

# FS50UM-3

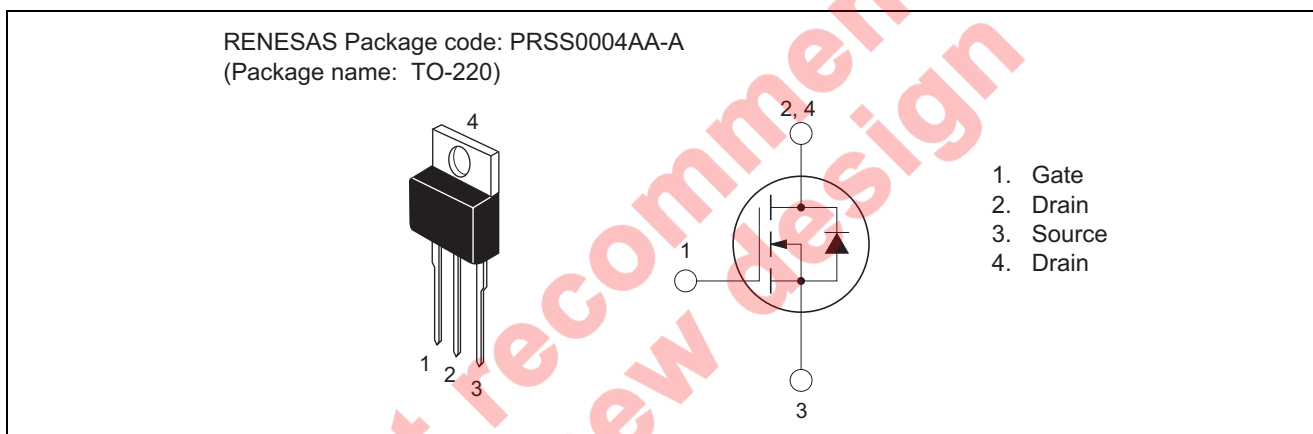
High-Speed Switching Use  
Nch Power MOS FET

REJ03G1424-0200  
(Previous: MEJ02G0118-0101)  
Rev.2.00  
Aug 07, 2006

## Features

- Drive voltage : 10 V
- $V_{DSS}$  : 150 V
- $r_{DS(ON)(max)}$  : 31 m $\Omega$
- $I_D$  : 50 A
- Integrated Fast Recovery Diode (TYP.) : 130 ns

## Outline



## Applications

Motor control, Lamp control, Solenoid control, DC-DC converters, etc.

## Maximum Ratings

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

| Parameter                        | Symbol    | Ratings      | Unit             | Conditions             |
|----------------------------------|-----------|--------------|------------------|------------------------|
| Drain-source voltage             | $V_{DSS}$ | 150          | V                | $V_{GS} = 0\text{ V}$  |
| Gate-source voltage              | $V_{GSS}$ | $\pm 20$     | V                | $V_{DS} = 0\text{ V}$  |
| Drain current                    | $I_D$     | 50           | A                |                        |
| Drain current (Pulsed)           | $I_{DM}$  | 200          | A                |                        |
| Avalanche drain current (Pulsed) | $I_{DA}$  | 50           | A                | $L = 100\ \mu\text{H}$ |
| Source current                   | $I_S$     | 50           | A                |                        |
| Source current (Pulsed)          | $I_{SM}$  | 200          | A                |                        |
| Maximum power dissipation        | $P_D$     | 125          | W                |                        |
| Channel temperature              | $T_{ch}$  | - 55 to +150 | $^\circ\text{C}$ |                        |
| Storage temperature              | $T_{stg}$ | - 55 to +150 | $^\circ\text{C}$ |                        |
| Mass                             | —         | 2.0          | g                | Typical value          |

