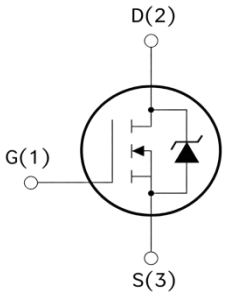
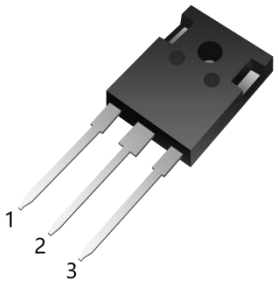
Silicon Carbide Power MOSFET

Parameter	Value	Unit
V_{DS}	1200	V
I_D	20	A
$R_{DS(ON)}$	160	mΩ
Q_G	26	nC





TO-247-3L

Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Low impedance package with driver source pin
- Easy to parallel and simple to drive

Applications

- EV Charging
- High Voltage DC/DC Converters
- Switched-Mode Power Supply(SMPS)
- Power Factor Correction(PFC)

Absolute Maximum Ratings (at T_J=25℃ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DS}	1200	V
Gate-source Voltage	V_{GS}	-8/+19	V
Drain Current (continuous;Tc=25°C)	I_D	20	A
Drain Current (continuous;Tc=100°C)		12	
Drain Current (pulsed)	I_{DM}	35	A
Power Dissipation (Tc=25°C)	P_D	116	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	°C
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.29	°C/W
Thermal Resistance From Junction to Ambient	$R_{\theta JA}$	40	

Electrical Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Static characteristics (at T_C=25°C unless otherwise specified)						
Drain-Source Breakdown Voltage	B_{VDS}	V_{GS}=0V; I_D=250uA	1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1200V; V_{GS}=0V; T_J=25°C	-	-	100	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=-8/+19V; V_{DS}=0V	-	-	250	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}; I_{DS}=2mA	1.8	2.5	3.6	V
Recommended Turn-on Voltage	$V_{GS(on)}$	Static	-	15	-	V
Recommended Turn-off Voltage	$V_{GS(off)}$		-	-4	-	V
Static Drain-Source on Resistance	$R_{DS(on)}$	V_{GS}=15V; I_D=10A	-	160	208	mΩ
		V_{GS}=15V; I_D=10A; T_J=175°C	-	272	-	
Dynamic characteristics (at T_C=25°C unless otherwise specified)						
Input Capacitance	C_{iss}	V_{DS}=1000V; f=1MHz; V_{AC}=25mV	-	715	-	pF
Output Capacitance	C_{oss}		-	42	-	
Reverse Transfer Capacitance	C_{rss}		-	3.2	-	
Transconductance	g_{fs}	V_{DS}=20V; I_D=10A	-	6	-	S
C_{OSS} Stored Energy	E_{OSS}	V_{DS}=1000V; f=1MHz	-	23	-	uJ
Turn-on Energy	E_{on}	V_{DS}=800V; V_{GS}=-4/+15V; I_D=10A; Load=300μH; T_J=175°C	-	105	-	uJ
Turn-off Energy	E_{off}		-	18	-	
Total Gate Charge	Q_G	V_{DS}=800V; V_{GS}=-4/+15V; I_D=10A	-	26	-	nC
Gate-Source Charge	Q_{GS}		-	12	-	
Gate-Drain Charge	Q_{GD}		-	6	-	
Internal Gate Resistor	R_{Gint}	f=1MHz; V_{AC}=25mV	-	5	-	Ω
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=800V; V_{GS}=-4/+15V; I_D=10A; $R_{g(ext)}$=2.5Ω; Load=300μH	-	12	-	ns
Rise Time	t_r		-	9	-	
Turn-off Delay Time	$t_{d(off)}$		-	15	-	
Fall Time	t_f		-	9	-	

Reverse SiC Diode Characteristics(at T_J=25℃ unless otherwise specified)

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{FSD}	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	
Continuous Diode Forward Current	I_S	V_{GS}=0V; T_C=25°C	-	20	-	A
Reverse Recovery Time	t_{RR}	V_R=800V; V_{GS}=-4V; I_F=10A; di/dt=1900A/μs; T_J=175°C	-	7	-	ns
Reverse Recovery Charge	Q_{RR}		-	33	-	nC
Peak Reverse Recovery Current	I_{RRM}		-	9	-	A

Typical Characteristics

Fig1. Output characteristics (T_J = 25 °C)

