

## Low-Profile Aluminum Electrolytic



With exceptional 10,000 hr. life and offering high energy density in a low profile, Type CLS allows for compact, high reliability power supply designs. Able to withstand 80,000 feet altitude. Further the reliability of your system by specifying type HRCLS for a MIL-level burn-in. Demand our high vibration (HVCLS) version package that withstands up to 30g's.

### Highlights

- High Energy Density Flatpack™
- Highest Capacitance Flatpack™
- High Ripple Current
- 10,000 hours (at rated load life)
- High Reliability

### Specifications

| Temperature Range                                               | -55°C to 105°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |      |      |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
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| Rated Voltage Range                                             | 10 Vdc to 300 Vdc                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Capacitance Range                                               | 150 µF to 83,000 µF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |      |      |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Capacitance Tolerance                                           | ±20%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |      |      |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Leakage Current                                                 | ≤ 0.004 × C × V microamps for C in microfarads and V in volts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |      |      |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Ripple Current Multipliers                                      | <div><div>Frequency</div><div>Frequency (Hz)</div><table><tr><th>Vdc</th><th>50</th><th>60</th><th>120</th><th>400</th><th>1000</th><th>10000</th></tr><tr><td>0-50</td><td>0.85</td><td>0.85</td><td>1.00</td><td>1.05</td><td>1.06</td><td>1.10</td></tr><tr><td>51-90</td><td>0.79</td><td>0.80</td><td>1.00</td><td>1.08</td><td>1.15</td><td>1.20</td></tr><tr><td>91-249</td><td>0.75</td><td>0.76</td><td>1.00</td><td>1.13</td><td>1.30</td><td>1.35</td></tr><tr><td>250-300</td><td>0.70</td><td>0.72</td><td>1.00</td><td>1.12</td><td>1.35</td><td>1.41</td></tr></table><div>Ambient Temperature (Natural Convection, No Heatsink)</div><div>Ambient Temperature (°C)</div><table><tr><th>Vdc</th><th>45</th><th>55</th><th>65</th><th>75</th><th>85</th><th>95</th><th>105</th></tr><tr><td>0-50</td><td>2.30</td><td>2.20</td><td>2.10</td><td>1.90</td><td>1.70</td><td>1.40</td><td>1.00</td></tr><tr><td>51-90</td><td>2.40</td><td>2.30</td><td>2.15</td><td>1.95</td><td>1.70</td><td>1.35</td><td>1.00</td></tr><tr><td>91-249</td><td>2.55</td><td>2.40</td><td>2.20</td><td>2.00</td><td>1.74</td><td>1.40</td><td>1.00</td></tr><tr><td>250-300</td><td>2.35</td><td>2.25</td><td>2.10</td><td>1.95</td><td>1.70</td><td>1.40</td><td>1.00</td></tr></table><div>Airflow Velocity (No Heatsink)</div><table><tr><td>Airflow velocity (No heatsink)<br/>Natural convection ≈ 0.25 m/s</td><td>0.25</td><td>1.00</td><td>2.50</td><td>5.00</td></tr><tr><td>Ripple Current Multiplier (Bare Case)</td><td>1.00</td><td>1.18</td><td>1.37</td><td>1.52</td></tr><tr><td>Ripple Current Multiplier (PE Sleeved)</td><td>1.00</td><td>1.16</td><td>1.35</td><td>1.50</td></tr></table></div> | Vdc  | 50   | 60   | 120  | 400   | 1000 | 10000 | 0-50 | 0.85 | 0.85 | 1.00 | 1.05 | 1.06 | 1.10 | 51-90 | 0.79 | 0.80 | 1.00 | 1.08 | 1.15 | 1.20 | 91-249 | 0.75 | 0.76 | 1.00 | 1.13 | 1.30 | 1.35 | 250-300 | 0.70 | 0.72 | 1.00 | 1.12 | 1.35 | 1.41 | Vdc | 45 | 55 | 65 | 75 | 85 | 95 | 105 | 0-50 | 2.30 | 2.20 | 2.10 | 1.90 | 1.70 | 1.40 | 1.00 | 51-90 | 2.40 | 2.30 | 2.15 | 1.95 | 1.70 | 1.35 | 1.00 | 91-249 | 2.55 | 2.40 | 2.20 | 2.00 | 1.74 | 1.40 | 1.00 | 250-300 | 2.35 | 2.25 | 2.10 | 1.95 | 1.70 | 1.40 | 1.00 | Airflow velocity (No heatsink)<br>Natural convection ≈ 0.25 m/s | 0.25 | 1.00 | 2.50 | 5.00 | Ripple Current Multiplier (Bare Case) | 1.00 | 1.18 | 1.37 | 1.52 | Ripple Current Multiplier (PE Sleeved) | 1.00 | 1.16 | 1.35 | 1.50 |
| Vdc                                                             | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 60   | 120  | 400  | 1000 | 10000 |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| 0-50                                                            | 0.85                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.85 | 1.00 | 1.05 | 1.06 | 1.10  |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| 51-90                                                           | 0.79                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.80 | 1.00 | 1.08 | 1.15 | 1.20  |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| 91-249                                                          | 0.75                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.76 | 1.00 | 1.13 | 1.30 | 1.35  |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| 250-300                                                         | 0.70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.72 | 1.00 | 1.12 | 1.35 | 1.41  |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Vdc                                                             | 45                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 55   | 65   | 75   | 85   | 95    | 105  |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| 0-50                                                            | 2.30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2.20 | 2.10 | 1.90 | 1.70 | 1.40  | 1.00 |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| 51-90                                                           | 2.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2.30 | 2.15 | 1.95 | 1.70 | 1.35  | 1.00 |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| 91-249                                                          | 2.55                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2.40 | 2.20 | 2.00 | 1.74 | 1.40  | 1.00 |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| 250-300                                                         | 2.35                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2.25 | 2.10 | 1.95 | 1.70 | 1.40  | 1.00 |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Airflow velocity (No heatsink)<br>Natural convection ≈ 0.25 m/s | 0.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1.00 | 2.50 | 5.00 |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Ripple Current Multiplier (Bare Case)                           | 1.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1.18 | 1.37 | 1.52 |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Ripple Current Multiplier (PE Sleeved)                          | 1.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1.16 | 1.35 | 1.50 |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Typical Ripple Current Capability                               | The typical ripple current capability is set by the maximum permissible internal core temperature, maximum lead current capability of 20 Arms, and a maximum 20°C core rise (Not heatsinked), the maximum peak voltage including ripple voltage applied continuously between the terminals is less than the rated voltage of the capacitor. In addition, the user should ensure that the peak-to-peak capacitor voltage divided by the capacitor's rated voltage V <sub>R</sub> should not exceed the greater of 10% or 0.01352 × (VDC Rated / 1[VDC]) <sup>1/2</sup> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |      |      |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Terminals - Lead Free Version Available                         | CLS: Copper wire with 60/40 tin/lead electroplate, 20 amps max<br>CLSR: Copper wire with bright tin electroplate, 20 amps max                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |      |      |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |
| Case Material                                                   | Stainless Steel: 316L or 304                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |      |      |      |       |      |       |      |      |      |      |      |      |      |       |      |      |      |      |      |      |        |      |      |      |      |      |      |         |      |      |      |      |      |      |     |    |    |    |    |    |    |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |        |      |      |      |      |      |      |      |         |      |      |      |      |      |      |      |                                                                 |      |      |      |      |                                       |      |      |      |      |                                        |      |      |      |      |

