

650V Super Junction Power MOSFET

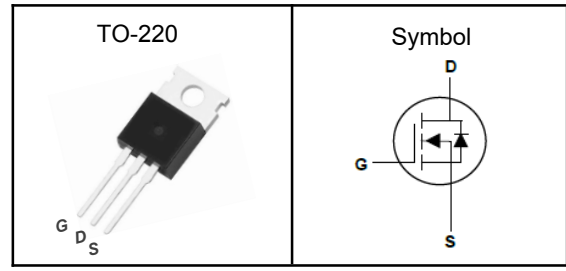
Features

- Low drain-source on-resistance: $R_{DS(ON)}=0.15\Omega(\text{typ})$
- Easy to control gate switching
- Enhancement mode: $V_{th} = 2.5$ to $4V$
- 100% avalanche tested
- RoHS compliant

Applications

- Switch Mode Power Supply (SMPS)
- TV power & LED Lighting Power
- AC to DC Converters
- Telecom

Pin Description



V_{DSS}	650	V
$R_{DS(ON)-Typ}$	150	m Ω
I_D	21	A

Absolute Maximum Ratings ($T_J=25^\circ\text{C}$, 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	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
E_{AS}	Single Pulse Avalanche Energy ^③	500	mJ	
$I_{DM}^{①}$	Pulse Drain Current Tested	52	A	
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	21	A
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	150	W

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ^①	0.83	$^\circ\text{C}/\text{W}$

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

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

Note ③ : Surface Mounted on 1in^2 FR-4 board with 1oz.



