

WH series

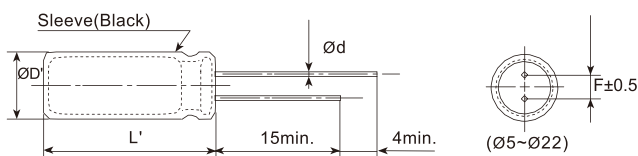
- Standard series for general purpose
- Wide temperature range from -40 °C to +105 °C
- Endurance: +105 °C 2,000 hours
- RoHS Compliant



SPECIFICATIONS

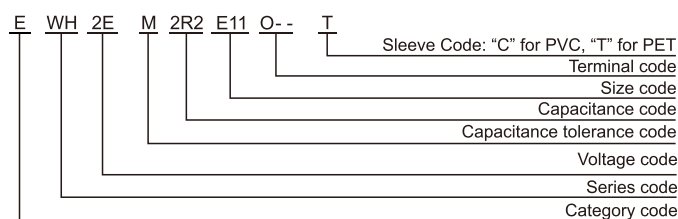
Items	Characteristics													
Category Temperature Range	-40~+105 °C (6.3~400 V _{dc})						-25~+105 °C(450~500 V _{dc})							
Rated Voltage Range	6.3~500 V _{dc}													
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)													
Leakage Current	6.3~100 V _{dc}					160~500 V _{dc}					Where, 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)					CV≤1,000		I≤0.1CV+40μA		I≤0.03CV+15μA				
	Whichever is greater					CV>1,000		I≤0.04CV+100μA		I≤0.02CV+25μA				
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										
	Leakage Current			≤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

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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■ STANDARD RATINGS

WV (V _{dc})	Cap (μF)	Size ΦD×L(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 (V _{dc})	Cap (μF)	Size ΦD×L(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
	0.10	5×11	0.10	1.3	EWH1HMR10D11OT
50(1H)	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	EWH1HMO10D11OT
	2.2	5×11	0.10	20	EWH1HMR2R2D11OT
	3.3	5×11	0.10	25	EWH1HMR3R3D11OT
	4.7	5×11	0.10	30	EWH1HMR4R7D11OT
	10	5×11	0.10	40	EWH1HMO100D11OT
	22	5×11	0.10	65	EWH1HMR220D11OT
	33	6.3×11	0.10	90	EWH1HMR330E11OT
	47	6.3×11	0.10	110	EWH1HMR470E11OT
	100	8×11	0.10	180	EWH1HMO101F11OT
	220	10×12.5	0.10	300	EWH1HMR221G1BOT
	330	10×16	0.10	410	EWH1HMR331G16OT
63(1J)	470	10×20	0.10	530	EWH1HMR471G20OT
	1000	12.5×25	0.10	950	EWH1HMO102W25OT
	2200	16×35	0.12	1470	EWH1HMR222L35OT
	3300	18×35	0.14	1770	EWH1HMR332M35OT
	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
	0.10	5×11	0.08	1.5	EWH1KMR10D11OT
100(1K)	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	EWH1KMO10D11OT
	2.2	5×11	0.08	21	EWH1KMR2R2D11OT
	3.3	5×11	0.08	29	EWH1KMR3R3D11OT
	4.7	5×11	0.08	32	EWH1KMR47D11OT
	10	6.3×11	0.08	54	EWH1KMO100E11OT
	22	8×11	0.08	93	EWH1KMR220F11OT
	33	8×12	0.08	130	EWH1KMR330F12OT
	47	10×12.5	0.08	165	EWH1KMR470G1BOT
	100	10×20	0.08	265	EWH1KMO101G20OT
	220	12.5×25	0.08	440	EWH1KMR221W25OT

