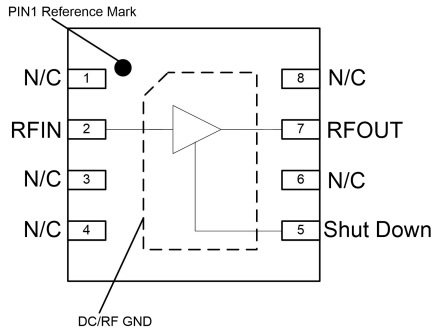
# GHLN-9047-DF2-8

## High Linearity Low Noise Gain Amplifier , 50 - 4200 MHz

### Product Introduction

GHLN-9047 -DF2-8 is a 50MHz~4200MHz ultra-wideband, high linearity, low noise gain block amplifier. This amplifier can meet the needs of a variety of application scenarios, including small base stations, walkie-talkies, LTE/WCDMA communication systems and other wireless communication systems. GHLN-9047 -DF2-8 adopts the standard DFN2X2 label package. The amplifier integrates shutdown bias capability and all pins are equipped with ESD protection. The product quality level is changed to industrial grade.

### Block Diagram




Bottom view

### Product Features

Working frequency: 50-4200MHz
Noise figure: 1.5dB@1900MHz
Small signal gain: 15.5dB@1900 MHz
Gain flatness: 13.5±1.3dB from 2000 to 5000MHz
P-1dB ： 21dBm
OIP3 : 39dBm
Integrated shutdown function
50Ohm input and output
+5V/65mA
2x2 mm 8 Pin DFN plastic package

### Electrical performance parameters ( TA = +25°C, Vd = +5V, 50Ω system)

| Index | Test Conditions | Minimum | Typical Value | Maximum | Unit |
|---|---|---|---|---|---|
| Frequency Range | | 50 | | 4200 | MHz |
| Test frequency | | | 1900 | | MHz |
| Small Signal Gain | | | 15.5 | | dB |
| Input return loss | | | 11.5 | | dB |
| Output return loss | | | 13.5 | | dB |
| P-1 | | | 21 | | dBm |
| OIP3 | Pout=+4dBm/tone , Δf =1MHz | | 39 | | dBm |
| Noise Figure * | Without de-embedding, the estimated evaluation board loss is0.15dB@1.9G | | 1.5 | | dB |
| Switching speed | Rise Time (10%-90%) | | 170 | | ns |
| | Fall Tine (90%-10%) | | 260 | | ns |
| Shutdown control | On state | 0 | | 0.5 | V |
| | Off state (Power down) | +1.4 | +3.3 | VDD | V |
| Current | On state | | 65 | | mA |
| | Off state (Power down) | | 3 | | mA |
| Shutdown pin current | VPD ≥ 3V | | 250 | | uA |
| Thermal resistance | Channel to case | | | 65 | °C/W |

*Noise figure is the test data without de -embedding .

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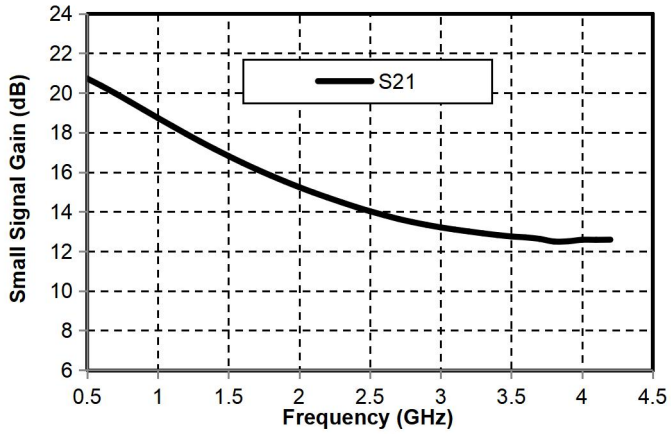
## High Linearity Low Noise Gain Amplifier , 50 - 4200 MHz

