

# FS50SMJ-3

High-Speed Switching Use  
Nch Power MOS FET

REJ03G1423-0300

Rev.3.00

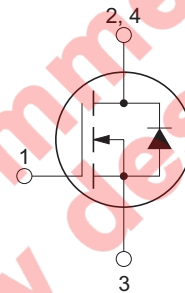
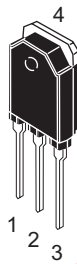
Nov 21, 2006

## Features

- Drive voltage : 4 V
- $V_{DSS}$  : 150 V
- $r_{DS(ON) (max)}$  : 30 m $\Omega$
- $I_D$  : 50 A
- Integrated Fast Recovery Diode (TYP.) : 125 ns

## Outline

RENESAS Package code: PRSS0004ZB-A  
(Package name: TO-3P)



1. Gate
2. Drain
3. Source
4. Drain

## 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	$P_D$	150	W	
Channel temperature	$T_{ch}$	- 55 to +150	$^\circ\text{C}$	
Storage temperature	$T_{stg}$	- 55 to +150	$^\circ\text{C}$	
Mass	—	4.8	g	Typical value

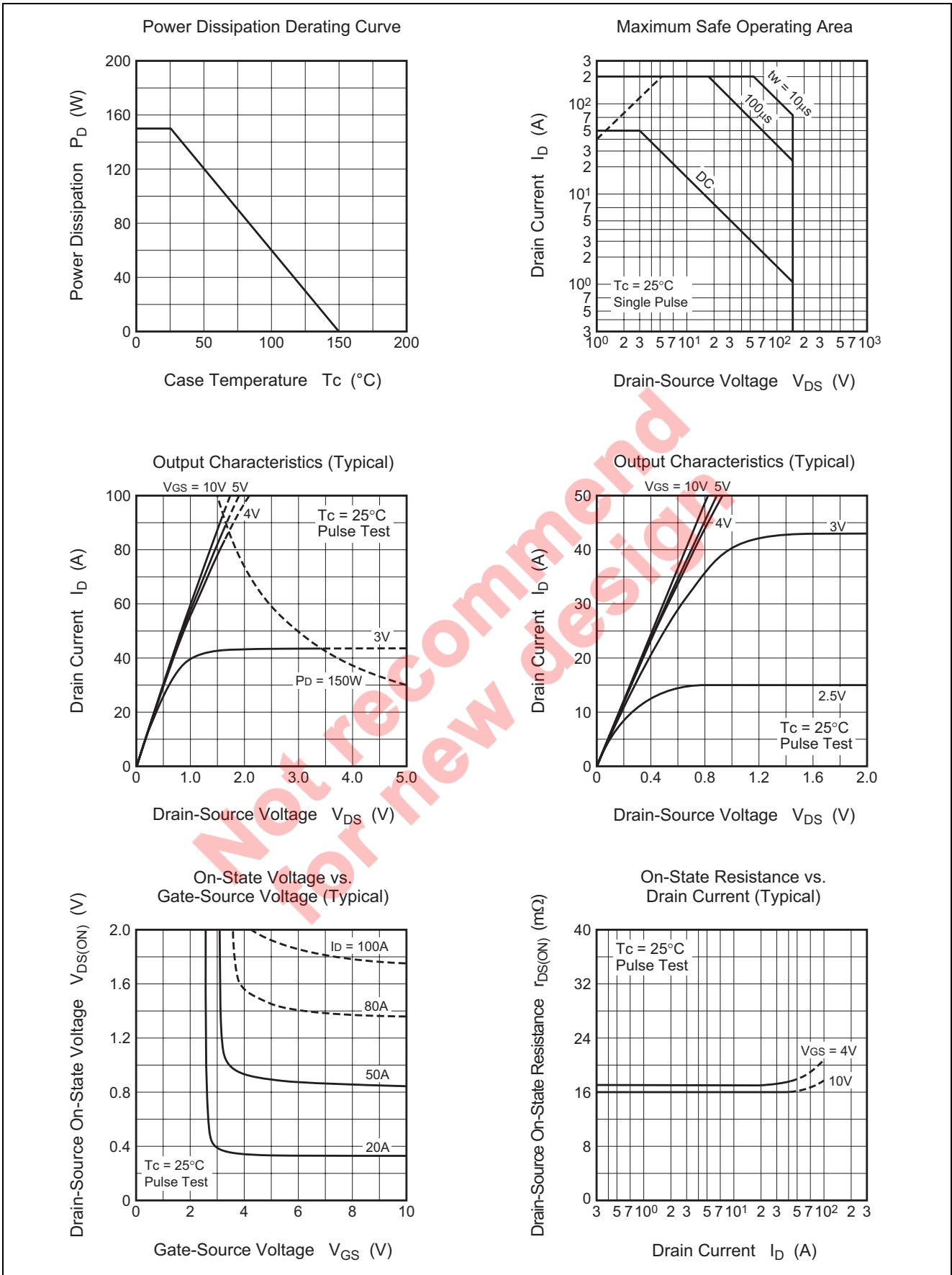
## Electrical Characteristics

(T<sub>ch</sub> = 25°C)

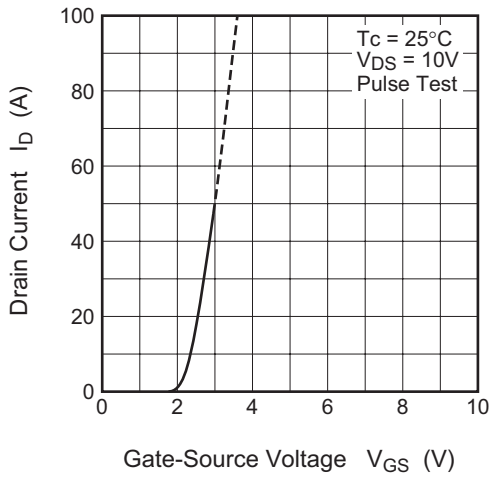
Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain-source breakdown voltage	$V_{(BR)DSS}$	150	—	—	V	$I_D = 1 \text{ mA}$ , $V_{GS} = 0 \text{ V}$
Gate-source leakage current	$I_{GSS}$	—	—	±0.1	μA	$V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0 \text{ V}$
Drain-source leakage current	$I_{DSS}$	—	—	0.1	mA	$V_{DS} = 150 \text{ V}$ , $V_{GS} = 0 \text{ V}$
