NEC

GaAs INTEGRATED CIRCUIT

μPG110P

2 to 8 GHz WIDE BAND AMPLIFIER CHIP

DESCRIPTION

The μPG110P 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 μPG110P 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 : $P_{O(1\ dB)}$ = +14 dBm TYP. @f = 2 to 8 GHz

ORDERING INFORMATION

PART NUMBER	FORM
μPG110P	Chip

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °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	°C
Storage Temperature	T_{stg}	–65 to +125	°C

***1** Mounted with AuSn hard solder

***2** The temperature of base material beside the chip

RECOMMENDED OPERATING CONDITIONS (T_A = 25 °C)

Supply Voltage	V_{DD}	+8 ± 0.2	V
Input Power	P_{in}	–5	dBm

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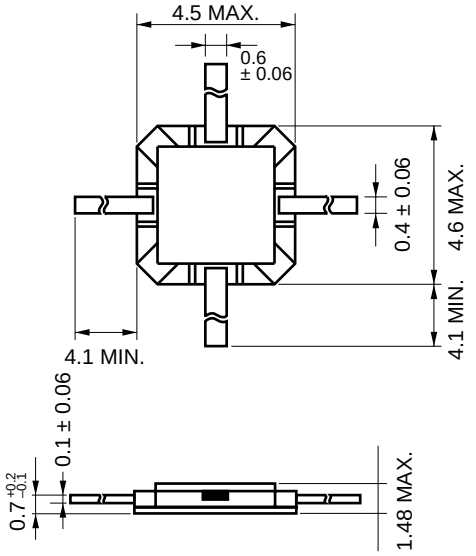
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)*3

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Supply Current	I_{DD}	65	135	180	mA	V_{DD} = +8 V
Power Gain	G_P	12	15		dB	f = 2 to 8 GHz
Gain Flatness	ΔG_P			±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	$P_{O(1\ dB)}$	10	14		dBm	

