

## AK6-Y Series



### Agency Recognitions

| AGENCY | AGENCY FILE NUMBER |
|--------|--------------------|
|        | E128662            |

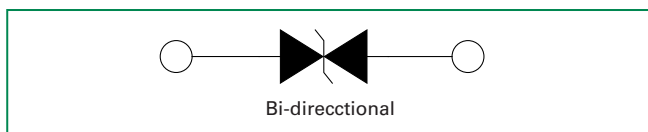
### Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| Parameter                            | Symbol           | Value      | Unit |
|--------------------------------------|------------------|------------|------|
| Operating Storage Temperature Range  | T <sub>STG</sub> | -55 to 150 | °C   |
| Operating Junction Temperature Range | T <sub>J</sub>   | -55 to 125 | °C   |
| Current Rating <sup>1</sup>          | I <sub>PP</sub>  | 6          | kA   |

**Note:**

1. Rated I<sub>pp</sub> measured with 8/20μs pulse.

### Functional Diagram



### Description

The AK6-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 Foldback™ 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

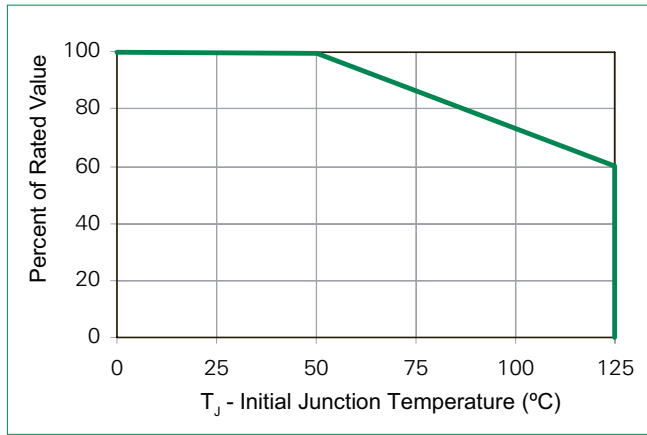
- Recognized to UL 497B as an Isolated Loop Circuit Protector
- Both reflow and wave soldering capable
- Very low clamping voltage
- Ultra compact: less than one-tenth the size of traditional discrete solutions
- Sharp breakdown voltage
- Low slope resistance
- Bi-directional
- Foldback technology for 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 2<sup>nd</sup> level interconnect is Pb-free and the terminal finish material is silver

### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

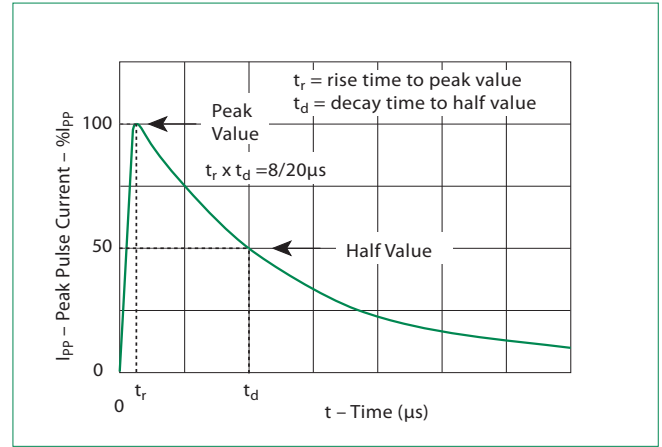
| Part Numbers | Part Marking | Standoff Voltage (V <sub>SO</sub> ) Volts | Max. Reverse Leakage (I <sub>R</sub> ) @ V <sub>SO</sub> μA | Typical I <sub>R</sub> @ 85°C (μA) | Reverse Breakdown Voltage (V <sub>BR</sub> ) @ I <sub>T</sub> |           | Test Current I <sub>T</sub> (mA) | Max. Clamping Voltage V <sub>CL</sub> @ I <sub>PP</sub> Peak Pulse Current (I <sub>PP</sub> ) (Note 1) |                      | Max. Temp Coefficient OF V <sub>BR</sub> (%/°C) | Max. Capacitance 0 Bias 10kHz (nF) | Agency Approval |
|--------------|--------------|---|---|------------------------------------|---|-----------|----------------------------------|--|----------------------|---|------------------------------------|-----------------|
|              |              |   |   |                                    | Min Volts   | Max Volts |                                  | V <sub>CL</sub> Volts  | I <sub>PP</sub> Amps |   |                                    |                 |
| AK6-030C-Y   | 6-030C       | 30  | 10  | 15                                 | 32  | 37        | 10                               | 90   | 6,000                | 0.1   | 11.0                               | X               |
| AK6-058C-Y   | 6-058C       | 58  | 10  | 15                                 | 64  | 70        | 10                               | 110  | 6,000                | 0.1   | 8.0                                | X               |
| AK6-066C-Y   | 6-066C       | 66  | 10  | 15                                 | 72  | 80        | 10                               | 120  | 6,000                | 0.1   | 6.0                                | X               |
| AK6-076C-Y   | 6-076C       | 76  | 10  | 15                                 | 85  | 95        | 10                               | 140  | 6,000                | 0.1   | 6.5                                | X               |
| AK6-170C-Y   | 6-170C       | 170                                       | 10  | 15                                 | 180   | 220       | 10                               | 260  | 6,000                | 0.1   | 2.8                                | X               |
| AK6-190C-Y   | 6-190C       | 190                                       | 10  | 15                                 | 200   | 245       | 10                               | 290  | 6,000                | 0.1   | 2.5                                | X               |
| AK6-240C-Y   | 6-240C       | 240                                       | 10  | 15                                 | 250   | 285       | 10                               | 340  | 6,000                | 0.1   | 2.0                                | X               |
| AK6-380C-Y   | 6-380C       | 380                                       | 10  | 15                                 | 401   | 443       | 10                               | 520  | 6,000                | 0.1   | 1.4                                | X               |
| AK6-430C-Y   | 6-430C       | 430                                       | 10  | 15                                 | 440   | 490       | 10                               | 625  | 6,000                | 0.1   | 1.0                                | X               |

