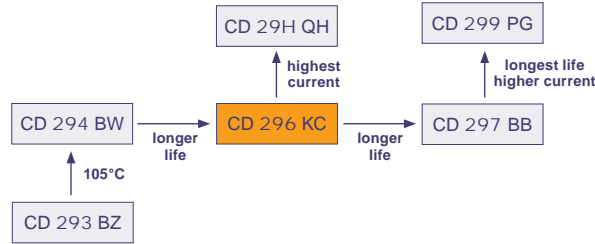


5000 at 105°C

- Long Life at High Temperature
- High Ripple Current
- Professional Power Supplies



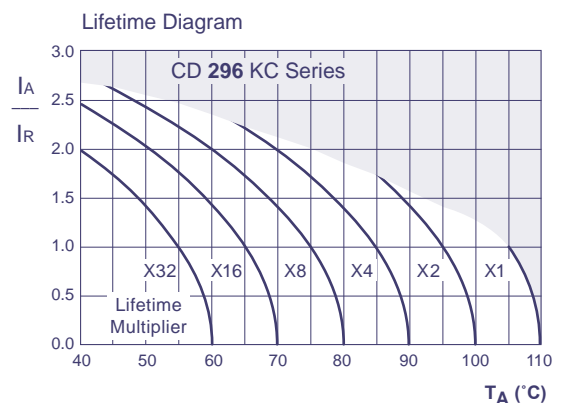
Item	Characteristics	
Operating Temperature Range (°C)	-40 ~ +105	-25 ~ +105
Voltage Range (V)	16 ~ 100	160 ~ 450
Capacitance Range (µF)	56 ~ 47 000	
Capacitance Tolerance (20°C, 120Hz)	± 20%	
Leakage Current (µA)	After 5 minutes at 20°C application of rated voltage, leakage current is not more than 0,01CV or 1,5mA, whichever is smaller C: Nominal Capacitance (µF) V: Rated Voltage (V)	
Dissipation Factor (20°C, 120Hz)	Rated Voltage (V)	16    25    35    50    63~100    160~400    450
	Tan δ (max)	0,50    0,40    0,35    0,30    0,20    0,15    0,20
Stability at Low Temperature (Impedance Ratio at 120Hz)	Rated Voltage (V)	16~100    160~200    250~500
	Z <sub>-25°C</sub> / Z <sub>+20°C</sub>	4
	Z <sub>-40°C</sub> / Z <sub>+20°C</sub>	15    -

	Useful Life		Load Life	Endurance Test	Shelf Life
Lifetime	5 000h	>200 000h	3 000h	4 000h	1 000h
Leakage Current	Not more than specified value		Not more than specified value	Not more than specified value	Not more than specified value
Capacity 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 130% of specified value	Not more than 200% of specified value
Condition: Applied Voltage Applied Current Applied Temperature Failure Rate Level	U <sub>R</sub> I <sub>R</sub> 105°C ≤ 1% Failure Rate	U <sub>R</sub> 1,4 x I <sub>R</sub> 40°C ≤ 1% Failure Rate	U <sub>R</sub> I <sub>R</sub> 105°C guaranteed	U <sub>R</sub> I <sub>R</sub> = 0 105°C	U <sub>R</sub> = 0 I <sub>R</sub> = 0 105°C <div style="border: 1px solid black; padding: 2px;">After test: U<sub>R</sub> to be applied for 30min &gt;24h before measurement</div>

## Multiplier for Ripple Current

Frequency Coefficient

Rated Voltage (V)	Frequency					
	50Hz	120Hz	1kHz	10kHz	20kHz	100kHz
≤ 100	0,95	1,00	1,10	1,15	1,15	1,20
160 ~ 250	0,87	1,00	1,11	1,18	1,20	1,40
≥ 350	0,80	1,00	1,14	1,14	1,20	1,60



I<sub>A</sub> = actual ripple current at 120Hz, I<sub>R</sub> = rated ripple current at 120Hz, 105°C  
Multiplier of Useful Life as a function of ambient temperature and ripple current load

