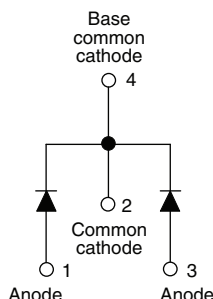


# Ultra fast Rectifier, 2 x 3 A FRED Pt®



DPAK (TO-252AA)



## FEATURES

- Ultra fast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- 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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## DESCRIPTION / APPLICATIONS

Vishay Semiconductors' 200 V series are the state of the art hyper fast recovery rectifiers specifically designed with optimized performance of forward voltage drop and hyper fast 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 diode 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.

## PRIMARY CHARACTERISTICS

$I_{F(AV)}$	2 x 3 A
$V_R$	200 V
$V_F$ at $I_F$	0.9 V
$t_{rr}$ typ.	See Recovery table
$T_J$ max.	175 °C
Package	DPAK (TO-252AA)
Circuit configuration	Common cathode

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Peak repetitive reverse voltage	$V_{RRM}$		200	V
Average rectified forward current per device	$I_{F(AV)}$	Total device, rated $V_R$ , $T_C = 159$ °C	6	A
Non-repetitive peak surge current	$I_{FSM}$		50	
Peak repetitive forward current per diode	$I_{FM}$	Rated $V_R$ , square wave, 20 kHz, $T_C = 159$ °C	6	
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	$V_{BR}, V_R$	$I_R = 100$ $\mu$ A	200	-	-	V
Forward voltage	$V_F$	$I_F = 3$ A	-	0.9	1	
		$I_F = 3$ A, $T_J = 125$ °C	-	0.78	0.9	
		$I_F = 6$ A	-	1	1.2	
		$I_F = 6$ A, $T_J = 125$ °C	-	0.89	1.08	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	-	5	$\mu$ A
		$T_J = 125$ °C, $V_R = V_R$ rated	-	-	100	
Junction capacitance	$C_T$	$V_R = 200$ V	-	12	-	pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	8.0	-	nH

**DYNAMIC RECOVERY CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1.0\text{ A}$ , $dI_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	20	35	ns
		$T_J = 25^\circ\text{C}$	-	19	-	
		$T_J = 125^\circ\text{C}$	-	26	-	
Peak recovery current	$I_{RRM}$	$T_J = 25^\circ\text{C}$	-	3.1	-	A
		$T_J = 125^\circ\text{C}$	-	4.6	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25^\circ\text{C}$	-	30	-	nC
		$T_J = 125^\circ\text{C}$	-	60	-	

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$	-65	-	175	$^\circ\text{C}$
Thermal resistance, junction to case per leg	$R_{thJC}$	-	-	5	$^\circ\text{C}/\text{W}$
Weight		-	0.3	-	g
		-	0.01	-	oz.
Mounting torque		6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style DPAK (TO-252AA)		6CWH02FNH	

