

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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P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The  $\mu$ PA1853 is a switching device which can be driven directly by a 4-V power source.

The  $\mu$ PA1853 features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as power switch of portable machine and so on.

FEATURES

- Can be driven by a 4-V power source
- Low on-state resistance  
 $R_{DS(on)1} = 85 \text{ m}\Omega \text{ MAX. (} V_{GS} = -10 \text{ V, } I_D = -1.5 \text{ A)}$   
 $R_{DS(on)2} = 152 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -1.5 \text{ A)}$   
 $R_{DS(on)3} = 180 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.0 \text{ V, } I_D = -1.5 \text{ A)}$

ORDERING INFORMATION

PART NUMBER	PACKAGE
$\mu$ PA1853GR-9JG	Power TSSOP8

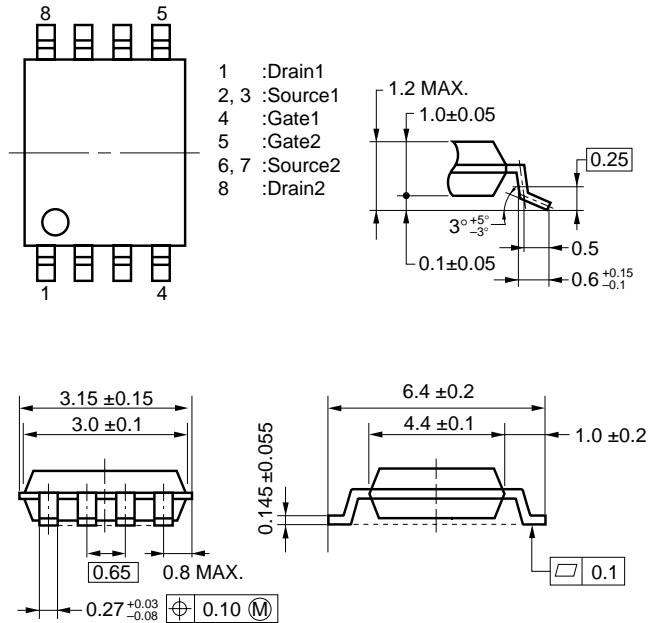
ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Drain to Source Voltage	V <sub>DSS</sub>	-30	V
Gate to Source Voltage	V <sub>GSS</sub>	-20/+5	V
Drain Current (DC)	I <sub>D(DC)</sub>	$\mp 2.5$	A
Drain Current (pulse) <sup>Note1</sup>	I <sub>D(pulse)</sub>	$\mp 10$	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

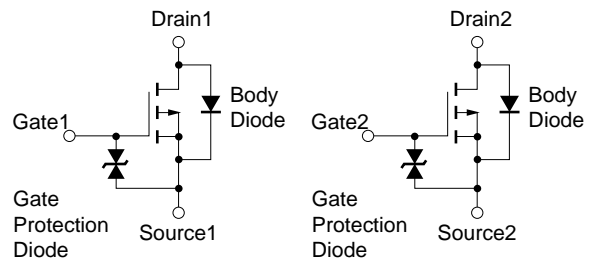
- Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1 %  
 2. Mounted on ceramic substrate of 5000 mm<sup>2</sup> x 1.1 mm

**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.

PACKAGE DRAWING (Unit : mm)



