

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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# MOS FIELD EFFECT TRANSISTOR

# μPA1731

## SWITCHING

### P-CHANNEL POWER MOS FET

### INDUSTRIAL USE

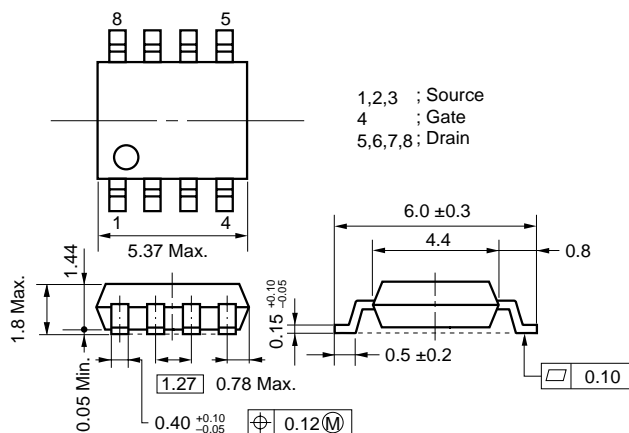
#### DESCRIPTION

The μPA1731 is P-Channel MOS Field Effect Transistor designed for power management applications of notebook computers and Li-ion battery protection circuit.

#### FEATURES

- Low on-resistance  
 $R_{DS(on)1} = 10.3 \text{ m}\Omega \text{ TYP. (} V_{GS} = -10 \text{ V, } I_D = -5.0 \text{ A)}$   
 $R_{DS(on)2} = 14.6 \text{ m}\Omega \text{ TYP. (} V_{GS} = -4.5 \text{ V, } I_D = -5.0 \text{ A)}$   
 $R_{DS(on)3} = 16.5 \text{ m}\Omega \text{ TYP. (} V_{GS} = -4.0 \text{ V, } I_D = -5.0 \text{ A)}$
- Low  $C_{iss}$  :  $C_{iss} = 2600 \text{ pF TYP.}$
- Built-in G-S protection diode
- Small and surface mount package (Power SOP8)

#### PACKAGE DRAWING (Unit : mm)



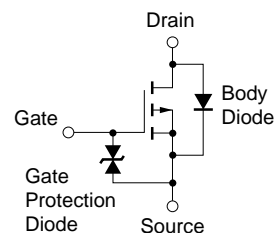
#### ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1731G	Power SOP8

#### 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>	± 10	A
Drain Current (pulse) <sup>Note1</sup>	I <sub>D(pulse)</sub>	± 40	A
Total Power Dissipation (T <sub>A</sub> = 25°C) <sup>Note2</sup>	P <sub>T</sub>	2.0	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to + 150	°C

#### EQUIVALENT CIRCUIT



- Notes 1.** PW ≤ 10 μs, Duty Cycle ≤ 1 %  
**2.** Mounted on ceramic substrate of 1200 mm<sup>2</sup> x 2.2 mm

