

**Microsemi**  
POWER PRODUCTS GROUP

**APT2x101DQ100J 1000V 100A**  
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## 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                                               | APT2x101_100DQ100J | UNIT             |
|----------------|--------------------------------------------------------------------------------|--------------------|------------------|
| $V_R$          | Maximum D.C. Reverse Voltage                                                   | 1000               | Volts            |
| $V_{RRM}$      | Maximum Peak Repetitive Reverse Voltage                                        |                    |                  |
| $V_{RWM}$      | Maximum Working Peak Reverse Voltage                                           |                    |                  |
| $I_{F(AV)}$    | Maximum Average Forward Current ( $T_C = 94^\circ\text{C}$ , Duty Cycle = 0.5) | 100                | Amps             |
| $I_{F(RMS)}$   | RMS Forward Current (Square wave, 50% duty)                                    | 133                |                  |
| $I_{FSM}$      | Non-Repetitive Forward Surge Current ( $T_J = 45^\circ\text{C}$ , 8.3ms)       | 1000               |                  |
| $E_{AVL}$      | 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                           |     | $I_F = 100\text{A}$                           | 2.1  | Volts         |
|          |                                           |     | $I_F = 150\text{A}$                           | 2.34 |               |
|          |                                           |     | $I_F = 100\text{A}, T_J = 125^\circ\text{C}$  | 1.64 |               |
| $I_{RM}$ | Maximum Reverse Leakage Current           |     | $V_R = 1000\text{V}$                          | 100  | $\mu\text{A}$ |
|          |                                           |     | $V_R = 1000\text{V}, T_J = 125^\circ\text{C}$ | 500  |               |
| $C_T$    | Junction Capacitance, $V_R = 200\text{V}$ |     | 120                                           |      | pF            |

# DYNAMIC CHARACTERISTICS

APT2x101\_100DQ100J

| Symbol    | Characteristic                   | Test Conditions                                                               | MIN | TYP  | MAX | UNIT |
|-----------|----------------------------------|-------------------------------------------------------------------------------|-----|------|-----|------|
| $t_{rr}$  | Reverse Recovery Time            | $I_F = 1A$ , $di_F/dt = -100A/\mu s$ , $V_R = 30V$ , $T_J = 25^\circ C$       | -   | 45   |     | ns   |
| $t_{rr}$  | Reverse Recovery Time            | $I_F = 100A$ , $di_F/dt = -200A/\mu s$<br>$V_R = 667V$ , $T_C = 25^\circ C$   | -   | 290  |     |      |
| $Q_{rr}$  | Reverse Recovery Charge          |                                                                               | -   | 685  |     | nC   |
| $I_{RRM}$ | Maximum Reverse Recovery Current |                                                                               | -   | 6    | -   | Amps |
| $t_{rr}$  | Reverse Recovery Time            | $I_F = 100A$ , $di_F/dt = -200A/\mu s$<br>$V_R = 667V$ , $T_C = 125^\circ C$  | -   | 340  |     | ns   |
| $Q_{rr}$  | Reverse Recovery Charge          |                                                                               | -   | 3645 |     | nC   |
| $I_{RRM}$ | Maximum Reverse Recovery Current |                                                                               | -   | 18   | -   | Amps |
| $t_{rr}$  | Reverse Recovery Time            | $I_F = 100A$ , $di_F/dt = -1000A/\mu s$<br>$V_R = 667V$ , $T_C = 125^\circ C$ | -   | 160  |     | ns   |
| $Q_{rr}$  | Reverse Recovery Charge          |                                                                               | -   | 7085 |     | nC   |
| $I_{RRM}$ | Maximum Reverse Recovery Current |                                                                               | -   | 70   |     | Amps |

# THERMAL AND MECHANICAL CHARACTERISTICS

| Symbol          | Characteristic / Test Conditions                                                     | MIN  | TYP  | MAX | UNIT         |
|-----------------|--------------------------------------------------------------------------------------|------|------|-----|--------------|
| $R_{\theta JC}$ | Junction-to-Case Thermal Resistance                                                  |      |      | .32 | $^\circ C/W$ |
| $V_{Isolation}$ | 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.

