650V N-Channel Power MOSFET

V_{DSS}	650V
I_D	47A
$R_{DS(ON)_Typ.}$ @V_{GS}=10V	0.088Ω

DESCRIPTION：

·Very low FOM $R_{DS(on)}$×Qg

·Ultra-fast body diode

·100% avalanche tested

·Easy to use/drive

·RoHS compliant



TO-247-3L

TYPICAL APPLICATIONS：

·Switch Mode Power Supply (SMPS)

·Uninterruptible Power Supply (UPS)

·Power Factor Correction (PFC)

·LLC Half-bridge

·Charger

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

Characteristic	Condition	Symbol	Value	Unit
Continuous Drain Current	Tc=25℃ Tc=100℃	I_D	47 28.2	A
Pulsed Drain Current (1)		$I_{D\ pulse}$	141	A
Gate-Source Voltage		V_{GS}	±30	V
Single Pulsed Avalanche Energy (2)		E_{AS}	1160	mJ
Repetitive Avalanche Energy (2)		E_{AR}	1.76	mJ
Avalanche Current		I_{AR}	8.7	A
Power dissipation		P_D	391	W
Continuous Diode Forward Current		I_S	47	A
Diode Pulsed Current (1)		$I_{S\ pulse}$	141	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. I_{AS} = 8.7A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Ambient Junction to Case	$R_{\theta JA}$ $R_{\theta JC}$	62 0.32	℃/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
Zero Gate Voltage Drain Current VDS = 650 V, VGS = 0 V ,Tj=25℃ VDS = 650 V, VGS = 0 V ,Tj=150℃	I_{DSS}			5 5000	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		5	V
Drain-Source On-State Resistance VGS = 10V, ID = 24A	$R_{DS(on)}$		0.088	0.1	Ω
Gate Resistance f=1MHz	Rg		0.8		Ω
Input capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{iss}		3587		pF
Output capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{oss}		106		pF
Reverse transfer capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{rss}		2.6		pF
Total Gate Charge VDS= 520V, ID= 47A,VGS= 10V	Q_G		78		nC
Gate to Source Charge VDS= 520V, ID= 47A,VGS= 10V	Q_{GS}		24		nC
Gate to Drain Charge VDS= 520V, ID= 47A,VGS= 10V	Q_{GD}		32		nC
Turn-on delay time VDD=400 V, ID=47A, R_{GEN}=25Ω	td (ON)		49		ns
Rise time VDD=400 V, ID=47A, R_{GEN}=25Ω	tr		123		ns
Turn-off delay time VDD=400 V, ID=47A, R_{GEN}=25Ω	td (OFF)		105		ns
Fall time VDD=400 V, ID=47A, R_{GEN}=25Ω	tf		49		ns
Diode Forward Voltage VGS = 0V, I_{SD} =24A	V_{SD}		1.0	1.5	V
Revers Recovery Time V_R=400V, I_F=23A, di_F/dt = 100A/us	Trr		145		ns
Revers Recovery Charge V_R=400V, I_F=23A, di_F/dt = 100A/us	Qrr		0.87		uC
Peak Reverse Recovery Current V_R=400V, I_F=23A, di_F/dt = 100A/us	Irrm		12		A

