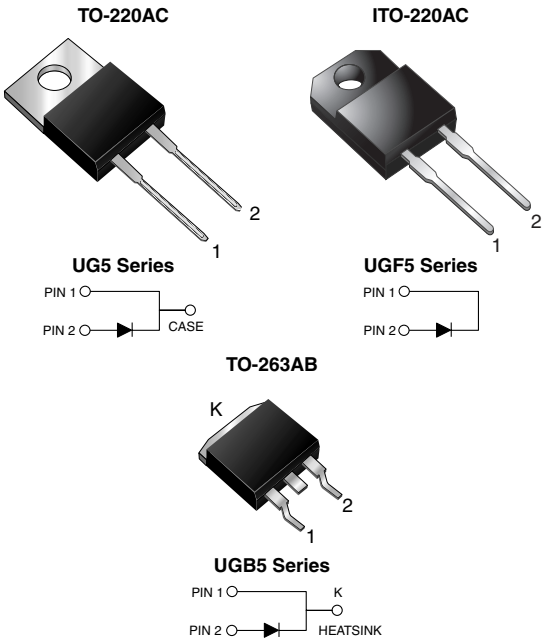
# High Voltage Ultrafast Rectifier




## FEATURES

- Glass passivated chip junction
- Ultrafast recovery time
- Soft recovery characteristics
- Low switching losses, high efficiency
- High forward surge capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C (for TO-263AB package)
- Solder dip 260 °C, 40 s (for TO-220AC and ITO-220AC package)
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

RoHS COMPLIANT

## TYPICAL APPLICATIONS

For use in high voltage and high frequency power factor corrector, freewheeling diodes and secondary dc-to-dc rectification application.

## MECHANICAL DATA

**Case:** TO-220AC, ITO-220AC, TO-263AB

Epoxy meets UL 94V-0 flammability rating

**Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD22-B102

E3 suffix for consumer grade, meets JESD 201 class 1A whisker test, HE3 suffix for high reliability grade (AEC Q101 qualified), meets JESD 201 class 2 whisker test

**Polarity:** As marked

**Mounting Torque:** 10 in-lbs maximum

| PRIMARY CHARACTERISTICS | |
|---|---|
| $I_{F(AV)}$ | 5.0 A |
| $V_{RRM}$ | 500 V, 600 V |
| $I_{FSM}$ | 65 A |
| $t_{rr}$ | 25 ns |
| $V_F$ | 1.5 V |
| $T_J$ max. | 150 °C |

**MAXIMUM RATINGS** ($T_C$ = 25 °C unless otherwise noted)

| PARAMETER | SYMBOL | UG5HT | UG5JT | UNIT |
|---|---|---|---|---|
| Maximum repetitive peak reverse voltage | $V_{RRM}$ | 500 | 600 | V |
| Maximum working reverse voltage | $V_{RWM}$ | 400 | 480 | V |
| Maximum RMS voltage | $V_{RMS}$ | 350 | 420 | V |
| Maximum DC blocking voltage | $V_{DC}$ | 500 | 600 | V |
| Maximum average forward rectified current | $I_{F(AV)}$ | 5.0 | | A |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$ | 65 | | A |
| Operating junction and storage temperature range | $T_J$, $T_{STG}$ | - 55 to + 150 | | °C |
| Isolation voltage (ITO-220AB only) from terminals to heatsink t = 1 min | $V_{AC}$ | 1500 | | V |

