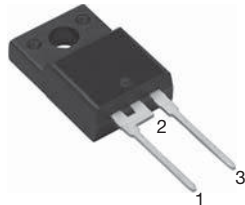
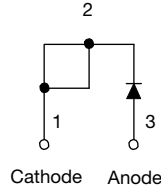


Fast Soft Recovery Rectifier Diode, 20 A


TO-220 FULL-PAK


FEATURES

- Glass passivated pellet chip junction
- 150 °C max. operation junction temperature
- Designed and qualified according to JEDEC®-JESD 47
- Fully isolated package ($V_{INS} = 2500 V_{RMS}$)
- UL E78996 approved
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE
 Available

PRODUCT SUMMARY	
Package	TO-220FP
$I_{F(AV)}$	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
Diode variation	Single die
Snap factor	0.6

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.

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
V_{RRM}		1000 to 1200	V
$I_{F(AV)}$	Sinusoidal waveform	20	A
I_{FSM}		320	
t_{rr}	1 A, 100 A/ μ s	95	ns
V_F	20 A, $T_J = 25$ °C	1.31	V
T_J	Range	-40 to +150	°C

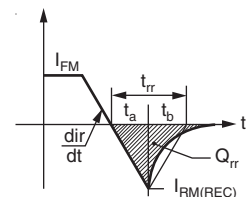
VOLTAGE RATINGS			
PART NUMBER	V_{RRM} , MAXIMUM PEAK REVERSE VOLTAGE V	V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM} AT 150 °C mA
VS-20ETF10FPPbF, VS-20ETF10FP-M3	1000	1100	6
VS-20ETF12FPPbF, VS-20ETF12FP-M3	1200	1300	

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 50$ °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 reapplied	320	
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied	365	A^2s
		10 ms sine pulse, no voltage reapplied	515	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ ms to 10 ms, no voltage reapplied	5150	$A^2\sqrt{s}$



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	m Ω
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 Apk 25 A/ μs 25 $^\circ\text{C}$	400	ns
Reverse recovery current	I_{rr}		6.1	A
Reverse recovery charge	Q_{rr}		1.7	μC
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	2.5	$^\circ\text{C/W}$
Maximum thermal resistance, junction to ambient	R_{thJA}		62	
Typical thermal resistance, case to heatsink	R_{thCS}	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 FULL-PAK	20ETF10FP 20ETF12FP	

