



# FS50SM-3

## High-Speed Switching Use Nch Power MOS FET

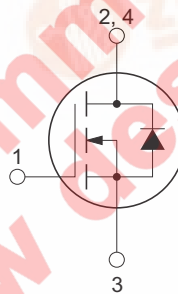
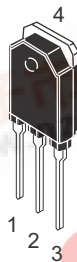
REJ03G1422-0200  
(Previous: MEJ02G0120-0101)  
Rev.2.00  
Aug 07, 2006

### Features

- Drive voltage : 10 V
- $V_{DS}$  : 150 V
- $r_{DS(ON)} (max)$  : 31 m $\Omega$
- $I_D$  : 50 A
- Integrated Fast Recovery Diode (TYP.) : 130 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	$V_{DS}$	150	V	$V_{GS} = 0\text{ V}$
Gate-source voltage	$V_{GS}$	$\pm 20$	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	$L = 100\text{ }\mu\text{H}$
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



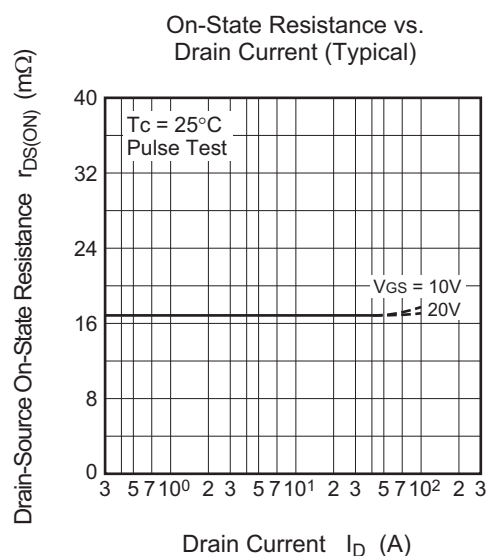
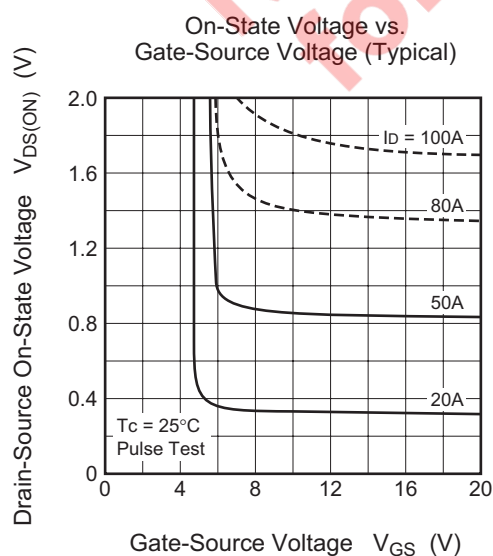
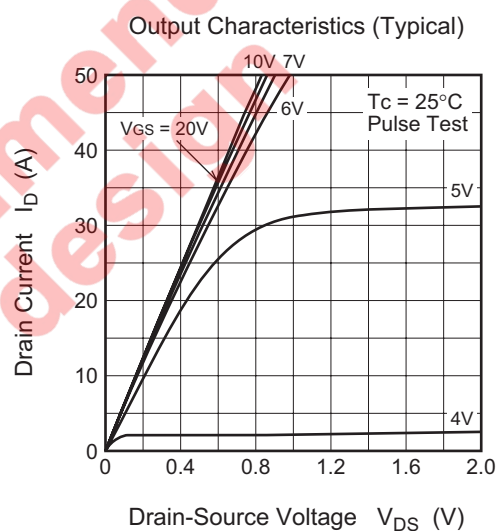
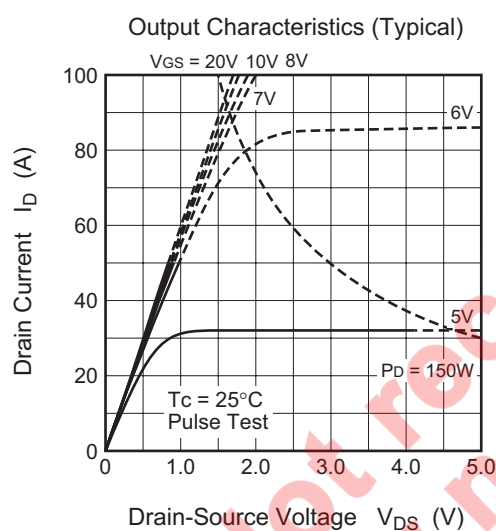
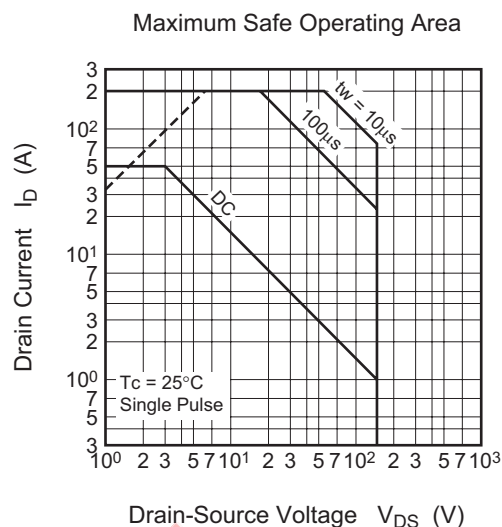
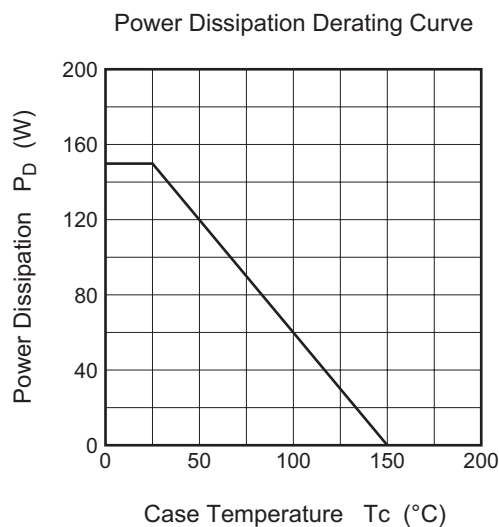
## Electrical Characteristics

