

Product Features

Frequency: 500MHz ~ 4GHz

Noise Figure: 0.7dB@2GHz

Gain: 22.1dB@2GHz LNA Mode

Insertion Loss: -0.79dB@2GHz Bypass Mode

Output Third-Order Interception:

32.3dBm@2GHz

Output Power for 1dB Compression:

18.6dBm@2GHz

Vdd=+5V, Quiescent Current: 70mA

Vdd=+3.3V, Quiescent Current: 36mA

Package: DFN8 (2mm * 2mm)

Apply

5G Base Station

Mobile Terminal

IoT Device

Relay / DAS

Satellite Navigation

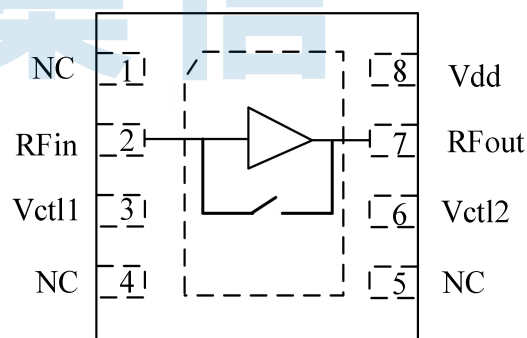
Ordering Information

Part Number	Package	Description
BR9388DAJ	DFN8	500MHz~4GHz Low Noise Amplifier

General Description

The BR9388DAJ is an integrated Bypass low noise amplifier covering a frequency range of 500 MHz to 4 GHz. It is internally matched to 50 ohms, requiring only external DC - blocking capacitors at the RF input and output ports. The on-chip active bias network ensures that the quiescent current remains stable against threshold voltage and temperature variations. At 2 GHz, the device typically provides a small -signal gain of 22.1 dB, an insertion loss of 0.8 dB, an output P1dB of 18.6 dBm, and a noise figure of 0.7 dB. This product features low power consumption and high gain flatness across a wide bandwidth, making it suitable for high-performance transceiver systems.

Functional Block Diagram



Electrical Specifications (+5V)

Parameters	Min.	Typ.	Max.	Units	Test condition
Gain	-	22.1	-	dB	2GHz
Insertion Loss (Bypass)	-	-0.79	-	dB	2GHz
Output Power for 1dB Compression (LNA)	-	18.6	-	dBm	2GHz
Output Power for 1dB Compression (Bypass)	-	22.4	-	dBm	2GHz
Output Third-Order Interception (LNA)	-	32.3	-	dBm	2GHz
Output Third-Order Interception (Bypass)	-	36.8	-	dBm	2GHz
Noise Figure	-	0.72	-	dB	2GHz
Input Return Loss	-	-13.6	-	dB	2GHz
Output Return Loss	-	-14.5	-	dB	2GHz
Reverse Isolation	-	-27.3	-	dB	2GHz
Supply Voltage	-	+5	-	V	-
Supply Current	-	70	-	mA	-
Test conditions: Vdd=+5V, I=70mA, OIP3 spacing=1MHz, Pout=+5dBm/tone, TA=+25°C					

Absolute Maximum Ratings

Maximum Supply Voltage : +6V

Maximum Input Power: 23dBm

ESD Rating: Class B (<600V)

Recommended Operating Conditions

Supply Voltage: +5V

Supply Current: 70mA

Operating Temperature: -55°C ~ +125°C

Storage Temperature: -65°C ~ +150°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.

