

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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Not recommended  
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# MOS FIELD EFFECT TRANSISTOR

# $\mu$ PA2810

## SWITCHING

## P-CHANNEL POWER MOSFET

### DESCRIPTION

The  $\mu$ PA2810 is P-channel MOSFET designed for DC/DC converter and power management applications of portable equipments.

### FEATURES

- Low on-state resistance  
 $R_{DS(on)1} = 12 \text{ m}\Omega \text{ MAX. (} V_{GS} = -10 \text{ V, } I_D = -13 \text{ A)}$   
 $R_{DS(on)2} = 23 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -6.5 \text{ A)}$
- Built-in gate protection diode
- Thin type surface mount package with heat spreader
- RoHS Compliant

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C, All terminals are connected.)

Drain to Source Voltage (V <sub>GS</sub> = 0 V)	V <sub>DSS</sub>	-30	V
Gate to Source Voltage (V <sub>DS</sub> = 0 V)	V <sub>GSS</sub>	±20	V
Drain Current (DC)	I <sub>D(DC)</sub>	±13	A
Drain Current (pulse) <sup>Note1</sup>	I <sub>D(pulse)</sub>	±78	A
Total Power Dissipation <sup>Note2</sup>	P <sub>T1</sub>	1.5	W
Total Power Dissipation (PW = 10 sec) <sup>Note2</sup>	P <sub>T2</sub>	3.8	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C
Single Avalanche Current <sup>Note3</sup>	I <sub>AS</sub>	-13	A
Single Avalanche Energy <sup>Note3</sup>	E <sub>AS</sub>	16.9	mJ

### THERMAL RESISTANCE

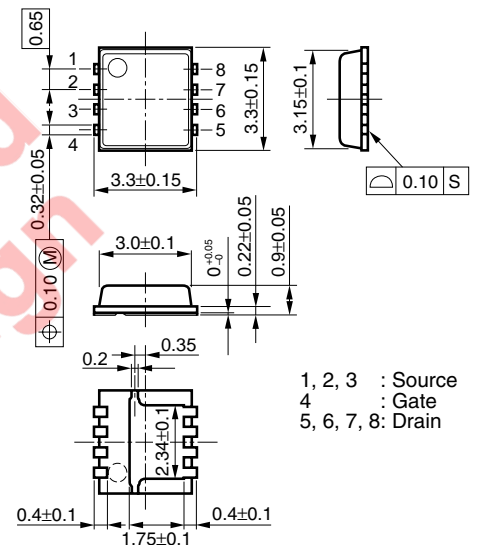
Channel to Ambient Thermal Resistance <sup>Note2</sup>	R <sub>th(ch-A)</sub>	83.3	°C/W
Channel to Case (Drain) Thermal Resistance	R <sub>th(ch-C)</sub>	2.4	°C/W

- Notes 1.** PW ≤ 10 μs, Duty Cycle ≤ 1%
- 2.** Mounted on FR-4 board of 25.4 mm x 25.4 mm x 0.8 mm
- 3.** Starting T<sub>ch</sub> = 25°C, V<sub>DD</sub> = -15 V, R<sub>G</sub> = 25 Ω, V<sub>GS</sub> = -20 → 0 V, L = 100 μH

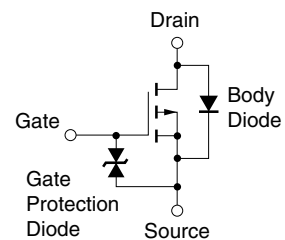
**Remark** The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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### PACKAGE DRAWING (Unit: mm)



