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Vishay Semiconductor/Diodes Division
30EPH03

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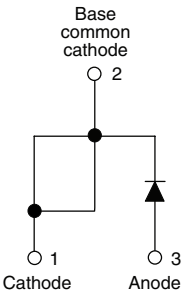
# Ultrafast Rectifier, 30 A FRED Pt™

TO-247AC modified




## FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- Designed and qualified for industrial level

## DESCRIPTION/APPLICATIONS

300 V series are the state of the art ultrafast recovery rectifiers designed with optimized performance of forward voltage drop and ultrafast recovery time.
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 the output rectification stage of SMPS, UPS, dc-to-dc converters as well as freewheeling diodes in low voltage inverters and chopper motor drives.
Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

| PRODUCT SUMMARY | |
|---|---|
| $t_{rr}$ | 55 ns |
| $I_{F(AV)}$ | 30 A |
| $V_R$ | 300 V |

| ABSOLUTE MAXIMUM RATINGS | | | | |
|---|---|---|---|---|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Peak repetitive reverse voltage | $V_{RRM}$ | | 300 | V |
| Average rectified forward current | $I_{F(AV)}$ | $T_C$ = 143 °C | 30 | A |
| Non-repetitive peak surge current | $I_{FSM}$ | $T_J$ = 25 °C | 300 | |
| Operating junction and storage temperatures | $T_J$, $T_{Stg}$ | | - 65 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 | 300 | - | - | V |
| Forward voltage | $V_F$ | $I_F$ = 30 A | - | 1.08 | 1.25 | |
| | | $I_F$ = 30 A, $T_J$ = 125 °C | - | 0.9 | 1.00 | |
| Reverse leakage current | $I_R$ | $V_R$ = $V_R$ rated | - | 0.05 | 60 | µA |
| | | $T_J$ = 125 °C, $V_R$ = $V_R$ rated | - | 280 | 600 | |
| Junction capacitance | $C_T$ | $V_R$ = 300 V | - | 90 | - | pF |
| Series inductance | $L_S$ | Measured lead to lead 5 mm from package body | - | 3.5 | - | nH |

# 30EPH03

Vishay High Power Products

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| DYNAMIC RECOVERY CHARACTERISTICS ($T_J$ = 25 °C unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Reverse recovery time | $t_{rr}$ | $I_F$ = 1.0 A, $dI_F/dt$ = 50 A/µs, $V_R$ = 30 V | | - | - | 55 | ns |
| | | $T_J$ = 25 °C | $I_F$ = 30 A<br>$dI_F/dt$ = - 200 A/µs<br>$V_R$ = 200 V | - | 38 | - | |
| | | $T_J$ = 125 °C | | - | 52 | - | |
| Peak recovery current | $I_{RRM}$ | $T_J$ = 25 °C | | - | 2.8 | - | A |
| | | $T_J$ = 125 °C | | - | 7.3 | - | |
| Reverse recovery charge | $Q_{rr}$ | $T_J$ = 25 °C | | - | 53 | - | nC |
| | | $T_J$ = 125 °C | | - | 190 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Maximum junction and storage temperature range | $T_J$, $T_{Stg}$ | | - 65 | - | 175 | °C |
| Thermal resistance, junction to case per leg | $R_{thJC}$ | | - | 0.5 | 0.9 | °C/W |
| Thermal resistance, junction to ambient | $R_{thJA}$ | Typical socket mount | - | - | 40 | |
| Thermal resistance, case to heatsink | $R_{thCS}$ | Mounting surface, flat, smooth and greased | - | 0.4 | - | |
| Weight | | | - | 6.0 | - | g |
| | | | - | 0.22 | - | oz. |
| Mounting torque | | | 6.0<br>(5.0) | - | 12<br>(10) | kgf · cm<br>(lbf · in) |
| Marking device | | Case style TO-247AC modified | 30EPH03 | | | |

