

MOS FIELD EFFECT TRANSISTOR μ PA2701GR

SWITCHING N-CHANNEL POWER MOS FET

DESCRIPTION

The μ PA2701GR is N-Channel MOS Field Effect Transistor designed for DC/DC converters and power management applications of notebook computers.

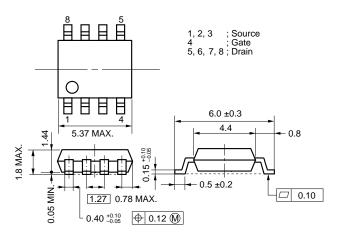
FEATURES

- Low on-state resistance RDS(on)1 = 7.5 m Ω MAX. (Vgs = 10 V, ID = 7.0 A) RDS(on)2 = 11.6 m Ω MAX. (Vgs = 4.5 V, ID = 7.0 A)
- Low Ciss: Ciss = 1200 pF TYP. (VDS = 10 V, VGS = 0 V)
- Small and surface mount package (Power SOP8)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA2701GR	Power SOP8

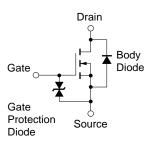
PACKAGE DRAWING (Unit: mm)



ABSOLUTE MAXIMUM RATINGS (TA = 25°C, All terminals are connected.)

Drain to Source Voltage (Vos = 0 V)	Voss	30	V
Gate to Source Voltage (Vps = 0 V)	Vgss	±20	V
Drain Current (DC)	ID(DC)	±14	Α
Drain Current (pulse) Note1	ID(pulse)	±56	Α
Total Power Dissipation (T _A = 25°C) Note2	Рт	2.0	W
Channel Temperature	Tch	150	°C
Storage Temperature	T _{stg}	-55 to +150	°C
Single Avalanche Current Note3	las	14	Α
Single Avalanche Energy Note3	Eas	19.6	mJ

EQUIVALENT CIRCUIT



- **Notes 1.** PW \leq 10 μ s, Duty Cycle \leq 1%
 - 2. Mounted on ceramic substrate of 1200 mm² x 2.2 mm
 - 3. Starting T_{ch} = 25°C, V_{DD} = 15 V, R_G = 25 Ω , L = 100 μ H, V_{GS} = 20 \rightarrow 0 V

Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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.

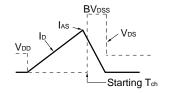


ELECTRICAL CHARACTERISTICS (TA = 25°C, All terminals are connected.)

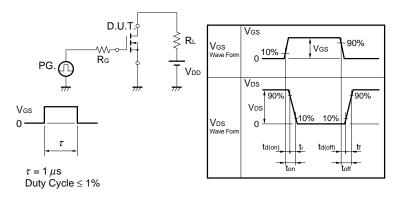
	•					
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	IDSS	V _{DS} = 30 V, V _{GS} = 0 V			10	μΑ
Gate Leakage Current	lgss	V _{GS} = ±20 V, V _{DS} = 0 V			±10	μΑ
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	1.5	2.0	2.5	V
Forward Transfer Admittance	yfs	V _{DS} = 10 V, I _D = 7.0 A	7	14		S
Drain to Source On-state Resistance	RDS(on)1	V _G S = 10 V, I _D = 7.0 A		6.2	7.5	mΩ
	R _{DS(on)2}	Vgs = 4.5 V, Ib = 7.0 A		8.7	11.6	mΩ
	R _{DS(on)3}	Vgs = 4.0 V, Ib = 7.0 A		10.3	13.7	mΩ
Input Capacitance	Ciss	V _{DS} = 10 V		1200		pF
Output Capacitance	Coss	V _G S = 0 V		500		pF
Reverse Transfer Capacitance	Crss	f = 1 MHz		160		pF
Turn-on Delay Time	t d(on)	V _{DD} = 15 V, I _D = 7.0 A		10		ns
Rise Time	tr	Vgs = 10 V		13		ns
Turn-off Delay Time	t d(off)	$R_G = 10 \Omega$		44		ns
Fall Time	t _f			11		ns
Total Gate Charge	Q _G	V _{DD} = 15 V		12		nC
Gate to Source Charge	Qgs	Vgs = 5 V		4		nC
Gate to Drain Charge	Q _{GD}	ID = 14 A		6		nC
Body Diode Forward Voltage	V _{F(S-D)}	IF = 14 A, VGS = 0 V		0.8	1.2	V
Reverse Recovery Time	trr	IF = 14 A, VGS = 0 V		32		ns
Reverse Recovery Charge	Qrr	di/dt = 100 A/ μs		27		nC

TEST CIRCUIT 1 AVALANCHE CAPABILITY

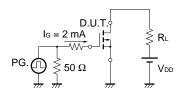
$V_{GS} = 20 \rightarrow 0 \text{ V}$ $V_{GS} = 20 \rightarrow 0 \text{ V}$



