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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RENESAS

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MOS FIELD EFFECT TRANSISTOR
μPA1820

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μPA1820 is a switching device which can be driven directly by a 2.5 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.

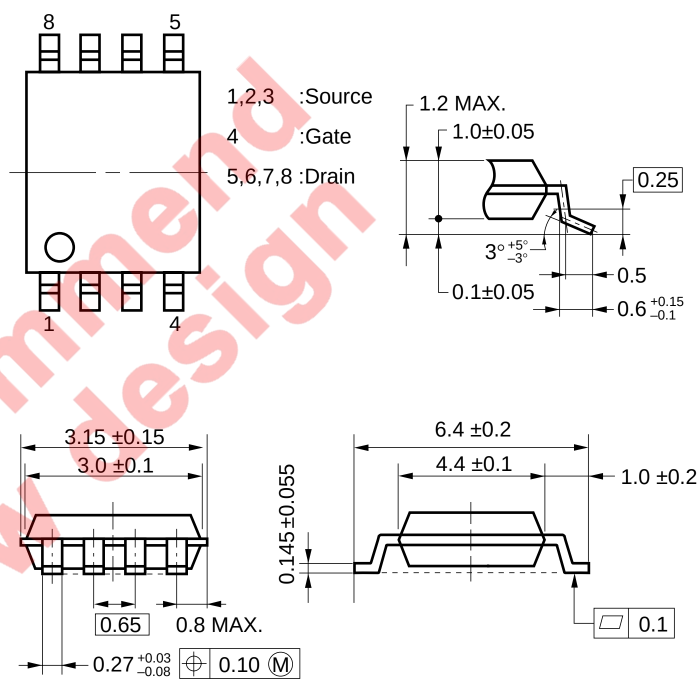
FEATURES

- 2.5 V drive available
- Low on-state resistance
  $R_{DS(on)1}$ = 8.6 mΩ MAX. (V_{GS} = 4.5 V, I_D = 6.0 A)
  $R_{DS(on)2}$ = 8.8 mΩ MAX. (V_{GS} = 4.0 V, I_D = 6.0 A)
  $R_{DS(on)3}$ = 12 mΩ MAX. (V_{GS} = 2.5 V, I_D = 6.0 A)
- Built-in G-S protection diode against ESD

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1820GR-9JG	Power TSSOP8

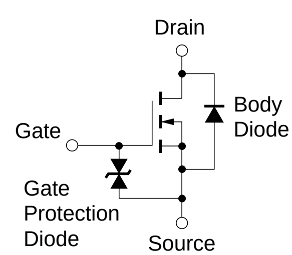
PACKAGE DRAWING (Unit: mm)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	20	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±12	V
Drain Current (DC)	$I_{D(DC)}$	±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	°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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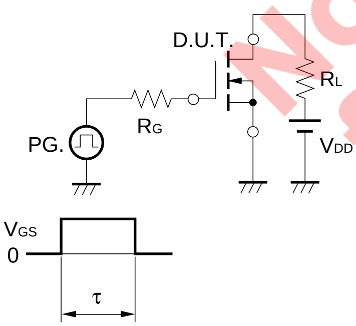
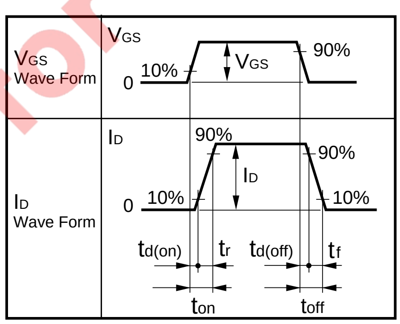
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			1.0	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±12 V, V_{DS} = 0 V			±10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1.0 mA	0.5	1.0	1.5	V
Forward Transfer Admittance	$\| y_{fs} \|$	V_{DS} = 10 V, I_D = 6.0 A	11	21.5		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 4.5 V, I_D = 6.0 A		6.8	8.6	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.0 V, I_D = 6.0 A		7.0	8.8	mΩ
	$R_{DS(on)3}$	V_{GS} = 2.5 V, I_D = 6.0 A		8.7	12	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		2020		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		600		pF
Reverse Transfer Capacitance	C_{rss}	f = 1.0 MHz		430		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 10 V, I_D = 6.0 A		18		ns
Rise Time	t_r	V_{GS} = 4.0 V		56		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		75		ns
Fall Time	t_f			52		ns
Total Gate Charge	Q_G	V_{DD} = 16 V		27		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 4.0 V		2.6		nC
Gate to Drain Charge	Q_{GD}	I_D = 12 A		13		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 12 A, V_{GS} = 0 V		0.81		V
Reverse Recovery Time	t_{rr}	I_F = 12 A, V_{GS} = 0 V		61		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A / μs		40		nC

