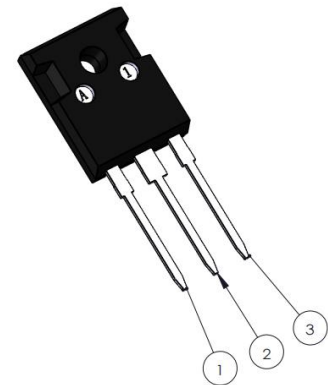


Description

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.

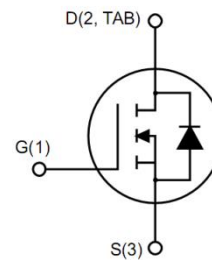
Features

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



Application

- EV Charging
- DC/DC Converters
- Switch Mode Power Supplies
- Power Factor Correction Modules
- Solar PV inverters



Ordering Information

Part Number	Marking	Package	Packaging
ASC100N650MT3	ASC100N650MT3	TO247-3	Tube

Absolute Maximum Ratings($T_c=25^{\circ}\text{C}$)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	650	V
I_D	Drain Current(continuous)at $T_c=25^{\circ}\text{C}$	100	A
I_D	Drain Current(continuous)at $T_c=100^{\circ}\text{C}$	60	A
I_{DM}	Drain Current (pulsed)	300	A
V_{GS}	Gate-Source Voltage	-10/+22	V
P_D	Power Dissipation $T_c = 25^{\circ}\text{C}$	450	W
T_J, T_{stg}	Junction and Storage Temperature Range	-55 to +150	$^{\circ}\text{C}$

Electrical Characteristics($T_J = 25^{\circ}\text{C}$ unless otherwise specified)
Typical Performance-Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DS}	Drain-source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	650			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650\text{V},$ $V_{GS}=0\text{V}, T_J=25^{\circ}\text{C}$			100	μA
I_{GSS}	Gate-body Leakage Current	$V_{DS}=0\text{V};$ $V_{GS}=-10\text{ to }20\text{V}$		10	250	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=15\text{mA}$	2	3	4	V
$V_{GS(on)}$	Recommended turn-on Voltage	Static		20		V
$V_{GS(off)}$	Recommended turn-off Voltage			-5		V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS}=20\text{V}, I_D=50\text{A}$		15	21	m Ω
		$V_{GS}=20\text{V}, I_D=50\text{A}$ $T_J=150^{\circ}\text{C}$		19		m Ω

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C _{iss}	Input Capacitance	V _{DS} =400V, f=1KHz, V _{AC} =25mV		5315		pF
C _{oss}	Output Capacitance			325		pF
C _{rss}	Reverse Transfer Capacitance			31		pF
g _{fs}	Transconductance	V _{DS} =20V, I _D =15A		42		S
E _{oss}	Coss Stored Energy	V _{DS} =400V, f=1KHz		32		μJ
E _{on}	Turn-On Energy (Body Diode)	V _{DS} =400V, V _{GS} =-5/20V, I _D =50A, L=68μH T _J =150°C		1565		μJ
E _{off}	Turn-Off Energy (Body Diode)			800		μJ
Q _g	Total Gate Charge	V _{DS} =400V, V _{GS} =-5V/20V, I _D =50A		236		nC
Q _{gs}	Gate-source Charge			56		nC
Q _{gd}	Gate-Drain Charge			64		nC
R _{G(int)}	Internal Gate Resistance	f=1MHz, V _{AC} =25mV		3.5		Ω
t _{d(on)}	Turn-on Delay Time	V _{DS} =400V, V _{GS} =-5V/20V, I _D =50A, L=68 μH R _{ext} =5Ω		25		ns
t _r	Rise Time			136		ns
t _{d(off)}	Turn-off Delay Time			63		ns
t _f	Fall Time			27		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 =25A, T _J =25°C		4.8	6	V
		V _{GS} =0V, I _F =25A, T _J =150°C		4.2	6	V
I _S	Continuous Diode Forward Current	V _{GS} =0V, T _C =25°C		80		A
t _{rr}	Reverse Recovery Time	V _{GS} =-5 V, I _F =25 A, V _R =400 V, T _J =150°C di/dt= 2400 A/μs		88		nS
Q _{rr}	Reverse Recovery Charge			680		nC
I _{rrm}	Peak Reverse Recovery Current			17		A

