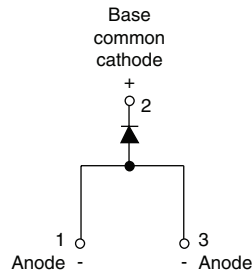


## Surface Mountable Fast Soft Recovery Rectifier Diode, 20 A



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



### FEATURES/DESCRIPTION

The 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.

This product series has been designed and qualified for industrial level.

Compliant to RoHS directive 2002/95/EC.

Halogen-free according to IEC 61249-2-21 definition.



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

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

### APPLICATIONS

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

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, $T_J = 25^\circ\text{C}$	1.2	V
$t_{rr}$	1 A, 100 A/ $\mu\text{s}$	60	ns
$T_J$	Range	- 40 to 150	$^\circ\text{C}$

VOLTAGE RATINGS			
PART NUMBER	$V_{RRM}$ , MAXIMUM PEAK REVERSE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	$I_{RRM}$ AT 150 $^\circ\text{C}$ mA
20ETF02SPbF	200	300	5
20ETF04SPbF	400	500	
20ETF06SPbF	600	700	

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 97^\circ\text{C}$ , 180 $^\circ$ 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	$I^2\sqrt{t}$	$t = 0.1$ ms to 10 ms, no voltage reapplied	4420	$\text{A}^2\sqrt{\text{s}}$

\* Pb containing terminations are not RoHS compliant, exemptions may apply

# 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/ $\mu\text{s}$ 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**

