

**2 to 8 GHz WIDE BAND AMPLIFIER CHIP****DESCRIPTION**

The  $\mu$ PG110P is a GaAs monolithic integrated circuit designed as a wide band amplifier from 2 to 8 GHz. And the device is available in chip form. The  $\mu$ PG110P is suitable for the gain stage required high gain characteristic of the microwave communication system and the measurement equipment.

**FEATURES**

- Ultra wide band : 2 to 8 GHz
- High Power Gain :  $G_P = 15$  dB TYP. @f = 2 to 8 GHz
- Medium Power :  $P_{O(1\text{ dB})} = +14$  dBm TYP. @f = 2 to 8 GHz

**ORDERING INFORMATION**

| PART NUMBER  | FORM |
|--------------|------|
| $\mu$ PG110P | Chip |

**ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )**

|                         |                |             |                  |
|-------------------------|----------------|-------------|------------------|
| Supply Voltage          | $V_{DD}$       | +10         | V                |
| Input Voltage           | $V_{IN}$       | -5 to +0.6  | V                |
| Input Power             | $P_{in}$       | +10         | dBm              |
| Total Power Dissipation | $P_{tot}^{*1}$ | 1.5         | W                |
| Operating Temperature   | $T_{opr}^{*2}$ | -65 to +125 | $^\circ\text{C}$ |
| Storage Temperature     | $T_{stg}$      | -65 to +125 | $^\circ\text{C}$ |

\*1 Mounted with AuSn hard solder

\*2 The temperature of base material beside the chip

**RECOMMENDED OPERATING CONDITIONS ( $T_A = 25^\circ\text{C}$ )**

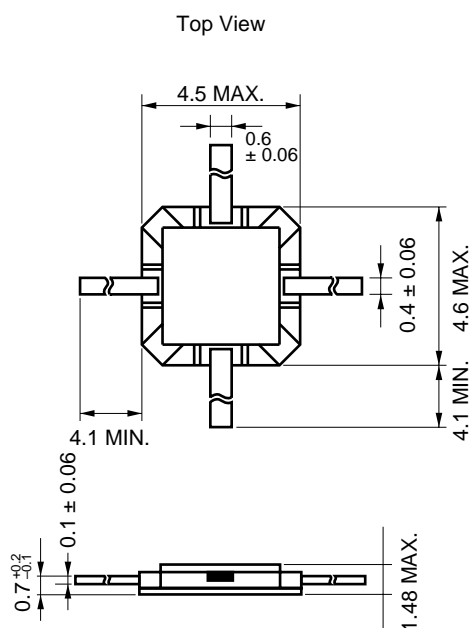
|                |          |              |     |
|----------------|----------|--------------|-----|
| Supply Voltage | $V_{DD}$ | $+8 \pm 0.2$ | V   |
| Input Power    | $P_{in}$ | -5           | dBm |

**ELECTRICAL CHARACTERISTICS ( $T_A = 25\text{ }^{\circ}\text{C}$ )\*3**

| CHARACTERISTIC                              | SYMBOL               | MIN. | TYP. | MAX.      | UNIT | TEST CONDITIONS  |
|---|----------------------|------|------|-----------|------|--|
| Supply Current                              | $I_{DD}$             | 65   | 135  | 180       | mA   | $V_{DD} = +8\text{ V}$<br>$f = 2\text{ to }8\text{ GHz}$ |
| Power Gain                                  | $G_P$                | 12   | 15   |           | dB   |  |
| Gain Flatness                               | $\Delta G_P$         |      |      | $\pm 1.5$ | dB   |  |
| Input Return Loss                           | $RL_{in}$            | 6    | 10   |           | dB   |  |
| Output Return Loss                          | $RL_{out}$           | 7    | 10   |           | dB   |  |
| Isolation                                   | ISL                  | 30   | 40   |           | dB   |  |
| Output Power at 1 dB Gain Compression Point | $P_{O(1\text{ dB})}$ | 10   | 14   |           | dBm  |  |

