

Type MLSH 125 °C Hermetic Slimpack, Ultra Long Life, Aluminum Electrolytic



The world's only hermetically sealed aluminum electrolytic capacitor with glass-to-metal seal, type MLSH has extraordinary long life and rugged construction for the most demanding power electronics applications.

Type MLSH has superior capacitance retention compared to axial wet tantalum capacitors at -55 °C. Packaged in a robust stainless steel case capable of withstanding 80g's, it replaces 3 or more axial wet tantalum capacitors in parallel. Unlike wet tantalums that require voltage derating at temperatures above 85 °C, type MLSH capacitors are rated for full operating voltage at 125 °C and tested to 5000 hrs at rated voltage and temperature.

Highlights

- Hermetically sealed with no dry out
- Alternative to axial wet tantalum
- High capacitance retention @ -55 °C
- 5000 Hr DC life test
- Up to 80g vibration

Specifications

Temperature Range	-55 °C to +125 °C																																																																						
Rated Voltage Range	30 Vdc to 50 Vdc																																																																						
Capacitance Range	1700 µF to 3200 µF																																																																						
Capacitance Tolerance	±20%																																																																						
Leakage Current	≤ 0.002 CV µA, @ 25 °C and 5 mins.																																																																						
Ripple Current Multipliers	<p>Case Temperature</p> <table border="1"><tr><td>45 °C</td><td>55 °C</td><td>65 °C</td><td>75 °C</td><td>85 °C</td><td>95 °C</td><td>105 °C</td><td>115 °C</td><td>125 °C</td></tr><tr><td>1.41</td><td>1.32</td><td>1.22</td><td>1.12</td><td>1.00</td><td>0.87</td><td>0.71</td><td>0.50</td><td>0.00</td></tr></table> <p>Ambient Temperature, No Heatsink</p> <table border="1"><tr><td>45 °C</td><td>55 °C</td><td>65 °C</td><td>75 °C</td><td>85 °C</td><td>95 °C</td><td>105 °C</td><td>115 °C</td><td>125 °C</td></tr><tr><td>0.63</td><td>0.58</td><td>0.54</td><td>0.49</td><td>0.44</td><td>0.38</td><td>0.31</td><td>0.22</td><td>0.00</td></tr></table> <p>Frequency</p> <table border="1"><tr><td></td><td>50 Hz</td><td>60 Hz</td><td>120 Hz</td><td>360 Hz</td><td>1 kHz</td><td>5 kHz</td><td>10 kHz & up</td></tr><tr><td>5 to 40 V</td><td>0.95</td><td>0.96</td><td>1.00</td><td>1.03</td><td>1.04</td><td>1.04</td><td>1.04</td></tr><tr><td>60 to 250 V</td><td>0.80</td><td>0.84</td><td>1.00</td><td>1.18</td><td>1.25</td><td>1.30</td><td>1.30</td></tr></table>											45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C	1.41	1.32	1.22	1.12	1.00	0.87	0.71	0.50	0.00	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C	0.63	0.58	0.54	0.49	0.44	0.38	0.31	0.22	0.00		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	5 to 40 V	0.95	0.96	1.00	1.03	1.04	1.04	1.04	60 to 250 V	0.80	0.84	1.00	1.18	1.25	1.30	1.30
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Low Temperature Characteristics	Impedance ratio: $Z_{-55^{\circ}\text{C}}/Z_{+25^{\circ}\text{C}}$ @120 Hz ≤ 3																																																																						
DC Life Test	5000 h @ rated voltage at 125 °C Δ Capacitance ±20% (<50 Vdc) Δ Capacitance ±10% (>50 Vdc) ESR 200% of limit DCL 100% of limit																																																																						
Shelf Life Test	500 h @ 125 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit																																																																						
Vibration	Standard MLSH Flatpack: 80g Mounting: Vibration capability is dependent upon mounting restraint. MIL-STD-202, Meth. 204, Condition H																																																																						

