Standard Circuit

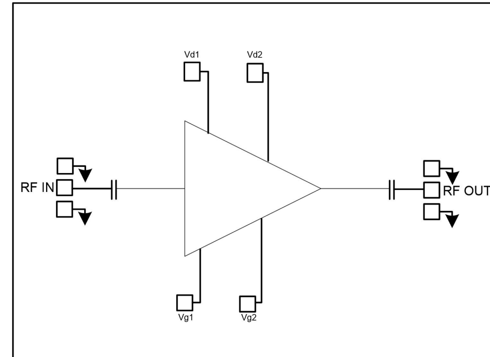
# GPA-2040B

## GaAs MMIC Power Amplifier Chip, 20-40GHz

### Performance characteristics

Frequency range: 20-40GHzz
Small Signal Gain: 22.5 dB
Gain flatness: ≤± 1.75dB
Noise figure: 7.0dB typ.
P-1dB: 21dBm
Psat: 23dBm
Power supply: +5 V/ 180 mA
50Ohm input/output
100% on-chip testing
Chip size: 1.85 x 1.05 x 0.1mm

### Functional Block Diagram




### Product Introduction

GPA-2040B is a broadband amplifier chip based on GaAs technology, covering a frequency range of 20 ~ 40 GHz, a small signal gain of 21dB, and a saturated output power of 23dBm. The chip is powered by a +5V power supply. The chip through-hole metallization process ensures good grounding, and the back side is metallized, which is suitable for eutectic sintering or conductive adhesive bonding process.

| Use restriction parameter [1] | |
|---|---|
| Maximum drain voltage | +7 V |
| Maximum gate bias | -3V |
| Maximum input power | +20dBm |
| Operating temperature | -55 ~ + 85 °C |
| Storage temperature | -65 ~ +150°C |

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

Electrical performance parameters ( TA = +25°C , Vd = +5V )

| Index | Minimum | Typical Value | Maximum | Unit |
|---|---|---|---|---|
| Frequency Range | | 20-40 | | GHz |
| Small Signal Gain | - | 22.5 | - | dB |
| Gain Flatness | | ± 1.75 | | dB |
| P -1 dB | - | 21 | - | dBm |
| Psat | - | 23 | - | dBm |
| Input return loss | - | 17 | - | dB |
| Output return loss | - | 10 | - | dB |
| Quiescent Current | | 180 | | mA |

* By tuning the Vg terminal voltage from -2V to 0V , 180 mA is achieved , and the Vg terminal voltage is expected to be -0.7 V.

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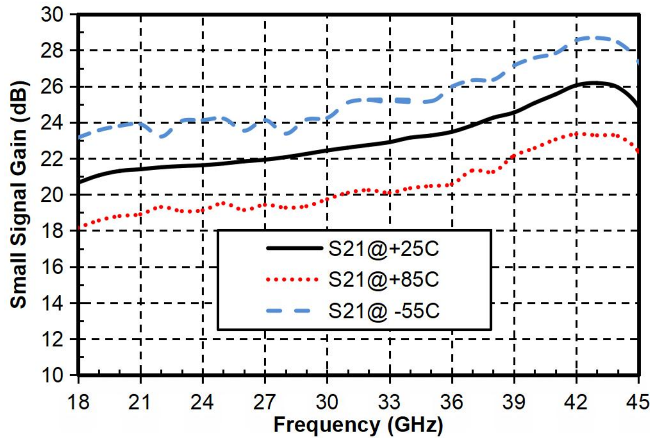
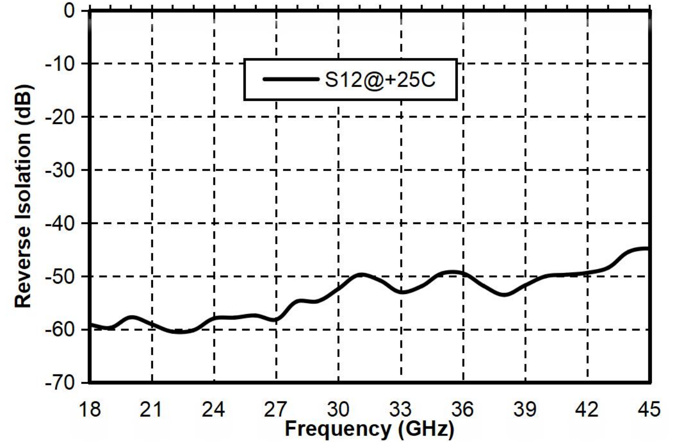
Main index test curve (the following data is based on probe test)

