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April 1st, 2010
Renesas Electronics Corporation

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DATA SHEET

RENESAS

MOS FIELD EFFECT TRANSISTOR

μPA2715GR

SWITCHING
P-CHANNEL POWER MOS FET

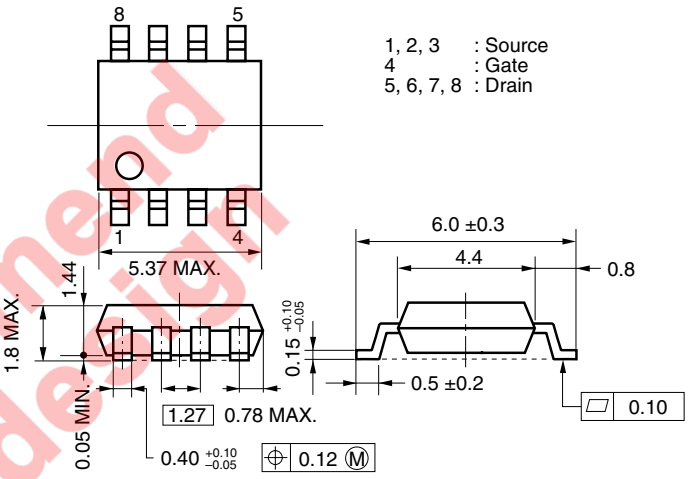
DESCRIPTION

The μPA2715GR is P-Channel MOS FET designed for power management applications of notebook computers and Li-ion battery protection circuit.

FEATURES

- Low on-state resistance
  $R_{DS(on)1}$ = 4.6 mΩ MAX. (V_{GS} = –10 V, I_D = –9.0 A)
  $R_{DS(on)2}$ = 9.0 mΩ MAX. (V_{GS} = –4.5 V, I_D = –9.0 A)
- Low C_{iss}: C_{iss} = 3500 pF TYP.
- Built-in gate protection diode
- Small and surface mount package (Power SOP8)

PACKAGE DRAWING (Unit: mm)



ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA2715GR-E1-A[Note]	Power SOP8
μPA2715GR-E2-A[Note]	Power SOP8

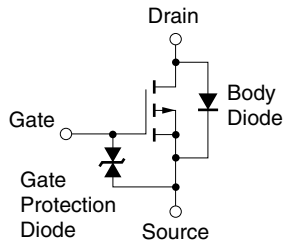
Note Pb-free (This product does not contain Pb in external electrode and other parts.)

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ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, 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)	$I_{D(DC)}$	∓18	A
Drain Current (pulse) [Note1]	$I_{D(pulse)}$	∓150	A
Total Power Dissipation [Note2]	P_{T1}	1.1	W
Total Power Dissipation (PW = 10 sec) [Note2]	P_{T2}	2.5	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. PW ≤ 10 μs, Duty Cycle ≤ 1%
2. Mounted on a glass epoxy board of 25.4 mm^2 × 0.8 mm, PW = 10 sec
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 externally required if a voltage exceeding the rated voltage may be applied to this device.

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Date Published June 2006 NS CP(K)
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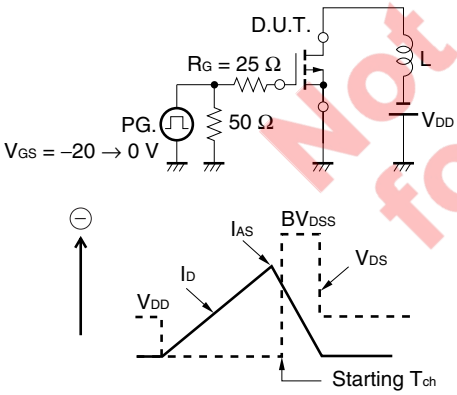
ELECTRICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = −30 V, V_{GS} = 0 V			−1	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	−1.0		−2.5	V
Forward Transfer Admittance Note	$\|y_{fs}\|$	V_{DS} = −10 V, I_D = −9.0 A	16			S
Drain to Source On-state Resistance Note	$R_{DS(on)1}$	V_{GS} = −10 V, I_D = −9.0 A		3.9	4.6	mΩ
	$R_{DS(on)2}$	V_{GS} = −4.5 V, I_D = −9.0 A		6.2	9.0	mΩ
Input Capacitance	C_{iss}	V_{DS} = −10 V		3500		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		1250		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		560		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = −15 V		16		ns
Rise Time	t_r	I_D = −9.0 A		25		ns
Turn-off Delay Time	$t_{d(off)}$	V_{GS} = −10 V		690		ns
Fall Time	t_f	R_G = 10 Ω		400		ns
Total Gate Charge	Q_G	V_{DD} = −24 V		118		nC
Gate to Source Carge	Q_{GS}	V_{GS} = −10 V		13		nC
Gate to Drain Carge	Q_{GD}	I_D = −18 A		45		nC
Body Diode Forward Voltage Note	$V_{F(S-D)}$	I_F = 18 A, V_{GS} = 0 V		0.81		V
Reverse Recovery Time	t_{rr}	I_F = 18 A, V_{GS} = 0 V		490		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 50 A/μs		2450		nC