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



# 20ETF..SPbF Soft Recovery Series

Surface Mountable Fast  
Soft Recovery Rectifier Diode, 20 A

Vishay High Power Products

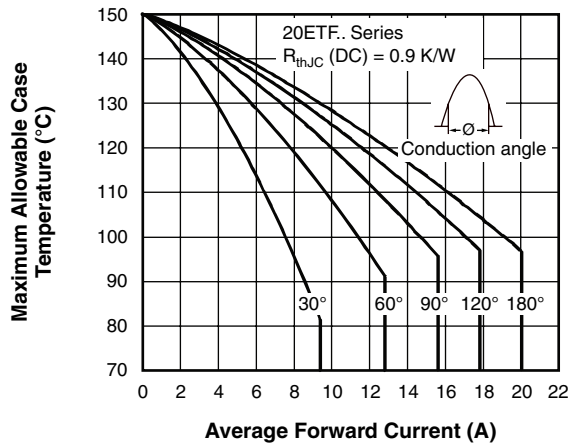


Fig. 1 - Current Rating Characteristics

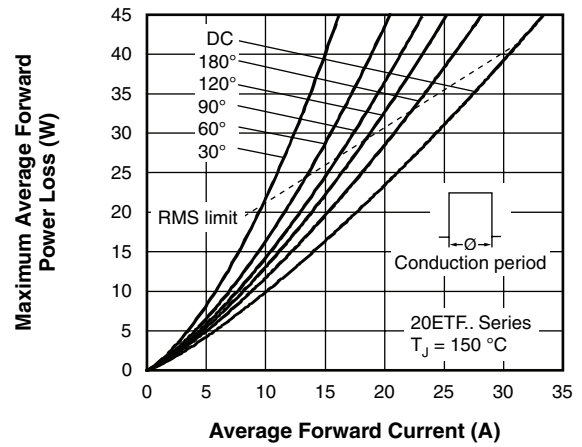


Fig. 4 - Forward Power Loss Characteristics

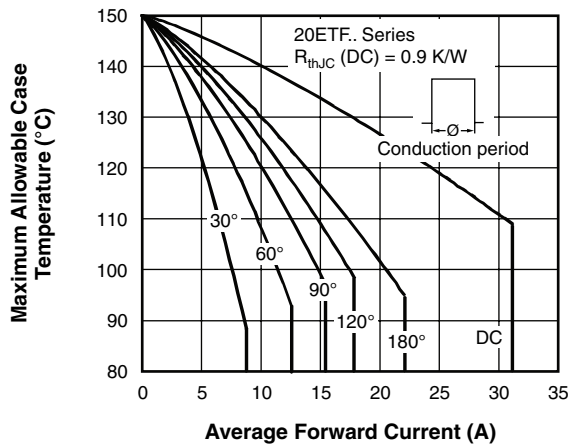


Fig. 2 - Current Rating Characteristics

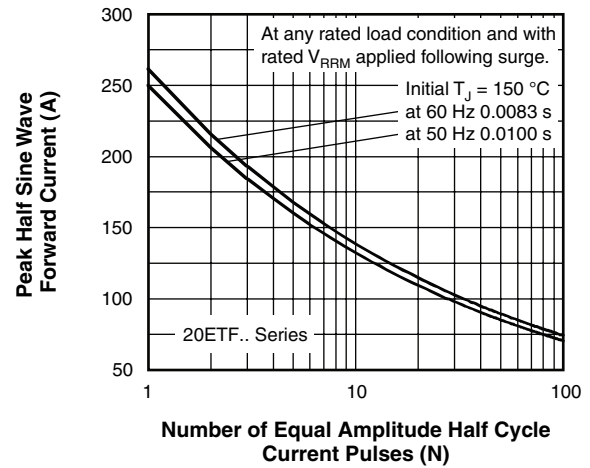


Fig. 5 - Maximum Non-Repetitive Surge Current

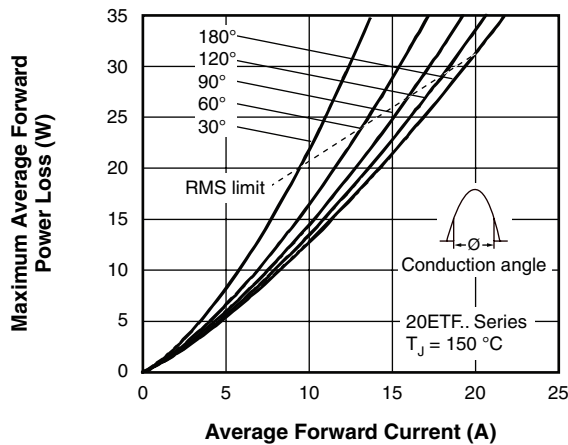


Fig. 3 - Forward Power Loss Characteristics

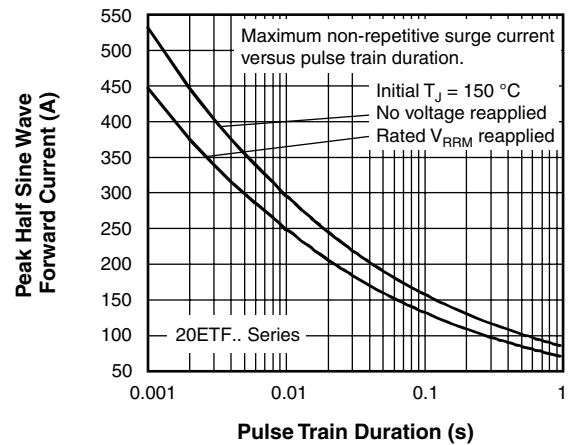


Fig. 6 - Maximum Non-Repetitive Surge Current

# 20ETF..SPbF Soft Recovery Series



Vishay High Power Products

Surface Mountable Fast  
Soft Recovery Rectifier Diode, 20 A

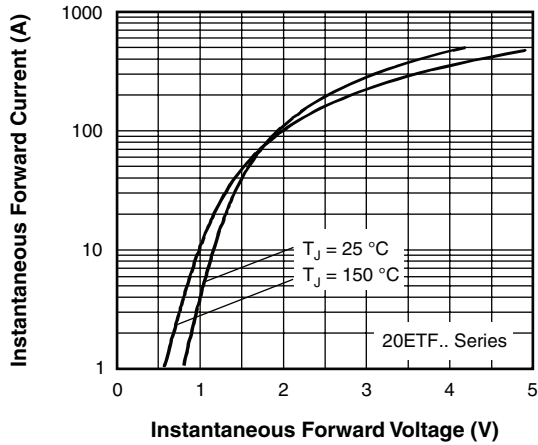


