

Film Capacitors for Power Electronics



Snubber capacitor (Dry type) **SH type**

■ Features

- Maintenance-free, long-life, compact and lightweight dry film capacitor
- A low-inductance capacitor with high ripple current capability suitable for high-frequency application
- Can be manufactured in various terminal shapes depending on installation requirements. Can be installed in any direction or position, and can accommodate various installation methods.
- RoHS Compliant = Environmentally friendly (oil-less)

■ Applications

- For semiconductor protection in high-frequency power devices



■ Specification

Item		Performance Characteristics
Installation location		For indoor use, altitude not exceeding 1000m
Category Temperature Range		-25 to +70°C
Capacitance tolerance		±10% at 20°C
Withstanding Voltage	Between terminals	DC Voltage×1.5 VDC at 10 seconds, 20°C
	Between terminals and case	DC Voltage× $\frac{2}{\sqrt{2}}$ +1000 (minimum 2000) VAC at 10 seconds, 20°C
Insulation Resistance	Between terminals and case	More than 1000MΩ (at 500VDC, 20°C)
Dissipation factor		Less than 0.15% at 1kHz, 20°C
Reference standards		JEM 1419 (IEC61071) (Power electronic capacitors)

In addition, the standard is based on JEM 1419 (IEC61071) (Power electronic capacitors).

If using the product outside the specifications mentioned above, please contact your local Nichicon sales office.

Lead type is also available upon request. Please contact us for details.

■ Standard ratings

Rated Voltage VDC (VAC)	Capacitance (μF)	Part Number	Dimensions (mm)			Current Value		Terminal type	Fig
			A	B	C	Ie	Ip		
500 (400)	4.0	EM501040D0UA9HL	48	21.5	35	5	150	M5 screw	2
	5.0	EM501050D0UA9HN	48	24	38	5	200	M5 screw	2
	8.0	EM501080D0UA9HW	58	26	40	12	250	M5 screw	3
	10.0	EM501100D0UA9HP	58	30	44	16	300	M5 screw	3
	13.0	EM501130D0UA9HS	59	34	49	18	400	M5 screw	3
700 (500)	1.5	EM7011R5D0UA9HF	37	21.5	35	5	250	M5 screw	1
	2.0	EM701020D0UA9HL	48	21.5	35	12	250	M5 screw	2
	2.5	EM7012R5D0UA9HN	48	24.5	38	15	300	M5 screw	2
	4.0	EM701040D0UA9HW	58	26	40	15	350	M5 screw	3
	5.0	EM701050D0UA9HP	58	30	44	18	450	M5 screw	3
800 (600)	7.5	EM7017R5D0UA9HS	59	34	49	18	500	M5 screw	3
	1.0	EM801010D0UA9HF	37	21.5	35	12	200	M5 screw	1
	1.5	EM8011R5D0UA9HL	48	21.5	35	12	200	M5 screw	2
	3.0	EM801030D0UA9HW	58	26	40	18	350	M5 screw	3
	4.0	EM801040D0UA9HP	58	30	44	18	450	M5 screw	3
5.0	EM801050D0UA9HS	59	34	49	18	500	M5 screw	3	

Also available in sizes other than M5 screw diameter. Please contact us for details.

Design, specifications are subject to change without notice.