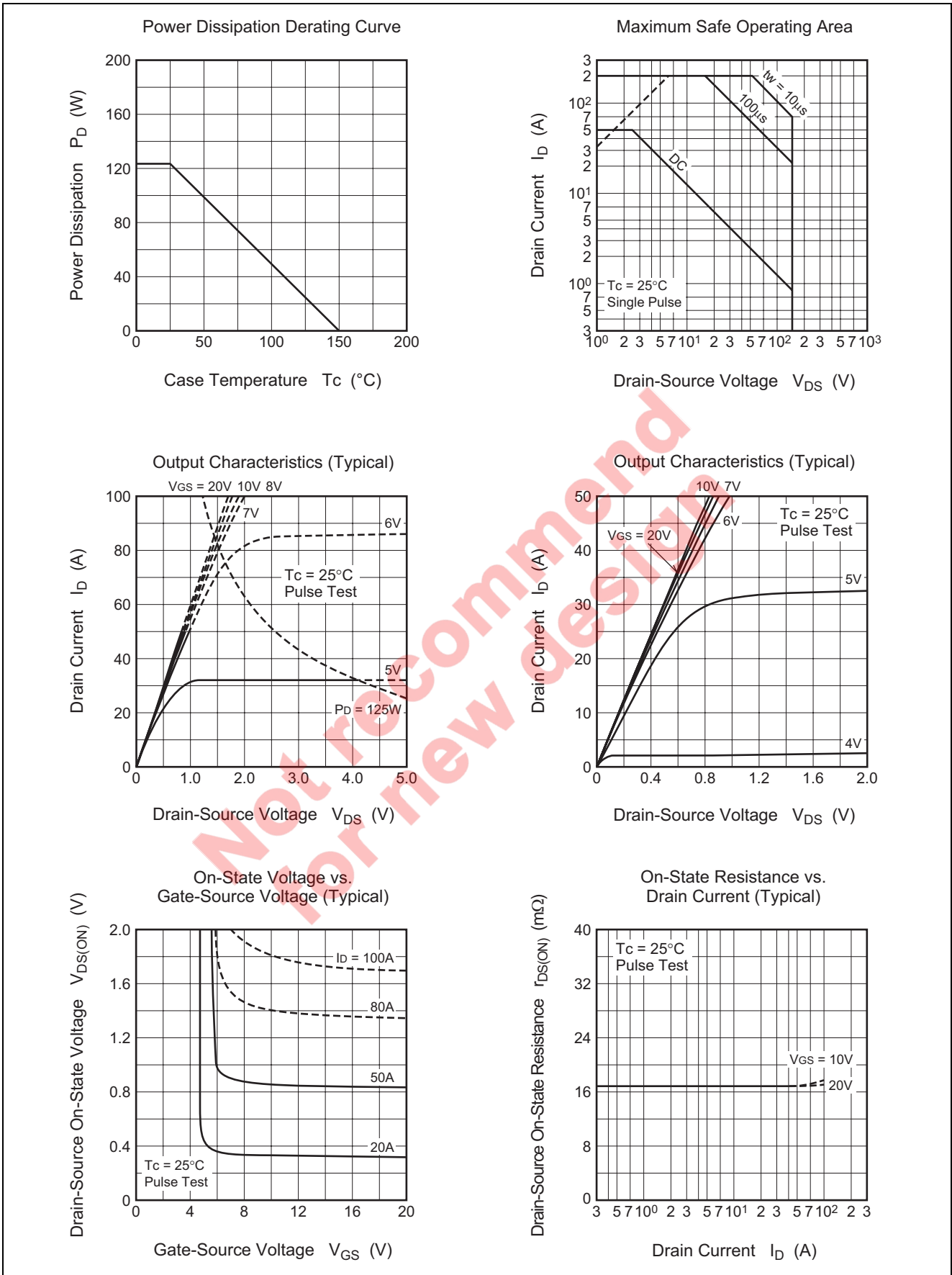
## Electrical Characteristics

(T<sub>ch</sub> = 25°C)

