

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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# 2SK4093

## Silicon N Channel MOS FET High Speed Power Switching

REJ03G1534-0300

Rev.3.00

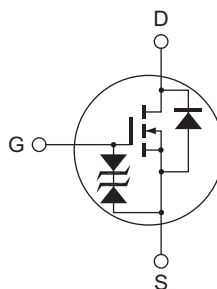
Feb 01, 2008

### Features

- Capable of 2.5V gate drive
- Low drive current
- Low on-resistance

### Outline

RENESAS Package code: PRSS0003DC-A  
(Package name: TO-92 Mod)



1. Source
2. Drain
3. Gate

### Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	$V_{DSS}$	250	V
Gate to source voltage	$V_{GSS}$	±10	V
Drain current	$I_D$ <sup>Note1</sup>	1	A
Drain peak current	$I_{D(pulse)}$ <sup>Note2</sup>	2	A
Body-drain diode reverse drain current	$I_{DR}$	0.5	A
Body-drain diode reverse drain peak current	$I_{DR(pulse)}$ <sup>Note2</sup>	2	A
Channel dissipation	Pch	0.9	W
Channel to ambient thermal impedance	$\theta_{ch-a}$	139	°C/W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 30%

2. PW ≤ 10 μs, duty cycle ≤ 1%

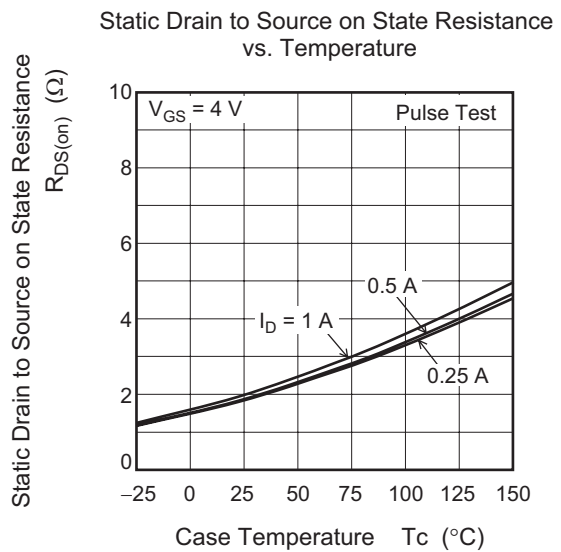
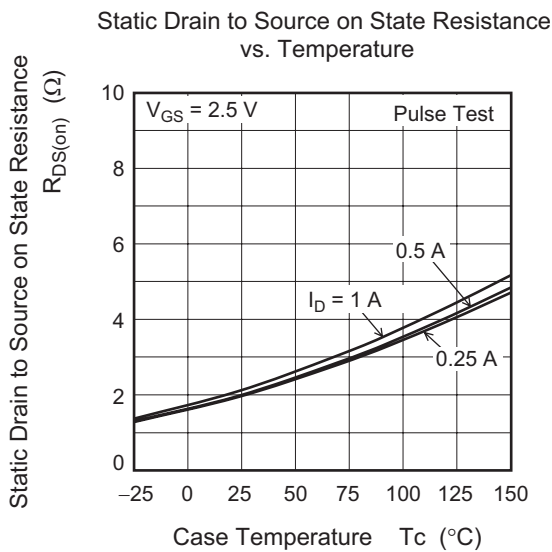
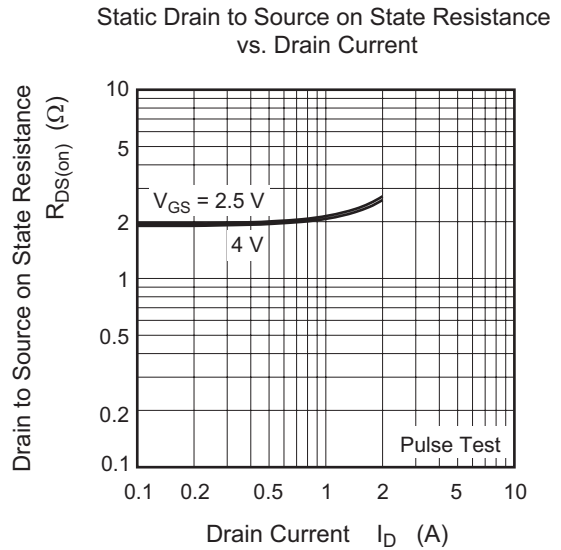
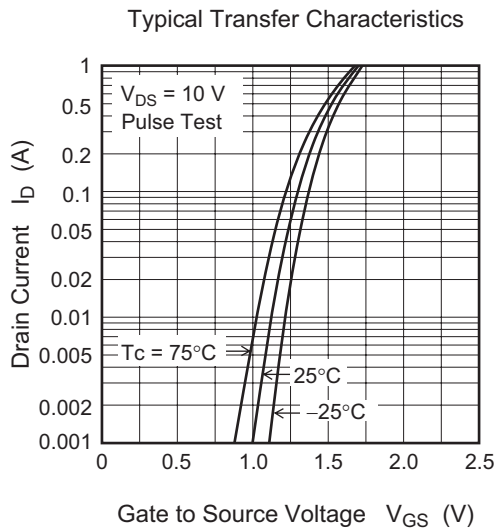
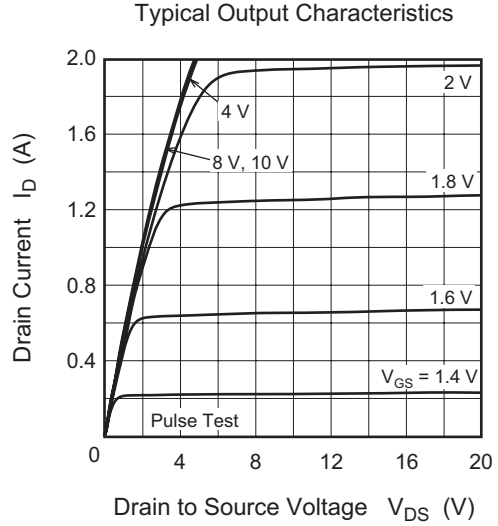
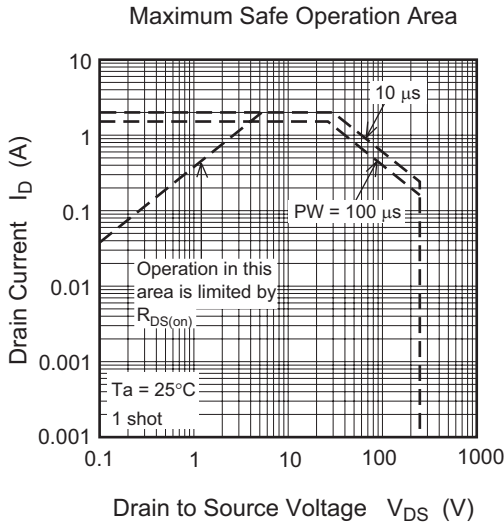
## Electrical Characteristics

(Ta = 25°C)