Typical Performance Characteristics

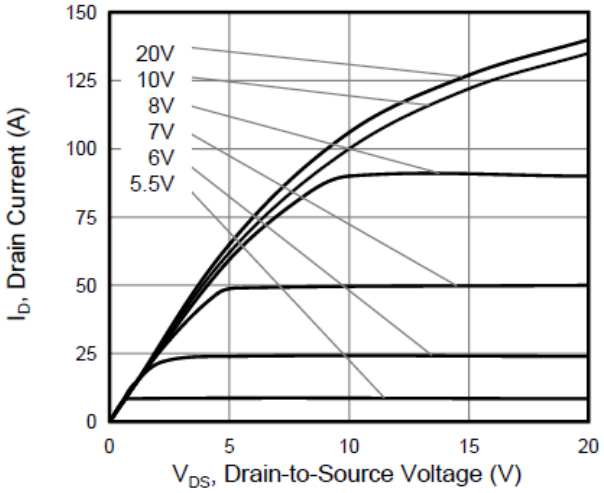


Figure 1. Output Characteristics

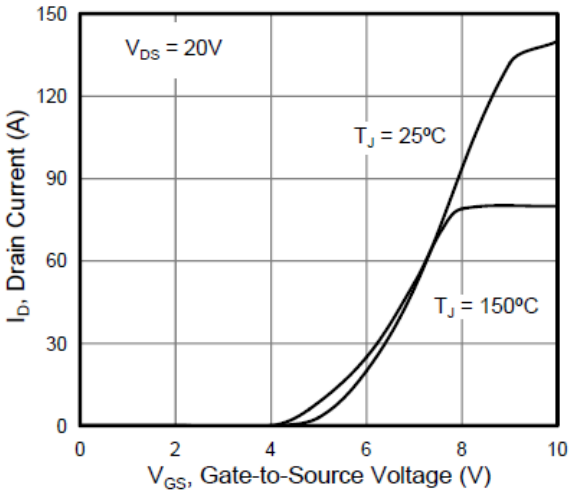


Figure 2. Transfer Characteristics

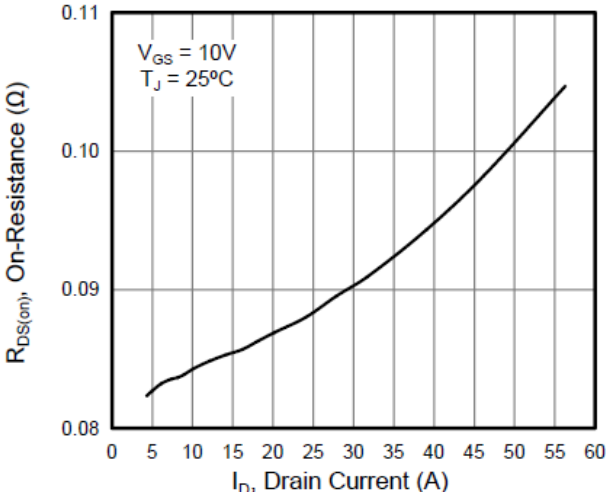


Figure 3. On-Resistance vs. Drain Current

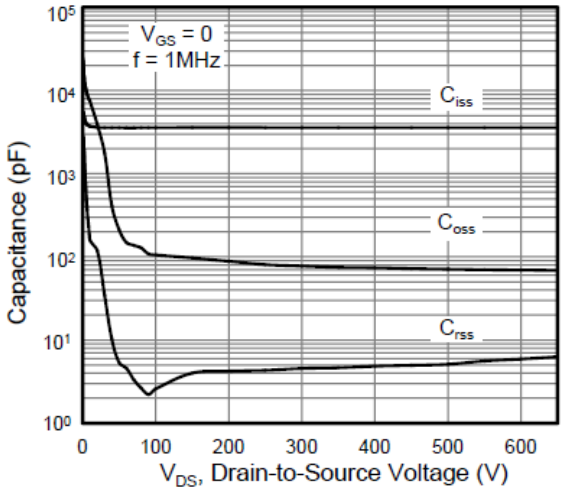


Figure 4. Capacitance

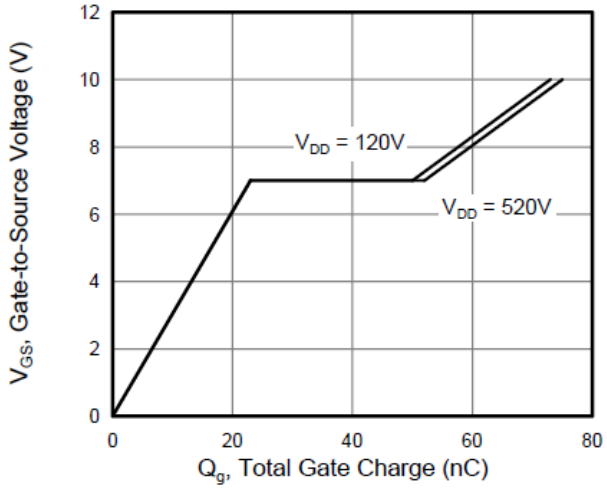


Figure 5. Gate Charge

