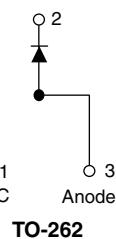
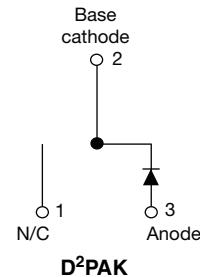


Hyperfast Rectifier, 15 A FRED Pt®


VS-ETH1506S-M3

VS-ETH1506-1-M3


FEATURES

- Hyperfast recovery time
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- AEC-Q101 qualified, meets JESD 201 class 1A whisker test
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT
HALOGEN
FREE

DESCRIPTION/APPLICATIONS

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/DC section of SMPS, inverters or as freewheeling diodes.

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

PRODUCT SUMMARY	
Package	TO-263AB (D ² PAK), TO-262AA
$I_F(AV)$	15 A
V_R	600 V
V_F at I_F	2.45 V
t_{rr} (typ.)	21 ns
T_J max.	175 °C
Diode variation	Single die

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS	
Repetitive peak reverse voltage	V_{RRM}		600	V	
Average rectified forward current	$I_F(AV)$	$T_C = 139$ °C	15	A	
Non-repetitive peak surge current	I_{FSM}	$T_C = 25$ °C	160		
Operating junction and storage temperatures	T_J, T_{Stg}		- 65 to 175	°C	

ELECTRICAL SPECIFICATIONS ($T_J = 25$ °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V_{BR}, V_R	$I_R = 100$ μA	600	-	-	V
Forward voltage	V_F	$I_F = 15$ A	-	1.8	2.45	
		$I_F = 15$ A, $T_J = 150$ °C	-	1.25	1.6	
Reverse leakage current	I_R	$V_R = V_R$ rated	-	0.01	15	μA
		$T_J = 150$ °C, $V_R = V_R$ rated	-	20	200	
Junction capacitance	C_T	$V_R = 600$ V	-	12	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	$I_F = 1.0 \text{ A}$, $dI_F/dt = 100 \text{ A}/\mu\text{s}$, $V_R = 30 \text{ V}$		-	21	26	ns
		$I_F = 1.5 \text{ A}$, $dI_F/dt = 100 \text{ A}/\mu\text{s}$, $V_R = 30 \text{ V}$		-	25	36	
		$T_J = 25^\circ\text{C}$	$I_F = 15 \text{ A}$ $dI_F/dt = 200 \text{ A}/\mu\text{s}$ $V_R = 390 \text{ V}$	-	29	-	
		$T_J = 125^\circ\text{C}$		-	65	-	
Peak recovery current	I_{RRM}	$T_J = 25^\circ\text{C}$		-	3.9	-	A
		$T_J = 125^\circ\text{C}$		-	7.0	-	
Reverse recovery charge	Q_{rr}	$T_J = 25^\circ\text{C}$		-	60	-	nC
		$T_J = 125^\circ\text{C}$		-	240	-	
Reverse recovery time	t_{rr}	$T_J = 125^\circ\text{C}$	$I_F = 15 \text{ A}$ $dI_F/dt = 800 \text{ A}/\mu\text{s}$ $V_R = 390 \text{ V}$	-	42	-	ns
Peak recovery current	I_{RRM}		-	21	-	A	
Reverse recovery charge	Q_{rr}		-	480	-	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	R_{thJC}			-	1.3	1.51	°C/W
Thermal resistance, junction to ambient	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 (5)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style D ² PAK		ETH1506SH			
		Case style TO-262		ETH1506-1H			

