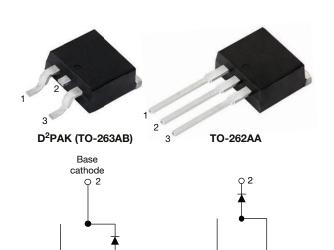


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Hyperfast Rectifier, 15 A FRED Pt®



PRIMARY CHARACTERISTICS						
I _{F(AV)}	15 A					
V_{R}	600 V					
V _F at I _F	1.25 V					
t _{rr} (typ.)	21 ns					
T _J max.	175 °C					
Package	D ² PAK (TO-263AB), TO-262AA					
Circuit configuration	Single					

Anode

VS-ETH1506S-M3

ბ 3

Anode

VS-ETH1506-1-M3

N/C

FEATURES

- Hyperfast recovery time
- · Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current

- HALOGEN FREE
- Designed and qualified according to JEDEC®-JESD 47
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

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.

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	۸			
Non-repetitive peak surge current	I _{FSM}	T _C = 25 °C	160	Α			
Operating junction and storage temperatures	T _J , T _{Stg}		-55 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	Ι _R = 100 μΑ	600	-	-			
Forward voltage	V _F	I _F = 15A	-	1.8	2.45	V		
Forward voitage		I _F = 15 A, T _J = 150 °C	1	1.25	1.6			
Reverse leakage current	1_	$V_R = V_R$ rated	-	0.01	15			
neverse leakage current	I _R	$T_J = 150 ^{\circ}\text{C}, V_R = V_R \text{rated}$	-	20	200	μΑ		
Junction capacitance	C _T	$V_{R} = 600 \text{ V}$	1	12	-	pF		
Series inductance	L _S	Measured lead to lead 5 mm from package body	1	8.0	-	nH		



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DYNAMIC RECOVERY CHARACTERISTICS (T _J = 25 °C unless otherwise specified)								
PARAMETER	SYMBOL	TEST	CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Reverse recovery time		$I_F = 1.0 \text{ A}, dI_F/dt =$	100 A/μs, V _R = 30 V	-	21	26		
		$I_F = 15 A$, $dI_F/dt =$	100 A/μs, V _R = 30 V	-	25	36	no	
	t _{rr}	T _J = 25 °C		-	29	-	ns	
		T _J = 125 °C	$I_F = 15 \text{ A}$ $dI_F/dt = 200 \text{ A/}\mu\text{s}$ $V_R = 390 \text{ V}$	-	65	-		
Park and a second		T _J = 25 °C		-	3.9	-	А	
Peak recovery current	I _{RRM}	T _J = 125 °C		-	7.0	-		
Reverse recovery charge	0	T _J = 25 °C	- VR = 390 V	-	60	-	nC	
neverse recovery charge	Q _{rr}	T _J = 125 °C		-	240	-	IIC	
Reverse recovery time	t _{rr}		I _E = 15 A	-	42	-	ns	
Peak recovery current	I _{RRM}	T _J = 125 °C	$dI_F/dt = 800 A/\mu s$	-	21	-	Α	
Reverse recovery charge	Q _{rr}		V _R = 390 V	-	480	-	nC	

THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Maximum junction and storage temperature range	T _J , T _{Stg}		-55	-	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	
weight			-	0.07	-	OZ.	
Mounting torque			6 (5)	-	12 (10)	kgf · cm (lbf · in)	
Madiana		Case style D ² PAK (TO-263AB)	ETH1506S				
Marking device		Case style TO-262AA	ETH1506-1				

