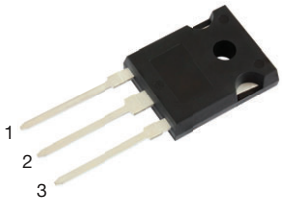
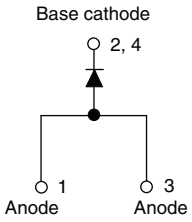
# Hyperfast Rectifier, 30 A FRED Pt®




TO-247AD 3L




## FEATURES

- Low forward voltage drop
- Hyperfast soft recovery time
- 175 °C operating junction temperature
- Designed and qualified according to commercial qualification
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

| PRODUCT SUMMARY | |
|---|---|
| Package | TO-247AD 3L |
| $I_{F(AV)}$ | 30 A |
| $V_R$ | 600 V |
| $V_F$ at $I_F$ | 1.4 V |
| $t_{rr}$ typ. | 26 ns |
| $T_J$ max. | 175 °C |
| Diode variation | Single die |

## 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 SMPS, inverters or as freewheeling diodes.

The extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

| ABSOLUTE MAXIMUM RATINGS | | | | |
|---|---|---|---|---|
| PARAMETER | SYMBOL | TEST CONDITIONS | MAX. | UNITS |
| Repetitive peak reverse voltage | $V_{RRM}$ | | 600 | V |
| Average rectified forward current | $I_{F(AV)}$ | $T_C$ = 112 °C | 30 | A |
| Non-repetitive peak surge current | $I_{FSM}$ | $T_C$ = 25 °C, $t_p$ = 8.3 ms half sine wave; connecting two anode pins | 240 | |
| 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 | - | 2.0 | 2.65 | |
| | | $I_F$ = 30 A, $T_J$ = 150 °C | - | 1.4 | 1.8 | |
| Reverse leakage current | $I_R$ | $V_R$ = $V_R$ rated | - | 0.02 | 30 | µA |
| | | $T_J$ = 150 °C, $V_R$ = $V_R$ rated | - | - | 300 | |
| Junction capacitance | $C_T$ | $V_R$ = 600 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 °C unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Reverse recovery time | $t_{rr}$ | $I_F$ = 1 A, $dI_F/dt$ = 50 A/µs, $V_R$ = 30 V | | - | 26 | - | ns |
| | | $T_J$ = 25 °C | $I_F$ = 30 A<br>$dI_F/dt$ = 200 A/µs<br>$V_R$ = 200 V | - | 26 | - | |
| | | $T_J$ = 125 °C | | - | 70 | - | |
| Peak recovery current | $I_{RRM}$ | $T_J$ = 25 °C | | - | 3.5 | - | A |
| | | $T_J$ = 125 °C | | - | 7.6 | - | |
| Reverse recovery charge | $Q_{rr}$ | $T_J$ = 25 °C | | - | 50 | - | nC |
| | | $T_J$ = 125 °C | | - | 280 | - | |

| 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 | $R_{thJC}$ | | - | 0.7 | 1.1 | °C/W |
| Thermal resistance, junction to ambient per leg | $R_{thJA}$ | Typical socket mount | - | - | 70 | |
| Thermal resistance, case to heat sink | $R_{thCS}$ | Mounting surface, flat, smooth, and greased | - | 0.5 | - | |
| Weight | | | - | 5.5 | - | g |
| | | | - | 0.2 | - | oz. |
| Mounting torque | | | 1.2<br>(10) | - | 2.4<br>(20) | kgf · cm<br>(lbf · in) |
| Marking device | | Case style TO-247AD 3L | APH3006L | | | |

