

FS40SM-6A

High-Speed Switching Use
Nch Power MOS FET

REJ03G0278-0100

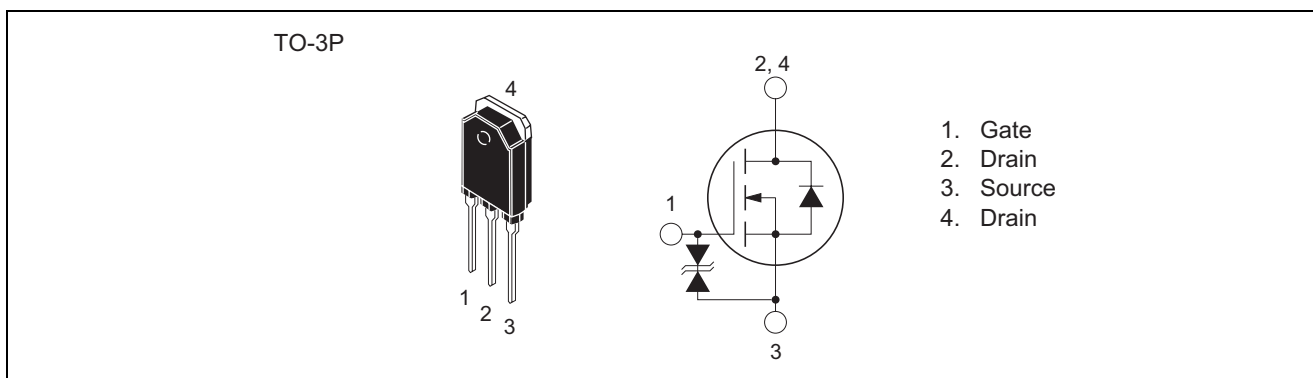
Rev.1.00

Aug.20.2004

Features

- Drive voltage : 10 V
- V_{DSS} : 300 V
- $r_{DS(ON)(max)}$: 0.105 Ω
- I_D : 40 A

