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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DATA SHEET

RENESAS

MOS FIELD EFFECT TRANSISTOR

μPA2701TP

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The μPA2701TP, which has a heat spreader, is N-Channel MOS Field Effect Transistor designed for DC/DC converter and power management applications of notebook computers.

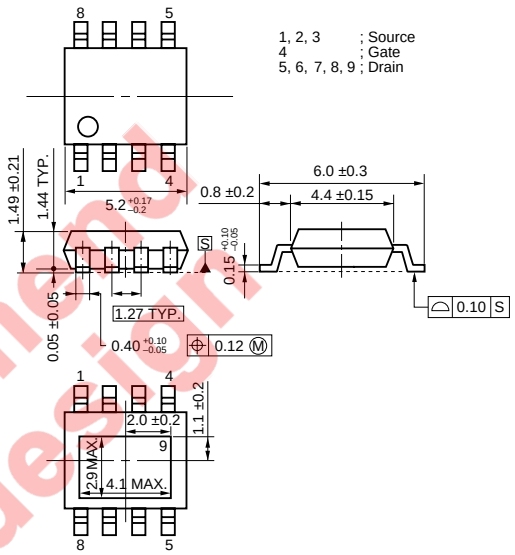
FEATURES

- Low on-state resistance
  $R_{DS(on)1}$ = 7.5 mΩ MAX. (V_{GS} = 10 V, I_D = 7.0 A)
  $R_{DS(on)2}$ = 11.6 mΩ MAX. (V_{GS} = 4.5 V, I_D = 7.0 A)
- Low C_{iss}: C_{iss} = 1200 pF TYP. (V_{DS} = 10 V, V_{GS} = 0 V)
- Small and surface mount package (Power HSOP8)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA2701TP	Power HSOP8

PACKAGE DRAWING (Unit: mm)

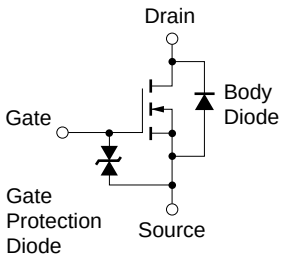


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ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, Unless otherwise noted, All terminals are connected.)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	30	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±20	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)1}$	±35	A
Drain Current (DC) (T_A = 25°C) Note1	$I_{D(DC)2}$	±16	A
Drain Current (pulse) Note2	$I_{D(pulse)}$	±80	A
Total Power Dissipation (T_C = 25°C)	P_{T1}	28	W
Total Power Dissipation (T_A = 25°C) Note1	P_{T2}	3	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C
Single Avalanche Current Note3	I_{AS}	18	A
Single Avalanche Energy Note3	E_{AS}	32.4	mJ

EQUIVALENT CIRCUIT



Notes 1. Mounted on a glass epoxy board (1 inch x 1 inch x 0.8 mm), PW = 10 sec
2. PW ≤ 10 μs, Duty Cycle ≤ 1%
3. Starting T_{ch} = 25°C, V_{DD} = 15 V, R_G = 25 Ω, L = 100 μH, V_{GS} = 20 → 0 V

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 extemally required if a voltage exceeding the rated voltage may be applied to this device.

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Document No. G15844EJ2V0DS00 (2nd edition)
Date Published May 2002 NS CP(K)
Printed in Japan

The mark ★ shows major revised points.

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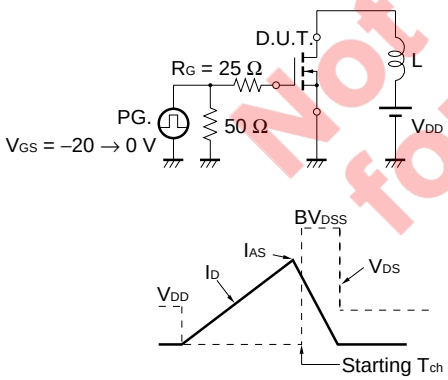
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ELECTRICAL CHARACTERISTICS (T_A = 25°C, Unless otherwise noted, All terminals are connected.)