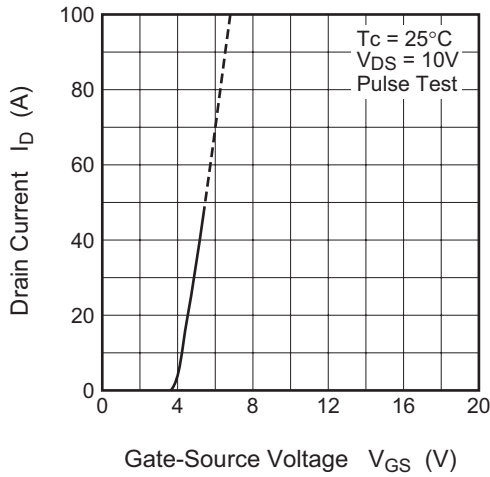
| Parameter                        | Symbol                | Min | Typ   | Max   | Unit | Test Conditions  |
|----------------------------------|-----------------------|-----|-------|-------|------|--|
| Drain-source breakdown voltage   | V <sub>(BR)DSS</sub>  | 150 | —     | —     | V    | I <sub>D</sub> = 1 mA, V <sub>GS</sub> = 0 V   |
| Gate-source leakage current      | I <sub>GSS</sub>      | —   | —     | ±0.1  | μA   | V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V   |
| Drain-source leakage current     | I <sub>DSS</sub>      | —   | —     | 0.1   | mA   | V <sub>DS</sub> = 150 V, V <sub>GS</sub> = 0 V   |
| Gate-source threshold voltage    | V <sub>GS(th)</sub>   | 2.0 | 3.0   | 4.0   | V    | I <sub>D</sub> = 1 mA, V <sub>DS</sub> = 10 V  |
| Drain-source on-state resistance | r <sub>DS(ON)</sub>   | —   | 24    | 31    | mΩ   | I <sub>D</sub> = 25 A, V <sub>GS</sub> = 10 V  |
| Drain-source on-state voltage    | V <sub>DS(ON)</sub>   | —   | 0.600 | 0.775 | V    | I <sub>D</sub> = 25 A, V <sub>GS</sub> = 10 V  |
| Forward transfer admittance      | y <sub>fs</sub>       | —   | 55    | —     | S    | I <sub>D</sub> = 25 A, V <sub>DS</sub> = 10 V  |
| Input capacitance                | C <sub>iSS</sub>      | —   | 6540  | —     | pF   | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V,<br>f = 1MHz   |
| Output capacitance               | C <sub>oSS</sub>      | —   | 860   | —     | pF   |  |
| Reverse transfer capacitance     | C <sub>rSS</sub>      | —   | 360   | —     | pF   |  |
| Turn-on delay time               | t <sub>d(on)</sub>    | —   | 95    | —     | ns   | V <sub>DD</sub> = 80 V, I <sub>D</sub> = 25 A,<br>V <sub>GS</sub> = 10 V,<br>R <sub>GEN</sub> = R <sub>GS</sub> = 50 Ω |
| Rise time                        | t <sub>r</sub>        | —   | 155   | —     | ns   |  |
| Turn-off delay time              | t <sub>d(off)</sub>   | —   | 380   | —     | ns   |  |
| Fall time                        | t <sub>f</sub>        | —   | 180   | —     | ns   |  |
| Source-drain voltage             | V <sub>SD</sub>       | —   | 1.0   | 1.5   | V    | I <sub>S</sub> = 25 A, V <sub>GS</sub> = 0 V   |
| Thermal resistance               | R <sub>th(ch-c)</sub> | —   | —     | 1.0   | °C/W | Channel to case  |
| Reverse recovery time            | t <sub>rr</sub>       | —   | 130   | —     | ns   | I <sub>S</sub> = 50 A, d <sub>is</sub> /d <sub>t</sub> = -100 A/μs   |

Not recommended  
for new design

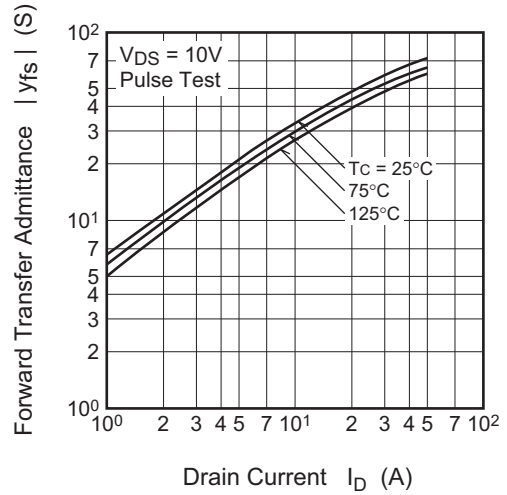
Performance Curves



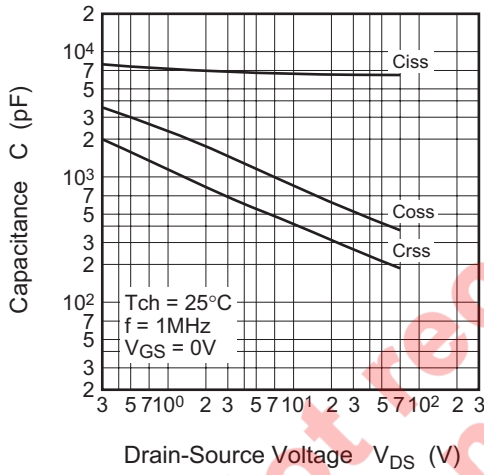
Transfer Characteristics (Typical)



