

## ULTRAFAST SOFT RECOVERY RECTIFIER DIODE

### PRODUCT APPLICATIONS

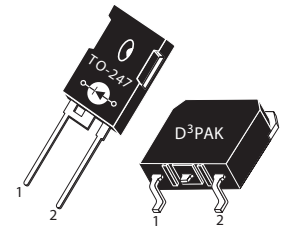
- Anti-Parallel Diode
  - Switchmode Power Supply
  - Inverters
- Free Wheeling Diode
  - Motor Controllers
  - Converters
  - Inverters
- Snubber Diode
- PFC

### 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



1 - Cathode  
 2 - Anode  
 Back of Case - Cathode

### 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            | $I_F = 60A, di_F/dt = -200A/\mu s, V_R = 400V, T_C = 25^\circ C$   | -   | 130  |     |      |
| $Q_{rr}$  | Reverse Recovery Charge          |  | -   | 220  |     | nC   |
| $I_{RRM}$ | Maximum Reverse Recovery Current |  | -   | 4    | -   | Amps |
| $t_{rr}$  | Reverse Recovery Time            | $I_F = 60A, di_F/dt = -200A/\mu s, V_R = 400V, T_C = 125^\circ C$  | -   | 170  |     | ns   |
| $Q_{rr}$  | Reverse Recovery Charge          |  | -   | 920  |     | nC   |
| $I_{RRM}$ | Maximum Reverse Recovery Current |  | -   | 10   | -   | Amps |
| $t_{rr}$  | Reverse Recovery Time            | $I_F = 60A, di_F/dt = -1000A/\mu s, V_R = 400V, T_C = 125^\circ C$ | -   | 80   |     | ns   |
| $Q_{rr}$  | Reverse Recovery Charge          |  | -   | 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.

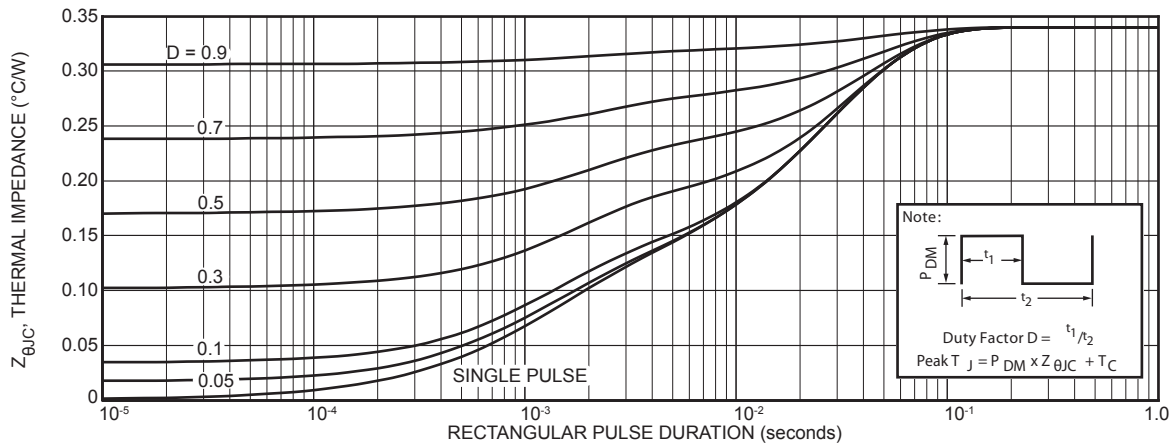


FIGURE 1. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

# TYPICAL PERFORMANCE CURVES

APT60D60B\_S(G)

