

Product Features

Operating frequency: 6GHz ~ 18GHz

Small Signal Gain: 22.9dB@12GHz

OP1dB: 28.5dBm@12GHz

Psat: 28.5dBm@12GHz

PAE@Psat: 28.5%@12GHz

OIP3: 30.4dBm@12GHz

Recommended Bias: 450mA@V_D=+6V

Package: QFN24 (4mm×4mm)

General Description

The BR9772FPJ is an MMIC Broadband driver amplifier, powered by a +6V drain-level power and the static current is 450mA. The amplifier covers the frequency range from 6GHz to 18GHz. With advantages of internal bandwidth matching, it can be widely applied in transmitter systems for broadband communications and electronic countermeasures.

Application

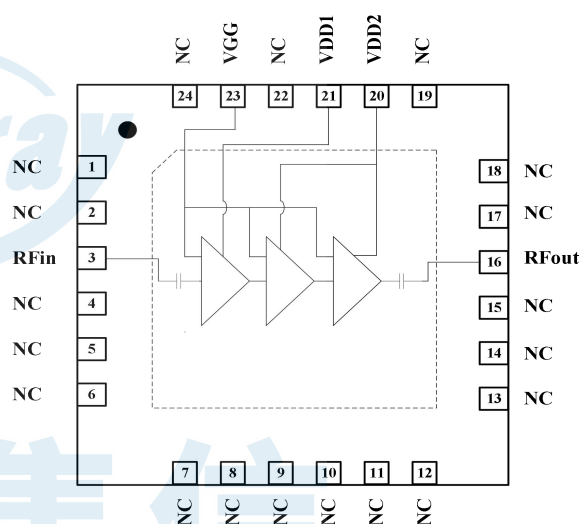
Electronic Countermeasures

Broadband Communication

Ordering Information

Part Number	Package	Description
BR9772FPJ	QFN24	6GHz~18GHz Driver Amplifier

Functional Block Diagram



Technical Specifications (EVB Test, +6V Electrical Performance Parameters)

Parameters	Test condition	Min	Typ.	Max	Units
Small Signal Gain	6GHz	—	20.9	—	dB
	12GHz	—	22.9	—	dB
	18GHz	—	21.3	—	dB
Input Return Loss	6GHz	—	-5.5	—	dB
	12GHz	—	-10.0	—	dB
	18GHz	—	-11.1	—	dB
Output Return Loss	6GHz	—	-18.1	—	dB
	12GHz	—	-32.1	—	dB
	18GHz	—	-19.1	—	dB
Reverse Isolation	6GHz	—	-69.2	—	dB
	12GHz	—	-59.3	—	dB
	18GHz	—	-60.1	—	dB
Output Power for 1dB Compression	6GHz	—	29.6	—	dBm
	12GHz	—	28.5	—	dBm
	18GHz	—	28.6	—	dBm
Output Third-Order Interception	6GHz	—	30.0	—	%
	12GHz	—	30.4	—	%
	18GHz	—	28.9	—	%
Supply Voltage	-	—	6	9	V
Static Current	-	—	450	—	mA

Test Conditions: Vdd=+6V, OIP3 Fspacing=1MHz (Pout=5dBm/tone), TA=+25°C;

Absolute Maximum Ratings

Maximum Supply voltage (Vdd): +9V

Maximum RF input power: +20dBm

Recommended Operating Conditions

Drain Voltage (V_{DD}): +6V (Typ)

Drain Static Current (I_{DQ}): 450mA (Typ)

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

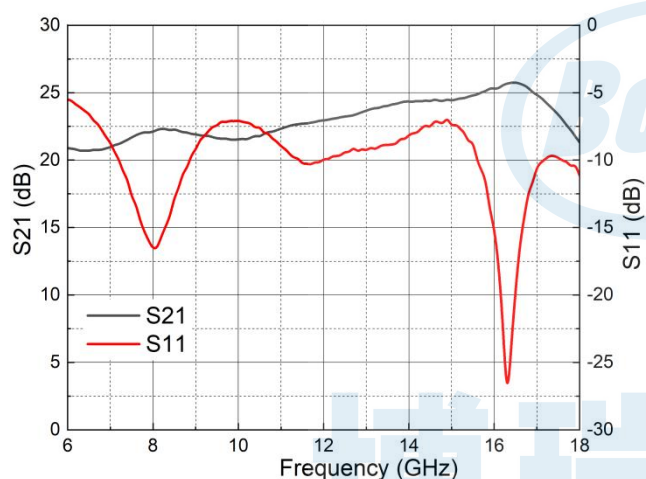
OBSERVE HANDLING PRECAUTIONS

ESD Rating: Class 1C.

