



# TCS Series 85°C V- chip Aluminum Electrolytic Capacitor

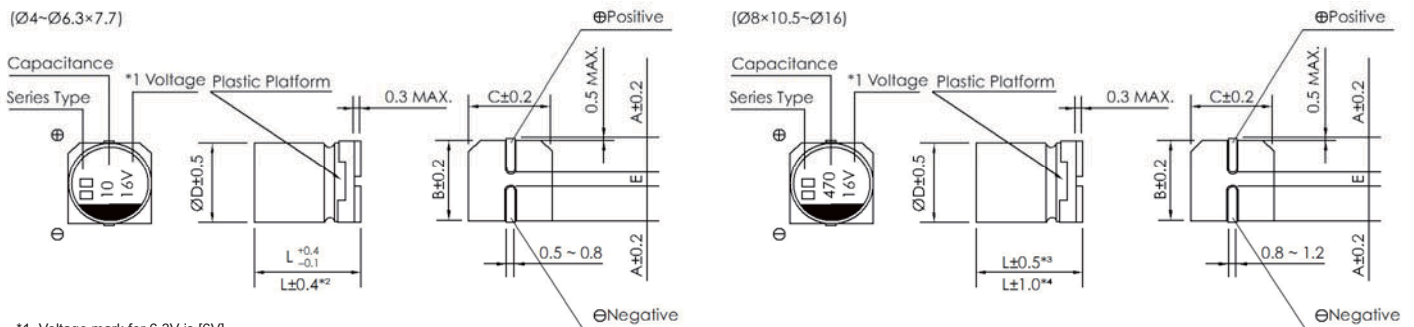
Designed for surface mounting on high density circuit board.  
 Operating with general temperature range -40~+85°C  
 Load life of 2000 hours  
 Comply with the RoHS directive



## SPECIFICATIONS

Items	Characteristics												
Operation Temperature Range	-40 ~ +85°C												
Voltage Range	4 ~ 450V												
Capacitance Range	0.1 ~ 6800μF												
Capacitance Tolerance	±20% at 120Hz, 20°C												
Leakage Current	Rated Voltage	6.3 ~ 100V	160 ~ 450V										
	Case size	∅4~∅10	∅12.5~∅16	∅6.3~∅16									
	Time	after 2 min. (application of rated voltage)	after 1 min. (application of rated voltage)	after 5 min. (application of rated voltage)									
	Leakage current	≤0.01CV or 3μA, whichever is greater	≤0.03CV or 4μA, whichever is greater	≤0.04CV+100μA, whichever is greater									
Dissipation Factor (tan δ)	Measurement frequency : 120Hz, Temperature												
	Rated Voltage (V)	4	6.3	10	16	25	35	50	63	100	160~250	350~450	
tan δ (max.)	∅4~∅10	0.42	0.28	0.24	0.20	0.14	0.12	0.12	0.10	0.10	0.20	0.25	
	∅12.5~∅16	0.45	0.38	0.34	0.30	0.28	0.22	0.18	0.14	0.10	0.20	0.25	
Stability at Low Temperature	Measurement frequency : 120Hz												
	Rated Voltage (V)		4	6.3	10	16	25	35	50~100	160~250	350~450		
	Impedance Ratio	∅4~∅10	Z(-25°C)/Z(20°C)	7	4	3	2	2	2	2	2	3	3
			Z(-40°C)/Z(20°C)	15	8	6	4	4	3	3	3	3	6
ZT/Z20 (max.)	∅12.5~∅16	Z(-25°C)/Z(20°C)	7	5	4	3	2	2	2	2	2	4	
		Z(-40°C)/Z(20°C)	17	12	10	8	5	4	3	6	10		
Load Life	After 2000 hours application of the rated voltage at 85°C, they meet the characteristics listed below.												
	Capacitance Change	Within ±20% of initial value (Within ±30% of initial value for 4V)											
	Dissipation Factor	200% or less of initial specified value											
	Leakage Current	initial specified value or less											
Shelf Life	After leaving capacitors under no load at 85°C for 1000 hours, they meet the specified value for load life characteristics listed above.												
Resistance to Soldering Heat	After reflow soldering and restored at room temperature, they meet the characteristics listed below.												
	Capacitance Change	Within ±10% of initial value											
	Dissipation Factor	initial specified value or less											
	Leakage Current	initial specified value or less											
Marking	Black print on the case top.												