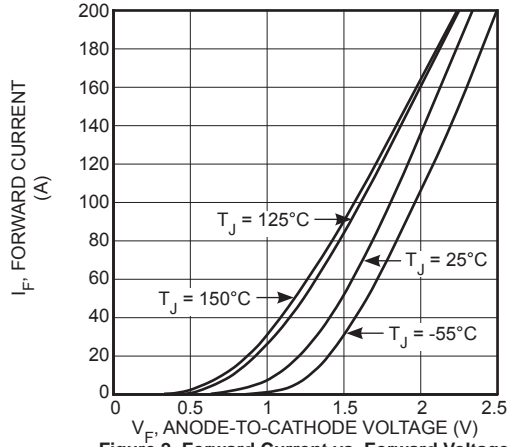


Figure 2. Forward Current vs. Forward Voltage

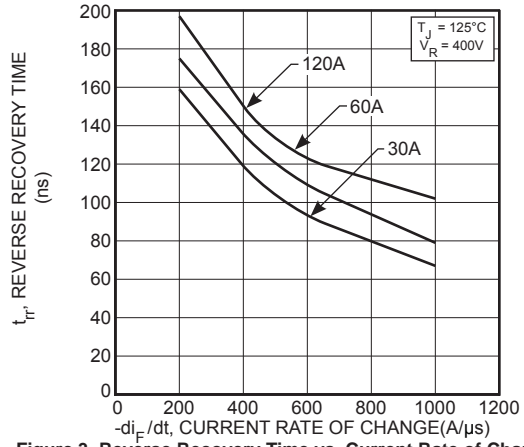


Figure 3. Reverse Recovery Time vs. Current Rate of Change

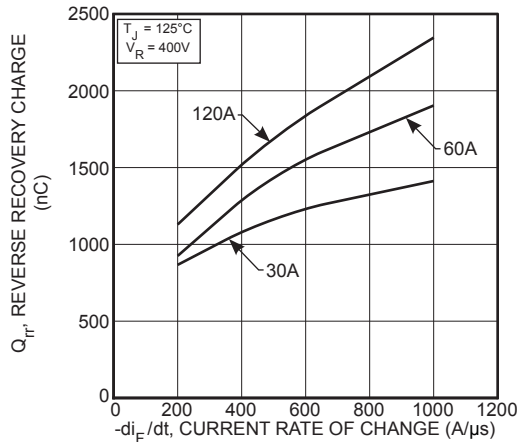


Figure 4. Reverse Recovery Charge vs. Current Rate of Change

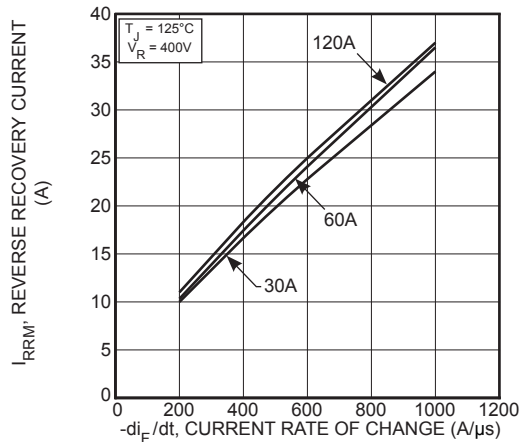


Figure 5. Reverse Recovery Current vs. Current Rate of Change

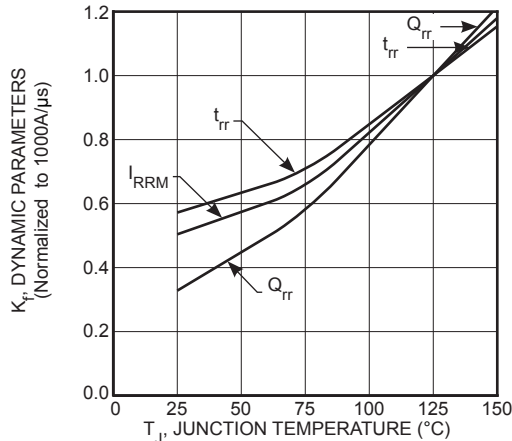


Figure 6. Dynamic Parameters vs. Junction Temperature

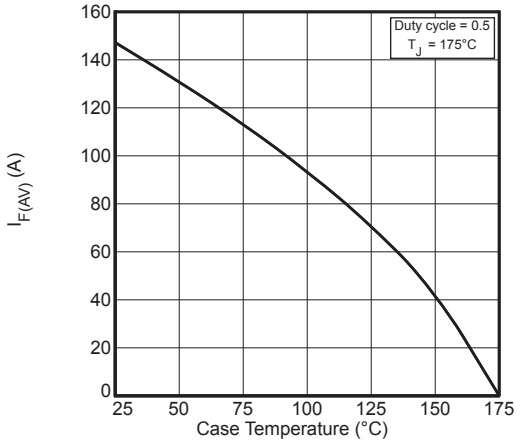


Figure 7. Maximum Average Forward Current vs. Case Temperature

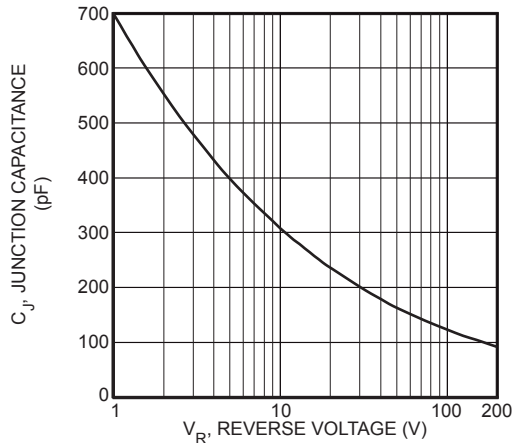


Figure 8. Junction Capacitance vs. Reverse Voltage

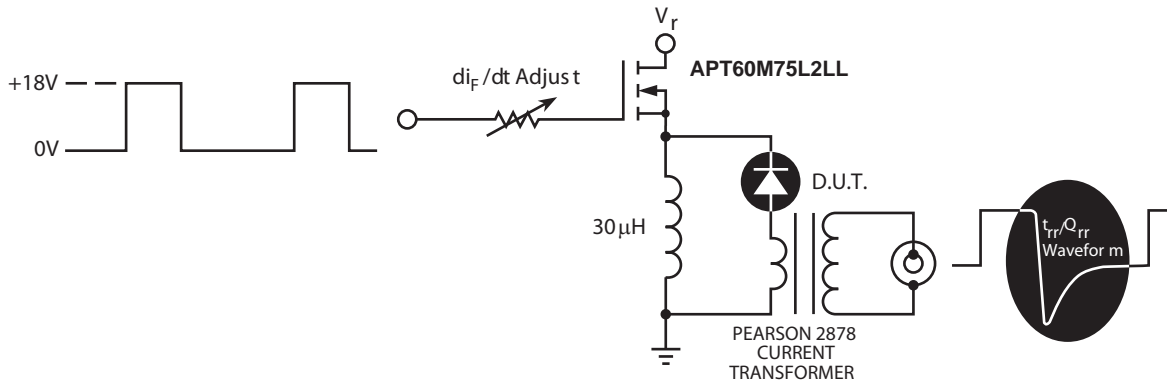


