

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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# FX6KMJ-3

High-Speed Switching Use  
Pch Power MOS FET

REJ03G0263-0100

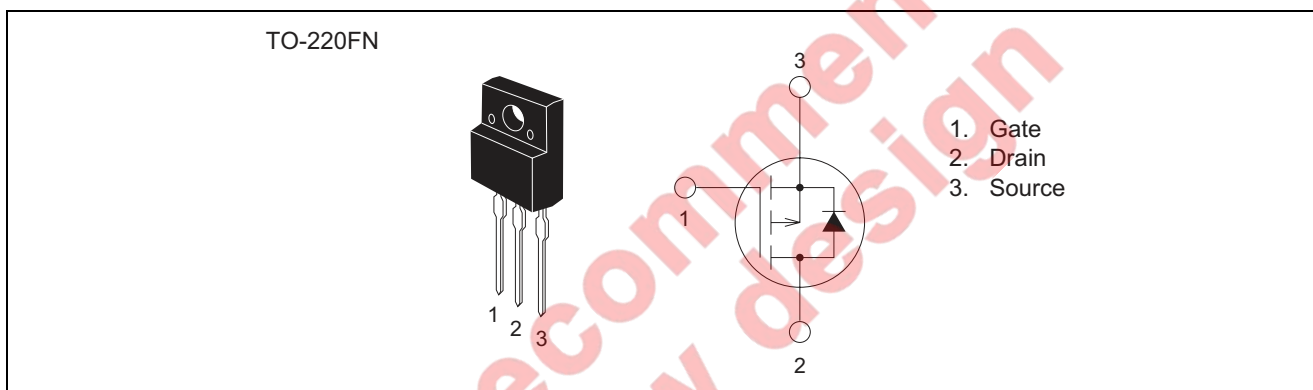
Rev.1.00

Aug.20.2004

## Features

- Drive voltage : 4 V
- $V_{DSS}$  : -150 V
- $r_{DS(ON) (max)}$  : 0.53  $\Omega$
- $I_D$  : -6 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

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

Parameter	Symbol	Rated	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	$I_D$	-6	A	
Drain current (Pulsed)	$I_{DM}$	-24	A	
Avalanche current (Pulsed)	$I_{DA}$	-6	A	$L = 100\ \mu\text{H}$
Source current	$I_S$	-6	A	
Source current (Pulsed)	$I_{SM}$	-24	A	
Maximum power dissipation	$P_D$	25	W	
Channel temperature	$T_{ch}$	-55 to +150	$^\circ\text{C}$	
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$	
Isolation voltage	Viso	2000	V	AC 1 minute, Terminal to case
Mass	—	2.0	g	Typical value

