

# FX20KMJ-03

High-Speed Switching Use  
Pch Power MOS FET

REJ03G0259-0100

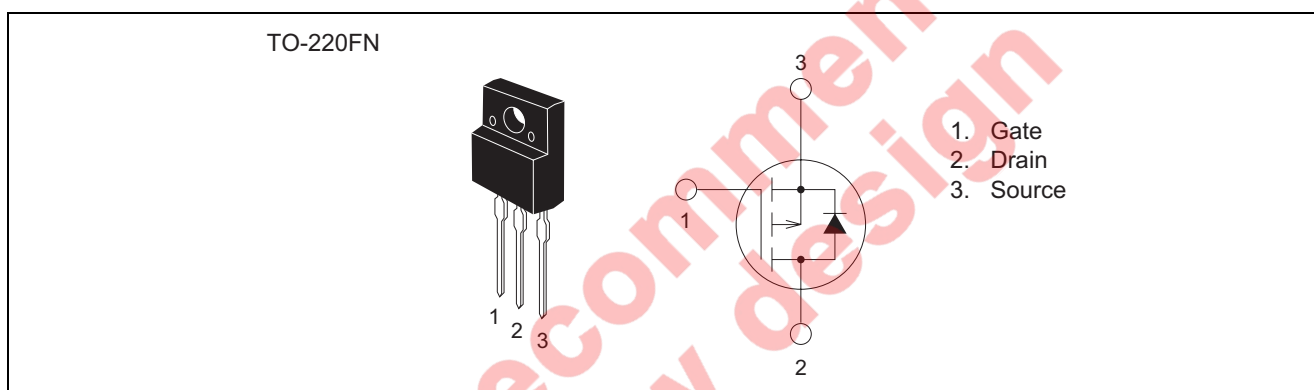
Rev.1.00

Aug.20.2004

## Features

- Drive voltage : 4 V
- $V_{DSS} : -30$  V
- $r_{DS(ON) (max)} : 0.13 \Omega$
- $I_D : -20$  A
- Recovery Time of the Integrated Fast Recovery Diode (TYP.) : 50 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	$V_{DSS}$	-30	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	$L = 10 \mu\text{H}$
Source current	$I_S$	-20	A	
Source current (Pulsed)	$I_{SM}$	-80	A	
Maximum power dissipation	$P_D$	20	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

