

FS20KM-5A

High-Speed Switching Use
Nch Power MOS FET

REJ03G0257-0100

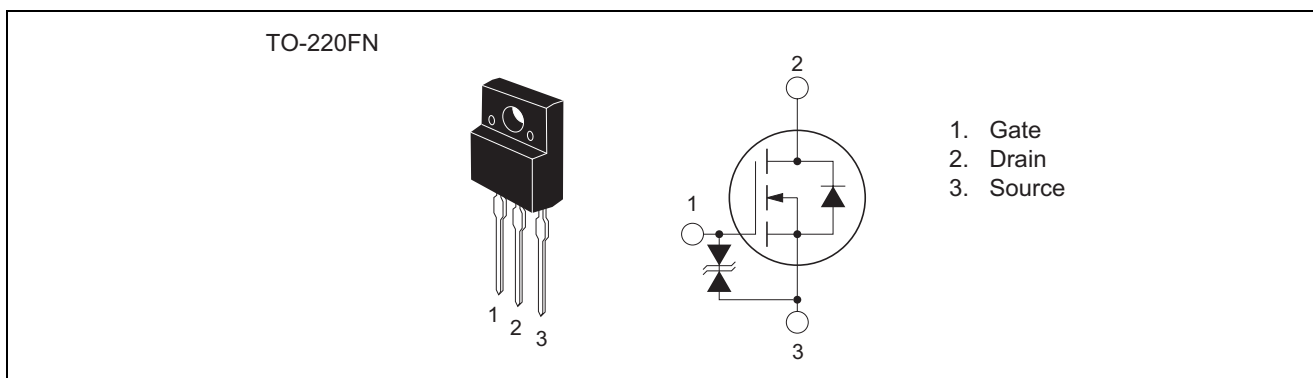
Rev.1.00

Aug.20.2004

Features

- Drive voltage : 10 V
- V_{DSS} : 250 V
- $r_{DS(ON)(max)}$: 0.19 Ω
- I_D : 20 A

