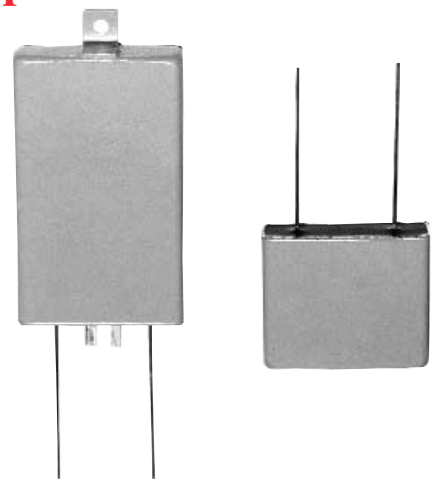
Type MLP 85 ºC Flatpack, Ultra-Long Life, Aluminum

Type MLP 85 °C



1/2-Inch Height, 50-Year Life

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 ºC. You can readily heatsink it to double the ripple-current capability. Ratings up to 250 V can operate at 75% of rated voltage up to 125 ºC if clamped or potted to prevent expanding beyond 1/2".

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
- New 2 inch case size

Specifications

Operating Temperature: –55 °C to +85 °C up to 250 Vdc, –40 °C to 85 °C 300 Vdc & up

Rated Voltage: 7.5 to 450 Vdc

Capacitance: 110 µF to 47,000 µF ±20%

Leakage Current: ≤ 0.002 CV µA @ 25 °C and 5 min

Cold Impedance: –55 ºC multiple of 25 ºC Z ≤ 4 for 7.5 V, 2 for 10 V to 250 V
–20 ºC multiple of 25 ºC Z ≤ 4 for 300 V and up

Ripple Current Multipliers:

Case Temperature

45 °C	55 °C	65 °C	75 °C	85 °C
3.79	3.32	2.77	2.08	1.00

Ambient Temperature, No Heatsink

45 °C	55 °C	65 °C	75 °C	85 °C
1.00	0.90	0.75	0.56	0.27

Frequency

	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

Load Life: 2,000 h @ +85 °C, Δ Capacitance ±10%,
ESR 200% of limit, DCL 100% of limit, height 0.5 in. max

Shelf Life: 500 h at 85 °C, capacitance, ESR and DCL, initial requirements.
Height 0.5 in max. Typical warehouse storage life is more then 25 years.

Thermal Resistance:

Large Sides Heatsinked	Case Length	1.5"	2.0"	3.0"
	Insulation	ºC/W	ºC/W	ºC/W
one	None	3.0	1.8	1.2
	Polyester	4.3	2.6	1.7
both	None	2.8	1.7	1.1
	Polyester	4.0	2.4	1.6

Vibration: 10 Hz to 2 kHz, 0.06" pp max and 10 g, MIL-STD-202, Meth. 204

ESL: <30 nH measured 1/4" from case at 1 MHz

Weight: Case EK 30g max.
Case EA 42 g max.
Case EB 66g max.

Terminals: 18 AWG copper wire with 60/40 tin-lead electroplate

Type MLP 85 ºC Flatpack, Ultra-Long Life, Aluminum

Specifications

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 is set by the maximum permissible internal core temperature, 88 ºC. 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 ºC case temperatures. For air temperatures without a heatsink use the multipliers Ambient Temperature, No Heatsink.

Heatsink Cooled. Temperature rise from the internal hottest spot, the core, to ambient air is:

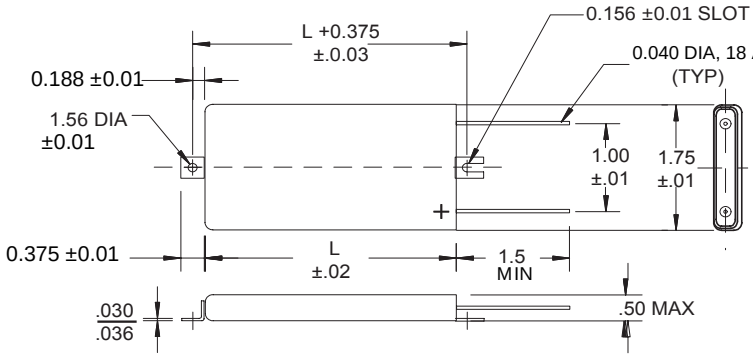
$$\Delta T = I^2(ESR)(\Theta cc + \Theta ca)$$

where Θcc is the thermal resistance from core to case and Θca from case to ambient. To calculate maximum ripple capability with the MLP attached to a heatsink use the maximum core temperature and the values for Θcc.

