

KNSCHA[®]

全球 高端 电容器 制造商

东莞市科尼盛电子有限公司

DONGGUAN KNSCHA ELECTRONICS CO., LTD.

规格承认书

Specification for approval

客户名称:

(Customer Name)

产品名称:

(Product Name)

客户料号:

(Customer part number)

科尼盛料号:

(KNSCHA number)

型号规格:

(Specifications)

铝电解电容

Aluminum Electrolytic Capacitor

152EC0251

E/C 250V/220UF 16*32mm KNSCHA SHC 2000H 黑体白字

制 造
(Manufacture)

Approval

拟 制
(Fiction)

审 核
(Chief)

核 准
(Approval)



刘淑芬

刘军军

徐贵南

客 户
(Customer)

Approval

检 验
(Inspect)

审 核
(Chief)

核 准
(Approval)

东莞市科尼盛电子有限公司

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Aluminum Electrolytic Capacitors

DIMENSIONS(mm)

Customer :	Electrolytic Capacitors SHC Series
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Electric Characteristics:

Customer P/N	KNSCHA P/N	Cap. 120Hz (uF)	Cap. Tol. (%)	Rate Volt. (V-DC)	Surge Volt. (V-DC)	Oper. Temp. (°C)	Nominal Case Size D*L(mm)	Leakage Current Max(uA)	D.F. Max ()	RC 120HZ (mArms)	ESR 120HZ (Ω)	Load life (Hours)
	152EC0251	220	±20	250	288	-40 ~ +105	16*32	1670	0.20	618	/	2000

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Aluminum Electrolytic Capacitor

SHC series

- 105°C 2000hours, standard product.
- RoHS Compliance
- 105°C 2000~3000小時標準品

SPECIFICATIONS

Items 項目	Characteristics 特性												
Capacitance Tolerance 靜電容量誤差	± 20%(120Hz,20°C)												
Operating Temperature Range 適用溫度範圍	-40 ~ +105°C				-40 ~ +105°C				-25 ~ +105°C				
Rated Voltage Range 額定電壓範圍	6.3 ~ 100VDC				160 ~ 250VDC				350 ~ 500VDC				
Leakage Current 洩漏電流	I ≤ 0.01CV or 3 (μA) which is greater.(After 2 minutes application of DC rated voltage, at 20 °C)							I ≤ 0.03CV +20 (μA) (After 3 minutes application of DC rated voltage, at 20 °C)					
Dissipation Factor 散逸因素(tan δ)	Measurement Frequency: 120Hz. Temperature: 20°C												
	Rated Voltage(V)	6.3	10	16	25	35	50	63	80	100	160~250	350~500	
	tan δ(Max)	0.24	0.20	0.16	0.15	0.12	0.10	0.09	0.08	0.08	0.20	0.25	
	When nominal capacitance over 1000μF, tanδ shall be added 0.02 to the listed value with increase of every 1000μF .												
Low Temperature Stability 低溫特性 Impedance Ratio(Max) 阻抗比率(最大值)	Measurement Frequency: 120Hz.												
	Rated Voltage(V)	6.3	10	16	25	35	50~100	160~250	350~400	450~500			
	Z(-25°C)/Z(20°C)	5	4	3	2	2	2	3	6	15			
	Z(-40°C)/Z(20°C)	10	8	6	4	3	3	4	-	-			
Load Life 負荷壽命	2000hours,with application of rated voltage at 105°C (8: 3000hours)												
	Capacitance Change	Within ± 20% of Initial Value											
	tan δ	200% or less of Initial Specified Value											
	Leakage Current	Initial Specified Value or less											
Shelf Life 放置壽命	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours 105°C without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to them 4.1 of JIS C5101-4.												
	Capacitance Change	Within ± 20% of Initial Value											
	tan δ	200% or less of Initial Specified Value											
	Leakage Current	Initial Specified Value or less											
Standards 參照標準	JIS C 5101-4 (IEC 60384)												

Frequency Coefficient of Permissible Ripple Current

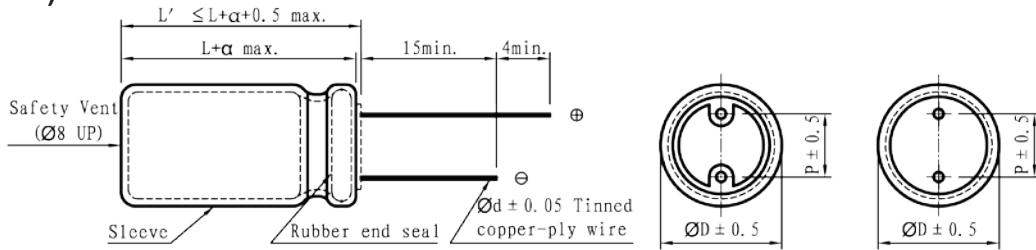
Rated Voltage (V)	Capacitance (μF)	Frequency (Hz)			
		50	120	1K	≤20K
≤ 100	< 100	0.75	1.00	1.57	2.00
	100 ~ 470	0.80	1.00	1.34	1.50
	> 470	0.85	1.00	1.10	1.15
≥ 160	0.47 ~ 470	0.85	1.00	1.40	1.50

The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 5°C rise. When long life performance is required in actual use , the rms ripple current has to be reduced.

