

# KR Supercapacitors

## Coin cells



### Features and benefits

- High specific capacitance
- Low leakage current
- Long cycle life
- Eco-friendly

### Applications

- Computers and peripherals
- Network switches and routers
- Utility meters
- HVAC Controls
- Appliances and white goods
- Real-time clock backup
- Office equipment

### 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, life time 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 +70 °C.

\*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



*Powering Business Worldwide*

## Specifications<sup>1</sup>

|                                                   |                                                            |
|---------------------------------------------------|------------------------------------------------------------|
| Capacitance                                       | 0.1 F to 1.5 F                                             |
| Maximum working voltage                           | 5.5 V                                                      |
| Surge voltage <sup>3</sup>                        | 6.3 V                                                      |
| Capacitance tolerance                             | -20% to +80% +20 °C                                        |
| Operating temperature range <sup>2</sup>          | -25 °C to +70 °C                                           |
| Extended operating temperature range <sup>2</sup> | -25 °C to +85 °C (with voltage derating to 3.6 V @ +85 °C) |

## Standard Product

| Capacitance (F) | Part number   | Type        | Lead length | Maximum initial ESR (Ω) (Equivalent series resistance) measured @ 1 kHz | Typical mass (g) |
|-----------------|---------------|-------------|-------------|-------------------------------------------------------------------------|------------------|
| 0.1             | KR-5R5V104-R  | Vertical    | Standard    | 75                                                                      | 1.4              |
| 0.1             | KR-5R5H104-R  | Horizontal  | Standard    | 75                                                                      | 1.4              |
| 0.1             | KR-5R5C104-R  | Cylindrical | Standard    | 75                                                                      | 3.3              |
| 0.1             | KR-5R5C104H-R | Cylindrical | Short       | 75                                                                      | 3.3              |
| 0.22            | KR-5R5V224-R  | Vertical    | Standard    | 75                                                                      | 1.4              |
| 0.22            | KR-5R5H224-R  | Horizontal  | Standard    | 75                                                                      | 1.4              |
| 0.22            | KR-5R5C224-R  | Cylindrical | Standard    | 75                                                                      | 3.3              |
| 0.22            | KR-5R5C224H-R | Cylindrical | Short       | 75                                                                      | 3.3              |
| 0.33            | KR-5R5V334-R  | Vertical    | Standard    | 50                                                                      | 1.4              |
| 0.33            | KR-5R5H334-R  | Horizontal  | Standard    | 50                                                                      | 1.4              |
| 0.33            | KR-5R5C334-R  | Cylindrical | Standard    | 50                                                                      | 3.3              |
| 0.33            | KR-5R5C334H-R | Cylindrical | Short       | 50                                                                      | 3.3              |
| 0.47            | KR-5R5V474-R  | Vertical    | Standard    | 50                                                                      | 1.4              |
| 0.47            | KR-5R5H474-R  | Horizontal  | Standard    | 50                                                                      | 1.4              |
| 0.47            | KR-5R5C474-R  | Cylindrical | Standard    | 50                                                                      | 3.3              |
| 0.47            | KR-5R5C474H-R | Cylindrical | Short       | 50                                                                      | 3.3              |
| 1.0             | KR-5R5V105-R  | Vertical    | Standard    | 30                                                                      | 4.2              |
| 1.0             | KR-5R5H105-R  | Horizontal  | Standard    | 30                                                                      | 4.2              |
| 1.0             | KR-5R5C105-R  | Cylindrical | Standard    | 30                                                                      | 9.1              |
| 1.0             | KR-5R5C105H-R | Cylindrical | Short       | 30                                                                      | 9.1              |
| 1.5             | KR-5R5V155-R  | Vertical    | Standard    | 30                                                                      | 4.2              |
| 1.5             | KR-5R5H155-R  | Horizontal  | Standard    | 30                                                                      | 4.2              |
| 1.5             | KR-5R5C155-R  | Cylindrical | Standard    | 30                                                                      | 9.1              |
| 1.5             | KR-5R5C155H-R | Cylindrical | Short       | 30                                                                      | 9.1              |

