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

MOS FIELD EFFECT TRANSISTOR

μPA654TT

P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μPA654TT is a switching device, which can be driven directly by a 1.8 V power source, and it is suitable for applications such as power switch of portable equipment and so on.

FEATURES

- 1.8 V drive available
- Low on-state resistance
  $R_{DS(on)1}$ = 88 mΩ MAX. (V_{GS} = –4.5 V, I_D = –1.5 A)
  $R_{DS(on)2}$ = 133 mΩ MAX. (V_{GS} = –2.5 V, I_D = –1.5 A)
  $R_{DS(on)3}$ = 234 mΩ MAX. (V_{GS} = –1.8 V, I_D = –1.0 A)

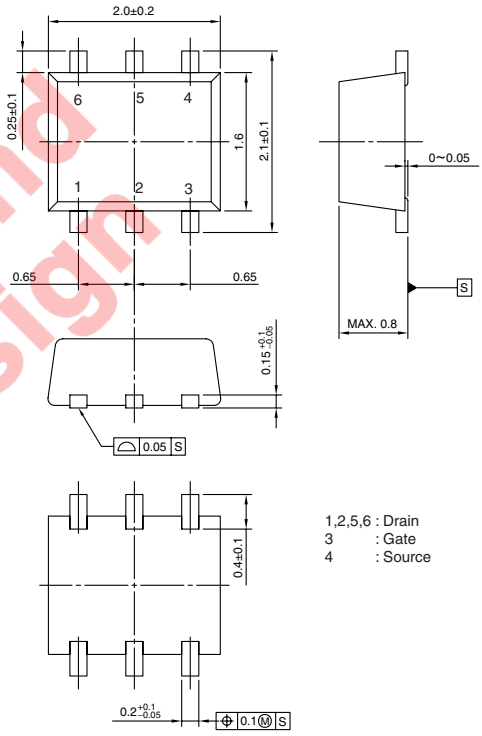
ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA654TT-E1-A	6pinWSOF (1620)
μPA654TT-E2-A	

Marking: WH

Remark "-A"indicates Pb-free (This product does not contain Pb in external electrode and other parts.). "-E1", "-E2"indicates the unit orientation. (8 mm embossed carrier tape, 3000 pcs/reel)

PACKAGE DRAWING (Unit: mm)



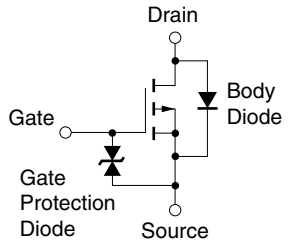
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	–12	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	∓8.0	V
Drain Current (DC) Note1	$I_{D(DC)}$	∓2.5	A
Drain Current (pulse) Note2	$I_{D(pulse)}$	∓10	A
Total Power Dissipation 1	P_{T1}	0.2	W
Total Power Dissipation 2 Note1	P_{T2}	1.3	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Notes 1. Mounted on FR-4 board of 5000 mm² x 1.1 mm, t ≤ 5 sec.

2. PW ≤ 10 μs, Duty Cycle ≤ 1%

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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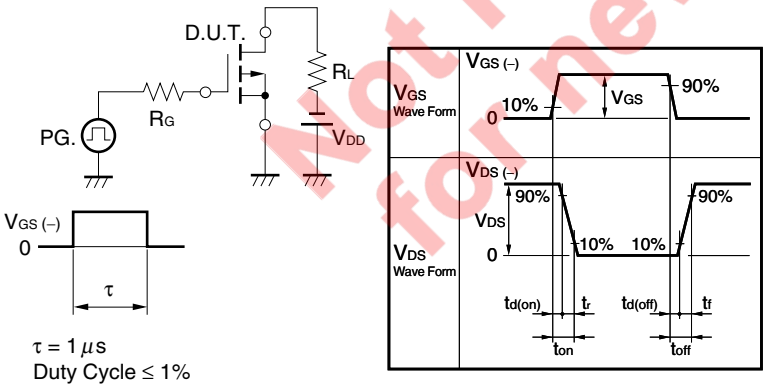
Date Published October 2005 NS CP(K)
Printed in Japan

