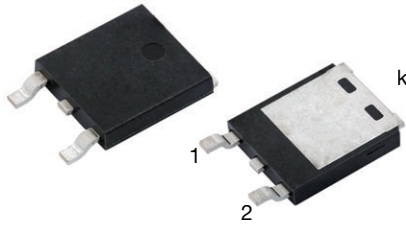
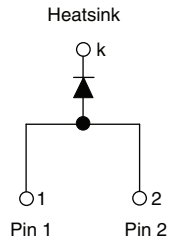


Ultralow V_F Ultrafast Rectifier, 6 A FRED Pt[®]

eSMP[®] Series

SlimDPAK (TO-252AE)

FEATURES

- Ultrafast recovery time, extremely low V_F and soft recovery
- For PFC CCM operation
- 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
 - Automotive ordering code: base P/NHM3, meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE


RoHS
COMPLIANT
HALOGEN
FREE
LINKS TO ADDITIONAL RESOURCES

[3D Models](#)
PRIMARY CHARACTERISTICS

| | |
|-----------------------|---------------------|
| $I_{F(AV)}$ | 6 A |
| V_R | 600 V |
| V_F at I_F | 0.98 V |
| t_{rr} (typ.) | 34 ns |
| T_J max. | 175 °C |
| Package | SlimDPAK (TO-252AE) |
| Circuit configuration | Single |

TYPICAL APPLICATIONS

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

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} | | 600 | V |
| Average rectified forward current | $I_{F(AV)}$ | $T_C = 158\text{ °C}$ | 6 | A |
| Non-repetitive peak surge current | I_{FSM} | $T_J = 25\text{ °C}$, 10 ms sine pulse wave | 80 | |
| 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 | $I_R = 100\ \mu\text{A}$ | 600 | - | - | V |
| Forward voltage | V_F | $I_F = 6\text{ A}$ | - | 1.15 | 1.35 | |
| | | $I_F = 6\text{ A}, T_J = 150\text{ °C}$ | - | 0.98 | 1.15 | |
| Reverse leakage current | I_R | $V_R = V_R$ rated | - | - | 5 | μA |
| | | $T_J = 150\text{ °C}, V_R = V_R$ rated | - | - | 125 | |
| Junction capacitance | C_T | $V_R = 600\text{ V}$ | - | 10 | - | 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} | $I_F = 1\text{ A}$, $di_F/dt = 50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$ | - | 45 | - | ns |
| | | $I_F = 1\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$ | - | 34 | - | |
| | | $I_F = 0.5\text{ A}$, $I_R = 1\text{ A}$, $I_{RR} = 0.25\text{ A}$ | - | - | 50 | |
| | | $T_J = 25\text{ }^\circ\text{C}$ | - | 65 | - | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 90 | - | |
| Peak recovery current | I_{RRM} | $T_J = 25\text{ }^\circ\text{C}$ | - | 9.5 | - | A |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 13.5 | - | |
| Reverse recovery charge | Q_{rr} | $T_J = 25\text{ }^\circ\text{C}$ | - | 320 | - | nC |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 620 | - | |

| 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} | | - | - | 2.5 | $^\circ\text{C}/\text{W}$ |
| Marking device | | Case style SlimDPAK (TO-252AE) | 6EVL06 | | | |