Aluminum Electrolytic Capacitor

SHC series

DIMENSIONS(mm)



φD	5	6.3	8	10	13	14.5	16	18	22	25
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	7.5	10	12.5
φd	0.5	0.5	0.5	0.6	0.6	0.8	0.8	0.8	0.8	1.0

α	(L < 16) 1.5
	(L ≥ 16) 2.0

STANDARD RATINGS

D×L(mm) ; R.C.(mA rms) at 105°C 120Hz.

Cap (μF)	V (Code)	6.3 (0J)		10 (1A)		16 (1C)		25 (1E)		35 (1V)		50 (1H)		63 (1J)		100 (2A)	
		Item	D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L
0.1~0.47												5x11	11	5x11	12	5x11	17
1												5x11	15	5x11	17	5x11	20
2.2												5x11	24	5x11	25	5x11	30
3.3												5x11	30	5x11	31	5x11	36
4.7								5x11	30	5x11	31	5x11	36	5x11	37	5x11	44
6.8								5x11	35	5x11	37	5x11	46	5x11	51	5x11	45
10						5x11	42	5x11	43	5x11	47	5x11	54	5x11	58	6.3x11	75
22		5x11	54	5x11	59	5x11	63	5x11	65	5x11	75	5x11	83	6.3x11	109	8x12	112
33		5x11	66	5x11	77	5x11	79	5x11	83	5x11	91	6.3x11	107	8x12	121	8x12	133
47		5x11	78	5x11	87	5x11	94	5x11	97	6.3x11	116	6.3x11	145	8x12	163	10x13	170
56		5x11	90	5x11	100	5x11	105	5x11	109	6.3x11	127	6.3x11	151	8x12	172	10x16	187
68		5x11	102	5x11	119	5x11	145	5x11	151	6.3x11	169	6.3x11	196	8x12	206	10x16	238
100		5x11	111	5x11	139	6.3x11	151	6.3x11	163	8x12	194	8x14	242	10x13	254	10x20	315
220		5x11	175	6.3x11	212	8x12	237	8x12	290	10x13	332	10x16	363	10x20	436	13x25	581
330		6.3x11	233	6.3x11	272	8x12	321	10x13	369	10x16	484	10x20	514	13x21	666	16x26	714
470		6.3x11	266	8x12	299	8x14	381	8x16	436	10x20	581	13x21	762	13x25	847	16x32	968
560		8x12	272	8x12	306	8x14	387	10x16	448	10x20	629	13x21	774	13x25	871	16x36	1012
680		8x12	278	8x12	319	8x16	424	10x20	581	13x21	702	13x25	799	16x26	1004	18x32	1210
1000		8x14	484	10x13	586	10x16	617	10x20	750	13x21	908	13x25	1089	16x32	1210	18x35	1573
1500		8x20	545	10x20	592	10x20	641	13x21	787	13x25	1041	16x32	1452	18x32	1718		
2200		10x20	774	10x20	918	13x21	1004	13x25	1132	16x26	1343	16x36	1609	18x35	1997		
3300		10x20	908	13x21	1091	13x25	1222	16x26	1428	16x36	1730	18x35	1997	22x40	2347		
4700		13x21	1162	13x25	1306	16x26	1464	16x32	1718	18x35	2057	22x40	2541	22x50	2965		
6800		13x25	1385	16x26	1770	16x36	1863	18x35	2202	22x40	2602	22x50	3025				
10000		16x26	1730	16x36	2236	18x35	2335	22x40	2589	22x50	3207						
15000		16x36	2214	18x35	2808	22x40	2928	22x50	3328								
22000		18x40	2771	22x40	3514	22x50	3630										

Cap (μF)	V (Code)	160 (2C)		200 (2D)		250 (2E)		350 (2V)		400 (2G)		450 (2W)		500 (2H)			
		Item	D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L	R.C.	
2.2		6.3x11	26	6.3x11	28	8x12	34	8x12	30	10x13	36	10x16	39				
3.3		8x12	36	8x12	42	8x12	48	10x13	39	10x13	46	10x16	51	10x20	35		
4.7		8x12	48	8x12	51	10x13	61	10x13	46	10x16	61	10x20	65	10x20	48		
6.8		8x12	51	8x12	61	10x13	70	10x13	76	10x16	83	13x21	87	13x21	65		
10		10x13	61	10x16	73	10x16	85	10x20	97	10x20	97	13x21	95	13x21	80		
22		10x16	121	10x20	163	13x21	157	13x25	151	13x25	175	16x26	182	16x26	105		
33		10x20	145	13x21	175	13x21	182	13x25	176	16x26	211	16x26	211	16x32	145		
47		13x21	194	13x25	242	13x25	248	16x26	254	16x26	278	16x32	339	18x35	165		
68		13x21	224	13x25	253	16x26	272	16x32	260	16x32	317	18x32	508	18x45	180		
82		13x25	266	13x25	278	16x26	300	16x32	284	18x26	424	18x35	569				
100		16x26	363	16x26	320	16x32	393	18x32	328	18x32	484	18x40	605				
120		16x26	363	16x26	363	16x32	460	18x35	347	18x35	545	18x40	666				
150		16x26	399	16x32	444	18x32	545	18x40	387	18x40	605	22x45	750				
220		16x36	520	18x32	641	22x35	847										
330		18x35	726	22x35	750												
470		18x40	877	22x40	925												

※ 13mm may be replaced by 12.5mm upon customer's request.