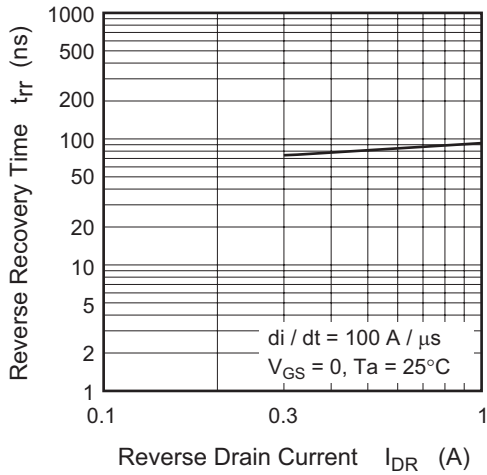
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	250	—	—	V	$I_D = 10 \text{ mA}$ , $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	$\pm 10$	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 250 \text{ V}$ , $V_{GS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 8 \text{ V}$ , $V_{DS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	0.5	—	1.5	V	$V_{DS} = 10 \text{ V}$ , $I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	1.9	2.6	$\Omega$	$I_D = 0.5 \text{ A}$ , $V_{GS} = 4 \text{ V}$ <sup>Note3</sup>
Static drain to source on state resistance	$R_{DS(on)}$	—	2.0	2.7	$\Omega$	$I_D = 0.5 \text{ A}$ , $V_{GS} = 2.5 \text{ V}$ <sup>Note3</sup>
Input capacitance	$C_{iss}$	—	140	—	pF	$V_{DS} = 25 \text{ V}$
Output capacitance	$C_{oss}$	—	18	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	$C_{rss}$	—	6	—	pF	$f = 1 \text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	14	—	ns	$I_D = 0.5 \text{ A}$
Rise time	$t_r$	—	17	—	ns	$V_{GS} = 4 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	46	—	ns	$R_L = 250 \text{ }\Omega$
Fall time	$t_f$	—	16	—	ns	$R_g = 10 \text{ }\Omega$
Total gate charge	$Q_g$	—	5.5	—	nC	$V_{DD} = 200 \text{ V}$
Gate to source charge	$Q_{gs}$	—	0.4	—	nC	$V_{GS} = 4 \text{ V}$
Gate to drain charge	$Q_{gd}$	—	3.1	—	nC	$I_D = 1 \text{ A}$
Body-drain diode forward voltage	$V_{DF}$	—	0.78	1.20	V	$I_F = 0.5 \text{ A}$ , $V_{GS} = 0$ <sup>Note3</sup>
Body-drain diode reverse recovery time	$t_{rr}$	—	80	—	ns	$I_F = 0.5 \text{ A}$ , $V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

Notes: 3. Pulse test

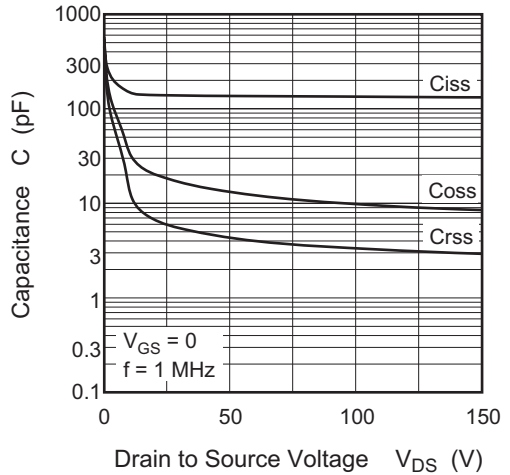
Main Characteristics



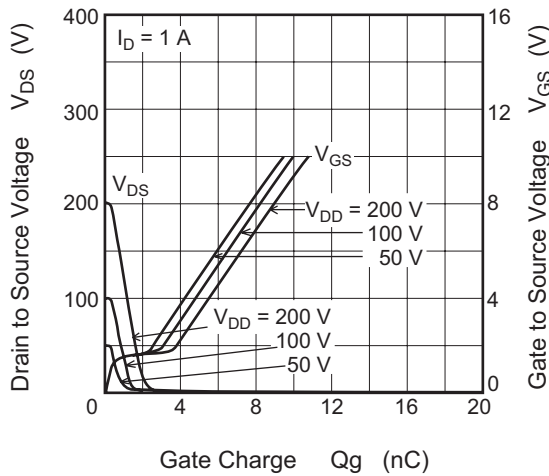
Body-Drain Diode Reverse Recovery Time



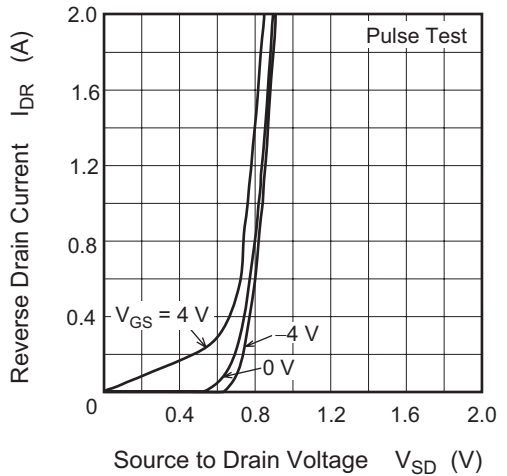
Typical Capacitance vs. Drain to Source Voltage