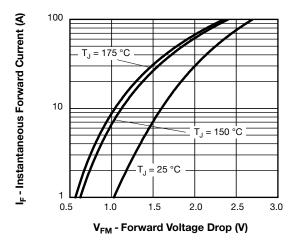


Fig. 1 - Maximum Forward Voltage Drop Characteristics

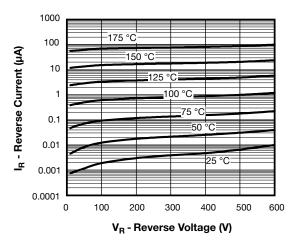


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage



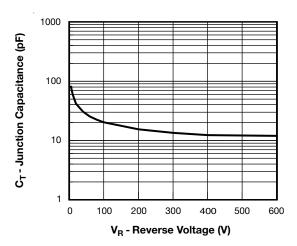


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

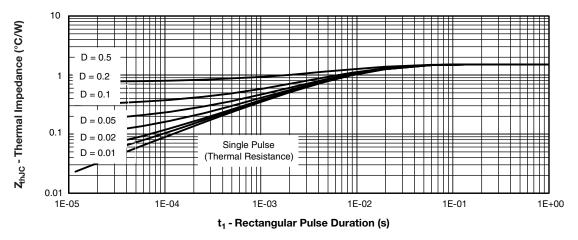


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

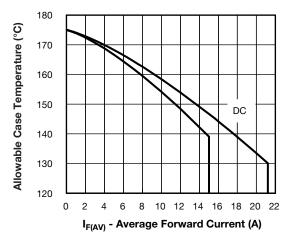


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current

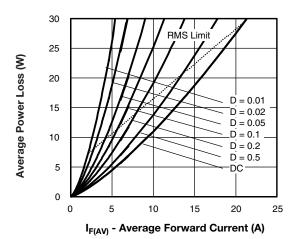


Fig. 6 - Forward Power Loss Characteristics



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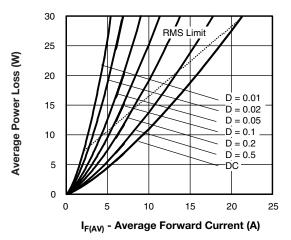


Fig. 7 - Typical Reverse Recovery Time vs. dl_F/dt

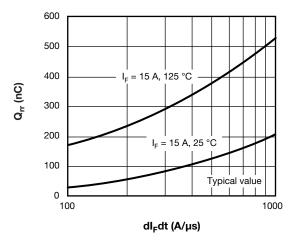
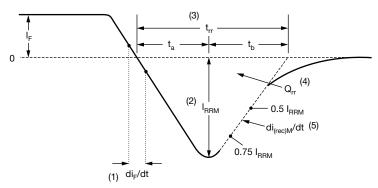


Fig. 8 - Typical Stored Charge vs. dl_F/dt



- (1) di_F/dt rate of change of current through zero crossing
- (2) I_{RRM} peak reverse recovery current
- (3) $\rm t_{rr}$ reverse recovery time measured from zero crossing point of negative going $\rm I_F$ to point where a line passing through 0.75 $\rm I_{RRM}$ and 0.50 $\rm I_{RRM}$ 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}

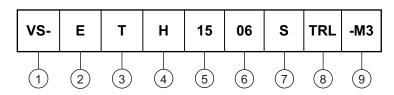
Fig. 9 - Reverse Recovery Waveform and Definitions

VS-ETH1506S-M3, VS-ETH1506-1-M3

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ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

- Circuit configuration

E = single

3 - T = TO-220

H = hyperfast recovery time

5 - Current code (15 = 15 A)

6 - Voltage code (06 = 600 V)

7 - • S = D^2PAK (TO-263AB)

- • -1 = TO-262AA

8 - • None = tube (50 pieces)

- • TRL = tape and reel (left oriented, for D²PAK (TO-263AB) package)

- • TRR = tape and reel (right oriented, for D²PAK (TO-263AB) package)

9 - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)						
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION				
VS-ETH1506S-M3	50	Antistatic plastic tubes				
VS-ETH1506STRR-M3	800	13" diameter plastic tape and reel				
VS-ETH1506STRL-M3	800	13" diameter plastic tape and reel				
VS-ETH1506-1-M3	50	Antistatic plastic tubes				

