

2SK3228

Silicon N Channel MOS FET High Speed Power Switching

REJ03G1094-0400

Rev.4.00

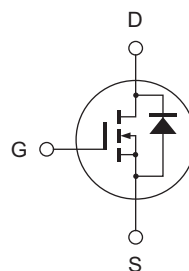
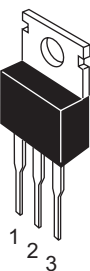
May 15, 2006

Features

- Low on-resistance
 $R_{DS(on)} = 6\text{ m}\Omega$ typ.
- Low drive current
- 4 V gate drive device can be driven from 5 V source

Outline

RENESAS Package code: PRSS0004AC-A
(Package name: TO-220AB)



1. Gate
2. Drain (Flange)
3. Source

Absolute Maximum Ratings

(Ta = 25°C)

| Item | Symbol | Value | Unit |
|--|----------------------------------|-------------|------|
| Drain to source voltage | V_{DS} | 80 | V |
| Gate to source voltage | V_{GS} | ±20 | V |
| Drain current | I_D | 75 | A |
| Drain peak current | $I_{D(pulse)}$ ^{Note 1} | 300 | A |
| Body-drain diode reverse drain current | I_{DR} | 75 | A |
| Avalanche current | I_{AP} ^{Note 3} | 50 | A |
| Avalanche energy | E_{AR} ^{Note 3} | 181 | mJ |
| Channel dissipation | P_{ch} ^{Note 2} | 100 | W |
| Channel temperature | T_{ch} | 150 | °C |
| Storage temperature | T_{stg} | -55 to +150 | °C |

Notes: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1\%$
 2. Value at $T_c = 25^\circ C$
 3. Value at $T_{ch} \leq 25^\circ C$, $R_g \geq 50 \Omega$

Electrical Characteristics

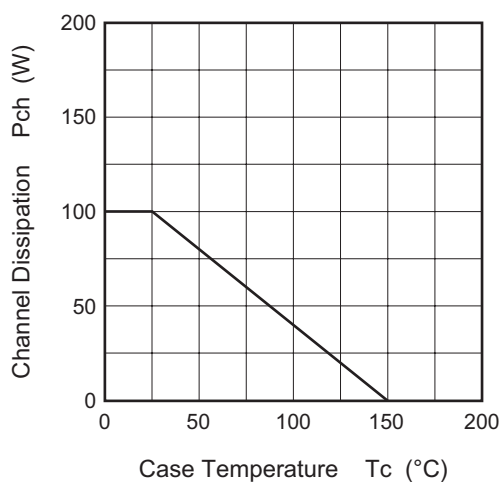
(Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|--|---------------|-----|------|------|------|--|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 80 | — | — | V | $I_D = 10 \text{ mA}$, $V_{GS} = 0$ |
| Gate to source leak current | I_{GSS} | — | — | ±0.1 | μA | $V_{GS} = \pm 20 \text{ V}$, $V_{DS} = 0$ |
| Zero gate voltage drain current | I_{DSS} | — | — | 10 | μA | $V_{DS} = 80 \text{ V}$, $V_{GS} = 0$ |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 1.0 | — | 2.5 | V | $I_D = 1 \text{ mA}$, $V_{DS} = 10 \text{ V}$ |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 6.0 | 7.5 | mΩ | $I_D = 40 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note 4} |
| | $R_{DS(on)}$ | — | 8.0 | 12 | mΩ | $I_D = 40 \text{ A}$, $V_{GS} = 4 \text{ V}$ ^{Note 4} |
| Forward transfer admittance | $ y_{fs} $ | 55 | 90 | — | S | $I_D = 40 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note 4} |
| Input capacitance | C_{iss} | — | 9700 | — | pF | $V_{GS} = 0$ $f = 1 \text{ MHz}$ |
| Output capacitance | C_{oss} | — | 1250 | — | pF | |
| Reverse transfer capacitance | C_{rss} | — | 290 | — | pF | |
| Total gate charge | Q_g | — | 150 | — | nC | $V_{DD} = 25 \text{ V}$ $V_{GS} = 25 \text{ V}$ $I_D = 75 \text{ A}$ |
| Gate to source charge | Q_{gs} | — | 30 | — | nC | |
| Gate to drain charge | Q_{gd} | — | 30 | — | nC | |
| Turn-on delay time | $t_{d(on)}$ | — | 80 | — | ns | $I_D = 10 \text{ A}$ $V_{GS} = 40 \text{ V}$ $R_L = 0.75 \Omega$ |
| Rise time | t_r | — | 300 | — | ns | |
| Turn-off delay time | $t_{d(off)}$ | — | 770 | — | ns | |
| Fall time | t_f | — | 370 | — | ns | |
| Body-drain diode forward voltage | V_{DF} | — | 1.05 | — | V | $I_F = 75 \text{ A}$, $V_{GS} = 0$ |
| Body-drain diode reverse recovery time | t_{rr} | — | 90 | — | ns | $I_F = 75 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 50 \text{ A}/\mu s$ |