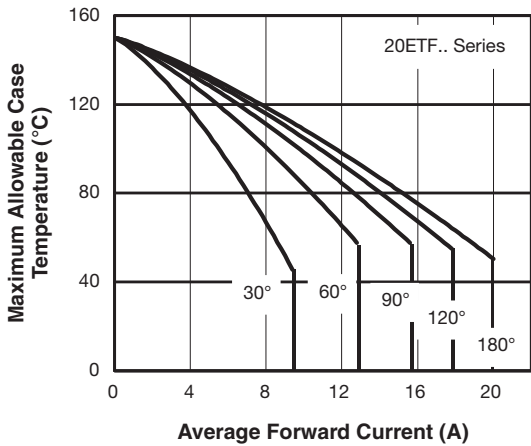


Fig. 1 - Current Rating Characteristics

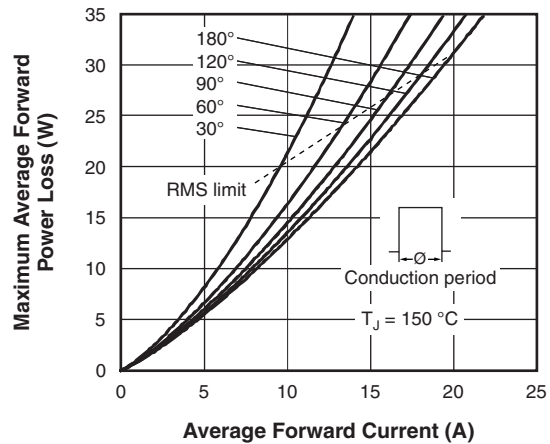


Fig. 4 - Forward Power Loss Characteristics

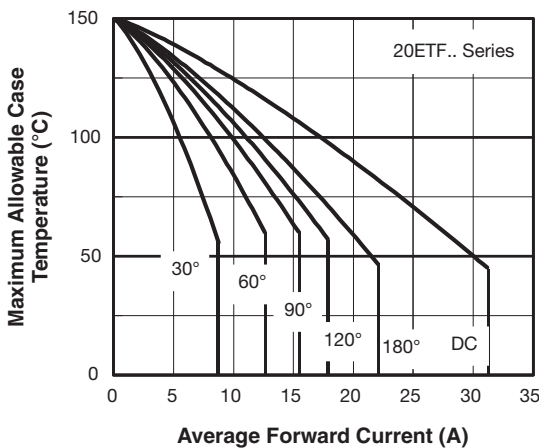


Fig. 2 - Current Rating Characteristics

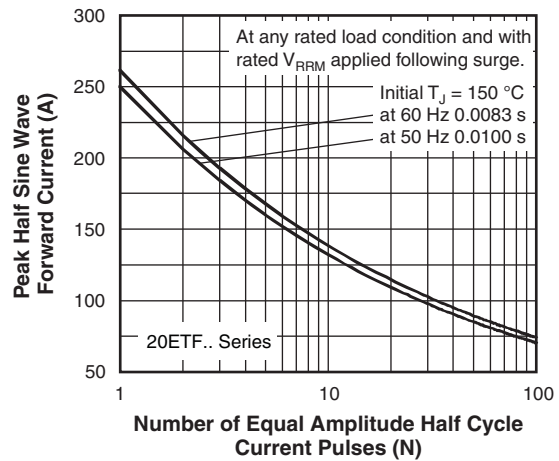


Fig. 5 - Maximum Non-Repetitive Surge Current

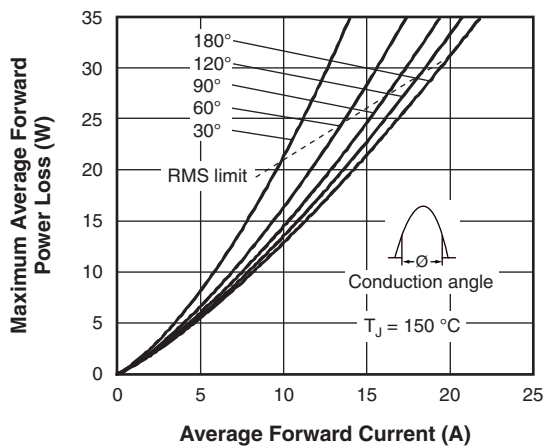


Fig. 3 - Forward Power Loss Characteristics

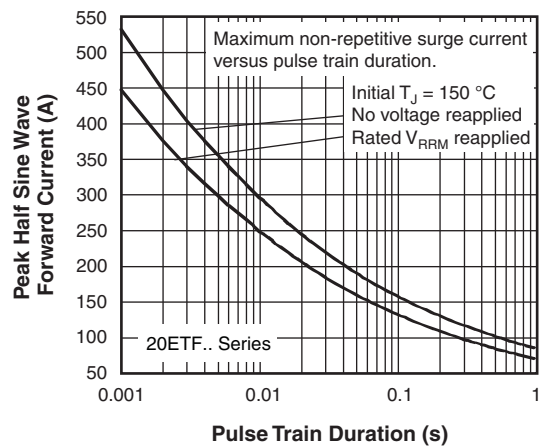


