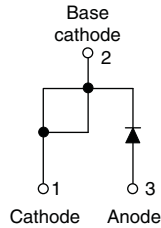




## High Voltage, Input Rectifier Diode, 20 A



TO-220 FULL-PAK



### FEATURES

- Very low forward voltage drop
- 150 °C max. operating junction temperature
- Designed and qualified according to JEDEC-JESD47
- Fully isolated package ( $V_{INS} = 2500 V_{RMS}$ )
- UL E78996 approved
- Compliant to RoHS Directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition (-M3 only)



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

PRODUCT SUMMARY	
Package	TO-220FP
$I_{F(AV)}$	20 A
$V_R$	800 V, 1200 V
$V_F$ at $I_F$	1.1 V
$I_{FSM}$	300 A
$T_J$ max.	150 °C
Diode variation	Single die

### 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).

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	18	22	A

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Sinusoidal waveform	20	A
$V_{RRM}$	Range	800/1200	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-20ETS08FPPbF, VS-20ETS08FP-M3	800	900	1
VS-20ETS12FPPbF, VS-20ETS12FP-M3	1200	1300	



<b>ABSOLUTE MAXIMUM RATINGS</b>				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 51\text{ }^\circ\text{C}$ , 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 <sup>2</sup> 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	A <sup>2</sup> √s

<b>ELECTRICAL SPECIFICATIONS</b>					
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	mΩ	
Threshold voltage	$V_{F(TO)}$		0.85	V	
Maximum reverse leakage current	$I_{RM}$	$V_R = \text{Rated } V_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	0.1	mA
			$T_J = 150\text{ }^\circ\text{C}$	1.0	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		- 40 to 150	°C
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation	2.8	°C/W
Maximum thermal resistance, junction to ambient	$R_{thJA}$		62	
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		6.0 (5.0)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-220 FULL-PAK (94/V0)	20ETS08FP	
			20ETS12FP	