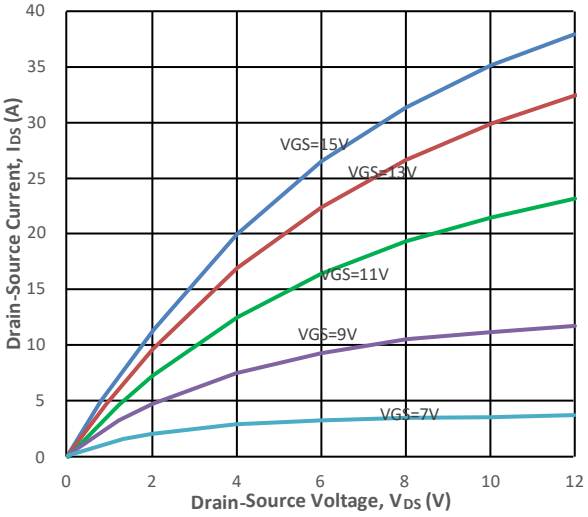


Fig2. Output characteristics (T_J = 175 °C)

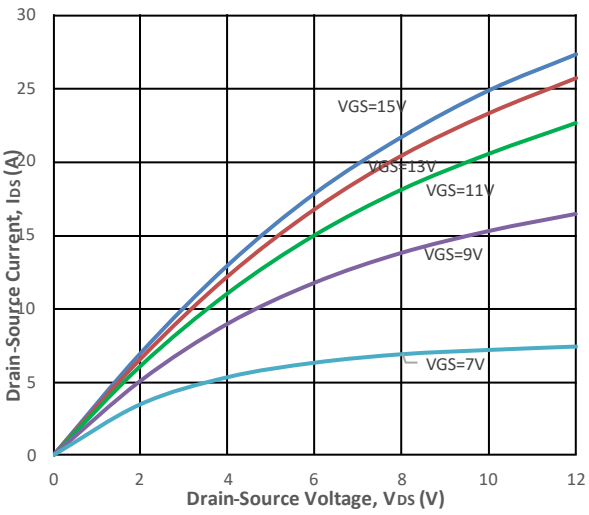


Fig3.Normalized On-Resistance vs. Temperature

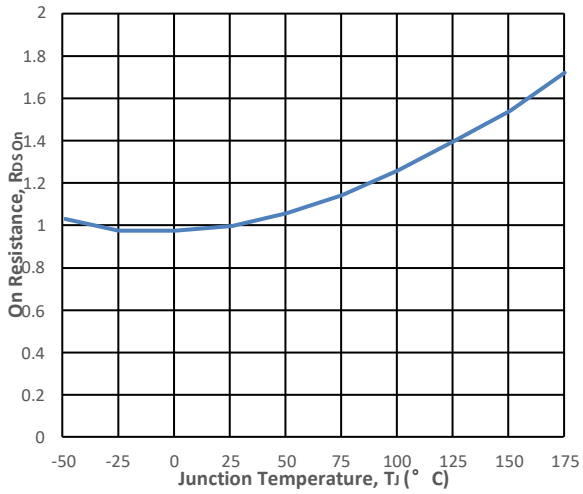


Fig4. On-Resistance vs. Temperature

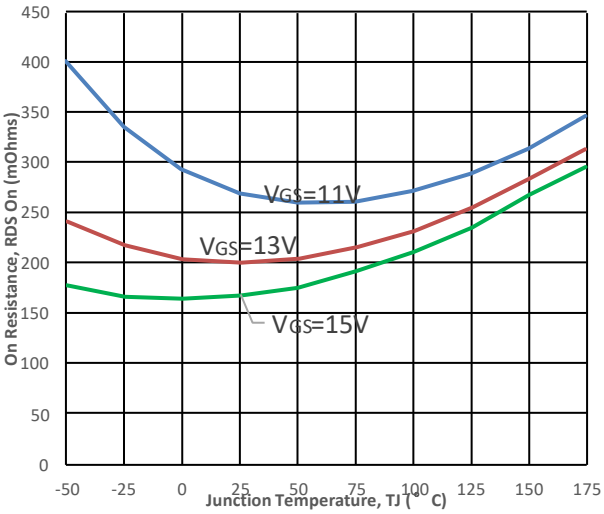


