



# PROTEK DEVICES®

.....Engineered solutions for the transient environment

TVS  
Transient Voltage  
Suppressors  
Low Capacitance  
LC 6.5  
thru  
LC 90A

## DESCRIPTION

This specification sheet defines a premium series of Silicon Transient Voltage Suppressors (TVS) specifically designed with low capacitance for protection on data lines up to 300 kB. Transients and noise pulses are generated by electromechanical switching, electromagnetic coupling, capacitive or inductive load switching, voltage reversals, and electrostatic discharge. These devices will clamp the voltage transient without affecting data transmission.

The TVS is desired over a crowbar circuit, an LC or RC network, and a catch or clamping diode because of: fewer components; speed of response; high power or energy absorption, and low clamping factor.

For bidirectional data line applications, two of these devices are required in parallel, opposite in polarity. (See application note.) These units are hermetically sealed, capable of meeting the screening specifications of military requirements. Contact the factory for parallel matching conditions. This is only one of many series of Transient Voltage Suppressors available from ProTek Devices.

## FEATURES

- 1500 watts Peak Power dissipation
- Available in ranges from 6.5 to 90 volts
- Low Capacitance for Data Line Protection up to 300 kB
- Hermetically sealed package
- Each device 100% tested

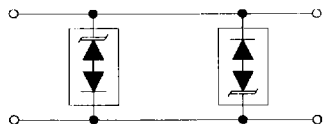
## MAXIMUM RATINGS

- 1500 Watts of Peak Pulse Power dissipation at 25°C (see Figure 1)
- Operating and Storage temperatures: -65° to +175°C
- Steady State (Average) power dissipation: 1.0 watt at T<sub>L</sub> of 75°C
- Repetition rate (duty cycle): .01%
- t<sub>clamping</sub> (0 volts to V<sub>BR</sub> min): Less than 4 nano-second

## MECHANICAL CHARACTERISTICS

- Standard DO-13 package, glass and metal hermetically sealed
- Weight: 1.5 grams (approximate)
- Positive terminal marked with band
- Body marked with Logo and type number

## APPLICATION:



Devices must be used with two units in parallel, opposite in polarity as shown in circuit for AC Signal Line Protection

## SCHEMATIC

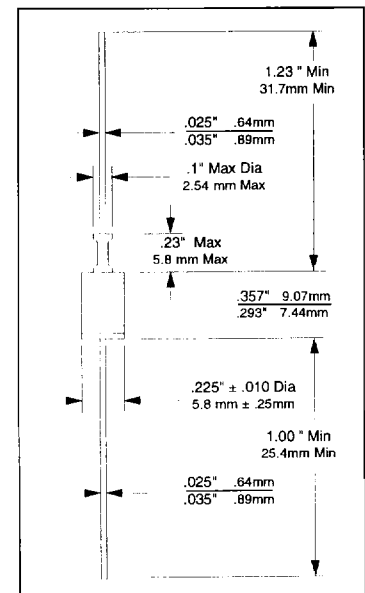
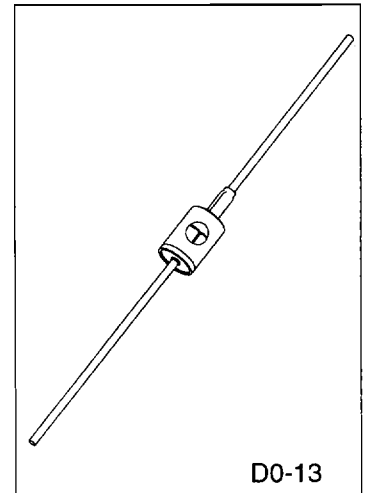


