

# WH series

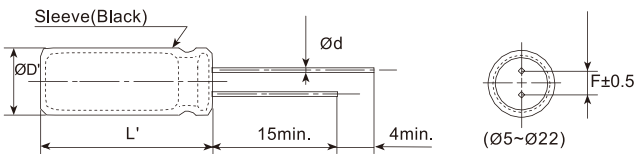
- Standard series for general purpose
- Wide temperature range from -40 °C to +105 °C
- Endurance: +105 °C 2,000 hours
- RoHS Compliant



## SPECIFICATIONS

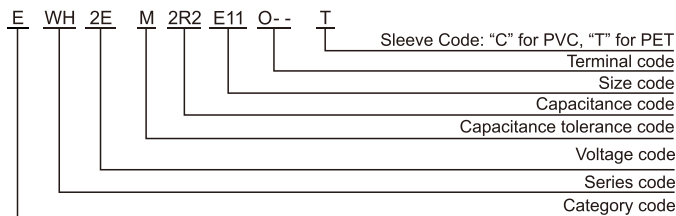
Items	Characteristics												
Category Temperature Range	-40~+105 °C (6.3~400 V <sub>dc</sub> )						-25~+105°C(450~500 V <sub>dc</sub> )						
Rated Voltage Range	6.3~500 V <sub>dc</sub>												
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)												
Leakage Current	6.3~100 V <sub>dc</sub>						160~500 V <sub>dc</sub>						Where, I:Max. leakage current (μA), C:Nominal capacitance (μF), V: Rated voltage (V) (at 20°C)
	I 0.03CV or 4μA (at 1 minute)						CV		After 1 minute		After 5 minutes		
	I 0.01CV or 3μA (at 2 minutes) Whichever is greater						CV 1,000		I 0.1CV+40μA		I 0.03CV+15μA		
Dissipation Factor (tanδ)	Rated Voltage(V <sub>dc</sub> )	6.3	10	16	25	35	50	63	100	160~250	350~400	450	500
	tanδ (max.)	0.26	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.20	0.24	0.24	0.24
	When nominal capacitance exceeds 1,000μF, add 0.02 to the value above for each 1,000μF increase. (at 20°C, 120Hz)												
Low Temperature Characteristics (Max. Impedance Ratio)	Rated Voltage(V <sub>dc</sub> )	6.3	10	16	25	35	50	63	100	160~250	350~400	450	500
	Z(-25°C)/Z(+20°C)	5	4	3			2			3	6	6	8
	Z(-40°C)/Z(+20°C)	12	10	8	5	4		3		7	10	-	-
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after DC voltage plus the rated ripple current is applied for 2,000 hours at 105°C.												
	Capacitance Change	≤±20% of the initial value											
	D.F. (tanδ)	≤200% of the initial specified value											
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied.												
	Capacitance Change	≤±20% of the initial value											
	D.F. (tanδ)	≤200% of the initial specified value											
	Leakage Current	≤200% of the initial specified value											

## DIMENSIONS[mm]



ØD	5	6.3	8	10	12.5	16	18	22
Ød	0.5	0.5	0.5	0.6	0.6	0.8	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0
ØD'	ØD+0.5max.							
L'	L+2max.							

## PART NUMBERING SYSTEM



## RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

Cap.(μF)	Freq.(Hz)						
	50	120	300	1k	10k	100k	
Cap.<10	0.65	1.00	1.35	1.75	2.30	2.50	
10 Cap.<100	0.75	1.00	1.25	1.50	1.75	1.80	
100 Cap. 1000	0.80	1.00	1.15	1.30	1.40	1.50	
Cap.>1000	0.85	1.00	1.03	1.05	1.08	1.08	

The endurance of capacitors is shortened with internal heating produced by ripple current at the rate of halving the lifetime with every 5 °C rise. When long life performance is required in actual use, the rms ripple current has to be reduced.

