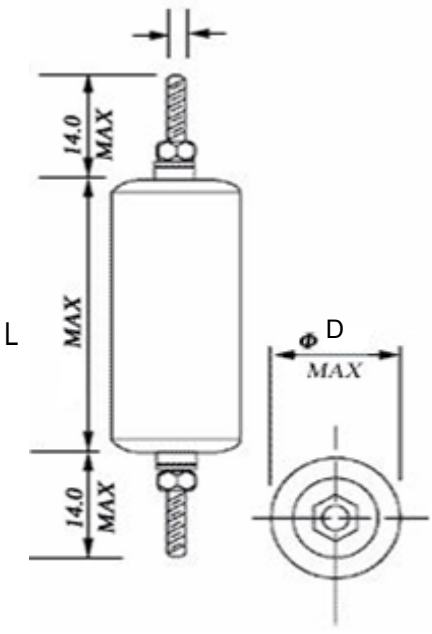
MKP52 - Self healing Snubber Capacitors



Features

Oil Impregnated for Good Corona Resistance
Dielectric - Polypropylene
Electrode - Double Metallised Paper
Coil - Non-inductively wound, mineral oil impregnated
Leads - Brass stud
Construction - Aluminium can + Blue PVC Sleeve,
stud insert moulded plastic end caps
Markings - El-Ci-Ar logo, Capacitance, Voltage, Type
Capacitor Tolerance - 10% (K), 5% (J)
Dissipation Factor <= 0.001 at 1KHz at 25C (Typical Value 0.0004)
Test Voltage b/w terminals 2.5 x Vr for 2 sec (Vr=2000V, 3000V)
Test Voltage b/w terminal & case 2 x Vr for 60 sec
Max Pulse Rise 500V/usec
Temperature Range from -25°C to +85°C
Insulation Resistance >= 25 GΩ for C <= 0.33uF At 20C
>= 7500 sec for C>=0.33uF



Available Values

Capacitance - 0.1 uF to 2.2 uF
Voltage - 600VDC to 2000VDC

Applications

For snubber applications

For use as a snubbers in circuits designed with power semiconductors, these capacitors offer a self healing property. They employ polypropylene as dielectric and are designed with double metallic paper as electrodes. The end metallised coils are connected to outer threaded terminals through sturdy electrical jointing techniques to enable these capacitors to handle high currents.

MKP71 - Self healing Power Electronics Capacitors

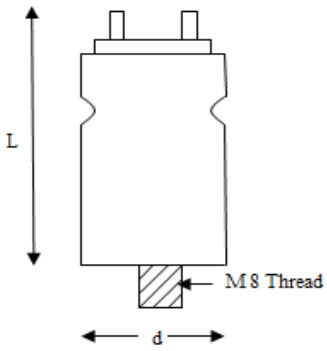


Features

Oil Impregnated, Aluminium Can Encased
Dielectric - Polypropylene
Electrode - Double Metallised Paper
Coil - Non inductively wound, Extended Foil
Leads - Fast on terminals, weld jointed to coil
Construction - Aluminium can with a threaded stud for mounting.
Markings - El-Ci-Ar, Capacitance, Tolerance, Voltage, Type
Capacitor Tolerance - 10% (K), 5% (J)
Dissipation Factor <= 0.001 at 1KHz at 25C (Typical Value 0.0004)
Test Voltage b/w terminals 2.5 x Vr for 2 sec
Test Voltage b/w terminal & case 2 x Vr for 60 sec
Max Pulse Rise 500V/usec
Temperature Range from -25°C to +85°C

Applications

Damping Capacitor for overvoltage protection of semiconductor devices
Commutation Capacitor for positive quenching of thyristors
Smoothing Capacitor for D.C. Circuits
The Capacitor has a self healing capacity which ensures long life even under occasional overvoltage conditions.



Rated Capacitor uF	640VAC		1000VAC	
	d	l	d	l
0.22	30	50	40	50
0.33	30	50	40	50
0.47	30	50	40	50
2.00	40	50		

Custom Values are also available on request

KT22 - Film Foil Polyester Capacitors

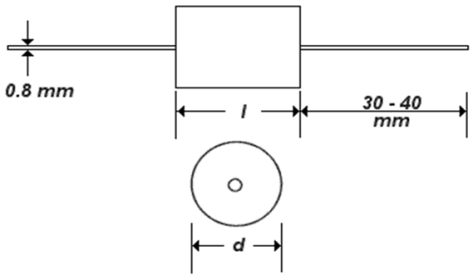


Features

Oil Impregnated - to withstand higher voltages
Dielectric - Polyester
Electrode - Aluminium Foil
Coil - Non inductively wound, Extended Foil
Leads - Axial tinned copper wires
Construction - Moulded plastic tube + blue PVC sleeve
Markings - El-Ci-Ar logo, Capacitance, Voltage, Type
Capacitor Tolerance - 20% (M), 10% (K), 5% (J)
Dissipation Factor <= 0.007 at 1KHz at 25C (Typical Value 0.004)
Test Voltage - 2.5 x Vr for 2 sec
Max Pulse Rise - 500V/usec
Temperature Range from -25°C to +85°C

Applications

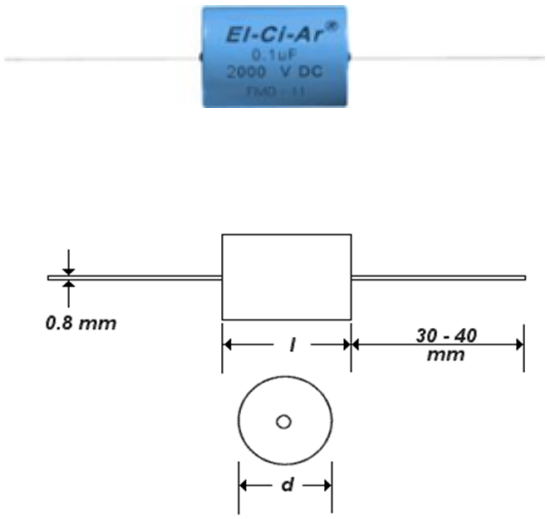
Filtering & quenching applications in SMPS & RC Circuits
Direct Welded contacts give better ESR
Lighting Applications
Ac motor speed control



Custom Values are also available on request

Rated Capacitor	400V		630V		1000V	
nF	d	l	d	l	d	l
10			10	23	10	23
47			12	23	12	23
68			12	23	12	23
100			15	23	15	23
150			17	34	17	34
220			17	34	17	34
1000	17	34				

FMD11 - Mixed Dielectric Capacitors



Features

Oil Impregnated for Good Corona Resistance
Dielectric - Polyester + Paper
Electrode - Aluminium Foil
Coil - Non inductively wound, Extended Foil construction
Leads - Axial copper wires, solder plated pressure contacts
Construction - Moulded plastic tube + blue PVC sleeve
Markings - El-Ci-Ar logo, Capacitance, Voltage, Type
Capacitor Tolerance - 20% (M), 10% (K), 5% (J)
Dissipation Factor <= 0.01 at 1KHz at 25C (Typical Value 0.005)
Test Voltage - 2.5 x Vr for 2 sec (Vr=2000V, 3000V)
2 x Vr for 2 sec (Vr=5000V)
Max Pulse Rise - 300V/usec
Temperature Range from -25°C to +85°C
Insulation Resistance >= 25 GΩ for C <= 0.33uF At 20C
>= 75000 sec for C>=0.33uF

Applications

General Purpose RC N/W across diodes, SCR
Suited for High Voltage Applications like Induction Heating Suppression Circuits

Custom Values are also available on request

Rated Capacitor	2000V		3000V		5000V	
uF	d	l	d	l	d	l
0.001			10	23	10	23
0.0015			10	23	12	23
0.0022			10	23	12	23
0.0033			12	23	15	23
0.0047			12	23	15	23
0.0068			15	23	17	34
0.010	10	23	15	23	17	34
0.015	12	23	15	23	17	34
0.022	12	23	17	34	17	34
0.033	15	23	17	34	19	52
0.047	15	23	19	36	19	52
0.068	17	34	19	52	22	52
0.100	17	34	19	52	22	52
0.15	19	52	22	52	25	52
0.22	19	52	25	52	30	52
0.33	22	52	30	52		
0.47	25	52	30	52		
0.68	30	52				

Also available FMD21 1uF / 2000VDC in 39mm (dia) x 52mm (length) axial M6 studs

KP11 - Film Foil Polypropylene Capacitor



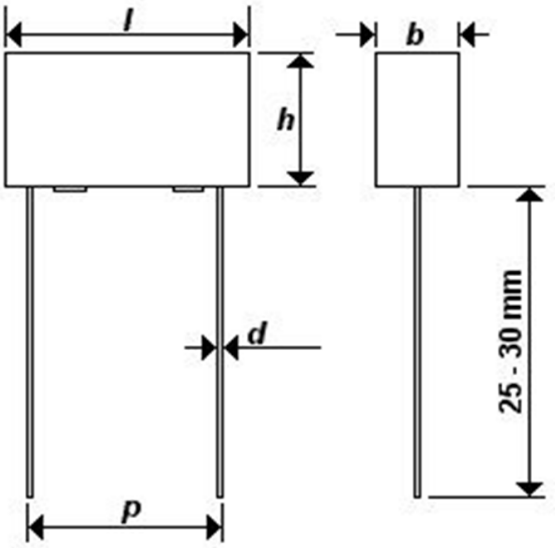
Features

Oil Impregnated, Low Loss
Dielectric - Polypropylene
Electrode - Aluminium Foil
Coil - Non inductively wound
Leads - Radial Copper Wires, Solder Plated, Directly welded
Construction - Rectangular plastic box, Resin sealed
Markings - El-Ci-Ar logo, Capacitance, Voltage, Type
Capacitor Tolerance - 20% (M), 10% (K), 5% (J)
Dissipation Factor <= 0.0001 at 1KHz at 25C°
Test Voltage - 2.5 x Vr for 2 sec
Max Pulse Rise - 1000V/usec
Temperature Range from -25C° to +85C°
Insulation Resistance >= 50 GΩ for C <= 0.33uF at 25C°

