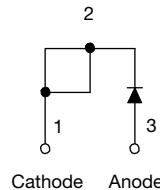


Fast Soft Recovery Rectifier Diode, 10 A



FEATURES

- 150 °C max. operation junction temperature
- Designed and qualified according to JEDEC®-JESD47
- Fully isolated package ($V_{INS} = 2500 \text{ V}_{\text{RMS}}$)
- 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
$I_{F(AV)}$	10 A
V_R	200 V, 400 V, 600 V
V_F at I_F	1.2 V
I_{FSM}	160 A
t_{rr}	50 ns
T_J max.	150 °C
Diode variation	Single die
Snap factor	0.5

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-10ETF0..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.

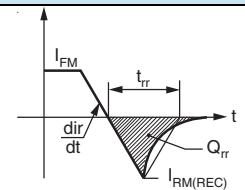
MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
V_{RRM}		200 to 600	V
$I_{F(AV)}$	Sinusoidal waveform	10	A
I_{FSM}		160	
t_{rr}	1 A, 100 A/μs	50	ns
V_F	10 A, $T_J = 25 \text{ }^\circ\text{C}$	1.2	V
T_J		-40 to 150	°C

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-10ETF02FPPbF, VS-10ETF02FP-M3	200	300	3
VS-10ETF04FPPbF, VS-10ETF04FP-M3	400	500	
VS-10ETF06FPPbF, VS-10ETF06FP-M3	600	700	

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 98 \text{ }^\circ\text{C}$, 180° conduction half sine wave	10	A
Maximum peak one cycle non-repetitive surge current	I_{FSM}	10 ms sine pulse, rated V_{RRM} applied	150	
		10 ms sine pulse, no voltage reapplied	160	
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied	112.5	A^2s
		10 ms sine pulse, no voltage reapplied	160	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ to 10 ms, no voltage reapplied	1600	$\text{A}^2\sqrt{\text{s}}$

ELECTRICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum forward voltage drop	V_{FM}	10 A, $T_J = 25^\circ\text{C}$	1.2	V
Forward slope resistance	r_t	$T_J = 150^\circ\text{C}$	23.5	$\text{m}\Omega$
Threshold voltage	$V_{F(TO)}$		0.85	V
Maximum reverse leakage current	I_{RM}	$T_J = 25^\circ\text{C}$	0.1	mA
		$T_J = 150^\circ\text{C}$	3.0	

RECOVERY CHARACTERISTICS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Reverse recovery time	t_{rr}	I_F at 10 A pk 25 A/ μs 25 °C	200	ns
Reverse recovery current	I_{rr}		2.75	A
Reverse recovery charge	Q_{rr}		0.32	μC
Snap factor	S		0.6	



THERMAL - MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		-40 to 150	°C
Maximum thermal resistance junction to case	R_{thJC}	DC operation	2.5	°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	10ETF02FP 10ETF04FP 10ETF06FP	

