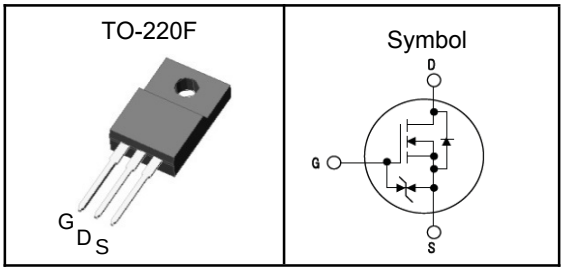
650V Super Junction Power MOSFET

Features

- Low drain-source on-resistance:$R_{DS(ON)}$=0.32Ω(typ)
- Easy to control gate switching
- Enhancement mode: V_{th} = 2 to 4V
- Built-in ESD Diode
- 100% avalanche tested

Pin Description



Applications

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

V_{DSS}	650	V
$R_{DS(ON)-Typ}$	320	mΩ
I_D	13	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		320	mJ
I_{DM} ①	Pulse Drain Current Tested		33	A
I_D	Continuous Drain Current	T_C=25°C	13	A
P_D	Maximum Power Dissipation	T_C=25°C	32	W

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62.5	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case	4	℃/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}=600V, V_{GS}=0V	---	---	1	uA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} , I_D=250uA	2	---	4	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=3.4A	---	320	390	mΩ
Dynamic Characteristics⑤						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=100V, Freq.=1MHz	---	860	---	pF
C_{oss}	Output Capacitance		---	30	---	
C_{rss}	Reverse Transfer Capacitance		---	4.2	---	
$T_{d(on)}$	Turn-on Delay Time	V_{DD}=400V , V_{GS}=10V , R_G=25Ω, I_D=4.8A	---	41	---	nS
T_r	Turn-on Rise Time		---	20		
$T_{d(off)}$	Turn-off Delay Time		---	120	---	
T_f	Turn-off Fall Time		---	20	---	
R_g	Gate Resistance	f = 1.0MHz, open drain	---	13	---	Ω
Q_g	Total Gate Charge	V_{DS}=400V , V_{GS}=10V , I_D=4.8A	---	20	---	nC
Q_{gs}	Gate-Source Charge		---	4.2	---	
Q_{gd}	Gate-Drain Charge		---	7	---	
Source-Drain Characteristics （T_J=25℃）						
V_{SD}④	Diode Forward Voltage	I_S=4.8A, V_{GS}=0V	---	0.8	1.2	V
trr	Reverse Recovery Time	V_R=400V, I_F=4.8A, di/dt=100A/μs，T_J=25℃	---	345	---	nS
Qrr	Reverse Recovery Charge		---	3.3	---	nC

