

E6D40065A

E-Series Automotive
650 V, 40 A Silicon Carbide Schottky Diode

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.



Tab - CASE



Part Number	Package	Marking
E6D40065A	TO-220-2	E6D40065A

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

Typical 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 ($T_c = 25^\circ\text{C}$ 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	115	A	$T_c = 25^\circ\text{C}$	Fig. 3
		57		$T_c = 125^\circ\text{C}$	
		36		$T_c = 150^\circ\text{C}$	
Repetitive Peak Forward Surge Current	I_{FRM}	153	A	$T_c = 25^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$	
		86		$T_c = 110^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$	
Non-Repetitive Forward Surge Current	I_{FSM}	244	A	$T_c = 25^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$	
		185		$T_c = 110^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$	
Power Dissipation	P_{tot}	294	W	$T_c = 25^\circ\text{C}$	Fig. 4
		127.5		$T_c = 110^\circ\text{C}$	
i^2t value	$\int i^2 dt$	298	A^2s	$T_c = 25^\circ\text{C}, t_p = 10\text{ ms}$	
		171		$T_c = 110^\circ\text{C}, t_p = 10\text{ ms}$	

Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
Forward Voltage	V_F	1.34	1.5	V	$I_F = 40 \text{ A}, T_j = 25^\circ\text{C}$	Fig. 1
		1.47	1.6		$I_F = 40 \text{ A}, T_j = 175^\circ\text{C}$	
Reverse Current	I_R	10	150	μA	$V_R = 650 \text{ V}, T_j = 25^\circ\text{C}$	Fig. 2
		25	500		$V_R = 650 \text{ V}, T_j = 175^\circ\text{C}$	
Total Capacitive Charge	Q_C	135		nC	$V_R = 400 \text{ V}, T_j = 25^\circ\text{C}$	Fig. 5
Total Capacitance	C	2485		pF	$V_R = 0 \text{ V}, T_j = 25^\circ\text{C}, f = 1 \text{ MHz}$	Fig. 6
		259			$V_R = 200 \text{ V}, T_j = 25^\circ\text{C}, f = 1 \text{ MHz}$	
		198			$V_R = 400 \text{ V}, T_j = 25^\circ\text{C}, f = 1 \text{ MHz}$	
Capacitance Stored Energy	E_C	20.3		μJ	$V_R = 400 \text{ V}$	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)	$R_{\theta, JC} \text{ (TYP)}$	0.35	$^\circ\text{C} / \text{W}$	
Thermal Resistance, Junction to Case (Max)	$R_{\theta, JC} \text{ (MAX)}$	0.51	$^\circ\text{C} / \text{W}$	
Junction Temperature	T_j	-55 to +175	$^\circ\text{C}$	
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

