

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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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 Θ_{cc} is the thermal resistance from core to case and Θ_{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 Θ_{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

| | | | | | | |
|------------|-----------------------------|-----------|---------------|---|-------------------------------|---|
| MLS | 821 | M | 200 | EB | O | A |
| 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 (μ F) | Catalog Part Number | ESR max 25 °C (m Ω) | | Ripple (A) Case @ 85°C | | Length (inches) |
|---|---------------------|--------------------------------|--------|---------------------------|--------|--------------------|
| | | 120 Hz | 20 kHz | 120 Hz | 20 kHz | |
| 5 Vdc (7.5 Vdc Surge) [105 °C: 7.5 Vdc (10 Vdc Surge)] | | | | | | |
| 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 |
| 7.5 Vdc (10 Vdc Surge) [105 °C: 10 Vdc (13 Vdc Surge)] | | | | | | |
| 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 |
| 10 Vdc (15 Vdc Surge) [105 °C: 16 Vdc (20 Vdc Surge)] | | | | | | |
| 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 |
| 20 Vdc (30 Vdc Surge) [105 °C: 30 Vdc (40 Vdc Surge)] | | | | | | |
| 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 |
| 40 Vdc (50 Vdc Surge) [105 °C: 50 Vdc (63 Vdc Surge)] | | | | | | |
| 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 |
| 60 Vdc (75 Vdc Surge) [105 °C: 80 Vdc (100 Vdc Surge)] | | | | | | |
| 1,500 | MLS152M060EK0C | 106 | 77 | 9.8 | 11.5 | 1.5 |

| Cap (μ F) | Catalog Part Number | ESR max 25 °C (m Ω) | | 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 |
| 75 Vdc (100 Vdc Surge) [105 °C: 100 Vdc (125 Vdc Surge)] | | | | | | |
| 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 |
| 100 Vdc (125 Vdc Surge) [105 °C: 150 Vdc (180 Vdc Surge)] | | | | | | |
| 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 |
| 150 Vdc (175 Vdc Surge) [105 °C: 200 Vdc (250 Vdc Surge)] | | | | | | |
| 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 |
| 200 Vdc (225 Vdc Surge) [105 °C: 250 Vdc (300 Vdc Surge)] | | | | | | |
| 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 |
| 250 Vdc (275 Vdc Surge) [105 °C: 250 Vdc (300 Vdc Surge)] | | | | | | |
| 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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