## Low-Profile Aluminum Electrolytic

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| <b>Low Temperature Characteristics</b> | $(Z_{-55^{\circ}\text{C}}/Z_{+25^{\circ}\text{C}} @120 \text{ Hz})$<br>$\leq 50 \text{ Vdc}, Z < 10X$ , Capacitance loss < 30%<br>$51 - 300 \text{ Vdc}, Z < 3.6X$ , Capacitance loss < 30%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Endurance Life Test</b>             | 10,000 Hours 105°C At Rated Ripple Load, with rated ripple current applied with rated voltage<br>$\Delta$ Capacitance $\pm 10\%$<br>ESR < 1.5X Catalog Limit<br>DCL $\leq 0.004 \text{ CV } \mu\text{A}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Shelf Life Test</b>                 | Up to 5 years $\leq 40^{\circ}\text{C}$ , 500 hours $\leq 105^{\circ}\text{C}$<br>Capacitance Inside Catalog Tolerance<br>ESR < Catalog Limit<br>DCL $\leq 0.004 \text{ CV } \mu\text{A}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Vibration</b>                       | <p><b>Amplitude</b><br/> The specimens shall be subjected to a simple harmonic motion with the double amplitude or acceleration max levels noted below, whichever is less.</p> <p><b>Acceleration Level</b><br/> 10 g (peak) - Non HV (High Vibration) part numbers, 30 g (peak) - for HV part numbers, HV may not be available on all sizes.</p> <p><b>Displacement Level</b><br/> 0.06-inch double amplitude (maximum total excursion).</p> <p><b>Frequency Range</b><br/> The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p><b>Sweep Time &amp; Duration</b><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.</p> <p><b>Mounting</b><br/> Vibration capability is dependent upon mounting restraint. The optional mounting pins, alone, are not capable of sustaining the high vibration levels. Additional mounting restraint may be required.</p> |
| <b>High Reliability Test/Burn-In</b>   | Established reliability HRCLS capacitors shall be subjected to a minimum of 100 percent of the dc rated voltage at 105°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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## Low-Profile Aluminum Electrolytic

