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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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RENESAS

MOS FIELD EFFECT TRANSISTOR

μPA1804

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μPA1804 is a switching device which can be driven directly by a 4.5 V power source.

The μPA1804 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.

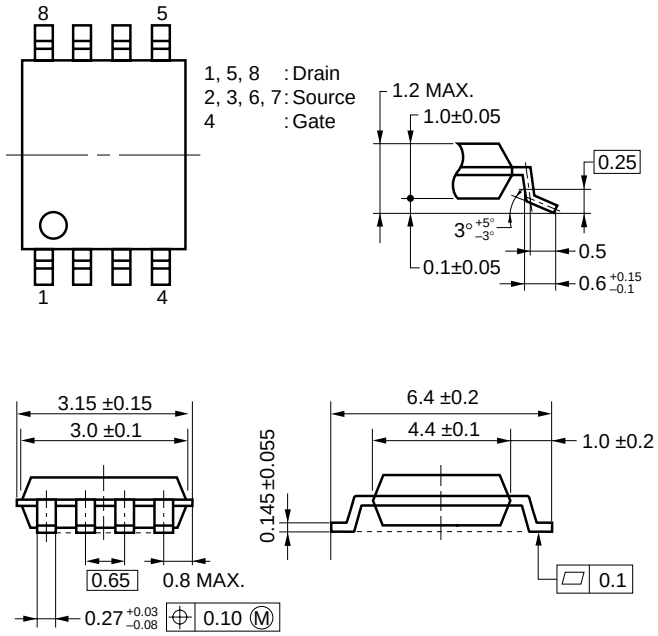
FEATURES

- Can be driven by a 4.5 V power source
- Low on-state resistance
  $R_{DS(on)1}$ = 23 mΩ MAX. (V_{GS} = 10 V, I_D = 4.0 A)
  $R_{DS(on)2}$ = 32 mΩ MAX. (V_{GS} = 4.5 V, I_D = 4.0 A)
- Built-in G-S protection diode against ESD

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1804GR-9JG	Power TSSOP8

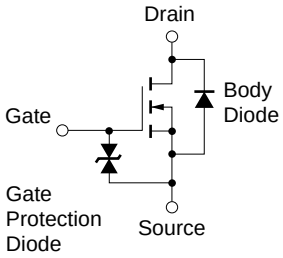
PACKAGE DRAWING (Unit : mm)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage	V_{DSS}	30	V
Gate to Source Voltage	V_{GSS}	±20	V
Drain Current (DC)	$I_{D(DC)}$	±8.0	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±32	A
Total Power Dissipation Note2	P_T	2.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

EQUIVALENT CIRCUIT



Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Mounted on ceramic substrate of 5000 mm^2 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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Document No. D13868EJ2V0DS00 (2nd edition)
Date Published May 2001 NS CP(K)
Printed in Japan

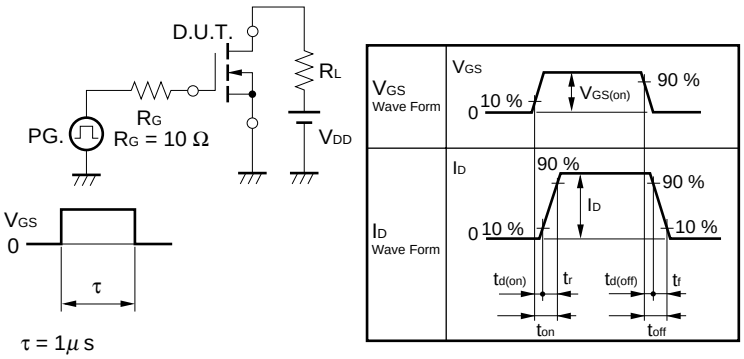
The mark ★ shows major revised points.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