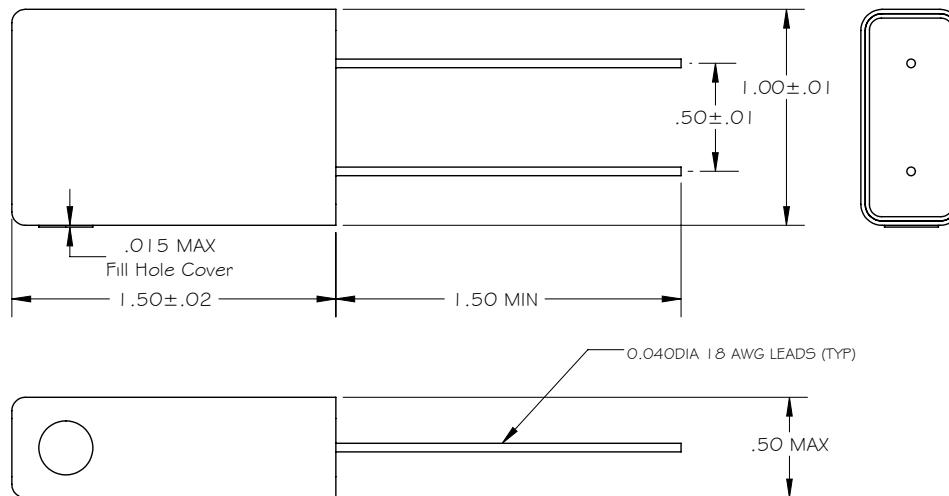
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Vibration Test	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size.</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above, whichever is less. The tolerance on vibration amplitude shall be ± 10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p>											
High Reliability Test/Burn-in	<p>Established Reliability capacitors shall be subjected to a minimum of 100 percent of the DC rated voltage at 85 °C for 48 hours minimum but not to exceed 96 hours. During this test, capacitors shall be adequately protected against temporary voltage surges of 10 percent or more of the test voltage. After burn-in, the capacitors shall be returned to room ambient conditions and the DC leakage, capacitance, and ESR shall be measured with respect to specified limits.</p>											
Thermal Resistance	<table border="1" data-bbox="922 960 1290 1212"> <thead> <tr> <th rowspan="2">Large Sides Heatsinked</th> <th colspan="2">Case Length</th> </tr> <tr> <th>Insulation</th> <th>1.5"</th> </tr> </thead> <tbody> <tr> <td>one</td> <td>None Polyester</td> <td>6.6 7.2</td> </tr> <tr> <td>both</td> <td>None Polyester</td> <td>4.4 4.7</td> </tr> </tbody> </table>	Large Sides Heatsinked	Case Length		Insulation	1.5"	one	None Polyester	6.6 7.2	both	None Polyester	4.4 4.7
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Typical Weight	Case JK - 32g											
Terminals	18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max											
Ripple Current Capability	The ripple current capability is set by the maximum permissible internal core temperature, 125 °C.											
Air Cooled	The ripple currents in the ratings tables are for 85 °C case temperatures. For air temperatures without a heatsink use the multipliers for Ambient Temperature, No Heatsink.											
Heatsink Cooled	Temperature rise from the hottest internal spot, the core, to ambient air is $\Delta T = I^2(ESR)(\theta_{cc} + \theta_{ca})$, recommended max ΔT of 30 °C where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the MLSH attached to a heatsink use the maximum core temperature and the values for θ_{cc} .											
Example	As an illustration, suppose you operate an noninsulated MLSH172M050JK0C in 95 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the MLSH and the heatsink, and the total thermal resistance is 2.7 + 6.6 or 9.3 °C/W. The power which would heat the core to 125 °C is $(125 - 95)/9.3$ or 3.2 W. For an ESR of 108 mΩ, 3.2 W equates to a ripple current of 5.45 A.											

Part Numbering System

MLSH	322	M	030	JK	0	C
Type	Capacitance	Tolerance	Rated Voltage	Case Code	Insulation	Mounting Style
MLSH	322 = 3200 μ F	M = $\pm 20\%$	030 = 30 Vdc	JK, L=1.5 in.	0 = bare can	C = two leads
	222 = 2200 μ F		040 = 40 Vdc	* other sizes available	1 = polyester	
	172 = 1700 μ F		050 = 50 Vdc			

