

## Silicon Avalanche Diodes

### 1500 Watt Metal Axial Leaded Transient Voltage Suppressors

## 1N56 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
- Uni-polar

### MAXIMUM RATING

- Peak Pulse Power (Ppk): 1500 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)
- Polarity: cathode indicated by colour band
- Weight: 1.5 grammes (approx)

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

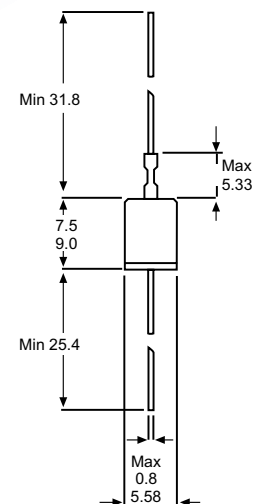
**Agency File Number:** E128662

### ORDERING INFORMATION

1 N 5 6 | X | X | A | L

Voltage Reference ————  
 5% Voltage Tolerance ————  
 Packaging Option ————

B = Bulk (500 pcs)

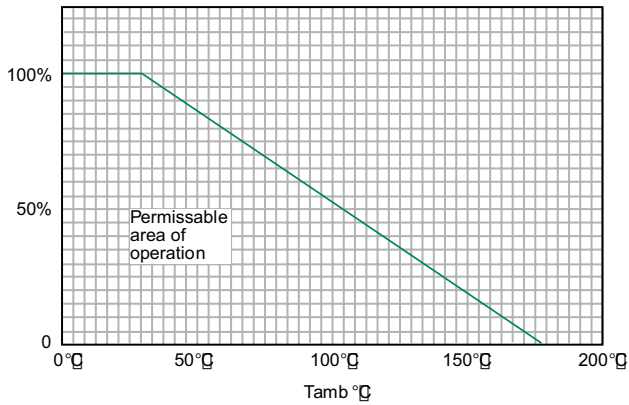


All dimensions in mm

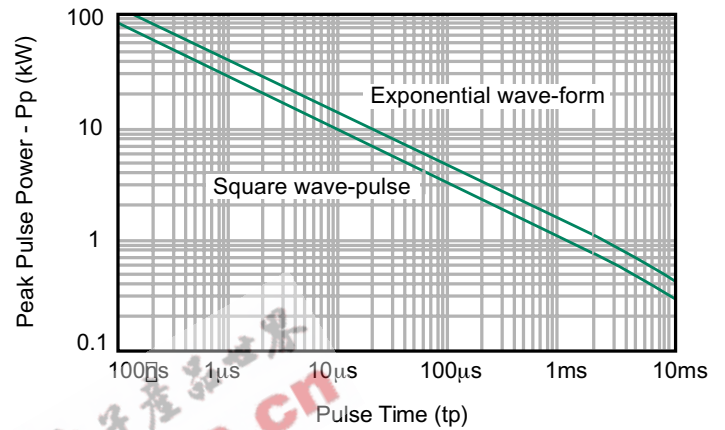
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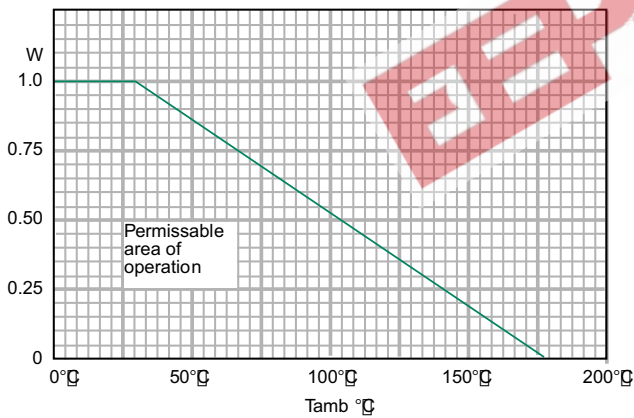
### 1N56 Series



