

## ULTRAFAST SOFT RECOVERY RECTIFIER DIODE

### PRODUCT APPLICATIONS

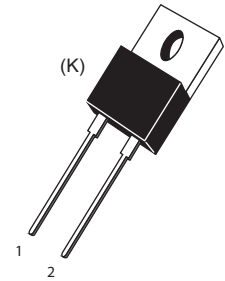
- Anti-Parallel Diode
  - Switchmode Power Supply
  - Inverters
- Free Wheeling Diode
  - Motor Controllers
  - Converters
  - Inverters
- Snubber Diode
- PFC

### PRODUCT FEATURES

- Ultrafast Recovery Times
- Soft Recovery Characteristics
- Popular TO-220 Package
- Low Forward Voltage
- Low Leakage Current
- Avalanche Energy Rated

### 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	APT15DQ100K(G)	UNIT
$V_R$	Maximum D.C. Reverse Voltage	1000	Volts
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		
$V_{RWM}$	Maximum Working Peak Reverse Voltage		
$I_{F(AV)}$	Maximum Average Forward Current ( $T_C = 126^\circ\text{C}$ , Duty Cycle = 0.5)	15	Amps
$I_{F(RMS)}$	RMS Forward Current (Square wave, 50% duty)	29	
$I_{FSM}$	Non-Repetitive Forward Surge Current ( $T_J = 45^\circ\text{C}$ , 8.3ms)	80	
$E_{AVL}$	Avalanche Energy (1A, 40mH)	20	mJ
$T_J, T_{STG}$	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		$I_F = 15\text{A}$	2.5	3.0	Volts
			$I_F = 30\text{A}$	3.06		
			$I_F = 15\text{A}, T_J = 125^\circ\text{C}$	1.92		
$I_{RM}$	Maximum Reverse Leakage Current		$V_R = 1000\text{V}$		100	$\mu\text{A}$
			$V_R = 1000\text{V}, T_J = 125^\circ\text{C}$		500	
$C_T$	Junction Capacitance, $V_R = 200\text{V}$		12		pF	

**DYNAMIC CHARACTERISTICS**

**APT15DQ100K(G)**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$t_{rr}$	Reverse Recovery Time	$I_F = 1A, di_F/dt = -100A/\mu s, V_R = 30V, T_J = 25^\circ C$	-	20		ns
$t_{rr}$	Reverse Recovery Time		-	235		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 15A, di_F/dt = -200A/\mu s, V_R = 667V, T_C = 25^\circ C$	-	185		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	3	-	Amps
$t_{rr}$	Reverse Recovery Time	$I_F = 15A, di_F/dt = -200A/\mu s, V_R = 667V, T_C = 125^\circ C$	-	300		ns
$Q_{rr}$	Reverse Recovery Charge		-	810		nC
$I_{RRM}$	Maximum Reverse Recovery Current	-	6	-	Amps	
$t_{rr}$	Reverse Recovery Time	$I_F = 15A, di_F/dt = -1000A/\mu s, V_R = 667V, T_C = 125^\circ C$	-	125		ns
$Q_{rr}$	Reverse Recovery Charge		-	1150		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	19		Amps

**THERMAL AND MECHANICAL CHARACTERISTICS**

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance			1.18	$^\circ C/W$
$W_T$	Package Weight		0.07		oz
			1.9		g
Torque	Maximum Mounting Torque			10	lb·in
				1.1	N·m

