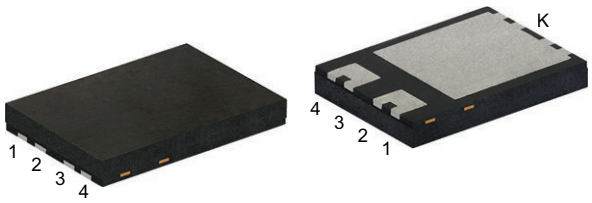
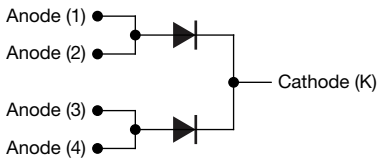
# Ultrafast Rectifier, 2 x 3 A FRED Pt®




DFN6546A




## 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 www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

## LINKS TO ADDITIONAL RESOURCES

Ultra Librarian EDA / CAD

## TYPICAL APPLICATIONS

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

## MECHANICAL DATA

**Case:** DFN6546A

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

| PRIMARY CHARACTERISTICS | |
|---|---|
| $I_{F(AV)}$ | 2 x 3 A |
| $V_R$ | 200 V |
| $V_F$ at $I_F$ | 0.75 V |
| $t_{rr}$ (typ.) | 10 ns |
| $I_{FSM}$ | 66 A |
| $T_J$ max. | 175 °C |
| Package | DFN6546A |
| Circuit configuration | Common cathode |

| ABSOLUTE MAXIMUM RATINGS | | | | |
|---|---|---|---|---|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Peak repetitive reverse voltage, per leg | $V_{RRM}$ | | 200 | V |
| Average rectified forward current, per leg | $I_{F(AV)}$ | $T_M$ = 161 °C, D = 0.50 | 3 | A |
| Non-repetitive peak surge current, per leg | $I_{FSM}$ | $T_J$ = 25 °C, 10 ms sine pulse | 66 | |
| 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, per leg | $V_{BR}$, $V_R$ | $I_R$ = 100 µA | 200 | - | - | V |
| Forward voltage, per leg | $V_F$ | $I_F$ = 3 A | - | 0.9 | 1.1 | |
| | | $I_F$ = 3 A, $T_J$ = 150 °C | - | 0.75 | 0.85 | |
| Reverse leakage current, per leg | $I_R$ | $V_R$ = $V_R$ rated | - | - | 1 | µA |
| | | $T_J$ = 150 °C, $V_R$ = $V_R$ rated | - | - | 100 | |
| Junction capacitance, per leg | $C_T$ | $V_R$ = 200 V | - | 11 | - | pF |

| DYNAMIC RECOVERY CHARACTERISTICS ($T_J$ = 25 °C unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time, per leg | $t_{rr}$ | $I_F$ = 0.5 A, $I_R$ = 1 A, $I_{rr}$ = 0.25 A | | - | 10 | 23 | ns |
| | | $T_J$ = 25 °C | $I_F$ = 3 A, $dI_F/dt$ = 500 A/µs, $V_R$ = 200 V | - | 11 | - | |
| | | $T_J$ = 125 °C | | - | 18 | - | |
| Peak recovery current, per leg | $I_{RRM}$ | $T_J$ = 25 °C | | - | 3.8 | - | A |
| | | $T_J$ = 125 °C | | - | 5.9 | - | |
| Reverse recovery charge, per leg | $Q_{rr}$ | $T_J$ = 25 °C | | - | 23 | - | nC |
| | | $T_J$ = 125 °C | | - | 55 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|---|---|---|---|---|---|---|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Maximum junction and storage temperature range | $T_J$, $T_{Stg}$ | | -55 | - | 175 | °C |
| Thermal resistance, junction to mount, per leg | $R_{thJM}$ (1) | | - | - | 4.7 | °C/W |
| Weight | | | - | 0.086 | - | 9 |
| Marking device | | Case style DFN6546A | 6CH2 | | | |

