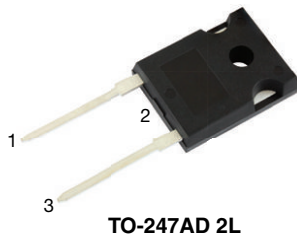
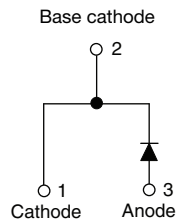


# 1200 V Power SiC Gen 3 Merged PIN Schottky Diode, 20 A



TO-247AD 2L



## FEATURES

- Majority carrier diode using Schottky technology on SiC wide band gap material
- Improved  $V_F$  and efficiency by thin wafer technology
- 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
- MPS structure for high ruggedness to forward current surge events
- Meets JESD 201 class 1A 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](http://www.vishay.com/doc?99912)


**RoHS**  
 COMPLIANT  
 HALOGEN  
**FREE**

## LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS	
$I_F$	20 A
$V_R$	1200 V
$V_F$ at $I_F$ at 25 °C, typ.	1.35 V
$T_J$ max.	175 °C
$I_R$ at $V_R$ at 175 °C	12 $\mu$ A
$Q_C$ ( $V_R = 800$ V)	107 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.

Optimum choice for high speed hard switching and efficient operation over a wide temperature range, it is also recommended for all applications suffering from Silicon ultrafast recovery behavior.

Typical applications include AC/DC PFC and DC/DC ultra high frequency output rectification in FBPS and LLC converters.

## MECHANICAL DATA

**Case:** TO-247AD 2L

Molding compound meets UL 94 V-0 flammability rating Base P/N-M3 - halogen-free, RoHS-compliant

**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	$I_F^{(1)}$	$T_C = 145$ °C (DC)	20	A
	$I_F^{(2)}$	$T_C = 152$ °C (DC)		
DC blocking voltage	$V_{DC}$		1200	V
Repetitive peak forward current	$I_{FRM}$	$T_C = 25$ °C, $f = 50$ Hz, square wave, DC = 25 %	90	A
Non-repetitive peak forward surge current	$I_{FSM}$	$T_C = 25$ °C, $t_p = 10$ ms, half sine wave	180	A
		$T_C = 110$ °C, $t_p = 10$ ms, half sine wave	148	
Power dissipation	$P_{tot}^{(1)}$	$T_C = 25$ °C	188	W
		$T_C = 110$ °C	81	
	$P_{tot}^{(2)}$	$T_C = 25$ °C	250	W
		$T_C = 110$ °C	108	
$I^2t$ value	$\int i^2 dt$	$T_C = 25$ °C	162	A <sup>2</sup> s
		$T_C = 110$ °C	105	
Operating junction and storage temperatures	$T_J^{(3)}, T_{Stg}$		-55 to +175	°C

### Notes

(1) Based on maximum  $R_{th}$

(2) Based on typical  $R_{th}$

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



<b>ELECTRICAL SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Forward voltage	$V_F$	$I_F = 20\text{ A}$	-	1.35	1.5	V
		$I_F = 20\text{ A}, T_J = 150\text{ }^\circ\text{C}$	-	1.73	2.0	
		$I_F = 20\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	1.85	-	
Reverse leakage current	$I_R$	$V_R = V_R\text{ rated}$	-	1.5	110	$\mu\text{A}$
		$V_R = V_R\text{ rated}, T_J = 150\text{ }^\circ\text{C}$	-	7	250	
		$V_R = V_R\text{ rated}, T_J = 175\text{ }^\circ\text{C}$	-	12	-	
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}$	-	1200	-	pF
		$V_R = 800\text{ V}, f = 1\text{ MHz}$	-	73	-	
Total capacitive charge	$Q_C$	$V_R = 800\text{ V}, f = 1\text{ MHz}$	-	107	-	nC

<b>THERMAL - MECHANICAL SPECIFICATIONS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction-to-case	$R_{thJC}$		-	0.6	0.8	$^\circ\text{C/W}$
Marking device			3C20EP12L			

