

Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- Wide bandgap SiC MOSFET technology
- Halogen free, RoHs compliant

Mechanical Data

- Case:TO-247 Package

Application

- Motor drivers
- Renewable energy
- Automotive DC/DC converters
- Switch mode power supplies

Product Summary			
V _{DS}	R _{DS(on)} (mΩ)Typ	I _D (A)	Q _g (Typ)
650V	45@ 20V 20A	55	66nc



Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

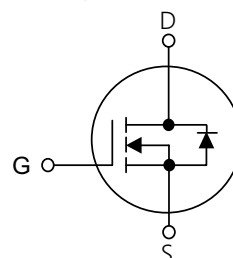


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	650	V
Gate-Source Voltage(Max)	V _{GS(max)}	-10/+25	V
Recommend Gate-Source Voltage	V _{GSop}	-4/+20	V
Continuous Drain Current	I _D	T _C =25°C	A
		T _C =100°C	
Pulsed Drain Current (Note 1)	I _{DM}	95	A
Power Dissipation T _C =25°C	P _D	208	W
Operating Junction and Storage Temperature	T _J /T _{STG}	-55 ~ +175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	SC45N65P	Unit
Thermal resistance Junction to Case	R _{θJC}	0.72	°C/W
Thermal resistance Junction to Ambient	R _{θJA}	40	°C/W

Table 3. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V,I _D =100μA	650	-	-	V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =650V,V _{GS} =0V	-	1	50	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =20V,V _{DS} =0V	-	-	250	nA
	Reverse		V _{GS} = -4V,V _{DS} =0V	-	-	-250	nA
On Characteristics							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} ,I _D =5mA	1.8	2.7	4.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =20V,I _D =20A,T _J =25°C	-	45	66	mΩ
			V _{GS} =20V,I _D =20A,T _J =175°C	-	75	-	
Gate Resitance		R _G	f=1MHz	-	1.8	-	Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =600V,V _{GS} =0V, f=1MHz,V _{AC} =25mV	-	1410	-	pF
Output Capacitance		C _{OSS}		-	119	-	pF
Reverse Transfer Capacitance		C _{RSS}		-	4	-	pF
Total Gate Charge		Q _G	V _{DD} =400V,I _D =20A, V _{GS} = -4/20V	-	66	-	nC
Gate-Source Charge		Q _{GS}		-	16	-	nC
Gate-Drain Charge		Q _{GD}		-	33	-	nC
Drain-Source Diode Characteristics and Maximum Ratings(Note 2)							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} = -4V,I _S =8.8A	-	3.7	-	V
Continuous Diode Forward Current		I _S	V _{GS} = -4V	-	30	-	A
Diode pulse Current		I _{S, pulse}	V _{GS} = -4V,pulse width tp limited by T _{Jmax}	-	125	-	A

