

# FS50SM-5A

High-Speed Switching Use  
Nch Power MOS FET

REJ03G0277-0100

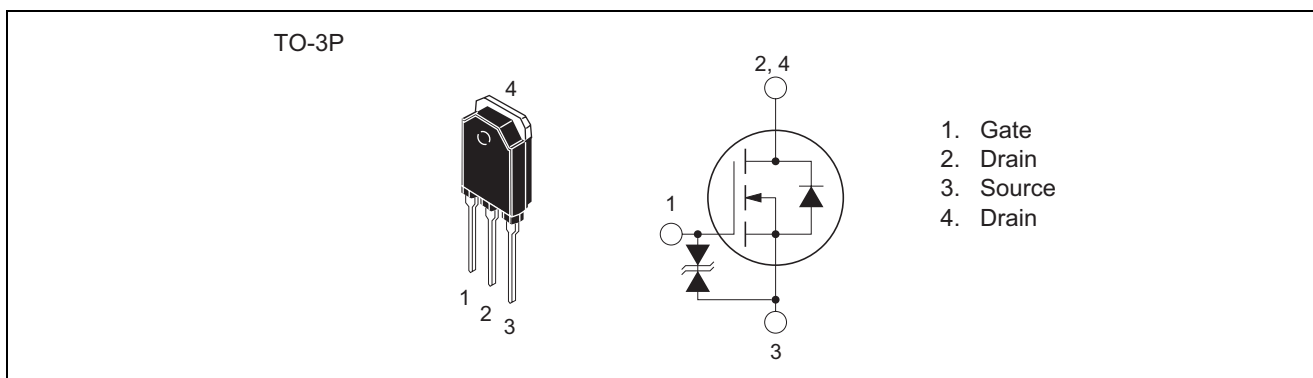
Rev.1.00

Aug.20.2004

## Features

- Drive voltage : 10 V
- $V_{DSS}$  : 250 V
- $r_{DS(ON)(max)}$  : 0.068  $\Omega$
- $I_D$  : 50 A

## Outline



## Applications

Switching mode power supply, plasma display TVs, DC-DC converters, etc.

