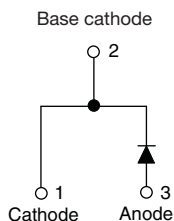


# High Voltage, Input Rectifier Diode, 20 A



## FEATURES

- Very low forward voltage drop
- 150 °C max. operating junction temperature
- Glass passivated pellet chip junction
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

## APPLICATIONS

- Input rectification
- 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

$I_{F(AV)}$	20 A
$V_R$	1600 V
$V_F$ at $I_F$	1.1 V
$I_{FSM}$	300 A
$T_J$ max.	150 °C
Package	2L TO-220AC
Circuit configuration	Single

## OUTPUT CURRENT IN TYPICAL APPLICATIONS

APPLICATIONS	SINGLE-PHASE BRIDGE	THREE-PHASE BRIDGE	UNITS
Capacitive input filter $T_A = 55$ °C, $T_J = 125$ °C common heatsink of 1 °C/W	16.3	21	A

## MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Sinusoidal waveform	20	A
$V_{RRM}$		1600	V
$I_{FSM}$		300	A
$V_F$	10 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-20ETS16-M3	1600	1700	1

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 105^\circ\text{C}$ , 180° conduction half sine wave	20	A
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	250	
		10 ms sine pulse, no voltage reapplied	300	
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	316	$\text{A}^2\text{s}$
		10 ms sine pulse, no voltage reapplied	442	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to } 10\text{ ms}$ , no voltage reapplied	4420	$\text{A}^2\sqrt{\text{s}}$

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	20 A, $T_J = 25^\circ\text{C}$	1.1	V
Forward slope resistance	$r_t$	$T_J = 150^\circ\text{C}$	10.4	$\text{m}\Omega$
Threshold voltage	$V_{F(TO)}$		0.85	V
Maximum reverse leakage current	$I_{RM}$	$T_J = 25^\circ\text{C}$	0.1	mA
		$T_J = 150^\circ\text{C}$	1.0	

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-40 to +150	°C
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation	1.3	°C/W
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth and greased	0.5	
Approximate weight			2	g
			0.07	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style 2L TO-220AC	20ETS16	

