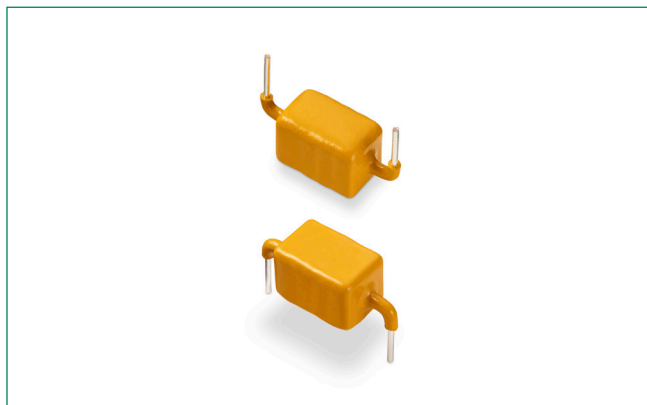


AK-FL Series

Axial Leaded, FlatSuppressX™ Flat And Low Clamping TVS



Maximum Ratings and Thermal Characteristics

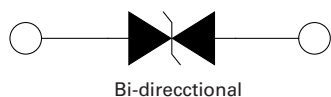
(T_A = 25 °C unless otherwise noted)

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, 8, 10	kA

Note:

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

Functional Diagram



Description

The AK-FL 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 FlatSuppressX™ 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

- FlatSuppressX™ TVS provides superior surge protection, maintaining a flat and stable clamping voltage through its advanced foldback I-V characteristics
- High-reliability devices with fabrication and assembly lot traceability
- Both reflow and wave soldering capable
- Typical failure mode is short from over-specified voltage or current
- Ultra compact: less than one-tenth the size of traditional discrete solutions
- Sharp breakdown voltage
- 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

Applications

Up-screened to provide high reliability for avionics applications

Electrical Characteristics (T_A = 25 °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 °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} (%/°C)	Max. Capacitance 0 Bias 10 kHz (nF)
						Min	Max		V _C (V)	I _{PP} (A)		
AK6-700C-FL	6-700C	700	10	15	700	760	825	10	870	6,000	0.1	0.7
AK8-470C-FL	8-470C	470	10	15	470	483	537	10	580	8,000	0.10	1.3
AK10-550C-FL	10-550C	550	10	15	550	600	663	10	786	10,000	0.10	1.0

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

Screen Process

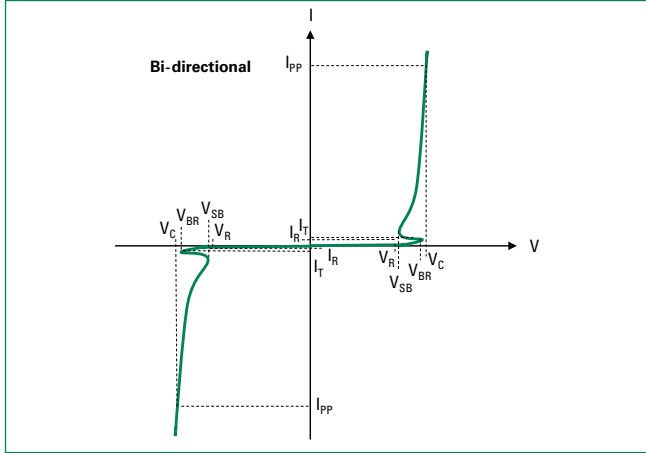
100 % Vision Inspection	MIL-STD-750 method 2074
100 % Surge Test (1x)	MIL-STD-750 method 4066
100 % Temperature Cycle Test (-55 to 150 °C, 20 cycles, dwell time 15 min)	MIL-STD-750 method 1051
100 % HTRB 125 °C Bias = V _R (80 % breakdown voltage, each direction 96 hrs for bi-directional products)	MIL-STD-750 method 1038

Note: Up-screen program can be specified by customer's request by contacting Littelfuse customer service

AK-FL Series

Axial Leded, FlatSuppressX™ Flat And Low Clamping TVS

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 though the TVS at a specified test current (I_R)
- 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
Peak Power Derating

