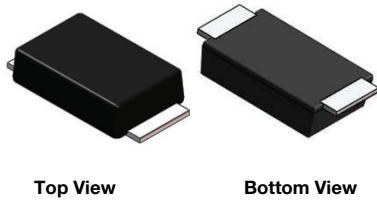


## Hyperfast Rectifier, 3 A FRED Pt<sup>®</sup>

### eSMP<sup>®</sup> Series



Top View

Bottom View

### SlimSMAW (DO-221AD)



### FEATURES

- Low profile package
- 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
- AEC-Q101 qualified, class 2 whisker test
- Compatible to SOD-128 package case outline
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE

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

### LINKS TO ADDITIONAL RESOURCES



### PRIMARY CHARACTERISTICS

|                       |                     |
|-----------------------|---------------------|
| $I_{F(AV)}$           | 3 A                 |
| $V_R$                 | 100 V, 200 V        |
| $V_F$ at $I_F$        | 0.71 V              |
| $I_{FSM}$             | 70 A                |
| $t_{rr}$ (typ.)       | 16 ns               |
| $T_J$ max.            | 175 °C              |
| Package               | SlimSMAW (DO-221AD) |
| Circuit configuration | Single              |

### DESCRIPTION / APPLICATIONS

For use in high frequency, freewheeling, DC/DC converters, PFC, and in snubber industrial, and automotive applications.

### MECHANICAL DATA

**Case:** SlimSMAW (DO-221AD)

Molding compound meets UL 94 V-0 flammability rating  
Halogen-free, RoHS-compliant

**Terminals:** matte tin plated leads, solderable per J-STD-002

**Polarity:** color band denotes cathode end

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                   | SYMBOL                     | TEST CONDITIONS                      | VALUES      | UNITS |
|---|----------------------------|--------------------------------------|-------------|-------|
| Peak repetitive reverse voltage             | $V_{RRM}$                  |                                      | 100<br>200  | V     |
| Average rectified forward current           | $I_{F(AV)}$ <sup>(1)</sup> | $T_C = 137$ °C                       | 3           | A     |
| Non-repetitive peak surge current           | $I_{FSM}$                  | $T_J = 25$ °C, 10 ms sine pulse wave | 70          |       |
| Operating junction and storage temperatures | $T_J, T_{Stg}$             |                                      | -55 to +175 | °C    |

#### Note

<sup>(1)</sup> Mounted on infinite heatsink

### 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               | 100  | -    | -    | V       |
|                                     |               |                                   | 200  | -    | -    |         |
| Forward voltage, per diode          | $V_F$         | $I_F = 3$ A                       | -    | 0.86 | 0.95 | V       |
|                                     |               | $I_F = 3$ A, $T_J = 150$ °C       | -    | 0.71 | 0.79 |         |
| Reverse leakage current, per diode  | $I_R$         | $V_R = V_R$ rated                 | -    | -    | 2    | $\mu$ A |
|                                     |               | $T_J = 150$ °C, $V_R = V_R$ rated | -    | -    | 20   |         |
| Junction capacitance                | $C_T$         | $V_R = 200$ V                     | -    | 16   | -    | pF      |



| DYNAMIC RECOVERY CHARACTERISTICS ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified) |           |   |      |      |      |       |
|---|-----------|---|------|------|------|-------|
| PARAMETER   | SYMBOL    | TEST CONDITIONS   | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time   | $t_{rr}$  | $I_F = 1.0\text{ A}$ , $di_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$  | -    | 22   | -    | ns    |
|   |           | $I_F = 1.0\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ | -    | 16   | -    |       |
|   |           | $I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{rr} = 0.25\text{ A}$              | -    | -    | 30   |       |
|   |           | $T_J = 25\text{ }^\circ\text{C}$  | -    | 18   | -    |       |
|   |           | $T_J = 125\text{ }^\circ\text{C}$   | -    | 30   | -    |       |
| Peak recovery current   | $I_{RRM}$ | $T_J = 25\text{ }^\circ\text{C}$  | -    | 2.5  | -    | A     |
|   |           | $T_J = 125\text{ }^\circ\text{C}$   | -    | 4    | -    |       |
| Reverse recovery charge   | $Q_{rr}$  | $T_J = 25\text{ }^\circ\text{C}$  | -    | 23   | -    | nC    |
|   |           | $T_J = 125\text{ }^\circ\text{C}$   | -    | 60   | -    |       |

