RENESAS

FS50SM-5A

High-Speed Switching Use
Nch Power MOS FET

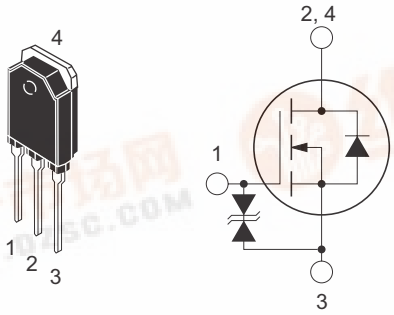
REJ03G0277-0100
Rev.1.00
Aug.20.2004

Features

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

Outline

TO-3P



1. Gate
2. Drain
3. Source
4. Drain

Applications

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

Maximum Ratings

(Tc = 25°C)

Parameter	Symbol	Ratings	Unit	Conditions
Drain-source voltage	V_{DSS}	250	V	V_{GS} = 0 V
Gate-source voltage	V_{GSS}	±30	V	V_{DS} = 0 V
Drain current	I_D	50	A	
Drain current (Pulsed)	I_{DM}	150	A	
Maximum power dissipation	P_D	250	W	
Channel temperature	Tch	– 55 to +150	°C	
Storage temperature	Tstg	– 55 to +150	°C	
Mass	—	4.8	g	Typical value

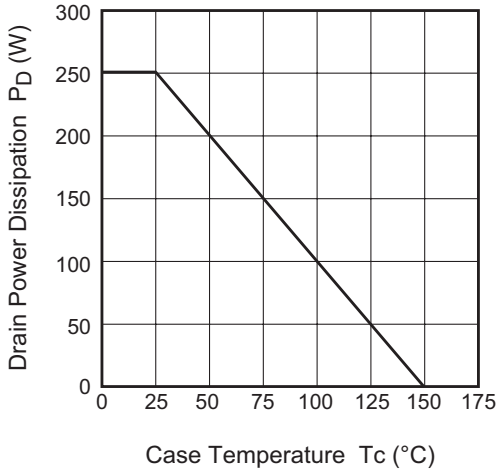
Electrical Characteristics

(Tch = 25°C)

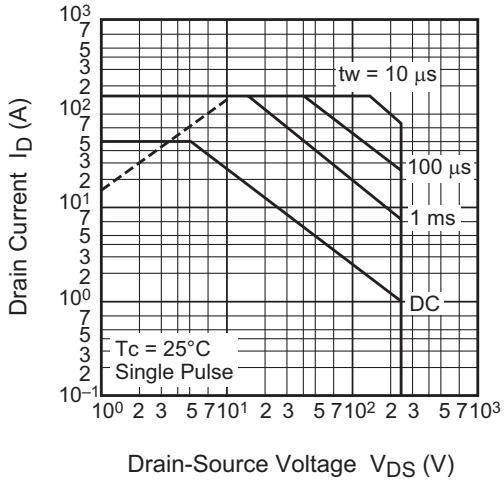
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Drain-source breakdown voltage	$V_{(BR)DSS}$	250	—	—	V	I_D = 1 mA, V_{GS} = 0 V
Gate-source breakdown voltage	$V_{(BR)GSS}$	±30	—	—	V	I_G = ±100 µA, V_{DS} = 0 V
Gate-source leakage current	I_{GSS}	—	—	±10	µA	V_{GS} = ±25 V, V_{DS} = 0 V
Drain-source leakage current	I_{DSS}	—	—	1	mA	V_{DS} = 250 V, V_{GS} = 0 V
Gate-source threshold voltage	$V_{GS(th)}$	3.0	3.5	4.0	V	I_D = 1 mA, V_{DS} = 10 V
Drain-source on-state resistance	$r_{DS(ON)}$	—	0.052	0.068	Ω	I_D = 25 A, V_{GS} = 10 V
Drain-source on-state voltage	$V_{DS(ON)}$	—	1.3	1.7	V	I_D = 25 A, V_{GS} = 10 V
Forward transfer admittance	$\lvert y_{fs} \rvert$	—	35	—	S	I_D = 25 A, V_{DS} = 10 V
Input capacitance	Ciss	—	3500	—	pF	V_{DS} = 25 V, V_{GS} = 0 V, f = 1MHz
Output capacitance	Coss	—	500	—	pF	
Reverse transfer capacitance	Crss	—	50	—	pF	
Turn-on delay time	$t_{d(on)}$	—	60	—	ns	V_{DD} = 150 V, I_D = 25 A, V_{GS} = 10 V, R_{GEN} = R_{GS} = 50 Ω
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 A, V_{GS} = 0 V
Thermal resistance	Rth(ch-c)	—	—	0.50	°C/W	Channel to case

