650V Super Junction MOSFET

DESCRIPTION：

·Low RDS(on) per chip area(Low FOM)

·Very low switching and conduction loss

·Excellent ESD robustness

·Extremely high commutation ruggedness

·100% avalanche tested

V_{DSS}	650V
I_D @V_{GS}=10V	13.8A
$R_{DS(ON)_Typ.}$ @V_{GS}=10V	246mΩ



TO-220WF

TYPICAL APPLICATIONS：

·TV and PC Power

·Adopter and Lighting

·Telecom and UPS(Uninterruptible Power Supply)

MAXIMUM RATINGS (at T_C = 25 °C, unless otherwise specified)

Characteristic	Condition	Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±25	V
Continuous Drain Current	Tc=25℃ Tc=100℃	I_D	13.8 8.7	A
Pulsed Drain Current	Starting Tj = 25˚C, IAS = 4.5A,VDD = 50V, ID = IAR	I_{DM}	41.4	A
Avalanche Energy, Single Pulse (3)		E_{AS}	254	mJ
Power Dissipation		Ptot	32.3	W
Reverse Diode dv/dt		dv/dt	15	V/ns
Junction & Storage temperature Range		T_J, T_{STG}	-55~+150	℃
Thermal resistance,	Junction to Ambient Junction to Case	$R_{\theta JA}$ $R_{\theta JC}$	80 3.87	℃/W

ELECTRICAL CHARATERISTICS (at T_J = 25 °C, unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage VGS = 0V, ID = 250uA	$V_{(BR)DSS}$	650			V
Gate-Source threshold voltage VDS = VGS, ID = 250uA	$V_{GS(th)}$	2.5	3.5	4.5	V
Gate-Source Leakage Current VGS = ±20V, VDS = 0V	I_{GSS}			1	uA
Zero Gate Voltage Drain Current VDS = 650 V, VGS = 0 V ,Tj=25℃	I_{DSS}			1	uA
Drain-Source On-State Resistance VGS = 10V, ID = 6.9A, Tj=25°C	$R_{DS(on)}$		246	280	mΩ
Input capacitance f=250KHz, VDS=400 V, VGS=0 V	C_{iss}		1092		pF
Output capacitance f=250KHz, VDS=400 V, VGS=0 V	C_{oss}		25		pF
Reverse transfer capacitance f=250KHz, VDS=400 V, VGS=0 V	C_{rss}		2.4		pF
Effective Output Capacitance, Energy Related VGS=10V, VDS=0 to 400V	$C_{O(er)}$		37.8		pF
Effective Output Capacitance, Time Related VGS=10V, VDS=0 to 400V	$C_{O(tr)}$		203		pF
Turn-on delay time VDD=325 V, ID=6.9A, VGS=10V, R_{GEN}=10Ω	$td_{(ON)}$		23.2		ns
Rise time VDD=325 V, ID=6.9A, VGS=10V, R_{GEN}=10Ω	tr		105		ns
Turn-off delay time VDD=325 V, ID=6.9A, VGS=10V, R_{GEN}=10Ω	$td_{(OFF)}$		86.4		ns
Fall time VDD=325 V, ID=6.9A, VGS=10V, R_{GEN}=10Ω	tf		22.4		ns
Gate Resistance f=1MHz	R_g		14		Ω
Total Gate Charge VDS= 520V, ID= 6.9A,VGS= 10V	Q_G		28		nC
Gate to Source Charge VDS= 520V, ID= 6.9A,VGS= 10V	Q_{GS}		6		nC
Gate to Drain Charge VDS= 520V, ID= 6.9A,VGS= 10V	Q_{GD}		12		nC
Diode Forward Voltage VGS = 0V, I_S =6.9A	V_{SD}			1.4	V
Continuous Diode forward current	I_{SD}			13.8	A
Revers Recovery Time V_{DS}=100V,I_{SD}=6.9A, di_F/dt = 100A/us	Trr		235		ns
Peak Reverse Recovery Current V_{DS}=100V,I_{SD}=6.9A, di_F/dt = 100A/us	Irrm		18.6		A
Revers Recovery Charge V_{DS}=100V,I_{SD}=6.9A, di_F/dt = 100A/us	Qrr		2.19		nC

