



**600V 60A**  
**APT60D60B APT60D60S**  
**APT60D60BG\* APT60D60SG\***

\*G Denotes RoHS Compliant, Pb Free Terminal Finish.

**ULTRAFAST SOFT RECOVERY RECTIFIER DIODE**

**PRODUCT APPLICATIONS**

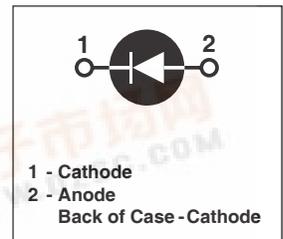
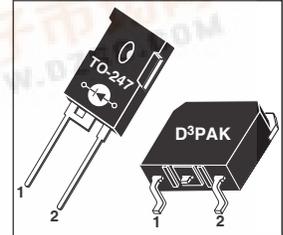
- Anti-Parallel Diode
  - Switchmode Power Supply
  - Inverters
- Free Wheeling Diode
  - Motor Controllers
  - Converters
  - Inverters
- Snubber Diode
- PFC

**PRODUCT FEATURES**

- Ultrafast Recovery Times
- Soft Recovery Characteristics
- Popular TO-247 Package or Surface Mount D<sup>3</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



**MAXIMUM RATINGS**

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

Symbol	Characteristic / Test Conditions	APT60D60B_S(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 ( $T_C = 135^\circ\text{C}$ , Duty Cycle = 0.5)	60	Amps
$I_{F(RMS)}$	RMS Forward Current (Square wave, 50% duty)	132	
$I_{FSM}$	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 175	$^\circ\text{C}$
$T_L$	Lead Temperature for 10 Sec.	300	

**STATIC ELECTRICAL CHARACTERISTICS**

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT	
$V_F$	Forward Voltage		$I_F = 60\text{A}$	1.6	1.8	Volts
			$I_F = 120\text{A}$	1.9		
			$I_F = 60\text{A}, T_J = 125^\circ\text{C}$	1.4		
$I_{RM}$	Maximum Reverse Leakage Current		$V_R = 600\text{V}$		250	$\mu\text{A}$
			$V_R = 600\text{V}, T_J = 125^\circ\text{C}$		500	
$C_T$	Junction Capacitance, $V_R = 200\text{V}$		90		pF	



**DYNAMIC CHARACTERISTICS**

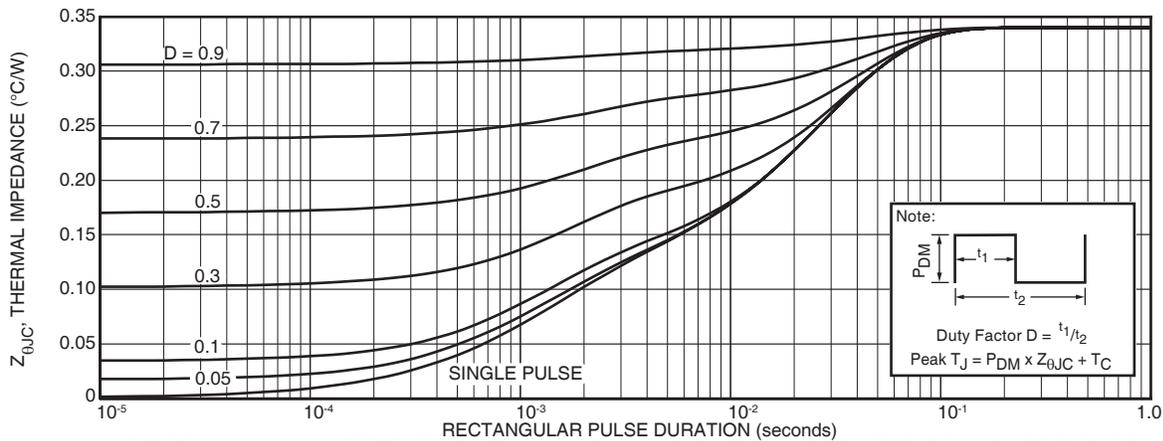
**APT60D60B\_S(G)**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$t_{rr}$	Reverse Recovery Time	$I_F = 1A, di_F/dt = -100A/\mu s, V_R = 30V, T_J = 25^\circ C$	-	40		ns
$t_{rr}$	Reverse Recovery Time		-	130		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 60A, di_F/dt = -200A/\mu s, V_R = 400V, T_C = 25^\circ C$	-	220		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	4	-	Amps
$t_{rr}$	Reverse Recovery Time			-	170	
$Q_{rr}$	Reverse Recovery Charge	$I_F = 60A, di_F/dt = -200A/\mu s, V_R = 400V, T_C = 125^\circ C$	-	920		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	10	-	Amps
$t_{rr}$	Reverse Recovery Time			-	80	
$Q_{rr}$	Reverse Recovery Charge	$I_F = 60A, di_F/dt = -1000A/\mu s, V_R = 400V, T_C = 125^\circ C$	-	1900		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	38		Amps

