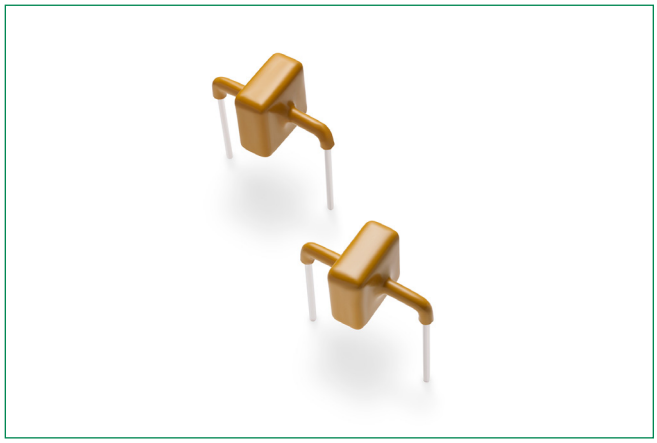
# AK3-Y Series
## Axial Leaded – 3kA



## Description

The AK3-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 FoldbakTM 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 & Benefits

- 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
- FoldbakTM 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

## Additional Information

Resources | Accessories | Samples

### Agency Recognitions

| Agency | Agency File Number |
|---|---|
| UL | E128662 |

### Maximum Ratings and Thermal Characteristics

($T_A$=25°C unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Operating Storage Temperature Range | $T_{STG}$ | -55 to 150 | °C |
| Operating Junction Temperature Range | $T_J$ | -55 to 125 | °C |
| Current Rating[1] | $I_{PP}$ | 3 | kA |

**Note:**
**1.** Rated $I_{PP}$ measured with 8/20µs pulse.

### Functional Diagram

Bi-directional

### Electrical Characteristics ($T_A$=25°C unless otherwise noted)

| Part Numbers | Part Marking | Standoff Voltage ($V_{SO}$) Volts | Max. Reverse Leakage ($I_R$) @$V_{SO}$ µA | Typical $I_R$ @ 85°C (µA) | Reverse Breakdown Voltage ($V_{BR}$) @ $I_T$ | | Test Current $I_T$ | Max. Clamping Voltage $V_{CL}$ @ $I_{PP}$ Peak Pulse Current ($I_{PP}$) (Note 1) | | Max. Temp Coefficient OF $V_{BR}$ | Max. Capacitance 0 Bias 10kHz | Agency Approval |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Min Volts | Max Volts | (mA) | $V_{CL}$ Volts | $I_{PP}$ Amps | (%/°C) | (nF) | UL |
| AK3-015C-Y | 3-015C | 15 | 10 | 15 | 16 | 19 | 10 | 28 | 3,000 | 0.1 | 12.0 | X |
| AK3-030C-Y | 3-030C | 30 | 10 | 15 | 32 | 37 | 10 | 90 | 3,000 | 0.1 | 11.0 | X |
| AK3-038C-Y | 3-038C | 38 | 10 | 15 | 40 | 46 | 10 | 95 | 3,000 | 0.1 | 10.0 | - |
| AK3-058C-Y | 3-058C | 58 | 10 | 15 | 64 | 70 | 10 | 110 | 3,000 | 0.1 | 6.0 | X |
| AK3-066C-Y | 3-066C | 66 | 10 | 15 | 72 | 80 | 10 | 120 | 3,000 | 0.1 | 6.0 | X |
| AK3-076C-Y | 3-076C | 76 | 10 | 15 | 85 | 95 | 10 | 140 | 3,000 | 0.1 | 6.0 | X |
| AK3-150C-Y | 3-150C | 150 | 10 | 15 | 158 | 194 | 10 | 230 | 3,000 | 0.1 | 2.6 | X |
| AK3-170C-Y | 3-170C | 170 | 10 | 15 | 179 | 220 | 10 | 260 | 3,000 | 0.1 | 2.4 | X |
| AK3-190C-Y | 3-190C | 190 | 10 | 15 | 200 | 245 | 10 | 290 | 3,000 | 0.1 | 2.4 | X |
| AK3-208C-Y | 3-208C | 208 | 10 | 15 | 223 | 246 | 10 | 306 | 3,000 | 0.1 | 2.4 | X |
| AK3-380C-Y | 3-380C | 380 | 10 | 15 | 401 | 443 | 10 | 520 | 3,000 | 0.1 | 2.0 | X |
| AK3-430C-Y | 3-430C | 430 | 10 | 15 | 440 | 490 | 10 | 625 | 3,000 | 0.1 | 2.0 | X |

