

## WH SERIES

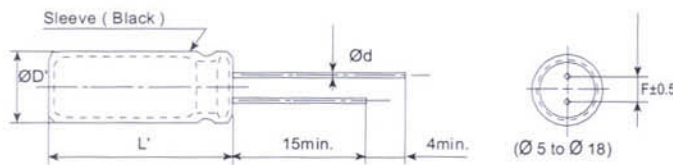
- Standard series for general purposes
- Wide temperature range from -40°C~+105°C
- Endurance: +105°C2,000hours
- RoHS Compliant



### SPECIFICATIONS

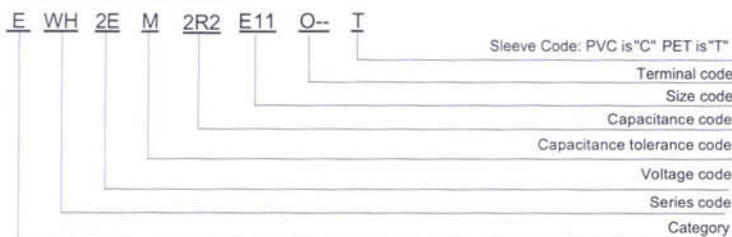
Items	Characteristics												
Category	-40 to +105°C(6.3 to 100Vdc) -25 to +105°C(160 to 450Vdc)												
Temperature Range													
Rated Voltage Range	6.3 to 450V <sub>dc</sub>												
Capacitance Tolerance	± 20%(M) (at 20°C, 120Hz)												
Leakage Current	6.3 to 100V <sub>dc</sub>						160 to 450V <sub>dc</sub>						Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C)
	I≤0.03CV or 4uA ( at 1 minute ) I≤0.01CV or 3uA ( at 2 minute ) Whichever is greater						CV		After 1 minutes		After 5 minutes		
							CV≤1,000		I≤0.1CV+40μA		I≤0.03CV+15μA		
							CV > 1,000		I≤0.04CV+100μA		I≤0.02CV+25μA		
Dissipation Factor (tanδ)	Rated voltage (V <sub>dc</sub> )	6.3	10	16	25	35	50	63	100	160-250	350-400	450	(at 20°C, 120Hz)
	tanδ (Max.)	0.26	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.20	0.24	0.24	
	When nominal capacitance exceeds 1,000 μF, add 0.02 to the value above for each 1,000 μF increase.												
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	(at 120Hz)
	Z(-25°C)/Z(+20°C)	5	4	3	2				3	6	6		
	Z(-40°C)/Z(+20°C)	12	10	8	5	4	3		-	-	-		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with 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]



Ø D	5	6.3	8	10	12.5/13	16	18
Ø d	0.5	0.5	0.5	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ø D'	Ø D+0.5max.						
L'	L+2max.						

### PART NUMBERING SYSTEM



※ Sleeve Code and Terminal Code should follow the part number system

### RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

Cap.(μF) \ Freq.(Hz)	50	120	300	1K	10K	100K
0.1 to 4.7	0.65	1.00	1.35	1.75	2.30	2.50
10 to 47	0.75	1.00	1.25	1.50	1.75	1.80
100 to 1000	0.80	1.00	1.15	1.30	1.40	1.50
2,200 to	0.85	1.00	1.03	1.05	1.08	1.08

The endurance of capacitors is shorted 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.

