

Product Features

Frequency: 1MHz ~ 4GHz
Gain: 22.7dB@2000MHz
Noise Figure: 1.2dB@2000MHz
Output Third-Order Interception:
38.5dBm@800MHz
35.9 dBm @ 2000 MHZ
Output Power for 1dB Compression:
22.6dBm@800MHz
23.2 dBm @ 2000 MHZ
Supply Current: 130mA@Vdd=+5V
Package: SOT89

Application

Honeycomb
PCS
GSM
Satellite Navigation
IF Amplifier

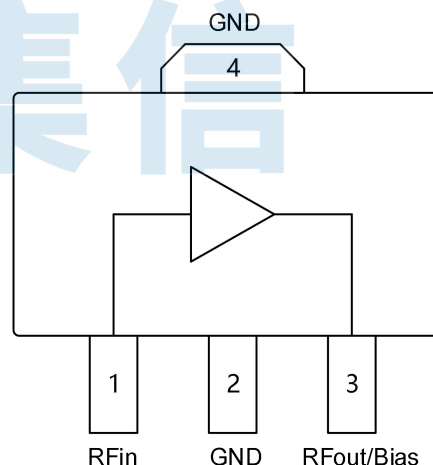
Ordering Information

Part Number	Package	Description
BR9112TA	SOT89	1MHz to 4GHz Low Noise Amplifier

General Description

The BR9112TA is a high-linearity MMIC low noise amplifier manufactured using GaAs process, which can cover the frequency range of 1MHz to 4GHz. It has been internally matched to 50 ohms, and only requires an external RF choke and blocking/bypass capacitors. The amplifier contains on-chip active bias network to ensure that the quiescent current is not affected by temperature. The product is powered by a single supply voltage of +5V with the characteristics of high reliability, high linearity, low noise, and general packaging etc., which can be applied in high dynamic range system.

Functional Block Diagram



Electrical Specifications

Parameter	Min.	Typ.	Max.	Units	Test Condition
Gain	-	28.6	-	dB	1MHz
	-	22.7	-	dB	2000MHz
	-	19.5	-	dB	4000MHz
Output Power for 1dB	-	22.6	-	dBm	800MHz
Compression	-	23.2	-	dBm	2000MHz
Output Third-Order	-	38.5	-	dBm	800MHz
Interception	-	35.9	-	dBm	2000MHz
Noise Figure	-	1.2	-	dB	2000MHz
Input Return Loss	-	-22.1	-	dB	2000MHz
Output Return Loss	-	-12.9	-	dB	2000MHz
Reverse Isolation	-	-30.4	-	dB	2000MHz
Supply Voltage	-	+5	-	V	-
Supply Current	-	130	-	mA	-

Test Conditions: Vdd=+5V, I=130mA, OIP3 spacing=1MHz, Pout=5dBm/tone, R_{BIAS}=0Ω, TA=+25°C

Absolute Maximum Ratings

Maximum Operating Voltage (Vdd) : +6V

Maximum RF input Power: +20dBm

Recommended Operating Conditions

Supply Voltage: +5V

Quiescent Current: 130mA

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

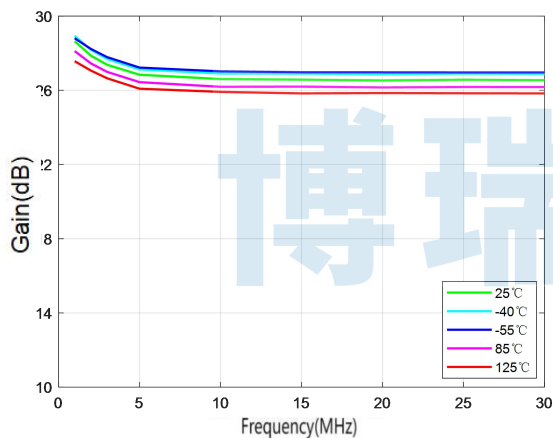

ELECTROSTATIC SENSITIVE DEVICE

OBSERVE HANDLING PRECAUTIONS

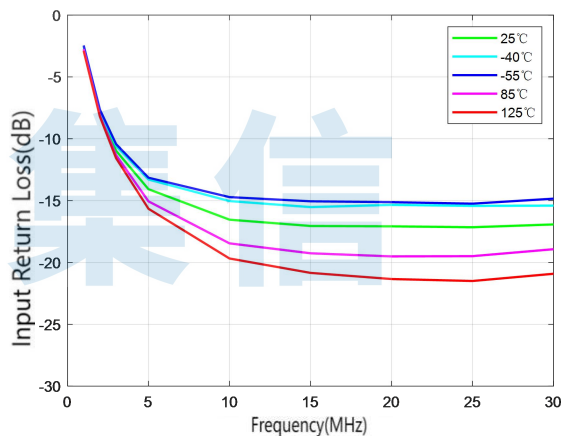
Typical Performance (EVB test results at +5V supply voltage, 1MHz~30MHz)

