

# Silicon Avalanche Diodes

## 1500 Watt Metal Axial Leaded Transient Voltage Suppressors

### 1N60 Series



#### FEATURES

- Hermetically sealed
- Breakdown voltage range 6.8 - 200 volts
- Glass passivated junction
- Excellent clamping capability
- Low zener impedance
- 100% surge tested
- -55°C to +150°C
- Bi-directional

#### MAXIMUM RATING

- Peak Pulse Power (Ppk): 15000 Watts (10 x 1000µs)@25°C (see diagram on page 3 for wave form)
- 1 watt steady state
- Response time:  $1 \times 10^{-12}$  seconds (theoretical)
- Operating & storage temperature: -55°C to +150°C

#### MECHANICAL CHARACTERISTICS

- Case: Metal hermetically sealed DO-13 package
- Terminals: Axial leads, solderable per MIL-STD-202 Method 208
- Solderable leads = 230°C for 10 seconds (1.59mm from case)
- Weight: 1.5 grammes (approx)

**Agency Approvals:** Recognized under the Components Program of Underwriters Laboratories.

**Agency File Number:** E128662

#### ORDERING INFORMATION

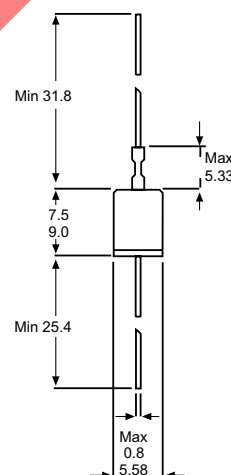
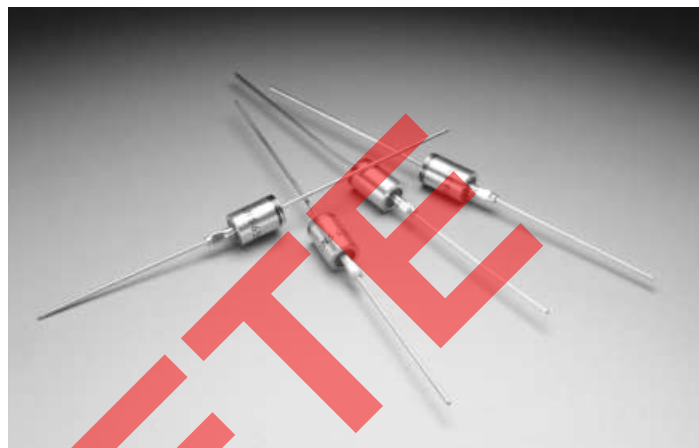
1N60 [X][X][A][J]

Voltage Reference

5% Voltage Tolerance

Packaging Option

B = Bulk (500 pcs)



