NEC

GaAs INTEGRATED CIRCUIT

μPG100B, μPG101B

WIDE-BAND AMPLIFIER

The μPG100B and μPG101B are GaAs integrated circuits designed as wide band amplifiers. Both devices are available in chip form.

The μPG100B is low noise amplifier from 50 MHz to 3 GHz and μPG101B 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 MHz to 3 GHz
- Input/output impedance matched to 50 Ω
- Hermetic sealed ceramic package assures high reliability

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPG100B	T-31, 8 PIN CERAMIC
μPG101B	T-31, 8 PIN CERAMIC

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

		μPG100B	μPG101B	
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}	1.5	1.5	W
Operating Case Temperature	T_{opt}	–65 to +125	–65 to +125	°C
Storage Temperature	T_{stg}	–65 to +175	–65 to +175	°C

* $T_C \leq 125$ °C

RECOMMENDED OPERATING CONDITIONS (T_A = 25 °C)

		μPG100B	μPG101B	
Drain Voltage	V_{DD}	+5.0±0.5	+8.0±0.8	V
Gate Voltage	V_{GG}	–5.0±0.5	–5.0±0.5	V
Input Power	P_{in}	to +10	to +10	dBm
Operating Case Temperature	T_{opt}	–50 to +80	–50 to +80	°C

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

μPG100B

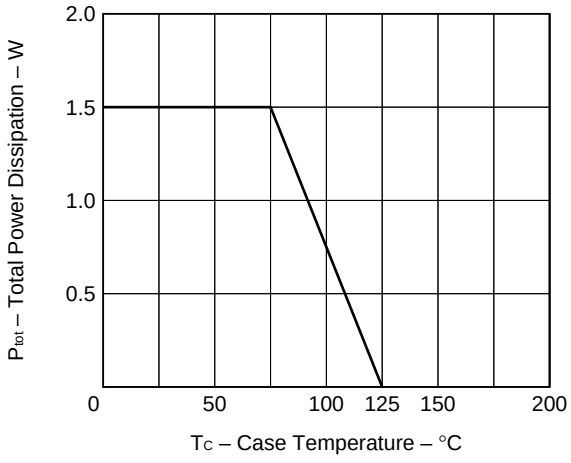
CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Current	I_{DD}	30	45	60	mA	V_{DD} = +5 V, V_{GG} = –5 V RF OFF
Gate Current	I_{GG}		0.7	1.5	mA	
Power Gain	G_p	14	16		dB	V_{DD} = +5 V, V_{GG} = –5 V f = 0.05 to 3 GHz
Gain Flatness	ΔG_p			±1.5	dB	
Noise Figure	NF		2.7	3.5	dB	
Input Return Loss	RL_{in}	7	10		dB	
Output Return Loss	RL_{out}	7	10		dB	
Isolation	I_{SOL}	30	40		dB	
Output Power at 1 dB Gain Compression Point	$P_{O(1\ dB)}$	+3	+6		dBm	

μPG101B

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Current	I_{DD}	70	100	140	mA	V_{DD} = +8 V, V_{GG} = –5 V RF OFF
Gate Current	I_{GG}		1.0	3.0	mA	
Power Gain	G_p	12	14		dB	V_{DD} = +8 V, V_{GG} = –5 V f = 0.05 to 3 GHz
Gain Flatness	ΔG_p			±1.5	dB	
Noise Figure	NF		5	7	dB	
Input Return Loss	RL_{in}	6	8		dB	
Output Return Loss	RL_{out}	6	8		dB	
Isolation	I_{SOL}	30	40		dB	
Output Power at 1 dB Gain Compression Point	$P_{O(1\ dB)}$	+16	+18		dBm	

