# Type MLSG – Slimpack, 5000 hr@125 ºC, Aluminum Electrolytic



With a profile of 1.0" by 0.5" type MLSG Slimpack capacitors fit into the tightest of spaces and meets a DC test of 5000 hrs at rated voltage, 125 ºC. MLSG Slimpack is a perfect fit for military and aerospace applications requiring a low profile, rugged design and long-life. Specify type HRMLSG for high reliability burn-in.

## Highlights

- 5000 hrs @ rated voltage, 125 °C
- Stainless steel case
- Withstands more than 80,000 feet altitude
- 80 g vibration
- Type HR, high reliability burn-in

## Specifications

| | |
|---|---|
| **Temperature Range** | –55 °C to +125 °C |
| **Rated Voltage Range** | 10 Vdc to 250 Vdc |
| **Capacitance Range** | 140 µF to 24,000 µF |
| **Capacitance Tolerance** | ±20% |
| **Leakage Current** | ≤ 0.002 CV µA, @ 25 °C and 5 mins. |
| **Ripple Current Multipliers** | Case Temperature<br>**45 °C** 1.41 / **55 °C** 1.32 / **65 °C** 1.22 / **75 °C** 1.12 / **85 °C** 1.00 / **95 °C** 0.87 / **105 °C** 0.71 / **115 °C** 0.50 / **125 °C** 0.00<br>Ambient Temperature, No Heatsink<br>**45 °C** 0.63 / **55 °C** 0.58 / **65 °C** 0.54 / **75 °C** 0.49 / **85 °C** 0.44 / **95 °C** 0.38 / **105 °C** 0.31 / **115 °C** 0.22 / **125 °C** 0.00<br>Frequency<br>**50 Hz** / **60 Hz** / **120 Hz** / **360 Hz** / **1 kHz** / **5 kHz** / **10 kHz & up**<br>**5 to 40 V** 0.95 / 0.96 / 1.00 / 1.03 / 1.04 / 1.04 / 1.04<br>**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<br>≤ 10 (5 - 20 Vdc)<br>≤ 2 (25 - 250 Vdc) |
| **DC Life Test** | 5000 h at rated voltage @ 125 °C<br>Δ Capacitance +/- 15% less than or equal to 60 Vdc<br>Δ Capacitance +/- 10% greater than 60 Vdc<br>ESR 200% of limit<br>DCL 100% of limit |
| **Shelf Life Test** | 500 h @ 125 °C<br>Capacitance 100% of limit<br>ESR 100% of limit<br>DCL 100% of limit |
| **Vibration**<br>*Mounting: Vibration capability is dependent upon mounting restraint.* | MIL-STD-202, Meth. 204, Sine Swept. IEC 60068-2-6<br>JK Case = 80g<br>All Others = 50g |

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|---|---|
| **Vibration Test** | **Level**<br>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.<br>**Amplitude**<br>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.<br>**Frequency Range**<br>The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.<br>**Sweep Time and Duration**<br>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** | |
| **ESL** | |
| **Typical Weight** | Case JK = 30<br>Case JA = 39<br>Case JH = 48<br>Case JB = 57 |
| **Terminals** | 18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max |
| **Case Material** | Stainless Steel |
| **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<br>$\Delta T = I^2(ESR)(\theta cc + \theta ca)$, recommended max $\Delta T$ of 30 °C<br>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 MLSG262M060JB0C in 95 °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 +3. 4 or 6.1° C/W. The power which would heat the core to 125 °C is (125 - 95)/6. 1 or 4.9 W. For an ESR of 47 mΩ, 4.9 W equates to a ripple current of 10.2 A. |

| Large Sides Heatsinked | Case Length | 1.5" | 2.0" | 2.5″ | 3.0" |
|---|---|---|---|---|---|
| | Insulation | °C/W | °C/W | °C/W | °C/W |
| one | None | 6.6 | 4.8 | 3.8 | 3.1 |
| | Polyester | 7.2 | 5.3 | 4.2 | 3.4 |
| both | None | 4.4 | 3.1 | 2.4 | 2 |
| | Polyester | 4.7 | 3.3 | 2.6 | 2.2 |

