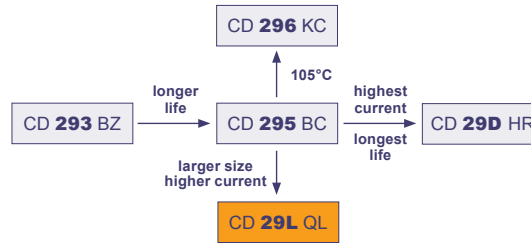


7000h at 85°C

- Larger Size Components
- Long Useful Life
- High Ripple Current
- Industrial Power Supplies



Item	Characteristics	
Operating Temperature Range (°C)	-40 ~ +85	-25 ~ +85
Voltage Range (V)	16 ~ 400	450 ~ 500
Capacitance Range (µF)	390 ~ 120 000	
Capacitance Tolerance (20°C, 120Hz)	± 20%	
Leakage Current (µA)	After 5 minutes at 20°C application of rated voltage, leakage current is not more than 0,01CV or 1,5mA, whichever is smaller C: Nominal Capacitance (µF) V: Rated Voltage (V)	
Dissipation Factor (20°C, 120Hz)	<b>Rated Voltage (V)</b>	<b>16 25 35 50 63~100 160~250 350~450 500</b>
	<b>Tan δ (max)</b>	0,60 0,50 0,40 0,30 0,20 0,15
Stability at Low Temperature (Impedance Ratio at 120Hz)	<b>Rated Voltage (V)</b>	<b>16~35 50~100 160~200 250~400 450 500</b>
	$Z_{-25°C} / Z_{+20°C}$	4 3 4
	$Z_{-40°C} / Z_{+20°C}$	15 10 6 8 -

	Useful Life		Load Life	Endurance Test	Shelf Life
<b>Lifetime</b>	<b>7000h</b>	>100000h	5000h	5000h	1000h
<b>Leakage Current</b>	Not more than specified value		Not more than specified value	Not more than specified value	Not more than specified value
<b>Capacity Change</b>	Within ± 30% of initial value		Within ± 20% of initial value	Within ± 20% of initial value	Within ± 20% of initial value
<b>Dissipation Factor</b>	Not more than 300% of specified value		Not more than 200% of specified value	Not more than 130% of specified value	Not more than 200% of specified value
<b>Condition:</b>	$U_R$	$U_R$	$U_R$	$U_R$	$U_R = 0$
<b>Applied Voltage</b>					
<b>Applied Current</b>	$I_R$	$1,2 \times I_R$	$I_R$	$I_R = 0$	$I_R = 0$
<b>Applied Temperature</b>	85°C	40°C	85°C	85°C	85°C
<b>Failure Rate Level</b>	≤ 1% Failure Rate	≤ 1% Failure Rate	guaranteed		After test: $U_R$ to be applied for 30min >24h before measurement

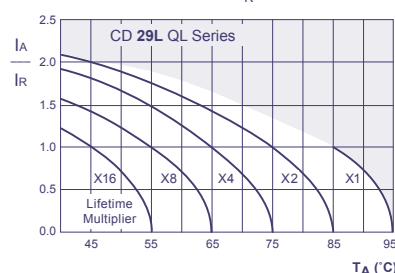
## Multiplier for Ripple Current

Frequency Coefficient

Rated Voltage (V)	Frequency				
	50Hz	120Hz	1kHz	10kHz	100kHz
≤ 50	0,95	1,00	1,10	1,15	1,15
63 ~ 100	0,90	1,00	1,16	1,30	1,33
≥ 160	0,85	1,00	1,20	1,35	1,40