Outline



Applications

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

Maximum Ratings

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

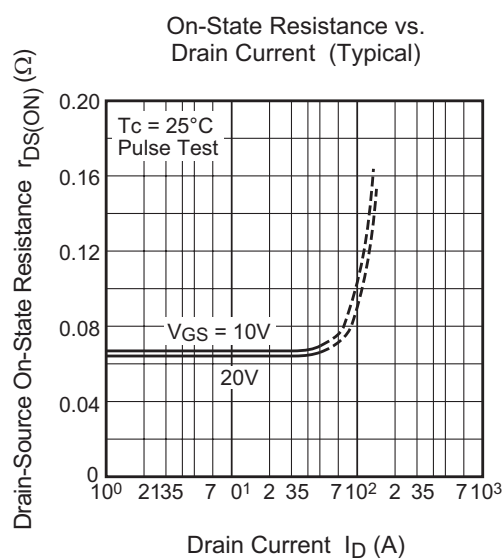
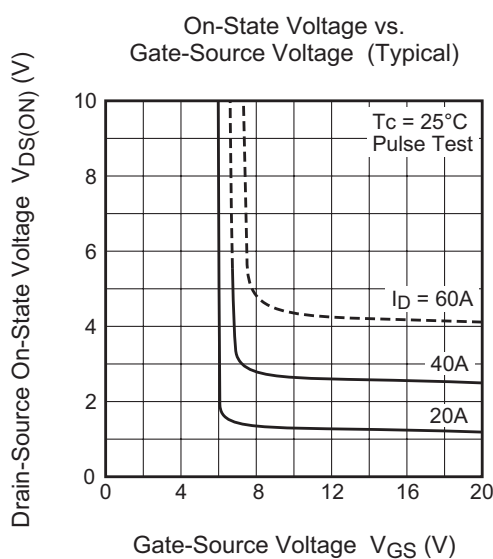
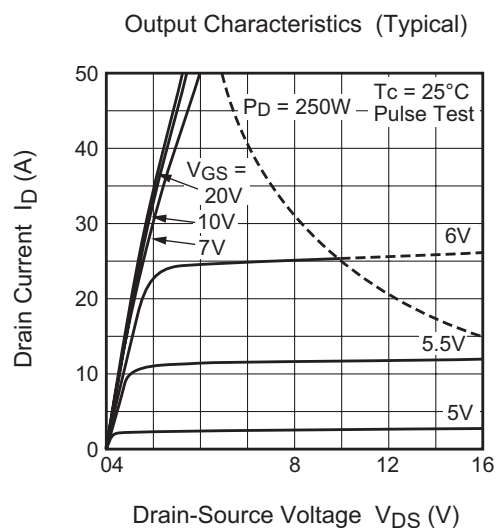
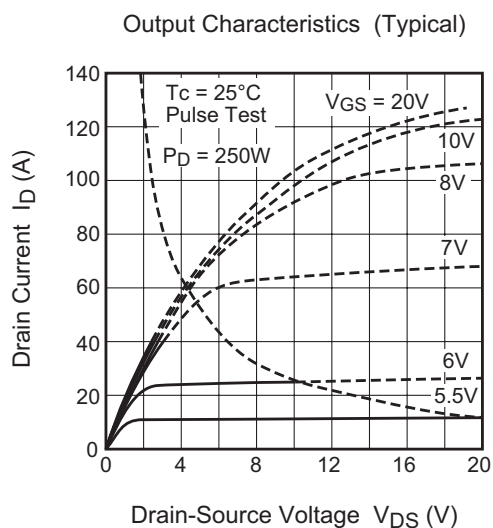
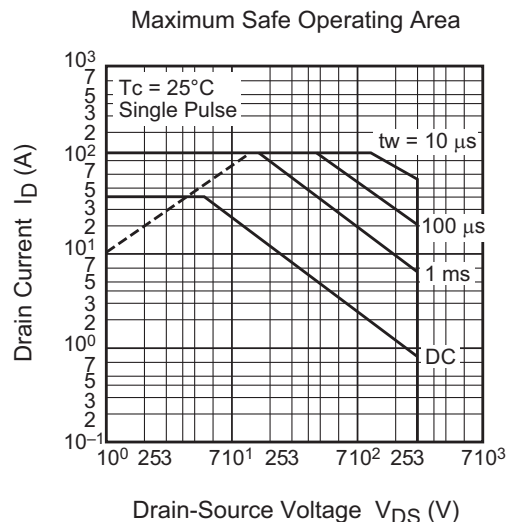
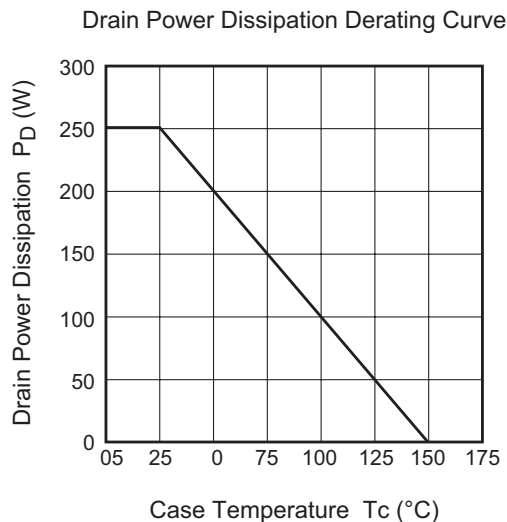
Parameter	Symbol	Ratings	Unit	Conditions
Drain-source voltage	V_{DSS}	300	V	$V_{GS} = 0 \text{ V}$
Gate-source voltage	V_{GSS}	± 30	V	$V_{DS} = 0 \text{ V}$
Drain current	I_D	40	A	
Drain current (Pulsed)	I_{DM}	120	A	
Maximum power dissipation	P_D	250	W	
Channel temperature	T_{ch}	-55 to $+150$	$^\circ\text{C}$	
Storage temperature	T_{stg}	-55 to $+150$	$^\circ\text{C}$	
Mass	—	4.8	g	Typical value

