


# FS50SMJ-3

HIGH-SPEED SWITCHING USE

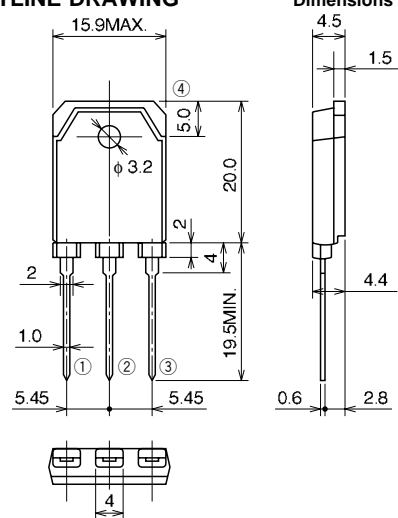
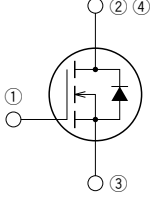
**FS50SMJ-3**



- 4V DRIVE
- $V_{DSS}$  .....150V
- $r_{DS(ON)}$  (MAX) .....30m $\Omega$
- $I_D$  .....50A
- Integrated Fast Recovery Diode (TYP.) .....125ns

**OUTLINE DRAWING**

Dimensions in mm

① GATE  
② DRAIN  
③ SOURCE  
④ DRAIN

**TO-3P**

## APPLICATION

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

## MAXIMUM RATINGS (Tc = 25°C)

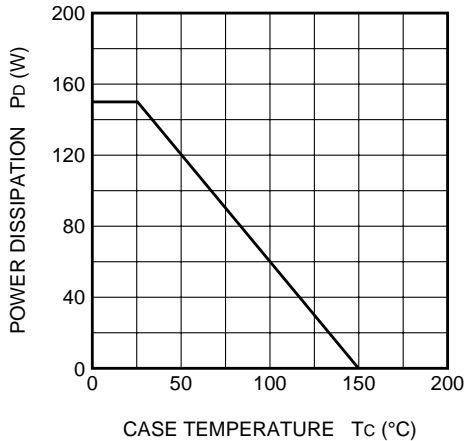
Symbol	Parameter	Conditions	Ratings	Unit
$V_{DSS}$	Drain-source voltage	$V_{GS} = 0V$	150	V
$V_{GSS}$	Gate-source voltage	$V_{DS} = 0V$	$\pm 20$	V
$I_D$	Drain current		50	A
$I_{DM}$	Drain current (Pulsed)		200	A
$I_{DA}$	Avalanche drain current (Pulsed)	$L = 100\mu H$	50	A
$I_S$	Source current		50	A
$I_{SM}$	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