SHC series

SLIM TYPE

- 105°C high-temperature and high voltage 400~500V, life 2000hrs.
- Specially Size, 8~16mm diameter.
- For LCD-TV and LCD-Monitor power.
- RoHS Compliance.
- 105°C 耐高溫標準品，高壓400~500V，壽命2000小時。
- 特殊專用尺寸，直徑8~16mm。
- 使用於LCD TV與LCD Monitor電源應用。

SPECIFICATIONS

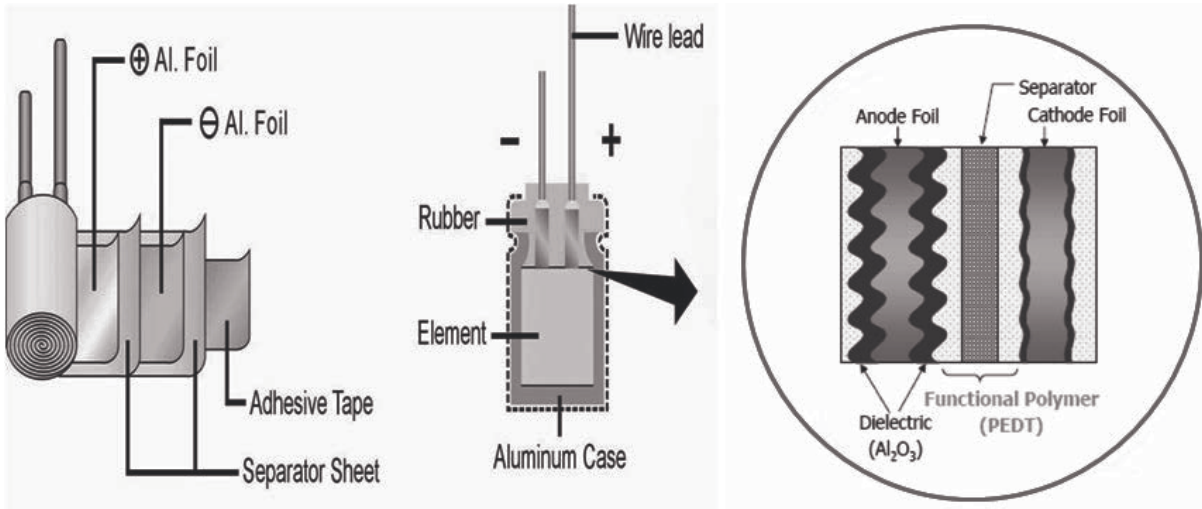
D×L(mm) ; R.C.(mA rms) at 105°C 120Hz.

Cap (μF)	V Item	400		450		500	
		D x L	R.C.	D x L	R.C.	D x L	R.C.
22		8x50	158	8x50	168	13x40	158
		10x30	150	10x35	153		
33		8x61	210	8x61	218	13x45	162
		10x40	192	10x45	198		
39		8x61	258	8x61	287	14.5x45	160
		10x45	235	10x50	250		
		13x35	250	13x40	265		
47		10x50	285	10x50	335	14.5x45	163
		13x40	282	13x45	305	16x50	175
		14.5x30	278	14.5x30	290		
53		10x50	305	10x50	400	16x50	178
68		13x45	340	14.5x40	460		
		14.5x30	330	16x35	490		
82		13x50	365	14.5x50	460		
		14.5x40	385	16x40	490		
100		14.5x45	468	14.5x50	620		
				16x50	640		
120		14.5x50	550	16x50	650		

※ 13mm may be replaced by 12.5mm upon customer's request.