Applications

Suited for light duty pulse, Logic & Timing Circuits
Lighting Applications
High Frequency Circuits
Electronic Ballasts

d	*p*
0.6	10 mm
0.8	15 mm
	22.5 mm
	27.5 mm



KP11 - Film Foil Polypropylene Capacitor

Rated Capacitor	630V				1000V				1250V				1600V				2000V			
uF	b	h	l	p	b	h	l	p	b	h	l	p	b	h	l	p	b	h	l	p
0.00068																	6	12	18	15
0.0010					5	11	13	10	5	11	13	10	6	12	18	15	6	12	18	15
0.0015					5	11	13	10	5	11	13	10	6	12	18	15	6	12	18	15
0.0022					5	11	13	10	5	11	13	10	6	12	18	15	6	12	18	15
0.0033					5	11	13	10	5	11	13	10	6	12	18	15	6	12	18	15
0.0047	5	11	13	10	5	11	13	10	5	11	13	10	6	12	18	15	6	12	18	15
0.0068	5	11	13	10	5	11	13	10	5	11	13	10	6	12	18	15	6	12	18	15
0.010	5	11	13	10	5	11	13	10	5	11	13	10	7	13	18	15	7	13	18	15
0.015	6	11	13	10	7	13	18	15	7	13	18	15	10	18	26	22.5	10	18	26	22.5
0.022	6	12	14	10	7	13	18	15	7	13	18	15	10	18	26	22.5	10	18	26	22.5
0.033	8	14	18	15	8	14	18	15	8	14	18	15								
0.047	8	16	26	22.5	8	16	26	22.5	8	16	26	22.5								
0.068	8	16	26	22.5	8	16	26	22.5	8	16	26	22.5								
0.10	8	16	26	22.5	8	16	26	22.5	8	16	26	22.5								
0.15	10	18	26	22.5																

Custom Values are also available on request

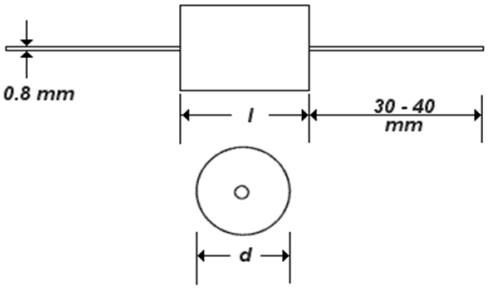
UPDATE

0.0033 uF 630V / 1000V / 1250V also available in 7.5 mm Pitch Box Size 5mm x 10mm x 11mm
0.0047 uF 630V / 1000V / 1250V also available in 7.5 mm Pitch Box Size 5mm x 10mm x 11mm
0.0068 uF 630V / 1000V / 1250V also available in 7.5 mm Pitch Box Size 5mm x 10mm x 11mm

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KT12 - Film Foil Polyester Capacitor Axial





Features

Oil Impregnated - to withstand higher voltages
Dielectric - Polyester
Electrode - Aluminium Foil
Coil - Non inductively wound
Leads - Axial copper wires, solder plated pressure contacts
Construction - Moulded plastic tube + blue PVC sleeve
Markings - El-Ci-Ar logo, Capacitance, Voltage, Type
Capacitor Tolerance - 20% (M), 10% (K), 5% (J)
Dissipation Factor <= 0.007 at 1KHz at 25C (Typical Value 0.004)
Test Voltage - 2.5 x Vr for 2 sec
Max Pulse Rise - 500V/usec
Temperature Range from -25°C to +85°C
Insulation Resistance >= 30 GΩ for C <= 0.33uF At 25°C
>= 10000 sec for C>=0.33uF

Applications

General Purpose RC N/W across diodes, SCR
Lighting Applications
Suppression Circuits

Custom Values are also available on request

Rated Capacitor uF	400V		630V		1000V	
	d	l	d	l	d	l
0.010					10	23
0.015					12	23
0.022					12	23
0.033					12	23
0.047			12	23	12	23
0.068			12	23	12	23
0.100			15	23	15	23
0.15			17	34	17	34
0.22	17	34	17	34	17	34
0.33	17	34	19	40	19	40
0.47	17	34	19	40	19	40
0.68	17	34	22	55	22	55
1.00	17	34	22	55	25	55
1.50	19	55	25	55	25	55
2.00	22	55	30	55	30	55
2.20	25	55				

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Tel: (022) 66307244 / 45, 40029962 / 63 Fax: (022) 40025469 Email: sales@neotroniks.com

LR-16

Non-Inductive Wire Wound Resistors

Features
Low Inductance

Applications
Used in Inductance Sensitive Circuits

Technical Specifications
A special technique of dual-opposing winding with adequate interlayer insulation can result in self inductance of a resistor being greatly reduced. This method known as the Aryton-Perry winding can bring down the inductance value to as low as 10% of the original value (had it been wound normally). In circuits which are sensitive to inductance which is inherently present in wire wound resistors, this series offers customers as low an inductance as possible. Such a feature is made available in wattage ratings upwards of 10 watts. Appropriate mounting hardwares can also be supplied for this range.



LR-15

Adjustable Wire Wound Resistors

Features

Wire Wound Resistors Custom Built in adjustable style with presettable bands.
Varnish Coated
Resistance Wire - Copper Nickel alloy for low and medium values
- Nickel Chromium alloy for high values
Coating Glossy varnish, Class F, grey colour
Leads - Radial,Copper Wires,Solder Plated.
Construction - Tubular With central hole stud insert moulded plastic end caps
Markings - El-Ci-Ar logo, Resistance value, tolerance, Ωattage
Resistor Tolerance - 10% (K), 5% (J)
Breakdown Voltage >= 500V (b/w leads & body)
Temperature Coefficient - Better than + 150 ppm / deg. C.
Temperature Severity from - 40^{o}C to + 200^{o}C
Endurance - Change in value < 3% after 1000 hours at 70C, full load
Humidity - Change in value < 1.5% after 1000 hours at 40C, 90-95% RH

Applications:

Applications where online slecetion of resistance value is required
As Voltage Dividers
As Multi-Tap Resistors



LR-11

High Wattage Wire Wound Resistors

Features

Varnish Coated
Resistance Wire - Copper Nickel alloy for low and medium values
- Nickel Chromium alloy for high values

Coating Glossy varnish, Class F, grey colour
Leads - Radial,Copper Wires,Solder Plated.
Construction - Tubular With central hole stud insert moulded plastic end caps
Markings - El-Ci-Ar logo, Resistance value, tolerance, Ωattage
Resistor Tolerance - 10% (K), 5% (J)
Breakdown Voltage >= 500V (b/w leads & body)
Temperature Coefficient - Better than + 150 ppm / ^{o}C.
Temperature Severity from - 40^{o}C to + 200^{o}C
Endurance - Change in value < 3% after 1000 hours at 70^{o}C, full load
Humidity - Change in value < 1.5% after 1000 hours at 40^{o}C, 90-95% RH

Application

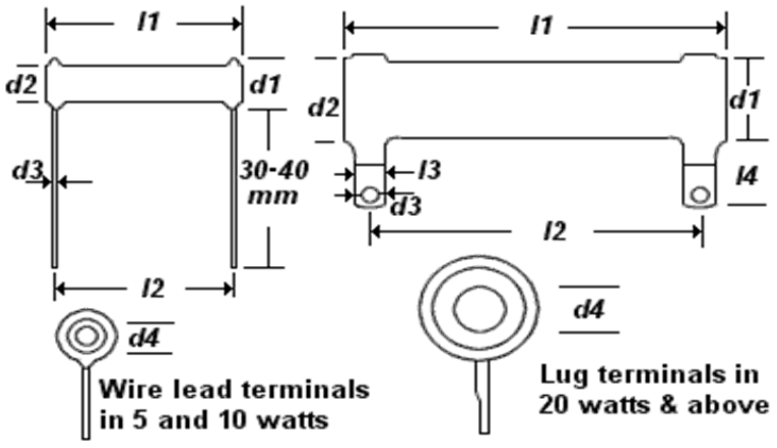
For a variety of Industrial Applications