Typical Performance Characteristics

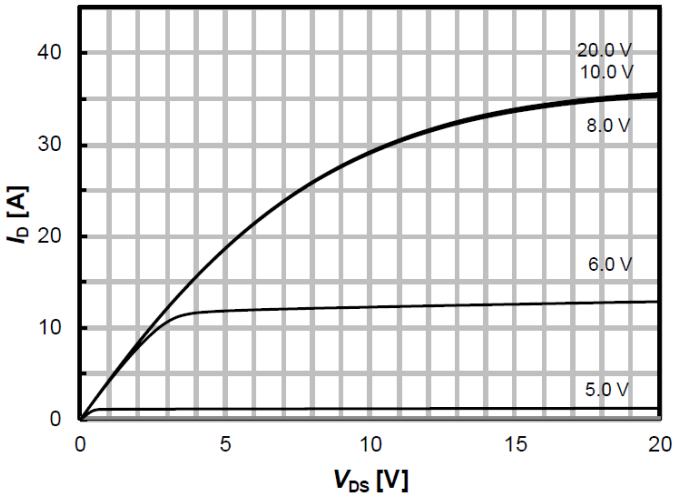


Figure 1. Output Characteristics

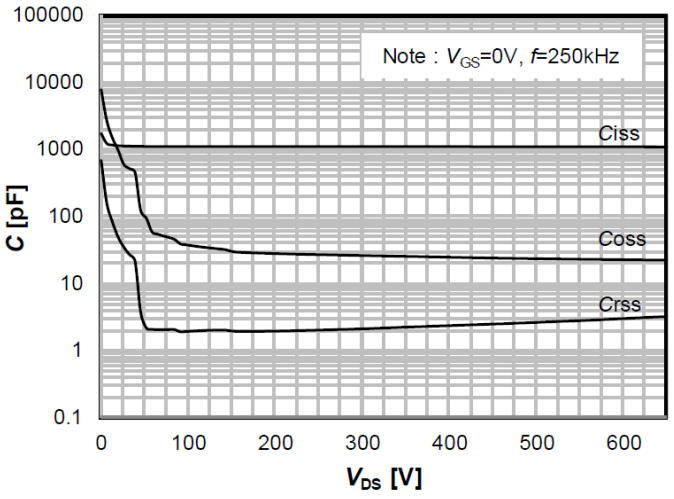


Figure 2. Capacitances

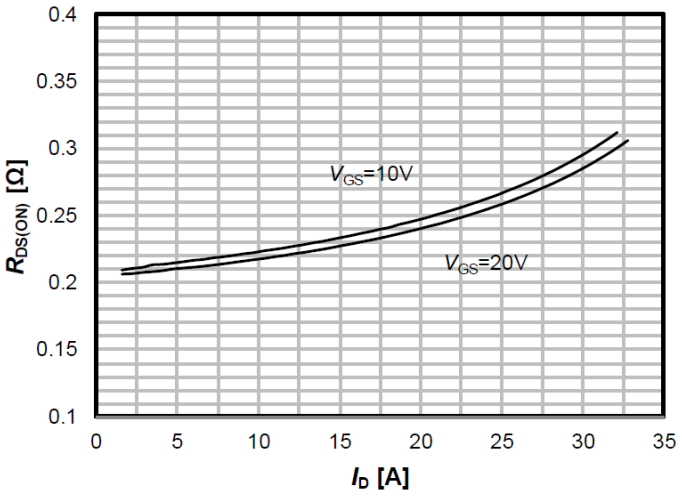


Figure 3. On-state Resistance

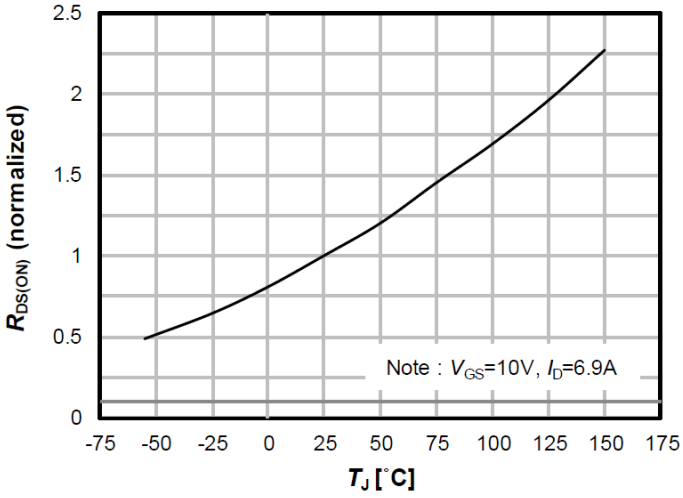


Figure 4. On-state Resistance with Temperature

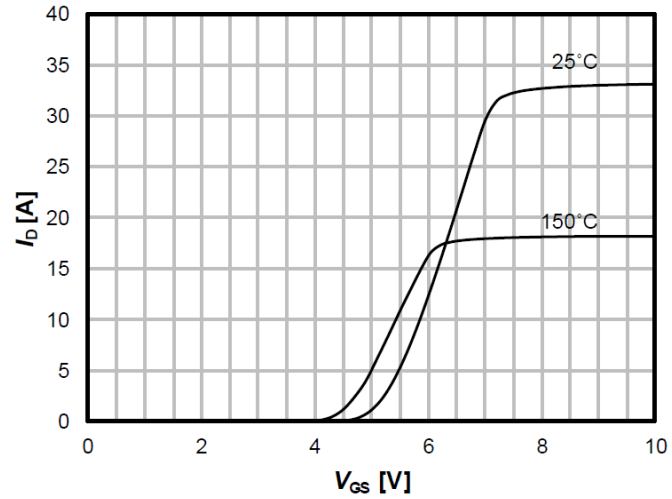


Figure 5. Transfer Characteristics

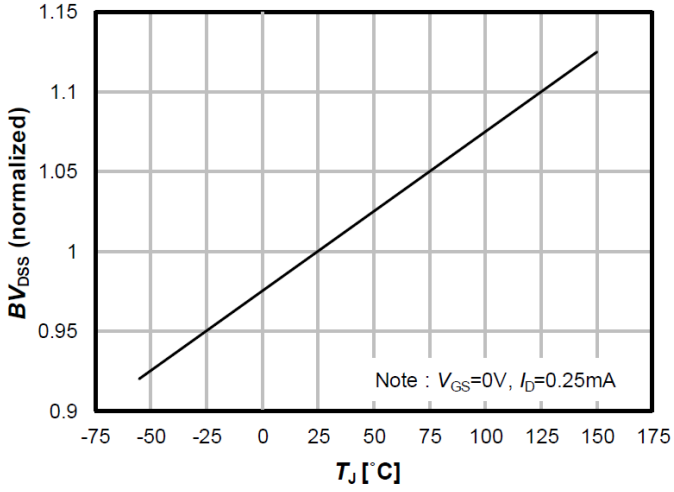


