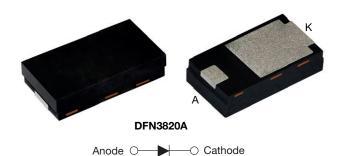
**Vishay Semiconductors** 

# Ultrafast Rectifier, 5 A FRED Pt®



www.vishay.com

## LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS					
I <sub>F(AV)</sub>	5 A				
V <sub>R</sub>	200 V				
V <sub>F</sub> at I <sub>F</sub>	0.72 V				
t <sub>rr</sub> (typ.)	15 ns				
I <sub>FSM</sub>	102 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
- Wettable flanks allows easy inspection with AOI (automated optical inspection). No X-ray necessary
- 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 <u>www.vishay.com/doc?99912</u>

## **TYPICAL APPLICATIONS**

For use in high frequency inverters, DC/DC converters, freewheeling diodes, clamping and snubber, polarity protection, and 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 <sub>RRM</sub>		200	V		
Average rectified forward current	I <sub>F(AV)</sub>	T <sub>M</sub> = 154 °C	5	^		
Non-repetitive peak surge current	I <sub>FSM</sub>	$T_J = 25 \ ^{\circ}C$ , 10 ms sine pulse	102	A		
Operating junction and storage temperatures	T <sub>J</sub> , T <sub>Stg</sub>		-55 to +175	°C		

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_J = 25 \text{ °C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Breakdown voltage, blocking voltage	$V_{BR}$ , $V_{R}$	I <sub>R</sub> = 100 μA	200	-	-		
Forward voltage	V	I <sub>F</sub> = 5 A	-	0.88	0.97	V	
Forward voltage	V <sub>F</sub>	I <sub>F</sub> = 5 A, T <sub>J</sub> = 150 °C	-	0.72	0.79		
Deverse leakerse eurrent	I	V <sub>R</sub> = V <sub>R</sub> rated	-	-	4		
Reverse leakage current	IR	$T_J = 150 \text{ °C}, V_R = V_R \text{ rated}$	-	-	50	μΑ	
Junction capacitance	CT	V <sub>R</sub> = 200 V	-	19	-	pF	

Revision: 26-Jul-2023 1 Document Number: 97085 For technical questions within your region: <u>DiodesAmericas@vishay.com</u>, <u>DiodesAsia@vishay.com</u>, <u>DiodesEurope@vishay.com</u> THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT <u>www.vishay.com/doc?91000</u>



FREE



www.vishay.com

## **Vishay Semiconductors**

<b>DYNAMIC RECOVERY CHARACTERISTICS</b> (T <sub>J</sub> = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CO	TEST CONDITIONS MIN. TYP			MAX.	UNITS
		$I_{\rm F} = 0.5 \text{ A}, I_{\rm R} = 1 \text{ A}$	A, I <sub>rr</sub> = 0.25 A	-	15	25	
Reverse recovery time	t <sub>rr</sub>	T <sub>J</sub> = 25 °C		-	12	-	ns
		T <sub>J</sub> = 125 °C		-	19	-	
Doold recovery ourrent		T <sub>J</sub> = 25 °C	$I_F = 5 A$	-	4.1	-	A nC
Peak recovery current	IRRM	T <sub>J</sub> = 125 °C	dI <sub>F</sub> /dt = 500 A/µs V <sub>R</sub> = 200 V	-	6.8	-	
Reverse recovery charge	0	T <sub>J</sub> = 25 °C		-	27	-	
	Q <sub>rr</sub>	T <sub>J</sub> = 125 °C		-	69	-	

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>		-	3.5	4.5			
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		5H	-12			

#### Note

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

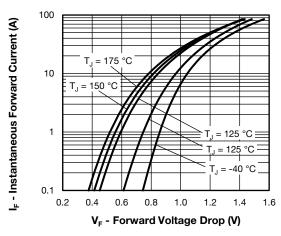


Fig. 1 - Typical Forward Voltage Drop Characteristics

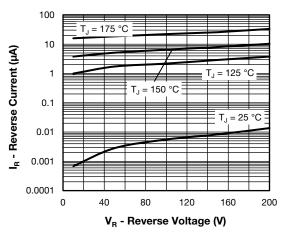


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage



## **Vishay Semiconductors**



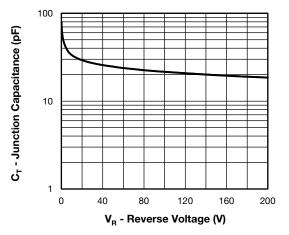


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

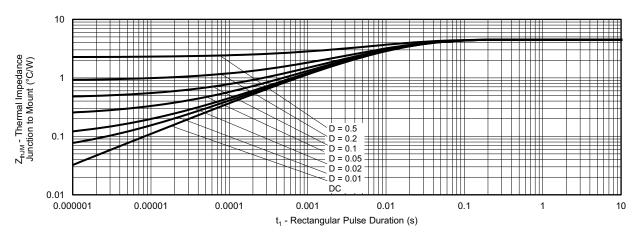
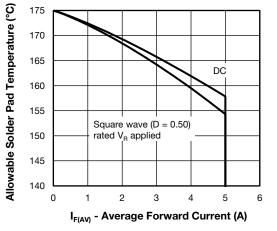
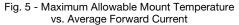


