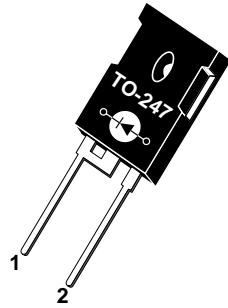


1 - Cathode  
2 - Anode  
Back of Case - Cathode



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

## ULTRAFAST SOFT RECOVERY RECTIFIER DIODE

PRODUCT APPLICATIONS	PRODUCT FEATURES	PRODUCT BENEFITS
<ul style="list-style-type: none"> <li>• Anti-Parallel Diode               <ul style="list-style-type: none"> <li>-Switchmode Power Supply</li> <li>-Inverters</li> </ul> </li> <li>• Free Wheeling Diode               <ul style="list-style-type: none"> <li>-Motor Controllers</li> <li>-Converters</li> </ul> </li> <li>• Snubber Diode</li> <li>• Uninterruptible Power Supply (UPS)</li> <li>• Induction Heating</li> <li>• High Speed Rectifiers</li> </ul>	<ul style="list-style-type: none"> <li>• Ultrafast Recovery Times</li> <li>• Soft Recovery Characteristics</li> <li>• Popular TO-247 Package</li> <li>• Low Forward Voltage</li> <li>• High Blocking Voltage</li> <li>• Low Leakage Current</li> </ul>	<ul style="list-style-type: none"> <li>• Low Losses</li> <li>• Low Noise Switching</li> <li>• Cooler Operation</li> <li>• Higher Reliability Systems</li> <li>• Increased System Power Density</li> </ul>

