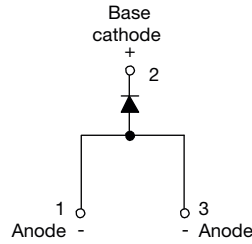




# Surface Mount Fast Soft Recovery Rectifier Diode, 20 A



## FEATURES

- Glass passivated pellet chip junction
- Designed and qualified according to JEDEC®-JESD 47
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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..S-M3 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.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	20 A
$V_R$	800 V, 1000 V, 1200 V
$V_F$ at $I_F$	1.31 V
$I_{FSM}$	355 A
$t_{rr}$	95 ns
$T_J$ max.	150 °C
Snap factor	0.6
Package	D <sup>2</sup> PAK (TO-263AB)
Circuit configuration	Single

## LINKS TO ADDITIONAL RESOURCES



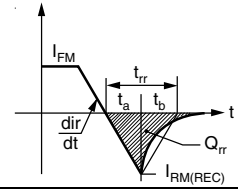
MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Sinusoidal waveform	20	A
$V_{RRM}$		800 to 1200	V
$I_{FSM}$		355	A
$V_F$	20 A, $T_J = 25$ °C	1.31	V
$t_{rr}$	1 A, 100 A/μs	95	ns
$T_J$	Range	-40 to +150	°C

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
20ETF08S-M3	800	900	6
20ETF10S-M3	1000	1100	
20ETF12S-M3	1200	1300	

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 97$ °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	300	
		10 ms sine pulse, no voltage reapplied	355	
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	450	A <sup>2</sup> s
		10 ms sine pulse, no voltage reapplied	635	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ ms to 10 ms, no voltage reapplied	6350	A <sup>2</sup> /s

ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	20 A, $T_J = 25\text{ }^\circ\text{C}$		1.31	V
Forward slope resistance	$r_t$	$T_J = 150\text{ }^\circ\text{C}$		11.88	$\text{m}\Omega$
Threshold voltage	$V_{F(TO)}$			0.93	V
Maximum reverse leakage current	$I_{RM}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{rated } V_{RRM}$	0.1	mA
		$T_J = 150\text{ }^\circ\text{C}$		6	

RECOVERY CHARACTERISTICS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Reverse recovery time	$t_{rr}$	$I_F$ at 20 A <sub>pk</sub> 25 A/ $\mu\text{s}$ 25 $^\circ\text{C}$	400	ns
Reverse recovery current	$I_{rr}$		6.1	A
Reverse recovery charge	$Q_{rr}$		1.7	$\mu\text{C}$
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	$^\circ\text{C}/\text{W}$
Maximum thermal resistance, junction to ambient (PCB mount)	$R_{thJA}^{(1)}$		62	
Approximate weight			2	g
			0.07	oz.
Marking device		Case style D <sup>2</sup> PAK (TO-263AB)	20ETF08S	
			20ETF10S	
			20ETF12S	

### 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  $^\circ\text{C}/\text{W}$ . For recommended footprint and soldering techniques refer to application note #AN-994

