

# 2SK4150

Silicon N Channel MOS FET  
High Speed Power Switching

REJ03G1909-0300

Rev.3.00

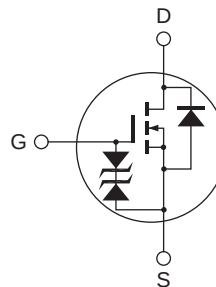
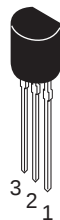
May 27, 2010

## Features

- Capable of 2.5 V gate drive
- Low drive current
- Low on-resistance  
 $R_{DS(on)} = 4.0 \Omega$  typ. (at  $I_D = 0.2 \text{ A}$ ,  $V_{GS} = 4 \text{ V}$ ,  $T_a = 25^\circ\text{C}$ )

## 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                     | $V_{DSS}$                        | 250         | V                  |
| Gate to source voltage                      | $V_{GSS}$                        | $\pm 10$    | V                  |
| Drain current                               | $I_D$                            | 0.4         | A                  |
| Drain peak current                          | $I_{D(pulse)}$ <sup>Note1</sup>  | 1.6         | A                  |
| Body-drain diode reverse drain current      | $I_{DR}$                         | 0.4         | A                  |
| Body-drain diode reverse drain peak current | $I_{DR(pulse)}$ <sup>Note1</sup> | 1.6         | A                  |
| Channel dissipation                         | $P_{ch}$                         | 0.75        | W                  |
| Channel to ambient thermal impedance        | $\theta_{ch-a}$                  | 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  $\leq 1\%$

## 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 | $R_{DS(on)}$  | —        | 4.0  | 5.7      | $\Omega$      | $I_D = 0.2 \text{ A}$ , $V_{GS} = 4 \text{ V}$ <sup>Note2</sup>                            |
| Static drain to source on state resistance | $R_{DS(on)}$  | —        | 4.1  | 5.9      | $\Omega$      | $I_D = 0.2 \text{ A}$ , $V_{GS} = 2.5 \text{ V}$ <sup>Note2</sup>                          |
| Input capacitance                          | $C_{iss}$     | —        | 80   | —        | pF            | $V_{DS} = 25 \text{ V}$<br>$V_{GS} = 0$<br>$f = 1 \text{ MHz}$                             |
| Output capacitance                         | $C_{oss}$     | —        | 11.4 | —        | pF            |                                                                                            |
| Reverse transfer capacitance               | $C_{rss}$     | —        | 3.4  | —        | pF            |                                                                                            |
| Turn-on delay time                         | $t_{d(on)}$   | —        | 17   | —        | ns            | $I_D = 0.2 \text{ A}$<br>$V_{GS} = 4 \text{ V}$<br>$R_L = 625 \Omega$<br>$R_g = 10 \Omega$ |
| Rise time                                  | $t_r$         | —        | 14   | —        | ns            |                                                                                            |
| Turn-off delay time                        | $t_{d(off)}$  | —        | 38   | —        | ns            |                                                                                            |
| Fall time                                  | $t_f$         | —        | 36   | —        | ns            |                                                                                            |
| Total gate charge                          | $Q_g$         | —        | 3.7  | —        | nC            | $V_{DD} = 200 \text{ V}$<br>$V_{GS} = 4 \text{ V}$<br>$I_D = 0.4 \text{ A}$                |
| Gate to source charge                      | $Q_{gs}$      | —        | 0.3  | —        | nC            |                                                                                            |
| Gate to drain charge                       | $Q_{gd}$      | —        | 2.3  | —        | nC            |                                                                                            |
| Body-drain diode forward voltage           | $V_{DF}$      | —        | 0.8  | 1.2      | V             | $I_F = 0.4 \text{ A}$ , $V_{GS} = 0$ <sup>Note2</sup>                                      |
| Body-drain diode reverse recovery time     | $t_{rr}$      | —        | 70   | —        | ns            | $I_F = 0.4 \text{ A}$ , $V_{GS} = 0$<br>$di_F/dt = 100 \text{ A}/\mu\text{s}$              |

