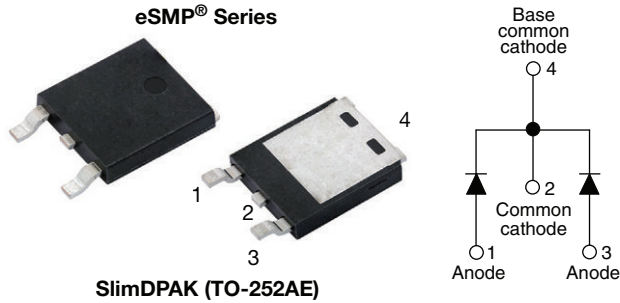


Hyperfast Rectifier, 2 x 5 A FRED Pt[®]

 AUTOMOTIVE
GRADE

RoHS
COMPLIANT
HALOGEN
FREE


FEATURES

- Hyperfast recovery time
- 175 °C max. operating junction temperature
- Low forward voltage drop reduced Q_{rr} and soft recovery
- Low leakage current
- Very low profile - typical height of 1.3 mm
- Ideal for automated placement
- Polyimide passivation for high reliability standard
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified, meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS

| | |
|-----------------------|---------------------|
| $I_{F(AV)}$ | 2 x 5 A |
| V_R | 200 V |
| V_F at I_F | 0.74 V |
| t_{rr} (typ.) | 16 ns |
| T_J max. | 175 °C |
| Package | SlimDPAK (TO-252AE) |
| Circuit configuration | Common cathode |

DESCRIPTION / APPLICATIONS

State of the art hyper fast recovery rectifiers designed with optimized performance of forward voltage drop, hyper fast recovery time, and soft recovery.

The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in PFC boost stage in the AC/DC section of SMPS inverters or as freewheeling diodes. Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

MECHANICAL DATA

Case: SlimDPAK (TO-252AE)

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

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

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|----------------|--|-------------|-------|
| Peak repetitive reverse voltage | V_{RRM} | | 200 | V |
| Average rectified forward current per leg per device | $I_{F(AV)}$ | $T_C = 165\text{ °C}$ | 5 10 | A |
| Non-repetitive peak surge current per leg | I_{FSM} | $T_J = 25\text{ °C}$, 10 ms sine pulse wave | 100 | |
| Operating junction and storage temperatures | T_J, T_{Stg} | | -55 to +175 | °C |

ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ °C}$ unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|-------------------------------------|---------------|--|------|------|------|---------------|
| Breakdown voltage, blocking voltage | V_{BR}, V_R | $I_R = 100\text{ }\mu\text{A}$ | 200 | - | - | |
| Forward voltage | V_F | $I_F = 5\text{ A}$ | - | 0.90 | 1.04 | V |
| | | $I_F = 10\text{ A}$ | - | 1.0 | 1.17 | |
| | | $I_F = 5\text{ A}, T_J = 150\text{ °C}$ | - | 0.74 | 0.84 | |
| | | $I_F = 10\text{ A}, T_J = 150\text{ °C}$ | - | 0.85 | 1.05 | |
| Reverse leakage current per leg | I_R | $V_R = V_R$ rated | - | - | 4 | μA |
| | | $T_J = 150\text{ °C}, V_R = V_R$ rated | - | - | 80 | |
| Junction capacitance per leg | C_T | $V_R = 200\text{ V}$ | - | 17 | - | 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} | $I_F = 1\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$ | - | 16 | - | ns |
| | | $I_F = 0.5\text{ A}$, $I_R = 1\text{ A}$, $I_{RR} = 0.25\text{ A}$ | - | - | 25 | |
| | | $T_J = 25\text{ }^\circ\text{C}$ | - | 21 | - | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 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} | $T_J = 25\text{ }^\circ\text{C}$ | - | 25 | - | 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 ambient | R_{thJA} ⁽¹⁾⁽²⁾ | | - | 73 | 90 | $^\circ\text{C}/\text{W}$ |
| Thermal resistance, junction to mount, per diode | R_{thJM} ⁽³⁾ | | - | 2.1 | 2.5 | |
| Weight | | | - | 0.20 | - | g |
| Marking device | | Case style SlimDPAK (TO-252AE) | 10CVH02 | | | |