**Note**

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

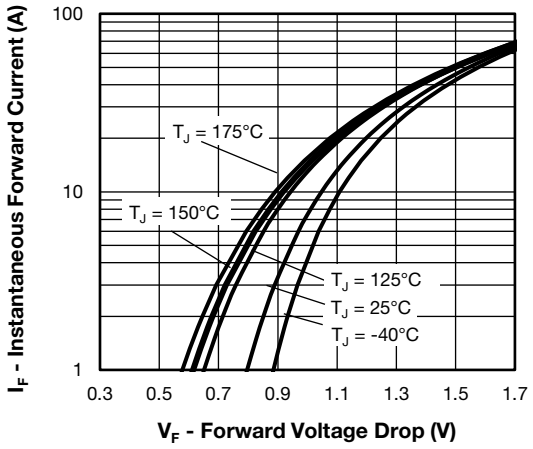



Fig. 1 - Typical Forward Voltage Drop Characteristics, per Leg

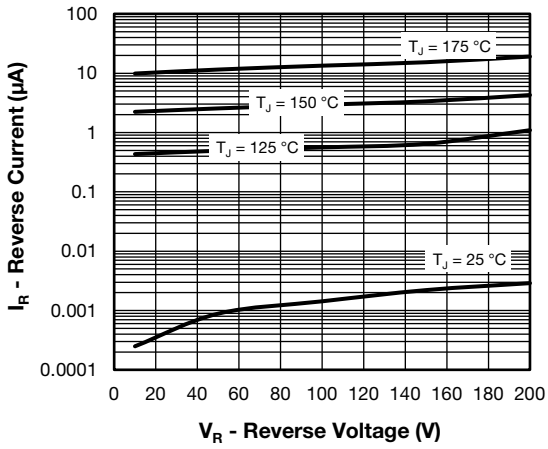



Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage, per Leg

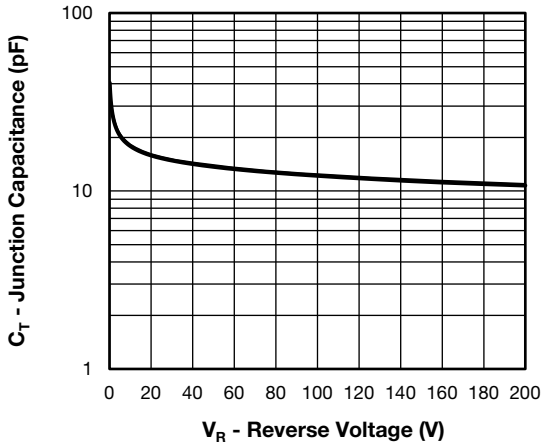



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, per Leg

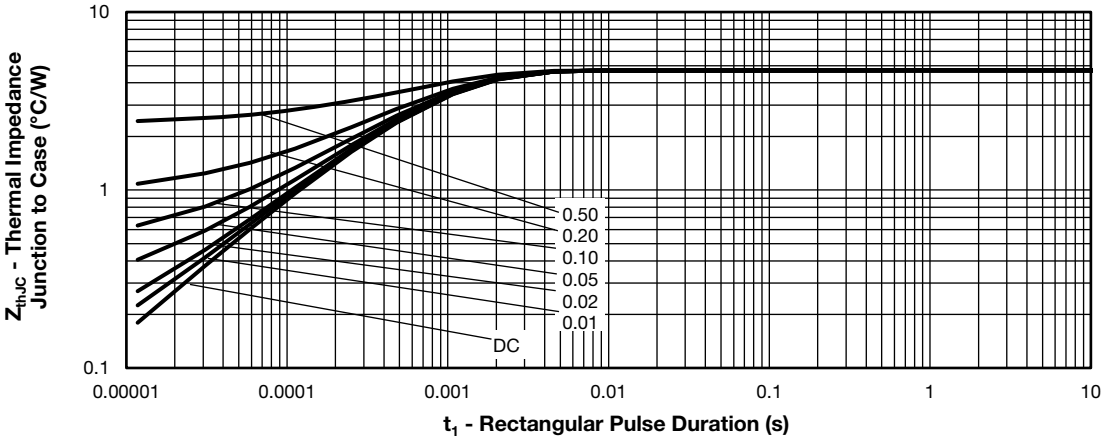



Fig. 4 - Maximum Transient Thermal Impedance, Junction to Mount, per Leg

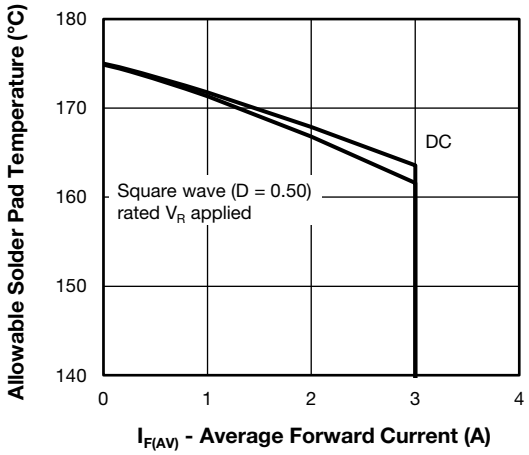



Fig. 5 - Maximum Allowable Mount Temperature vs. Average Forward Current, per Leg

