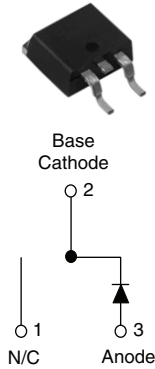


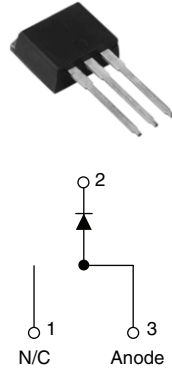
Hyperfast Rectifier, 15 A FRED Pt[®]

VS-15ETX06SPbF



D²PAK

VS-15ETX06-1PbF



TO-262

FEATURES

- Benchmark ultralow forward voltage drop
- Hyperfast recovery time
- Low leakage current
- 175 °C operating junction temperature
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Halogen-free according to IEC 61249-2-21 definition
- Compliant to RoHS directive 2002/95/EC
- AEC-Q101 qualified



RoHS
COMPLIANT
HALOGEN
FREE

DESCRIPTION/APPLICATIONS

State of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, hyperfast recovery time, and soft recovery.

The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in PFC boost stage in the ac-to-dc section of SMPS, inverters or as freewheeling diodes.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

PRODUCT SUMMARY

t_{rr}	18 ns
$I_{F(AV)}$	15 A
V_R	600 V

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Peak repetitive reverse voltage	V_{RRM}		600	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 133\text{ °C}$	15	A
Non-repetitive peak surge current	I_{FSM}	$T_J = 25\text{ °C}$	170	
Peak repetitive forward current	I_{FM}		30	
Operating junction and storage temperatures	T_J, T_{Stg}		- 65 to 175	°C

ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ °C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V_{BR}, V_R	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	V_F	$I_F = 15\text{ A}$ $I_F = 15\text{ A}, T_J = 150\text{ °C}$	-	2.3 1.5	3.2 1.8	
Reverse leakage current	I_R	$V_R = V_R\text{ rated}$ $T_J = 150\text{ °C}, V_R = V_R\text{ rated}$	-	0.1 40	50 300	μA
Junction capacitance	C_T	$V_R = 600\text{ V}$	-	20	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8.0	-	nH

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DYNAMIC RECOVERY CHARACTERISTICS (T _C = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Reverse recovery time	t _{rr}	I _F = 1 A, di _F /dt = 100 A/μs, V _R = 30 V	-	18	22	ns	
		I _F = 15 A, di _F /dt = 100 A/μs, V _R = 30 V	-	20	32		
		T _J = 25 °C	-	22	-		
		T _J = 125 °C	-	52	-		
Peak recovery current	I _{RRM}	T _J = 25 °C	-	2.4	-	A	
		T _J = 125 °C	-	5.1	-		
Reverse recovery charge	Q _{rr}	T _J = 25 °C	-	25	-	nC	
		T _J = 125 °C	-	150	-		
Reverse recovery time	t _{rr}	T _J = 125 °C	I _F = 15 A di _F /dt = 800 A/μs V _R = 390 V	-	37	-	ns
Peak recovery current	I _{RRM}			-	16	-	A
Reverse recovery charge	Q _{rr}			-	350	-	nC

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T _J , T _{Stg}		- 65	-	175	°C
Thermal resistance, junction to case per leg	R _{thJC}		-	1.0	1.3	°C/W
Thermal resistance, junction to ambient per leg	R _{thJA}	Typical socket mount	-	-	70	
Thermal resistance, case to heatsink	R _{thCS}	Mounting surface, flat, smooth and greased	-	0.5	-	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style D ² PAK	15ETX06S			
		Case style TO-262	15ETX06-1			