All dimensions in mm

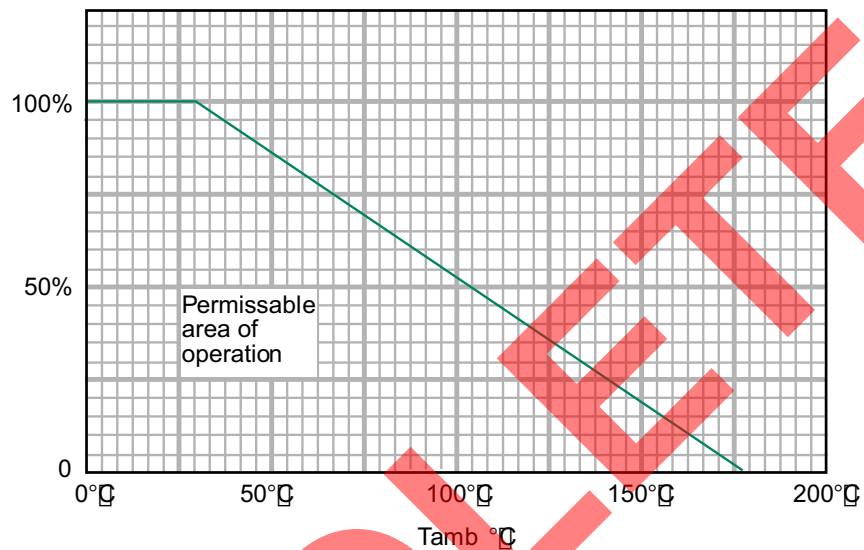
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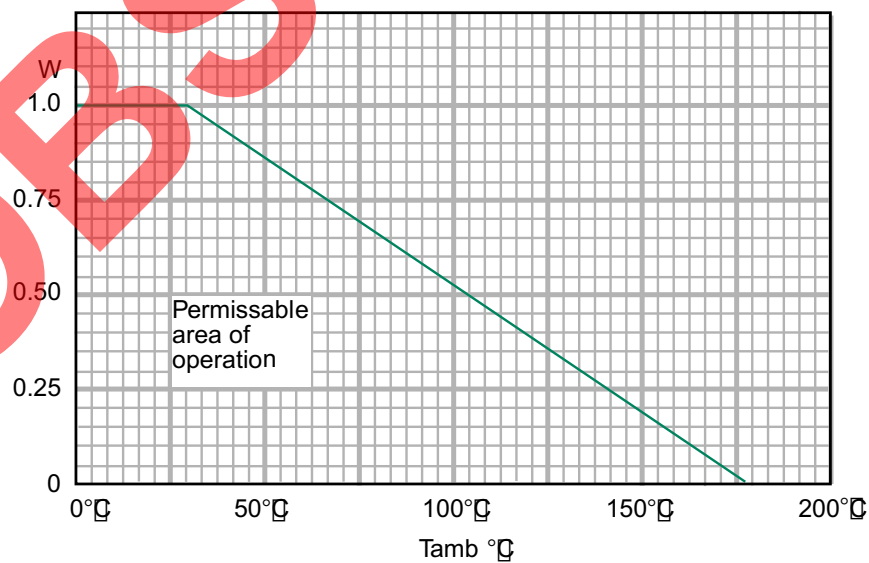
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**Figure 1 - Peak Power Derating Curve**  
Peak pulse power in percent of 25°C rating



**Figure 2 - Continuous D.C. Power Derating Curve**  
Continuous d.c. power dissipation

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### ELECTRICAL SPECIFICATION @ Tamb 25°C

