650 Super Junction Power MOSFET

Features

● Low drain-source on-resistance:$R_{DS(ON)}$=1Ω(typ)

● Easy to control gate switching

● Enhancement mode: V_{th} = 2.5 to 4.0V

● 100% avalanche tested

● RoHS compliant
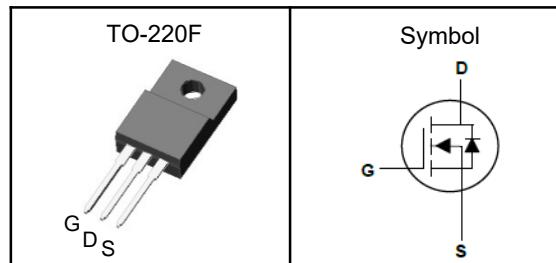
Applications

● Switch Mode Power Supply (SMPS)
● Uninterruptible Power Supply (UPS)
● Power Factor Correction (PFC)
● Charger,Lighting.

Pin Description

TO-220F	Symbol

V_{DSS}	650	V
$R_{DS(ON)-Typ}$	1000	mΩ
I_D	5	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 Energy3		51.2	mJ
I_{DM}[①]	Pulse Drain Current Tested		12	A
I_D	Continuous Drain Current	T_C=25°C	5	A
P_D	Maximum Power Dissipation	T_C=25°C	36	W

