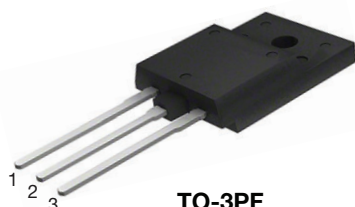
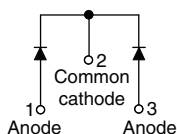


# Ultrafast Soft Recovery Diode, 2 x 30 A FRED Pt® Gen 4


**TO-3PF**


## 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
- Fully isolated package ( $V_{INS} = 2500 V_{RMS}$ )
- 175 °C operating junction temperature
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## PRIMARY CHARACTERISTICS

|                       |                |
|-----------------------|----------------|
| $I_{F(AV)}$ per leg   | 30 A           |
| $V_R$                 | 600 V          |
| $V_F$ at $I_F$        | 1.20 V         |
| $t_{rr}$ typ.         | 37 ns          |
| $T_J$ max.            | 175 °C         |
| Package               | TO-3PF         |
| Circuit configuration | Common cathode |

## DESCRIPTION

Gen 4 Fred Pt 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 over dissipation in the switching element and snubbers.

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                  | SYMBOL            | TEST CONDITIONS                                             | MAX.        | UNITS |
|--------------------------------------------|-------------------|-------------------------------------------------------------|-------------|-------|
| Peak repetitive reverse voltage            | $V_{RRM}$         |                                                             | 600         | V     |
| Average rectified forward current, per leg | $I_{F(AV)}$       | $T_C = 75\text{ °C}$                                        | 30          | A     |
| Non-repetitive peak surge current, per leg | $I_{FSM}$         | $T_C = 25\text{ °C}$ , $t_p = 8.3\text{ ms}$ half sine wave | 255         |       |
| Operating junction and storage temperature | $T_J$ , $T_{Stg}$ |                                                             | -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                     | $V_F$            | $I_F = 30\text{ A}$                         | -    | 1.4  | 1.65 |               |
|                                     |                  | $I_F = 50\text{ A}$                         | -    | 1.56 | 1.97 |               |
|                                     |                  | $I_F = 30\text{ A}$ , $T_J = 150\text{ °C}$ | -    | 1.20 | 1.45 |               |
|                                     |                  | $I_F = 50\text{ A}$ , $T_J = 150\text{ °C}$ | -    | 1.43 | -    |               |
| Reverse leakage current             | $I_R$            | $V_R = V_R$ rated                           | -    | -    | 50   | $\mu\text{A}$ |
|                                     |                  | $T_J = 125\text{ °C}$ , $V_R = V_R$ rated   | -    | -    | 500  |               |
| Junction capacitance                | $C_T$            | $V_R = 600\text{ V}$                        | -    | 19   | -    | pF            |

| <b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified) |           |                                                                                 |      |      |      |       |
|----------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------|------|------|------|-------|
| PARAMETER                                                                                                | SYMBOL    | TEST CONDITIONS                                                                 | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time, per leg                                                                           | $t_{rr}$  | $I_F = 1\text{ A}$ , $dI_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ | -    | 36   | -    | ns    |
|                                                                                                          |           | $T_J = 25\text{ }^{\circ}\text{C}$                                              | -    | 70   | -    |       |
|                                                                                                          |           | $T_J = 125\text{ }^{\circ}\text{C}$                                             | -    | 100  | -    |       |
| Peak recovery current, per leg                                                                           | $I_{RRM}$ | $T_J = 25\text{ }^{\circ}\text{C}$                                              | -    | 17   | -    | A     |
|                                                                                                          |           | $T_J = 125\text{ }^{\circ}\text{C}$                                             | -    | 30   | -    |       |
| Reverse recovery charge, per leg                                                                         | $Q_{rr}$  | $T_J = 25\text{ }^{\circ}\text{C}$                                              | -    | 800  | -    | nC    |
|                                                                                                          |           | $T_J = 125\text{ }^{\circ}\text{C}$                                             | -    | 1800 | -    |       |

| <b>THERMAL - MECHANICAL SPECIFICATIONS</b> |            |                   |              |      |              |                             |
|--------------------------------------------|------------|-------------------|--------------|------|--------------|-----------------------------|
| PARAMETER                                  | SYMBOL     | TEST CONDITIONS   | MIN.         | TYP. | MAX.         | UNITS                       |
| Thermal resistance, junction to case       | $R_{thJC}$ |                   | -            | -    | 2.4          | $^{\circ}\text{C}/\text{W}$ |
| Thermal resistance, case to heatsink       | $R_{thCS}$ |                   | -            | 0.4  | -            |                             |
| Weight                                     |            |                   | -            | 6.2  | -            | g                           |
|                                            |            |                   | -            | 0.21 | -            | oz.                         |
| Mounting torque                            |            |                   | 4.0<br>(3.5) | -    | 6.0<br>(5.3) | kgf · cm<br>(lbf · in)      |
| Marking device                             |            | Case style TO-3PF | C4ZU6006FP   |      |              |                             |