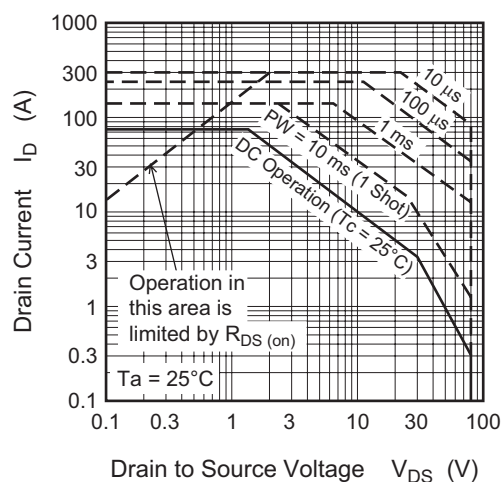
Note: 4. Pulse test

Main Characteristics

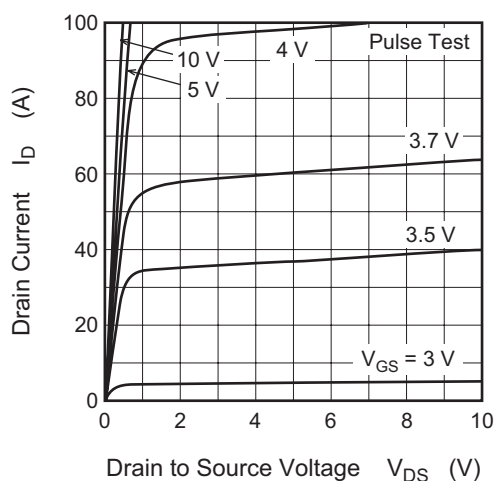
Power vs. Temperature Derating



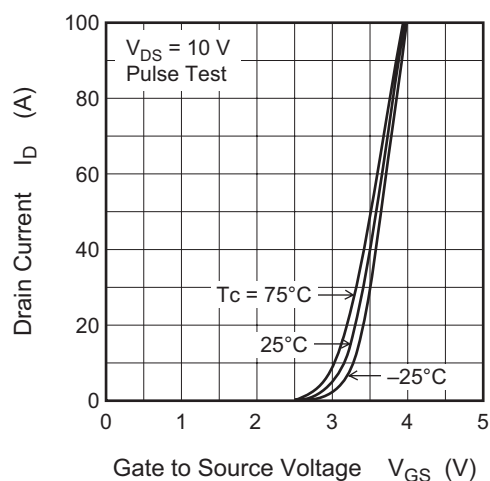
Maximum Safe Operation Area



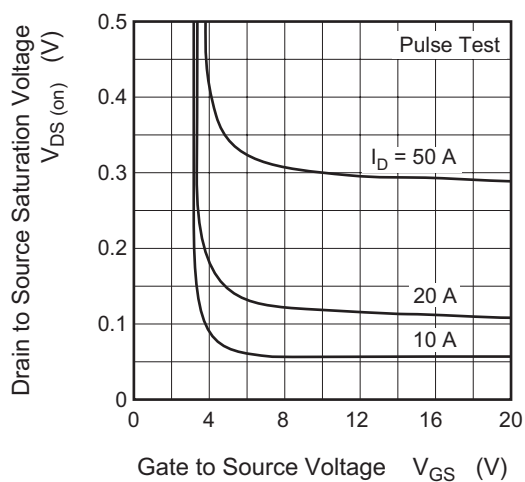
Typical Output Characteristics



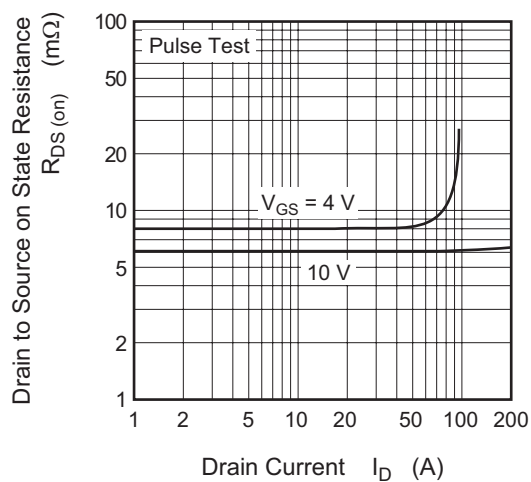
Typical Transfer Characteristics