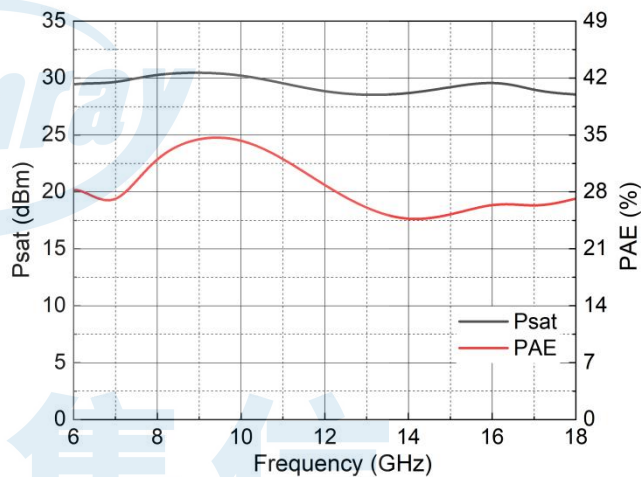
Typical Performance (+6V Power Supply, 6GHz~18GHz, EVB test results)

Parameters	Typ.							Units
Frequency	6	8	10	12	14	16	18	GHz
Gain	20.9	22.1	21.5	22.9	24.3	25.3	21.3	dB
Input Return Loss	-5.5	-16.6	-7.1	-10	-8.1	-15.0	-11.1	dB
Output Return Loss	-18.1	-12.7	-15.6	-32.1	-12.9	-9.5	-19.1	dB
Reverse Isolation	-69.2	-63.0	-67.6	-59.3	-57.9	-57.1	-60.1	dB
Output Third-Order Interception	30.0	32.4	33.7	30.4	31.5	26.7	28.9	dBm
Output Power for 1dB compression	29.6	30.5	30.6	28.5	28.4	30.0	28.6	dBm
PAE@P _{sat}	29.7	33.8	35.9	28.5	23.2	27.1	27.2	%

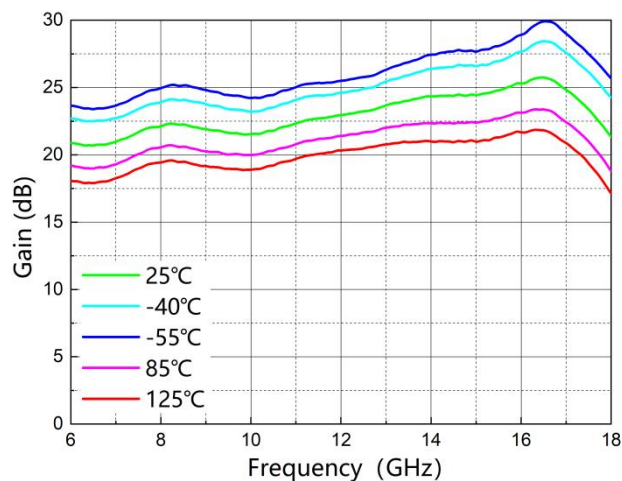
Test Condition: Temp=+25°C, V_{DD}=6V, I_{DQ}=450mA, OIP3 Fspacing=1MHz (Pout=5dBm/tone)



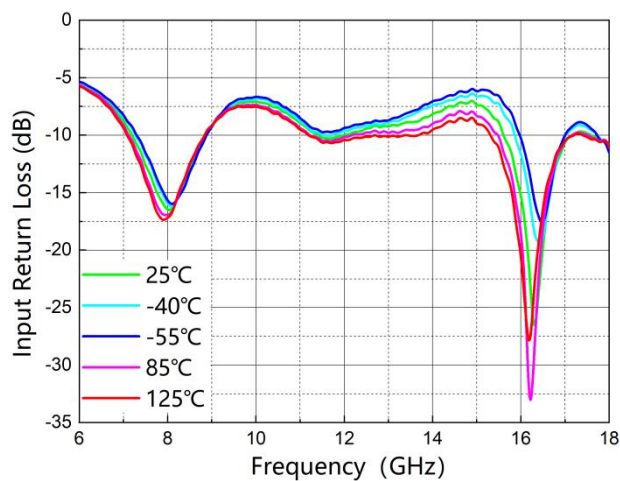
Gain, Input Return Loss vs. Freq.



