

APT30DQ100BG
Datasheet
Ultrafast Soft Recovery Rectifier Diode

Final
April 2018



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1 Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision D

Revision D was published in April 2018. The following is a summary of the changes in revision D of this document.

- Product image was updated.
- Product features were updated. For information, see [Product Overview \(see page 2\)](#).
- The lead thickness in the package outline drawing was updated. For more information, see [Package Outline Drawing \(see page 8\)](#).

1.2 Revision C

Revision C was published in May 2011. The following is a summary of the changes in Revision C of this document.

- Patent Information was removed.
- B-Pack Information was updated.
 - Changed max lead thickness from 0.79 (.031) to 1.016 (.040).

1.3 Revision B

Revision B was published in July 2009. The following is a summary of the changes in Revision B of this document.

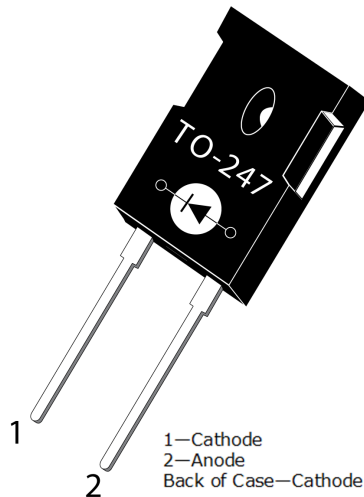
- Graphs were added.

1.4 Revision A

Revision A was published in January 2006. It is the first publication of this document.

2 Product Overview

This section outlines the product overview for the APT30DQ100BG device.



2.1 Features

The following are key features of the APT30DQ100BG device:

- Ultrafast recovery times
- Soft recovery characteristics
- Low forward voltage
- Low leakage current
- Avalanche energy rated
- RoHS compliant
- AEC-Q101 qualified

2.2 Benefits

The following are benefits of the APT30DQ100BG device:

- High switching frequency
- Low switching losses
- Low noise (EMI) switching
- Higher reliability systems
- Increased system power density

2.3 Applications

The APT30DQ100BG device is designed for the following applications:

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

3 Electrical Specifications

This section details the electrical specifications for the APT30DQ100BG device.

3.1 Absolute Maximum Ratings

The following table shows the maximum ratings for the APT30DQ100BG device.

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

Table 1 • Absolute Maximum Ratings

| Symbol | Parameter | Rating | Unit |
|----------------|---|------------|--------------------|
| V_R | Maximum DC reverse voltage | 1000 | V |
| V_{RRM} | Maximum peak repetitive reverse voltage | 1000 | |
| V_{RWM} | Maximum working peak reverse voltage | 1000 | |
| $I_{F(AV)}$ | Maximum average forward current ($T_c = 102\text{ }^{\circ}\text{C}$, duty cycle = 0.5) | 30 | A |
| $I_{F(RMS)}$ | RMS forward current | 43 | |
| I_{FSM} | Non-repetitive forward surge current ($T_J = 45\text{ }^{\circ}\text{C}$, 8.3 ms) | 150 | |
| E_{AVL} | Avalanche energy (1 A, 40 mH) | 20 | mJ |
| T_J, T_{STG} | Operating and storage temperature range | -55 to 175 | $^{\circ}\text{C}$ |
| T_L | Lead temperature for 10 s | 300 | |

3.2 Electrical Performance

The following table shows the static electrical characteristics of the APT30DQ100BG device.

Table 2 • Static Electrical Characteristics

| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | Unit |
|----------|---------------------------------|--|-----|------|-----|---------------|
| V_F | Forward voltage | $I_F = 30\text{ A}$ | | 2.5 | 3.0 | V |
| | | $I_F = 60\text{ A}$ | | 3.06 | | |
| | | $I_F = 30\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$ | | 1.92 | | |
| I_{RM} | Maximum reverse leakage current | $V_R = 1000\text{ V}$ | | | 100 | μA |
| | | $V_R = 1000\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$ | | | 500 | |
| C_T | Junction capacitance | $V_R = 200\text{ V}$ | | 26 | | pF |

3.3 Dynamic Characteristics

The following table shows the dynamic characteristics of the APT30DQ100BG device.