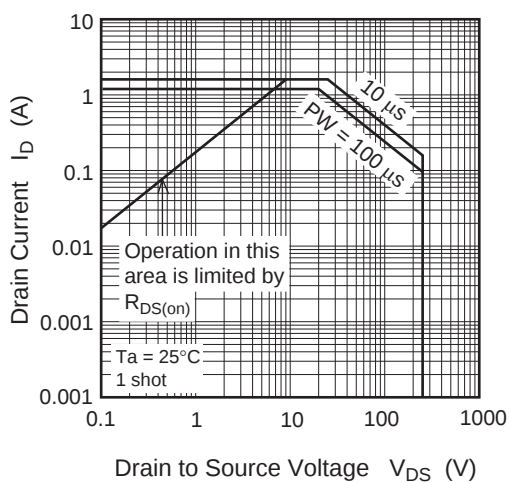
Notes: 2. Pulse test

3. This device is sensitive to electrostatic discharge.

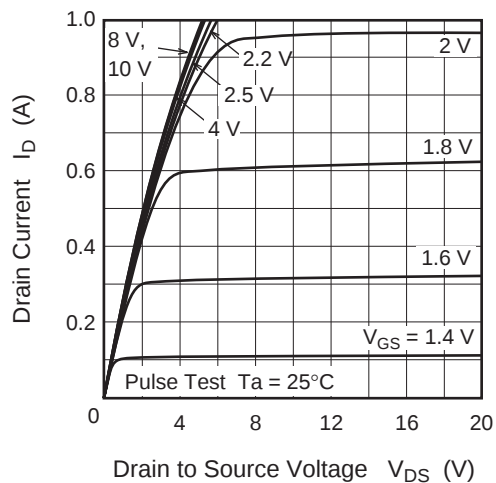
It is recommended to adopt appropriate cautions when handling this product.

