

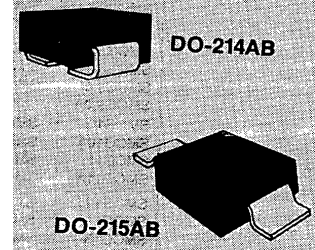
**1500 WATT LOW CAPACITANCE
SURFACE MOUNT TRANSIENT
VOLTAGE SUPPRESSOR**

DESCRIPTION

This surface mount Transient Voltage Suppressor (TVS) product family includes a rectifier diode element in series and opposite direction to achieve low capacitance below 100 pF. They are also available as RoHS Compliant with an e3 suffix. The low TVS capacitance may be used for protecting higher frequency applications in inductive switching environments or electrical systems involving secondary lightning effects per IEC61000-4-5 as well as RTCA/DO-160D or ARINC 429 for airborne avionics. They also protect from ESD and EFT per IEC61000-4-2 and IEC61000-4-4. If bipolar transient capability is required, two of these low capacitance TVS devices may be used in parallel and opposite directions (anti-parallel) for complete ac protection (Figure 6).

IMPORTANT: For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

APPEARANCE



FEATURES

- Available in standoff voltage range of 6.5 to 200 V
- Low capacitance of 100 pF or less
- Molding compound flammability rating: UL94V-0
- Two different terminations available in C-bend (modified J-Bend with DO-214AB) or Gull-wing (DO-215AB)
- Options for screening in accordance with MIL-PRF-19500 for JAN, JANTX, and JANTXV are available by adding MQ, MX, or MV prefixes respectively to part numbers
- Optional 100% screening for avionics grade is available by adding MA prefix to part number for 100% temperature cycle -55°C to 125°C (10X) as well as surge (3X) and 24 hours HTRB with post test V_{BR} & I_R
- RoHS Compliant devices available by adding an "e3" suffix

APPLICATIONS / BENEFITS

- 1500 Watts of Peak Pulse Power at 10/1000 μ s
- Low capacitance for data line protection to 1 MHz
- Protection for aircraft fast data rate lines up to Level 5 Waveform 4 and Level 2 Waveform 5A in RTCA/DO-160D (also see MicroNote 130) & ARINC 429 with bit rates of 100 kb/s (per ARINC 429, Part 1, par 2.4.1.1)
- IEC61000-4-2 ESD 15 kV (air), 8 kV (contact)
- IEC61000-4-5 (Lightning) as further detailed in LCE6.5 thru LCE170A data sheet
- T1/E1 Line Cards
- Base Stations, WAN & XDSL Interfaces
- CSU/DSU Equipment

MAXIMUM RATINGS

- 1500 Watts of Peak Pulse Power dissipation at 25°C with repetition rate of 0.01% or less*
- Clamping Factor: 1.4 @ Full Rated power
1.30 @ 50% Rated power
- $t_{clamping}$ (0 volts to $V_{(BR)}$ min): Less than 5×10^{-9} seconds
- Operating and Storage temperatures: -65 to +150°C
- Steady State power dissipation: 5.0W @ $T_L = 50^\circ\text{C}$
- THERMAL RESISTANCE: 20°C/W (typical junction to lead (tab) at mounting plane)
* When pulse testing, do not pulse in opposite direction (see "Schematic Applications" section herein and Figures 5 & 6 for further protection in both directions)

MECHANICAL AND PACKAGING

- CASE: Molded, surface mountable
- TERMINALS: Gull-wing or C-bend (modified J-bend) tin-lead or RoHS compliant annealed matte-tin plating solderable per MIL-STD-750, method 2026
- POLARITY: Cathode indicated by band
- MARKING: Part number with abbreviated prefix (CLC6.5A, CLC6.5Ae3, CLC33, CLC33e3, etc.)
- TAPE & REEL option: Standard per EIA-481-B with 16 mm tape, 750 per 7 inch reel or 2500 per 13 inch reel (add "TR" suffix to part number)

