



**THE DATASHEET OF
APT30D120BG**



APT30D120BG
Datasheet
Ultrafast Soft Recovery Rectifier Diode

Final
March 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 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

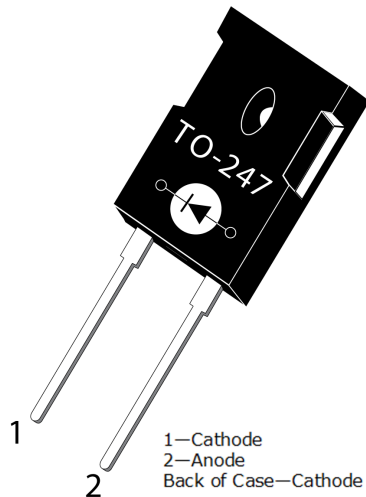
Revision B was published in January 2004. Changes include creating a new formatted datasheet.

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: $T_c = 25\text{ °C}$ 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 ($T_c = 128\text{ °C}$, duty cycle = 0.5)	30	A
$I_{F(RMS)}$	RMS forward current	59	
I_{FSM}	Non-repetitive forward surge current ($T_J = 45\text{ °C}$, 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	$I_F = 30\text{ A}$		2.0	2.5	V
		$I_F = 60\text{ A}$		2.3		
		$I_F = 30\text{ A}, T_J = 125\text{ °C}$		1.8		
I_{RM}	Maximum reverse leakage current	$V_R = V_R\text{ rated}$			250	μA
		$V_R = V_R\text{ rated}, T_J = 125\text{ °C}$			500	
C_T	Junction capacitance	$V_R = 200\text{ V}$		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	$I_F = 1\text{ A}$ $di_F/dt = -100\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$ $T_J = 25\text{ }^\circ\text{C}$		31		ns
t_{rr}	Reverse recovery time	$I_F = 30\text{ A}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 800\text{ V}$ $T_C = 25\text{ }^\circ\text{C}$		370		
Q_{rr}	Reverse recovery charge	$I_F = 30\text{ A}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 800\text{ V}$ $T_C = 25\text{ }^\circ\text{C}$		660		nC
I_{RRM}	Maximum reverse recovery current	$I_F = 30\text{ A}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 800\text{ V}$ $T_C = 25\text{ }^\circ\text{C}$		5		A
t_{rr}	Reverse recovery time	$I_F = 30\text{ A}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 800\text{ V}$ $T_C = 125\text{ }^\circ\text{C}$		500		ns
Q_{rr}	Reverse recovery charge	$I_F = 30\text{ A}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 800\text{ V}$ $T_C = 125\text{ }^\circ\text{C}$		3450		nC
I_{RRM}	Maximum reverse recovery current	$I_F = 30\text{ A}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 800\text{ V}$ $T_C = 125\text{ }^\circ\text{C}$		12		A
t_{rr}	Reverse recovery time	$I_F = 30\text{ A}$ $di_F/dt = -1000\text{ A}/\mu\text{s}$ $V_R = 800\text{ V}$ $T_C = 125\text{ }^\circ\text{C}$		220		ns
Q_{rr}	Reverse recovery charge	$I_F = 30\text{ A}$ $di_F/dt = -1000\text{ A}/\mu\text{s}$ $V_R = 800\text{ V}$ $T_C = 125\text{ }^\circ\text{C}$		4650		nC
I_{RRM}	Maximum reverse recovery current	$I_F = 30\text{ A}$ $di_F/dt = -1000\text{ A}/\mu\text{s}$ $V_R = 800\text{ V}$ $T_C = 125\text{ }^\circ\text{C}$		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