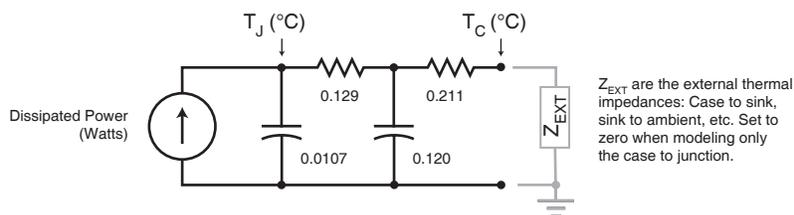
**THERMAL AND MECHANICAL CHARACTERISTICS**

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance			.34	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient Thermal Resistance			40	
$W_T$	Package Weight		0.22		oz
			5.9		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 1a. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION**

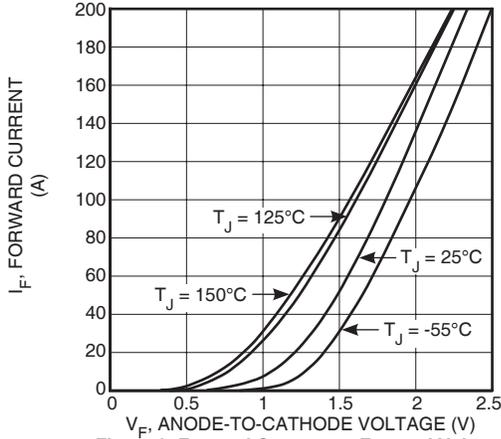


$Z_{EXT}$  are the external thermal impedances: Case to sink, sink to ambient, etc. Set to zero when modeling only the case to junction.

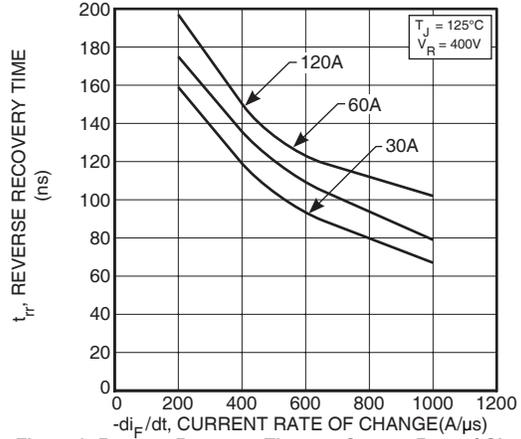
**FIGURE 1b. TRANSIENT THERMAL IMPEDANCE MODEL**

