

To our customers,

Old Company Name in Catalogs and Other Documents

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

April 1st, 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 μ PA1807 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

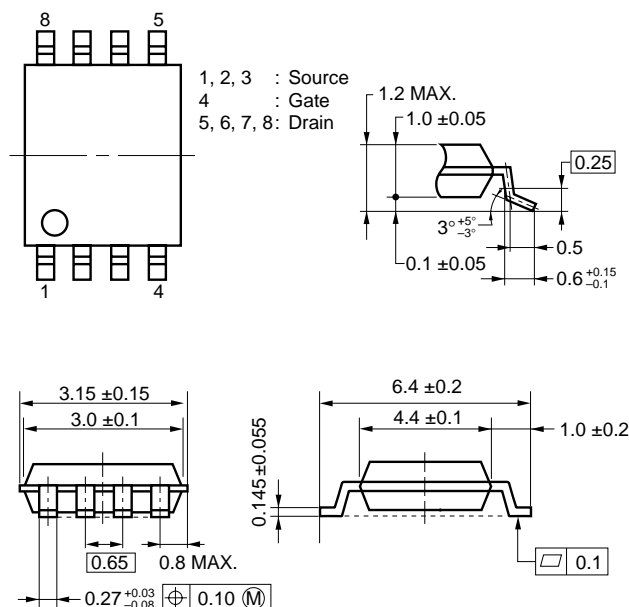
$$R_{DS(on)1} = 10 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 6.0 \text{ A)}$$
$$R_{DS(on)2} = 14 \text{ m}\Omega \text{ MAX. (V}_{GS} = 4.5 \text{ V, I}_D = 6.0 \text{ A)}$$
$$R_{DS(on)3} = 16 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 6.0 \text{ A)}$$

- Built-in G-S protection diode against ESD

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1807GR-9JG	Power TSSOP8

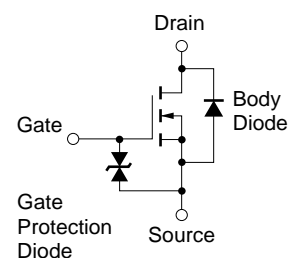
PACKAGE DRAWING (Unit: mm)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage ($V_{GS} = 0\text{ V}$)	V_{DSS}	30	V
Gate to Source Voltage ($V_{DS} = 0\text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_A = 25^\circ\text{C}$)	$I_{D(DC)}$	± 12	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 48	A
Total Power Dissipation ^{Note2}	P_T	2.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	$-55\text{ to }+150$	$^\circ\text{C}$

