

Green-Cap (Electric Double Layer Capacitors)

1. Polarity

Be sure verify the polarity of the capacitor before use. If a reverse voltage is applied for a long time, capacitor lifetime is shortened and serious damage such as electrolyte leakage may occur. Further more, there may be leftover electric charge from capacitor testing that could damage other circuit components such as the low-withstanding voltage parts of semiconductors, etc.

2. Voltage

If a Green-Cap is used at a voltage exceeding its rated voltage, not only is its life shortened, but depending on the actual voltage, gas generated by electrochemical reactions inside the capacitor may cause it to leak or rupture

3. Ambient Temperature

(1) Capacitor life is affected by operating temperature. In general, lowering ambient temperature by 10°C will double the life of a capacitor. Use the capacitor at the lowest possible temperature under the maximum guaranteed temperature.

(2) Operation above the maximum specified temperature not only shortens capacitor life, but can also cause serious damage such as electrolyte leakage. Verify the operating temperature of the capacitor by taking into consideration not only the ambient temperature and temperature inside the unit, but also the radiation from heat generating elements inside the unit (power transistors, IC's, resistors, etc.) and self-heating due to ripple current. Be careful not to place heat-generating elements across from the capacitor on the opposite of the PCB.

4. Ripple Current

Green-Cap have a higher internal resistance than do electrolytic capacitors and are more susceptible to internal heat generation when exposed to ripple current. When the temperature of the element rises, a reacting current flows inside the Green-Cap, generating reaction products and raising internal resistance even further. This makes it difficult to maintain capacitance. Set the allowable limit for the ripple current-induced rise in capacitor temperature to 3°C measured at the surface of the capacitor

5. Heat Stress During Soldering

Excessive heat stress may result in the deterioration of the electrical characteristics of the capacitor, loss of air-tightness, and electrolyte leakage due to the rise in internal pressure

- (1) If the tip of the soldering iron touches the capacitor's external sleeve, the sleeve will melt or break.
- (2) Use the general reference chart below to set soldering temperature and time.
- (3) When soldering with a soldering iron, do not touch the tip to the body of the capacitor. Minimize the time that soldering iron is in contact with the capacitor terminals.
- (4) When using equipment such as a UV curing oven for pre-heating and adhesive hardening, do not set the temperature above 150°C. If the temperature is higher than this, the external sleeve may crack and the end seal may suffer reduced performance.
- (5) Never perform reflow soldering on Green-Cap using infrared or atmospheric methods.

6. Circuit Board Cleaning

Circuit board can be immersed or ultrasonically cleaned using suitable cleaning solvents for up to 5 minutes and up to 60°C maximum temperature. The board should be thoroughly rinsed and dried. Recommended cleaning solvent include: Pine Alpha ST-100S, Sunetec B-12, DK beclear CW-5790, Aqua Cleaner 210SEP, Cold Cleaner P3-375, Telpen Cleaner EC 7R, Clean-thru 750H, Clean-thru 750L, Clean-thru 710M, Techno Cleaner 219, Techno Care FRV-1

- Consult with us if you are using a solvent other than any of those listed above
- The use of ozone depelling cleaning agents are not recommended in the interest of protecting the environment



