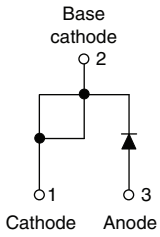
Ultrafast Rectifier, 8 A FRED Pt®

TO-220AC



FEATURES

- Ultrafast and soft recovery time
- Optimized forward voltage drop
- 175 °C maximum operating junction temperature
- Polyimide passivation
- Rugged design
- Good thermal performance
- AEC-Q101 qualified available
- Meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

PRODUCT SUMMARY	
Package	TO-220AC
$I_{F(AV)}$	8 A
V_R	1200 V
V_F at I_F at 125 °C	1.95 V
t_{rr}	42 ns
T_J max.	175 °C
Diode variation	Single die

DESCRIPTION / APPLICATIONS

Ultrafast recovery rectifiers designed with optimized forward voltage drop, ultrafast recovery time and soft recovery.

Polyimide passivated with a planar structure and platinum-doped lifetime control guarantee ruggedness, reliability and offer a solid value for efficiency and thermal performance.

These devices are intended for use in the boost stage in the AC/DC section of SMPS, high frequency output rectification of battery chargers, inverters for solar inverters or as freewheeling diodes in motor drives.

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Repetitive peak reverse voltage	V_{RRM}		1200	V
Average rectified forward current	$I_{F(AV)}$	T_C = 140 °C, D = 0.50	8	A
Non repetitive peak surge current	I_{FSM}	T_C = 25 °C, t_p = 10 ms, sine wave	80	
Repetitive peak forward current	I_{FM}		16	
Operating junction and storage temperature	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	I_R = 200 µA	1200	-	-	V
Forward voltage	V_F	I_F = 8 A	-	2.05	2.55	
		I_F = 8 A, T_J = 125 °C	-	1.95	2.37	
Reverse leakage current	I_R	V_R = V_R rated	-	-	55	µA
		T_J = 125 °C, V_R = V_R rated	-	-	100	
Junction capacitance	C_T	V_R = 200 V	-	8	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	I_F = 1.0 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	42	-	ns
		T_J = 25 °C	I_F = 8 A dI_F/dt = 100 A/µs V_R = 390 V	-	144	-	
		T_J = 125 °C		-	204	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	5	-	A
		T_J = 125 °C		-	7.2	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	370	-	nC
		T_J = 125 °C		-	745	-	

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}		-	1.25	1.5	°C/W
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	54	60	
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth, and greased	-	0.18	0.4	
Weight			-	0.2	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style: TO-220AC	8ETU12H			