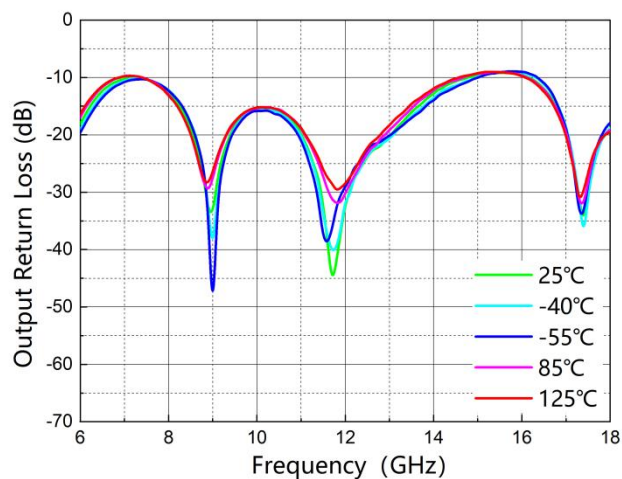
Psat, PAE vs. Freq



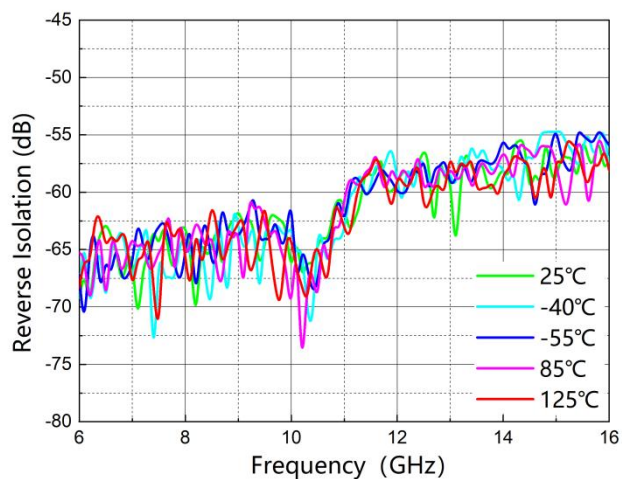
Gain vs. Freq.



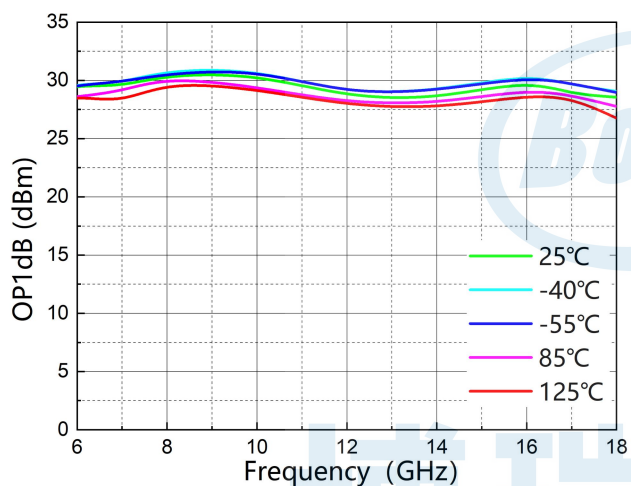
Input Return Loss vs. Freq.



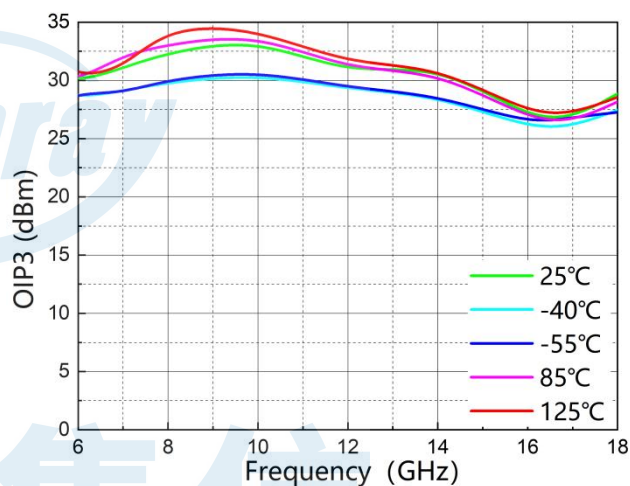
Output Return Loss vs. Freq.



Reverse Isolation vs. Freq.

