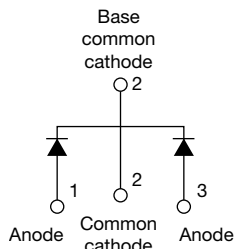


Hyperfast Rectifier, 2 x 5 A FRED Pt®


TO-252AA (D-PAK)


FEATURES

- Hyperfast recovery time
- 175 °C max. operating junction temperature
- Output rectification freewheeling
- Low forward voltage drop reduced Q_{rr} and soft recovery
- Low leakage current
- 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	TO-252AA (D-PAK)
$I_{F(AV)}$	2 x 5 A
V_R	200 V
V_F at I_F	0.74 V
t_{rr} (typ.)	23 ns
T_J max.	175 °C
Diode variation	Common cathode

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}		200	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 160\text{ °C}$	10	A
Non-repetitive peak surge current	I_{FSM}	$T_J = 25\text{ °C}$	80	
Operating junction and storage temperatures	T_J, T_{Stg}		-65 to +175	°C

ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ °C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V_{BR}, V_R	$I_R = 100\text{ }\mu\text{A}$	200	-	-	V
Forward voltage	V_F	$I_F = 5\text{ A}$	-	0.90	0.98	
		$I_F = 10\text{ A}$	-	0.98	1.15	
		$I_F = 5\text{ A}, T_J = 150\text{ °C}$	-	0.74	0.84	
		$I_F = 10\text{ A}, T_J = 150\text{ °C}$	-	0.84	1.05	
Reverse leakage current per leg	I_R	$V_R = V_R$ rated	-	-	4	μA
		$T_J = 125\text{ °C}, V_R = V_R$ rated	-	-	40	
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	-	80	
Junction capacitance per leg	C_T	$V_R = 600\text{ V}$	-	17	-	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 A, dI _F /dt = 100 A/μs, V _R = 30 V		-	23	27	ns
		T _J = 25 °C	I _F = 5 A dI _F /dt = 200 A/μs V _R = 160 V	-	21	-	
		T _J = 125 °C		-	26	-	
Peak recovery current	I _{RRM}	T _J = 25 °C		-	2	-	A
		T _J = 125 °C		-	3.1	-	
Reverse recovery charge	Q _{rr}	T _J = 25 °C		-	20	-	nC
		T _J = 125 °C		-	41	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		-65	-	175	$^{\circ}\text{C}$
Thermal resistance, $\frac{\text{per leg}}{\text{junction to case}}$ $\frac{\text{per device}}{\text{per device}}$	R_{thJC}		-	2.7	3.2	$^{\circ}\text{C}/\text{W}$
			-	1.35	1.6	
Approximate weight			0.3			g
			0.01			oz.
Marking device		Case style TO-252AA (D-PAK)	10CWH02FN			