Gate-source threshold voltage	$V_{GS(th)}$	1.0	1.5	2.0	V	$I_D = 1 \text{ mA}$ , $V_{DS} = 10 \text{ V}$
Drain-source on-state resistance	$r_{DS(ON)}$	—	23	30	mΩ	$I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$
Drain-source on-state resistance	$r_{DS(ON)}$	—	24	31	mΩ	$I_D = 25 \text{ A}$ , $V_{GS} = 4 \text{ V}$
Drain-source on-state voltage	$V_{DS(ON)}$	—	0.58	0.75	V	$I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$
Forward transfer admittance	$ y_{fs} $	—	62	—	S	$I_D = 25 \text{ A}$ , $V_{DS} = 10 \text{ V}$
Input capacitance	$C_{iss}$	—	8200	—	pF	$V_{DS} = 10 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$
Output capacitance	$C_{oss}$	—	870	—	pF	
Reverse transfer capacitance	$C_{rss}$	—	440	—	pF	
Turn-on delay time	$t_{d(on)}$	—	54	—	ns	$V_{DD} = 80 \text{ V}$ , $I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$ , $R_{GEN} = R_{GS} = 50 \Omega$
Rise time	$t_r$	—	110	—	ns	
Turn-off delay time	$t_{d(off)}$	—	850	—	ns	
Fall time	$t_f$	—	340	—	ns	
Source-drain voltage	$V_{SD}$	—	1.0	1.5	V	$I_S = 25 \text{ A}$ , $V_{GS} = 0 \text{ V}$
Thermal resistance	$R_{th(ch-c)}$	—	—	0.83	°C/W	Channel to case
Reverse recovery time	$t_{rr}$	—	125	—	ns	$I_S = 50 \text{ A}$ , $d_i/d_t = -100 \text{ A}/\mu\text{s}$