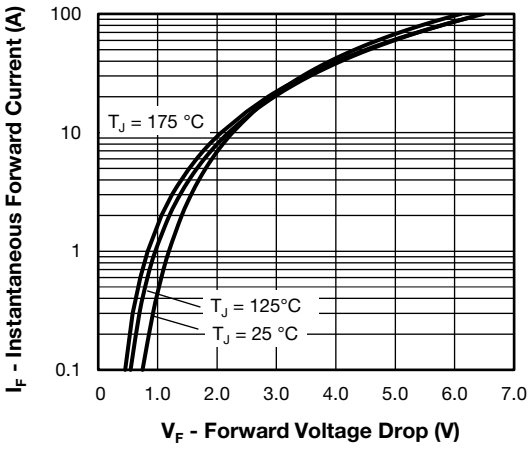


Fig. 1 - Typical Forward Voltage Drop Characteristics

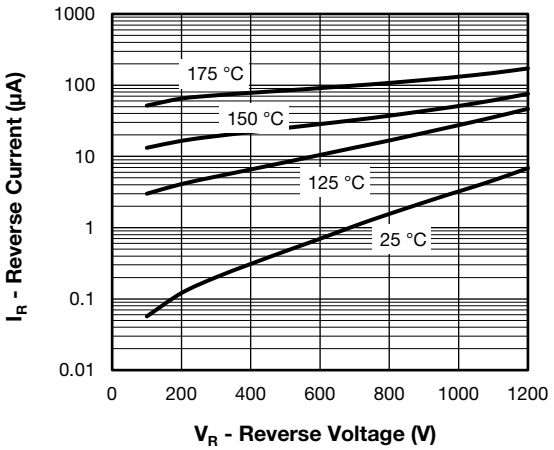


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

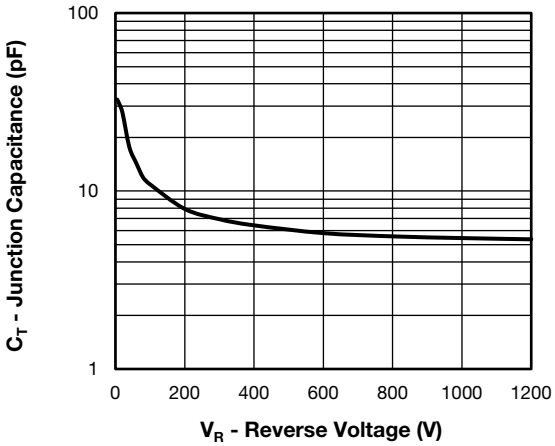


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

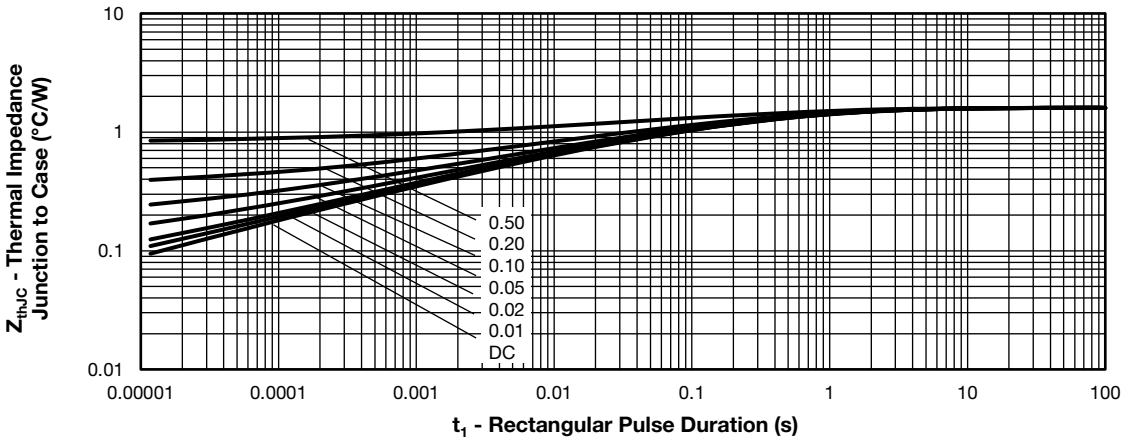


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

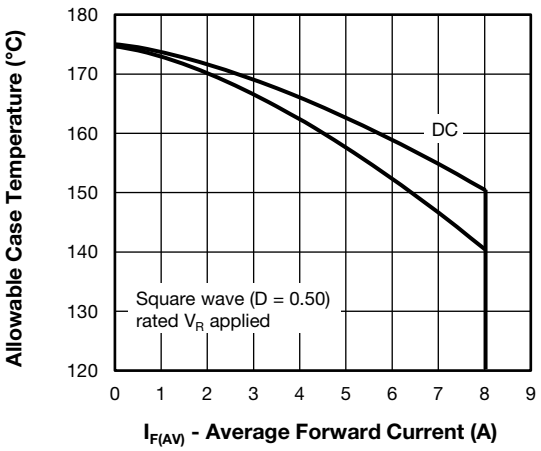


