A3G20N1200MT7

1200V N-Channel MOSFET Gen 3

Description

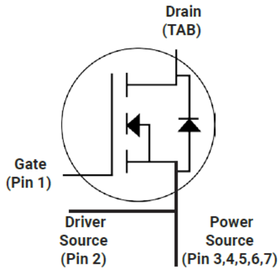
Silicon Carbide (SiC) MOSFET use a completely new technology that provide superior switching performance and higher reliability compared to Silicon. In addition, the low ON resistance and compact chip size ensure low capacitance and gate charge. Consequently, system benefits include highest efficiency, 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)
- Low impedance package with driver source pin
- Easy to parallel and simple to drive
- ROHS Compliant, Halogen free

Application

- EV Charging
- High Voltage DC/DC Converters
- Switch Mode Power Supplies
- Power Factor Correction Modules



Ordering Information

Part Number	Marking	Package	Packaging
A3G20N1200MT7	A3G20N1200MT7	TO-263-7	Reel

Absolute Maximum Ratings(Tc=25℃)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	1200	V
I_D	Drain Current(continuous)at Tc=25℃	20	A
I_D	Drain Current(continuous)at Tc=100℃	12	A
I_{DM}	Drain Current (pulsed)	35	A
V_{GS}	Gate-Source Voltage	-8/+19	V
P_D	Power Dissipation T_C = 25°C	108	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	1200			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =1200V, V_{GS} =0V, T_J=25°C			100	uA
I_{GSS}	Gate-body Leakage Current	V_{DS} =0V; V_{GS} =-8 to 19V			250	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= $V_{GS,}$ I_D=2mA	1.8	2.5	3.6	V
V_{GSon}	Recommended turn-on Voltage	Static		15		V
V_{GSoff}	Recommended turn-off Voltage			-4		V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS}=15V, I_D=10A		160	208	mΩ
		V_{GS}=15V, I_D=10A T_J=175℃		272		mΩ

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	V_{DS}=1000V,f=1MHz, V_{AC}=25mV		715		pF
C_{oss}	Output Capacitance			42		pF
C_{rss}	Reverse Transfer Capacitance			3.2		pF
g_{fs}	Transconductance	V_{DS}=20V, I_D=10A		6		S
E_{OSS}	C_{OSS} Stored Energy	V_{DS}=1000V,f=1MHz		23		μJ
E_{ON}	Turn-On Energy（Body Diode）	V_{DS}=800V,V_{GS}=-4/15V，I_D=10A，L=300uH T_J=175℃		100		μJ
E_{OFF}	Turn-Off Energy（Body Diode）			17		μJ
Q_g	Total Gate Charge	V_{DS}=800V, V_{GS}=-4V/15V, I_D = 10A		26		nC
Q_{gs}	Gate-source Charge			12		nC
Q_{gd}	Gate-Drain Charge			6		nC
$R_{G(int)}$	Internal Gate Resistance	f=1MHz,V_{AC}=25mV		5		Ω
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=800V, V_{GS}=-4V/15V, I_D =10A, L=300μH Rext=2.5Ω		11		ns
t_r	Rise Time			8		ns
$t_{d(off)}$	Turn-off Delay Time			14		ns
t_f	Fall Time			9		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=5A, T_J=25°C		3.5	6	V
		V_{GS}=0V, I_F=5A, T_J=175°C		3	6	V
Is	Continuous Diode Forward Current	V_{GS}=0V，T_C=25°C		20		A
t_{rr}	Reverse Recovery Time	V_{GS}=-4V, I_F=10 A, V_R=800 V, d*i*/d*t*=1900 A/μs，T_J=175°C		7		nS
Q_{rr}	Reverse Recovery Charge			33		nC
I_{rrm}	Peak Reverse Recovery Current			9		A

Thermal Characteristics

Symbol	Parameter	Value.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.38	°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)

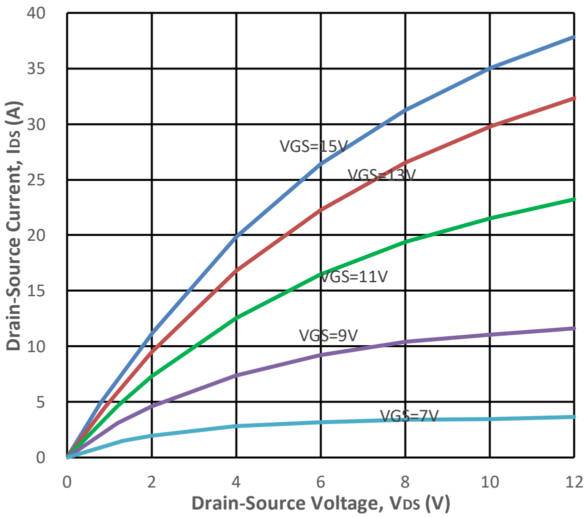


Fig2. Output characteristics (T_J = 175°C)

