NEC

GaAs INTEGRATED CIRCUIT

μPG103B

WIDE-BAND AMPLIFIER

μPG103B is GaAs integrated circuit designed as wide band (50 MHz to 3GHz) amplifiers.
This device is most suitable for the microwave communication system and the measurement equipment.

FEATURES

- Ultra wide band : f = 50 MHz to 3 GHz
- Input/output impedance matched to 50 Ω
- Hermetic sealed ceramic package assures high reliability

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPG103B	T-31, 8 PIN CERAMIC

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Drain Voltage	V_{DD}	+8	V
Gate Voltage	V_{GG}	–8	V
Input Voltage	V_{in}	–3 to +0.6	V
Input Power	P_{in}	+15	dBm
Total Power Dissipation*	P_{tot}	1.5	W
Operating Case Temperature	T_{opt}	–65 to +125	°C
Storage Temperature	T_{stg}	–65 to +175	°C

* $T_C \leq 125$ °C

RECOMMENDED OPERATING CONDITIONS (T_A = 25 °C)

Drain Voltage	V_{DD}	+5.0±0.5	V
Gate Voltage	V_{GG}	–5.0±0.5	V
Operating Case Temperature	T_{opt}	–50 to +80	°C

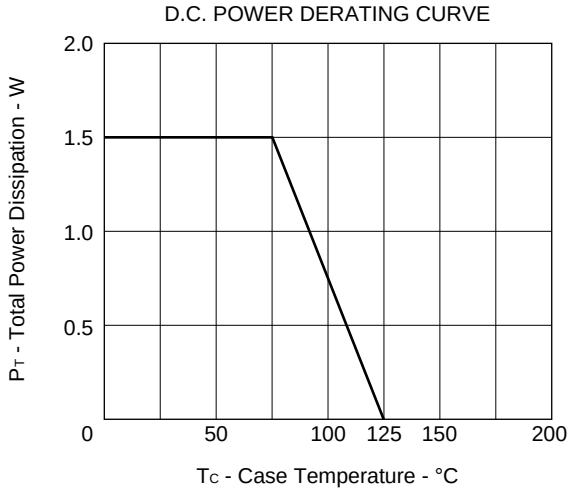
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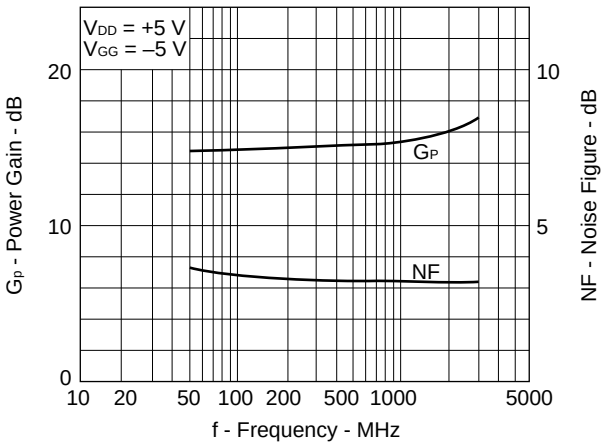
ELECTRICAL CHARACTERISTICS (T_A = 25 °C, V_{DD} = +5V, V_{GG} = –5V)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Current	I_{DD}	40	55	80	mA	RF OFF
Gate Current	I_{GG}		1	2	mA	
Power Gain	G_p	12			dB	f = 0.05 to 2 GHz
Power Gain	G_p	10			dB	f = 2 to 3 GHz
Gain Flatness	ΔG_p		±1.5	±2.0	dB	f = 0.05 to 2 GHz
Gain Flatness	ΔG_p		±2.0	±3.0	dB	f = 0.05 to 3 GHz
Noise Figure	NF		4.0	4.5	dB	f = 0.05 to 2 GHz
Noise Figure	NF		4.5	5.0	dB	f = 2 to 3 GHz
Input Return Loss	RL_{in}	6	10		dB	f = 0.05 to 1 GHz
Input Return Loss	RL_{in}	10	14		dB	f = 1 to 2 GHz
Input Return Loss	RL_{in}	6	10		dB	f = 2 to 3 GHz
Output Return Loss	RL_{out}	10	16		dB	f = 0.05 to 3 GHz
Isolation	I_{SOL}	30	40		dB	
Output Power at 1 dB Gain Compression Point	P_o (1dB)	+7	+9		dBm	