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WV (V _{dc})	Cap (μF)	Size ΦD×L(mm)	tanδ	Rated ripple current (mA _{rms} /105°C, 120Hz)	Part Number
100(1K)	330	16×25	0.08	540	EW11KM331L25OT
	470	16×30	0.08	715	EW11KM471L30OT
	1000	18×40	0.08	985	EW11KM102M40OT
160(2C)	3.3	6.3×11	0.20	32	EW22CM3R3E11OT
	4.7	6.3×11	0.20	38	EW22CM4R7E11OT
	10	8×12	0.20	65	EW22CM100F12OT
		10×12	0.20	76	EW22CM100G12OT
		10×12	0.20	98	EW22CM220G12OT
	22	10×16	0.20	108	EW22CM220G16OT
		10×20	0.20	120	EW22CM220G20OT
		10×16	0.20	158	EW22CM330G16OT
	33	10×20	0.20	165	EW22CM330G20OT
		10×20	0.20	182	EW22CM470G20OT
		12.5×20	0.20	205	EW22CM470W20OT
	68	12.5×20	0.20	265	EW22CM680W20OT
		12.5×25	0.20	318	EW22CM101W25OT
		16×25	0.20	335	EW22CM101L25OT
	220	16×30	0.20	568	EW22CM221L30OT
		18×35	0.20	710	EW22CM331M35OT
		18×40	0.20	870	EW22CM471M40OT
200(2D)	1	6.3×11	0.20	16	EW22DM010E11OT
	2.2	6.3×11	0.20	22	EW22DM2R2E11OT
	3.3	6.3×11	0.20	32	EW22DM3R3E11OT
	4.7	8×12	0.20	48	EW22DM4R7F12OT
		8×12	0.20	78	EW22DM100F12OT
		10×12	0.20	82	EW22DM100G12OT
	10	10×16	0.20	86	EW22DM100G16OT
		10×16	0.20	128	EW22DM220G16OT
		10×20	0.20	132	EW22DM220G20OT
	33	10×20	0.20	185	EW22DM330G20OT
		12.5×20	0.20	194	EW22DM330W20OT
		12.5×20	0.20	225	EW22DM470W20OT
	68	12.5×25	0.20	308	EW22DM680W25OT
		12.5×25	0.20	318	EW22DM820W25OT
		16×25	0.20	345	EW22DM101L25OT
	150	16×25	0.20	446	EW22DM151L25OT
		16×30	0.20	560	EW22DM181L30OT
		16×35	0.20	678	EW22DM221L35OT
	220	18×30	0.20	695	EW22DM221M30OT
		18×35	0.20	755	EW22DM331M35OT
		18×45	0.20	938	EW22DM471M45OT
250(2E)	2.2	6.3×11	0.20	22	EW22EM2R2E11OT
	3.3	6.3×11	0.20	32	EW22EM3R3E11OT
		8×12	0.20	34	EW22EM3R3F12OT
		6.3×11	0.20	38	EW22EM4R7E11OT
	4.7	8×12	0.20	48	EW22EM4R7F12OT
		10×12	0.20	75	EW22EM100G12OT
		10×16	0.20	84	EW22EM100G16OT
	22	10×20	0.20	128	EW22EM220G20OT
		12.5×20	0.20	145	EW22EM220W20OT
		10×20	0.20	150	EW22EM330G20OT
	33	12.5×20	0.20	185	EW22EM330W20OT
		12.5×20	0.20	232	EW22EM470W20OT
		12.5×25	0.20	245	EW22EM470W25OT
	100	16×25	0.20	370	EW22EM101L25OT
		16×30	0.20	400	EW22EM101L30OT
		16×35	0.20	468	EW22EM151L35OT
	220	18×35	0.20	660	EW22EM221M35OT
		18×40	0.20	702	EW22EM221M40OT
		18×40	0.20	730	EW22EM331M40OT