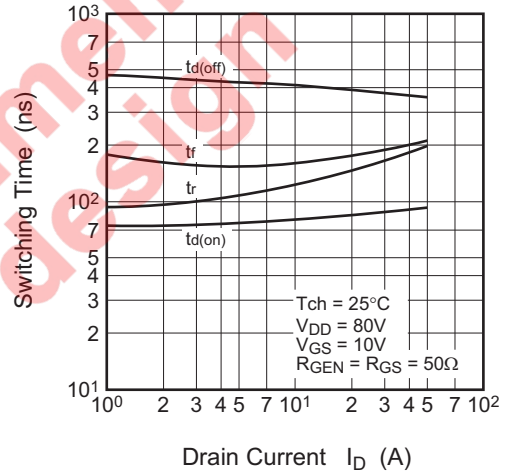
Forward Transfer Admittance vs. Drain Current (Typical)



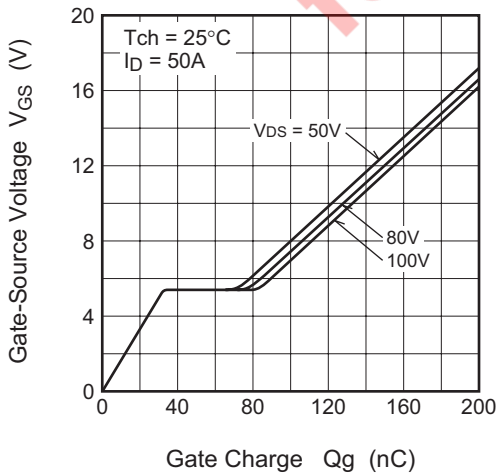
Capacitance vs. Drain-Source Voltage (Typical)



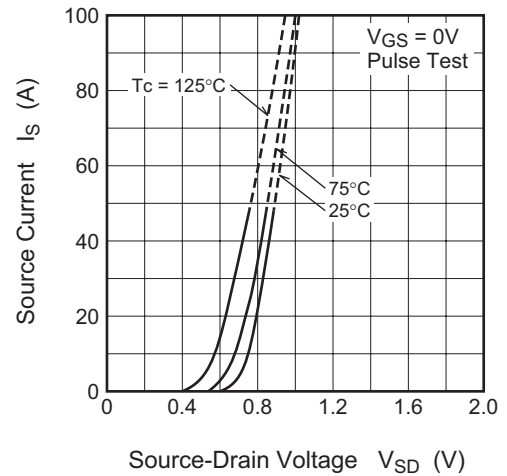
Switching Characteristics (Typical)