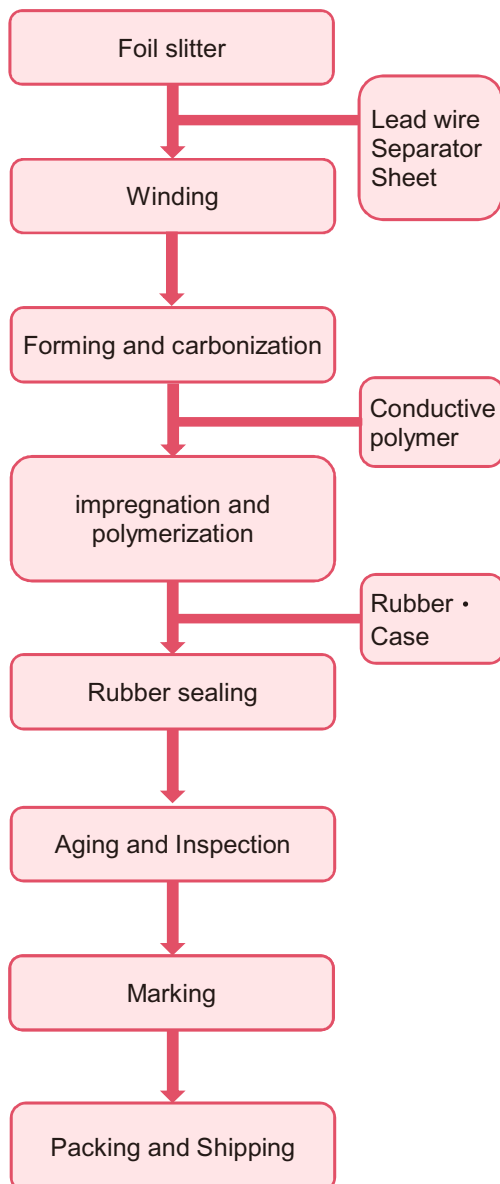
Aluminum Electrolytic Capacitor

Basic structure

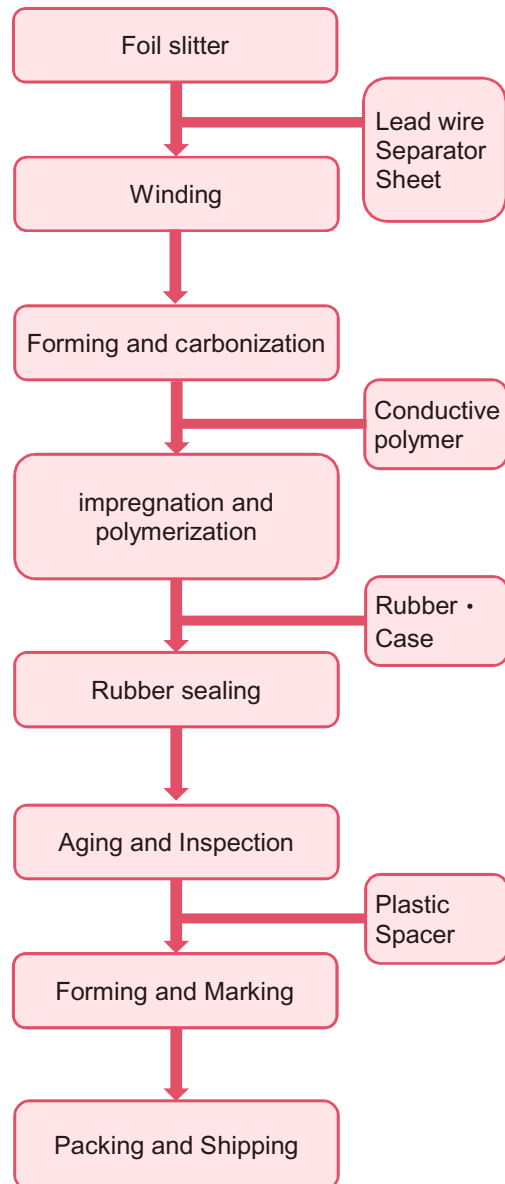


Manufacturing Method

Radial lead type



V-CHIP type



Aluminum Electrolytic Capacitor

Application Guidelines For Aluminum Electrolytic Capacitors

鋁電解電容器使用需知

一、電路設計的注意事項

1. 在確認使用環境及安裝環境的基礎上，在電容器的產品目錄及規格書上所規定的性能範圍內進行設計。
2. 在設計上，應該避免在下述情況下使用：
 - (1) 不可超過電容器的最高使用溫度。
 - (2) 不可有超過額定紋波電流的電流通過。
 - (3) 不可有超過額定電壓的電壓通過電容器。
 - a. 要注意紋波電壓 (交流部分)重疊到直流電壓上時的峰值不可超過額定電壓。
 - b. 當兩個電容器串聯時，通過各個電容器的電壓不可超過額定電壓。此時，要在各個電容器上並聯用於防止漏損電流的分壓電阻器。
 - (4) 電容器為極性電容器。要確認有無連接反向電壓或交流電壓。在極性反轉電路中請用雙極性電容器，但是雙極性電容器也不可以用於交流電路。
3. 進行電路設計時，請選用與機器壽命相符的電容器。
4. 在需要重複進行急速充放電的電路中請選用與條件相符的電容器。
5. 電容器的外殼、輔助引出端子與正、負極以及電路板間必須完全隔離。
6. 當電容器套管的絕緣不能保證時，在有絕緣性能特定要求的地方請不要使用。需要外套具有絕緣功能時請諮詢我們。
7. 電容器如果在以下環境中使用，可能會發生故障。
 - (1) 直接與水、油類、鹽水相接觸的環境或高溫高濕或結露的環境。
 - (2) 充滿有毒氣體(硫化物、亞硫酸、亞硝酸、氯氣、氨水等)的環境。
 - (3) 不能置於日照、O₃、紫外線及有放射性物質環境下使用。
 - (4) 有酸性及鹼性溶劑濺落的環境。