Fig. 6 - Maximum Non-Repetitive Surge Current

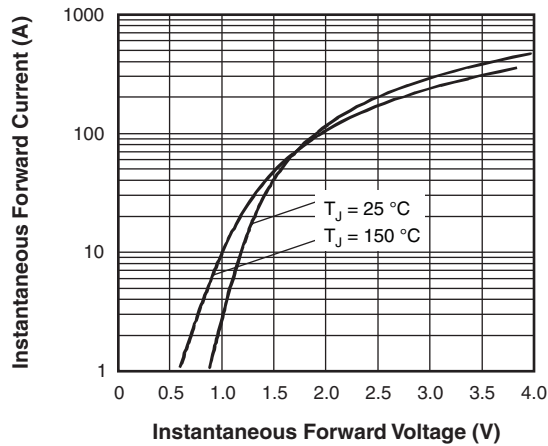


Fig. 7 - Forward Voltage Drop Characteristics

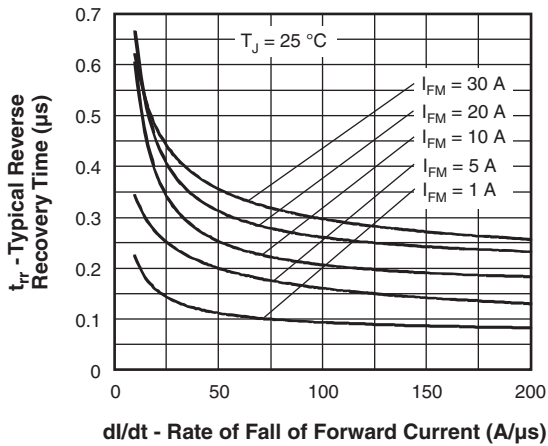


Fig. 8 - Recovery Time Characteristics, $T_J = 25\text{ }^\circ\text{C}$

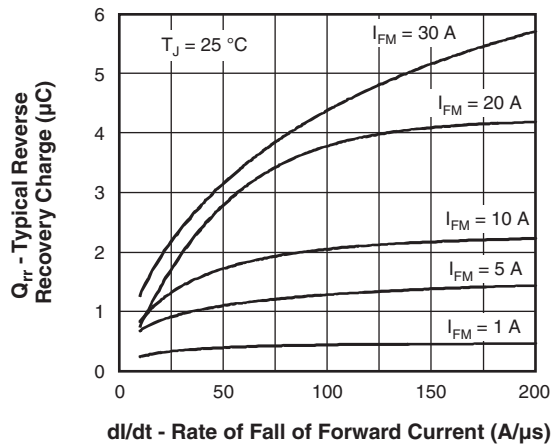


Fig. 10 - Recovery Charge Characteristics, $T_J = 25\text{ }^\circ\text{C}$

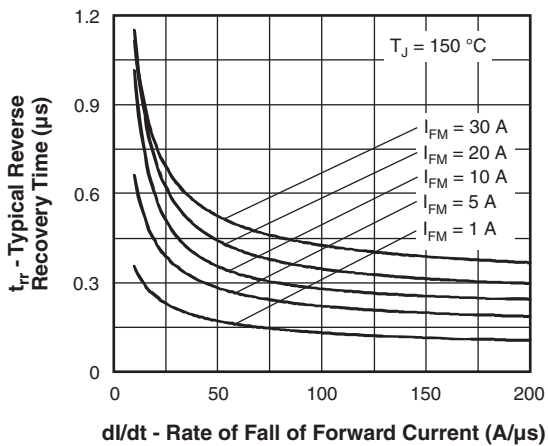


Fig. 9 - Recovery Time Characteristics, $T_J = 150\text{ }^\circ\text{C}$

