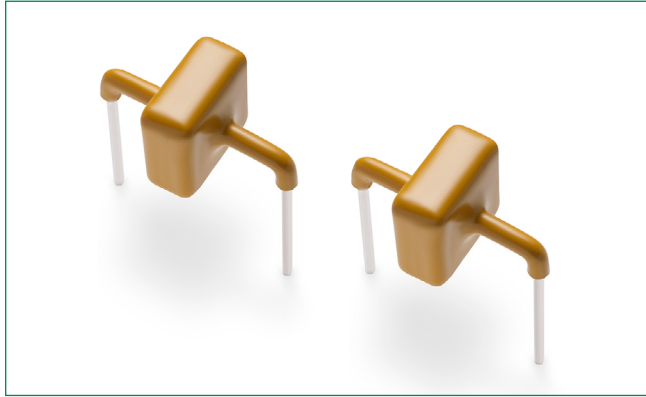


# AK10-Y Series

## Axial Leaded – 10kA



### Agency Approvals

| Agency | Agency File/Certificate Number |
|--------|--------------------------------|
|        | E128662                        |

### Maximum Ratings and Thermal Characteristics

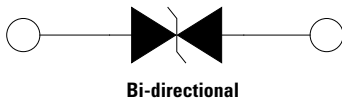
( $T_A=25^\circ\text{C}$  unless otherwise noted)

| Parameter                            | Symbol    | Value      | Unit             |
|--------------------------------------|-----------|------------|------------------|
| Operating Storage Temperature Range  | $T_{STG}$ | -55 to 150 | $^\circ\text{C}$ |
| Operating Junction Temperature Range | $T_J$     | -55 to 125 | $^\circ\text{C}$ |
| Current Rating <sup>1</sup>          | $I_{PP}$  | 10         | kA               |

**Note:**

1. Rated  $I_{PP}$  measured with 8/20 $\mu\text{s}$  pulse.

### Functional Diagram



## Description

The AK10-Y series of high power TVS diode is specially designed for meeting severe surge test environment of both AC and DC line protection applications. It features a very fast response and ultra low clamping characteristics as compared to MOVs (Metal Oxide Varistors). It accomplishes this by virtue of the Littelfuse Foldbak™ technology, which provides a clamping voltage lower than the avalanche voltage (but above the rated working voltage); therefore, any voltage rise due to increased current conduction is maintained at a minimum magnitude, providing the best possible protection level. These AK components can be connected in series and / or parallel to create a very high surge current protection solution.

## Features

- Recognized to UL 497B as an Isolated Loop Circuit Protector
- Both reflow and wave soldering capable
- Very low clamping voltage
- Ultra compact: less than one-tenth the size of traditional discrete solutions
- Sharp breakdown voltage
- Low slope resistance
- Bi-directional
- Foldbak™ technology for superior clamping factor
- Symmetric in leads width for easier soldering during assembly.
- IEC 61000-4-2 ESD 15kV(Air), 8kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2
- EFT protection of data lines in accordance with IEC 61000-4-4
- Halogen-free and RoHS compliant
- Glass passivated junction
- Pb-free E4 means 2nd level interconnect is Pb-free and the terminal finish material is silver

### Electrical Characteristics

( $T_A=25^\circ\text{C}$  unless otherwise noted)