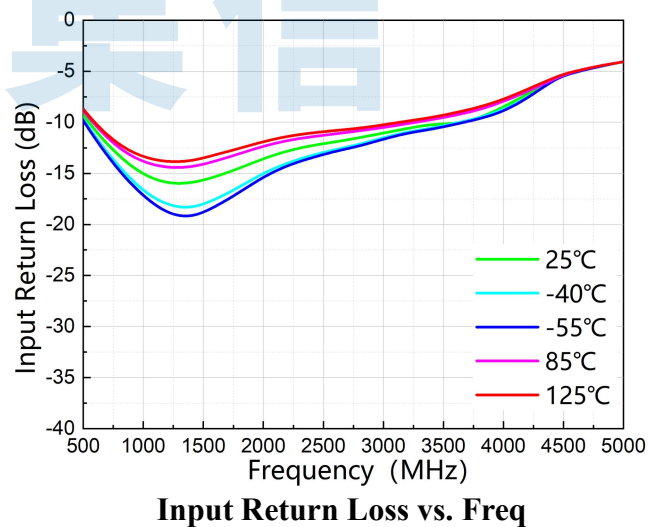
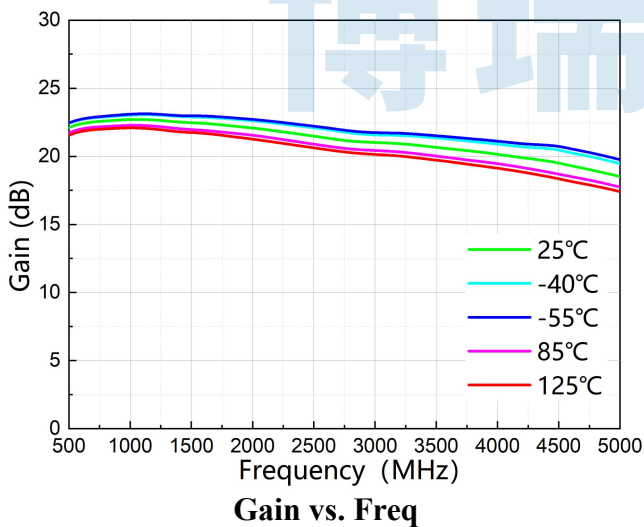
ESD WARNING

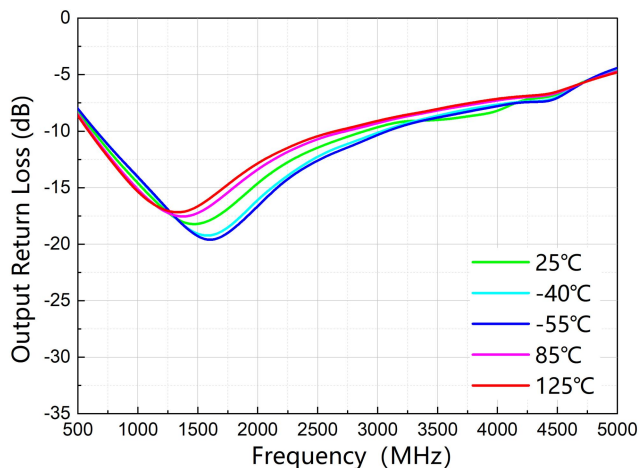
ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

博瑞集信

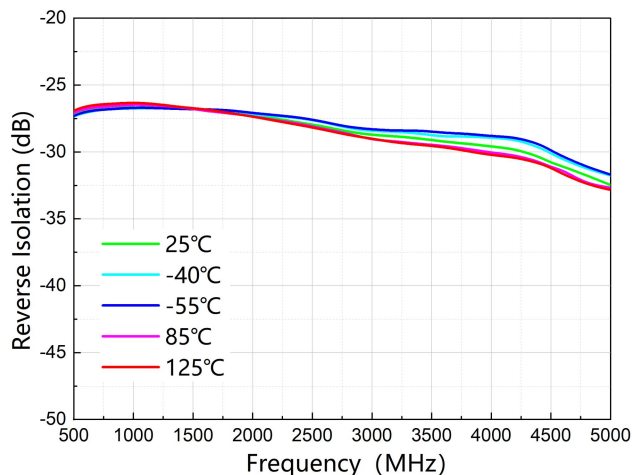
Typical Performance (EVB Test Results at LNA Mode, +5V Supply)

