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April 1st, 2010
Renesas Electronics Corporation

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2SK4151

Silicon N Channel MOS FET
High Speed Power Switching

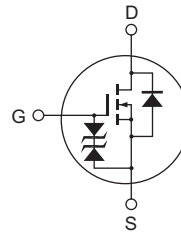
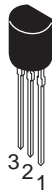
REJ03G1901-0100
Rev.1.00
Mar 15, 2010

Features

- Capable of 2.5 V gate drive
- Low drive current
- Low on-resistance
 $R_{DS(on)} = 1.5 \Omega$ typ. (at $I_D = 0.5 \text{ A}$, $V_{GS} = 4 \text{ V}$, $T_a = 25^\circ\text{C}$)

Outline

RENESAS Package code: PRSS0003DA-A
(Package name: TO-92(1))



1. Source
2. Drain
3. Gate

Absolute Maximum Ratings

($T_a = 25^\circ\text{C}$)

| Item | Symbol | Ratings | Unit |
|---|----------------------------------|-------------|--------------------|
| Drain to source voltage | V_{DSS} | 150 | V |
| Gate to source voltage | V_{GSS} | ± 10 | V |
| Drain current | I_D ^{Note1} | 1 | A |
| Drain peak current | $I_{D(pulse)}$ ^{Note2} | 4 | A |
| Body-drain diode reverse drain current | I_{DR} ^{Note1} | 1 | A |
| Body-drain diode reverse drain peak current | $I_{DR(pulse)}$ ^{Note2} | 4 | A |
| Channel dissipation | P_{ch} ^{Note2} | 0.75 | W |
| Channel to ambient thermal impedance | θ_{ch-a} | 166.7 | $^\circ\text{C/W}$ |
| Channel temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55 to +150 | $^\circ\text{C}$ |

Notes: 1. $PW \leq 10 \mu\text{s}$, duty cycle $\leq 30\%$

2. $PW \leq 10 \mu\text{s}$, duty cycle $\leq 1\%$

Electrical Characteristics

(Ta = 25°C)