ELECTRICAL CHARACTERISTICS @ 25°C

| MICROSEMI Part Number | MICROSEMI Part Number | Reverse Stand-Off Voltage V_{WM} | Breakdown Voltage V_{BR} @ $I_{(BR)}$ | | | Maximum Reverse Leakage @ V_{WM} I_D μA | Maximum Clamping Voltage @ I_{PP} V_C Volts | Maximum Peak Pulse Current I_{PP} @ 10/1000 Amps | Maximum Capacitance @ 0 Volts, $f = 1$ MHz | V_{WIB} Working Inverse Blocking Voltage Volts | I_{IB} Inverse Blocking Leakage Current μA | V_{PIB} Peak Inverse Blocking Voltage Volts |
|-------------------------|------------------------|------------------------------------|---|------|-----|--|---|--|--|--|---|---|
| | | | Volts | MIN | MAX | | | | | | | |
| Gull-Wing "G" Bend Lead | Modified "J" Bend Lead | Volts | | | | | | | | | | |
| SMCGLCE6.5 | SMCJLCE6.5 | 6.5 | 7.22 | 8.82 | 10 | 1000 | 12.3 | 100 | 100 | 75 | 10 | 100 |
| SMCGLCE6.5A | SMCJLCE6.5A | 6.5 | 7.22 | 7.98 | 10 | 1000 | 11.2 | 100 | 100 | 75 | 10 | 100 |
| SMCGLCE7.0 | SMCJLCE7.0 | 7.0 | 7.78 | 9.51 | 10 | 500 | 13.3 | 100 | 100 | 75 | 10 | 100 |
| SMCGLCE7.0A | SMCJLCE7.0A | 7.0 | 7.78 | 8.60 | 10 | 500 | 12.0 | 100 | 100 | 75 | 10 | 100 |
| SMCGLCE7.5 | SMCJLCE7.5 | 7.5 | 8.33 | 10.2 | 10 | 250 | 14.3 | 100 | 100 | 75 | 10 | 100 |
| SMCGLCE7.5A | SMCJLCE7.5A | 7.5 | 8.33 | 9.21 | 10 | 250 | 12.9 | 100 | 100 | 75 | 10 | 100 |
| SMCGLCE8.0 | SMCJLCE8.0 | 8.0 | 8.89 | 10.9 | 1 | 100 | 15.0 | 100 | 100 | 75 | 10 | 100 |
| SMCGLCE8.0A | SMCJLCE8.0A | 8.0 | 8.89 | 9.83 | 1 | 100 | 13.6 | 100 | 100 | 75 | 10 | 100 |
| SMCGLCE8.5 | SMCJLCE8.5 | 8.5 | 9.44 | 11.5 | 1 | 50 | 15.9 | 94 | 100 | 75 | 10 | 100 |
| SMCGLCE8.5A | SMCJLCE8.5A | 8.5 | 9.44 | 10.4 | 1 | 50 | 14.4 | 100 | 100 | 75 | 10 | 100 |
| SMCGLCE9.0 | SMCJLCE9.0 | 9.0 | 10.0 | 12.2 | 1 | 10 | 16.9 | 89 | 100 | 75 | 10 | 100 |
| SMCGLCE9.0A | SMCJLCE9.0A | 9.0 | 10.0 | 11.1 | 1 | 10 | 15.4 | 97 | 100 | 75 | 10 | 100 |



