

# MA series

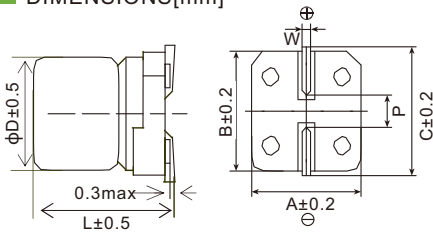
- Endurance: 10,000 hours at 105°C
- Designed for surface mounting on high density PC board
- Compliant to AEC-Q200
- RoHS Compliant



## SPECIFICATIONS

Items	Characteristics										
Category Temperature Range	-55~+105°C(16~100 V <sub>dc</sub> )					-40~+105°C(160~450 V <sub>dc</sub> )					
Rated Voltage Range	16~450 V <sub>dc</sub>										
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)										
Leakage Current	16~100 V <sub>dc</sub>					160~450 V <sub>dc</sub>					
	I ≤ 0.03CV or 4μA, whichever is greater. (2 minutes)					I ≤ 0.04CV + 100μA (1 minute)					
Where, I: Max. leakage current (μA), C: Nominal capacitance (μF), V: Rated voltage (V) (at 20°C)											
Dissipation Factor (tanδ)	Rated Voltage(V <sub>dc</sub> )	16	25	35	50	63	80	100	160~250	400~450	(at 20°C, 120Hz)
	Dissipation Factor(Max.)	0.26	0.16	0.14	0.14	0.20	0.20	0.20	0.20	0.24	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated Voltage(V <sub>dc</sub> )	16	25	35	50	63	80	100	160~250	400~450	(at 120Hz)
	Z(-25°C)/Z(+20°C)	2	2	2	2	2	2	2	6	6	
	Z(-40°C)/Z(+20°C)	3	3	3	3	3	3	3	10	18	
	Z(-55°C)/Z(+20°C)	4	3	3	3	3	3	3	-	-	
Endurance	The specifications listed below shall be satisfied when the capacitors are restored to 20°C after rated voltage is applied for 10,000 hours at 105°C.										
	Rated Voltage(V <sub>dc</sub> )	16~100					160~450				
	Capacitance Change	≤±30% of the initial value					≤±20% of the initial value				
	Dissipation Factor (tanδ)	≤300% of the initial specified value					≤200% of the initial specified value				
	Leakage Current	≤The initial specified value					≤The initial specified value				
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after leaving them under no load at 105°C for 1,000 hours.										
	Rated Voltage(V <sub>dc</sub> )	16~100					160~450				
	Capacitance Change	≤±30% of the initial value					≤±20% of the initial value				
	Dissipation Factor (tanδ)	≤300% of the initial specified value					≤200% of the initial specified value				
	Leakage Current	≤300% of the initial specified value					≤200% of the initial specified value				

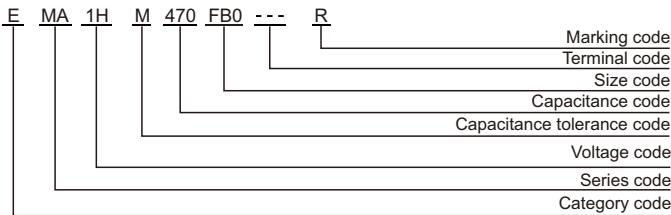
## DIMENSIONS[mm]



Size code	D	L	A	B	C	W	P
E83	6.3	8.0	6.6	6.6	7.2	0.5~0.8	1.9
EB0	6.3	10.5	6.6	6.6	7.2	0.5~0.8	1.9
FB0	8	10.5	8.3	8.3	9.0	0.7~1.1	3.1
FD0	8	12.5	8.3	8.3	9.0	0.7~1.1	3.1
FE0	8	13.5	8.3	8.3	9.0	0.7~1.1	3.1
GB0	10	10.5	10.3	10.3	11.0	0.7~1.1	4.5
GD0	10	12.5	10.3	10.3	11.0	0.7~1.1	4.5
GE0	10	13.5	10.3	10.3	11.0	0.7~1.1	4.5
GH0	10	16.5	10.3	10.3	11.0	0.7~1.1	4.5
WE0	12.5	13.5	13.0	13.0	13.7	1.0~1.3	4.5
WG5	12.5	16.0	13.0	13.0	13.7	1.0~1.3	4.5
WM5	12.5	21.0	13.0	13.0	13.7	1.0~1.3	4.5

Note: M type forming is available for Size E83 ~ GH0.