LR-11

High Wattage Wire Wound Resistors

Watts W	Resistance Range	d1 +/- 1.5	d2 +/- 2.5	d3 +/- 0.1	d4 +/- 1.5	l1 +/- 2.5	l2 +/- 2.0	l3 +/- 1.0	l4 +/- 2.0	Avg Ωt gms
5	0.1 Ω - 5 KΩ	12	10	0.8	4	25	20	-	-	3.0
10	0.2 Ω - 10 KΩ	9	6	0.8	5	45	15	-	-	8.0
20	2 Ω - 15 KΩ	11	7	0.8	9	60	20	7	18	24.0
25	5 Ω - 20 KΩ	18	16	3.2	9	75	65	7	18	28
30	10 Ω - 25 KΩ	20	18	3.2	11	75	65	7	18	40
40	10 Ω - 25 KΩ	28	25	3.2	15	77	65	7	18	70
50	10 Ω - 40 KΩ	28	25	3.2	15	95	85	7	18	85
75	10 Ω - 50 KΩ	32	30	3.2	20	115	100	7	18	120
100	20 Ω - 70 KΩ	32	30	3.2	20	150	130	7	18	160
120	20 Ω - 70 KΩ	32	30	3.2	20	165	145	7	18	180
150	20 Ω - 100 KΩ	32	30	3.2	20	200	180	7	18	240
200	50 Ω - 100 KΩ	32	30	3.2	20	250	230	7	18	275
200	50 Ω - 100 KΩ	52	50	5.0	38	175	145	12	25	400
250	50 Ω - 100 KΩ	52	50	5.0	38	200	170	12	25	470
300	75 Ω - 100 KΩ	52	50	5.0	38	250	220	12	25	620



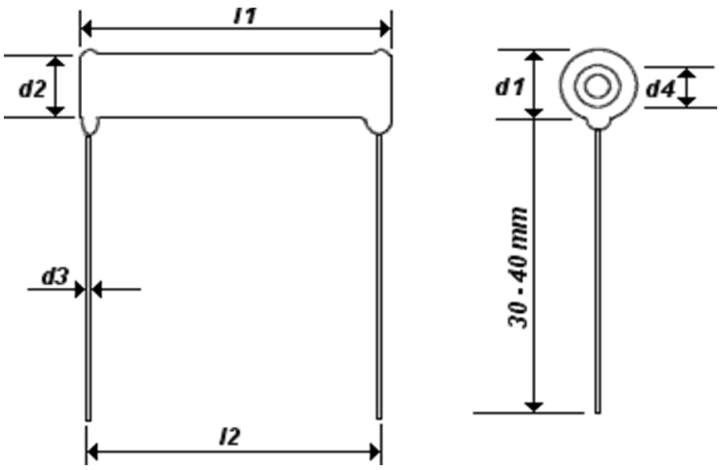
LC-11

Low Wattage Varnish Coated Wire Wound Resistors



Features

Varnish Coated
Resistance Wire - Copper Nickel alloy for low and medium values
- Nickel Chromium alloy for high values
Coating Glossy varnish, Class F, grey colour
Leads - Radial,Copper Wires,Solder Plated.
Construction - Tubular with central hole
stud insert moulded plastic end caps
Markings - El-Ci-Ar logo, Resistance value, tolerance, wattage
Resistor Tolerance - 10% (K), 5% (J)
Breakdown Voltage >= 500V (b/w leads & body)
Temperature Coefficient Better than $\pm$ 50 ppm / ^{o}C.
Temperature Severity - 40^{o}C to + 85^{o}C.
Endurance Change in value < 1.5 % after 1000 hours at 40^{o}C, full load
Humidity Change in value < 1% after 1000 hours at 40^{o}C, 90-95% RH



Watts	Resistance Range	d1 +/- 1.0	d2 +/- 1.0	d3 +/- 1.0	d4 +/- 1.0	l1 +/- 1.0	l2 +/- 0.5	Avg Wt gms
0.5W	0.33 Ohms - 25 Ohm	8.0	5.0	0.7	1.5	13.0	10.2	1.0
1W	0.1 Ohms - 100 Ohms	9.0	6.0	0.8	2.5	19.0	15.2	2.0
2W	0.05 Ohms - 500 Ohms	10.5	7.0	0.8	3.0	25.0	20.3	2.7

Applications: Suited for direct PCB mounting, General purpoose applications.

KP14 - Film Foil Polypropylene Capacitor

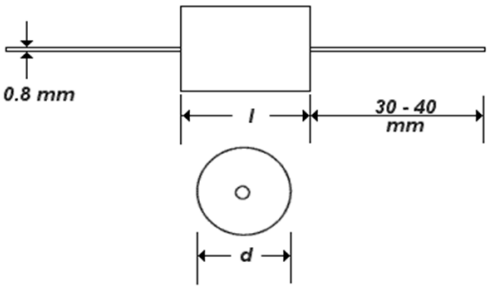


Features

Very low loss polypropylene
Oil Impregnated - to withstand higher voltages
Dielectric - Polypropylene
Electrode - Aluminium Foil
Coil - Non inductively wound , Extended Foil
Leads - Axial tinned copper wires
Construction - Preformed plastic case, resin sealed, green sleeve
Markings - El-Ci-Ar logo, Capacitance, Voltage, Type
Capacitor Tolerance - 20% (M), 10% (K), 5% (J)
Dissipation Factor <= 0.001 at 1KHz at 25^{o}C (Typical Value 0.0004)
Test Voltage - 2.5 x Vr for 2 sec
Max Pulse Rise - 1000V/usec
Temperature Range from -25^{o}C to +85^{o}C

Applications

High Frequency Circuits
High dv/dt applications like snubers across MOSFETS in SMPS & UPS
Resonant Capacitor in Electronic (Lighting) Ballasts



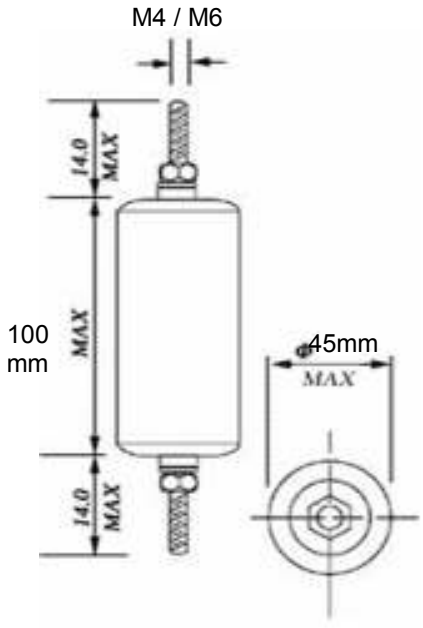
Rated Capacitor nF	1000V		2000V	
	d	l	d	l
10			12	23
47	12	23	15	23
68	12	23		
100	15	23	17	34
220	17	34		
470			32	55
1uF	25	55		

Custom Values are also available on request

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FMD52 - Mixed Dielectric AC Capacitors





Features

Oil Impregnated for Good Corona Resistance
Dielectric - Polypropylene + Paper
Electrode - Aluminium Foil
Coil - Non-inductively wound, mineral oil impregnated
Leads - Brass stud
Construction - Aluminium can + Blue PVC Sleeve,
stud insert moulded plastic end caps
Markings - El-Ci-Ar logo, Capacitance, Voltage, Type
Capacitor Tolerance - 20% (M), 10% (K), 5% (J)
Dissipation Factor <= 0.005 at 1KHz at 25C (Typical Value 0.001)
Test Voltage - 2.5 x Vr for 2 sec

Max Pulse Rise - 300V/usec
Temperature Range from -25^{o}C to +85^{o}C
Insulation Resistance >= 25 GΩ for C <= 0.33uF At 20^{o}C
>= 3000 sec for C>=0.33uF

Available Values

Capacitance - 0.1uF to 2uF
Voltage - AC Rating 1200VAC
DC Rating 2000VDC

Value (uF)	Diameter	Length	Stud
0.1	19	40	M4
0.25	25	72	M6
0.5	30	72	M6
1	40	100	M6
2	45	100	M6

Applications

For forced commutation of SCRs such as in inverters and choppers these capacitors are ruggedly designed to carry heavy currents. They employ a non-inductively wound oil impregnated paper polypropylene mixed dielectric coil with aluminium foil as electrode. Encased in aluminium can and offered in axial threaded screw terminals these are generally popular in values from 0.1 υF to 2 μF and in voltage rating of 1200 VAC. A special construction feature provides for an explosion proof performance through the means of an open circuiting of the element when excessive current flows through the capacitor under fault conditions.