Notes

- (1) The heat generated must be less than thermal conductivity from junction to ambient; $dP_D/dT_J < 1R_{thJA}$
- (2) Free air, mounted or recommended copper pad area; thermal resistance R_{thJA} - junction to ambient
- (3) Mounted on infinite heatsink

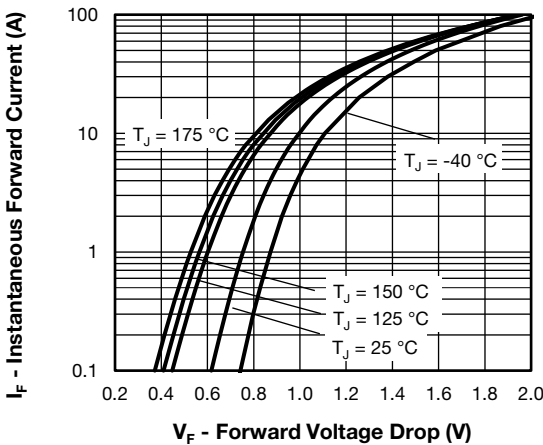


Fig. 1 - Typical Forward Voltage Drop Characteristics

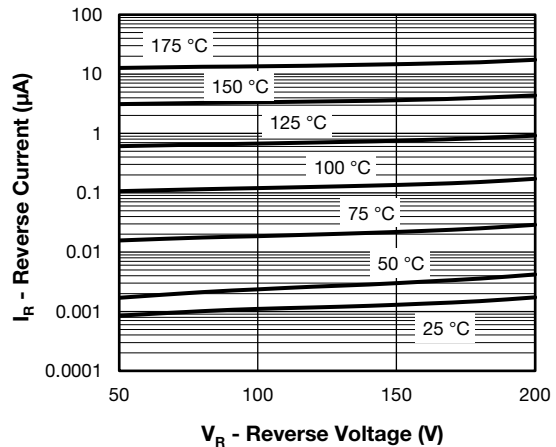


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

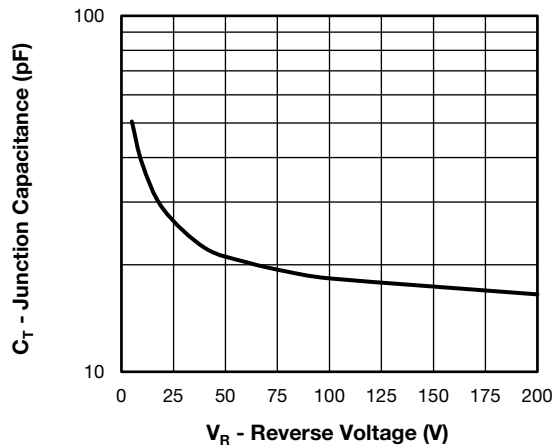


