

## 2SK2586

Silicon N Channel MOS FET

REJ03G1020-0500  
(Previous: ADE-208-358C)  
Rev.5.00  
Sep 07, 2005

### Application

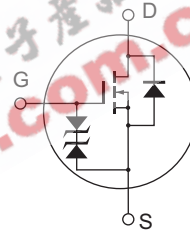
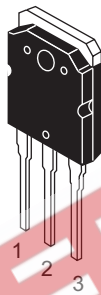
High speed power switching

### Features

- Low on-resistance  
 $R_{DS(on)} = 7 \text{ m}\Omega$  typ.
- High speed switching
- 4 V gate drive device can be driven from 5 V source

### Outline

RENESAS Package code: PRSS0004ZE-A  
(Package name: TO-3P)



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

## Absolute Maximum Ratings

(Ta = 25°C)

| Item                                      | Symbol              | Ratings     | Unit |
|---|---------------------|-------------|------|
| Drain to source voltage                   | $V_{DSS}$           | 60          | V    |
| Gate to source voltage                    | $V_{GSS}$           | ±20         | V    |
| Drain current                             | $I_D^{*2}$          | 60          | A    |
| Drain peak current                        | $I_{D(pulse)}^{*1}$ | 240         | A    |
| Body to drain diode reverse drain current | $I_{DR}^{*2}$       | 60          | A    |
| Avalanche current                         | $I_{AP}^{*3}$       | 45          | A    |
| Avalanche energy                          | $E_{AR}^{*3}$       | 174         | mJ   |
| Channel dissipation                       | $P_{ch}^{*2}$       | 125         | W    |
| Channel temperature                       | Tch                 | 150         | °C   |
| Storage temperature                       | Tstg                | -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  $T_{ch} = 25^\circ C$ ,  $R_g \geq 50 \Omega$

