

# XL60 Supercapacitors

## Cylindrical cells



### Description

Eaton supercapacitors are unique, ultra-high capacitance devices utilizing electric 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. The XL60 supercapacitor cells offers high energy and power in a standardized form factor. Terminal design is optimized for high reliability and low contact resistance.

### Features and benefits

- Long life energy storage, up to 20 years\*
- Ultra low ESR for very high power density
- Wide operating temperature range
- Maintenance free
- Cost effective backup power and large energy recapture
- Low operating costs
- High efficiency (>98%) under broad environmental conditions
- High reliability, green solution
- UL recognized (3000 F/2.7 V)

### Applications

- Backup power
- Peak power shaving, pulse power
- Engine starting
- Energy capture and re-use (Hybrids) for automotive, trucks, mining and construction, equipment, cranes
- Remote power for sensors, LEDs, switches

\* 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<sup>10</sup>

Capacitance	3000 F to 3400 F
Maximum working voltage	2.70 V / 2.85 V / 3.00 V
Surge voltage	2.85 V / 3.00 V / 3.20 V
Capacitance tolerance	0% to +20%
Operating temperature range	-40 °C to +65 °C
Extended operating temperature range	-40 °C to +85 °C (with voltage derating to 2.3 V / 2.4 V / na V @ +85 °C)

## Specifications

Capacitance <sup>1</sup> (F)	Part number	Maximum working voltage (V)	Maximum initial ESR <sup>1</sup> (mΩ)	Nominal leakage current <sup>2</sup> (mA)	Stored energy <sup>3</sup> (Wh)	Peak power <sup>4</sup> (W)	Pulse current <sup>5</sup> (A)	Continuous current <sup>6</sup> (A)	Typical thermal resistance <sup>7</sup> Rth (°C/W)	Short circuit current <sup>8</sup> (A)
3000	XL60-2R7308W-R	2.70	0.23	5.0	3.0	7,900	2,400	143	3.2	11,700
3000	XL60-2R7308T-R	2.70	0.23	5.0	3.0	7,900	2,400	143	3.2	11,700
3400	XL60-2R9348W-R	2.85	0.23	8.0	3.8	8,800	2,700	143	3.2	12,400
3400	XL60-2R9348T-R	2.85	0.23	8.0	3.8	8,800	2,700	143	3.2	12,400
3000	XL60-3R0308W-R	3.00	0.23	7.0	3.8	9,700	2,400	143	3.2	13,000
3000	XL60-3R0308T-R	3.00	0.23	7.0	3.8	9,700	2,400	143	3.2	13,000

## Performance

Parameter	Capacitance change (% of initial value)	ESR (% of initial maximum value)
Lifetime — 1,500 hours at maximum rated voltage and operating temperature	≤ 20%	≤ 200%
Lifetime — 1,000 hours at maximum rated voltage and operating temperature (3.0 V/3000 F)	≤ 20%	≤ 200%
Charge/discharge cycling <sup>9</sup> — 1 million at +25 °C	≤ 20%	≤ 200%
Storage, uncharged, up to +35 °C — 3 years	≤ 5%	≤ 10%

1. Capacitance, Equivalent series resistance (ESR) and leakage current are measured according to IEC62391-1 with current in milliamps (mA) =  $8 \times C \times V$ .

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

3. Stored 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 for 1 second from full rate voltage to half voltage. (A) =  $\frac{0.5 \times V \times C}{(1 + \text{ESR} \times C)}$

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

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.

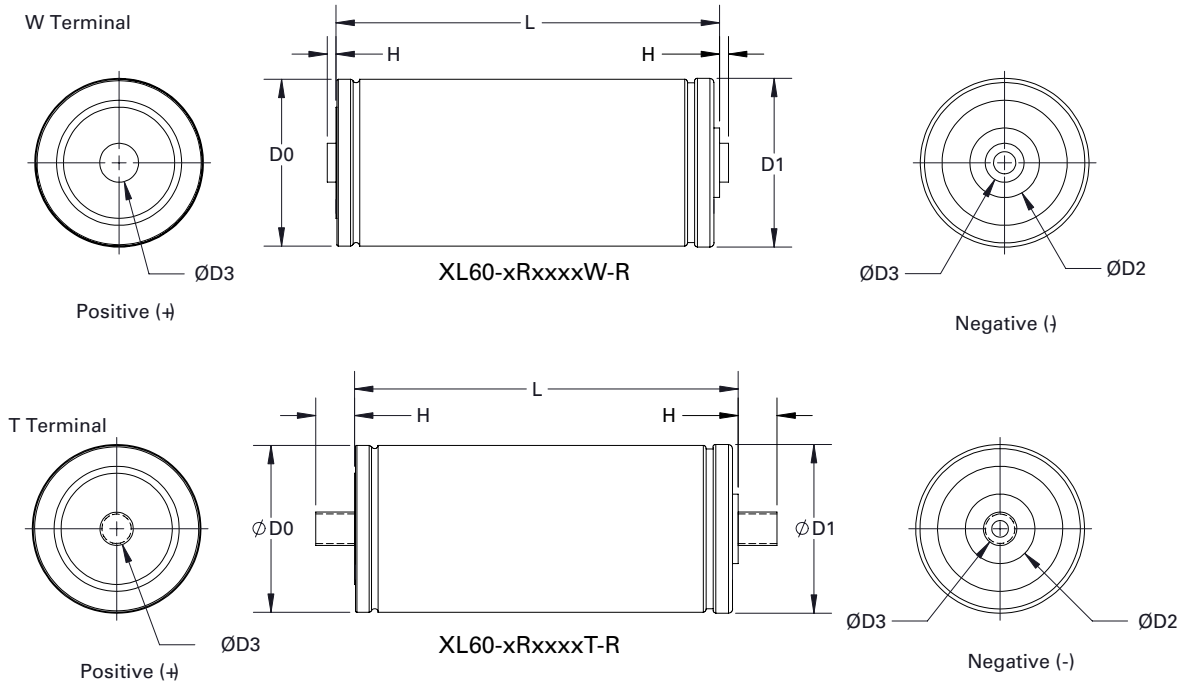
9. Cycling between maximum working voltage and half voltage with 3 seconds rest at +25 °C, 100 A.

10. Testing and verification of product under end application conditions is recommended

## Safety and certifications

Agency information	UL Recognized (3000 F/2.7 V), Guide BBBG2, File MH46887
Shock and vibration	IEC 61373 Category 1, Class B, IEC 60068-2-6
Safety	UL 810A
Environmental	RoHS compliant, lead free, halogen free
Altitude, Operating	10,000 ft
Altitude, Non-operating	40,000 ft

**Dimensions (mm)**



Part number	D0 (±0.3)	D1 (±0.7)	D2 (±0.1)	D3 (±0.1)	H (±0.125)	L (±0.5)	Typical mass (g)
XL60-xRxxxxW-R	60.3	60.7	25.0	Ø14.0	3.18	138.0	525
XL60-xRxxxxT-R	60.3	60.7	25.0	M12, P1.75	14.0	138.0	515

**Part numbering system**

XL	60	-2R7	30	8	-R
Family code	Size reference (mm)	Voltage (V) R = decimal	Capacitance (µF) Value	Multiplier	Standard product
XL = Family Code	Diameter = 60	2R7 = 2.7 V	Example 308 = 30 x 10 <sup>8</sup> µF or 3,000 F		

**Packaging information**

- Standard packaging: Bulk, 20 parts per box

**Part Marking**

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

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