DATA SHEET

NEC

GaAs INTEGRATED CIRCUITS

μPG2106TB,μPG2110TB

L-BAND PA DRIVER AMPLIFIER

DESCRIPTION

The μPG2106TB and μPG2110TB are GaAs MMIC for PA driver amplifier which were developed for mobile phone and another L-band application. These devices can operate with 3.0 V TYP., having the high gain and low distortion.

These devices are housed in a 6-pin super minimold package. And this package is able to high-density surface mounting.

★ FEATURES

- Operation frequency : μPG2106TB : f_{opt} = 889 to 960 MHz
  : μPG2110TB : f_{opt} = 1 429 to 1 453 MHz
- Supply voltage : μPG2106TB, μPG2110TB : $V_{DD1, 2}$ = 2.7 to 3.3 V (3.0 V TYP.)
- Circuit current : μPG2106TB, μPG2110TB : I_{DD} = 25 mA TYP. @ $V_{DD1, 2}$ = 3.0 V, V_{AGC} = 2.5 V, P_{out} = +8 dBm
- High power gain : μPG2106TB : G_P = 30 dB TYP. @ $V_{DD1, 2}$ = 3.0 V, V_{AGC} = 2.5 V, P_{in} = –18 dBm
  : μPG2110TB : G_P = 27 dB TYP. @ $V_{DD1, 2}$ = 3.0 V, V_{AGC} = 2.5 V, P_{in} = –18 dBm
- Gain control range : μPG2106TB, μPG2110TB : GCR = 40 dB TYP. @ $V_{DD1, 2}$ = 3.0 V, V_{AGC} = 0.5 to 2.5 V, P_{in} = –18 dBm
- Low distortion : μPG2106TB : P_{adj1} = –60 dBc TYP. @ $V_{DD1, 2}$ = 3.0 V, V_{AGC} = 2.5 V, P_{out} = +8 dBm, f = 925 MHz, Δf = ±50 kHz, 21 kHz Bandwidth
  : μPG2110TB : P_{adj1} = –60 dBc TYP. @ $V_{DD1, 2}$ = 3.0 V, V_{AGC} = 2.5 V, P_{out} = +8 dBm, f = 1 441 MHz, Δf = ±50 kHz, 21 kHz Bandwidth
- High-density surface mounting : 6-pin super minimold package (2.0 × 1.25 × 0.9 mm)

★ APPLICATION

- Digital Cellular: PDC 800 MHz, PDC 1.5 GHz etc.

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
μPG2106TB-E3	6-pin super minimold	G1V	• Embossed tape 8 mm wide • Pin 1, 2, 3 face the perforation side of the tape • Qty 3 kpcs/reel
μPG2110TB-E3		G1Y	

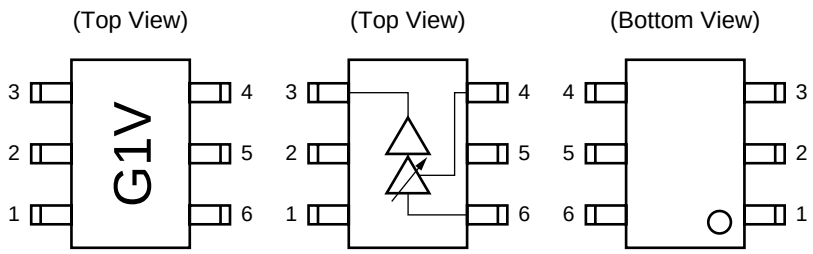
Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: μPG2106TB, μPG2110TB

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

Document No. PG10168EJ01V0DS (1st edition)
(Previous No. P14318EJ1V0DS00)
Date Published July 2002 CP(K)
Printed in Japan

The mark ★ shows major revised points.

★ PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



Pin No.	Pin Name
1	V_{DD1}
2	GND
3	OUTPUT/V_{DD2}
4	V_{AGC}
5	GND
6	INPUT

Caution Marking is an example of μPG2106TB.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Supply Voltage1, 2	$V_{DD1, 2}$	6.0	V
Gain Control Voltage	V_{AGC}	6.0	V
Input Power	P_{in}	–8	dBm
Power Dissipation	P_D	140 Note	mW
★ Operating Ambient Temperature	T_A	–40 to +90	°C
★ Storage Temperature	T_{stg}	–45 to +150	°C

Note Mounted on double copper-clad 50 × 50 × 1.6 mm epoxy glass PWB, T_A = +85°C

RECOMMENDED OPERATING RENGE (T_A = +25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage1, 2	$V_{DD1, 2}$	2.7	3.0	3.3	V
Gain Control Voltage	V_{AGC}	0	–	2.5	V
Input Power	P_{in}	–	–18	–10	dBm

★ ELECTRICAL CHARACTERISTICS

(T_A = +25°C, $V_{DD1, 2}$ = 3.0 V, π/4DQPSK modulated signal input, with external input and output matching, unless otherwise specified)

μPG2106TB

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Operating Frequency	f_{opt}		889	–	960	MHz
Circuit Current	I_{DD}	P_{out} = +8 dBm, V_{AGC} = 2.5 V	–	25	35	mA
Power Gain	G_P	P_{in} = –18 dBm, V_{AGC} = 2.5 V	26	30	–	dB
Adjacent Channel Power Leakage 1	P_{adj1}	P_{out} = +8 dBm, V_{AGC} = 2.5 V, Δf = ±50 kHz, 21 kHz Bandwidth	–	–60	–55	dBc
Adjacent Channel Power Leakage 2	P_{adj2}	P_{out} = +8 dBm, V_{AGC} = 2.5 V, Δf = ±100 kHz, 21 kHz Bandwidth	–	–70	–65	dBc
Gain Control Range	GCR	P_{in} = –18 dBm, V_{AGC} = 0.5 to 2.5 V	35	40	–	dB
Gain Control Current	I_{AGC}	V_{AGC} = 0.5 to 2.5 V	–	200	500	μA