## Ratings for CD 296 KC Series

V <sub>DC</sub> (Surge Voltage) Code	Rated Capacitance	Max ESR 20°C, 120Hz	Typ ESR 20°C, 120Hz	Max Ripple Current 105°C, 120Hz	Size Ø D x L	
(V)	(µF)	(mΩ)	(mΩ)	(Arms)	(mm)	
<b>16 (20) 1C</b>	6800	98	69	1,60	22 x 25	
	8200	81	57	1,80	25 x 25	
	10000	67	47	1,99	22 x 30	
		67	47	1,99	25 x 25	
	12000	56	39	2,28	22 x 35	
		56	39	2,30	25 x 30	
	15000	56	39	2,38	30 x 25	
		45	31	2,64	22 x 40	
	18000	45	31	2,68	25 x 35	
		37	26	2,98	22 x 45	
	22000	37	26	3,04	25 x 40	
		37	26	3,00	30 x 30	
	27000	37	26	3,10	35 x 25	
		31	22	3,40	25 x 45	
	33000	31	22	3,39	30 x 35	
		25	18	3,81	25 x 50	
	39000	25	18	3,83	30 x 40	
		25	18	3,74	35 x 30	
	47000	21	15	4,30	30 x 45	
		21	15	4,24	35 x 35	
<b>25 (32) 1E</b>	4700	113	80	1,55	22 x 25	
	5600	95	67	1,70	25 x 25	
	6800	79	55	1,91	22 x 30	
		79	55	1,91	25 x 25	
	8200	65	46	2,14	22 x 35	
		65	46	2,16	25 x 30	
	10000	65	46	2,25	30 x 25	
		54	38	2,40	22 x 40	
	12000	54	38	2,44	25 x 35	
		45	31	2,69	22 x 45	
	15000	45	31	2,74	25 x 40	
		45	31	2,70	30 x 30	
	18000	45	31	2,80	35 x 25	
		36	25	3,15	25 x 45	
	22000	36	25	3,13	30 x 35	
		36	25	3,22	35 x 30	
	27000	30	21	3,54	25 x 50	
		30	21	3,54	30 x 40	
	33000	25	17	4,24	30 x 45	
		25	17	3,96	35 x 35	
<b>35 (44) 1V</b>	3300	141	99	1,43	22 x 25	
	3900	120	84	1,65	22 x 30	
	4700	99	70	1,78	25 x 25	
	5600	83	59	2,02	22 x 35	
		83	59	2,04	25 x 30	
	6800	83	59	2,12	30 x 25	
		69	48	2,28	22 x 40	
	8200	69	48	2,31	25 x 35	
		57	40	2,67	22 x 50	
	10000	57	40	2,60	25 x 40	
		57	40	2,56	30 x 30	
	12000	57	40	2,78	35 x 25	
		47	33	2,92	25 x 45	
	15000	47	33	2,92	30 x 35	
		39	28	3,26	25 x 50	
	18000	39	28	3,28	30 x 40	
		39	28	3,20	35 x 30	
	22000	31	22	3,74	30 x 45	
		31	22	3,69	35 x 35	
	<b>50 (63) 1H</b>	18000	26	19	4,16	35 x 40
22000		22	15	4,92	35 x 50	
27000		1800	222	155	1,31	22 x 25
		2200	181	127	1,45	22 x 25
3300		148	104	1,70	22 x 30	
		148	104	1,70	25 x 25	
3900		121	85	1,98	22 x 35	
		121	85	2,00	25 x 30	
4700		103	72	2,25	22 x 40	
		103	72	2,28	25 x 35	
5600		103	72	2,22	30 x 25	
		85	60	2,56	22 x 45	
6800		85	60	2,58	30 x 30	
		85	60	2,67	35 x 25	
8200		72	50	2,89	22 x 50	
		72	50	2,81	25 x 40	
9800		72	50	2,95	30 x 35	
		59	41	3,37	25 x 50	
11800		59	41	3,39	30 x 40	
		59	41	3,31	35 x 30	

