APT60D120SG Datasheet Ultrafast Soft Recovery Rectifier Diode

June 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.

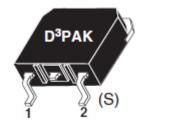
1.1 Revision A

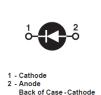
Revision A was published in June 2018. It is the first publication of this document.



2 Product Overview

This section outlines the product overview for the APT60D120SG device.





2.1 Features

The following are key features of the APT60D120SG device.

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

2.2 Benefits

The following are benefits of the APT60D120SG device.

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

2.3 Applications

The APT60D120SG 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 details the electrical specifications for the APT60D120SG device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the APT60D120SG device.

All Ratings: $T_c = 25$ °C unless otherwise specified.

Table 1 • Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
VR	Maximum DC reverse voltage 1200		V
VRRM	Maximum peak repetitive reverse voltage	1200	_
VRWM	Maximum working peak reverse voltage	1200	_
I _{F(AV)}	Maximum average forward current (Tc= 126 °C, duty cycle = 0.5)	60	Α
IF(RMS)	RMS forward current	115	_
IFSM	Non-repetitive forward surge current (T _J = 45 °C, 8.3 ms)	540	
Tı, Tstg	Operating and storage temperature range	-55 to 175	°C
Tι	Lead temperature for 10 seconds	300	_

3.2 Typical Electrical Performance

The following table shows the static electrical characteristics of the APT60D120SG device.

Table 2 • Static Electrical Characteristics

Symbol	Characteristic	Test Conditions	Minimum	Typical	Maximum	Unit
VF	Forward voltage	I _F = 60 A		2.0	2.5	V
		I _F = 120 A		2.3		-
	I _F = 60 A, T _J = 125 °C		1.8		-	
IRM	Maximum reverse leakage	V _R = V _R rated			250	μΑ
	current	V _R = V _R rated, T _J = 125 °C			500	-
Ст	Junction capacitance	V _R = 200 V		60		pF



The following table shows the dynamic characteristics of the APT60D120SG device.

Table 3 • Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Minimum	Typical	Maximum	Unit
trr	Reverse recovery time	I _F =1 A di _F /dt=-100 A/μs V _R =30 V T _J =25 °C		38		ns
trr	Reverse recovery time	I _F =60 A di _F /dt=-200 A/μs V _R =800 V T _C =25 °C		400		=
Qrr	Reverse recovery charge			1200		nC
IRRM	Maximum reverse recovery current			6		Α
trr	Reverse recovery time	I _F = 60 A di _F /dt = -200 A/μs V _R = 800 V T _C = 125 °C		470		ns
Qrr	Reverse recovery charge			4000		nC
IRRM	Maximum reverse recovery current			13		Α
trr	Reverse recovery time	I _F = 60 A		200		ns
Qrr	Reverse recovery charge	di _F /dt = -1000 A/μs V _R = 800 V T _C = 125 °C		6200		nC
IRRM	Maximum reverse recovery current			47		Α

The following table shows the thermal and mechanical characteristics of the APT60D120SG device.

Table 4 • Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Minimum	Typical	Maximum	Unit
Rejc	Junction-to-case thermal resistance	ction-to-case thermal resistance 0.31		°C/W	
Rеја	Junction-to-ambient thermal resistance			40	-
WT	Package weight		0.14		OZ
			4.0		g



3.3 Typical Performance Curves

This section shows the typical performance curves for the APT60D120SG device.