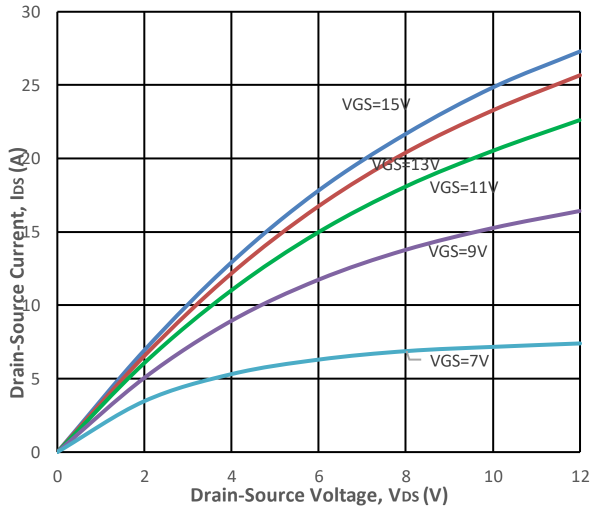


Fig3.Normalized On-Resistance vs. Temperature

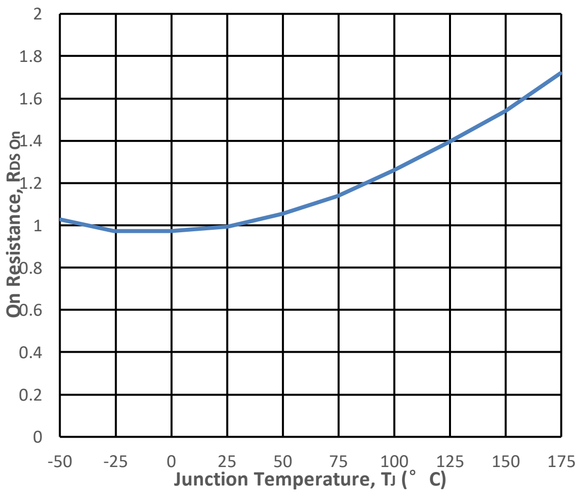


Fig4. On-Resistance vs. Temperature

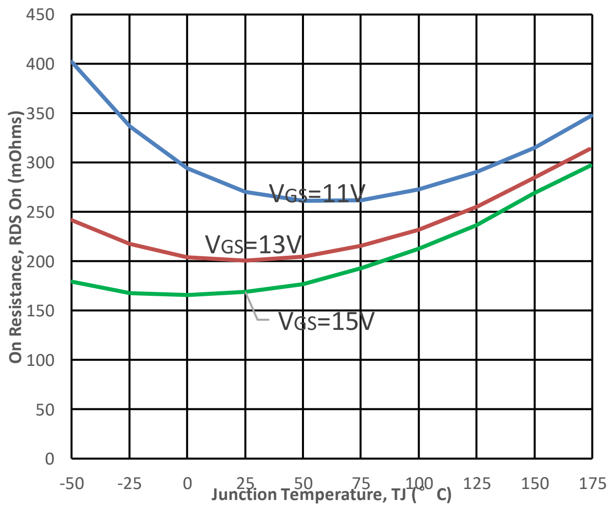


Fig5. Transfer Characteristic

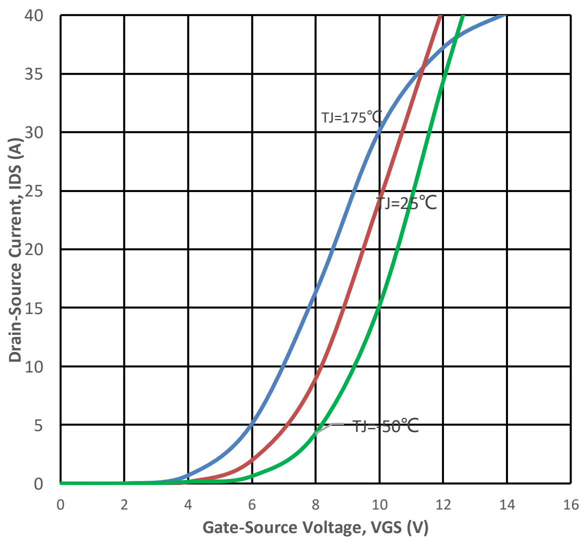


Fig6. Body Diode Characteristic at 25 °C

