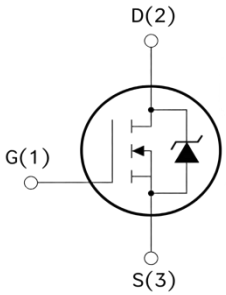
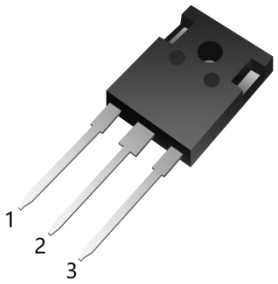
Silicon Carbide Power MOSFET

Parameter	Value	Unit
V_{DS}	650	V
I_D	66	A
$R_{DS(ON)}$	40	mΩ
Q_G	80	nC





TO-247-3L

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggedness
- Easy to Parallel and Simple to Drive

Applications

- Battery Chargers
- Motor Drives
- Pulsed Power Applications
- High Voltage DC/DC Converters
- Switched-Mode Power Supply(SMPS)

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

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DS}	650	V
Gate-source Voltage (Absolute maximum values)	V_{GS}	-10/+25	V
Gate-source Voltage (Recommended operational values)		-5/+20	
Drain Current (continuous;Tc=25°C)	I_D	66	A
Drain Current (continuous;Tc=100°C)		47	
Drain Current (pulsed)	I_{DM}	165	A
Single-Pulse Avalanche Energy	E_{AS}	288	mJ
Power Dissipation (Tc=25°C, T_J=175°C)	P_D	258	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	°C
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.58	°C/W

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=100uA	650	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V; V_{GS}=0V	-	-	100	μA
Gate-Body Leakage Current	I_{GSS+}	V_{GS}=20V; V_{DS}=0V	-	-	100	nA
Gate-Body Leakage Current	I_{GSS-}	V_{GS}=-10V; V_{DS}=0V	-	-	-100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}; I_{DS}=7.5mA; T_J=25°C	3.2	3.8	4.6	V
Static Drain-Source on Resistance	$R_{DS(on)}$	V_{GS}=20V; I_D=25A; T_J=25°C	-	40	55	mΩ
		V_{GS}=18V; I_D=25A; T_J=25°C	-	47	-	
		V_{GS}=20V; I_D=25A; T_J=175°C	-	43	-	
Dynamic characteristics (at T_C=25°C unless otherwise specified)						
Input Capacitance	C_{iss}	V_{DS}=400V; f=1MHz; V_{GS}=0V T_j=25°C	-	1969	-	pF
Output Capacitance	C_{oss}		-	178	-	
Reverse Transfer Capacitance	C_{rss}		-	4.5	-	
Total Gate Charge	Q_G	V_{DD}=400V; V_{GS}=0/20V; I_D=25A T_j=25°C	-	80	-	nC
Gate-Source Charge	Q_{GS}		-	18	-	
Gate-Drain Charge	Q_{GD}		-	28	-	
Internal Gate Resistor	R_{Gint}	f=1MHz; V_{AC}=25mA	-	4.3	-	Ω
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=400V; V_{GS}=-3.5/18V; I_D=25A; $R_{g(ext)}$=2Ω	-	11	-	ns
Rise Time	t_r		-	13	-	
Turn-off Delay Time	$t_{d(off)}$		-	32	-	
Fall Time	t_f		-	11	-	
Turn-on Energy	E_{on}		-	106	-	uJ
Turn-off Energy	E_{off}		-	79	-	

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=25A; T_J=25°C	-	4.2	-	V
Continuous Diode Forward Current	I_S	T_j=25°C	-	66	-	A
Reverse Recovery Time	t_{RR}	V_R=400V; V_{GS}=0V; I_F=25A; di/dt=1000A/μs, T_j=25°C	-	20	-	ns
Reverse Recovery Charge	Q_{RR}		-	65	-	nC
Peak Reverse Recovery Current	I_{RRM}		-	5.7	-	A