## DRAWING (Unit: mm)



\*1. Voltage mark for 6.3V is [6V]  
 \*2. Applicable to ∅6.3×7.7  
 \*3. Applicable to ∅8×10.5~∅10  
 \*4. Applicable to ∅12.5~∅16



**DIMENSIONS (Unit: mm)**

∅D x L	4 x 5.4	5 x 5.4	6.3 x 5.4	6.3 x 7.7	8 x 10.5	10 x 10.5	10 x 13.5	12.5 x 13.5	12.5 x 16	16 x 16.5
A	2.0	2.2	2.6	2.6	3.0	3.3	3.3	4.9	4.9	5.8
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
E ± 0.2	1.0	1.4	1.9	1.9	3.1	4.7	4.7	4.7	4.7	6.4
L	5.4	5.4	5.4	7.7	10.5	10.5	13.5	13.5	16.0	16.5

**DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT**

•Case size ∅DxL(mm), ripple current (mA rms) at 85°C, 120Hz

WV Code		4 V		6.3V		10 V		16 V		25 V	
μF		Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current
4.7	475									4 x 5.4	19
10	106							4 x 5.4	25	5 x 5.4 (4 x 5.4)	28 (20)
15	156							4 x 5.4	28	5 x 5.4	34
22	226			4 x 5.4	31	5 x 5.4 (4 x 5.4)	35 (28)	5 x 5.4 (4 x 5.4)	39 (28)	6.3 x 5.4 (5 x 5.4)	52 (35)
33	336	4 x 5.4	26	5 x 5.4 (4 x 5.4)	39 (31)	5 x 5.4 (4 x 5.4)	43 (32)	6.3 x 5.4 (5 x 5.4)	57 (40)	6.3 x 5.4 (5 x 5.4)	63 (42)
47	476	4 x 5.4	34	5 x 5.4 (4 x 5.4)	47 (36)	5 x 5.4	43	6.3 x 5.4 (5 x 5.4)	68 (44)	6.3 x 5.4	68
56	566	4 x 5.4	39	5 x 5.4	46	6.3 x 5.4	57	6.3 x 5.4	74	6.3 x 5.4	82
68	686	5 x 5.4	45	6.3 x 5.4 (5 x 5.4)	62 (52)	6.3 x 5.4	72	6.3 x 5.4	80	6.3 x 5.4	94
100	107	5 x 5.4	61	6.3 x 5.4 (5 x 5.4)	71 (55)	6.3 x 5.4 (5 x 5.4)	76 (70)	6.3 x 5.4	86	6.3 x 7.7	130
150	157	6.3 x 5.4	74	6.3 x 5.4	78	6.3 x 5.4	88	6.3 x 7.7	135	8 x 10.5 (6.3 x 7.7)	200 (130)
220	227	6.3 x 5.4	82	6.3 x 5.4	95	6.3 x 7.7	150	8 x 10.5 (6.3 x 7.7)	215 (150)	8 x 10.5	250
330	337	6.3 x 7.7	150	6.3 x 7.7	150	8 x 10.5	280	8 x 10.5	280	10 x 10.5 (8 x 10.5)	340 (310)
470	477	6.3 x 7.7	150	8 x 10.5 (6.3 x 7.7)	300 (150)	10 x 10.5 (8 x 10.5)	320 (300)	10 x 10.5 (8 x 10.5)	420 (330)	10 x 10.5	400
680	687	8 x 10.5	300	8 x 10.5	300	10 x 10.5	380	10 x 10.5	450	10 x 13.5	550
1000	108	8 x 10.5	330	10 x 10.5 (8 x 10.5)	430 (330)	10 x 10.5	450	12.5 x 13.5 (10 x 13.5) (10 x 10.5)	710 (550) (490)	12.5 x 13.5	820
1500	158	10 x 10.5	450	10 x 13.5 (10 x 10.5)	650 (450)	10 x 13.5	650	12.5 x 13.5	750	12.5 x 16	1000
2200	228	10 x 13.5 (10 x 10.5)	620 (480)	12.5 x 13.5 (10 x 13.5)	890 (720)	12.5 x 13.5	960	16 x 16.5 (12.5 x 16)	1150 (1000)	16 x 16.5	1250
3300	338	10 x 13.5	700	12.5 x 16 (12.5 x 13.5)	1000 (900)	16 x 16.5 (12.5 x 16)	1300 (1050)	16 x 16.5	1350		
4700	478	12.5 x 13.5	850	16 x 16.5	1400	16 x 16.5	1450				
6800	688	16 x 16.5 (12.5 x 16)	1350 (900)								