Outline



Applications

PDP, lamp ballast, DC-DC converters

Maximum Ratings

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

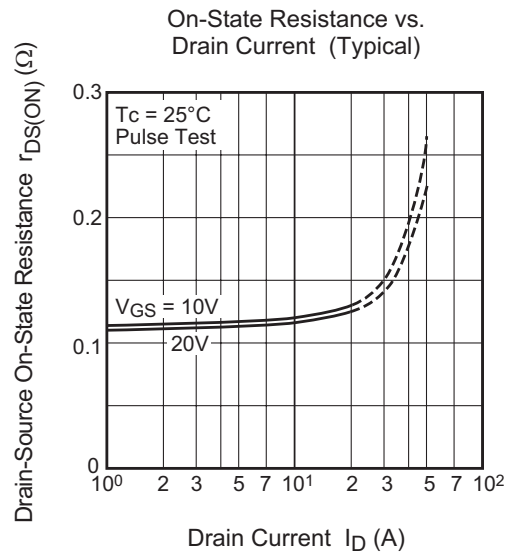
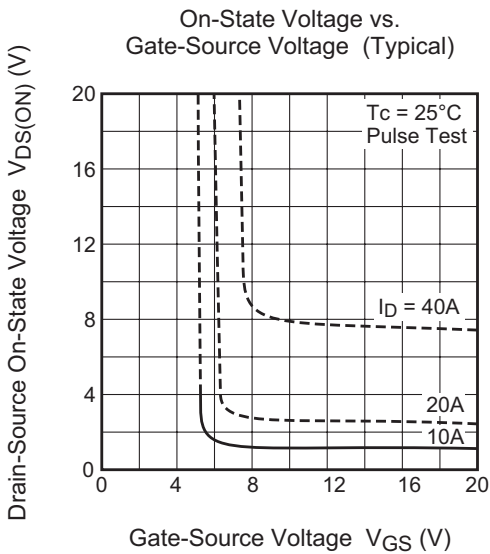
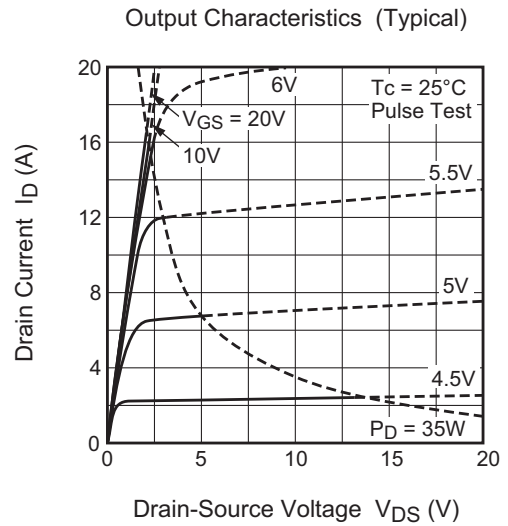
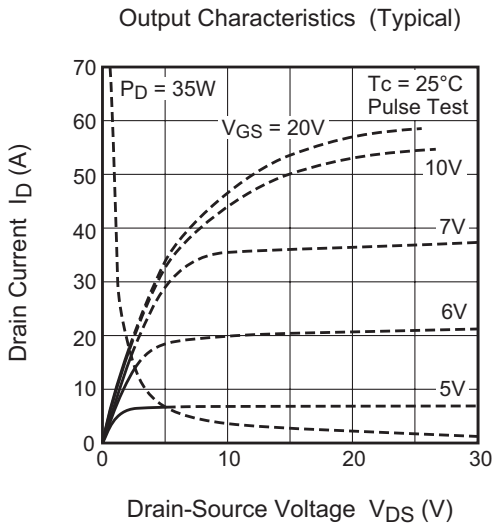
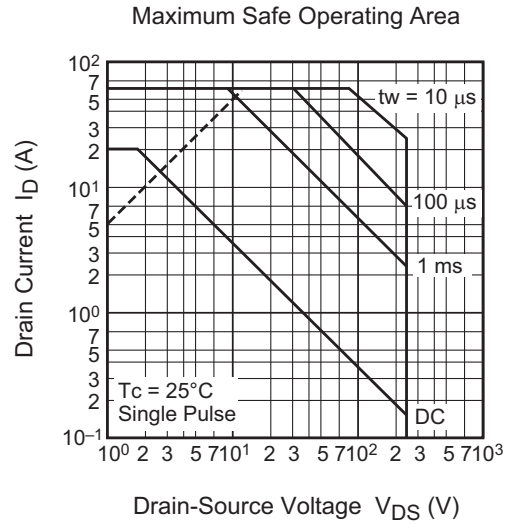
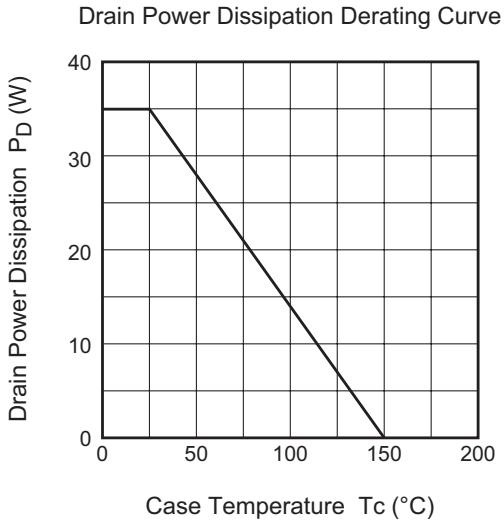
Parameter	Symbol	Ratings	Unit	Conditions
Drain-source voltage	V_{DSS}	250	V	$V_{GS} = 0\text{ V}$
Gate-source voltage	V_{GSS}	± 30	V	$V_{DS} = 0\text{ V}$
Drain current	I_D	20	A	
Drain current (Pulsed)	I_{DM}	60	A	
Avalanche current (Pulsed)	I_{DA}	20	A	$L = 200\ \mu\text{H}$
Maximum power dissipation	P_D	35	W	
Channel temperature	T_{ch}	- 55 to +150	$^\circ\text{C}$	
Storage temperature	T_{stg}	- 55 to +150	$^\circ\text{C}$	
Mass	—	2.0	g	Typical value
Isolation voltage	V_{iso}	2000	Vrms	AC 1 minute, Terminal to case