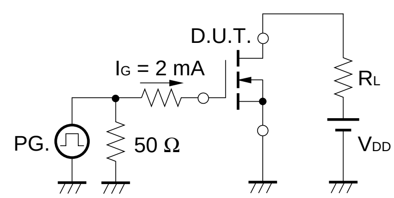
TEST CIRCUIT 1 SWITCHING TIME





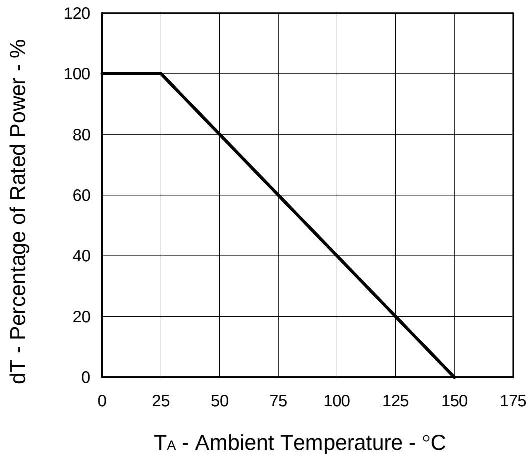
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 2 GATE CHARGE

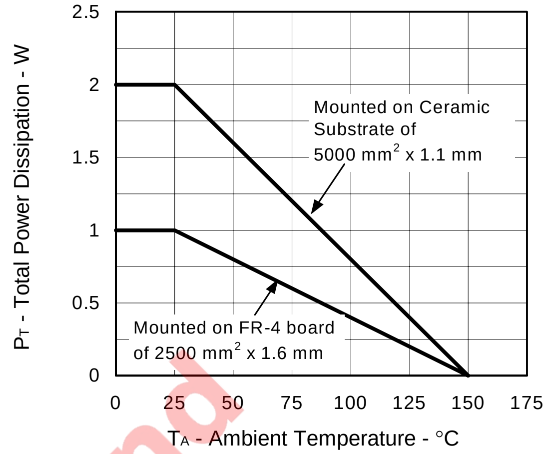


TYPICAL CHARACTERISTICS (TA = 25°C)

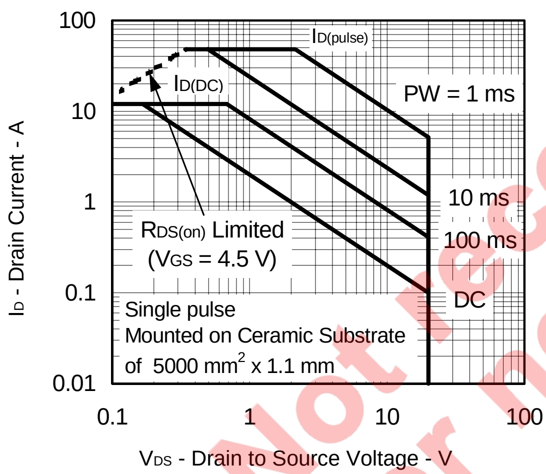
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



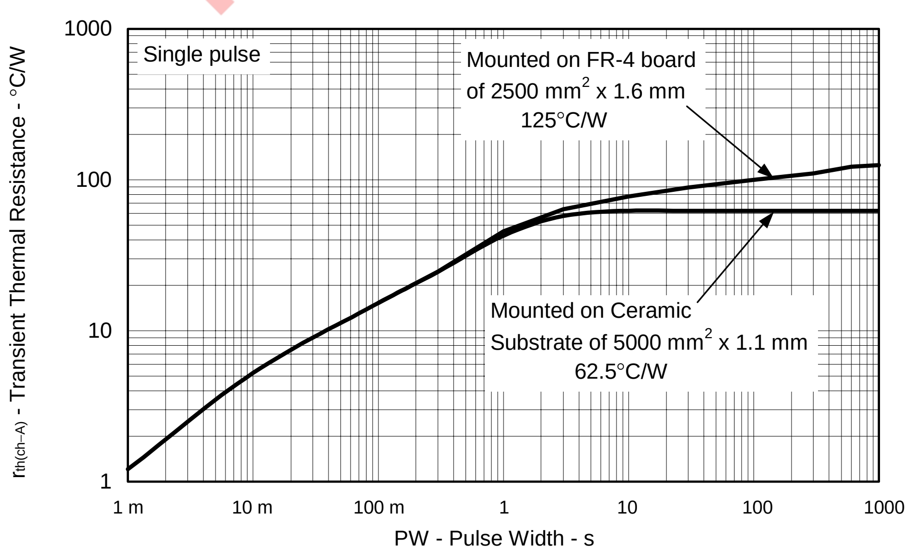
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