| THERMAL - MECHANICAL SPECIFICATIONS            |                   |  |      |      |      |                           |
|--|-------------------|--|------|------|------|---------------------------|
| 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          | $R_{thJM}^{(1)}$  | Infinite heatsink                                      | -    | 12   | 15   | $^\circ\text{C}/\text{W}$ |
| Thermal resistance, junction to ambient        | $R_{thJA}$        | Device mounted on FR4 PCB,<br>2 oz. standard footprint | -    | 120  | 150  |                           |
| Marking device                                 | VS-3EYH01HM3      | Case style SlimSMAW (DO-221AD)                         | 3H1  |      |      |                           |
|  | VS-3EYH02HM3      |  | 3H2  |      |      |                           |

**Note**

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

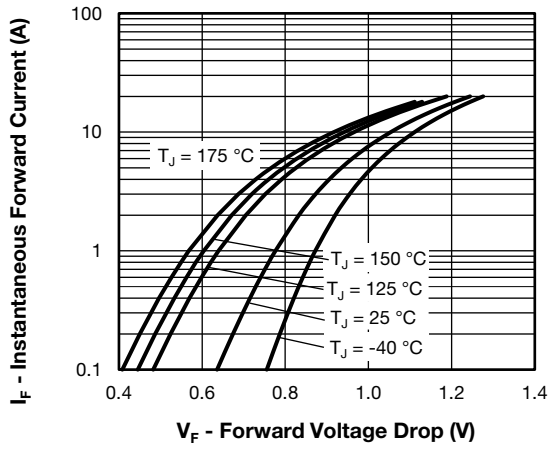


Fig. 1 - Typical Forward Voltage Drop Characteristics

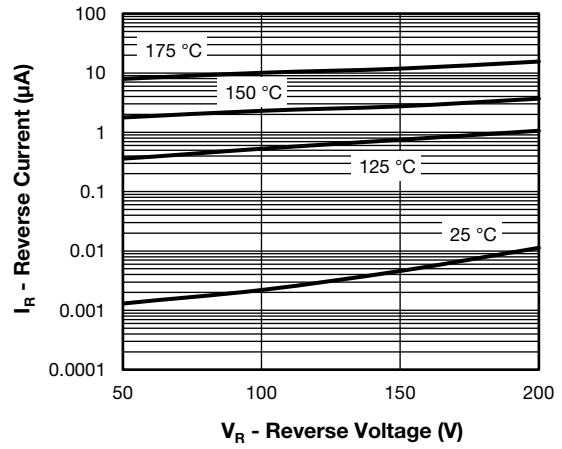


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

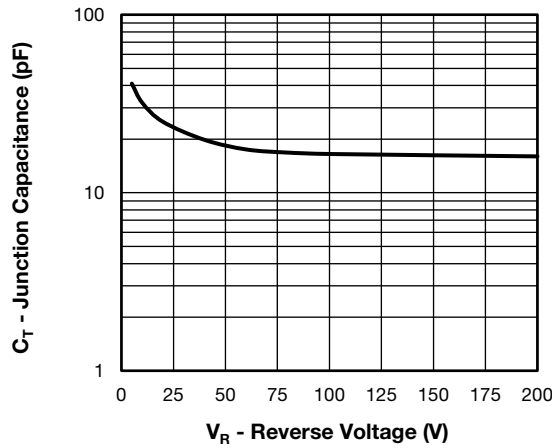