## Maximum Ratings

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

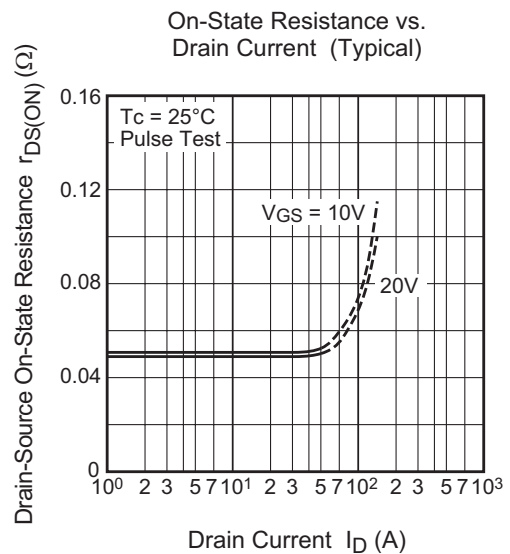
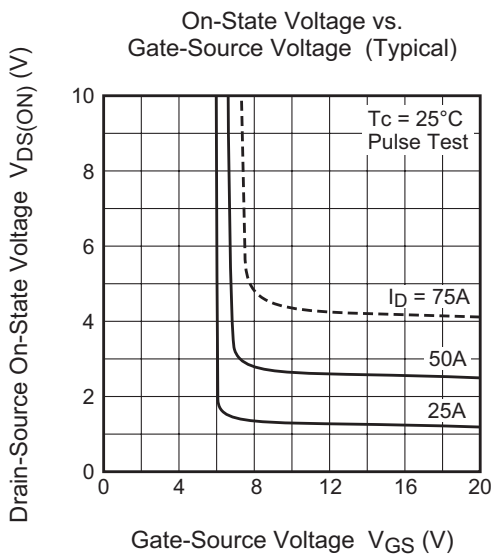
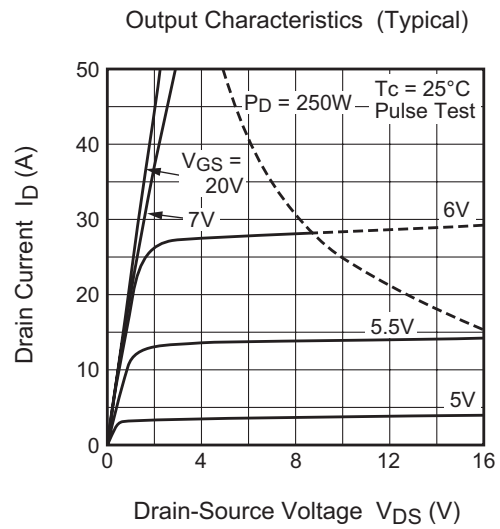
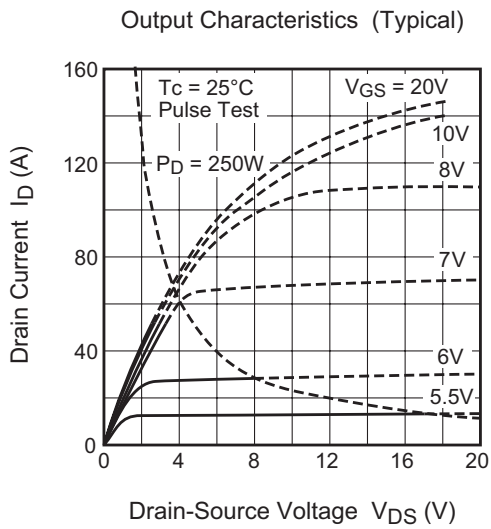
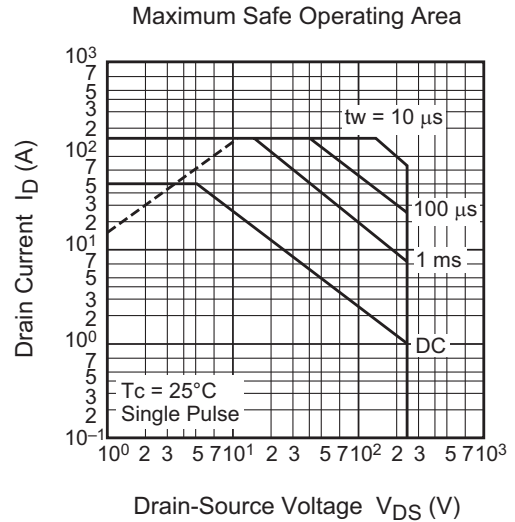
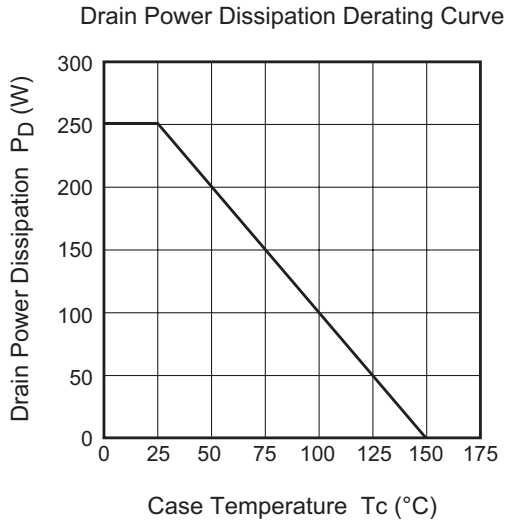
Parameter	Symbol	Ratings	Unit	Conditions
Drain-source voltage	$V_{DSS}$	250	V	$V_{GS} = 0\text{ V}$
Gate-source voltage	$V_{GSS}$	$\pm 30$	V	$V_{DS} = 0\text{ V}$
Drain current	$I_D$	50	A	
Drain current (Pulsed)	$I_{DM}$	150	A	
Maximum power dissipation	$P_D$	250	W	
Channel temperature	$T_{ch}$	- 55 to +150	$^\circ\text{C}$	
Storage temperature	$T_{stg}$	- 55 to +150	$^\circ\text{C}$	
Mass	—	4.8	g	Typical value