Thermal Characteristics

Symbol	Parameter	Value.	Unit
R _{θJC}	Thermal Resistance, Junction-to-Case	0.28	°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)=150°C

Electrical Characteristics

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

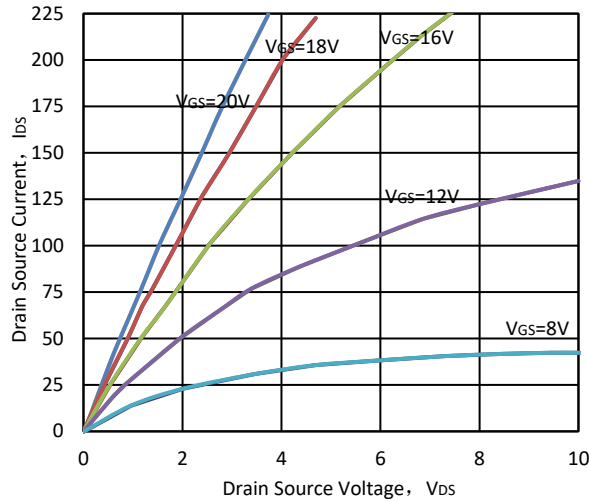


Fig2. Output characteristics ($T_J = 150^\circ\text{C}$)

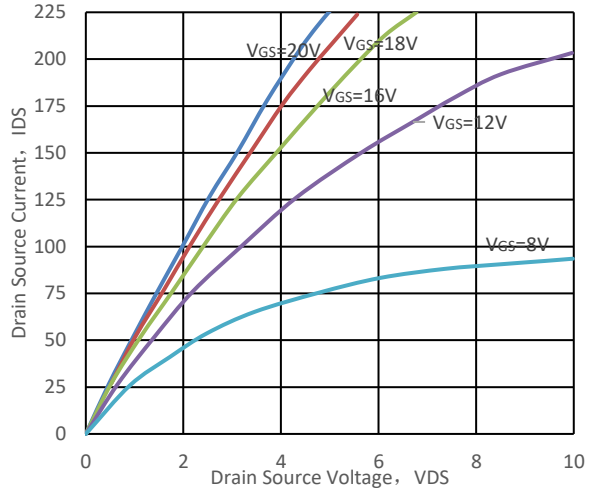


Fig3. Normalized On-Resistance vs. Temperature

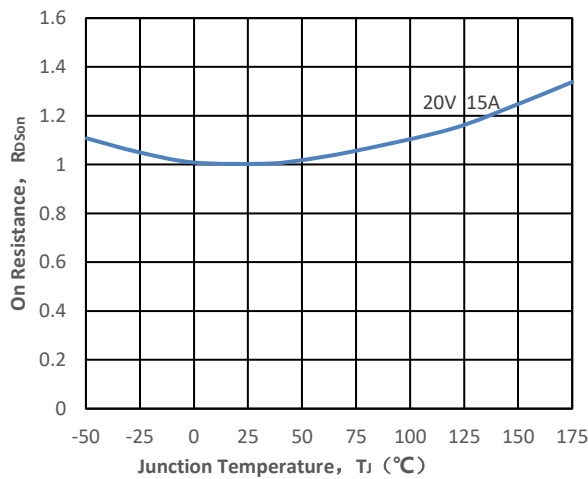


Fig4. On-Resistance vs. Temperature