**TYPICAL PERFORMANCE CURVES**

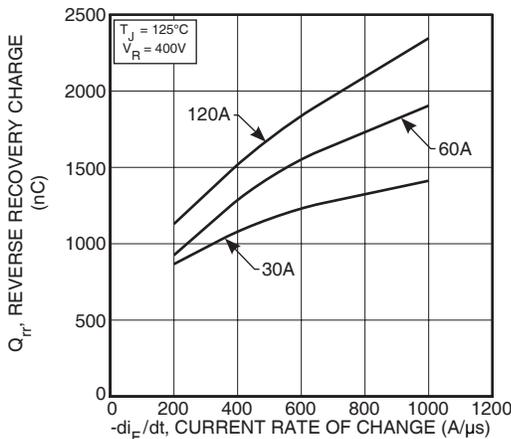
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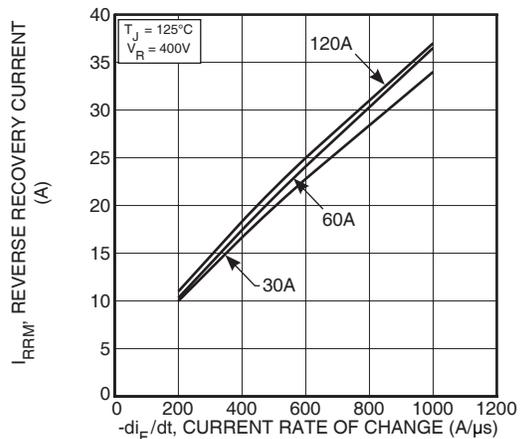
**Figure 2. Forward Current vs. Forward Voltage**



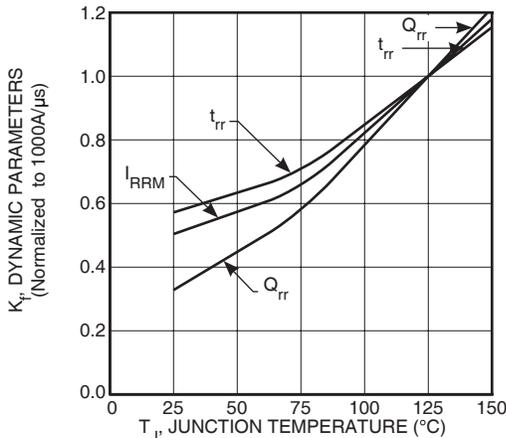
**Figure 3. Reverse Recovery Time vs. Current Rate of Change**



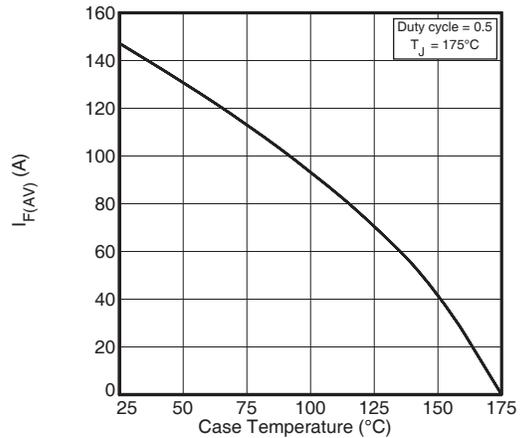
**Figure 4. Reverse Recovery Charge vs. Current Rate of Change**



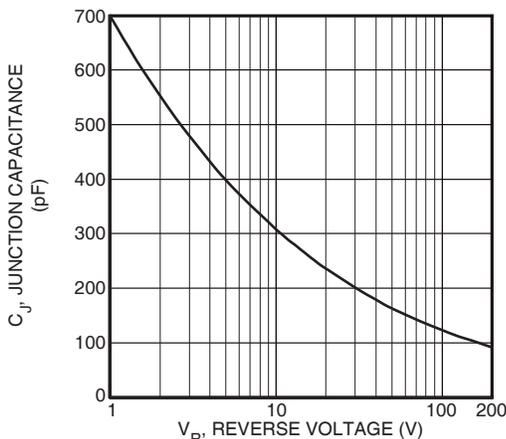
**Figure 5. Reverse Recovery Current vs. Current Rate of Change**