SCOTTSDALE DIVISION

SMCGLCE6.5 thru SMCGLCE170A, e3
SMCJLCE6.5 thru SMCJLCE170A, e3

1500 WATT LOW CAPACITANCE
SURFACE MOUNT TRANSIENT
VOLTAGE SUPPRESSOR

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SMCGLCE/SMCJLCE, e3

| MICROSEMI Part Number | MICROSEMI Part Number | Reverse Stand-Off Voltage V_{WM} | Breakdown Voltage V_{BR} @ $I_{(BR)}$ | | | Maximum Reverse Leakage @ V_{WM} I_D μA | Maximum Clamping Voltage @ I_{PP} V_C Volts | Maximum Peak Pulse Current I_{PP} @ 10/1000 Amps | Maximum Capacitance @ 0 Volts pF | V_{WIB} Working Inverse Blocking Voltage Volts | I_{IB} Inverse Blocking Leakage Current μA | V_{PIB} Peak Inverse Blocking Voltage Volts |
|-----------------------|-----------------------|------------------------------------|---|------|----|--|---|--|----------------------------------|--|---|---|
| | | | Volts | | | | | | | | | |
| | | | MIN | MAX | mA | | | | | | | |
| SMCGLCE10 | SMCJLCE10 | 10 | 11.1 | 13.6 | 1 | 5 | 18.8 | 80 | 100 | 75 | 10 | 100 |
| SMCGLCE10A | SMCJLCE10A | 10 | 11.1 | 12.3 | 1 | 5 | 17.0 | 88 | 100 | 75 | 10 | 100 |
| SMCGLCE11 | SMCJLCE11 | 11 | 12.2 | 14.9 | 1 | 5 | 20.1 | 74 | 100 | 75 | 10 | 100 |
| SMCGLCE11A | SMCJLCE11A | 11 | 12.2 | 13.5 | 1 | 5 | 18.2 | 82 | 100 | 75 | 10 | 100 |
| SMCGLCE12 | SMCJLCE12 | 12 | 13.3 | 16.3 | 1 | 5 | 22.0 | 68 | 100 | 75 | 10 | 100 |
| SMCGLCE12A | SMCJLCE12A | 12 | 13.3 | 14.7 | 1 | 5 | 19.9 | 75 | 100 | 75 | 10 | 100 |
| SMCGLCE13 | SMCJLCE13 | 13 | 14.4 | 17.6 | 1 | 5 | 23.8 | 63 | 100 | 75 | 10 | 100 |
| SMCGLCE13A | SMCJLCE13A | 13 | 14.4 | 15.9 | 1 | 5 | 21.5 | 70 | 100 | 75 | 10 | 100 |
| SMCGLCE14 | SMCJLCE14 | 14 | 15.6 | 19.1 | 1 | 5 | 25.8 | 58 | 100 | 75 | 10 | 100 |
| SMCGLCE14A | SMCJLCE14A | 14 | 15.6 | 17.2 | 1 | 5 | 23.2 | 65 | 100 | 75 | 10 | 100 |
| SMCGLCE15 | SMCJLCE15 | 15 | 16.7 | 20.4 | 1 | 5 | 26.9 | 56 | 100 | 75 | 10 | 100 |
