

GaAs INTEGRATED CIRCUIT

μ PG2106TB, μ PG2110TB

L-BAND PA DRIVER AMPLIFIER

DESCRIPTION

The μ PG2106TB and μ PG2110TB are GaAs MMIC for PA driver amplifier with variable gain function which were developed for PDC (Personal Digital Cellular in Japan) and another L-band application. The device can operate with 3.0 V, having the high gain and low distortion. The μ PG2106TB is for 800 MHz band application, and the μ PG2110TB is for 1.5 GHz band application.

FEATURES

- Low operation voltage : $V_{DD1} = V_{DD2} = 3.0$ V
- f_{RF} : 889 to 960 MHz, 1429 to 1453 MHz @ $P_{out} = +8$ dBm
- Low distortion : $P_{adj1} = -60$ dBc TYP. @ $V_{DD} = 3.0$ V, $P_{out} = +8$ dBm, $V_{AGC} = 2.5$ V
External input and output matching
- Low operation current : $I_{DD} = 25$ mA TYP. @ $V_{DD} = 3.0$ V, $P_{out} = +8$ dBm, $V_{AGC} = 2.5$ V
External input and output matching
- Variable gain control function : $\Delta G = 40$ dB TYP. @ $V_{AGC} = 0.5$ to 2.5 V
External input and output matching
- 6-pin super minimold package

APPLICATION

- Digital Cellular : PDC, IS-136 etc.

ORDERING INFORMATION (PLAN)

| Part Number | Package | Supplying Form |
|--|----------------------|---|
| μ PG2106TB-E3 μ PG2110TB-E3 | 6-pin super minimold | Carrier tape width is 8 mm. Qty 3 kp/reel. |

Remark To order evaluation samples, please contact your local NEC sales office. (Part number for sample order: μ PG2106TB, μ PG2110TB)

ABSOLUTE MAXIMUM RATINGS ($T_A = +25$ °C)

| Parameter | Symbol | Ratings | Unit |
|-------------------------------|--------------------|---------------------|------|
| Supply Voltage | V_{DD1}, V_{DD2} | 6.0 | V |
| AGC Control Voltage | V_{AGC} | 6.0 | V |
| Input Power | P_{in} | -8 | dBm |
| Total Power Dissipation | P_{tot} | 140 ^{Note} | mW |
| Operating Ambient Temperature | T_A | -30 to +90 | °C |
| Storage Temperature | T_{stg} | -35 to +150 | °C |

Note Mounted on a $50 \times 50 \times 1.6$ mm double copper clad epoxy glass PWB, $T_A = +85$ °C

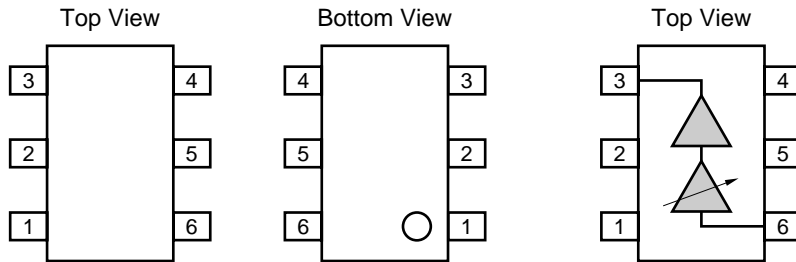
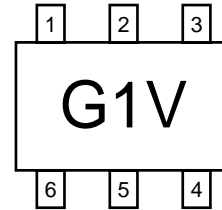
Caution The IC must be handled with care to prevent static discharge because its circuit composed of GaAs HJ-FET.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

[μPG2106TB]

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

| Pin No. | Connection | Pin No. | Connection |
|---------|------------------------|---------|------------------|
| 1 | V _{DD1} | 4 | V _{AGC} |
| 2 | GND | 5 | GND |
| 3 | V _{DD2} & OUT | 6 | IN |



RECOMMENDED OPERATING CONDITIONS (T_A = +25 °C)