EQUIVALENT CIRCUIT



Notes 1. $PW \leq 10 \mu s$, Duty Cycle $\leq 1\%$

2. Mounted on ceramic substrate of $5000 \text{ mm}^2 \times 1.1 \text{ mm}$

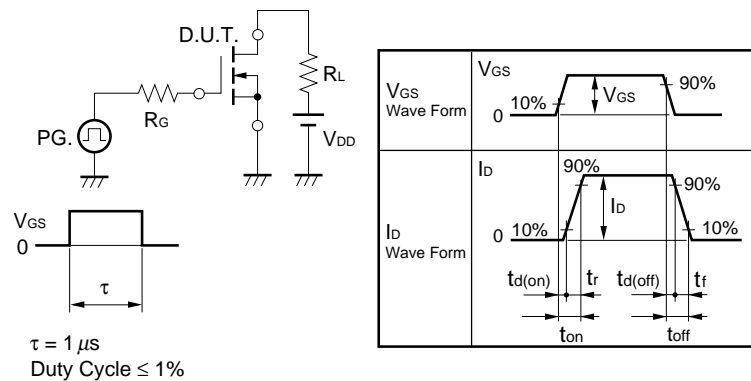
Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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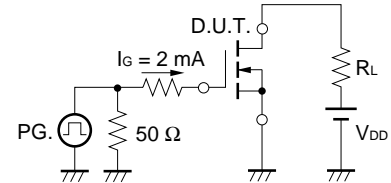
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			1.0	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±10	μA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1.0 mA	1.5	2.0	2.5	V
Forward Transfer Admittance	y _{ts}	V _{DS} = 10 V, I _D = 6.0 A	7.0	15		S
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 10 V, I _D = 6.0 A		8.1	10	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 6.0 A		10.5	14	mΩ
	R _{DS(on)3}	V _{GS} = 4.0 V, I _D = 6.0 A		12	16	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		1000		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		390		pF
Reverse Transfer Capacitance	C _{rss}	f = 1.0 MHz		140		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 15 V, I _D = 6.0 A		16		ns
Rise Time	t _r	V _{GS} = 10 V		11		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		46		ns
Fall Time	t _f			11.5		ns
Total Gate Charge	Q _G	V _{DD} = 24 V		19		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		3.1		nC
Gate to Drain Charge	Q _{GD}	I _D = 12 A		5.0		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 12 A, V _{GS} = 0 V		0.82		V
Reverse Recovery Time	t _{rr}	I _F = 12 A, V _{GS} = 0 V		32		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		24		nC

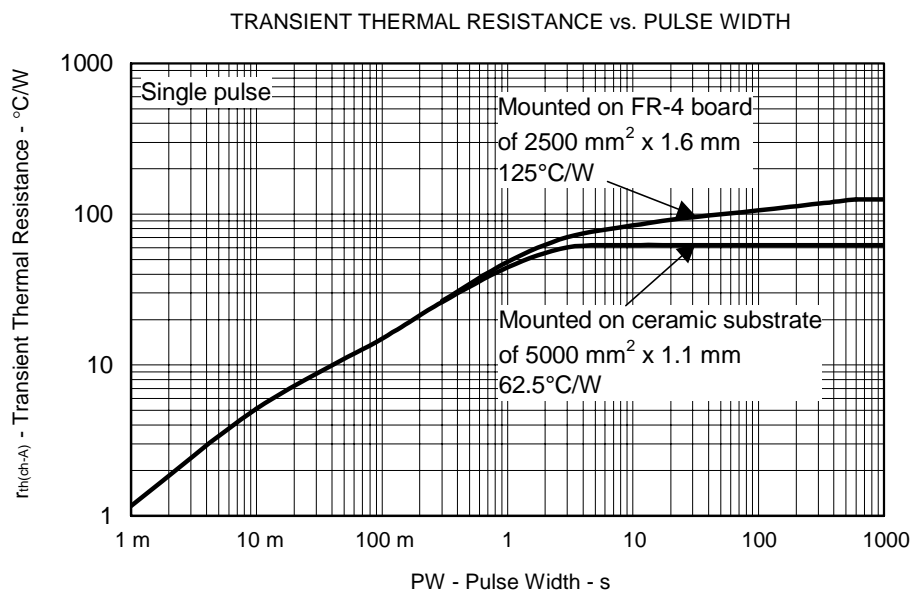
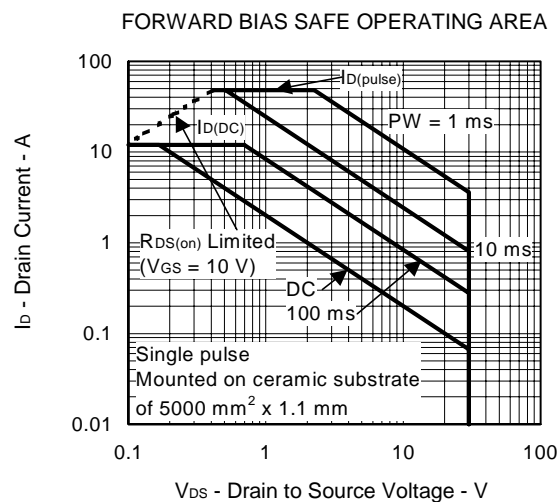
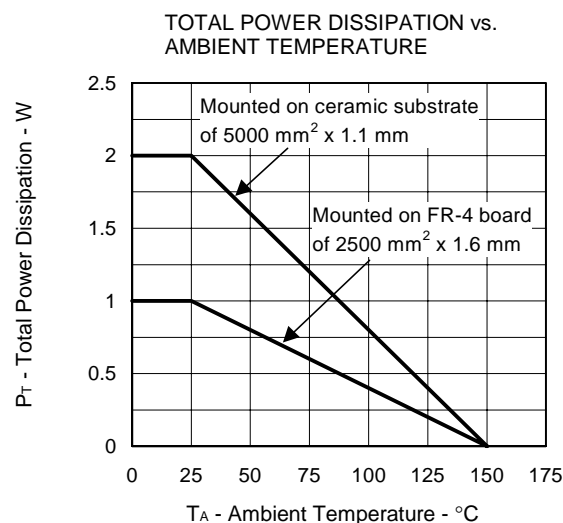
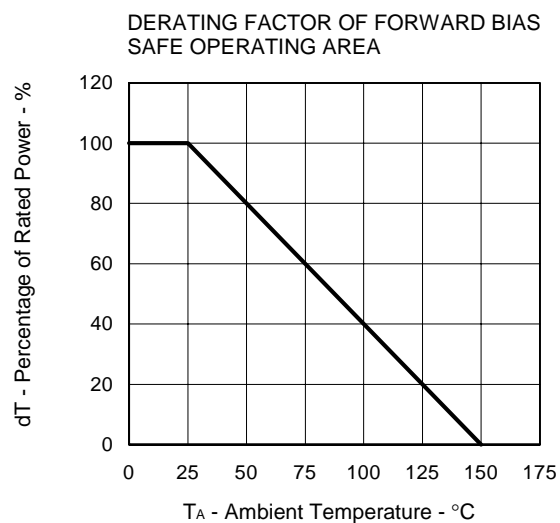
TEST CIRCUIT 1 SWITCHING TIME