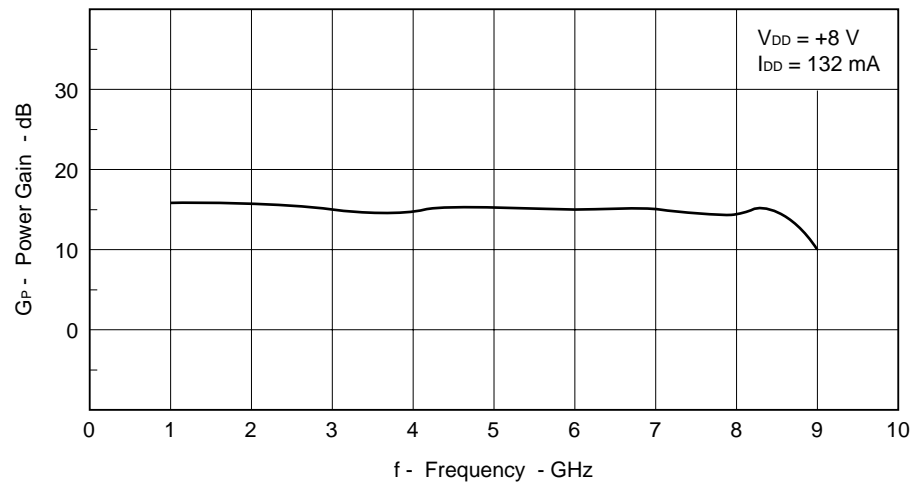
\*3 These characteristics are based on performance of devices mounted in the standard package shown in Fig. 1.

