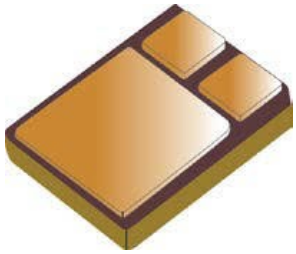
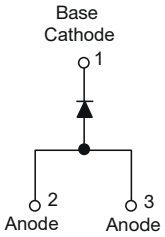
Hyperfast Rectifier, 8 A FRED Pt®





FEATURES

- Wafer fab by Vishay Semiconductors
- Hyperfast recovery time
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- Hermetic U8 (SMD.2) package
- Available with Engineering Model through JANS equivalent screening (see ordering PN table)

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	8 A
V_R	300 V
V_F at I_F	0.83 V
t_{rr} typ.	See Recovery table
T_J max.	175 °C
Package	SMD.2
Circuit configuration	Single

DESCRIPTION / APPLICATIONS

300 V series are the state of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop and hyperfast recovery time.

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 the output rectification stage of SMPS, UPS, DC/DC converters as well as freewheeling diodes in low voltage inverters and chopper motor drives.

Their 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**	**VALUES**	**UNITS**
Repetitive peak reverse voltage	V_{RRM}		300	V
Average rectified forward current	$I_{F(AV)}$	T_C = 155 °C	8	A
Non-repetitive peak surge current	I_{FSM}	T_C = 25 °C	100	
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	300	-	-	V
Forward voltage	V_F	I_F = 8 A	-	1.0	1.25	
		I_F = 8 A, T_J = 125 °C	-	0.83	1.00	
Reverse leakage current	I_R	V_R = V_R rated	-	0.02	20	µA
		T_J = 125 °C, V_R = V_R rated	-	6.0	200	
Junction capacitance	C_T	V_R = 300 V	-	31	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8	-	nH

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 = - 50 A/µs, V_R = 30 V		-	-	35	ns
		T_J = 25 °C	I_F = 8 A dI_F/dt = - 200 A/µs V_R = 200 V	-	27	-	
		T_J = 125 °C		-	40	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	2.2	-	A
		T_J = 125 °C		-	5.3	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	30	-	nC
		T_J = 125 °C		-	106	-	

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}		-	1.45	2.5	°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	-	0.2	-	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-220AC 2L	8ETH03			