| **ELECTRICAL CHARACTERISTICS** ($T_C$ = 25 °C unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITIONS** | | **SYMBOL** | **UG5HT** | **UG5JT** | **UNIT** |
| Maximum instantaneous forward voltage (1) | $I_F$ = 5 A<br>$I_F$ = 5 A | $T_J$ = 25 °C<br>$T_J$ = 125 °C | $V_F$ | 1.75<br>1.50 | | V |
| Maximum DC reverse current at $V_{RWM}$ | | $T_J$ = 25 °C<br>$T_J$ = 100 °C<br>$T_J$ = 125 °C | $I_R$ | 30<br>800<br>4.0 | | µA<br>µA<br>mA |
| Maximum reverse recovery time | $I_F$ = 0.5 A, $I_R$ = 1.0 A, $I_{rr}$ = 0.25 A | | $t_{rr}$ | 25 | | ns |
| Maximum reverse recovery time | $I_F$ = 1.0 A, dI/dt = 50 A/µs, $V_R$ = 30 V, $I_{rr}$ = 0.1 $I_{RM}$ | | $t_{rr}$ | 50 | | ns |
| Typical softness factor ($t_b/t_a$) | $I_F$ = 5.0 A, dI/dt = 240 A/µs, $V_R$ = 400 V, $I_{rr}$ = 0.1 $I_{RM}$ | | S | 0.9 | | - |
| Maximum reverse recovery current | $I_F$ = 5.0 A, dI/dt = 40 A/µs, $V_R$ = 400 V, $T_C$ = 125 °C | | $I_{RM}$ | 3.0 | | A |
| Maximum reverse recovery current | $I_F$ = 5.0 A, dI/dt = 240 A/µs, $V_R$ = 400 V, $T_C$ = 125 °C | | $I_{RM}$ | 9.0 | | A |
| Peak forward recovery time | $I_F$ = 5.0 A, dI/dt = 64 A/µs, $V_F$ = 1.1 $V_{F\ max.}$ | | $t_{fr}$ | 500 | | ns |

| **THERMAL CHARACTERISTICS** ($T_C$ = 25 °C unless otherwise noted) | | | | | |
|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **UG5** | **UGF5** | **UGB5** | **UNIT** |
| Typical thermal resistance from junction to case | $R_{\theta JC}$ | 3.0 | 5.5 | 3.0 | °C/W |

**Note:**

(1) Pulse test: 300 µs pulse width, 1 % duty cycle

| **ORDERING INFORMATION** (Example) | | | | | |
|---|---|---|---|---|---|
| **PACKAGE** | **PREFERRED P/N** | **UNIT WEIGHT (g)** | **PACKAGE CODE** | **BASE QUANTITY** | **DELIVERY MODE** |
| TO-220AC | UG5JT-E3/45 | 1.80 | 45 | 50/tube | Tube |
| ITO-220AC | UGF5JT-E3/45 | 1.95 | 45 | 50/tube | Tube |
| TO-263AB | UGB5JT-E3/45 | 1.33 | 45 | 50/tube | Tube |
| TO-263AB | UGB5JT-E3/81 | 1.33 | 81 | 800/reel | Tape reel |
| TO-220AC | UG5JTHE3/45 (1) | 1.80 | 45 | 50/tube | Tube |
| ITO-220AC | UGF5JTHE3/45 (1) | 1.95 | 45 | 50/tube | Tube |
| TO-263AB | UGB5JTHE3/45 (1) | 1.33 | 45 | 50/tube | Tube |
| TO-263AB | UGB5JTHE3/81 (1) | 1.33 | 81 | 800/reel | Tape reel |

**Note:**

(1) Automotive grade AEC Q101 qualified

## RATINGS AND CHARACTERISTICS CURVES

($T_A$ = 25 °C unless otherwise noted)

