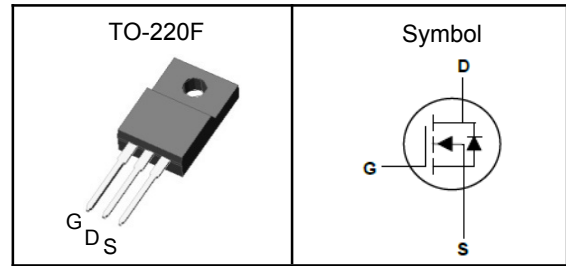# N-Channel Enhancement Mode MOSFET

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

TO-220F	Symbol

V_{DSS}	650	V
$R_{DS(ON)-Typ}$	0.34	Ω
I_D	25	A

Absolute Maximum Ratings (T$_J$=25℃, Unless Otherwise Noted)

Symbol	Parameter		Rating	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 Energy[3]		871	mJ
I_{DM} [①]	Pulse Drain Current Tested		100	A
I_D	Continuous Drain Current	T_C=25℃	25	A
P_D	Maximum Power Dissipation	T_C=25℃	39	W

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{θJA}$	Thermal Resistance Junction-Ambient[1]	62	℃/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	3.2	℃/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 1in^2 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	---	4.5	V
I$_{GSS}$	Gate Leakage Current	V$_{GS}$=±30V, V$_{DS}$=0V	---	---	±10	uA
R$_{DS(ON)}$	Drain-Source On-state Resistance	V$_{GS}$=10V, I$_D$=1A	---	0.34	0.38	Ω
Dynamic Characteristics[5]						
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=25V, Freq.=1MHz	---	3150	---	pF
C$_{oss}$	Output Capacitance		---	340	---	pF
C$_{rss}$	Reverse Transfer Capacitance		---	13	---	pF
T$_{d(on)}$	Turn-on Delay Time	V$_{DD}$=250V , V$_{GS}$=10V , R$_G$=25Ω, I$_D$=25A	---	53	---	nS
T$_r$	Turn-on Rise Time		---	36	---	nS
T$_{d(off)}$	Turn-off Delay Time		---	220	---	nS
T$_f$	Turn-off Fall Time		---	70	---	nS
Q$_g$	Total Gate Charge	V$_{DD}$=400V , V$_{GS}$=10V , I$_D$=25A	---	62	---	nC
Q$_{gs}$	Gate-Source Charge		---	16	---	nC
Q$_{gd}$	Gate-Drain Charge		---	22	---	nC
Source-Drain Characteristics (T$_J$=25℃)						
V$_{SD}$	Diode Forward Voltage2	V$_{GS}$=0V , I$_S$=10A ,T$_J$=25℃	---	0.8	1.4	V
t$_{rr}$	Reverse Recovery Time	I$_F$=10A, di/dt=100A/μs, T$_J$=25℃	---	350	---	nS
Q$_{rr}$	Reverse Recovery Charge		---	6	---	nC

