

## ULTRAFAST SOFT RECOVERY RECTIFIER DIODE

### PRODUCT APPLICATIONS

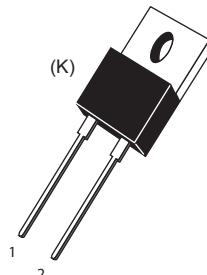
- Anti-Parallel Diode
  - Switchmode Power Supply
  - Inverters
- Free Wheeling Diode
  - Motor Controllers
  - Converters
  - Inverters
- Snubber Diode
- PFC

### PRODUCT FEATURES

- Ultrafast Recovery Times
- Soft Recovery Characteristics
- Popular TO-220 Package or Surface Mount D<sup>2</sup>PAK Package
- Low Forward Voltage
- Low Leakage Current

### PRODUCT BENEFITS

- Low Losses
- Low Noise Switching
- Cooler Operation
- Higher Reliability Systems
- Increased System Power Density



1 - Cathode  
 2 - Anode  
 Back of Case - Cathode

### MAXIMUM RATINGS

All Ratings:  $T_C = 25^\circ\text{C}$  unless otherwise specified.

Symbol	Characteristic / Test Conditions	APT15D60K(G)	UNIT
$V_R$	Maximum D.C. Reverse Voltage	600	Volts
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		
$V_{RWM}$	Maximum Working Peak Reverse Voltage		
$I_{F(AV)}$	Maximum Average Forward Current ( $T_C = 133^\circ\text{C}$ , Duty Cycle = 0.5)	15	Amps
$I_{F(RMS)}$	RMS Forward Current (Square wave, 50% duty)	32	
$I_{FSM}$	Non-Repetitive Forward Surge Current ( $T_J = 45^\circ\text{C}$ , 8.3ms)	110	
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 175	°C
$T_L$	Lead Temperature for 10 Sec.	300	

### STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$V_F$	Forward Voltage	$I_F = 15\text{A}$		1.6	1.8
		$I_F = 30\text{A}$		1.9	Volts
		$I_F = 15\text{A}, T_J = 125^\circ\text{C}$		1.4	
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = V_R$ Rated		250	$\mu\text{A}$
		$V_R = V_R$ Rated, $T_J = 125^\circ\text{C}$		500	
$C_T$	Junction Capacitance, $V_R = 200\text{V}$		23		pF

## DYNAMIC CHARACTERISTICS

APT15D60K(G)

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$t_{rr}$	Reverse Recovery Time $I_F = 1A, di_F/dt = -100A/\mu s, V_R = 30V, T_J = 25^\circ C$	$I_F = 15A, di_F/dt = -200A/\mu s, V_R = 400V, T_C = 25^\circ C$	-	21		ns
$t_{rr}$	Reverse Recovery Time		-	80		
$Q_{rr}$	Reverse Recovery Charge		-	95		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	3	-	Amps
$t_{rr}$	Reverse Recovery Time	$I_F = 15A, di_F/dt = -200A/\mu s, V_R = 400V, T_C = 125^\circ C$	-	150		ns
$Q_{rr}$	Reverse Recovery Charge		-	520		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	7	-	Amps
$t_{rr}$	Reverse Recovery Time	$I_F = 15A, di_F/dt = -1000A/\mu s, V_R = 400V, T_C = 125^\circ C$	-	60		ns
$Q_{rr}$	Reverse Recovery Charge		-	810		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	22		Amps

## THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance	1.35			°C/W
$R_{\theta JA}$	Junction-to-Ambient Thermal Resistance			80	
$W_T$	Package Weight	0.07			oz
				1.9	g
Torque	Maximum Mounting Torque	10			lb•in
				1.1	N•m

Microsemi Reserves the right to change, without notice, the specifications and information contained herein.