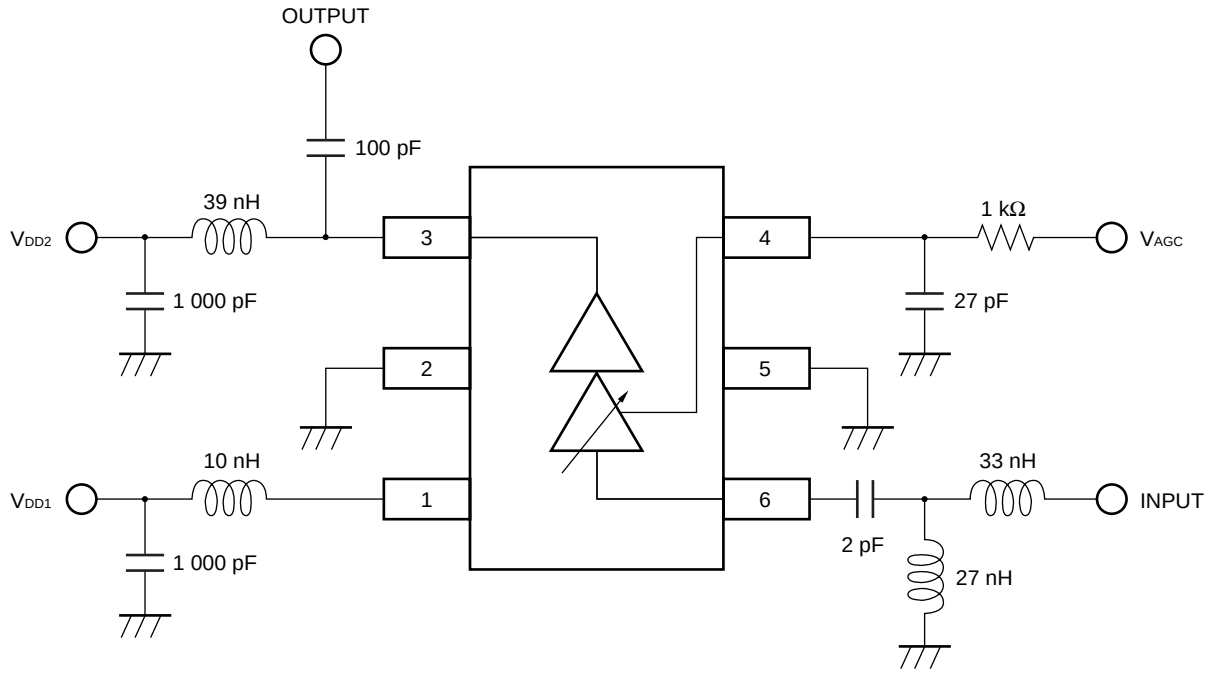
μPG2110TB

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Operating Frequency	f_{opt}		1 429	–	1 453	MHz
Circuit Current	I_{DD}	P_{out} = +8 dBm, V_{AGC} = 2.5 V	–	25	35	mA
Power Gain	G_P	P_{in} = –18 dBm, V_{AGC} = 2.5 V	24	27	–	dB
Adjacent Channel Power Leakage 1	P_{adj1}	P_{out} = +8 dBm, V_{AGC} = 2.5 V, Δf = ±50 kHz, 21 kHz Bandwidth	–	–60	–55	dBc
Adjacent Channel Power Leakage 2	P_{adj2}	P_{out} = +8 dBm, V_{AGC} = 2.5 V, Δf = ±100 kHz, 21 kHz Bandwidth	–	–70	–65	dBc
Gain Control Range	GCR	P_{in} = –18 dBm, V_{AGC} = 0.5 to 2.5 V	35	40	–	dB
Gain Control Current	I_{AGC}	V_{AGC} = 0.5 to 2.5 V	–	200	500	μA