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|---------------------|-------------------------------------|------|------|------|------|
| Supply Voltage | V _{DD1} , V _{DD2} | +2.7 | +3.0 | +3.3 | V |
| Input Power | P _{in} | – | –18 | –10 | dBm |
| AGC Control Voltage | V _{AGC} | 0 | – | 2.5 | V |

ELECTRICAL CHARACTERISTICS

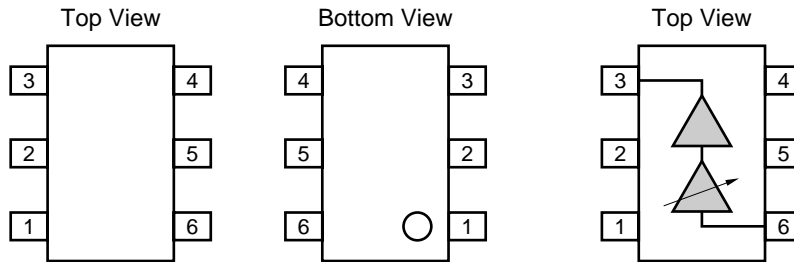
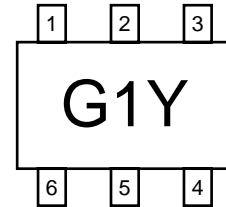
(Unless otherwise specified, T_A = +25 °C, V_{DD1} = V_{DD2} = +3.0 V, π/4DQPSK modulated signal input, External input and output matching)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|----------------------------------|-------------------|---|------|------|------|------|
| Operating Frequency | f | | 889 | – | 960 | MHz |
| Power Gain | G _p | P _{in} = –18 dBm, V _{AGC} = 2.5 V | 26 | 30 | – | dB |
| Total Current | I _{DD} | P _{out} = +8 dBm, V _{AGC} = 2.5 V | – | 25 | 35 | mA |
| Adjacent Channel Power Leakage 1 | P _{adj1} | P _{out} = +8 dBm, V _{AGC} = 2.5 V Δf = ±50 kHz, 21 kHz Band Width | – | –60 | –55 | dBc |
| Adjacent Channel Power Leakage 2 | P _{adj2} | P _{out} = +8 dBm, V _{AGC} = 2.5 V Δf = ±100 kHz, 21 kHz Band Width | – | –70 | –65 | |
| Variable Gain Range | ΔG | P _{in} = –18 dBm, V _{AGC} = 0.5 to 2.5 V | 35 | 40 | – | dB |
| AGC Control Current | I _{AGC} | V _{AGC} = 0.5 to 2.5 V | – | 200 | 500 | μA |

[μPG2110TB]

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

| Pin No. | Connection | Pin No. | Connection |
|---------|------------------------|---------|------------------|
| 1 | V _{DD1} | 4 | V _{AGC} |
| 2 | GND | 5 | GND |
| 3 | V _{DD2} & OUT | 6 | IN |



RECOMMENDED OPERATING CONDITIONS (T_A = +25 °C)

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|---------------------|-------------------------------------|------|------|------|------|
| Supply Voltage | V _{DD1} , V _{DD2} | +2.7 | +3.0 | +3.3 | V |
| Input Power | P _{in} | – | –18 | –10 | dBm |
| AGC Control Voltage | V _{AGC} | 0 | – | 2.5 | V |

