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**APT30DQ100BG**  
**Datasheet**  
**Ultrafast Soft Recovery Rectifier Diode**

Final  
April 2018



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# 1 Revision History

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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.

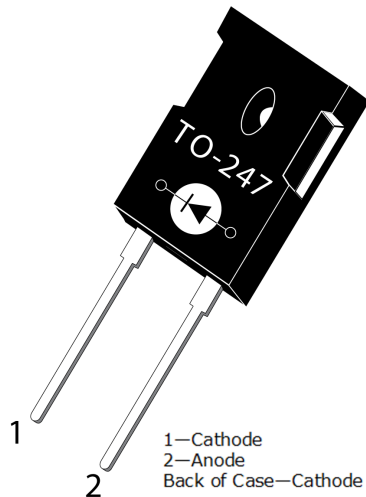
## 1.4 Revision A

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

## 2 Product Overview

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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	$\mu\text{A}$
		$V_R = 1000\text{ V}, T_J = 125\text{ }^\circ\text{C}$			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**

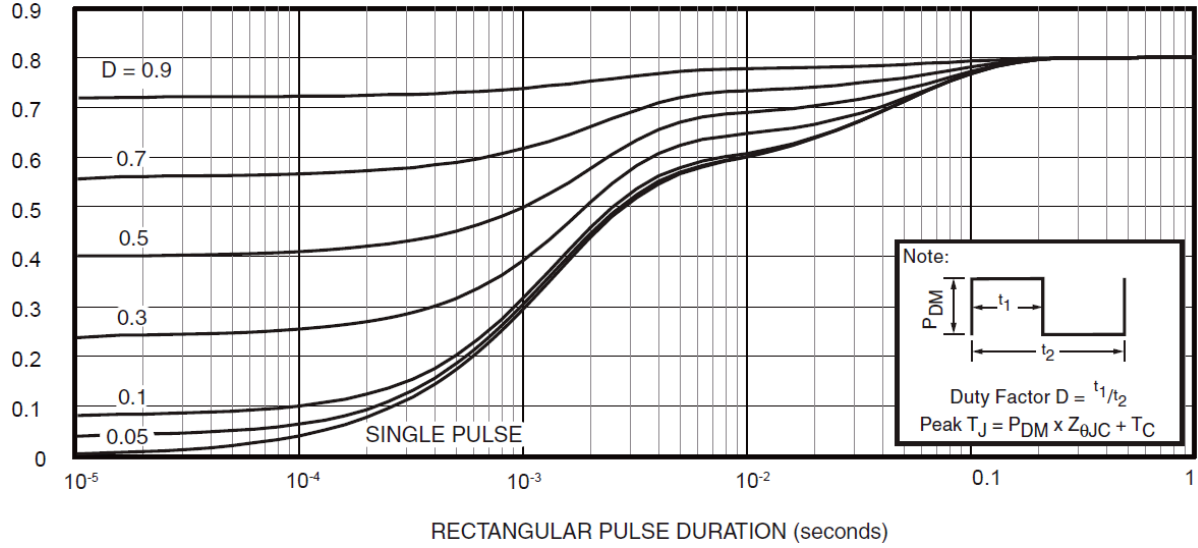
Symbol	Characteristic/Test Conditions	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-case thermal resistance			0.80	$^\circ\text{C}/\text{W}$
$W_T$	Package weight		0.22		oz
			5.9		g
Torque	Maximum mounting torque			10	lb-in
				1.1	N-m

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

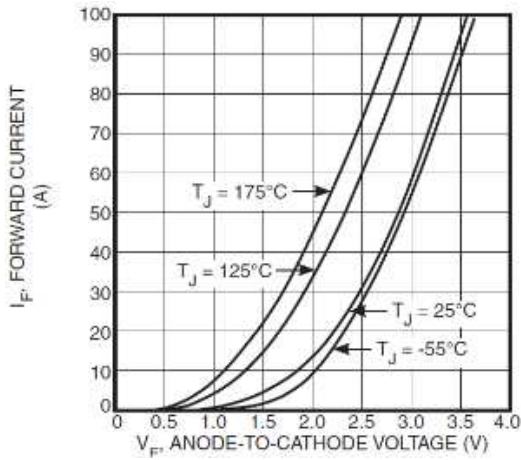
### 3.5 Typical Performance Curves

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

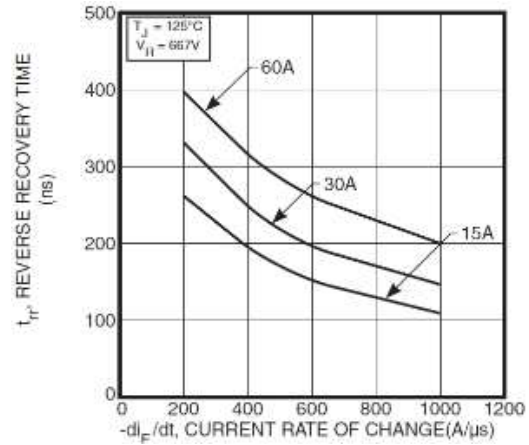
**Figure 1 • Maximum Transient Thermal Impedance**



