

ZLH CD28L



MINIATURE ALUMINUM
ELECTROLYTIC CAPACITORS

2000 - 8000h at 105°C

- Miniaturized
- Low Impedance, High Current
- Switching Power Supply



Rated voltage

ZLH

Rated Capacitance

Capacitance tolerance

Terminal Code

DXL

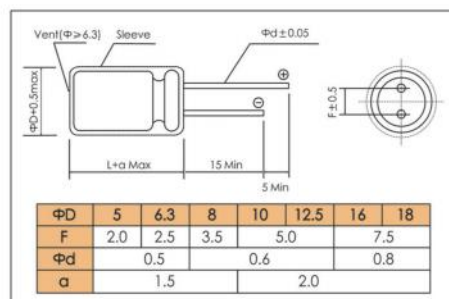
MINIATURE

Items	Characteristics							
Operating Temperature Range (°C)	-55 ~ +105							
Voltage Range (V)	6.3 ~ 63							
Capacitance Range (μF)	12 ~ 18000							
Capacitance Tolerance (20°C, 120Hz)	± 20%							
Leakage Current (μA)	After 2 minutes at 20°C application of rated voltage, leakage current is not more than 0.01CV or 3, whichever is greater. C: Nominal Capacitance (μF) V: Rated Voltage (V)							
Dissipation Factor (20°C, 120Hz)	Rated Voltage (V)	6.3	10	16	25	35	50	63
	Tan δ (max)	0.22	0.19	0.16	0.14	0.12	0.10	0.08
For Capacitances >1000μF add 0.02 to every 1000μF								
Stability at Low Temperature (Impedance Ratio at 120Hz)	Rated Voltage (V)	6.3 ~ 63						
	Z _{-55℃} / Z _{+20℃}	3						

	Useful Life		Load Life	Endurance Test	Shelf Life
Lifetime	$\Phi \leq 6.3$: 4000h $\Phi 8$: 6000h $\Phi 10$: 10000h $\Phi 12.5$: 12000h $\Phi \geq 16$: 14000h	$\Phi \geq 8$: > 250000h	$\Phi \leq 6.3$: 2000h $\Phi 8$: 3000h $\Phi 10$: 5000h $\Phi 12.5$: 7000h $\Phi \geq 16$: 8000h	$\Phi \leq 6.3$: 3000h $\Phi 8$: 5000h $\Phi 10$: 7000h $\Phi 12.5$: 9000h $\Phi \geq 16$: 10000h	1000h
Leakage Current	Not more than specified value		Not more than specified value	Not more than specified value	Not more than specified value
Capacitance Change	Within ± 30% of initial value		Within ± 20% of initial value	Within ± 20% of initial value	Within ± 20% of initial value
Dissipation Factor	Not more than 300% of specified value		Not more than 200% of specified value	Not more than 200% of specified value	Not more than 200% of specified value
Condition: Applied Voltage Applied Current Applied Temperature	U _R I _R 105°C	U _R 1.4 x I _R 40°C	U _R I _R 105°C	U _R I _R = 0 105°C	U _R = 0 I _R = 0 105°C After test: U _R to be applied for 30min >24h before measurement

Dimensions

mm

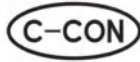


Frequency Coefficient

Cap (μF)	Frequency	120Hz	1kHz	10kHz	100kHz
12 ~ 180		0.40	0.75	0.90	1.00
220 ~ 560		0.50	0.83	0.93	1.00
680 ~ 1800		0.60	0.86	0.95	1.00
2200 ~ 3900		0.75	0.90	0.97	1.00
4700 ~ 18000		0.85	0.95	0.98	1.00

Temperature Coefficient

Temperature(°C)	+70	+85	+105
Coefficient	1.96	1.68	1.00



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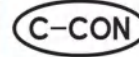
Ratings for CD 28L Series

