

## HL Series Low ESR, Snap-in Type

### Features

- ◆ Highly reliable capacitors that withstand low ESR & long life.
- ◆ Two or three dimensions with same ratings.
- ◆ RoHS Compliant



### Specifications

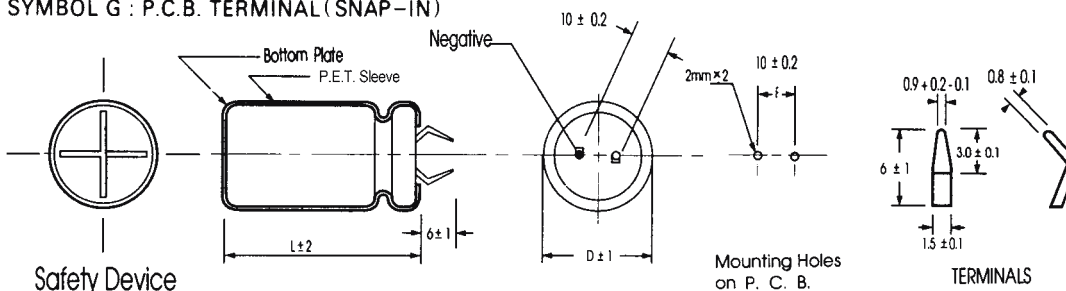
Item	Performance Characteristics											
Operating Temperature Range	-40 to +105°C	-25 to +105°C										
Rated Voltage Range	10 to 100 VDC	160 to 400 VDC										
Capacitance Range	560 to 47000 µF	56 to 1500 µF										
Capacitance Tolerance	±20% (120Hz, +20°C)											
Leakage Current (+20°C, max.)	I ≤ 0.02CV After 5 minutes with rated working voltage applied.											
Dissipation Factor (tan δ , at 20°C , 120Hz)	Less than the value under table (%)											
	Working Voltage(VDC)	10	16	25	35	50	63	80	100	160 ~ 250	350 ~ 400	
Low Temperature Characteristics (at 120Hz)	D.F. (%) max.	55	40	30	25	20	15	15	15	15	15	
	Impedance ratio max.											
	Working voltage (VDC)	10 , 16	25	35	50 , 63	80 , 100	160 to 400					
Endurance	Z -25°C / Z +20°C	4	3	3	2	2	2	2	2	4		
	Z -40°C / Z +20°C	15	10	8	6	5	—					
	Test conditions	Duration time :5000 Hrs 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 :1000 Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C : The same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes.										

### Multiplier for Ripple Current vs. Frequency

VDC \ Frequency(Hz)	50	120	300	1K	10K	50K
10~50 WV	0.95	1	1.03	1.05	1.08	1.08
63~100 WV	0.93	1	1.07	1.13	1.19	1.20
160,250 WV	0.81	1	1.17	1.32	1.45	1.50
350,400 WV	0.77	1	1.16	1.30	1.41	1.43

### Diagram of Dimensions:(unit:mm)

SYMBOL G : P.C.B. TERMINAL (SNAP-IN)



## Case Size

Cap (μF) / φ D		10											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
5600	22x26	1.1	50										
6800	22x26	1.3	41	25x26	1.3	41							
8200	22x26	1.56	34	25x26	1.56	34							
10000	22x31	1.6	32	25x26	1.6	32	30x26	1.6	32				
12000	22x36	1.8	27	25x31	1.8	27	30x26	1.8	27				
15000	22x36	2.1	21	25x31	2.1	21	30x26	2.1	21				
18000	22x36	2.2	18	25x31	2.2	18	30x31	2.2	18				
22000	22x41	2.75	14	25x36	2.75	14	30x31	2.75	14	35x27	2.75	14	
27000				25x51	3.05	13	30x41	3.05	13	35x32	3.05	13	
33000				25x51	3.4	11	30x41	3.4	11	35x37	3.4	11	
39000							30x51	3.6	9	35x41	3.6	9	
47000							30x51	4.6	8	35x52	4.6	8	

Cap (μF) / φ D		16											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
5600	22x26	1.4	50										
6800	22x31	1.6	41	25x26	1.6	41							
8200	22x36	1.8	34	25x31	1.8	34							
10000	22x41	2.1	32	25x31	2.1	32	30x26	2.1	32				
12000	22x41	2.4	27	25x36	2.4	27	30x26	2.4	27				
15000	22x51	2.7	21	25x41	2.7	21	30x31	2.7	21				
18000				25x51	3.05	18	30x36	3.05	18	35x32	3.05	18	
22000				25x51	3.4	14	30x41	3.4	14	35x47	3.4	14	
27000							30x51	4.02	13	35x42	4.02	13	
33000							30x51	4.32	11	35x42	4.32	11	
39000										35x52	4.95	9	