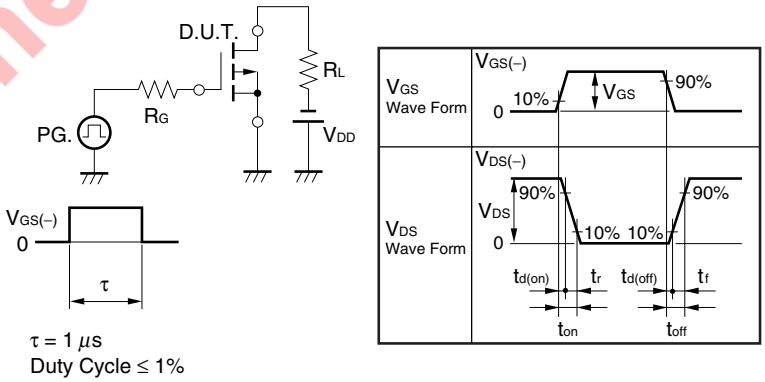
Note Pulsed

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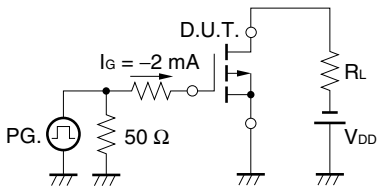
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME



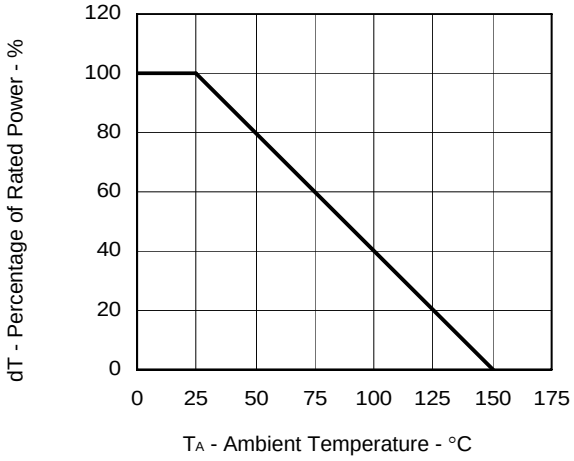
TEST CIRCUIT 3 GATE CHARGE



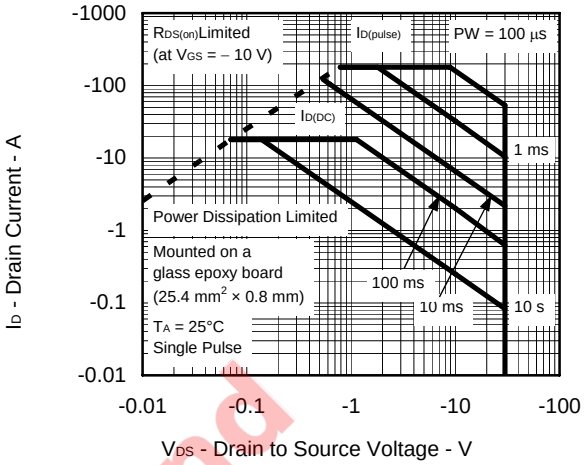
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TYPICAL CHARACTERISTICS (T_A = 25°C)

