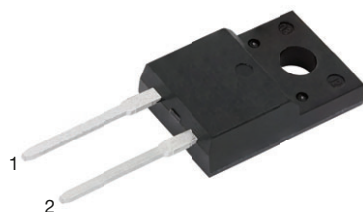
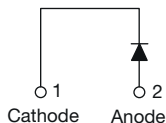


## Fast Soft Recovery Rectifier Diode, 20 A



TO-220 FullPAK 2L



### FEATURES

- Glass passivated pellet chip junction
- 150 °C max. operation junction temperature
- Designed and qualified according to JEDEC®-JESD 47
- Fully isolated package ( $V_{INS} = 2500 V_{RMS}$ )
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### APPLICATIONS

These devices are intended for use in output rectification and freewheeling in inverters, choppers and converters as well as in input rectification where severe restrictions on conducted EMI should be met.

### DESCRIPTION

The VS-20ETF...FP... fast 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
$V_R$	1000 V, 1200 V
$V_F$ at $I_F$	1.31 V
$I_{FSM}$	320 A
$t_{rr}$	95 ns
$T_J$ max.	150 °C
Snap factor	0.6
Package	TO-220 FullPAK 2L
Circuit configuration	Single

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$V_{RRM}$		1000, 1200	V
$I_{F(AV)}$	Sinusoidal waveform	20	A
$I_{FSM}$		320	
$t_{rr}$	1 A, 100 A/μs	95	ns
$V_F$	20 A, $T_J = 25\text{ °C}$	1.31	V
$T_J$	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-20ETF10FP-M3	1000	1100	6
VS-20ETF12FP-M3	1200	1300	

**ABSOLUTE MAXIMUM RATINGS**

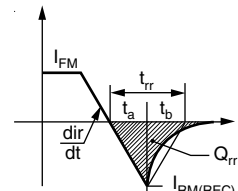
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 50\text{ }^{\circ}\text{C}$ , 180° conduction half sine wave	20	A
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	270	
		10 ms sine pulse, no voltage reappplied	320	
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	365	$\text{A}^2\text{s}$
		10 ms sine pulse, no voltage reappplied	515	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to }10\text{ ms}$ , no voltage reappplied	5150	$\text{A}^2\sqrt{\text{s}}$

**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	$I_{RM}$	$T_J = 25\text{ }^{\circ}\text{C}$	0.1	mA
		$T_J = 150\text{ }^{\circ}\text{C}$	6	

 $V_R = \text{Rated } V_{RRM}$ **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 <sub>J</sub> , T <sub>Stg</sub>		-40 to +150	°C
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation	2.5	°C/W
Maximum thermal resistance, junction to ambient	R <sub>thJA</sub>		62	
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth, and greased	0.5	
Approximate weight			2	g
			0.07	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-220 FullPAK 2L	20ETF10FP 20ETF12FP	