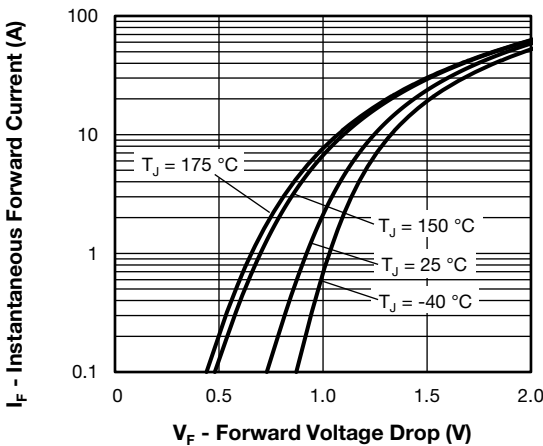


Fig. 1 - Typical Forward Voltage Drop Characteristics

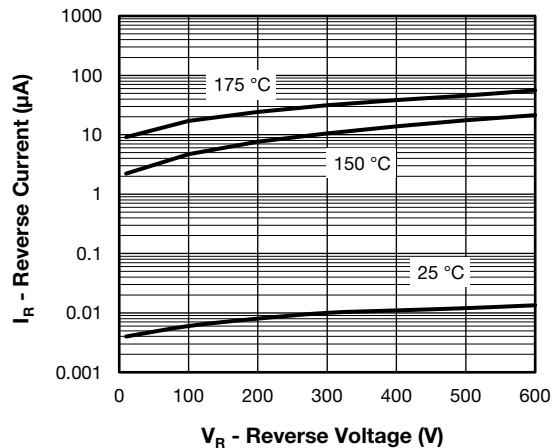


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

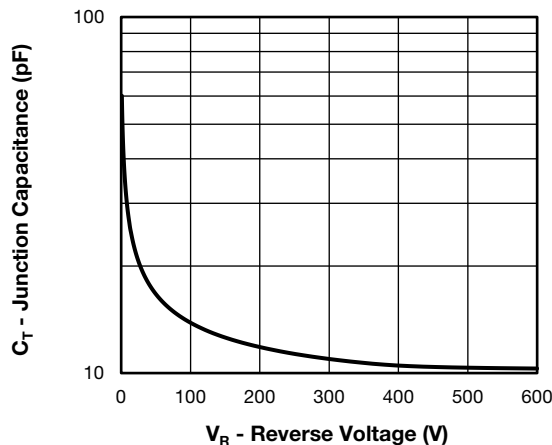


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

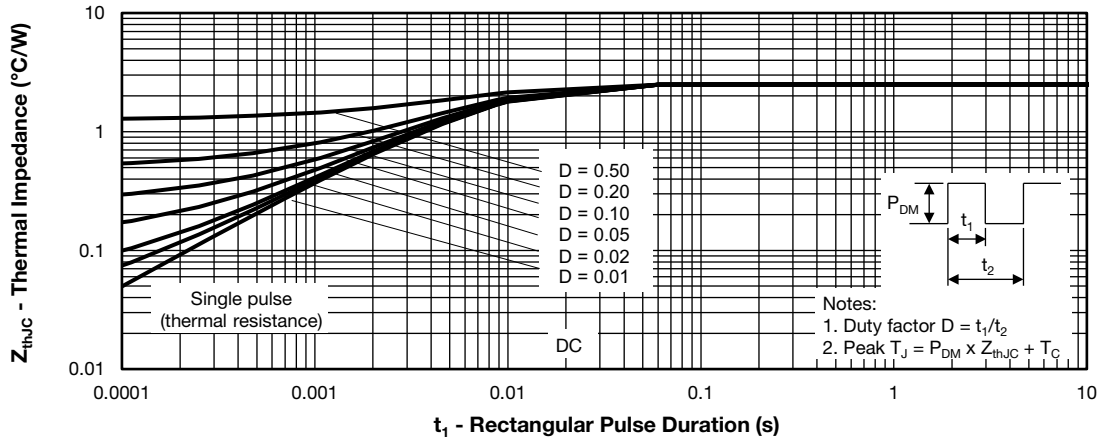


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

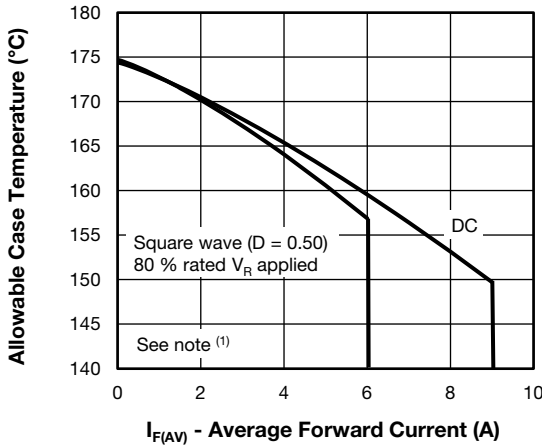


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

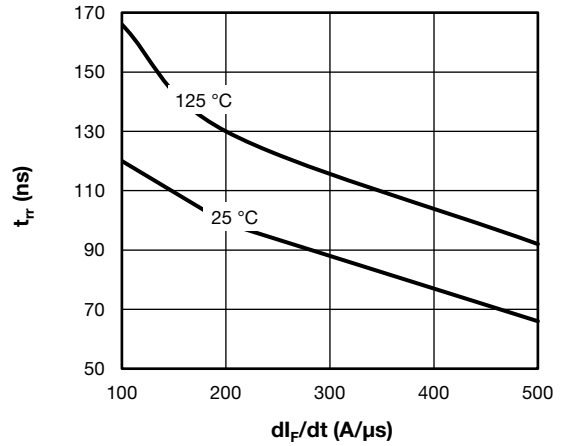


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

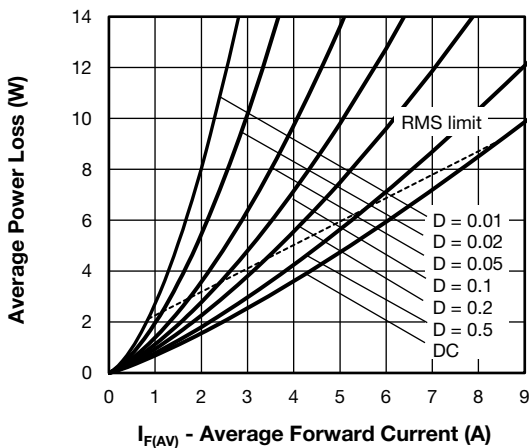


Fig. 6 - Forward Power Loss Characteristics

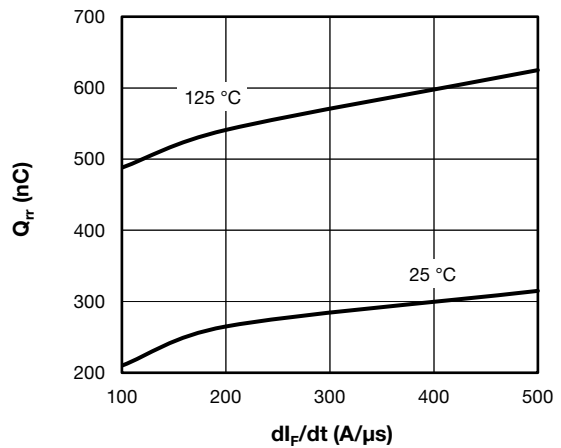
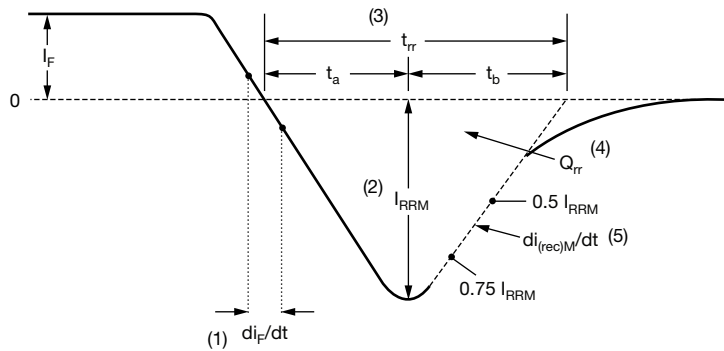


Fig. 8 - Typical Stored Charge vs. dI_F/dt

Note

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



- (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

| | | | | | | | | |
|-------------|------------|----------|----------|----------|----------|-----------|----------|-----------|
| Device code | VS- | 6 | E | V | L | 06 | H | M3 |
| | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |

- 1** - Vishay Semiconductors product
- 2** - Current rating (6 = 6 A)
- 3** - Circuit configuration:
E = single die
- 4** - V = SlimDPAK
- 5** - Process type:
L = ultralow V_F ultrafast rectifier
- 6** - Voltage code (06 = 600 V)
- 7** - H = AEC-Q101 qualified
- 8** - Environmental digit:
M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