Electrical Characteristics

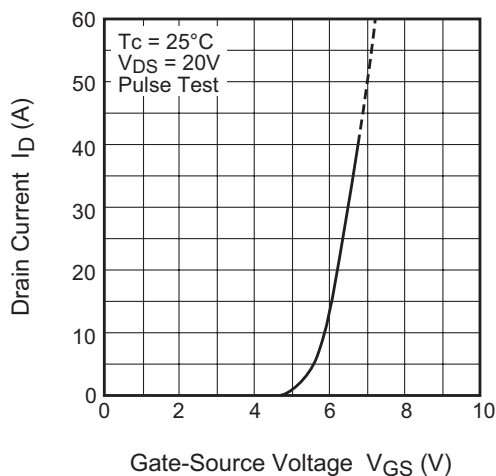
(Tch = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Drain-source breakdown voltage	$V_{(BR)DSS}$	300	—	—	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	$V_{DS} = 300 \text{ V}$, $V_{GS} = 0 \text{ V}$
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	$r_{DS(on)}$	—	0.074	0.105	Ω	$I_D = 20 \text{ A}$, $V_{GS} = 10 \text{ V}$
Drain-source on-state voltage	$V_{DS(on)}$	—	1.48	2.10	V	$I_D = 20 \text{ A}$, $V_{GS} = 10 \text{ V}$
Forward transfer admittance	$ y_{fs} $		—35	—	S	$I_D = 20 \text{ A}$, $V_{DS} = 10 \text{ V}$
Input capacitance	C_{iss}	—	3500	—	pF	$V_{DS} = 25 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$
Output capacitance	C_{oss}	—	450	—	pF	
Reverse transfer capacitance	C_{rss}	—	50	—	pF	
Turn-on delay time	$t_{d(on)}$	—	60	—	ns	$V_{DD} = 150 \text{ V}$, $I_D = 20 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_{GEN} = R_{GS} = 50 \text{ }\Omega$
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	$I_S = 20 \text{ A}$, $V_{GS} = 0 \text{ V}$
Thermal resistance	$R_{th(ch-c)}$	—	—	0.50	$^{\circ}\text{C/W}$	Channel to case

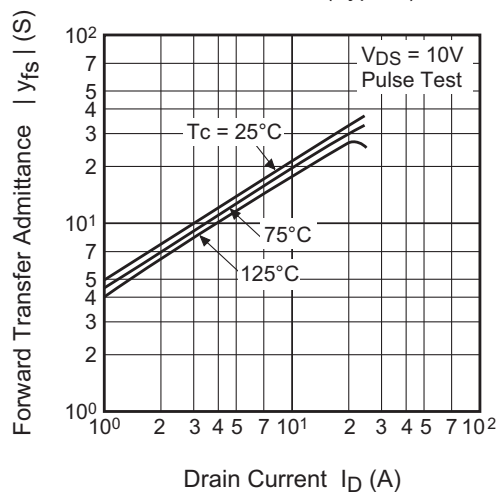
Performance Curves



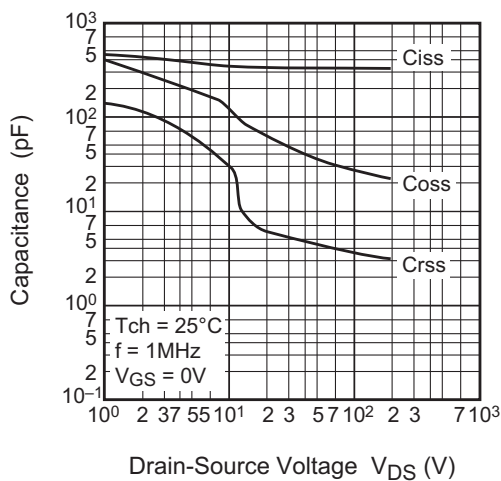
Transfer Characteristics (Typical)



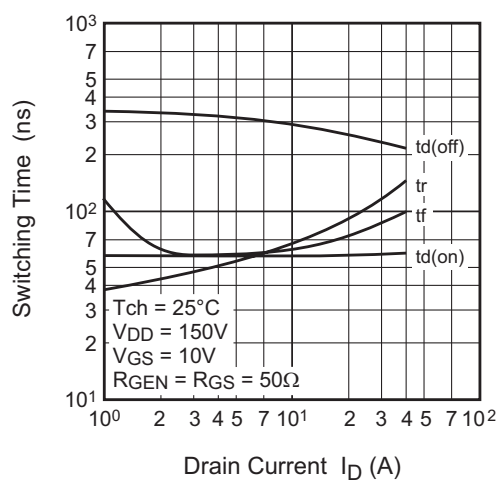
Forward Transfer Admittance vs. Drain Current (Typical)



