Type MLSG – Flatpack, 5000 hr@125 ºC, Aluminum Electrolytic

Available with High Vibration and High Reliability Options

With over 5000 hrs of DC life at rated voltage, 125°C, type MLSG is our longest life steel-cased Flatpack capacitor. For systems requiring the highest life expectancy, type MLSG is the best choice. Enhance the reliability of your system even further by specifying type HRMLSG for a MIL-level burn-in. This series is also available in a high vibration package up to 50g's by specifying type HVMLSG.

Highlights

- Longest Life
- Stainless-steel case
- Withstands more than 80,000 feet altitude
- Type HV up to 50g
- Type HR, High Reliability

Specifications

Temperature Range	–55 °C to +125 °C
Rated Voltage Range	20 Vdc to 250 Vdc
Capacitance Range	220 µF to 17,000 µF
Capacitance Tolerance	±20%
Leakage Current	≤ 0.002 CV µA, @ 25 °C and 5 mins.
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

Low Temperature Characteristics	Impedance ratio: $Z_{-55\,°C}/Z_{+25\,°C}$ @ 120 Hz ≤ 10 (5 - 60 Vdc) ≤ 2 (61 - 250 Vdc)
DC Life Test	5000 h at rated voltage &125 °C Δ Capacitance +/- 15% less than or equal to 60 Vdc Δ Capacitance +/- 10% greater than 60 Vdc ESR 200% of limit DCL 100% of limit
Shelf Life Test	500 h at 125 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit
Vibration *Mounting: Vibration capability is dependent upon mounting restraint. The optional welded mounting tabs, alone, are not capable of sustaining the high vibration levels.* *To achieve the high vibration levels as published on right, additional mounting restraint is required.*	MIL-STD-202, Meth. 204, Sine Swept, IEC 60068-2-6 Standard MLSG Flatpack: 10g Type HVMLSG Flatpack 1.5" and 2.0" case length, 50g Type HVMLSG Flatpack 2.5" and 3.0" case length, 30g

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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.

High Reliability Test/Burn-in

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.

Thermal Resistance

Large Sides Heatsinked	Case Length	1.5"	2.0"	3.0"
	Insulation	°C/W	°C/W	°C/W
one	None	4.3	3.1	2.0
	Polyester	4.7	3.4	2.2
both	None	2.8	2.0	1.3
	Polyester	3.0	2.2	1.4

ESL

≤30 nH measured 1/4" from case at 1 MHz

Weight

Case EK 48g typical
Case EA 63g typical
Case EH 78g typical
Case EB 93g typical

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 Ambient Temperature, No Heatsink.

Heatsink Cooled

Temperature rise from the internal hottest spot, the core, to ambient air is

$$\Delta T = I^2(ESR)(\theta cc + \theta ca), \text{ recommended max } \Delta T \text{ of } 30\ ^\circ C$$

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

Example

As an illustration, suppose you operate an insulated MLSG332M060EB1C 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 2.3 + 2.2 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 20.7 A, however, the wire leads are rated for only 20 A.

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Part Numbering System

HV	HR	MLSG	821	M	200	EB	0	A
Optional	**Optional**	**Type**	**Capacitance**	**Tolerance**	**Rated Voltage**	**Case Code**	**Insulation**	**Mounting Style**
High Vibration	**High Reliability**	**MLSG**	**821**=820 µF **102** = 1000 µF	**M=**±20%	Vdc	**EK,** L=1.5 in. **EA**, L=2.0 in. **EH**, L=2.5 in. **EB**, L=3.0 in. * other sizes available	**0** = bare can **1** = polyester	**A =** mounting tabs **C** = two leads/no tabs **D** = hook leads/tabs * other mounting tab options available

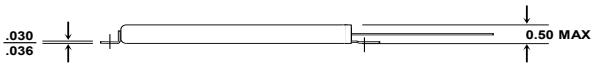
Examples:

Standard MLSG: MLSG821M200EB0C
High Reliability: HRMLSG821M200EB0C
High Vibration: HVMLSG821M200EB0C
High Reliability, High Vibration: HVHRMLSG821M200EB0C