Fig5. Transfer Characteristic

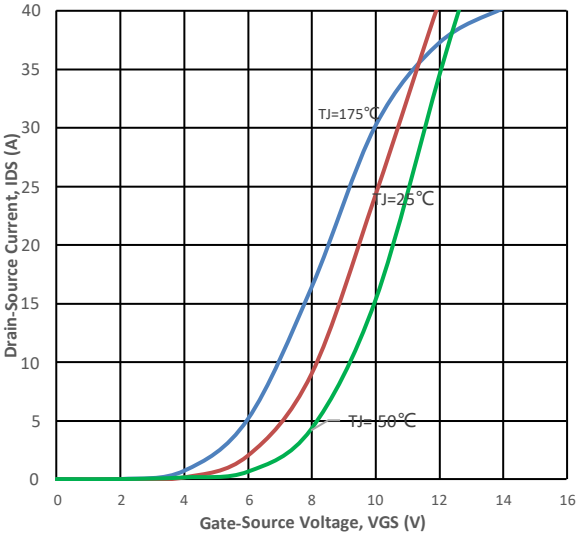


Fig6. Body Diode Characteristic at 25 °C

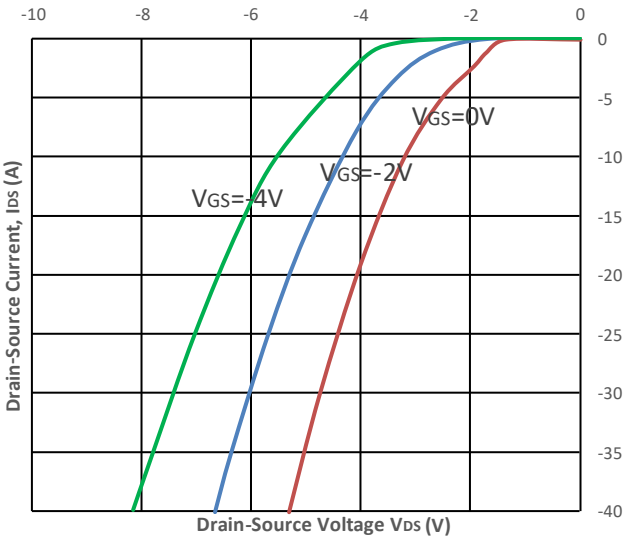


Fig7.Threshold Voltage vs. Temperature

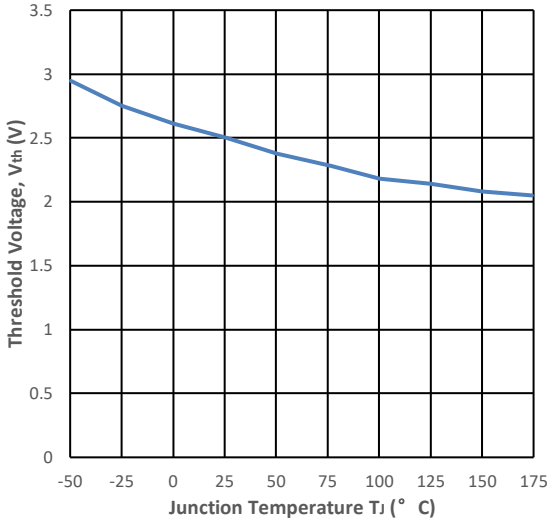


Fig8. Gate Charge Characteristics

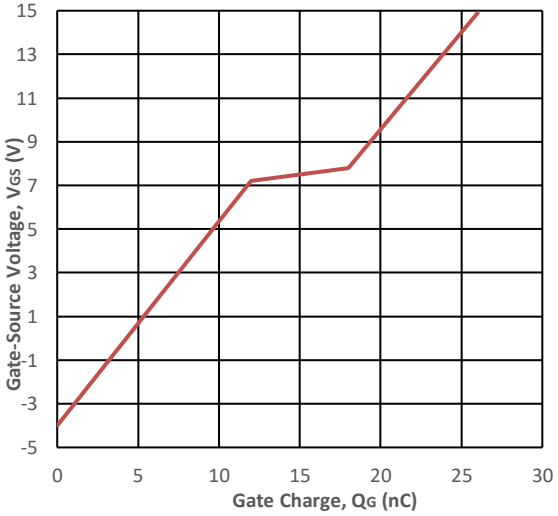