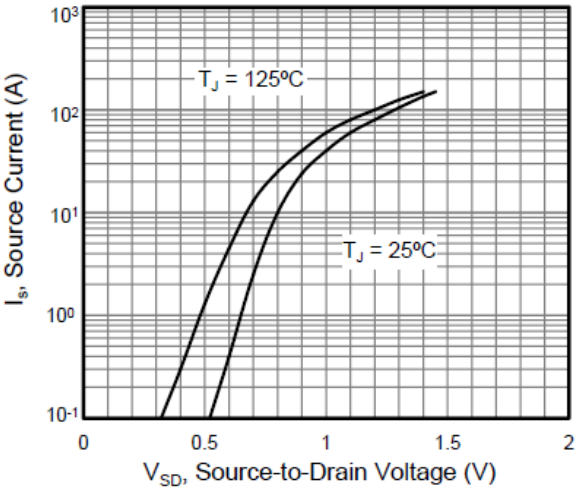


Figure 6. Body Diode Forward Voltage

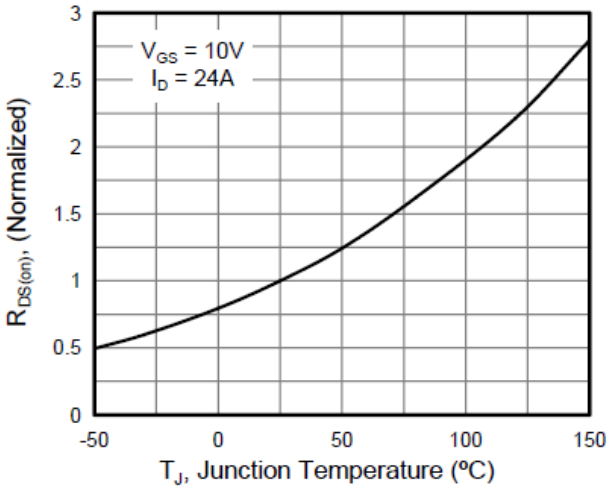


Figure 7. On-Resistance vs.Temperature

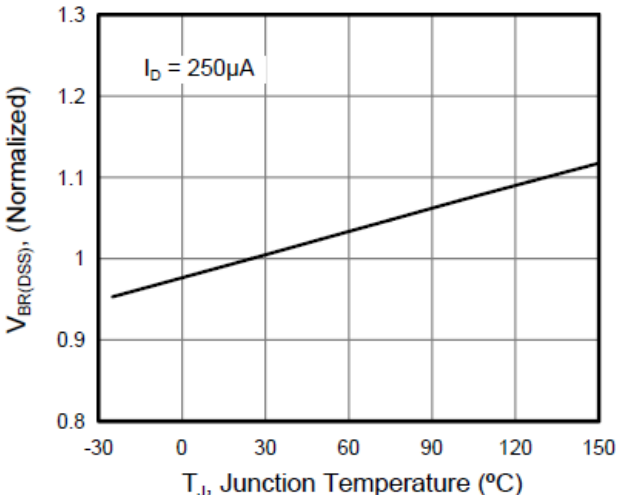


Figure8. Breakdown voltage vs. Junction Temperature

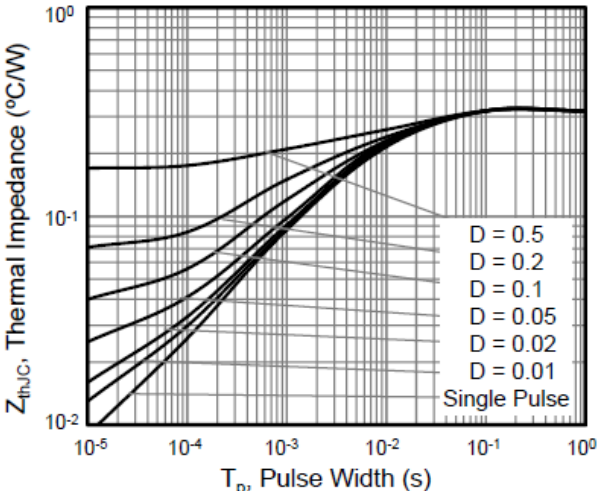


Figure 9. Transient Thermal Impedance

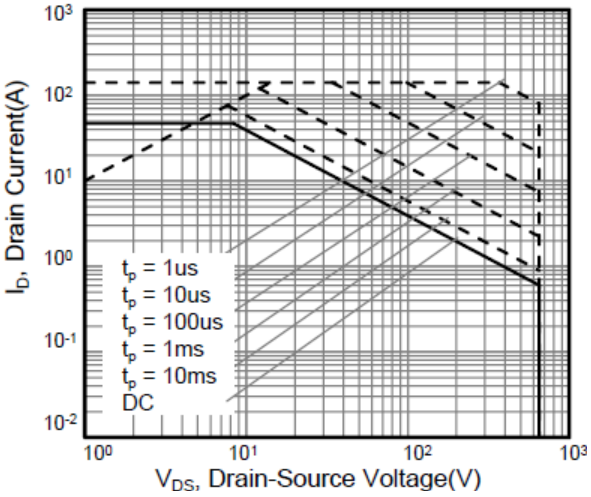


Figure 10. Safe Operation Area

