

# Type MLS 125 °C Stainless Flatpack, Ultra-Long Life, Aluminum

## Type MLS 125 °C



The Type MLS extends the super performance of the MLP from a maximum operating temperature of 85 °C to 125 °C. While the MLP is inherently capable of operation at 125 °C, its flat aluminum case can't withstand the higher temperature without inflating from internal pressure. The MLS incorporates a rugged, stainless steel case which assures flatness to beyond 125 °C. The MLS is perfect for hi-rel military systems and applications operating above 85 °C.

### Highlights

- Near-hermetic welded seal
- Stainless-steel case
- 100 years expected operating life
- New 2 inch case size

### Specifications

**Operating Temperature:**

–55 °C to +125 °C

**Rated Voltage:**

5.0 to 250 Vdc

**Capacitance:**

220 to 47,000 µF ±20%

**Load Life:**

2,000 h @ +125 °C

**Leakage Current:**

0.002 CV µA @ 25 °C and 5 min

**Cold Impedance:**

–55 °C multiple of 25 °C Z is ≤ 10 for up to 20 V, 2 for 25 V to 250 V

**Ripple Current Multipliers:**

**Case Temperature**

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

**Ambient Temperature, No Heatsink**

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

**Frequency**

	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

**EIA Ripple Life:**

10,000 h full load at 85 C per EIA IS-749

Δ capacitance ±10%

ESR 200% of limit

DCL 100% of limit

**Shelf Life:**  
**Thermal Resistance:**

500 h at 125 °C, capacitance, ESR & DCL, initial requirements

Large Sides Heatsinked	Case Length	1.5"	2.0"	3.0"
	Insulation	°C/W	°C/W	°C/W
one	None	3.3	2.6	1.3
	Polyester	4.5	3.6	1.8
both	None	2.8	2.2	1.1
	Polyester	4	3.2	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 43 g typical

Case EA 76 g typical

Case EB 92 g typical

**Terminals:**

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



#### RoHS-5 Compliant

Has more than 1000 ppm lead in some homogenous material but otherwise complies with the EU Directive 2002/95/EC requirement restricting the use of Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent chromium (Cr(VI)), PolyBrominated Biphenyls (PBB) and PolyBrominated Diphenyl Ethers (PBDE).

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## Specifications

**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 Ambient Temperature, No Heatsink multipliers.

**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  $\Theta_{cc}$  is the thermal resistance from core to case and  $\Theta_{ca}$  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  $\Theta_{cc}$ .

As an illustration, suppose you operate an MLS332M060EB1C in 65 °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 MLS and the heatsink, and the total thermal resistance is 2.7 + 1.8 or 4.5 °C/W. The power which would heat the core to 125 °C is (125-65)/4.5 or 13.3 W. For an ESR of 31 mΩ, 13.3 W equates to a ripple current of 20.7A, however, the wire leads are rated for only 20 A.

## Outline Drawings

Style A: Mounting Tabs



Case Code	Length L (in)	Weight (g)
EK	1.5	43
EA	2.0	76
EB	3.0	92

Style C: Two Leads, No Tabs



Style D: Hook Leads



Note: The mounting tabs are at case potential and the negative lead connects to the case through the electrolyte.

## Part Numbering System

<b>MLS</b>	<b>821</b>	<b>M</b>	<b>200</b>	<b>EB</b>	<b>0</b>	<b>A</b>
Type	Capacitance	Tolerance	Rated Voltage	Case Code	Insulation	Mounting Style
MLS	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 C = two leads/no tabs D = hook leads/tabs

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## MLS102M150EB0D Life Test at 125 °C, 150 V



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## Typical Performance Curves