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{θJA}$	Thermal Resistance Junction-Ambient1	62.5	℃/W
$R_{θJC}$	Thermal Resistance Junction-Case1	3.47	℃/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=1mA	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=0.8mA	2.5	---	4.0	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=2A	---	1000	1200	mΩ
Dynamic Characteristics[5]						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=50V, Freq.=1MHz	---	270	---	pF
C_{oss}	Output Capacitance		---	50	---	
C_{rss}	Reverse Transfer Capacitance		---	2.7	---	
$T_{d(on)}$	Turn-on Delay Time	V_{DD}=400V , R_G=10Ω, I_D=4A	---	12	---	nS
T_r	Turn-on Rise Time		---	25	---	
$T_{d(off)}$	Turn-off Delay Time		---	29	---	
T_f	Turn-off Fall Time		---	25	---	
Q_g	Total Gate Charge	V_{DS}=520V , V_{GS}=10V , I_D=4A	---	9	---	nC
Q_{gs}	Gate-Source Charge		---	2.6	---	
Q_{gd}	Gate-Drain Charge		---	3.8	---	
Source-Drain Characteristics （T_J=25℃）						
V_{SD}	Diode Forward Voltage2	V_{GS}=0V , I_S=4A ,T_J=25℃	---	---	1.2	V
t_{rr}	Reverse Recovery Time	I_S=4A，V_{DD}=520V di/dt=100A/μs，T_J=25℃	---	209	---	nS
Q_{rr}	Reverse Recovery Charge		---	1.5	---	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
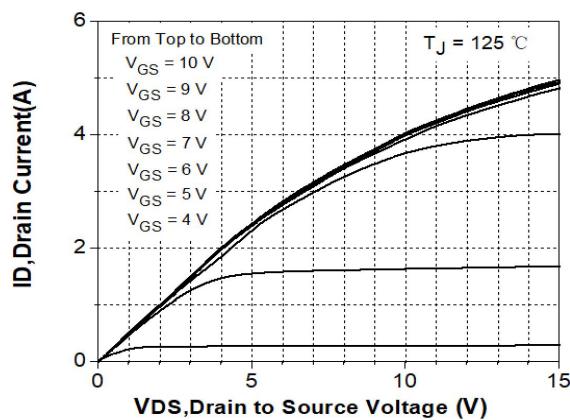
Figure 1. On-Region Characteristics
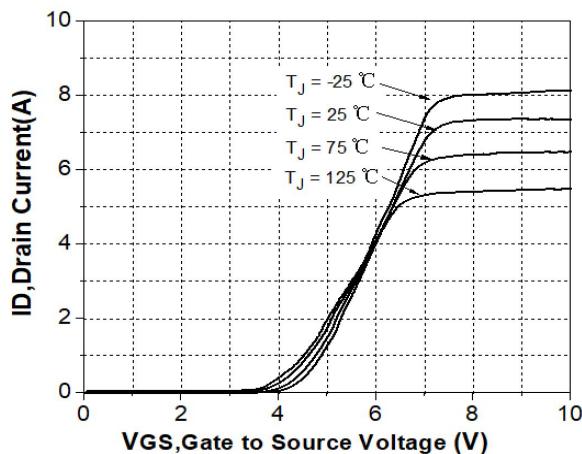
Figure 2. Transfer Characteristics
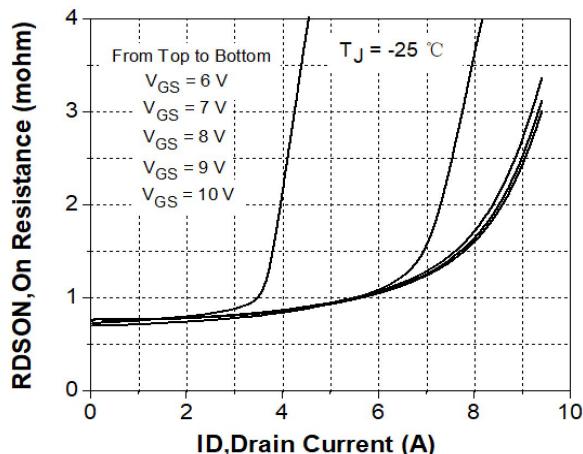
Figure 3. On-Resistance Variation vs
Drain Current and Gate Voltage
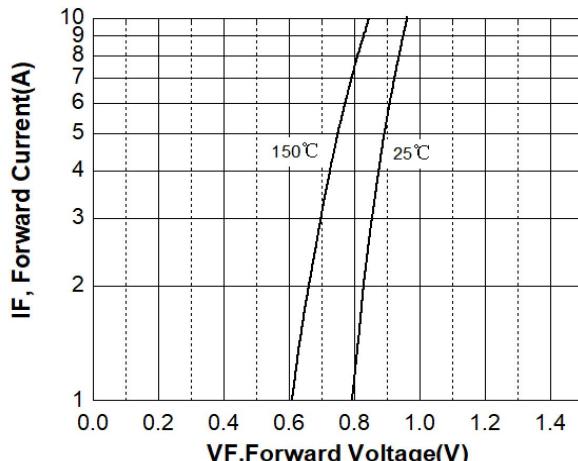
Figure 4. Body Diode Forward Voltage
Variation with Source Current
and Temperature
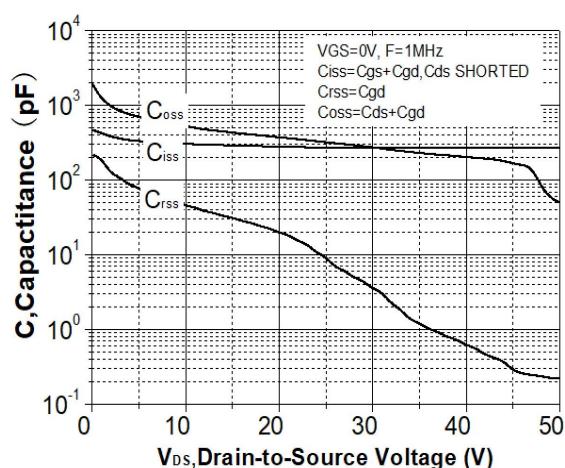
Figure 5. Capacitance Characteristics
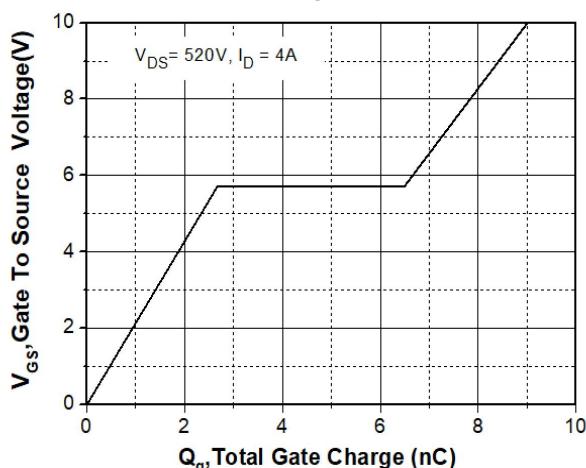
Figure 6. Gate Charge Characteristics

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Specifications are subject to change without notice