Notes: 1 RepetitiveRating Pulse width limited by maximum junction temperature

2 Pulse Test: Pulse width ≤300μS, Duty cycle≤2%

Typical Characteristics Diagrams

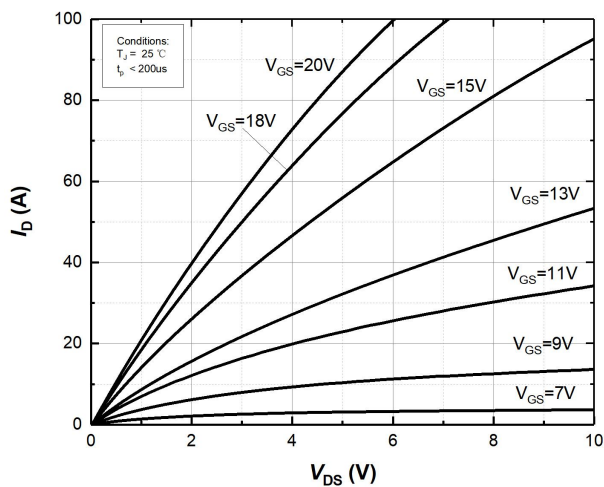


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

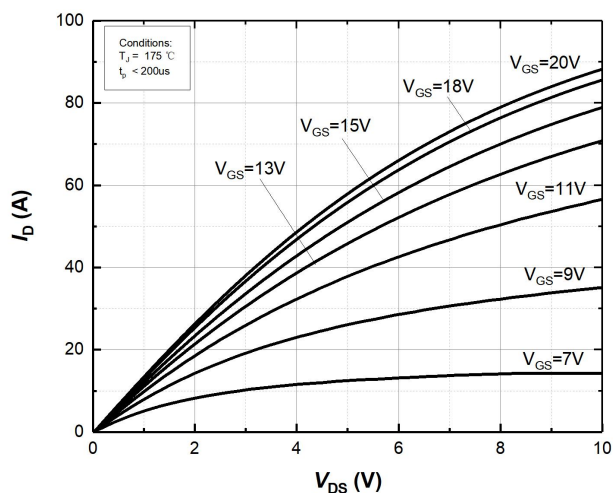


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

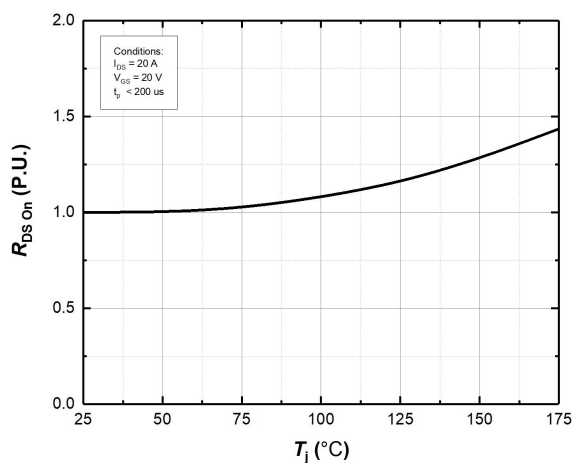


Figure 3. Normalized On-Resistance vs. Temperature

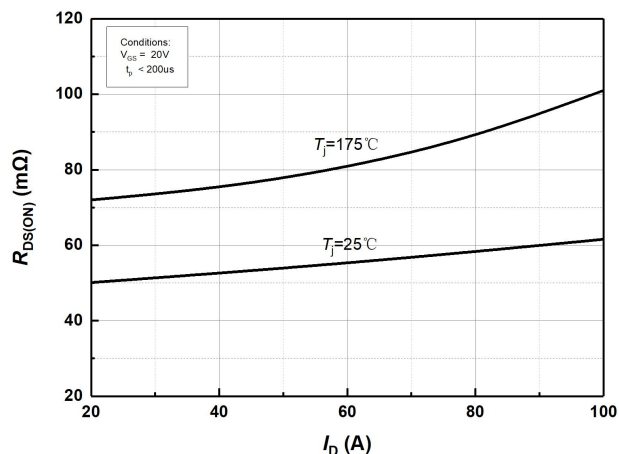