V <sub>DC</sub> (Surge Voltage) Code	Rated Capacitance	Max ESR 20°C, 120Hz	Typ ESR 20°C, 120Hz	Max Ripple Current 105°C, 120Hz	Size Ø D x L
(V)	(µF)	(mΩ)	(mΩ)	(Arms)	(mm)
<b>50 (63) 1H</b>	8200	49	34	3,71	30 x 45
		49	34	3,66	35 x 35
	10000	40	28	4,09	30 x 50
		40	28	4,07	35 x 40
	12000	34	24	4,50	35 x 45
		1200	222	155	1,25
	15000	177	124	1,25	22 x 25
		148	104	1,52	22 x 30
	1800	148	104	1,52	25 x 25
		121	85	1,73	22 x 35
	2200	121	85	1,75	25 x 30
		99	69	1,97	22 x 40
2700	99	69	1,99	25 x 35	
	99	69	1,93	30 x 25	
63 (79) 1J	3300	81	57	2,32	22 x 50
		81	57	2,27	25 x 40
		81	57	2,24	30 x 30
	3900	81	57	2,41	35 x 25
		69	48	2,54	25 x 45
		69	48	2,55	30 x 35
4700	57	40	2,88	25 x 50	
	57	40	2,90	30 x 40	
	57	40	2,83	35 x 30	
5600	48	34	3,28	30 x 45	
	48	34	3,24	35 x 35	
6800	40	28	3,73	30 x 50	
	40	28	3,71	35 x 40	
8200	33	23	4,16	35 x 45	
	27	19	4,69	35 x 50	
<b>80 (100) 1K</b>	820	324	227	1,11	22 x 25
	1000	266	186	1,20	22 x 30
	1200	222	155	1,39	22 x 30
		222	155	1,39	25 x 25
	1500	177	124	1,61	22 x 35
		177	124	1,62	25 x 30
	1800	148	104	1,83	22 x 40
		148	104	1,81	30 x 25
	2200	121	85	2,09	22 x 45
		121	85	2,01	25 x 35
	2700	121	85	2,10	30 x 30
		121	85	2,17	35 x 25
	3300	99	69	2,43	25 x 45
		99	69	2,43	30 x 35
	3900	81	57	2,76	25 x 50
		81	57	2,78	30 x 40
	4700	81	57	2,71	35 x 30
		69	48	3,12	30 x 45
	5600	69	48	3,07	35 x 35
		57	40	3,56	30 x 50
6800	57	40	3,50	35 x 40	
	48	34	3,87	35 x 45	
8200	48	34	3,87	35 x 45	
	40	28	4,19	35 x 50	
<b>100 (125) 2A</b>	560	474	332	1,07	22 x 25
	680	391	274	1,20	22 x 30
	820	324	227	1,35	22 x 30
		324	227	1,35	25 x 25
	1000	266	186	1,54	22 x 35
		266	186	1,56	25 x 30
	1200	222	155	1,74	22 x 40
		222	155	1,76	25 x 35
	1500	222	155	1,71	30 x 25
		177	124	1,99	22 x 45
	1800	177	124	2,03	25 x 40
		177	124	2,00	30 x 30
	2200	177	124	2,07	35 x 25
		148	104	2,28	25 x 45
	2700	148	104	2,27	30 x 35
		121	85	2,57	25 x 50
	3300	121	85	2,59	30 x 40
		121	85	2,52	35 x 30
	3900	99	69	2,94	30 x 45
		99	69	2,90	35 x 35
4700	81	57	3,32	30 x 50	
	81	57	3,31	35 x 40	
5600	68	48	3,69	35 x 45	
	57	40	4,14	35 x 50	
6800	330	603	423	1,16	22 x 25
	390	511	358	1,43	22 x 30
8200	424	297	1,52	22 x 35	
	424	297	1,55	25 x 25	
9800	356	249	1,62	22 x 40	
	356	249	1,73	25 x 30	

Snap-In

Custom products are available on request.