Not recommended  
for new design

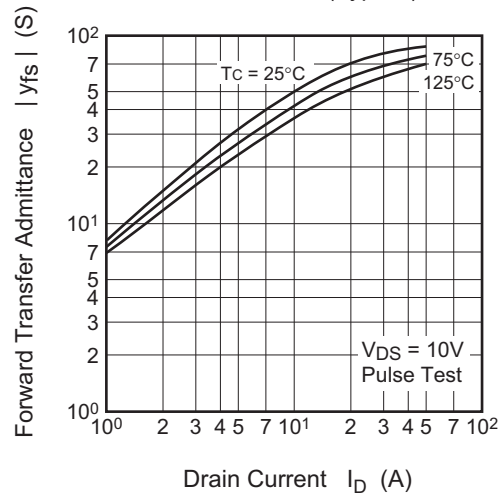
Performance Curves



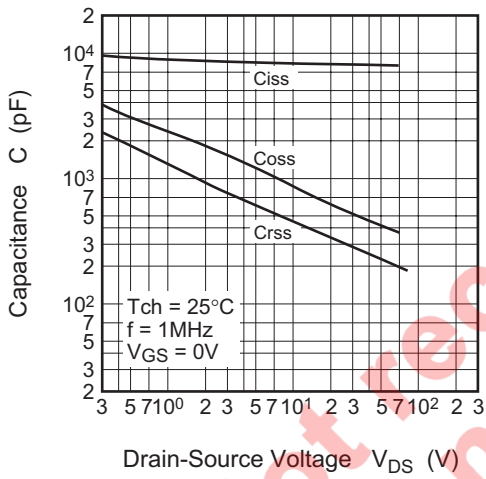
Transfer Characteristics (Typical)



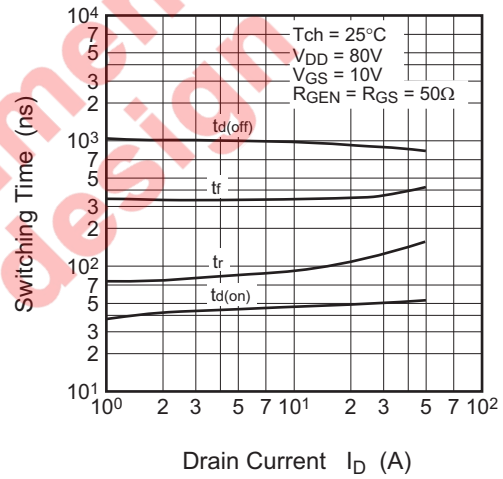
Forward Transfer Admittance vs. Drain Current (Typical)



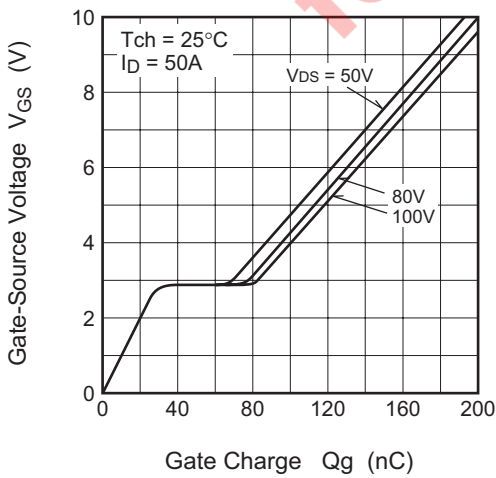
Capacitance vs. Drain-Source Voltage (Typical)



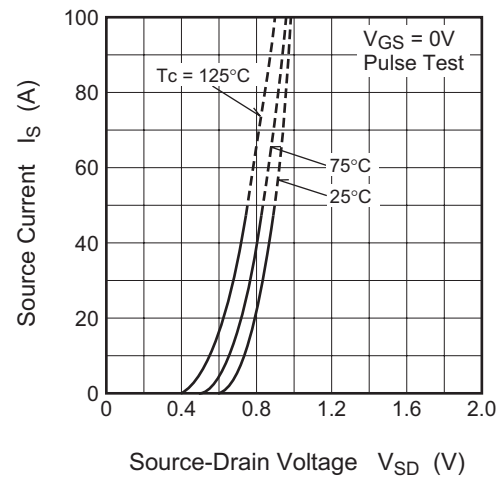
Switching Characteristics (Typical)

