

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

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

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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**P-CHANNEL MOSFET  
FOR SWITCHING**

**DESCRIPTION**

The μPA1930 is a P-channel MOSFET designed for power switch of portable machine and so on.

**FEATURES**

- 4.5 V drive available
- $R_{DS(on)1} = 77 \text{ m}\Omega \text{ MAX. (} V_{GS} = -10 \text{ V, } I_D = -2.5 \text{ A)}$
- $R_{DS(on)2} = 100 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -2.5 \text{ A)}$

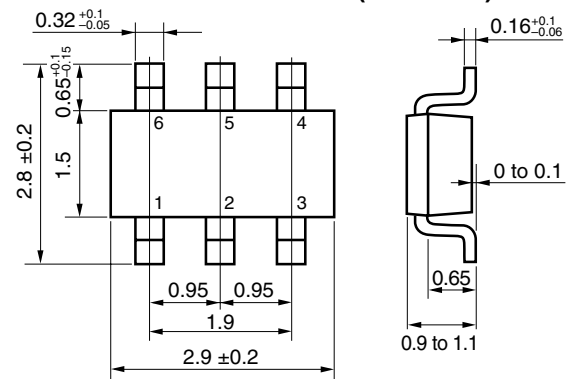
**ORDERING INFORMATION**

PART NUMBER	PACKAGE
μPA1930TE-T1-A	SC-95 (Mini Mold Thin Type)
μPA1930TE-T2-A	

**Remark** "-A" indicates Pb-free (This product does not contain Pb in external electrode and other parts).  
 "-T1", "-T2" indicates the unit orientation (8 mm embossed carrier tape, 3,000 pcs/reel).

**Marking : UA**

**PACKAGE DRAWING (Unit : mm)**



- 1, 2, 5, 6 : Drain
- 3 : Gate
- 4 : Source

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)**

Drain to Source Voltage (V <sub>GS</sub> = 0V)	V <sub>DSS</sub>	-30	V
Gate to Source Voltage (V <sub>DS</sub> = 0V)	V <sub>GSS</sub>	±20	V
Drain Current (DC) <sup>Note1</sup>	I <sub>D(DC)</sub>	±4.5	A
Drain Current (pulse) <sup>Note2</sup>	I <sub>D(pulse)</sub>	±18	A
Total Power Dissipation	P <sub>T1</sub>	0.2	W
Total Power Dissipation <sup>Note1</sup>	P <sub>T2</sub>	2.0	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

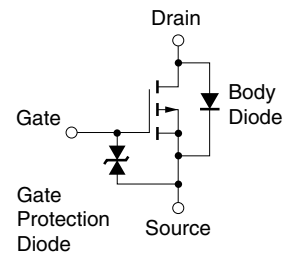
- Notes**
- Mounted on FR-4 Board 2500 mm<sup>2</sup> × 1.6 mm, t ≤ 5 sec
  - PW ≤ 10 μs, Duty Cycle ≤ 1%

**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.

**Caution** This product is electrostatic-sensitive device due to low ESD capability and should be handled with caution for electrostatic discharge. V<sub>ESD</sub> ± 150 V TYP. (C = 200 pF, R = 0 Ω, Single pulse)

