

**AK20-Y Series**



**Descriptions**

The AK20-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.

**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>	20	kA

**Note:**  
1. Rated I<sub>PP</sub> measured with 8/20µs pulse as defined in IEC 61000-4-5 2<sup>nd</sup> edition.

**Functional Diagram**



**Features**

- No wear-out nor degrade surge rating over multiple transient events as long as within surge capability
- Ultra high power rating
- Very low clamping voltage
- Both reflow and wave soldering capable
- 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 lead width for easy soldering during assembly
- IEC 61000-4-2 ESD 15 kV (air), 8 kV (contact) rating
- Lightning, 20 kA (8/20 as defined in IEC 61000-4-5 2<sup>nd</sup> Edition)
- EFT protection of data lines in accordance with IEC 61000-4-4
- UL Recognized compound meeting flammability rating V-0
- 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 (IPC/ JEDEC J-STD-609A.01)

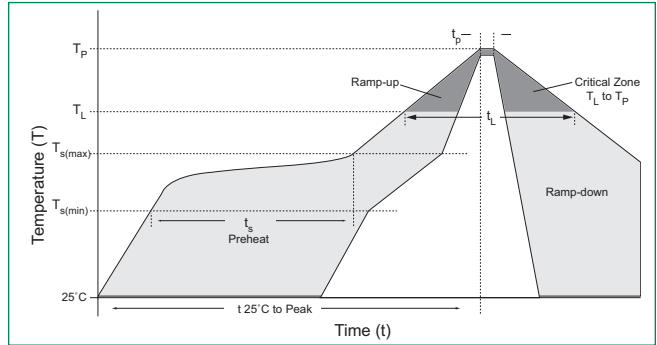
**Electrical Characteristics** (T<sub>A</sub>=25°C unless otherwise noted)

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> @ Peak Pulse Current (I <sub>PP</sub> )				Max. Temp Coefficient of V <sub>BR</sub> (%/°C)	Max. Capacitance 0V Bias 10kHz (nF)
					Min Volts	Max Volts		V <sub>CL</sub> (8/20µs) Volts	I <sub>PP</sub> (8/20µs) Amps	V <sub>CL</sub> (10/350µs) Volts	I <sub>PP</sub> (10/350µs) Amps		
AK20-016C-Y	20-016C	16	5	15	17.5	19.3	10	30	20,000	28	3,200	0.1	50
AK20-058C-Y	20-058C	58	5	15	64.0	70.0	10	120	20,000	107	3,200	0.1	15
AK20-063C-Y	20-063C	63	5	15	68.0	75.0	10	125	20,000	110	3,200	0.1	12
AK20-066C-Y	20-066C	66	5	15	72.0	80.0	10	130	20,000	120	3,200	0.1	12
AK20-076C-Y	20-076C	76	5	15	85.0	95.0	10	160	20,000	145	3,200	0.1	12

**Note:** using 8/20 waveshape as defined in IEC 61000-4-5 2<sup>nd</sup> edition

**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_L</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 max
<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

