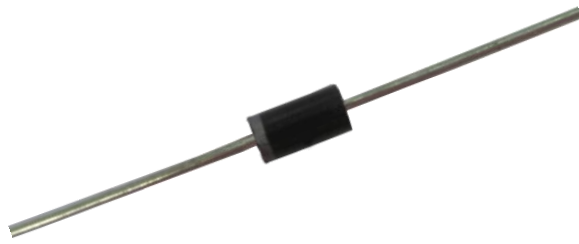
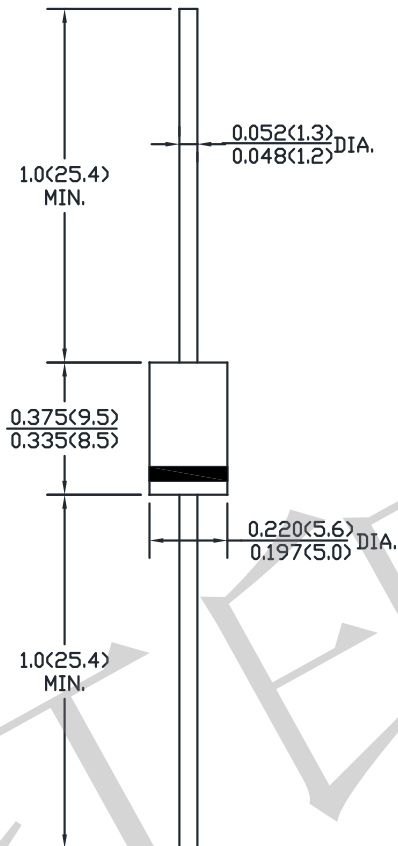


Transient Voltage Suppressor

Breakdown Voltage 6.5 to 170 Volts
Peak Pulse Power 1500 Watts



CASE: DO-204AL (DO-27)



Dimensions in inches and (millimeters)

Features

- Breakdown Voltages (V_{BR}) from 6.5 to 170V
- 1500W peak pulse power capability with a 10/1000 μ s waveform, repetitive rate (duty cycle): 0.01%
- Low capacitance
- Fast Response Time
- Excellent clamping capability
- High temperature soldering guaranteed: 265°C / 10 seconds, 0.375" (9.5mm) lead length, 5lbs. (2.3kg) tension

Application

- Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFE, signal lines of sensor units for consumer, computer, industrial, automotive and telecommunication

Mechanical Data

- **Case:** Void-free transfer molded thermosetting epoxy body meeting UL94V-O
- **Terminals:** Tin-Lead or ROHS Compliant annealed matte-Tin plating readily solderable per MIL-STD-750, Method 2026
- **Marking:** Part number and cathode band
- **Polarity:** Cathode indicated by band
- **Weight:** 1.2g (Approximately)

Maximum Ratings and Electrical Characteristics @ 25°C unless otherwise specified

| Symbol | Conditions | Value | Unit |
|-----------------|--|-------------|--------------------|
| P_{PPM} | Peak pulse power capability with a 10/1000 μ s | 1500 | W |
| I_{PPM} | Peak pulse current with a 10/1000 μ s | SEE TABLE 1 | A |
| $P_{M(AV)}$ | Steady state power dissipation at $T_L=40^\circ\text{C}$, Lead lengths 0.375" (10mm) | 5 | W |
| | Steady state power dissipation at $T_A=25^\circ\text{C}$ when mounted on FR4 PC described for thermal resistance | 1.52 | W |
| V_F | Maximum instantaneous forward voltage at 100A | 3.5 | V |
| $R_{\theta JL}$ | Thermal resistance junction to lead | 22 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal resistance junction to ambient | 82 | $^\circ\text{C/W}$ |
| T_J, T_{STG} | Operating and Storage Temperature | -65 to +150 | $^\circ\text{C}$ |