## Performance

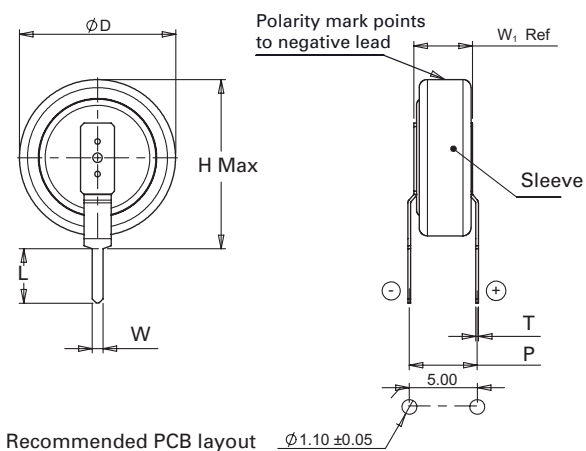
| Parameter                                   | Capacitance change (% of initial value) | ESR (% of maximum initial value) |
|---------------------------------------------|-----------------------------------------|----------------------------------|
| Life — +70 °C @ 5.5 Vdc, 1000 hours         | ≤ 30%                                   | ≤ 400%                           |
| Life — +85 °C @ 3.6 Vdc, 2000 hours         | ≤ 30%                                   | ≤ 400%                           |
| Storage Life — -25 °C to +70 °C, 1000 hours | ≤ 30%                                   | ≤ 400%                           |

1. Testing and verification of product under end application conditions is recommended
2. Not recommended for +85 °C/85% RH applications
3. Surge voltage: Maximum voltage, non-repetitive, 1 second maximum

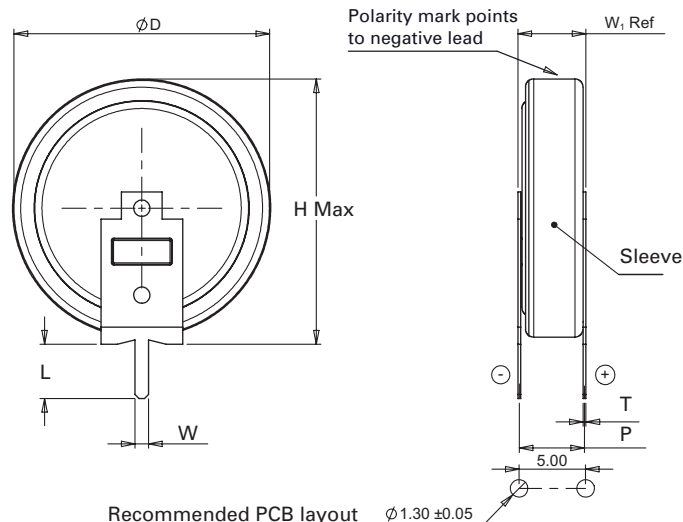
## Dimensions (mm)

