

APT30DQ100BG
Datasheet
Ultrafast Soft Recovery Rectifier Diode

Final
April 2018



Contents

1	Revision History	1
1.1	Revision D	1
1.2	Revision C	1
1.3	Revision B	1
1.4	Revision A	1
2	Product Overview	2
2.1	Features	2
2.2	Benefits	2
2.3	Applications	2
3	Electrical Specifications	3
3.1	Absolute Maximum Ratings	3
3.2	Electrical Performance	3
3.3	Dynamic Characteristics	4
3.4	Thermal and Mechanical Characteristics	4
3.5	Typical Performance Curves	5
3.6	Reverse Recovery Overview	7
4	Package Specification	8
4.1	Package Outline Drawing	8

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.

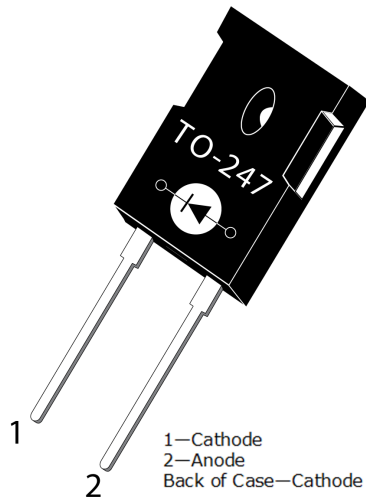
- Graphs were added.