Outline Drawing

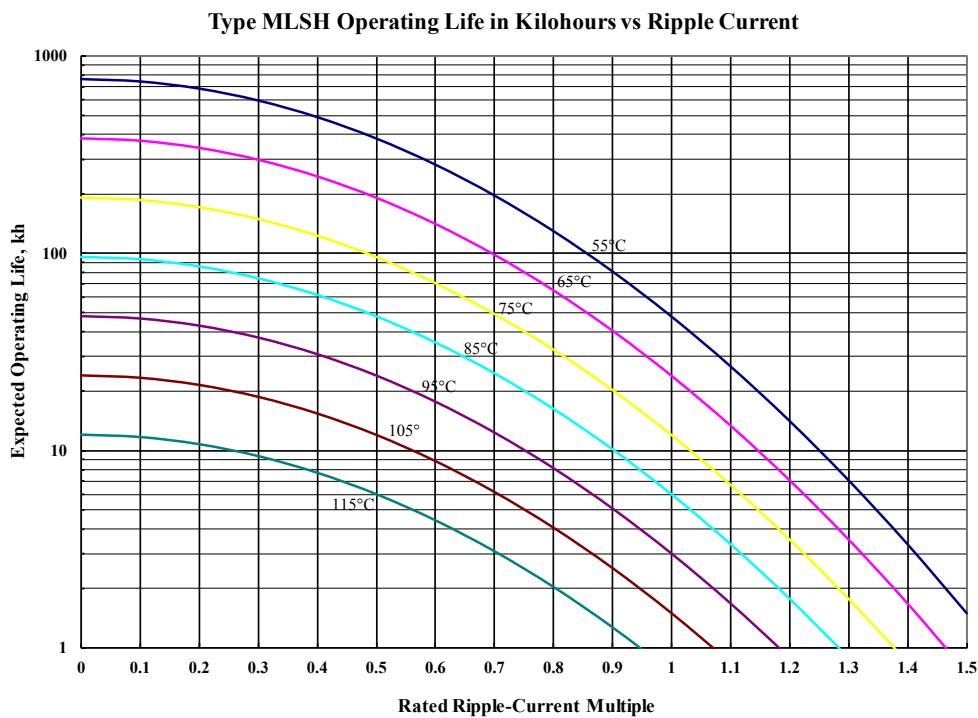


- Stainless steel case
- All dimensions are in inches
- Dimensions are for bare can, non-insulated

Ratings

Cap (μ F)	Voltage	Catalog Part Number	ESR max 25 °C (m Ω)		Ripple (A) Case @ 85°C	
			120 Hz	10 kHz	120 Hz	10 kHz
3200	30 Vdc @ 125 °C 36 Vdc @ 105 °C 40 Vdc @ 85 °C 50 Vdc Surge @25 °C	MLSH322M030JK0C	0.103	0.098	6.6	6.8
2200	40 Vdc @ 125 °C 48 Vdc @ 105 °C 55 Vdc @ 85 °C 63 Vdc Surge @25 °C	MLSH222M040JK0C	0.105	0.1	6.6	6.8
1700	50 Vdc @ 125 °C 60Vdc @ 105 °C 70Vdc @ 85 °C 75Vdc Surge @25 °C	MLSH172M050JK0C	0.108	0.101	6.6	6.8