| Part Number | Reverse Stand Off Voltage $V_R$ (Volts) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$ |       |      | Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu A$ ) | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (Volts) | Maximum Peak Pulse Current $I_{PP}$ (A) | Max Voltage Temperature Variation of $V_{BR}$ (mV/°C) |
|-------------|-----------------------------------------|--------------------------------------------|-------|------|---------------------------------------------------|---------------------------------------------------|-----------------------------------------|-------------------------------------------------------|
|             |                                         | MIN                                        | MAX   | (mA) |                                                   |                                                   |                                         |                                                       |
| 1N6036*     | 5.5                                     | 6.75                                       | 8.25  | 10   | 1000.0                                            | 11.7                                              | 128.0                                   | 5.0                                                   |
| 1N6036A*    | 6.0                                     | 7.13                                       | 7.88  | 10   | 1000.0                                            | 11.3                                              | 132.0                                   | 5.0                                                   |
| 1N6037*     | 6.5                                     | 7.38                                       | 9.02  | 10   | 500.0                                             | 12.5                                              | 120.0                                   | 5.0                                                   |
| 1N6037A*    | 7.0                                     | 7.79                                       | 8.61  | 10   | 500.0                                             | 12.1                                              | 124.0                                   | 5.0                                                   |
| 1N6038      | 7.0                                     | 8.19                                       | 10.00 | 1.0  | 200.0                                             | 13.8                                              | 109.0                                   | 7.0                                                   |
| 1N6038A     | 7.5                                     | 8.65                                       | 9.55  | 1.0  | 200.0                                             | 13.4                                              | 112.0                                   | 7.0                                                   |
| 1N6039      | 8.0                                     | 9.00                                       | 11.00 | 1.0  | 50.0                                              | 15.0                                              | 100.0                                   | 7.0                                                   |
| 1N6039A     | 8.5                                     | 9.50                                       | 10.50 | 1.0  | 50.0                                              | 14.5                                              | 103.0                                   | 7.0                                                   |
| 1N6040*     | 8.5                                     | 9.90                                       | 12.10 | 1.0  | 10.0                                              | 16.2                                              | 93.0                                    | 8.0                                                   |
| 1N6040A*    | 9.0                                     | 10.50                                      | 11.60 | 1.0  | 10.0                                              | 15.6                                              | 96.0                                    | 8.0                                                   |
| 1N6041*     | 9.0                                     | 10.80                                      | 13.20 | 1.0  | 5.0                                               | 17.3                                              | 87.0                                    | 9.0                                                   |
| 1N6041A*    | 10.0                                    | 11.40                                      | 12.60 | 1.0  | 5.0                                               | 16.7                                              | 90.0                                    | 9.0                                                   |
| 1N6042      | 10.0                                    | 11.70                                      | 14.30 | 1.0  | 5.0                                               | 19.0                                              | 79.0                                    | 10.0                                                  |
| 1N6042A     | 11.0                                    | 12.40                                      | 13.70 | 1.0  | 5.0                                               | 18.2                                              | 82.0                                    | 10.0                                                  |
| 1N6043      | 11.0                                    | 13.50                                      | 16.50 | 1.0  | 5.0                                               | 22.0                                              | 68.0                                    | 11.0                                                  |
| 1N6043A     | 12.0                                    | 14.30                                      | 15.80 | 1.0  | 5.0                                               | 21.2                                              | 71.0                                    | 12.0                                                  |
| 1N6044      | 12.0                                    | 14.40                                      | 17.60 | 1.0  | 5.0                                               | 23.5                                              | 64.0                                    | 12.0                                                  |
| 1N6044A     | 13.0                                    | 15.20                                      | 16.80 | 1.0  | 5.0                                               | 22.5                                              | 67.0                                    | 13.0                                                  |
| 1N6045*     | 14.0                                    | 16.20                                      | 19.80 | 1.0  | 5.0                                               | 26.5                                              | 56.5                                    | 14.0                                                  |
| 1N6045A*    | 15.0                                    | 17.10                                      | 18.90 | 1.0  | 5.0                                               | 25.2                                              | 59.5                                    | 15.0                                                  |
| 1N6046      | 16.0                                    | 18.00                                      | 22.00 | 1.0  | 5.0                                               | 29.1                                              | 51.5                                    | 17.0                                                  |
| 1N6046A     | 17.0                                    | 19.00                                      | 21.00 | 1.0  | 5.0                                               | 27.7                                              | 54.0                                    | 18.0                                                  |
| 1N6047      | 17.0                                    | 19.80                                      | 24.20 | 1.0  | 5.0                                               | 31.9                                              | 47.0                                    | 19.0                                                  |
| 1N6047A     | 18.0                                    | 20.90                                      | 23.10 | 1.0  | 5.0                                               | 30.6                                              | 49.0                                    | 20.0                                                  |
| 1N6048      | 19.0                                    | 21.60                                      | 26.40 | 1.0  | 5.0                                               | 34.7                                              | 43.0                                    | 24.0                                                  |
| 1N6048A     | 20.0                                    | 22.80                                      | 25.20 | 1.0  | 5.0                                               | 33.2                                              | 45.0                                    | 24.0                                                  |
| 1N6049*     | 21.0                                    | 24.30                                      | 29.70 | 1.0  | 5.0                                               | 39.1                                              | 38.5                                    | 27.0                                                  |
| 1N6049A*    | 22.0                                    | 25.70                                      | 28.40 | 1.0  | 5.0                                               | 37.5                                              | 40.0                                    | 28.0                                                  |
| 1N6050      | 24.0                                    | 27.00                                      | 33.00 | 1.0  | 5.0                                               | 43.5                                              | 34.5                                    | 36.0                                                  |
| 1N6050A     | 25.0                                    | 28.50                                      | 31.50 | 1.0  | 5.0                                               | 41.4                                              | 36.0                                    | 31.0                                                  |
| 1N6051*     | 26.0                                    | 29.70                                      | 36.30 | 1.0  | 5.0                                               | 47.7                                              | 31.5                                    | 32.0                                                  |
| 1N6051A*    | 28.0                                    | 31.40                                      | 34.70 | 1.0  | 5.0                                               | 45.7                                              | 33.0                                    | 34.0                                                  |
| 1N6052      | 29.0                                    | 32.40                                      | 39.60 | 1.0  | 5.0                                               | 52.0                                              | 29.0                                    | 36.0                                                  |
| 1N6052A     | 30.0                                    | 34.20                                      | 37.80 | 1.0  | 5.0                                               | 49.9                                              | 30.0                                    | 37.0                                                  |

Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

\* Preferred voltages.