Typical Characteristics

Figure 1. Typical Output Characteristics

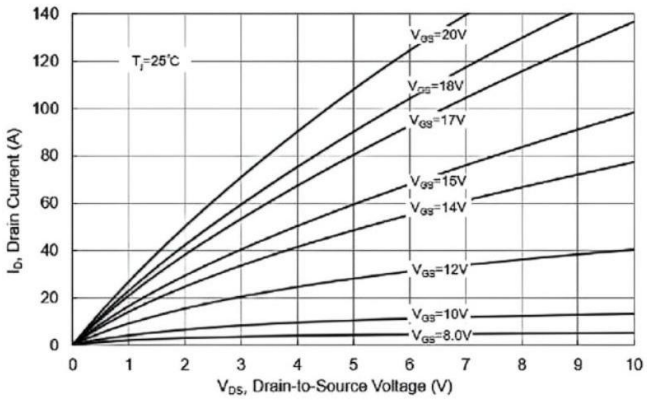


Figure 2. Typical Output Characteristics

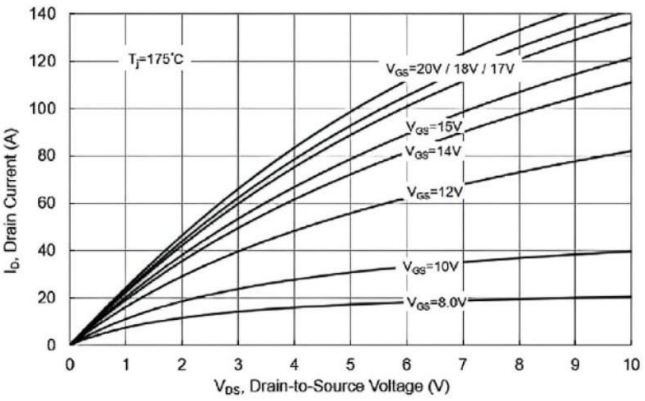


Figure 3. Typical Drain-to-Source ON Resistance vs. Gate Voltage

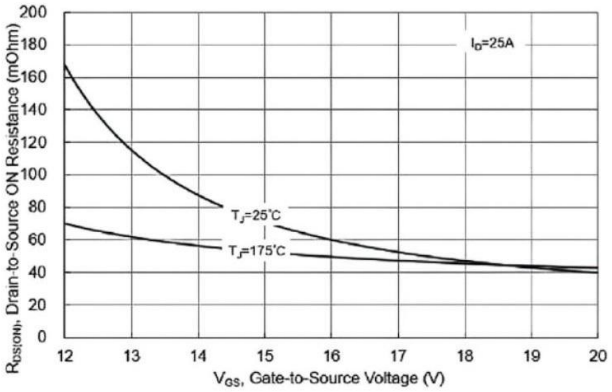


Figure 4. Typical Transfer Characteristics

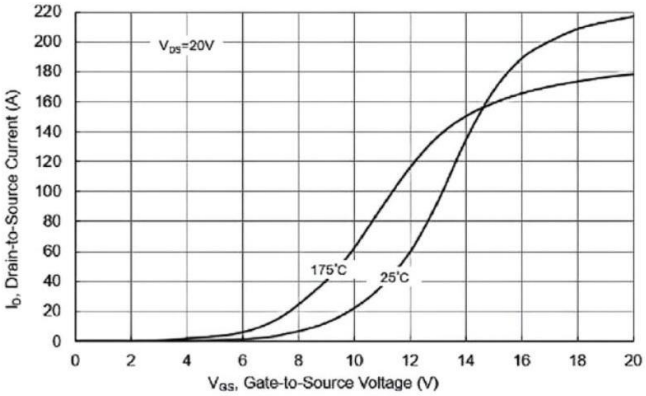


