RENESAS

FS50KMJ-06F

High-Speed Switching Use
Nch Power MOS FET

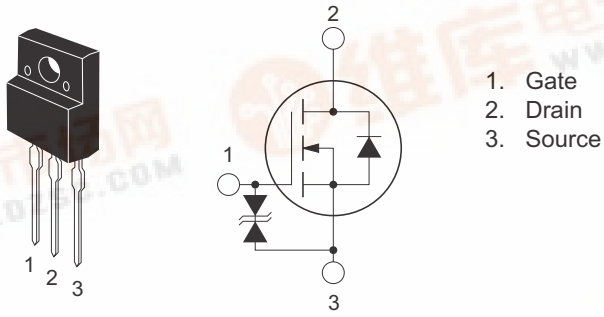
REJ03G0255-0100
Rev.1.00
Aug.20.2004

Features

- Drive voltage : 4 V
- V_{DSS} : 60 V
- $r_{DS(ON)\ (max)}$: 14 mΩ
- I_D : 50 A
- Recovery Time of the Integrated Fast Recovery Diode (TYP.) : 50 ns

Outline

TO-220FN



1. Gate
2. Drain
3. Source

Applications

Motor control, lamp control, solenoid control, DC-DC converters, etc.

Maximum Ratings

(Tc = 25°C)

Parameter	Symbol	Ratings	Unit	Conditions
Drain-source voltage	V_{DSS}	60	V	V_{GS} = 0 V
Gate-source voltage	V_{GSS}	±20	V	V_{DS} = 0 V
Drain current	I_D	50	A	
Drain current (Pulsed)	I_{DM}	200	A	
Avalanche current (Pulsed)	I_{DA}	50	A	L = 10 µH
Source current	I_S	50	A	
Source current (Pulsed)	I_{SM}	200	A	
Maximum power dissipation	P_D	25	W	
Channel temperature	Tch	– 55 to +150	°C	
Storage temperature	Tstg	– 55 to +150	°C	
Isolation voltage	Viso	2000	V	AC 1 minute, Terminal to case
Mass	—	2.0	g	Typical value

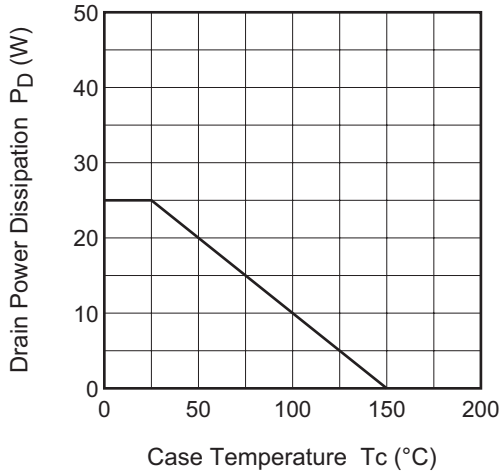
Electrical Characteristics

(Tch = 25°C)

