

WH series

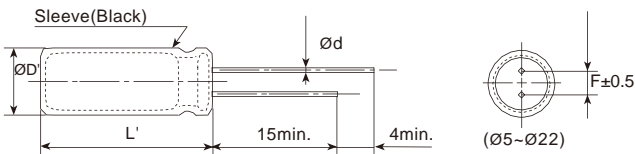
- Standard series for general purpose
- Wide temperature range from -40 °C to +105 °C
- Endurance: +105 °C 2,000 hours
- RoHS Compliant



SPECIFICATIONS

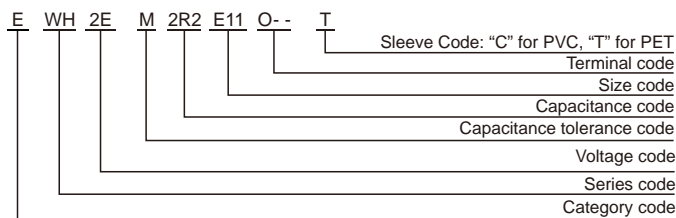
Items	Characteristics												
Category Temperature Range	-40~+105 °C (6.3~400 V _{dc})						-25~+105°C(450~500 V _{dc})						
Rated Voltage Range	6.3~500 V _{dc}												
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)												
Leakage Current	6.3~100 V _{dc}			160~500 V _{dc}						Where, I:Max. 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 (tan)	Rated Voltage(V _{dc})	6.3	10	16	25	35	50	63	100	160~250	350~400	450	500
	tan (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	-	-	(at 120Hz)
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. (tan)	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. (tan)	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 DxL(mm)	tan	Rated ripple current (mA _{RMS} /105°C, 120Hz)	Part Number
6.3(0J)	33	5x11	0.26	54	EWHOJM330D11OT
	47	5x11	0.26	64	EWHOJM470D11OT
	100	5x11	0.26	94	EWHOJM101D11OT
	220	5x11	0.26	140	EWHOJM221D11OT
	330	6.3x11	0.26	190	EWHOJM331E11OT
	470	6.3x11	0.26	230	EWHOJM471E11OT
	1000	8x12	0.26	380	EWHOJM102F12OT
	2200	10x20	0.28	710	EWHOJM222G20OT
	3300	10x20	0.30	840	EWHOJM332G20OT
	4700	12.5x20	0.32	1090	EWHOJM472W20OT
	6800	12.5x25	0.36	1350	EWHOJM682W25OT
	10000	16x25	0.44	1650	EWHOJM103L25OT
	15000	16x35	0.54	2010	EWHOJM153L35OT
	22000	18x40	0.68	2350	EWHOJM223M40OT
10(1A)	22	5x11	0.19	46	EWH1AM220D11OT
	33	5x11	0.19	57	EWH1AM330D11OT
	47	5x11	0.19	68	EWH1AM470D11OT
	100	5x11	0.19	100	EWH1AM101D11OT
	220	6.3x11	0.19	170	EWH1AM221E11OT
	330	6.3x11	0.19	200	EWH1AM331E11OT
	470	8x11	0.19	250	EWH1AM471F11OT
	1000	10x12.5	0.19	460	EWH1AM102G1BOT
	2200	10x20	0.21	760	EWH1AM222G20OT
	3300	12.5x20	0.23	1000	EWH1AM332W20OT
	4700	12.5x25	0.25	1260	EWH1AM472W25OT
	6800	16x25	0.29	1570	EWH1AM682L25OT
	10000	16x35	0.37	1890	EWH1AM103L35OT
	15000	18x35	0.47	2180	EWH1AM153M35OT
16(1C)	10	5x11	0.16	34	EWH1CM100D11OT
	22	5x11	0.16	51	EWH1CM220D11OT
	33	5x11	0.16	63	EWH1CM330D11OT
	47	5x11	0.16	75	EWH1CM470D11OT
	100	5x11	0.16	110	EWH1CM101D11OT
	220	6.3x11	0.16	180	EWH1CM221E11OT
	330	8x11	0.16	260	EWH1CM331F11OT
	470	8x12	0.16	310	EWH1CM471F12OT
	1000	10x16	0.16	560	EWH1CM102G1BOT
	2200	12.5x20	0.18	920	EWH1CM222W20OT
	3300	12.5x25	0.20	1170	EWH1CM332W25OT
	4700	16x25	0.22	1480	EWH1CM472L25OT
	6800	16x30	0.26	1780	EWH1CM682L30OT
	10000	18x35	0.34	2060	EWH1CM103M35OT
25(1E)	4.7	5x11	0.14	25	EWH1EM4R7D11OT
	10	5x11	0.14	36	EWH1EM100D11OT
	22	5x11	0.14	54	EWH1EM220D11OT
	33	5x11	0.14	67	EWH1EM330D11OT
	47	5x11	0.14	80	EWH1EM470D11OT
	100	6.3x11	0.14	130	EWH1EM101E11OT
	220	8x11	0.14	230	EWH1EM221F11OT
	330	8x12	0.14	310	EWH1EM331F12OT
	470	10x12.5	0.14	380	EWH1EM471G1BOT
	1000	10x20	0.14	680	EWH1EM102G20OT
	2200	12.5x25	0.16	1090	EWH1EM222W25OT
	3300	16x25	0.18	1400	EWH1EM332L25OT
	4700	16x30	0.20	1710	EWH1EM472L30OT
	6800	18x35	0.24	2040	EWH1EM682M35OT

