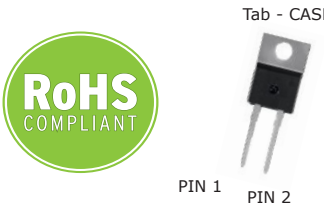
E6D20065A

E-Series Automotive
650 V, 20 A Silicon Carbide Schottky Diode



Part Number	Package	Marking
E6D20065A	TO-220-2	E6D20065A

Description

With the performance advantages of a Silicon Carbide (SiC) Schottky Barrier diode, power electronics systems can expect to meet higher efficiency standards than Si-based solutions, while also reaching higher frequencies and power densities. SiC diodes can be easily paralleled to meet various application demands, without concern of thermal runaway. In combination with the reduced cooling requirements and improved thermal performance of SiC products, SiC diodes are able to provide lower overall system costs in a variety of diverse applications.

Features

- Low Forward Voltage (V_F) Drop with Positive Temperature Coefficient
- Zero Reverse Recovery Current / Forward Recovery Voltage
- Temperature-Independent Switching Behavior
- Automotive Qualified (AEC Q101) and PPAP Capable

Applications

- Interleaved or Bridgless PFC
- DC/DC On Board Battery Chargers
- Boost for PFC & DC-DC Stages
- AC/DC On Board Chargers
- PFC Output Rectification

Maximum Ratings (T_C = 25°C Unless Otherwise Specified)

Parameter	Symbol	Value	Unit	Test Conditions	Notes
Repetitive Peak Reverse Voltage	V_{RRM}	650	V		
Surge Peak Reverse Voltage	V_{RSM}	650			
DC Blocking Voltage	V_{DC}	650			
Continuous Forward Current	I_F	68	A	T_C = 25 °C	Fig. 3
		34		T_C = 125 °C	
		21.5		T_C = 150 °C	
Repetitive Peak Forward Surge Current	I_{FRM}	85		T_C = 25 °C, t_p = 10 ms, Half Sine Wave	
		50		T_C = 110 °C, t_p = 10 ms, Half Sine Wave	
Non-Repetitive Forward Surge Current	I_{FSM}	150	A	T_C = 25 °C, t_p = 10 ms, Half Sine Wave	
		133		T_C = 110 °C, t_p = 10 ms, Half Sine Wave	
Power Dissipation	P_{tot}	184	W	T_C = 25 °C	Fig. 4
		80		T_C = 110 °C	
i^2t value	$\int i^2dt$	112.5	A^2s	T_C = 25 °C, t_p = 10 ms	
		88		T_C = 110 °C, t_p = 10 ms	

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Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
Forward Voltage	V_F	1.3	1.5	V	I_F = 20 A, T_j = 25 °C	Fig. 1
		1.4	1.6		I_F = 20 A, T_j = 175 °C	
Reverse Current	I_R	7	75	µA	V_R = 650 V, T_j = 25 °C	Fig. 2
		12	300		V_R = 650 V, T_j = 175 °C	
Total Capacitive Charge	Q_C	71		nC	V_R = 400 V, T_j = 25 °C	Fig. 5
Total Capacitance	C	1277		pF	V_R = 0 V, T_j = 25 °C, f = 1 MHz	Fig. 6
		137			V_R = 200 V, T_j = 25 °C, f = 1 MHz	
		107			V_R = 400 V, T_j = 25 °C, f = 1 MHz	
Capacitance Stored Energy	E_C	10.7		µJ	V_R = 400 V	Fig. 7

Notes:
SiC Schottky Diodes are majority carrier devices, so there is no reverse recovery charge.

Thermal & Mechanical Characteristics

Parameter	Symbol	Value	Unit	Notes
Thermal Resistance, Junction to Case (Typical)	$R_{\theta, JC (TYP)}$	0.625	°C / W	
Thermal Resistance, Junction to Case (Max)	$R_{\theta, JC (MAX)}$	0.814	°C / W	
Junction Temperature	T_j	-55 to +175	°C	
Case & Storage Temperature	T_c	-55 to +175		
TO-220 Mounting Torque	-	1	Nm	M3 Screw
		8.8	lbf-in	6-32 Screw

