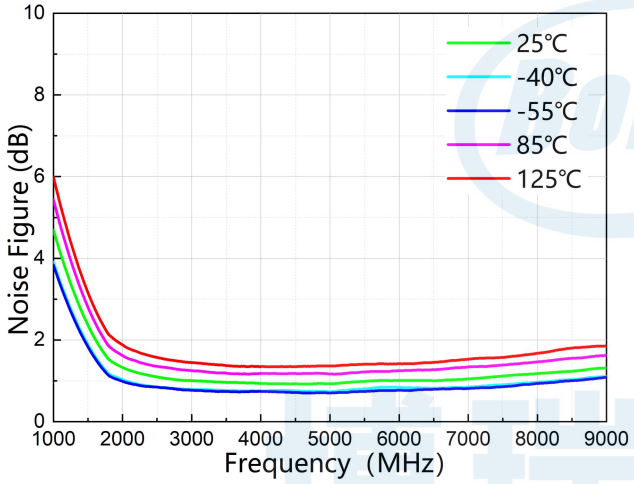
Input Return Loss vs. Freq



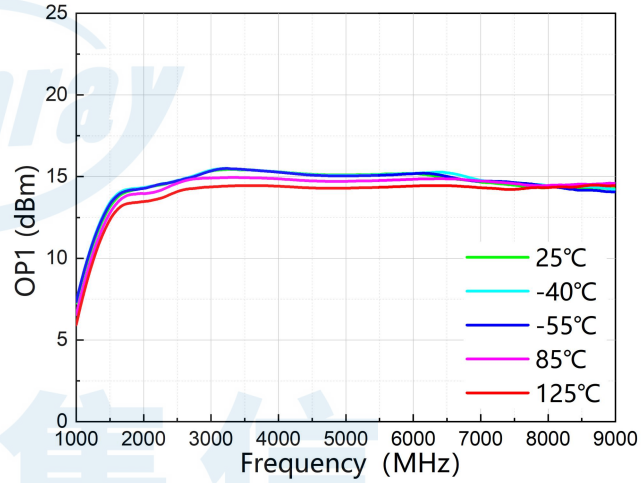
Output Return Loss vs. Freq



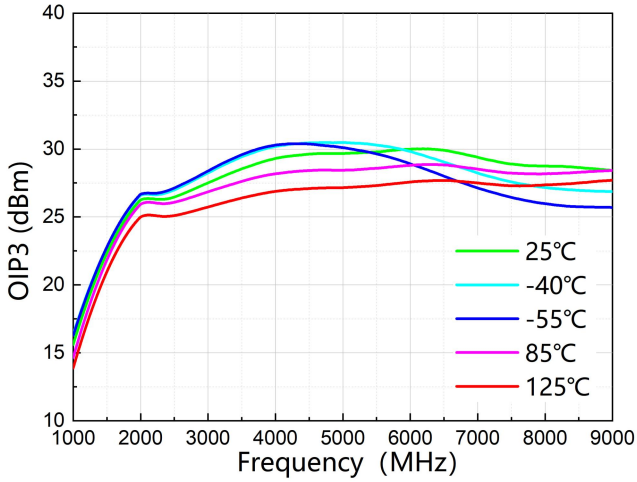
Reverse Isolation vs. Freq



Noise Figure vs. Freq

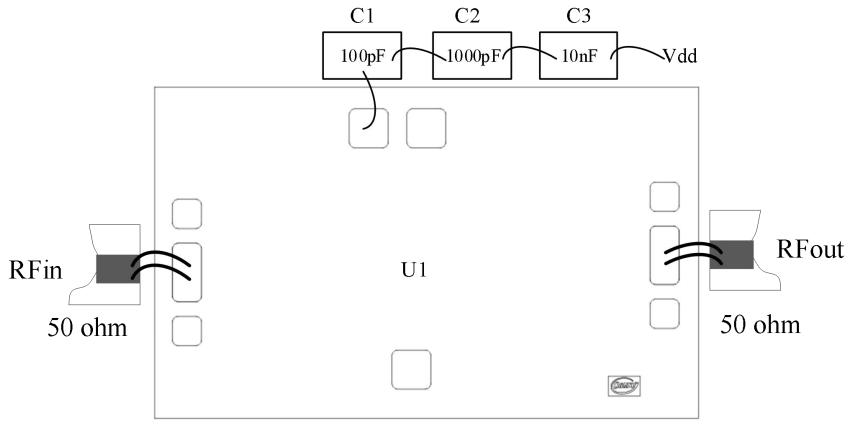


Output Power for 1dB Compression vs. Freq

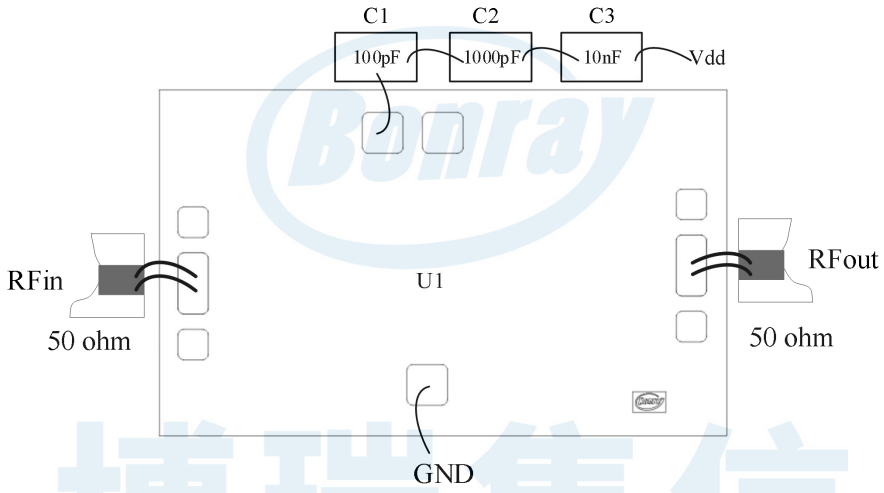


Output Third-Order Interception vs. Freq

Assembly Diagram



Assembly diagram for normal Operation Mode



Assembly diagram for low-power Operation Mode

Note: Chip capacitors as close as possible to power supply pad.

