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

μPA2781GR

SWITCHING
N-CHANNEL POWER MOS FET/SCHOTTKY BARRIER DIODE

DESCRIPTION

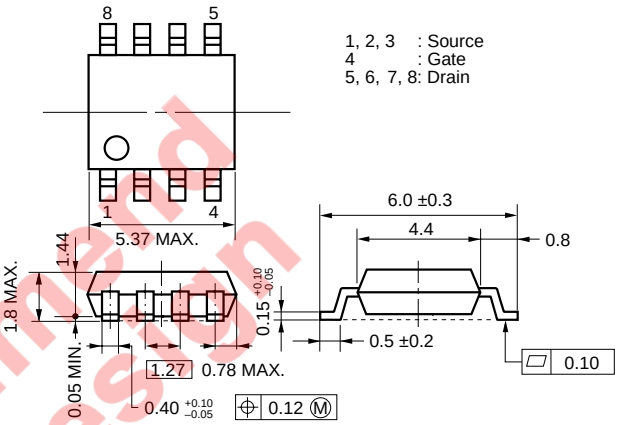
The μPA2781GR is N-channel Power MOSFET, which built a Schottky Barrier Diode inside.

This product is designed for synchronous DC/DC converter application.

FEATURES

- Built a Schottky Barrier Diode
- Low on-state resistance
  $R_{DS(on)1}$ = 7.6 mΩ TYP. (V_{GS} = 10 V, I_D = 7 A)
  $R_{DS(on)2}$ = 11.3 mΩ TYP. (V_{GS} = 4.5 V, I_D = 7 A)
  $R_{DS(on)3}$ = 12.9 mΩ TYP. (V_{GS} = 4.0 V, I_D = 7 A)
- Low C_{iss}: C_{iss} = 900 pF TYP.
- Small and surface mount package (Power SOP8)

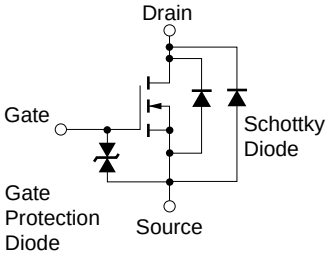
PACKAGE DRAWING (Unit: mm)



ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA2781GR	Power SOP8

EQUIVALENT CIRCUIT



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) [MOSFET]	$I_{D(DC)}$	±13	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±52	A
Average Forward Current Note2 [SCHOTTKY]	$I_{F(AV)}$	2.5	A
Total Power Dissipation Note3 [MOSFET]	P_T	2	W
Total Power Dissipation Note3 [SCHOTTKY]	P_T	1	W
Channel & Junction Temperature	T_{ch}, T_j	150	°C
Storage Temperature	T_{stg}	–55 to + 150	°C

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Rectangle wave, 50% Duty Cycle

3. Mounted on ceramic substrate of 1200 mm^2 x 2.2 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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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 Note	I_{DSS}	V_{DS} = 24 V, V_{GS} = 0 V			50	μA
		V_{DS} = 24 V, V_{GS} = 0 V, T_A = 125°C			10	mA
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
Drain to Source On-state Resistance Note	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 7 A		7.6	9.5	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.5 V, I_D = 7 A		11.3	15.1	mΩ
	$R_{DS(on)3}$	V_{GS} = 4.0 V, I_D = 7 A		12.9	17.2	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		900		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		450		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		120		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 15 V, I_D = 7 A		9		ns
Rise Time	t_r	V_{GS} = 10 V		5		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		35		ns
Fall Time	t_f			8		ns
Total Gate Charge	Q_G	V_{DD} = 15 V		9		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 5 V		3		nC
Gate to Drain Charge	Q_{GD}	I_D = 13 A		4		nC
Body Diode Forward Voltage Note	$V_{F(S-D)}$	I_F = 1 A, V_{GS} = 0 V		0.45	0.5	V
		I_F = 1 A, V_{GS} = 0 V, T_A = 125°C		0.37		V
Reverse Recovery Time	t_{rr}	I_F = 7 A, V_{GS} = 0 V		28		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		18		nC