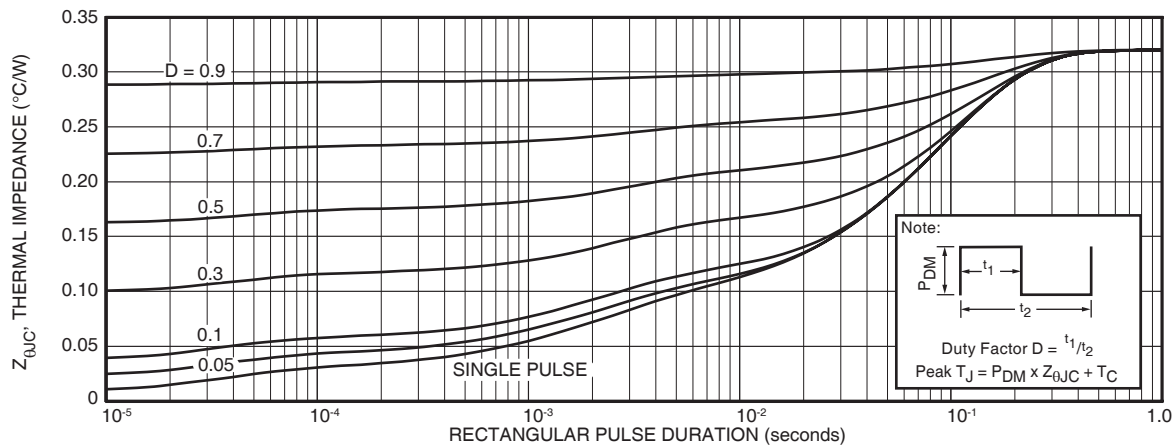


FIGURE 1a. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

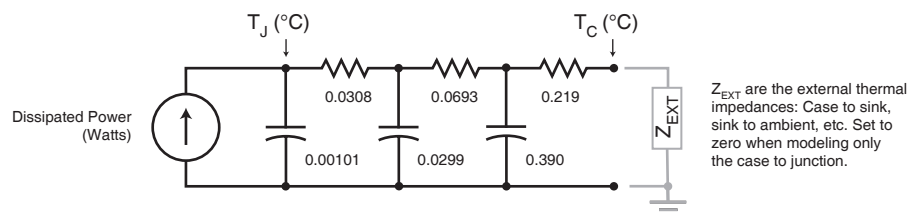


FIGURE 1b. TRANSIENT THERMAL IMPEDANCE MODEL

## TYPICAL PERFORMANCE CURVES

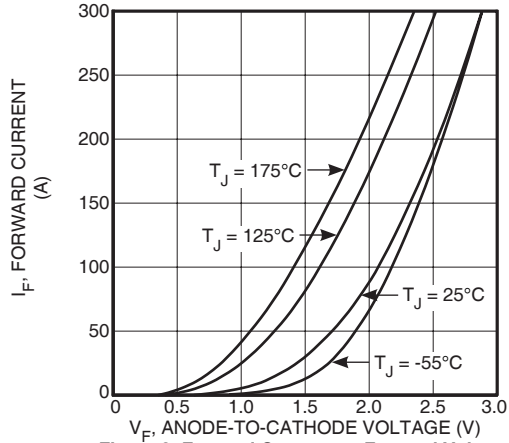


Figure 2. Forward Current vs. Forward Voltage

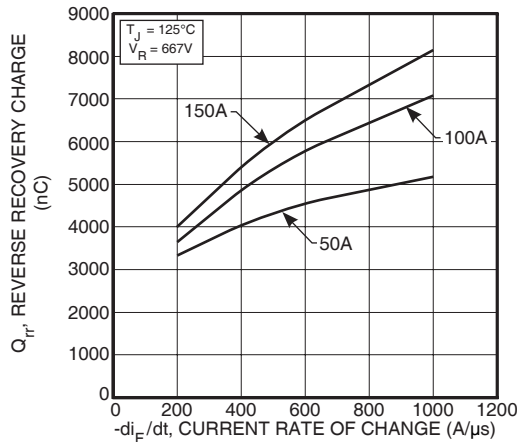


Figure 4. Reverse Recovery Charge vs. Current Rate of Change