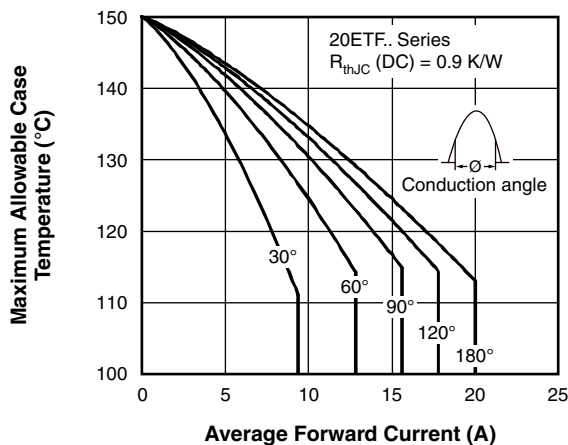


Fig. 1 - Current Rating Characteristics

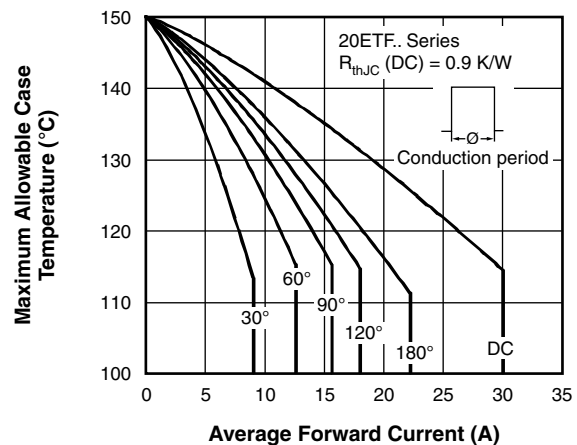


Fig. 2 - Current Rating Characteristics

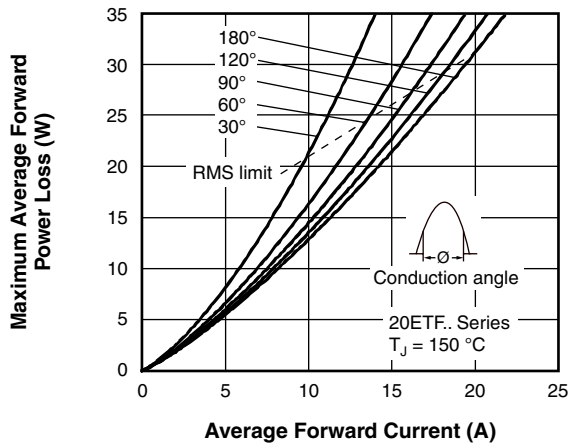


Fig. 3 - Forward Power Loss Characteristics

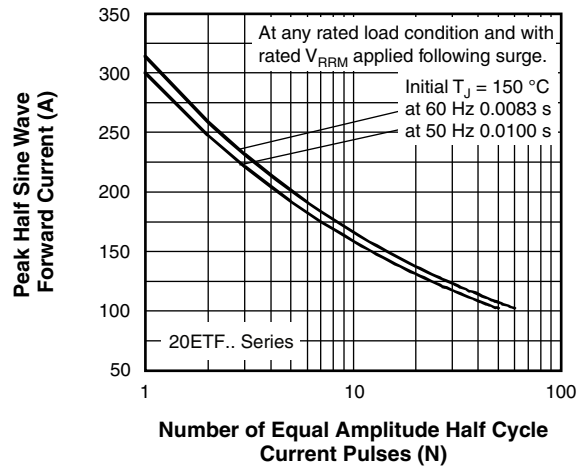


Fig. 5 - Maximum Non-Repetitive Surge Current

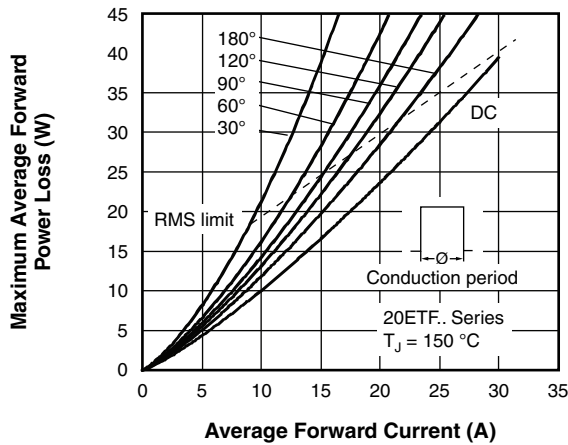


Fig. 4 - Forward Power Loss Characteristics

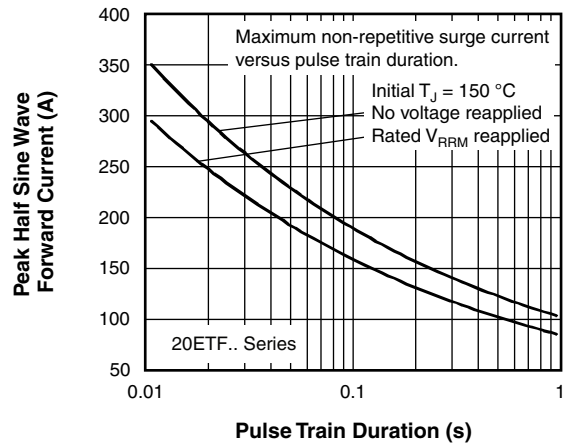


Fig. 6 - Maximum Non-Repetitive Surge Current

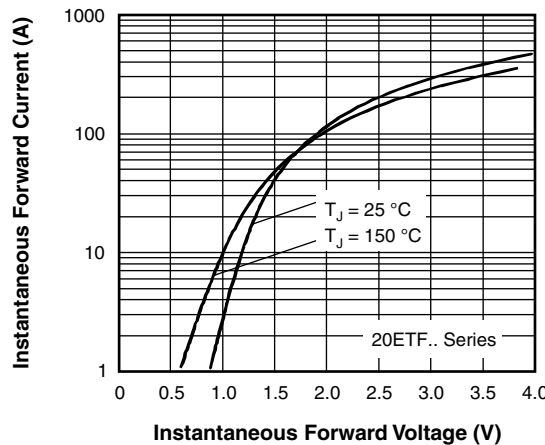


Fig. 7 - Forward Voltage Drop Characteristics

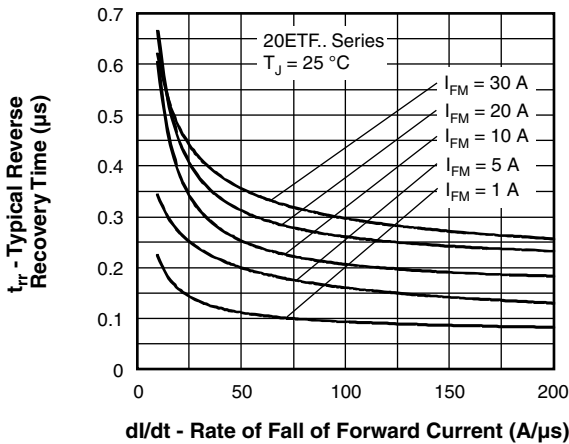


Fig. 8 - Recovery Time Characteristics, T<sub>J</sub> = 25 °C

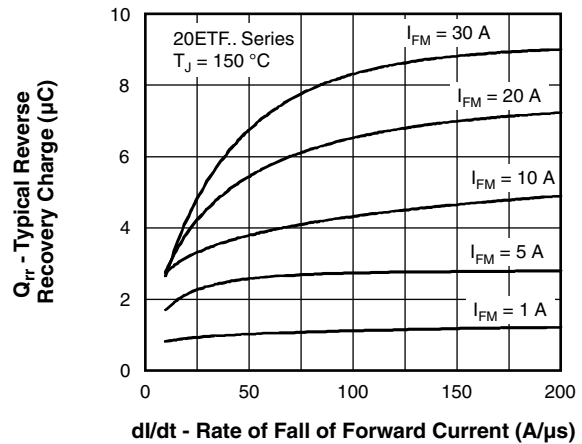


Fig. 11 - Recovery Charge Characteristics, T<sub>J</sub> = 150 °C

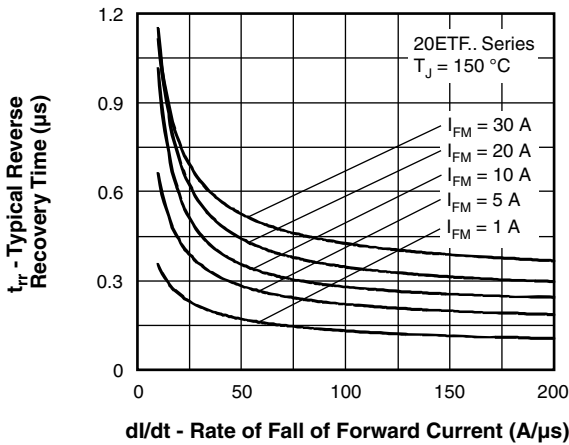


Fig. 9 - Recovery Time Characteristics, T<sub>J</sub> = 150 °C

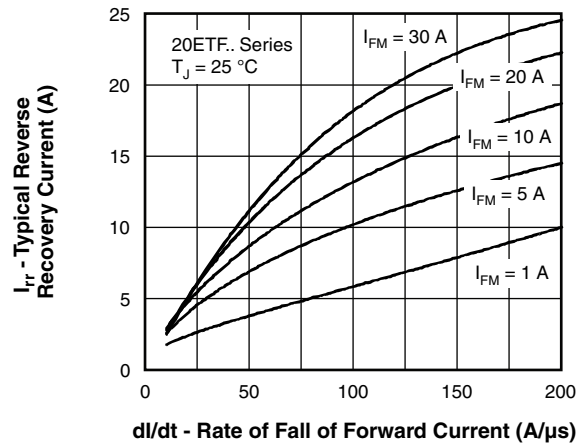