### EQUIVALENT CIRCUIT

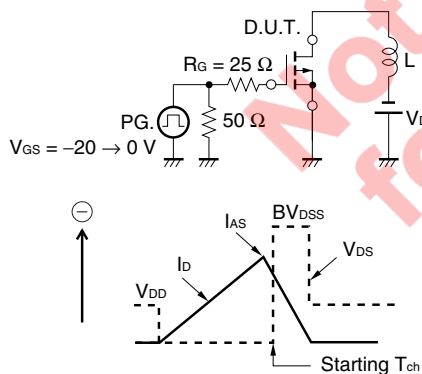


**ELECTRICAL CHARACTERISTICS (TA = 25°C, All terminals are connected.)**

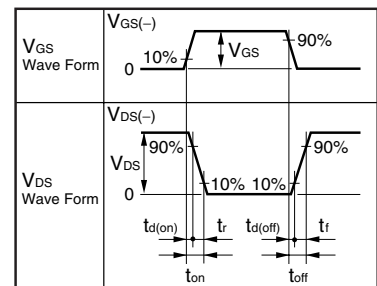
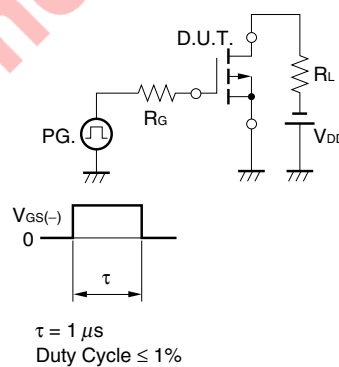
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			±10	μA
Gate to Source Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$	-1.0		-2.5	V
Forward Transfer Admittance <sup>Note</sup>	$ y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -6.5\text{ A}$	7			S
Drain to Source On-state Resistance <sup>Note</sup>	$R_{DS(on)1}$	$V_{GS} = -10\text{ V}, I_D = -13\text{ A}$		9.5	12	mΩ
	$R_{DS(on)2}$	$V_{GS} = -4.5\text{ V}, I_D = -6.5\text{ A}$		15	23	mΩ
Input Capacitance	$C_{iss}$	$V_{DS} = -10\text{ V},$		1860		pF
Output Capacitance	$C_{oss}$	$V_{GS} = 0\text{ V},$		400		pF
Reverse Transfer Capacitance	$C_{rss}$	$f = 1\text{ MHz}$		300		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, I_D = -6.5\text{ A},$		11		ns
Rise Time	$t_r$	$V_{GS} = -10\text{ V},$		19		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 10\ \Omega$		160		ns
Fall Time	$t_f$			100		ns
Total Gate Charge	$Q_G$	$V_{DD} = -24\text{ V},$		40		nC
Gate to Source Charge	$Q_{GS}$	$V_{GS} = -10\text{ V},$		6		nC
Gate to Drain Charge	$Q_{GD}$	$I_D = -13\text{ A}$		14		nC
Body Diode Forward Voltage <sup>Note</sup>	$V_{F(S-D)}$	$I_F = 13\text{ A}, V_{GS} = 0\text{ V}$		0.87		V
Reverse Recovery Time	$t_{rr}$	$I_F = 13\text{ A}, V_{GS} = 0\text{ V},$		50		ns
Reverse Recovery Charge	$Q_{rr}$	$di/dt = 100\text{ A}/\mu\text{s}$		40		nC