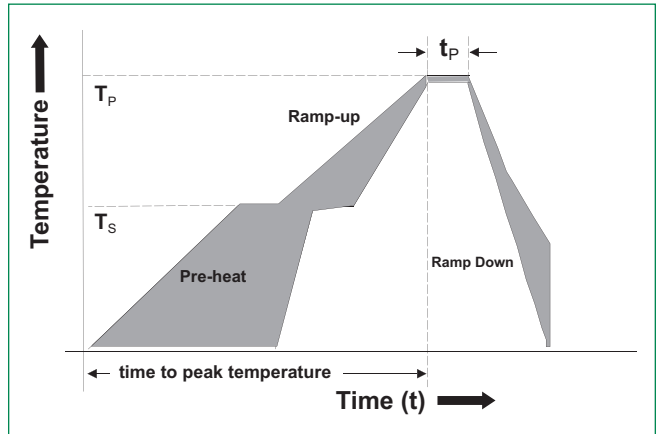


**Physical Specifications**

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

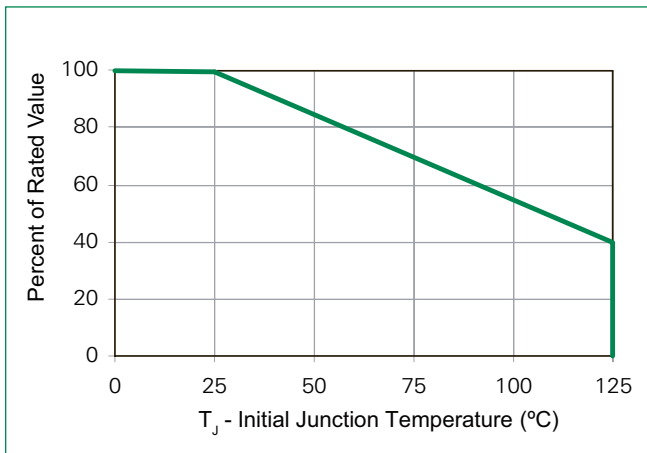
**Flow Soldering (Solder Dipping)**

<b>Wave soldering condition</b>		Pb - Free assembly
<b>Pre Heat</b>	- Temperature Min	140°C
	- Temperature Max	160°C
	Time to Pre-Heat Temp	60-150 seconds
<b>Average ramp up rate to Pre-Heat Temp</b>		5°C/second max
<b>Peak Temperature</b>		260+0/-5 °C
<b>Average ramp up rate (Tpre-heat to Tp)</b>		5°C/second max
<b>Time within actual peak Temperature Max</b>		6 seconds
<b>Ramp-down Rate</b>		5°C/second max

