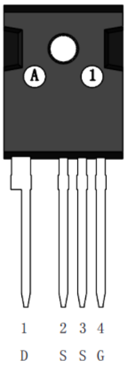
Description

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.

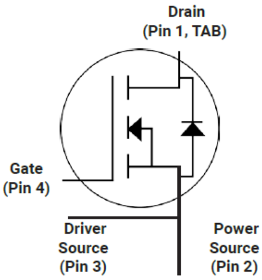


Features

- 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
MSM065012T4	MSM065012T4	TO247-4	Tube

Absolute Maximum Ratings(Tc=25℃)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	650	V
I_D	Drain Current(continuous)at Tc=25℃	100	A
I_D	Drain Current(continuous)at Tc=100℃	70	A
I_{DM}	Drain Current (pulsed)	300	A
V_{GS}	Gate-Source Voltage	-10/+22	V
P_D	Power Dissipation T_C = 25°C	500	W
$T_{J,}$ Tstg	Junction and Storage Temperature Range	-55 to +175	℃

Electrical Characteristics(T_J = 25℃ unless otherwise specified)

Typical Performance-Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DS}	Drain-source Breakdown Voltage	I_D=250uA,V_{GS}=0V	650			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =650V, V_{GS} =0V, T_J=25°C			100	μA
I_{GSS}	Gate-body Leakage Current	V_{DS} =0V；V_{GS} =-10 to 20V			250	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= $V_{GS,}$ I_D=22mA	2	3	4	V
V_{GSon}	Recommended turn-on Voltage	Static		18		V
V_{GSoff}	Recommended turn-off Voltage			-5		V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS}=18V, I_D=75A		15	18	mΩ
		V_{GS}=18V, I_D=75A T_J=175℃		20.5		mΩ

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	V_{DS}=400V,f=1MHz, V_{AC}=25mV		7169		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}	C_{OSS} Stored Energy	V_{DS}=400V,f=1MHz		32		μJ
E_{ON}	Turn-On Energy（Body Diode）	V_{DS}=400V,V_{GS}=-5/20V， I_D=50A，L=60uH T_J=175℃		436		μJ
E_{OFF}	Turn-Off Energy（Body Diode）			287		μJ
Q_g	Total Gate Charge	V_{DS}=400V, V_{GS}=-5V/20V, I_D = 50 A		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		2.2		Ω
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=400V,V_{GS}=-5V/20V, I_D =50A, L=60μH Rext=5Ω		26		ns
t_r	Rise Time			35		ns
$t_{d(off)}$	Turn-off Delay Time			63		ns
t_f	Fall Time			17		ns

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{FSD}	Forward Voltage	V_{GS}=0V,I_F=50A,T_J=25°C		3.5	6	V
		V_{GS}=0V,I_F=50A,T_J=175°C		3.0	6	V
Is	Continuous Diode Forward Current	V_{GS}=0V，T_C=25°C		80		A
t_{rr}	Reverse Recovery Time	V_{GS}=-5 V, I_F=50 A, V_R=400 V, T_J=175°C d*i*/d*t*= 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
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.30	°C/W
$R_{\theta JA}$	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 Tj(max)=175℃

Electrical Characteristics

Fig1. Output characteristics (T_J = 25 °C)

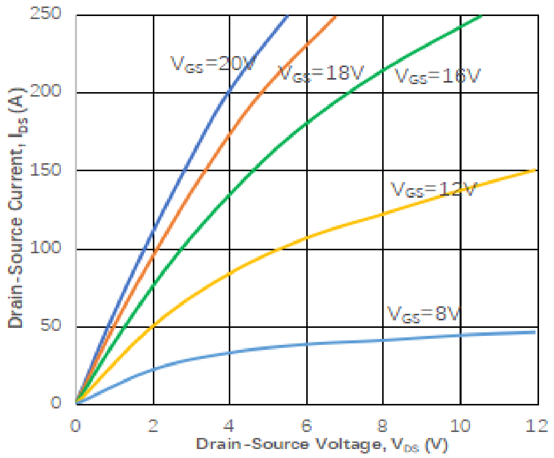


Fig2. Output characteristics (T_J = 175 °C)