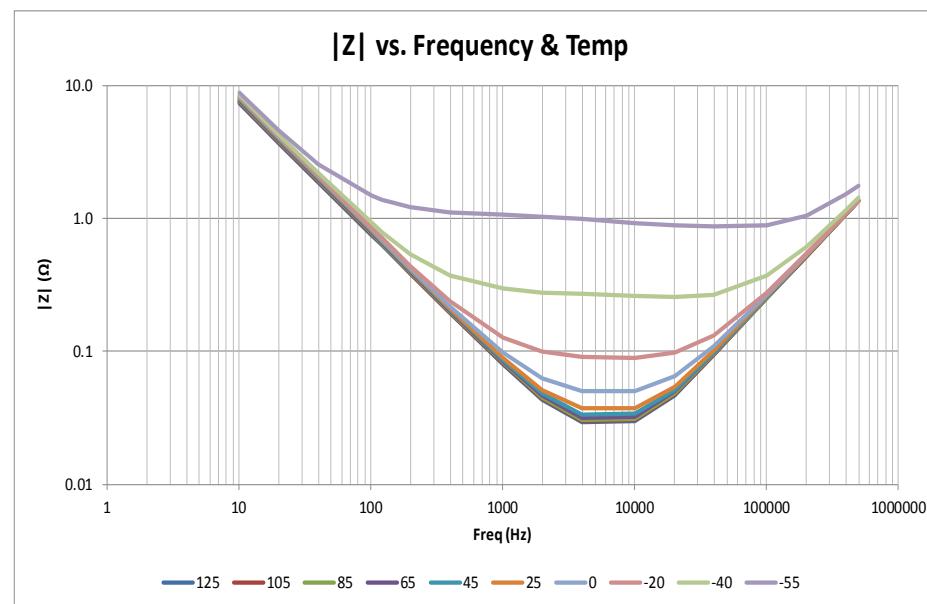
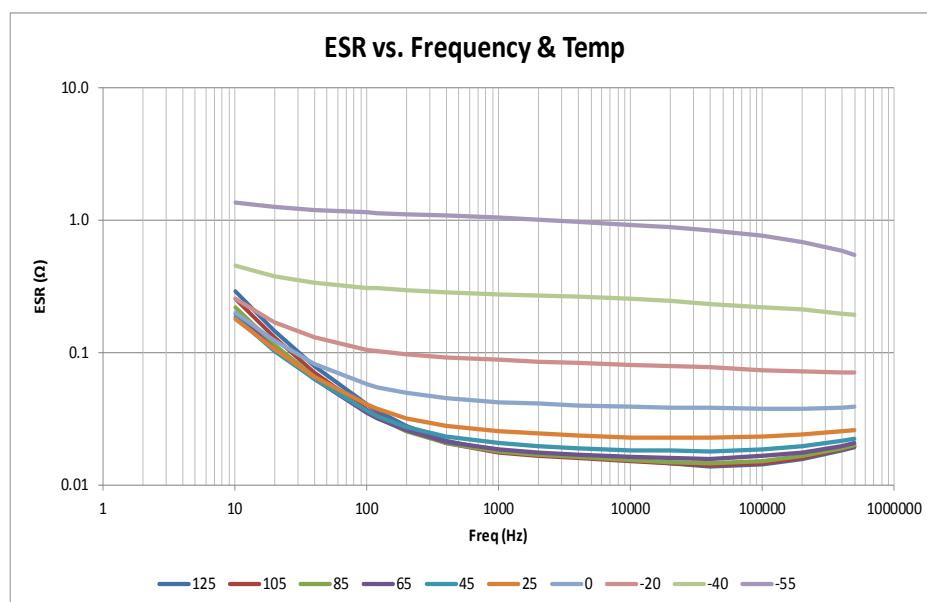
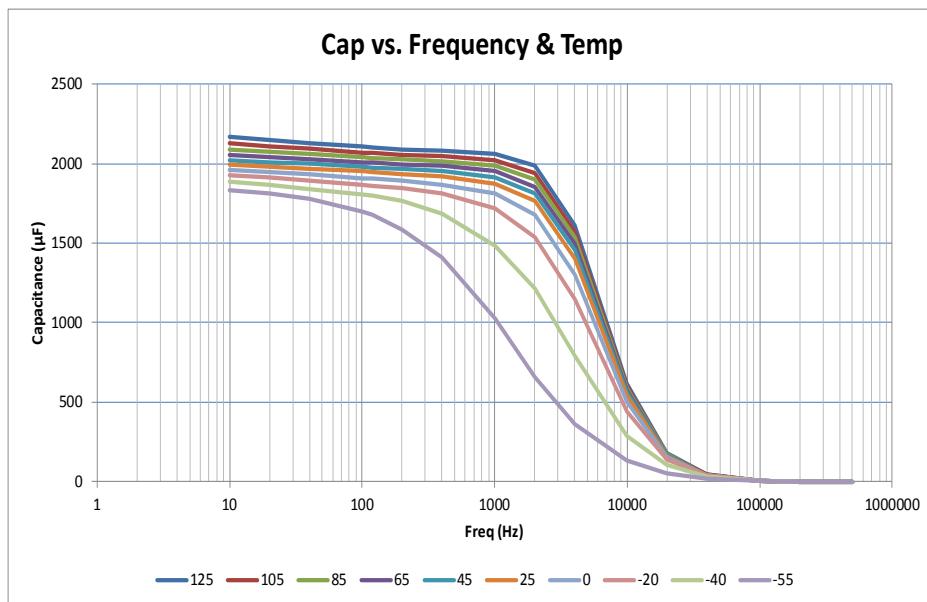
Typical Performance Curves



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Typical Performance Curves

MLSH222M640JK0C



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