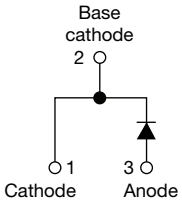
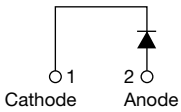
Hyperfast Rectifier, 8 A FRED Pt®

2L TO-220AC

2L TO-220 FULL-PAK



VS-8E2TH06



VS-8E2TH06FP

FEATURES

- Hyperfast recovery time, reduced Q_{rr} and soft recovery
- 175 °C maximum operating junction temperature
- For PFC CRM/CCM operation
- True 2 pin package
- Low forward voltage drop
- Low leakage current
- Fully isolated package (V_{INS} = 2500 V_{RMS})
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- Designed and qualified for industrial level

Pb e3 RoHS COMPLIANT HALOGEN FREE Available

DESCRIPTION/APPLICATIONS

State of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop and 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	
Package	2L TO-220AC, 2L TO-220 FP
$I_{F(AV)}$	8 A
V_R	600 V
V_F at I_F	2.5 V
t_{rr} (typ.)	17 ns
T_J max.	175 °C
Diode variation	Single die

ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage		V_{RRM}		600	V
Average rectified forward current		$I_{F(AV)}$	T_C = 133 °C	8	A
	FULL-PAK		T_C = 78 °C		
Non-repetitive peak surge current		I_{FSM}	T_J = 25 °C	70	
Peak repetitive forward current		I_{FM}		16	
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 = 8 A	-	2.1	2.5	
		I_F = 8 A, T_J = 150 °C	-	1.6	1.9	
Reverse leakage current	I_R	V_R = V_R rated	-	0.2	35	µA
		T_J = 150 °C, V_R = V_R rated	-	50	350	
Junction capacitance	C_T	V_R = 600 V	-	6	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8	-	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		-	17	23	ns
		I_F = 8.0 A, dI_F/dt = 100 A/μs, V_R = 30 V		-	22	25	
		T_J = 25 °C	I_F = 8 A, dI_F/dt = 200 A/μs, V_R = 390 V	-	22	-	
		T_J = 125 °C		-	43	-	
			I_F = 8 A, dI_F/dt = 600 A/μs, V_R = 390 V	-	33	-	
Peak recovery current	I_{RRM}	T_J = 25 °C	I_F = 8 A, dI_F/dt = 200 A/μs, V_R = 390 V	-	3.1	-	A
		T_J = 125 °C		-	5.2	-	
			I_F = 8 A, dI_F/dt = 600 A/μs, V_R = 390 V	-	13	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C	I_F = 8 A, dI_F/dt = 200 A/μs, V_R = 390 V	-	32	-	nC
		T_J = 125 °C		-	120	-	
			I_F = 8 A, dI_F/dt = 600 A/μs, V_R = 390 V	-	230	-	

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}		-	2	2.4	°C/W
	FULL-PAK			-	5	5.5	
Thermal resistance, junction to ambient per leg		R_{thJA}	Typical socket mount	-	-	70	
Typical thermal resistance, case to heatsink		R_{thCS}	Mounting surface, flat, smooth and greased	-	0.5	-	
Weight				-	2	-	g
				-	0.07	-	oz.
Mounting torque				6 (5)	-	12 (10)	kgf · cm (lbf · in)
Marking device			Case style TO-220	8E2TH06			
			Case style TO-220 FULL-PAK	8E2TH06FP			

