WH Series

- Standard series for general purpose
- Wide temperature range from -40℃~+105℃
- Endurance: +105℃2,000hours
- **RoHS Compliant**

◆SPECIFICATIONS

Items	Characteristics
Category Temperature Range	−40 to +105℃(6.3 to 100Vdc)　　−25 to +105℃(160 to 450Vdc)
Rated Voltage Range	6.3 to 450Vdc
Capacitance Tolerance	±20%(M)　(at 20℃, 120Hz)
Leakage Current	6.3 to 100Vdc: I≦0.03CV or 4uA（at 1minute） I≦0.01CV or 3uA（at 2minute） Whichever is greater 160 to 450Vdc: CV≤1,000: I≦0.1CV+40μA (After 1 minutes); I≦0.03CV+15μA (After 5 minutes) CV＞1,000: I≦0.04CV+100μA (After 1 minutes); I≦0.02CV+25μA (After 5 minutes) Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)　(at 20℃)

Dissipation Factor (tanδ)	Rated voltage (Vdc)	6.3	10	16	25	35	50	63	100	160~250	350~400	450
	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 uF, add 0.02 to the value above for each 1,000 uF increase.　(at 20℃, 120Hz)

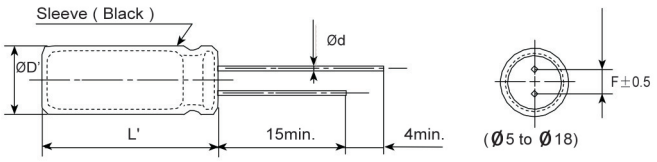
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (Vdc)	6.3	10	16	25	35	50	63	100	160~250	350~400	450
	Z(−25℃)/Z(+20℃)	5	4	3	2					3	6	6
	Z(−40℃)/Z(+20℃)	12	10	8	5	4	3			-	-	-

(at 120Hz)

Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjected to DC voltage with the rated ripple current is applied for 2,000 hours at 105℃.	
	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℃ after exposing them for 1,000 hours at 105℃ 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
Ød	0.5	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5		5.0	5.0	7.5	7.5
ØD'	ØD+0.5max.							
L'	L+2max.							

◆ PART NUMBER SYSTEM

E WH 2E M 2R2 E11 O-- T

- T — Sleeve Code: PVC is "C" PET is "T"
- O-- — Terminal code
- E11 — Size code
- 2R2 — Capacitance code
- M — Capacitance tolerance code
- 2E — Voltage code
- WH — Series code
- E — Category

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

◆ RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

Freq.(Hz) / Cap.(uF)	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 shorted with internal heating produced by ripple current at the rate of halving the lifetime with every 5℃ 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 ΦD×L(mm)	tanδ	Ripple current (mArms/105℃,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 ΦD×L(mm)	tanδ	Ripple current (mArms/105℃,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 ΦD×L(mm)	tanδ	Ripple current (mArms/105℃,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	32
	4.7	6.3×11	0.20	38
	10	8×12	0.20	65
	10	10×12	0.20	76
	22	10×12	0.20	98
	22	10×16	0.20	108
	22	10×20	0.20	120
	33	10×16	0.20	158
	33	10×20	0.20	165
	47	10×20	0.20	182
	47	12.5×20	0.20	205
	68	12.5×20	0.20	265
	100	12.5×25	0.20	318
	100	16×25	0.20	335
	220	16×30	0.20	568
	330	18×35	0.20	710
	470	18×40	0.20	870
200(2D)	1	6.3×11	0.20	16
	2.2	6.3×11	0.20	22
	3.3	6.3×11	0.20	32
	4.7	8×12	0.20	48
	10	8×12	0.20	78
	10	10×12	0.20	82
	10	10×16	0.20	86
	22	10×16	0.20	128
	22	10×20	0.20	132
	33	10×20	0.20	185
	33	12.5×20	0.20	194
	47	12.5×20	0.20	225
	68	12.5×25	0.20	308
	82	12.5×25	0.20	318
	100	16×25	0.20	345
	150	16×25	0.20	446
	180	16×30	0.20	560
	220	16×35	0.20	678
	220	18×30	0.20	695
	330	18×35	0.20	755
	470	18×45	0.20	938
250(2E)	2.2	6.3×11	0.20	22
	3.3	6.3×11	0.20	32
	3.3	8×12	0.20	34
	4.7	6.3×11	0.20	38
	4.7	8×12	0.20	48
	10	10×12	0.20	75
	10	10×16	0.20	84
	22	10×20	0.20	128
	22	12.5×20	0.20	145
	33	10×20	0.20	150
	33	12.5×20	0.20	185
	47	12.5×20	0.20	232
	47	12.5×25	0.20	245
	100	16×25	0.20	370
	100	16×30	0.20	400
	150	16×35	0.20	468
	220	18×35	0.20	660
	220	18×40	0.20	702
	330	18×40	0.20	730

WV (Vdc)	Cap (μF)	Case size ΦD×L(mm)	tanδ	Ripple current (mArms/105℃,120Hz)
350(2V)	0.47	6.3×11	0.24	11
	1	6.3×11	0.24	16
	2.2	8×12	0.24	26
	3.3	8×12	0.24	34
	3.3	10×12	0.24	38
	4.7	8×12	0.24	48
	4.7	10×12	0.24	52
	10	10×12	0.24	68
	10	10×16	0.24	82
	10	10×20	0.24	88
	22	12.5×20	0.24	154
	33	12.5×20	0.24	184
	33	16×20	0.24	198
	47	16×25	0.24	250
	68	16×25	0.24	336
	100	18×30	0.24	398
400(2G)	1	6.3×11	0.24	16
	2.2	6.3×11	0.24	30
	2.2	8×12	0.24	34
	3.3	8×12	0.24	35
	3.3	10×12	0.24	38
	4.7	8×12	0.24	48
	4.7	10×12	0.24	52
	10	10×16	0.24	98
	10	10×20	0.24	115
	22	12.5×25	0.24	192
	33	16×20	0.24	258
	47	16×25	0.24	305
	68	16×30	0.24	465
	68	18×25	0.24	445
	82	18×25	0.24	474
	100	16×40	0.24	544
	100	18×30	0.24	532
	120	18×35	0.24	588
	150	18×40	0.24	668
450(2W)	0.47	8×12	0.24	11
	1	8×12	0.24	18
	2.2	8×12	0.24	25
	2.2	10×12	0.24	32
	3.3	10×12	0.24	36
	3.3	10×16	0.24	40
	4.7	10×20	0.24	55
	10	10×20	0.24	90
	10	12.5×20	0.24	100
	22	12.5×25	0.24	168
	22	16×20	0.24	185
	33	16×25	0.24	215
	47	16×30	0.24	344
	68	18×30	0.24	455
	82	18×30	0.24	472
	100	18×35	0.24	530
	120	18×40	0.24	582
	150	18×50	0.24	700