Parameters	Operation Mode	Typ.										Units
Frequency	LNA Mode	500	800	1000	1400	1600	2000	2400	3000	3400	4000	MHz
Gain	5V	22.1	22.6	22.7	22.5	22.5	22.1	21.6	21.0	20.8	20.2	dB
	3.3V	21.4	21.8	22.0	21.7	21.6	21.3	20.8	20.2	20.0	19.3	
Input Return Loss	5V	-9.3	-13.4	-15.2	-16.0	-15.4	-13.6	-12.3	-11.1	-10.2	-8.5	dB
	3.3V	-8.8	-12.2	-13.3	-13.3	-12.7	-11.3	-10.4	-9.5	-8.8	-7.3	
Output Return Loss	5V	-8.3	-12.3	-14.6	-18.4	-18.1	-14.5	-11.9	-9.6	-9.1	-8.3	dB
	3.3V	-8.7	-13.4	-16.4	-19.8	-18.1	-14.3	-11.8	-9.9	-9.0	-8.0	
Output Power for 1dB Compression	5V	19.9	19.5	19.2	19.2	18.8	18.6	17.7	17.6	17.7	18.5	dBm
	3.3V	17.1	17.1	16.8	17.0	16.3	16.6	14.7	14.0	13.5	14.5	
Output Third-Order Interception	5V	35.8	35.1	34.3	33.4	33.1	32.3	31.9	32.2	32.5	31.4	dBm
	3.3V	29.1	28.5	28.1	27.5	27.3	26.8	26.9	25.9	25.6	26.3	
Noise Figure	5V	1.00	0.81	0.80	0.92	0.89	0.72	0.96	1.05	1.11	1.16	dB
	3.3V	0.96	0.79	1.12	0.94	0.89	0.85	0.96	1.05	1.15	1.13	
Test Conditions: Vdd=+5V, I=70mA, OIP3 spacing=1MHz, Pout=+5dBm/tone, TA=+25°C Vdd=+3.3V, I=36mA, OIP3 spacing=1MHz, Pout=+5dBm/tone, TA=+25°C												

