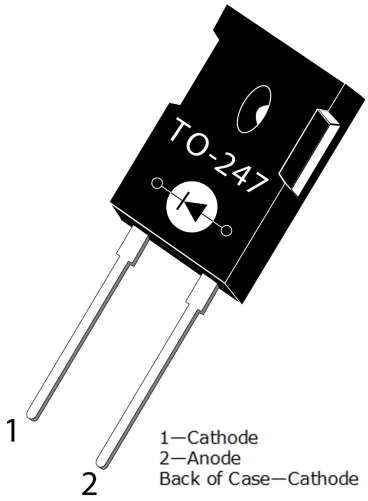
APT60D60BG Ultrafast Soft Recovery Rectifier Diode

1 Product Overview

This section outlines the product overview for the APT60D60BG device.



1.1 Features

The following are key features of the APT60D60BG device.

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

1.2 Benefits

The following are benefits of the APT60D60BG device.

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

1.3 Applications

The APT60D60BG device is designed for the following applications.

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

2 Electrical Specifications

This section shows the electrical specifications of the APT60D60BG device.

2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the APT60D60BG 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	600	V
V_{RRM}	Maximum peak repetitive reverse voltage	600	
V_{RWM}	Maximum working peak reverse voltage	600	
$I_{F(AV)}$	Maximum average forward current (T_C = 125 °C, duty cycle = 0.5)	60	A
$I_{F(RMS)}$	RMS forward current	132	
I_{FSM}	Non-repetitive forward surge current (T_J = 45 °C, 8.3 ms)	600	
T_J , T_{STG}	Operating and storage temperature range	–55 to 175	°C
T_L	Lead temperature for 10 seconds	300	

2.2 Electrical Performance

The following table shows the static characteristics of the APT60D60BG device.

Table 2 • Static Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage	I_F = 60 A		1.6	1.8	V
		I_F = 120 A		1.9		
		I_F = 60 A, T_J = 125 °C		1.4		
I_{RM}	Maximum reverse leakage current	V_R = 600 V			250	µA
		V_R = 600 V, T_J = 125 °C			500	
C_J	Junction capacitance	V_R = 200 V		90		pF

The following table shows the dynamic characteristics of the APT60D60BG 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		40		ns
t_{rr}	Reverse recovery time	I_F = 60 A di_F/dt = –200 A/µs V_R = 400 V T_C = 25 °C		130		
Q_{rr}	Reverse recovery charge			220		nC
I_{RRM}	Maximum reverse recovery current			4		A
t_{rr}	Reverse recovery time	I_F = 60 A di_F/dt = –200 A/µs V_R = 400 V T_C = 125 °C		170		ns
Q_{rr}	Reverse recovery charge			920		nC
I_{RRM}	Maximum reverse recovery current			10		A
t_{rr}	Reverse recovery time	I_F = 60 A di_F/dt = –1000 A/µs V_R = 400 V T_C = 125 °C		80		ns
Q_{rr}	Reverse recovery charge			1900		nC
I_{RRM}	Maximum reverse recovery current			38		A

The following table shows the thermal and mechanical characteristics of the APT60D60BG device.

Table 4 • Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance			0.34	°C/W
$R_{\theta JA}$	Junction-to-ambient thermal resistance			40	
Wt	Package weight		0.22		oz
			6.2		g
	Mounting torque			10	lbf-in
				1.1	N-m

2.3 Typical Performance Curves

This section shows the typical performance curves for the APT60D60BG device.