PART NUMBER SYSTEM

Single Cell Number System



1 Series Name
See page 4.

2 Rated Working Voltage

WV	2.5	2.7
CODE	0E	5U

3 Capacitance

ex) 1F	105
10F	106
100F	107
1000F	108

4 Capacitance Tolerance

Tolerance (%)	±20
Code	M

5 Case Diameter

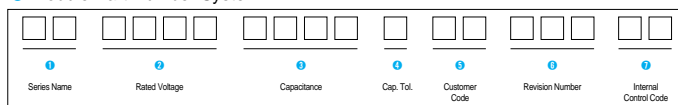
ex) Ø10	10
Ø16	16
Ø18	18

6 Case Height

ex) 20mm	020
25mm	025
30mm	030

7 Lead Taping, Forming and Cutting
See pages 67 ~ 69.

Module Part Number System



1 Series Name
See page 4.

2 Rated Working Voltage

ex)	5.0V	0050
	13.5V	0135
	135V	1350

3 Capacitance

ex)	1.6F	0016
	16F	0160
	160F	1600

4 Capacitance Tolerance

Tolerance (%)	0 +20
Code	W

5 Customer Code

2 Word in Abbreviations of Initial from User Name
ex) Samwha SW
A.B.C.D AB

6 Revision Number

Number of Module to Same User

Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)

NEW DM Green-Cap Module

- Low internal resistance
- Balancing and overvoltage protection of individual cell
- Efficient heat Transfer to outside
- Compliant with RoHS requirement (Cd, Pb, etc.)

Application

- Next Generation Vehicle(FCEV,HEV)
- Short term UPS and telecom
- Portable Power Tool
- Wind Turbine Pitch System
- Electric Scooter
- Heavy Duty Transportation
- Golf Car



Product & Spec.

Item	Characteristics	
Capacitance tolerance	0% ~ +20% at 120Hz, 20°C	
Operating temperature range	-40 ~ 60°C or -25 ~ 70°C	
Storage Temperature Range	-40 ~ 70°C	
Life Time at RT ⁽¹⁾	10 years	(1) Δ LC < 30% and Δ ESR < 100% of initial specified value, respectively and LC < specified value
Cycle Life (25°C) ⁽¹⁾⁽²⁾	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

CHARACTERISTIC LIST & DIMENSIONS

Part Number	Rated Voltage	Capacitance (F)	ESR,1KHz (mΩ)	Max. Current (A)	Stored Energy (Wh)	Specific Energy (Wh/kg)	Dimension (mm)			Weight (kg)
							L	W	T	
DM00500015WSS101	5	1.5	110	3.1	0.005	1.47	23	10	18	0.0034
DM00500025WSS101	5	2.5	53	5.3	0.009	1.80	23	12	22	0.005
DM01500666WSS101	15	66.6	36	167	2.08	3.47	117	81	80	0.6
DM01505000WSS101	15	500	4.2	625	15.63	2.60	200	135	198	6
DM02502000WSS101	25	200	13	735	17.36	2.11	263	108	198	8.2
DM04861666WSS101	48.6	166.6	20	1500	46.41	3.87	446	195	198	14
DM09200025WSS101	92	2.5	720	54	2.94	3.42	250	140	50	0.86
DM35000215WSS101	350	21.5	96	1250	365.79	2.43	1000	684	230	150

Note: Other Green-Cap modules are supplied on custom-made basis.

Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)



Upgrade DP Screw Terminal Type, High Power Density Type

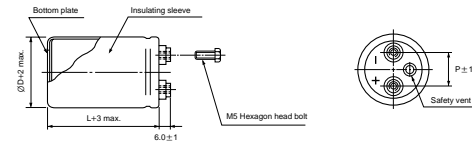
- High Power Density
- Rapid charge and discharge
- Charge and discharge efficiency are higher than in batteries



Item	Characteristics	
Operating temperature range	-25 ~ +60°C	-40 ~ +60°C
Rated Working Voltage	2.5VDC	2.7VDC
Capacitance tolerance	-20 ~ +20% at 20°C	
Low temperature characteristics	Capacitance change	Within ± 30% of initial value at +20°C (-25 to +60°C, -40 to +60°C)
	Internal resistance	Less than 400% of initial at +20°C
Endurance(60°C)	Test time	1000 hours
	Capacitance change	Within ± 30% of initial value
	Internal resistance	Less than 300% of initial at specified value
Shelf life (at 60°C)	After 1000 hours no load test same as endurance	
Life Time at RT ⁽¹⁾	10 years	(1) Δ LC < 30% and Δ ESR < 100% of initially specified value, respectively and LC < specified value
Cycle Life (25°C) ⁽¹⁾⁽²⁾	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