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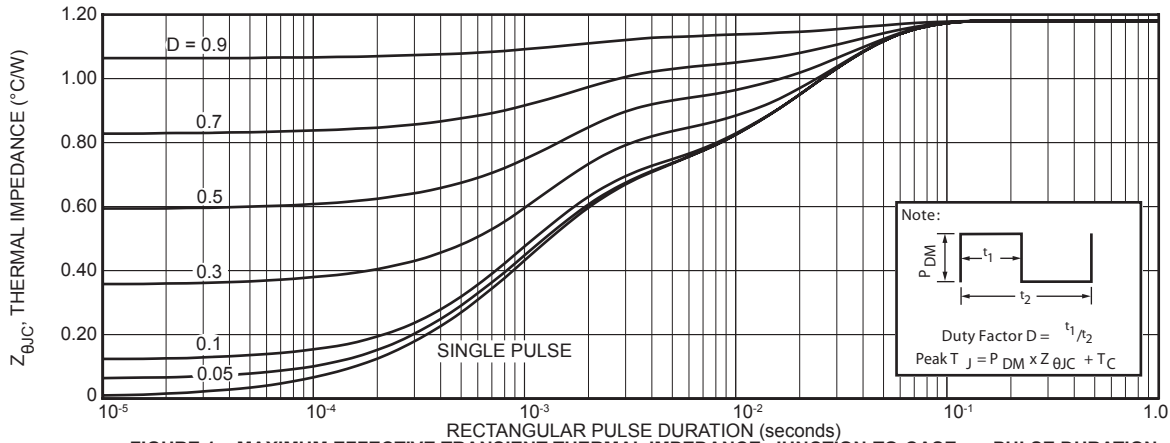


FIGURE 1a. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

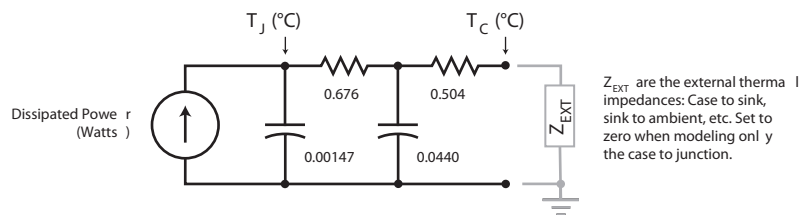
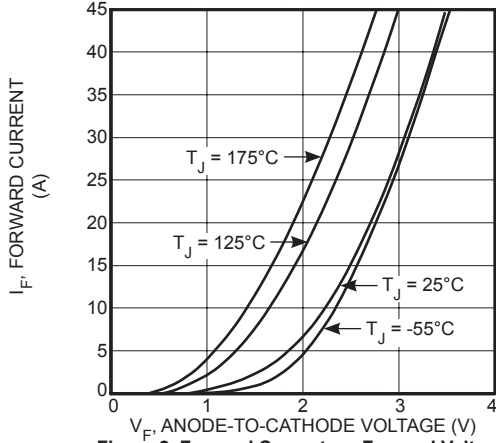


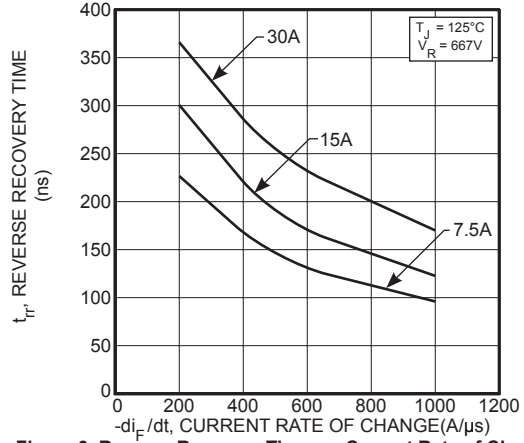
FIGURE 1b, TRANSIENT THERMAL IMPEDANCE MODEL