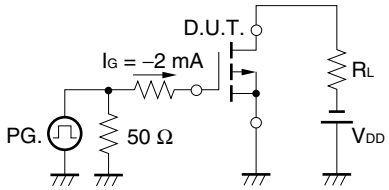
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –12 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	–0.75	–1.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = –10 V, I_D = –1.5 A	1.0	4.7		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = –4.5 V, I_D = –1.5 A		70	88	mΩ
	$R_{DS(on)2}$	V_{GS} = –2.5 V, I_D = –1.5 A		100	133	mΩ
	$R_{DS(on)3}$	V_{GS} = –1.8 V, I_D = –1.0 A		140	234	mΩ
Input Capacitance	C_{iss}	V_{DS} = –10 V		250		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		83		pF
Reverse Transfer Capacitance	C_{rss}	f = 1.0 MHz		40		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = –6.0 V, I_D = –1.5 A		16		ns
Rise Time	t_r	V_{GS} = –4.0 V		90		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		173		ns
Fall Time	t_f			138		ns
Total Gate Charge	Q_G	V_{DD} = –10 V		2.7		nC
Gate to Source Charge	Q_{GS}	V_{GS} = –4.0 V		0.5		nC
Gate to Drain Charge	Q_{GD}	I_D = –2.5 A		0.8		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 2.5 A, V_{GS} = 0 V		0.87		V

TEST CIRCUIT 1 SWITCHING TIME

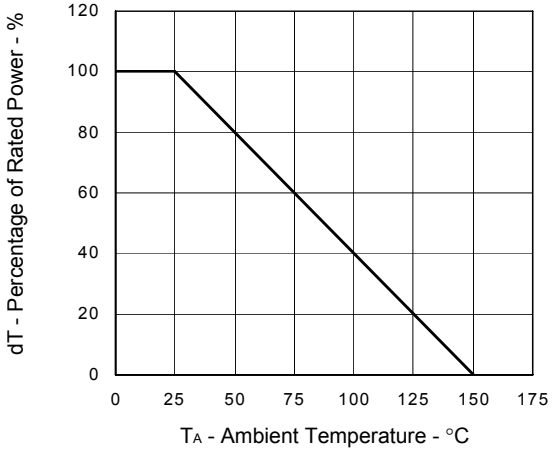


TEST CIRCUIT 2 GATE CHARGE

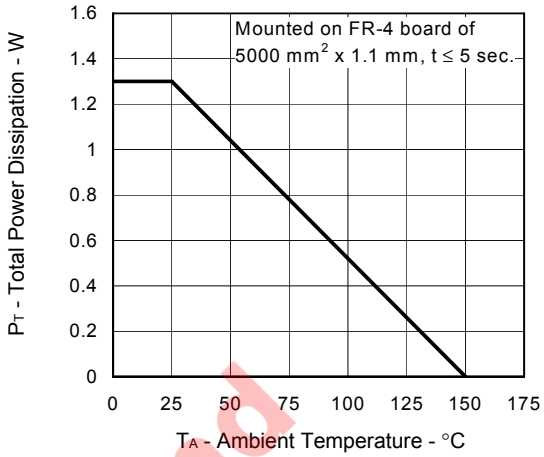


TYPICAL CHARACTERISTICS (T_A = 25°C)

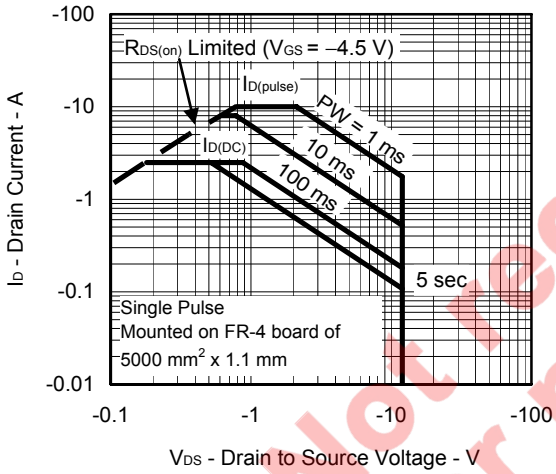
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