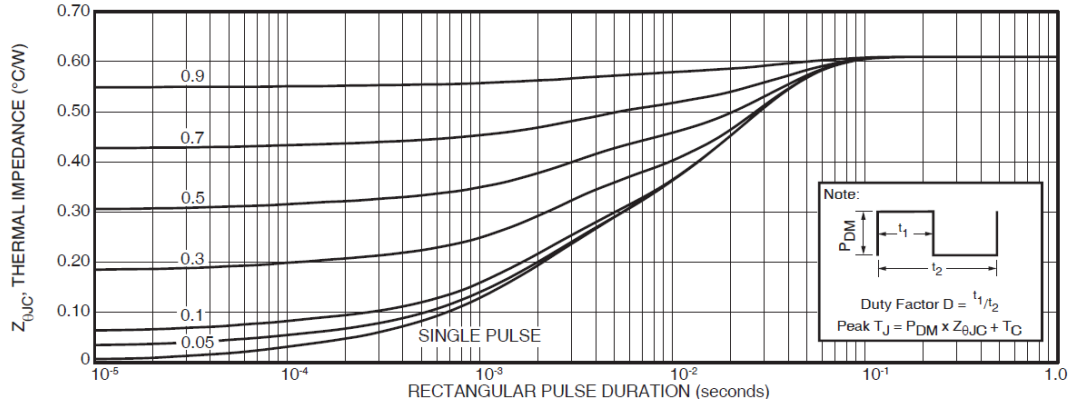


Figure 2 • Transient Thermal Impedance Model

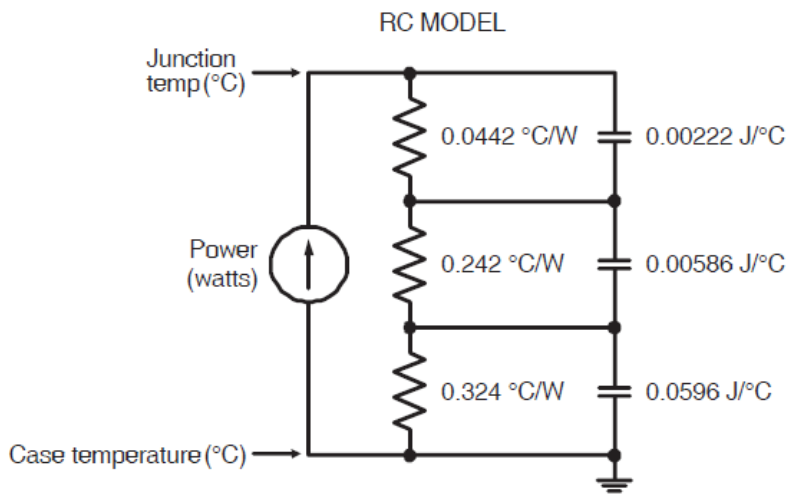


Figure 3 • Forward Current vs. Forward Voltage

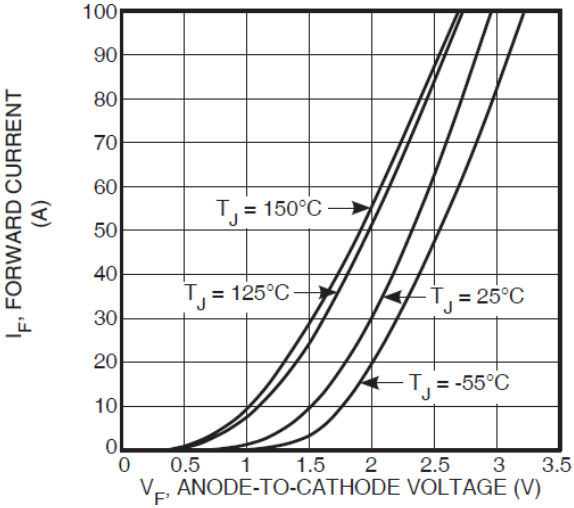


Figure 5 • Reverse Recovery Charge vs. Current Rate of Change

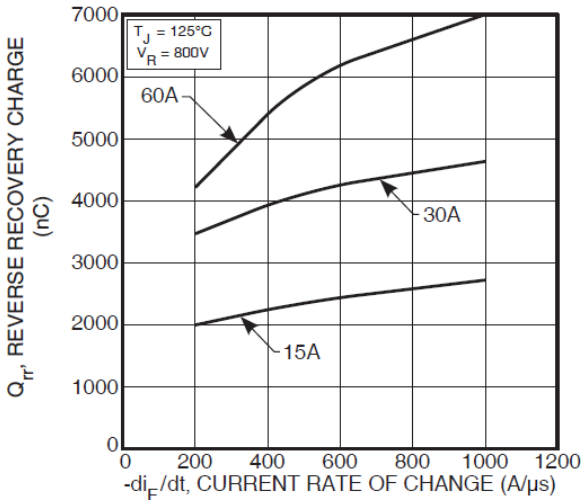


Figure 7 • Dynamic Parameters vs. Junction Temp

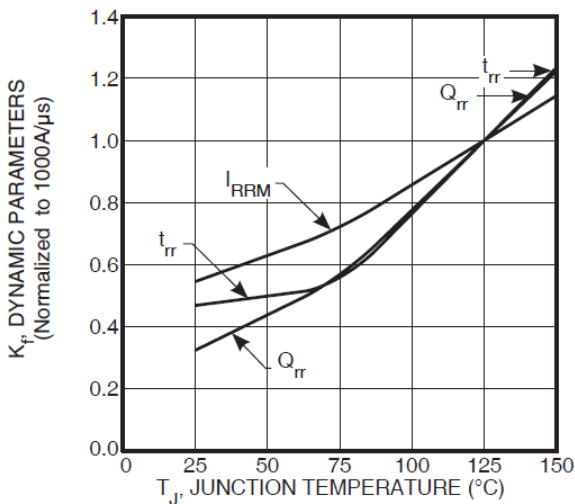