## Electrical Characteristics

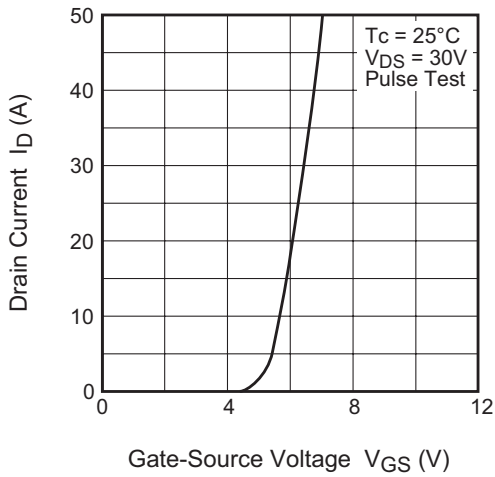
(T<sub>ch</sub> = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Drain-source breakdown voltage	$V_{(BR)DSS}$	250	—	—	V	$I_D = 1 \text{ mA}$ , $V_{GS} = 0 \text{ V}$
Gate-source breakdown voltage	$V_{(BR)GSS}$	$\pm 30$	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$ , $V_{DS} = 0 \text{ V}$
Gate-source leakage current	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 25 \text{ V}$ , $V_{DS} = 0 \text{ V}$
Drain-source leakage current	$I_{DSS}$	—	—	1	mA	$V_{DS} = 250 \text{ V}$ , $V_{GS} = 0 \text{ V}$
Gate-source threshold voltage	$V_{GS(th)}$	3.0	3.5	4.0	V	$I_D = 1 \text{ mA}$ , $V_{DS} = 10 \text{ V}$
Drain-source on-state resistance	$r_{DS(ON)}$	—	0.052	0.068	$\Omega$	$I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$
Drain-source on-state voltage	$V_{DS(ON)}$	—	1.3	1.7	V	$I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$
Forward transfer admittance	$ y_{fs} $	—	35	—	S	$I_D = 25 \text{ A}$ , $V_{DS} = 10 \text{ V}$
Input capacitance	$C_{iss}$	—	3500	—	pF	$V_{DS} = 25 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$
Output capacitance	$C_{oss}$	—	500	—	pF	
Reverse transfer capacitance	$C_{rss}$	—	50	—	pF	
Turn-on delay time	$t_{d(on)}$	—	60	—	ns	$V_{DD} = 150 \text{ V}$ , $I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$ , $R_{GEN} = R_{GS} = 50 \text{ }\Omega$
Rise time	$t_r$	—	110	—	ns	
Turn-off delay time	$t_{d(off)}$	—	270	—	ns	
Fall time	$t_f$	—	90	—	ns	
Source-drain voltage	$V_{SD}$	—	1.5	2.0	V	$I_S = 25 \text{ A}$ , $V_{GS} = 0 \text{ V}$
Thermal resistance	$R_{th(ch-c)}$	—	—	0.50	$^{\circ}\text{C/W}$	Channel to case

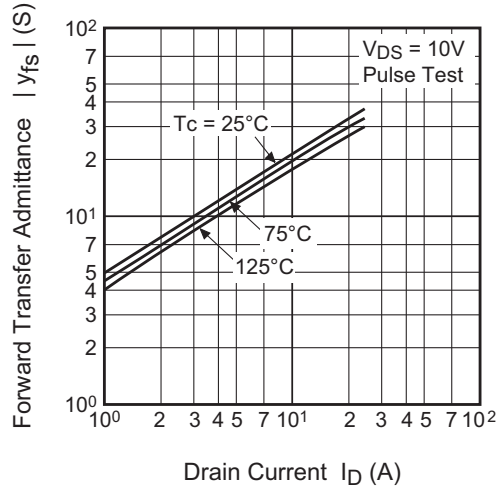
Performance Curves



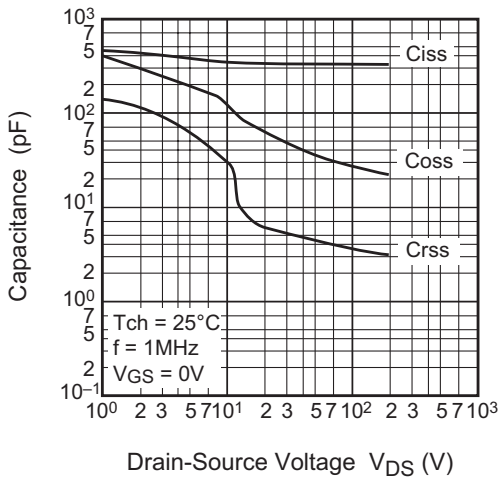
Transfer Characteristics (Typical)



