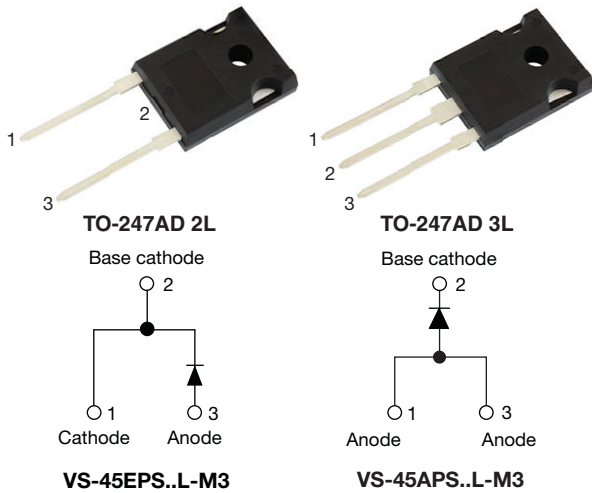




**THE DATASHEET OF  
VS-45EPS12L-M3**



## High Voltage Input Rectifier Diode, 45 A



### FEATURES

- Very low forward voltage drop
- Glass passivated pellet chip junction
- Designed and qualified according to JEDEC® - JESD 47
- Flexible solution for reliable AC power rectification
- High surge, low  $V_F$  rugged blocking diode for DC charging stations
- AEC-Q101 qualified P/N available (VS-45EPS12LHM3, VS-45APS12LHM3)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### APPLICATIONS

- On-board and off-board EV / HEV battery chargers
- Renewable energy inverters
- Input rectification for single and three phase bridge configurations
- Vishay Semiconductors switches and output rectifiers which are available in identical package outlines

### DESCRIPTION

High voltage rectifiers optimized for very low forward voltage drop with moderate leakage. These devices are intended for use in main rectification (single or three phase bridge).

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	45 A
$V_R$	800 V, 1200 V
$V_F$ at $I_F$	1.14 V
$I_{FSM}$	500 A
$T_J$ max.	150 °C
Package	TO-247AD 2L, TO-247AD 3L
Circuit configuration	Single

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Sinusoidal waveform	45	A
$V_{RRM}$		800, 1200	V
$I_{FSM}$		500	A
$V_F$	20 A, $T_J = 25$ °C	1.0	V
$T_J$		-40 to +150	°C

VOLTAGE RATINGS			
PART NUMBER	$V_{RRM}$ , MAXIMUM PEAK REVERSE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	$I_{RRM}$ AT 150 °C mA
VS-45EPS08L-M3	800	900	1.0
VS-45APS08L-M3	800	900	
VS-45EPS12L-M3	1200	1300	1.0
VS-45APS12L-M3	1200	1300	

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 109$ °C, 180° conduction half sine wave	45	A
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	420	
		10 ms sine pulse, no voltage reapplied	500	
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	884	A <sup>2</sup> s
		10 ms sine pulse, no voltage reapplied	1250	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ ms to 10 ms, no voltage reapplied	12 500	A <sup>2</sup> √s

ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	45 A, $T_J = 25\text{ }^\circ\text{C}$		1.14	V
Forward slope resistance	$r_t$	$T_J = 150\text{ }^\circ\text{C}$		7.16	m $\Omega$
Threshold voltage	$V_{F(TO)}$			0.74	V
Maximum reverse leakage current	$I_{RM}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{rated } V_{RRM}$	0.1	mA
		$T_J = 150\text{ }^\circ\text{C}$		1.0	

THERMAL - MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$			-40 to +150	$^\circ\text{C}$
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation		0.4	$^\circ\text{C/W}$
Maximum thermal resistance, junction to ambient	$R_{thJA}$			40	
Typical thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, smooth, and greased		0.25	
Approximate weight				6	g
				0.21	oz.
Mounting torque	minimum			6 (5)	kgf · cm (lbf · in)
	maximum			12 (10)	
Marking device			Case style TO-247AD 2L	45EPS08L	
			Case style TO-247AD 3L	45APS08L	
			Case style TO-247AD 2L	45EPS12L	
			Case style TO-247AD 3L	45APS12L	

