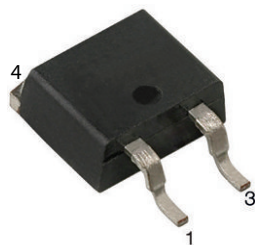
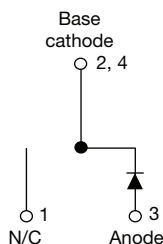


Ultrafast Rectifier, 20 A FRED Pt®



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

DESCRIPTION

State of the art, 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 switching applications

APPLICATIONS

AC/DC SMPS 70 W to 400 W

e.g. laptop and printer AC adapters, 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

PRIMARY CHARACTERISTICS

| | |
|-----------------------|------------------------|
| $I_{F(AV)}$ | 20 A |
| V_R | 600 V |
| V_F at I_F | 1.2 V |
| t_{rr} (typ.) | ns |
| T_J max. | 175 °C |
| Package | D²PAK 2L (TO-263AB 2L) |
| Circuit configuration | Single |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | MAX. | UNITS |
|---|----------------|-----------------------|-------------|-------|
| Repetitive peak reverse voltage | V_{RRM} | | 600 | V |
| Average rectified forward current | $I_{F(AV)}$ | $T_C = 129\text{ °C}$ | 20 | A |
| Non-repetitive peak surge current | I_{FSM} | $T_C = 25\text{ °C}$ | 180 | |
| 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 | $I_F = 20\text{ A}$ | - | 1.35 | 1.7 | |
| | | $I_F = 20\text{ A}, T_J = 150\text{ °C}$ | - | 1.2 | 1.4 | |
| Reverse leakage current | I_R | $V_R = V_R$ rated | - | 0.02 | 5 | μA |
| | | $T_J = 150\text{ °C}, V_R = V_R$ rated | - | 20 | 200 | |
| Junction capacitance | C_T | $V_R = 600\text{ V}$ | - | 12 | - | 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} | $I_F = 1\text{ A}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$ | - | 26 | - | ns |
| | | $T_J = 25\text{ }^{\circ}\text{C}$ | - | 42 | - | |
| | | $T_J = 125\text{ }^{\circ}\text{C}$ | - | 89 | - | |
| Peak recovery current | I_{RRM} | $T_J = 25\text{ }^{\circ}\text{C}$ | - | 4.9 | - | A |
| | | $T_J = 125\text{ }^{\circ}\text{C}$ | - | 8.4 | - | |
| | | $T_J = 25\text{ }^{\circ}\text{C}$ | - | 110 | - | C |
| Reverse recovery charge | Q_{rr} | $T_J = 125\text{ }^{\circ}\text{C}$ | - | 440 | - | |

| 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} | | - | - | 1.51 | $^{\circ}\text{C}/\text{W}$ |
| Thermal resistance, junction to ambient | R_{thJA} | Typical socket mount | - | - | 70 | |
| Thermal resistance, case to heat sink | R_{thCS} | Mounting surface, flat, smooth, and greased | - | 0.5 | - | |
| Weight | | | - | 2.0 | - | g |
| | | | - | 0.07 | - | oz. |
| Mounting torque | | | 6 (5) | - | 12 (10) | kgf · cm (lbf · in) |
| Marking device | | Case style D ² PAK 2L (TO-263AB 2L) | ETU2006SH | | | |

