

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# FX20VSJ-3

## High-Speed Switching Use Pch Power MOS FET

REJ03G0273-0100

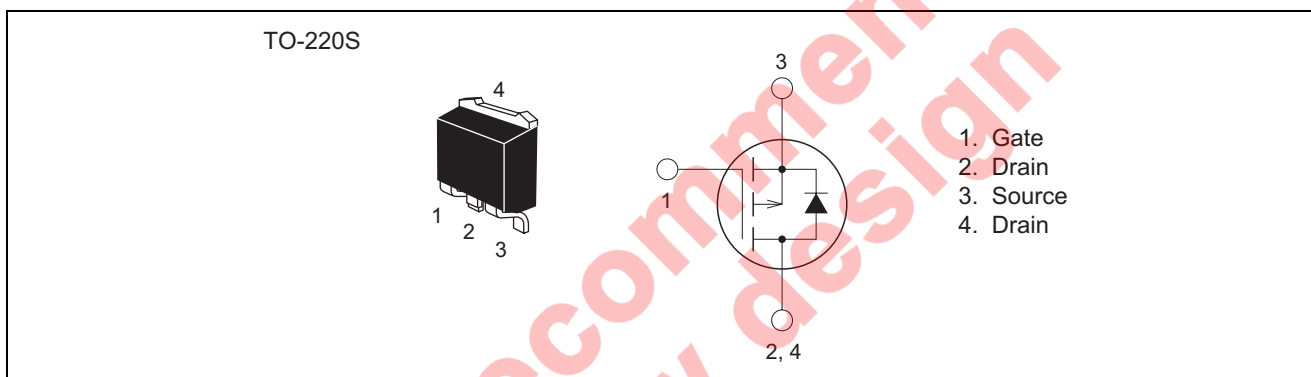
Rev.1.00

Aug.20.2004

### Features

- Drive voltage : 4 V
- $V_{DSS}$  : - 150 V
- $r_{DS(ON)(max)}$  : 0.29  $\Omega$
- $I_D$  : - 20 A
- Recovery Time of the Integrated Fast Recovery Diode (TYP.) : 100 ns

### Outline



### Applications

Motor control, lamp control, solenoid control, DC-DC converters, etc.

### Maximum Ratings

(Tc = 25°C)

