

WH series

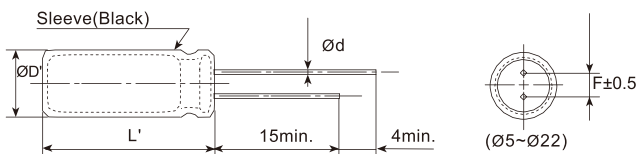
- Standard series for general purpose
- Wide temperature range from -40 °C to +105 °C
- Endurance: +105 °C 2,000 hours
- RoHS Compliant



SPECIFICATIONS

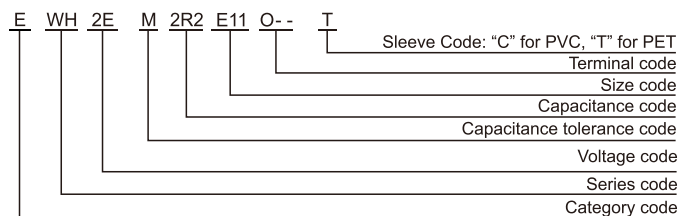
Items	Characteristics												
Category Temperature Range	-40~+105 °C (6.3~400 V _{dc})						-25~+105°C(450~500 V _{dc})						
Rated Voltage Range	6.3~500 V _{dc}												
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)												
Leakage Current	6.3~100 V _{dc}			160~500 V _{dc}						Where, I:Max. 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 _{dc})	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 _{dc})	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	0.6	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 ΦDxL(mm)	tanδ	Rated ripple current (mA _{RMS} /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
10(1A)	22	5×11	0.19	46	EWH1AM220D11OT
	33	5×11	0.19	57	EWH1AM330D11OT
	47	5×11	0.19	68	EWH1AM470D11OT
	100	5×11	0.19	100	EWH1AM101D11OT
	220	6.3×11	0.19	170	EWH1AM221E11OT
	330	6.3×11	0.19	200	EWH1AM331E11OT
	470	8×11	0.19	250	EWH1AM471F11OT
	1000	10×12.5	0.19	460	EWH1AM102G1BOT
	2200	10×20	0.21	760	EWH1AM222G20OT
	3300	12.5×20	0.23	1000	EWH1AM332W20OT
	4700	12.5×25	0.25	1260	EWH1AM472W25OT
	6800	16×25	0.29	1570	EWH1AM682L25OT
	10000	16×35	0.37	1890	EWH1AM103L35OT
	15000	18×35	0.47	2180	EWH1AM153M35OT
16(1C)	10	5×11	0.16	34	EWH1CM100D11OT
	22	5×11	0.16	51	EWH1CM220D11OT
	33	5×11	0.16	63	EWH1CM330D11OT
	47	5×11	0.16	75	EWH1CM470D11OT
	100	5×11	0.16	110	EWH1CM101D11OT
	220	6.3×11	0.16	180	EWH1CM221E11OT
	330	8×11	0.16	260	EWH1CM331F11OT
	470	8×12	0.16	310	EWH1CM471F12OT
	1000	10×16	0.16	560	EWH1CM102G1BOT
	2200	12.5×20	0.18	920	EWH1CM222W20OT
	3300	12.5×25	0.20	1170	EWH1CM332W25OT
	4700	16×25	0.22	1480	EWH1CM472L25OT
	6800	16×30	0.26	1780	EWH1CM682L30OT
	10000	18×35	0.34	2060	EWH1CM103M35OT
25(1E)	4.7	5×11	0.14	25	EWH1EM47R7D11OT
	10	5×11	0.14	36	EWH1EM100D11OT
	22	5×11	0.14	54	EWH1EM220D11OT
	33	5×11	0.14	67	EWH1EM330D11OT
	47	5×11	0.14	80	EWH1EM470D11OT
	100	6.3×11	0.14	130	EWH1EM101E11OT
	220	8×11	0.14	230	EWH1EM221F11OT
	330	8×12	0.14	310	EWH1EM331F12OT
	470	10×12.5	0.14	380	EWH1EM471G1BOT
	1000	10×20	0.14	680	EWH1EM102G20OT
	2200	12.5×25	0.16	1090	EWH1EM222W25OT
	3300	16×25	0.18	1400	EWH1EM332L25OT
	4700	16×30	0.20	1710	EWH1EM472L30OT
	6800	18×35	0.24	2040	EWH1EM682M35OT