U _r (Surge Voltage) Code	Rated Capa- citance	Max ESR 20°C, 120Hz	Max Imp 20°C, 100kHz	Max Imp -10°C, 100kHz	Rated Ripple Current 105°C, 100kHz	Size ΦD x L
(V)	(μF)	(Ω)	(Ω)	(Ω)	(mA _{rms})	(mm)
6.3 (7.2) 0J	150	1.946	0.5	1	175	5×11.5
	330	0.885	0.25	0.5	290	6.3×11.5
	470	0.621	0.18	0.36	400	6.3×15
	680	0.429	0.12	0.24	555	8×11.5
	820	0.356	0.09	0.18	760	10×12.5
	1000	0.292	0.09	0.18	730	8×16
	1200	0.243	0.08	0.16	810	8×20
		0.243	0.068	0.136	1050	10×16
	1500	0.195	0.052	0.104	1220	10×20
	2200	0.145	0.045	0.09	1440	10×25
	2700	0.118	0.037	0.074	1690	10×30
	3300	0.105	0.038	0.076	1660	12.5×20
	3900	0.088	0.03	0.06	1950	12.5×25
	4700	0.079	0.025	0.05	2310	12.5×30
	5600	0.071	0.022	0.044	2510	12.5×35
		0.071	0.029	0.058	2210	16×20
	6800	0.062	0.017	0.034	2870	12.5×40
		0.062	0.022	0.044	2560	16×25
		0.062	0.028	0.056	2490	18×20
	8200	0.058	0.019	0.038	3010	16×31.5
	10000	0.053	0.017	0.034	3150	16×35.5
		0.053	0.02	0.04	2740	18×25
	12000	0.049	0.015	0.03	3710	16×40
		0.049	0.018	0.036	3330	18×31.5
	15000	0.044	0.016	0.032	3680	18×35.5
	18000	0.041	0.015	0.03	3800	18×40
10 (13) 1A	100	2.521	0.5	1	175	5×11.5
	220	1.146	0.25	0.5	290	6.3×11.5
	330	0.764	0.18	0.36	400	6.3×15
	470	0.536	0.12	0.24	555	8×11.5
	680	0.371	0.09	0.18	730	8×16
		0.371	0.09	0.18	760	10×12.5
	1000	0.252	0.08	0.16	810	8×20
		0.252	0.068	0.136	1050	10×16
	1200	0.21	0.052	0.104	1220	10×20
	1500	0.168	0.045	0.09	1440	10×25
	1800	0.14	0.037	0.074	1690	10×30
	2200	0.127	0.038	0.076	1660	12.5×20
	3300	0.092	0.03	0.06	1950	12.5×25
	3900	0.078	0.025	0.05	2310	12.5×30
		0.078	0.029	0.058	2210	16×20
	4700	0.071	0.022	0.044	2510	12.5×35
	5600	0.064	0.017	0.034	2870	12.5×40
		0.064	0.022	0.044	2560	16×25
		0.064	0.028	0.056	2490	18×20
	6800	0.057	0.019	0.038	3010	16×31.5
		0.057	0.02	0.04	2740	18×25
	8200	0.053	0.017	0.034	3150	16×35.5
		0.053	0.018	0.036	3330	18×31.5
	10000	0.049	0.015	0.03	3710	16×40
		0.049	0.016	0.032	3680	18×35.5
	12000	0.045	0.015	0.03	3800	18×40