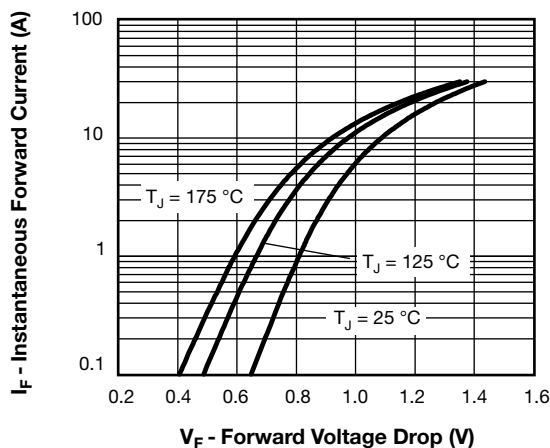


Fig. 1 - Maximum Forward Voltage Drop Characteristics

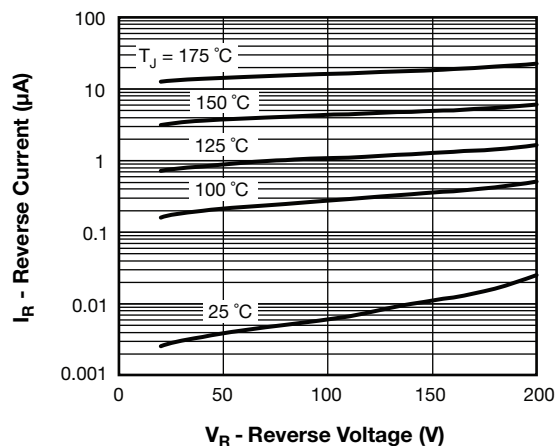


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

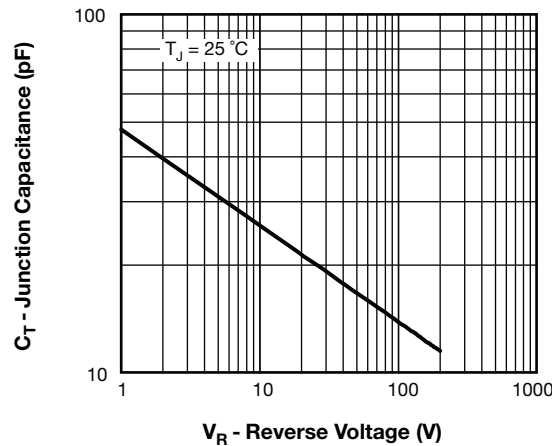


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

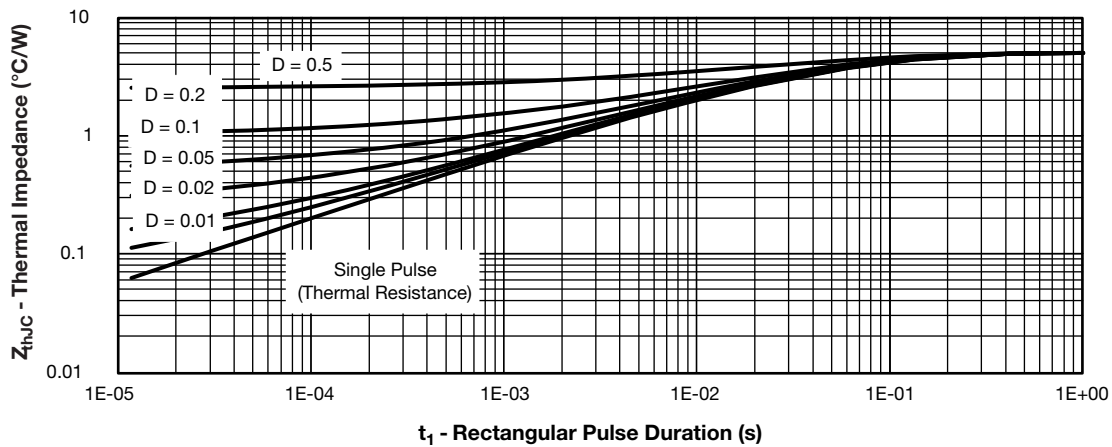
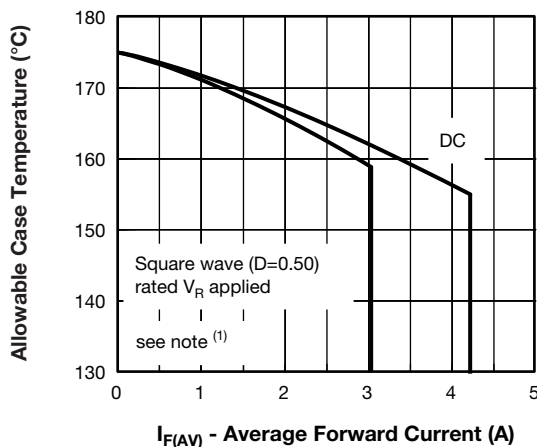

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


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

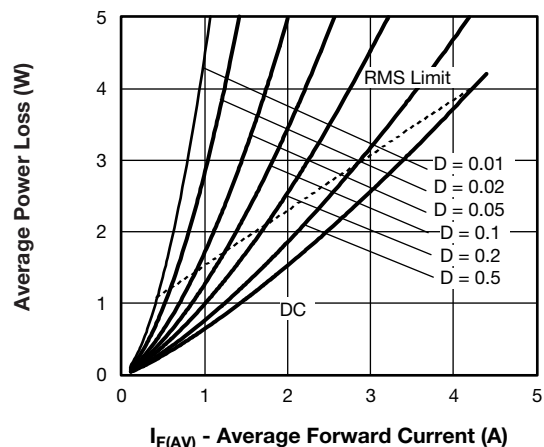
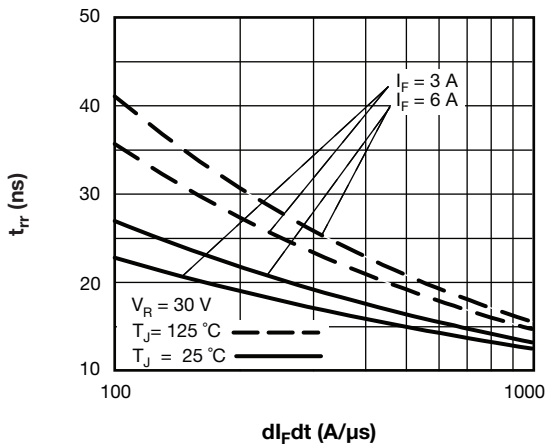
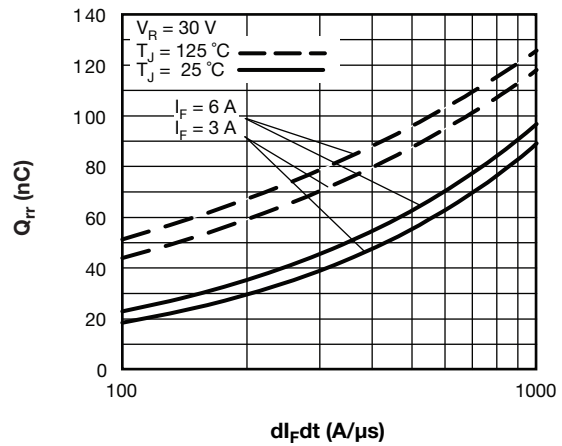