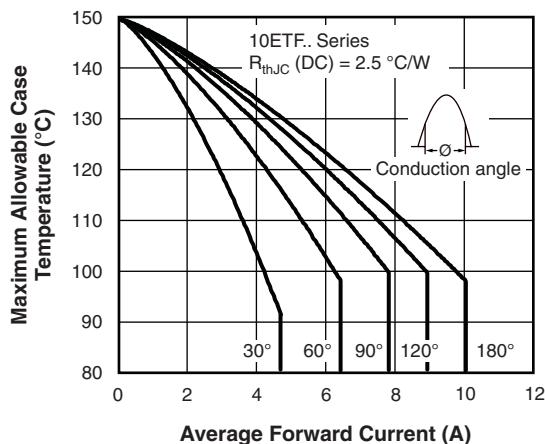


Fig. 1 - Current Rating Characteristics

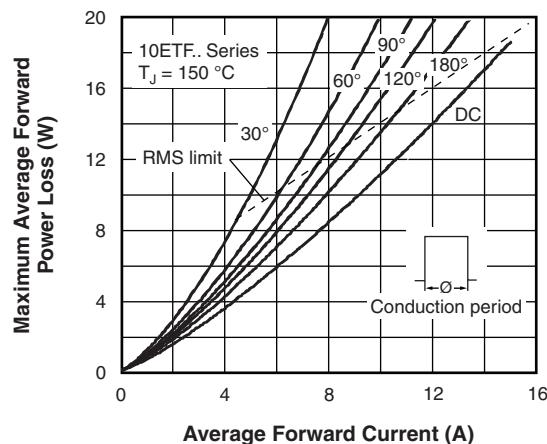


Fig. 4 - Forward Power Loss Characteristics

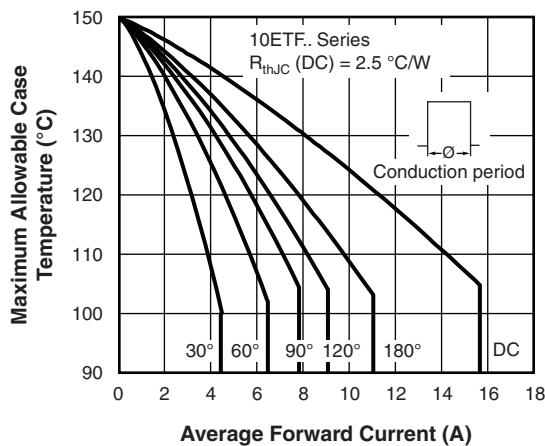


Fig. 2 - Current Rating Characteristics

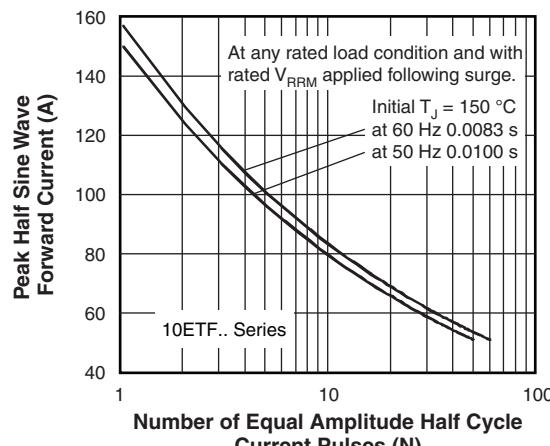


Fig. 5 - Maximum Non-Repetitive Surge Current

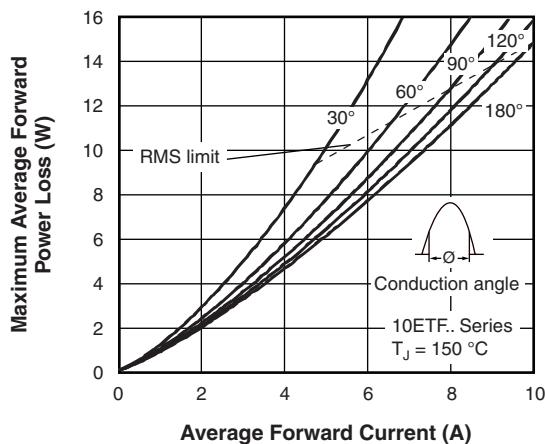


Fig. 3 - Forward Power Loss Characteristics

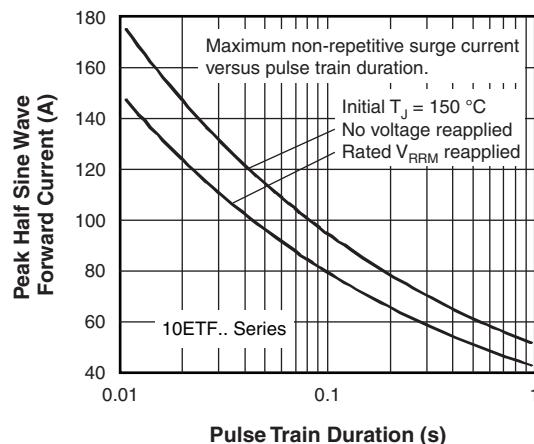


Fig. 6 - Maximum Non-Repetitive Surge Current

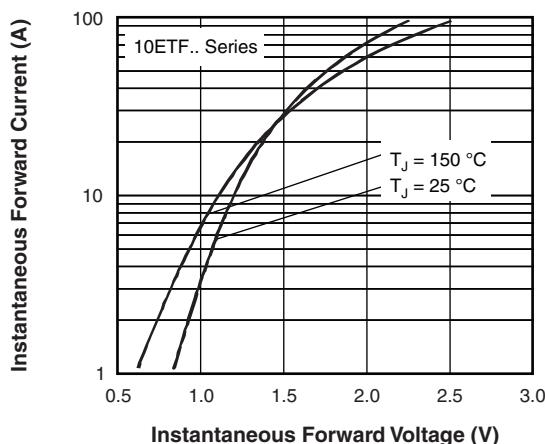