ELECTRICAL CHARACTERISTICS

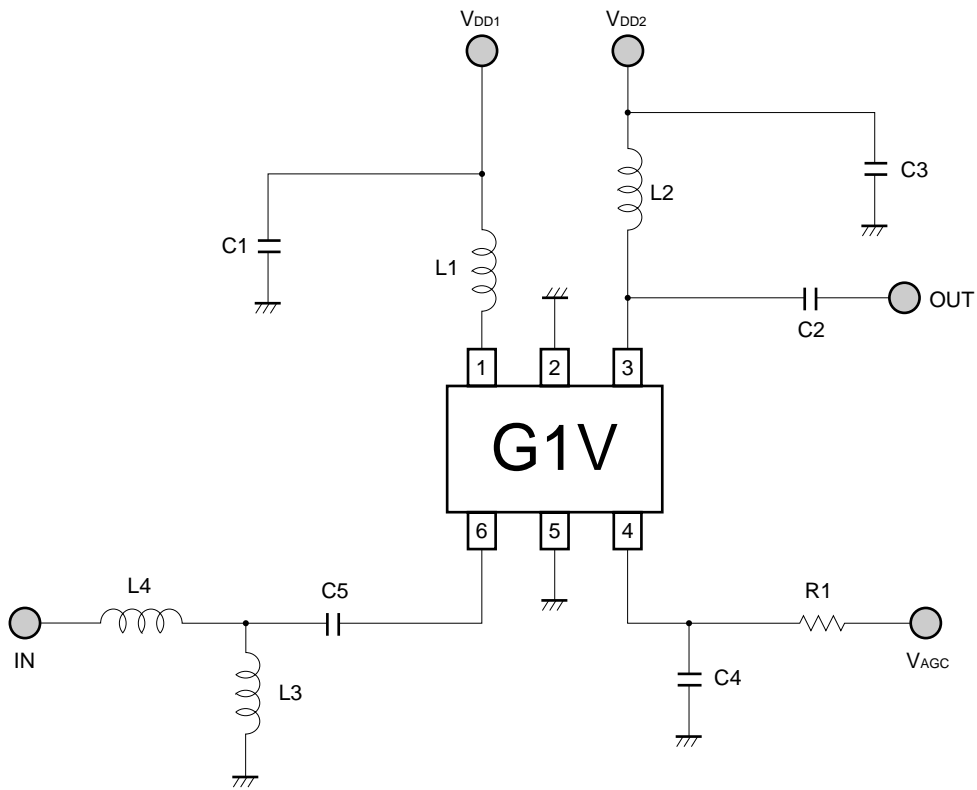
(Unless otherwise specified, T_A = +25 °C, V_{DD1} = V_{DD2} = +3.0 V, π/4DQPSK modulated signal input, External input and output matching)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|----------------------------------|-------------------|---|------|------|------|------|
| Operating Frequency | f | | 1429 | – | 1453 | MHz |
| Power Gain | G _p | P _{in} = –18 dBm, V _{AGC} = 2.5 V | 24 | 27 | – | dB |
| Total Current | I _{DD} | P _{out} = +8 dBm, V _{AGC} = 2.5 V | – | 25 | 35 | mA |
| Adjacent Channel Power Leakage 1 | P _{adj1} | P _{out} = +8 dBm, V _{AGC} = 2.5 V Δf = ±50 kHz, 21 kHz Band Width | – | –60 | –55 | dBc |
| Adjacent Channel Power Leakage 2 | P _{adj2} | P _{out} = +8 dBm, V _{AGC} = 2.5 V Δf = ±100 kHz, 21 kHz Band Width | – | –70 | –65 | dBc |
| Variable Gain Range | ΔG | P _{in} = –18 dBm, V _{AGC} = 0.5 to 2.5 V | 35 | 40 | – | dB |
| AGC Control Current | I _{AGC} | V _{AGC} = 0.5 to 2.5 V | – | 200 | 500 | μA |

[μPG2106TB]

EVALUATION CIRCUIT (Preliminary)

