THE DATASHEET OF

APT30D120BG

APT30D120BG

Datasheet

Ultrafast Soft Recovery Rectifier Diode

Final

March 2018

Microsemi

Power Matters.™

Contents

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 March 2018. The new Microsemi template and format was applied. The package outline drawing was updated. For more information, see Package Outline Drawing (see page 9).

1.2 Revision C

Revision C was published in May 2005. New ratings and lead-free format implemented.

1.3 Revision B

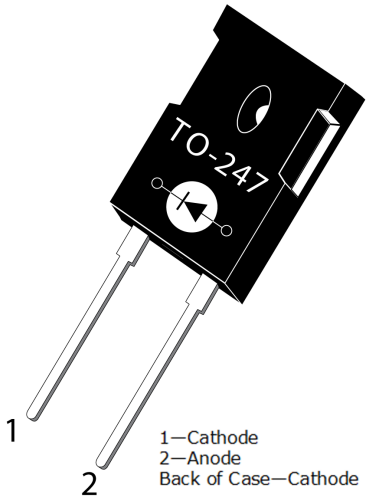
Revision B was published in January 2004. Changes include creating a new formatted datasheet.

1.4 Revision A

Revision A was published in March 2001. It is the first publication of this document.

2 Product Overview

This section outlines the product overview for the APT30D120BG device.



2.1 Features

The following are key features of the APT30D120BG device:

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

2.2 Benefits

The following are benefits of the APT30D120BG device:

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

2.3 Applications

The APT30D120BG device is designed for the following applications:

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

3 Electrical Specifications

This section shows the electrical specifications for the APT30D120BG device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the APT30D120BG device.

All ratings: T_C = 25 °C unless otherwise specified.

Table 1 • Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
V_R	Maximum DC reverse voltage	1200	V
V_{RRM}	Maximum peak repetitive reverse voltage	1200	
V_{RWM}	Maximum working peak reverse voltage	1200	
$I_{F(AV)}$	Maximum average forward current (T_C = 128 °C, duty cycle = 0.5)	30	A
$I_{F(RMS)}$	RMS forward current	59	
I_{FSM}	Non-repetitive forward surge current (T_J = 45 °C, 8.3 ms)	210	
T_J , T_{STG}	Operating and storage temperature range	–55 to 175	°C
T_L	Lead temperature for 10 s	300	

3.2 Typical Electrical Performance

The following table shows the static characteristics of the APT30D120BG device.

Table 2 • Static Electrical Characteristics

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	Unit
V_F	Forward voltage	I_F = 30 A		2.0	2.5	V
		I_F = 60 A		2.3		
		I_F = 30 A, T_J = 125 °C		1.8		
I_{RM}	Maximum reverse leakage current	V_R = V_R rated			250	µA
		V_R = V_R rated, T_J = 125 °C			500	
C_T	Junction capacitance	V_R = 200 V		32		pF

The following table shows the dynamic characteristics of the APT30D120BG device.

Table 3 • Dynamic Characteristics

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	Unit
t_{rr}	Reverse recovery time	I_F = 1 A di_F/dt = –100 A/µs V_R = 30 V T_J = 25 °C		31		ns
t_{rr}	Reverse recovery time	I_F = 30 A di_F/dt = –200 A/µs V_R = 800 V T_C = 25 °C		370		
Q_{rr}	Reverse recovery charge			660		nC
I_{RRM}	Maximum reverse recovery current			5		A
t_{rr}	Reverse recovery time	I_F = 30 A di_F/dt = –200 A/µs V_R = 800 V T_C = 125 °C		500		ns
Q_{rr}	Reverse recovery charge			3450		nC
I_{RRM}	Maximum reverse recovery current			12		A
t_{rr}	Reverse recovery time	I_F = 30 A di_F/dt = –1000 A/µs V_R = 800 V T_C = 125 °C		220		ns
Q_{rr}	Reverse recovery charge			4650		nC
I_{RRM}	Maximum reverse recovery current			37		A

The following table shows the thermal and mechanical characteristics of the APT30D120BG device.