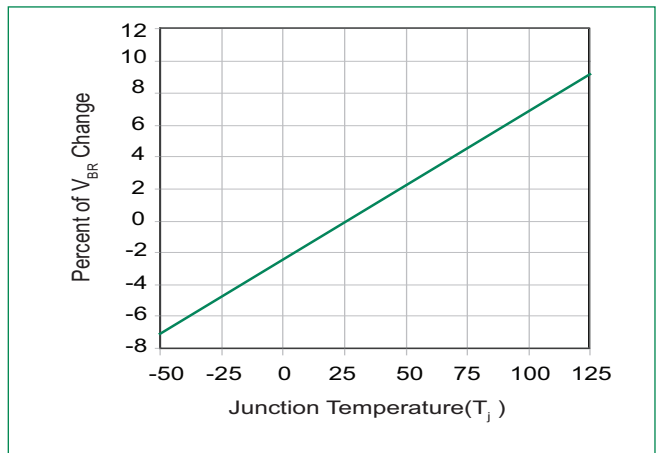


**Ratings and Characteristic Curves** ( $T_a=25^\circ\text{C}$  unless otherwise noted)

**Figure 1- Peak Power Derating**

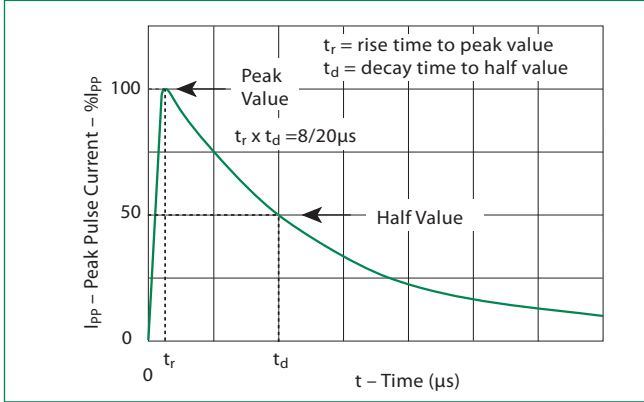


**Figure 2 - Typical  $V_{BR}$  Vs Junction Temperature**

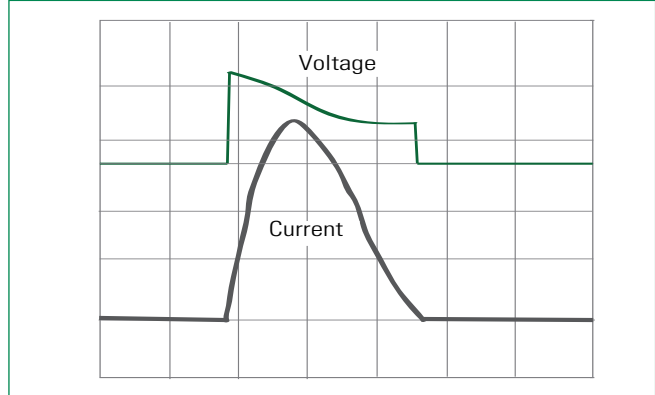


**Ratings and Characteristic Curves** ( $T_A=25^\circ\text{C}$  unless otherwise noted) (Continued)

**Figure 3 - Pulse Waveform**



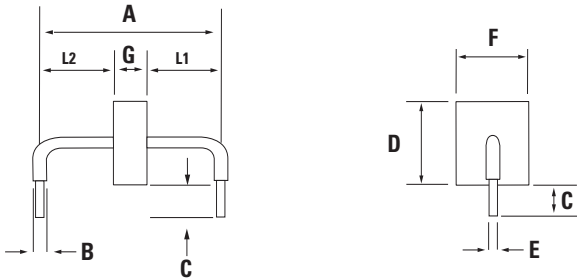
**Figure 4 - Surge Response (8/20 Surge Current Waveform)**



**Note:**

Its Foldback™ technology provides a clamping voltage lower than the avalanche voltage (but above the rated working voltage). Also use similar clamping diagram showing the actual voltage waveshape reaction of this foldback technology as shown in attached text at the end of this document. Please note this is specifically for a 10 kA rated AK, so we need an actual waveshape for this 20 kA rated component.

**Dimensions**

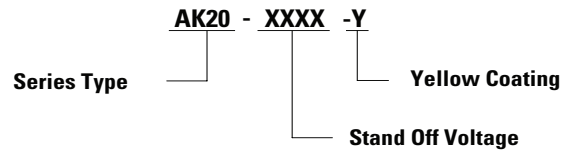


Dimensions	Inches	Millimeters
A	0.950±0.030	24.15±0.8
B	0.095±0.024	2.4±0.60
C	0.236±0.040	6.00±1.0
D	0.630±0.055	16.0±1.4
E	0.050±0.002	1.27±0.05
F	0.587±0.055	14.9±1.4
G - 016C	0.157 max.	4.00 max.
G - 058C/063C 066C/076C	0.307 max.	7.80 max.
L1/L2	L1= L2 tolerance +/- 0.04 inch (1.0 mm)	

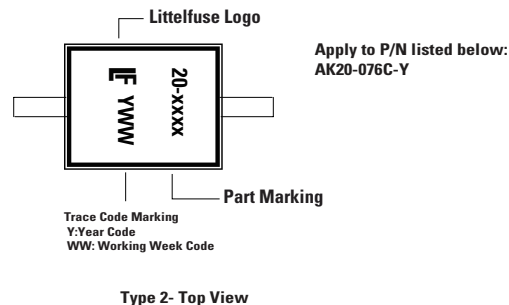
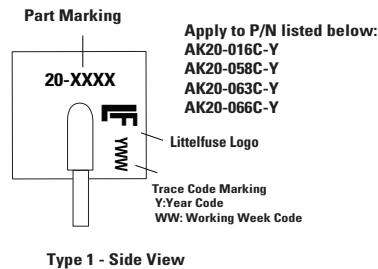
**Packing Options**

Part Number	Component Package	Quantity	Packaging Option
AK20-XXXX-Y	AK Package	56pcs/Box	Bulk
AK20-XXXX-Y-12	AK Package	12pcs/Box	Bulk

**Part Numbering System**



**Part Marking System**



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