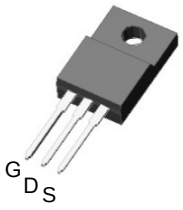
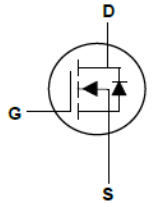
N-Channel Enhancement Mode MOSFET

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}	500	V
$R_{DS(ON)-Typ}$	210	mΩ
I_D	18	A

Absolute Maximum Ratings(T_J=25℃, 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	℃
T_{STG}	Storage Temperature Range		-55 to 150	℃
E_{AS}	Single Pulse Avalanche Energy[3]		689	mJ
I_{DM} ①	Pulse Drain Current Tested		72	A
I_D	Continuous Drain Current	T_C=25°C	18	A
P_D	Maximum Power Dissipation	T_C=25°C	41	W

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient[1]	63	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	3.04	℃/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 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	500	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=500V, V_{GS}=0V	---	---	1	uA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} , I_D=250uA	3.0	---	5.0	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=9A	---	210	265	mΩ
Dynamic Characteristics⑤						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, Freq.=1MHz	---	3110	---	pF
C_{oss}	Output Capacitance		---	328	---	
C_{rss}	Reverse Transfer Capacitance		---	32	---	
$T_{d(on)}$	Turn-on Delay Time	V_{DD}=250V , V_{GS}=10V , R_G=25Ω, I_D=18A	---	65	---	nS
T_r	Turn-on Rise Time		---	40	---	
$T_{d(off)}$	Turn-off Delay Time		---	245	---	
T_f	Turn-off Fall Time		---	68	---	
Q_g	Total Gate Charge	V_{DD}=250V , V_{GS}=10V , I_D=18A	---	116	---	nC
Q_{gs}	Gate-Source Charge		---	16	---	
Q_{gd}	Gate-Drain Charge		---	38	---	
Source-Drain Characteristics （T_J=25℃）						
V_{SD}	Diode Forward Voltage②	V_{GS}=0V , I_S=9A ,T_J=25℃	---	---	1.4	V
t_{rr}	Reverse Recovery Time	I_S=18A, di/dt=100A/μs, T_J=25℃	---	525	---	nS
Q_{rr}	Reverse Recovery Charge		---	6.2	---	nC