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**EQUIVALENT CIRCUIT**

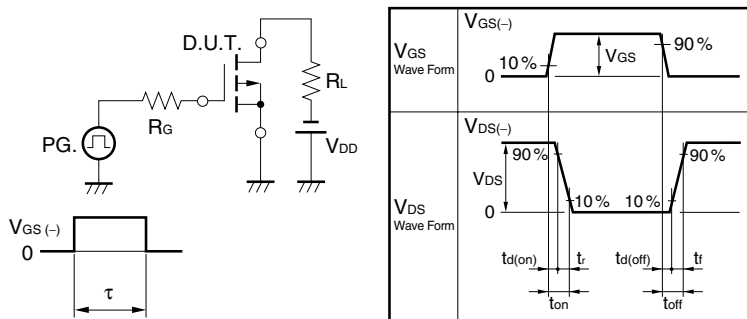


**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V			-1	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0 V			±10	μA
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -1.0 mA	-1.0		-2.5	V
Forward Transfer Admittance <sup>Note</sup>	y <sub>fs</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -2.5 A	1			S
Drain to Source On-state Resistance <sup>Note</sup>	R <sub>DS(on)1</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -2.5 A		58	77	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -2.5 A		77	100	mΩ
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -10 V		325		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		78		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1.0 MHz		65		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -15 V, I <sub>D</sub> = -2.5 A,		8.5		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = -10 V,		3.5		ns
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 6 Ω		33		ns
Fall Time	t <sub>f</sub>			19.5		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = -24 V,		7.5		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>GS</sub> = -10 V,		1.1		nC
Gate to Drain Charge	Q <sub>GD</sub>	I <sub>D</sub> = -4.5 A		2.3		nC
Diode Forward Voltage <sup>Note</sup>	V <sub>F(S-D)</sub>	I <sub>F</sub> = 4.5 A, V <sub>GS</sub> = 0 V		0.93		V

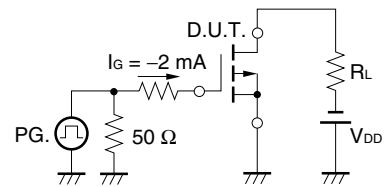
Note Pulsed

**TEST CIRCUIT 1 SWITCHING TIME**



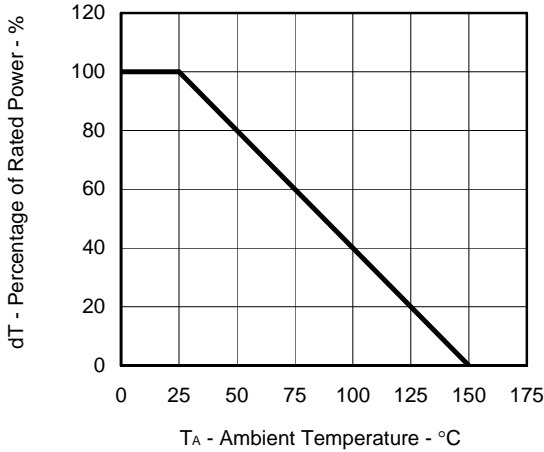
τ = 1 μs  
Duty Cycle ≤ 1%

**TEST CIRCUIT 2 GATE CHARGE**

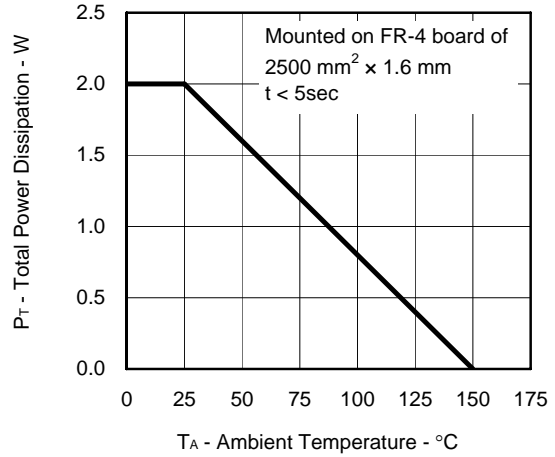


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

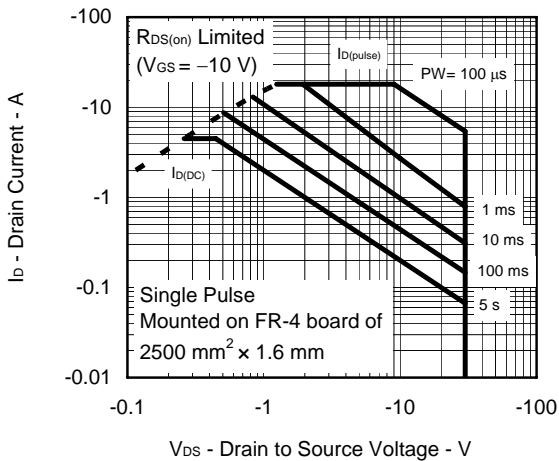
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



