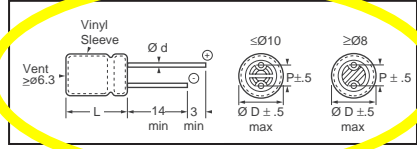


# Panasonic M Series Radial Lead Aluminum Electrolytic Capacitors

**PANASONIC M SERIES CROSS REFERENCES**  
 Nichicon: VR; Chemicon: SMG;  
 Marcon: DSM; Rubycon: YK;  
 Elna: RE3; Nitsuko: MK;  
 Sanyo: HC/HPC



- FEATURES:**
- Miniaturized size version for general purpose use
  - Life: 2000 hours at +85°C
  - Vent construction for ≥φ6.3 mm products

**SPECIFICATIONS:**

<b>Operating Temperature Range</b>	-40°C to +85°C	-25°C to +85°C
<b>Rated Working Voltage Range</b>	6.3 to 100 V DC	160 to 450 V DC
<b>Nominal Capacitance Range</b>	0.33 to 22000 µF	1 to 470 µF

**Capacitance Tolerance:** ±20% (120 Hz, +20°C)

<b>Leakage Current</b>	≤ 0.03 CV or 4 (µA) after 1 minute	≤ 0.06 CV + 10 (µA) after 2 minutes
	≤ 0.01 CV or 3 (µA) after 2 minutes	application of rated working voltage at +20°C.
Which ever is greater measured with rated working voltage at +20°C.		

**tan δ:** (at 120 Hz, +20°C)

<b>W.V.</b>	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
<b>tan δ</b>	0.28	0.24	0.20	0.16	0.14	0.12	0.11	0.10	0.16	0.18	0.18	0.20	0.20	0.20

For capacitance value > 1000 µF, add 0.02 per every 1000 µF.

**Low Temperature Characteristics:** Impedance ratio max. at 120 Hz

<b>W.V.</b>	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
<b>-25°C/+20°C</b>	5	4	3	2	2	2	2	2	2	2	3	5	6	6
<b>-40°C/+20°C</b>	12	10	8	5	4	3	3	3	—	—	—	—	—	—

For capacitance value >1000 µF, add 0.5 per every 1000 µF for -25°C/+20°C.  
 add 1.0 per every 1000 µF for -40°C/+20°C.

**Ripple Current:** 120 Hz, +85°C

<b>Frequency (Hz)</b>	50/60	120	1k	10k
<b>Correction Factor (Multiplier)</b>	0.7	1	1.3	1.7

**Endurance:**

<b>Test Conditions</b>		<b>Post Test Requirements at +20°C</b>	
<b>Duration</b>	2000 Hours	<b>Leakage Current</b>	≤ initial specified value
<b>Ambient Temperature</b>	+85°C	<b>Capacitance Change</b>	±20% of initial measured value
<b>Applied Voltage</b>	Rated DC Working Voltage	<b>tan δ</b>	≤ 150% initial specified value

**Shelf Life:**

<b>Test Conditions</b>		<b>Post Test Requirements at +20°C</b>	
<b>Duration</b>	1000 Hours	<b>Leakage Current</b>	≤ initial specified value
<b>Ambient Temperature</b>	+85°C	<b>Capacitance Change</b>	±20% of initial measured value
<b>Applied Voltage</b>	—	<b>tan δ</b>	≤ 150% initial specified value