### 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

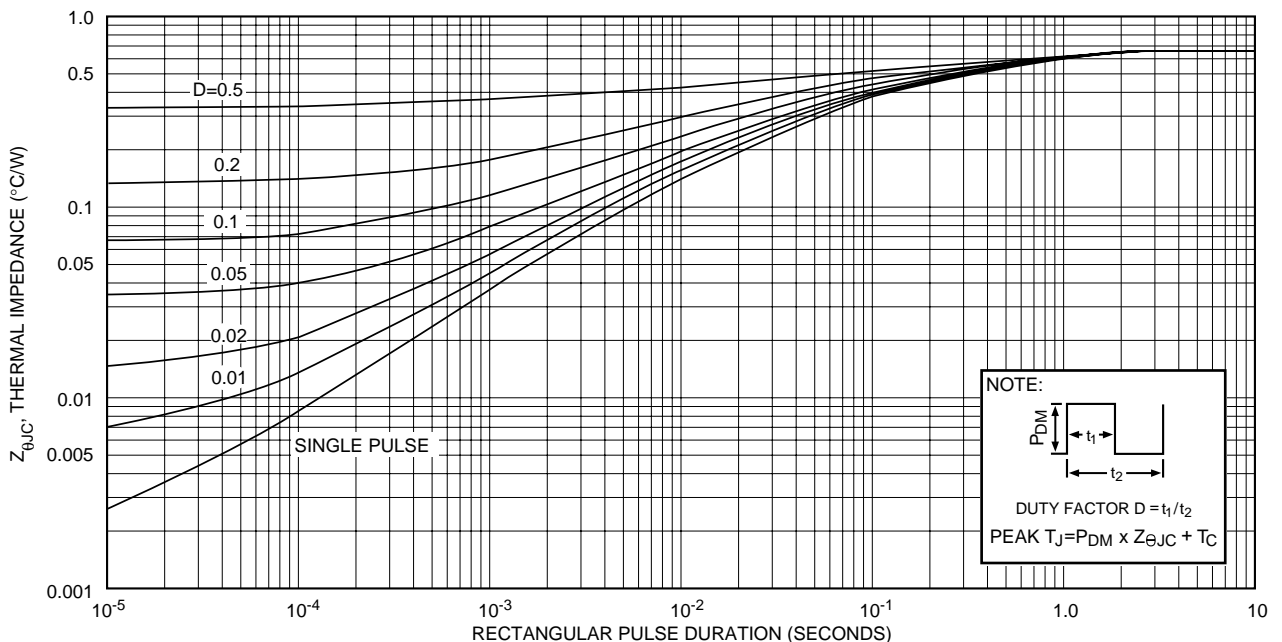


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

# APT60D40B

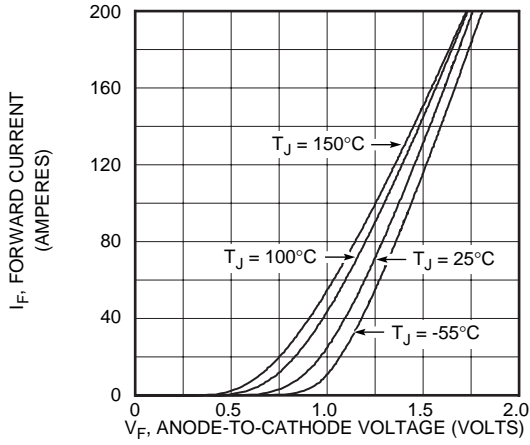


Figure 2, Forward Voltage Drop vs Forward Current

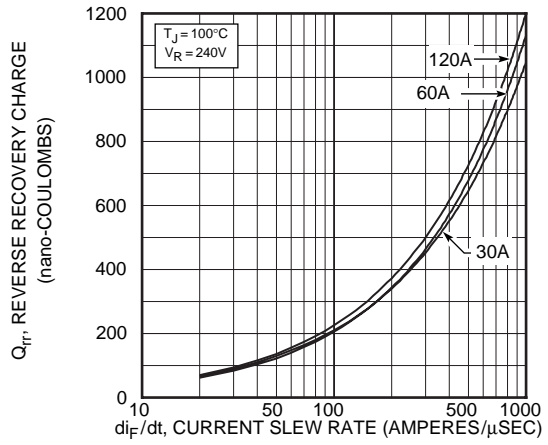


Figure 3, Reverse Recovery Charge vs Current Slew Rate

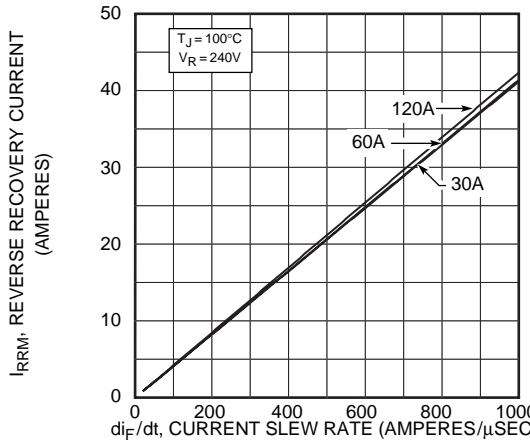


Figure 4, Reverse Recovery Current vs Current Slew Rate

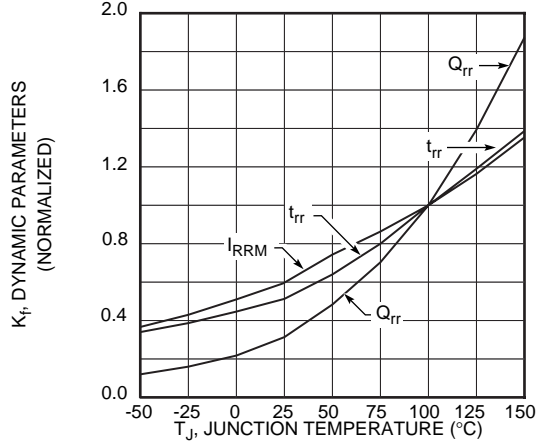