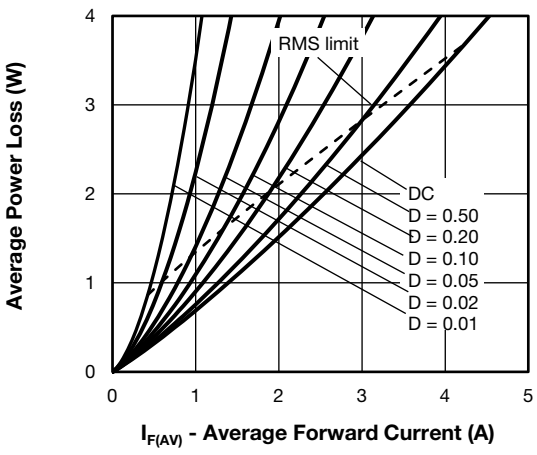



Fig. 6 - Forward Power Loss Characteristics, per Leg

**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 $V_R$

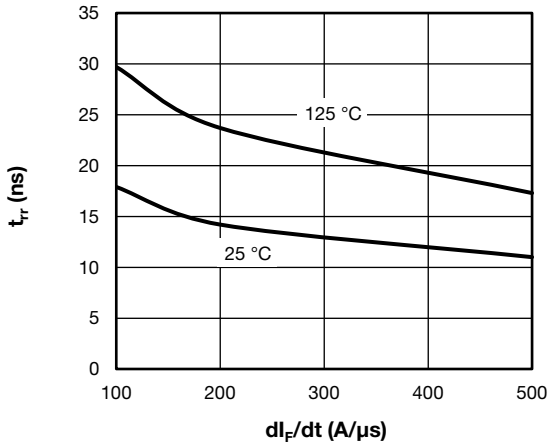



Fig. 7 - Typical Reverse Recovery Time vs. $dI_F/dt$, per Leg

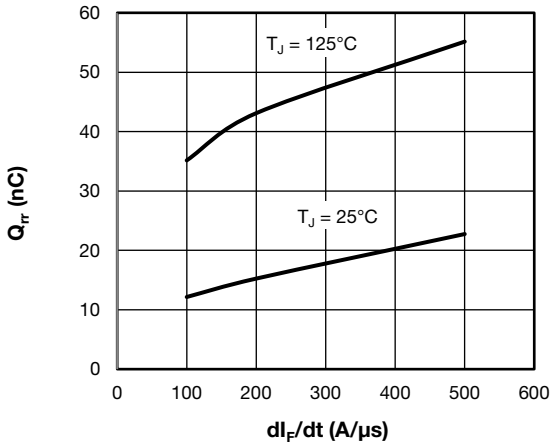



Fig. 8 - Typical Stored Charge vs. $dI_F/dt$, per Leg

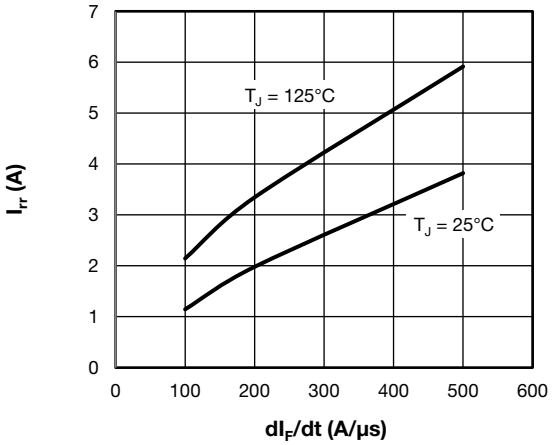
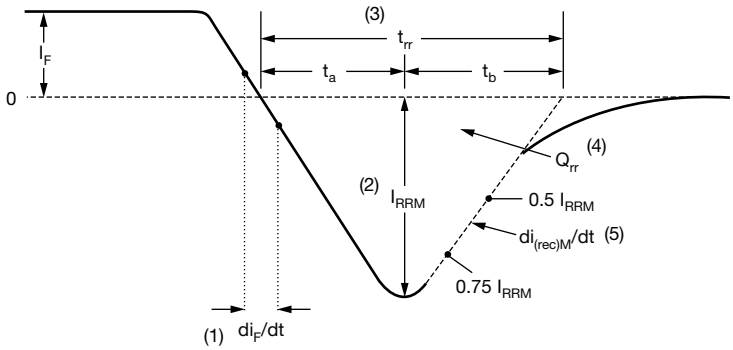



Fig. 9 - $I_{rr}$ vs. dI/dt, per Leg




(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 $I_{RRM}$

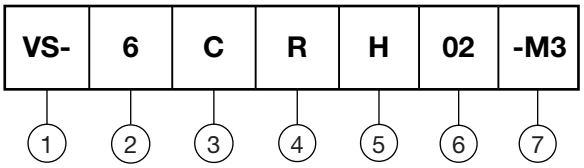
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(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