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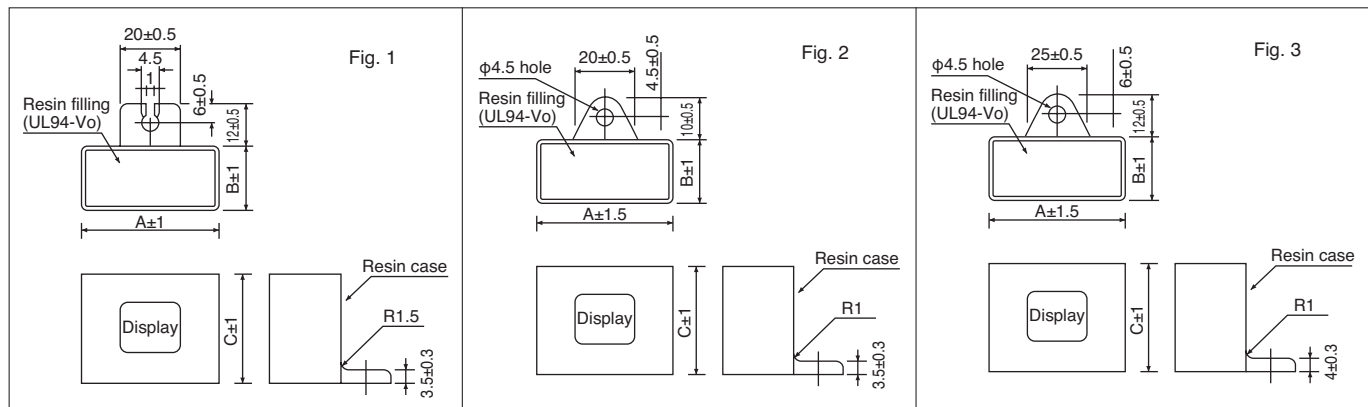
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Standard ratings

Rated Voltage VDC (VAC)	Capacitance (μ F)	Part Number	Dimensions (mm)			Current Value		Terminal type	Fig
			A	B	C	le	lp		
1000 (700)	0.5	EM1020R5D0UA9HF	37	21.5	35	8	150	M5 screw	1
	1.5	EM1021R5D0UA9HW	58	26	40	10	200	M5 screw	3
	2.0	EM102020D0UA9HP	58	30	44	15	300	M5 screw	3
	2.5	EM1022R5D0UA9HS	59	34	49	18	350	M5 screw	3
	3.0	EM102030D0UA9HS	59	34	49	18	450	M5 screw	3
1200 (800)	0.5	EM1220R5D0UA9HL	48	21.5	35	6	100	M5 screw	2
	1.0	EM122010D0UA9HW	58	26	40	10	200	M5 screw	3
	1.5	EM1221R5D0UA9HP	58	30	44	15	300	M5 screw	3
	1.8	EM1221R8D0UA9HS	59	34	49	18	350	M5 screw	3
	2.0	EM122020D0UA9HS	59	34	49	18	400	M5 screw	3
1500 (900)	0.5	EM1520R5D0UA9HN	48	24	38	10	200	M5 screw	2
	0.7	EM1520R7D0UA9HW	58	26	40	10	200	M5 screw	3
	1.0	EM152010D0UA9HP	58	30	44	14	300	M5 screw	3
	1.3	EM1521R3D0UA9HS	59	34	49	18	400	M5 screw	3
2000 (1000)	0.2	EM2020R2D0UA9HW	58	26	40	5	100	M5 screw	3
	0.5	EM2020R5D0UA9HP	58	30	44	8	150	M5 screw	3
	0.8	EM2020R8D0UA9HS	59	34	49	14	300	M5 screw	3
2500	0.5	EM2520R5D0UA9CHS	59	34	49	10	250	M5 screw	3

Also available in sizes other than M5 screw diameter. Please contact us for details.

Drawing



Terminal type	M5 screw	For mounting on circuit boards	For direct mounting on modules
Shape			
Reference	<ul style="list-style-type: none"> Nichicon also manufactures products with diameters other than M5 screw size for special applications (e.g. ϕ5.5 through-hole and 4mm screw). 	<ul style="list-style-type: none"> Standard wire types are ϕ1.0 soft copper wire and ϕ0.8 copper wire. Please contact us for pitch dimensions. 	<ul style="list-style-type: none"> Please contact us for terminal pitch dimensions.

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Snubber capacitor (Dry type) **SH type**