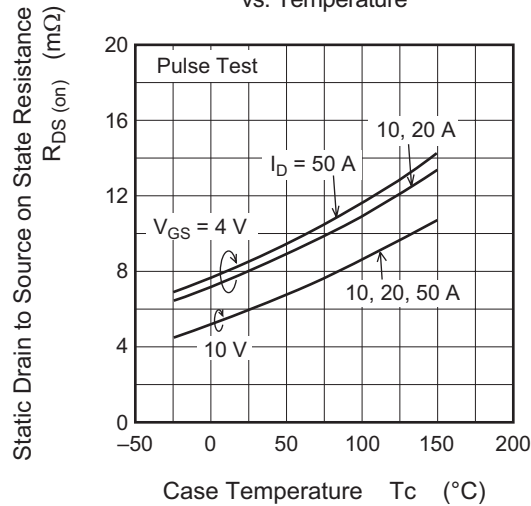
Drain to Source Saturation Voltage vs. Gate to Source Voltage



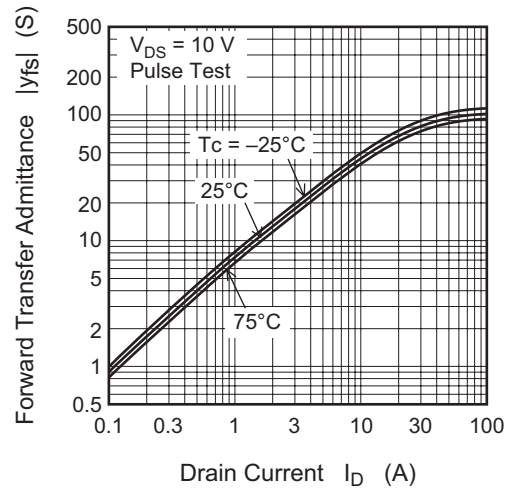
Static Drain to Source on State Resistance vs. Drain Current



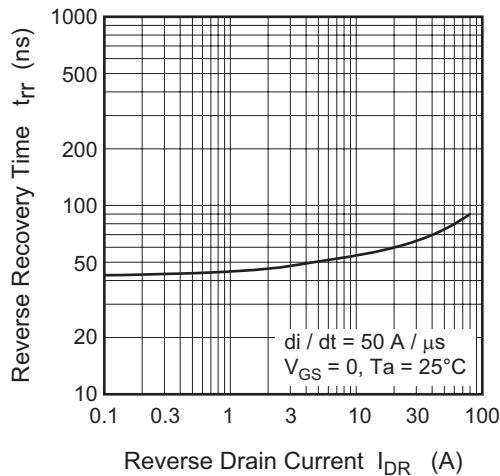
Static Drain to Source on State Resistance vs. Temperature



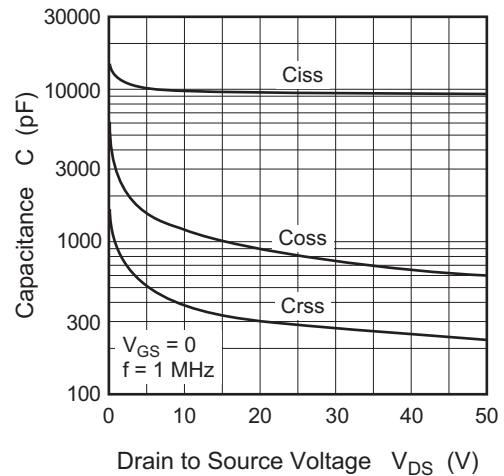
Forward Transfer Admittance vs. Drain Current