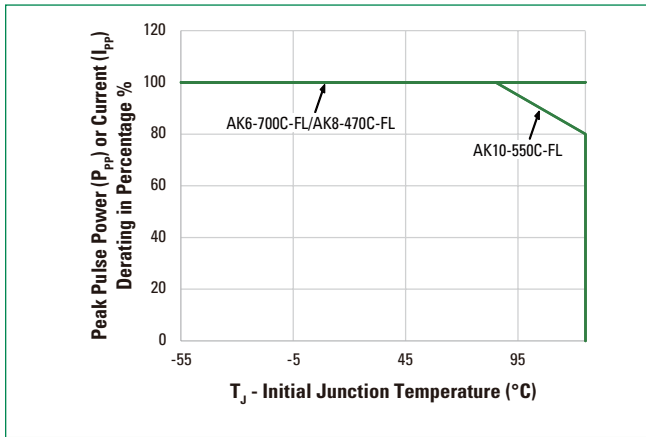


Figure 2
Pulse Waveform

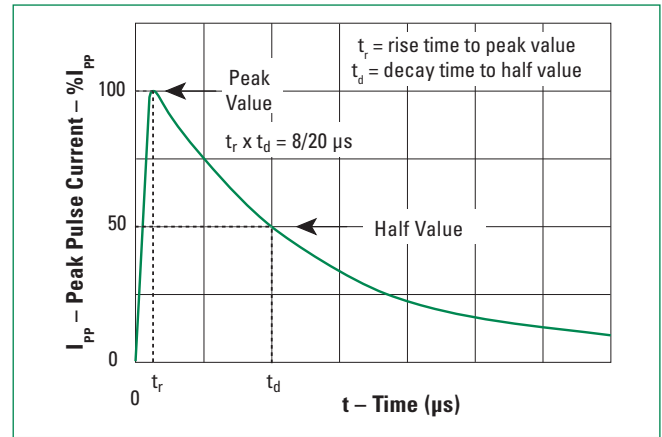


Figure 3
Typical Peak Pulse Power Rating Curve

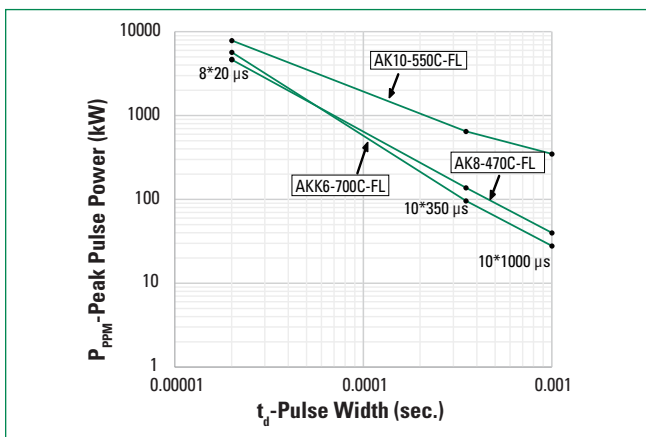
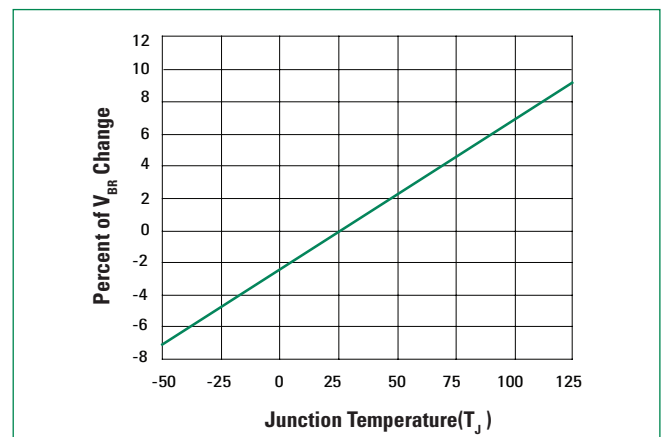


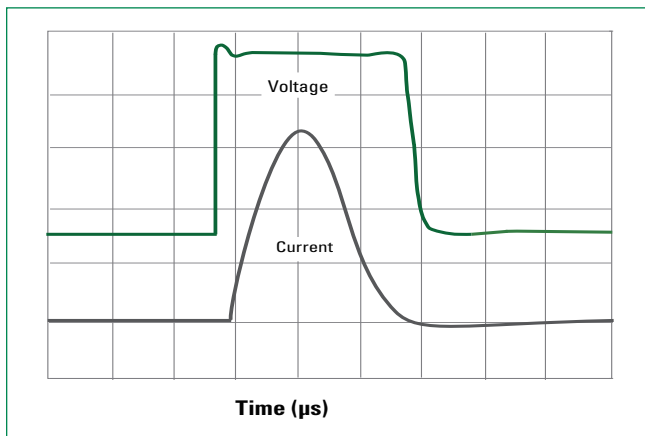
Figure 4
Typical V_BR Vs Junction Temperature



