

AK10-FB Series

Axial Leaded - Controlled Foldback and Low Clamping - 10 kA



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 ¹	I_{PP}	10	kA

Note:

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

Functional Diagram



Description

The AK10-FB 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.

Features

- Controlled Foldback technology for superior clamping performance
- Both reflow and wave soldering capable
- Typical failure mode is short from over-specified voltage or current
- Symmetric in leads width for easier soldering during assembly
- IEC 61000-4-2 ESD 15 kV(Air), 8 kV (Contact)
- 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
- Designed for HVDC applications, no latch up risk
- AK-FB has best in class, 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 ($T_A = 25^\circ\text{C}$ unless otherwise noted)

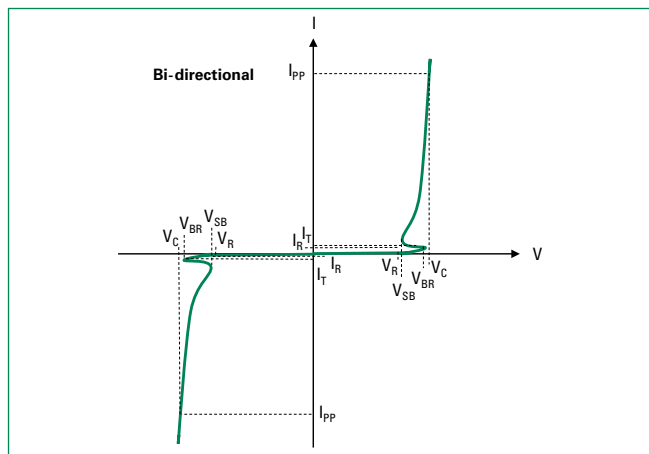
Part Numbers	Part Marking	Reverse Stand off Voltage V_R (V)	Max. Reverse Leakage $I_R @ V_R$ (μA)	Typical $I_R @ 85^\circ\text{C}$ (μA)	Minimum Snapback Voltage V_{SB} (V)	Breakdown Voltage $V_{BR} @ I_T$ (V)		Test Current I_T (mA)	Maximum Clamping Voltage $V_C @ I_{PP}$ (8/20 μs) (V) (Note 1)		Max. Temp Coefficient of V_{BR} (%/ $^\circ\text{C}$)	Max. Capacitance 0 Bias 10 kHz (nF)	Agency Approval
						Min	Max		V_C (V)	I_{PP} (A)			
AK10-430C-FB	10-430C	450	10	15	430	453	502	10	715	10,000	0.1	1.2	-
AK10-450C-FB	10-450C	450	10	15	450	475	525	10	740	10,000	0.1	1.2	-
AK10-550C-FB	10-550C	550	10	15	550	600	663	10	786	10,000	0.1	1.0	-
AK10-570C-FB	10-570C	570	10	15	570	620	687	10	800	10,000	0.1	1.0	-

Note: 1 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 ($I_{PP} \times V_C$)** - 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 through 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
 V_{SB} Snapback Voltage

