

# GaAs INTEGRATED CIRCUIT

# $\mu$ PG100P, $\mu$ PG101P

### WIDE BAND AMPLIFIER CHIPS

#### DESCRIPTION

$\mu$ PG100P and  $\mu$ PG101P are GaAs integrated circuits designed as wide band amplifiers. Both devices are available in chip form.

$\mu$ PG100P is low noise amplifier from 50 MHz to 3 GHz and  $\mu$ PG101P is a medium power amplifier in the same frequency band. These devices are most suitable for the IF stage of microwave communication system and the measurement equipment.

#### FEATURES

- Wide band :  $f = 50 \text{ MHz to } 3 \text{ GHz}$

#### ORDERING INFORMATION

PART NUMBER	FORM
$\mu$ PG100P	chip
$\mu$ PG101P	chip

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

		$\mu$ PG100P	$\mu$ PG101P	
Drain Voltage	$V_{DD}$	+8	+10	V
Gate Voltage	$V_{GG}$	-8	-8	V
Input Voltage	$V_{in}$	-3 to +0.6	-5 to +0.6	V
Input Power	$P_{in}$	+15	+15	dBm
Total Power Dissipation	$P_{tot}^{*1}$	1.5	1.5	W
Operating Temperature	$T_{opr}^{*2}$	-65 to +125	-65 to +125	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +175	-65 to +175	$^\circ\text{C}$

\*1 Mounted with AuSn hard solder

\*2 The temperature of base material beside the chip

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)<sup>\*3</sup>**

μPG100P (V<sub>DD</sub> = +5 V, V<sub>GG</sub> = -5 V)

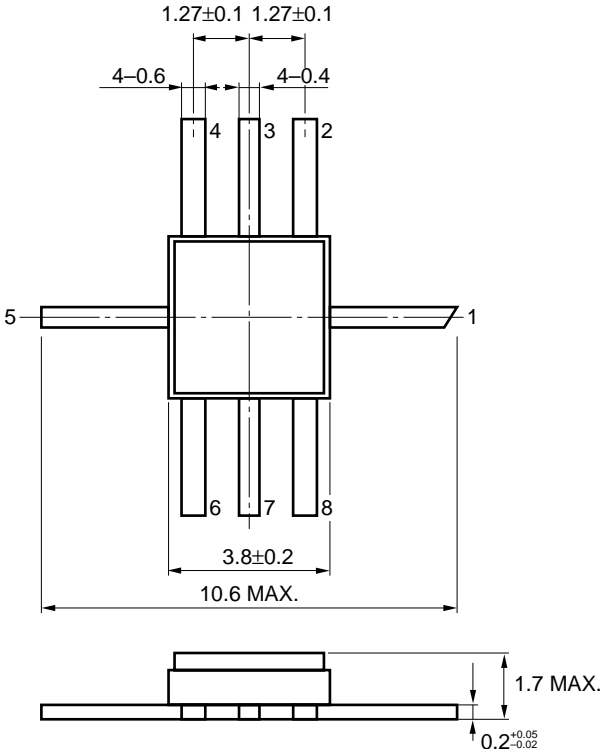
CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Current	I <sub>DD</sub>	30	45	60	mA	RF OFF
Gate Current	I <sub>GG</sub>		0.7	1.5	mA	
Power Gain	G <sub>p</sub>	14	16		dB	f = 0.05 to 3 GHz
Gain Flatness	ΔG <sub>p</sub>			±1.5	dB	
Noise Figure	NF		2.7	3.5	dB	
Input Return Loss	RL <sub>in</sub>	7	10		dB	
Output Return Loss	RL <sub>out</sub>	7	10		dB	
Isolation	ISOL	30	40		dB	
Output Power at 1 dB Gain Compression Point	P <sub>O(1 dB)</sub>	+3	+6		dBm	

μPG101P (V<sub>DD</sub> = +8 V, V<sub>GG</sub> = -5 V)