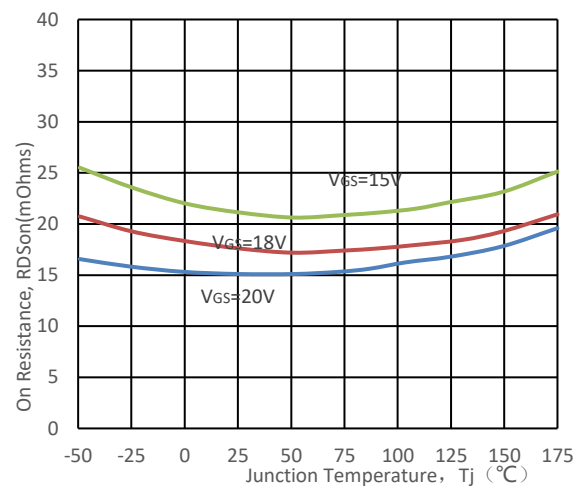


Fig5. Transfer Characteristic

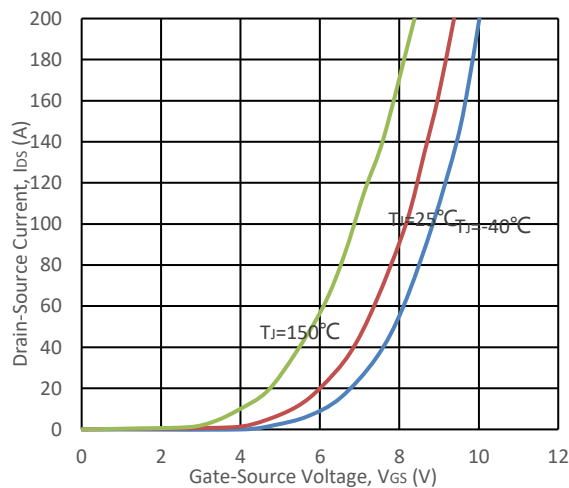


Fig6. Body Diode Characteristic at 25°C

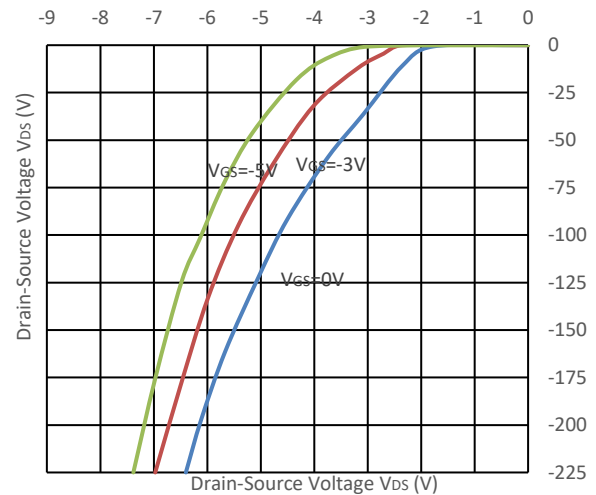


Fig7. Threshold Voltage vs. Temperature

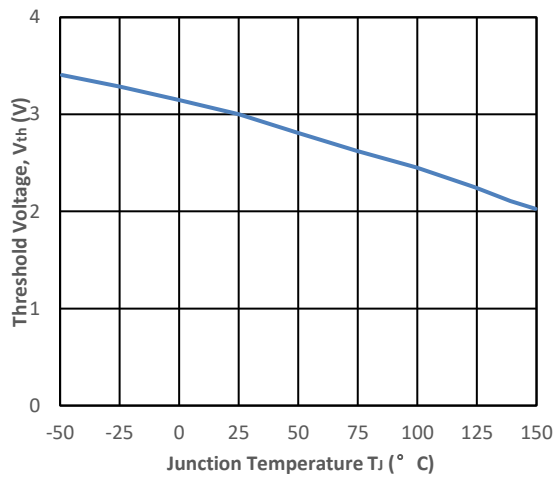


Fig8. Gate Charge Characteristics

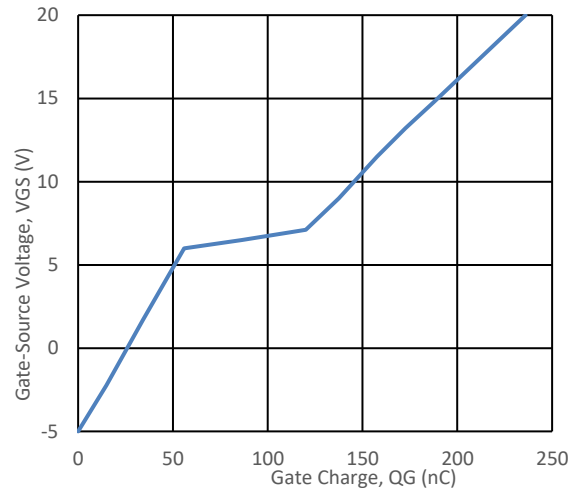


Fig9. 3rd Quadrant Characteristic at 25 $^{\circ}$ C

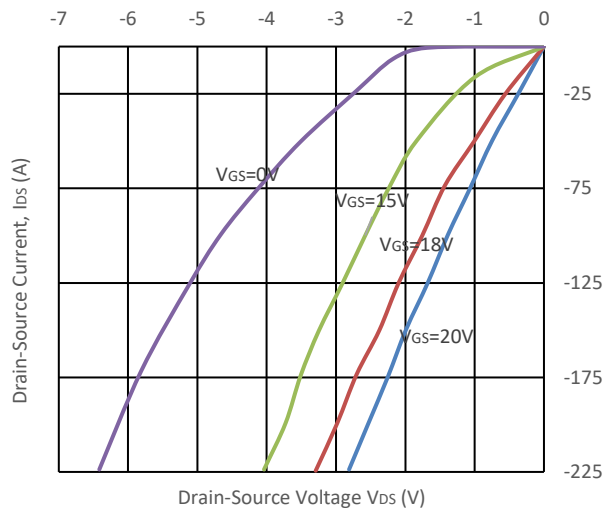


Fig10. Output Capacitor Stored Energy

