HV Supercapacitors
Cylindrical cells

Description
Eaton supercapacitors are high reliability, high power, ultra-high capacitance energy storage devices utilizing electric double layer capacitor (EDLC) construction combined with proprietary materials and processes. This combination of advanced technologies allows Eaton to offer a wide variety of capacitor solutions tailored to applications for backup power, pulse power and hybrid power systems. They can be applied as the sole energy storage or in combination with batteries to optimize cost, lifetime and run time. System requirements can range from a few microwatts to megawatts. All products feature low ESR for high power density with environmentally friendly materials for a green power solution. Eaton supercapacitors are maintenance-free with design lifetimes up to 20 years* and operating temperatures down to -40 °C and up to +85 °C.

Features
• Ultra low ESR for high power density
• UL recognized

Applications
• Electric, Gas, Water smart meters
• Controllers
• RF radio power
• Solar capture
• Storage servers
• Pulse power
• Backup power

*Supercapacitor lifetimes vary based on charge voltage and temperature. See Eaton’s application guidelines or contact your local Eaton sales representative for more information on lifetime estimates.
Technical Data 4376
Effective January 2020

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Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance</td>
<td>1.0 F to 100 F</td>
</tr>
<tr>
<td>Maximum working voltage</td>
<td>2.7 V</td>
</tr>
<tr>
<td>Surge voltage</td>
<td>3.0 V</td>
</tr>
<tr>
<td>Capacitance tolerance</td>
<td>-10% to +30%</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-40 °C to +65 °C</td>
</tr>
<tr>
<td>Extended temperature range</td>
<td>-40 °C to +85 °C (with linear voltage derating to 2.3 V @ +85 °C)</td>
</tr>
</tbody>
</table>

Specifications

<table>
<thead>
<tr>
<th>Capacitance (F)</th>
<th>Part number</th>
<th>Maximum initial ESR (Ω)</th>
<th>Nominal leakage current (µA)</th>
<th>Stored energy (mWh)</th>
<th>Peak power (W)</th>
<th>Pulse current (A)</th>
<th>Continuous current (A)</th>
<th>Typical thermal resistance (°C/W)</th>
<th>Short circuit current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HV0810-2R7105-R</td>
<td>0.200</td>
<td>10</td>
<td>1.0</td>
<td>9.1</td>
<td>1.1</td>
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<td>120</td>
<td>14</td>
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<td>3</td>
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<td>3.3</td>
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<td>5.1</td>
<td>46</td>
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<td>2.3</td>
<td>73</td>
<td>68</td>
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<td>20</td>
<td>6.1</td>
<td>46</td>
<td>6.5</td>
<td>2.8</td>
<td>47</td>
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<tr>
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<td>54</td>
<td>10</td>
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<td>40</td>
<td>79</td>
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<td>HV1325-2R7156-R</td>
<td>0.030</td>
<td>23</td>
<td>15</td>
<td>61</td>
<td>14</td>
<td>3.1</td>
<td>53</td>
<td>90</td>
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<td>25</td>
<td>HV1625-2R7256-R</td>
<td>0.027</td>
<td>45</td>
<td>25</td>
<td>68</td>
<td>20</td>
<td>3.4</td>
<td>47</td>
<td>100</td>
</tr>
<tr>
<td>35</td>
<td>HV1245-2R7356-R</td>
<td>0.020</td>
<td>51</td>
<td>35</td>
<td>91</td>
<td>28</td>
<td>5.8</td>
<td>22</td>
<td>135**</td>
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<tr>
<td>35</td>
<td>HV1635-2R7356-R</td>
<td>0.024</td>
<td>51</td>
<td>35</td>
<td>76</td>
<td>26</td>
<td>4.0</td>
<td>39</td>
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<tr>
<td>60</td>
<td>HV1840-2R7606-R</td>
<td>0.018</td>
<td>110</td>
<td>61</td>
<td>101</td>
<td>39</td>
<td>5.7</td>
<td>26</td>
<td>150**</td>
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<tr>
<td>100</td>
<td>HV1860-2R7107-R</td>
<td>0.012</td>
<td>260</td>
<td>101</td>
<td>152</td>
<td>61</td>
<td>11</td>
<td>10</td>
<td>225**</td>
</tr>
</tbody>
</table>

** Repeated short circuit current will permanently damage the leads and cause an open failure.

Performance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Capacitance change (% of initial value)</th>
<th>ESR (% of maximum initial value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life (1000 hours @ +65 °C @ 2.7 Vdc)</td>
<td>≤ 30%</td>
<td>≤ 200%</td>
</tr>
<tr>
<td>Storage (3 years, uncharged, &lt;+35 °C)</td>
<td>≤ 5%</td>
<td>≤ 110%</td>
</tr>
<tr>
<td>Cycle Life* (500,000 cycles)</td>
<td>≤ 30%</td>
<td>≤ 200%</td>
</tr>
</tbody>
</table>

1. Capacitance and Equivalent Series Resistance (ESR) measured according to IEC62391-1 at +20 °C, with current in milliamps (mA) = 8*C*V
2. Leakage current at +20 °C after 72 hour charge and hold
3. Energy (mWh) = \( \frac{1}{2} \times C \times V \times 1000 \times 3600 \)
4. Peak Power (W) = \( \frac{V^2}{4 \times ESR} \)
5. Pulse Current in Amps (A), 1 second discharge from rated voltage to half rated voltage = \( \frac{V \times C \times V}{(1+EWR) \times 3600} \)
6. Continuous current with a 15 °C temperature rise. Continuous current (A) = \( \sqrt{\frac{C \times V}{(1+EWR) \times 3600}} \)
7. Thermal resistance (Rth) cell body temperature to ambient in open air in degrees C per Watt (°C/W)
8. Short circuit current is for safety information only. Do not use as operating current.
9. Cycling between rated voltage and half voltage, 3 seconds rest at +20 °C