DC paper capacitor: Replacement product list

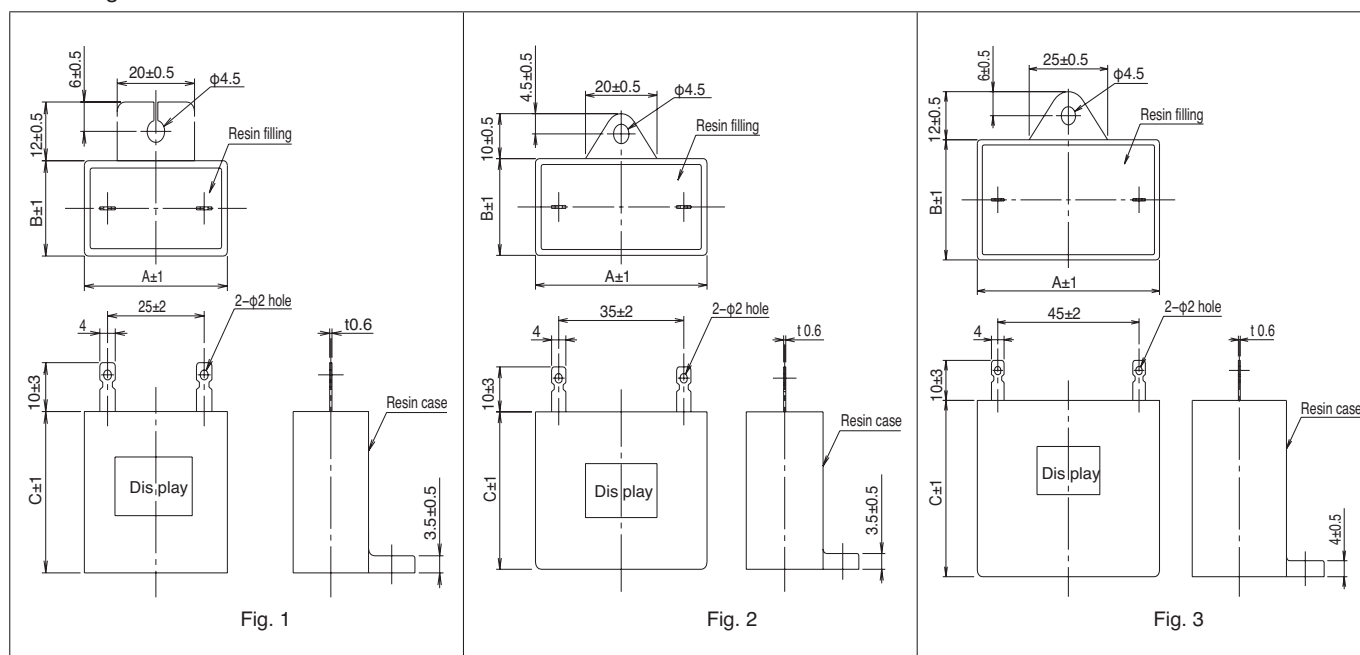
DC paper capacitor (discontinued products)				Replacement products (EM series)						
JIS product number	Part Number	Rated Voltage VDC (VAC)	Capacitance (μF)	Part Number	Dimensions (mm)			Current Value		Fig
					A	B	C	Ie	Ip	
CP701A2G104K	EC4010R1DD1	400 (200)	0.1	EM4010R1D0ZA7HE	37	19.5	33	2	20	1
CP701A2G204K	EC4010R2DD1		0.2	EM4010R2D0ZA7HE	37	19.5	33	2.5	25	1
CP701A2G504K	EC4010R5DD1		0.5	EM4010R5D0ZA7HE	37	19.5	33	3	30	1
CP701A2G105K	ES401010DD1		1	EM401010D0ZA7HE	37	19.5	33	3	30	1
CP701A2G205K	ES401020DD1		2	EM401020D0ZA7HF	37	21.5	35	4	40	1
CP701A2G405K	ES401040DD1		4	EM401040D0ZA7HL	48	21.5	35	5	50	2
CP701A2G605K	ES401060DD1		6	EM401060D0ZA7HW	58	26	40	6	60	3
CP701A2G805K	ES401080DD1		8	EM401080D0ZA7HP	58	30	44	10	100	3
CP701A2G106K	ES401100DD1		10	EM401100D0ZA7HS	59	34	49	12	120	3
CP701A3A104K	EC1020R1DD1		1000 (400)	0.1	EM1020R1D0ZA7HE	37	19.5	33	2	20
CP701A3A204K	EC1020R2DD1	0.2		EM1020R2D0ZA7HE	37	19.5	33	2.5	25	1
CP701A3A504K	ES1020R5DD1	0.5		EM1020R5D0ZA7HF	37	21.5	35	3	30	1
CP701A3A105K	ES102010DD1	1		EM102010D0ZA7HN	48	24	38	5	50	2
CP701A3A205K	ES102020DD1	2		EM102020D0ZA7HP	58	30	44	8	80	3
CP701A3C104K	ES1620R1DD1	1600 (450)	0.1	EM1620R1D0ZA7HE	37	19.5	33	2	20	1
CP701A3C204K	ES1620R2DD1		0.2	EM1620R2D0ZA7HE	37	19.5	33	2.5	25	1
CP701A3C504K	ES1620R5DD1		0.5	EM1620R5D0ZA7HN	48	24	38	5	50	2
CP701A3C105K	ES162010DD1		1	EM162010D0ZA7HP	58	30	44	10	100	3
CP711A3E104K	ES2520R1DD1	2500 (550)	0.1	EM2520R1D0ZA7HW	58	26	40	2	20	3
CP711A3E204K	ES2520R2DD1		0.2	EM2520R2D0ZA7HP	58	30	44	2.5	25	3
CP711A3E504K	ES2520R5DD1		0.5	EM2520R5D0ZA7HS	59	34	49	5	50	3