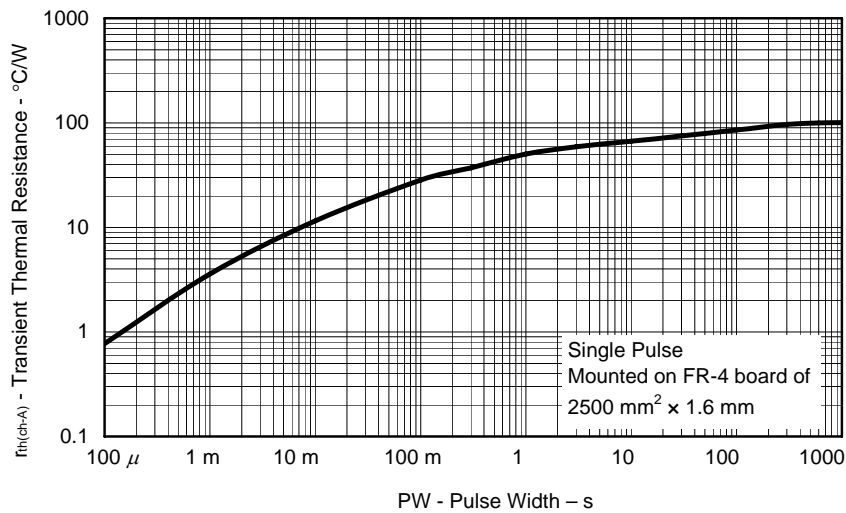
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



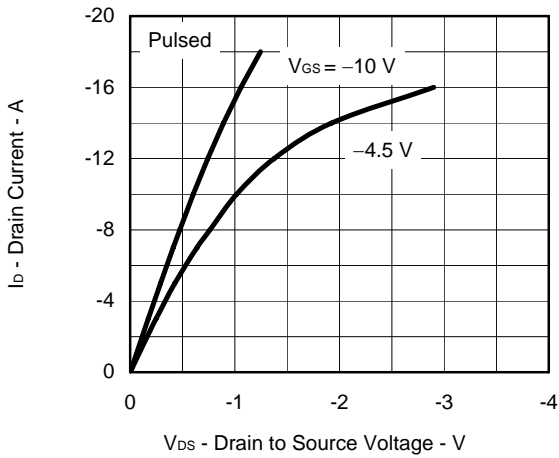
FORWARD BIAS SAFE OPERATING AREA



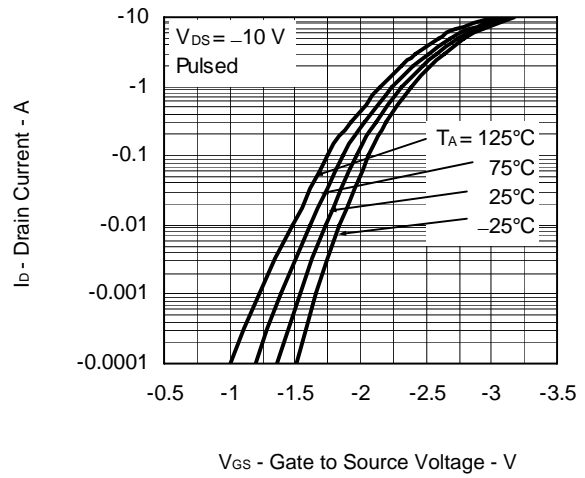
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



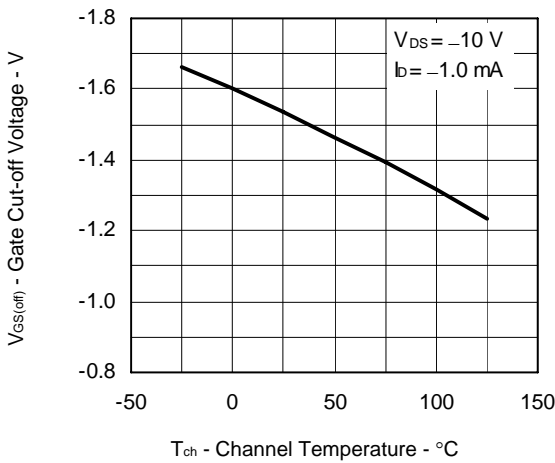
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