**Fig. 1 4 pin Ceramic Package**

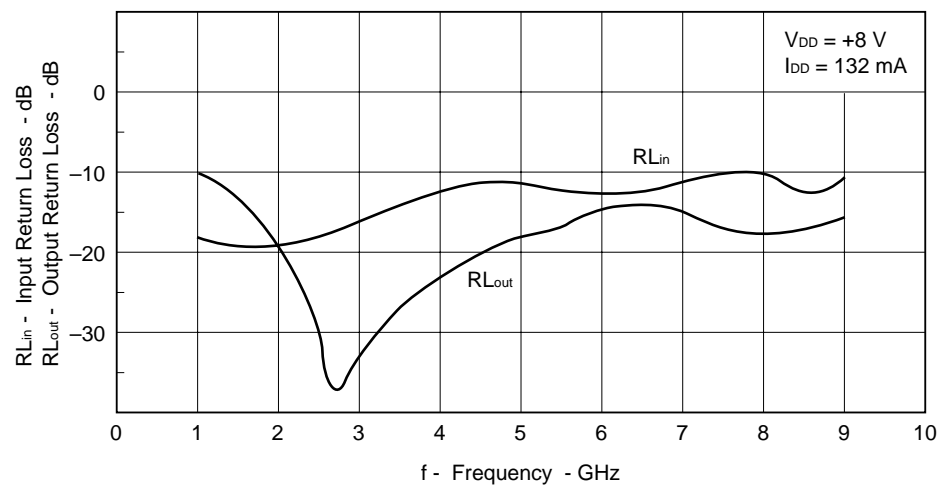


TYPICAL CHARACTERISTICS ( $T_A = 25\text{ }^{\circ}\text{C}$ )\*4

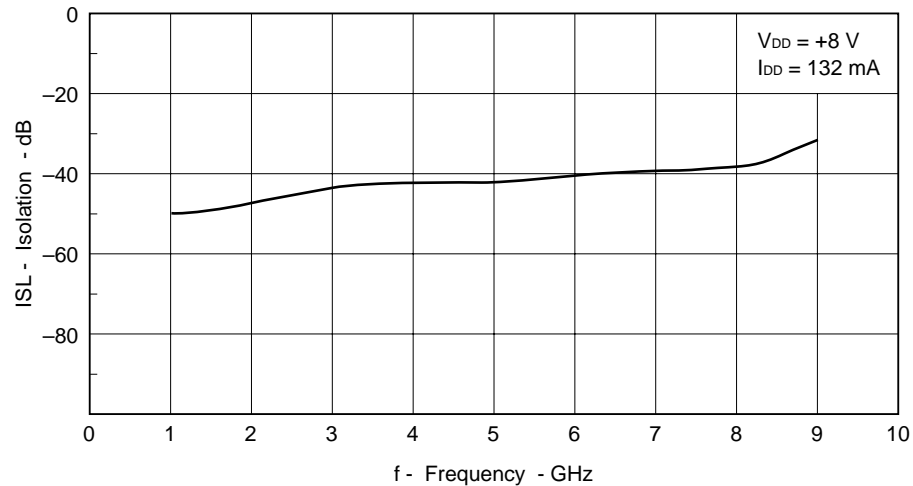
POWER GAIN vs. FREQUENCY

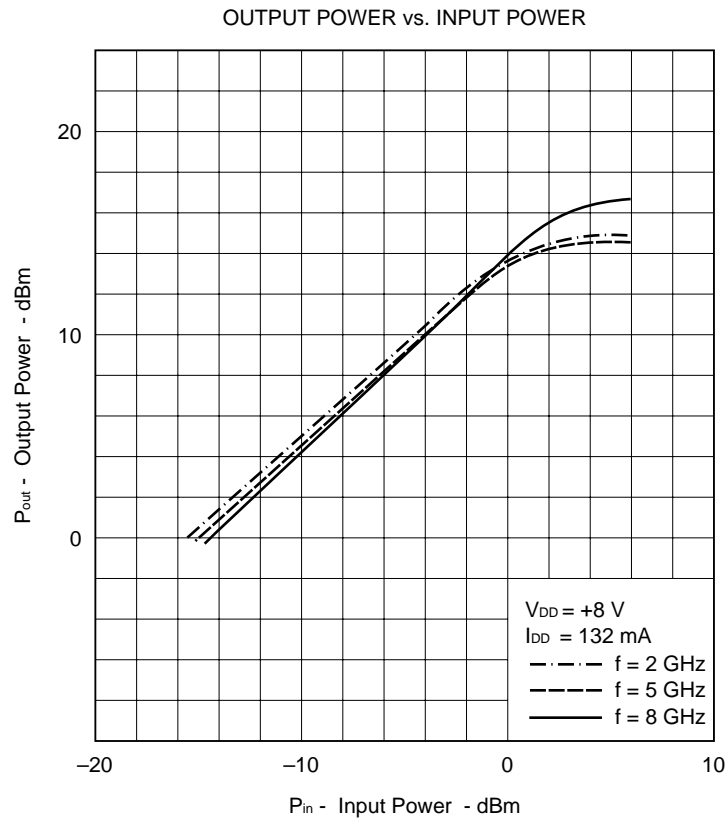


INPUT RETURN LOSS vs. FREQUENCY



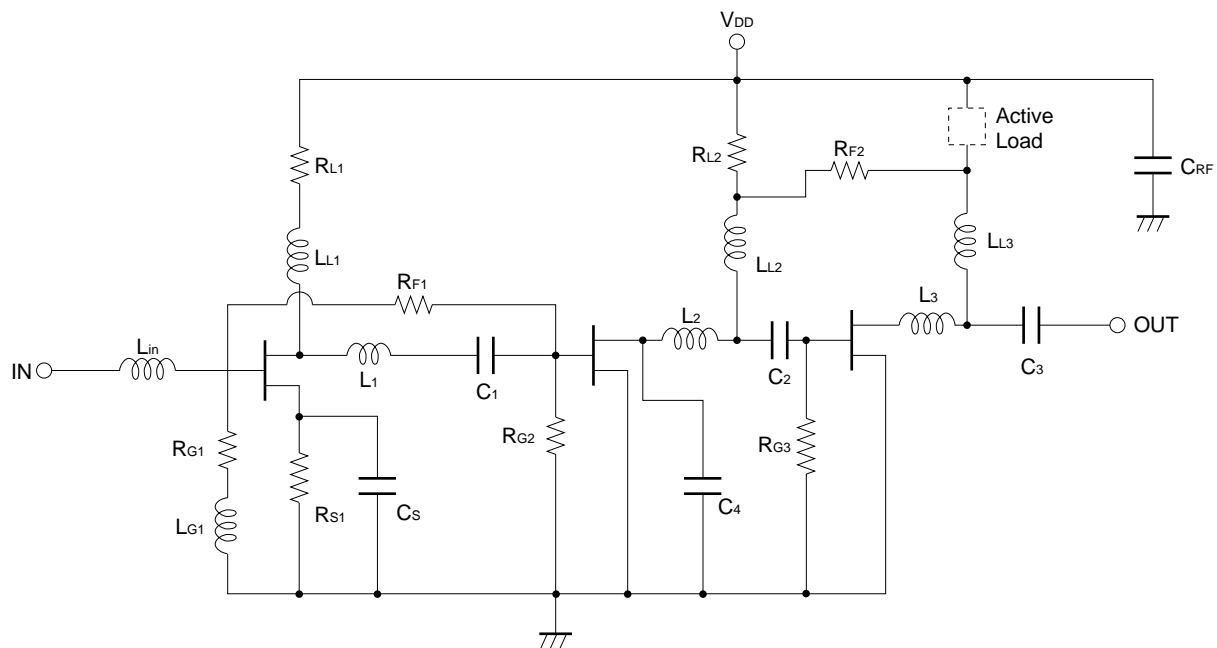
ISOLATION vs. FREQUENCY





\*4 These characteristics are measured for device mounted in the standard package shown in Fig. 1.

## EQUIVALENT CIRCUIT



## RECOMMENDED CHIP ASSEMBLY CONDITIONS

### Die Attachment

Atmosphere : N<sub>2</sub> gas

Temperature : 320 ± 5 °C

AuSn Preform : 0.5 × 0.5 × 0.05<sup>t</sup> (mm), 1 pce.

\* The hard solder such as AuSi or AuGe which has higher melting point than AuSn should not be used.

Base Material : CuW, Cu, KV

\* Other material should not be used.

Epoxy Die Attach is not recommended.

