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

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RENESAS

MOS FIELD EFFECT TRANSISTOR

μPA651TT

P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μPA651TT is a switching device, which can be driven directly by a 1.8 V power source.

This device 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

- 1.8 V drive available
- Low on-state resistance

$R_{DS(on)1}$ = 69 mΩ MAX. (V_{GS} = –4.5 V, I_D = –2.5 A)
$R_{DS(on)2}$ = 88 mΩ MAX. (V_{GS} = –2.5 V, I_D = –2.5 A)
$R_{DS(on)3}$ = 142 mΩ MAX. (V_{GS} = –1.8 V, I_D = –1.5 A)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA651TT	6pinWSOF (1620)

Marking: WE

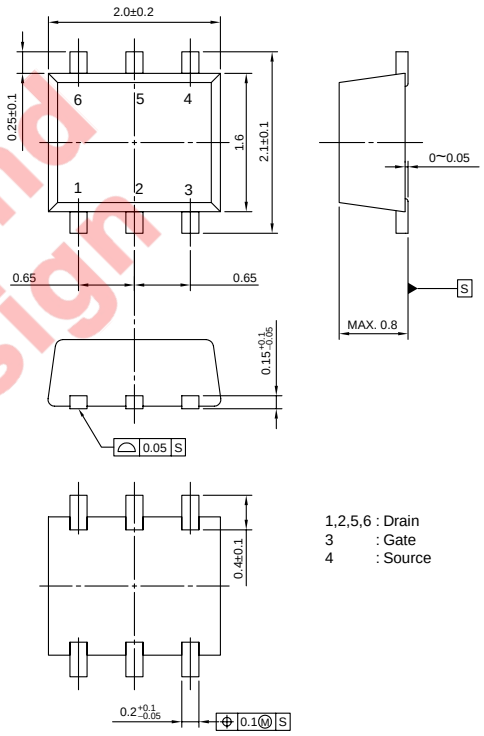
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	–20	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	∓8.0	V
Drain Current (DC) (T_A = 25°C)	$I_{D(DC)}$	∓5.0	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	∓20	A
Total Power Dissipation (T_A = 25°C)	P_{T1}	0.2	W
Total Power Dissipation (T_A = 25°C) Note2	P_{T2}	1.4	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

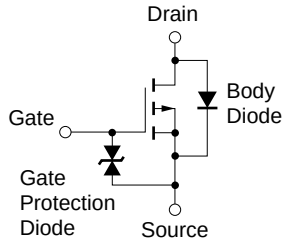
Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Mounted on FR-4 board, t ≤ 5 sec.

PACKAGE DRAWING (Unit: mm)



EQUIVALENT CIRCUIT



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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Date Published May 2002 NS CP(K)
Printed in Japan

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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} = –20 V, V_{GS} = 0 V			–10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ∓8.0 V, V_{DS} = 0 V			∓10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = –10 V, I_D = –1.0 mA	–0.45		–1.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = –10 V, I_D = –2.5 A	4.0			S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = –4.5 V, I_D = –2.5 A		55	69	mΩ
	$R_{DS(on)2}$	V_{GS} = –2.5 V, I_D = –2.5 A		66	88	mΩ
	$R_{DS(on)3}$	V_{GS} = –1.8 V, I_D = –1.5 A		85	142	mΩ
Input Capacitance	C_{iss}	V_{DS} = –10 V		600		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		120		pF
Reverse Transfer Capacitance	C_{rss}	f = 1.0 MHz		75		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = –10 V, I_D = –2.5 A		45		ns
Rise Time	t_r	V_{GS} = –4.0 V		200		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		435		ns
Fall Time	t_f			345		ns
Total Gate Charge	Q_G	V_{DD} = –16 V		5.5		nC
Gate to Source Charge	Q_{GS}	V_{GS} = –4.0 V		1.2		nC
Gate to Drain Charge	Q_{GD}	I_D = –5.0 A		2.1		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 5.0 A, V_{GS} = 0 V		0.94		V

