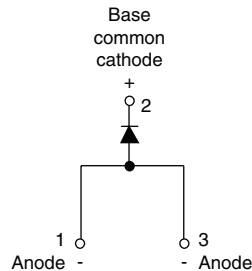


## Surface Mountable Fast Soft Recovery Rectifier Diode, 20 A



D<sup>2</sup>PAK (SMD-220)



### FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- Designed and qualified for industrial level



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

### APPLICATIONS

- Output rectification and freewheeling in inverters, choppers and converters
- Input rectifications where severe restrictions on conducted EMI should be met

### DESCRIPTION

The VS-20ETF..SPbF soft recovery rectifier series has been optimized for combined short reverse recovery time and low forward voltage drop.

The glass passivation ensures stable reliable operation in the most severe temperature and power cycling conditions.

### PRODUCT SUMMARY

$V_F$ at 10 A	< 1.2 V
$I_{FSM}$	300 A
$V_{RRM}$	200 V to 600 V

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Sinusoidal waveform	20	A
$V_{RRM}$		200 to 600	V
$I_{FSM}$		300	A
$V_F$	10 A, $T_J = 25\text{ °C}$	1.2	V
$t_{rr}$	1 A, 100 A/ $\mu$ s	60	ns
$T_J$	Range	- 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-20ETF02SPbF	200	300	5
VS-20ETF04SPbF	400	500	
VS-20ETF06SPbF	600	700	

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 97\text{ °C}$ , 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> / $\sqrt{s}$

# VS-20ETF..SPbF Soft Recovery Series



Vishay High Power Products Surface Mountable Fast Soft Recovery Rectifier Diode, 20 A

ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	20 A, $T_J = 25\text{ }^\circ\text{C}$		1.30	V
		60 A, $T_J = 25\text{ }^\circ\text{C}$		1.67	
Forward slope resistance	$r_t$			12.5	m $\Omega$
Threshold voltage	$V_{F(TO)}$	$T_J = 150\text{ }^\circ\text{C}$		0.9	V
Maximum reverse leakage current	$I_{RM}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_{RRM}$	0.1	mA
		$T_J = 150\text{ }^\circ\text{C}$		5.0	

RECOVERY CHARACTERISTICS					
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Reverse recovery time	$t_{rr}$	$I_F$ at 20 Apk 100 A/ $\mu$ s 25 $^\circ\text{C}$	160	ns	
Reverse recovery current	$I_{rr}$		10	A	
Reverse recovery charge	$Q_{rr}$		1.25	$\mu\text{C}$	
Snap factor	S	Typical	0.6		

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	0.9	$^\circ\text{C/W}$
Maximum thermal resistance junction to ambient (PCB mount)	$R_{thJA}^{(1)}$		40	
Soldering temperature	$T_S$		240	$^\circ\text{C}$
Approximate weight			2	g
			0.07	oz.
Marking device		Case style D <sup>2</sup> PAK (SMD-220)	20ETF02S	
			20ETF04S	
			20ETF06S	

**Note**

<sup>(1)</sup> When mounted on 1" square (650 mm<sup>2</sup>) PCB of FR-4 or G-10 material 4 oz. (140  $\mu$ m) copper 40  $^\circ\text{C/W}$ . For recommended footprint and soldering techniques refer to application note #AN-994.



# VS-20ETF..SPbF Soft Recovery Series

Surface Mountable Fast Soft Recovery Rectifier Diode, 20 A  
Vishay High Power Products