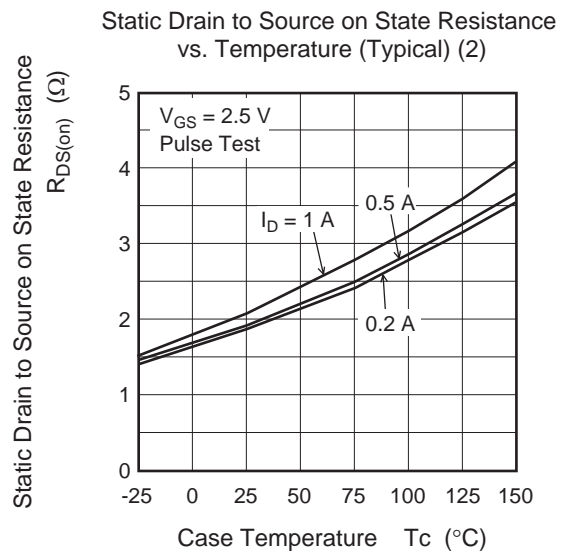
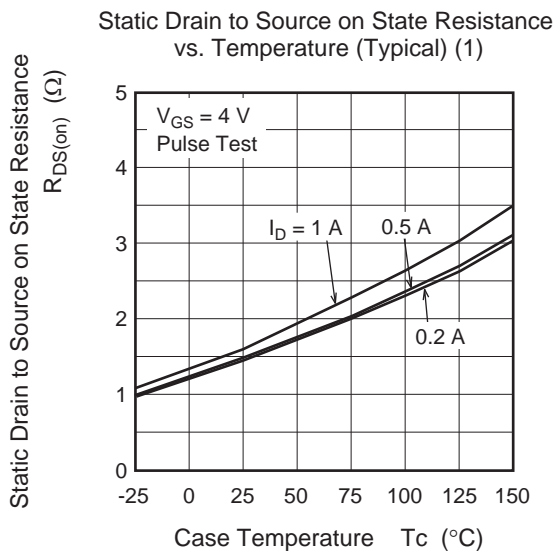
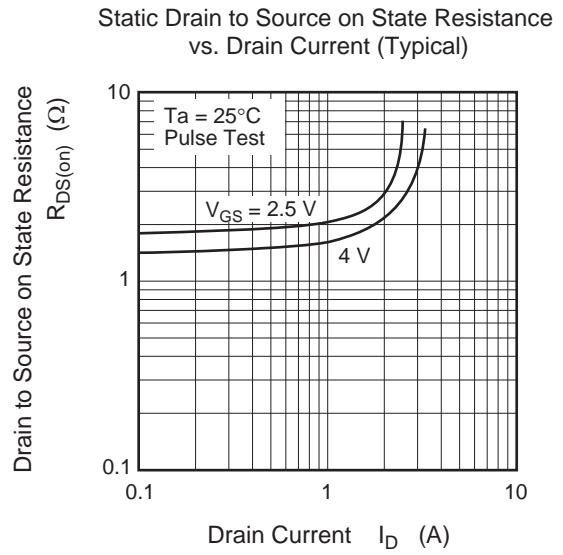
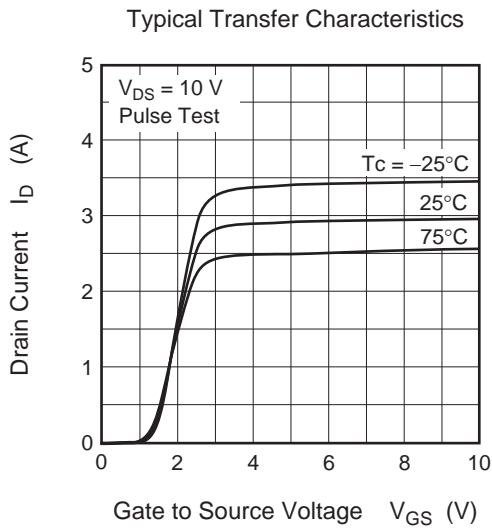
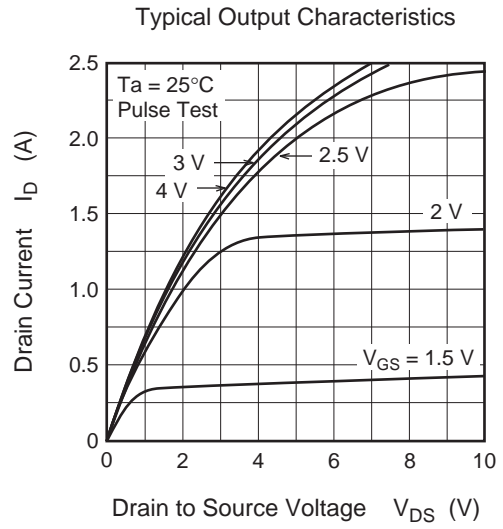
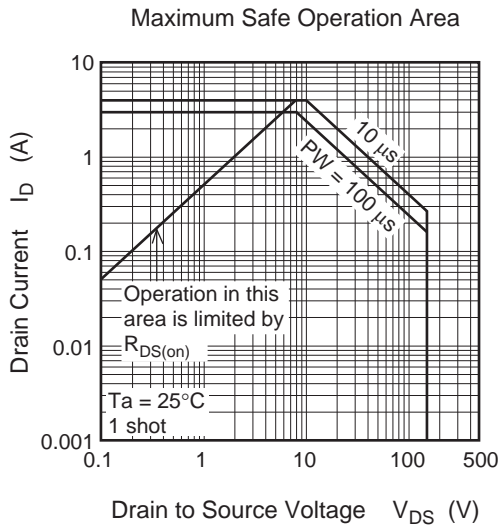
| Item | Symbol | Min | Typ | Max | Unit | Test conditions |
|--|---------------|----------|-----|----------|---------------|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 150 | — | — | V | $I_D = 10 \text{ mA}$, $V_{GS} = 0$ |
| Gate to source breakdown voltage | $V_{(BR)GSS}$ | ± 10 | — | — | V | $I_G = \pm 100 \text{ }\mu\text{A}$, $V_{DS} = 0$ |
| Gate to source leak current | I_{GSS} | — | — | ± 10 | μA | $V_{GS} = \pm 8 \text{ V}$, $V_{DS} = 0$ |
| Zero gate voltage drain current | I_{DSS} | — | — | 1 | μA | $V_{DS} = 150 \text{ V}$, $V_{GS} = 0$ |
| 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 | $R_{DS(on)}$ | — | 1.5 | 1.95 | Ω | $I_D = 0.5 \text{ A}$, $V_{GS} = 4 \text{ V}$ ^{Note3} |
| | $R_{DS(on)}$ | — | 1.9 | 2.5 | Ω | $I_D = 0.5 \text{ A}$, $V_{GS} = 2.5 \text{ V}$ ^{Note3} |