Figure 9. Diode Test Circuit

- 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 the diode current goes from positive to negative, to the point at which the straight line through  $I_{RRM}$  and  $0.25 I_{RRM}$  passes through zero.
- 5  $Q_{rr}$  - Area Under the Curve Defined by  $I_{RRM}$  and  $t_{rr}$ .

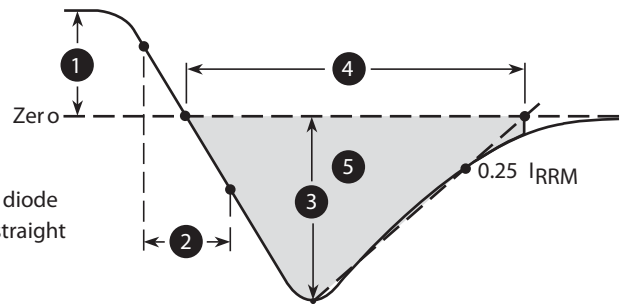
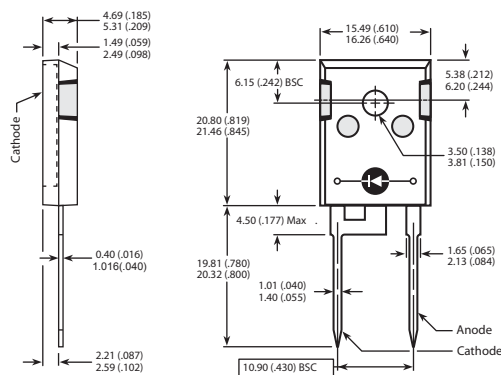


Figure 10. Diode Reverse Recovery and Definitions

### TO-247 Package Outline

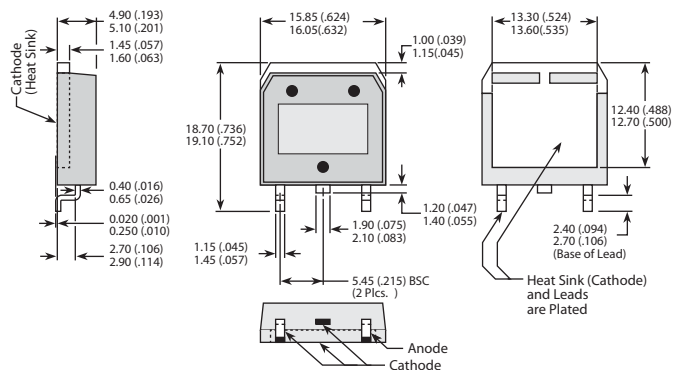
e1 SAC: Tin, Silver, Copper



Dimensions in Millimeters and (Inches)

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

e3 100% Sn



Dimensions in Millimeters (Inches)

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