Product Features

Operating Frequency: 6GHz~12GHz

Gain: 16.2dB@10GHz

Output Power for 1dB Compression:

16.6dBm@10GHz

Noise Figure: 1.4dB@10GHz

Output Third-Order Interception:

28.9dBm@10GHz

+3.3V/+5V Single Power Supply

Supply Current:

53mA@ Vdd=5V

30mA@ Vdd=3.3V

Package: QFN16 (3mm×3mm)

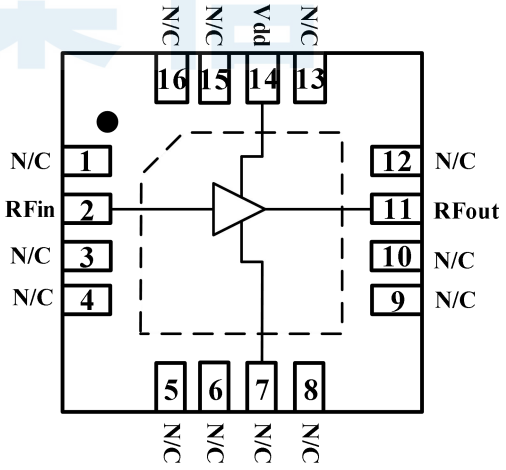
Ordering Information

Part Number	Package	Description
BR9642FDJ	QFN16	6GHz~12GHz Gain Block Amplifier

General Description

The BR9642FDJ is a high-performance MMIC gain amplifier designed using GaAs process, which operates between 6GHz and 12GHz. The amplifier is powered by a single-supply operation of +5V or +3.3V. At 10GHz, the amplifier typically provides a gain of 16.2dB, noise figure of 1.4dB, output P1dB of 16.6dBm, output IP3 of 28.9dBm 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 product has the characteristics of low dynamic current, low noise figure and high reliability, which can be used in both the receiving system and the transmitting system.

Functional Block Diagram



Electrical Specifications

Parameter	Test Conditions	5V (Typ.)	3.3V (Typ.)	Units
Gain	8000MHz	16.6	15.5	dB
	10000MHz	16.2	14.7	dB
	12000MHz	14.6	12.5	dB
Output Power for 1dB Compression	8000MHz	17.6	11.8	dBm
	12000MHz	14.6	7.4	dBm
Output Third-Order Interception	8000MHz	28.4	23.4	dBm
	12000MHz	28.7	17.3	dBm
Noise Figure	10000MHz	1.4	1.7	dB
Input Return Loss	10000MHz	-13.9	-10.4	dB
Output Return Loss	10000MHz	-13.4	-19.3	dB
Reverse Isolation	10000MHz	-29.6	-30.4	dB
Supply Voltage	-	+5	+3.3	V
Supply Current	-	53	30	mA
Test Conditions: Vdd=+5V, I=53mA; OIP3 spacing=1MHz, Pout=0dBm/tone; TA=+25℃				

Absolute Maximum Ratings

Maximum Supply Voltage (Vdd): +6V

Maximum RF Input Power: +20dBm

Recommended Operating Conditions

Supply Voltage: +5V/3.3V

Supply Current:

53mA@ Vdd=5V

30mA@ Vdd=5V

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 WARNINGS

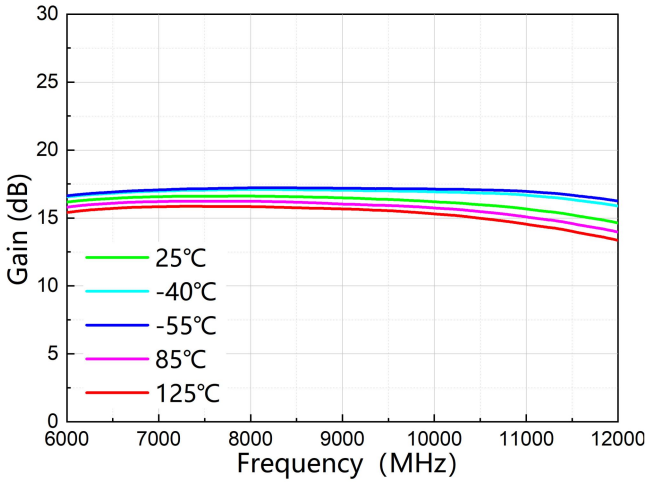
ELECTROSTATIC SENSITIVE DEVICE

OBSERVE HANDLING PRECAUTIONS

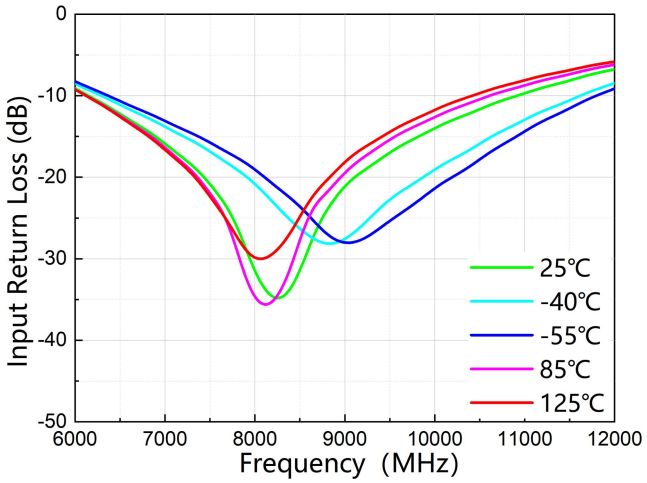
ESD Rating：Class 1A

Typical Performance (EVB test results at +5V supply voltage)

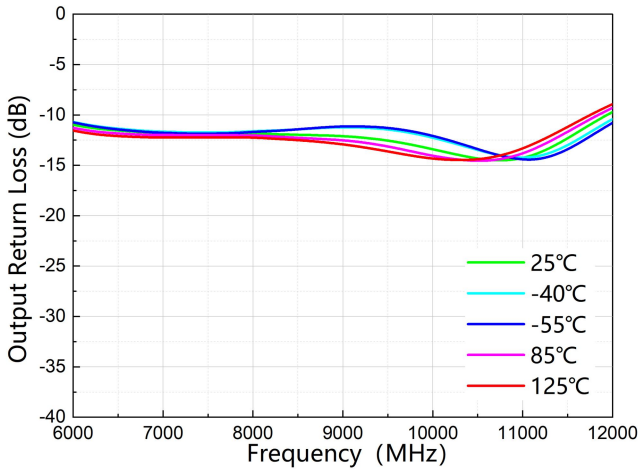
Parameter	Typ.									Units
Frequency	6000	6500	7000	7500	8000	8500	9000	9500	9750	MHz
Gain	16.2	16.4	16.5	16.6	16.6	16.5	16.4	16.3	16.3	dB
Input Return Loss	-9.1	-12.2	-15.8	-20.7	-30.7	-30.9	-21.3	-17.0	-15.4	dB
Output Return Loss	-11.0	-11.5	-11.8	-11.9	-11.9	-12.0	-12.1	-12.5	-13.0	dB
Reverse Isolation	-26.7	-26.6	-26.7	-27.0	-27.3	-27.7	-28.1	-28.8	-29.2	dB
Output Power for 1dB Compression	16.7	17.1	17.4	17.6	17.6	17.5	17.3	16.9	16.7	dBm
Output Third-Order Interception	27.9	27.9	28.0	28.3	28.4	28.3	28.7	28.5	28.7	dBm
Noise Figure	1.7	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.4	dB
Frequency	10000	10250	10500	10750	11000	11250	11500	11750	12000	MHz
Gain	16.2	16.1	16.0	15.8	15.6	15.5	15.2	14.9	14.6	dB
Input Return Loss	-13.9	-12.8	-11.6	-10.7	-9.6	-9.0	-8.1	-7.5	-6.6	dB
Output Return Loss	-13.4	-13.9	-14.3	-14.5	-14.3	-13.5	-12.3	-11.0	-9.7	dB
Reverse Isolation	-29.6	-30.1	-30.7	-31.2	-31.8	-32.3	-33.0	-33.7	-34.6	dB
Output Power for 1dB Compression	16.6	16.5	16.3	16.2	15.8	15.6	15.4	15.0	14.6	dBm
Output Third-Order Interception	28.9	28.6	28.9	29.0	29.1	28.9	28.9	28.7	28.7	dBm
Noise Figure	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.8	1.8	dB
Test Conditions: Vdd=+5V, Idd=53mA; OIP3 spacing=1MHz, Pout=0dBm/tone; TA=+25°C										