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WV (Vdc)	Cap (μF)	Size D×L(mm)	tanδ	Rated ripple current (mA <sub>RMS</sub> /105°C, 120Hz)	Part Number
6.3(0J)	33	5×11	0.26	54	EWHOJM330D11OT
	47	5×11	0.26	64	EWHOJM470D11OT
	100	5×11	0.26	94	EWHOJM101D11OT
	220	5×11	0.26	140	EWHOJM221D11OT
	330	6.3×11	0.26	190	EWHOJM331E11OT
	470	6.3×11	0.26	230	EWHOJM471E11OT
	1000	8×12	0.26	380	EWHOJM102F12OT
	2200	10×20	0.28	710	EWHOJM222G20OT
	3300	10×20	0.30	840	EWHOJM332G20OT
	4700	12.5×20	0.32	1090	EWHOJM472W20OT
	6800	12.5×25	0.36	1350	EWHOJM682W25OT
	10000	16×25	0.44	1650	EWHOJM103L25OT
	15000	16×35	0.54	2010	EWHOJM153L35OT
	22000	18×40	0.68	2350	EWHOJM223M40OT
	22	5×11	0.19	46	EWHA1AM220D11OT
33	5×11	0.19	57	EWHA1AM330D11OT	
47	5×11	0.19	68	EWHA1AM470D11OT	
100	5×11	0.19	100	EWHA1AM101D11OT	
220	6.3×11	0.19	170	EWHA1AM221E11OT	
330	6.3×11	0.19	200	EWHA1AM331E11OT	
470	8×11	0.19	250	EWHA1AM471F11OT	
1000	10×12.5	0.19	460	EWHA1AM102G1BOT	
2200	10×20	0.21	760	EWHA1AM222G20OT	
3300	12.5×20	0.23	1000	EWHA1AM332W20OT	
4700	12.5×25	0.25	1260	EWHA1AM472W25OT	
6800	16×25	0.29	1570	EWHA1AM682L25OT	
10000	16×35	0.37	1890	EWHA1AM103L35OT	
15000	18×35	0.47	2180	EWHA1AM153M35OT	
10	5×11	0.16	34	EWHA1CM100D11OT	
22	5×11	0.16	51	EWHA1CM220D11OT	
33	5×11	0.16	63	EWHA1CM330D11OT	
47	5×11	0.16	75	EWHA1CM470D11OT	
100	5×11	0.16	110	EWHA1CM101D11OT	
220	6.3×11	0.16	180	EWHA1CM221E11OT	
330	8×11	0.16	260	EWHA1CM331F11OT	
470	8×12	0.16	310	EWHA1CM471F12OT	
1000	10×16	0.16	560	EWHA1CM102G1BOT	
2200	12.5×20	0.18	920	EWHA1CM222W20OT	
3300	12.5×25	0.20	1170	EWHA1CM332W25OT	
4700	16×25	0.22	1480	EWHA1CM472L25OT	
6800	16×30	0.26	1780	EWHA1CM682L30OT	
10000	18×35	0.34	2060	EWHA1CM103M35OT	
4.7	5×11	0.14	25	EWHA1EM47R7D11OT	
10	5×11	0.14	36	EWHA1EM100D11OT	
22	5×11	0.14	54	EWHA1EM220D11OT	
33	5×11	0.14	67	EWHA1EM330D11OT	
47	5×11	0.14	80	EWHA1EM470D11OT	
100	6.3×11	0.14	130	EWHA1EM101E11OT	
220	8×11	0.14	230	EWHA1EM221F11OT	
330	8×12	0.14	310	EWHA1EM331F12OT	
470	10×12.5	0.14	380	EWHA1EM471G1BOT	
1000	10×20	0.14	680	EWHA1EM102G20OT	
2200	12.5×25	0.16	1090	EWHA1EM222W25OT	
3300	16×25	0.18	1400	EWHA1EM332L25OT	
4700	16×30	0.20	1710	EWHA1EM472L30OT	
6800	18×35	0.24	2040	EWHA1EM682M35OT	