FIGURE 1  
PEAK PULSE POWER vs PULSE TIME

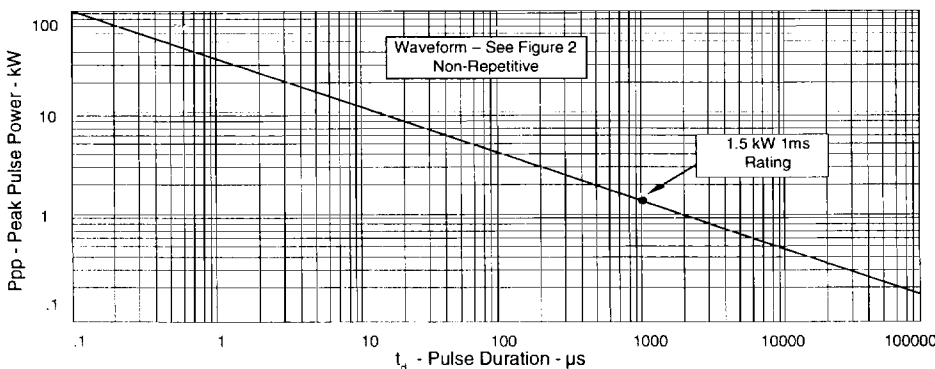
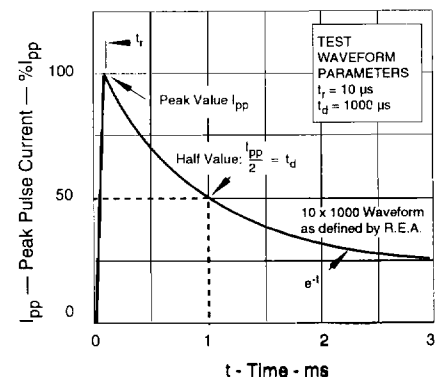


