

CE04W-KD, MD SERIES

Marcon CE04W-KD, MD Series Capacitors are low-leakage current and closer capacitance tolerance, which are developed for use in amplifiers and tape decks of high-fidelity sound systems. Another application area of great interest to the design engineer and component engineer is the replacement of tantalum capacitors with aluminum electrolytic capacitors.



CE04W-KD, MD (Radial Type)

• GENERAL SPECIFICATIONS

Operating temperature range

-40°C ~ +85°C

Capacitance tolerance

KD ±10%, MD ±20%

Leakage current (at 20°C)

The maximum leakage current at 2 minutes shall not exceed the value determined from the following equation or 0.4μA, whichever is greater:

$$I = 0.002CV \quad \text{where: } I = \text{Leakage Current } (\mu A) \\ C = \text{Nominal Capacitance } (\mu F) \\ V = \text{Rated DC Voltage (V. DC)}$$

Tangent of loss angle
(tan δ) (120 Hz at 20°C)

WV(DC)	6.3	10	16	25	35	50
tan δ	0.20	0.17	0.13	0.10	0.10	0.08

More than 1000μF: Add .02 to above value for every 1000μF or less.

Temperature Characteristics
(High temperature)
(Low temperature)

Capacitance change:

Capacitance at +85°C; less than 115% of the value at 25°C

Capacitance at -40°C; more than 75% of the value at 25°C

tan δ at -40°C

WV(DC)	6.3	10	16	25	35	50
tan δ	3.5	3.0	2.5	2.0	2.0	1.5

Leakage current at +85°C;

The maximum leakage current at 2 minutes shall not exceed the value determined from the following equation.

$$\text{Cap} \leq 47\mu F : I = 0.001CV + 1 (\mu A)$$

$$\text{Cap} > 47\mu F : I = 0.002CV + 1 (\mu A)$$

Life test

Rated voltage is applied at
85°C, 2,000 hours

Capacitance change : within ±20% of the initial value

tan δ : less than 200% of the value specified at 20°C

Leakage current : less than the value specified on above column on
Temperature Characteristics

Shelf life test

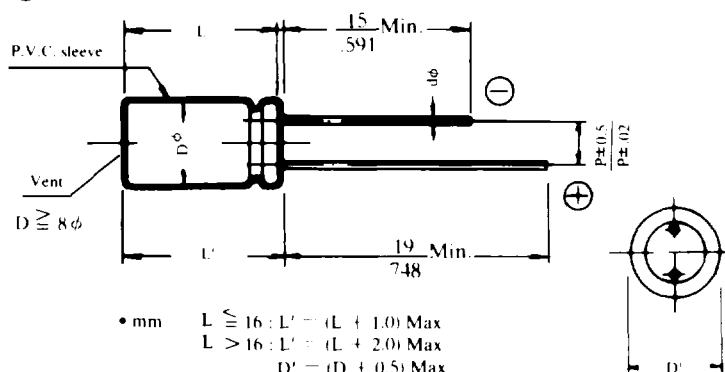
No voltage is applied at
85°C, 2,000 hours

Capacitance change : within ±20% of the initial value

tan δ : less than 200% of the value specified at 20°C

Leakage current : less than the value of the temperature characteristics

Test conditions : The capacitors are stored with no voltage applied at a temperature of 85°C for 2,000 hours. Following this period the capacitors shall be removed from the test chamber and be allowed to stabilize at room temperature for 24 to 48 hours. Next they shall be connected to a series limiting resistor with DC rated voltage applied for 30 minutes after which the capacitors shall be discharged. After completion of these procedures, the capacitors shall meet each of the specification.

● Dimensions


- mm $L \leq 16 : L' = (L + 1.0) \text{ Max}$
 $L > 16 : L' = (L + 2.0) \text{ Max}$
 $D' = (D + 0.5) \text{ Max}$
- Inches $L \leq .629 : L' = (L + .039) \text{ Max}$
 $L > .629 : L' = (L + .079) \text{ Max}$
 $D' = (D + .020) \text{ Max}$

DIMENSION Unit= $\frac{\text{mm}}{\text{inch}}$

Diameter	D ϕ	5	6.3	8	10	13	16	18
		.196	.248	.314	.393	.511	.629	.708
Lead Spacing	P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
		.078	.098	.138	.197	.197	.295	.295
Lead Wire	d ϕ	0.5	0.5	0.6	0.6	0.6	0.8	0.8
		.020	.020	.024	.024	.024	.031	.031
	AWG	24	24	23	23	23	20	20