EQUIVALENT CIRCUIT

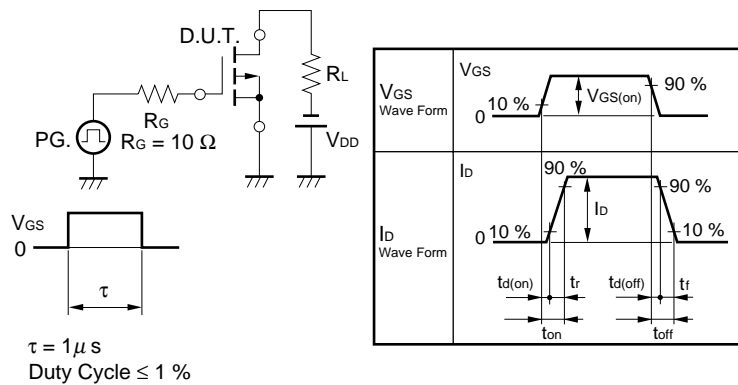


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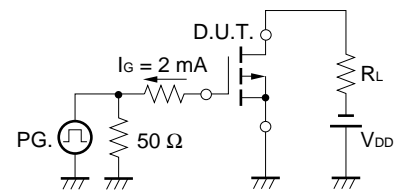
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain Cut-off Current	I <sub>DSS</sub>	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V			-10	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ± 20 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 mA	-1.0	-1.7	-2.5	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -1.5 A	1	3.6		S
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -1.5 A		64	85	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -1.5 A		114	152	mΩ
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = -4.0 V, I <sub>D</sub> = -1.5 A		135	180	mΩ
Input Capacitance	C <sub>iSS</sub>	V <sub>DS</sub> = -10 V		520		pF
Output Capacitance	C <sub>oSS</sub>	V <sub>GS</sub> = 0 V		200		pF
Reverse Transfer Capacitance	C <sub>rSS</sub>	f = 1 MHz		82		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -10 V		60		ns
Rise Time	t <sub>r</sub>	I <sub>D</sub> = -1.5 A		220		ns
Turn-off Delay Time	t <sub>d(off)</sub>	V <sub>GS(on)</sub> = -10 V		800		ns
Fall Time	t <sub>f</sub>	R <sub>G</sub> = 10 Ω		620		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = -24 V		12		nC
Gate to Source Charge	Q <sub>GS</sub>	I <sub>D</sub> = -2.5 A		2		nC
Gate to Drain Charge	Q <sub>GD</sub>	V <sub>GS</sub> = -10 V		3		nC
Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 2.5 A, V <sub>GS</sub> = 0 V		0.73		V