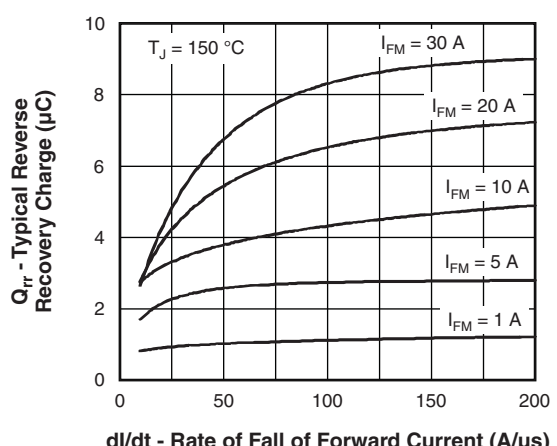


Fig. 11 - Recovery Charge Characteristics, $T_J = 150\text{ }^\circ\text{C}$

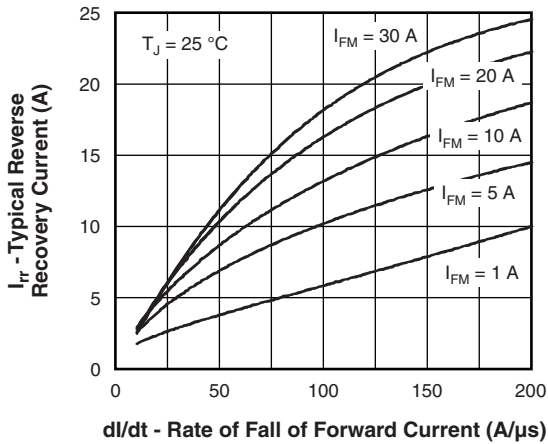


Fig. 12 - Recovery Current Characteristics, $T_J = 25\text{ }^\circ\text{C}$

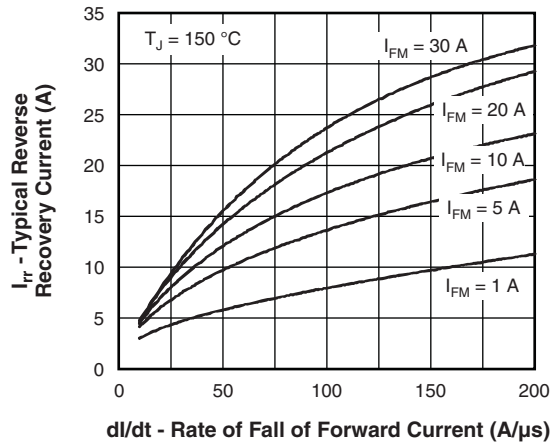


Fig. 13 - Recovery Current Characteristics, $T_J = 150\text{ }^\circ\text{C}$

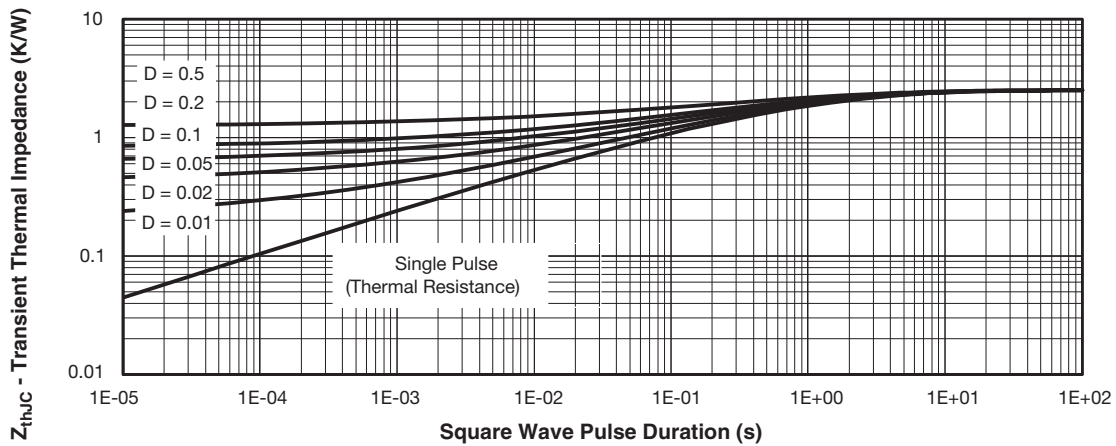
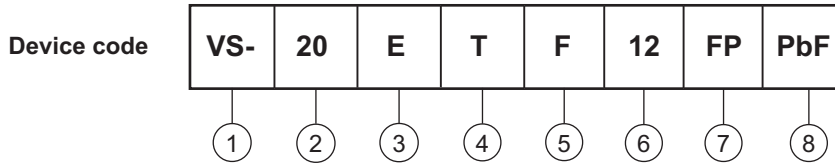