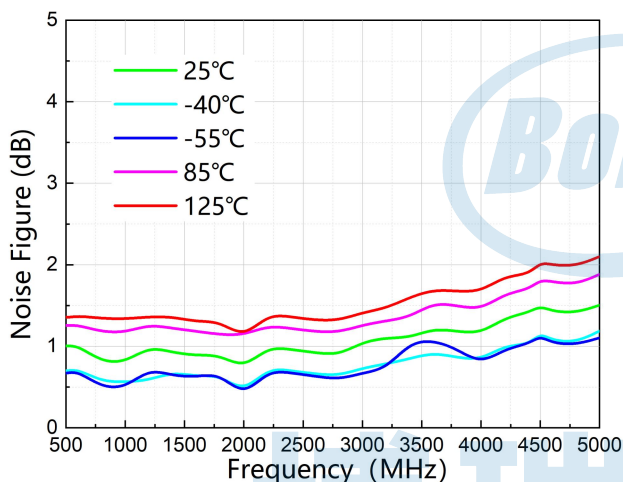




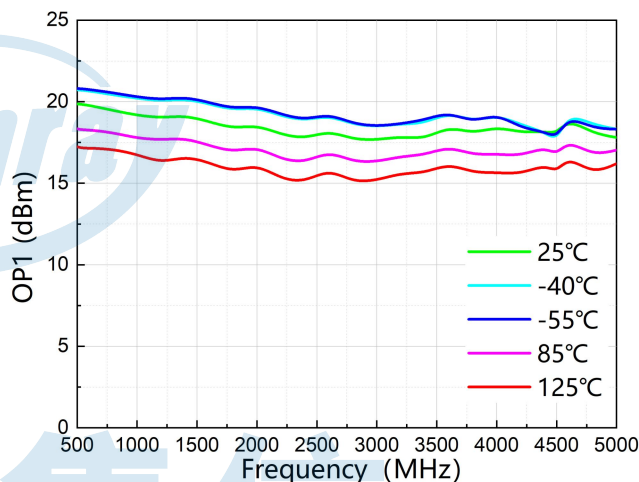
Output Return Loss vs. Freq



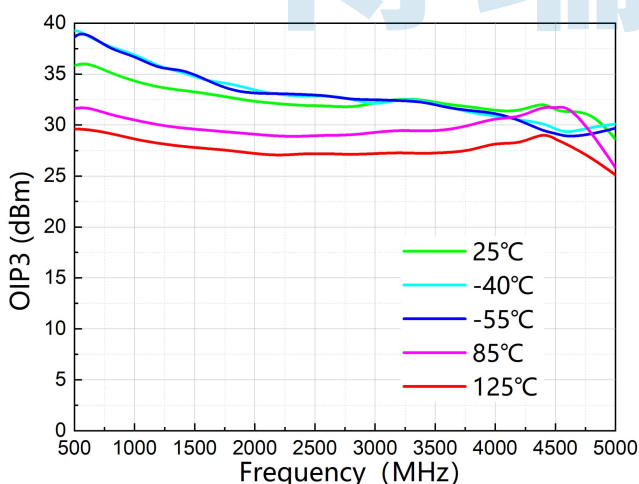
Reverse Isolation vs. Freq



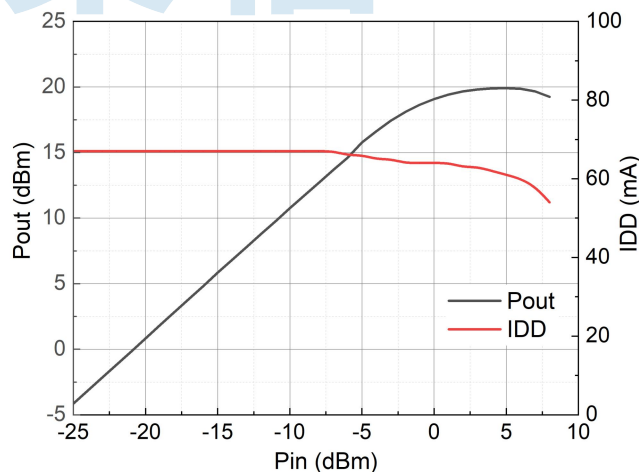
Noise Figure vs. Freq



Output Power for 1dB Compression vs. Freq



Output Third-Order Interception vs. Freq

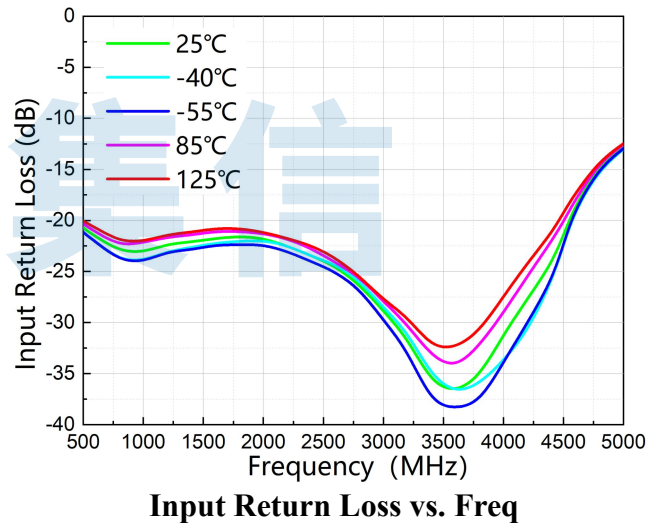
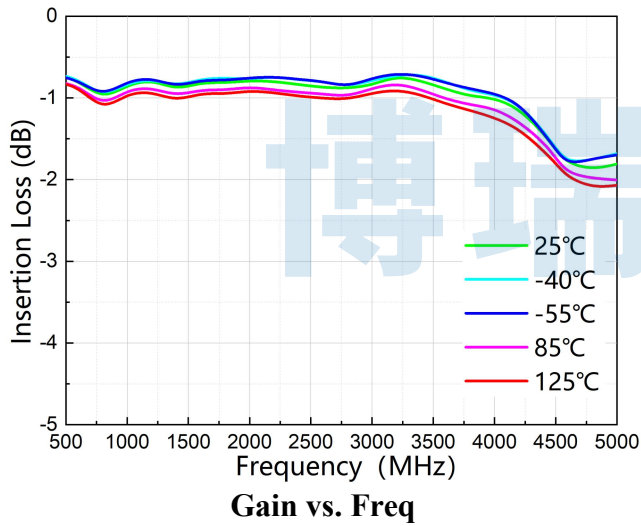


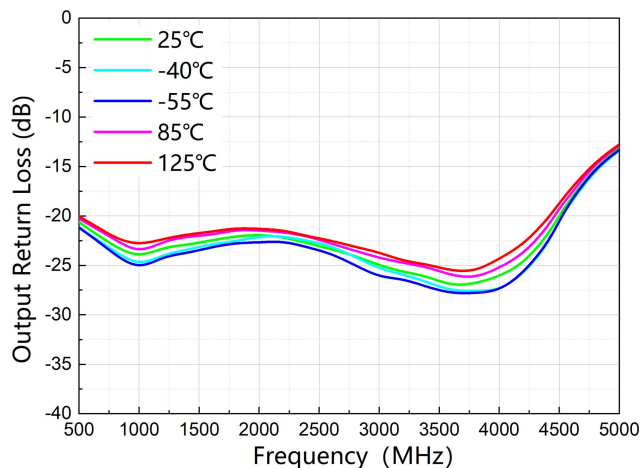
P_{out} and IDD vs. P_{in} (2GHz)