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

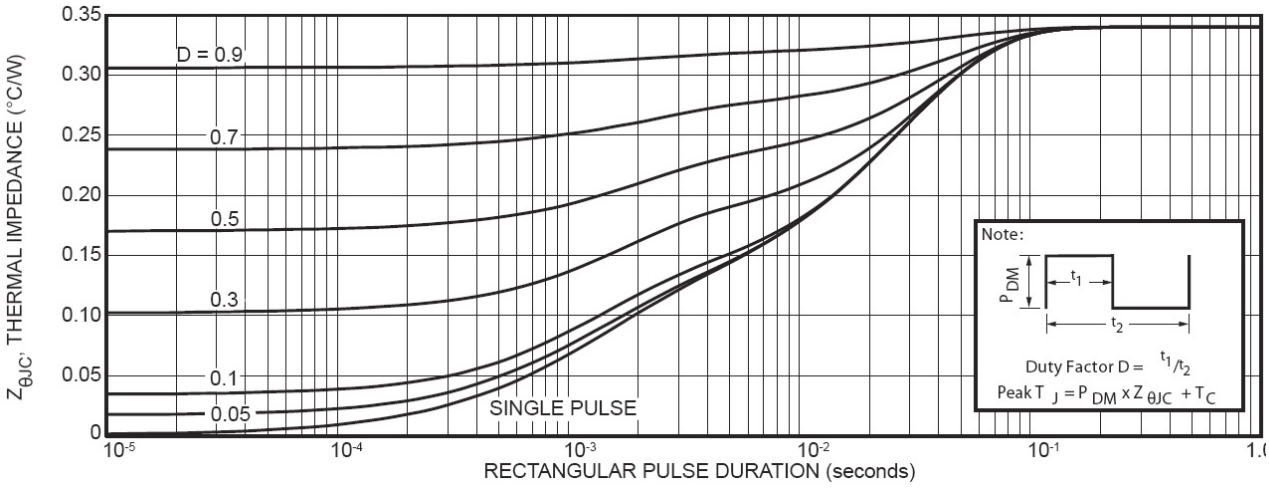


Figure 2 • Forward Current vs. Forward Voltage

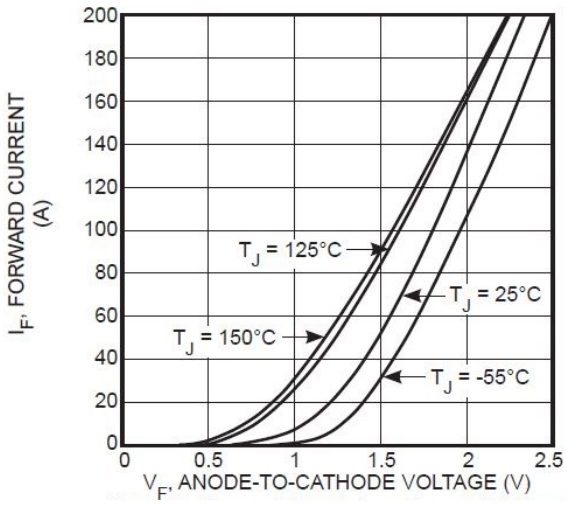


Figure 3 • RRT vs. Current Rate of Change

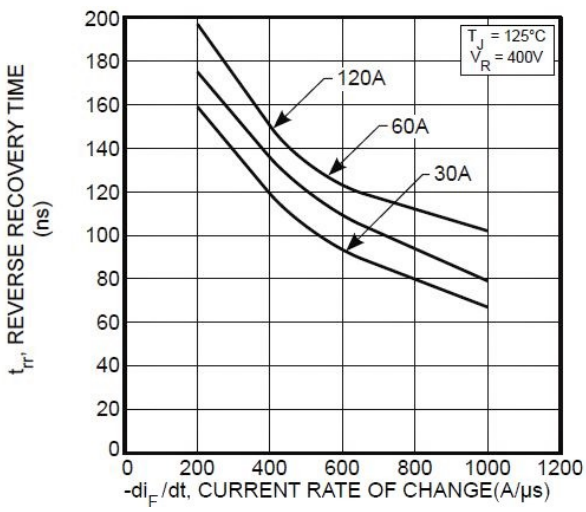


Figure 4 • Reverse Recovery Charge vs. Current Rate of Change

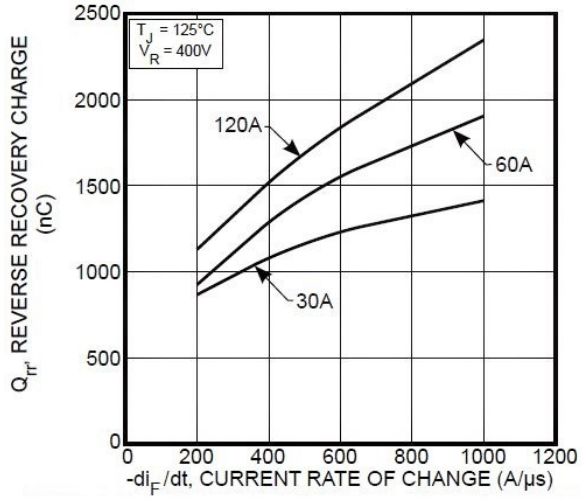


Figure 5 • Reverse Recovery Current vs. Current Rate of Change

