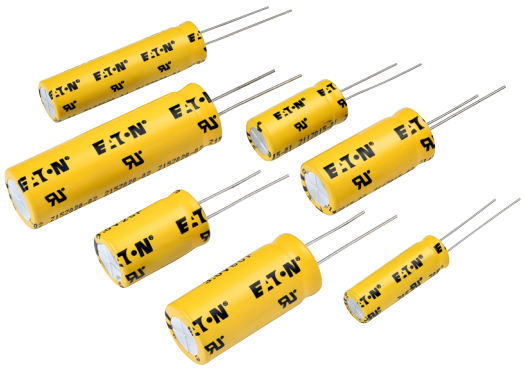
TV Supercapacitors

Cylindrical cells



Features

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

Applications

- Electric, Gas, Water smart meters
- RF radio pulse power
- Storage server
- Industrial backup / ride through
- Pulse power
- Solar capture

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 -40 °C and up to +85 °C.

Ratings

Capacitance	6 F to 100 F
Maximum working voltage	3.0 V
Surge voltage	3.3 V
Capacitance tolerance	-10% to +30% (+20 °C)
Operating temperature range	-40 °C to +65 °C
Extended temperature range	-40 °C to +85 °C (with linear voltage derating to 2.5 V @ +85 °C)

Specifications

Capacitance (F)	Part Number	Maximum Initial ESR[1] (Ω)	Nominal Leakage Current[1,2] (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)
6	TV1020-3R0605-R	0.035	13	7.5	64.3	7.4	2.4	73	86
10	TV1030-3R0106-R	0.026	25	12.5	86.5	12	3.7	40	115
15	TV1325-3R0156-R	0.024	35	18.8	94	17	3.4	53	125
25	TV1625-3R0256-R	0.018	60	31.3	125	26	4.2	47	167
34	TV1245-3R0346-R	0.016	75	42.5	141	33	6.5	22	188**
35	TV1635-3R0356-R	0.015	90	43.8	150	34	5.1	39	200**
60	TV1840-3R0606-R	0.013	135	75	173	51	6.7	26	231**
100	TV1860-3R0107-R	0.011	225	125	205	71	11.7	10	273**

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

Performance

Parameter	Capacitance change (% of initial value)	ESR (% of maximum initial value)
Lifetime: (1000 hours at maximum temperature and voltage)	≤ 30%	≤ 200%
Charge/Discharge Cycles[9]: (500,000 at +20 °C)	≤ 30%	≤ 200%
Storage: (3 years, uncharged, <35 °C)	≤ 5%	≤ 10%

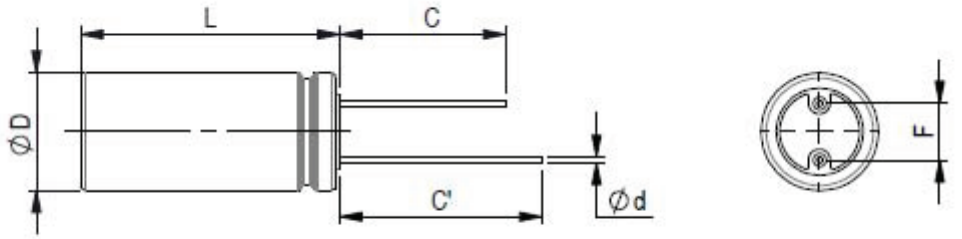
1. Capacitance, Equivalent Series Resistance (ESR) and Leakage current are measured according to IEC62391-1 with current in milliamps (mA) = 8 x C x V.
2. Leakage current at +20 °C after 72 hour charge and hold.
3. Stored Energy (mWh) = $\frac{0.5 \times C \times V^2}{3600} \times 1000$
4. Peak Power (W) = $\frac{V^2}{4 \times ESR}$
5. Pulse current for 1 second from full rate voltage to half voltage.(A) = $\frac{0.5 \times V \times C}{(1 + ESR \times C)}$
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 second rest at +20 °C.

