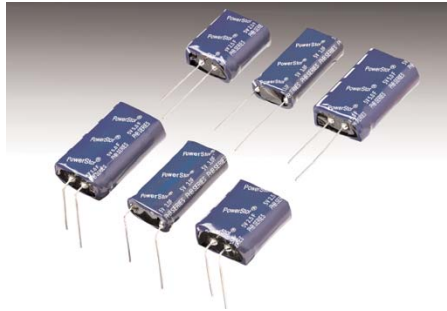


# PHB Supercapacitors

## Cylindrical pack



### Features

- Large capacitance for high energy density
- Low ESR for high power density

### Applications

- Bridging or hold-up power
- Memory back-up
- Battery Swap out

### Description

Eaton supercapacitors are unique, ultra-high capacitance devices utilizing electrochemical double layer capacitor (EDLC) construction combined with new, high performance materials. This combination of advanced technologies allows Eaton to offer a wide variety of capacitor solutions tailored to specific applications that range from a few micro-amps for several days to several amps for milliseconds.

### Ratings

|                                      |   |
|--------------------------------------|---|
| Capacitance                          | 1.5 F to 5.0 F  |
| Maximum working voltage              | 5.0 V   |
| Surge voltage                        | 5.5 V   |
| Capacitance tolerance                | -10% to +30% (+20 °C)                                     |
| Operating temperature range          | -25 °C to +70 °C  |
| Extended operating temperature range | -25 °C to +85 °C (with linear derating to 4.0 V @ +85 °C) |

### Specifications

| Nominal Capacitance (F) | Vertical Part Number | Horizontal Part Number | Maximum ESR ( $\Omega$ ) (Equivalent Series Resistance) Measured |        | Nominal leakage current ( $\mu$ A) after 100 hours @ 5 V, +20 °C | Nominal dimensions (mm) | Typical mass (grams/piece) |
|-------------------------|----------------------|------------------------|--|--------|--|-------------------------|----------------------------|
|                         |                      |                        | @ 1 kHz  | 100 Hz |  |                         |                            |
| 1.5                     | PHB-5ROV155-R        | PHB-5ROH155-R          | 0.31   | 0.33   | 10   | 8.5 x 16.8 x 21.5       | 3.3                        |
| 2.5                     | PHB-5ROV255-R        | PHB-5ROH255-R          | 0.19   | 0.20   | 14   | 10.5 x 20.8 x 22.5      | 5.0                        |
| 3.0                     | PHB-5ROV305-R        | PHB-5ROH305-R          | 0.19   | 0.20   | 16   | 8.5 x 16.8 x 31.5       | 5.3                        |
| 5.0                     | PHB-5ROV505-R        | PHB-5ROH505-R          | 0.12   | 0.13   | 25   | 10.5 x 20.8 x 32        | 7.5                        |

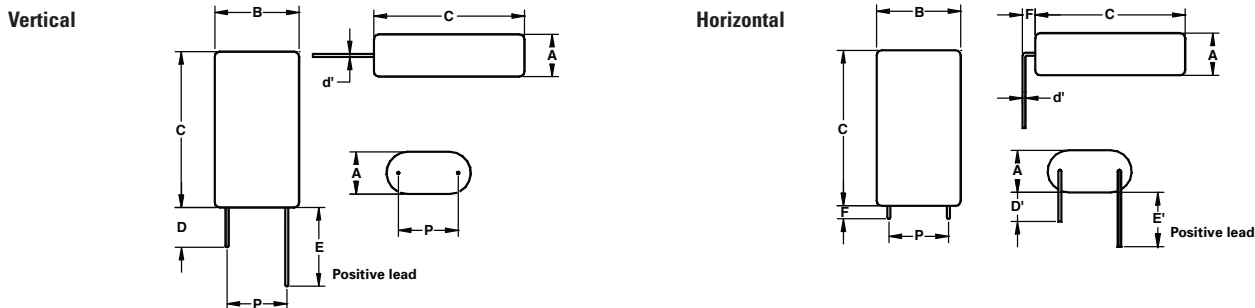
### Performance

| Parameter   | Capacitance change (% of initial value) | ESR (% of max. initial value) |
|---|---|-------------------------------|
| Life (1000 hours @ +70 °C @ 5.0 Vdc)                                | $\leq 30\%$                             | $\leq 200\%$                  |
| Storage - Low and High Temperature (1000 hours @ -25 °C and +85 °C) | $\leq 30\%$                             | $\leq 200\%$                  |

### Dimensions (mm)

| Vertical Part Number | Horizontal Part Number | A              | B    | C    | d'  | D          | D'             | E  | E' | F   | P         |
|----------------------|------------------------|----------------|------|------|-----|------------|----------------|----|----|-----|-----------|
| PHB-5ROV155-R        | PHB-5ROH155-R          | 9.0            | 17.3 | 22.0 | 0.5 | 20         | 15             | 25 | 20 | 2.0 | 11.8      |
| PHB-5ROV255-R        | PHB-5ROH255-R          | 11.0           | 21.3 | 23.0 | 0.6 | 20         | 15             | 25 | 20 | 2.0 | 5.3       |
| PHB-5ROV305-R        | PHB-5ROH305-R          | 9.0            | 17.3 | 32.5 | 0.5 | 20         | 15             | 25 | 20 | 2.0 | 11.8      |
| PHB-5ROV505-R        | PHB-5ROH505-R          | 11.0           | 21.3 | 32.5 | 0.6 | 20         | 15             | 25 | 20 | 2.0 | 5.3       |
| <b>Tolerances</b>    |                        | <b>Maximum</b> |      |      |     | $\pm 0.02$ | <b>Minimum</b> |    |    |     | $\pm 0.5$ |

Note: Longer lead is positive.



### Part numbering system

| P           | HB      | 5RO                     | V                              | 15   | 5          | -R               |
|-------------|---------|-------------------------|--------------------------------|--|------------|------------------|
| Family Code | Version | Voltage (V) R = Decimal | Configuration                  | Capacitance ( $\mu$ F)                       |            | Standard product |
|             |         |                         |                                | Value  | Multiplier |                  |
| P= Pack     |         | 5RO = 5.0 V             | V = Vertical<br>H = Horizontal | Example: 155 = 15 x 10 <sup>5</sup> or 1.5 F |            |                  |

### Packaging information

- Standard packaging: Bulk, 100 units per bag
- Larger bulk packages available on request

### Part marking

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

**Wave solder profile**



| Profile Feature                     | Standard SnPb Solder  | Lead (Pb) Free Solder  |
|-------------------------------------|---|--|
| Preheat and soak                    | <ul style="list-style-type: none"> <li>• Temperature max. (<math>T_{smax}</math>)</li> <li>• Time max.</li> </ul> | <ul style="list-style-type: none"> <li>100 °C</li> <li>60 seconds</li> </ul> |
| $\Delta$ preheat to max Temperature | 160 °C max.   | 160 °C max.  |
| Peak temperature ( $T_p$ )*         | 220 °C – 260 °C   | 250 °C – 260 °C  |
| Time at peak temperature ( $t_p$ )  | 10 seconds max<br>5 seconds max each wave   | 10 seconds max<br>5 seconds max each wave                                    |
| Ramp-down rate                      | ~ 2 K/s min<br>~3.5 K/s typ<br>~5 K/s max   | ~ 2 K/s min<br>~3.5 K/s typ<br>~5 K/s max                                    |
| Time 25 °C to 25 °C                 | 4 minutes   | 4 minutes  |

**Manual solder**

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

**Reflow soldering**

Do not use reflow soldering using infrared or convection oven heating methods.

**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.

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