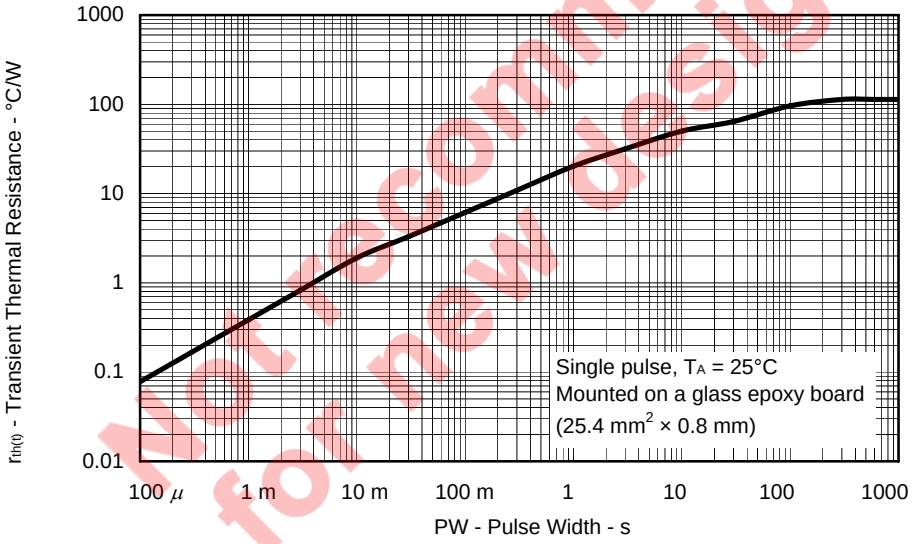
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



FOWARD BIAS SAFE OPERATING AREA

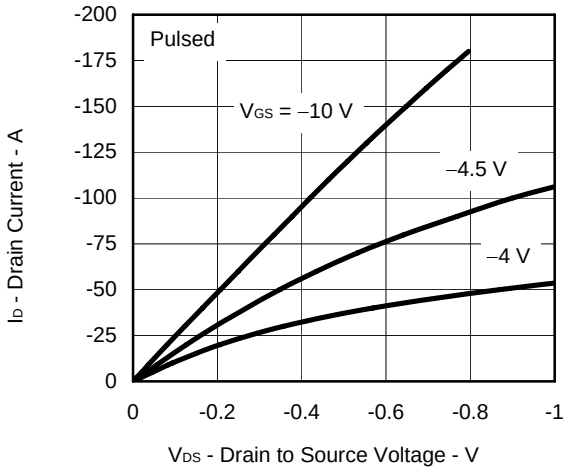


TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

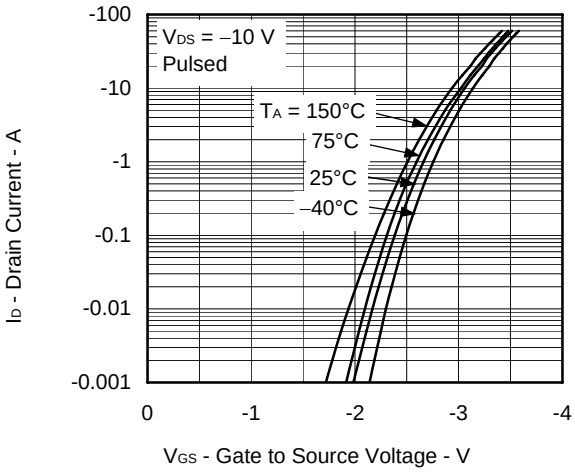


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DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE

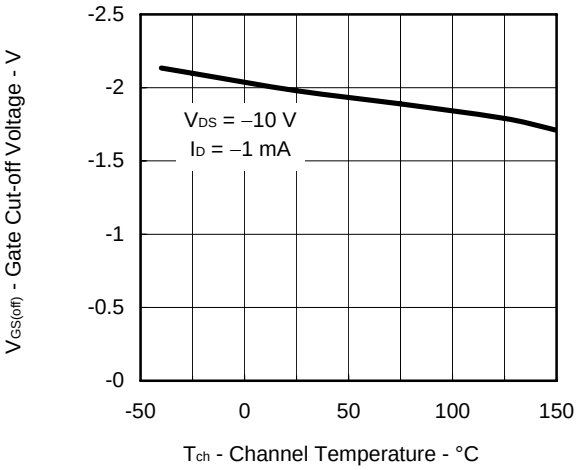


FORWARD TRANSFER CHARACTERISTICS

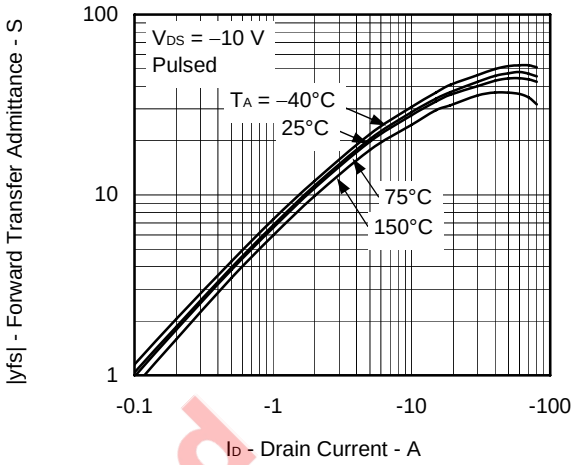


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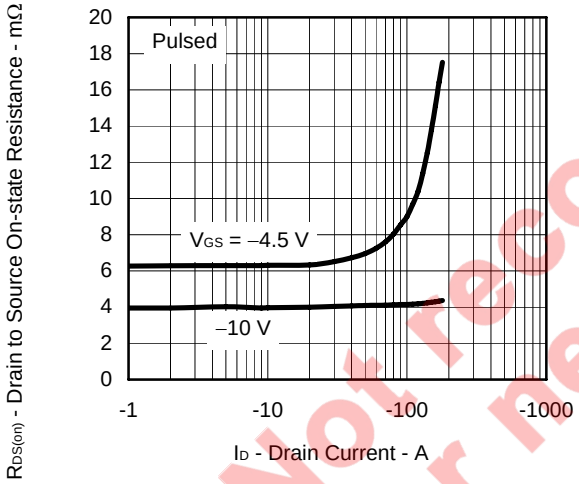
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



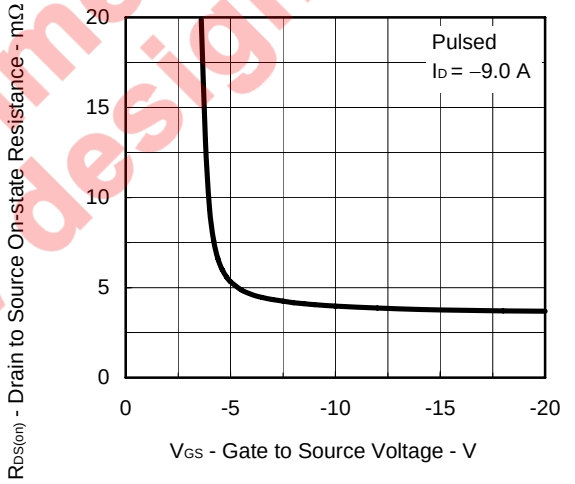
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



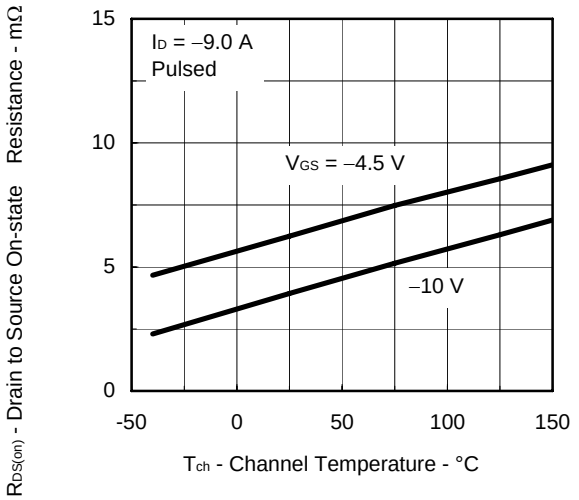
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