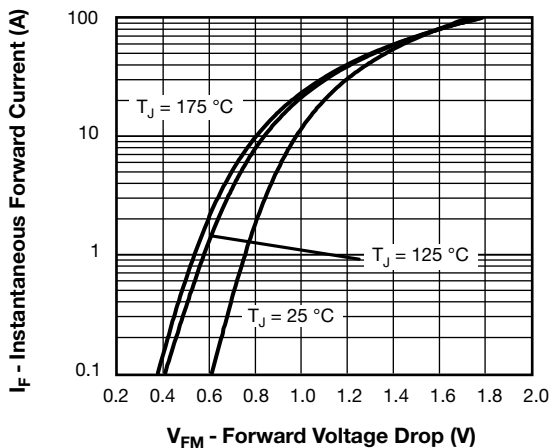


Fig. 1 - Typical Forward Voltage Drop Characteristics

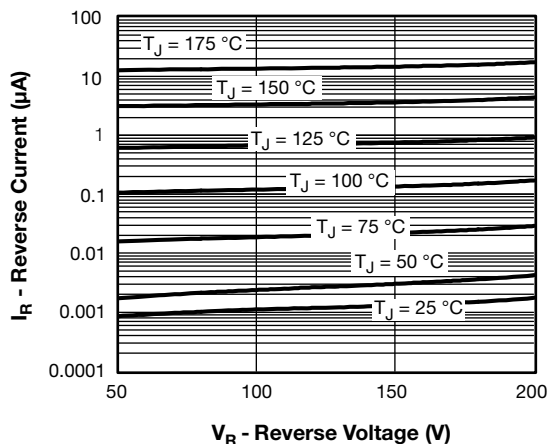


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

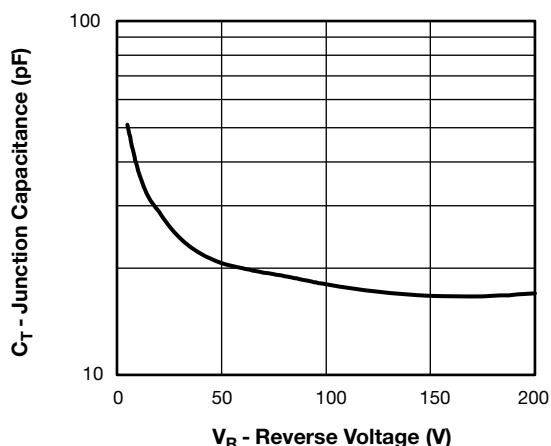


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

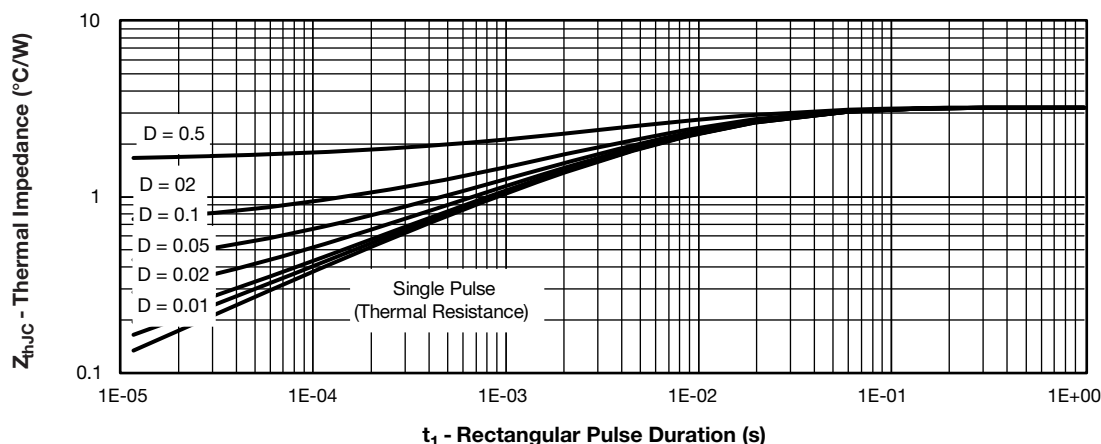
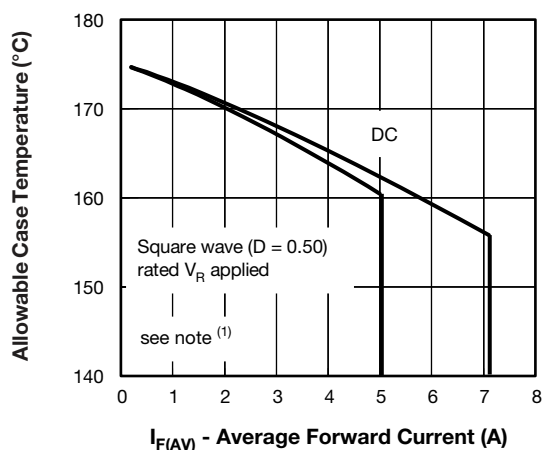

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics


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

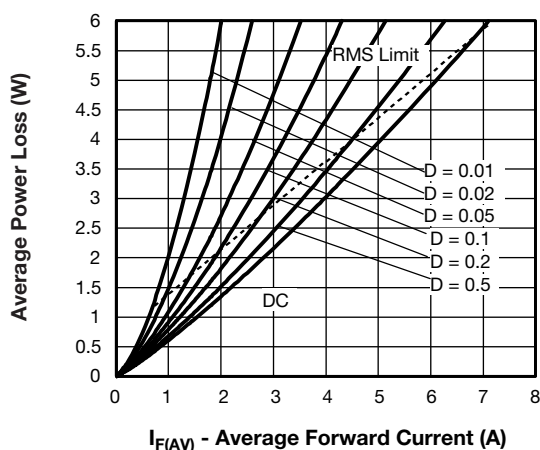


Fig. 6 - Forward Power Loss Characteristics

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 P_d = forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 P_{dREV} = inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = rated V_R