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

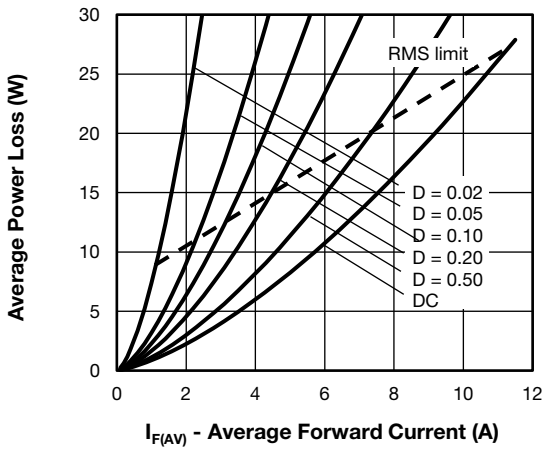


Fig. 6 - Forward Power Loss Characteristics

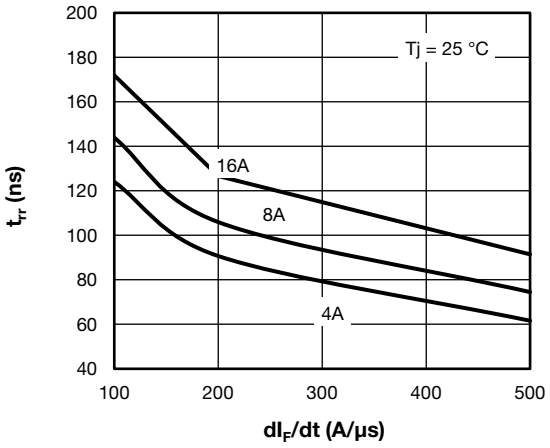


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

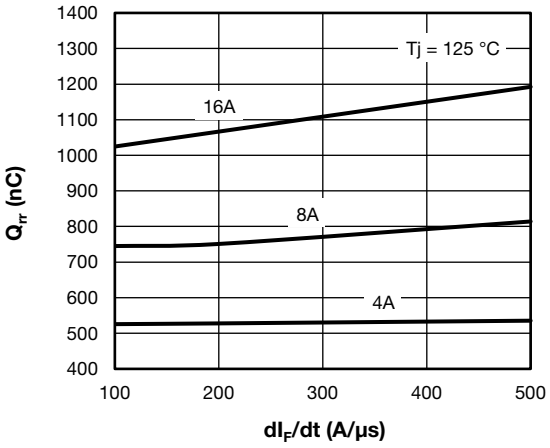


Fig. 10 - Typical Stored Charge vs. dI_F/dt

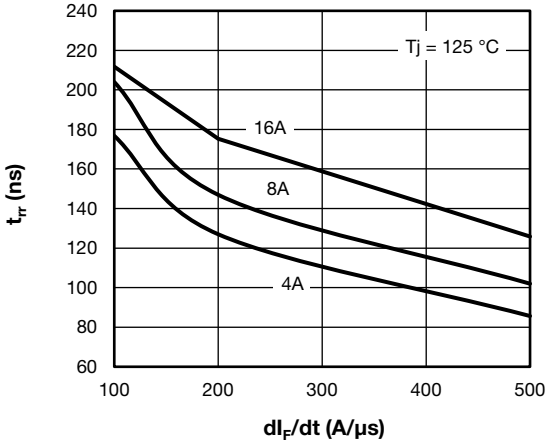


Fig. 8 - Typical Reverse Recovery Time vs. dI_F/dt