## Multiplier for Lifetime

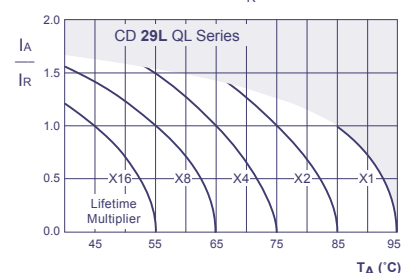
Lifetime Diagram  $U_R < 160V$



$I_A$  = actual ripple current at 120Hz,  
 $I_R$  = rated ripple current at 120Hz, 85°C  
 Multiplier of Useful Life as a function of ambient temperature and ripple current load

## Multiplier for Lifetime

Lifetime Diagram  $U_R \geq 160V$



$I_A$  = actual ripple current at 120Hz,  
 $I_R$  = rated ripple current at 120Hz, 85°C  
 Multiplier of Useful Life as a function of ambient temperature and ripple current load

## Ratings for CD 29L QL Series

U <sub>R,DC</sub> (Surge Voltage) Code	Rated Capacitance	Max ESR 20°C, 120Hz	Typ ESR 20°C, 120Hz	Max Ripple Current 85°C, 120Hz	Size Ø D x L
(V)	(µF)	(mΩ)	(mΩ)	(Arms)	(mm)
16 (20) 1C	56 000	14,3	10,0	10,4	35 x 45
		14,3	10,0	9,8	40 x 40
	68 000	12,0	8,2	10,8	35 x 50
		12,0	8,2	11,5	40 x 50
	82 000	10,0	7,0	11,8	35 x 60
		10,0	7,0	11,8	40 x 50
	100 000	8,0	6,0	13,2	35 x 80
		8,0	6,0	13,5	40 x 60
	120 000	7,0	5,0	15,3	35 x 105
		7,0	5,0	14,8	40 x 80
25 (32) 1E	33 000	20,1	14,1	8,1	35 x 40
		20,1	14,1	8,7	40 x 40
	39 000	17,1	12,0	9,0	35 x 45
		17,1	12,0	9,6	40 x 40
	47 000	14,2	9,9	9,6	35 x 50
		12,0	8,3	10,3	35 x 60
	56 000	12,0	8,3	10,8	40 x 50
		10,0	7,0	11,3	35 x 80
68 000	10,0	7,0	11,8	40 x 60	
	8,1	6,0	13,5	40 x 80	
35 (44) 1V	27 000	20,0	14,0	8,2	35 x 45
		20,0	14,0	8,0	40 x 40
	33 000	16,1	11,3	8,7	35 x 50
		14,0	10,0	10,3	35 x 60
	39 000	14,0	10,0	9,6	40 x 50
		11,3	8,0	11,4	35 x 80
	47 000	11,3	8,0	10,8	40 x 60
		10,0	7,0	12,1	40 x 70
56 000	8,0	6,0	14,2	40 x 80	
	27,0	19,0	7,7	35 x 40	
50 (63) 1H	15 000	27,0	19,0	8,1	40 x 40
		23,0	16,0	8,3	35 x 45
	18 000	23,0	16,0	8,3	40 x 40
		18,1	13,0	9,1	35 x 50
	22 000	18,1	13,0	9,4	40 x 50
		15,0	10,4	11,2	35 x 80
	27 000	15,0	10,4	10,8	40 x 60
		12,1	8,5	11,0	35 x 80
33 000	12,1	8,5	14,4	40 x 70	
	10,3	7,2	12,8	40 x 80	
63 (79) 1J	12 000	23,0	16,0	8,7	35 x 50
		23,0	16,0	8,6	40 x 40
	15 000	18,0	12,4	10,2	35 x 70
		18,0	12,4	9,5	40 x 50
	18 000	15,0	10,4	11,2	35 x 80
		15,0	10,4	10,7	40 x 60
27 000	10,0	7,0	12,7	40 x 80	
80 (100) 1K	8 200	33,0	23,0	6,9	35 x 50
		27,0	19,0	8,7	35 x 60
	10 000	23,0	16,0	9,7	35 x 70
		23,0	16,0	9,0	40 x 50
	15 000	18,0	12,4	10,5	35 x 80
		18,0	12,4	10,2	40 x 60
18 000	15,0	10,4	12,3	40 x 80	
100 (125) 2A	5 600	48	34	7,0	35 x 45
		48	34	7,4	40 x 40
	6 800	40	28	8,0	35 x 50
		40	28	8,9	40 x 50
	8 200	33	23	9,6	35 x 70
		33	23	9,6	40 x 60
	10 000	27	19	10,4	35 x 80
		27	19	10,2	40 x 60
	12 000	23	16	12,3	40 x 80
		2 200	91	64	4,9
160 (200) 2C	2 700	74	52	5,3	35 x 50
		61	43	5,5	35 x 70
	3 300	61	43	5,5	40 x 60
		52	35	5,9	35 x 80
	3 900	43	30	7,3	40 x 80
		1500	133	93	4,3
200 (250) 2D	1 800	111	78	4,7	35 x 45
		91	64	5,4	35 x 50
	2 200	91	64	5,4	40 x 40
		74	52	5,9	35 x 60
	2 700	74	52	5,9	40 x 50