We recommend users regularly update products that have exceeded the recommended replacement period (approx. 10 years after the start of use) and former series products produced before 1989 that may contain trace amounts of polychlorinated biphenyls (PCBs).

As an example, we have provided a list of replacement products for the DC paper capacitor as above.

* Please contact us for products with ratings other than the above. Please use the capacitors within the ratings (temperature, voltage, and current) specified in the capacitor diagrams after confirming the operating environment.

Drawing



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Precautions for Use of Film Capacitors for Power Electronics Applications

The following is a summary of general precautions for the use of oil-impregnated or dry-type film capacitors for power electronics. Before using our capacitors, please read this document carefully together with the delivery specifications to ensure safe and proper use.

1. Safety precautions: May cause electric shock, injury, or fire.

1) In the unlikely event of an insulation breakdown of the internal element of a capacitor, decomposition gas of the element will be generated, and in extremely rare cases this energy may destroy the capacitor and cause it to smoke or catch fire.

For capacitors that are not equipped with an internal protection device (including those with a safety mechanism), please take into consideration the circuit and the environment in which they are installed.

For capacitors with an external protection device, please wire the capacitor correctly before use.

2) Do not approach or contact the charging section. Capacitors with grounding terminals must be properly grounded. When inspecting, be sure to short-circuit the charging terminal to ground after confirming discharge.

3) In case of failure, immediately stop operation, check discharge, and short-circuit the terminals to ground.

If abnormal case deformation or leakage of insulating oil is detected, or if an unusual odor is noticed, immediately disconnect the unit from the circuit.

If the safety device or pressure abnormality detection switch engages, do not reinstall the unit.

4) Even if the capacitor has been discharged once, voltage may be generated between the terminals (recovery voltage). Discharge the capacitor through a resistor before use.

2. Other Precautions

1) Check the operating and installation environments and use the capacitor within the rated performance specified in the delivery specifications (drawings) of the capacitor.

Excessive operating temperature, voltage, or current may shorten the life of the capacitor. Use the capacitor within the stated specifications (as shown in the delivery drawings and specifications).

2) Installation/handling: When tightening bolts, nuts, and screws, use a torque wrench or similar tool to tighten to the specified torque value.

When soldering pin terminals, etc., make connections within three seconds at 350°C. Do not allow melted solder or soldering iron to come into contact with the product body, only the lead wires. Do not install capacitor terminals or mounting feet with excessive force (bending, pulling, etc.).

3) Storage: The standard storage location is indoors within the range of -25°C to +50°C and relative humidity of 75% or less. Store away from direct sunlight or atmospheres with corrosive gases.

4) Product life: Unless otherwise specified, the target life of film capacitors for power electronics is 10 years or more when used within the normal rating range. It is therefore recommended that film capacitors be replaced after 10 years in order to increase the overall reliability of the equipment.

5) Disposal: Please dispose of capacitors as industrial waste.

Please contact our nearest branch or sales office if you have any questions regarding the above.