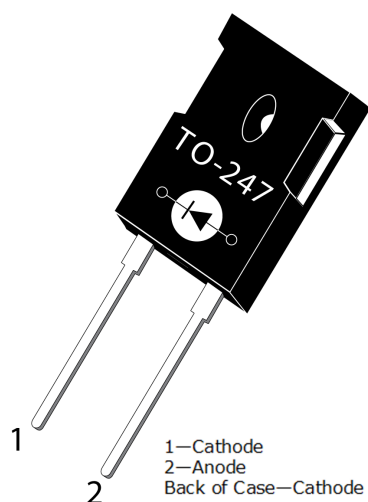


APT60D60BG Ultrafast Soft Recovery Rectifier Diode

1 Product Overview

This section outlines the product overview for the APT60D60BG device.



1.1 Features

The following are key features of the APT60D60BG device.

- Ultrafast recovery times
- Soft recovery characteristics
- Low forward voltage
- Low leakage current
- RoHS compliant

1.2 Benefits

The following are benefits of the APT60D60BG device.

- Low switching losses
- Low noise (EMI) switching
- Cooler operation
- Higher reliability systems
- Increased system power density

1.3 Applications

The APT60D60BG device is designed for the following applications.

- Power factor correction (PFC)
- Anti-parallel diode
 - Switchmode power supply
 - Inverters
- Freewheeling diode
 - Motor controllers
 - Inverters/converters
- Snubber diode

2 Electrical Specifications

This section shows the electrical specifications of the APT60D60BG device.

2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the APT60D60BG device.

All ratings: $T_c = 25\text{ }^\circ\text{C}$ unless otherwise specified.

Table 1 • Absolute Maximum Ratings

| Symbol | Parameter | Ratings | Unit |
|----------------|---|------------|------------------|
| V_R | Maximum DC reverse voltage | 600 | V |
| V_{RRM} | Maximum peak repetitive reverse voltage | 600 | |
| V_{RWM} | Maximum working peak reverse voltage | 600 | |
| $I_{F(AV)}$ | Maximum average forward current ($T_c = 125\text{ }^\circ\text{C}$, duty cycle = 0.5) | 60 | A |
| $I_{F(RMS)}$ | RMS forward current | 132 | |
| I_{FSM} | Non-repetitive forward surge current ($T_J = 45\text{ }^\circ\text{C}$, 8.3 ms) | 600 | |
| T_J, T_{STG} | Operating and storage temperature range | -55 to 175 | $^\circ\text{C}$ |
| T_L | Lead temperature for 10 seconds | 300 | |

2.2 Electrical Performance

The following table shows the static characteristics of the APT60D60BG device.

Table 2 • Static Electrical Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|----------|---------------------------------|---|-----|-----|-----|---------------|
| V_F | Forward voltage | $I_F = 60\text{ A}$ | | 1.6 | 1.8 | V |
| | | $I_F = 120\text{ A}$ | | 1.9 | | |
| | | $I_F = 60\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | | 1.4 | | |
| I_{RM} | Maximum reverse leakage current | $V_R = 600\text{ V}$ | | | 250 | μA |
| | | $V_R = 600\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | | | 500 | |
| C_J | Junction capacitance | $V_R = 200\text{ V}$ | | 90 | | pF |

The following table shows the dynamic characteristics of the APT60D60BG device.

Table 3 • Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-----------|----------------------------------|--|-----|------|-----|------|
| t_{rr} | Reverse recovery time | $I_F = 1\text{ A}$ $di_F/dt = -100\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$ $T_J = 25\text{ }^\circ\text{C}$ | | 40 | | ns |
| t_{rr} | Reverse recovery time | $I_F = 60\text{ A}$ | | 130 | | |
| Q_{rr} | Reverse recovery charge | $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 400\text{ V}$ | | 220 | | nC |
| I_{RRM} | Maximum reverse recovery current | $T_C = 25\text{ }^\circ\text{C}$ | | 4 | | A |
| t_{rr} | Reverse recovery time | $I_F = 60\text{ A}$ | | 170 | | ns |
| Q_{rr} | Reverse recovery charge | $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 400\text{ V}$ | | 920 | | nC |
| I_{RRM} | Maximum reverse recovery current | $T_C = 125\text{ }^\circ\text{C}$ | | 10 | | A |
| t_{rr} | Reverse recovery time | $I_F = 60\text{ A}$ | | 80 | | ns |
| Q_{rr} | Reverse recovery charge | $di_F/dt = -1000\text{ A}/\mu\text{s}$ $V_R = 400\text{ V}$ | | 1900 | | nC |
| I_{RRM} | Maximum reverse recovery current | $T_C = 125\text{ }^\circ\text{C}$ | | 38 | | A |

The following table shows the thermal and mechanical characteristics of the APT60D60BG device.