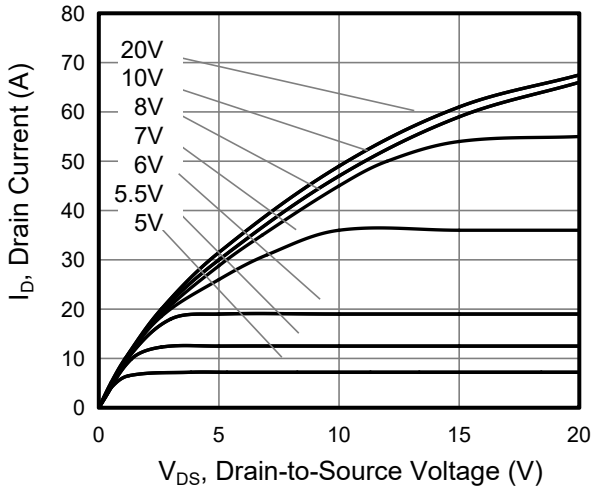
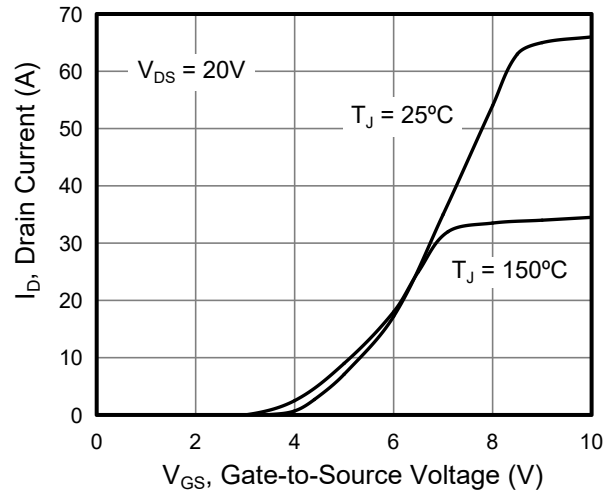
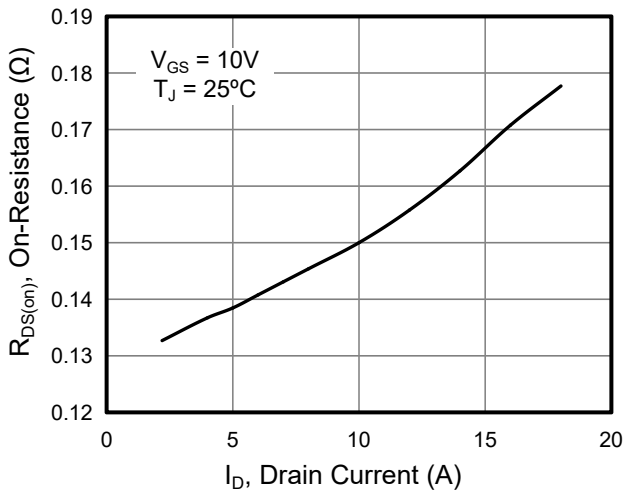
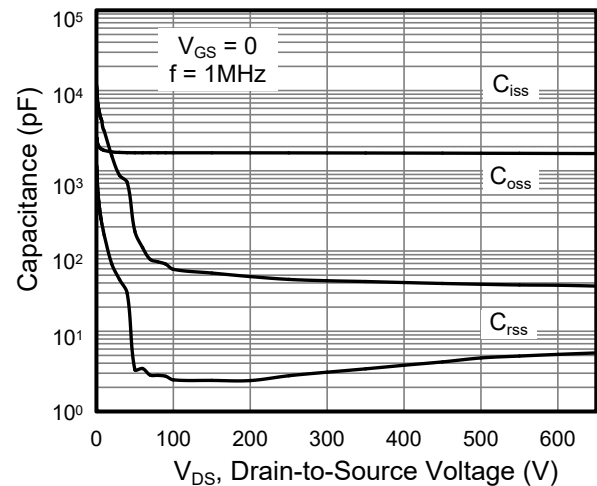
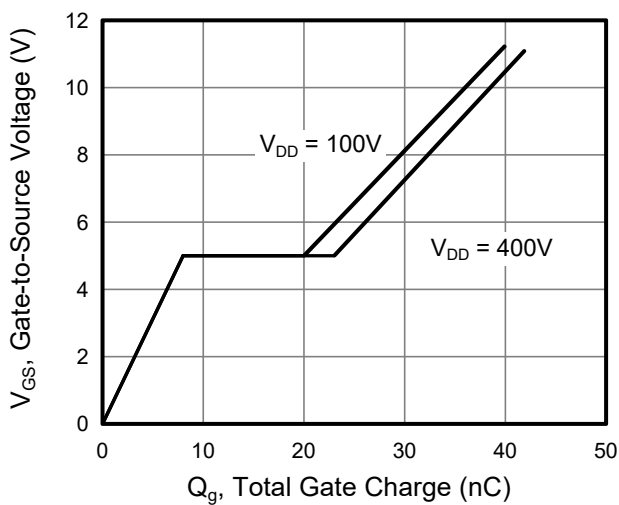
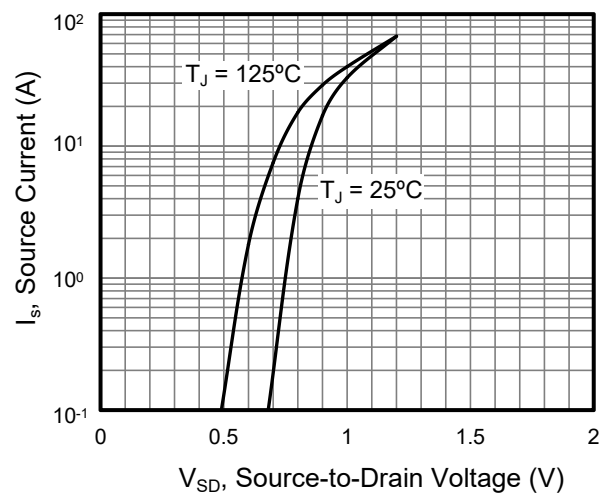
