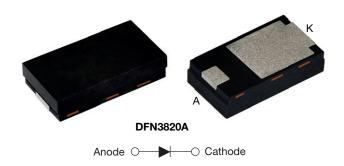


## Ultrafast Rectifier, 2 A FRED Pt®



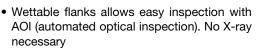
#### **LINKS TO ADDITIONAL RESOURCES**



PRIMARY CHARACTERISTICS				
I <sub>F(AV)</sub>	2 A			
$V_R$	200 V			
V <sub>F</sub> at I <sub>F</sub>	0.71 V			
t <sub>rr</sub> (typ.)	15 ns			
I <sub>FSM</sub>	54 A			
T <sub>J</sub> max.	175 °C			
Package	DFN3820A			
Circuit configuration	Single			

#### **FEATURES**

- Very low profile typical height of 0.88 mm
- · Ideal for automated placement





- Low forward voltage drop, low power losses
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- For PFC, CRM snubber operation
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

#### **TYPICAL APPLICATIONS**

For use in high frequency inverters, DC/DC converters, freewheeling diodes, clamping and snubber, polarity protection, LED lighting

#### **MECHANICAL DATA**

Case: DFN3820A

Molding compound meets UL 94 V-0 flammability rating

Terminals: matte tin plated leads, solderable per

J-STD-002, meets JESD 201 class 2 whisker test

Polarity: color band denotes cathode end

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	$V_{RRM}$		200	V
Average rectified forward current	I <sub>F(AV)</sub>	T <sub>M</sub> = 165 °C	2	Δ.
Non-repetitive peak surge current	I <sub>FSM</sub>	T <sub>J</sub> = 25 °C, 10 ms sine pulse	54	A
Operating junction and storage temperatures	T <sub>J</sub> , T <sub>Stg</sub>		-55 to +175	°C

<b>ELECTRICAL SPECIFICATIONS</b> (T <sub>J</sub> = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Breakdown voltage, blocking voltage	$V_{BR}$ , $V_{R}$	I <sub>R</sub> = 100 μA	200	-	-		
Forward voltage	V	I <sub>F</sub> = 2 A	-	0.88	0.95	V	
	V <sub>F</sub>	I <sub>F</sub> = 2 A, T <sub>J</sub> = 150 °C	-	0.71	0.76		
Reverse leakage current		$V_R = V_R$ rated	-	-	2		
	IR	T <sub>J</sub> = 150 °C, V <sub>R</sub> = V <sub>R</sub> rated	-	-	50	μA	
Junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 200 V	-	10	-	pF	



<b>DYNAMIC RECOVERY CHARACTERISTICS</b> (T <sub>J</sub> = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CO	NDITIONS	MIN.	TYP.	MAX.	UNITS
		$I_F = 0.5 \text{ A}, I_R = 1 \text{ A}$	A, $I_{rr} = 0.25 A$	-	15	25	
Reverse recovery time	t <sub>rr</sub>	T <sub>J</sub> = 25 °C		-	10	-	ns
		T <sub>J</sub> = 125 °C	$I_F = 2 \text{ A}$ $dI_F/dt = 500 \text{ A/}\mu\text{s}$ $V_R = 200 \text{ V}$	-	15	-	
Dook recovery ourrent		T <sub>J</sub> = 25 °C		-	3.1	-	Α
Peak recovery current	I <sub>RRM</sub>	T <sub>J</sub> = 125 °C		-	4.7	-	] ^
Poverne receivent charge	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C		-	18	-	nC
Reverse recovery charge		T <sub>J</sub> = 125 °C		-	39	-	110

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-55	-	175	°C
Thermal resistance, junction to mount	R <sub>thJM</sub> <sup>(1)</sup>		-	5	6.3	
Thermal resistance, junction to ambient	R <sub>thJA</sub>	Device mounted on FR4 PCB, 2 oz. standard footprint	=	140	-	°C/W
Weight			-	0.023	-	9
Marking device		Case style DFN3820A		21	12	

#### Note

<sup>(1)</sup> Thermal resistance junction to mount follows JEDEC® 51-14 transient dual interface test method (TDIM)

