

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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**N-CHANNEL MOS FIELD EFFECT TRANSISTOR  
FOR SWITCHING**

**DESCRIPTION**

The μPA1808 is a switching device, which can be driven directly by a 4.0 V power source.

This device features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as DC/DC converters and power management of notebook computers and so on.

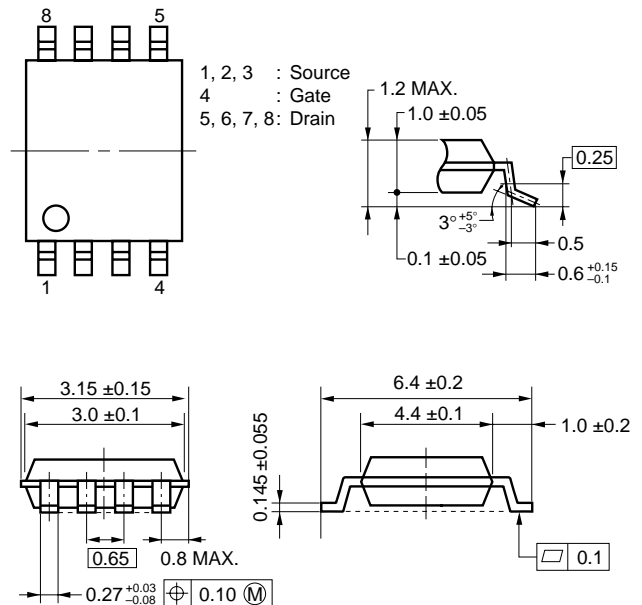
**FEATURES**

- 4.0 V drive available
- Low on-state resistance  
 $R_{DS(on)1} = 17 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 5.0 \text{ A)}$   
 $R_{DS(on)2} = 23 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 5.0 \text{ A)}$   
 $R_{DS(on)3} = 26 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 5.0 \text{ A)}$
- Built-in G-S protection diode against ESD

**ORDERING INFORMATION**

PART NUMBER	PACKAGE
μPA1808GR-9JG	Power TSSOP8

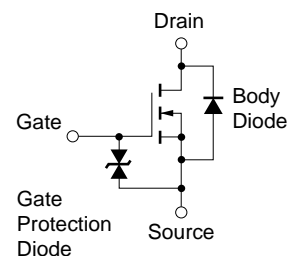
**PACKAGE DRAWING (Unit: mm)**



**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)**

Drain to Source Voltage (V <sub>GS</sub> = 0 V)	V <sub>DSS</sub>	30	V
Gate to Source Voltage (V <sub>DS</sub> = 0 V)	V <sub>GSS</sub>	±20	V
Drain Current (DC) (T <sub>A</sub> = 25°C)	I <sub>D(DC)</sub>	±9.5	A
Drain Current (pulse) <sup>Note1</sup>	I <sub>D(pulse)</sub>	±38	A
Total Power Dissipation <sup>Note2</sup>	P <sub>T</sub>	2.0	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