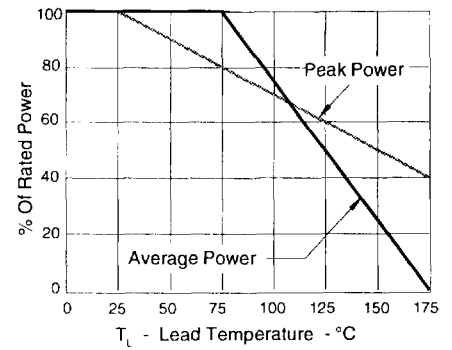
FIGURE 2  
PULSE WAVEFORM



**ELECTRICAL CHARACTERISTICS AT 25° C**

| PROTEK TYPE NUMBER | RATED STAND-OFF VOLTAGE (See Note 1)<br>$V_{WM}$<br>VOLTS | BREAKDOWN VOLTAGE $V_{BR}$ @ $I_T$ mA |       | MAXIMUM STANDBY CURRENT @ $V_{WM}$ ID $\mu$ A | MAXIMUM CLAMPING VOLTAGE @ $I_{pp}$ $V_C$ VOLTS (See Fig. 2) | MAXIMUM PEAK PULSE CURRENT (See Fig. 2) $I_{pp}$ A | CAPACITANCE @ 0 VOLTS C pF | WORKING INVERSE BLOCKING VOLTAGE $V_{WIB}$ VOLTS | INVERSE BLOCKING LEAKAGE CURRENT @ $V_{WIB}$ mA | PEAK INVERSE BLOCKING VOLTAGE $V_{PIB}$ VOLTS |     |
|--------------------|---|---------------------------------------|-------|---|--|--|----------------------------|--|---|---|-----|
|                    |   | Min                                   | Max   |   |  |  |                            |  |   |   |     |
| LC6.5              | 6.5   | 7.22                                  | 8.82  | 10  | 12.3   | 100  | 100                        | 75   | 1   | 100   |     |
| LC6.5A             | 6.5   | 7.22                                  | 7.98  | 10  | 1000   | 11.2   | 100                        | 75   | 1   | 100   |     |
| LC7.0              | 7.0   | 7.78                                  | 9.51  | 10  | 500  | 13.3   | 100                        | 75   | 1   | 100   |     |
| LC7.0A             | 7.0   | 7.78                                  | 8.60  | 10  | 500  | 12.0   | 100                        | 75   | 1   | 100   |     |
| LC7.5              | 7.5   | 8.33                                  | 10.2  | 10  | 250  | 14.3   | 100                        | 75   | 1   | 100   |     |
| LC7.5A             | 7.5   | 8.33                                  | 9.21  | 10  | 250  | 12.9   | 100                        | 75   | 1   | 100   |     |
| LC8.0              | 8.0   | 8.89                                  | 10.9  | 1   | 100  | 15.0   | 100                        | 75   | 1   | 100   |     |
| LC8.0A             | 8.0   | 8.89                                  | 9.83  | 1   | 100  | 13.6   | 100                        | 75   | 1   | 100   |     |
| LC8.5              | 8.5   | 9.44                                  | 11.5  | 1   | 50   | 15.9   | 94                         | 100  | 75  | 1   | 100 |
| LC8.5A             | 8.5   | 9.44                                  | 10.4  | 1   | 50   | 14.4   | 100                        | 75   | 1   | 100   |     |
| LC9.0              | 9.0   | 10.0                                  | 12.2  | 1   | 10   | 16.9   | 89                         | 100  | 75  | 1   | 100 |
| LC9.0A             | 9.0   | 10.0                                  | 11.1  | 1   | 10   | 15.4   | 97                         | 100  | 75  | 1   | 100 |
| LC10               | 10  | 11.1                                  | 13.6  | 1   | 5  | 18.8   | 80                         | 100  | 75  | 1   | 100 |
| LC10A              | 10  | 11.1                                  | 12.3  | 1   | 5  | 17.0   | 88                         | 100  | 75  | 1   | 100 |
| LC11               | 11  | 12.2                                  | 14.9  | 1   | 5  | 20.1   | 74                         | 100  | 75  | 1   | 100 |
| LC11A              | 11  | 12.2                                  | 13.5  | 1   | 5  | 18.2   | 82                         | 100  | 75  | 1   | 100 |
| LC12               | 12  | 13.3                                  | 16.3  | 1   | 5  | 22.0   | 68                         | 100  | 75  | 1   | 100 |
| LC12A              | 12  | 13.3                                  | 14.7  | 1   | 5  | 19.9   | 75                         | 100  | 75  | 1   | 100 |
| LC13               | 13  | 14.4                                  | 17.6  | 1   | 5  | 23.8   | 63                         | 100  | 75  | 1   | 100 |
| LC13A              | 13  | 14.4                                  | 15.9  | 1   | 5  | 21.5   | 70                         | 100  | 75  | 1   | 100 |
| LC14               | 14  | 15.6                                  | 19.1  | 1   | 5  | 25.8   | 58                         | 100  | 75  | 1   | 100 |
| LC14A              | 14  | 15.6                                  | 17.2  | 1   | 5  | 23.2   | 65                         | 100  | 75  | 1   | 100 |
| LC15               | 15  | 16.7                                  | 20.4  | 1   | 5  | 26.9   | 56                         | 100  | 75  | 1   | 100 |
| LC15A              | 15  | 16.7                                  | 18.5  | 1   | 5  | 24.4   | 61                         | 100  | 75  | 1   | 100 |
| LC16               | 16  | 17.8                                  | 21.8  | 1   | 5  | 28.8   | 52                         | 100  | 75  | 1   | 100 |
| LC16A              | 16  | 17.8                                  | 19.7  | 1   | 5  | 26.0   | 57                         | 100  | 75  | 1   | 100 |
| LC17               | 17  | 18.9                                  | 23.1  | 1   | 5  | 30.5   | 49                         | 100  | 75  | 1   | 100 |
| LC17A              | 17  | 18.9                                  | 20.9  | 1   | 5  | 27.6   | 54                         | 100  | 75  | 1   | 100 |
| LC18               | 18  | 20.0                                  | 24.4  | 1   | 5  | 32.2   | 46                         | 100  | 75  | 1   | 100 |
| LC18A              | 18  | 20.0                                  | 22.1  | 1   | 5  | 29.2   | 51                         | 100  | 75  | 1   | 100 |
| LC20               | 20  | 22.2                                  | 27.1  | 1   | 5  | 35.8   | 42                         | 100  | 75  | 1   | 100 |
| LC20A              | 20  | 22.2                                  | 24.5  | 1   | 5  | 32.4   | 46                         | 100  | 75  | 1   | 100 |
| LC22               | 22  | 24.4                                  | 29.8  | 1   | 5  | 39.4   | 38                         | 100  | 75  | 1   | 100 |