Electrical Characteristics

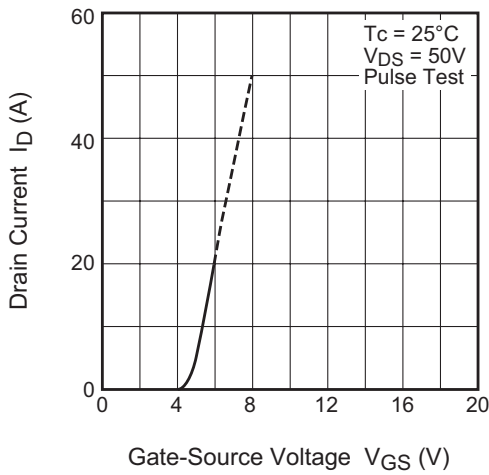
(T_{ch} = 25°C)

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	$V_{(BR)GSS}$	± 30	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$, $V_{DS} = 0 \text{ V}$
Gate-source leakage current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 25 \text{ V}$, $V_{DS} = 0 \text{ V}$
Drain-source leakage current	I_{DSS}	—	—	1	mA	$V_{DS} = 250 \text{ V}$, $V_{GS} = 0 \text{ V}$
Gate-source threshold voltage	$V_{GS(th)}$	2.5	3.0	3.5	V	$I_D = 1 \text{ mA}$, $V_{DS} = 10 \text{ V}$
Drain-source on-state resistance	$r_{DS(ON)}$	—	0.15	0.19	Ω	$I_D = 10 \text{ A}$, $V_{GS} = 10 \text{ V}$
Drain-source on-state voltage	$V_{DS(ON)}$	—	1.5	1.9	V	$I_D = 10 \text{ A}$, $V_{GS} = 10 \text{ V}$
Forward transfer admittance	$ y_{fs} $	8.5	12	—	S	$I_D = 10 \text{ A}$, $V_{DS} = 10 \text{ V}$
Input capacitance	C_{iss}	—	1300	—	pF	$V_{DS} = 25 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$
Output capacitance	C_{oss}	—	200	—	pF	
Reverse transfer capacitance	C_{rss}	—	30	—	pF	
Turn-on delay time	$t_{d(on)}$	—	22	—	ns	$V_{DD} = 150 \text{ V}$, $I_D = 10 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_{GEN} = R_{GS} = 50 \text{ }\Omega$
Rise time	t_r	—	35	—	ns	
Turn-off delay time	$t_{d(off)}$	—	120	—	ns	
Fall time	t_f	—	45	—	ns	
Source-drain voltage	V_{SD}	—	1.5	2.0	V	$I_S = 10 \text{ A}$, $V_{GS} = 0 \text{ V}$
Thermal resistance	$R_{th(ch-c)}$	—	—	3.57	$^{\circ}\text{C/W}$	Channel to case

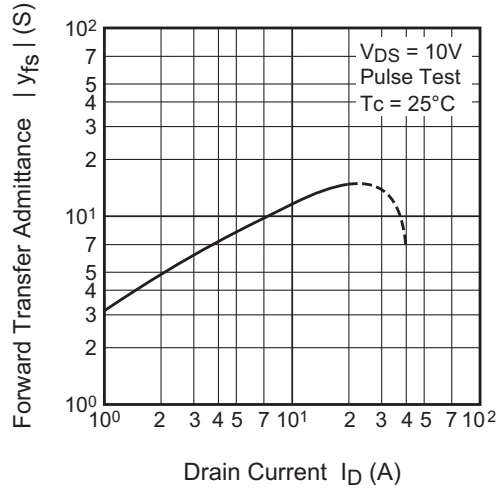
Performance Curves



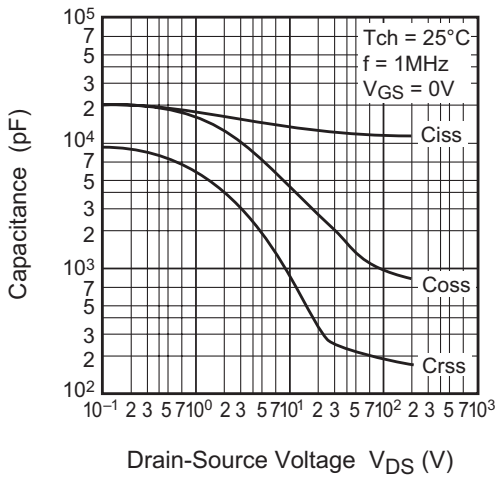
Transfer Characteristics (Typical)