Table 4 • Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	MIN	TYP	MAX	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance			0.61	°C/W
$R_{\theta JA}$	Junction-to-ambient thermal resistance			40	
W_T	Package weight		0.22		oz
			5.9		g
Torque	Maximum mounting torque			10	lb•m
				1.1	N•m

3.3 Typical Performance Curves

This section shows the typical performance curves for the APT30D120BG device.

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

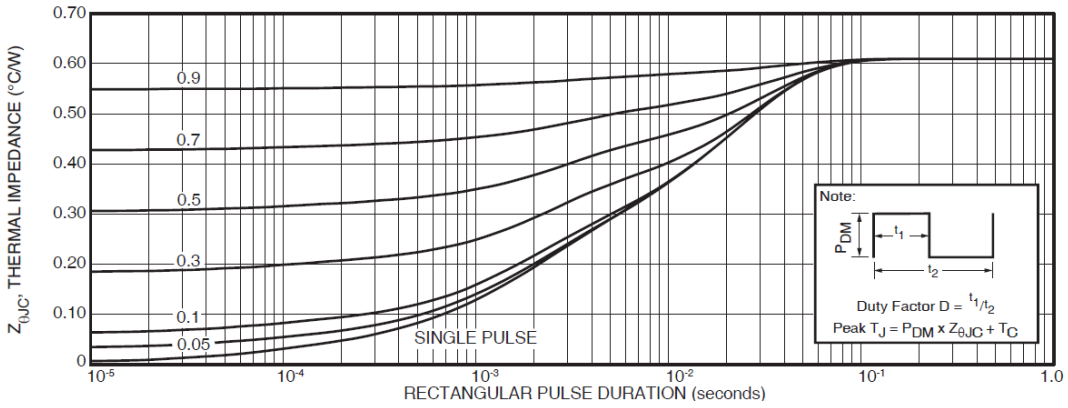