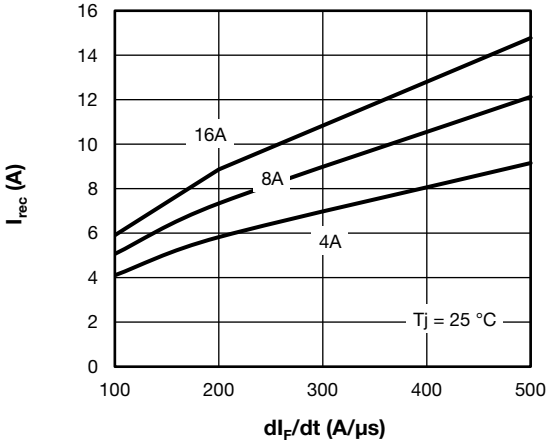


Fig. 11 - Typical Reverse Current vs. dI_F/dt

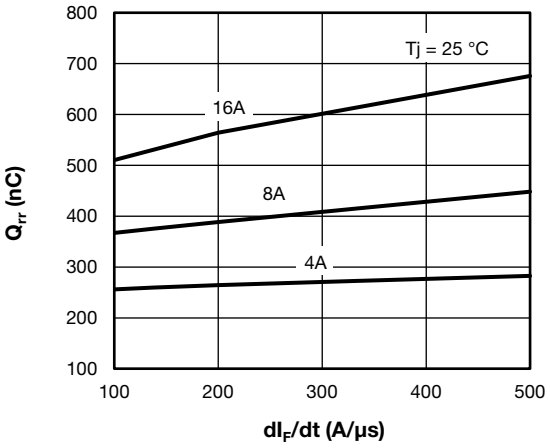


Fig. 9 - Typical Stored Charge vs. dI_F/dt

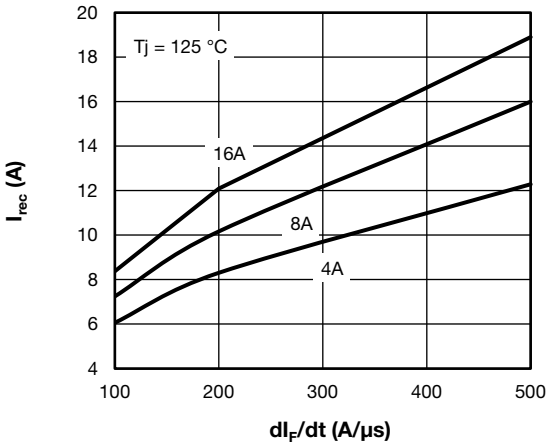
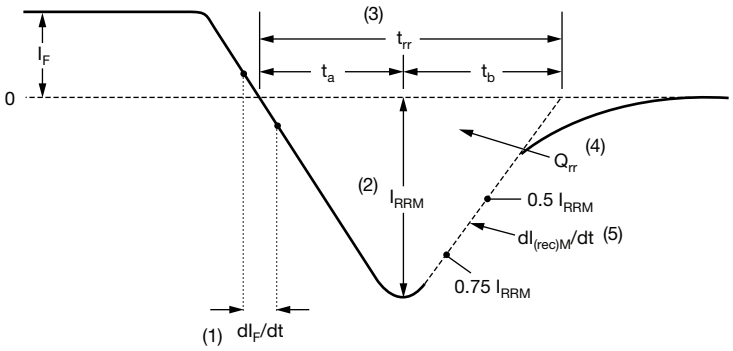


Fig. 12 - Typical Reverse Current vs. dI_F/dt



(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. 13 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code