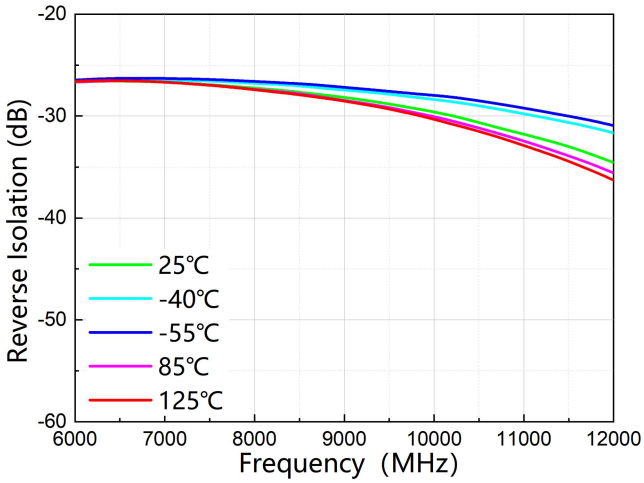
Gain vs. Freq



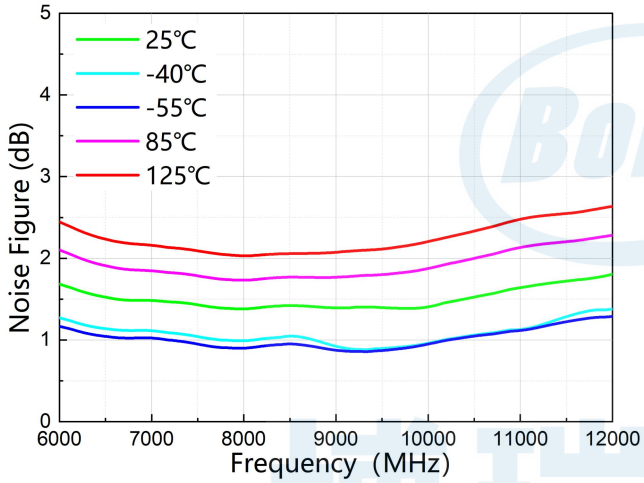
Input Return Loss vs. Freq



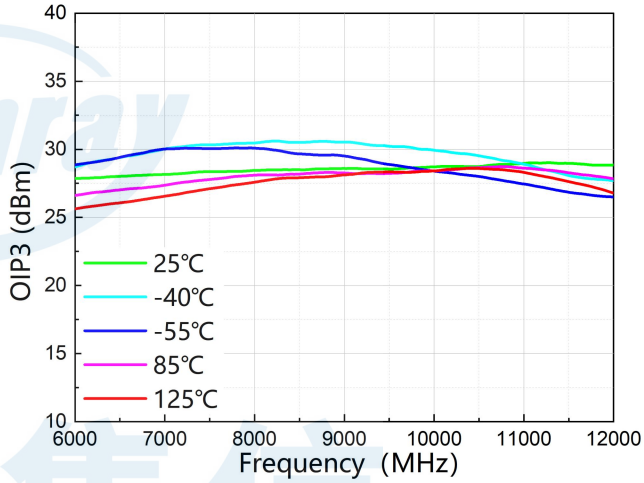
Output Return Loss vs. Freq



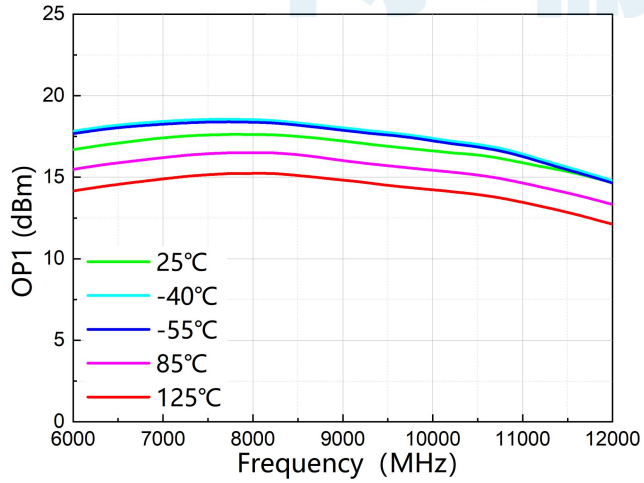
Reverse Isolation vs. Freq



