Ultra High Capacitance, Small Case Size Options



Type EDL electric double layer supercapacitors offer extremely high capacitance values (farads) in a variety of packaging options that will satisfy, low profile, surface mount, through hole and high density assembly requirements. The EDL is a cut above the standard electrolytic capacitor in that it can act as a battery without having to deal with the environmental or hazardous material issues that batteries entail.

Highlights

- Unlimited charging and discharging capability
- Recycling is not necessary
- Long Life 15 years
- Low ESR
- Will extend battery life up to 1.6 times
- First class performance with economy pricing

Specifications

Operating Temperature Range	−25 °C to +85 °C
Rated Voltage Range	2.1 Vdc to 5.5 Vdc
Capacitance Range	0.022 F to 70 F

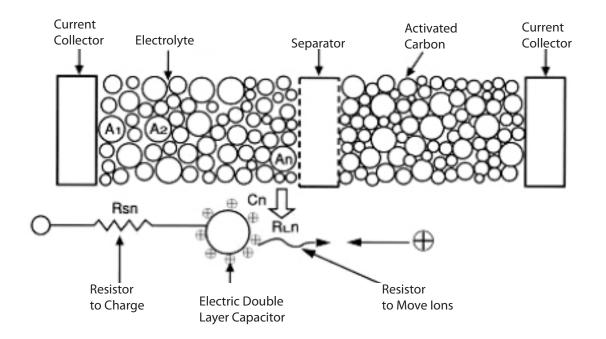
How To Select an Electric Double Layer Capacitor

Estimated Initial Backup Time	Back-up time for Type EDL Electric Double Layer Supercapacitors decreases with use and over time especially when the current is large or operating at high temperature. Be sure to specify extra back-up time initially to allow for product changes.					
Select the optimum supercapacitor according to applied current The internal resistance of the supercapacitor discharge currents. Select the supercapacitor peak current at switchover to back-up more				apacitor capa	ble of delive	ering the
		Мах	imum Opei	rating (Disch	arge) Curre	ent
	Series	0.047 F	0.1 F to 0.33 F	0.47 F to 1.5 F	3.3 F to 4.7 F	10 F to 50 F
	SG, SD, NF	200 µA	300 µA	1 mA	_	-
	F	200 µA	300 µA	300 µA	-	-
	EN	-	10 µA	-	-	-
	HW	_	-	-	300 mA	1 A
Back Up Time Example	HW300 mA1 ABack-up time is the time it takes for the applied voltage to decay to the cut-off voltage set by the user after applying the application's maximum voltage at application maximum temperature.Example: An F Type EDL, P/N EDLF105B5R5C (Rated at 5.5 V, 1.0 F) is charged to 5.0 Vdc. The circuit requirement is such that it must maintain a memory circuit with a current drain of 10 µA in an ambient temperature of +40 °C. The memory RTC cut-off voltage is 2.0 Vdc. Using minimum capacitance, calculate the back-up time as follows: t = CΔV/1 = C[V0-(i•R)-V1]/(i+iL) C = 1.0 F-20% = 0.8 F, R=50 Ω, V0=5 V, V1=2 V, i=10 µA Therefore, t = 0.8 (5-0.0005-2)/((10+2) x10^-6)= 55 hours And thus the initial back-up time is 55 hours. After 1000 hours, 					

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Life Design	Type EDL supercapacitors have a useful lifetime that decreases with increasing operating temperature, humidity, applied-voltage, current and backup-time requirements. Expected lifetime is the product of four factors:			
	Expected Life = (Lifetime)•(Temperature Factor)•(Voltage Factor)•(Moisture Factor)			
Lifetime	The minimum rated life at 85 °C with 5.5 Vdc applied is 1000 hours with maximum permitted end-of-life capacitance change of -30% and a 4 times increase in internal resistance.			
Temperature Factor	To determine the effect of temperature on expected life of a supercapacitor, use the fact that expected lifetime doubles for each 10 °C that the operating temperature is reduced. As an illustration, at 85 °C and full voltage the rated lifetime is 1000 hours. So, at 40 °C the expected lifetime would be multiplied by $2(85-40)/10 = 2^{4.5} = 22.6$ times. The Temperature Factor is 22.6, and for 1000-h, 85 °C rated life, the expected 40 °C life would be 22600 hours.			
Voltage Factor	The rate of change of capacitance decreases with decreasing applied voltage. The effect on life extension is roughly proportional to the voltage derating, e.g., 5 V applied to 5.5 V rated supercapacitors extends the life 1.1 times.			
Moisture Factor	Expected life of these supercapacitors is considerably shortened by operation in high humidity. The applications discussed here assume that the relative humidity is no more than 50%.			
Expected Life Example	So, for a 5.5 V supercapacitor at 40 °C charged to 5.V in less than 50% RH the expected life is: Expected Life = (Lifetime) (Temperature Factor) (Voltage Factor) (Moisture Factor) = (1000 h) (22.6) (1.1) (1) = 24800 hours = 2.8 years			
RoHS Compliant				