Parameter	Typ.									Units
Frequency	1	2	3	5	10	15	20	25	30	MHz
Gain	28.6	27.9	27.4	26.8	26.6	26.6	26.5	26.6	26.5	dB
Output Power for 1dB Compression	19.2	19.4	19.5	19.5	19.5	19.5	19.7	19.9	20.0	dBm
Output Third-Order Interception	33.2	31.3	36.5	36.6	37.2	37.0	36.8	37.2	37.2	dBm
Noise Figure	/	/	/	/	1.1	1.3	1.1	1.1	1.0	dB
Input Return Loss	-2.5	-7.8	-11.0	-14.1	-16.5	-17.1	-17.1	-17.2	-16.9	dB
Output Return Loss	-5.5	-9.6	-10.5	-9.9	-9.7	-9.7	-9.6	-9.8	-9.6	dB
Reverse Isolation	-36.6	-31.6	-30.5	-30.5	-30.2	-29.7	-30.1	-30.2	-30.2	dB

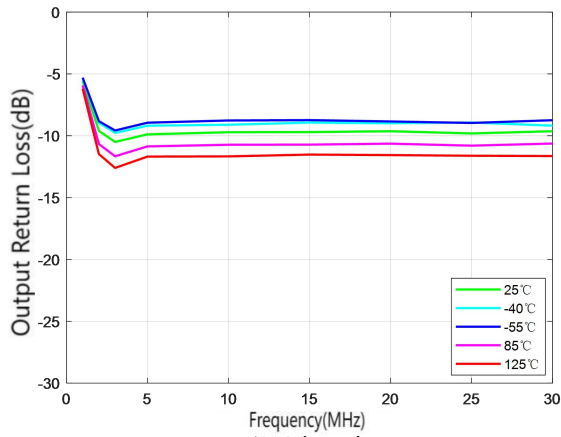
Test Condition: Vdd=+5V, I=130mA, OIP3 spacing=1MHz, Pout=5dBm/tone, RBIAS=0Ω, TA=+25°C