## Main Characteristics

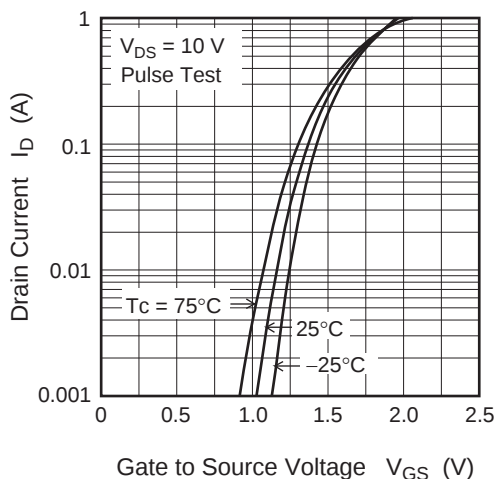
Maximum Safe Operation Area



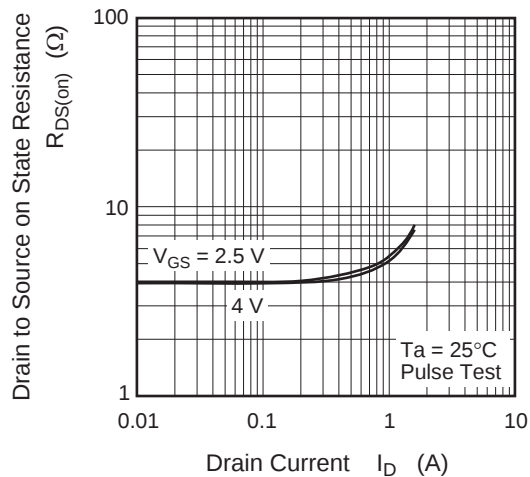
Typical Output Characteristics



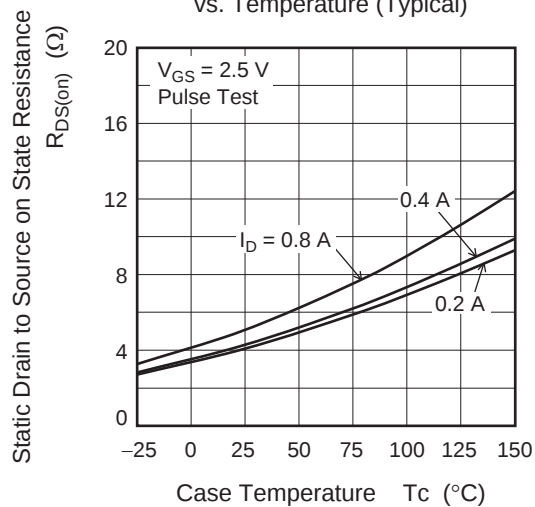
Typical Transfer Characteristics



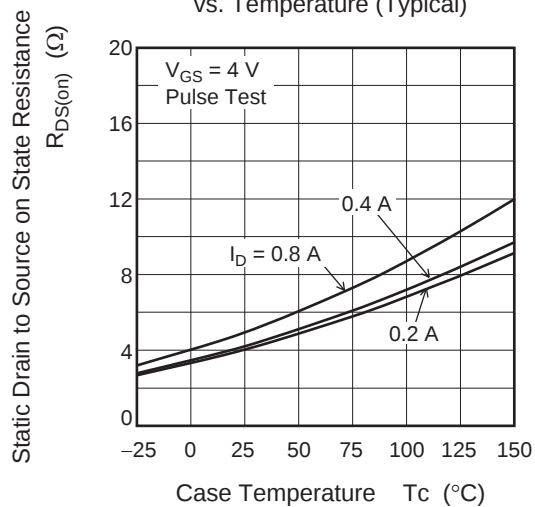
Static Drain to Source on State Resistance vs. Drain Current (Typical)



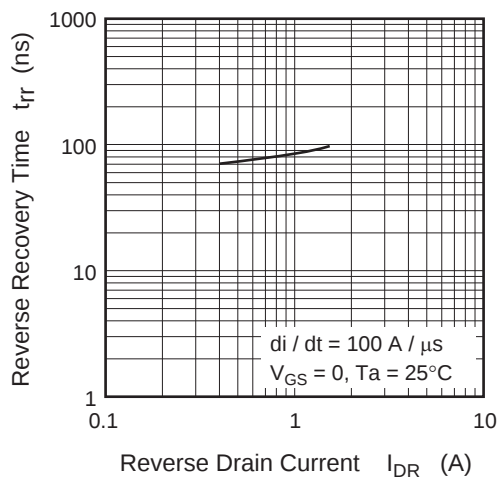
Static Drain to Source on State Resistance vs. Temperature (Typical)



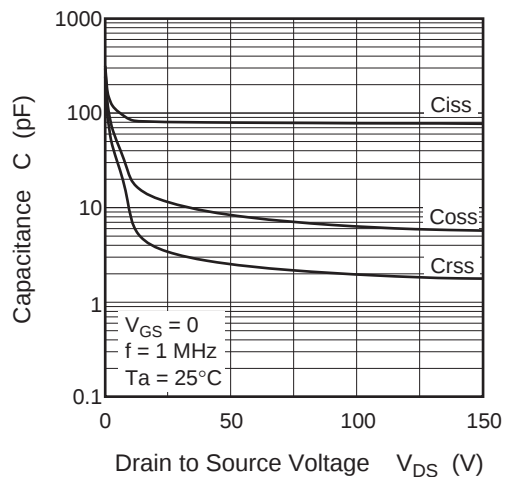
Static Drain to Source on State Resistance vs. Temperature (Typical)



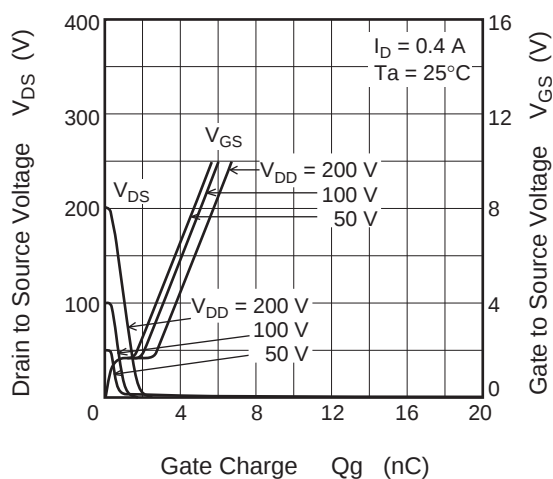
Body-Drain Diode Reverse Recovery Time (Typical)



