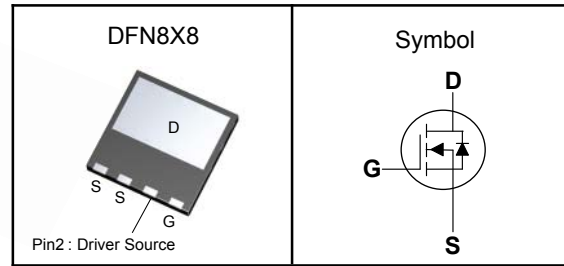


650V Super Junction Power MOSFET
Features

- Low drain-source on-resistance: $R_{DS(ON)}=0.14\Omega(\text{typ})$
- Easy to control gate switching
- Enhancement mode: $V_{th} = 2.5$ to $3.5V$
- 100% avalanche tested
- RoHS compliant

Applications

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

Pin Description


V_{DSS}	650	V
$R_{DS(ON)-Typ}$	140	m Ω
I_D	20	A

Absolute Maximum Ratings ($T_C=25^\circ C$, 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	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
E_{AS}	Single Pulse Avalanche Energy ³	480	mJ
$I_{DM}^{①}$	300 μs Pulse Drain Current Tested	60	A
I_D	Continuous Drain Current	20	A
P_D	Maximum Power Dissipation	150	W
I_{AS}	Avalanche Current	3.5	A
dv/dt	MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 400V$	50	V/ns
	Reverse diode dv/dt ³ $V_{DS}=0 \dots 400V, I_{SD} \leq I_D$	50	

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}^{③}$	Thermal Resistance Junction-Ambient ¹ (Max)	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹ (Max)	0.83	$^\circ C/W$

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

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150 $^\circ C$.