### V Type (Vertical)

KR-5R5V104/224/334/474-R



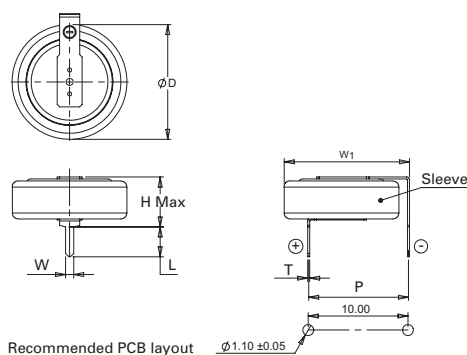
R-5R5V105/155-R



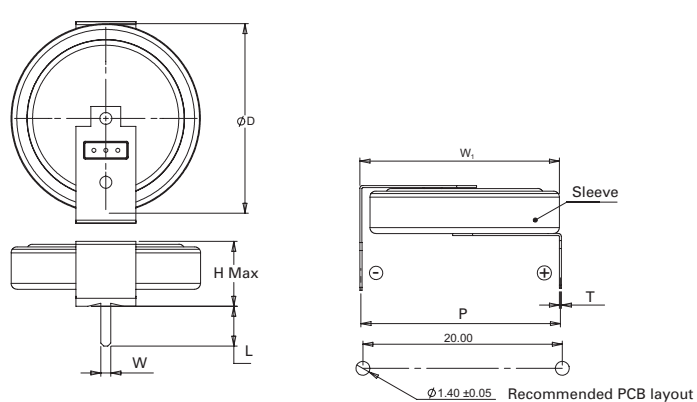
| Part Number  | Ø D ±0.2 | H Max | L ±0.1 | P ±0.3   | T   | W±0.1 | W1 Ref. |
|--------------|----------|-------|--------|----------|-----|-------|---------|
| KR-5R5V104-R | 11.5     | 12.7  | 4.0    | 5.0      | 0.2 | 0.8   | 4.3     |
| KR-5R5V224-R | 11.5     | 12.7  | 4.0    | 5.0      | 0.2 | 0.8   | 4.3     |
| KR-5R5V334-R | 11.5     | 12.7  | 4.0    | 5.0      | 0.2 | 0.8   | 4.3     |
| KR-5R5V474-R | 11.5     | 12.7  | 4.0    | 5.0      | 0.2 | 0.8   | 4.3     |
| KR-5R5V105-R | 19.0     | 19.7  | 4.0    | 5.0 ±0.5 | 0.2 | 1.0   | 5.0     |
| KR-5R5V155-R | 19.0     | 19.7  | 4.0    | 5.0 ±0.5 | 0.2 | 1.0   | 5.0     |

### H Type (Horizontal)

KR-5R5H104/224/334/474-R



KR-5R5H105/155-R

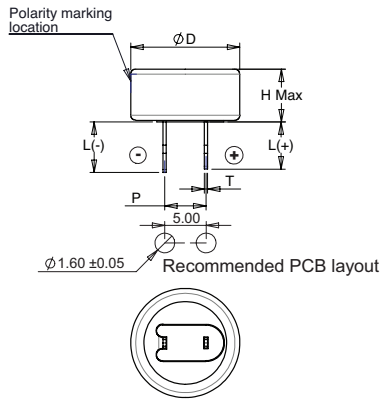


| Part Number  | Ø D ±0.2 | H Max | L ±0.1 | P        | T   | W±0.1 | W1 ±0.5. |
|--------------|----------|-------|--------|----------|-----|-------|----------|
| KR-5R5H104-R | 11.5     | 5.2   | 3.0    | 10.0±0.3 | 0.2 | 0.8   | 12.4     |
| KR-5R5H224-R | 11.5     | 5.2   | 3.0    | 10.0±0.3 | 0.2 | 0.8   | 12.4     |
| KR-5R5H334-R | 11.5     | 5.2   | 3.0    | 10.0±0.3 | 0.2 | 0.8   | 12.4     |
| KR-5R5H474-R | 11.5     | 5.2   | 3.0    | 10.0±0.3 | 0.2 | 0.8   | 12.4     |
| KR-5R5H105-R | 19.0     | 6.7   | 4.0    | 20.0±0.5 | 0.2 | 1.0   | 20.0     |
| KR-5R5H155-R | 19.0     | 6.7   | 4.0    | 20.0±0.5 | 0.2 | 1.0   | 20.0     |

