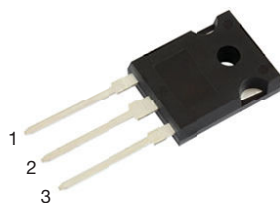
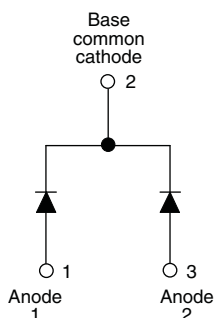


Ultrafast Soft Recovery Diode, 2 x 30 A FRED Pt® Gen 4



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
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

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 |

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.

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | MAX. | UNITS |
|--|-------------------|---|-------------|-------|
| Peak repetitive reverse voltage | V_{RRM} | | 600 | V |
| Average rectified forward current | $I_{F(AV)}$ | $T_C = 131\text{ °C}$ | 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 | 240 | |
| 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 | $I_F = 30\text{ A}$ | - | 1.36 | 1.6 | |
| | | $I_F = 60\text{ A}$ | - | 1.6 | - | |
| | | $I_F = 30\text{ A}$, $T_J = 125\text{ °C}$ | - | 1.23 | - | |
| | | $I_F = 60\text{ A}$, $T_J = 125\text{ °C}$ | - | 1.5 | - | |
| | | $I_F = 30\text{ A}$, $T_J = 150\text{ °C}$ | - | 1.19 | 1.35 | |
| | | $I_F = 60\text{ A}$, $T_J = 150\text{ °C}$ | - | 1.48 | - | |
| Reverse leakage current | I_R | $V_R = V_R$ rated | - | - | 50 | μA |
| | | $T_J = 125\text{ °C}$, $V_R = V_R$ rated | - | - | 500 | |
| Junction capacitance | C_T | $V_R = 600\text{ V}$ | - | 18.3 | - | pF |



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

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|---|------------|------------------------|------------|------|------------|-----------------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Thermal resistance, junction to case | R_{thJC} | | - | - | 1 | $^{\circ}\text{C}/\text{W}$ |
| Thermal resistance, junction to ambient | R_{thJA} | Typical socket mount | - | - | 40 | |
| Thermal resistance, case to heat sink | R_{thCS} | | - | 0.4 | - | |
| Weight | | | - | 6.0 | - | g |
| | | | - | 0.21 | - | oz. |
| Mounting torque | | | 6.0 (5) | - | 12 (10) | kgf · cm (lbf · in) |
| Marking device | | Case style TO-247AD 3L | C4PU3006L | | | |