U <sub>R,DC</sub> (Surge Voltage) Code	Rated Capacitance	Max ESR 20°C, 120Hz	Typ ESR 20°C, 120Hz	Max Ripple Current 85°C, 120Hz	Size Ø D x L
(V)	(µF)	(mΩ)	(mΩ)	(Arms)	(mm)
200 (250) 2D	3 300	61	43	6,5	35 x 80
		61	43	6,5	40 x 60
	3 900	52	36	7,0	40 x 80
		43	30	9,2	40 x 90
250 (300) 2E	1 000	199	140	3,7	35 x 40
		1200	166	117	3,8
	1 500	133	93	4,4	35 x 50
		133	93	4,5	40 x 40
	1 800	111	78	5,0	35 x 70
		111	78	5,0	40 x 50
	2 200	91	64	5,4	35 x 70
		74	52	6,9	40 x 80
350 (400) 2V	680	293	205	3,6	35 x 45
		293	205	3,6	40 x 40
	820	243	170	4,5	35 x 60
		243	170	4,3	40 x 50
	1 000	199	140	5,2	35 x 70
		199	140	4,9	40 x 60
	1 200	166	117	5,6	35 x 80
		166	117	5,5	40 x 70
	1 500	133	93	6,5	40 x 80
		133	93	6,2	45 x 70
	1 800	111	78	7,9	40 x 100
		111	78	7,1	45 x 70
2 200	91	64	8,7	40 x 100	
400 (450) 2G	560	356	249	3,2	35 x 50
		356	249	2,8	40 x 40
	680	293	205	3,7	35 x 60
		293	205	3,8	40 x 50
	820	243	170	4,2	35 x 60
		243	170	4,1	40 x 50
	1 000	199	140	4,9	35 x 70
		199	140	4,8	40 x 60
	1 200	166	117	5,8	35 x 80
		166	117	5,5	40 x 60
	1 500	133	93	6,9	40 x 90
		133	93	6,6	45 x 70
1 800	111	78	7,9	45 x 80	
	111	78	7,3	45 x 80	
450 (500) 2W	470	424	297	3,0	35 x 50
		424	297	3,0	40 x 40
	560	356	249	3,1	35 x 50
		356	249	3,3	35 x 60
	680	293	205	3,4	40 x 50
		293	205	3,5	35 x 60
	820	243	170	4,6	35 x 70
		243	170	4,4	40 x 60
	1 000	199	140	5,7	35 x 80
		199	140	5,2	40 x 60
	1 200	166	117	5,9	40 x 70
		166	117	6,2	45 x 70
1 500	133	93	7,3	40 x 100	
	133	93	7,0	45 x 80	
500 (550) 2H	1 800	111	78	7,9	45 x 100
		390	511	1,9	35 x 50
	470	424	297	2,3	35 x 60
		356	249	2,5	35 x 60
	560	356	249	2,7	40 x 60
		293	205	3,1	35 x 80
	680	293	205	2,8	40 x 70
		243	170	3,4	35 x 90
	820	243	170	3,3	40 x 70
		199	140	3,9	40 x 80
	1 000	199	140	3,9	45 x 70
		166	117	4,3	40 x 90
1 500	133	93	4,8	40 x 100	