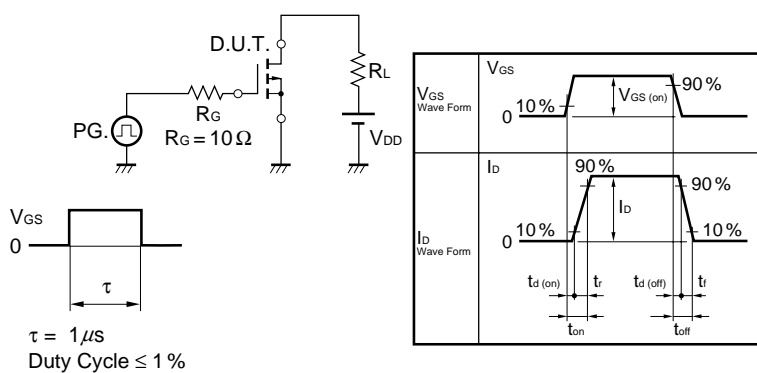
**Remark** The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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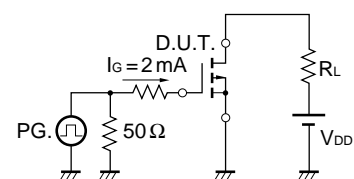
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, All terminals are connected.)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -5.0 A		10.3	13.0	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -5.0 A		14.6	19.5	mΩ
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = -4.0 V, I <sub>D</sub> = -5.0 A		16.5	22.0	mΩ
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -1 mA	-1.0	-1.6	-2.5	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -5.0 A	8.0	18.0		S
Drain Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			-1	μA
Gate to Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ± 20 V, V <sub>DS</sub> = 0 V			± 10	μA
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -10 V		2600		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		810		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		350		pF
Turn-on Delay Time	t <sub>d(on)</sub>	I <sub>D</sub> = -5.0 A		32		ns
Rise Time	t <sub>r</sub>	V <sub>GS(on)</sub> = -10 V		185		ns
Turn-off Delay Time	t <sub>d(off)</sub>	V <sub>DD</sub> = -15 V		155		ns
Fall Time	t <sub>f</sub>	R <sub>G</sub> = 10 Ω		110		ns
Total Gate Charge	Q <sub>G</sub>	I <sub>D</sub> = -10 A		46		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>DD</sub> = -24 V		6.5		nC
Gate to Drain Charge	Q <sub>GD</sub>	V <sub>GS</sub> = -10 V		12		nC
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 10 A, V <sub>GS</sub> = 0 V		0.80		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 10 A, V <sub>GS</sub> = 0 V		50		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100 A/μs		46		nC

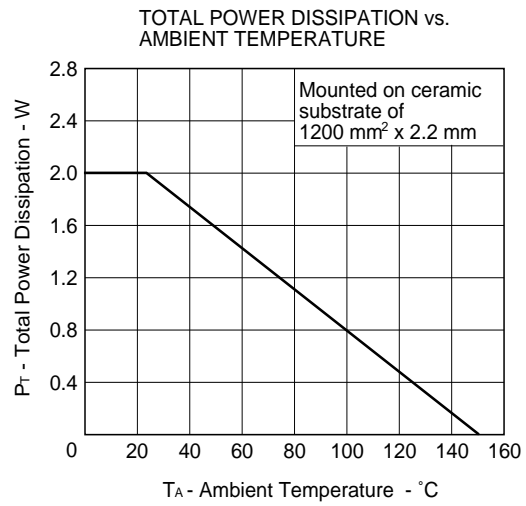
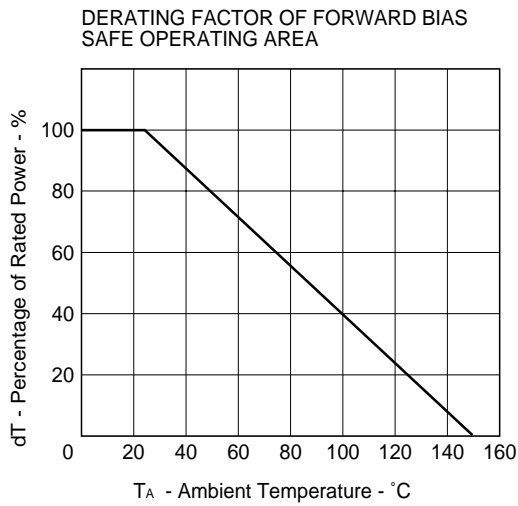
**TEST CIRCUIT 1 SWITCHING TIME**