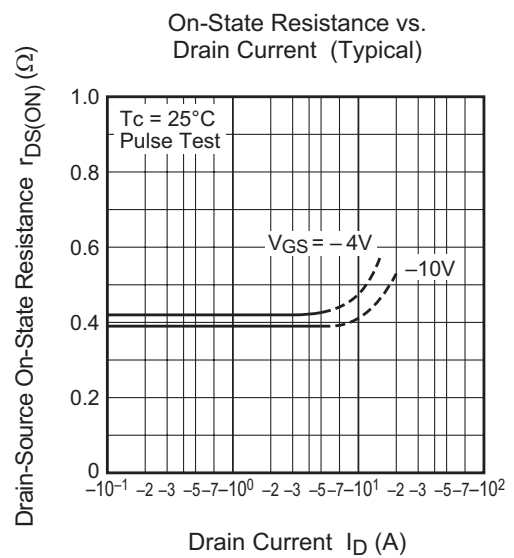
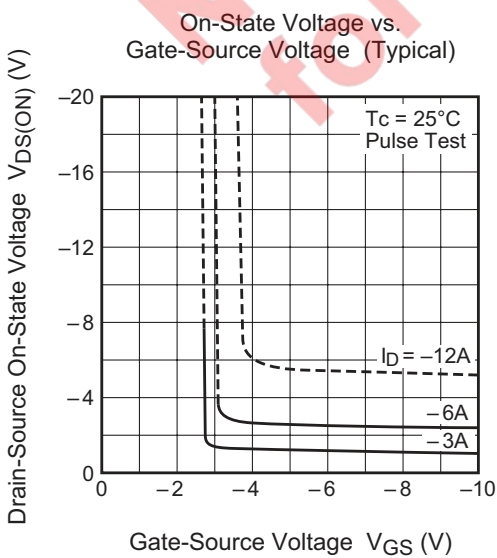
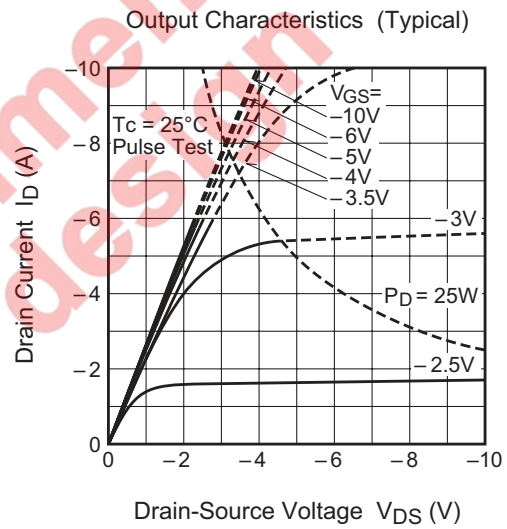
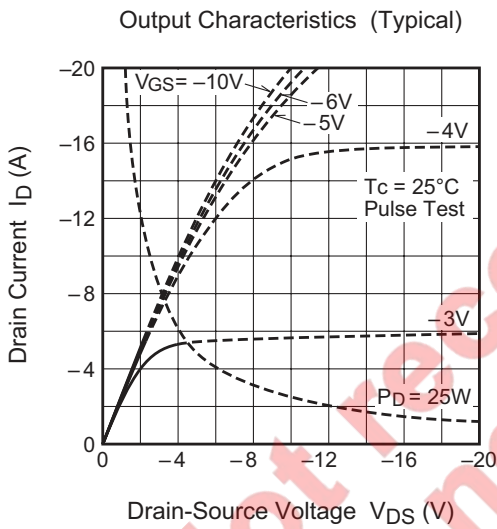
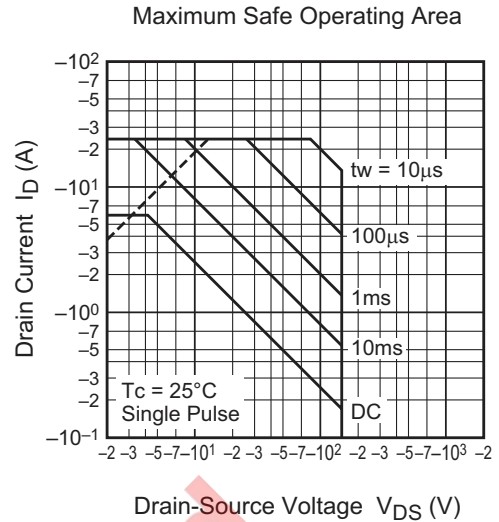
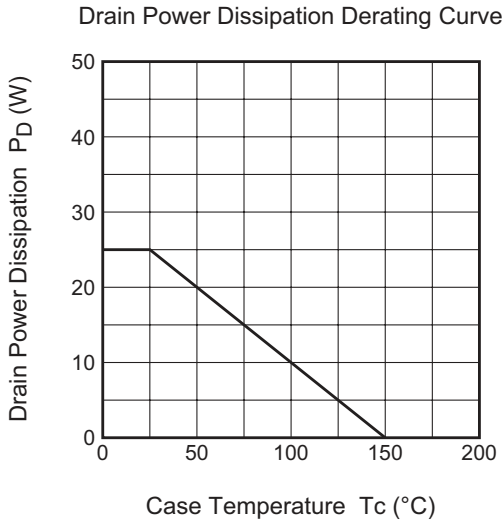
## Electrical Characteristics

(T<sub>ch</sub> = 25°C)