U _r (Surge Voltage) Code	Rated Capa- citance	Max ESR 20°C, 120Hz	Max Imp 20°C, 100kHz	Max Imp -10°C, 100kHz	Rated Ripple Current 105°C, 100kHz	Size ΦD x L
(V)	(μF)	(Ω)	(Ω)	(Ω)	(mA _{rms})	(mm)
16 (20) 1C	47	4.517	0.5	1	175	5×11.5
	100	2.123	0.25	0.5	290	6.3×11.5
	220	0.965	0.18	0.36	400	6.3×15
	330	0.643	0.12	0.24	555	8×11.5
	470	0.452	0.09	0.18	730	8×16
		0.452	0.09	0.18	760	10×12.5
	560	0.379	0.08	0.16	810	8×20
	680	0.312	0.068	0.136	1050	10×16
	1000	0.212	0.052	0.104	1220	10×20
	1200	0.177	0.045	0.09	1440	10×25
	1500	0.142	0.037	0.074	1690	10×30
		0.142	0.038	0.076	1660	12.5×20
	2200	0.109	0.03	0.06	1950	12.5×25
	2700	0.088	0.025	0.05	2310	12.5×30
		0.088	0.029	0.058	2210	16×20
	3300	0.08	0.022	0.044	2510	12.5×35
	3900	0.068	0.017	0.034	2870	12.5×40
		0.068	0.022	0.044	2560	16×25
		0.068	0.028	0.056	2490	18×20
	4700	0.062	0.019	0.038	3010	16×31.5
		0.062	0.02	0.04	2740	18×25
	5600	0.057	0.017	0.034	3150	16×35.5
		0.057	0.018	0.036	3330	18×31.5
	6800	0.051	0.015	0.03	3710	16×40
	8200	0.049	0.016	0.032	3680	18×35.5
	10000	0.045	0.015	0.03	3800	18×40
25 (32) 1E	47	3.953	0.5	1	175	5×11.5
	100	1.858	0.25	0.5	290	6.3×11.5
	150	1.238	0.18	0.36	400	6.3×15
	220	0.844	0.12	0.24	555	8×11.5
	330	0.563	0.09	0.18	730	8×16
		0.563	0.09	0.18	760	10×12.5
	390	0.476	0.08	0.16	810	8×20
	470	0.395	0.068	0.136	1050	10×16
	680	0.273	0.052	0.104	1220	10×20
	820	0.227	0.045	0.09	1440	10×25
	1000	0.186	0.037	0.074	1690	10×30
		0.186	0.038	0.076	1660	12.5×20
	1500	0.124	0.03	0.06	1950	12.5×25
	1800	0.103	0.025	0.05	2310	12.5×30
		0.103	0.029	0.058	2210	16×20
	2200	0.097	0.025	0.05	2310	12.5×30
		0.097	0.022	0.044	2510	12.5×35
		0.097	0.028	0.056	2490	18×20
	2700	0.079	0.017	0.034	2870	12.5×40
		0.079	0.022	0.044	2560	16×25
	3300	0.072	0.022	0.044	2560	16×25
		0.072	0.019	0.038	3010	16×31.5
		0.072	0.028	0.056	2490	18×20
		0.072	0.02	0.04	2740	18×25
	3900	0.061	0.017	0.034	3150	16×35.5
		0.061	0.018	0.036	3330	18×31.5

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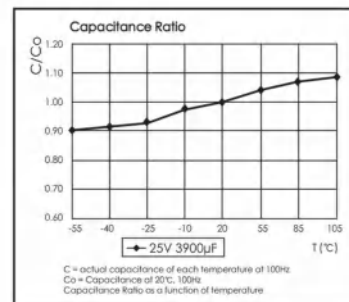
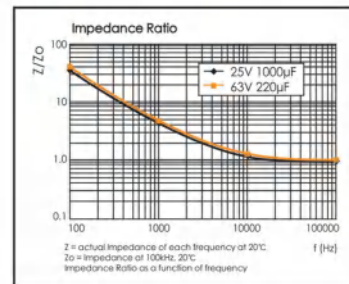
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Ratings for CD 28L Series