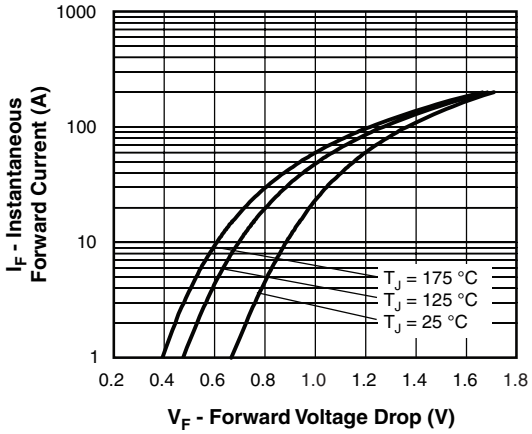



Fig. 1 - Typical Forward Voltage Drop Characteristics

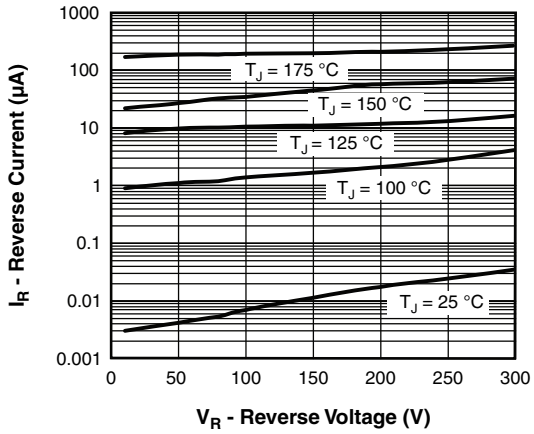



Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

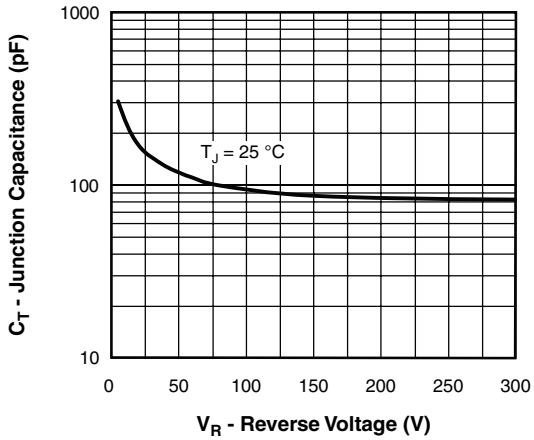



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

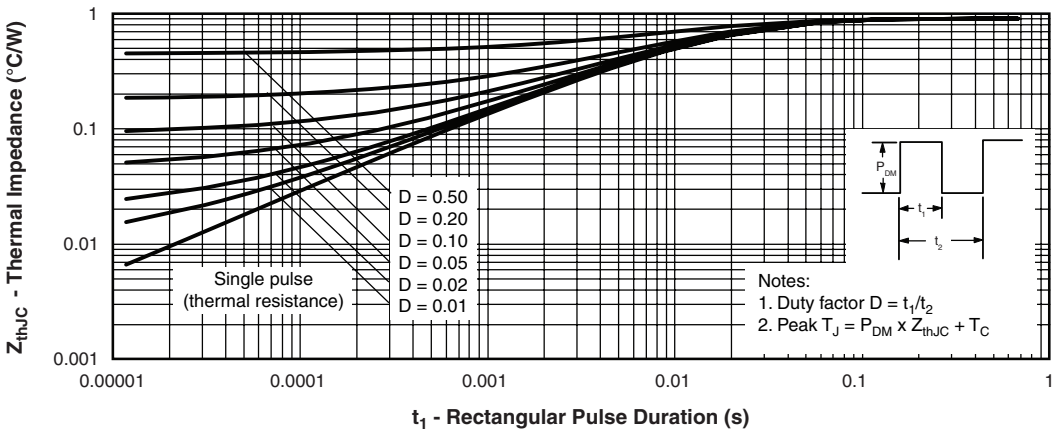



Fig. 4 - Maximum Thermal Impedance $Z_{thJC}$ Characteristics

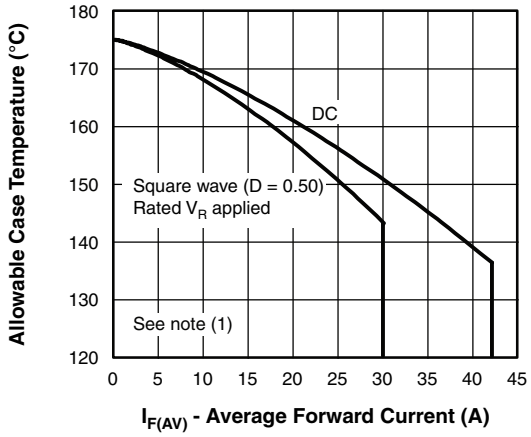



Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

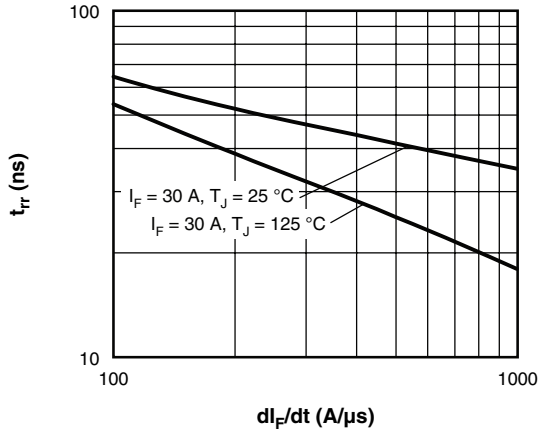



Fig. 7 - Typical Reverse Recovery Time vs. $dI_F/dt$

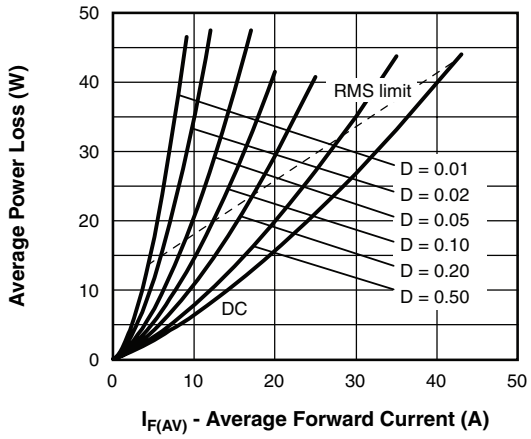



Fig. 6 - Forward Power Loss Characteristics

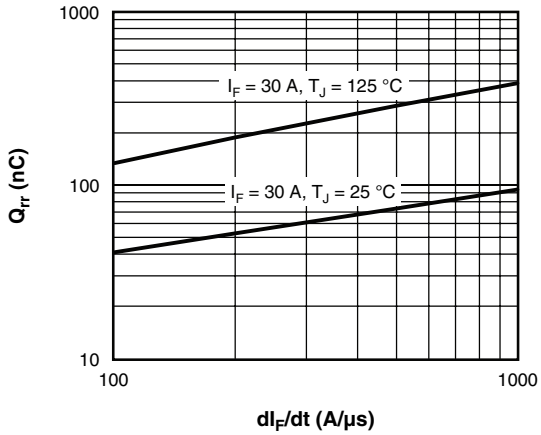



Fig. 8 - Typical Stored Charge vs. $dI_F/dt$

**Note**

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see fig. 6);
$Pd_{REV}$ = Inverse power loss = $V_{R1} \times I_R$ (1 - D); $I_R$ at $V_{R1}$ = Rated $V_R$