Typical Performance

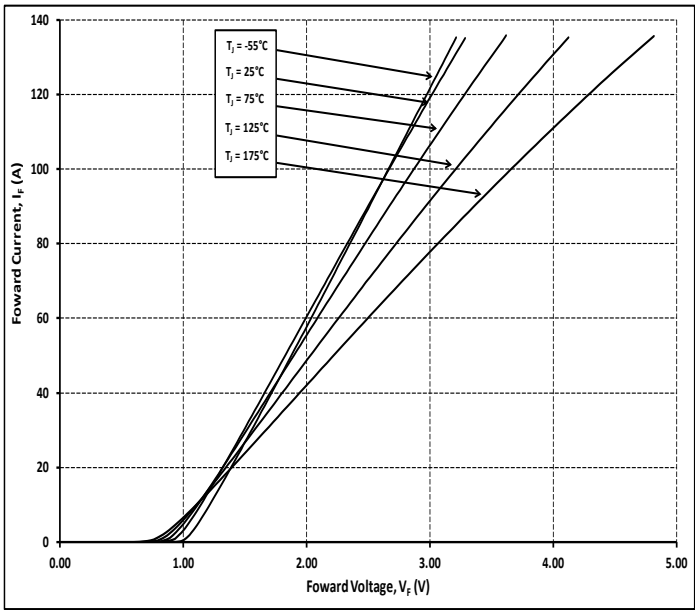


Figure 1
Forward Characteristics

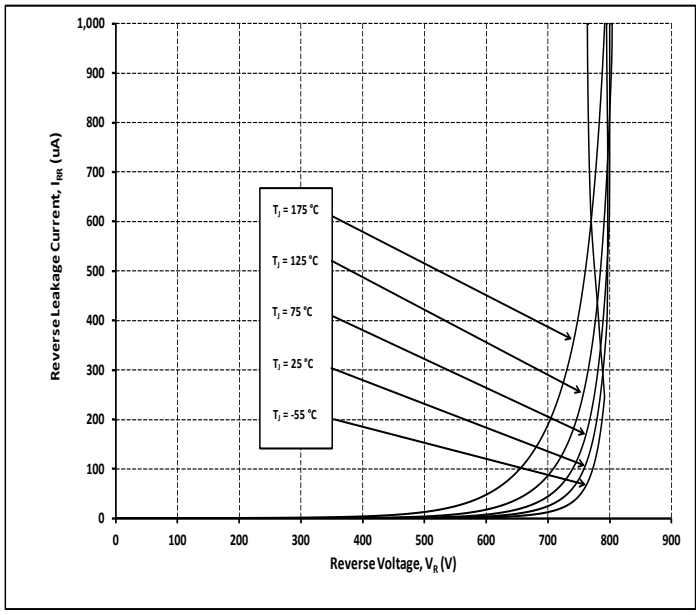


Figure 2
Reverse Characteristics

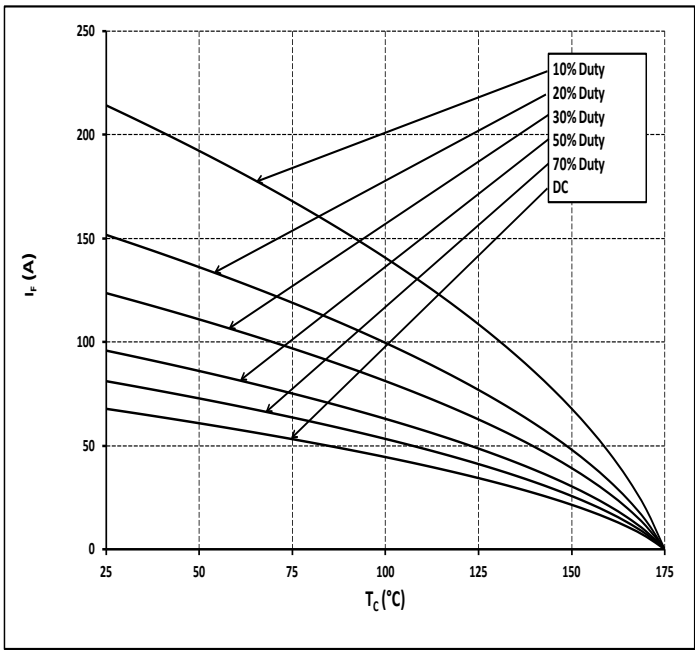


Figure 3
Current Derating