Note Pulsed

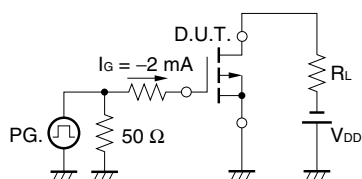
**TEST CIRCUIT 1 AVALANCHE CAPABILITY**



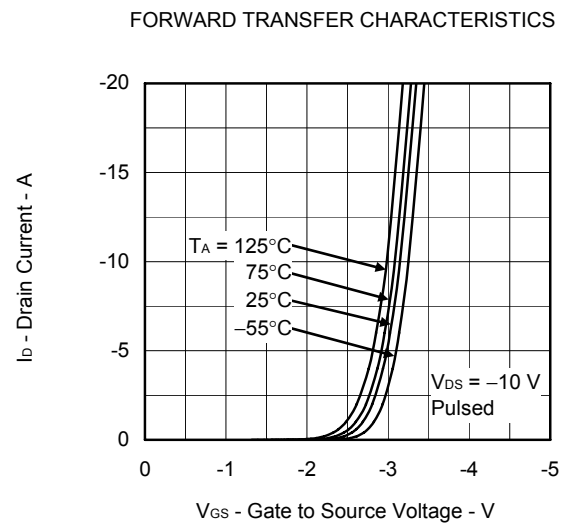
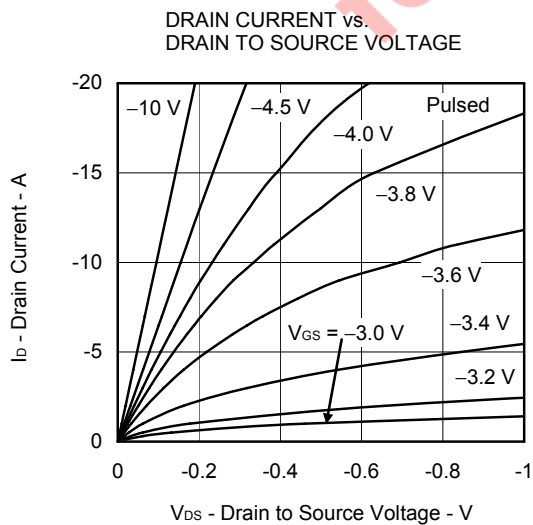
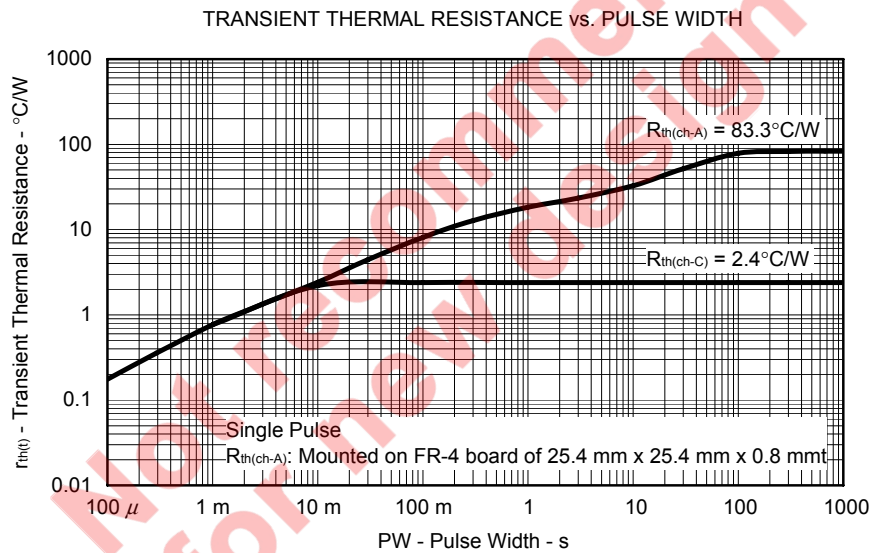
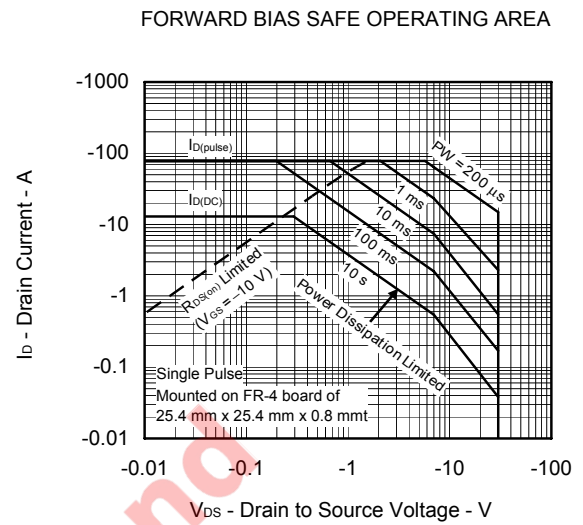
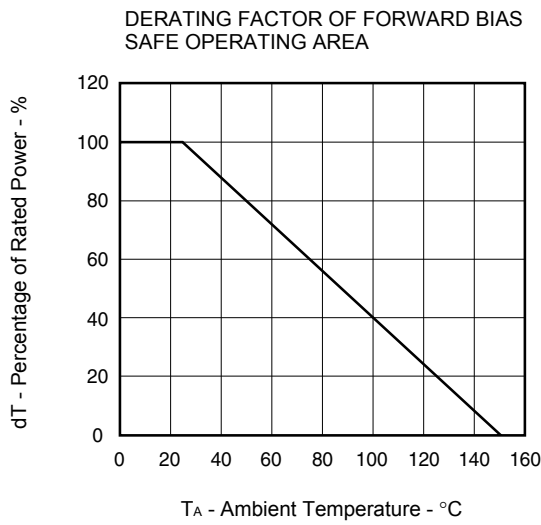
**TEST CIRCUIT 2 SWITCHING TIME**