Part No.	W.V. (DC)	Cap. (μF) @120Hz, 20°C	Max. Leakage (μA)@20°C	Max. ESR (Ω) @120 Hz, 20°C	Max. Ripple (mA) @120 Hz, 85°C	Nominal Case Size	
						D x L (mm)	D x L (inches)
CE04W0J220MD	6.3	22	0.4	15.1	81	5 x 11	196 x .433
CE04W0J330MD	6.3	33	0.4	10.0	104	6.3 x 11	248 x .433
CE04W0J470MD	6.3	47	0.6	7.05	121	6.3 x 11	248 x .433
CE04W0J680MD	6.3	68	0.9	4.87	147	6.3 x 11	248 x .433
CE04W0J101MD	6.3	100	1.3	3.32	200	8 x 11.5	314 x .453
CE04W0J151MD	6.3	150	1.9	2.21	260	8 x 11.5	314 x .453
CE04W0J221MD	6.3	220	2.8	1.51	300	10 x 12.5	393 x .492
CE04W0J331MD	6.3	330	4.2	1.00	401	10 x 16	393 x .629
CE04W0J471MD	6.3	470	5.9	0.71	511	10 x 20	393 x .787
CE04W0J681MD	6.3	680	8.6	0.49	621	10 x 20	393 x .787
CE04W0J102MD	6.3	1,000	12.6	0.33	792	13 x 25	511 x .984
CE04W0J152MD	6.3	1,500	18.9	0.24	895	13 x 25	511 x .984
CE04W0J222MD	6.3	2,200	27.7	0.18	1,080	16 x 25	629 x .984
CE04W1A220MD	10	22	0.4	12.8	98	5 x 11	196 x .433
CE04W1A330MD	10	33	0.7	8.54	131	6.3 x 11	248 x .433
CE04W1A470MD	10	47	0.9	6.00	168	6.3 x 11	248 x .433
CE04W1A680MD	10	68	1.4	4.14	209	6.3 x 11	248 x .433
CE04W1A101MD	10	100	2	2.82	250	8 x 11.5	314 x .453
CE04W1A151MD	10	150	3	1.88	300	10 x 12.5	393 x .492
CE04W1A221MD	10	220	4.4	1.28	385	10 x 16	393 x .629
CE04W1A331MD	10	330	6.6	0.85	491	10 x 20	393 x .787
CE04W1A471MD	10	470	9.4	0.60	572	13 x 20	511 x .787
CE04W1A681MD	10	680	13.6	0.41	779	13 x 20	511 x .787
CE04W1A102MD	10	1,000	20.0	0.28	887	13 x 25	511 x .984
CE04W1A152MD	10	1,500	30.0	0.21	957	16 x 25	629 x .984
CE04W1A222MD	10	2,200	44.0	0.16	1,300	16 x 31.5	629 x 1.24
CE04W1C6R8MD	16	6.8	0.4	31.7	83	5 x 11	196 x .433
CE04W1C100MD	16	10	0.4	21.6	95	5 x 11	196 x .433
CE04W1C150MD	16	15	0.5	14.4	100	5 x 11	196 x .433
CE04W1C220MD	16	22	0.7	9.79	137	6.3 x 11	248 x .433
CE04W1C330MD	16	33	1.1	6.53	159	6.3 x 11	248 x .433
CE04W1C470MD	16	47	1.5	4.59	189	8 x 11.5	314 x .453
CE04W1C680MD	16	68	2.2	3.17	227	8 x 11.5	314 x .453
CE04W1C101MD	16	100	3.2	2.16	283	10 x 12.5	393 x .492
CE04W1C151MD	16	150	4.8	1.44	371	10 x 16	393 x .629
CE04W1C221MD	16	220	7	0.98	439	10 x 16	393 x .629
CE04W1C331MD	16	330	10.6	0.65	559	10 x 20	393 x .787
CE04W1C471MD	16	470	15.0	0.46	673	13 x 20	511 x .787
CE04W1C681MD	16	680	21.8	0.32	820	13 x 25	511 x .984
CE04W1C102MD	16	1,000	32	0.22	1,050	16 x 25	629 x .984
CE04W1C152MD	16	1,500	48	0.17	1,130	16 x 31.5	629 x 1.24
CE04W1C222MD	16	2,200	70.4	0.13	1,270	18 x 31.5	708 x 1.24