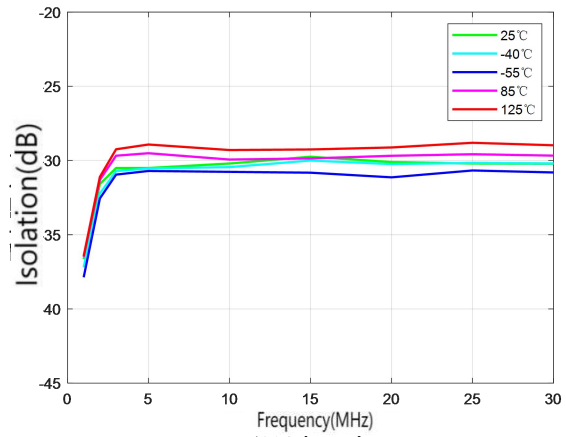
Gain vs. Freq



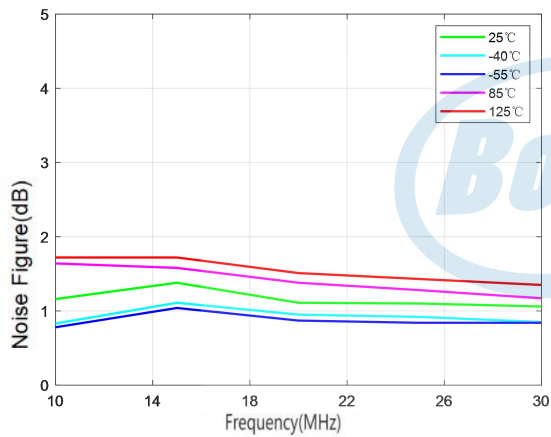
Input Return Loss vs. Freq



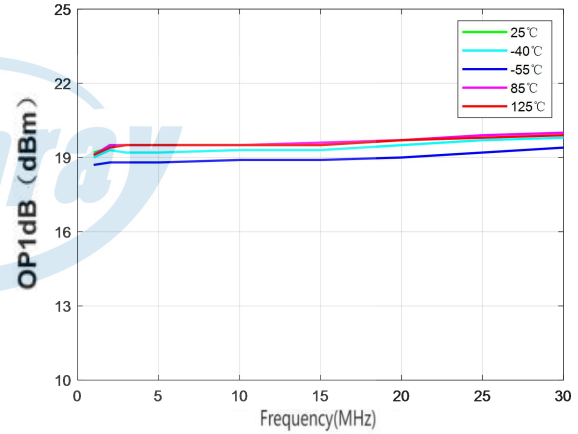
Output Return Loss vs. Freq



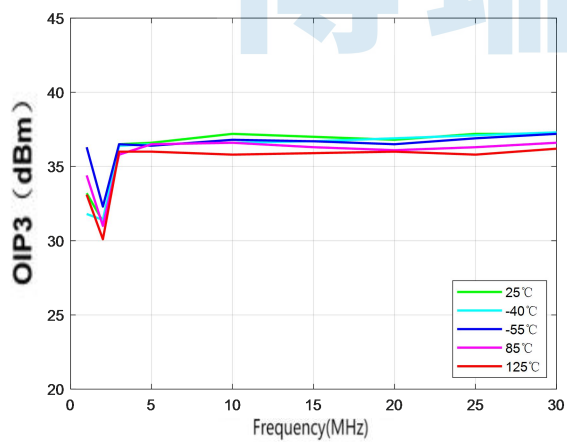
Reverse Isolation vs. Freq



Noise Figure vs. Freq



Output Power for 1dB Compression vs. Freq

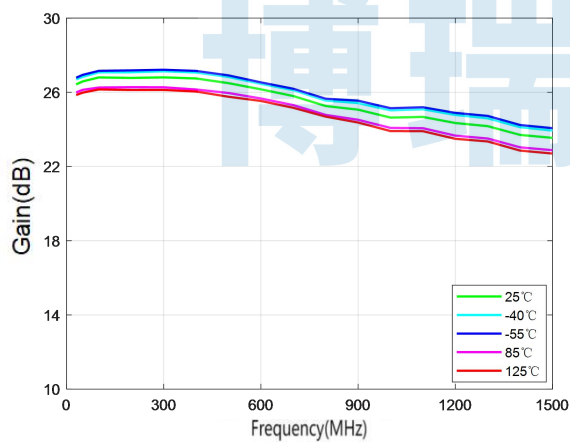


Output Third-Order Interception vs. Freq

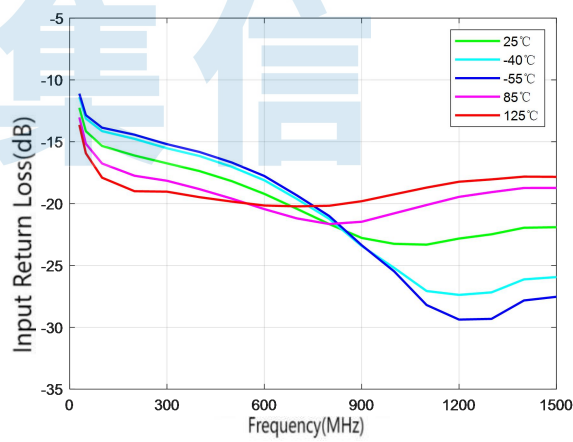
Typical Performance (EVB test results at +5V supply voltage, 30MHz~1500MHz)

Parameter	Typ.										Units
Frequency	30	300	600	800	1000	1100	1200	1300	1400	1500	MHz
Gain	26.5	26.8	26.2	25.3	24.6	24.7	24.3	24.2	23.7	23.5	dB
Output Power for 1dB Compression	20.0	22.6	22.8	22.6	22.2	22.1	22.3	22.5	22.6	22.5	dBm
Output Third-Order Interception	36.9	39.9	37.9	38.5	37.9	38.2	38.6	38.1	37.2	37.3	dBm
Noise Figure	0.9	0.9	1.0	0.9	0.9	0.9	1.0	1.0	1.0	1.0	dB
Input Return Loss	-15.6	-16.7	-32.7	-21.7	-23.3	-23.3	-22.8	-22.5	-22.0	-21.9	dB
Output Return Loss	-9.6	-11.2	-20.7	-15.6	-16.0	-15.5	-14.7	-13.9	-13.1	-12.5	dB
Reverse Isolation	-30.3	-29.8	-29.4	-29.7	-29.9	-30.1	-30.2	-30.4	-30.5	-30.5	dB

