PRELIMINARY DATA SHEET

NEC

GaAs INTEGRATED CIRCUIT

μPG2106TB, μPG2110TB

L-BAND PA DRIVER AMPLIFIER

DESCRIPTION

The μPG2106TB and μPG2110TB 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 μPG2106TB is for 800 MHz band application, and the μPG2110TB 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 : ΔG = 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
μPG2106TB-E3 μPG2110TB-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: μPG2106TB, μPG2110TB)

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 × 50 × 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.

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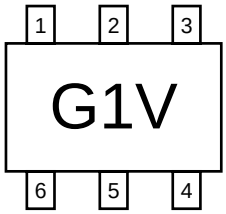
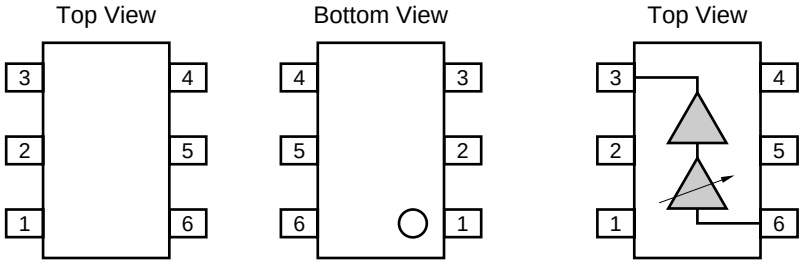
[μPG2106TB]

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

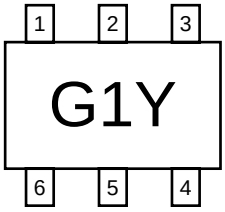
(Unless otherwise specified, T_A = +25 °C, V_{DD1} = V_{DD2} = +3.0 V, π/4DQPSK modulated signal input, External input and output matching)

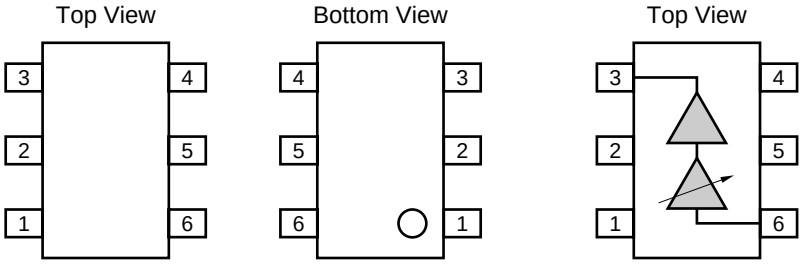
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Operating Frequency	f		889	–	960	MHz
Power Gain	G_P	P_{in} = –18 dBm, V_{AGC} = 2.5 V	26	30	–	dB
Total Current	I_{DD}	P_{out} = +8 dBm, V_{AGC} = 2.5 V	–	25	35	mA
Adjacent Channel Power Leakage 1	P_{adj1}	P_{out} = +8 dBm, V_{AGC} = 2.5 V Δf = ±50 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