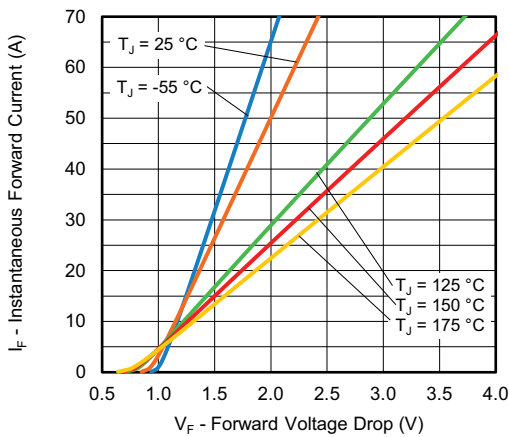


Fig. 1 - Typical Forward Voltage Drop Characteristics

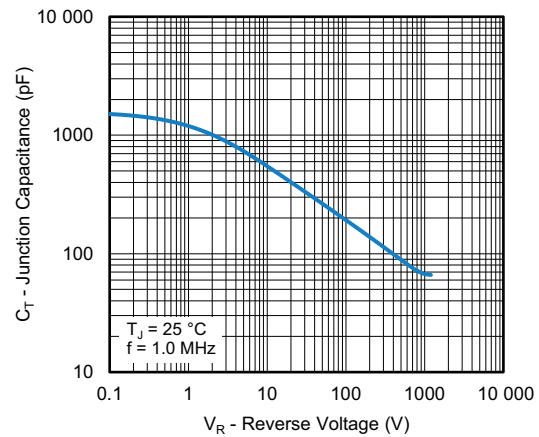


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

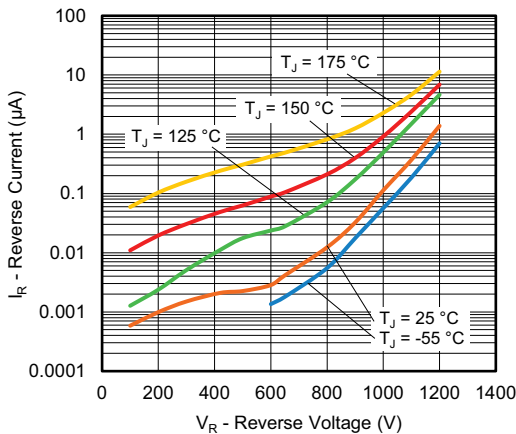


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

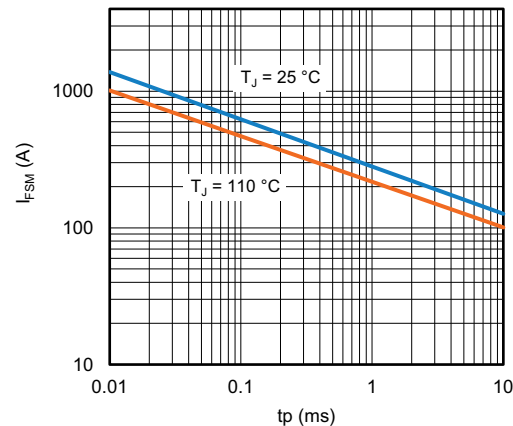


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

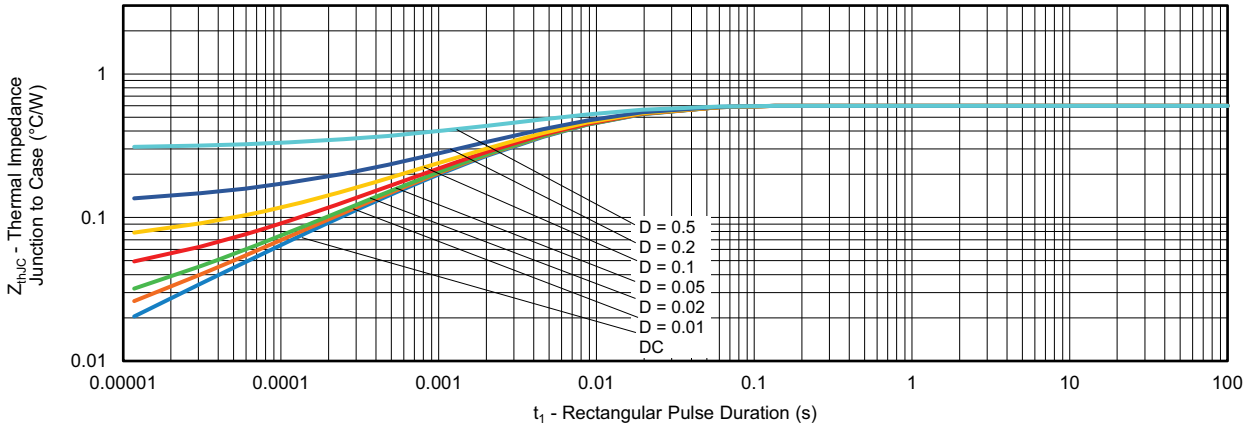