**Figure 2 • Forward Current vs. Forward Voltage**

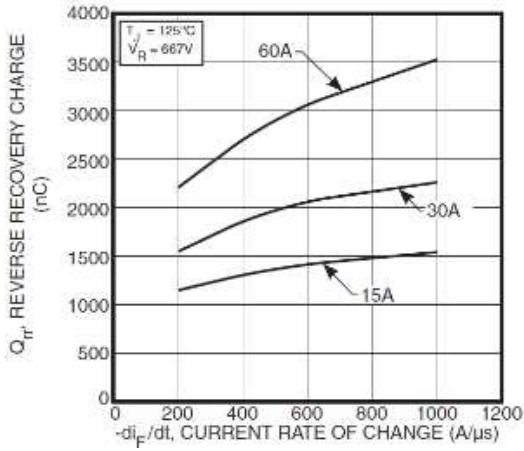


**Figure 3 • trr vs. Current Rate of Change**

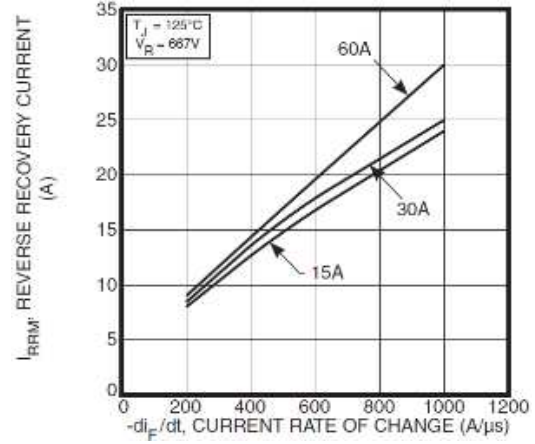




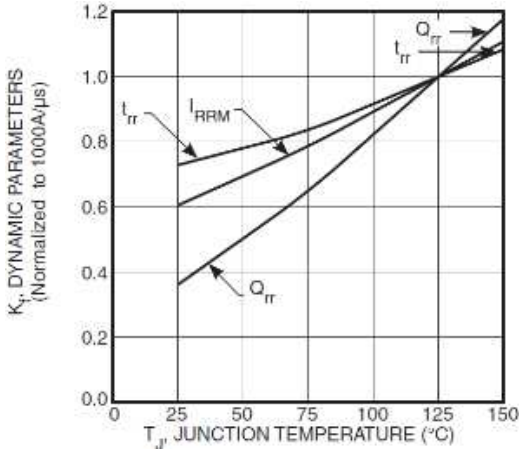
**Figure 4 • Reverse Recovery Charge vs. Current Rate of Change**



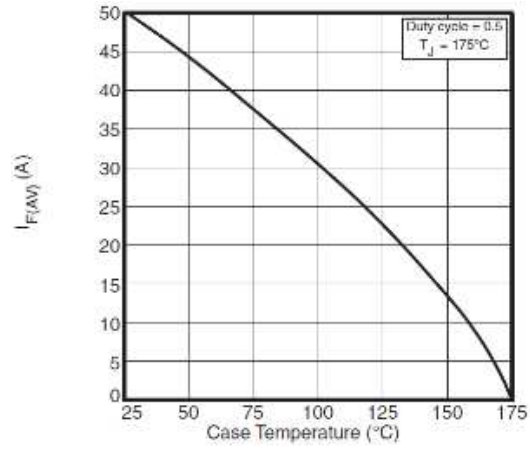
**Figure 5 • Reverse Recovery Current vs. Current Rate of Change**



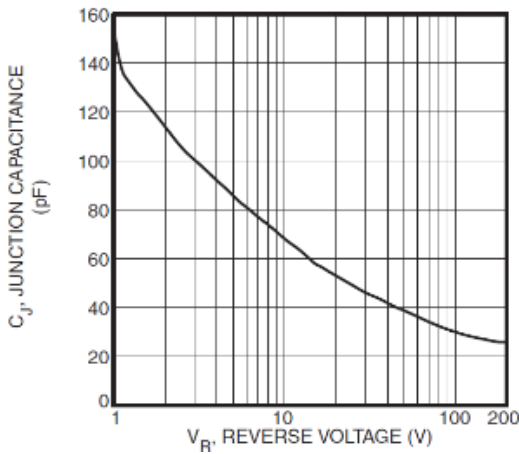
**Figure 6 • Dynamic Parameters vs. Junction Temperature**



