

N-Channel Enhancement Mode MOSFET

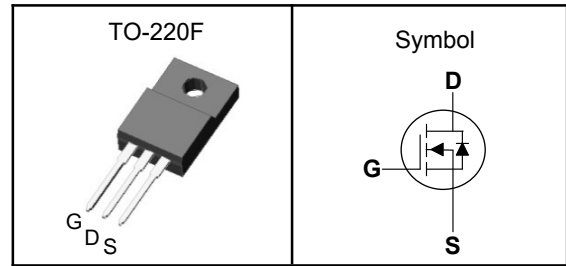
Features

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant
- 100% UIS and Rg Tested

Applications

- Power Management in Desktop Computer
- DC/DC Converters

Pin Description



V_{DSS}	500	V
$R_{DS(ON)-Typ}$	1.1	Ω
I_D	5	A

Absolute Maximum Ratings ($T_J=25^\circ\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit
V_{DSS}	Drain-Source Voltage	500	V
V_{GSS}	Gate-Source Voltage	± 30	V
T_J	Maximum Junction Temperature	-55 to 150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
E_{AS}	Single Pulse Avalanche Energy ³	305	mJ
$I_{DM}^{①}$	Pulse Drain Current Tested	20	A
I_D	Continuous Drain Current	$T_c=25^\circ\text{C}$	A
P_D	Maximum Power Dissipation	$T_c=25^\circ\text{C}$	W

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	3.45	$^\circ\text{C/W}$

Note ① : Max. current is limited by bonding wire.

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°C .

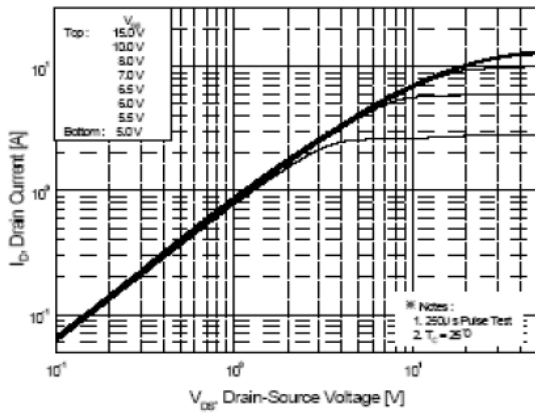
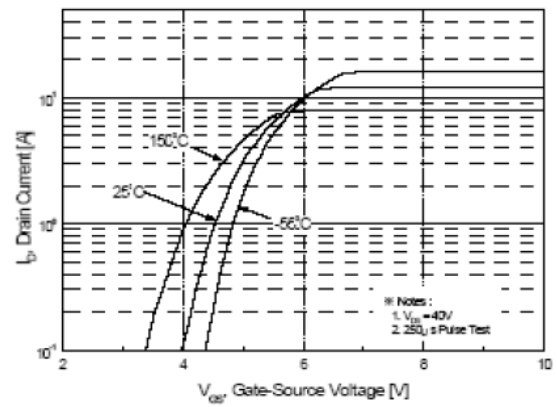
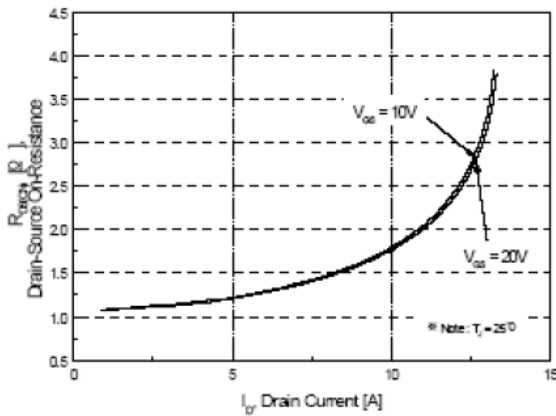
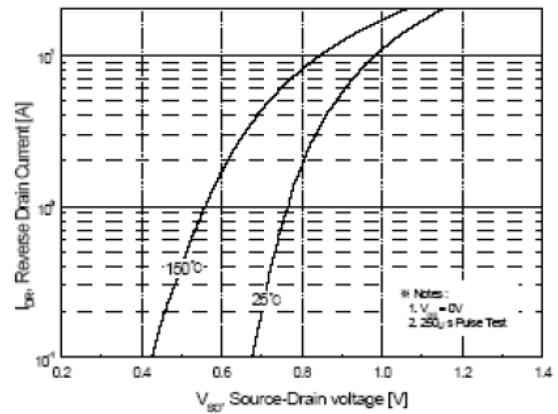
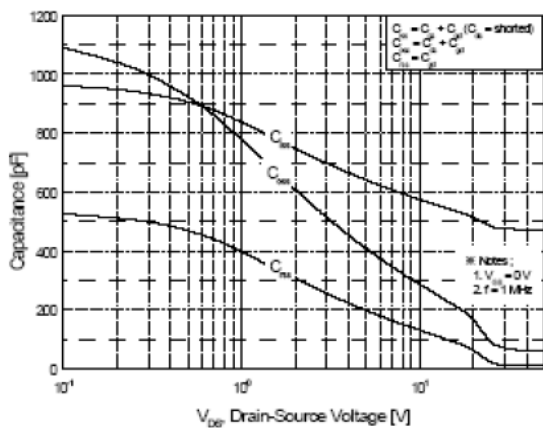
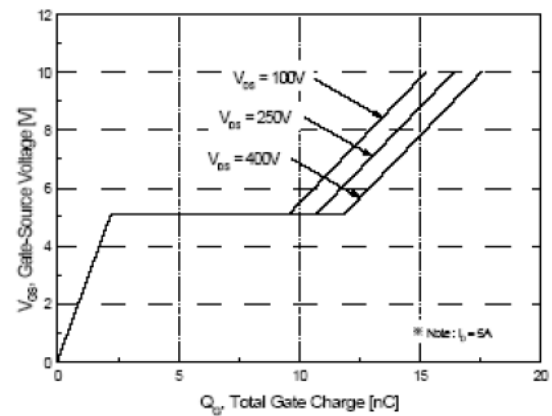
Note ③ : Surface Mounted on 1in^2 FR-4 board with 1oz.

