

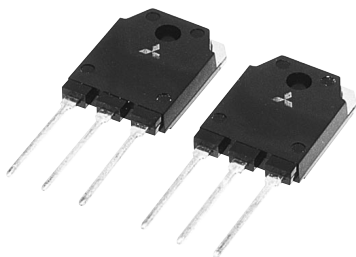
**PRELIMINARY**  
 Notice: This is not a final specification.  
 Some parametric limits are subject to change.

MITSUBISHI Pch POWER MOSFET

# FX50SMJ-06

HIGH-SPEED SWITCHING USE

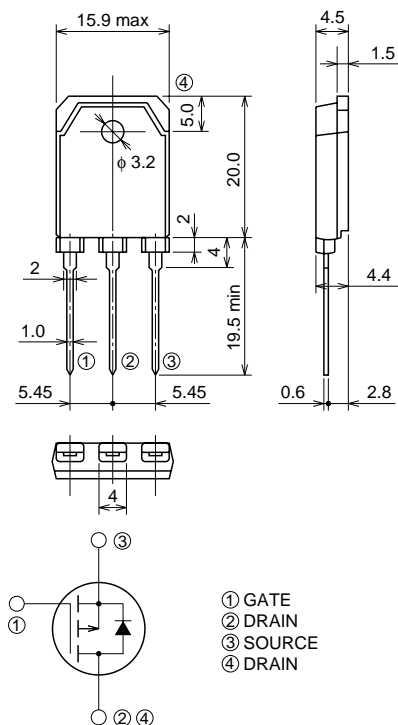
## FX50SMJ-06



- 4V DRIVE
- $V_{DS}$  ..... -60V
- $r_{DS(ON)}$  (MAX) ..... 18.9m $\Omega$
- $I_D$  ..... -50A
- Integrated Fast Recovery Diode (TYP.) ..... 70ns

## OUTLINE DRAWING

Dimensions in mm



TO-3P

## APPLICATION

Motor control, Lamp control, Solenoid control  
 DC-DC converter, etc.

## MAXIMUM RATINGS (T<sub>c</sub> = 25°C)

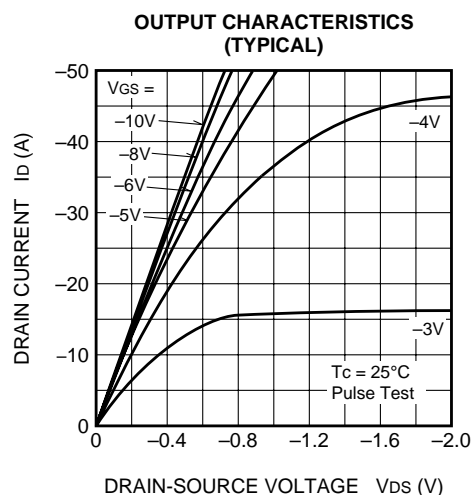
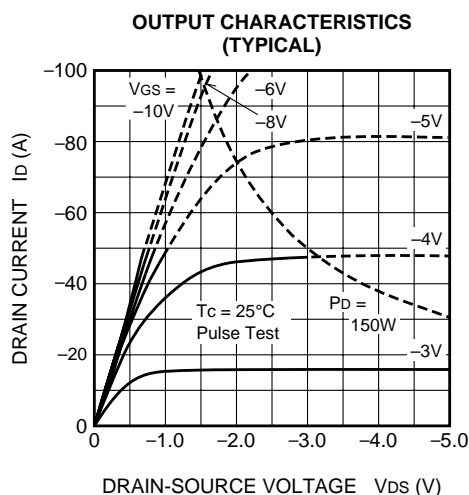
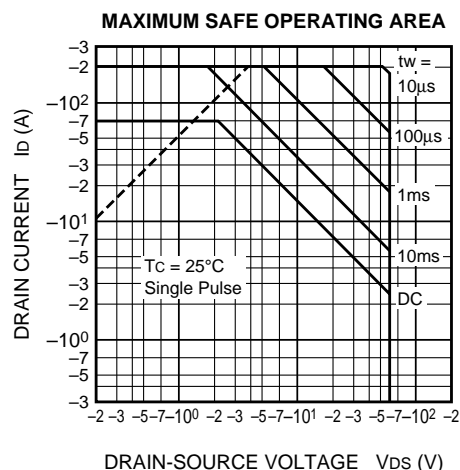
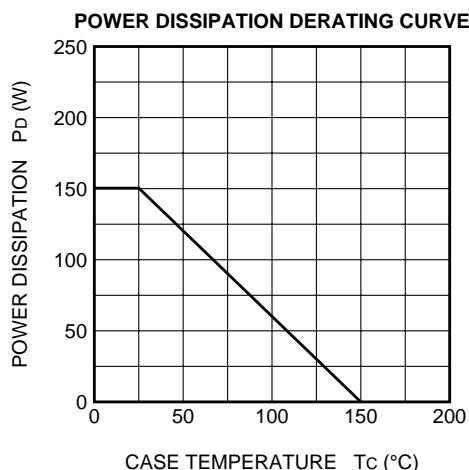
Symbol	Parameter	Conditions	Ratings	Unit
$V_{DS}$	Drain-source voltage	$V_{GS} = 0V$	-60	V
$V_{GSS}$	Gate-source voltage	$V_{DS} = 0V$	$\pm 20$	V
$I_D$	Drain current		-50	A
$I_{DM}$	Drain current (Pulsed)		-200	A
$I_{DA}$	Avalanche drain current (Pulsed)	$L = 50\mu H$	-50	A
$I_S$	Source current		-50	A
$I_{SM}$	Source current (Pulsed)		-200	A
$P_D$	Maximum power dissipation		150	W
$T_{ch}$	Channel temperature		-55 ~ +150	°C
$T_{stg}$	Storage temperature		-55 ~ +150	°C
—	Weight	Typical value	4.8	g