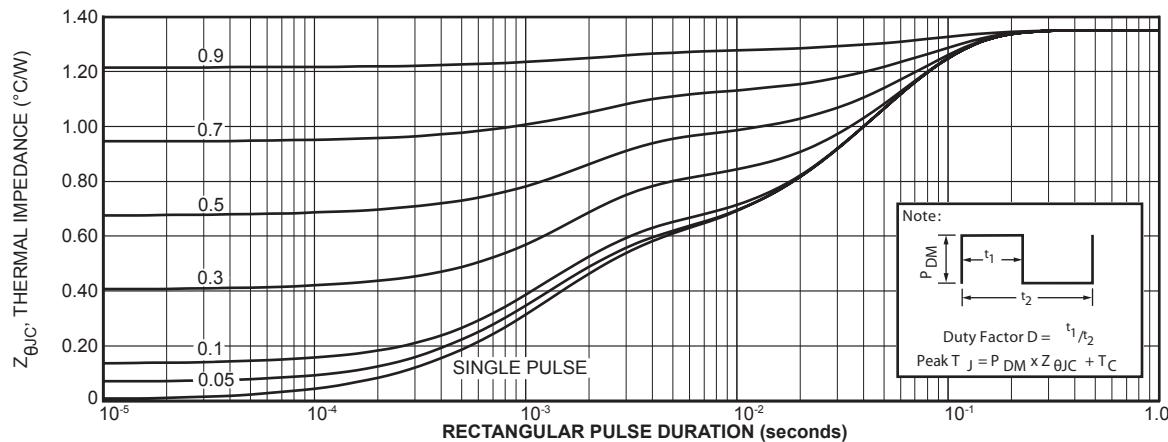
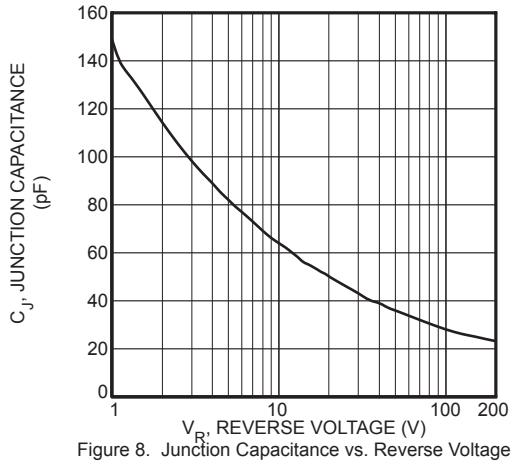
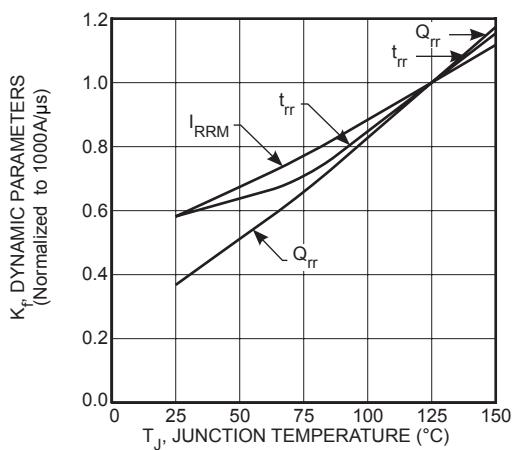
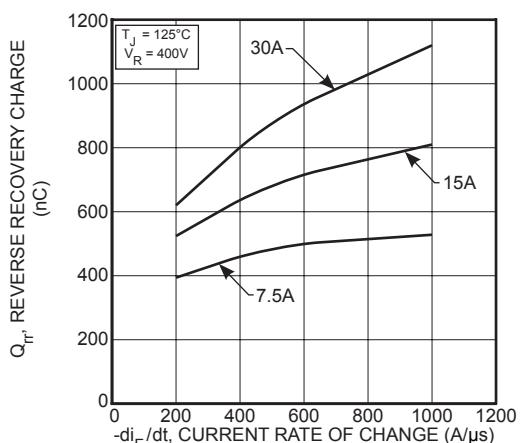
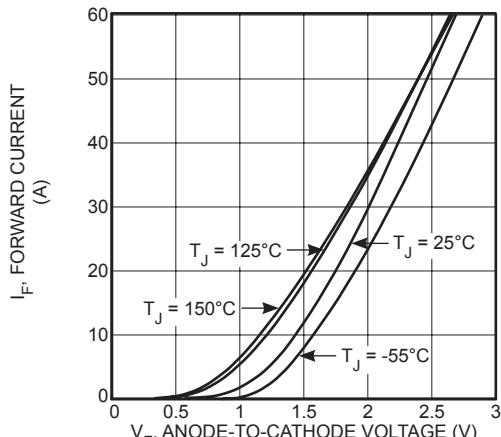
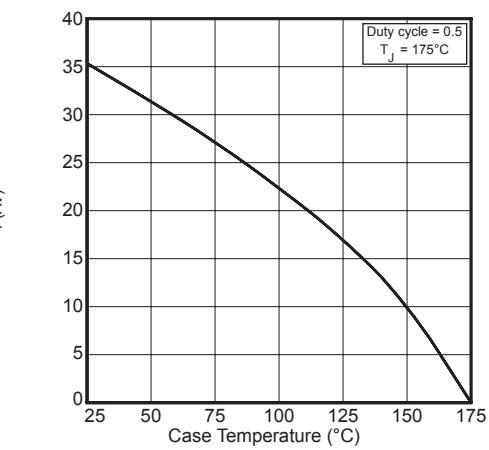
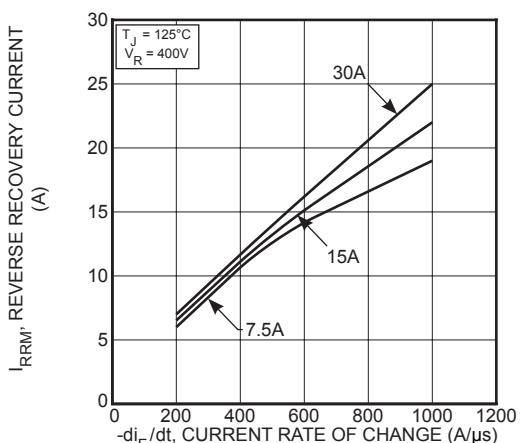
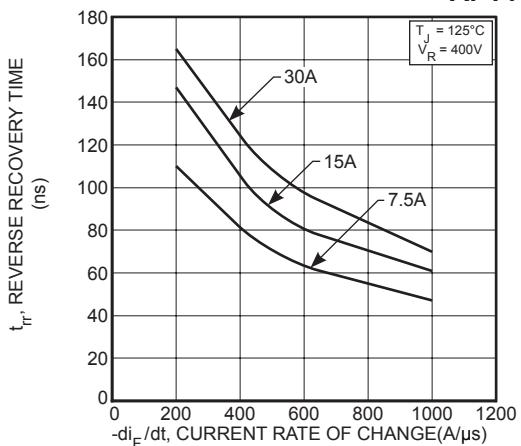


