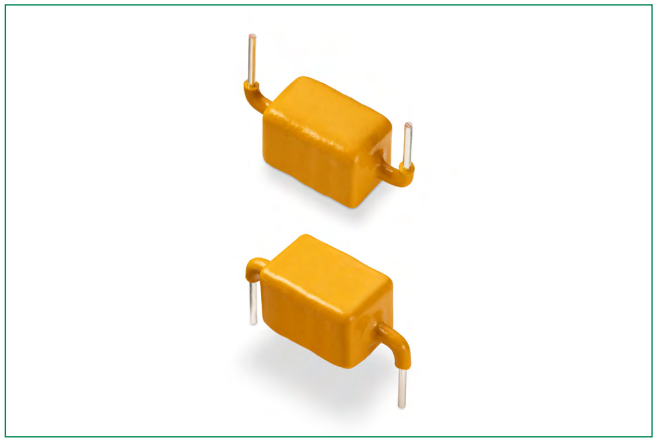
AK6-A Series

Axial Leaded - 6 kA Non-foldback TVS Diode



Agency Recognitions

Agency	Agency File Number
	E128662

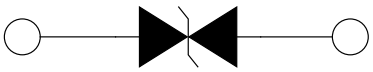
Maximum Ratings and Thermal Characteristics

(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}	6	kA

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

Functional Diagram



Bi-directional

Description

The AK6-A 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 its traditional avalanche clamping behavior, which provides huge energy dissipation at its maximum peak surge current specification, providing best-in-class protection level in high-power applications.

Features & Benefits

- Ultra compact: less than onetenth the size of traditional discrete solutions
- Both reflow and wave soldering capable
- Typical failure mode is short from over-specified voltage orcurrent
- IEC 61000-4-2 ESD 15 kV(Air), 8 kV (Contact)
- Glass passivated junction
- Sharp breakdown voltage
- Low dynamic resistance
- V_{BR} @ T_J = V_{BR}@25 °C x (1+αT x (T_J - 25))(αT:Temperature Coefficient, typical value is 0.1 %)
- Halogen-free and RoHS compliant
- EFT protection of data lines in accordance with IEC 61000-4-4
- Symmetric in leads width for easier soldering during assembly
- Pb-free E4 means 2nd level interconnect is Pb-free and the terminal finish material is silver
- Designed for HVDC applications, no latch up risk
- AK-A maximizes power dissipation while maintaining an ultra low clamping voltage (VC)
- High surge current ratings for robust protection in high-reliability, mission-critical applications.

Applications

- AI/Data Center/ICT HVDC distribution and power supplies
- EV Chargers, Energy Storage Systems, Rolling Stock
- HVDC transmission, convertors, power supplies, SSTs, SSCBs
- High Power Density AC and DC applications

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

Part Numbers	Part Marking	Standoff Voltage (V_R) 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_C @ Peak Pulse Current (I_{PP}) (Note 1)		Max. Temp Coefficient of V_{BR}	Max. Capacitance 0 V Bias 10 kHz	Agency Approval
					Min Volts	Max Volts	(mA)	V_C Volts	I_{PP} Amps	(%/°C)	(nF)	
AK6-240C-A	6-240A	240	10	15	269.6	298.0	10	451	6,000	0.1	2.2	-
AK6-430C-A	6-430A	430	10	15	440.0	490.0	10	740	6,000	0.1	1.4	X

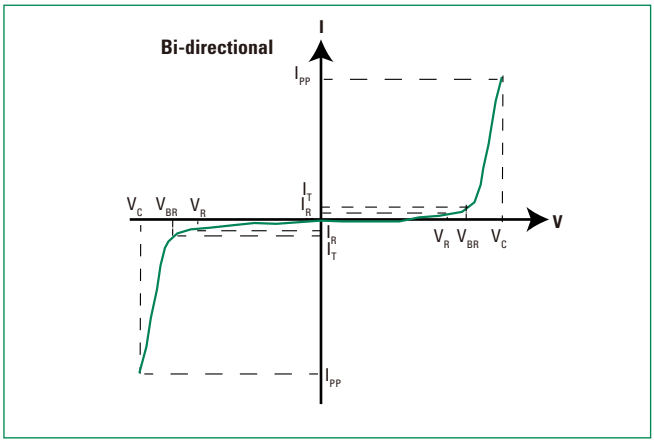
Note: Using 8/20 µs wave shape as defined in IEC 61000-4-5.