WV (Vdc)	Cap (μF)	Size ΦDxL(mm)	tanδ	Rated ripple current (mA _{RMS} /105°C, 120Hz)	Part Number
35(1V)	4.7	5×11	0.12	28	EWH1VM47R7D11OT
	10	5×11	0.12	41	EWH1VM100D11OT
	22	5×11	0.12	61	EWH1VM220D11OT
	33	5×11	0.12	75	EWH1VM330D11OT
	47	5×11	0.12	90	EWH1VM470D11OT
	100	6.3×11	0.12	150	EWH1VM101E11OT
	220	8×12	0.12	270	EWH1VM221F12OT
	330	10×12.5	0.12	350	EWH1VM331G1BOT
	470	10×16	0.12	460	EWH1VM471G16OT
	1000	12.5×20	0.12	810	EWH1VM102W20OT
	2200	16×25	0.14	1260	EWH1VM222L25OT
	3300	16×35	0.16	1610	EWH1VM332L35OT
	4700	18×35	0.18	1910	EWH1VM472M35OT
	50(1H)	0.10	5×11	0.10	1.3
0.22		5×11	0.10	2.9	EWH1HMR22D11OT
0.33		5×11	0.10	4.3	EWH1HMR33D11OT
0.47		5×11	0.10	6.2	EWH1HMR47D11OT
1.0		5×11	0.10	13	EWH1HM010D11OT
2.2		5×11	0.10	20	EWH1HM2R2D11OT
3.3		5×11	0.10	25	EWH1HM3R3D11OT
4.7		5×11	0.10	30	EWH1HM4R7D11OT
10		5×11	0.10	40	EWH1HM100D11OT
22		5×11	0.10	65	EWH1HM220D11OT
33		6.3×11	0.10	90	EWH1HM330E11OT
47		6.3×11	0.10	110	EWH1HM470E11OT
100		8×11	0.10	180	EWH1HM101F11OT
220		10×12.5	0.10	300	EWH1HM221G1BOT
330	10×16	0.10	410	EWH1HM331G16OT	
470	10×20	0.10	530	EWH1HM471G20OT	
1000	12.5×25	0.10	950	EWH1HM102W25OT	
2200	16×35	0.12	1470	EWH1HM222L35OT	
3300	18×35	0.14	1770	EWH1HM332M35OT	
63(1J)	10	5×11	0.09	46	EWH1JM100D11OT
	22	5×11	0.09	71	EWH1JM220D11OT
	33	6.3×11	0.09	100	EWH1JM330E11OT
	47	6.3×11	0.09	120	EWH1JM470E11OT
	100	10×12.5	0.09	215	EWH1JM101G1BOT
	220	10×16	0.09	335	EWH1JM221G16OT
	330	10×20	0.09	510	EWH1JM331G20OT
	470	12.5×20	0.09	640	EWH1JM471W20OT
	1000	16×25	0.09	930	EWH1JM102L25OT
	100(1K)	0.10	5×11	0.08	1.5
0.22		5×11	0.08	3.4	EWH1KMR22D11OT
0.33		5×11	0.08	5.0	EWH1KMR33D11OT
0.47		5×11	0.08	7.1	EWH1KMR47D11OT
1.0		5×11	0.08	15	EWH1KM010D11OT
2.2		5×11	0.08	21	EWH1KM2R2D11OT
3.3		5×11	0.08	29	EWH1KM3R3D11OT
4.7		5×11	0.08	32	EWH1KM4R7D11OT
10		6.3×11	0.08	54	EWH1KM100E11OT
22		8×11	0.08	93	EWH1KM220F11OT
33		8×12	0.08	130	EWH1KM330F12OT
47		10×12.5	0.08	165	EWH1KM470G1BOT
100		10×20	0.08	265	EWH1KM101G20OT
220		12.5×25	0.08	440	EWH1KM221W25OT

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WV (Vdc)	Cap (μF)	Size ΦDxL(mm)	tanδ	Rated ripple current (mA _{rms} /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
	22	10×12	0.20	98	EWH2CM220G12OT
		10×16	0.20	108	EWH2CM220G16OT
		10×20	0.20	120	EWH2CM220G20OT
	33	10×16	0.20	158	EWH2CM330G16OT
		10×20	0.20	165	EWH2CM330G20OT
	47	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	
100	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
	22	10×16	0.20	128	EWH2DM220G16OT
		10×20	0.20	132	EWH2DM220G20OT
	33	10×20	0.20	185	EWH2DM330G20OT
		12.5×20	0.20	194	EWH2DM330W20OT
	47	12.5×20	0.20	225	EWH2DM470W20OT
	68	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
	220	16×35	0.20	678	EWH2DM221L35OT
		18×30	0.20	695	EWH2DM221M30OT
	330	18×35	0.20	755	EWH2DM331M35OT
470	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
	22	10×20	0.20	128	EWH2EM220G20OT
		12.5×20	0.20	145	EWH2EM220W20OT
	33	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
	100	16×25	0.20	370	EWH2EM101L25OT
		16×30	0.20	400	EWH2EM101L30OT
	150	16×35	0.20	468	EWH2EM151L35OT
	220	18×35	0.20	660	EWH2EM221M35OT
		18×40	0.20	702	EWH2EM221M40OT
330	18×40	0.20	730	EWH2EM331M40OT	

WV (Vdc)	Cap (μF)	Size ΦDxL(mm)	tanδ	Rated ripple current (mA _{rms} /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	10×12	0.24	68	EWH2VM100G12OT
		10×16	0.24	82	EWH2VM100G16OT
		10×20	0.24	88	EWH2VM100G20OT
	22	12.5×20	0.24	154	EWH2VM220W20OT
		12.5×20	0.24	184	EWH2VM330W20OT
33	16×20	0.24	198	EWH2VM330L20OT	
	16×25	0.24	250	EWH2VM470L25OT	
68	16×25	0.24	336	EWH2VM680L25OT	
100	18×30	0.24	398	EWH2VM101M30OT	
400(2G)	1	6.3×11	0.24	16	EWH2GM010E11OT
	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
	22	12.5×25	0.24	192	EWH2GM220W25OT
		16×20	0.24	258	EWH2GM330L20OT
	47	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
100	16×40	0.24	544	EWH2GM101L40OT	
	18×30	0.24	532	EWH2GM101M30OT	
120	18×35	0.24	588	EWH2GM121M35OT	
150	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
	22	12.5×25	0.24	168	EWH2WM220W25OT
		16×20	0.24	185	EWH2WM220L20OT
	33	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
100	18×35	0.24	530	EWH2WM101M35OT	
	18×40	0.24	582	EWH2WM121M40OT	
150	18×50	0.24	700	EWH2WM151M50OT	
500(2H)	4.7	10×20	0.24	60	EWH2HM4R7G20OT
	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
	82	18×50	0.24	520	EWH2HM820M50OT
		22×40	0.24	550	EWH2HM101O40OT
	120	22×46	0.24	580	EWH2HM121O46OT