$V_{DD1} = V_{DD2} = +3.0\text{ V}$, $f = 925\text{ MHz}$



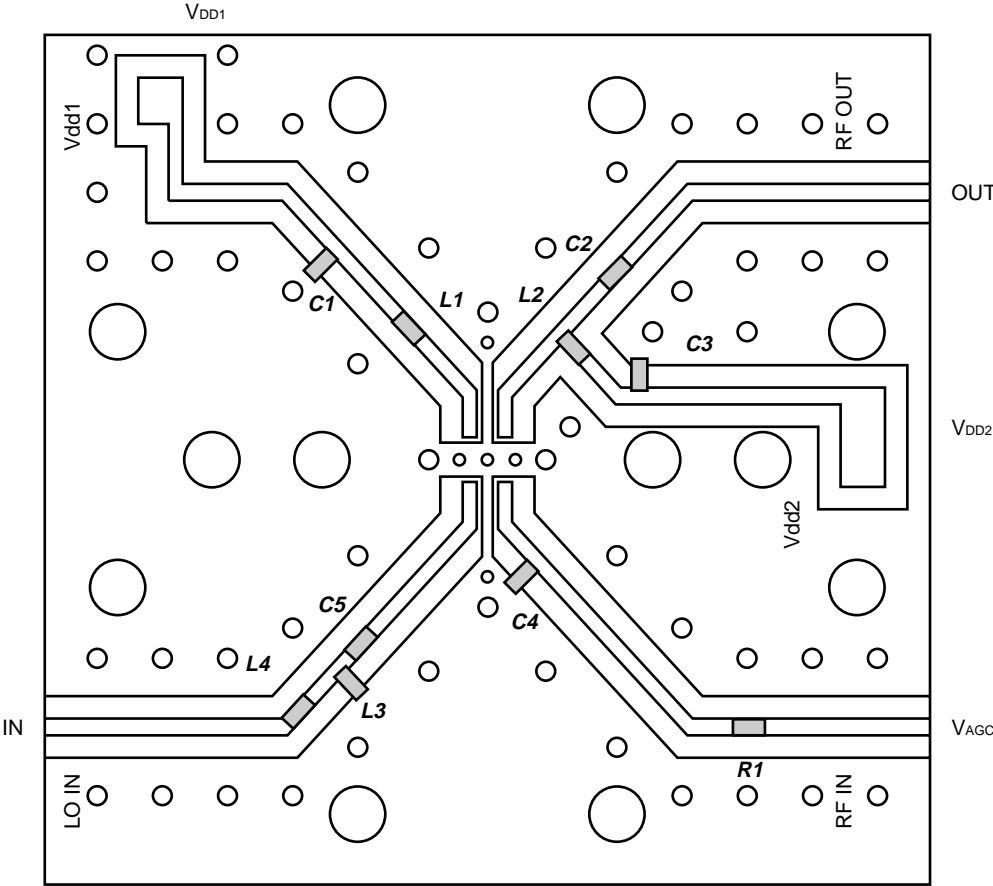
Using the NEC Evaluation Board (Preliminary)

| Symbol | Value |
|--------|----------|
| C1, C3 | 1 000 pF |
| C2 | 100 pF |
| C4 | 27 pF |
| C5 | 2 pF |
| L1 | 10 nH |
| L2 | 39 nH |
| L3 | 27 nH |
| L4 | 33 nH |
| R1 | 1 kΩ |

[μ PG2106TB]

EVALUATION BOARD

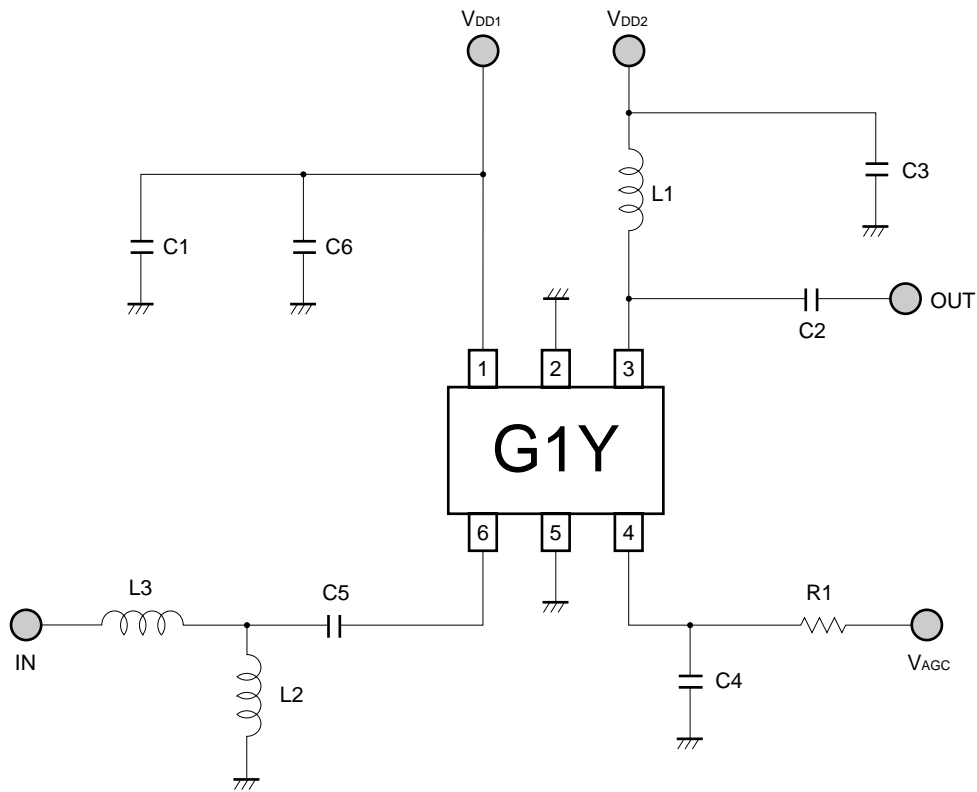
Epoxy glass: $\epsilon = 4.6$, $t = 0.4$ mm, Board Dimension: 38 x 40 mm



