

Type MLP 85 °C Flatpack™, Ultra Long Life, Aluminum Electrolytic

Very Low Profile



The MLP's high-energy storage and box-shape make it perfect for voltage holdup or filtering in military SEM-E modules, telecom circuit packs and computer cards. The MLP delivers up to 20 joules of energy storage in a 1/2" height with 50 year's life at +45 °C. You can readily heatsink it to double the ripple-current capability. The MLP is the square-peg component that fits the square-holes in electronic assemblies.

Highlights

- Low-profile replacement for snap-ins
- Double the ripple capability with a heatsink
- Nearly hermetic welded seal assures 50-year life
- Withstands more than 80,000 feet altitude

Specifications

Temperature Range	-55°C to +85°C ≤250 Vdc -40°C to +85°C ≥300 Vdc																																												
Rated Voltage Range	7.5 Vdc to 450 Vdc																																												
Capacitance Range	110 µF to 47,000 µF																																												
Capacitance Tolerance	±20%																																												
Leakage Current	≤ 0.002 CV µA, @ 25 °C and 5 min.																																												
Ripple Current Multipliers	Ambient Temperature, No Heatsink <table border="1"> <thead> <tr> <th>45 °C</th><th>55 °C</th><th>65 °C</th><th>75 °C</th><th>85 °C</th></tr> </thead> <tbody> <tr> <td>1.00</td><td>0.90</td><td>0.75</td><td>0.56</td><td>0.27</td></tr> </tbody> </table> Case Temperature <table border="1"> <thead> <tr> <th>45 °C</th><th>55 °C</th><th>65 °C</th><th>75 °C</th><th>85 °C</th></tr> </thead> <tbody> <tr> <td>3.79</td><td>3.32</td><td>2.77</td><td>2.08</td><td>1.00</td></tr> </tbody> </table> Frequency <table border="1"> <thead> <tr> <th></th><th>50 Hz</th><th>60 Hz</th><th>120 Hz</th><th>360 Hz</th><th>1 kHz</th><th>5 kHz</th><th>10 kHz & up</th></tr> </thead> <tbody> <tr> <td>7.5 to 63 V</td><td>0.94</td><td>0.95</td><td>1.00</td><td>1.04</td><td>1.05</td><td>1.06</td><td>1.06</td></tr> <tr> <td>80 to 450 V</td><td>0.80</td><td>0.85</td><td>1.00</td><td>1.17</td><td>1.24</td><td>1.28</td><td>1.29</td></tr> </tbody> </table>	45 °C	55 °C	65 °C	75 °C	85 °C	1.00	0.90	0.75	0.56	0.27	45 °C	55 °C	65 °C	75 °C	85 °C	3.79	3.32	2.77	2.08	1.00		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	7.5 to 63 V	0.94	0.95	1.00	1.04	1.05	1.06	1.06	80 to 450 V	0.80	0.85	1.00	1.17	1.24	1.28	1.29
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Low Temperature Characteristics	Impedance ratio: $Z_{-55^{\circ}\text{C}}/Z_{+25^{\circ}\text{C}}$ ≤ 10 (7.5 - 20 Vdc) ≤ 2 (25 - 2																																												

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Vibration Test	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. 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 (XXg peak), whichever is less. The tolerance on vibration amplitude shall be ±10 percent. Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz. 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.																															
Thermal Resistance	<table border="1"> <thead> <tr> <th rowspan="2">Large Sides Heatsinked</th><th>Case Length</th><th>1.5"</th><th>2.0"</th><th>3.0"</th></tr> <tr> <th>Insulation</th><th>°C/W</th><th>°C/W</th><th>°C/W</th></tr> </thead> <tbody> <tr> <td rowspan="2">one</td><td>None</td><td>2.9</td><td>2.1</td><td>1.4</td></tr> <tr> <td>Polyester</td><td>3.3</td><td>2.4</td><td>1.6</td></tr> <tr> <td rowspan="2">both</td><td>None</td><td>2.7</td><td>1.9</td><td>1.2</td></tr> <tr> <td>Polyester</td><td>2.9</td><td>2.1</td><td>1.3</td></tr> </tbody> </table>					Large Sides Heatsinked	Case Length	1.5"	2.0"	3.0"	Insulation	°C/W	°C/W	°C/W	one	None	2.9	2.1	1.4	Polyester	3.3	2.4	1.6	both	None	2.7	1.9	1.2	Polyester	2.9	2.1	1.3
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ESL	<30 nH measured 1/4" from case at 1 MHz																															
Weight	Case EK 30 g typical Case EA 42 g typical Case EB 66 g typical																															
Terminals - lead free version available	18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max																															
Case Material	Aluminum																															
Double the Ripple Current	Attach the MLP to an external heatsink and you can easily double the ripple current capability and assure long life through cooler operation. The broad, flat top and bottom on the MLP are ideal for cooling the capacitor and removing the heat caused by ripple current.																															
Ripple Current Capability	The ripple current capability is set by the maximum permissible internal core temperature, 88 °C. This assures that the case does not inflate beyond 0.5 inch height.																															
Air Cooled	The ripple currents in the ratings tables are for 85 °C case temperatures. For air temperatures without a heatsink use the multipliers Ambient Temperature, No Heatsink.																															
Heatsink Cooled																																

