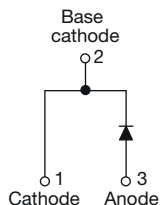


# Fast Soft Recovery Rectifier Diode, 20 A



TO-220AC 2L



## FEATURES

- Glass passivated pellet chip junction
- 150 °C max operating junction temperature
- Low forward voltage drop and short reverse recovery time
- Designed and qualified according to JEDEC®-JESD 47
- 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-20ETF0... 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
$V_R$	200 V, 400 V, 600 V
$V_F$ at $I_F$	1.3 V
$I_{FSM}$	300 A
$t_{rr}$	60 ns
$T_J$ max.	150 °C
Snap factor	0.6
Package	TO-220AC 2L
Circuit configuration	Single

## MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$V_{RRM}$	Range	200 to 600	V
$I_{F(AV)}$	Sinusoidal waveform	20	A
$I_{FSM}$		300	
$t_{rr}$	1 A, 100 A/μs	60	ns
$V_F$	10 A, $T_J = 25$ °C	1.2	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-20ETF02-M3	200	300	5
VS-20ETF04-M3	400	500	
VS-20ETF06-M3	600	700	

## 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	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	A²s
		10 ms sine pulse, no voltage reapplied	442	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ to 10 ms, no voltage reapplied	4420	A²√s

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	20 A, $T_J = 25\text{ }^{\circ}\text{C}$		1.3	V
Forward slope resistance	$r_t$	$T_J = 150\text{ }^{\circ}\text{C}$		12.5	$\text{m}\Omega$
Threshold voltage	$V_{F(TO)}$			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 A <sub>pk</sub> 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 <sub>J</sub> , T <sub>Stg</sub>		-40 to +150	°C
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation	0.9	°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	<div>minimum</div> <div>maximum</div>		6 (5)	kgf · cm (lbf · in)
			12 (10)	
Marking device		Case style TO-220AC 2L	20ETF02 20ETF04 20ETF06	