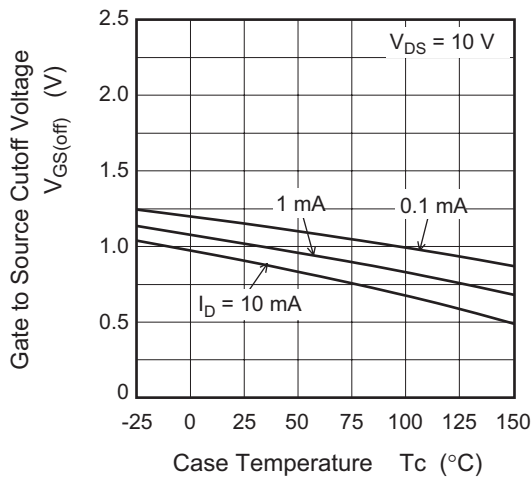
Dynamic Input Characteristics

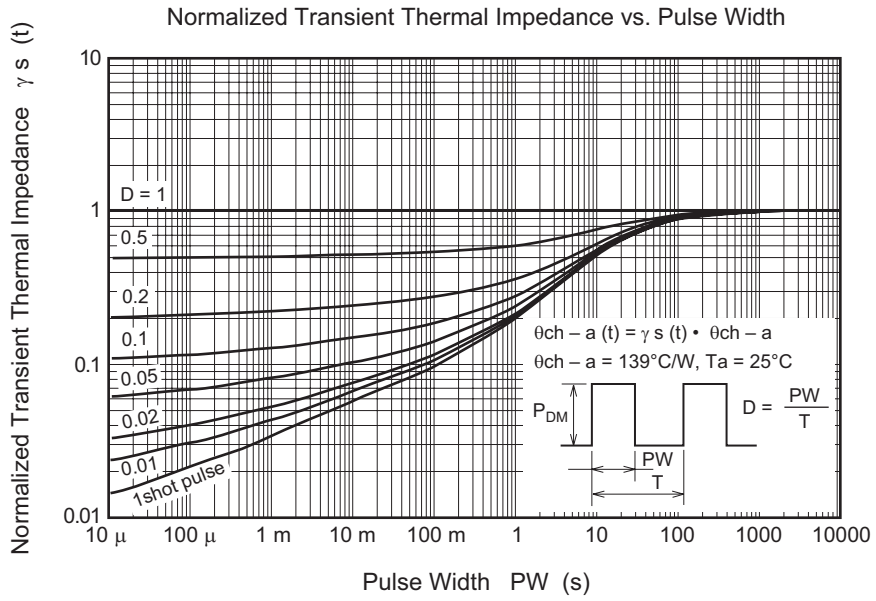


Reverse Drain Current vs. Source to Drain Voltage

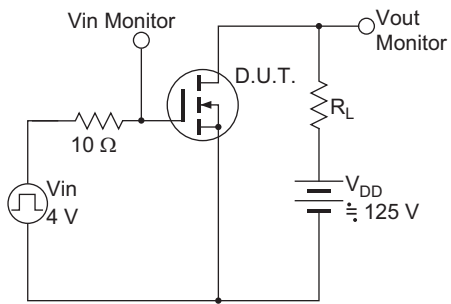


Gate to Source Cutoff Voltage vs. Case Temperature

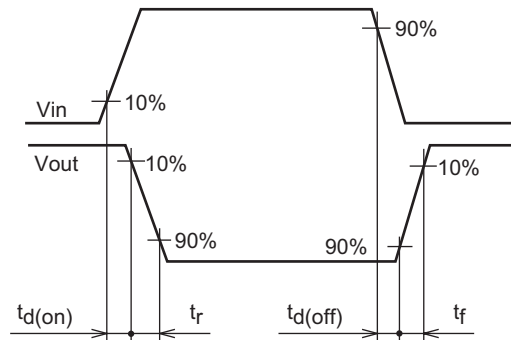




