

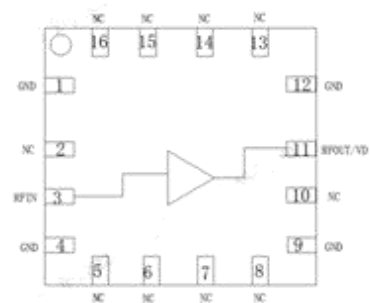
Performance Features

- Broadband width: 0.01GHz~3GHz
- Low noise: 1.3dB typical
- Small signal gain: 20dB
- Output P1dB: 19dBm
- Output IP3: 35dBm
- Ultra-low phase noise: 170dBc/Hz@100KHz frequency deviation
- Package size: 3*3 QFN 16L

Typical Applications

- Point-to-Point Communication
- Instrumentation

Functional Block Diagram



Overview

The CWA247SP3 is a 0.01GHz~3GHz low phase noise broadband amplifier manufactured using GaAs process. The amplifier is self-biasing with 50 Ω matched loads at the input and output. The amplifier provides ultra-low phase noise performance of -170 dBc/Hz@100kHz offset at 100MHz input signal.

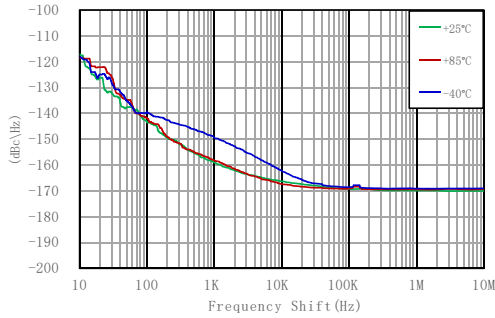
Electrical performance table (TA= +25°C VD=5V)

Parameter Name	Description	Minimum value	Typical values	Maximum value	Minimum value	Typical values	Maximum value	Minimum value	Typical values	Maximum value	Unit
Operating frequency	Freq	0.01~1GHz			1~2GHz			2~3GHz			GHz
Gain	S21		20			18			16		dB
Gain Flatness	ΔG		±1			±2			±2		dB
Input Return Loss	S11		-13			-10			-18		dB
Output Return Loss	S22		-15			-15			-12		dB
Reverse isolation degree	S12		-25			-26			-27		dB
Output 1dB compression point power	P1dB		20			19			18.5		dBm
Saturated output power	P3dB		20.5			20			20		dBm
Output IP3	Pout=0dBm/ tone, Δf=1MHz		35			34			34		dBm
Noise factor	NF		1			1.3			1.5		dB
Single-sideband phase noise (100KHz frequency bias)	Freq=100MHz, Pin=10dBm, VD=4V	175									dBc/Hz
	Freq=100MHz, Pin=10dBm, VD=5V	175									dBc/Hz
	Freq=100MHz, Pin=10dBm, VD=6V	175									dBc/Hz
	Freq=100MHz, Pin=10dBm, VD=7V	175									dBc/Hz
Operating current	ID	67									mA
Operating Voltage	VD	5									V

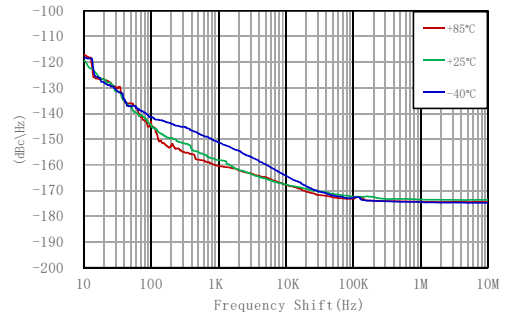
Note: The crystal used in the phase noise test is provided by World Wide Frequency Control (Model: FCOX291)

Phase noise (VD=3.5V)

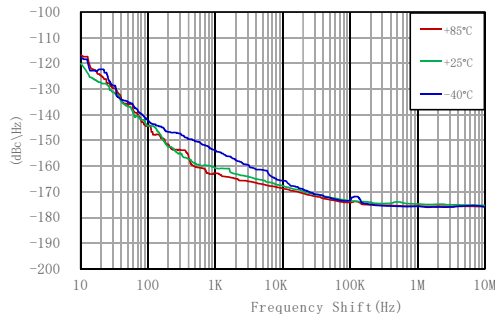
Phase Noise VS Frequency
(Pin=-5dBm)