Fig. 12 - Recovery Current Characteristics, T<sub>J</sub> = 25 °C

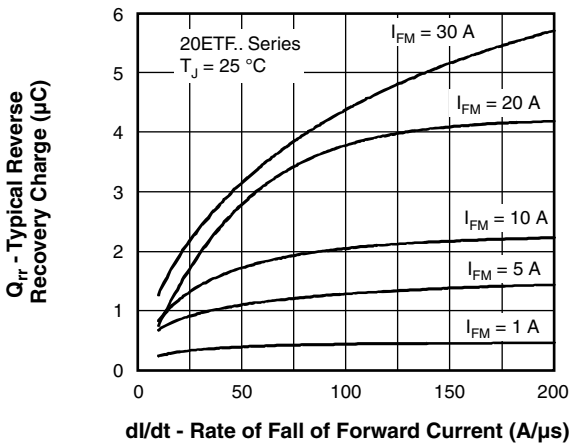


Fig. 10 - Recovery Charge Characteristics, T<sub>J</sub> = 25 °C

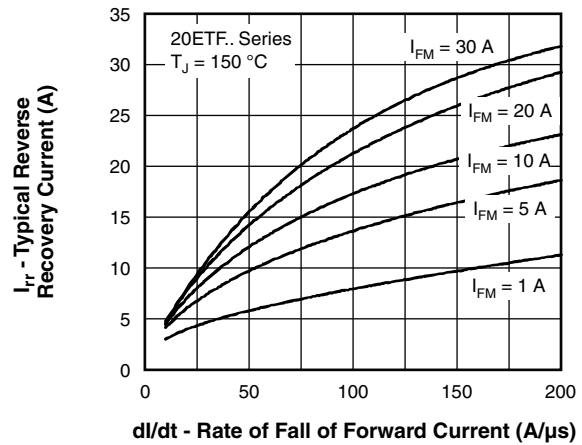


Fig. 13 - Recovery Current Characteristics, T<sub>J</sub> = 150 °C

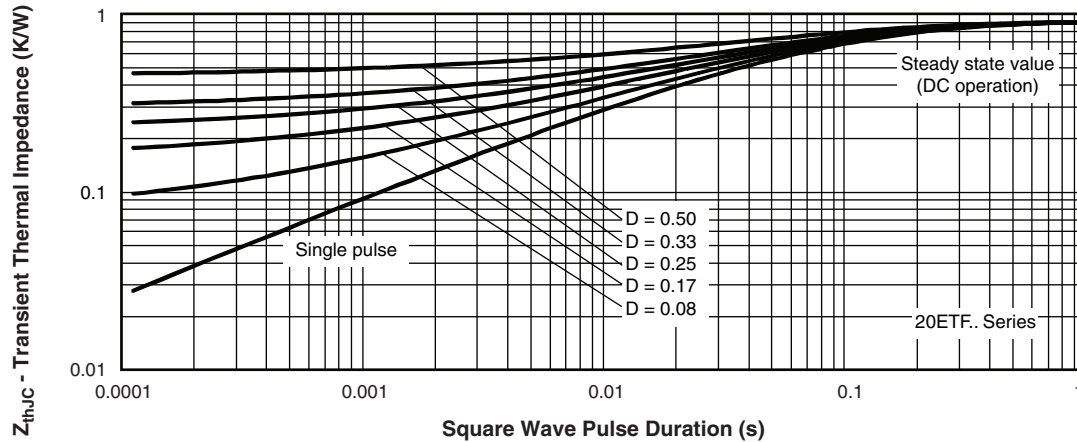


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>20</b>	<b>E</b>	<b>T</b>	<b>F</b>	<b>12</b>	<b>S</b>	<b>TRL</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 = single
- 4** - Package:  
T = D<sup>2</sup>PAK (TO-263AB)
- 5** - Type of silicon:  
F = fast soft recovery rectifier
- 6** - Voltage code x 100 =  $V_{RRM}$ 

08 = 800 V
10 = 1000 V
12 = 1200 V
- 7** - S = surface mountable
- 8** -
  - None = tube
  - TRR = tape and reel (right oriented)
  - TRL = tape and reel (left oriented)
- 9** - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free



<b>ORDERING INFORMATION</b> (Example)		
<b>PREFERRED P/N</b>	<b>BASSE QUANTITY</b>	<b>PACKAGING DESCRIPTION</b>
VS-20ETF08S-M3	50	Antistatic plastic tubes
VS-20ETF08STRR-M3	800	13" diameter plastic tape and reel
VS-20ETF08STRL-M3	800	13" diameter plastic tape and reel
VS-20ETF10S-M3	50	Antistatic plastic tubes
VS-20ETF10STRR-M3	800	13" diameter plastic tape and reel
VS-20ETF10STRL-M3	800	13" diameter plastic tape and reel
VS-20ETF12S-M3	50	Antistatic plastic tubes
VS-20ETF12STRR-M3	800	13" diameter plastic tape and reel
VS-20ETF12STRL-M3	800	13" diameter plastic tape and reel

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?96164">www.vishay.com/doc?96164</a>
Part marking information	<a href="http://www.vishay.com/doc?95444">www.vishay.com/doc?95444</a>
Packaging information	<a href="http://www.vishay.com/doc?96424">www.vishay.com/doc?96424</a>
SPICE model	<a href="http://www.vishay.com/doc?96669">www.vishay.com/doc?96669</a>



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