Performance Curves

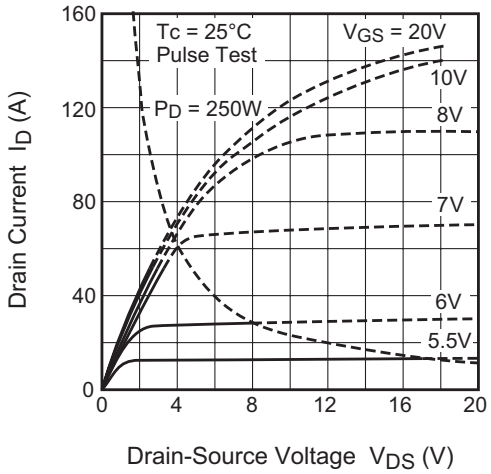
Drain Power Dissipation Derating Curve



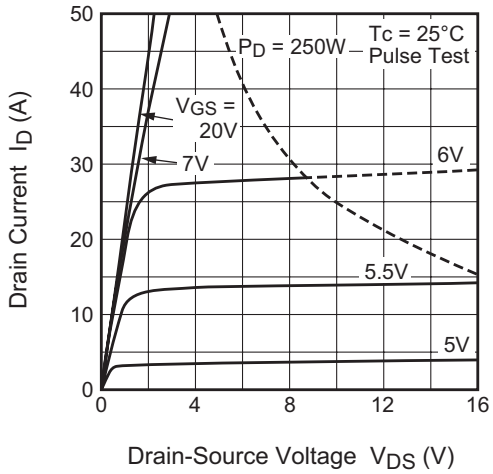
Maximum Safe Operating Area



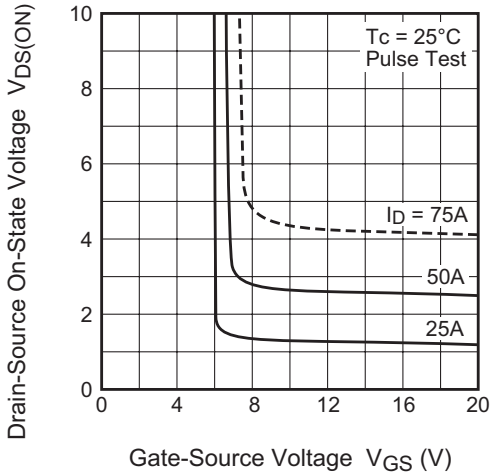
Output Characteristics (Typical)



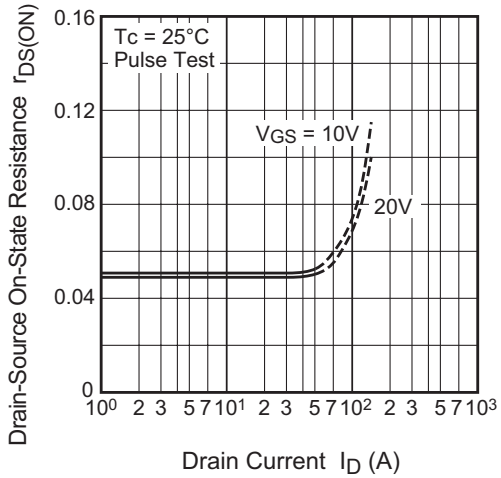
Output Characteristics (Typical)