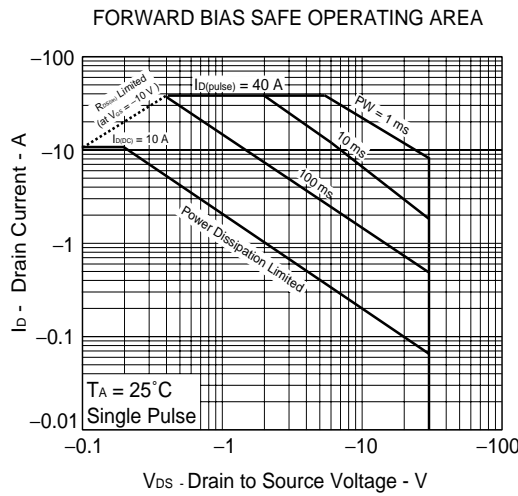
**TEST CIRCUIT 2 GATE CHARGE**



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

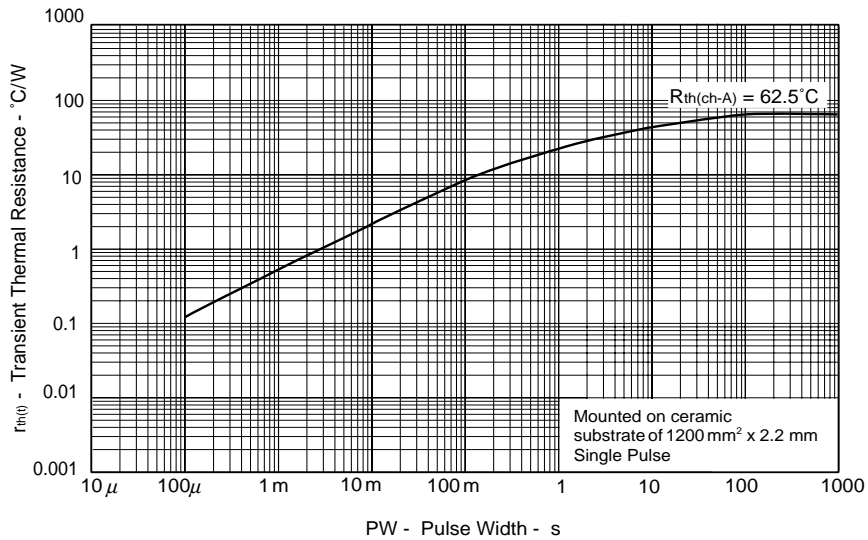


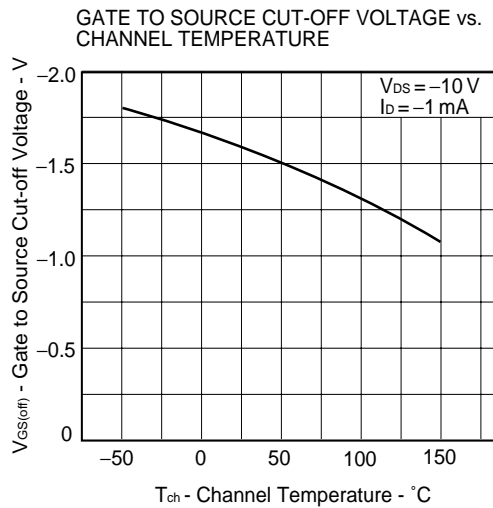
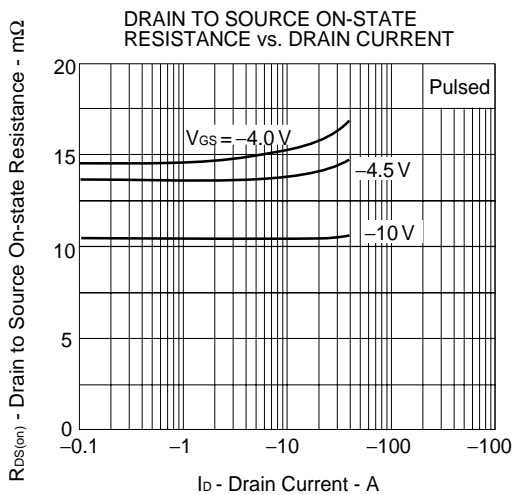
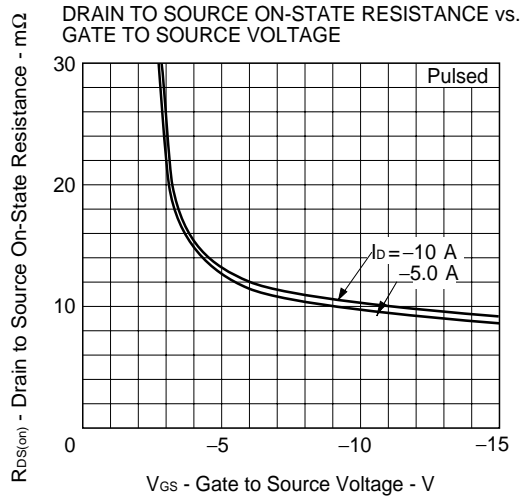
