

Description

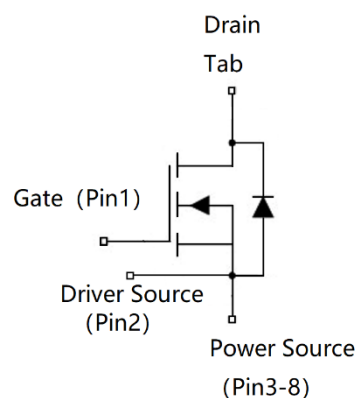
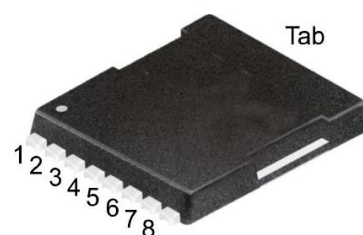
Silicon Carbide (SiC) MOSFET use a completely new technology that provide superior switching performance and higher reliability compared to Silicon. In addition, the low ON resistance and compact chip size ensure low capacitance and gate charge. Consequently, system benefits include highest efficiency, faster operating frequency, increased power density, reduced EMI, and reduced system size.

Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low RDS(on)
- Optimized package with separate driver source pin
- Easy to parallel and simple to drive
- ROHS Compliant, Halogen free

Application

- EV motor drive
- High Voltage DC/DC Converters
- Switch Mode Power Supplies
- Solar inverters
- EV charging



Ordering Information

Part Number	Marking	Package	Packaging
A3GR20N1200MD02	A3GR20N1200MD02	Toll	Reel

Absolute Maximum Ratings(Tc=25°C)

Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage	1200	V
I _D	Drain Current(continuous)at Tc=25°C	100	A
I _D	Drain Current(continuous)at Tc=100°C	75	A
I _{DM}	Drain Current (pulsed)	200	A
V _{GS}	Gate-Source Voltage	-8/+19	V
P _D	Power Dissipation T _C = 25°C	470	W
T _J , Tstg	Junction and Storage Temperature Range	-55 to +175	°C

Electrical Characteristics(T_J = 25°C unless otherwise specified)
Typical Performance-Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV _{DS}	Drain-source Breakdown Voltage	I _D =250μA, V _{GS} =0V	1200			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =1200V, V _{GS} =0V, T _J =25°C		5	100	μA
I _{GSS}	Gate-body Leakage Current	V _{DS} =0V ; V _{GS} =-8 to 19V		10	250	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =22mA	1.8	2.5	3.6	V
V _{GS(on)}	Recommended turn-on Voltage	Static		15		V
V _{GS(off)}	Recommended turn-off Voltage			-4		V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} =15V, I _D =50A		20	28	mΩ
		V _{GS} =15V, I _D =50A T _J =175°C		34		mΩ

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C _{iss}	Input Capacitance	V _{DS} =1000V, f=1MHz, V _{AC} =25mV		7218		pF
C _{oss}	Output Capacitance			275		pF
C _{rss}	Reverse Transfer Capacitance			12		pF
g _{fs}	Transconductance	V _{DS} =20V, I _D =50A		60		S
E _{OSS}	C _{OSS} Stored Energy	V _{DS} =1000V, f=1MHz		117		μJ
E _{ON}	Turn-On Energy (Body Diode)	V _{DS} =800V, V _{GS} =-4/15V, I _D =50A, L=150μH T _J =175°C		1.72		mJ
E _{OFF}	Turn-Off Energy (Body Diode)			0.38		mJ
Q _g	Total Gate Charge	V _{DS} =800V, V _{GS} =-4V/15V, I _D =50 A		172		nC
Q _{gs}	Gate-source Charge			60		nC
Q _{gd}	Gate-Drain Charge			58		nC
R _{G(int)}	Internal Gate Resistance	f=1MHz, V _{AC} =25mV		3		Ω
t _{d(on)}	Turn-on Delay Time	V _{DS} =800V, V _{GS} =-4V/15V, I _D =50A, L=150 μH R _{ext} =2.5Ω		32		ns
t _r	Rise Time			36		ns
t _{d(off)}	Turn-off Delay Time			61		ns
t _f	Fall Time			14		ns