500M-5G electrical performance parameters

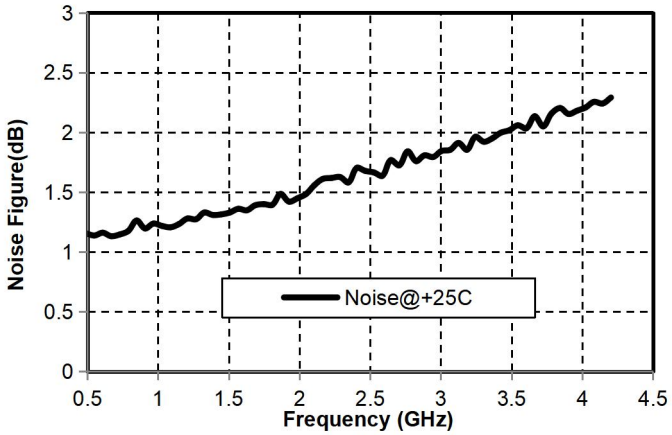
| | Electrical performance parameters ( $T_A$ = +25°C , Vd = +5V , 50Ω system) | | | | | | |
|---|---|---|---|---|---|---|---|
| Index | Test Conditions | Typical Value | | | | | Unit |
| Test frequency | | 900 | 1900 | 2700 | 3500 | 5000 | MHz |
| Small Signal Gain | | 19 | 15.5 | 13.5 | 12.5 | 12.5 | dB |
| Input return loss | | 13.5 | 11.5 | 11 | 11 | 10.5 | dB |
| Output return loss | | 14.5 | 13.5 | 11.5 | 10.5 | 11 | dB |
| P-1 | | 21 | 21 | 21 | 20.5 | 16.5 | dBm |
| OIP3 | Pout=+4 dBm /tone , Δf =1MHz | 37 | 36 | 36.5 | 35.5 | 33.5 | dBm |
| Noise Figure * | | 1.2 | 1.45 | 1.7 | 2.0 | 2.4 | dB |

*Noise figure is the test data without de -embedding .