Figure 4 • RRT vs. Current Rate of Change

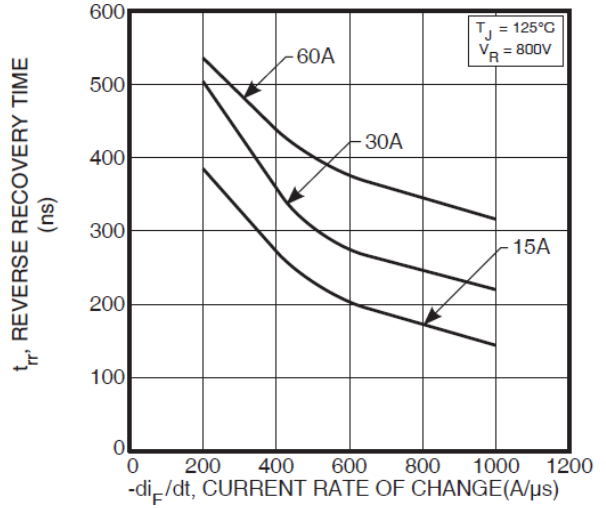


Figure 6 • Reverse Recovery Current vs. Current Rate of Change

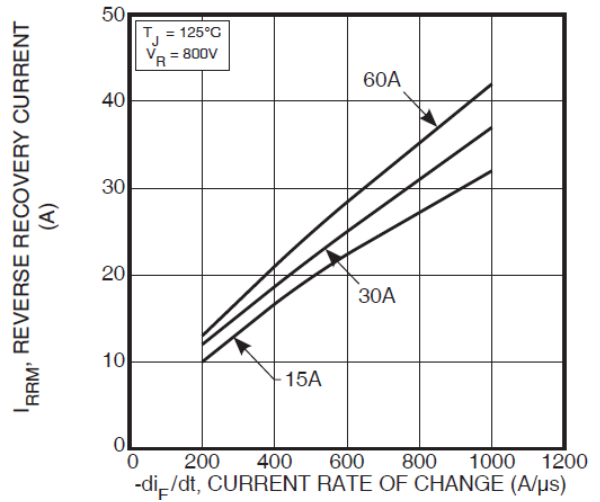


Figure 8 • Max Avg Fwd Current vs. CaseTemp

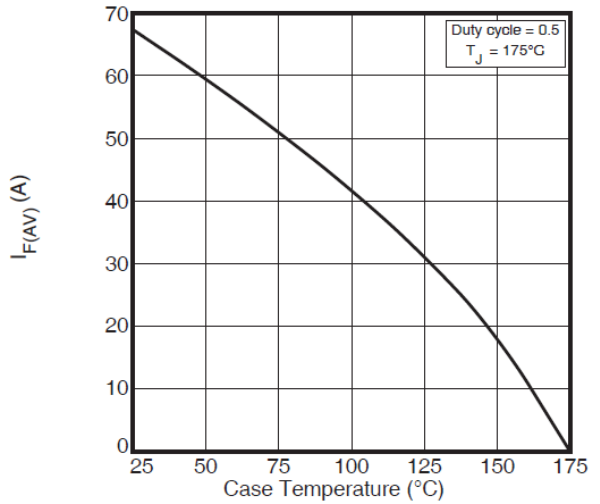
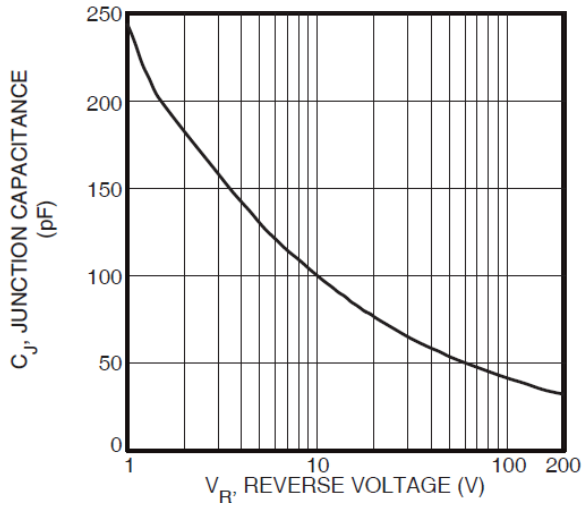


Figure 9 • Junction Capacitance vs. Reverse Voltage



