

**Microsemi**  
POWER PRODUCTS GROUP

**APT2x61DQ120J 1200V 60A**  
**APT2x60DQ120J 1200V 60A**

## DUAL DIE ISOTOP® PACKAGE

## 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 SOT-227 Package</li> <li>• Low Forward Voltage</li> <li>• High Blocking Voltage</li> <li>• Low Leakage Current</li> <li>• Avalanche Energy Rated</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	APT2x61_60DQ120J	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 ( $T_C = 85^\circ\text{C}$ , Duty Cycle = 0.5)	60	Amps
$I_{F(RMS)}$	RMS Forward Current (Square wave, 50% duty)	73	
$I_{FSM}$	Non-Repetitive Forward Surge Current ( $T_J = 45^\circ\text{C}$ , 8.3ms)	540	
$E_{AVL}$	Avalanche Energy (1A, 40mH)	20	mJ
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 175	$^\circ\text{C}$

### STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT	
$V_F$	Forward Voltage		$I_F = 60\text{A}$	2.5	3.1	Volts
			$I_F = 120\text{A}$	3.07		
			$I_F = 60\text{A}, T_J = 125^\circ\text{C}$	1.82		
$I_{RM}$	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, $V_R = 200\text{V}$		70		pF	

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# DYNAMIC CHARACTERISTICS

APT2x61\_60DQ120J

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$t_{rr}$	Reverse Recovery Time	$I_F = 1A, di_F/dt = -100A/\mu s, V_R = 30V, T_J = 25^\circ C$	-	60		ns
$t_{rr}$	Reverse Recovery Time	$I_F = 60A, di_F/dt = -200A/\mu s, V_R = 800V, T_C = 25^\circ C$	-	265		
$Q_{rr}$	Reverse Recovery Charge		-	560		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	5	-	Amps
$t_{rr}$	Reverse Recovery Time	$I_F = 60A, di_F/dt = -200A/\mu s, V_R = 800V, T_C = 125^\circ C$	-	350		ns
$Q_{rr}$	Reverse Recovery Charge		-	2890		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	13	-	Amps
$t_{rr}$	Reverse Recovery Time	$I_F = 60A, di_F/dt = -1000A/\mu s, V_R = 800V, T_C = 125^\circ C$	-	150		ns
$Q_{rr}$	Reverse Recovery Charge		-	4720		nC
$I_{RRM}$	Maximum Reverse Recovery Current		-	40		Amps

# THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance			.56	$^\circ C/W$
$V_{Isolation}$	RMS Voltage (50-60Hz Sinusoidal Waveform From Terminals to Mounting Base for 1 Min.)	2500			Volts
$W_T$	Package Weight		1.03		oz
			29.2		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.