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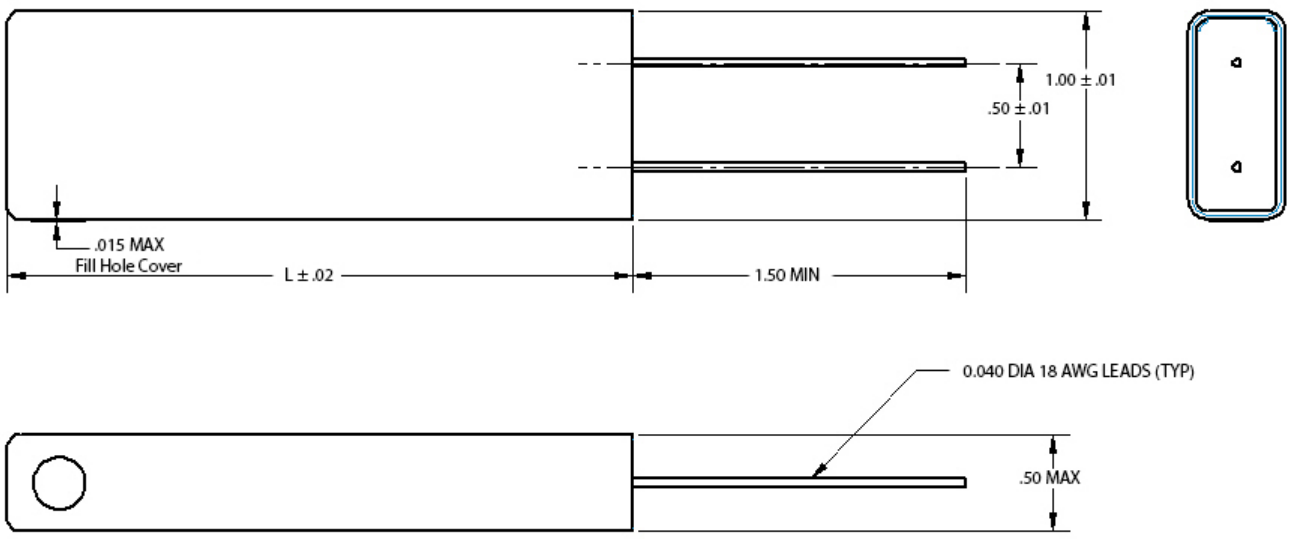
## Part Numbering System

| HR | MLSG | 821 | M | 200 | JB | 0 | A |
|---|---|---|---|---|---|---|---|
| **Optional** | **Type** | **Capacitance** | **Tolerance** | **Rated Voltage** | **Case Code** | **Insulation** | **Mounting Style** |
| **High Reliability** | **MLSG** | **191** = 190 µF<br>**102** = 1000 µF | **M=**±20% | 005 = 5 Vdc<br>7R5 = 7.5 Vdc<br>200 = 200 Vdc | **JK,** L=1.5 in.<br>**JA**, L=2.0 in<br>**JH**, L=2.5 in<br>**JB**, L=3.0 in.<br>* other sizes available | **0** = bare can<br>**1** = polyester | **C** = two leads |