| SMCGLCE15A | SMCJLCE15A | 15 | 16.7 | 18.5 | 1 | 5 | 24.4 | 61 | 100 | 75 | 10 | 100 |
| SMCGLCE16 | SMCJLCE16 | 16 | 17.8 | 21.8 | 1 | 5 | 28.8 | 52 | 100 | 75 | 10 | 100 |
| SMCGLCE16A | SMCJLCE16A | 16 | 17.8 | 19.7 | 1 | 5 | 26.0 | 57 | 100 | 75 | 10 | 100 |
| SMCGLCE17 | SMCJLCE17 | 17 | 18.9 | 23.1 | 1 | 5 | 30.5 | 49 | 100 | 75 | 10 | 100 |
| SMCGLCE17A | SMCJLCE17A | 17 | 18.9 | 20.9 | 1 | 5 | 27.6 | 54 | 100 | 75 | 10 | 100 |
| SMCGLCE18 | SMCJLCE18 | 18 | 20.0 | 24.4 | 1 | 5 | 32.2 | 45 | 100 | 75 | 10 | 100 |
| SMCGLCE18A | SMCJLCE18A | 18 | 20.0 | 22.1 | 1 | 5 | 29.2 | 51 | 100 | 75 | 10 | 100 |
| SMCGLCE20 | SMCJLCE20 | 20 | 22.2 | 27.1 | 1 | 5 | 35.8 | 42 | 100 | 75 | 10 | 100 |
| SMCGLCE20A | SMCJLCE20A | 20 | 22.2 | 24.5 | 1 | 5 | 32.4 | 46 | 100 | 75 | 10 | 100 |
| SMCGLCE22 | SMCJLCE22 | 22 | 24.4 | 29.8 | 1 | 5 | 39.4 | 38 | 100 | 75 | 10 | 100 |
| SMCGLCE22A | SMCJLCE22A | 22 | 24.4 | 26.9 | 1 | 5 | 35.5 | 42 | 100 | 75 | 10 | 100 |
| SMCGLCE24 | SMCJLCE24 | 24 | 26.7 | 32.6 | 1 | 5 | 43.0 | 35 | 100 | 75 | 10 | 100 |
| SMCGLCE24A | SMCJLCE24A | 24 | 26.7 | 29.5 | 1 | 5 | 38.9 | 39 | 100 | 75 | 10 | 100 |
| SMCGLCE26 | SMCJLCE26 | 26 | 28.9 | 35.3 | 1 | 5 | 46.6 | 32 | 100 | 75 | 10 | 100 |
| SMCGLCE26A | SMCJLCE26A | 26 | 28.9 | 31.9 | 1 | 5 | 42.1 | 36 | 100 | 75 | 10 | 100 |
| SMCGLCE28 | SMCJLCE28 | 28 | 31.1 | 38.0 | 1 | 5 | 50.1 | 30 | 100 | 75 | 10 | 100 |
| SMCGLCE28A | SMCJLCE28A | 28 | 31.1 | 34.4 | 1 | 5 | 45.5 | 33 | 100 | 75 | 10 | 100 |
| SMCGLCE30 | SMCJLCE30 | 30 | 33.3 | 40.7 | 1 | 5 | 53.5 | 28 | 100 | 75 | 10 | 100 |
| SMCGLCE30A | SMCJLCE30A | 30 | 33.3 | 36.8 | 1 | 5 | 48.4 | 31 | 100 | 75 | 10 | 100 |
| SMCGLCE33 | SMCJLCE33 | 33 | 36.7 | 44.9 | 1 | 5 | 59.0 | 25.4 | 100 | 75 | 10 | 100 |
| SMCGLCE33A | SMCJLCE33A | 33 | 36.7 | 40.6 | 1 | 5 | 53.3 | 28.1 | 100 | 75 | 10 | 100 |