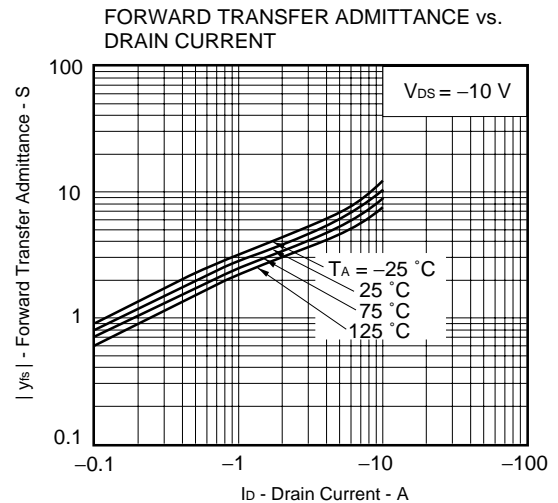
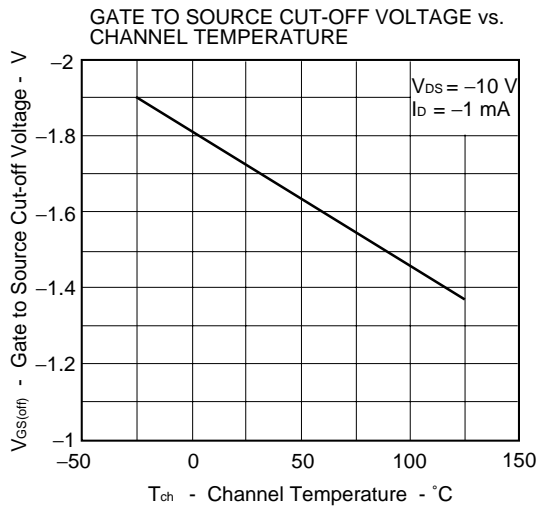
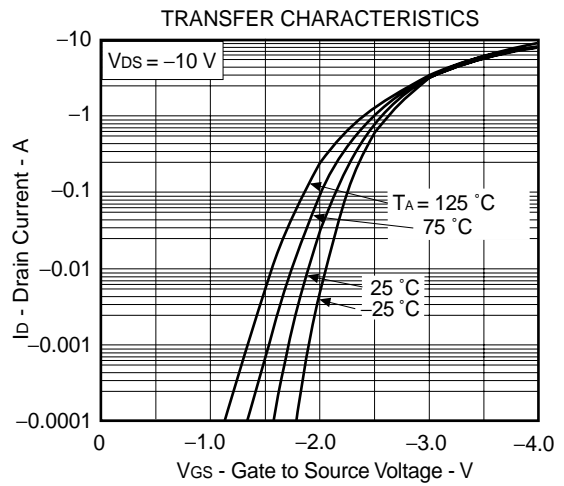
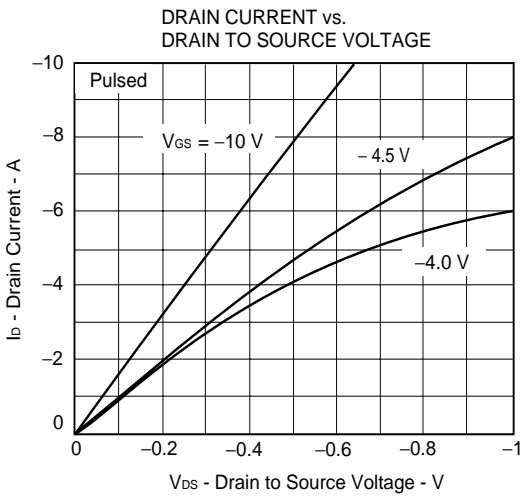
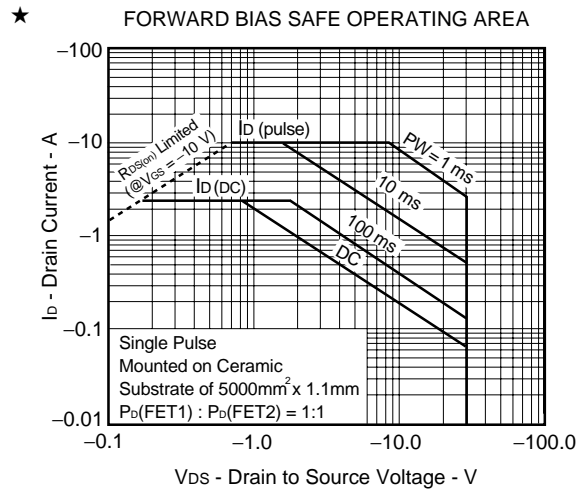
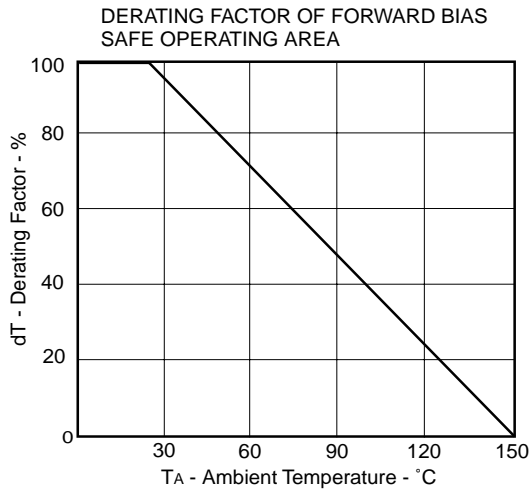
**TEST CIRCUIT 1 SWITCHING TIME**