Snap-In

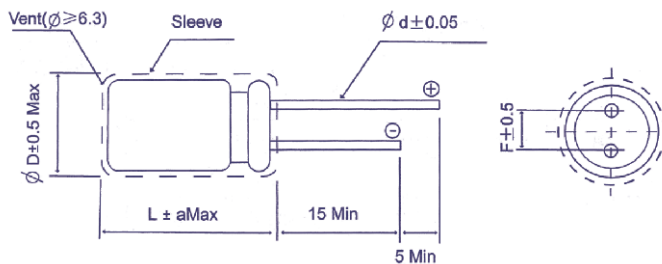
Customer specific products and adaptations on request.

## Order Code **SMD, Radial, Snap-In**

EC	R	1C	PT	101	M	FF	25	0611	JExxxx
Technology	Terminal Type	Rated Voltage Code	Series Code	Capacitance Code (in $\mu\text{F}$ )	Capacitance Tolerance	Lead Form	Terminal/Pitch Size	Size $\varnothing D \times L$	for Specials only
EC = Electrolytic Capacitor	SMD = V	2,5V = 0E	CD <b>110</b> = PT	0,47 = R47	$\pm 20\%$ = M	SMD:		4x7 = 0407	
	Radial = R	4V = 0G	CD <b>11GL</b> = GL	1,0 = 010	$\pm 10\%$ = K	<b>Taped</b> = FF	Terminal = T2	5x11,5 = 0511	
PC = Polymer Capacitor	Snap-In = S	6,3V = 0J	CD <b>261</b> = LK	2,2 = 2R2	+20 / -0% = R	Radial:		6,3x11,5 = 0611	
		10V = 1A	CD <b>261X</b> = QX	10 = 100	+20 / -10% = V	<b>Taped</b> = FF	2,0mm = 20	35x80 = 3580	
		16V = 1C	CD <b>262</b> = QM	100 = 101	+30 / -10% = Q	<b>Long Lead</b> = LL	2,5mm = 25	45x100 = 45100	
		20V = 1D	CD <b>263</b> = BK	1000 = 102	+50 / -10% = T	<b>Cut 5,0mm</b> = CB	3,5mm = 35		
		25V = 1E	CD <b>269</b> = PH	10000 = 103		<b>Cut 4,5mm</b> = CC	5,0mm = 50		
		35V = 1V	CD <b>269L</b> = HL			<b>Cut 4,0mm</b> = CD	7,5mm = 75		
		40V = 1G	CD <b>281</b> = LL			<b>Cut 3,5mm</b> = CE	10,0mm = 10		
		50V = 1H	CD <b>281L</b> = LH			<b>Cut 3,0mm</b> = CF	12,5mm = 12		
		63V = 1J	CD <b>287</b> = GC			on request: alternative lead forms (Keyed Polarity, axial, 90° - angle, others)			
		80V = 1K	CD <b>28L</b> = QL			<b>Snap-In:</b>			
		100V = 2A	CD <b>293</b> = BZ			4,0mm Pin Length = T4	2 Pin = P2		
		160V = 2C	CD <b>294</b> = BW			<b>6,3mm Pin Length</b> = T6	3 Pin = P3		
		180V = 2K	CD <b>295</b> = BC			Soldering Pin = S4	4 Pin = P4		
		200V = 2D	CD <b>296</b> = KC				5 Pin = P5		
		250V = 2E	CD <b>297</b> = BB			<b>preferred</b>			
		315V = 2F	CD <b>299</b> = PG						
		350V = 2V	CD <b>29D</b> = HR						
		385V = 2J	CD <b>29H</b> = QH						
		400V = 2G	CD <b>29L</b> = QL						
		415V = 2P	<b>HVC</b> = VC						
		420V = 2X	<b>HVM</b> = VM						
		450V = 2W	<b>HCP/HCN</b> = CP/CN						
		500V = 2H	<b>HPN</b> = PN						
		550V = 2Y	<b>HPE/HEN</b> = PE/EN						