Fig9. 3rd Quadrant Characteristic at 25 °C

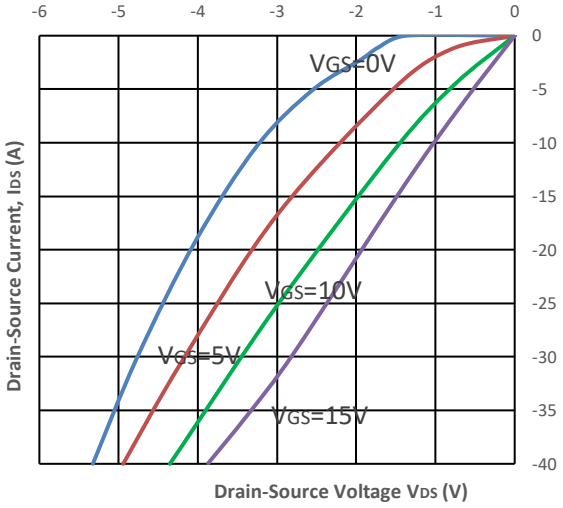


Fig10. Output Capacitor Stored Energy

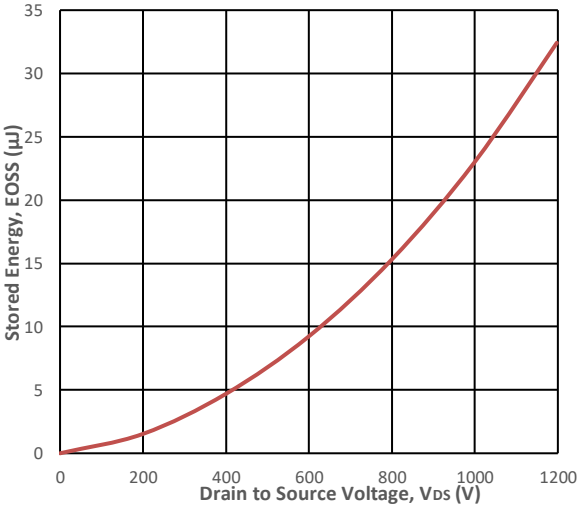


Fig11. Capacitances vs. Drain-Source

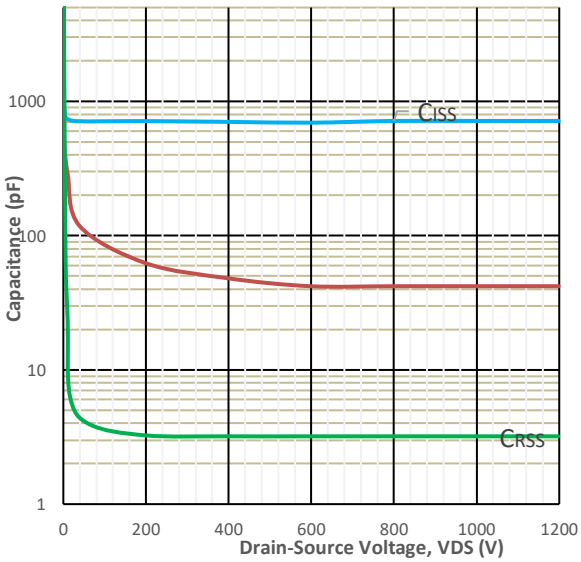


Fig12. Max Power Dissipation Derating Vs TC

