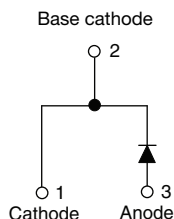


1200 V Gen 4 Power Silicon Carbide Schottky Diode, 40 A


TO-247AD 2L


FEATURES

- Positive V_F temperature coefficient for easy paralleling
- Virtually no recovery tail and no switching losses
- Temperature invariant switching behavior
- 175 °C maximum operating junction temperature
- AEC-Q101 qualified, meets JESD 201 class 2 whisker test
- Solder bath temperature 275 °C maximum, 10 s per JESD 22-B106
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT
HALOGEN
FREE

LINKS TO ADDITIONAL RESOURCES



3D Models

PRIMARY CHARACTERISTICS

I_F	40 A
V_R	1200 V
V_F at I_F at 25 °C, typ.	1.40 V
T_J max.	175 °C
I_R at V_R at 175 °C	860 μ A
Q_C ($V_R = 800$ V)	203 nC
Package	TO-247AD 2L
Circuit configuration	Single

DESCRIPTION / APPLICATIONS

Wide band gap SiC based 1200 V Schottky diode, designed for high performance and ruggedness.

Optimized for extreme high-speed hard switching across a wide temperature range. This SiC diode is ideal for applications with high dI/dt such as high efficiency PFC and ultra-high frequency output rectifiers in AC/DC and DC/DC converters

MECHANICAL DATA

Case: TO-247AD 2L

Molding compound meets UL 94 V-0 flammability rating
Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

Mounting torque: 10 in-lbs maximum

MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous forward current	$I_F^{(1)}$	$T_C = 159$ °C (DC)	40	A
	$I_F^{(2)}$	$T_C = 136$ °C (DC)	40	A
DC blocking voltage	V_{DC}		1200	V
Repetitive peak forward current	I_{FRM}	$T_C = 25$ °C, $f = 50$ Hz, square wave, DC = 25 %	150	A
Non-repetitive peak forward surge current	I_{FSM}	$T_C = 25$ °C, $t_p = 10$ ms, half sine wave	161	A
		$T_C = 110$ °C, $t_p = 10$ ms, half sine wave	130	
Power dissipation	$P_{tot}^{(1)}$	$T_C = 25$ °C	750	W
		$T_C = 110$ °C	325	
	$P_{tot}^{(2)}$	$T_C = 25$ °C	300	W
		$T_C = 110$ °C	130	
I^2t value	$\int i^2 dt$	$T_C = 25$ °C	130	A ² s
		$T_C = 110$ °C	84.5	
Operating junction and storage temperatures	$T_J^{(3)}, T_{Stg}$		-55 to +175	°C

Notes

(1) Based on typical R_{th}

(2) Based on maximum R_{th}

(3) The heat generated must be less than the thermal conductivity from junction-to-ambient: $dP_D/dT_J < 1/R_{thJA}$

**ELECTRICAL SPECIFICATIONS** ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Forward voltage	V_F	$I_F = 40\text{ A}$	-	1.4	1.6	V
		$I_F = 40\text{ A}, T_J = 150\text{ }^{\circ}\text{C}$	-	1.81	2.2	
		$I_F = 40\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	1.94	-	
Reverse leakage current	I_R	$V_R = V_R\text{ rated}$	-	18	200	μA
		$V_R = V_R\text{ rated}, T_J = 150\text{ }^{\circ}\text{C}$	-	380	2000	
		$V_R = V_R\text{ rated}, T_J = 175\text{ }^{\circ}\text{C}$	-	860	-	
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}$	-	2360	-	pF
		$V_R = 800\text{ V}, f = 1\text{ MHz}$	-	140	-	
Total capacitive charge	Q_C	$V_R = 800\text{ V}, f = 1\text{ MHz}$	-	203	-	nC

THERMAL - MECHANICAL SPECIFICATIONS ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction-to-case	R_{thJC}		-	0.2	0.5	$^{\circ}\text{C/W}$
Marking device			4C40EP12L			