Table 4 • Thermal and Mechanical Characteristics

| Symbol | Characteristic/Test Conditions | Min | Typ | Max | Unit |
|-----------------|--|-----|------|------|--------|
| $R_{\theta JC}$ | Junction-to-case thermal resistance | | | 0.34 | °C/W |
| $R_{\theta JA}$ | Junction-to-ambient thermal resistance | | | 40 | |
| Wt | Package weight | | 0.22 | | oz |
| | | | 6.2 | | g |
| | Mounting torque | | | 10 | lbf-in |
| | | | | 1.1 | N-m |

2.3 Typical Performance Curves

This section shows the typical performance curves for the APT60D60BG device.

Figure 1 • Maximum Effective Transient Thermal Impedance, Junction-To-Case vs. Pulse Duration

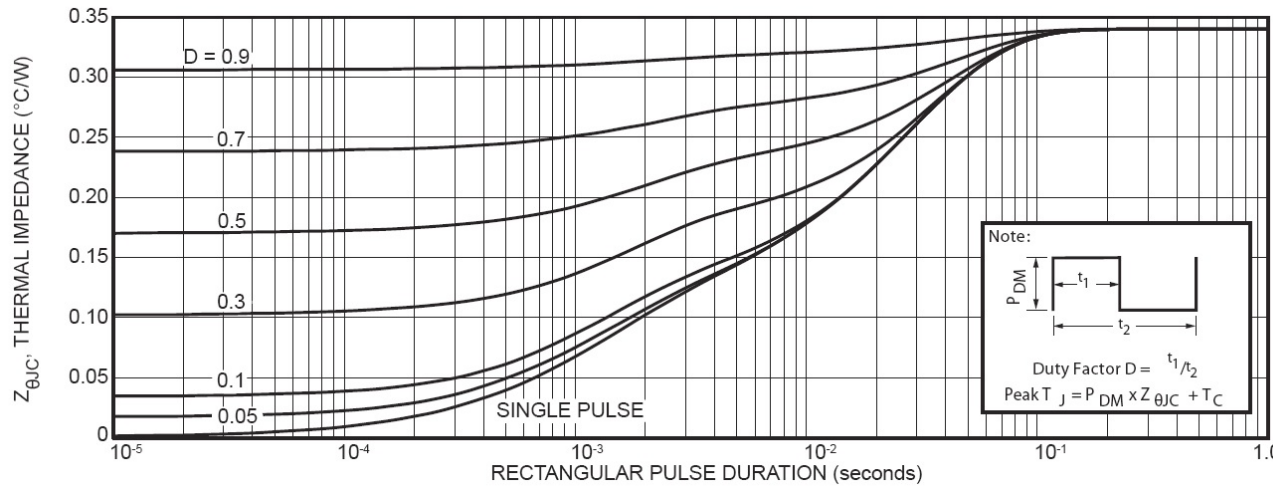


Figure 2 • Forward Current vs. Forward Voltage

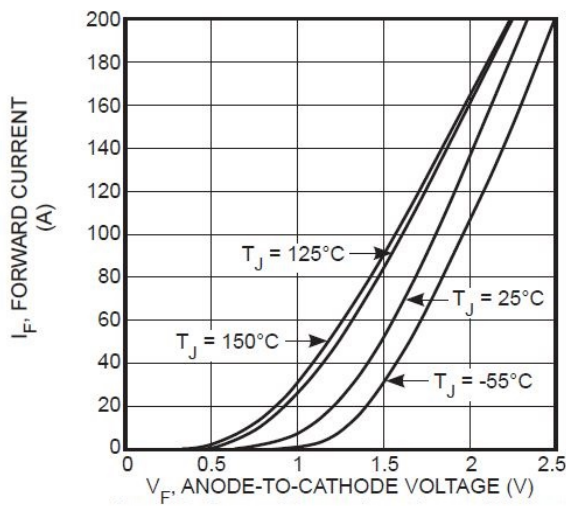


Figure 3 • RRT vs. Current Rate of Change

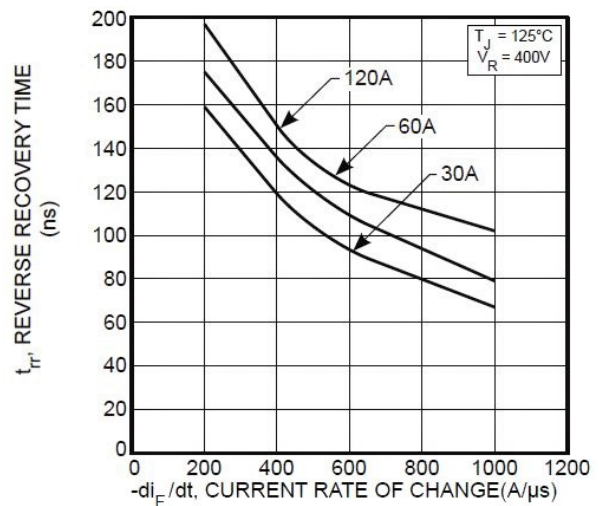


Figure 4 • Reverse Recovery Charge vs. Current Rate of Change

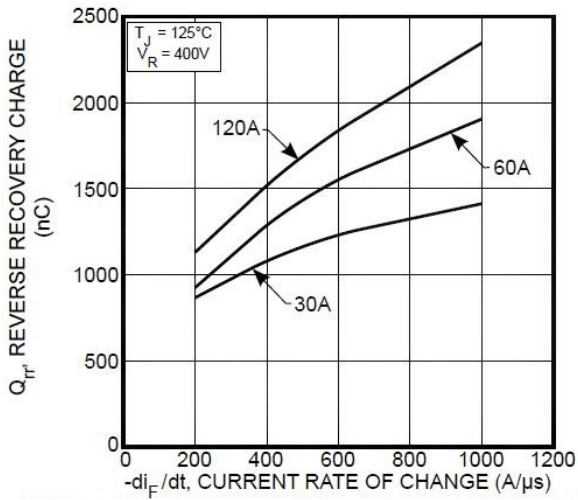


Figure 5 • Reverse Recovery Current vs. Current Rate of Change