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Tel: (022) 66307244 / 45, 40029962 / 63 Fax: (022) 40025469 Email: sales@neotroniks.com

FMD51 - Mixed Dielectric AC Capacitors



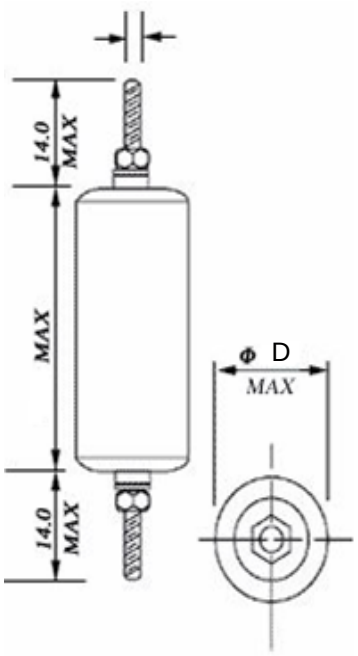
Features

Oil Impregnated for Good Corona Resistance
Dielectric - Polyester + Paper
Electrode - Aluminium Foil
Coil - Non-inductively wound, mineral oil impregnated
Leads - Brass stud
Construction - Aluminium can + Blue PVC Sleeve,
stud insert moulded plastic end caps
Markings - El-Ci-Ar logo, Capacitance, Voltage, Type
Capacitor Tolerance - 20% (M), 10% (K), 5% (J)
Dissipation Factor <= 0.01 at 1KHz at 25C (Typical Value 0.005)
Test Voltage - 2.5 x Vr for 2 sec (Vr=2000V, 3000V)
2 x Vr for 2 sec (Vr=5000V)
Max Pulse Rise - 300V/usec
Temperature Range from -25°C to +85°C
Insulation Resistance >= 25 GΩ for C <= 0.33uF At 20C
>= 75000 sec for C>=0.33uF

Applications

General Purpose RC N/W across diodes, SCR
Suited for High Voltage Applications like Induction Heating
Suppression Circuits

M4 / M6



L

Available Values

Capacitance - 0.1uF to 1uF
Voltage - 1000VAC / 1200VAC

Value (uF)	Diameter	Length	Stud
0.1	19	40	M4
0.25	25	72	M6
0.5	30	72	M6
1	40	100	M6

El-Ci-Ar® *neotroniks* *Pvt Ltd* 68 Hadapsar Ind Estate, Pune 411013, India

RC-11 Resistor Capacitor Network

Features

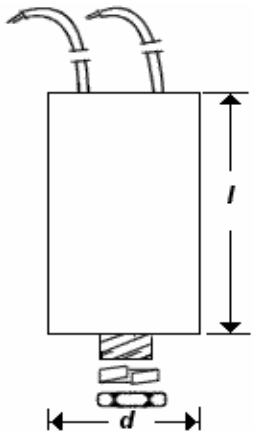
Aluminium Can Encased, Resistor Capacitor Series Block
Capacitor - Film foil, polyester dielectric (KT-12)
Resistor - Wire wound placed directly around the capacitor
Coil - Non-inductively wound, mineral oil impregnated
Leads - Flexible PVC coated copper wires 23/36, red colour, 150 mm length
Construction - Aluminium can housed and epoxy filled.
Bottom stud of M8 threads for panel mounting. R and C series connected
Markings - El-Ci-Ar logo, Resistance value, wattage, capacitance value, rated voltage
Tolerance 10% (K) on Capacitor, 5% (J) on Resistor
Resistor Rating 10 watts (effective).
Test Voltage - 2500 VDC for 2 sec b/w terminals
2000 VDC b/w terminals & case for 60 sec
Max Pulse Rise - 300V/usec
Temperature Range from -25°C to +85°C
Insulation Resistance > 25 GΩ at 500V for 25°C



Applications

Useful for thyristor circuits and for spark quenching
General Purpose RC N/W across diodes, SCR

R (Ω)	+	C (uF)	d (mm)	l (mm)
10Ω	+	0.1uF	30	40
22Ω	+	0.1uF	30	40
10Ω	+	0.22uF	30	53
22Ω	+	0.22uF	30	53
47Ω	+	0.22uF	30	53
100Ω	+	0.22uF	30	53
470Ω	+	0.22uF	30	53
820Ω	+	0.22uF	30	53
22Ω	+	0.47uF	30	53
47Ω	+	0.47uF	30	53



Regd off: 1st Floor, Mistry Mansion, 107 M.G.Road, Fort, Mumbai 400001
Tel: (022) 66307244 / 45, 40029962 / 63 Fax: (022) 40025469 Email: sales@neotroniks.com

KT11



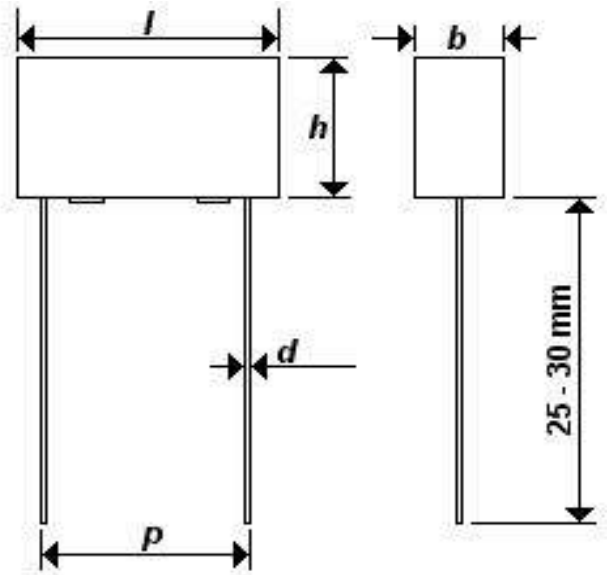
Features

Oil Impregnated - to withstand higher voltages
Dielectric - Polyester
Electrode - Aluminium Foil
Coil - Non inductively wound
Leads - Radial Copper Wires, Solder Plated, Directly welded
Construction - Rectangular plastic box, Resin sealed
Markings - El-Ci-Ar logo, Capacitance, Voltage, Type
Tolerance - 20%, 10%, 5%
Dissipation Factor <= 0.007 at 1KHz at 25C (Typical Value 0.004)
Test Voltage - 2.5 x Vr for 2 sec
Max Pulse Rise - 500V/usec
Temperature Range -25C to +85C
Insulation Resistance >= 30 GΩ for C <= 0.33uF at 25C

Applications

General Purpose RC N/W across diodes, SCR
Lighting Applications
Suppression Circuits
Electronic Ballasts

d	*p*
0.6	10 mm
0.8	15 mm
	22.5 mm
	27.5 mm



KT11

Rated Capacitor	400V				630V				1000V			
uF	b	h	l	p	b	h	l	p	b	h	l	p
0.0010									5	11	13	10
0.0015									5	11	13	10
0.0022									5	11	13	10
0.0033									5	11	13	10
0.0047									5	11	13	10
0.0068									5	11	13	10
0.010					5	11	13	10	5	11	13	10
0.015					6	11	13	10	6	11	13	10
0.022					6	11	13	10	6	12	18	15
0.033					6	11	13	10	7	13	18	15
0.047					7	13	18	15	7	13	26	22.5
0.068					8	14	18	15	8	14	26	22.5
0.10	7	13	18	15	8	14	18	15	8	16	26	22.5
0.15	8	14	18	15	8	16	26	22.5				
0.22	8	16	26	22.5								

Custom Values are also available on request

UPDATE:

0.01 uF 630V / 1000V also available in 7.5 mm Pitch as KT98
0.01 uF 1000V also available in 15 mm Pitch as KT2B2

Products Specification



www.ultracapacitor.co.kr

■ General

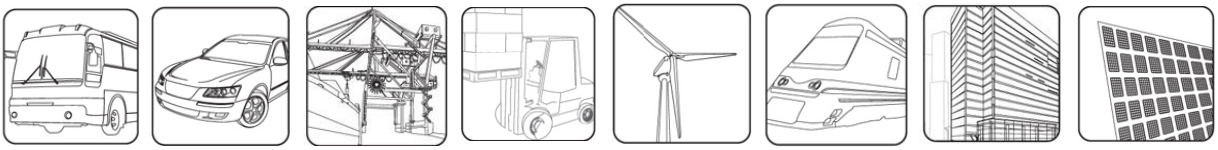
LS Ultracapacitor is promising energy storage device that Positioned between conventional electrolytic capacitor and Rechargeable battery. High power, high energy and long-term Reliability feature of LS Ultracapacitor enables this component to Use in various applications as backup power unit, auxiliary power Unit, instantaneous power compensation, peak power Compensation and energy storage as well.

- Rated voltage : up to 2.8V
- High power performance (vs. Battery)
- High Energy performance (vs. Conventional electrolytic capacitor)
- Environmental Friendliness
- Maintenance-free
- Wide operating temperature range(-40~65)

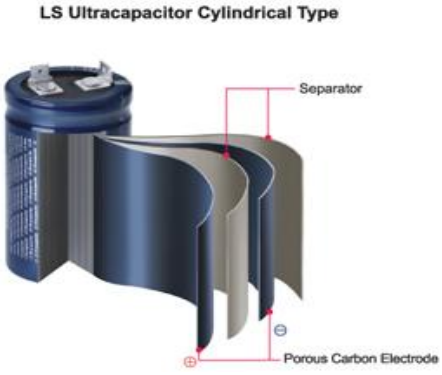
LS Ultracapacitor

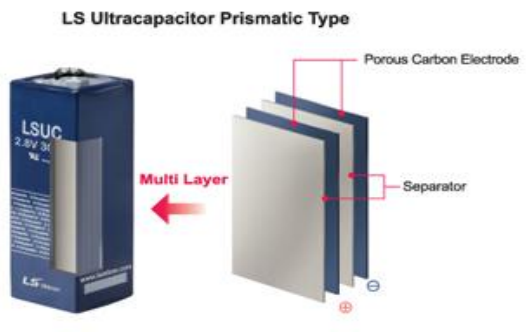
- **LSUC®**
  - 2.5V, 2.7V, 2.8V
  - PC & ACN Technology
- **LSHC®**
  - High Energy density
  - Pseudo Technology
- **LSMD®**
  - Standard Module
  - Customized Module

■ Application



■ Structure





LS Ultracapacitors have been Certified by **ISO/TS16949, ISO14001:2004 , OHSAS18001:2007, UL**

