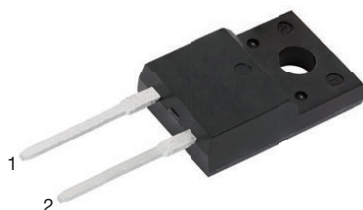
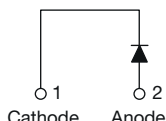


Ultrafast Rectifier, 20 A FRED Pt®


TO-220 FullPAK 2L


LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS

| | |
|-----------------------|-------------------|
| $I_{F(AV)}$ | 20 A |
| V_R | 600 V |
| V_F at I_F | 1.26 V |
| t_{rr} (typ.) | 61 ns |
| T_J max. | 175 °C |
| Package | TO-220 FullPAK 2L |
| Circuit configuration | Single |

FEATURES

- Low forward voltage drop
- Ultrafast soft recovery time
- 175 °C operating junction temperature
- Low leakage current
- Fully isolated package ($V_{INS} = 2500 V_{RMS}$)
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

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: TO-220 FullPAK 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 | VALUES | UNITS |
|---|----------------|-----------------------|-------------|-------|
| Peak repetitive reverse voltage | V_{RRM} | | 600 | V |
| Average rectified forward current in DC | $I_{F(AV)}$ | $T_C = 102\text{ °C}$ | 20 | A |
| Non-repetitive peak surge current | I_{FSM} | $T_J = 25\text{ °C}$ | 190 | |
| 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 | $I_F = 20\text{ A}$ | - | 1.4 | 1.63 | |
| | | $I_F = 20\text{ A}, T_J = 125\text{ °C}$ | - | 1.26 | 1.49 | |
| Reverse leakage current | I_R | $V_R = V_R$ rated | - | 0.3 | 15 | μA |
| | | $T_J = 125\text{ °C}, V_R = V_R$ rated | - | 50 | 500 | |
| Junction capacitance | C_T | $V_R = 600\text{ V}$ | - | 18 | - | pF |
| Series inductance | L_S | Measured lead to lead 5 mm from package body | - | 8 | - | 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} | $T_J = 25\text{ }^{\circ}\text{C}$ | - | 61 | - | ns |
| | | $T_J = 125\text{ }^{\circ}\text{C}$ | - | 87 | - | |
| Peak recovery current | I_{RRM} | $T_J = 25\text{ }^{\circ}\text{C}$ | - | 13 | - | A |
| | | $T_J = 125\text{ }^{\circ}\text{C}$ | - | 21 | - | |
| Reverse recovery charge | Q_{rr} | $T_J = 25\text{ }^{\circ}\text{C}$ | - | 480 | - | nC |
| | | $T_J = 125\text{ }^{\circ}\text{C}$ | - | 1080 | - | |

$I_F = 20\text{ A}$
 $dI_F/dt = 1000\text{ A}/\mu\text{s}$
 $V_R = 400\text{ V}$

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} | | - | 2.5 | 3 | |
| Thermal resistance, junction to ambient | R_{thJA} | Typical socket mount | - | - | 70 | $^{\circ}\text{C}/\text{W}$ |
| Typical thermal resistance, case to heatsink | R_{thCS} | Mounting surface, flat, smooth, and greased | - | 0.5 | - | |
| Weight | | | - | 2 | - | g |
| | | | - | 0.07 | - | oz. |
| Mounting torque | | | 6 (5) | - | 12 (10) | kgf · cm (lbf · in) |
| Marking device | | Case style: 2L TO-220 FullPAK | E4TU2006FP | | | |