Cap (μF) / φ D		25											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
3900	22x26	1.3	51										
4700	22x31	1.5	51	25x26	1.5	51							
5600	22x36	1.6	43	25x26	1.6	43							
6800	22x41	1.87	35	25x31	1.87	35	30x26	1.87	35				
8200	22x46	2.2	29	25x36	2.2	29	30x31	2.2	29	35x27	2.2	29	
10000	22x51	2.35	28	25x41	2.35	28	30x36	2.35	28	35x32	2.35	28	
12000				25x51	2.7	23	30x36	2.7	23	35x32	2.7	23	
15000							30x41	3.15	19	35x37	3.15	19	
18000							30x51	3.6	15	35x42	3.6	15	
22000										35x47	3.9	13	
27000										35x52	4.6	12	

Cap (μF) / φ D		35											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
2200	22x26	1.1	90										
2700	22x26	1.29	74										
3300	22x31	1.4	60	25x26	1.4	60							
3900	22x36	1.55	51	25x31	1.55	51							
4700	22x41	1.75	42	25x31	1.75	42	30x26	1.75	42				
5600	22x46	1.95	36	25x36	1.95	36	30x31	1.95	36	35x27	1.95	36	
6800	22x51	2.2	29	25x41	2.2	29	30x36	2.2	29	35x32	2.2	29	
8200				25x51	2.5	24	30x36	2.5	24	35x32	2.5	24	
10000							30x41	2.8	24	35x37	2.8	24	
12000							30x51	3.3	20	35x42	3.3	20	
15000										35x52	4.25	16	

Ripple Current (A, rms) at 105°C 120Hz  
Max ESR (mΩ) at 20°C 30KHz

φ DxL(mm)

Cap (μF)	φ D	50											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
1500		22x26	1	80									
1800		22x31	1.1	66	25x26	1.1	66						
2200		22x36	1.3	54	25x26	1.3	54						
2700		22x41	1.45	44	25x31	1.45	44	30x26	1.45	44			
3300		22x41	1.7	36	25x36	1.7	36	30x31	1.7	36			
3900		22x51	1.9	31	25x41	1.9	31	30x36	1.9	31			
4700					25x41	2.1	25	30x36	2.1	25	35x32	2.1	25
5600					25x51	2.36	21	30x41	2.36	21	35x37	2.36	21
6800								30x51	2.7	18	35x42	2.7	18
8200								30x51	3.16	15	35x42	3.16	15
10000											35x52	3.5	16

Cap (μF)	φ D	63											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
1000		22x26	1	100									
1200		22x26	1.15	86	25x26	1.15	86						
1500		22x36	1.3	69	25x31	1.3	69						
1800		22x41	1.45	58	25x31	1.45	58	30x26	1.45	58			
2200		22x46	1.65	47	25x36	1.65	47	30x31	1.65	47	35x27	1.65	47
2700		22x51	1.9	38	25x41	1.9	38	30x36	1.9	38	35x32	1.9	38
3300					25x51	2.15	31	30x36	2.15	31	35x32	2.15	31
3900								30x41	2.4	27	35x37	2.4	27
4700								30x51	2.7	22	35x42	2.7	22
5600								30x51	3.1	18	35x42	3.1	18
6800											35x52	3.5	15

Cap (μF)	φ D	80											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
680		22x26	0.95	140									
820		22x31	1	120									
1000		22x36	1.2	96	25x26	1.2	96						
1200		22x41	1.4	80	25x31	1.4	80						
1500		22x46	1.6	64	25x36	1.6	64	30x26	1.6	64			
1800		22x51	1.8	53	25x41	1.8	53	30x31	1.8	53	35x27	1.8	53
2200					25x51	2.05	43	30x36	2.05	43	35x32	2.05	43
2700								30x41	2.35	35	35x37	2.35	35
3300								30x51	2.7	29	35x42	2.7	29
3900											35x47	2.8	24
4700											35x52	3.4	20