Fig. 4 - Maximum Transient Thermal Impedance, Junction to Mount





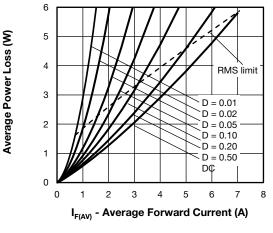


Fig. 6 - Forward Power Loss Characteristics

### Note

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

Revision: 26-Jul-2023

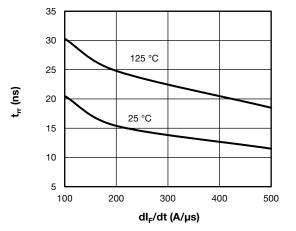
3

Document Number: 97085

For technical questions within your region: <u>DiodesAmericas@vishay.com</u>, <u>DiodesAsia@vishay.com</u>, <u>DiodesEurope@vishay.com</u> THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000



## Vishay Semiconductors



www.vishay.com

SHAY

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

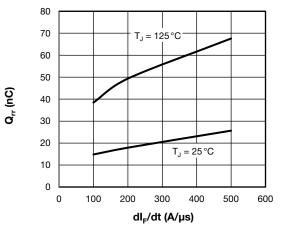


Fig. 8 - Typical Stored Charge vs. dl<sub>F</sub>/dt

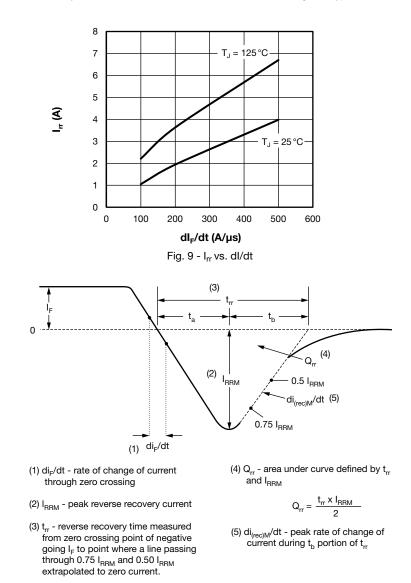


Fig. 10 - Reverse Recovery Waveform and Definitions

Revision: 26-Jul-2023	4	Document Number: 97085
For technical questions within your region:	DiodesAmericas@vishay.com, DiodesAsia@vishay.c	<u>com, DiodesEurope@vishay.com</u>
	E WITHOUT NOTICE. THE PRODUCTS DESCRIBED CIFIC DISCLAIMERS, SET FORTH AT <u>www.vishay.co</u>	



**ORDERING INFORMATION TABLE** 

		_	_	_			
Device code	VS-	5	Е	A	н	02	-M3
	1	2	3	4	5	6	7
	1 .	· Visl	nay Sen	niconduo	ctors pro	oduct	
	2 -	Cur	rent rati	ng (5 =	5 A)		
	3 -	· Circ	uit conf	iguratior	า:		
		E =	single c	liode			
	4	• A =	DFN38	20A pac	kage		
	5 -	· Pro	cess typ	e,			
		H =	ultrafas	t recove	ery		
	6 -	· Volt	age coo	le (02 =	200 V)		
	7 -	-M3	= halog	gen-free	, RoHS-	complia	ant, and

ORDERING INFORMATION (Example)							
PREFERRED P/N	PREFERRED PACKAGE CODE	BASE QUANTITY	PACKAGING DESCRIPTION				
VS-5EAH02-M3/H	н	3500	7" diameter plastic tape and reel				
VS-5EAH02-M3/I	l	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?97098				

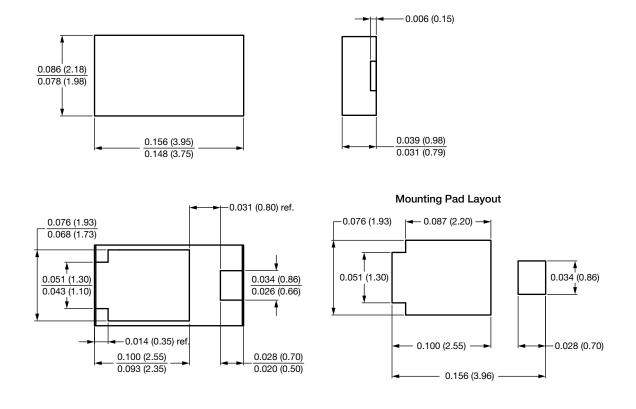






DFN3820A, FRED Pt<sup>®</sup>

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





Vishay

# Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

© 2025 VISHAY INTERTECHNOLOGY, INC. ALL RIGHTS RESERVED

Revision: 01-Jan-2025

1