Electric Double Layer Supercapacitor Construction

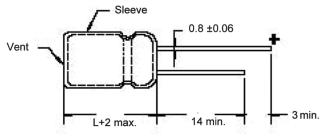


Catalog Part Number	Capacitance	Voltage (Vdc)	Max. Resistance @ 1 kHz (Ω)	Case Type	Case Dia. (mm)	Case Length (mm)	Style
EDLHW335D2R3R	3.3 F		0.3		12.5	23	HW
EDLHW475D2R3R	4.7 F		0.3		12.5	23	FOR
EDLHW106D2R3R	10 F		0.2		12.5	35	₩ U 5
EDLHW226D2R3R	22 F	2.3	0.1	Radial Lead	18	35	3 0 50
EDLHW306D2R3R	30 F		0.1	Leau	18	35	
EDLHW506D2R3R	50 F	1	0.1		18	40	
EDLHW706D2R1R	70 F	2.1	0.1		18	50	
EDLF473A5R5C	0.047 F		120		13.5	9.5	F
EDLF104A5R5C	0.10 F	-	120		13.5	9.5	
EDLF474B5R5C	0.47 F	5.5	75	Stacked	21.5	9.5	5.5
EDLF684B5R5C	0.68 F		50	Coin	21.5	9.5	
EDLF105B5R5C	1.00 F	-	50		21.5	9.5	+85 °C
		1	1		1	1	
EDLNF104A5R5C	.10 F	_	75		13.5	7.5	NF
EDLNF224A5R5C	.22 F	_	75	Stacked	13.5	7.5	5# 5.5
EDLNF474B5R5C	.47 F	5.5	30	Coin	21.5	8.0	
EDLNF105B5R5C	1.0 F	_	30		21.5	8.0	170.00
EDLNF155B5R5C	1.5 F		30		21.5	8.0	+70 °C
EDLSG474V5R5C	.47 F		30		19	5.0	SG
EDLSG105V5R5C	1.0 F	5.5	30	Stacked Coin	19	5.0	
EDLSG155V5R5C	1.5 F	1	30	Coin	19	5.0	
EDLSG474H5R5C	.47 F		30		20	6.0	
EDLSG105H5R5C	1.0 F	5.5	30	Stacked Coin	20	6.0	
EDLSG155H5R5C	1.5 F		30	Coin	20	6.0	+70 °C
EDLSD223V5R5C	.022 F		150		10.5	5.0	SD
EDLSD473V5R5C	.047 F	-	120		10.5	5.0	50
EDLSD104V5R5C	.10 F	5.5	75	Stacked	10.5	5.0	25
EDLSD224V5R5C	.10 F	-	75	Coin	10.5	5.0	55 (B)
EDLSD334V5R5C	.33 F	-	75		10.5	5.0	
EDLSD223H5R5C	.022 F		150		11.5	5.5	
EDLSD473H5R5C	.047 F	-	120		11.5	5.5	Saures 3
EDLSD104H5R5C	.10 F	5.5	75	Stacked	11.5	5.5	Mig24
EDLSD224H5R5C	.22 F	-	75	Coin	11.5	5.5	1 1
EDLSD334H5R5C	.33 F		75		11.5	5.5	+70 °C
EDLEN204A3R3S	.20 F	3.3	200	SMT Wide Lead	6.8	1.8	EN
EDLEN204RL3R3S	.20 F	3.3	200	SMT Radial Lead	6.8	1.8	+60 °C

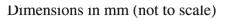
Outline Drawing and Dimensions

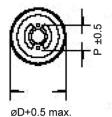
Style HW 70° C^{*} Radial Lead





* 30, 50, 70 F : +60 °C

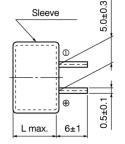


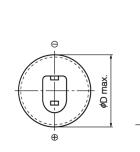


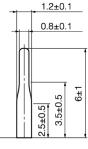
D	Ρ
12.5	5
18	7.5

Style F 85° C Stacked Coin





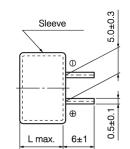


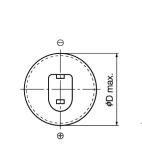


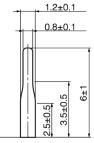
Case	Size		
code	D	L	
Α	13.5	9.5	
В	21.5	9.5	

Style NF 70° C Stacked Coin





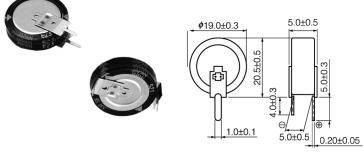




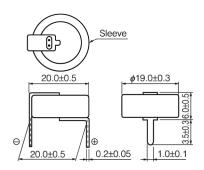
Case	Size		
code	D	L	
Α	13.5	7.5	
В	21.5	8.0	