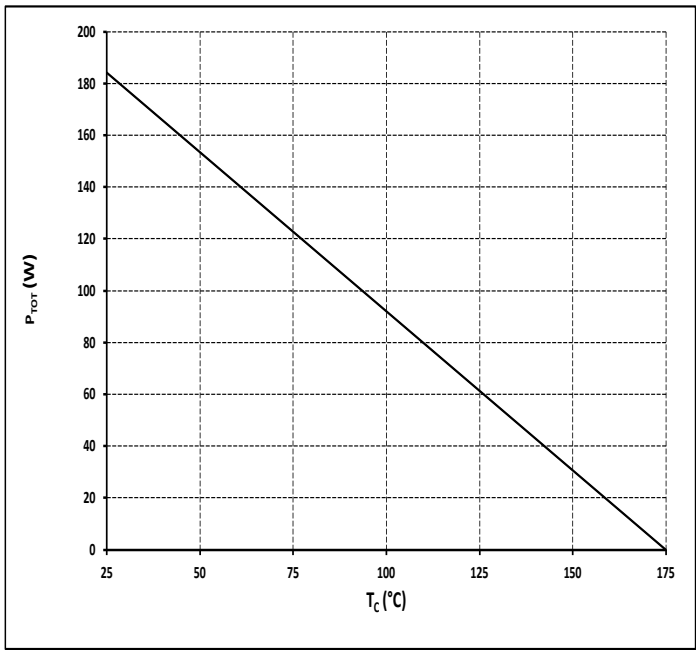


Figure 4
Power Derating

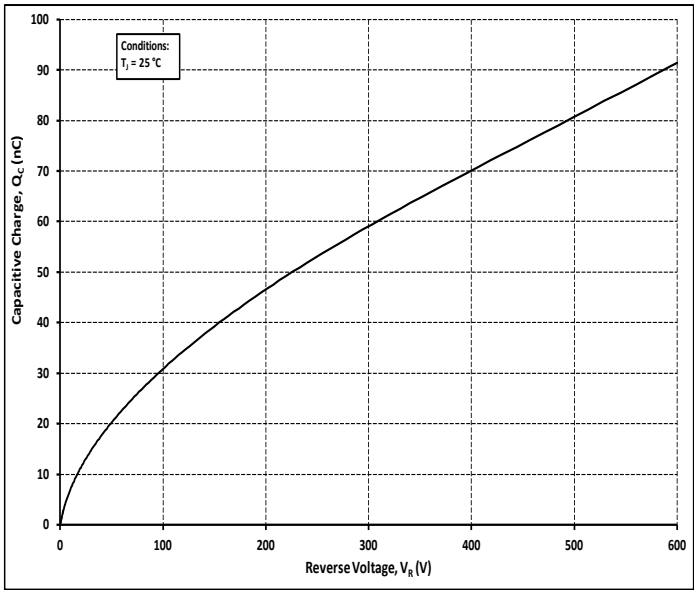


Figure 5
Total Capacitance vs. Reverse Voltage

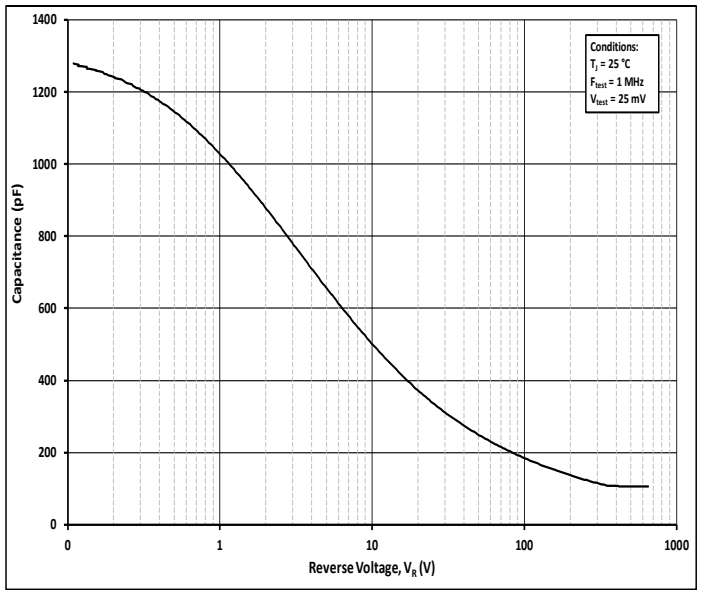


Figure 6
Capacitace vs. Reverse Voltage

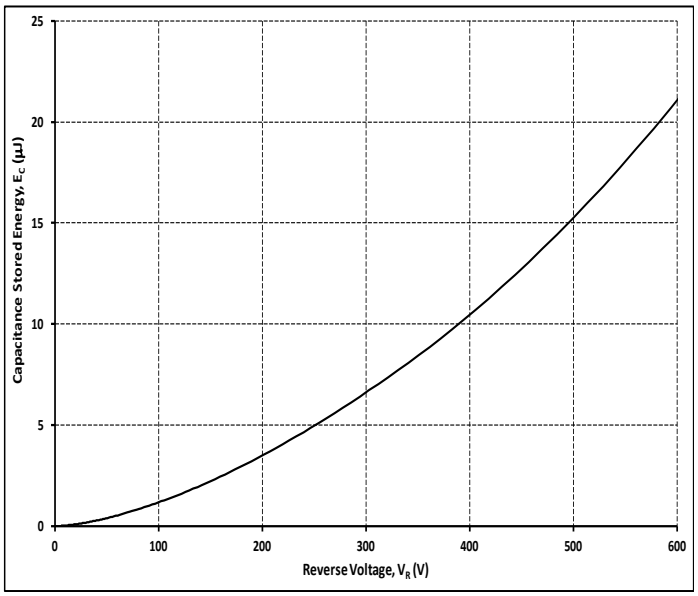