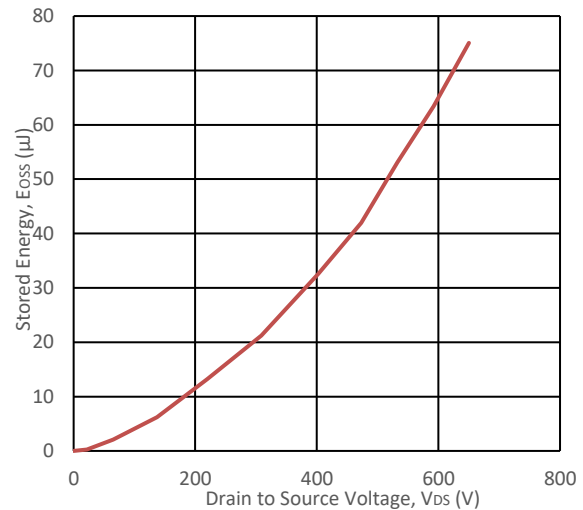


Fig11. Capacitances vs. Drain-Source

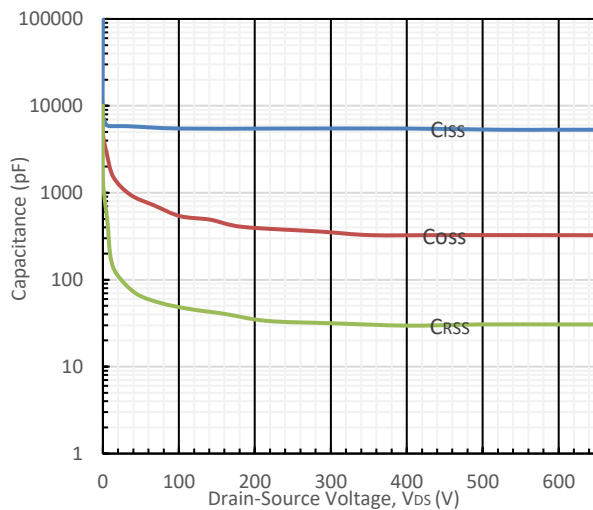


Fig12. Max Power Dissipation Derating Vs T_c

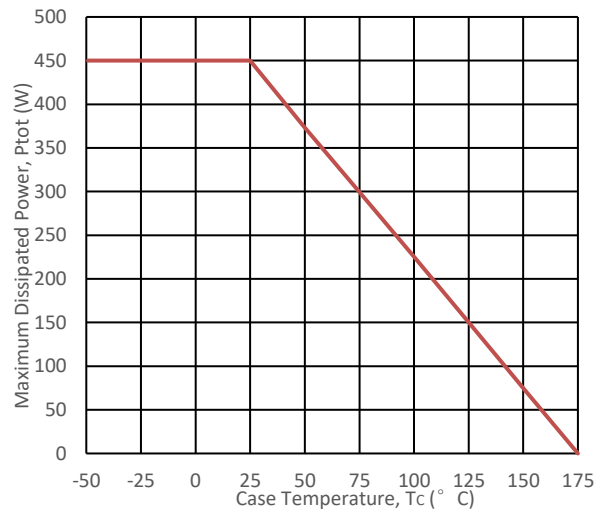


Fig13. Switching Energy vs. Drain Current

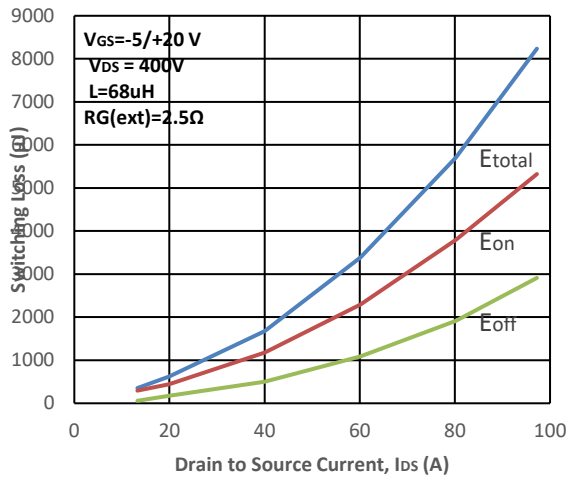


Fig14. Switching Energy vs. $R_{G(ext)}$

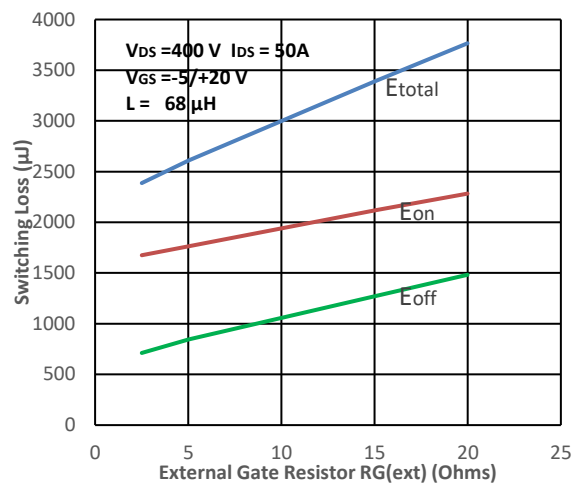


Fig15. Switching Energy vs. Temperature

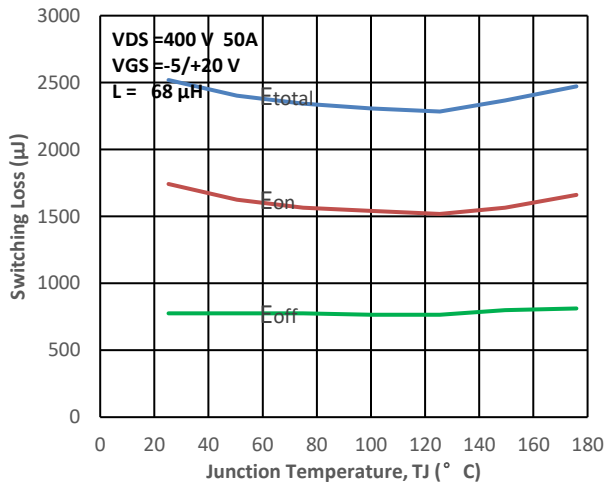


Fig16. Switching Times vs. $R_{G(ext)}$