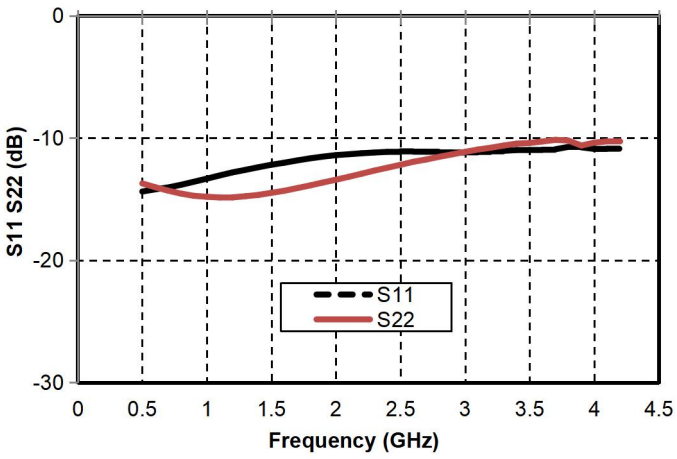
Small Signal Gain vs. Frequency



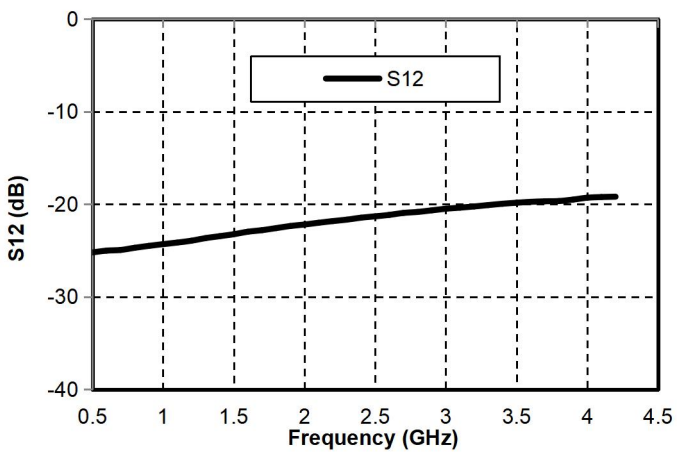

Noise Figure vs. Frequency




Input /Output Return Loss vs. Frequency




Reverse Isolation vs. Frequency

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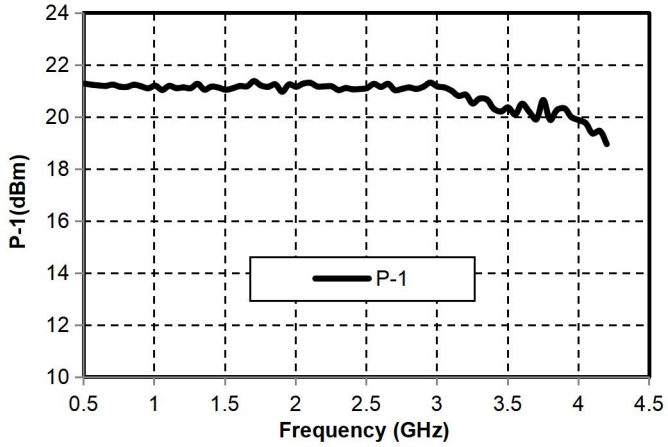
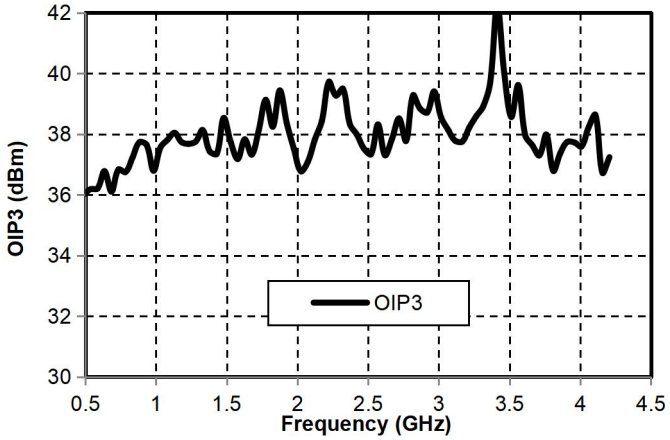
## High Linearity Low Noise Gain Amplifier , 50 - 4200 MHz

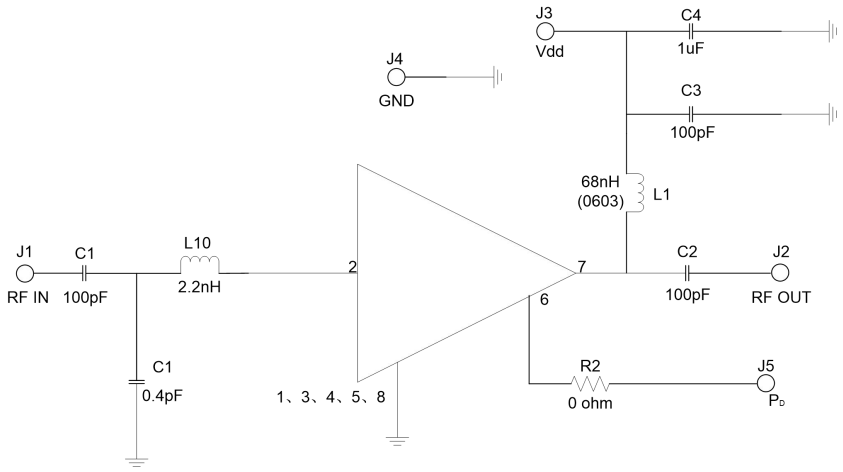
P-1dB vs. Frequency




OIP3 vs. Frequency




500M-4200M recommended circuit diagram




Precautions

1、 All resistors and capacitors are packaged in 0402

2、 The capacitance values of C1 , C2 and C3 need to be adjusted according to the actual application frequency.