一、Caution During Circuit Design

1. Please make sure the application and mounting conditions to which the capacitor will be exposed are within the conditions specified in the catalog or alternate product specification (Referred as to specification here after).
2. Design Aluminum Electrolytic Capacitors, please pay attention to the points listed below:
 - (1) The capacitor shall not be used in an ambient temperature which exceeds the operating temperature specified in the specification.
 - (2) Do not apply excessive current which exceeds the allowable ripple current.
 - (3) Make sure that no excess voltage (that is higher than the rated voltage) is applied to the capacitor.
 - a. Please pay attention that the peak voltage, which is DC voltage overlapped by ripple current, should not exceed the rated voltage.
 - b. In the case where more than 2 aluminum electrolytic capacitors are used in series, please make sure that applied voltage will be lower than rated voltage and the voltage be will applied to each capacitor equally using a balancing resistor in parallel with the capacitors.
 - (4) Aluminum electrolytic capacitors are polarized. Make sure that no reverse voltage or AC voltage is applied to the capacitors. Please apply bi-polarited capacitor to reverse polarity circuit but bi-polarited capacitors can not be applied to AC circuit.
3. Appropriate capacitors which comply with the life requirement of the products should be selected when designing the circuit.
4. For a circuit that repeats rapid charging/discharging of electricity, an appropriate capacitor that is capable of enduring such a condition must be used.
5. Aluminum case, cathode lead wire, anode lead wire and circuit pattern must be isolated .
6. The sleeve of capacitors is not recognized as an insulator, and therefore, the standard capacitor should not be used in a place where insulation function is needed. If you require a higher grade of insulating sleeve, please consult us.
7. Capacitors may fail if they are used under the following conditions:
 - (1) Damp conditions such as water, saltwater spray, or oil spray or fumes. High humidity or humidity condensation situations.
 - (2) In an atmosphere filled with toxic gasses (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.)
 - (3) Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.
 - (4) Being exposed to acidic or alkaline solutions.

Aluminum Electrolytic Capacitor

Application Guidelines For Aluminum Electrolytic Capacitors

鋁電解電容器使用需知

- (5) 振動或衝擊條件超過交貨仕様規定範圍的惡劣環境。
8. 在設計電容器的安裝時，必須確認下述內容：
 - (1) 線路板的孔距必須與電容器兩端子的間距相吻合。
 - (2) 在電容器防爆閥的上方盡量不要安裝配線及其它元件，應在防爆閥的上方保留一定的空間。
 - (3) 請勿在電容器的四周及電路板的背面（電容器下面）配置發熱元件。
9. 電容器的電氣特性根據溫度及頻率的變動及變化，請在確認該變化量的基礎上進行電路設計。
10. 在雙面印刷板上安裝電容器時，電容器的安裝位置避免多餘的基板孔和過孔。
11. 並聯兩個以上的電容器時，要充分考慮電流平衡。
12. 串聯兩個以上的電容器時，要充分考慮電壓平衡和插入並聯用分壓相抗。
- (5) Under severe conditions where vibration and / or mechanical shock exceed the applicable ranges of the specification.
8. In designing a circuit, the following matters should be ensured in advance to the capacitor assembly on the P.C. board.
 - (1) Design the appropriate hole spacing to match the lead pitch of capacitors.
 - (2) Do not locate any wiring and circuit patterns directly above the capacitor vent. Ensure enough free space above the capacitor vent.
 - (3) Do not design a circuit board so that heat generating components are placed near an aluminum electrolytic capacitor or reverse side of P.C. board (under the capacitor).
9. Electrical characteristics may vary depending on changes in temperature and frequency. Please consider this variation when you design circuits.
10. When you mount capacitors on the double-sided P.C. boards, avoid excess substrate holes and vias to capacitor location.
11. When you install more than 2 capacitors in parallel, consider the balance of current flowing through the capacitors.
12. If more than 2 aluminum electrolytic capacitors are used in series, make sure the applied voltage will be lower than the rated voltage and that voltage will be applied to each capacitor equally using a balancing resistor in parallel with each capacitor.

二、安裝的注意事項

1. 除了定期點檢時為檢測電氣性能而拆卸的電容器外，對組裝到設備上已經通電的電容器，拆除後均不能再使用。
2. 當電容器產生再生電壓時，請通過約1KΩ的電阻器進行放電。
3. 長期保存的電容器，需通過約1KΩ的電阻加壓處理。
4. 請確認電容器的規格(靜電容量及額定電壓)及極性後，才可進行安裝。
5. 掉落在地上的電容器及本體已經變形的電容器，請勿再使用。
6. 安裝時請確認電路板的孔距是否與電容器兩端子的間距吻合。
7. 自動插入機扭結固定電容器引線的強度不可過大。
8. 焊接時請注意以下內容：
 - (1) 焊接條件(溫度、時間)不可超出承認書中所規定的範圍。
 - (2) 請勿讓烙鐵的烙鐵頭接觸到電容器的本體及不要將電容器本體浸入焊錫溶液中。