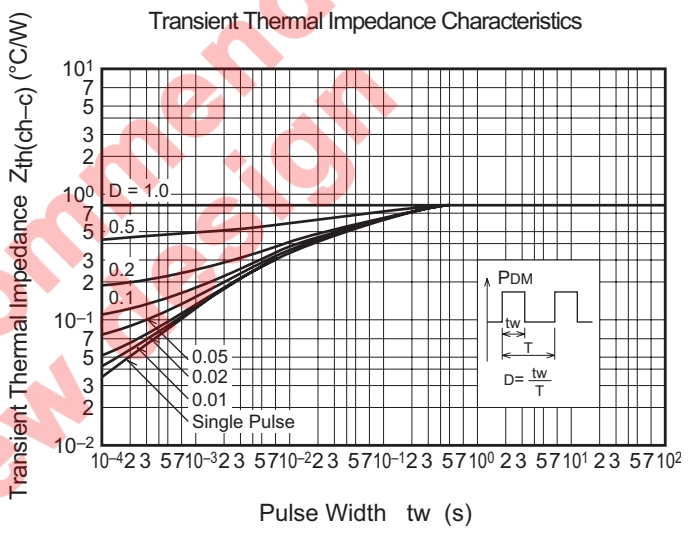
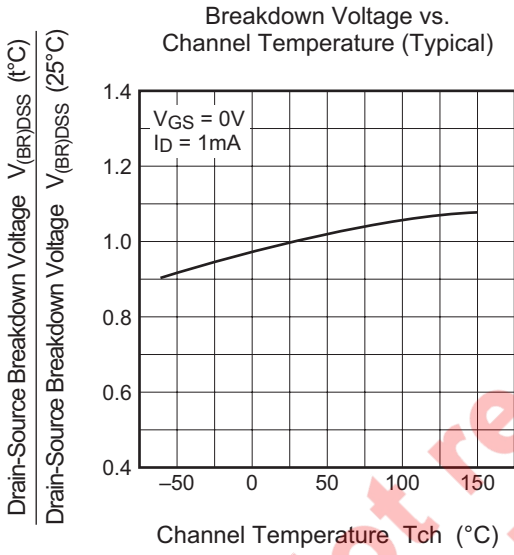
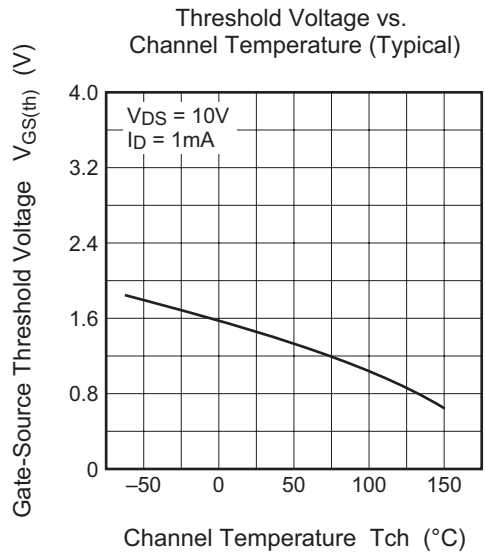
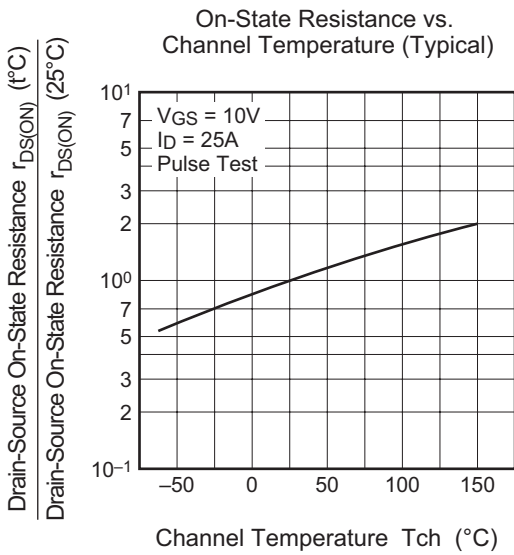


Gate-Source Voltage vs. Gate Charge (Typical)

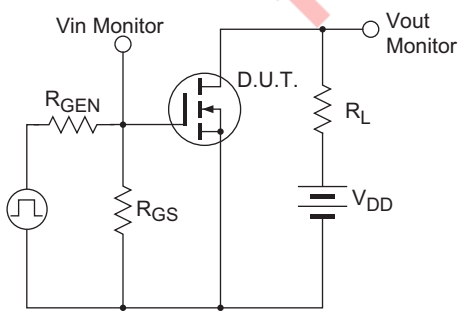


Source-Drain Diode Forward Characteristics (Typical)