Fig. 6 - Forward Power Loss Characteristics


Fig. 7 - Typical Reverse Recovery vs.  $di_F/dt$ 

Fig. 8 - Typical Stored Charge vs.  $di_F/dt$ 
**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  $V_R$

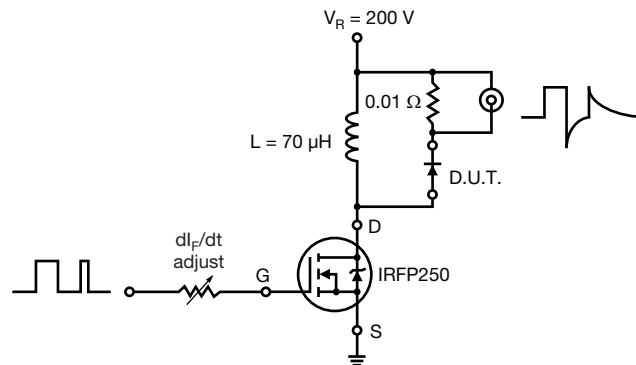


Fig. 9 - Reverse Recovery Parameter Test Circuit

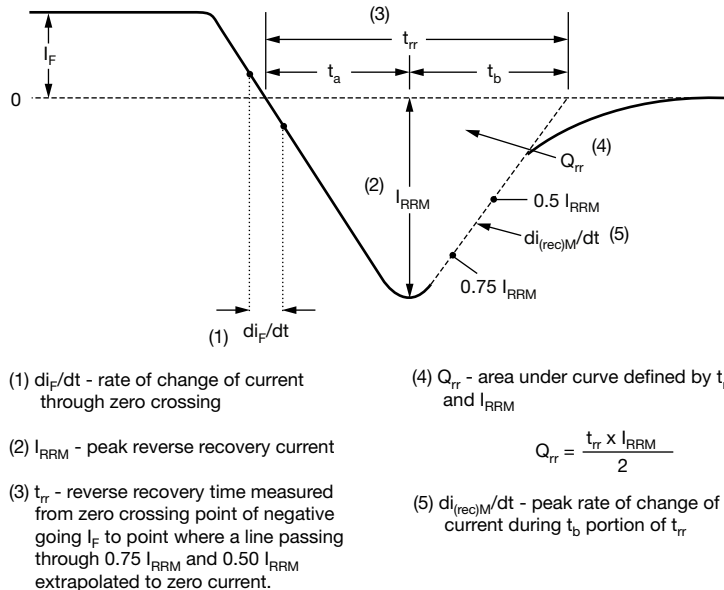


Fig. 10 - Reverse Recovery Waveform and Definitions



## ORDERING INFORMATION TABLE

Device code	VS-	6	C	W	H	02	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	- Center tap configuration									
4	- Package identifier: W = DPAK									
5	- H = hyperfast recovery									
6	- Voltage rating (02 = 200 V)									
7	- FN = TO-252AA									
8	- • None = tube (50 pieces) • 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-6CWH02FNHM3	75	3000	Antistatic plastic tube
VS-6CWH02FNTRHM3	2000	2000	13" diameter reel
VS-6CWH02FNTRRHM3	3000	3000	13" diameter reel
VS-6CWH02FNTRLHM3	3000	3000	13" diameter reel

### LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?95519">www.vishay.com/doc?95519</a>
Part marking information	<a href="http://www.vishay.com/doc?95518">www.vishay.com/doc?95518</a>
Packaging information	<a href="http://www.vishay.com/doc?95033">www.vishay.com/doc?95033</a>

### DPAK (TO-252AA)

#### 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

#### 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) Dimensions 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
- (5) Outline conforms to JEDEC® outline TO-252AA



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