

HL series

Features

- ◆ Highly reliable capacitors that withstand low ESR & long life.
- ◆ Two or three dimensions with same ratings.
- ◆ For detail specifications, please refer to Engineering Bulletin No.E128
- ◆ HoHS Compliant



Specifications

Item	Performance Characteristics										
Operating Temperature Range	-40~+105°C	-25~+105°C									
Rate Voltage Range	10~100VDC	160~400VDC									
Capacitance Range	560~47000µF	56~15000µF									
Capacitance Tolerance	±20% (120Hz, +20°C)										
Leakage current (+20°C, max.)	1 ≤ 0.02CVA After 5 minutes with rated working voltage applied.										
Dissipation factor (tgδ)	Less than the value under table (%)										
	Working Voltage(VDC)	10	16	25	35	50	63	80	100	160~250	350~400
	D.F.(%)max	55	40	30	25	20	15	15	15	15	15
Low Temperature Characteristics (120Hz)	Impedance ratio max.										
	Working Voltage(VDC)	10,16	25	35	50,63	80,100	160,400				
	Z-25°C / Z+20°C	4	3	3	2	2	4				
	Z-40°C / Z+20°C	15	10	8	6	5	-				
Load Life	Test conditions										
	Duration time	:5000Hrs									
	Ambient temperature	:+105°C									
	Applied voltage	: Rated DC working voltage									
	After test requirement at +20°C										
	Capacitance change	: ≤±25% of the initial measured value									
	Dissipation factor	: ≤250% of the initial specified value									
	Leakage current	: ≤The initial specified value									
Shelf Life	Test conditions										
	Duration time	: 1000Hrs									
	Ambient temperature	: +105°C									
	Applied voltage	: None									
	After test requirement at +20°C	: The same limits as Load life									
	Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes										

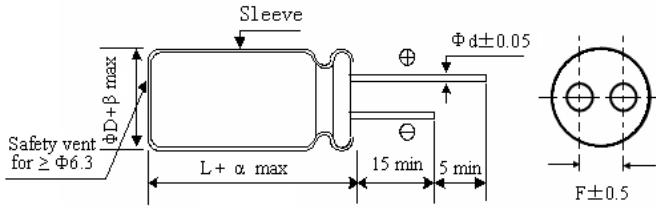
Multiplier for Ripple Current vs. Frequency

CAP(µF)	50(60)	120	400	1k	10k	50k-100k
CAP ≤ 10	0.8	1	1.30	1.45	1.65	1.70
10 < CAP ≤ 100	0.8	1	1.23	1.36	1.48	1.53
100 < CAP ≤ 1000	0.8	1	1.16	1.25	1.35	1.38
1000 < CAP	0.8	1	1.11	1.17	1.25	1.28

HL series

Diagram of Dimensions

Unit: mm



Case Size

Φ D x L

WV ΦD Cap (uF)	10											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
5600	22×26	1.10	126									
6800	22×26	1.30	126	25×26	1.30	88						
8200	22×26	1.56	126	25×26	1.56	88						
10000	22×31	1.60	98	25×26	1.60	88	30×26	1.60	75			
12000	22×36	1.80	82	25×31	1.80	78	30×26	1.80	75			
15000	22×36	2.10	82	25×31	2.10	68	30×26	2.10	75			
18000	22×36	2.20	82	25×31	2.20	68	30×31	2.20	65			
22000	22×41	2.75	68	25×36	2.75	62	30×31	2.75	48	35×27	2.75	68
27000				25×51	3.05	41	30×41	3.05	30	35×32	3.05	47
33000				25×51	3.40	41	30×41	3.40	30	35×37	3.40	37
39000							30×51	3.60	28	35×41	3.60	31
47000							30×51	4.60	28	35×52	4.60	25

WV ΦD Cap (uF)	16											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
5600	22×26	1.40	126									
6800	22×31	1.60	98	25×26	1.60	88						
8200	22×36	1.80	82	25×31	1.80	75						
10000	22×41	2.10	68	25×31	2.10	68	30×26	2.10	75			
12000	22×41	2.40	68	25×36	2.40	52	30×26	2.40	75			
15000	22×51	2.70	53	25×41	2.70	52	30×31	2.70	48			
18000				25×51	3.05	41	30×36	3.05	36	35×32	3.05	47
22000				25×51	3.40	41	30×41	3.40	30	35×47	3.40	37
27000							30×51	4.02	28	35×42	4.02	31
33000							30×51	4.32	28	35×42	4.32	31
39000										35×52	4.95	25