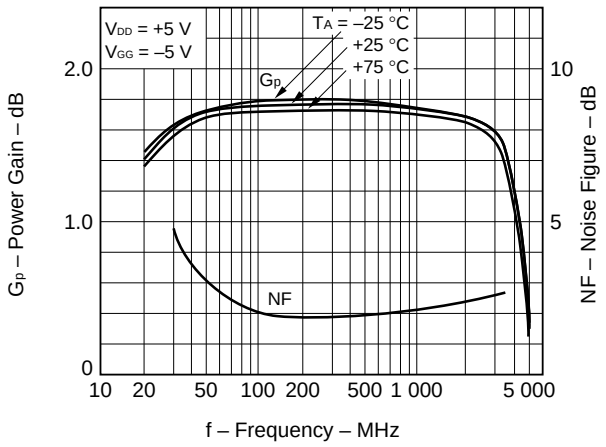
TYPICAL PERFORMANCE CURVES

D.C. POWER DERATING CURVE

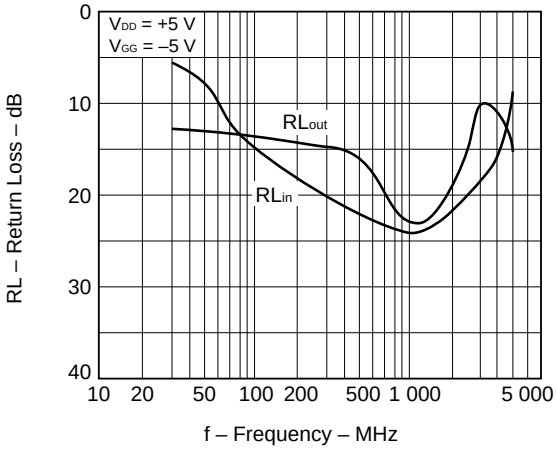


μPG100B

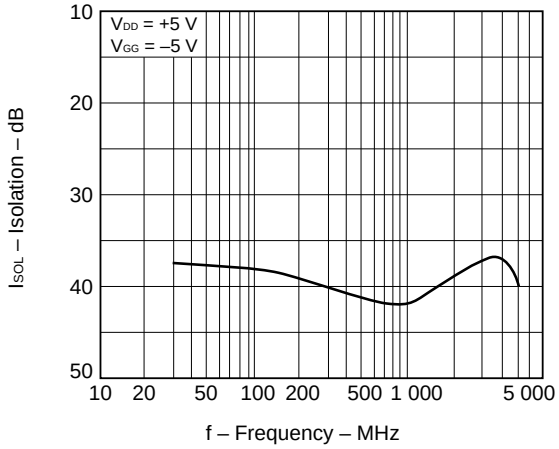
POWER GAIN AND NOISE FIGURE vs. FREQUENCY



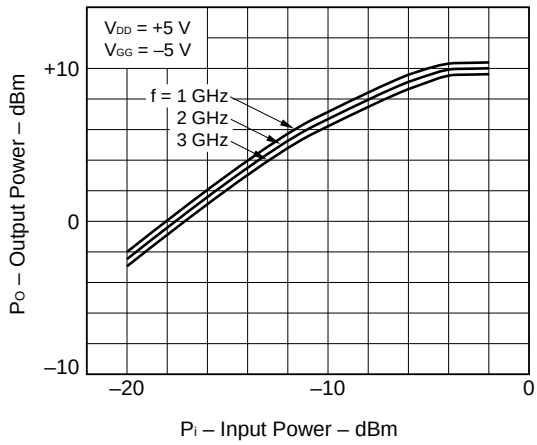
INPUT AND OUTPUT RETURN LOSS vs. FREQUENCY