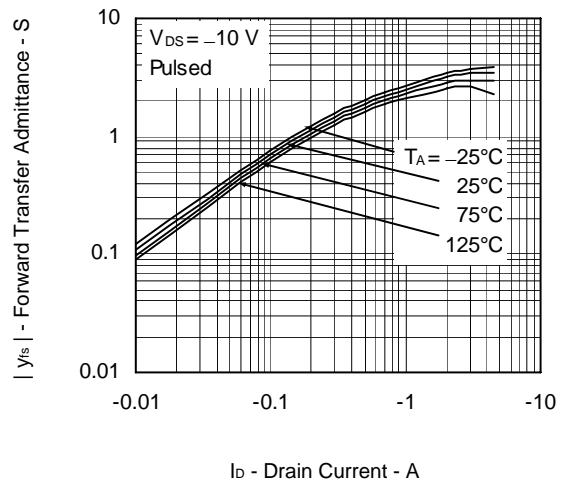
FORWARD TRANSFER CHARACTERISTICS



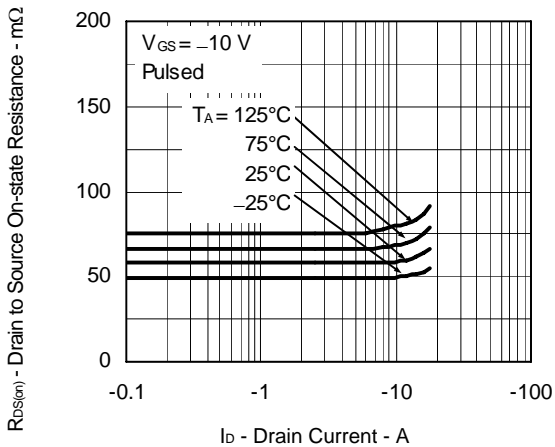
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



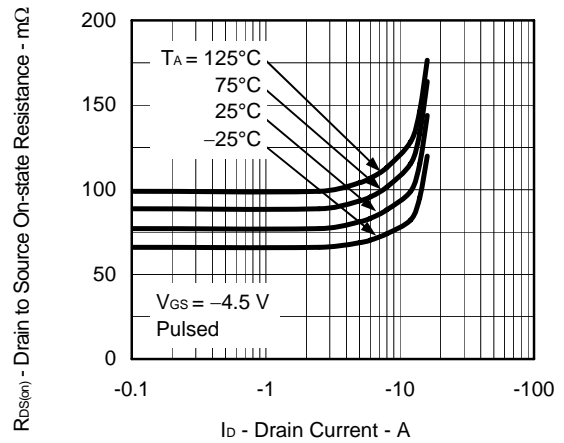
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



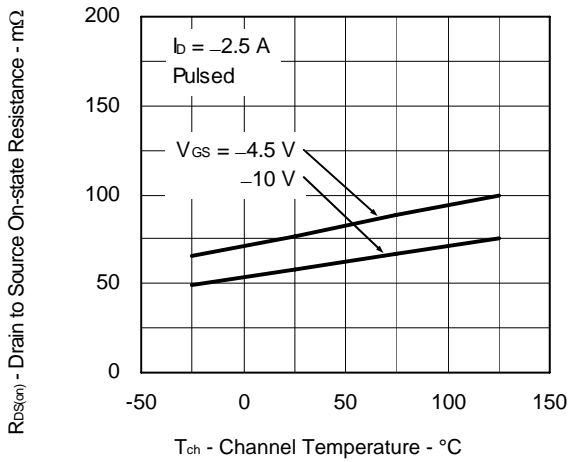
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