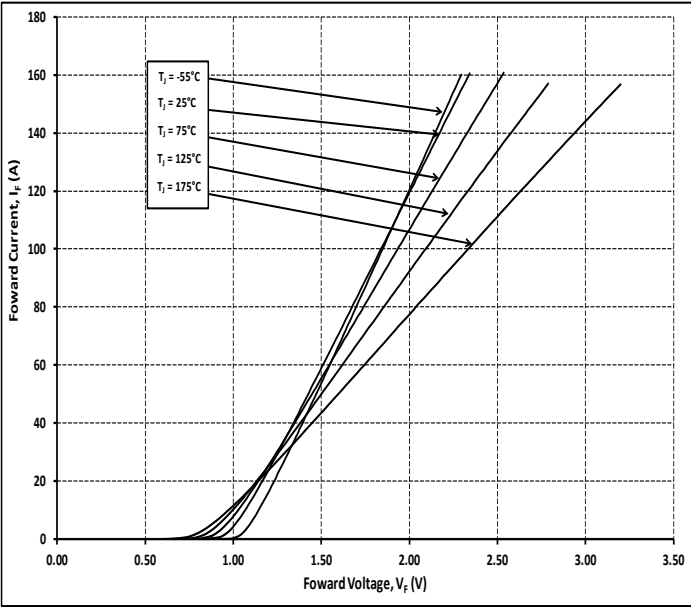


Figure 1
Forward Characteristics

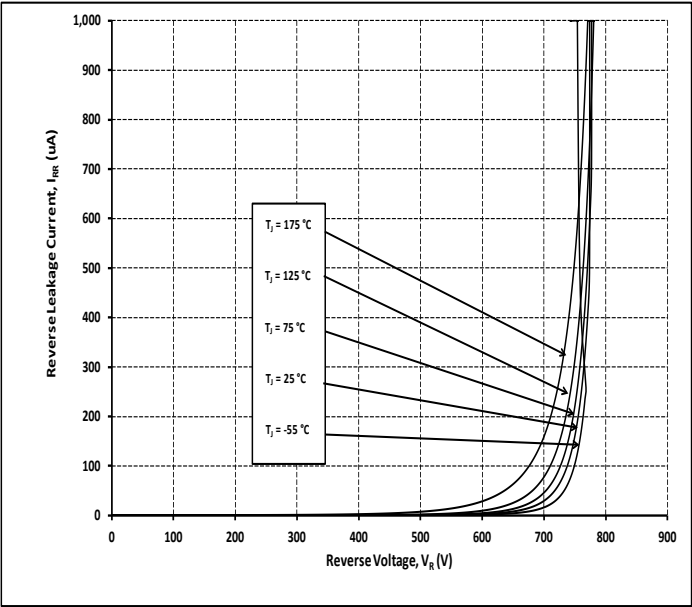


Figure 2
Reverse Characteristics

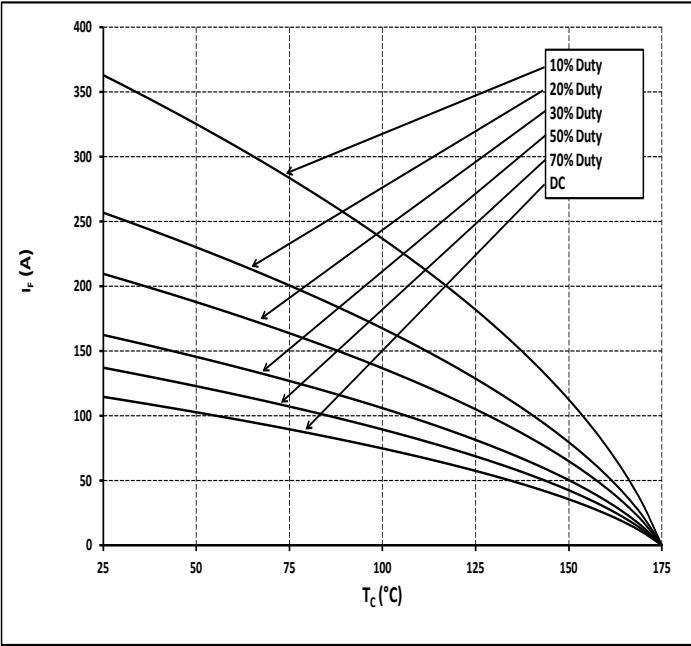


Figure 3