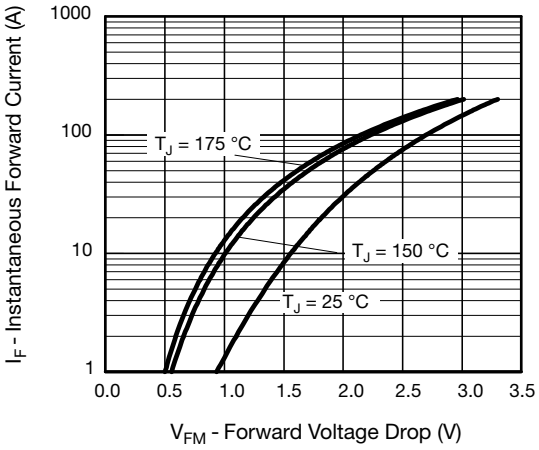



Fig. 1 - Typical Forward Voltage Drop Characteristics

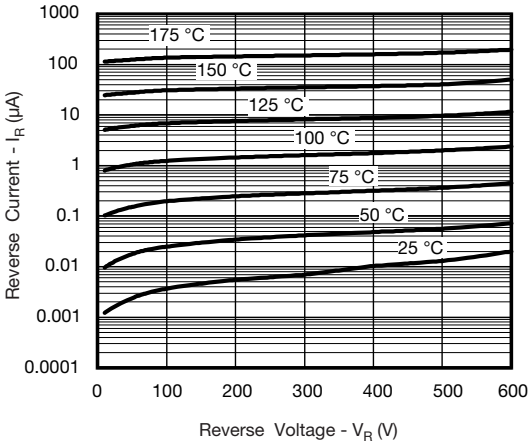



Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

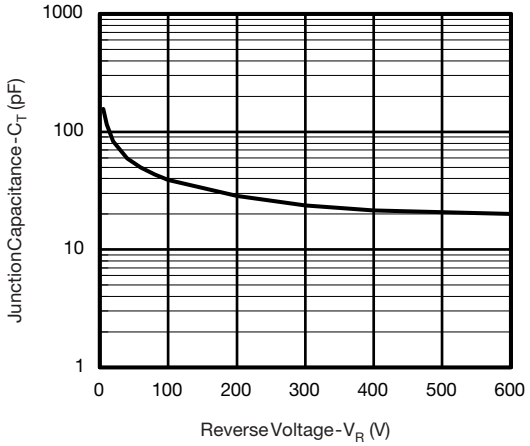



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

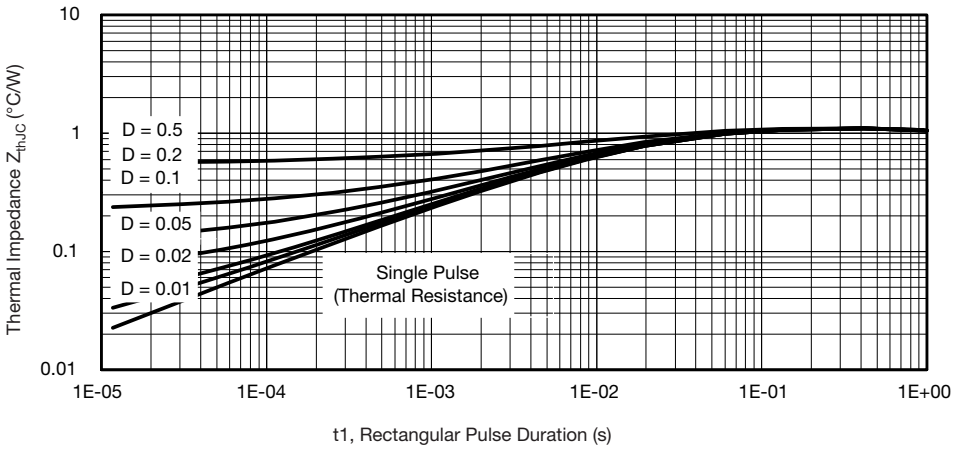



Fig. 4 - Max. Thermal Impedance $Z_{thJC}$ Characteristics

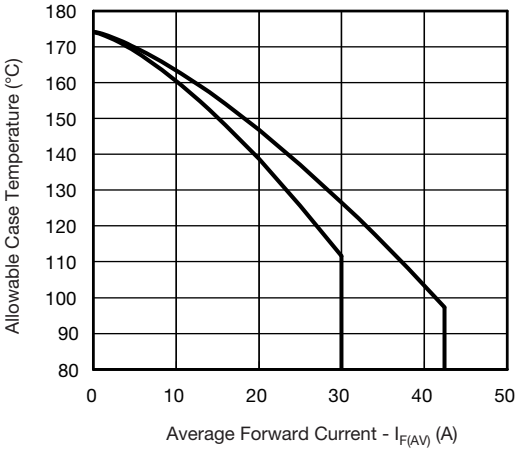



Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

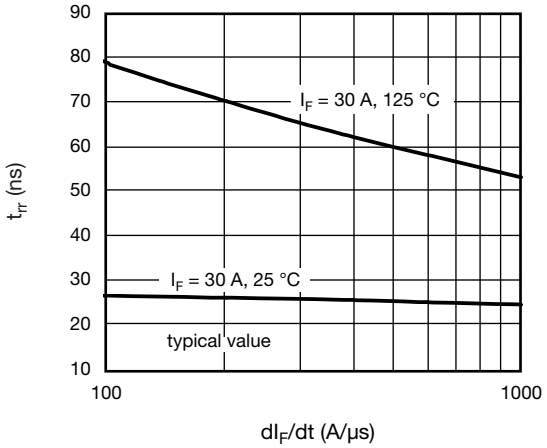



Fig. 7 - Typical Reverse Recovery Time vs. $dI_F/dt$

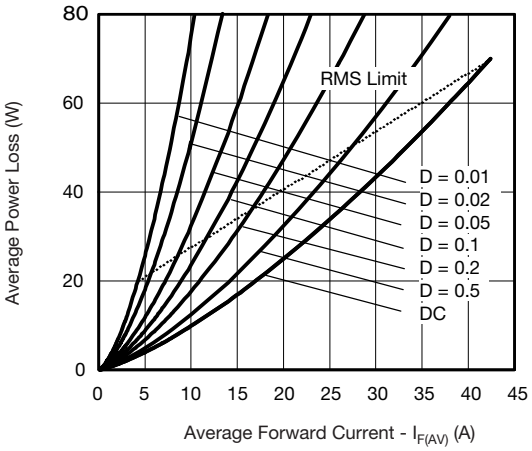



Fig. 6 - Forward Power Loss Characteristics

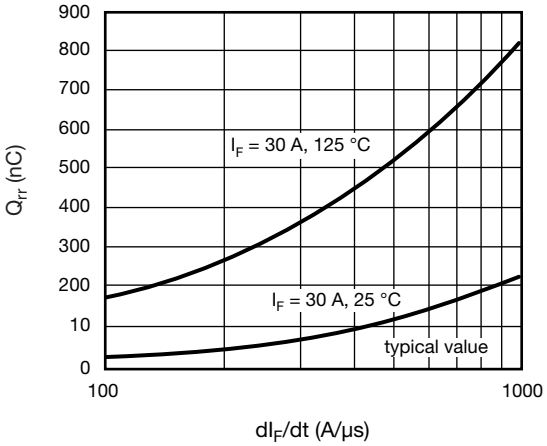
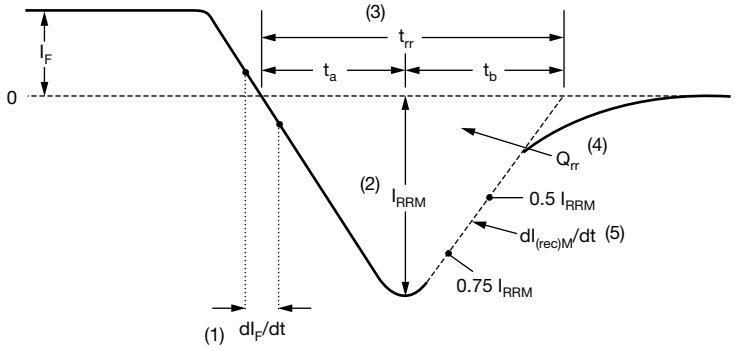



Fig. 8 - Typical Stored Charge vs. $dI_F/dt$




(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 $I_{RRM}$

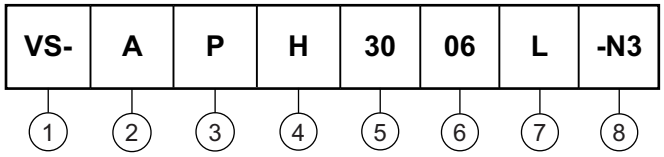
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

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

Fig. 9 - Reverse Recovery Waveform and Definitions

## ORDERING INFORMATION TABLE

Device code




1 - Vishay Semiconductors product
2 - A = single diode
3 - P = TO-247
4 - H = hyperfast recovery time
5 - Current code (30 = 30 A)
6 - Voltage code (06 = 600 V)
7 - L = long lead
8 - 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-APH3006L-N3 | 25 | 500 | Antistatic plastic tube |

| **LINKS TO RELATED DOCUMENTS** | | |
|---|---|---|
| Dimensions | TO-247AD 3L | www.vishay.com/doc?95626 |
| Part marking information | TO-247AD 3L | www.vishay.com/doc?95007 |

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