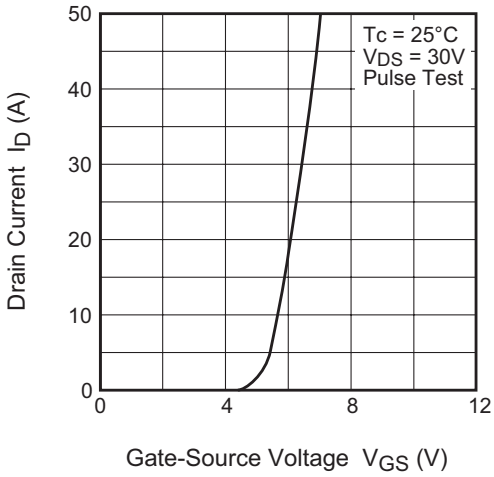
On-State Voltage vs. Gate-Source Voltage (Typical)



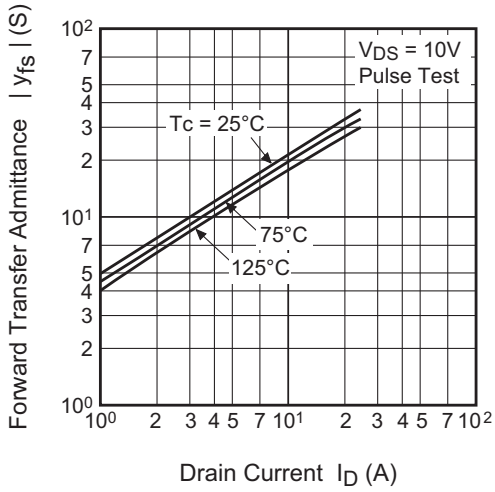
On-State Resistance vs. Drain Current (Typical)



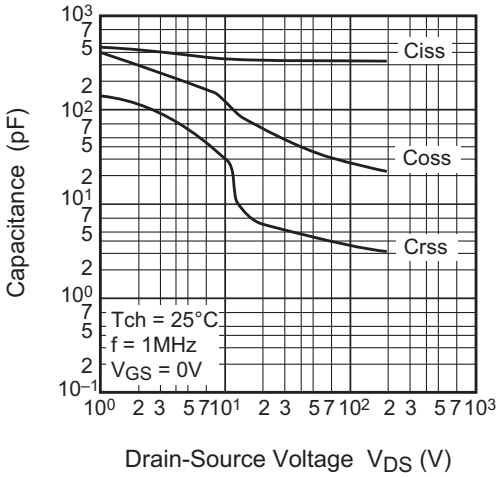
Transfer Characteristics (Typical)



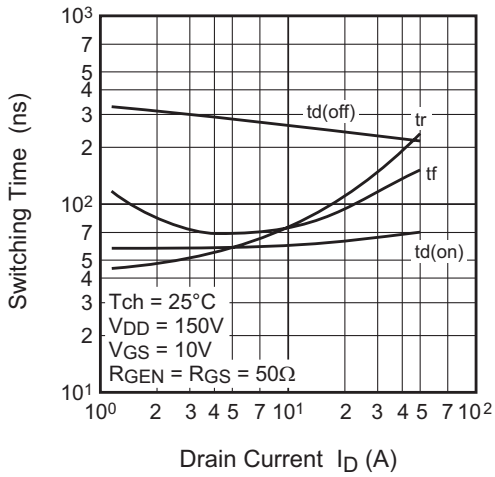
Forward Transfer Admittance vs. Drain Current (Typical)