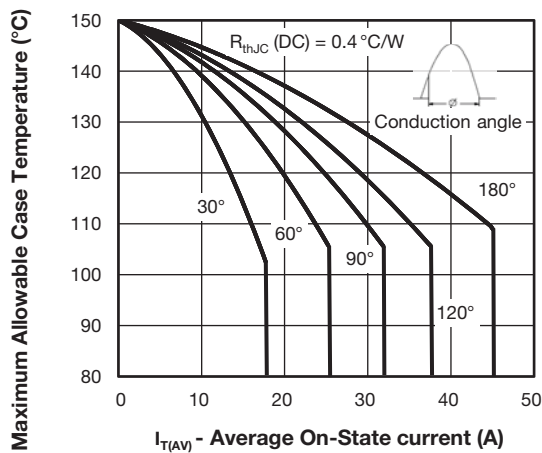


Fig. 1 - Current Rating Characteristics

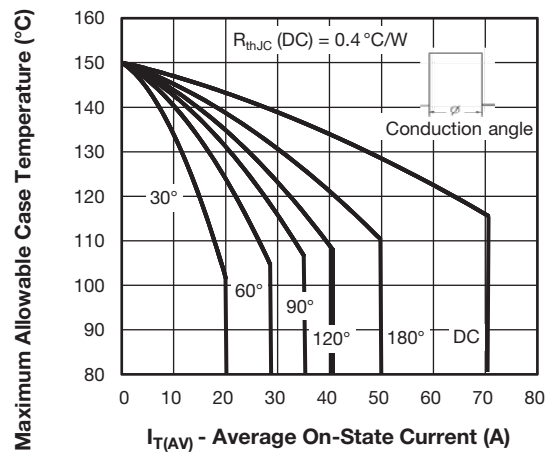


Fig. 2 - Current Rating Characteristics

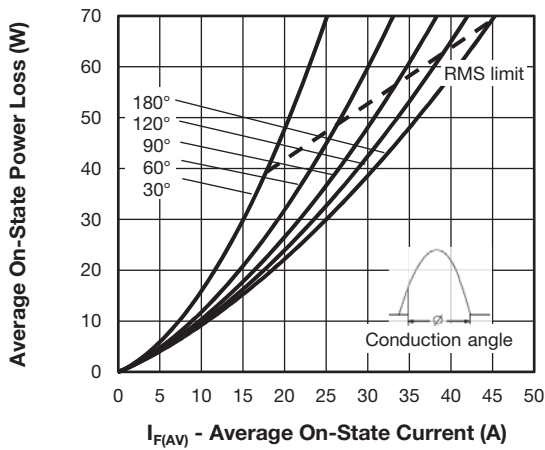


Fig. 3 - Forward Power Loss Characteristics

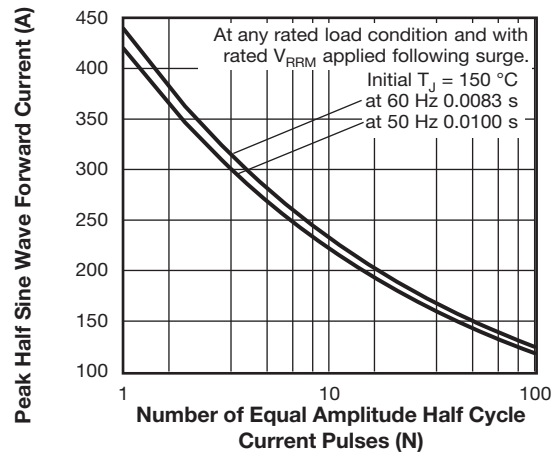


Fig. 5 - Maximum Non-Repetitive Surge Current

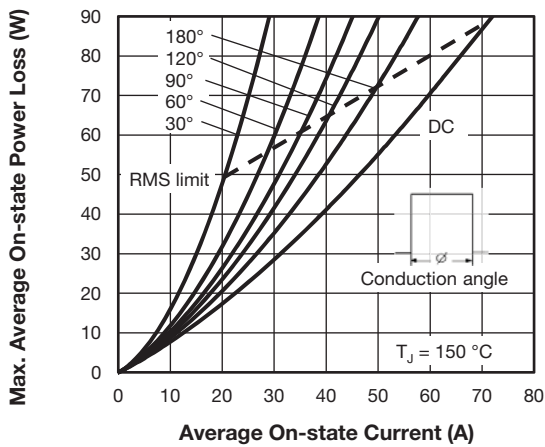


Fig. 4 - Forward Power Loss Characteristics

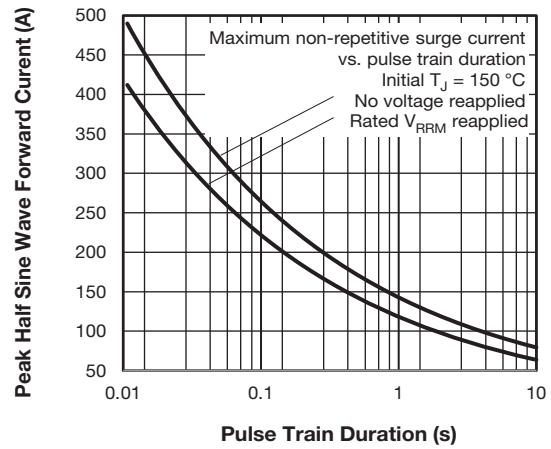


Fig. 6 - Maximum Non-Repetitive Surge Current