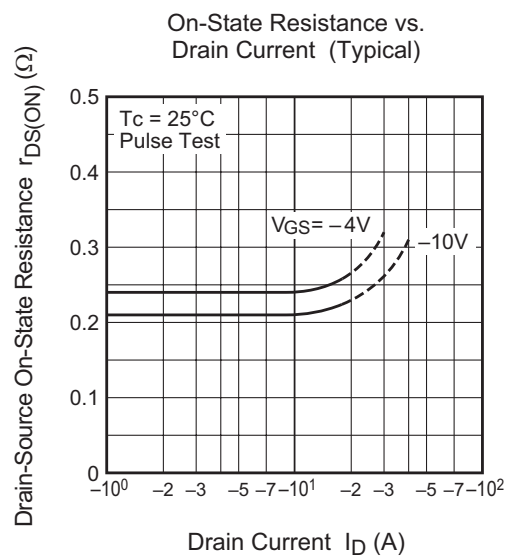
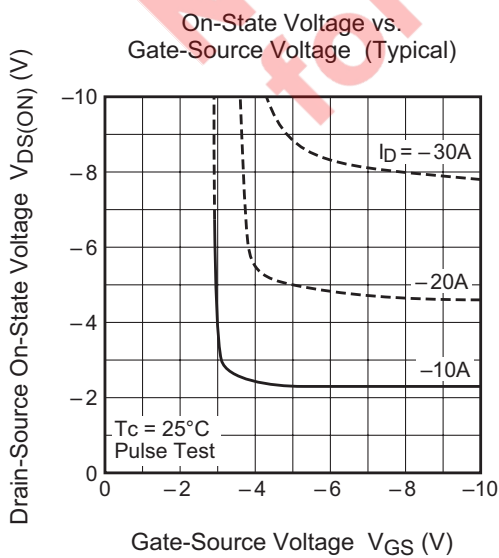
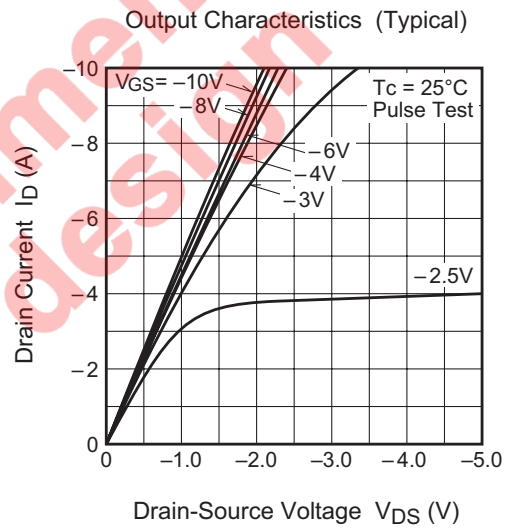
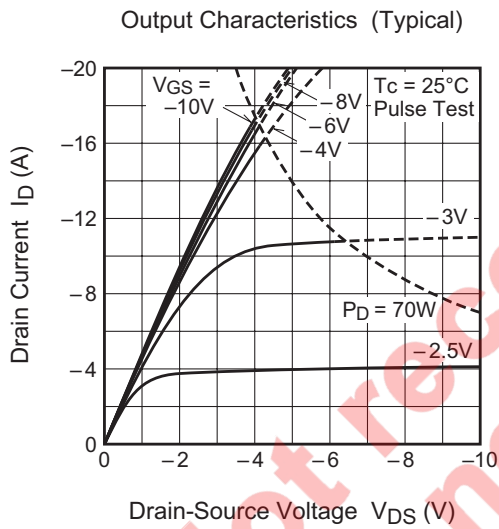
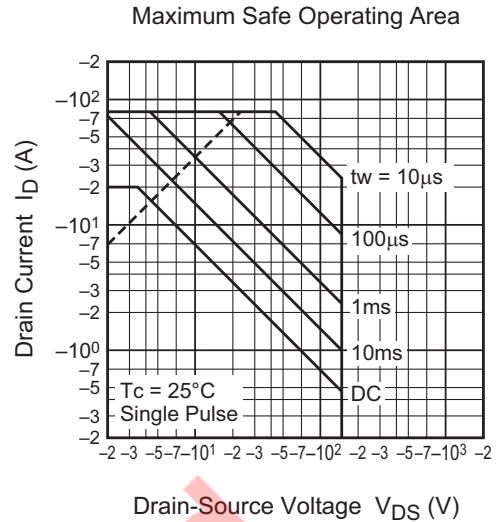
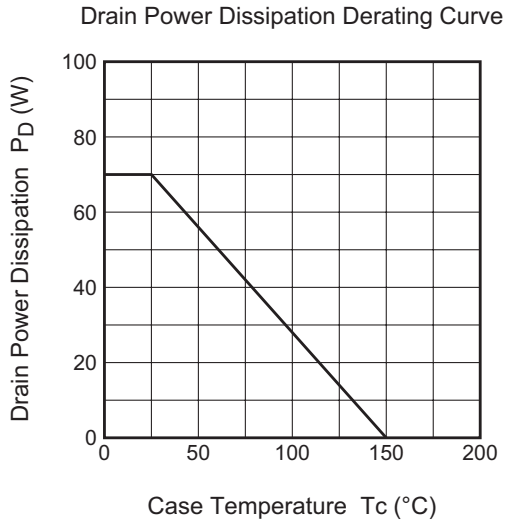
Parameter	Symbol	Ratings	Unit	Conditions
Drain-source voltage	$V_{DSS}$	-150	V	$V_{GS} = 0$ V
Gate-source voltage	$V_{GSS}$	$\pm 20$	V	$V_{DS} = 0$ V
Drain current	$I_D$	-20	A	
Drain current (Pulsed)	$I_{DM}$	-80	A	
Avalanche current (Pulsed)	$I_{DA}$	-20	A	L = 30 $\mu$ H
Source current	$I_S$	-20	A	
Source current (Pulsed)	$I_{SM}$	-80	A	
Maximum power dissipation	$P_D$	70	W	
Channel temperature	Tch	- 55 to +150	°C	
Storage temperature	Tstg	- 55 to +150	°C	
Mass	—	1.2	g	Typical value