Fig. 7 - Forward Voltage Drop Characteristics

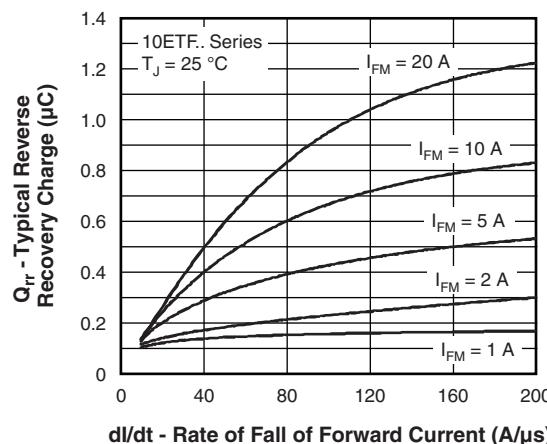


Fig. 10 - Recovery Charge Characteristics, $T_J = 25 \text{ }^{\circ}\text{C}$

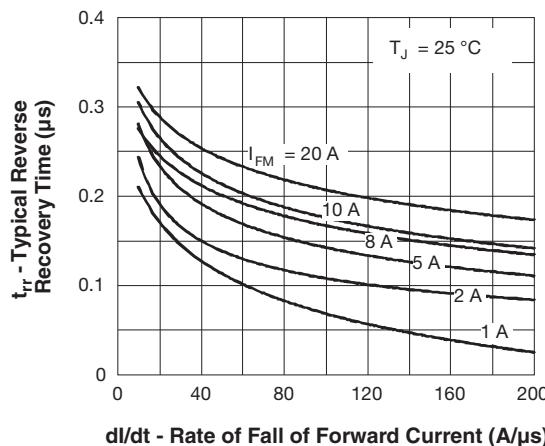


Fig. 8 - Recovery Time Characteristics, $T_J = 25 \text{ }^{\circ}\text{C}$

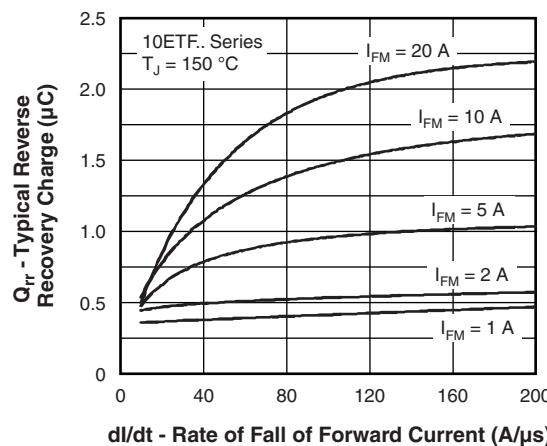


Fig. 11 - Recovery Charge Characteristics, $T_J = 150 \text{ }^{\circ}\text{C}$

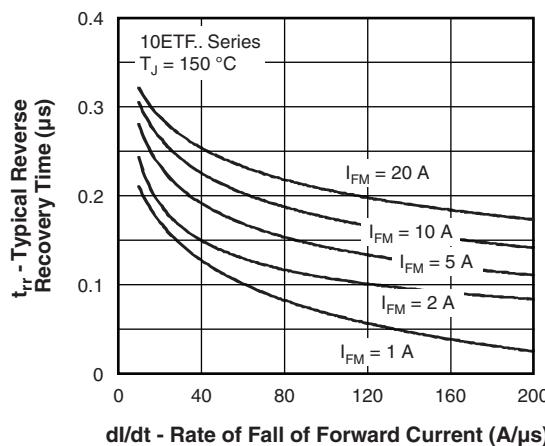


Fig. 9 - Recovery Time Characteristics, $T_J = 150 \text{ }^{\circ}\text{C}$

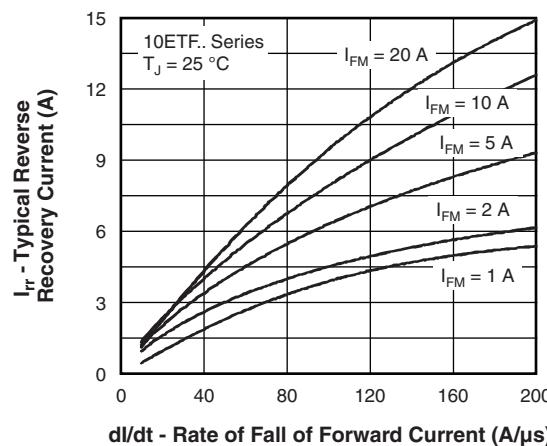


