650V Super-junction Power MOSFET

V_{DSS}	650V
I_D	45A
$R_{DS(ON)_MAX}$ @V_{GS}=10V	75mΩ

DESCRIPTION：

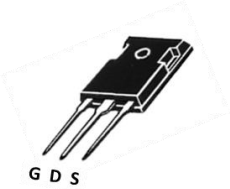
·Very low FOM $R_{DS(on)}$×Qg

·Ultra fast body diode

·100% avalanche tested

·Easy to use/drive

·RoHS compliant



TO-247

TYPICAL APPLICATIONS：

·Switch Mode Power Supply (SMPS)

·Uninterruptible Power Supply (UPS)

·Power Factor Correction (PFC)

·LLC Half bridge

·Charger

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

Characteristic	Condition	Symbol	Value	Unit
Continuous Drain Current	Tc=25℃ Tc=100℃	I_D	45 28	A
Pulsed Drain Current (1)		$I_{D\ pulse}$	135	A
Gate-Source Voltage		V_{GS}	±30	V
Single Pulsed Avalanche Energy (2)		E_{AS}	361	mJ
Repetitive Avalanche Energy (2)		E_{AR}	1.4	mJ
Avalanche Current		I_{AS}	8.5	A
Power dissipation		P_D	312	W
Continuous Diode Forward Current		I_S	45	A
Diode Pulsed Current (1)		$I_{S\ pulse}$	135	A
Reverse Diode dv/dt		dv/dt	50	V/ns
Junction & Storage temperature Range		T_J, T_{STG}	-55~+150	℃

Notes： 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2. L = 10mH, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C

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
Zero Gate Voltage Drain Current VDS = 650 V, VGS = 0 V ,Tj=25℃ VDS = 650 V, VGS = 0 V ,Tj=150℃	I_{DSS}			10 500	uA
Gate-Source Leakage Current VGS = ±30V, VDS = 0V	I_{GSS}			±100	nA
Gate-Source threshold voltage VDS = VGS, ID = 250uA	$V_{GS(th)}$	3.0	3.7	5.0	V
Drain-Source On-State Resistance VGS = 10V, ID = 22A	$R_{DS(on)}$		0.058	0.075	Ω
Gate Resistance f=1MHz	Rg		0.54		Ω
Input capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{iss}		4253		pF
Output capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{oss}		144		pF
Reverse transfer capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{rss}		10		pF
Total Gate Charge VDS= 400V, ID= 22A,VGS= 10V	Q_G		72		nC
Gate to Source Charge VDS= 400V, ID= 22A,VGS= 10V	Q_{GS}		23.2		nC
Gate to Drain Charge VDS= 400V, ID= 22A,VGS= 10V	Q_{GD}		21.6		nC
Turn-on delay time VDD=400 V, ID=22A, R_{GEN}=25Ω	td (ON)		270		ns
Rise time VDD=400 V, ID=22A, R_{GEN}=25Ω	tr		6.72		ns
Turn-off delay time VDD=400 V, ID=22A, R_{GEN}=25Ω	td (OFF)		153		ns
Fall time VDD=400 V, ID=22A, R_{GEN}=25Ω	tf		12.4		ns
Diode Forward Voltage VGS = 0V, I_{SD} =22A	V_{SD}		0.9	1.2	V
Revers Recovery Time V_R=400V, I_S =22A, di_F/dt = 100A/us	Trr		198		ns
Revers Recovery Charge V_R=400V, I_S =22A, di_F/dt = 100A/us	Qrr		1.177		uC
Peak Reverse Recovery Current V_R=400V, I_S =22A, di_F/dt = 100A/us	Irrm		10.5		A

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Ambient Junction to Case	$R_{\theta JA}$ $R_{\theta JC}$	62 0.4	℃/W