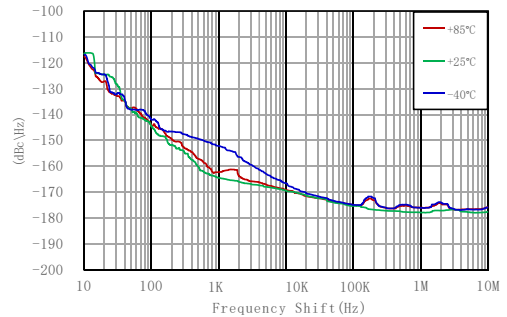
Phase Noise VS Frequency
(Pin=0dBm)



Phase Noise VS Frequency
(Pin=5dBm)

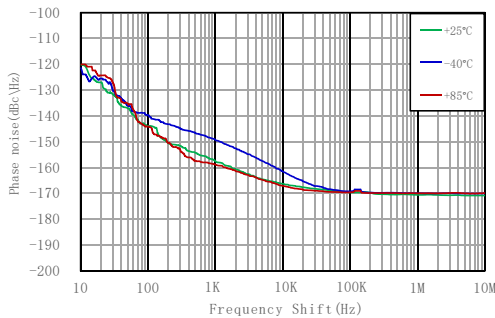


Phase Noise VS Frequency
(Pin=10dBm)

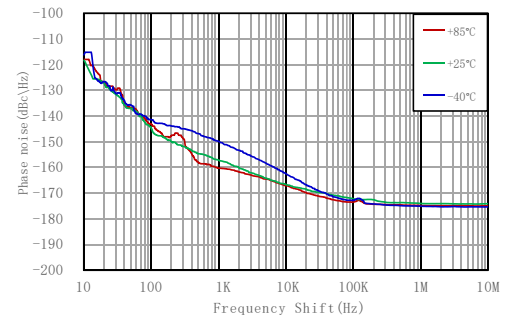


Phase noise (VD=4V)

Phase Noise VS Frequency
(Pin=-5dBm)

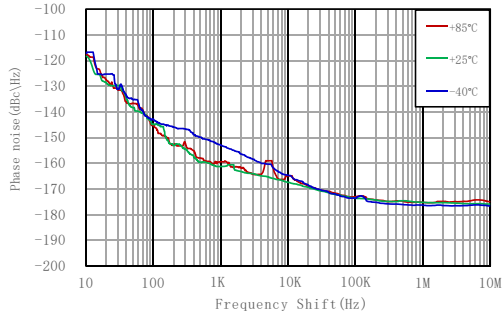


Phase Noise VS Frequency
(Pin=0dBm)

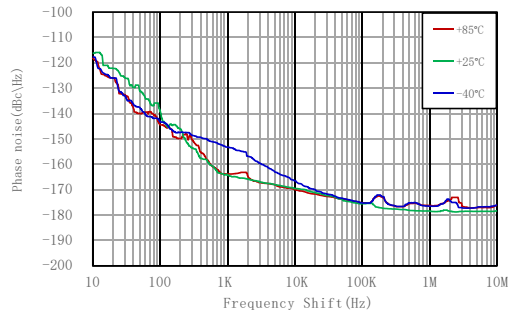


Phase noise (VD=4V)

Phase Noise VS Frequency
(Pin=5dBm)

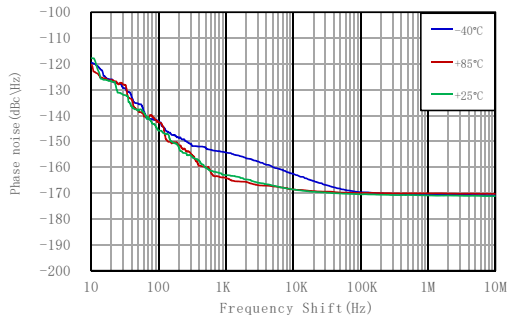


Phase Noise VS Frequency
(Pin=10dBm)