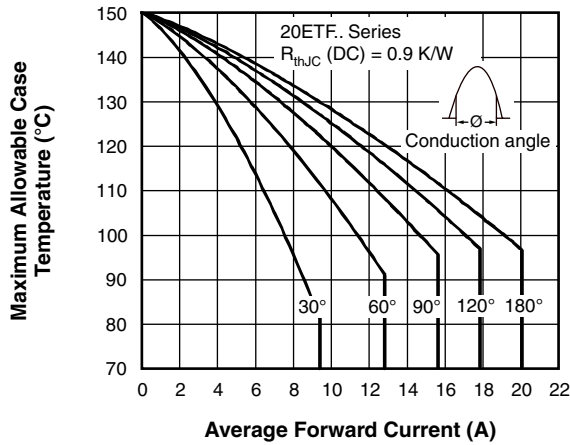


Fig. 1 - Current Rating Characteristics

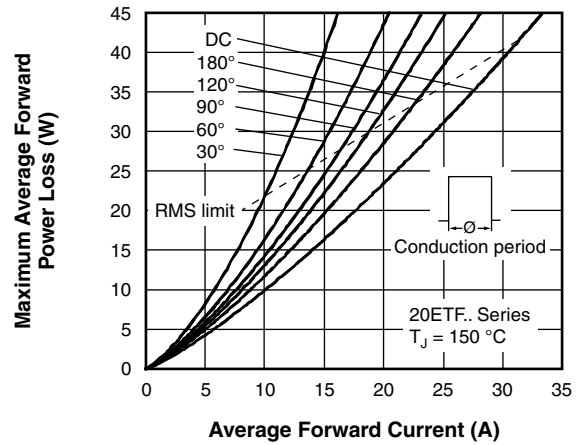


Fig. 4 - Forward Power Loss Characteristics

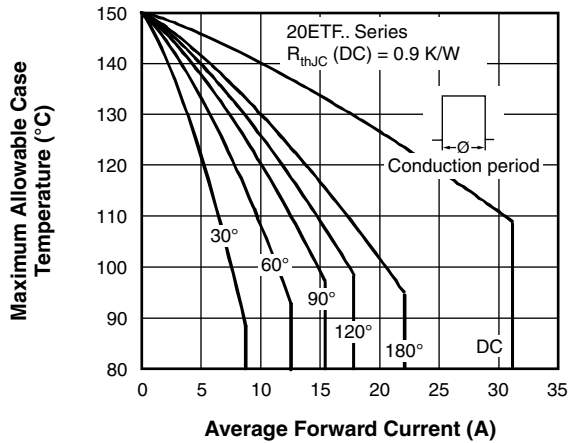


Fig. 2 - Current Rating Characteristics

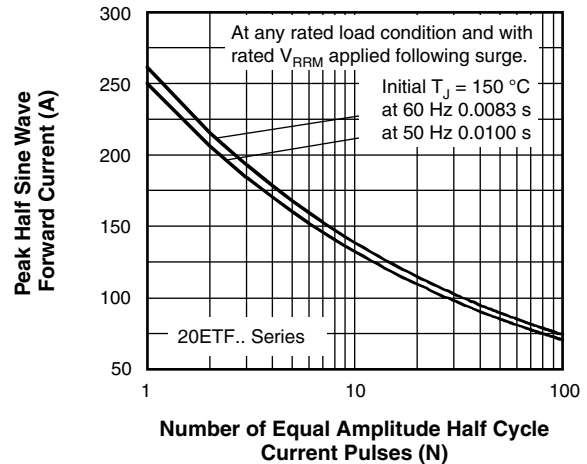


Fig. 5 - Maximum Non-Repetitive Surge Current

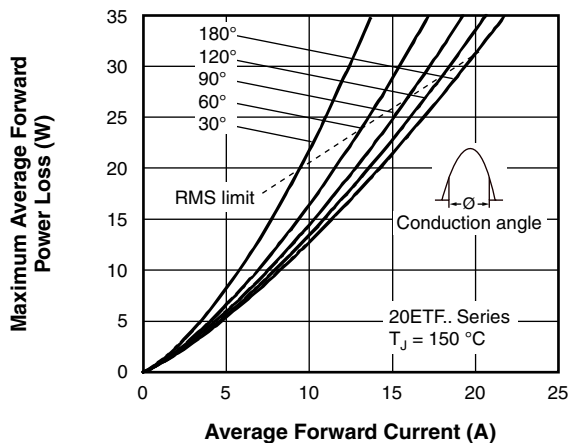


Fig. 3 - Forward Power Loss Characteristics

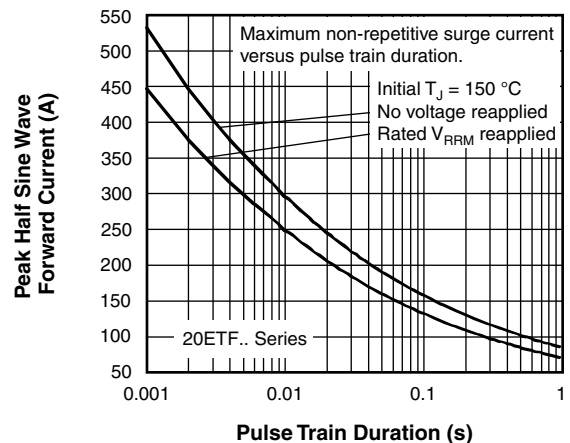


Fig. 6 - Maximum Non-Repetitive Surge Current

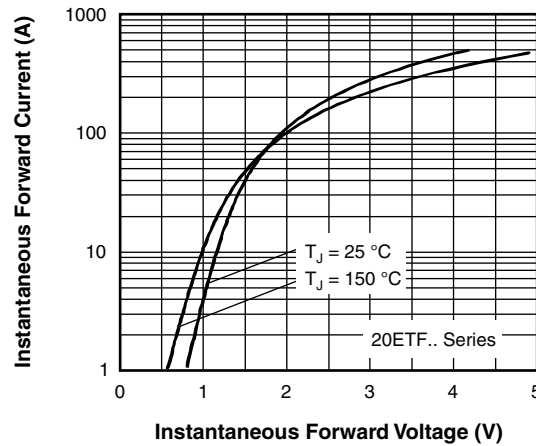
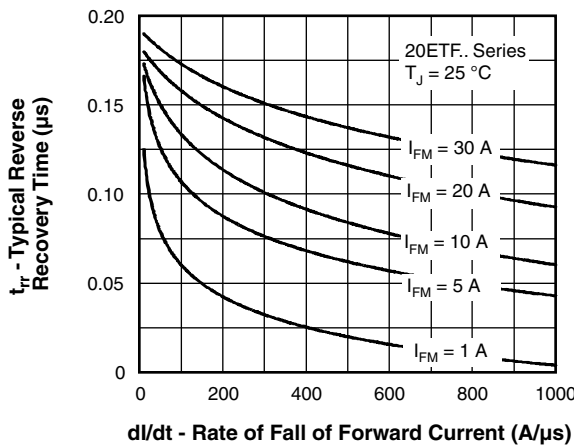
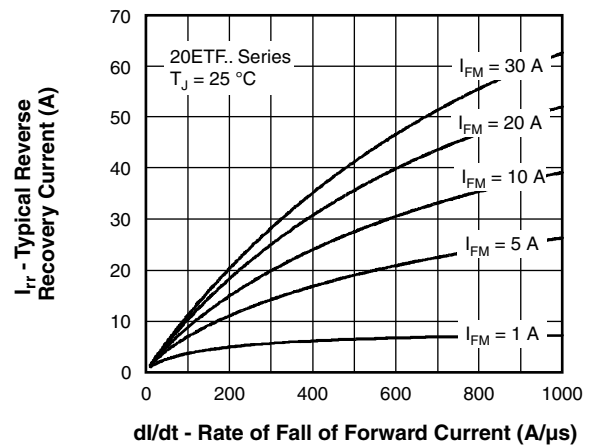