Ripple Current (A,ms) at 105°C 120Hz

Max ESR(mΩ) at 20°C 30KHz

HL series

Case Size

Φ D×L

WV ΦD Cap (uF)	25											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
3900	22×26	1.30	126									
4700	22×31	1.50	98	25×26	1.50	88						
5600	22×36	1.60	82	25×26	1.60	88						
6800	22×41	1.87	68	25×1	1.87	68	30×26	1.87	75			
8200	22×46	2.20	62	25×36	2.20	62	30×31	2.20	48	35×27	2.20	68
10000	22×51	2.35	41	25×41	2.35	52	30×36	2.35	36	35×32	2.35	60
12000				25×51	2.70	41	30×36	2.70	36	35×32	2.70	47
15000							30×41	3.15	30	35×37	3.15	37
18000							30×51	3.60	28	35×42	3.60	31
22000										35×47	3.90	29
27000										35×52	4.60	25

WV ΦD Cap (uF)	35											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
2200	22×26	1.10	126									
2700	22×26	1.29	126									
3300	22×31	1.40	98	25×26	1.40	88						
3900	22×36	1.55	82	25×31	1.55	68						
4700	22×41	1.75	68	25×31	1.75	68	30×26	1.75	75			
5600	22×46	1.95	62	25×36	1.95	62	30×31	1.95	48	35×27	1.95	68
6800	22×51	2.20	53	25×41	2.20	52	30×36	2.20	36	35×32	2.20	60
8200				25×51	2.50	41	30×36	2.50	36	35×32	2.50	47
10000							30×41	2.80	30	35×37	2.80	37
12000							30×51	3.3	28	35×42	3.30	31
15000										35×52	4.25	25

WV ΦD Cap (uF)	50											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
1500	22×26	1.00	126									
1800	22×31	1.10	98	25×26	1.10	88						
2200	22×36	1.30	82	25×26	1.30	88						
2700	22×41	1.45	68	25×31	1.45	68	30×26	1.45	75			
3300	22×41	1.70	68	25×36	1.70	62	30×31	1.70	48			
3900	22×51	1.90	3	25×41	1.90	52	30×36	1.90	36			
4700				25×41	2.10	52	30×36	2.10	36	35×32	2.10	47
5600				25×51	2.36	41	30×41	2.36	30	35×37	2.36	37
6800							30×51	2.70	28	35×42	2.70	31
8200							30×1	3.16	28	35×42	3.16	31
10000										35×52	3.50	25

Ripple Current (A,ms) at 105°C 120Hz

Max ESR(mΩ) at 20°C 30KHz

HL series

Case Size

Φ D×L

WV ΦD Cap (uF)	63											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
1000	22×26	1.00	126									
1200	22×26	1.15	126	25×26	1.15	88						
1500	22×36	1.30	82	25×31	1.30	68						
1800	22×41	1.45	68	25×31	1.45	68	30×26	1.45	75			
2200	22×46	1.65	62	25×36	1.65	62	30×31	1.65	48	35×27	1.65	68
2700	22×51	1.90	53	25×41	1.90	52	30×36	1.90	36	35×32	1.90	60
3300				25×51	2.15	41	30×36	2.15	36	35×32	2.15	47
3900							3×41	2.40	30	35×37	2.40	37
4700							30×51	2.70	28	35×42	2.70	31
5600							30×51	3.10	28	35×42	3.10	31
6800										35×52	3.50	25

WV ΦD Cap (uF)	80											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
6800	22×26	0.95	148									
820	22×31	1.00	118									
1000	22×36	1.20	98	25×26	1.20	115						
1200	22×41	1.40	78	25×31	1.40	80						
1500	22×46	1.60	48	25×36	1.60	65	30×26	1.60	82			
1800	22×51	1.80	58	25×41	1.80	62	30×31	1.80	58	35×27	1.80	68
2200				25×51	2.05	43	30×36	2.05	52	35×32	2.05	48
2700							30×41	2.35	41	35×37	2.35	42
3300							30×51	2.70	28	35×42	2.70	28
3900										35×47	2.80	26
4700										35×52	3.40	22

WV ΦD Cap (uF)	100											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
560	22×31	0.95	118	25×26	0.95	115						
680	22×36	1.10	98	25×31	1.10	80						
820	22×41	1.40	78	25×31	1.40	80	30×26	1.40	82			
1000	22×46	1.40	75	25×36	1.40	65	30×31	1.40	58	35×27	1.40	68
1200	22×51	1.60	58	25×41	1.60	62	30×36	1.60	52	35×32	1.60	65
1500				25×51	1.85	43	30×41	1.85	41	35×32	1.85	48
1800							30×46	2.05	37	35×37	2.05	42
2200							30×51	2.40	28	35×42	2.40	28
2700										35×52	2.80	22