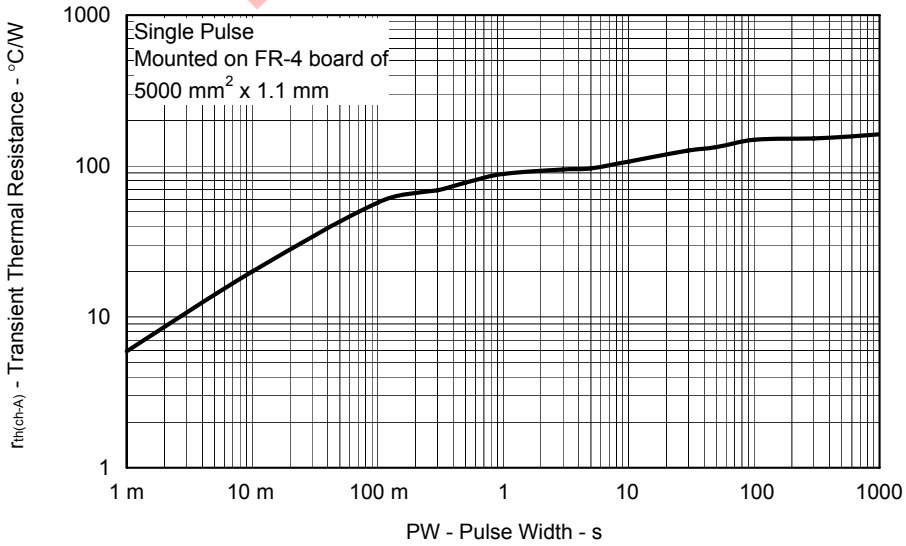
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



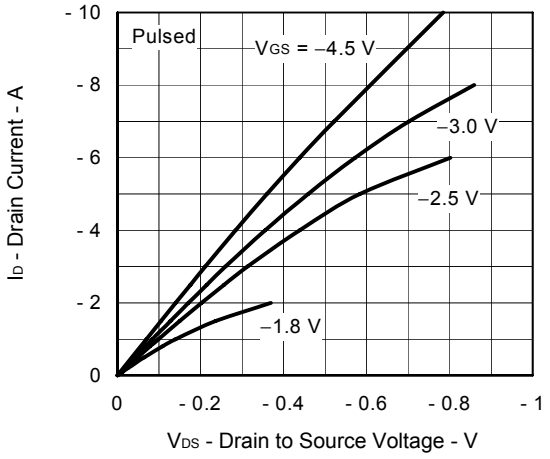
FORWARD BIAS SAFE OPERATING AREA



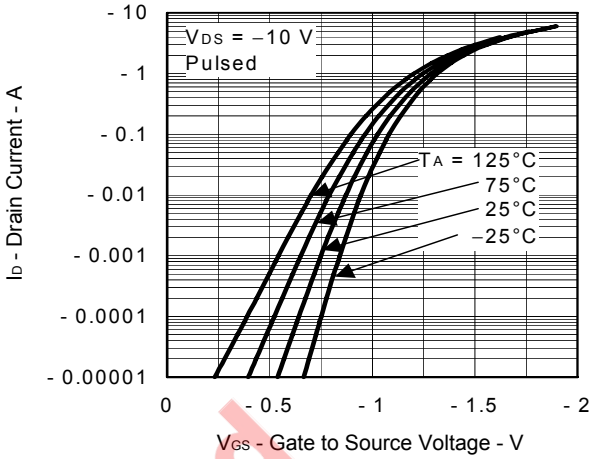
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



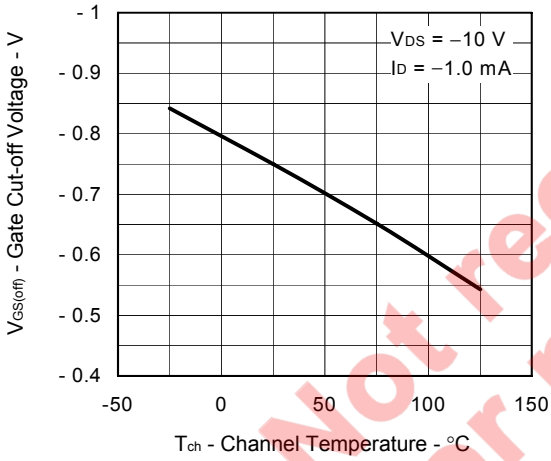
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



