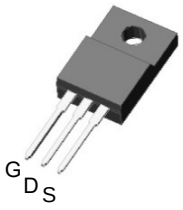
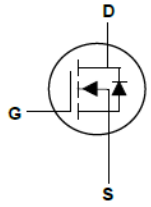
N-Channel Enhancement Mode MOSFET

Features

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

Pin Description

TO-220F	Symbol
	

Applications

- Power Management in Desktop Computer
- DC/DC Converters

V_{DSS}	650	V
$R_{DS(ON)-Typ}$	350	mΩ
I_D	20	A

Absolute Maximum Ratings(T_J=25℃, Unless Otherwise Noted)

Symbol	Parameter		N-Channel	Unit
V_{DSS}	Drain-Source Voltage		650	V
V_{GSS}	Gate-Source Voltage		±30	V
T_J	Maximum Junction Temperature		-55 to 150	℃
T_{STG}	Storage Temperature Range		-55 to 150	℃
E_{AS}	Single Pulse Avalanche Energy③		1500	mJ
I_{DM}①	Pulse Drain Current Tested		80	A
I_D	Continuous Drain Current	T_C=25°C	20	A
P_D	Maximum Power Dissipation	T_C=25°C	120	W

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient① （Max）	62.5	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case①	1.04	℃/W

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

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

Note ③：Surface Mounted on 1in² FR-4 board with 1oz.

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Electrical Characteristics (T_J=25℃, 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=250uA	650	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V	---	---	1	uA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} , I_D=250uA	2	---	5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±30V, V_{DS}=0V	---	---	±100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	V_{GS}=10V , I_D=10A	---	350	450	mΩ
Dynamic Characteristics⑤						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, Freq.=1MHz	---	3000	---	pF
C_{oss}	Output Capacitance		---	250	---	
C_{rss}	Reverse Transfer Capacitance		---	20	---	
$T_{d(on)}$	Turn-on Delay Time	V_{DD}=325V, R_G=25Ω, I_D=20A	---	37	---	nS
T_r	Turn-on Rise Time		---	66	---	
$T_{d(off)}$	Turn-off Delay Time		---	175	---	
T_f	Turn-off Fall Time		---	84	---	
Q_g	Total Gate Charge	V_{DD}=520V , V_{GS}=10V , I_D=20A	---	60	---	nC
Q_{gs}	Gate-Source Charge		---	14	---	
Q_{gd}	Gate-Drain Charge		---	23	---	
Source-Drain Characteristics （T_J=25℃）						
V_{SD}	Diode Forward Voltage②	V_{GS}=0V , I_S=10A ,T_J=25℃	---	---	1.4	V
t_{rr}	Reverse Recovery Time	V_R=400V, I_S=20A, di/dt=100A/μs，T_J=25℃	---	450	---	nS
Q_{rr}	Reverse Recovery Charge		---	7.1	---	nC

Note ④： Pulse test (pulse width≤300us, duty cycle≤2%).