Bill of Material

Reference Designator	Package	Value	P/N
U1	Naked Die	2GHz~8GHz Low Noise Amplifier	BR9373LDZ
C1	Chip Capacitor	100pF	SG201N101MSTW
C2	Chip Capacitor	1000pF	CT91202X102M100TW
C3	Chip Capacitor	10nF	CT91-20-2X-103-M-50-C-W

Handling Precautions:

1. **Storage:** All bare dies are placed in ESD protective containers, and then sealed in an ESD protective bag for shipment. Once the sealed ESD protective bag has been opened, all die should be stored in a dry nitrogen environment.

2. **Cleanliness**: Handle the chips in a clean environment. DO NOT attempt to clean the chip using liquid cleaning systems.

3. **Electrostatic protection:** Follow ESD precautions to protect against ESD strikes.

4. **Transients:** Suppress instrument and bias supply transients while bias is applied. Use shielded signal and bias cables to minimize inductive pickup.

5. **General Handling**: Handle the chip along the edges with a vacuum collet or with a sharp pair of bent tweezers. The surface of the chip should not be touched with vacuum collet, tweezers, or fingers.

6. **Mouning:** The chip is back-metallized and can be die mounted with electrically conductive epoxy. The mounting surface should be clean and flat.

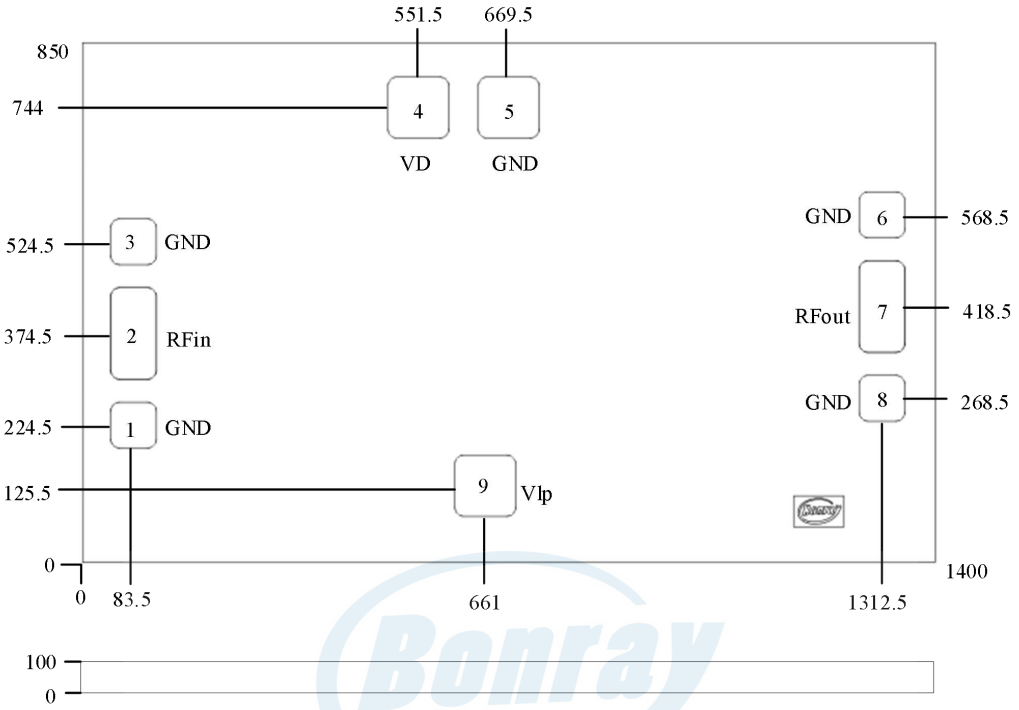
7. **Conductive epoxy Die Attach:** Apply conductive epoxy to the mounting surface so that the overflow of conductive epoxy on all four sides should not be less than 75%, and the height of conductive epoxy climbing on all four sides should not exceed the surface of the chip. Cure conductive epoxy per the manufacturer's schedule.

8. **Die bonding process unless otherwise noted**: Ball or wedge bond with 0.025mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. **The length of all bonds should be as short as possible and the arc height as low as possible.**

9. **Die bonding void rate:** not more than 10%.

10. Please contact customer service if you have any problem.

Mechanical Information (Units: um)



Notes:

1. Backside and bond pad metal: Gold;
2. Backside is RF and DC ground;
3. Pads size: RFin 75um×150um, RFout 75um×150um, Vlp 100um×100um, VD 100um×100um;
4. Cannot be bonded on the hole.

Functional Description

Pad	Function	Description
2	RFin	RF Input. No external DC block is required.
9	Vlp	Sets operation modes, and see assembly for required operation mode
7	RFout	RF Output. No external DC block is required.
4	VD	Power Supply. See assembly for required external components.
1,3,5,6,8	GND	Connected to die bottom through hole
Die Bottom	GND	Die bottom must be well grounded to RF/DC