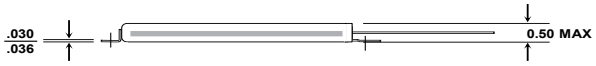
Outline Drawings

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

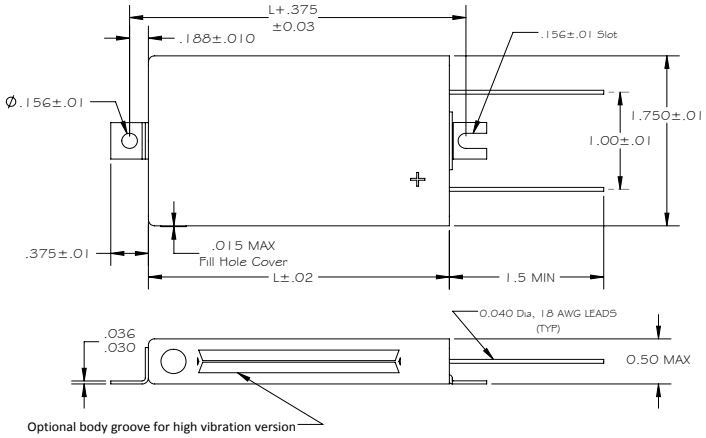
Standard Type MLSG



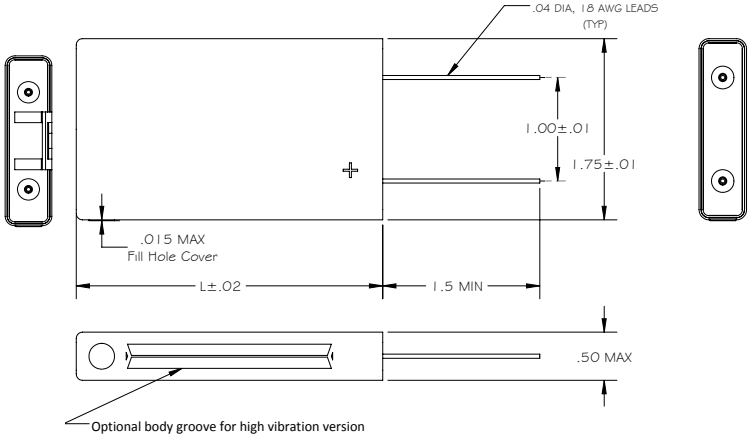
Type HV, Rilled Construction



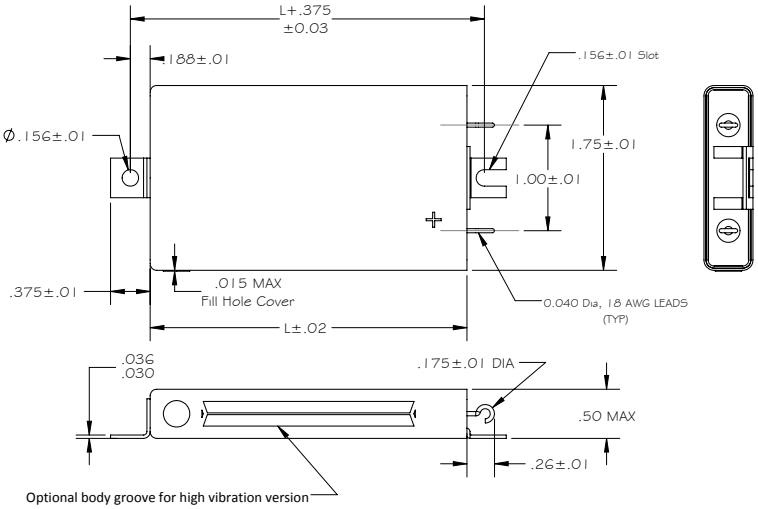
Style A: Mounting Tabs



Style C: No Tabs



Style D: Hook Leads



Mounting tabs are welded to the case.

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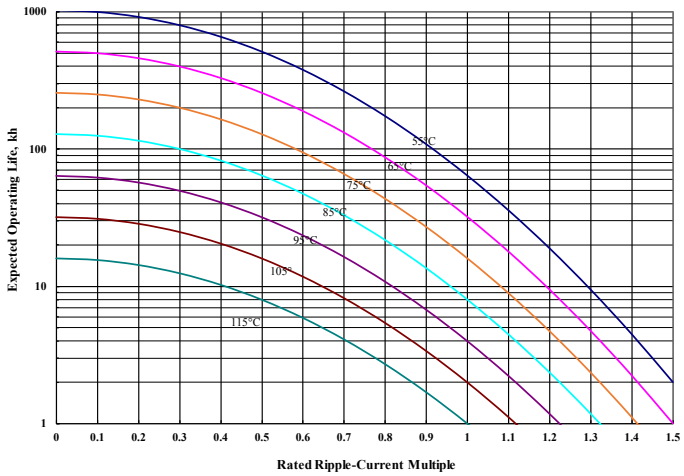
Ratings

