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To our customers,

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## Old Company Name in Catalogs and Other Documents

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On April 1<sup>st</sup>, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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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N-CHANNEL/P-CHANNEL MOS FET PAIR  
FOR LOAD SWITCH

DESCRIPTION

The  $\mu$  PA1981 is a N-Channel/P-Channel MOS FET pair for compact power management in portable electronic equipment where 2.5 to 8 V input and 2.8 A output current capability are needed.

This load switch integrated a small N-Channel MOS FET (Q1), which drives a large P-Channel MOS FET (Q2) in one tiny package (SC-95).

FEATURES

- $V_{S2D21} = 0.2$  V MAX. ( $V_{S2S1} = 5.0$  V,  $I_{D2} = -2.8$  A,  $R_{D2S2(on)1} = 70$  m $\Omega$ )
- $V_{S2D22} = 0.2$  V MAX. ( $V_{S2S1} = 2.5$  V,  $I_{D2} = -1.9$  A,  $R_{D2S2(on)2} = 105$  m $\Omega$ )

ORDERING INFORMATION

PART NUMBER	PACKAGE
$\mu$ PA1981TE	SC-95 (Mini Mold Thin Type)

Marking: TZ

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

Source2 to Source1 Input Voltage Range	$V_{S2S1}$	2.5 to 8.0	V
Gate1 to Source1 On Voltage Range	$V_{G1S1}$	1.5 to 7.0	V
Drain2 Current (DC) <sup>Note1</sup>	$I_{D2(DC)}$	-2.8	A
Drain2 Current (pulse) <sup>Note2</sup>	$I_{D2(pulse)}$	-10.0	A
Total Power Dissipation <sup>Note1</sup>	$P_T$	1.0	W
Channel Temperature	$T_{ch}$	150	°C
Storage Temperature	$T_{stg}$	-55 to +150	°C

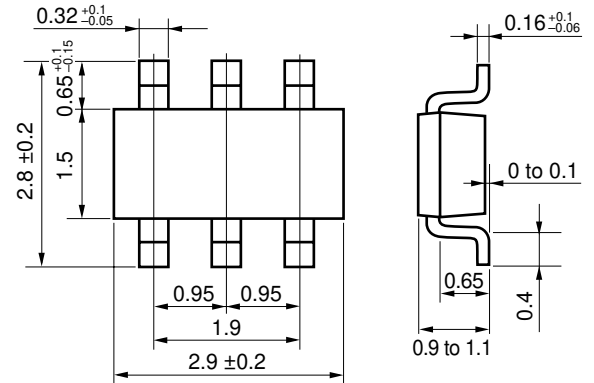
Notes 1. Mounted on FR-4 Board of 2500 mm<sup>2</sup> x 1.6 mm, t ≤ 5 sec

2.  $PW \leq 10$   $\mu$ s, Duty Cycle ≤ 1%

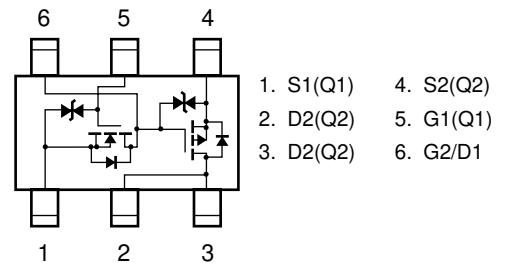
Remark The diode connected between the gate and source of the transistor serves as a protector against ESD.

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.

PACKAGE DRAWING (Unit: mm)



PIN CONNECTION (Top View)



