

MITSUBISHI Nch POWER MOSFET

# FS50VSJ-03

HIGH-SPEED SWITCHING USE

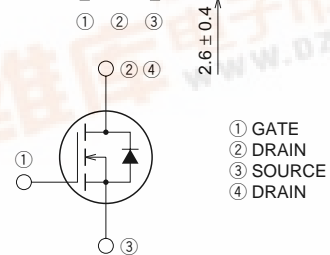
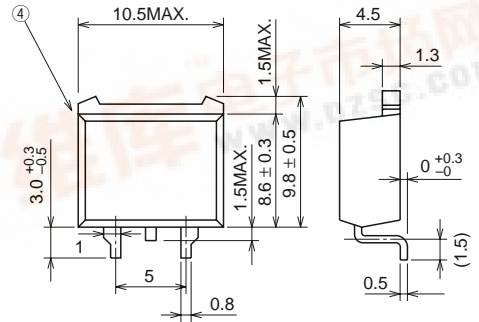
## FS50VSJ-03



- 4V DRIVE
- V<sub>DSS</sub> ..... 30V
- r<sub>DSON</sub> (MAX) ..... 19mΩ
- I<sub>D</sub> ..... 50A
- Integrated Fast Recovery Diode (TYP.) ..... 60ns

## OUTLINE DRAWING

Dimensions in mm



TO-220S

## 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 <sub>DSS</sub>	Drain-source voltage	V <sub>GS</sub> = 0V	30	V
V <sub>GSS</sub>	Gate-source voltage	V <sub>DS</sub> = 0V	±20	V
I <sub>D</sub>	Drain current		50	A
I <sub>DM</sub>	Drain current (Pulsed)		200	A
I <sub>DA</sub>	Avalanche drain current (Pulsed)	L = 30μH	50	A
I <sub>S</sub>	Source current		50	A
I <sub>SM</sub>	Source current (Pulsed)		200	A
P <sub>D</sub>	Maximum power dissipation		45	W
T <sub>ch</sub>	Channel temperature		-55 ~ +150	°C
T <sub>stg</sub>	Storage temperature		-55 ~ +150	°C
—	Weight	Typical value	1.2	g

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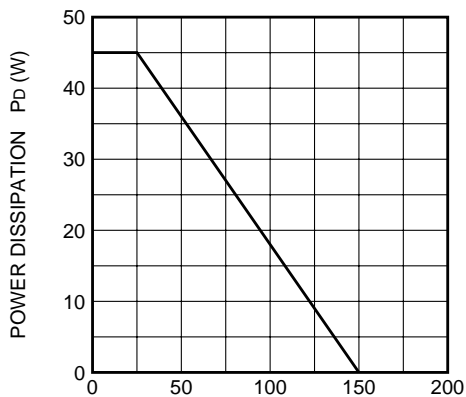
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## ELECTRICAL CHARACTERISTICS (T<sub>ch</sub> = 25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
V(BR) <sub>DSS</sub>	Drain-source breakdown voltage	I <sub>D</sub> = 1mA, V <sub>GS</sub> = 0V	30	—	—	V
I <sub>GSS</sub>	Gate-source leakage current	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	—	—	±0.1	μA
I <sub>DSS</sub>	Drain-source leakage current	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V	—	—	0.1	mA
V <sub>GS(th)</sub>	Gate-source threshold voltage	I <sub>D</sub> = 1mA, V <sub>DS</sub> = 10V	1.0	1.5	2.0	V
r <sub>DS(ON)</sub>	Drain-source on-state resistance	I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V	—	15	19	mΩ
r <sub>DS(ON)</sub>	Drain-source on-state resistance	I <sub>D</sub> = 25A, V <sub>GS</sub> = 4V	—	21	35	mΩ
V <sub>DS(ON)</sub>	Drain-source on-state voltage	I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V	—	0.375	0.475	V
y <sub>fs</sub>	Forward transfer admittance	I <sub>D</sub> = 25A, V <sub>DS</sub> = 10V	—	28	—	S
C <sub>iss</sub>	Input capacitance	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz	—	1600	—	pF
C <sub>oss</sub>	Output capacitance		—	500	—	pF
C <sub>rss</sub>	Reverse transfer capacitance		—	260	—	pF
t <sub>d(on)</sub>	Turn-on delay time	V <sub>DD</sub> = 15V, I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = R <sub>GS</sub> = 50Ω	—	17	—	ns
t <sub>r</sub>	Rise time		—	90	—	ns
t <sub>d(off)</sub>	Turn-off delay time		—	130	—	ns
t <sub>f</sub>	Fall time		—	125	—	ns
V <sub>SD</sub>	Source-drain voltage	I <sub>S</sub> = 25A, V <sub>GS</sub> = 0V	—	1.0	1.5	V
R <sub>th(ch-c)</sub>	Thermal resistance	Channel to case	—	—	2.78	°C/W
t <sub>rr</sub>	Reverse recovery time	I <sub>S</sub> = 25A, dis/dt = -50A/μs	—	60	—	ns

