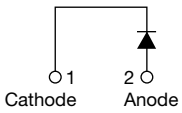
# Hyperfast Rectifier, 30 A FRED Pt®


**2L TO-220 FullPAK**

## FEATURES

- Hyperfast soft recovery time
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- Fully isolated package ($V_{INS}$ = 2500 $V_{RMS}$)
- True 2 pin package
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

HALOGEN FREE

## LINKS TO ADDITIONAL RESOURCES

3D Models

| PRIMARY CHARACTERISTICS | |
|---|---|
| $I_{F(AV)}$ | 30 A |
| $V_R$ | 600 V |
| $V_F$ at $I_F$ | 1.40 V |
| $t_{rr}$ (typ.) | 22 ns |
| $T_J$ max. | 175 °C |
| Package | 2L TO-220 FullPAK |
| Circuit configuration | Single |

## DESCRIPTION / APPLICATIONS

Hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, hyperfast 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 switch mode power supplies and inverters (air conditioning, high-frequency welding, UPS, and motor drives)

The 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:** 2L TO-220 FullPACK

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 | $I_{F(AV)}$ | | 30 | A |
| Non-repetitive peak surge current | $I_{FSM}$ | $T_J$ = 25 °C | 280 | |
| Operating junction and storage temperatures | $T_J$, $T_{Stg}$ | | -55 to +175 | °C |

| ELECTRICAL SPECIFICATIONS ($T_J$ = 25 °C unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Breakdown voltage, blocking voltage | $V_{BR}$, $V_R$ | $I_R$ = 100 µA | 600 | - | - | V |
| Forward voltage | $V_F$ | $I_F$ = 30 A | - | 1.70 | 2.15 | |
| | | $I_F$ = 30 A, $T_J$ = 150 °C | - | 1.40 | 1.65 | |
| Reverse leakage current | $I_R$ | $V_R$ = $V_R$ rated | - | 0.02 | 10 | µA |
| | | $T_J$ = 150 °C, $V_R$ = $V_R$ rated | - | 36 | 300 | |
| Junction capacitance | $C_T$ | $V_R$ = 600 V | - | 19 | - | pF |

| DYNAMIC RECOVERY CHARACTERISTICS ($T_J$ = 25 °C unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Reverse recovery time | $t_{rr}$ | $I_F$ = 1 A, $dI_F/dt$ = 100 A/µs, $V_R$ = 30 V | | - | 22 | - | ns |
| | | $T_J$ = 25 °C | $I_F$ = 30 A, $dI_F/dt$ = 200 A/µs, $V_R$ = 400 V | - | 90 | - | |
| | | $T_J$ = 125 °C | | - | 110 | - | |
| Peak recovery current | $I_{RRM}$ | $T_J$ = 25 °C | | - | 4.1 | - | A |
| | | $T_J$ = 125 °C | | - | 9.4 | - | |
| Reverse recovery charge | $Q_{rr}$ | $T_J$ = 25 °C | | - | 230 | - | nC |
| | | $T_J$ = 125 °C | | - | 730 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Maximum junction and storage temperature range | $T_J$, $T_{Stg}$ | | -55 | - | 175 | °C |
| Thermal resistance, junction-to-case | $R_{thJC}$ | | - | 2.40 | 3.10 | °C/W |
| Thermal resistance, junction-to-ambient | $R_{thJA}$ | Typical socket mount | - | 45 | - | |
| 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 | ETH3106FP | | | |