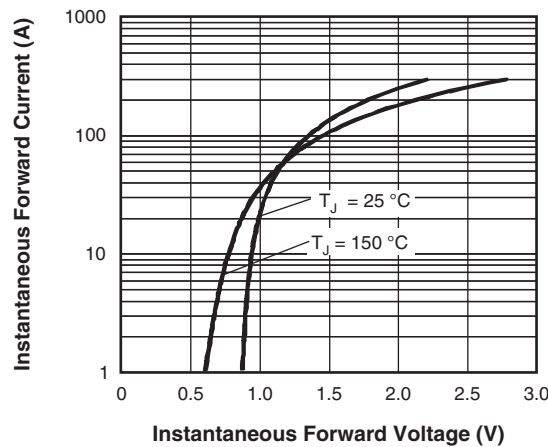


Fig. 7 - Forward Voltage Drop Characteristics

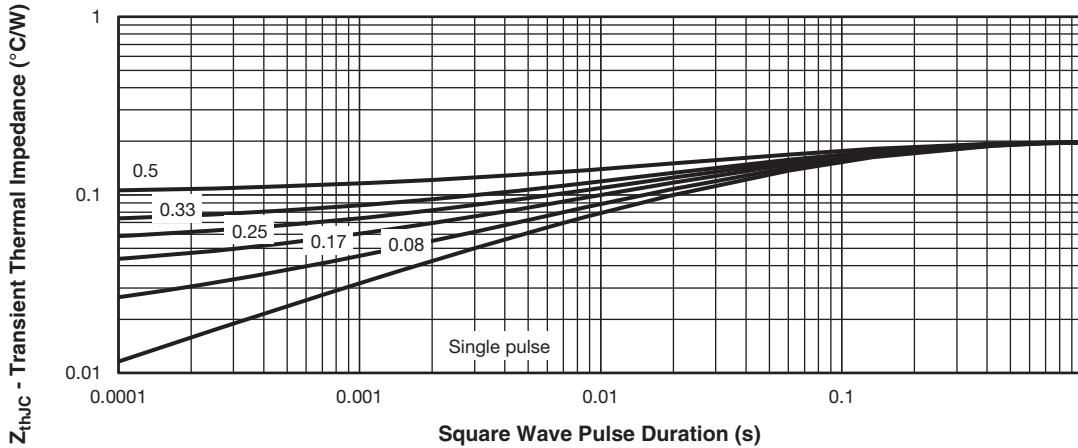


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>45</b>	<b>E</b>	<b>P</b>	<b>S</b>	<b>12</b>	<b>L</b>	<b>-M3</b>
	①	②	③	④	⑤	⑥	⑦	⑧

- 1** - Vishay Semiconductors product
- 2** - Current rating (45 = 45 A)
- 3** - Circuit configuration:  
E = single, 2 pins  
A = single 3 pins
- 4** - Package:  
P = TO-247AD
- 5** - Type of silicon:  
S = standard recovery rectifier
- 6** - Voltage code x 100 =  $V_{RRM}$ 