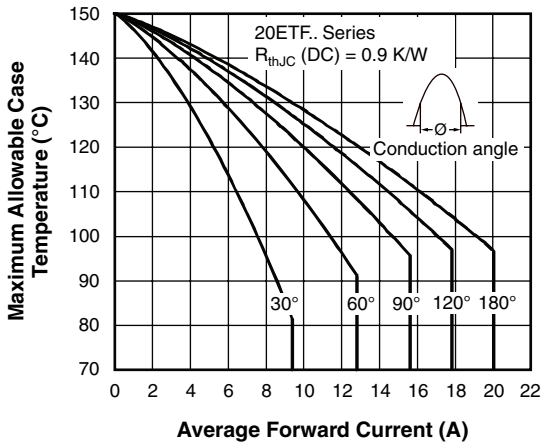


Fig. 1 - Current Rating Characteristics

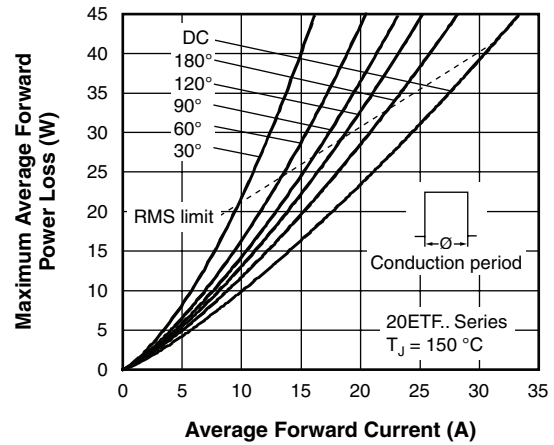


Fig. 4 - Forward Power Loss Characteristics

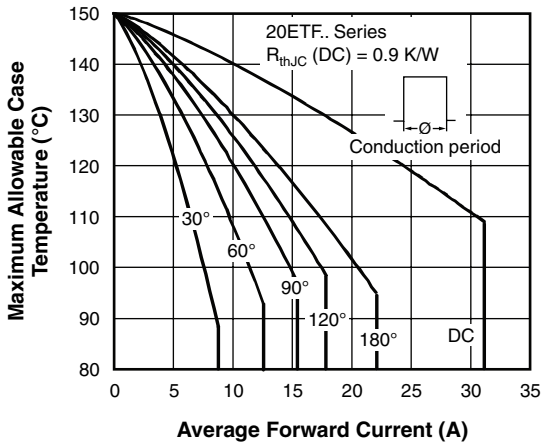


Fig. 2 - Current Rating Characteristics

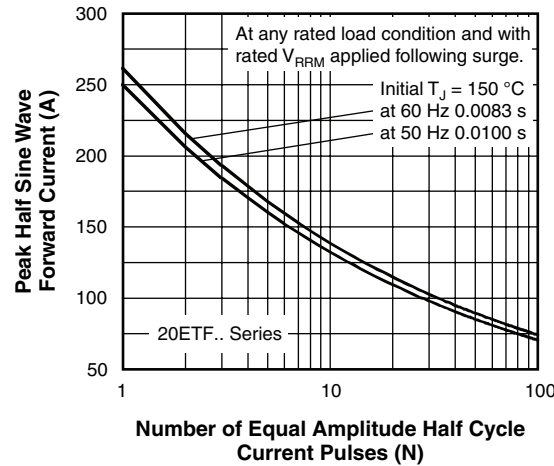


Fig. 5 - Maximum Non-Repetitive Surge Current

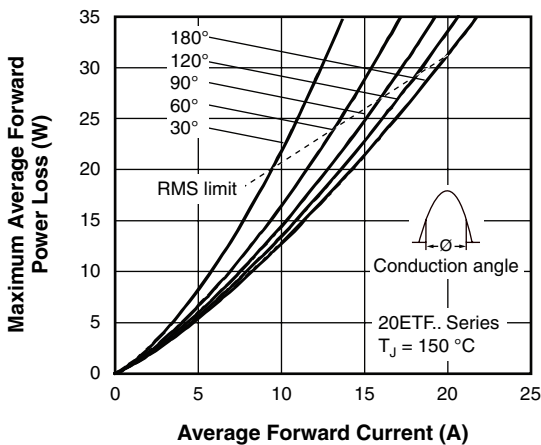


Fig. 3 - Forward Power Loss Characteristics

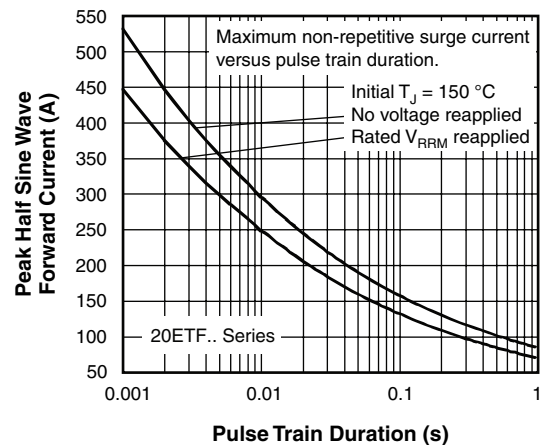


Fig. 6 - Maximum Non-Repetitive Surge Current

# VS-20ETF..SPbF Soft Recovery Series



Vishay High Power Products Surface Mountable Fast Soft Recovery Rectifier Diode, 20 A

