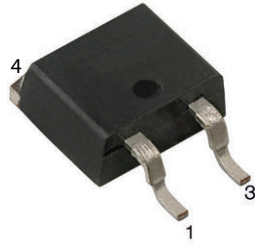
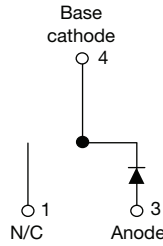


Ultrafast Rectifier, 30 A FRED Pt®


D²PAK 2L (TO-263AB 2L)


FEATURES

- Low forward voltage drop
- Ultrafast recovery time
- 175 °C operating junction temperature
- Low leakage current
- AEC-Q101 qualified, meets JESD 201 class 2 whisker test
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE

LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS | |
|-------------------------|------------------------|
| $I_{F(AV)}$ | 30 A |
| V_R | 600 V |
| V_F at I_F | 0.9 V |
| t_{rr} (typ.) | 110 ns |
| T_J max. | 175 °C |
| Package | D²PAK 2L (TO-263AB 2L) |
| Circuit configuration | Single |

DESCRIPTION

Ultralow V_F , soft-switching ultrafast rectifiers optimized for discontinuous (critical) mode (DCM) power factor correction (PFC).

The minimized conduction loss, optimized stored charge and low recovery current minimized the switching losses and reduce over dissipation in the switching element and snubbers.

The device is also intended for use as a freewheeling diode in power supplies and other power switching applications.

APPLICATIONS

AC/DC SMPS 70 W to 400 W

e.g. laptop and printer AC adaptors, desktop PC, TV and monitor, games units, and DVD AC/DC power supplies.

MECHANICAL DATA

Case: D²PAK 2L (TO-263AB 2L)

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 | MAX. | UNITS |
| Repetitive peak reverse voltage | V_{RRM} | | 600 | V |
| Average rectified forward current | $I_{F(AV)}$ | $T_C = 125\text{ °C}$ | 30 | A |
| Non-repetitive peak surge current | I_{FSM} | $T_C = 25\text{ °C}$ | 280 | |
| 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 | $I_R = 100\text{ }\mu\text{A}$ | 600 | - | - | V |
| Forward voltage | V_F | $I_F = 30\text{ A}$ $I_F = 30\text{ A}, T_J = 150\text{ °C}$ | - | 1.01 0.90 | - 1.02 | |
| Reverse leakage current | I_R | $V_R = V_R$ rated $T_J = 150\text{ °C}, V_R = V_R$ rated | - | 0.02 30 | 30 250 | μA |
| Junction capacitance | C_T | $V_R = 600\text{ V}$ | - | 20 | - | pF |
| Series inductance | L_S | Measured lead to lead 5 mm from package body | - | 8.0 | - | nH |



| 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} | $I_F = 1\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$ | - | 110 | - | ns |
| | | $T_J = 25\text{ }^\circ\text{C}$ | - | 134 | - | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 176 | - | |
| Peak recovery current | I_{RRM} | $T_J = 25\text{ }^\circ\text{C}$ | - | 76 | - | A |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 94 | - | |
| Reverse recovery charge | Q_{rr} | $T_J = 25\text{ }^\circ\text{C}$ | - | 6670 | - | nC |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 10 300 | - | |

| 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-case | R_{thJC} | | - | 0.95 | 1.2 | $^\circ\text{C}/\text{W}$ |
| Thermal resistance, junction-to-ambient | R_{thJA} | Typical socket mount | - | - | 70 | |
| Thermal resistance, case-to-heatsink | R_{thCS} | Mounting surface, flat, smooth, and greased | - | 0.5 | - | |
| Weight | | | - | 2.0 | - | g |
| | | | - | 0.07 | - | oz. |
| Marking device | | Case style D ² PAK 2L (TO-263AB 2L) | ETL3006SH | | | |