AK-FL Series

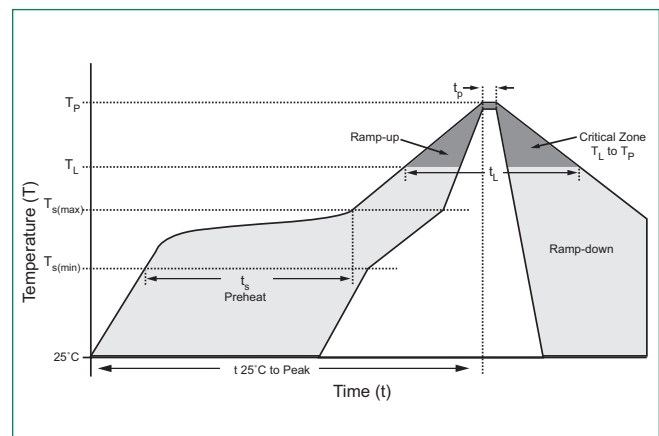
Axial Leaded, FlatSuppressX™ Flat And Low Clamping TVS

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



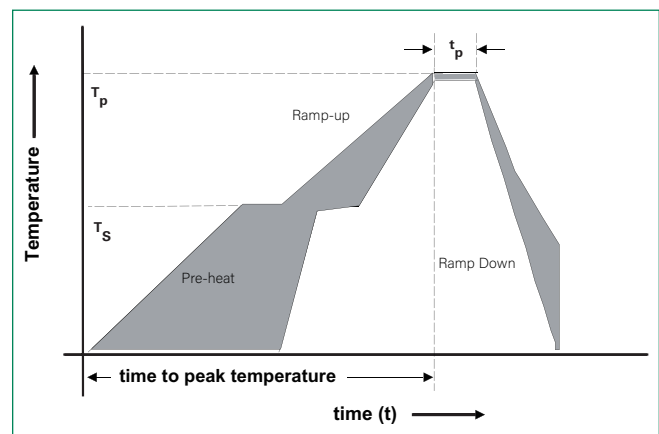
Soldering Parameters

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



AK-FL Series

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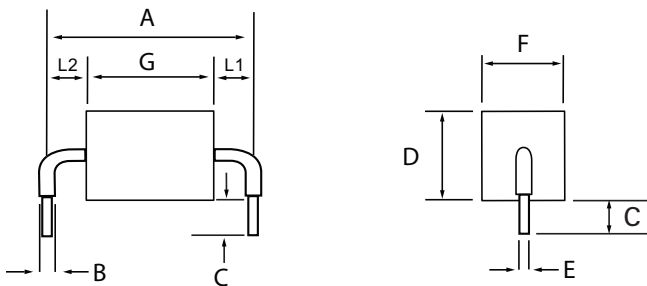
Physical Specifications

Weight	Contact manufacturer
Case	Axial component over glass passivated junction
Polarity	Uni-directional products are denoted with a cathode band
Terminal	Silver plated leads, solderable per MIL-STD-750 method 2026

Environmental Specifications

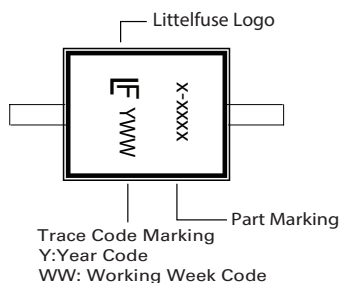
High Temp Voltage Blocking(HTRB)	100 % DC reverse voltage rated 125 °C,1008 hours. JEDEC,JESD22-A-108
Biased Temp & Humidity(H3TRB)	1008 hours at $T_A = 85$ °C/85 % RH with part reverse biased at 80 % of rated breakdown voltage.JEDEC, JESD22-A-101
Temp Cycle(T_c)	-55 °C to +125 °C, 15 min. dwell, 20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

Dimensions

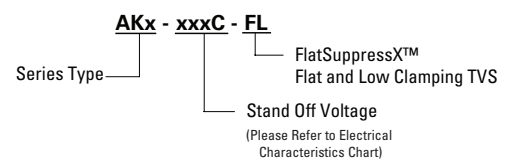


Dimensions	Inches	Millimeters
A-AK6-700C-FL	1.404 +/- 0.080	35.65 +/- 2.00
A-AK8-470C-FL	1.140 +/- 0.080	29.00 +/- 2.00
A-AK10-550C-FL	1.404 +/- 0.080	35.65 +/- 2.00
B	0.095 +/- 0.024	2.4 +/- 0.60
C	0.236 +/- 0.040	6.00 +/- 1.00
D	0.570 max	14.48 max.
E	0.050 +/- 0.002	1.270 +/- 0.05
F	0.500 max	12.70 max.
G-AK6-700C-FL	0.774 +/- 0.04	25.80 +/- 1.00
G-AK8-470C-FL	0.748 +/- 0.04	19.50 +/- 1.00
G-AK10-550C-FL	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
AKx-xxxC-FL	AK Package	56pcs/Box	Bulk

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