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I-V Curve Characteristics



P_{PPM} Peak Pulse Power Dissipation (I_{PP} x V_C) – Max power dissipation
V_R Stand-off Voltage – Maximum voltage that can be applied to the TVS without operation
V_{BR} Breakdown Voltage – Maximum voltage that flows though the TVS at a specified test current (I_T)
V_C Clamping Voltage – Peak voltage measured across the TVS at a specified I_{PPM} (peak impulse current)
I_R Reverse Leakage Current – Current measured at V_R

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

Figure 1 : Peak Power Derating

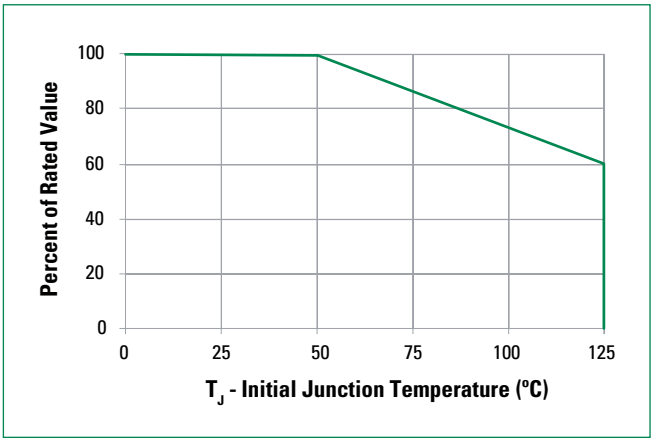


Figure 2 : Pulse Waveform

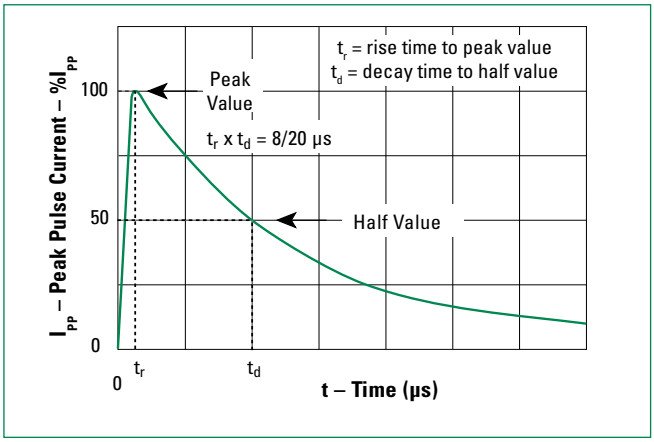


Figure 3 : Typical V_{BR} Vs Junction Temperature

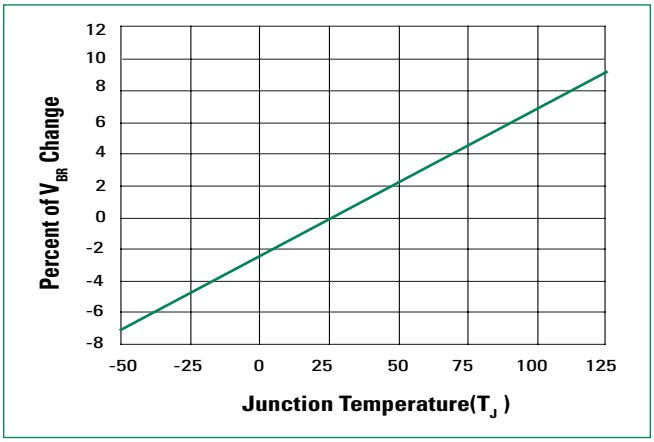
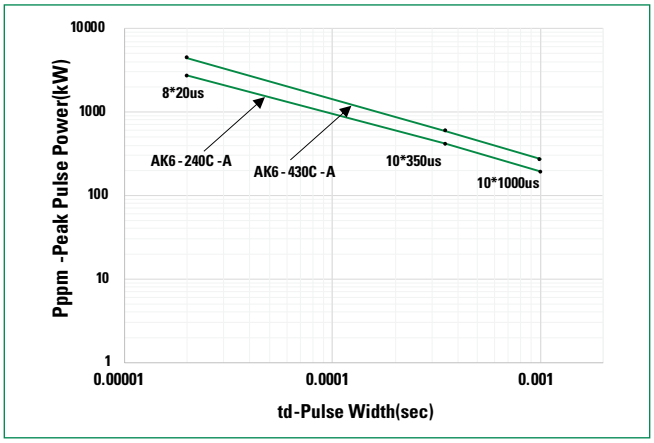


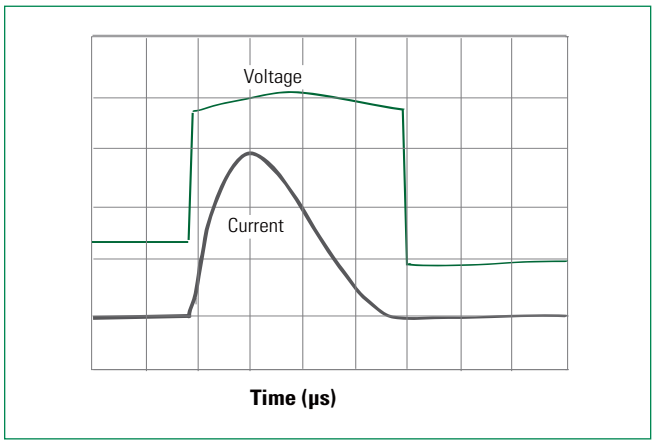
Figure 4 : Typical Peak Pulse Power Rating Curve