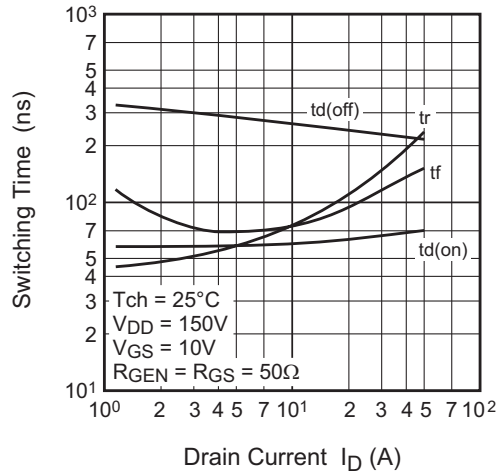
Forward Transfer Admittance vs. Drain Current (Typical)



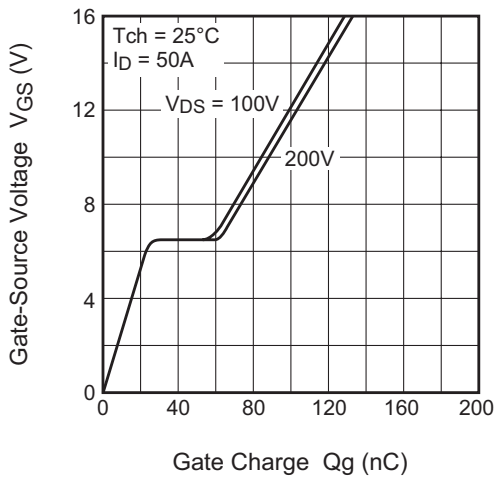
Capacitance vs. Drain-Source Voltage (Typical)



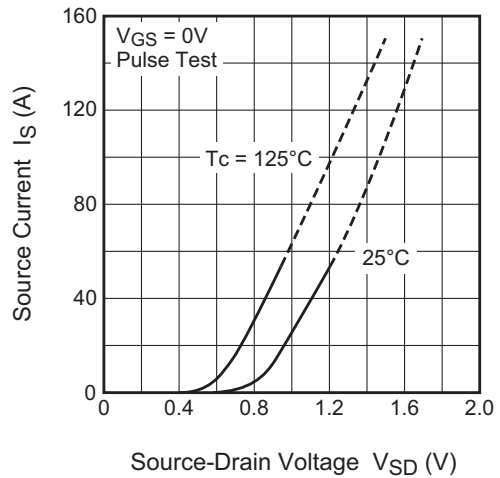
Switching Characteristics (Typical)

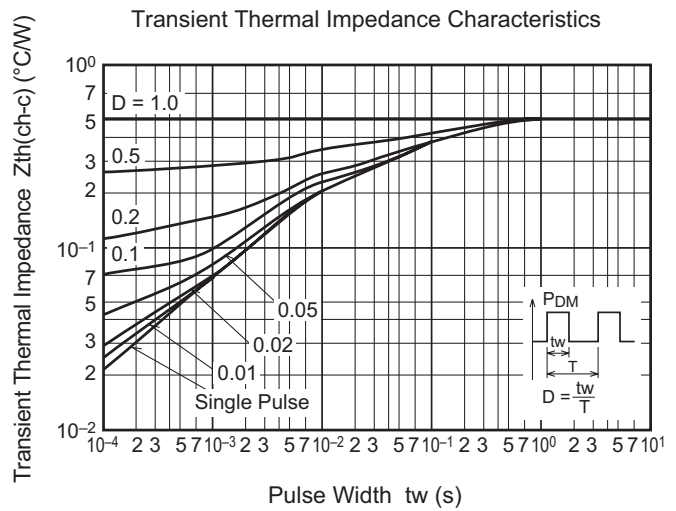
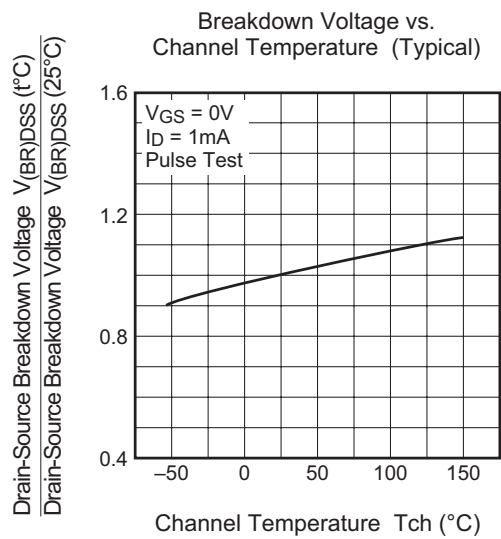
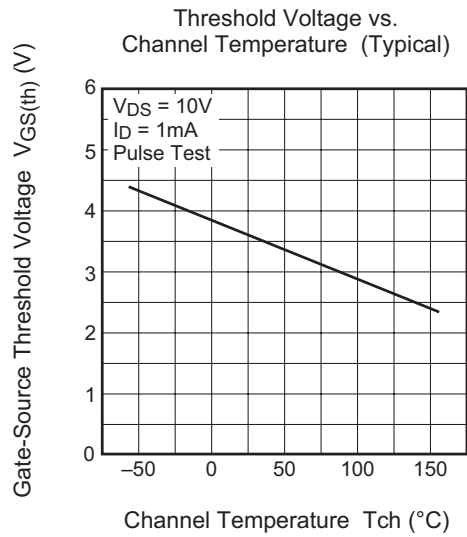
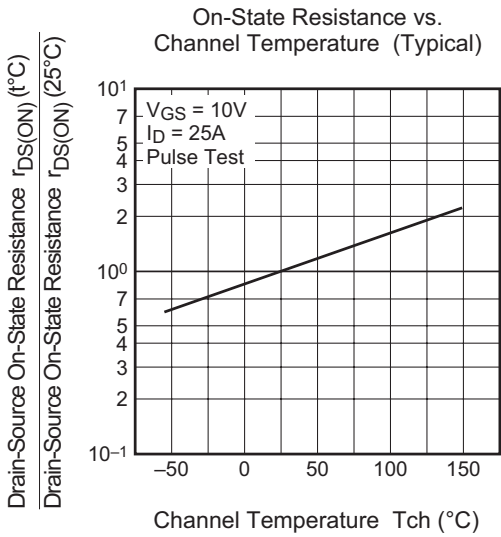