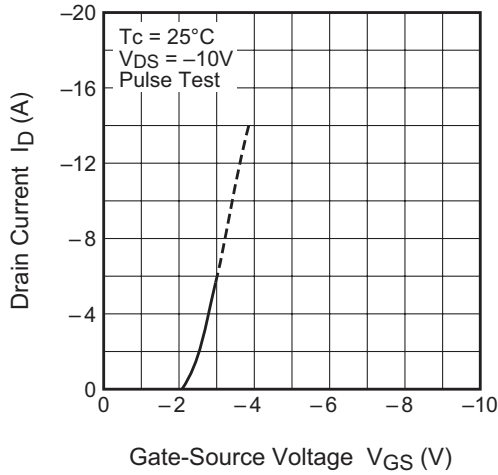
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	-150	—	—	V	I <sub>D</sub> = -1 mA, V <sub>GS</sub> = 0 V
Gate-source leakage current	I <sub>GSS</sub>	—	—	±0.1	∞A	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V
Drain-source leakage current	I <sub>DSS</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>	-1.0	-1.5	-2.0	V	I <sub>D</sub> = -1 mA, V <sub>DS</sub> = -10 V
Drain-source on-state resistance	r <sub>DS(ON)</sub>	—	0.41	0.53	Ω	I <sub>D</sub> = -3 A, V <sub>GS</sub> = -10 V
Drain-source on-state resistance	r <sub>DS(ON)</sub>	—	0.45	0.59	Ω	I <sub>D</sub> = -3 A, V <sub>GS</sub> = -4 V
Drain-source on-state voltage	V <sub>DS(ON)</sub>	—	-1.23	-1.59	V	I <sub>D</sub> = -3 A, V <sub>GS</sub> = -10 V
Forward transfer admittance	y <sub>fs</sub>	—	7.9	—	S	I <sub>D</sub> = -3 A, V <sub>DS</sub> = -10 V
Input capacitance	C <sub>iss</sub>	—	2420	—	pF	V <sub>DS</sub> = -10 V, V <sub>GS</sub> = 0 V, f = 1MHz
Output capacitance	C <sub>oss</sub>	—	152	—	pF	
Reverse transfer capacitance	C <sub>rss</sub>	—	69	—	pF	
Turn-on delay time	t <sub>d(on)</sub>	—	14	—	ns	V <sub>DD</sub> = -80 V, I <sub>D</sub> = -3 A, V <sub>GS</sub> = -10 V, R <sub>GEN</sub> = R <sub>GS</sub> = 50 Ω
Rise time	t <sub>r</sub>	—	18	—	ns	
Turn-off delay time	t <sub>d(off)</sub>	—	156	—	ns	
Fall time	t <sub>f</sub>	—	58	—	ns	
Source-drain voltage	V <sub>SD</sub>	—	-1.0	-1.5	V	I <sub>S</sub> = -3 A, V <sub>GS</sub> = 0 V
Thermal resistance	R <sub>th(ch-c)</sub>	—	—	5.00	°C/W	Channel to case
Reverse recovery time	t <sub>rr</sub>	—	100	—	ns	I <sub>S</sub> = -6 A, di <sub>s</sub> /dt = 100 A/∞s

Not recommended  
for new designs

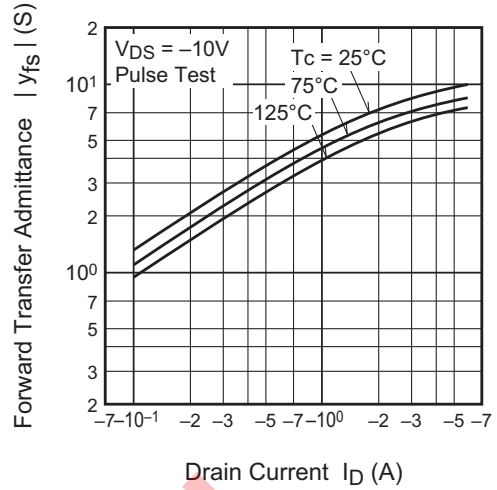
Performance Curves



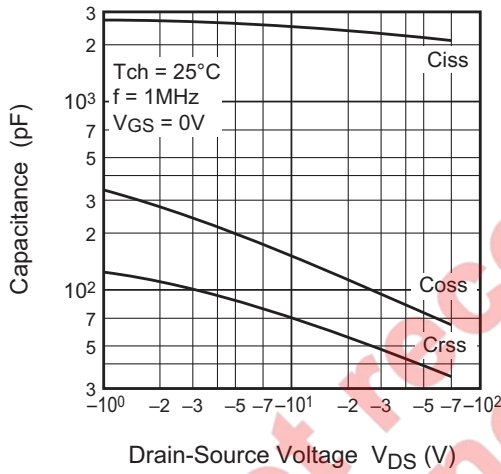
Transfer Characteristics (Typical)