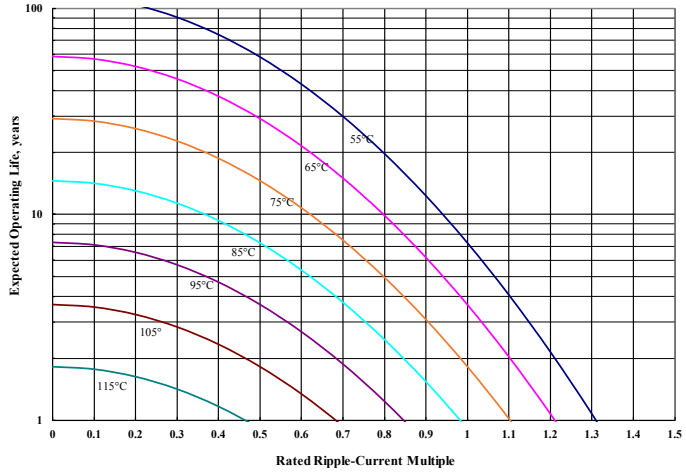
Voltage	Cap (µF)	Catalog Part Number	ESR max 25 °C (mΩ) 120 Hz	ESR max 25 °C (mΩ) 20 kHz	Ripple (A) Case @ 85°C 120 Hz	Ripple (A) Case @ 85°C 20 kHz	Length (inches)
20 Vdc @ 125 °C 24 Vdc @ 105 °C 30 Vdc Surge @ 25 °C	6,800	MLSG682M020EK0C	84	69	11	12.2	1.5
	17,000	MLSG173M020EB0A	33	27	17.6	19.5	3.0
40 Vdc @ 125 °C 48 Vdc @ 105 °C 60 Vdc Surge @ 25 °C	4,400	MLSG442M040EK0C	97	70	10.3	12.1	1.5
	6,300	MLSG632M040EA0A	62	46	12.9	15	2.0
	10,000	MLSG103M040EB0C	36	27	16.9	19.5	3.0
60 Vdc @ 125 °C 65 Vdc @ 105 °C 90 Vdc Surge @ 25 °C	1,500	MLSG152M060EK0A	106	77	9.8	11.5	1.5
	2,100	MLSG212M060EA0A	72	52	11.9	14.1	2.0
	3,300	MLSG332M060EB0C	44	31	15.3	18.2	3.0
100 Vdc @ 125 °C 120 Vdc @ 105 °C 150 Vdc Surge @ 25 °C	500	MLSG501M100EK0A	355	248	5.4	6.4	1.5
	770	MLSG771M100EA0C	238	166	6.6	7.8	2.0
	1,300	MLSG132M100EB0D	143	100	8.5	10.1	3.0
150 Vdc @ 125 °C 180 Vdc @ 105 °C 225 Vdc Surge @ 25 °C	360	MLSG361M150EK1A	388	253	5.1	6.4	1.5
	540	MLSG541M150EA1A	261	168	6.3	7.8	2.0
	900	MLSG901M150EB0C	158	100	8.1	10.1	3.0
200 Vdc @ 125 °C 250 Vdc @ 105 °C 300 Vdc Surge @ 25 °C	280	MLSG281M200EK1A	426	258	4.9	6.2	1.5
	400	MLSG401M200EA0A	285	172	6	7.7	2.0
	720	MLSG721M200EB0C	172	103	7.7	10	3.0
250 Vdc @ 125 °C 275 Vdc @ 105 °C 300 Vdc Surge @ 25 °C	220	MLSG221M250EK0C	597	393	4.1	5.1	1.5
	560	MLSG561M250EB0C	240	157	6.5	8.1	3.0

Typical Performance Curves

Type MLSG Operating Life in Kilohours vs Ripple Current



Type MLSG Operating Life in Years vs Ripple Current



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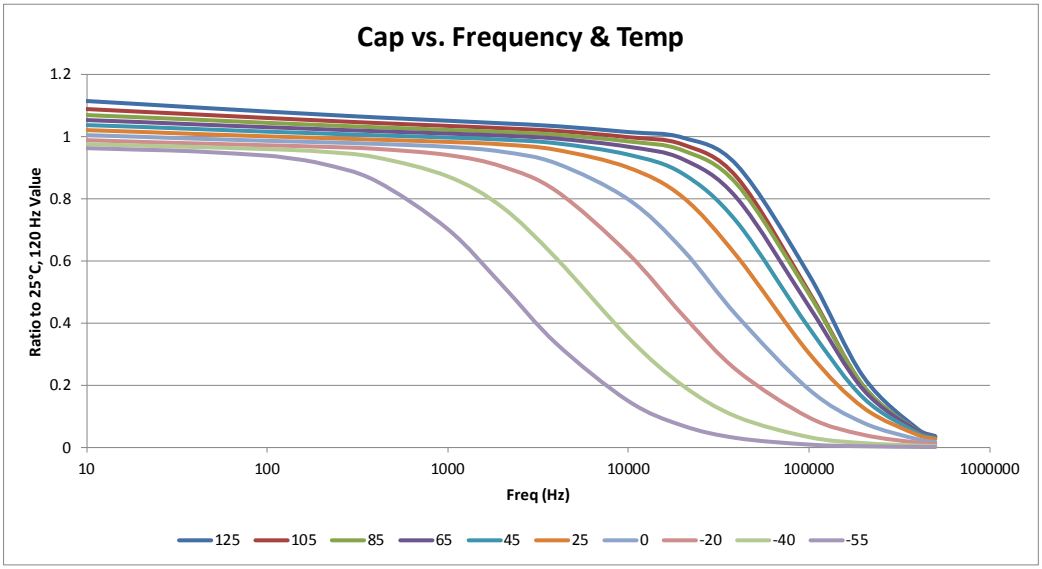