★ EVALUATION CIRCUIT

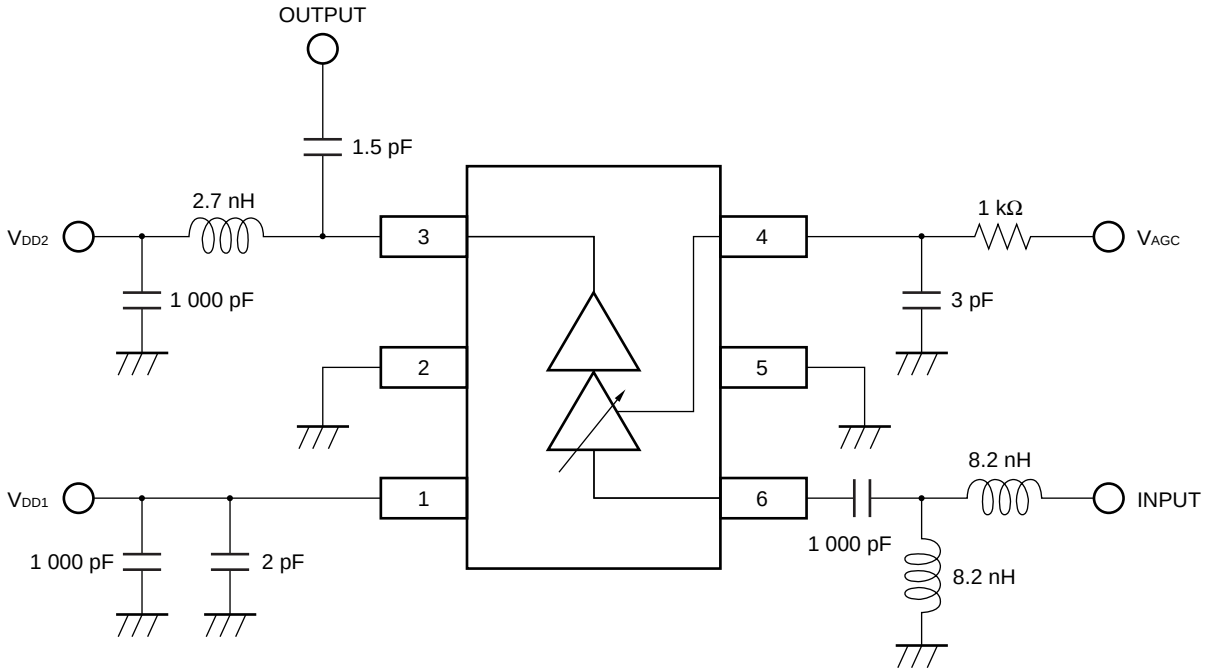
μPG2106TB

f = 925 MHz, $V_{DD1, 2}$ = 3.0 V



μPG2110TB

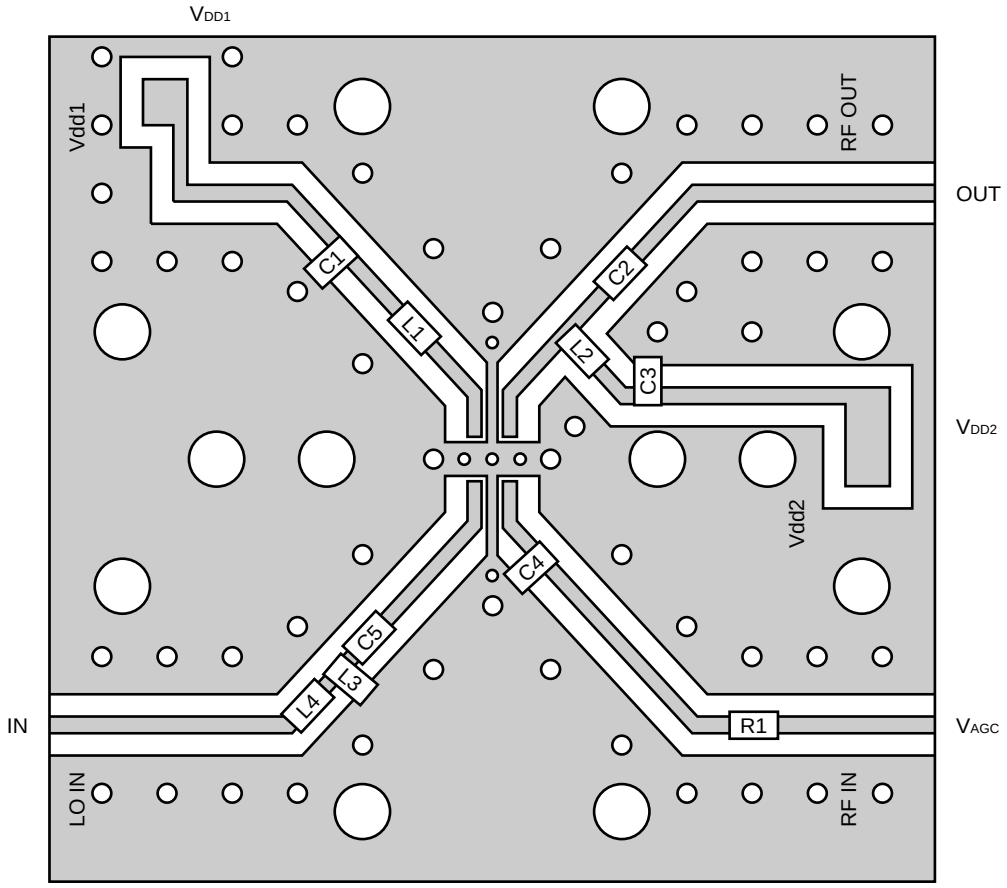
f = 1 441 MHz, $V_{DD1, 2}$ = 3.0 V



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

★ **ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD**

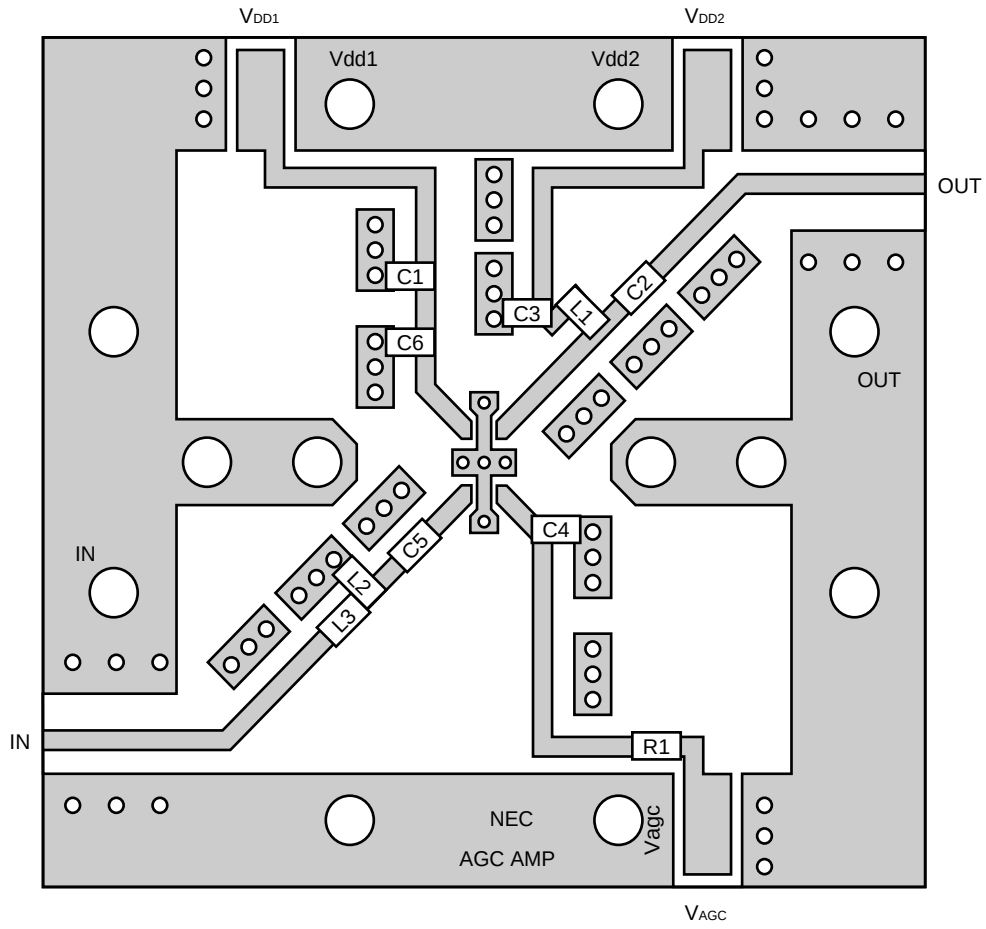
μPG2106TB



USING THE NEC EVALUATION BOARD

Symbol	Values	Part Number	Maker
C1, C3	1 000 pF	GRM39CH102J25PB	muRata
C2	100 pF	GRM39CH101J50PB	muRata
C4	27 pF	GRM39CH270J50PB	muRata
C5	2 pF	GRM39CH020C50PB	muRata
L1	10 nH	TFL0816-10N	Susumu
L2	39 nH	TFL0816-39N	Susumu
L3	27 nH	TFL0816-27N	Susumu
L4	33 nH	TFL0816-33N	Susumu
R1	1 kΩ	RR0816P-102-D	Susumu

