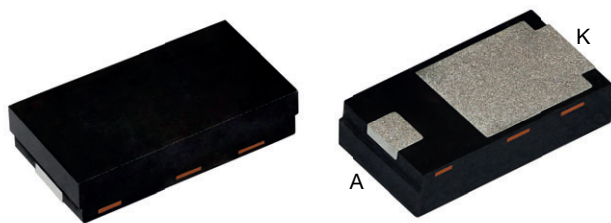


# Ultrafast Rectifier, 3 A FRED Pt®


**DFN3820A**

Anode  Cathode

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

## 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
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

## LINKS TO ADDITIONAL RESOURCES



## PRIMARY CHARACTERISTICS

$I_{F(AV)}$	3 A
$V_R$	200 V
$V_F$ at $I_F$	0.73 V
$t_{rr}$ (typ.)	15 ns
$I_{FSM}$	61 A
$T_J$ max.	175 °C
Package	DFN3820A
Circuit configuration	Single

## TYPICAL APPLICATIONS

For use in high frequency inverters, DC/DC converters, freewheeling diodes, clamping and snubber, polarity protection, dual voltage injector drivers, piezo drivers, ECU, Antilock Braking Systems (ABS), HID 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	$V_{RRM}$		200	V
Average rectified forward current	$I_{F(AV)}$	$T_M = 160$ °C	3	A
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25$ °C, 10 ms sine pulse	61	
Operating junction and storage temperatures	$T_J, T_{Stg}$		-55 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	-	0.90	0.96	
		$I_F = 3$ A, $T_J = 150$ °C	-	0.73	0.79	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	-	2	$\mu$ A
		$T_J = 150$ °C, $V_R = V_R$ rated	-	-	50	
Junction capacitance	$C_T$	$V_R = 200$ V	-	11	-	pF

<b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{rr} = 0.25\text{ A}$	-	15	25	ns
		$T_J = 25\text{ }^{\circ}\text{C}$	-	11	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	17	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	3.8	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	5.8	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	23	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	53	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		-55	-	175	$^{\circ}\text{C}$
Thermal resistance, junction to mount	$R_{thJM}^{(1)}$		-	4.5	6	$^{\circ}\text{C/W}$
Thermal resistance, junction to ambient	$R_{thJA}$	Device mounted on FR4 PCB, 2 oz. standard footprint	-	140	-	
Weight			-	0.023	-	g
Marking device		Case style DFN3820A	3H2			