Current Derating

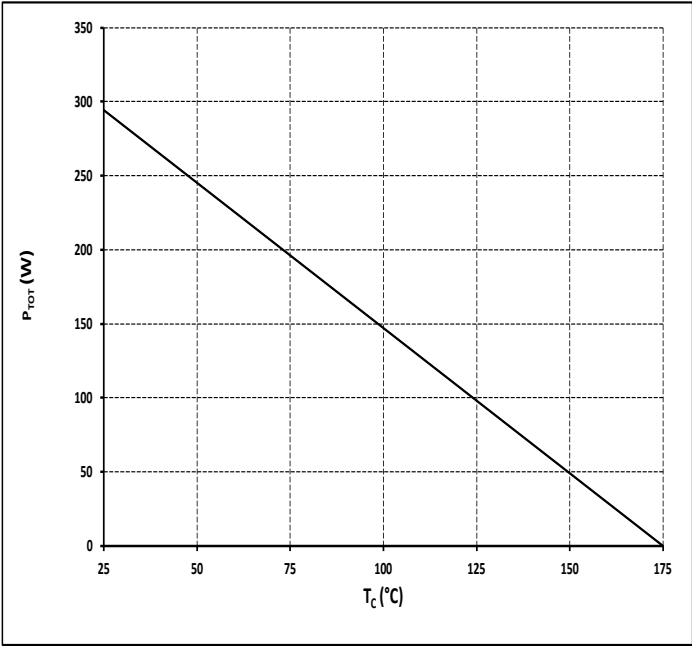


Figure 4
Power Derating

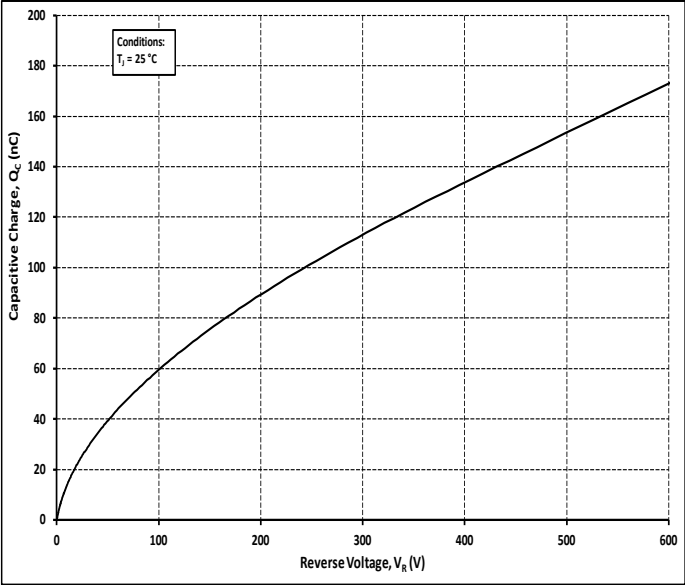


Figure 5
Total Capacitance vs. Reverse Voltage

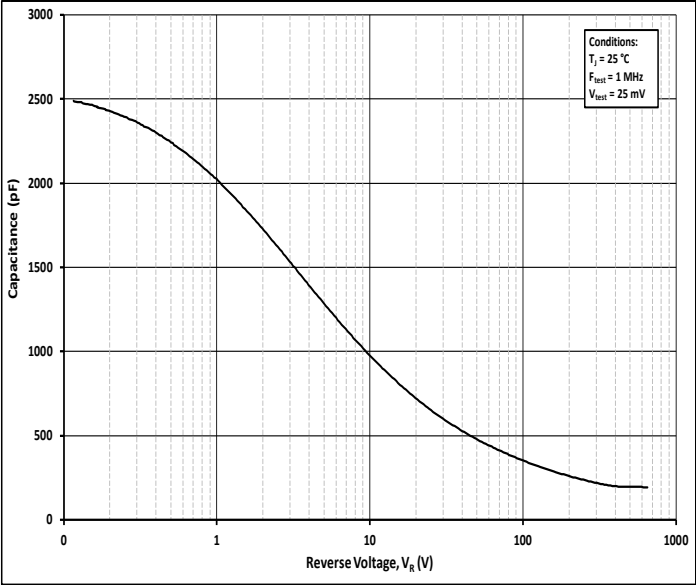