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

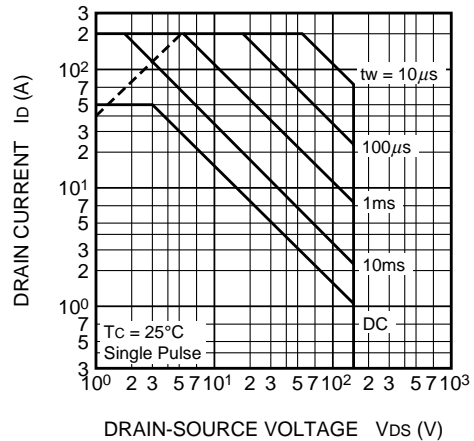
Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
V (BR) DSS	Drain-source breakdown voltage	I <sub>D</sub> = 1mA, V <sub>GS</sub> = 0V	150	—	—	V
I <sub>GSS</sub>	Gate-source leakage current	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	—	—	±0.1	μA
I <sub>DSS</sub>	Drain-source leakage current	V <sub>DS</sub> = 150V, V <sub>GS</sub> = 0V	—	—	0.1	mA
V <sub>GS</sub> (th)	Gate-source threshold voltage	I <sub>D</sub> = 1mA, V <sub>DS</sub> = 10V	1.0	1.5	2.0	V
r <sub>DS</sub> (ON)	Drain-source on-state resistance	I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V	—	23	30	mΩ
r <sub>DS</sub> (ON)	Drain-source on-state resistance	I <sub>D</sub> = 25A, V <sub>GS</sub> = 4V	—	24	32	mΩ
V <sub>DS</sub> (ON)	Drain-source on-state voltage	I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V	—	0.58	0.75	V
y <sub>fs</sub>	Forward transfer admittance	I <sub>D</sub> = 25A, V <sub>DS</sub> = 10V	—	62	—	S
C <sub>iss</sub>	Input capacitance	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz	—	8200	—	pF
C <sub>oss</sub>	Output capacitance		—	870	—	pF
C <sub>rss</sub>	Reverse transfer capacitance		—	440	—	pF
t <sub>d</sub> (on)	Turn-on delay time	V <sub>DD</sub> = 80V, I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = R <sub>GS</sub> = 50Ω	—	54	—	ns
t <sub>r</sub>	Rise time		—	110	—	ns
t <sub>d</sub> (off)	Turn-off delay time		—	850	—	ns
t <sub>f</sub>	Fall time		—	340	—	ns
V <sub>SD</sub>	Source-drain voltage		I <sub>S</sub> = 25A, V <sub>GS</sub> = 0V	—	1.0	1.5
R <sub>th</sub> (ch-c)	Thermal resistance	Channel to case	—	—	0.83	°C/W
t <sub>rr</sub>	Reverse recovery time	I <sub>S</sub> = 50A, di <sub>s</sub> /dt = -100A/μs	—	125	—	ns