3、 The inductance values of L1 and L10 need to be adjusted accordingly according to the actual application frequency.

4、 If not needed, R2 can be not installed; when R2 is not installed, the amplifier is always in working condition.

Ingredients list

| Raw material | RC Inductance | Describe | Brand |
|---|---|---|---|
| R2 | 0 Ω | Resistor, Chip, 0402, 5%, 1/16W | various |
| L1 0 | 2.2 nH | Inductor, 0603, 5%, Ceramic | various |
| LI | 68nH | Inductor, 0603, 5%, Ceramic | various |
| C4 | 1uF | Cap., Chip, 0402, 10%, 10V, X5R | various |
| C1 C2 C3 | 100 pF | Cap., Chip, 0402, 5%, 50V, NPO/COG | various |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# GHLN-9047-DF2-8

## High Linearity Low Noise Gain Amplifier , 50 - 4200 MHz

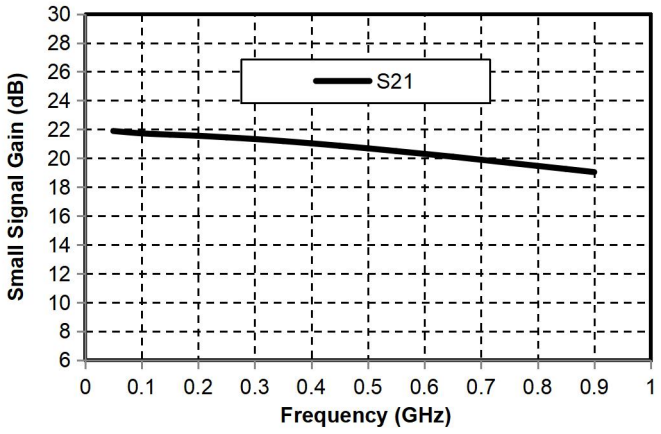
### 50M-500M electrical performance parameters

GHLN-9047-DF2-8 can achieve 50-500 MHz intermediate frequency operation by properly adjusting the bias induct value and DC capacitor value .

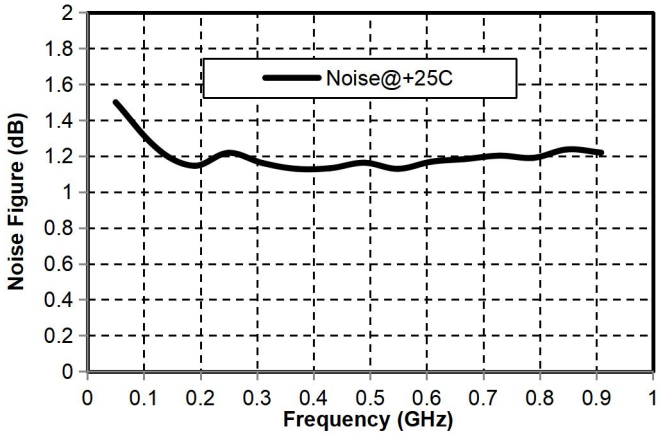
| Electrical performance parameters ( TA = +25°C, Vd = +5V, 50Ω system) | | | | | | |
|---|---|---|---|---|---|---|
| Index | Test Conditions | Typical Value | | | | Unit |
| Test frequency | | 50 | 100 | 200 | 500 | MHz |
| Small Signal Gain | | 21.5 | 21.5 | 21.5 | 20.5 | dB |
| Input return loss | | 7.5 | 13.5 | 16 | 15.5 | dB |
| Output return loss | | 12 | 15 | 15 | 15.5 | dB |
| P-1 | | 20 | 20.5 | 20.5 | 20.5 | dBm |
| OIP3 | Pout=+4 dBm /tone, Δf =1 MHz | 33.5 | 34.5 | 34.5 | 35 | dBm |
| Noise Figure* | | 1.5 | 1.3 | 1.2 | 1.2 | dB |

*Noise figure is the test data without de -embedding .