Typical Performance-Reverse Diode(T_J = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{FSD}	Forward Voltage	V _{GS} =0V, I _F =37.5A, T _J =25°C		3.2	6	V
		V _{GS} =0V, I _F =37.5A, T _J =175°C		2.9	6	V
I _S	Continuous Diode Forward Current	V _{GS} =0V, T _C =25°C		100		A
t _{rr}	Reverse Recovery Time	V _{GS} =-4 V, I _F =50 A, V _R =800 V, di/dt=1900 A/μs, T _J =175°C		38		nS
Q _{rr}	Reverse Recovery Charge			932		nC
I _{rrm}	Peak Reverse Recovery Current			45		A

Thermal Characteristics

Symbol	Parameter	Value.	Unit
R _{θJC}	Thermal Resistance, Junction-to-Case	0.32	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	40	°C/W

The values are based on the junction-to case thermal impedance which is measured with the device mounted to a large heat sink assuming maximum junction temperature of T_J(max)=175°C

Electrical Characteristics

Fig1. Output characteristics ($T_J = 25^\circ\text{C}$)

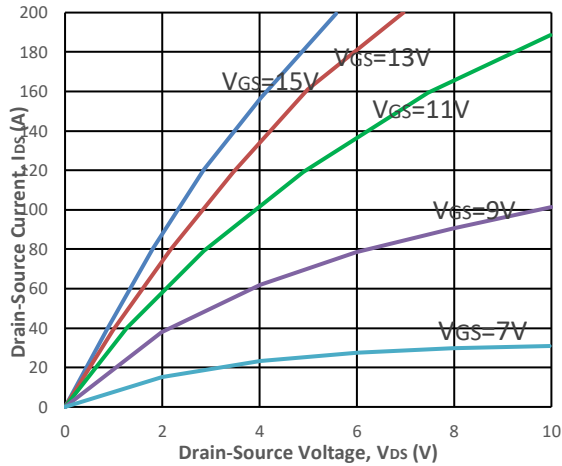


Fig2. Output characteristics ($T_J = 175^\circ\text{C}$)