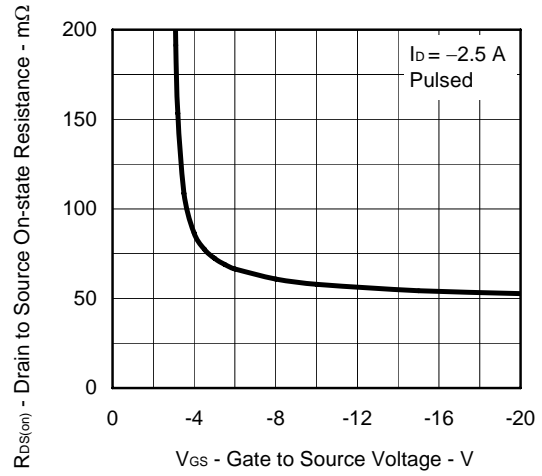
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



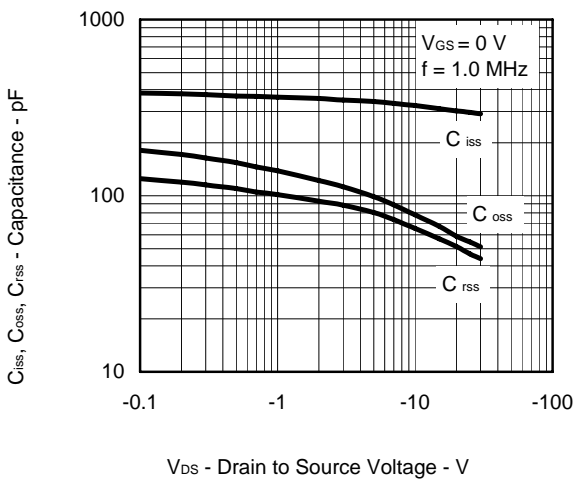
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



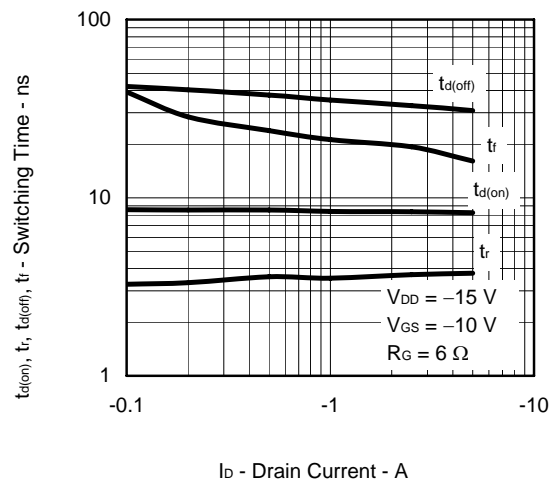
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



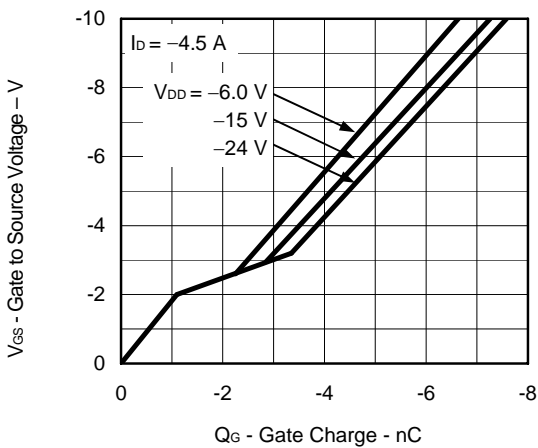
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



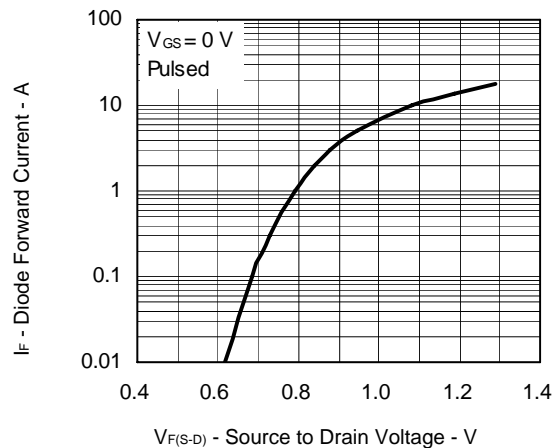
SWITCHING CHARACTERISTICS



DYNAMIC INPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



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