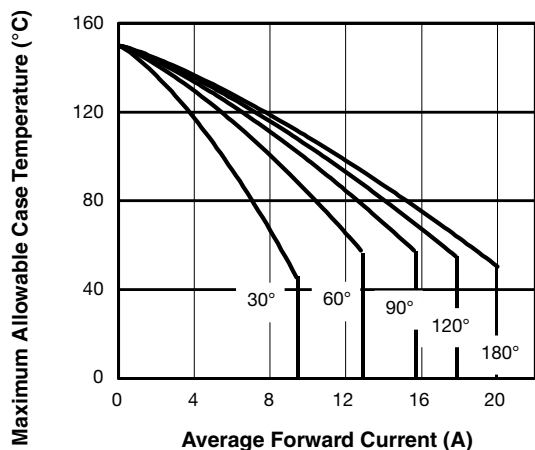


Fig. 1 - Current Rating Characteristics

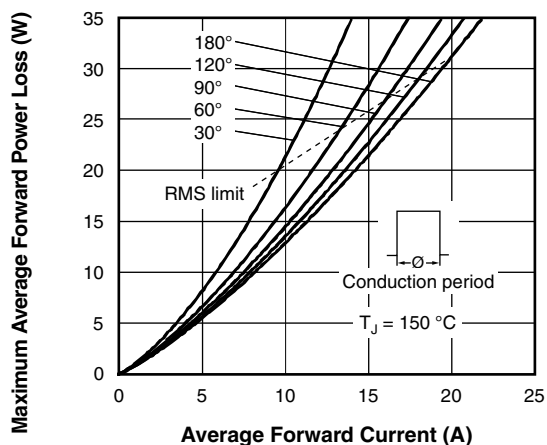


Fig. 4 - Forward Power Loss Characteristics

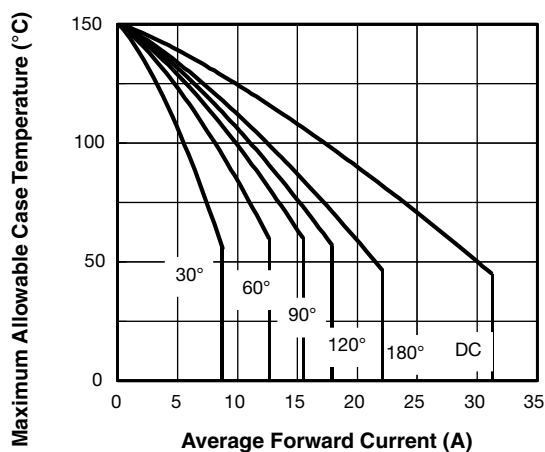


Fig. 2 - Current Rating Characteristics

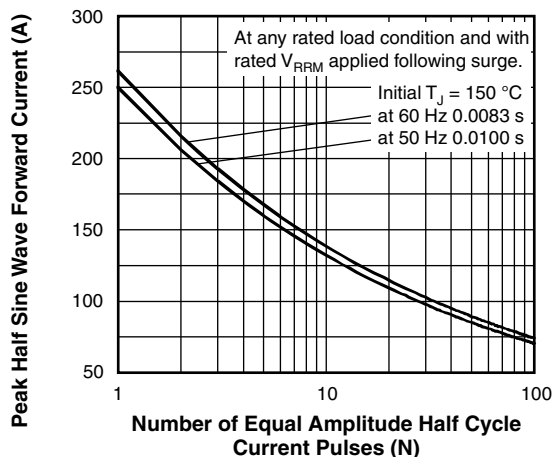


Fig. 5 - Maximum Non-Repetitive Surge Current