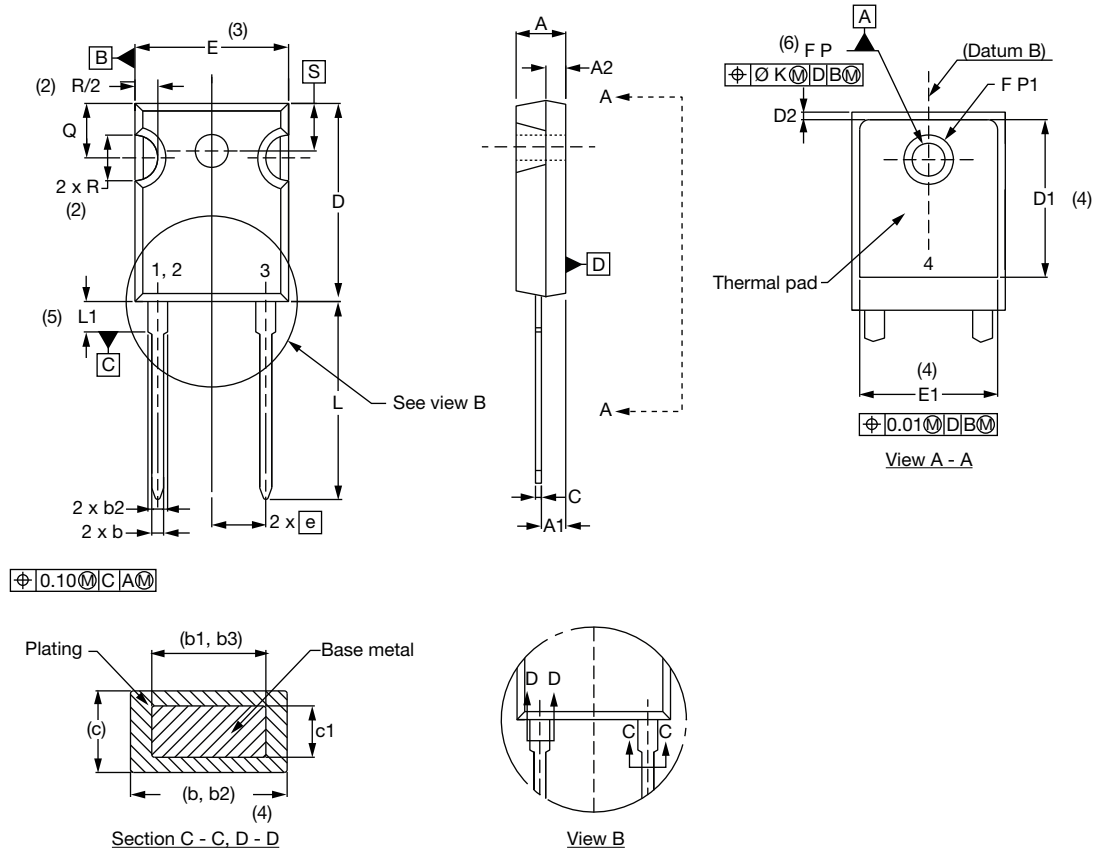
08 = 800 V
12 = 1200 V
- 7** - L = long leads
- 8** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

<b>ORDERING INFORMATION (Example)</b>			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-45EPS08L-M3	25	500	Antistatic plastic tubes
VS-45APS08L-M3	25	500	Antistatic plastic tubes
VS-45EPS12L-M3	25	500	Antistatic plastic tubes
VS-45APS12L-M3	25	500	Antistatic plastic tubes

<b>LINKS TO RELATED DOCUMENTS</b>		
Dimensions	TO-247AD 2L	<a href="http://www.vishay.com/doc?95536">www.vishay.com/doc?95536</a>
	TO-247AD 3L	<a href="http://www.vishay.com/doc?95626">www.vishay.com/doc?95626</a>
Part marking information	TO-247AD 2L	<a href="http://www.vishay.com/doc?95648">www.vishay.com/doc?95648</a>
	TO-247AD 3L	<a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>