FIGURE 1. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

## TYPICAL PERFORMANCE CURVES



## APT15D60K(G)



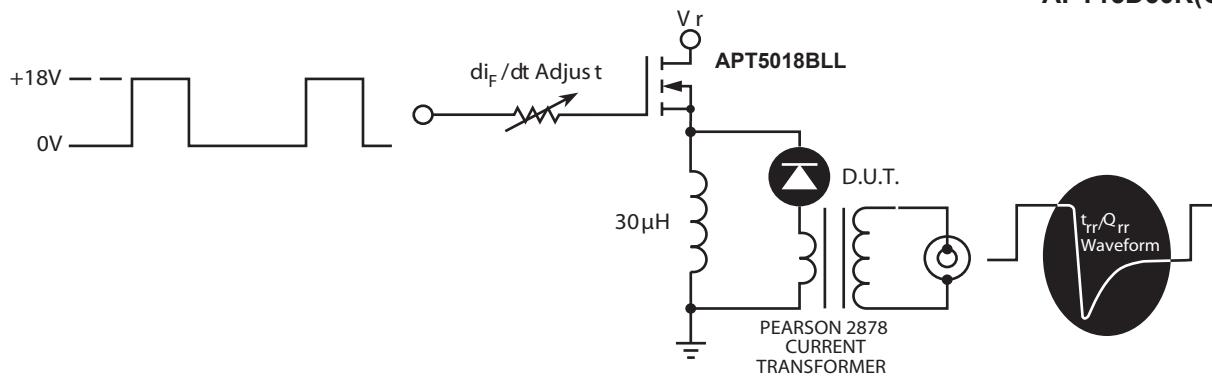
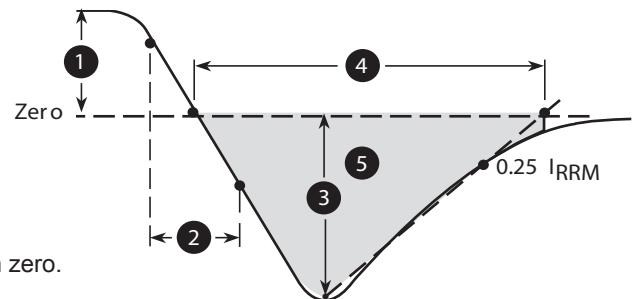