## PART NUMBERING SYSTEM



## RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

Freq.(Hz)	120	1k	10k	100k
Rated voltage(V <sub>dc</sub> )				
6.3~450	0.50	0.80	0.90	1.00

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### STANDARD RATINGS

WV (Vdc)	Cap (µF)	Size code	Rated ripple current (mA <sub>rms</sub> /105°C, 100kHz)	Part Number
16	47	E83	125	EMA1CM470E83---R
	100	E83	245	EMA1CM101E83---R
	220	FB0	260	EMA1CM221FB0---R
	330	GB0	450	EMA1CM331GB0---R
	470	GD0	480	EMA1CM471GD0---R
	680	WE0	820	EMA1CM681WE0---R
	1000	WG5	860	EMA1CM102WG5---R
25	47	E83	125	EMA1EM470E83---R
	100	FB0	245	EMA1EM101FB0---R
	220	GB0	440	EMA1EM221GB0---R
	330	GB0	460	EMA1EM331GB0---R
	470	WE0	820	EMA1EM471WE0---R
35	47	E83	140	EMA1VM470E83---R
	100	FB0	245	EMA1VM101FB0---R
	220	GB0	440	EMA1VM221GB0---R
	330	WE0	820	EMA1VM331WE0---R
50	470	WG5	860	EMA1VM471WG5---R
	10	E83	100	EMA1HM100E83---R
	22	E83	105	EMA1HM220E83---R
	33	E83	110	EMA1HM330E83---R
	47	FB0	260	EMA1HM470FB0---R
	47	GB0	400	EMA1HM470GB0---R
	100	GB0	420	EMA1HM101GB0---R
63	220	WE0	800	EMA1HM221WE0---R
	330	WG5	845	EMA1HM331WG5---R
	22	E83	95	EMA1JM220E83---R
	33	FB0	180	EMA1JM330FB0---R
	47	FB0	210	EMA1JM470FB0---R
80	100	GD0	420	EMA1JM101GD0---R
	220	WG5	820	EMA1JM221WG5---R
	10	FB0	165	EMA1BM100FB0---R
	22	FB0	180	EMA1BM220FB0---R
	22	GB0	305	EMA1BM220GB0---R
100	33	FB0	190	EMA1BM330FB0---R
	47	GB0	350	EMA1BM470GB0---R
	100	WE0	760	EMA1BM101WE0---R
	10	E83	150	EMA1KM100E83---R
	22	FB0	165	EMA1KM220FB0---R
	33	GB0	280	EMA1KM330GB0---R
160	47	GB0	320	EMA1KM470GB0---R
	68	GD0	350	EMA1KM680GD0---R
	82	WE0	530	EMA1KM820WE0---R
	100	WE0	555	EMA1KM101WE0---R
	10	GB0	190	EMA2CM100GB0---R
	15	FD0	220	EMA2CM150FD0---R
200	22	GB0	315	EMA2CM220GB0---R
	33	GE0	420	EMA2CM330GE0---R
	47	GH0	530	EMA2CM470GH0---R
	68	WM5	640	EMA2CM680WM5---R
	100	WM5	840	EMA2CM101WM5---R
	4.7	FB0	110	EMA2DM4R7FB0---R
6.8	FB0	150	EMA2DM6R8FB0---R	
10	FD0	180	EMA2DM100FD0---R	
10	GB0	198	EMA2DM100GB0---R	
15	FE0	230	EMA2DM150FE0---R	
22	GE0	350	EMA2DM220GE0---R	
33	GH0	440	EMA2DM330GH0---R	
68	WM5	670	EMA2DM680WM5---R	
250	2.2	EB0	52	EMA2EM2R2EB0---R
	4.7	FB0	120	EMA2EM4R7FB0---R
	10	FE0	180	EMA2EM100FE0---R
	10	GB0	200	EMA2EM100GB0---R
	22	GH0	360	EMA2EM220GH0---R
	33	WM5	435	EMA2EM330WM5---R
47	WM5	600	EMA2EM470WM5---R	

WV (Vdc)	Cap (µF)	Size code	Rated ripple current (mA <sub>rms</sub> /105°C, 100kHz)	Part Number
400	2.2	FB0	60	EMA2GM2R2FB0---R
	3.3	FB0	76	EMA2GM3R3FB0---R
	4.7	FE0	124	EMA2GM4R7FE0---R
	4.7	GB0	124	EMA2GM4R7GB0---R
	6.8	GE0	176	EMA2GM6R8GE0---R
	10	GH0	250	EMA2GM100GH0---R
	15	WG5	300	EMA2GM150WG5---R
	22	WM5	380	EMA2GM220WM5---R
450	2.2	GB0	70	EMA2WM2R2GB0---R
	3.3	GB0	80	EMA2WM3R3GB0---R
	4.7	GE0	130	EMA2WM4R7GE0---R
	10	GH0	265	EMA2WM100GH0---R
	15	WM5	310	EMA2WM150WM5---R
	22	WM5	390	EMA2WM220WM5---R

※ Specifications subject to change without notice.