Noise Figure vs. Freq



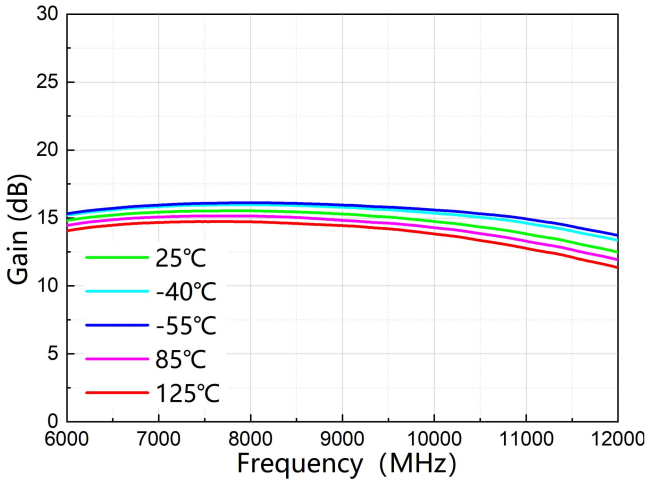
Output Third-Order Interception vs. Freq



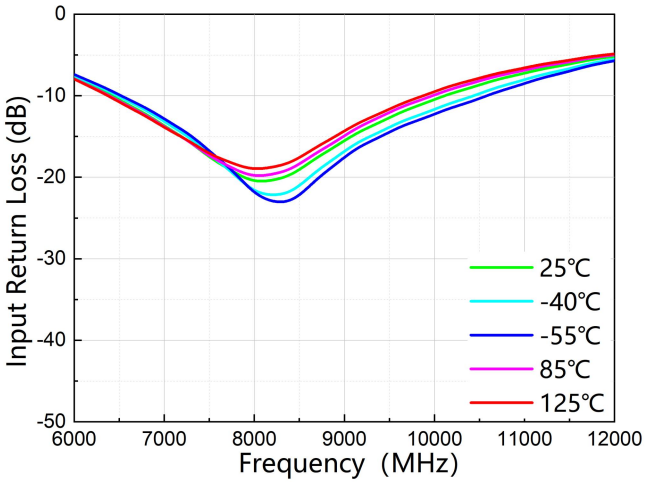
Output Power for 1dB Compression vs. Freq

Typical Performance (EVB test results at +3.3V supply voltage)