U _s (Surge Voltage) Code	Rated Capa- cance	Max ESR 20°C, 120Hz	Max Imp 20°C, 100kHz	Max Imp -10°C, 100kHz	Rated Ripple Current 105°C, 100kHz	Size ΦD x L
(V)	(μF)	(Ω)	(Ω)	(Ω)	(mA rms)	(mm)
25 (32) 1E	4700	0.056	0.015	0.03	3710	16×40
		0.056	0.016	0.032	3680	18×35.5
	5600	0.052	0.015	0.03	3800	18×40
	33	4.825	0.5	1	175	5×11.5
	56	2.843	0.25	0.5	290	6.3×11.5
	100	1.592	0.18	0.36	400	6.3×15
	150	1.062	0.12	0.24	555	8×11.5
	220	0.724	0.09	0.18	730	8×16
		0.724	0.09	0.18	760	10×12.5
	270	0.59	0.08	0.16	810	8×20
35 (44) 1V	330	0.483	0.068	0.136	1050	10×16
	470	0.339	0.052	0.104	1220	10×20
	560	0.284	0.052	0.104	1220	10×20
		0.284	0.045	0.09	1440	10×25
	680	0.234	0.037	0.074	1690	10×30
		0.234	0.038	0.076	1660	12.5×20
	1000	0.159	0.038	0.076	1660	12.5×20
		0.159	0.03	0.06	1950	12.5×25
	1200	0.133	0.025	0.05	2310	12.5×30
		0.133	0.029	0.058	2210	16×20
	1500	0.106	0.022	0.044	2510	12.5×35.5
		0.088	0.017	0.034	2870	12.5×40
	1800	0.088	0.022	0.044	2560	16×25
		0.088	0.028	0.056	2490	18×20
		0.084	0.022	0.044	2560	16×25
	2200	0.084	0.019	0.038	3010	16×31.5
		0.084	0.028	0.056	2490	18×20
		0.084	0.02	0.04	2740	18×25
	2700	0.069	0.017	0.034	3150	16×35.5
		0.069	0.018	0.036	3330	18×31.5
50 (63) 1H	3300	0.064	0.015	0.03	3710	16×40
		0.064	0.016	0.032	3680	18×35.5
	3900	0.054	0.015	0.03	3800	18×40
	4700	0.051	0.015	0.03	3800	18×40
	22	6.032	0.9	1.8	155	5×11.5
	47	2.823	0.45	0.9	260	6.3×11.5
	68	1.951	0.31	0.62	360	6.3×15
	100	1.327	0.22	0.44	485	8×11.5
	120	1.106	0.16	0.32	635	8×16
		1.106	0.16	0.32	620	10×12.5
	180	0.737	0.12	0.24	730	8×20
		0.737	0.13	0.26	850	10×16
	220	0.603	0.088	0.18	1050	10×20
	330	0.402	0.08	0.16	1250	10×25
	390	0.34	0.065	0.13	1500	10×30
		0.34	0.07	0.14	1480	12.5×20
	470	0.28	0.07	0.14	1480	12.5×20
	560	0.237	0.054	0.108	1840	12.5×25
	680	0.195	0.044	0.088	2220	12.5×30
		0.195	0.048	0.096	1840	16×20
820		0.162	0.033	0.066	2290	12.5×35
		0.162	0.042	0.084	1980	18×20

U _s (Surge Voltage) Code	Rated Capa- cance	Max ESR 20°C, 120Hz	Max Imp 20°C, 100kHz	Max Imp -10°C, 100kHz	Rated Ripple Current 105°C, 100kHz	Size ΦD x L
(V)	(μF)	(Ω)	(Ω)	(Ω)	(mA rms)	(mm)
50 (63) 1H	1000	0.133	0.029	0.058	2500	12.5×40
		0.133	0.034	0.068	2240	16×25
	1200	0.111	0.028	0.056	2700	16×31.5
		0.111	0.029	0.058	2610	18×25
	1500	0.088	0.025	0.05	2800	16×35.5
	1800	0.074	0.021	0.042	3200	16×40
		0.074	0.025	0.05	3000	18×31.5
	2200	0.072	0.023	0.046	3100	18×35.5
	2700	0.059	0.022	0.044	3400	18×40
	12	8.846	1.9	4	145	5×11.5
63 (79) 1J	22	4.825	1	2	240	6.3×11.5
	39	2.722	0.61	1.4	330	6.3×15
	68	1.561	0.34	0.75	405	8×11.5
	100	1.062	0.27	0.65	535	8×16
		1.062	0.255	0.51	540	10×12.5
	120	0.885	0.19	0.38	600	10×16
	150	0.708	0.21	0.52	690	8×20
	180	0.59	0.145	0.29	890	10×20
	220	0.483	0.13	0.26	1050	10×25
	330	0.322	0.09	0.18	1300	10×30
		0.322	0.085	0.17	1290	12.5×20
	390	0.272	0.07	0.14	1720	12.5×25
	470	0.226	0.055	0.11	2090	12.5×30
		0.226	0.059	0.12	1770	16×20
		0.156	0.047	0.094	2270	12.5×35
	680	0.156	0.05	0.1	2160	16×25
		0.156	0.055	0.11	2290	18×20
	820	0.129	0.042	0.084	2560	12.5×40
		0.129	0.043	0.086	2670	16×31.5
		0.129	0.043	0.086	2590	18×25
1000		0.106	0.043	0.086	2670	16×31.5
		0.106	0.036	0.072	2770	16×35.5
	1200	0.088	0.03	0.06	2850	16×40
		0.088	0.032	0.064	2950	18×31.5
1500		0.071	0.03	0.06	3100	18×35.5
1800		0.059	0.025	0.05	3210	18×40
2200		0.048	0.025	0.05	3210	18×40

Typical Curves



Lifetime Diagram