Table 3 • Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | Unit |
|-----------|----------------------------------|--|-----|------|-----|------|
| t_{rr} | Reverse recovery time | $I_F = 1\text{ A}$, $di_F/dt = -100\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$, $T_J = 25\text{ }^\circ\text{C}$ | | 24 | | ns |
| t_{rr} | Reverse recovery time | $I_F = 30\text{ A}$, $di_F/dt = -200\text{ A}/\mu\text{s}$ | | 295 | | |
| Q_{rr} | Reverse recovery charge | $V_R = 667\text{ V}$, $T_C = 25\text{ }^\circ\text{C}$ | | 440 | | nC |
| I_{RRM} | Maximum reverse recovery current | | | 4 | | A |
| t_{rr} | Reverse recovery time | $I_F = 30\text{ A}$, $di_F/dt = -200\text{ A}/\mu\text{s}$ | | 330 | | ns |
| Q_{rr} | Reverse recovery charge | $V_R = 667\text{ V}$, $T_C = 125\text{ }^\circ\text{C}$ | | 1550 | | nC |
| I_{RRM} | Maximum reverse recovery current | | | 8 | | A |
| t_{rr} | Reverse recovery time | $I_F = 30\text{ A}$, $di_F/dt = -1000\text{ A}/\mu\text{s}$ | | 150 | | ns |
| Q_{rr} | Reverse recovery charge | $V_R = 667\text{ V}$, $T_C = 125\text{ }^\circ\text{C}$ | | 2250 | | nC |
| I_{RRM} | Maximum reverse recovery current | | | 25 | | A |

3.4 Thermal and Mechanical Characteristics

This section shows the thermal and mechanical characteristics of the APT30DQ100BG device.

Table 4 • Thermal and Mechanical Characteristics

| Symbol | Characteristic/Test Conditions | MIN | TYP | MAX | UNIT |
|-----------------|-------------------------------------|-----|------|------|---------------------------|
| $R_{\theta JC}$ | Junction-to-case thermal resistance | | | 0.80 | $^\circ\text{C}/\text{W}$ |
| W_T | Package weight | | 0.22 | | oz |
| | | | 5.9 | | g |
| Torque | Maximum mounting torque | | | 10 | lb-in |
| | | | | 1.1 | N-m |

Microsemi reserves the right to change, without notice, the specifications and information contained herein.

3.5 Typical Performance Curves

This section shows the typical performance curves for the APT30DQ100BG device.