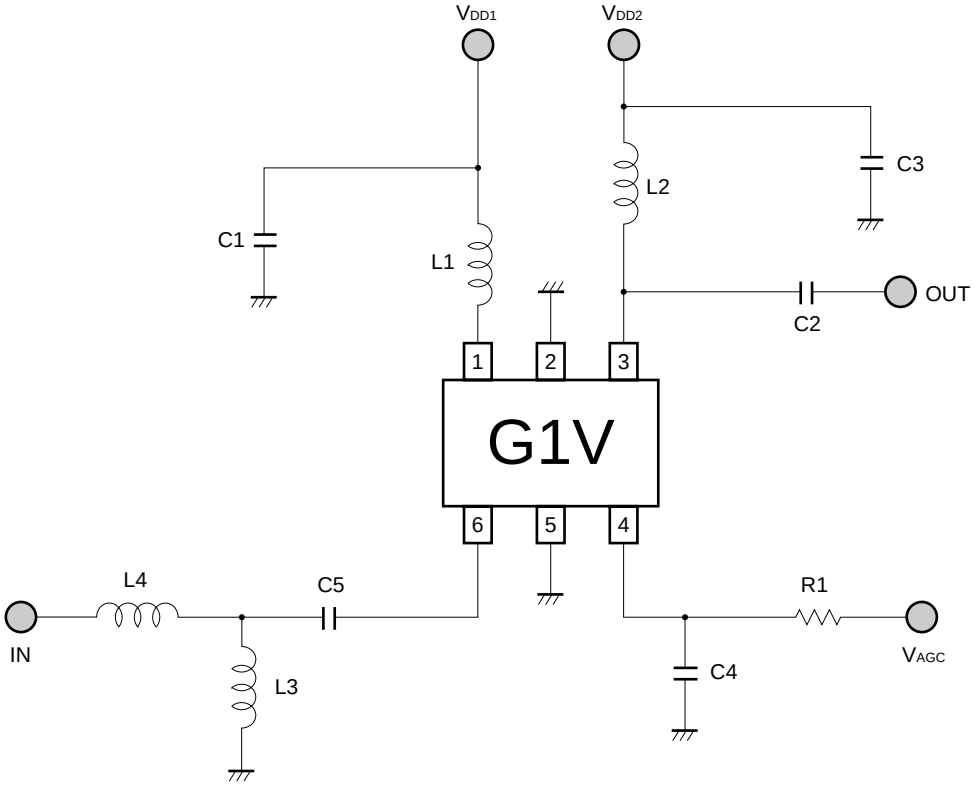
(Unless otherwise specified, T_A = +25 °C, V_{DD1} = V_{DD2} = +3.0 V, π/4DQPSK modulated signal input, External input and output matching)

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	
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 V, f = 925 MHz



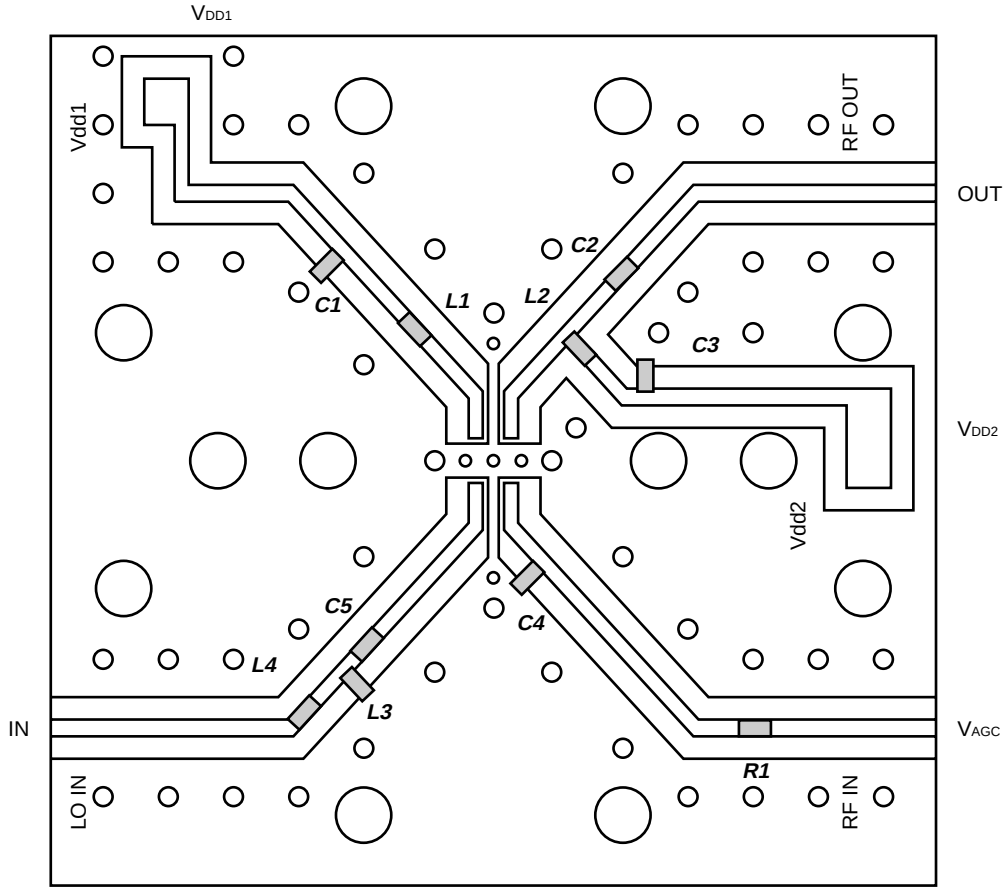
Using the NEC Evaluation Board (Preliminary)