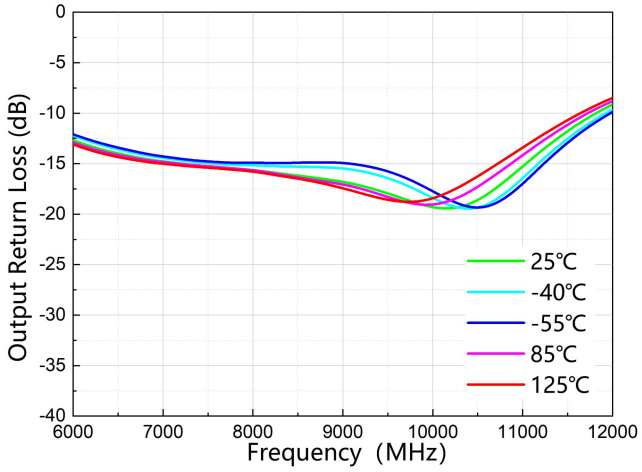
Parameter	Typ.									Units
Frequency	6000	6500	7000	7500	8000	8500	9000	9500	9750	MHz
Gain	14.8	15.2	15.4	15.5	15.5	15.4	15.3	15.1	14.9	dB
Input Return Loss	-7.7	-10.4	-13.6	-17.3	-20.2	-18.9	-15.4	-12.6	-11.6	dB
Output Return Loss	-12.7	-14.0	-14.8	-15.3	-15.7	-16.2	-16.8	-17.9	-18.7	dB
Reverse Isolation	-26.1	-25.9	-26.0	-26.3	-26.8	-27.4	-28.2	-29.2	-29.8	dB
Output Power for 1dB Compression	11.4	11.7	11.9	12.0	11.8	11.5	11.1	10.6	10.3	dBm
Output Third-Order Interception	22.3	22.7	23.2	23.5	23.4	23.1	22.4	21.6	21.2	dBm
Noise Figure	1.8	1.6	1.6	1.5	1.5	1.5	1.6	1.6	1.6	dB
Frequency	10000	10250	10500	10750	11000	11250	11500	11750	12000	MHz
Gain	14.7	14.6	14.3	14.1	13.8	13.5	13.2	12.8	12.5	dB
Input Return Loss	-10.4	-9.6	-8.6	-8.0	-7.1	-6.7	-6.0	-5.7	-5.0	dB
Output Return Loss	-19.3	-19.4	-18.5	-17.1	-15.3	-13.4	-11.8	-10.3	-9.1	dB
Reverse Isolation	-30.4	-31.2	-32.1	-33.1	-34.0	-35.1	-36.5	-38.2	-39.9	dB
Output Power for 1dB Compression	10.1	10.0	9.6	9.4	9.1	8.7	8.4	7.9	7.4	dBm
Output Third-Order Interception	21.0	20.6	20.2	19.9	19.4	18.8	18.4	18.0	17.3	dBm
Noise Figure	1.7	1.8	1.8	1.9	2.0	2.1	2.1	2.1	2.2	dB
Test Conditions: Vdd=+3.3V, Idd=30mA; OIP3 spacing=1MHz, Pout=0dBm/tone; TA=+25°C										