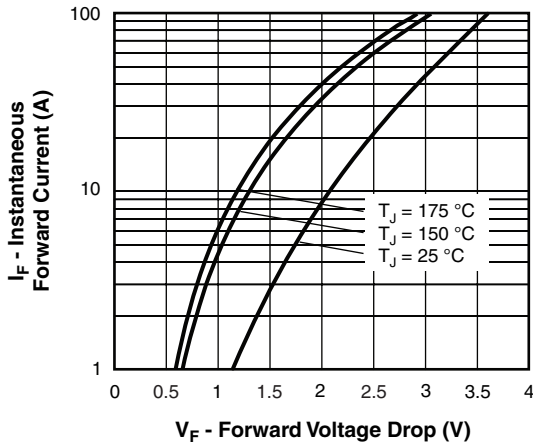


Fig. 1 - Typical Forward Voltage Drop Characteristics

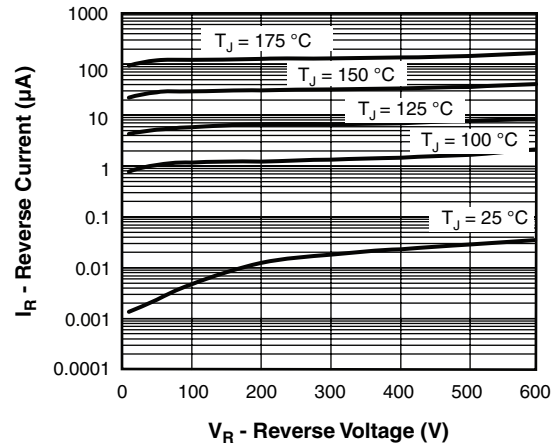


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

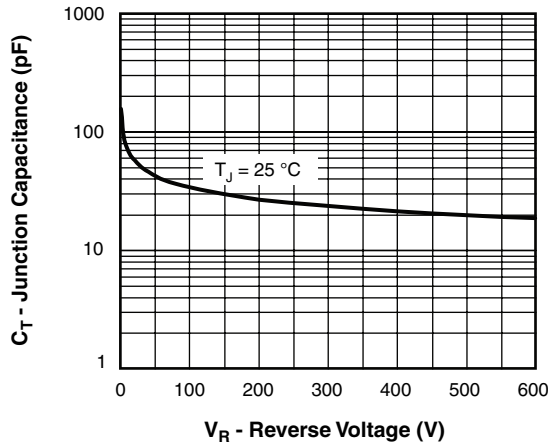


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

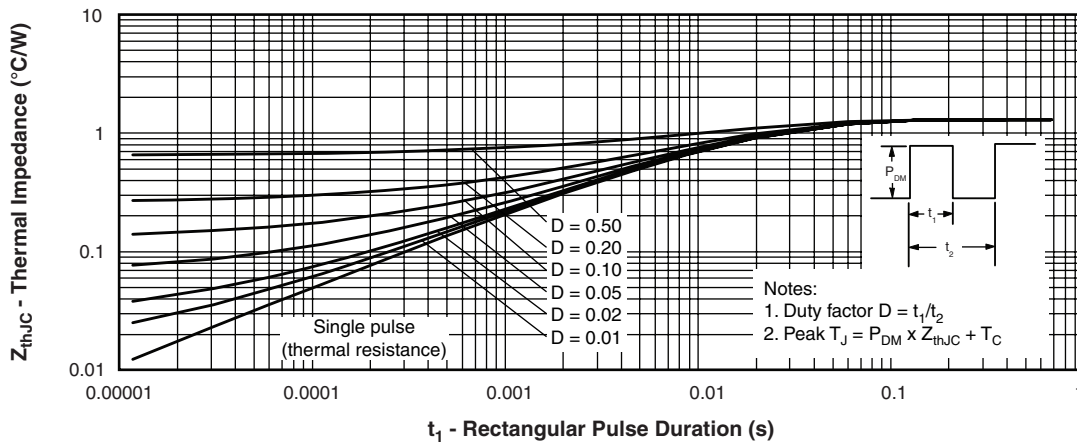


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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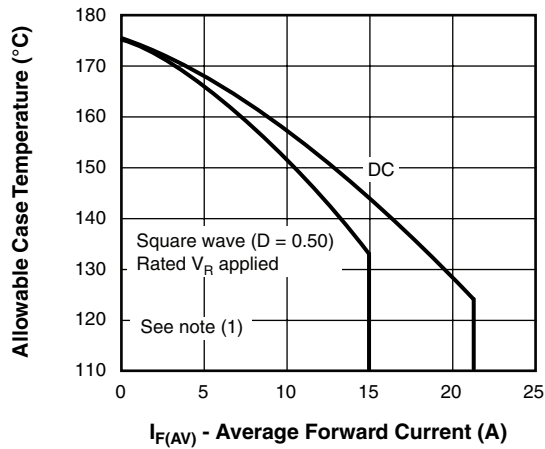