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

[μPG2106TB]

EVALUATION BOARD

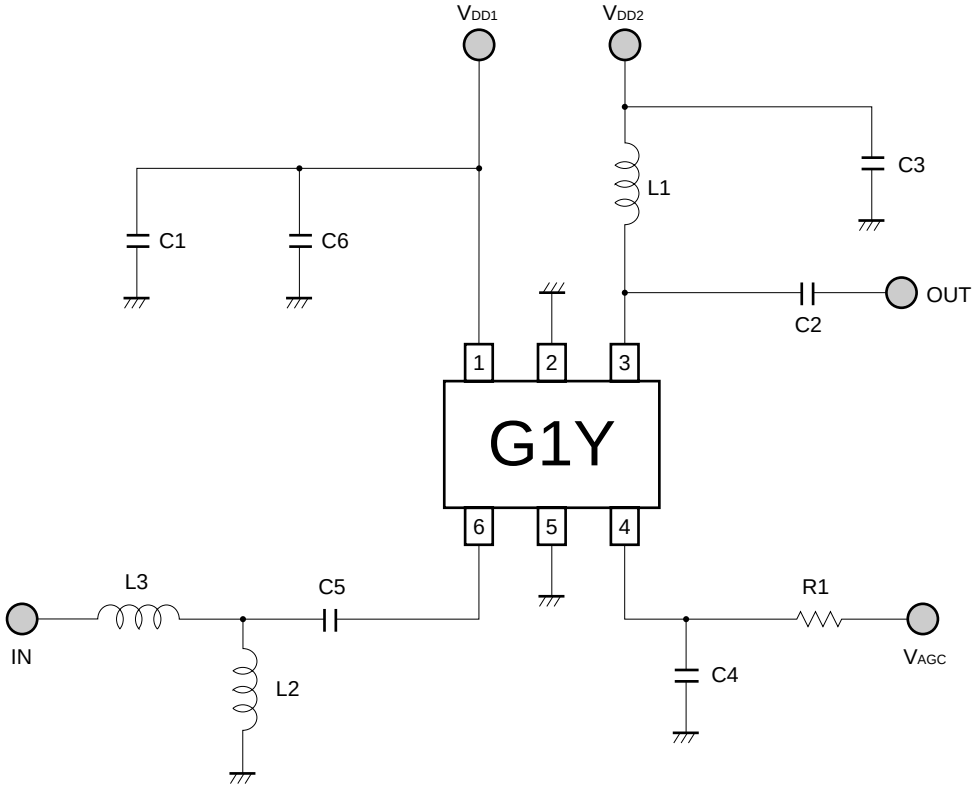
Epoxy glass: ε = 4.6, t = 0.4 mm, Board Dimension: 38 × 40 mm



[μPG2110TB]

EVALUATION CIRCUIT (Preliminary)