## Electrical Characteristics

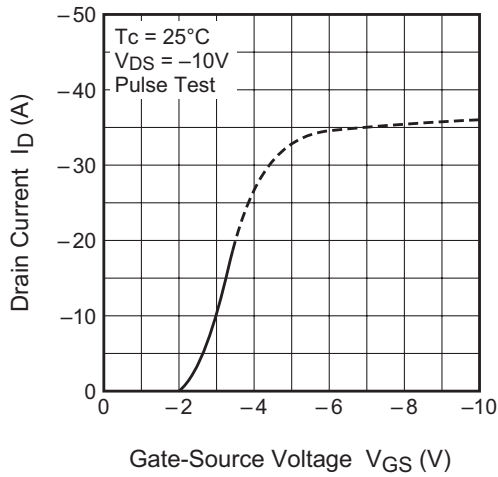
(T<sub>ch</sub> = 25°C)

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	$r_{DS(ON)}$	—	0.23	0.29	Ω	$I_D = -10 \text{ A}$ , $V_{GS} = -10 \text{ V}$
Drain-source on-state resistance	$r_{DS(ON)}$	—	0.25	0.32	Ω	$I_D = -10 \text{ A}$ , $V_{GS} = -4 \text{ V}$
Drain-source on-state voltage	$V_{DS(ON)}$	—	-2.3	-2.9	V	$I_D = -10 \text{ A}$ , $V_{GS} = -10 \text{ V}$
Forward transfer admittance	$ y_{fs} $	—	17.5	—	S	$I_D = -10 \text{ A}$ , $V_{DS} = -10 \text{ V}$
Input capacitance	$C_{iss}$	—	4470	—	pF	$V_{DS} = -10 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$
Output capacitance	$C_{oss}$	—	248	—	pF	
Reverse transfer capacitance	$C_{rss}$	—	115	—	pF	
Turn-on delay time	$t_{d(on)}$	—	15	—	ns	$V_{DD} = -80 \text{ V}$ , $I_D = -10 \text{ A}$ , $V_{GS} = -10 \text{ V}$ , $R_{GEN} = R_{GS} = 50 \text{ Ω}$
Rise time	$t_r$	—	42	—	ns	
Turn-off delay time	$t_{d(off)}$	—	273	—	ns	
Fall time	$t_f$	—	114	—	ns	
Source-drain voltage	$V_{SD}$	—	-1.0	-1.5	V	$I_S = -10 \text{ A}$ , $V_{GS} = 0 \text{ V}$
Thermal resistance	$R_{th(ch-c)}$	—	—	1.79	°C/W	Channel to case
Reverse recovery time	$t_{rr}$	—	100	—	ns	$I_S = -20 \text{ A}$ , $dis/dt = 100 \text{ A/μs}$

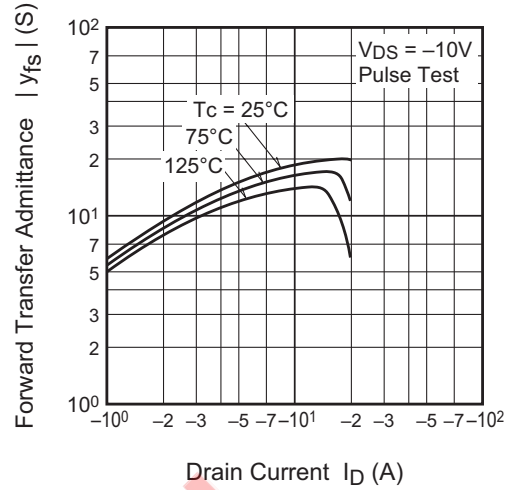
Performance Curves



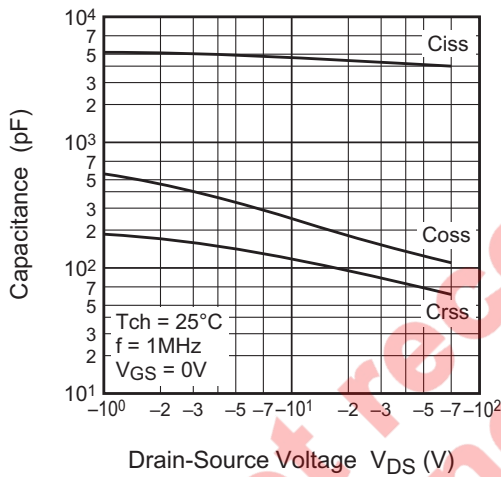
Transfer Characteristics (Typical)