Part No.	W.V. (DC)	Cap. (μF) @ 120Hz, 20°C	Max. Leakage (μA) @ 20°C	Max. ESR(Ω) @ 120Hz, 20°C	Max. Ripple (mA) @ 120Hz, 85°C	Nominal Case Size	
						DxL (mm)	DxL (inches)
CE04W1E2R2MD	25	2.2	0.4	75.4	35	5 x 11	196 x .433
CE04W1E3R3MD	25	3.3	0.4	50.2	53	5 x 11	196 x .433
CE04W1E4R7MD	25	4.7	0.4	35.3	80	5 x 11	196 x .433
CE04W1E6R8MD	25	6.8	0.4	24.4	87	6.3 x 11	248 x .433
CE04W1E100MD	25	10	0.5	16.6	98	6.3 x 11	248 x .433
CE04W1E150MD	25	15	0.8	11.0	138	6.3 x 11	248 x .433
CE04W1E220MD	25	22	1.1	7.54	145	8 x 11.5	314 x .453
CE04W1E330MD	25	33	1.7	5.02	171	8 x 11.5	314 x .453
CE04W1E470MD	25	47	2.4	3.53	238	10 x 12.5	393 x .492
CE04W1E680MD	25	68	3.4	2.44	285	10 x 12.5	393 x .492
CE04W1E101MD	25	100	5	1.66	401	10 x 16	393 x .629
CE04W1E151MD	25	150	7.5	1.10	451	10 x 20	393 x .787
CE04W1E221MD	25	220	11	0.75	559	13 x 20	511 x .787
CE04W1E331MD	25	330	16.5	0.50	642	13 x 25	511 x .984
CE04W1E471MD	25	470	23.5	0.35	852	16 x 25	629 x .984
CE04W1E681MD	25	680	34	0.24	1,000	16 x 25	629 x .984
CE04W1E102MD	25	1,000	50	0.17	1,105	16 x 31.5	629 x 1.24
CE04W1E152MD	25	1,500	75	0.13	1,290	18 x 40	708 x 1.57
CE04W1V2R2MD	35	2.2	0.4	75.4	41	5 x 11	196 x .433
CE04W1V3R3MD	35	3.3	0.4	50.2	72	5 x 11	196 x .433
CE04W1V4R7MD	35	4.7	0.4	35.3	81	5 x 11	196 x .433
CE04W1V6R8MD	35	6.8	0.5	24.4	97	6.3 x 11	248 x .433
CE04W1V100MD	35	10	0.7	16.6	118	6.3 x 11	248 x .433
CE04W1V150MD	35	15	1.1	11.0	128	6.3 x 11	248 x .433
CE04W1V220MD	35	22	1.5	7.54	145	8 x 11.5	314 x .453
CE04W1V330MD	35	33	2.3	5.02	207	10 x 12.5	393 x .492
CE04W1V470MD	35	47	3.3	3.53	271	10 x 12.5	393 x .492
CE04W1V680MD	35	68	4.8	2.44	393	10 x 16	393 x .629
CE04W1V101MD	35	100	7	1.66	430	10 x 20	393 x .787
CE04W1V151MD	35	150	10.5	1.10	535	13 x 20	511 x .787
CE04W1V221MD	35	220	15.4	0.75	578	13 x 25	511 x .984
CE04W1V331MD	35	330	23.1	0.50	790	16 x 25	629 x .984
CE04W1V471MD	35	470	32.9	0.35	892	16 x 25	629 x .984
CE04W1V681MD	35	680	47.6	0.24	1,105	16 x 31.5	629 x 1.24
CE04W1V102MD	35	1,000	70	0.17	1,280	18 x 40	708 x 1.57
CE04W1HR10MD	50	0.10	0.4	1,326	8	5 x 11	196 x .433
CE04W1HR15MD	50	0.15	0.4	884	10	5 x 11	196 x .433
CE04W1HR22MD	50	0.22	0.4	603	13	5 x 11	196 x .433
CE04W1HR33MD	50	0.33	0.4	402	16	5 x 11	196 x .433
CE04W1HR47MD	50	0.47	0.4	282	22	5 x 11	196 x .433
CE04W1HR68MD	50	0.68	0.4	195	25	5 x 11	196 x .433
CE04W1H010MD	50	1.0	0.4	133	33	5 x 11	196 x .433
CE04W1H1R5MD	50	1.5	0.4	88.4	47	5 x 11	196 x .433
CE04W1H2R2MD	50	2.2	0.4	60.3	69	5 x 11	196 x .433
CE04W1H3R3MD	50	3.3	0.4	40.2	75	5 x 11	196 x .433
CE04W1H4R7MD	50	4.7	0.5	28.2	85	6.3 x 11	248 x .433
CE04W1H6R8MD	50	6.8	0.7	19.5	98	8 x 11.5	314 x .453
CE04W1H100MD	50	10	1	13.3	123	8 x 11.5	314 x .453
CE04W1H150MD	50	15	1.5	8.84	163	8 x 11.5	314 x .453
CE04W1H220MD	50	22	2.2	6.03	183	10 x 12.5	393 x .492
CE04W1H330MD	50	33	3.3	40.2	227	10 x 16	393 x .629
CE04W1H470MD	50	47	4.7	2.82	279	10 x 16	393 x .629
CE04W1H680MD	50	68	6.8	1.95	399	10 x 20	393 x .787
CE04W1H101MD	50	100	10	1.33	467	13 x 20	511 x .787
CE04W1H161MD	50	150	15	0.88	567	13 x 25	511 x .984
CE04W1H221MD	50	220	22	0.60	650	16 x 25	629 x .984
CE04W1H331MD	50	330	33	0.40	835	16 x 31.5	629 x 1.24
CE04W1H471MD	50	470	47	0.28	927	18 x 31.5	708 x 1.24