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SILICON DIODE  
ARRAYS

# Silicon Avalanche Diodes

1500 Watt Metal Axial Leaded Transient Voltage Suppressors

## 1N60 Series

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### ELECTRICAL SPECIFICATION @ Tamb 25°C

| Part Number | Reverse Stand Off Voltage $V_R$ (Volts) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$ |       |      | Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu A$ ) | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (Volts) | Maximum Peak Pulse Current $I_{PP}$ (A) | Max Voltage Temperature Variation of $V_{BR}$ (mV/°C) |
|-------------|-----------------------------------------|--------------------------------------------|-------|------|---------------------------------------------------|---------------------------------------------------|-----------------------------------------|-------------------------------------------------------|
|             |                                         | MIN                                        | MAX   | (mA) |                                                   |                                                   |                                         |                                                       |
| 1N6053*     | 31.0                                    | 35.10                                      | 42.90 | 1.0  | 5.0                                               | 56.4                                              | 26.5                                    | 39.0                                                  |
| 1N6053A*    | 33.0                                    | 37.10                                      | 41.00 | 1.0  | 5.0                                               | 53.9                                              | 28.0                                    | 40.0                                                  |
| 1N6054*     | 34.0                                    | 38.70                                      | 47.30 | 1.0  | 5.0                                               | 61.9                                              | 24.0                                    | 44.0                                                  |
| 1N6054A*    | 36.0                                    | 40.90                                      | 45.20 | 1.0  | 5.0                                               | 59.3                                              | 25.3                                    | 43.0                                                  |
| 1N6055*     | 38.0                                    | 42.30                                      | 51.70 | 1.0  | 5.0                                               | 67.8                                              | 22.2                                    | 49.0                                                  |
| 1N6055A*    | 40.0                                    | 44.70                                      | 49.40 | 1.0  | 5.0                                               | 64.8                                              | 23.2                                    | 47.0                                                  |
| 1N6056*     | 41.0                                    | 45.90                                      | 56.10 | 1.0  | 5.0                                               | 73.5                                              | 20.4                                    | 53.0                                                  |
| 1N6056A*    | 43.0                                    | 48.50                                      | 53.60 | 1.0  | 5.0                                               | 70.1                                              | 21.4                                    | 51.0                                                  |
| 1N6057      | 45.0                                    | 50.4                                       | 61.6  | 1.0  | 5.0                                               | 80.5                                              | 18.6                                    | 58.0                                                  |
| 1N6057A     | 47.0                                    | 53.2                                       | 58.8  | 1.0  | 5.0                                               | 77.0                                              | 19.5                                    | 56.0                                                  |
| 1N6058*     | 48.0                                    | 55.8                                       | 68.2  | 1.0  | 5.0                                               | 89.0                                              | 16.9                                    | 64.0                                                  |
| 1N6058A*    | 53.0                                    | 58.9                                       | 65.1  | 1.0  | 5.0                                               | 85.0                                              | 17.7                                    | 62.0                                                  |
| 1N6059*     | 55.0                                    | 61.2                                       | 74.8  | 1.0  | 5.0                                               | 98.0                                              | 15.3                                    | 70.0                                                  |
| 1N6059A*    | 58.0                                    | 64.6                                       | 71.4  | 1.0  | 5.0                                               | 92.0                                              | 16.3                                    | 68.0                                                  |
| 1N6060*     | 60.0                                    | 67.5                                       | 82.5  | 1.0  | 5.0                                               | 108.0                                             | 13.9                                    | 77.0                                                  |
| 1N6060A*    | 64.0                                    | 71.3                                       | 78.8  | 1.0  | 5.0                                               | 103.0                                             | 14.6                                    | 75.0                                                  |
| 1N6061*     | 66.0                                    | 73.8                                       | 90.2  | 1.0  | 5.0                                               | 118.0                                             | 12.7                                    | 84.0                                                  |
| 1N6061A*    | 70.0                                    | 77.9                                       | 86.1  | 1.0  | 5.0                                               | 113.0                                             | 13.3                                    | 82.0                                                  |