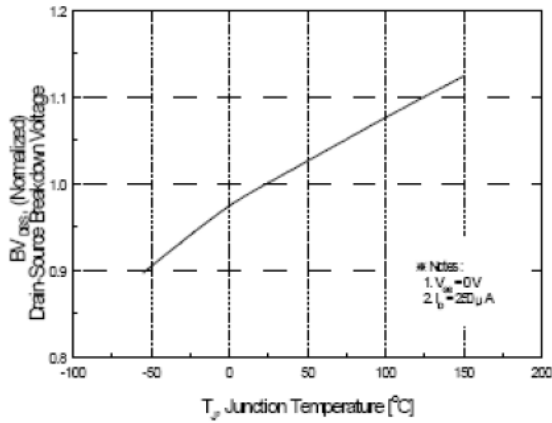
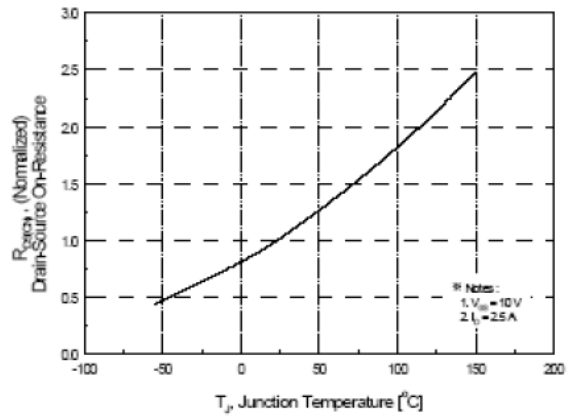
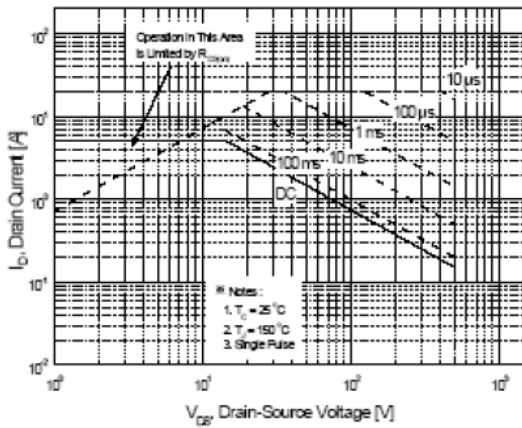
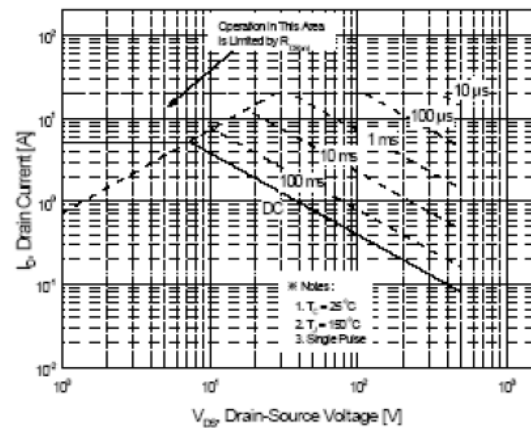
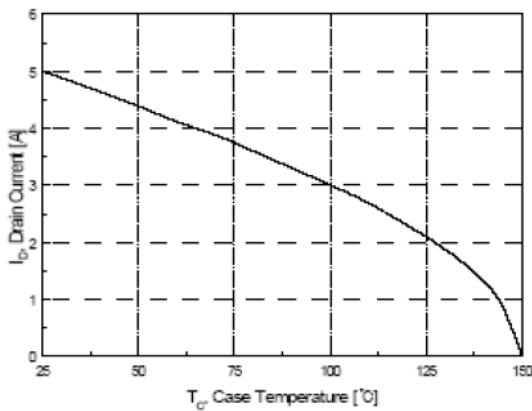
**N-Channel Enhancement Mode MOSFET****Electrical Characteristics** ($T_J=25^\circ\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250mA$	500	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=500V, V_{GS}=0V$	---	---	1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	---	4	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	± 100	nA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_D=2.5A$	---	1.1	1.5	Ω
Dynamic Characteristics^⑤						
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ Freq.=1MHz	---	522	---	pF
C_{oss}	Output Capacitance		---	70	---	
C_{rss}	Reverse Transfer Capacitance		---	8	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DS}=250V, R_L=18\Omega,$ $V_{GS}=10V, R_G=25\Omega$	---	13	---	nS
T_r	Turn-on Rise Time		---	55	---	
$T_{d(off)}$	Turn-off Delay Time		---	25	---	
T_f	Turn-off Fall Time		---	35	---	
Q_g	Total Gate Charge	$V_{DS}=400V,$ $V_{GS}=10V, I_D=5A$	---	19	---	nC
Q_{gs}	Gate-Source Charge		---	3.4	---	
Q_{gd}	Gate-Drain Charge		---	6.4	---	
Source-Drain Characteristics ($T_J=25^\circ\text{C}$)						
V_{SD}	Diode Forward Voltage ^②	$V_{GS}=0V, I_D=5A, T_J=25^\circ\text{C}$	---	---	5.0	V

Note ④ : Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).

Note ⑤ : Guaranteed by design, not subject to production testing.

N-Channel Enhancement Mode MOSFET
Typical Characteristics

Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics

Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

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Figure 7. Breakdown Voltage Variation vs Temperature

Figure 8. On-Resistance Variation vs Temperature

Figure 9-1. Maximum Safe Operating Area for TSP5N50M

Figure 9-2. Maximum Safe Operating Area for TSF5N50M

Figure 10. Maximum Drain Current vs Case Temperature

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TO-220F Package Outline Data