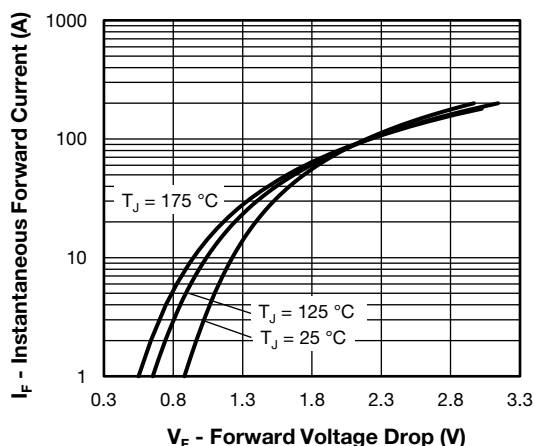


Fig. 1 - Typical Forward Voltage Drop Characteristics

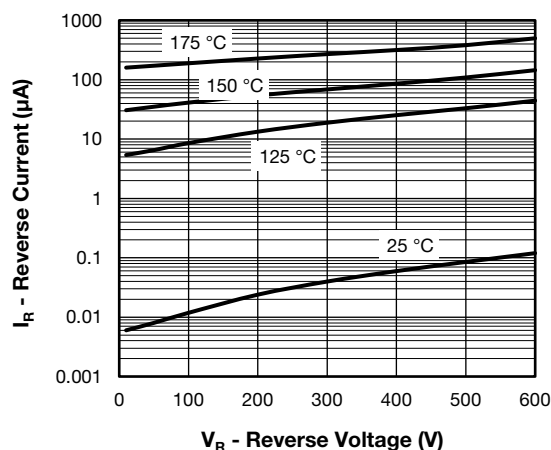


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

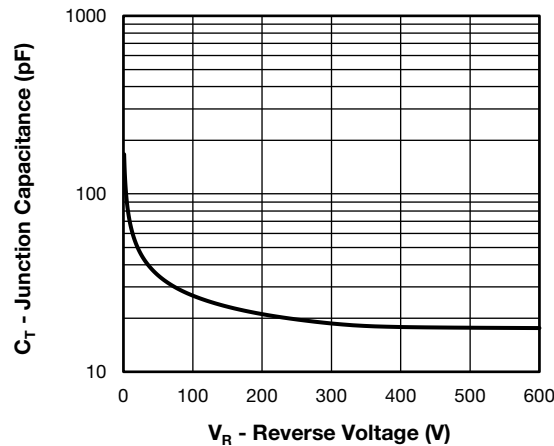


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

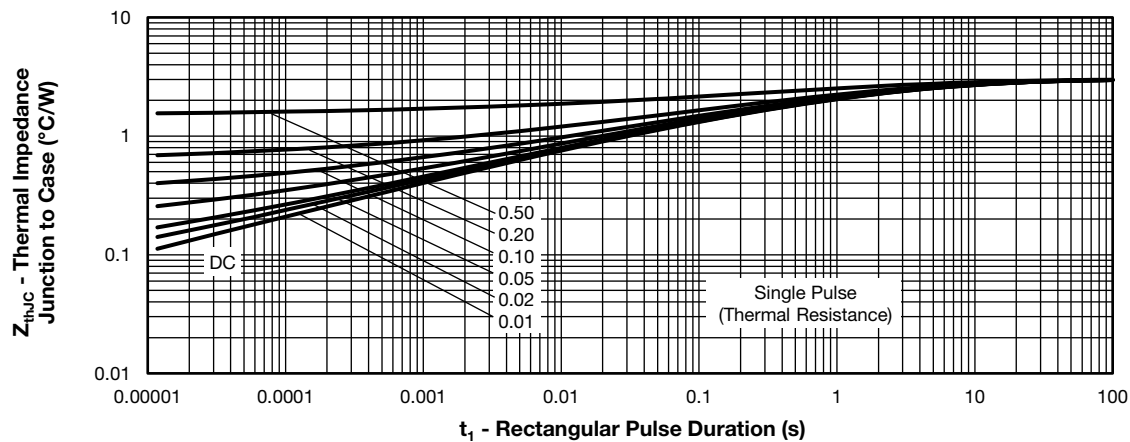
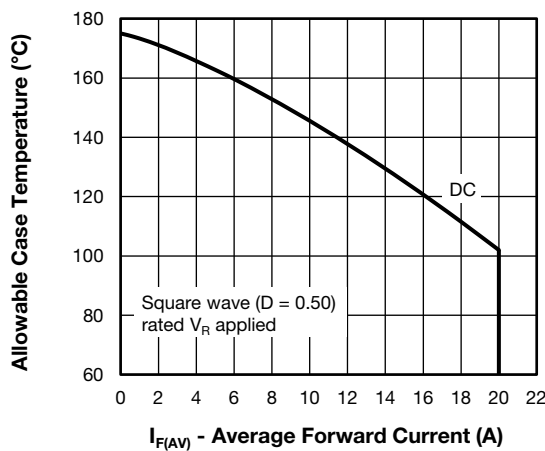