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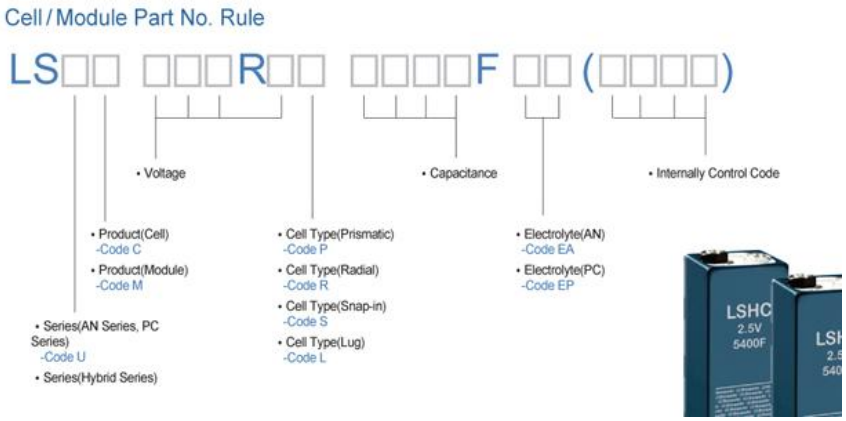
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■ Product Line-up

Group	Series	Feature	Voltage	Capacitance	Part Number	Terminal Type
LSUC	2.8V Series	World top class voltage	2.8	100F	LSUC 002R8S 0100F EA	Snap In
			2.8	120F	LSUC 002R8S 0120F EA	Snap In
			2.8	350F	LSUC 002R8L 0350F EA	Lug
			2.8	400F	LSUC 002R8L 0400F EA	Lug
			2.8	1000F	LSUC 002R8P 1000F EA	Screw
			2.8	1700F	LSUC 002R8P 1700F EA	Screw
			2.8	3000F	LSUC 002R8P 3000F EA	Screw
			2.8	3000F	LSUC 002R8P 3000F EA LR01	Screw
	2.7V Series	AN series	2.7	3F	LSUC 002R7R 0003F EA	Lead wire
			2.7	5F	LSUC 002R7R 0005F EA	Lead wire
			2.7	10F	LSUC 002R7R 0010F EA	Lead wire
			2.7	25F	LSUC 002R7R 0025F EA	Lead wire
			2.7	50F	LSUC 002R7R 0050F EA	Lead wire
	2.5V Series	PC series	2.5	110F	LSUC 002R5S 0110F EP	Snap In
			2.5	320F	LSUC 002R5L 0320F EP	Lug
			2.5	380F	LSUC 002R5L 0380F EP	Lug
			2.5	2800F	LSUC 002R5P 2800F EP	Screw
LSHC	2.5V Series	High energy density	2.5	220F	LSHC 002R5S 0220F EA	Snap In
			2.5	650F	LSHC 002R5L 0650F EA	Lug
			2.5	850F	LSHC 002R5L 0850F EA	Lug
			2.5	1800F	LSHC 002R5P 1800F EA	Screw
			2.5	5400F	LSHC 002R5P 5400F EA	Screw
LSMD	Standard Module		16.8	500F	LSUM 016R8P 0500F EA	
			50.4	166.7F	LSUM 050R4P 0250F EA	
			67.2	125F	LSUM 067R2P 0125F EA	
			84.0	100F	LSUM 084R0P 0100F EA	

■ Part number System



■ Marking

LS Ultracapacitors are maked with the following information ;

LSUC, LSHC – Polarity, Rated capacitance, Rated Voltage, Serial number, Directions
LSMD – Polarity, Rated capacitance, Rated Voltage, Part number, Serial number, Warning

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LSUC® 2.8V Series

Snap-in type terminal

■ Features and benefits



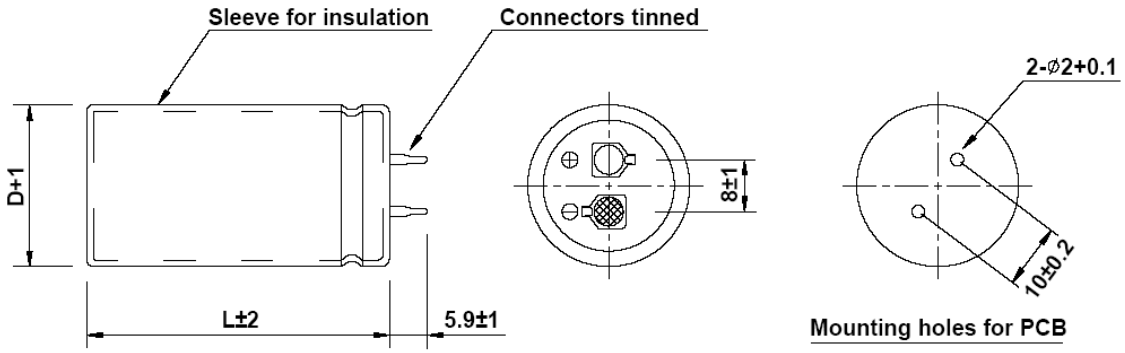
-World top class voltage series.
-Long term reliable cycle life
-Quick charge & discharge available

Typical Application
- HEV & FCEV
- Consumer application
- Short term UPS
- Windmill pitch control
- Power back up, voltage stabilizer
- Robotics memory back up

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)



■ Specification

Rated Voltage	2.8 V	
Surge Voltage	3.0 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-40 ~ 65 °C	
Storage temperature range	-40 ~ 70 °C	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 100% of initially specified value
Cycle Life (25°C)	After 500,000 cycles betw een rated voltage to half rated voltage at +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 100% of initially specified value

■ Standard Ratings

Capacitance (F)	Dimension (mm)		Resistance(mΩ)		Continuous Current (A)	Max. Current (A)	Leakage Current (mA)	Max. Stored Energy (Wh)	Weight (g)	Part number
	D	L	(1kHz)	DC						
120	25	46	7	9	20	81	< 0.4	0.13	25	LSUC 002R8S 0120F EA
100	22	46	7	9	20	74	< 0.3	0.11	23	LSUC 002R8S 0100F EA

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LSUC® 2.8V Series

Lug type terminal

■ Features and benefits



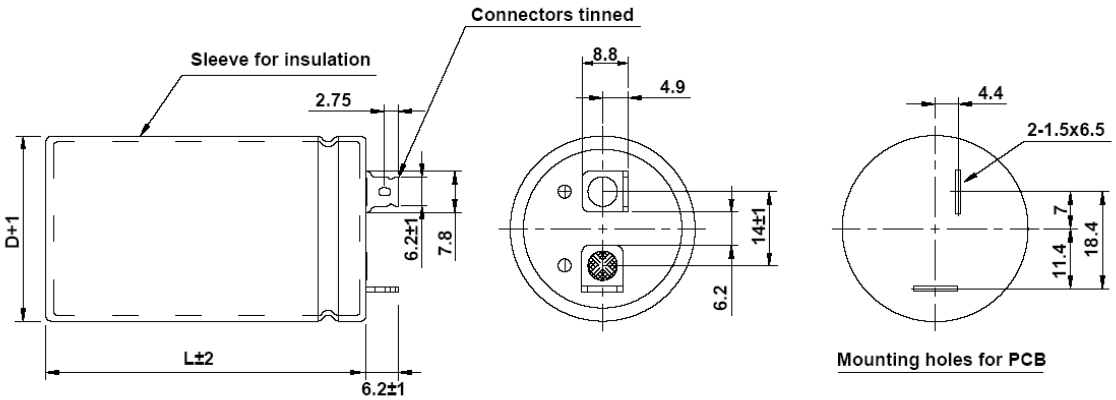
-World top class voltage series.
-Long term reliable cycle life
-Quick charge & discharge available

Typical Application
- HEV & FCEV
- Consumer application
- Short term UPS
- Windmill pitch control
- Power back up, voltage stabilizer
- Robotics memory back up

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)



■ Specification

Rated Voltage	2.8 V	
Surge Voltage	3.0 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-40 ~ 65 °C	
Storage temperature range	-40 ~ 70 °C	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 100% of initially specified value
Cycle Life (25°C)	After 500,000 cycles betw een rated voltage to half rated voltage at +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 100% of initially specified value

■ Standard Ratings

Capacitance (F)	Dimension (mm)		Resistance(mΩ)		Continuous Current (A)	Max. Current (A)	Leakage Current (mA)	Max. Stored Energy (Wh)	Weight (g)	Part number
	D	L	(1kHz)	DC						
400	35	71	2.8	3	25	255	< 1	0.44	74	LSUC 002R8L 0400F EA
350	35	61	3	3.2	25	231	< 1	0.38	65	LSUC 002R8L 0350F EA

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LSUC® 2.8V Series

Screw in terminal

■ Features and benefits



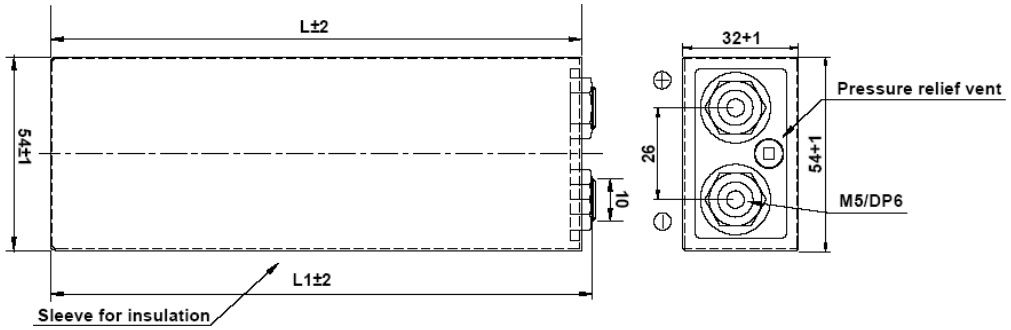
- **World top class voltage series.**
- **Long term reliable cycle life**
- **Quick charge & discharge available**
- **Endurance : At 65°C, 1500 hours**