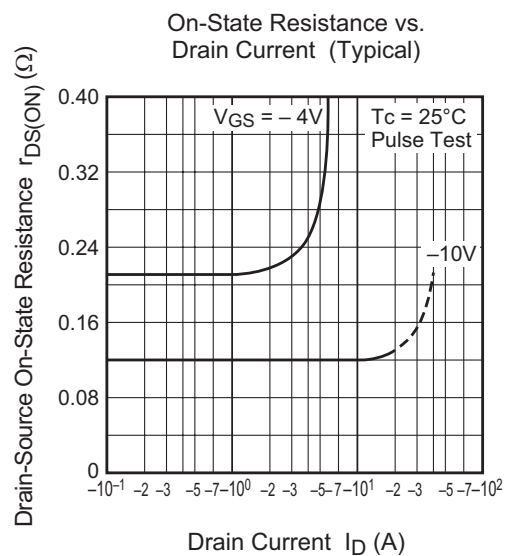
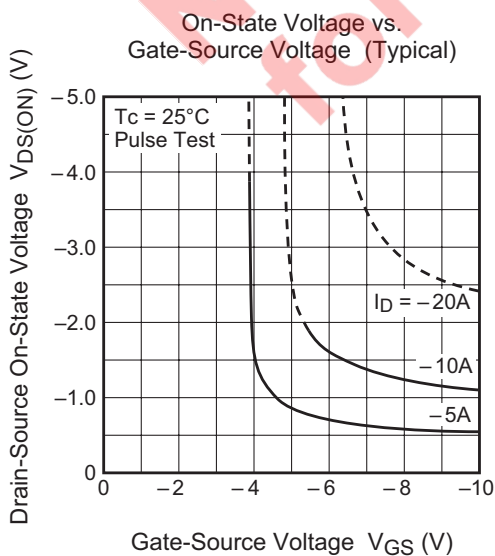
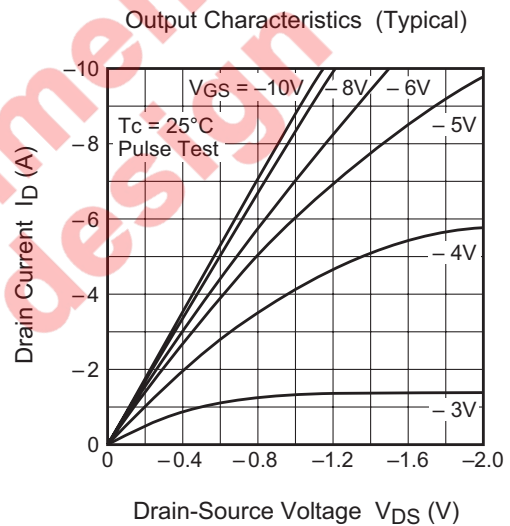
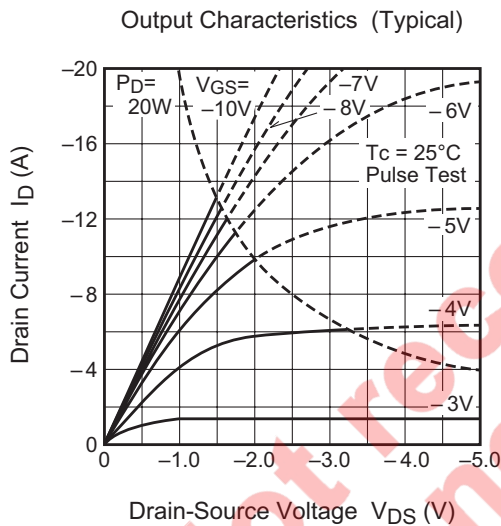
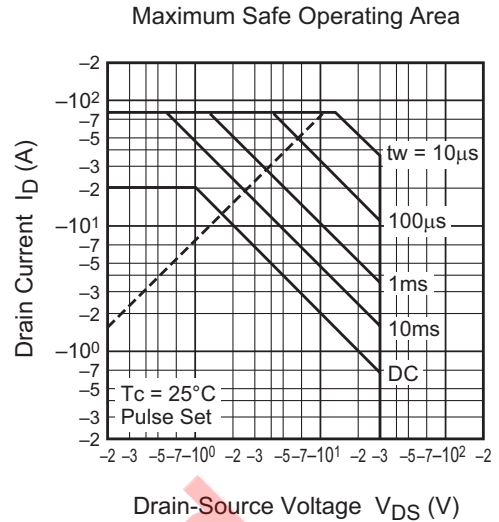
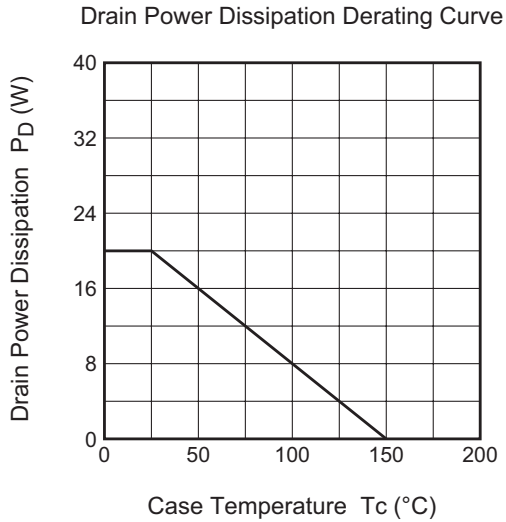
## Electrical Characteristics

(T<sub>ch</sub> = 25°C)