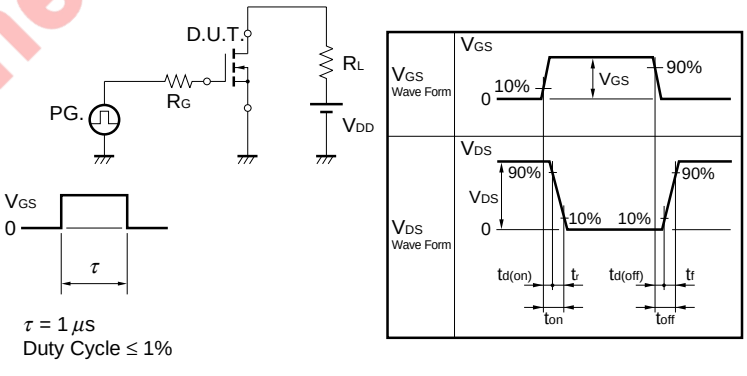
	CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
	Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			10	μA
★	Gate Leakage Current	I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0 V			±10	μA
	Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	1.5	2.0	2.5	V
	Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 7.0 A	7	14		S
	Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 7.0 A		6.2	7.5	mΩ
		$R_{DS(on)2}$	V_{GS} = 4.5 V, I_D = 7.0 A		8.7	11.6	mΩ
		$R_{DS(on)3}$	V_{GS} = 4.0 V, I_D = 7.0 A		10.3	13.7	mΩ
	Input Capacitance	C_{iss}	V_{DS} = 10 V		1200		pF
	Output Capacitance	C_{oss}	V_{GS} = 0 V		500		pF
	Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		160		pF
	Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 15 V, I_D = 7.0 A		10		ns
	Rise Time	t_r	V_{GS} = 10 V		13		ns
	Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		44		ns
	Fall Time	t_f			11		ns
	Total Gate Charge	Q_G	V_{DD} = 15 V		12		nC
	Gate to Source Charge	Q_{GS}	V_{GS} = 5 V		4		nC
	Gate to Drain Charge	Q_{GD}	I_D = 14 A		6		nC
	Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 14 A, V_{GS} = 0 V		0.8	1.2	V
	Reverse Recovery Time	t_{rr}	I_F = 14 A, V_{GS} = 0 V		32		ns
	Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/ μs		27		nC

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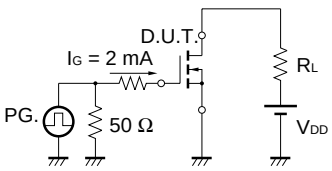
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME



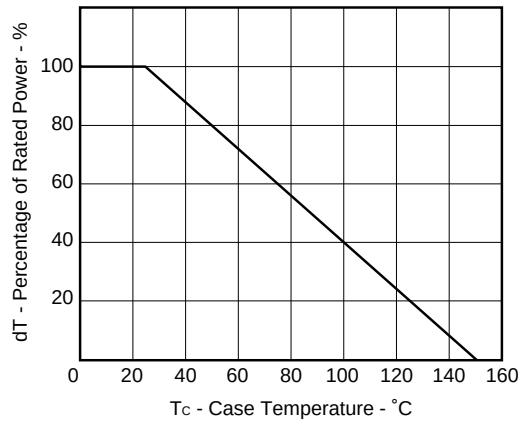
TEST CIRCUIT 3 GATE CHARGE



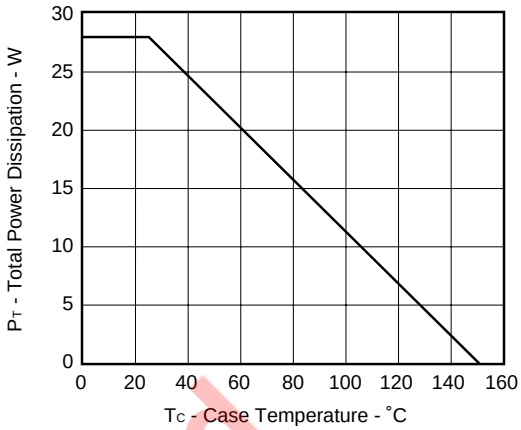
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TYPICAL CHARACTERISTICS (T_A = 25°C)