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

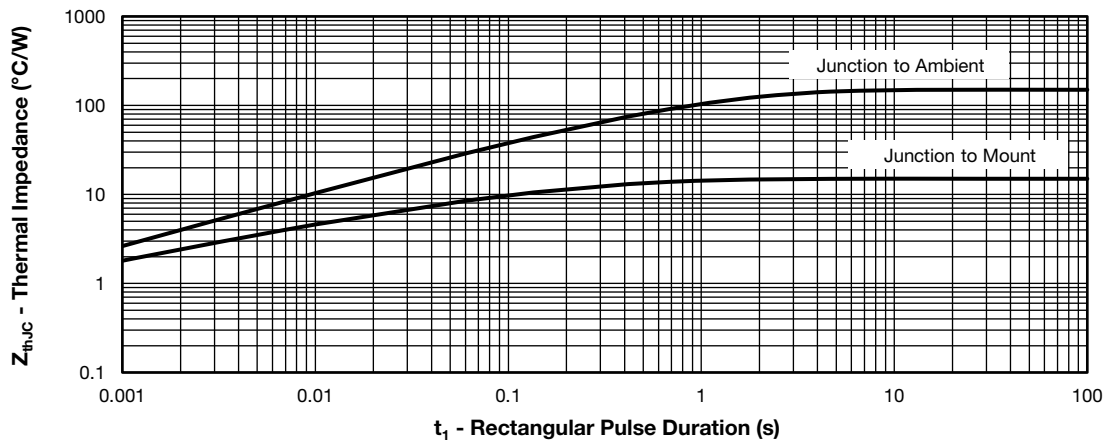


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

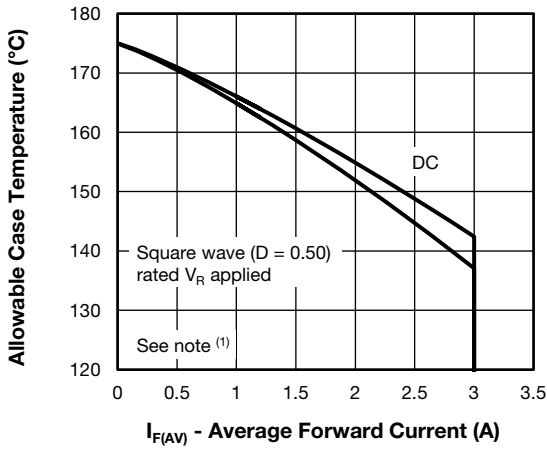


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

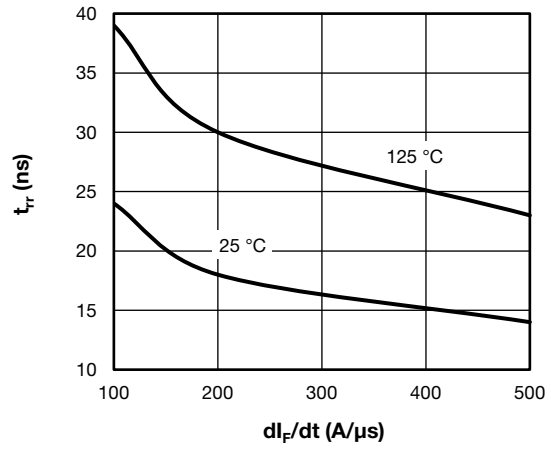


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$

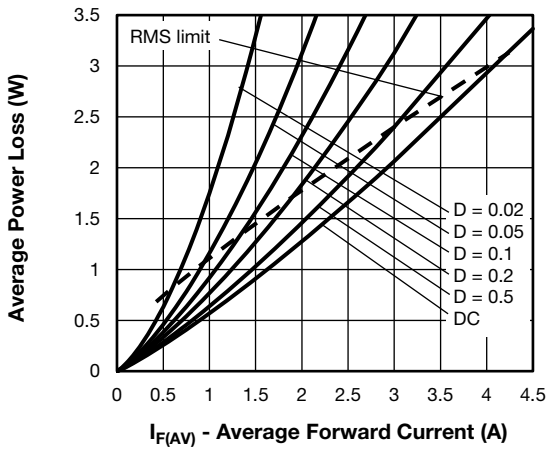


Fig. 6 - Forward Power Loss Characteristics

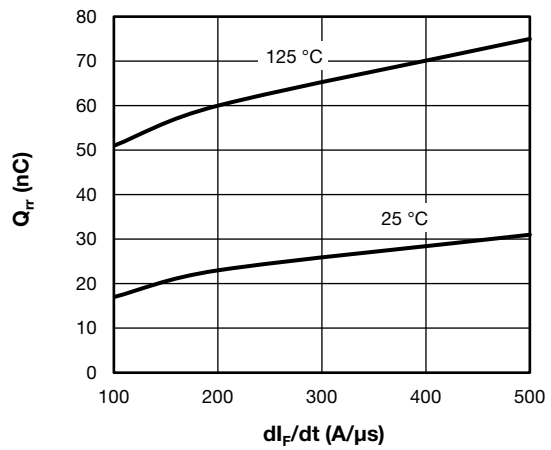


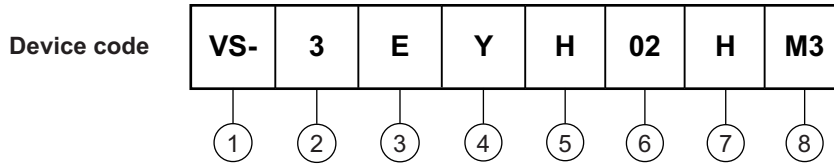
Fig. 8 - Typical Stored Charge vs.  $dI_F/dt$

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;  
 $P_d$  = 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  $V_R$



## ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (3 = 3 A)
- 3** - Circuit configuration:  
E = single diode
- 4** - Y = SlimSMAW (DO-221AD)
- 5** - Process type,  
H = hyperfast 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                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | PACKAGING DESCRIPTION              |
| VS-3EYH01HM3/H                 | 0.033           | H                      | 3500          | 7" diameter plastic tape and reel  |