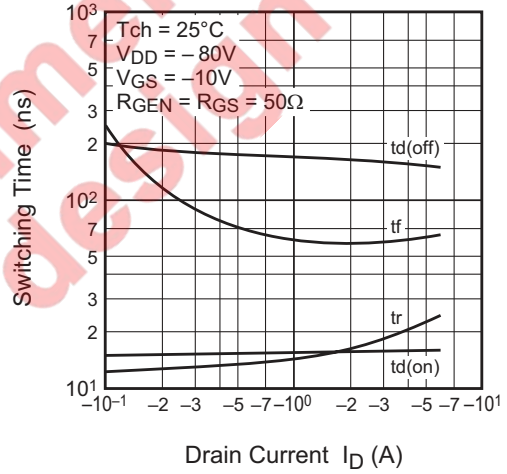
Forward Transfer Admittance vs. Drain Current (Typical)



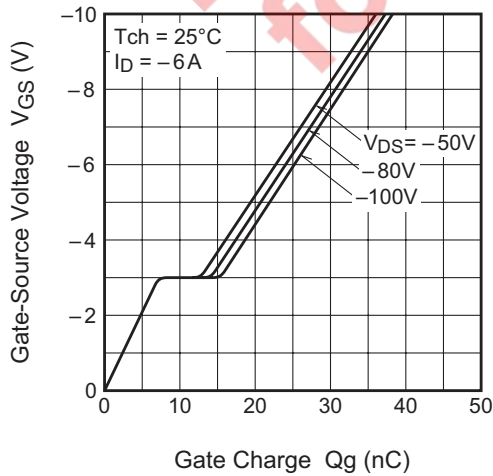
Capacitance vs. Drain-Source Voltage (Typical)



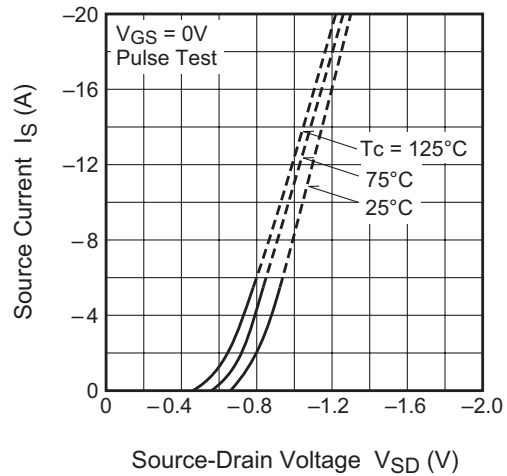
Switching Characteristics (Typical)

