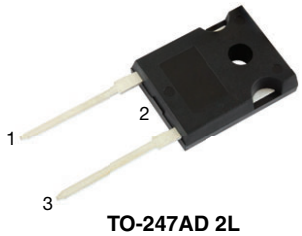
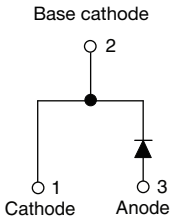
1200 V Gen 4 Power Silicon Carbide Schottky Diode, 20 A



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	20 A
V_R	1200 V
V_F at I_F at 25 °C, typ.	1.38 V
T_J max.	175 °C
I_R at V_R at 175 °C	260 µA
Q_C (V_R = 800 V)	101 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 demanding applications such as high efficiency PFC diodes 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)	20	A
	I_F (2)	T_C = 148 °C (DC)	20	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 %	91	A
Non-repetitive peak forward surge current	I_{FSM}	T_C = 25 °C, t_p = 10 ms, half sine wave	116	A
		T_C = 110 °C, t_p = 10 ms, half sine wave	90	
Power dissipation	P_{tot} (1)	T_C = 25 °C	375	W
		T_C = 110 °C	162	
	P_{tot} (2)	T_C = 25 °C	214	W
		T_C = 110 °C	93	
I^2t value	$\int i^2 dt$	T_C = 25 °C	67	A^2s
		T_C = 110 °C	40	
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: $dP_D/dT_J < 1/R_{\theta JA}$

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Forward voltage	V_F	I_F = 20 A	-	1.38	1.6	V
		I_F = 20 A, T_J = 150 °C	-	1.77	2.2	
		I_F = 20 A, T_J = 175 °C	-	1.9	-	
Reverse leakage current	I_R	V_R = V_R rated	-	9	150	µA
		V_R = V_R rated, T_J = 150 °C	-	120	800	
		V_R = V_R rated, T_J = 175 °C	-	260	-	
Total capacitance	C	V_R = 1 V, f = 1 MHz	-	1160	-	pF
		V_R = 800 V, f = 1 MHz	-	69	-	
Total capacitive charge	Q_C	V_R = 800 V, f = 1 MHz	-	101	-	nC

THERMAL - MECHANICAL SPECIFICATIONS (T_A = 25 °C unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Thermal resistance, junction-to-case	R_{thJC}		-	0.4	0.7	°C/W
Marking device			4C20EP12L			

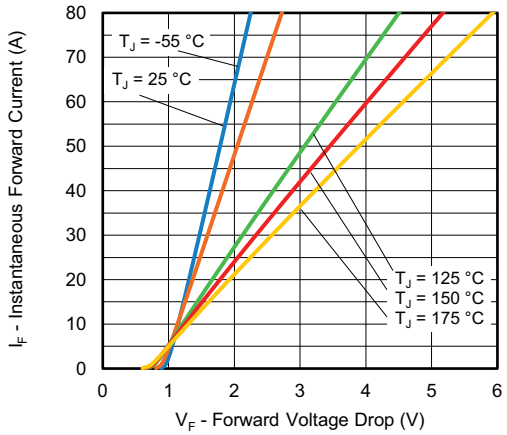


Fig. 1 - Typical Forward Voltage Drop Characteristics

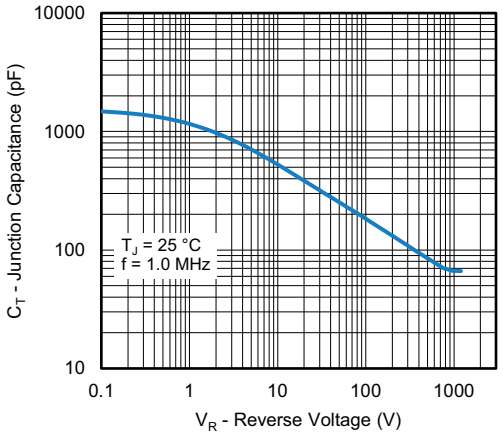


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

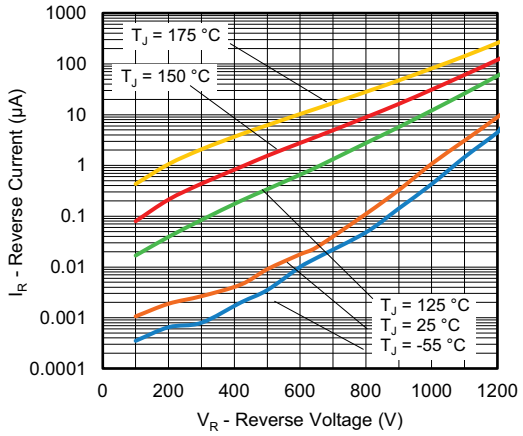


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

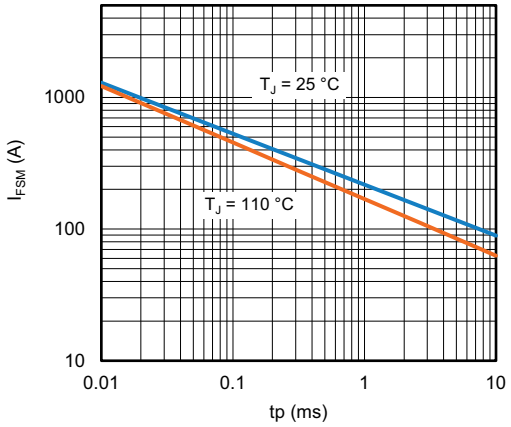


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

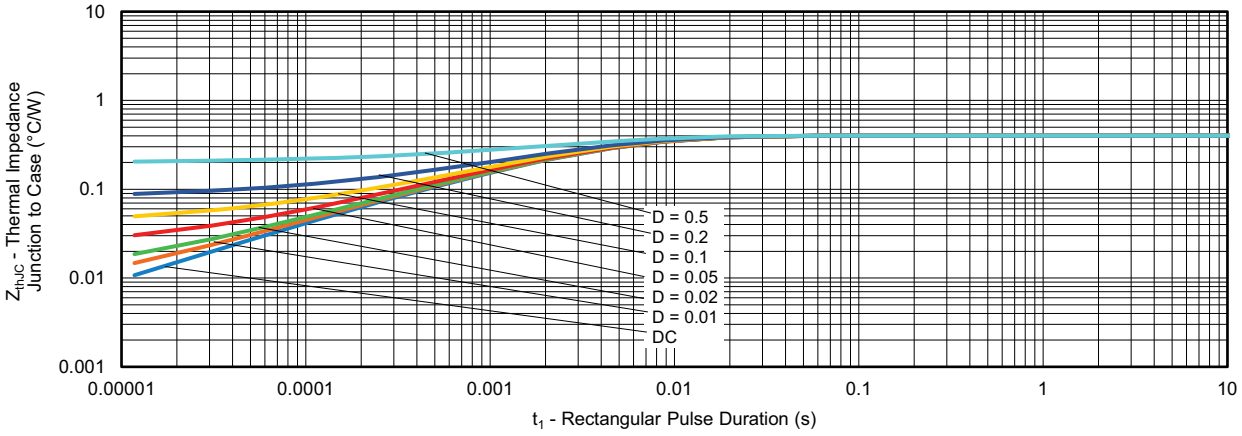


Fig. 5 - Thermal Impedance Z_{thJC} - Characteristics

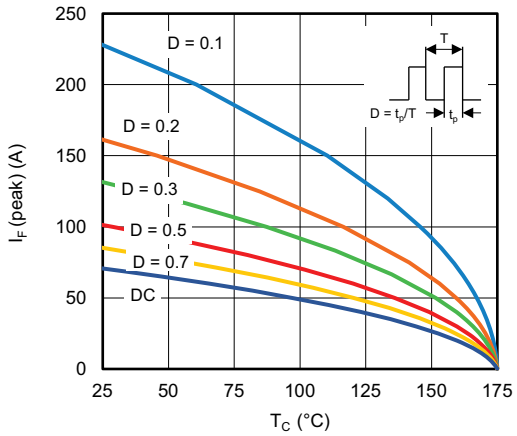


Fig. 6 - Peak Forward Current vs. Maximum Allowable Case Temperature

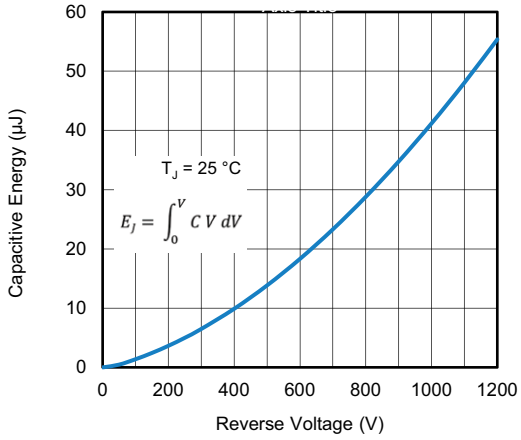


Fig. 8 - Capacitance Energy vs. Reverse Voltage

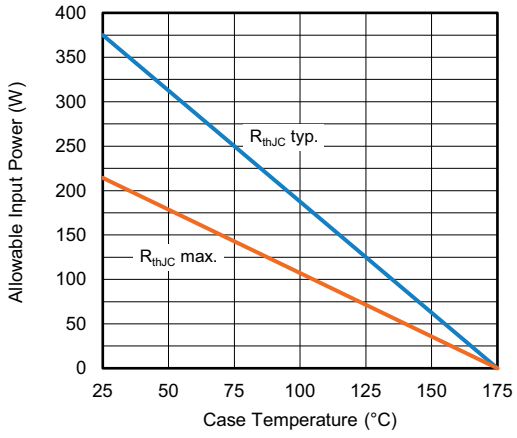


Fig. 7 - Allowable Input Power vs. Case Temperature

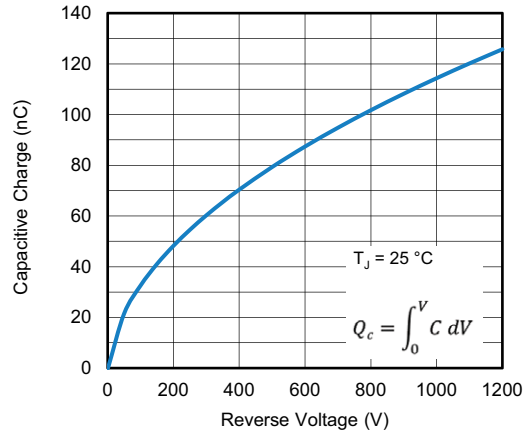
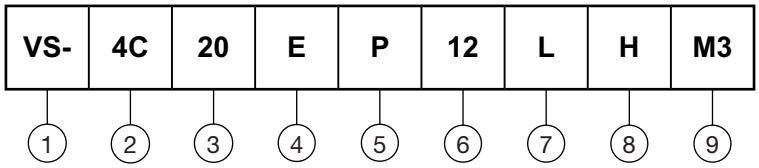


Fig. 9 - Capacitance Change vs. Reverse Voltage

ORDERING INFORMATION TABLE

Device code



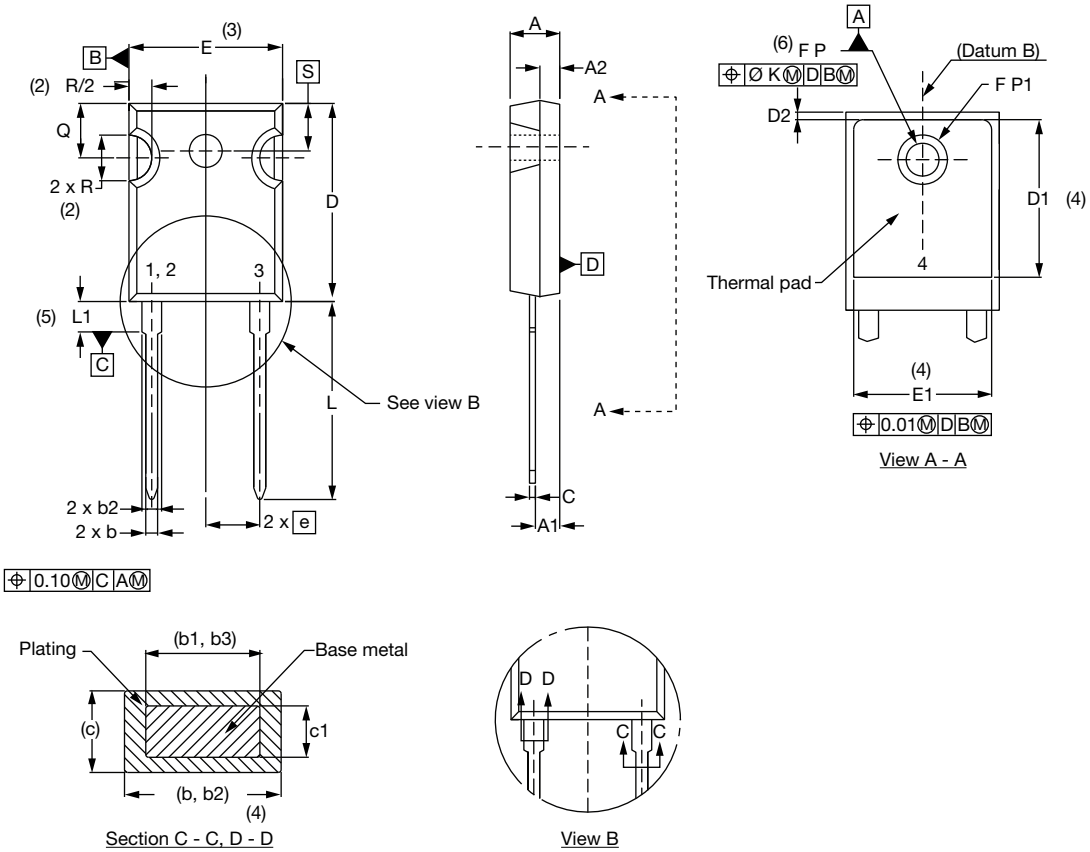
1 - Vishay Semiconductors product
2 - 4C = SiC diode, Generation 4
3 - Current rating (20 = 20 A)
4 - E = single diode
5 - P = package TO-247
6 - Voltage rating: 12 = 1200 V
7 - L = long lead
8 - H = AEC-Q101 qualified
9 - Environmental digit:
M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

ORDERING INFORMATION			
PREFERRED P/N	**UNIT WEIGHT**	**BASE QUANTITY**	**PACKAGING DESCRIPTION**
VS-4C20EP12LHM3	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

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		
Ø K	0.254		0.010		
L	19.81	20.32	0.780	0.800	
L1	3.71	4.29	0.146	0.169	
Ø P	3.56	3.66	0.14	0.144	
Ø 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

(1) Dimensioning and tolerancing per ASME Y14.5M-1994

(2) Contour of slot optional

(3) Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body

(4) Thermal pad contour optional with dimensions D1 and E1

(5) Lead finish uncontrolled in L1

(6) Ø P 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")

(7) 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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