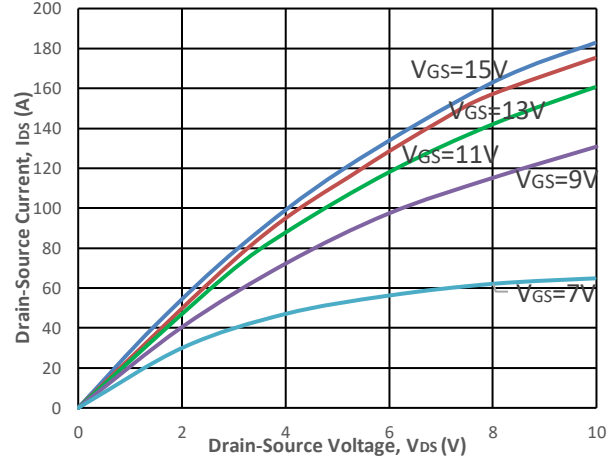


Fig3. Normalized On-Resistance vs. Temperature

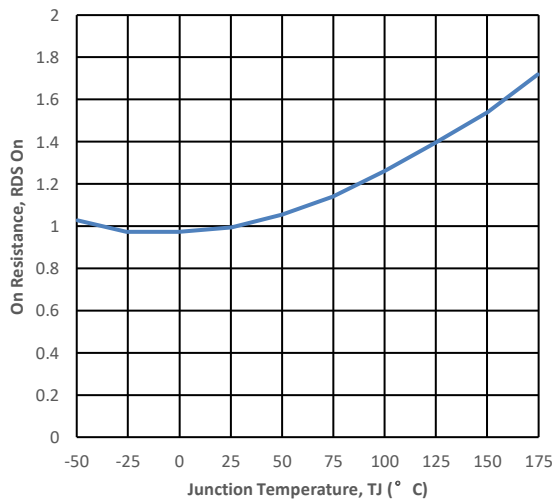


Fig4. On-Resistance vs. Temperature

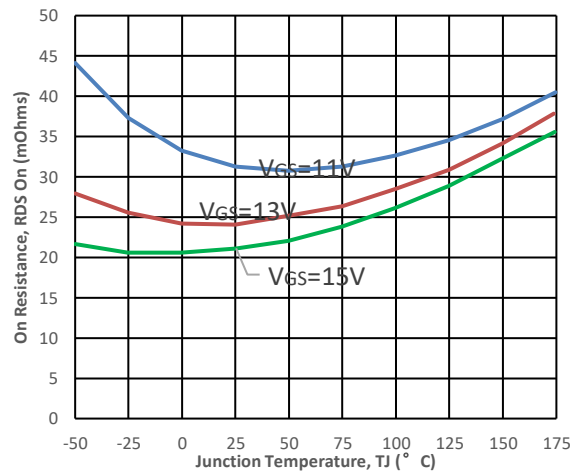


Fig5. Transfer Characteristic

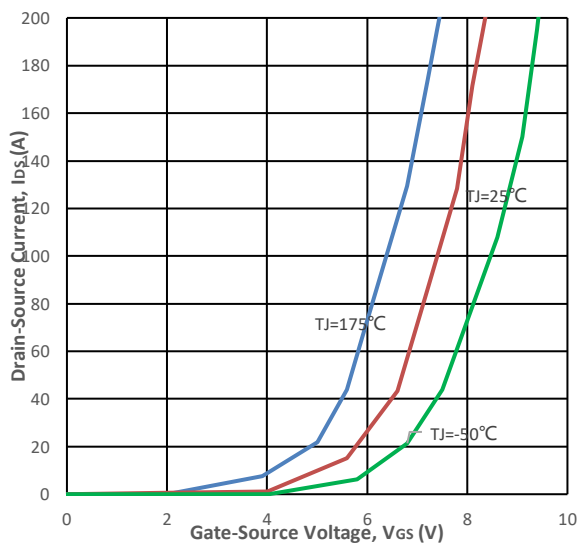


Fig6. Body Diode Characteristic at 25°C

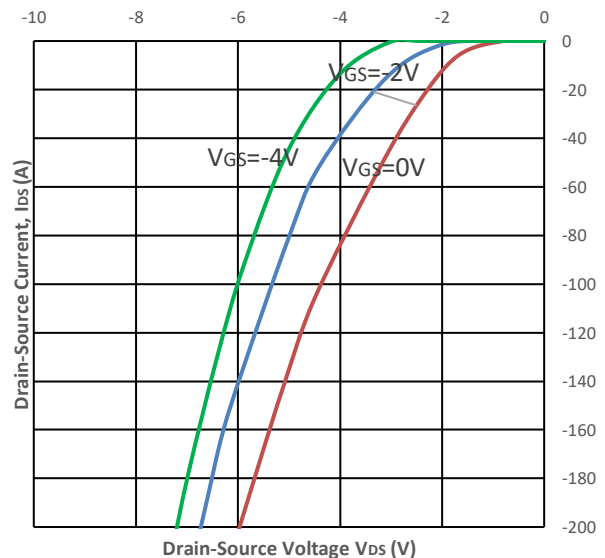


Fig7. Threshold Voltage vs. Temperature