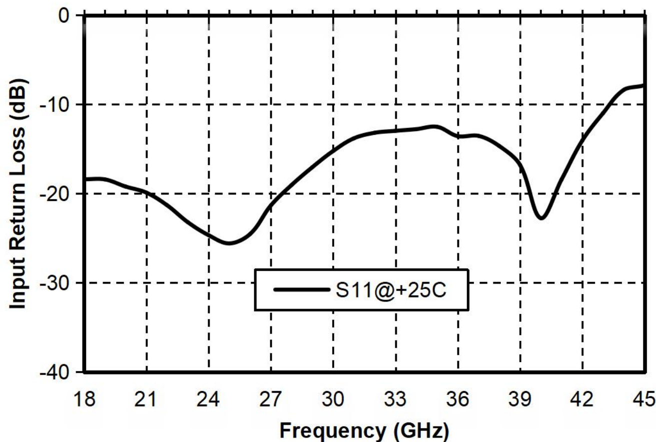
Gain vs. Frequency



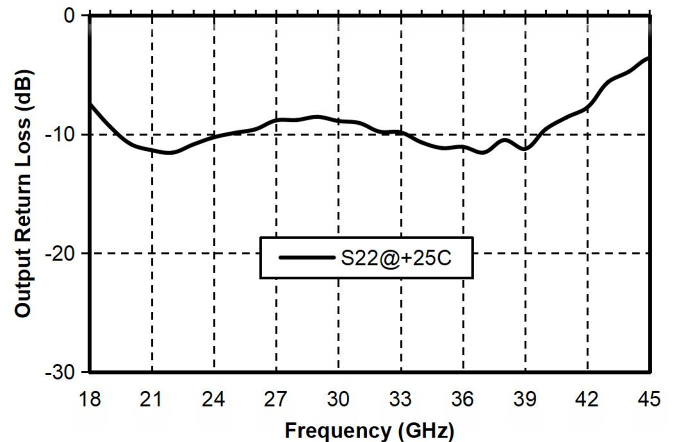

Reverse Isolation vs. Frequency



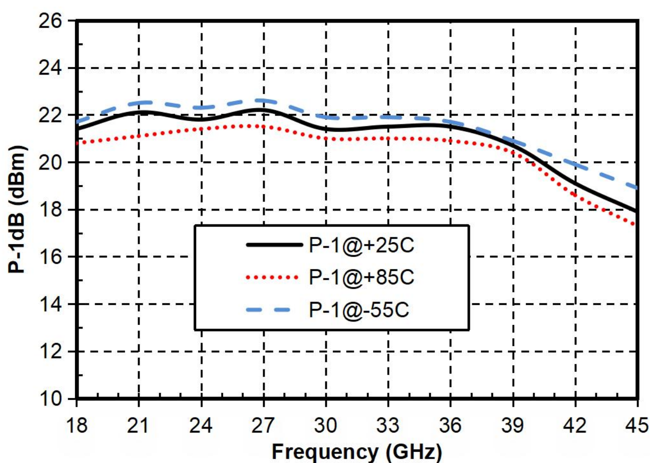

Input Return Loss vs. Frequency



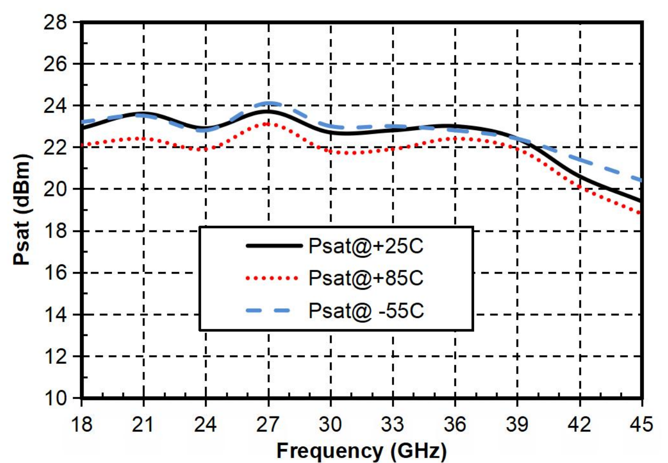

Output Return Loss vs. Frequency




P-1dB vs. Frequency




Psat vs. Frequency



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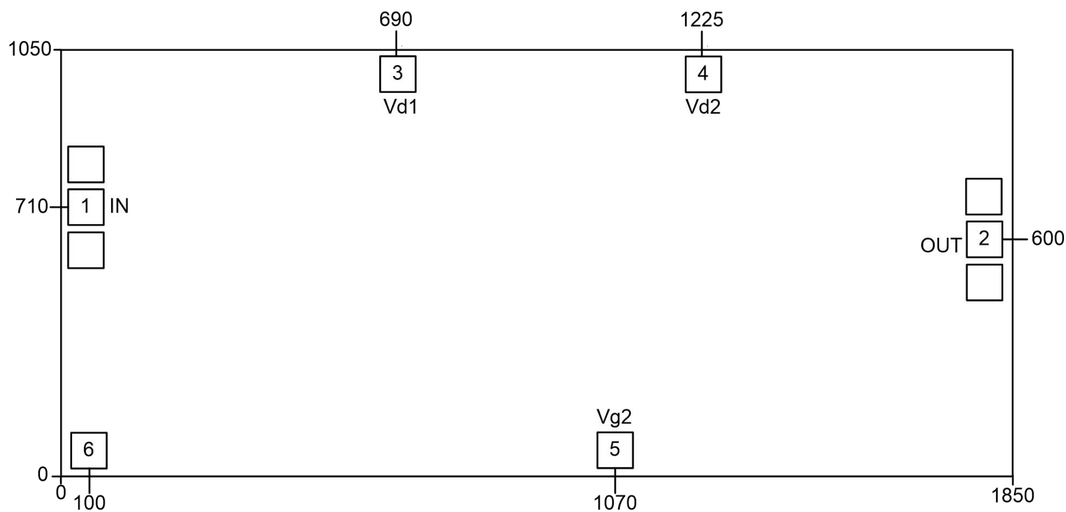
### Appearance structure [2]