Figure 4. On-Resistance vs. Drain current for Various Temperature

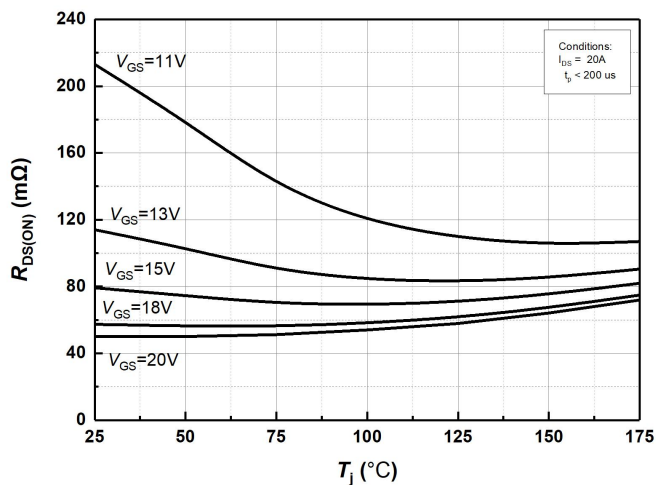


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

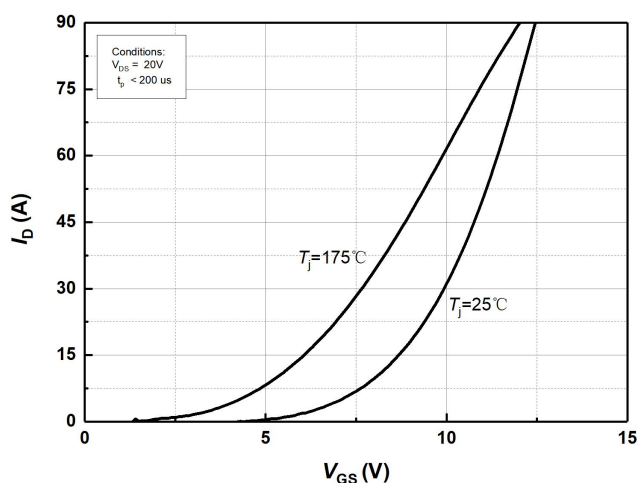


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics Diagrams

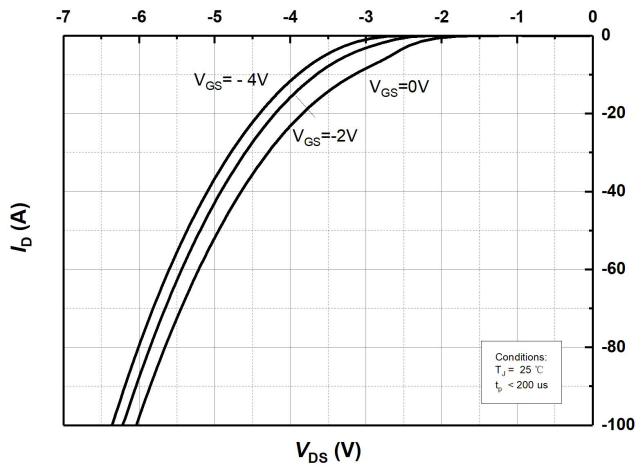


Figure 7. Body Diode Characteristics at $T_j=25^{\circ}\text{C}$

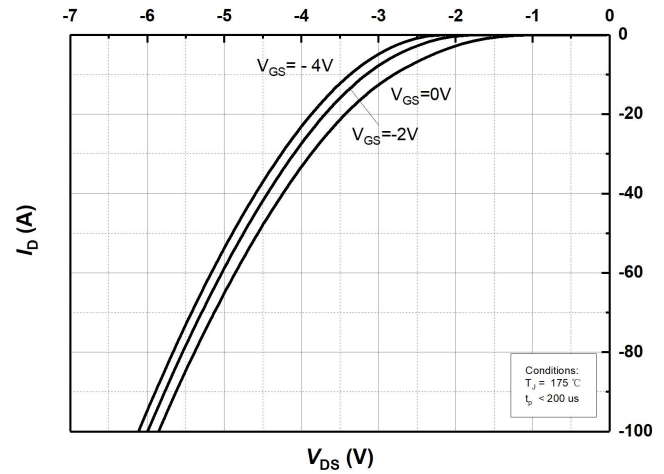


Figure 8. Body Diode Characteristics at $T_j=175^{\circ}\text{C}$

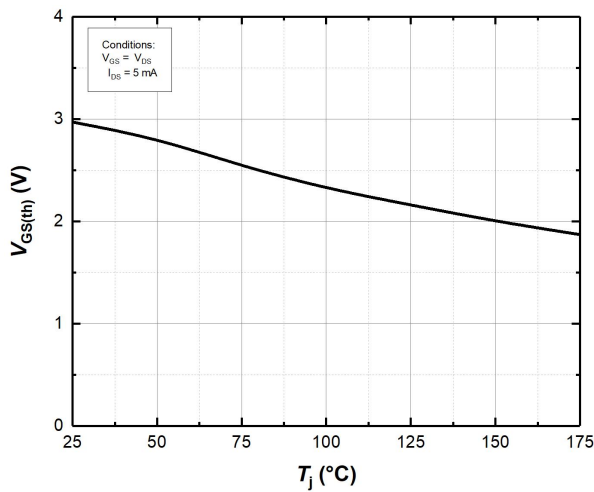