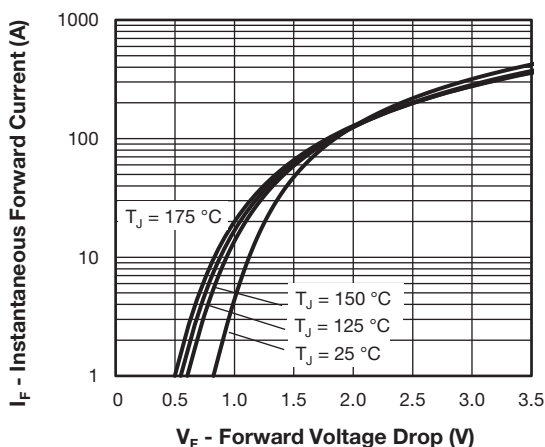


Fig. 1 - Typical Forward Voltage Drop Characteristics

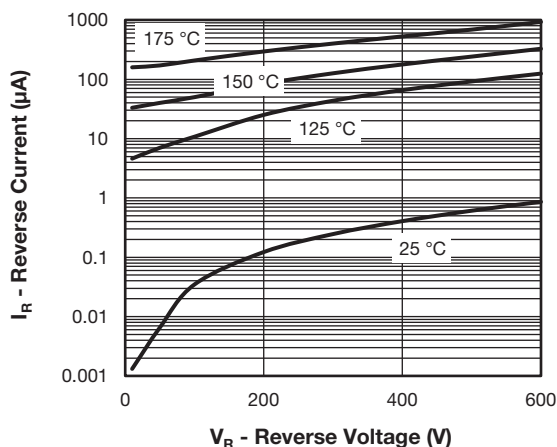


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

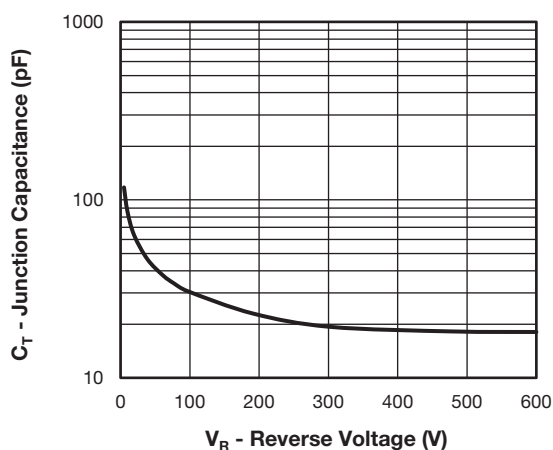


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

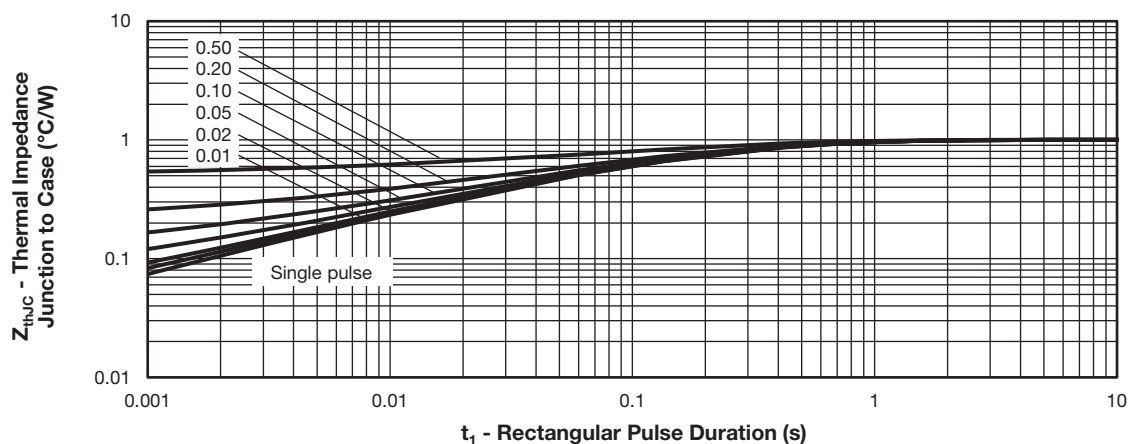
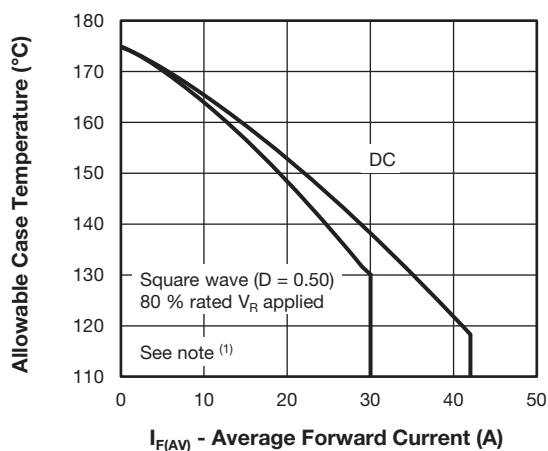