Figure 6
Capacitance vs. Reverse Voltage

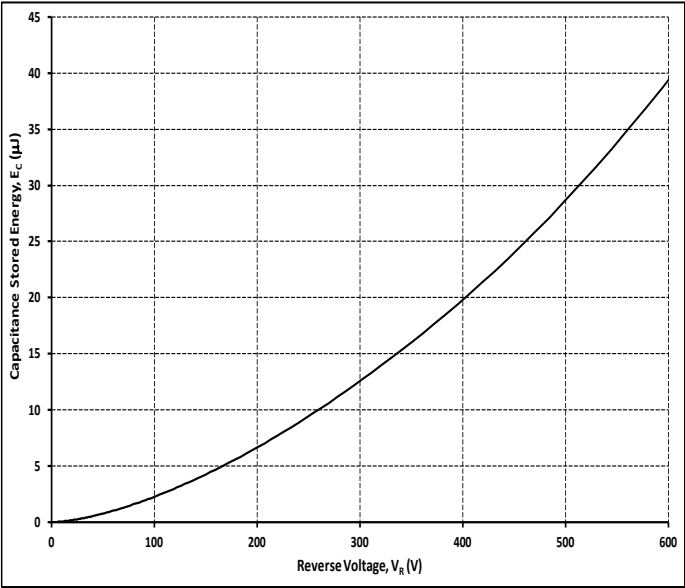


Figure 7
Capacitance Stored Energy

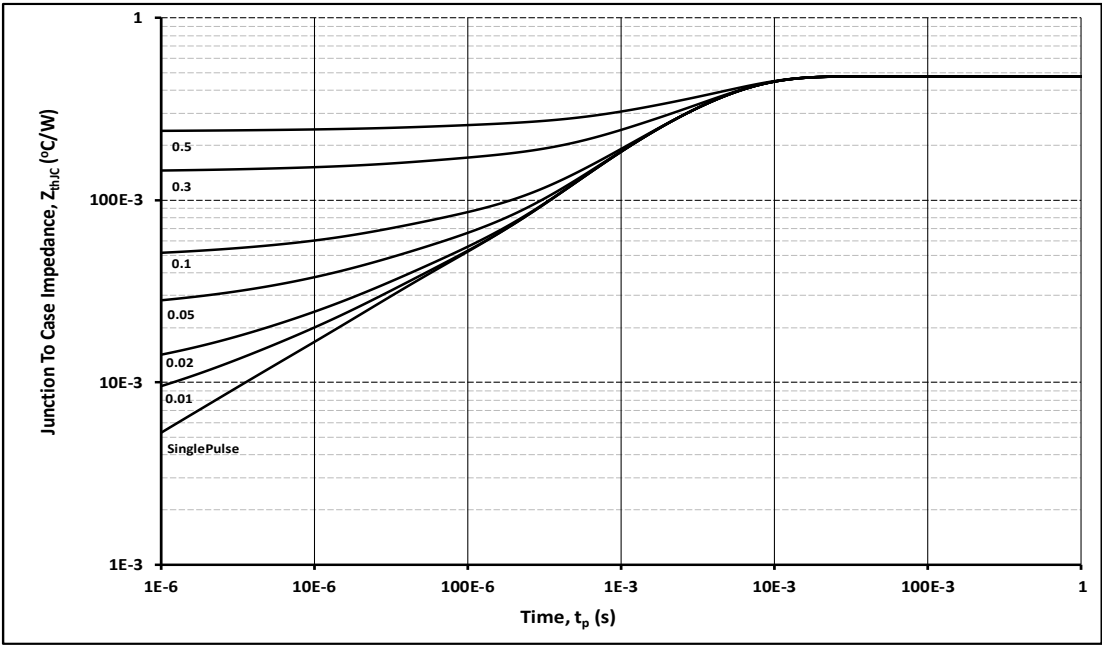
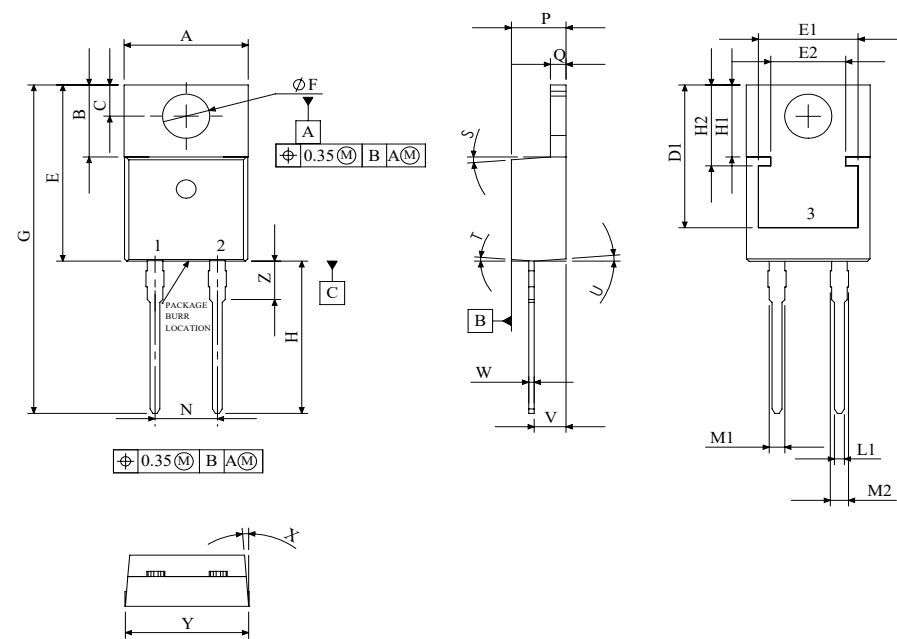