WV (Vdc)	Cap (μF)	Size D×L(mm)	tanδ	Rated ripple current (mA <sub>RMS</sub> /105°C, 120Hz)	Part Number
35(1V)	4.7	5×11	0.12	28	EWHA1VM47R7D11OT
	10	5×11	0.12	41	EWHA1VM100D11OT
	22	5×11	0.12	61	EWHA1VM220D11OT
	33	5×11	0.12	75	EWHA1VM330D11OT
	47	5×11	0.12	90	EWHA1VM470D11OT
	100	6.3×11	0.12	150	EWHA1VM101E11OT
	220	8×12	0.12	270	EWHA1VM221F12OT
	330	10×12.5	0.12	350	EWHA1VM331G1BOT
	470	10×16	0.12	460	EWHA1VM471G16OT
	1000	12.5×20	0.12	810	EWHA1VM102W20OT
	2200	16×25	0.14	1260	EWHA1VM222L25OT
	3300	16×35	0.16	1610	EWHA1VM332L35OT
	4700	18×35	0.18	1910	EWHA1VM472M35OT
	0.10	5×11	0.10	1.3	EWHA1HMR10D11OT
	0.22	5×11	0.10	2.9	EWHA1HMR22D11OT
0.33	5×11	0.10	4.3	EWHA1HMR33D11OT	
0.47	5×11	0.10	6.2	EWHA1HMR47D11OT	
1.0	5×11	0.10	13	EWHA1HM010D11OT	
2.2	5×11	0.10	20	EWHA1HM2R2D11OT	
3.3	5×11	0.10	25	EWHA1HM3R3D11OT	
4.7	5×11	0.10	30	EWHA1HM4R7D11OT	
10	5×11	0.10	40	EWHA1HM100D11OT	
22	5×11	0.10	65	EWHA1HM220D11OT	
33	6.3×11	0.10	90	EWHA1HM330E11OT	
47	6.3×11	0.10	110	EWHA1HM470E11OT	
100	8×11	0.10	180	EWHA1HM101F11OT	
220	10×12.5	0.10	300	EWHA1HM221G1BOT	
330	10×16	0.10	410	EWHA1HM331G16OT	
470	10×20	0.10	530	EWHA1HM471G20OT	
1000	12.5×25	0.10	950	EWHA1HM102W25OT	
2200	16×35	0.12	1470	EWHA1HM222L35OT	
3300	18×35	0.14	1770	EWHA1HM332M35OT	
10	5×11	0.09	46	EWHA1JM100D11OT	
22	5×11	0.09	71	EWHA1JM220D11OT	
33	6.3×11	0.09	100	EWHA1JM330E11OT	
47	6.3×11	0.09	120	EWHA1JM470E11OT	
100	10×12.5	0.09	215	EWHA1JM101G1BOT	
220	10×16	0.09	335	EWHA1JM221G16OT	
330	10×20	0.09	510	EWHA1JM331G20OT	
470	12.5×20	0.09	640	EWHA1JM471W20OT	
1000	16×25	0.09	930	EWHA1JM102L25OT	
0.10	5×11	0.08	1.5	EWHA1KMR10D11OT	
0.22	5×11	0.08	3.4	EWHA1KMR22D11OT	
0.33	5×11	0.08	5.0	EWHA1KMR33D11OT	
0.47	5×11	0.08	7.1	EWHA1KMR47D11OT	
1.0	5×11	0.08	15	EWHA1KM010D11OT	
2.2	5×11	0.08	21	EWHA1KM2R2D11OT	
3.3	5×11	0.08	29	EWHA1KM3R3D11OT	
4.7	5×11	0.08	32	EWHA1KM4R7D11OT	
10	6.3×11	0.08	54	EWHA1KM100E11OT	
22	8×11	0.08	93	EWHA1KM220F11OT	
33	8×12	0.08	130	EWHA1KM330F12OT	
47	10×12.5	0.08	165	EWHA1KM470G1BOT	
100	10×20	0.08	265	EWHA1KM101G20OT	
220	12.5×25	0.08	440	EWHA1KM221W25OT	