Typical Performance (EVB Test Results at Bypass Mode, +5V Supply)

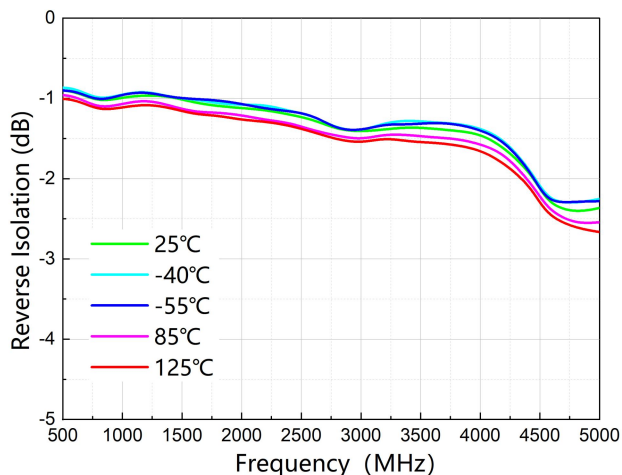
Parameters	Operation Mode	Typ.										Units
Frequency	LNA Mode	500	800	1000	1400	1600	2000	2400	3000	3400	4000	MHz
Insertion Loss	5V	-0.75	-1.02	-0.84	-0.91	-0.81	-0.79	-0.84	-0.84	-0.79	-1.00	dB
	3.3V	-0.75	-1.10	-0.82	-0.92	-0.85	-0.80	-0.86	-0.83	-0.78	-1.09	
Input Return Loss	5V	-20.8	-23.0	-23.1	-22.1	-21.8	-21.7	-23.5	-28.8	-35.9	-31.2	dB
	3.3V	-20.6	-23.1	-23.0	-21.9	-21.1	-21.5	-23.1	-27.7	-33.7	-29.6	
Output Return Loss	5V	-20.6	-23.1	-24.2	-22.9	-22.5	-21.9	-22.7	-25.0	-26.1	-26.1	dB
	3.3V	-20.6	-23.1	-24.2	-22.6	-22.1	-21.6	-22.2	-24.4	-25.7	-25.3	
Input 1dB Compression Point	5V	22.7	20.5	20.6	20.7	20.8	20.6	20.3	20.4	20.3	20.4	dBm
	3.3V	22.6	20.1	20.3	20.3	20.6	20.3	20.0	20.1	20.0	19.9	
Input Third-Order Intercept Point	5V	37.3	36.0	36.3	36.5	36.4	36	35.1	35.9	34.7	33.6	dBm
	3.3V	42.4	40.7	39.7	39.3	38.9	37.9	36.6	37.4	36.4	35.4	