Fig. 5 - Typical Thermal Impedance  $Z_{thJC}$  Characteristics

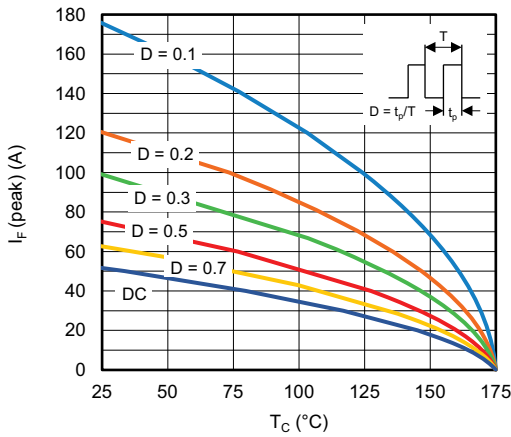


Fig. 6 - Peak Forward Current vs. Maximum Allowable Case Temperature

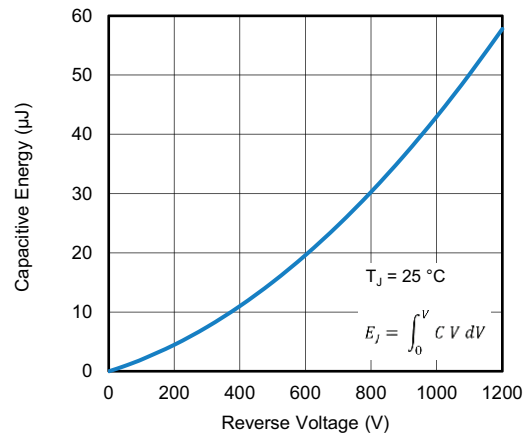


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

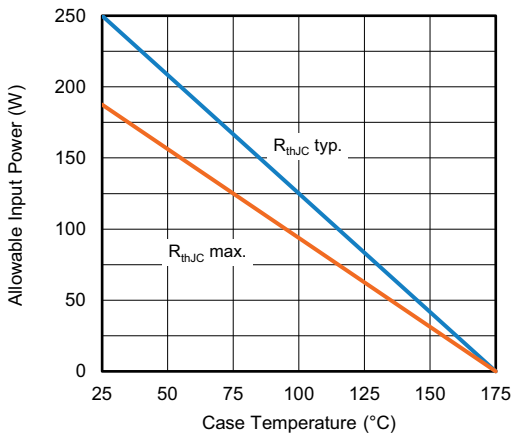


Fig. 7 - Forward Power Loss Characteristics

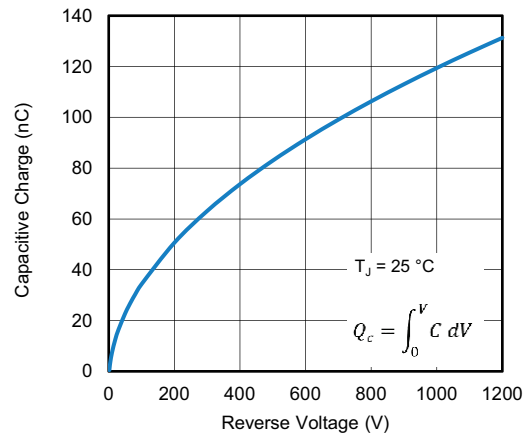
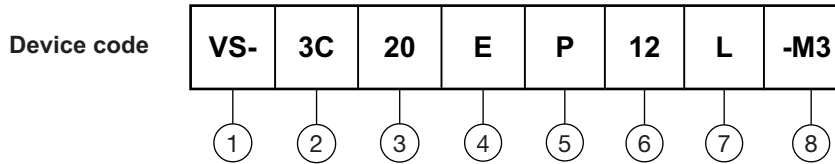