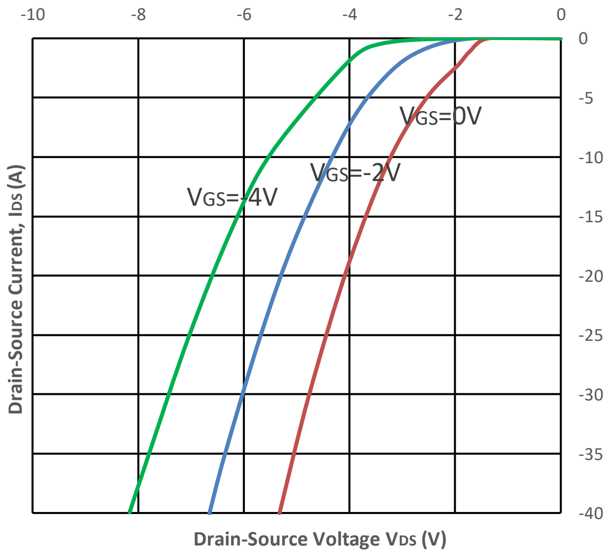


Fig7.Threshold Voltage vs. Temperature

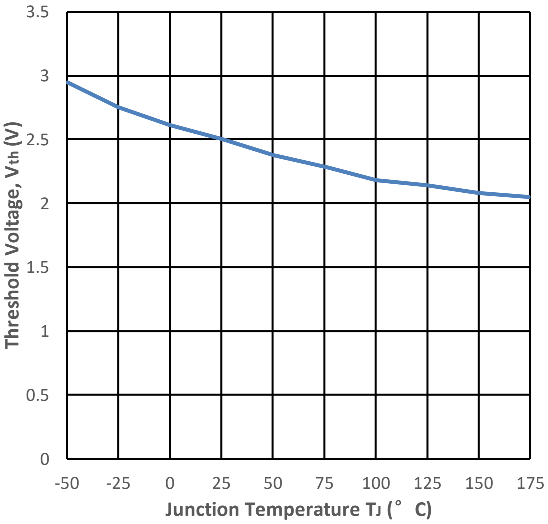


Fig8. Gate Charge Characteristics

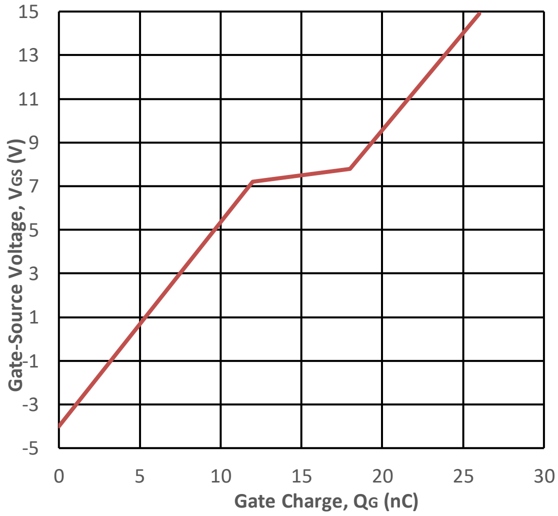


Fig9. 3rd Quadrant Characteristic at 25 °C

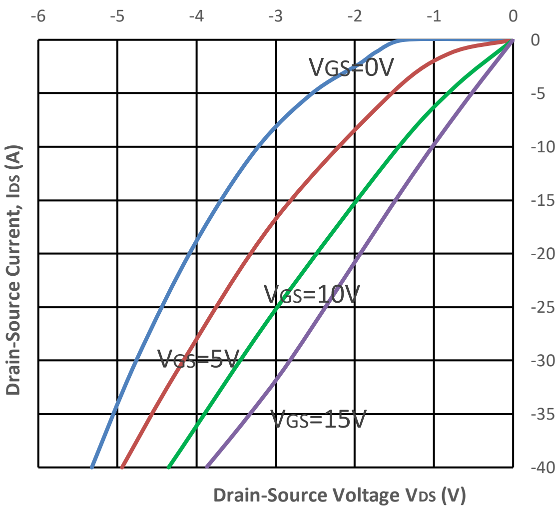


Fig10. Output Capacitor Stored Energy