WV (Vdc)	Cap (μF)	Size DxL(mm)	tan	Rated ripple current (mA _{RMS} /105°C, 120Hz)	Part Number
35(1V)	4.7	5x11	0.12	28	EWH1VM4R7D11OT
	10	5x11	0.12	41	EWH1VM100D11OT
	22	5x11	0.12	61	EWH1VM220D11OT
	33	5x11	0.12	75	EWH1VM330D11OT
	47	5x11	0.12	90	EWH1VM470D11OT
	100	6.3x11	0.12	150	EWH1VM101E11OT
	220	8x12	0.12	270	EWH1VM221F12OT
	330	10x12.5	0.12	350	EWH1VM331G1BOT
	470	10x16	0.12	460	EWH1VM471G16OT
	1000	12.5x20	0.12	810	EWH1VM102W20OT
	2200	16x25	0.14	1260	EWH1VM222L25OT
	3300	16x35	0.16	1610	EWH1VM332L35OT
	4700	18x35	0.18	1910	EWH1VM472M35OT
	50(1H)	0.10	5x11	0.10	1.3
0.22		5x11	0.10	2.9	EWH1HMR22D11OT
0.33		5x11	0.10	4.3	EWH1HMR33D11OT
0.47		5x11	0.10	6.2	EWH1HMR47D11OT
1.0		5x11	0.10	13	EWH1HM010D11OT
2.2		5x11	0.10	20	EWH1HM2R2D11OT
3.3		5x11	0.10	25	EWH1HM3R3D11OT
4.7		5x11	0.10	30	EWH1HM4R7D11OT
10		5x11	0.10	40	EWH1HM100D11OT
22		5x11	0.10	65	EWH1HM220D11OT
33		6.3x11	0.10	90	EWH1HM330E11OT
47		6.3x11	0.10	110	EWH1HM470E11OT
100		8x11	0.10	180	EWH1HM101F11OT
220		10x12.5	0.10	300	EWH1HM221G1BOT
330	10x16	0.10	410	EWH1HM331G16OT	
470	10x20	0.10	530	EWH1HM471G20OT	
1000	12.5x25	0.10	950	EWH1HM102W25OT	
2200	16x35	0.12	1470	EWH1HM222L35OT	
3300	18x35	0.14	1770	EWH1HM332M35OT	
63(1J)	10	5x11	0.09	46	EWH1JM100D11OT
	22	5x11	0.09	71	EWH1JM220D11OT
	33	6.3x11	0.09	100	EWH1JM330E11OT
	47	6.3x11	0.09	120	EWH1JM470E11OT
	100	10x12.5	0.09	215	EWH1JM101G1BOT
	220	10x16	0.09	335	EWH1JM221G16OT
	330	10x20	0.09	510	EWH1JM331G20OT
	470	12.5x20	0.09	640	EWH1JM471W20OT
	1000	16x25	0.09	930	EWH1JM102L25OT
	100(1K)	0.10	5x11	0.08	1.5
0.22		5x11	0.08	3.4	EWH1KMR22D11OT
0.33		5x11	0.08	5.0	EWH1KMR33D11OT
0.47		5x11	0.08	7.1	EWH1KMR47D11OT
1.0		5x11	0.08	15	EWH1KM010D11OT
2.2		5x11	0.08	21	EWH1KM2R2D11OT
3.3		5x11	0.08	29	EWH1KM3R3D11OT
4.7		5x11	0.08	32	EWH1KM4R7D11OT
10		6.3x11	0.08	54	EWH1KM100E11OT
22		8x11	0.08	93	EWH1KM220F11OT
33		8x12	0.08	130	EWH1KM330F12OT
47		10x12.5	0.08	165	EWH1KM470G1BOT
100		10x20	0.08	265	EWH1KM101G20OT
220		12.5x25	0.08	440	EWH1KM221W25OT