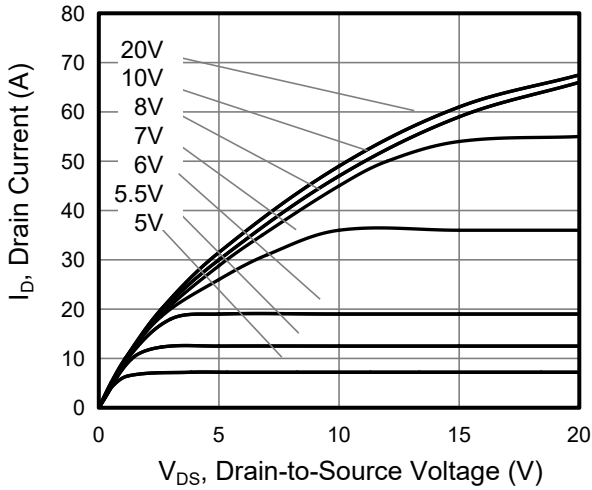
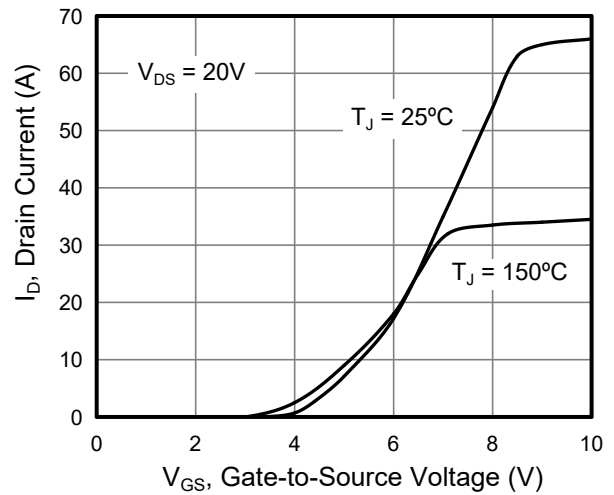
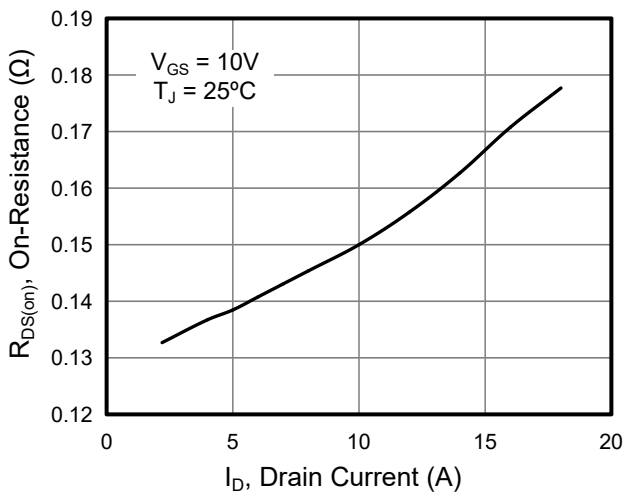
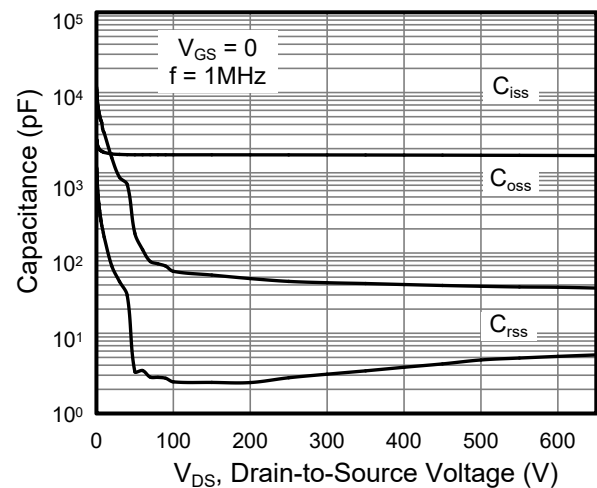
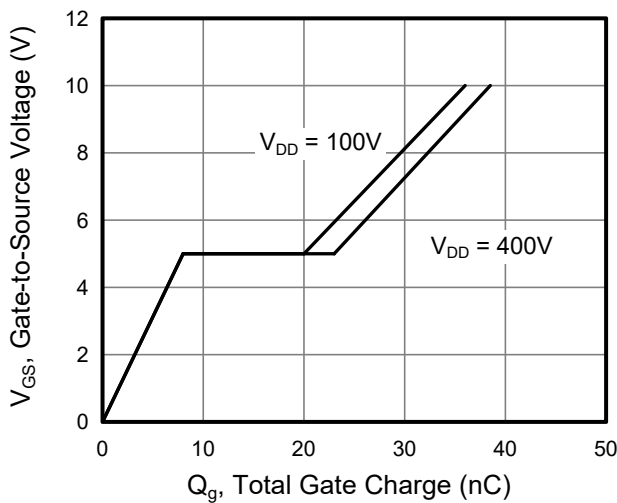
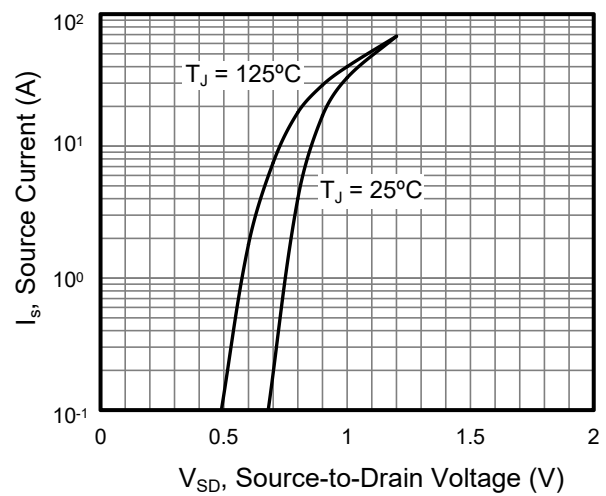
Note ③ : Surface Mounted on 1in² FR-4 board with 1oz.

