

# XLR-51 Supercapacitor

## 51 V, 188 F Rugged module



### Description

Eaton supercapacitors are high reliability, high power, ultra-high capacitance energy storage devices utilizing electrochemical 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 back up 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 micro-amps 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\*.

### Features

- Ultra low ESR provides high efficiency, high power
- Industry standard form factor for easy integration
- High power density to optimize system size and low operating costs
- Millions of charge/discharge cycles for life of application
- No heavy metals, RoHS compliant, non-hazardous energy storage
- Heavy duty metal housing for high vibration, high current applications
- IP65 environmental rating for high dust areas and water jet washable

### Applications

- Hybrid and electric vehicles
- Grid storage
- Commercial vehicles: trucks, mining, construction
- Automated guided vehicle (AGV)
- Trolley, subway
- Marine

\*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



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## Ratings

|                             |                                                            |
|-----------------------------|------------------------------------------------------------|
| Capacitance                 | 188 F                                                      |
| Maximum working voltage     | 51.3 V                                                     |
| Surge voltage               | 54.0 V                                                     |
| Capacitance tolerance       | 0% to +20% (+20 °C)                                        |
| Operating temperature range | -40 °C to +65 °C                                           |
| Extended temperature range  | -40 °C to +85 °C (with linear derating to 41.0 V @ +85 °C) |

## Specifications

| Capacitance (F) | Part number   | Maximum initial ESR <sup>1</sup><br>(mΩ) | Nominal leakage current <sup>2</sup><br>(mA) | Stored energy <sup>3</sup><br>(Wh) | Peak power <sup>4</sup><br>(kW) | Pulse current <sup>5</sup><br>(A) | Continuous current <sup>6</sup><br>(A) | Typical thermal resistance <sup>7</sup><br>Rth (°C/W) | Short circuit current <sup>8</sup><br>(A) |
|-----------------|---------------|------------------------------------------|----------------------------------------------|------------------------------------|---------------------------------|-----------------------------------|----------------------------------------|-------------------------------------------------------|-------------------------------------------|
| 188             | XLR-51R3187-R | 5.0                                      | 8.0                                          | 68.7                               | 131.6                           | 2485                              | 86                                     | 0.4                                                   | 10200                                     |

## Performance

| Parameter (F)                                | Capacitance change<br>(% of initial value) | ESR (% of maximum<br>initial value) |
|----------------------------------------------|--------------------------------------------|-------------------------------------|
| Life (1500 hours @ +65 °C/51.3 Vdc)          | ≤ 20%                                      | ≤ 200%                              |
| Storage – 3 years (uncharged, +30 °C)        | ≤ 5%                                       | ≤ 10%                               |
| Cycling life <sup>9</sup> (1,000,000 cycles) | ≤ 20%                                      | ≤ 200%                              |

1. Capacitance, 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 (Wh) =  $\frac{0.5 \times C \times V^2}{3600}$

4. Peak Power (W) =  $\frac{V^2}{4 \times \text{ESR}}$

5. Pulse current in Amps (A), 1 second discharge from maximum working voltage to half rated voltage. =  $\frac{0.5 \times V \times C}{(1 + \text{ESR} \times C)}$

6. Continuous current with a 15 °C temperature rise. Continuous current (A) =  $\sqrt{\frac{P}{\text{ESR} \times R_{th}}}$

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.

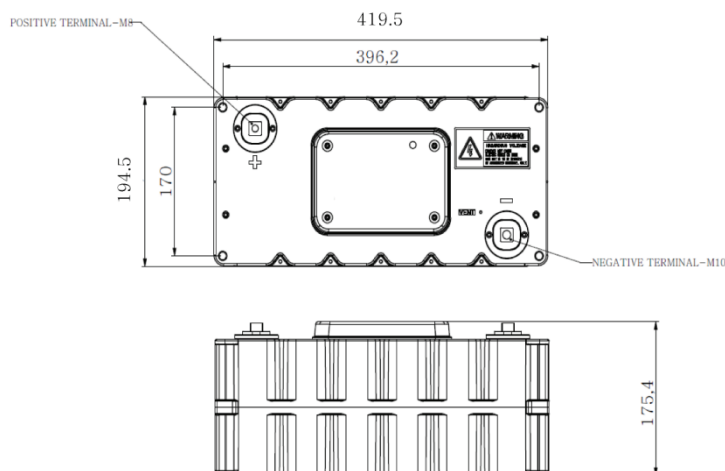
9. Cycling between maximum working voltage and half voltage with 3 seconds rest at +25 °C.

## Standards and certifications

|                     |                                                                         |
|---------------------|-------------------------------------------------------------------------|
| Regulatory          | E-mark (UN-ECE Regulation 10 - Rev. 5 & UN-ECE Regulation 100 - Rev. 2) |
| Shock and vibration | IEC 61373 Cat. 1, Class B, SAE J2380, ISO16750-3 Table 14, SAE J2464    |
| Warnings            | Do not overvoltage, do not reverse polarity.                            |
| Environmental       | IP65, RoHS                                                              |
| Shipping            | UN3499, <10 Wh, Non-hazardous when shipped with shorting wire.          |

## Dimensions (mm) and Mass (kg)

| Part Number   | W (max) | L (max) | H (max) | Typical Mass (kg) |
|---------------|---------|---------|---------|-------------------|
| XLR-51R3187-R | 177     | 421     | 196     | 14.7              |



## Part numbering system

| XLM               | — 51R3                    | 18                                           | 7          | -R               |
|-------------------|---------------------------|----------------------------------------------|------------|------------------|
| Family Code       | Voltage (V)<br>R= decimal | Capacitance (μF)                             |            |                  |
|                   |                           | Value                                        | Multiplier |                  |
| XLR = Family code | 51R3= 51.3 V              | Example 188=18 x 10 <sup>7</sup> μF or 188 F |            | Standard product |

## Packaging information

- Standard packaging: 1 piece per box

## Part marking

- Manufacturer
- Capacitance (F)
- Maximum operating voltage (V)
- Part number
- Polarity
- Serial number

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