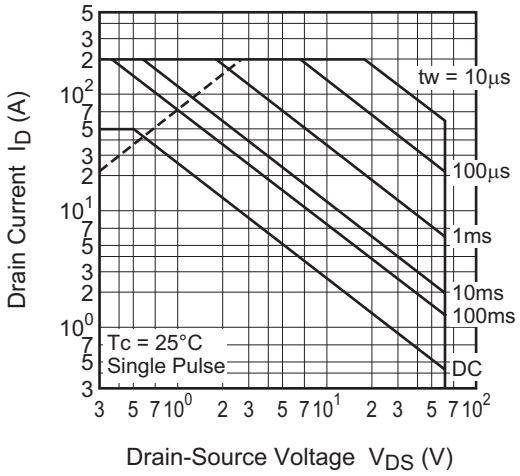
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Drain-source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	I_D = 1 mA, V_{GS} = 0 V
Gate-source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100 µA, V_{DS} = 0 V
Drain-source leakage current	I_{DSS}	—	—	100	µA	V_{DS} = 60 V, V_{GS} = 0 V
Gate-source leakage current	I_{GSS}	—	—	±10	µA	V_{GS} = ±20 V, V_{DS} = 0 V
Gate-source threshold voltage	$V_{GS(th)}$	1.0	1.5	2.0	V	I_D = 1 mA, V_{DS} = 10 V
Drain-source on-state resistance	$r_{DS(ON)}$	—	12	14	mΩ	I_D = 25 A, V_{GS} = 10 V
Drain-source on-state resistance	$r_{DS(ON)}$	—	14	18	mΩ	I_D = 25 A, V_{GS} = 4 V
Drain-source on-state voltage	$V_{DS(ON)}$	—	0.30	0.35	V	I_D = 25 A, V_{GS} = 10 V
Forward transfer admittance	$\lvert y_{fs} \rvert$	—	60	—	S	I_D = 25 A, V_{DS} = 10 V
Input capacitance	Ciss	—	3850	—	pF	V_{DS} = 10 V, V_{GS} = 0 V, f = 1MHz
Output capacitance	Coss	—	580	—	pF	
Reverse transfer capacitance	Crss	—	320	—	pF	
Turn-on delay time	$t_{d(on)}$	—	19	—	ns	V_{DD} = 30 V, I_D = 25 A, V_{GS} = 10 V, R_{GEN} = R_{GS} = 50 Ω
Rise time	t_r	—	70	—	ns	
Turn-off delay time	$t_{d(off)}$	—	360	—	ns	
Fall time	t_f	—	160	—	ns	
Source-drain voltage	V_{SD}	—	1.0	1.5	V	I_S = 25 A, V_{GS} = 0 V
Thermal resistance	Rth(ch-c)	—	—	5.0	°C/W	Channel to case
Reverse recovery time	t_{rr}	—	50	—	ns	I_S = 50 A, dis/dt = – 100 A/µs

Performance Curves

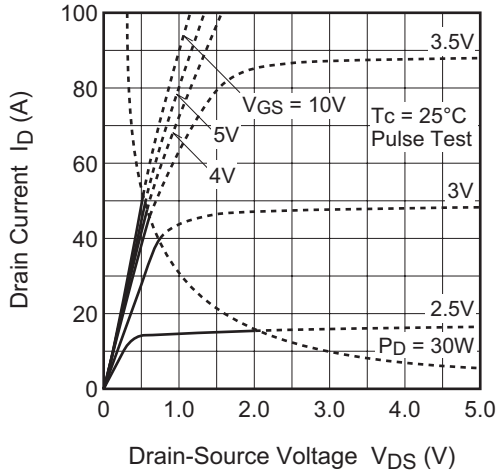
Drain Power Dissipation Derating Curve



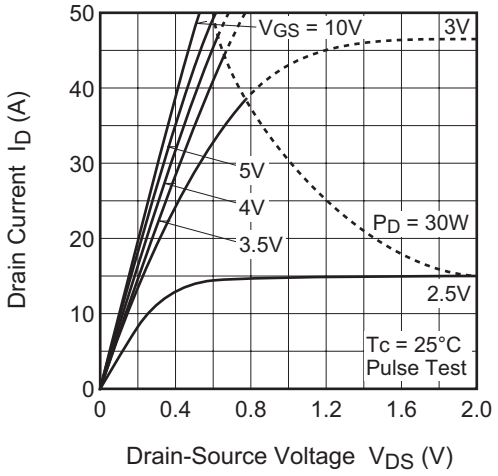
Maximum Safe Operating Area



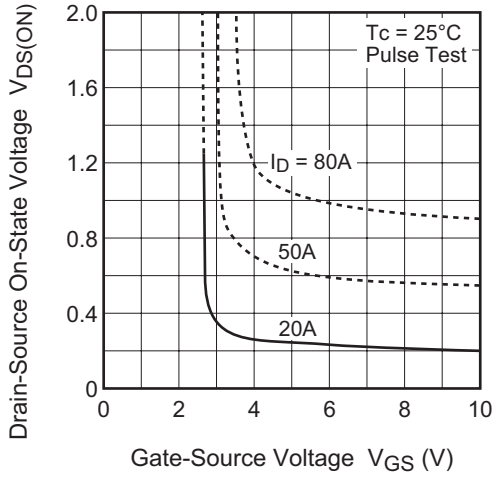
Output Characteristics (Typical)