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

Figure 1 - Typical Peak Power Derating Curve

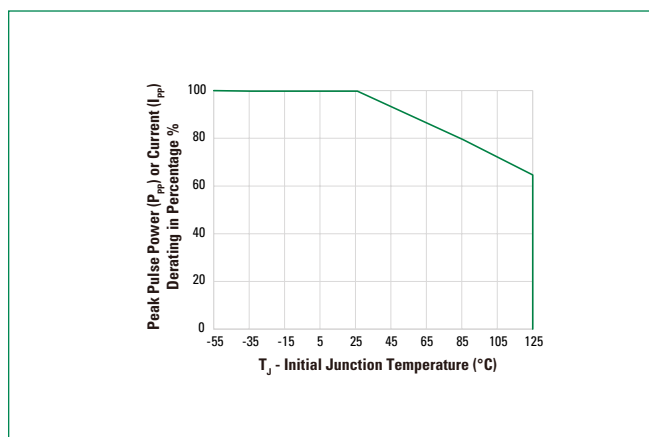


Figure 2 - Pulse Waveform

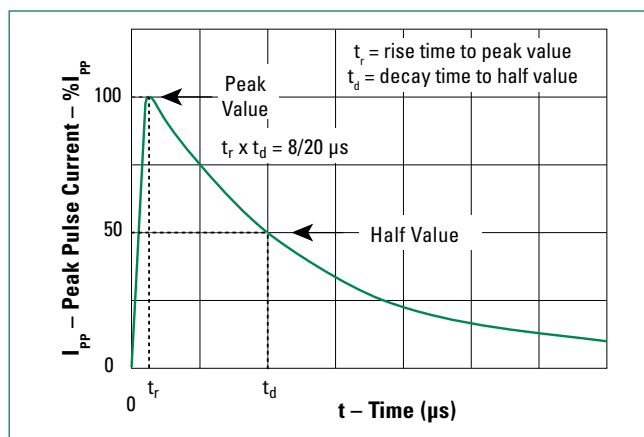


Figure 3 - Typical Peak Pulse Power Rating Curve

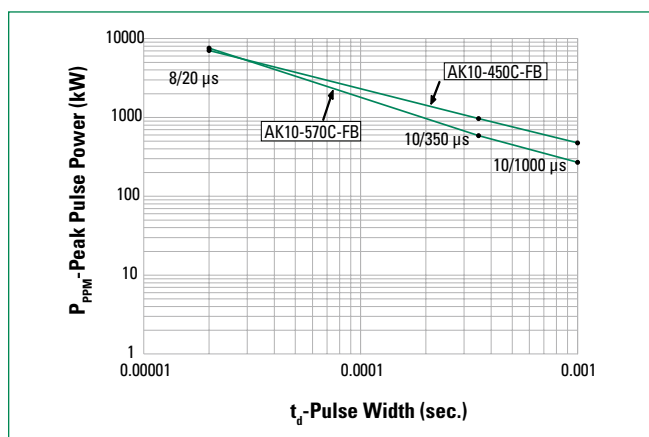
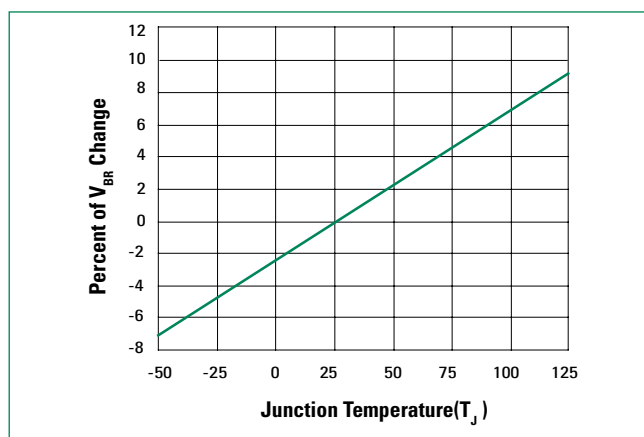


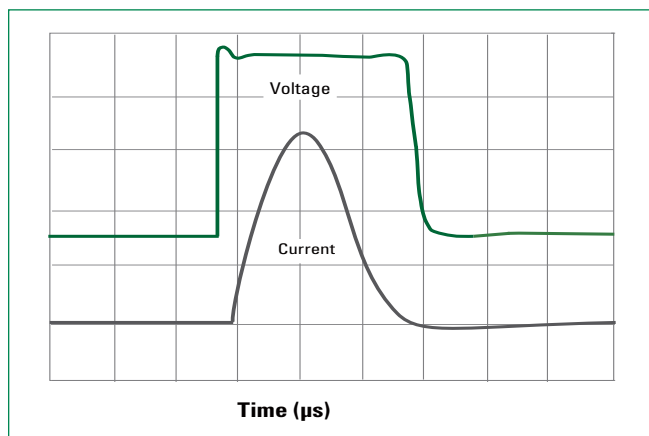
Figure 4 - Typical V_{BR} Vs Junction Temperature



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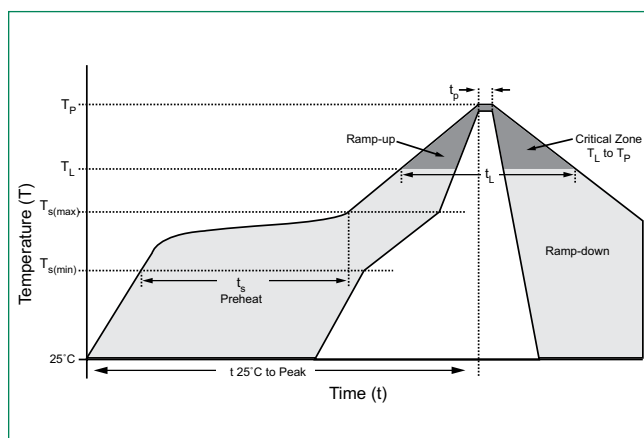
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Figure 5 - Surge Response (8/20 Surge current waveform)