Figure 7
Capacitance Stored Energy

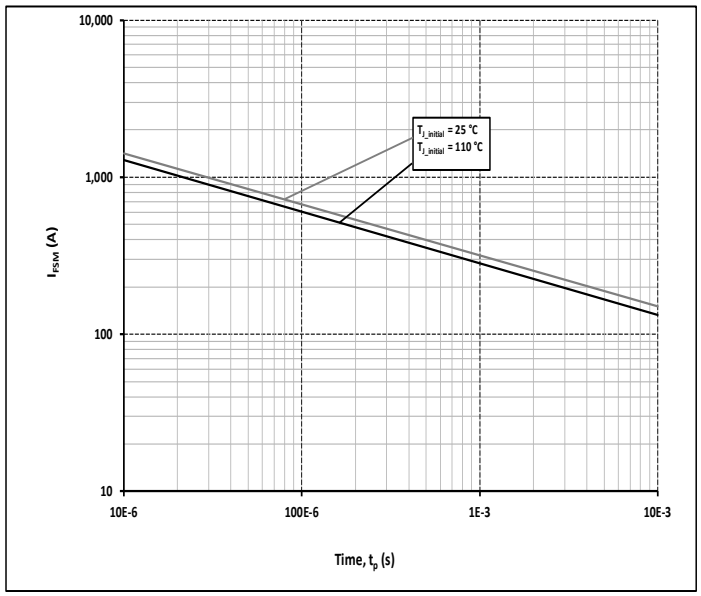


Figure 8
Non Repetitive Peak Forward Surge Current versus Pulse Duration (sinsusoidal waveform)

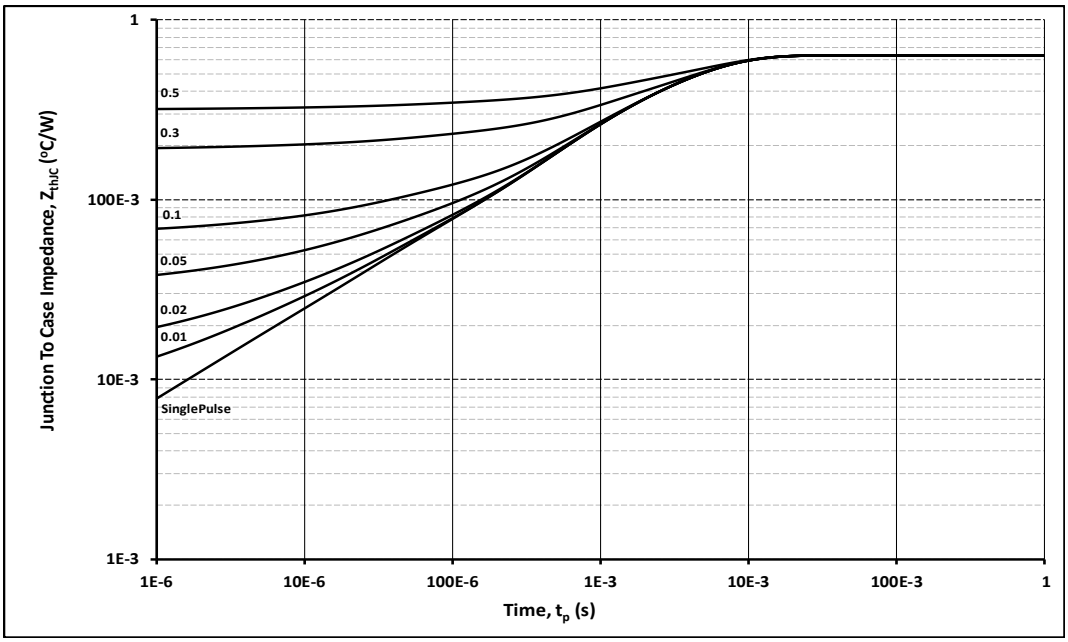
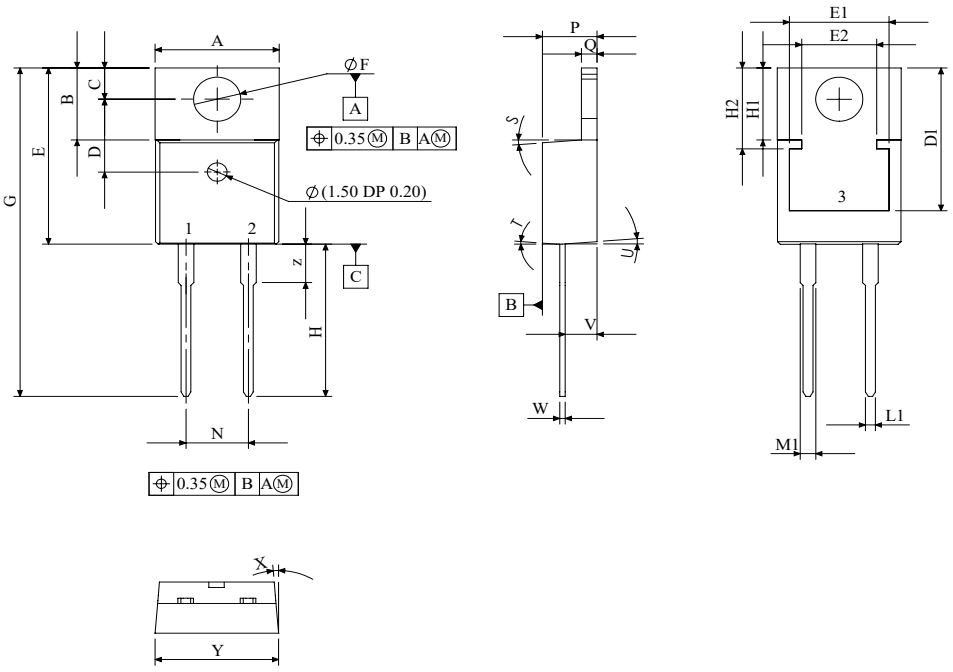