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

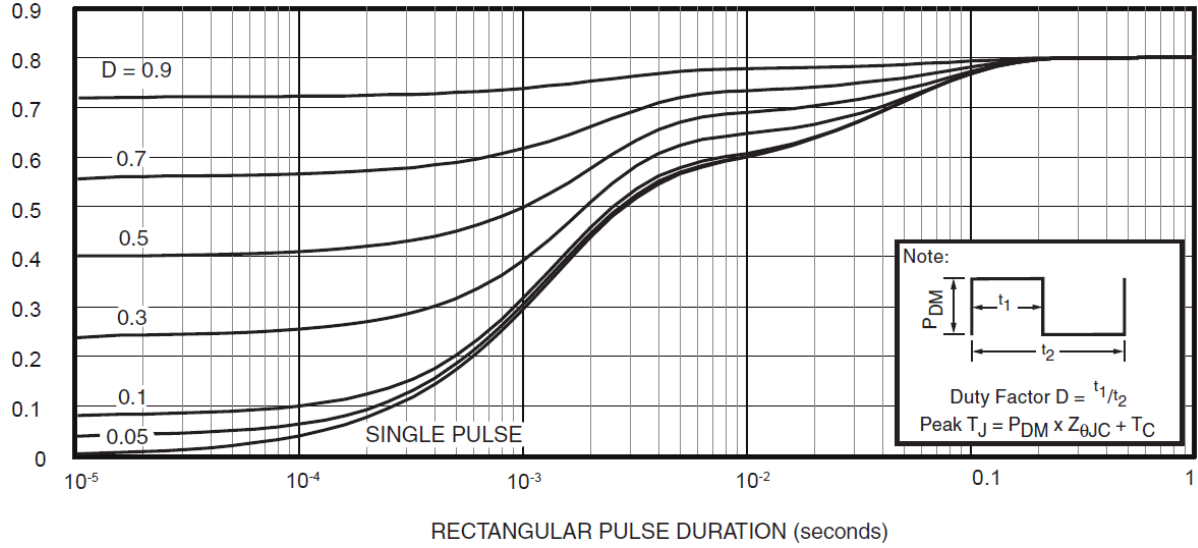


Figure 2 • Forward Current vs. Forward Voltage

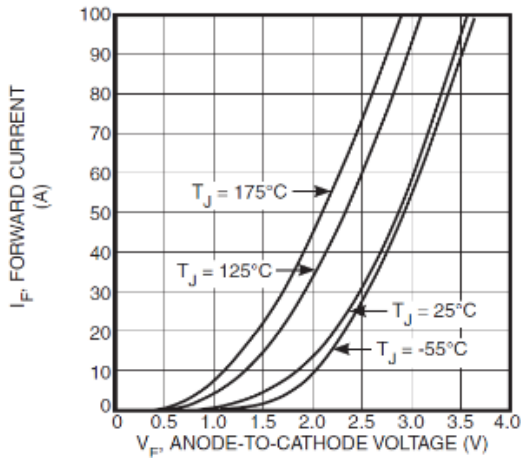


Figure 3 • trr vs. Current Rate of Change

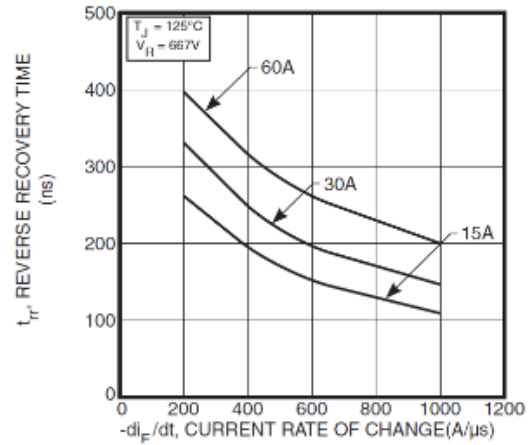


Figure 4 • Reverse Recovery Charge vs. Current Rate of Change

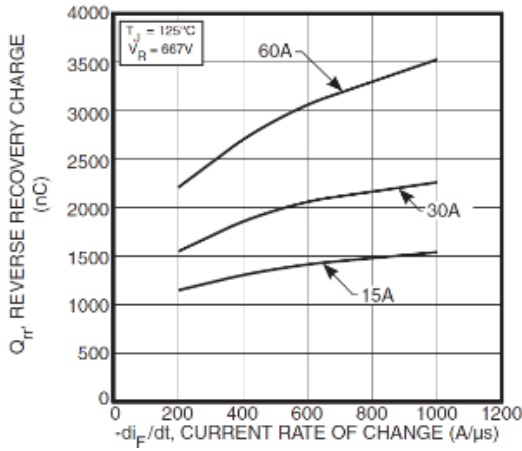


Figure 5 • Reverse Recovery Current vs. Current Rate of Change

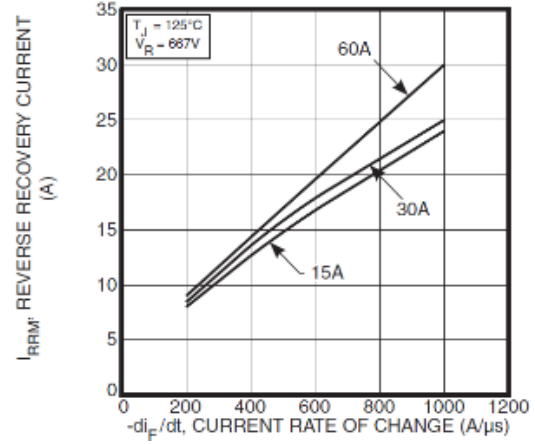


Figure 6 • Dynamic Parameters vs. Junction Temperature

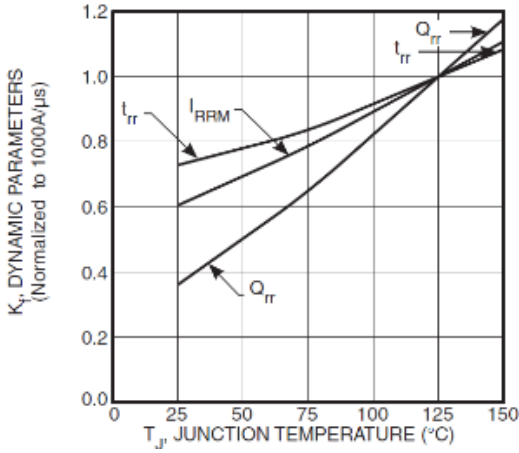


Figure 7 • Maximum Average Forward Current vs. Case Temperature

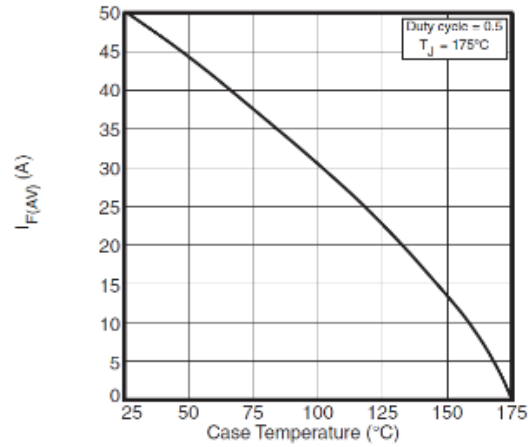
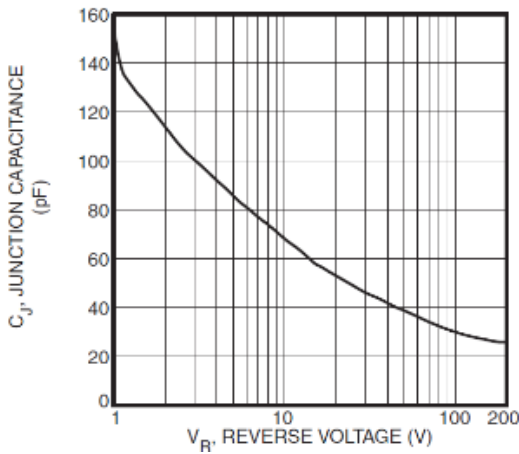


