HB Supercapacitors

Cylindrical cells



Features

- Ultra low ESR for high power density
- UL recognized

Applications

- Electric, Gas, Water smart meters
- Controllers
- RF radio power
- Solar capture
- Storage servers
- Pulse power
- Backup power

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 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 -25 °C and up to +85 °C.

Ratings

Capacitance	3.0 F to 110 F
Maximum working voltage	2.5 V
Surge voltage	2.8 V
Capacitance tolerance	-10% to +30% (+20 °C)
Operating temperature range	-25 °C to +70 °C
Extended temperature range	-25 °C to +85 °C (with linear voltage derating to 2.3 V @ +85 °C)

Specifications

Capacitance (F)	Part Number	Maximum Initial ESR[1] (Ω)	Nominal Leakage Current[2] (µA)	Stored Energy[3] (mWh)	Peak Power[4] (W)	Pulse Current[5] (A)	Continuous Current[6] (A)	Typical Thermal Resistance[7], Rth (°C/W)	Short Circuit Current[8] (A)
3	HB0820-2R5305-R	0.160	7.0	2.6	9.8	1.0	1.1	76	16
5	HB1020-2R5505-R	0.100	11	4.3	16	3.0	1.4	73	25
6	HB0830-2R5605-R	0.100	11	5.2	16	6.0	1.8	47	25
10	HB1030-2R5106-R	0.060	20	8.7	26	5.2	2.5	40	42
15	HB1325-2R5156-R	0.050	22	13	31	9.3	2.4	53	50
25	HB1625-2R5256-R	0.040	28	22	39	13	2.8	47	63
35	HB1635-2R5356-R	0.030	32	30	52	19	3.6	39	83
60	HB1840-2R5606-R	0.025	47	52	63	26	4.8	26	100
110	HB1860-2R5117-R	0.020	180	95	78	24	8.7	10	125**

** Repeated short circuit current will permanently damage the leads and cause an open failure.

Performance

Parameter	Capacitance change (% of initial value)	ESR (% of maximum initial value)
Life (1000 hours @ +70 °C @ 2.5 Vdc)	≤ 30%	≤ 200%
Storage (3 years, uncharged, <+35 °C)	≤ 5%	≤ 110%
Cycle Life[9] (500,000 cycles)	≤ 30%	≤ 200%

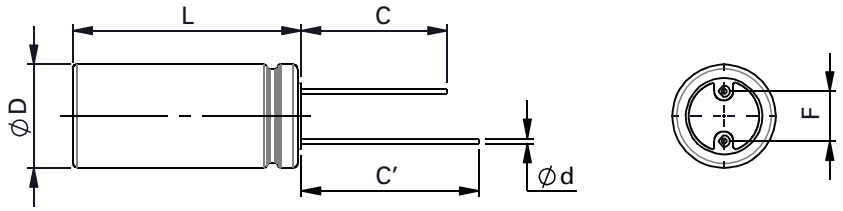
1. Capacitance and Equivalent Series Resistance (ESR) measured according to IEC62391-1 at +20 °C, with current in milliamps (mA) = 8*C*V
2. Leakage current at 20 °C after 72 hour charge and hold
3. Energy (mWh) = $\frac{½*C*V2\ *1000}{3600}$
4. Peak Power (W) = $\frac{V^2}{4*ESR}$
5. Pulse Current in Amps (A), 1 second discharge from rated voltage to half rated voltage = $\frac{½*C*V}{(1+ESR*C)}$
6. Continuous current with a 15 °C temperature rise. Continuous current (A) = $\sqrt{\frac{\Delta T}{ESR \times Rth}}$
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 rated voltage and half voltage, 3 seconds rest at +20 °C

Safety and Certifications

Regulatory	UL810a,RoHS
Warnings	Do not overvoltage, do not reverse polarity
Shipping	UN3499, <0.3Wh, Non-hazardous goods

Dimensions (mm)

Part Number	ØD nominal	ØD maximum	L maximum	F ±0.50	Ød ±0.02	C minimum	C′ minimum	Typical mass (grams/pieces)
HB0820-2R5305-R	8	8.5	21	3.5	0.5	20	25	1.5
HB1020-2R5505-R	10	10.5	22.3	5	0.6	20	25	2.4
HB0830-2R5605-R	8	8.5	31	3.5	0.5	20	25	2.4
HB1030-2R5106-R	10	10.5	31.5	5	0.6	20	25	3.5
HB1325-2R5156-R	13	13.5	28.4	5	0.6	20	25	4.8
HB1625-2R5256-R	16	16.5	28.4	7.5	0.8	20	25	8.2
HB1635-2R5356-R	16	16.5	38	7.5	0.8	20	25	9.8
HB1840-2R5606-R	18	18.5	42	7.5	0.8	20	25	13.8
HB1860-2R5117-R	18	18.5	60.5	7.5	0.8	20	25	22



Longer lead is positive

Part numbering system

HB	1860		–2R5	11	7	-R
Family Code	Size reference (mm)		Voltage (V) R = decimal	Capacitance (µF) Value	Multiplier	Standard product
HB = Family Code	Diameter = 18	Length = 60	2R5 = 2.5 V	Example 117= 11 x 10^7 µF or 110 F		