[μPG2110TB]

EVALUATION CIRCUIT (Preliminary)

$V_{DD1} = V_{DD2} = +3.0\text{ V}$, $f = 1441\text{ MHz}$



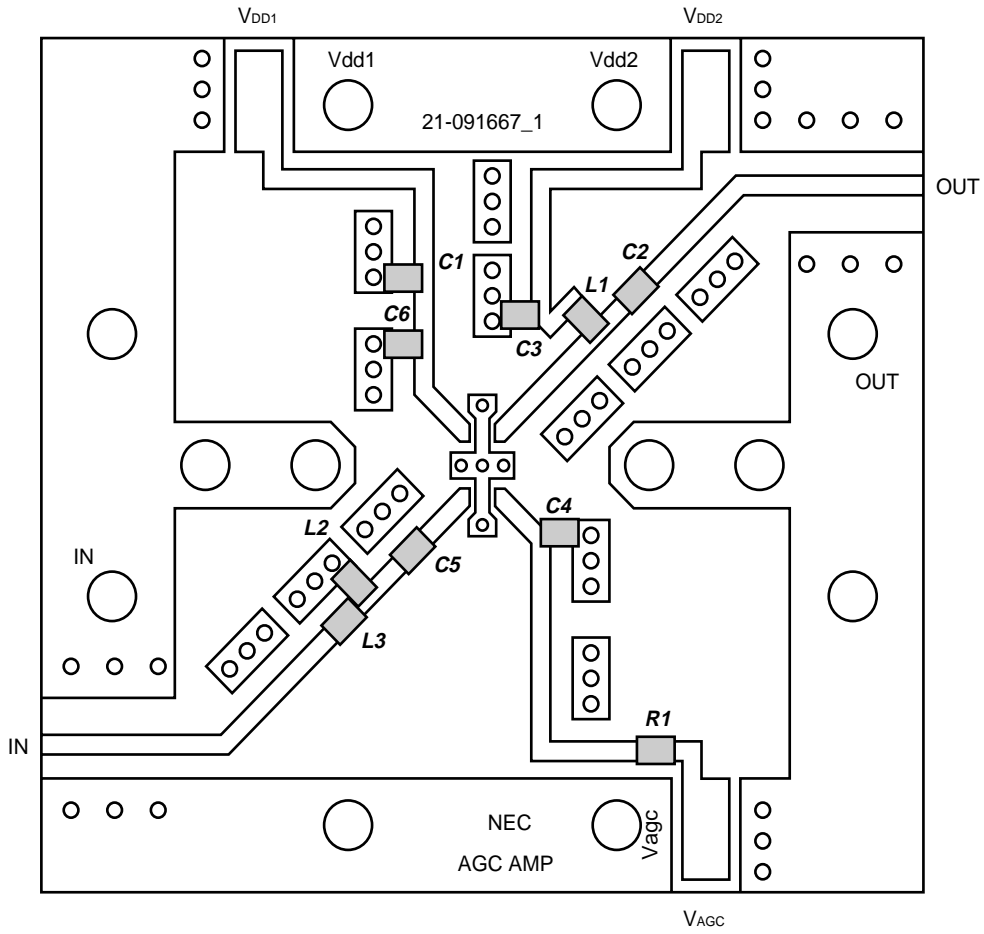
Using the NEC Evaluation Board (Preliminary)