Fig. 14 - Thermal Impedance Z_{thJC} Characteristics



ORDERING INFORMATION TABLE



- 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}

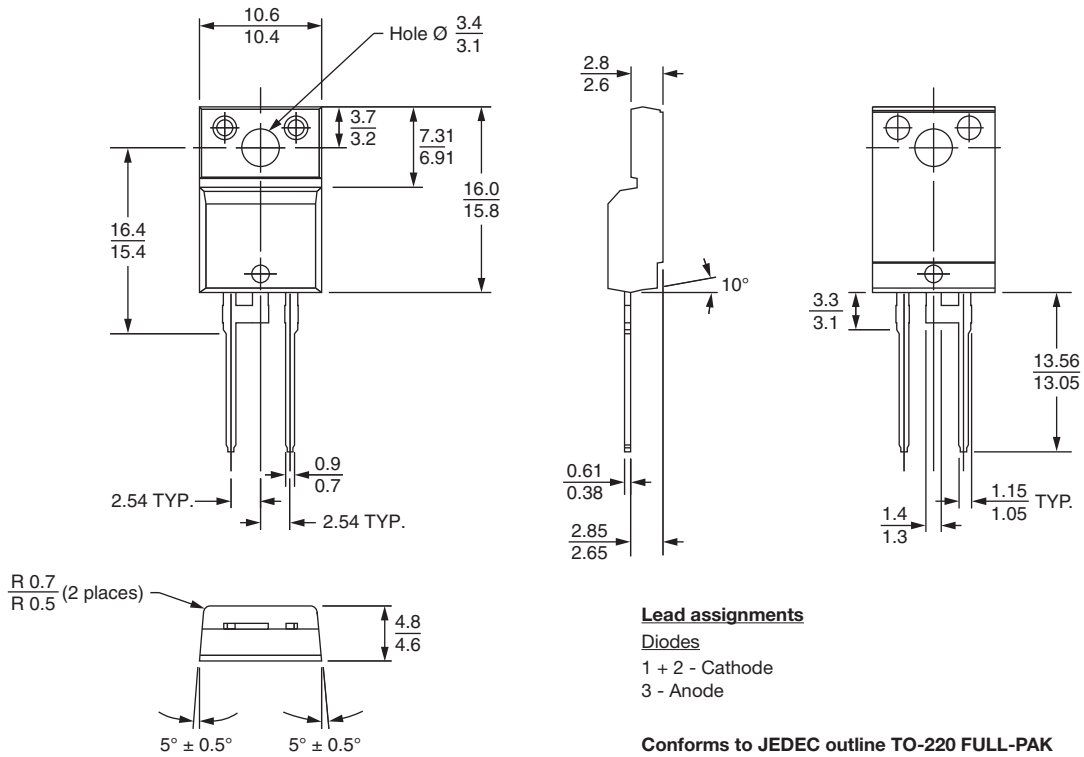
10 = 1000 V
12 = 1200 V
- 7** - FULL-PAK
- 8** - Environmental digit:
 - PbF = lead (Pb)-free and RoHS compliant
 - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-20ETF10FPPbF	50	1000	Antistatic plastic tubes
VS-20ETF10FP-M3	50	1000	Antistatic plastic tubes
VS-20ETF12FPPbF	50	1000	Antistatic plastic tubes
VS-20ETF12FP-M3	50	1000	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95005
Part marking information	TO-220 FPPbF www.vishay.com/doc?95009
	TO-220 FP-M3 www.vishay.com/doc?95440



DIMENSIONS in millimeters



Lead assignments

- Diodes**
1 + 2 - Cathode
3 - Anode

Conforms to JEDEC outline TO-220 FULL-PAK



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