Test Conditions: Vdd=+5V, I=4mA, OIP3 spacing=1MHz, Pout=+5dBm/1tone, TA=+25°C

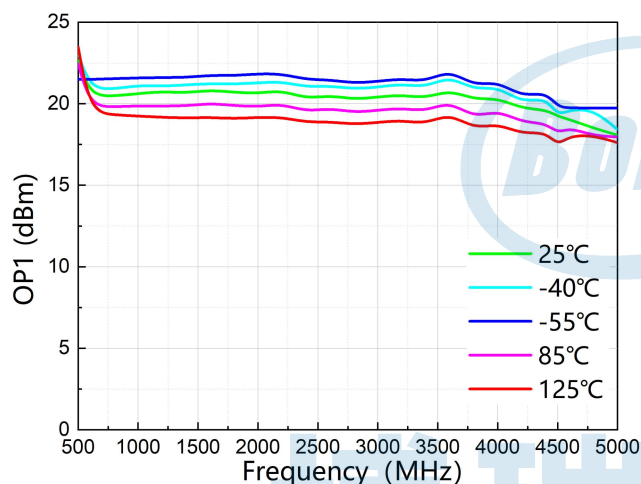




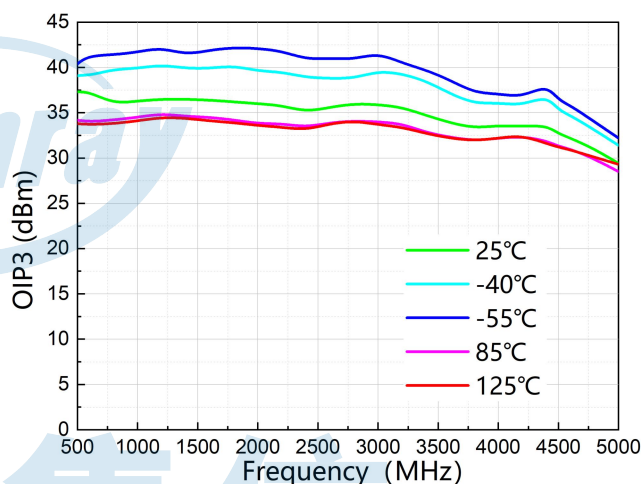
Output Return Loss vs. Freq



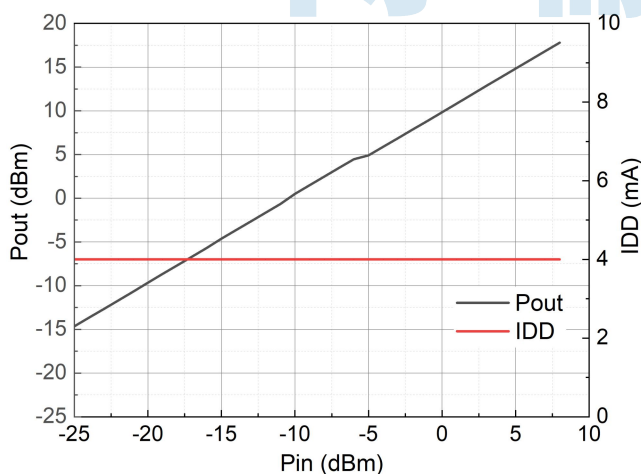
Reverse Isolation vs. Freq



Output Power for 1dB Compression vs. Freq

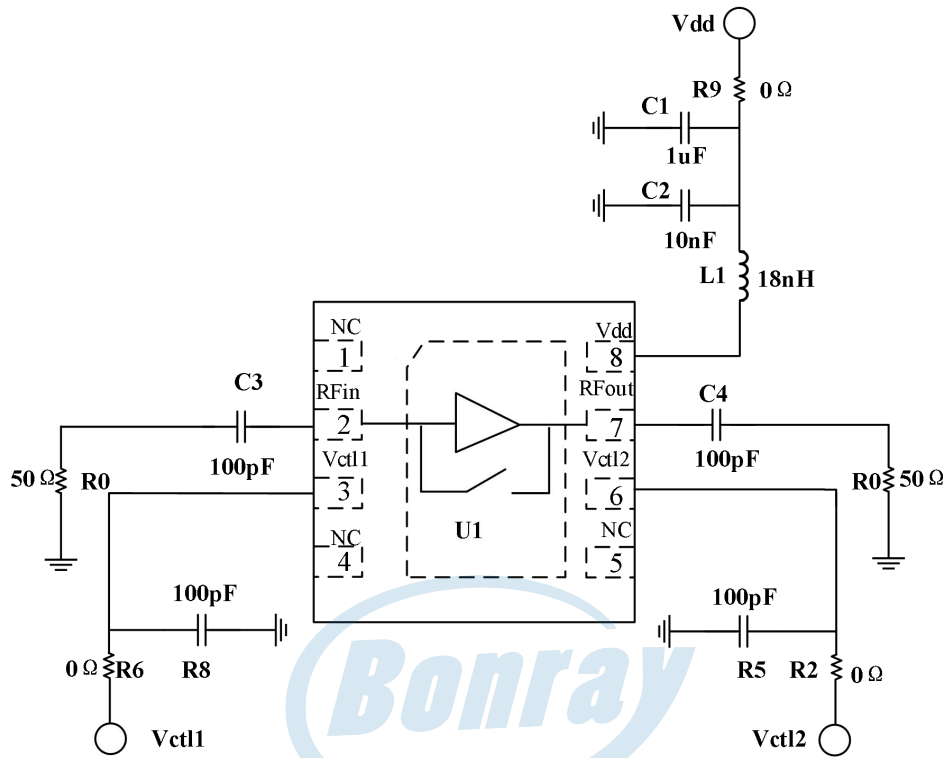


Output Third-Order Interception vs. Freq



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

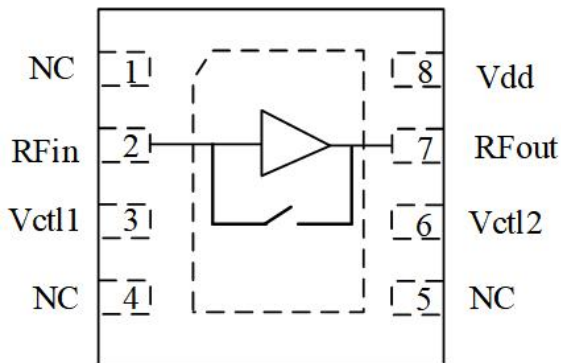
Typical Application Schematic



Bill of Material

Designator	Package	Description	Part Number
U1	DFN8	/	BR9388DAJ
C1	0603	1uF,16V,10%	GRM188R61C105KA93D
C2	0402	10nF,6V,±10%	GRM155R71H103KA88D
C3、C4、R5、R8	0402	50V 100pF ±5%	GRM1555C1H101JA01D
R1、R2、R6、R9	0402	±1% 0Ω 1/16 W	RC0402FR-070RL
L1	0603	18nH ±5% 1200mA	-
R0	0402	50Ω 5% 50V	RC0402JR-0750RL

Pin Configuration and Description

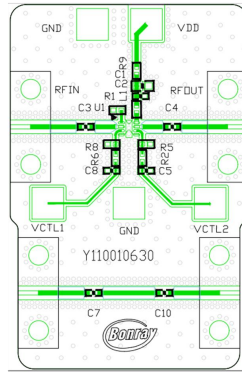