| Heatsinked Ripple Current                                           | <div>Thermal Resistance <math>\theta_{CHS}</math> Core to Heatsink (°C/W) by Case Length "L"</div> <table><tr><th colspan="2"></th><th>Code Length</th><th>_K</th><th>_A</th><th>_H</th><th>_B</th></tr><tr><th>Number of Sides<br/>Heatsinked</th><th>Code</th><th>Length (in)</th><td>1.5</td><td>2</td><td>2.5</td><td>3</td></tr><tr><td rowspan="4">One Large Side<br/>Heat Sinked<br/><br/>Two Large Sides<br/>Heat Sinked</td><td rowspan="4">J_</td><td>Bare can</td><td>6.31</td><td>4.82</td><td>3.91</td><td>3.29</td></tr><tr><td>Polyester</td><td>7.34</td><td>5.25</td><td>4.95</td><td>3.80</td></tr><tr><td>Bare can</td><td>4.09</td><td>3.07</td><td>2.45</td><td>2.04</td></tr><tr><td>Polyester</td><td>4.63</td><td>3.47</td><td>2.78</td><td>2.31</td></tr><tr><td rowspan="4">One Large Side<br/>Heat Sinked<br/><br/>Two Large Sides<br/>Heat Sinked</td><td rowspan="4">E_</td><td>Bare can</td><td>4.03</td><td>3.08</td><td>2.50</td><td>2.11</td></tr><tr><td>Polyester</td><td>4.62</td><td>3.52</td><td>2.86</td><td>2.40</td></tr><tr><td>Bare can</td><td>2.57</td><td>1.93</td><td>1.55</td><td>1.29</td></tr><tr><td>Polyester</td><td>2.87</td><td>2.15</td><td>1.72</td><td>1.44</td></tr></table> |             |      | Code Length | _K   | _A   | _H | _B | Number of Sides<br>Heatsinked | Code | Length (in) | 1.5 | 2 | 2.5 | 3 | One Large Side<br>Heat Sinked<br><br>Two Large Sides<br>Heat Sinked | J_ | Bare can | 6.31 | 4.82 | 3.91 | 3.29 | Polyester | 7.34 | 5.25 | 4.95 | 3.80 | Bare can | 4.09 | 3.07 | 2.45 | 2.04 | Polyester | 4.63 | 3.47 | 2.78 | 2.31 | One Large Side<br>Heat Sinked<br><br>Two Large Sides<br>Heat Sinked | E_ | Bare can | 4.03 | 3.08 | 2.50 | 2.11 | Polyester | 4.62 | 3.52 | 2.86 | 2.40 | Bare can | 2.57 | 1.93 | 1.55 | 1.29 | Polyester | 2.87 | 2.15 | 1.72 | 1.44 |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------|-------------|------|------|----|----|-------------------------------|------|-------------|-----|---|-----|---|---------------------------------------------------------------------|----|----------|------|------|------|------|-----------|------|------|------|------|----------|------|------|------|------|-----------|------|------|------|------|---------------------------------------------------------------------|----|----------|------|------|------|------|-----------|------|------|------|------|----------|------|------|------|------|-----------|------|------|------|------|
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Code Length | _K   | _A          | _H   | _B   |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
| Number of Sides<br>Heatsinked                                       | Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Length (in) | 1.5  | 2           | 2.5  | 3    |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
| One Large Side<br>Heat Sinked<br><br>Two Large Sides<br>Heat Sinked | J_                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Bare can    | 6.31 | 4.82        | 3.91 | 3.29 |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Polyester   | 7.34 | 5.25        | 4.95 | 3.80 |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Bare can    | 4.09 | 3.07        | 2.45 | 2.04 |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Polyester   | 4.63 | 3.47        | 2.78 | 2.31 |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
| One Large Side<br>Heat Sinked<br><br>Two Large Sides<br>Heat Sinked | E_                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Bare can    | 4.03 | 3.08        | 2.50 | 2.11 |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Polyester   | 4.62 | 3.52        | 2.86 | 2.40 |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Bare can    | 2.57 | 1.93        | 1.55 | 1.29 |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Polyester   | 2.87 | 2.15        | 1.72 | 1.44 |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
| Heatsink Cooled                                                     | <p>Temperature rise from the hottest internal spot, the core, to ambient air is <math>\Delta T = I^2(ESR)(\theta_{cc} + \theta_{ca})</math>, recommended max <math>\Delta T</math> of 30°C where <math>\theta_{cc}</math> is the thermal resistance from core to case and <math>\theta_{ca}</math> from case to ambient. To calculate maximum ripple capability with the CLS attached to a heatsink use the maximum core temperature of 105°C, the tabulated values of <math>\theta_{CHS}</math> in lieu of <math>\theta_{cc}</math>, and substitute the heatsink thermal resistance for the case to ambient thermal resistance <math>\theta_{ca}</math>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |      |             |      |      |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |
| Example                                                             | <p>As an illustration, suppose you operate an insulated CLS792M063EB1C in 65°C air and attach it to a commercial heatsink with a free-air thermal resistance of 1.0°C/W for one side. Using a good thermal grease between the CLS and the heatsink, and the total thermal resistance is 1.0 + 2.4 or 3.4°C/W. The CLS is allowed to operate at up to 105°C, which would be a 40°C rise from 65°C, exceeding the recommended 30°C maximum heat rise. The power which would heat the core by 30°C is <math>30/3.4 = 8.82</math> W. For an ESR of 45 mΩ @ 120Hz, 8.82 W equates to a ripple current of 14.00 Arms. In addition, the user should ensure that the peak-to-peak capacitor voltage divided by the capacitor's rated voltage <math>V_R</math> not exceed the greater of 10% or <math>0.01352 \times (VDC \text{ Rated} / 1[VDC])^{1/2}</math>. The Vpp limit for this capacitor at 120Hz is thereby calculated as 6.76 volts, while the planned 14 amps rms at 120Hz will result in a peak-to-peak voltage of 6.65 volts, just within the AC voltage limit.</p>                                                                                                                                                                 |             |      |             |      |      |    |    |                               |      |             |     |   |     |   |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |                                                                     |    |          |      |      |      |      |           |      |      |      |      |          |      |      |      |      |           |      |      |      |      |