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

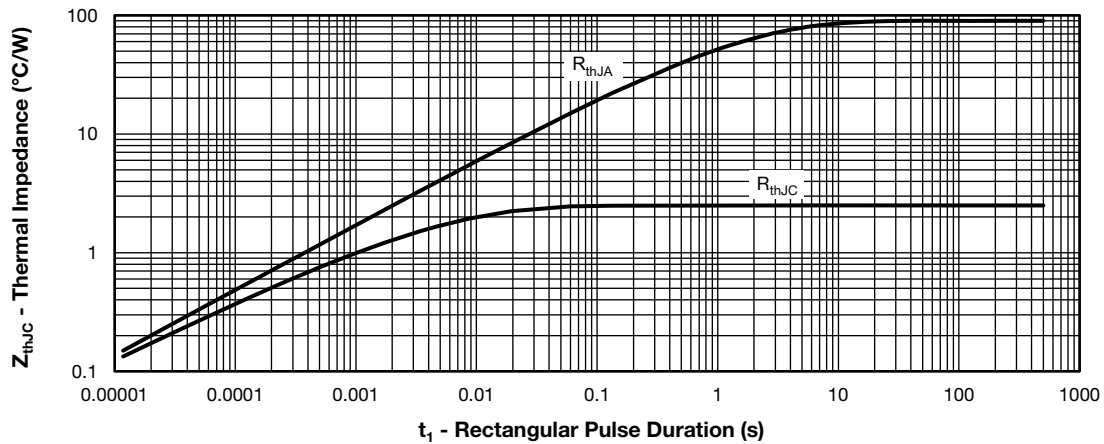


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

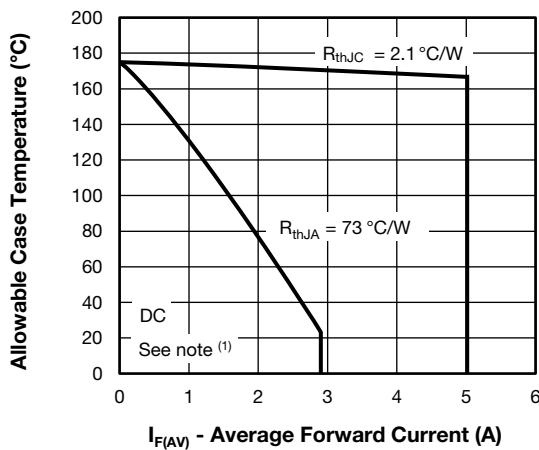


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

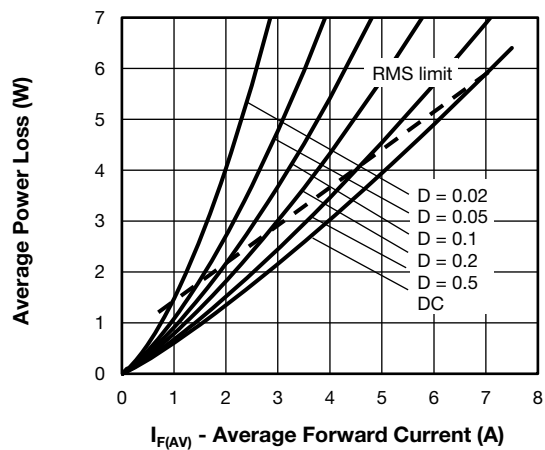


Fig. 6 - Forward Power Loss Characteristics

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 P_d = forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 P_{dREV} = inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = rated V_R