| Input capacitance | C_{iss} | — | 98 | — | pF | $V_{DS} = 10 \text{ V}$ |
| Output capacitance | C_{oss} | — | 31 | — | pF | $V_{GS} = 0$ |
| Reverse transfer capacitance | C_{rss} | — | 14 | — | pF | $f = 1 \text{ MHz}$ |
| Total gate charge | Q_g | — | 3.5 | — | nC | $V_{DD} = 100 \text{ V}$ |
| Gate to source charge | Q_{gs} | — | 0.5 | — | nC | $V_{GS} = 4 \text{ V}$ |
| Gate to drain charge | Q_{gd} | — | 1.8 | — | nC | $I_D = 1 \text{ A}$ |
| Turn-on delay time | $t_{d(on)}$ | — | 8 | — | ns | $V_{GS} = 4 \text{ V}$ |
| Rise time | t_r | — | 12 | — | ns | $I_D = 0.5 \text{ A}$ |
| Turn-off delay time | $t_{d(off)}$ | — | 34 | — | ns | $R_L = 60 \text{ }\Omega$ |
| Fall time | t_f | — | 19 | — | ns | |
| Body-drain diode forward voltage | V_{DF} | — | 1.0 | 1.5 | V | $I_F = 1 \text{ A}$, $V_{GS} = 0$ ^{Note3} |
| Body-drain diode reverse recovery time | t_{rr} | — | 60 | — | ns | $I_F = 1 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$ |