Figure 2 • Transient Thermal Impedance Model

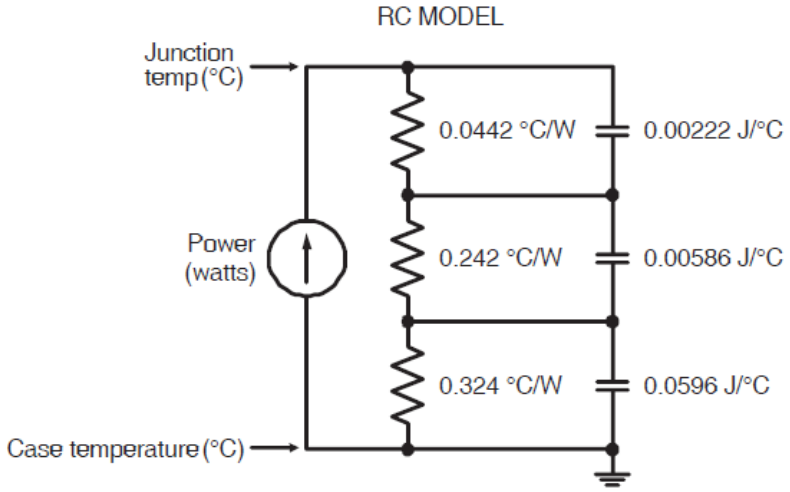


Figure 3 • Forward Current vs. Forward Voltage

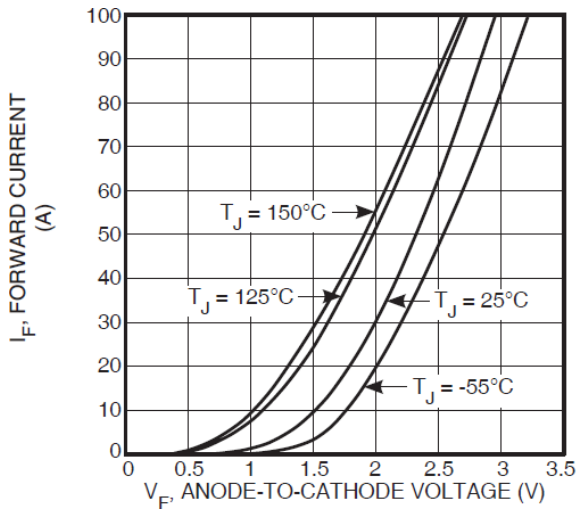


Figure 4 • RRT vs. Current Rate of Change

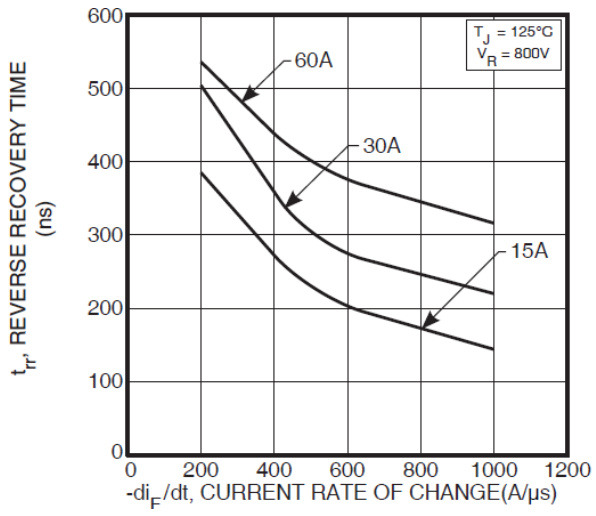


Figure 5 • Reverse Recovery Charge vs. Current Rate of Change

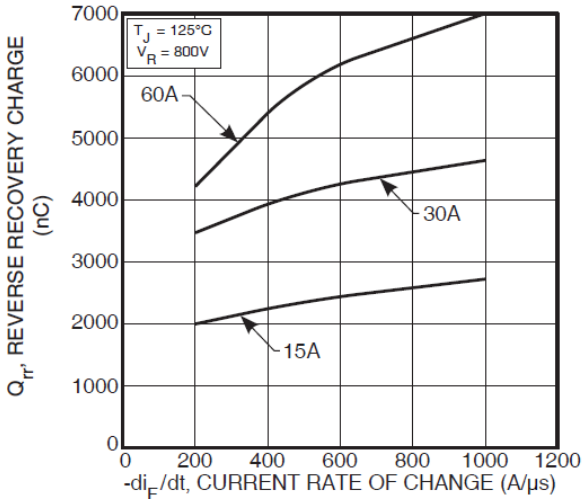


Figure 6 • Reverse Recovery Current vs. Current Rate of Change

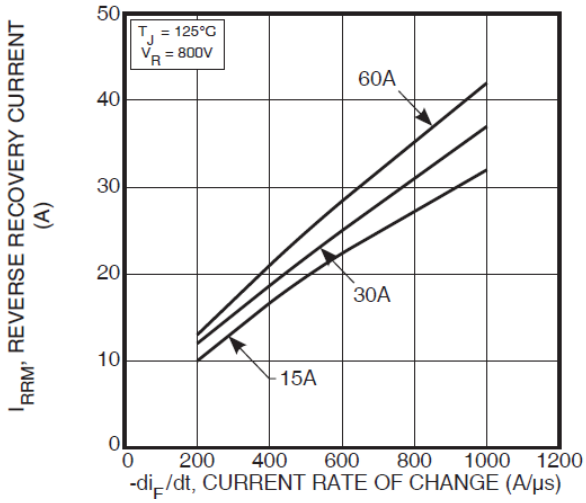


Figure 7 • Dynamic Parameters vs. Junction Temp