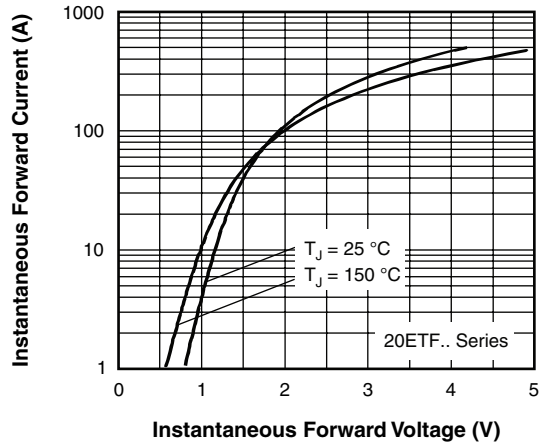


Fig. 7 - Forward Voltage Drop Characteristics

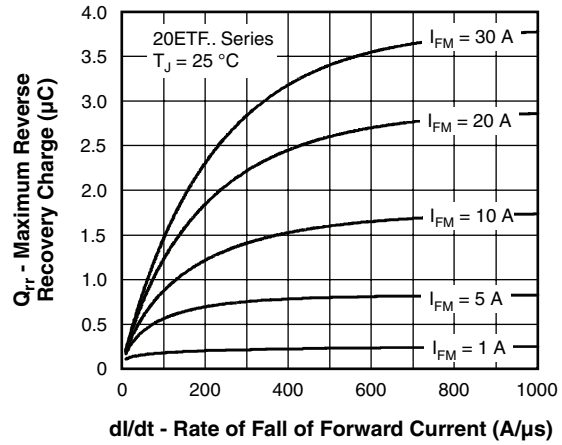


Fig. 10 - Recovery Charge Characteristics,  $T_J = 25\text{ °C}$

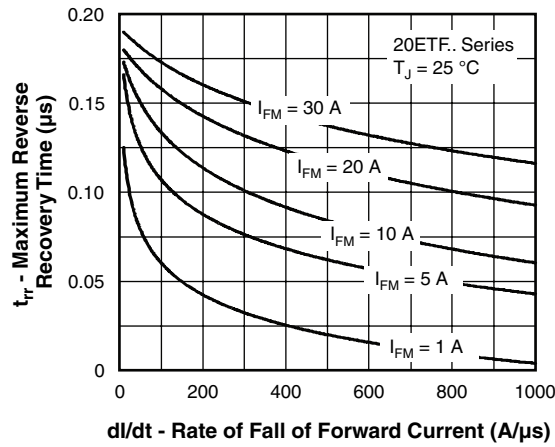


Fig. 8 - Recovery Time Characteristics,  $T_J = 25\text{ °C}$

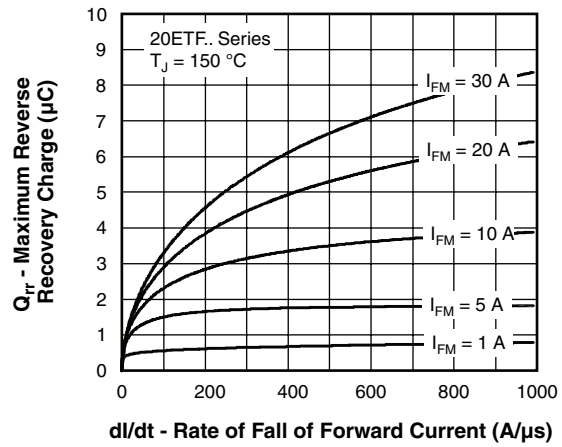


Fig. 11 - Recovery Charge Characteristics,  $T_J = 150\text{ °C}$

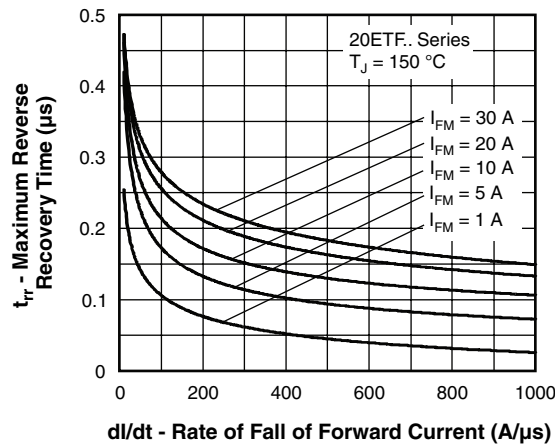


Fig. 9 - Recovery Time Characteristics,  $T_J = 150\text{ °C}$

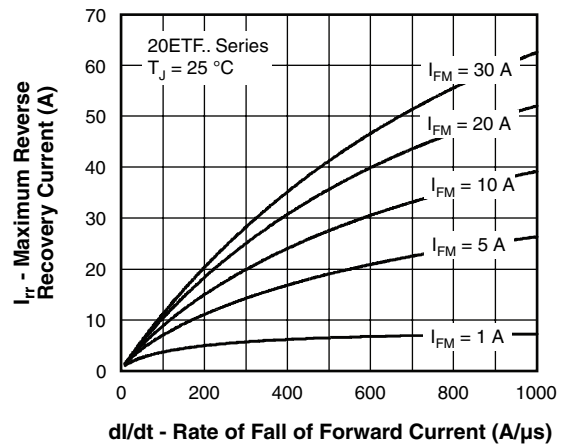


Fig. 12 - Recovery Current Characteristics,  $T_J = 25\text{ °C}$



# VS-20ETF..SPbF Soft Recovery Series

Surface Mountable Fast Soft Recovery Rectifier Diode, 20 A Vishay High Power Products