| Part Numbers | Part Marking | Standoff Voltage ( $V_{SO}$ ) Volts | Max. Reverse Leakage ( $I_R$ ) @ $V_{SO}$ $\mu\text{A}$ | Typical $I_R$ @ $85^\circ\text{C}$ ( $\mu\text{A}$ ) | Reverse Breakdown Voltage ( $V_{BR}$ ) @ $I_T$ |           | Test Current $I_T$ (mA) | Max. Clamping Voltage $V_{CL}$ @ Peak Pulse Current ( $I_{PP}$ ) (Note 1) |               | Max. Temp Coefficient of $V_{BR}$ (%/ $^\circ\text{C}$ ) | Max. Capacitance 0 Bias 10kHz (nF) | Agency Approval |
|--------------|--------------|-------------------------------------|---------------------------------------------------------|------------------------------------------------------|------------------------------------------------|-----------|-------------------------|---------------------------------------------------------------------------|---------------|----------------------------------------------------------|------------------------------------|-----------------|
|              |              |                                     |                                                         |                                                      | Min Volts                                      | Max Volts |                         | $V_{CL}$ Volts                                                            | $I_{PP}$ Amps |                                                          |                                    |                 |
| AK10-015C-Y  | 10-015C      | 15                                  | 10                                                      | 15                                                   | 16                                             | 19        | 10                      | 28                                                                        | 10,000        | 0.1                                                      | 40.0                               | -               |
| AK10-030C-Y  | 10-030C      | 30                                  | 10                                                      | 15                                                   | 32                                             | 37        | 10                      | 48                                                                        | 10,000        | 0.1                                                      | 20.0                               | X               |
| AK10-033C-Y  | 10-033C      | 33                                  | 10                                                      | 15                                                   | 36                                             | 40        | 10                      | 53                                                                        | 10,000        | 0.1                                                      | 20.0                               | X               |
| AK10-058C-Y  | 10-058C      | 58                                  | 10                                                      | 15                                                   | 64                                             | 70        | 10                      | 110                                                                       | 10,000        | 0.1                                                      | 10.0                               | X               |
| AK10-066C-Y  | 10-066C      | 66                                  | 10                                                      | 15                                                   | 72                                             | 80        | 10                      | 120                                                                       | 10,000        | 0.1                                                      | 10.0                               | X               |
| AK10-076C-Y  | 10-076C      | 76                                  | 10                                                      | 15                                                   | 85                                             | 95        | 10                      | 140                                                                       | 10,000        | 0.1                                                      | 6.5                                | X               |
| AK10-170C-Y  | 10-170C      | 170                                 | 10                                                      | 15                                                   | 180                                            | 220       | 10                      | 260                                                                       | 10,000        | 0.1                                                      | 4.0                                | X               |
| AK10-190C-Y  | 10-190C      | 190                                 | 10                                                      | 15                                                   | 200                                            | 245       | 10                      | 290                                                                       | 10,000        | 0.1                                                      | 3.0                                | X               |
| AK10-220C-Y  | 10-220C      | 220                                 | 10                                                      | 15                                                   | 230                                            | 270       | 10                      | 330                                                                       | 10,000        | 0.1                                                      | 2.5                                | X               |
| AK10-240C-Y  | 10-240C      | 240                                 | 10                                                      | 15                                                   | 250                                            | 285       | 10                      | 340                                                                       | 10,000        | 0.1                                                      | 2.2                                | X               |
| AK10-270C-Y  | 10-270C      | 270                                 | 10                                                      | 15                                                   | 282                                            | 315       | 10                      | 401                                                                       | 10,000        | 0.1                                                      | 2.3                                | X               |
| AK10-380C-Y  | 10-380C      | 380                                 | 10                                                      | 15                                                   | 401                                            | 443       | 10                      | 520                                                                       | 10,000        | 0.1                                                      | 2.0                                | X               |
| AK10-430C-Y  | 10-430C      | 430                                 | 10                                                      | 15                                                   | 440                                            | 490       | 10                      | 625                                                                       | 10,000        | 0.1                                                      | 1.4                                | X               |
| AK10-530C-Y  | 10-530C      | 530                                 | 10                                                      | 15                                                   | 560                                            | 619       | 10                      | 750                                                                       | 10,000        | 0.1                                                      | 1.0                                | X               |

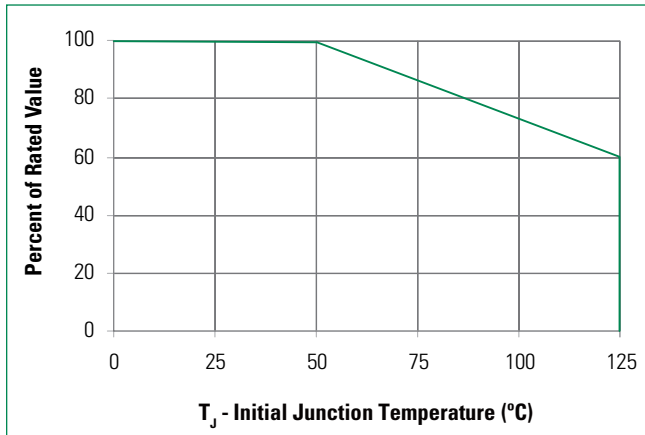
**Note:** Using 8/20 $\mu\text{s}$  wave shape as defined in IEC 61000-4-5.