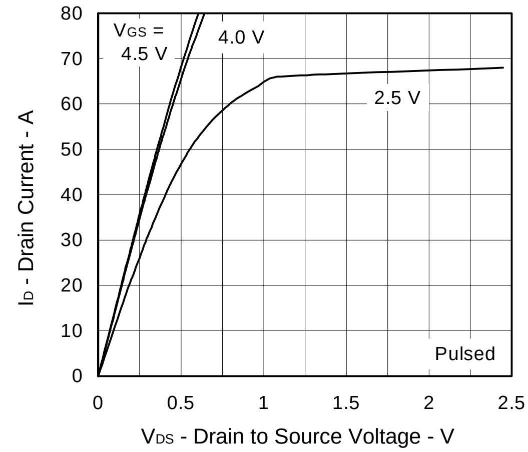
FORWARD BIAS SAFE OPERATING AREA



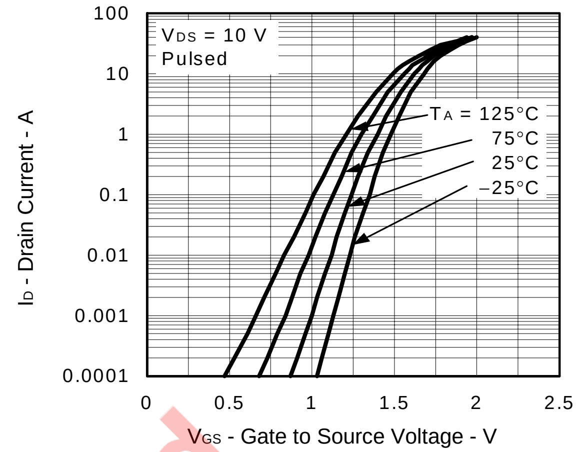
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



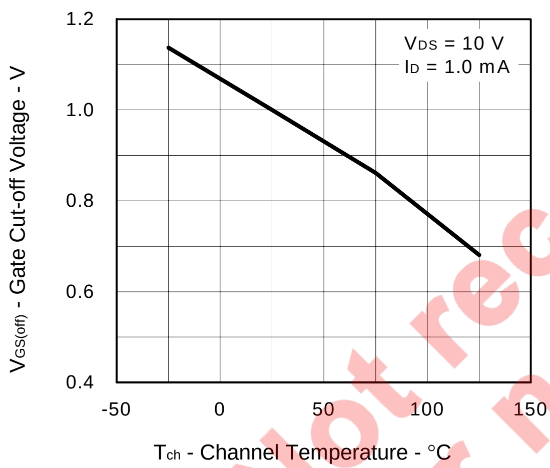
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



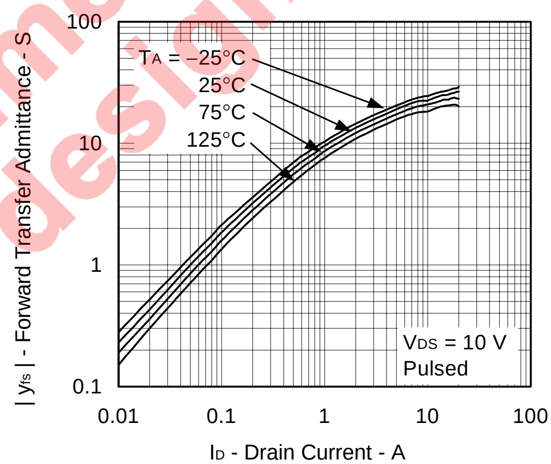
FORWARD TRANSFER CHARACTERISTICS



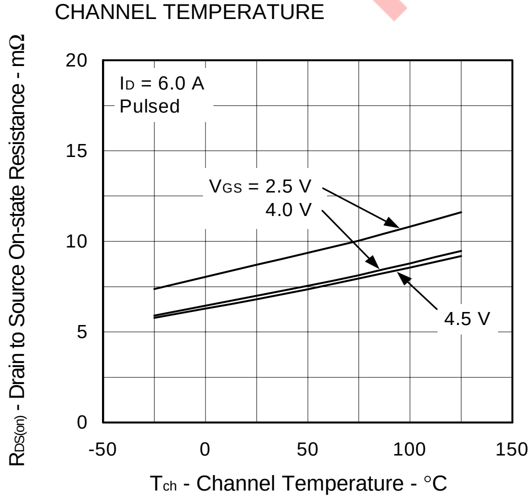
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