二、Caution For Assembling Capacitors

1. Once a capacitor has been assembled in the set and power applied, even if a capacitor is discharged, an electric potential (restricting voltage) may exist between the terminals.
2. Electric potential between positive and negative terminal may exist as a result of returned electromotive force, so please discharge the capacitor using a 1KΩ resistor.
3. Leakage current of aluminum electrolytic capacitors may be increased during long storage time. In this case, the capacitors should be subjected to voltage treatment a 1K Ω resistor before using.
4. Please confirm ratings (voltage and capacitance) and polarity before in stalling capacitors on the P.C. board.
5. Do not drop capacitors on the floors and damage, nor use a capacitors that was dropped.
6. Please confirm that lead spacing of the capacitor matches the hole spacing of the P.C. board prior to installation.
7. Please pay attention that the clinch force is not too strong when capacitors are placed and fixed by an automatic insertion machine.
8. Soldering
 - (1) Soldering condition (temperature and times) must be confirmed to be within Su'scon specification.
 - (2) Soldering iron should never touch the capacitors body and do not dip capacitors body into melted solder.

Aluminum Electrolytic Capacitor

Application Guidelines For Aluminum Electrolytic Capacitors

鋁電解電容器使用需知

- (3) 在進行焊接時，避免其它物件倒下碰到電容器。
- (4) 在進行焊接時，除端子外電容器其它部位不可附著有焊劑。

9. 電容器焊接在電路板後，請注意以下內容：

- (1) 不可將電容器本體傾斜、扭轉等。
- (2) 不可讓其它物體碰到電容器。

10. 電解電容器不得以鹵化化學藥品類似溶劑，作為電容器洗滌用。

11. 在使用固定劑與塗層劑時，電路板與電容器的封口部之間須乾淨，不可留有焊劑殘渣及污垢。

- (3) Please avoid contact between other components and the aluminum capacitor.

- (4) Please avoid having flux adhere to any portion except the terminal.

9. After Soldering

- (1) Do not bend or twist the capacitors body after soldering on P.C. board.
- (2) Do not hit the capacitors and isolate capacitors from the P.C. board or other device when stacking P.C. boards in store.

10. Standard Aluminum Electrolytic Capacitors should be free from halogenated solvents during P.C. board cleaning after soldering.

11. Do not use halogenated adhesives and coating materials to fix aluminum electrolytic capacitors.

三、組裝使用注意事項

1. 不可直接觸摸電容器的端子，有導致觸電的危險。
2. 不可有導電體靠近電容器的兩端子，避免電容器端子之間短路。
3. 裝配了電容器的設備請不要在以下環境中使用：
 - (1) 直接與水、油類、鹽水相接觸的環境或高溫高濕或結露的環境。
 - (2) 充滿有毒氣體(硫化物、亞硫酸、亞硝酸、氯氣、氨水等)的環境。
 - (3) 不能置於日照、O₃、紫外線及有放射性物質環境下使用。
 - (4) 有酸性及鹼性溶劑濺落的環境。
 - (5) 振動或衝擊條件超過交貨仕様書規定範圍的惡劣環境。

四、電容器的保養與檢修

電容器在工業機器中使用時要進行定期檢修，檢修時請注意電容器的外觀及電氣性能是否符合產品的標準。

五、安全注意事項

1. 在設備使用過程中，電容器的防爆閥開裂，並冒出氣體時，應切斷設備的主電源或從設備上拔下電線插頭。
2. 電容器的防爆閥開裂時，因為超過100°C高溫氣體噴出，臉不要接近。噴出的氣體進入眼睛時，立即用水清洗眼睛。如果噴出的電解液濺到皮膚上，請立即使用肥皂進行沖洗。

六、儲存條件

1. 電容器建議在環境溫度5~35 °C、相對濕度低於75%的條件下存放。

三、Caution For Assembling Capacitors

1. Do not directly touch terminal by hand.
2. Keep electric conductor off terminals to avoid short circuit.
3. Do not use following conditions for assembling capacitors.
 - (1) Damp conditions such as water, saltwater spray, or oil spray or fumes. High humidity or humidity condensation situations.
 - (2) In an atmosphere filled with toxic gasses (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.)
 - (3) Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.
 - (4) Being exposed to acidic or alkaline solutions.
 - (5) Under severe conditions where vibration and / or mechanical shock exceed the applicable ranges of the specification.

四、Maintenance Inspection

Please periodically inspect the capacitors that are installed in industrial equipment. Remarkable abnormality such as vent operating, leaking electrolyte, etc. Capacitance, dielectric loss tangent, leakage current, and items specified in the specification.

五、Safe Precautions

1. If you see smoke due to operation of safety vent, turn off the main switch or pull out the plug form the outlet.
2. Do not bring your face near the capacitor when the pressure relief vent operates, because the gases emitted from that are over 100°C. If the gas gets into your eyes, please flush your eyes immediately with pure water. If electrolyte exposed on your skin , please wash it with soap and water.

六、Storage

1. It is recommended to keep capacitors between the ambient temperatures of 5°C to 35°C and a relative humidity of 75% or below.