**TYPICAL PERFORMANCE CURVES**

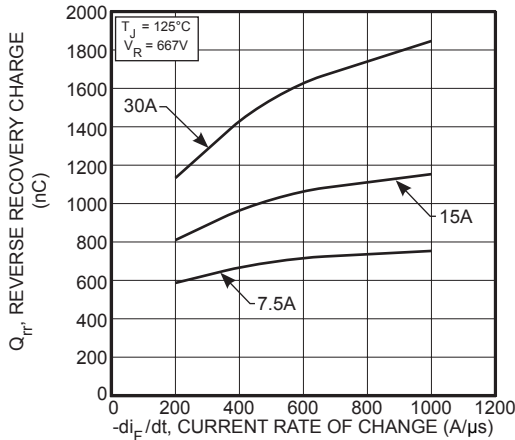
**APT15DQ100K(G)**



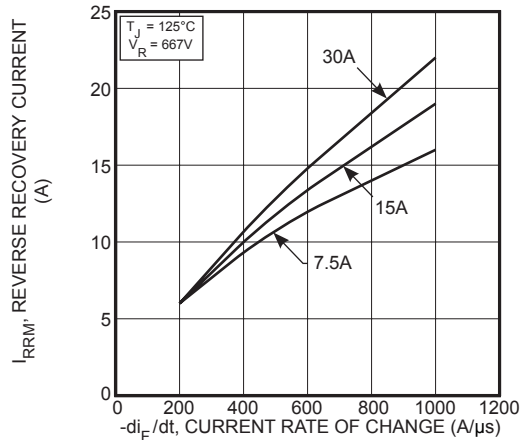
**Figure 2. Forward Current vs. Forward Voltage**



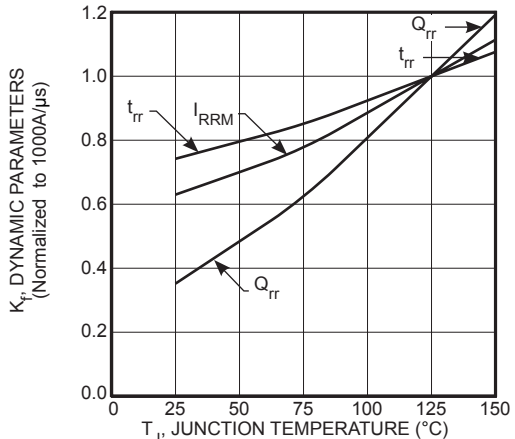
**Figure 3. Reverse Recovery Time vs. Current Rate of Change**



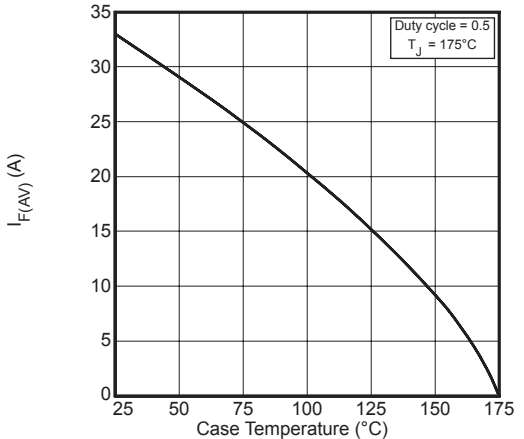
**Figure 4. Reverse Recovery Charge vs. Current Rate of Change**



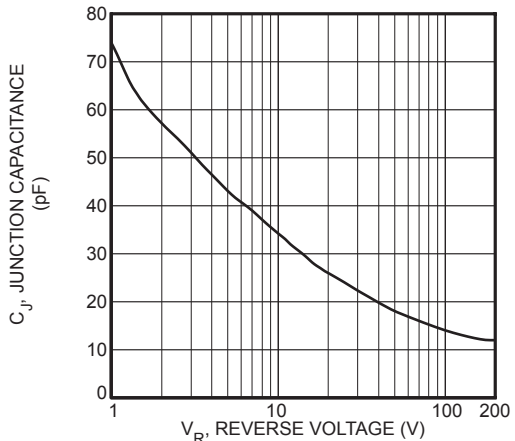
**Figure 5. Reverse Recovery Current vs. Current Rate of Change**