Figure 8 • Junction Capacitance vs. Reverse Voltage



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

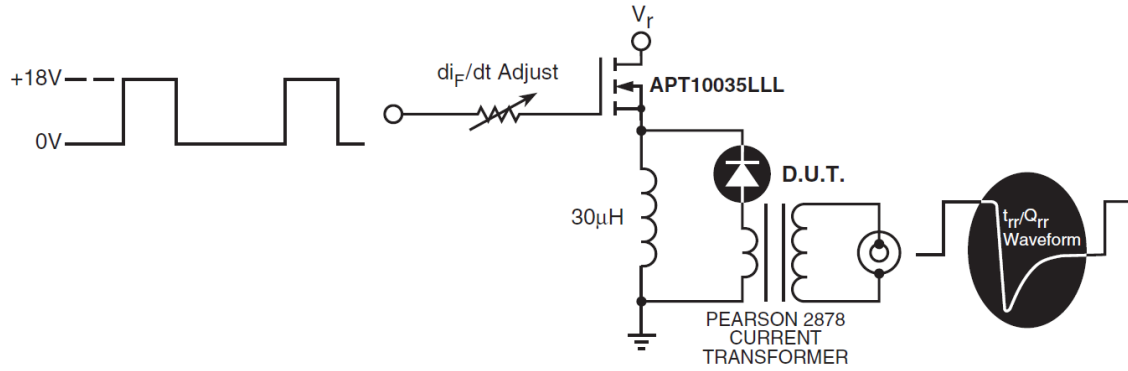
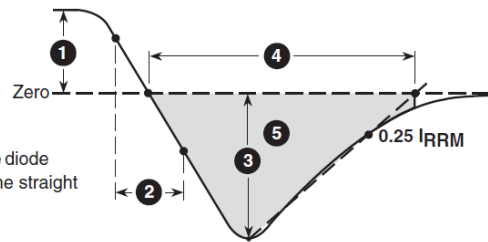


Figure 10 • Diode Reverse Recovery Waveform and Definitions

- 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} .



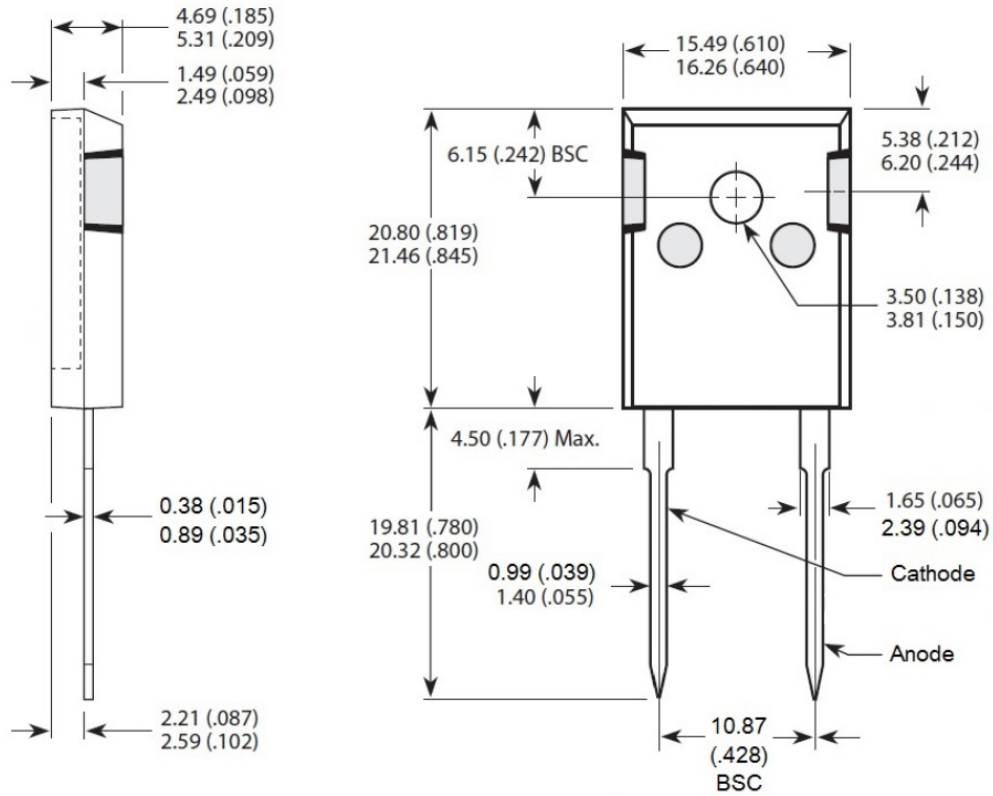
4 Package Specification

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



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