Typical Application
- **HEV & FCEV**
- **Short term UPS**
- **Windmill pitch control**
- **Power back up,**
- **Robotics memory back up**

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)



■ Specification

Rated Voltage	2.8 V	
Surge Voltage	3.0 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-40 ~ 65 °C	
Storage temperature range	-40 ~ 70 °C	
Endurance	After 1500 hours application of 2.8V .DC at 65℃, the capacitor shall meet the following limits.	
	Capacitance change	Within 20% of initially specified value
	Internal resistance change	Within 60% of initially specified value
Shelf life	After 1500 hours storage at +65 °C without load shall meet specification of endurance	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 150% of initially specified value
Cycle Life (25°C)	After 1,000,000 cycles between rated voltage to half rated voltage at +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 150% of initially specified value

■ Standard Ratings

Capacitance (F)	Dimension (mm)				Resistance(mΩ)		Max. Current (A)	Leakage Current (mA)	Max.Stored Energy (Wh)	Weight (g)	Part number
	D	W	L	L1	(100Hz)	DC					
1700	32	54	150	155	0.47	0.50	1,286	< 3	1.85	380	LSUC 002R8P 1700F EA
1000	32	54	97	100	0.55	0.58	886	< 2	1.09	245	LSUC 002R8P 1000F EA

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LSUC® 2.8V Series

Screw in terminal

■ Features and benefits



-World top class voltage series.
-Long term reliable cycle life
-Quick charge & discharge available
-Endurance : At 65°C, 1500 hours

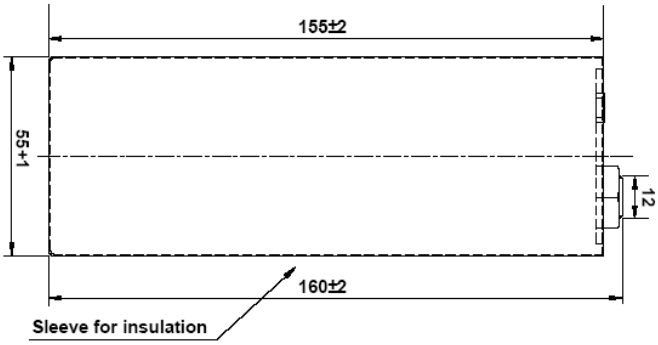
Typical Application

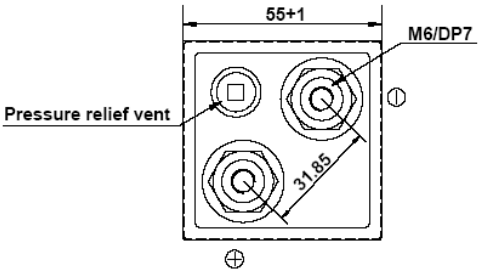
- HEV & FCEV
- Short term UPS
- Windmill pitch control
- Power back up
- Robotics memory back up

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)





■ Specification

Rated Voltage	2.8 V	
Surge Voltage	3.0 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-40 ~ 65 °C	
Storage temperature range	-40 ~ 70 °C	
Endurance	After 1500 hours application of 2.8V .DC at 65℃, the capacitor shall meet the following limits.	
	Capacitance change	Within 20% of initially specified value
	Internal resistance change	Within 60% of initially specified value
Shelf life	After 1500 hours storage at +65 °C without load shall meet specification of endurance	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 150% of initially specified value
Cycle Life (25°C)	After 1,000,000 cycles between rated voltage to half rated voltage at +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 150% of initially specified value

■ Standard Ratings

Capacitance (F)	Dimension (mm)			Resistance(mΩ)		Max. Current (A)	Leakage Current (mA)	Max. Stored Energy (Wh)	Weight (g)	Part number
	D	W	L	(100Hz)	DC					
3000	55	55	155	0.29	0.36	2,019	< 5	3.27	650	LSUC 002R8P 3000F EA
3000	55	55	155	0.25	0.25	2,400	< 5	3.27	650	LSUC 002R8P 3000F EA LR01

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LSUC® 2.7V Series

Lead wire terminal

■ Features and benefits



-Long term reliable cycle life
-Quick charge & discharge available

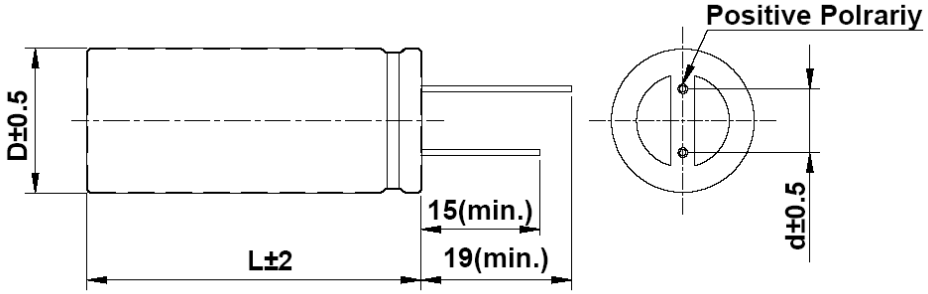
Typical Application

- **Consumer application**
- **Short term UPS**
- **Windmill pitch control**
- **Power back up, voltage stabilizer**
- **Robotics memory back up**
- **Solar application**

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)



■ Specification

Rated Voltage	2.7 V	
Surge Voltage	2.85 V	
Capacitance Tolerance	-20% / 20%	
Resisitance Tolerance	MAX.	
Operating temperature range	-40 ~ 60 °C	
Storage temperature range	-40 ~ 70 °C	
Life Time (25°C)	After 10 years at rated voltage and +25 oC	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 100% of initially specified value
Cycle Life (25°C)	After 500,000 cycles between rated voltage to half rated voltage at +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 100% of initially specified value

■ Standard Ratings

Capacitance (F)	Dimension (mm)			Resistance(mΩ)		Max. Current (A)	Rated Current (A)	Stored Energy (Wh)	Weight (g)	Part number
	D	L	d	(1kHz)	DC					
3	8	20	4	60	90	3	0.77	0.003	1.4	LSUC 002R7R 0003F EA
5	10	20	5.5	45	70	5	1.26	0.005	2.1	LSUC 002R7R 0005F EA
10	10	30	5.5	30	50	9	2.45	0.011	3	LSUC 002R7R 0010F EA
25	16	25	8.0	20	40	17	5.63	0.027	6.8	LSUC 002R7R 0025F EA
50	18	40	8.0	15	30	27	10.4	0.054	11.3	LSUC 002R7R 0050F EA

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LSUC® 2.5V Series

Snap-in type terminal

■ Features and benefits



-PC electrolyte
-Long term reliable cycle life
-Quick charge & discharge available

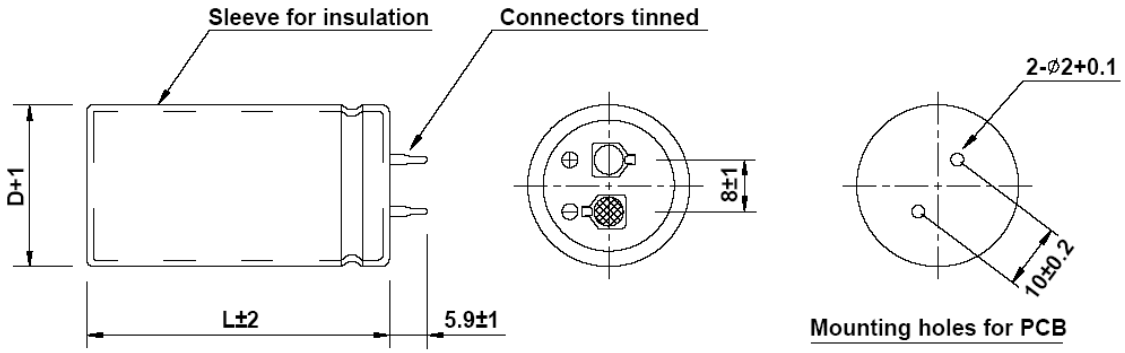
Typical Application

- **HEV & FCEV**
- **Consumer application**
- **Short term UPS**
- **Windmill pitch control**
- **Power back up**
- **Robotics memory back up**

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)



■ Specification

Rated Voltage	2.5 V	
Surge Voltage	2.7 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-25 ~ 65 °C	
Storage temperature range	-40 ~ 85 °C	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30%of initially specified value
	Internal resistance change	Within 100% of initially specified value
Cycle Life (25°C)	After 500,000 cycles at +25 °C	
	Capacitance change	Within 30%of initially specified value
	Internal resistance change	Within 100% of initially specified value

■ Standard Ratings

Capacitance (F)	Dimension (mm)		Resistance(mΩ)		Continuous Current (A)	Max. Current (A)	Leakage Current (mA)	Max. Stored Energy (Wh)	Weight (g)	Part number
	D	L	(1kHz)	DC						
110	25	46	10	14	20	54	< 0.3	0.10	28	LSUC 002R5S 0110F EP