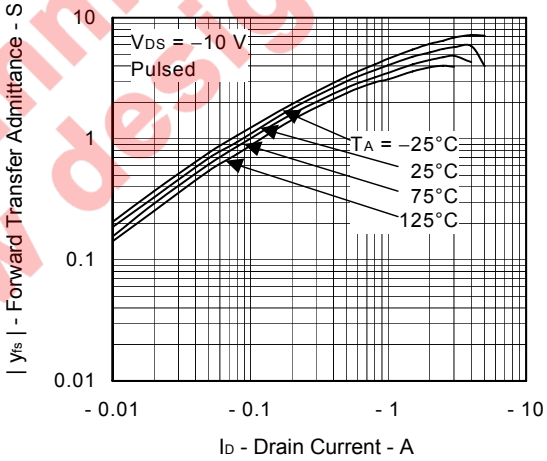
FORWARD TRANSFER CHARACTERISTICS



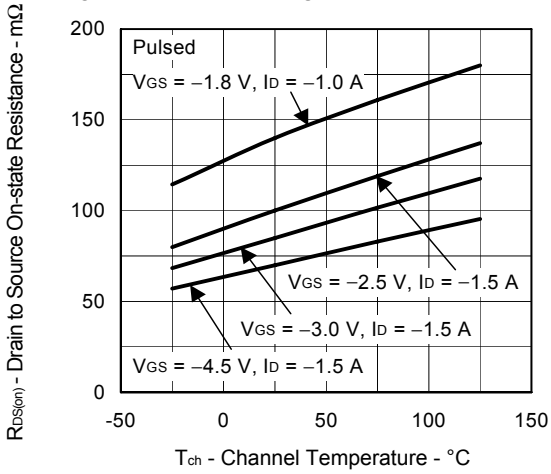
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



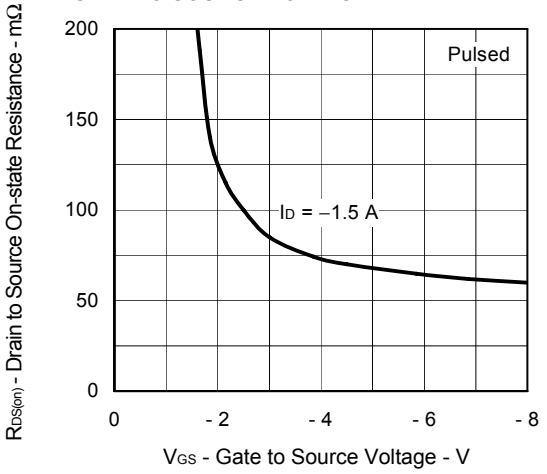
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



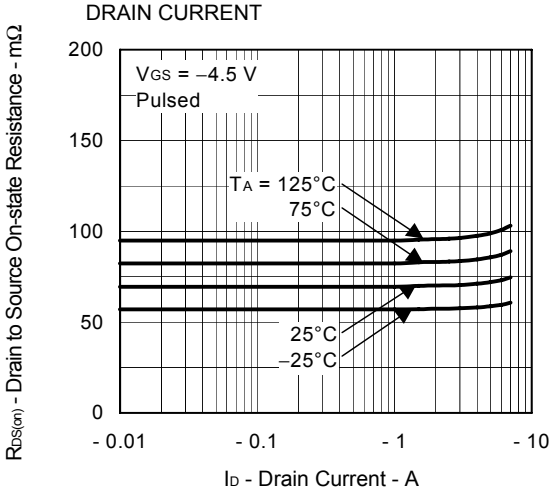
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



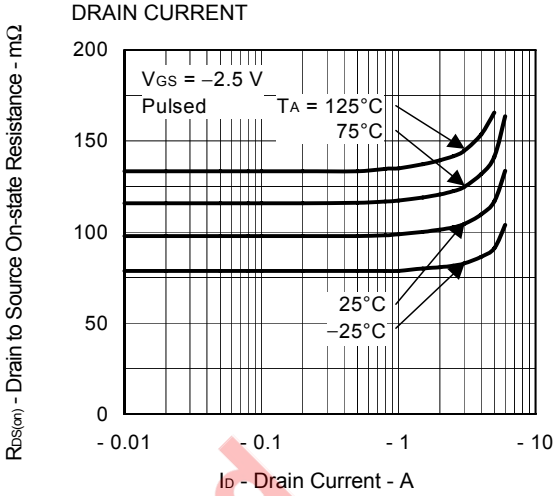
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