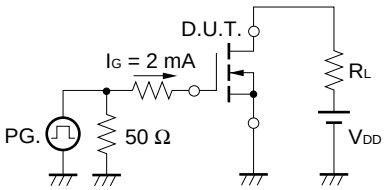
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V			±10	μA
Gate to Source Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	1.0	2.1	2.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 4.0 A	3	8.7		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 4.0 A		18	23	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.5 V, I_D = 4.0 A		24	32	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		761		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		258		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		99		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 15 V		24		ns
Rise Time	t_r	I_D = 4.0 A		83		ns
Turn-off Delay Time	$t_{d(off)}$	$V_{GS(on)}$ = 10 V		46		ns
Fall Time	t_f	R_G = 10 Ω		29		ns
Total Gate Charge	Q_G	V_{DS} = 24 V		13.5		nC
Gate to Source Charge	Q_{GS}	I_D = 8.0 A		2.4		nC
Gate to Drain Charge	Q_{GD}	V_{GS} = 10 V		3.7		nC
Diode Forward Voltage	$V_{F(S-D)}$	I_F = 8.0 A, V_{GS} = 0 V		0.86		V
Reverse Recovery Time	t_{rr}	I_F = 8.0 A, V_{GS} = 0 V		27		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		16		nC

TEST CIRCUIT 1 SWITCHING TIME



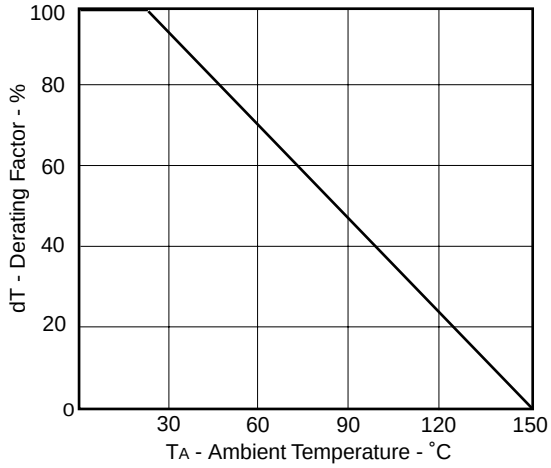
τ = 1μs
Duty Cycle ≤ 1 %

TEST CIRCUIT 2 GATE CHARGE

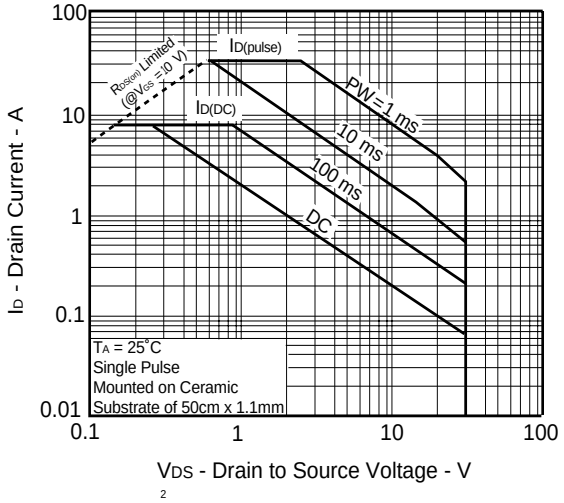


TYPICAL CHARACTERISTICS (T_A = 25°C)

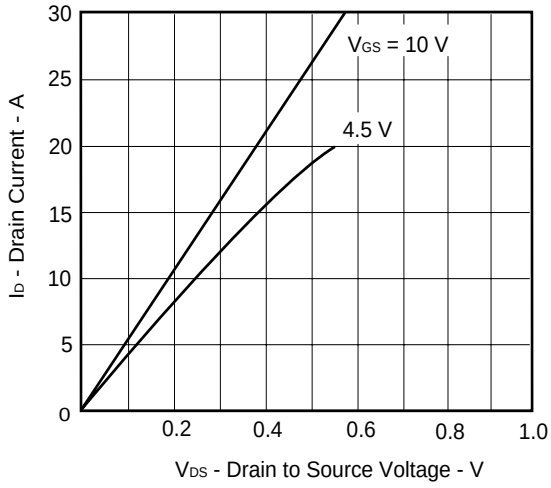
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



