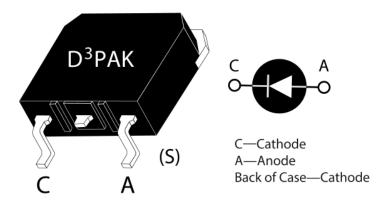


## **APT75DQ120SG Ultrafast Soft Recovery Rectifier Diode**

### 1 Product Overview

This section shows the product overview for the APT75DQ120SG device.



#### 1.1 Features

The following are key features of the APT75DQ120SG device:

- Ultra fast recovery times
- Soft recovery characteristics
- Low forward voltage
- Low leakage current
- Avalanche energy rated
- RoHS compliant

#### 1.2 Benefits

The following are benefits of the APT75DQ120SG device:

- High switching frequency
- Low switching losses
- Low noise (EMI) switching
- Higher reliability systems
- Increased system power density

### 1.3 Applications

The APT75DQ120SG device is designed for the following applications:

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



# **2** Electrical Specifications

This section shows the electrical specifications for the APT75DQ120SG device.

### 2.1 Absolute Maximum Ratings

The following table lists the absolute maximum ratings for the APT75DQ120SG device.

All ratings: Tc = 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	<del>_</del>
I <sub>F(AV)</sub>	Maximum average forward current (Tc = 112 °C, duty cycle = 0.5)	75	Α
IF(RMS)	RMS forward current	121	
İfsm	Non-repetitive forward surge current (T <sub>J</sub> = 45 °C, 8.3 ms)	540	<del>_</del>
EAVL	Avalanche energy (1 A, 40 mH)	20	mJ
Tı , Tstg	Operating and storage temperature range	-55 to 175	°C
Tι	Lead temperature for 10 seconds	300	

The following table lists the thermal and mechanical characteristics of the APT75DQ120SG device.

**Table 2 • Thermal and Mechanical Characteristics** 

Symbol	Characteristic	Min	Тур	Max	Unit
Rejc	Junction-to-case thermal resistance			0.31	°C/W
Wt	Package weight		0.14		OZ
			3.9		g

### 2.2 Electrical Performance

The following table lists the static characteristics of the APT75DQ120SG device.

**Table 3 • Static Characteristics** 

Symbol	Characteristic	Test Conditions	Min	Тур	Max	Unit
VF	Forward voltage	I <sub>F</sub> = 75 A		2.8	3.3	V
		I <sub>F</sub> = 150 A		3.5		_
		I <sub>F</sub> = 75 A, T <sub>J</sub> = 125 °C		2.2		_
IRM	Maximum reverse leakage current	V <sub>R</sub> = 1200 V			100	μΑ
		V <sub>R</sub> = 1200 V, T <sub>J</sub> = 125 °C			500	_
Cı	Junction capacitance	V <sub>R</sub> = 200 V		50		pF



# 2.3

**Dynamic Characteristics**The following table lists the dynamic characteristics of the APT75DQ120SG device.

**Table 4 • Dynamic Characteristics** 

Symbol	Characteristic	<b>Test Conditions</b>	Min	Тур	Max	Unit
t <sub>rr</sub>	Reverse recovery time	I <sub>F</sub> = 1 A		32		ns
		$di_F/dt = -100 A/\mu s$				
		$V_R = 30 V$				
		T <sub>J</sub> = 25 °C				
trr	Reverse recovery time	I <sub>F</sub> = 75 A		325		
Qrr	Reverse recovery change	— di <sub>F</sub> /dt = -200 A/μs — V <sub>R</sub> = 800 V		715		nC
IRRM	Maximum reverse recovery current	Tc = 25 °C		5		Α
trr	Reverse recovery time	I <sub>F</sub> = 75 A — di <sub>F</sub> /dt = -200 A/μs — V <sub>R</sub> = 800 V		420		ns
Qrr	Reverse recovery charge			3340		nC
IRRM	Maximum reverse recovery current	Tc = 125 °C		13		Α
trr	Reverse recovery time	I <sub>F</sub> = 75 A — di <sub>F</sub> /dt = -1000 A — /μs		195		ns
Qrr	Reverse recovery change			5810		nC
IRRM	Maximum reverse recovery current	V <sub>R</sub> = 800 V		42		Α
		Tc = 125 °C				



### 2.4 Typical Performance Curves

This section shows the typical performance curves for the APT75DQ120SG device.