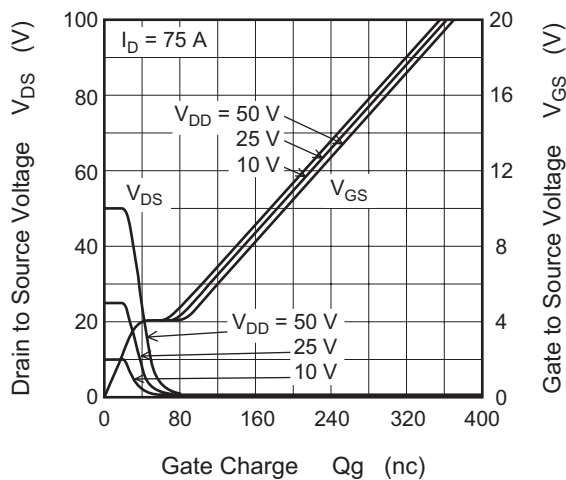
Body to Drain Diode Reverse Recovery Time



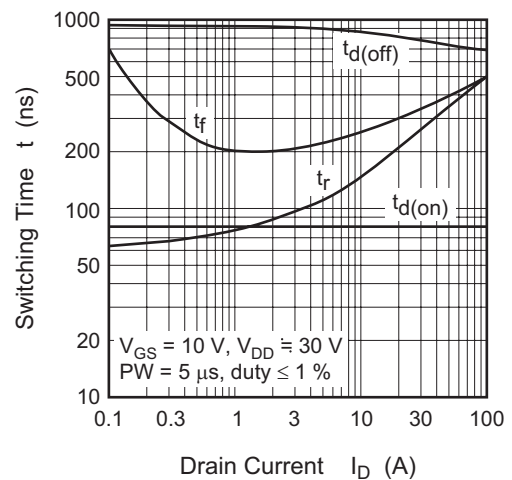
Typical Capacitance vs. Drain to Source Voltage