DRAWING

Unit : mm



CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	LC (30min) (mA)	Specific Energy		Weight (g)	Volume (ml)	Dimension ØD×L(mm)
				(Wh/kg)	(Wh/L)			
2.5	400	5.3	200	3.86	4.51	90	77	35×80
	700	3.5	350	4.40	5.26	138	115	35×120
	1700	2.0	850	5.18	5.56	285	266	51×130
	3000	0.9	1500	5.85	6.33	445	412	63.5×130
2.7	400	3.0	200	5.40	5.26	75	77	35×80
	700	2.5	350	6.01	4.14	120	115	35×120
	1700	1.5	850	6.62	6.48	260	266	51×130
	3000	0.8	1500	7.02	7.38	435	412	63.5×130

Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)

DE Screw Terminal Type, High Energy Density Type

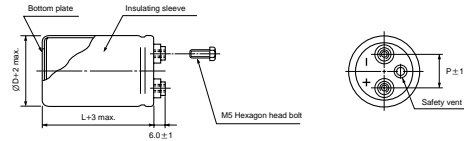
- High Energy Density
- Suitable for electric power storage
- Charge and discharge efficiency are higher than in batteries



Item	Characteristics	
Operating temperature range	-25 ~ +60°C	
Rated Working Voltage	2.5VDC	
Capacitance tolerance	-20 ~ +20% at 20°C	
Low temperature characteristics	Capacitance change	Within ±30% of initial value at +20°C (-25 to +60°C)
	Internal resistance	Less than 400% of initial at +20°C
Endurance (60°C)	Test time	1000 hours
	Capacitance change	Within ±30% of initial value
	Internal resistance	Less than 300% of initial at specified value
Shelf life (at 60°C)	After 1000 hours no load test same as endurance	
Life Time at RT ⁽¹⁾	10 years	(1) IΔCI < 30% and ΔESR < 100% of initially specified value, respectively and LC < specified value
Cycle Life (25°C) ⁽¹⁾⁽²⁾	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

DRAWING

Unit : mm



CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	LC (30min) (mA)	Specific Energy		Weight (g)	Volume (ml)	Dimension ØD×L(mm)
				(Wh/kg)	(Wh/L)			
2.5	700	4	350	5.96	6.32	102	96	35 × 100
	1400	3	700	6.17	5.95	197	204	51 × 100
	3000	1	1500	6.51	6.85	400	380	63.5 × 120
	5000	0.8	2500	6.89	6.34	630	684	76.2 × 150

Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)



NEW DB Snap-in Terminal Type, Standard Series

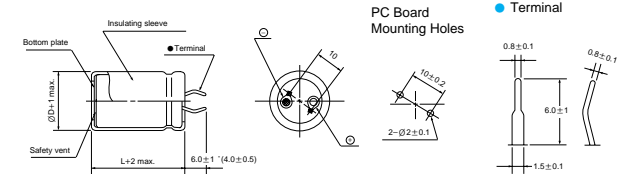
- Endurance : 2.5V 70°C 1000 hours, 2.7V 60°C 1000 hours
- The middle size and high capacitance, low resistance
- Charge and discharge efficiency are higher than in batteries



Item	Characteristics	
Operating temperature range	-25 ~ +70°C	-40 ~ +60°C
Rated Voltage	2.5VDC	2.7VDC
Capacitance tolerance	-20 ~ +20% at 20°C	
Low temperature characteristics	Capacitance change	Within ±30% of initial value at +20°C (-25 to +70°C, -40 to +60°C)
	Internal resistance	Less than 400% of initial at +20°C
Endurance (2.5V:70°C, 2.7V:60°C)	Test time	1000 hours
	Capacitance change	Within ±30% of the initial value
	Internal resistance	Less than 300% of initial at specified value
Shelf life (2.5V:70°C, 2.7V:60°C)	After 1000 hours no load test same as endurance	
Life Time at RT ⁽¹⁾	10 years	(1) IΔCI < 30% and ΔESR < 100% of initially specified value, respectively and LC < specified value
Cycle Life (25°C) ⁽¹⁾⁽²⁾	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