| SMCGLCE36 | SMCJLCE36 | 36 | 40.0 | 48.9 | 1 | 5 | 64.3 | 23.3 | 100 | 75 | 10 | 100 |
| SMCGLCE36A | SMCJLCE36A | 36 | 40.0 | 44.2 | 1 | 5 | 58.1 | 25.8 | 100 | 75 | 10 | 100 |
| SMCGLCE40 | SMCJLCE40 | 40 | 44.4 | 54.3 | 1 | 5 | 71.4 | 21.0 | 100 | 75 | 10 | 100 |
| SMCGLCE40A | SMCJLCE40A | 40 | 44.4 | 49.1 | 1 | 5 | 64.5 | 23.3 | 100 | 75 | 10 | 100 |
| SMCGLCE43 | SMCJLCE43 | 43 | 47.8 | 58.4 | 1 | 5 | 76.7 | 19.5 | 100 | 150 | 10 | 200 |
| SMCGLCE43A | SMCJLCE43A | 43 | 47.8 | 52.8 | 1 | 5 | 69.4 | 21.6 | 100 | 150 | 10 | 200 |
| SMCGLCE45 | SMCJLCE45 | 45 | 50.0 | 61.1 | 1 | 5 | 80.3 | 18.7 | 100 | 150 | 10 | 200 |
| SMCGLCE45A | SMCJLCE45A | 45 | 50.0 | 55.3 | 1 | 5 | 72.7 | 20.6 | 100 | 150 | 10 | 200 |
| SMCGLCE48 | SMCJLCE48 | 48 | 53.3 | 65.1 | 1 | 5 | 85.5 | 17.5 | 100 | 150 | 10 | 200 |
| SMCGLCE48A | SMCJLCE48A | 48 | 53.3 | 58.9 | 1 | 5 | 77.4 | 19.4 | 100 | 150 | 10 | 200 |
| SMCGLCE51 | SMCJLCE51 | 51 | 56.7 | 69.3 | 1 | 5 | 91.1 | 16.5 | 100 | 150 | 10 | 200 |
| SMCGLCE51A | SMCJLCE51A | 51 | 56.7 | 62.7 | 1 | 5 | 82.4 | 18.2 | 100 | 150 | 10 | 200 |
| SMCGLCE54 | SMCJLCE54 | 54 | 60.0 | 73.3 | 1 | 5 | 96.3 | 15.6 | 100 | 150 | 10 | 200 |
| SMCGLCE54A | SMCJLCE54A | 54 | 60.0 | 66.3 | 1 | 5 | 87.1 | 17.2 | 100 | 150 | 10 | 200 |
| SMCGLCE58 | SMCJLCE58 | 58 | 64.4 | 78.7 | 1 | 5 | 103 | 14.6 | 100 | 150 | 10 | 200 |
| SMCGLCE58A | SMCJLCE58A | 58 | 64.4 | 71.2 | 1 | 5 | 93.6 | 16.0 | 100 | 150 | 10 | 200 |
| SMCGLCE60 | SMCJLCE60 | 60 | 66.7 | 81.5 | 1 | 5 | 107 | 14.0 | 90 | 150 | 10 | 200 |
| SMCGLCE60A | SMCJLCE60A | 60 | 66.7 | 73.7 | 1 | 5 | 96.8 | 15.5 | 90 | 150 | 10 | 200 |
| SMCGLCE64 | SMCJLCE64 | 64 | 71.1 | 86.9 | 1 | 5 | 114 | 13.2 | 90 | 150 | 10 | 200 |
| SMCGLCE64A | SMCJLCE64A | 64 | 71.1 | 78.6 | 1 | 5 | 103 | 14.6 | 90 | 150 | 10 | 200 |
| SMCGLCE70 | SMCJLCE70 | 70 | 77.8 | 95.1 | 1 | 5 | 125 | 12.0 | 90 | 150 | 10 | 200 |