## Low-Profile Aluminum Electrolytic

### Part Numbering System

| HV                                 | HR                                  | CLS/CLSR                                                                                                                                               | 100                                                                | M                          | 200                                   | JK                                  | 0                                                  | A                                                                                                                    |
|------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------|---------------------------------------|-------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Optional<br><b>High Vibration*</b> | Optional<br><b>High Reliability</b> | <b>Type</b><br>CLS: Copper wire with 60/40 tin/lead electroplate, 20 amps max<br>CLSR: Copper wire with lead free, brite tin electroplate, 20 amps max | <b>Capacitance</b><br>100 = 10 µF<br>101 = 100 µF<br>272 = 2700 µF | <b>Tolerance</b><br>M=±20% | <b>Rated Voltage</b><br>200 = 200 Vdc | <b>Case Code</b><br>See chart below | <b>Insulation</b><br>0 = bare can<br>1 = polyester | <b>Mounting Style</b><br>A= mounting tabs*<br>C=straight leads/no tabs<br>D=hook leads/tabs*<br>E=hook leads/no tabs |

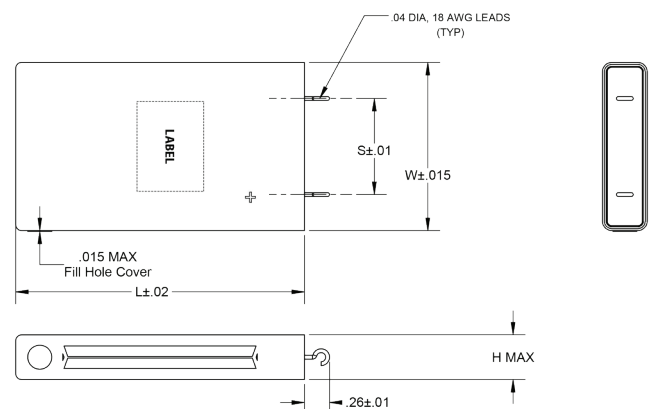
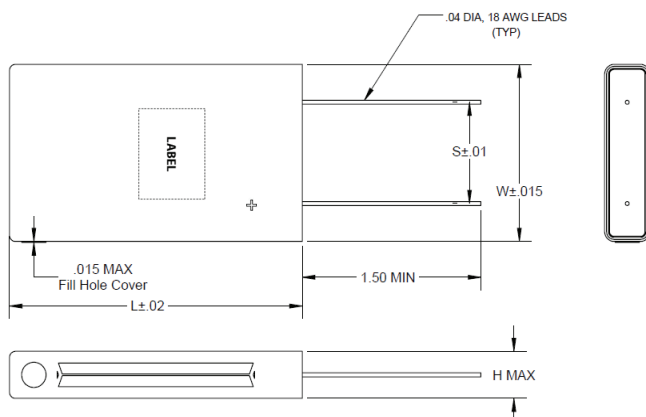
### Case Codes

| Case Code | "W"  | "H"  | "L"  | "S"  |
|-----------|------|------|------|------|
| JK        | 1.00 | 0.50 | 1.50 | 0.50 |
| JA        | 1.00 | 0.50 | 2.00 | 0.50 |
| JH        | 1.00 | 0.50 | 2.50 | 0.50 |
| JB        | 1.00 | 0.50 | 3.00 | 0.50 |

| Case Code | "W"  | "H"  | "L"  | "S"  |
|-----------|------|------|------|------|
| EK        | 1.75 | 0.50 | 1.50 | 1.00 |
| EA        | 1.75 | 0.50 | 2.00 | 1.00 |
| EH        | 1.75 | 0.50 | 2.50 | 1.00 |
| EB        | 1.75 | 0.50 | 3.00 | 1.00 |

