

### L-BAND PA DRIVER AMPLIFIER

#### DESCRIPTION

The  $\mu$ PG174TA is L-Band PA driver amplifier developed for digital cellular telephone and PCS applications. This device feature high output power and low distortion with 2.8 V low voltage and 35 mA low current operation. It is housed in a very small 6-pin minimold package available on tape-and-reel and easy to install and contributes to miniaturizing the systems.

#### FEATURES

- Low operation voltage :  $V_{DD} = 2.8$  V
- Low distortion :  $P_{adj1} = -60$  dBc TYP. @  $V_{DD} = 2.8$  V,  $f_{RF} = 1\ 429$  to  $1\ 453$  MHz,  $P_{out} = +10$  dBm  
Off-chip input and output matching
- Low operation current :  $I_{DD} = 35$  mA TYP. @  $V_{DD} = 2.8$  V,  $f_{RF} = 1\ 429$  to  $1\ 453$  MHz,  $P_{out} = +10$  dBm  
Off-chip input and output matching
- 6-pin minimold package

#### APPLICATION

- Digital Cellular: PDC1.5G, DCS1800, PCS, etc.

#### ORDERING INFORMATION

Part Number	Package	Supplying Form
$\mu$ PG174TA-E3	6-pin minimold	Carrier tape width is 8 mm. Qty 3kp/reel.

**Remark** To order evaluation samples, please contact your local NEC sales office. (Part number for sample order:  $\mu$ PG174TA)

#### ABSOLUTE MAXIMUM RATINGS ( $T_A = +25^\circ\text{C}$ )

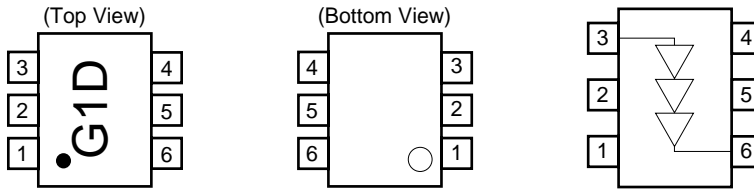
Parameters	Symbol	Ratings	Unit
Supply Voltage	$V_{DD}$	6.0	V
Input Power	$P_{in}$	-10	dBm
Total Power Dissipation	$P_{tot}$	170 <sup>Note</sup>	mW
Operating Ambient Temperature	$T_A$	-30 to +90	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-35 to +150	$^\circ\text{C}$

**Note** Mounted on a  $50 \times 50 \times 1.6$  mm double copper clad epoxy glass PWB,  $T_A = +85^\circ\text{C}$

**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.

**PIN CONNECTION AND INTERNAL BLOCK DIAGRAM**



Pin No.	Connection
1	GND
2	GND
3	IN
4	V <sub>DD1</sub>
5	GND
6	V <sub>DD2</sub> & OUT

**★ RECOMMENDED OPERATING CONDITIONS (T<sub>A</sub> = +25°C)**

Parameters	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage 1, 2	V <sub>DD1,2</sub>	+2.7	+2.8	+3.0	V
Input Power	P <sub>in</sub>	–	–22	–20	dBm

**★ ELECTRICAL CHARACTERISTICS**

(Unless otherwise specified, T<sub>A</sub> = +25°C, V<sub>DD1</sub> = V<sub>DD2</sub> = +2.8 V, π/4DQPSK modulated signal input, off-chip input and output matching)

Parameters	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Operating Frequency	f		1 429	–	1 453	MHz
Power Gain	G <sub>P</sub>	P <sub>in</sub> = –22 dBm	32.0	34.0	–	dB
Total Current	I <sub>DD</sub>	P <sub>in</sub> = –22 dBm	–	35	40	mA
Adjacent Channel Power Leakage 1	P <sub>adj1</sub>	P <sub>out</sub> = +10 dBm, Δf = ±50 kHz	–	–60	–55	dBc
Adjacent Channel Power Leakage 2	P <sub>adj2</sub>	P <sub>out</sub> = +10 dBm, Δf = ±100 kHz	–	–65	–60	dBc