# WH SERIES

## ◆ STANDARD RATINGS

WV (Vdc)	Cap (μF)	Case size ΦDxL(mm)	tanδ	Ripple current (mAmps/105°C, 120Hz)
6.3(0J)	33	5×11	0.26	54
	47	5×11	0.26	64
	100	5×11	0.26	94
	220	5×11	0.26	140
	330	6.3×11	0.26	190
	470	6.3×11	0.26	230
	1000	8×11.5	0.26	380
	2200	10×20	0.28	710
	3300	10×20	0.30	840
	4700	12.5×20	0.32	1090
	6800	12.5×25	0.36	1350
	10000	16×25	0.44	1650
	15000	16×35	0.54	2010
	22000	18×40	0.68	2350
10(1A)	22	5×11	0.19	46
	33	5×11	0.19	57
	47	5×11	0.19	68
	100	5×11	0.19	100
	220	6.3×11	0.19	170
	330	6.3×11	0.19	200
	470	8×11.5	0.19	250
	1000	10×12	0.19	460
	2200	10×20	0.21	760
	3300	12.5×20	0.23	1000
	4700	12.5×25	0.25	1260
	6800	16×25	0.29	1570
	10000	16×35	0.37	1890
	15000	18×35	0.47	2180
16(1C)	10	5×11	0.16	34
	22	5×11	0.16	51
	33	5×11	0.16	63
	47	5×11	0.16	75
	100	5×11	0.16	110
	220	6.3×11	0.16	180
	330	8×11.5	0.16	260
	470	8×11.5	0.16	310
	1000	10×16	0.16	560
	2200	12.5×20	0.18	920
	3300	12.5×25	0.20	1170
	4700	16×25	0.22	1480
6800	16×30	0.26	1780	
10000	18×35	0.34	2060	
25(1E)	4.7	5×11	0.14	25
	10	5×11	0.14	36
	22	5×11	0.14	54
	33	5×11	0.14	67
	47	5×11	0.14	80
	100	6.3×11	0.14	130
	220	8×11.5	0.14	230
	330	8×11.5	0.14	310
	470	10×12	0.14	380
	1000	10×20	0.14	680
	2200	12.5×25	0.16	1090
	3300	16×25	0.18	1400
	4700	16×30	0.20	1710
	6800	18×35	0.24	2040

WV (Vdc)	Cap (μF)	Case size ΦDxL(mm)	tanδ	Ripple current (mAmps/105°C, 120Hz)	
35(1V)	4.7	5×11	0.12	28	
	10	5×11	0.12	41	
	22	5×11	0.12	61	
	33	5×11	0.12	75	
	47	5×11	0.12	90	
	100	6.3×11	0.12	150	
	220	8×11.5	0.12	270	
	330	10×12	0.12	350	
	470	10×16	0.12	460	
	1000	12.5×20	0.12	810	
	2200	16×25	0.14	1260	
	3300	16×35	0.16	1610	
	4700	18×35	0.18	1910	
	50(1H)	0.10	5×11	0.10	1.3
		0.22	5×11	0.10	2.9
		0.33	5×11	0.10	4.3
0.47		5×11	0.10	6.2	
1.0		5×11	0.10	13	
2.2		5×11	0.10	20	
3.3		5×11	0.10	25	
4.7		5×11	0.10	30	
10		5×11	0.10	40	
22		5×11	0.10	65	
33		6.3×11	0.10	90	
47		6.3×11	0.10	110	
100		8×11.5	0.10	180	
220		10×12	0.10	300	
330		10×16	0.10	410	
470		10×20	0.10	530	
1000	12.5×25	0.10	950		
2200	16×35	0.12	1470		
3300	18×35	0.14	1770		
63(1J)	10	5×11	0.09	46	
	22	5×11	0.09	71	
	33	6.3×11	0.09	100	
	47	6.3×11	0.09	120	
	100	10×12	0.09	215	
	220	10×16	0.09	335	
	330	10×20	0.09	510	
	470	12.5×20	0.09	640	
	1000	16×25	0.09	930	
	100(1K)	0.10	5×11	0.08	1.5
0.22		5×11	0.08	3.4	
0.33		5×11	0.08	5.0	
0.47		5×11	0.08	7.1	
1.0		5×11	0.08	15	
2.2		5×11	0.08	21	
3.3		5×11	0.08	29	
4.7		5×11	0.08	62	
10		6.3×11	0.08	54	
22		8×11.5	0.08	93	
33		8×11.5	0.08	130	
47		10×12	0.08	165	
100		10×20	0.08	265	
220		12.5×25	0.08	440	