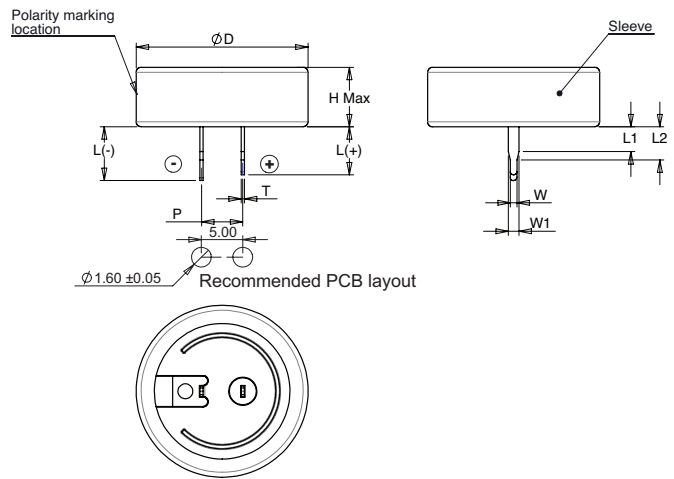
## Dimensions (mm)

### C Type (cylindrical)

KR-5R5C104/224/334/474-R



KR-5R5C105/155-R



| Part Number   | $\phi D$<br>Max | H<br>Max | L (-)<br>$\pm 0.2$ | L (+)<br>$\pm 0.2$ | P<br>$\pm 0.3$ | T<br>$\pm 0.05$ | L1<br>$\pm 0.10$ | L2<br>$\pm 0.10$ | W<br>$\pm 0.06$ | W1<br>$\pm 0.06$ |
|---------------|-----------------|----------|--------------------|--------------------|----------------|-----------------|------------------|------------------|-----------------|------------------|
| KR-5R5C104-R  | 13.5            | 6.5      | 6.1                | 5.7                | 5.0            | 0.4             | 3.0              | 4.0              | 0.8             | 1.3              |
| KR-5R5C104H-R | 13.5            | 6.5      | 3.3                | 3.3                | 5.0            | 0.4             | 0.9              | 1.9              | 0.8             | 1.3              |
| KR-5R5C224-R  | 13.5            | 6.5      | 6.1                | 5.7                | 5.0            | 0.4             | 3.0              | 4.0              | 0.8             | 1.3              |
| KR-5R5C224H-R | 13.5            | 6.5      | 3.3                | 3.3                | 5.0            | 0.4             | 0.9              | 1.9              | 0.8             | 1.3              |
| KR-5R5C334-R  | 13.5            | 6.5      | 6.1                | 5.7                | 5.0            | 0.4             | 3.0              | 4.0              | 0.8             | 1.3              |
| KR-5R5C334H-R | 13.5            | 6.5      | 3.3                | 3.3                | 5.0            | 0.4             | 0.9              | 1.9              | 0.8             | 1.3              |
| KR-5R5C474-R  | 13.5            | 6.5      | 6.1                | 5.7                | 5.0            | 0.4             | 3.0              | 4.0              | 0.8             | 1.3              |
| KR-5R5C474H-R | 13.5            | 6.5      | 3.3                | 3.3                | 5.0            | 0.4             | 0.9              | 1.9              | 0.8             | 1.3              |
| KR-5R5C105-R  | 21.5            | 7.1      | 6.5                | 5.8                | 5.0            | 0.4             | 3.0              | 4.0              | 0.8             | 1.3              |
| KR-5R5C105H-R | 21.5            | 7.1      | 3.3                | 3.3                | 5.0            | 0.4             | 0.8              | 1.8              | 0.8             | 1.3              |
| KR-5R5C155-R  | 21.5            | 7.1      | 6.5                | 5.8                | 5.0            | 0.4             | 3.0              | 4.0              | 0.8             | 1.3              |
| KR-5R5C155H-R | 21.5            | 7.1      | 3.3                | 3.3                | 5.0            | 0.4             | 0.8              | 1.8              | 0.8             | 1.3              |