| VS-3EYH01HM3/I                 | 0.033           | I                      | 14 000        | 13" diameter plastic tape and reel |
| VS-3EYH02HM3/H                 | 0.033           | H                      | 3500          | 7" diameter plastic tape and reel  |
| VS-3EYH02HM3/I                 | 0.033           | I                      | 14 000        | 13" diameter plastic tape and reel |

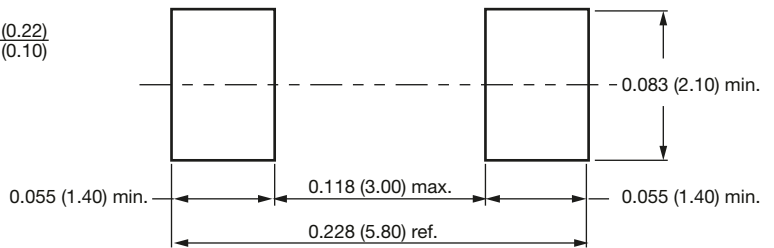
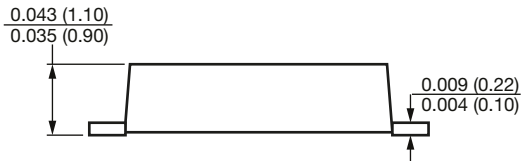
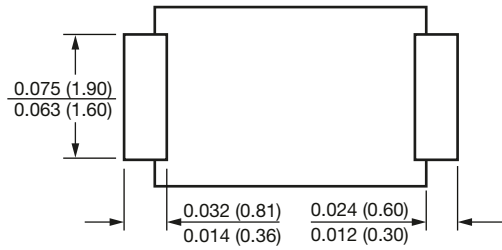
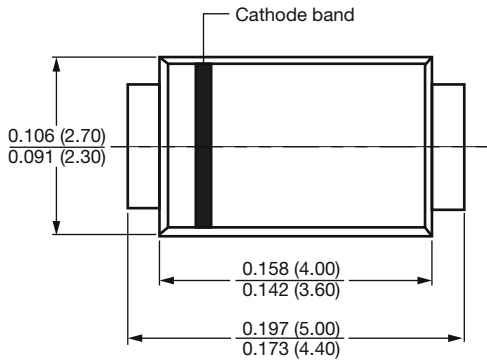
| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?96582">www.vishay.com/doc?96582</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95562">www.vishay.com/doc?95562</a> |
| Packaging information      | <a href="http://www.vishay.com/doc?88869">www.vishay.com/doc?88869</a> |
| SPICE model                | <a href="http://www.vishay.com/doc?96586">www.vishay.com/doc?96586</a> |



### SlimSMAW (DO-221AD)

**DIMENSIONS** in inches (millimeters)

#### SlimSMAW (DO-221AD)



**Mounting pad layout**



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