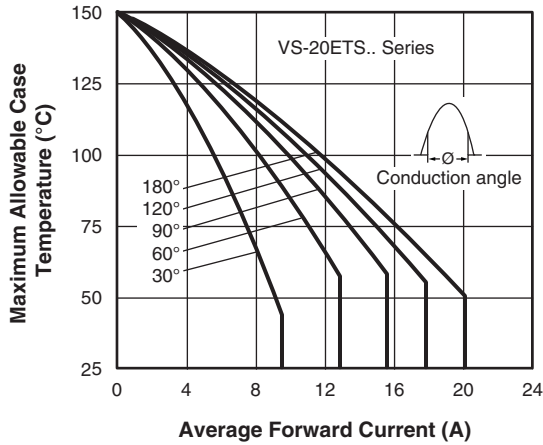


Fig. 1 - Current Rating Characteristics

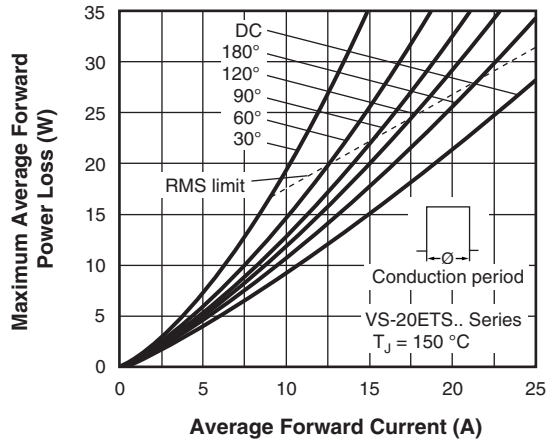


Fig. 4 - Forward Power Loss Characteristics

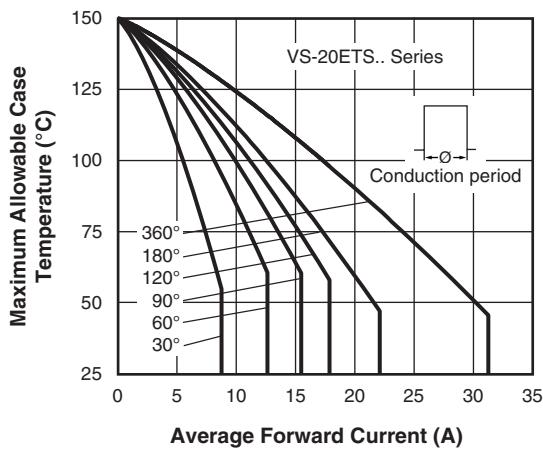


Fig. 2 - Current Rating Characteristics

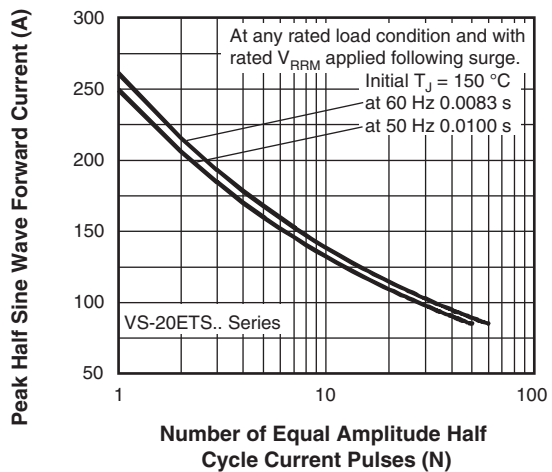


Fig. 5 - Maximum Non-Repetitive Surge Current

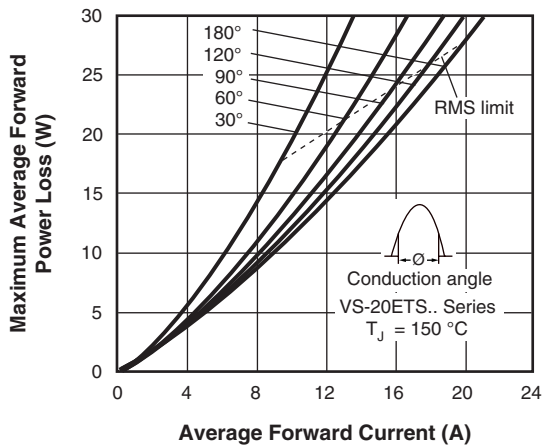


Fig. 3 - Forward Power Loss Characteristics

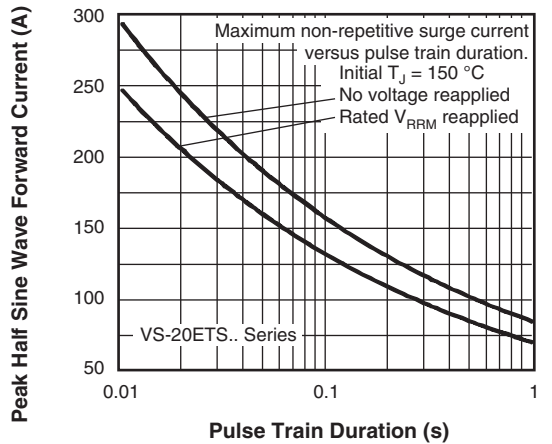


Fig. 6 - Maximum Non-Repetitive Surge Current

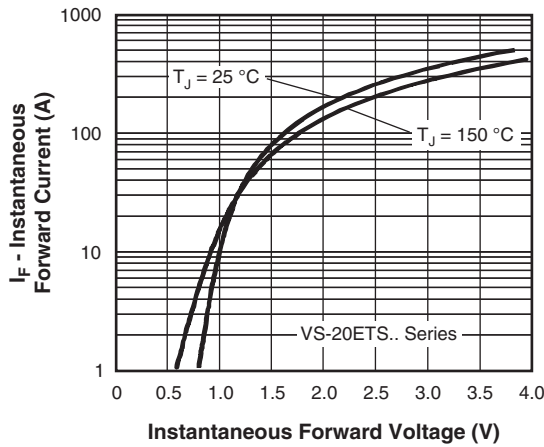


Fig. 7 - Forward Voltage Drop Characteristics

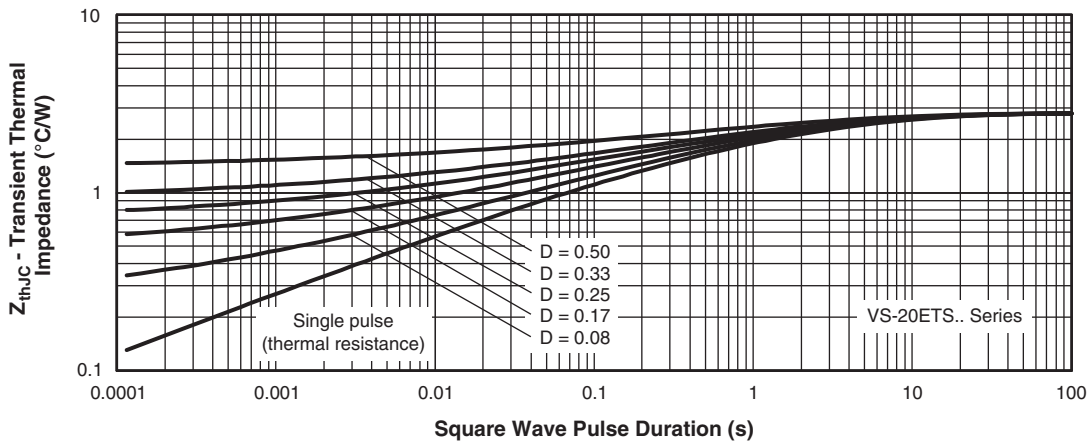


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics



## ORDERING INFORMATION TABLE

<b>Device code</b>	<b>VS-</b>	<b>20</b>	<b>E</b>	<b>T</b>	<b>S</b>	<b>12</b>	<b>FP</b>	<b>PbF</b>
	①	②	③	④	⑤	⑥	⑦	⑧

