

#### Performance Features

- Wide Bandwidth: DC~24GHz
- Noise factor: 2.7dB typical
- Small signal gain: 15dB typical
- Output P1dB: 16dBm typical
- Supply voltage: +8V@80mA
- Package size: 5mm\*5mm 32-pin QFN

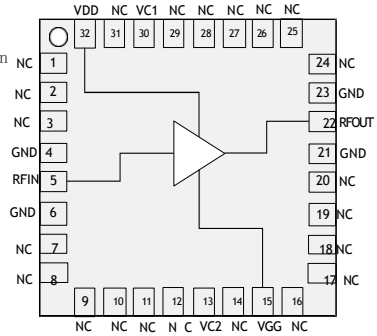
#### Overview

The CWA077SP5 is a DC to 24 GHz low-noise broadband amplifier manufactured in a GaAs process. The amplifier provides 15 dB gain, 2.5 dB noise figure and 1 dB when the output power of +16 dBm is compressed while requiring only 80 mA from a V<sub>DD</sub>=8V supply. Gain flatness is excellent from DC to 24 GHz. 50 Ω matched load at the input and output.

#### Typical Applications

- Point-to-Point Communication
- Point-to-Multipoint Communication
- Instrumentation

#### Functional Block Diagram



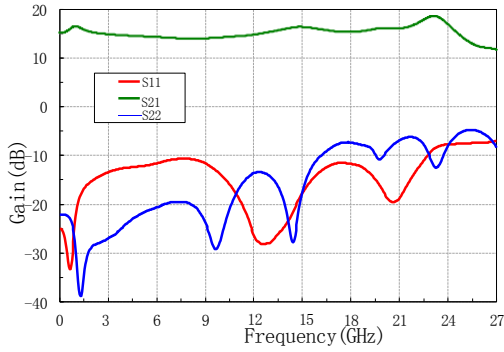
Electrical performance table (TA=+25°C, V<sub>DD</sub>=8V, I<sub>DD</sub>=80mA\*)

Parameter Name	Minimum value	Typical values	Maximum value	Minimum value	Typical values	Maximum value	Minimum value	Typical values	Maximum value	Unit
Operating frequency	DC~6			6~18			18~24			GHz
Gain		15			15			15.5		dB
Gain Flatness		±0.8			±0.8			±0.8		dB
Input Return Loss		-15			-15			-10		dB
Output Return Loss		-20			-15			-10		dB
Output power 1dB compression point (P1dB)		17			16			15		dBm
Saturated output power (P <sub>sat</sub> )		20.5			19			18.5		dBm
Output IP3		27			26			25		dBm
Noise factor		3.5			2.3			3		dB
Single-sideband phase noise (100KHz frequency bias)		-159			-156			-146		dBc/Hz
Operating current		80			80			80		mA
Operating Voltage		8			8			8		V

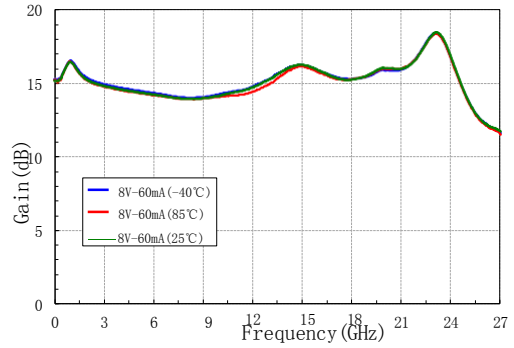
\*For testing, adjust the gate voltage VGG from -2V to 0V to obtain an operating current (IDD) of 80mA typical.

Test curve ( $V_{DD} = 8V, I_{DD} = 80mA$ )