Fig. 7 - Forward Voltage Drop Characteristics

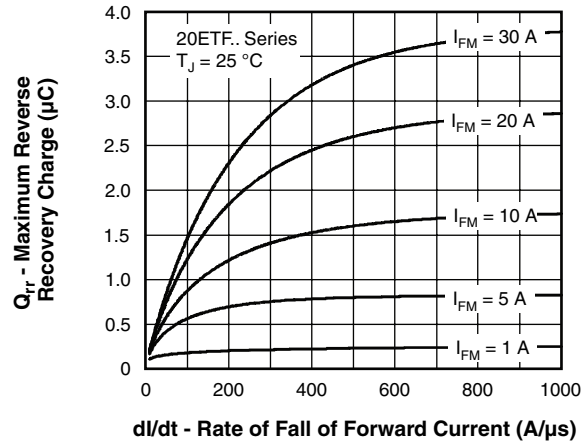


Fig. 10 - Recovery Charge Characteristics,  $T_J = 25\text{ }^\circ\text{C}$

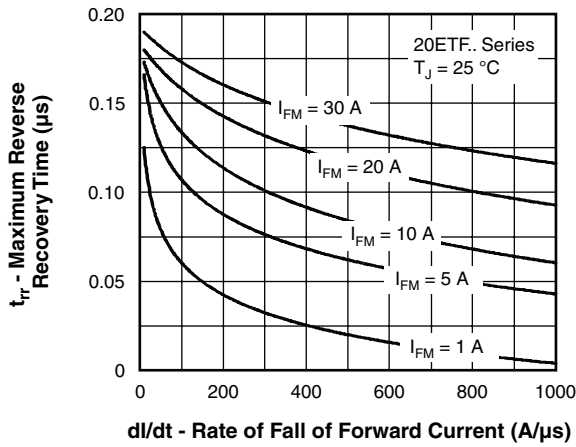


Fig. 8 - Recovery Time Characteristics,  $T_J = 25\text{ }^\circ\text{C}$

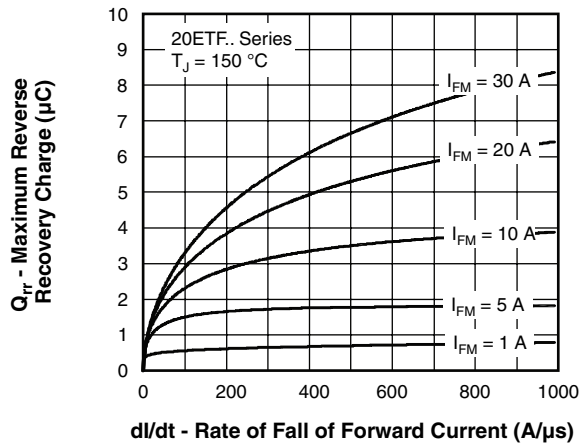


Fig. 11 - Recovery Charge Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

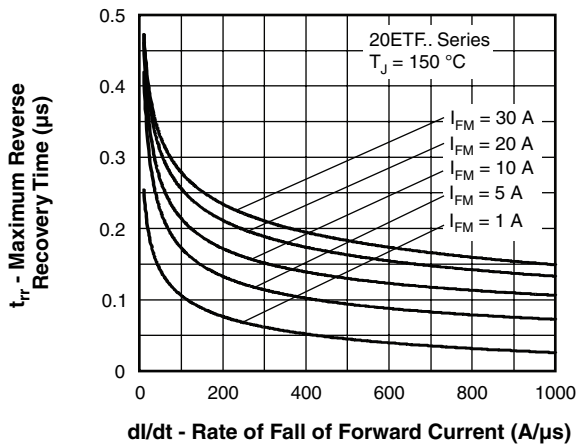


Fig. 9 - Recovery Time Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

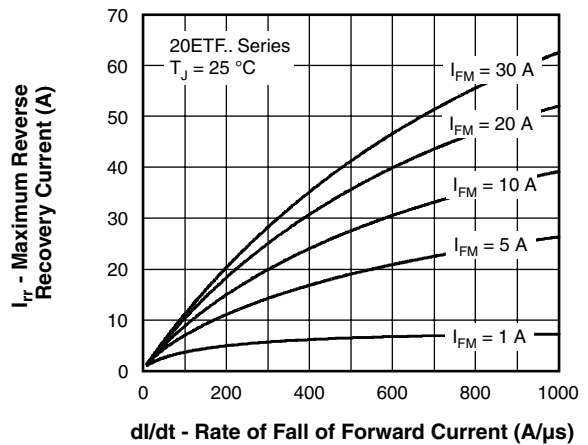


Fig. 12 - Recovery Current Characteristics,  $T_J = 25\text{ }^\circ\text{C}$



# 20ETF..SPbF Soft Recovery Series

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

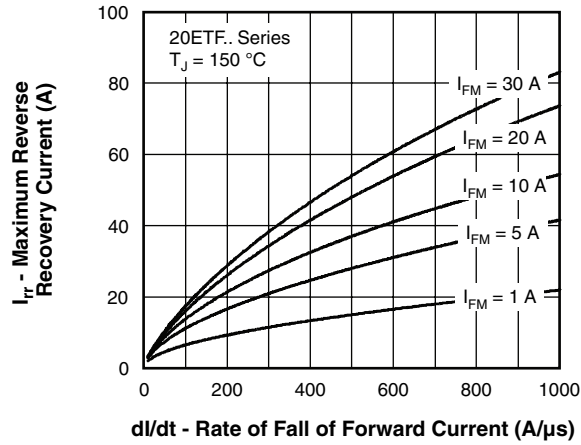


Fig. 13 - Recovery Current Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

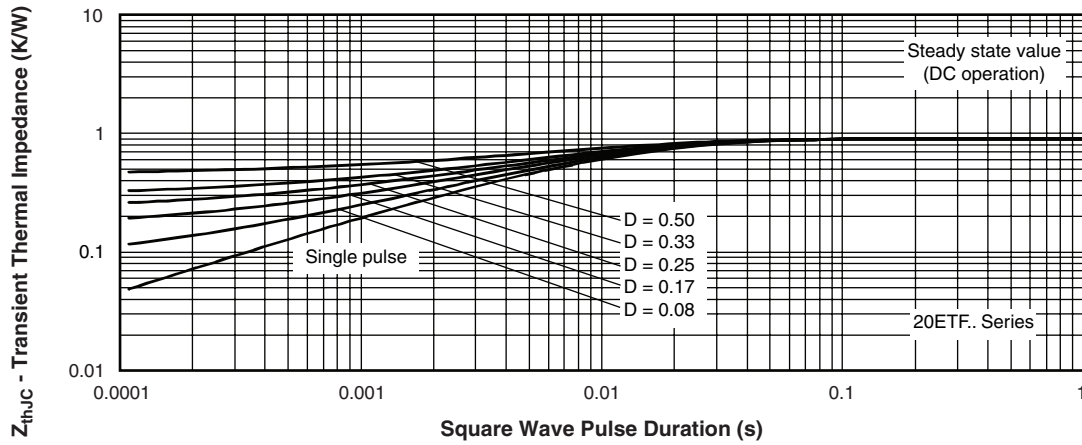


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

# 20ETF..SPbF Soft Recovery Series



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

## ORDERING INFORMATION TABLE

Device code	<b>20</b>	<b>E</b>	<b>T</b>	<b>F</b>	<b>06</b>	<b>S</b>	<b>TRL</b>	<b>PbF</b>
	①	②	③	④	⑤	⑥	⑦	⑧

- 1** - Current rating (20 = 20 A)
- 2** - Circuit configuration:  
E = Single diode
- 3** - Package:  
T = D<sup>2</sup>PAK (TO-220AC)
- 4** - Type of silicon:  
F = Fast soft recovery rectifier
- 5** - Voltage code x 100 = V<sub>RRM</sub> —
- 6** - S = Surface mountable
- 7** -
  - None = Tube
  - TRR = Tape and reel (right oriented)
  - TRL = Tape and reel (left oriented)
- 8** -
  - None = Standard production
  - PbF = Lead (Pb)-free

02 = 200 V
04 = 400 V
06 = 600 V

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>



## Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.