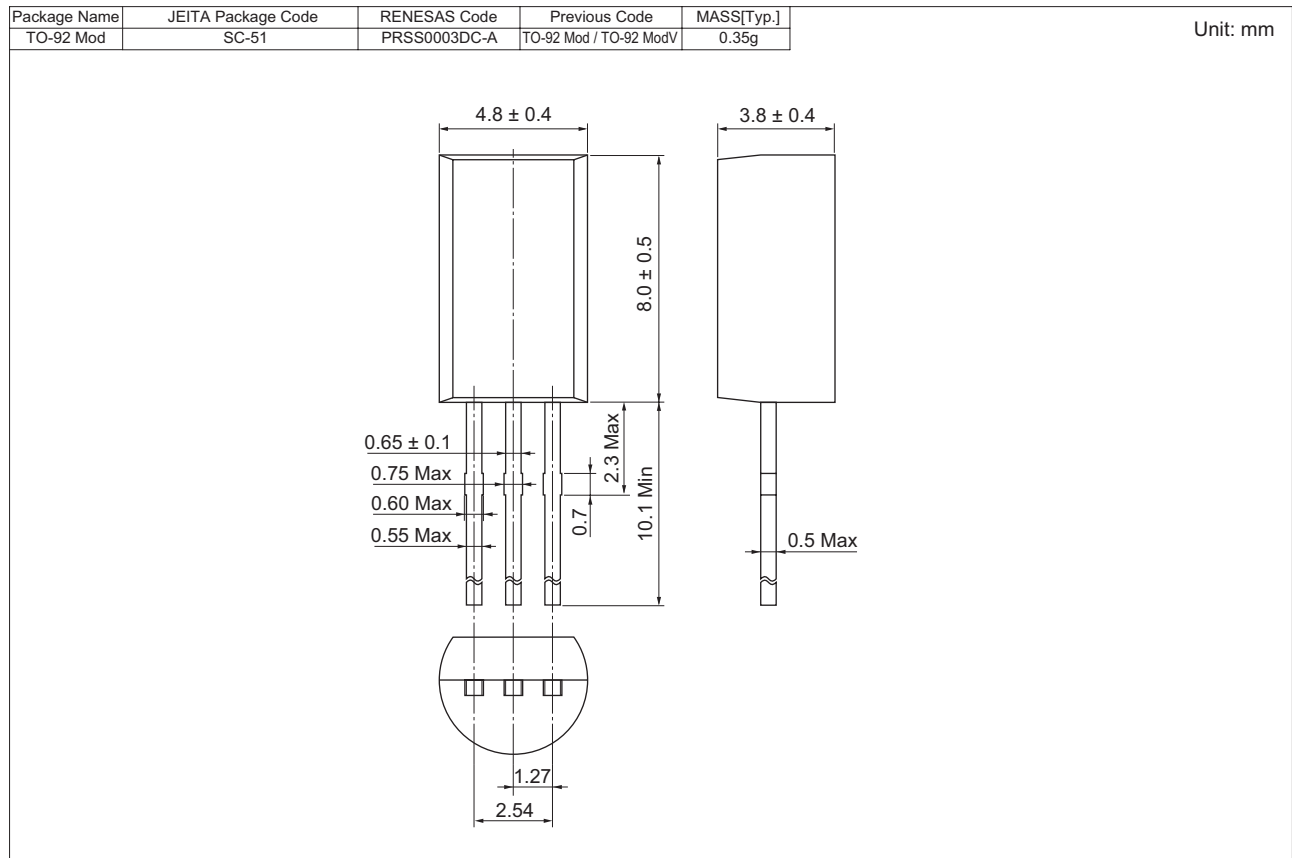
Switching Time Test Circuit



Waveform



## Package Dimensions



## Ordering Information

Part No.	Quantity	Shipping Container
2SK4093TZ-E	2500 pcs	Hold Box, Radial Taping



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