WV Code		35V		50V		63V		100V	
μF		Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current
0.1	104			4 x 5.4	1.0	4 x 5.4	1.0		
0.22	224			4 x 5.4	2.3	4 x 5.4	2.3		
0.33	334			4 x 5.4	3.5	4 x 5.4	3.5		
0.47	474			4 x 5.4	5.0	4 x 5.4	5.0		
1	105			4 x 5.4	10	4 x 5.4	10	4 x 5.4	10
1.5	155			4 x 5.4	12	4 x 5.4	12	6.3 x 5.4	15
2.2	225			4 x 5.4	15	4 x 5.4	15	6.3 x 5.4	20
3.3	335	4 x 5.4	18	4 x 5.4	18	5 x 5.4	20	6.3 x 7.7 (6.3 x 5.4)	45 (28)
4.7	475	4 x 5.4	20	5 x 5.4 (4 x 5.4)	23 (19)	5 x 5.4	23	6.3 x 7.7 (6.3 x 5.4)	50 (30)
10	106	5 x 5.4 (4 x 5.4)	30 (20)	6.3 x 5.4 (5 x 5.4)	34 (27)	6.3 x 7.7 (6.3 x 5.4)	55 (34)	8 x 10.5 (6.3 x 7.7)	110 (50)
22	226	6.3 x 5.4 (5 x 5.4)	54 (42)	6.3 x 5.4	60	8 x 10.5 (6.3 x 7.7)	140 (70)	10 x 10.5 (8 x 10.5)	180 (120)
33	336	6.3 x 5.4	60	6.3 x 7.7	85	8 x 10.5 (6.3 x 7.7)	160 (85)	10 x 10.5	190
47	476	6.3 x 5.4 (6.3 x 7.7)	70 (165)	10 x 10.5 (8 x 10.5) (6.3 x 7.7)	130 (110) (90)	10 x 10.5 (8 x 10.5)	230 (170)		

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

•Case size  $\varnothing D \times L$ (mm), ripple current (mA rms) at 85°C, 120Hz

$\mu F$	WV Code	35V		50V		63 V		100 V		160 V	
		Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current
22	226									10 × 13.5	50
33	336									12.5 × 13.5	95
47	476									12.5 × 13.5 (16 × 16.5)	205 (240)
56	566	6.3 × 7.7	80	6.3 × 7.7	110	10 × 10.5	250				
68	686	6.3 × 7.7	110	8 × 10.5	170	10 × 10.5	260				
100	107	8 × 10.5 (6.3 × 7.7)	175 (120)	10 × 10.5 (8 × 10.5)	240 (200)	12.5 × 13.5 (10 × 13.5) (10 × 10.5)	380 (290) (280)	12.5 × 13.5	440	16 × 16.5	250
150	157	8 × 10.5	220	10 × 10.5	240	10 × 13.5	310				
220	227	10 × 10.5 (8 × 10.5)	310 (270)	10 × 13.5 (10 × 10.5)	400 (320)	12.5 × 13.5	580	16 × 16.5	700		
330	337	10 × 10.5	350	12.5 × 13.5 (10 × 13.5)	600 (420)	16 × 16.5 (12.5 × 16)	820 (720)				
470	477	12.5 × 13.5 (10 × 13.5) (10 × 10.5)	600 (530) (400)	16 × 16.5 (12.5 × 16)	850 (740)	16 × 16.5	950				
680	687	12.5 × 13.5	750	16 × 16.5	950						
1000	108	16 × 16.5 (12.5 × 16)	1100 (800)								

$\mu F$	WV Code	200 V		250 V		350 V		400V		450 V	
		Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current
3.3	335							10 × 13.5	40	10 × 13.5	40
4.7	475			10 × 13.5		10 × 13.5	85	10 × 13.5 (12.5 × 13.5)	45 (48)	10 × 13.5 (12.5 × 13.5)	42 (45)
10	106	10 × 13.5	75	10 × 13.5	75	12.5 × 13.5	105	12.5 × 13.5	50	12.5 × 13.5	55
22	226	12.5 × 13.5	105	12.5 × 13.5	105	16 × 16.5	130	16 × 16.5	85	16 × 16.5	85
33	336	12.5 × 13.5	120	16 × 16.5	135						
47	476			16 × 16.5	220						
100	107										

## FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency		50Hz	120Hz	300Hz	1KHz	10KHz~	
Coefficient	$\varnothing 4 \sim \varnothing 10$	0.1 ~ 68 $\mu F$	0.70	1.00	1.17	1.50	
		100 ~ 3300 $\mu F$	0.85	1.00	1.08	1.30	
	$\varnothing 12.5 \sim \varnothing 16$	~ 68 $\mu F$	0.75	1.00	1.35	1.57	2.00
		100 ~ 680 $\mu F$	0.80	1.00	1.23	1.34	1.50
		1000 ~ 6800 $\mu F$	0.85	1.00	1.10	1.13	1.15

## ■ Package Quantity

Size $\varnothing D \times L$ (mm)	Quantity per Reel	Reels in Box	Quantity in Box/Pcs	3 Inbox per cartons (pcs)
4 × 5.4/5.8	2,000	6	12,000	36,000
5 × 5.4/5.8	1,000	6	6,000	18,000
6.3 × 5.4/5.8	1,000	5	5,000	15,000
6.3 × 7.7	1,000	5	5,000	15,000
8 × 10.5	500	4	2,000	6,000
10 × 10.5	500	4	2,000	6,000
10 × 13.5	500	4	2,000	6,000
12.5 × 13.5	250	3	750	2,250
12.5 × 16	200/150*	3	600/450*	1,800/1,350*