

## Ultrafast Soft Recovery Dual Rectifier Diode

### PRODUCT APPLICATIONS

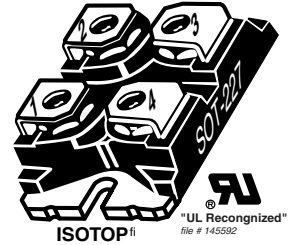
- Anti-Parallel Diode
  - Switchmode Power Supply
  - Inverters
- Free Wheeling Diode
  - Motor Controllers
  - Converters
- Snubber Diode
- Uninterruptible Power Supply
- Induction Heating
- High Speed Rectifiers

### PRODUCT FEATURES

- Ultrafast Recovery Times ( $t_{rr}$ )
- Soft Recovery Characteristics
- Low Forward Voltage
- Low Forward Voltage
- High Blocking Voltage
- Low Leakage Current

### PRODUCT BENEFITS

- Low Losses
- Low Noise Switching
- Cooler Operation
- Higher Reliability Systems
- Increased System Power Density



### MAXIMUM RATINGS

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

| Symbol         | Characteristic / Test Conditions                                               | Ratings    | 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 ( $T_C = 40^\circ\text{C}$ , Duty Cycle = 0.5) | 150        | Amps             |
| $I_{F(RMS)}$   | RMS Forward Current (Square wave, 50% duty)                                    | 165        |                  |
| $I_{FSM}$      | Non-Repetitive Forward Surge Current ( $T_J = 45^\circ\text{C}$ , 8.3 ms)      | 1000       |                  |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range                               | -55 to 175 | $^\circ\text{C}$ |

### STATIC ELECTRICAL CHARACTERISTICS

| Symbol   | Characteristic / Test Conditions          | Min | Typ                                          | Max                                          | Unit  |
|----------|-------------------------------------------|-----|----------------------------------------------|----------------------------------------------|-------|
| $V_F$    | Forward Voltage                           |     | $I_F = 150\text{A}$                          | 1.25                                         | Volts |
|          |                                           |     | $I_F = 300\text{A}$                          | 2.0                                          |       |
|          |                                           |     | $I_F = 150\text{A}, T_J = 125^\circ\text{C}$ | 1.25                                         |       |
| $I_{RM}$ | Maximum Reverse Leakage Current           |     |                                              | $V_R = 600\text{V}$                          | 25    |
|          |                                           |     |                                              | $V_R = 600\text{V}, T_J = 125^\circ\text{C}$ | 250   |
| $C_T$    | Junction Capacitance, $V_R = 200\text{V}$ |     | 139                                          |                                              | pF    |

1 Continuous current limited by package lead temperature.

# DYNAMIC CHARACTERISTICS

APT2X151\_150DL60J

| Symbol    | Characteristic / Test Conditions                                                    | Min | Typ   | Max | Unit |
|-----------|-------------------------------------------------------------------------------------|-----|-------|-----|------|
| $t_{rr}$  | Reverse Recovery Time $I_F = 1A, di_F/dt = -15A/\mu s, V_R = 30V, T_J = 25^\circ C$ |     | 51    |     | ns   |
| $t_{rr}$  | Reverse Recovery Time                                                               |     | 408   |     |      |
| $Q_{rr}$  | Reverse Recovery Charge                                                             |     | 2387  |     | nC   |
| $I_{RRM}$ | Maximum Reverse Recovery Current                                                    |     | 13    |     | Amps |
| $t_{rr}$  | Reverse Recovery Time                                                               |     | 639   |     | ns   |
| $Q_{rr}$  | Reverse Recovery Charge                                                             |     | 7253  |     | nC   |
| $I_{RRM}$ | Maximum Reverse Recovery Current                                                    |     | 21    |     | Amps |
| $t_{rr}$  | Reverse Recovery Time                                                               |     | 299   |     | ns   |
| $Q_{rr}$  | Reverse Recovery Charge                                                             |     | 12075 |     | nC   |
| $I_{RRM}$ | Maximum Reverse Recovery Current                                                    |     | 68    |     | Amps |

# THERMAL AND MECHANICAL CHARACTERISTICS

| Symbol          | Characteristic / Test Conditions                                                      | Min  | Typ  | Max  | Unit         |
|-----------------|---------------------------------------------------------------------------------------|------|------|------|--------------|
| $R_{\theta JC}$ | Junction-to-Case Thermal Resistance                                                   |      |      | 0.56 | $^\circ C/W$ |
| $V_{Isolation}$ | RMS Voltage (50-60mHz Sinusoidal Waveform from Terminals to Mounting Base for 1 Min.) | 2500 |      |      |              |
| $W_T$           | 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.