- 1** - Vishay Semiconductors product
- 2** - Current rating (20 = 20 A)
- Circuit configuration:
- 3** E = Single diode
- Package:
- 4** T = TO-220
- Type of silicon:
- 5** S = Standard recovery rectifier
- 6** - Voltage ratings 08 = 800 V  
12 = 1200 V
- 7** - FULL-PAK
- 8** - Environmental digit:

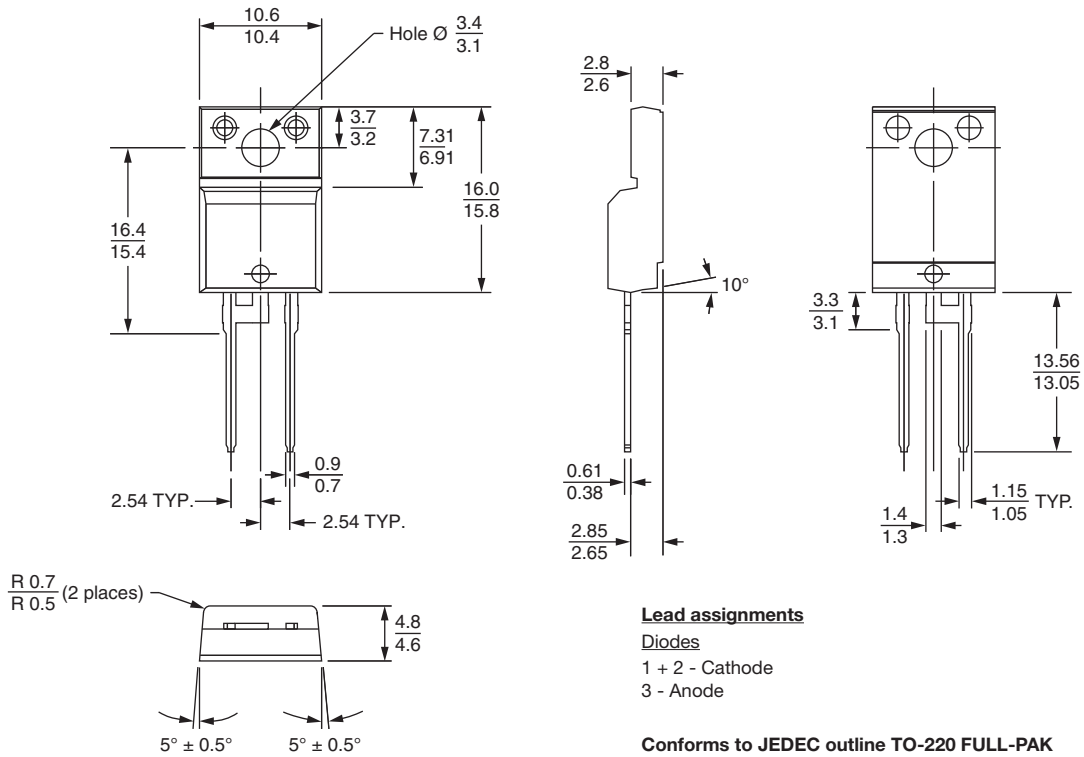
PbF = Lead (Pb)-free and RoHS compliant  
 -M3 = Halogen-free, RoHS compliant and terminations lead (Pb)-free

<b>ORDERING INFORMATION (Example)</b>			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-20ETS08FPPbF	50	1000	Antistatic plastic tubes
VS-20ETS08FP-M3	50	1000	Antistatic plastic tubes
VS-20ETS12FPPbF	50	1000	Antistatic plastic tubes
VS-20ETS12FP-M3	50	1000	Antistatic plastic tubes

<b>LINKS TO RELATED DOCUMENTS</b>		
Dimensions		<a href="http://www.vishay.com/doc?95005">www.vishay.com/doc?95005</a>
Part marking information	TO-220 FP PbF	<a href="http://www.vishay.com/doc?95009">www.vishay.com/doc?95009</a>
	TO-220 FP -M3	<a href="http://www.vishay.com/doc?95440">www.vishay.com/doc?95440</a>



**DIMENSIONS** in millimeters





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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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