**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

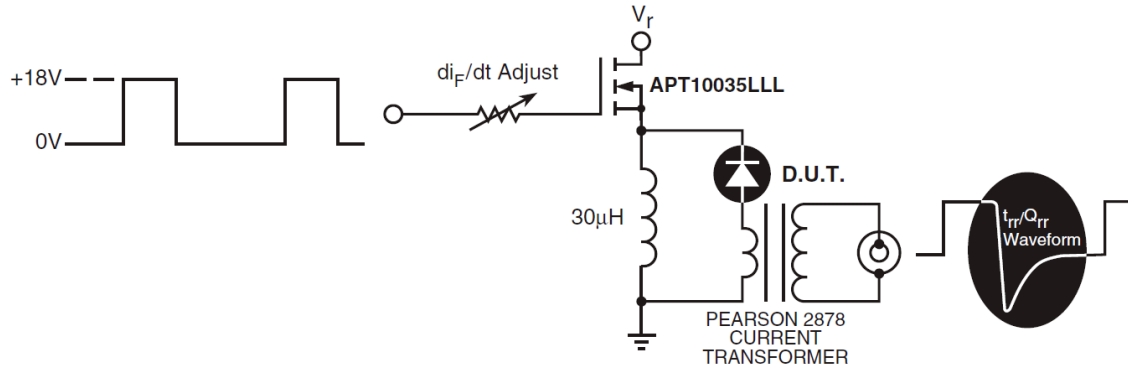
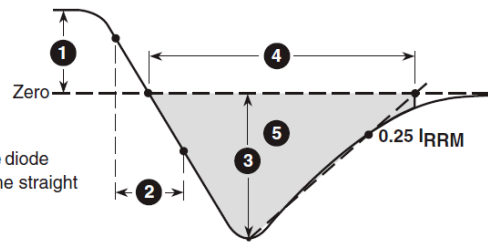


Figure 10 • Diode Reverse Recovery Waveform and Definitions

- 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  $t_{rr}$ .



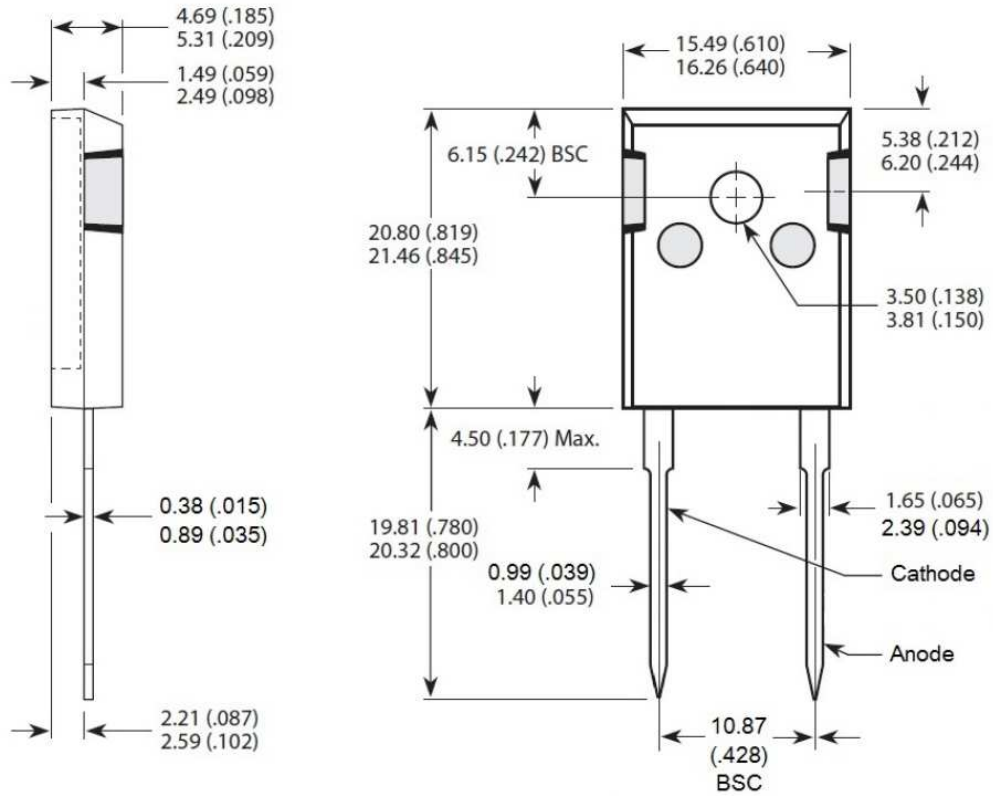
## 4 Package Specification

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



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