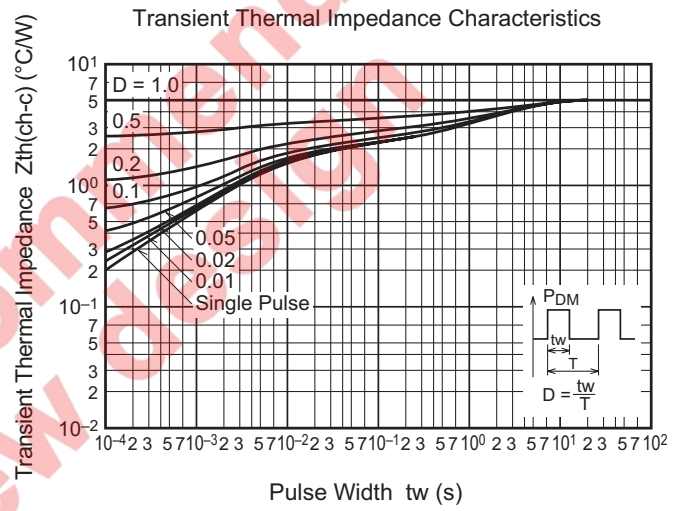
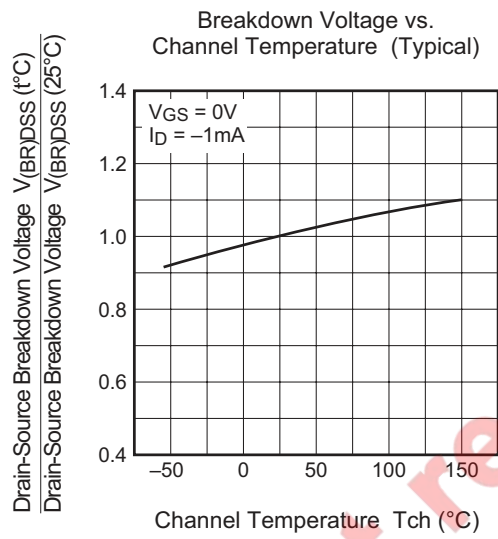
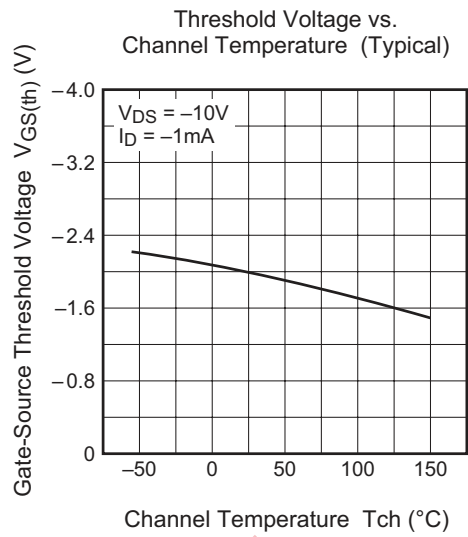
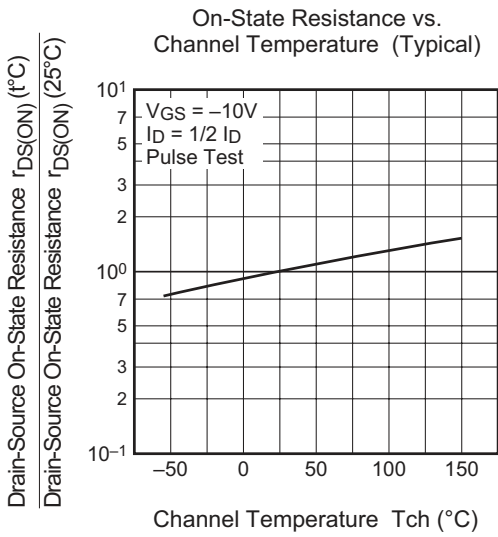


Gate-Source Voltage vs. Gate Charge (Typical)

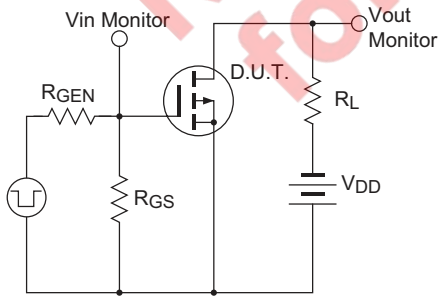


Source-Drain Diode Forward Characteristics (Typical)

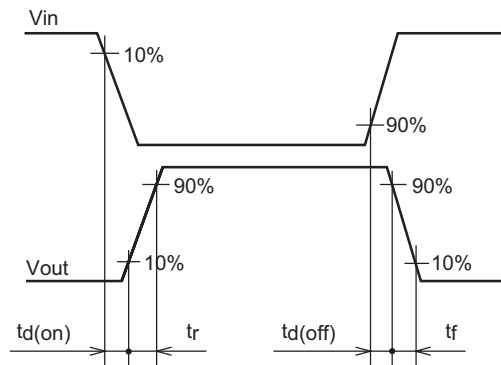




Switching Time Measurement Circuit



Switching Waveform



### Package Dimensions

**TO-220FN**

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

Technical drawings showing dimensions for the TO-220FN package. Dimensions include: 10 ± 0.3, 3 ± 0.3, 15 ± 0.3, 6.5 ± 0.3, φ 3.2 ± 0.2, 14 ± 0.5, 3.6 ± 0.3, 1.1 ± 0.2, 0.75 ± 0.15, 2.54 ± 0.25, 2.8 ± 0.2, 0.75 ± 0.15, 4.5 ± 0.2, and 2.6 ± 0.2.

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
Straight type	Plastic Magazine (Tube)	50	Type name	FX6KMJ-3
Lead form	Plastic Magazine (Tube)	50	Type name – Lead forming code	FX6KMJ-3-A8

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



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