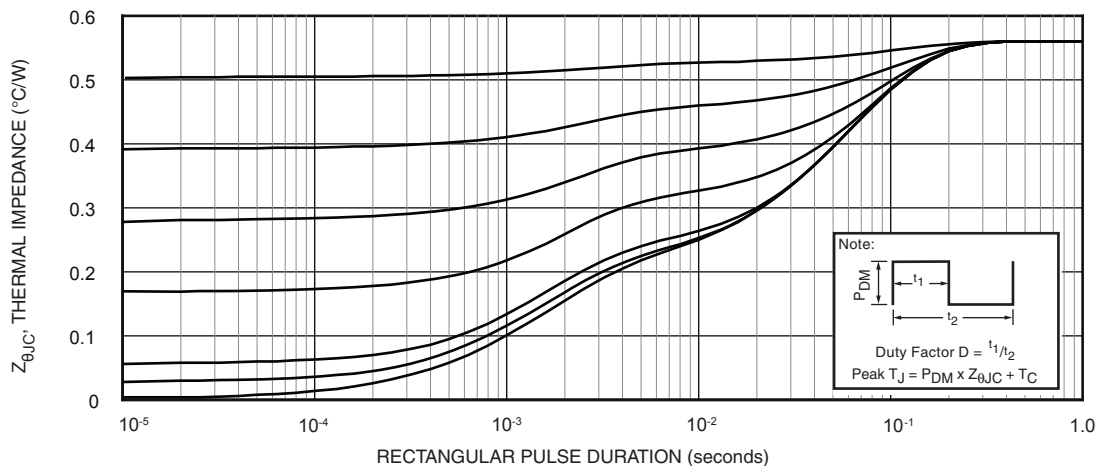


FIGURE 1. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

# TYPICAL PERFORMANCE CURVES

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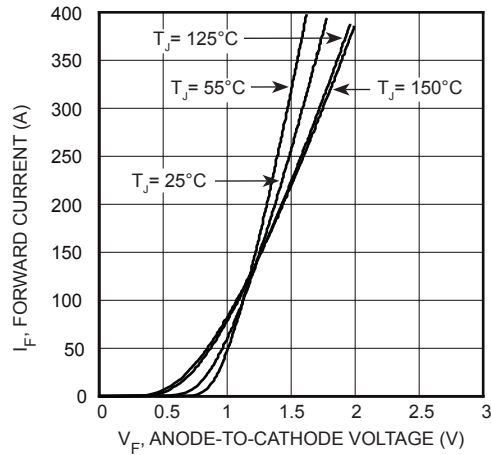