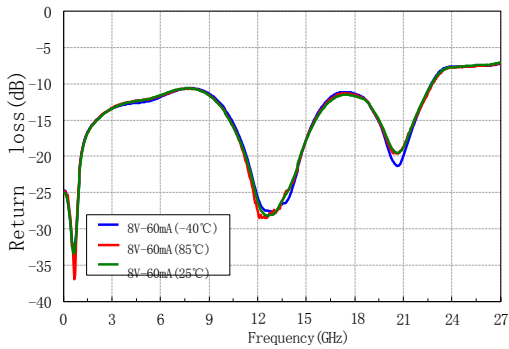
Gain and return loss



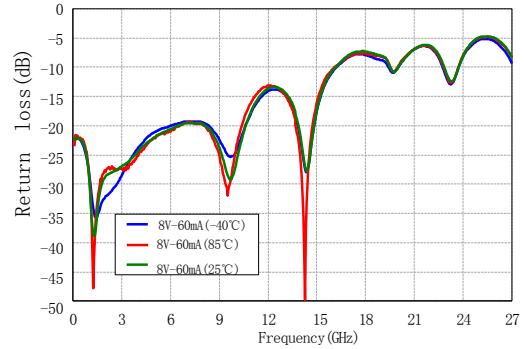
Gain vs. temperature



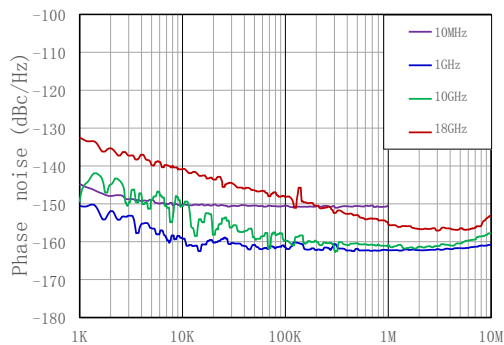
Input return loss vs. temperature



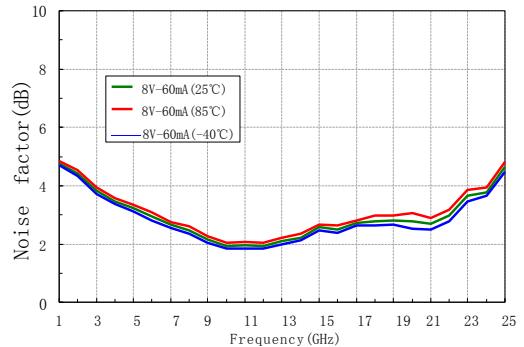
Output return loss vs. temperature



Phase noise vs. frequency bias (input power of -10dBm)

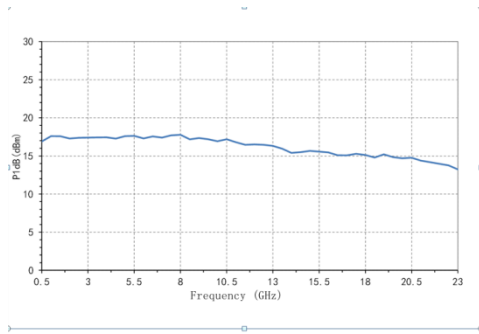


Noise factor vs. temperature

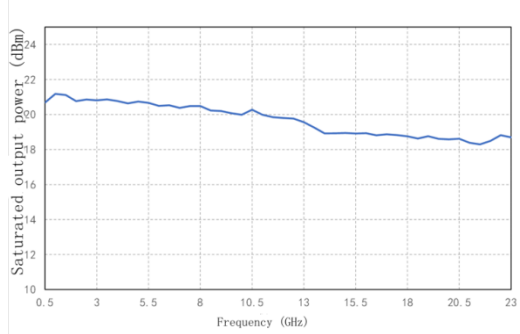


Test curve ( $V_{DD}=8V, I_{DD}=80mA$ )

P1dB VS Frequency



Saturated output power vs. frequency



### Working parameters

Operating temperature	-40°C~+85°C
leakage pressure $V_{DD}$	8V
current $I_{DD}$	80mA

### Typical supply current $V_S/V_{DD}$

$V_{DD}$ (V)	$I_{DD}$ (mA)
+7.5	79
+8	80
+8.5	81

### Absolute maximum rating

Storage temperature	-65°C~+150°C
leakage pressure $V_{DD}$	9V
grid voltage $V_{G6}$	-2V~+0.2V
ESD-HBM	TBD

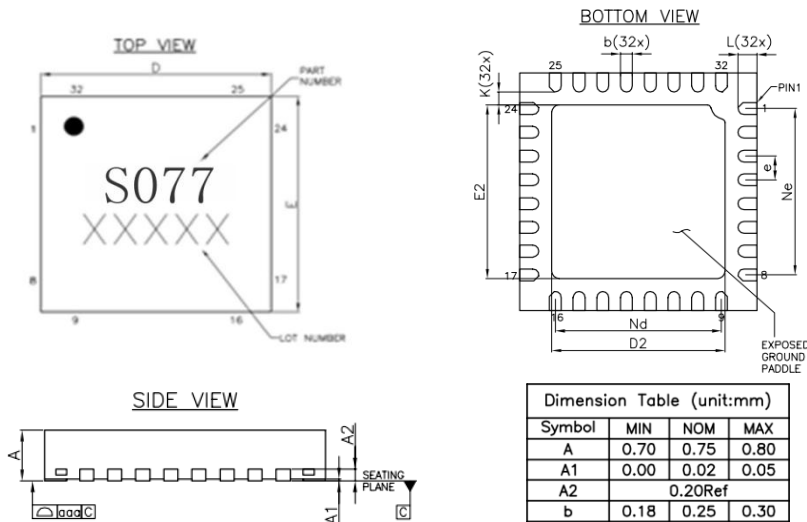
### Package Information

Model	Packaging Materials	Solder plate plating	MSL level [1]	Package identification [2]	Environmental requirements
CWA077SP5	Green resin compounds	NiPdAuAg	MSL 3	S077 XXXXX	RoHS compliant

