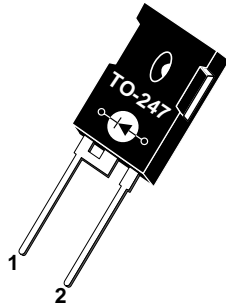


1 - Cathode  
2 - Anode  
Back of Case - Cathode



**ADVANCED  
POWER  
TECHNOLOGY®**  
APT60D40B 400V 60A

## ULTRAFAST SOFT RECOVERY RECTIFIER DIODE

### PRODUCT APPLICATIONS

- Anti-Parallel Diode
  - Switchmode Power Supply
  - Inverters
- Free Wheeling Diode
  - Motor Controllers
  - Converters
- Snubber Diode
- Uninterruptible Power Supply (UPS)
- Induction Heating
- High Speed Rectifiers

### PRODUCT FEATURES

- Ultrafast Recovery Times
- Soft Recovery Characteristics
- Popular TO-247 Package
- Low Forward Voltage
- High Blocking Voltage
- Low Leakage Current

### PRODUCT BENEFITS

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

### MAXIMUM RATINGS

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

Symbol	Characteristic / Test Conditions	APT60D40B	UNIT
$V_R$	Maximum D.C. Reverse Voltage	400	Volts
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		
$V_{RWM}$	Maximum Working Peak Reverse Voltage		
$I_F(AV)$	Maximum Average Forward Current ( $T_C = 70^\circ\text{C}$ , Duty Cycle = 0.5)	60	Amps
$I_F(RMS)$	RMS Forward Current	100	
$I_{FSM}$	Non-Repetitive Forward Surge Current ( $T_J = 45^\circ\text{C}$ , 8.3ms)	600	
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_L$	Lead Temperature: 0.063" from Case for 10 Sec.	300	

### STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT	
$V_F$	Maximum Forward Voltage		$I_F = 60\text{A}$	1.2	1.5	Volts
			$I_F = 120\text{A}$	1.5		
			$I_F = 60\text{A}, T_J = 150^\circ\text{C}$	1.05	1.3	
$I_{RM}$	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, $V_R = 200\text{V}$		110		pF	
$L_S$	Series Inductance (Lead to Lead 5mm from Base)		10		nH	

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### DYNAMIC CHARACTERISTICS

APT60D40B

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$t_{rr1}$	Reverse Recovery Time, $I_F = 1.0A$ , $di_F/dt = -15A/\mu s$ , $V_R = 30V$ , $T_J = 25^\circ C$		55	70	ns
$t_{rr2}$	Reverse Recovery Time	$T_J = 25^\circ C$	40		
$t_{rr3}$	$I_F = 60A$ , $di_F/dt = -480A/\mu s$ , $V_R = 240V$	$T_J = 100^\circ C$	65		
$t_{fr1}$	Forward Recovery Time	$T_J = 25^\circ C$	175		
$t_{fr2}$	$I_F = 60A$ , $di_F/dt = 480A/\mu s$ , $V_R = 240V$	$T_J = 100^\circ C$	175		
$I_{RRM1}$	Reverse Recovery Current	$T_J = 25^\circ C$	10	17	Amps
$I_{RRM2}$	$I_F = 60A$ , $di_F/dt = -480A/\mu s$ , $V_R = 240V$	$T_J = 100^\circ C$	20	30	
$Q_{rr1}$	Recovery Charge	$T_J = 25^\circ C$	275		nC
$Q_{rr2}$	$I_F = 60A$ , $di_F/dt = -480A/\mu s$ , $V_R = 240V$	$T_J = 100^\circ C$	800		
$V_{fr1}$	Forward Recovery Voltage	$T_J = 25^\circ C$	6.5		Volts
$V_{fr2}$	$I_F = 60A$ , $di_F/dt = 480A/\mu s$ , $V_R = 240V$	$T_J = 100^\circ C$	6.5		
$diM/dt$	Rate of Fall of Recovery Current	$T_J = 25^\circ C$	1250		A/ $\mu s$
	$I_F = 60A$ , $di_F/dt = -480A/\mu s$ , $V_R = 240V$ (See Figure 10)	$T_J = 100^\circ C$	2700		

### THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance			0.66	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient Thermal Resistance			40	
$W_T$	Package Weight		0.22		oz
			6.1		gm
Torque	Maximum Mounting Torque (Screw Type = 6-32 or 3mm Machine)			10	lb•in
				1.1	N•m

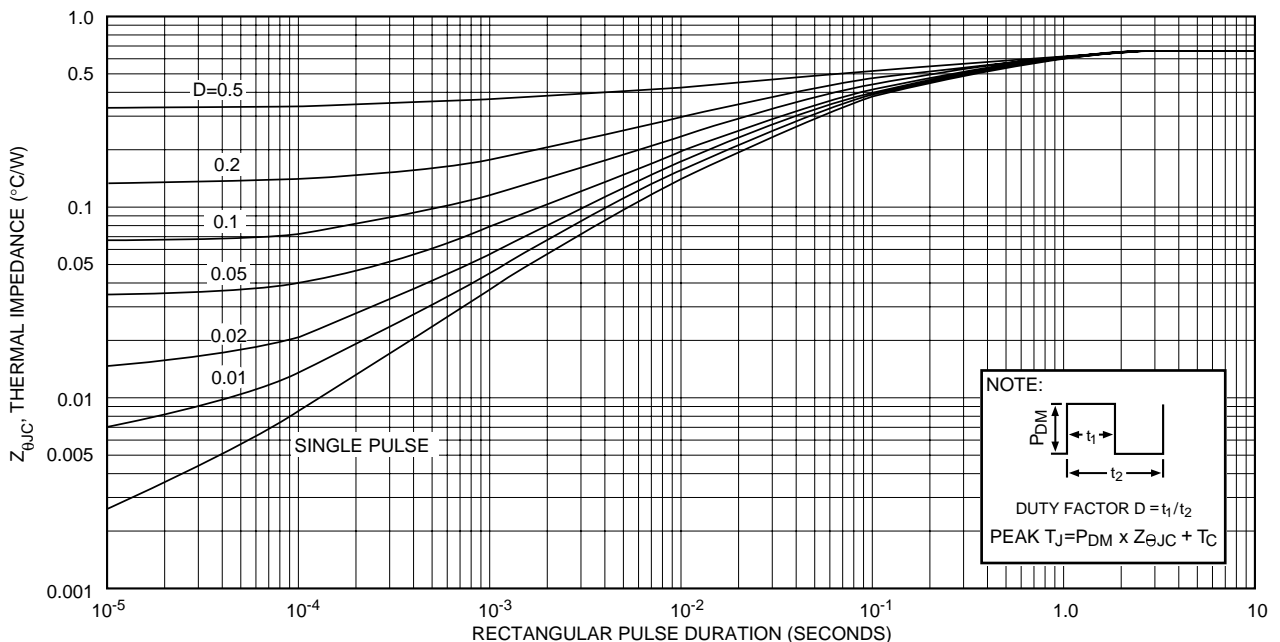
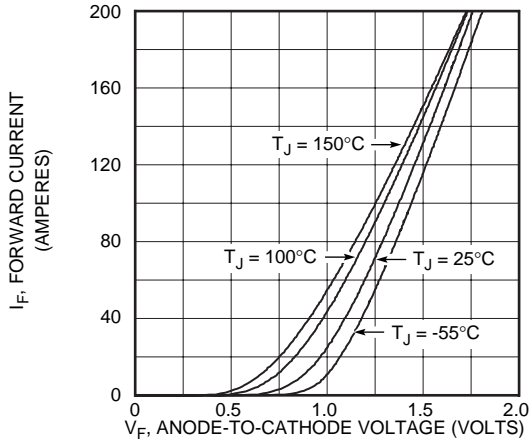
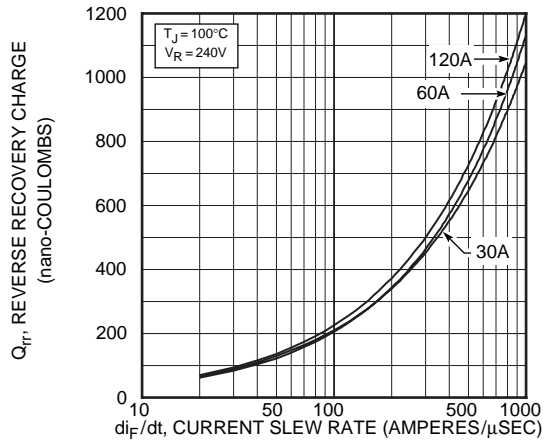