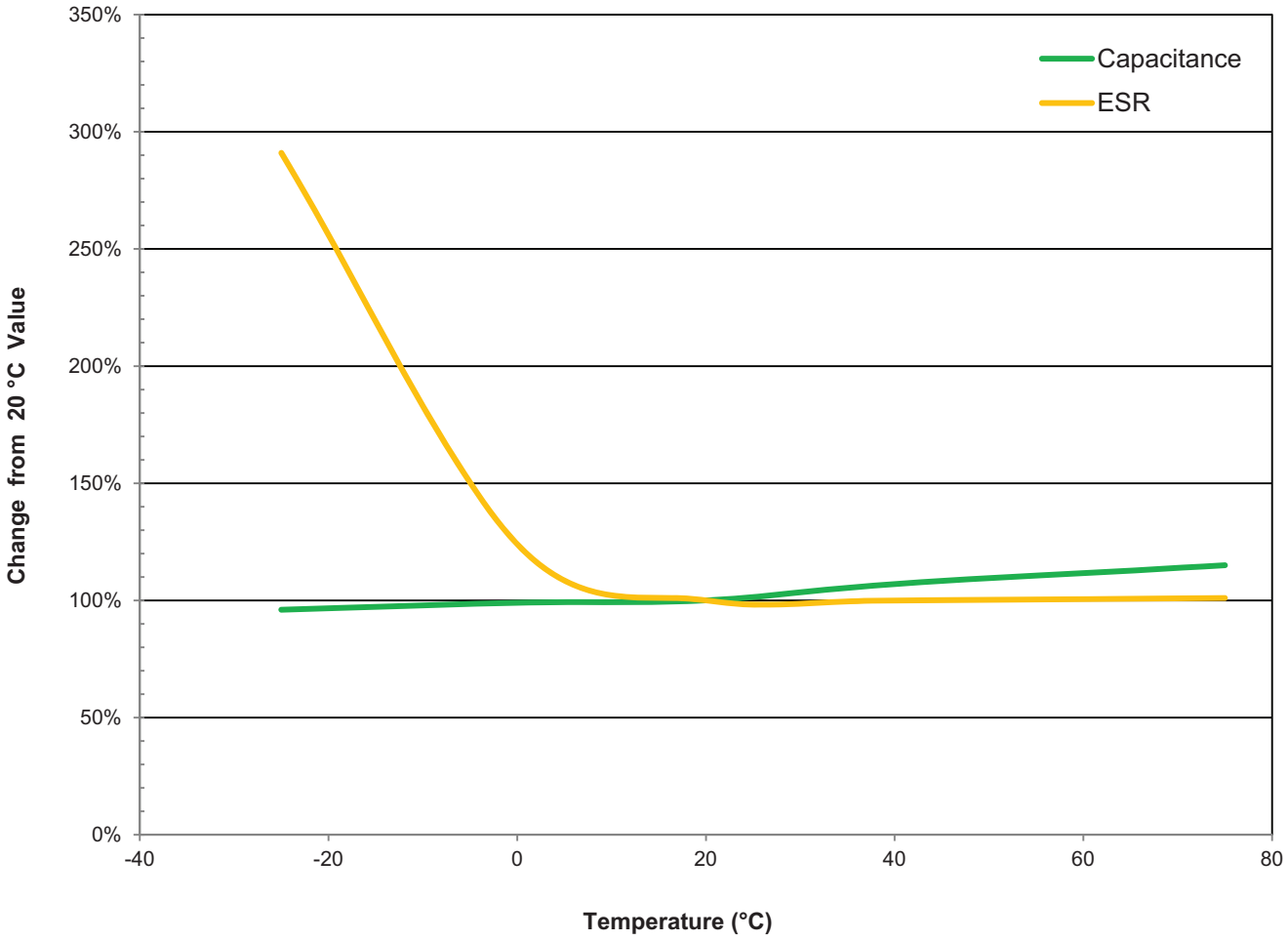
Packaging information

- Standard packaging: Bulk, 100 units per bag (8 mm - 13 mm diameter)
- 16 mm - 18 mm diameter products: Bulk package quantity varies by size.

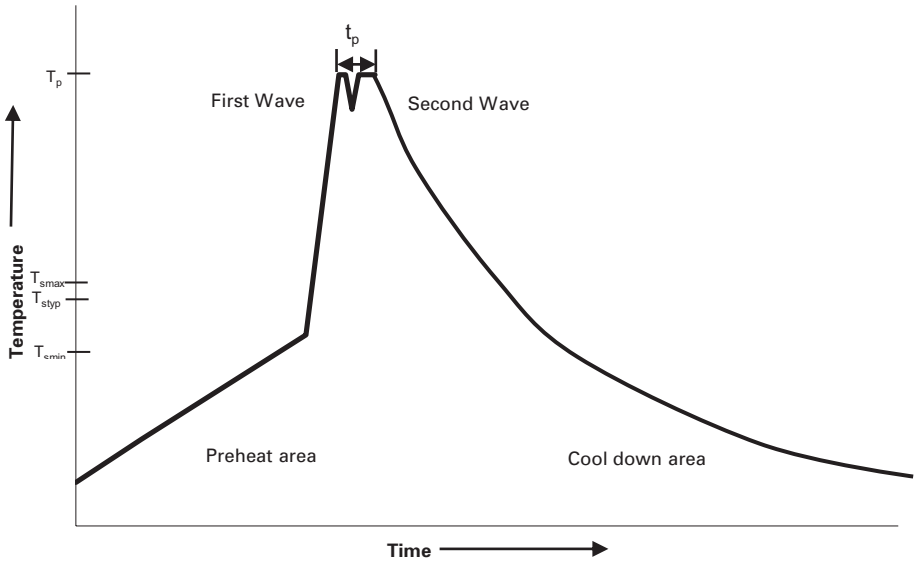
Part marking

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

Temperature vs. Capacitance and ESR



Wave solder profile



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
Δ preheat to max Temperature	160 °C max.	160 °C max.
Peak temperature (Tp)*	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.

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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