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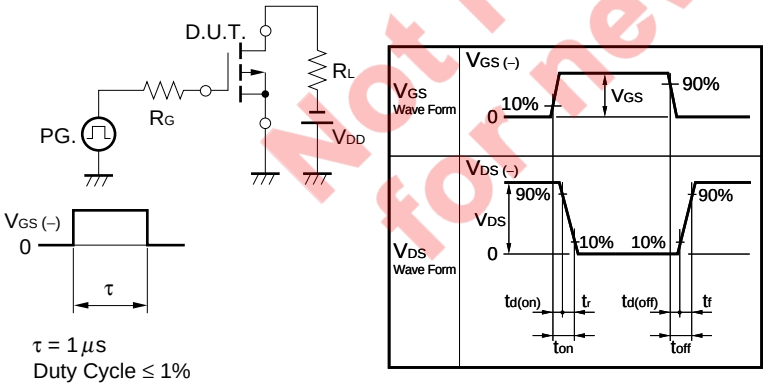
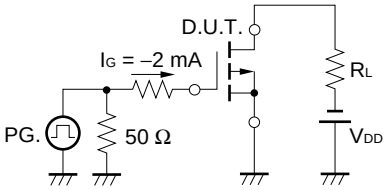
TEST CIRCUIT 1 SWITCHING TIME



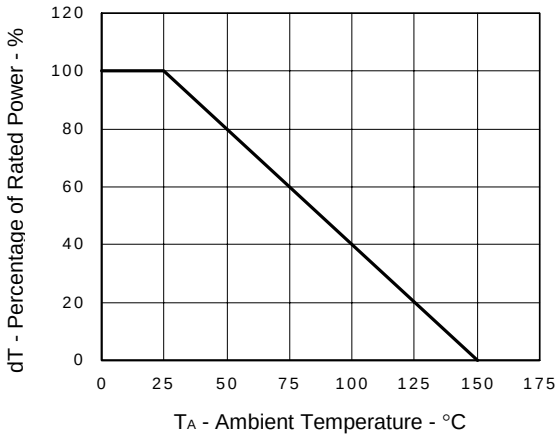
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 2 GATE CHARGE

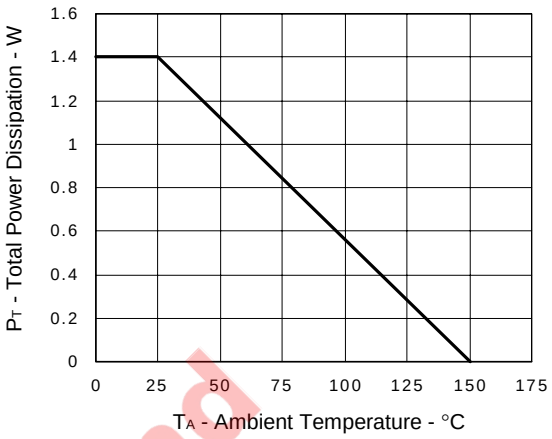


TYPICAL CHARACTERISTICS (T_A = 25°C)