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

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

Typical Characteristics

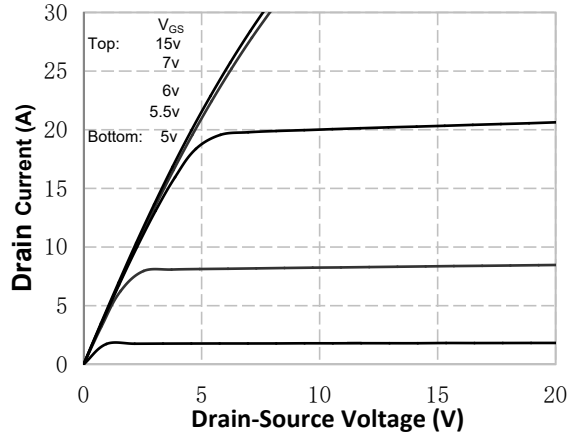

Figure 1. On-Region Characteristics

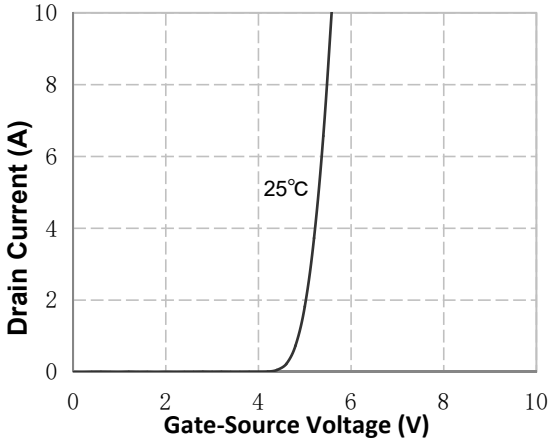

Figure 2. Transfer Characteristics

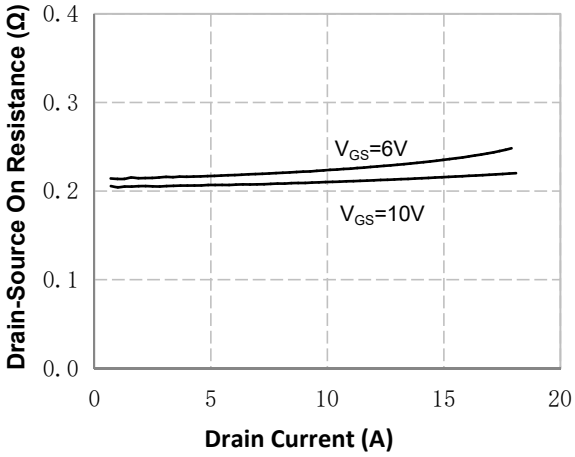

Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

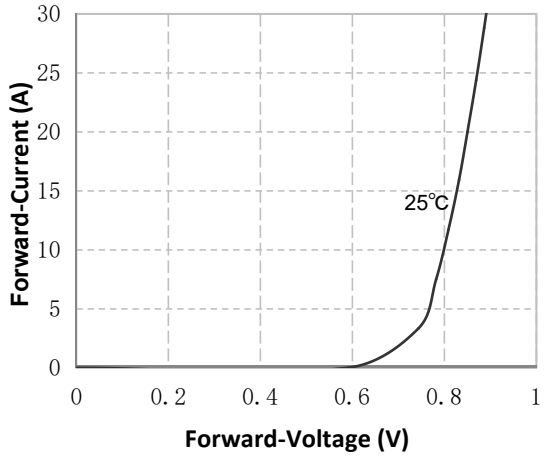

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

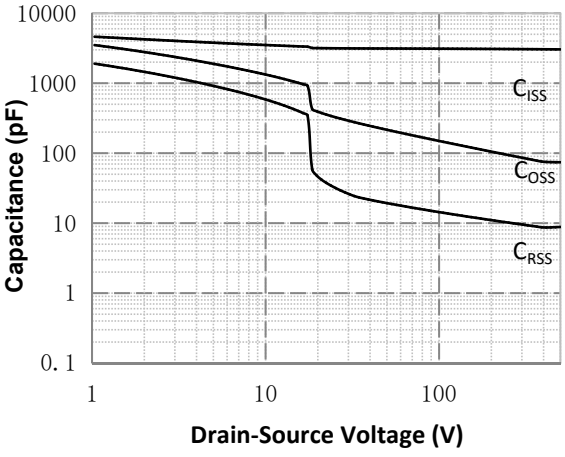

Figure 5. Capacitance Characteristics

