APT15D120BG

Datasheet

Ultrafast Soft Recovery Rectifier Diode

Final

October 2018

Microsemi

a Microchip company

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 C

Revision C was published in October 2018. The new template and format was applied. The following is a summary of the changes in revision C of this document.

- Product image was updated.
- Product features were updated. For information, see Product Overview (see page 2).
- The operating and storage temperature range was changed from 150 °C to 175 °C, see Absolute Maximum Ratings (see page 3).
- The lead thickness in the package outline drawing was updated. For more information, see Package Outline Drawing (see page 8).

1.2 Revision B

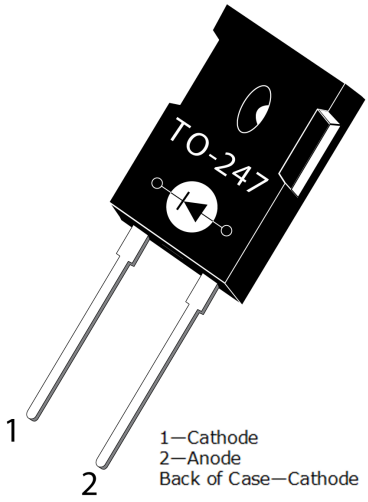
Revision B was published in November 2009. RoHS (G) designation was added to the datasheet title.

1.3 Revision A

Revision A was published in August 2004. It is the first publication of this document.

2 Product Overview

This section outlines the product overview for the APT15D120BG device.



2.1 Features

The following are key features of the APT15D120BG device.

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

2.2 Benefits

The following are benefits of the APT15D120BG device.

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

2.3 Applications

The APT15D120BG 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 APT15D120BG device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the APT15D120BG 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		
V_{RWM}	Maximum working peak reverse voltage		
$I_{F(AV)}$	Maximum average forward current (T_C = 98 °C, duty cycle = 0.5)	15	A
$I_{F(RMS)}$	RMS forward current	24	
I_{FSM}	Non-repetitive forward surge current (T_J = 45 °C, 8.3 ms)	110	
T_J , T_{STG}	Operating and storage temperature range	–55 to 175	°C
T_L	Lead temperature for 10 seconds	300	

The following table shows the thermal and mechanical characteristics of the APT15D120BG device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance			1.18	°C/W
$R_{\theta JA}$	Junction-to-ambient thermal resistance			40	
Wt	Package weight		0.22		oz
			6.2		g
	Maximum mounting torque, 6-32 or M3 screw			10	lbf-in
				1.1	N-m

3.2 Electrical Performance

The following table shows the static characteristics of the APT15D120BG device.

Table 3 • Static Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage	I_F = 15 A		2.0	2.5	V
		I_F = 30 A		2.3		
		I_F = 15 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	
Cj	Junction capacitance	V_R = 200 V		17		pF

3.3 Dynamic Characteristics

The following table shows the dynamic characteristics of the APT15D120BG device.

Table 4 • 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		32		ns
t_{rr}	Reverse recovery time	I_F = 15 A di_F/dt = –200 A/µs V_R = 800 V T_C = 25 °C		260		ns
Q_{rr}	Reverse recovery charge			480		nC
I_{RRM}	Maximum reverse recovery current			4		A
t_{rr}	Reverse recovery time	I_F = 15A di_F/dt = –200 A/µs V_R = 800 V T_C = 125 °C		370		ns
Q_{rr}	Reverse recovery charge			1300		nC
I_{RRM}	Maximum reverse recovery current			9		A
t_{rr}	Reverse recovery time	I_F = 15 A di_F/dt = –1000 A/µs V_R = 800 V T_C = 125 °C		140		ns
Q_{rr}	Reverse recovery charge			2000		nC
I_{RRM}	Maximum reverse recovery current			28		A

3.4 Typical Performance Curves

This section shows the typical performance curves for the APT15D120BG device.