Notes: 3. Pulse test

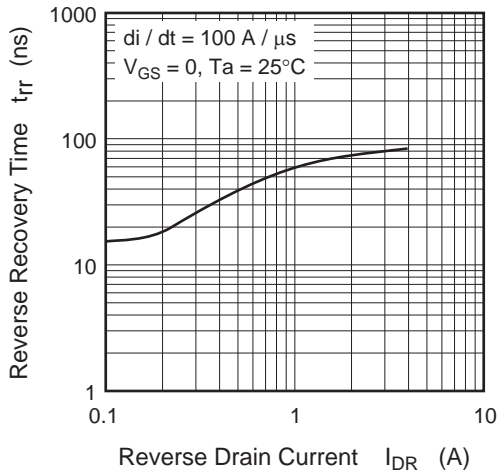
4. This device is sensitive to electrostatic discharge.

It is recommended to adopt appropriate cautions when handling this product.

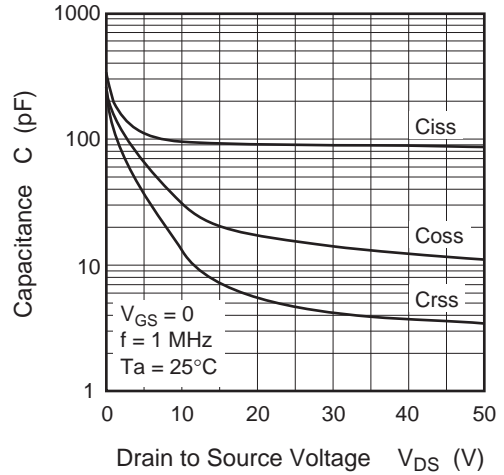
Main Characteristics



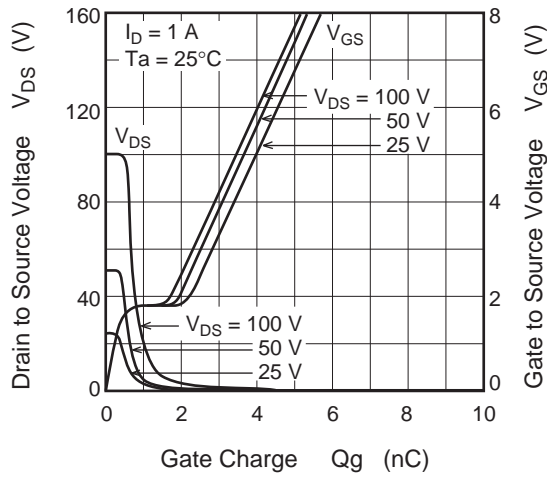
Body-Drain Diode Reverse Recovery Time (Typical)



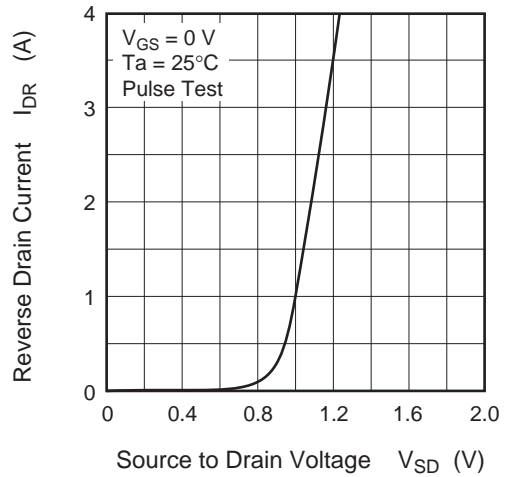
Typical Capacitance vs. Drain to Source Voltage



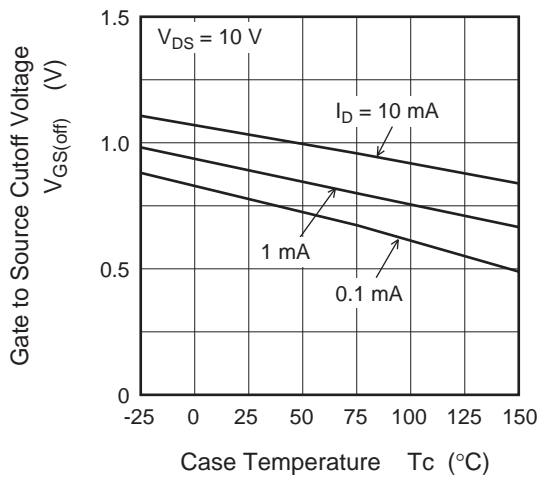
Dynamic Input Characteristics (Typical)