**EQUIVALENT CIRCUIT**



**Notes 1.** PW ≤ 10 μs, Duty Cycle ≤ 1%

**2.** Mounted on ceramic substrate of 5000 mm<sup>2</sup> x 1.1 mm

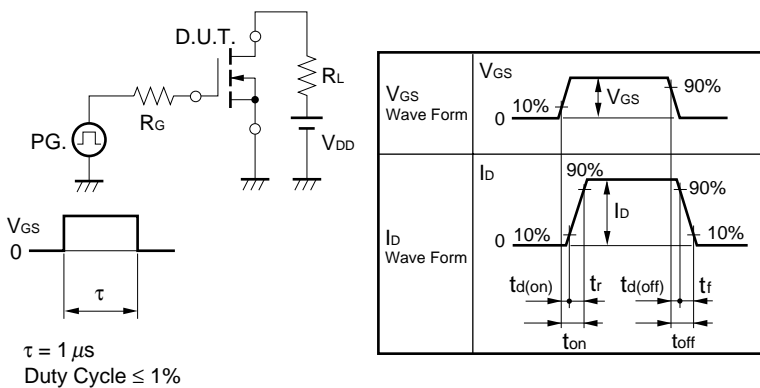
**Remark** The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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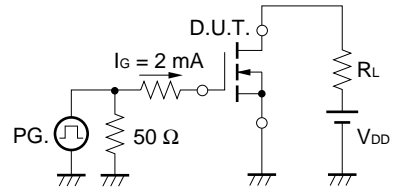
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			1.0	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±18 V, V <sub>DS</sub> = 0 V			±10	μA
Gate Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1.0 mA	1.5	1.9	2.5	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 5.0 A	5.0	10.5		S
Drain to Source On-state Resistance	R <sub>DSON1</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 5.0 A		13.5	17	mΩ
	R <sub>DSON2</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 5.0 A		17	23	mΩ
	R <sub>DSON3</sub>	V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 5.0 A		19	26	mΩ
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V		660		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		280		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1.0 MHz		100		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, I <sub>D</sub> = 5.0 A		13.5		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = 10 V		5.6		ns
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 10 Ω		38		ns
Fall Time	t <sub>f</sub>			7.9		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = 24 V		13		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>GS</sub> = 10 V		1.8		nC
Gate to Drain Charge	Q <sub>GD</sub>	I <sub>D</sub> = 9.5 A		3.7		nC
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 9.5 A, V <sub>GS</sub> = 0 V		0.84		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 9.5 A, V <sub>GS</sub> = 0 V		27		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100 A/μs		19		nC

**TEST CIRCUIT 1 SWITCHING TIME**

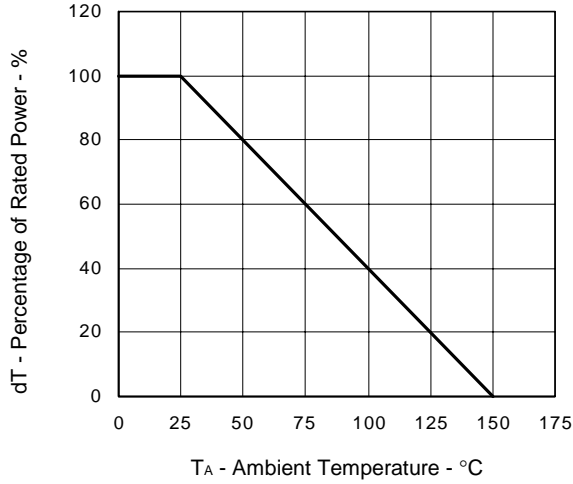


**TEST CIRCUIT 2 GATE CHARGE**

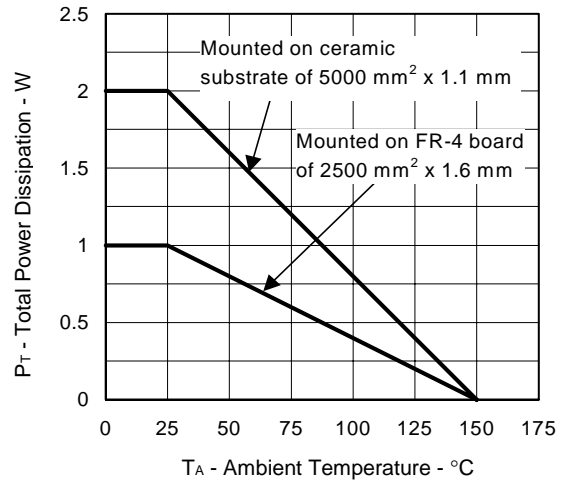


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

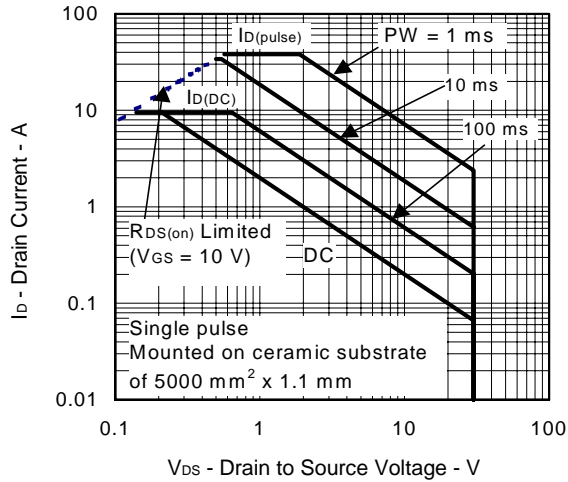
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