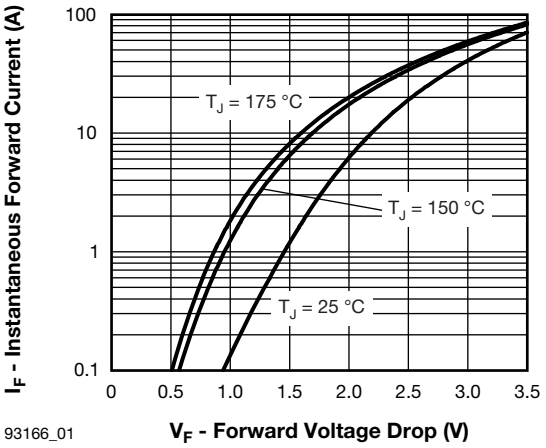


Fig. 1 - Typical Forward Voltage Drop Characteristics

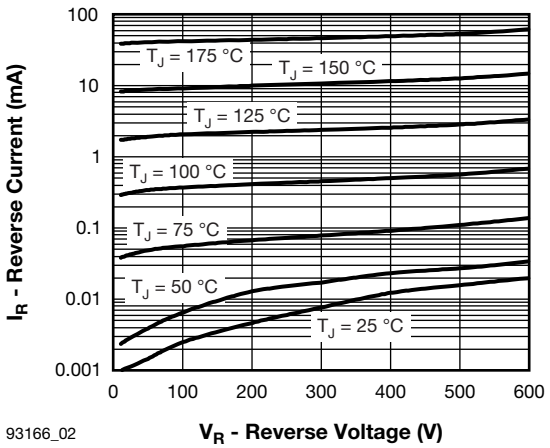


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

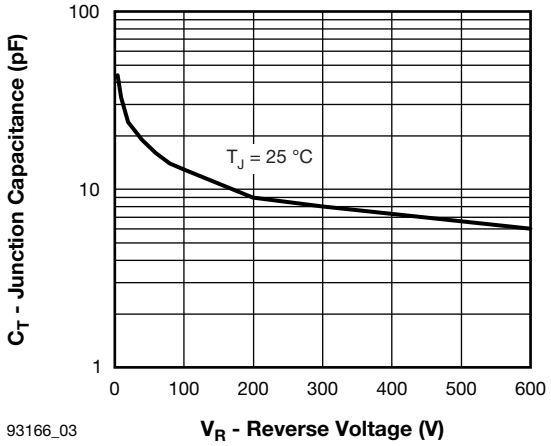


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

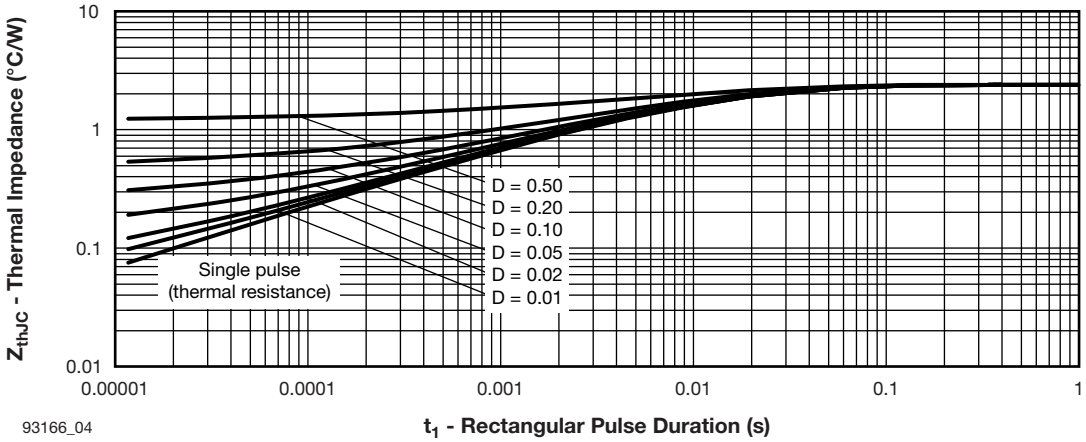


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (TO-220)