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WV (Vdc)	Cap (μF)	Size DxL(mm)	tanδ	Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz)	Part Number	
100(1K)	330	16×25	0.08	540	EWH1KM331L25OT	
	470	16×30	0.08	715	EWH1KM471L30OT	
	1000	18×40	0.08	985	EWH1KM102M40OT	
160(2C)	3.3	6.3×11	0.20	32	EWH2CM3R3E11OT	
	4.7	6.3×11	0.20	38	EWH2CM4R7E11OT	
	10	8×12	0.20	65	EWH2CM100F12OT	
		10×12	0.20	76	EWH2CM100G12OT	
		10×12	0.20	98	EWH2CM220G12OT	
	22	10×16	0.20	108	EWH2CM220G16OT	
		10×20	0.20	120	EWH2CM220G20OT	
		10×16	0.20	158	EWH2CM330G16OT	
	33	10×20	0.20	165	EWH2CM330G20OT	
		10×20	0.20	182	EWH2CM470G20OT	
		12.5×20	0.20	205	EWH2CM470W20OT	
	68	12.5×20	0.20	265	EWH2CM680W20OT	
12.5×25		0.20	318	EWH2CM101W25OT		
16×25		0.20	335	EWH2CM101L25OT		
220	16×30	0.20	568	EWH2CM221L30OT		
	330	18×35	0.20	710	EWH2CM331M35OT	
	470	18×40	0.20	870	EWH2CM471M40OT	
200(2D)	1	6.3×11	0.20	16	EWH2DM010E11OT	
	2.2	6.3×11	0.20	22	EWH2DM2R2E11OT	
	3.3	6.3×11	0.20	32	EWH2DM3R3E11OT	
	4.7	8×12	0.20	48	EWH2DM4R7F12OT	
		8×12	0.20	78	EWH2DM100F12OT	
	10	10×12	0.20	82	EWH2DM100G12OT	
		10×16	0.20	86	EWH2DM100G16OT	
		10×16	0.20	128	EWH2DM220G16OT	
	22	10×20	0.20	132	EWH2DM220G20OT	
		10×20	0.20	185	EWH2DM330G20OT	
	33	12.5×20	0.20	194	EWH2DM330W20OT	
		12.5×20	0.20	225	EWH2DM470W20OT	
		12.5×25	0.20	308	EWH2DM680W25OT	
	82	12.5×25	0.20	318	EWH2DM820W25OT	
		100	16×25	0.20	345	EWH2DM101L25OT
		150	16×25	0.20	446	EWH2DM151L25OT
	180	16×30	0.20	560	EWH2DM181L30OT	
		16×35	0.20	678	EWH2DM221L35OT	
		18×30	0.20	695	EWH2DM221M30OT	
	330	18×35	0.20	755	EWH2DM331M35OT	
18×45		0.20	938	EWH2DM471M45OT		
250(2E)		2.2	6.3×11	0.20	22	EWH2EM2R2E11OT
	3.3	6.3×11	0.20	32	EWH2EM3R3E11OT	
		8×12	0.20	34	EWH2EM3R3F12OT	
	4.7	6.3×11	0.20	38	EWH2EM4R7E11OT	
		8×12	0.20	48	EWH2EM4R7F12OT	
	10	10×12	0.20	75	EWH2EM100G12OT	
		10×16	0.20	84	EWH2EM100G16OT	
		10×20	0.20	128	EWH2EM220G20OT	
	22	12.5×20	0.20	145	EWH2EM220W20OT	
		10×20	0.20	150	EWH2EM330G20OT	
		12.5×20	0.20	185	EWH2EM330W20OT	
	47	12.5×20	0.20	232	EWH2EM470W20OT	
12.5×25		0.20	245	EWH2EM470W25OT		
16×25		0.20	370	EWH2EM101L25OT		
100	16×30	0.20	400	EWH2EM101L30OT		
	16×35	0.20	468	EWH2EM151L35OT		
	18×35	0.20	660	EWH2EM221M35OT		
220	18×40	0.20	702	EWH2EM221M40OT		
	330	18×40	0.20	730	EWH2EM331M40OT	