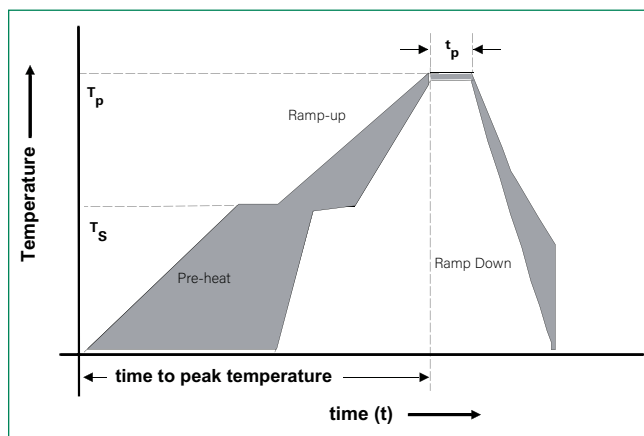
Soldering Parameters

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



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



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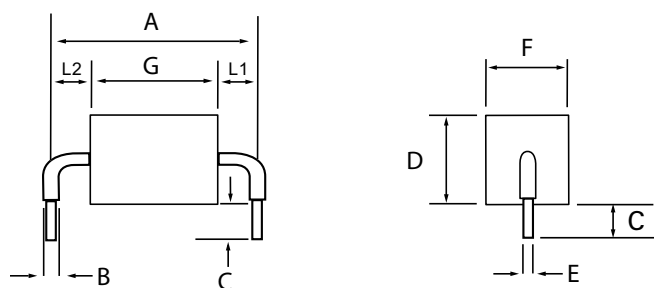
Physical Specifications

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

Environmental Specifications

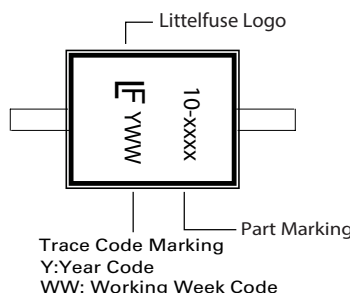
High Temp Voltage Blocking(HTRB)	100 % DC reverse voltage rated 125 °C, 1008 hours. JEDEC, JESD22-A-108
Biased Temp & Humidity(H3TRB)	1008 hours at $T_A = 85\text{ °C}/85\% \text{ RH}$ with part reverse biased at 80 % of rated breakdown voltage. JEDEC, JESD22-A-101
Temp Cycle(T_c)	-55 °C to +125 °C,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

Dimensions

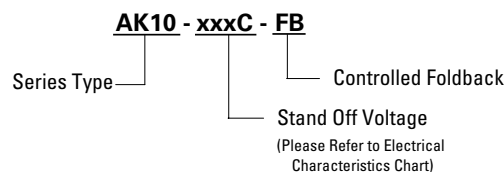


Dimensions	Inches	Millimeters
A	1.404 +/- 0.08	35.65 +/- 2.00
B	0.095 +/- 0.024	2.40 +/- 0.60
C	0.236 +/- 0.04	6.00 +/- 1.00
D	0.570 max.	14.48 max.
E	0.050 +/- 0.002	1.270 +/- 0.05
F	0.500 max.	12.70 max.
G-430C-FB	0.974 +/- 0.06	24.73 +/- 1.50
G-450C-FB	0.999 +/- 0.06	25.38 +/- 1.50
G-550C/570C-FB	1.045 +/- 0.06	26.55 +/- 1.50
L1/L2	L1 = L2 tolerance +/- 0.04 inch (1.0 mm)	

Part Marking System



Part Marking System



Packing Option

Part Number	Component Package	Quantity	Packaging Option
AK10-xxxC-FB	AK Package	56pcs/Box	Bulk
AK10-xxxC-FB-12	AK Package	12pcs/Box	Bulk

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