

## Ultrafast Rectifier, 5 A FRED Pt<sup>®</sup>


**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	
$I_{F(AV)}$	5 A
$V_R$	200 V
$V_F$ at $I_F$	0.72 V
$t_{rr}$ (typ.)	15 ns
$I_{FSM}$	102 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	$I_{F(AV)}$	$T_M = 154$ °C	5	A
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25$ °C, 10 ms sine pulse	102	
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	$V_F$	$I_F = 5$ A	-	0.88	0.97	
		$I_F = 5$ A, $T_J = 150$ °C	-	0.72	0.79	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	-	4	$\mu$ A
		$T_J = 150$ °C, $V_R = V_R$ rated	-	-	50	
Junction capacitance	$C_T$	$V_R = 200$ V	-	19	-	pF



DYNAMIC RECOVERY CHARACTERISTICS (T <sub>J</sub> = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 0.5 A, I <sub>R</sub> = 1 A, I <sub>rr</sub> = 0.25 A	-	15	25	ns
		T <sub>J</sub> = 25 °C	-	12	-	
		T <sub>J</sub> = 125 °C	-	19	-	
Peak recovery current	I <sub>RRM</sub>	T <sub>J</sub> = 25 °C	-	4.1	-	A
		T <sub>J</sub> = 125 °C	-	6.8	-	
Reverse recovery charge	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C	-	27	-	nC
		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	°C/W
Thermal resistance, junction to ambient	R <sub>thJA</sub>	Device mounted on FR4 PCB, 2 oz. standard footprint	-	140	-	
Weight			-	0.023	-	g
Marking device		Case style DFN3820A	5H2			