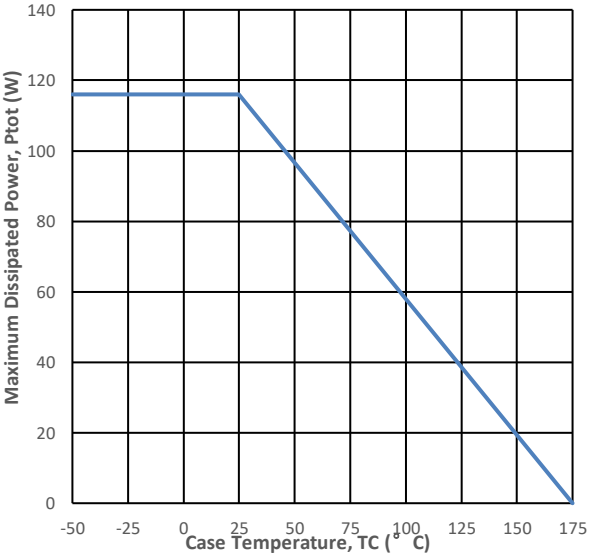


Fig13. Switching Energy vs. Drain Current

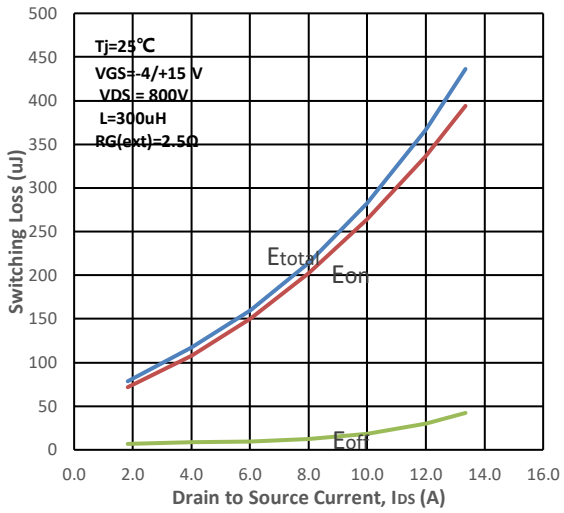


Fig14. Switching Energy vs. RG(ext)

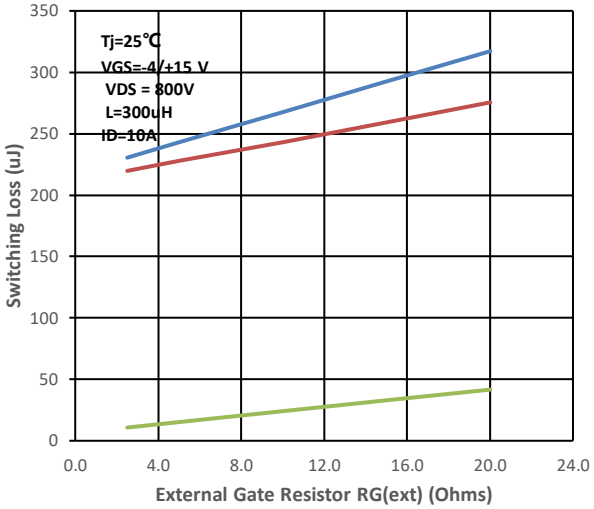


Fig15. Switching Energy vs. Temperature

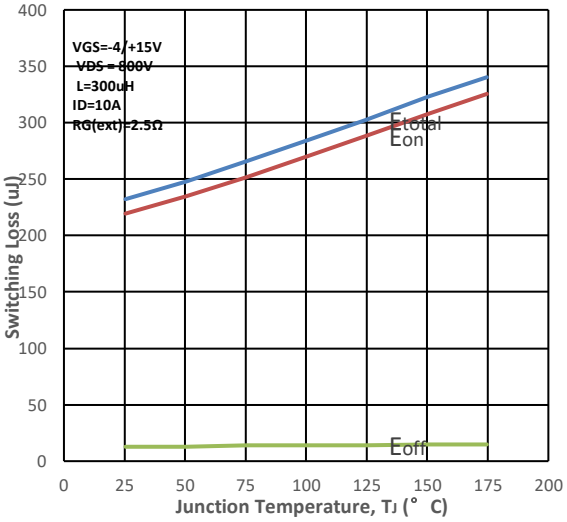


Fig16. Switching Times vs. RG(ext)