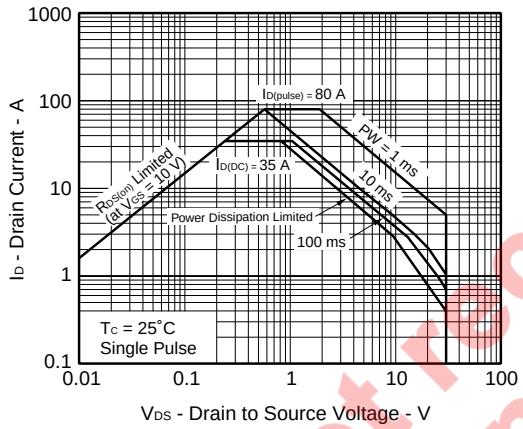
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



TOTAL POWER DISSIPATION vs. CASE TEMPERATURE

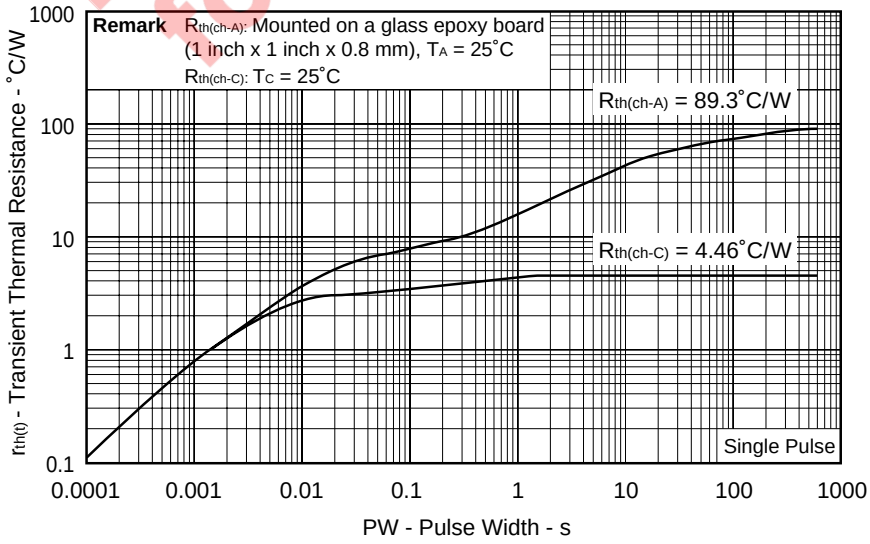


FORWARD BIAS SAFE OPERATING AREA



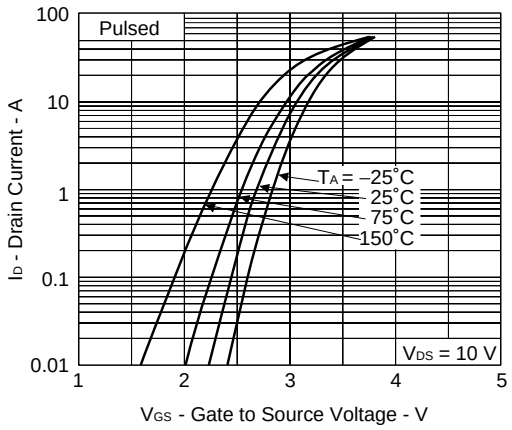
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TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