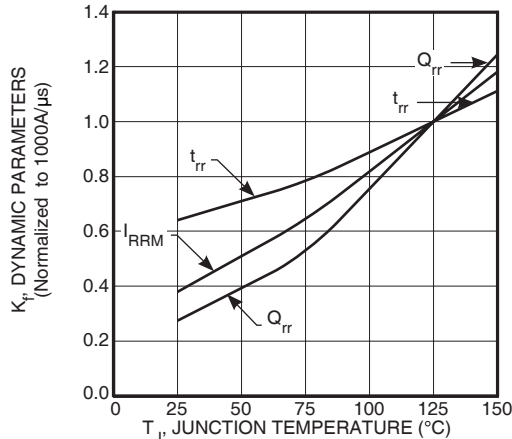


Figure 6. Dynamic Parameters vs. Junction Temperature

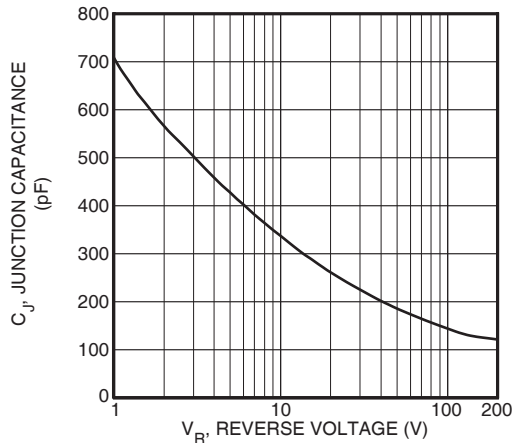


Figure 8. Junction Capacitance vs. Reverse Voltage

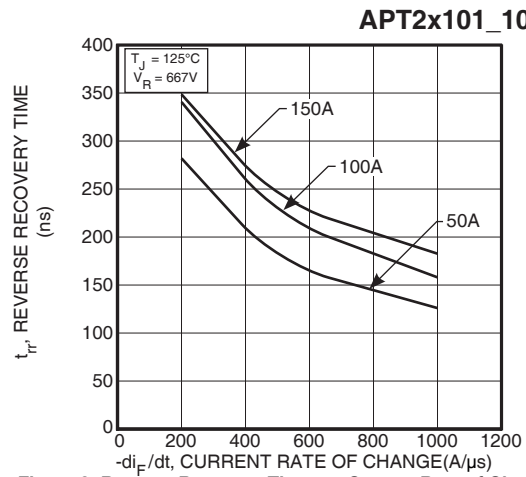


Figure 3. Reverse Recovery Time vs. Current Rate of Change

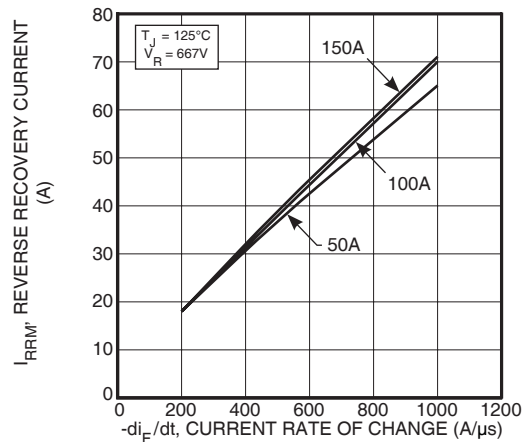


Figure 5. Reverse Recovery Current vs. Current Rate of Change

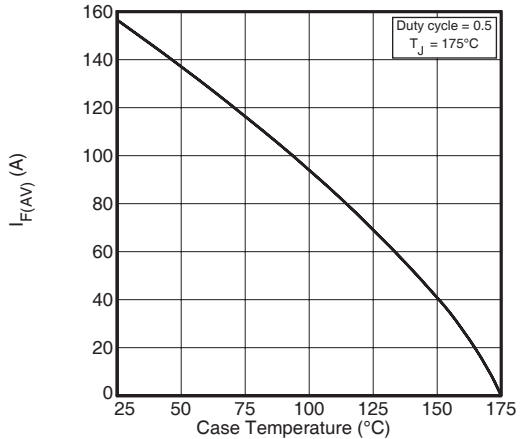