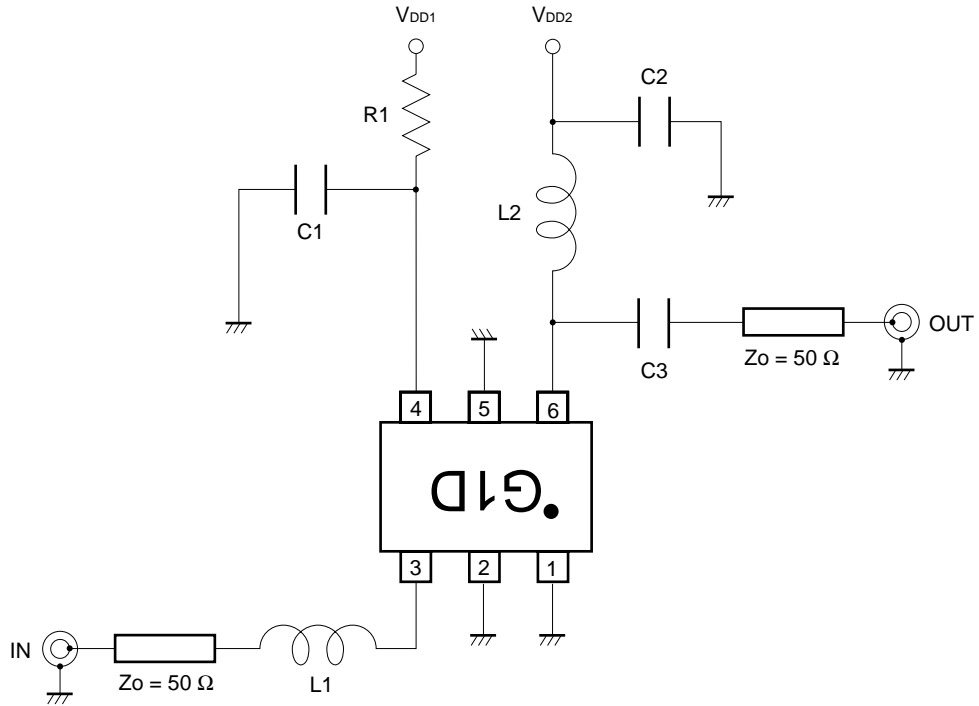
**★ REFERENCE CHARACTERISTICS**

(Unless otherwise specified, T<sub>A</sub> = +25°C, V<sub>DD1</sub> = V<sub>DD2</sub> = +2.8 V, f = 1 429 to 1 453 MHz, off-chip input and output matching)

Parameters	Symbol	MIN.	TYP.	MAX.	Unit
Input Return Loss	RL <sub>in</sub>	–	10	–	dB
Output Return Loss	RL <sub>out</sub>	–	10	–	dB