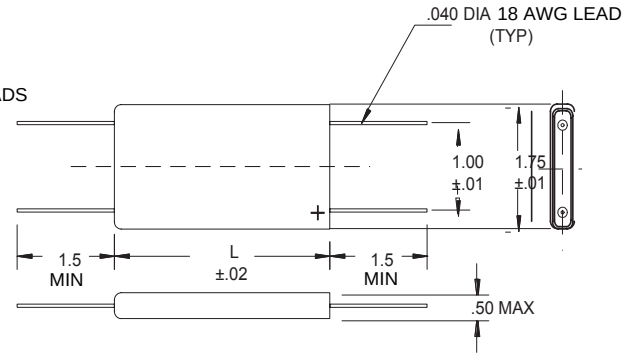
As an illustration, suppose you operate an insulated MLP332M080EK1C in 65 ºC air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 ºC/W. Use a good thermal grease between the MLP and the heatsink, and the total thermal resistance is 2.7 +1.7 or 4.4 ºC/W. The power which would heat the core to 88 ºC is (88-65)/4.4 or 4.75 W. For an ESR of 31 mΩ, 4.7 W equates to a ripple current of 12.3A.

Outline Drawings

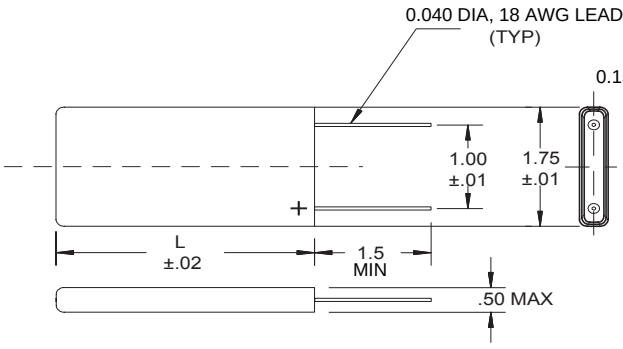
Style A: Mounting Tabs



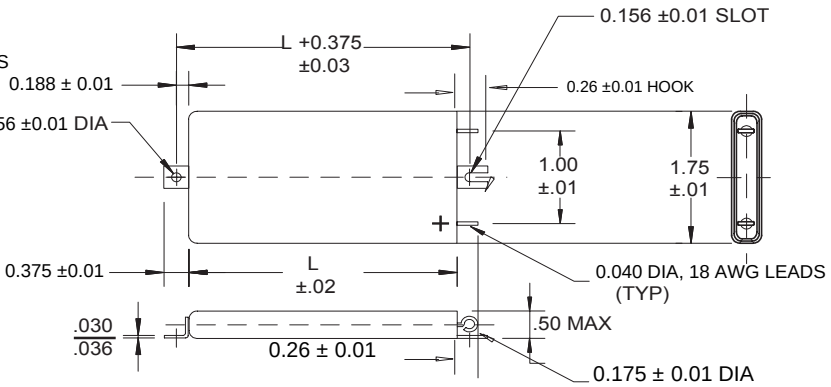
Style B: Four Leads



Style C: No Tabs