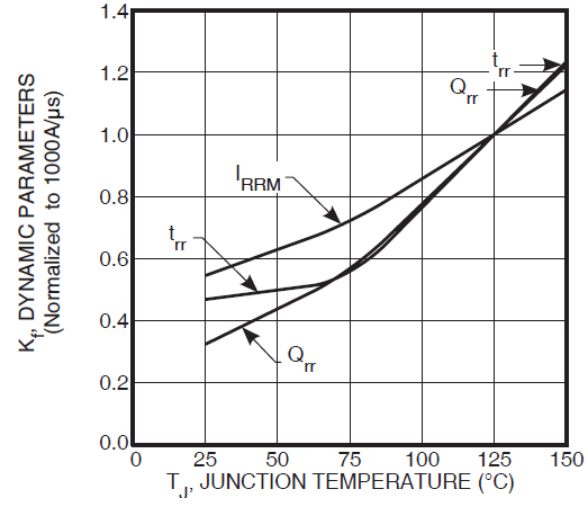


Figure 8 • Max Avg Fwd Current vs. CaseTemp

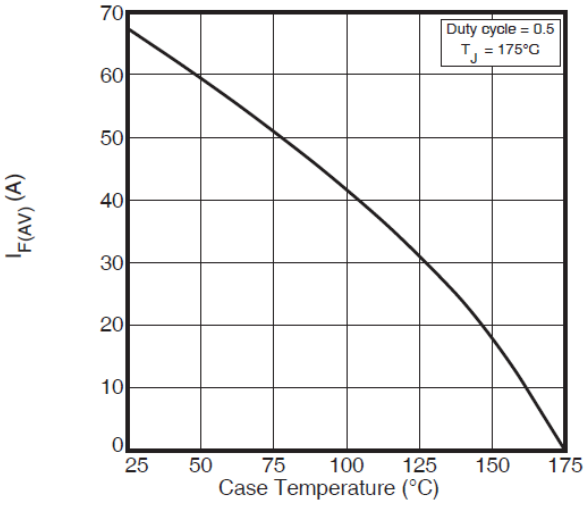
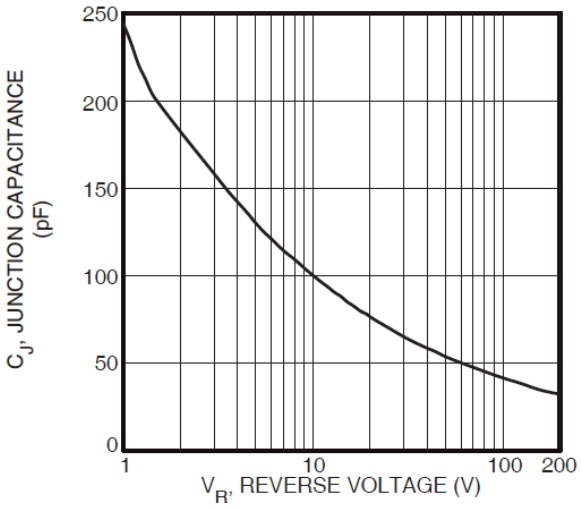


Figure 9 • Junction Capacitance vs. Reverse Voltage



3.4 Reverse Recovery Overview

The following illustration shows the reverse recovery testing and measurement information for the APT30D120BG device.

Figure 10 • Diode Test Circuit

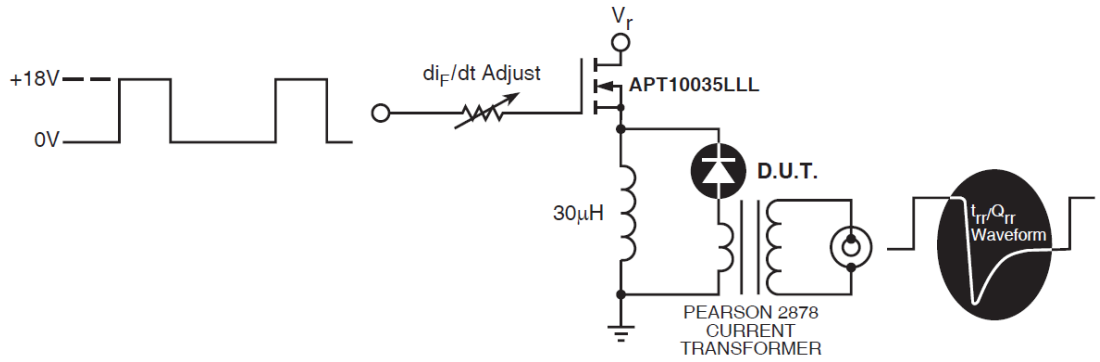
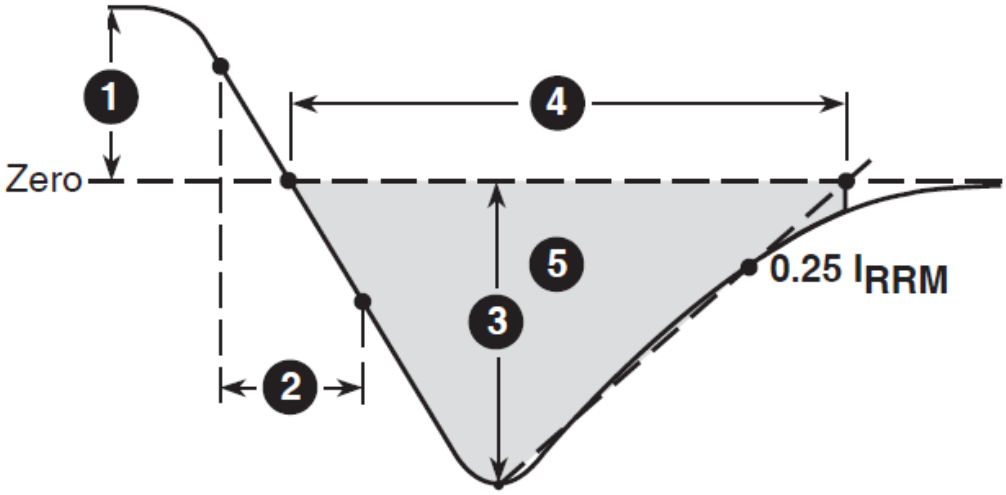