**EVALUATION CIRCUIT**

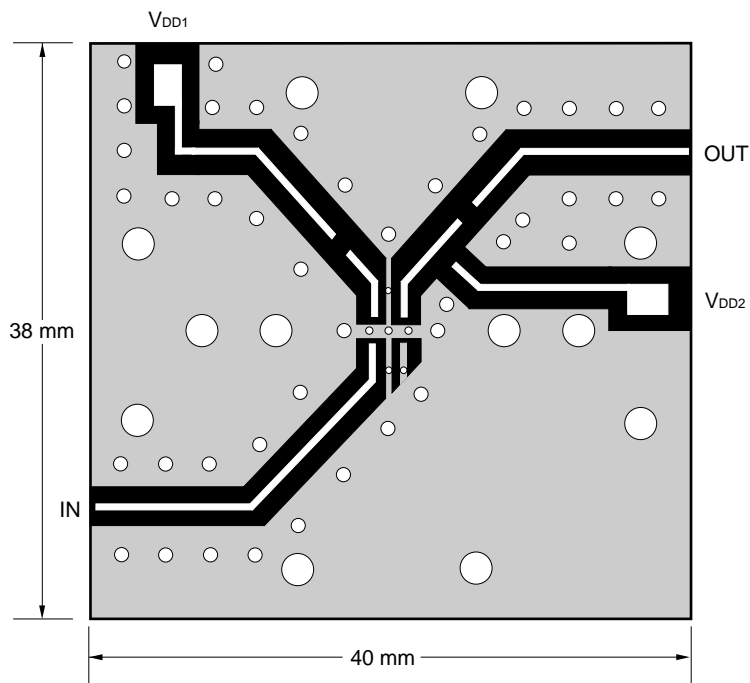
$V_{DD1} = V_{DD2} = +2.8\text{ V}$ ,  $f = 1\,429\text{ to }1\,453\text{ MHz}$



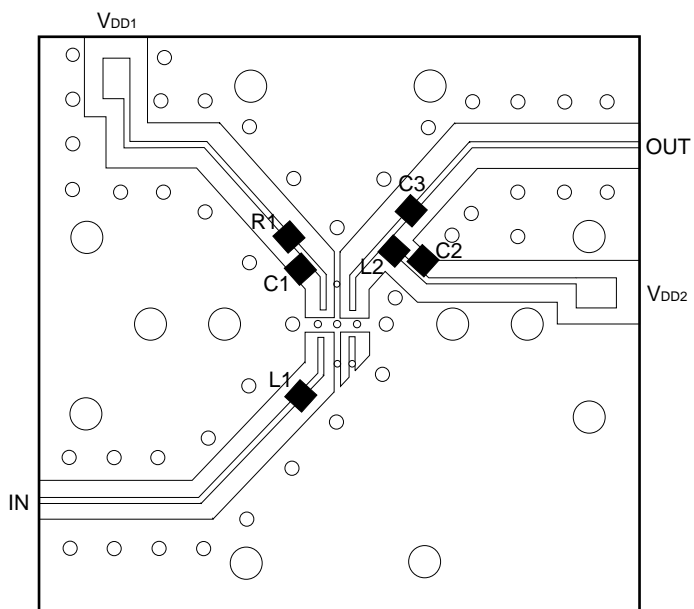
Using the NEC Evaluation board

Parts List	Value
C1, C2	1 000 pF
C3	2.0 pF
R1	10 Ω
L1	6.8 nH
L2	3.3 nH

EVALUATION BOARD (Epoxy Glass,  $\epsilon = 4.6$ , 0.4 mm thickness)