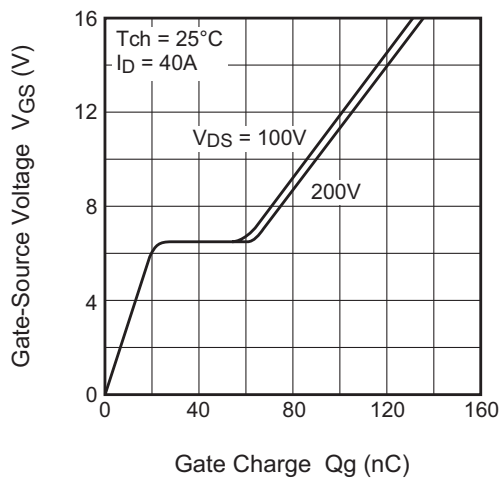
Capacitance vs. Drain-Source Voltage (Typical)



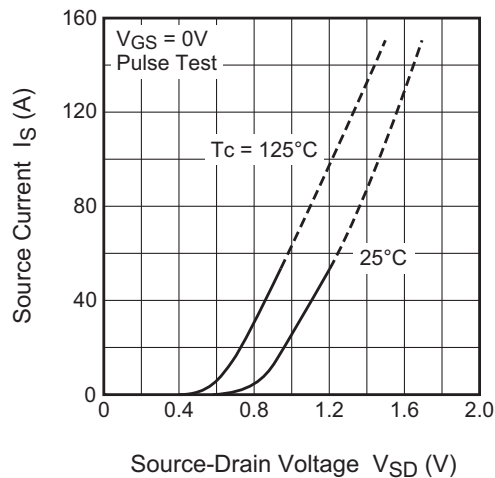
Switching Characteristics (Typical)

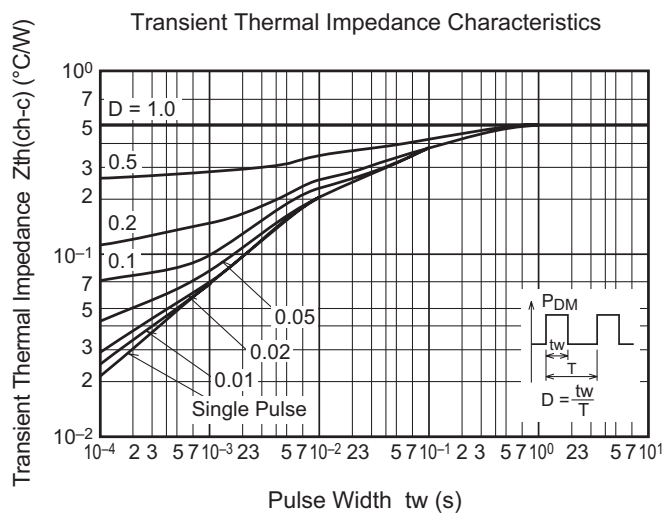
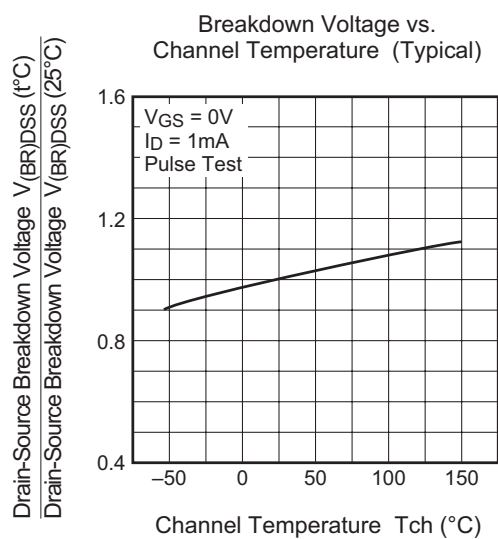
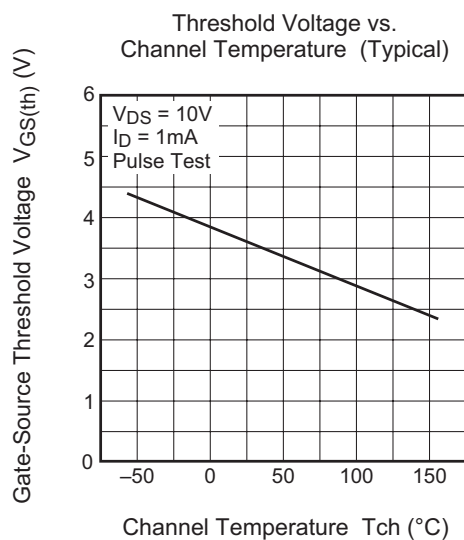
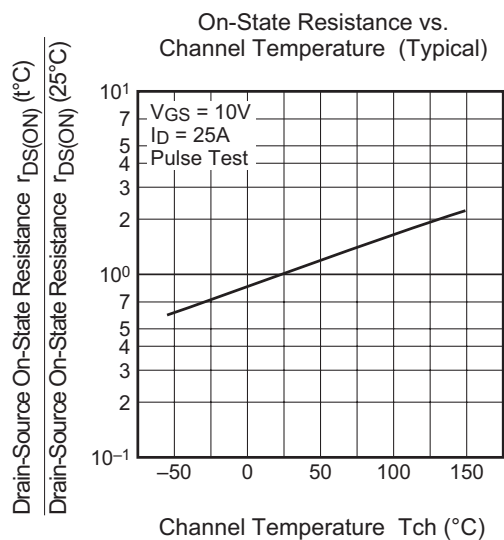