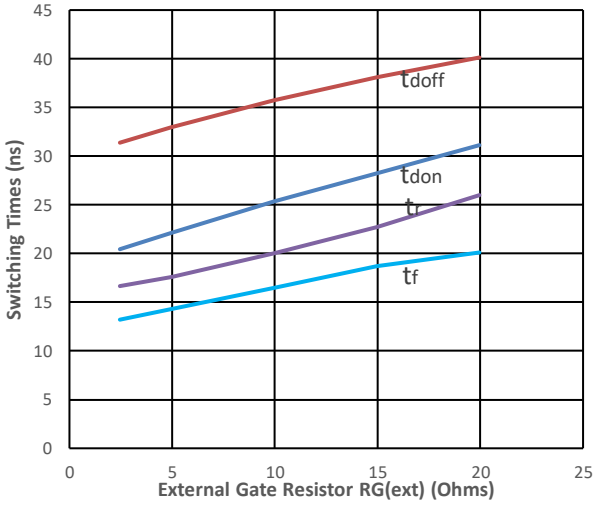


Fig17.Transient Thermal Impedance

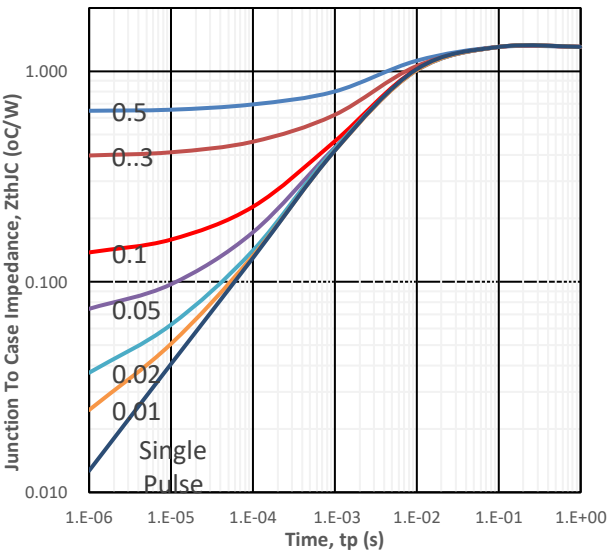
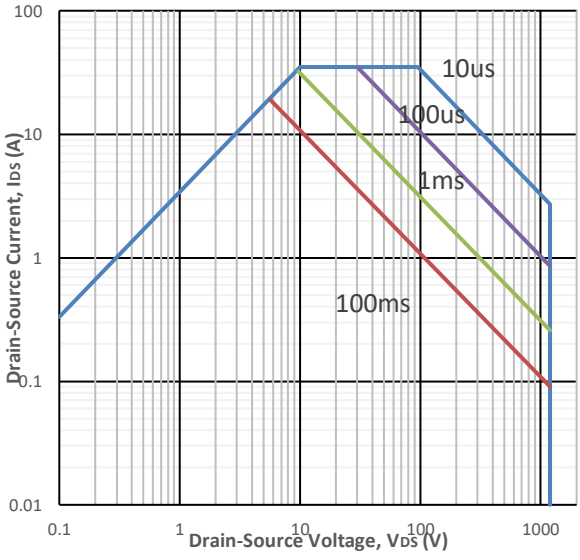
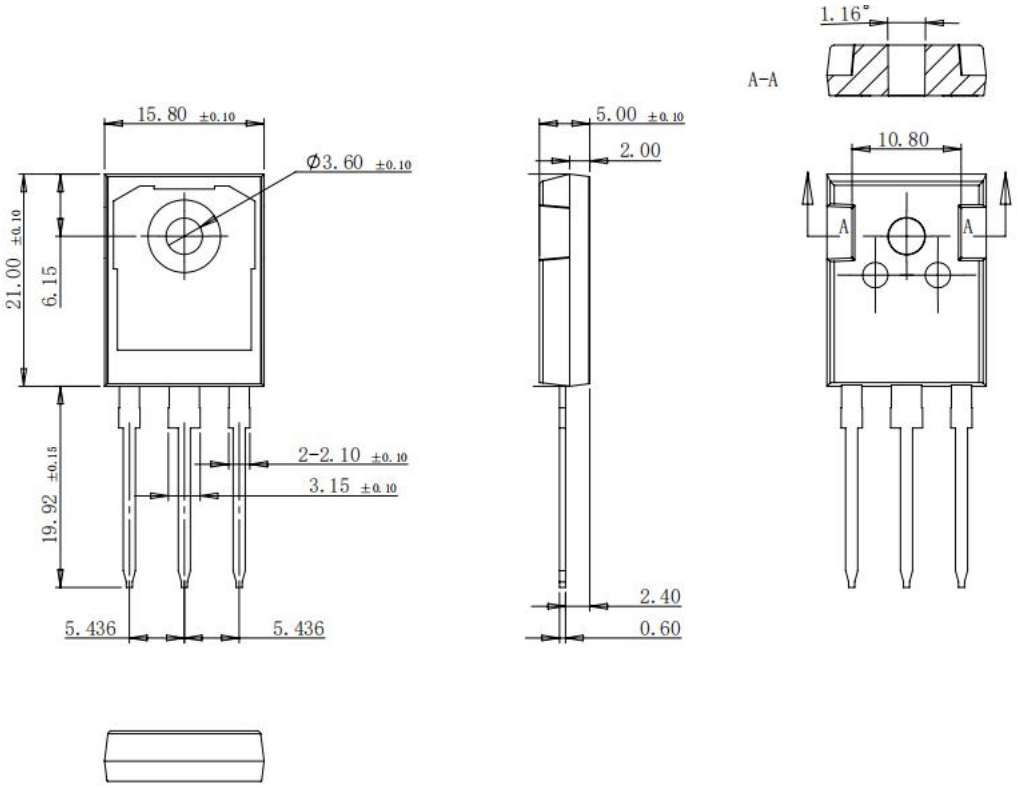


Fig18. Safe Operating Area



Package Outlines(Unit:mm)

TO-247-3L



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