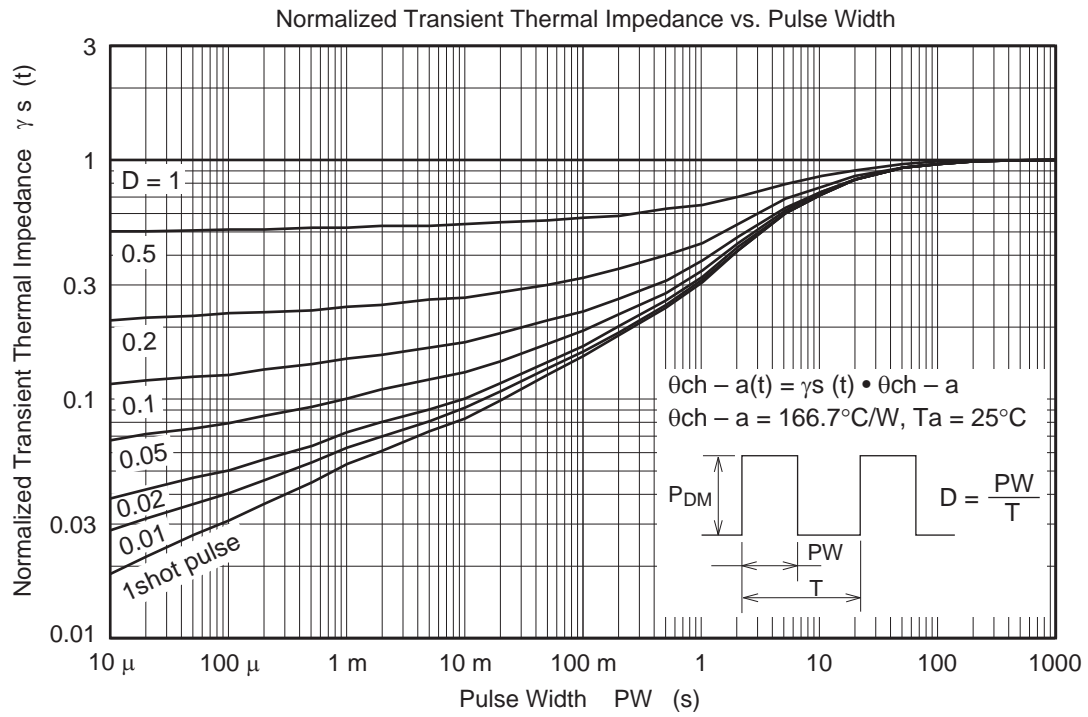


Reverse Drain Current vs. Source to Drain Voltage (Typical)

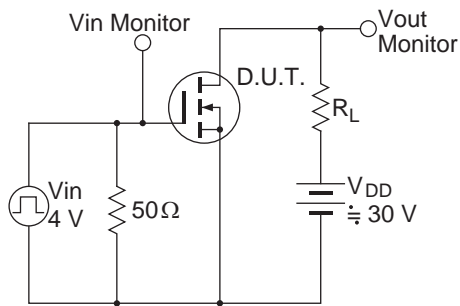


Gate to Source Cutoff Voltage vs. Case Temperature (Typical)