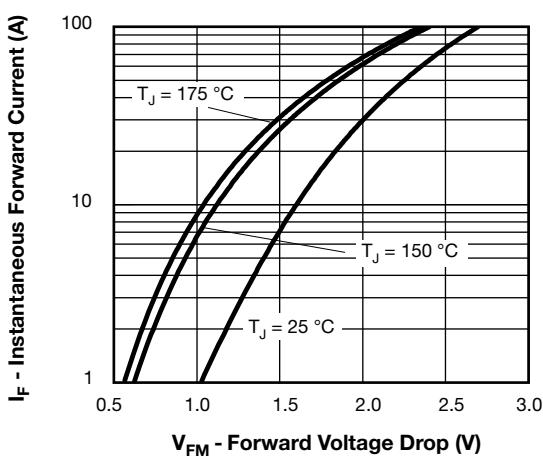


Fig. 1 - Typical Forward Voltage Drop Characteristics

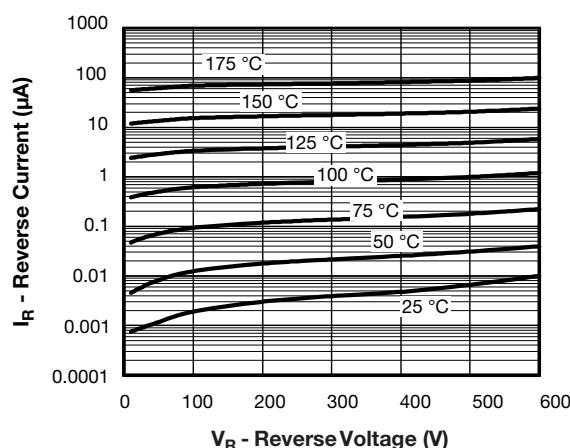


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

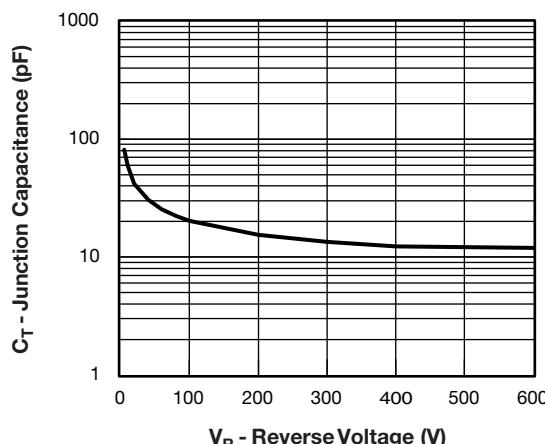


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

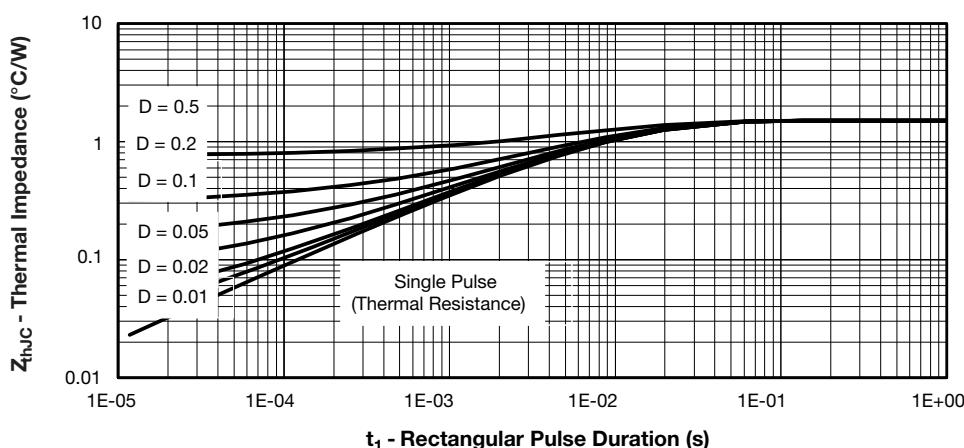


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

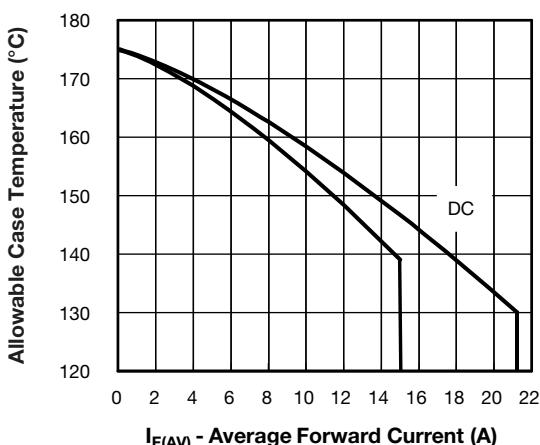


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

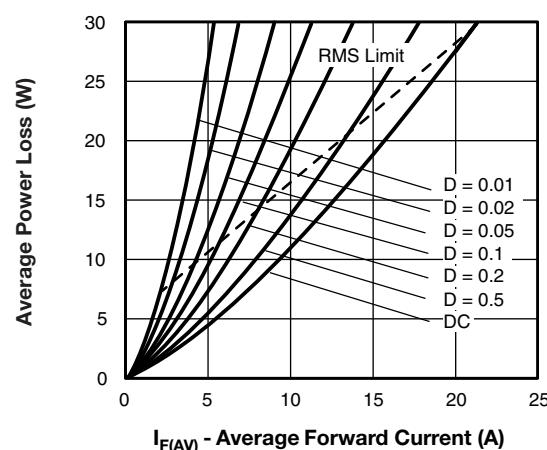


Fig. 6 - Forward Power Loss Characteristics

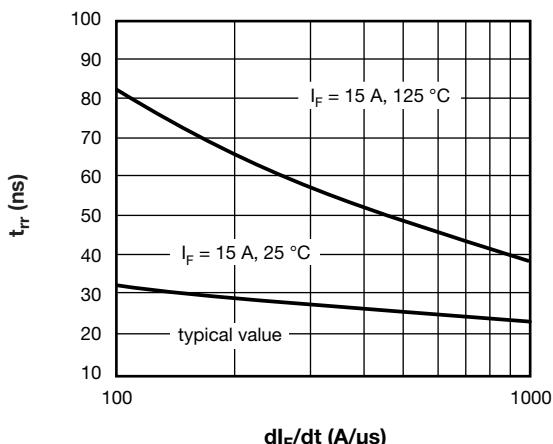


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

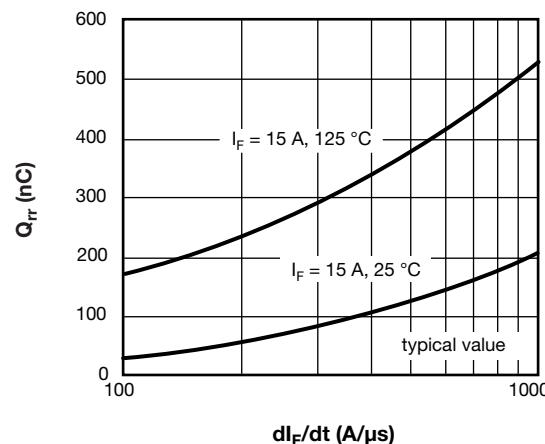


Fig. 8 - Typical Stored Charge vs. dI_F/dt

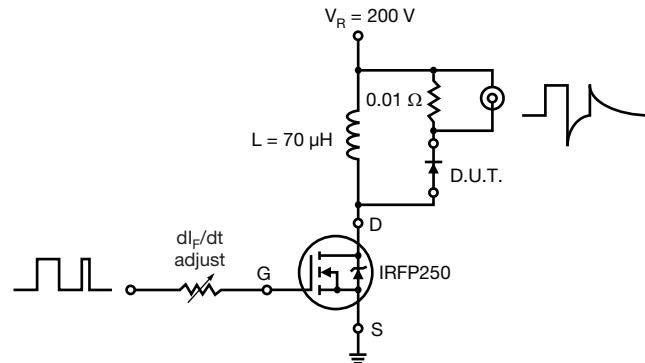
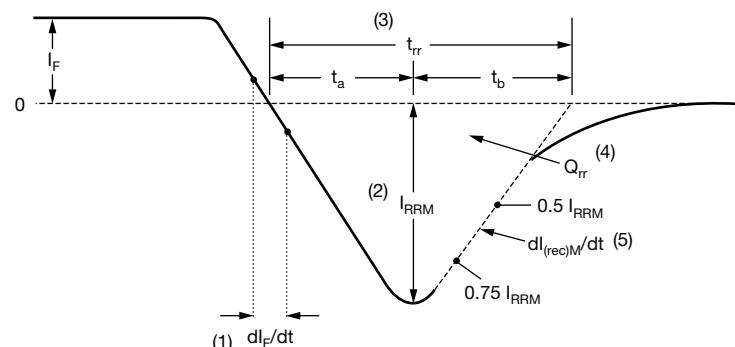


Fig. 9 - Reverse Recovery Parameter Test Circuit



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

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

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

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

(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.

(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

