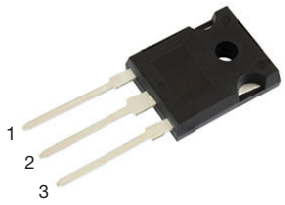
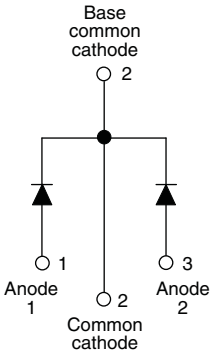
# Ultrafast Soft Recovery Diode, 2 x 30 A FRED Pt® Gen 4




TO-247AD 3L




## FEATURES

- Gen 4 FRED Pt® technology
- Low $I_{RRM}$ and reverse recovery charge
- Very low forward voltage drop
- Polyimide passivated chip for high reliability standard
- 175 °C operating junction temperature
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

HALOGEN FREE

## DESCRIPTION

Gen 4 Fred technology, state of the art, ultralow $V_F$, soft switching optimized for Discontinuous (Critical) Mode (DCM) and IGBT F/W diode.

The minimized conduction loss, optimized stored charge and low recovery current minimize the switching losses and reduce power dissipation in the switching element and snubbers.

| PRIMARY CHARACTERISTICS | |
|---|---|
| $I_{F(AV)}$ | 2 x 30 A |
| $V_R$ | 600 V |
| $V_F$ at $I_F$ | 1.19 V |
| $t_{rr}$ typ. | See Recovery table |
| $T_J$ max. | 175 °C |
| Package | TO-247AD 3L |
| Circuit configuration | Common cathode |

| ABSOLUTE MAXIMUM RATINGS | | | | |
|---|---|---|---|---|
| PARAMETER | SYMBOL | TEST CONDITIONS | MAX. | UNITS |
| Peak repetitive reverse voltage | $V_{RRM}$ | | 600 | V |
| Average rectified forward current | $I_{F(AV)}$ | $T_C$ = 131 °C | 30 | A |
| Non-repetitive peak surge current, per leg | $I_{FSM}$ | $T_C$ = 25 °C, $t_p$ = 8.3 ms, half sine wave | 240 | |
| Operating junction and storage temperature | $T_J$, $T_{Stg}$ | | -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 | - | 1.36 | 1.6 | |
| | | $I_F$ = 60 A | - | 1.6 | - | |
| | | $I_F$ = 30 A, $T_J$ = 125 °C | - | 1.23 | - | |
| | | $I_F$ = 60 A, $T_J$ = 125 °C | - | 1.5 | - | |
| | | $I_F$ = 30 A, $T_J$ = 150 °C | - | 1.19 | 1.35 | |
| | | $I_F$ = 60 A, $T_J$ = 150 °C | - | 1.48 | - | |
| Reverse leakage current | $I_R$ | $V_R$ = $V_R$ rated | - | - | 50 | µA |
| | | $T_J$ = 125 °C, $V_R$ = $V_R$ rated | - | - | 500 | |
| Junction capacitance | $C_T$ | $V_R$ = 600 V | - | 18.3 | - | pF |

| DYNAMIC RECOVERY CHARACTERISTICS ($T_J$ = 25 °C unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time | $t_{rr}$ | $T_J$ = 25 °C | $I_F$ = 30 A<br>$dI_F/dt$ = 1000 A/µs<br>$V_R$ = 400 V | - | 65 | - | ns |
| | | $T_J$ = 125 °C | | - | 90 | - | |
| Peak recovery current | $I_{RRM}$ | $T_J$ = 25 °C | | - | 18 | - | A |
| | | $T_J$ = 125 °C | | - | 32 | - | |
| Reverse recovery charge | $Q_{rr}$ | $T_J$ = 25 °C | | - | 850 | - | nC |
| | | $T_J$ = 125 °C | | - | 1850 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|---|---|---|---|---|---|---|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Thermal resistance, junction to case | $R_{thJC}$ | | - | - | 1 | °C/W |
| Thermal resistance, case to heat sink | $R_{thCS}$ | | - | 0.4 | - | |
| Weight | | | - | 6.0 | - | g |
| | | | - | 0.21 | - | oz. |
| Mounting torque | | | 6.0<br>(5) | - | 12<br>(10) | kgf · cm<br>(lbf · in) |
| Marking device | | Case style TO-247AD 3L | C4PU3006L | | | |