Figure 5, Dynamic Parameters vs Junction Temperature

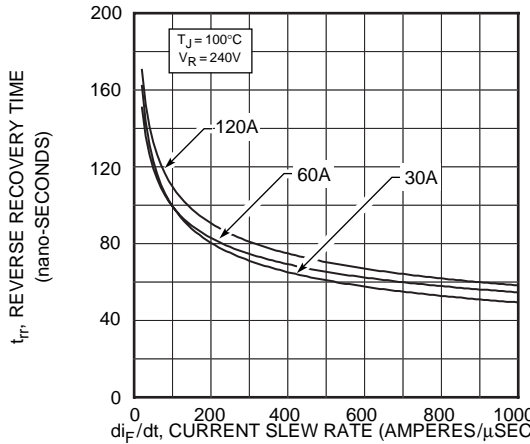


Figure 6, Reverse Recovery Time vs Current Slew Rate

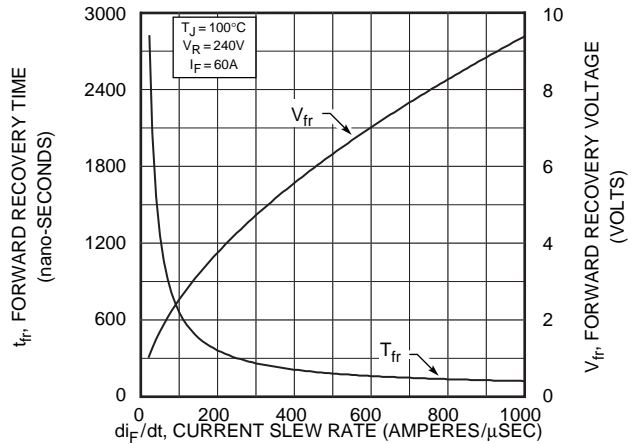


Figure 7, Forward Recovery Voltage/Time vs Current Slew Rate

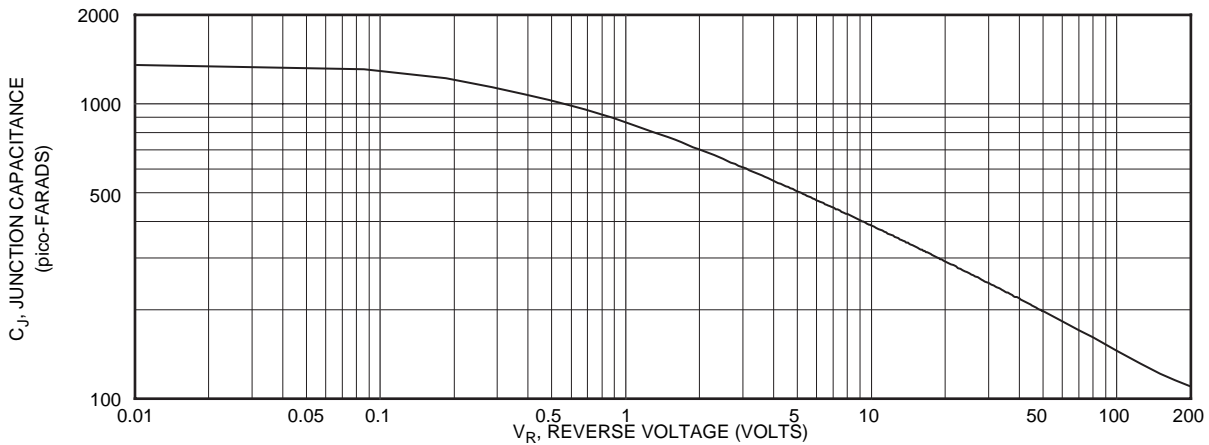


Figure 8, Junction Capacitance vs Reverse Voltage

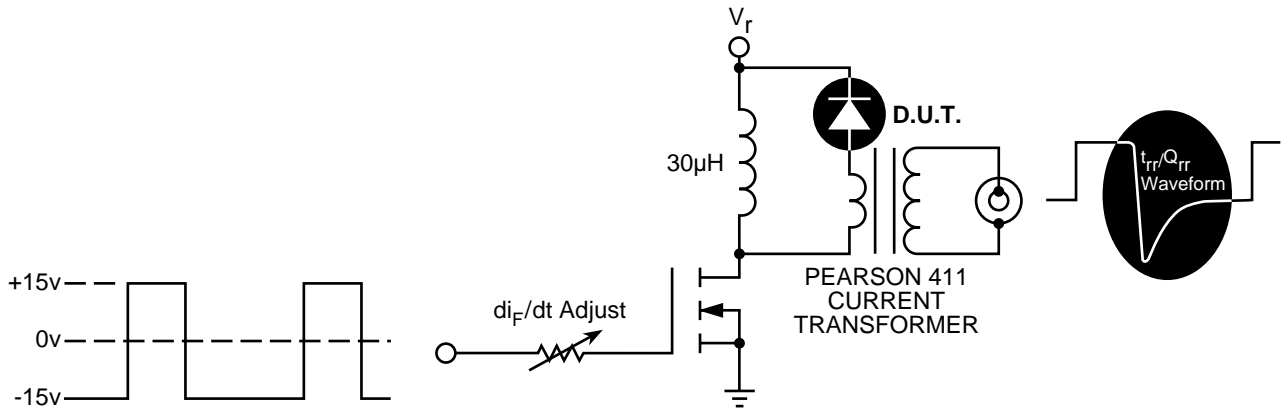


Figure 9, Diode Reverse Recovery Test Circuit and Waveforms

1  $I_F$  - Forward Conduction Current

