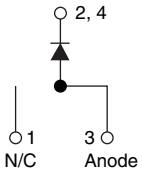
Ultralow V_F Ultrafast Rectifier, 6 A FRED Pt®

D-PAK (TO-252AA)



FEATURES

- Hyperfast recovery time, reduced Q_{rr} and soft recovery
- 175 °C maximum operating junction temperature
- For PFC CRM/CCM operation
- Low forward voltage drop
- Low leakage current
- AEC-Q101 qualified
- Meets JESD 201 class 2 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

PRODUCT SUMMARY	
Package	D-PAK (TO-252AA)
$I_{F(AV)}$	6 A
V_R	600 V
V_F at I_F	2.1 V
t_{rr} (typ.)	18 ns
T_J max.	175 °C
Diode variation	Single die

DESCRIPTION/APPLICATIONS

State of the art 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. 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
Peak repetitive reverse voltage	V_{RRM}		600	V
Average rectified forward current	$I_{F(AV)}$	T_C = 144 °C	6	A
Non-repetitive peak surge current	I_{FSM}	T_J = 25 °C	70	
Peak repetitive forward current	I_{FM}	T_C = 144 °C, f = 20 kHz, d = 50 %	12	
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 = 6 A	-	1.60	2.1	
		I_F = 6 A, T_J = 150 °C	-	1.26	1.7	
Reverse leakage current	I_R	V_R = V_R rated	-	-	50	µA
		T_J = 150 °C, V_R = V_R rated	-	-	250	
Junction capacitance	C_T	V_R = 600 V	-	3.5	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8	-	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	t_{rr}	I_F = 1 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	18	25	ns
		I_F = 1 A, dI_F/dt = 50 A/µs, V_R = 30 V		-	22	-	
		T_J = 25 °C	I_F = 6 A dI_F/dt = 200 A/µs V_R = 390 V	-	27	-	
		T_J = 125 °C		-	37	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	4.1	-	A
		T_J = 125 °C		-	5.3	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	57	-	nC
		T_J = 125 °C		-	103	-	

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}		-	-	3	°C/W
Approximate weight			0.3			g
			0.01			oz.
Marking device		Case style D-PAK	6EWH06FNH			

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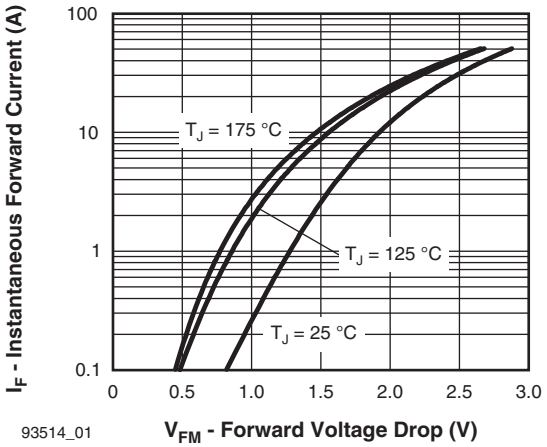