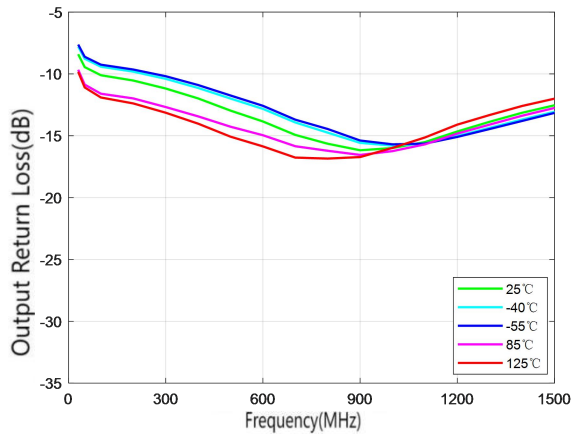
Test Condition: Vdd=+5V, I=130mA, OIP3 spacing=1MHz, Pout=5dBm/100MHz, R_{BIAS}=0Ω, TA=+25°C



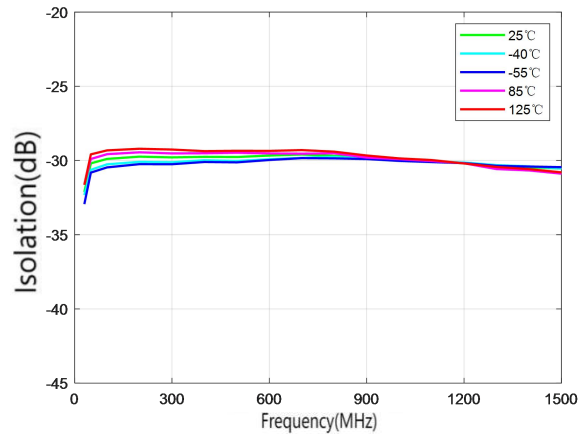
Gain vs. Freq



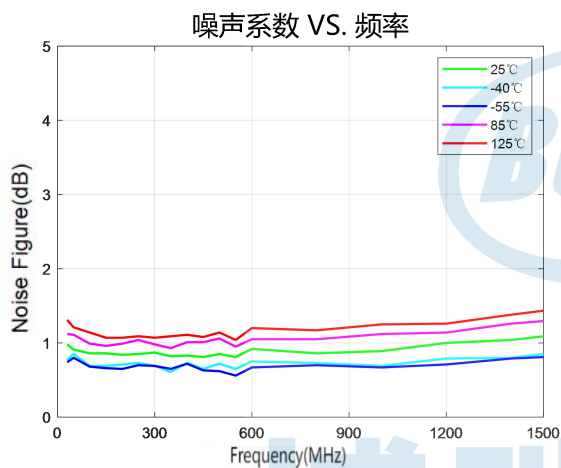
Input Return Loss vs. Freq



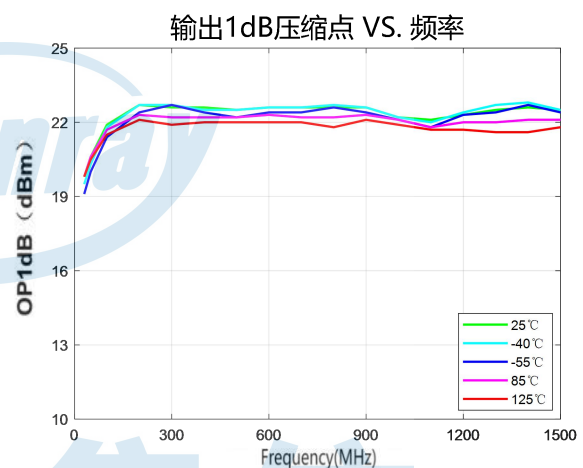
Output Return Loss vs. Freq



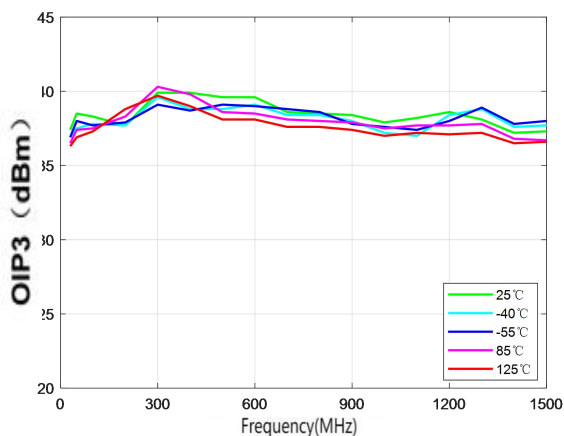
Reverse Isolation vs. Freq



Noise Figure vs. Freq



Output Power for 1dB Compression vs. Freq

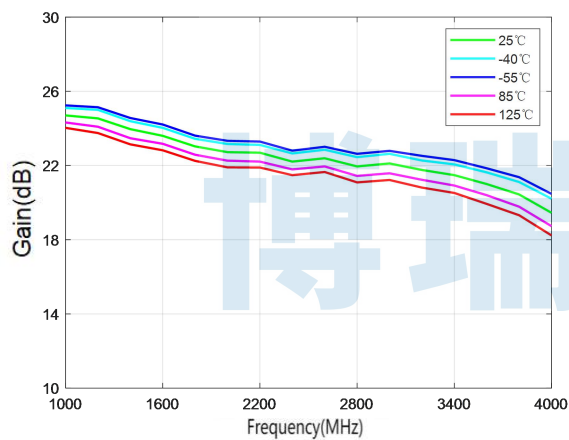


Output Third-Order Interception vs. Freq

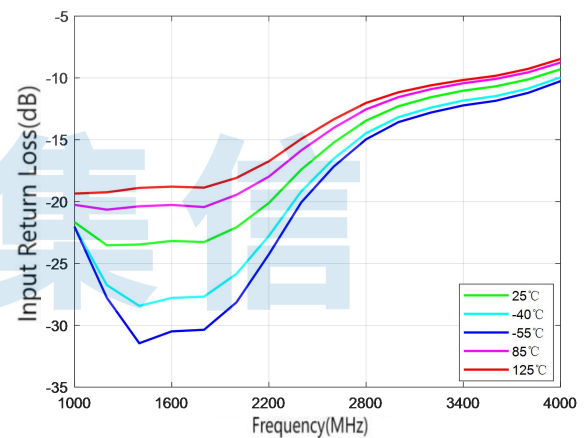
Typical Performance (EVB test results at +5V supply voltage, 1000MHz~4000MHz)

Parameter	Typ.										Units