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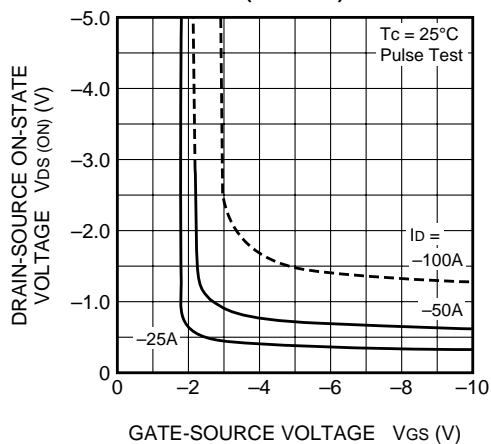
**ELECTRICAL CHARACTERISTICS** ( $T_{ch} = 25^{\circ}\text{C}$ )

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = -1\text{mA}$ , $V_{GS} = 0\text{V}$	-60	—	—	V
$I_{GSS}$	Gate-source leakage current	$V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$	—	—	$\pm 0.1$	$\mu\text{A}$
$I_{DSS}$	Drain-source leakage current	$V_{DS} = -60\text{V}$ , $V_{GS} = 0\text{V}$	—	—	-0.1	mA
$V_{GS(th)}$	Gate-source threshold voltage	$I_D = -1\text{mA}$ , $V_{DS} = -10\text{V}$	-1.3	-1.8	-2.3	V
$r_{DS(on)}$	Drain-source on-state resistance	$I_D = -25\text{A}$ , $V_{GS} = -10\text{V}$	—	15.0	18.9	$\text{m}\Omega$
$r_{DS(on)}$	Drain-source on-state resistance	$I_D = -25\text{A}$ , $V_{GS} = -4\text{V}$	—	23	32	$\text{m}\Omega$
$V_{DS(on)}$	Drain-source on-state voltage	$I_D = -25\text{A}$ , $V_{GS} = -10\text{V}$	—	-0.38	-0.47	V
$ y_{fs} $	Forward transfer admittance	$I_D = -25\text{A}$ , $V_{DS} = -10\text{V}$	—	49.1	—	S
$C_{iss}$	Input capacitance	$V_{DS} = -10\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$	—	11610	—	pF
$C_{oss}$	Output capacitance		—	1355	—	pF
$C_{rss}$	Reverse transfer capacitance		—	687	—	pF
$t_{d(on)}$	Turn-on delay time	$V_{DD} = -30\text{V}$ , $I_D = -25\text{A}$ , $V_{GS} = -10\text{V}$ , $R_{GEN} = R_{GS} = 50\Omega$	—	73	—	ns
$t_r$	Rise time		—	137	—	ns
$t_{d(off)}$	Turn-off delay time		—	822	—	ns
$t_f$	Fall time		—	320	—	ns
$V_{SD}$	Source-drain voltage	$I_S = -25\text{A}$ , $V_{GS} = 0\text{V}$	—	-1.0	-1.5	V
$R_{th(ch-c)}$	Thermal resistance	Channel to case	—	—	0.83	$^{\circ}\text{C/W}$
$t_{rr}$	Reverse recovery time	$I_S = -50\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$	—	70	—	ns

