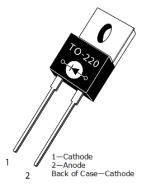


APT15DQ120KG Ultrafast Soft Recovery Rectifier Diode

Product Overview

The APT15DQ120KG is a 1200 V, 15 A Ultrafast Soft Recovery Rectifier Si Diode in a TO-220 package.



Features

The following are key features of the APT15DQ120KG device:

- Ultrafast recovery times
- Soft recovery characteristics
- Low forward voltage
- Low leakage current
- Avalanche-energy rated
- RoHS compliant
- AEC-Q101 qualified

Benefits

The following are benefits of the APT15DQ120KG device:

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

Applications

The APT15DQ120KG 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



Device Specifications

This section shows the specifications of the APT15DQ120KG device.

Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the APT15DQ120KG device.

 T_C = 25 °C, unless otherwise specified.

Table 1 • Absolute Maximum Ratings

Symbol	Parameter	Rating	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 = 127 °C, duty cycle = 0.5)	15	Α
I _{FSM}	Non-repetitive forward surge current (T _J = 45 °C, 8.3 ms)	110	
E _{AVL}	Avalanche-energy (1 A, 40 mH)	20	mJ

The following table shows the thermal and mechanical characteristics of the APT15DQ120KG device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic	Min	Тур	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance			1.18	°C/W
T _J , T _{STG}	Operating and storage temperature range	-55		175	°C
T _L	Lead temperature for 10 seconds			300	
Wt	Package weight		0.07		OZ
			1.9		g
	Mounting torque, 6-32 or M3 screw			10	lbf•m
				1.1	N∙m



Electrical Performance

The following table shows the static characteristics of the APT15DQ120KG device. T_J = 25 °C, unless otherwise specified.

Table 3 • Static Characteristics

Symbol	Characteristic	Test Conditions	Min	Тур	Max	Unit
V _F	Forward voltage	I _F = 15 A		2.8	3.3	V
		I _F = 30 A		3.4		
		I _F = 15 A, T _J = 125 °C		2.5		
I _{RM}	Maximum reverse leakage current	V _R = 1200 V			100	μА
		V _R = 1200 V, T _J = 125 °C			500	
C _J	Junction capacitance	V _R = 200 V		17		pF

The following table shows the dynamic characteristics of the APT15DQ120KG device.

Table 4 • Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Тур	Max	Unit
t _{rr}	Reverse recovery time	$I_F = 1 \text{ A; } di_F/dt = -100 \text{ A}/\mu\text{s}$ $V_R = 30 \text{ V}$		21		ns
t _{rr}	Reverse recovery time	$I_F = 15 \text{ A}; \text{ di}_F/\text{dt} = -200 \text{ A}/\mu\text{s}$ $V_R = 800 \text{ V}$		240		ns
Q _{rr}	Reverse recovery charge	V _R ddd t		260		nC
I _{RRM}	Maximum reverse recovery current			3		Α
t _{rr}	Reverse recovery time	$I_F = 15 \text{ A}; \text{ di}_F/\text{dt} = -200 \text{ A}/\mu\text{s}$ $V_R = 800 \text{ V}; T_I = 125 \text{ °C}$		290		ns
Q _{rr}	Reverse recovery charge	VR - 600 V, 1j - 123 C		960		nC
I _{RRM}	Maximum reverse recovery current			6		Α
t _{rr}	Reverse recovery time	$I_F = 15 \text{ A}; \text{ di}_F/\text{dt} = -1000 \text{ A}/\mu\text{s}$ $V_R = 800 \text{ V}; T_I = 125 ^{\circ}\text{C}$		130		ns
Q _{rr}	Reverse recovery charge	v _R - 500 v, 1 _J - 125 C		1340		nC
I _{RRM}	Maximum reverse recovery current			19		А



Typical Performance Curves

This section shows the typical performance curves of the APT15DQ120KG device.