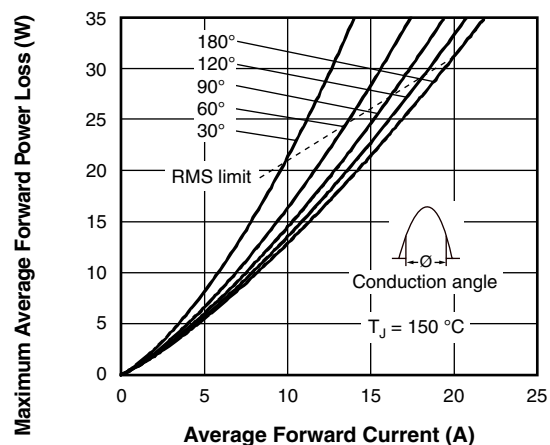


Fig. 3 - Forward Power Loss Characteristics

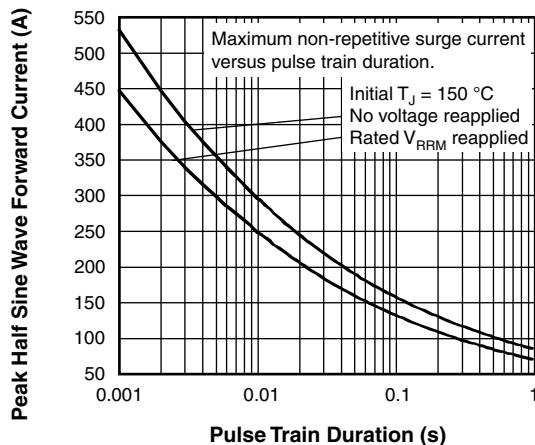


Fig. 6 - Maximum Non-Repetitive Surge Current

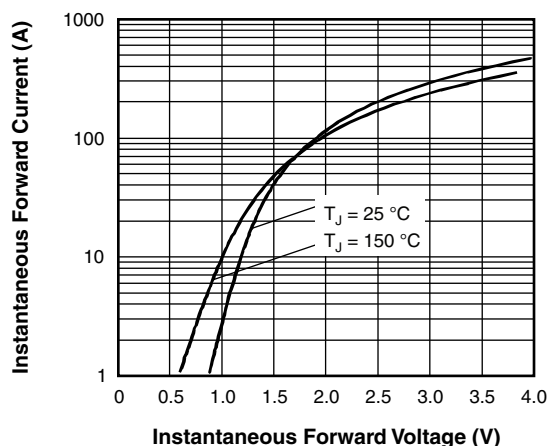
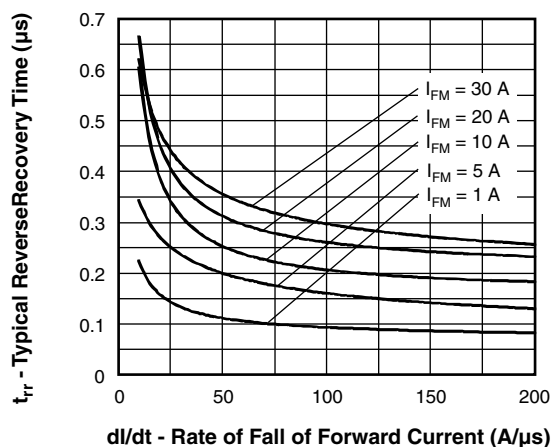
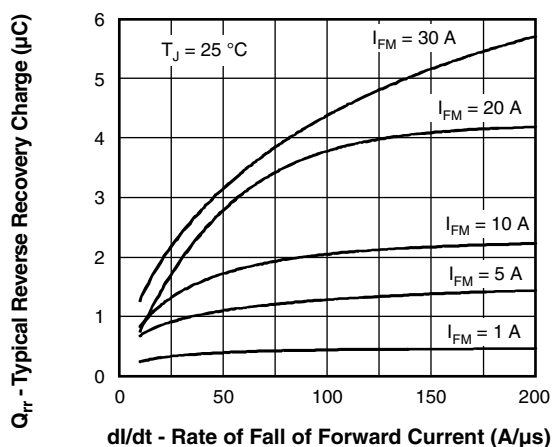
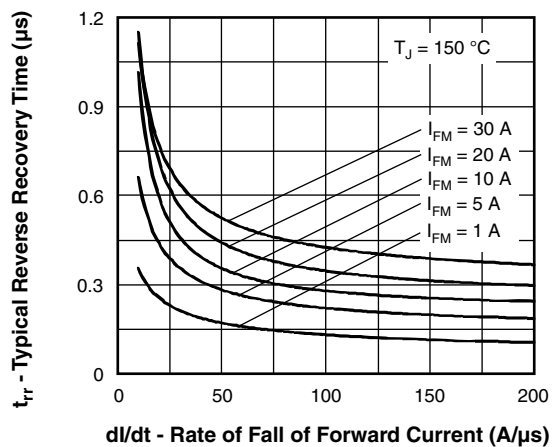
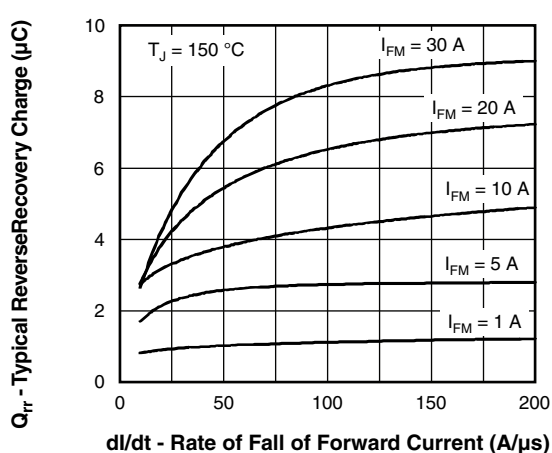