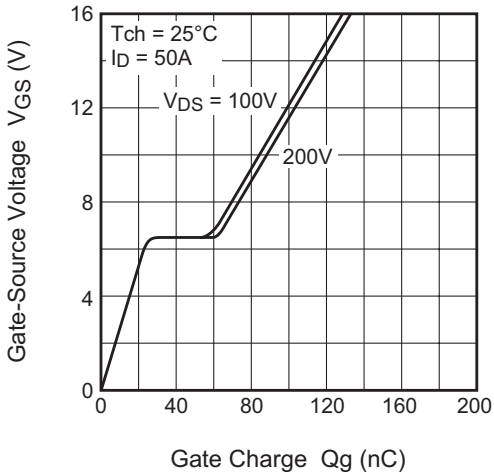
Capacitance vs. Drain-Source Voltage (Typical)



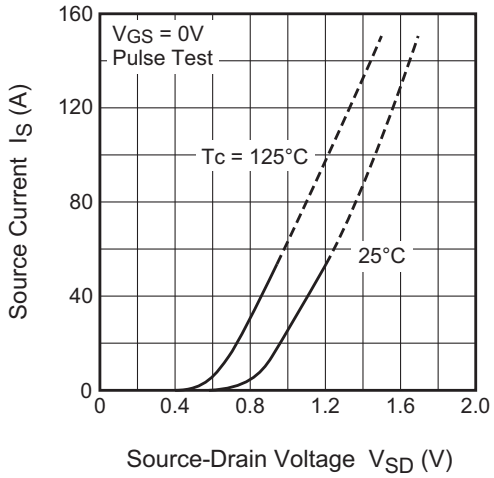
Switching Characteristics (Typical)



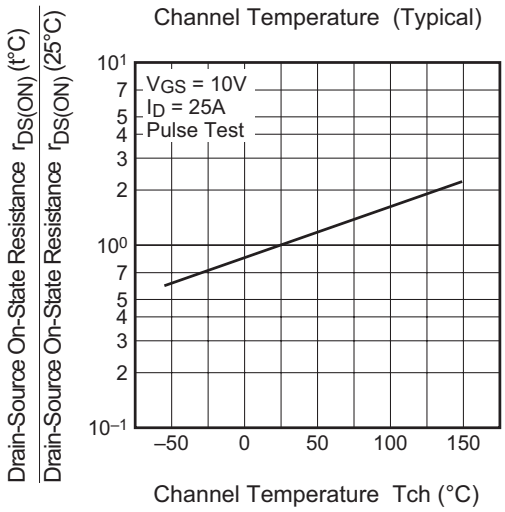
Gate-Source Voltage vs. Gate Charge (Typical)



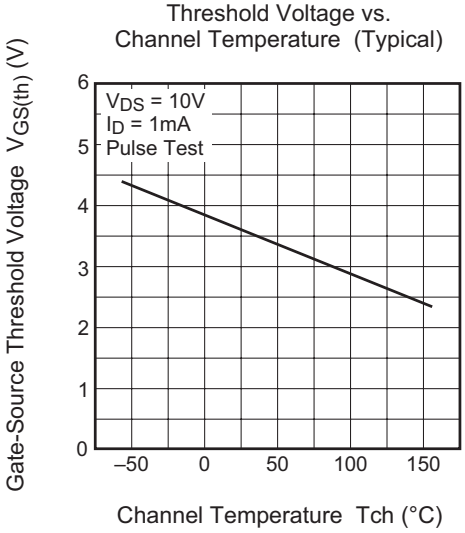
Source-Drain Diode Forward Characteristics (Typical)



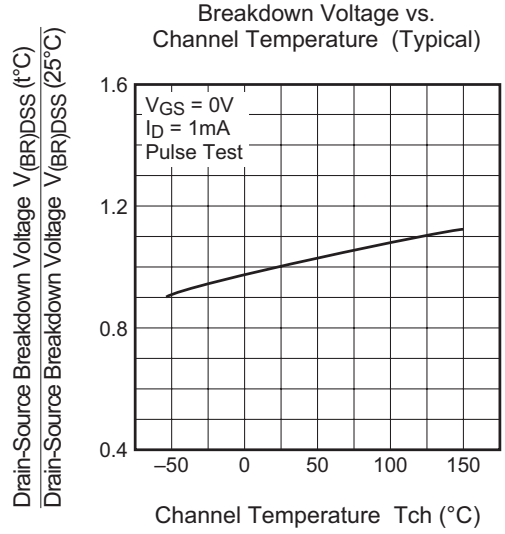
On-State Resistance vs.
Channel Temperature (Typical)