Frequency	1000	1400	1800	2000	2400	2800	3000	3400	3800	4000	MHz
Gain	24.6	24.0	23.0	22.7	22.2	21.9	22.1	21.5	20.4	19.5	dB
Output Power for 1dB Compression	22.2	22.7	22.9	23.2	22.3	21.1	20.3	18.5	18.1	17.1	dBm
Output Third-Order Interception	37.9	36.9	36.7	35.9	35.4	33.2	33.2	31.3	30.5	30.5	dBm
Noise Figure	0.9	1.0	1.2	1.2	1.2	1.4	1.4	1.6	1.8	1.9	dB
Input Return loss	-23.3	-23.5	-23.3	-22.1	-17.4	-13.4	-12.3	-11.0	-10.1	-9.3	dB
Output Return loss	-16.0	-15.3	-13.2	-12.9	-14.0	-17.3	-19.1	-18.9	-17.7	-17.9	dB
Reverse Isolation	-29.9	-30.0	-30.3	-30.4	-30.7	-30.6	-30.8	-30.2	-29.6	-29.5	dB

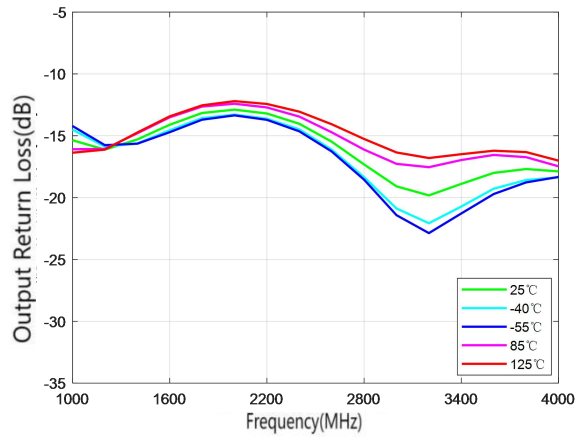
Test Condition: Vdd=+5V, I=130mA, OIP3 spacing=1MHz, Pout=5dBm/tone, R_{BIAS}=0Ω, TA=+25°C