Fig. 7 - Forward Voltage Drop Characteristics


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

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

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

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

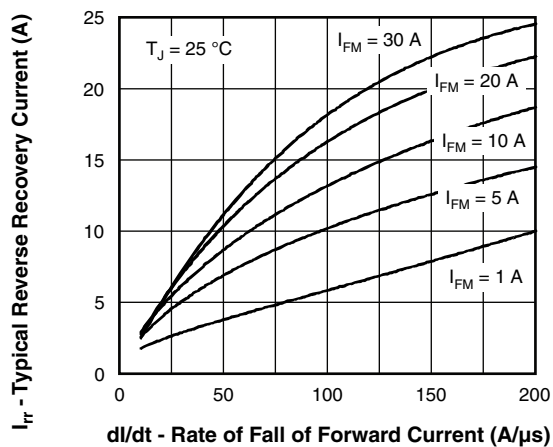


Fig. 12 - Recovery Current Characteristics,  $T_J = 25^\circ C$

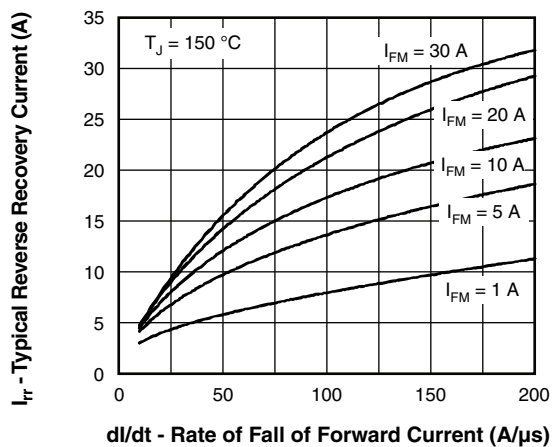


Fig. 13 - Recovery Current Characteristics,  $T_J = 150^\circ C$

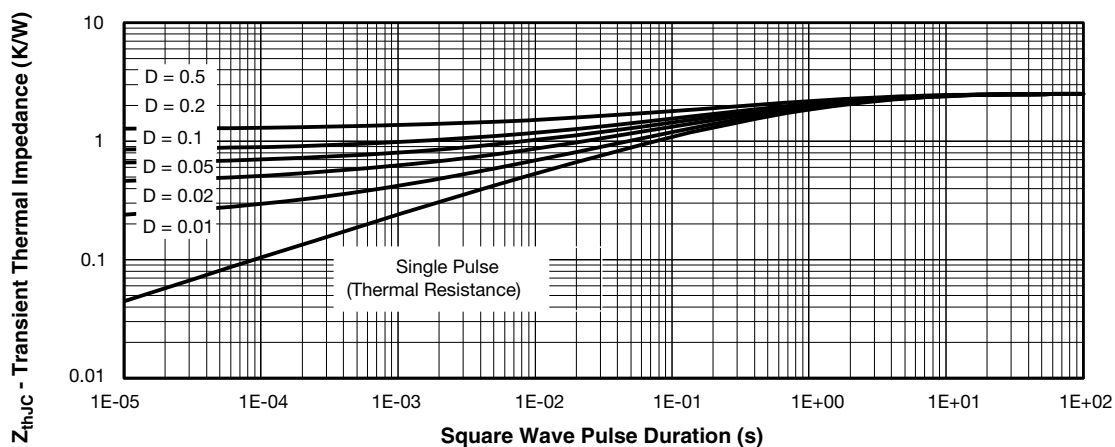


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>20</b>	<b>E</b>	<b>T</b>	<b>F</b>	<b>12</b>	<b>FP</b>	<b>-M3</b>
	①	②	③	④	⑤	⑥	⑦	⑧

- 1** - Vishay Semiconductors product
- 2** - Current rating (20 = 20 A)
- 3** - Circuit configuration:  
E = single diode
- 4** - Package:  
T = TO-220
- 5** - Type of silicon:  
F = fast soft recovery rectifier
- 6** - Voltage code x 100 =  $V_{RRM}$  10 = 1000 V  
12 = 1200 V
- 7** - FullPAK
- 8** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-20ETF10FP-M3	50	1000	Antistatic plastic tubes
VS-20ETF12FP-M3	50	1000	Antistatic plastic tubes

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?96157">www.vishay.com/doc?96157</a>
Part marking information	<a href="http://www.vishay.com/doc?95392">www.vishay.com/doc?95392</a>



## 2L TO-220 FullPAK

**DIMENSIONS** in millimeters





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