**PERFORMANCE CURVES**

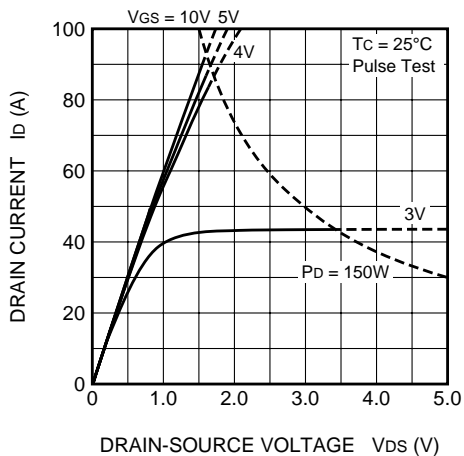
**POWER DISSIPATION DERATING CURVE**



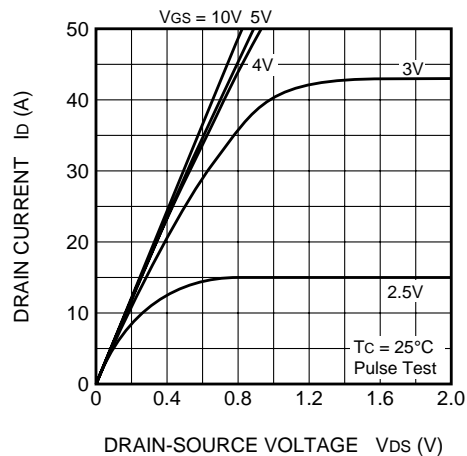
**MAXIMUM SAFE OPERATING AREA**

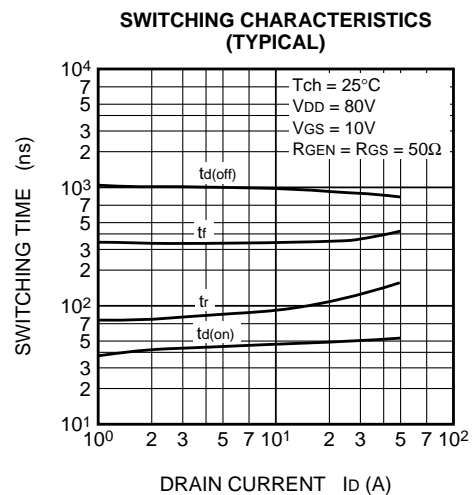
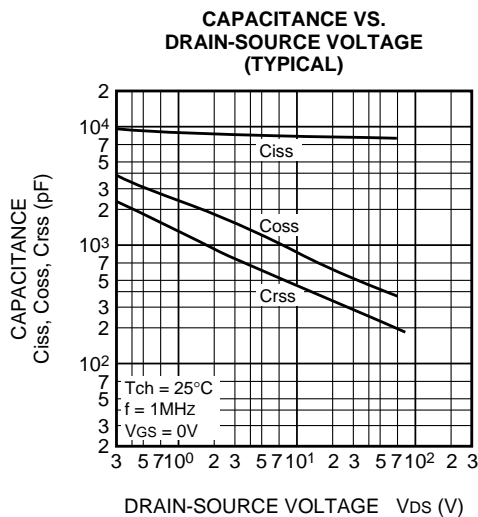
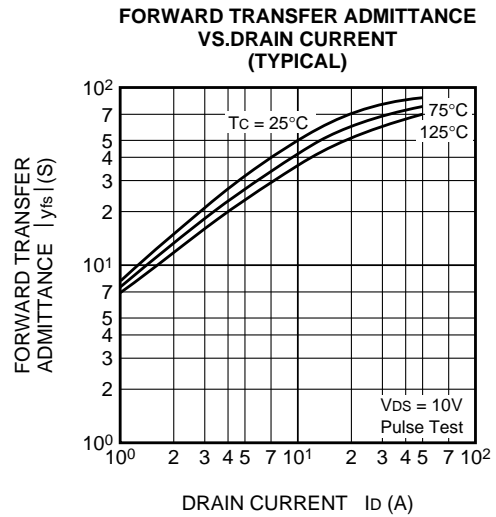
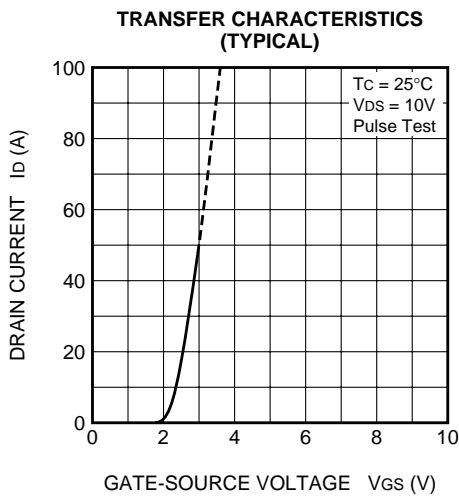
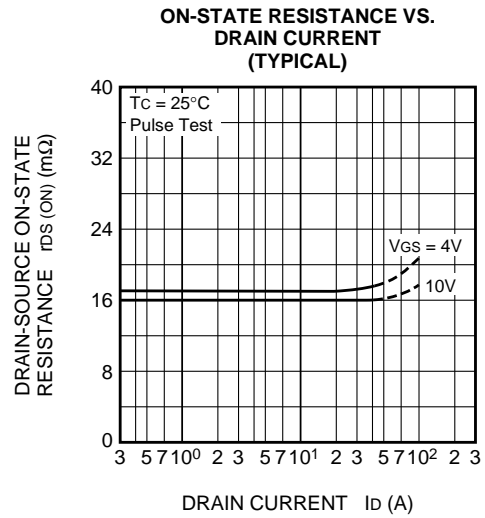
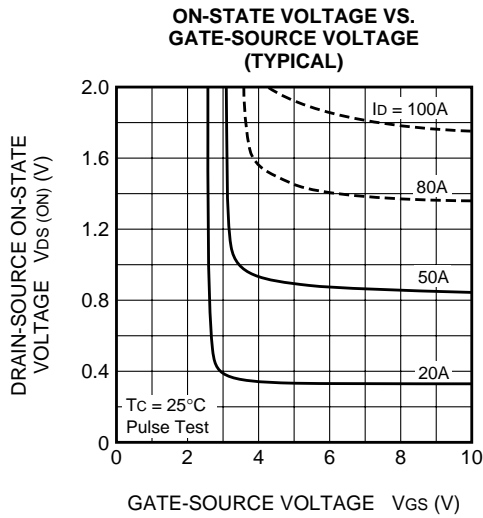