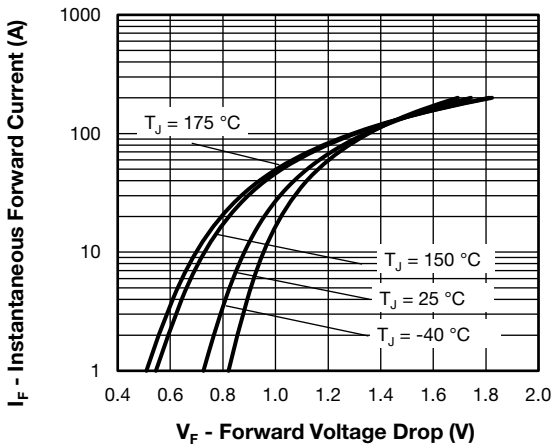


Fig. 1 - Typical Forward Voltage Drop Characteristics

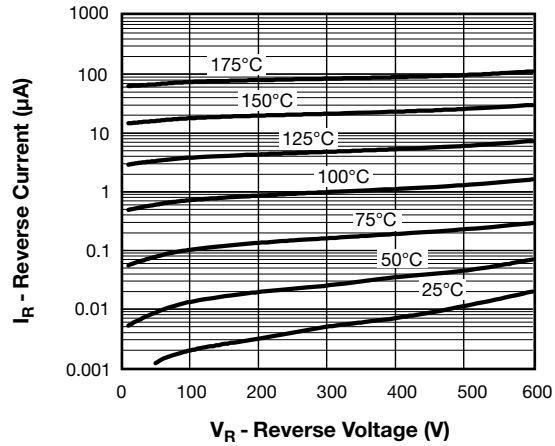


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

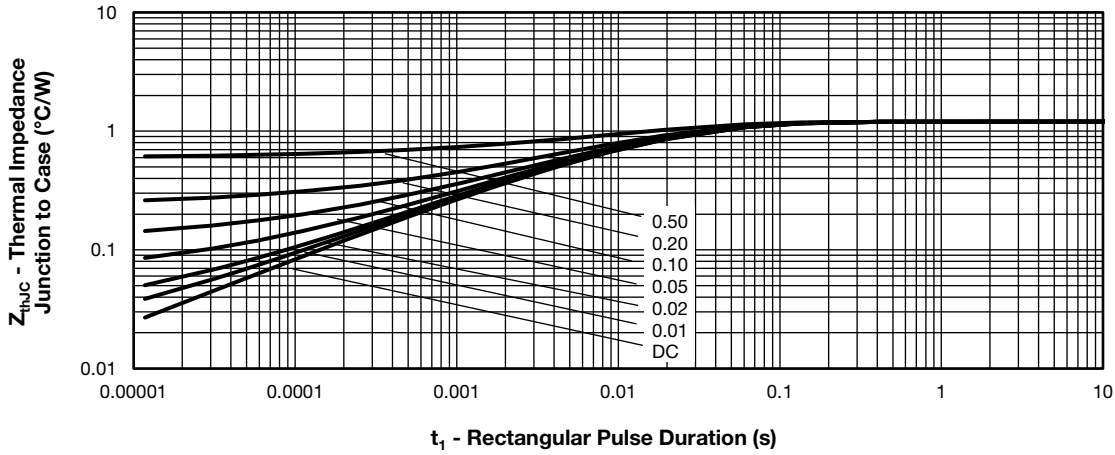


Fig. 3 - Maximum Thermal Impedance Z_{thJC} Characteristics

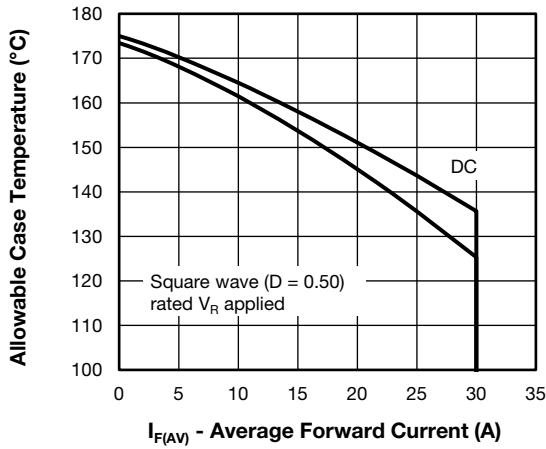


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

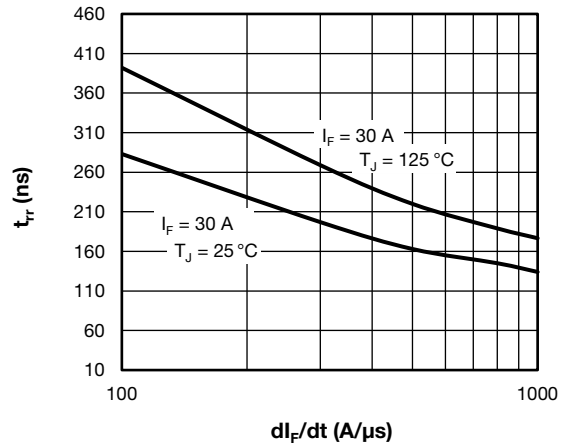


Fig. 6 - Typical Reverse Recovery Time vs. di_F/dt

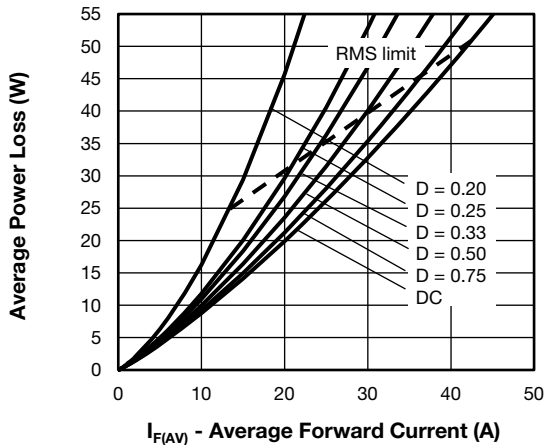


Fig. 5 - Forward Power Loss Characteristics

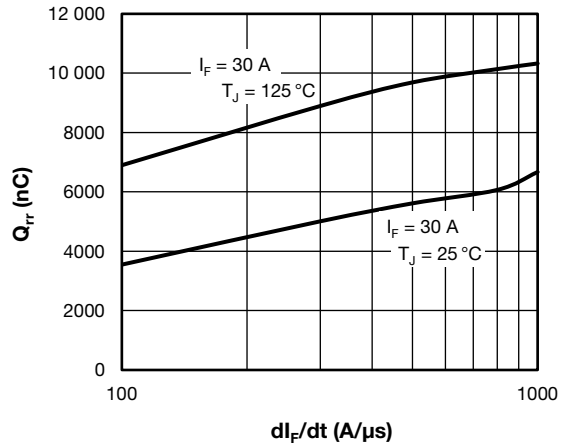


Fig. 7 - Typical Stored Charge vs. di_F/dt

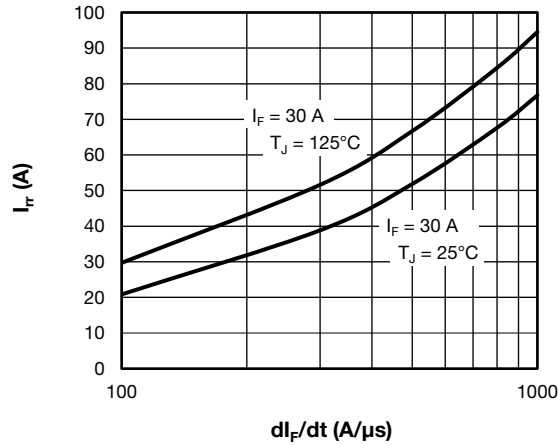
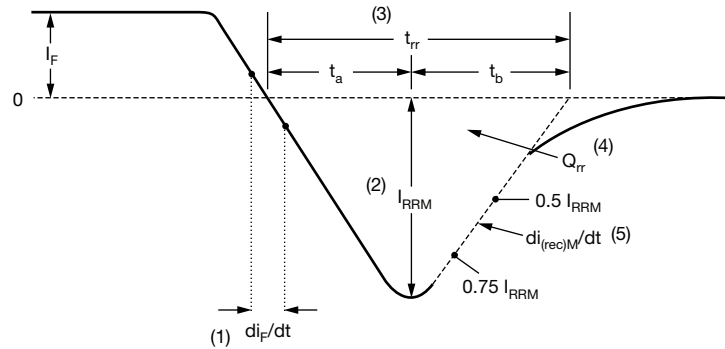


Fig. 8 - Typical Reverse Recovery Current vs. di_F/dt



- (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

| | | | | | | | | | | |
|-------------|------------|----------|----------|----------|-----------|-----------|-----------|----------|----------|-----------|
| Device code | VS- | E | T | L | 30 | 06 | S2 | L | H | M3 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

- 1** - Vishay Semiconductors product
- 2** - Circuit configuration
E = single
- 3** - T = D²PAK (TO-262) package
- 4** - L = ultrafast recovery time
- 5** - Current code (30 = 30 A)
- 6** - Voltage code (06 = 600 V)
- 7** - S2 = true 2 pin D²PAK
- 8** -
 - None = tube
 - L = tape and reel (left oriented, for D²PAK package)
If needed different orientation/packaging, please contact factory
- 9** - H = AEC-Q101 qualified
- 10** - Environmental digit:
M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