Figure 5. Typical Drain-to-Source ON Resistance

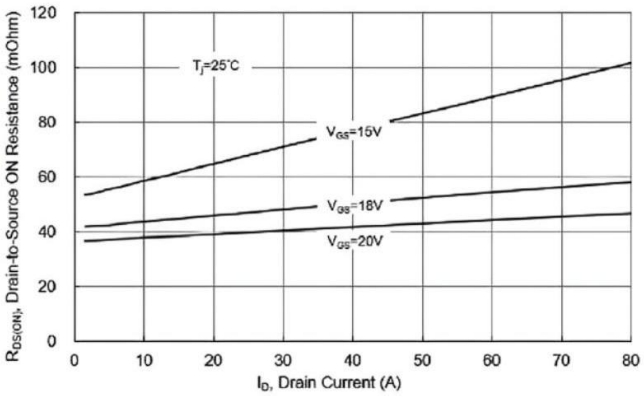


Figure 6. Typical Drain-to-Source ON Resistance

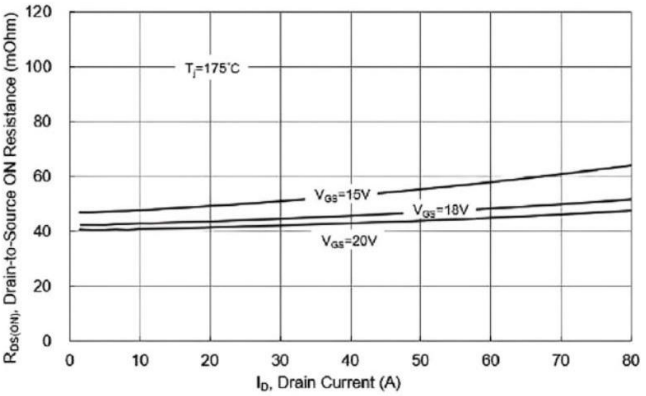


Figure 7. Typical Body Diode Characteristics

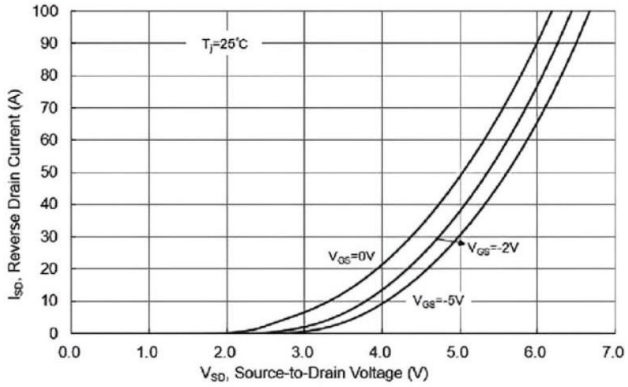


Figure 8. Typical Body Diode Characteristics

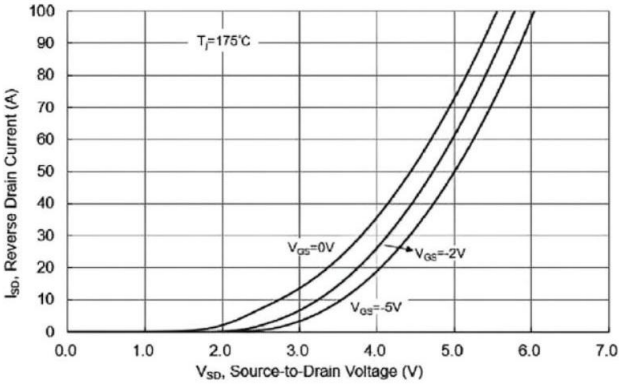