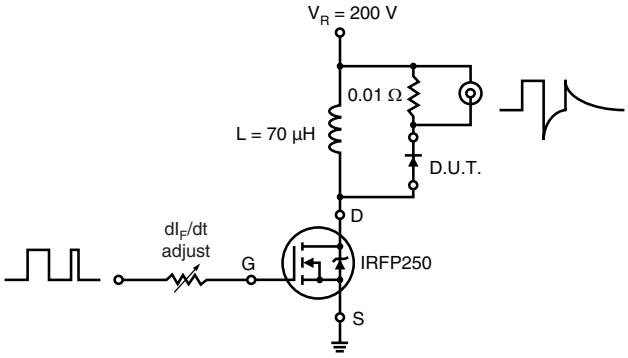
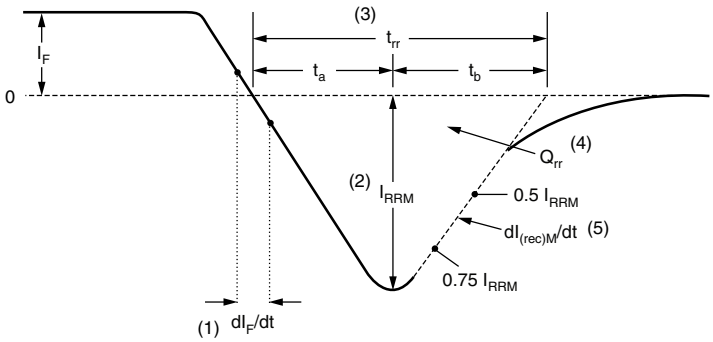



Fig. 9 - Reverse Recovery Parameter Test Circuit




(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. 10 - Reverse Recovery Waveform and Definitions

# 30EPH03

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## ORDERING INFORMATION TABLE

**Device code**

| 30 | E | P | H | 03 | - |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |

1 - Current rating (30 = 30A)

2 - Circuit configuration:
E = Single diode

3 - Package:
P = TO-247AC modified

4 - H = Hyperfast recovery

5 - Voltage rating (03 = 300V)

6 - • None = Standard production
• PbF = Lead (Pb)-free

Tube standard pack quantity: 25 pieces

| LINKS TO RELATED DOCUMENTS | |
|---|---|
| Dimensions | http://www.vishay.com/doc?95253 |
| Part marking information | http://www.vishay.com/doc?95255 |

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