## Ratings for CD 296 KC Series

V <sub>DC</sub> (Surge Voltage) Code	Rated Capacitance	Max ESR 20°C, 120Hz	Typ ESR 20°C, 120Hz	Max Ripple Current 105°C, 120Hz	Size Ø D x L	
(V)	(µF)	(mΩ)	(mΩ)	(Arms)	(mm)	
<b>160 (200) 2C</b>	680	293	205	1,70	22 x 45	
		293	205	1,81	25 x 35	
		293	205	1,82	30 x 25	
	820	243	170	1,81	22 x 50	
		243	170	1,98	25 x 40	
		243	170	1,98	30 x 30	
		243	170	1,93	35 x 25	
		199	140	2,04	25 x 45	
	1000	199	140	2,14	30 x 35	
		166	117	2,12	25 x 50	
		166	117	2,22	30 x 40	
	1200	166	117	2,40	35 x 30	
		133	93	2,46	30 x 45	
		133	93	2,53	35 x 35	
	1800	111	78	2,98	35 x 45	
	2200	91	64	3,10	35 x 50	
	<b>180 (225) 2K</b>	270	737	516	1,08	22 x 25
		330	603	423	1,30	22 x 30
390		511	358	1,35	25 x 25	
470		424	297	1,50	22 x 35	
		424	297	1,62	25 x 30	
560		356	249	1,62	22 x 40	
		356	249	1,69	25 x 35	
		356	249	1,67	30 x 25	
680		293	205	1,76	22 x 50	
		293	205	1,72	25 x 40	
		293	205	1,74	30 x 30	
		293	205	1,92	35 x 25	
		243	170	1,78	25 x 45	
		243	170	1,85	30 x 35	
820		199	140	1,91	25 x 50	
		199	140	2,01	30 x 40	
		199	140	2,16	35 x 30	
1200		166	117	2,19	30 x 45	
		166	117	2,34	35 x 35	
		133	93	2,36	30 x 50	
1500		133	93	2,56	35 x 40	
		111	78	2,67	35 x 45	
		220	905	634	1,08	22 x 25
<b>200 (250) 2D</b>		330	603	423	1,30	22 x 30
	390	511	358	1,41	22 x 35	
	470	424	297	1,50	22 x 40	
		424	297	1,47	25 x 30	
		424	297	1,56	30 x 25	
	560	356	249	1,58	22 x 45	
		356	249	1,65	25 x 35	
		293	205	1,68	22 x 50	
	680	293	205	1,80	25 x 40	
		293	205	1,82	30 x 30	
		293	205	1,96	35 x 25	
	820	243	170	1,87	25 x 50	
		243	170	1,99	30 x 35	
		243	170	2,07	35 x 30	
	1000	199	140	2,17	30 x 45	
		199	140	2,22	35 x 35	
		166	117	2,22	30 x 50	
	1200	166	117	2,42	35 x 40	
		1500	133	93	2,59	35 x 45
		1800	111	78	2,70	35 x 50
	<b>250 (300) 2E</b>	180	1106	774	0,94	22 x 25
		220	905	634	1,10	22 x 30
			905	634	1,15	25 x 25
		270	737	516	1,13	22 x 35
330		603	423	1,20	22 x 40	
		603	423	1,30	25 x 30	
		603	423	1,30	30 x 25	
390		511	358	1,26	22 x 45	
		511	358	1,41	25 x 35	
		424	297	1,37	22 x 50	
470		424	297	1,52	25 x 40	
		424	297	1,36	30 x 30	
		424	297	1,40	35 x 25	
560		356	249	1,59	25 x 45	
		356	249	1,57	30 x 35	
		356	249	1,56	35 x 30	
680		293	205	1,66	25 x 50	
		293	205	1,76	30 x 40	
		243	170	1,83	30 x 45	
820		243	170	1,82	35 x 35	
		199	140	1,87	30 x 50	
		199	140	1,99	35 x 40	
1200		166	117	2,10	35 x 45	