Figure 9. 3rd Quadrant Characteristics

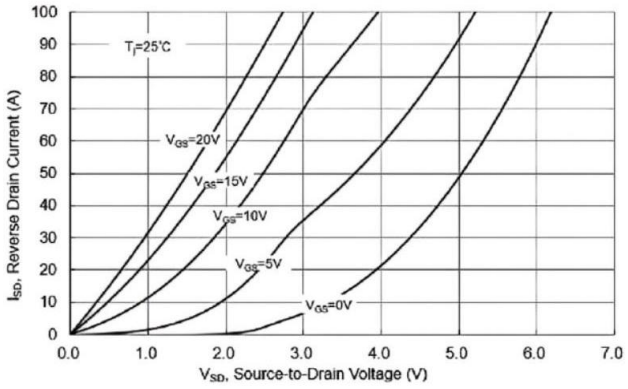


Figure 10. 3rd Quadrant Characteristics

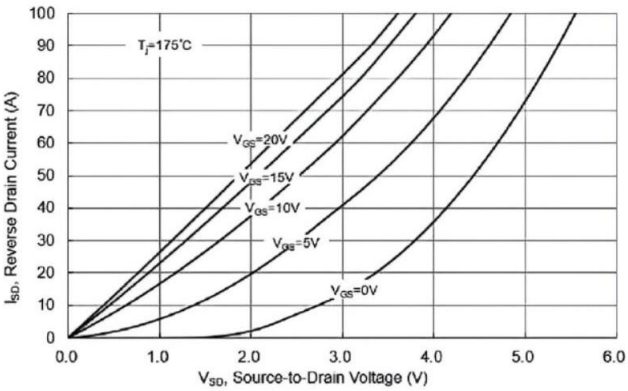


Figure 11. Typical Drain-to-Source On Resistance vs. Junction Temperature

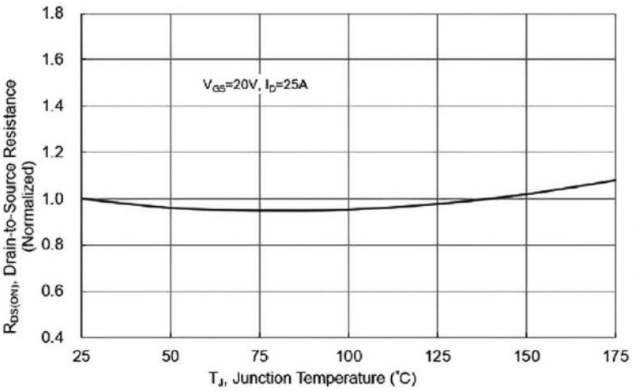


Figure 12. Typical Breakdown Voltage vs. Junction Temperature

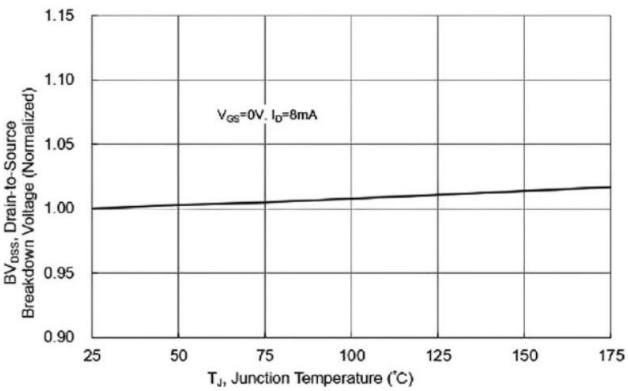