WV (VDC)	Cap. (µF)	Leakage Current (µA)	tan δ max.	Ripple Current (mA) rms	Dimensions (mm)			Digi-Key Part No.	Pricing			Panasonic Part No.				
					øD	L	P		500	1,000	5,000					
6.3	100	6.3	0.28	130	5	11	2.0	0.5	P5111-ND	.21	1.06	7.13	24.15	37.00	31.00/M	ECA-0JM101
	220	13.8	0.28	240	5	11	2.0	0.5	P5112-ND	.28	1.38	9.30	31.50	48.00	41.00/M	ECA-0JM221
	330	20.7	0.28	300	6.3	11.2	2.5	0.5	P5113-ND	.29	1.52	10.73	37.05	59.00	51.00/M	ECA-0JM331
	470	29.6	0.28	380	6.3	11.2	2.5	0.5	P5114-ND	.35	1.79	12.65	43.70	69.00	60.00/M	ECA-0JM471
	1000	63.0	0.28	580	8	11.5	3.5	0.6	P5115-ND	.41	2.45	17.50	63.00	98.00	91.00/M	ECA-0JM102
	2200	138.6	0.30	890	10	16	5.0	0.6	P5116-ND	.66	3.71	26.50	95.40	148.00	138.00/M	ECA-0JM222
	3300	207.9	0.32	1020	10	20	5.0	0.6	P5117-ND	.81	4.67	34.31	124.10	197.00	190.00/M	ECA-0JM332
	4700	296.1	0.34	1170	12.5	20	5.0	0.6	P5118-ND	1.13	6.37	46.77	169.15	269.00	259.00/M	ECA-0JM472
	6800	428.4	0.38	1270	12.5	25	5.0	0.6	P5119-ND	1.42	9.00	67.50	240.00	399.00	384.00/M	ECA-0JM682
	10000	630.0	0.46	1450	16	25	7.5	0.8	P5120-ND	2.03	11.58	86.85	308.80	513.00	494.00/M	ECA-0JM103
	15000	945.0	0.56	1700	16	31.5	7.5	0.8	P5121-ND	2.54	14.63	110.40	414.00	718.00	696.00/M	ECA-0JM153
	22000	1386.0	0.70	1900	18	35.5	7.5	0.8	P5122-ND	3.64	20.91	157.80	591.75	1026.00	994.00/M	ECA-0JM223
10	100	10.0	0.24	150	5	11	2.0	0.5	P5123-ND	.23	1.15	7.75	26.25	40.00	34.00/M	ECA-1AM101
	220	22.0	0.24	250	6.3	11.2	2.5	0.5	P5124-ND	.32	1.61	10.85	36.75	56.00	47.00/M	ECA-1AM221
	330	33.0	0.24	330	6.3	11.2	2.5	0.5	P5125-ND	.35	1.79	12.65	43.70	69.00	60.00/M	ECA-1AM331
	470	47.0	0.24	400	8	11.5	3.5	0.6	P5126-ND	.41	2.15	15.13	52.25	83.00	72.00/M	ECA-1AM471
	1000	100.0	0.24	630	10	12.5	5.0	0.6	P5127-ND	.52	3.08	22.00	79.20	123.00	114.00/M	ECA-1AM102
	2200	220.0	0.26	920	10	20	5.0	0.6	P5128-ND	.76	4.35	31.96	115.60	184.00	177.00/M	ECA-1AM222
	3300	330.0	0.28	1090	12.5	20	5.0	0.6	P5129-ND	1.08	6.75	49.59	179.35	285.00	274.00/M	ECA-1AM332
	4700	470.0	0.30	1200	12.5	25	5.0	0.6	P5130-ND	1.34	8.40	63.00	224.00	372.00	358.00/M	ECA-1AM472
	6800	680.0	0.34	1400	16	25	7.5	0.8	P5131-ND	1.88	10.74	80.55	286.40	476.00	458.00/M	ECA-1AM682
	10000	1000.0	0.42	1600	16	31.5	7.5	0.8	P5132-ND	2.27	13.52	102.00	382.50	663.00	643.00/M	ECA-1AM103
	15000	1500.0	0.52	1850	18	35.5	7.5	0.8	P5133-ND	3.50	20.14	152.00	570.00	988.00	958.00/M	ECA-1AM153
	16	10	3.0	0.20	30	5	11	2.0	0.5	P5134-ND	.21	1.06	7.13	24.15	37.00	31.00/M