Figure 1 • Maximum Transient Thermal Impedance

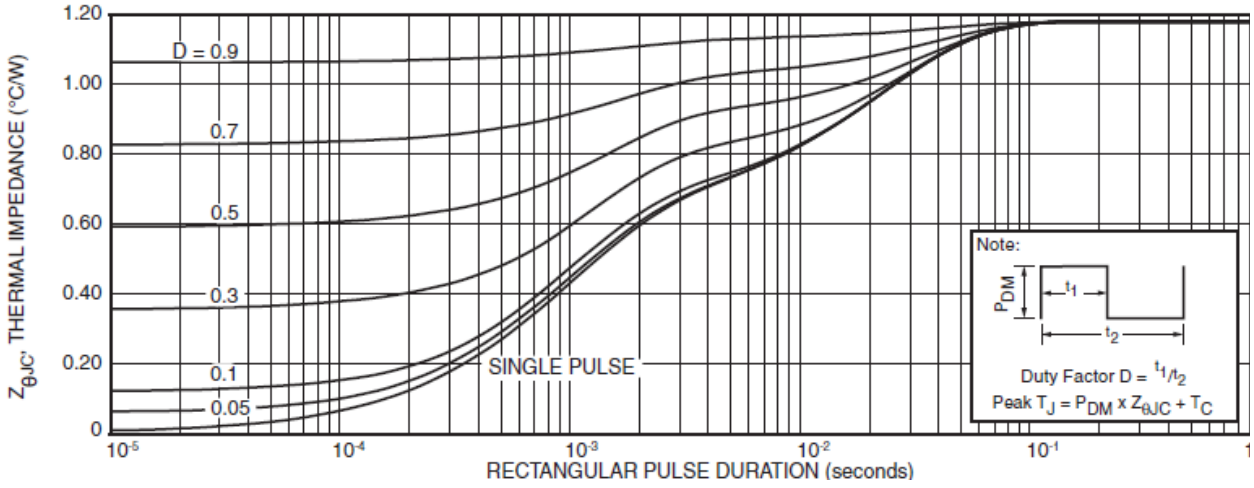


Figure 2 • Forward Current vs. Anode-to-Cathode Voltage (V)