FIGURE 2, Forward Current vs. Forward Voltage

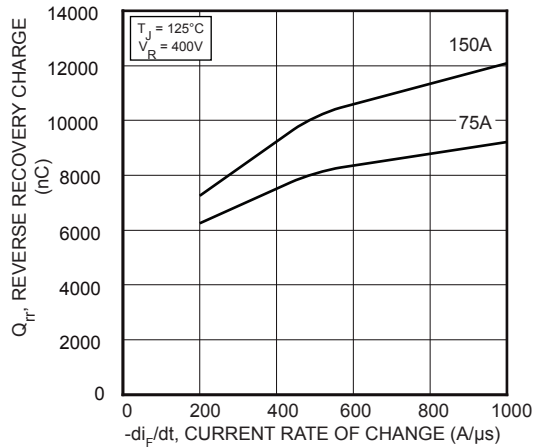


FIGURE 4, Reverse Recovery Charge vs. Current Rate of Change

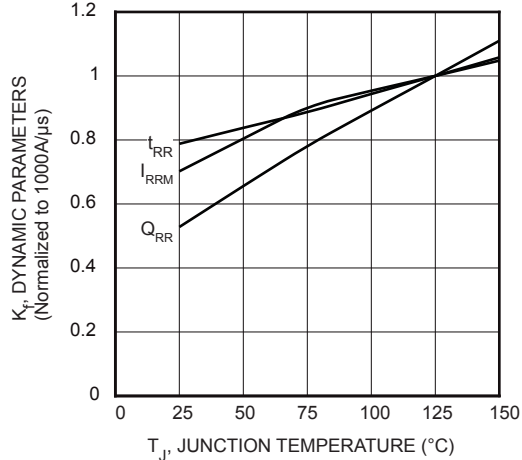


FIGURE 6, Dynamic Parameters vs. Junction Temperature

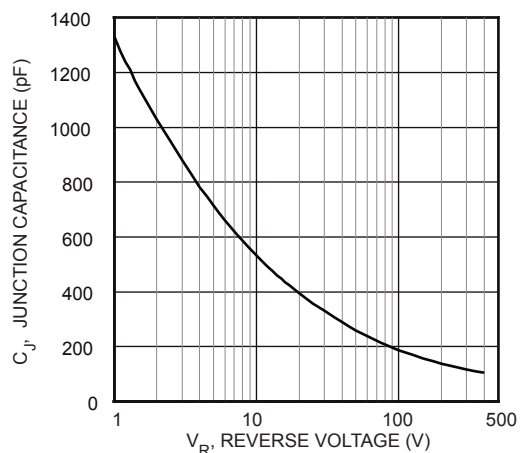


FIGURE 8, Junction Capacitance vs. Reverse Voltage

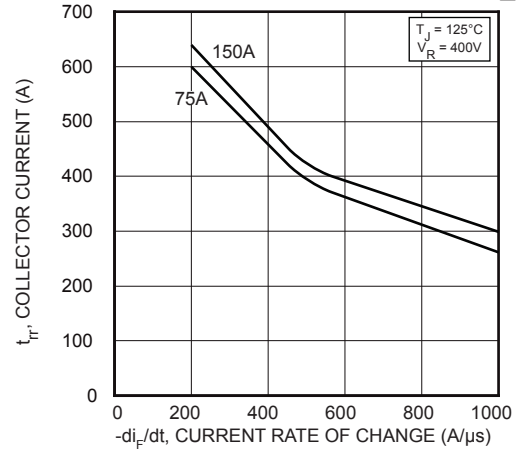


FIGURE 3, Reverse Recovery Time vs. Current Rate of Change

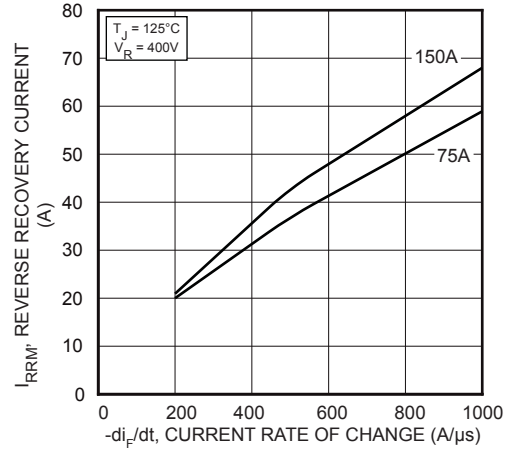


FIGURE 5, Reverse Recovery Current vs. Current Rate of Change

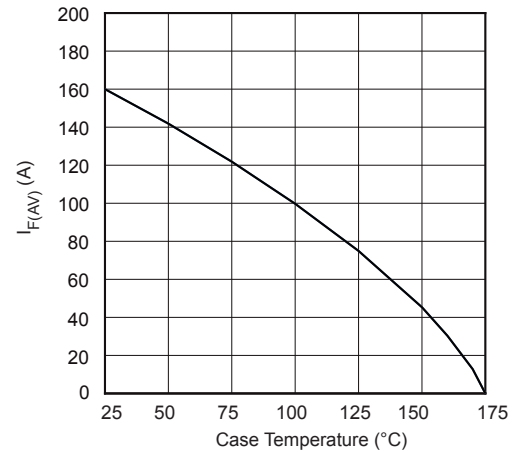