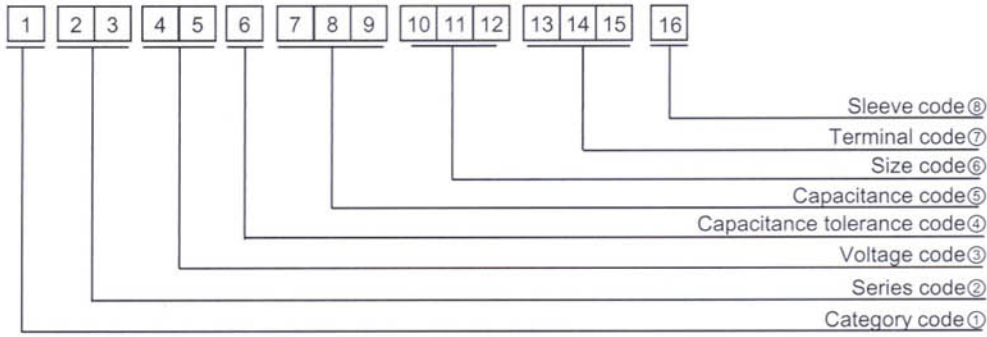
## WH SERIES

◆ STANDARD RATINGS

WV (Vdc)	Cap (μF)	Case size ΦDxL(mm)	tanδ	Ripple current (mA rms/105°C, 120Hz)
100(1K)	330	16×25	0.08	540
	470	16×30	0.08	715
	1000	18×40	0.08	985
160(2C)	3.3	6.3×11	0.20	28
	4.7	6.3×11	0.20	34
	10	10×12	0.20	67
	22	10×20	0.20	120
	33	10×20	0.20	145
	47	12.5×20	0.20	195
	100	16×25	0.20	335
	220	16×30	0.20	540
	330	18×35	0.20	705
200(2D)	3.3	6.3×11	0.20	28
	4.7	8×11.5	0.20	39
	10	10×16	0.20	74
	22	10×20	0.20	120
	33	12.5×20	0.20	160
	47	12.5×20	0.20	195
	68	12.5×25	0.20	250
	82	12.5×25	0.20	300
	100	16×25	0.20	335
	150	16×25	0.20	390
	180	16×30	0.20	450
	220	18×30	0.20	575
	330	18×35	0.20	650
	470	18×45	0.20	700
250(2E)	2.2	6.3×11	0.20	23
	3.3	8×11.5	0.20	32
	4.7	8×11.5	0.20	39
	10	10×16	0.20	74
	22	12.5×20	0.20	130
	33	12.5×20	0.20	160
	47	12.5×25	0.20	210
	100	16×30	0.20	365
	150	16×35	0.20	460
	220	18×40	0.20	585
330	18×40	0.20	700	

WV (Vdc)	Cap (μF)	Case size ΦDxL(mm)	tanδ	Ripple current (mA rms/105°C, 120Hz)
350(2V)	0.47	6.3×11	0.24	11
	1.0	6.3×11	0.24	15
	2.2	8×11.5	0.24	26
	3.3	10×12	0.24	38
	4.7	10×16	0.24	50
	10	10×20	0.24	80
	22	12.5×20	0.24	130
	33	16×20	0.24	195
	47	16×25	0.24	230
400(2G)	100	18×30	0.24	375
	1.0	6.3×11	0.24	15
	2.2	8×11.5	0.24	26
	3.3	10×12	0.24	38
	4.7	10×16	0.24	50
	10	10×20	0.24	80
	22	12.5×25	0.24	165
	33	16×20	0.24	215
	47	16×25	0.24	300
	68	18×25	0.24	310
	82	18×25	0.24	320
	100	16×40	0.24	350
		18×30	0.24	450
	120	18×35	0.24	550
150	18×40	0.24	700	
450(2W)	0.47	10×12	0.24	9.0
	1.0	10×12	0.24	13
	2.2	10×12	0.24	23
	3.3	10×16	0.24	31
	4.7	10×20	0.24	40
	10	12.5×20	0.24	95
	22	16×20	0.24	185
	33	16×25	0.24	215
	47	16×30	0.24	320
	68	18×30	0.24	350
	82	18×30	0.24	400
	100	18×35	0.24	450
	120	18×40	0.24	550
150	18×50	0.24	650	