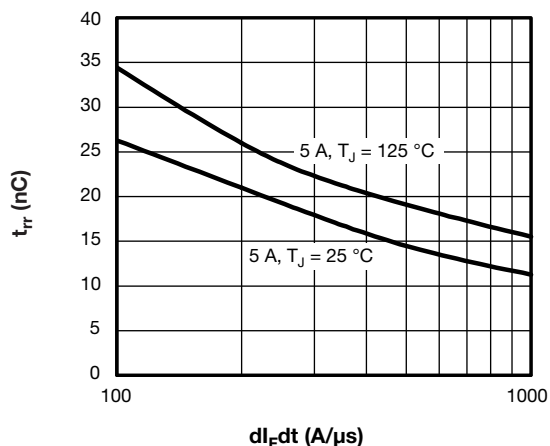
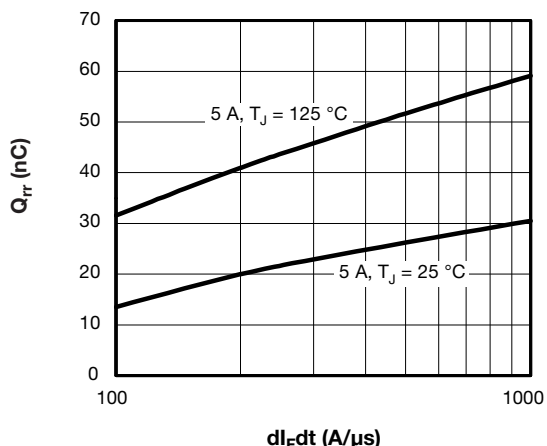
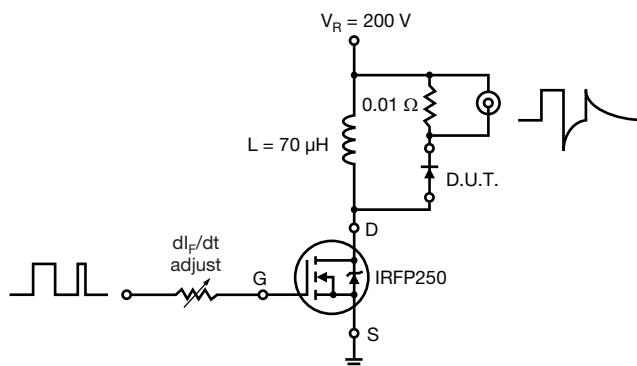

Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

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


Fig. 9 - Reverse Recovery Parameter Test Circuit

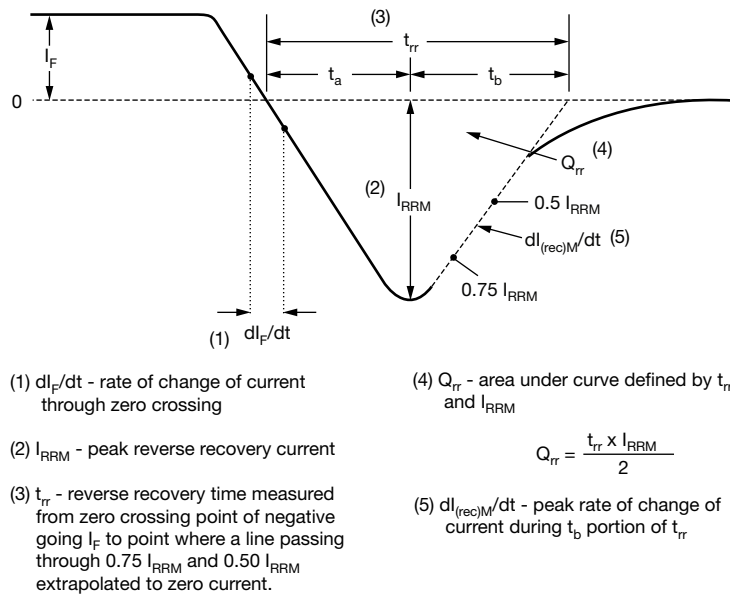


Fig. 10 - Reverse Recovery Waveform and Definitions

**ORDERING INFORMATION TABLE**

Device code	VS-	10	C	W	H	02	FN	TRL	-M3
	1	2	3	4	5	6	7	8	9

- | | | |
|----------|---|---|
| 1 | - | Vishay Semiconductors product |
| 2 | - | Current rating (10 = 10 A) |
| 3 | - | Circuit configuration:
C = common cathode |
| 4 | - | Package identifier:
W = D-PAK |
| 5 | - | H = hyperfast recovery |
| 6 | - | Voltage rating (02 = 200 V) |
| 7 | - | FN = TO-252AA |
| 8 | - | <ul style="list-style-type: none">• None = tube• TR = tape and reel• TRL = tape and reel (left oriented)• TRR = tape and reel (right oriented) |
| 9 | - | Environmental digit:
-M3 = halogen-free, RoHS-compliant and terminations lead (Pb)-free |

ORDERING INFORMATION (Example)