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

Typical Characteristics

Figure 1. Output Characteristics

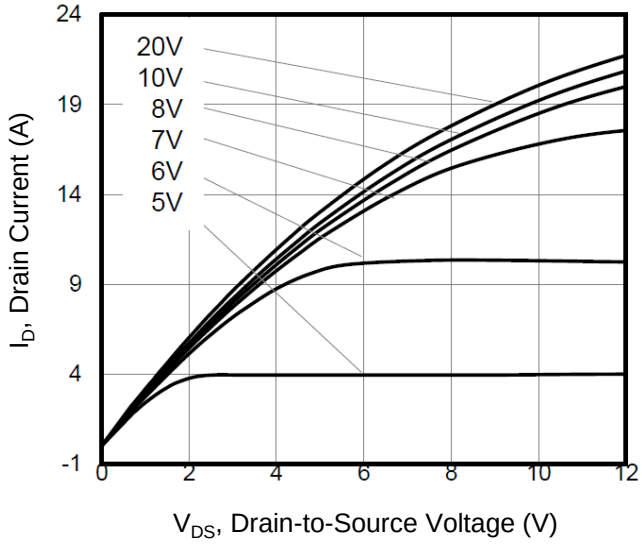


Figure 2. Transfer Characteristics

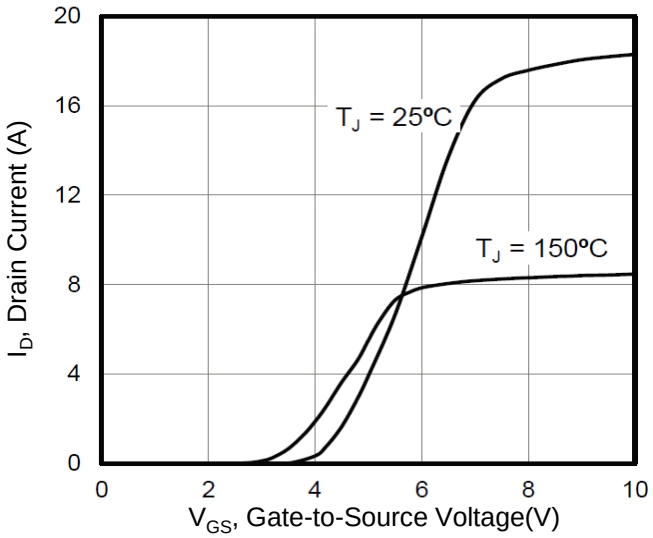


Figure 3. BV_{DSS} vs. Temperature

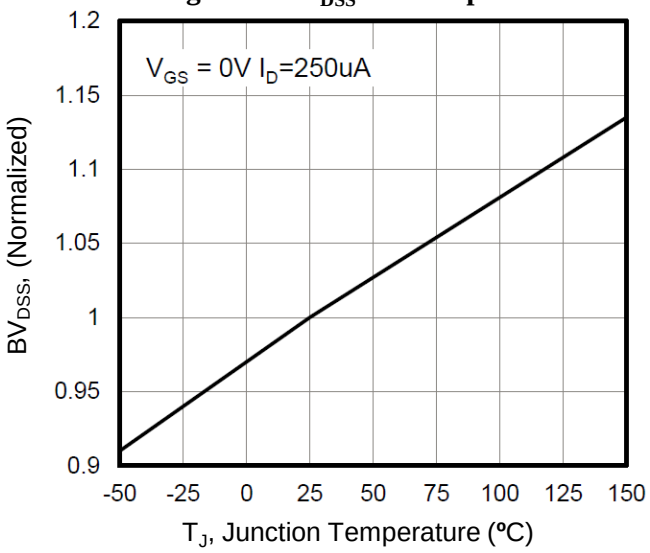


Figure 4. On-Resistance vs. Temperature

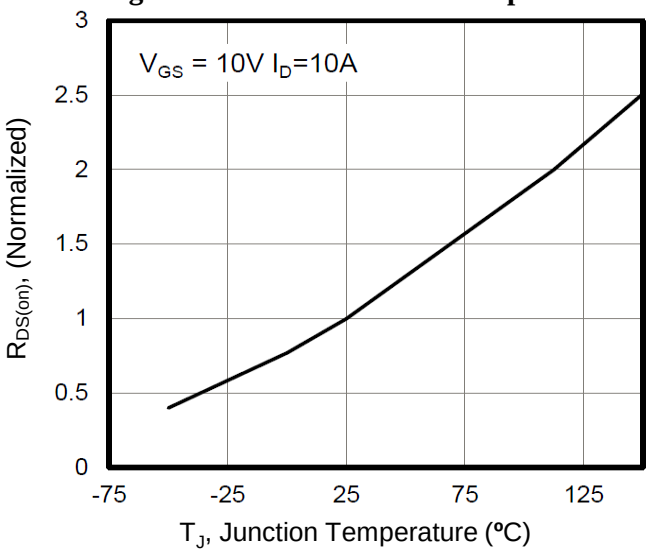


Figure 5. Gate Charge

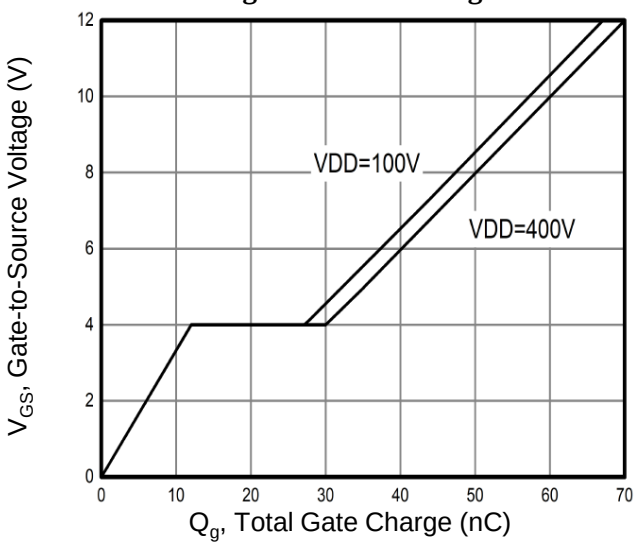


Figure 6. Body Diode Forward Voltage

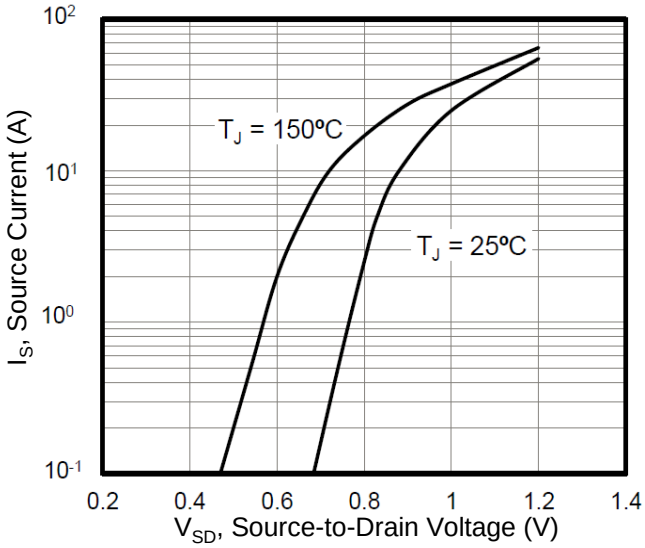
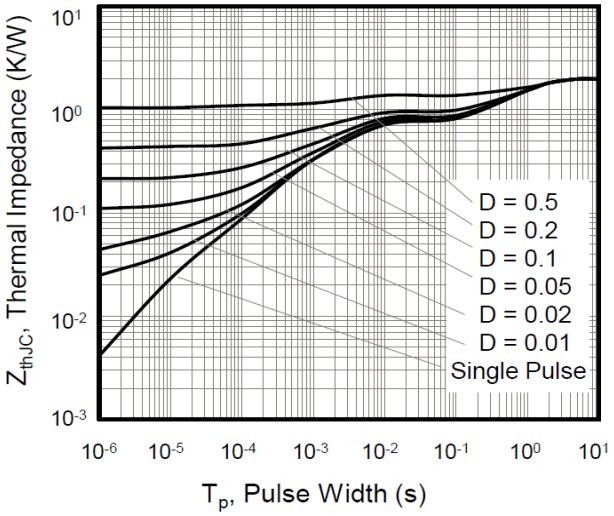


Figure 7. Transient Thermal Impedance

(TO-220F)



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TO-220F Package Outline Data