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



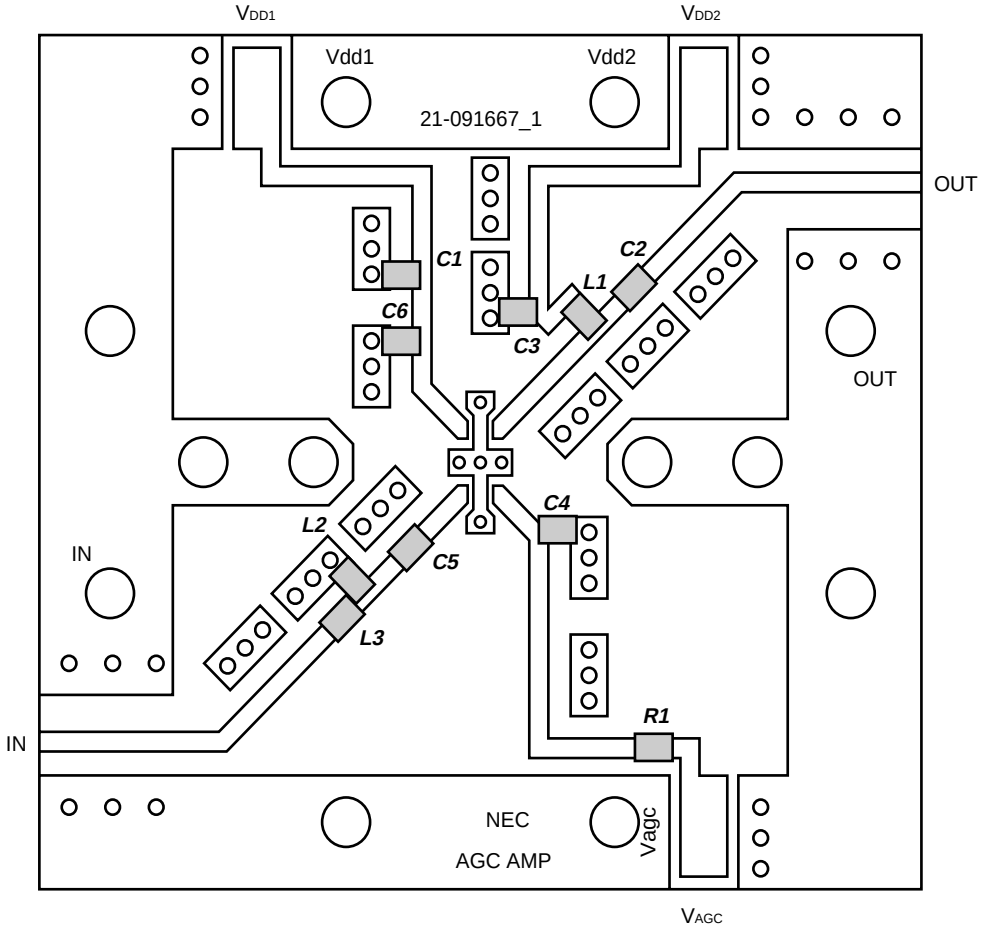
Using the NEC Evaluation Board (Preliminary)

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

[μPG2110TB]

EVALUATION BOARD

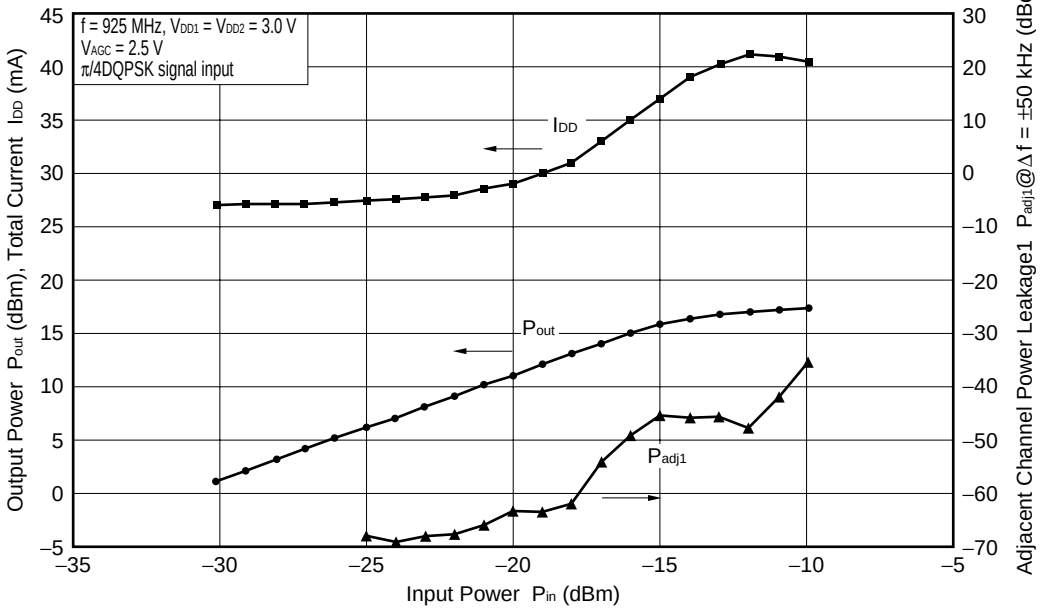
Polyimide: ε = 4.6, t = 0.4 mm, Board Dimension: 38 × 40 mm