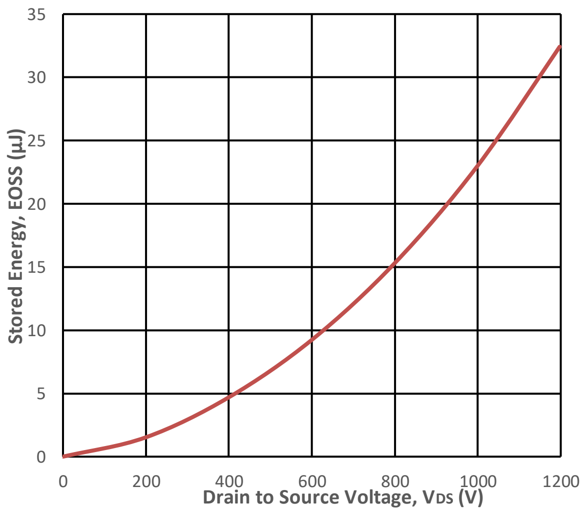


Fig11. Capacitances vs. Drain-Source

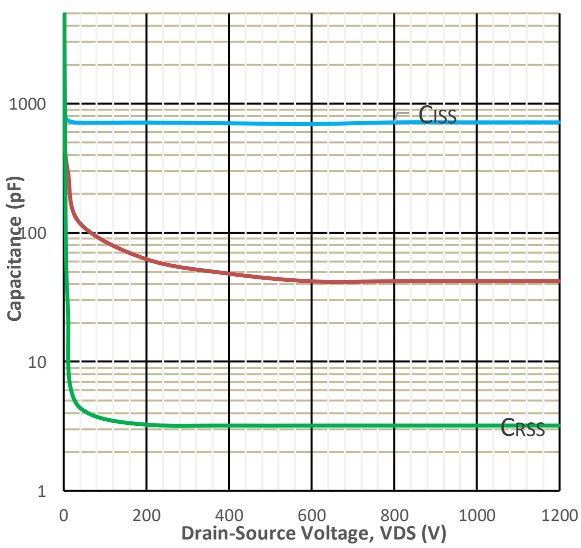


Fig12. Max Power Dissipation Derating Vs TC

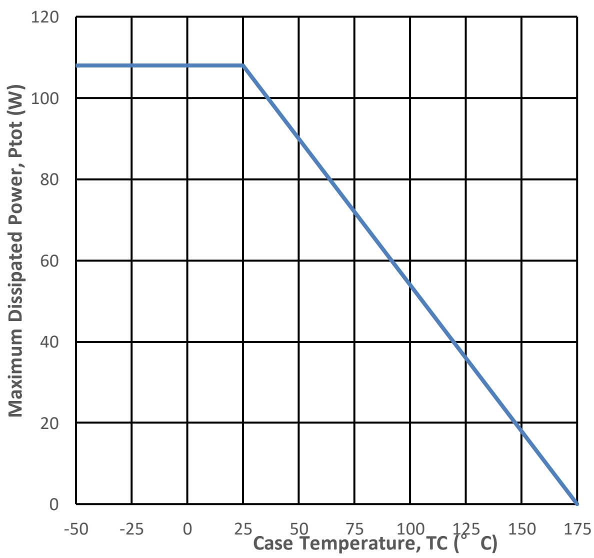


Fig13. Switching Energy vs. Drain Current

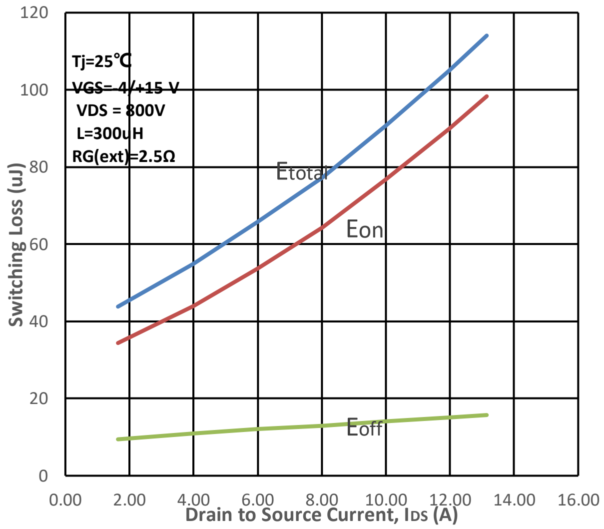


Fig14. Switching Energy vs. RG(ext)