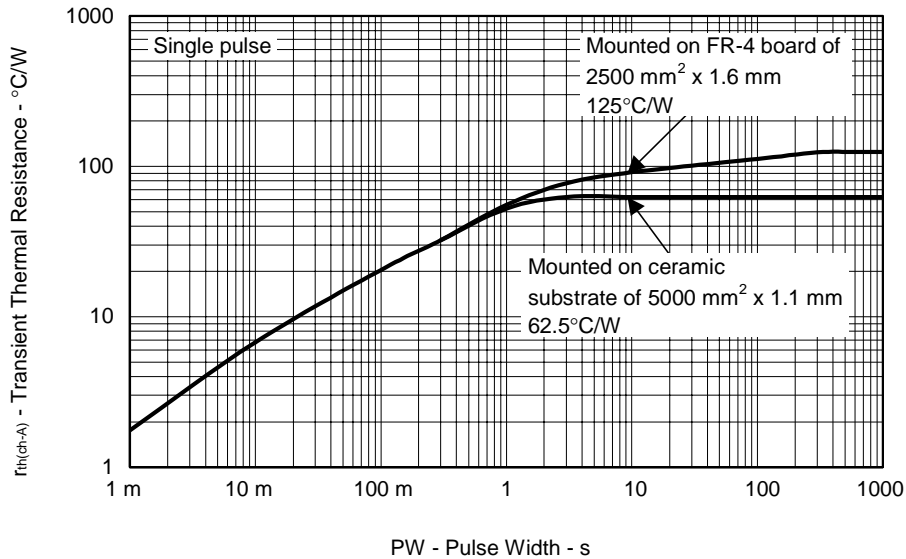
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



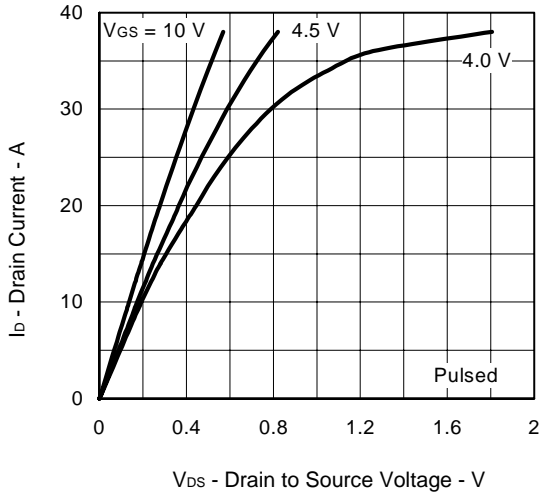
FORWARD BIAS SAFE OPERATING AREA



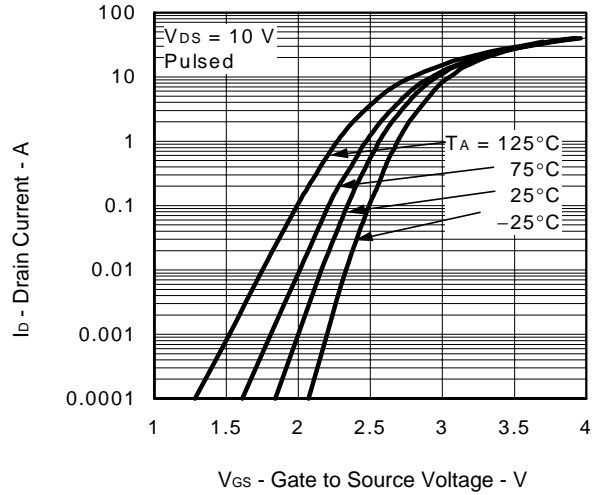
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



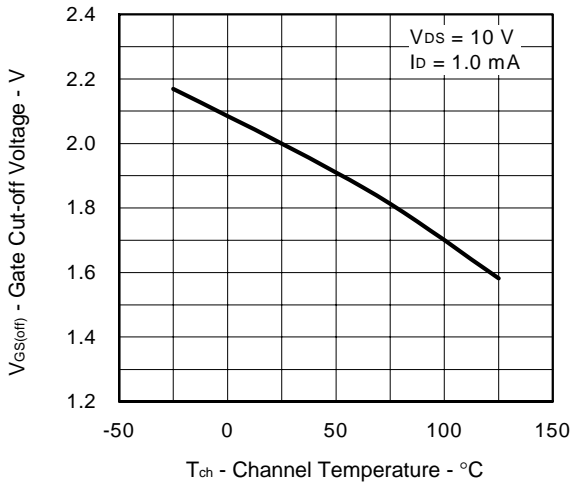
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