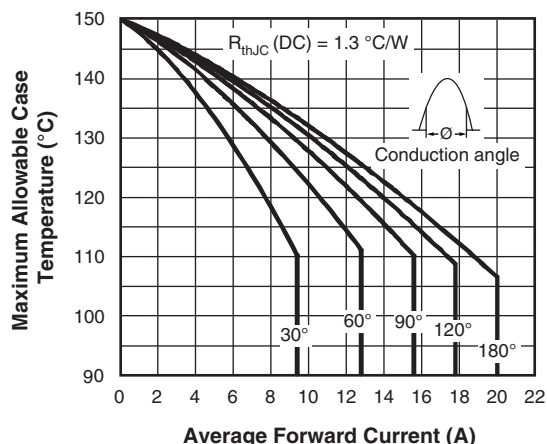


Fig. 1 - Current Rating Characteristics

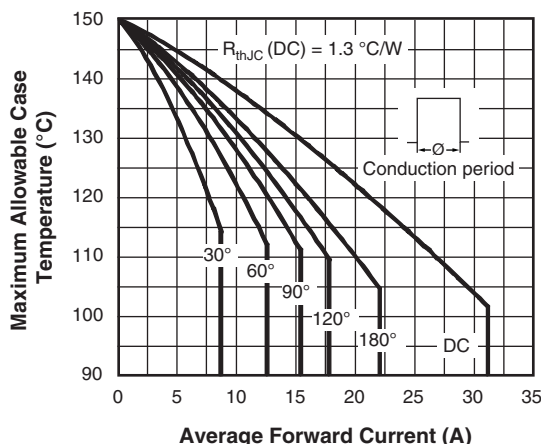


Fig. 2 - Current Rating Characteristics

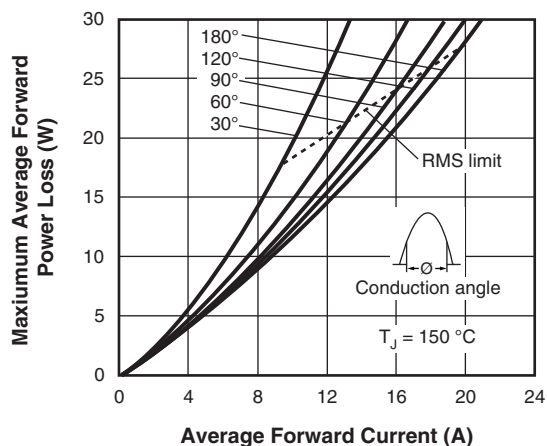


Fig. 3 - Forward Power Loss Characteristics

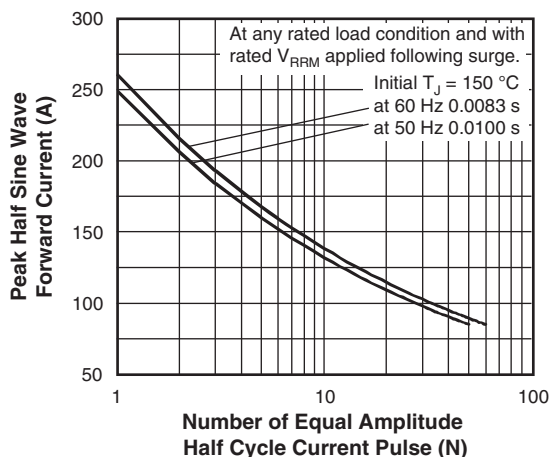


Fig. 5 - Maximum Non-Repetitive Surge Current

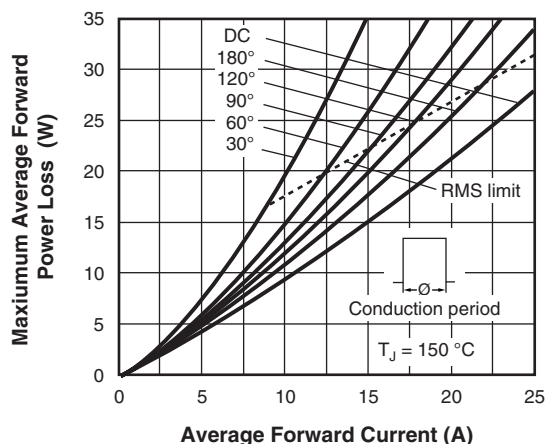


Fig. 4 - Forward Power Loss Characteristics

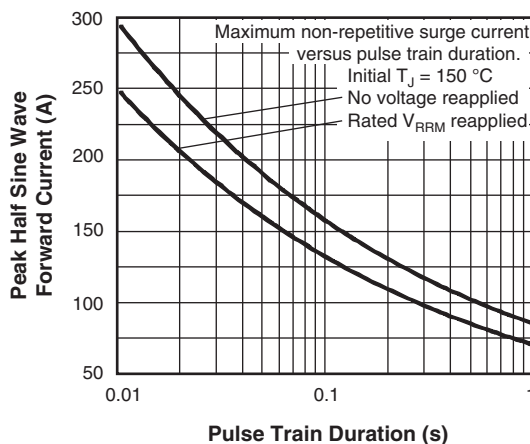


Fig. 6 - Maximum Non-Repetitive Surge Current

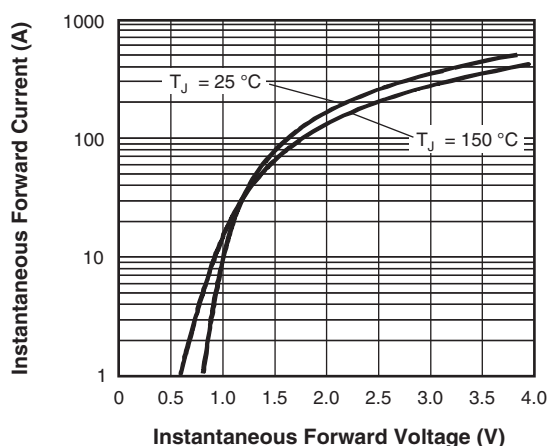
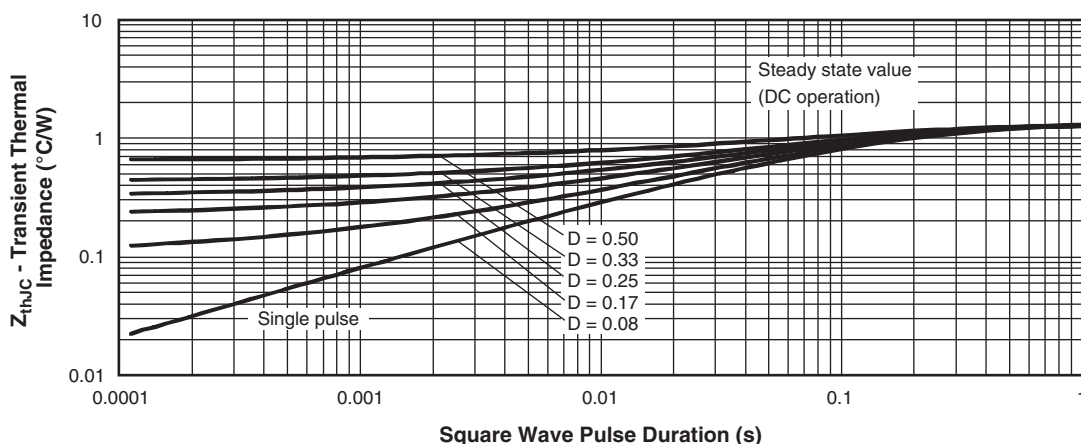


Fig. 7 - Forward Voltage Drop Characteristics


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

## ORDERING INFORMATION TABLE

Device code	VS-	20	E	T	S	16	-M3
	①	②	③	④	⑤	⑥	⑦
①	- Vishay Semiconductors product						
②	- Current rating (20 = 20 A)						
③	- Circuit configuration: E = TO-220AC						
④	- Package: T = TO-220						
⑤	- Type of silicon: S = standard recovery rectifier						
⑥	- Voltage rating (16 = 1600 V)						
⑦	- Environmental digit: -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free						

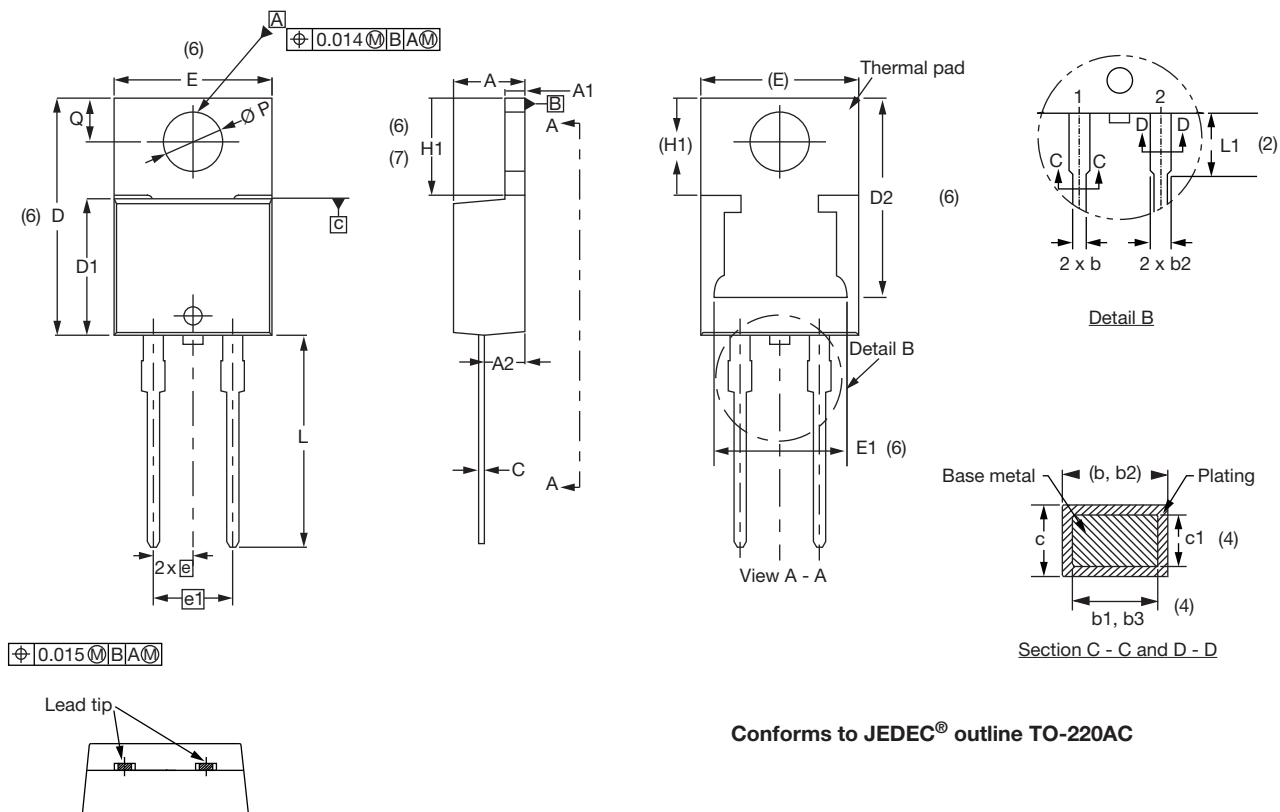
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-20ETS16-M3	50	1000	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?96156">www.vishay.com/doc?96156</a>
Part marking information	<a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a>



### 2L TO-220AC

**DIMENSIONS** in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.50	2.92	0.098	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.35	0.585	0.604	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	12.88	0.460	0.507	6
E	10.11	10.51	0.398	0.414	3, 6
E1	6.86	8.89	0.270	0.350	6
e	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	6.09	6.48	0.240	0.255	6, 7
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
Ø P	3.54	3.91	0.139	0.154	
Q	2.60	3.00	0.102	0.118	

#### Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1, and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
- (4) Dimension b1, b3, and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2, and E1
- (7) Outline conforms to JEDEC® TO-220, except D2 (minimum)



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