V <sub>DC</sub> (Surge Voltage) Code	Rated Capacitance	Max ESR 20°C, 120Hz	Typ ESR 20°C, 120Hz	Max Ripple Current 105°C, 120Hz	Size Ø D x L	
(V)	(µF)	(mΩ)	(mΩ)	(Arms)	(mm)	
<b>350 (400) 2V</b>	68	2926	1610	0,56	22 x 25	
		1990	1095	0,70	22 x 30	
	100	1990	1095	0,70	25 x 25	
		1658	912	0,73	22 x 35	
	120	1327	730	0,79	22 x 40	
		1327	730	0,82	25 x 30	
		1327	730	0,82	30 x 25	
	150	1106	608	0,81	22 x 45	
		1106	608	0,89	25 x 35	
		1106	608	0,90	30 x 30	
	180	905	498	0,93	22 x 50	
		905	498	0,97	25 x 40	
		905	498	0,98	35 x 25	
	220	737	406	1,01	25 x 50	
		737	406	1,05	30 x 35	
		737	406	1,01	35 x 30	
	270	603	332	1,16	30 x 45	
		603	332	1,16	35 x 35	
		511	281	1,26	30 x 50	
	330	511	281	1,26	35 x 40	
		424	233	1,35	35 x 45	
		356	196	1,51	35 x 50	
	<b>400 (450) 2G</b>	68	2926	1522	0,47	22 x 25
		82	2427	1262	0,56	22 x 30
2427			1262	0,65	25 x 25	
100		1990	1035	0,60	25 x 25	
		1658	863	0,64	22 x 35	
		1658	863	0,78	30 x 25	
120		1327	690	0,70	22 x 40	
		1327	690	0,73	25 x 35	
		1106	575	0,78	22 x 50	
150		1106	575	0,82	25 x 40	
		1106	575	0,83	30 x 30	
		1106	575	0,86	35 x 25	
180		905	471	0,87	25 x 45	
		905	471	0,86	30 x 35	
		737	384	0,94	25 x 50	
220		737	384	0,95	30 x 40	
		603	314	1,11	35 x 30	
		603	314	1,13	35 x 35	
270		511	266	1,15	30 x 50	
		511	266	1,26	30 x 40	
		424	221	1,31	35 x 45	
330		356	185	1,50	35 x 50	
		56	4737	2369	0,47	22 x 25
		68	3901	1951	0,56	22 x 30
82	3901	1951	0,65	25 x 25		
	3235	1618	0,64	22 x 35		
	2653	1327	0,70	22 x 40		
100	2653	1327	0,70	25 x 30		
	2653	1327	0,78	30 x 25		
	2211	1106	0,73	22 x 45		
120	2211	1106	0,73	25 x 35		
	1769	885	0,78	22 x 50		
	1769	885	0,82	25 x 40		
150	1769	885	0,83	30 x 30		
	1769	885	0,86	35 x 25		
	1474	737	0,87	25 x 45		
180	1474	737	0,86	30 x 35		
	1206	603	0,94	25 x 50		
	1206	603	0,95	30 x 40		
220	1206	603	0,91	35 x 30		
	983	492	1,11	30 x 45		
	983	492	1,13	35 x 35		
270	804	402	1,15	30 x 50		
	804	402	1,26	35 x 40		
	681	341	1,31	35 x 45		
390	681	341	1,31	35 x 45		
470	565	283	1,50	35 x 50		

Custom products are available on request.