Figure 9. Threshold Voltage vs. Temperature

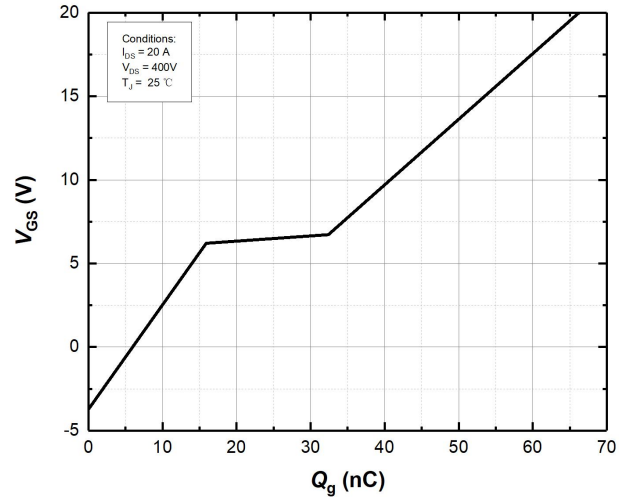


Figure 10 Gate Charge Characteristics

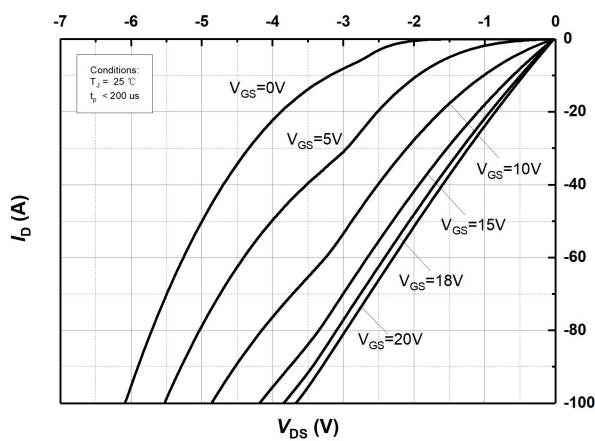


Figure 11. 3rd Quadrant Characteristic at $T_j=25^{\circ}\text{C}$

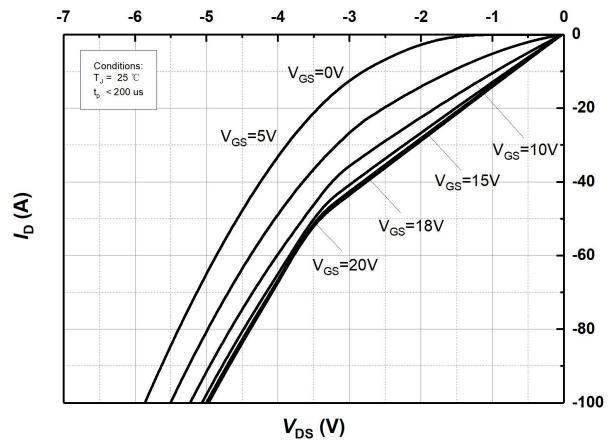


Figure 12. 3rd Quadrant Characteristic at $T_j=175^{\circ}\text{C}$

Typical Characteristics Diagrams

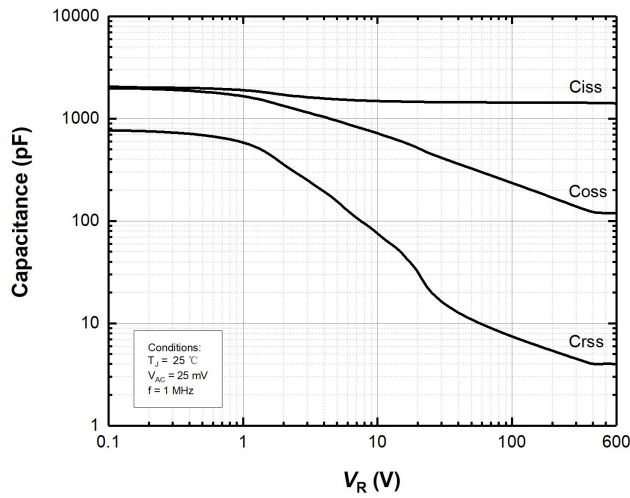


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 1000V)