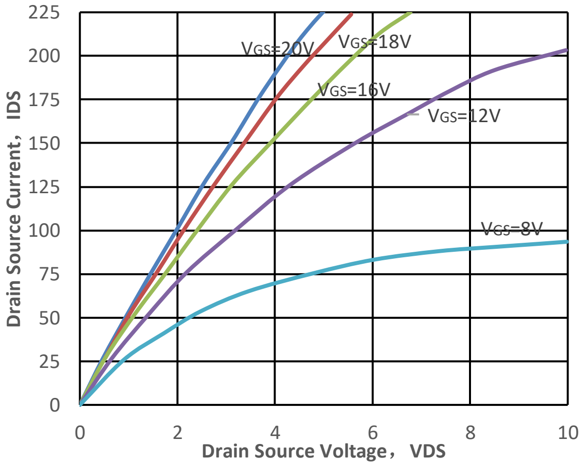


Fig3.Normalized On-Resistance vs. Temperature

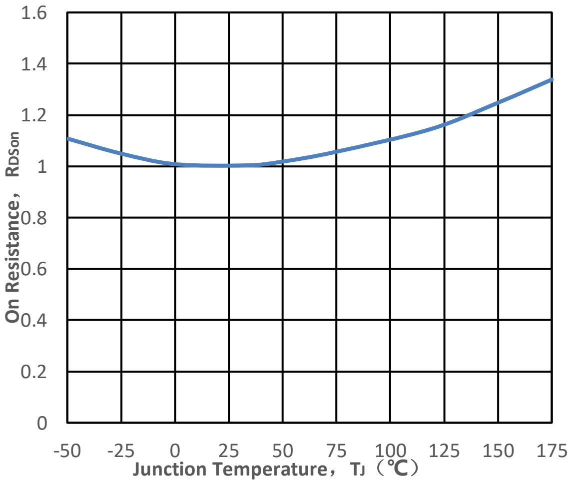


Fig4. On-Resistance vs. Temperature

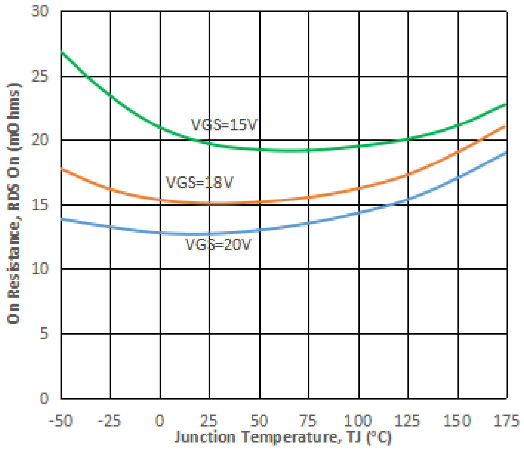


Fig5. Transfer Characteristic

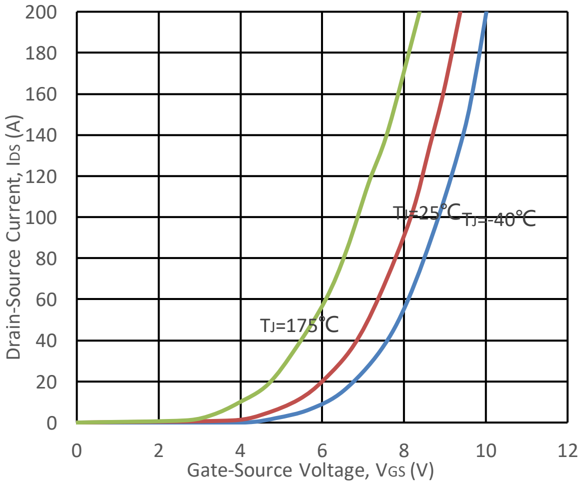


Fig6. Body Diode Characteristic at 25 °C