Pin Number	Pin Name	Description
2	RFin	RF input pin. DC-coupled and internally matched to 50 ohms. A DC Block is required.
1,4,5	NC	Ground pin. This pin and the package substrate must be connected to the RF/DC ground.
7	RFout	RF output pin. DC-coupled and internally matched to 50 ohms. Requires an external DC Block and an RF choke inductor.
3,6	Vctl	Control pin. Specific operating modes are defined in the truth table below.
8	Vdd	Amplifier power supply port.

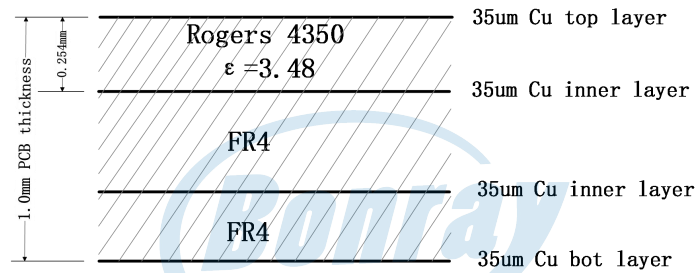
Truth Table

Operation Mode	Vctl1	Vctl2
LNA Mode	0V	0V
Bypass Mode	0/5V	5V
All Off Mode	5V	0V

PCB Evaluation Board

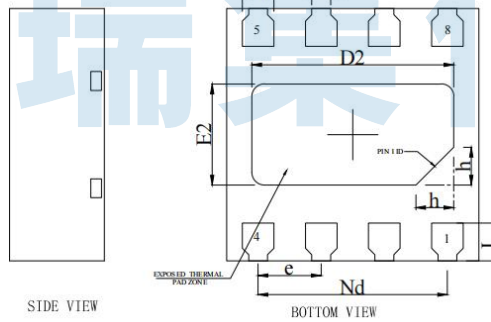
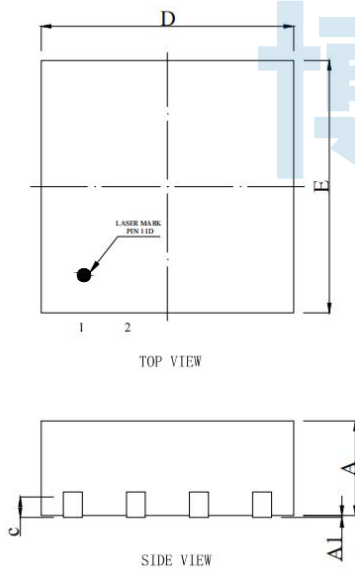


PCB



50 Ω line: width=0.53mm, spacing=0.6mm

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	0.203REF		
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
h1	0.20	0.30	0.40