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WV (Vdc)	Cap (μF)	Size DxL(mm)	tan	Rated ripple current (mA _{rms} /105°C, 120Hz)	Part Number
100(1K)	330	16x25	0.08	540	EW11KM331L25OT
	470	16x30	0.08	715	EW11KM471L30OT
	1000	18x40	0.08	985	EW11KM102M40OT
160(2C)	3.3	6.3x11	0.20	32	EW22CM3R3E11OT
	4.7	6.3x11	0.20	38	EW22CM4R7E11OT
	10	8x12	0.20	65	EW22CM100F12OT
		10x12	0.20	76	EW22CM100G12OT
		10x12	0.20	98	EW22CM220G12OT
	22	10x16	0.20	108	EW22CM220G16OT
		10x20	0.20	120	EW22CM220G20OT
		10x16	0.20	158	EW22CM330G16OT
	33	10x20	0.20	165	EW22CM330G20OT
		10x20	0.20	182	EW22CM470G20OT
		12.5x20	0.20	205	EW22CM470W20OT
	68	12.5x20	0.20	265	EW22CM680W20OT
12.5x25		0.20	318	EW22CM101W25OT	
16x25		0.20	335	EW22CM101L25OT	
220	16x30	0.20	568	EW22CM221L30OT	
	18x35	0.20	710	EW22CM331M35OT	
	18x40	0.20	870	EW22CM471M40OT	
200(2D)	1	6.3x11	0.20	16	EW22DM010E11OT
	2.2	6.3x11	0.20	22	EW22DM2R2E11OT
	3.3	6.3x11	0.20	32	EW22DM3R3E11OT
	4.7	8x12	0.20	48	EW22DM4R7F12OT
		8x12	0.20	78	EW22DM100F12OT
	10	10x12	0.20	82	EW22DM100G12OT
		10x16	0.20	86	EW22DM100G16OT
		10x16	0.20	128	EW22DM220G16OT
	22	10x20	0.20	132	EW22DM220G20OT
		10x20	0.20	185	EW22DM330G20OT
	33	12.5x20	0.20	194	EW22DM330W20OT
		12.5x20	0.20	225	EW22DM470W20OT
	68	12.5x25	0.20	308	EW22DM680W25OT
		12.5x25	0.20	318	EW22DM820W25OT
	100	16x25	0.20	345	EW22DM101L25OT
	150	16x25	0.20	446	EW22DM151L25OT
	180	16x30	0.20	560	EW22DM181L30OT
	220	16x35	0.20	678	EW22DM221L35OT
		18x30	0.20	695	EW22DM221M30OT
	330	18x35	0.20	755	EW22DM331M35OT
18x45		0.20	938	EW22DM471M45OT	
250(2E)	2.2	6.3x11	0.20	22	EW22EM2R2E11OT
	3.3	6.3x11	0.20	32	EW22EM3R3E11OT
		8x12	0.20	34	EW22EM3R3F12OT
	4.7	6.3x11	0.20	38	EW22EM4R7E11OT
		8x12	0.20	48	EW22EM4R7F12OT
	10	10x12	0.20	75	EW22EM100G12OT
		10x16	0.20	84	EW22EM100G16OT
	22	10x20	0.20	128	EW22EM220G20OT
		12.5x20	0.20	145	EW22EM220W20OT
	33	10x20	0.20	150	EW22EM330G20OT
		12.5x20	0.20	185	EW22EM330W20OT
	47	12.5x20	0.20	232	EW22EM470W20OT
		12.5x25	0.20	245	EW22EM470W25OT
	100	16x25	0.20	370	EW22EM101L25OT
		16x30	0.20	400	EW22EM101L30OT
	150	16x35	0.20	468	EW22EM151L35OT
		18x35	0.20	660	EW22EM221M35OT
	220	18x40	0.20	702	EW22EM221M40OT
		18x40	0.20	730	EW22EM331M40OT