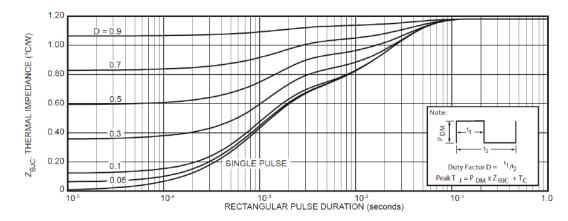


Figure 1 • Maximum Transient Thermal Impedance

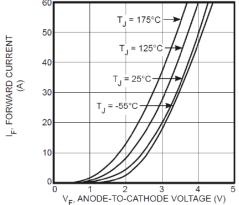


Figure 2 • Forward Current vs. Forward Voltage

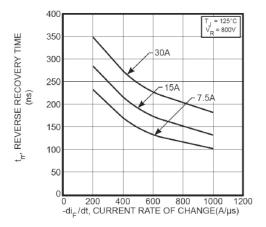


Figure 3 • Reverse Recovery Time vs. Current Rate of Change



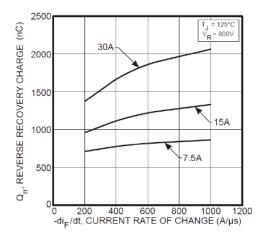


Figure 4 • Reverse Recovery Charge vs. Current Rate of Change

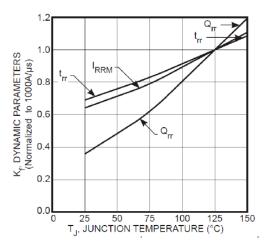


Figure 6 • Dynamic Parameters vs. Junction Temperature

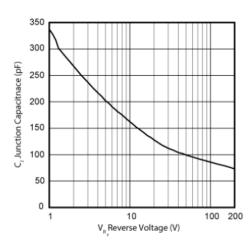


Figure 8 • Junction Capacitance vs. Reverse Voltage

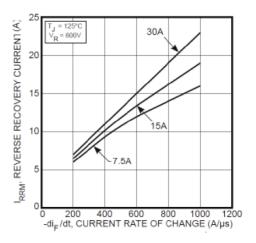


Figure 5 • Reverse Recovery Current vs. Current Rate of Change

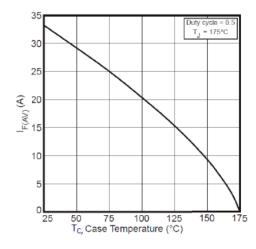


Figure 7 • Maximum Average Forward Current vs. Case Temperature



Reverse Recovery Overview

The following figure illustrates the diode test circuit of the APT15DQ120KG device.

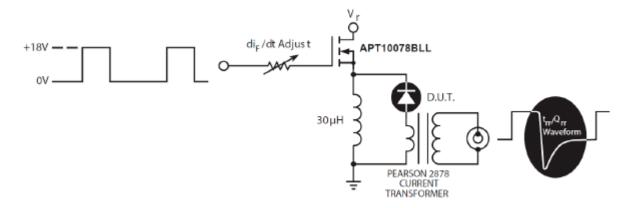


Figure 9 • Diode Test Circuit

The following figure illustrates the diode reverse recovery waveform and definitions of the APT15DQ120KG device.

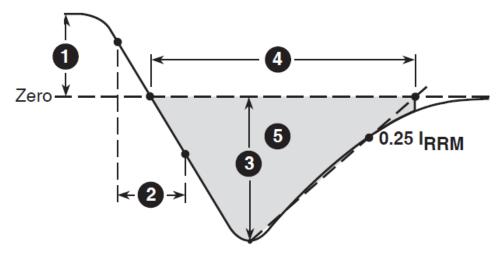


Figure 10 • Diode Reverse Recovery Waveform and Definitions

- **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} .



Package Specification

This section shows the package specification of the APT15DQ120KG device.

Package Outline Drawing

The following figure illustrates the TO-220 package outline of the APT15DQ120KG device.