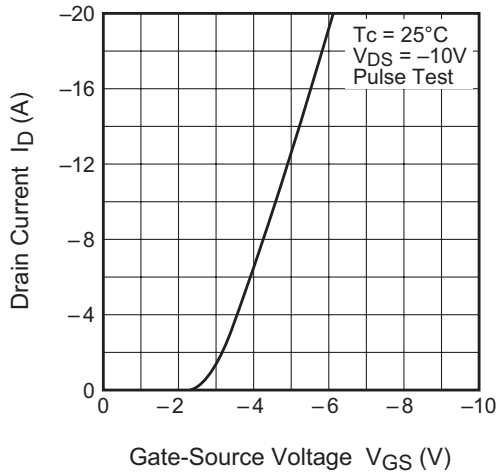
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Drain-source breakdown voltage	$V_{(BR)DSS}$	-30	—	—	V	$I_D = -1 \text{ mA}$ , $V_{GS} = 0 \text{ V}$
Gate-source leakage current	$I_{GSS}$	—	—	$\pm 0.1$	$\mu\text{A}$	$V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0 \text{ V}$
Drain-source leakage current	$I_{DSS}$	—	—	-0.1	mA	$V_{DS} = -30 \text{ V}$ , $V_{GS} = 0 \text{ V}$
Gate-source threshold voltage	$V_{GS(th)}$	-1.3	-1.8	-2.3	V	$I_D = -1 \text{ mA}$ , $V_{DS} = -10 \text{ V}$
Drain-source on-state resistance	$r_{DS(ON)}$	—	0.11	0.13	$\Omega$	$I_D = -10 \text{ A}$ , $V_{GS} = -10 \text{ V}$
Drain-source on-state resistance	$r_{DS(ON)}$	—	0.21	0.29	$\Omega$	$I_D = -2 \text{ A}$ , $V_{GS} = -4 \text{ V}$
Drain-source on-state voltage	$V_{DS(ON)}$	—	-1.1	-1.3	V	$I_D = -10 \text{ A}$ , $V_{GS} = -10 \text{ V}$
Forward transfer admittance	$ y_{fs} $	—	5.8	—	S	$I_D = -10 \text{ A}$ , $V_{DS} = -5 \text{ V}$
Input capacitance	$C_{iss}$	—	1130	—	pF	$V_{DS} = -10 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$
Output capacitance	$C_{oss}$	—	232	—	pF	
Reverse transfer capacitance	$C_{rss}$	—	83	—	pF	
Turn-on delay time	$t_{d(on)}$	—	15	—	ns	$V_{DD} = -15 \text{ V}$ , $I_D = -10 \text{ A}$ , $V_{GS} = -10 \text{ V}$ , $R_{GEN} = R_{GS} = 50 \Omega$
Rise time	$t_r$	—	33	—	ns	
Turn-off delay time	$t_{d(off)}$	—	49	—	ns	
Fall time	$t_f$	—	26	—	ns	
Source-drain voltage	$V_{SD}$	—	-1.0	-1.5	V	$I_S = -10 \text{ A}$ , $V_{GS} = 0 \text{ V}$
Thermal resistance	$R_{th(ch-c)}$	—	—	6.25	$^{\circ}\text{C/W}$	Channel to case
Reverse recovery time	$t_{rr}$	—	50	—	ns	$I_S = -10 \text{ A}$ , $dis/dt = 50 \text{ A}/\mu\text{s}$

Not recommended  
for new designs

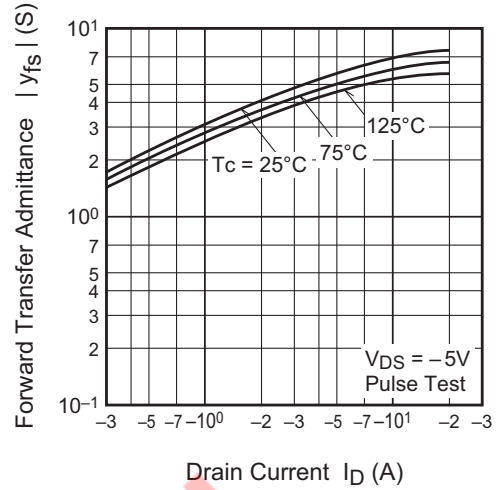
Performance Curves



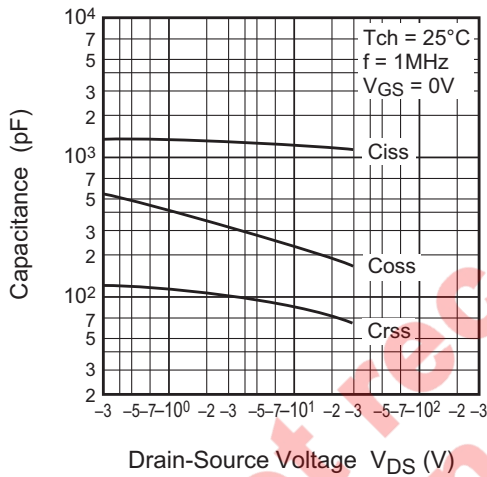
Transfer Characteristics (Typical)



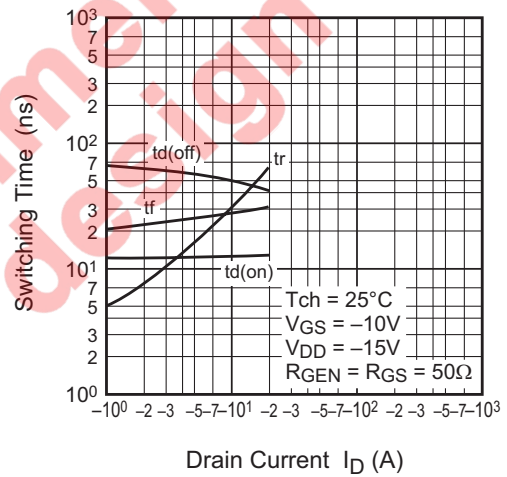
Forward Transfer Admittance vs. Drain Current (Typical)



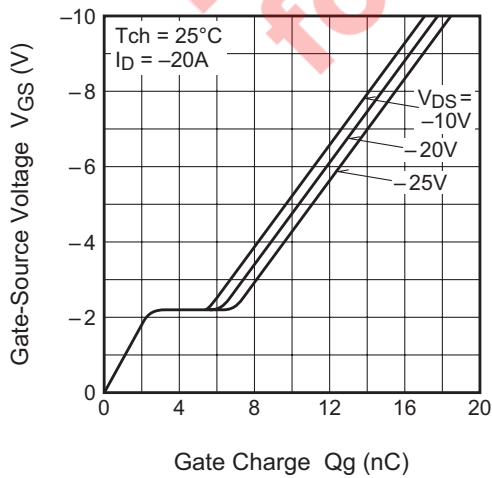
Capacitance vs. Drain-Source Voltage (Typical)



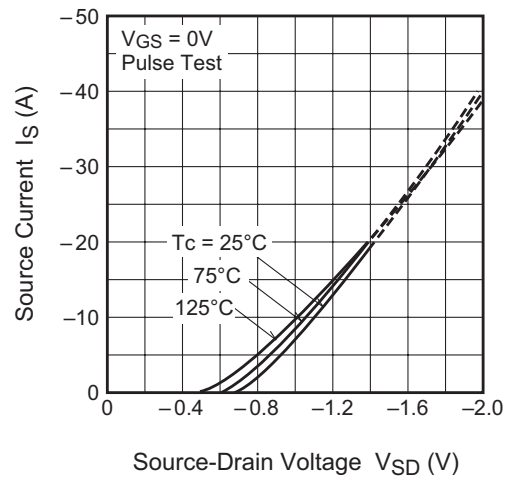
Switching Characteristics (Typical)

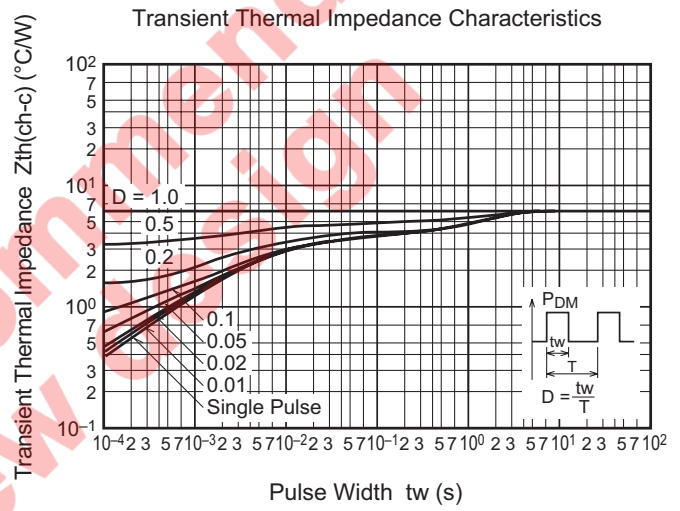
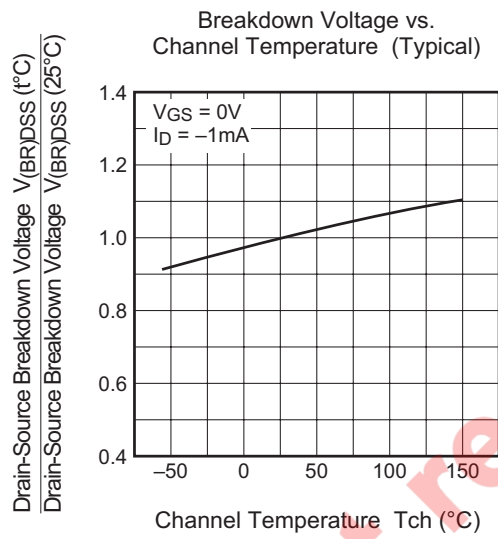
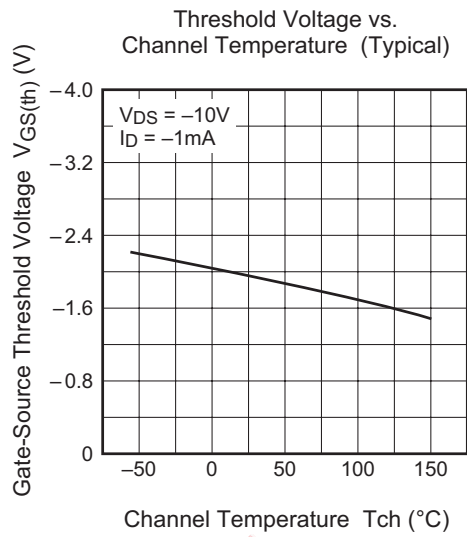
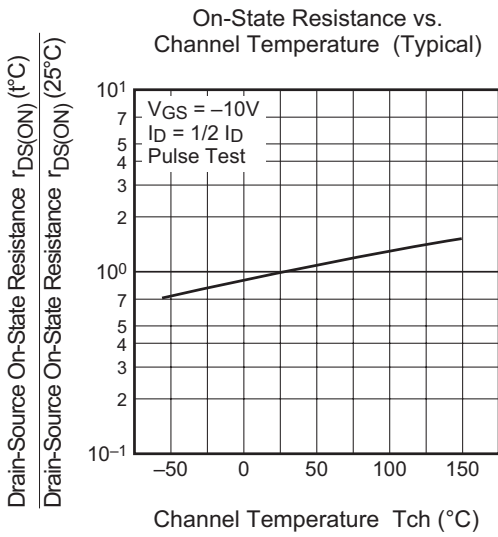


Gate-Source Voltage vs. Gate Charge (Typical)

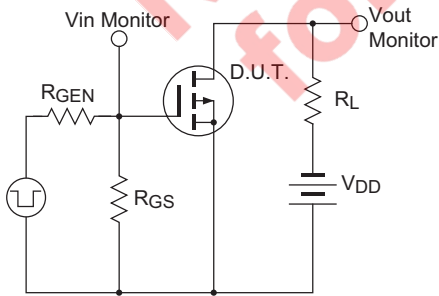


Source-Drain Diode Forward Characteristics (Typical)

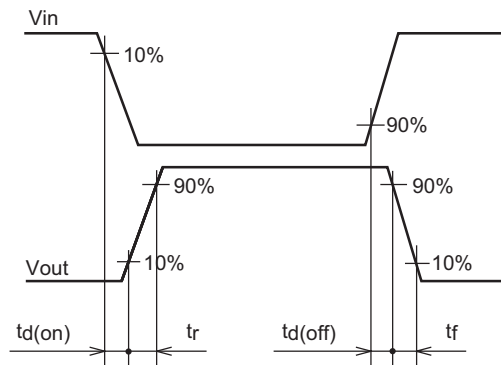




Switching Time Measurement Circuit



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, 15 ± 0.3, 3 ± 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	FX20KMJ-03
Lead form	Plastic Magazine (Tube)	50	Type name – Lead forming code	FX20KMJ-03-A8

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

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