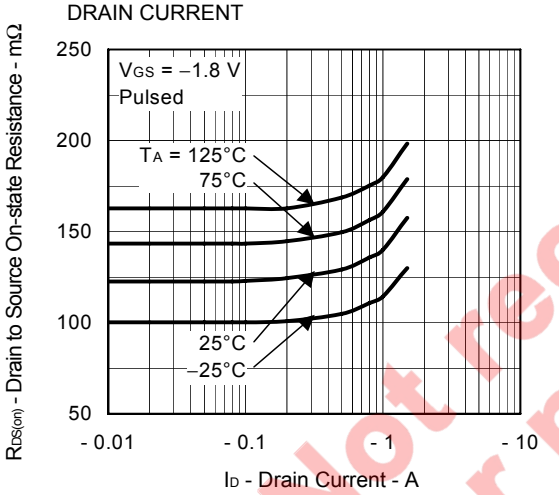
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



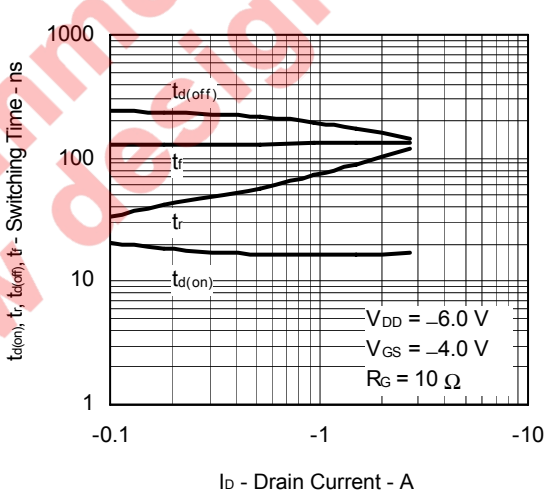
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



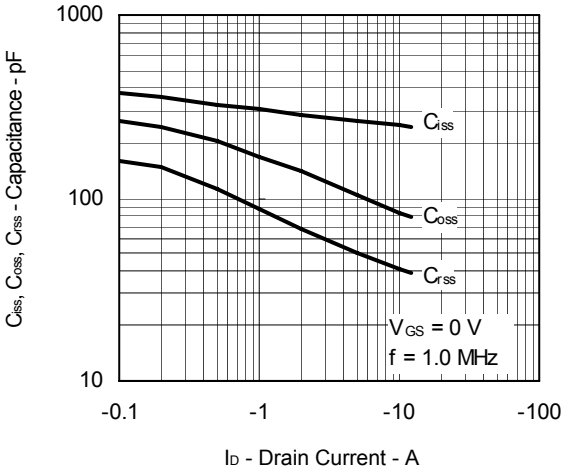
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



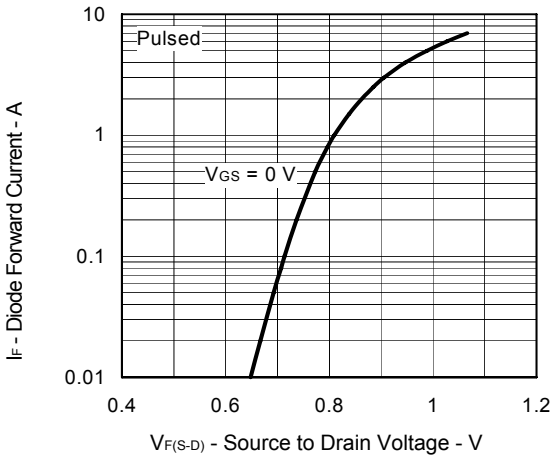
SWITCHING CHARACTERISTICS



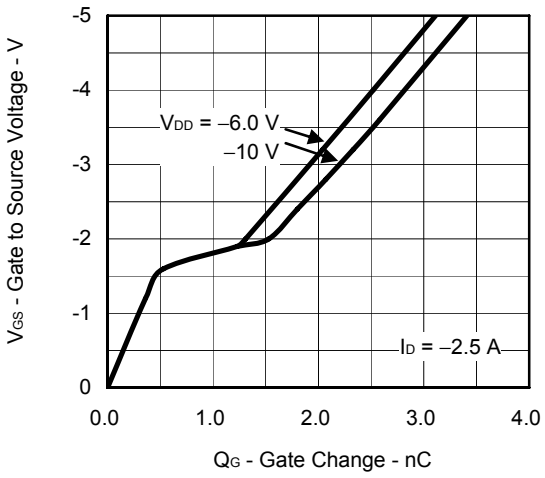
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT CHARACTERISTICS



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