Figure 7. Maximum Average Forward Current vs. Case Temperature

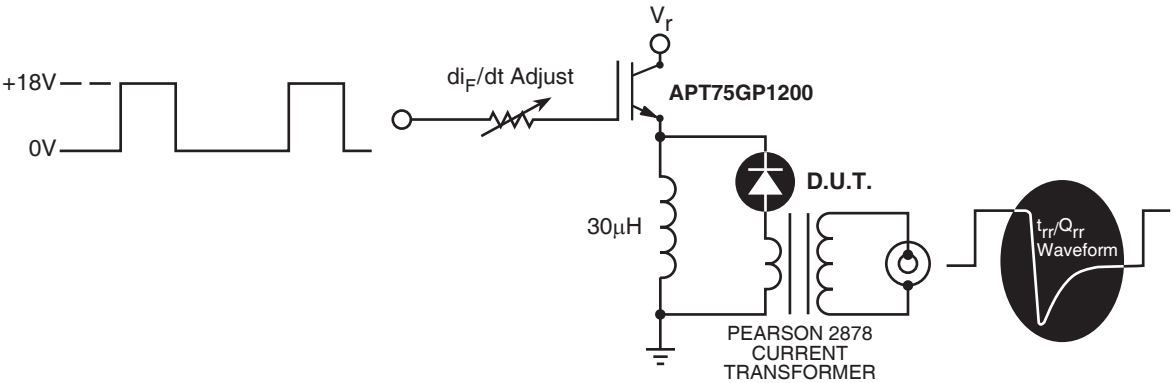


Figure 9. Diode Test Circuit

- 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  $t_{rr}$ .

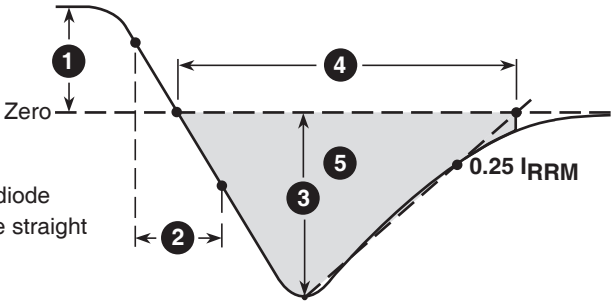
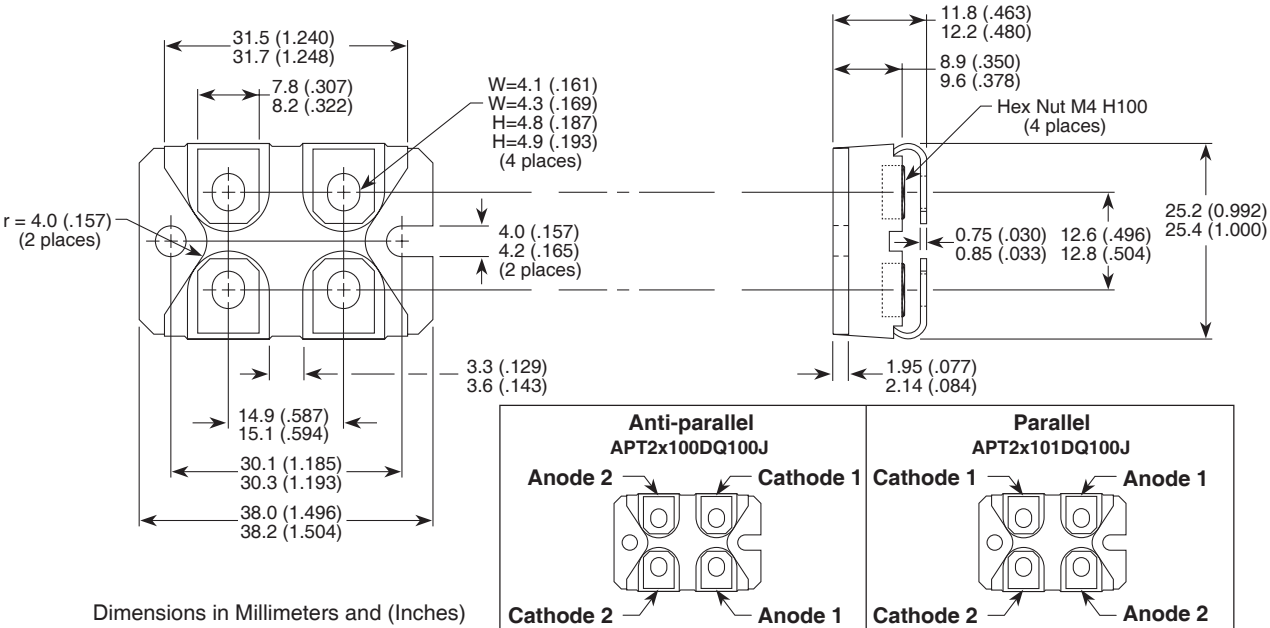


Figure 10. Diode Reverse Recovery Waveform and Definitions

SOT-227 (ISOTOP®) Package Outline



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