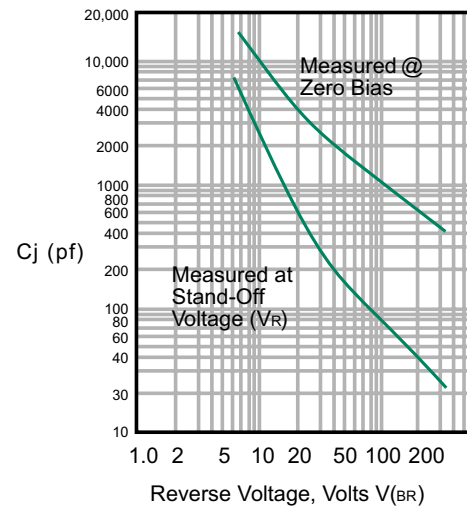
**Figure 1 - Peak Power Derating Curve**  
Peak pulse power in percent of 25°C rating



**Figure 3 - Peak Pulse Power vs. Pulse Time**



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



**Figure 4 - Typical Junction Capacitance**

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91

#### 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) |   |   |   |   |
| 1N5629*     | 5.50                                    | 6.12                                       | 7.48  | 10   | 1000.0  | 10.8  | 139.0                                   | 5.0   |
| 1N5629A*    | 5.80                                    | 6.45                                       | 7.14  | 10   | 1000.0  | 10.5  | 143.0                                   | 5.0   |
| 1N5630      | 6.05                                    | 6.75                                       | 8.25  | 10   | 500.0   | 11.7  | 128.0                                   | 5.0   |
| 1N5630A     | 6.40                                    | 7.13                                       | 7.88  | 10   | 500.0   | 11.3  | 132.0                                   | 5.0   |
| 1N5631      | 6.63                                    | 7.38                                       | 9.02  | 10   | 200.0   | 12.5  | 120.0                                   | 6.0   |
| 1N5631A     | 7.02                                    | 7.79                                       | 8.61  | 10   | 200.0   | 12.1  | 124.0                                   | 6.0   |
| 1N5632      | 7.37                                    | 8.19                                       | 10.00 | 1.0  | 50.0  | 13.8  | 109.0                                   | 7.0   |
| 1N5632A     | 7.78                                    | 8.65                                       | 9.55  | 1.0  | 50.0  | 13.4  | 112.0                                   | 7.0   |
| 1N5633      | 8.10                                    | 9.00                                       | 11.00 | 1.0  | 10.0  | 15.0  | 100.0                                   | 8.0   |
| 1N5633A     | 8.55                                    | 9.50                                       | 10.50 | 1.0  | 10.0  | 14.5  | 103.0                                   | 8.0   |
| 1N5634      | 8.92                                    | 9.90                                       | 12.10 | 1.0  | 5.0   | 16.2  | 93.0                                    | 9.0   |
| 1N5634A     | 9.40                                    | 10.50                                      | 11.60 | 1.0  | 5.0   | 15.6  | 96.0                                    | 9.0   |
| 1N5635      | 9.72                                    | 10.80                                      | 13.20 | 1.0  | 5.0   | 17.3  | 87.0                                    | 10.0  |
| 1N5635A     | 10.20                                   | 11.40                                      | 12.60 | 1.0  | 5.0   | 16.7  | 90.0                                    | 10.0  |
| 1N5636      | 10.50                                   | 11.70                                      | 14.30 | 1.0  | 5.0   | 19.0  | 79.0                                    | 11.0  |
| 1N5636A     | 11.10                                   | 12.40                                      | 13.70 | 1.0  | 5.0   | 18.2  | 82.0                                    | 11.0  |
| 1N5637*     | 12.10                                   | 13.50                                      | 16.50 | 1.0  | 5.0   | 22.0  | 68.0                                    | 13.0  |