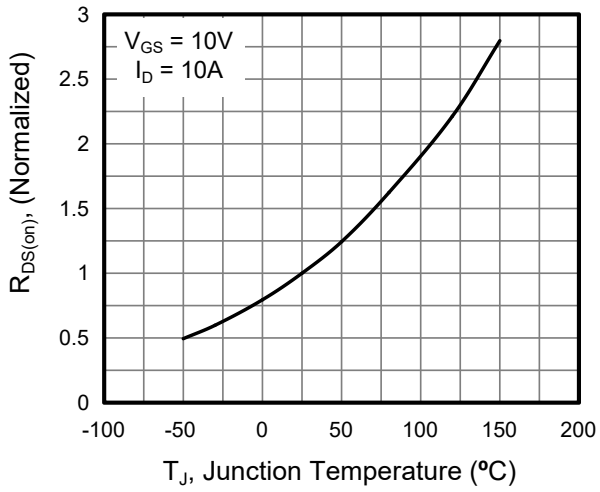
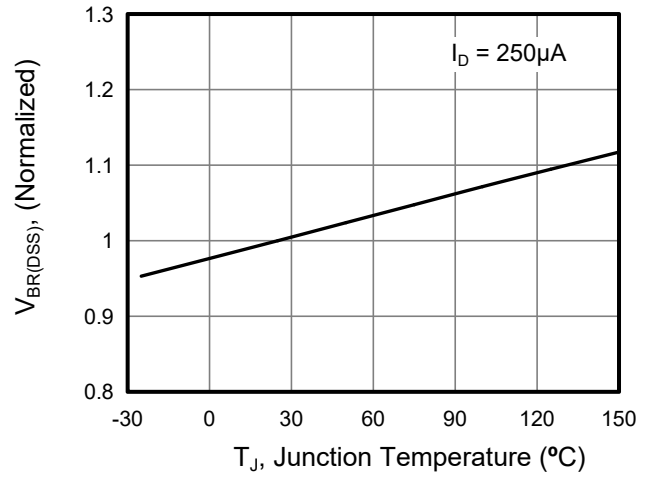
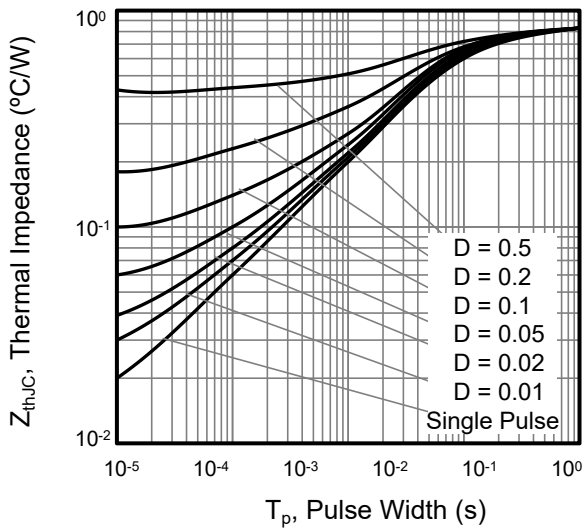
**650V Super Junction Power MOSFET****Electrical Characteristics** ($T_J=25^\circ\text{C}$, Unless Otherwise Noted)