WV (V _{dc})	Cap (μF)	Size ΦD×L(mm)	tanδ	Rated ripple current (mA _{rms} /105°C, 120Hz)	Part Number
350(2V)	0.47	6.3×11	0.24	11	EW22VMR47E11OT
	1	6.3×11	0.24	16	EW22VM010E11OT
	2.2	8×12	0.24	26	EW22VM2R2F12OT
	3.3	8×12	0.24	34	EW22VM3R3F12OT
		10×12	0.24	38	EW22VM3R3G12OT
		8×12	0.24	48	EW22VM4R7F12OT
	4.7	10×12	0.24	52	EW22VM4R7G12OT
		10×12	0.24	68	EW22VM100G12OT
		10×16	0.24	82	EW22VM100G16OT
	10	10×20	0.24	88	EW22VM100G20OT
		12.5×20	0.24	154	EW22VM220W20OT
		12.5×20	0.24	184	EW22VM330W20OT
	33	16×20	0.24	198	EW22VM330L20OT
		16×25	0.24	250	EW22VM470L25OT
		16×25	0.24	336	EW22VM680L25OT
	100	18×30	0.24	398	EW22VM101M30OT
400(2G)	1	6.3×11	0.24	16	EW22GM010E11OT
	2.2	6.3×11	0.24	30	EW22GM2R2E11OT
	3.3	8×12	0.24	34	EW22GM2R2F12OT
		8×12	0.24	35	EW22GM3R3F12OT
		10×12	0.24	38	EW22GM3R3G12OT
	4.7	8×12	0.24	48	EW22GM4R7F12OT
		10×12	0.24	52	EW22GM4R7G12OT
		10×16	0.24	98	EW22GM100G16OT
	10	10×20	0.24	115	EW22GM100G20OT
		12.5×25	0.24	192	EW22GM220W25OT
		16×20	0.24	258	EW22GM330L20OT
	47	16×25	0.24	305	EW22GM470L25OT
		16×30	0.24	465	EW22GM680L30OT
		18×25	0.24	445	EW22GM680M25OT
	82	18×25	0.24	474	EW22GM820M25OT
		16×40	0.24	544	EW22GM101L40OT
		18×30	0.24	532	EW22GM101M30OT
	120	18×35	0.24	588	EW22GM121M35OT
		18×40	0.24	668	EW22GM151M40OT
	0.47	8×12	0.24	11	EW22WMR47F12OT
	1	8×12	0.24	18	EW22WM010F12OT
	2.2	8×12	0.24	25	EW22WM2R2F12OT
		10×12	0.24	32	EW22WM2R2G12OT
		10×12	0.24	36	EW22WM3R3G12OT
	3.3	10×16	0.24	40	EW22WM3R3G16OT
		10×20	0.24	55	EW22WM4R7G20OT
		10×20	0.24	90	EW22WM100G20OT
	22	12.5×25	0.24	100	EW22WM100W20OT
		12.5×25	0.24	168	EW22WM220W25OT
		16×20	0.24	185	EW22WM220L20OT
	33	16×25	0.24	215	EW22WM330L25OT
		16×30	0.24	344	EW22WM470L30OT
		18×30	0.24	455	EW22WM680M30OT
	82	18×30	0.24	472	EW22WM820M30OT
		18×35	0.24	530	EW22WM101M35OT
		18×40	0.24	582	EW22WM121M40OT
	150	18×50	0.24	700	EW22WM151M50OT
500(2H)	4.7	10×20	0.24	60	EW22HM4R7G20OT
	10	12.5×20	0.24	115	EW22HM100W20OT
	15	12.5×25	0.24	140	EW22HM150W25OT
	22	16×25	0.24	185	EW22HM220L25OT
	33	18×25	0.24	215	EW22HM330M25OT
	47	18×35	0.24	345	EW22HM470M35OT
	68	18×40	0.24	455	EW22HM680M40OT
	82	18×50	0.24	520	EW22HM820M50OT
	100	22×40	0.24	550	EW22HM101O40OT
	120	22×46	0.24	580	EW22HM121O46OT