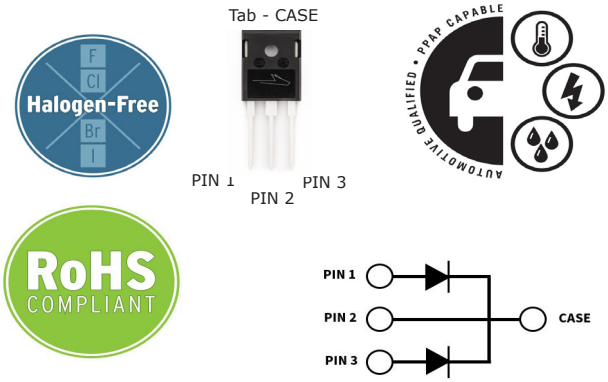
E6D40065D

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.

Part Number	Package	Marking
E6D40065D	TO-247-3	E6D40065D

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

- Automotive and traction power convertion
- 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	63*/126**	A	T_C = 25 °C	Fig. 3
		32*/64**		T_C = 125 °C	
		20*/40**		T_C = 150 °C	
Repetitive Peak Forward Surge Current	I_{FRM}	80*		T_C = 25 °C, t_p = 10 ms, Half Sine Wave	
		45*		T_C = 110 °C, t_p = 10 ms, Half Sine Wave	
Non-Repetitive Forward Surge Current	I_{FSM}	152*	A	T_C = 25 °C, t_p = 10 ms, Half Sine Wave	
		135*		T_C = 110 °C, t_p = 10 ms, Half Sine Wave	
Power Dissipation	P_{tot}	161*	W	T_C = 25 °C	Fig. 4
		70*		T_C = 110 °C	
i^2t value	$\int i^2dt$	115.5*	A^2s	T_C = 25 °C, t_p = 10 ms	
		91*		T_C = 110 °C, t_p = 10 ms	

* Per Leg, ** Per Device

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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	10*	200*	µA	V_R = 650 V, T_j = 25 °C	Fig. 2
		100*	700*		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)	$R_{\theta, JC (TYP)}$	0.795*/0.398**	°C / W	
Thermal Resistance, Junction to Case (Max)	$R_{\theta, JC (MAX)}$	0.93*/0.465**	°C / W	
Junction Temperature	T_j	-55 to +175	°C	
Case & Storage Temperature	T_c	-55 to +175		
TO-247 Mounting Torque	-	1	Nm	M3 Screw
		8.8	lbf-in	6-32 Screw