### TO-247AD 2L

**DIMENSIONS** in millimeters and inches



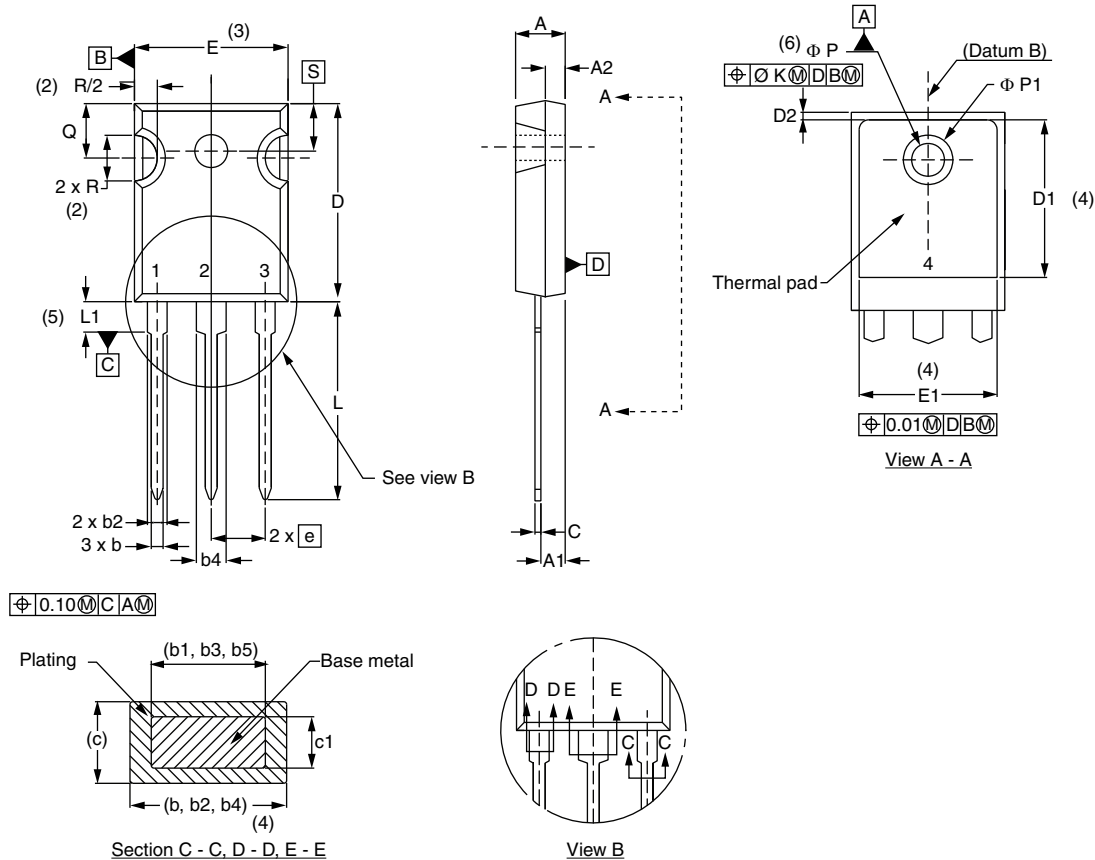
SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209		E	15.29	15.87	0.602	0.625	3
A1	2.21	2.59	0.087	0.102		E1	13.46	-	0.53	-	
A2	1.50	2.49	0.059	0.098		e	5.46 BSC		0.215 BSC		
b	0.99	1.40	0.039	0.055		$\phi$ K	0.254		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<sup>®</sup> outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4

### TO-247AD 3L

**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		D2	0.51	1.30	0.020	0.051	
A1	2.21	2.59	0.087	0.102		E	15.29	15.87	0.602	0.625	3
A2	1.50	2.49	0.059	0.098		E1	13.46	-	0.53	-	
b	0.99	1.40	0.039	0.055		e	5.46 BSC		0.215 BSC		
b1	0.99	1.35	0.039	0.053		Ø K	0.254		0.010		
b2	1.65	2.39	0.065	0.094		L	19.81	20.32	0.780	0.800	
b3	1.65	2.34	0.065	0.092		L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135		Ø P	3.56	3.66	0.14	0.144	
b5	2.59	3.38	0.102	0.133		Ø P1	-	6.98	-	0.275	
c	0.38	0.89	0.015	0.035		Q	5.31	5.69	0.209	0.224	
c1	0.38	0.84	0.015	0.033		R	4.52	5.49	0.178	0.216	
D	19.71	20.70	0.776	0.815	3	S	5.51 BSC		0.217 BSC		
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