● Part Number System



① Category

Type	Code	
	1th	
Electrolytic Capacitor	E	

② Series code

Series name	Code	
	2 th	3 th
WH	W	H
CD11GE	G	E

③ Voltage code

WV (V)	Code	
	4th	5th
4	0	G
6.3	0	J
10	1	A
16	1	C
25	1	E
35	1	V
40	1	G
50	1	H
63	1	J
80	1	B
100	1	K
160	2	C
180	2	L
200	2	D
220	2	N
250	2	E
315	2	F
350	2	V
380	2	P
400	2	G
420	2	T
450	2	W
500	2	H

④ Capacitance Tolerance

Tol. (%)	Code	
	6th	
-10 ~ +10	K	
-20 ~ +20	M	
-10 ~ +30	Q	
-10 ~ +50	T	
-10 ~ +20	V	
-0 ~ +20	A	
-0 ~ +30		
-5 ~ +20	C	
-10 ~ -20	B	
-5 ~ +5	D	
-0 ~ +10	E	
-5 ~ +20	F	
-15 ~ +5	N	

⑤ Capacitance code

Cap (μF)	Code		
	7th	8th	9th
0.10	0	R	1
0.22	R	2	2
0.33	R	3	3
0.47	R	4	7
0.68	R	6	8
1	0	1	0
2.2	2	R	2
3.3	3	R	3
4.7	4	R	7
6.8	6	R	8
10	1	0	0
22	2	2	0
33	3	3	0
47	4	7	0
68	6	8	0
100	1	0	1
220	2	2	1
330	3	3	1
470	4	7	1
680	6	8	1
1000	1	0	2
2200	2	2	2
3300	3	3	2
4700	4	7	2
6800	6	8	2
10000	1	0	3
22000	2	2	3
33000	3	3	3
68000	6	8	3

⑥ Size code

ΦD	Code	
	10th	
4	C	
5	D	
6.3	E	
8	F	
10	G	
11	H	
12	J	
12.5	W	
13	K	
14	X	
16	L	
18	M	
19	Z	
20	N	
22	O	
25	P	
30	Q	
35	R	
40	Y	
51	S	
63.5	T	
76	U	
89	V	

L	Code	
	11th	12th
5	0	5
7	0	7
11	1	1
12	1	2
16	1	6
20	2	0
25	2	5
30	3	0
35	3	5
40	4	0
46	4	6
50	5	0
60	6	0
80	8	0
100	A	0
115	B	5
120	C	0
130	D	0
140	E	0
160	G	0
200	K	0

⑦ Terminal Code

Specification	Code		
	13th	14th	15th
Bulk packing	O	-	-
Taping F=5.0mm	P	5	0
Lead Cut L=3.5mm	C	3	5
Lead Cut L=11.0mm	C	B	0
Lead Forming & cut L=4.5mm	F	4	5
Kink & cut L=4.5mm	J	4	5
Snap-in type Terminal 4.0mm in Length	K	4	0
Horizontal mounting Terminal	M	-	-
Screw Terminal	S	-	-
Lug Terminal	L	-	-
Three terminals	T	-	-
Four terminals	Q	-	-
Five terminals	Y	-	-

⑧ Sleeve Code

Sleeve	Code	
	16th	
PVC	C	
PET	T	