| Symbol | Value |
|------------|----------|
| C1, C3, C5 | 1 000 pF |
| C2 | 1.5 pF |
| C4 | 3 pF |
| C6 | 2 pF |
| L1 | 2.7 nH |
| L2, L3 | 8.2 nH |
| R1 | 1 kΩ |

[μ PG2110TB]

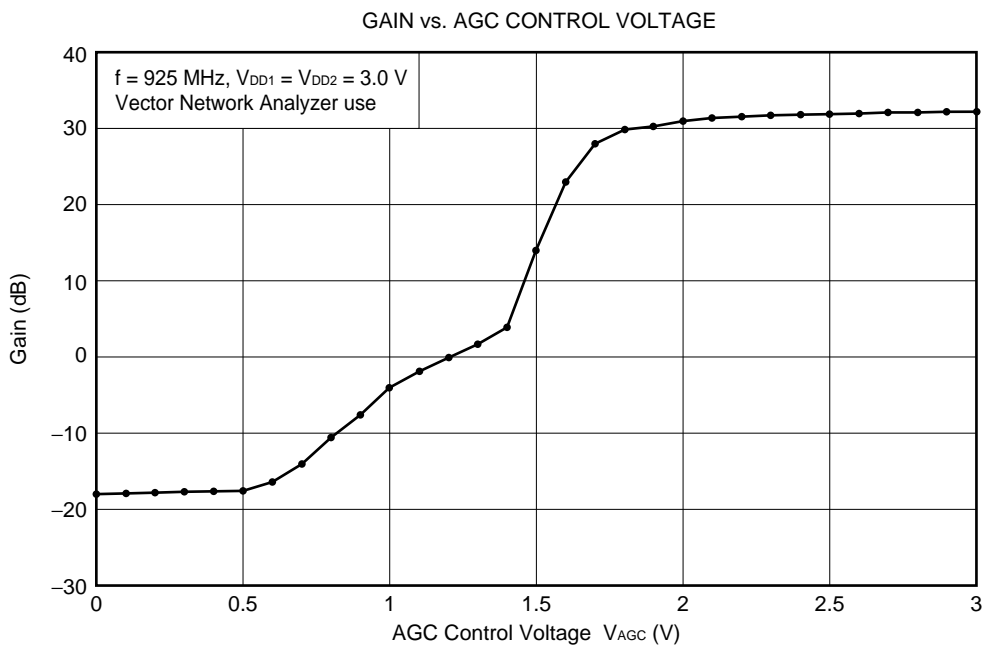
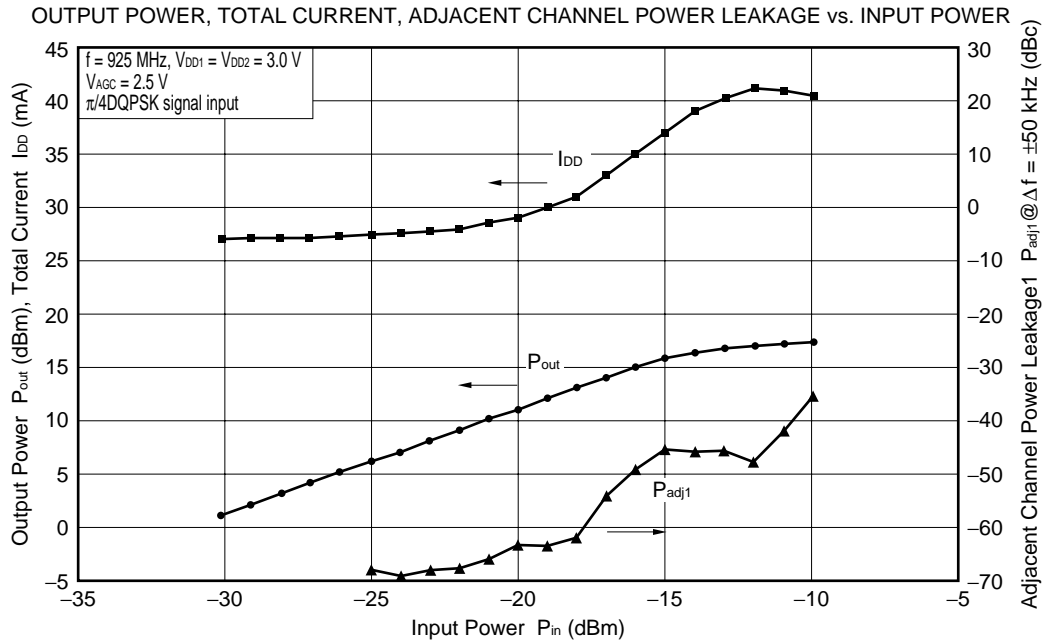
EVALUATION BOARD