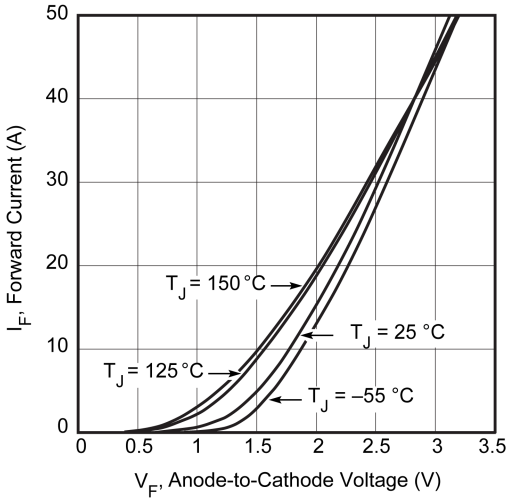


Figure 3 • Reverse Recovery Time vs. Current Rate of Change

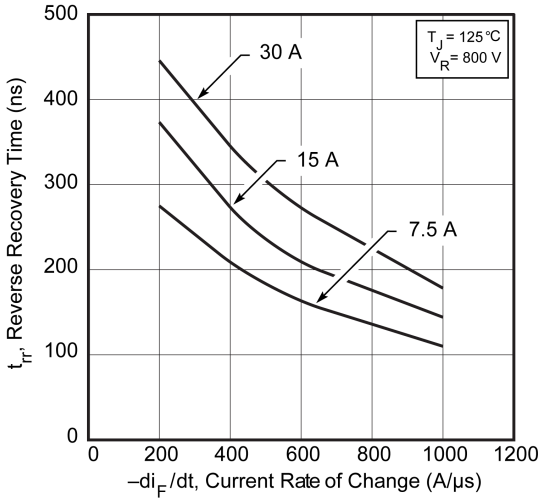


Figure 4 • Reverse Recovery Charge vs. Current Rate of Change

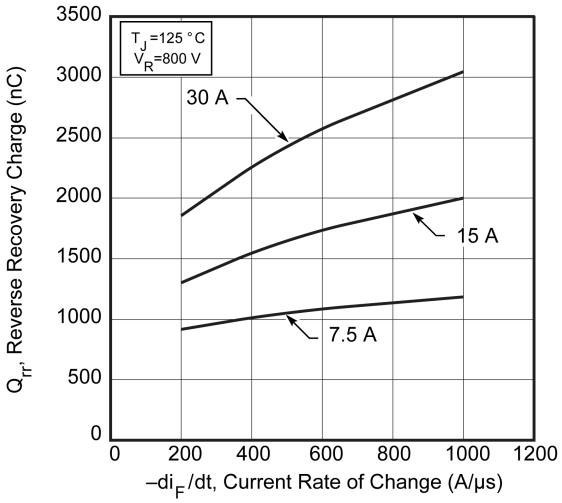


Figure 5 • Reverse Recovery Current vs. Current Rate of Change

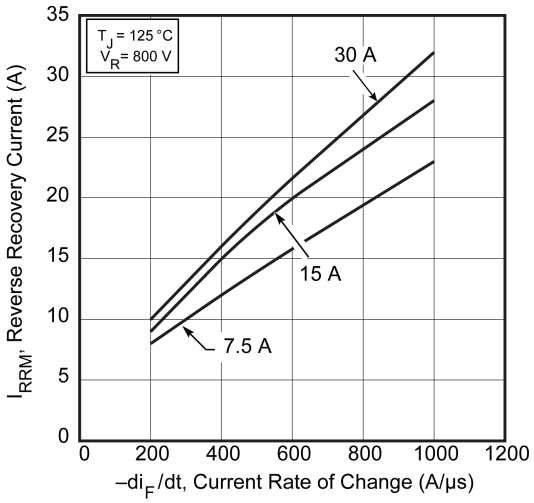


Figure 6 • Dynamic Parameters vs. Junction Temperature

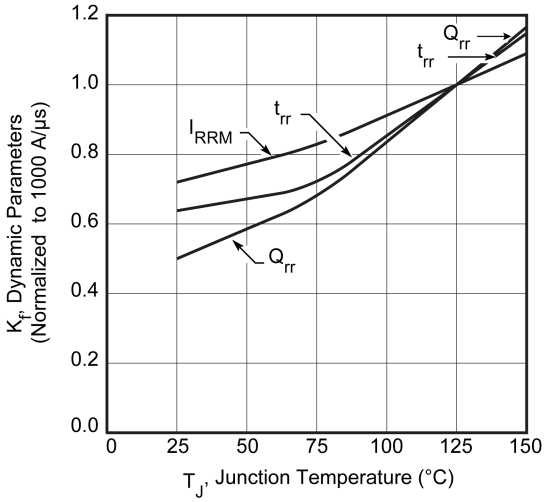


Figure 7 • Maximum Average Forward Current vs. Case Temperature

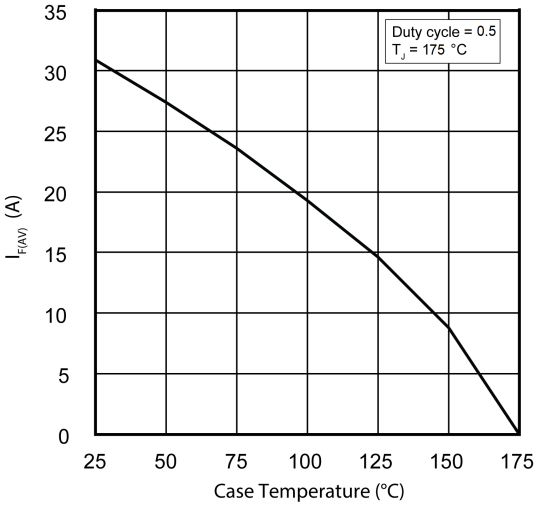
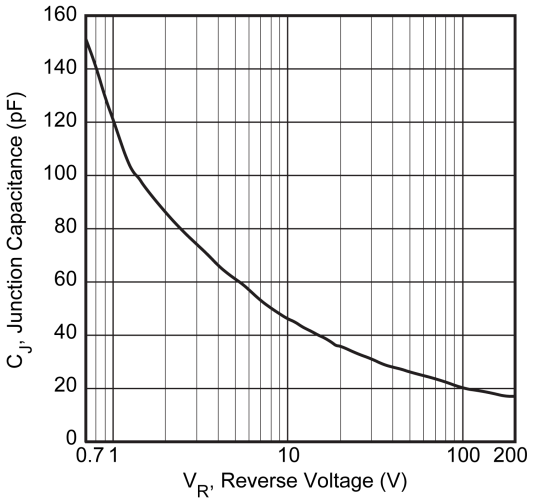


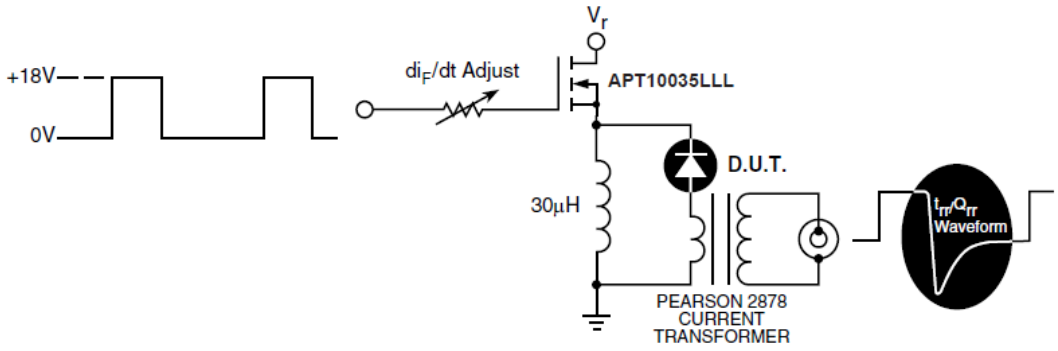
Figure 8 • Junction Capacitance vs. Reverse Voltage