Figure 1 • Maximum Transient Thermal Impedance

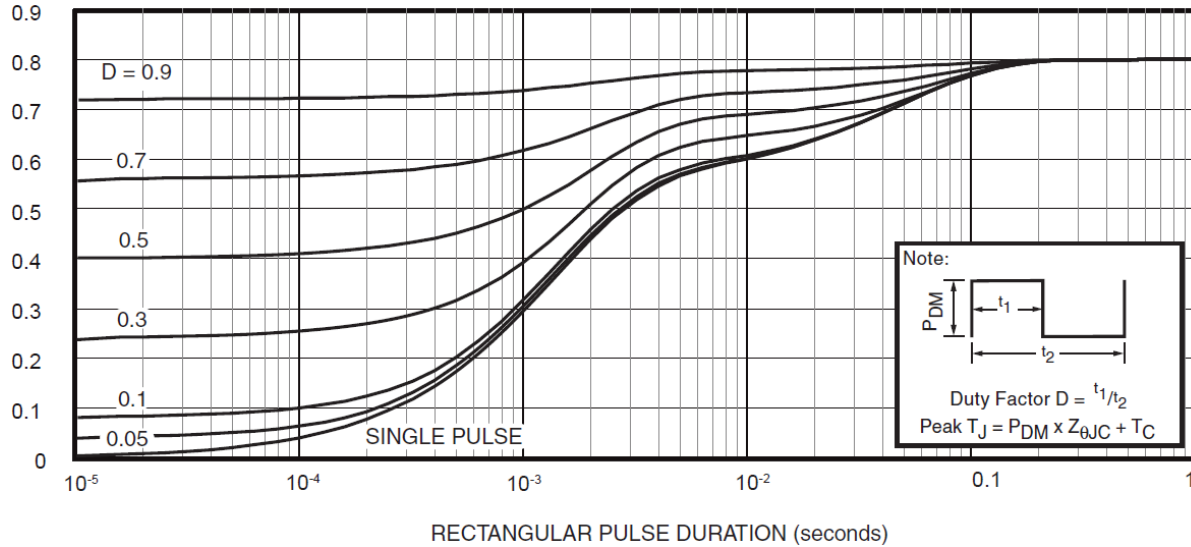


Figure 2 • Forward Current vs. Forward Voltage

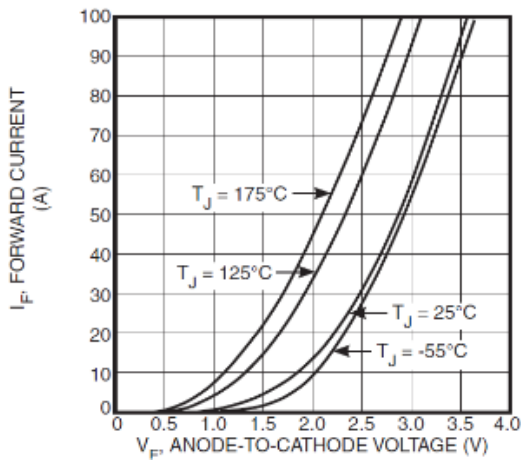


Figure 3 • trr vs. Current Rate of Change

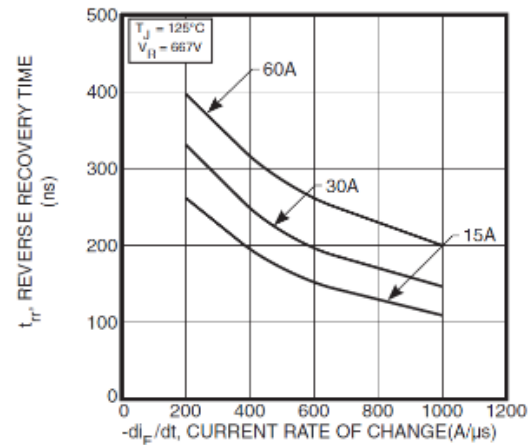
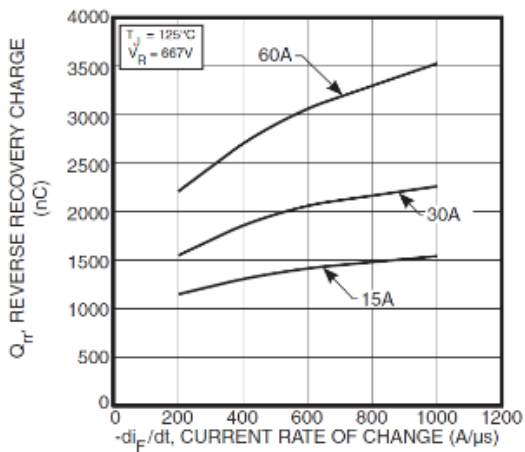
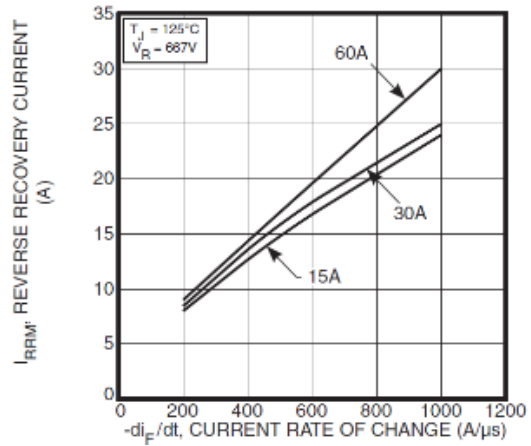
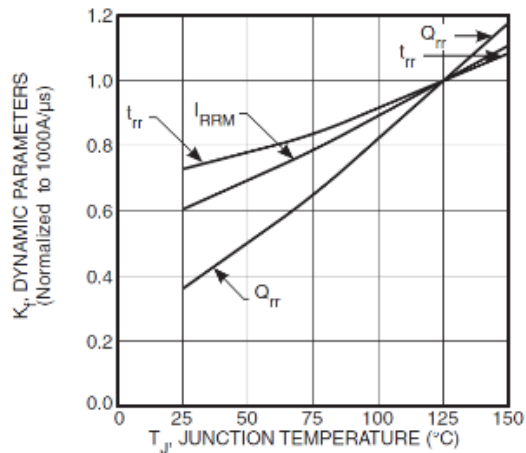
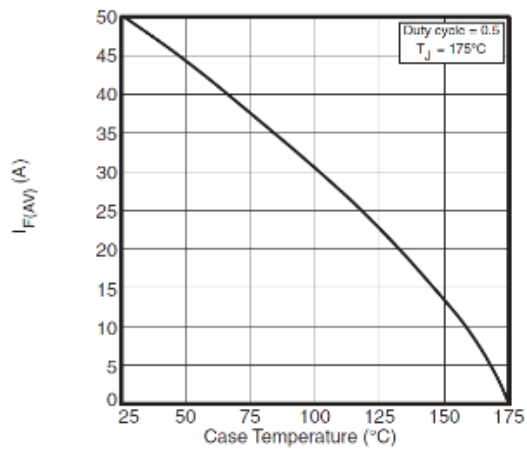