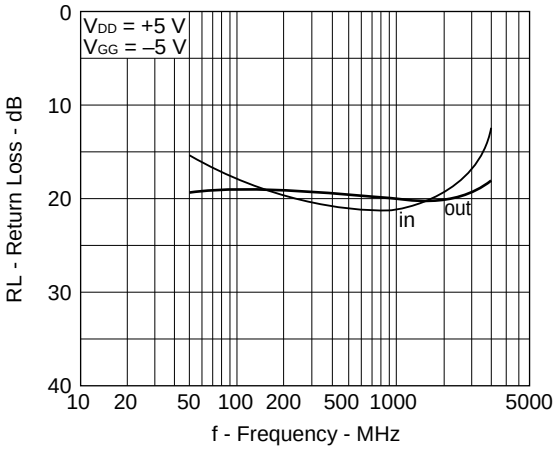
TYPICAL PERFORMANCE CURVES



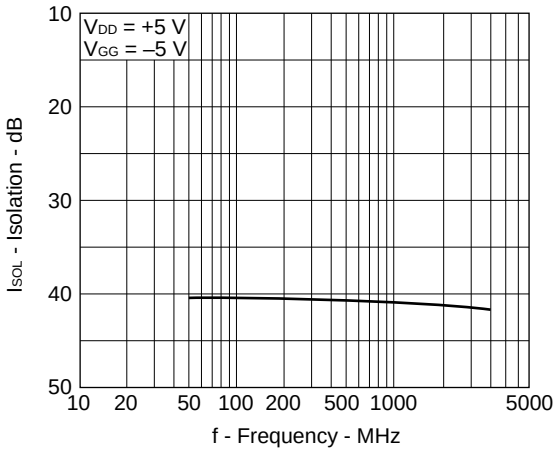
POWER GAIN AND NOISE FIGURE vs. FREQUENCY



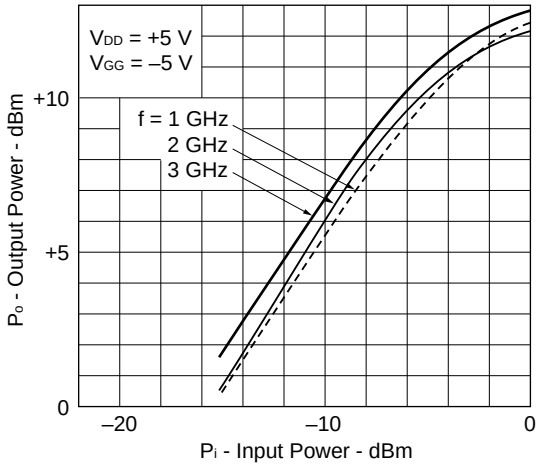
INPUT AND OUTPUT RETURN LOSS vs. FREQUENCY