Style D: Hook Leads

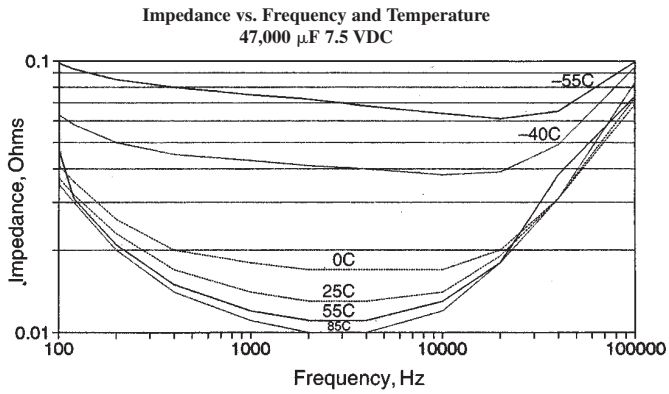


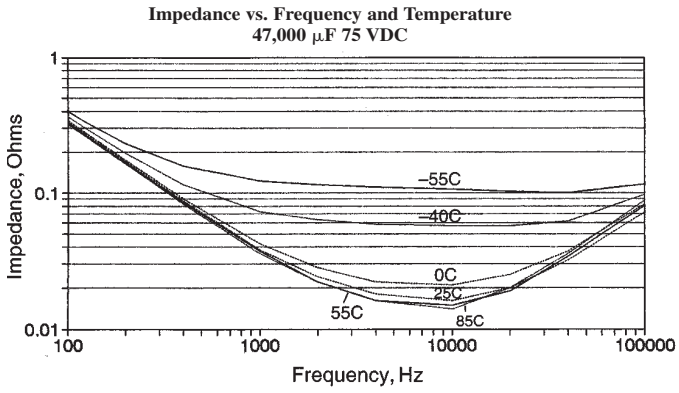
Case Code	Length L (in)	Weight (g)
EK	1.5	30
EA	2.0	42
EB	3.0	66

Part Numbering System

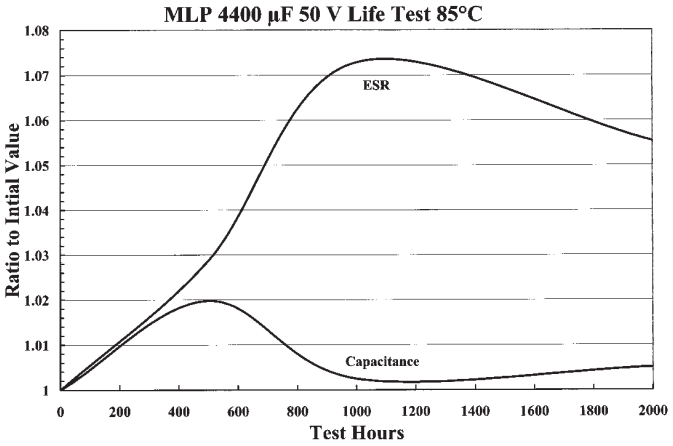
MLP	102	M	200	EB	O	A
Type	**Capacitance**	**Tolerance**	**Rated Voltage**	**Case Code**	**Insulation**	**Mounting Style**
MLP	**821**=820 µF **102** = 1000 µF	**M=**±20%	Vdc	**EK,** L=1.5 in. **EA**, L=2.0 in **EB**, L=3.0 in.	**0** = bare can **1** = polyester	**A =** mounting tabs **B** = four leads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