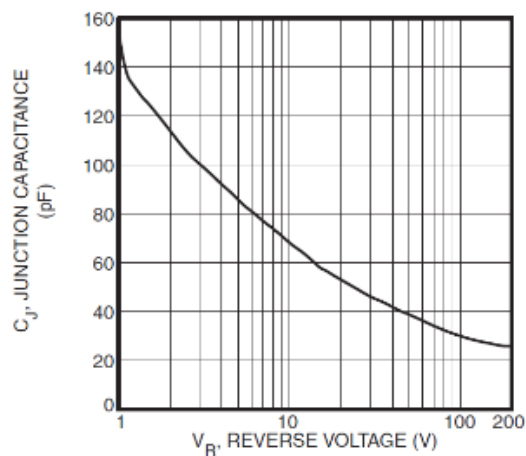


Figure 4 • Reverse Recovery Charge vs. Current Rate of Change

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


3.6 Reverse Recovery Overview

The following figures illustrate the reverse recovery testing and measurement information for the APT30DQ100BG device.

Figure 9 • Diode Test Circuit

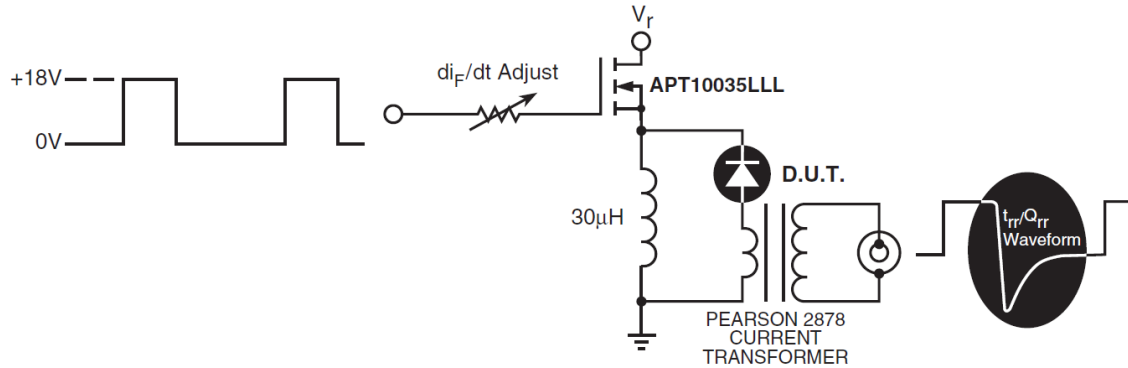
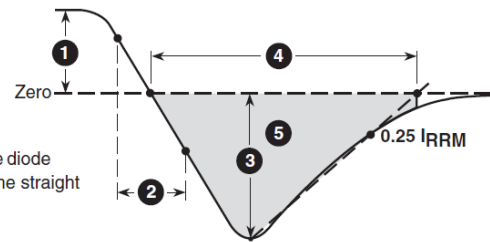