3.5 Reverse Recovery Overview

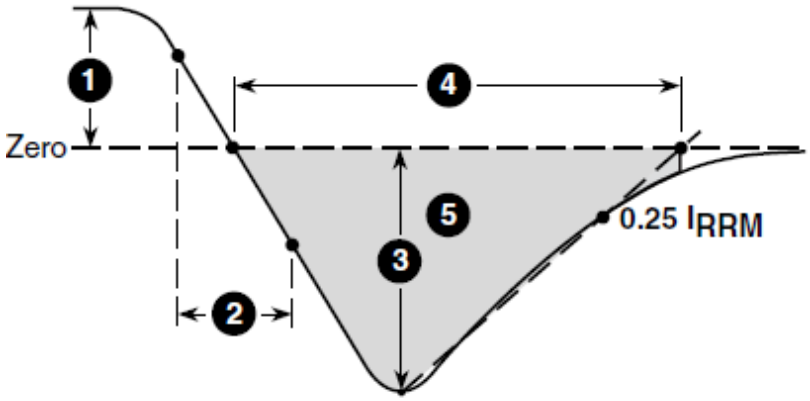
The following illustration shows the diode test circuit for the APT15D120BG device.

Figure 9 • Diode Test Circuit



The following illustration shows the diode reverse recovery waveform and definitions for the APT15D120BG 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•I_{RRM} passes through zero
5. Q_{rr}—Area under the curve defined by I_{RRM} and t_{rr}

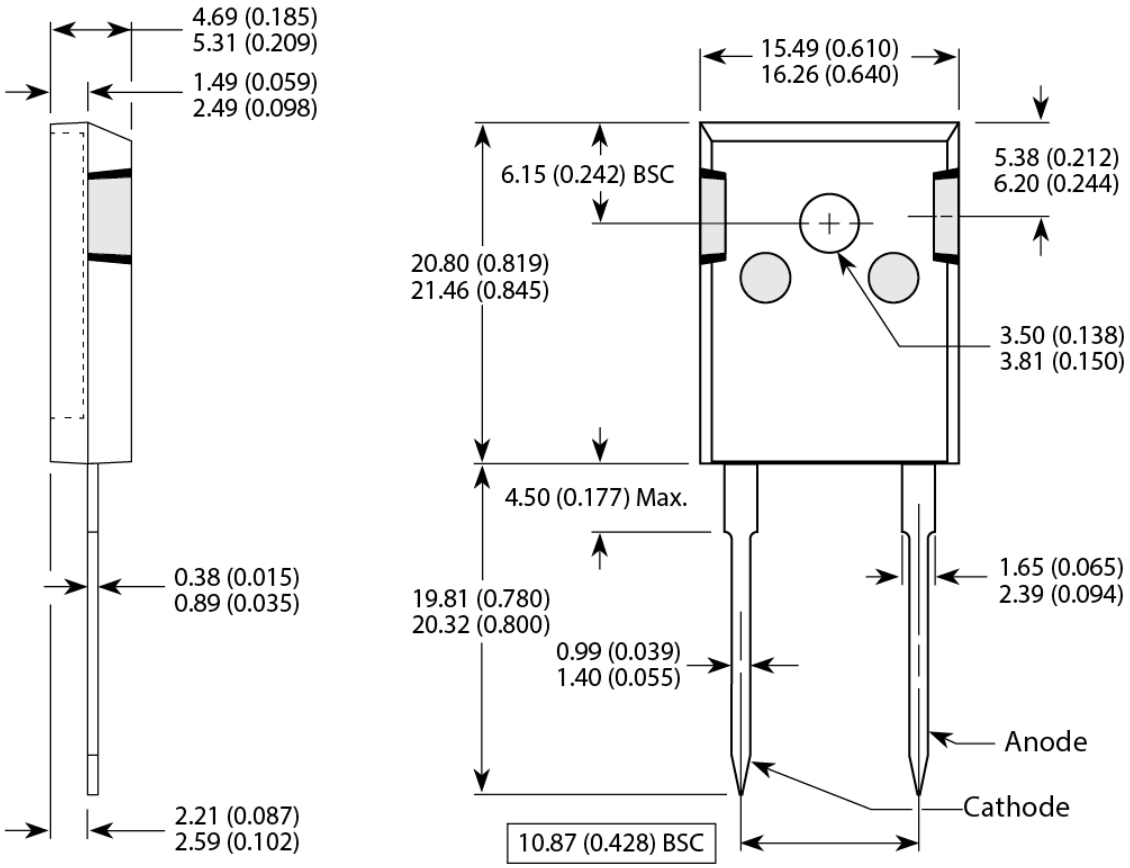
4 Package Specification

This section outlines the package specification for the APT15D120BG device.

4.1 Package Outline Drawing

The following figure shows the package outline drawing of the APT15D120BG device. Dimensions are in millimeters and (inches).

Figure 11 • Package Outline Drawing



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