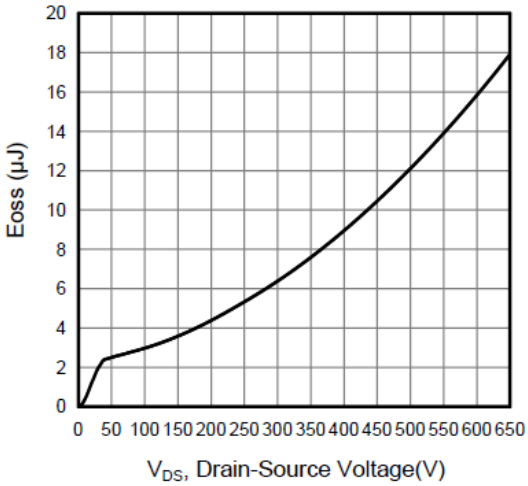
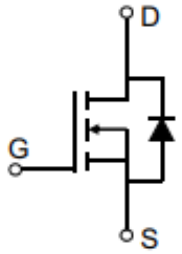
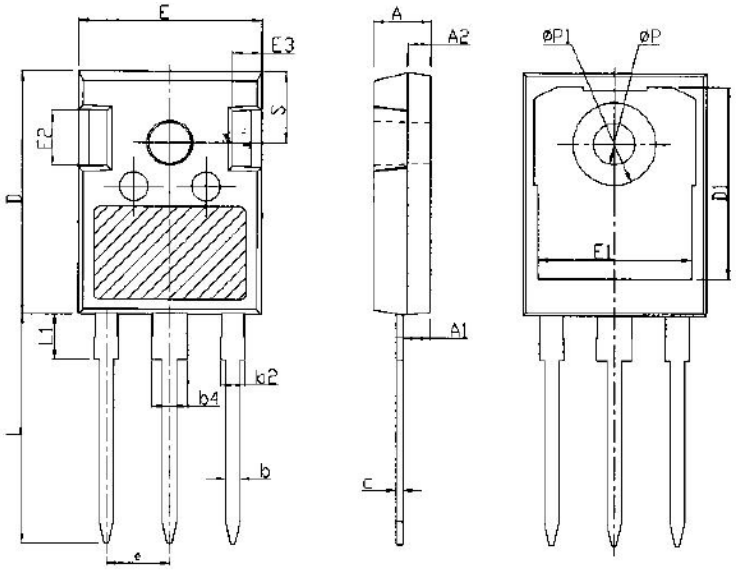


Figure 11. Typ. Coss Stored Energy

·Circuit diagram



·Package outlines :



Unit:mm			
Symbol	Min.	Nom	Max.
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85

Unit:mm			
Symbol	Min.	Nom.	Max.
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

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