Figure 6. Breakdown Voltage with Temperature

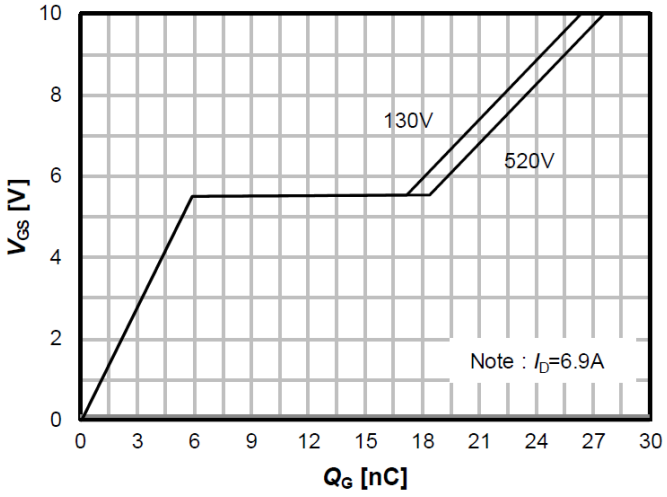


Figure 7. Gate Charge

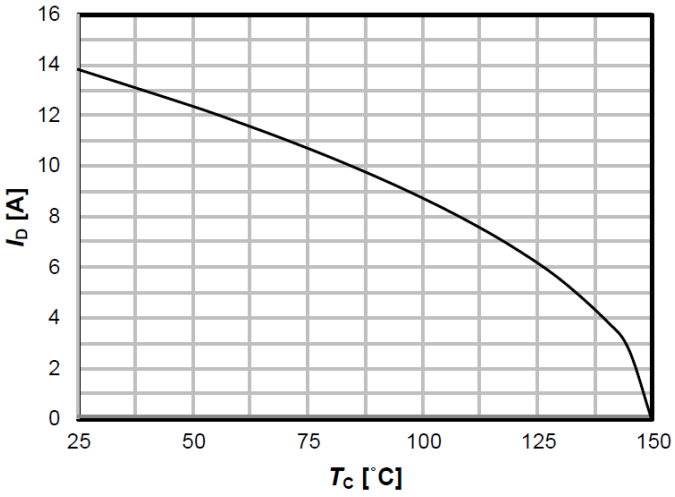


Figure8. Maximum Drain Current

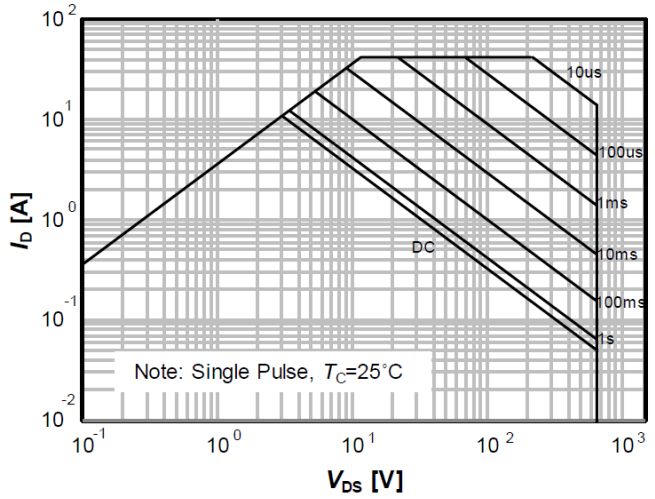


Figure 9. Safe Operating Area

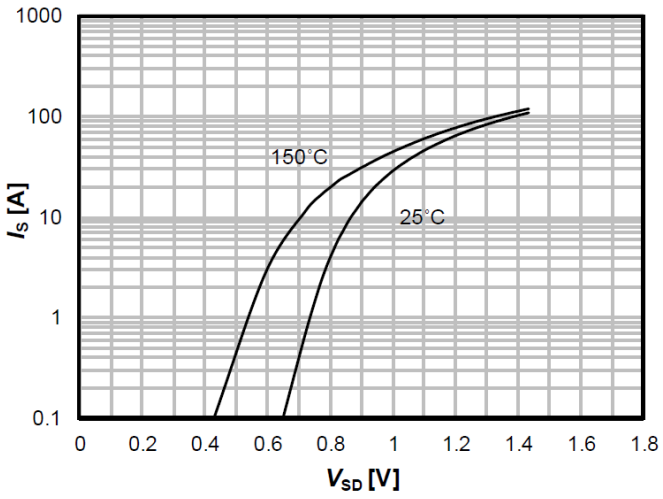


Figure 10. Body Diode Characteristics

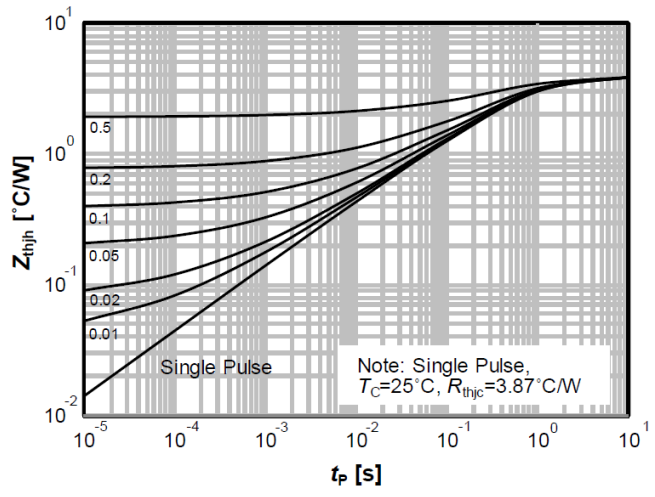


Figure 11. Maximum Transient Thermal Characteristics

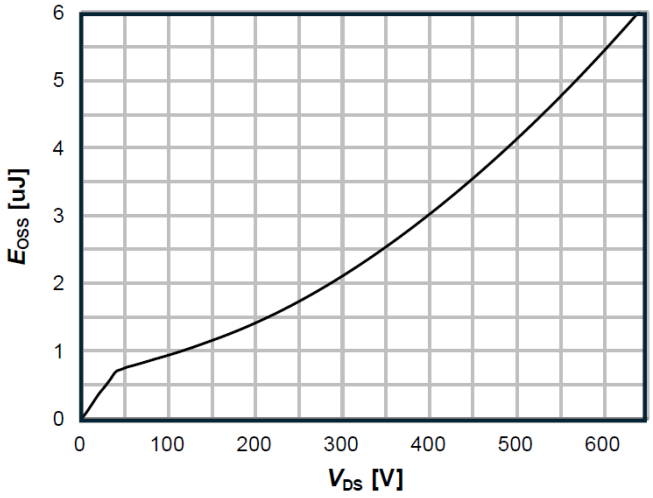
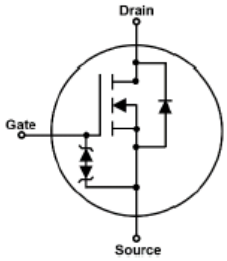