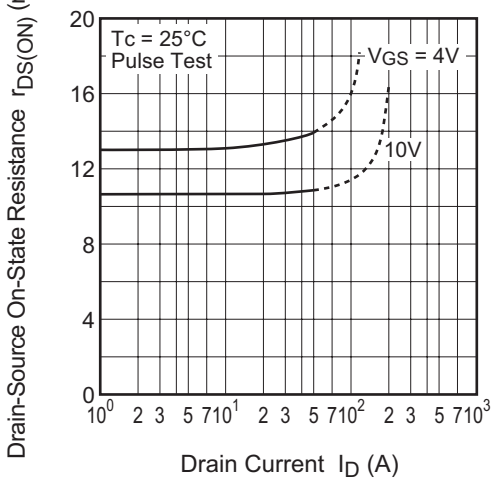
Output Characteristics (Typical)



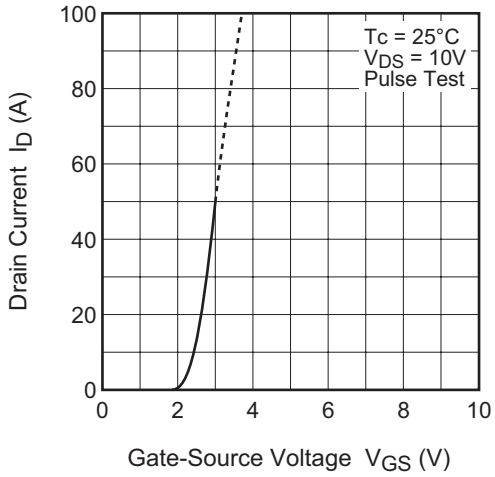
On-State Voltage vs.
Gate-Source Voltage (Typical)



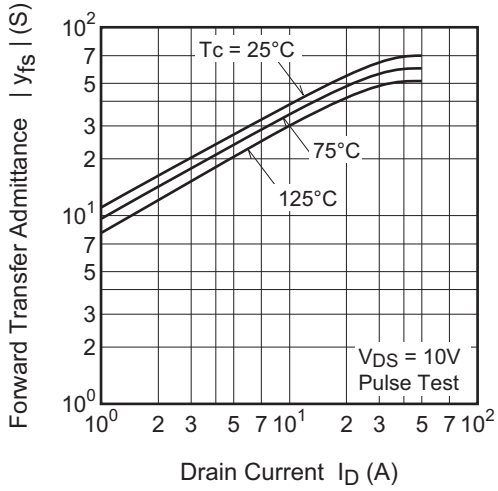
On-State Resistance vs.
Drain Current (Typical)



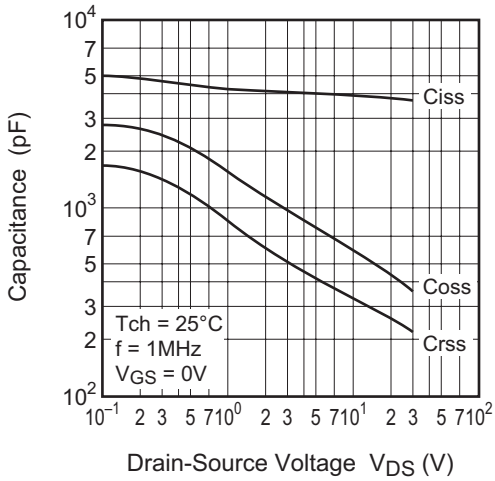
Transfer Characteristics (Typical)



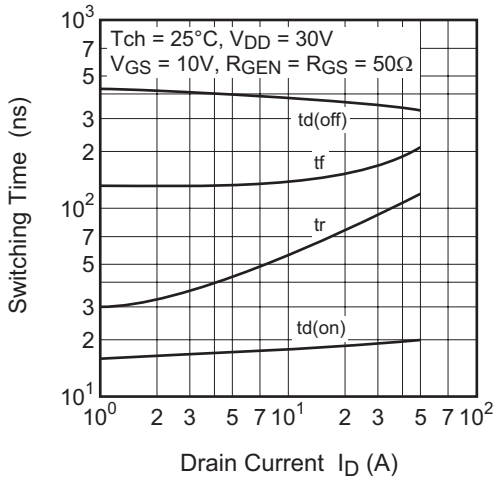
Forward Transfer Admittance vs. Drain Current (Typical)



