

XT Supercapacitors

Snap-in cylindrical cells



Features and benefits

- 3.0 V operating voltage for high power and energy
- Ultra low ESR for very high power density
- Large capacitance for high energy density
- UL recognized

Applications

- Industrial backup/ridethrough
- Energy storage for UPSs
- Automotive pulse power
- Medical equipment pulse power

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 seconds.

The XT family advances the energy density by 20% and power density by 10%. These advances allow longer operating life and/or lower cost systems.



Powering Business Worldwide

Ratings

| | |
|--------------------------------------|---|
| Capacitance | 275 F to 555 F |
| Working voltage | 3.0 V |
| Surge voltage | 3.3 V |
| Capacitance tolerance | -5% to +20% (+20 °C) |
| Operating temperature range | -40 °C to +65 °C |
| Extended operating temperature range | -40 °C to +85 °C (with linear voltage derating to 2.6 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 (mA) | Peak power ⁴ (W) | Stored energy ³ (mWh) | Typical thermal resistance ⁷ Rth (°C/W) | Short circuit current ^{**8} (A) |
|------------------------------|-----------------|---------------------------------------|-------------------------------------|-------------------------------|---|-----------------------------|----------------------------------|--|--|
| 275 | XT3550-3R0287-R | 4.5 | 20.4 | 184 | 0.60 | 500 | 344 | 8 | 670 |
| 370 | XT3560-3R0377-R | 3.2 | 25.9 | 254 | 0.85 | 700 | 463 | 7 | 940 |
| 555 | XT3585-3R0567-R | 2.6 | 33.0 | 341 | 1.30 | 870 | 694 | 5 | 1150 |

** Short circuit will cause permanent damage to the leads

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% |
| Charge/discharge cycling ⁹ — 500,000 at +20 °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.

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

3. Stored Energy (mWh) = $\frac{0.5 \times C \times V^2 \times 1000}{3600}$

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

5. Peak 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) = $\sqrt{\frac{\Delta T}{\text{ESR} \times \text{Rth}}}$

7. Thermal resistance (Rth) cell body temperature to ambient in open air in degrees C per Watt (°C/W).

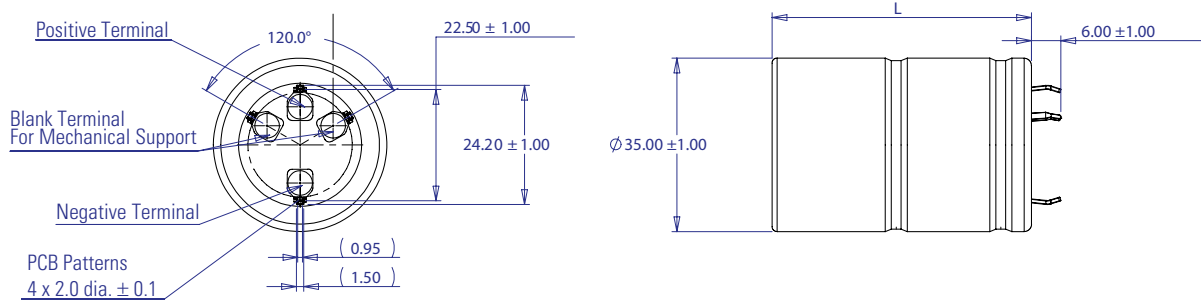
8. Short circuit current is for safety information only. Do not use as operating current.

9. Cycling between maximum working voltage and half voltage with 3 seconds rest at +20 °C.

Safety and Certifications

| | |
|---------------------|---|
| Agency information | UL810a |
| Shock and vibration | MIL-STD-202G |
| Environmental | RoHS and REACH compliant, lead free, halogen free, |
| Warnings | Do not overvoltage, do not reverse polarity |
| Shipping | No restrictions, per UN3499 with all cells <10 watt-hours |

Dimensions (mm) and Mass (g)



| Part Number | L (±1.0) | Typical Mass (g) |
|-----------------|----------|------------------|
| XT3550-3R0287-R | 53 | 62 |
| XT3560-3R0377-R | 63 | 72 |
| XT3585-3R0567-R | 87.5 | 108 |

Part numbering system

| XT | 3560 | -3R0 | 37 | 7 | -R | |
|------------------|---------------------|-------------|----------------------------|--|------------|------------------|
| Family code | Size reference (mm) | | Voltage (V) R = decimal | Capacitance (µF) Value | Multiplier | Standard product |
| XT = Family Code | Diameter = 35 | Length = 60 | 3R0 = 3.0 V | Example 377 = 37 x 10 ⁷ µF or 275 F | | |

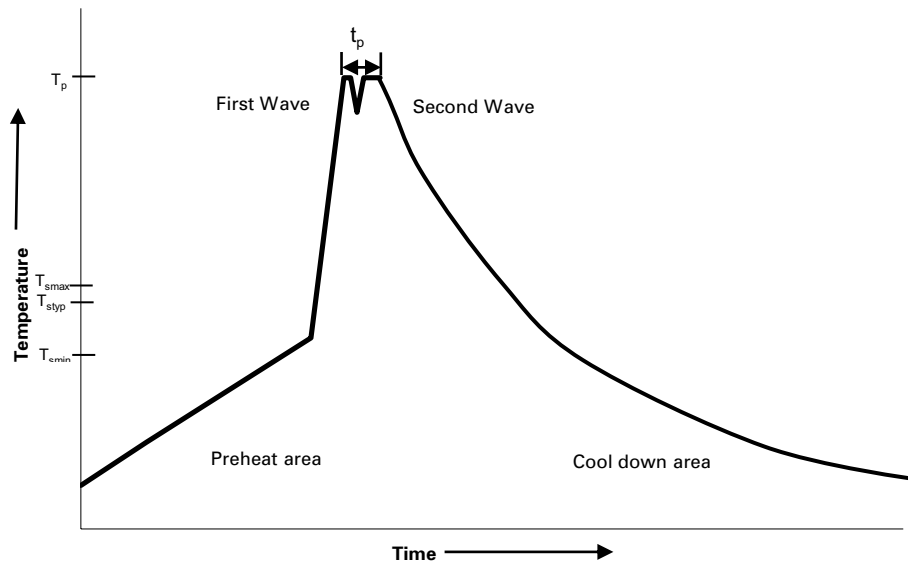
Packaging information

- Standard packaging: Bulk, 20 parts per box

Part Marking

- Manufacturer
- Capacitance (F)
- Maximum working voltage (V)
- Family code or part number
- Polarity
- 2D matrix serial code

Wave solder profile



| Profile Feature | Standard SnPb Solder | Lead (Pb) Free Solder |
|-------------------------------------|--|---|
| Preheat and soak | • Temperature max. (T_{smax}) • Time max. | 100 °C 60 seconds |
| Δ 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 5 seconds max each wave | 10 seconds max 5 seconds max each wave |
| Ramp-down rate | ~ 2 K/s min ~3.5 K/s typ ~5 K/s max | ~ 2 K/s min ~3.5 K/s typ ~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.

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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