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

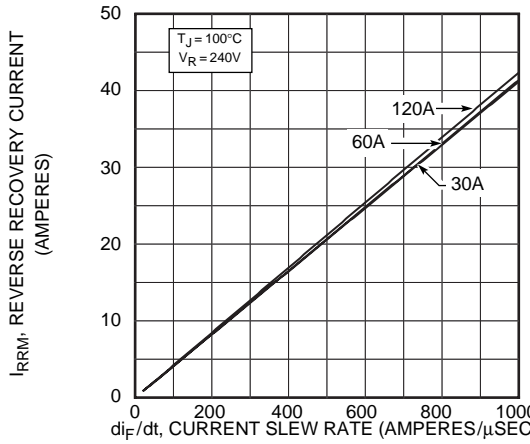
**APT60D40B**



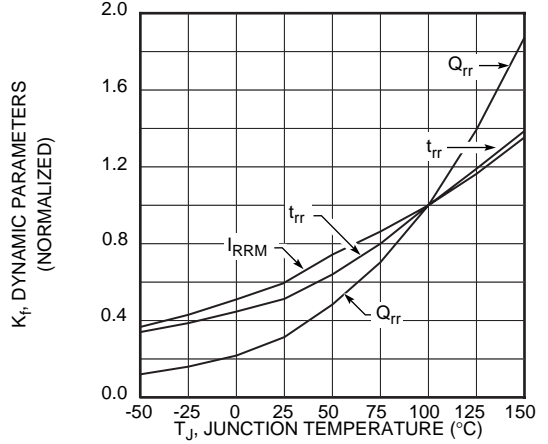
**Figure 2, Forward Voltage Drop vs Forward Current**



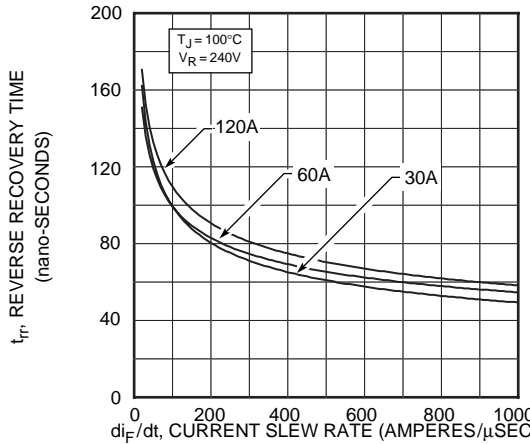
**Figure 3, Reverse Recovery Charge vs Current Slew Rate**



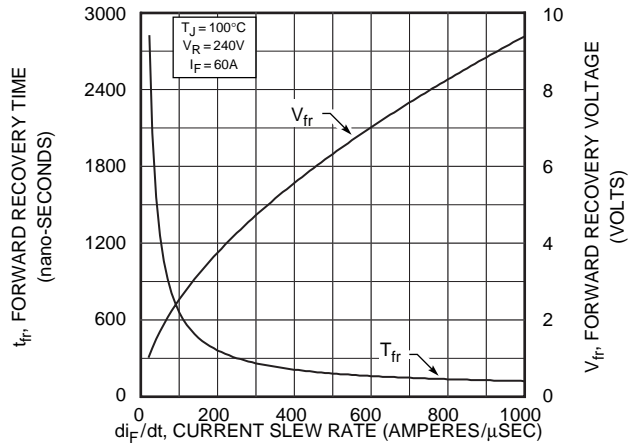
**Figure 4, Reverse Recovery Current vs Current Slew Rate**