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

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

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Typical Characteristics

Figure 1. Output Characteristics (T$_J$ = 25⁰C)
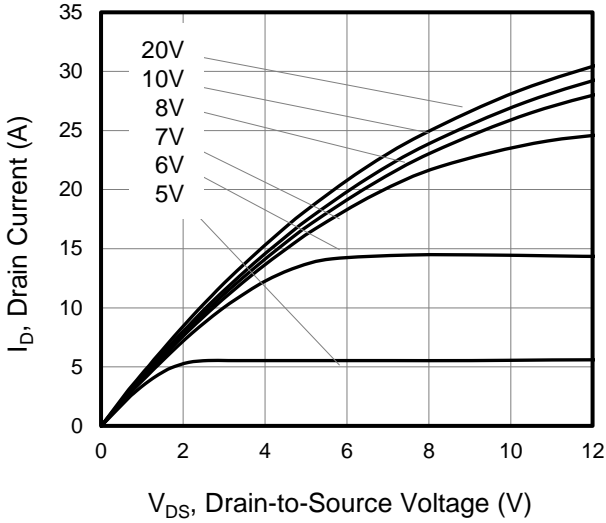
Figure 2. Body Diode Forward Voltage
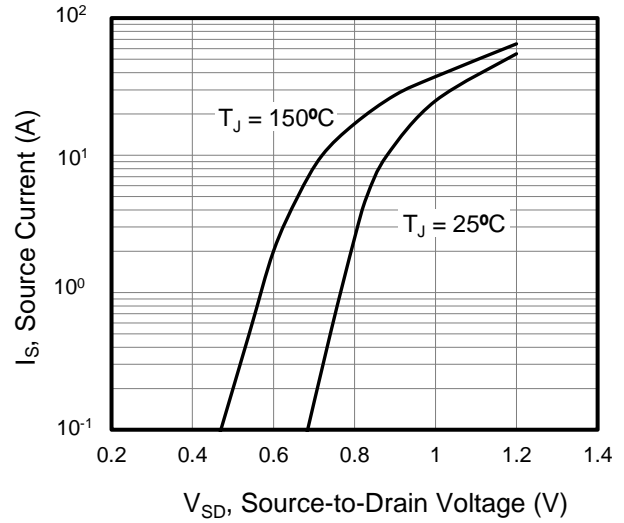
Figure 3. Drain Current vs. Temperature
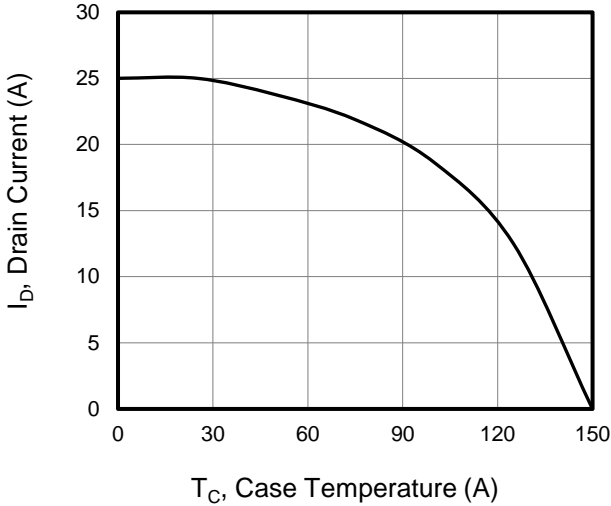
Figure 4. BV$_{DSS}$ Variation vs. Temperature
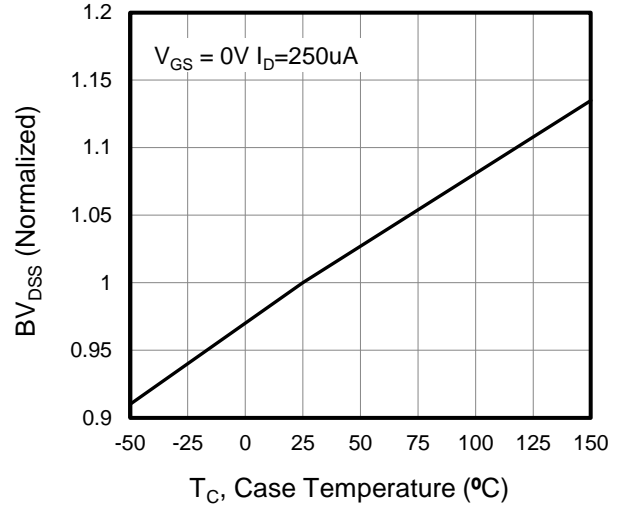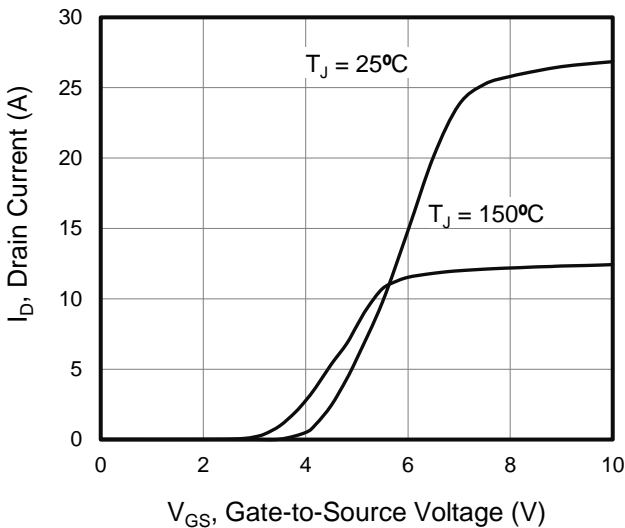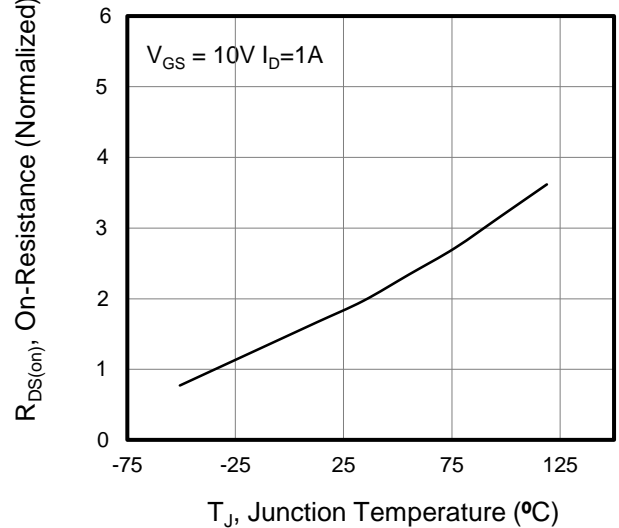