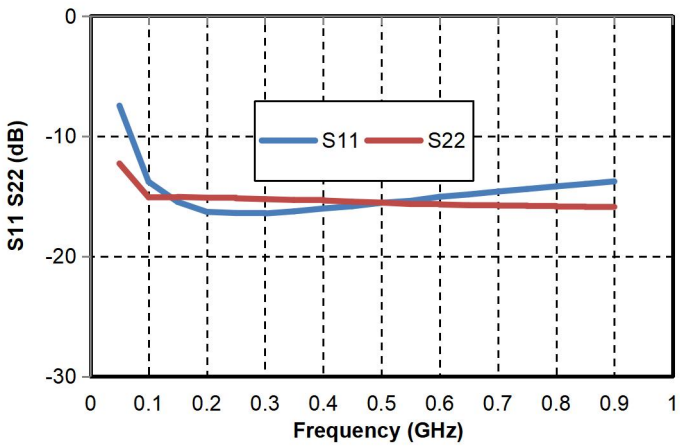
Small Signal Gain vs. Frequency



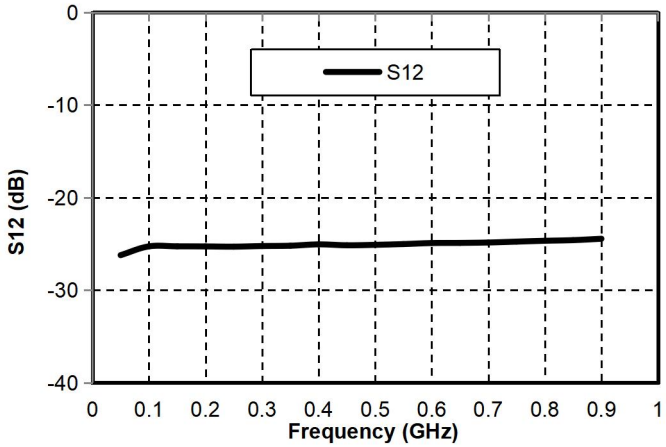

Noise Figure vs. Frequency




Input /Output Return Loss vs. Frequency




Reverse Isolation vs. Frequency

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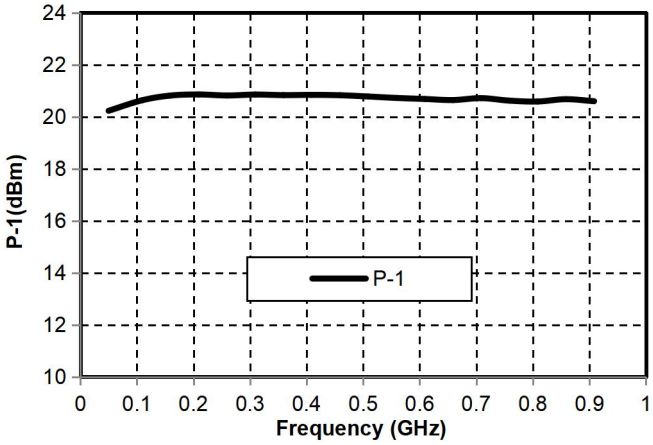
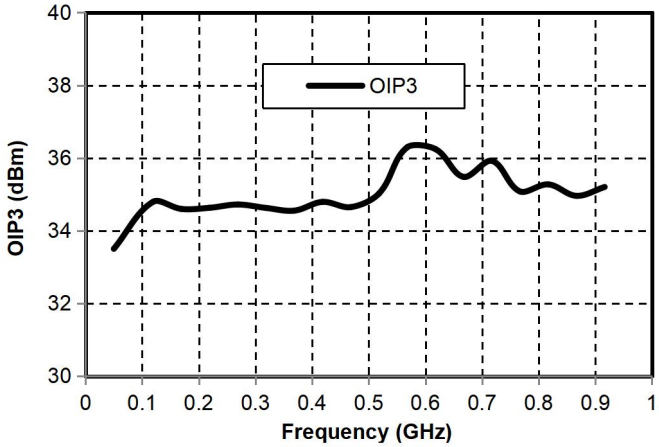
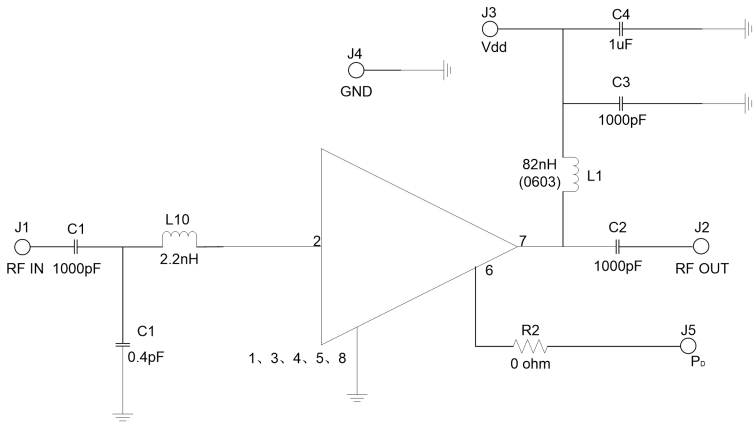
P-1dB vs. Frequency




OIP3 vs. Frequency




50M-500M recommended circuit diagram

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Ingredients list

| Raw material | RC Inductance | Describe | Brand |
|---|---|---|---|
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| L1 0 | 2.2 nH | Inductor, 0603, 5%, Ceramic | various |
| LI | 82nH | Inductor, 0603, 5%, Ceramic | various |
| C4 | 1uF | Cap., Chip, 0402, 10%, 10V, X5R | various |
| C1 C2 C3 | 1000 pF | Cap., Chip, 0402, 5%, 50V, NPO/COG | various |


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## High Linearity Low Noise Gain Amplifier , 50 - 4200 MHz

### Pin Definition

| Bonding point number | Function Symbol | Functional Description |
|---|---|---|
| 2 | RF IN | RF input port, impedance 50ohm , requires external DC blocking capacitor |