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

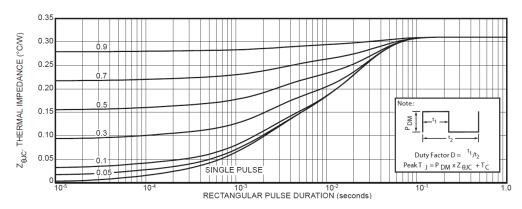


Figure 2 • Transient Thermal Impedance Model

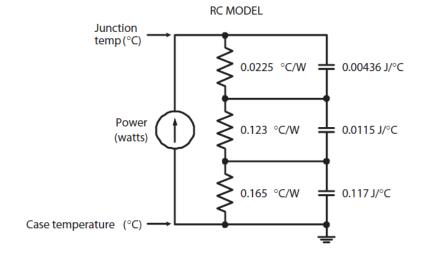




Figure 3 • Forward Current vs. Forward Voltage

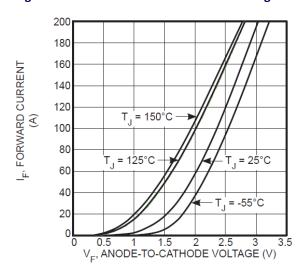


Figure 5 ● Reverse Recovery Charge vs. Current Rate of Change

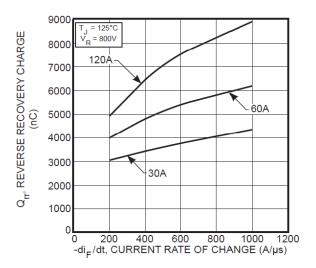


Figure 4 • RRT vs. Current Rate of Change

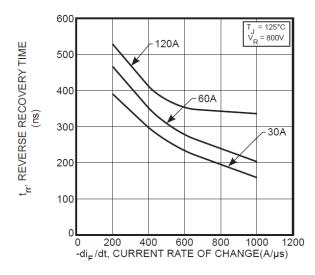


Figure 6 • Reverse Recovery Current vs. Current Rate of Change

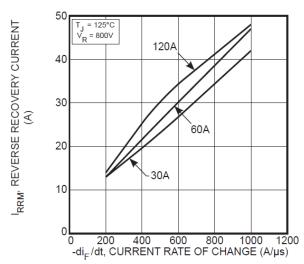




Figure 7 • Dynamic Parameters vs. Junction Temperature

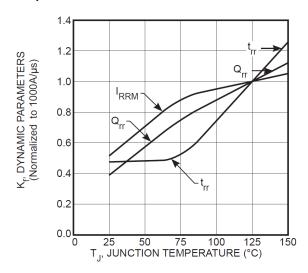


Figure 8 • Maximum Average Forward Current vs. Case Temperature

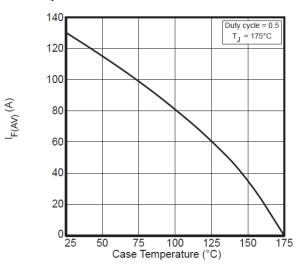
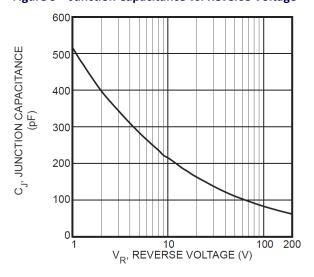


Figure 9 • Junction Capacitance vs. Reverse Voltage

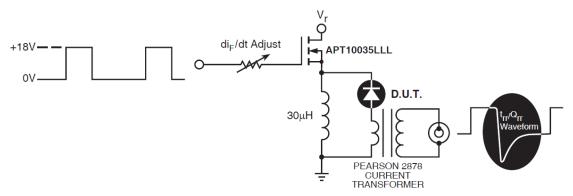




3.4 Reverse Recovery Overview

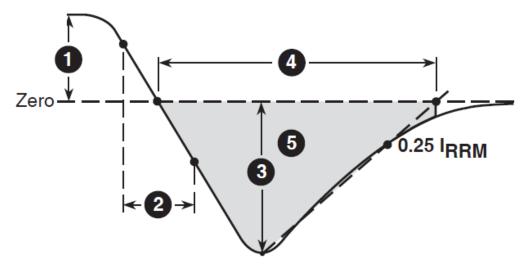
The following figure shows the diode test circuit.

Figure 10 • Diode Test Circuit



The following figure shows the diode reverse recovery waveform.

Figure 11 • Diode Reverse Recovery Waveform and Defintions



- 1. IF—Forward conduction current
- 2. di_F/dt—Rate of diode current change through zero crossing
- 3. IRRM—Maximum reverse recovery current
- 4. trr—Reverse recovery time, measured from zero crossing where diode current goes from positive to negative, to the point at which the straight line through IRRM and 0.25•IRRM passes through zero
- 5. Qrr—Area under the curve defined by IRRM and trr



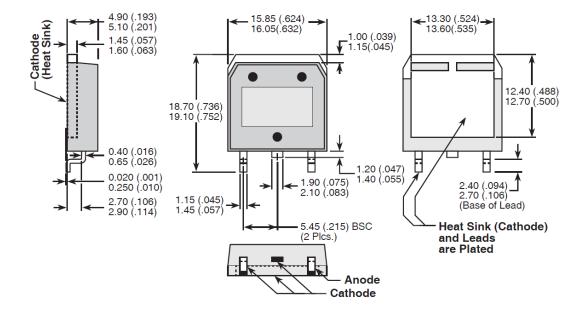
4 Package Specification

This section outlines the package specification for the APT60D120SG device.

4.1 Package Outline Drawing

This section details the D3PAK package drawing of the APT60D120SG device. Dimensions are in millimeters and (inches).

Figure 12 • Package Outline Drawing







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