


## ULTRAFAST SOFT RECOVERY RECTIFIER DIODE

### PRODUCT APPLICATIONS

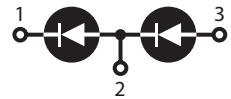
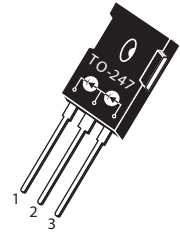
- Anti-Parallel Diode
  - Switchmode Power Supply
  - Inverters
- Free Wheeling Diode
  - Motor Controllers
  - Converters
  - Inverters
- Snubber Diode
- PFC
- RoHS Compliant 

### PRODUCT FEATURES

- Ultrafast Recovery Time
- Soft Recovery Characteristics
- Popular TO-247 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 1
- 2 - Anode 1  
Cathode 2
- 3 - Anode 2

### MAXIMUM RATINGS

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

Symbol	Parameter	Ratings	Unit
$V_R$	Maximum D.C. 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 ( $T_C = 74^\circ\text{C}$ , Duty Cycle = 0.5)	15	A
$I_{F(RMS)}$	RMS Forward Current (Square wave, 50% duty)	17	
$I_{FSM}$	Non-Repetitive Forward Surge Current ( $T_J = 45^\circ\text{C}$ , 8.3ms)	110	
$E_{AVL}$	Avalanche Energy (1A, 40mH)	20	mJ
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 175	$^\circ\text{C}$
$T_L$	Lead Temperature for 10 Sec.	300	

### STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	MIN	TYP	MAX	Unit
$V_F$	Forward Voltage	$I_F = 15\text{A}$	3.0	3.5	V
		$I_F = 30\text{A}$	3.7		
		$I_F = 15\text{A}, T_J = 125^\circ\text{C}$	2.2		
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$		100	$\mu\text{A}$
		$V_R = 1200\text{V}, T_J = 125^\circ\text{C}$		500	
$C_T$	Junction Capacitance, $V_R = 200\text{V}$		17		



CAUTION: These Devices are Sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

## DYNAMIC CHARACTERISTICS

APT15DQ120BHB(G)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$t_{rr}$	Reverse Recovery Time	$I_F = 1A, di_F/dt = -100A/\mu s$ $V_R = 30V, T_J = 25^\circ C$		21		ns
$t_{rr}$	Reverse Recovery Time	$I_F = 15A, di_F/dt = -200A/\mu s$ $V_R = 800V, T_C = 25^\circ C$		240		
$Q_{rr}$	Reverse Recovery Charge			260		nC
$I_{RRM}$	Reverse Recovery Current			3		Amps
$t_{rr}$	Reverse Recovery Time	$I_F = 15A, di_F/dt = -200A/\mu s$ $V_R = 800V, T_C = 125^\circ C$		290		ns
$Q_{rr}$	Reverse Recovery Charge			960		nC
$I_{RRM}$	Reverse Recovery Current			6		Amps
$t_{rr}$	Reverse Recovery Time	$I_F = 15A, di_F/dt = -1000A/\mu s$ $V_R = 800V, T_C = 125^\circ C$		130		ns
$Q_{rr}$	Reverse Recovery Charge			1340		nC
$I_{RRM}$	Maximum Reverse Recovery Current			19		Amps

## THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Reverse Recovery Time			2.3	$^\circ C/W$
$W_T$	Package Weight		0.22		oz
			5.9		g
Torque	Maximum Mounting Torque			10	lb·in
				1.1	N·m

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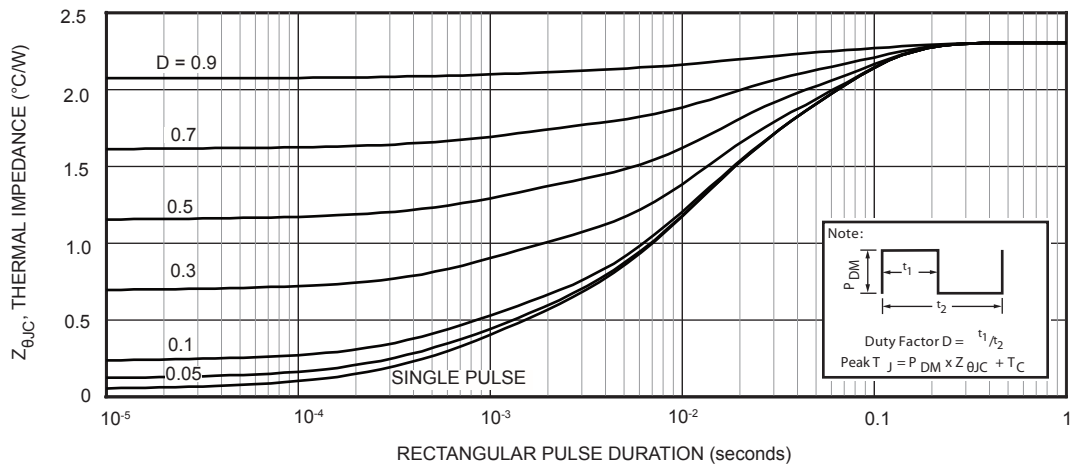
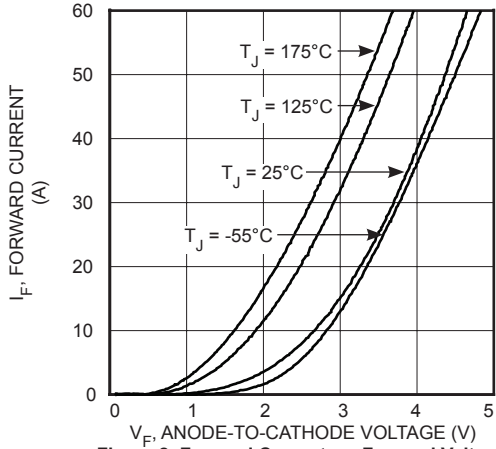