Notes:
* Per Leg, ** Per Device

Typical Performance

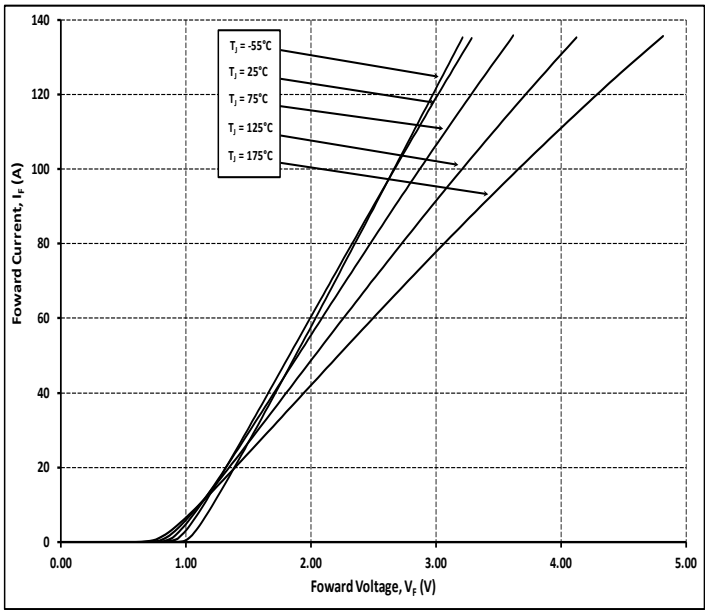


Figure 1
Forward Characteristics

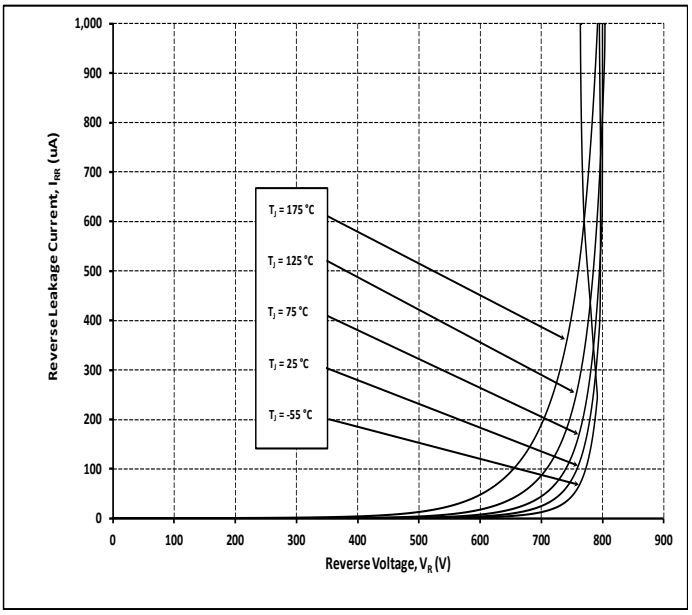


Figure 2
Reverse Characteristics

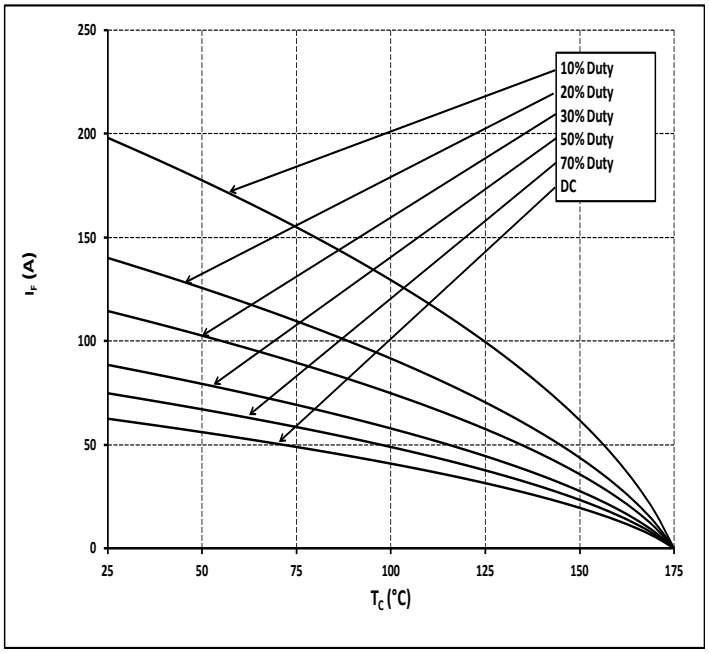


Figure 3
Current Derating