**OUTPUT CHARACTERISTICS (TYPICAL)**

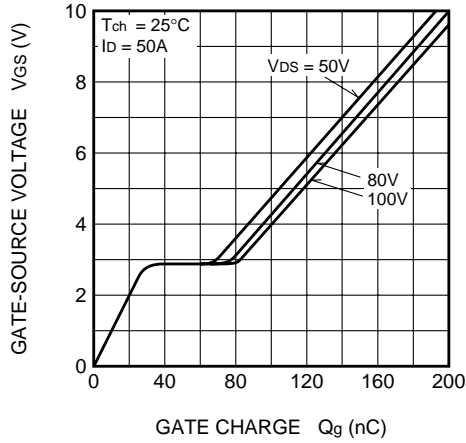


**OUTPUT CHARACTERISTICS (TYPICAL)**

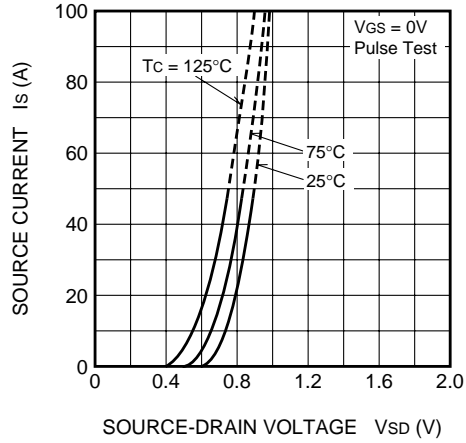




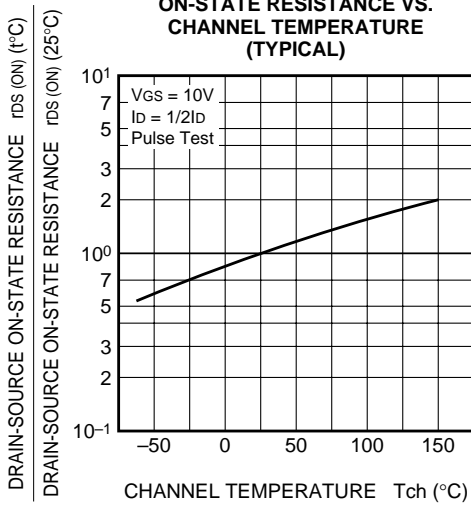
**GATE-SOURCE VOLTAGE VS. GATE CHARGE (TYPICAL)**



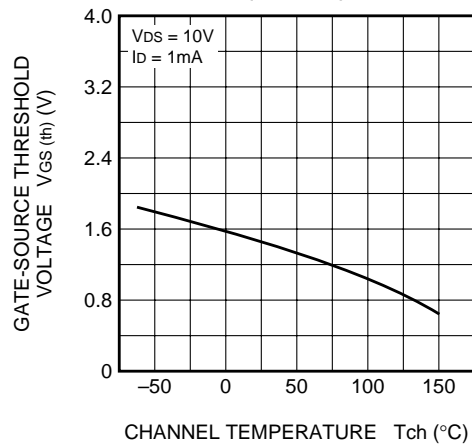
**SOURCE-DRAIN DIODE FORWARD CHARACTERISTICS (TYPICAL)**



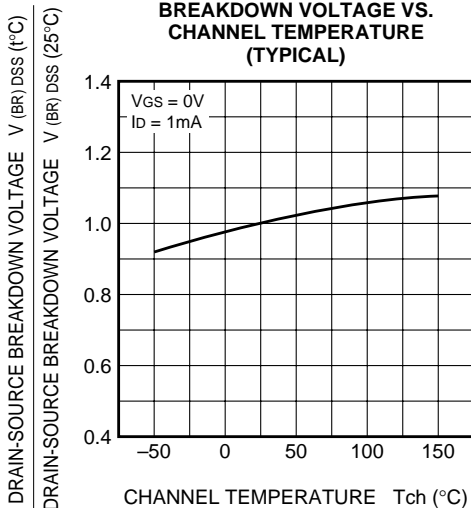
**ON-STATE RESISTANCE VS. CHANNEL TEMPERATURE (TYPICAL)**



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



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



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS**