**Note**

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

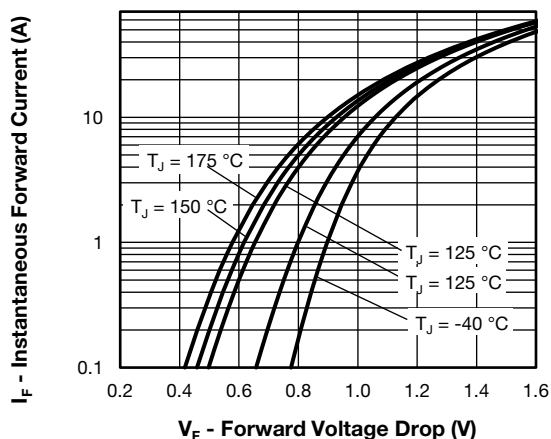


Fig. 1 - Typical Forward Voltage Drop Characteristics

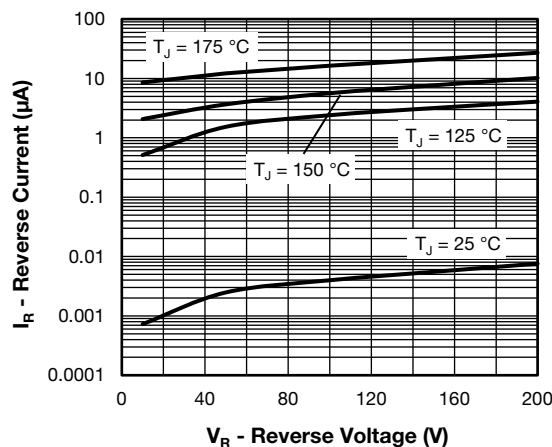


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

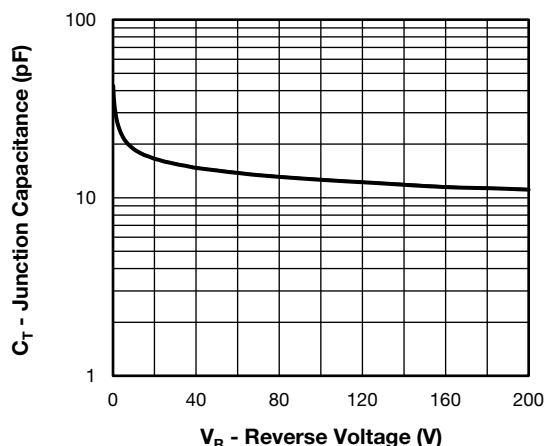


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

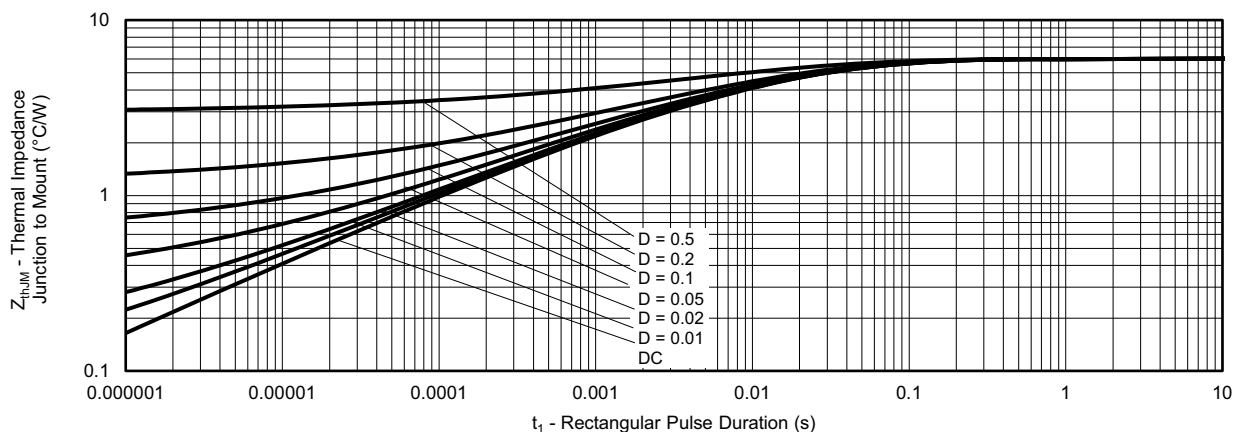


Fig. 4 - Maximum Transient Thermal Impedance, Junction to Mount

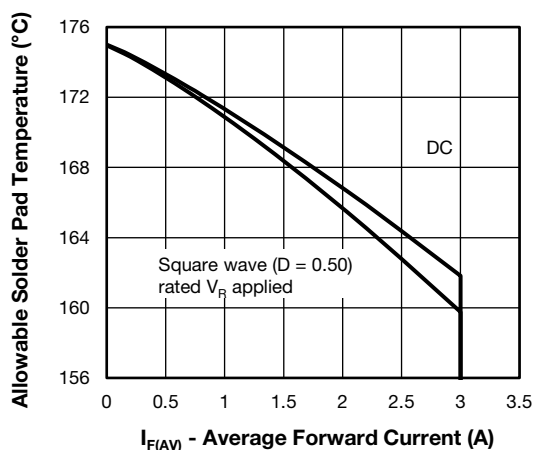


Fig. 5 - Maximum Allowable Mount Temperature vs. Average Forward Current

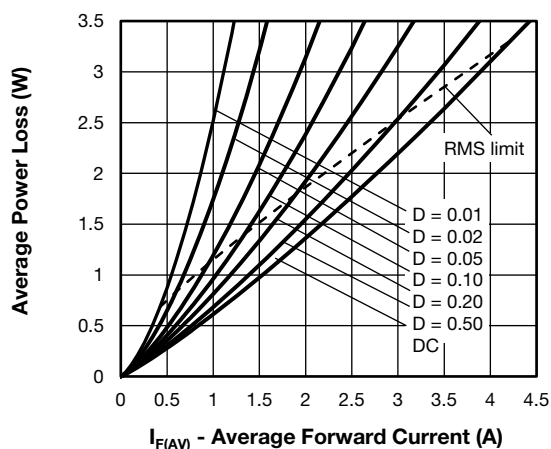


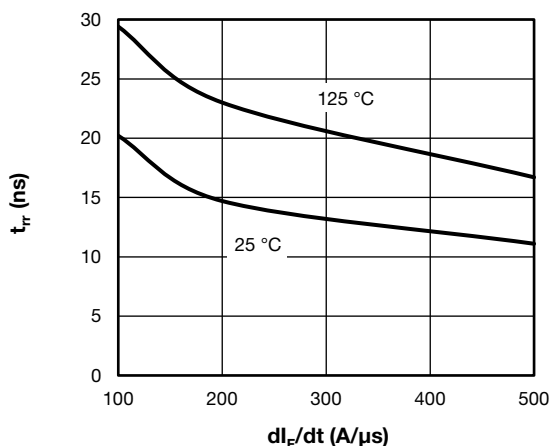
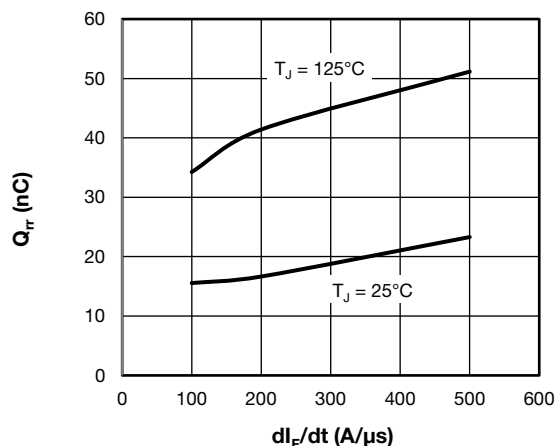
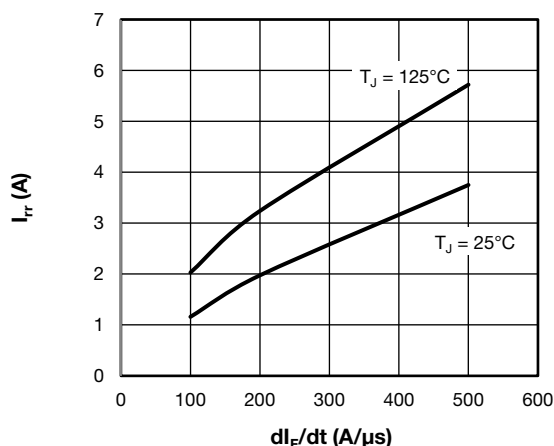
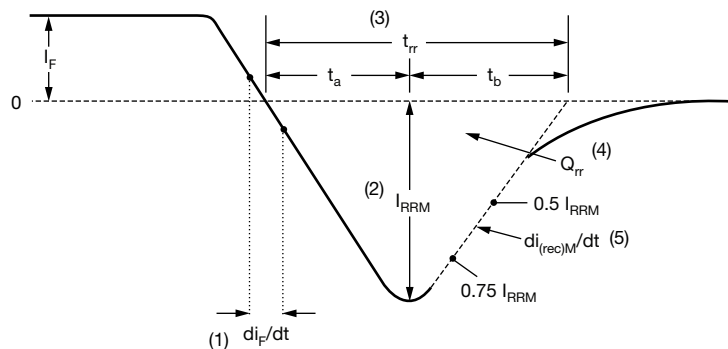
Fig. 6 - Forward Power Loss Characteristics

#### Note

Formula used:  $T_M = T_J - (P_d + P_{d_{REV}}) \times R_{thJM}$ ;

$P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 5);

$P_{d_{REV}}$  = 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.  $dI_F/dt$ 

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

Fig. 9 -  $I_{rr}$  vs.  $dI/dt$ 