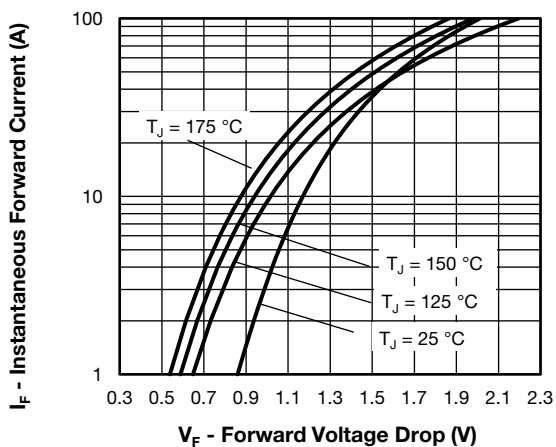


Fig. 1 - Typical Forward Voltage Drop Characteristics

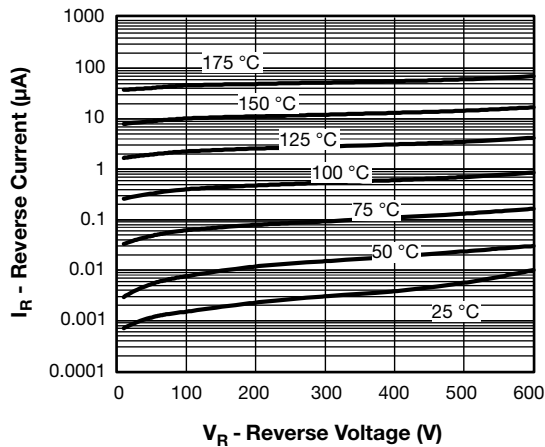


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

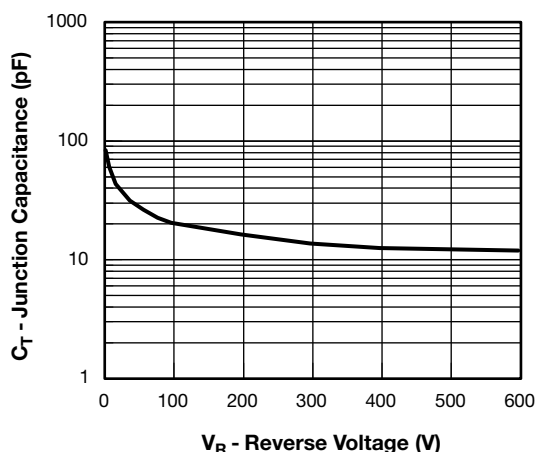


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

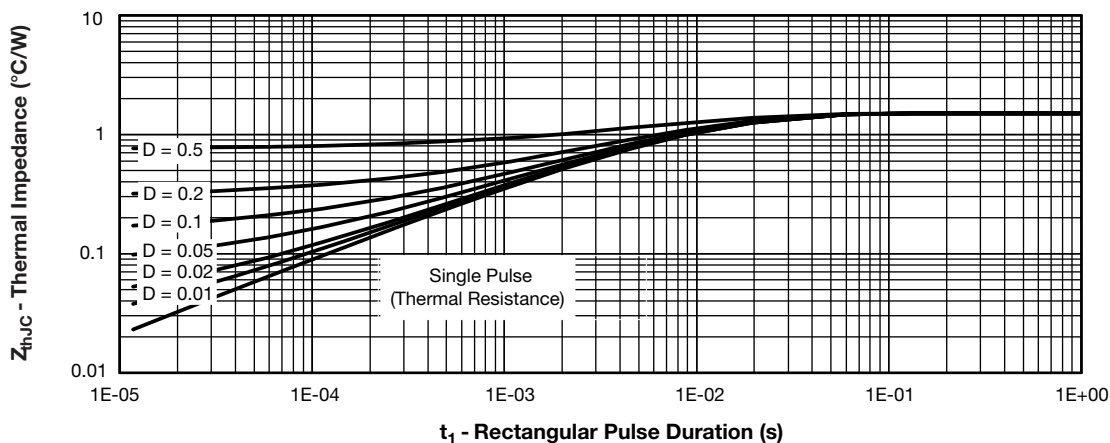
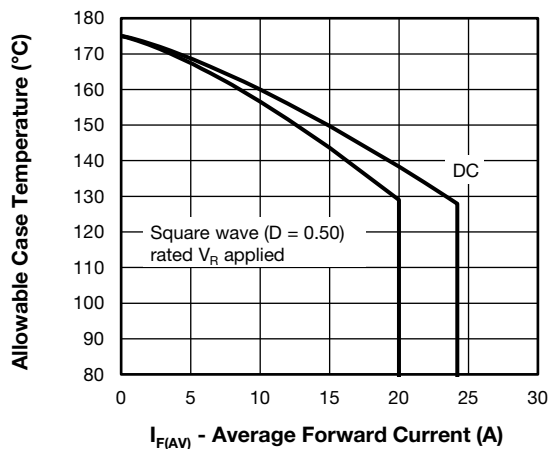

Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics


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

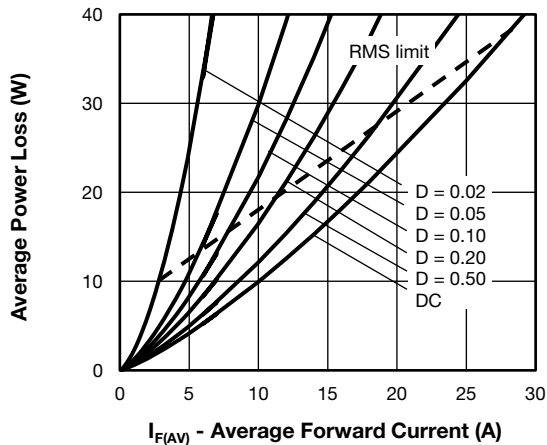


Fig. 6 - Forward Power Loss Characteristics

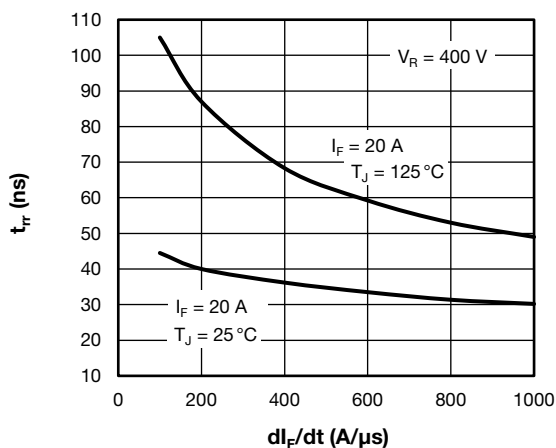
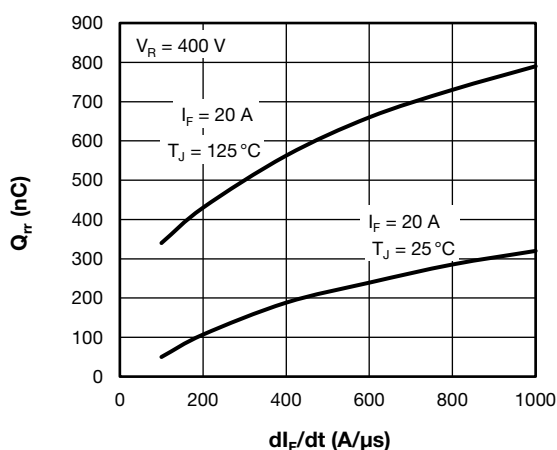
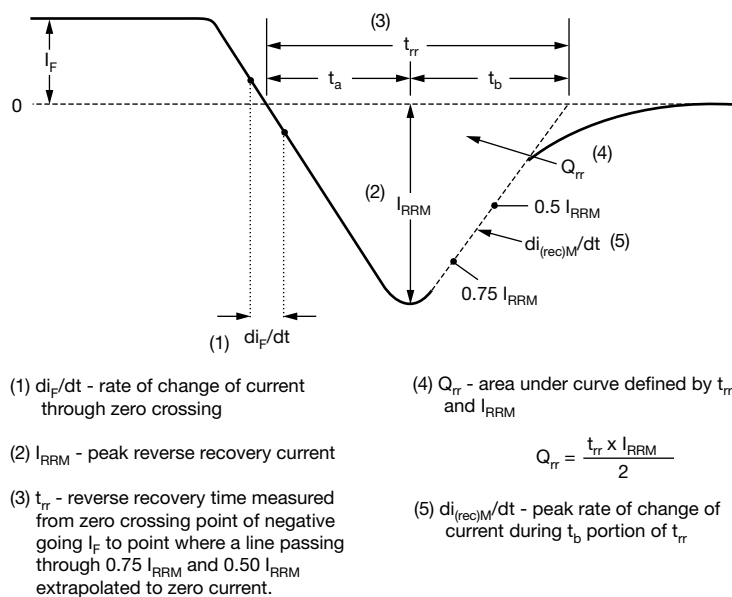

Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

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


Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

| | | | | | | | | | | |
|-------------|-----|---|---|---|----|----|----|---|---|----|
| Device code | VS- | E | T | U | 20 | 06 | S2 | L | H | M3 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

- 1** - Vishay Semiconductors product
- 2** - Circuit configuration
E = single diode
- 3** - T = D²PAK (TO-263) package
- 4** - U = ultrafast recovery time
- 5** - Current code (20 = 20 A)
- 6** - Voltage code (06 = 600 V)
- 7** - • S2 = true 2 pin D²PAK
- 8** - • None = tube (50 pieces)
• 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 termination lead (Pb)-free

| ORDERING INFORMATION (Example) | | |
|--------------------------------|---------------|-----------------------|
| PREFERRED P/N | BASE QUANTITY | PACKAGING DESCRIPTION |
| VS-ETU2006S2LHM3 | 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 |



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