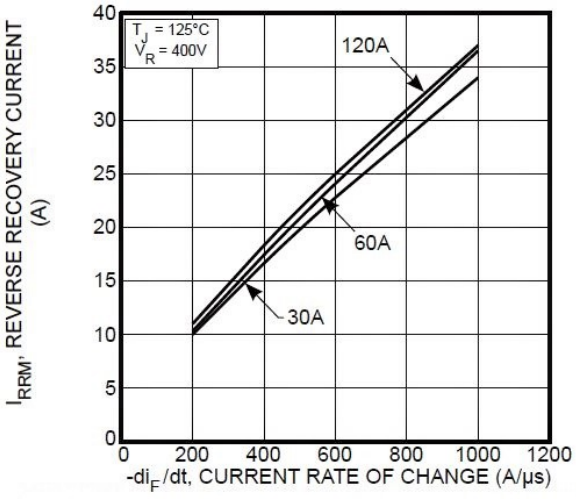


Figure 6 • Dynamic Parameters vs. Junction Temperature

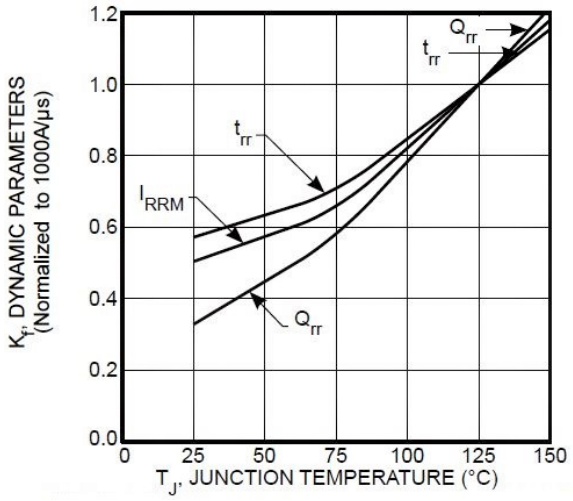


Figure 7 • Maximum Average Forward Current vs. Case Temperature

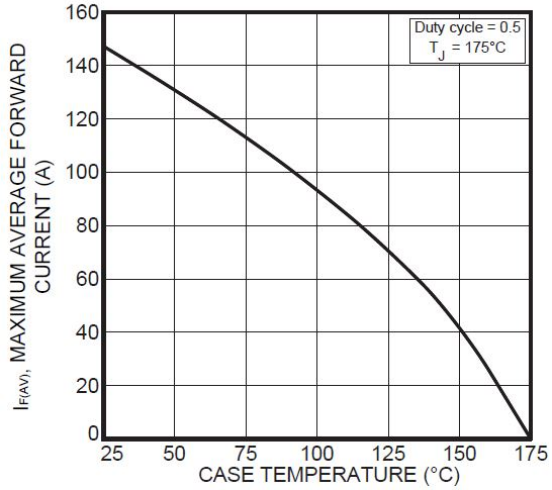
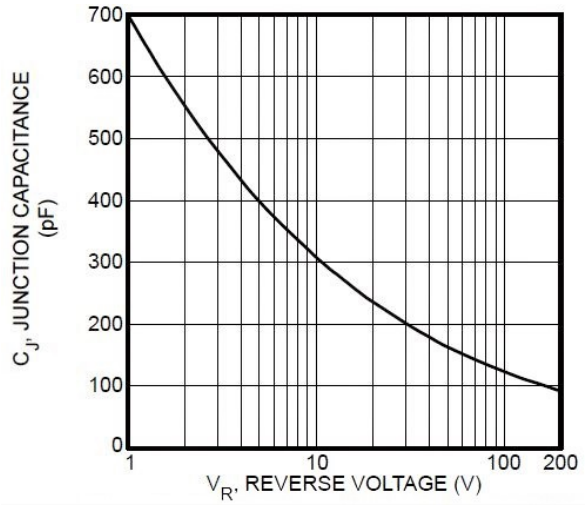


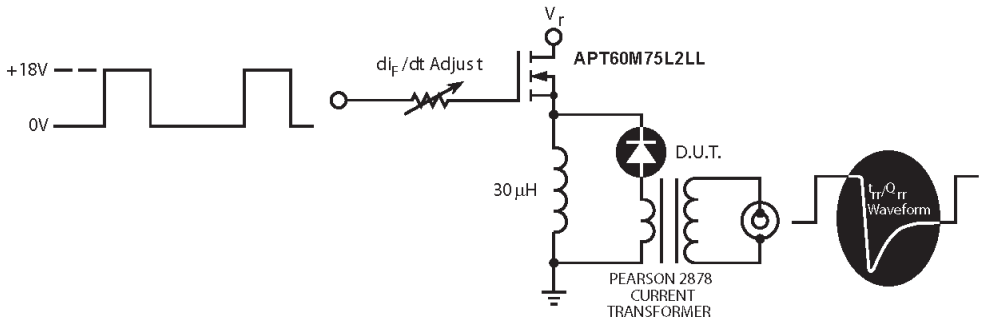
Figure 8 • Junction Capacitance vs. Reverse Voltage