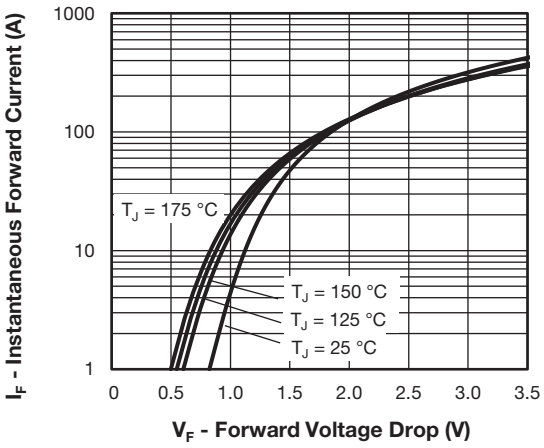



Fig. 1 - Typical Forward Voltage Drop Characteristics

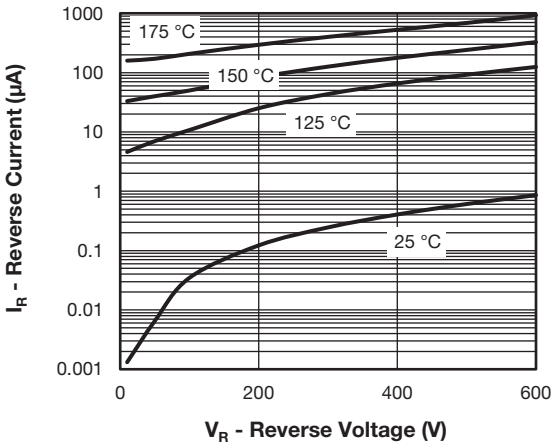



Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

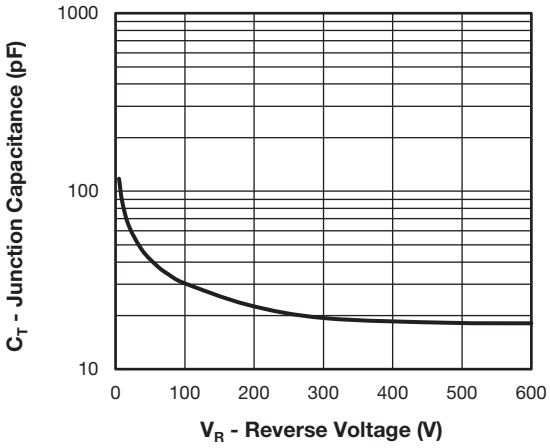



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

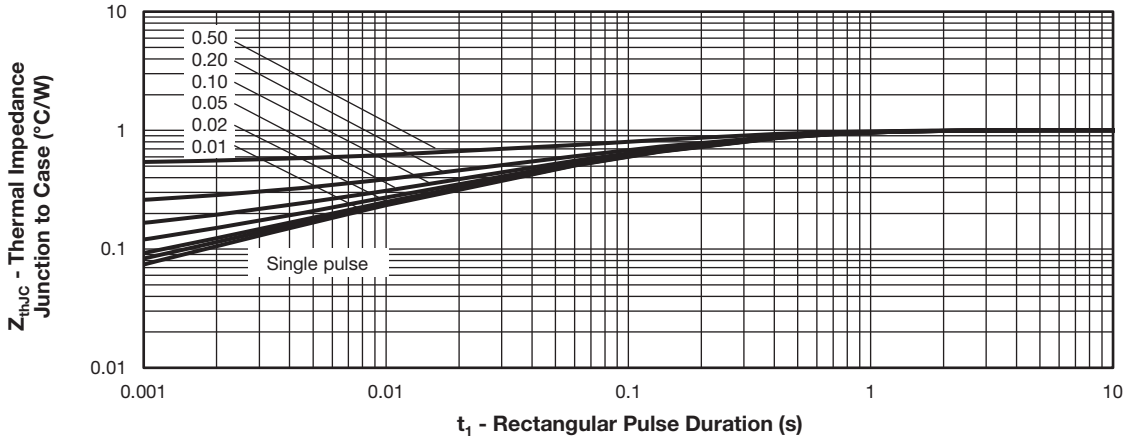



Fig. 4 - Maximum Thermal Impedance $Z_{thJC}$ Characteristics

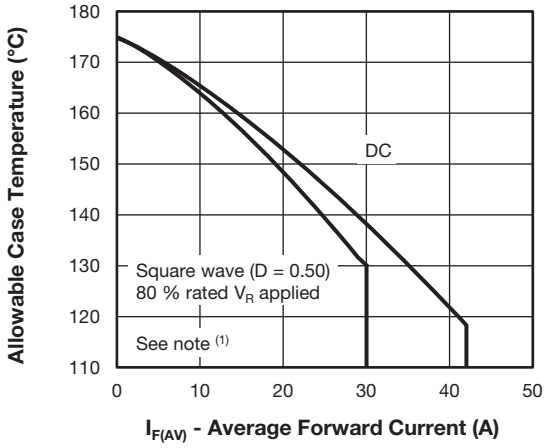



Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

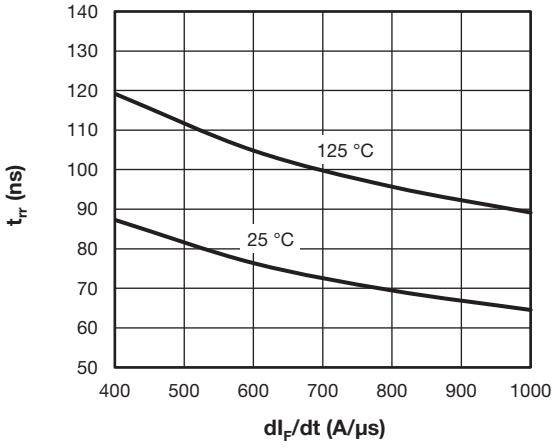



Fig. 7 - Typical Reverse Recovery Time vs. $dI_F/dt$

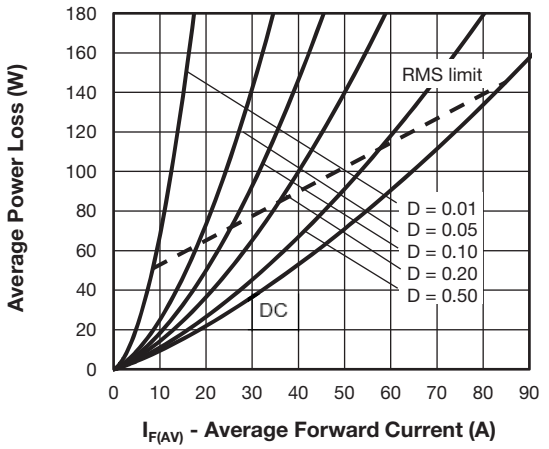



Fig. 6 - Forward Power Loss Characteristics

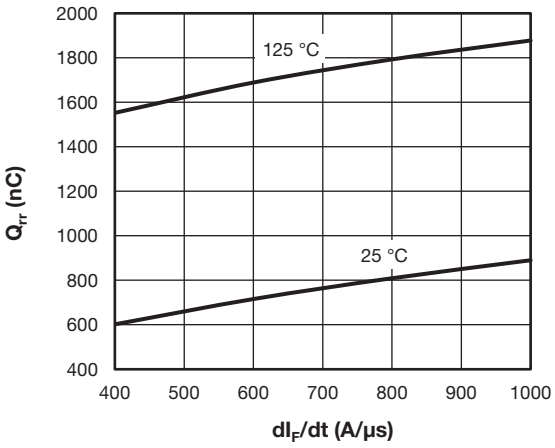



Fig. 8 - Typical Stored Charge vs. $dI_F/dt$

**Note**

(1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