Fig. 12 - Recovery Current Characteristics, $T_J = 25 \text{ }^{\circ}\text{C}$

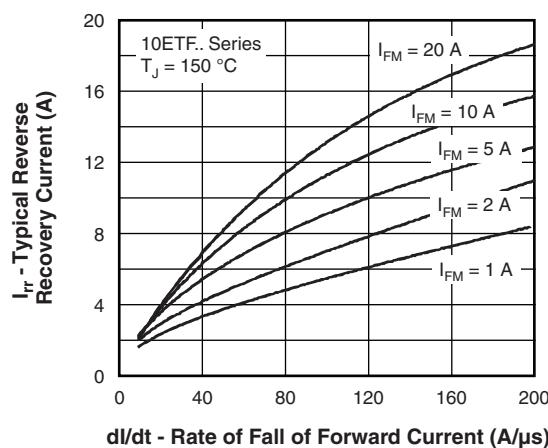


Fig. 13 - Recovery Current Characteristics, T_J = 150 °C

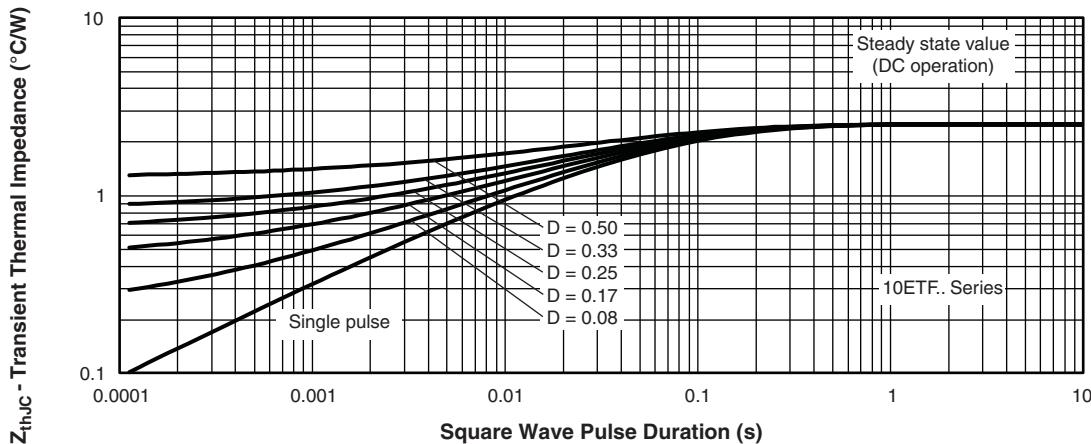


Fig. 14 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

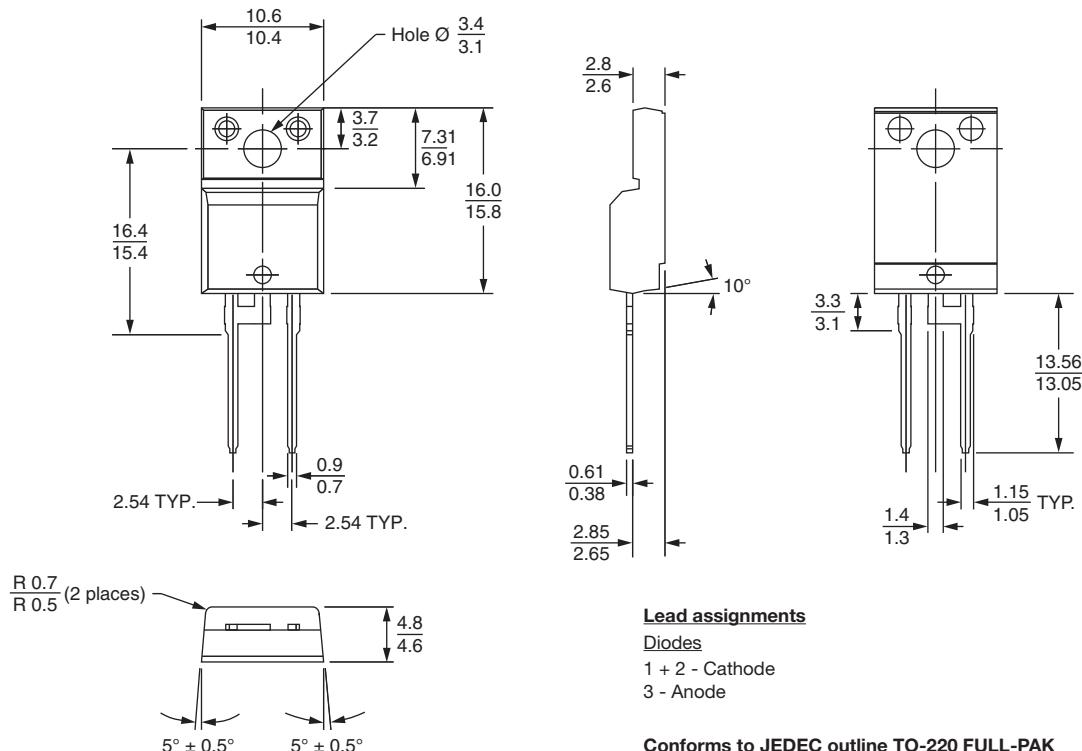
Device code	VS-	10	E	T	F	06	FP	PbF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

- (1)** - Vishay Semiconductors product
- (2)** - Current rating (10 = 10 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} ————— 02 = 200 V
04 = 400 V
06 = 600 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-10ETF02FPPbF	50	1000	Antistatic plastic tubes	
VS-10ETF02FP-M3	50	1000	Antistatic plastic tubes	
VS-10ETF04FPPbF	50	1000	Antistatic plastic tubes	
VS-10ETF04FP-M3	50	1000	Antistatic plastic tubes	
VS-10ETF06FPPbF	50	1000	Antistatic plastic tubes	
VS-10ETF06FP-M3	50	1000	Antistatic plastic tubes	

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

DIMENSIONS in millimeters



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Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.