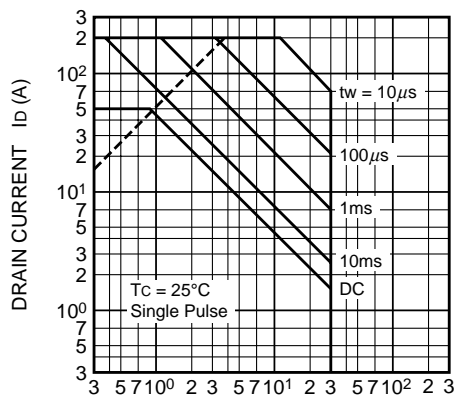
## PERFORMANCE CURVES

POWER DISSIPATION DERATING CURVE



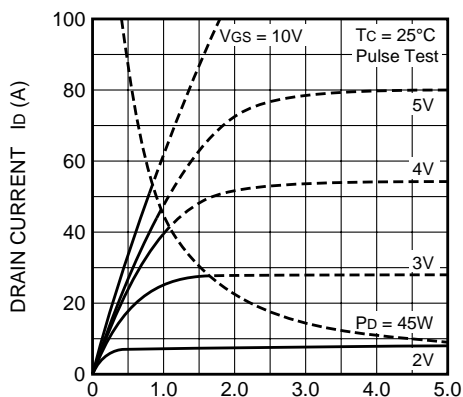
CASE TEMPERATURE T<sub>c</sub> (°C)

MAXIMUM SAFE OPERATING AREA



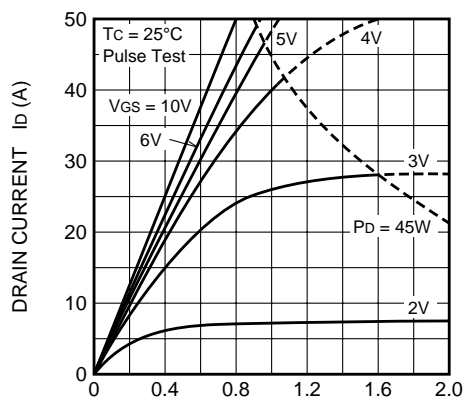
DRAIN-SOURCE VOLTAGE V<sub>ds</sub> (V)

OUTPUT CHARACTERISTICS (TYPICAL)



DRAIN-SOURCE VOLTAGE V<sub>ds</sub> (V)

OUTPUT CHARACTERISTICS (TYPICAL)

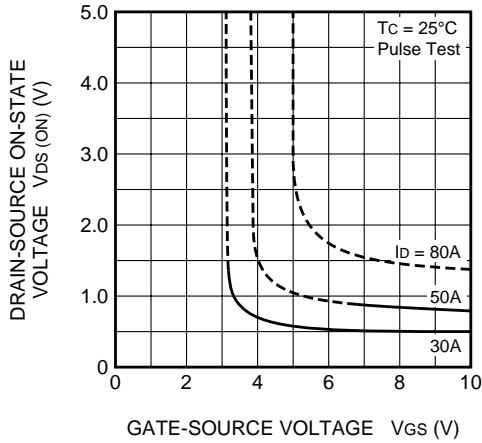


DRAIN-SOURCE VOLTAGE V<sub>ds</sub> (V)