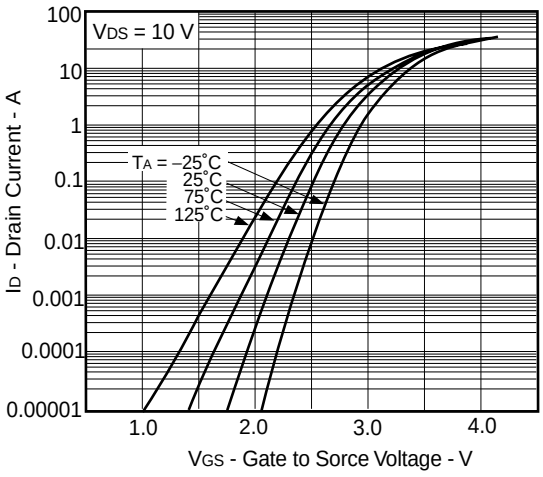
★ FORWARD BIAS SAFE OPERATING AREA



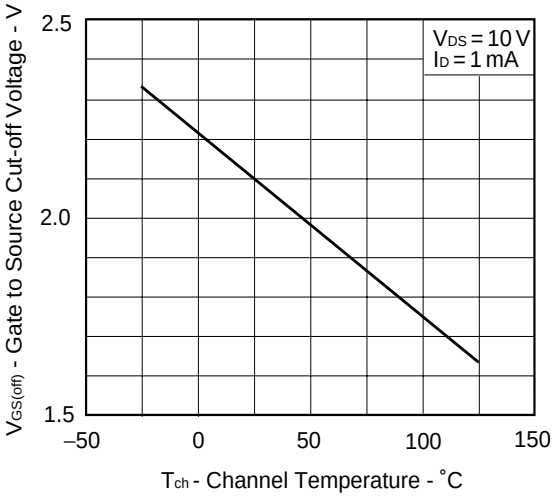
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



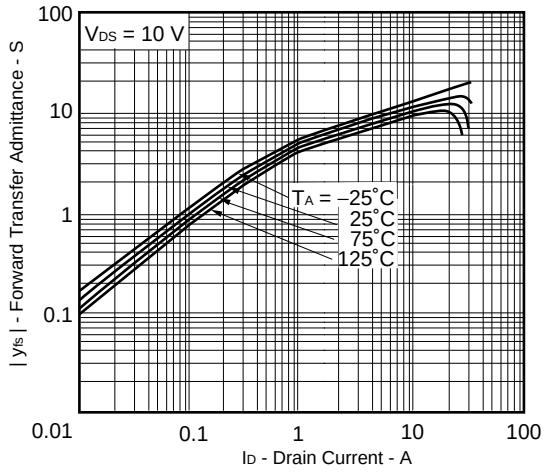
TRANSFER CHARACTERISTICS



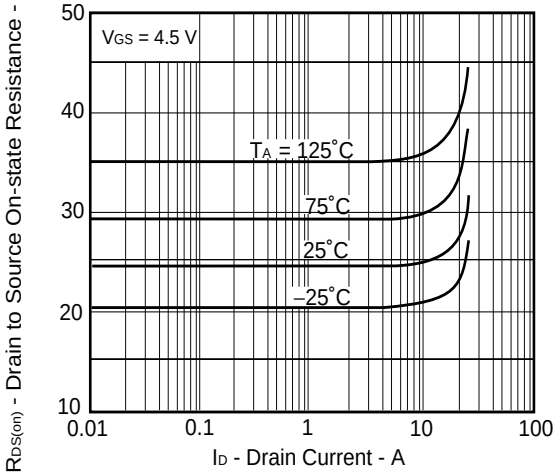
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