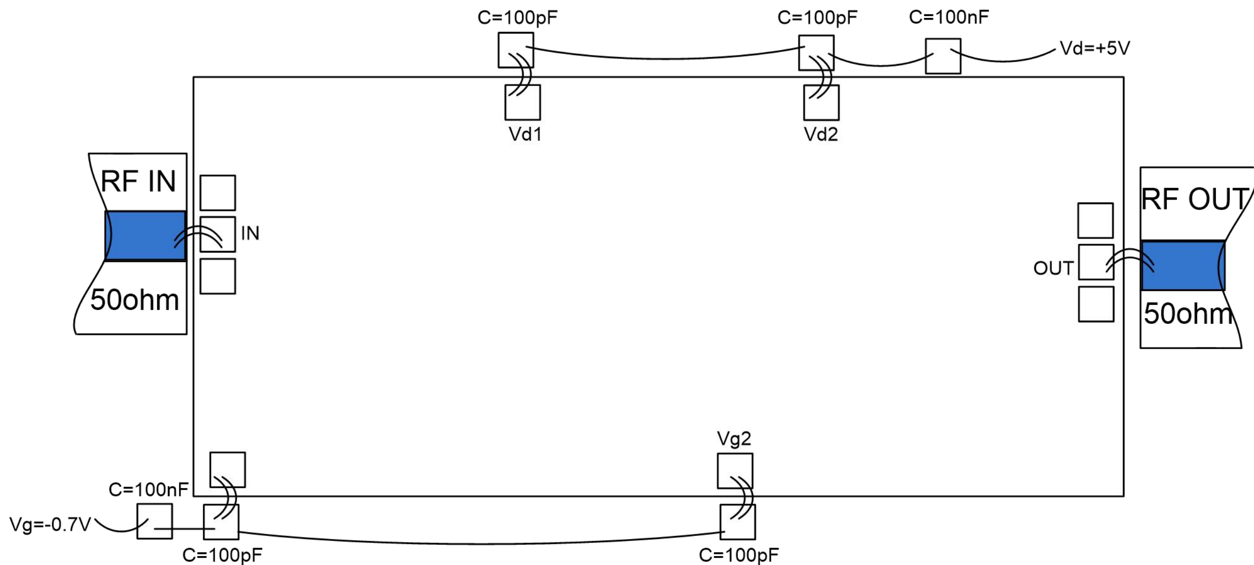

【 2 】All units in the figure are micrometers

### Bonding point definition

| Bonding point number | Function Symbol | Functional Description |
|---|---|---|
| 1 | RF IN | RF signal input terminal, no DC blocking capacitor required |
| 2 | RF OUT | RF signal output terminal, no DC blocking capacitor required |
| 3.4 | Vd 1, Vd 2 | Amplifier drain bias, requires external 100 pF, 1000pF, 100nF bypass capacitor |
| 5, 6 | Vg1, Vg2 | Amplifier gate bias, external 100 pF, 1000 pF, 100 nF bypass capacitor required |
| Chip bottom | GND | needs to be in good contact with the RF and DC grounds |

## GaAs MMIC Power Amplifier Chip, 20-40GHz

### Recommended assembly diagram




### Notice

- The chip must be stored in an anti-static container and kept in a nitrogen environment.
- bare die surface using wet chemical methods .
- Please strictly follow the ESD protection requirements to avoid static damage to the bare chip.
- General operation: Please use precision pointed tweezers to pick up bare chips. Avoid touching the chip surface with tools or fingers during operation.
- Rack mounting operation suggestions: Bare chip mounting can be done by AuSn solder eutectic sintering or conductive adhesive bonding. The mounting surface must be clean and flat.
- Sintering process: It is recommended to use AuSn solder sheets with a gold -tin ratio of 80/20 . The working surface temperature reaches 255 ℃ and the tool (vacuum chuck) temperature reaches 265 ℃ . When the high-temperature mixed gas (nitrogen-hydrogen ratio of 90/10) is blown to the chip, the temperature at the top of the tool should be raised to 290 ℃ . Do not let the chip exceed 320 ℃ for more than 20 seconds. The friction time should not exceed 3 seconds.
- Bonding process: The amount of conductive glue dispensed should be as small as possible. After the chip is placed in the installation position, the conductive glue can be vaguely seen around it . For curing conditions, please follow the information provided by the conductive glue manufacturer.
- Bonding operation suggestions: Use Φ0.025mm (1mil) gold wire for both ball and wedge bonding . Thermosonic bonding temperature is 150 ℃ . The pressure of the wedge bonding knife is 40~50gf for ball bonding and 18~22gf for wedge bonding . Use the smallest possible ultrasonic energy. The bonding starts at the pressure point on the chip and ends at the package (or substrate).

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