Electrical Characteristics @ 25°C (Unless Otherwise Noted) TABLE1

| Microsemi Part Number | Breakdown Voltage V_{BR} @ I_{BR} | | | Reverse Stand Off Voltage | Maximum Standby current I_D @ V_{WM} | Maximum Peak Pulse Current I_{PP} @ 10/1000 μ s | Maximum Clamping Voltage V_C @ I_{PP} | Maximum Capacitance @ 0V $f=1$ MHz | Working Inverse Blocking Voltage I_{IB} @ V_{WIB} | | Peak Inverse Blocking Voltage |
|-----------------------|---------------------------------------|------|---------------|---------------------------|--|---|---|------------------------------------|---|------------------|-------------------------------|
| | MIN | MAX | I_{BR} (mA) | | | | | | V_{WM} (V) | I_D (μ A) | |
| | V_{BR} (V) | | | | | | | | | | |
| LCE6.5 | 7.22 | 8.82 | 10 | 6.5 | 1000 | 100.0 | 12.3 | 100 | 75 | 10 | 100 |
| LCE6.5A | 7.22 | 7.98 | 10 | 6.5 | 1000 | 100.0 | 11.2 | 100 | 75 | 10 | 100 |
| LCE7.0 | 7.78 | 9.51 | 10 | 7.0 | 500 | 100.0 | 13.3 | 100 | 75 | 10 | 100 |
| LCE7.0A | 7.78 | 8.60 | 10 | 7.0 | 500 | 100.0 | 12.0 | 100 | 75 | 10 | 100 |
| LCE7.5 | 8.33 | 10.2 | 10 | 7.5 | 250 | 100.0 | 14.3 | 100 | 75 | 10 | 100 |
| LCE7.5A | 8.33 | 9.21 | 10 | 7.5 | 250 | 100.0 | 12.9 | 100 | 75 | 10 | 100 |
| LCE8.0 | 8.89 | 10.9 | 1 | 8.0 | 100 | 100.0 | 15.0 | 100 | 75 | 10 | 100 |
| LCE8.0A | 8.89 | 9.83 | 1 | 8.0 | 100 | 100.0 | 13.6 | 100 | 75 | 10 | 100 |
| LCE8.5 | 9.44 | 11.5 | 1 | 8.5 | 50 | 94.0 | 15.9 | 100 | 75 | 10 | 100 |
| LCE8.5A | 9.44 | 10.4 | 1 | 8.5 | 50 | 100.0 | 14.4 | 100 | 75 | 10 | 100 |
| LCE9.0 | 10.0 | 12.2 | 1 | 9.0 | 10 | 89.0 | 16.9 | 100 | 75 | 10 | 100 |
| LCE9.0A | 10.0 | 11.1 | 1 | 9.0 | 10 | 97.0 | 15.4 | 100 | 75 | 10 | 100 |
| LCE10 | 11.1 | 13.6 | 1 | 10.0 | 5 | 80.0 | 18.8 | 100 | 75 | 10 | 100 |
| LCE10A | 11.1 | 12.3 | 1 | 10.0 | 5 | 88.0 | 17.0 | 100 | 75 | 10 | 100 |
| LCE11 | 12.2 | 14.9 | 1 | 11.0 | 5 | 74.0 | 20.1 | 100 | 75 | 10 | 100 |
| LCE11A | 12.2 | 13.5 | 1 | 11.0 | 5 | 82.0 | 18.2 | 100 | 75 | 10 | 100 |
| LCE12 | 13.3 | 16.3 | 1 | 12.0 | 5 | 68.0 | 22.0 | 100 | 75 | 10 | 100 |
| LCE12A | 13.3 | 14.7 | 1 | 12.0 | 5 | 75.0 | 19.9 | 100 | 75 | 10 | 100 |
| LCE13 | 14.4 | 17.6 | 1 | 13.0 | 5 | 63.0 | 23.8 | 100 | 75 | 10 | 100 |
| LCE13A | 14.4 | 15.9 | 1 | 13.0 | 5 | 70.0 | 21.5 | 100 | 75 | 10 | 100 |
| LCE14 | 15.6 | 19.1 | 1 | 14.0 | 5 | 58.0 | 25.8 | 100 | 75 | 10 | 100 |
| LCE14A | 15.6 | 17.2 | 1 | 14.0 | 5 | 65.0 | 23.2 | 100 | 75 | 10 | 100 |
| LCE15 | 16.7 | 20.4 | 1 | 15.0 | 5 | 56.0 | 26.9 | 100 | 75 | 10 | 100 |