(T<sub>ch</sub> = 25°C)

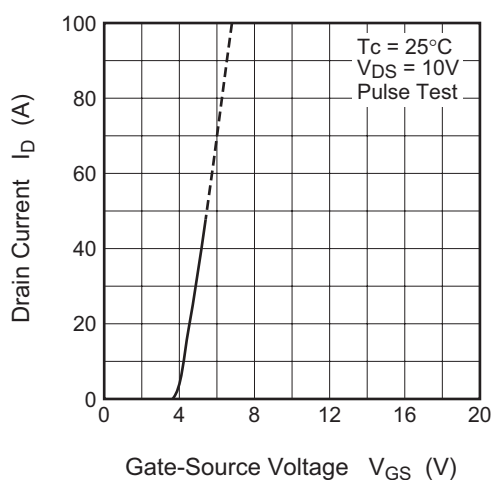
Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain-source breakdown voltage	$V_{(BR)DSS}$	150	—	—	V	$I_D = 1 \text{ mA}$ , $V_{GS} = 0 \text{ V}$
Gate-source leakage current	$I_{GSS}$	—	—	$\pm 0.1$	$\mu\text{A}$	$V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0 \text{ V}$
Drain-source leakage current	$I_{DSS}$	—	—	0.1	mA	$V_{DS} = 150 \text{ V}$ , $V_{GS} = 0 \text{ V}$
Gate-source threshold voltage	$V_{GS(th)}$	2.0	3.0	4.0	V	$I_D = 1 \text{ mA}$ , $V_{DS} = 10 \text{ V}$
Drain-source on-state resistance	$r_{DS(ON)}$	—	24	31	$\text{m}\Omega$	$I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$
Drain-source on-state voltage	$V_{DS(ON)}$	—	0.600	0.775	V	$I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$
Forward transfer admittance	$ y_{fs} $	—	55	—	S	$I_D = 25 \text{ A}$ , $V_{DS} = 10 \text{ V}$
Input capacitance	$C_{iss}$	—	6540	—	pF	$V_{DS} = 10 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$
Output capacitance	$C_{oss}$	—	860	—	pF	
Reverse transfer capacitance	$C_{rss}$	—	360	—	pF	
Turn-on delay time	$t_{d(on)}$	—	95	—	ns	$V_{DD} = 80 \text{ V}$ , $I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$ , $R_{GEN} = R_{GS} = 50 \Omega$
Rise time	$t_r$	—	155	—	ns	
Turn-off delay time	$t_{d(off)}$	—	380	—	ns	
Fall time	$t_f$	—	180	—	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	$^{\circ}\text{C/W}$	Channel to case
Reverse recovery time	$t_{rr}$	—	130	—	ns	$I_S = 50 \text{ A}$ , $d_i/d_t = -100 \text{ A}/\mu\text{s}$