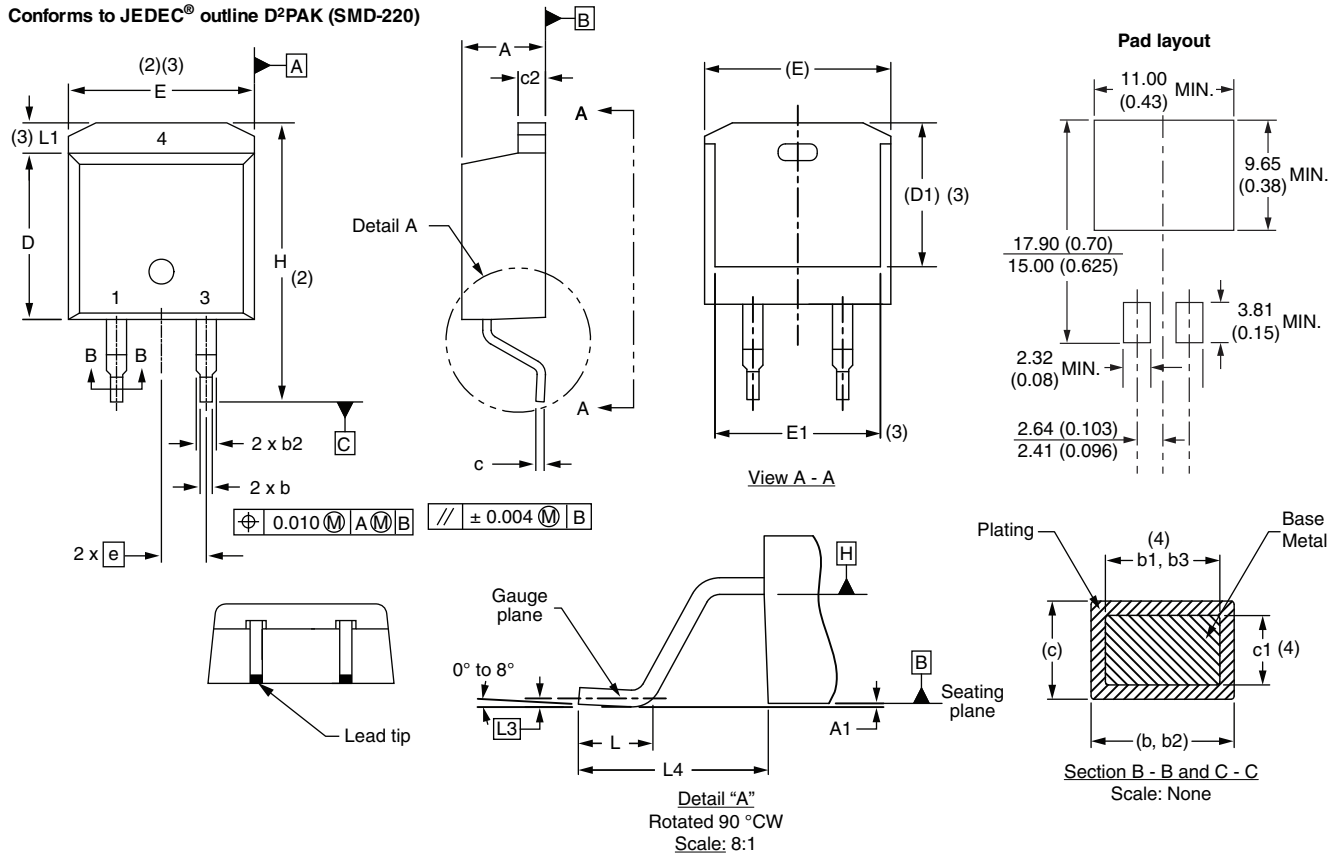
| ORDERING INFORMATION (Example) | | |
|--------------------------------|---------------|-----------------------|
| PREFERRED P/N | BASE QUANTITY | PACKAGING DESCRIPTION |
| VS-ETL3006S2LHM3 | 800 | 13" diameter reel |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?96683 |
| Part marking information | www.vishay.com/doc?96693 |
| Packaging information | www.vishay.com/doc?95032 |

D²PAK 2L (TO-263AB 2L)

DIMENSIONS in millimeters and inches

Conforms to JEDEC[®] outline D²PAK (SMD-220)



| SYMBOL | MILLIMETERS | | INCHES | | NOTES | SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | | | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | 0.160 | 0.190 | | D1 | 6.86 | 8.00 | 0.270 | 0.315 | 3 |
| A1 | 0.00 | 0.254 | 0.000 | 0.010 | | E | 9.65 | 10.67 | 0.380 | 0.420 | 2, 3 |
| b | 0.51 | 0.99 | 0.020 | 0.039 | | E1 | 7.90 | 8.80 | 0.311 | 0.346 | 3 |
| b1 | 0.51 | 0.89 | 0.020 | 0.035 | 4 | e | 2.54 BSC | | 0.100 BSC | | |
| b2 | 1.14 | 1.78 | 0.045 | 0.070 | | H | 14.61 | 15.88 | 0.575 | 0.625 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 | L | 1.78 | 2.79 | 0.070 | 0.110 | |
| c | 0.38 | 0.74 | 0.015 | 0.029 | | L1 | - | 1.65 | - | 0.066 | 3 |
| c1 | 0.38 | 0.58 | 0.015 | 0.023 | 4 | L3 | 0.25 BSC | | 0.010 BSC | | |
| c2 | 1.14 | 1.65 | 0.045 | 0.065 | | L4 | 4.78 | 5.28 | 0.188 | 0.208 | |
| D | 8.51 | 9.65 | 0.335 | 0.380 | 2 | | | | | | |

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inch
- (7) Outline conforms to JEDEC[®] outline TO-263AB



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