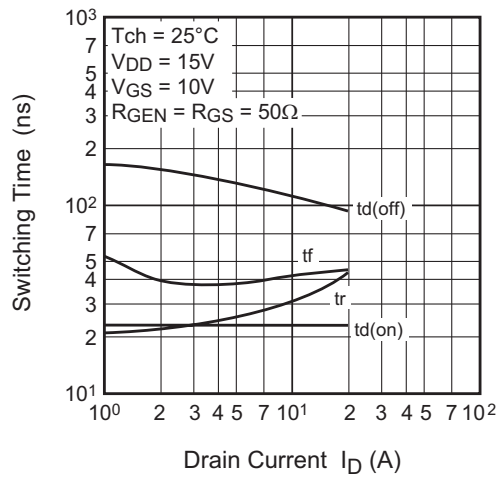
Forward Transfer Admittance vs. Drain Current (Typical)



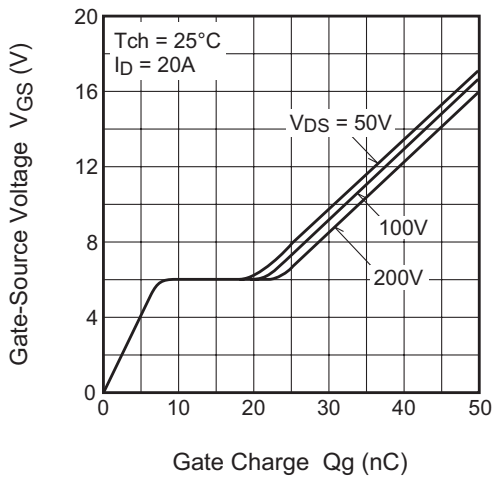
Capacitance vs. Drain-Source Voltage (Typical)



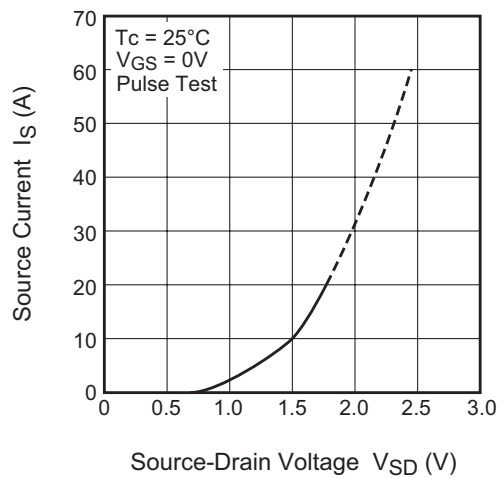
Switching Characteristics (Typical)