### Outline Drawings

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



## Low-Profile Aluminum Electrolytic

## Ratings

| Voltage<br>Vdc | Cap<br>µF | P/N            | 120Hz<br>25°C (mΩ)<br>ESR Max | 20KHz<br>25°C (mΩ)<br>ESR Max | 105°C<br>Arms<br>120Hz | 105°C<br>Arms<br>20KHz | Case      |           |           | Surge<br>Vdc |
|----------------|-----------|----------------|-------------------------------|-------------------------------|------------------------|------------------------|-----------|-----------|-----------|--------------|
|                |           |                |                               |                               |                        |                        | H<br>(in) | W<br>(in) | L<br>(in) |              |
| 10             | 19000     | CLS193M010JK1C | 76                            | 68                            | 2.74                   | 3.05                   | 0.5       | 1         | 1.5       | 12.5         |
| 10             | 28000     | CLS283M010JA1C | 53                            | 46                            | 3.64                   | 4.04                   | 0.5       | 1         | 2         | 12.5         |
| 10             | 32000     | CLS323M010EK1C | 53                            | 47                            | 4.02                   | 4.47                   | 0.5       | 1.75      | 1.5       | 12.5         |
| 10             | 39000     | CLS393M010JH1C | 39                            | 34                            | 4.55                   | 5.06                   | 0.5       | 1         | 2.5       | 12.5         |
| 10             | 48000     | CLS483M010EA1C | 37                            | 33                            | 5.35                   | 5.95                   | 0.5       | 1.75      | 2         | 12.5         |
| 10             | 49000     | CLS493M010JB1C | 31                            | 28                            | 5.41                   | 6.02                   | 0.5       | 1         | 3         | 12.5         |
| 10             | 65000     | CLS653M010EH1C | 28                            | 25                            | 6.62                   | 7.36                   | 0.5       | 1.75      | 2.5       | 12.5         |
| 10             | 83000     | CLS833M010EB1C | 23                            | 20                            | 7.80                   | 8.67                   | 0.5       | 1.75      | 3         | 12.5         |
| 25             | 6200      | CLS622M025JK1C | 82                            | 72                            | 2.65                   | 2.95                   | 0.5       | 1         | 1.5       | 30           |
| 25             | 9100      | CLS912M025JA1C | 56                            | 50                            | 3.51                   | 3.91                   | 0.5       | 1         | 2         | 30           |
| 25             | 10000     | CLS103M025EK1C | 57                            | 50                            | 3.90                   | 4.33                   | 0.5       | 1.75      | 1.5       | 30           |
| 25             | 12000     | CLS123M025JH1C | 42                            | 37                            | 4.39                   | 4.88                   | 0.5       | 1         | 2.5       | 30           |
| 25             | 15000     | CLS153M025JB1C | 34                            | 30                            | 5.22                   | 5.81                   | 0.5       | 1         | 3         | 30           |
| 25             | 15000     | CLS153M025EA1C | 39                            | 35                            | 5.20                   | 5.78                   | 0.5       | 1.75      | 2         | 30           |
| 25             | 20000     | CLS203M025EH1C | 30                            | 26                            | 6.43                   | 7.14                   | 0.5       | 1.75      | 2.5       | 30           |
| 25             | 26000     | CLS263M025EB1C | 24                            | 21                            | 7.59                   | 8.43                   | 0.5       | 1.75      | 3         | 30           |
| 40             | 4000      | CLS402M040JK1C | 82                            | 72                            | 2.65                   | 2.95                   | 0.5       | 1         | 1.5       | 48           |
| 40             | 5900      | CLS592M040JA1C | 56                            | 50                            | 3.51                   | 3.91                   | 0.5       | 1         | 2         | 48           |
| 40             | 6700      | CLS672M040EK1C | 58                            | 51                            | 3.87                   | 4.30                   | 0.5       | 1.75      | 1.5       | 48           |
| 40             | 8100      | CLS812M040JH1C | 42                            | 37                            | 4.40                   | 4.89                   | 0.5       | 1         | 2.5       | 48           |
| 40             | 9900      | CLS992M040EA1C | 40                            | 35                            | 5.15                   | 5.73                   | 0.5       | 1.75      | 2         | 48           |
| 40             | 10000     | CLS103M040JB1C | 33                            | 30                            | 5.23                   | 5.81                   | 0.5       | 1         | 3         | 48           |
| 40             | 13000     | CLS133M040EH1C | 30                            | 27                            | 6.37                   | 7.08                   | 0.5       | 1.75      | 2.5       | 48           |
| 40             | 17000     | CLS173M040EB1C | 25                            | 22                            | 7.53                   | 8.36                   | 0.5       | 1.75      | 3         | 48           |
| 50             | 2600      | CLS262M050JK1C | 93                            | 82                            | 2.49                   | 2.76                   | 0.5       | 1         | 1.5       | 60           |
| 50             | 4100      | CLS412M050JA1C | 61                            | 54                            | 3.37                   | 3.74                   | 0.5       | 1         | 2         | 60           |
| 50             | 4400      | CLS442M050EK1C | 63                            | 56                            | 3.69                   | 4.10                   | 0.5       | 1.75      | 1.5       | 60           |
| 50             | 5600      | CLS562M050JH1C | 45                            | 40                            | 4.22                   | 4.68                   | 0.5       | 1         | 2.5       | 60           |
| 50             | 6700      | CLS672M050EA1C | 43                            | 38                            | 4.97                   | 5.52                   | 0.5       | 1.75      | 2         | 60           |
| 50             | 6800      | CLS682M050JB1C | 38                            | 33                            | 4.94                   | 5.48                   | 0.5       | 1         | 3         | 60           |
| 50             | 9100      | CLS912M050EH1C | 33                            | 29                            | 6.16                   | 6.84                   | 0.5       | 1.75      | 2.5       | 60           |
| 50             | 11000     | CLS113M050EB1C | 27                            | 24                            | 7.24                   | 8.05                   | 0.5       | 1.75      | 3         | 60           |