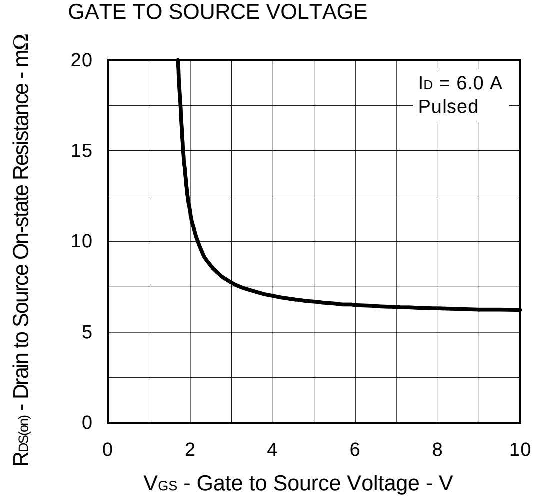
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



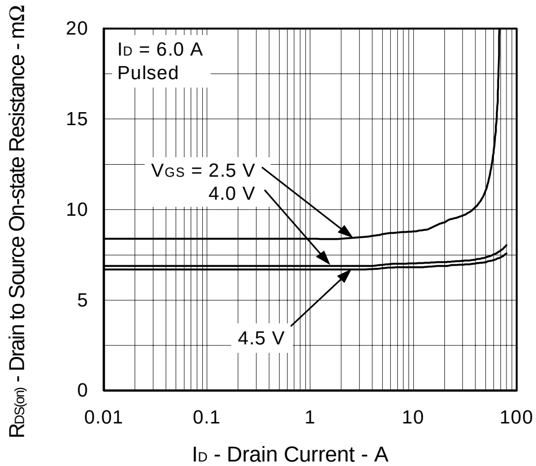
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



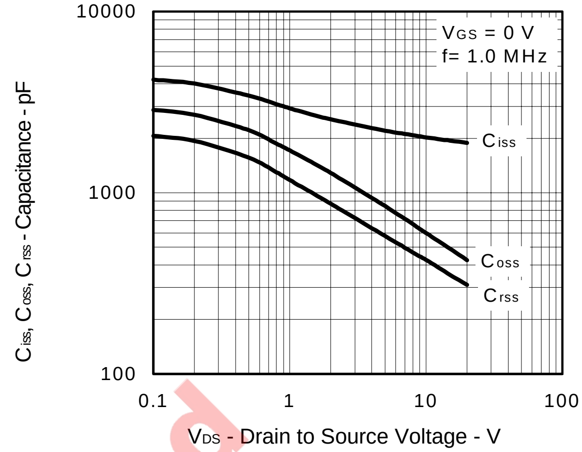
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



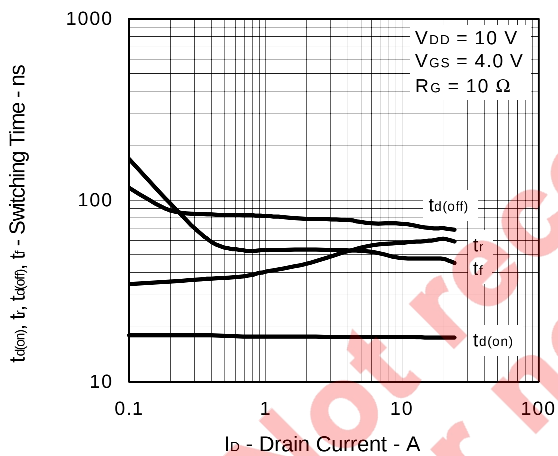
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



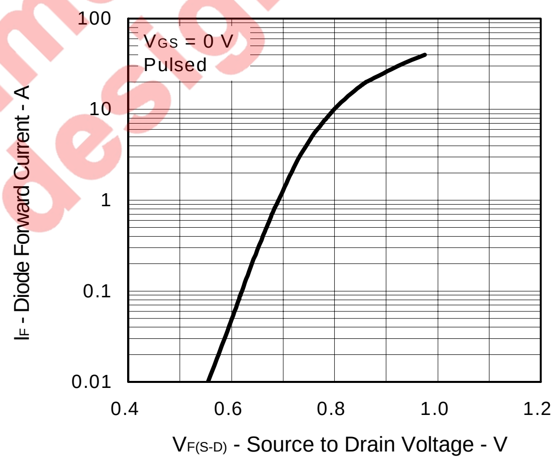
CAPACITANCE vs.
DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE
FORWARD VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS