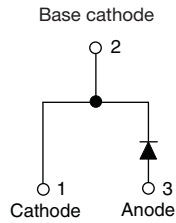


## High Voltage, Input Rectifier Diode, 20 A



### FEATURES

- Glass passivated pellet chip junction
- AEC-Q101 qualified
- Meets JESD 201 class 1A whisker test
- Flexible solution for reliable AC power rectification
- High surge, low  $V_F$  rugged blocking diode for DC charging stations
- 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
- Input rectification

### 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-20ETS16THM3	1600	1700	1



ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 105\text{ }^\circ\text{C}$ , 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	$A^2s$
		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	$A^2\sqrt{s}$

ELECTRICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	20 A, $T_J = 25\text{ }^\circ\text{C}$	1.1	V
Forward slope resistance	$r_t$	$T_J = 150\text{ }^\circ\text{C}$	10.4	$m\Omega$
Threshold voltage	$V_{F(TO)}$		0.85	V
Maximum reverse leakage current	$I_{RM}$	$T_J = 25\text{ }^\circ\text{C}$	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	1.3	$^\circ\text{C/W}$
Typical thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, smooth and greased	0.5	
Approximate weight			2	g
			0.07	oz.
Mounting torque	minimum		6 (5)	$\text{kgf} \cdot \text{cm}$ $(\text{lbf} \cdot \text{in})$
	maximum		12 (10)	
Marking device		Case style 2L TO-220AC	20ETS16TH	

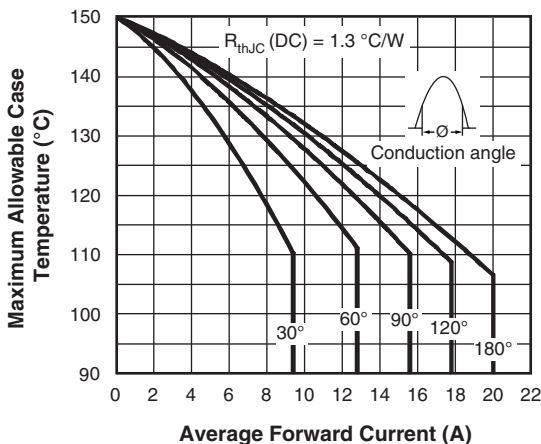


Fig. 1 - Current Rating Characteristics

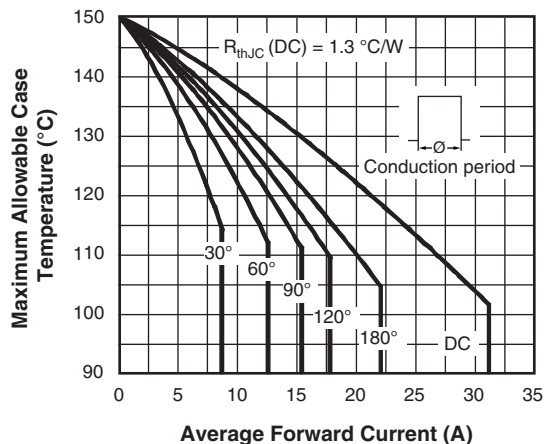


Fig. 2 - Current Rating Characteristics

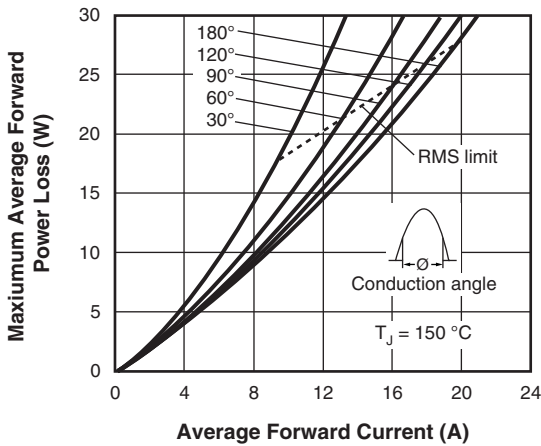


Fig. 3 - Forward Power Loss Characteristics

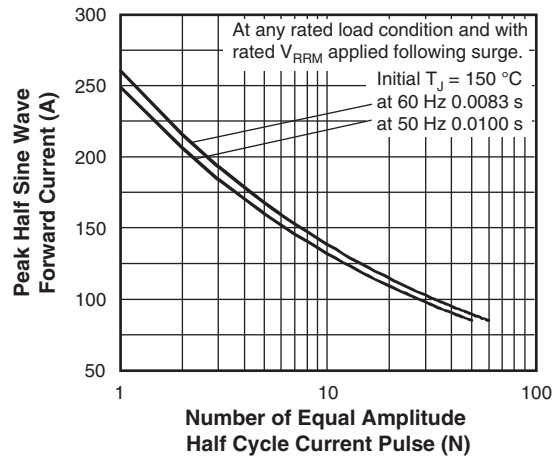


Fig. 5 - Maximum Non-Repetitive Surge Current

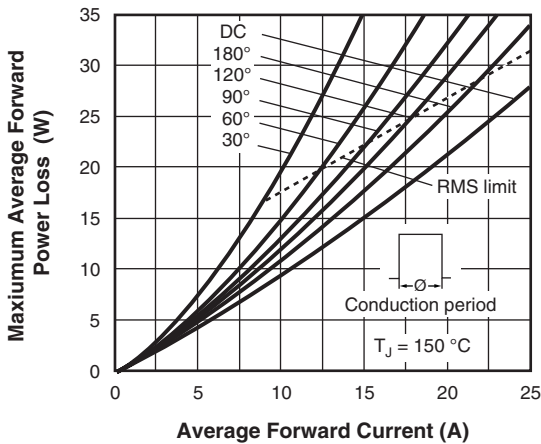


Fig. 4 - Forward Power Loss Characteristics

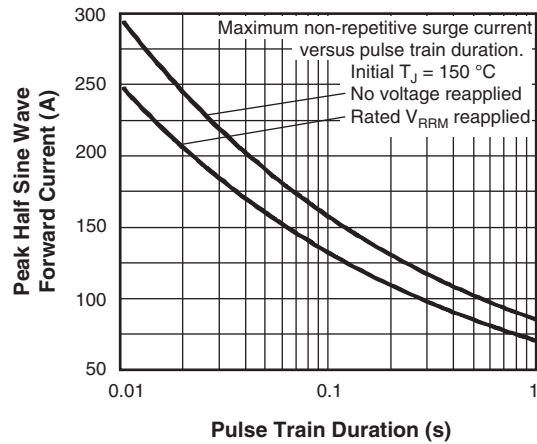


Fig. 6 - Maximum Non-Repetitive Surge Current

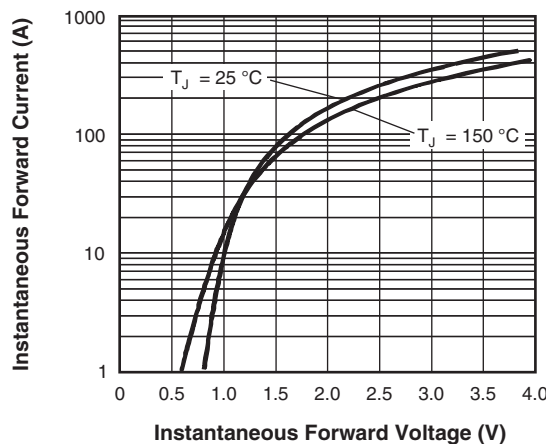
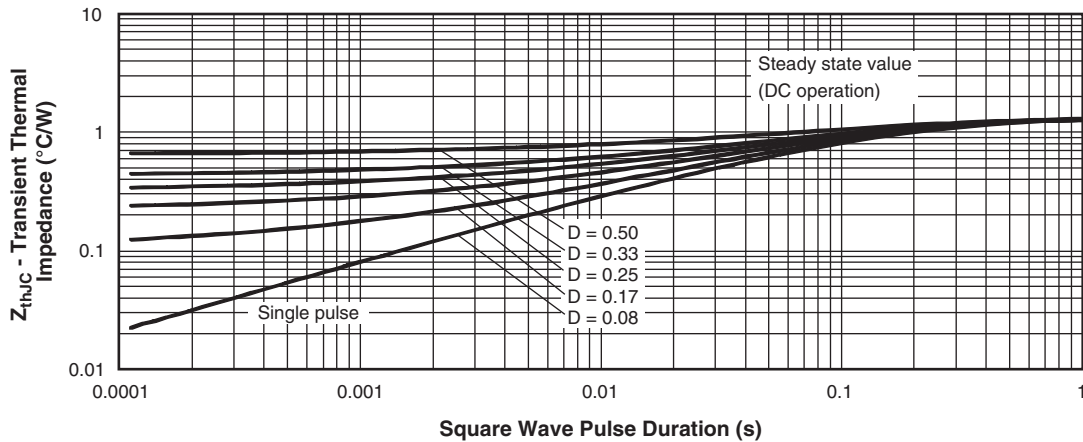