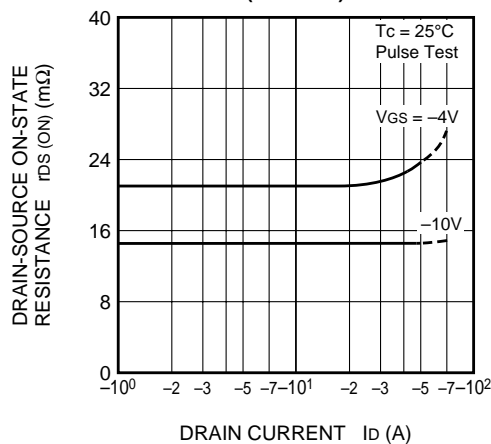
**PERFORMANCE CURVES**



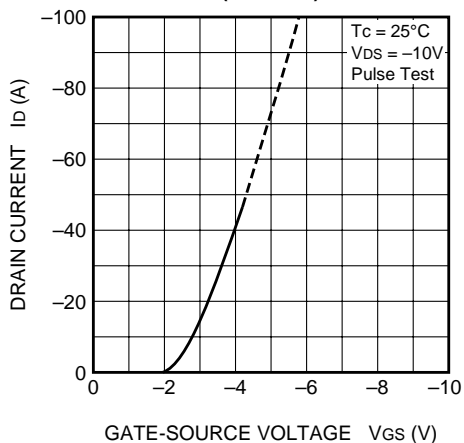
**ON-STATE VOLTAGE VS.  
GATE-SOURCE VOLTAGE  
(TYPICAL)**



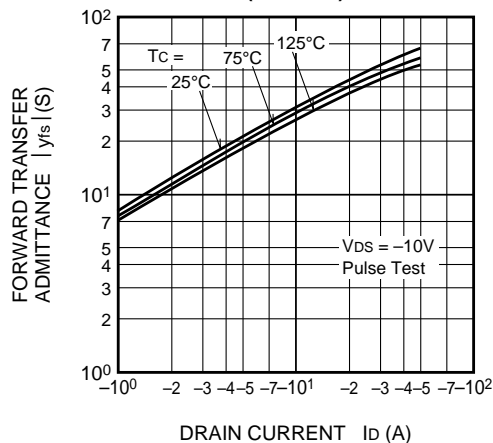
**ON-STATE RESISTANCE VS.  
DRAIN CURRENT  
(TYPICAL)**



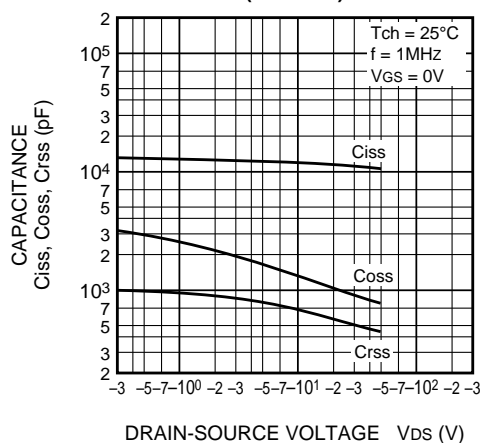
**TRANSFER CHARACTERISTICS  
(TYPICAL)**



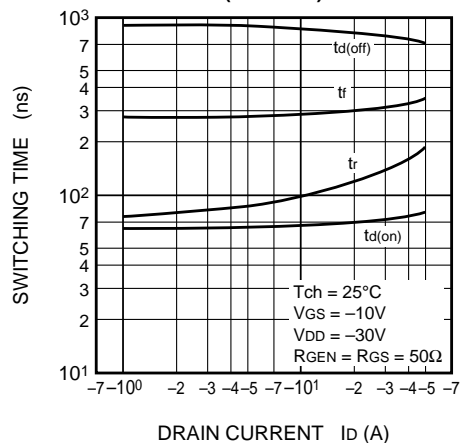
**FORWARD TRANSFER ADMITTANCE  
VS.DRAIN CURRENT  
(TYPICAL)**



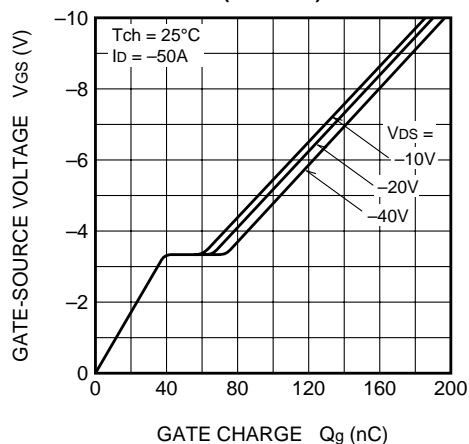
**CAPACITANCE VS.  
DRAIN-SOURCE VOLTAGE  
(TYPICAL)**