Fig. 1 - Typical Forward Voltage Drop Characteristics

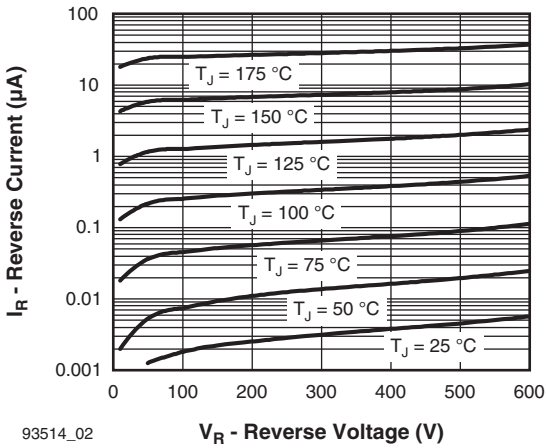

Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

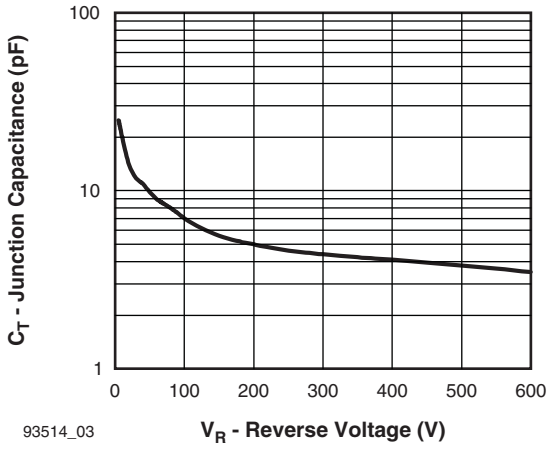

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

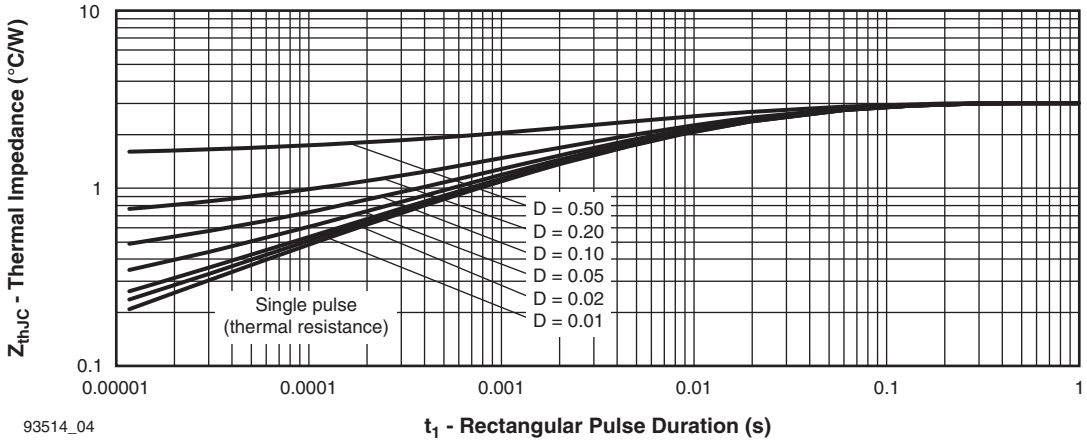

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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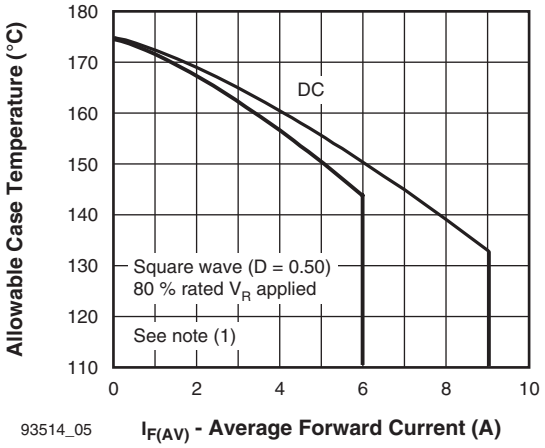

Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

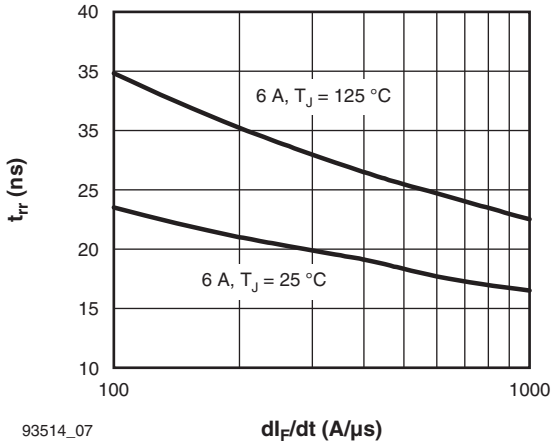

Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

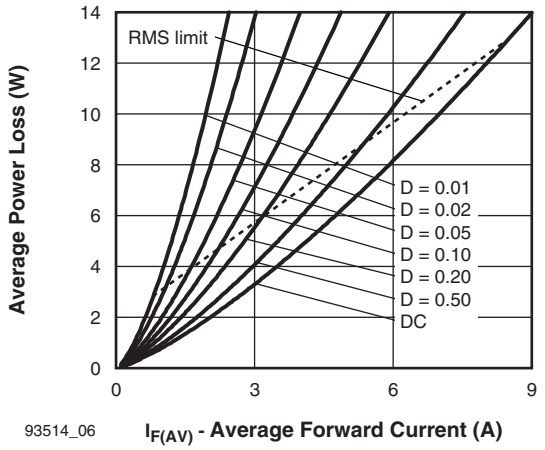

Fig. 6 - Forward Power Loss Characteristics

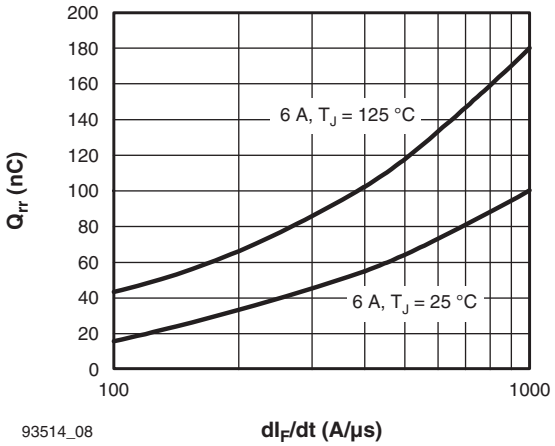

Fig. 8 - Typical Stored Charge vs. dI_F/dt

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

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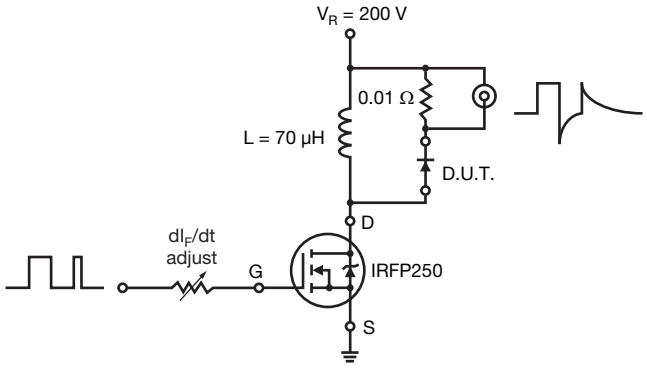
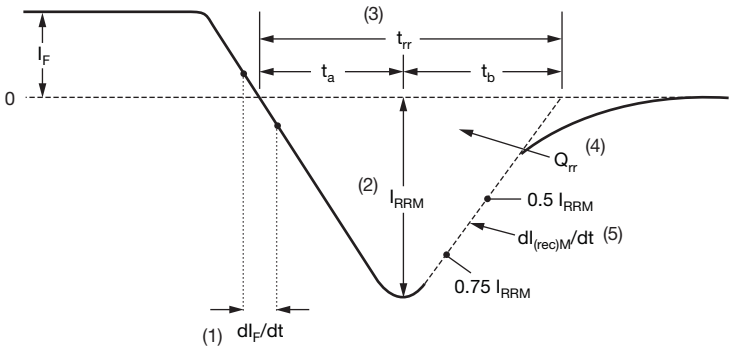


Fig. 9 - Reverse Recovery Parameter Test Circuit



(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. 10 - Reverse Recovery Waveform and Definitions

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ORDERING INFORMATION TABLE

Device code

VS-	6	E	W	H	06	FN	TRL	H	M3
1	2	3	4	5	6	7	8	9	10

1 - Vishay Semiconductors product

2 - Current rating (6 = 6 A)

3 - Circuit configuration:
E = Single diode

4 - Package identifier:
W = D-PAK

5 - H = Hyperfast recovery

6 - Voltage rating (06 = 600 V)

7 - FN = TO-252AA

8 - • None = Tube
• TR = Tape and reel
• TRL = Tape and reel (left oriented)
• TRR = Tape and reel (right oriented)

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 T/R**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-6EWH06FNHM3	75	3000	Antistatic plastic tube
VS-6EWH06FNTRHM3	2000	2000	13" diameter reel
VS-6EWH06FNTRRHM3	3000	3000	13" diameter reel
VS-6EWH06FNTRLHM3	3000	3000	13" diameter reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95519
Part marking information	www.vishay.com/doc?95518
Packaging information	www.vishay.com/doc?95033

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