

Notes on Capacitor Specifications

- All tests for performed at 25°C unless otherwise noted
- All testing below 1000m above sea level at atmospheric pressure unless otherwise specified
- Surge Voltage is the non-repetitive max voltage allowed for 1 minute or less
- Leakage current is measured after being held at rated voltage and at room temperature for 72 hours after initially being charged. Please see Ioxus Test Procedures at www.IOXUS.com, Initial current will be higher
- Rated capacitance as per test detailed in Ioxus Test Procedures at www.IOXUS.com for details on how to perform the test.
- DC_{ESR} as per test detailed in Ioxus Test Procedures at www.IOXUS.com for details on how to perform the test.
- Short circuit current rating is the calculated instantaneous maximum current possible in a short circuit event (reference only) $I_{SS} = V_{RATED} / DCESR_{10ms}$
- The 1 second current rating is the calculated maximum nominal current that could be delivered over a 1 second interval (reference only) $I_{peak} = \frac{1/2 C_{rated} * V_{rated}}{C_{rated} * ESR_{DC} + 1}$
- Specific energy and specific power are reference values only, and are to provided to assist in comparisons with other technologies
- Usable Specific Power [Power Density] (as per IEC 62391-2) $P_d = \frac{0.12 * V_{rated}^2}{ESR_{DC} * Mass}$
- Impedance Match Specific Power $P_{max} = \frac{V_{rated}^2 / ESR_{AC} * 4}{Mass (or Volume)}$
- Specific Energy $E_{max} = \frac{1/2 CV^2}{Mass (or Volume)}$
- All energy equations give results in Joules, to convert to Whrs divide result by 3600s/hr.
- $E_{max} = 1/2 * CV^2 / (3600s/hr)$
- Rated continuous current is established a $\Delta T = 20^\circ C$, in free air, estimates of temperature rise in free air can be made using the equation $\Delta T = I_{rms}^2 * DCESR_{IEC} * R_{th}$

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16. Continuous current is defined as RMS current calculated over time intervals greater than 15 minutes
Cycle life is dependent on actual usage, actual results will vary
17. Cycle life is estimated from test results cycling the cells from V_{rated} to $1/2V_{\text{rated}}$ at a constant current with a 10 second break between cycles
18. Per United Nations material classification UN3499, all Ioxus ultracapacitors have less than 10 Wh capacity to meet the requirements of Special Provisions 361. When packaged according to the regulation, both individual ultracapacitors and modules composed of those ultracapacitors shipped by Ioxus can be transported without being treated as dangerous goods (aka hazardous materials)

Mounting Recommendations

1. Please refer to the appropriate user manual for your product available at
 - www.IOXUS.com
2. Do no reverse polarity
3. Do not handle when charged
4. Apply shorting strap once discharged and prior to handling
5. Consult with your sales person for questions that are not addressed in these documents

Product Markings

All products are marked with

1. At least 1 polarity marker/symbol
2. Rated capacitance
3. Rated voltage
4. Name of manufacturer
5. Serial number
6. Date code
7. Part number