Figure 5. Transfer Characteristics

Figure 6. On-Resistance vs. Temperature

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Figure 7. Capacitance
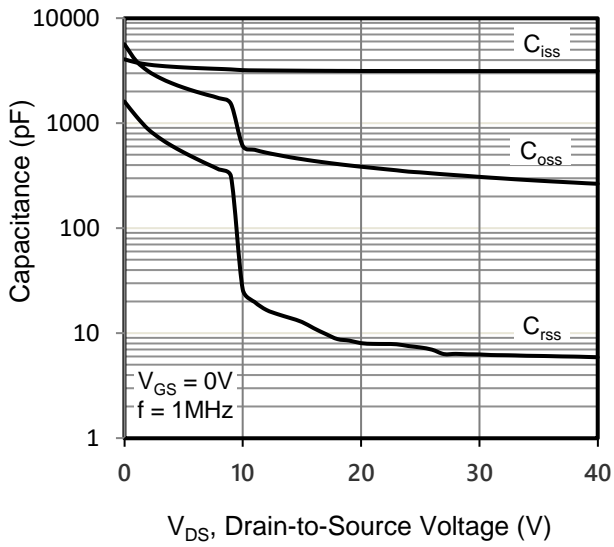
Figure 8. Gate Charge
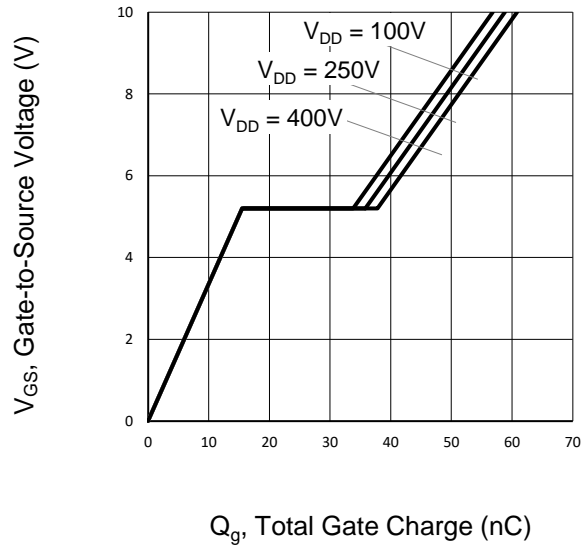
Figure 9. Transient Thermal Impedance
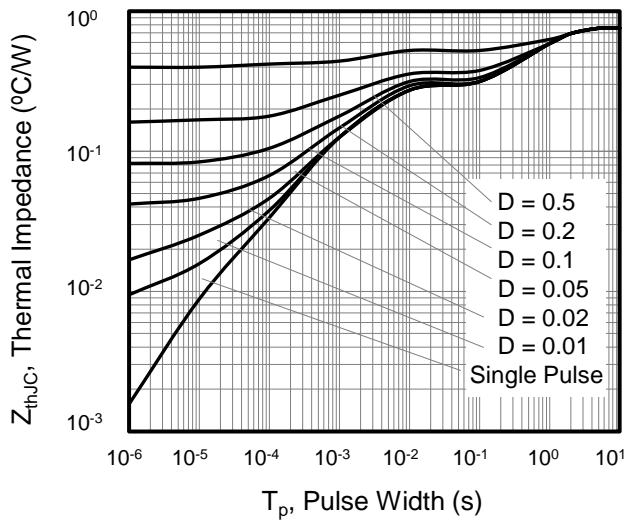
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TO-220F Package Outline Data