### Bonding

Machine : TCB

\* USB is not recommended

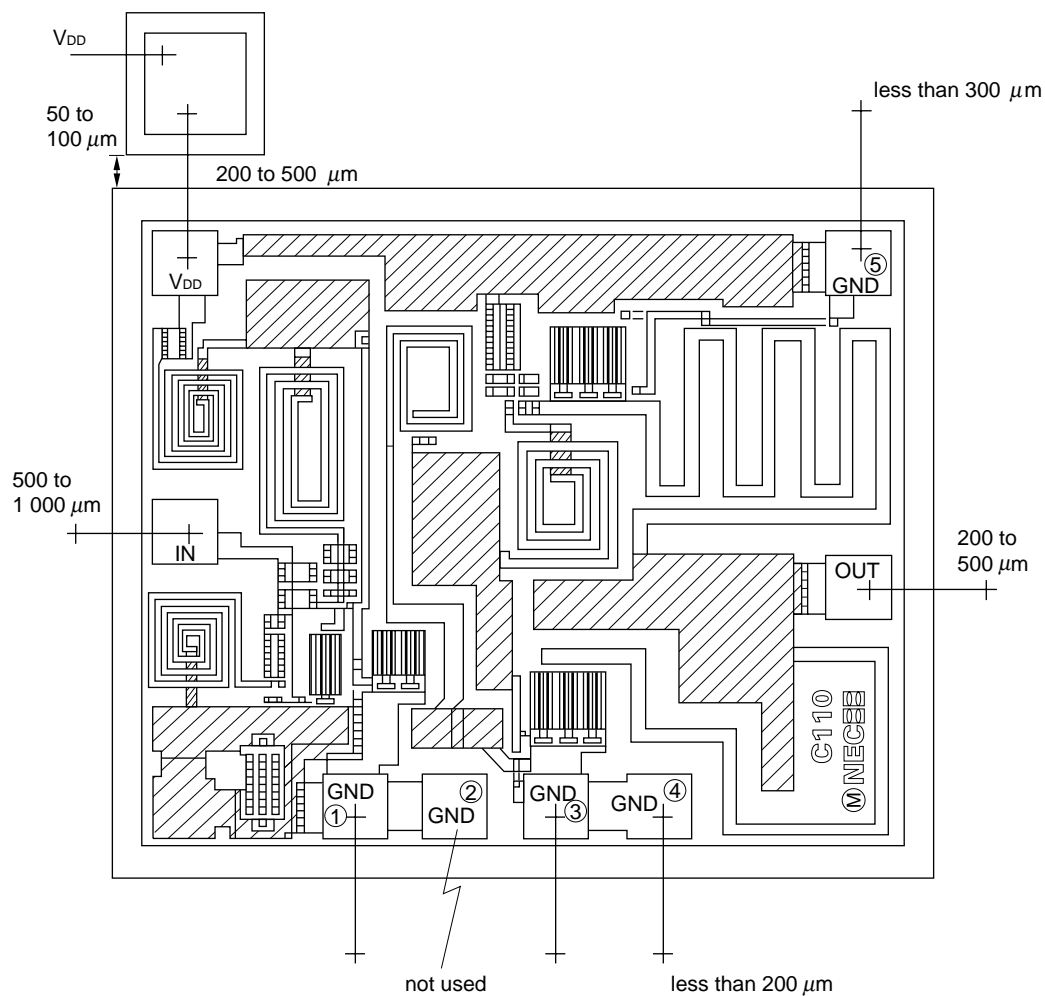
Wire : 30 μm diameter Au wire

Temperature : 260 ± 5 °C

Strength : 31 ± 3 g

Atmosphere : N<sub>2</sub> gas

### Chip Bonding Diagram



**Recommended Wire Length**

1. 500 to 1 000  $\mu\text{m}$  for Input (the longer the wire, the better the VSWR)
2. 200 to 500  $\mu\text{m}$  for Output (the shorter the wire, the better the VSWR)
3. It should be bonded via a chip capacitor for  $V_{DD}$ .

Wire length is 200 to 500  $\mu\text{m}$

4. There are five GND pads but GND pad <2> is not used.

Wire length is 200  $\mu\text{m}$  for <1>, <3> and <4>.

Less than 300  $\mu\text{m}$  for <5>.

Chip Size:  $1.1 \times 1.3 \text{ mm}$

$t = 140 \mu\text{m}$

Pad Size :  $100 \times 100 \mu\text{m}$

**QUALITY ASSURANCE** (Refer to GET-30116)**1. 100 % Tests**

1-1 100 % DC Probe

1-2 Visual Inspection

MIL-STD-883 Method 2010 Condition B

**2. Tests on Sampling Basis**

2-1 Bond Pull Tests (In case of recommended chip handling)

MIL-STD-883 Method 2011

5 samples/wafer and 20 points tested

Accept 0/Reject 1

2-2 Tests in Standard Package

Test the electrical characteristics of chips assembled into the standard package used for μPG110B

5 samples/wafer tested

DC and RF measurement Accept 1/Reject 2

**3. Warrantee**

NEC has a responsibility of quality assurance for the products within 180 days after delivered to customers where these are handled properly and stored in a desiccater with the flow of dry N<sub>2</sub> gas.

**4. Caution**

4-1 Take great care to prevent static electricity.

4-2 Be sure that Die Attach is performed in N<sub>2</sub> atmosphere.

## Caution

**The Great Care must be taken in dealing with the devices in this guide.**

**The reason is that the material of the devices is GaAs (Galium Arsenide), which is designated as harmful substance according to the law concerned.**

**Keep the law concerned and so on, especially in case of removal.**

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Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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Anti-radioactive design is not implemented in this product.