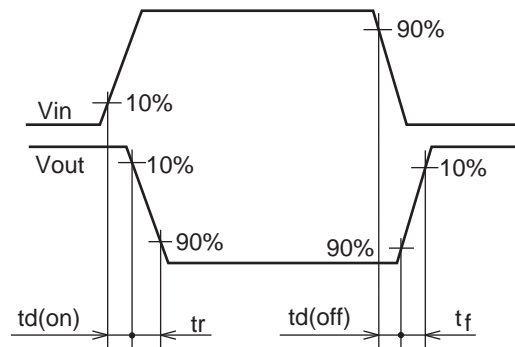




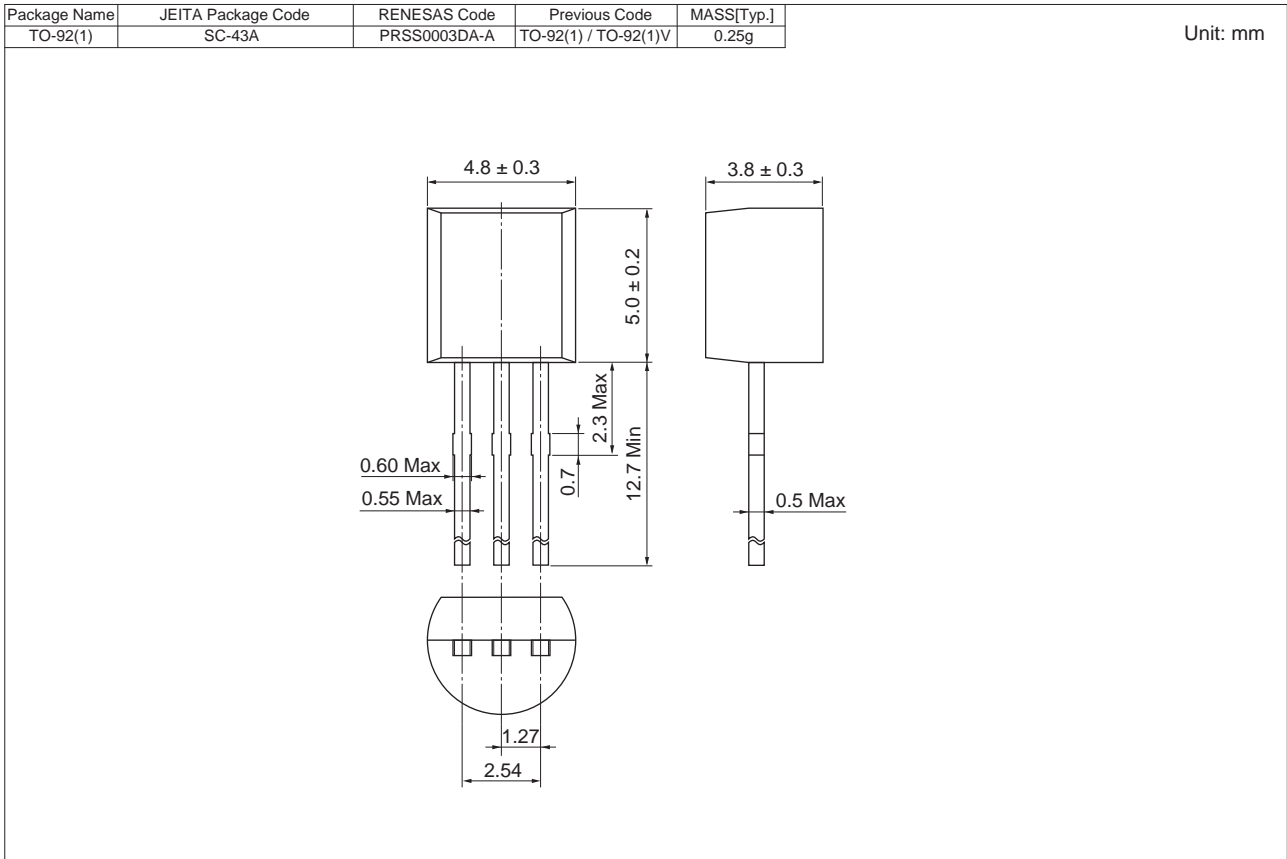
Switching Time Test Circuit



Waveform



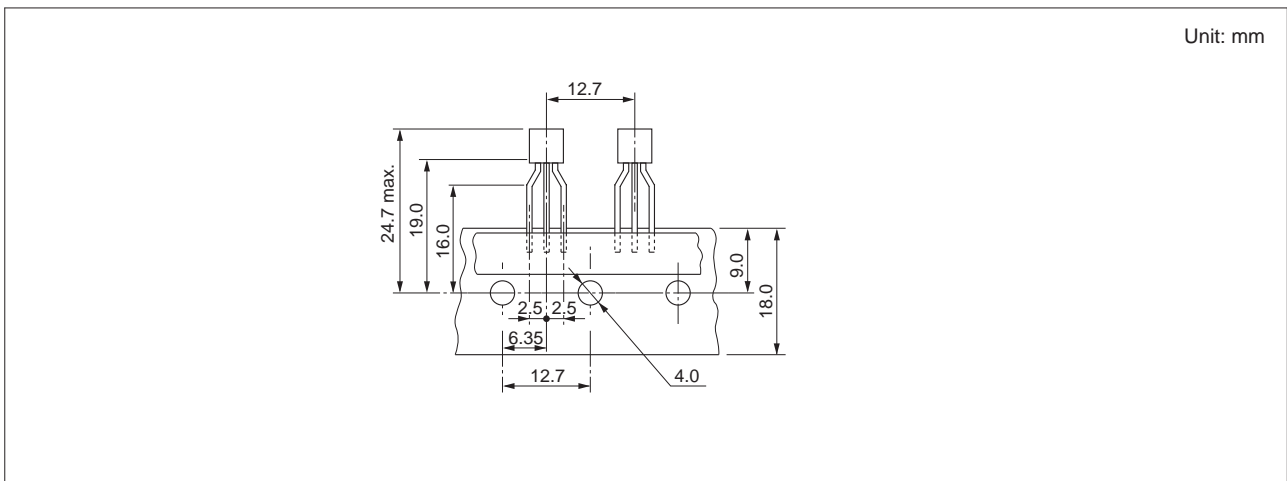
Package Dimension



Ordering Information

| Part No. | Quantity | Shipping Container |
|-------------|----------|-------------------------|
| 2SK4151TZ-E | 2500 pcs | Hold box, Radial taping |

Note: Leads is forming applied as following figure.



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