

HS/HSL Supercapacitors

Hybrid cylindrical cells



Description

Eaton hybrid supercapacitors are high reliability, high power, ultra-high capacitance energy storage devices utilizing 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 hundreds of watts.

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 -25 °C (HSL) and up to +85 °C (HS)

Features and benefits

- 3.8 V operating voltage for high energy
- Low ESR for high power density
- Up to 8 times energy density compared to standard supercapacitors
- Low self discharge ideal for use with batteries
- UL recognized (10, 25, and 150 F pending)

Applications

- Industrial backup/ride through
- Backup for storage servers
- Water and gas smart meters
- IoT energy storage
- Medical backup power/alarm
- Commercial trucks/containers asset tracking

Environmental compliance



Agency information



*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

Ratings

| | |
|--------------------------------------|---|
| Capacitance | 10 F to 220 F |
| Working voltage | 3.8 V |
| Minimum working voltage | 2.2 V |
| Surge voltage | 4.0 V |
| Capacitance tolerance | -20% to +20% (+20 °C) |
| Operating temperature range | HSL: -25 °C to +60 °C HS: -15 °C to +70 °C |
| Extended operating temperature range | HS: -15 °C to +85 °C (with linear voltage derating to 3.5 V @ +85 °C) |

Specifications

| Capacitance ¹ (F) | Part number | Maximum initial ESR ¹ (mΩ) | Continuous current ⁵ (A) | Peak current ⁵ (A) | Nominal leakage current ² (μA) HS/HSL | Peak power ⁴ (W) | Stored energy ³ (mWh) | Short circuit current ^{**7} (A) |
|------------------------------|---------------------|---------------------------------------|-------------------------------------|-------------------------------|--|-----------------------------|----------------------------------|--|
| 10 | HS/HSL0814-3R8106-R | 1500 | 0.075 | 1.0 | 2.0/3.0 | 2.4 | 13.3 | 2.5 |
| 25 | HS/HSL0820-3R8256-R | 650 | 0.125 | 2.3 | 2.5/3.3 | 5.5 | 33.3 | 5.8 |
| 30 | HS/HSL1016-3R8306-R | 550 | 0.15 | 2.7 | 3.0/4.0 | 6.6 | 40 | 7.0 |
| 50 | HS/HSL1020-3R8506-R | 450 | 0.25 | 3.4 | 4.0/5.0 | 8.0 | 67 | 9.0 |
| 70 | HS/HSL1025-3R8706-R | 250 | 0.35 | 6.1 | 5.0/8.0 | 14 | 93 | 15 |
| 120 | HS/HSL1225-3R8127-R | 200 | 0.6 | 7.7 | 7.0/12 | 18 | 160 | 19 |
| 150 | HS/HSL1040-3R8157-R | 140 | 0.75 | 10.9 | 9.0/16 | 26 | 200 | 27 |
| 220 | HS/HSL1625-3R8227-R | 100 | 1.1 | 15.3 | 12/25 | 36 | 293 | 38 |

** Repeated short circuit current will permanently damage the leads.

Performance

| Parameter | Capacitance change (% of initial value) | ESR (% of maximum initial value) |
|--|---|----------------------------------|
| Lifetime: (1000 hours, rated voltage, maximum operating temperature) | ≤ 30% | ≤ 200% |
| Charge/discharge cycles ⁸ : HS: (500,000 at +20 °C), HSL: (250,000 at +20 °C) | ≤ 30% | ≤ 200% |
| Storage: (3 years, uncharged, <+35 °C) | ≤ 5% | ≤ 10% |

1. Capacitance, Equivalent series resistance (ESR) and Leakage current are measured according to IEC62391-1

2. Leakage current at +20 °C after 72 hour charge and hold.

3. Stored energy (mWh) = $\frac{0.5 \times (V_{rated}^2 - V_{min}^2) \times C}{3600} \times 1000$

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

5. Pulse current for 1 second from full rate voltage to minimum rated voltage.(A) = $\frac{(V_{rated} - V_{min}) \times C}{(1 + ESR \times C)}$

6. Continuous current with a 15 °C temperature rise.

7. Short circuit current is for safety information only. Do not use as operating current.

8. Cycling between rated voltage and 2.5 V, 3 second rest at +20 °C.

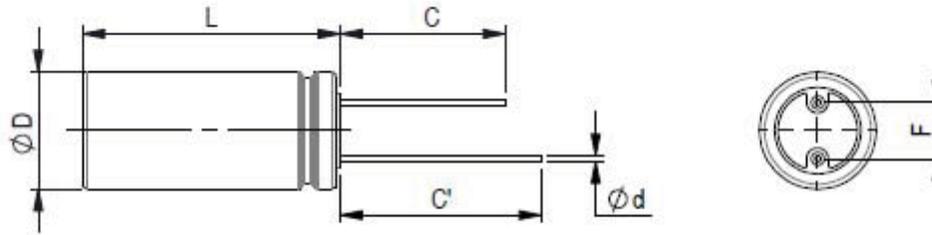
Note: Do not discharge supercapacitors below minimum working voltage.

Safety and certifications

| | |
|--------------------------|---|
| Agency information | UL810a |
| Shock and vibration | MIL-STD 202G |
| Environmental compliance | RoHS, REACH, lead free, halogen free |
| Warnings | Do not overvoltage, do not reverse polarity |
| Shipping | No restrictions, per UN 3508 with all cells <0.3 watt-hours |

Dimensions (mm)

| Part number | ØD maximum | L maximum | F ±0.5 | Ød ±0.05 | C minimum | C' minimum |
|---------------------|------------|-----------|--------|----------|-----------|------------|
| HS/HSL0814-3R8106-R | 8.5 | 15.5 | 3.5 | 0.6 | 19 | 22 |
| HS/HSL0820-3R8256-R | 8.5 | 22 | 3.5 | 0.6 | 19 | 22 |
| HS/HSL1016-3R8306-R | 10.5 | 18 | 5 | 0.6 | 22 | 27 |
| HS/HSL1020-3R8506-R | 10.5 | 22 | 5 | 0.6 | 22 | 27 |
| HS/HSL1025-3R8706-R | 10.5 | 27 | 5 | 0.6 | 22 | 27 |
| HS/HSL1225-3R8127-R | 12.9 | 27 | 5 | 0.6 | 22 | 27 |
| HS/HSL1040-3R8157-R | 10.5 | 42 | 5 | 0.6 | 19 | 22 |
| HS/HSL1625-3R8227-R | 16.5 | 27 | 7.5 | 0.8 | 22 | 27 |



Longer lead is positive

Part numbering system

| HS | 1020 | -3R8 | 50 | 6 | -R | |
|--------------------------------|---------------------|-------------|----------------------------|--|------------|------------------|
| Family code | Size reference (mm) | | Voltage (V) R = decimal | Capacitance (µF) Value | Multiplier | Standard product |
| HS/HSL = Hybrid supercapacitor | Diameter = 10 | Length = 20 | 3R8 = 3.8 V | Example 506= 50 x 10 ⁶ µF or 50 F | | |

Part marking

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

Packaging information

- Bulk

Manual solder only (Wave and reflow soldering not recommended)

+350 °C (4-5 seconds by soldering iron)

Cleaning/Washing

No clean soldering recommended. Do not wash the supercapacitors..

Life Support Policy: Eaton does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

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Publication No. 11043
November 2021

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