Fig. 7 - Forward Voltage Drop Characteristics


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

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>20</b>	<b>E</b>	<b>T</b>	<b>S</b>	<b>16</b>	<b>T</b>	<b>H</b>	<b>M3</b>
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

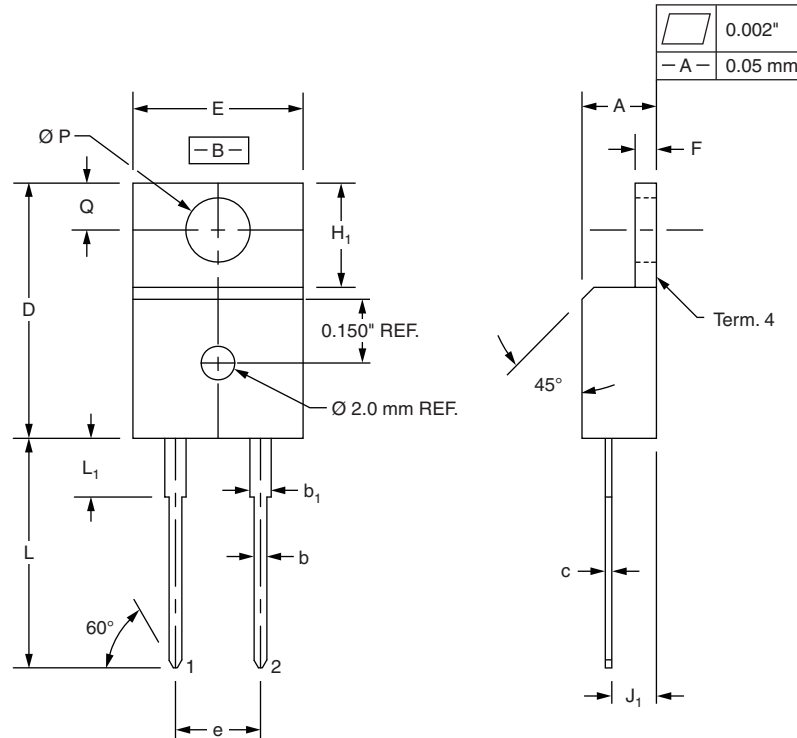
- 1** - Vishay Semiconductors product
- 2** - Current rating (20 = 20 A)
- 3** - Circuit configuration:  
E = 2L TO-220AC  
A = 3L TO-220AB, common anode
- 4** - Package:  
T = TO-220
- 5** - Type of silicon:  
S = standard recovery rectifier
- 6** - Voltage code x 100 =  $V_{RRM}$  ——— **16 = 1600 V**
- 7** -
  - None = TO-220AB
  - T = True pin TO-220
- 8** - H = AEC-Q101 qualified
- 9** - 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-20ETS16THM3	50	1000	Antistatic plastic tubes

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?95259">www.vishay.com/doc?95259</a>
Part marking information	<a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a>

### True 2 Pin TO-220

**DIMENSIONS** in millimeters and inches



SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.32	4.57	0.170	0.180
b	0.71	0.91	0.028	0.036
b <sub>1</sub>	1.15	1.39	0.045	0.055
c	0.36	0.53	0.014	0.021
D	14.99	15.49	0.590	0.610
E	10.04	10.41	0.395	0.410
e	5.08 BSC		0.200 BSC	
F	1.22	1.37	0.048	0.054
H <sub>1</sub>	5.97	6.47	0.235	0.255
J <sub>1</sub>	2.54	2.79	0.100	0.110
L	13.47	13.97	0.530	0.550
L <sub>1</sub> <sup>(1)</sup>	3.31	3.81	0.130	0.150
Ø P	3.79	3.88	0.149	0.153
Q	2.60	2.84	0.102	0.112

**Notes**

<sup>(1)</sup> Lead dimension and finish uncontrolled in L<sub>1</sub>

- These dimensions are within allowable dimensions of JEDEC TO-220AB rev. J outline dated 3-24-87
- Controlling dimension: Inch



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