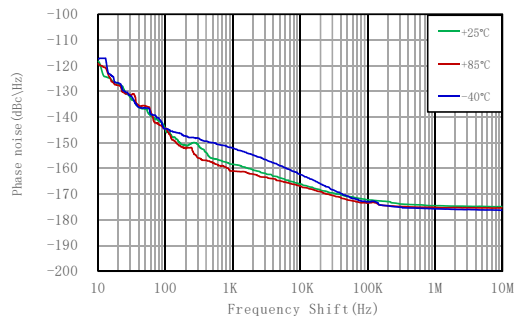


Phase noise (VD=5V)

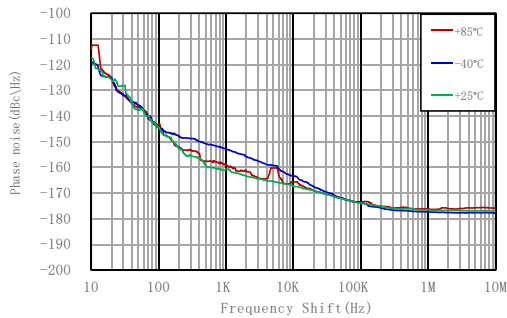
Phase Noise VS Frequency
(Pin=-5dBm)



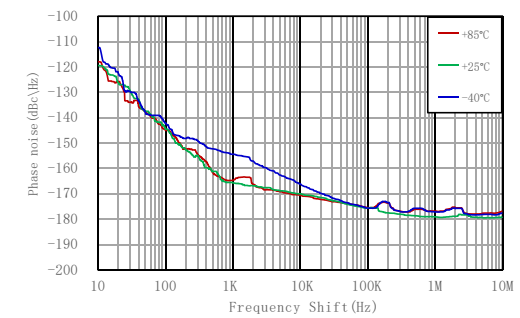
Phase Noise VS Frequency
(Pin=0dBm)



Phase Noise VS Frequency
(Pin=5dBm)

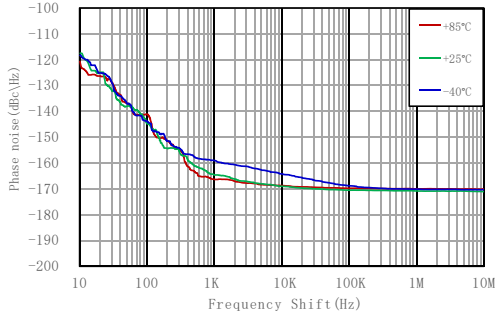


Phase Noise VS Frequency
(Pin=10dBm)

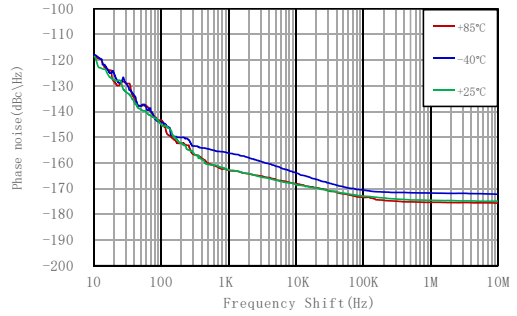


Phase noise (VD=6V)

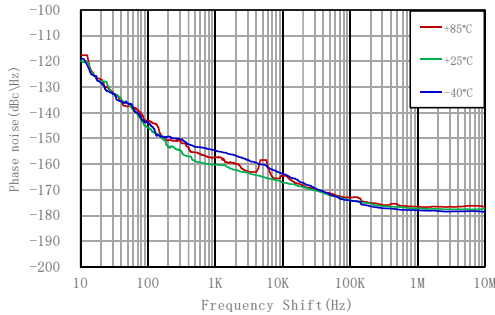
Phase Noise VS Frequency
(Pin=-5dBm)



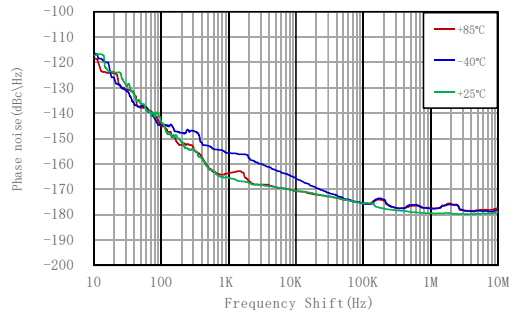
Phase Noise VS Frequency
(Pin=0dBm)