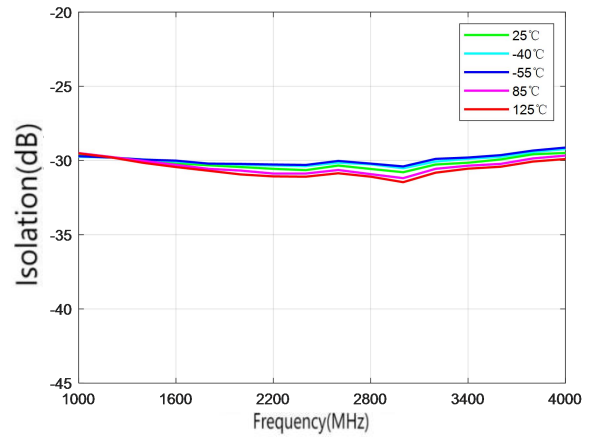
Gain vs. Freq



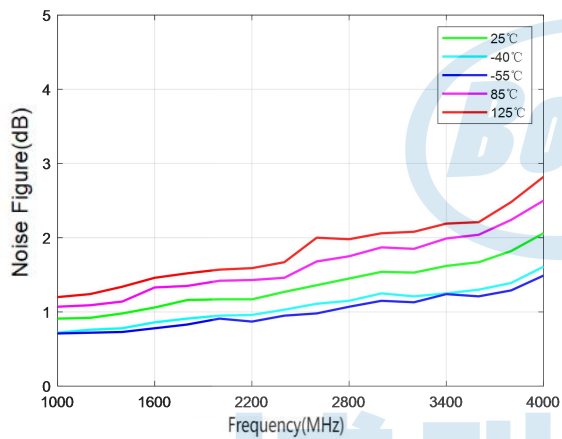
Input Return Loss vs. Freq



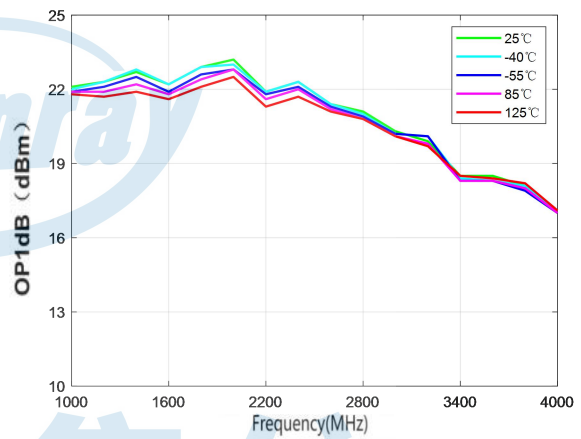
Output Return Loss vs. Freq



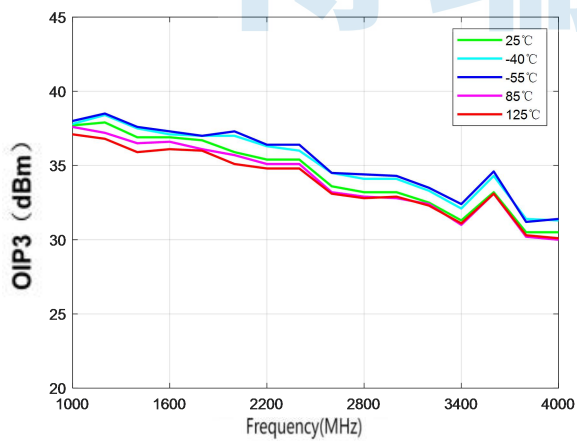
Reverse Isolation vs. Freq



Noise Figure vs. Freq

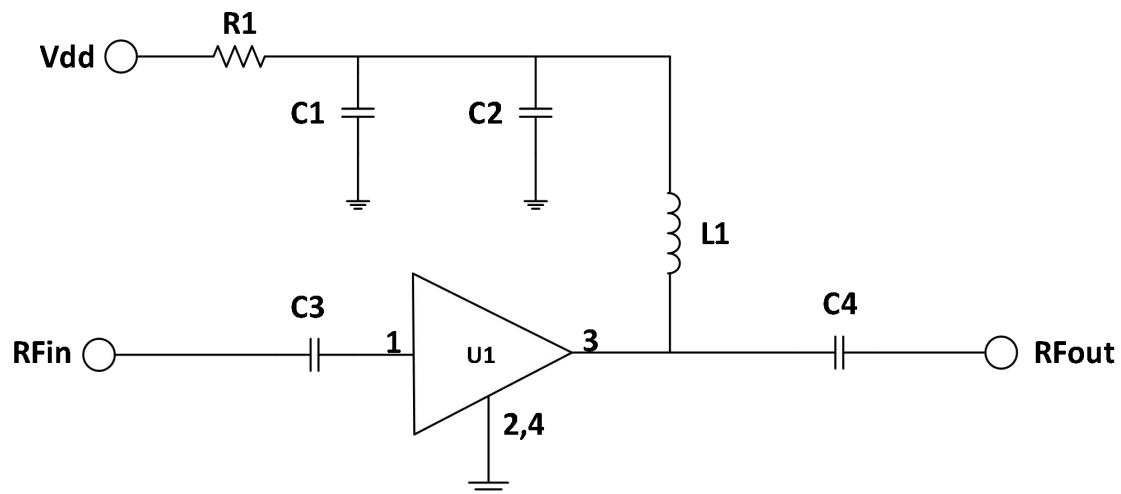


Output Power for 1dB Compression vs. Freq



Output Third-Order Interception vs. Freq

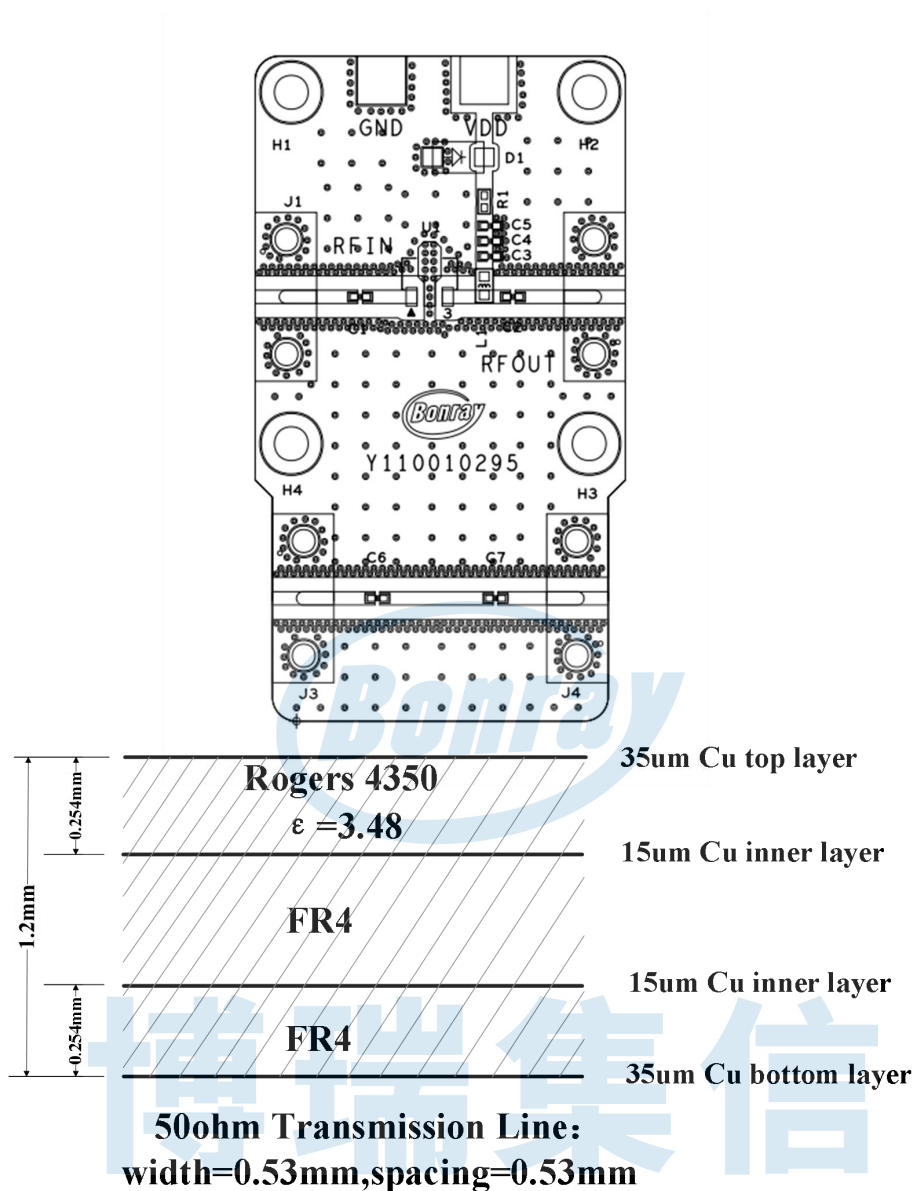
Typical Application Schematic



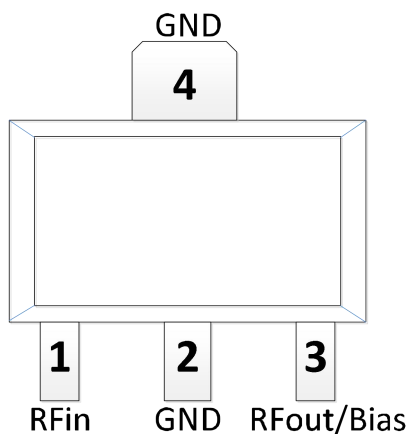
Bill of Material

Reference Designator	P/N(1MHz-30MHz)	P/N(30MHz-1500MHz)	P/N(1000MHz-4000MHz)