FIGURE 7, Maximum Average Forward Current vs. Case Temperature

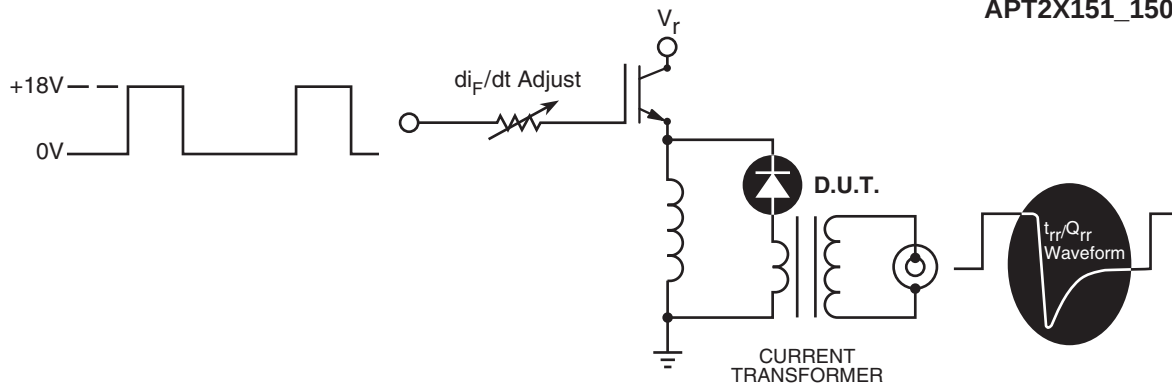


Figure 9. Diode Test Circuit

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

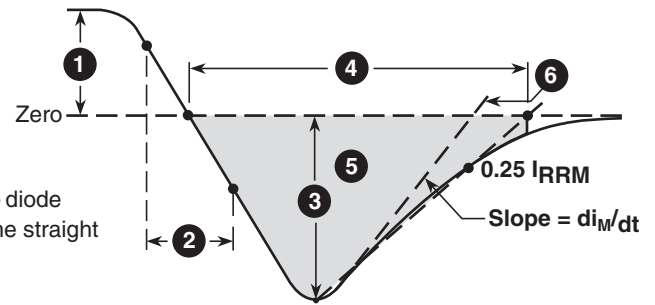
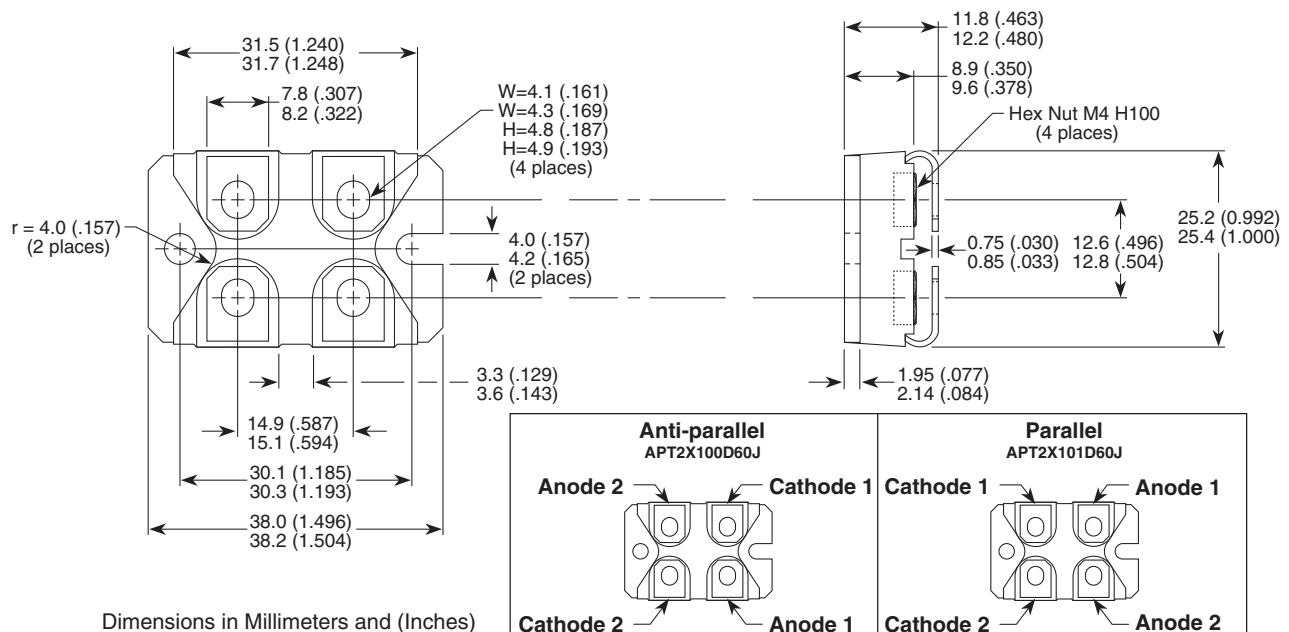


Figure 10. Diode Reverse Recovery Waveform and Definitions

## SOT-227 (ISOTOP®) Package Outline



Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 6,939,743, 7,352,045 5,283,201 5,801,417 5,648,283 7,196,634 6,664,594 7,157,886 6,939,743 7,342,262 and foreign patents. US and Foreign patents pending. All Rights Reserved.



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