Typical Performance Characteristics

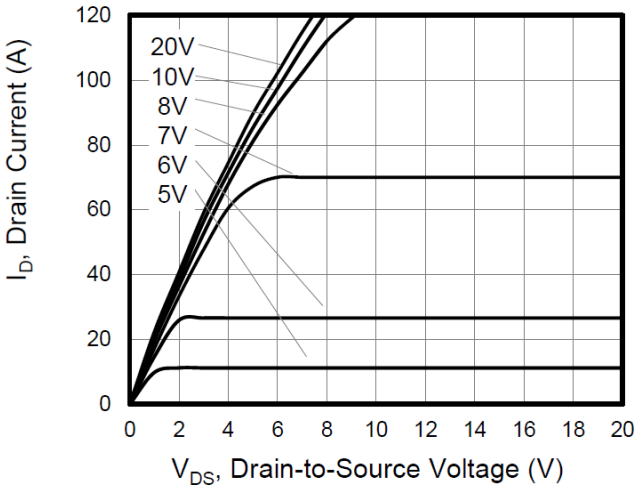


Figure 1. Output Characteristics

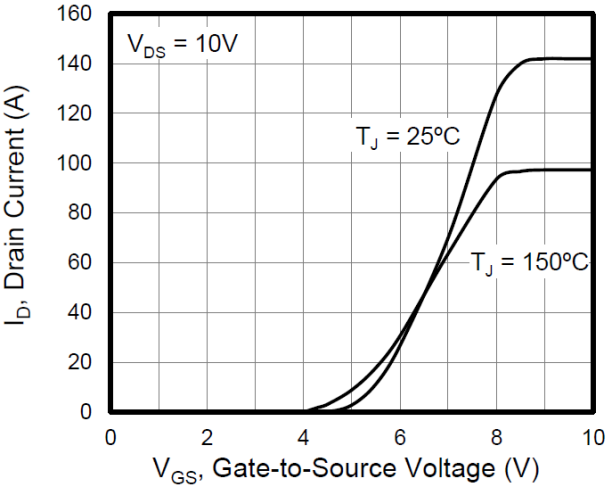


Figure 2. Transfer Characteristics

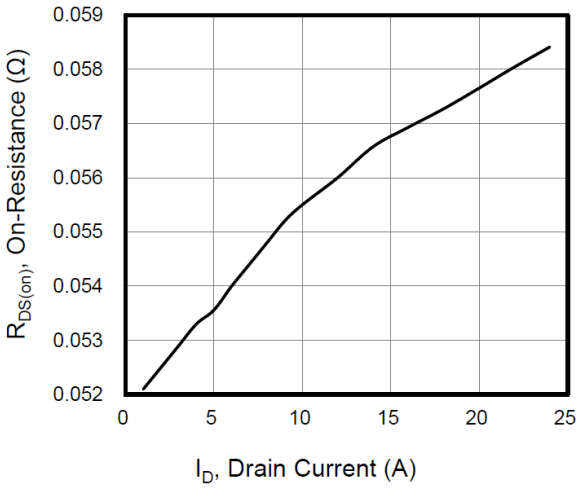


Figure 3. On-Resistance vs. Drain Current

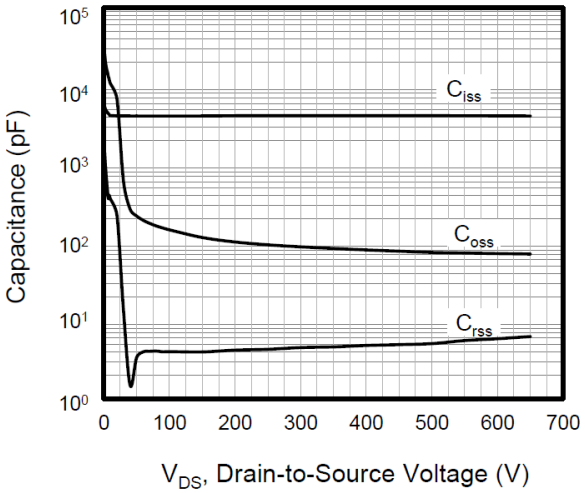


Figure 4. Capacitance

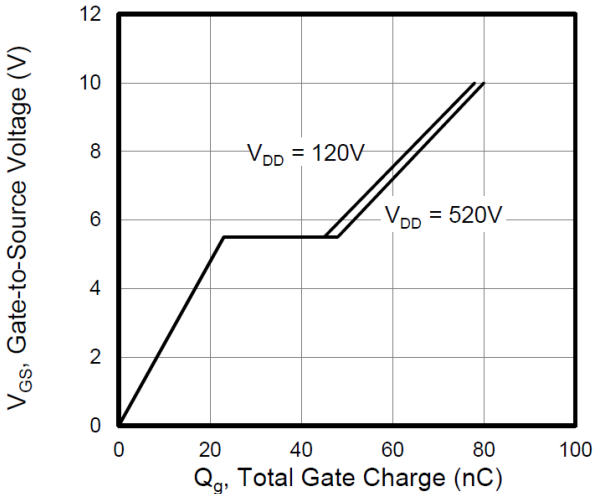


Figure 5. Gate Charge

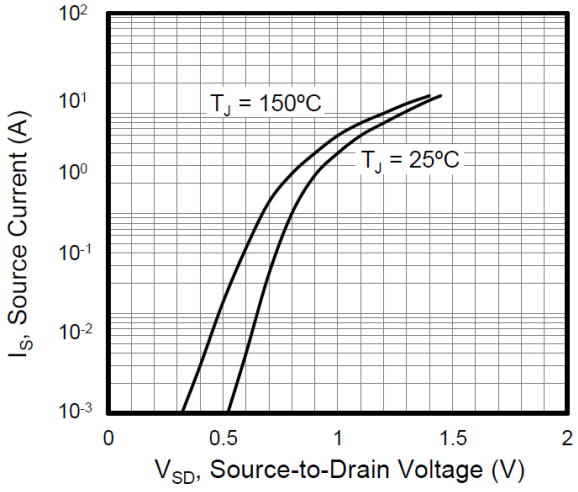


Figure 6. Body Diode Forward Voltage

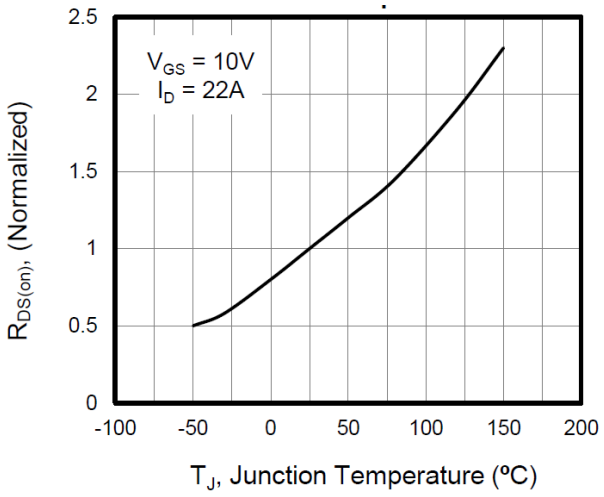


Figure 7. On-Resistance vs. Junction Temperature

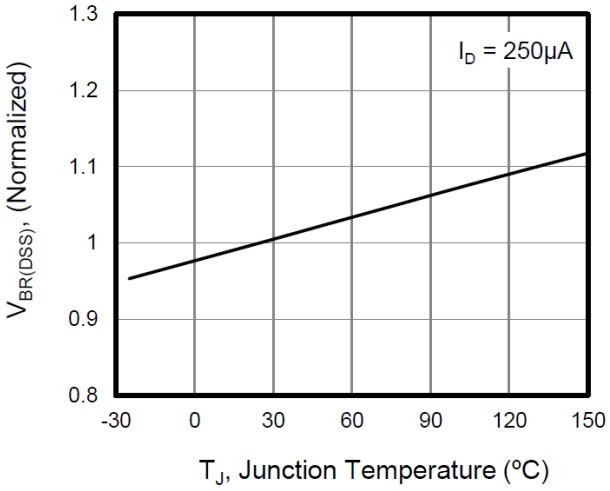