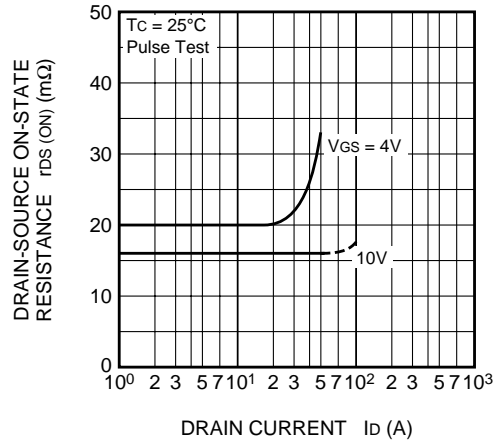
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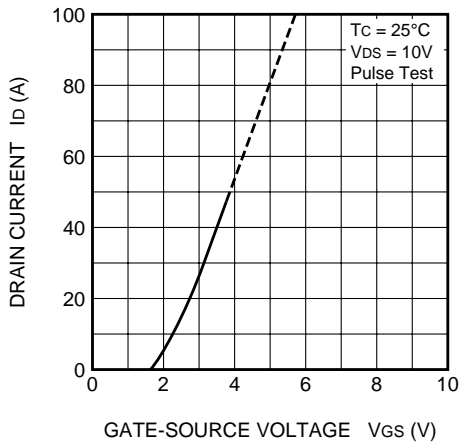
**ON-STATE VOLTAGE VS. GATE-SOURCE VOLTAGE (TYPICAL)**



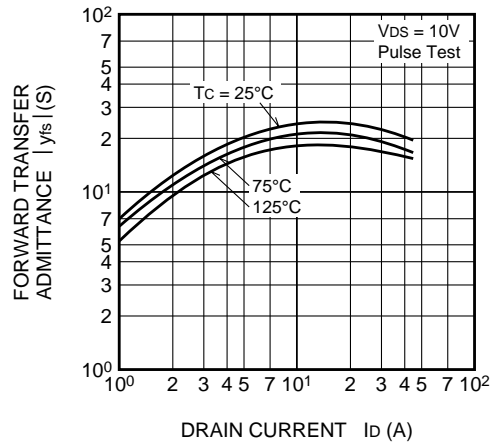
**ON-STATE RESISTANCE VS. DRAIN CURRENT (TYPICAL)**