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

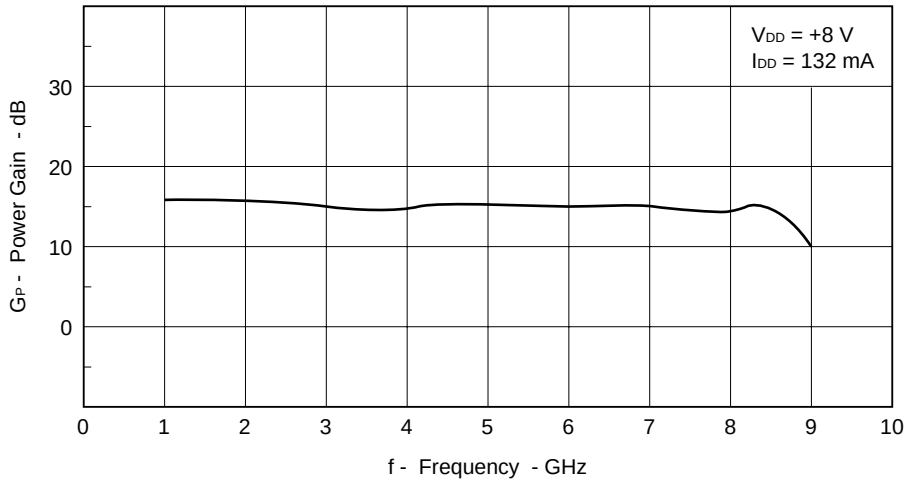
Fig. 1 4 pin Ceramic Package

Top View

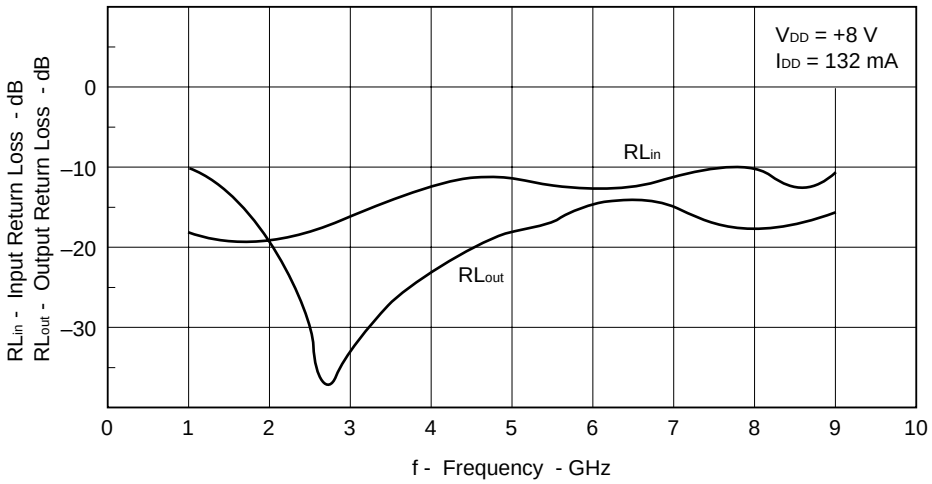


TYPICAL CHARACTERISTICS (T_A = 25 °C)*4

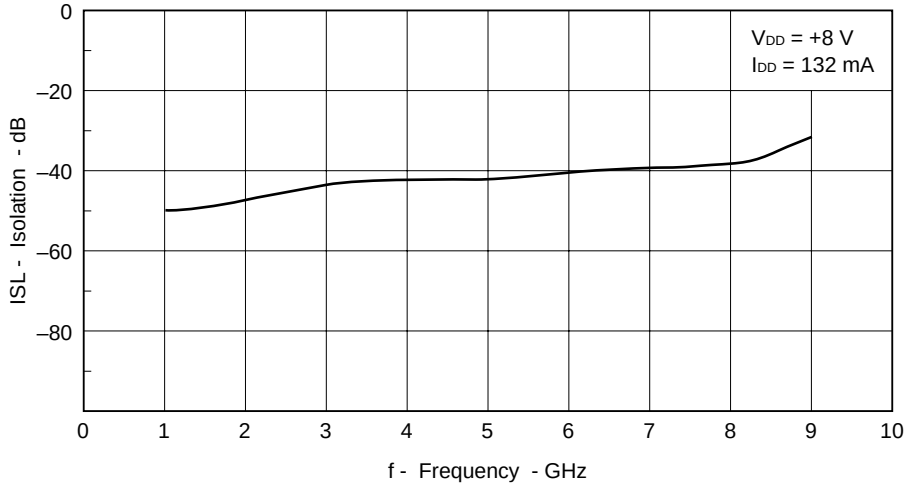
POWER GAIN vs. FREQUENCY

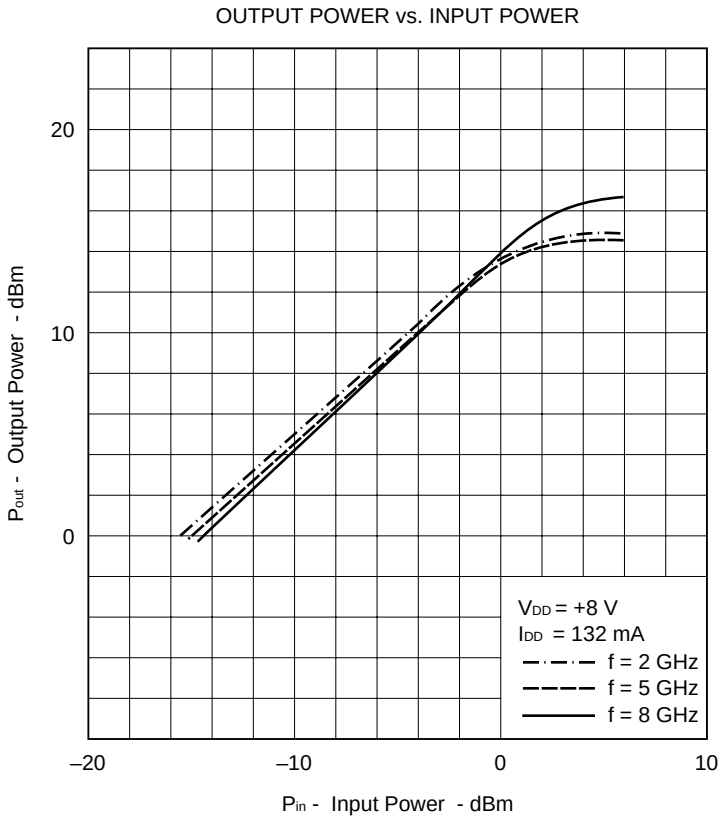


INPUT RETURN LOSS vs. FREQUENCY



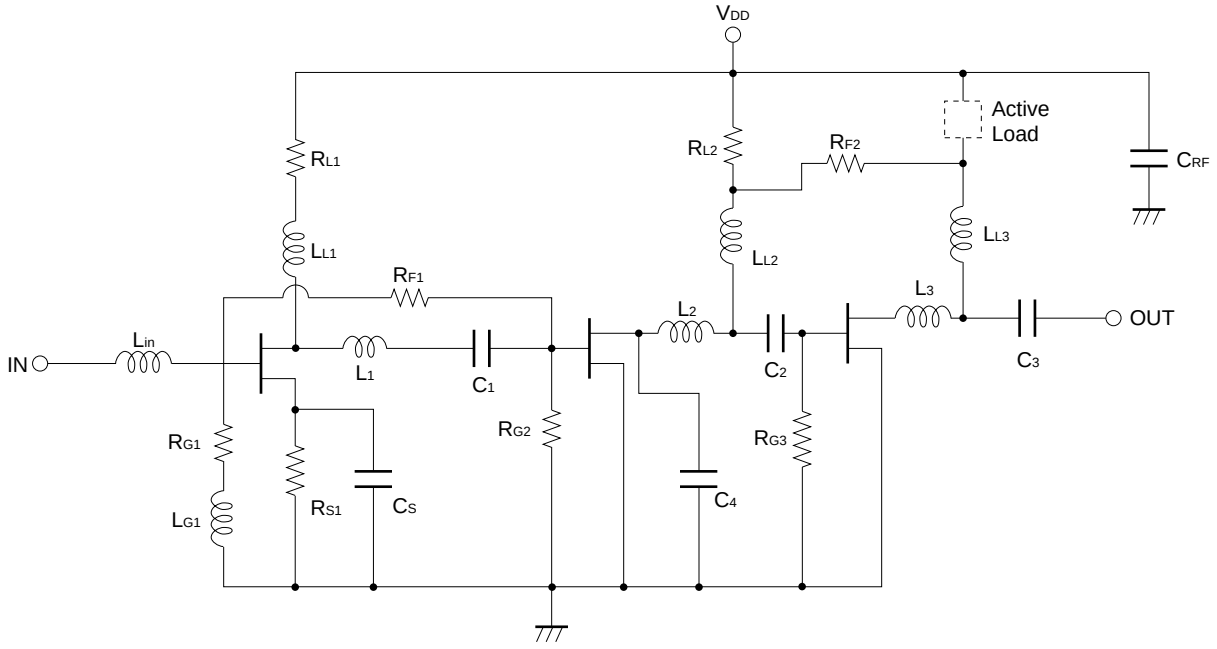
ISOLATION vs. FREQUENCY





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