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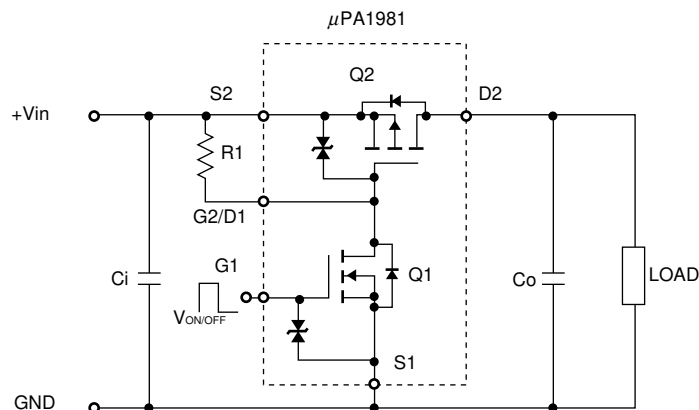
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**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>OFF CHARACTERISTICS</b>						
Q2-S2 to D2 Leakage Current	I <sub>S2D2</sub>	V <sub>S2D2</sub> = 8.0 V, V <sub>G1S1</sub> = 0 V			1.0	μA
Q1-D1 to S1 Leakage Current	I <sub>D1S1</sub>	V <sub>D1S1</sub> = 8.0 V, V <sub>G1S1</sub> = 0 V			1.0	μA
<b>ON CHARACTERISTICS</b>						
Q2-S2 to D2 Voltage <sup>Note</sup>	V <sub>S2D21</sub>	V <sub>S2S1</sub> = 5.0 V, V <sub>G1S1</sub> = 3.3 V, I <sub>D2</sub> = -2.8 A		0.15	0.2	V
	V <sub>S2D22</sub>	V <sub>S2S1</sub> = 2.5 V, V <sub>G1S1</sub> = 3.3 V, I <sub>D2</sub> = -1.9 A		0.15	0.2	V
Q2-Static On-Resistance <sup>Note</sup>	R <sub>D2S2(on)1</sub>	V <sub>G2S2</sub> = -5.0 V, I <sub>D2</sub> = -2.8 A		52	70	mΩ
	R <sub>D2S2(on)2</sub>	V <sub>G2S2</sub> = -2.5 V, I <sub>D2</sub> = -1.9 A		76	105	mΩ
Q2-S2 to D2 Current <sup>Note</sup>	I <sub>S2D21</sub>	V <sub>S2D2</sub> = 0.2 V, V <sub>S2S1</sub> = 5.0 V, V <sub>G1S1</sub> = 3.3 V	2.8			A
	I <sub>S2D22</sub>	V <sub>S2D2</sub> = 0.2 V, V <sub>S2S1</sub> = 2.5 V, V <sub>G1S1</sub> = 3.3 V	1.9			A