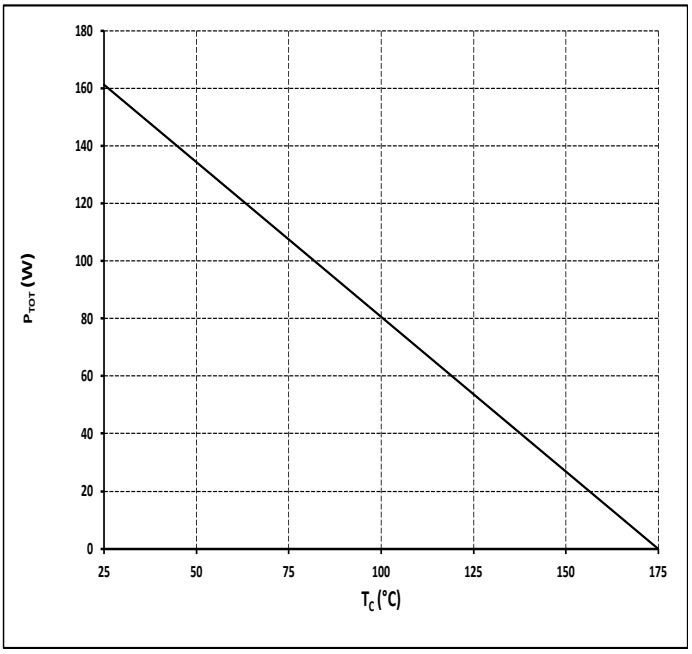


Figure 4
Power Derating

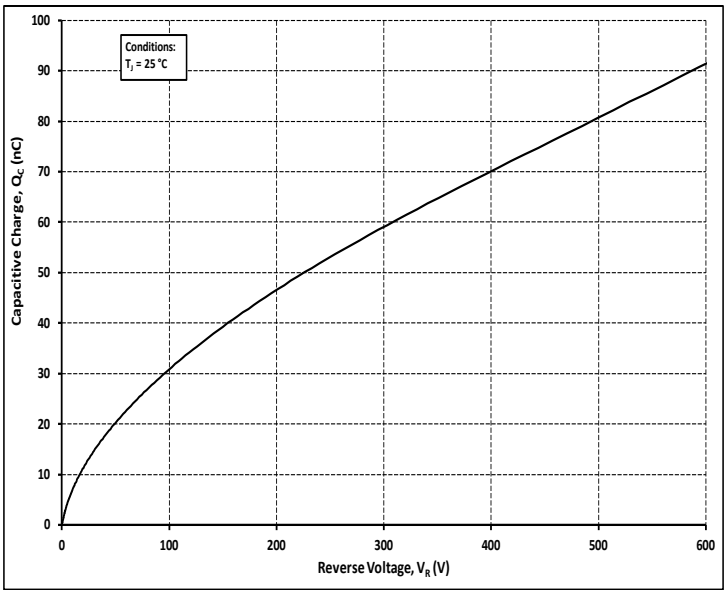


Figure 5
Total Capacitance vs. Reverse Voltage

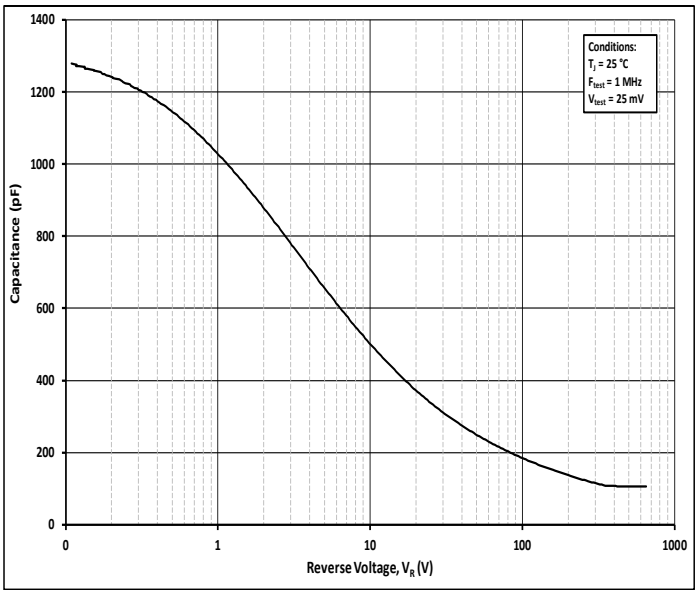


Figure 6
Capacitace vs. Reverse Voltage

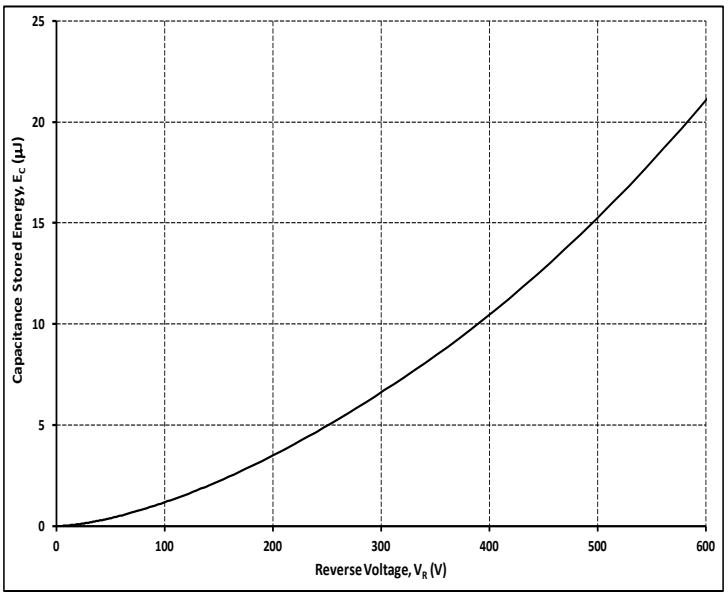