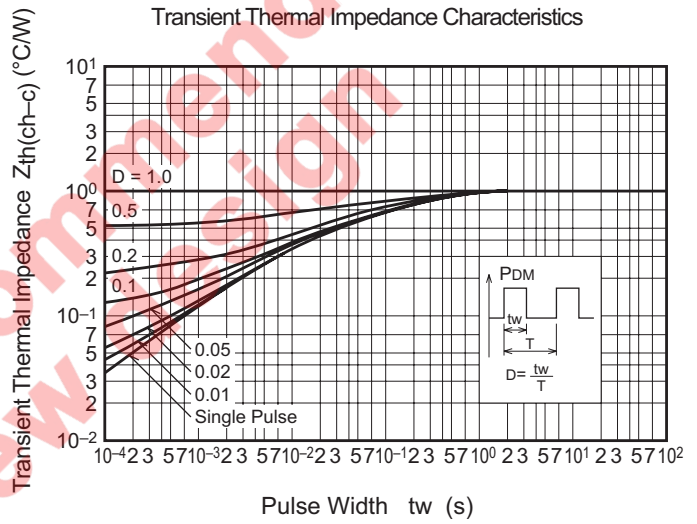
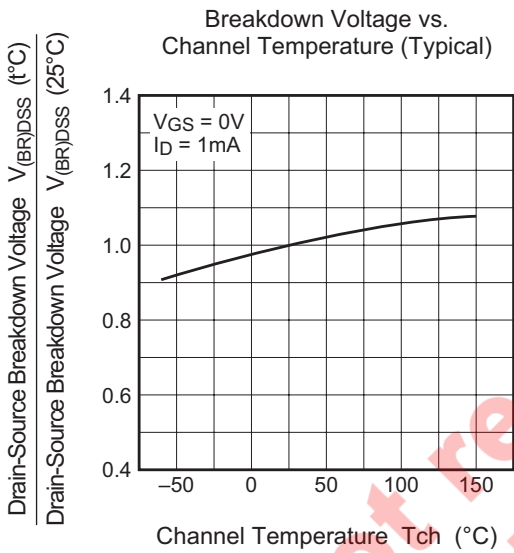
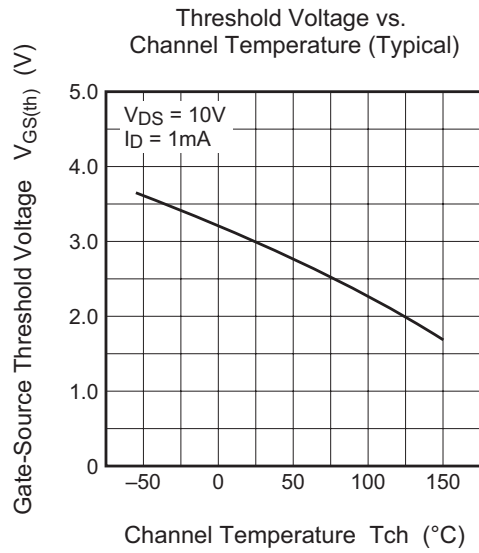
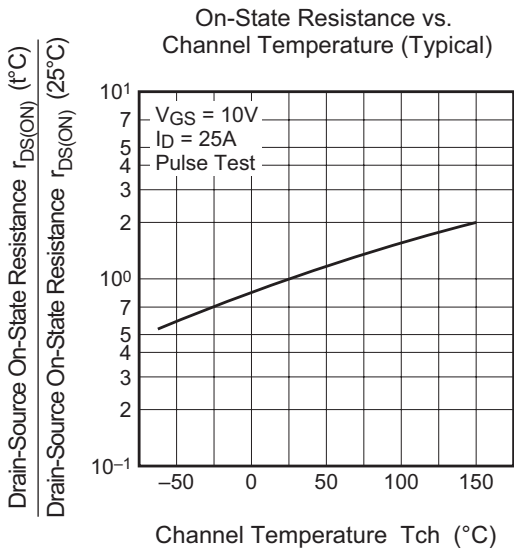


Gate-Source Voltage vs. Gate Charge (Typical)

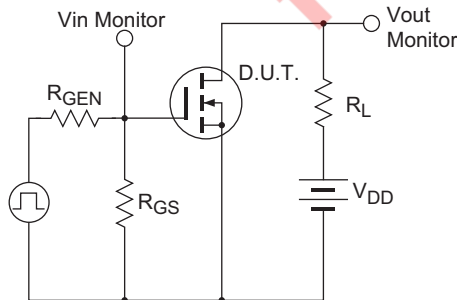


Source-Drain Diode Forward Characteristics (Typical)