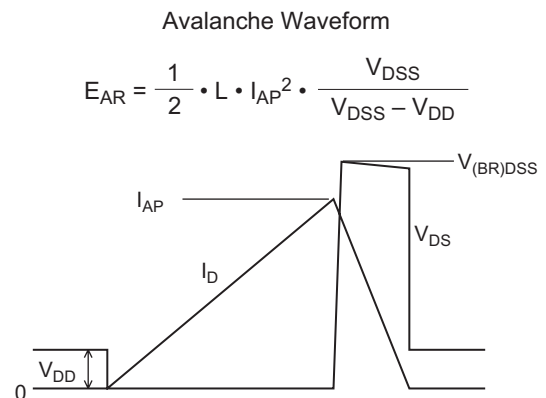
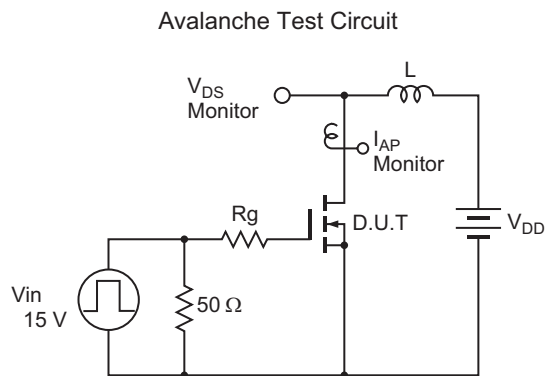
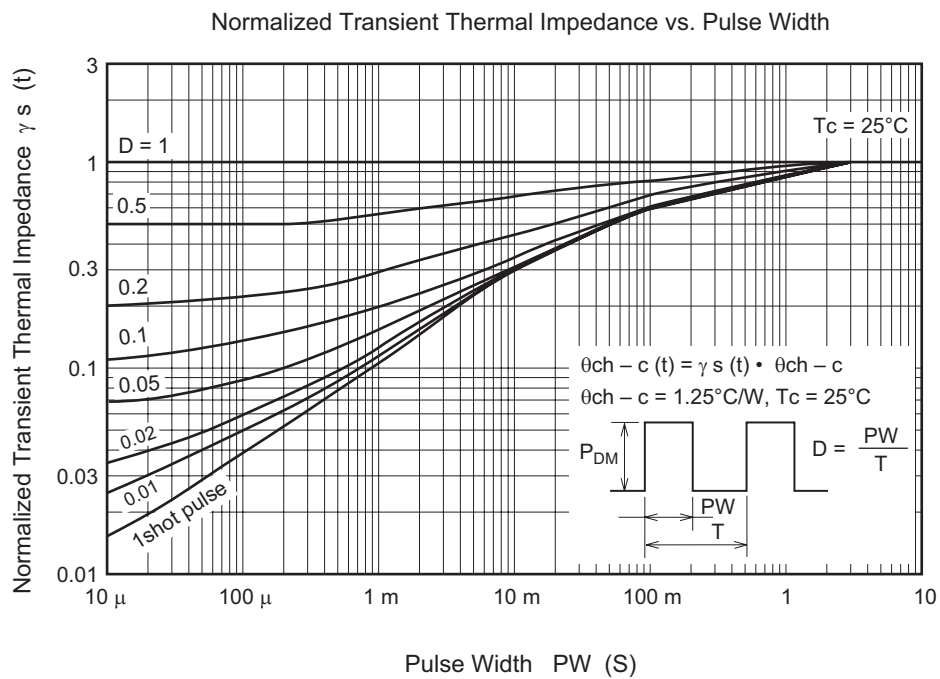
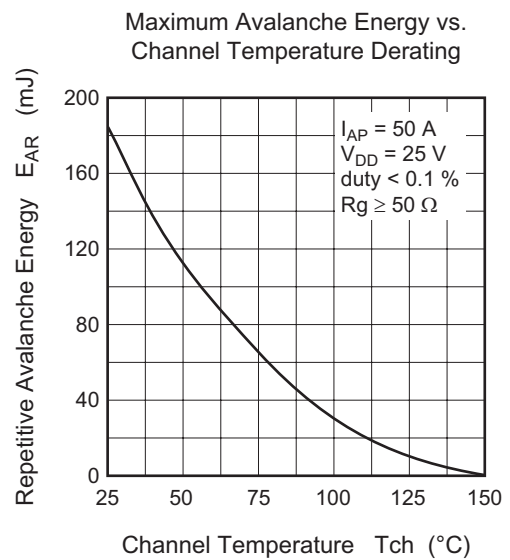
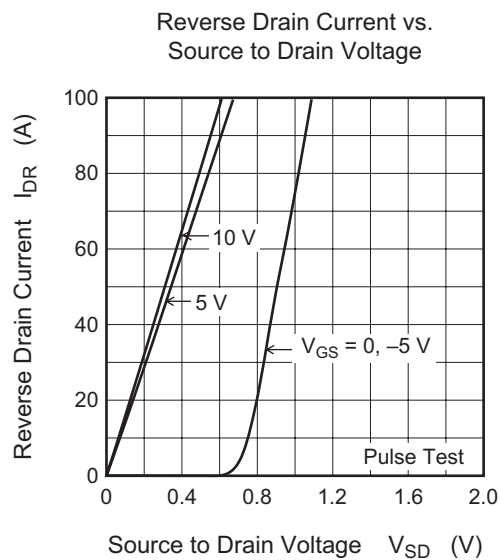