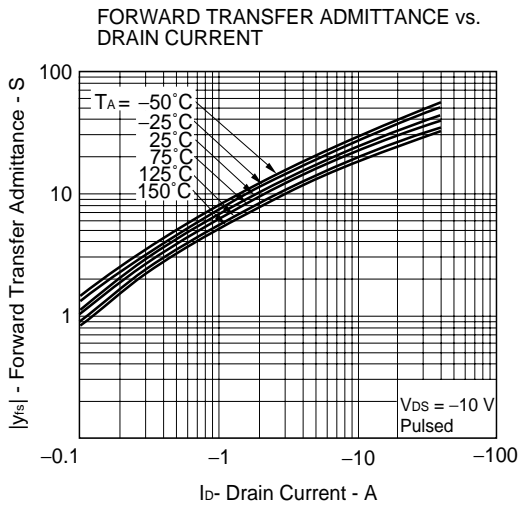
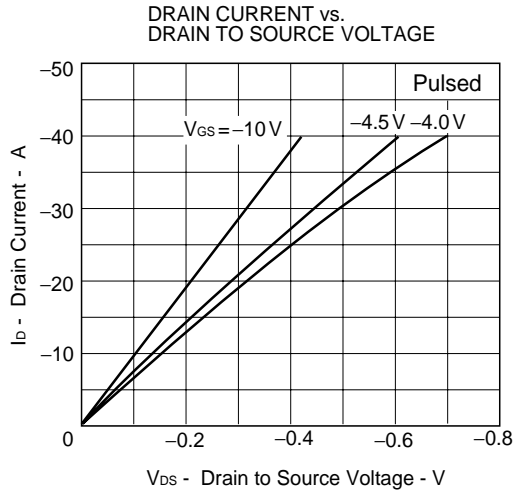
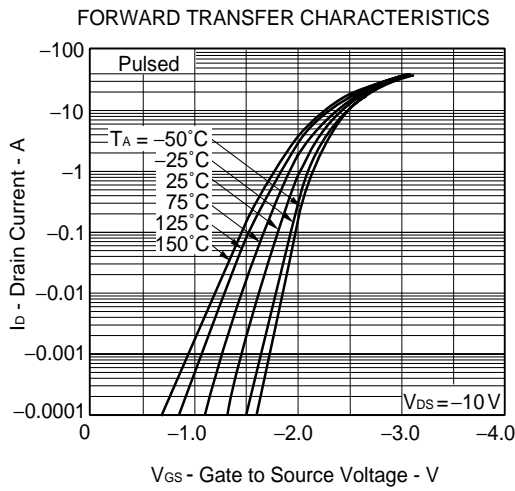
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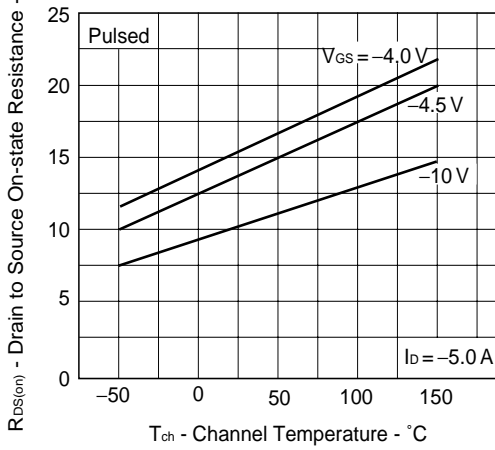
**Remark** Mounted on ceramic substrate of 1200 mm<sup>2</sup> x 2.2 mm

TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

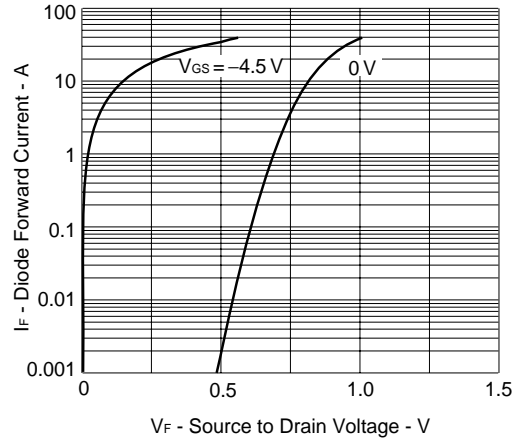




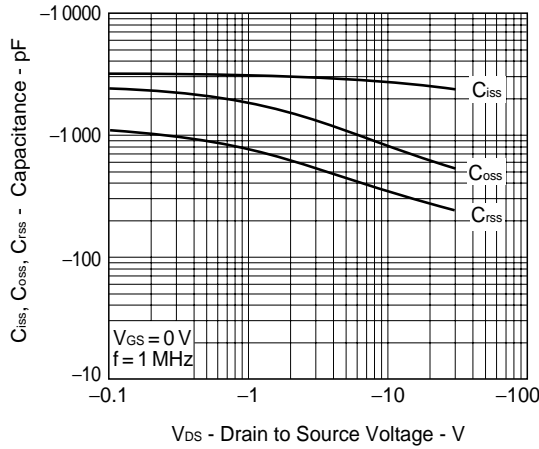
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



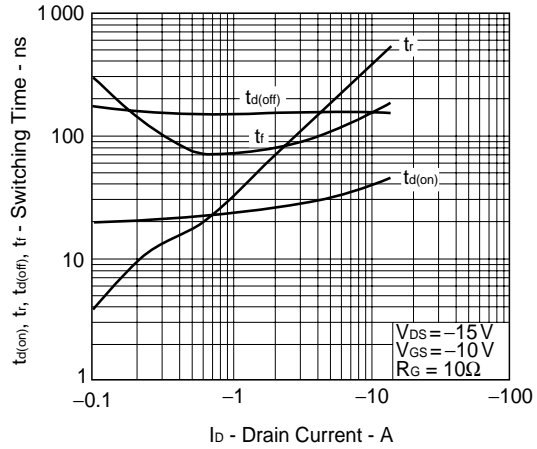
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



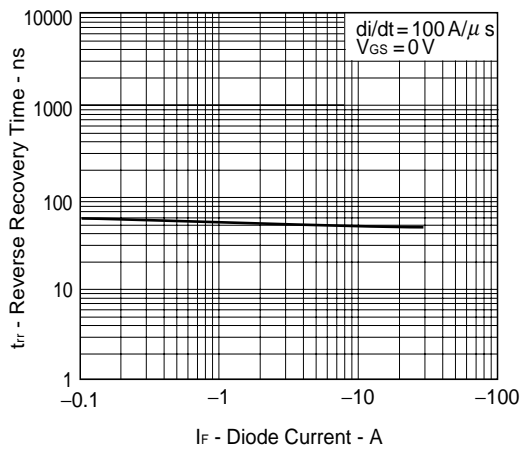
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



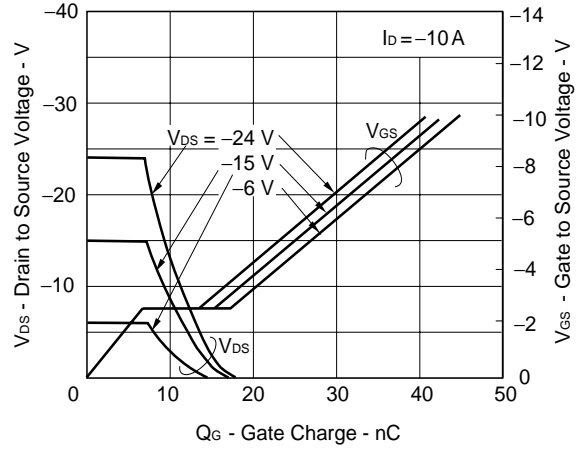
SWITCHING CHARACTERISTICS



REVERSE RECOVERY TIME vs. DIODE CURRENT



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



[MEMO]



[MEMO]

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