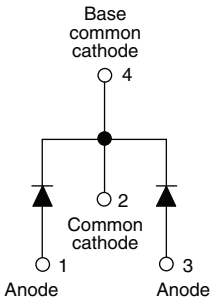
Ultrafast Rectifier, 2 x 3 A FRED Pt®

DPAK (TO-252AA)



FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- 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

DESCRIPTION / APPLICATIONS

Vishay Semiconductors' 200 V series are the state of the art hyperfast recovery rectifiers specifically 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 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 µA	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	µA
		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 °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 = 50 A/μs, V_R = 30 V		-	-	35	ns
		T_J = 25 °C	I_F = 3 A V_R = 160 V dI_F/dt = 200 A/μs	-	19	-	
		T_J = 125 °C		-	26	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	3.1	-	A
		T_J = 125 °C		-	4.6	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	30	-	nC
		T_J = 125 °C		-	60	-	

THERMAL - MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	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}	-	-	5	°C/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)		6CWH02FN	

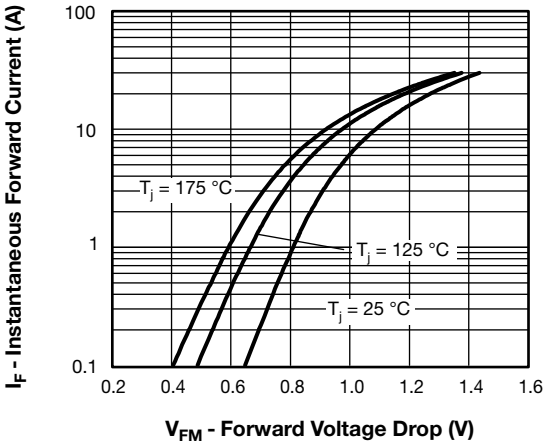


Fig. 1 - Maximum Forward Voltage Drop Characteristics

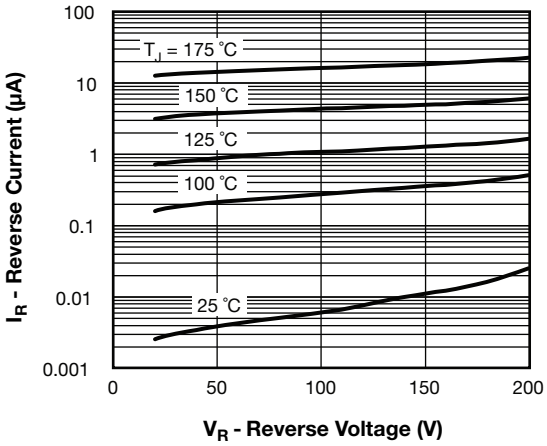


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

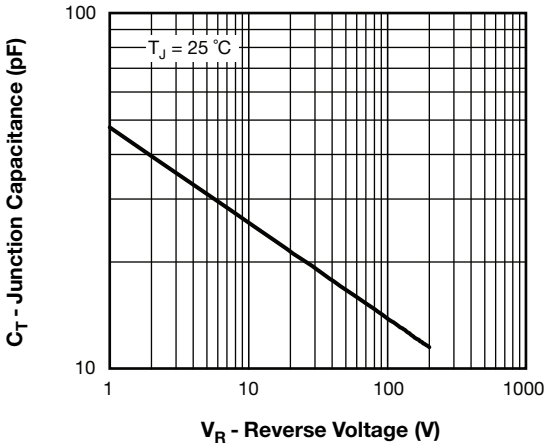


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

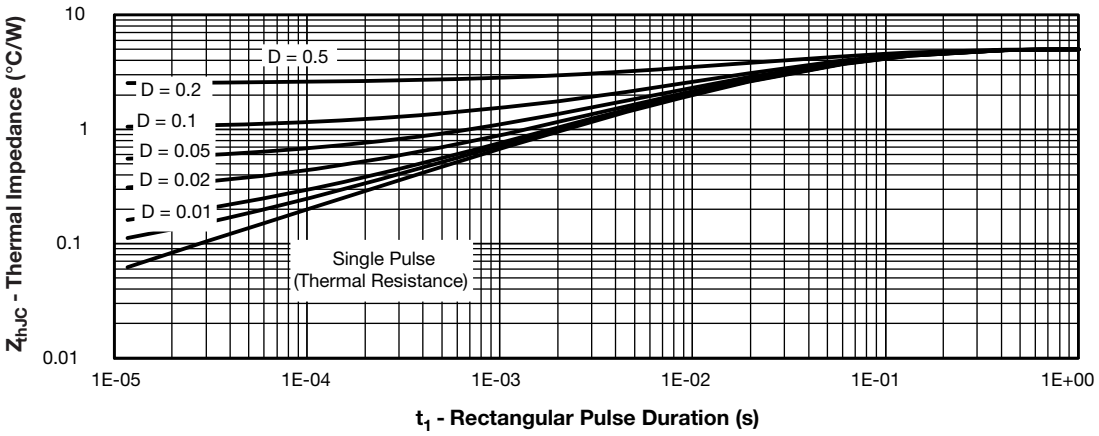


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

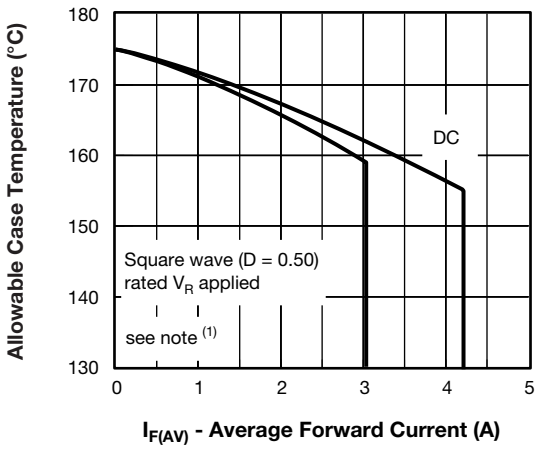


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

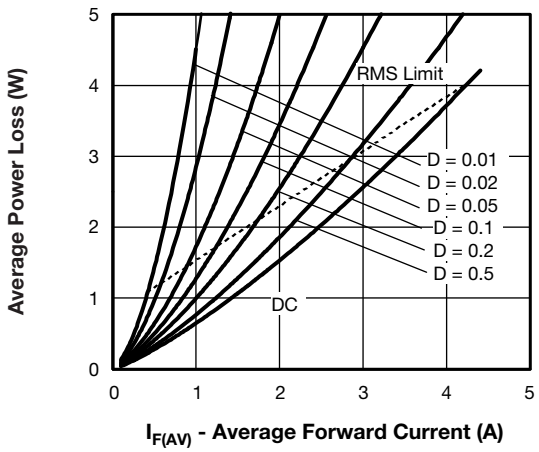


Fig. 6 - Forward Power Loss Characteristics

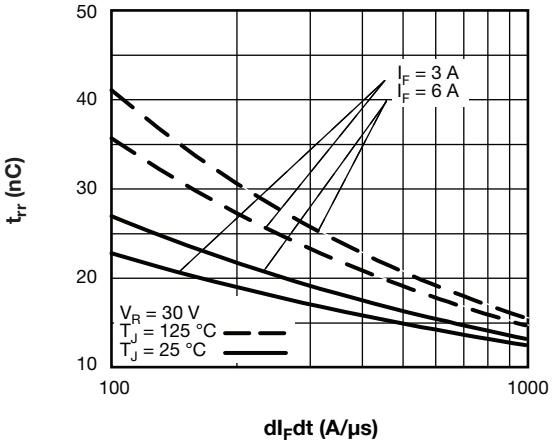


Fig. 7 - Typical Reverse Recovery vs. dI_F/dt

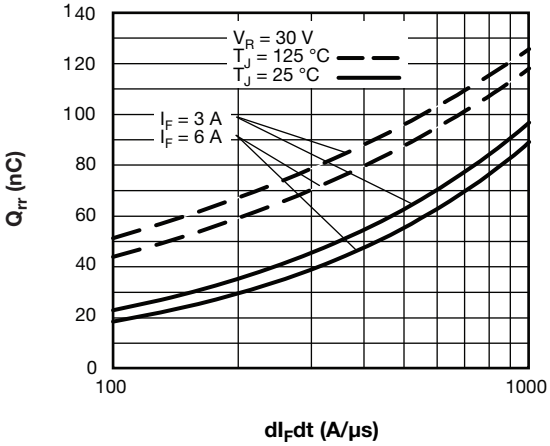


Fig. 8 - Typical Stored Charge vs. dI_F/dt

Note

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
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

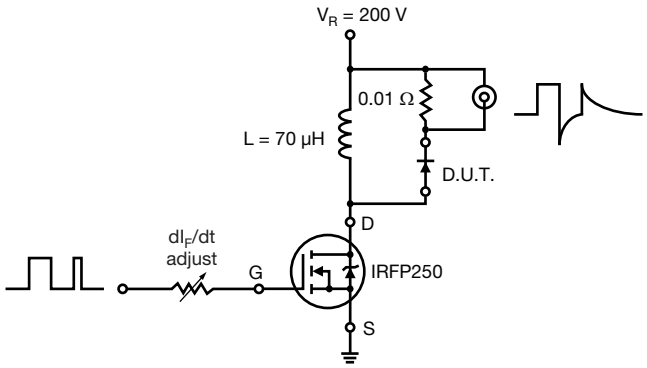
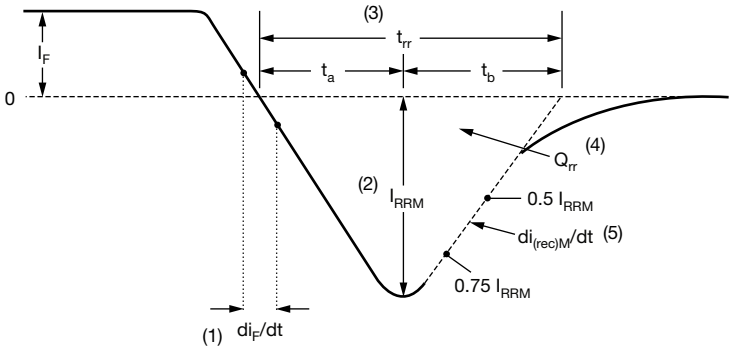