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LSUC® 2.5V Series

Lug type terminal

■ Features and benefits



-PC electrolyte
-Long term reliable cycle life
-Quick charge & discharge available

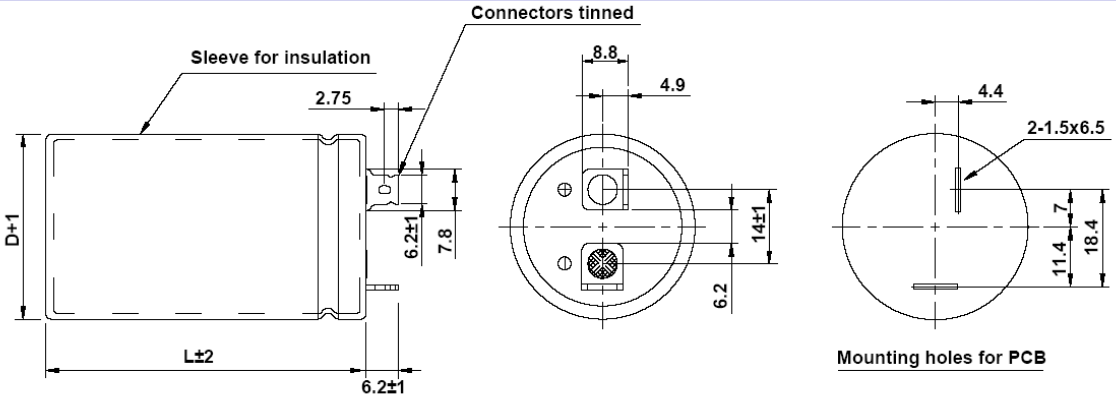
Typical Application

- **HEV & FCEV**
- **Consumer application**
- **Short term UPS**
- **Windmill pitch control**
- **Power back up,**
- **Robotics memory back up**

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)



■ Specification

Rated Voltage	2.5 V	
Surge Voltage	2.7 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-25 ~ 65 °C	
Storage temperature range	-40 ~ 85 °C	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30%of initially specified value
	Internal resistance change	Within 100% of initially specified value
Cycle Life (25°C)	After 500,000 cycles at +25 °C	
	Capacitance change	Within 30%of initially specified value
	Internal resistance change	Within 100% of initially specified value

■ Standard Ratings

Capacitance (F)	Dimension (mm)		Resistance(mΩ)		Continuous Current (A)	Max. Current (A)	Leakage Current (mA)	Max. Stored Energy (Wh)	Weight (g)	Part number
	D	L	(1kHz)	DC						
380	35	71	4	4.5	25	175	< 1.1	0.33	89	LSUC 002R5L 0380F EP
320	35	61	4.5	5	25	154	< 0.9	0.28	75	LSUC 002R5L 0320F EP

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LSUC® 2.5V Series

Screw in terminal

■ Features and benefits



-PC electrolyte
-Long term reliable cycle life
-Quick charge & discharge available

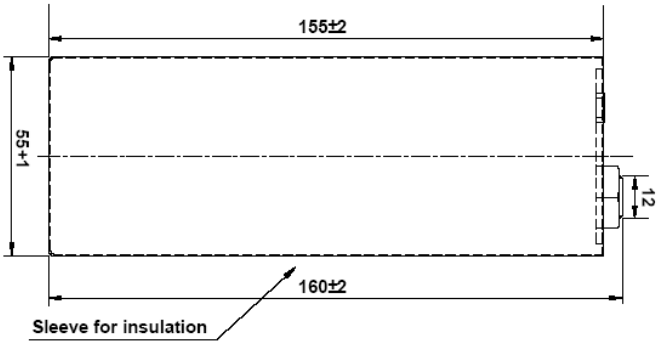
Typical Application

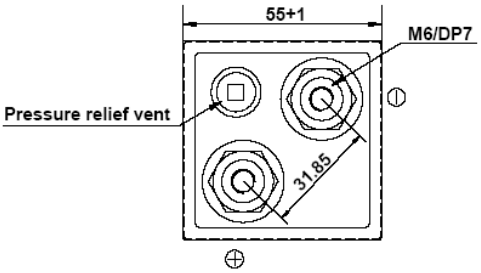
- **HEV & FCEV**
- **Short term UPS**
- **Windmill pitch control**
- **Power back up,**
- **Robotics memory back up**

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)





■ Specification

Rated Voltage	2.5 V	
Surge Voltage	2.7 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-25 ~ 65 °C	
Storage temperature range	-40 ~ 85 °C	
Endurance	After 1000 hours application of 2.5V .DC at 65℃, the capacitor shall meet the following limits.	
	Capacitance change	Within 20% of initially specified value
	Internal resistance change	Within 60% of initially specified value
Shelf life	After 1000 hours storage at +65 °C without load shall meet specification of endurance	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 100% of initially specified value
Cycle Life (25°C)	After 500,000 cycles at +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 100% of initially specified value

■ Standard Ratings

Capacitance (F)	Dimension (mm)			Resistance(mΩ)		Max. Current (A)	Leakage Current (mA)	Max. Stored Energy (Wh)	Weight (g)	Part number
	D	W	L	(100Hz)	DC					
2800	55	55	155	0.60	0.65	1,241	< 8	2.43	730	LSUC 002R5P 2800F EP

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LSHC® 2.5V Series

Snap-in type terminal

■ Features and benefits



- **Hybrid capacitor**
- **Long term reliable cycle life**
- **High Energy density**
- **Quick charge & discharge available**

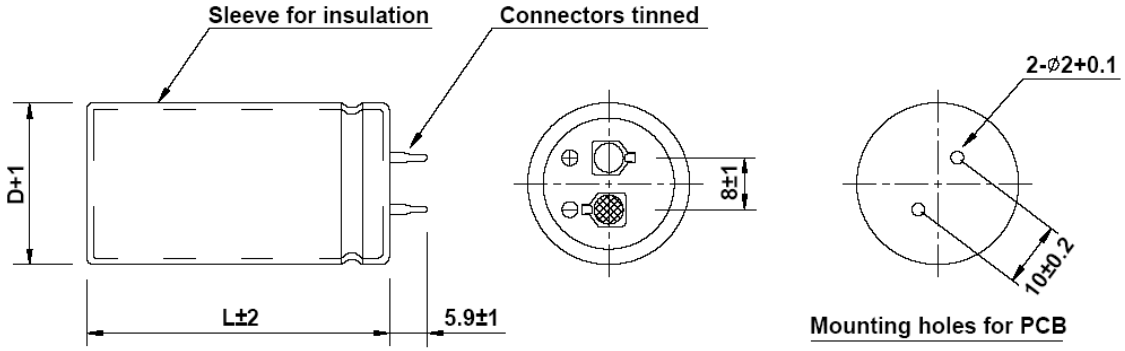
Typical Application

- **Consumer application**
- **Short term UPS**
- **Windmill pitch control**
- **Power back up**
- **Solar application**

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)



■ Specification

Rated Voltage	2.5 V	
Surge Voltage	2.7 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-25 ~ 60 °C	
Storage temperature range	-25 ~ 70 °C	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 200% of initially specified value
Cycle Life (25°C)	After 500,000 cycles at +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 200% of initially specified value

*** Operating voltage range : 2.5 ~ 1.0V**

■ Standard Ratings

Capacitance (F)	Dimension (mm)		Resistance(mΩ)		Continuous Current (A)	Max. Current (A)	Leakage Current (mA)	Max. Stored Energy (Wh)	Weight (g)	Part number
	D	L	(1kHz)	DC						
220	25	46	12	18	20	55	< 0.5	0.19	27	LSHC 002R5S 0220F EA

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LSHC® 2.5V Series

Lug type terminal

■ Features and benefits



-Hybrid capacitor
-Long term reliable cycle life
-Quick charge & discharge available

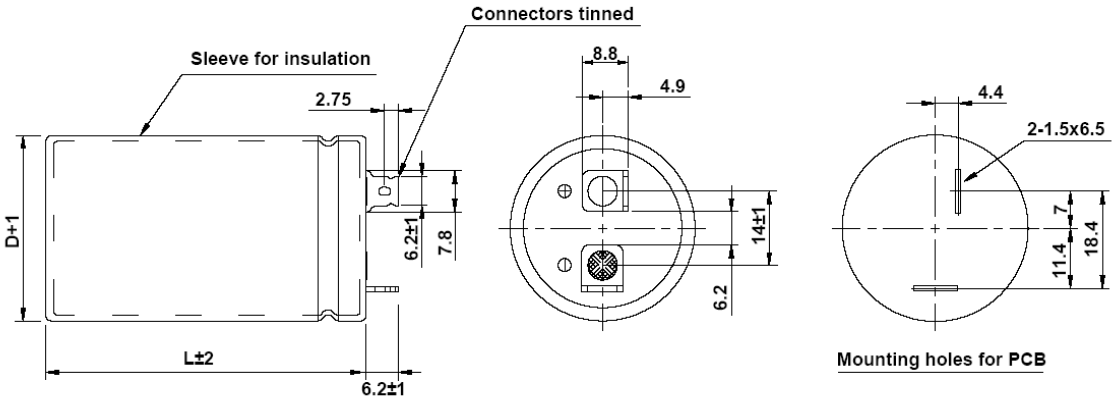
Typical Application

- Solar application
- Short term UPS
- Windmill pitch control
- Power back up,
- Robotics memory back up

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)