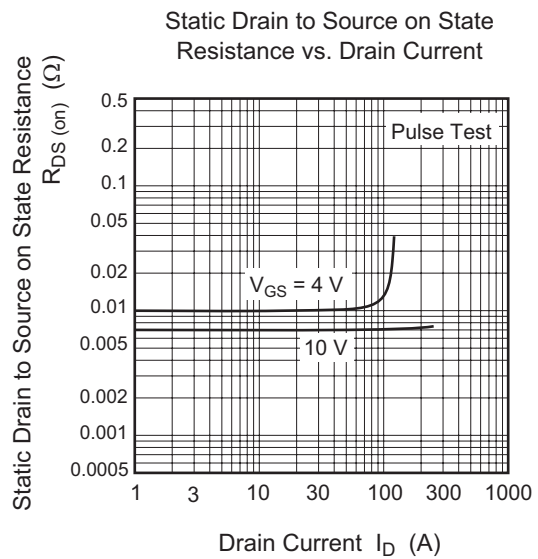
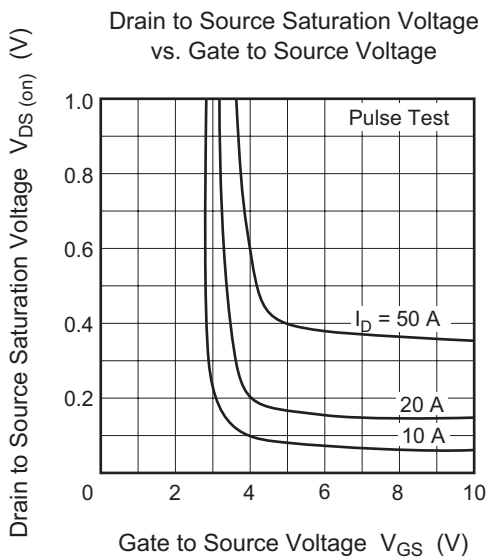
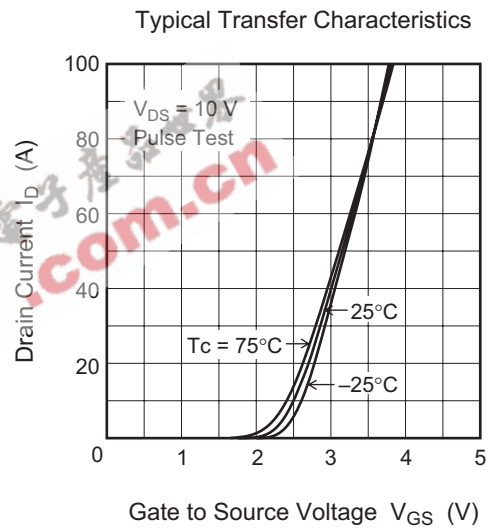
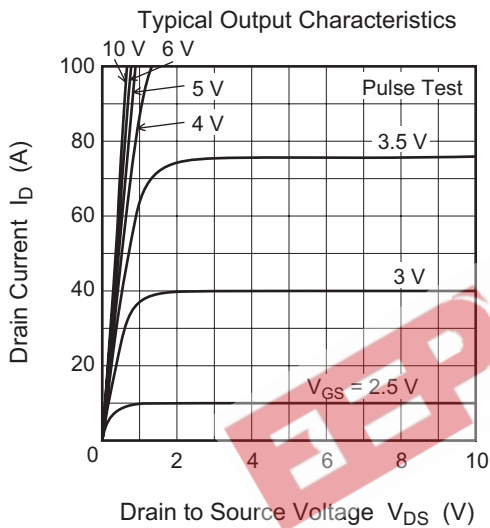
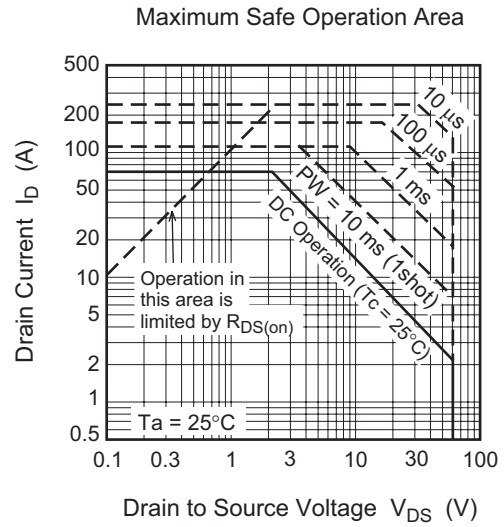
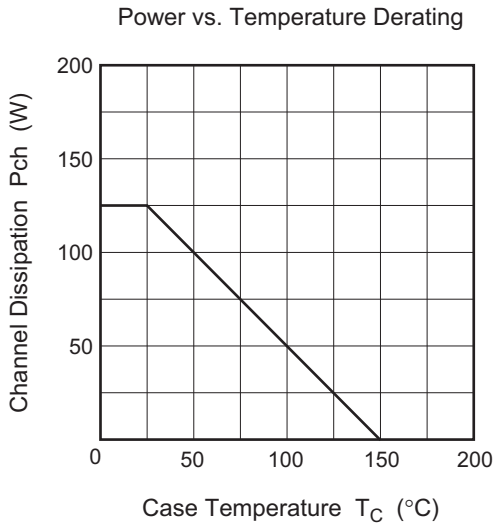
## Electrical Characteristics