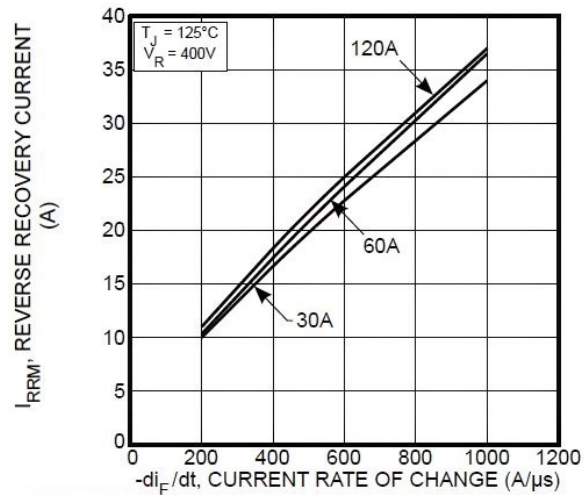


Figure 6 • Dynamic Parameters vs. Junction Temperature

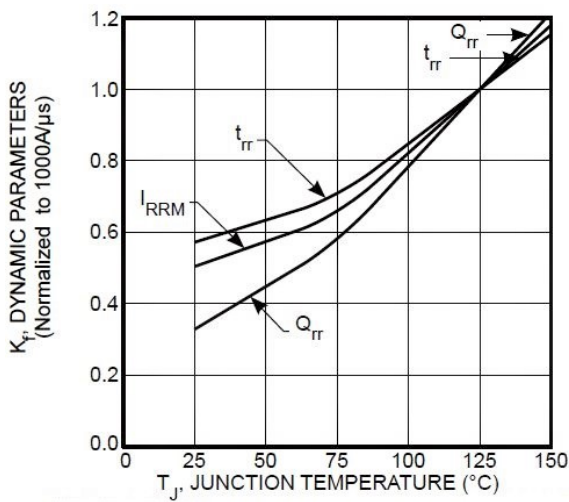


Figure 7 • Maximum Average Forward Current vs. Case Temperature

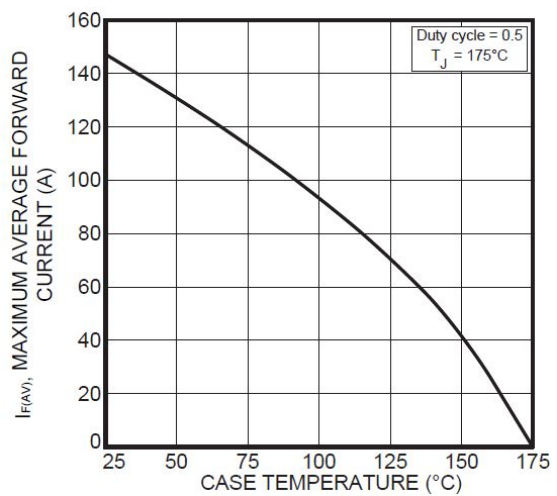
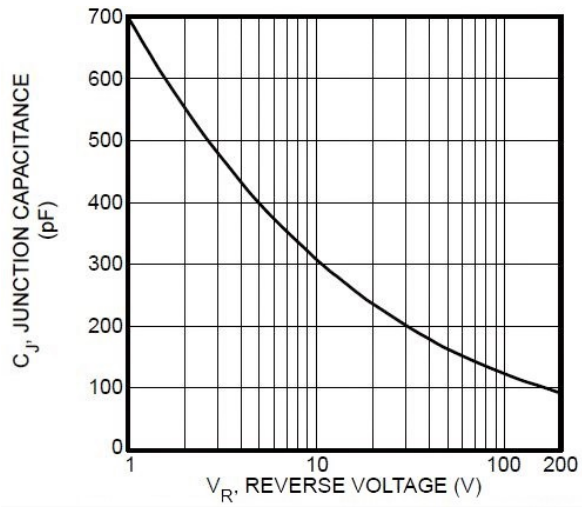


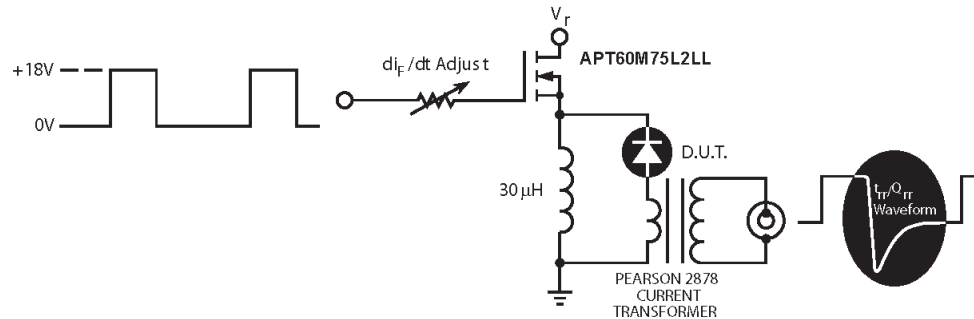
Figure 8 • Junction Capacitance vs. Reverse Voltage



2.4 Reverse Recovery Overview

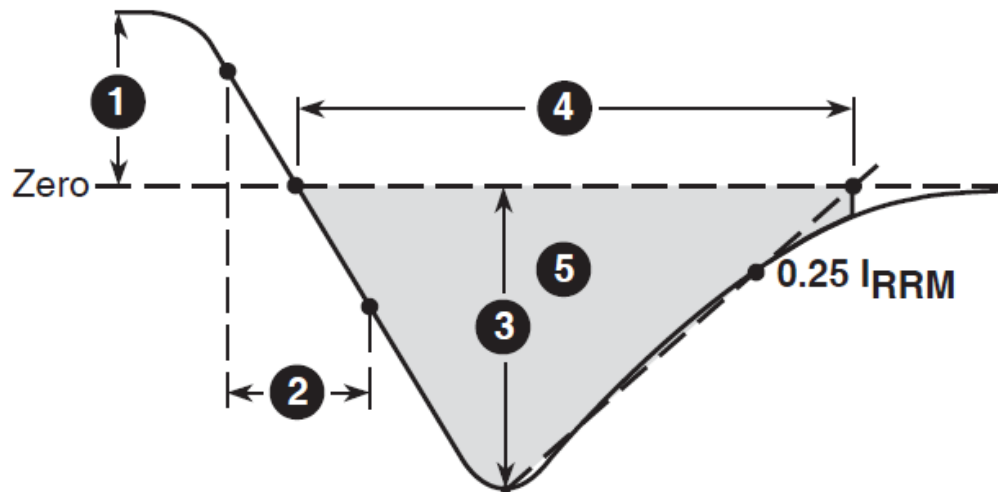
The following figure shows the diode test circuit of the APT60D60BG device.