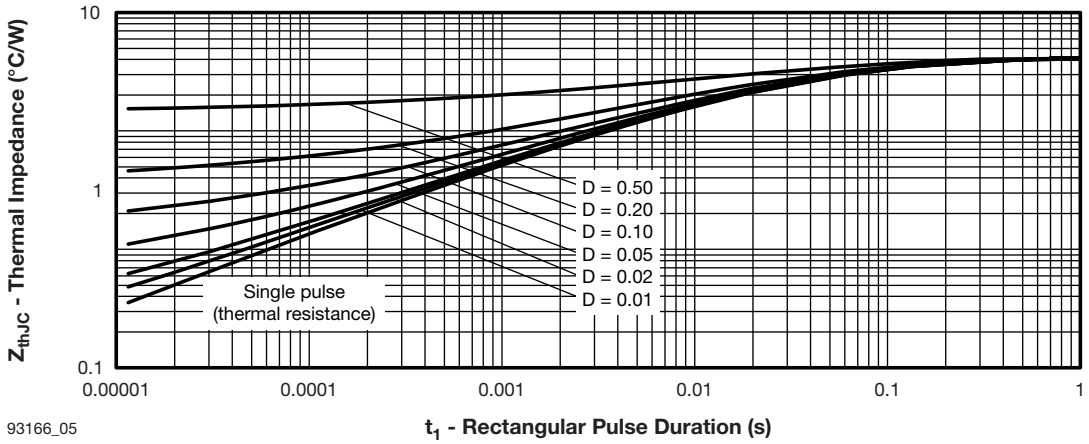


Fig. 5 - Maximum Thermal Impedance Z_{thJC} Characteristics (FULL-PAK)

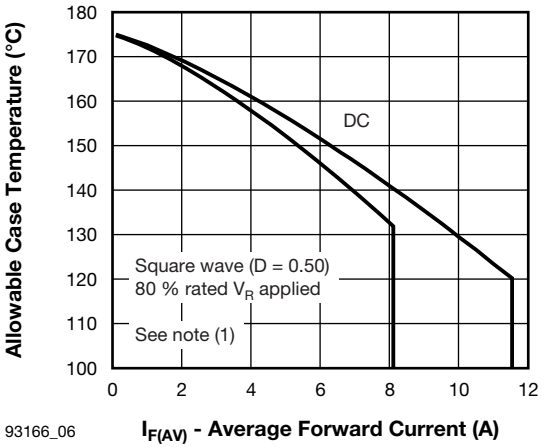


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current (TO-220)

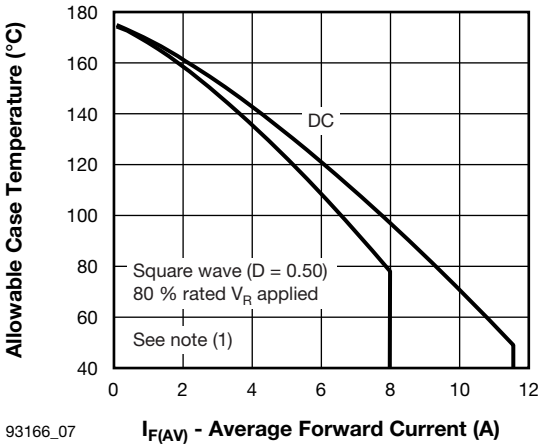


Fig. 7 - Maximum Allowable Case Temperature vs. Average Forward Current (FULL-PAK)