| 1N6062      | 73.0                                    | 81.9                                       | 100.0 | 1.0  | 5.0                                               | 131.0                                             | 11.4                                    | 90.0                                                  |
| 1N6062A     | 75.0                                    | 86.5                                       | 95.5  | 1.0  | 5.0                                               | 125.0                                             | 12.0                                    | 86.0                                                  |
| 1N6063*     | 81.0                                    | 90.0                                       | 110.0 | 1.0  | 5.0                                               | 144.0                                             | 10.4                                    | 99.0                                                  |
| 1N6063A*    | 82.0                                    | 95.0                                       | 105.0 | 1.0  | 5.0                                               | 137.0                                             | 11.0                                    | 94.0                                                  |
| 1N6064*     | 90.0                                    | 99.0                                       | 121.0 | 1.0  | 5.0                                               | 158.0                                             | 9.5                                     | 109.0                                                 |
| 1N6064A*    | 94.0                                    | 105.0                                      | 116.0 | 1.0  | 5.0                                               | 152.0                                             | 9.9                                     | 104.0                                                 |
| 1N6065      | 95.0                                    | 108.0                                      | 132.0 | 1.0  | 5.0                                               | 173.0                                             | 8.7                                     | 120.0                                                 |
| 1N6065A     | 100.0                                   | 114.0                                      | 126.0 | 1.0  | 5.0                                               | 165.0                                             | 9.1                                     | 115.0                                                 |
| 1N6066      | 105.0                                   | 117.0                                      | 143.0 | 1.0  | 5.0                                               | 187.0                                             | 8.0                                     | 131.0                                                 |
| 1N6066A     | 110.0                                   | 124.0                                      | 137.0 | 1.0  | 5.0                                               | 179.0                                             | 8.4                                     | 125.0                                                 |
| 1N6067      | 121.0                                   | 135.0                                      | 165.0 | 1.0  | 5.0                                               | 215.0                                             | 7.0                                     | 142.0                                                 |
| 1N6067A     | 128.0                                   | 143.0                                      | 158.0 | 1.0  | 5.0                                               | 207.0                                             | 7.2                                     | 136.0                                                 |
| 1N6068      | 137.0                                   | 153.0                                      | 187.0 | 1.0  | 5.0                                               | 258.0                                             | 5.8                                     | 164.0                                                 |
| 1N6068A     | 145.0                                   | 162.0                                      | 179.0 | 1.0  | 5.0                                               | 245.0                                             | 6.1                                     | 157.0                                                 |
| 1N6069*     | 145.0                                   | 162.0                                      | 198.0 | 1.0  | 5.0                                               | 274.0                                             | 5.5                                     | 175.0                                                 |
| 1N6069A*    | 150.0                                   | 171.0                                      | 189.0 | 1.0  | 5.0                                               | 261.0                                             | 5.7                                     | 167.0                                                 |
| 1N6070      | 155.0                                   | 171.0                                      | 210.0 | 1.0  | 5.0                                               | 292.0                                             | 5.1                                     | 186.0                                                 |
| 1N6070A     | 160.0                                   | 181.0                                      | 200.0 | 1.0  | 5.0                                               | 278.0                                             | 5.4                                     | 188.0                                                 |
| 1N6071*     | 165.0                                   | 180.0                                      | 220.0 | 1.0  | 5.0                                               | 308.0                                             | 4.9                                     | 197.0                                                 |
| 1N6071A*    | 170.0                                   | 190.0                                      | 210.0 | 1.0  | 5.0                                               | 294.0                                             | 5.1                                     | 188.0                                                 |
| 1N6072      | 175.0                                   | 198.0                                      | 242.0 | 1.0  | 5.0                                               | 344.0                                             | 4.3                                     | 219.0                                                 |
| 1N6072A     | 185.0                                   | 209.0                                      | 231.0 | 1.0  | 5.0                                               | 328.0                                             | 4.6                                     | 209.0                                                 |

Suffix 'A' denotes 5% tolerance device, no suffix denotes a 10% tolerance device.

\* Preferred voltages.