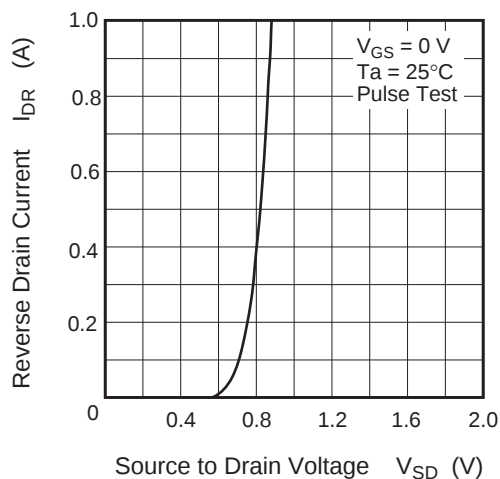
Typical Capacitance vs. Drain to Source Voltage



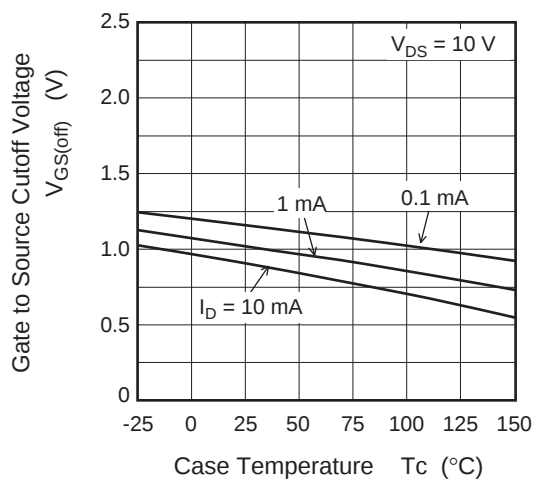
Dynamic Input Characteristics (Typical)

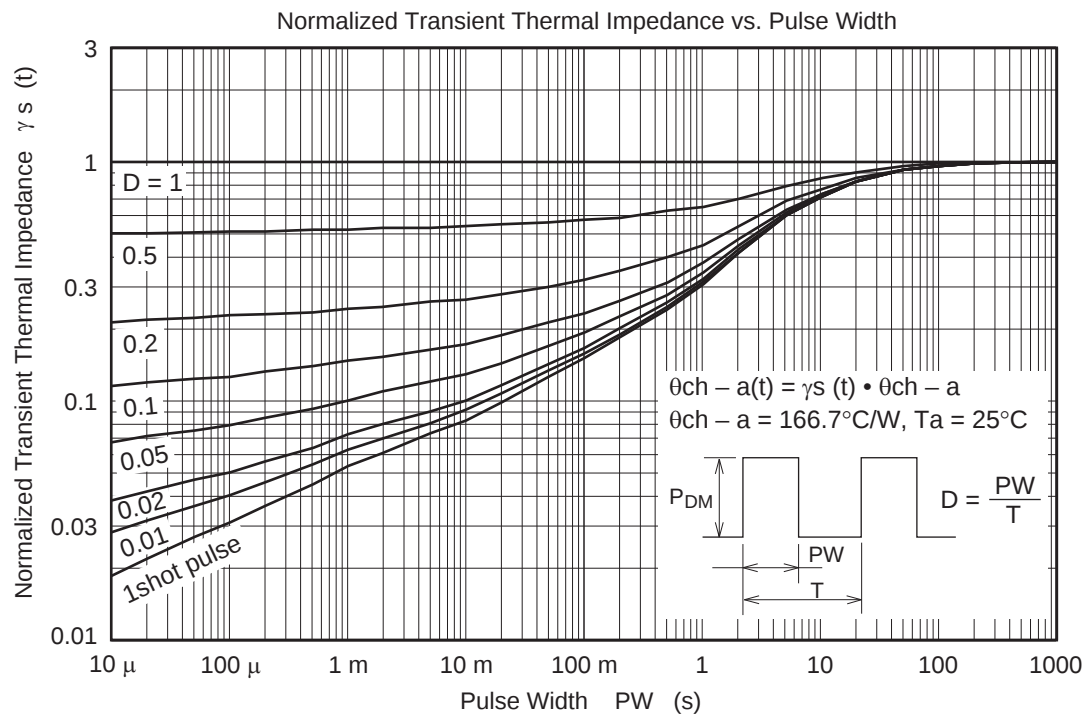


Reverse Drain Current vs. Source to Drain Voltage (Typical)