Gate-Source Voltage vs. Gate Charge (Typical)

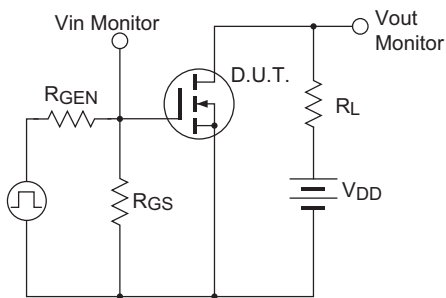


Source-Drain Diode Forward Characteristics (Typical)

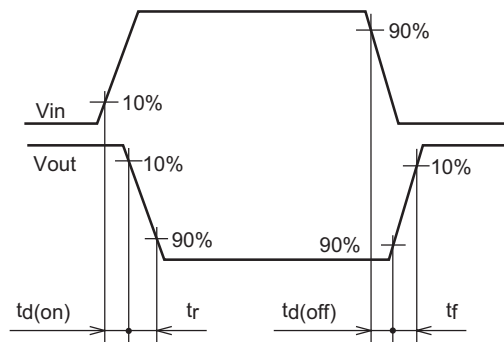




Switching Time Measurement Circuit



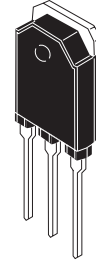
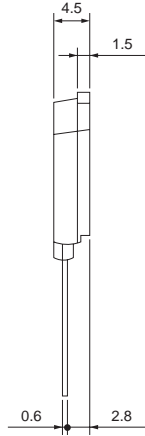
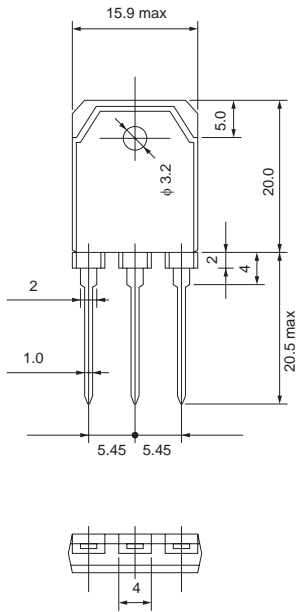
Switching Waveform



## Package Dimensions

### TO-3P

EIAJ Package Code	JEDEC Code	Mass (g) (reference value)	Lead Material
Conforms	—	4.8	Cu alloy



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	—	—	—

Note 1) The dimensional figures indicate representative values unless otherwise the tolerance is specified.

## Order Code

Lead form	Standard packing	Quantity	Standard order code	Standard order code example
Straight type	Static electricity prevention bag	20	Type name	FS50SM-5A
Lead form	Plastic Magazine (Tube)	30	Type name – Lead forming code	FS50SM-5A-A8

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