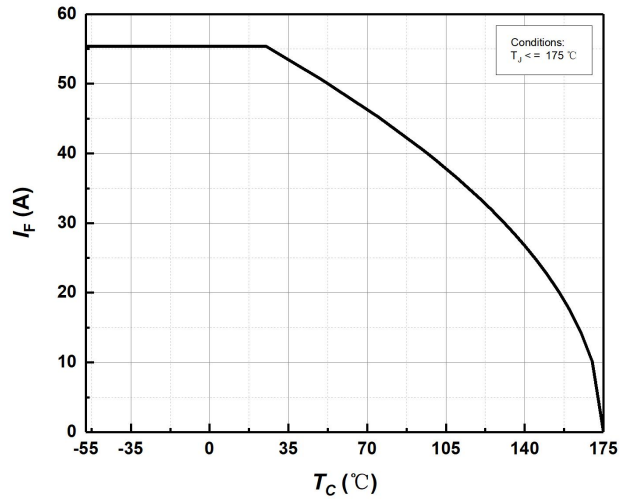


Figure 14. Continuous Drain Current Derating vs Case Temperature

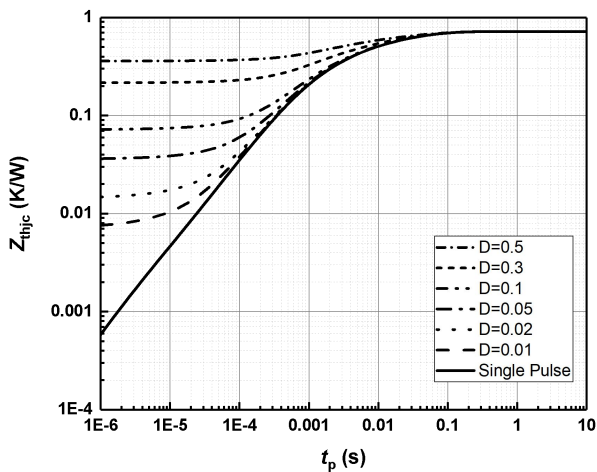


Figure 15. Transient Thermal Impedance (Junction – Case)