## Low-Profile Aluminum Electrolytic

## Ratings

| Voltage<br>Vdc | Cap<br>μF | P/N            | 120Hz<br>25°C (mΩ)<br>ESR Max | 20KHz<br>25°C (mΩ)<br>ESR Max | 105°C<br>Arms<br>120Hz | 105°C<br>Arms<br>20KHz | Case      |           |           | Surge<br>Vdc |
|----------------|-----------|----------------|-------------------------------|-------------------------------|------------------------|------------------------|-----------|-----------|-----------|--------------|
|                |           |                |                               |                               |                        |                        | H<br>(in) | W<br>(in) | L<br>(in) |              |
| 63             | 1900      | CLS192M063JK1C | 157                           | 126                           | 1.77                   | 2.20                   | 0.5       | 1         | 1.5       | 75           |
| 63             | 2800      | CLS282M063JA1C | 107                           | 86                            | 2.36                   | 2.93                   | 0.5       | 1         | 2         | 75           |
| 63             | 3100      | CLS312M063EK1C | 109                           | 88                            | 2.60                   | 3.23                   | 0.5       | 1.75      | 1.5       | 75           |
| 63             | 3800      | CLS382M063JH1C | 79                            | 64                            | 2.96                   | 3.68                   | 0.5       | 1         | 2.5       | 75           |
| 63             | 4600      | CLS462M063EA1C | 75                            | 61                            | 3.49                   | 4.33                   | 0.5       | 1.75      | 2         | 75           |
| 63             | 4900      | CLS492M063JB1C | 63                            | 50                            | 3.54                   | 4.40                   | 0.5       | 1         | 3         | 75           |
| 63             | 6300      | CLS632M063EH1C | 56                            | 45                            | 4.35                   | 5.40                   | 0.5       | 1.75      | 2.5       | 75           |
| 63             | 7900      | CLS792M063EB1C | 45                            | 36                            | 5.16                   | 6.41                   | 0.5       | 1.75      | 3         | 75           |
| 100            | 670       | CLS671M100JK1C | 367                           | 230                           | 1.10                   | 1.72                   | 0.5       | 1         | 1.5       | 125          |
| 100            | 990       | CLS991M100JA1C | 249                           | 157                           | 1.46                   | 2.30                   | 0.5       | 1         | 2         | 125          |
| 100            | 990       | CLS991M100EK1C | 261                           | 164                           | 1.59                   | 2.50                   | 0.5       | 1.75      | 1.5       | 125          |
| 100            | 1300      | CLS132M100JH1C | 185                           | 116                           | 1.83                   | 2.88                   | 0.5       | 1         | 2.5       | 125          |
| 100            | 1400      | CLS142M100EA1C | 179                           | 113                           | 2.14                   | 3.35                   | 0.5       | 1.75      | 2         | 125          |
| 100            | 1700      | CLS172M100JB1C | 145                           | 91                            | 2.20                   | 3.45                   | 0.5       | 1         | 3         | 125          |
| 100            | 1900      | CLS192M100EH1C | 133                           | 83                            | 2.67                   | 4.20                   | 0.5       | 1.75      | 2.5       | 125          |
| 100            | 2500      | CLS252M100EB1C | 105                           | 66                            | 3.20                   | 5.03                   | 0.5       | 1.75      | 3         | 125          |
| 200            | 290       | CLS291M200JK1C | 483                           | 303                           | 0.96                   | 1.50                   | 0.5       | 1         | 1.5       | 250          |
| 200            | 430       | CLS431M200JA1C | 328                           | 206                           | 1.27                   | 2.00                   | 0.5       | 1         | 2         | 250          |
| 200            | 460       | CLS461M200EK1C | 318                           | 200                           | 1.44                   | 2.26                   | 0.5       | 1.75      | 1.5       | 250          |
| 200            | 590       | CLS591M200JH1C | 240                           | 151                           | 1.61                   | 2.52                   | 0.5       | 1         | 2.5       | 250          |
| 200            | 680       | CLS681M200EA1C | 217                           | 136                           | 1.94                   | 3.05                   | 0.5       | 1.75      | 2         | 250          |
| 200            | 750       | CLS751M200JB1C | 190                           | 119                           | 1.92                   | 3.02                   | 0.5       | 1         | 3         | 250          |
| 200            | 930       | CLS931M200EH1C | 160                           | 100                           | 2.44                   | 3.83                   | 0.5       | 1.75      | 2.5       | 250          |
| 200            | 1100      | CLS112M200EB1C | 130                           | 82                            | 2.88                   | 4.52                   | 0.5       | 1.75      | 3         | 250          |
| 250            | 200       | CLS201M250JK1C | 776                           | 448                           | 0.84                   | 1.38                   | 0.5       | 1         | 1.5       | 300          |
| 250            | 290       | CLS291M250JA1C | 530                           | 306                           | 1.12                   | 1.84                   | 0.5       | 1         | 2         | 300          |
| 250            | 330       | CLS331M250EK1C | 484                           | 279                           | 1.30                   | 2.14                   | 0.5       | 1.75      | 1.5       | 300          |
| 250            | 400       | CLS401M250JH1C | 387                           | 224                           | 1.41                   | 2.32                   | 0.5       | 1         | 2.5       | 300          |
| 250            | 480       | CLS481M250EA1C | 331                           | 191                           | 1.75                   | 2.88                   | 0.5       | 1.75      | 2         | 300          |
| 250            | 510       | CLS511M250JB1C | 306                           | 177                           | 1.69                   | 2.78                   | 0.5       | 1         | 3         | 300          |
| 250            | 660       | CLS661M250EH1C | 243                           | 140                           | 2.20                   | 3.62                   | 0.5       | 1.75      | 2.5       | 300          |
| 250            | 840       | CLS841M250EB1C | 189                           | 109                           | 2.65                   | 4.37                   | 0.5       | 1.75      | 3         | 300          |