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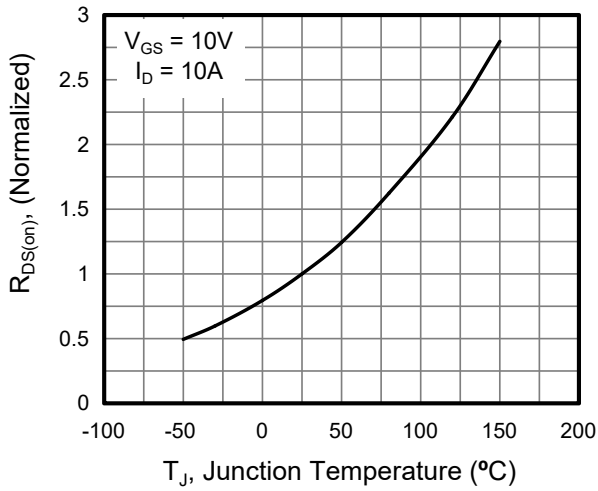
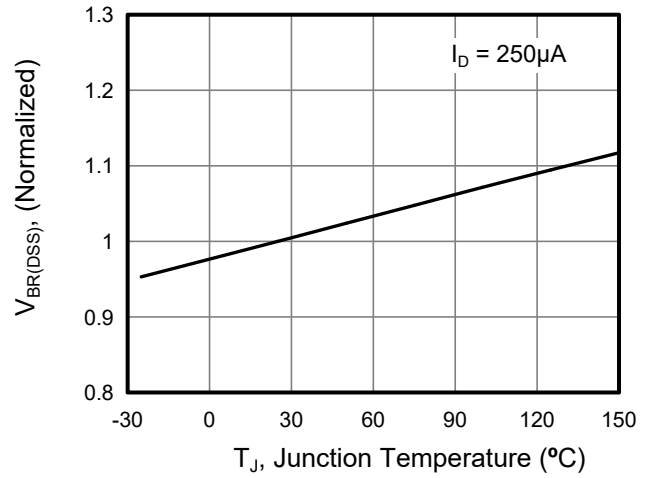
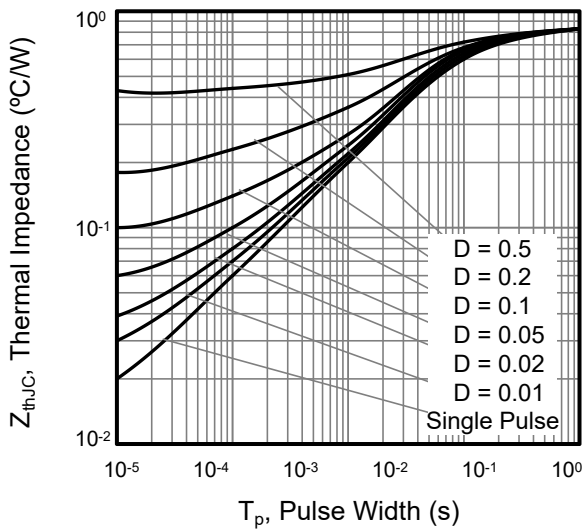
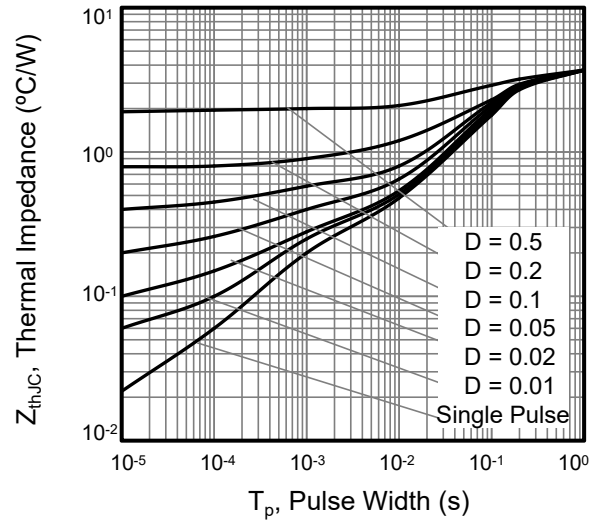
Electrical Characteristics (T_J=25°C, Unless Otherwise Noted)