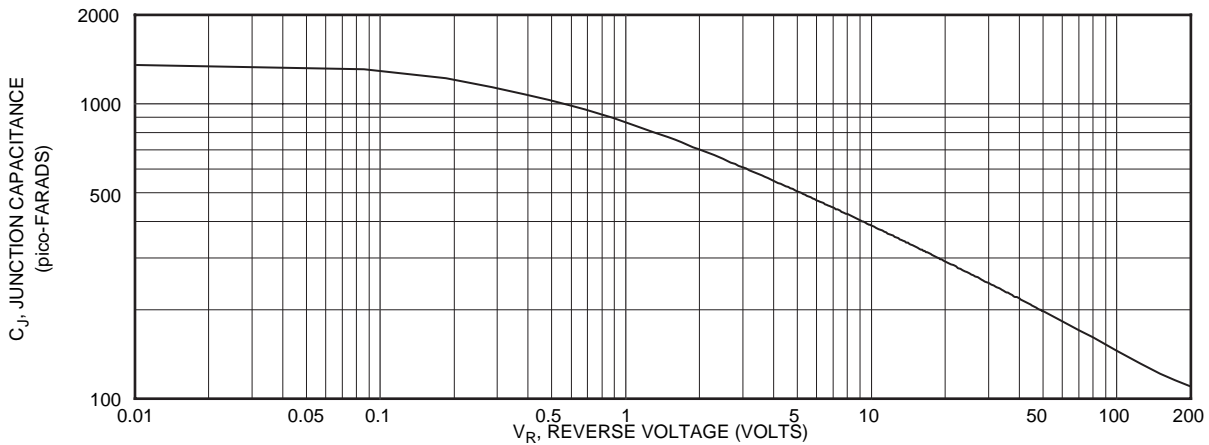
**Figure 5, Dynamic Parameters vs Junction Temperature**