| 1N5637A*    | 12.80                                   | 14.30                                      | 15.80 | 1.0  | 5.0   | 21.2  | 71.0                                    | 12.0  |
| 1N5638*     | 12.90                                   | 14.40                                      | 17.60 | 1.0  | 5.0   | 23.5  | 64.0                                    | 16.0  |
| 1N5638A*    | 13.60                                   | 15.20                                      | 16.80 | 1.0  | 5.0   | 22.5  | 67.0                                    | 14.0  |
| 1N5639*     | 14.50                                   | 16.20                                      | 19.80 | 1.0  | 5.0   | 26.5  | 56.5                                    | 17.0  |
| 1N5639A*    | 15.30                                   | 17.10                                      | 18.90 | 1.0  | 5.0   | 25.2  | 59.5                                    | 19.0  |
| 1N5640      | 16.20                                   | 18.00                                      | 22.00 | 1.0  | 5.0   | 29.1  | 51.5                                    | 20.0  |
| 1N5640A     | 17.10                                   | 19.00                                      | 21.00 | 1.0  | 5.0   | 27.7  | 54.0                                    | 19.0  |
| 1N5641      | 17.80                                   | 19.80                                      | 24.20 | 1.0  | 5.0   | 31.9  | 47.0                                    | 21.0  |
| 1N5641A     | 18.80                                   | 20.90                                      | 23.10 | 1.0  | 5.0   | 30.6  | 49.0                                    | 20.0  |
| 1N5642      | 19.40                                   | 21.60                                      | 26.40 | 1.0  | 5.0   | 34.7  | 43.0                                    | 25.0  |
| 1N5642A     | 20.50                                   | 22.80                                      | 25.20 | 1.0  | 5.0   | 33.2  | 45.0                                    | 23.0  |
| 1N5643*     | 21.80                                   | 24.30                                      | 29.70 | 1.0  | 5.0   | 39.1  | 38.5                                    | 28.0  |
| 1N5643A*    | 23.10                                   | 25.70                                      | 28.40 | 1.0  | 5.0   | 37.5  | 40.0                                    | 25.0  |
| 1N5644*     | 24.30                                   | 27.00                                      | 33.00 | 1.0  | 5.0   | 43.5  | 34.5                                    | 31.0  |
| 1N5644A     | 25.60                                   | 28.50                                      | 31.50 | 1.0  | 5.0   | 41.4  | 36.0                                    | 28.0  |
| 1N5645      | 26.80                                   | 29.70                                      | 36.30 | 1.0  | 5.0   | 47.7  | 31.5                                    | 31.0  |
| 1N5645A     | 28.20                                   | 31.40                                      | 34.70 | 1.0  | 5.0   | 45.7  | 33.0                                    | 30.0  |
| 1N5646*     | 29.10                                   | 32.40                                      | 39.60 | 1.0  | 5.0   | 52.0  | 29.0                                    | 35.0  |
| 1N5646A*    | 30.80                                   | 34.20                                      | 37.80 | 1.0  | 5.0   | 49.9  | 30.0                                    | 31.0  |