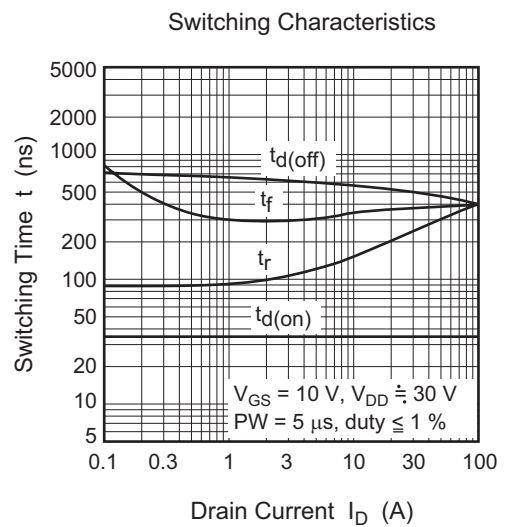
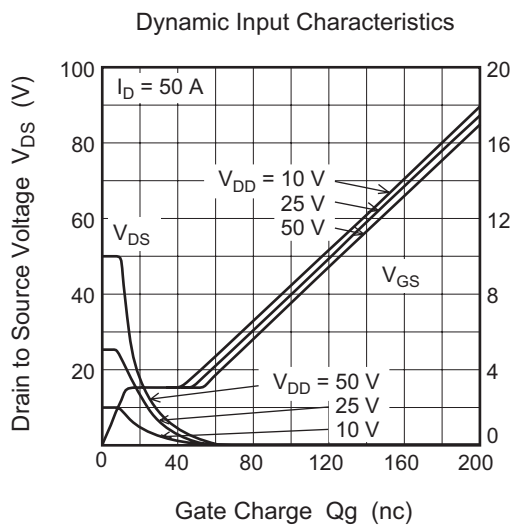
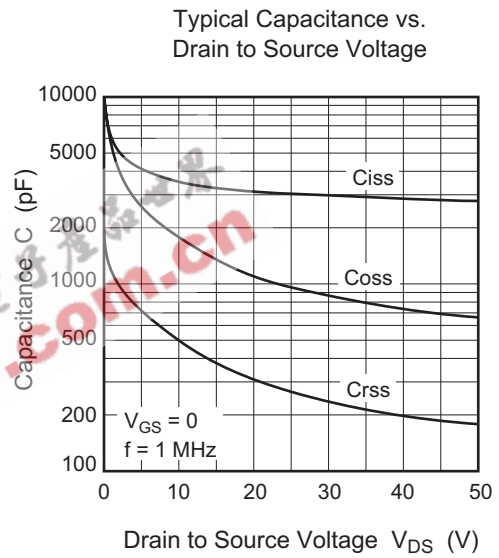
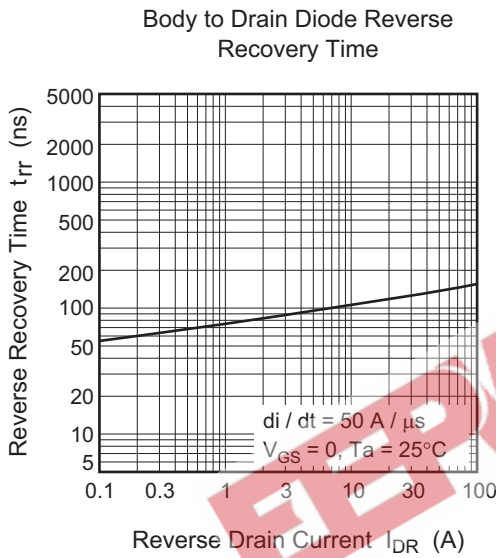
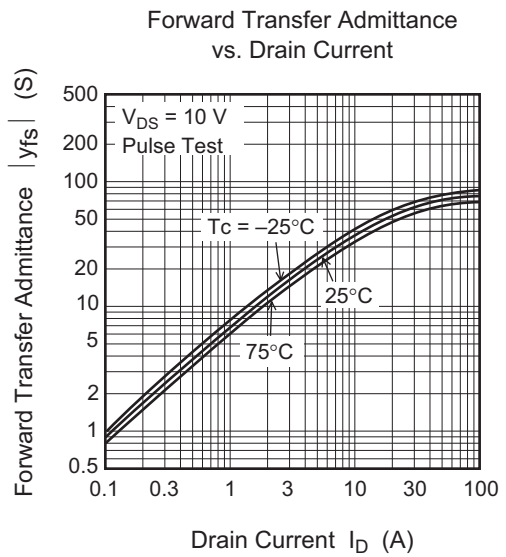
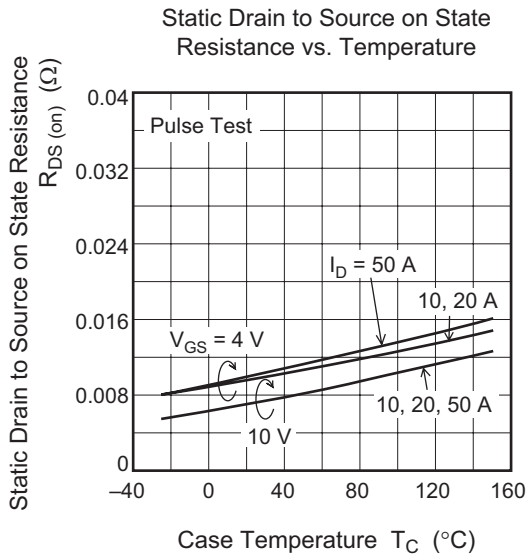
(Ta = 25°C)