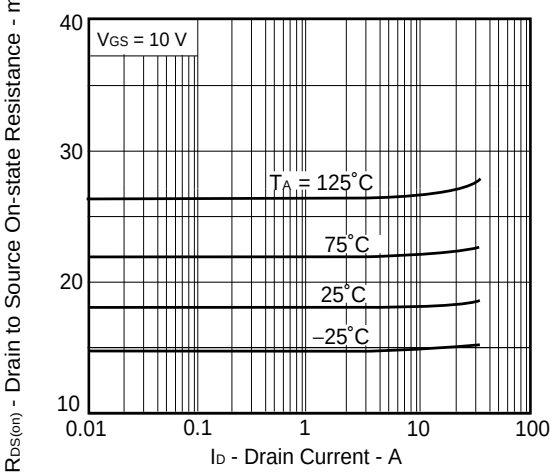
FORWARD TRANSFER ADMITTANCE Vs. DRAIN CURRENT



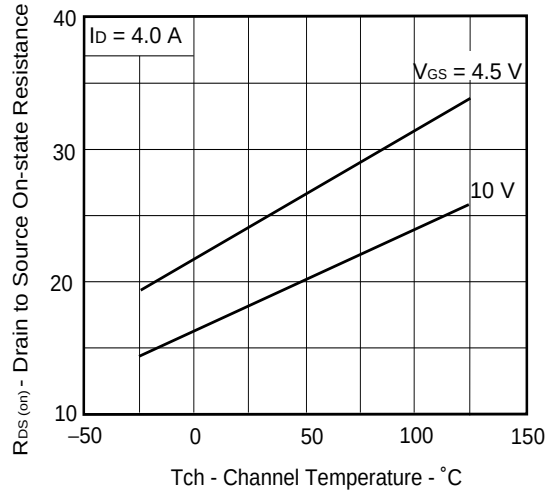
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



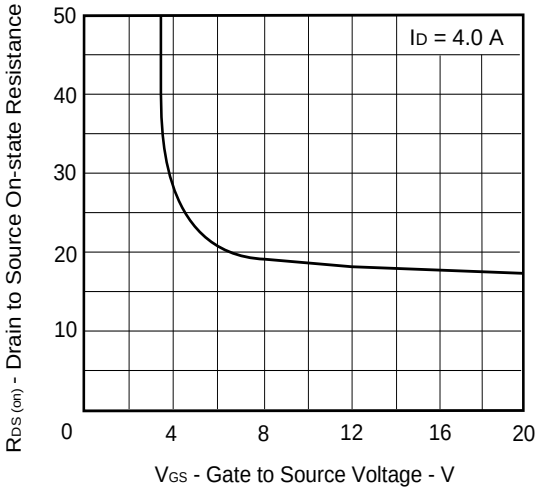
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



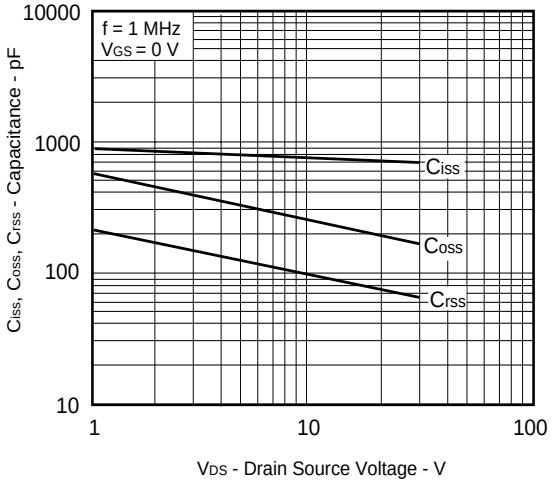
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



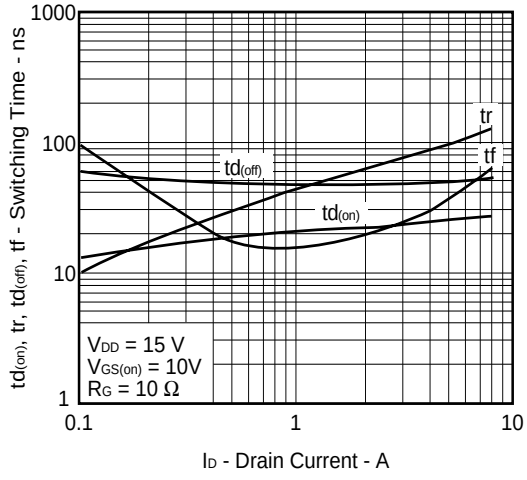
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