**Note**

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

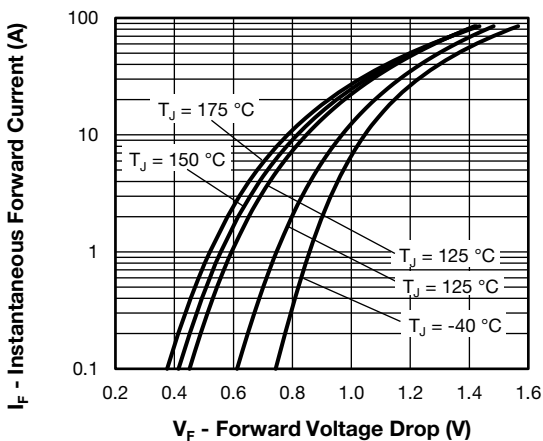


Fig. 1 - Typical Forward Voltage Drop Characteristics

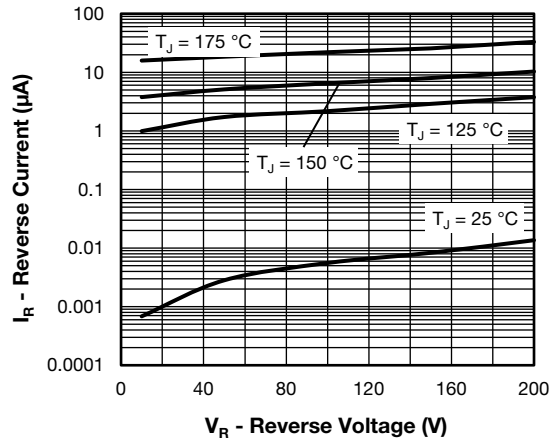


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

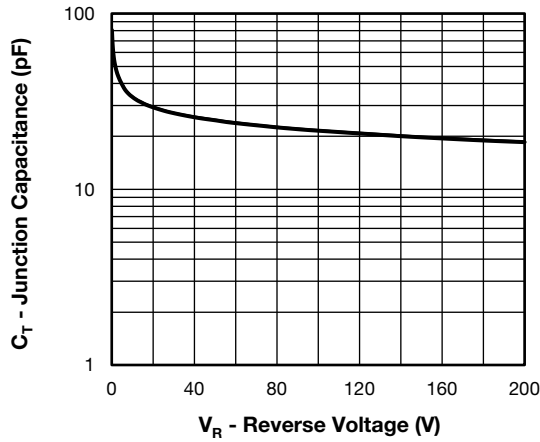


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

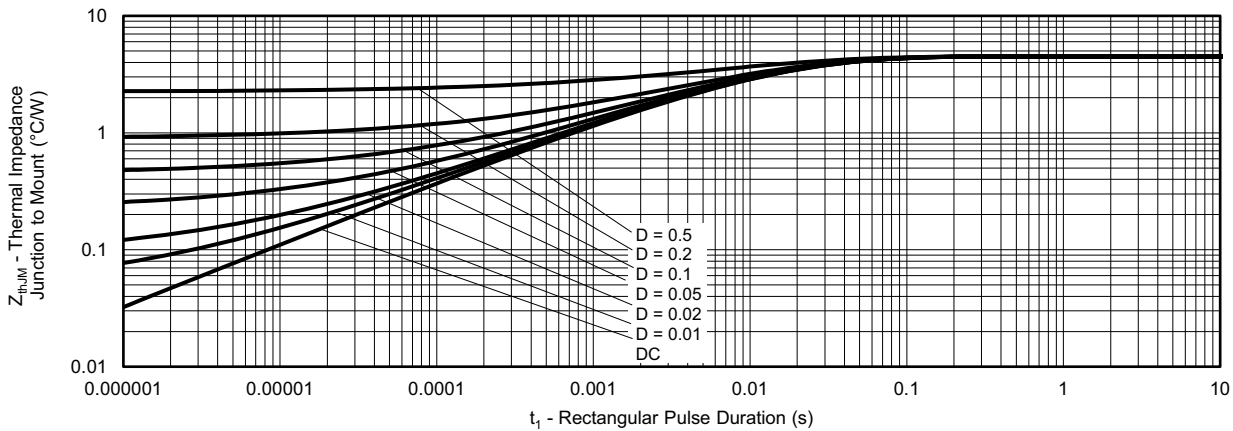


Fig. 4 - Maximum Transient Thermal Impedance, Junction to Mount

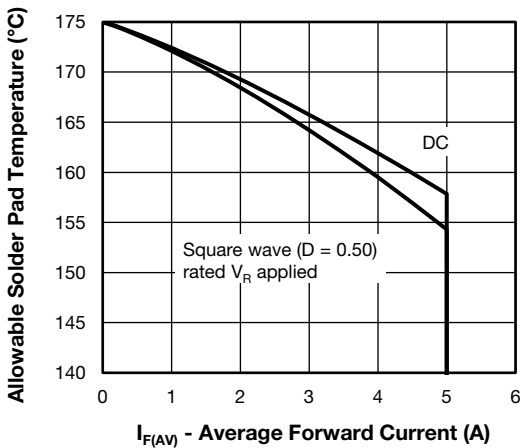


Fig. 5 - Maximum Allowable Mount Temperature vs. Average Forward Current

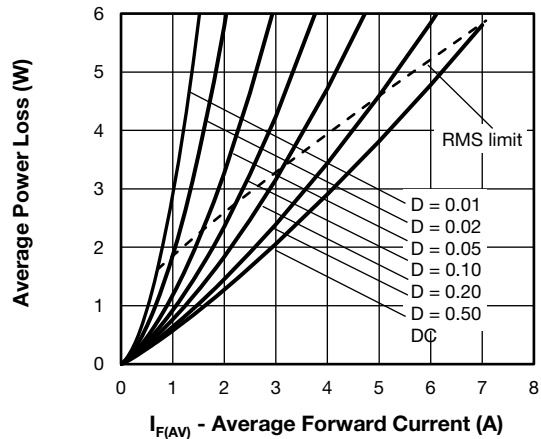


Fig. 6 - Forward Power Loss Characteristics

**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  $V_R$

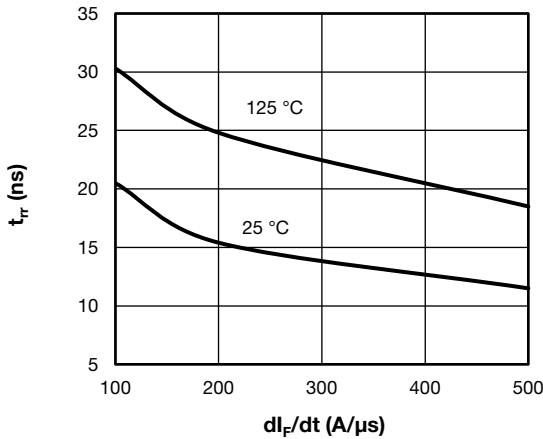


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

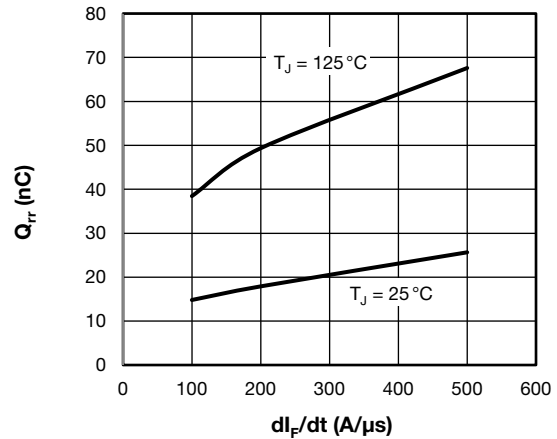


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$