Part Numbering System

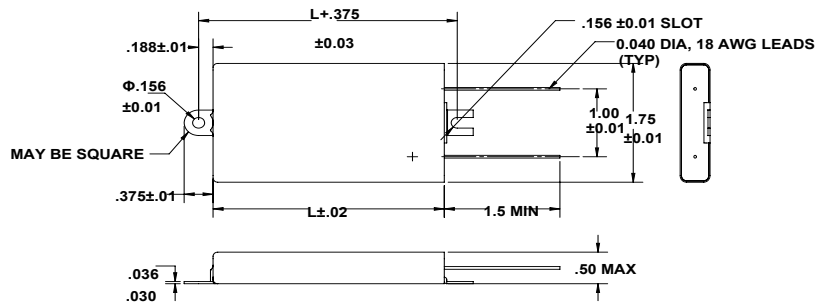
MLP	102	M	200	EB	0	A
Type	Capacitance	Tolerance	Rated Voltage	Case Code	Insulation	Mounting Style
MLP	821=820 μ F 102 = 1000 μ F	M=±20%	Vdc	EK, L=1.5 in. EA, L=2.0 in. EB, L=3.0 in.	0 = bare can 1 = polyester	A = mounting tabs B = four leads C = two leads/no tabs D = hook leads/tabs E = hook leads/no tabs

Outline Drawings

Note: The polyester tape wrap may add up to 0.020 inches to the thickness and width of the capacitor.

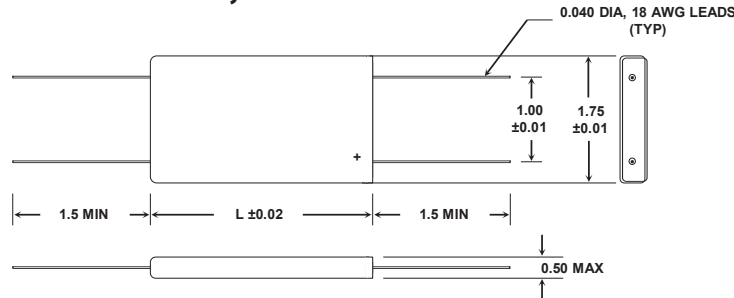
Style A: Mounting Tabs

Mounting tabs and negative lead are welded to the case.



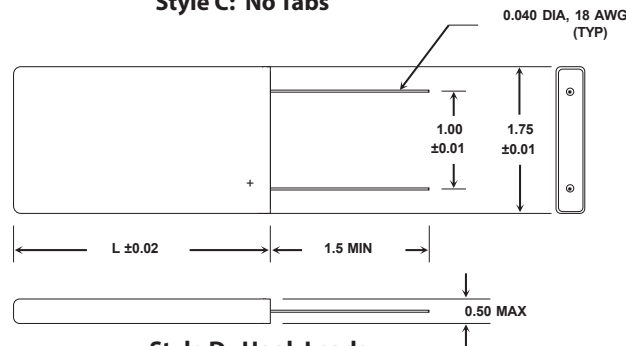
Style B: Four Leads

Three negative leads are welded to the case.



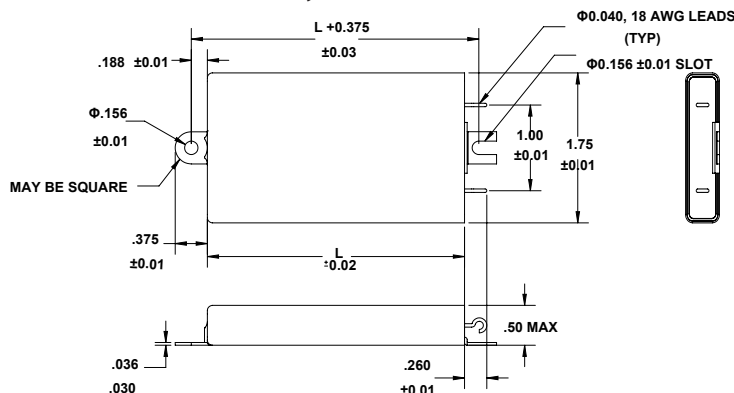
Style C: No Tabs

The negative lead is welded to the case.