Figure 11 • Diode Reverse Recovery Waveform and Definitions



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 • I_{RRM} passes through zero.
5. Q_{rr}—Area under the curve defined by I_{RRM} and t_{rr}.

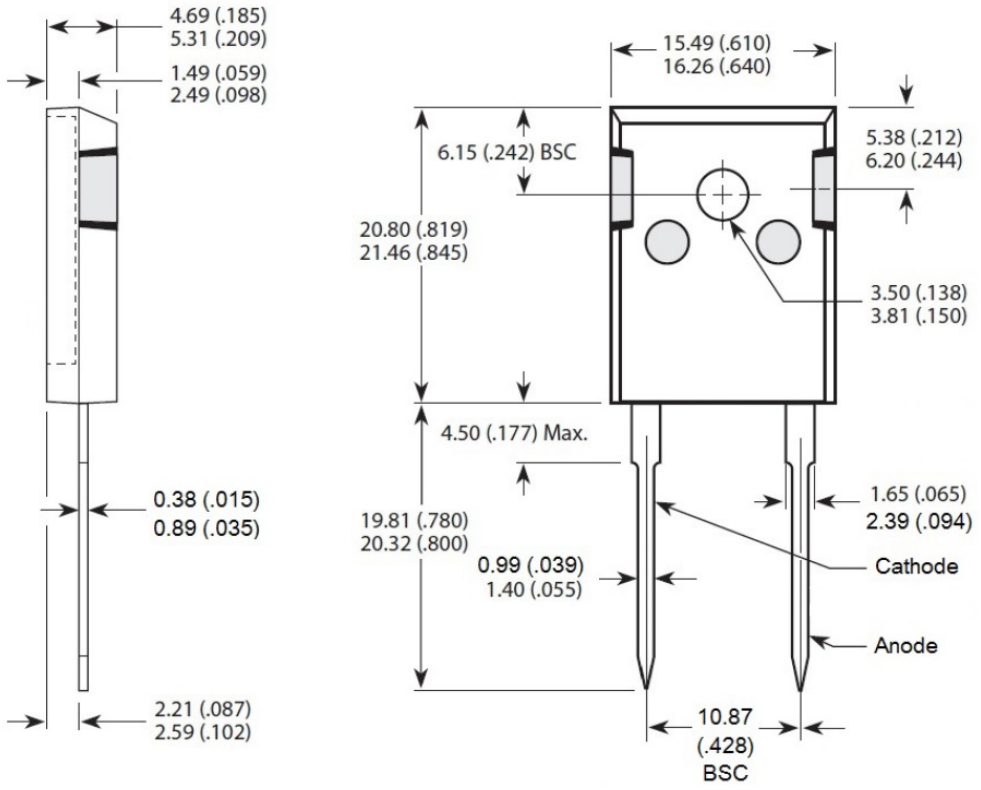
4 Package Specification

This section details the TO-247 package drawing of the APT30D120BG device. Dimensions are in millimeters and (inches).

4.1 Package Outline Drawing

The following table shows the package outline drawing of the APT30D120BG device.

Figure 12 • Package Outline Drawing



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