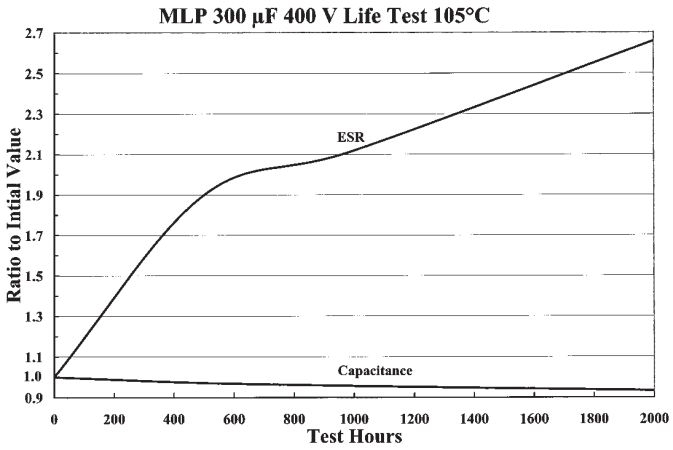
Typical Performance Curves

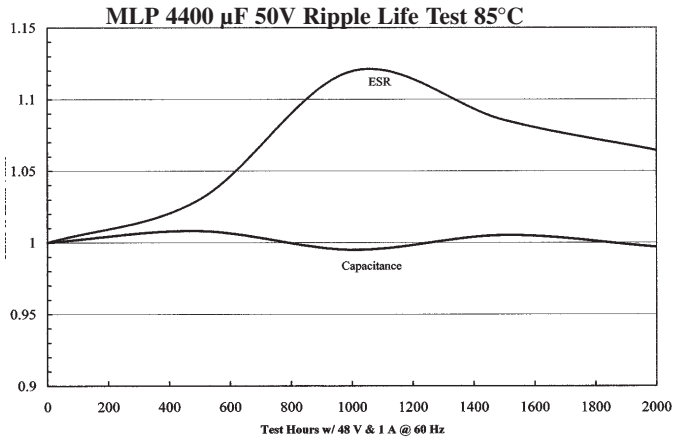


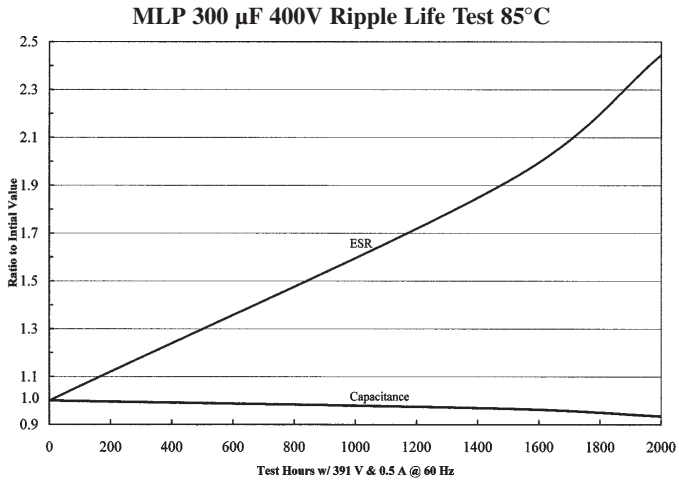


Note: Impedance measured at ends of leads.





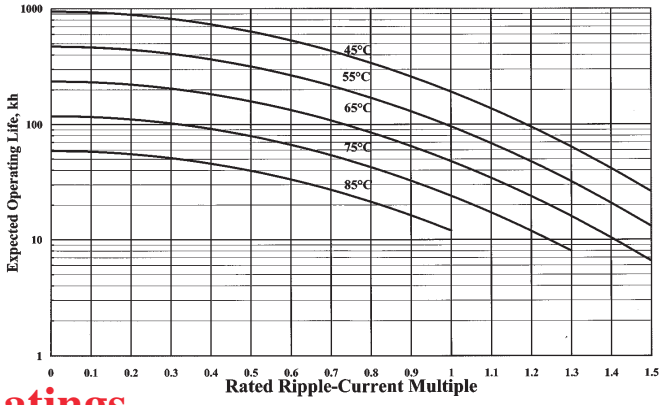




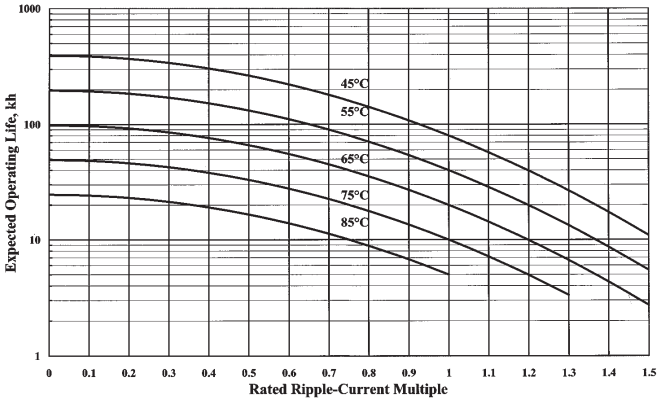
Type MLP 85 ºC Flatpack, Ultra-Long Life, Aluminum