**Note:** Using 8/20μs wave shape as defined in IEC 61000-4-5.

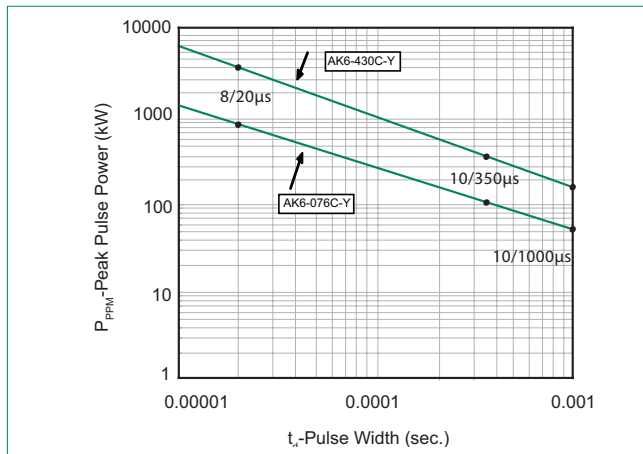
**Figure 1 - Peak Power Derating**



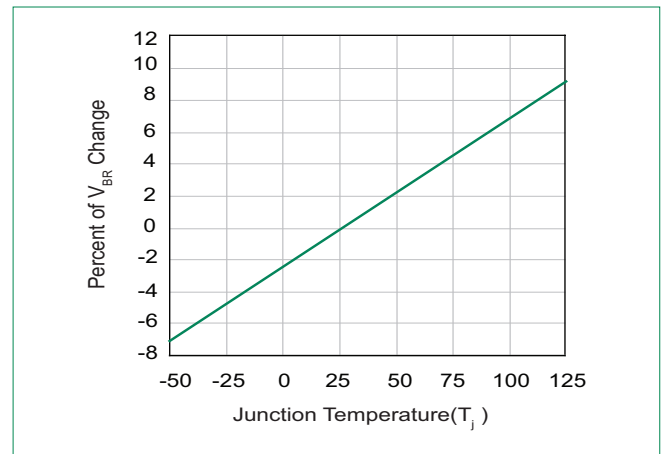
**Figure 2 - Pulse Waveform**



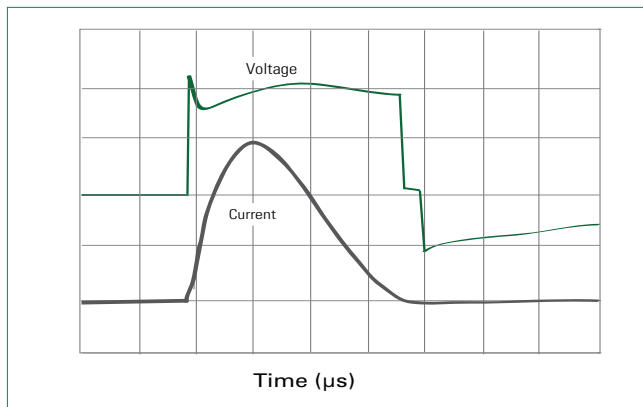
**Figure 3 - Typical Peak Pulse Power Rating Curve**



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



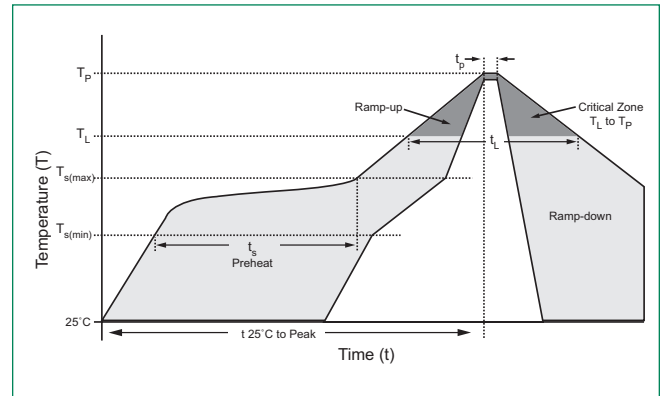
**Figure 5 - Surge Response (8/20 Surge current waveform)**



Note: The power dissipation causes a change in avalanche voltage during the surge and the avalanche voltage eventually returns to the original value when the transient has passed.