| LCE15A | 16.7 | 18.5 | 1 | 15.0 | 5 | 61.0 | 24.4 | 100 | 75 | 10 | 100 |
| LCE16 | 17.8 | 21.8 | 1 | 16.0 | 5 | 52.0 | 28.8 | 100 | 75 | 10 | 100 |
| LCE16A | 17.8 | 19.7 | 1 | 16.0 | 5 | 57.0 | 26.0 | 100 | 75 | 10 | 100 |
| LCE17 | 18.9 | 23.1 | 1 | 17.0 | 5 | 49.0 | 30.5 | 100 | 75 | 10 | 100 |
| LCE17A | 18.9 | 20.9 | 1 | 17.0 | 5 | 54.0 | 27.6 | 100 | 75 | 10 | 100 |
| LCE18 | 20.0 | 24.4 | 1 | 18.0 | 5 | 46.0 | 32.2 | 100 | 75 | 10 | 100 |
| LCE18A | 20.0 | 22.1 | 1 | 18.0 | 5 | 51.0 | 29.2 | 100 | 75 | 10 | 100 |
| LCE20 | 22.2 | 27.1 | 1 | 20.0 | 5 | 42.0 | 35.8 | 100 | 75 | 10 | 100 |
| LCE20A | 22.2 | 24.5 | 1 | 20.0 | 5 | 46.0 | 32.4 | 100 | 75 | 10 | 100 |
| LCE22 | 24.4 | 29.8 | 1 | 22.0 | 5 | 38.0 | 39.4 | 100 | 75 | 10 | 100 |
| LCE22A | 24.4 | 26.9 | 1 | 22.0 | 5 | 42.0 | 35.5 | 100 | 75 | 10 | 100 |
| LCE24 | 26.7 | 32.6 | 1 | 24.0 | 5 | 35.0 | 43.0 | 100 | 75 | 10 | 100 |
| LCE24A | 26.7 | 29.5 | 1 | 24.0 | 5 | 39.0 | 38.9 | 100 | 75 | 10 | 100 |
| LCE26 | 28.9 | 35.3 | 1 | 26.0 | 5 | 32.0 | 46.6 | 100 | 75 | 10 | 100 |
| LCE26A | 28.9 | 31.9 | 1 | 26.0 | 5 | 36.0 | 42.1 | 100 | 75 | 10 | 100 |
| LCE28 | 31.1 | 38.0 | 1 | 28.0 | 5 | 30.0 | 50.0 | 100 | 75 | 10 | 100 |
| LCE28A | 31.1 | 34.4 | 1 | 28.0 | 5 | 33.0 | 45.4 | 100 | 75 | 10 | 100 |
| LCE30 | 33.3 | 40.7 | 1 | 30.0 | 5 | 28.0 | 53.5 | 100 | 75 | 10 | 100 |
| LCE30A | 33.3 | 36.8 | 1 | 30.0 | 5 | 31.0 | 48.4 | 100 | 75 | 10 | 100 |
| LCE33 | 36.7 | 44.9 | 1 | 33.0 | 5 | 25.4 | 58.0 | 100 | 75 | 10 | 100 |
| LCE33A | 36.7 | 40.6 | 1 | 33.0 | 5 | 28.1 | 53.3 | 100 | 75 | 10 | 100 |
| LCE36 | 40.0 | 48.9 | 1 | 36.0 | 5 | 23.3 | 64.3 | 100 | 75 | 10 | 100 |
| LCE36A | 40.0 | 44.2 | 1 | 36.0 | 5 | 25.8 | 58.1 | 100 | 75 | 10 | 100 |
| LCE40 | 44.4 | 54.3 | 1 | 40.0 | 5 | 21.0 | 71.4 | 100 | 75 | 10 | 100 |
| LCE40A | 44.4 | 49.1 | 1 | 40.0 | 5 | 23.0 | 64.5 | 100 | 75 | 10 | 100 |
| LCE43 | 47.8 | 58.4 | 1 | 43.0 | 5 | 19.5 | 76.7 | 100 | 150 | 10 | 200 |
| LCE43A | 47.8 | 52.8 | 1 | 43.0 | 5 | 21.6 | 69.4 | 100 | 150 | 10 | 200 |
| LCE45 | 50.0 | 61.1 | 1 | 45.0 | 5 | 18.7 | 80.3 | 100 | 150 | 10 | 200 |
| LCE45A | 50.0 | 55.3 | 1 | 45.0 | 5 | 20.6 | 72.7 | 100 | 150 | 10 | 200 |
| LCE48 | 53.3 | 65.1 | 1 | 48.0 | 5 | 17.5 | 85.5 | 100 | 150 | 10 | 200 |
| LCE48A | 53.3 | 58.9 | 1 | 48.0 | 5 | 19.4 | 77.4 | 100 | 150 | 10 | 200 |
| LCE51 | 56.7 | 69.3 | 1 | 51.0 | 5 | 16.5 | 91.1 | 100 | 150 | 10 | 200 |
| LCE51A | 56.7 | 62.7 | 1 | 51.0 | 5 | 18.2 | 82.4 | 100 | 150 | 10 | 200 |