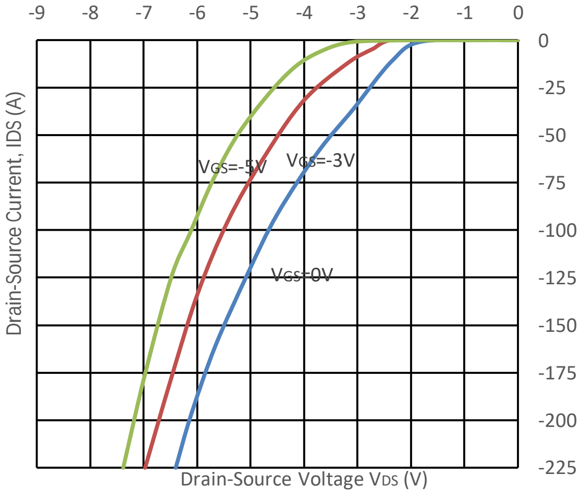


Fig7.Threshold Voltage vs. Temperature

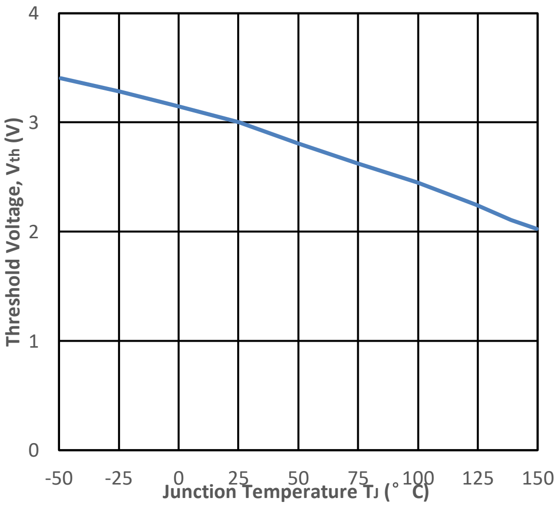


Fig8. Gate Charge Characteristics

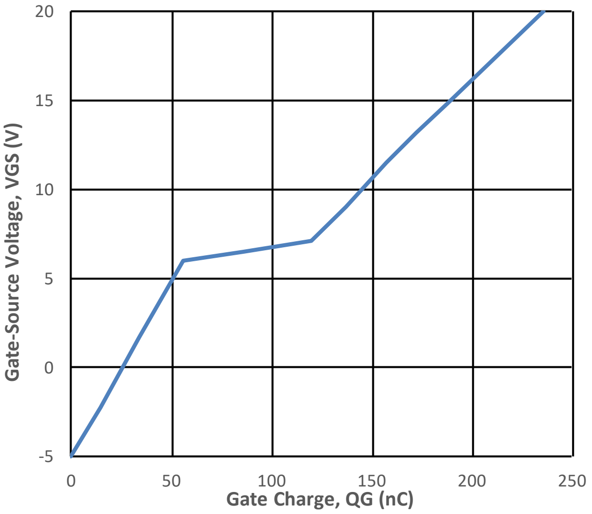


Fig9. 3rd Quadrant Characteristic at 25 °C

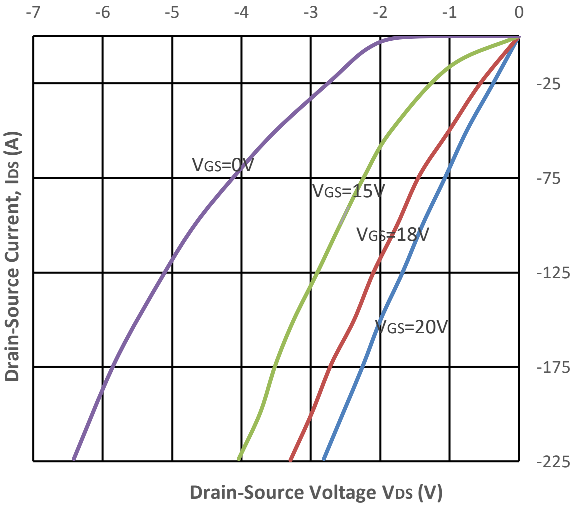


Fig10. Output Capacitor Stored Energy