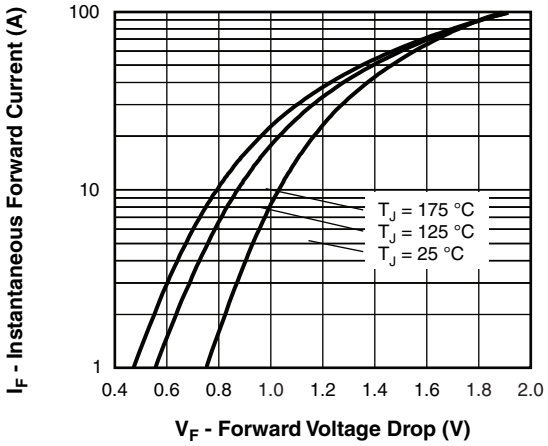


Fig. 1 - Typical Forward Voltage Drop Characteristics

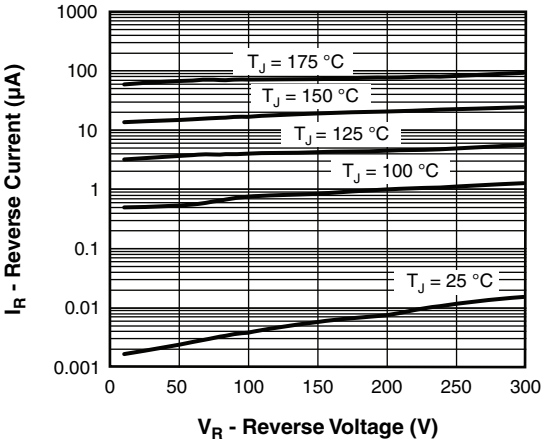


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

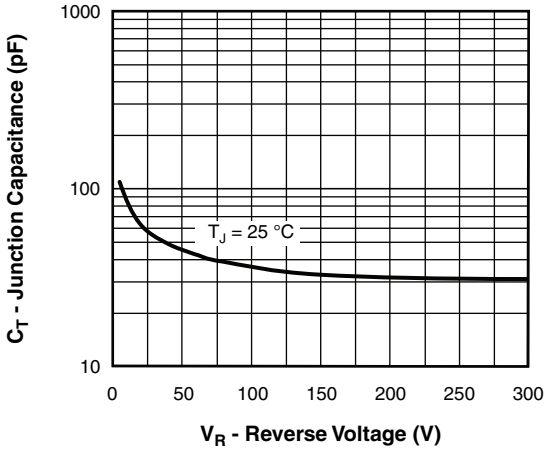


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

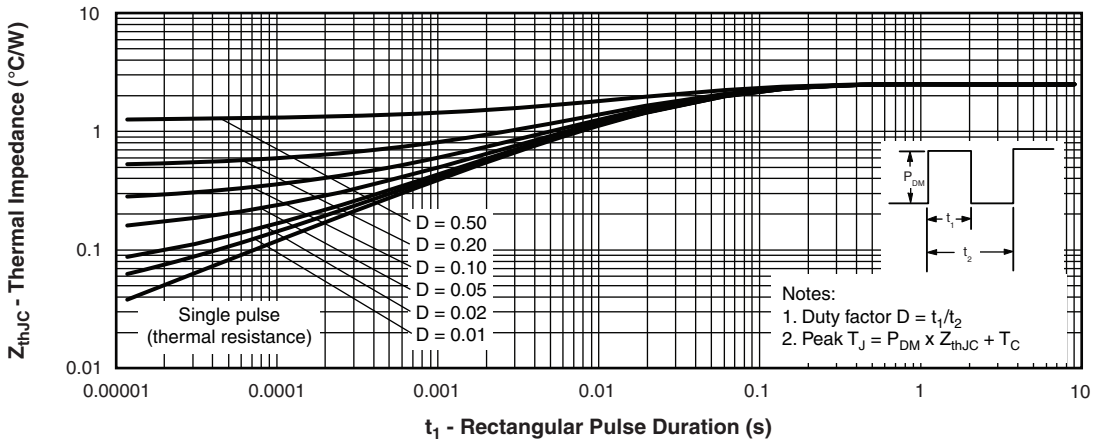


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

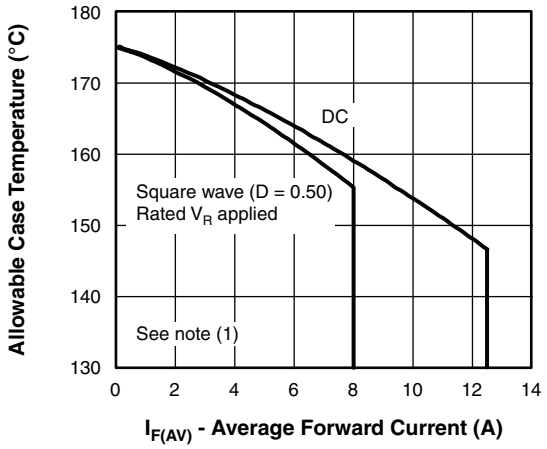


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

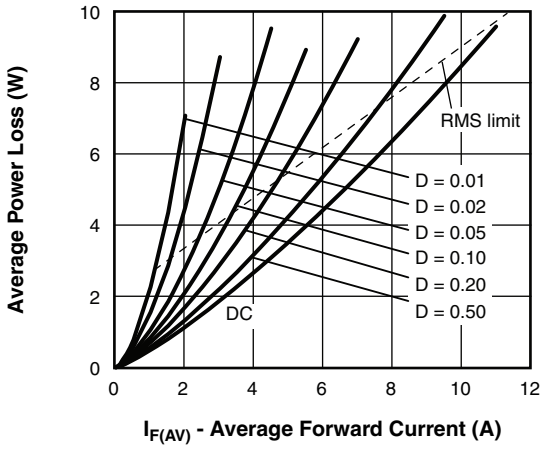


Fig. 6 - Forward Power Loss Characteristics

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

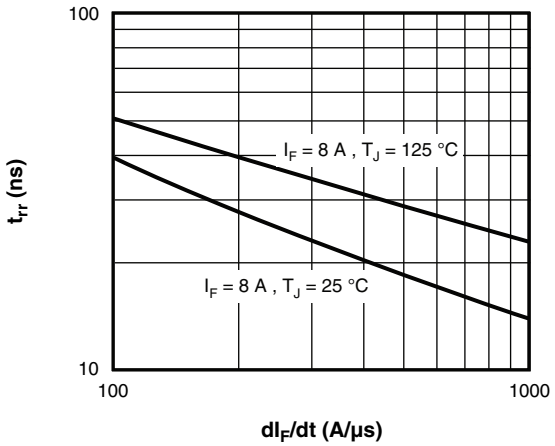


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

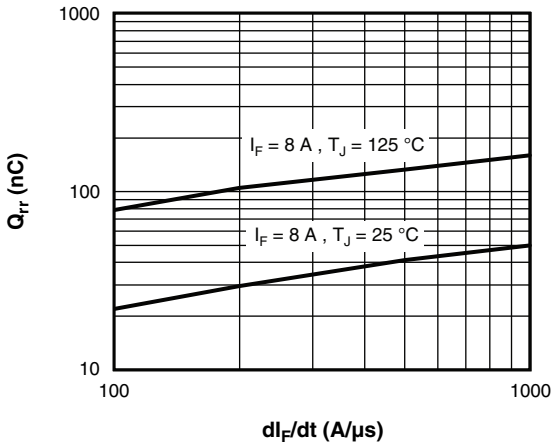
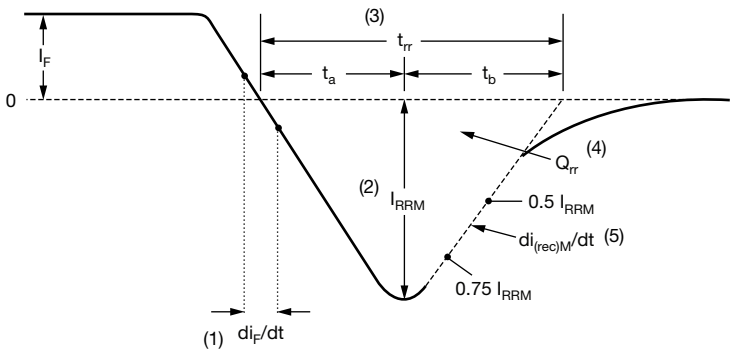


Fig. 8 - Typical Stored Charge vs. dI_F/dt



(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.

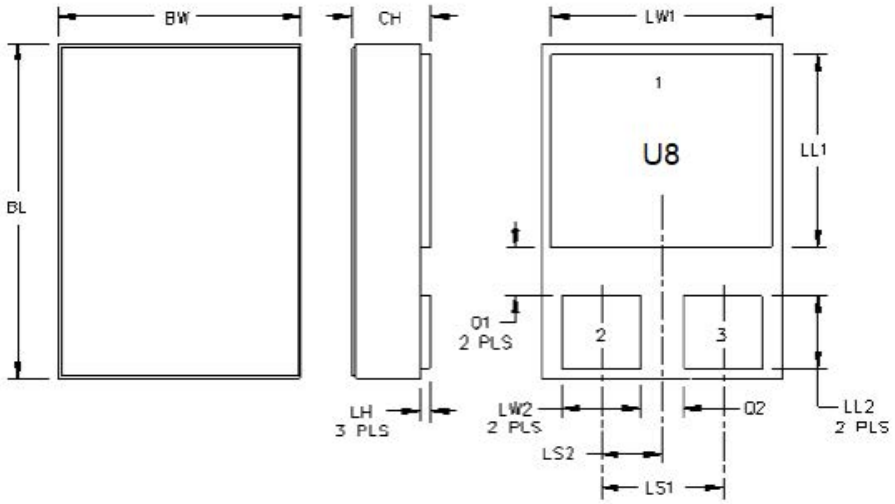
(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

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

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