**Examples:**
Standard MLSG: MLSG191M200JK0C
High Reliability: HRMLSG191M200JK0C

## Outline Drawing

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



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## Ratings

| | Cap | Part Number | Ω 120 Hz 25 ºC Cat. ESR | Ω 10 KHz 25 ºC Cat. ESR | Ripple (A) Case @ 85°C 120Hz | Ripple (A) Case @ 85°C 10kHz | Surge 25 ºC Vdc | Case Length | 105 ºC Vdc |
|---|---|---|---|---|---|---|---|---|---|
| **10 Vdc @ 125 °C**<br>12 Vdc @ 105 °C<br>15 Vdc Surge @ 25 °C | 9500 | MLSG952M010JK0C | 0.096 | 0.091 | 6.9 | 7.1 | 15 | 1.5 | 12 |
| | 14000 | MLSG143M010JA0C | 0.068 | 0.064 | 9.8 | 10 | 15 | 2 | 12 |
| | 19000 | MLSG193M010JH0C | 0.053 | 0.050 | 12.6 | 12.9 | 15 | 2.5 | 12 |
| | 24000 | MLSG243M010JB0C | 0.042 | 0.040 | 15.4 | 15.8 | 15 | 3 | 12 |
| **20 Vdc @ 125 °C**<br>24 Vdc @ 105 °C<br>30 Vdc Surge @ 25 °C | 4600 | MLSG462M020JK0C | 0.102 | 0.097 | 6.6 | 6.8 | 30 | 1.5 | 24 |
| | 6800 | MLSG682M020JA0C | 0.072 | 0.068 | 9.4 | 9.7 | 30 | 2 | 24 |
| | 9300 | MLSG932M020JH0C | 0.054 | 0.052 | 12.3 | 12.6 | 30 | 2.5 | 24 |
| | 11000 | MLSG113M020JB0C | 0.042 | 0.040 | 15.2 | 15.6 | 30 | 3 | 24 |
| **30 Vdc @ 125 °C**<br>36 Vdc @ 105 °C<br>45 Vdc Surge @ 25 °C | 3300 | MLSG332M030JK0C | 0.103 | 0.098 | 6.6 | 6.8 | 45 | 1.5 | 36 |
| | 4900 | MLSG492M030JA0C | 0.072 | 0.069 | 9.5 | 9.7 | 45 | 2 | 36 |
| | 6700 | MLSG672M030JH0C | 0.055 | 0.053 | 12.3 | 12.6 | 45 | 2.5 | 36 |
| | 8500 | MLSG852M030JB0C | 0.043 | 0.041 | 14.9 | 15.3 | 45 | 3 | 36 |
| **40 Vdc @ 125 °C**<br>48 Vdc @ 105 °C<br>60 Vdc Surge @ 25 °C | 2300 | MLSG232M040JK0C | 0.105 | 0.100 | 6.6 | 6.8 | 60 | 1.5 | 48 |
| | 3400 | MLSG342M040JA0C | 0.072 | 0.068 | 9.5 | 9.7 | 60 | 2 | 48 |
| | 4600 | MLSG462M040JH0C | 0.056 | 0.053 | 12.3 | 12.6 | 60 | 2.5 | 48 |
| | 5900 | MLSG592M040JB0C | 0.045 | 0.043 | 14.9 | 15.3 | 60 | 3 | 48 |
| **50 Vdc @ 125 °C**<br>60 Vdc @ 105 °C<br>75 Vdc Surge @ 25 °C | 1600 | MLSG162M050JK0C | 0.108 | 0.101 | 6.6 | 6.8 | 75 | 1.5 | 60 |
| | 2500 | MLSG252M050JA0C | 0.073 | 0.700 | 9.5 | 9.7 | 75 | 2 | 60 |
| | 3400 | MLSG342M050JH0C | 0.056 | 0.053 | 12.3 | 12.6 | 75 | 2.5 | 60 |