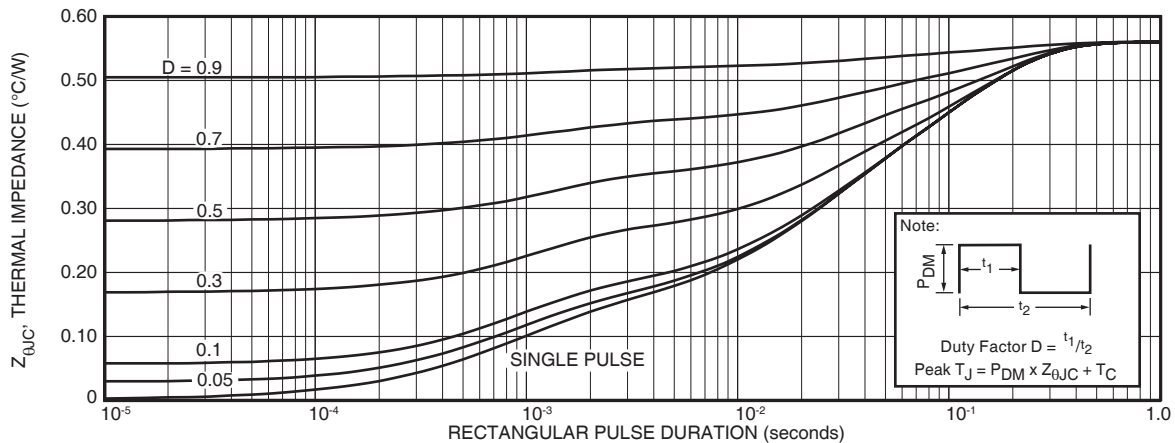


FIGURE 1a. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

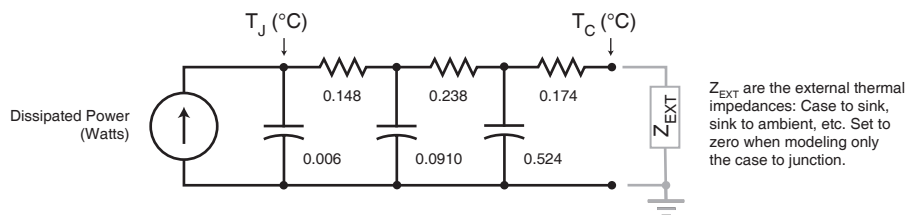


FIGURE 1b, TRANSIENT THERMAL IMPEDANCE MODEL

# TYPICAL PERFORMANCE CURVES

APT2x61\_60DQ120J

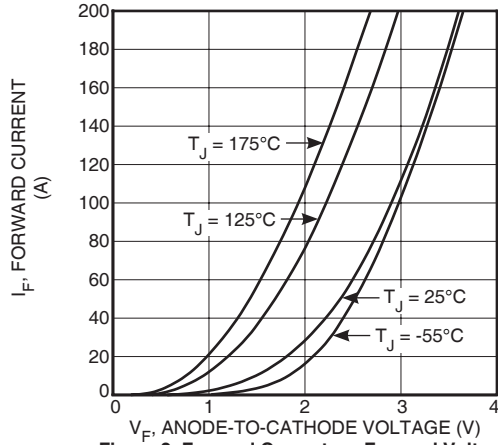


Figure 2. Forward Current vs. Forward Voltage

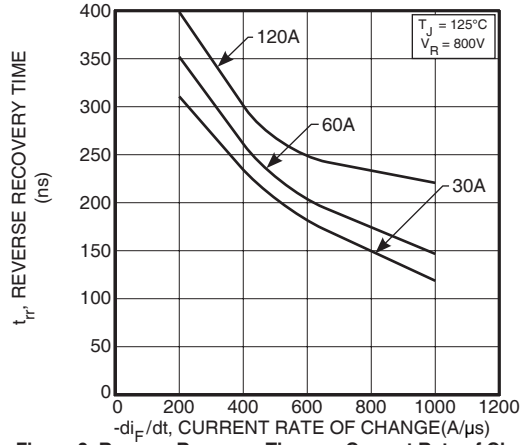


Figure 3. Reverse Recovery Time vs. Current Rate of Change

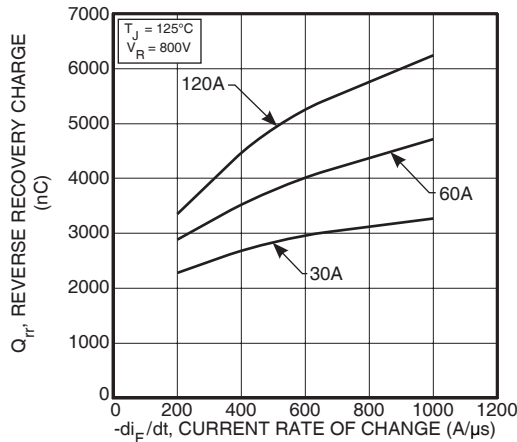


Figure 4. Reverse Recovery Charge vs. Current Rate of Change