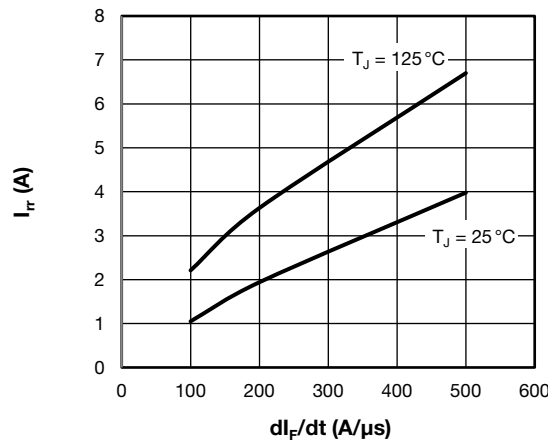
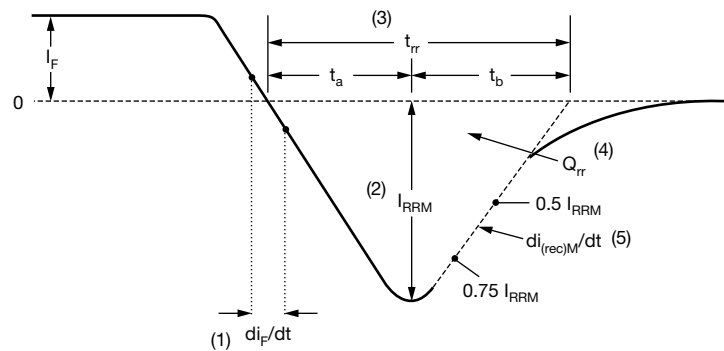


Fig. 9 -  $I_{rr}$  vs.  $di/dt$



- (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  $I_{RRM}$

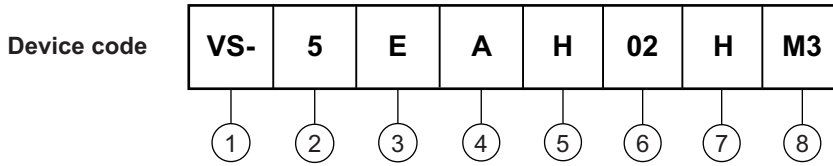
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

- (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



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

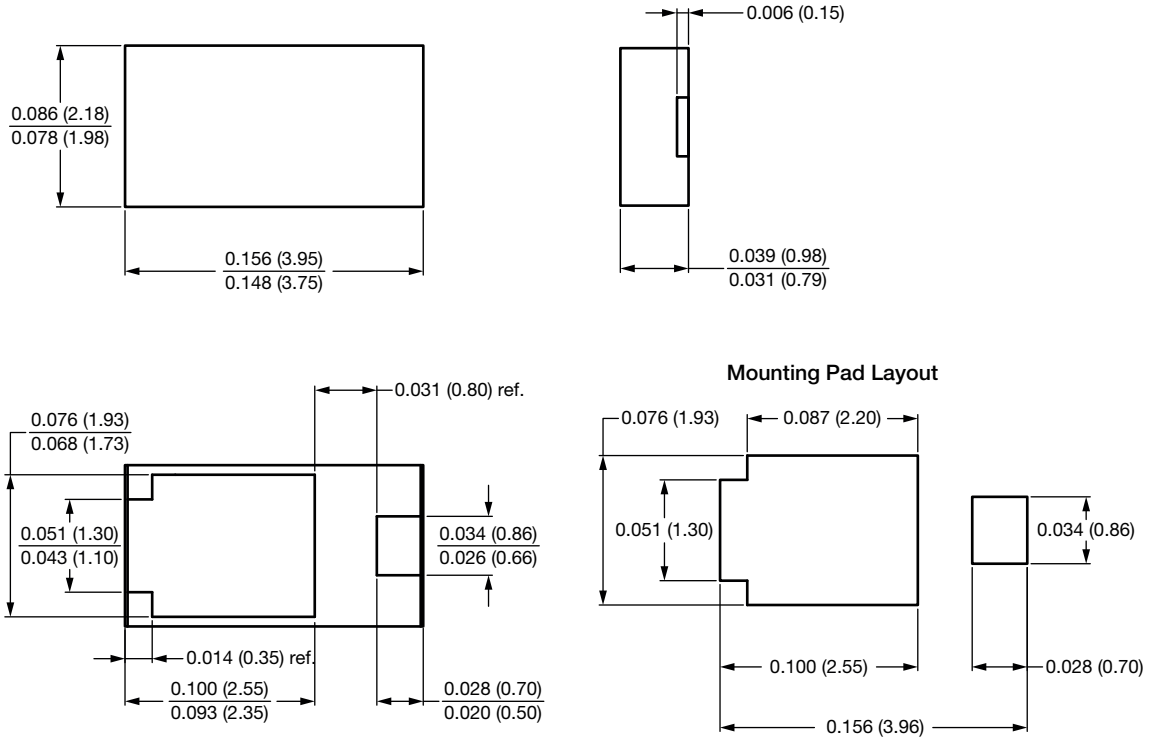
ORDERING INFORMATION (Example)			
PREFERRED P/N	PREFERRED PACKAGE CODE	BASE QUANTITY	PACKAGING DESCRIPTION
VS-5EAH02HM3/H	H	3500	7" diameter plastic tape and reel
VS-5EAH02HM3/I	I	14 000	13" diameter plastic tape and reel

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?88869">www.vishay.com/doc?88869</a>
SPIICE model	<a href="http://www.vishay.com/doc?97098">www.vishay.com/doc?97098</a>



## DFN3820A, FRED Pt<sup>®</sup>

**DIMENSIONS** in inches (millimeters)





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