| | 4300 | MLSG432M050JB0C | 0.046 | 0.043 | 14.9 | 15.3 | 75 | 3 | 60 |
| **60 Vdc @ 125 °C**<br>60 Vdc @ 105 °C<br>90 Vdc Surge @ 25 °C | 1000 | MLSG102M060JK0C | 0.109 | 0.103 | 6.5 | 6.6 | 90 | 1.5 | 72 |
| | 1500 | MLSG152M060JA0C | 0.074 | 0.071 | 9.3 | 9.6 | 90 | 2 | 72 |
| | 2100 | MLSG212M060JH0C | 0.057 | 0.054 | 12.1 | 12.4 | 90 | 2.5 | 72 |
| | 2600 | MLSG262M060JB0C | 0.047 | 0.044 | 14.7 | 15 | 90 | 3 | 72 |
| **75 Vdc @ 125 °C**<br>90 Vdc @ 105 °C<br>112 Vdc Surge @ 25 °C | 790 | MLSG791M075JK0C | 0.246 | 0.234 | 4.0 | 4.2 | 112.5 | 1.5 | 90 |
| | 1100 | MLSG112M075JA0C | 0.200 | 0.190 | 5.0 | 5.2 | 112.5 | 2 | 90 |
| | 1500 | MLSG152M075JH0C | 0.148 | 0.141 | 6.2 | 6.5 | 112.5 | 2.5 | 90 |
| | 2000 | MLSG202M075JB0C | 0.096 | 0.091 | 8.2 | 8.5 | 112.5 | 3 | 90 |
| **100 Vdc @ 125 °C**<br>120 Vdc @ 105 °C<br>150 Vdc Surge @ 25 °C | 400 | MLSG401M100JK0C | 0.960 | 0.768 | 2 | 2.4 | 150 | 1.5 | 120 |
| | 600 | MLSG601M100JA0C | 0.634 | 0.507 | 2.8 | 3.6 | 150 | 2 | 120 |
| | 800 | MLSG801M100JH0C | 0.484 | 0.387 | 3.6 | 4.6 | 150 | 2.5 | 120 |
| | 1000 | MLSG102M100JB0C | 0.387 | 0.310 | 4.4 | 5.7 | 150 | 3 | 120 |
| **150 Vdc @ 125 °C**<br>180 Vdc @ 105 °C<br>225 Vdc Surge @ 25 °C | 200 | MLSG201M150JK0C | 0.960 | 0.768 | 2 | 2.4 | 225 | 1.5 | 180 |
| | 300 | MLSG301M150JA0C | 0.634 | 0.507 | 2.8 | 3.6 | 225 | 2 | 180 |
| | 400 | MLSG401M150JH0C | 0.484 | 0.387 | 3.6 | 4.6 | 225 | 2.5 | 180 |
| | 500 | MLSG501M150JB0C | 0.387 | 0.310 | 4.4 | 5.7 | 225 | 3 | 180 |
| **200 Vdc @ 125 °C**<br>250 Vdc @ 105 °C<br>300 Vdc Surge @ 25 °C | 190 | MLSG191M200JK0C | 1.274 | 1.019 | 1.9 | 2.1 | 300 | 1.5 | 250 |
| | 280 | MLSG281M200JA0C | 0.845 | 0.676 | 2.8 | 3.1 | 300 | 2 | 250 |
| | 380 | MLSG381M200JH0C | 0.634 | 0.508 | 3.6 | 4.1 | 300 | 2.5 | 250 |
| | 490 | MLSG491M200JB0C | 0.507 | 0.406 | 4.4 | 5 | 300 | 3 | 250 |
| **250 Vdc @ 125 °C**<br>275 Vdc @ 105 °C<br>350 Vdc Surge @ 25 °C | 140 | MLSG141M250JK0C | 1.200 | 0.960 | 1.9 | 2.2 | 350 | 1.5 | 300 |
| | 220 | MLSG221M250JA0C | 0.792 | 0.634 | 2.9 | 3.2 | 350 | 2 | 300 |
| | 300 | MLSG301M250JH0C | 0.605 | 0.484 | 3.7 | 4.2 | 350 | 2.5 | 300 |
| | 380 | MLSG381M250JB0C | 0.484 | 0.387 | 4.5 | 5.1 | 350 | 3 | 300 |