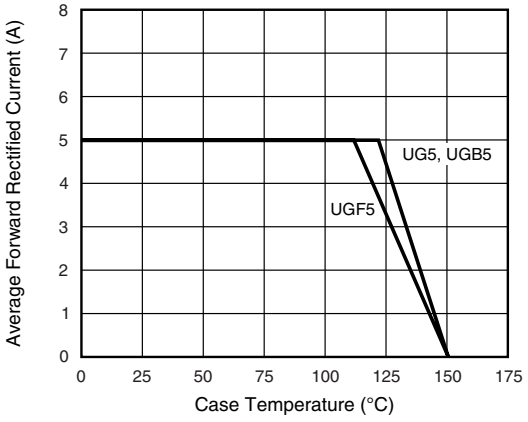



Figure 1. Forward Current Derating Curve

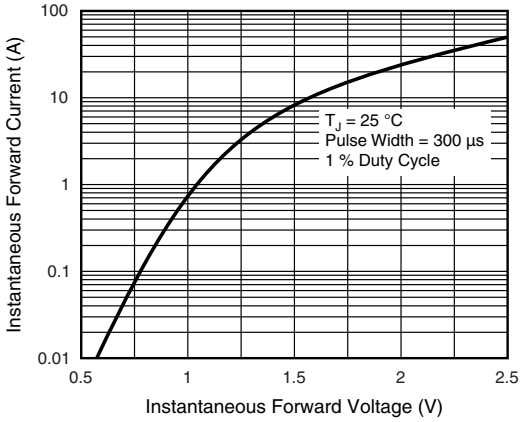



Figure 4. Typical Instantaneous Forward Charateristics

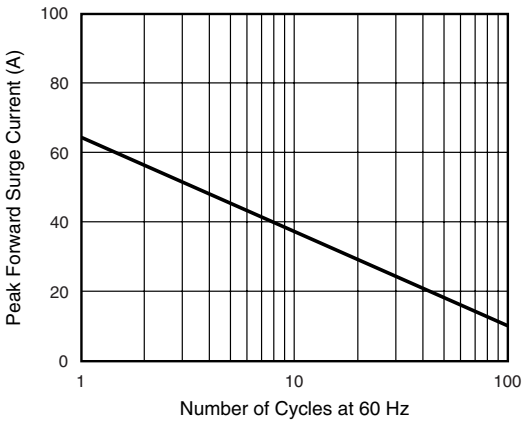



Figure 2. Maximum Non-Repetitive Peak Forward Surge Current

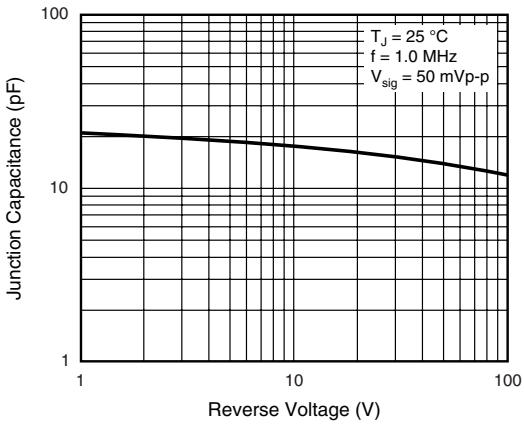



Figure 5. Typical Junction Capacitance

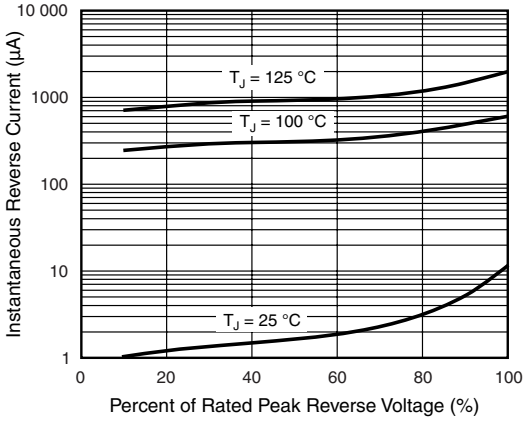