## Order Code SMD, Radial, Snap-In

EC	R	1C	PT	101	M	FF	25	0611	JE xxxxx
Technology	Terminal Type	Rated Voltage Code	Series Code	Capacitance Code (in $\mu\text{F}$ )	Capacitance Tolerance	Lead Form	Terminal/Pitch Size	Dimension	for Specials only
EC = Electrolytic Capacitor	SMD = V Radial = R	For coding please refer to the pages of ratings	CD VS = BS	0,47 = R47	$\pm 20\%$ = M	SMD:		4x7 = 0407	
			CD VH = VH	1,0 = 010	$\pm 10\%$ = K	Taped = FF	Terminal = T2	5x11,5 = 0511	
PC = Polymer Capacitor	Snap-In = S		CD VZ = VZ	2,2 = 2R2	+30 / -10% = Q	Radial:		6,3x11,5 = 0611	
			CD 261 = LK	100 = 101	+50 / -10% = T	Long Lead = LL	2,0mm = 20	35x80 = 3580	
			CD 261X = QX	1000 = 102		Cut 5,0mm = CB	2,5mm = 25	45x100 = 45100	
			CD 262 = QM	10000 = 103		Cut 4,5mm = CC	3,5mm = 35		
			CD 263 = BK			Cut 4,0mm = CD	5,0mm = 50		
			CD 269 = PH			Cut 3,5mm = CE	7,5mm = 75		
			CD 281 = LL			Cut 3,0mm = CF	10,0mm = 10		
			CD 284 = XY			on request: alternative lead forms (axial, 90° - angle, others)		12,5mm = 12	
			CD 287 = GC						
			CD 28L = QL						
			CD 293 = BZ						
			CD 294 = BW						
			CD 295 = BC						
			CD 296 = KC						
			CD 297 = BB						
			CD 299 = PG						
			CD 29D = HR						
			CD 29H = QH						
			CD 29L = QL						
			HCP = CP						
			HPM = PM						
			HVC = VC						

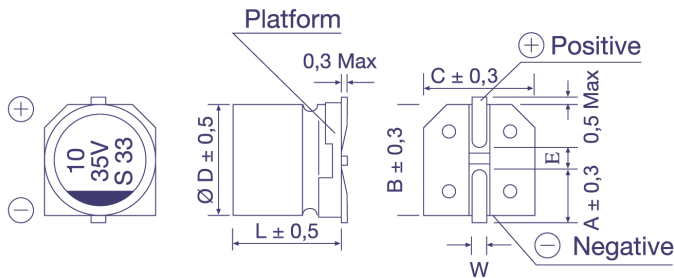
  

Snap-In:	
4,0mm Pin Length = T4	2 Pin = P2
6,3mm Pin Length = T6	3 Pin = P3
Soldering Pin = S4	4 Pin = P4
	5 Pin = P5

preferred

## Technical Specification SMD Type

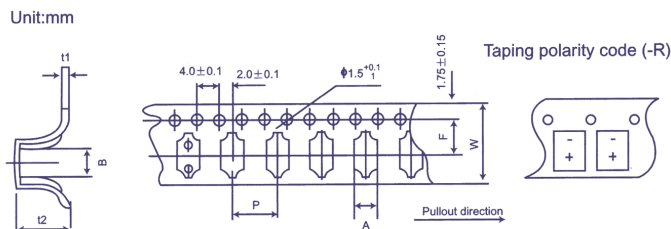
### Dimensions



Ø D x L	4x5,4	5x5,4	6,3x5,4	6,3x7,7	8x10,5	8x11,8	10x10,5	10x12,7
A	1,8	2,1	2,4	2,5	2,9	2,9	3,2	3,2
B	4,3	5,3	6,6	6,6	8,3	8,4	10,3	10,4
C	4,3	5,3	6,6	6,6	8,3	8,4	10,3	10,4
E	1,0	1,3	2,2	2,2	3,1	3,1	4,5	4,5
L	5,4	5,4	5,4	7,7	10,5	11,8	10,5	12,7
W	0,5 - 0,8				0,7 - 1,1			