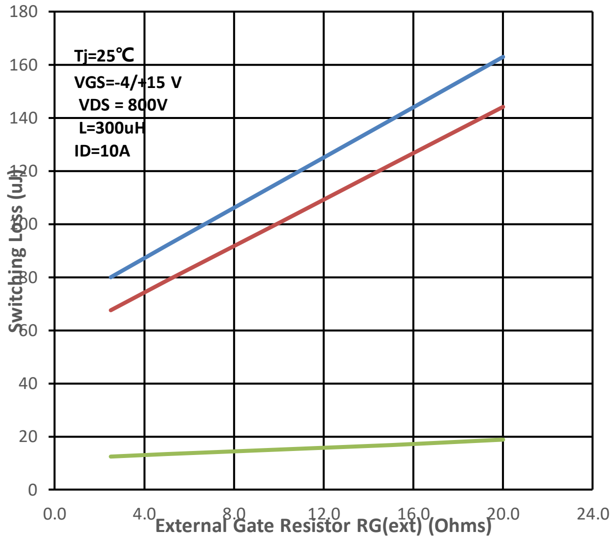


Fig15. Switching Energy vs. Temperature

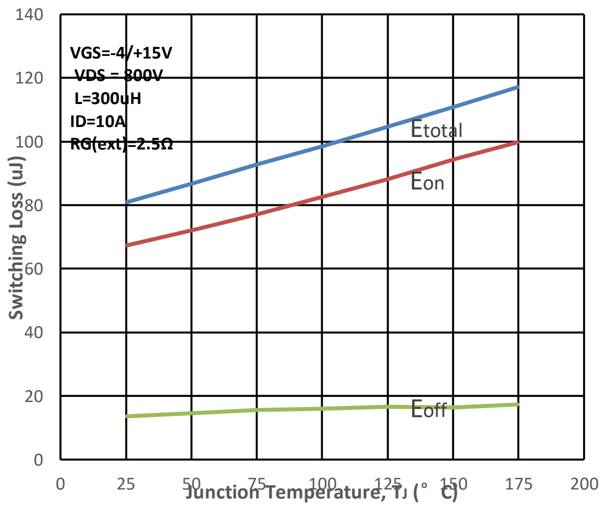


Fig16. Switching Times vs. RG(ext)