DRAWING

Unit : mm



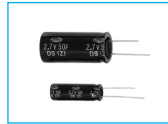
CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	LC (30min) (mA)	Specific Energy		Weight (g)	Volume (ml)	Dimension ØD×L(mm)
				(Wh/kg)	(Wh/L)			
2.5	100	15	50	4.11	5.07	21	17	22 × 45
	200	10	100	4.54	5.46	38	32	30 × 45
	300	8	150	4.77	5.41	55	48	35 × 50
	400	6	200	4.96	6.01	70	58	35 × 60
2.7	100	10	50	5.50	5.92	18	17	22 × 45
	200	8	100	6.03	6.37	34	32	30 × 45
	300	6	150	6.26	6.31	49	48	35 × 50
	400	3.5	200	6.75	7.02	60	58	35 × 60

Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)

DS Radial Type, Standard Series

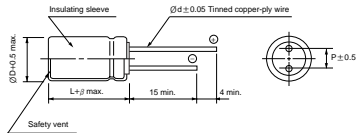
- Endurance : 2.5V 70°C 1000 hours, 2.7V 60°C 1000 hours
- The small size and high capacitance, low resistance
- Can be charge and discharge more times than secondary batteries



Item	Characteristics	
Operating temperature range	-25 ~ +70°C	-40 ~ +60°C
Rated Voltage	2.5VDC	2.7VDC
Capacitance tolerance	-20 ~ +20% at 20°C	
Low temperature characteristics	Capacitance change	Within ±30% of initial value at +20°C (-25 to+70°C,-40 to+60°C)
	Internal resistance	Less than 400% of initial at +20°C
Endurance (2.5V:70°C, 2.7V:60°C)	Test time	1000 hours
	Capacitance change	Within ±30% of initial value
	Internal resistance	Less than 300% of initial at specified value
Shelf life (2.5V:70°C, 2.7V:60°C)	After 1000 hours no load test same as endurance	
Life Time at RT ⁽¹⁾	10 years	(1) IΔCl < 30% and ΔESR < 100% of initially specified value, respectively and LC < specified value
Cycle Life (25°C) ⁽¹⁾⁽²⁾	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

DRAWING

Unit : mm



ØD	8	10	16	18
P	3.5	5	7.5	7.5
Ød	0.6	0.6	0.8	0.8
β	1.5		2.0	

CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, DC (m Ω)	ESR, 1KHz (m Ω)	LC (30min) (mA)	Specific Energy		Specific Power		Weight (g)	Volume (ml)	Dimension ØD × L (mm)
					(Wh/kg)	(Wh/L)	(W/kg)	(W/L)			
2.5	3	350	140	2	1.63	2.59	1339	2132	1.6	1.0	8 × 20
	5	250	110	4	1.97	2.76	1364	1910	2.2	1.6	10 × 20
	10	120	65	8	2.48	3.68	1786	2653	3.5	2.4	10 × 30
	25	65	35	20	2.89	4.32	1538	2296	7.5	5.0	16 × 25
	60	30	20	48	3.77	5.12	1812	2456	13.8	10.2	18 × 40
2.7	3	90	60	2	2.17	3.02	6943	9669	1.4	1.0	8 × 20
	5	70	50	4	2.41	3.22	5951	7956	2.1	1.6	10 × 20
	10	50	35	8	3.49	4.30	6033	7426	2.9	2.4	10 × 30
	25	45	20	20	3.78	5.04	2901	3867	6.7	5.0	16 × 25
	50	40	10	48	4.40	4.97	1902	2149	11.5	10.2	18 × 40