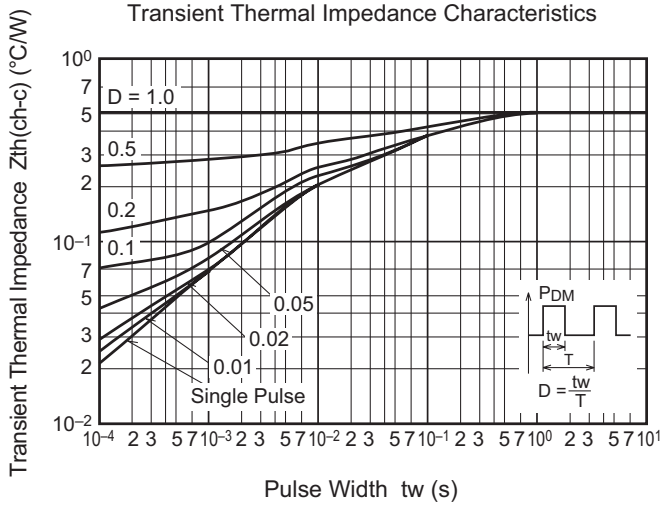
Threshold Voltage vs.
Channel Temperature (Typical)



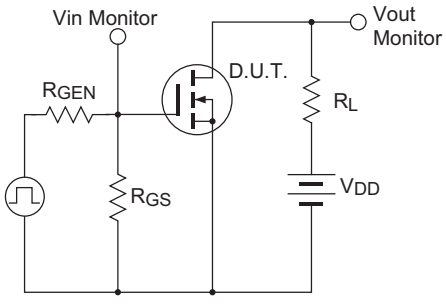
Breakdown Voltage vs.
Channel Temperature (Typical)



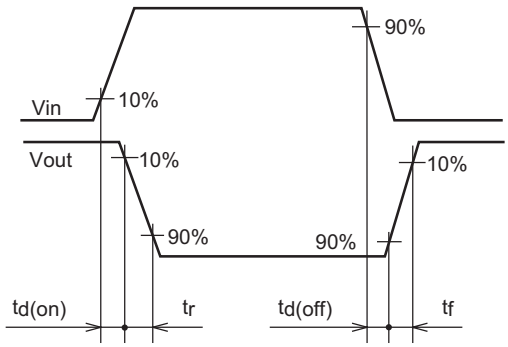
Transient Thermal Impedance Characteristics



Switching Time Measurement Circuit



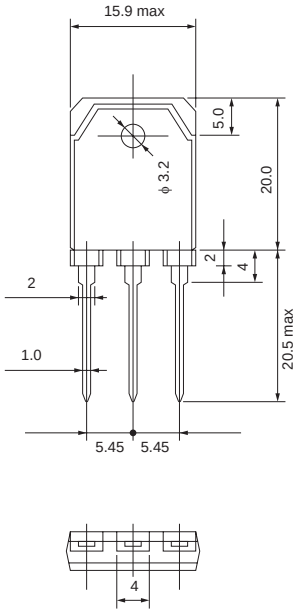
Switching Waveform

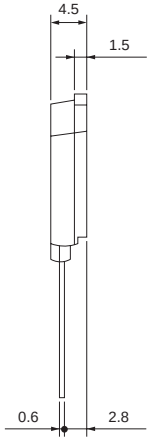


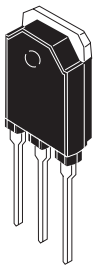
Package Dimensions

TO-3P

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







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

Symbol	Dimension in Millimeters		
	Min	Typ	Max
A			
A_1			
A_2			
b			
D			
E			
e			
x			
y			
y_1			
ZD			
ZE			

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.