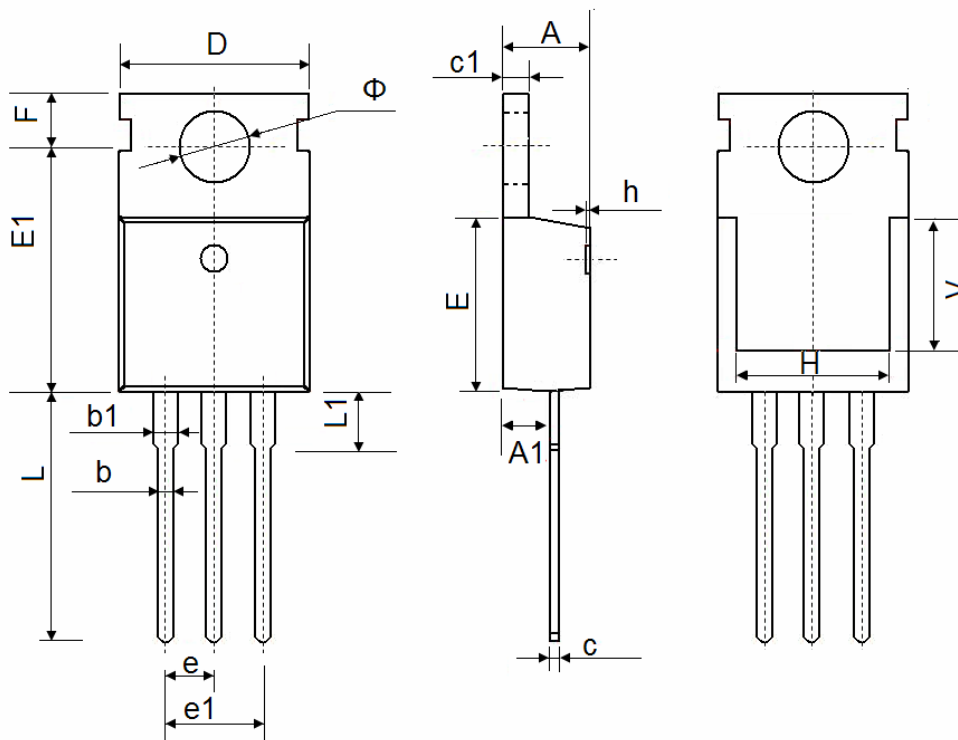
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	650	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =650V, V _{GS} =0V	---	---	1	uA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2.5	---	4.0	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 =10A	---	150	190	mΩ
Dynamic Characteristics ^⑤						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =100V, Freq.=1MHz	---	1524	---	pF
C _{oss}	Output Capacitance		---	65	---	
C _{rss}	Reverse Transfer Capacitance		---	8	---	
T _{d(on)}	Turn-on Delay Time	V _{DD} =400V, V _{GS} =10V, R _G =25Ω, I _D =20A	---	25	---	nS
T _r	Turn-on Rise Time		---	59	---	
T _{d(off)}	Turn-off Delay Time		---	121	---	
T _f	Turn-off Fall Time		---	44	---	
R _g	Gate Resistance	f = 1.0MHz, open drain	---	8	---	Ω
Q _g	Total Gate Charge	V _{DS} =400V, V _{GS} =10V, I _D =20A	---	40.5	---	nC
Q _{gs}	Gate-Source Charge		---	8	---	
Q _{gd}	Gate-Drain Charge		---	15	---	
Source-Drain Characteristics (T _J =25°C)						
V _{SD} ^④	Diode Forward Voltage	I _S =20A, V _{GS} =0V	---	0.9	1.2	V
t _{rr}	Reverse Recovery Time	V _R =400V, I _F =20 A, di/dt=100A/μs, T _J =25°C	---	453	---	nS
Q _{rr}	Reverse Recovery Charge		---	5.1	---	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

Figure 2. Transfer Characteristics

Figure 3. On-Resistance vs. Drain Current

Figure 4. Capacitance

Figure 5. Gate Charge

Figure 6. Body Diode Forward Voltage

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Figure 7. On-Resistance vs. Junction Temperature

Figure 8. Breakdown voltage vs. Junction Temperature

Figure 9. Transient Thermal Impedance TO-220/TO-263

Figure 10. Transient Thermal Impedance TO-220F

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TO-220 Package Outline Data


Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.350	4.650
A1	2.250	2.550
b	0.710	0.910
b1	1.170	1.400
c	0.330	0.650
c1	1.200	1.400
D	9.910	10.250
E	8.9500	9.750
E1	12.650	12.950
e	2.540 TYP.	
e1	4.980	5.180
F	2.650	2.950
H	7.900	8.100
h	0.000	0.300
L	12.700	13.500
L1	2.850	3.250
V	7.500 REF.	
Φ	3.400	3.800