Not recommended  
for new design

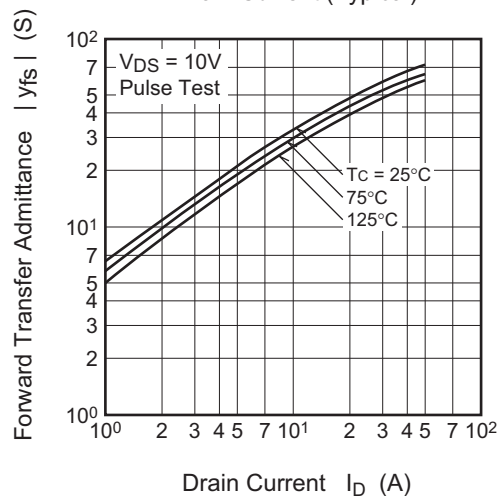
## Performance Curves



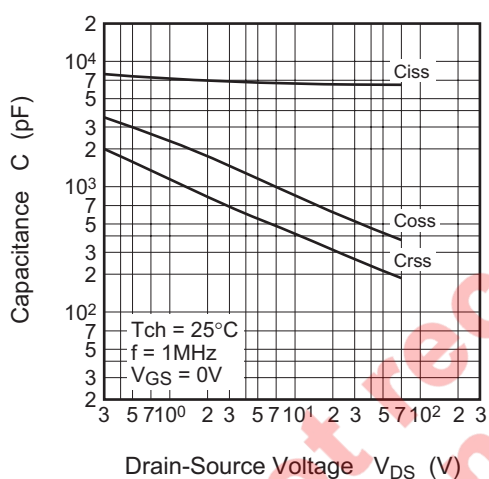
Transfer Characteristics (Typical)



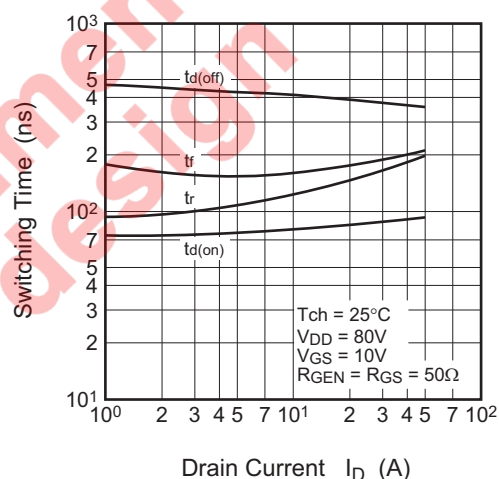
Forward Transfer Admittance vs. Drain Current (Typical)



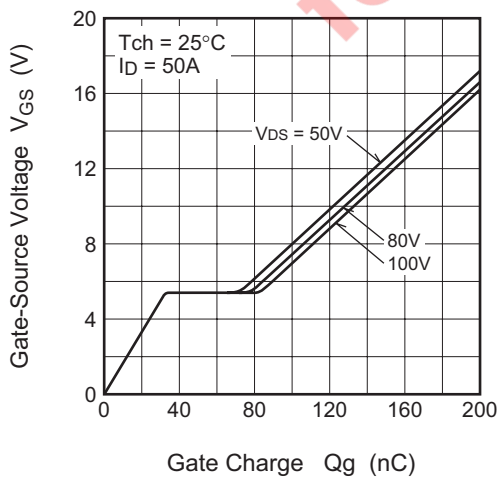
Capacitance vs. Drain-Source Voltage (Typical)