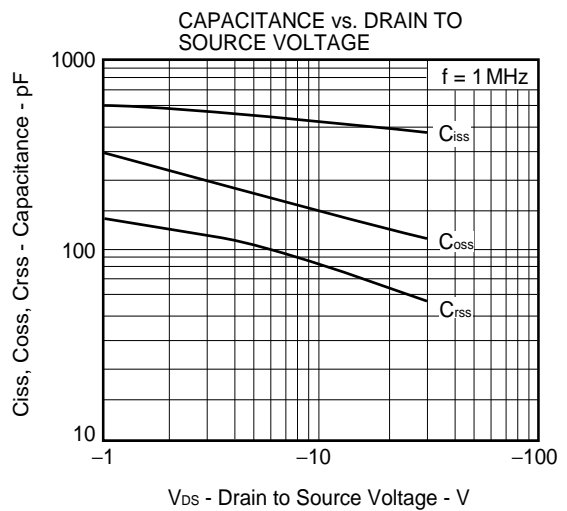
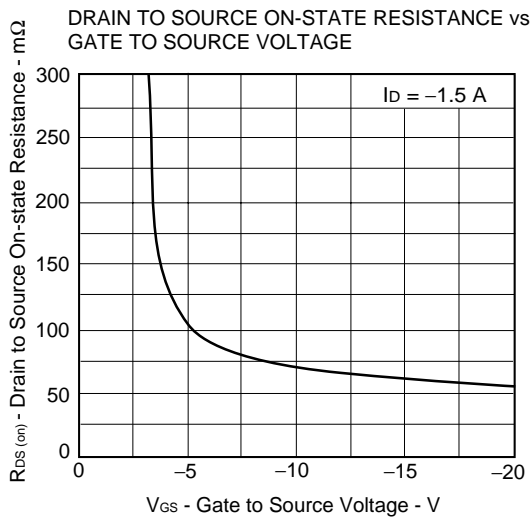
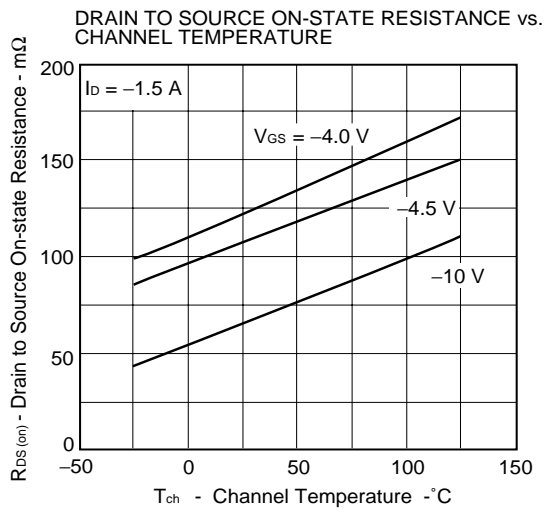
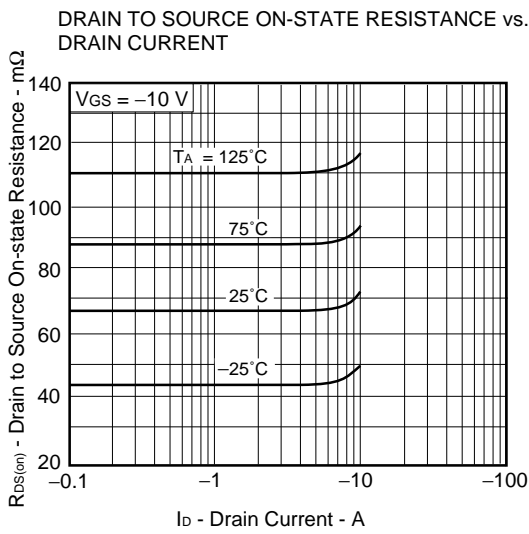
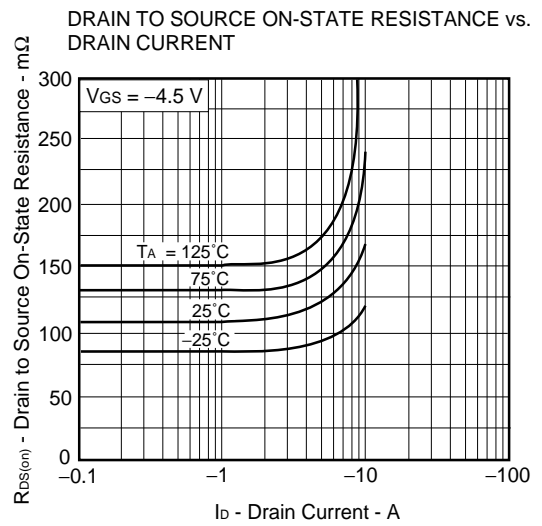
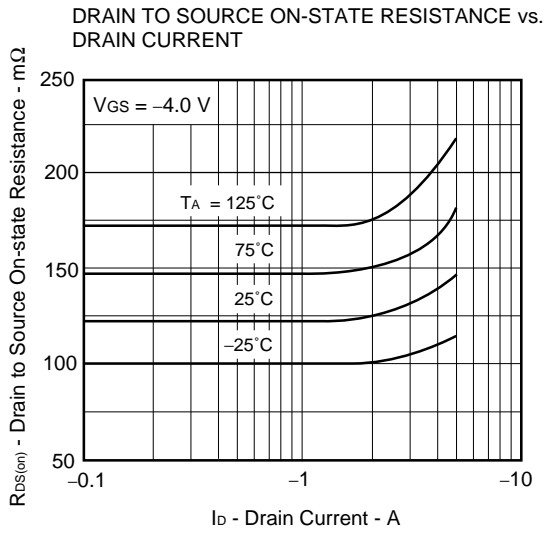