Phase Noise VS Frequency
(Pin=5dBm)

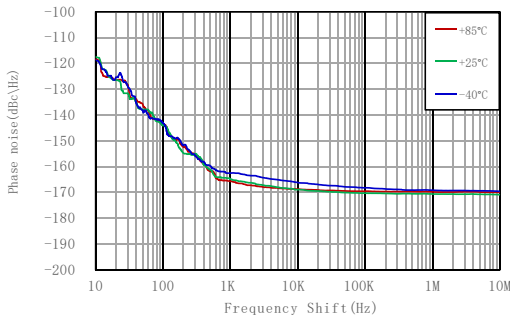


Phase Noise VS Frequency
(Pin=10dBm)

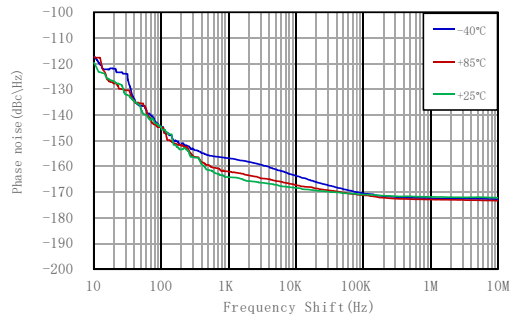


Phase noise (VD=7V)

Phase Noise VS Frequency
(Pin=-5dBm)

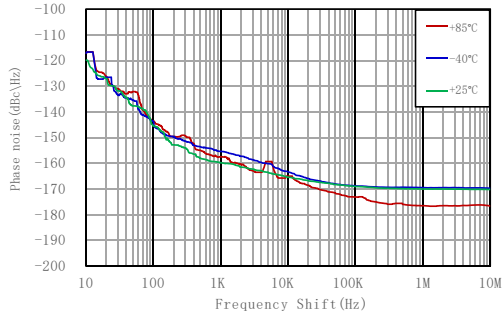


Phase Noise VS Frequency
(Pin=0dBm)

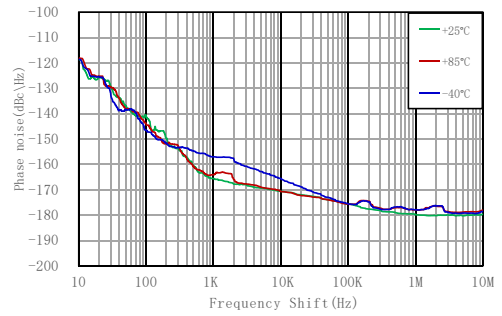


Phase noise (VD=7V)

Phase Noise VS Frequency
(Pin=5dBm)

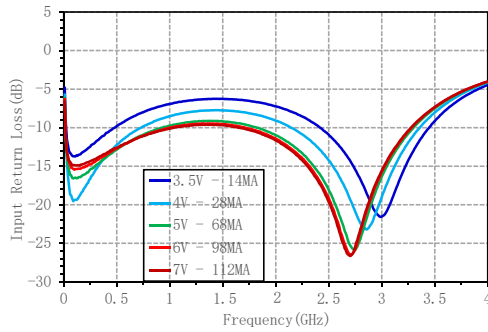


Phase Noise VS Frequency
(Pin=10dBm)