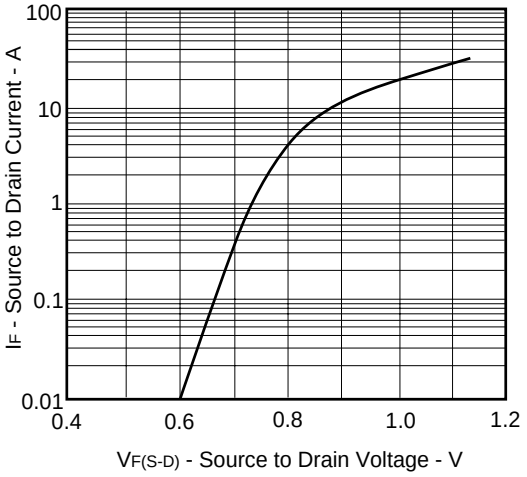
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



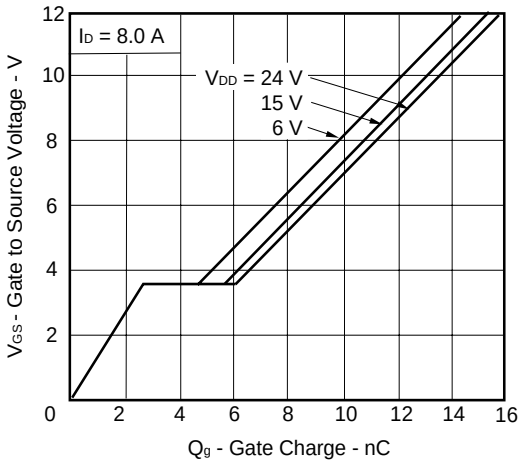
SWITCHING CHARACTERISTICS



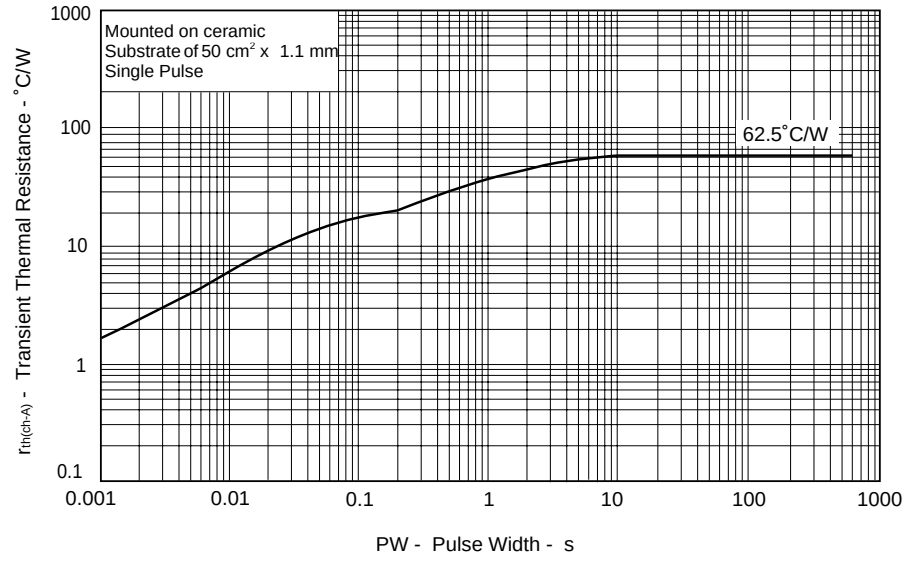
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT CHARACTERISTICS



★ TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



[MEMO]

[MEMO]

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