- (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	<b>VS-</b>	<b>3</b>	<b>E</b>	<b>A</b>	<b>H</b>	<b>02</b>	<b>H</b>	<b>M3</b>
	1	2	3	4	5	6	7	8
<b>1</b>	- Vishay Semiconductors product							
<b>2</b>	- Current rating (3 = 3 A)							
<b>3</b>	- Circuit configuration: E = single diode							
<b>4</b>	- A = DFN3820A package							
<b>5</b>	- Process type, H = ultrafast recovery							
<b>6</b>	- Voltage code (02 = 200 V)							
<b>7</b>	- H = AEC-Q101 qualified							
<b>8</b>	- M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free							

**ORDERING INFORMATION** (Example)

PREFERRED P/N	PREFERRED PACKAGE CODE	BASE QUANTITY	PACKAGING DESCRIPTION
VS-3EAH02HM3/H	H	3500	7" diameter plastic tape and reel
VS-3EAH02HM3/I	I	14 000	13" diameter plastic tape and reel

**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?97066">www.vishay.com/doc?97066</a>
Part marking information	<a href="http://www.vishay.com/doc?97065">www.vishay.com/doc?97065</a>
Packaging information	<a href="http://www.vishay.com/doc?98488">www.vishay.com/doc?98488</a>
SPIICE model	<a href="http://www.vishay.com/doc?97097">www.vishay.com/doc?97097</a>



## DFN3820A, FRED Pt®

**DIMENSIONS** in inches (millimeters)





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