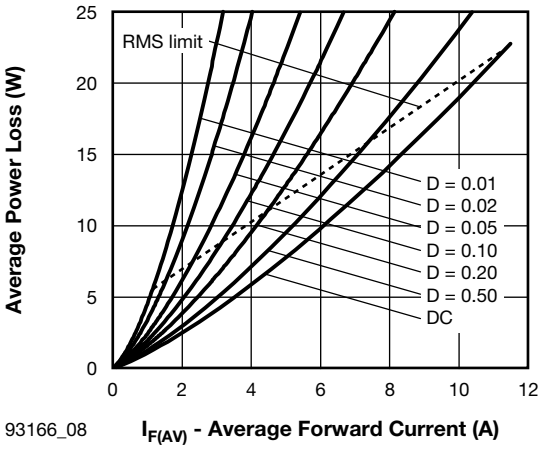


Fig. 8 - Forward Power Loss Characteristics

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

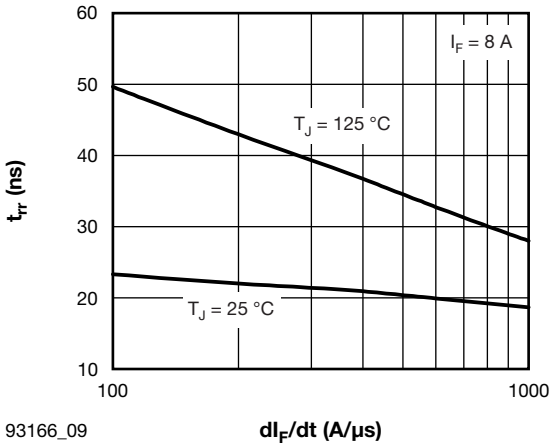


Fig. 9 - Typical Reverse Recovery Time vs. dI_F/dt

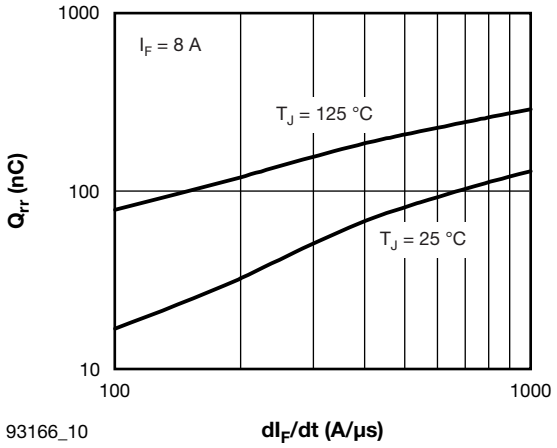


Fig. 10 - Typical Stored Charge vs. dI_F/dt

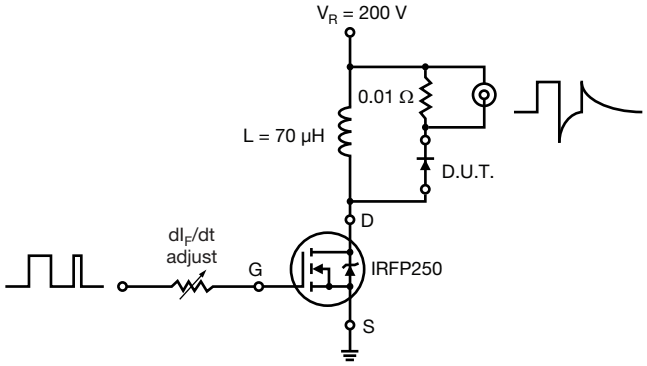
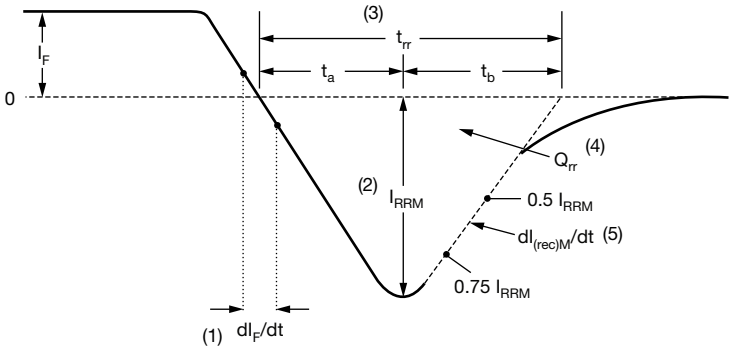


Fig. 11 - Reverse Recovery Parameter Test Circuit



(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. 12 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	VS-	8	E	2	T	H	06	FP	-E
	1	2	3	4	5	6	7	8	9

1 - Vishay Semiconductors product suffix
2 - Current rating (8 = 8 A)
3 - Circuit configuration:
E = Single diode
4 - 2 = True 2 pin package
5 - T = TO-220
6 - H = Hyperfast recovery time
7 - Voltage code (06 = 600 V)
8 -
- None = TO-220
- FP = FULL-PAK

9 - Environmental digit:
- -E = RoHS compliant and terminations lead (Pb)-free
- -M = Halogen-free, RoHS compliant and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER TUBE**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-8E2TH06-E	50	1000	Antistatic plastic tubes
VS-8E2TH06-M	50	1000	Antistatic plastic tubes
VS-8E2TH06FP-E	50	1000	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-220AC	www.vishay.com/doc?95259
	TO-220 FULL-PAK	www.vishay.com/doc?95260
Part marking information	TO-220AC	www.vishay.com/doc?95391
	TO-220 FULL-PAK	www.vishay.com/doc?95392
Packaging information		www.vishay.com/doc?95388

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