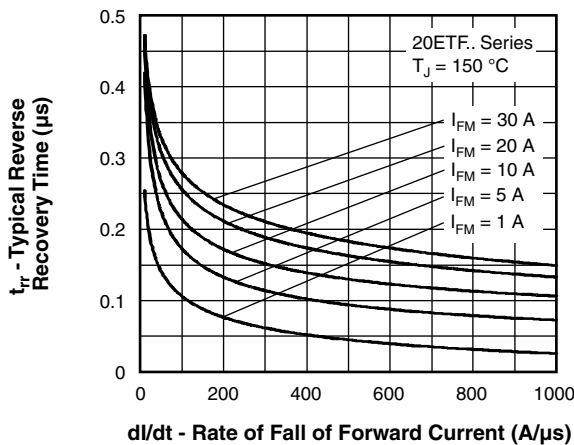
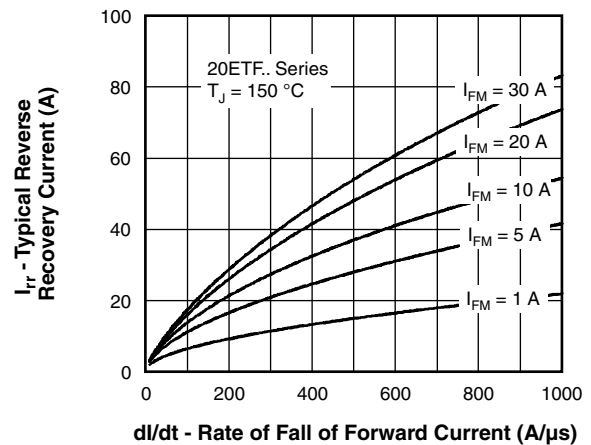
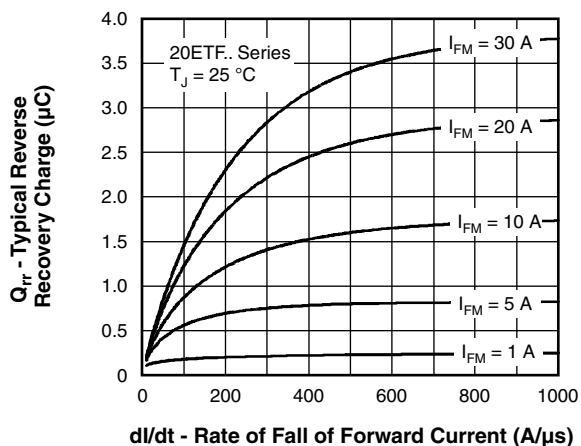
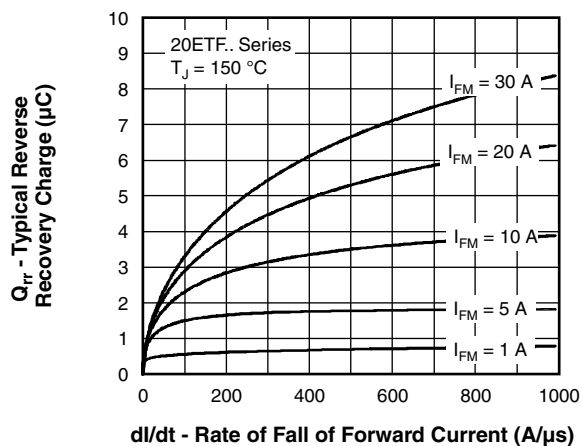
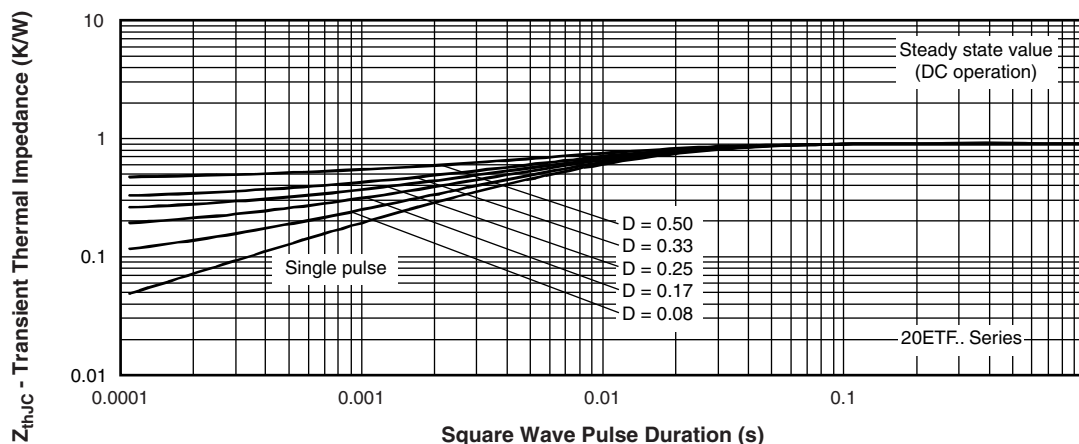


Fig. 7 - Forward Voltage Drop Characteristics


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,  $T_J = 25\text{ }^{\circ}\text{C}$ 

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

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



## ORDERING INFORMATION TABLE

Device code	VS-	20	E	T	F	06	-M3
	1	2	3	4	5	6	7
1	Vishay Semiconductors product						
2	Current rating (20 = 20 A)						
3	Circuit configuration: E = single						
4	Package: T = 2L TO-220AC						
5	Type of silicon: F = fast soft recovery rectifier						
6	Voltage code x 100 = $V_{RRM}$						
7	Environmental digit -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free						

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

ORDERING INFORMATION (Example)		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-20ETF02-M3	50	Antistatic plastic tube
VS-20ETF04-M3	50	Antistatic plastic tube
VS-20ETF06-M3	50	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?96156">www.vishay.com/doc?96156</a>
Part marking information	<a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a>





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