## Technical Specification **Radial Type**

Dimensions for loose, long-lead type (bulk)  
Order Code: LL



L	L ≤ 7					L ≥ 11										
$\varnothing D$	3	4	5	6,3	8	5	6,3	8	10	12,5	16	18	20	22	25	
F	1	1,5	2,0	2,5	3,5	2,0	2,5	3,5	5,0	7,5	10,0	12,5				
$\varnothing d$	0,4	0,45		0,5		0,6		0,8		1,0						
$a_{\text{Max}}$	1,0					2,0										

in mm

Dimensions for loose, short cut leads (bulk)  
Order Code: CC (CB, CD, CE, CF)

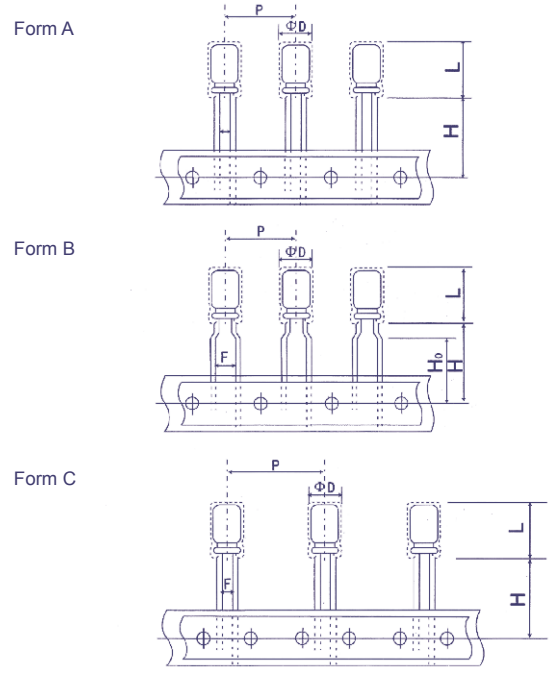
Straight Lead						Bended Lead	
<b>Code</b>	CB	<b>CC</b>	CD	CE	CF		
<b>I</b>	5,0 ± 0,5	<b>4,5 ± 0,5</b>	4,0 ± 0,5	3,5 ± 0,5	3,0 ± 0,5		

in mm

## Dimensions for Ammopack taping

Order Code: FF (FD)

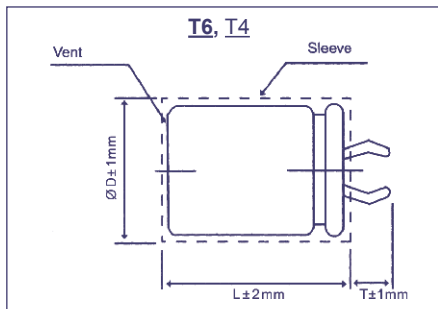
Code	Case Range		Dimensions				Form
	Ø D	L (max)	H ± 0,75	Ho ± 0,5	F ± 0,5	P ± 0,1	
FF	4 ~ 5	13	18,5	17	2,5	12,7	B
	6,3	13	18,5	-	2,5	12,7	A
	8	13	18,5	-	3,5	12,7	
	4 ~ 8	7	17,5	16	5,0	12,7	B
	5 ~ 6,3	13	18,5				
	8	22	20,0				
		10	22	18,5	-	-	15,0
	12,5	27	18,5	-	-	-	C
FD	12,5	27	18,5	-	-	25,4	
FF	16 ~ 18	27	18,5	-	7,5	30,0	