ISOLATION vs. FREQUENCY

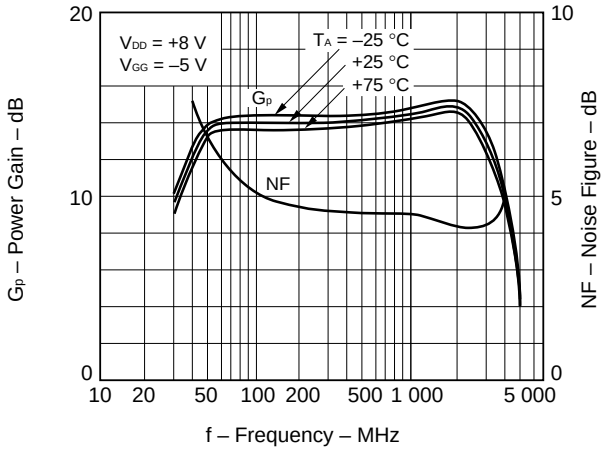


OUTPUT POWER vs. INPUT POWER

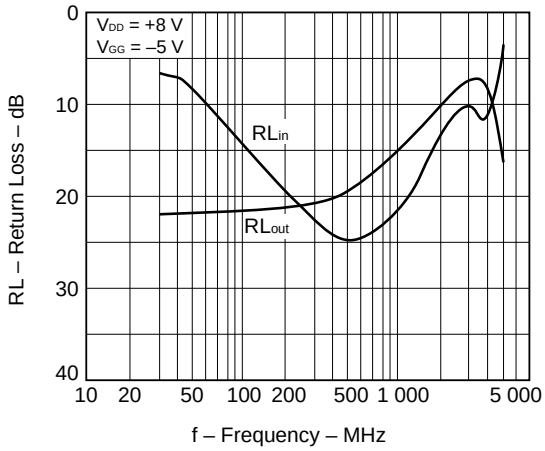


μPG101B

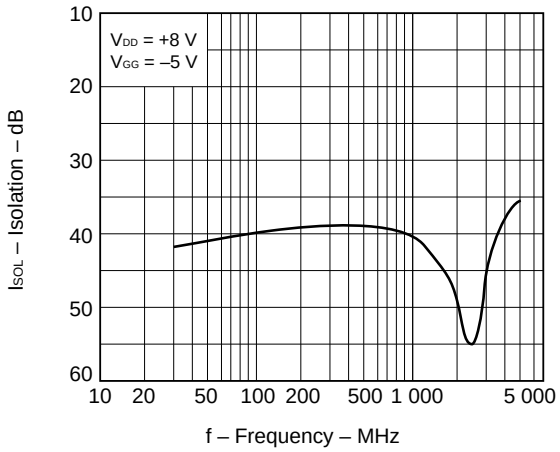
POWER GAIN AND NOISE FIGURE vs. FREQUENCY



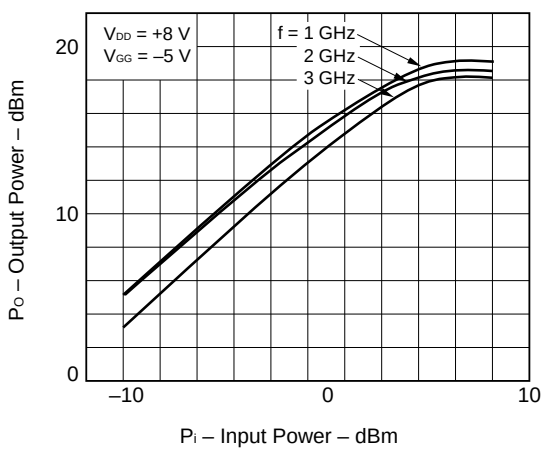
INPUT AND OUTPUT RETURN LOSS vs. FREQUENCY