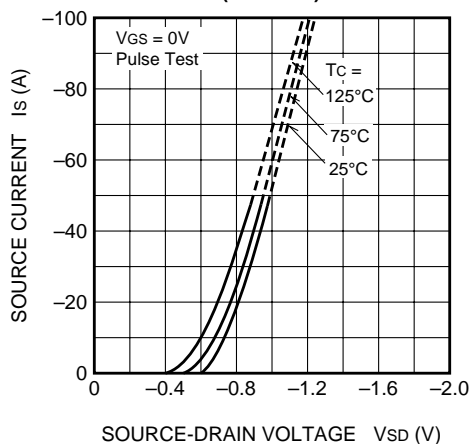
**SWITCHING CHARACTERISTICS  
(TYPICAL)**



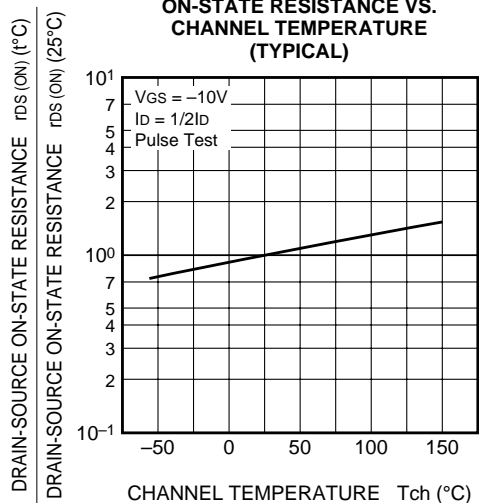
**GATE-SOURCE VOLTAGE  
 VS. GATE CHARGE  
 (TYPICAL)**



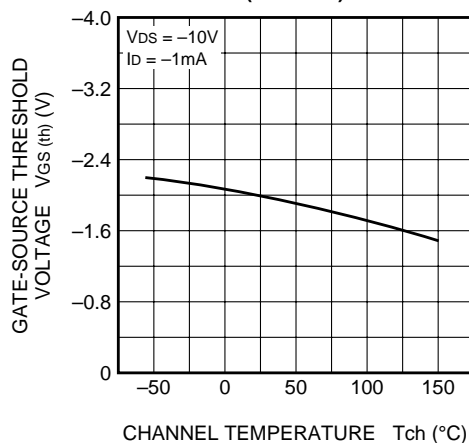
**SOURCE-DRAIN DIODE  
 FORWARD CHARACTERISTICS  
 (TYPICAL)**



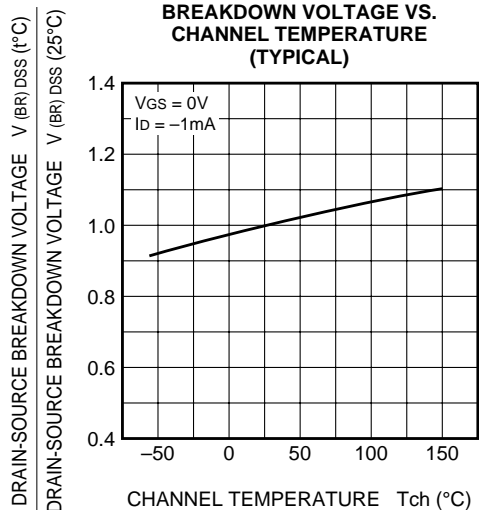
**ON-STATE RESISTANCE VS.  
 CHANNEL TEMPERATURE  
 (TYPICAL)**



**THRESHOLD VOLTAGE VS.  
 CHANNEL TEMPERATURE  
 (TYPICAL)**



**BREAKDOWN VOLTAGE VS.  
 CHANNEL TEMPERATURE  
 (TYPICAL)**



**TRANSIENT THERMAL IMPEDANCE  
 CHARACTERISTICS**