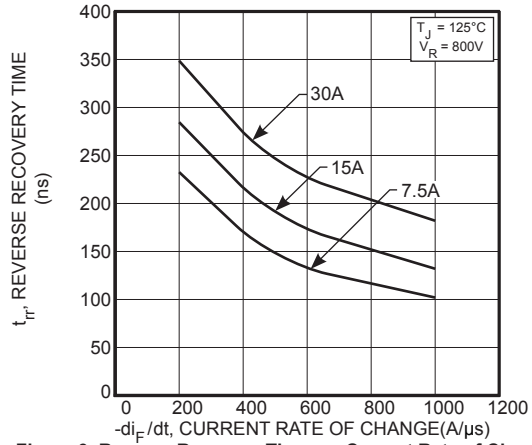
FIGURE 1. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

**TYPICAL PERFORMANCE CURVES**

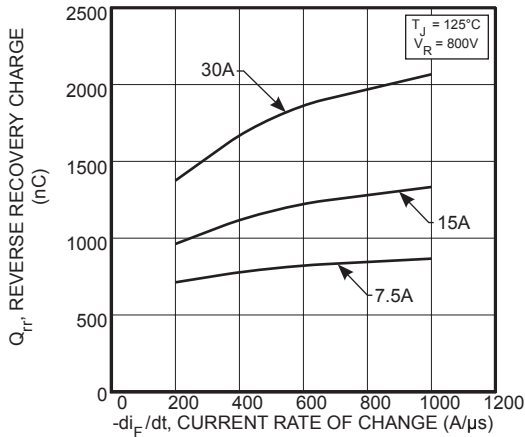
**APT15DQ120BHB(G)**



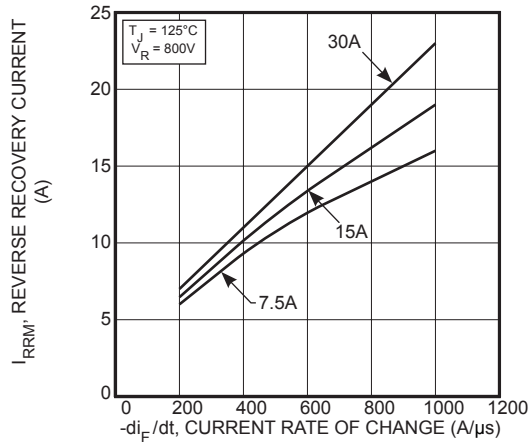
**Figure 2. Forward Current vs. Forward Voltage**



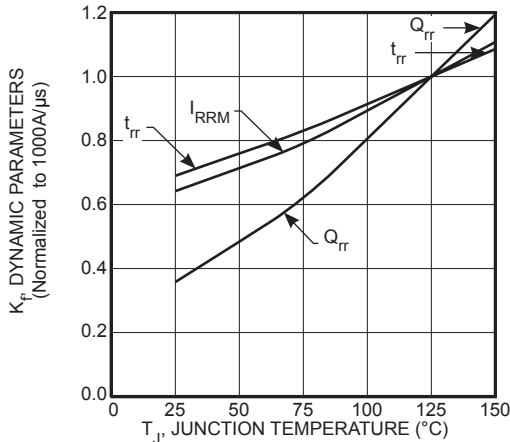
**Figure 3. Reverse Recovery Time vs. Current Rate of Change**



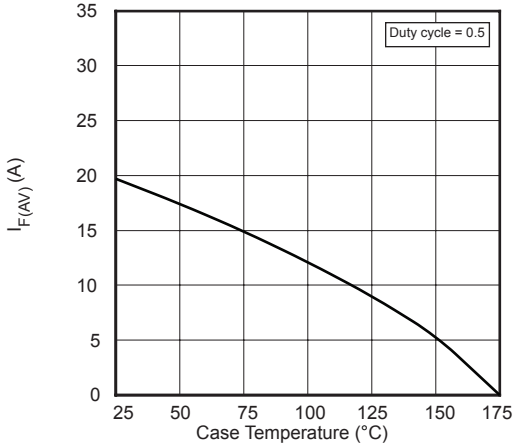
**Figure 4. Reverse Recovery Charge vs. Current Rate of Change**