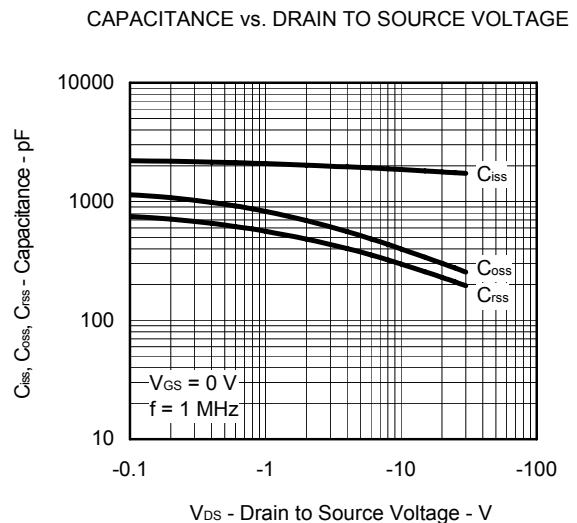
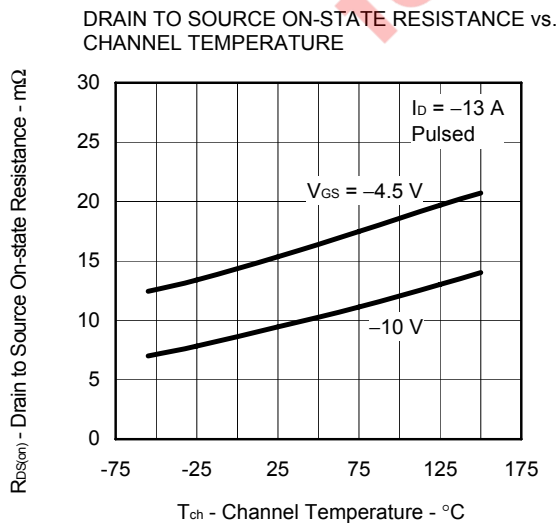
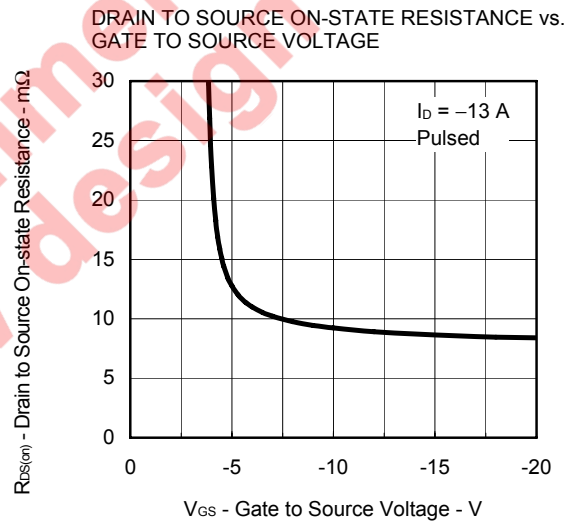
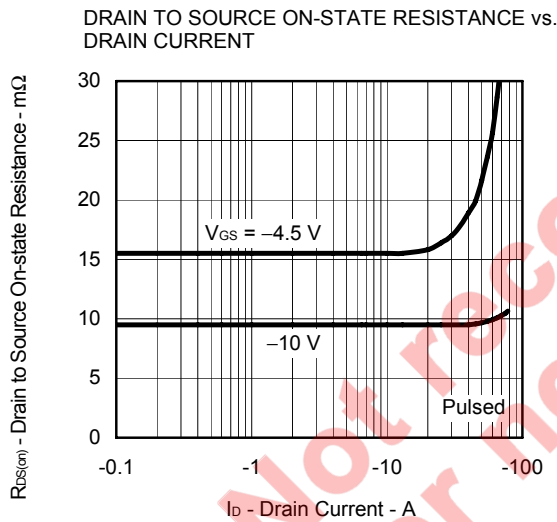
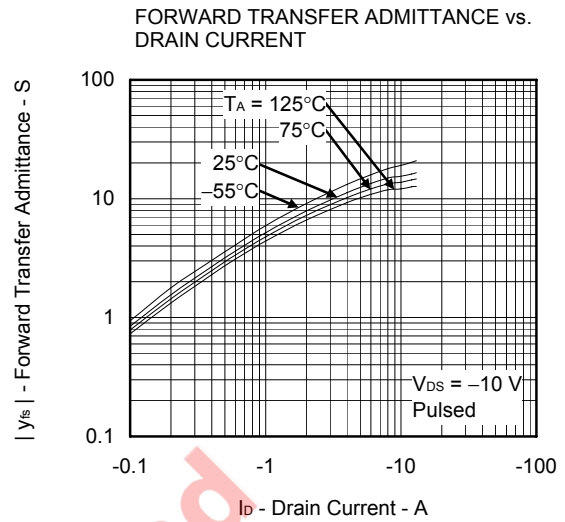
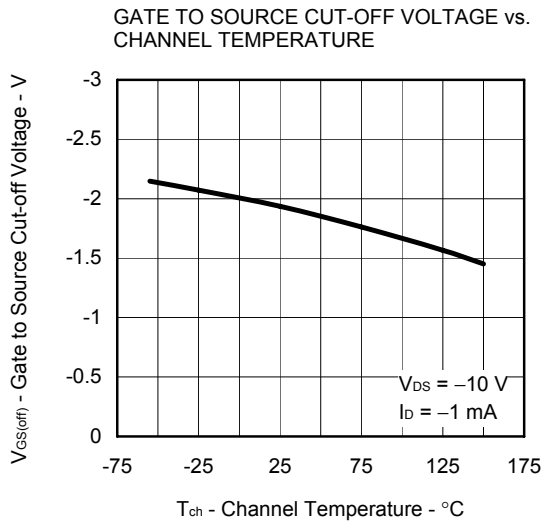