Figure 9

Transient Thermal Impedance

Package Dimensions & Pin-Out

Package: TO-220-2



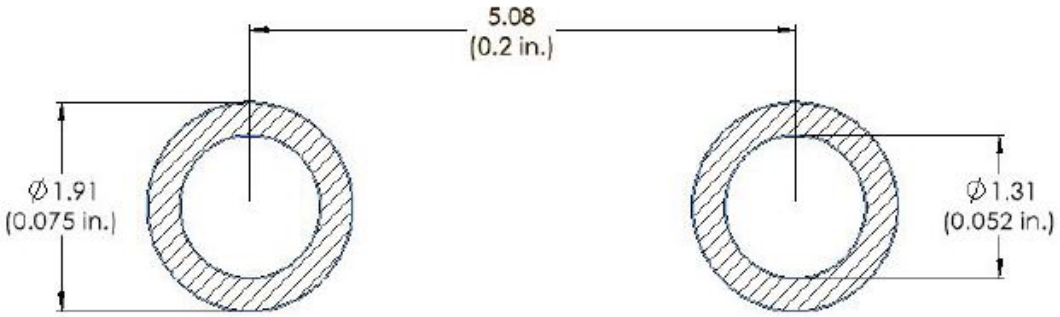
SYMBOL	MIN (mm)	MAX (mm)
A	9.677	10.414
B	5.969	6.477
C	2.540	3.048
D	5.664	8.560
D1	12.450 REF	
E	14.986	15.621
E1	8.120 REF	
E2	6.100 REF	
F	3.632	3.886
G	28.067	29.134
H	12.700	13.970
H1	6.223 REF	
H2	7.040 REF	
L1	0.635	0.914
M1	1.143	1.397
N	4.953	5.207
P	4.191	4.699
Q	1.219	1.372
S	3°	6°
T	3°	6°
U	3°	6°
V	2.388	2.794
W	0.356	0.635
W1	0.356	0.520
X	3°	5.5°
Y	9.779	10.414
Z	3.302	3.810

1	CATHODE
2	ANODE
3	CATHODE

NOTE
1. ALL METAL SURFACES ARE TIN PLATED (MATTE), EXCEPT AREA OF CUT.
2. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE LISTED IN MILLIMETERS. ANGLES ARE IN DEGREES.
4. PACKAGE BURR FLASH SIZE (0.5 mm) IS NOT INCLUDED IN THE DIMENSIONS

Recommended Solder Pad Layout

Primary dimensions shown in mm.



Product Ordering Information

Order Number	Packing Type
E6D20065A	Tube

Revision History

Document Version	Date of Release	Description of Changes
1	January 2024	Initial Release

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