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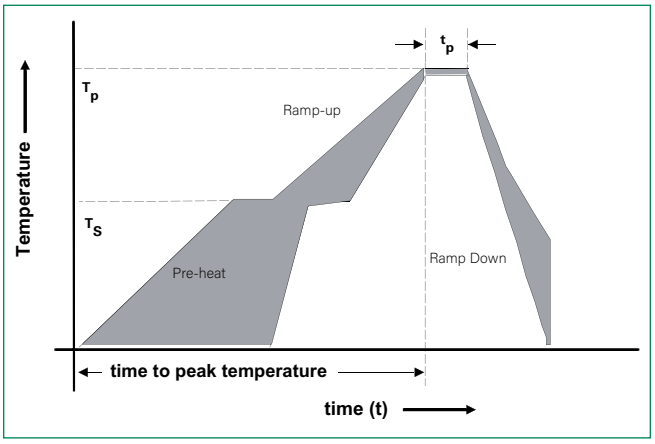
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Figure 5 : Surge Response (8/20 Surge current waveform)



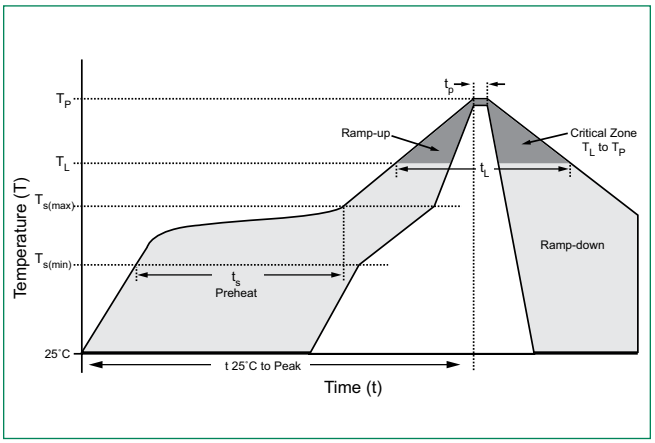
Flow Soldering (Solder Dipping)

Flow/Wave 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 seconds
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



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 seconds
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)		$260^{+0/-5}$ °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



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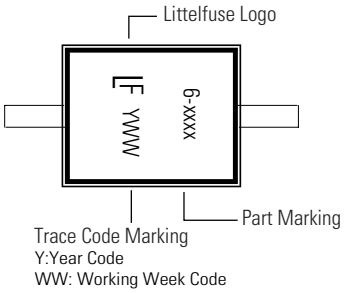
Physical Specifications

Weight	Contact manufacturer
Case	Axial component over glass passivated junction
Terminal	Silver plated leads, solderable per MIL-STD-750 method 2026

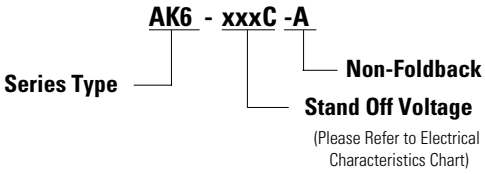
Environmental Specifications

High Temp Voltage Blocking (HTRB)	100% DC reverse voltage rated 125 °C, 1008 hours. JEDEC, JESD22-A-108
Biased Temp & Humidity (H3TRB)	1008 hours at T_A = 85 °C/85 % RH with part reversebiased at 80 % of rated breakdown voltage.JEDEC, JESD22-A-101
Temp Cycle (TC)	-55 °C to +125 °C, 15 min. dwell, 20 cycles JEDEC, JESD22-A104
Resistance to soldering heat (RSH)	+260 °C, 30 secs. JEDEC,JESD22-B-106

Part Marking System



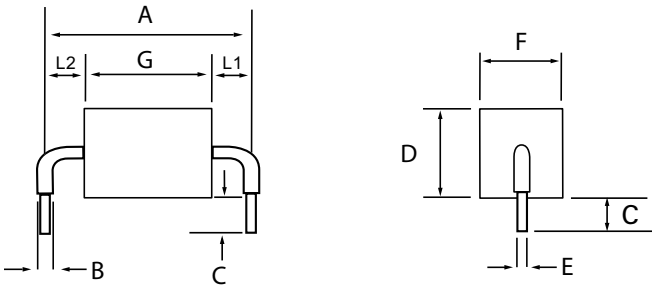
Part Marking System



Packing Option

Part Number	Component Package	Quantity	Packaging Option
AK6-xxxC-A	AK Package	56pcs/Box	Bulk
AK6-xxxC-A-12	AK Package	12pcs/Box	Bulk

Dimensions



Dimensions	Inches	Millimeters
A-240C	0.950+/-0.04	24.15+/-1.00
A-430C	1.193 +/- 0.04	30.3 +/- 1.00
B	0.095 +/- 0.024	2.4 +/- 0.60
C	0.236 +/- 0.04	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-240C-A	0.492+/-0.06	12.50+/-1.50
G-430C-A	0.767 +/- 0.06	18.8 +/- 1.50
L1/L2	L1= L2 tolerance +/- 0.04 inch (1.0 mm)	

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