Style D: Hook Leads

Mounting tabs and negative lead are welded to the case.



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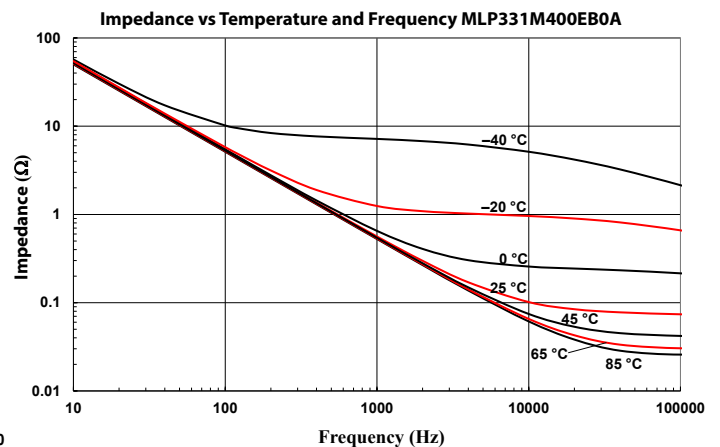
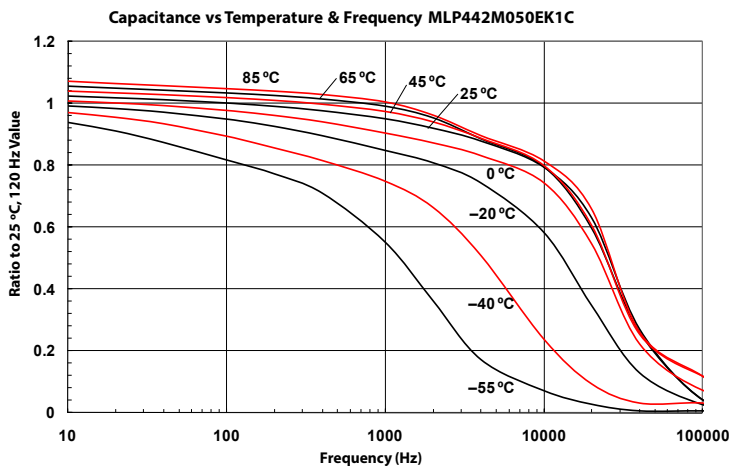
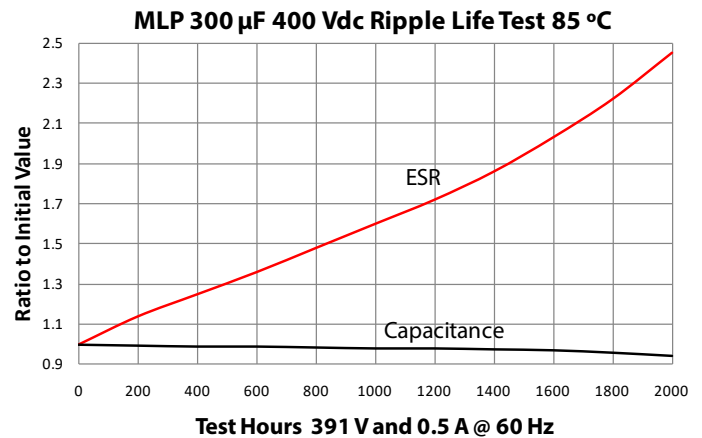
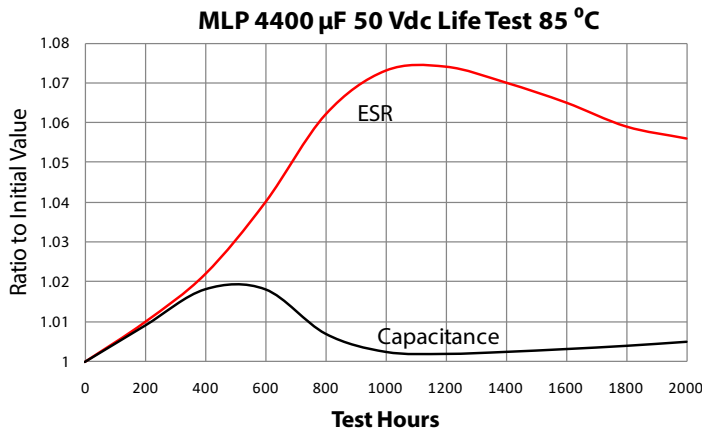
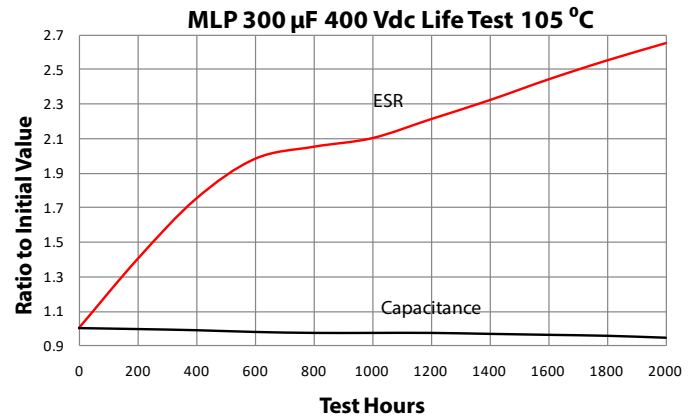
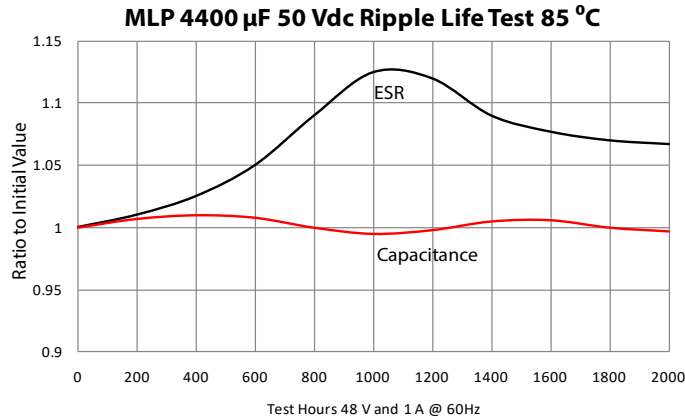
Ratings