Style SG 70° C Stacked Coin

Terminal V

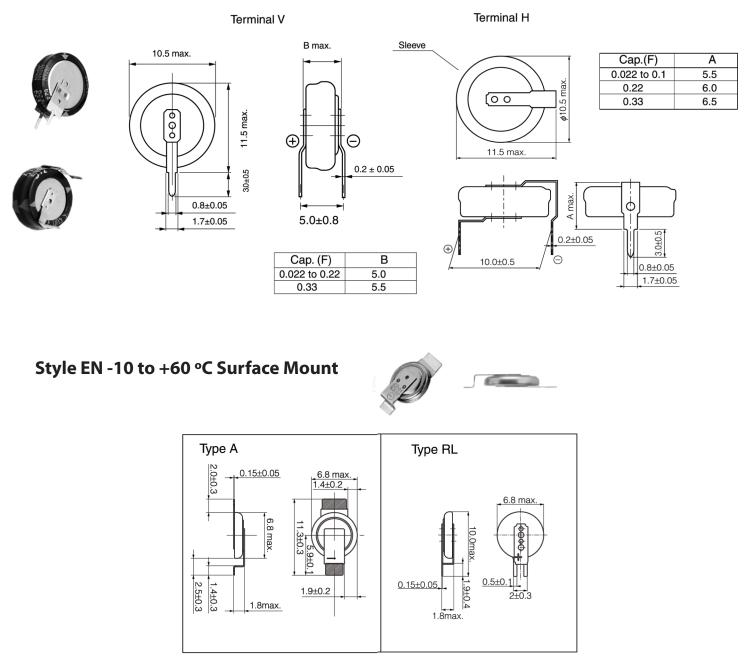


Terminal H



Outline Drawing and Dimensions

Style SD 70 °C Stacked Coin



Notes:

1 - Style EN is packaged on 24 mm wide tape and a 330 mm dia. reel, with 2000 pieces per reel.

2 - Only Style EN is capable of reflow soldering. Peak reflow soldering temperature is 250 °C for a maximum of 5 seconds, with a maximum of 30 seconds at or above 220 °C.

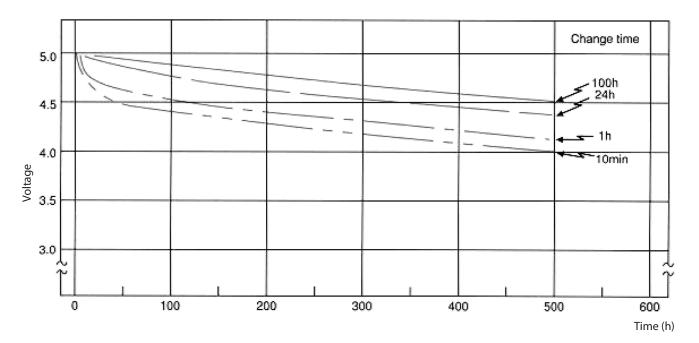
3 - Do not reflow solder when the cell voltage is above 0.3 V.

Applications and Recommended Series

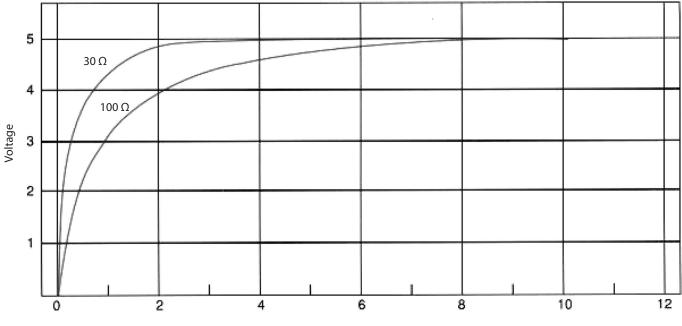
Application	Function	Recommended Series	Component		
Mobile Phones	Real-Time Clock Back-Up				
PDA	Real-Time Clock Back-Up	EN EN	1 Star		
DSC	Real-Time Clock Back-Up	EN, SD			
DVD Recorder	Real-Time Clock and Channel Back-Up	SD, SG	R D		
Digitial TV	Real-Time Clock and Channel Back-Up	SD, SG NF			
PC, Server	Real-Time Clock and Channel Back-Up	F	Jir 100		
Mobile Phone Base Station	Real-Time Clock and Channel Back-Up				
Inkjet Printer	Time and Impact Back-Up	SD, SG, NF			
Electric Power Gas and Water Meters	Real-Time Clock and Data Back-Up	F	Ar 10 51 53		
LED Light with Solar Battery	LED Lighting at Night				
Toys	Motor Drives	- HW			
Toy Games	Real-Time Clock Back-Up	EN			
Robot	Real-Time Clock and Data Back-Up	- F	.de 1.07 55 555		
Car Audio Memory	Real-Time Clock Back-Up				

Performance Data

Self-Discharging Characteristics Versus Charging Time Part number: EDLF105B5R5C (5.5 V 1.0 F) Charge voltage: 5V



Charging Characteristics Part number: EDLF105B5R5C (5.5 V 1.0 F) @ +20 °C



Time (m)