[1] Maximum reflow temperature 260° C

[2] XXXXX is the lot number

### Dimension



Dimension Table (unit:mm)			
Symbol	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.20Ref		
b	0.18	0.25	0.30
D	4.90	5.00	5.10
D2	3.50	3.65	3.75
e	0.50BSC		
Ne	3.50BSC		
Nd	3.50BSC		
E	4.90	5.00	5.10
E2	3.50	3.65	3.75
K	0.20	---	---
L	0.30	0.40	0.50
aaa	0.08		

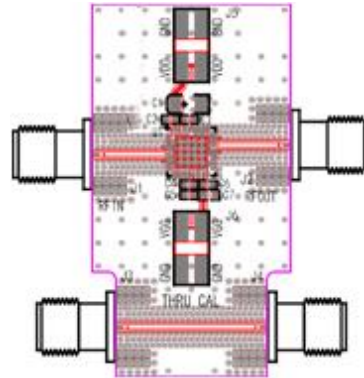
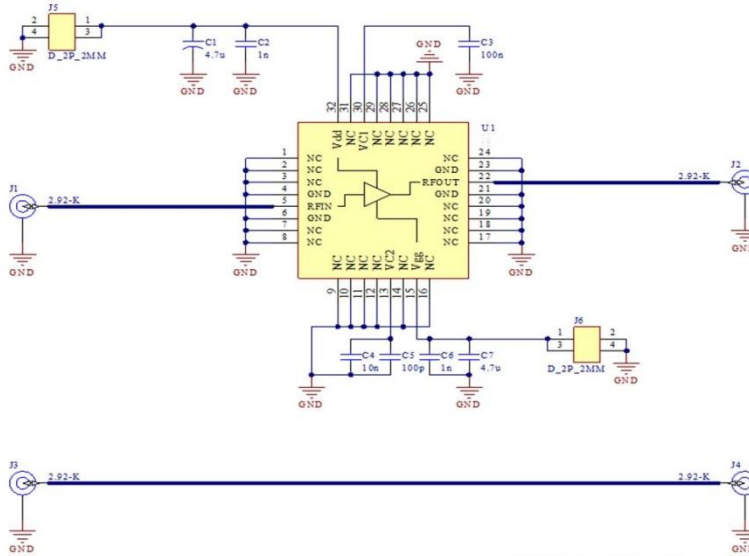
Description:

- Unit: mm
- Lead frame material: copper alloy
- Package surface warpage: not more than 0.05mm
- All ground pins should be connected to PCB RF ground

## Pin Definition

Pin Number	Function Symbols	Function Description	Pin Number	Function Symbols	Function Description
1	NC	Vacant	17	NC	Vacant
2	NC	Vacant	18	NC	Vacant
3	NC	Vacant	19	NC	Vacant
4	GND	RF Ground	20	NC	Vacant
5	RFIN	RF input, DC coupling	21	GND	RF Ground
6	GND	RF Ground	22	RFOUT	RF output, DC coupling
7	NC	Vacant	23	GND	RF Ground
8	NC	Vacant	24	NC	Vacant
9	NC	Vacant	25	NC	Vacant
10	NC	Vacant	26	NC	Vacant
11	NC	Vacant	27	NC	Vacant
12	NC	Vacant	28	NC	Vacant
13	VC2	Low Frequency Interface 2	29	NC	Vacant
14	NC	Vacant	30	VC1	Low frequency interfacel
15	VGG	Grid pressure	31	NC	Vacant
16	NC	Vacant	32	VDD	Pressure leakage

#### Evaluation Boards



Circuit board material: Rogers 4350B

The circuit board of the device application should be designed according to the RF circuit design method, the signal line should be designed according to 50 ohm impedance, and the ground pin of the package shell should be grounded nearby (similar to the figure), and there should be enough ground holes to connect the top and bottom ground.

Designator	Description
C1	4.7uF Tantalum Capacitor 1206
C2, C6	1nF Multilayer Ceramic Capacitor 0402
C3	100nF Multilayer Ceramic Capacitor 0402
C4	10nF Multilayer Ceramic Capacitor 0402
C5	100pF Multilayer Ceramic Capacitor 0402
C7	4.7uF Multilayer Ceramic Capacitors 0603
J1, J2, J3, J4	SMA-K connector
J5, J6	Nanjing Aowen D360B12E01-023
J5, J6	D_2P_2MM DC pins
U1	CWA077SP5