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Current	I <sub>DD</sub>	70	100	140	mA	RF OFF
Gate Current	I <sub>GG</sub>		1.0	3.0	mA	
Power Gain	G <sub>p</sub>	12	14		dB	f = 0.05 to 3 GHz
Gain Flatness	ΔG <sub>p</sub>			±1.5	dB	
Noise Figure	NF		5	7	dB	
Input Return Loss	RL <sub>in</sub>	6	8		dB	
Output Return Loss	RL <sub>out</sub>	6	8		dB	
Isolation	ISOL	30	40		dB	
Output Power at 1 dB Gain Compression Point	P <sub>O(1 dB)</sub>	+16	+18		dBm	

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

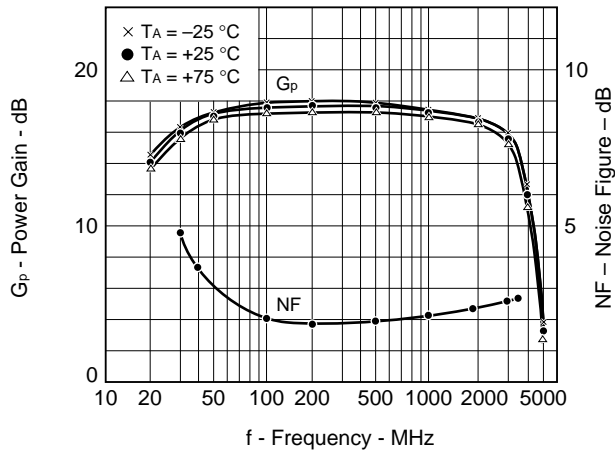
Fig. 1 8 Pin Ceramic Package



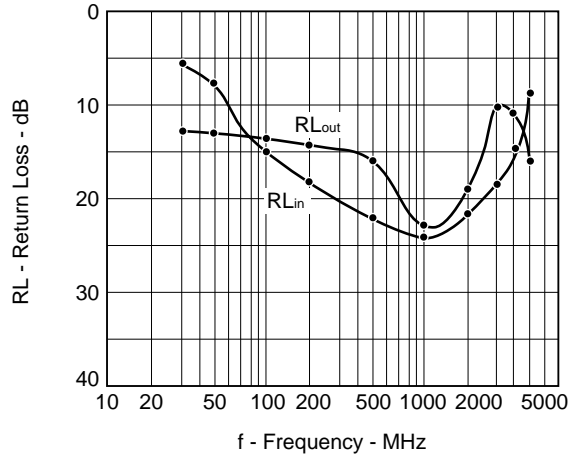
TYPICAL CHARACTERISTICS<sup>4</sup>

$\mu$ PG100P ( $V_{DD} = +5$  V,  $V_{GG} = -5$  V)

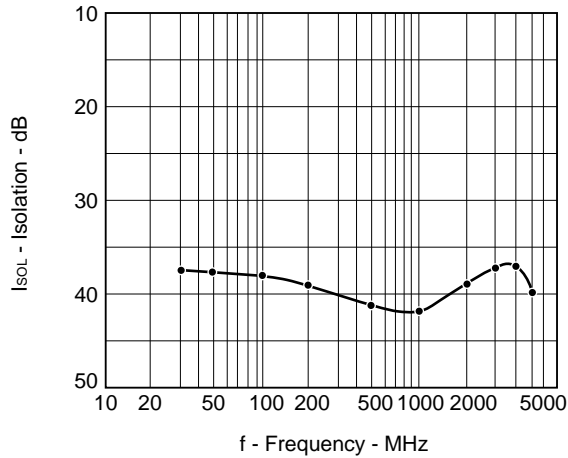
POWER GAIN AND NOISE FIGURE vs. FREQUENCY



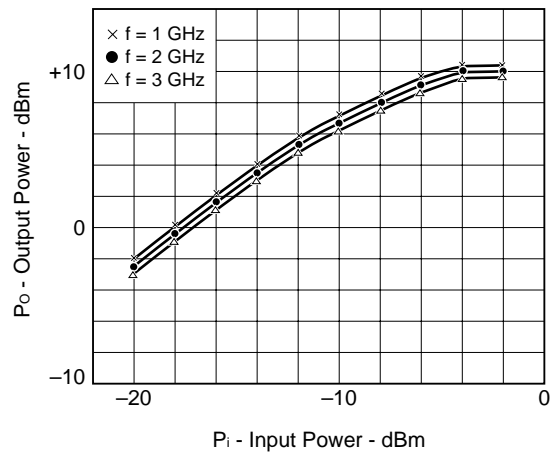
INPUT AND OUTPUT RETURN LOSS vs. FREQUENCY