| LC22A              | 22  | 24.4                                  | 26.9  | 1   | 5  | 35.5   | 42                         | 100  | 75  | 1   | 100 |
| LC24               | 24  | 26.7                                  | 32.6  | 1   | 5  | 43.0   | 35                         | 100  | 75  | 1   | 100 |
| LC24A              | 24  | 26.7                                  | 29.5  | 1   | 5  | 38.9   | 39                         | 100  | 75  | 1   | 100 |
| LC26               | 26  | 28.9                                  | 35.3  | 1   | 5  | 46.6   | 32                         | 100  | 75  | 1   | 100 |
| LC26A              | 26  | 28.9                                  | 31.9  | 1   | 5  | 42.1   | 36                         | 100  | 75  | 1   | 100 |
| LC28               | 28  | 31.1                                  | 38.0  | 1   | 5  | 50.1   | 30                         | 100  | 75  | 1   | 100 |
| LC28A              | 28  | 31.1                                  | 34.4  | 1   | 5  | 45.5   | 33                         | 100  | 75  | 1   | 100 |
| LC30               | 30  | 33.3                                  | 40.7  | 1   | 5  | 53.5   | 28                         | 100  | 75  | 1   | 100 |
| LC30A              | 30  | 33.3                                  | 36.8  | 1   | 5  | 48.4   | 31                         | 100  | 75  | 1   | 100 |
| LC33               | 33  | 36.7                                  | 44.9  | 1   | 5  | 59.0   | 25.4                       | 100  | 75  | 1   | 100 |
| LC33A              | 33  | 36.7                                  | 40.6  | 1   | 5  | 53.3   | 28.1                       | 100  | 75  | 1   | 100 |
| LC36               | 36  | 40.0                                  | 48.9  | 1   | 5  | 64.3   | 23.3                       | 100  | 75  | 1   | 100 |
| LC36A              | 36  | 40.0                                  | 44.2  | 1   | 5  | 58.1   | 25.8                       | 100  | 75  | 1   | 100 |
| LC40               | 40  | 44.4                                  | 54.3  | 1   | 5  | 71.4   | 21.0                       | 100  | 75  | 1   | 100 |
| LC40A              | 40  | 44.4                                  | 49.1  | 1   | 5  | 64.5   | 23.3                       | 100  | 75  | 1   | 100 |
| LC43               | 43  | 47.8                                  | 58.4  | 1   | 5  | 76.7   | 19.5                       | 100  | 150   | 1   | 200 |
| LC43A              | 43  | 47.8                                  | 52.8  | 1   | 5  | 69.4   | 21.6                       | 100  | 150   | 1   | 200 |
| LC45               | 45  | 50.0                                  | 61.1  | 1   | 5  | 80.3   | 18.7                       | 100  | 150   | 1   | 200 |
| LC45A              | 45  | 50.0                                  | 55.3  | 1   | 5  | 72.7   | 20.6                       | 100  | 150   | 1   | 200 |
| LC48               | 48  | 53.3                                  | 65.1  | 1   | 5  | 85.5   | 17.5                       | 100  | 150   | 1   | 200 |
| LC48A              | 48  | 53.3                                  | 58.9  | 1   | 5  | 77.4   | 19.4                       | 100  | 150   | 1   | 200 |
| LC51               | 51  | 56.7                                  | 69.3  | 1   | 5  | 91.1   | 16.5                       | 100  | 150   | 1   | 200 |
| LC51A              | 51  | 56.7                                  | 62.7  | 1   | 5  | 82.4   | 18.2                       | 100  | 150   | 1   | 200 |
| LC54               | 54  | 60.0                                  | 73.3  | 1   | 5  | 96.3   | 15.6                       | 100  | 150   | 1   | 200 |
| LC54A              | 54  | 60.0                                  | 66.3  | 1   | 5  | 87.1   | 17.2                       | 100  | 150   | 1   | 200 |
| LC58               | 58  | 64.4                                  | 78.7  | 1   | 5  | 103.0  | 14.6                       | 100  | 150   | 1   | 200 |
| LC58A              | 58  | 64.4                                  | 71.2  | 1   | 5  | 93.6   | 16.0                       | 100  | 150   | 1   | 200 |
| LC60               | 60  | 66.7                                  | 81.5  | 1   | 5  | 107.0  | 14.0                       | 90   | 150   | 1   | 200 |
| LC60A              | 60  | 66.7                                  | 73.7  | 1   | 5  | 96.8   | 15.5                       | 90   | 150   | 1   | 200 |
| LC64               | 64  | 71.1                                  | 86.9  | 1   | 5  | 114.0  | 13.2                       | 90   | 150   | 1   | 200 |
| LC64A              | 64  | 71.1                                  | 78.6  | 1   | 5  | 103.0  | 14.6                       | 90   | 150   | 1   | 200 |
| LC70               | 70  | 77.8                                  | 95.1  | 1   | 5  | 125  | 12.0                       | 90   | 150   | 1   | 200 |
| LC70A              | 70  | 77.8                                  | 86.0  | 1   | 5  | 113  | 13.3                       | 90   | 150   | 1   | 200 |
| LC75               | 75  | 83.3                                  | 102.0 | 1   | 5  | 134  | 11.2                       | 90   | 150   | 1   | 200 |
| LC75A              | 75  | 83.3                                  | 92.1  | 1   | 5  | 121  | 12.4                       | 90   | 150   | 1   | 200 |
| LC80               | 80  | 88.7                                  | 108   | 1   | 5  | 142  | 10.6                       | 90   | 150   | 1   | 200 |
| LC80A              | 80  | 88.7                                  | 98.0  | 1   | 5  | 129  | 11.6                       | 90   | 150   | 1   | 200 |
| LC90               | 90  | 100                                   | 122   | 1   | 5  | 160  | 9.4                        | 90   | 300   | 1   | 200 |
| LC90A              | 90  | 100                                   | 111   | 1   | 5  | 146  | 10.3                       | 90   | 300   | 1   | 200 |