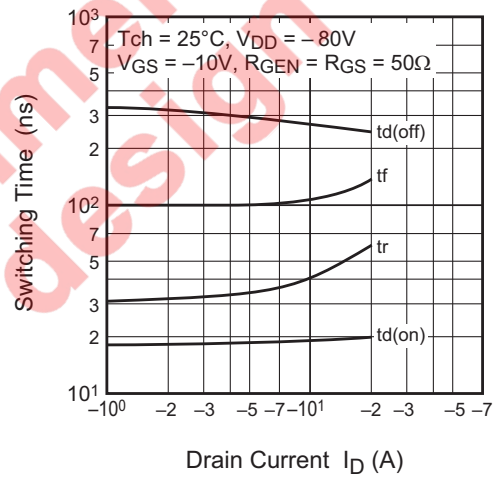
Forward Transfer Admittance vs. Drain Current (Typical)



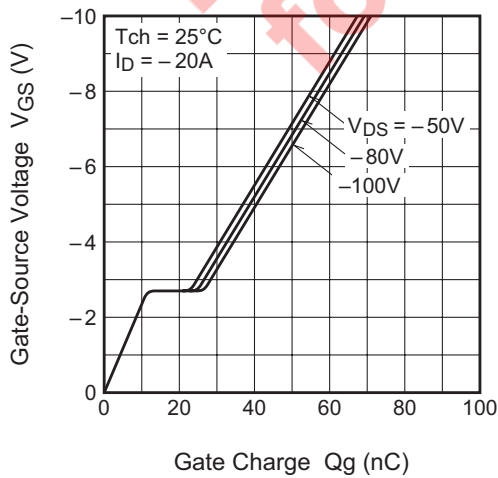
Capacitance vs. Drain-Source Voltage (Typical)



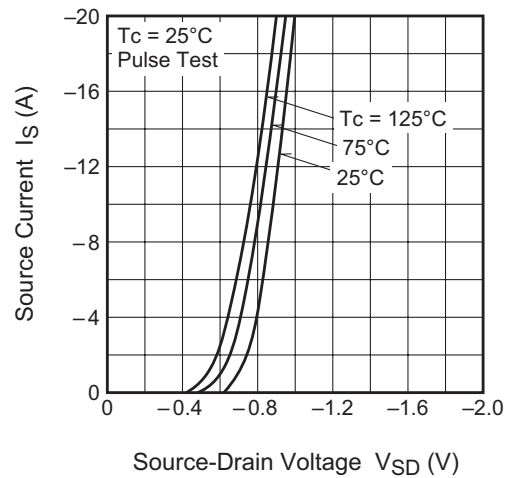
Switching Characteristics (Typical)