Polyimide: $\epsilon = 4.6$, $t = 0.4$ mm, Board Dimension: 38 x 40 mm

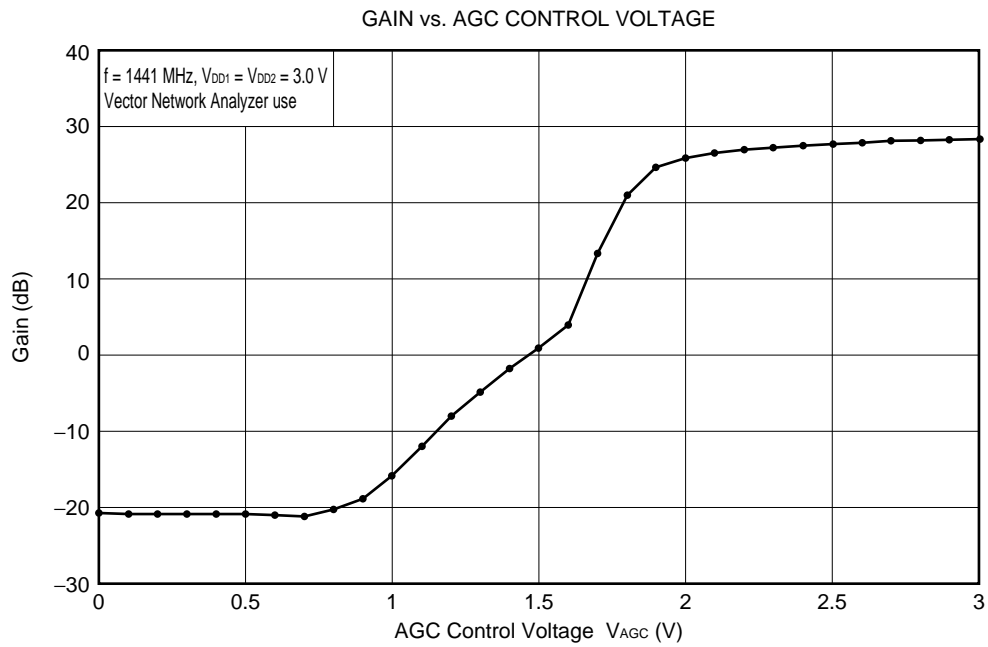
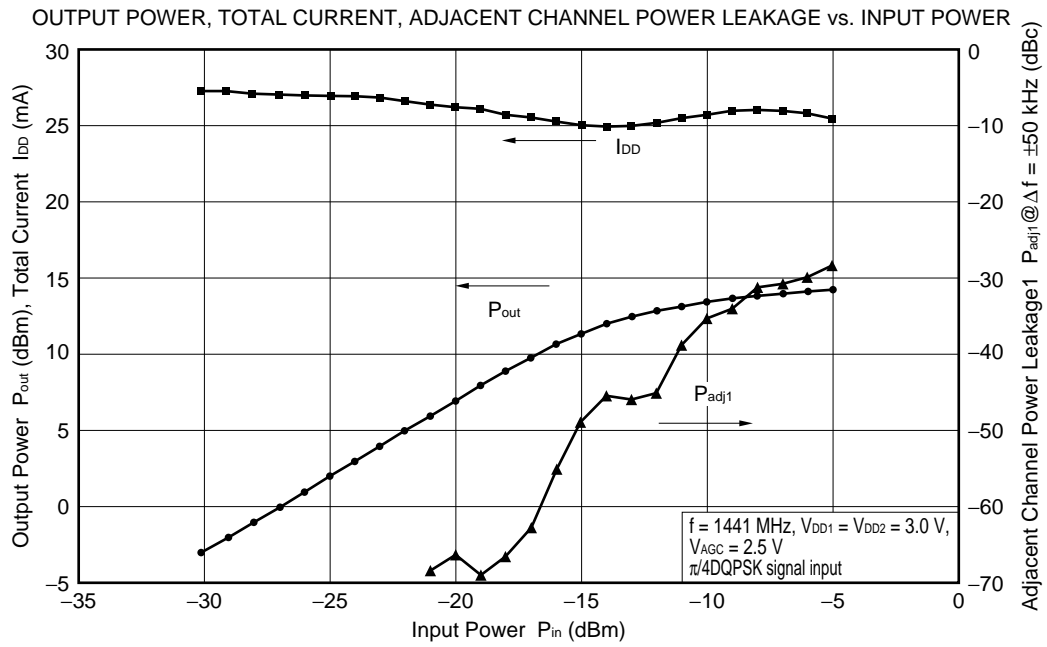