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

1N5629 to 1N5647A  $V_F$  max = 3.5V at  $I_F$  = 50A 300  $\mu$ S square wave pulse.

1N5648 to 1N5665A  $V_F$  max = 5.0V at  $I_F$  = 50A 300  $\mu$ S square wave pulse.

\* Preferred voltages.

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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) |   |   |   |   |
| 1N5647      | 31.60                                   | 35.10                                      | 42.90 | 1.0  | 5.0   | 56.4  | 26.5                                    | 39.0  |
| 1N5647A     | 33.30                                   | 37.10                                      | 41.00 | 1.0  | 5.0   | 53.9  | 28.0                                    | 36.0  |
| 1N5648      | 34.80                                   | 38.70                                      | 47.30 | 1.0  | 5.0   | 61.9  | 24.0                                    | 46.0  |
| 1N5648A     | 36.80                                   | 40.90                                      | 45.20 | 1.0  | 5.0   | 59.3  | 25.3                                    | 44.0  |
| 1N5649*     | 38.10                                   | 42.30                                      | 51.70 | 1.0  | 5.0   | 67.8  | 22.2                                    | 50.0  |
| 1N5649A*    | 40.20                                   | 44.70                                      | 49.40 | 1.0  | 5.0   | 64.8  | 23.2                                    | 48.0  |
| 1N5650      | 41.30                                   | 45.90                                      | 56.10 | 1.0  | 5.0   | 73.5  | 20.4                                    | 55.0  |
| 1N5650A     | 43.60                                   | 48.50                                      | 53.60 | 1.0  | 5.0   | 70.1  | 21.4                                    | 51.0  |
| 1N5651      | 45.4                                    | 50.4                                       | 61.6  | 1.0  | 5.0   | 80.5  | 18.6                                    | 58.0  |
| 1N5651A     | 47.8                                    | 53.2                                       | 58.8  | 1.0  | 5.0   | 77.0  | 19.5                                    | 56.0  |
| 1N5652      | 50.2                                    | 55.8                                       | 68.2  | 1.0  | 5.0   | 89.0  | 16.9                                    | 65.0  |
| 1N5652A     | 53.0                                    | 58.9                                       | 65.1  | 1.0  | 5.0   | 85.0  | 17.7                                    | 62.0  |
| 1N5653      | 55.1                                    | 61.2                                       | 74.8  | 1.0  | 5.0   | 98.0  | 15.3                                    | 71.0  |
| 1N5653A     | 58.1                                    | 64.6                                       | 71.4  | 1.0  | 5.0   | 92.0  | 16.3                                    | 69.0  |
| 1N5654      | 60.7                                    | 67.5                                       | 82.5  | 1.0  | 5.0   | 108.0   | 13.9                                    | 80.0  |
| 1N5654A     | 64.1                                    | 71.3                                       | 78.8  | 1.0  | 5.0   | 103.0   | 14.6                                    | 76.0  |
| 1N5655*     | 66.4                                    | 73.8                                       | 90.2  | 1.0  | 5.0   | 118.0   | 12.7                                    | 90.0  |
| 1N5655A*    | 70.1                                    | 77.9                                       | 86.1  | 1.0  | 5.0   | 113.0   | 13.3                                    | 86.0  |
| 1N5656*     | 73.7                                    | 81.9                                       | 100.0 | 1.0  | 5.0   | 131.0   | 11.4                                    | 99.0  |
| 1N5656A*    | 77.8                                    | 86.5                                       | 95.5  | 1.0  | 5.0   | 125.0   | 12.0                                    | 94.0  |
| 1N5657      | 81.0                                    | 90.0                                       | 110.0 | 1.0  | 5.0   | 144.0   | 10.4                                    | 109.0   |
| 1N5657A     | 85.5                                    | 95.0                                       | 105.0 | 1.0  | 5.0   | 137.0   | 11.0                                    | 104.0   |
| 1N5658      | 89.2                                    | 99.0                                       | 121.0 | 1.0  | 5.0   | 158.0   | 9.5                                     | 120.0   |
| 1N5658A     | 94.0                                    | 105.0                                      | 116.0 | 1.0  | 5.0   | 152.0   | 9.9                                     | 115.0   |
| 1N5659      | 97.2                                    | 108.0                                      | 132.0 | 1.0  | 5.0   | 173.0   | 8.7                                     | 131.0   |
| 1N5659A     | 102.0                                   | 114.0                                      | 126.0 | 1.0  | 5.0   | 165.0   | 9.1                                     | 125.0   |
| 1N5660*     | 105.0                                   | 117.0                                      | 143.0 | 1.0  | 5.0   | 187.0   | 8.0                                     | 142.0   |
| 1N5660A*    | 111.0                                   | 124.0                                      | 137.0 | 1.0  | 5.0   | 179.0   | 8.4                                     | 136.0   |
| 1N5661      | 121.0                                   | 135.0                                      | 165.0 | 1.0  | 5.0   | 215.0   | 7.0                                     | 164.0   |
| 1N5661A     | 128.0                                   | 143.0                                      | 158.0 | 1.0  | 5.0   | 207.0   | 7.2                                     | 157.0   |
| 1N5662      | 130.0                                   | 144.0                                      | 176.0 | 1.0  | 5.0   | 230.0   | 6.5                                     | 175.0   |
| 1N5662A     | 136.0                                   | 152.0                                      | 168.0 | 1.0  | 5.0   | 219.0   | 6.8                                     | 167.0   |
| 1N5663      | 138.0                                   | 153.0                                      | 187.0 | 1.0  | 5.0   | 244.0   | 6.2                                     | 186.0   |
| 1N5663A     | 145.0                                   | 162.0                                      | 179.0 | 1.0  | 5.0   | 234.0   | 6.4                                     | 188.0   |
| 1N5664      | 146.0                                   | 162.0                                      | 198.0 | 1.0  | 5.0   | 258.0   | 5.8                                     | 197.0   |
| 1N5664A     | 154.0                                   | 171.0                                      | 189.0 | 1.0  | 5.0   | 246.0   | 6.1                                     | 188.0   |
| 1N5665      | 162.0                                   | 180.0                                      | 220.0 | 1.0  | 5.0   | 287.0   | 5.2                                     | 219.0   |
| 1N5665A     | 171.0                                   | 190.0                                      | 210.0 | 1.0  | 5.0   | 274.0   | 5.5                                     | 209.0   |

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1N5648 to 1N5665A  $V_F$  max = 5.0V at  $I_F$  = 50A 300  $\mu$ S square wave pulse.

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