Figure 13. Typical Threshold Voltage vs. Junction Temperature

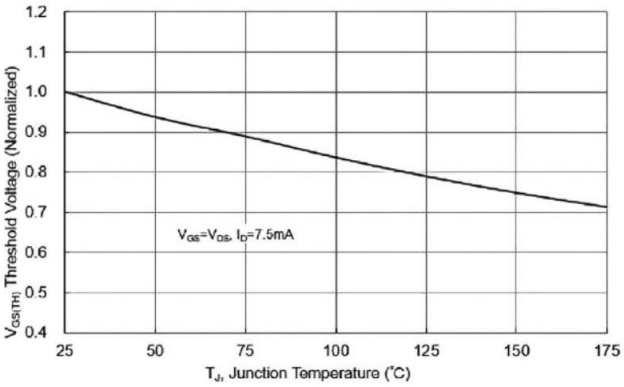


Figure 14. Typical Capacitance vs. Drain-to-Source Voltage

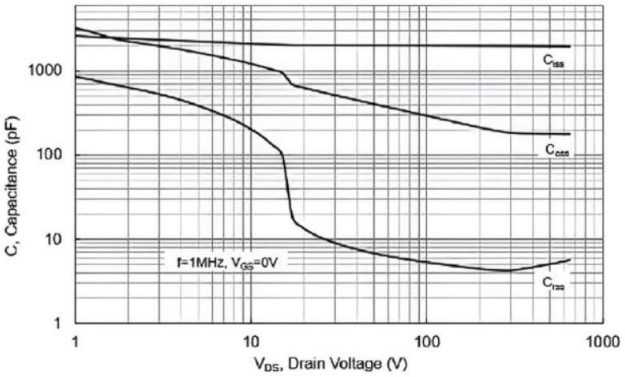


Figure 15. Typical Gate Charge vs. Gate-to-Source Voltage

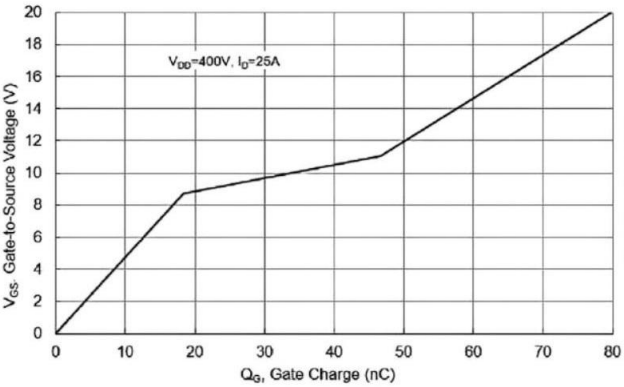


Figure 16. Switching Times vs. R_G

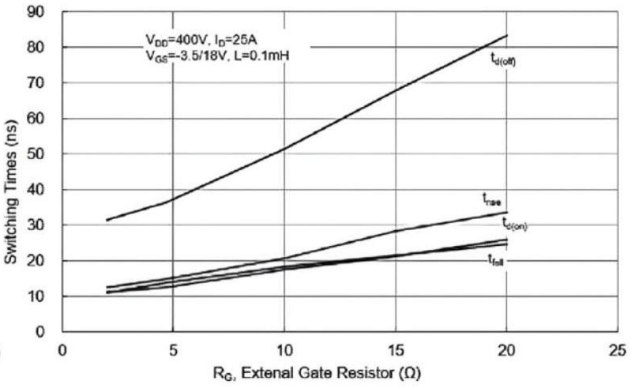