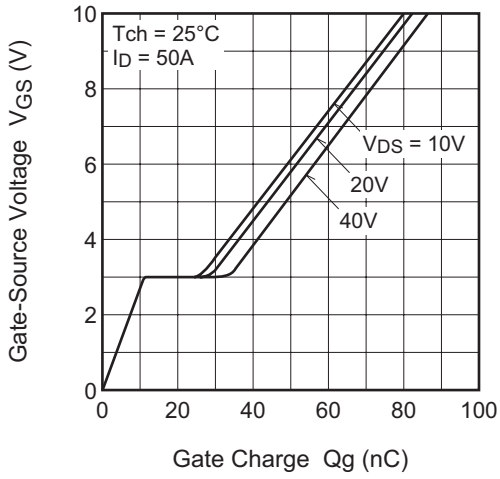
Capacitance vs. Drain-Source Voltage (Typical)



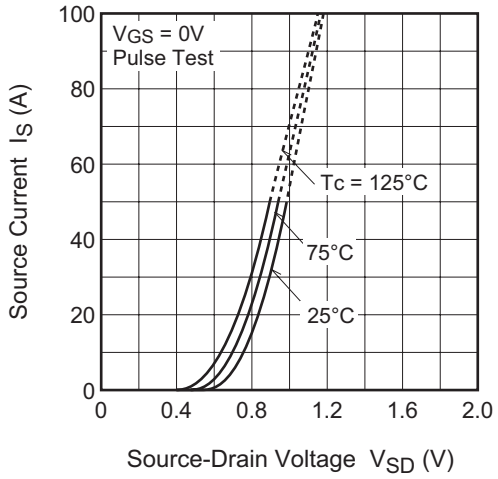
Switching Characteristics (Typical)



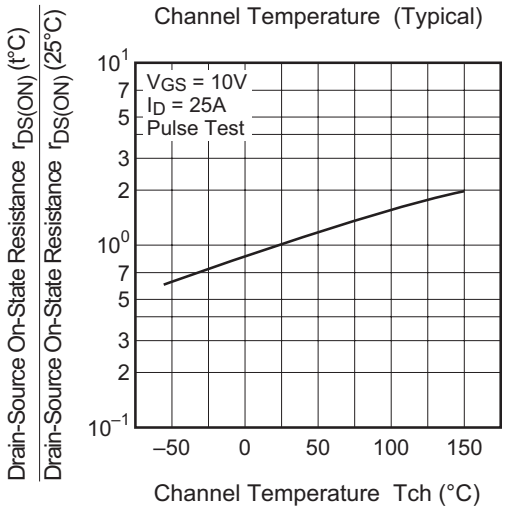
Gate-Source Voltage vs. Gate Charge (Typical)



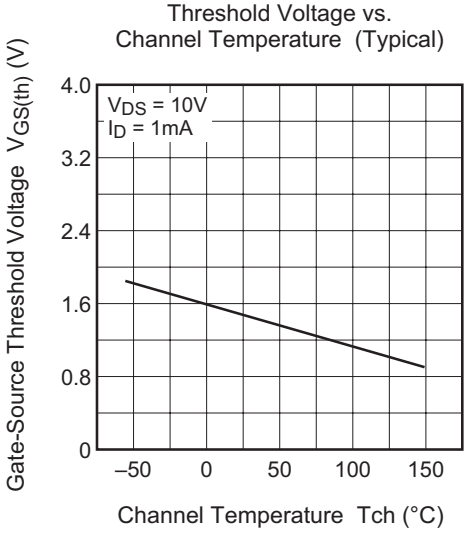
Source-Drain Diode Forward Characteristics (Typical)



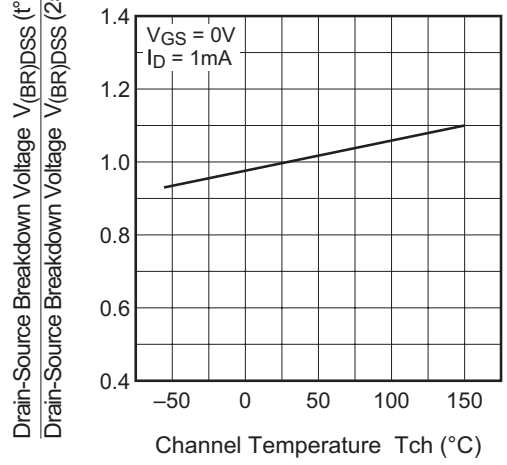
On-State Resistance vs.
Channel Temperature (Typical)