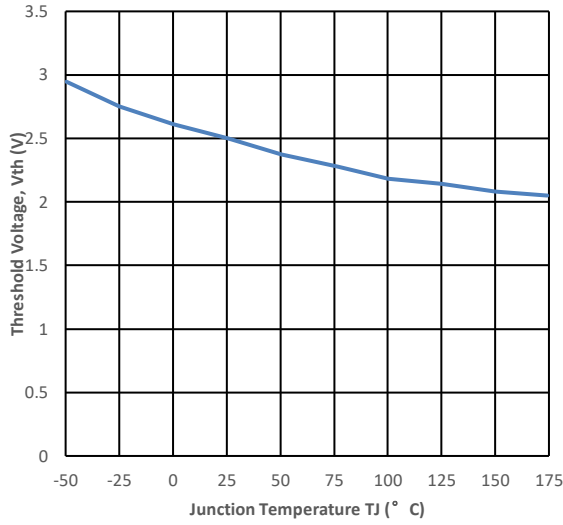


Fig8. Gate Charge Characteristics

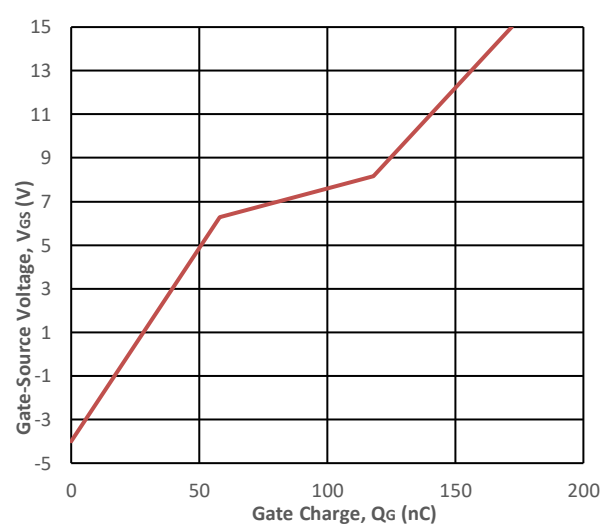


Fig9. 3rd Quadrant Characteristic at 25 °C

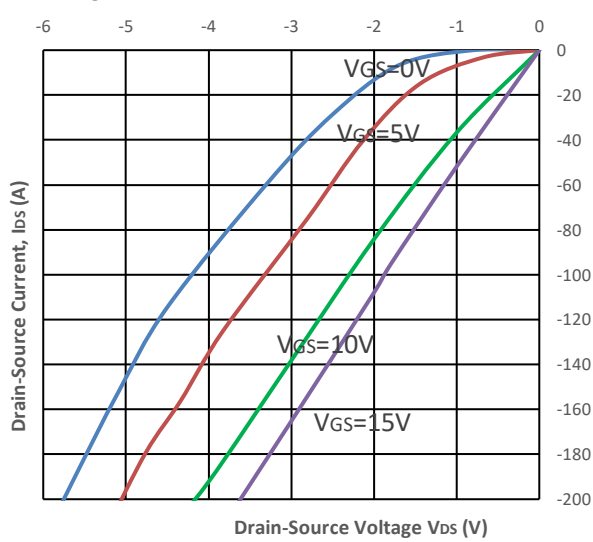


Fig10. Output Capacitor Stored Energy

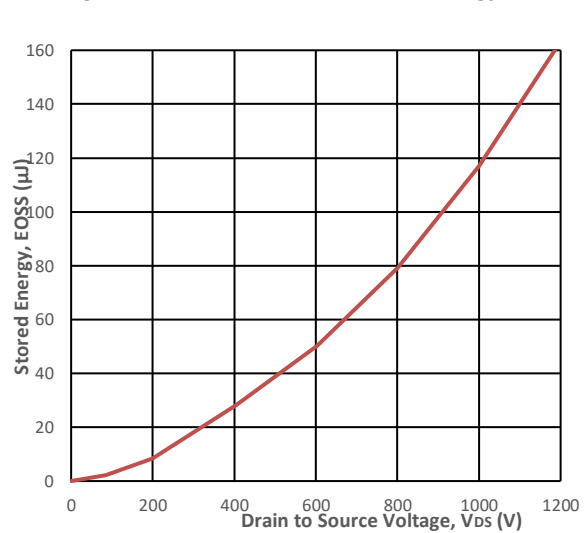


Fig11. Capacitances vs. Drain-Source

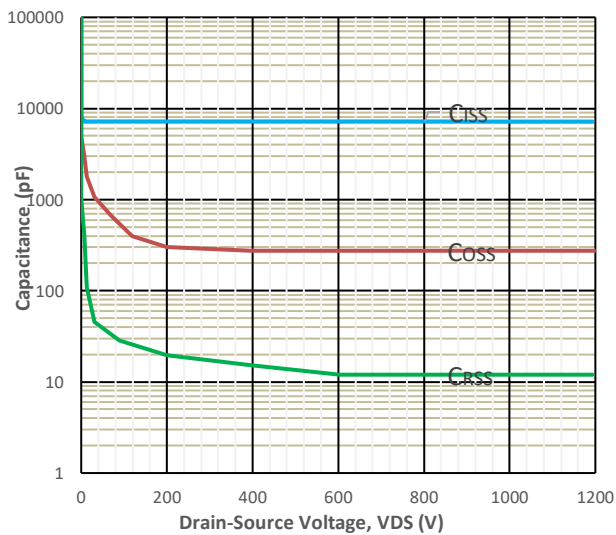


Fig12. Max Power Dissipation Derating Vs Tc