Figure 1 • Maximum Transient Thermal Impedance

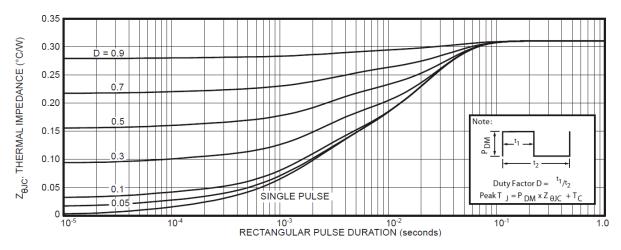


Figure 2 • Forward Current vs. Forward Voltage

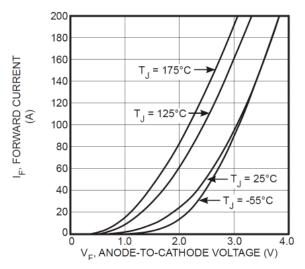


Figure 3 • RRT vs. Current Rate of Change

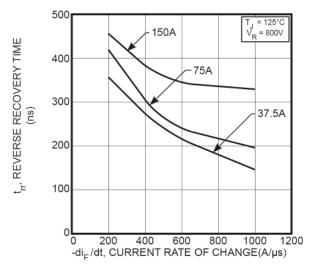




Figure 4 ● Reverse Recovery Charge vs. Current Rate of Change

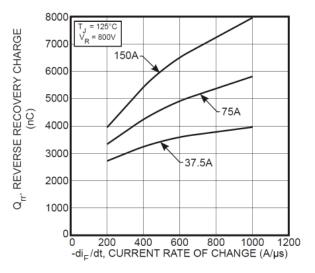


Figure 6 • Dynamic Parameters vs. Junction Temperature

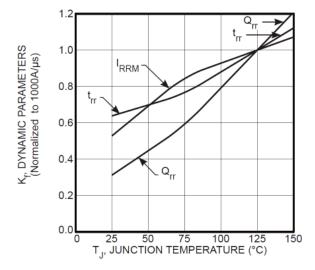


Figure 5 • Reverse Recovery Current vs. Current Rate of Change

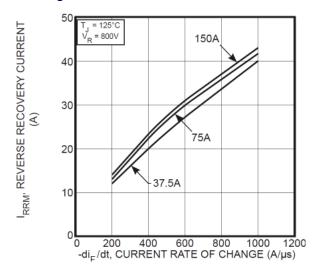


Figure 7 • Maximum Average Forward Current vs.

Case Temperature

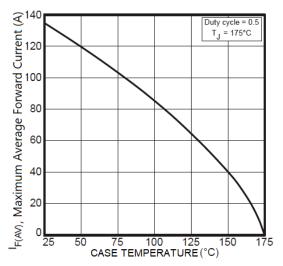
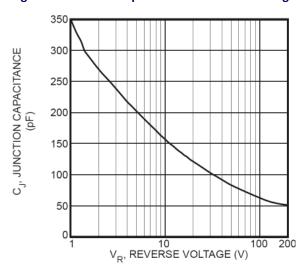




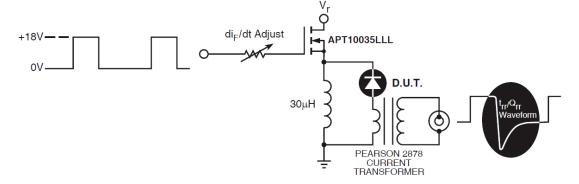
Figure 8 • Junction Capacitance vs. Reverse Voltage



### 2.5 Reverse Recovery Overview

The following figure illustrates the diode test circuit for the APT75DQ120SG device.

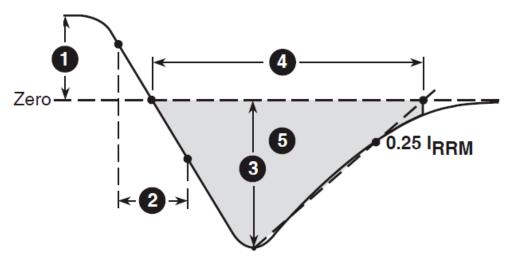
Figure 9 • Diode Test Circuit





The following figure illustrates the diode reverse recovery waveform and definitions for the APT75DQ120SG device.

Figure 10 • Diode Reverse Recovery Waveform and Definitions



- 1. IF—Forward conduction current.
- 2. di<sub>F</sub>/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.

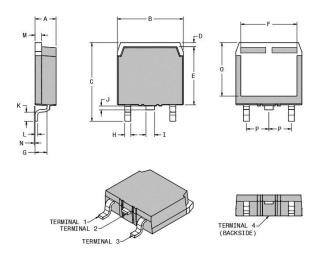
### 3 Package Specification

This section shows the package specification for the APT75DQ120SG device.

### 3.1 Package Outline Drawing

The following figure illustrates the TO-268 package outline of APT75DQ120SG device.

Figure 11 • Package Outline Drawing





The following table lists the TO-268 dimensions and should be used in conjunction with the package outline drawing.

Table 5 • TO-268 Dimensions

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)	
A	4.90	5.10	0.193	0.201	
В	15.85	16.20	0.624	0.638	
С	18.70	19.10	0.736	0.752	
D	1.00	1.25	0.039	0.049	
E	13.80	14.00	0.543	0.551	
F	13.30	13.60	0.524	0.535	
G	2.70	2.90	0.106	0.114	
Н	1.15	1.45	0.045	0.057	
I	1.95	2.21	0.077	0.087	
J	0.94	1.40	0.037	0.055	
К	2.40	2.70	0.094	0.106	
L	0.40	0.60	0.016	0.024	
М	1.45	1.60	0.057	0.063	
N	0.00	0.18	0.000	0.007	
0	12.40	12.70	0.488	0.500	
Р	5.45 BSC (nom.)		0.215 BSC (nom.)		
Terminal 1	Cathode				
Terminal 2	Cathode				
Terminal 3	Anode				
Terminal 4	Cathode				





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