**Figure 6. Dynamic Parameters vs. Junction Temperature**



**Figure 7. Maximum Average Forward Current vs. Case Temperature**



**Figure 8. Junction Capacitance vs. Reverse Voltage**

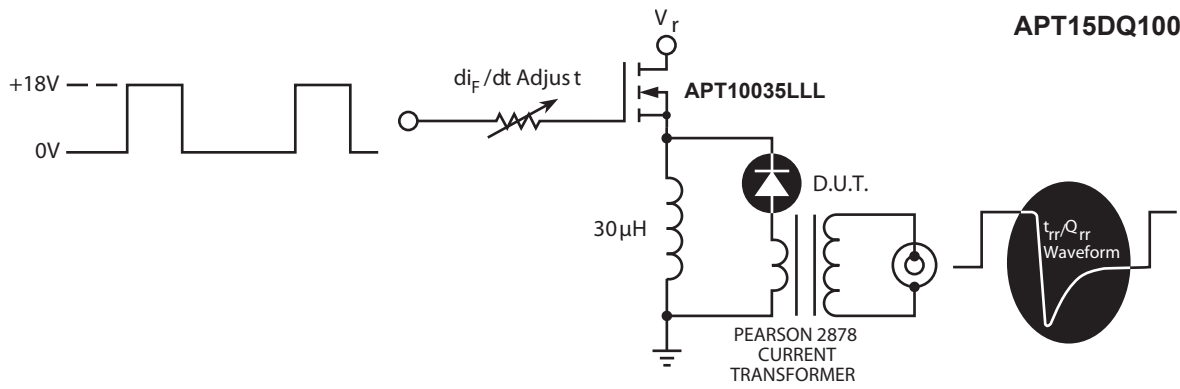


Figure 9. Diode Test Circuit

- 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  $t_{rr}$ .

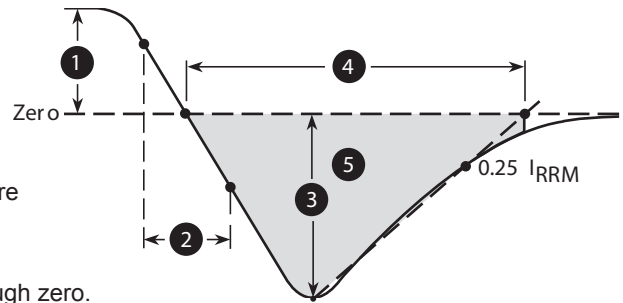
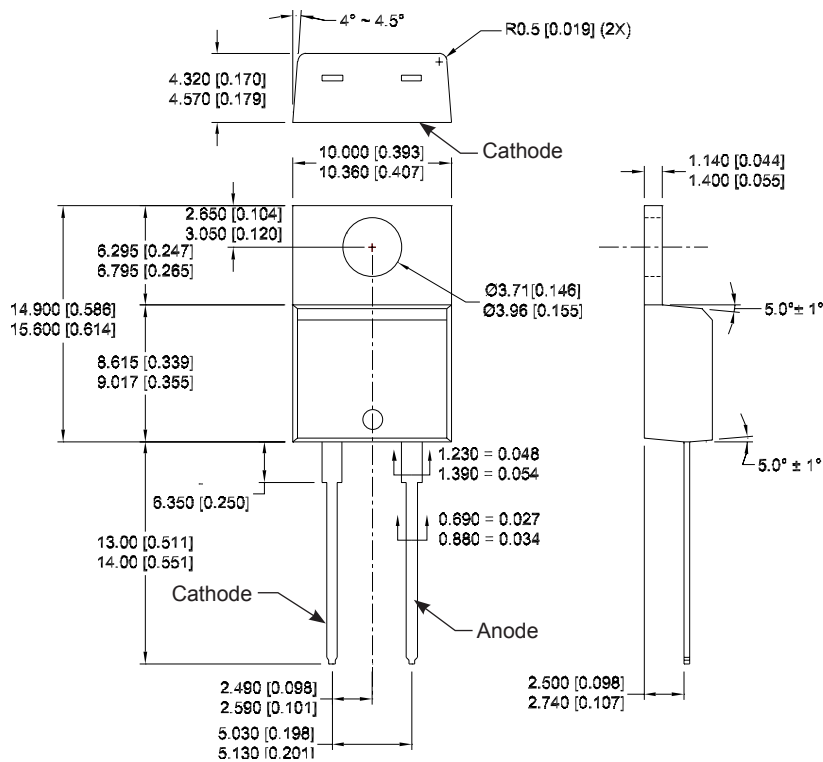


Figure 10. Diode Reverse Recovery Waveform Definition

**TO-220 (K) Package Outline**  
e3 100% Sn



Dimensions in millimeters and [inches]

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