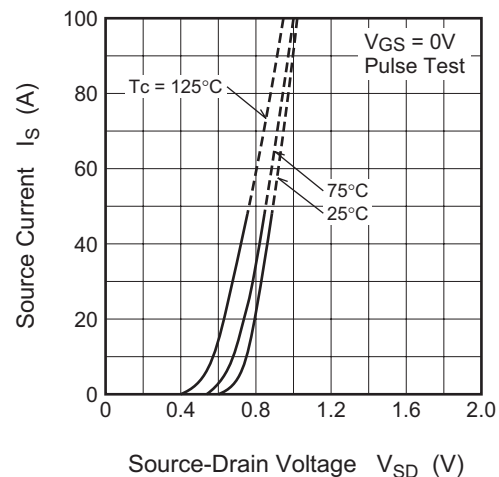
Switching Characteristics (Typical)



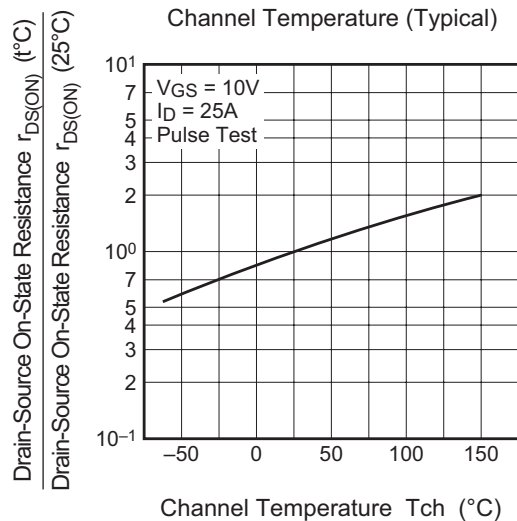
Gate-Source Voltage vs. Gate Charge (Typical)



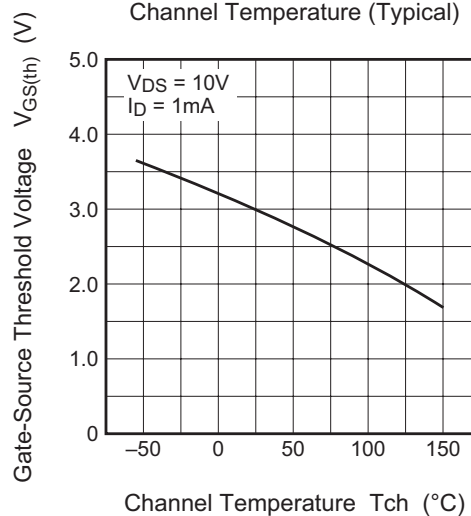
Source-Drain Diode Forward Characteristics (Typical)



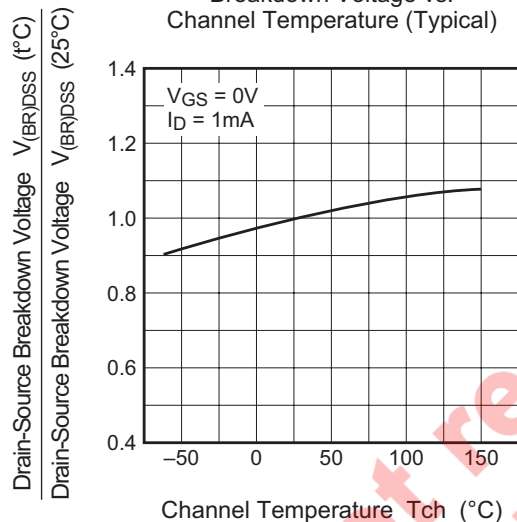
On-State Resistance vs.  
Channel Temperature (Typical)