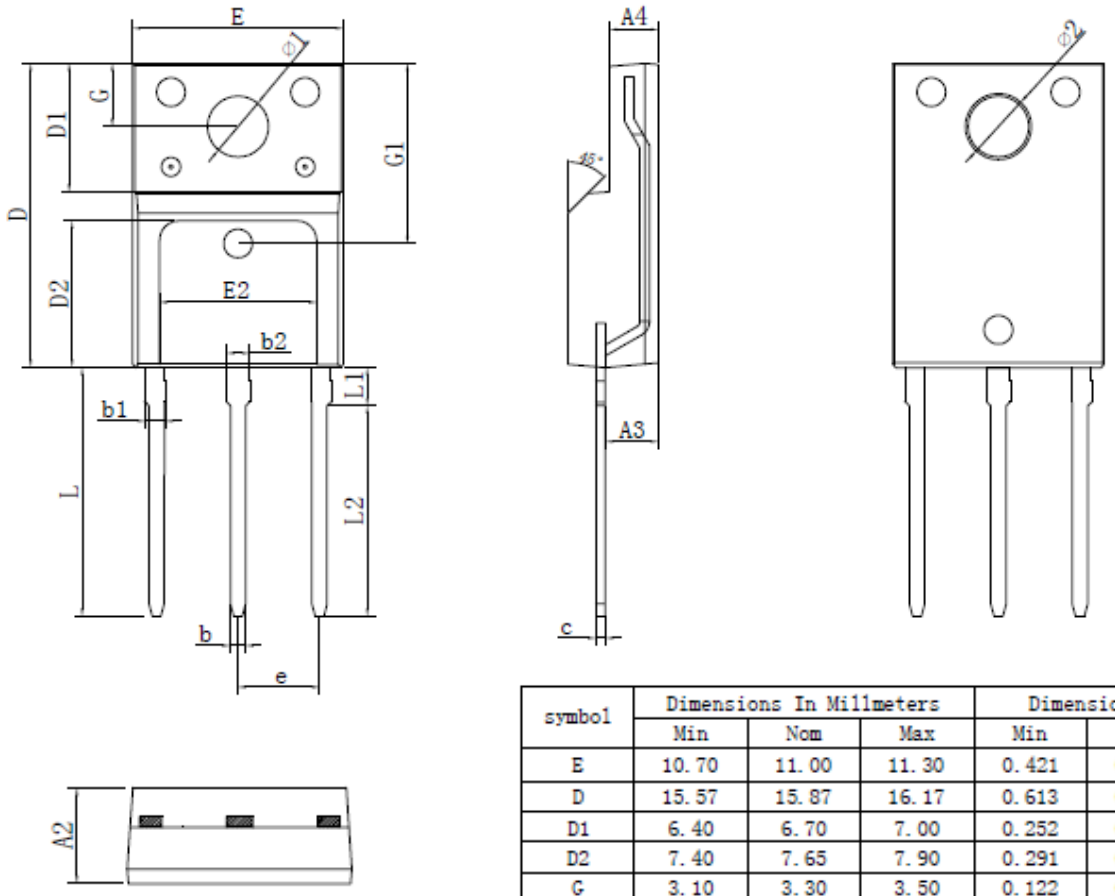


Figure 12. Coss Stored Energy

·Circuit diagram



·Package outlines : Dimensions in (mm)



symbol	Dimensions In Millmeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
E	10.70	11.00	11.30	0.421	0.433	0.445
D	15.57	15.87	16.17	0.613	0.625	0.637
D1	6.40	6.70	7.00	0.252	0.264	0.276
D2	7.40	7.65	7.90	0.291	0.301	0.311
G	3.10	3.30	3.50	0.122	0.130	0.138
G1	9.35 BSC			0.368 BSC		
E2	7.90	8.20	8.50	0.311	0.323	0.335
L	12.68	12.98	13.28	0.499	0.511	0.523
L1	1.75	2.00	2.25	0.069	0.079	0.089
L2	10.68	10.98	11.28	0.420	0.432	0.444
b	0.75	0.80	0.90	0.030	0.031	0.035
b1	0.98	1.08	1.26	0.039	0.043	0.050
b2	1.25			0.049		
A2	4.50	4.70	4.90	0.177	0.185	0.193
A3	2.65	2.76	2.95	0.104	0.109	0.116
A4	2.34	2.54	2.74	0.092	0.100	0.108
e	4.25 BSC			0.167 BSC		
c	0.40	0.50	0.60	0.016	0.020	0.024
Ø1	2.95	3.15	3.35	0.116	0.124	0.132
Ø2	3.20	3.40	3.60	0.126	0.134	0.142

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