# AK10-Y Series

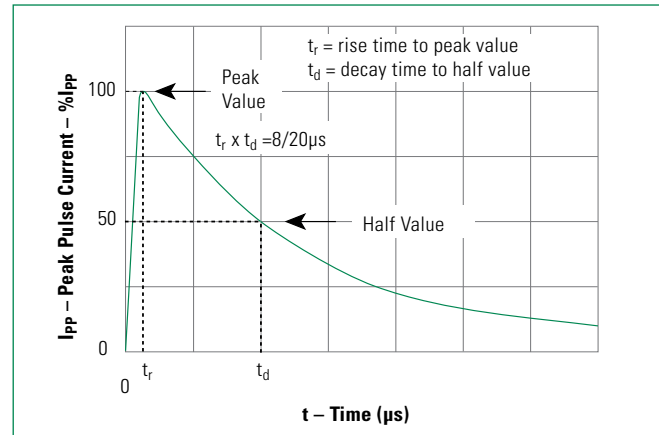
## Axial Leaded – 10kA

### Ratings and Characteristic Curves (TA=25°C unless otherwise noted) (Continued)

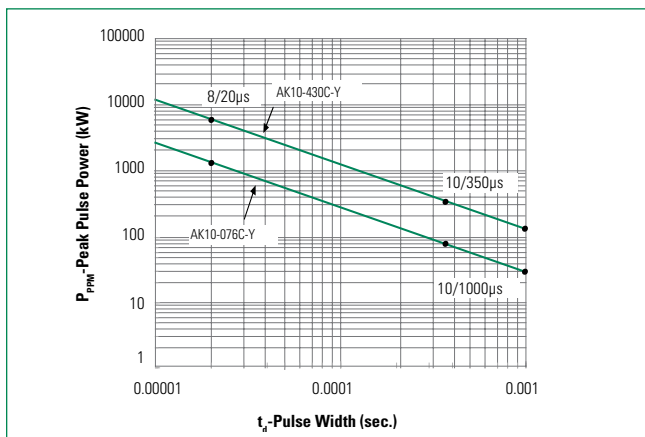
**Figure 1**  
Peak Power Derating



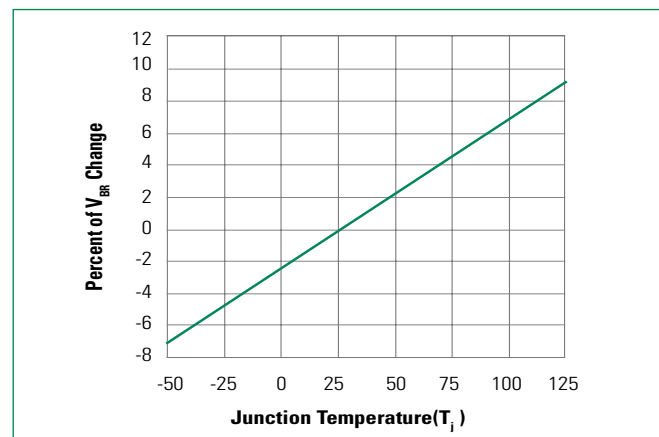
**Figure 2**  
Pulse Waveform



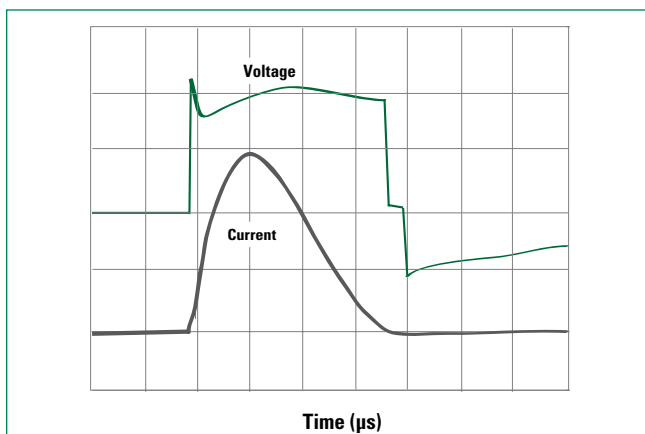
**Figure 3**  
Typical Peak Pulse Power Rating Curve