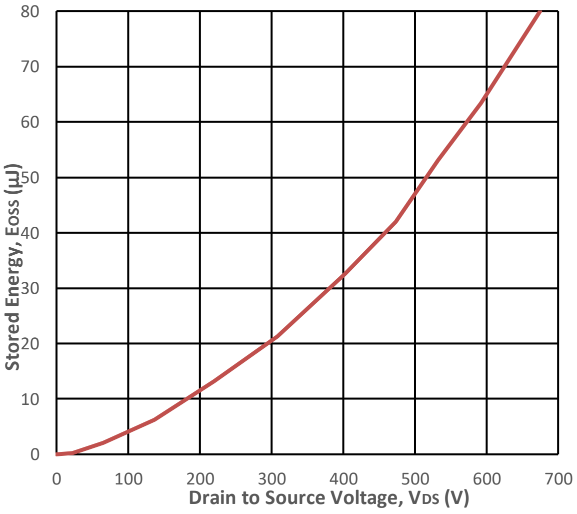


Fig11. Capacitances vs. Drain-Source

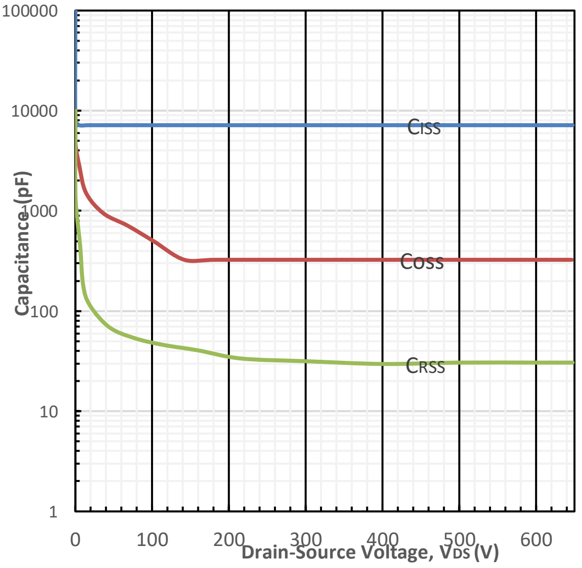


Fig12. Max Power Dissipation Derating Vs Tc

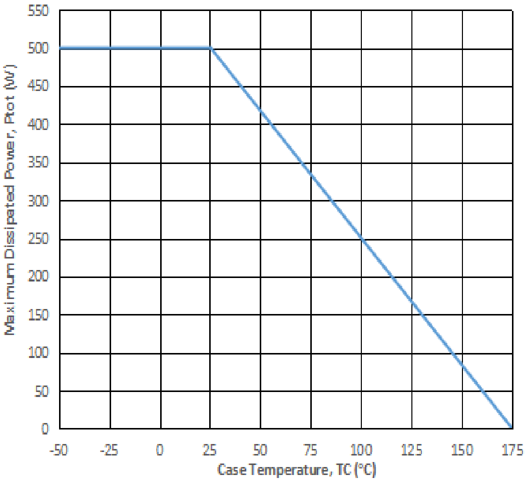


Fig13. Switching Energy vs. Drain Current

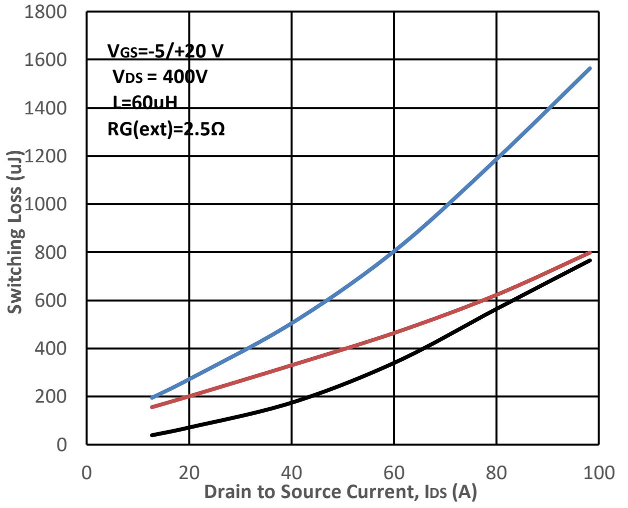


Fig14. Switching Energy vs. RG(ext)