| Microsemi Part Number | Breakdown Voltage V_{BR} @ I_{BR} | | | Reverse Stand Off Voltage $V_{WM}(V)$ | Maximum Standby current I_D @ V_{WM} (μA) | Maximum Peak Pulse Current I_{PP} @ 10/1000 μs (A) | Maximum Clamping Voltage V_C @ I_{PP} (V) | Maximum Capacitance @ 0V $f=1MHz$ (pF) | Working Inverse Blocking Voltage I_{IB} @ V_{WIB} | | Peak Inverse Blocking Voltage $V_{PIB}(V)$ |
|-----------------------|---------------------------------------|------|---------------|---------------------------------------|--|---|---|--|---|-----------------|--|
| | MIN | MAX | I_{BR} (mA) | | | | | | $V_{WIB}(V)$ | $I_{IB}(\mu A)$ | |
| | $V_{BR}(V)$ | | | | | | | | | | |
| LCE54 | 60.0 | 73.3 | 1 | 54.0 | 5 | 15.6 | 96.3 | 100 | 150 | 10 | 200 |
| LCE54A | 60.0 | 66.3 | 1 | 54.0 | 5 | 17.2 | 87.1 | 100 | 150 | 10 | 200 |
| LCE58 | 64.4 | 78.7 | 1 | 58.0 | 5 | 14.6 | 103.0 | 100 | 150 | 10 | 200 |
| LCE58A | 64.4 | 71.2 | 1 | 58.0 | 5 | 16.0 | 93.6 | 100 | 150 | 10 | 200 |
| LCE60 | 66.7 | 81.5 | 1 | 60.0 | 5 | 14.0 | 107.0 | 90 | 150 | 10 | 200 |
| LCE60A | 66.7 | 73.7 | 1 | 60.0 | 5 | 15.5 | 96.8 | 90 | 150 | 10 | 200 |
| LCE64 | 71.1 | 86.9 | 1 | 64.0 | 5 | 13.2 | 114.0 | 90 | 150 | 10 | 200 |
| LCE64A | 71.1 | 78.6 | 1 | 64.0 | 5 | 14.6 | 103.0 | 90 | 150 | 10 | 200 |
| LCE70 | 77.8 | 95.1 | 1 | 70.0 | 5 | 12.0 | 125.0 | 90 | 150 | 10 | 200 |
| LCE70A | 77.8 | 86.0 | 1 | 70.0 | 5 | 13.3 | 113.0 | 90 | 150 | 10 | 200 |
| LCE75 | 83.3 | 102 | 1 | 75.0 | 5 | 11.2 | 134.0 | 90 | 150 | 10 | 200 |
| LCE75A | 83.3 | 92.1 | 1 | 75.0 | 5 | 12.4 | 121.0 | 90 | 150 | 10 | 200 |
| LCE80 | 88.7 | 108 | 1 | 80.0 | 5 | 10.6 | 142.0 | 90 | 150 | 10 | 200 |
| LCE80A | 88.7 | 98.0 | 1 | 80.0 | 5 | 11.6 | 129.0 | 90 | 150 | 10 | 200 |
| LCE90 | 100 | 122 | 1 | 90.0 | 5 | 9.4 | 160.0 | 90 | 300 | 10 | 200 |
| LCE90A | 100 | 111 | 1 | 90.0 | 5 | 10.3 | 146.0 | 90 | 300 | 10 | 200 |
| LCE100 | 111 | 136 | 1 | 100.0 | 5 | 8.4 | 179.0 | 90 | 300 | 10 | 200 |
| LCE100A | 111 | 123 | 1 | 100.0 | 5 | 9.3 | 162.0 | 90 | 300 | 10 | 200 |
| LCE110 | 122 | 149 | 1 | 110.0 | 5 | 7.7 | 196.0 | 90 | 300 | 10 | 400 |
| LCE110 | 122 | 135 | 1 | 110.0 | 5 | 8.4 | 178.0 | 90 | 300 | 10 | 400 |
| LCE120 | 133 | 163 | 1 | 120.0 | 5 | 7.0 | 214.0 | 90 | 300 | 10 | 400 |
| LCE120A | 133 | 147 | 1 | 120.0 | 5 | 7.8 | 193.0 | 90 | 300 | 10 | 400 |
| LCE130 | 144 | 176 | 1 | 130.0 | 5 | 6.5 | 231.0 | 90 | 300 | 10 | 400 |
| LCE130A | 144 | 159 | 1 | 130.0 | 5 | 7.2 | 209.0 | 90 | 300 | 10 | 400 |
| LCE150 | 167 | 204 | 1 | 150.0 | 5 | 5.6 | 268.0 | 90 | 300 | 10 | 400 |
| LCE150A | 167 | 185 | 1 | 150.0 | 5 | 6.2 | 243.0 | 90 | 300 | 10 | 400 |
| LCE160 | 178 | 218 | 1 | 160.0 | 5 | 5.2 | 287.0 | 90 | 300 | 10 | 400 |
| LCE160A | 178 | 197 | 1 | 160.0 | 5 | 5.8 | 259.0 | 90 | 300 | 10 | 400 |
| LCE170 | 189 | 231 | 1 | 170.0 | 5 | 4.9 | 304.0 | 90 | 300 | 10 | 400 |
| LCE170A | 189 | 209 | 1 | 170.0 | 5 | 5.4 | 275.0 | 90 | 300 | 10 | 400 |