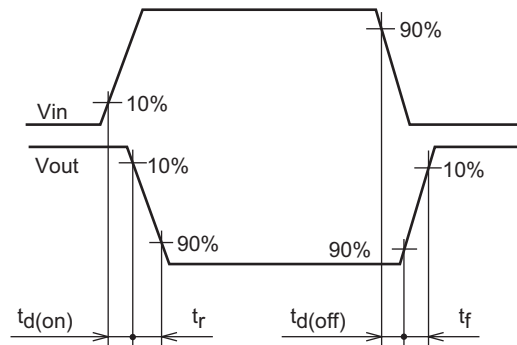




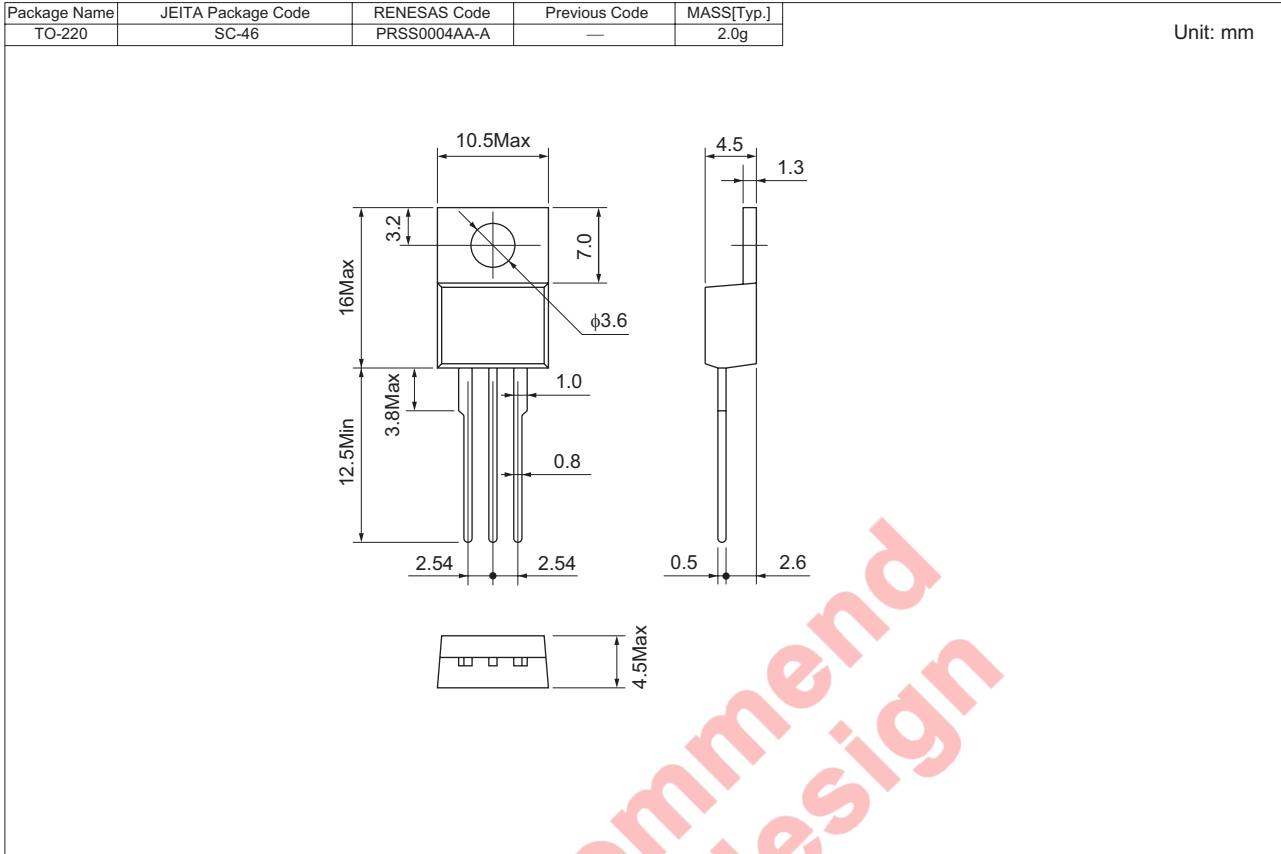
Switching Time Measurement Circuit



Switching Waveform



Package Dimensions



Order Code

| Lead form     | Standard packing                  | Quantity | Standard order code           | Standard order code example |
|---------------|-----------------------------------|----------|-------------------------------|-----------------------------|
| Straight type | Static electricity prevention bag | 100      | Type name                     | FS50UM-3                    |
| Lead form     | Plastic Magazine (Tube)           | 50       | Type name – Lead forming code | FS50UM-3-A8                 |

Note : Please confirm the specification about the shipping in detail.

**Keep safety first in your circuit designs!**

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Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

**Renesas Technology Europe Limited**

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.  
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**Renesas Technology (Shanghai) Co., Ltd.**

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**Renesas Technology Hong Kong Ltd.**

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**Renesas Technology Singapore Pte. Ltd.**

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Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

**Renesas Technology Malaysia Sdn. Bhd**

Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia  
Tel: <603> 7955-9390, Fax: <603> 7955-9510