Figure 10 • Diode Reverse Recovery Waveform and Definitions

- 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} .



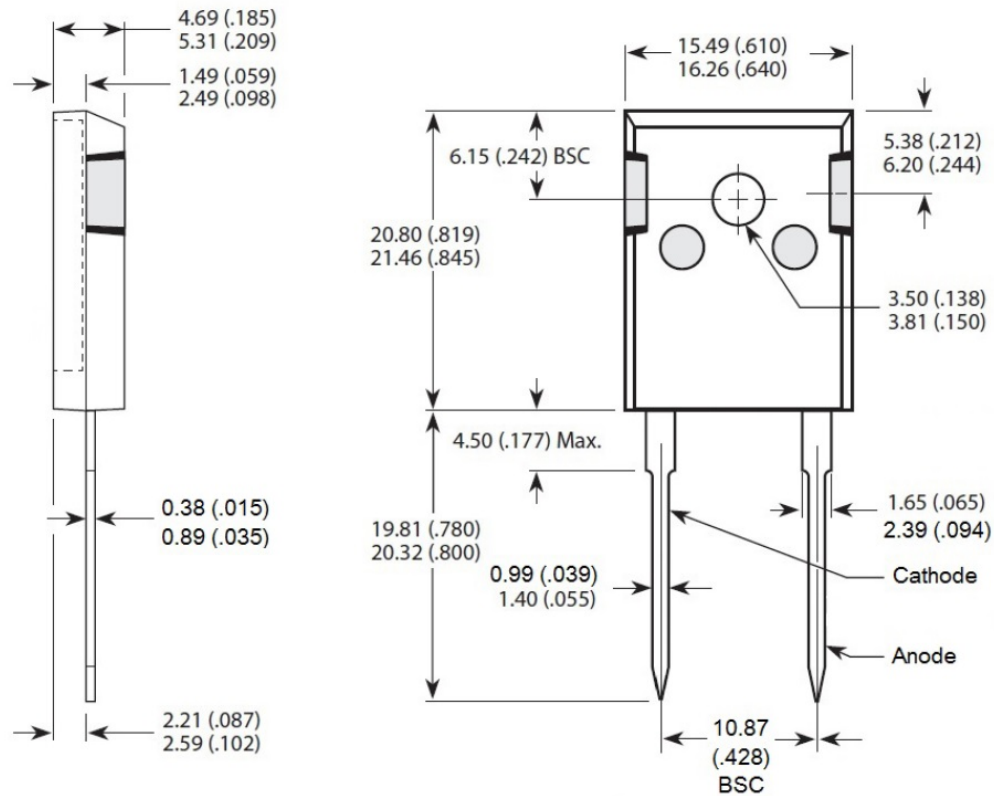
4 Package Specification

This section outlines the package specification for the APT30DQ100BG device.

4.1 Package Outline Drawing

This section details the TO-247 package drawing of the APT30DQ100BG device.

Figure 11 • Package Outline Drawing



**Microsemi Corporate Headquarters**

One Enterprise, Aliso Viejo,
CA 92656 USA
Within the USA: +1 (800) 713-4113
Outside the USA: +1 (949) 380-6100
Fax: +1 (949) 215-4996
Email: sales.support@microsemi.com
www.microsemi.com

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