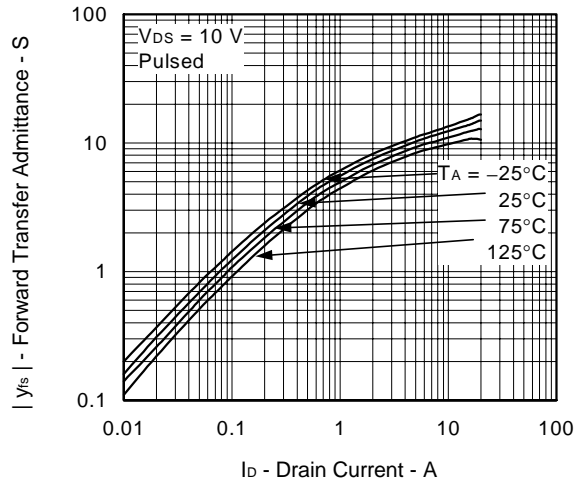
FORWARD TRANSFER CHARACTERISTICS



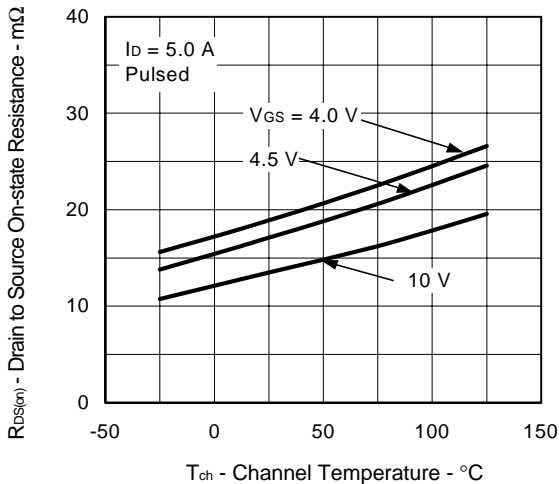
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



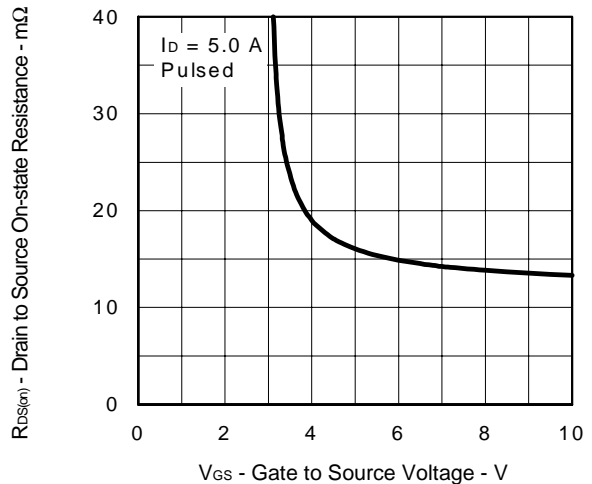
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



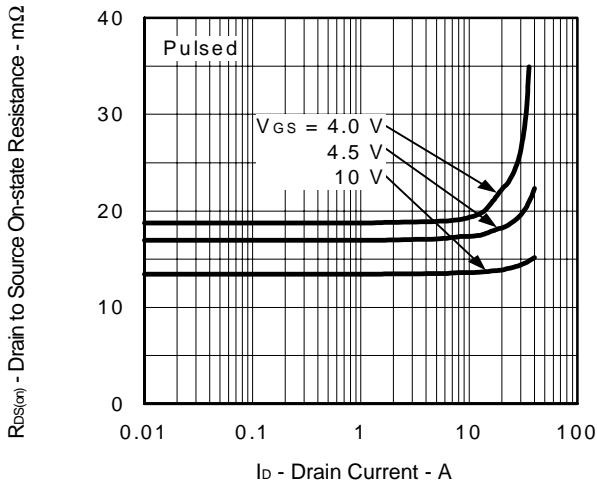
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