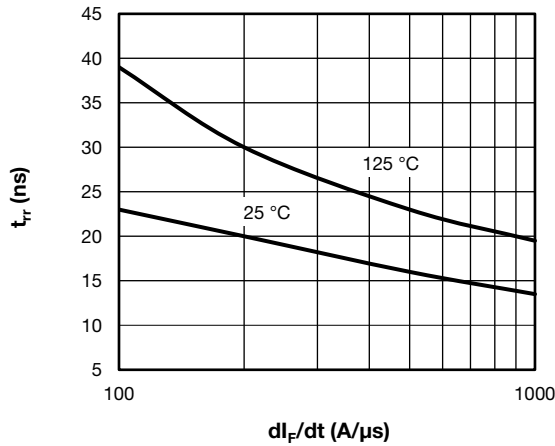


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

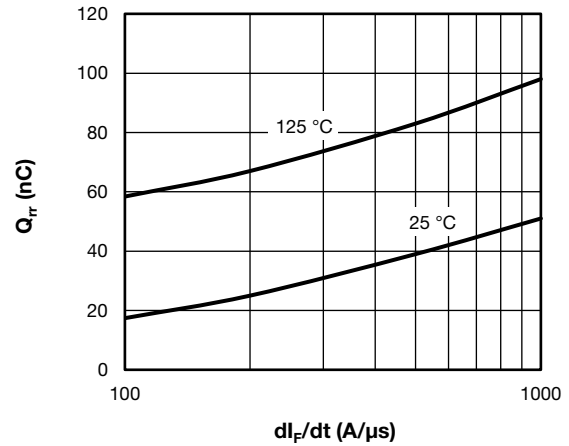
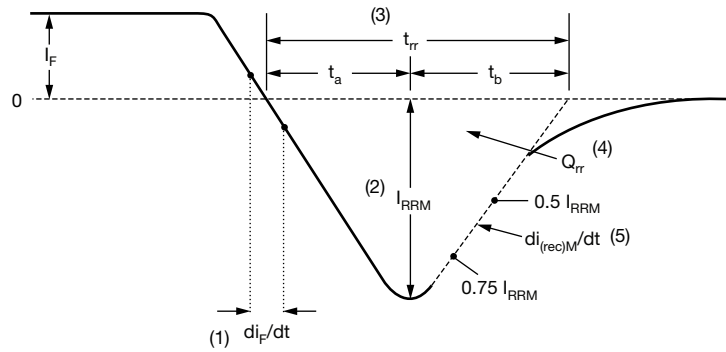


Fig. 8 - Typical Stored Charge vs. di_F/dt



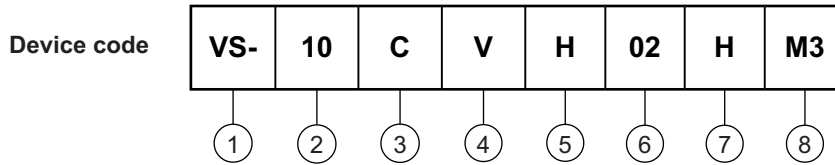
- (1) di_F/dt - rate of change of current through zero crossing
- (2) I_{RRM} - peak reverse recovery current
- (3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through $0.75 I_{RRM}$ and $0.50 I_{RRM}$ extrapolated to zero current.
- (4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}
- (5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

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

Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (10 = 10 A)
- 3** - Circuit configuration:
C = common cathode
- 4** - V = SlimDPAK
- 5** - Process type,
H = hyper fast recovery
- 6** - Voltage code (02 = 200 V)
- 7** - H = AEC-Q101 qualified
- 8** - M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

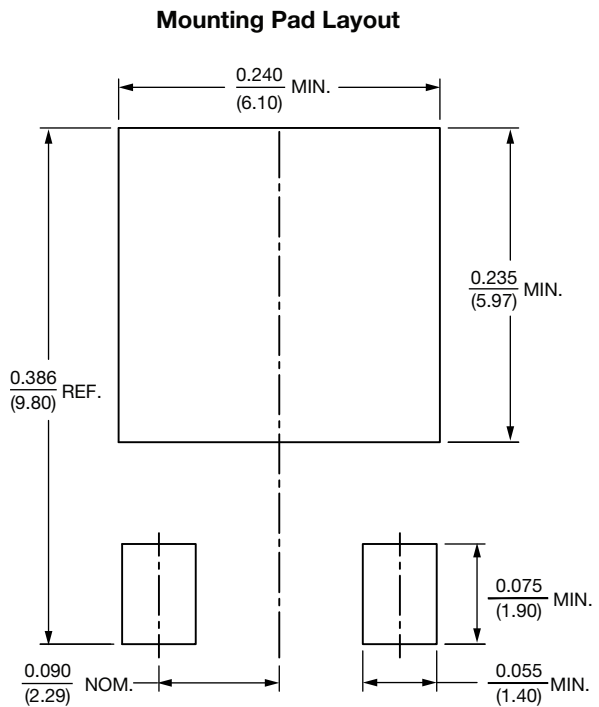
| ORDERING INFORMATION (Example) | | | |
|---------------------------------------|-------------------|------------------------|------------------------------------|
| PREFERRED P/N | QUANTITY PER REEL | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-10CVH02HM3/I | 4500 | 4500 | 13" diameter plastic tape and reel |

| LINKS TO RELATED DOCUMENTS | |
|-----------------------------------|--|
| Dimensions | www.vishay.com/doc?96081 |
| Part marking information | www.vishay.com/doc?96085 |
| Packaging information | www.vishay.com/doc?88869 |



SlimDPAK

DIMENSIONS in inches (millimeters)





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