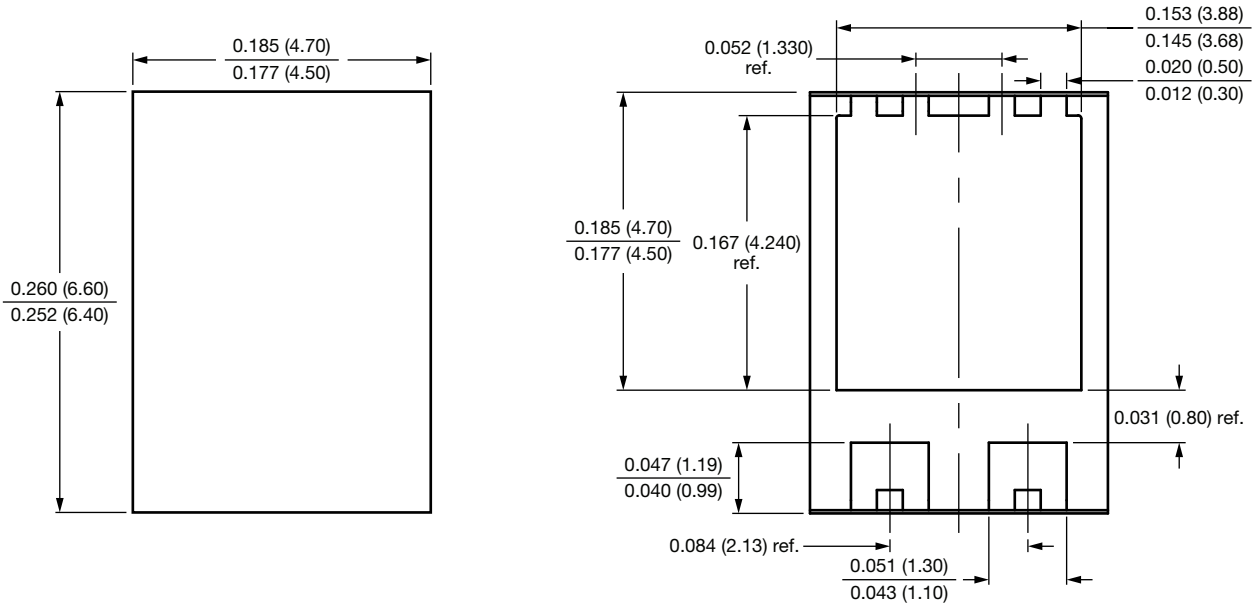

1 - Vishay Semiconductors product
2 - Current rating (6 = 6 A)
3 - Circuit configuration:
C = common cathode
4 - R = DFN6546A package
5 - Process type,
H = ultrafast recovery
6 - Voltage code (02 = 200 V)
7 - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

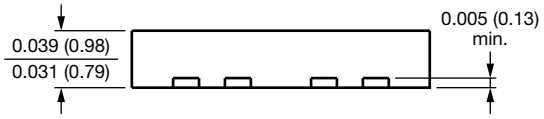
| **ORDERING INFORMATION** (Example) | | | |
|---|---|---|---|
| **PREFERRED P/N** | **PREFERRED PACKAGE CODE** | **BASE QUANTITY** | **PACKAGING DESCRIPTION** |
| VS-6CRH02-M3/I | I | 6000 | 13" diameter plastic tape and reel |

| **LINKS TO RELATED DOCUMENTS** | |
|---|---|
| Dimensions | www.vishay.com/doc?97347 |
| Part marking information | www.vishay.com/doc?97348 |
| Packaging information | www.vishay.com/doc?98691 |

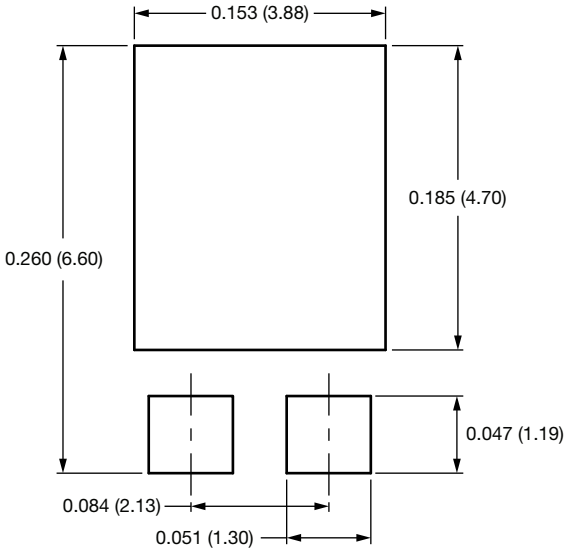
# DFN6456, FRED Pt®

**DIMENSIONS** in inches (millimeters)




Mounting Pad Layout



# 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.