Figure 9 • Diode Test Circuit



The following figure shows the diode reverse recovery waveform and definitions for the APT60D60BG device.

Figure 10 • Diode Reverse Recovery Waveform and Definitions



1. I_F —Forward conduction current
2. di_F/dt —Rate of diode current change through zero crossing
3. I_{RRM} —Maximum reverse recovery current
4. t_{rr} —Reverse recovery time, measured from zero crossing where diode current goes from positive to negative, to the point at which the straight line through I_{RRM} and $0.25 \cdot I_{RRM}$ passes through zero
5. Q_{rr} —Area under the curve defined by I_{RRM} and t_{rr}

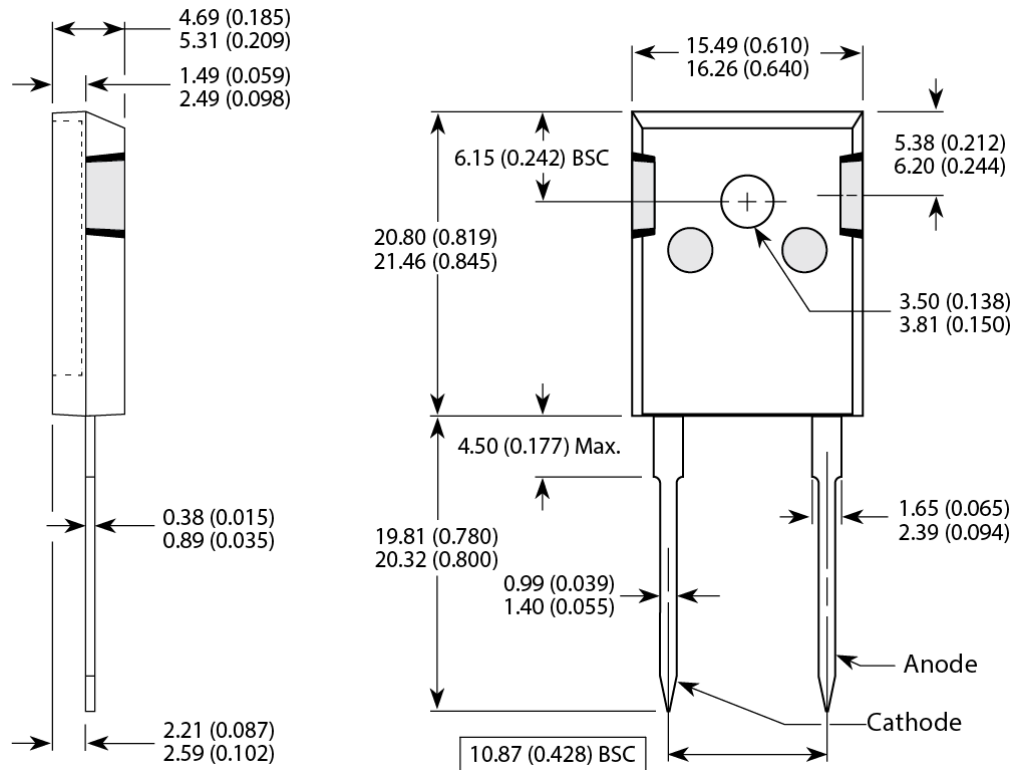
3 Package Specification

This section outlines the package specification of the APT60D60BG device.

3.1 Package Outline Drawing

The following figure shows the package outline drawing of the APT60D60BG device. Dimensions are in millimeters and (inches).

Figure 11 • Package Outline Drawing





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