Note Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2%

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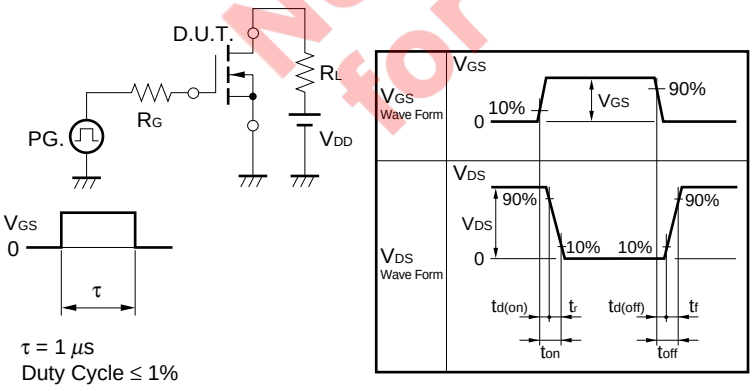
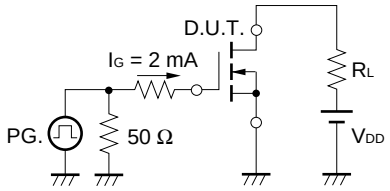
TEST CIRCUIT 1 SWITCHING TIME



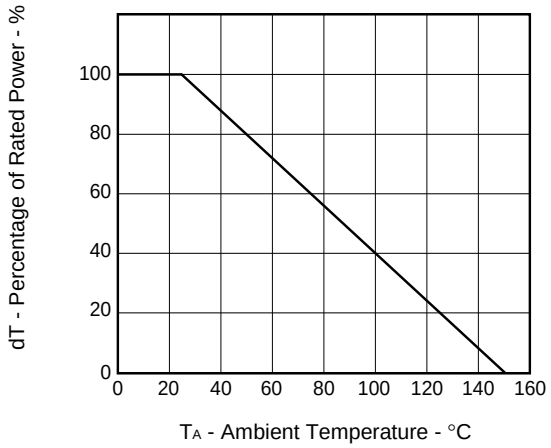
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 2 GATE CHARGE

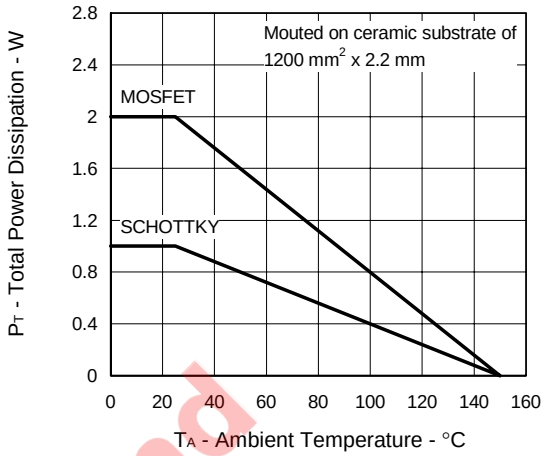


TYPICAL CHARACTERISTICS (T_A = 25°C. All terminals are connected.)

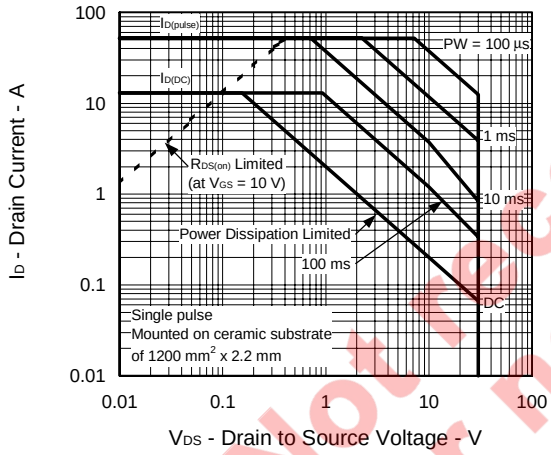
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