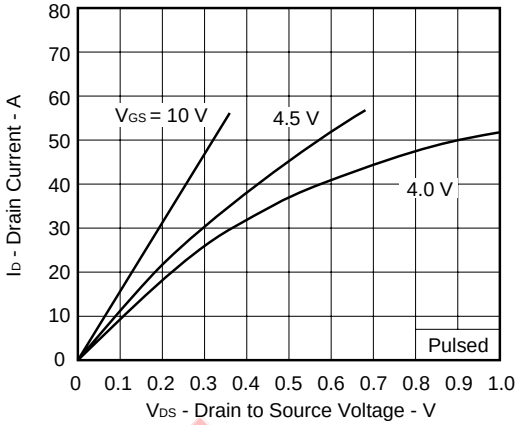


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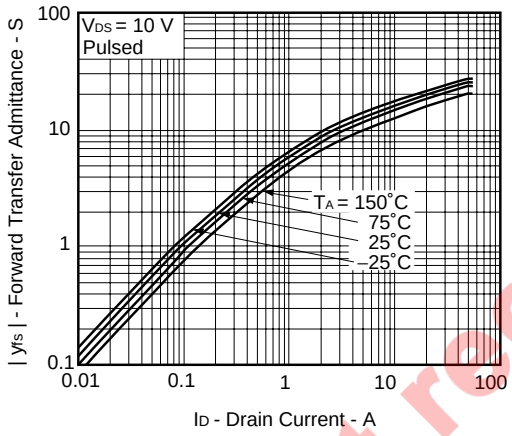
FORWARD TRANSFER CHARACTERISTICS



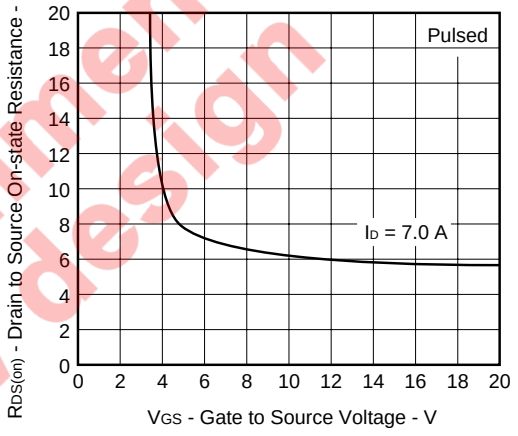
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



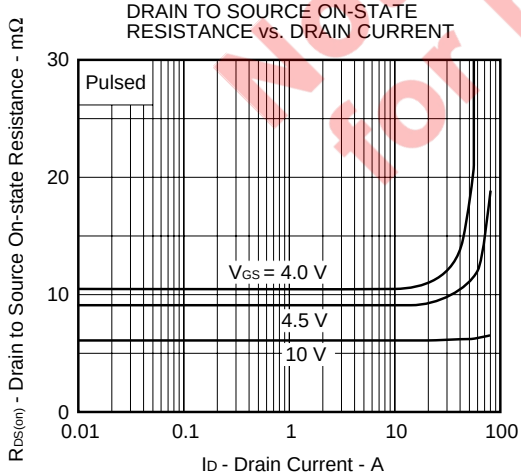
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



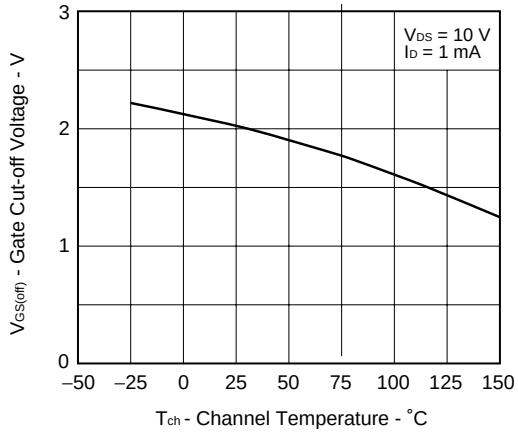
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



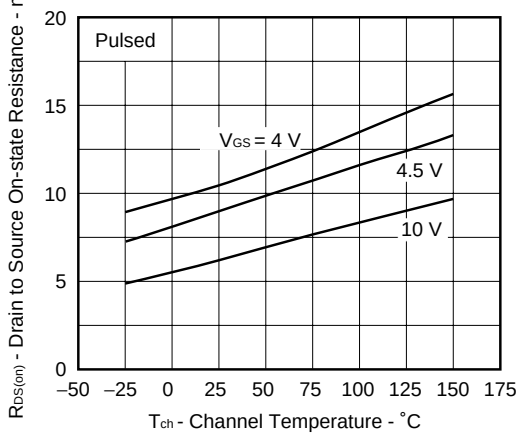
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