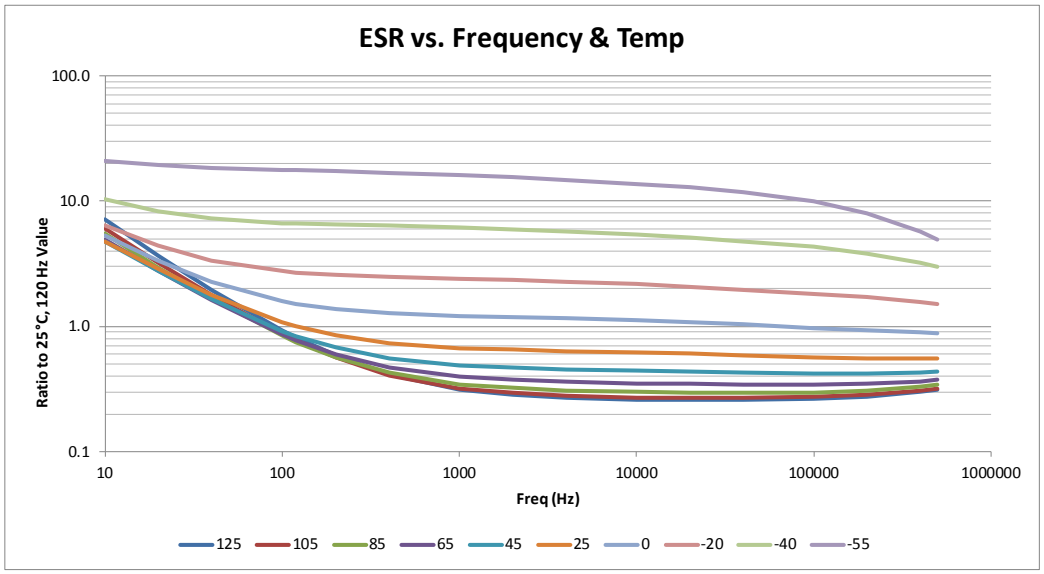

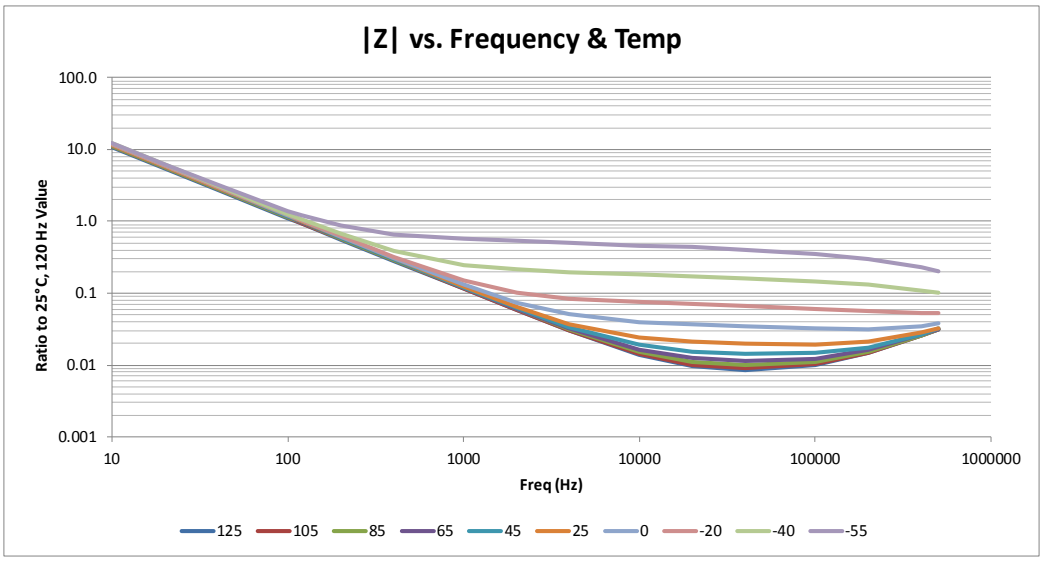

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