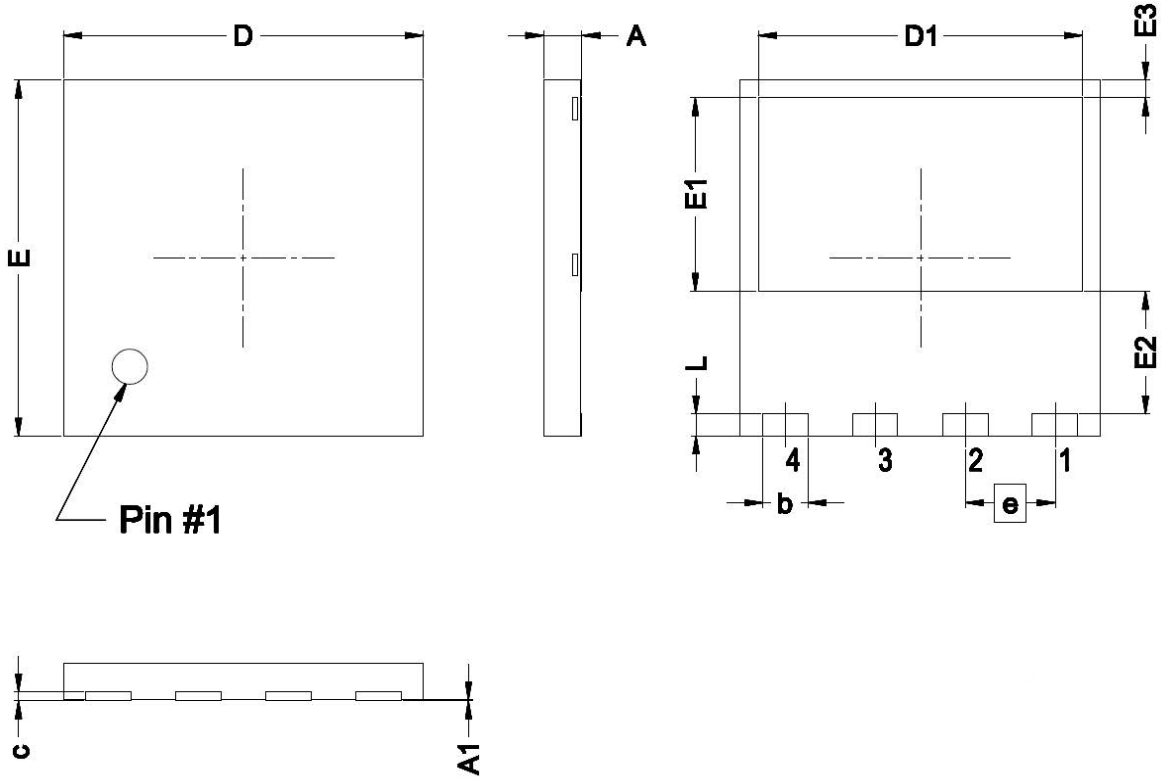
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	650	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	---	---	1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	---	3.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	± 100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_D=10A$	---	140	170	$m\Omega$
Dynamic Characteristics ^⑤						
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=100V,$ Freq.=1MHz	---	1724	---	pF
C_{oss}	Output Capacitance		---	72	---	
C_{rss}	Reverse Transfer Capacitance		---	6	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DD}=400V, V_{GS}=10V,$ $R_G=25\Omega, I_D=20A$	---	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	$f = 1.0\text{MHz}, \text{open drain}$	---	8	---	Ω
Q_g	Total Gate Charge	$V_{DS}=400V, V_{GS}=10V,$ $I_D=20A$	---	38.5	---	nC
Q_{gs}	Gate-Source Charge		---	8	---	
Q_{gd}	Gate-Drain Charge		---	15	---	
Source-Drain Characteristics ($T_J=25^\circ\text{C}$)						
V_{SD} ^④	Diode Forward Voltage	$I_S=20A, V_{GS}=0V$	---	0.9	1.2	V
t_{rr}	Reverse Recovery Time	$V_R=400V, I_F=20A,$ $di/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	453	---	nS
Q_{rr}	Reverse Recovery Charge		---	5.1	---	nC

Note ④ : Pulse test (pulse width $\leq 300\mu s$, duty cycles $\leq 2\%$).

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

650V Super Junction Power MOSFET
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

650V Super Junction Power MOSFET

Figure 7. On-Resistance vs. Junction Temperature

Figure 8. Breakdown voltage vs. Junction Temperature

Figure 9. Transient Thermal Impedance

650V Super Junction Power MOSFET
DFN8X8 Package Outline Dimensions


Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
A	0.75	0.85	0.95	E	7.90	8.00	8.10
A1	0.00		0.05	E1	4.20	4.35	4.45
b	0.90	1.00	1.10	E2	2.60	2.75	2.85
c	0.10	0.20	0.30	E3	0.30	0.40	0.50
D	7.90	8.00	8.10	e	2.00 BSC		
D1	7.10	7.20	7.30	L	0.40	0.50	0.60