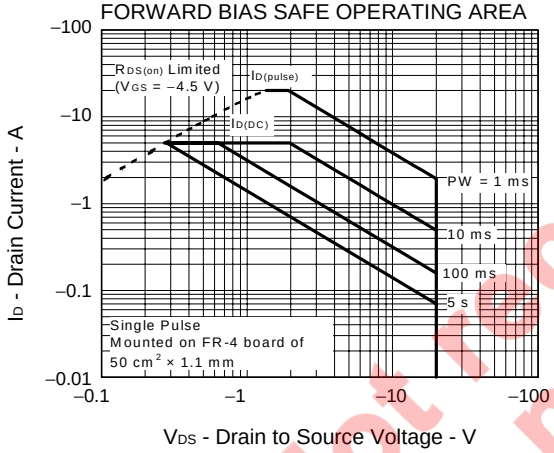
DERATING FACTOR FORWARD BIAS SAFE OPERATING AREA



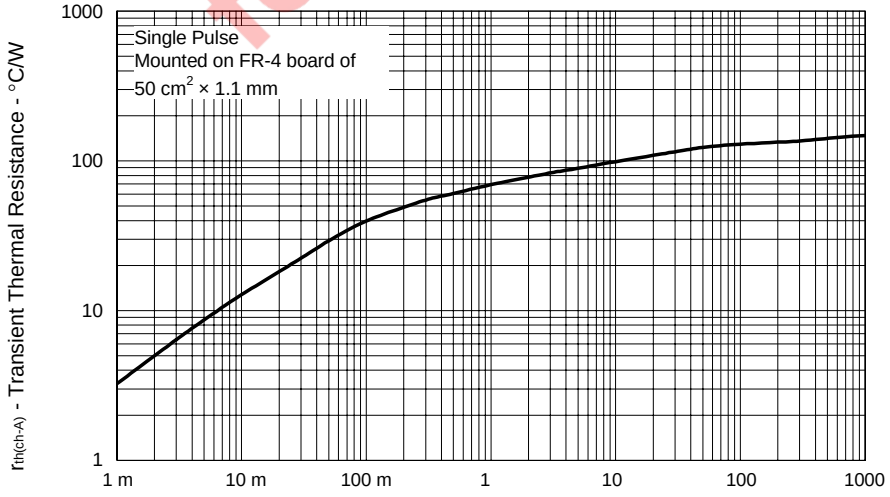
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



FORWARD BIAS SAFE OPERATING AREA



TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



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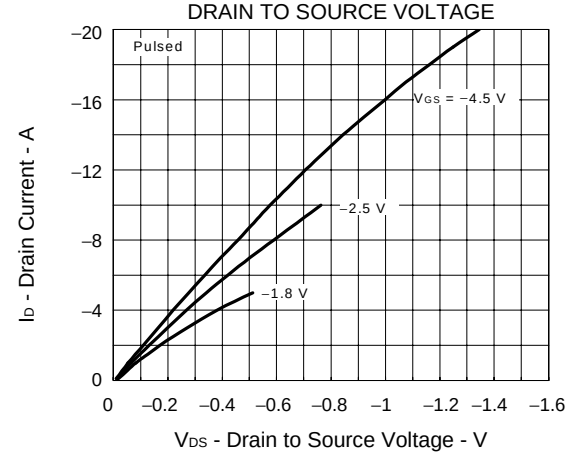
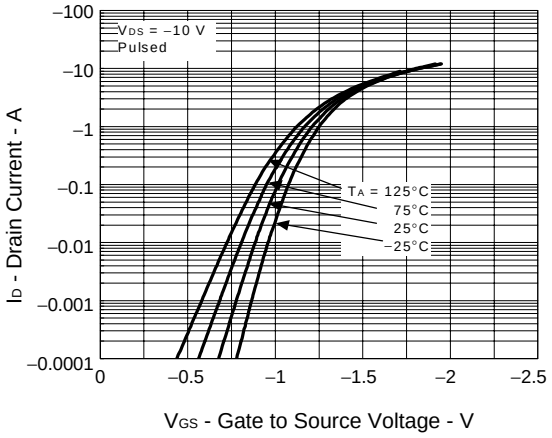
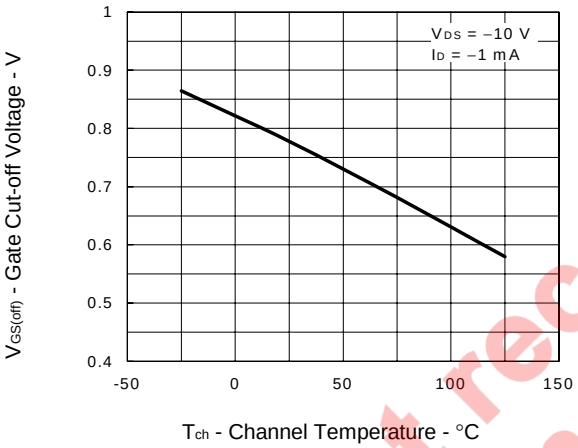
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