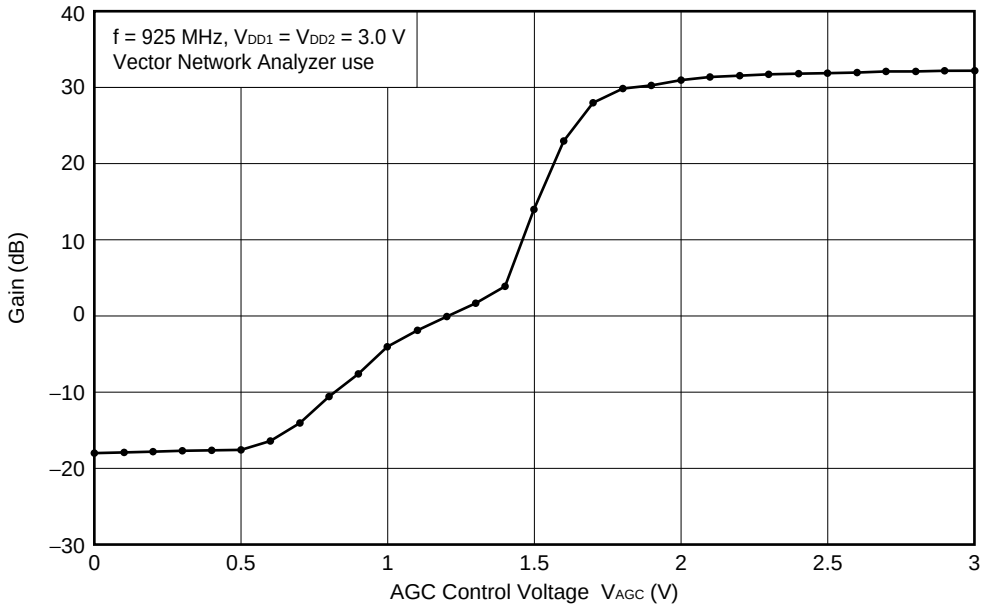
TYPICAL CHARACTERISTICS

[μPG2106TB]