TYPICAL CHARACTERISTICS

[μ PG2106TB]

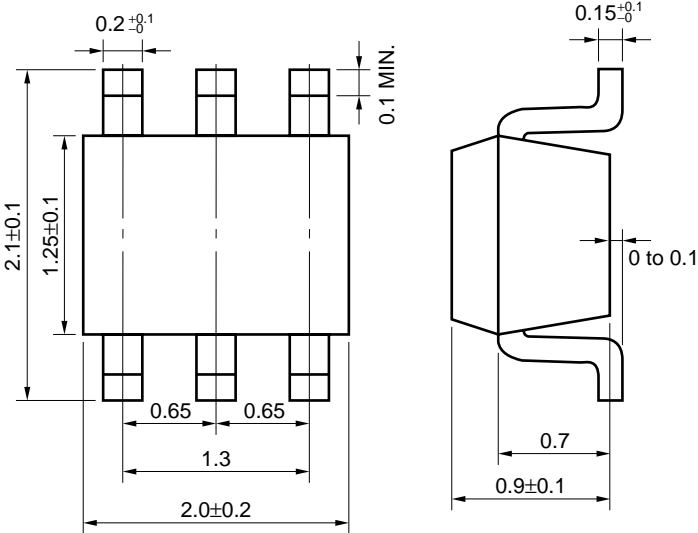


[μ PG2110TB]



PACKAGE DIMENSIONS

6 pin super minimold (Unit: mm)



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your NEC sales representative.

| Soldering Method | Soldering Conditions | Recommended Condition Symbol |
|------------------|---|------------------------------|
| Infrared Reflow | Package peak temperature: 235 °C or below Time: 30 seconds or less (at 210 °C) Count: 3, Exposure limit: None ^{Note} | IR35-00-3 |
| VPS | Package peak temperature: 215 °C or below Time: 40 seconds or less (at 200 °C) Count: 3, Exposure limit: None ^{Note} | VP15-00-3 |
| Wave Soldering | Soldering bath temperature: 260 °C or below Time: 10 seconds or less Count: 1, Exposure limit: None ^{Note} | WS60-00-1 |
| Partial Heating | Pin temperature: 300 °C Time: 3 seconds or less (per side of device) Exposure limit: None ^{Note} | — |

Note After opening the dry pack, keep it in a place below 25 °C and 65 % RH for the allowable storage period.

Caution Do not use different soldering methods together (except for partial heating).

For details of recommended soldering conditions for surface mounting, refer to information document SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL (C10535E).

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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