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2. 請勿儲存於下列所述的環境中。

- (1) 直接與水、油類、鹽水相接觸的環境或高溫高濕或結露的環境。
- (2) 充滿有毒氣體(硫化物、亞硫酸、亞硝酸、氯氣、氨水等)的環境。
- (3) 不能置於日照、O₃、紫外線及有放射性物質環境下使用。
- (4) 有酸性及鹼性溶劑濺落的環境。
- (5) 振動或衝擊條件超過交貨仕様書規定範圍的惡劣環境。

七、廢棄處理

1. 在電容器上開孔或壓碎後焚燒。
2. 電容器不焚燒時，請交給專業的工業廢棄物處理廠處理。

八、特別注意事項

在選用電容器時，如果在產品目錄及規格書中沒有找到符合要求的系列或規格時，請直接與我們的業務部或研發部聯繫，我們可根據客戶的要求開發特殊性能產品。上述鋁電解電容器的使用注意事項依據EIAJRCR-2367B 2002年3月發行的《電子機器用固定鋁電解電容器使用注意事項指南》製作而成，詳情請參照該指南。

2. Confirm that the environment does not have any of the following conditions:

- (1) Damp conditions such as water, saltwater spray, or oil spray or fumes. High humidity or humidity condensation situations.
- (2) In an atmosphere filled with toxic gasses (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.)
- (3) Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.
- (4) Being exposed to acidic or alkaline solutions.
- (5) Under severe conditions where vibration and / or mechanical shock exceed the applicable ranges of the specification.

七、Disposal

1. Make a hole the in the capacitor body or crush capacitors and incinerate them.
2. If incineration is not applicable, hand them over to a waste disposal agent and have them buried in a landfill.

八、Special Notice

When choosing capacitors, if clients couldn't find the series or specification in catalogue and data sheet, please contact with our Sales or RD department, we are able to base on clients' needs to develop product with special functions. For further details, please refer to EAIJRCR-2367B-Guideline of notabilia for fix for use in electronic equipment (Technical Standardization Committee on Passive Components (established in March 1995, revised in March 2002))

Environment Protection Policy

We are reducing environmentally harmful substances to do our capacitors in global environmental protection activities. Products compatible with Pb-free and products with non-PVC encasing and ROHS Compliance materials are available.

● ROHS Compliance

Our capacitors do not use any of the materials specifically identified and restricted hazardous material under ROHS Prohibited

Pb : Lead, Cr6+: Hexavalent chromium, Hg:Mercury, Cd:Cadmium, PBB:Polybrominated biphenyls, PBDE : Polybrominated diphenylethers, PVC:Polyvinyl chloride

● PVC free Capacitors

We use PET (Polyethylene Terephthalate) sleeve to instead of PVC (Polyvinyl Chloride) sleeve since 2005 January. As there is a size limitation for this counter measure, Please consult our sales representative their availability in big size capacitors.

● Pb-Free Capacitors

Our Capacitors lead wire and terminal doesn't contain lead.

We follow up those conditions as rule and standards to use right materials to production capacitors for maintain earth environment everlasting for human.

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Effects of ambient temperature to life (for reference)

Because an aluminum electrolytic capacitor is essentially an electrochemical component, increase temperatures accelerate the chemical reaction producing gas within the capacitor, diffuse the gas to outside through the end seal, and consequently accelerate a gradual decrease in capacitance and a gradual increase in $\tan\delta$ and ESR, the following equation has been experimentally found to express the relationship between the temperature acceleration factor and the deterioration of the capacitor.

$$L_x = L_o \cdot K_{temp} = L_o \cdot B^{(T_o - T_x)/10}$$

Where : $K_{temp} = B^{(T_o - T_x)/10}$

L_x = Life time (hour) of capacitor to be estimated

L_o = Base life time (hour) of capacitor

T_o = Maximum rated operating temperature (°C) of capacitor shown in catalog

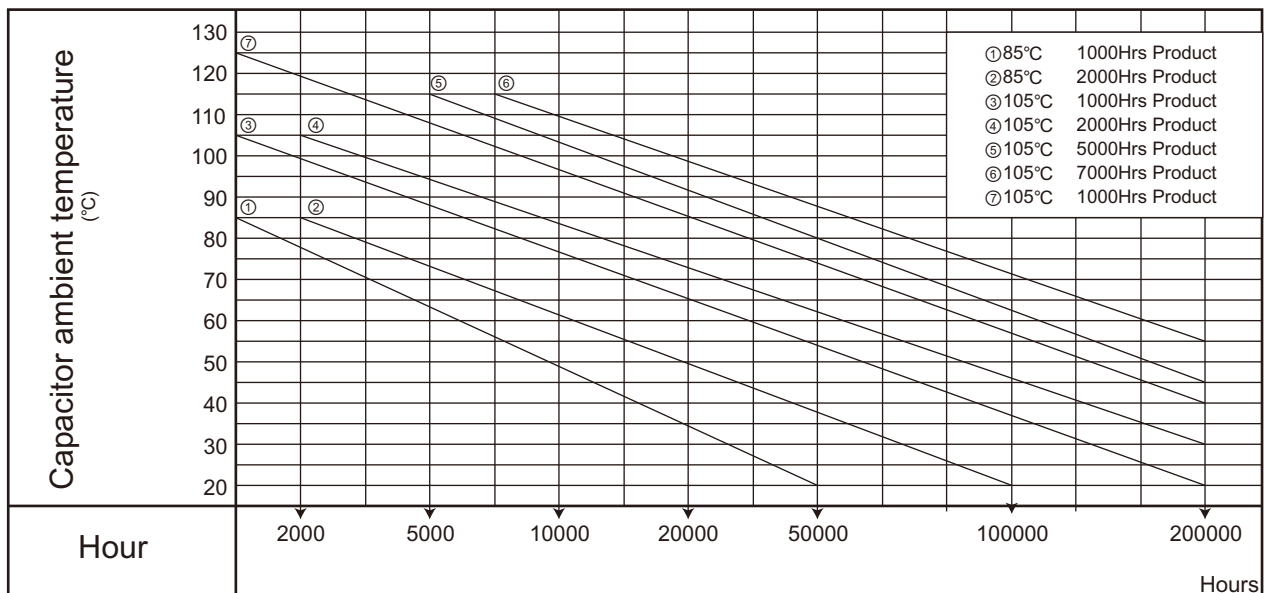
T_x = Actual ambient temperature (°C) of capacitor