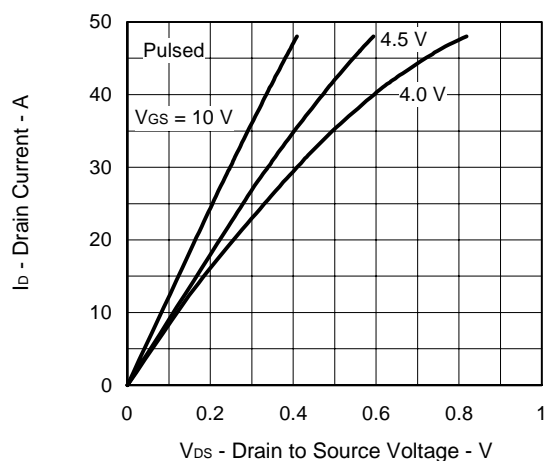
TEST CIRCUIT 2 GATE CHARGE



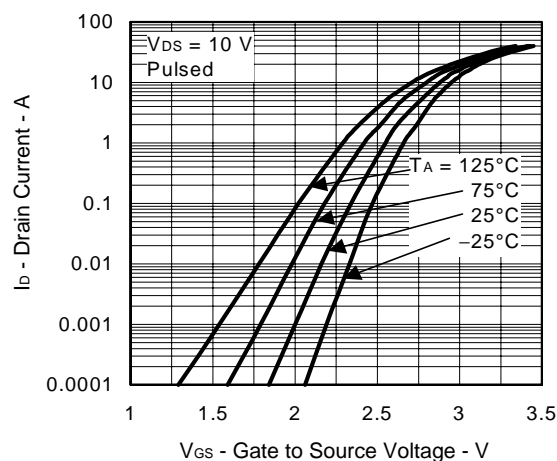
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