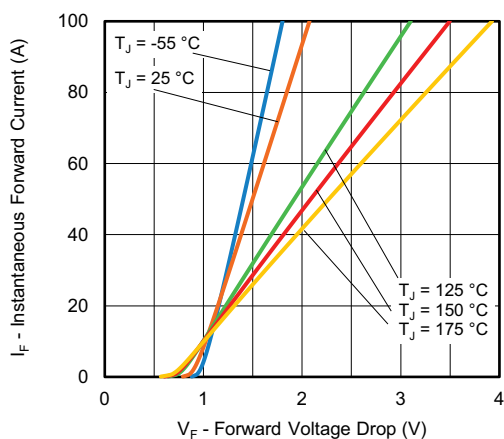


Fig. 1 - Typical Forward Voltage Drop Characteristics

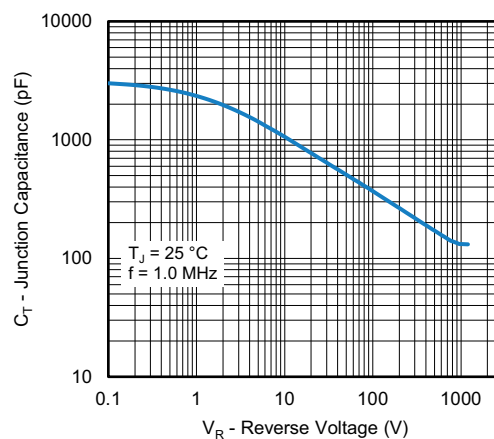


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

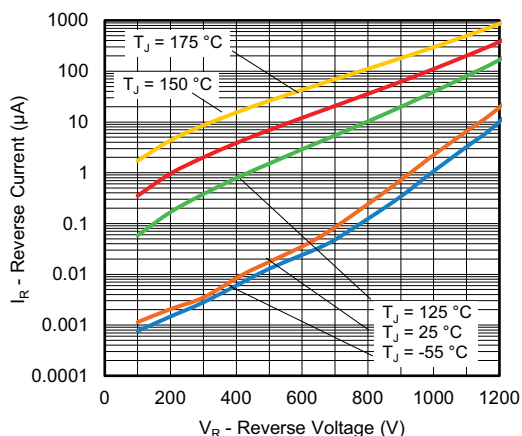


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

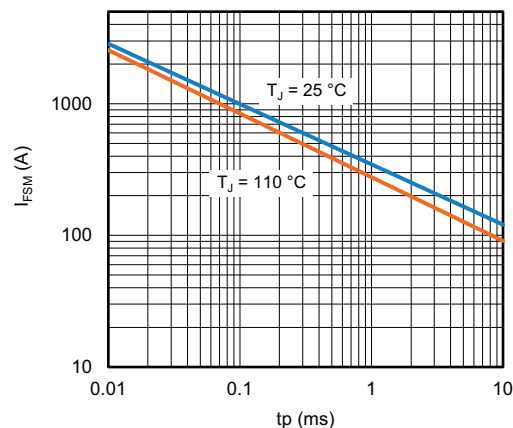


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

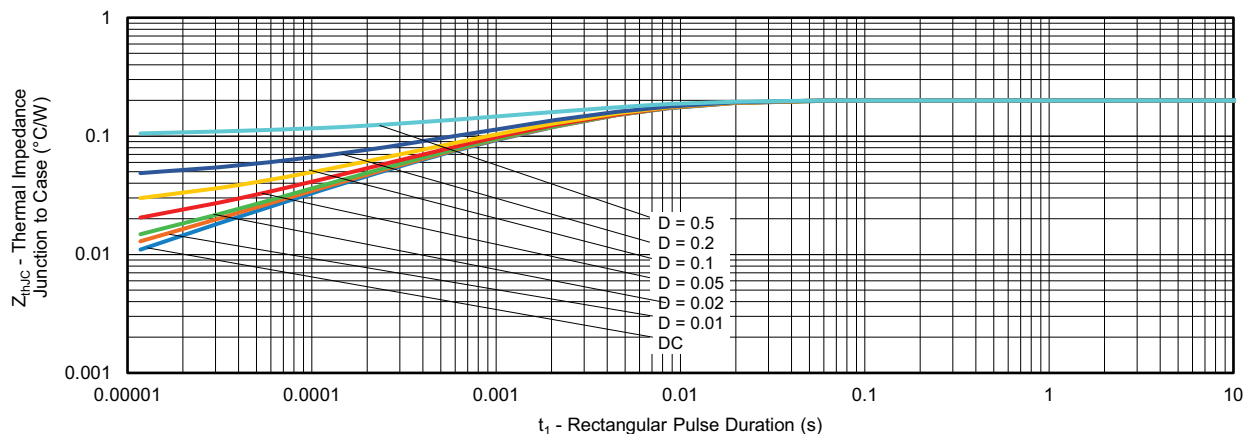
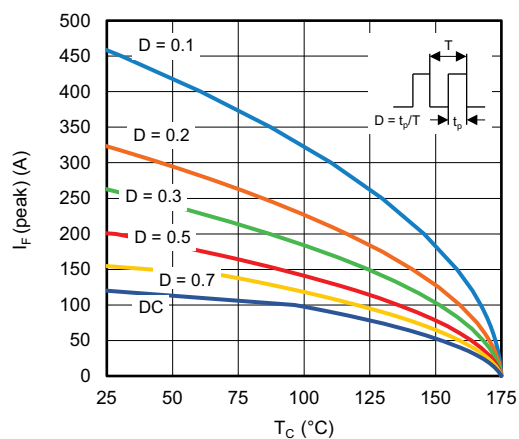

Fig. 5 - Typical Thermal Impedance Z_{thJM} Characteristics


Fig. 6 - Peak Forward Current vs. Maximum Allowable Mount Temperature

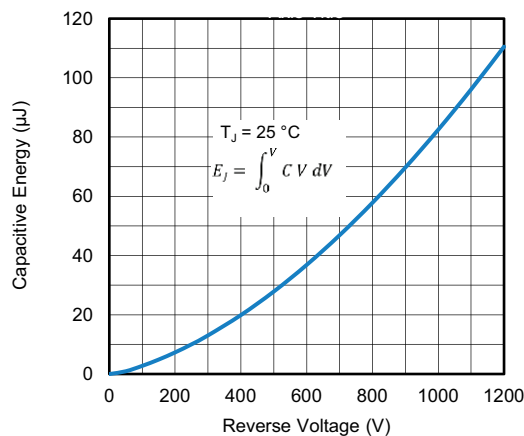


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

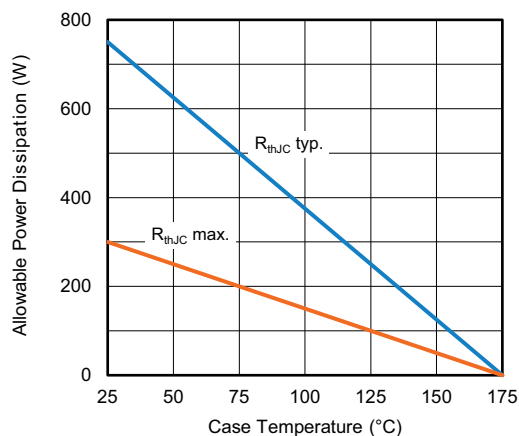


Fig. 7 - Forward Power Loss Characteristics

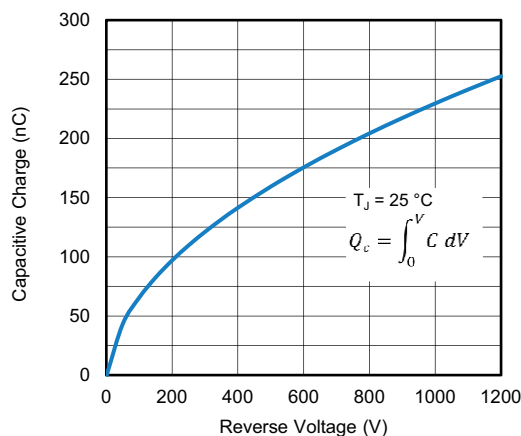


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage



ORDERING INFORMATION TABLE

Device code	VS-	4C	40	E	P	12	L	H	M3
	1	2	3	4	5	6	7	8	9

- | | | |
|---|---|-------------------------------|
| 1 | - | Vishay Semiconductors product |
| 2 | - | 4C = SiC diode, Generation 4 |
| 3 | - | Current rating (40 = 40 A) |
| 4 | - | E = single diode |
| 5 | - | P = package TO-247 |
| 6 | - | Voltage rating: 12 = 1200 V |
| 7 | - | L = long lead |
| 8 | - | H = AEC-Q101 qualified |
| 9 | - | Environmental digit: |
- M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

ORDERING INFORMATION			
PREFERRED P/N	UNIT WEIGHT	BASE QUANTITY	PACKAGING DESCRIPTION
VS-4C40EP12LHM3	5.5 g	25 / tube	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95536
Part marking information	www.vishay.com/doc?95648
SPIICE model	www.vishay.com/doc?97511



TO-247AD 2L

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
c	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4
D2	0.51	1.35	0.020	0.053	

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
ϕK	0.254		0.010		
L	19.81	20.32	0.780	0.800	
L1	3.71	4.29	0.146	0.169	
ϕP	3.56	3.66	0.14	0.144	
$\phi P1$	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217 BSC		

Notes

- Dimensioning and tolerancing per ASME Y14.5M-1994
- Contour of slot optional
- Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
- Thermal pad contour optional with dimensions D1 and E1
- Lead finish uncontrolled in L1
- ϕP to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- Outline conforms to JEDEC® outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4



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