**TEST CIRCUIT 2 GATE CHARGE**

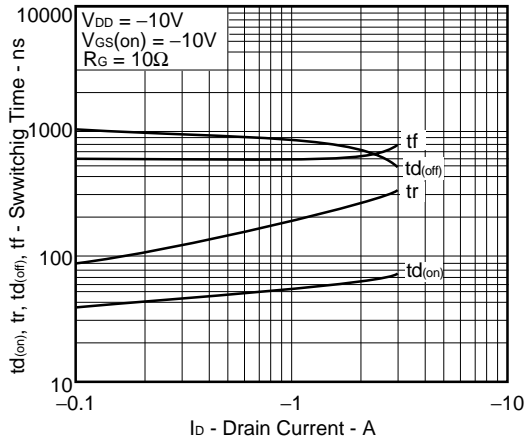


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

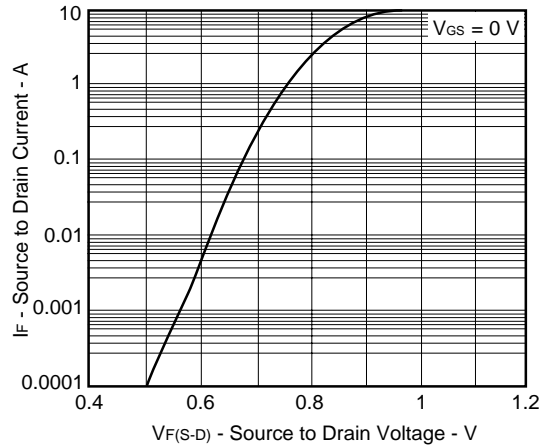




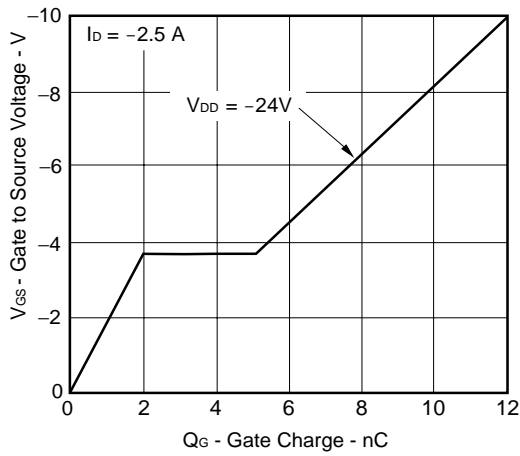
SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

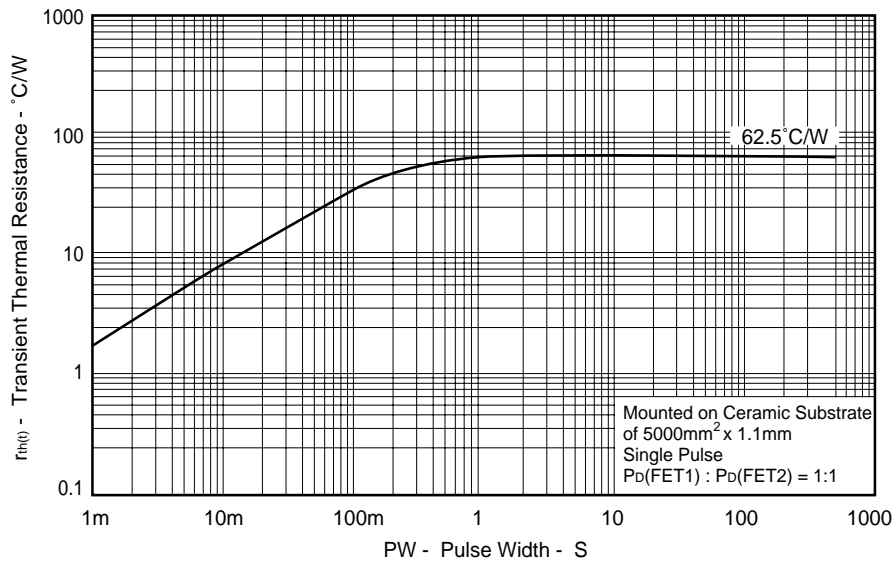


DYNAMIC INPUT CHARACTERISTICS



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TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



[MEMO]



[MEMO]

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