R1	0Ω, YAGEO,0402 Pkg RC0402JR-070RL	0Ω, YAGEO,0402 Pkg RC0402JR-070RL	0Ω, YAGEO,0402 Pkg RC0402JR-070RL
L1	15uH, Murata,1008 Pkg LQH32DN150K53L	1uH, Murata,1008 Pkg XFL4020-102ME	82nH, Murata,1008 Pkg 0603HP-82NXGEV
C1	1μF, Murata,0402 Pkg GRM1555C1H105JA01	1μF, Murata,0402 Pkg GRM1555C1H105JA01	1μF, Murata,0402 Pkg GRM1555C1H105JA01
C2	100pF, Murata,0402 Pkg GCM1555C1H101JA16D	100pF, Murata,0402 Pkg GCM1555C1H101JA16D	100pF, Murata,0402 Pkg GCM1555C1H101JA16D
C3,C4	1μF, Murata,0402 Pkg GRM1555C1H105JA01	1nF, Murata,0402 Pkg GCM155R71H102KA37D	100pF, Murata,0402 Pkg GCM1555C1H101JA16D

PCB Evaluation Board



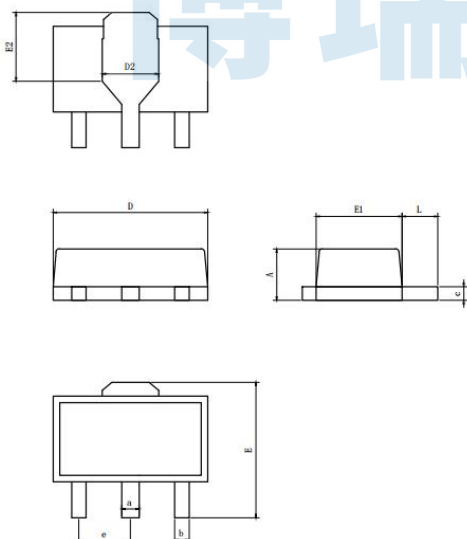
Pin Configuration and Description



Pin Number	Pin name	Description
1	RFin	RF Input pin. A DC Block is required.
2, 4	GND	Ground pins. These pins must be connected to RF/DC ground
3	RFout/Bias	RF Output and DC bias pin. DC bias will also need to be injected through a RF bias choke/inductor for operation.



Package Dimensions (mm)



SYMBOL 号	MILLIMETER 米		
	MIN —、	NOM 尔	MAX こ
A	1.40	1.50	1.60
b	0.37	0.42	0.45
c	0.38	—	0.42
a	0.45	0.48	0.51
D	4.40	4.50	4.60
E	4.00	4.10	4.20
E1	2.40	2.50	2.60
e	1.50BSC		
L	0.89	1.045	1.20
D2	1.50	1.60	1.70
E2	2.218	2.318	2.418