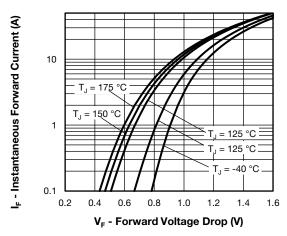


Fig. 1 - Typical Forward Voltage Drop Characteristics

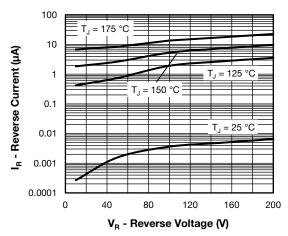


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage



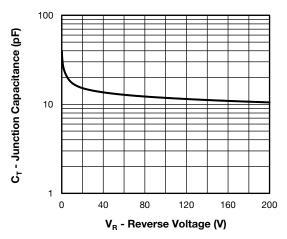


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

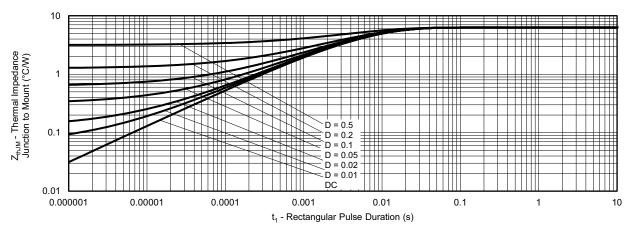


Fig. 4 - Maximum Transient Thermal Impedance, Junction to Mount

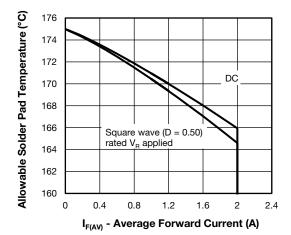


Fig. 5 - Maximum Allowable Mount Temperature vs. Average Forward Current

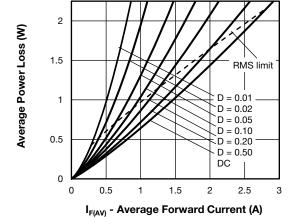


Fig. 6 - Forward Power Loss Characteristics

#### Note

Formula used:  $T_M = T_J - (Pd + Pd_{REV}) \times R_{thJM}$ ;  $Pd = forward power loss = I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 5);  $Pd_{REV} = inverse power loss = V_{R1} \times I_R$  (1 - D);  $I_R$  at  $V_{R1} = rated V_R$ 



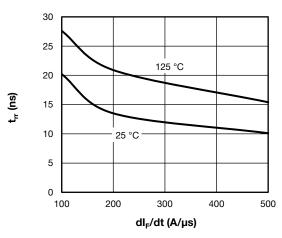


Fig. 7 - Typical Reverse Recovery Time vs. dl<sub>F</sub>/dt

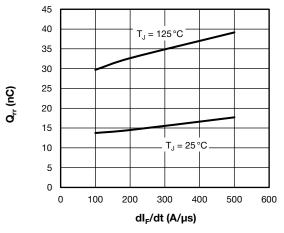


Fig. 8 - Typical Stored Charge vs. dl<sub>F</sub>/dt

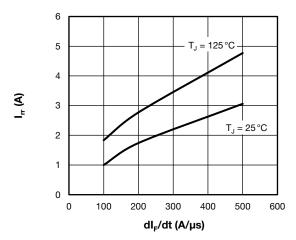
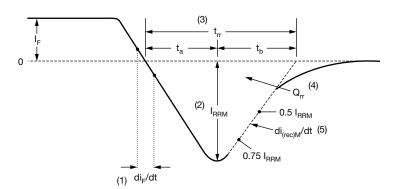


Fig. 9 - I<sub>rr</sub> vs. dI/dt



- (1) di<sub>F</sub>/dt rate of change of current through zero crossing
- (2)  $I_{RRM}$  peak reverse recovery current
- (3)  $\rm t_{rr}$  reverse recovery time measured from zero crossing point of negative going  $\rm I_F$  to point where a line passing through 0.75  $\rm I_{RRM}$  and 0.50  $\rm I_{RRM}$  extrapolated to zero current.
- (4)  $\mathbf{Q}_{rr}$  area under curve defined by  $\mathbf{t}_{rr}$  and  $\mathbf{I}_{RRM}$

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

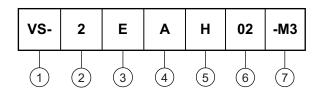
(5) di<sub>(rec)M</sub>/dt - peak rate of change of current during t<sub>b</sub> portion of t<sub>rr</sub>

Fig. 10 - Reverse Recovery Waveform and Definitions



#### **ORDERING INFORMATION TABLE**

Device code



1 - Vishay Semiconductors product

- Current rating (2 = 2 A)

Circuit configuration:

E = single diode

4 - A = DFN3820A package

**5** - Process type,

H = ultrafast recovery

6 - Voltage code (02 = 200 V)

7 - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

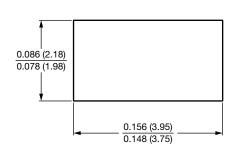
ORDERING INFORMATION (Example)					
PREFERRED P/N	PREFERRED PACKAGE CODE	BASE QUANTITY	PACKAGING DESCRIPTION		
VS-2EAH02-M3/H	Н	3500	7" diameter plastic tape and reel		
VS-2EAH02-M3/I	1	14 000	13" diameter plastic tape and reel		

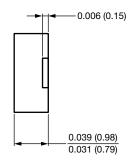
LINKS TO RELATED DOCUMENTS				
Dimensions	www.vishay.com/doc?97066			
Part marking information	www.vishay.com/doc?97065			
Packaging information	www.vishay.com/doc?98488			
SPICE model	www.vishay.com/doc?97096			

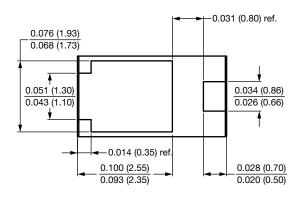


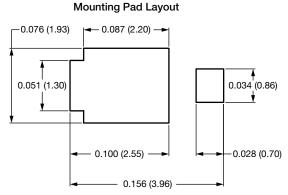
# DFN3820A, FRED Pt®

### **DIMENSIONS** in inches (millimeters)













Vishay

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