μPG2110TB



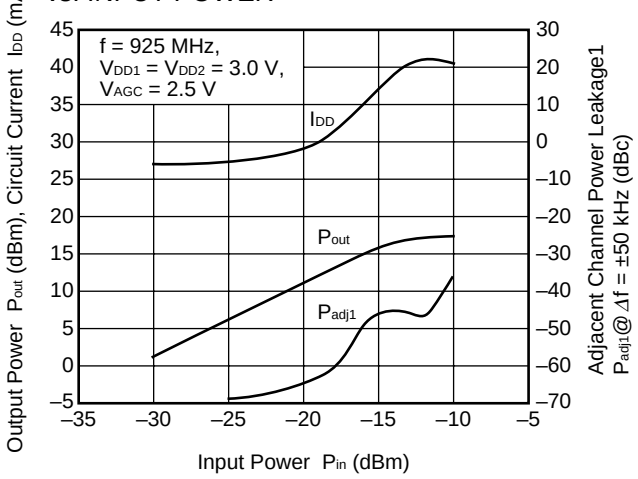
USING THE NEC EVALUATION BOARD

Symbol	Values	Part Number	Maker
C1, C3, C5	1 000 pF	GRM39CH102J25PB	muRata
C2	1.5 pF	GRM39CH1R5C50PB	muRata
C4	3 pF	GRM39CH030C50PB	muRata
C6	2 pF	GRM39CH020C50PB	muRata
L1	2.7 nH	TFL0816-2N7	Susumu
L2, L3	8.2 nH	TFL0816-8N2	Susumu
R1	1 kΩ	RR0816P-102-D	Susumu

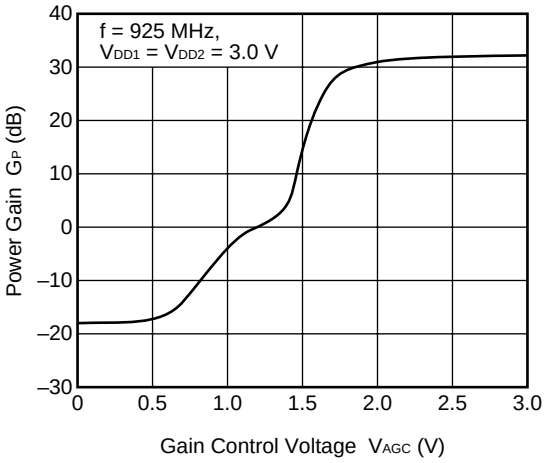
TYPICAL CHARACTERISTICS (T_A = +25°C, unless otherwise specified)