Figure 17. Switching Loss vs. R_G

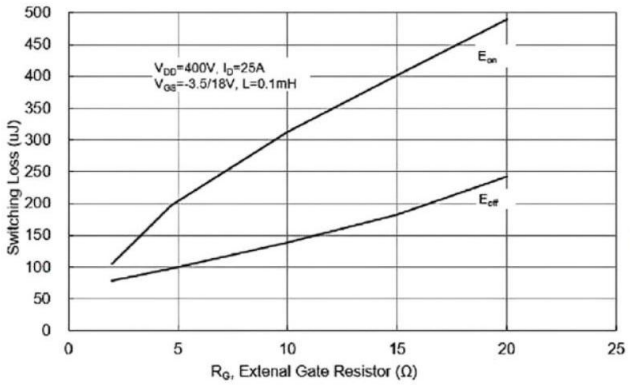


Figure 18. Switching Loss vs. Drain Current

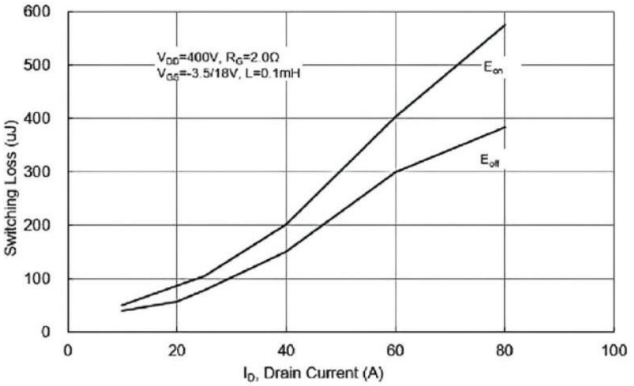


Figure 19. Thermal Impedance Junction-to-Case

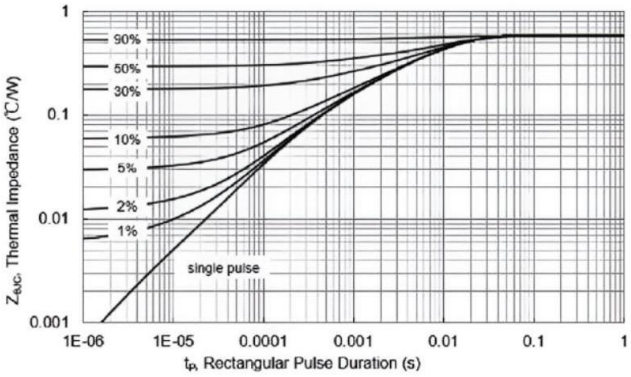


Figure 20. Maximum Peak Current Capability

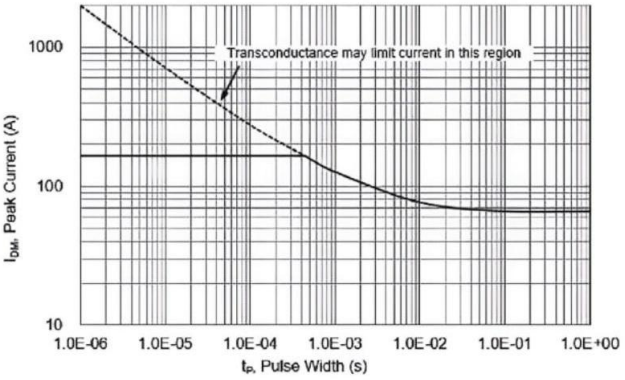


Figure 21. Maximum Power Dissipation vs. Case Temperature