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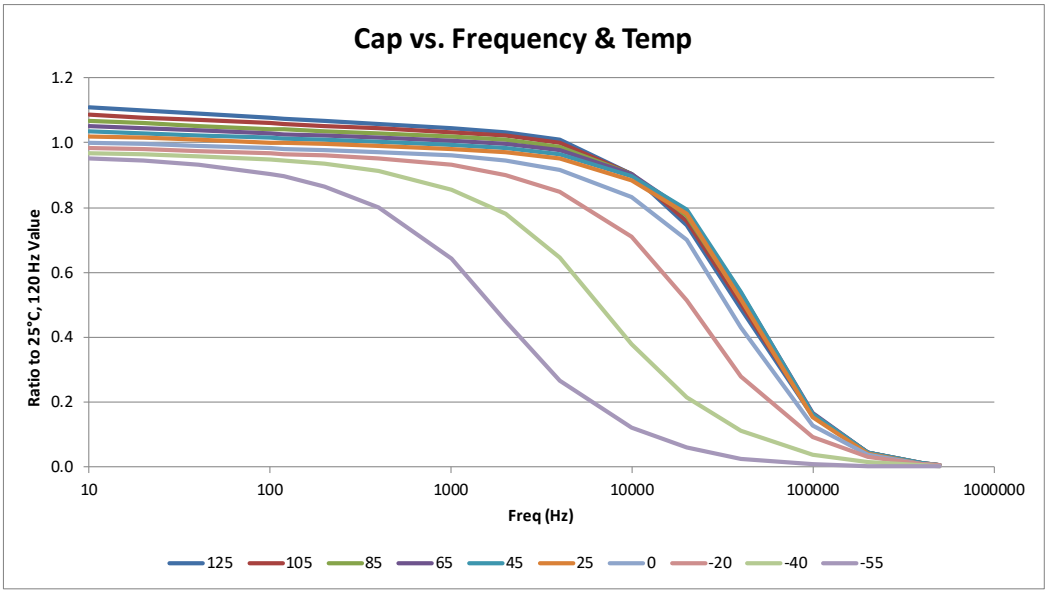
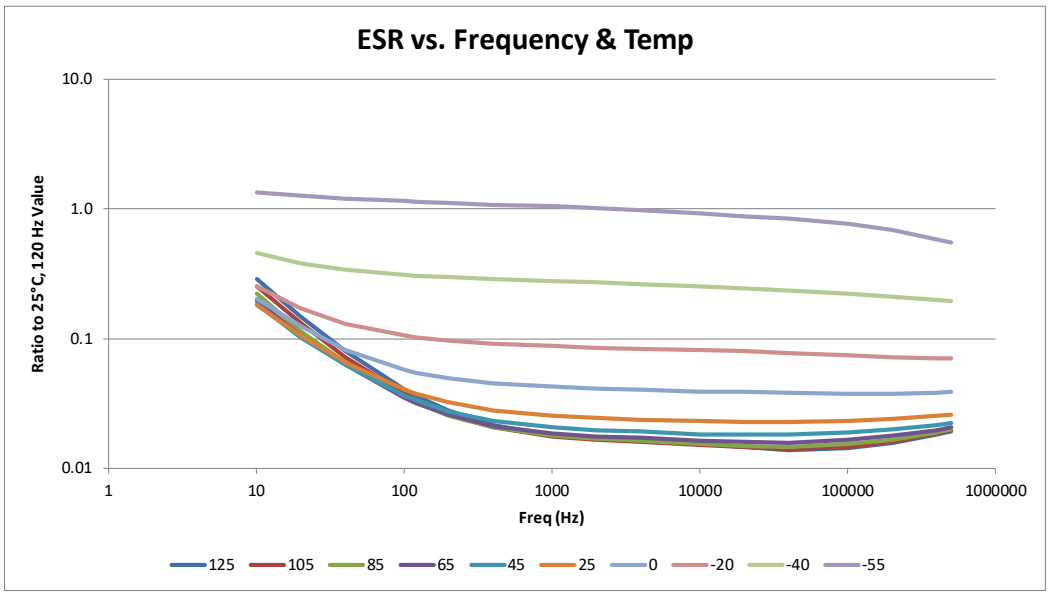
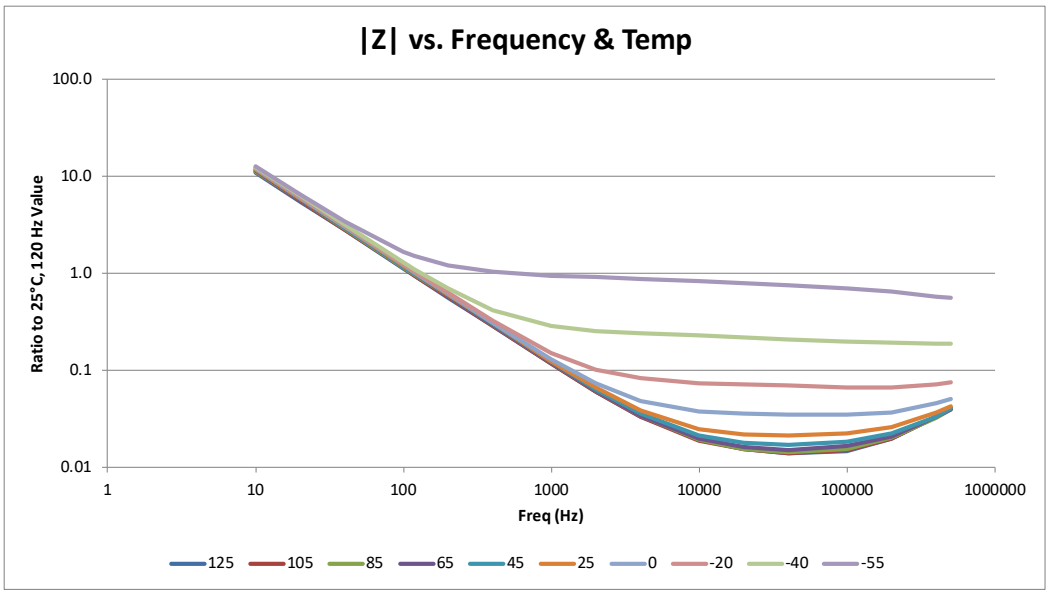
## Typical Performance Curves