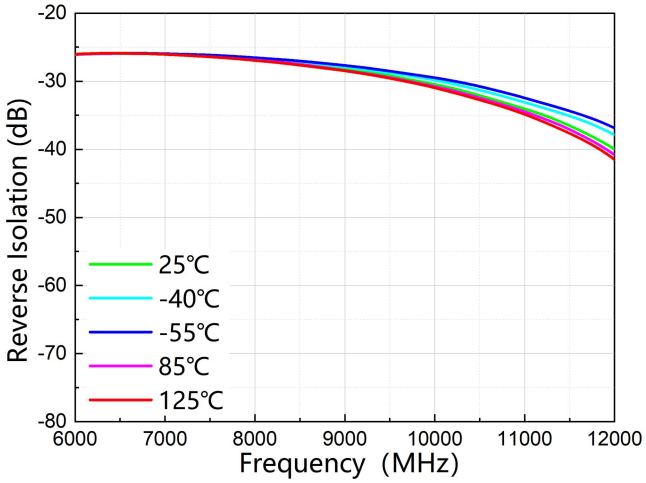
Gain vs. Freq



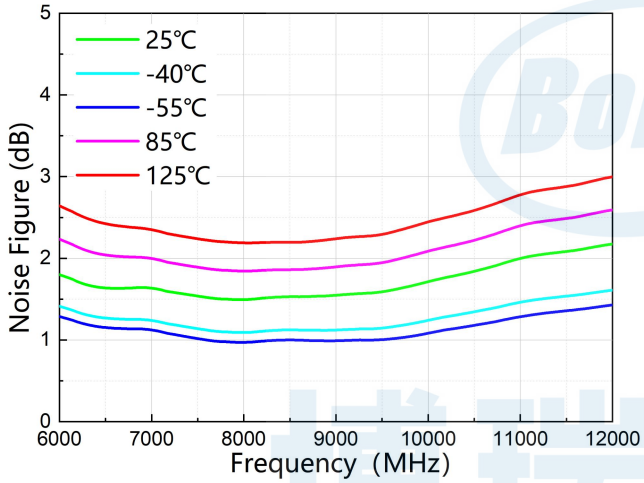
Input Return Loss vs. Freq



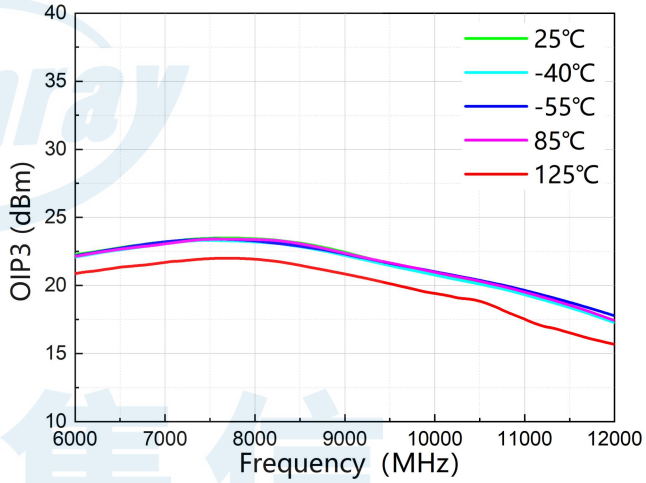
Output Return Loss vs. Freq



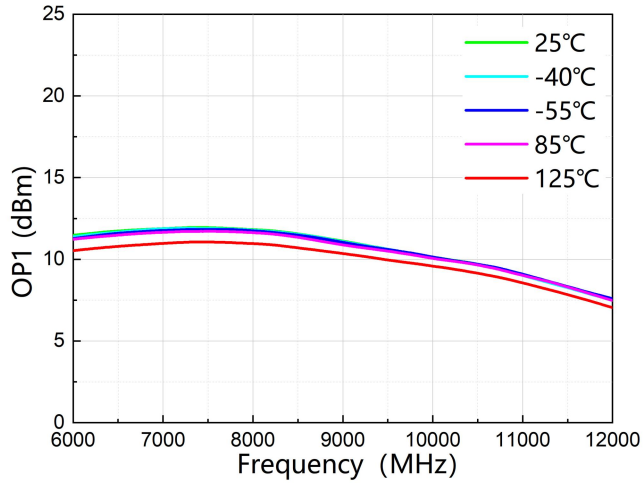
Reverse Isolation vs. Freq



Noise Figure vs. Freq

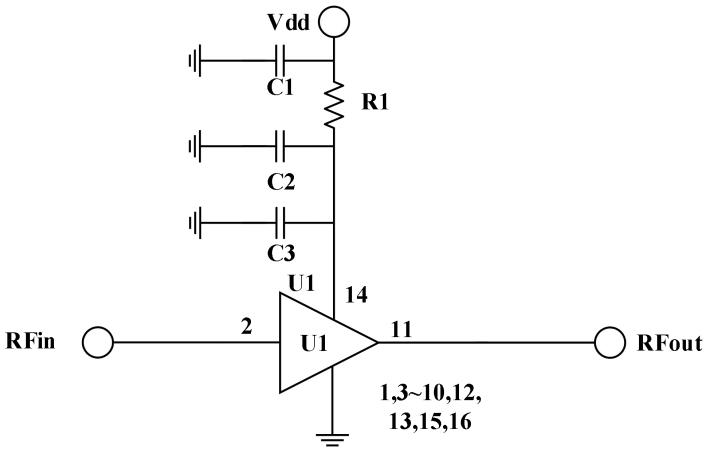


Output Third-Order Interception vs. Freq



Output Power for 1dB Compression vs. Freq

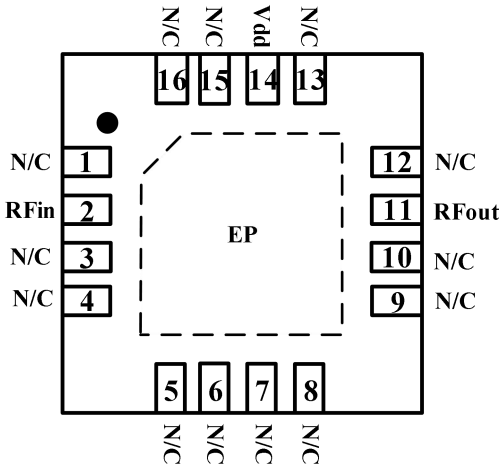
Typical Application Schematic



Bill of Material

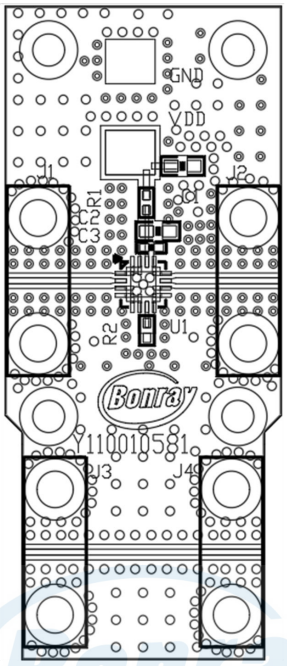
Reference Designator	Package Size	Value	P/N
U1	QFN16	6GHz~12GHz Gain Block Amplifier	BR9642FDJ
C1	0603	1uF	GCM188R71C105KA64D
C2	0402	1nF	GCM155R71H102KA37D
C3	0402	100pF	GRM1555C1H101JA01D
R1	0402	0 Ω	RC0402FR-070RL

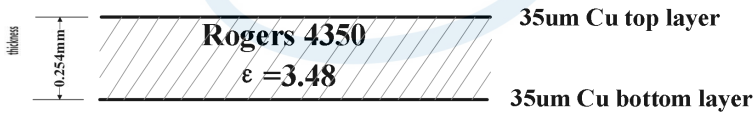
Pin Configuration and Description