**Figure 4**  
Typical V<sub>BR</sub> Vs Junction Temperature



**Figure 5**  
Surge Response (8/20 Surge current waveform)

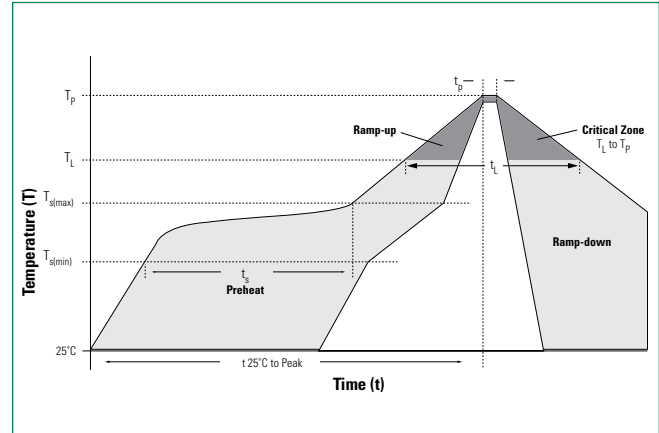


# AK10-Y Series

## Axial Leaded – 10kA

### Soldering Parameters

|                                                                        |                                    |                         |
|------------------------------------------------------------------------|------------------------------------|-------------------------|
| <b>Reflow Condition</b>                                                |                                    | Lead-free assembly      |
| <b>Pre Heat</b>                                                        | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|                                                                        | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|                                                                        | - Time (min to max) ( $t_s$ )      | 60 – 120 secs           |
| <b>Average ramp up rate (Liquidus Temp (<math>T_L</math>) to peak)</b> |                                    | 3°C/second max          |
| <b><math>T_{s(max)}</math> to <math>T_A</math> - Ramp-up Rate</b>      |                                    | 3°C/second max          |
| <b>Reflow</b>                                                          | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|                                                                        | - Time (min to max) ( $T_s$ )      | 60 – 150 seconds        |
| <b>Peak Temperature (<math>T_p</math>)</b>                             |                                    | 260 <sup>+0/-5</sup> °C |
| <b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>   |                                    | 30 seconds              |
| <b>Ramp-down Rate</b>                                                  |                                    | 6°C/second max          |
| <b>Time 25°C to peak Temperature (<math>T_p</math>)</b>                |                                    | 8 minutes Max.          |
| <b>Do not exceed</b>                                                   |                                    | 260°C                   |

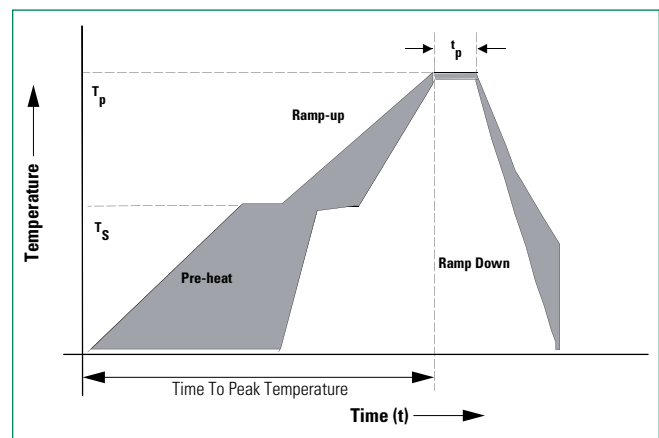


### Flow Soldering (Solder Dipping)

|                                                            |                                    |                         |
|------------------------------------------------------------|------------------------------------|-------------------------|
| <b>Reflow Condition</b>                                    |                                    | Lead-free assembly      |
| <b>Pre Heat</b>                                            | - Temperature Min ( $T_{s(min)}$ ) | 140°C                   |
|                                                            | - Temperature Max ( $T_{s(max)}$ ) | 160°C                   |
|                                                            | - Time to Pre-Heat Temp            | 60 – 150 secs           |
| <b>Average ramp up rate to Pre-Heat Temp</b>               |                                    | 5°C/second max          |
| <b>Peak Temperature (<math>T_p</math>)</b>                 |                                    | 260 <sup>+0/-5</sup> °C |
| <b>Average ramp up rate (pre-heat to <math>T_p</math>)</b> |                                    | 5°C/second max          |
| <b>Time within actual peak Temperature Max</b>             |                                    | 6 seconds               |
| <b>Ramp-down Rate</b>                                      |                                    | 5°C/second max          |

### Physical Specifications

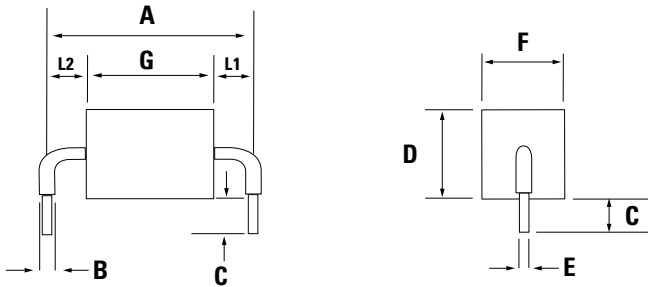
|                 |                                                             |
|-----------------|-------------------------------------------------------------|
| <b>Weight</b>   | Contact manufacturer                                        |
| <b>Case</b>     | UL Recognized compound meeting flammability rating V-0      |
| <b>Terminal</b> | Silver plated leads, solderable per MIL-STD-750 Method 2026 |