Gate-Source Voltage vs. Gate Charge (Typical)

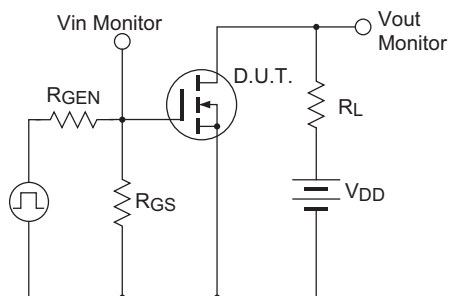


Source-Drain Diode Forward Characteristics (Typical)

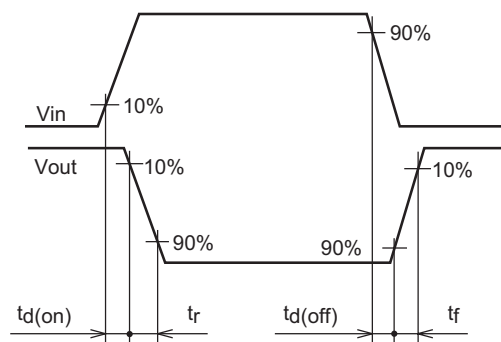




Switching Time Measurement Circuit



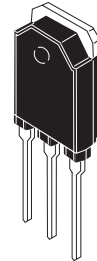
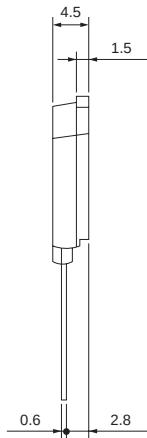
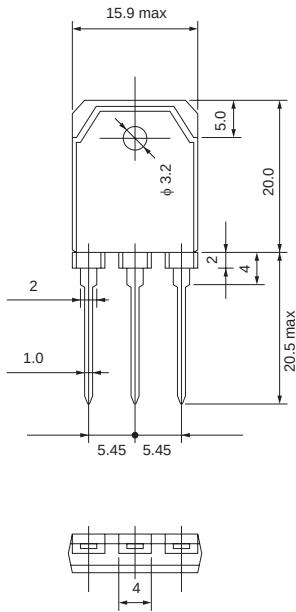
Switching Waveform



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 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	Static electricity prevention bag	20	Type name	FS40SM-6A
Lead form	Plastic Magazine (Tube)	30	Type name – Lead forming code	FS40SM-6A-A8

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

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