

High Temperature Silicon Carbide Power Rectifier

Silicon Carbide Schottky Diodes

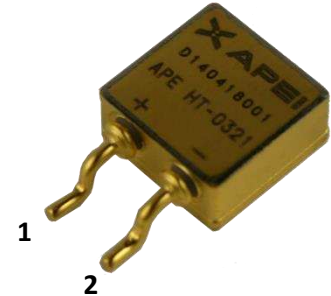
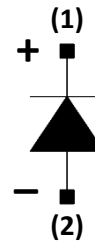
650 V / 10 A / 25 nC

FEATURES

- High temperature: $T_{c(max)} = 225\text{ }^{\circ}\text{C}$, $T_{j(max)} = 225\text{ }^{\circ}\text{C}$
- AS9100:Rev. C-certified manufacturing, traceable throughout value chain
- Near zero forward and reverse recovery
- Extremely fast switching
- High system efficiency
- Hermetic seal; flux free, void free packaging
- Backside isolation
- High reliability

APPLICATIONS

- Downhole tools
- High efficiency converters
- Motor drives
- Aerospace: Military & Commercial
- Smart grid/grid-tie distributed generation



Absolute Maximum Ratings ¹ (at $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise stated)				
Symbol	Parameter	Condition(s)	Value	Units
V_{RRM}	Repetitive peak reverse voltage		650	V
V_{DC}	DC blocking voltage		650	
I_F	Average forward current	$T_j = 175\text{ }^{\circ}\text{C}$	10	A
I_{FRM}	Repetitive peak forward surge current	$T_j = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$, Half Sine Wave, $D=0.3$	67^2	
I_{FSM}	Non-repetitive peak forward surge current	$T_j = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ }\mu\text{s}$, Pulse	250^2	
P_{tot}	Power dissipation	$T_c = 25\text{ }^{\circ}\text{C}$	105^3	W
		$T_c = 100\text{ }^{\circ}\text{C}$	66^3	
		$T_c = 200\text{ }^{\circ}\text{C}$	13^3	
T_j	Operating junction temperature		-50 to 225	$^{\circ}\text{C}$
T_{stg}	Storage temperature		-50 to 225	

¹ Obtained from Cree, Inc. CPW2-0650-S010B - datasheet

² Assumes thermal resistance of 1.1 $^{\circ}\text{C}/\text{W}$ or less

³ Data obtained through APEI experimentation and/or calculation

SiC Diode Electrical Characteristics ¹						
Symbols	Parameter	Condition(s)	Values			Units
			Min.	Typical	Max.	
$V_{SD} = V_F$	Diode forward voltage	$I_F = 10 \text{ A}, T_j = 25 \text{ }^\circ\text{C}$	-	1.5	1.8	V
		$I_F = 10 \text{ A}, T_j = 175 \text{ }^\circ\text{C}$	-	2	2.4	
I_R	Reverse current	$V_R = 650 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$	-	12	60	μA
		$V_R = 650 \text{ V}, T_j = 175 \text{ }^\circ\text{C}$	-	24	220	
Q_C	Total capacitive charge	$V_R = 650 \text{ V}, I_F = 10 \text{ A}$ $di_F/dt = 500 \text{ A}/\mu\text{s}, T_j = 25 \text{ }^\circ\text{C}$		25		nC
C	Total capacitance	$V_R = 0 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$	-	480	-	pF
		$V_R = 200 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$	-	50	-	
		$V_R = 400 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$	-	42	-	

Thermal Characteristics (Per Die)						
Symbols	Parameter	Condition(s)	Values			Units
			Min.	Typical	Max.	
$R_{\theta(j-c)}$	Thermal resistance junction-case	Calculated at 200 °C		1.9		$^\circ\text{C}/\text{W}$

Mechanical Characteristics						
Symbols	Parameter	Condition(s)	Values			Units
			Min.	Typical	Max.	
w	Weight			3.5		g