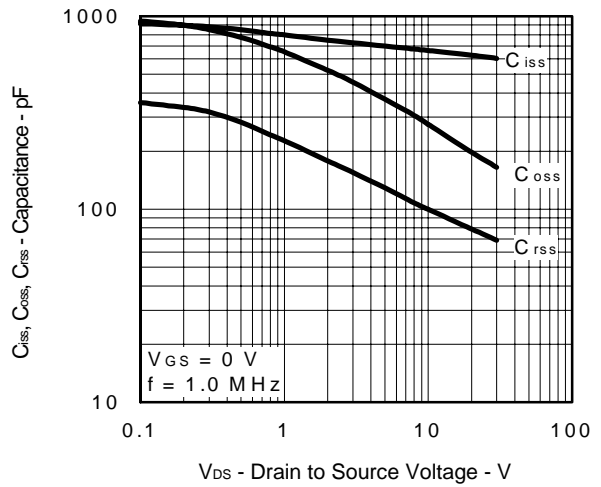
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



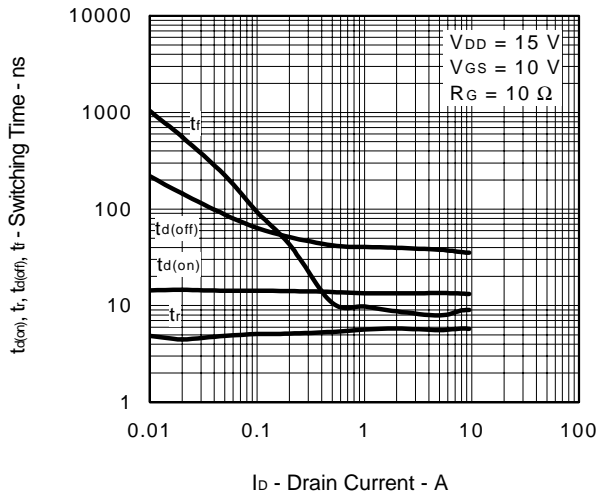
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



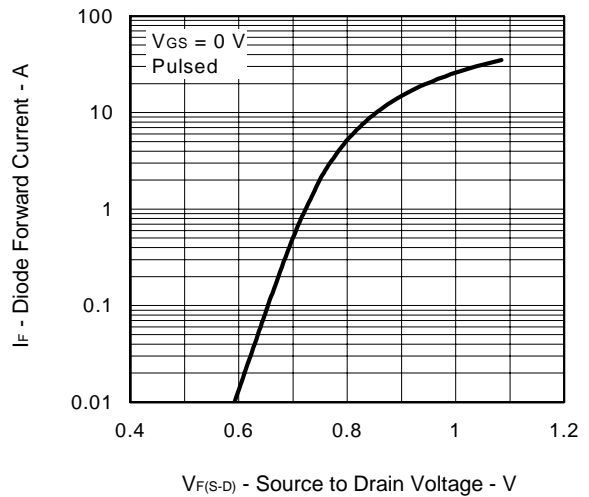
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



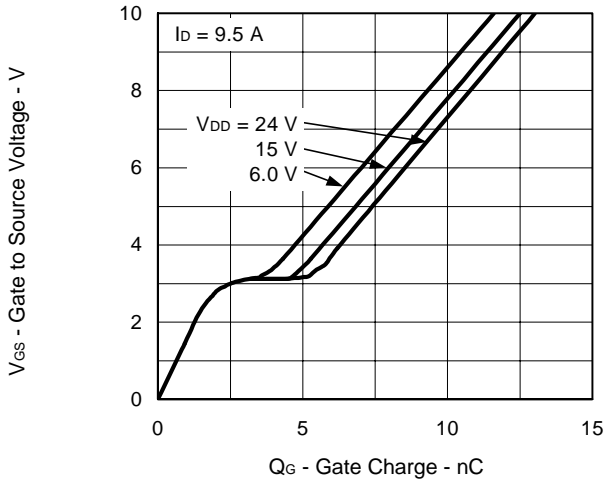
SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



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