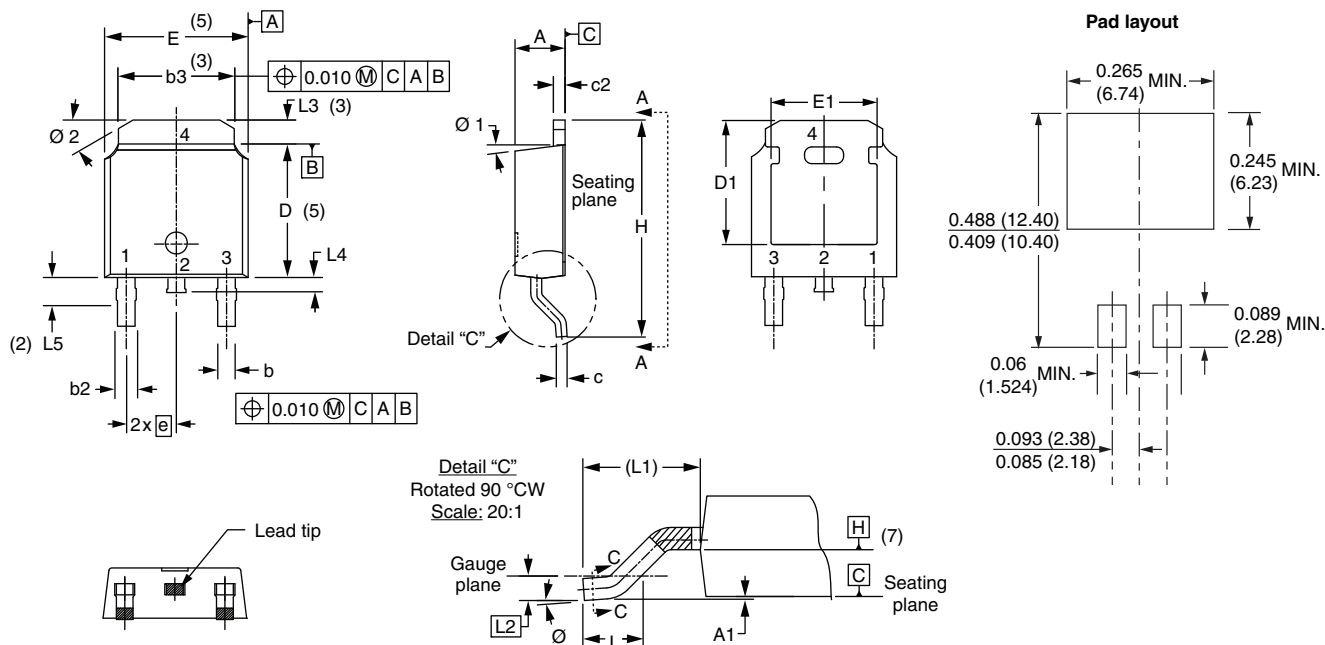
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-10CWH02FN-M3	75	3000	Antistatic plastic tube
VS-10CWH02FNTR-M3	2000	2000	13" diameter reel
VS-10CWH02FNTRL-M3	3000	3000	13" diameter reel
VS-10CWH02FNTRR-M3	3000	3000	13" diameter reel

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95627
Part marking information	www.vishay.com/doc?95176
Packaging information	www.vishay.com/doc?95033
SPIICE model	www.vishay.com/doc?95376

D-PAK (TO-252AA) "M"

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	2.18	2.39	0.086	0.094	
A1	-	0.13	-	0.005	
b	0.64	0.89	0.025	0.035	
b2	0.76	1.14	0.030	0.045	
b3	4.95	5.46	0.195	0.215	3
c	0.46	0.61	0.018	0.024	
c2	0.46	0.89	0.018	0.035	
D	5.97	6.22	0.235	0.245	5
D1	5.21	-	0.205	-	3
E	6.35	6.73	0.250	0.265	5
E1	4.32	-	0.170	-	3

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
e	2.29 BSC		0.090 BSC		
H	9.40	10.41	0.370	0.410	
L	1.40	1.78	0.055	0.070	
L1	2.74 BSC		0.108 REF.		
L2	0.51 BSC		0.020 BSC		
L3	0.89	1.27	0.035	0.050	3
L4	-	1.02	-	0.040	
L5	1.14	1.52	0.045	0.060	2
Ø	0°	10°	0°	10°	
Ø1	0°	15°	0°	15°	
Ø2	25°	35°	25°	35°	

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension uncontrolled in L5
- (3) Dimension D1, E1, L3 and b3 establish a minimum mounting surface for thermal pad
- (4) Section C - C dimension apply to the flat section of the lead between 0.13 and 0.25 mm (0.005 and 0.010") from the lead tip
- (5) 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 outermost extremes of the plastic body
- (6) Dimension b1 and c1 applied to base metal only
- (7) Datum A and B to be determined at datum plane H
- (8) Outline conforms to JEDEC® outline TO-252AA



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