VS-	8	E	T	U	12	H	N3
1	2	3	4	5	6	7	8

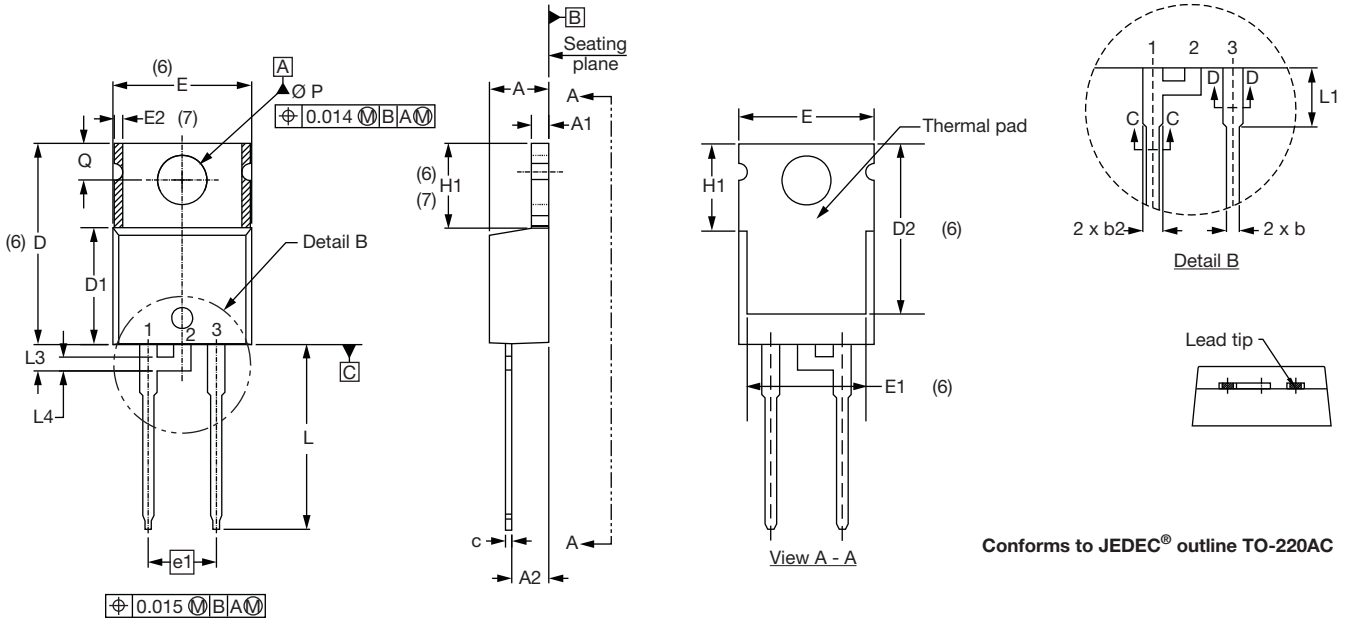
- 1 - Vishay Semiconductors product
- 2 - Current rating (8 = 8 A)
- 3 - Circuit configuration: E = single diode
- 4 - Package:
  T = TO-220
- 5 - U = ultrafast recovery
- 6 - Voltage rating (12 = 1200 V)
- 7 - H = AEC-Q101 qualified
- 8 - Environmental digit:
  N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER T/R**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-8ETU12HN3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95221
Part marking information	www.vishay.com/doc?95068

TO-220AC

DIMENSIONS in millimeters and inches



Conforms to JEDEC® outline TO-220AC

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.56	2.92	0.101	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.25	0.585	0.600	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	12.88	0.460	0.507	6
E	10.11	10.51	0.398	0.414	3, 6

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E1	6.86	8.89	0.270	0.350	6
E2	-	0.76	-	0.030	7
e1	4.88	5.28	0.192	0.208	
H1	5.84	6.86	0.230	0.270	6, 7
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
L3	1.78	2.13	0.070	0.084	
L4	0.76	1.27	0.030	0.050	2
Ø P	3.54	3.73	0.139	0.147	
Q	2.60	3.00	0.102	0.118	

Notes

(1) Dimensioning and tolerancing as per ASME Y14.5M-1994
(2) Lead dimension and finish uncontrolled in L1
(3) Dimension D, D1 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 outermost extremes of the plastic body
(4) Dimension b1, b3 and c1 apply to base metal only
(5) Controlling dimension: inches
(6) Thermal pad contour optional within dimensions E, H1, D2 and E1
(7) Dimension E2 x H1 define a zone where stamping and singulation irregularities are allowed
(8) Outline conforms to JEDEC TO-220, D2 (minimum) where dimensions are derived from the actual package outline

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