TEST CIRCUIT 2 SWITCHING TIME

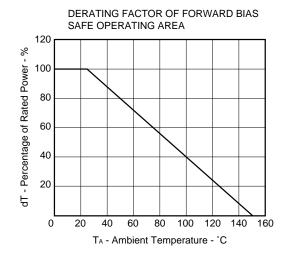


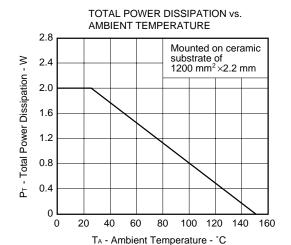
TEST CIRCUIT 3 GATE CHARGE



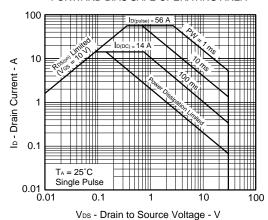
TYPICAL CHARACTERISTICS (TA = 25°C)

 \star



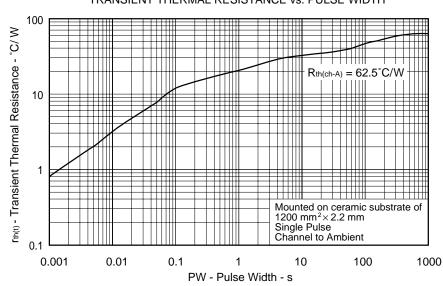


FORWARD BIAS SAFE OPERATING AREA

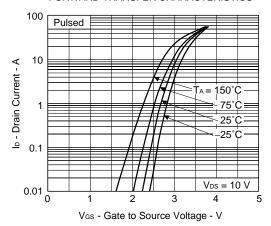


Remark Mounted on ceramicsubstrate of 1200 mm² x 2.2 mm

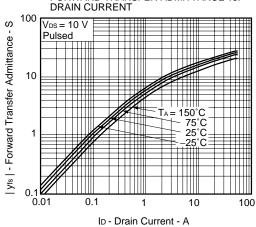
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



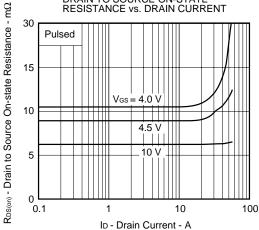
FORWARD TRANSFER CHARACTERISTICS



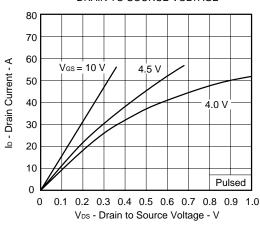




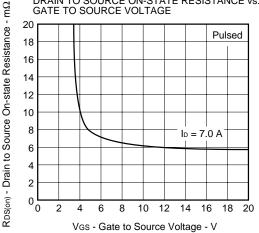
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

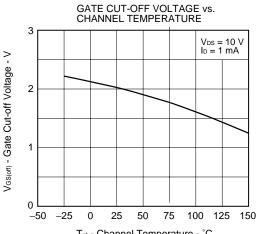


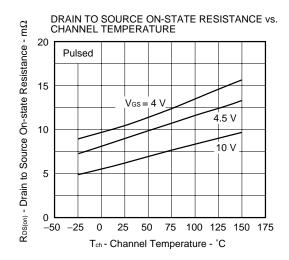
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE

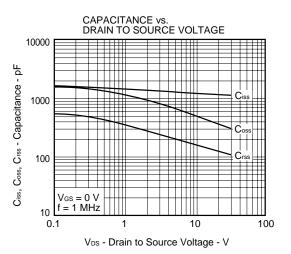


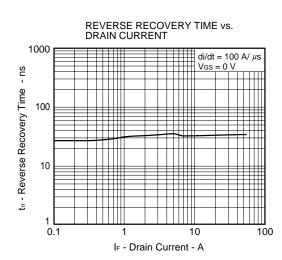
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

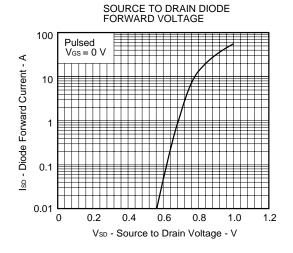


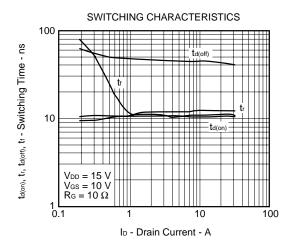


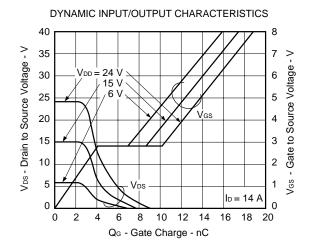












NEC μ PA2701GR

[MEMO]

NEC μ PA2701GR

[MEMO]

- The information in this document is current as of May, 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 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