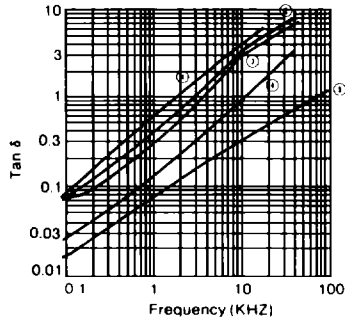
Above items are for $\pm 20\%$ capacitance tolerance.

Please specify designation KD as last two letters for $\pm 10\%$ tolerance.

i.e., CE04W1C222KD 2,200 $\mu\text{F} \pm 10\% / 16\text{VDC}$.

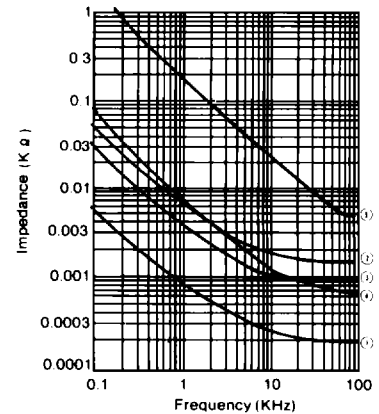
TECHNICAL TEST DATA ON CE04W-MD SERIES

Frequency Characteristics at 20°C



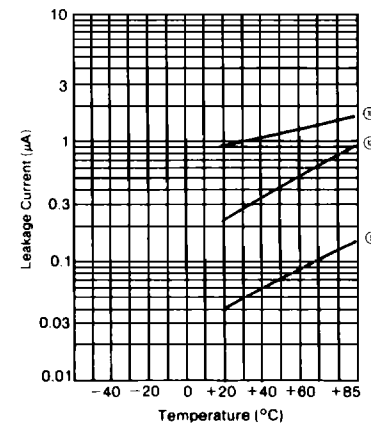
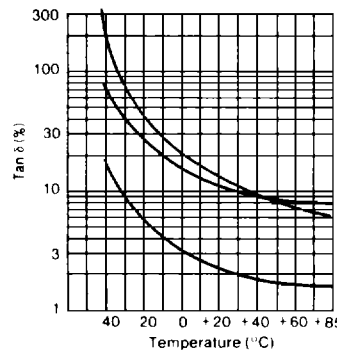
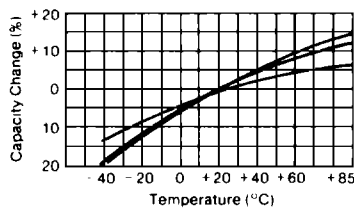
- ① 16 WV — 330 μ F
- ② 10 WV — 33 μ F
- ③ 16 WV — 47 μ F
- ④ 25 WV — 22 μ F
- ⑤ 50 WV — 1 μ F

- ① 16 WV — 330 μ F
- ② 10 WV — 33 μ F
- ③ 16 WV — 47 μ F
- ④ 25 WV — 22 μ F
- ⑤ 50 WV — 1 μ F



• Temperature Characteristics

- ① (6.3 WV — 47 μ F)
- ② (16V — 10 μ F)
- ③ (50 WV — 1 μ F)



• Life Characteristics with Rated Voltage Applied

- ① (6.3 WV — 47 μ F)
- ② (16V — 10 μ F)
- ③ (50 WV — 1 μ F)