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

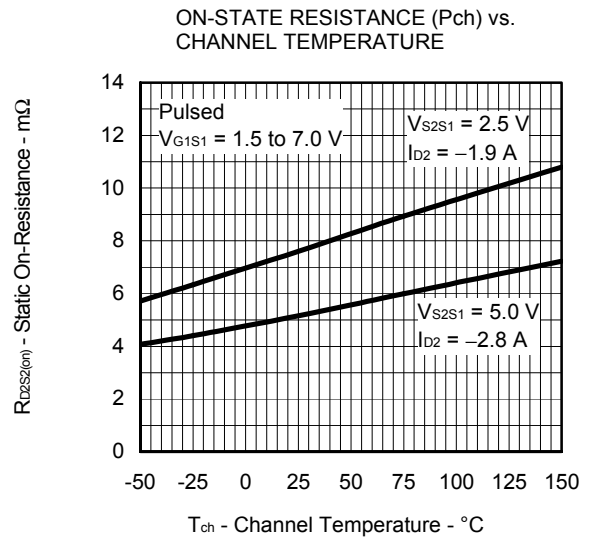
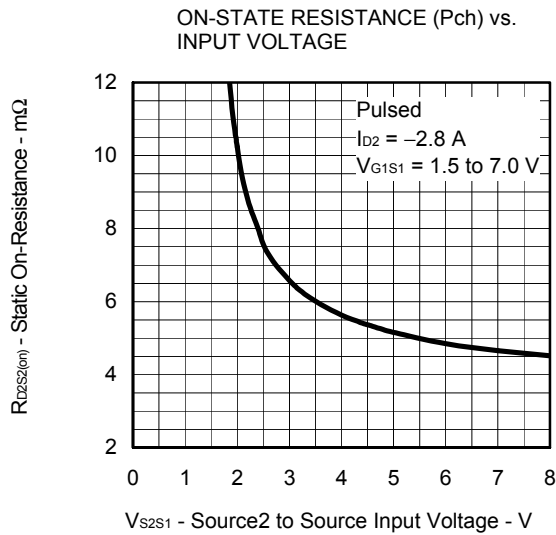
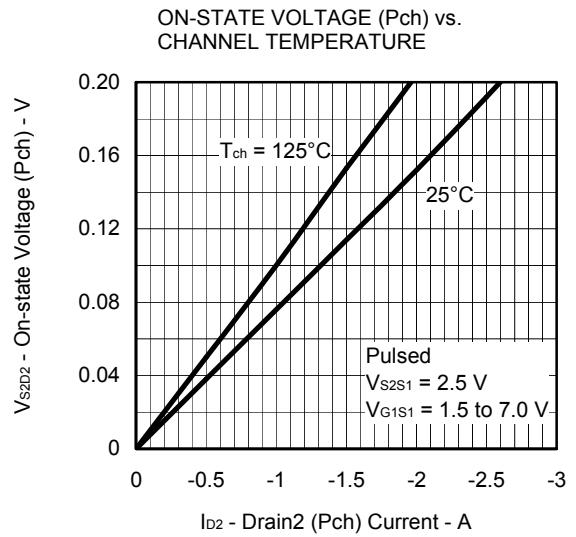
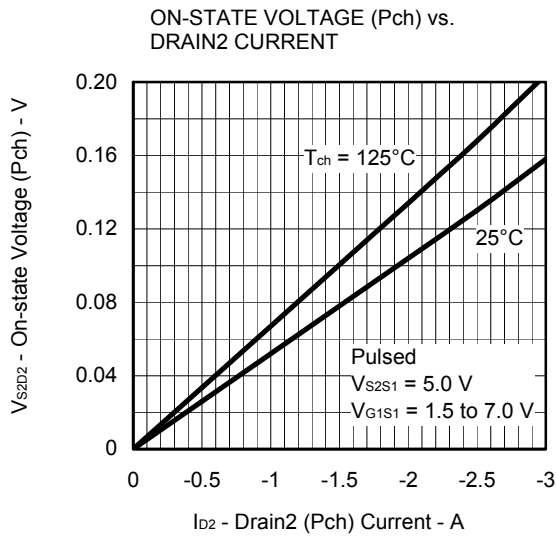
**CIRCUIT1 EXAMPLE OF APPLICATION CIRCUIT**



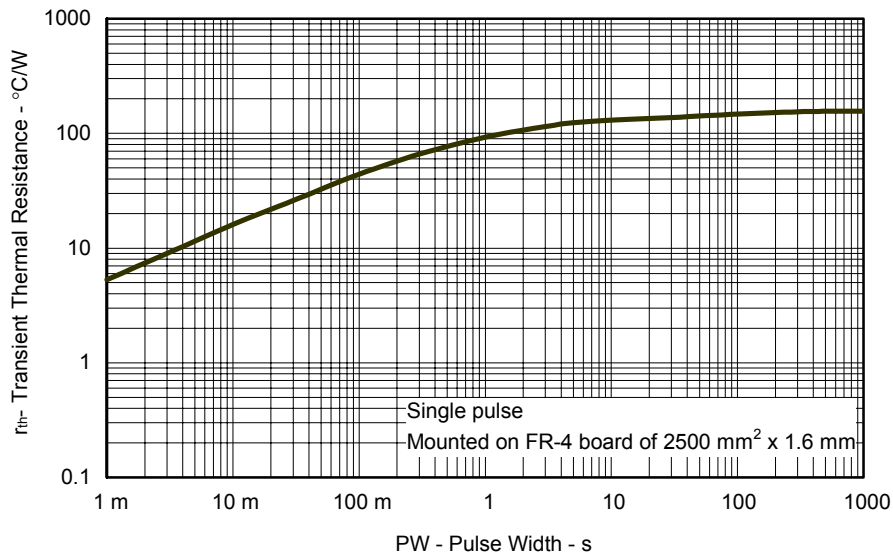
**RECOMMENDATION OF CIRCUIT1**

- Co ≤ 1 μF for applications
- R1 is required to turn Q2 off.
- Select R1 in the range of 10 to 470 kΩ.

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



TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



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