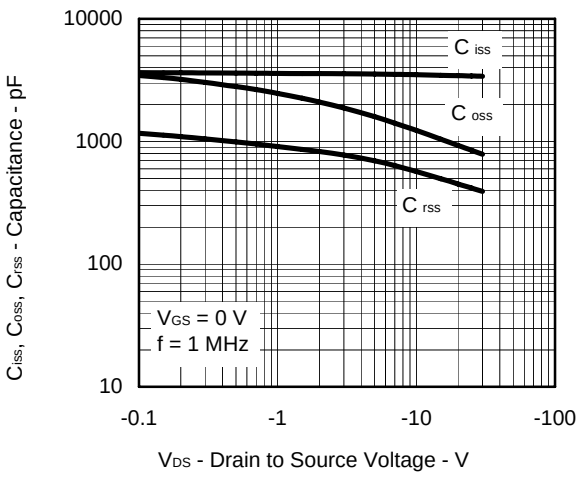
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



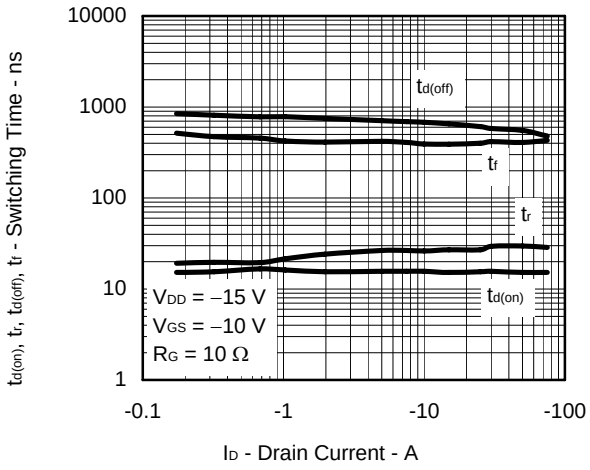
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



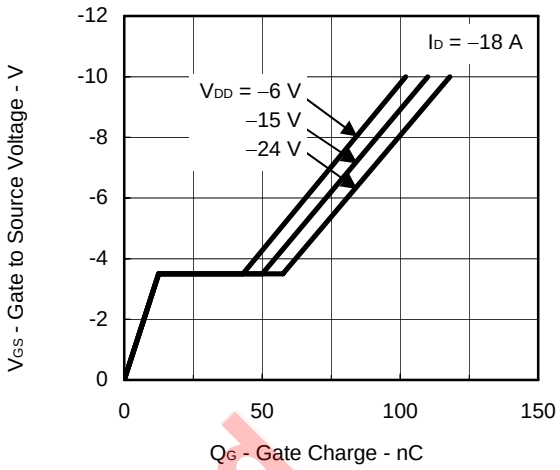
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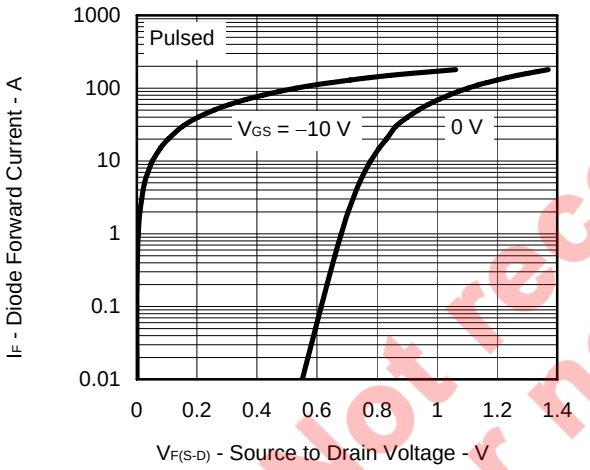
SWITCHING CHARACTERISTICS



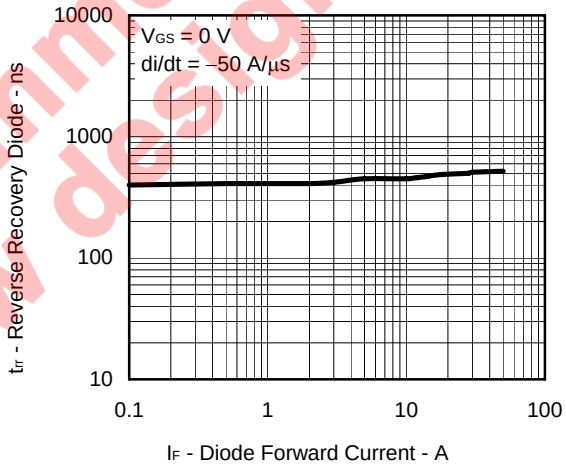
DYNAMIC INPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME
vs. DIODE FORWARD CURRENT



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