Note1: A transient voltage suppressor is normally selected according to voltage (V_{WM}), which should be equal to or greater than the dc or continuous peak operating voltage level.

Characteristic Curve

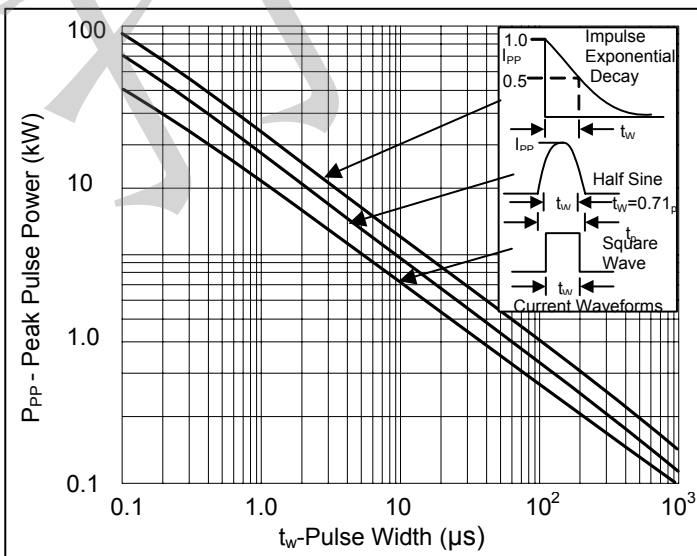


Fig. 1 Peak Pulse Power vs. Pulse Time

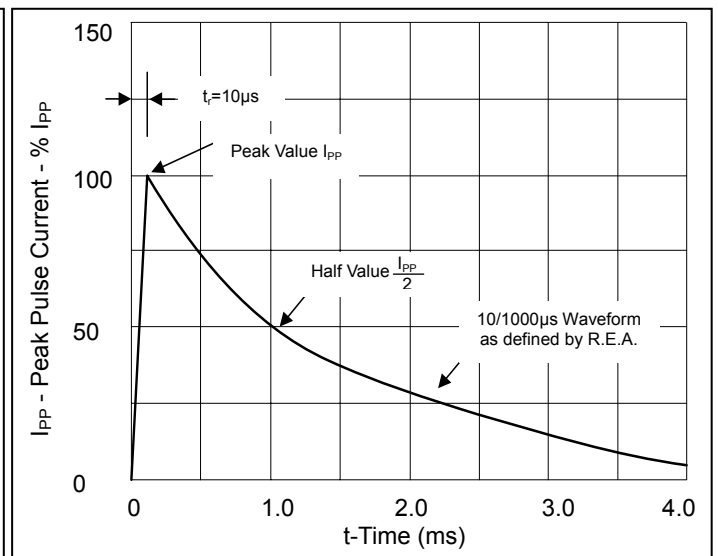


Fig.2 Pulse Waveform for Exponential Surge

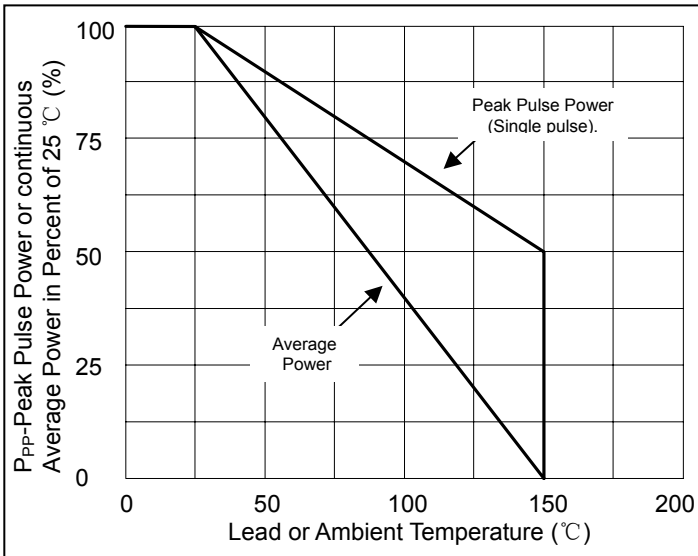


Fig.3 Derating Curve

Schematic Applications

The TVS low capacitance device configuration is shown in Fig.4. As a further option for unidirectional applications, an additional low capacitance rectifier diode may be used in parallel in the same polarity direction as the TVS as shown in Fig.5. In applications where random high voltage transients occur, this will prevent reverse