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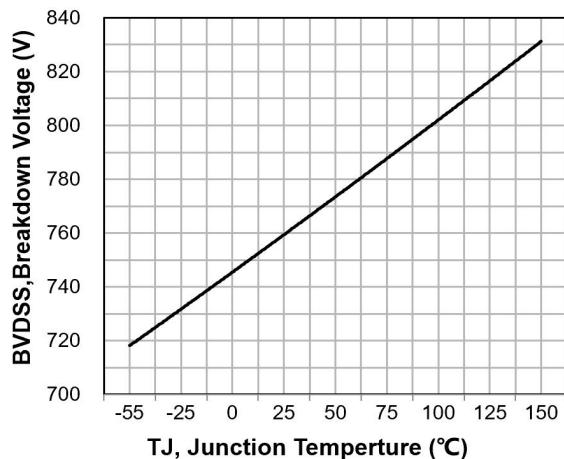
Figure 7. Breakdown Voltage Variation vs Temperature
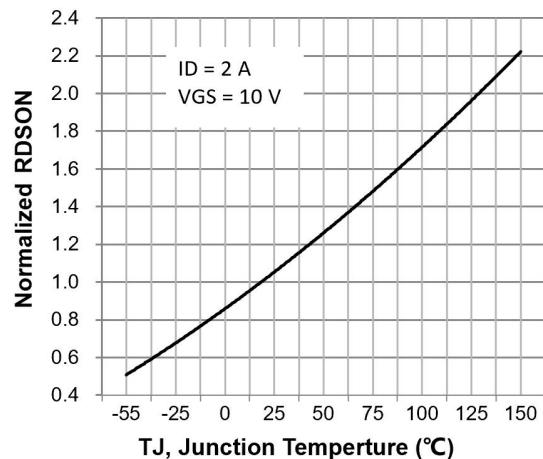
Figure 8. On-Resistance Variation vs Temperature
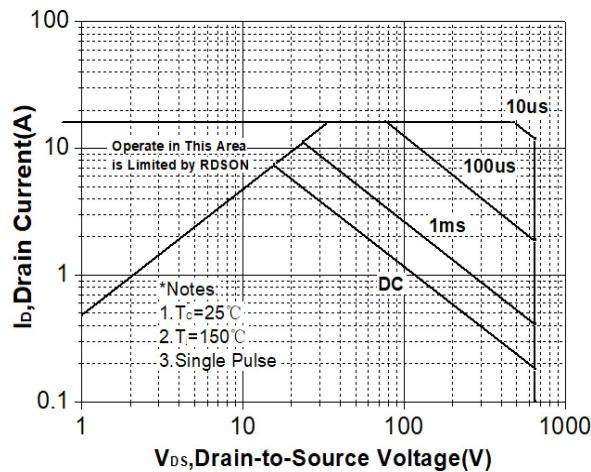
Figure 9. Maximum Safe Operating Area
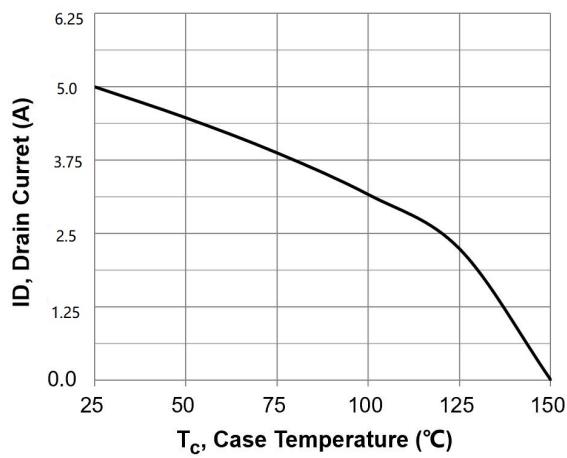
Figure 10. Maximum Drain Current vs Case Temperature
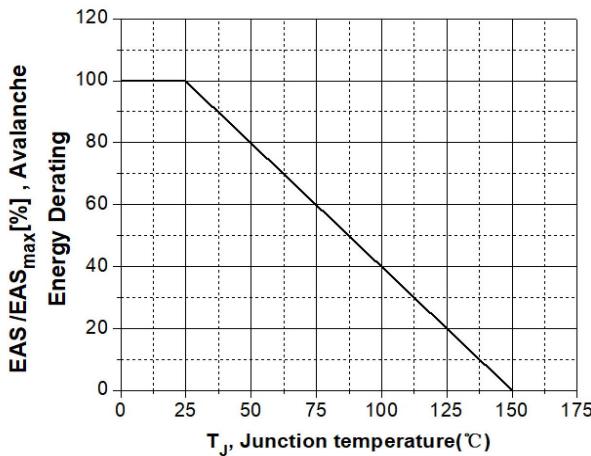
Figure 11. Transconductance vs. Drain Current
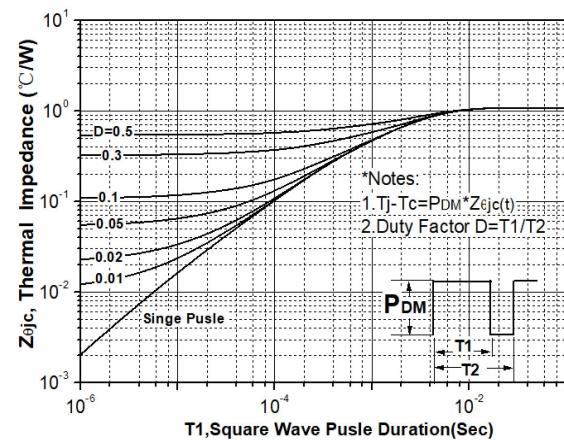
Figure 12. Transient Thermal Response Curve

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TO-220F Package Outline Data