| 6 | Shut Down | Shutdown control port |
| 7 | RF OUT / DC Bias | RF output port, impedance 50ohm, amplifier leakage bias, bias the circuit at the output end through external current-choking inductor and bias resistor, external DC blocking capacitor is required |
| 1, 3, 4, 5, 8 | NC | No welding required |
| Chip bottom | GND | The bottom of the chip needs to be well grounded to RF and DC |

### Use restriction parameter [2]

| | |
|---|---|
| Collector voltage: +6V | Input power: +23dBm |
| Operating temperature: -40 ~ +70 ° C | Storage Temperature: -65 ~ +150°C |

【2】 Exceeding any of these maximum limits may cause permanent damage.

### Environmental conditions

| parameter | grade | standard |
|---|---|---|
| ESD – Human Body Model (HBM) | 1A | ESDA / JEDEC JS-001-2014 |
| ESD – Charged Device Model (CDM) | C3 | ESDA / JEDEC JS-001-2014 |
| MSL – Moisture Sensitivity Level | LEVEL 1 | IPC/JEDEC J-STD-020 |

### Precautions for use

- Plastic package material : Low-pressure injection molding plastic that meets ROSH specifications
- Lead frame material: copper alloy
- Lead surface plating: 100% matte tin
- Maximum reflow soldering peak temperature: 260℃

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