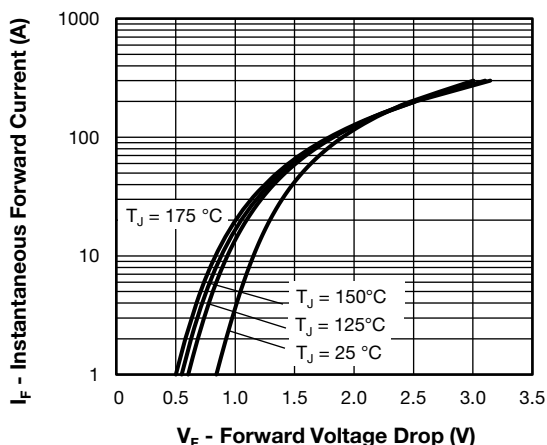


Fig. 1 - Typical Forward Voltage Drop Characteristics

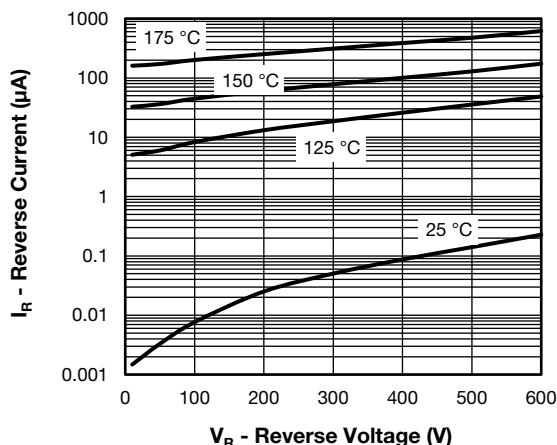


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

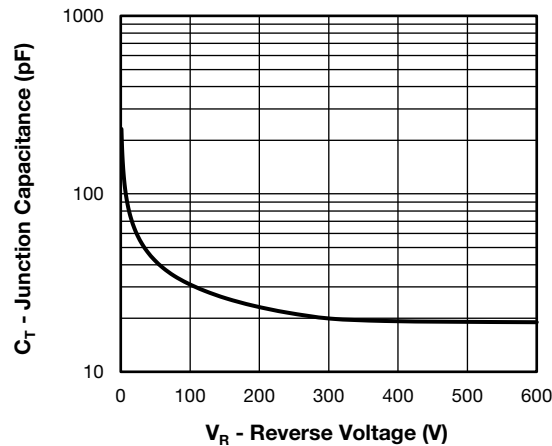


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

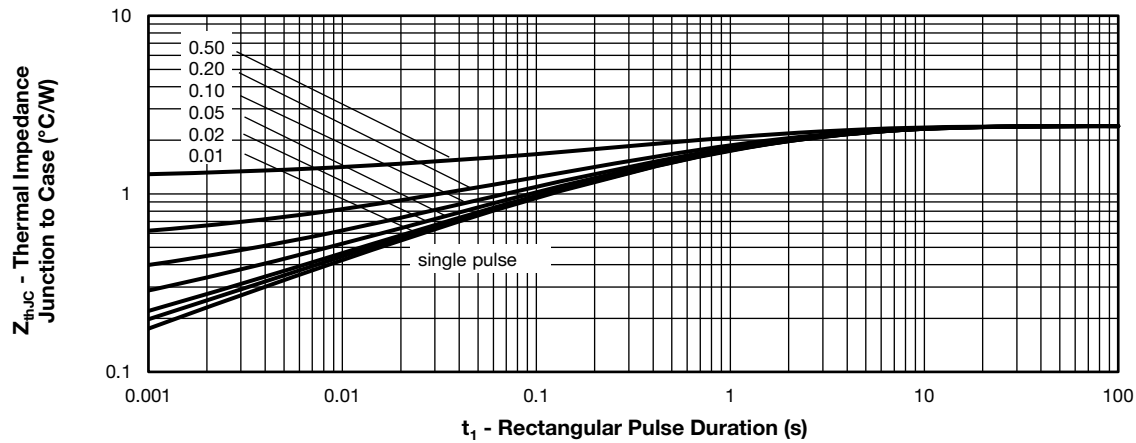
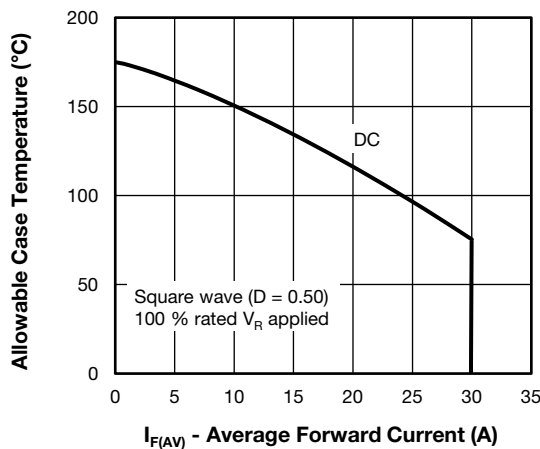

Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics


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

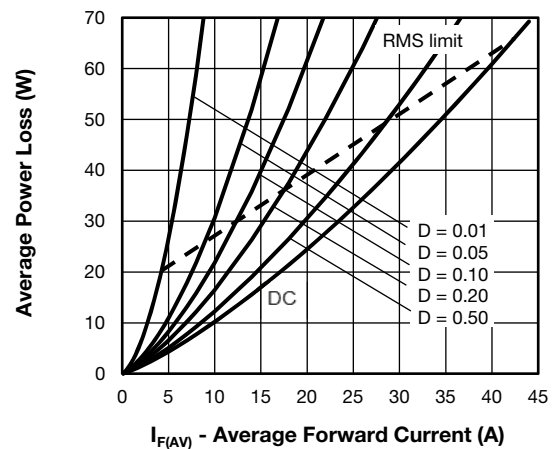
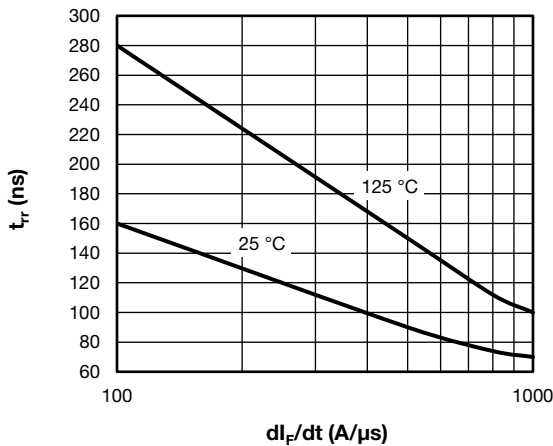
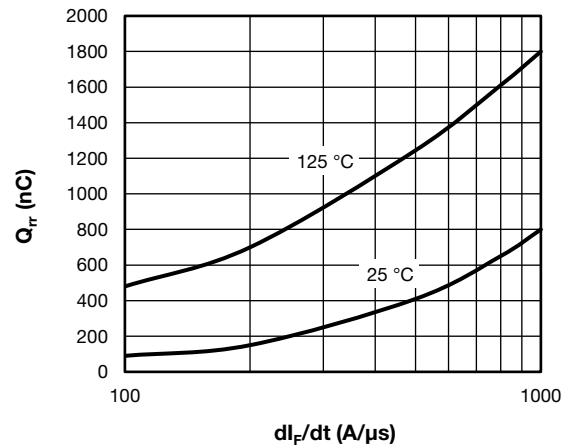


Fig. 6 - Forward Power Loss Characteristics


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

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

## ORDERING INFORMATION TABLE

| Device code | VS-                                                                                     | C | 4 | Z | U | 60 | 06 | FP | -M3 |
|-------------|-----------------------------------------------------------------------------------------|---|---|---|---|----|----|----|-----|
|             | 1                                                                                       | 2 | 3 | 4 | 5 | 6  | 7  | 8  | 9   |
| 1           | Vishay Semiconductors product                                                           |   |   |   |   |    |    |    |     |
| 2           | Circuit configuration:<br>C = common cathode                                            |   |   |   |   |    |    |    |     |
| 3           | FRED Pt Gen 4                                                                           |   |   |   |   |    |    |    |     |
| 4           | Z = TO-3PF package                                                                      |   |   |   |   |    |    |    |     |
| 5           | Process type:<br>U = ultrafast recovery                                                 |   |   |   |   |    |    |    |     |
| 6           | Current rating (60 = 2 x 30 A)                                                          |   |   |   |   |    |    |    |     |
| 7           | Voltage rating (06 = 600 V)                                                             |   |   |   |   |    |    |    |     |
| 8           | FULL-PAK                                                                                |   |   |   |   |    |    |    |     |
| 9           | Environmental digit:<br>-M3 = halogen-free, RoHS-compliant, terminations lead (Pb)-free |   |   |   |   |    |    |    |     |

| ORDERING INFORMATION (Example) |                   |                        |                         |
|--------------------------------|-------------------|------------------------|-------------------------|
| PREFERRED P/N                  | QUANTITY PER TUBE | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION   |
| VS-C4ZU6006FP-M3               | 25                | 300                    | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS |        |                                                                        |
|----------------------------|--------|------------------------------------------------------------------------|
| Dimensions                 | TO-3PF | <a href="http://www.vishay.com/doc?96691">www.vishay.com/doc?96691</a> |
| Part marking information   | TO-3PF | <a href="http://www.vishay.com/doc?96690">www.vishay.com/doc?96690</a> |



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