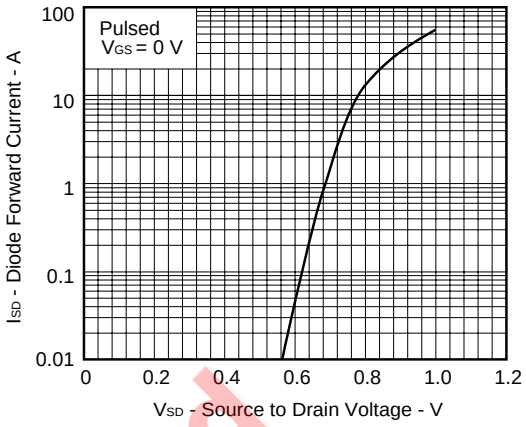
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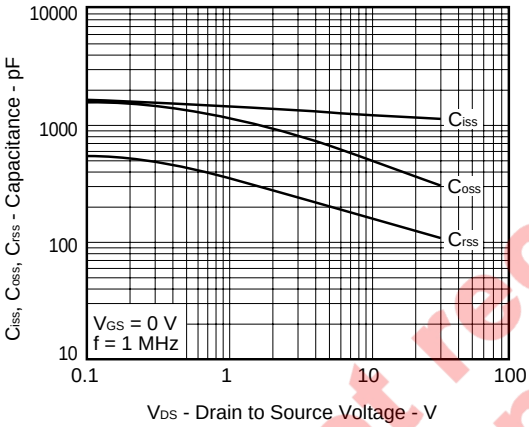
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



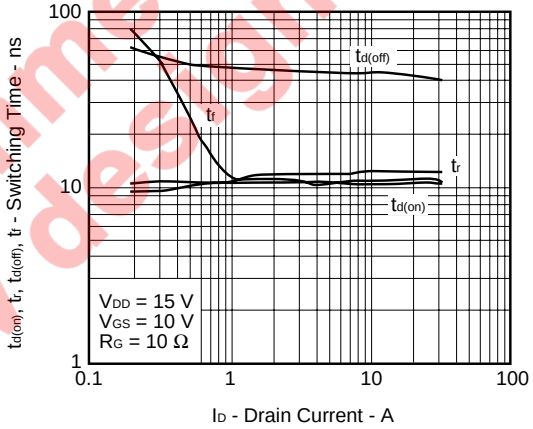
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



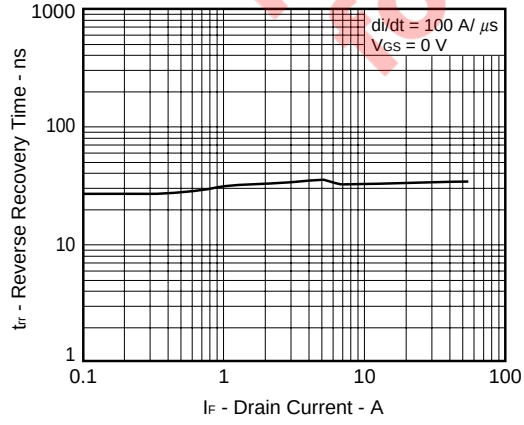
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



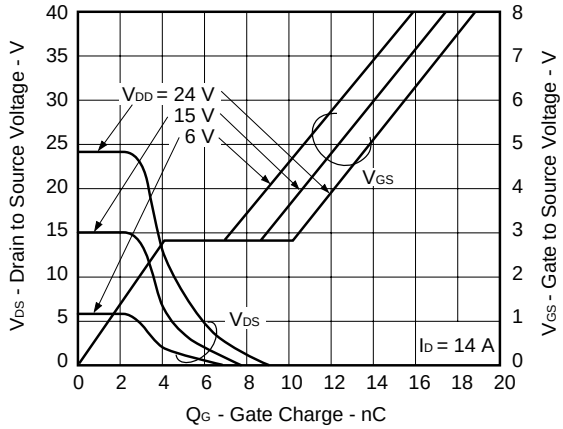
SWITCHING CHARACTERISTICS



REVERSE RECOVERY TIME vs. DRAIN CURRENT



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



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