WV (Vdc)	Cap (μF)	Size DxL(mm)	tan	Rated ripple current (mA _{rms} /105°C, 120Hz)	Part Number
350(2V)	0.47	6.3x11	0.24	11	EW22VMR47E11OT
	1	6.3x11	0.24	16	EW22VM010E11OT
		8x12	0.24	26	EW22VM2R2F12OT
	3.3	8x12	0.24	34	EW22VM3R3F12OT
		10x12	0.24	38	EW22VM3R3G12OT
	4.7	8x12	0.24	48	EW22VM4R7F12OT
		10x12	0.24	52	EW22VM4R7G12OT
	10	10x12	0.24	68	EW22VM100G12OT
		10x16	0.24	82	EW22VM100G16OT
		10x20	0.24	88	EW22VM100G20OT
	22	12.5x20	0.24	154	EW22VM220W20OT
		12.5x20	0.24	184	EW22VM330W20OT
33	16x20	0.24	198	EW22VM330L20OT	
	16x25	0.24	250	EW22VM470L25OT	
68	16x25	0.24	336	EW22VM680L25OT	
	18x30	0.24	398	EW22VM101M30OT	
400(2G)	1	6.3x11	0.24	16	EW22GM010E11OT
	2.2	6.3x11	0.24	30	EW22GM2R2E11OT
		8x12	0.24	34	EW22GM2R2F12OT
	3.3	8x12	0.24	35	EW22GM3R3F12OT
		10x12	0.24	38	EW22GM3R3G12OT
	4.7	8x12	0.24	48	EW22GM4R7F12OT
		10x12	0.24	52	EW22GM4R7G12OT
	10	10x16	0.24	98	EW22GM100G16OT
		10x20	0.24	115	EW22GM100G20OT
	22	12.5x25	0.24	192	EW22GM220W25OT
		16x20	0.24	258	EW22GM330L20OT
	47	16x25	0.24	305	EW22GM470L25OT
16x30		0.24	465	EW22GM680L30OT	
68	18x25	0.24	445	EW22GM680M25OT	
	18x25	0.24	474	EW22GM820M25OT	
100	16x40	0.24	544	EW22GM101L40OT	
	18x30	0.24	532	EW22GM101M30OT	
120	18x35	0.24	588	EW22GM121M35OT	
	18x40	0.24	668	EW22GM151M40OT	
450(2W)	0.47	8x12	0.24	11	EW22WMR47F12OT
	1	8x12	0.24	18	EW22WM010F12OT
		8x12	0.24	25	EW22WM2R2F12OT
	2.2	10x12	0.24	32	EW22WM2R2G12OT
		10x12	0.24	36	EW22WM3R3G12OT
	3.3	10x16	0.24	40	EW22WM3R3G16OT
		10x20	0.24	55	EW22WM4R7G20OT
	10	10x20	0.24	90	EW22WM100G20OT
		12.5x20	0.24	100	EW22WM100W20OT
	22	12.5x25	0.24	168	EW22WM220W25OT
		16x20	0.24	185	EW22WM220L20OT
	33	16x25	0.24	215	EW22WM330L25OT
16x30		0.24	344	EW22WM470L30OT	
68	18x30	0.24	455	EW22WM680M30OT	
	18x30	0.24	472	EW22WM820M30OT	
100	18x35	0.24	530	EW22WM101M35OT	
	18x40	0.24	582	EW22WM121M40OT	
150	18x50	0.24	700	EW22WM151M50OT	
	500(2H)	4.7	10x20	0.24	60
10		12.5x20	0.24	115	EW22HM100W20OT
		12.5x25	0.24	140	EW22HM150W25OT
22		16x25	0.24	185	EW22HM220L25OT
		18x25	0.24	215	EW22HM330M25OT
47		18x35	0.24	345	EW22HM470M35OT
		18x40	0.24	455	EW22HM680M40OT
82		18x50	0.24	520	EW22HM820M50OT
		22x40	0.24	550	EW22HM101O40OT
120		22x46	0.24	580	EW22HM121O46OT