ISOLATION vs. FREQUENCY

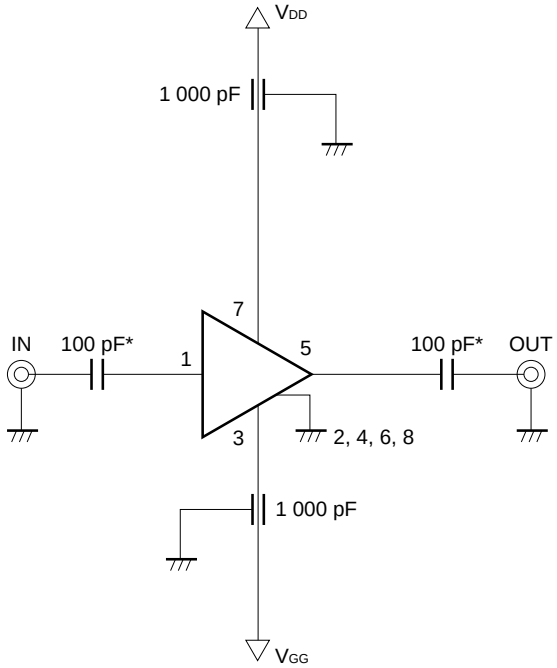


OUTPUT POWER vs. INPUT POWER



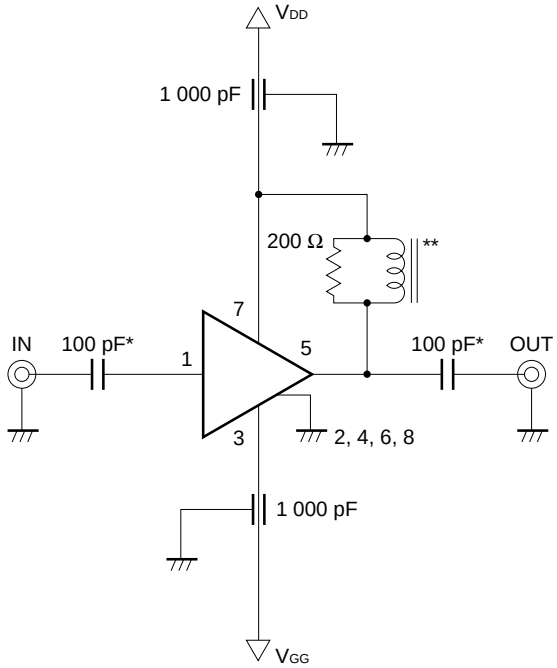
TEST CIRCUIT

μPG100B



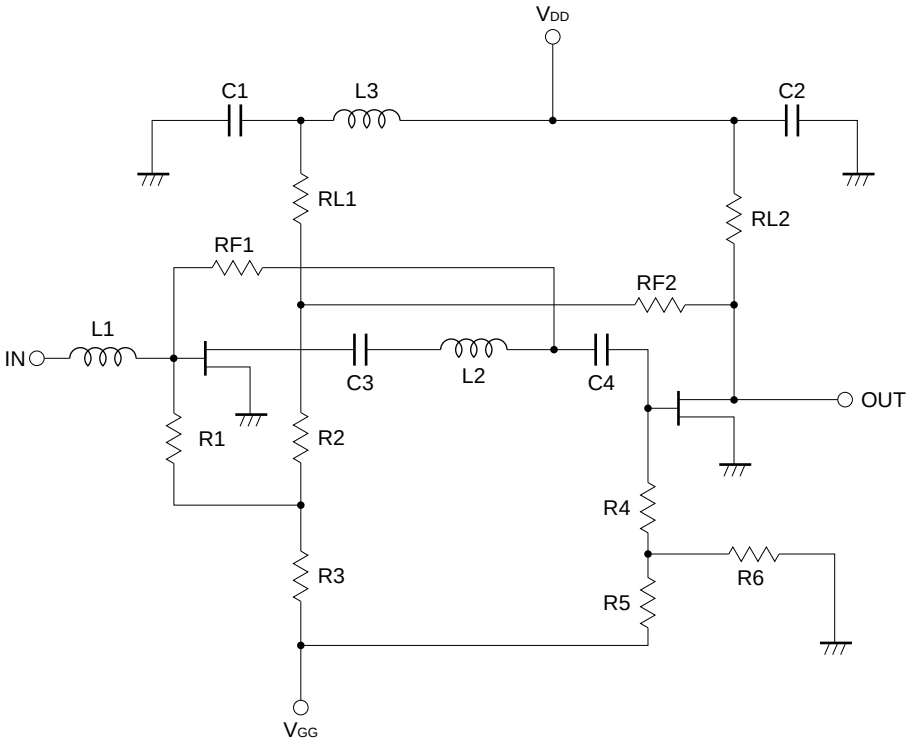
* Chip capacitor

μPG101B

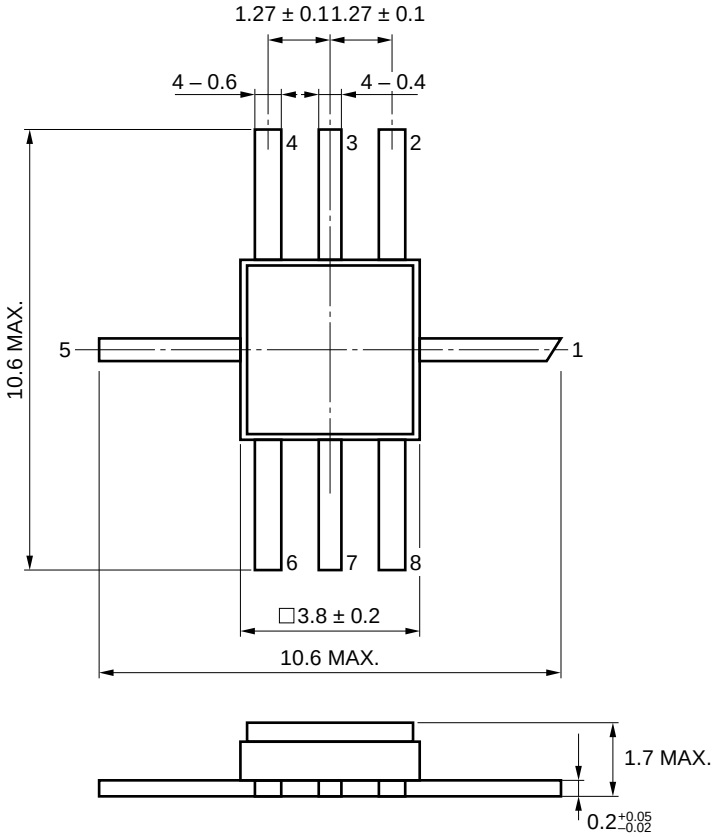


* Chip capacitor
** Choke Coil : ϕ0.1 mm, 15T

EQUIVALENT CIRCUIT



PACKAGE DIMENSIONS (Unit : mm)



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” (C10535E).

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

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