FORWARD BIAS SAFE OPERATING AREA



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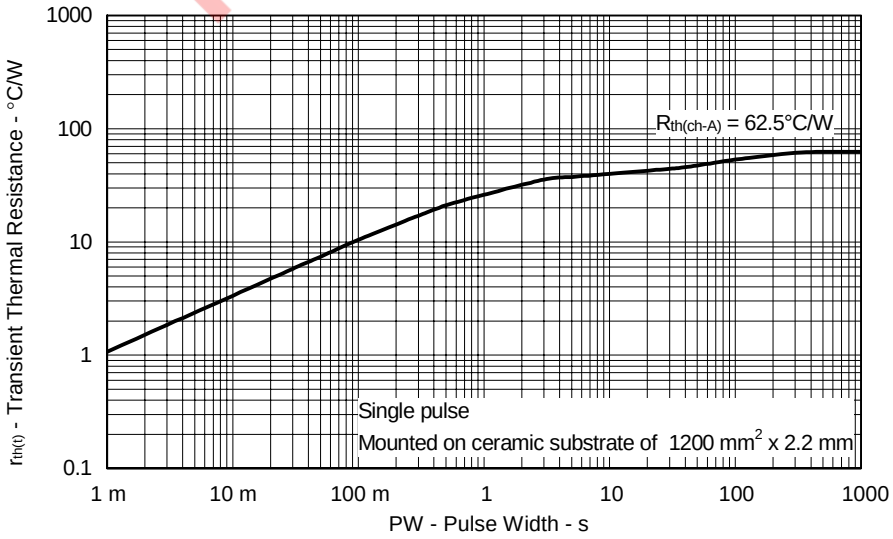
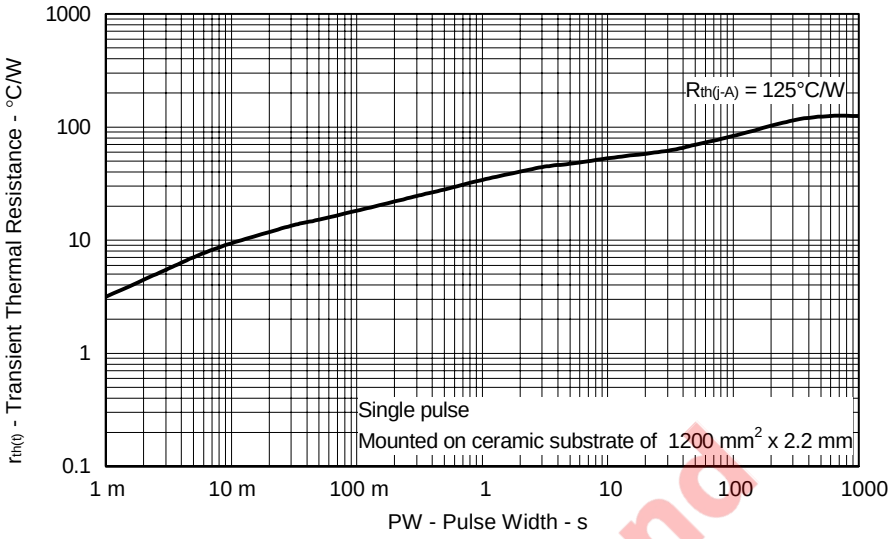
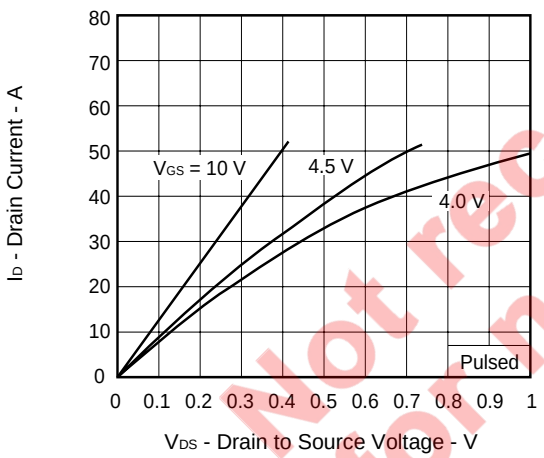
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH (MOSFET)