**TEST CIRCUIT 3 GATE CHARGE**

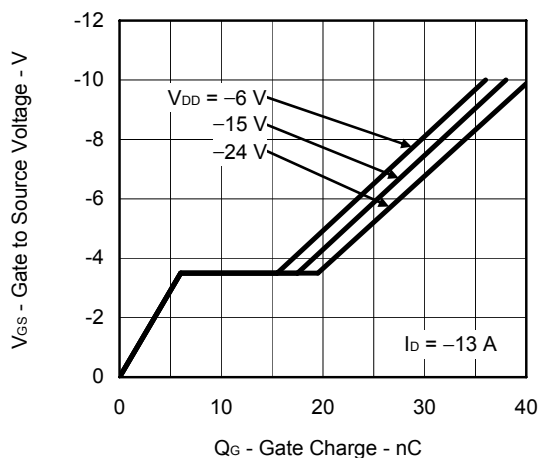


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

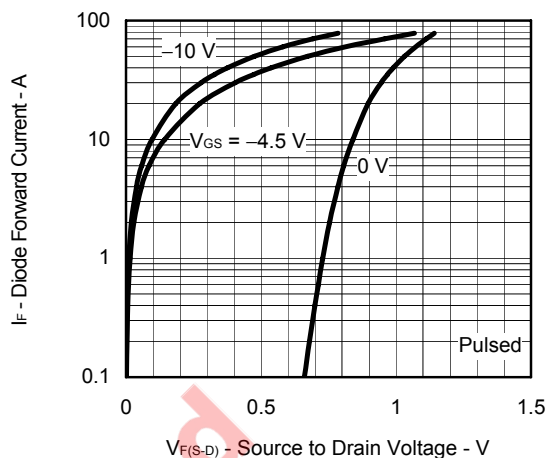




DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



ORDERING INFORMATION

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
μPA2810T1L-E1-AY <small>Note</small>	Pure Sn	Tape 3000 p/reel	8-pin HVSON (3333) 0.028 g TYP.
μPA2810T1L-E2-AY <small>Note</small>			

**Note** Pb-free (This product does not contain Pb in the external electrode.)

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