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

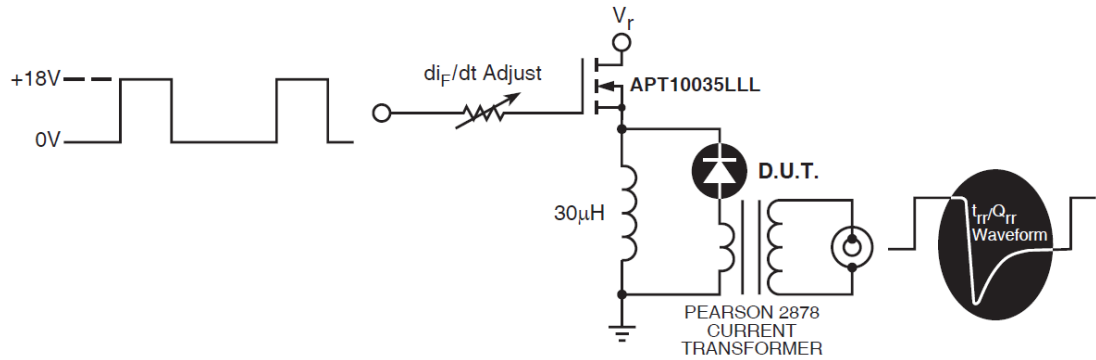
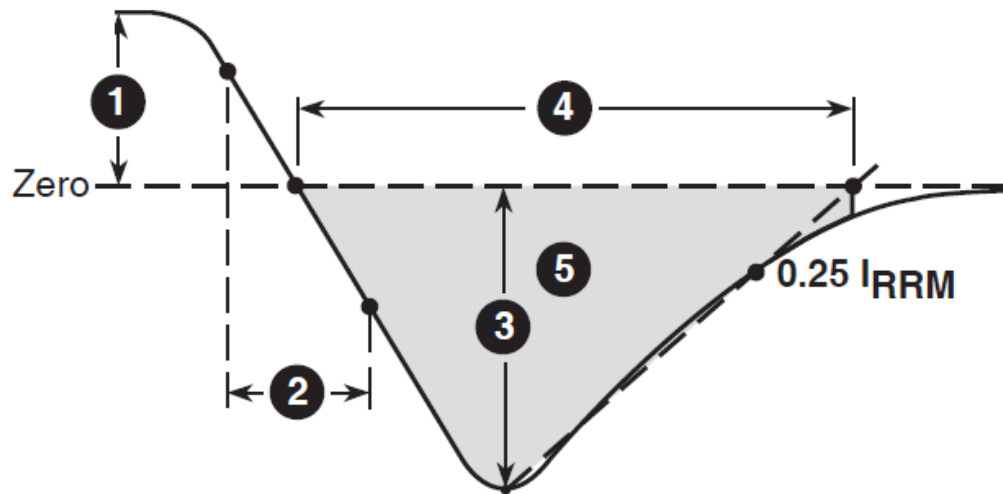


Figure 11 • Diode Reverse Recovery Waveform and Definitions



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 $0.25 \cdot I_{RRM}$ passes through zero.
5. Q_{rr} —Area under the curve defined by I_{RRM} and t_{rr} .

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