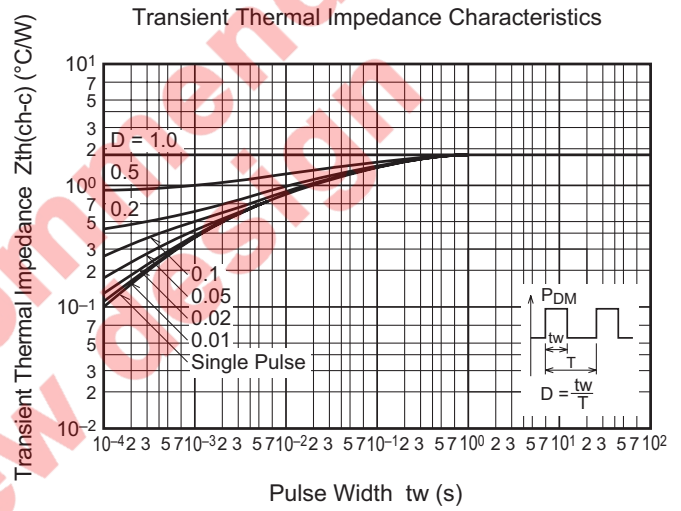
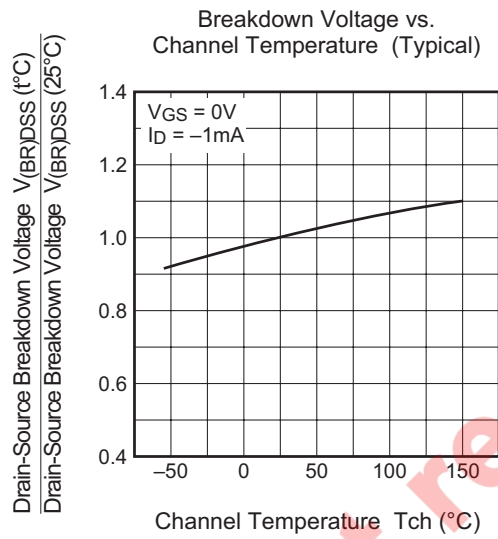
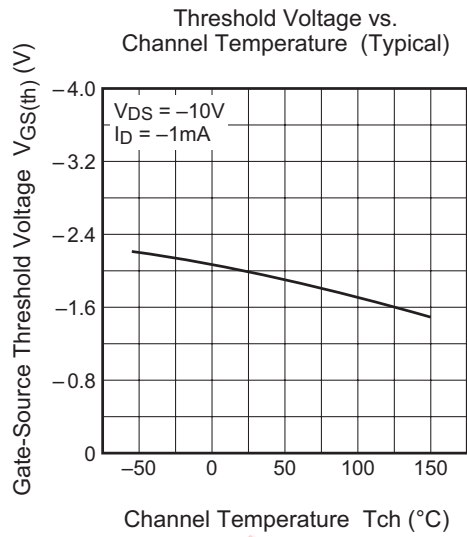
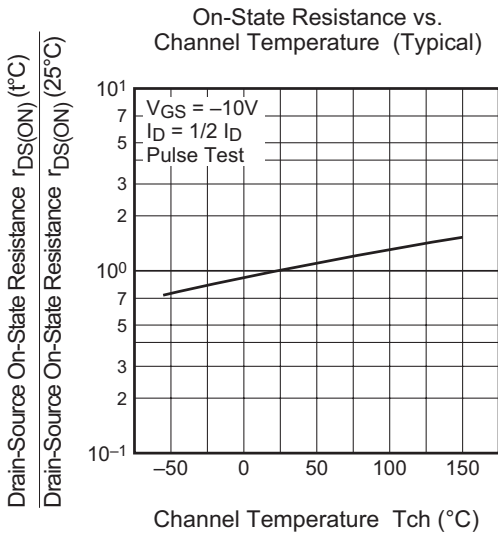


Gate-Source Voltage vs. Gate Charge (Typical)

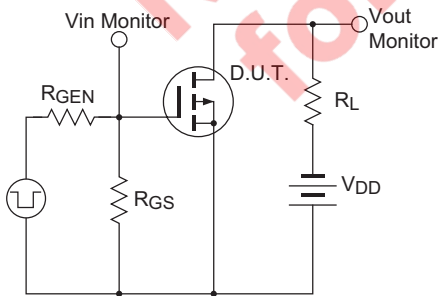


Source-Drain Diode Forward Characteristics (Typical)

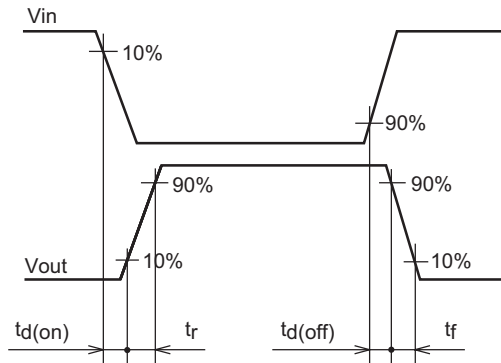




Switching Time Measurement Circuit



Switching Waveform



## Package Dimensions

**TO-220S**

EIAJ Package Code	JEDEC Code	Mass (g) (reference value)	Lead Material
—	—	1.2	Cu alloy

Note 1) The dimensional figures indicate representative values unless otherwise the tolerance is specified.

Symbol	Dimension in Millimeters		
	Min	Typ	Max
A	—	—	—
A <sub>1</sub>	—	—	—
A <sub>2</sub>	—	—	—
b	—	—	—
D	—	—	—
E	—	—	—
e	—	—	—
x	—	—	—
y	—	—	—
y <sub>1</sub>	—	—	—
ZD	—	—	—
ZE	—	—	—

## Order Code

Lead form	Standard packing	Quantity	Standard order code	Standard order code example
Surface-mounted type	Taping	1000	Type name – T +Direction (1 or 2) +1	FS20VSJ-3-T11
Surface-mounted type	Plastic Magazine (Tube)	50	Type name	FS20VSJ-3
Straight type	Plastic Magazine (Tube)	50	Type name +A1	FS20VSJ-3-A1

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



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