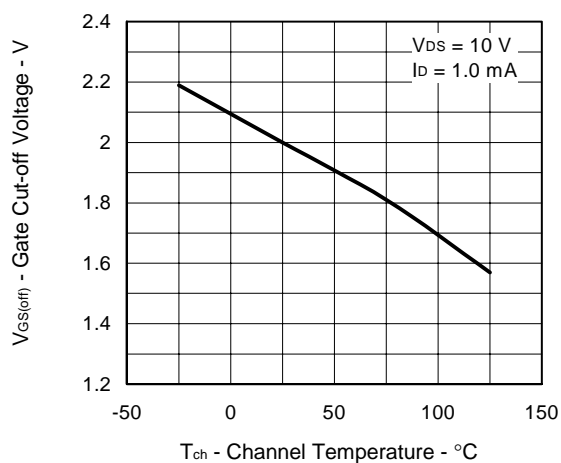
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



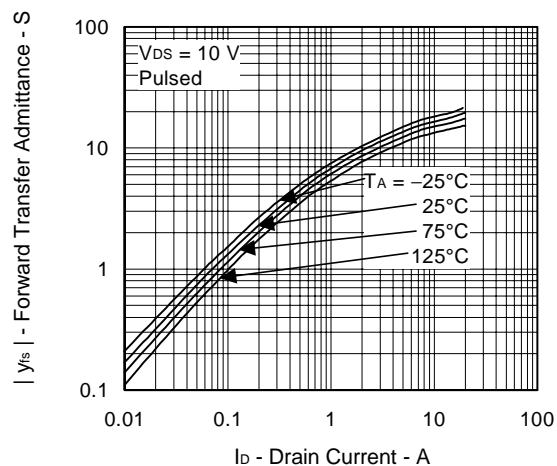
FORWARD TRANSFER CHARACTERISTICS



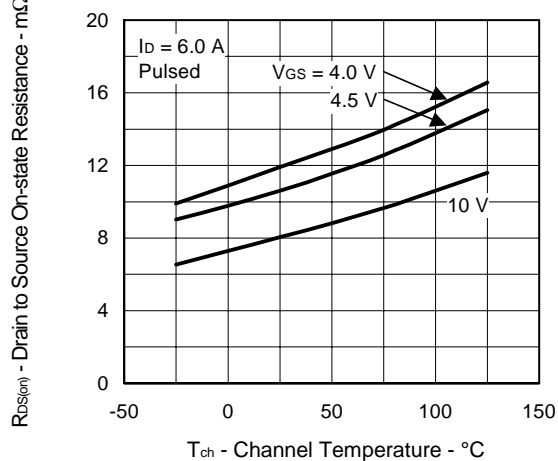
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



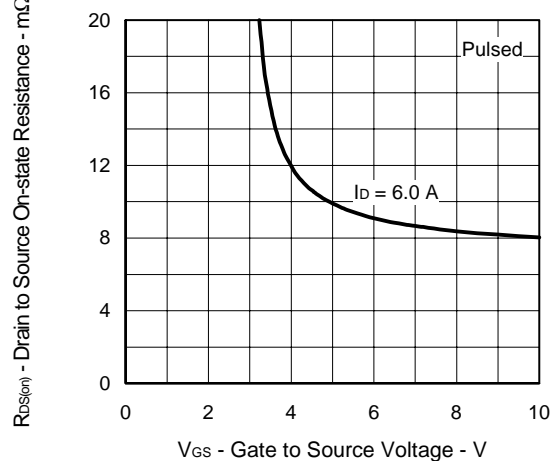
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



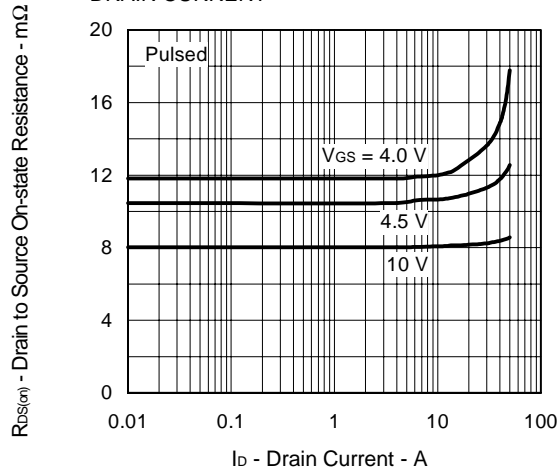
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