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics


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

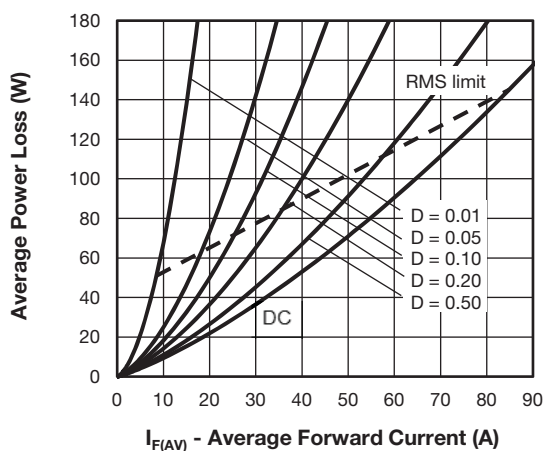
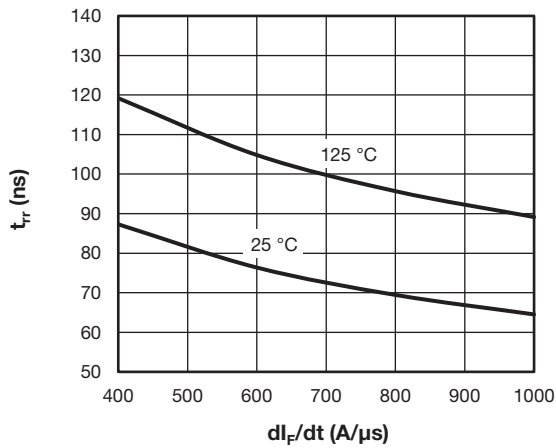
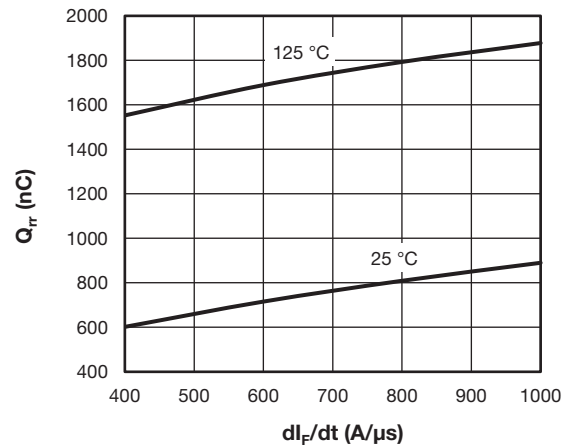
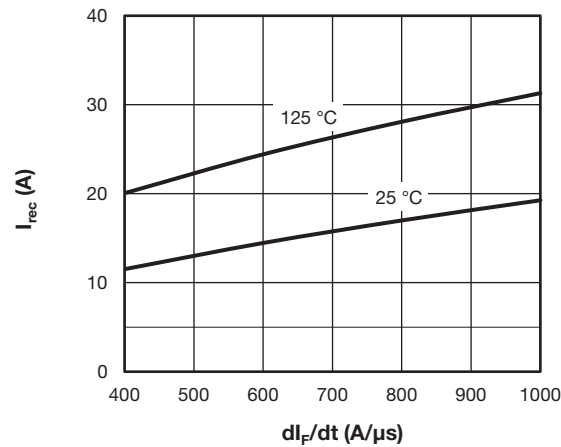


Fig. 6 - Forward Power Loss Characteristics

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 P_d = 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. 7 - Typical Reverse Recovery Time vs. dI_F/dt