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



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



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

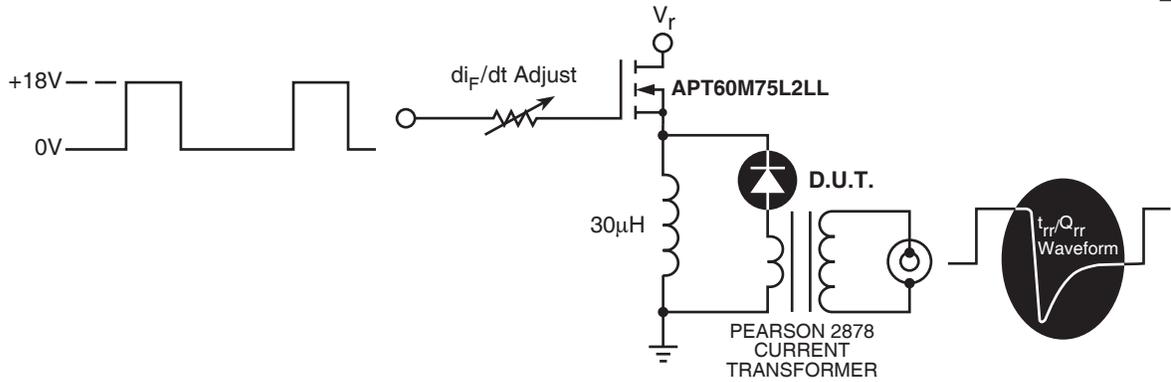


Figure 9. Diode Test Circuit

- 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  $0.25 \cdot I_{RRM}$  passes through zero.
- 5  $Q_{rr}$  - Area Under the Curve Defined by  $I_{RRM}$  and  $t_{rr}$ .

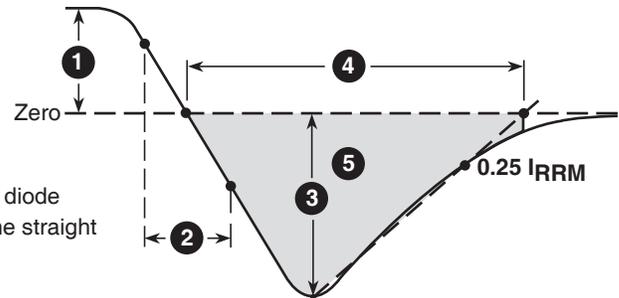
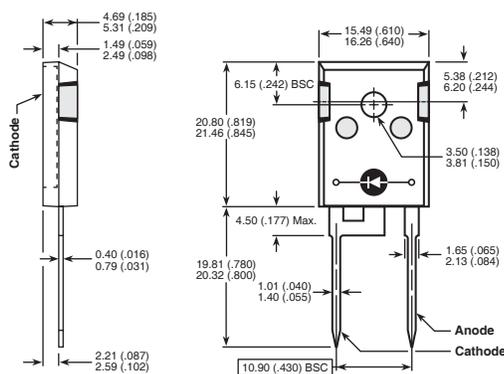


Figure 10, Diode Reverse Recovery Waveform and Definitions

### TO-247 Package Outline

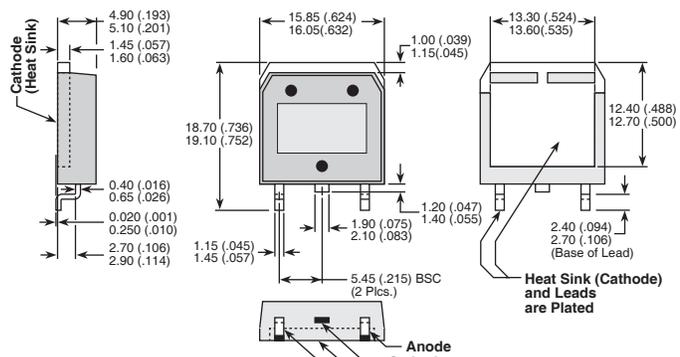
(e1) SAC: Tin, Silver, Copper



Dimensions in Millimeters and (Inches)

### D<sup>3</sup>PAK Package Outline

(e3) 100% Sn



Dimensions in Millimeters (Inches)

Heat Sink (Cathode) and Leads are Plated