**FIGURE 3  
DERATING CURVE**



**ABBREVIATIONS & SYMBOLS**

- $V_R$**  Rated Stand-Off Voltage: Maximum working (continuous) DC or peak voltage which may be applied over the standard operating temperature range. (Note:  $V_{WM}$  is a selected device parameter and should be equal to or greater than the maximum operating voltage of the line to be protected.)
- $V_{BR}$  (min)** Minimum Breakdown Voltage: This is the minimum voltage the device will exhibit and is used to assure that conduction does not occur prior to that voltage at 25°C.
- $V_C$**  Maximum Clamping Voltage: The maximum peak voltage that appears across the TVS when subjected to the peak pulse current in a 1 ms time interval. The peak pulse voltages are the combination of voltage rise due to both the series resistance and the thermal rise.
- $I_{pp}$**  Peak Pulse Current - See Figure 2
- $P_p$**  Peak Pulse Power - See Figure 1
- $I_R$**  Standby-Current
- $I_T$**  Test Current
- $V_{WIB}$**  Working Inverse Blocking voltage for the Compensating diode
- $V_{PIB}$**  Peak Inverse Blocking Voltage of the Compensating diode
- $I_{IB}$**  Inverse Blocking Leakage Current of the Compensating diode
- Device Selection:** A TVS diode is normally selected according to the Rated Standoff voltage ( $V_{wm}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.

Note 1 A TVS is normally selected according to its Rated Stand-Off Voltage ( $V_{wm}$ ) which should be equal to or greater than the continuous peak operating voltage level.

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