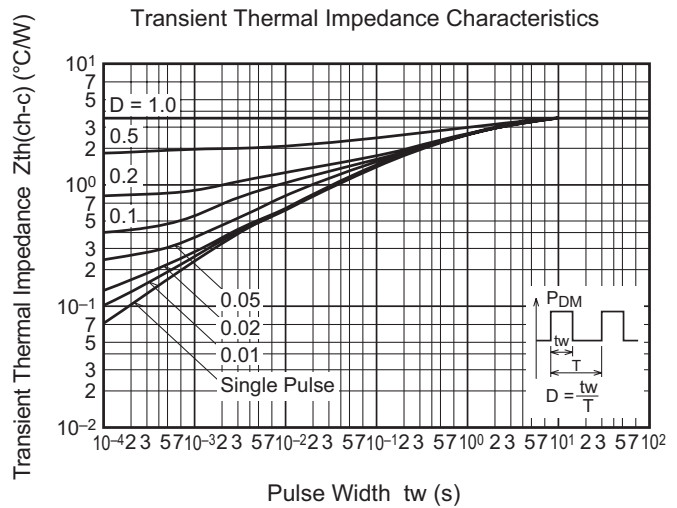
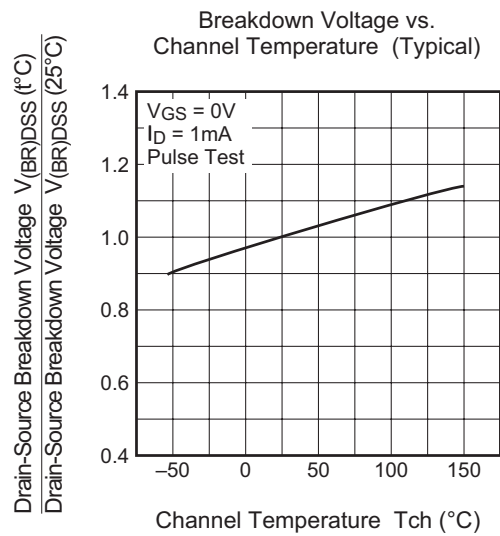
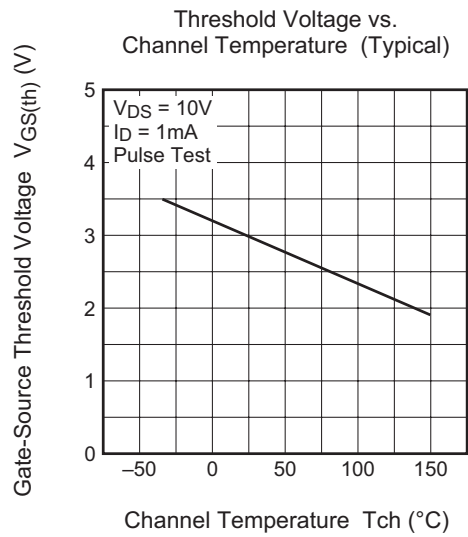
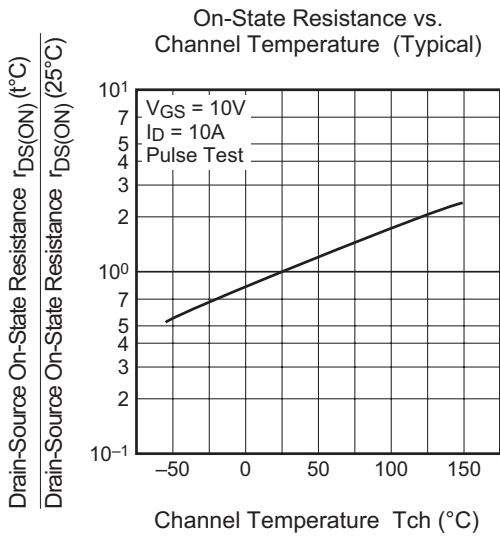


Gate-Source Voltage vs. Gate Charge (Typical)

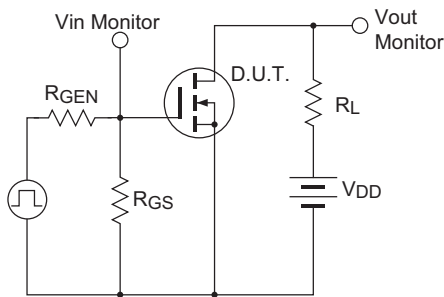


Source-Drain Diode Forward Characteristics (Typical)

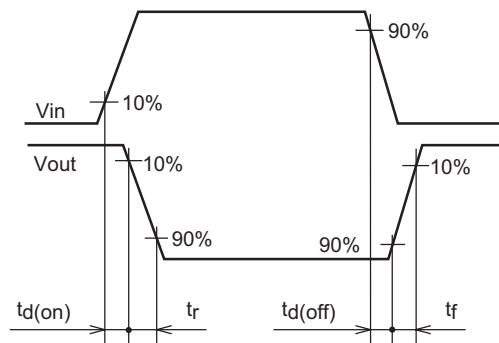




Switching Time Measurement Circuit



Switching Waveform



Package Dimensions

TO-220FN

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

Technical drawings showing dimensions for the TO-220FN package:

- Top view dimensions: 10 ± 0.3 (width), 15 ± 0.3 (height), 3 ± 0.3 (lead spacing), 6.5 ± 0.3 (lead length), φ 3.2 ± 0.2 (lead diameter), 1.1 ± 0.2 (lead thickness), 0.75 ± 0.15 (lead width), 2.54 ± 0.25 (lead pitch).
- Side view dimensions: 2.8 ± 0.2 (height), 0.75 ± 0.15 (lead length).
- Lead view dimensions: 4.5 ± 0.2 (lead length), 2.6 ± 0.2 (lead width).

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	Plastic Magazine (Tube)	50	Type name	FS20KM-5A
Lead form	Plastic Magazine (Tube)	50	Type name – Lead forming code	FS20KM-5A-A8

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

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