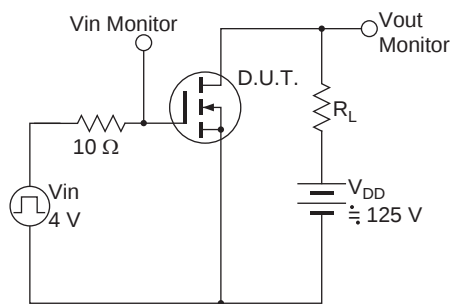


Gate to Source Cutoff Voltage vs. Case Temperature (Typical)

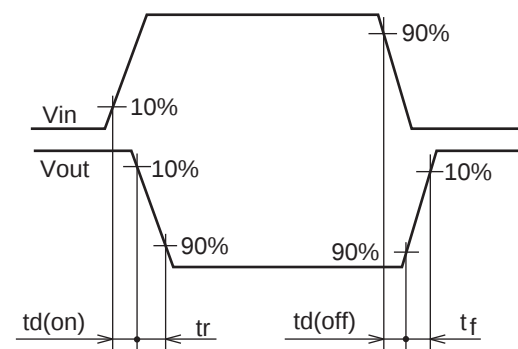




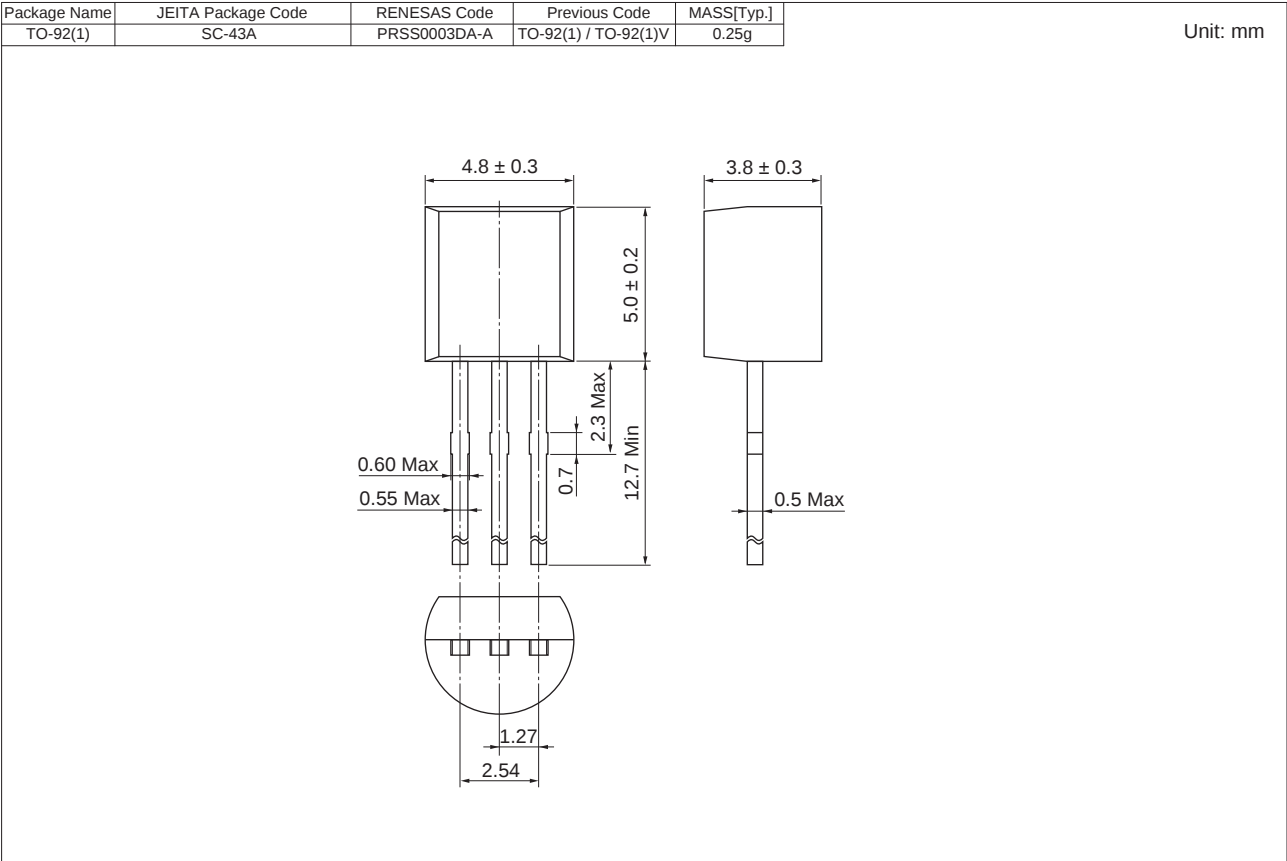
Switching Time Test Circuit



Waveform



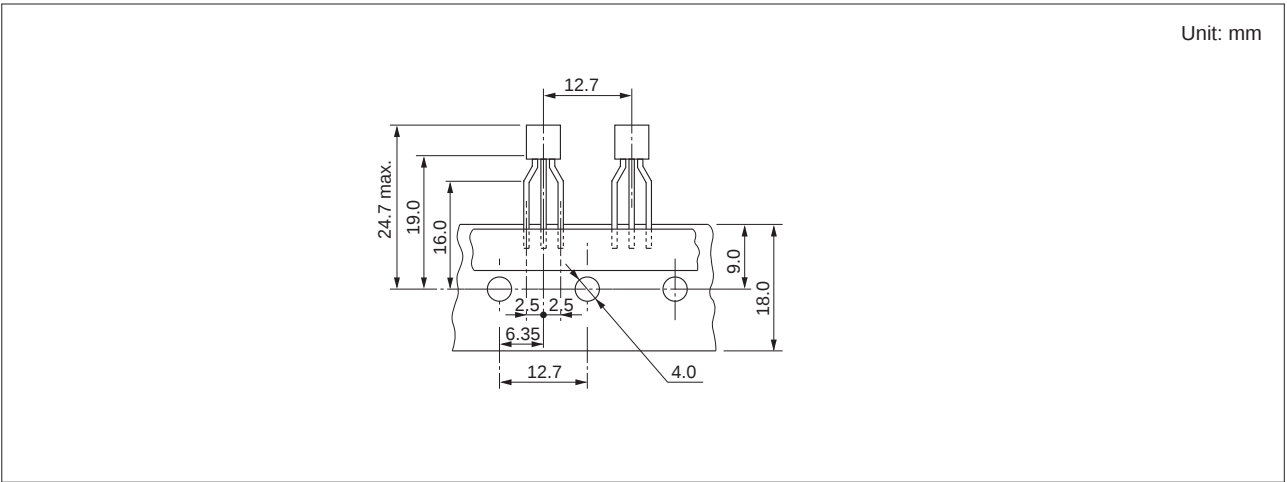
Package Dimensions



Ordering Information

| Part No.    | Quantity | Shipping Container      |
|-------------|----------|-------------------------|
| 2SK4150TZ-E | 2500 pcs | Hold Box, Radial Taping |

Note: Leads is forming applied as following figure.



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2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.  
Tel: +1-408-588-6000, Fax: +1-408-588-6130

**Renesas Electronics Canada Limited**  
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada  
Tel: +1-905-898-5441, Fax: +1-905-898-3220

**Renesas Electronics Europe Limited**  
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.  
Tel: +44-1628-585-100, Fax: +44-1628-585-900

**Renesas Electronics Europe GmbH**  
Arcadiastrasse 10, 40472 Düsseldorf, Germany  
Tel: +49-211-65030, Fax: +49-211-6503-1327

**Renesas Electronics (China) Co., Ltd.**  
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China  
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

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Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China  
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

**Renesas Electronics Hong Kong Limited**  
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong  
Tel: +852-2886-9318, Fax: +852-2886-9022/9044

**Renesas Electronics Taiwan Co., Ltd.**  
7F, No. 363 Fu Shing North Road Taipei, Taiwan  
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Tel: +65-6213-0200, Fax: +65-6278-8001

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Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

**Renesas Electronics Korea Co., Ltd.**  
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Tel: +82-2-558-3737, Fax: +82-2-558-5141