**Note: 1.** Using 8/20µs wave shape as defined in IEC 61000-4-5.




Revised: GD. 06/22/21

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

**Figure 1:**
Peak Power Derating

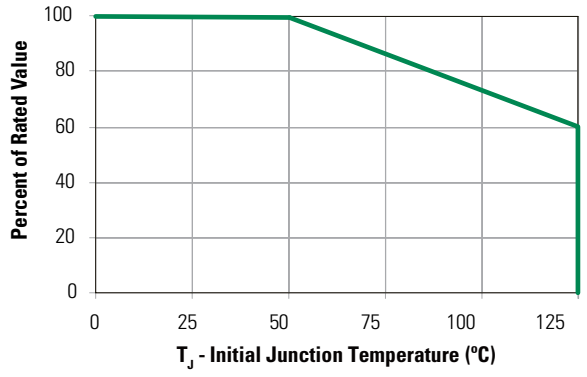



**Figure 2:**
Pulse Waveform

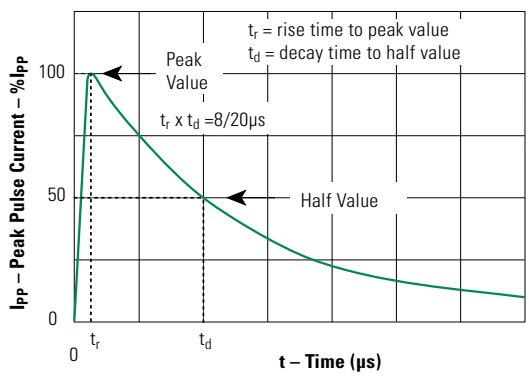



**Figure 3:**
Typical Peak Pulse Power Rating Curve

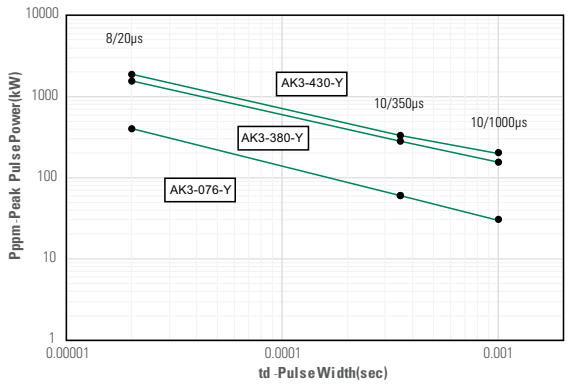



**Figure 4:**
Typical VBR Vs Junction Temperature

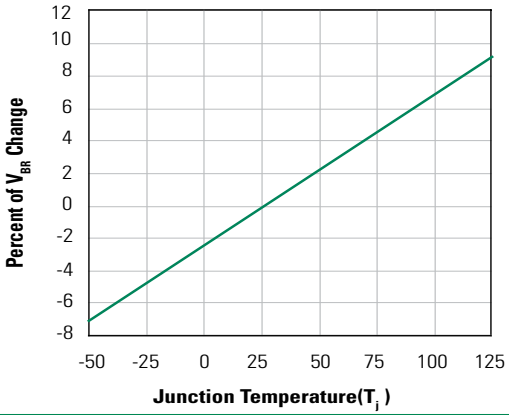
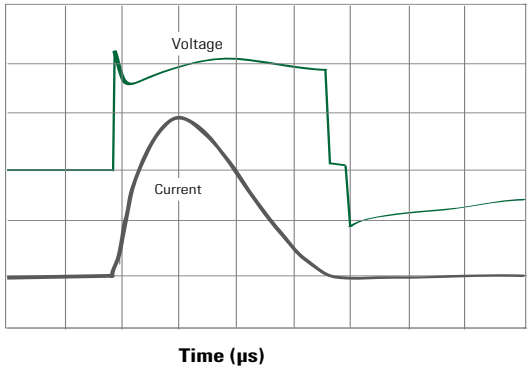



**Figure 5:**
Surge Response (8/20 Surge current waveform)




**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.



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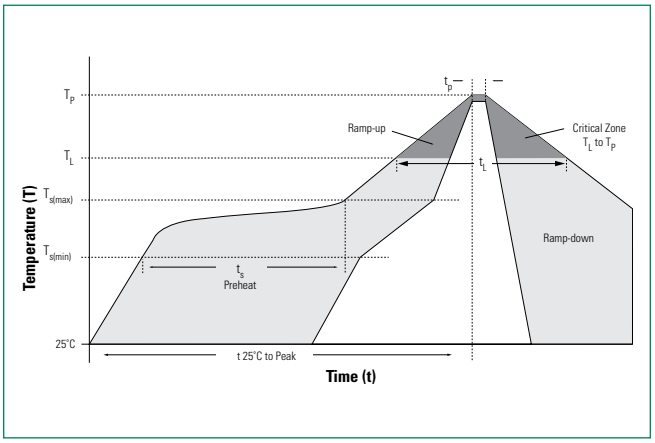
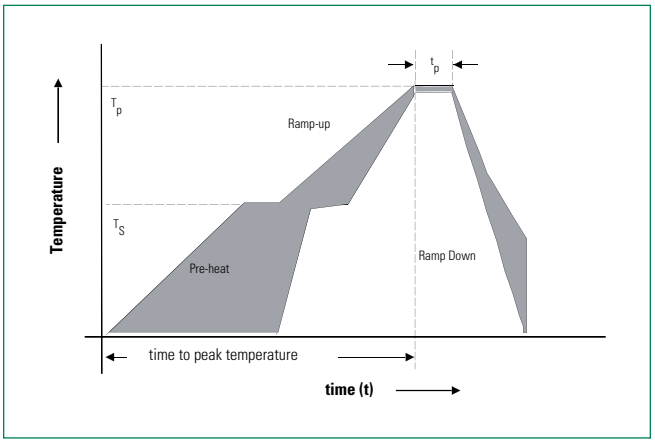
## Soldering Parameters

| | | |
|---|---|---|
| **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 ($T_A$) 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) ($t_L$)** | 60 – 150 seconds |
| **Peak Temperature ($T_P$)** | | $260^{+0/-5}$ °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 ($T_P$)** | | $260^{+0/-5}$ °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