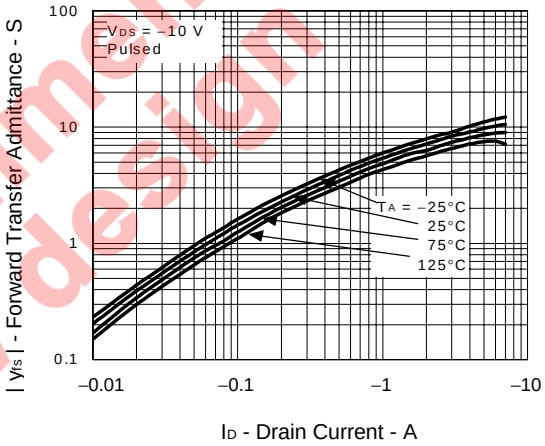
FORWARD TRANSFER CHARACTERISTICS



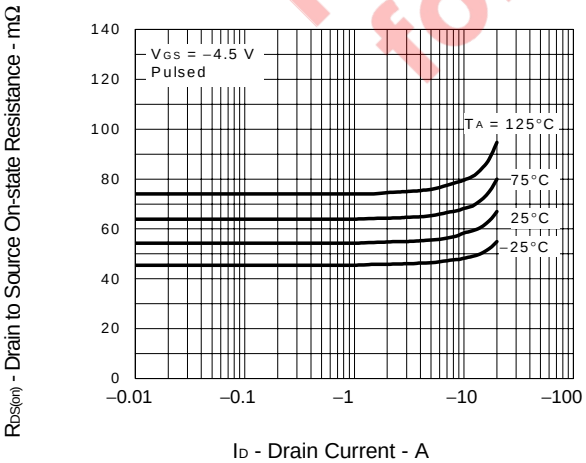
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



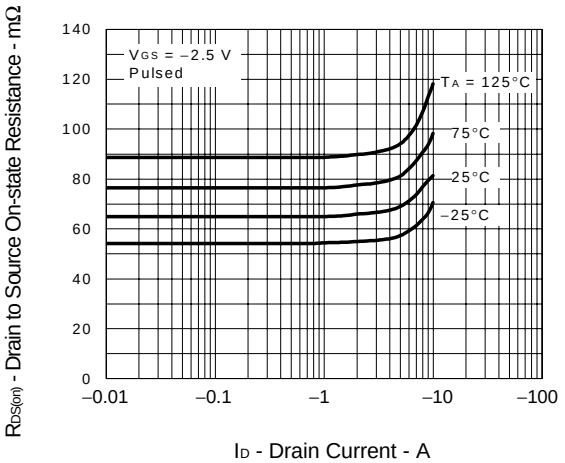
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



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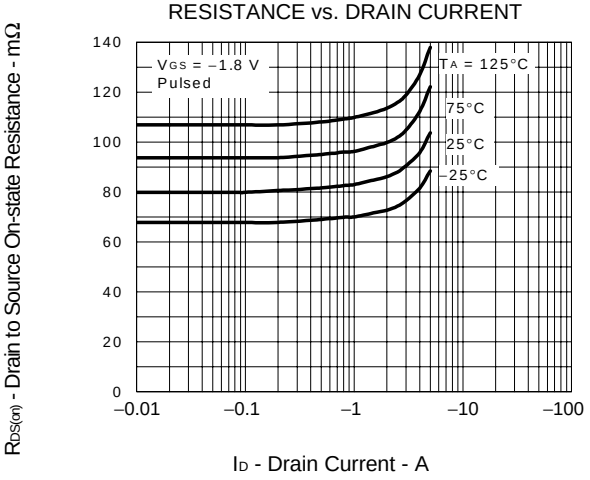
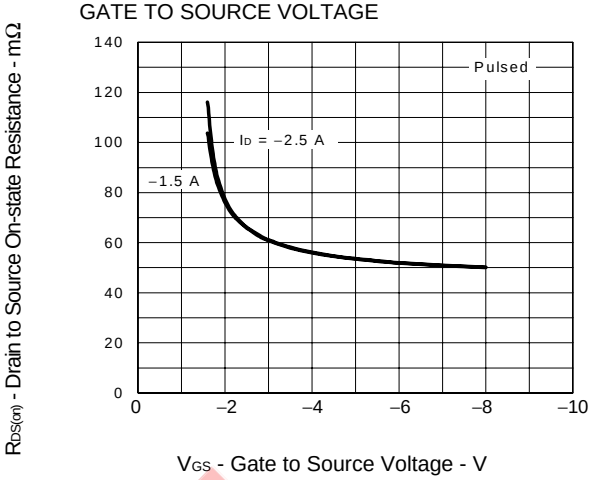
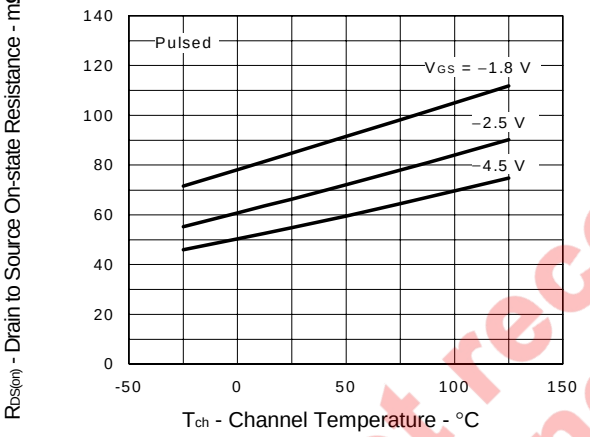
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