TYPICAL PERFORMANCE CURVES

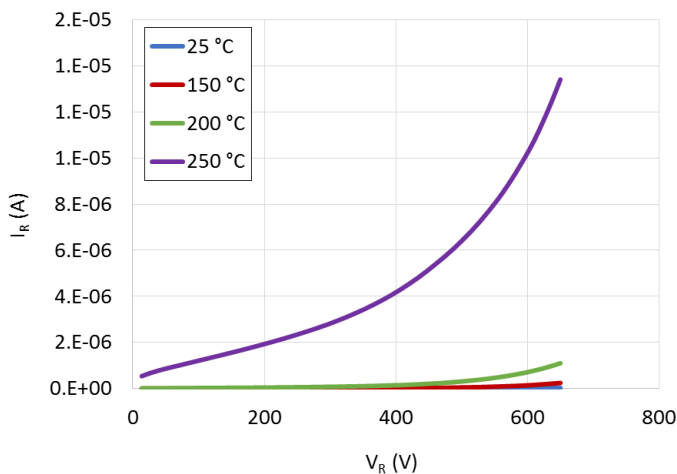


Fig. 1 – Reverse Leakage

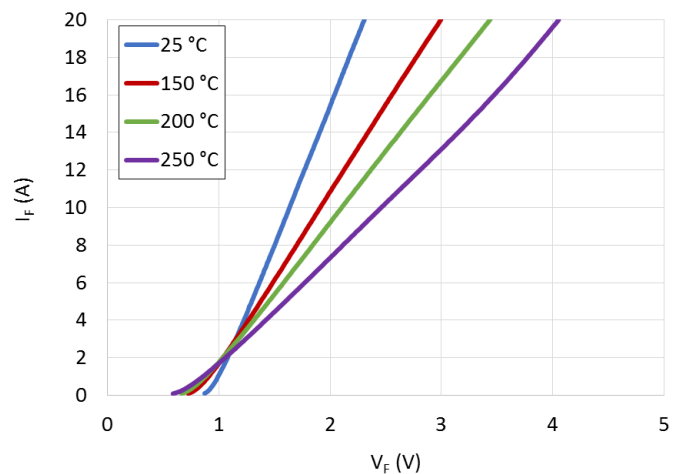
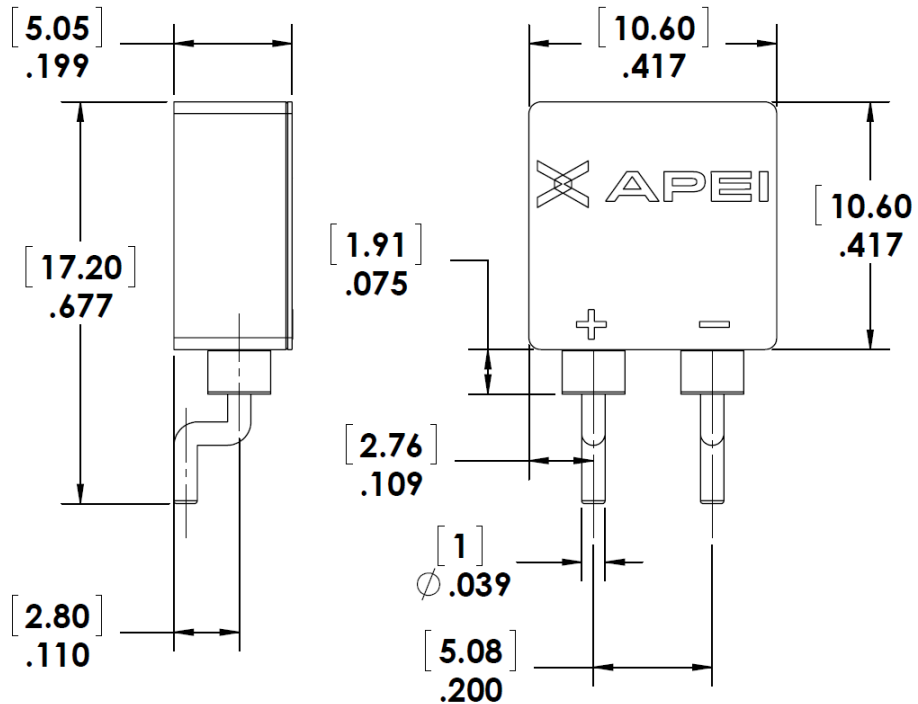


Fig. 2 – Forward Voltage




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