| Item                                       | Symbol        | Min | Typ  | Max | Unit | Test Conditions   |
|--|---------------|-----|------|-----|------|---|
| Drain to source breakdown voltage          | $V_{(BR)DSS}$ | 60  | —    | —   | V    | $I_D = 10 \text{ mA}$ , $V_{GS} = 0$                                      |
| Gate to source breakdown voltage           | $V_{(BR)GSS}$ | ±20 | —    | —   | V    | $I_G = \pm 100 \mu A$ , $V_{DS} = 0$                                      |
| Gate to source leak current                | $I_{GSS}$     | —   | —    | ±10 | μA   | $V_{GS} = \pm 16 \text{ V}$ , $V_{DS} = 0$                                |
| Zero gate voltage drain current            | $I_{DSS}$     | —   | —    | 100 | μA   | $V_{DS} = 60 \text{ V}$ , $V_{GS} = 0$                                    |
| Gate to source cutoff voltage              | $V_{GS(off)}$ | 1.0 | —    | 2.0 | V    | $I_D = 1 \text{ mA}$ , $V_{DS} = 10 \text{ V}$                            |
| Static drain to source on state resistance | $R_{DS(on)}$  | —   | 7    | 10  | mΩ   | $I_D = 30 \text{ A}$ , $V_{GS} = 10 \text{ V}^{*4}$                       |
|  |               | —   | 10   | 16  | mΩ   | $I_D = 30 \text{ A}$ , $V_{GS} = 4 \text{ V}^{*4}$                        |
| Forward transfer admittance                | $ y_{fs} $    | 35  | 60   | —   | S    | $I_D = 30 \text{ A}$ , $V_{DS} = 10 \text{ V}^{*4}$                       |
| Input capacitance                          | $C_{iss}$     | —   | 3550 | —   | pF   | $V_{DS} = 10 \text{ V}$ , $V_{GS} = 0$ ,<br>$f = 1 \text{ MHz}$           |
| Output capacitance                         | $C_{oss}$     | —   | 1760 | —   | pF   |   |
| Reverse transfer capacitance               | $C_{rss}$     | —   | 500  | —   | pF   |   |
| Turn-on delay time                         | $t_{d(on)}$   | —   | 35   | —   | ns   | $I_D = 30 \text{ A}$ , $V_{GS} = 10 \text{ V}$ ,<br>$R_L = 1.0 \Omega$    |
| Rise time                                  | $t_r$         | —   | 260  | —   | ns   |   |
| Turn-off delay time                        | $t_{d(off)}$  | —   | 480  | —   | ns   |   |
| Fall time                                  | $t_f$         | —   | 370  | —   | ns   |   |
| Body to drain diode forward voltage        | $V_{DF}$      | —   | 0.94 | —   | V    | $I_F = 60 \text{ A}$ , $V_{GS} = 0$                                       |
| Body to drain diode reverse recovery time  | $t_{rr}$      | —   | 140  | —   | ns   | $I_F = 60 \text{ A}$ , $V_{GS} = 0$<br>$di_F / dt = 50 \text{ A} / \mu s$ |