Typical Performance Curves

Type MLP, Up to 250V, Operating Life in Kilohours vs Ripple Current



Type MLP, 300V and Up, Operating Life in Kilohours vs Ripple Current



Ratings

Cap. (µF)	Catalog Part Number	ESR max 25 ºC (mΩ) 120 Hz	ESR max 25 ºC (mΩ) 20 kHz	Ripple (A) Case @ 85 °C 120 Hz	Ripple (A) Case @ 85 °C 20 kHz	Length (Inches)
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
25 Vdc (30 Vdc Surge)						
8000	MLP802M025EK0A	87	69	3.9	4.4	1.5
12000	MLP123M025EA0A	57	46	5.5	6.1	2.0
20000	MLP203M025EB0A	34	27	8.6	9.6	3.0
35 Vdc (50 Vdc Surge)						
5600	MLP562M035EK0A	90	70	3.4	4.4	1.5
8400	MLP842M035EA0A	59	46	5.4	6.1	2.0
14000	MLP143M035EB0A	35	27	8.4	9.6	3.0
50 Vdc (63 Vdc Surge)						
4400	MLP442M050EK0A	97	70	3.7	4.4	1.5
6600	MLP662M050EA0A	62	46	5.2	6.1	2.0
11000	MLP113M050EB0A	36	27	8.3	9.6	3.0
63 Vdc (75 Vdc Surge)						
2200	MLP222M063EK0A	101	76	3.7	4.2	1.5
3300	MLP332M063EA0A	64	50	5.2	5.8	2.0
5600	MLP562M063EB0A	36	29	8.3	9.3	3.0
80 Vdc (100 Vdc Surge)						
1500	MLP152M080EK0A	106	77	3.6	4.2	1.5
2100	MLP212M080EA0A	72	52	4.9	5.7	2.0
3300	MLP332M080EB0A	44	31	7.5	9.0	3.0

Cap. (µF)	Catalog Part Number	ESR max 25 ºC (mΩ) 120 Hz	ESR max 25 ºC (mΩ) 20 kHz	Ripple (A) Case @ 85 °C 120 Hz	Ripple (A) Case @ 85 °C 20 kHz	Length (Inches)
100 Vdc (125 Vdc Surge)						
1100	MLP112M100EK0A	112	78	3.5	4.2	1.5
1600	MLP162M100EA0A	76	54	4.7	5.6	2.0
2700	MLP272M100EB0A	46	33	7.4	8.7	3.0
150 Vdc (180 Vdc Surge)						
500	MLP501M150EK0A	355	248	1.9	2.3	1.5
770	MLP771M150EA0A	238	166	2.7	3.2	2.0
1300	MLP132M150EB0A	143	100	4.2	5.0	3.0
200 Vdc (250 Vdc Surge)						
400	MLP401M200EK0A	388	253	1.9	2.3	1.5
600	MLP601M200EA0A	261	168	2.6	3.2	2.0
1000	MLP102M200EB0A	158	100	3.8	5.0	3.0
250 Vdc (300 Vdc Surge)						
330	MLP331M250EK0A	426	258	1.8	2.3	1.5
490	MLP491M250EA0A	285	172	2.4	3.1	2.0
820	MLP821M250EB0A	172	103	3.8	4.9	3.0
300 Vdc (350 Vdc Surge)						
220	MLP221M300EK0A	597	393	1.5	1.9	1.5
330	MLP331M300EA0A	399	262	2.1	2.5	2.0
560	MLP561M300EB0A	240	157	3.2	4.0	3.0
350 Vdc (400 Vdc Surge)						
150	MLP151M350EK0A	1000	734	1.2	1.4	1.5
220	MLP221M350EA0A	683	503	1.6	1.8	2.0
370	MLP371M350EB0A	420	310	2.3	2.8	3.0
400 Vdc (450 Vdc Surge)						
130	MLP131M400EK0A	1320	970	1.0	1.2	1.5
200	MLP201M400EA0A	882	648	1.4	1.6	2.0
330	MLP331M400EB0A	530	390	2.1	2.5	3.0
420 Vdc (475 Vdc Surge)						
130	MLP131M420EK0A	1320	970	1.0	1.2	1.5
200	MLP201M420EA0A	882	648	1.4	1.6	2.0
330	MLP331M420EB0A	530	390	2.1	2.5	3.0
450 Vdc (500 Vdc Surge)						
110	MLP111M450EK0A	1456	1190	0.96	1.1	1.5
170	MLP171M450EA0A	973	797	1.3	1.5	2.0
280	MLP281M450EB0A	585	480	2.0	2.3	3.0