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

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

Typical Characteristics

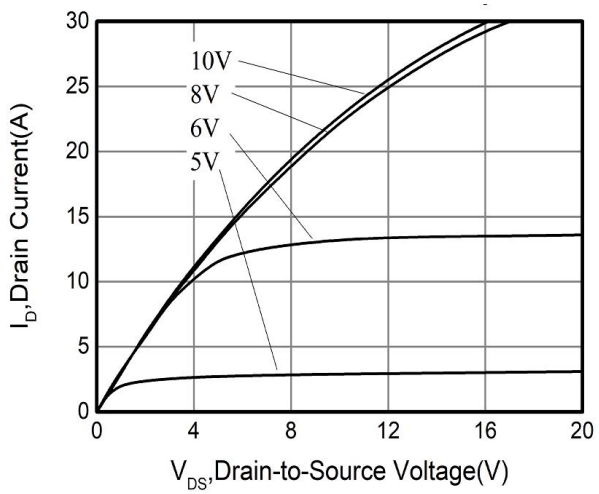

Figure 1. Output Characteristics

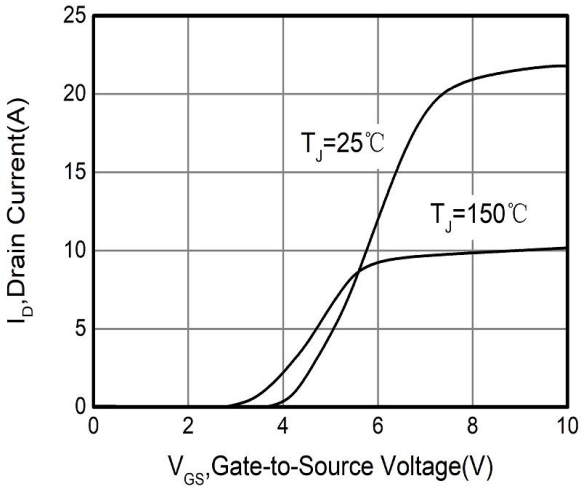

Figure 2. Transfer Characteristics

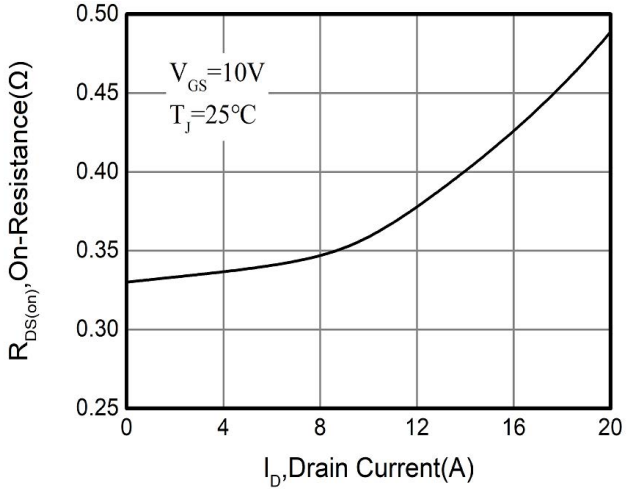

Figure 3. On-Resistance vs. Drain Current

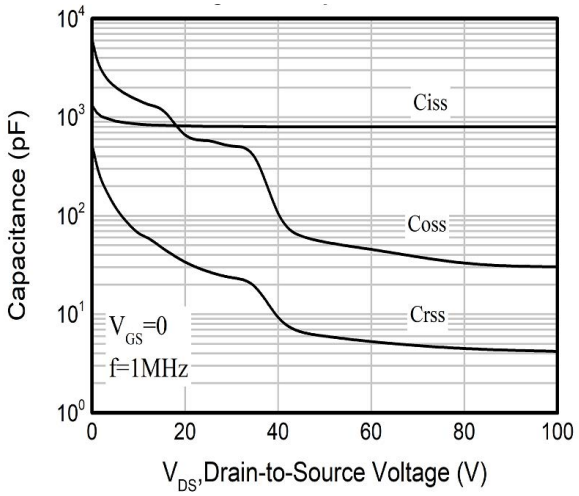

Figure 4. Capacitance

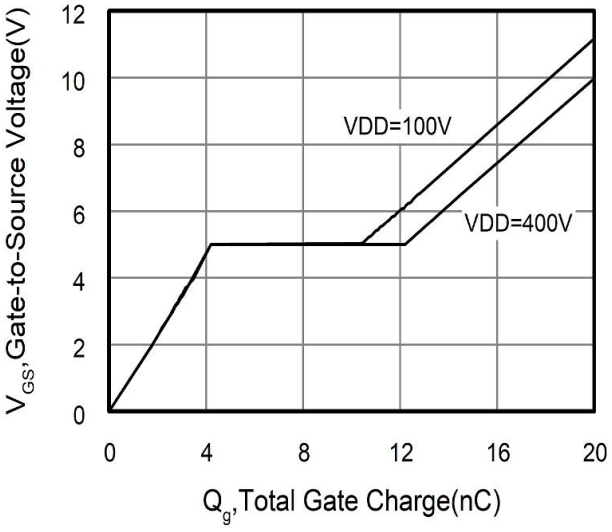