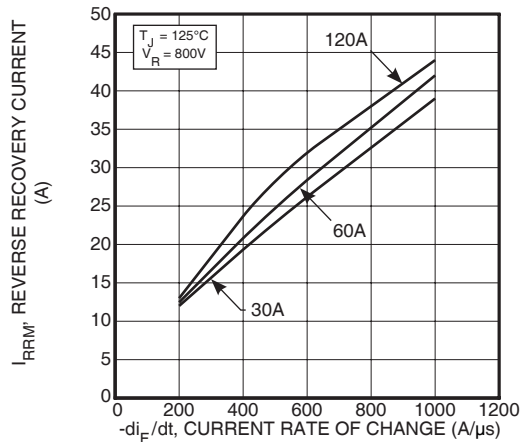


Figure 5. Reverse Recovery Current vs. Current Rate of Change

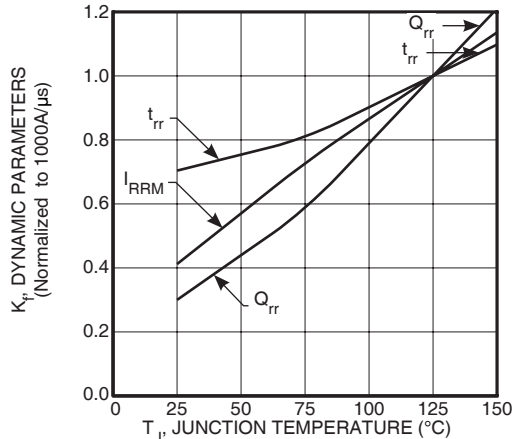


Figure 6. Dynamic Parameters vs. Junction Temperature

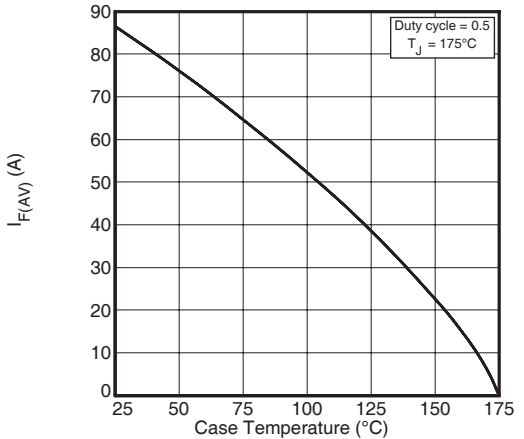


Figure 7. Maximum Average Forward Current vs. Case Temperature

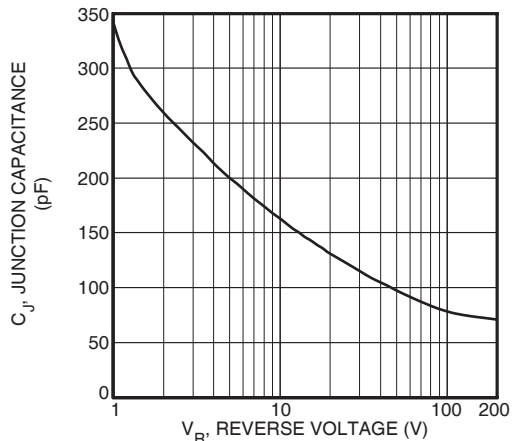


Figure 8. Junction Capacitance vs. Reverse Voltage

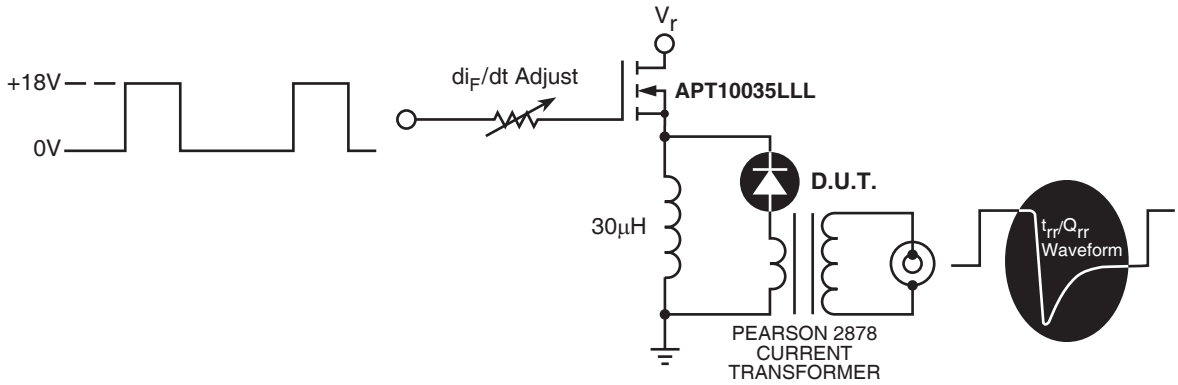


Figure 9. Diode Test Circuit

- 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

### SOT-227 (ISOTOP®) Package Outline

