



**1200V 40A**  
**APT40DQ120B**      **APT40DQ120S**  
**APT40DQ120BG\***   **APT40DQ120SG\***

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

**ULTRAFAST SOFT RECOVERY RECTIFIER DIODE**

**PRODUCT APPLICATIONS**

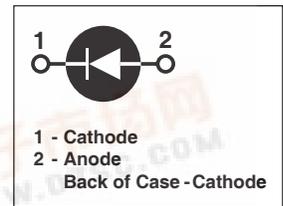
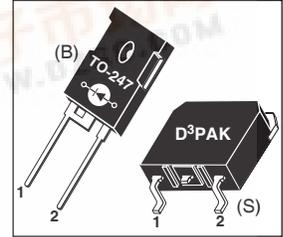
- Anti-Parallel Diode
  - Switchmode Power Supply
  - Inverters
- Free Wheeling Diode
  - Motor Controllers
  - Converters
  - Inverters
- Snubber Diode
- PFC

**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
- Avalanche Energy Rated

**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	APT40DQ120B(G)_S(G)	UNIT
$V_R$	Maximum D.C. Reverse Voltage	1200	Volts
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		
$V_{RWM}$	Maximum Working Peak Reverse Voltage		
$I_{F(AV)}$	Maximum Average Forward Current ( $T_C = 112^\circ\text{C}$ , Duty Cycle = 0.5)	40	Amps
$I_{F(RMS)}$	RMS Forward Current (Square wave, 50% duty)	63	
$I_{FSM}$	Non-Repetitive Forward Surge Current ( $T_J = 45^\circ\text{C}$ , 8.3ms)	210	
$E_{AVL}$	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	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT	
$V_F$	Forward Voltage		$I_F = 40\text{A}$	2.8	3.3	Volts
			$I_F = 80\text{A}$	3.43		
			$I_F = 40\text{A}, T_J = 125^\circ\text{C}$	2.17		
$I_{RM}$	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, $V_R = 200\text{V}$		36		pF	

**DYNAMIC CHARACTERISTICS**

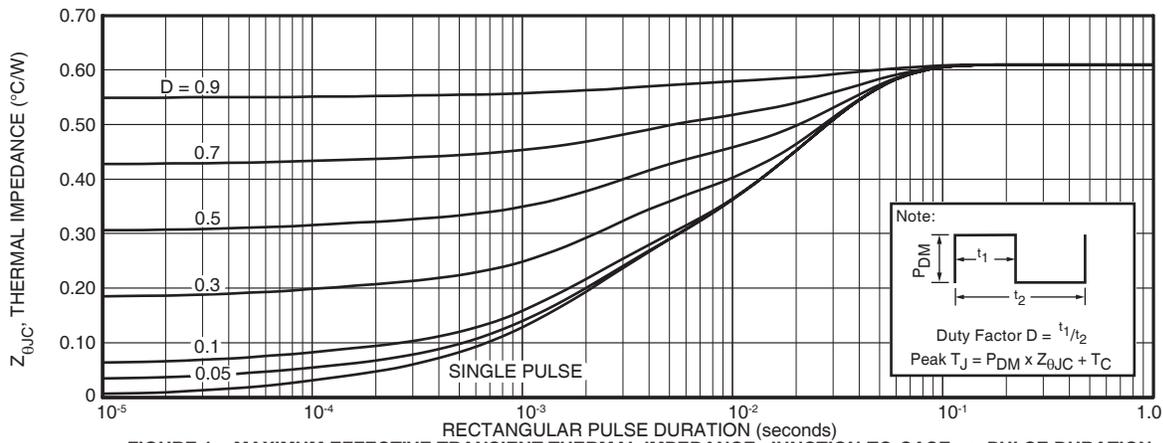
**APT40DQ120B(G)\_S(G)**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$t_{rr}$	Reverse Recovery Time	$I_F = 1A, di_F/dt = -100A/\mu s, V_R = 30V, T_J = 25^\circ C$	-	26		ns
$t_{rr}$	Reverse Recovery Time		-	350		
$Q_{rr}$	Reverse Recovery Charge		$I_F = 40A, di_F/dt = -200A/\mu s, V_R = 800V, T_C = 25^\circ C$	-	570	
$I_{RRM}$	Maximum Reverse Recovery Current	-		4	-	Amps
$t_{rr}$	Reverse Recovery Time	$I_F = 40A, di_F/dt = -200A/\mu s, V_R = 800V, T_C = 125^\circ C$		-	430	
$Q_{rr}$	Reverse Recovery Charge		-	2200		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	9	-	Amps
$t_{rr}$	Reverse Recovery Time	$I_F = 40A, di_F/dt = -1000A/\mu s, V_R = 800V, T_C = 125^\circ C$	-	210		ns
$Q_{rr}$	Reverse Recovery Charge		-	3400		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	29		Amps