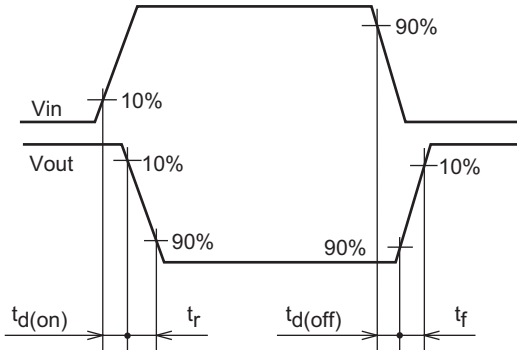




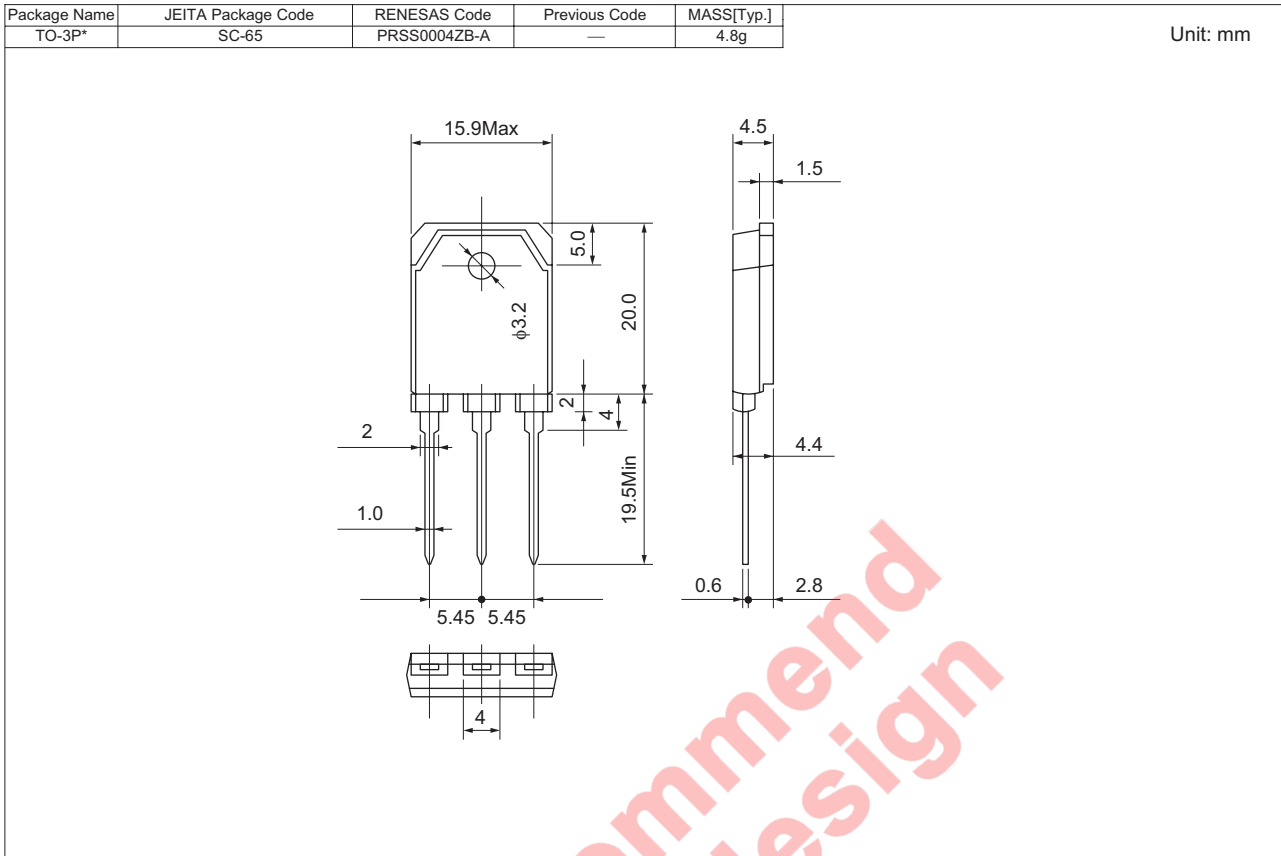
Switching Time Measurement Circuit



Switching Waveform



Package Dimensions



Order Code

Lead form	Standard packing	Quantity	Standard order code	Standard order code example
Straight type	Static electricity prevention bag	20	Type name	FS50SMJ-3
Lead form	Plastic Magazine (Tube)	30	Type name – Lead forming code	FS50SMJ-3-A8

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

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