■ Specification

Rated Voltage	2.5 V	
Surge Voltage	2.7 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-25 ~ 60 °C	
Storage temperature range	-25 ~ 70 °C	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 200% of initially specified value
Cycle Life (25°C)	After 500,000 cycles at +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 200% of initially specified value

*** Operating voltage range : 2.5 ~ 1.0V**

■ Standard Ratings

Capacitance (F)	Dimension (mm)		Resistance(mΩ)		Continuous Current (A)	Max. Current (A)	Leakage Current (mA)	Max. Stored Energy (Wh)	Weight (g)	Part number
	D	L	(1kHz)	DC						
850	35	71	6	7	40	153	< 2	0.74	92	LSHC 002R5L 0850F EA
650	35	61	7	8	40	131	< 1.5	0.56	80	LSHC 002R5L 0650F EA

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LSHC® 2.5V Series

Screw in terminal

■ Features and benefits



-Hybrid capacitor
-Long term reliable cycle life
-Quick charge & discharge available

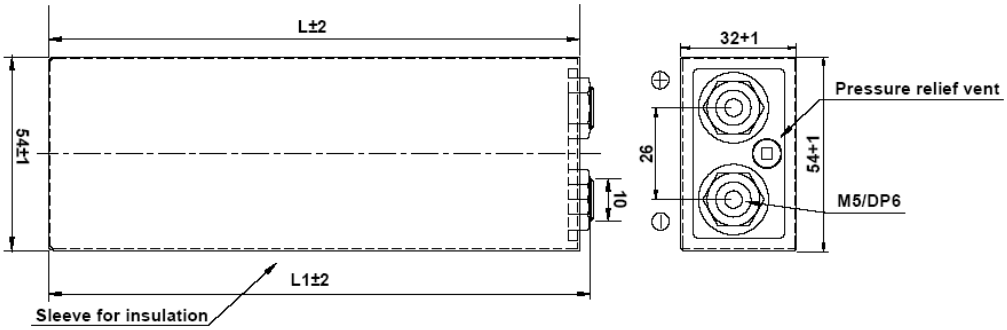
Typical Application

- Consumer application
- Short term UPS
- Windmill pitch control
- Power back up
- Robotics memory back up

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)



■ Specification

Rated Voltage	2.5 V	
Surge Voltage	2.7 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-25 ~ 60 °C	
Storage temperature range	-25 ~ 70 °C	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 200% of initially specified value
Cycle Life (25°C)	After 500,000 cycles at +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 200% of initially specified value

*** Operating voltage range : 2.5 ~ 1.0V**

■ Standard Ratings

Capacitance (F)	Dimension (mm)				Resistance(mΩ)		Max. Current (A)	Leakage Current (mA)	Max. Stored Energy (Wh)	Weight (g)	Part number
	D	W	L	L1	(100Hz)	DC					
1800	32	54	97	100	0.80	0.90	859	< 4	1.56	285	LSHC 002R5P 1800F EA

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LSHC® 2.5V Series

Screw in terminal

■ Features and benefits



-Hybrid capacitor
-Long term reliable cycle life
-Quick charge & discharge available

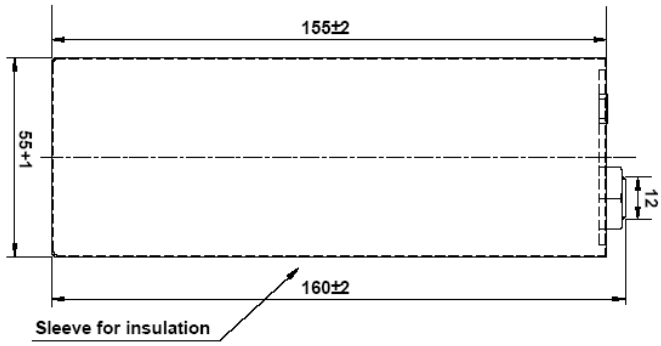
Typical Application

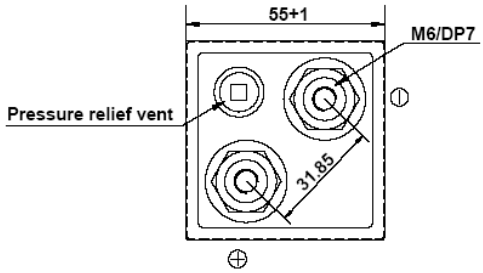
- Consumer application
- Short term UPS
- Windmill pitch control
- Power back up
- Robotics memory back up
- Solar application

RoHS compliant

■ Physical properties

Dimension in mm (not to scale)





■ Specification

Rated Voltage	2.5 V	
Surge Voltage	2.7 V	
Capacitance Tolerance	-10% / 10%	
Resisitance Tolerance	MAX.	
Operating temperature range	-25 ~ 60 °C	
Storage temperature range	-25 ~ 70 °C	
Life Time (25°C)	After 10 years at rated voltage and +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 200% of initially specified value
Cycle Life (25°C)	After 500,000 cycles at +25 °C	
	Capacitance change	Within 30% of initially specified value
	Internal resistance change	Within 200% of initially specified value

*** Operating voltage range : 2.5 ~ 1.0V**

■ Standard Ratings

Capacitance (F)	Dimension (mm)			Resistance(mΩ)		Max. Current (A)	Leakage Current (mA)	Max. Stored Energy (Wh)	Weight (g)	Part number
	D	W	L	(100Hz)	DC					
5400	55	55	155	0.40	0.50	1,824	< 10	4.67	760	LSHC 002R5P 5400F EA

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Technical Information

How to calculate specification value

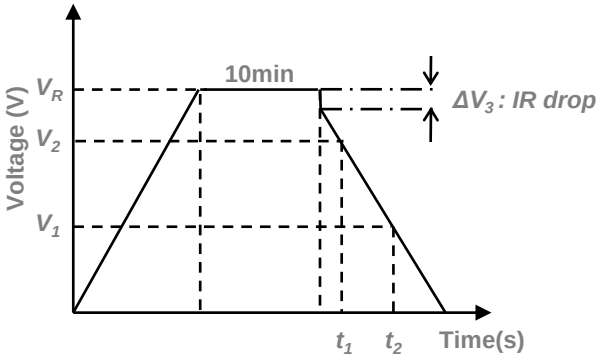
1. The Measurement Methods

1-1 Capacitance

Apply rated voltage and charge for 10min after the constant current / constant voltage power supply has achieved the rated voltage. After a charge for 10min has finished, discharge with 10mA/F to 0.1V.

Measure the time t1 to t2 where the voltage between capacitor terminals at the time of discharge reduces from V1 to V2 as shown figure and calculate the capacitance value by the following formula:

1) Constant current charge with 10mA/F to V_R
2) Constant voltage charge at V_R for 5min
3) Constant current discharge with 10mA/F to 0.1V



$$C = \frac{I \times (t_2 - t_1)}{V_2 - V_1}$$

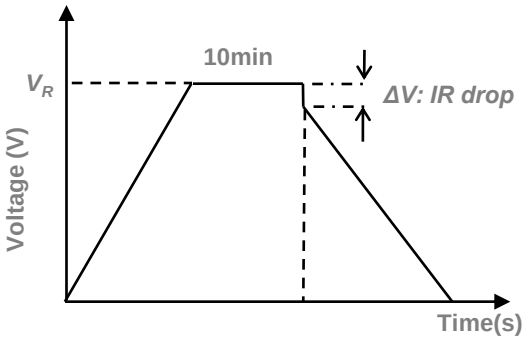
1-2 Resistance

The AC and DC resistance of a capacitor shall be calculated by the following formula;

$$R_{AC} = \frac{V}{I_{AC}}$$ (The frequency of the measuring voltage shall be 100Hz or 1kHz)

$$R_{DC} = \frac{\Delta V}{I_{DC}}$$

Where R_{AC} is the AC internal resistance (Ω);
R_{DC} is the DC internal resistance (Ω);
V is the effective value of AC voltage (V);
ΔV is the drop voltage for 10ms (V);
I_{AC} is the effective value of AC current (A);
I_{DC} is the discharge current (A);



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1-3 Leakage current & Self discharge

The leakage current shall be measured using the direct voltage appropriate to the test temperature(25℃) for 72hrs. Self discharge voltage shall be measured after charging up for 12hrs, disconnect the capacitor terminals from the voltage source. The capacitor shall be kept under standard condition for 100hrs.

1-4 Maximum current

Current for 1sec discharge from the rated voltage to the half of it in constant current discharge,

$$I_{Max} = \frac{V_R - 0.5*V_R}{\Delta t / C + R_{DC}}$$

Where I_{Max} is the Maximum current (A);
Δt is the discharge time (sec), 1 sec in this case ;
C is the capacitance (F);
R_{DC} is the DC resistance (Ω);
V_R is the rated voltage (V).

1-5 Maximum stored energy (E_{MAX})

$$E_{MAX}\,(Wh) = \frac{½\,CV_R^2}{3600}$$

2. The Standard Atmospheric Condition for Measurement

All test and measurements shall be made under standard atmospheric conditions for testing. Before the measurements are made, the capacitor shall be stored at the measuring temperature for a time sufficient to allow the entire capacitor to reach this temperature. The period as prescribed for recovery at the end of a test is a normally sufficient for this purpose.

Temperature : *15~35 ℃*
Relative humidity : *25~75%*
Air Pressure : *86~106 kPa*

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