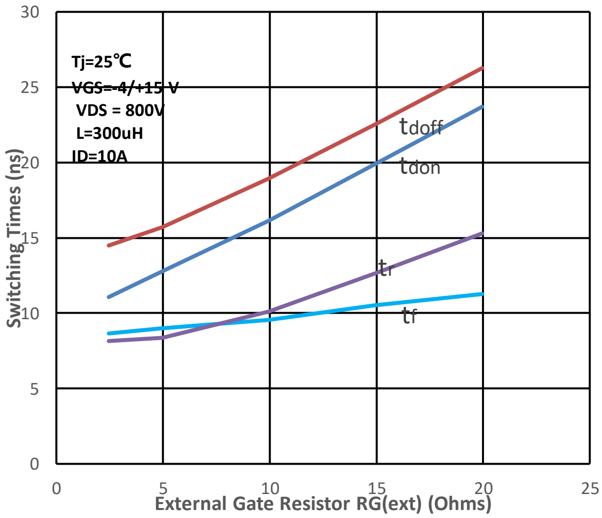


Fig17.Transient Thermal Impedance

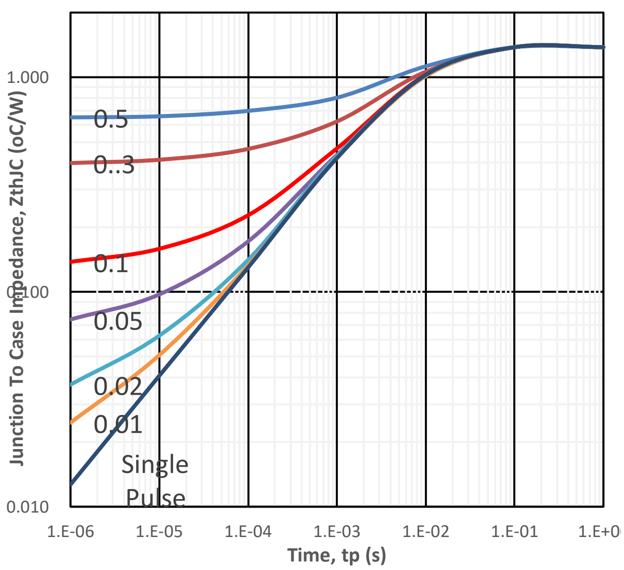
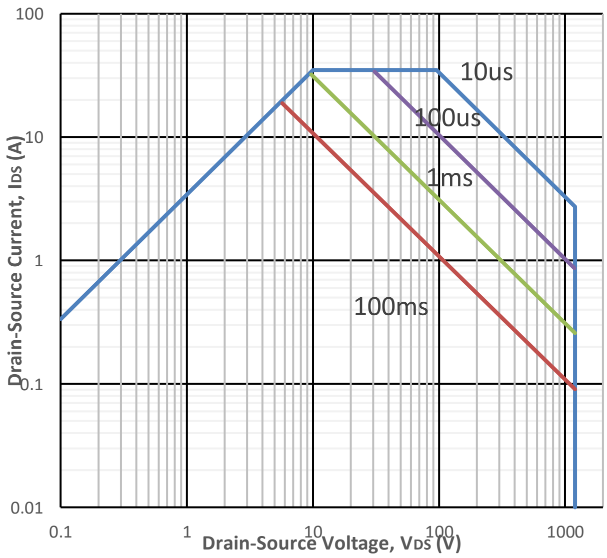
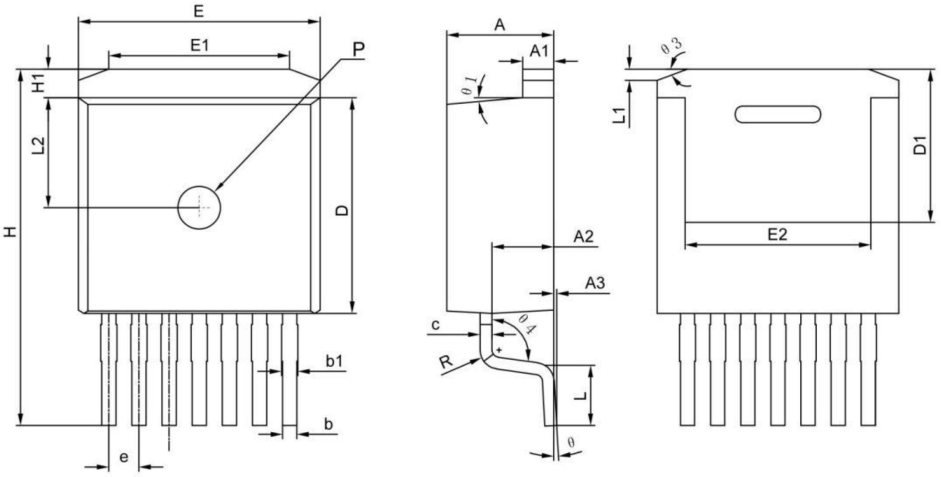
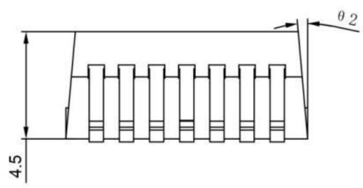


Fig18. Safe Operating Area



Package Drawing:





Dimensions:（ UNIT：mm）

SYMBO	MIN	TYPE	MAX
A	4.40	4.50	4.60
A1	1.25	1.30	1.40
A2	2.45	2.60	2.70
A3	0.05	0.13	0.20
b	0.50	0.60	0.70
b1	0.60	0.70	0.85
c	0.45	0.50	0.60
D	8.88	9.08	9.28
D1	6.25	6.45	6.65
E	9.88	10.18	10.28
E1	6.67	7.07	7.47
E2	7.67	7.82	7.97
e	1.17	1.27	1.37
H	14.75	15.00	15.25
H1	1.10	1.20	1.30
L	2.35	2.55	2.75
L1	0.37	0.57	0.77
L2	4.48	4.63	4.78
θ	0°	3°	5°
θ1	3°	5°	7°
θ2	3°	5°	7°
θ3	15°	20°	25°
R	0.75	0.80	0.85
P	1.70	1.80	1.90