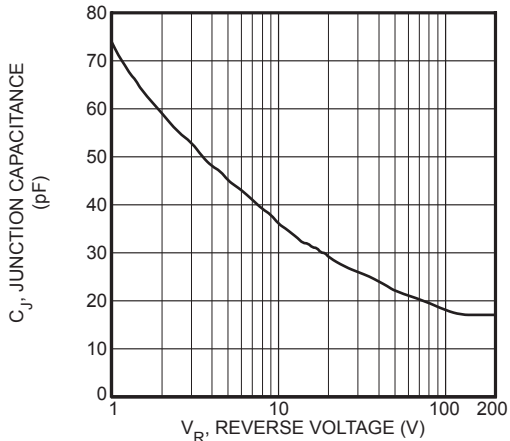
**Figure 5. Reverse Recovery Current vs. Current Rate of Change**



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



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



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

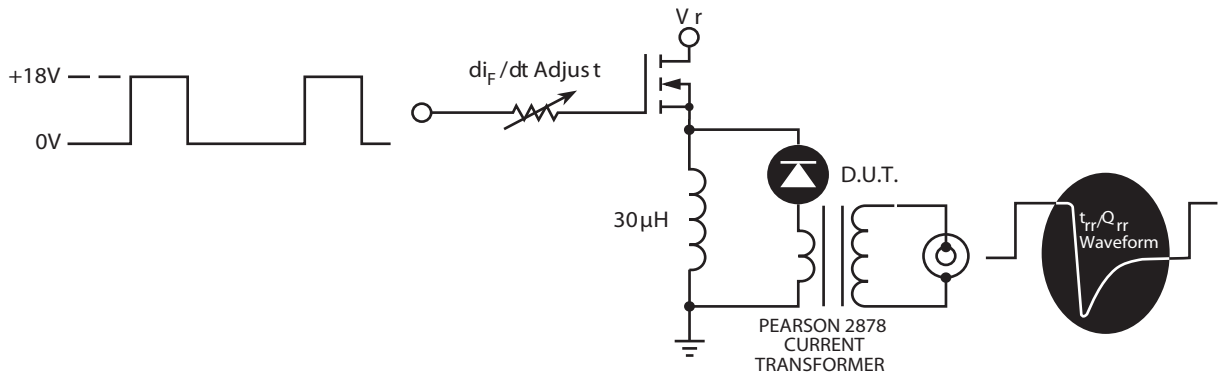


Figure 9. Diode Test Circuit

- 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  $t_{rr}$ .

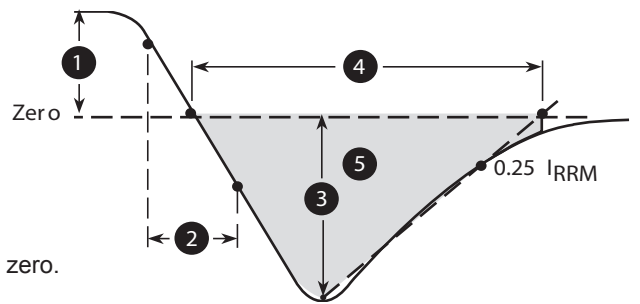
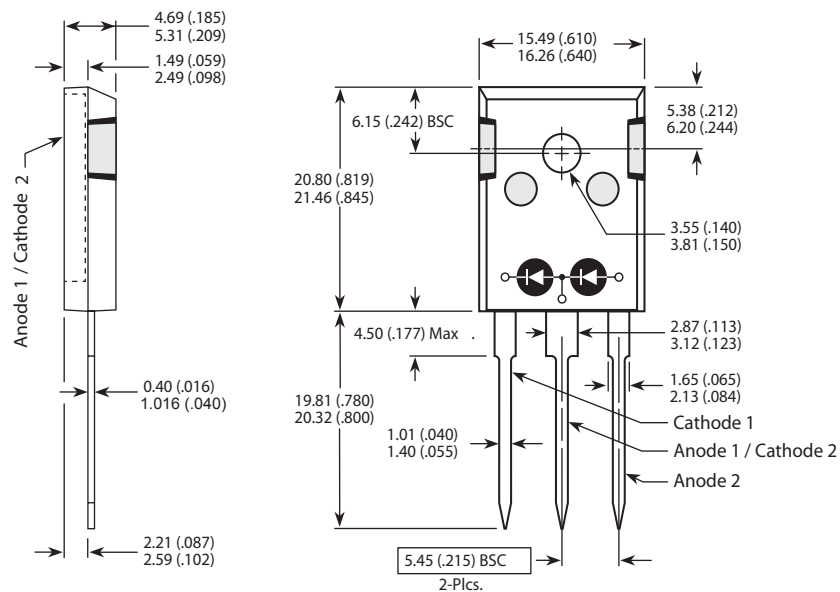


Figure 10. Diode Reverse Recovery Waveform Definition

### TO-247 Package Outline

Ⓢ SAC: Tin, Silver, Copper



Dimensions in Millimeters and (Inches)

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