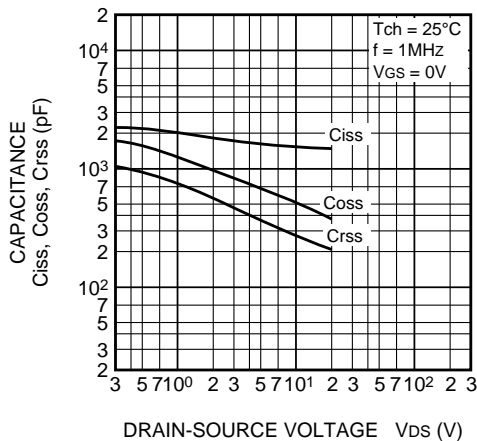
**TRANSFER CHARACTERISTICS (TYPICAL)**



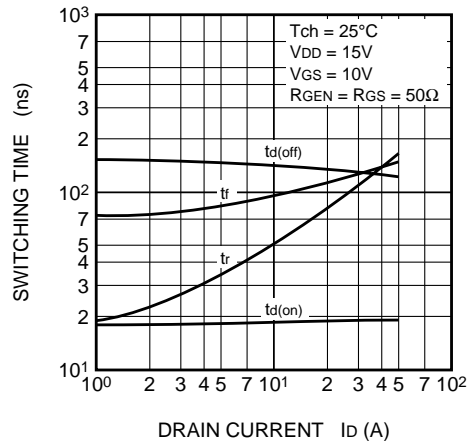
**FORWARD TRANSFER ADMITTANCE VS. DRAIN CURRENT (TYPICAL)**



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



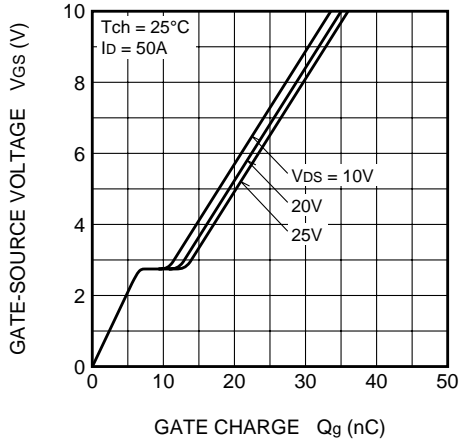
**SWITCHING CHARACTERISTICS (TYPICAL)**



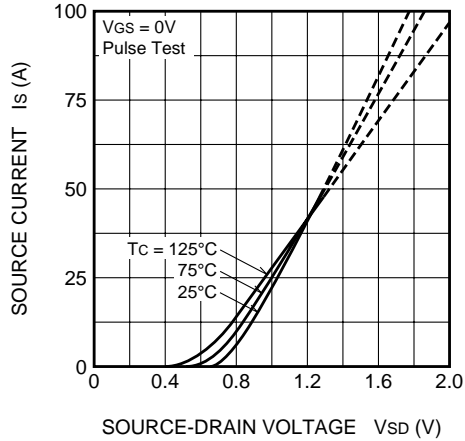
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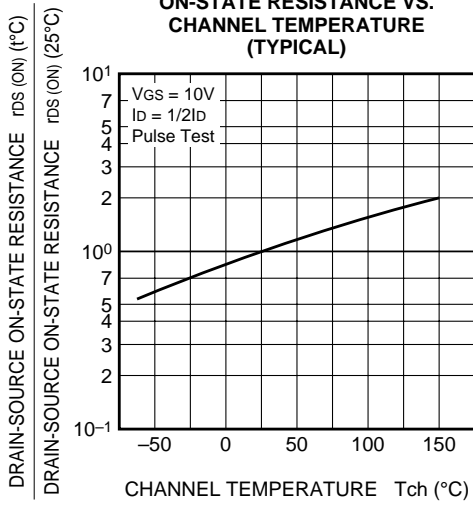
**GATE-SOURCE VOLTAGE VS. GATE CHARGE (TYPICAL)**



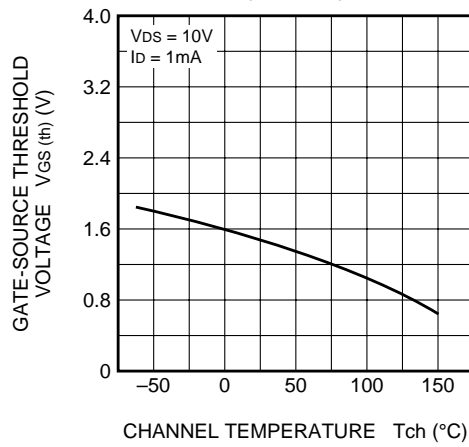
**SOURCE-DRAIN DIODE FORWARD CHARACTERISTICS (TYPICAL)**



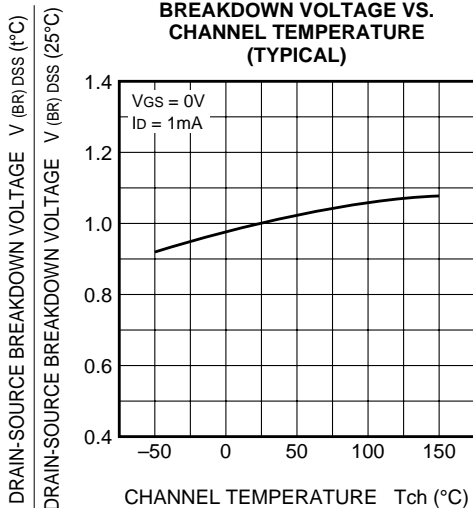
**ON-STATE RESISTANCE VS. CHANNEL TEMPERATURE (TYPICAL)**



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



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



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS**