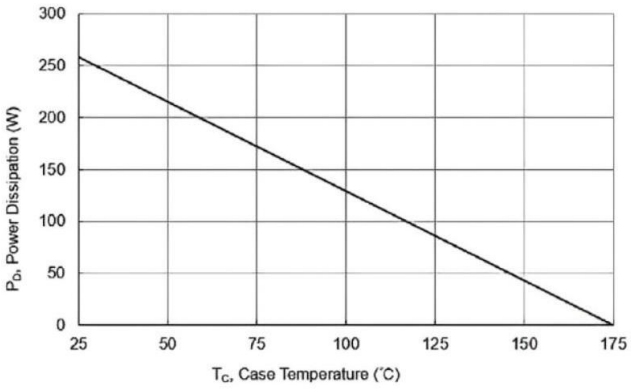


Figure 22. Maximum Continuous Drain Current vs. Case Temperature

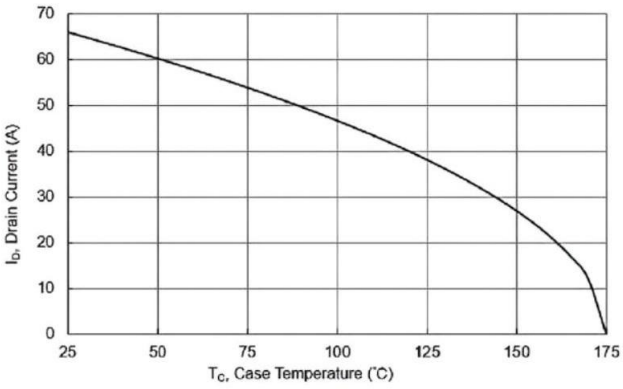
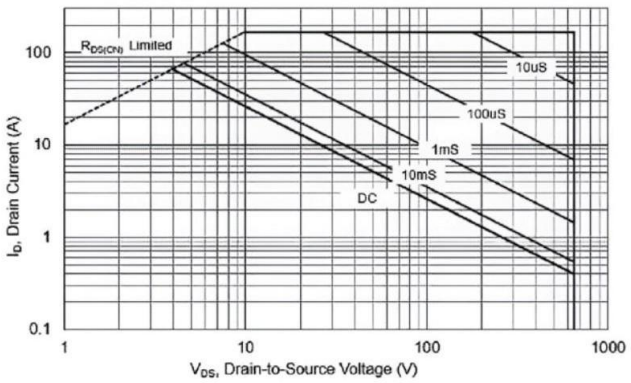
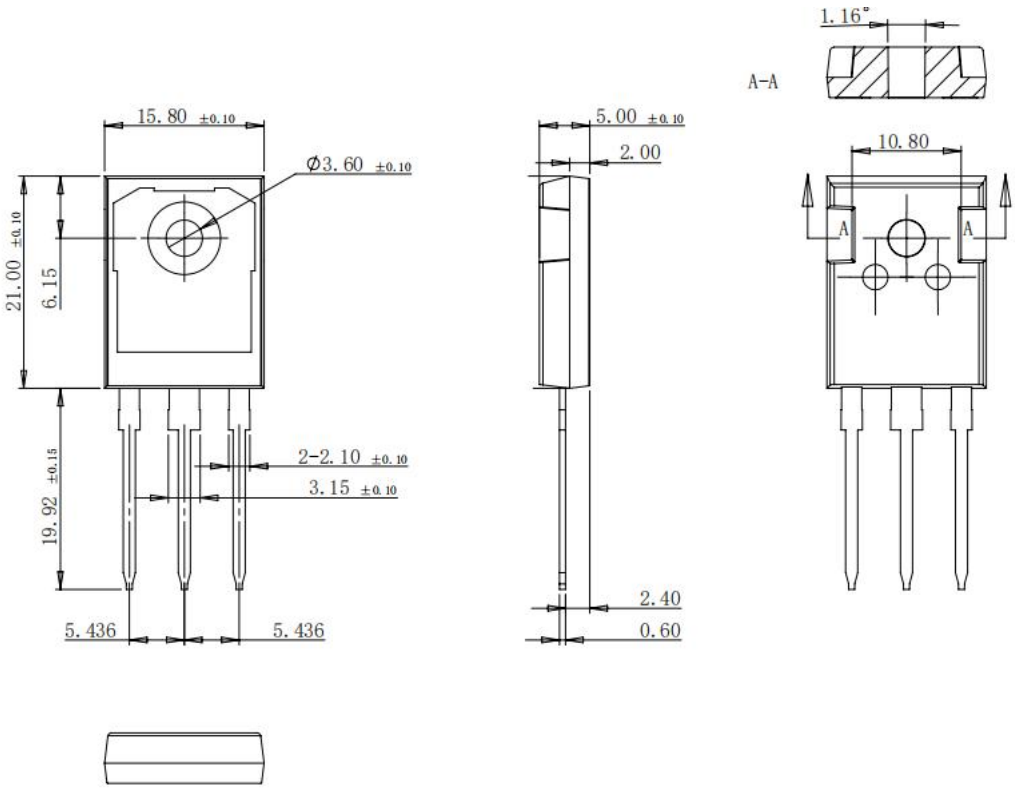


Figure 23. Maximum Forward Safe Operation Area



Package Outlines(Unit:mm)

TO-247-3L



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