EQUIVALENT CIRCUIT



RECOMMENDED CHIP ASSEMBLY CONDITIONS

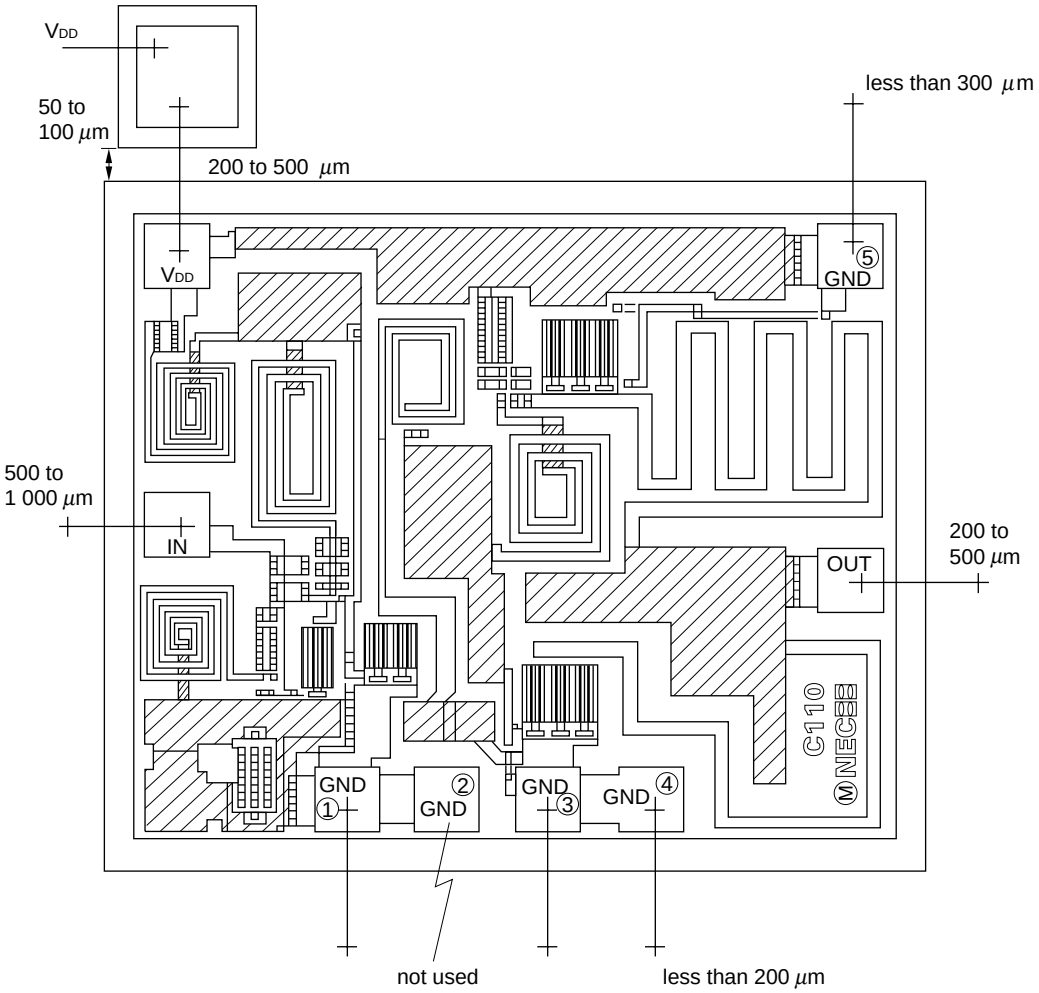
Die Attachment

Atmosphere : N_2 gas
Temperature : 320 ± 5 °C
AuSn Preform : $0.5 \times 0.5 \times 0.05^t$ (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_2 gas

Chip Bonding Diagram



Recommended Wire Length

1. 500 to 1 000 μm for Input (the longer the wire, the better the VSWR)
2. 200 to 500 μm 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 μm
4. There are five GND pads but GND pad <2> is not used.
   Wire length is 200 μm for <1>, <3> and <4>.
   Less than 300 μm for <5>.
   Chip Size: 1.1 × 1.3 mm
   t = 140 μm
   Pad Size : 100 × 100 μm

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_2 gas.

4. Caution

4-1 Take great care to prevent static electricity.

4-2 Be sure that Die Attach is performed in N_2 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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