| SMCGLCE70A | SMCJLCE70A | 70 | 77.8 | 85.0 | 1 | 5 | 113 | 13.3 | 90 | 150 | 10 | 200 |
| SMCGLCE75 | SMCJLCE75 | 75 | 83.3 | 102 | 1 | 5 | 134 | 11.2 | 90 | 150 | 10 | 200 |
| SMCGLCE75A | SMCJLCE75A | 75 | 83.3 | 92.1 | 1 | 5 | 121 | 12.4 | 90 | 150 | 10 | 200 |
| SMCGLCE80 | SMCJLCE80 | 80 | 88.7 | 108 | 1 | 5 | 142 | 10.6 | 90 | 150 | 10 | 200 |
| SMCGLCE80A | SMCJLCE80A | 80 | 88.7 | 98.0 | 1 | 5 | 129 | 11.6 | 90 | 150 | 10 | 200 |
| SMCGLCE90 | SMCJLCE90 | 90 | 100 | 122 | 1 | 5 | 160 | 9.4 | 90 | 300 | 10 | 200 |
| SMCGLCE90A | SMCJLCE90A | 90 | 100 | 111 | 1 | 5 | 146 | 10.3 | 90 | 300 | 10 | 200 |
| SMCGLCE100 | SMCJLCE100 | 100 | 111 | 136 | 1 | 5 | 179 | 8.4 | 90 | 300 | 10 | 200 |
| SMCGLCE100A | SMCJLCE100A | 100 | 111 | 123 | 1 | 5 | 162 | 9.3 | 90 | 300 | 10 | 200 |
| SMCGLCE110 | SMCJLCE110 | 110 | 122 | 149 | 1 | 5 | 196 | 7.7 | 90 | 300 | 10 | 400 |
| SMCGLCE110A | SMCJLCE110A | 110 | 122 | 135 | 1 | 5 | 178 | 8.4 | 90 | 300 | 10 | 400 |
| SMCGLCE120 | SMCJLCE120 | 120 | 133 | 163 | 1 | 5 | 214 | 7.0 | 90 | 300 | 10 | 400 |
| SMCGLCE120A | SMCJLCE120A | 120 | 133 | 147 | 1 | 5 | 193 | 7.8 | 90 | 300 | 10 | 400 |
| SMCGLCE130 | SMCJLCE130 | 130 | 144 | 176 | 1 | 5 | 231 | 6.5 | 90 | 300 | 10 | 400 |
| SMCGLCE130A | SMCJLCE130A | 130 | 144 | 159 | 1 | 5 | 209 | 7.2 | 90 | 300 | 10 | 400 |
| SMCGLCE150 | SMCJLCE150 | 150 | 167 | 204 | 1 | 5 | 268 | 5.6 | 90 | 300 | 10 | 400 |
| SMCGLCE150A | SMCJLCE150A | 150 | 167 | 185 | 1 | 5 | 243 | 6.2 | 90 | 300 | 10 | 400 |
| SMCGLCE160 | SMCJLCE160 | 160 | 178 | 218 | 1 | 5 | 287 | 5.2 | 90 | 300 | 10 | 400 |
| SMCGLCE160A | SMCJLCE160A | 160 | 178 | 197 | 1 | 5 | 259 | 5.8 | 90 | 300 | 10 | 400 |
| SMCGLCE170 | SMCJLCE170 | 170 | 189 | 231 | 1 | 5 | 304 | 4.9 | 90 | 300 | 10 | 400 |
| SMCGLCE170A | SMCJLCE170A | 170 | 189 | 209 | 1 | 5 | 275 | 5.4 | 90 | 300 | 10 | 400 |