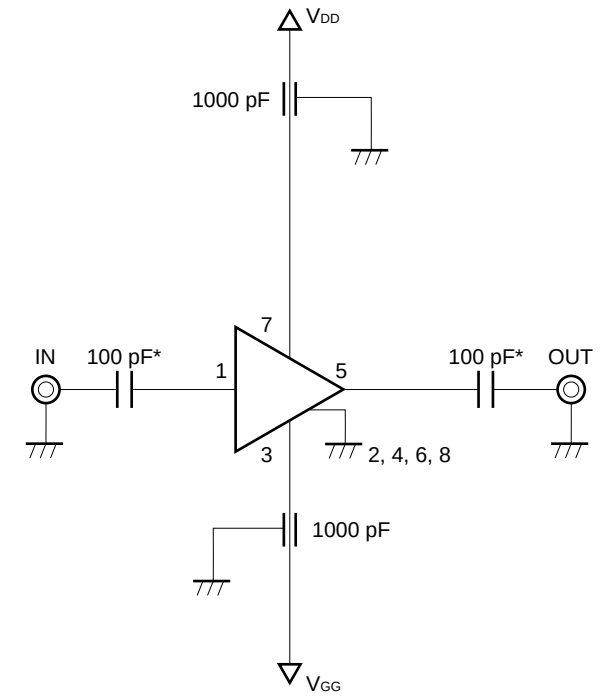
ISOLATION vs. FREQUENCY



OUTPUT POWER vs. INPUT POWER

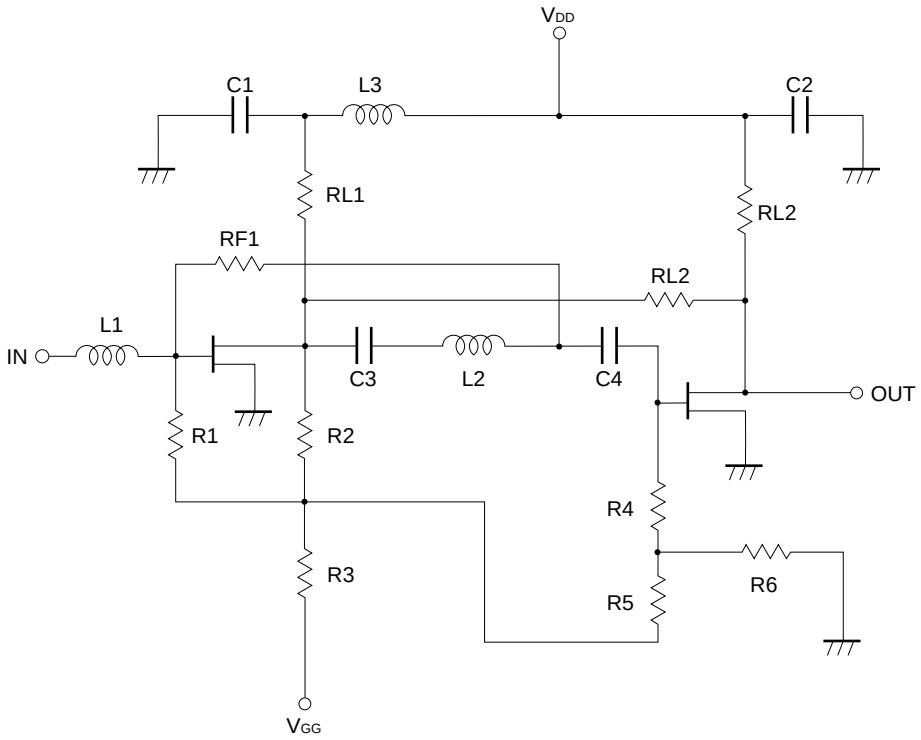


TEST CIRCUIT



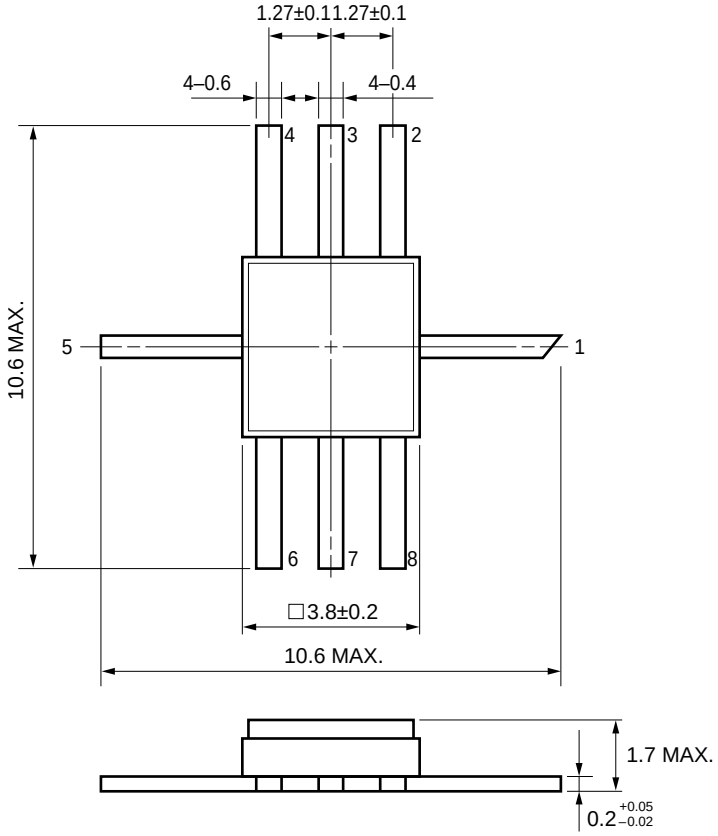
* Chip capacitor

EQUIVALENT CIRCUIT



OUTLINE DIMENSIONS (Unit : mm)

PACKAGE OUTLINE



PIN CONNECTIONS:

1. INPUT
2. GND
3. V_{GG}
4. GND
5. OUTPUT
6. GND
7. V_{DD}
8. GND

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

TYPES OF SURFACE MOUNT DEVICE

For more details, refer to our document “SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL” (C10535EJ7V0IF00).

μPG103B

Soldering process	Soldering conditions	Symbol
Infrared ray reflow	Peak package’s surface temperature: 230 ˚C or below, Reflow time: 10 seconds or below (210 ˚C or higher), Number of reflow process: 1, Exposure limit*: None	
Partial heating method	Terminal temperature: 260 ˚C or below, Flow time: 10 seconds or below, Exposure limit*: None	

***** Exposure limit before soldering after dry-pack package is opened.
Storage conditions: 25 ˚C and relative humidity at 65 % or less.

Note Do not apply more than a single process at once, except for “Partial heating method”.

PRECAUTION This IC must be handled with great care to prevent static discharge because its circuitry is composed of GaAs MES FET.

Caution

The Grate Care must be taken in dealing with the devices in this guide.
The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the Japanese law concerned.
Keep the Japanese law concerned and so on, especially in case of removal.

[MEMO]

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NEC devices are classified into the following three quality grades:

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- Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
- 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.

The quality grade of NEC devices in "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact NEC Sales Representative in advance.

Anti-radioactive design is not implemented in this product.

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