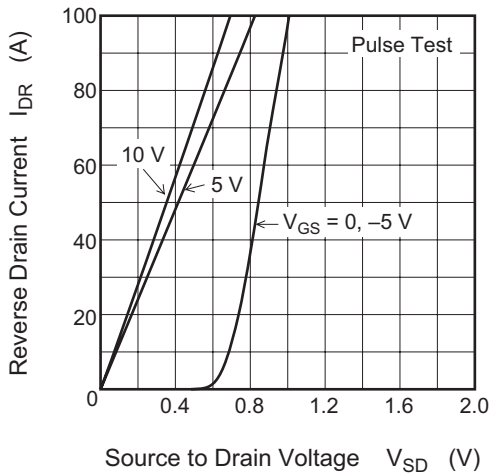
- Note: 4. Pulse Test

Main Characteristics

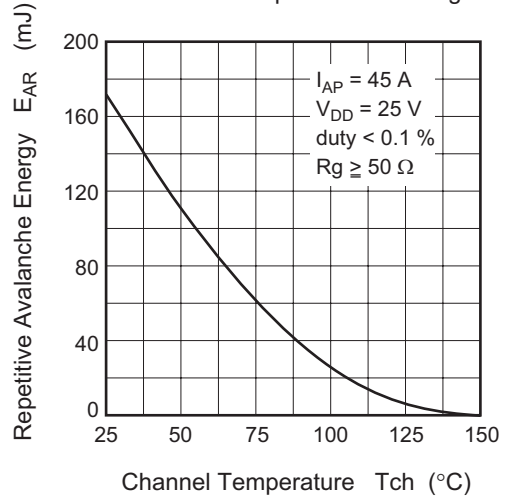




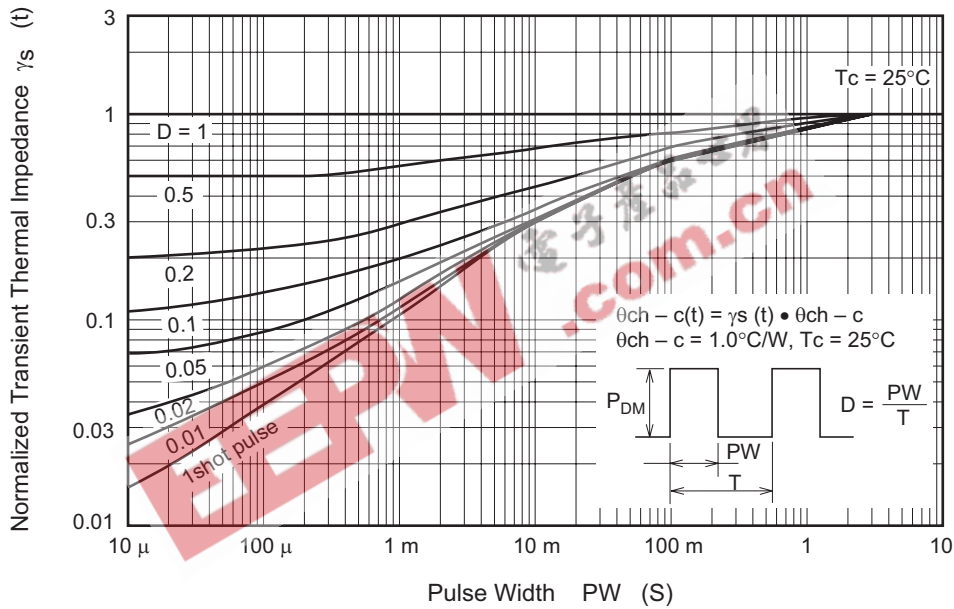
Reverse Drain Current vs. Source to Drain Voltage



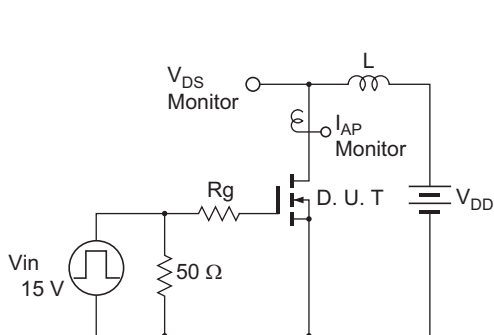
Maximum Avalanche Energy vs. Channel Temperature Derating



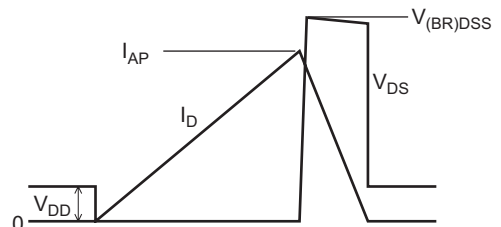
Normalized Transient Thermal Impedance vs. Pulse Width