Safety and Certifications

Regulatory: UL810a, RoHS
Warnings: Do not overvoltage, do not reverse polarity
Shipping: UN3499, <0.3Wh, Non-hazardous goods
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Cylindrical cells

Technical Data
Effective January 2020

Dimensions (mm)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>ØD nominal</th>
<th>ØD maximum</th>
<th>L maximum</th>
<th>F ±0.50</th>
<th>Ød ±0.02</th>
<th>C minimum</th>
<th>C' minimum</th>
<th>Typical mass (grams/pieces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV0810-2R7105-R</td>
<td>8.0</td>
<td>8.5</td>
<td>13.5</td>
<td>3.5</td>
<td>0.50</td>
<td>20.0</td>
<td>25.0</td>
<td>1.2</td>
</tr>
<tr>
<td>HV0820-2R7305-R</td>
<td>8.0</td>
<td>8.5</td>
<td>21.0</td>
<td>3.5</td>
<td>0.50</td>
<td>20.0</td>
<td>25.0</td>
<td>1.4</td>
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<tr>
<td>HV1020-2R7505-R</td>
<td>10.0</td>
<td>10.5</td>
<td>22.3</td>
<td>5.0</td>
<td>0.60</td>
<td>20.0</td>
<td>25.0</td>
<td>2.3</td>
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<tr>
<td>HV0830-2R7605-R</td>
<td>8.0</td>
<td>8.5</td>
<td>31.0</td>
<td>3.5</td>
<td>0.50</td>
<td>20.0</td>
<td>25.0</td>
<td>2.1</td>
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<tr>
<td>HV1030-2R7106-R</td>
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<td>0.60</td>
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<td>3.2</td>
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<tr>
<td>HV1325-2R7156-R</td>
<td>13.0</td>
<td>13.5</td>
<td>28.4</td>
<td>5.0</td>
<td>0.60</td>
<td>20.0</td>
<td>25.0</td>
<td>4.5</td>
</tr>
<tr>
<td>HV1625-2R7256-R</td>
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<td>16.5</td>
<td>29.4</td>
<td>7.5</td>
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<tr>
<td>HV1245-2R7356-R</td>
<td>12.5</td>
<td>12.9</td>
<td>49.0</td>
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<tr>
<td>HV1635-2R7356-R</td>
<td>16.0</td>
<td>16.5</td>
<td>38.0</td>
<td>7.5</td>
<td>0.80</td>
<td>20.0</td>
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<tr>
<td>HV1840-2R7606-R</td>
<td>18.0</td>
<td>18.5</td>
<td>42.0</td>
<td>7.5</td>
<td>0.80</td>
<td>20.0</td>
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<tr>
<td>HV1860-2R7107-R</td>
<td>18.0</td>
<td>18.5</td>
<td>60.5</td>
<td>7.5</td>
<td>0.80</td>
<td>20.0</td>
<td>25.0</td>
<td>20.0</td>
</tr>
</tbody>
</table>

Part marking

- Manufacturer
- Capacitance (F)
- Max operating voltage (V)
- Family code (or part number)
- Polarity

Packaging information

- Standard packaging: Bulk, 100 units per bag (8 mm - 13 mm diameter)
- 16 mm - 18 mm diameter products: Bulk package quantity varies by size.
Temperature vs. Capacitance and ESR

- Change from +20°C Value
- Capacitance
- ESR

Temperature (°C)
Wave solder profile

![Wave solder profile diagram]

<table>
<thead>
<tr>
<th>Profile Feature</th>
<th>Standard SnPb Solder</th>
<th>Lead (Pb) Free Solder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preheat and soak</td>
<td>• Temperature max. ($T_{S\text{max}}^\text{max}$) 100 °C</td>
<td>100 °C</td>
</tr>
<tr>
<td></td>
<td>• Time max. 60 seconds</td>
<td>60 seconds</td>
</tr>
<tr>
<td>Δ preheat to max Temperature</td>
<td>160 °C max.</td>
<td>160 °C max.</td>
</tr>
<tr>
<td>Peak temperature ($T_p^\text{max}$)</td>
<td>220 °C – 260 °C</td>
<td>250 °C – 260 °C</td>
</tr>
<tr>
<td>Time at peak temperature ($t_p$)</td>
<td>10 seconds max 5 seconds max each wave</td>
<td>10 seconds max 5 seconds max each wave</td>
</tr>
<tr>
<td>Ramp-down rate</td>
<td>~ 2 K/s min ~3.5 K/s typ ~5 K/s max</td>
<td>~ 2 K/s min ~3.5 K/s typ ~5 K/s max</td>
</tr>
<tr>
<td>Time 25 °C to 25 °C</td>
<td>4 minutes</td>
<td>4 minutes</td>
</tr>
</tbody>
</table>

**Manual solder**

+350 °C, 4-5 seconds. (by soldering iron), generally manual, hand soldering is not recommended.

**Cleaning/Washing**

Avoid cleaning of circuit boards, however if the circuit board must be cleaned use static or ultrasonic immersion in a standard circuit board cleaning fluid for no more than 5 minutes and a maximum temperature of +60 °C. Afterwards thoroughly rinse and dry the circuit boards. In general, treat supercapacitors in the same manner you would an aluminum electrolytic capacitor.