Figure 5. Gate Charge

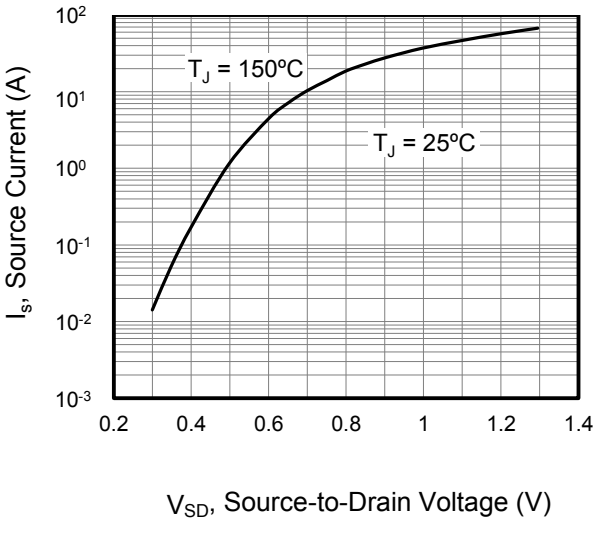

Figure 6. Body Diode Forward Voltage

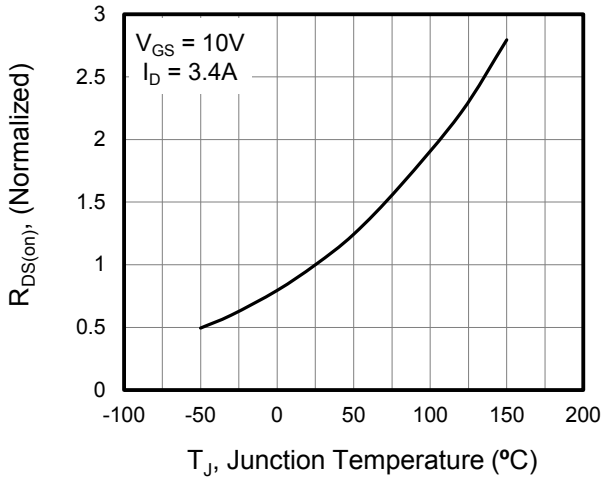

Figure 7. On-Resistance vs. Junction Temperature

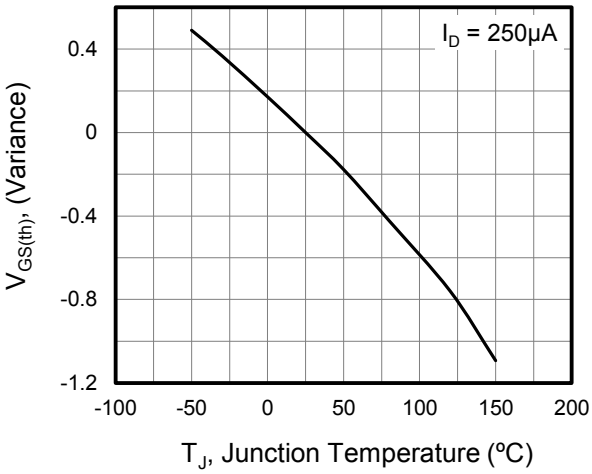

Figure 8. Threshold Voltage vs. Junction Temperature

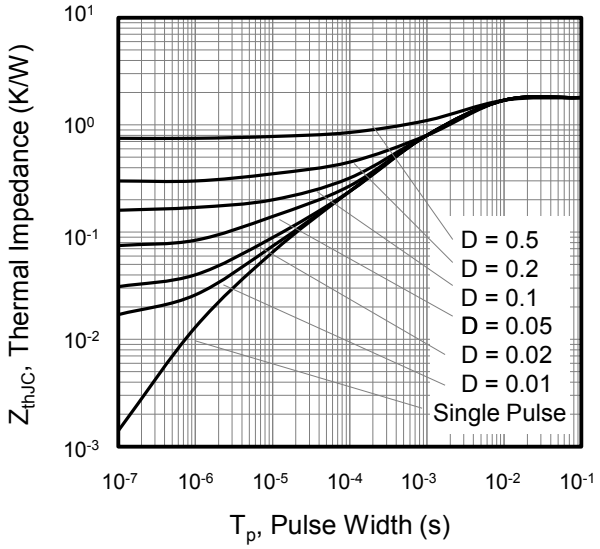

Figure 9. Transient Thermal Impedance

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TO-220F Package Outline Data

unit: mm