Cap (μF)	φ D	100											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
560		22x31	0.95	170	25x26	0.95	170						
680		22x36	1.1	140	25x31	1.1	140						
820		22x41	1.4	120	25x31	1.4	120	30x26	1.4	120			
1000		22x46	1.4	96	25x36	1.4	96	30x31	1.4	96	35x27	1.4	96
1200		22x51	1.6	80	25x41	1.6	80	30x36	1.6	80	35x32	1.6	80
1500					25x51	1.85	64	30x41	1.85	64	35x32	1.85	64
1800								30x46	2.05	53	35x37	2.05	53
2200								30x51	2.4	43	35x42	2.4	43
2700											35x52	2.8	35

Ripple Current (A, rms) at 105°C 120Hz

Max ESR (mΩ) at 20°C 30KHz

φ D x L (mm)

Cap (μF)	φ D	160											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
270		22x31	0.6	320									
330		22x36	0.8	270	25x26	0.8	270						
390		22x36	0.85	220	25x31	0.85	220						
470		22x46	1.1	190	25x36	1.1	190	30x31	1.1	190			
560		22x46	1.16	160	25x36	1.16	160	30x31	1.16	160			
680					25x46	1.3	130	30x36	1.3	130			
820					25x46	1.43	110	30x41	1.43	110	35x32	1.43	110
1000								30x46	1.69	88	35x37	1.69	88
1200											35x47	1.95	73
1500											35x52	2.4	58

Cap (μF)	φ D	200											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
180		22x26	0.57	490									
220		22x31	0.65	400									
270		22x36	0.78	320	25x26	0.78	320						
330		22x41	0.9	270	25x31	0.9	270						
390		22x41	0.98	220	25x36	0.98	220	30x26	0.98	220			
470		22x41	1.15	190	25x36	1.15	190	30x26	1.15	190			
560		22x46	1.3	160	25x36	1.3	160	30x26	1.3	160			
680		22x51	1.45	130	25x41	1.45	130	30x31	1.45	130	35x27	1.45	130
820					25x46	1.6	110	30x36	1.6	110	35x37	1.77	110
1000					25x56	1.9	88	30x46	1.9	88	35x37	1.9	88
1200								30x51	2.1	73	35x42	2.1	73

Cap (μF)	φ D	250											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
150		22x26	0.52	580									
180		22x31	0.64	490	25x26	0.64	490						
220		22x36	0.75	400	25x31	0.75	400						
270		22x41	0.85	320	25x31	0.85	320	30x26	0.85	320			
330		22x46	1	270	25x36	1	270	30x31	1	270	35x27	1	270
390		22x51	1.1	220	25x41	1.1	220	30x36	1.1	220			
470					25x51	1.2	190	30x36	1.2	190	35x32	1.2	190
560								30x41	1.35	160	35x37	1.35	160
680								30x51	1.55	130	35x42	1.55	130
820								30x56	1.7	110			
1000											35x52	2	88

Cap (μF)	φ D	350											
		22			25			30			35		
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
68		22x26	0.34	1290									
82		22x31	0.4	1070									
100		22x36	0.5	880	25x26	0.5	880						
120		22x41	0.56	730	25x31	0.56	730	30x26	0.56	730			
150		22x46	0.63	580	25x36	0.63	580	30x31	0.63	580			
180		22x51	0.7	490	25x41	0.7	490	30x31	0.7	490			
220					25x51	0.82	400	30x36	0.82	400	35x32	0.82	400
270								30x41	0.9	320	35x37	0.9	320
330								30x51	1.1	270	35x42	1.1	270
390											35x47	1.2	220
470											35x52	1.3	190

Ripple Current (A, rms) at 105°C 120Hz  
Max ESR (mΩ) at 20°C 30KHz

Cap ( $\mu$ F)	$\phi$ D	400											$\phi$ DxL(mm)	
		22			25			30			35			
		Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple		ESR
56		22x26	0.32	1560										
68		22x31	0.4	1290	25x26	0.4	1290							
82		22x36	0.45	1070	25x31	0.45	1070							
100		22x41	0.5	880	25x31	0.5	880	30x26	0.5	880				
120		22x41	0.55	730	25x36	0.55	730	30x31	0.55	730				
150		22x51	0.65	580	25x41	0.65	580	30x36	0.65	580				
180					25x46	0.75	490	30x36	0.75	490	35x32	0.75	490	
220					25x51	0.85	400	30x41	0.85	400	35x37	0.85	400	
270								30x51	1.05	320	35x42	1.05	320	
330											35x47	1.1	270	
390											35x52	1.2	220	

Ripple Current ( A, rms ) at 105°C 120Hz

Max ESR (m $\Omega$ ) at 20°C 30KHz