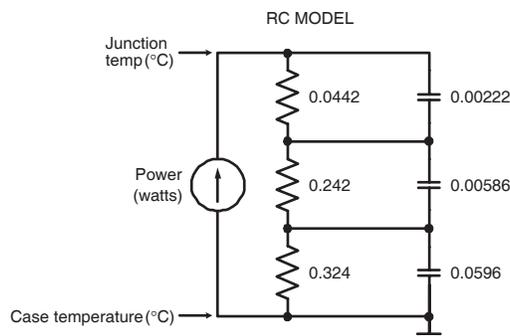
**THERMAL AND MECHANICAL CHARACTERISTICS**

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance			.61	$^\circ C/W$
$W_T$	Package Weight		0.22		oz
			5.9		g
Torque	Maximum Mounting Torque			10	lb•in
				1.1	N•m

APT Reserves the right to change, without notice, the specifications and information contained herein.



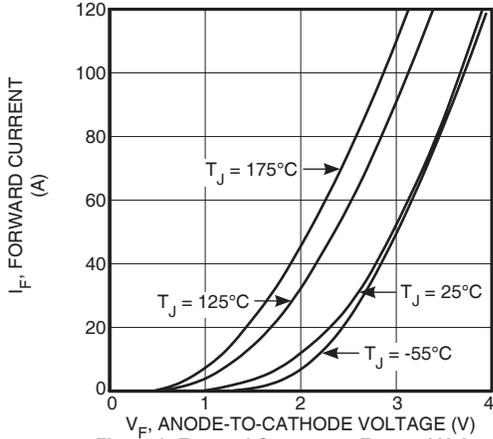
**FIGURE 1a. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION**



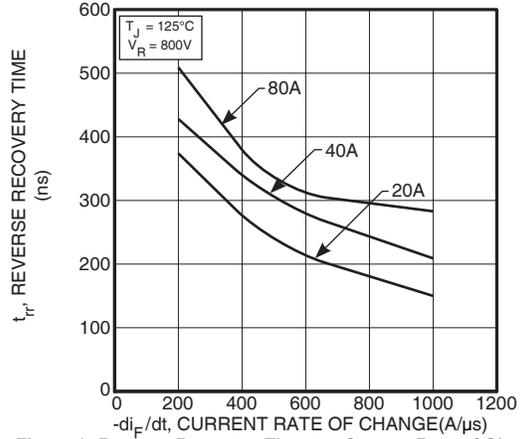
**FIGURE 1b. TRANSIENT THERMAL IMPEDANCE MODEL**

**TYPICAL PERFORMANCE CURVES**

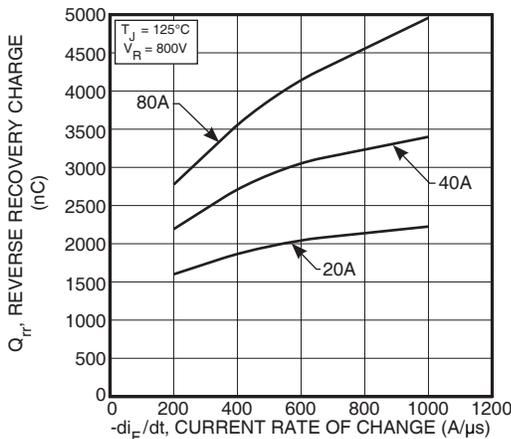
**APT40DQ120B(G)\_S(G)**



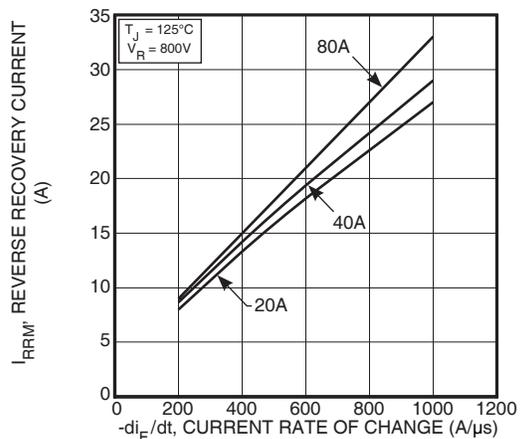
**Figure 2. Forward Current vs. Forward Voltage**



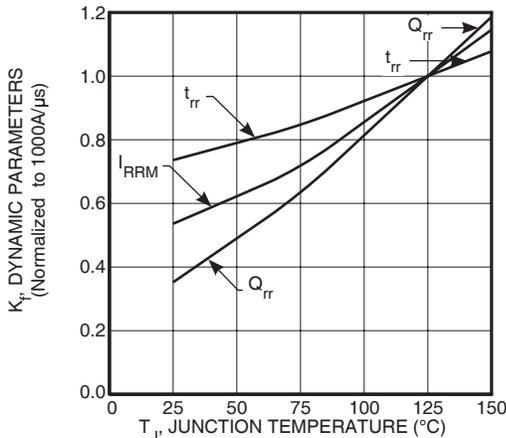
**Figure 3. Reverse Recovery Time vs. Current Rate of Change**