Figure 9. Diode Test Circuit

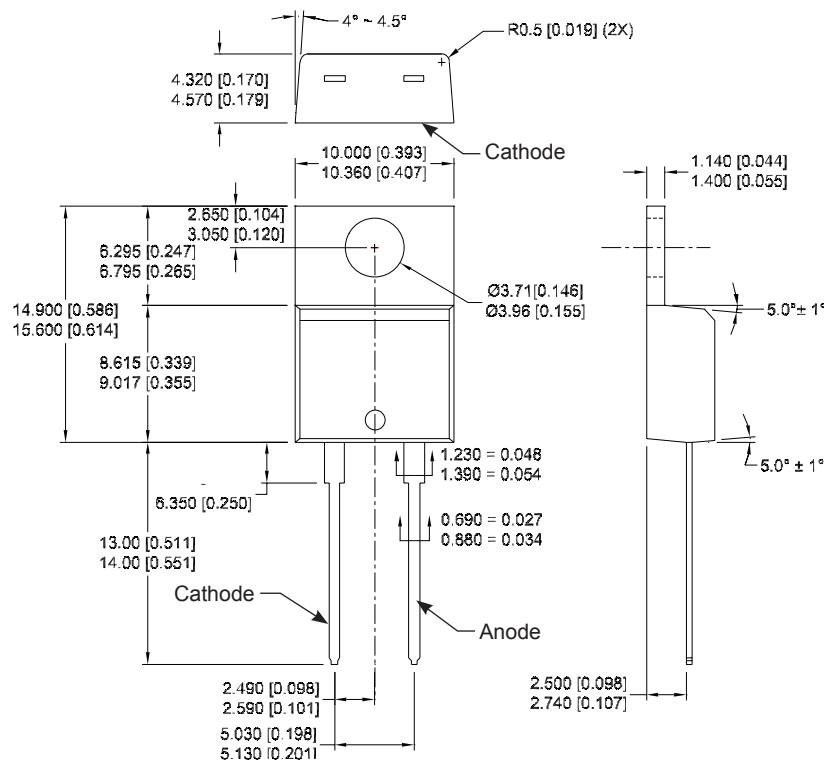
- 1  $I_F$  - Forward Conduction Current
- 2  $di_F/dt$  - Rate of Diode Current Change Through Zero Crossing.
- 3  $I_{RRM}$  - Maximum Reverse Recovery Current
- 4  $t_{rr}$  - Reverse Recovery Time measured from zero crossing where diode current goes from positive to negative, to the point at which the straight line through  $I_{RRM}$  and 0.25,  $I_{RRM}$  passes through zero.
- 5  $Q_{rr}$  - Area Under the Curve Defined by  $I_{RRM}$  and  $t_{RR}$



**Figure 10. Diode Reverse Recovery Waveform Definition**

## TO-220 (K) Package Outline

e3 100% Sn



Dimensions in millimeters and [inches]

**Disclaimer:**

The information contained in the document (unless it is publicly available on the Web without access restrictions) is PROPRIETARY AND CONFIDENTIAL information of Microsemi and cannot be copied, published, uploaded, posted, transmitted, distributed or disclosed or used without the express duly signed written consent of Microsemi. If the recipient of this document has entered into a disclosure agreement with Microsemi, then the terms of such Agreement will also apply. This document and the information contained herein may not be modified, by any person other than authorized personnel of Microsemi. No license under any patent, copyright, trade secret or other intellectual property right is granted to or conferred upon you by disclosure or delivery of the information, either expressly, by implication, inducement, estoppels or otherwise. Any license under such intellectual property rights must be approved by Microsemi in writing signed by an officer of Microsemi.

Microsemi reserves the right to change the configuration, functionality and performance of its products at anytime without any notice. This product has been subject to limited testing and should not be used in conjunction with life-support or other mission-critical equipment or applications. Microsemi assumes no liability whatsoever, and Microsemi disclaims any express or implied warranty, relating to sale and/or use of Microsemi products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. Any performance specifications believed to be reliable but are not verified and customer or user must conduct and complete all performance and other testing of this product as well as any user or customer's final application. User or customer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is the customer's and user's responsibility to independently determine suitability of any Microsemi product and to test and verify the same. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the User. Microsemi specifically disclaims any liability of any kind including for consequential, incidental and punitive damages as well as lost profit. The product is subject to other terms and conditions which can be located on the web at <http://www.microsemi.com/terms-a-conditions>.