Figure 8
Transient Thermal Impedance

Package Dimensions & Pin-Out

Package: TO-220-2



SYMBOL	MIN (mm)	MAX (mm)
A	9.67	10.41
B	5.96	6.48
C	2.54	3.05
D1	12.45 REF	
E	14.98	15.62
E1	8.12 REF	
E2	6.10 REF	
F	3.63	3.89
G	28.06	29.13
H	12.70	13.97
H1	6.22 REF	
H2	7.04 REF	
L1	0.63	0.91
M1	1.14	1.40
M2	1.14	1.77
N	4.95	5.21
P	4.19	4.70
Q	1.21	1.37
S	3°	6°
T	3°	6°
U	3°	6°
V	2.38	2.79
W	0.35	0.64
X	3°	5.5°
Y	9.77	10.41
Z	3.30	3.81

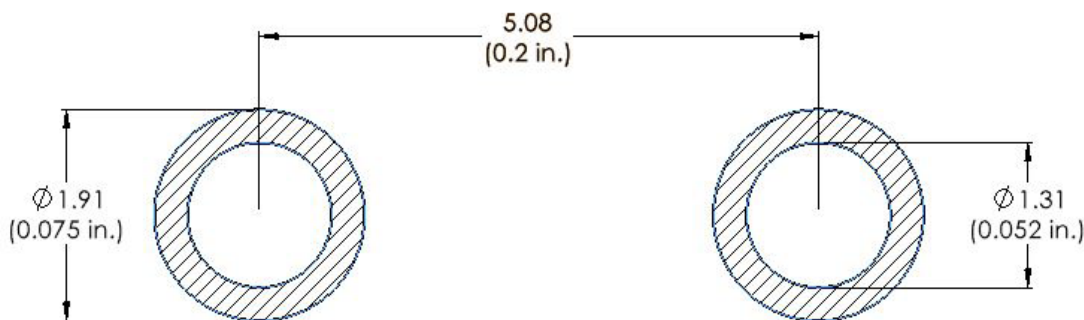
1	CATHODE
2	ANODE
3	CATHODE

- 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
E6D40065A	Tube



Revision History

Document Version	Date of Release	Description of Changes
1	January 2024	Initial Release
2	February - 2025	Legal Disclaimer, Updated POD

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