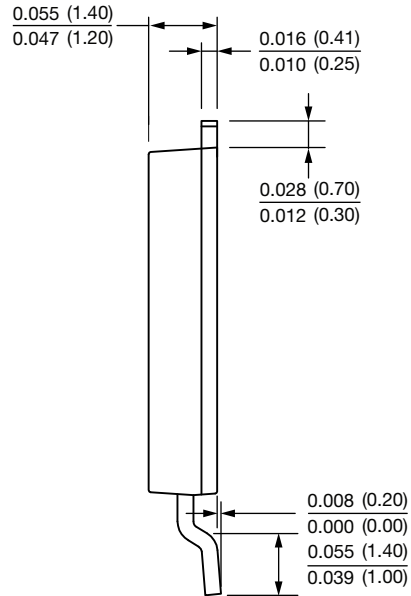
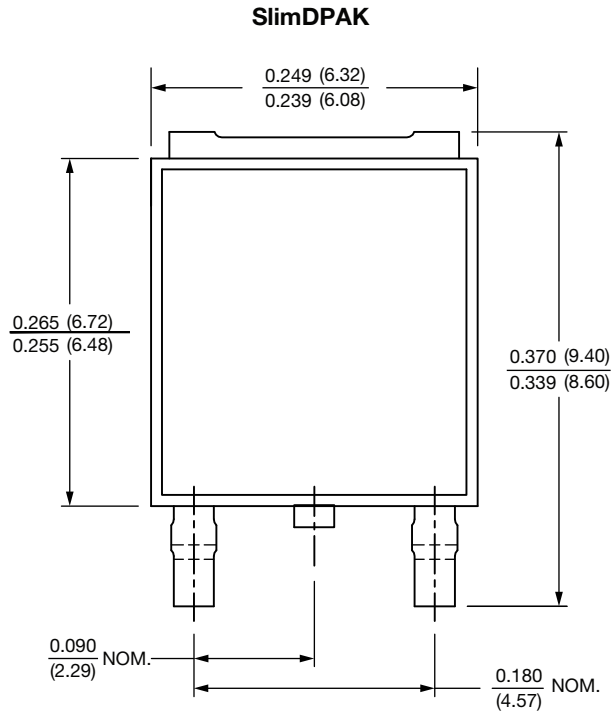
| ORDERING INFORMATION (Example) | | | | |
|---------------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | PACKAGING DESCRIPTION |
| VS-6EVL06HM3/I | 0.20 | I | 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 |

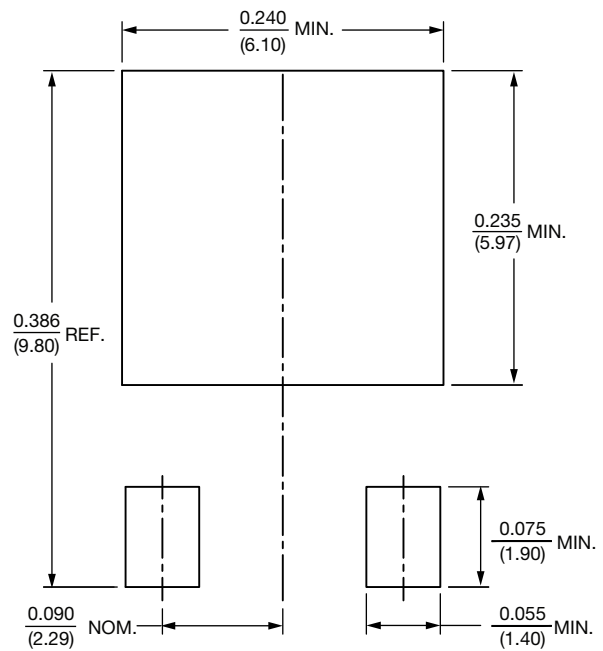
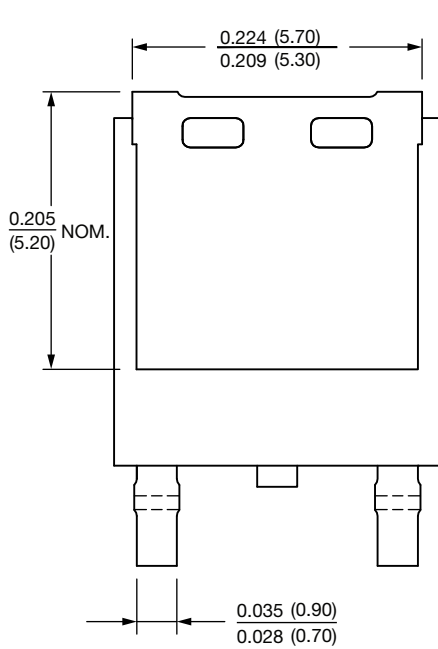


SlimDPAK

DIMENSIONS in inches (millimeters)



Mounting Pad Layout





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