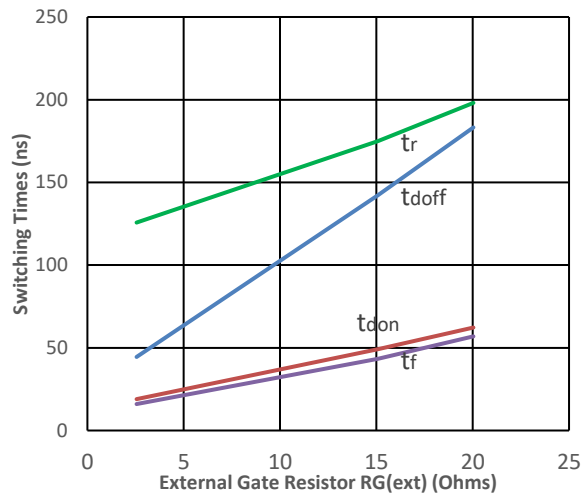


Fig17. Transient Thermal Impedance

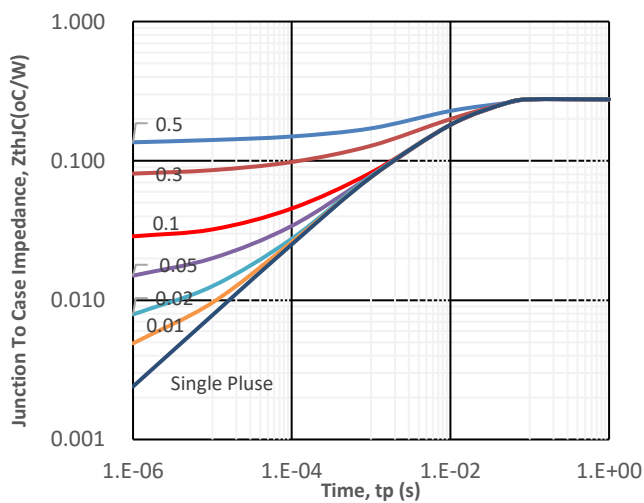
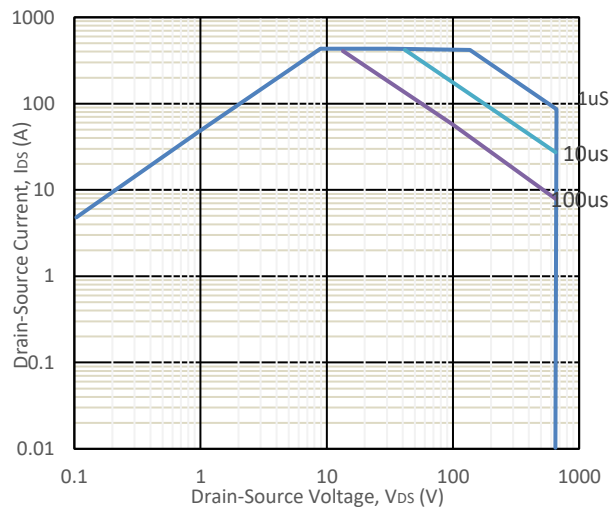
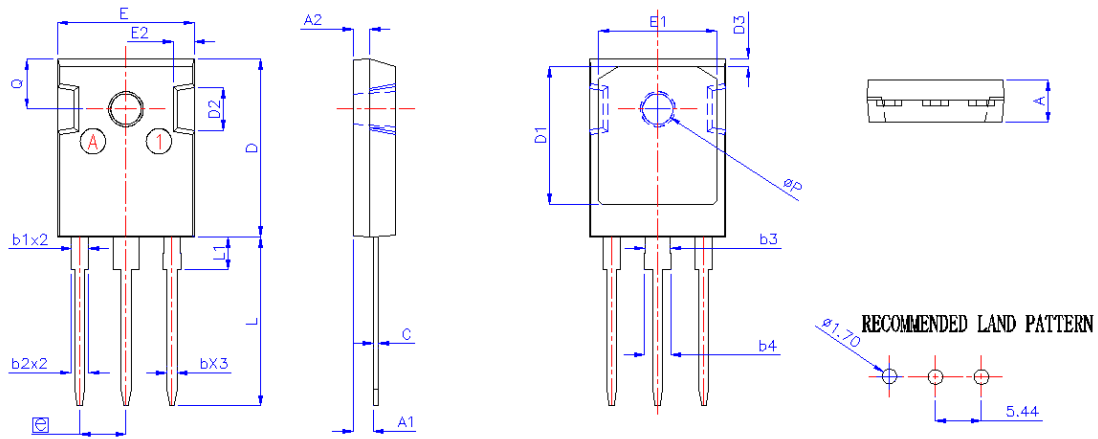


Fig18. Safe Operating Area



Package Drawing:

Dimensions (UNIT: mm)

SYMBDLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.90	5.00	5.10	0.193	0.197	0.201
A1	2.31	2.42	2.52	0.091	0.095	0.099
A2	1.90	2.00	2.10	0.075	0.079	0.083
b	1.16	1.22	1.27	0.046	0.048	0.050
b1	1.96	2.02	2.07	0.079	0.080	0.081
b2	2.03	2.07	2.10	0.080	0.0815	0.083
b3	2.96	3.02	3.07	0.117	0.119	0.121
b4	3.03	3.07	3.1	0.119	0.120	0.122
C	0.59	0.62	0.66	0.023	0.024	0.026
D	20.90	21.00	21.10	0.823	0.827	0.831
D1	15.96	16.26	16.56	0.628	0.640	0.652
D2	4.3			4.3		
D3	0.8	0.95	1.1	0.031	0.037	0.043
e	5.44 BSC				0.214 BSC	
E	15.95	16.15	16.35	0.628	0.636	0.644
E1	13.82	14.02	14.26	0.544	0.552	0.561
E2	4.3				0.169	
L	19.72	19.92	20.12	0.776	0.784	0.792
L1	—	—	3.86	—	—	0.152
Q	5.95 BSC			0.234BSC		
ØP	3.55	3.60	3.70	0.140	0.142	0.146