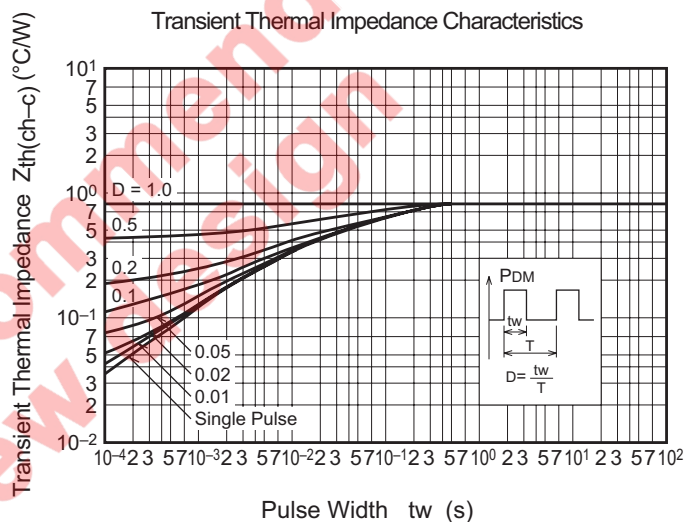
Threshold Voltage vs.  
Channel Temperature (Typical)



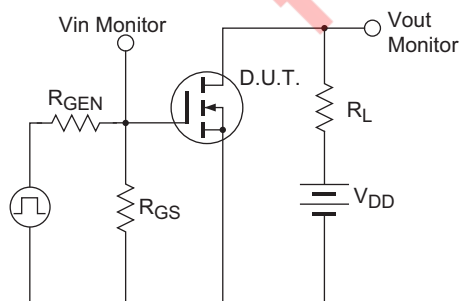
Breakdown Voltage vs.  
Channel Temperature (Typical)



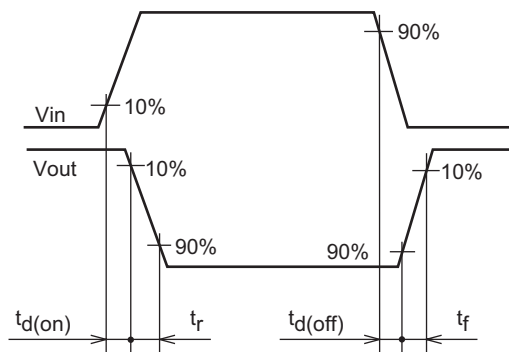
Transient Thermal Impedance Characteristics



Switching Time Measurement Circuit



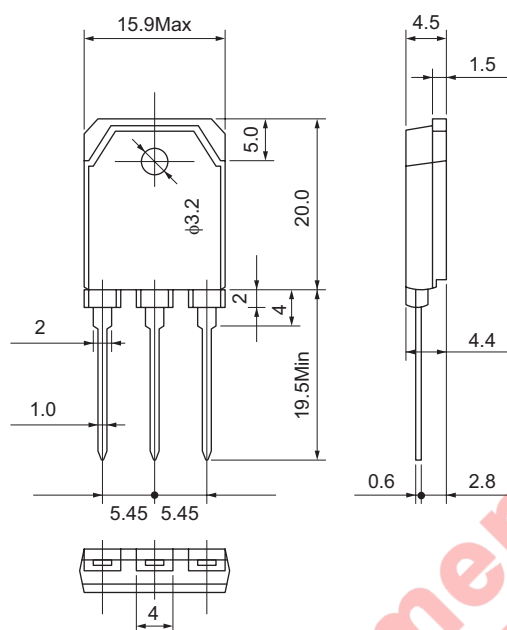
Switching Waveform



## Package Dimensions

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
TO-3P*	SC-65	PRSS0004ZB-A	—	4.8g

Unit: mm



## Order Code

Lead form	Standard packing	Quantity	Standard order code	Standard order code example
Straight type	Static electricity prevention bag	20	Type name	FS50SM-3
Lead form	Plastic Magazine (Tube)	30	Type name – Lead forming code	FS50SM-3-A8

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

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### Renesas Technology Malaysia Sdn. Bhd

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