22		3.5	0.20	75	5	11	2.0	0.5	P5135-ND	.21	1.06	7.13	24.15	37.00	31.00/M	ECA-1CM220
33		5.2	0.20	110	5	11	2.0	0.5	P5136-ND	.21	1.06	7.13	24.15	37.00	31.00/M	ECA-1CM330
47		7.5	0.20	130	5	11	2.0	0.5	P5137-ND	.21	1.06	7.13	24.15	37.00	31.00/M	ECA-1CM470
100		16.0	0.20	180	5	11	2.0	0.5	P5138-ND	.28	1.38	9.30	31.50	48.00	41.00/M	ECA-1CM101
220		35.2	0.20	280	6.3	11.2	2.5	0.5	P5139-ND	.35	1.87	13.20	45.60	72.00	62.00/M	ECA-1CM221
330		52.8	0.20	350	8	11.5	3.5	0.6	P5140-ND	.41	2.15	15.13	52.25	83.00	72.00/M	ECA-1CM331
470		75.2	0.20	440	8	11.5	3.5	0.6	P5141-ND	.41	2.35	16.75	60.30	94.00	87.00/M	ECA-1CM471
1000		160.0	0.20	680	10	16	5.0	0.6	P5142-ND	.65	4.20	30.00	108.00	168.00	156.00/M	ECA-1CM102
2200		352.0	0.22	1000	12.5	20	5.0	0.6	P5143-ND	1.13	6.37	46.77	169.15	269.00	259.00/M	ECA-1CM222
3300		528.0	0.24	1200	12.5	25	5.0	0.6	P5144-ND	1.45	8.28	62.10	220.80	367.00	353.00/M	ECA-1CM332
4700		752.0	0.26	1360	16	25	7.5	0.8	P5145-ND	1.98	11.31	84.83	301.60	501.00	483.00/M	ECA-1CM472
6800	1088.0	0.30	1600	16	31.5	7.5	0.8	P5146-ND	2.32	13.59	102.60	384.75	667.00	646.00/M	ECA-1CM682	
10000	1600.0	0.38	1800	18	35.5	7.5	0.8	P5147-ND	3.46	19.90	150.20	563.25	976.00	946.00/M	ECA-1CM103	
25	10	3.0	0.16	50	5	11	2.0	0.5	P5148-ND	.21	1.06	7.13	24.15	37.00	31.00/M	ECA-1EM100
	22	5.5	0.16	90	5	11	2.0	0.5	P5149-ND	.21	1.10	7.44	25.20	38.00	32.00/M	ECA-1EM220
	33	8.2	0.16	110	5	11	2.0	0.5	P5150-ND	.21	1.06	7.13	24.15	37.00	31.00/M	ECA-1EM330
	47	11.7	0.16	130	5	11	2.0	0.5	P5151-ND	.23	1.15	7.75	26.25	40.00	34.00/M	ECA-1EM470
	100	25.0	0.16	180	6.3	11.2	2.5	0.5	P5152-ND	.32	1.66	11.16	37.80	58.00	49.00/M	ECA-1EM101
	220	55.0	0.16	310	8	11.5	3.5	0.6	P5153-ND	.41	2.22	15.68	54.15	86.00	74.00/M	ECA-1EM221
	330	82.5	0.16	390	8	11.5	3.5	0.6	P5154-ND	.41	2.45	17.50	63.00	98.00	91.00/M	ECA-1EM331
	470	117.5	0.16	480	10	12.5	5.0	0.6	P5155-ND	.55	3.26	23.25	83.70	130.00	121.00/M	ECA-1EM471
	1000	250.0	0.16	850	10	20	5.0	0.6	P5156-ND	.80	4.80	35.25	127.50	203.00	195.00/M	ECA-1EM102
	2200	550.0	0.18	1200	12.5	25	5.0	0.6	P5157-ND	1.38	7.86	58.95	209.60	348.00	335.00/M	ECA-1EM222
	3300	825.0	0.20	1300	16	25	7.5	0.8	P5158-ND	1.95	12.00	90.00	320.00	532.00	512.00/M	ECA-1EM332
	4700	1175.0	0.22	1500	16	31.5	7.5	0.8	P5159-ND	2.46	14.42	108.80	408.00	707.00	685.00/M	ECA-1EM472
6800	1700.0	0.26	1750	18	35.5	7.5	0.8	P5160-ND	3.62	20.80	157.00	588.75	1021.00	989.00/M	ECA-1EM682	

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