2.4 Reverse Recovery Overview

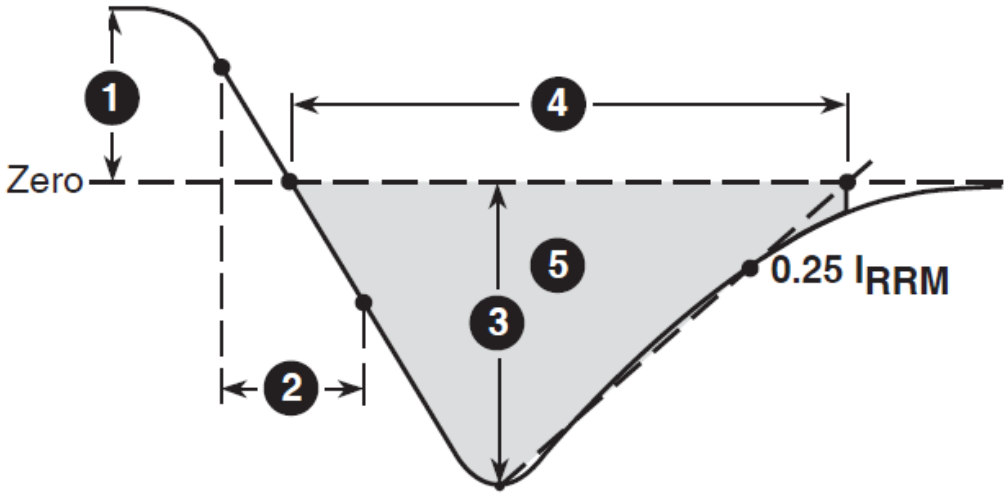
The following figure shows the diode test circuit of the APT60D60BG device.

Figure 9 • Diode Test Circuit



The following figure shows the diode reverse recovery waveform and definitions for the APT60D60BG 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 $0.25 \bullet I_{RRM}$ passes through zero
5. Q_{rr}—Area under the curve defined by I_{RRM} and t_{rr}

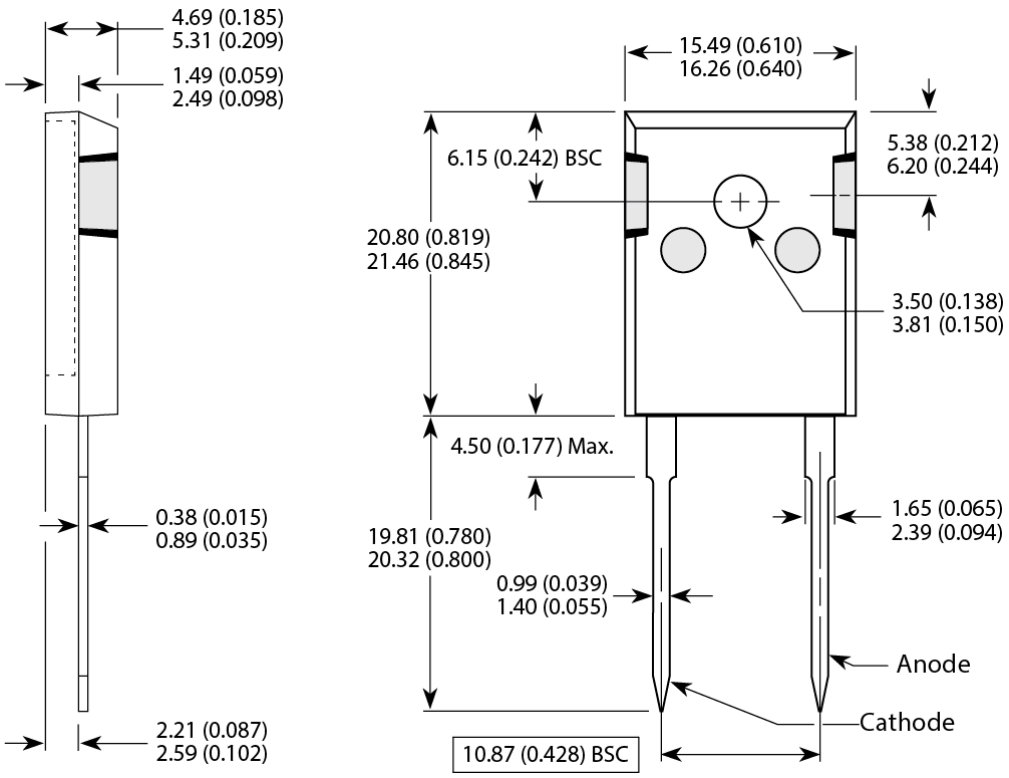
3 Package Specification

This section outlines the package specification of the APT60D60BG device.

3.1 Package Outline Drawing

The following figure shows the package outline drawing of the APT60D60BG device. Dimensions are in millimeters and (inches).

Figure 11 • Package Outline Drawing



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