Fig. 1 - Reverse Recovery Waveform and Definitions

Outline Drawing (U8)



Symbol	Dimensions			
	Inches		Milimeters	
	Max	Min	Max	Min
BL	0.303	0.323	7.70	8.20
BW	0.200	0.226	5.08	5.74
CH	-	0.112	-	2.85
LH	-	0.020	-	0.51
LW1	0.193	0.203	4.90	5.16
LW2	0.076	0.086	1.93	2.19
LL1	0.174	0.184	4.42	4.67
LL2	0.074	0.084	1.88	2.13
LS1	0.106		2.70	
LS2	0.053		1.35	
Q1	0.020	0.031	0.52	0.78
Q2	0.026	0.037	0.67	0.93

ESC ORDERING INFORMATION

PART NUMBER	EQUIVALENT SCREENING LEVEL	QCI per MIL-PRF-19500 (Note 2)	DESCRIPTION
ESE8EU8H03	Engineering Model	Not Applicable	EM units or commercial applications, (see Note 1)
ESQ8EU8H03	JAN	Group A only	JAN screening flow per MIL-PRF-19500
ESX8EU8H03	JANTX	Group A only	JANTX screening flow per MIL-PRF-19500
ESV8EU8H03	JANTXV	Group A only	Same as JANTX plus 100% precap visual inspection
ESS8EU8H03	JANS	Group A only	JANS screening per MIL-PRF-19500

Note 1: EM flow includes hermeticity and 3 temp testing of dc parameters 100%; dynamic parameters are tested on the first 116 units only and guaranteed by design.

Note 2: Full QCI per MIL PRF 19500 Groups B, C, D, and E are available if required, consult ESC at time of quote.