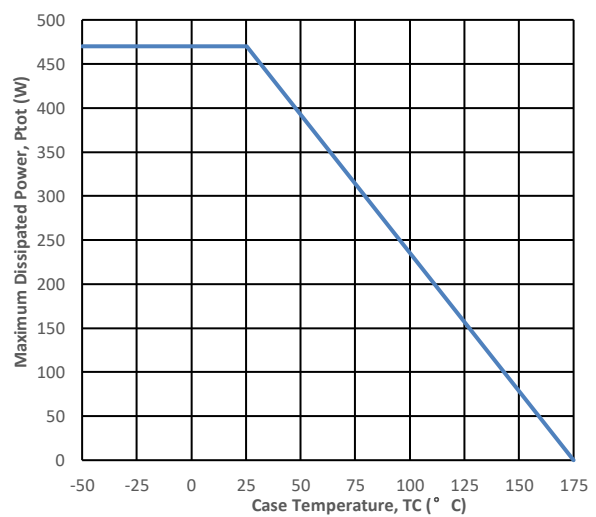


Fig13. Switching Energy vs. Drain Current

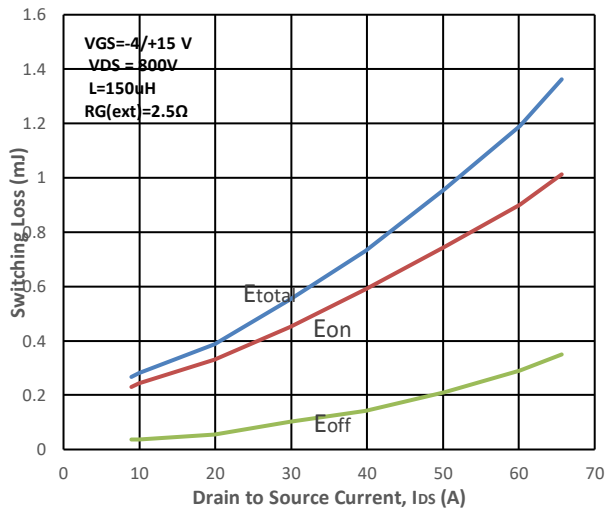


Fig14. Switching Energy vs. $R_{G(ext)}$

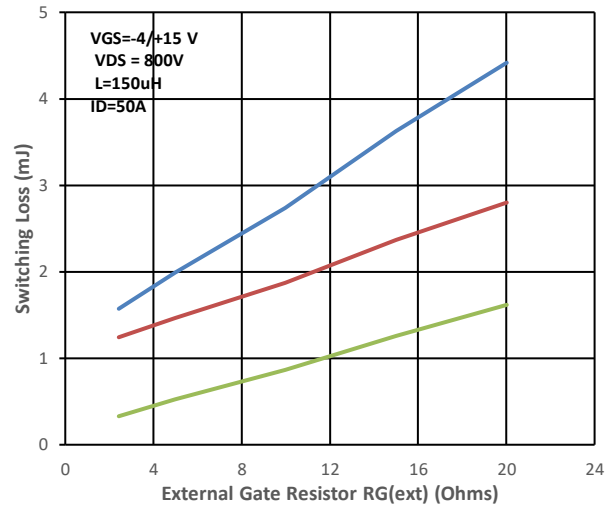


Fig15. Switching Energy vs. Temperature

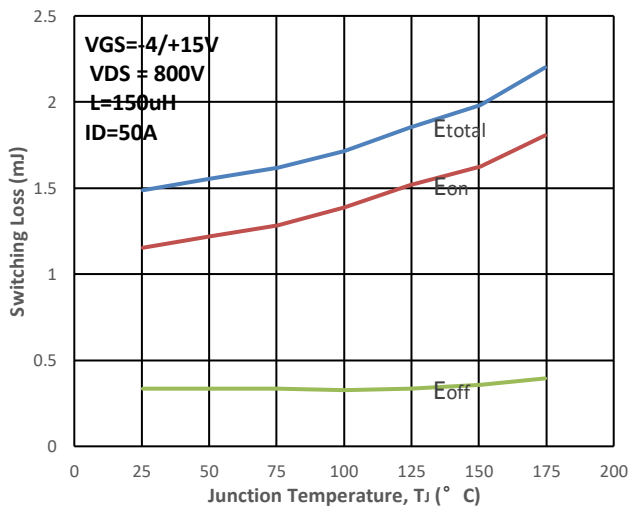


Fig16. Switching Times vs. $R_{G(ext)}$

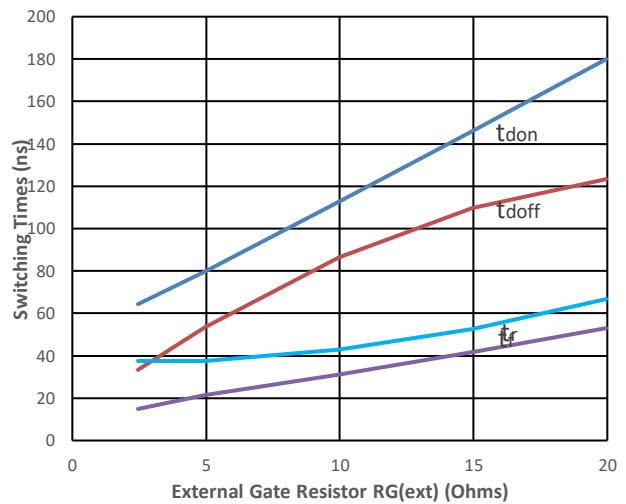


Fig17. Transient Thermal Impedance