Ripple Current (A,ms) at 105°C 120Hz

Max ESR(mΩ) at 20°C 30KHz

HL series

Case Size

Φ D×L

WV ΦD Cap (uF)	100											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
560	22×31	0.95	118	25×26	0.95	115						
680	22×36	1.10	98	25×31	1.10	80						
820	22×41	1.40	78	25×31	1.40	80	30×26	1.40	82			
1000	22×46	1.40	75	25×36	1.40	65	30×31	1.40	58	35×27	1.40	68
1200	22×51	1.60	58	25×41	1.60	62	30×36	1.60	52	35×32	1.60	65
1500				25×51	1.85	43	30×41	1.85	41	35×32	1.85	48
1800							30×46	2.05	37	35×37	2.05	42
2200							30×51	2.40	28	35×42	2.40	28
2700										35×52	2.80	22

WV ΦD Cap (uF)	160											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
270	22×31	0.60	565									
330	22×36	0.80	455	25×26	0.80	525						
390	22×36	0.85	455	25×31	0.85	415						
470	22×46	1.10	380	25×36	1.10	365	30×31	1.10	315			
560	22×46	1.16	380	25×36	1.16	300	30×31	1.16	315			
680				25×46	1.30	280	30×36	1.30	262			
820				25×46	1.43	280	30×41	1.43	345	35×32	1.43	255
1000							30×46	1.69	300	35×37	1.69	205
1200										35×47	1.95	165
1500										35×52	2.40	145

WV ΦD Cap (uF)	200											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
180	22×26	0.57	645									
220	22×31	0.65	565									
270	22×36	0.78	455	25×26	0.78	525						
330	33×41	0.90	405	25×31	0.90	415						
390	22×41	0.98	405	25×36	0.98	405	30×26	0.98	405			
470	22×41	1.15	405	25×36	1.15	405	30×26	1.15	405			
560	22×46	1.30	345	25×36	1.30	365	30×26	1.30	405			
680	22×51	1.45	315	25×41	1.45	300	30×31	1.45	315	35×27	1.45	345
820				25×46	1.60	300	30×36	1.60	362	35×37	1.60	285
1000				25×56	1.90	235	30×46	1.90	300	35×37	1.90	205
1200							30×51	2.10	173	35×42	2.10	175

Ripple Current (A,ms) at 105°C 120Hz

Max ESR(mΩ) at 20°C 30KHz

HL series

Case Size

Φ D × L

WV ΦD Cap (uF)	250											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
150	22×26	0.52	645									
180	22×31	0.64	565	25×26	0.64	525						
220	22×36	0.75	455	25×31	0.75	415						
270	22×41	0.85	405	25×31	0.85	415	30×26	0.85	405			
330	22×46	1.00	380	25×36	1.00	365	30×31	1.00	315	35×27	1.00	345
390	22×51	1.10	315	25×41	1.10	300	30×36	1.10	262			
470				25×51	1.20	235	30×36	1.20	262	35×32	1.20	255
560							30×41	1.35	345	35×37	1.35	205
680							30×51	1.55	173	35×42	1.55	175
820							30×56	1.70	300			
1000										35×52	2.00	145

WV ΦD Cap (uF)	350											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
68	22×26	0.34	795									
82	22×31	0.40	705									
100	22×36	0.50	565	25×26	0.50	655						
120	22×41	0.56	505	25×31	0.56	525	30×26	0.56	495			
150	22×46	0.63	460	25×36	0.63	435	30×31	0.63	395			
180	22×51	0.70	385	25×41	0.70	375	30×31	0.70	395			
220				25×51	0.82	305	30×36	0.82	325	35×32	0.82	310
270							30×41	0.90	285	35×37	0.90	250
330							30×51	1.10	215	35×42	1.10	225
390										35×47	1.20	210
470										35×52	1.30	175

WV ΦD Cap (uF)	400											
	22			25			30			35		
	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR	Case Size	Ripple Current	ESR
56	22×26	0.32	795									
68	22×31	0.40	705	25×26	0.40	656						
82	22×36	0.45	565	25×31	0.45	525						
100	22×41	0.50	505	25×31	0.50	525	30×26	0.50	495			
120	22×41	0.55	505	25×36	0.55	435	30×31	0.55	395			
150	22×51	0.65	385	25×41	0.65	375	30×36	0.65	325			
180				25×46	0.75	350	30×36	0.75	325	35×32	0.75	310
220				25×51	0.85	305	30×41	0.85	285	35×37	0.85	250
270							30×51	1.05	215	35×42	1.05	225
330										35×47	1.10	210
390										35×52	1.20	175

Ripple Current (A,ms) at 105°C 120Hz

Max ESR(mΩ) at 20°C 30KHz