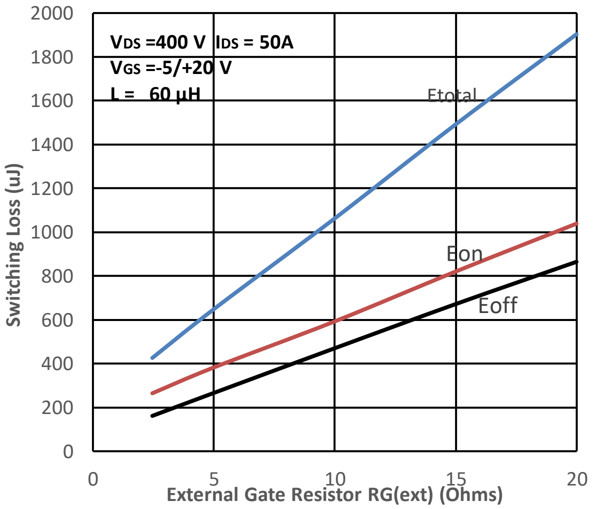


Fig15. Switching Energy vs. Temperature

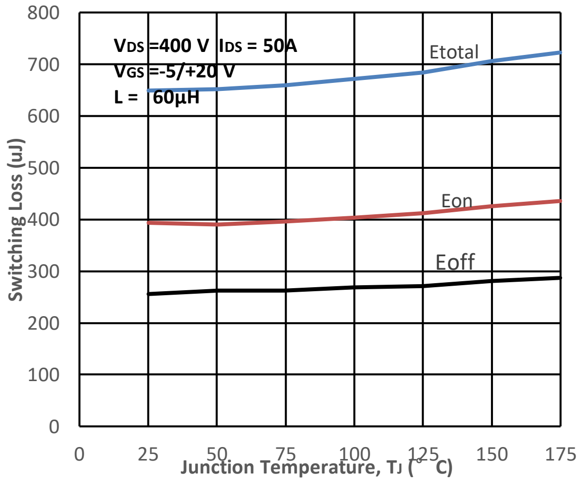


Fig16. Switching Times vs. RG(ext)