Figure8. Breakdown voltage vs. Junction Temperature

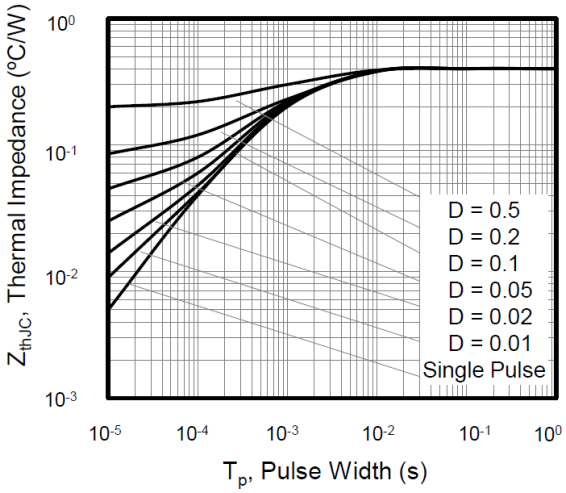


Figure 9. Transient Thermal Impedance

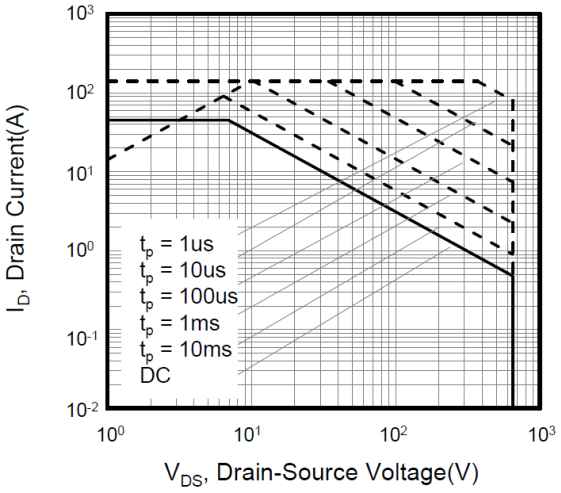


Figure 10. Safe Operation Area

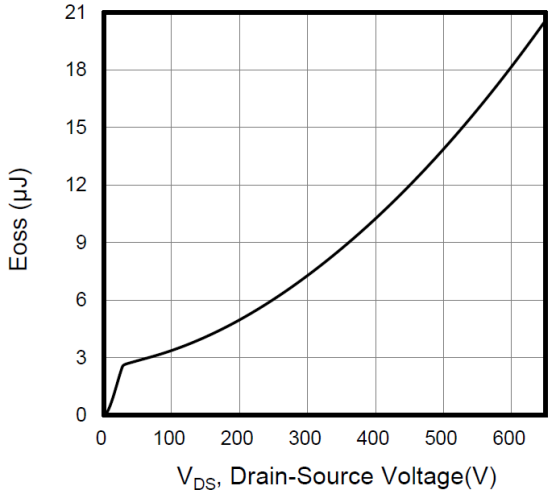
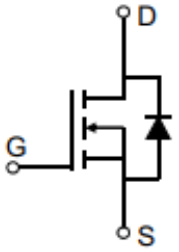
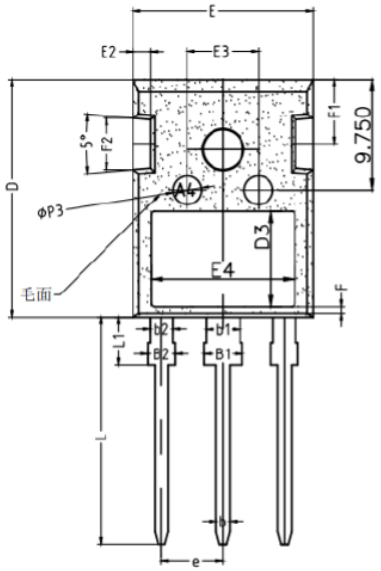


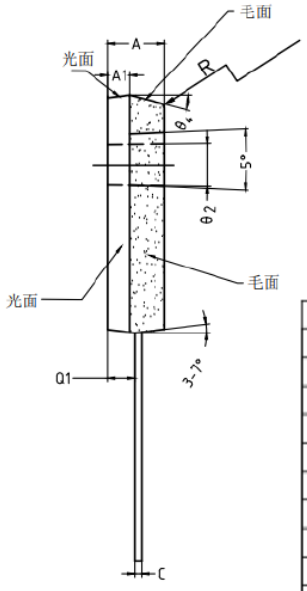
Figure 11. Typ. Coss Stored Energy

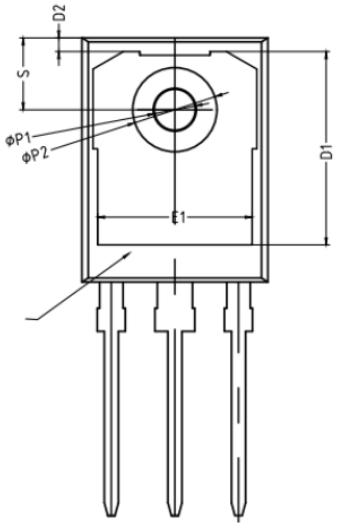
·Circuit diagram



·Package outlines : Dimensions in (mm)







SYMBOL	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	1.90	2.00	2.10
b	1.15	1.20	1.25
b1	2.95	3.00	3.05
b2	1.95	2.00	2.05
B1	3.00	3.10	3.20
B2	1.90	2.00	2.10
c	0.55	0.60	0.65
D	20.90	21.00	21.10
D1	16.45	16.55	16.65
D2	1.07	1.17	1.27
D3	8.15	8.20	8.25
E	15.70	15.80	15.90
E1	13.16	13.26	13.36
E2	2.40	2.50	2.60
E3	6.10	6.20	6.30
E4	12.70	12.80	12.90
F	0.75	0.85	0.95
F1	5.70	5.80	5.90
F2	4.90	5.00	5.10
F3	9.90	10.00	10.10
e		5.44BSC	
L	19.72	19.92	20.12
L1	4.03	4.13	4.23
θ1	5°	7°	9°
θ2	1°	2°	3°
θ3	4°	5°	6°
θ4	13°	15°	17°
ΦP1	3.50	3.60	3.70
ΦP2	7.09	7.19	7.29
ΦP3	2.40	2.50	2.60
Q1	2.31	2.41	2.51
S	6.05	6.15	6.25
R	0.30	0.40	0.50

（单位：mm）

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