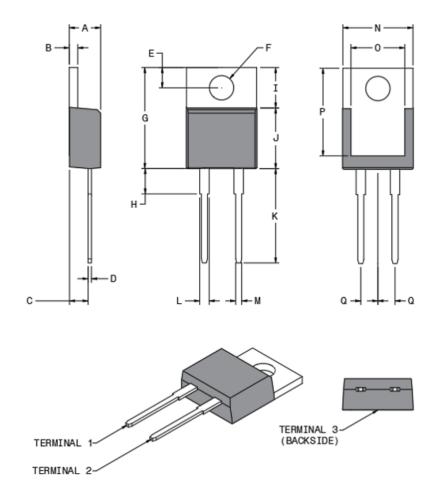


Figure 11 • Package Outline Drawing



The following table shows the TO-220 dimensions and should be used in conjunction with the package outline drawing.

Table 5 • TO-220 Dimensions

SYMBOL	MIN	MAX	MIN	MAX	
	[mm]	[mm]	[INCH]	[INCH]	
А	4.32	4.57	0.170	0.180	
В	1.14	1.40	0.045	0.055	
С	2.50	2.74	0.098	0.108	
D	0.36	0.53	0.014	0.021	
Е	2.65	3.05	0.104	0.120	
F	3.60	3.96	0.142	0.156	
G	14.50	15.60	0.571	0.614	
Н	2.39	3.65	0.094	0.144	
1	6.00	6.80	0.236	0.268	
J	8.40	9.00	0.331	0.354	
К	13.00	14.00	0.512	0.551	
L	1.23	1.39	0.048	0.055	
М	0.69	0.88	0.027	0.035	
N	10.00	10.36	0.394	0.408	
0	7.57	7.90	0.298	0.311	
P	12.20	13.10	0.480	0.516	
Q	2.54 BSC		0.100 BSC		
TERMINAL 1	CATHODE				
TERMINAL 2	ANODE				
TERMINAL 3	CATHODE				





Microsemi

2355 W. Chandler Blvd. Chandler, AZ 85224 USA

Within the USA: +1 (480) 792-7200 Fax: +1 (480) 792-7277

www.microsemi.com © 2020 Microsemi and its corporate affiliates. All rights reserved. Microsemi and the Microsemi logo are trademarks of Microsemi Corporation and its corporate affiliates. All other trademarks and service marks are the property of their respective owners.

Microsemi's product warranty is set forth in Microsemi's Sales Order Terms and Conditions. Information contained in this publication is provided for the sole purpose of designing with and using Microsemi products. Information regarding device applications and the like is provided only for your convenience and may be superseded by updates. Buyer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is your responsibility to ensure that your application meets with your specifications. THIS INFORMATION IS PROVIDED "AS IS." MICROSEMI MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT WILL MICROSEMI BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL OR CONSEQUENTIAL LOSS, DAMAGE, COST OR EXPENSE WHATSOEVER RELATED TO THIS INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROSEMI HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROSEMI'S TOTAL LIABILITY ON ALL CLAIMS IN RELATED TO THIS INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, YOU PAID DIRECTLY TO MICROSEMI FOR THIS INFORMATION. Use of Microsemi devices in life support, mission-critical equipment or applications, and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend and indemnify Microsemi from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microsemi intellectual property rights unless otherwise stated.

Microsemi Corporation, a subsidiary of Microchip Technology Inc. (Nasdaq: MCHP), and its corporate affiliates are leading providers of smart, connected and secure embedded control solutions. Their easy-to-use development tools and comprehensive product portfolio enable customers to create optimal designs which reduce risk while lowering total system cost and time to market. These solutions serve more than 120,000 customers across the industrial, automotive, consumer, aerospace and defense, communications and computing markets. Headquartered in Chandler, Arizona, the company offers outstanding technical support along with dependable delivery and quality. Learn more at www.microsemi.com.

053-4222 | April 2020 | Released

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Microchip:

APT15DQ120KG