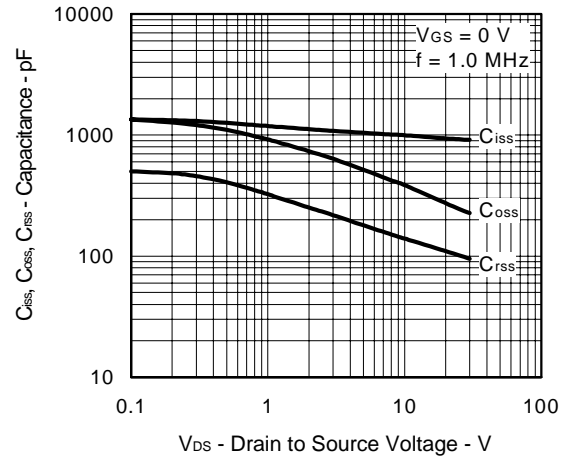
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



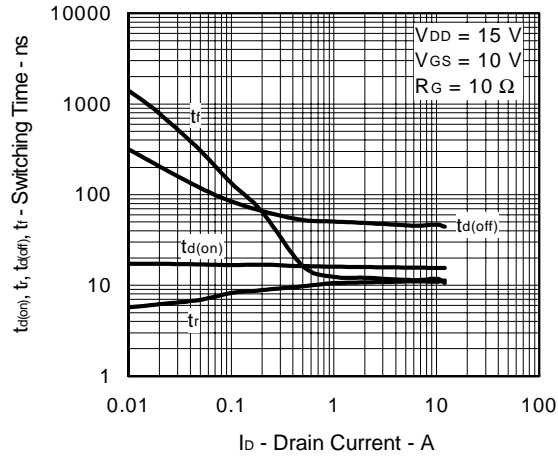
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



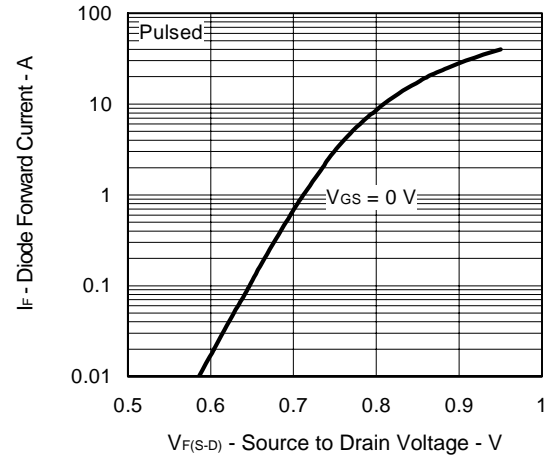
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



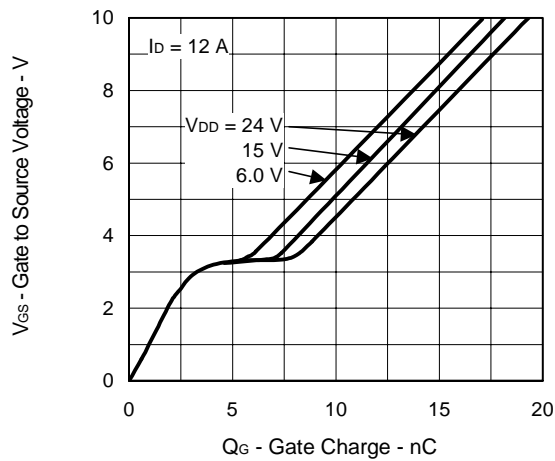
SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



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