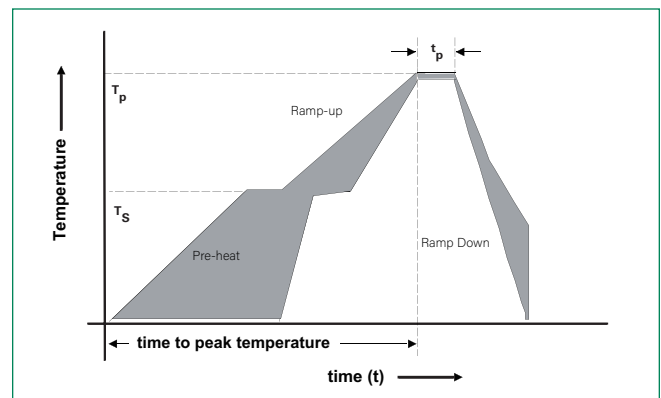
### Soldering Parameters

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



### Flow Soldering (Solder Dipping)

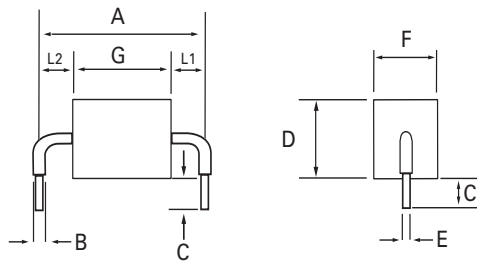
|   |                                    |                         |
|---|------------------------------------|-------------------------|
| Reflow Condition                          |                                    | Lead-free assembly      |
| Pre Heat                                  | - Temperature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



### Physical Specifications

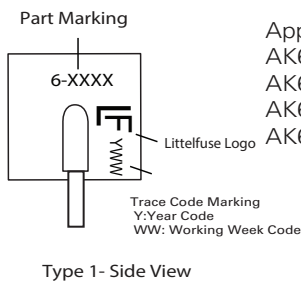
|                 |   |
|-----------------|---|
| <b>Weight</b>   | Contact manufacturer  |
| <b>Case</b>     | UL Recognized compound meeting flammability rating V-0      |
| <b>Terminal</b> | Silver plated leads, solderable per MIL-STD-750 Method 2026 |

**Dimensions**

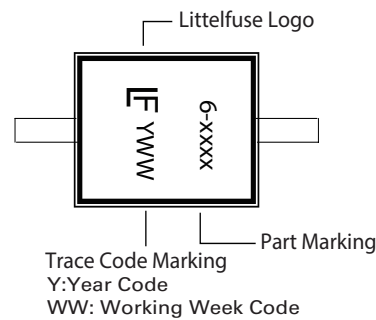


| Dimensions                  | Inches                                  | Millimeters    |
|-----------------------------|---|----------------|
| A                           | 0.950 +/- 0.040                         | 24.15 +/- 1.00 |
| B                           | 0.095 +/- 0.024                         | 2.4 +/- 0.60   |
| C                           | 0.236 +/- 0.040                         | 6.00 +/- 1.00  |
| D                           | 0.570 max.                              | 14.48 max.     |
| E                           | 0.050 +/- 0.002                         | 1.270 +/- 0.05 |
| F                           | 0.500 max.                              | 12.70 max.     |
| G - 030C-Y                  | 0.161 +/- 0.040                         | 4.10 +/- 1.00  |
| G - 058C-Y/066C-Y<br>076C-Y | 0.189 +/- 0.040                         | 4.8 +/- 1.00   |
| G - 170C-Y/190C-Y           | 0.320 +/- 0.040                         | 8.13 +/- 1.00  |
| G - 240C-Y                  | 0.370 +/- 0.040                         | 9.4 +/- 1.00   |
| G - 380C-Y/430C-Y           | 0.543 +/- 0.040                         | 13.8 +/- 1.00  |
| L1/L2                       | L1= L2 tolerance +/- 0.04 inch (1.0 mm) |                |

**Part Marking System**

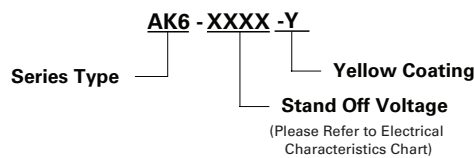


Apply to P/N listed below:  
AK6-030C-Y  
AK6-058C-Y  
AK6-066C-Y  
AK6-076C-Y



Apply to P/N listed below:  
AK6-170C-Y  
AK6-190C-Y  
AK6-240C-Y  
AK6-380C-Y  
AK6-430C-Y

**Part Numbering System**



**Packing Options**

| Part Number  | Component Package | Quantity  | Packaging Option |
|--------------|-------------------|-----------|------------------|
| AK6-XXXX-Y   | AK Package        | 56pcs/Box | Bulk             |
| AK6-XXXX-Y12 | AK Package        | 12pcs/Box | Bulk             |

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