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics


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

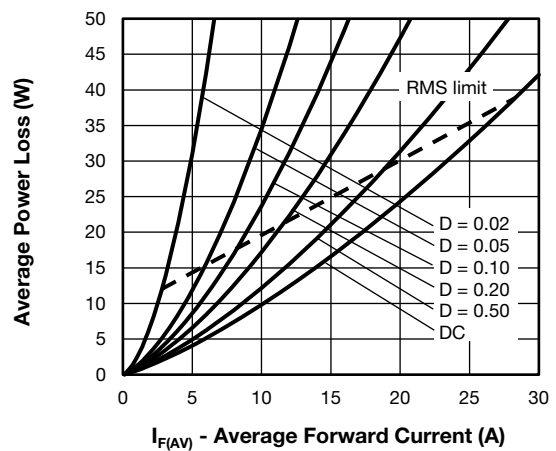


Fig. 6 - Forward Power Loss Characteristics

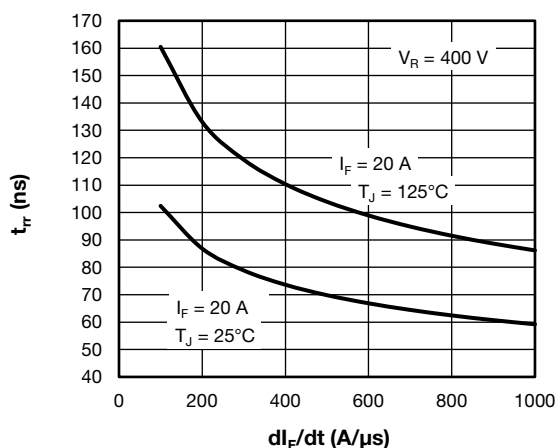
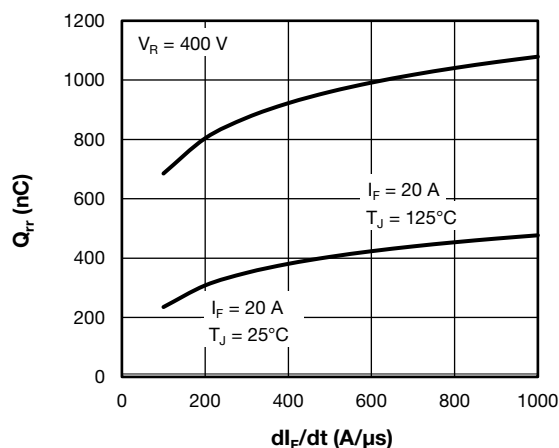
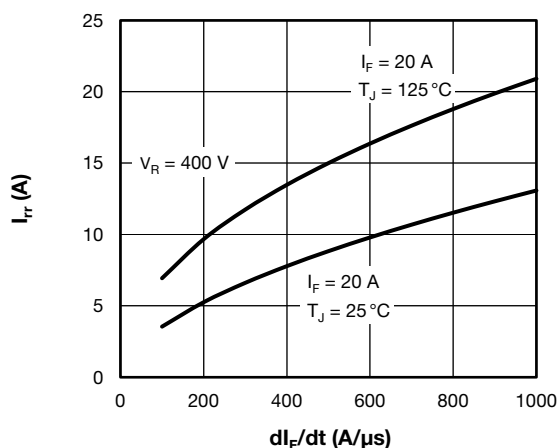
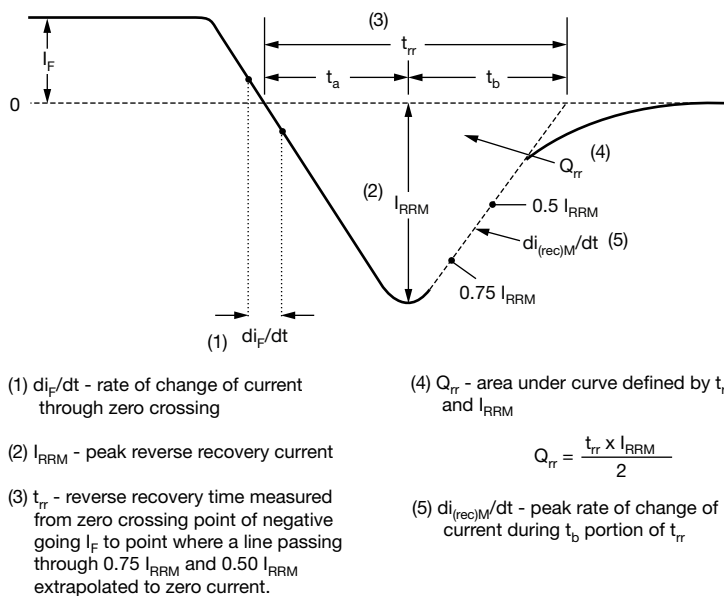

Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

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

Fig. 9 - Typical Reverse Recovery Current vs. di_F/dt


Fig. 10 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

| | | | | | | | | | |
|-------------|-----|---|---|---|---|----|----|----|-----|
| Device code | VS- | E | 4 | T | U | 20 | 06 | FP | -N3 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

- 1** - Vishay Semiconductors product
- 2** - Circuit configuration:
E = single diode
- 3** - 4 = Gen 4 FRED Pt
- 4** - T = TO-220
- 5** - U = ultrafast recovery time
- 6** - Current code: 20 = 20 A
- 7** - Voltage code: 06 = 600 V
- 8** - FP = FullPAK
- 9** - Environmental digit:
-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)

| PREFERRED P/N | QUANTITY PER TUBE | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
|------------------|-------------------|------------------------|-------------------------|
| VS-E4TU2006FP-N3 | 50 | 1000 | Antistatic plastic tube |

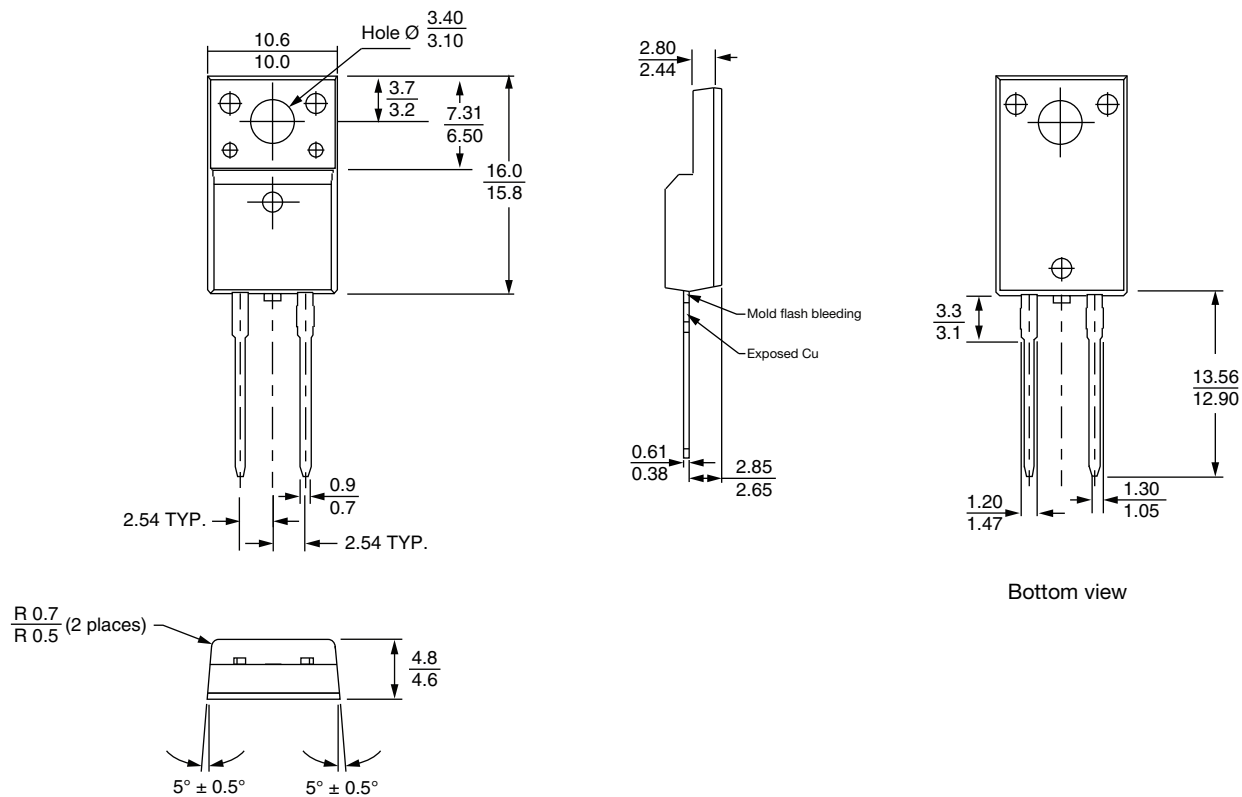
LINKS TO RELATED DOCUMENTS

| | |
|--------------------------|--|
| Dimensions | www.vishay.com/doc?96157 |
| Part marking information | www.vishay.com/doc?95392 |
| SPICE model | www.vishay.com/doc?96822 |



2L TO-220 FullPAK

DIMENSIONS in millimeters





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