ORDERING INFORMATION TABLE

Device code	VS-	E	T	H	15	06	S	TRL	H	M3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

- 1** - Vishay Semiconductors product
- 2** - Circuit configuration
E = Single diode
- 3** - T = TO-220
- 4** - H = Hyperfast recovery time
- 5** - Current code (15 = 15 A)
- 6** - Voltage code (06 = 600 V)
- 7** - • S = D²PAK
 - • -1 = TO-262
- 8** - • None = Tube
 - • TRL = Tape and reel (left oriented, for D²PAK package)
 - • TRR = Tape and reel (right oriented, for D²PAK package)
- 9** - H = AEC-Q101 qualified
- 10** - Environmental digit:
M3 = Halogen-free, RoHS compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-ETH1506SHM3	50	1000	Antistatic plastic tube
VS-ETH1506-1HM3	50	1000	Antistatic plastic tube
VS-ETH1506STRRHM3	800	800	13" diameter reel
VS-ETH1506STRLHM3	800	800	13" diameter reel

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-263AB (D ² PAK)	www.vishay.com/doc?95046
	TO-262AA	www.vishay.com/doc?95419
Part marking information	TO-263AB (D ² PAK)	www.vishay.com/doc?95444
	TO-262AA	www.vishay.com/doc?95443
Packaging information	TO-263AB (D ² PAK)	www.vishay.com/doc?95032

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