## Low-Profile Aluminum Electrolytic

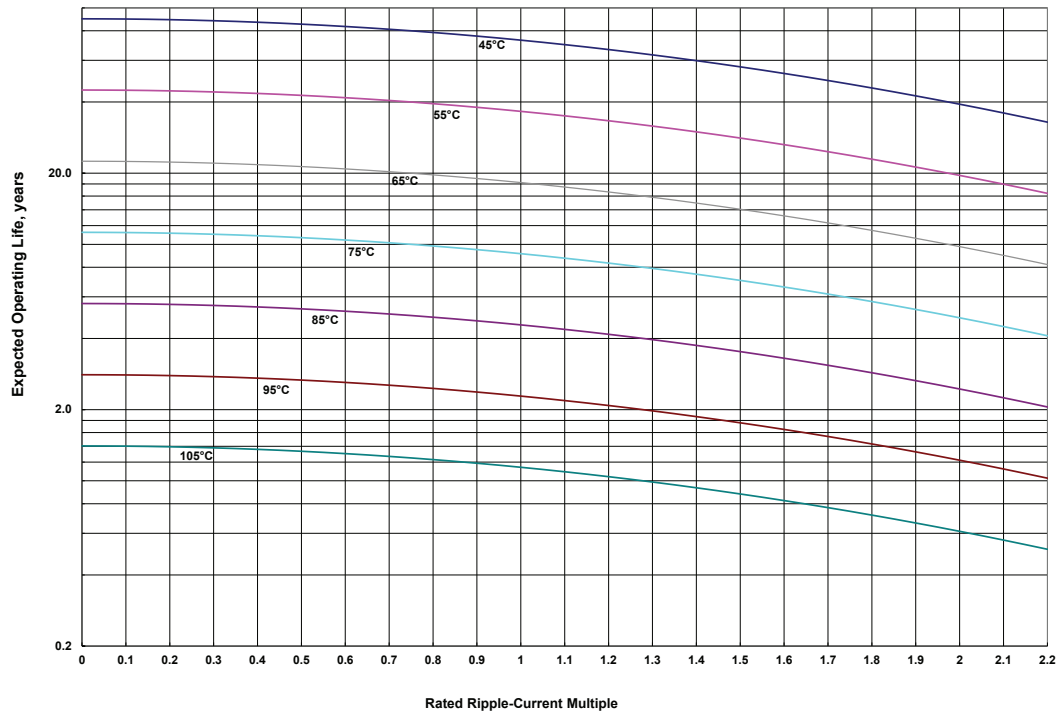
## Ratings

| Voltage<br>Vdc | Cap<br>μF | P/N            | 120Hz<br>25°C (mΩ)<br>ESR Max | 20KHz<br>25°C (mΩ)<br>ESR Max | 105°C<br>Arms<br>120Hz | 105°C<br>Arms<br>20KHz | Case      |           |           | Surge<br>Vdc |
|----------------|-----------|----------------|-------------------------------|-------------------------------|------------------------|------------------------|-----------|-----------|-----------|--------------|
|                |           |                |                               |                               |                        |                        | H<br>(in) | W<br>(in) | L<br>(in) |              |
| 300            | 150       | CLS151M300JK1C | 859                           | 496                           | 0.80                   | 1.31                   | 0.5       | 1         | 1.5       | 350          |
| 300            | 230       | CLS231M300JA1C | 575                           | 332                           | 1.07                   | 1.77                   | 0.5       | 1         | 2         | 350          |
| 300            | 250       | CLS251M300EK1C | 532                           | 307                           | 1.24                   | 2.04                   | 0.5       | 1.75      | 1.5       | 350          |
| 300            | 310       | CLS311M300JH1C | 424                           | 245                           | 1.35                   | 2.22                   | 0.5       | 1         | 2.5       | 350          |
| 300            | 370       | CLS371M300EA1C | 362                           | 209                           | 1.67                   | 2.76                   | 0.5       | 1.75      | 2         | 350          |
| 300            | 390       | CLS391M300JB1C | 336                           | 194                           | 1.61                   | 2.65                   | 0.5       | 1         | 3         | 350          |
| 300            | 510       | CLS511M300EH1C | 265                           | 153                           | 2.11                   | 3.47                   | 0.5       | 1.75      | 2.5       | 350          |
| 300            | 640       | CLS641M300EB1C | 210                           | 122                           | 2.51                   | 4.14                   | 0.5       | 1.75      | 3         | 350          |