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

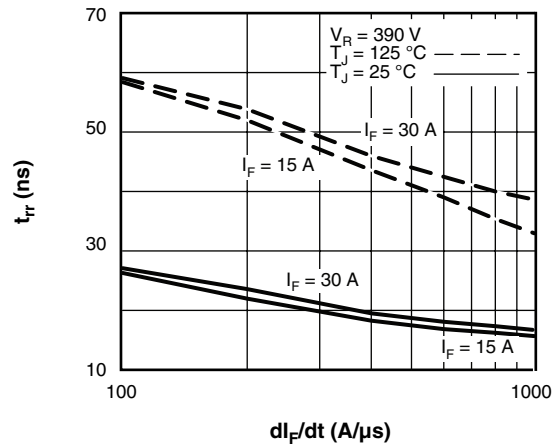


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

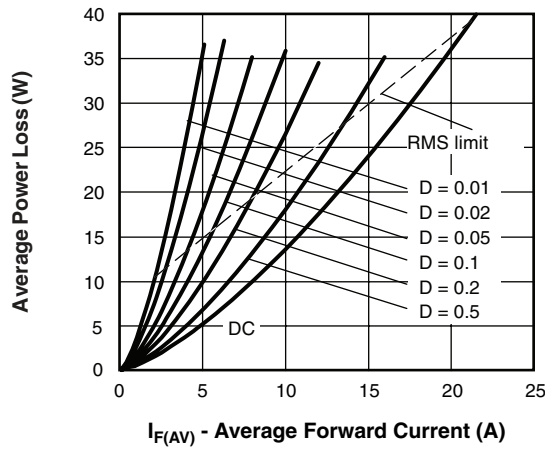


Fig. 6 - Forward Power Loss Characteristics

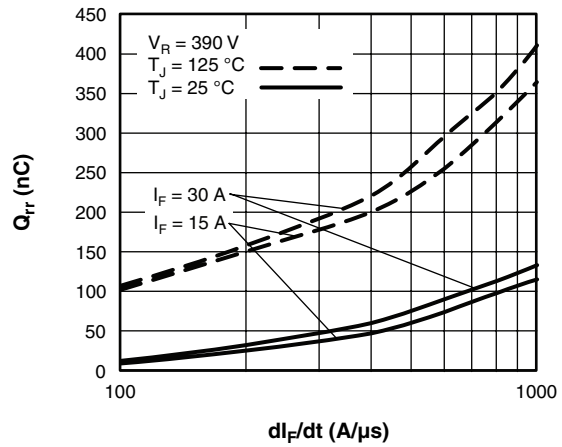


Fig. 8 - Typical Stored Charge vs. di_F/dt

Note

- (1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
 Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 Pd_{REV} = Inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = Rated V_R

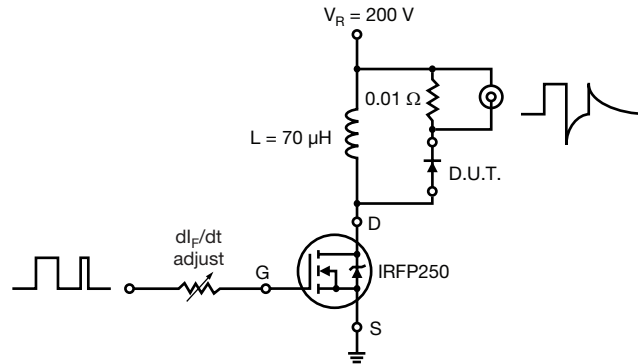
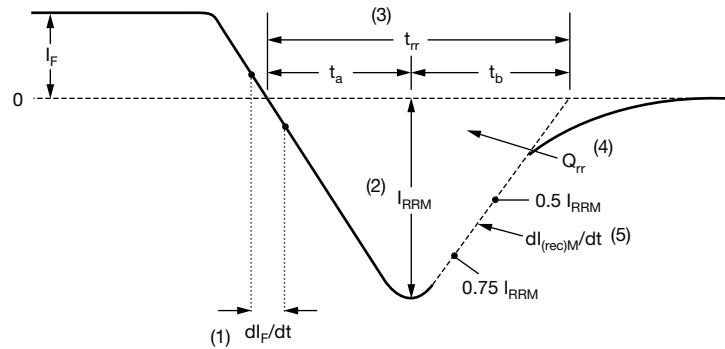


Fig. 9 - Reverse Recovery Parameter Test Circuit



(1) dI_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through $0.75 I_{RRM}$ and $0.50 I_{RRM}$ extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $dI_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 10 - Reverse Recovery Waveform and Definitions

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ORDERING INFORMATION TABLE

Device code	VS-	15	E	T	X	06	S	TRL	PbF
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

- | | | |
|----------|---|--|
| 1 | - | HPP product suffix |
| 2 | - | Current rating (15 A) |
| 3 | - | E = Single diode |
| 4 | - | T = TO-220, D ² PAK |
| 5 | - | X = Hyperfast recovery |
| 6 | - | Voltage rating (06 = 600 V) |
| 7 | - | • S = D ² PAK
• -1 = TO-262 |
| 8 | - | • None = Tube (50 pieces)
• TRL = Tape and reel (left oriented, for D ² PAK package)
• TRR = Tape and reel (right oriented, for D ² PAK package) |
| 9 | - | PbF = Lead (Pb)-free |

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95014
Part marking information	www.vishay.com/doc?95008
Packaging information	www.vishay.com/doc?95032



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