Dynamic Input Characteristics

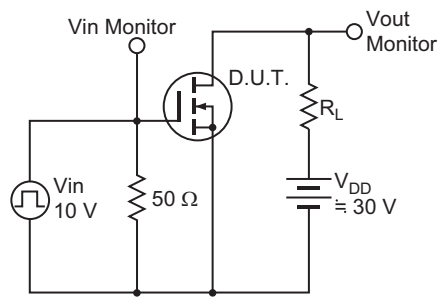


Switching Characteristics

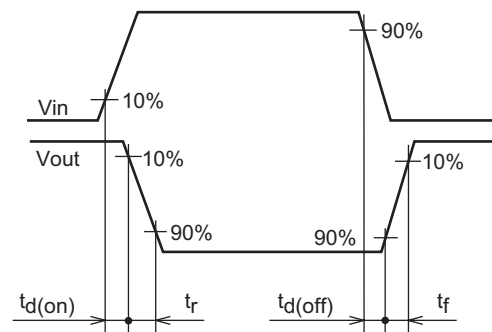




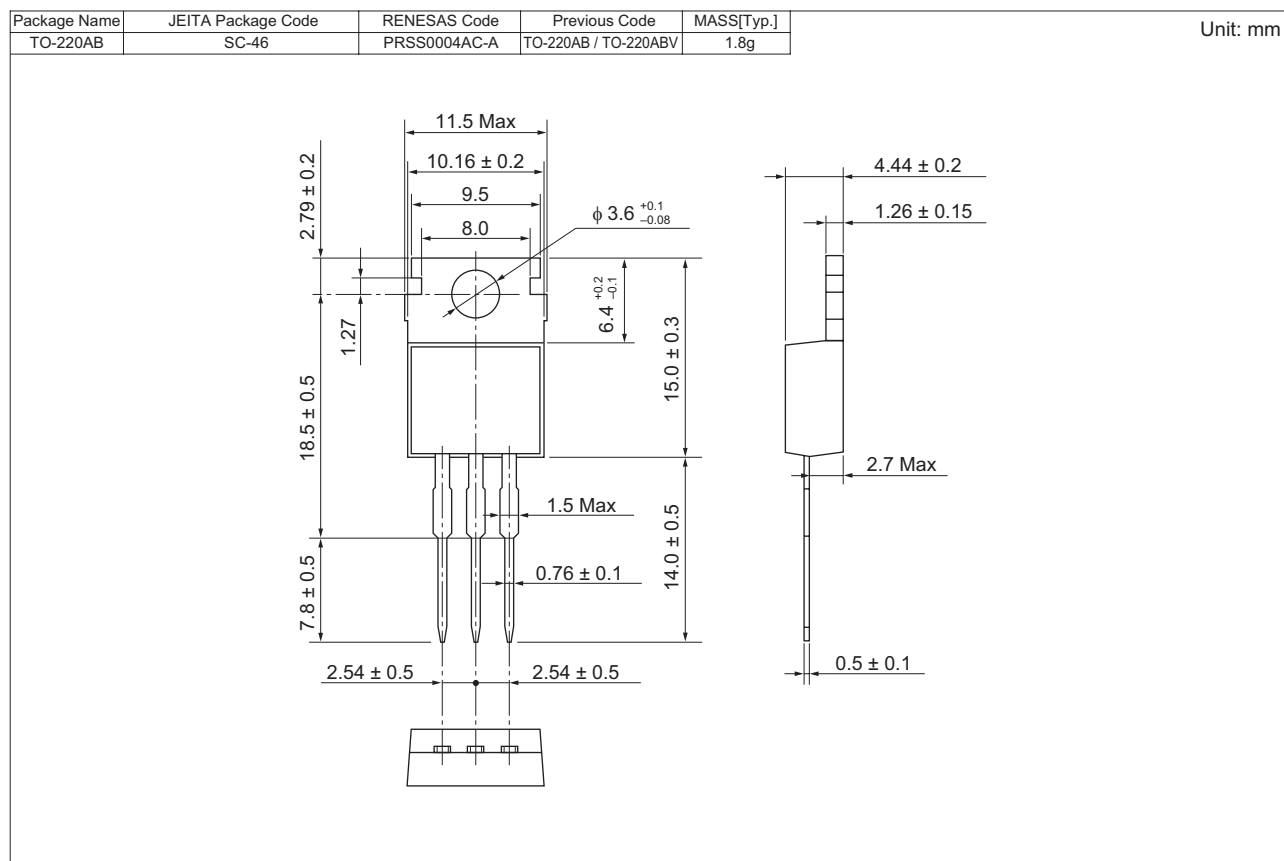
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

| Part Name | Quantity | Shipping Container |
|-----------|----------|--------------------|
| 2SK3228-E | 500 pcs | Box (Sack) |

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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