in mm

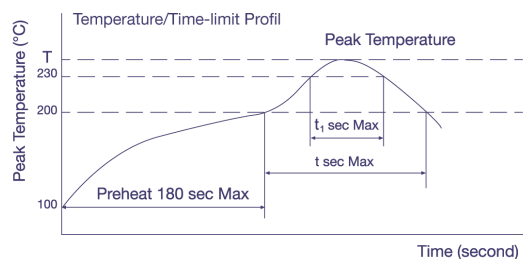
### Taping Dimensions



Size (DxL)	w ± 0,3	A ± 0,2	B ± 0,2	P ± 0,1	t2 ± 0,2	F ± 0,1	t1 ± 0,1
4 x 5,4	12,0	5,0	5,0	8,0	5,8	5,5	0,4
5 x 5,4	12,0	6,0	6,0	12,0	5,8	5,5	0,4
6,3 x 5,4	16,0	7,0	7,0	12,0	5,8	7,5	0,4
6,3 x 7,7	16,0	7,0	7,0	12,0	8,4	7,5	0,4
8 x 10,5	24,0	8,7	8,7	16,0	11,0	11,5	0,5
8 x 11,8	24,0	8,7	8,7	16,0	12,3	11,5	0,5
10 x 10,5	24,0	10,7	10,7	16,0	11,0	11,5	0,5
10 x 12,7	24,0	10,7	10,7	16,0	14,0	11,5	0,5

in mm

### Soldering Profile (Aluminium Electrolytic Capacitors)

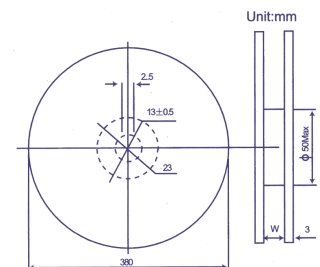


#### Allowable Range of Peak Temperature

Size	T (°C)	t (second)	t <sub>1</sub> (second)
Ø 4 ~ 6,3	250	90	40
Ø 8 x 10,5	240	90	30
Ø 10 x 10,5	235	60	30

Diameter	w	D
4; 5	14 ± 1	50 ± 1
6,3	18 ± 1	50 ± 1
8; 10	25 ± 1	50 ± 1
Polymer	25 ± 1	80 ± 1

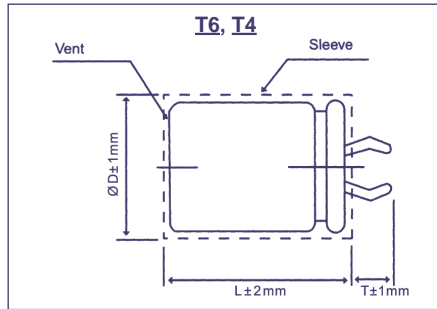
in mm



For more details or Soldering Profiles of Radials or Polymer-Capacitors please contact our local Sales Offices.