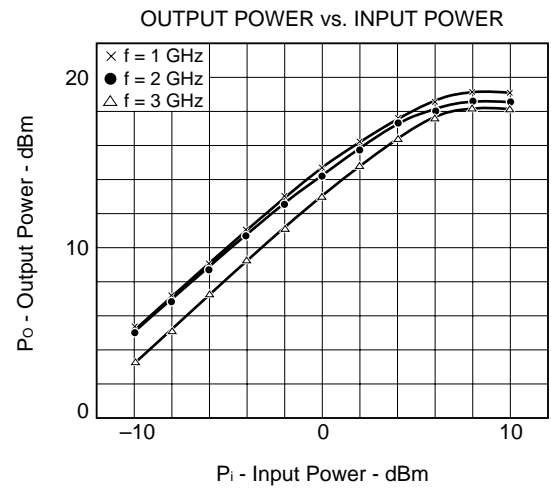
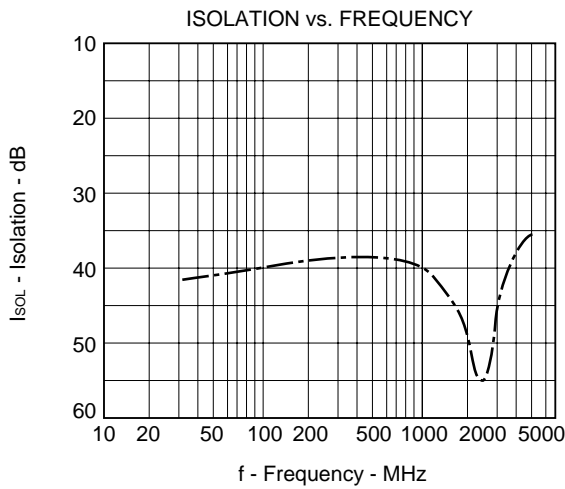
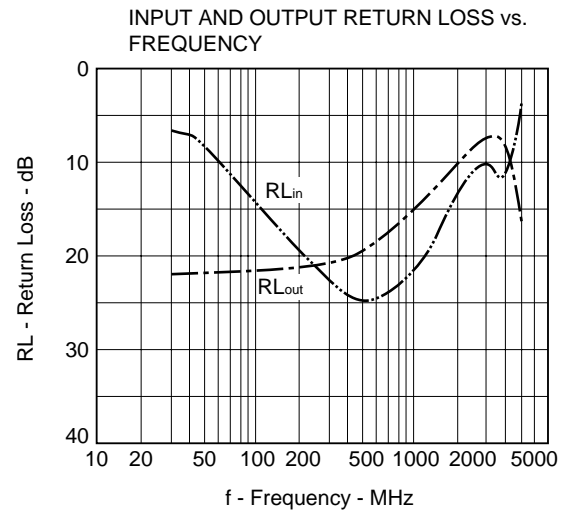
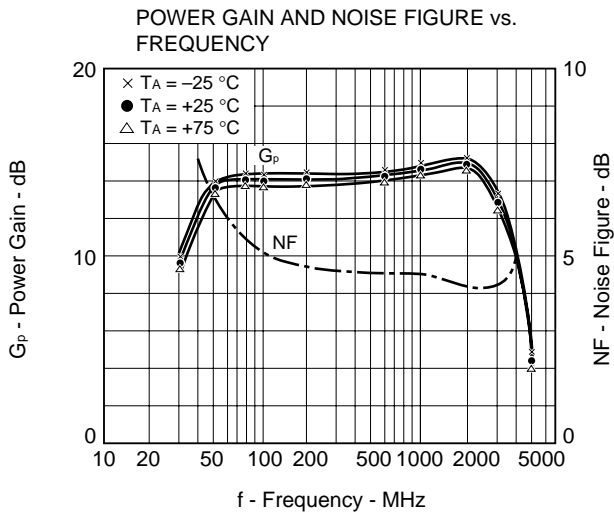
ISOLATION vs. FREQUENCY