### Ratings

Cap ( $\mu$ F)	Catalog Part Number	ESR max 25 °C (m $\Omega$ )		Ripple (A) Case @ 85°C		Length (inches)
		120 Hz	20 kHz	120 Hz	20 kHz	
<b>5 Vdc (7.5 Vdc Surge) [105 °C: 7.5 Vdc (10 Vdc Surge)]</b>						
19,000	MLS193M5R0EK0C	76	66	12.6	13.6	1.5
28,000	MLS283M5R0EA0C	50	44	19.9	21.4	2.0
47,000	MLS473M5R0EB0C	30	26	32.0	34.4	3.0
<b>7.5 Vdc (10 Vdc Surge) [105 °C: 10 Vdc (13 Vdc Surge)]</b>						
17,000	MLS173M7R5EK0C	77	67	12.5	13.5	1.5
26,000	MLS263M7R5EA0C	51	45	19.8	21.1	2.0
43,000	MLS433M7R5EB0C	31	27	31.5	33.8	3.0
<b>10 Vdc (15 Vdc Surge) [105 °C: 16 Vdc (20 Vdc Surge)]</b>						
13,000	MLS133M010EK0C	81	69	12.2	13.3	1.5
23,000	MLS233M010EA0C	51	45	19.8	21.1	2.0
38,000	MLS383M010EB0C	31	27	31.5	33.8	3.0
<b>20 Vdc (30 Vdc Surge) [105 °C: 30 Vdc (40 Vdc Surge)]</b>						
6,800	MLS682M020EK0C	84	69	11.0	12.2	1.5
10,000	MLS103M020EA0C	56	46	13.6	15.0	2.0
17,000	MLS173M020EB0C	33	27	17.6	19.5	3.0
<b>40 Vdc (50 Vdc Surge) [105 °C: 50 Vdc (63 Vdc Surge)]</b>						
4,400	MLS442M040EK0C	97	70	10.3	12.1	1.5
6,600	MLS662M040EA0C	62	46	12.9	15.0	2.0
11,000	MLS113M040EB0C	36	27	16.9	19.5	3.0
<b>60 Vdc (75 Vdc Surge) [105 °C: 80 Vdc (100 Vdc Surge)]</b>						
1,500	MLS152M060EK0C	106	77	9.8	11.5	1.5

Cap ( $\mu$ F)	Catalog Part Number	ESR max 25 °C (m $\Omega$ )		Ripple (A) Case @ 85°C		Length (inches)
		120 Hz	20 kHz	120 Hz	20 kHz	
2,100	MLS212M060EA0C	72	52	11.9	14.1	2.0
3,300	MLS332M060EB0C	44	31	15.3	18.2	3.0
<b>75 Vdc (100 Vdc Surge) [105 °C: 100 Vdc (125 Vdc Surge)]</b>						
1,100	MLS112M075EK0C	112	78	9.6	11.5	1.5
1,600	MLS162M075EA0C	76	54	11.6	13.8	2.0
2,700	MLS272M075EB0C	46	33	14.9	17.6	3.0
<b>100 Vdc (125 Vdc Surge) [105 °C: 150 Vdc (180 Vdc Surge)]</b>						
500	MLS501M100EK0C	355	248	5.4	6.4	1.5
770	MLS771M100EA0C	238	166	6.6	7.8	2.0
1,300	MLS132M100EB0C	143	100	8.5	10.1	3.0
<b>150 Vdc (175 Vdc Surge) [105 °C: 200 Vdc (250 Vdc Surge)]</b>						
400	MLS401M150EK0C	388	253	5.1	6.4	1.5
600	MLS601M150EA0C	261	168	6.3	7.8	2.0
1,000	MLS102M150EB0C	158	100	8.1	10.1	3.0
<b>200 Vdc (225 Vdc Surge) [105 °C: 250 Vdc (300 Vdc Surge)]</b>						
330	MLS331M200EK0C	426	258	4.9	6.2	1.5
490	MLS491M200EA0C	285	172	6.0	7.7	2.0
820	MLS821M200EB0C	172	103	7.7	10.0	3.0
<b>250 Vdc (275 Vdc Surge) [105 °C: 250 Vdc (300 Vdc Surge)]</b>						
220	MLS221M250EK0C	597	393	4.1	5.1	1.5
330	MLS331M250EA0C	399	262	5.0	6.3	2.0
560	MLS561M250EB0C	240	157	6.5	8.1	3.0



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