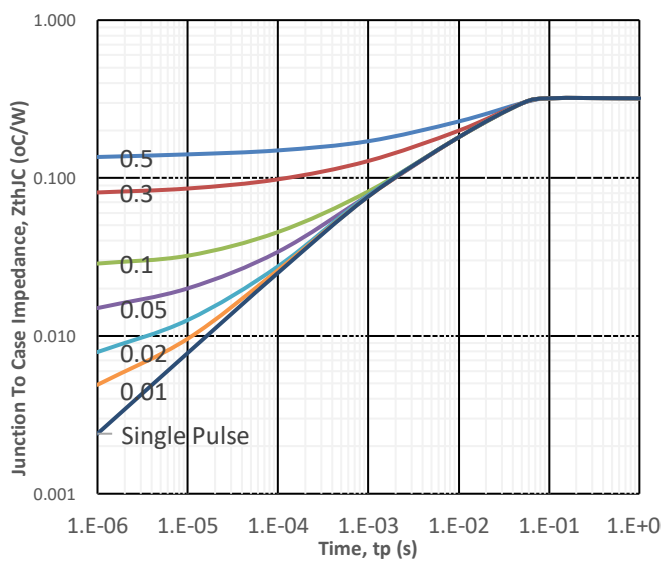
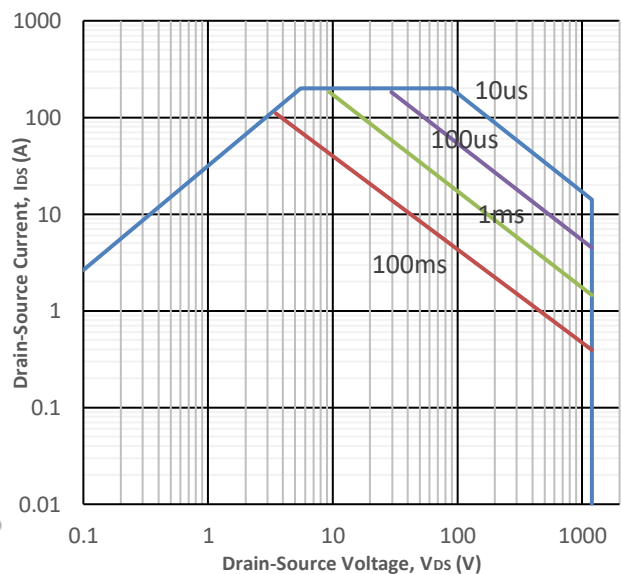
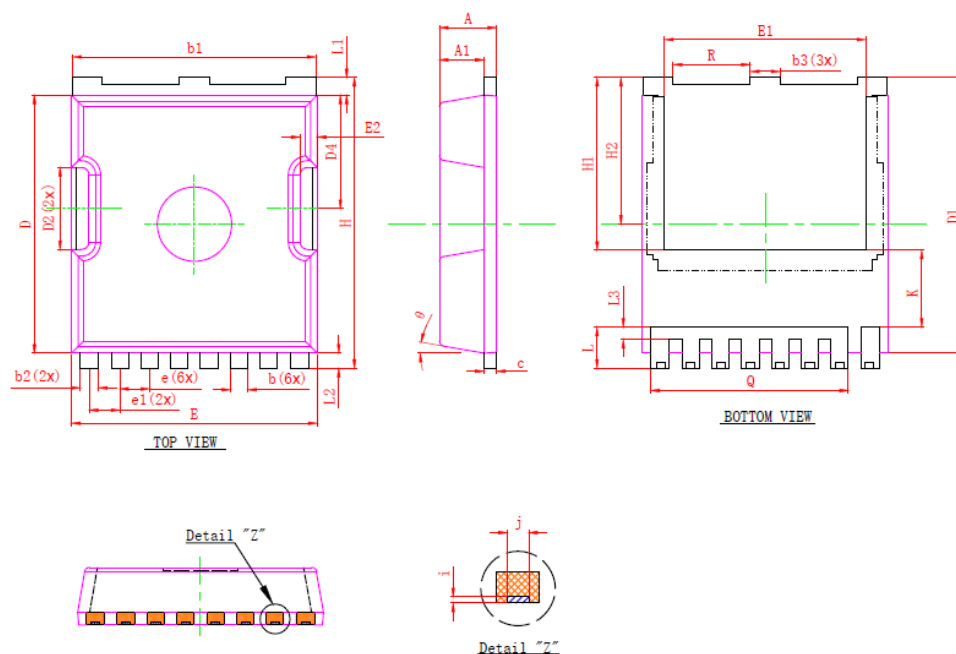


Fig18. Safe Operating Area



Package Drawing:



Dimensions (UNIT: mm)

SYMBOL	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.200	2.300	2.400
A1	1.700	1.800	1.900
b	0.600	0.700	0.800
b1	9.700	9.800	9.900
b2	0.650	0.750	0.850
b3	1.100	1.200	1.300
c	0.400	0.500	0.600
D	10.300	10.400	10.500
D1	11.000	11.100	11.200
D2	3.200	3.300	3.400
D4	4.470	4.570	4.670
E	9.800	9.900	10.000
E1	8.000	8.100	8.200
E2	0.500	0.600	0.700
e	1.200 BSC		
e1	1.225 BSC		
H	11.600	11.700	11.800
H1	6.950 BSC		
H2	5.900 BSC		
i	0.100 REF.		
j	0.350 REF.		
k	3.100 REF.		
L	1.550	1.650	1.750
L1	0.600	0.700	0.800
L2	0.500	0.600	0.700
L3	0.400	0.500	0.600
Q	7.950 REF		
R	3.000	3.100	3.200
ø	10° REF.		