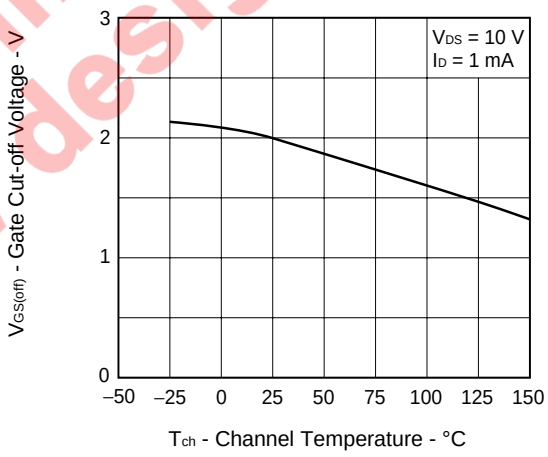
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH (SCHOTTKY)



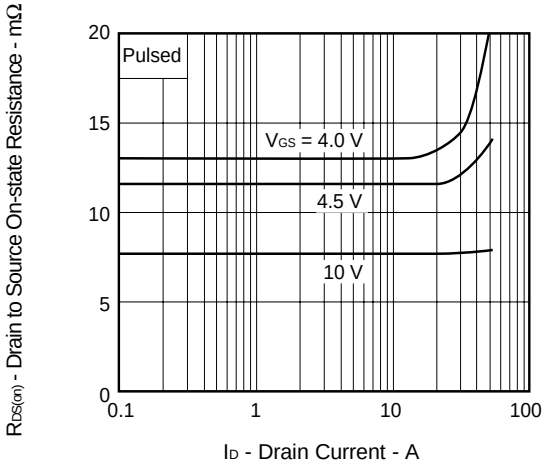
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



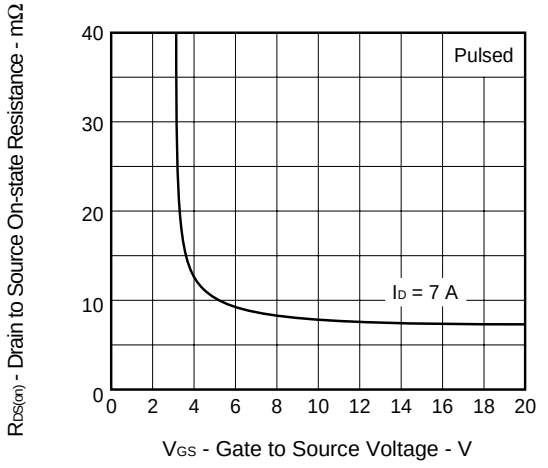
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



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



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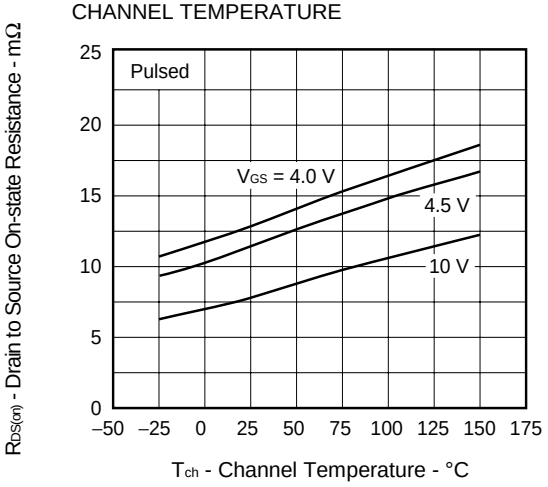
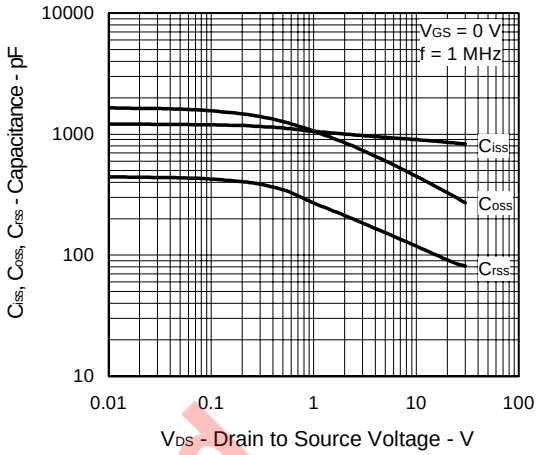
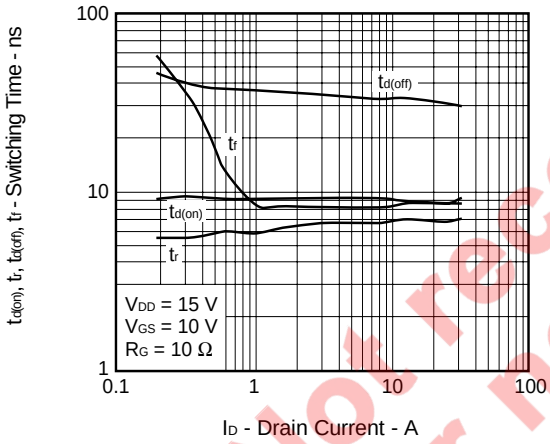
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