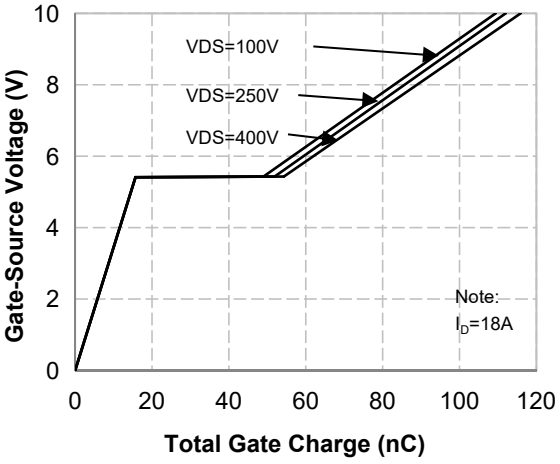

Figure 6. Gate Charge Characteristics

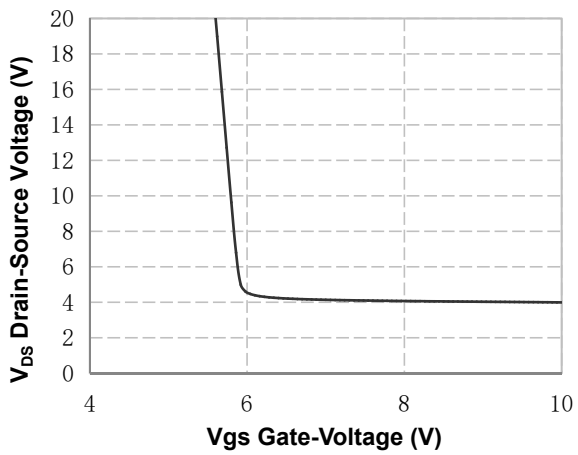

Figure 7. Vds Drain-Source Voltage vs Gate Voltage

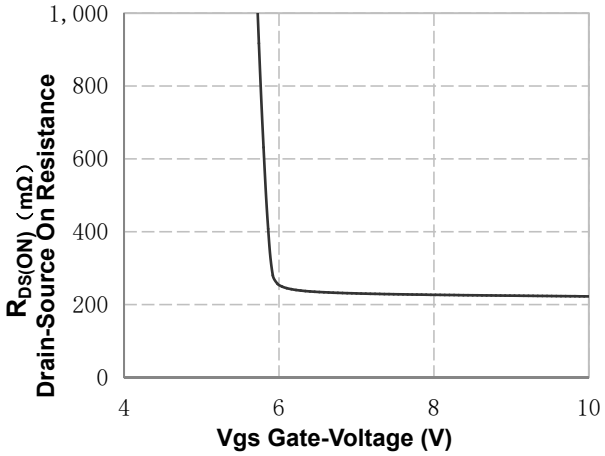

Figure 8. On-Resistance vs Gate Voltage

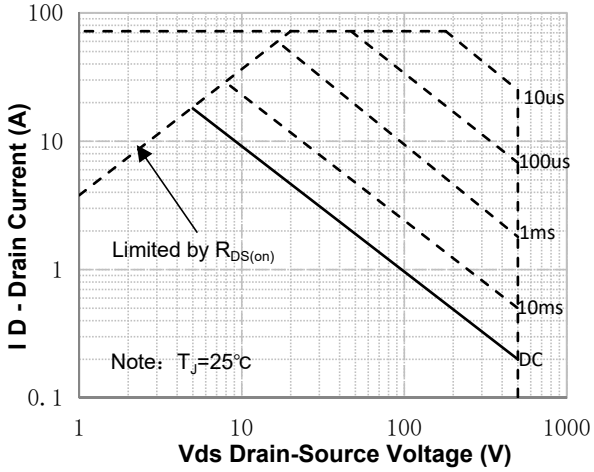

Figure 9. Maximum Safe Operating Area

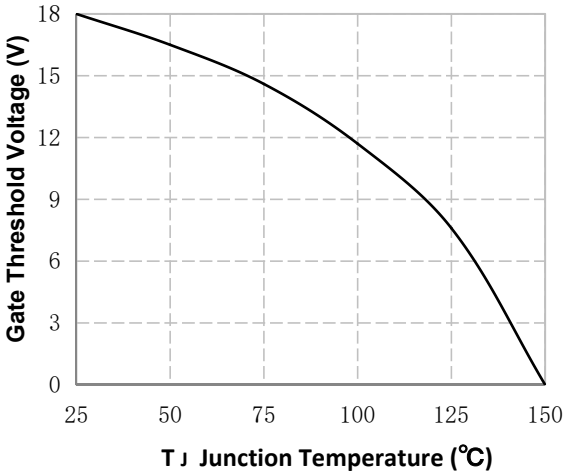

Figure 10. Maximum Drain Current vs Temperature

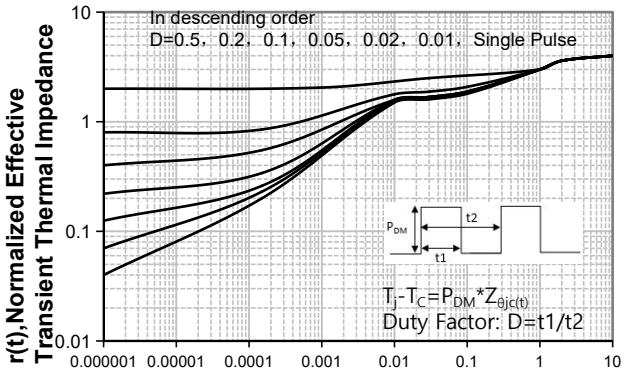

Figure 11. Transient Thermal Response Curve

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TO-220F Package Outline Data