Safety and Certifications

Regulatory	UL810a, RoHS, REACH
Shock and vibration	MIL-STD 202G
Warnings	Do not overvoltage, do not reverse polarity
Shipping	No restrictions, per UN3499 with all cells <0.3 watt-hours

Dimensions (mm) and Mass (g)

Part Number	ØD maximum	L maximum	F ±0.5	Ød ±0.02	C minimum	C′ minimum	Mass (typical)
TV1020-3R0605-R	10.5	22.3	5	0.6	20	25	2.3
TV1030-3R0106-R	10.5	31.5	5	0.6	20	25	3.2
TV1325-3R0156-R	13.5	28.4	5	0.6	20	25	4.5
TV1625-3R0256-R	16.5	28.4	7.5	0.8	20	25	7.3
TV1245-3R0346-R	12.9	49	5	0.6	20	25	8
TV1635-3R0356-R	16.5	38	7.5	0.8	20	25	9.3
TV1840-3R0606-R	18.5	42	7.5	0.8	20	25	13
TV1860-3R0107-R	18.5	60.5	7.5	0.8	20	25	20



Longer lead is positive

Part numbering system

TV	1860		–3R0	60	6	-R
Family code	Size reference (mm)		Voltage (V) R = decimal	Capacitance (µF) Value	Multiplier	RoHS compliant
TV = Family Code	Diameter = 18	Length = 60	3R0 = 3.0 V	Example 606= 60 x 10^6 µF o r 60 F		