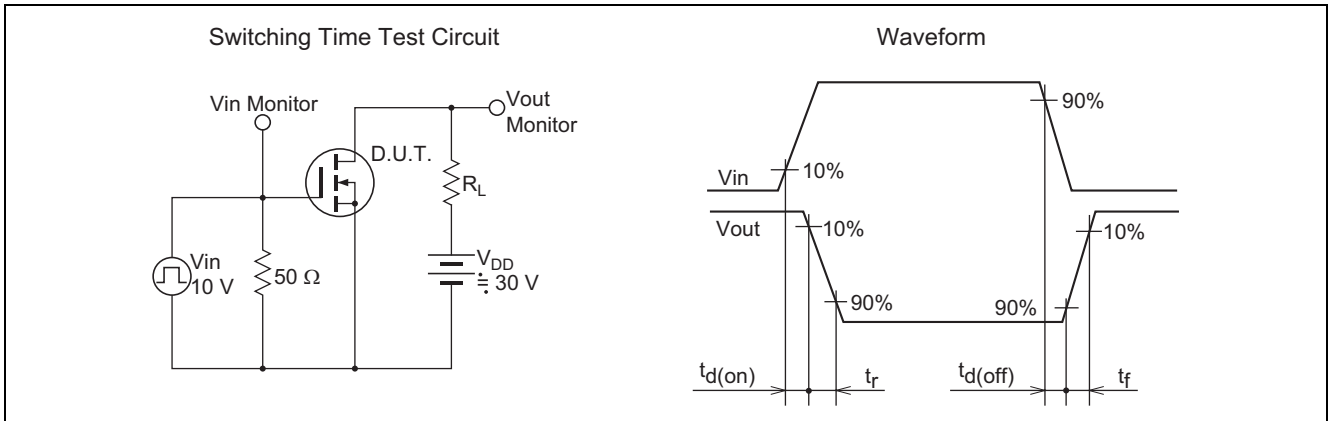


Avalanche Test Circuit and Waveform



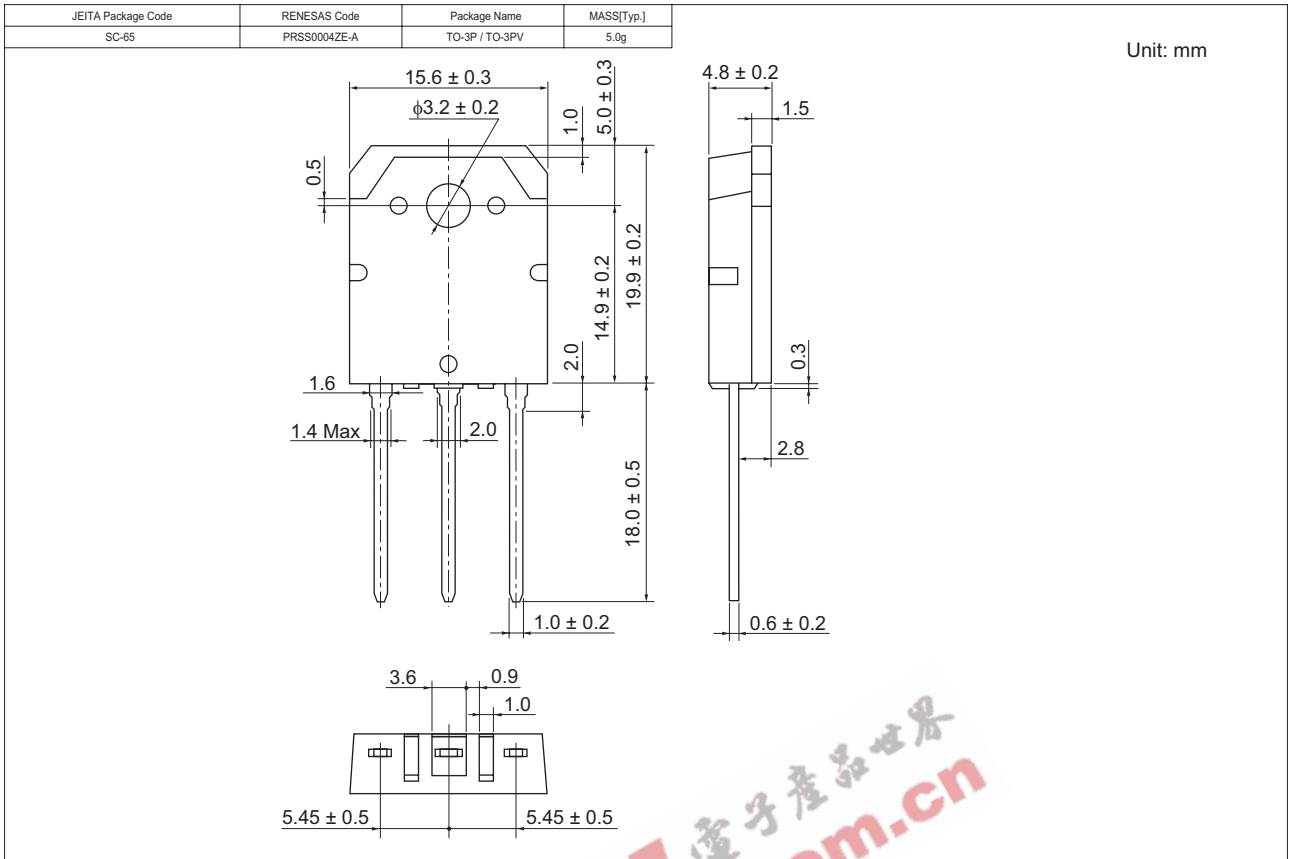
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$





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### Package Dimensions



### Ordering Information

| Part Name | Quantity | Shipping Container |
|-----------|----------|--------------------|
| 2SK2586-E | 30 pcs   | Plastic magazine   |

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