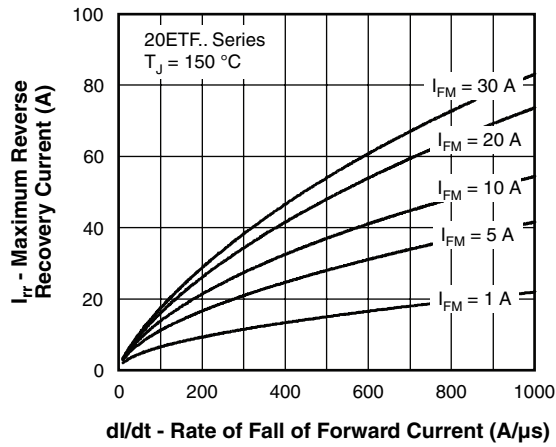


Fig. 13 - Recovery Current Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

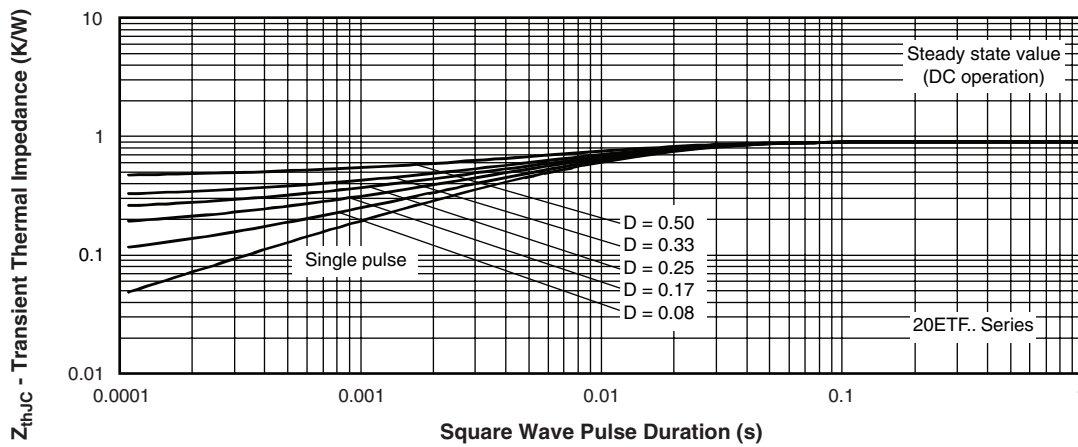


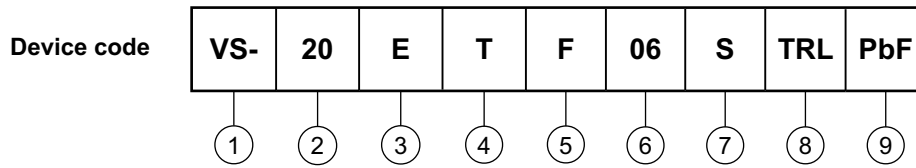
Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

# VS-20ETF..SPbF Soft Recovery Series



Vishay High Power Products Surface Mountable Fast Soft Recovery Rectifier Diode, 20 A

## ORDERING INFORMATION TABLE



- 1** - HPP product suffix
- 2** - Current rating (20 = 20 A)
- 3** - Circuit configuration:  
E = Single diode
- 4** - Package:  
T = D<sup>2</sup>PAK (TO-220AC)
- 5** - Type of silicon:  
F = Fast soft recovery rectifier
- 6** - Voltage code x 100 =  $V_{RRM}$ 

02 = 200 V
04 = 400 V
06 = 600 V
- 7** - S = Surface mountable
- 8** -
  - None = Tube
  - TRR = Tape and reel (right oriented)
  - TRL = Tape and reel (left oriented)
- 9** - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95046">www.vishay.com/doc?95046</a>
Part marking information	<a href="http://www.vishay.com/doc?95054">www.vishay.com/doc?95054</a>
Packaging information	<a href="http://www.vishay.com/doc?95032">www.vishay.com/doc?95032</a>



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