OUTPUT POWER vs. INPUT POWER



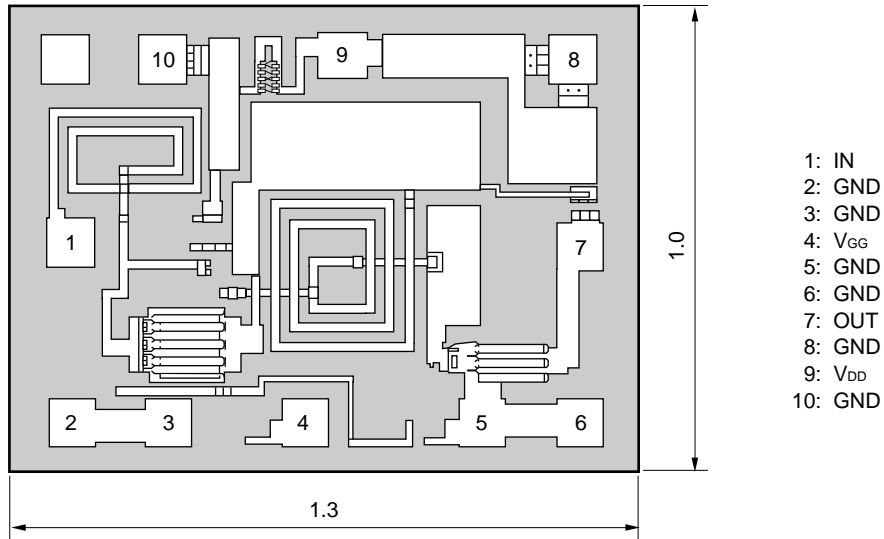
$\mu$ PG101P ( $V_{DD} = +8\text{ V}$ ,  $V_{GG} = -5\text{ V}$ )



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

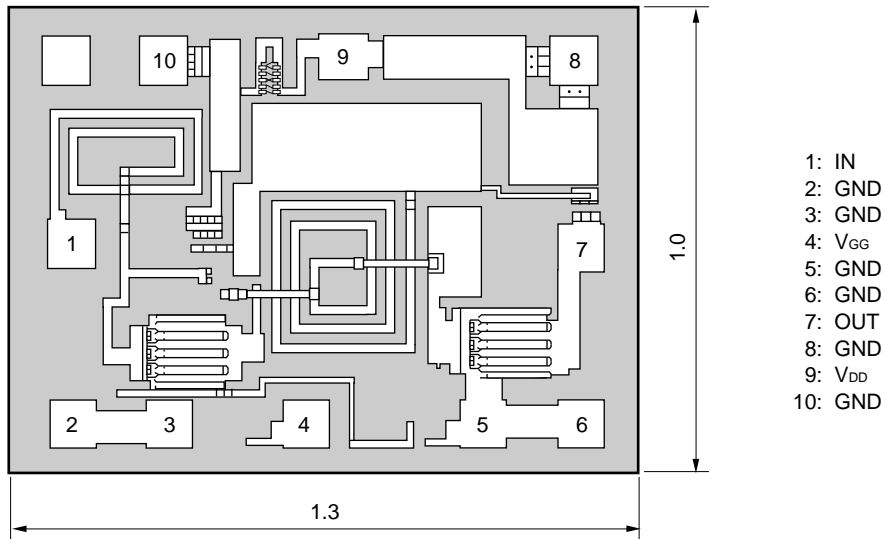
CHIP DIMENSIONS (Unit : mm)

$\mu$ PG100P



Bonding Pad Size: 100  $\mu$ m  $\times$  100  $\mu$ m

$\mu$ PG101P



Bonding Pad Size: 100  $\mu$ m  $\times$  100  $\mu$ m

**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), 2 pcs.
    - \* 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

**QUALITY ASSURANCE (Refer to GET-30116)**

**1. 100 % Tests**

- 1-1 100 % DC and RF 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 μPG100B and μPG101B.
  - 5 samples/wafer tested
  - DC and RF measurement Accept 1/Reject 2

**3. WARRANTY**

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 the desiccator 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.

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Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

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.