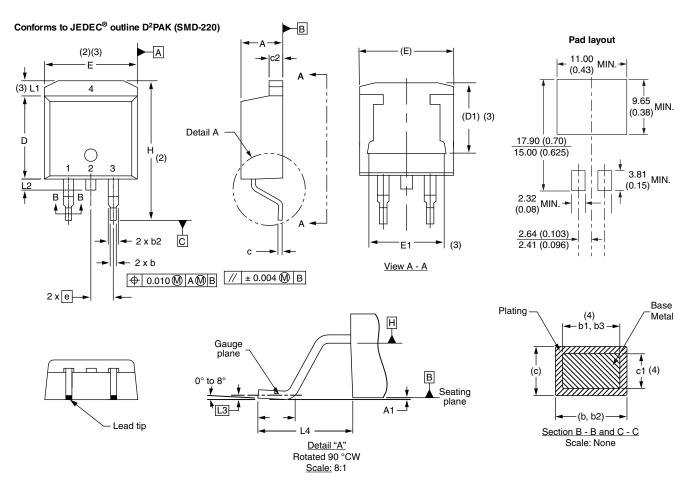
LINKS TO RELATED DOCUMENTS					
Dimensions	D ² PAK (TO-263AB)	www.vishay.com/doc?96164			
Dimensions	TO-262AA	www.vishay.com/doc?96165			
Dort marking information	D ² PAK (TO-263AB)	www.vishay.com/doc?95444			
Part marking information	TO-262AA	www.vishay.com/doc?95443			
Packaging information	D ² PAK (TO-263AB)	www.vishay.com/doc?96424			



Vishay Semiconductors

D²PAK

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIM	ETERS	INC	HES	NOTES
STIVIBUL	MIN.	MAX.	MIN.	MAX.	NOIES	OTMBOL	MIN.	MAX.	MIN.	MAX.	NOTES
Α	4.06	4.83	0.160	0.190		D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010		E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039		E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4	е	2.54	BSC	0.100	BSC	
b2	1.14	1.78	0.045	0.070		Н	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4	L	1.78	2.79	0.070	0.110	
С	0.38	0.74	0.015	0.029		L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4	L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065		L3	0.25	BSC	0.010	BSC	
D	8.51	9.65	0.335	0.380	2	L4	4.78	5.28	0.188	0.208	

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inches
- (7) Outline conforms to JEDEC® outline TO-263AB

Revision: 13-Jul-17 Document Number: 96164

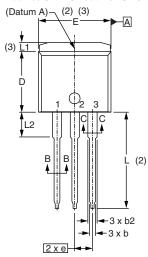


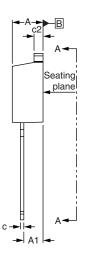
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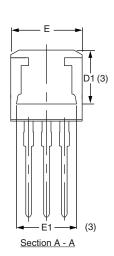
TO-262AA

DIMENSIONS in millimeters and inches

Modified JEDEC® outline TO-262







⊕ 0.010 **M** A**M** B

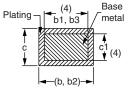
Lead assignments



Diodes 1. - Anode (two die)/open (one die)

2., 4. - Cathode

3. - Anode



Section B - B and C - C Scale: None

SYMBOL	MILLIM	IETERS	INC	INCHES		
	MIN.	MAX.	MIN.	MAX.	NOTES	
Α	4.06	4.83	0.160	0.190		
A1	2.03	3.02	0.080	0.119		
b	0.51	0.99	0.020	0.039		
b1	0.51	0.89	0.020	0.035	4	
b2	1.14	1.78	0.045	0.070		
b3	1.14	1.73	0.045	0.068	4	
С	0.38	0.74	0.015	0.029		
c1	0.38	0.58	0.015	0.023	4	
c2	1.14	1.65	0.045	0.065		
D	8.51	9.65	0.335	0.380	2	
D1	6.86	8.00	0.270	0.315	3	
Е	9.65	10.67	0.380	0.420	2, 3	
E1	7.90	8.80	0.311	0.346	3	
е	2.54	BSC	0.10	0 BSC		
L	13.46	14.10	0.530	0.555		
L1	-	1.65	-	0.065	3	
L2	3.56	3.71	0.140	0.146		

Notes

(4) Dimension b1 and c1 apply to base metal only

Controlling dimension: inches

⁽¹⁾ Dimensioning and tolerancing as per ASME Y14.5M-1994
(2) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body

Thermal pad contour optional within dimension E, L1, D1 and E1

Outline conform to JEDEC® TO-262 except A1 (max.), b (min., max.), b1 (min.), b2 (max.), c (min.), c1(min.), c2 (max.), D (min.), E (max.), L1 (max.), L2 (min., max.)



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