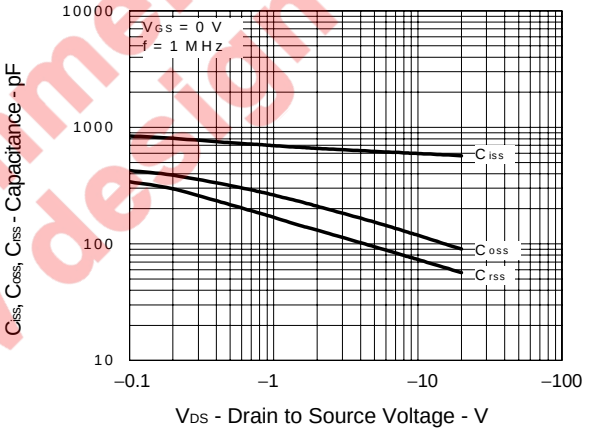
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



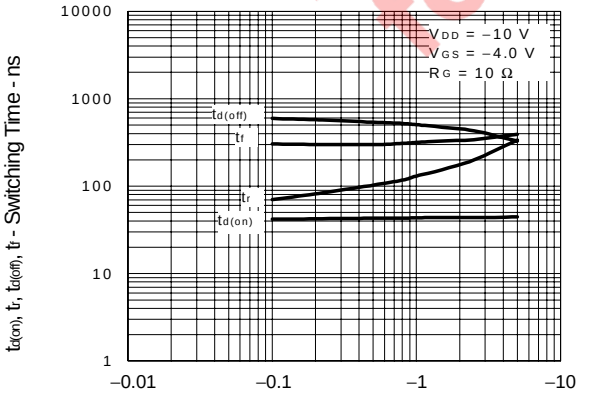
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



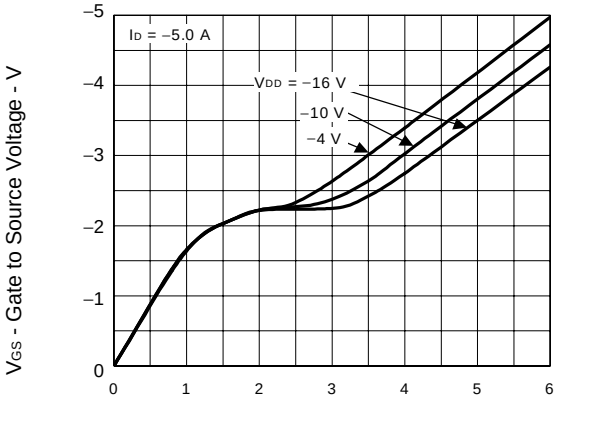
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



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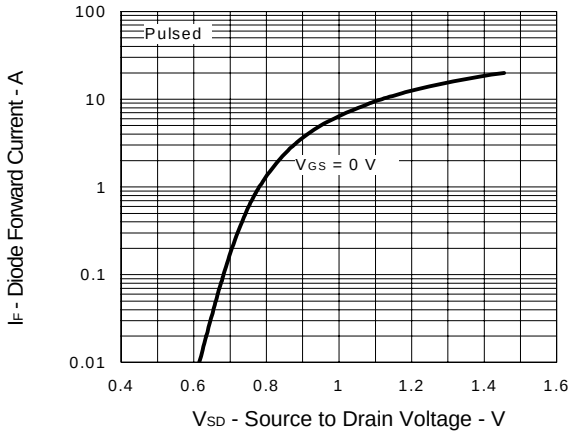
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



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