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage



### ORDERING INFORMATION TABLE



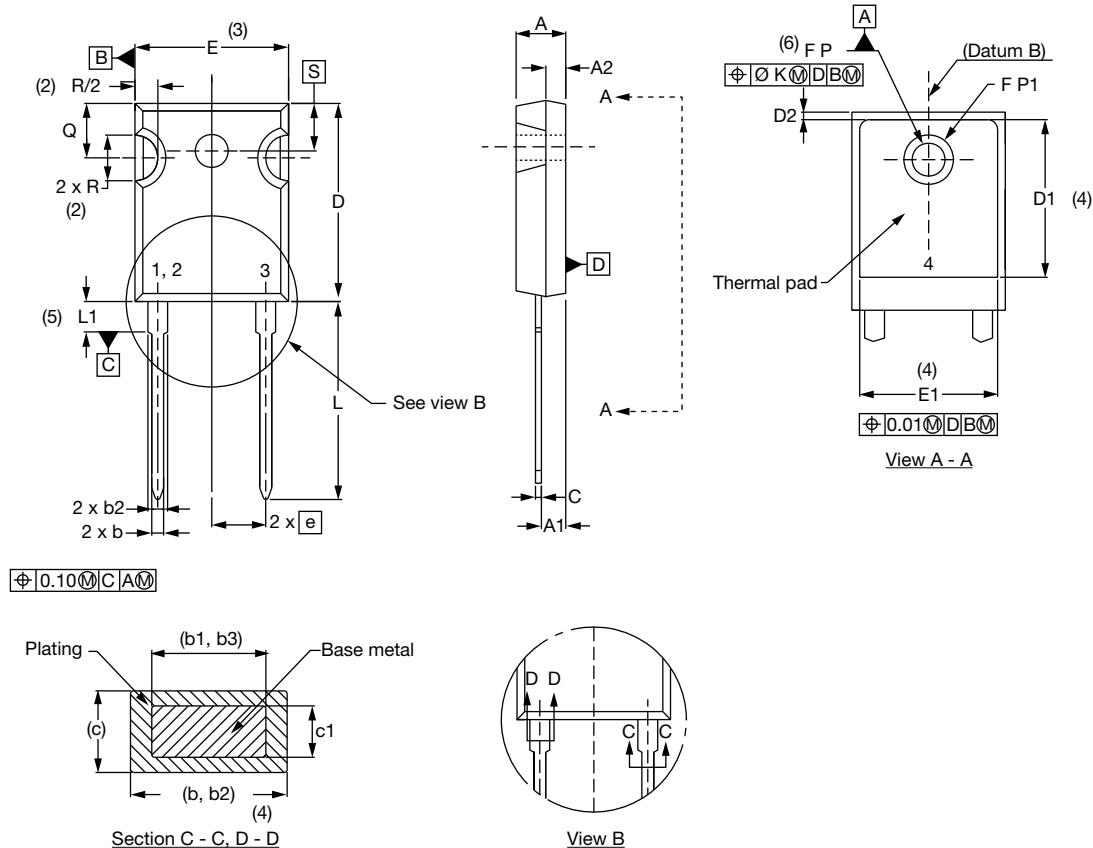
- 1** - Vishay Semiconductors product
- 2** - 3C = SiC diode, Generation 3
- 3** - Current rating (20 = 20 A)
- 4** - E = single diode
- 5** - P = package TO-247
- 6** - Voltage rating: 12 = 1200 V
- 7** - L = long lead
- 8** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and termination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

ORDERING INFORMATION		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-3C20EP12L-M3	25 / tube	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95536">www.vishay.com/doc?95536</a>
Part marking information	<a href="http://www.vishay.com/doc?95648">www.vishay.com/doc?95648</a>

### TO-247AD 2L

**DIMENSIONS** in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209		E	15.29	15.87	0.602	0.625	3
A1	2.21	2.59	0.087	0.102		E1	13.46	-	0.53	-	
A2	1.50	2.49	0.059	0.098		e	5.46 BSC		0.215 BSC		
b	0.99	1.40	0.039	0.055		$\phi K$	0.254		0.010		
b1	0.99	1.35	0.039	0.053		L	19.81	20.32	0.780	0.800	
b2	1.65	2.39	0.065	0.094		L1	3.71	4.29	0.146	0.169	
b3	1.65	2.34	0.065	0.092		$\phi P$	3.56	3.66	0.14	0.144	
c	0.38	0.89	0.015	0.035		$\phi P1$	-	6.98	-	0.275	
c1	0.38	0.84	0.015	0.033		Q	5.31	5.69	0.209	0.224	
D	19.71	20.70	0.776	0.815	3	R	4.52	5.49	0.178	0.216	
D1	13.08	-	0.515	-	4	S	5.51 BSC		0.217 BSC		
D2	0.51	1.35	0.020	0.053							

**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)  $\phi P$  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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