μPG2106TB

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

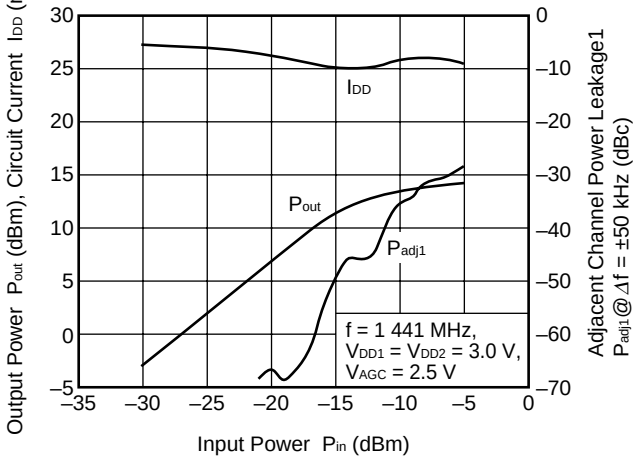


POWER GAIN vs. GAIN CONTROL VOLTAGE

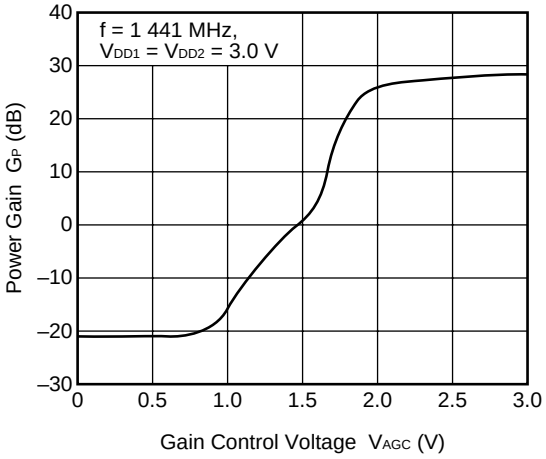


μPG2110TB

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



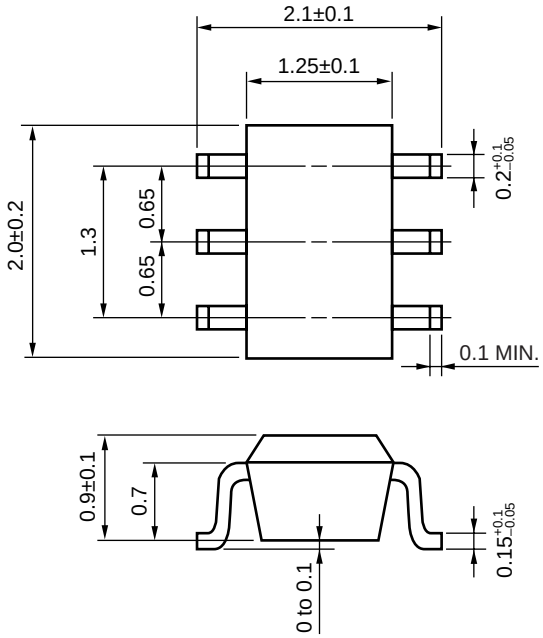
POWER GAIN vs. GAIN CONTROL VOLTAGE



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN SUPER MINIMOLD (UNIT: mm)



RECOMMENDED SOLDERING CONDITIONS

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

Soldering Method	Soldering Conditions		Condition Symbol
Infrared Reflow	Peak temperature (package surface temperature) Time at peak temperature Time at temperature of 220°C or higher Preheating time at 120 to 180°C Maximum number of reflow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 60 seconds or less : 120±30 seconds : 3 times : 0.2%(Wt.) or below	IR260
VPS	Peak temperature (package surface temperature) Time at temperature of 200°C or higher Preheating time at 120 to 150°C Maximum number of reflow processes Maximum chlorine content of rosin flux (% mass)	: 215°C or below : 25 to 40 seconds : 30 to 60 seconds : 3 times : 0.2%(Wt.) or below	VP215
Wave Soldering	Peak temperature (molten solder temperature) Time at peak temperature Preheating temperature (package surface temperature) Maximum number of flow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 120°C or below : 1 time : 0.2%(Wt.) or below	WS260
Partial Heating	Peak temperature (pin temperature) Soldering time (per side of device) Maximum chlorine content of rosin flux (% mass)	: 350°C or below : 3 seconds or less : 0.2%(Wt.) or below	HS350

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

- **The information in this document is current as of July, 2002. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
- No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
- NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.
- NEC semiconductor products are classified into the following three quality grades:
  "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product before using it in a particular application.

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

  The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.

  (Note)

  (1) "NEC" as used in this statement means NEC Corporation, NEC Compound Semiconductor Devices, Ltd. and also includes its majority-owned subsidiaries.

  (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT

Caution GaAs Products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.

▶Business issue

NEC Compound Semiconductor Devices, Ltd.
5th Sales Group, Sales Division TEL: +81-3-3798-6372 FAX: +81-3-3798-6783 E-mail: salesinfo@csd-nec.com

NEC Compound Semiconductor Devices Hong Kong Limited
Hong Kong Head Office TEL: +852-3107-7303 FAX: +852-3107-7309
Taipei Branch Office TEL: +886-2-8712-0478 FAX: +886-2-2545-3859
Korea Branch Office TEL: +82-2-528-0301 FAX: +82-2-528-0302

NEC Electron Devices European Operations http://www.nec.de/
TEL: +49-211-6503-101 FAX: +49-211-6503-487

California Eastern Laboratories, Inc. http://www.cel.com/
TEL: +1-408-988-3500 FAX: +1-408-988-0279

▶Technical issue

NEC Compound Semiconductor Devices, Ltd. http://www.csd-nec.com/
Sales Engineering Group, Sales Division
E-mail: techinfo@csd-nec.com FAX: +81-44-435-1918