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

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 | | | | | | | | |

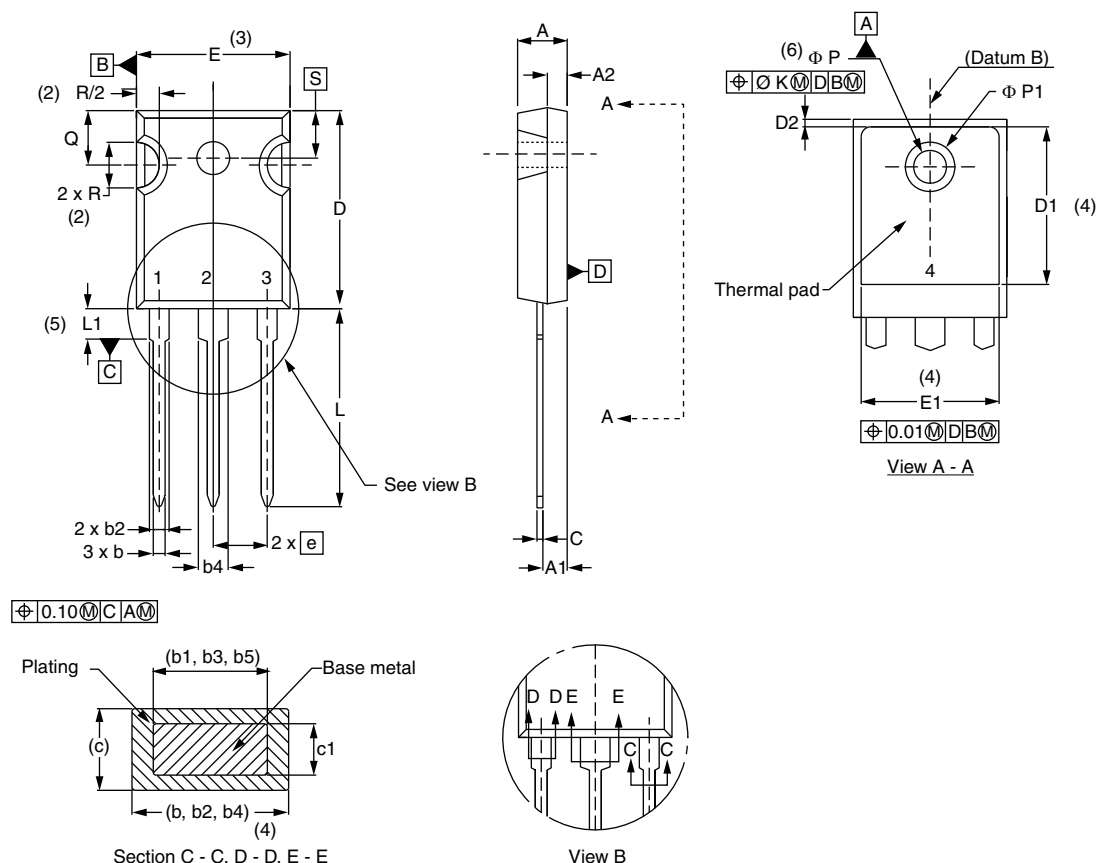
| ORDERING INFORMATION (Example) | | | |
|--------------------------------|-------------------|------------------------|-------------------------|
| PREFERRED P/N | QUANTITY PER TUBE | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-C4PU6006L-N3 | 25 | 500 | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95626 |
| Part marking information | www.vishay.com/doc?95007 |



TO-247AD 3L

DIMENSIONS in millimeters and inches



| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.65 | 5.31 | 0.183 | 0.209 | |
| A1 | 2.21 | 2.59 | 0.087 | 0.102 | |
| A2 | 1.50 | 2.49 | 0.059 | 0.098 | |
| b | 0.99 | 1.40 | 0.039 | 0.055 | |
| b1 | 0.99 | 1.35 | 0.039 | 0.053 | |
| b2 | 1.65 | 2.39 | 0.065 | 0.094 | |
| b3 | 1.65 | 2.34 | 0.065 | 0.092 | |
| b4 | 2.59 | 3.43 | 0.102 | 0.135 | |
| b5 | 2.59 | 3.38 | 0.102 | 0.133 | |
| c | 0.38 | 0.89 | 0.015 | 0.035 | |
| c1 | 0.38 | 0.84 | 0.015 | 0.033 | |
| D | 19.71 | 20.70 | 0.776 | 0.815 | 3 |
| D1 | 13.08 | - | 0.515 | - | 4 |

| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|-----------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| D2 | 0.51 | 1.30 | 0.020 | 0.051 | |
| E | 15.29 | 15.87 | 0.602 | 0.625 | 3 |
| E1 | 13.46 | - | 0.53 | - | |
| e | 5.46 BSC | | 0.215 BSC | | |
| ΦK | 0.254 | | 0.010 | | |
| L | 19.81 | 20.32 | 0.780 | 0.800 | |
| L1 | 3.71 | 4.29 | 0.146 | 0.169 | |
| ΦP | 3.56 | 3.66 | 0.14 | 0.144 | |
| $\Phi P1$ | - | 6.98 | - | 0.275 | |
| Q | 5.31 | 5.69 | 0.209 | 0.224 | |
| R | 4.52 | 5.49 | 0.178 | 0.216 | |
| S | 5.51 BSC | | 0.217 BSC | | |

Notes

- Dimensioning and tolerancing per ASME Y14.5M-1994
- Contour of slot optional
- Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
- Thermal pad contour optional with dimensions D1 and E1
- Lead finish uncontrolled in L1
- ΦP to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- Outline conforms to JEDEC® outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4



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