# AK10-Y Series

## Axial Leaded – 10kA

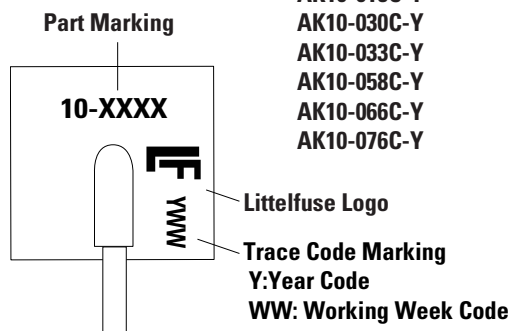
### Dimensions



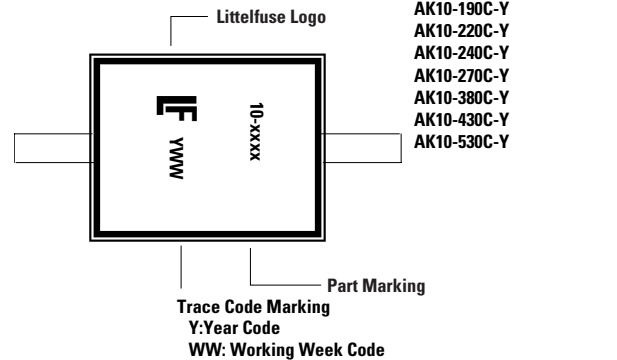
| Dimensions                      | Inches                                  | Millimeters    |
|---------------------------------|-----------------------------------------|----------------|
| <b>A</b>                        | 0.950 +/- 0.04                          | 24.15 +/- 1.00 |
| <b>A - 530C-Y</b>               | 1.370 +/- 0.08                          | 34.70 +/- 2.00 |
| <b>B</b>                        | 0.095 +/- 0.024                         | 2.4 +/- 0.60   |
| <b>C</b>                        | 0.236 +/- 0.04                          | 6.00 +/- 1.00  |
| <b>D</b>                        | 0.570 max.                              | 14.48 max.     |
| <b>E</b>                        | 0.050 +/- 0.002                         | 1.270 +/- 0.05 |
| <b>F</b>                        | 0.500 max.                              | 12.70 max.     |
| <b>G - 015C-Y</b>               | 0.142 +/- 0.04                          | 3.60 +/- 1.00  |
| <b>G - 030C-Y/ 033C-Y</b>       | 0.167 +/- 0.04                          | 4.23 +/- 1.00  |
| <b>G - 058C-Y/066C-Y/076C-Y</b> | 0.200 +/- 0.04                          | 5.08 +/- 1.00  |
| <b>G - 170C-Y/190C-Y</b>        | 0.362 +/- 0.04                          | 9.2 +/- 1.00   |
| <b>G-220C-Y</b>                 | 0.39 +/- 0.04                           | 9.9 +/- 1.00   |
| <b>G - 240C-Y/ /270C-Y</b>      | 0.420 +/- 0.04                          | 10.67 +/- 1.00 |
| <b>G - 380C-Y/430C-Y</b>        | 0.650 +/- 0.04                          | 16.50 +/- 1.00 |
| <b>G - 530C-Y</b>               | 1.060 +/- 0.06                          | 27.00 +/- 1.50 |
| <b>L1/L2</b>                    | L1= L2 tolerance +/- 0.04 inch (1.0 mm) |                |

### Part Marking System

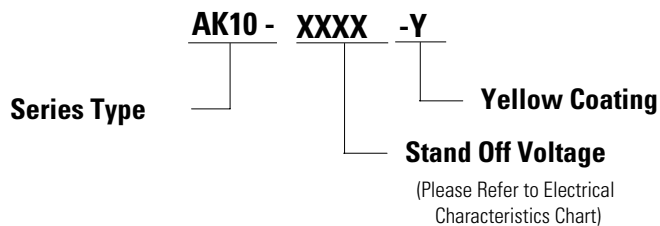
Type 1 - Side View



Type 2 - Top View



### Part Marking System



### Packing Options

| Part Number    | Component Package | Quantity  | Packaging Option |
|----------------|-------------------|-----------|------------------|
| AK10XXXX-Y     | AK Package        | 56pcs/Box | Bulk             |
| AK10-XXXX-Y-12 | AK Package        | 12pcs/Box | Bulk             |

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