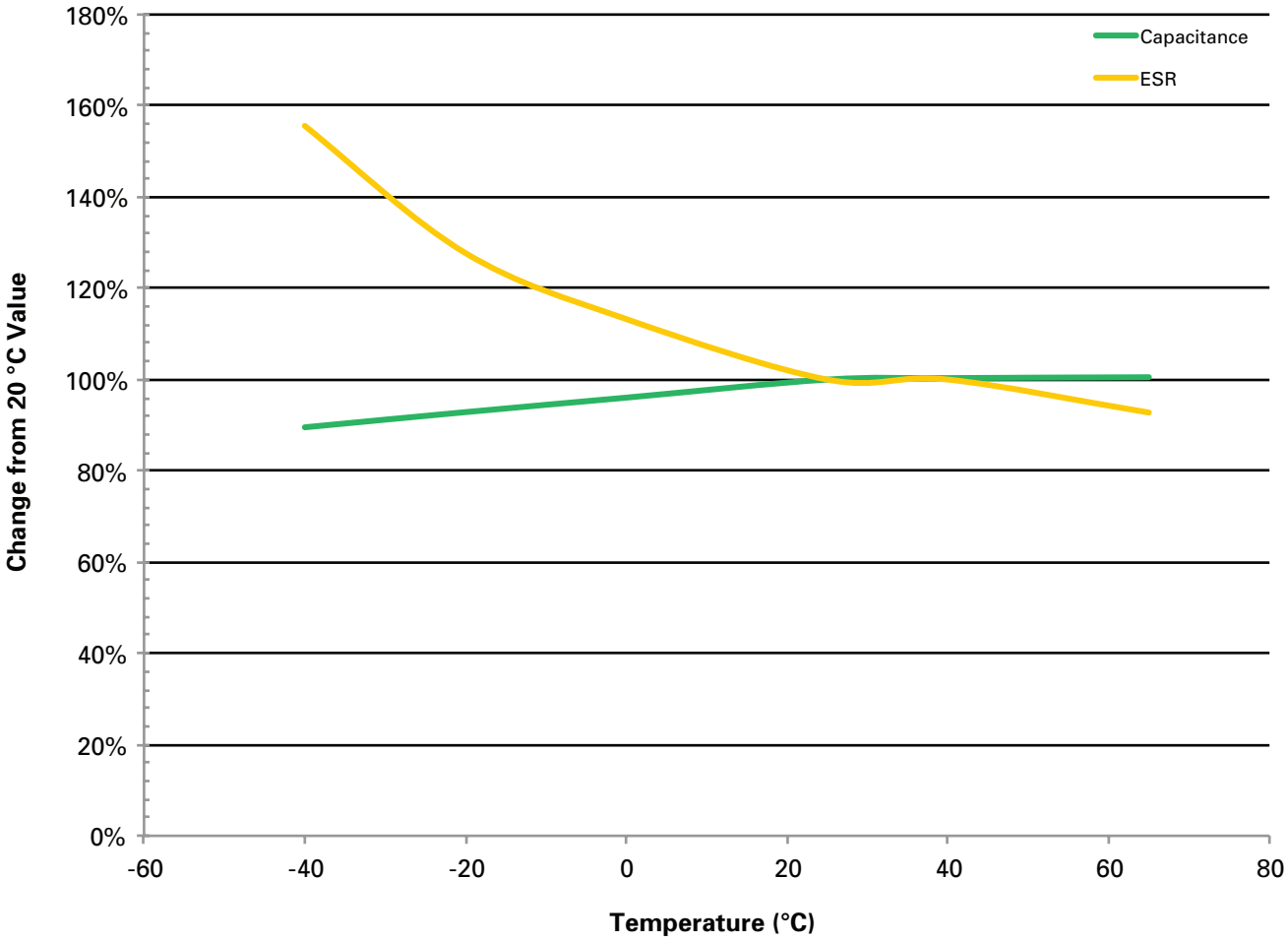
Packaging information

- Standard packaging: Bulk, 100 parts per bag (10 mm–13 mm diameter)
- 16 mm–18 mm diameter products: Bulk package quantity varies by size.

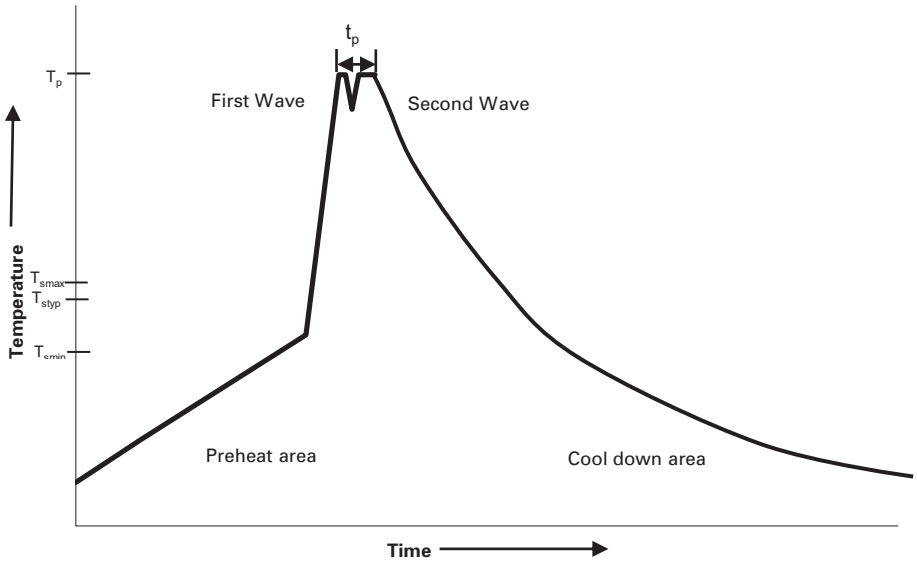
Part marking

- Eaton logo
- Capacitance value (F)
- Max operating voltage (V)
- TV Supercapacitors
- Polarity mark
- UL recognition Ru symbol
- date code ywwyddd-nn
  - y=year code for cell build (z=2016)
  - ww=work week for cell build
  - y=year code for electrode (z=2016)
  - ddd=serial day of year for electrode build
  - nn=number of lot in the day

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.

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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