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




Revised: GD. 06/22/21

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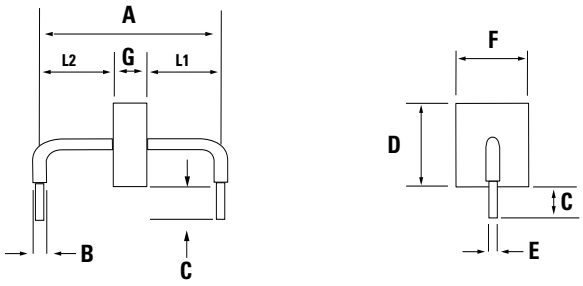
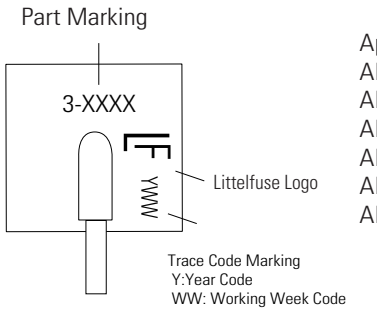
## Dimensions



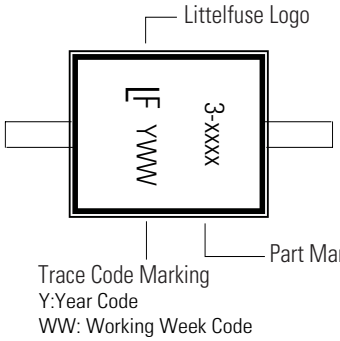

| Dimensions | | Inches | Millimeters |
|---|---|---|---|
| **A** | | 0.951 +/- 0.040 | 24.15 +/- 1.00 |
| **B** | | 0.094 +/- 0.024 | 2.40 +/- 0.60 |
| **C** | | 0.236 +/- 0.039 | 6.00 +/- 1.00 |
| | -208C | 0.145 +/- 0.040 | 3.68 +/- 1.00 |
| **D** | | 0.433 max. | 11.0 max. |
| **E** | | 0.050 +/- 0.002 | 1.27 +/- 0.05 |
| **F** | | 0.374 max. | 9.50 max. |
| **G** | -015C | 0.093 +/- 0.039 | 2.36 +/- 1.00 |
| | -030C/-038C/-066C | 0.130 +/- 0.047 | 3.30 +/- 1.20 |
| | -058C/-076C | 0.168 +/- 0.047 | 4.27 +/- 1.20 |
| | -150C | 0.383 +/- 0.047 | 9.72 +/- 1.20 |
| | -170C/-190C | 0.420 +/- 0.047 | 10.67 +/- 1.20 |
| | -208C | 0.358 +/- 0.047 | 9.10 +/- 1.20 |
| | -380C | 0.547 +/- 0.047 | 13.90 +/- 1.20 |
| | -430C | 0.583 +/- 0.047 | 14.80 +/- 1.20 |
| **L1** | -208C | 0.296 +/- 0.047 | 7.52 +/- 1.20 |
| | | L1= L2 tolerance +/- 0.047 inch (+/- 1.20 mm) | |
| **L2** | -208C | = A - (G+L1) tolerance +/- 0.047 inch (+/- 1.20 mm) | |
| | | L1= L2 tolerance +/- 0.047 inch (+/- 1.20 mm) | |

## Part Marking System




Apply to P/N listed below:
AK3-015C-Y
AK3-030C-Y
AK3-038C-Y
AK3-058C-Y
AK3-066C-Y
AK3-076C-Y

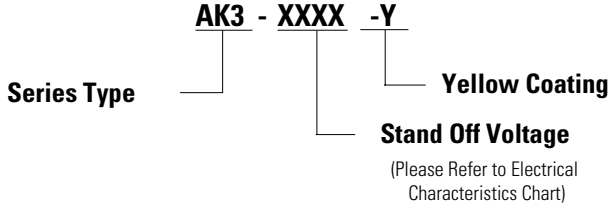
**Type 1- Side View**




Apply to P/N listed below:
AK3-150C-Y
AK3-170C-Y
AK3-190C-Y
AK3-208C-Y
AK3-380C-Y
AK3-430C-Y

**Type 2 - Top View**

## Part Numbering System




## Packing Options

| Part Number | Component Package | Quantity | Packaging Option |
|---|---|---|---|
| AK3-XXXX-Y | AK Package | 56pcs/Box | Bulk |
| AK3-XXXX-Y-12 | AK Package | 12pcs/Box | Bulk |