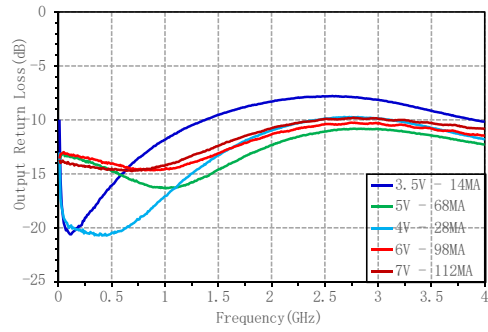


Test Curve

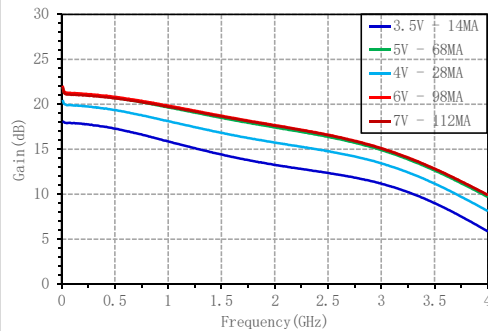
Input Return Loss VS Frequency



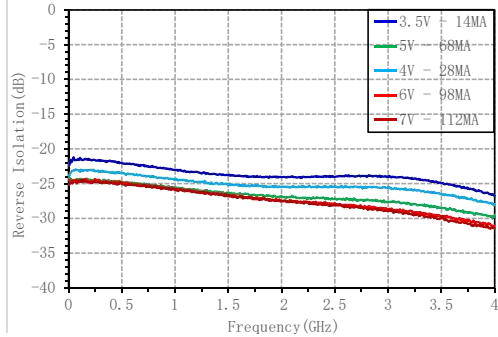
Output Return Loss VS Frequency



Gain VS Frequency

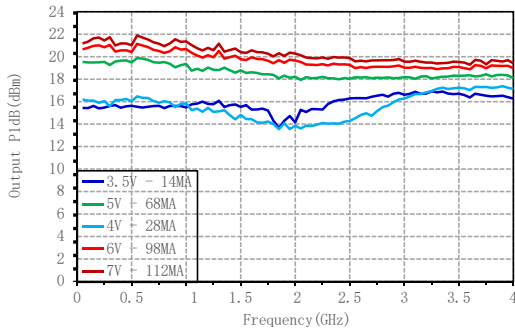


Reverse Isolation VS Frequency

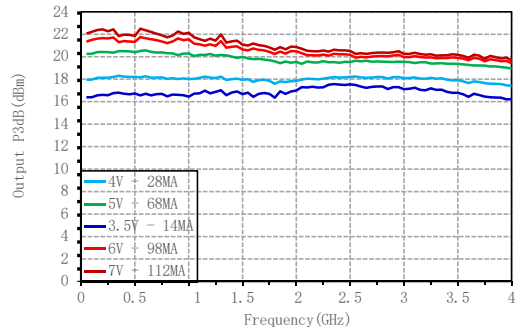


Test Curve

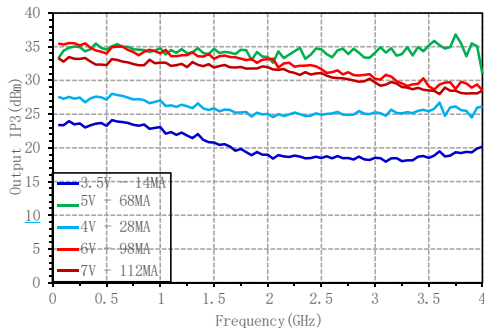
Output P1dB VS Frequency



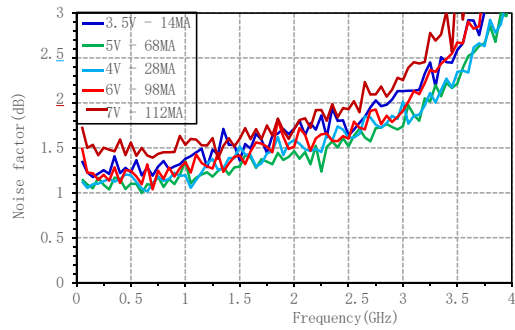
Output P3dB VS Frequency



Output IP3 VS Frequency



Noise factor VS frequency



CWA
Amplifier
Series

Working parameters

Operating temperature	-40℃~+85℃
Bias voltage VD/OUT	5V

Absolute maximum rating

RF input power	18dBm
Storage temperature	-65℃~+150℃
Operating temperature	-40℃~+85℃
Bias voltage VD/OUT	9V
ESD-HBM	Class 1A

Package Information

Model	Packaging materials	Solder plate plating	MSL level [1]	Package identification [2]	Environmental requirements
CWA247SP3	Green resin compounds	NiPdAuAg	MSL 3	S247 XXXXX	RoHS compliant