Figure 7
Capacitance Stored Energy

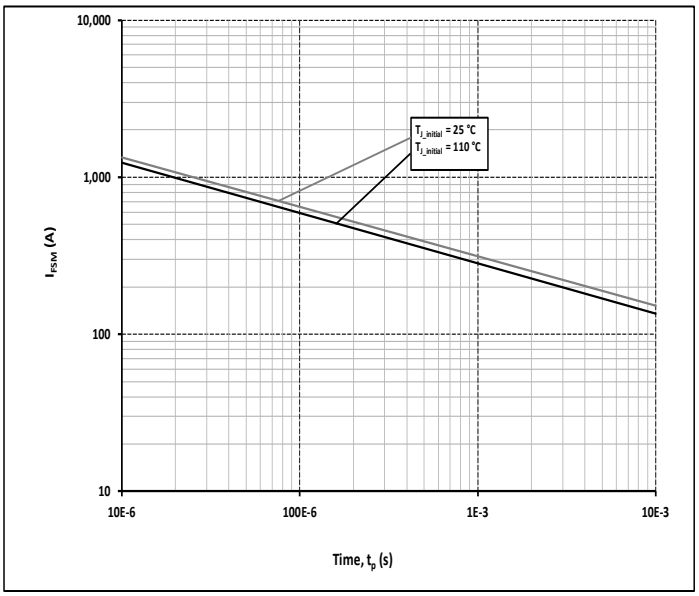


Figure 8
Non Repetitive Peak Forward Surge Current versus Pulse Duration (sinsusoidal waveform)

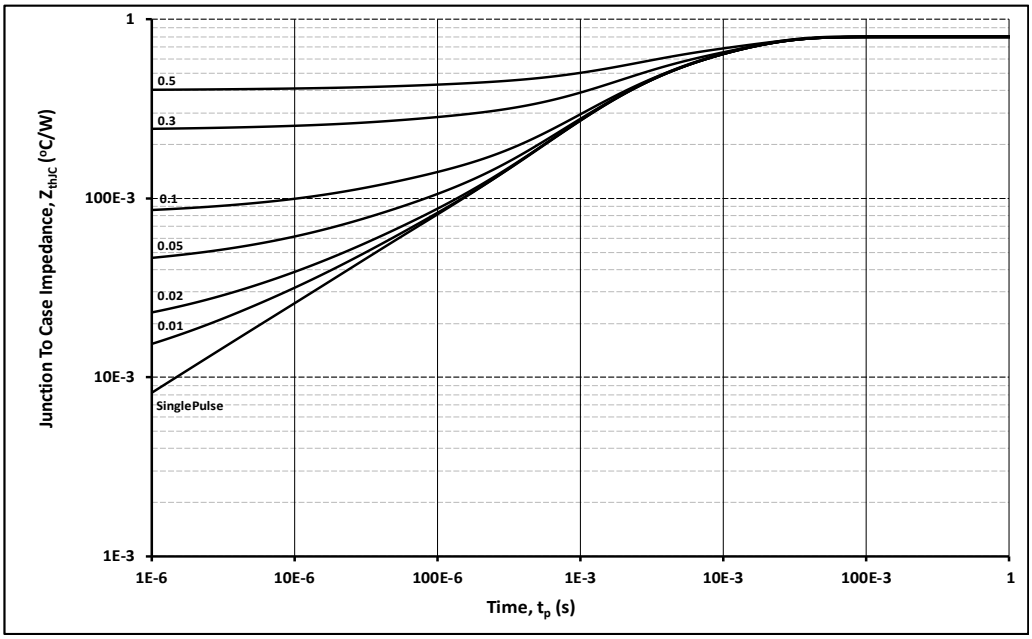
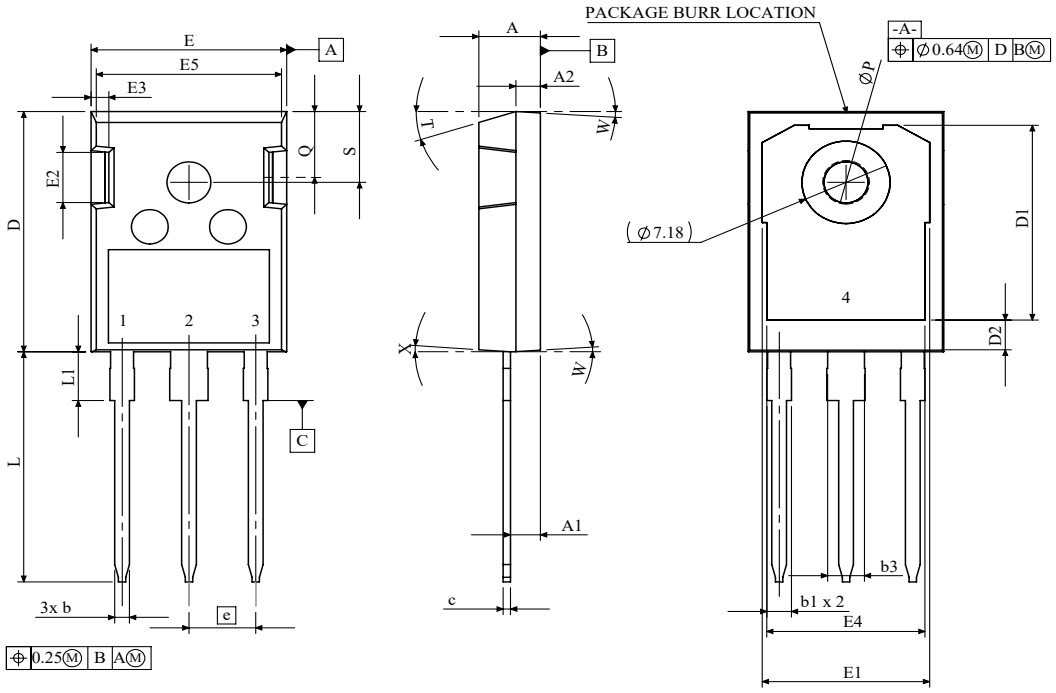


Figure 9

Transient Thermal Impedance

Package Dimensions & Pin-Out

Package: TO-247-3



SYMBOL	MIN (mm)	MAX (mm)
A	4.83	5.21
A1	2.27	2.52
A2	1.91	2.16
b	1.07	1.33
b1	1.91	2.41
b3	2.87	3.38
c	0.55	0.74
D	20.75	21.05
D1	16	17.4
D2	2.86	3.26
E	15.75	16.13
E1	13.5	14.55
E2	3.68	5.1
E3	1	1.9
E4	12.38	13.43
E5	14.65	15.05
e	5.44 BSC	
L	19.73	20.48
L1	3.97	4.69
ØP	3.18	4.06
Q	5.42	5.96
S	5.85	6.49
T	17.5° REF.	
W	3.5° REF.	
X	4° REF.	

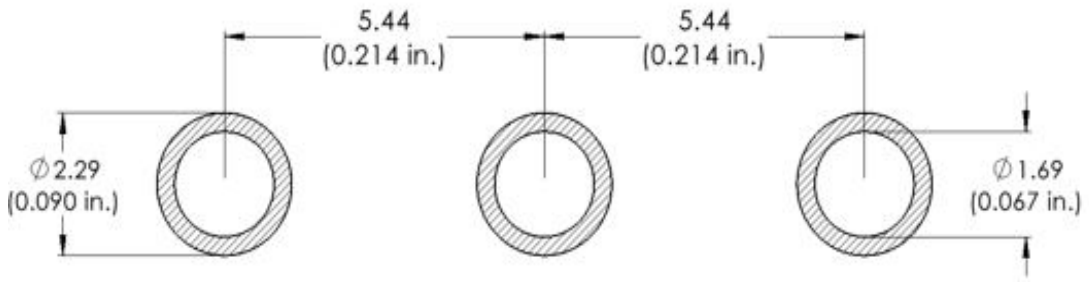
1	ANODE
2	CATHODE
3	ANODE
4	CATHODE

NOTES:

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. BURR OR MOLD 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
E6D40065D	Tube

Revision History

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

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