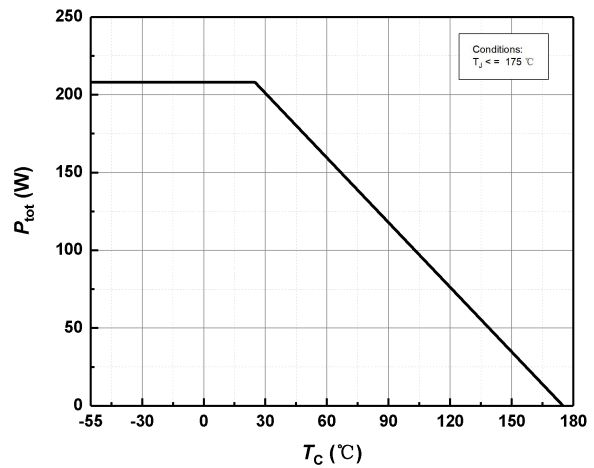


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

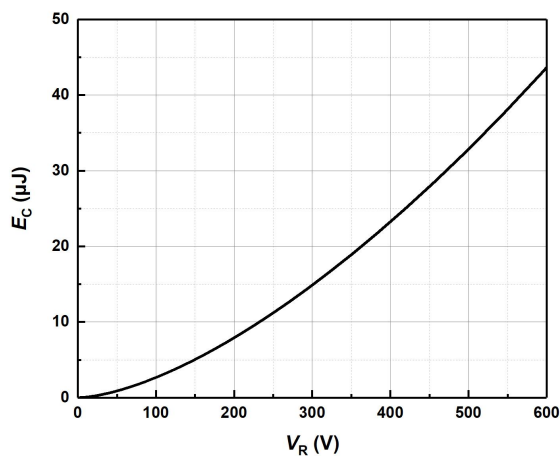


Figure 17. Output Capacitor Stored Energy

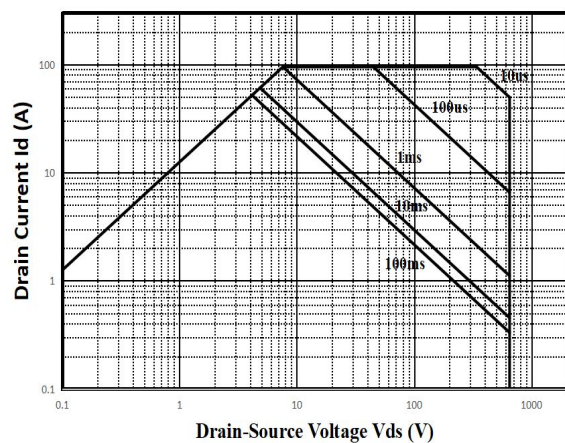
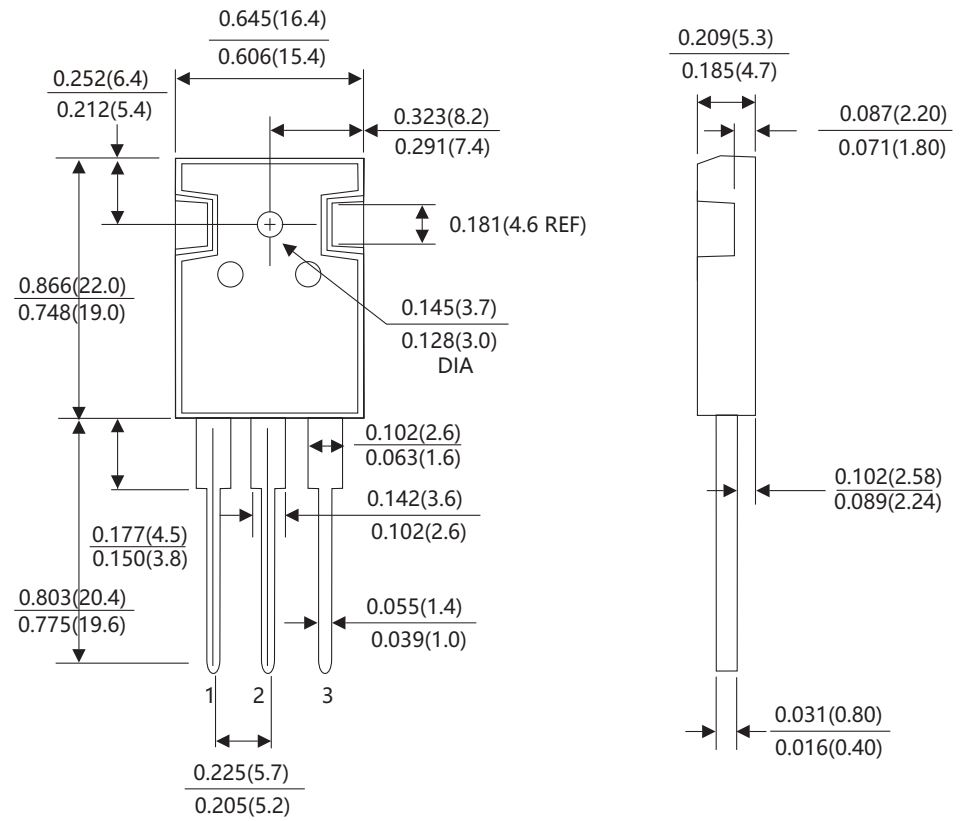
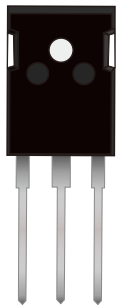


Figure 18. Safe Operating Area

Dimensions

TO-247 package



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