WV (Vdc)	Cap (μF)	Size DxL(mm)	tanδ	Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz)	Part Number
350(2V)	0.47	6.3×11	0.24	11	EWH2VMR47E11OT
	1	6.3×11	0.24	16	EWH2VM010E11OT
		8×12	0.24	26	EWH2VM2R2F12OT
	3.3	8×12	0.24	34	EWH2VM3R3F12OT
		10×12	0.24	38	EWH2VM3R3G12OT
	4.7	8×12	0.24	48	EWH2VM4R7F12OT
		10×12	0.24	52	EWH2VM4R7G12OT
		10×12	0.24	68	EWH2VM100G12OT
	10	10×16	0.24	82	EWH2VM100G16OT
		10×20	0.24	88	EWH2VM100G20OT
		12.5×20	0.24	154	EWH2VM220W20OT
	33	12.5×20	0.24	184	EWH2VM330W20OT
16×20		0.24	198	EWH2VM330L20OT	
16×25		0.24	250	EWH2VM470L25OT	
68	16×25	0.24	336	EWH2VM680L25OT	
	18×30	0.24	398	EWH2VM101M30OT	
	400(2G)	1	6.3×11	0.24	16
2.2		6.3×11	0.24	30	EWH2GM2R2E11OT
		8×12	0.24	34	EWH2GM2R2F12OT
3.3		8×12	0.24	35	EWH2GM3R3F12OT
		10×12	0.24	38	EWH2GM3R3G12OT
4.7		8×12	0.24	48	EWH2GM4R7F12OT
		10×12	0.24	52	EWH2GM4R7G12OT
10		10×16	0.24	98	EWH2GM100G16OT
		10×20	0.24	115	EWH2GM100G20OT
		12.5×25	0.24	192	EWH2GM220W25OT
33		16×20	0.24	258	EWH2GM330L20OT
		16×25	0.24	305	EWH2GM470L25OT
	16×30	0.24	465	EWH2GM680L30OT	
68	18×25	0.24	445	EWH2GM680M25OT	
	18×25	0.24	474	EWH2GM820M25OT	
	16×40	0.24	544	EWH2GM101L40OT	
100	18×30	0.24	532	EWH2GM101M30OT	
	18×35	0.24	588	EWH2GM121M35OT	
	18×40	0.24	668	EWH2GM151M40OT	
450(2W)	0.47	8×12	0.24	11	EWH2WMR47F12OT
	1	8×12	0.24	18	EWH2WM010F12OT
		8×12	0.24	25	EWH2WM2R2F12OT
	2.2	10×12	0.24	32	EWH2WM2R2G12OT
		10×12	0.24	36	EWH2WM3R3G12OT
	3.3	10×16	0.24	40	EWH2WM3R3G16OT
		10×20	0.24	55	EWH2WM4R7G20OT
	10	10×20	0.24	90	EWH2WM100G20OT
		12.5×20	0.24	100	EWH2WM100W20OT
		12.5×25	0.24	168	EWH2WM220W25OT
	22	16×20	0.24	185	EWH2WM220L20OT
		16×25	0.24	215	EWH2WM330L25OT
16×30		0.24	344	EWH2WM470L30OT	
68	18×30	0.24	455	EWH2WM680M30OT	
	18×30	0.24	472	EWH2WM820M30OT	
	18×35	0.24	530	EWH2WM101M35OT	
120	18×40	0.24	582	EWH2WM121M40OT	
	18×50	0.24	700	EWH2WM151M50OT	
	500(2H)	4.7	10×20	0.24	60
10		12.5×20	0.24	115	EWH2HM100W20OT
		12.5×25	0.24	140	EWH2HM150W25OT
22		16×25	0.24	185	EWH2HM220L25OT
		18×25	0.24	215	EWH2HM330M25OT
47		18×35	0.24	345	EWH2HM470M35OT
		18×40	0.24	455	EWH2HM680M40OT
		18×50	0.24	520	EWH2HM820M50OT
100		22×40	0.24	550	EWH2HM101O40OT
		22×46	0.24	580	EWH2HM121O46OT