**Figure 6, Reverse Recovery Time vs Current Slew Rate**



**Figure 7, Forward Recovery Voltage/Time vs Current Slew Rate**



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

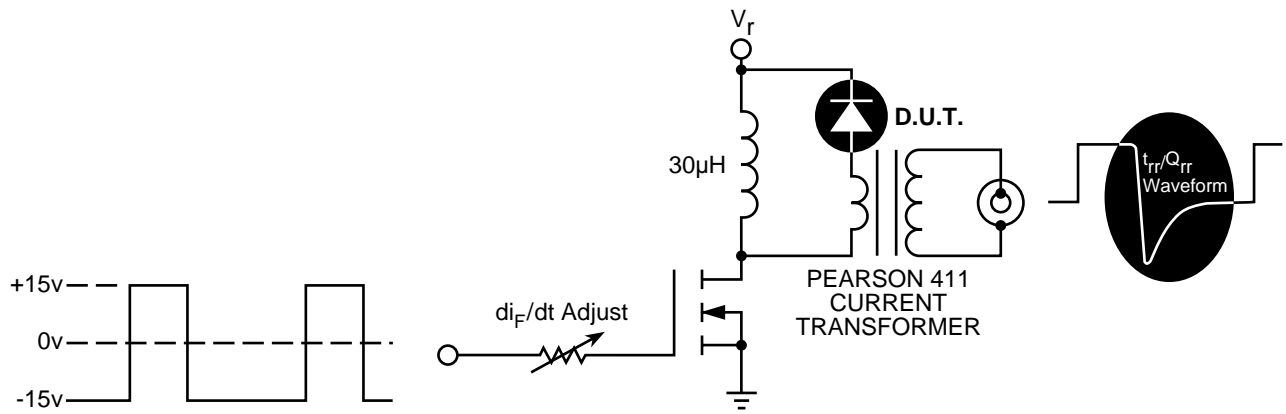


Figure 9, Diode Reverse Recovery Test Circuit and Waveforms

- 1  $I_F$  - Forward Conduction Current
- 2  $di_F/dt$  - Current Slew Rate, Rate of Forward Current Change Through Zero Crossing.
- 3  $I_{RRM}$  - Peak Reverse Recovery Current.
- 4  $t_{rr}$  - Reverse Recovery Time Measured from Point of  $I_F$  Current Falling Through Zero to a Tangent Line { 6  $di_M/dt$  } Extrapolated Through Zero Defined by 0.75 and 0.50  $I_{RRM}$ .
- 5  $Q_{rr}$  - Area Under the Curve Defined by  $I_{RRM}$  and  $t_{rr}$ .
- 6  $di_M/dt$  - Maximum Rate of Current Change During the Trailing Portion of  $t_{rr}$ .

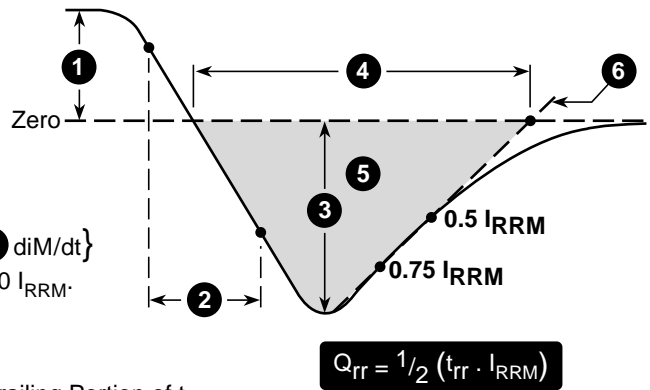
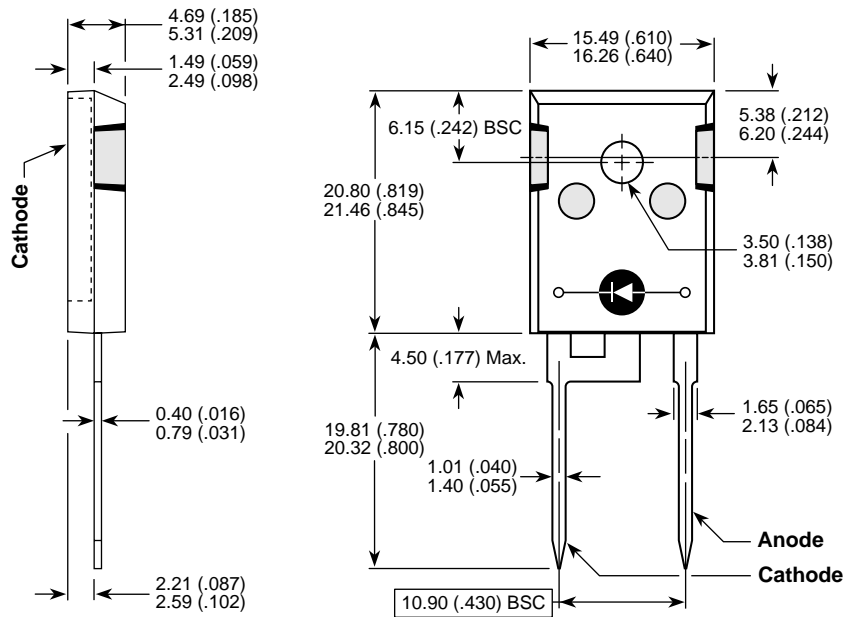


Figure 10, Diode Reverse Recovery Waveform and Definitions

### TO-247 Package Outline



Dimensions in Millimeters and (Inches)