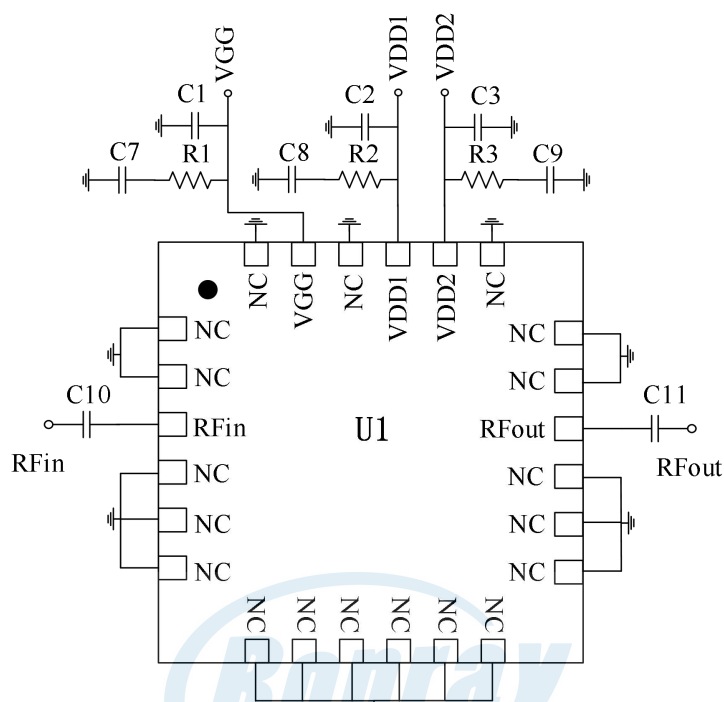


Output Power for 1dB compression vs. Freq.



Output Third-Order Interception vs. Freq.

Typical Application Schematic

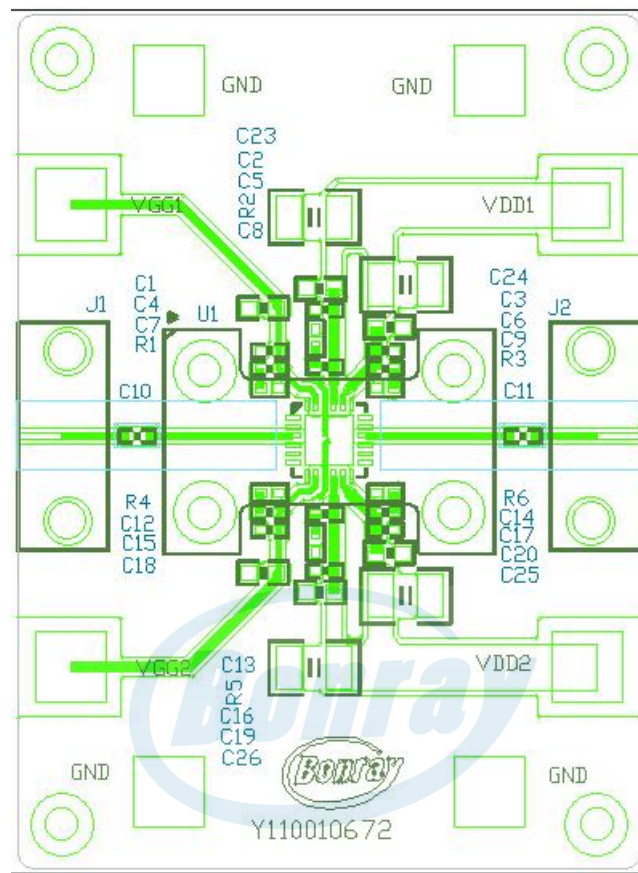


Typical Application Schematic

Bill of Material

Reference Designator	Package Size	Value	Part Number
C1, C2, C3	C0603	4.7uF	GRM188C71C475KE21D
C7, C8, C9, C10, C11	C0402	1nF	GRM1555C1H102JA01D
R1, R2, R3	R0402	10ohm	RC0402FR-0710RL