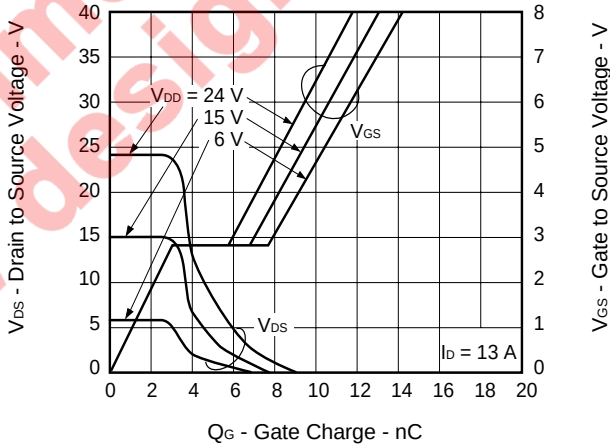
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



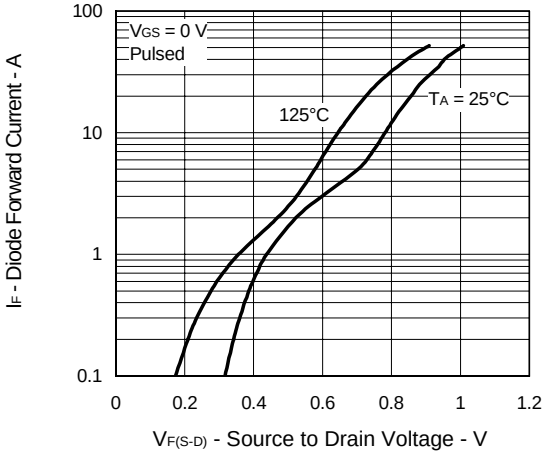
SWITCHING CHARACTERISTICS



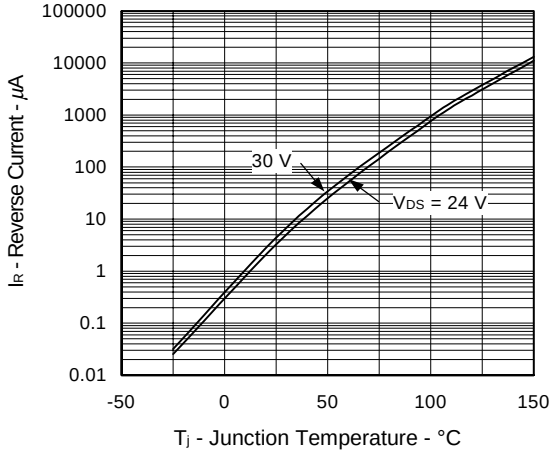
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



SOURCE TO DRAIN DIODE REVERSE CURRENT



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