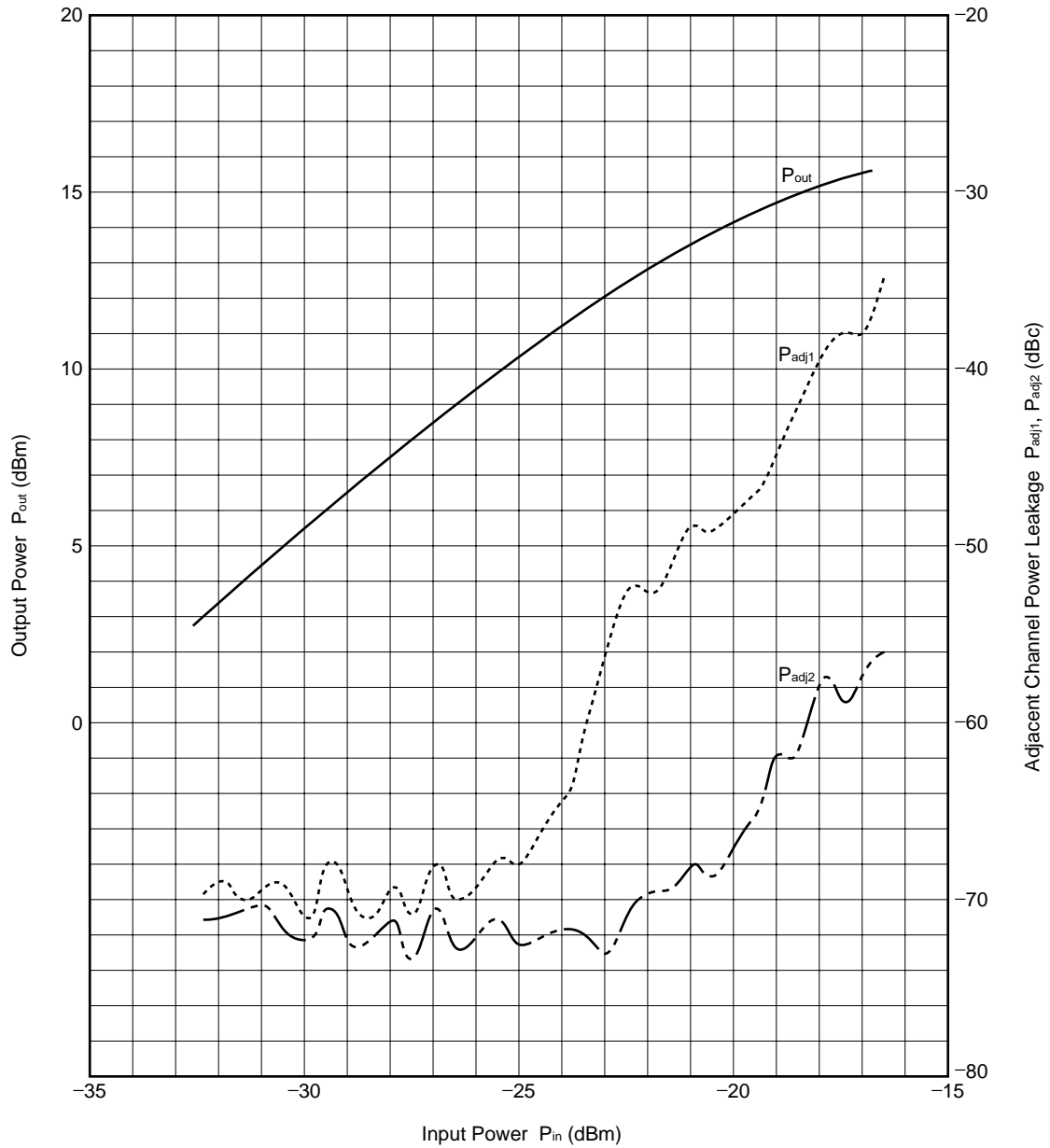


★



★ TYPICAL CHARACTERISTICS

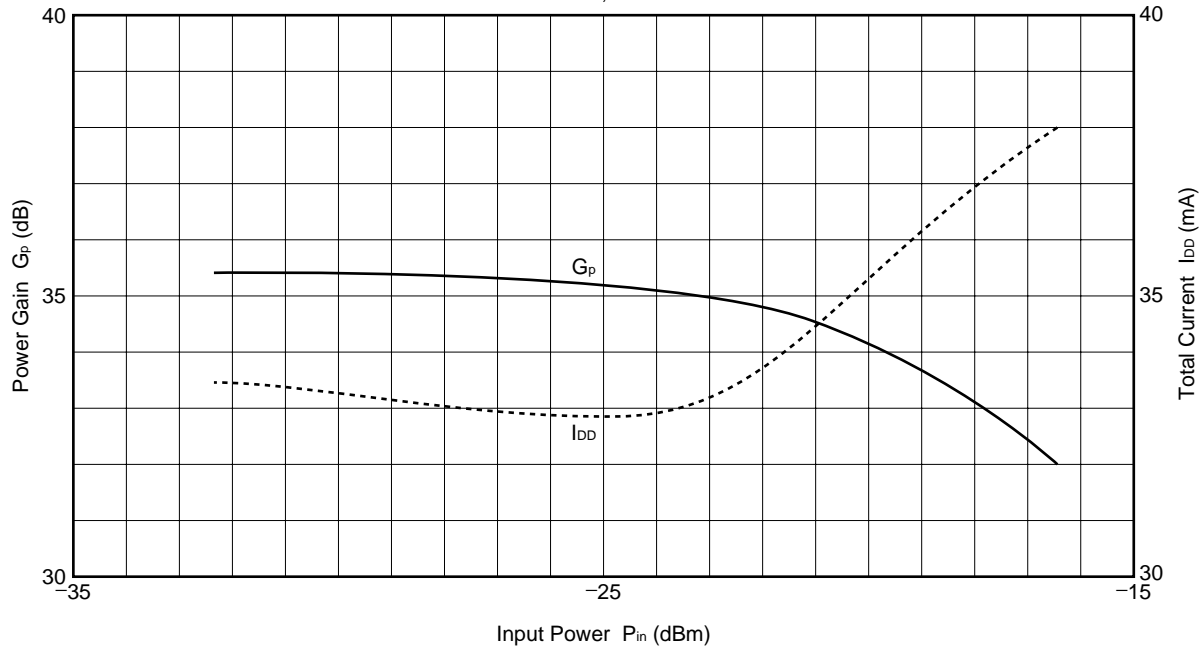
OUTPUT POWER AND ADJACENT CHANNEL POWER LEAKAGE vs. INPUT POWER  
 @  $V_{DD} = +2.8\text{ V}$ ,  $f = 1\ 450\text{ MHz}$



★

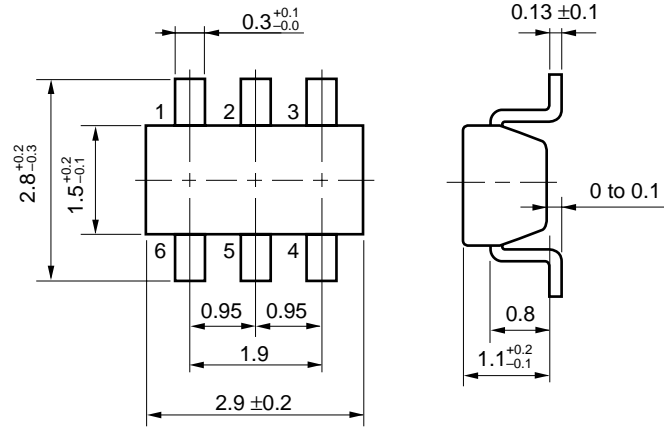
POWER GAIN AND TOTAL CURRENT vs. INPUT POWER

@V<sub>DD</sub> = -2.8 V, f = 1 450 MHz



PACKAGE DIMENSIONS

6 PIN MINIMOLD PACKAGE (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 <sup>Note</sup>	IR35-00-3
VPS	Package peak temperature: 215°C or below Time: 40 seconds or less (at 200°C) Count: 3, Exposure limit: None <sup>Note</sup>	VP15-00-3
Wave Soldering	Soldering bath temperature: 260°C or below Time: 10 seconds or less Count: 1, Exposure limit: None <sup>Note</sup>	WS60-00-1
Partial Heating	Pin temperature: 300°C Time: 3 seconds or less (per side of device) Exposure limit: None <sup>Note</sup>	—

**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)**.



[MEMO]

[MEMO]

[MEMO]

## 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.**

- **The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.**
  - No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.
  - NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation 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 the customer's equipment shall be done under the full responsibility of the customer. NEC Corporation assumes no responsibility for any losses incurred by the customer or third parties arising from the use of these circuits, software, and information.
  - While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.
  - NEC devices are classified into the following three quality grades:  
"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device 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 or medical equipment for life support, etc.
- The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.