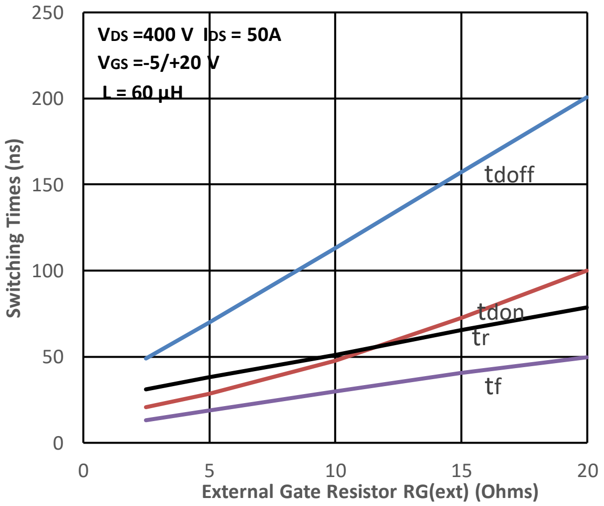


Fig17.Transient Thermal Impedance

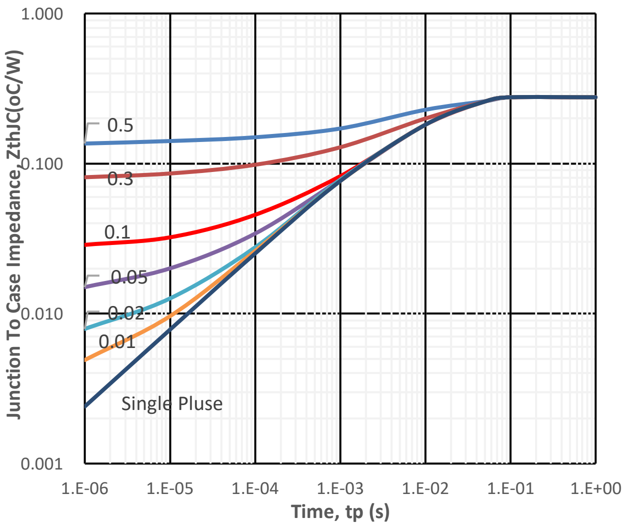
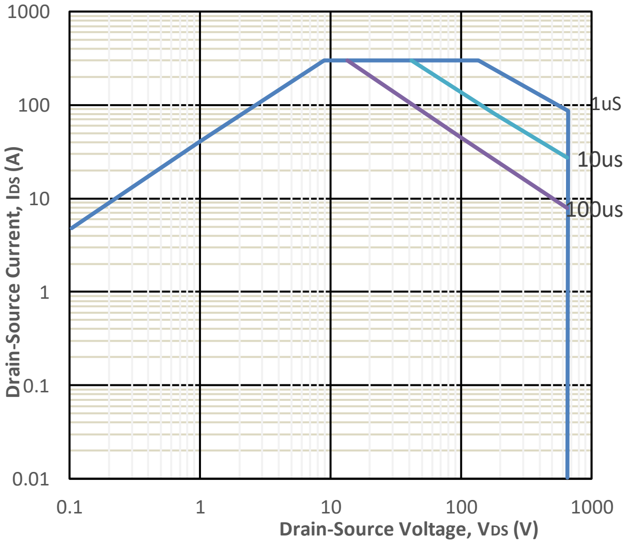
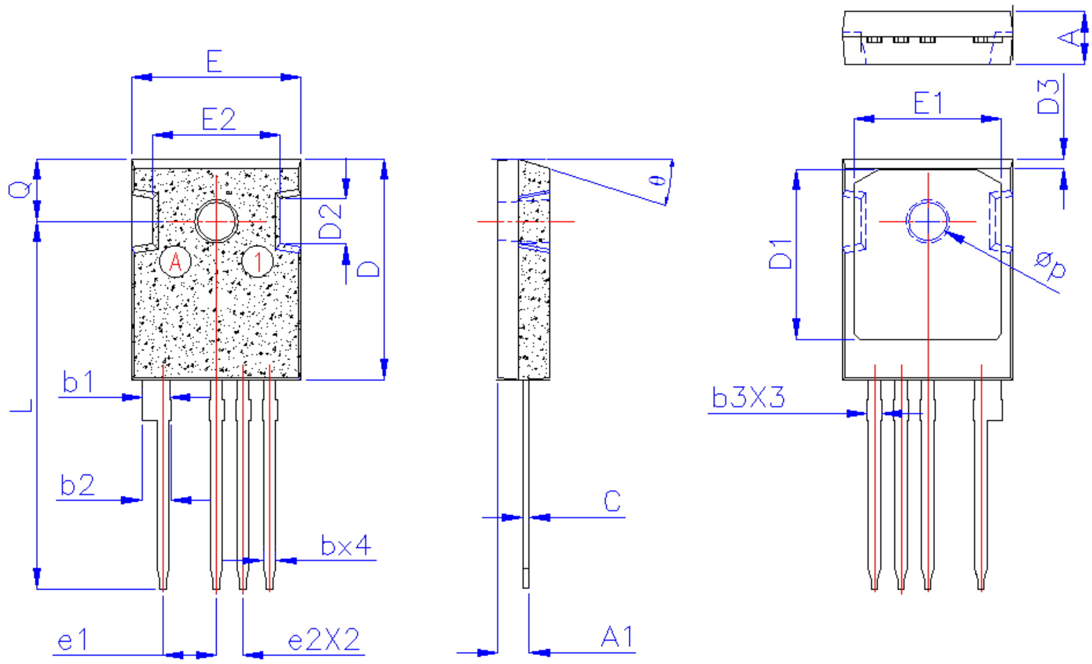


Fig18. Safe Operating Area



Package Drawing:



Dimensions (UNIT: mm)

SYMBDLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	TYPE	MAX	MIN	TYPE	MAX
A	4.80	5.00	5.20	0.189	0.197	0.205
A1	2.85	3.00	3.15	0.112	0.118	0.124
b	1.15	1.20	1.25	0.045	0.047	0.049
b1	2.40	2.50	2.60	0.094	0.098	0.102
b2	2.61	2.76	2.91	0.103	0.109	0.115
b3	1.30	1.42	1.57	0.051	0.056	0.062
C	0.55	0.60	0.65	0.022	0.024	0.026
D	20.80	21.00	21.20	0.819	0.827	0.835
D1	15.94	16.24	16.54	0.628	0.639	0.651
D2	4.3 TYPE			0.169 TYPE		
e1	4.93	5.08	5.23	0.194	0.200	0.206
e2	2.39	2.54	2.69	0.094	0.100	0.106
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	12.00	12.20	12.40	0.472	0.480	0.488
L	34.65	35.05	35.45	1.364	1.380	1.396
Q	5.85	5.95	6.05	0.230	0.234	0.238
⌀P	3.45	3.60	3.75	0.136	0.142	0.148
θ	17.5°			0.689°		