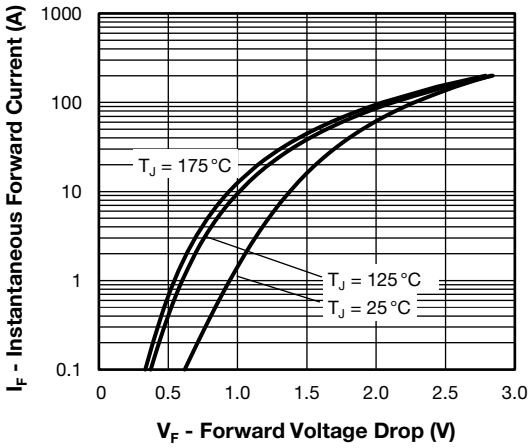



Fig. 1 - Forward Voltage Drop Characteristics

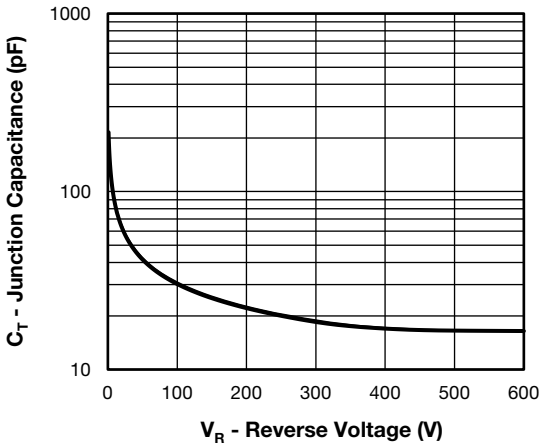



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

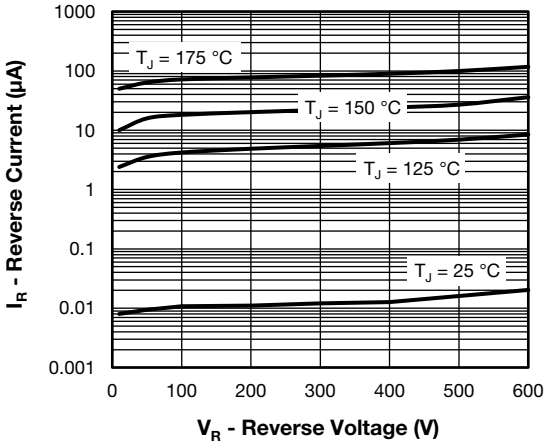



Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

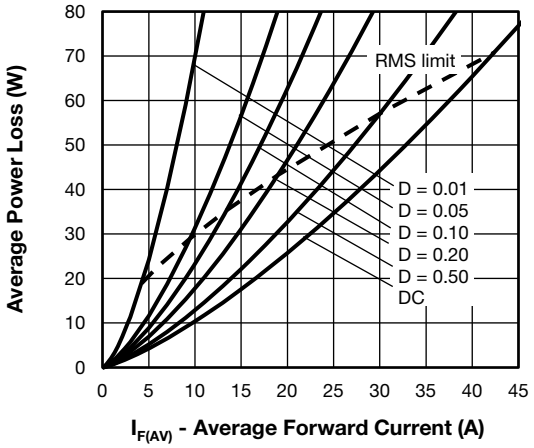



Fig. 4 - Forward Power Loss Characteristics

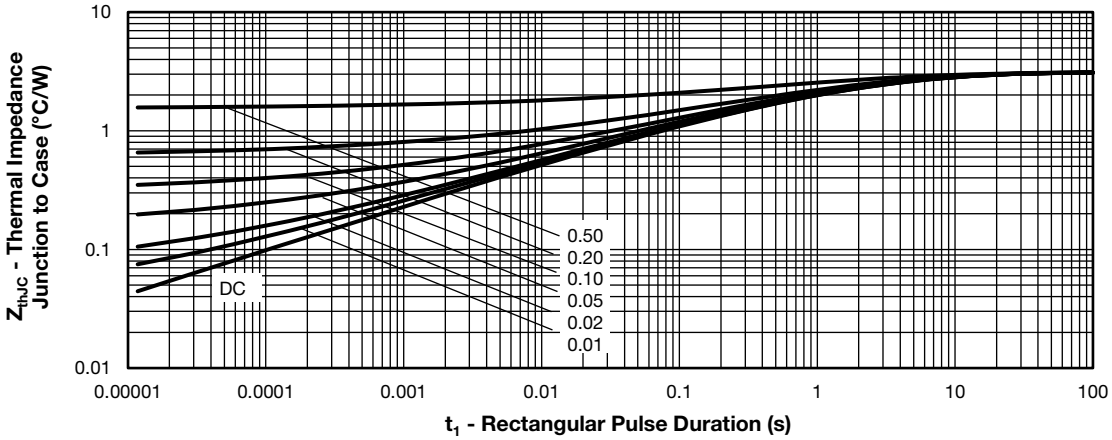



Fig. 5 - Transient Thermal Impedance, Junction to Case

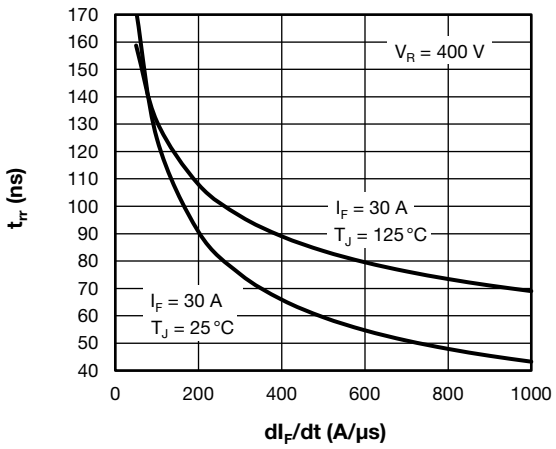



Fig. 6 - Typical Reverse Recovery Time vs. $dI_F/dt$

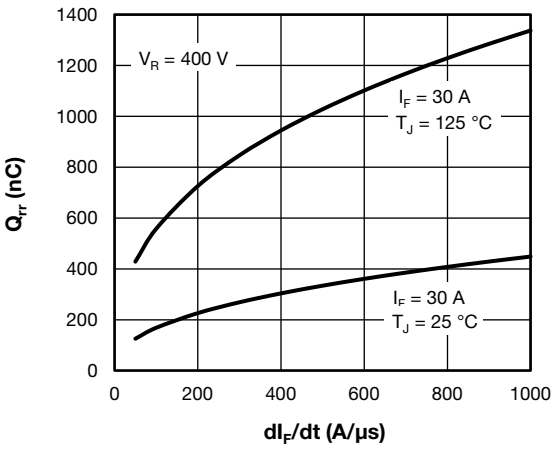



Fig. 7 - Typical Reverse Recovery Charge vs. $dI_F/dt$

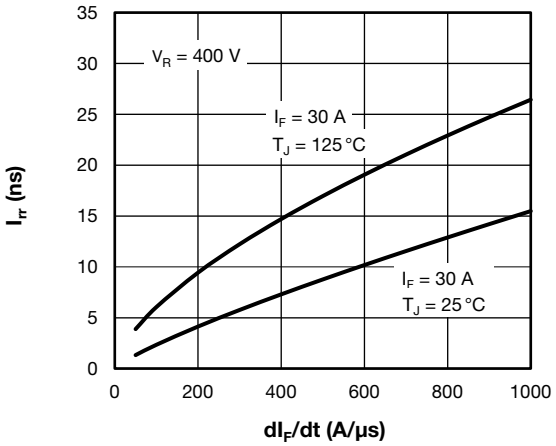



Fig. 8 - Typical Reverse Recovery Current vs. $dI_F/dt$

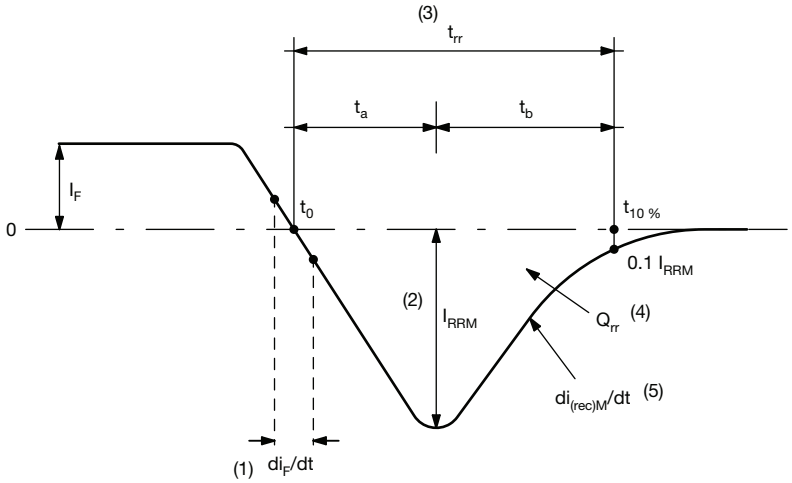



Fig. 9 - Reverse Recovery Waveform and Definitions

**Notes**

(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 $t_0$, crossing point of negative going $I_F$, to point $t_{10\%}$, 0.1 $I_{RRM}$

(4) $Q_{rr}$ - area under curve defined by $t_0$ and $t_{10\ \%}$

$$Q_{rr} = \int_{t_0}^{t_{10\ \%}} I(t)dt$$

(5) $di_{(rec)}M/dt$ - peak rate of change of current during $t_b$ portion of $t_{rr}$

## ORDERING INFORMATION TABLE

**Device code**

| VS- | E | T | H | 31 | 06 | FP | -N3 |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

1 - Vishay Semiconductors product

2 - Circuit configuration:
E = single

3 - T = TO-220

4 - H = hyperfast recovery time

5 - Current code: 31 = 30 A

6 - Voltage code: 06 = 600 V

7 - FP = 2L TO-220 FullPAK

8 - Environmental digit:
-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

| LINKS TO RELATED DOCUMENTS | |
|---|---|
| Dimensions | www.vishay.com/doc?96157 |
| Part marking information | www.vishay.com/doc?95392 |

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