**Part # MLSG122M060JKOC**



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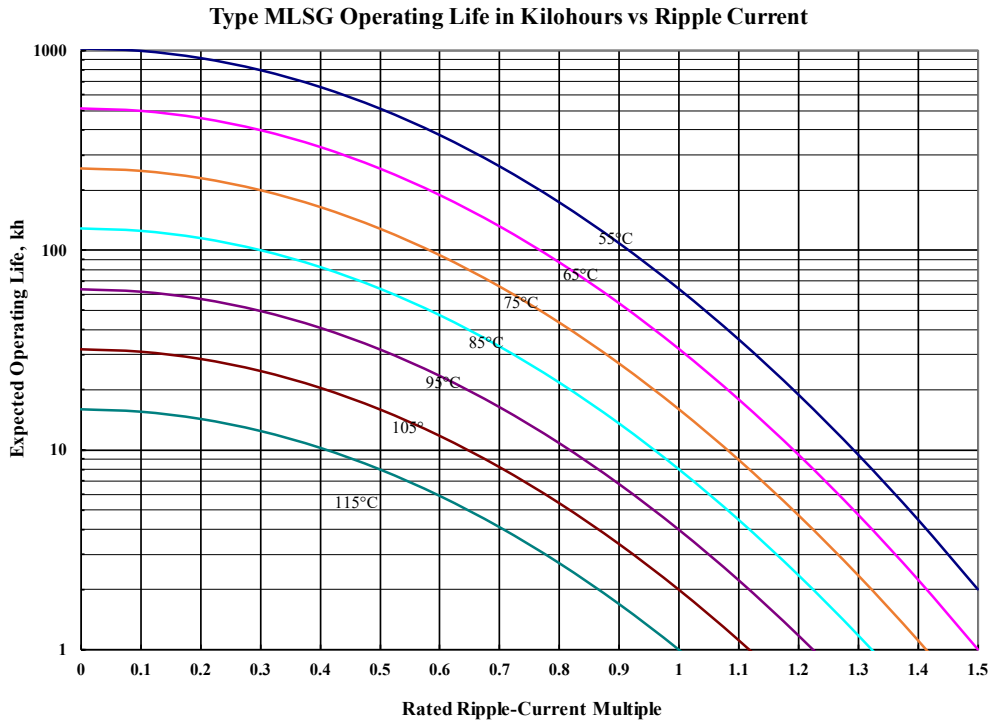


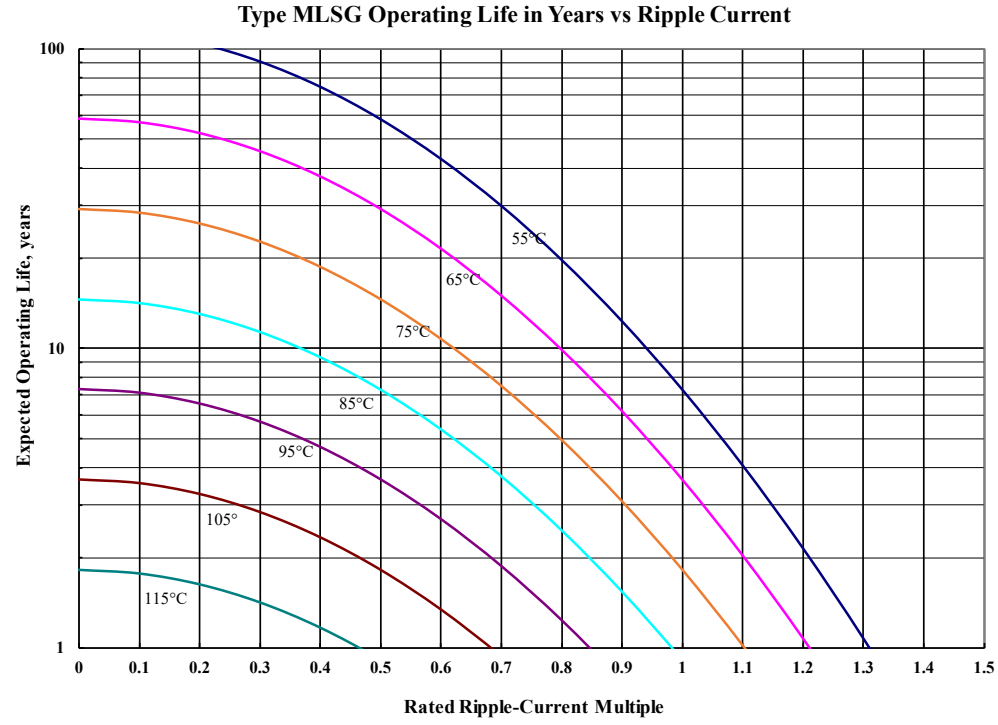

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