Figure 3. Typical Reverse Charateristics

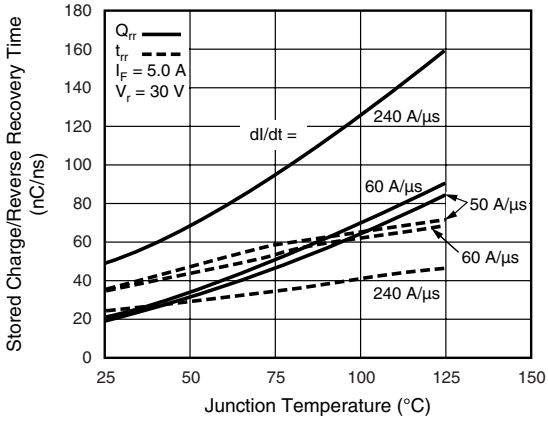
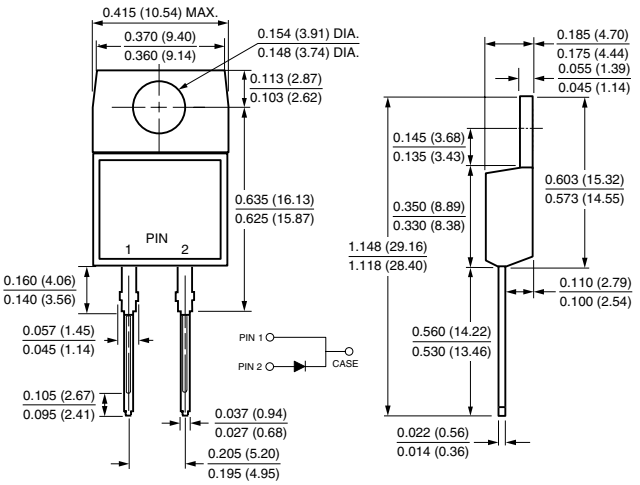


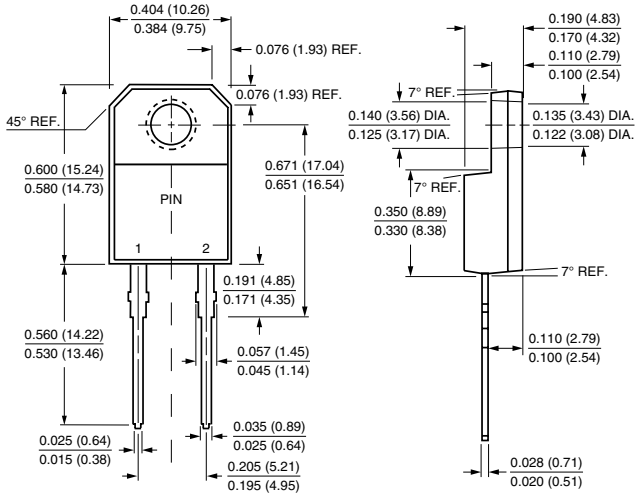

Figure 6. Reverse Switching Characteristics

## **PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

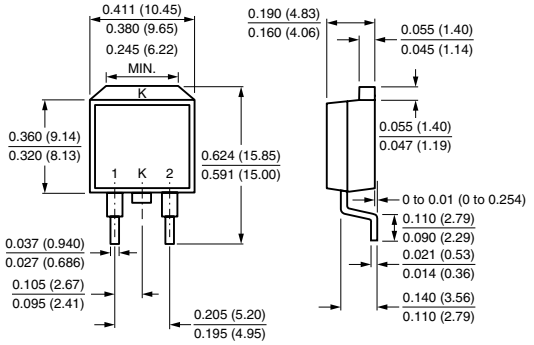
**TO-220AC**

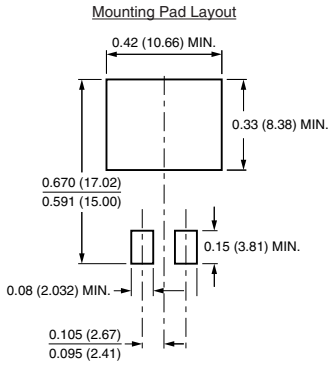



**ITO-220AC**




**TO-263AB**



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