## Part numbering system

| KR          | — | 5                                | R                                               | 5                                                | □ | □          | □                 | □                | H* | -R |
|-------------|---|----------------------------------|-------------------------------------------------|--------------------------------------------------|---|------------|-------------------|------------------|----|----|
| Family Code |   | Voltage (V)<br>R = Decimal point | Configuration                                   | Capacitance (μF)                                 |   | Multiplier | Short lead length | Standard product |    |    |
|             |   | Value                            |                                                 |                                                  |   |            |                   |                  |    |    |
|             |   | 5R5 = 5.5 V                      | V = Vertical<br>H = Horizontal<br>C=Cylindrical | Example: 474 = 47 x 10 <sup>4</sup> μF or 0.47 F |   |            |                   |                  |    |    |

\* Applies to cylindrical part numbers only. If ordering vertical or horizontal types, or standard lead length on cylindrical type, omit "H" from part number.

## Packaging information

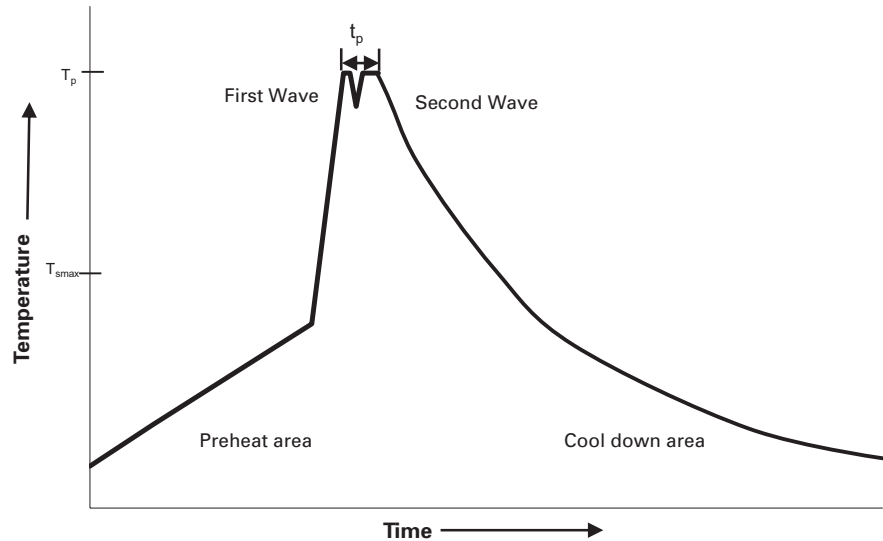
- Standard packaging: 500 parts per package
- For 0.1 F to 0.47 F, 500 parts per bag
- For 1.0 F to 1.5 F, 100 parts per tray, 5 trays per box

## Part marking

- Manufacturer
- Capacitance (F)
- Maximum operating voltage (V)
- Polarity

## Wave solder profile

**WARNING:** DO NOT EXCEED +100 °C BODY TEMPERATURE. PERMANENT DAMAGE MAY OCCUR



| Profile feature                     | Standard SnPb solder                      | Lead (Pb) Free solder                     |
|-------------------------------------|-------------------------------------------|-------------------------------------------|
| Preheat and soak                    |                                           |                                           |
| • Temperature max. ( $T_{smax}$ )   | 100 °C                                    | 100 °C                                    |
| • Time max                          | 60 seconds                                | 60 seconds                                |
| $\Delta$ preheat to max temperature | 160 °C max.                               | 160 °C max.                               |
| Peak temperature ( $T_p$ )*         | 235 °C – 260 °C                           | 250 °C – 260 °C                           |
| Time at peak temperature ( $t_p$ )  | 5 seconds max                             | 5 seconds max                             |
| 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

Do not touch the supercapacitor's external sleeve with the soldering rod or the sleeve will melt or crack. The recommended temperature of the soldering rod tip is less than +360 °C and the soldering duration should be less than 5 seconds. Minimize the time that the soldering iron is in direct contact with the terminals of the supercapacitor as excessive heating of the leads may lead to higher equivalent series resistance (ESR). Generally manual 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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