in mm

## Technical Specification Snap-In Type

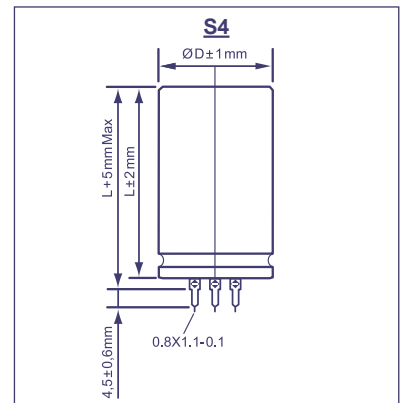
Pin Type: Snap-In Order Code: T6, T4



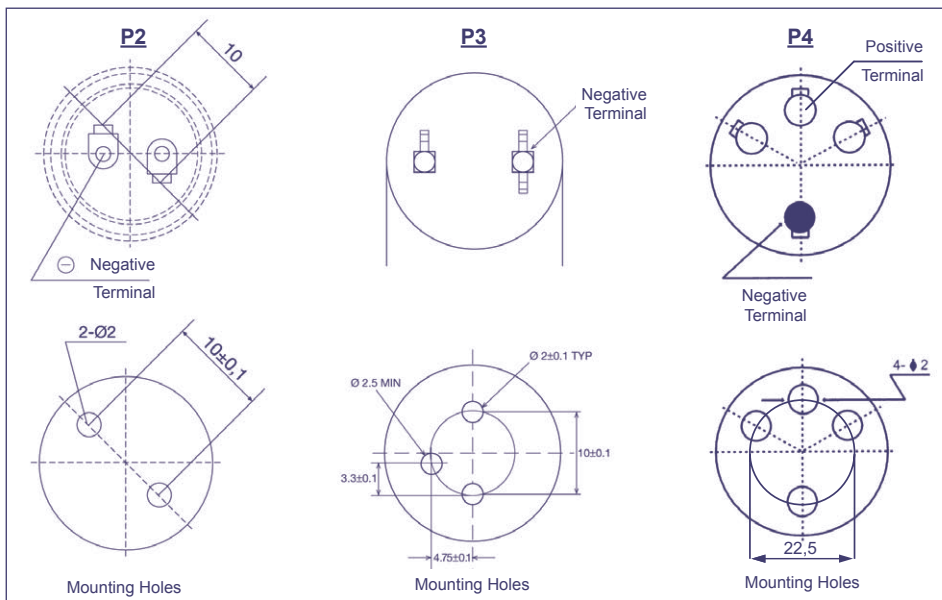
Terminal	T6	T4
Pin Length	6,3	4,0

**preferred**

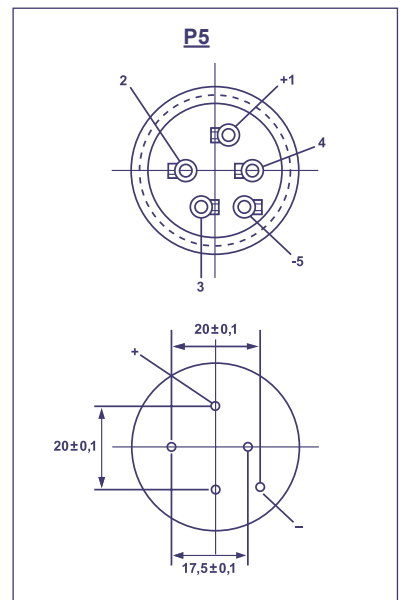
Pin Type: Soldering Order Code: S4



Snap-In Terminal Order Code: P2, P3, P4



Soldering Terminal Order Code: P5



P3 only as T4 Terminal available, P4 for Ø D ≥ 30mm, P5 for Ø D ≥ 40mm