Pd = forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see Fig.5)
$P_{dREV}$ = inverse power loss = $V_{R1} \times I_R$ (1 - D); $I_R$ at $V_R$ = rated $V_R$

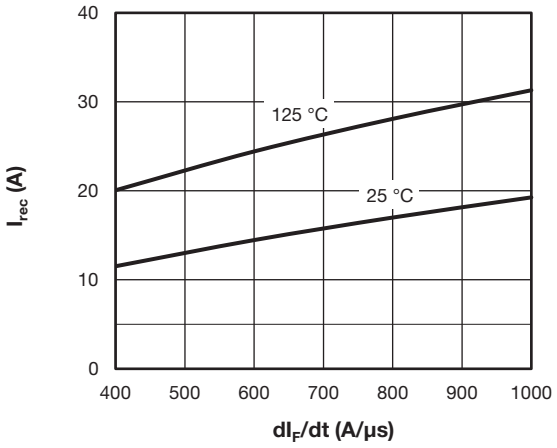



Fig. 9 - Typical Reverse Current vs. $dI_F/dt$

## ORDERING INFORMATION TABLE

| Device code | VS- | C | 4 | P | U | 60 | 06 | L | -N3 |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

1 - Vishay Semiconductors product

2 - Circuit configuration:
C = common diode

3 - FRED Pt Gen 4

4 - P = TO-247 package

5 - Process type:
U = ultrafast recovery

6 - Current rating (60 = 2 x 30 A)

7 - Voltage rating (06 = 600 V)

8 - Package: L = long lead

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-C4PU6006L-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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