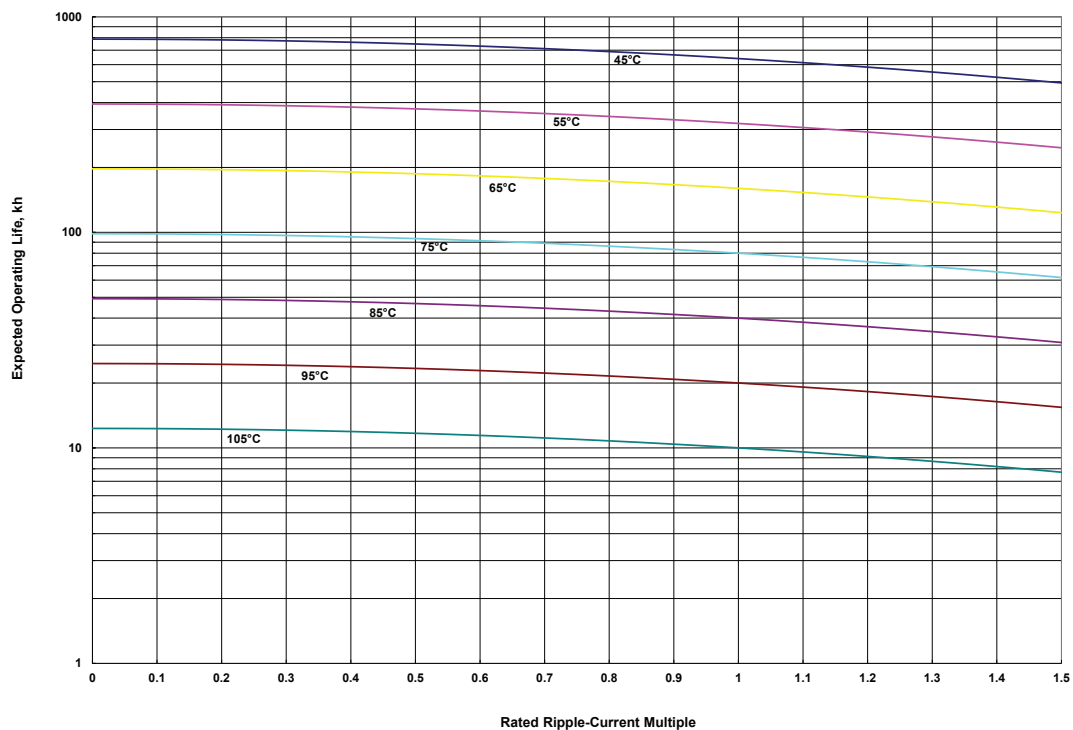
## Low-Profile Aluminum Electrolytic

### Typical Performance Curves

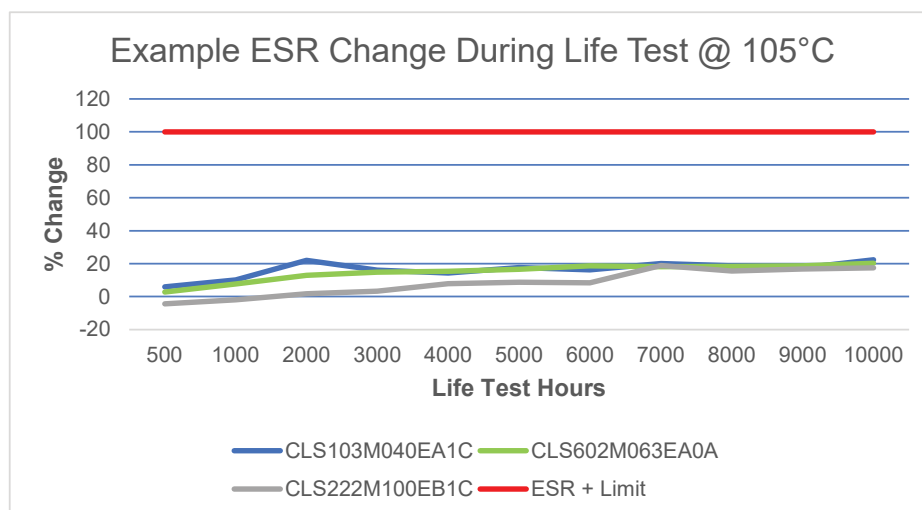
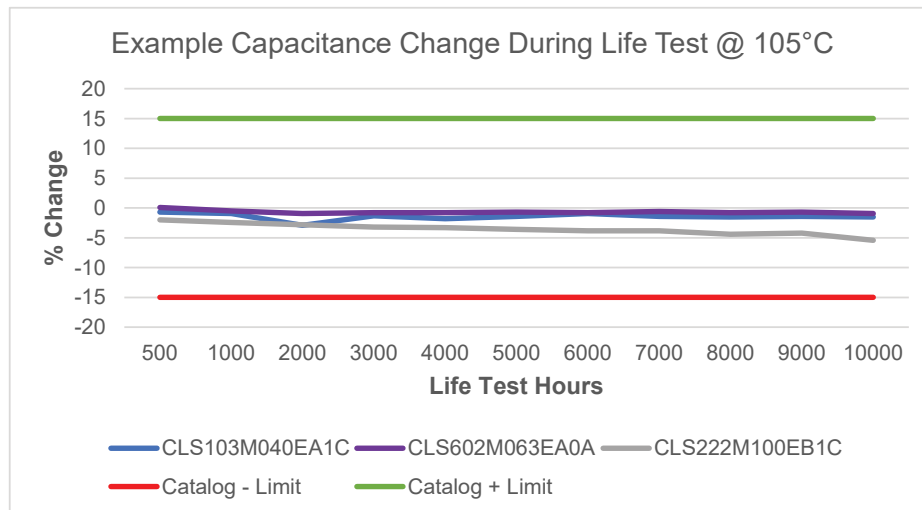
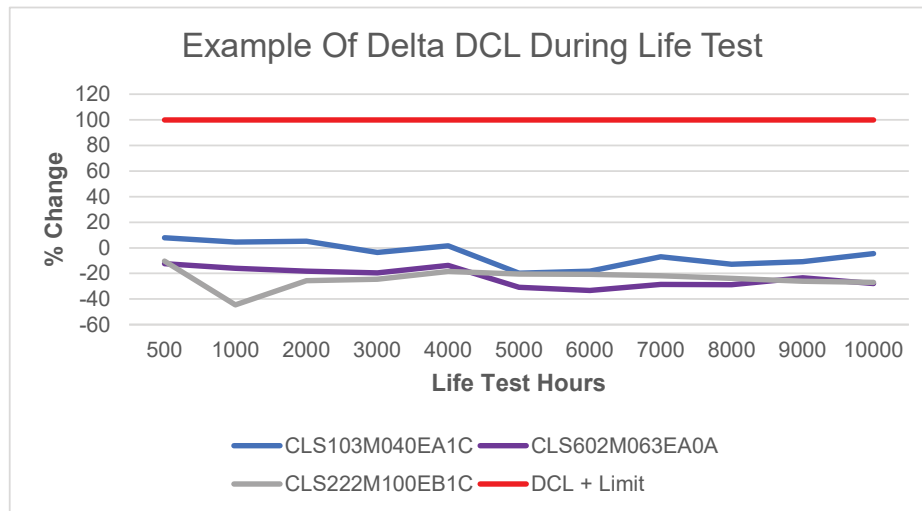
Type CLS Operating Life in Years vs Ripple Current



Type CLS Operating Life in Kilohours vs Ripple Current



## Low-Profile Aluminum Electrolytic



## Low-Profile Aluminum Electrolytic

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