Fig. 9 - Reverse Recovery Parameter Test Circuit



(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}

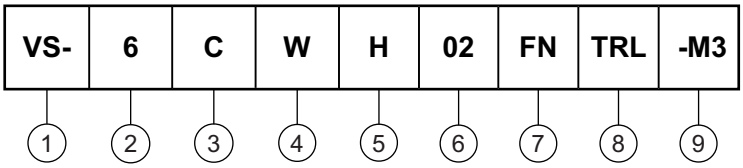
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(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

ORDERING INFORMATION TABLE

Device code



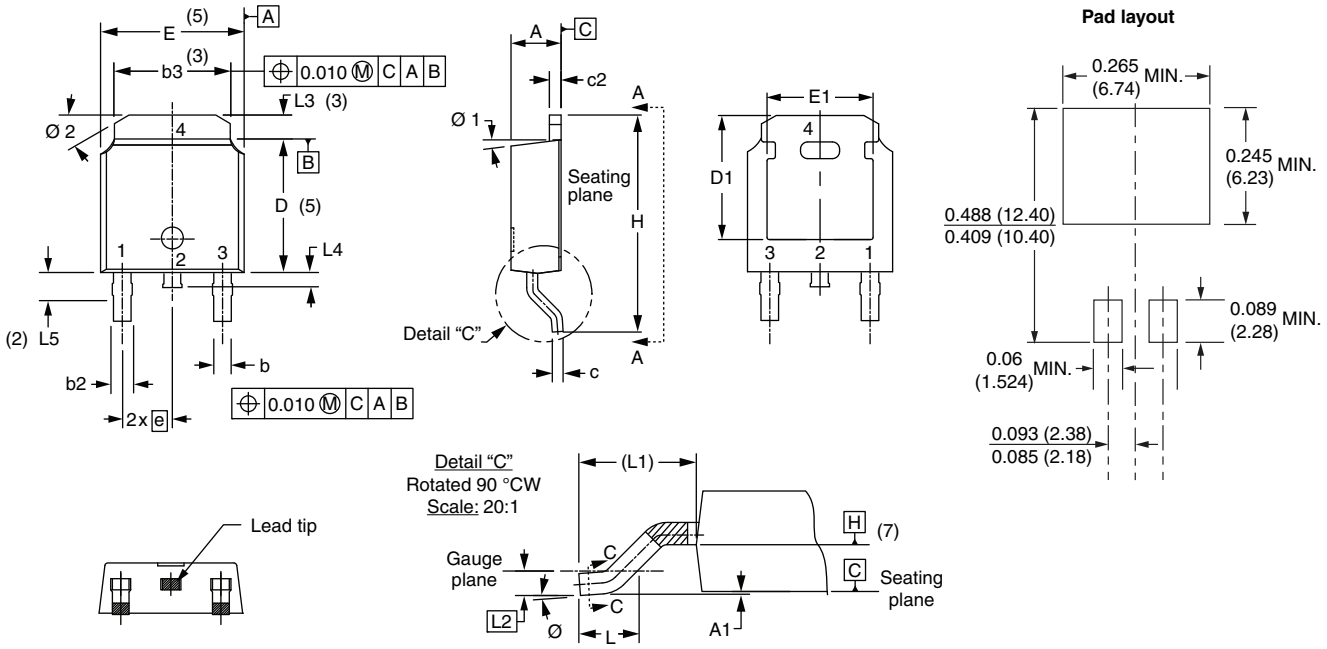
1 - Vishay Semiconductors product
2 - Current rating (6 = 6 A)
3 - Center tap configuration
4 - Package identifier:
W = DPAK
5 - H = hyperfast recovery
6 - Voltage rating (02 = 200 V)
7 - FN = TO-252AA
8 - • None = tube (50 pieces)
• TR = tape and reel
• TRL = tape and reel (left oriented)
• TRR = tape and reel (right oriented)
9 - Environmental digit:
-M3 = halogen-free, RoHS-compliant and terminations lead (Pb)-free

ORDERING INFORMATION (Example)		
PREFERRED P/N	**BASE QUANTITY**	**PACKAGING DESCRIPTION**
VS-6CWH02FN-M3	75	Antistatic plastic tube
VS-6CWH02FNTR-M3	2000	13" diameter reel
VS-6CWH02FNTRL-M3	3000	13" diameter reel
VS-6CWH02FNTRR-M3	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

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 0.10") 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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