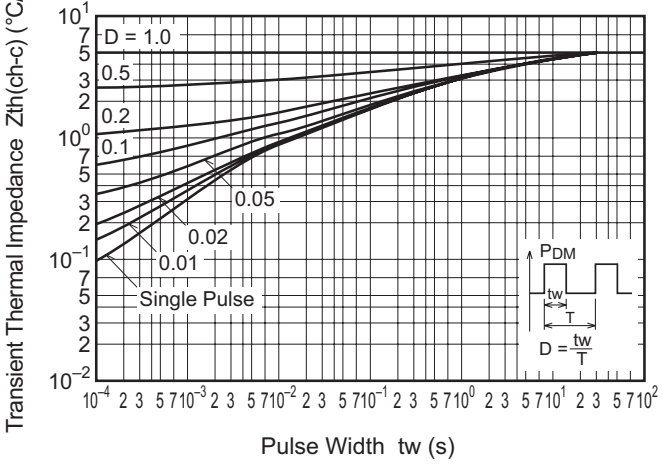
Threshold Voltage vs.
Channel Temperature (Typical)



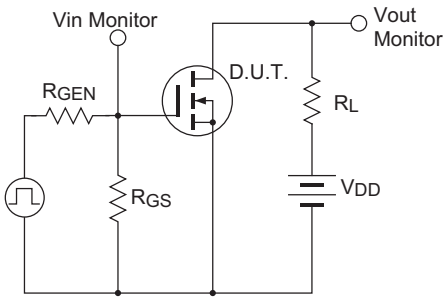
Breakdown Voltage vs.
Channel Temperature (Typical)



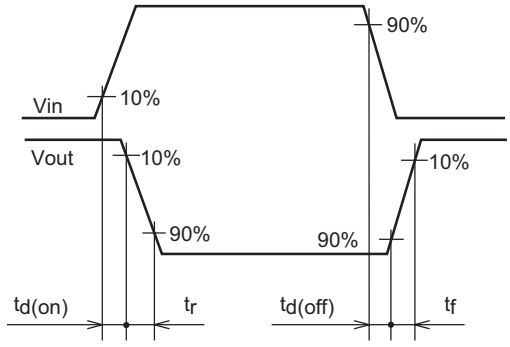
Transient Thermal Impedance Characteristics



Switching Time Measurement Circuit



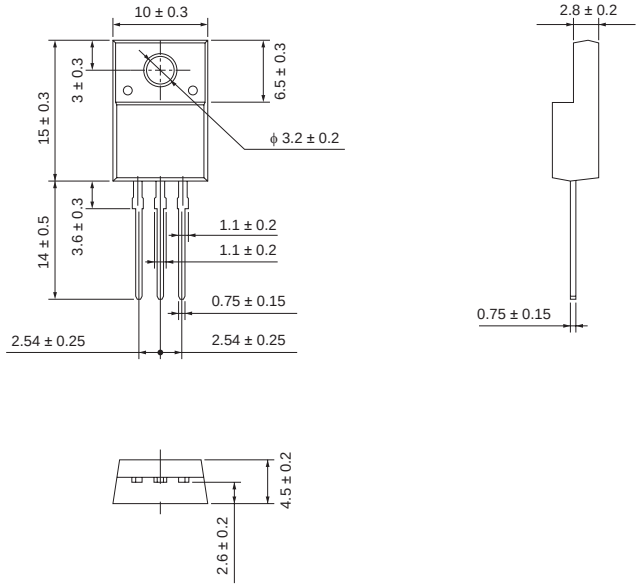
Switching Waveform

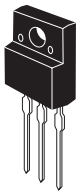


Package Dimensions

TO-220FN

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





Symbol	Dimension in Millimeters		
	Min	Typ	Max
A	———	———	———
A_1	———	———	———
A_2	———	———	———
b	———	———	———
D	———	———	———
E	———	———	———
e	———	———	———
x	———	———	———
y	———	———	———
y_1	———	———	———
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	Plastic Magazine (Tube)	50	Type name	FS50KMJ-06F
Lead form	Plastic Magazine (Tube)	50	Type name – Lead forming code	FS50KMJ-06F-A8

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

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