Cap. (μF)	Catalog Part Number	ESR max 25 °C (mΩ)		Ripple (A) Case @ 85 °C		Length (Inches)
		120 Hz	20 kHz	120 Hz	20 kHz	
7.5 Vdc (10 Vdc Surge)						
19,000	MLP193M7R5EK0A	76	66	4.2	4.5	1.5
28,000	MLP283M7R5EA0A	50	44	5.8	6.2	2.0
47,000	MLP473M7R5EB0A	30	26	9.1	9.8	3.0
10 Vdc (13 Vdc Surge)						
17000	MLP173M010EK0A	77	67	4.2	4.5	1.5
26000	MLP263M010EA0A	51	45	5.8	6.1	2.0
43000	MLP433M010EB0A	30	27	9.0	9.6	3.0
16 Vdc (20 Vdc Surge)						
13000	MLP133M016EK0A	81	69	4.1	4.4	1.5
21000	MLP213M016EA0A	53	46	5.7	6.1	2.0
38000	MLP383M016EB0A	31	27	9.0	9.6	3.0
20 Vdc (25 Vdc Surge)						
9600	MLP962M020EK0A	84	69	4.0	4.4	1.5
14000	MLP143M020EA0A	56	46	5.5	6.1	2.0
24000	MLP243M020EB0A	33	27	8.7	9.6	3.0

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Typical Performance Curves



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<u>MLP473M7R5EB1A</u>	<u>MLP802M025EK1C</u>	<u>MLP102M200EB1C</u>	<u>MLP301M400EB1A</u>	<u>MLP562M035EK0A</u>
<u>MLP143M035EB0A</u>	<u>MLP561M300EB1C</u>	<u>MLP561M300EB1E</u>	<u>MLP332M080EB1A</u>	<u>MLP111M450EK0A</u>
<u>MLP102M200EB1A</u>	<u>MLP111M450EK1A</u>	<u>MLP111M450EK1C</u>	<u>MLP112M100EK0A</u>	<u>MLP112M100EK0D</u>
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<u>MLP113M050EB1C</u>	<u>MLP113M050EB1D</u>	<u>MLP121M400EK0B</u>	<u>MLP121M400EK1C</u>	<u>MLP131M400EK1A</u>
<u>MLP131M420EK0A</u>	<u>MLP131M420EK0C</u>	<u>MLP143M035EB1A</u>	<u>MLP143M035EB1C</u>	<u>MLP152M080EK0A</u>
<u>MLP152M080EK1A</u>	<u>MLP203M025EB0A</u>	<u>MLP203M025EB0D</u>	<u>MLP203M025EB1C</u>	<u>MLP221M300EK1A</u>
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<u>MLP272M100EB0D</u>	<u>MLP281M450EB0A</u>	<u>MLP281M450EB1A</u>	<u>MLP281M450EB1C</u>	<u>MLP331M250EK1A</u>
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<u>MLP331M420EB0A</u>	<u>MLP331M420EB0C</u>	<u>MLP331M420EB1D</u>	<u>MLP332M080EB0A</u>	<u>MLP332M080EB0C</u>
<u>MLP401</u>				