OUTPUT POWER, TOTAL CURRENT, ADJACENT CHANNEL POWER LEAKAGE vs. INPUT POWER

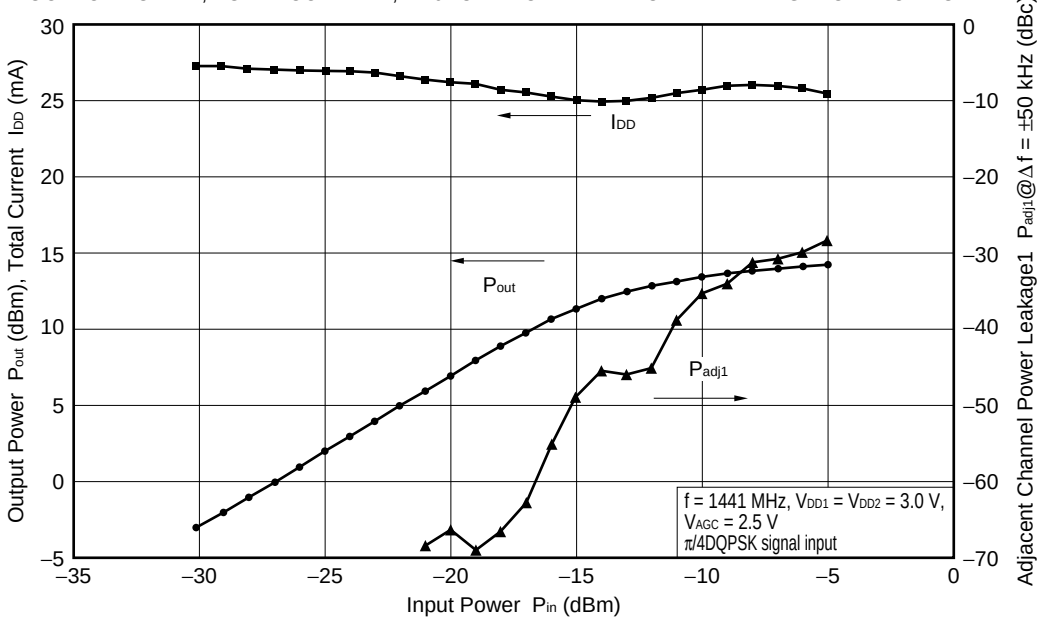


GAIN vs. AGC CONTROL VOLTAGE

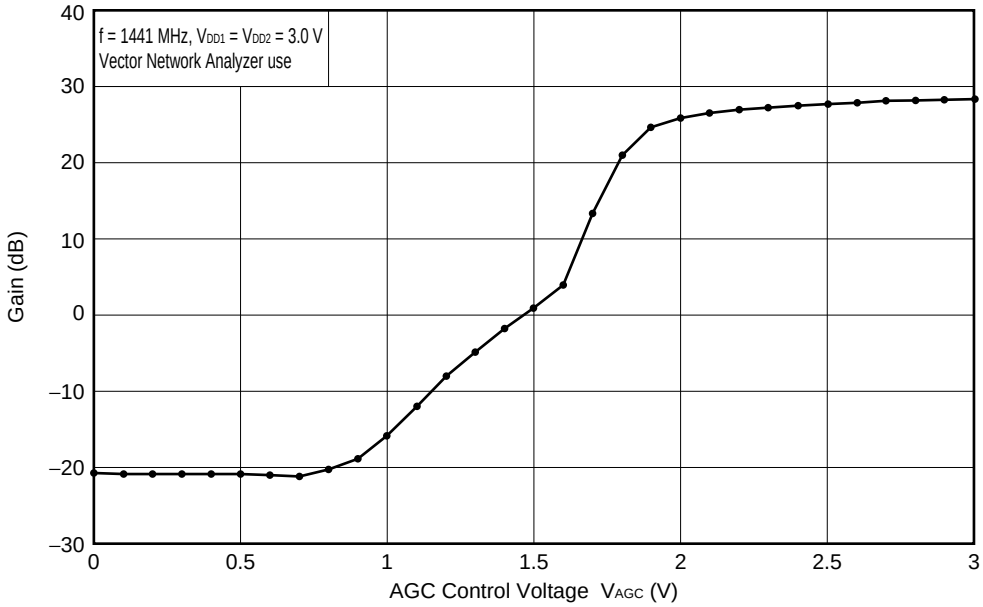


[μPG2110TB]

OUTPUT POWER, TOTAL CURRENT, ADJACENT CHANNEL POWER LEAKAGE vs. INPUT POWER

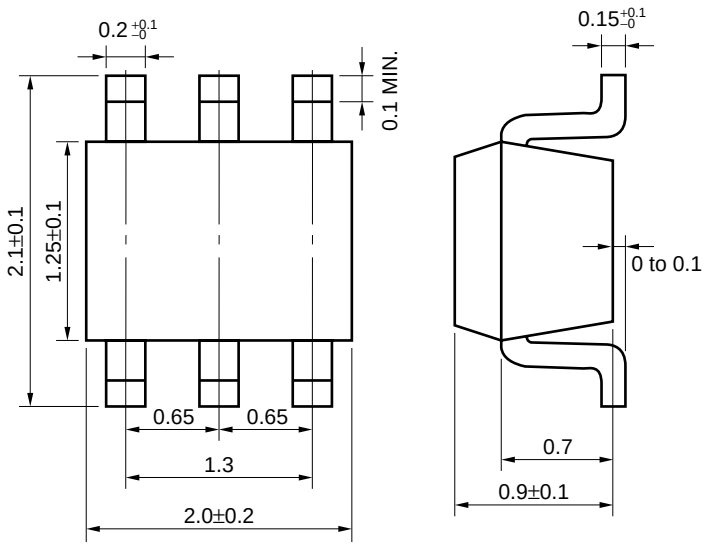


GAIN vs. AGC CONTROL VOLTAGE



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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  - 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: Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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