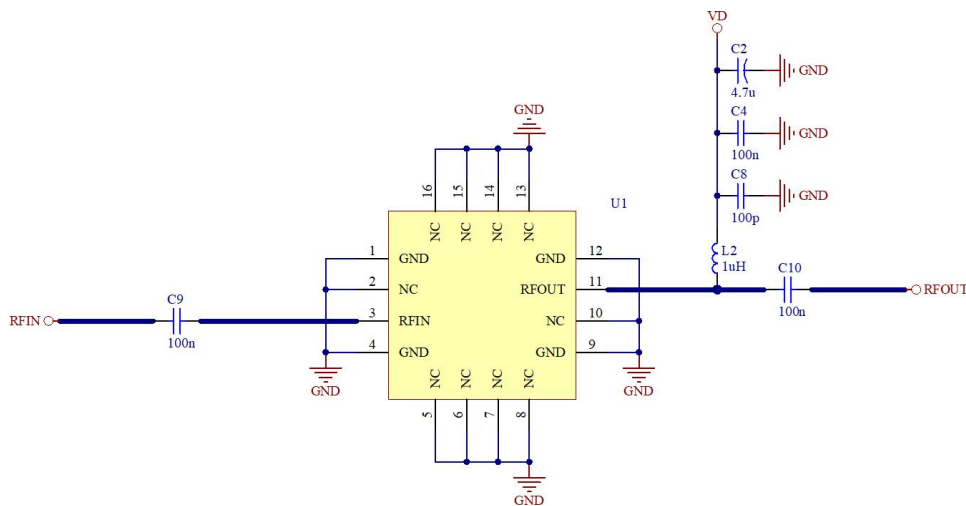
[1] Maximum reflow temperature 260℃

[2] XXXXX is the lot number

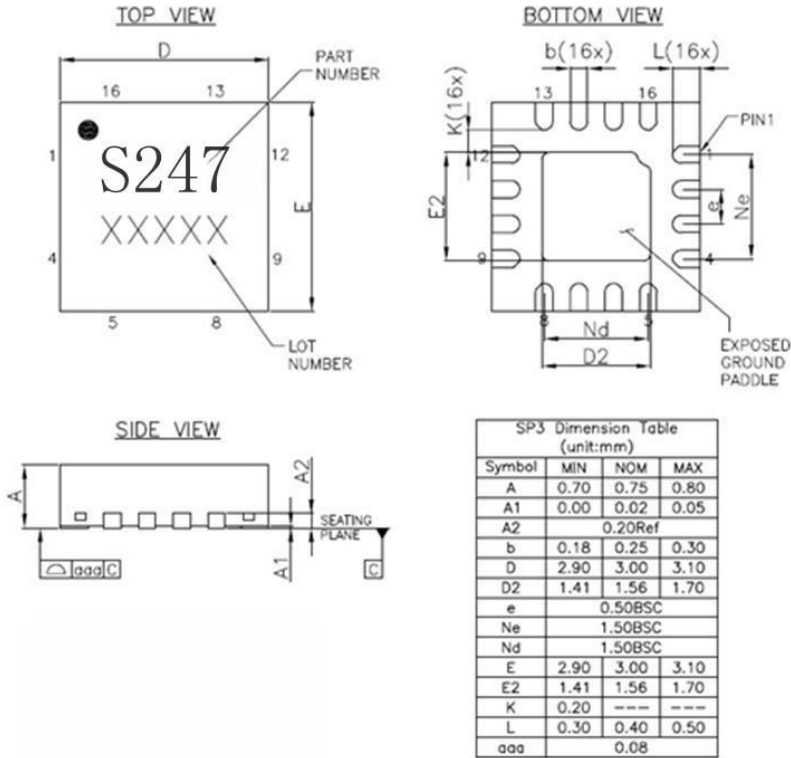
Static voltage vs static current

Static voltage	3.5V	4V	5V	6V	7V
Static current	13mA	28mA	67mA	100mA	116mA

Typical Application Diagram



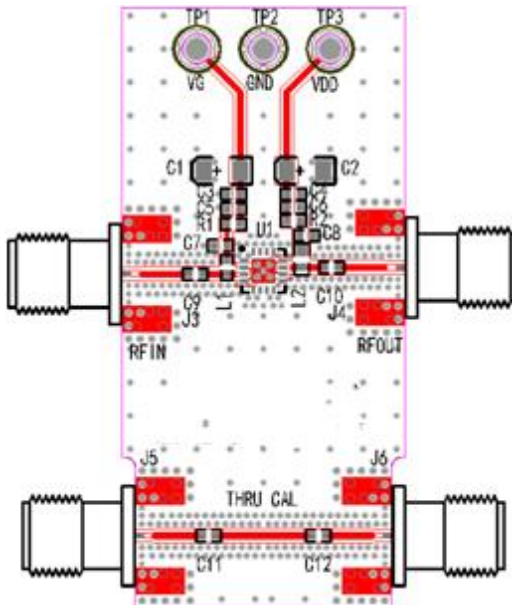
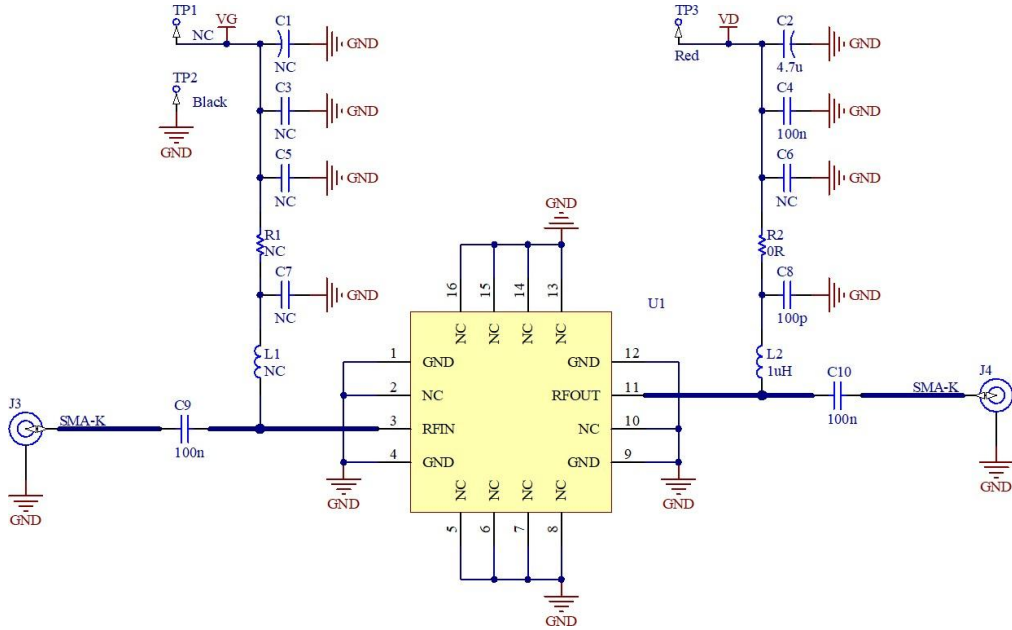
Dimension



Pin Definition

Pin Number	Function Symbols	Function Description
2;5-8;10;13-16	NC	No internal connection
3	RFIN	RF input port, no isolation capacitor
11	RFOUT/VD	RF output port/power port, no isolation capacitor
1;4;9;12	GND	RF ground, Exposed Ground Paddle at the bottom of the package is the same as RF ground

Evaluation Board Circuit Diagram



Designator	Description
C2	Tantalum capacitor 1206 4.7uF
C4, C9, C10	Multilayer Ceramic Capacitor 0402 100nF
C8	Multilayer Ceramic Capacitor 0402 100pF
J3, J4	SMA-K PCB Connectors
L2	Wirewound inductor 0603 1uH
R2	Resistor 0603 0Ω
TP2, TP3	DC test terminal
U1	CWA247SP3
J3, J4 Recommended for use with Nanjing Aowen D550B12E01-023 SMA-K connector.	
NC indicates that the port is unused or the device is not soldered. The chip NC port can be connected externally to GND.	