Pin Number	Pin Name	Description
1,3 to 10, 12,13,15,16	NC	No electrical connection. Provide grounded land pads for PCB mounting integrity.
2	RFin	RF input pin. No external DC block is required.
11	RFout	RF output pin. No external DC block is required.
14	Vdd	Power supply pin. External bypass capacitor is required.
-	EP	Exposed pins that must be connected to RF/DC ground.

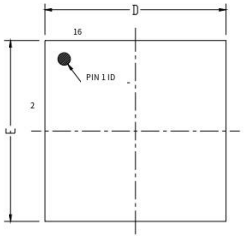
PCB Evaluation Board





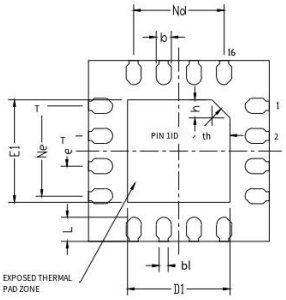
50ohm transmission lines：
width=0.406mm, spacing=0.406mm

Package Dimensions (mm)

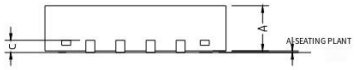


TOP VIEW

SIDE VIEW



BOTTOM VIEW



SIDE VIEW

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	2.90	3.00	3.10
D1	1.60	1.70	1.80
e	0.50BSC		
Ne	1.50BSC		
Nd	1.50BSC		
E	2.90	3.00	3.10
E1	1.60	1.70	1.80
L	0.25	0.30	0.35
h	0.25	0.30	0.35