NOTE 1: TVS are normally selected according to the reverse "Stand Off Voltage" (V_{WM}) which should be equal to or greater than the dc or continuous peak operating voltage level.

GRAPHS

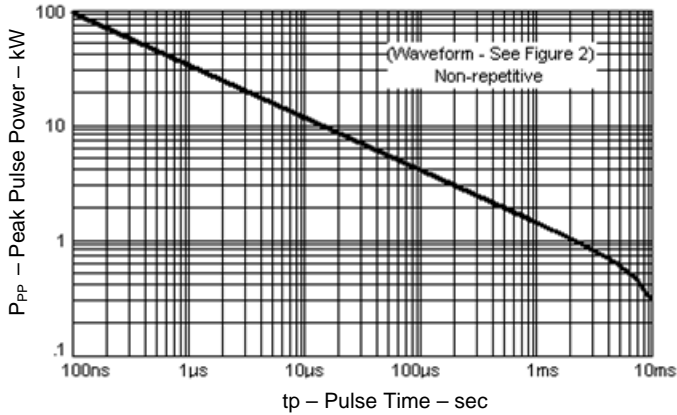


FIGURE 1 PEAK PULSE POWER vs. PULSE TIME

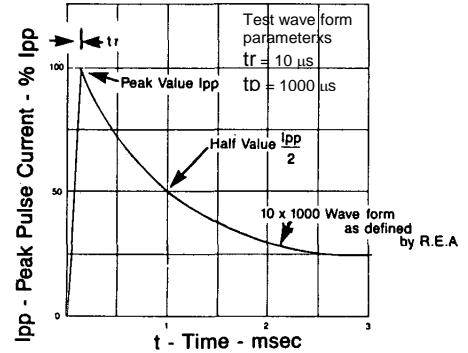


FIGURE 2 PULSE WAVEFORM

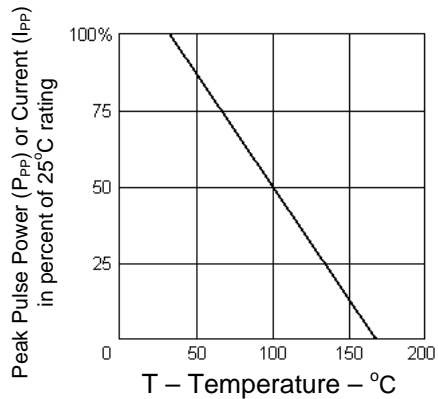


FIGURE 3 DERATING CURVE

SCHEMATIC APPLICATIONS

The TVS low capacitance device configuration is shown in Figure 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 Figure 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 . The Microsemi recommended rectifier part number for the application in Figure 5 is the "SMBJLCR80" or "SMBGLCR80" depending on the terminal configuration desired. If using two (2) low capacitance TVS devices in anti-parallel for bidirectional applications, this added protective feature for both directions (including the reverse of each rectifier diode) is inherently provided in Figure 6. The unidirectional and bidirectional configurations in Figure 5 and 6 will both result in twice the capacitance of Figure 4.

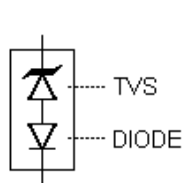


FIGURE 4
TVS with internal low capacitance rectifier diode

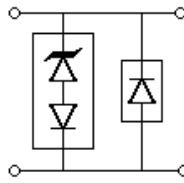


FIGURE 5
Optional Unidirectional configuration (TVS and separate rectifier diode in parallel)

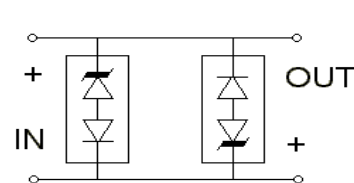
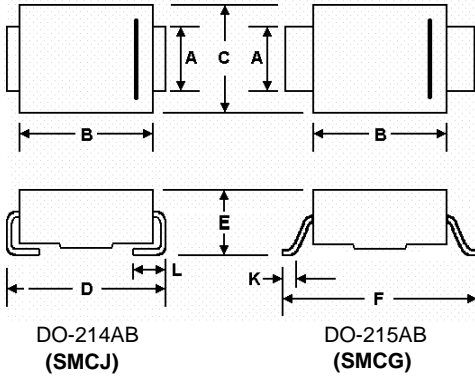


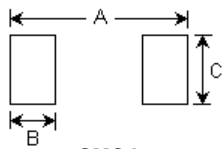
FIGURE 6
Optional Bidirectional configuration (two TVS devices in anti-parallel)

PACKAGE DIMENSIONS



| DIMENSIONS IN INCHES | | | | | | | | |
|---------------------------|------|------|------|------|------|-------|-------|-------|
| MIN | .115 | .260 | .220 | .305 | .077 | .380 | .025 | .30 |
| MAX | .121 | .280 | .245 | .320 | .104 | .400 | .040 | .060 |
| DIMENSIONS IN MILLIMETERS | | | | | | | | |
| MIN | 2.92 | 6.60 | 5.59 | 7.75 | 1.95 | 9.65 | 0.635 | 0.760 |
| MAX | 3.07 | 7.11 | 6.22 | 8.13 | 2.65 | 10.16 | 1.016 | 1.520 |

PAD LAYOUT



SMCJ

| | INCHES | mm |
|---|--------|------|
| A | .390 | 9.90 |
| B | .110 | 2.79 |
| C | .150 | 3.81 |

SMCG

| | INCHES | mm |
|---|--------|-------|
| A | 0.510 | 12.95 |
| B | 0.110 | 2.79 |
| C | 0.150 | 3.81 |