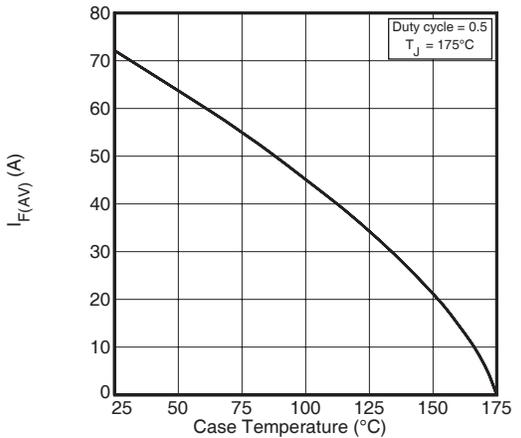
**Figure 4. Reverse Recovery Charge vs. Current Rate of Change**



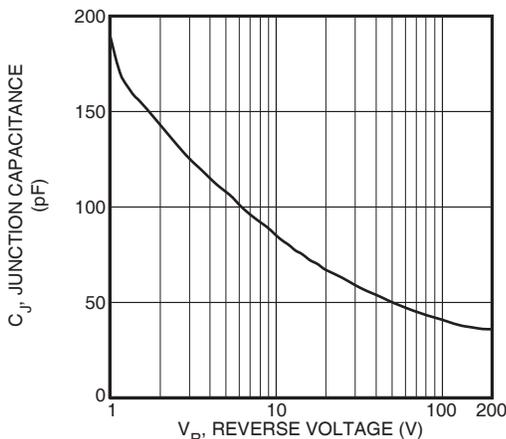
**Figure 5. Reverse Recovery Current vs. Current Rate of Change**



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



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



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

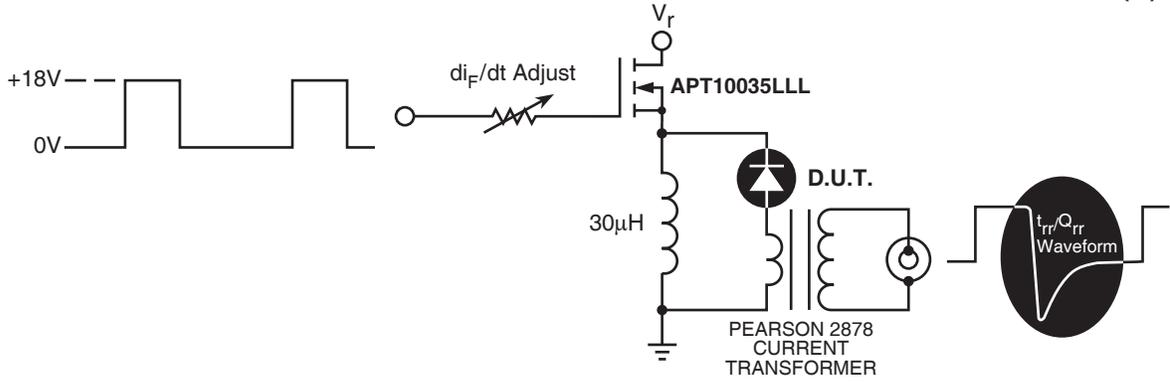


Figure 9. Diode Test Circuit

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

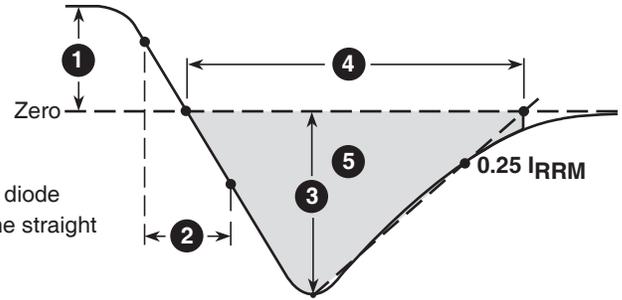
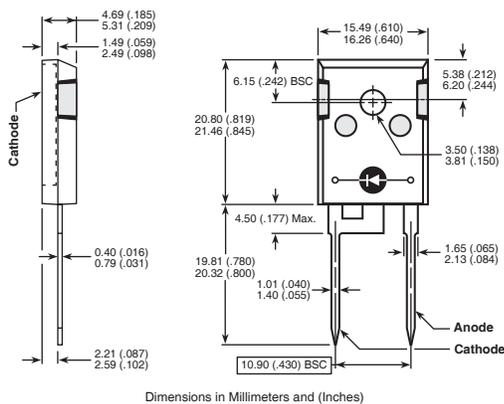


Figure 10, Diode Reverse Recovery Waveform and Definitions

**TO-247 Package Outline**

(e1) SAC: Tin, Silver, Copper



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

(e3) 100% Sn