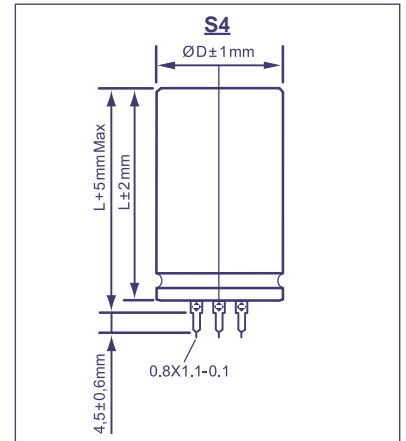
## Technical Specification Snap-In Type

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

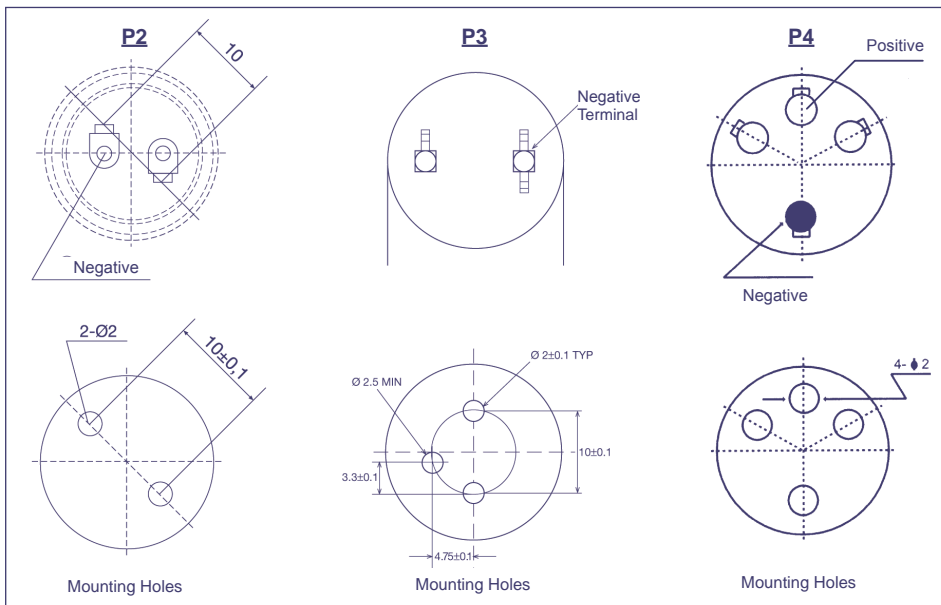


Terminal	T6	T4
Pin Length T	6,3	4,0

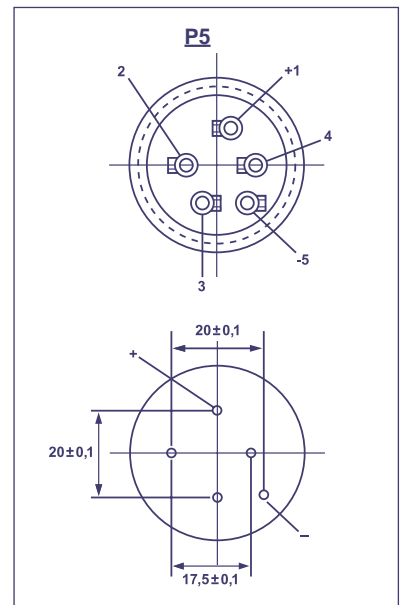
**Pin Type: Soldering**  
Order Code: S4



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



**Soldering Terminal**  
Order Code: P5



P3 only T4 Terminal

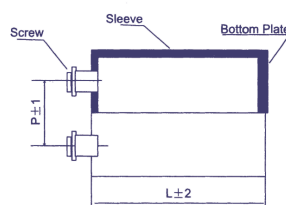
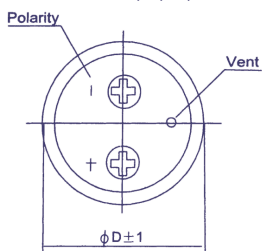
## Order Code Screw Type

EC	G	1C	BP	101	M	B	E	160	A361	JExxxxx
Technology	Terminal Type	Rated Voltage Code	Series Code	Capacitance Code	Capacitance Tolerance	Mounting	Diameter	Length	For Terminal Code see tables below	for Specials only
EC = Electrolytic Capacitor	Screw = G	For coding please refer to the pages of ratings	CD 135 = BP	100 = 101	±20% = M	Bolt = B	36 = A	53 = 053		
			CD 136 = PK	1000 = 102	±10% = K	No double sleeve = N	40 = B	65 = 065		
			CD 137 = PX	10000 = 103	+30 / -10% = Q	2 stoppers bracket+double sleeve* = I	51 = C	96 = 096		
			CD 138 = PC		+20 / -0% = R	3 stoppers bracket+double sleeve* = Y	64 = D	100 = 100		
			CD 139 = BL		+50 / -10% = T	No bracket, but double sleeve* = D	77 = E	115 = 115		
				<b>preferred</b>	* Double sleeve for diameter ≥ 51 only		90 = F	236 = 236		
							101 = G			

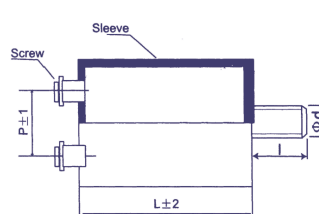
## Technical Specification Screw Type

### Dimensions

**Standard Housing**  
Order Code: I, Y, D, N



**Bolt Housing**  
Order Code: B



Ø D	Ø d	l
Ø 36	M8	12
≥ Ø 51	M12	16

in mm