transients from damaging the internal low capacitance rectifier diode and also provide a low voltage conducting direction. The added rectifier diode should be of similar low capacitance and also have a higher reverse voltage rating than the TVS clamping voltage V_C . If using two (2) low capacitance TVS devices in also provided. The unidirectional and bidirectional configurations in Fig.5 and 6 will both in twice the capacitance of Fig.4

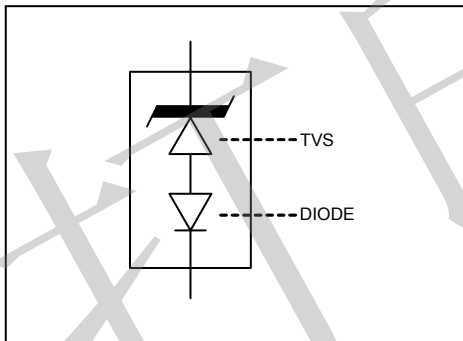


Fig.4 TVS with internal Low Capacitance Diode

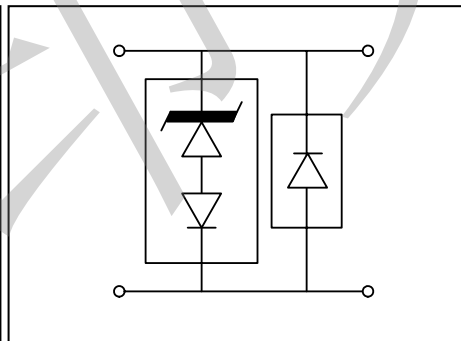


Fig.5 Optional Unidirectional configuration (TVS and separate rectifier diode in parallel)

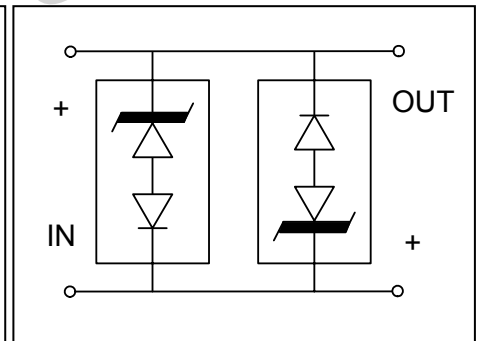


Fig.6 Optional Bidirectional configuration (two TVS and devices in anti-parallel)