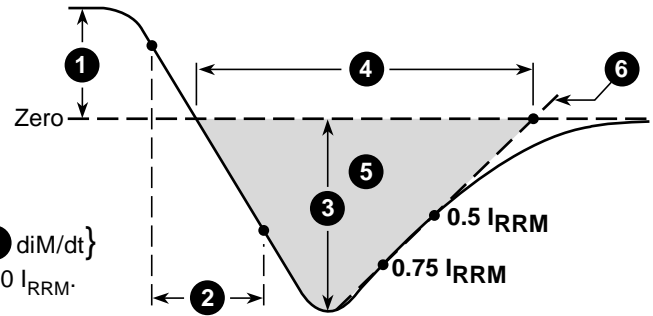
2  $di_F/dt$  - Current Slew Rate, Rate of Forward Current Change Through Zero Crossing.

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  $t_{rr}$ .

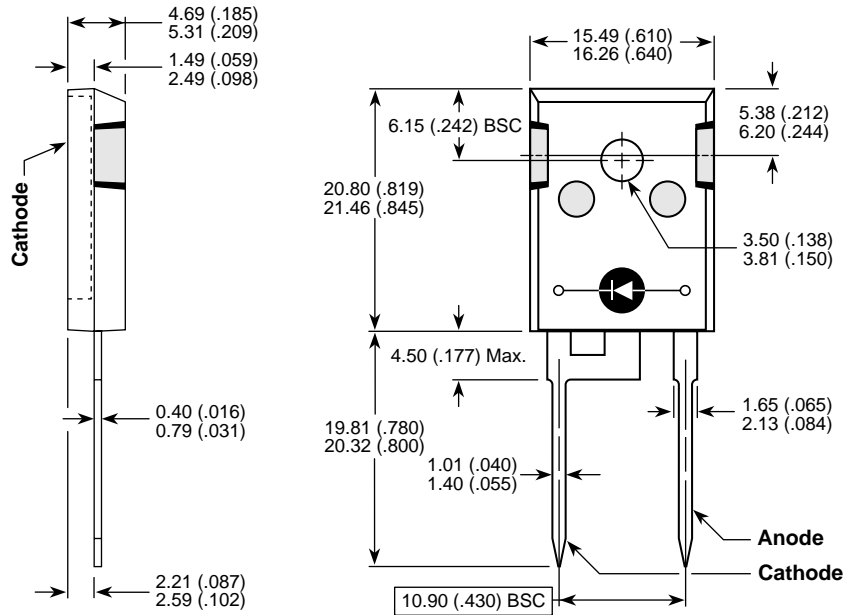
6  $di_M/dt$  - Maximum Rate of Current Change During the Trailing Portion of  $t_{rr}$ .



$$Q_{rr} = \frac{1}{2} (t_{rr} \cdot I_{RRM})$$

Figure 10, Diode Reverse Recovery Waveform and Definitions

### TO-247 Package Outline



Dimensions in Millimeters and (Inches)