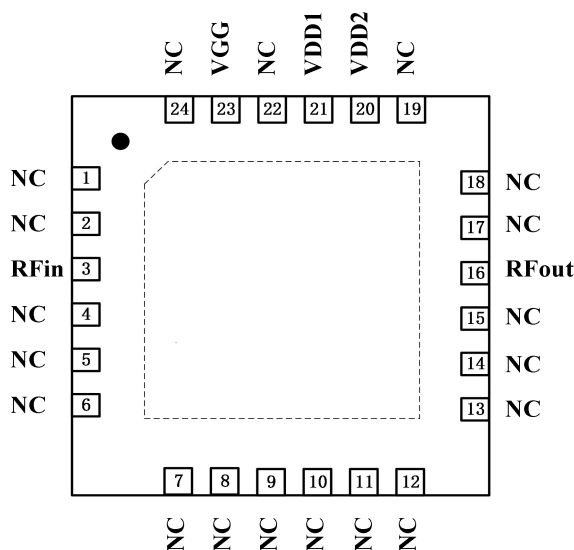
Board Information (10mil Rogers 4350B, double-layer board)



PCB Design Notes

- 1.The backside pad of the chip is used for RF grounding and heat dissipation. A sufficient number of ground vias shall be provided at the corresponding location (e.g., ground vias with 0.3 mm diameter, quantity ≥ 25), as shown in the figure above.
- 2.To ensure excellent heat dissipation and grounding performance, it is recommended to connect the bottom layer of the PCB to an external heat dissipation structure using thermal silicone grease.
- 3.Screws shall be provided around the chip to secure it to the structural components.

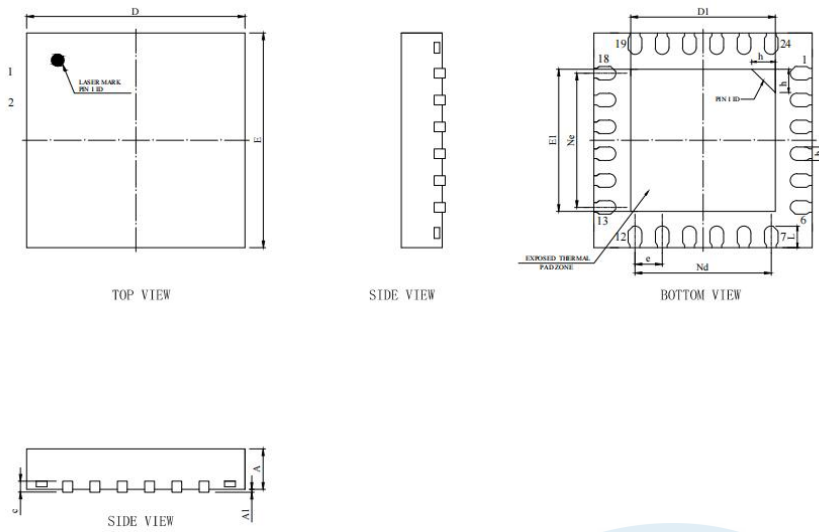
Pin Configuration and Description



Pin Description

Pin Number	Pin Name	Description
1-2, 4-15, 17-19, 22, 24	NC	Internally unconnected and recommended to ground during use.
3	RFin	RF input pin with internal matching at 50Ω.
16	RFout	RF output pin with internal matching at 50Ω.
23	VGG	Gate bias voltage.
11, 20	VDD1, VDD2	Drain bias voltage.
/	Backside	DC RF Grounding
Power-On Sequence - Set the gate voltage (V_{GG}) to -3V ; - Set drain voltage (V_{DD}) to +6V; - Turn on the gate voltage; - Turn on the drain voltage; - Increase the gate voltage (V_{GG}) so that the drain current is 450mA; - Input radio frequency signal.		Power-off Sequence - Turn off the radio frequency signal; - Turn off the drain supply voltage and wait 5 seconds for the drain capacitor to fully discharge; - Turn off the gate supply voltage.
Note: In circuit design, bias voltage under-voltage protection is needed with timing protection circuits to ensure that V_{GG} is fully powered up before V_{DD} is applied, and that V_{DD} is lowered to below 5V before V_{GG} is powered down, especially in T_{DD} applications. The gate driving decoupling capacitor needs to be carefully evaluated to meet the switching speed requirements.		

Packaging Information (Unit: mm)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.80	0.90
A1	-	0.02	0.05
b	0.20	0.25	0.30
c	0.203REF		
D	3.90	4.00	4.10
D1	2.60	2.70	2.80
e	0.50BSC		
Ne	2.50BSC		
Nd	2.50BSC		
E	3.90	4.00	4.10
E1	2.60	2.70	2.80
L	0.35	0.40	0.45
h	0.30	0.40	0.45

Packaging Information Diagram

Recommended Welding Temperature Curve