B = Temperature acceleration factor (=2)

This equations is similar to Arrhenius equation that express a relationship between chemical reaction rates and temperature and called Arrhenius rule of aluminum electrolytic capacitors.

The temperature acceleration factor (B) is approximately 2 over an ambient temperature range (T_x) from 40 °C to the maximum rated operating temperature of the capacitor, and it means that the lifetime is approximately halved with every 10°C rise in ambient temperature and can be extended by using the capacitors at low temperatures.

For an ambient temperature range (T_x) of 20°C to 40°C, the factor B will be close to 2, and the lifetime will be actually extended. However, the environment where the devices are placed and their operating conditions influence ambient temperature, and in particular the ambient temperature in this range will be very inconstant. Therefore, a minimum lifetime should be estimated from the above formula by using the 40°C as T_x .



- ※ 1. A guide limit of the calculated like Aimo is 15 years max
- 2. $T_x \geq 40^\circ\text{C}$

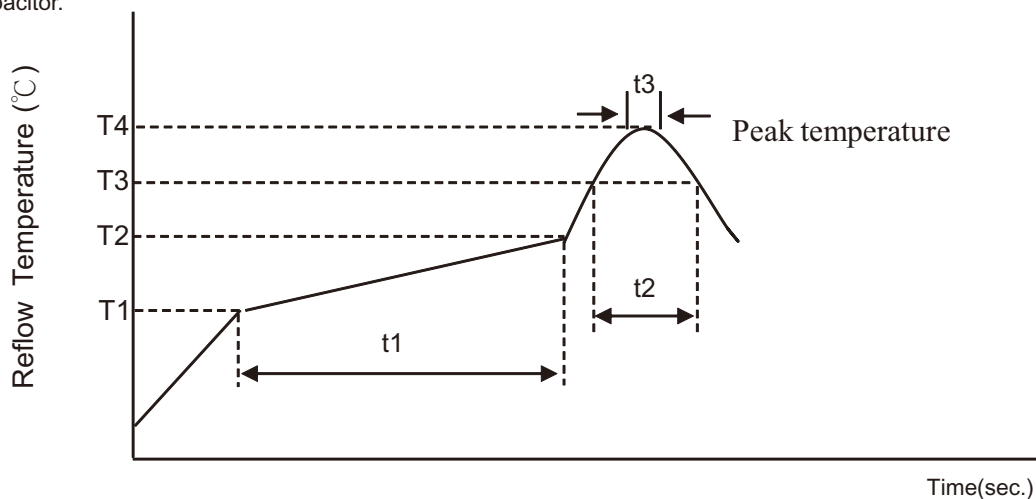
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RECOMMENDED PB-FREE REFLOW SOLDERING CONDITIONS

The following conditions are recommended for air or infrared reflow soldering of the surface mount capacitors onto a glass epoxy circuit board of 95 x 50 x 0.8mm (with resist) by cream solder (eutectic solder). The temperatures shown are the surface temperature values of the top of the capacitor.



TEMPERATURE PROFILE

Profile Feature	Pb Free Assembly	
	4~6.3Ø	8~10Ø
Average Ramp-up Rate	3°C/second max.	3°C/second max.
Preheat		
Temperature Min(T1 min)	150°C	150°C
Temperature Max(T2 max)	180°C	180°C
Time (t1 Max)	120sec.	120sec.
Ramp-up Rate (T2 ~T3)	3°C/second max.	3°C/second max.
Time maintained above		
Temperature(T3)	217°C	217°C
Time(t2 Max)	90sec.	40sec.
Peak Temperature(T4)	260°C	245°C
Time(t3 Max)	5sec.	5sec.
Reflow cycles	1	2 or less

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PRECAUTIONS FOR USERS

Soldering method

The capacitors of Alchip-series have no capability to withstand such dip or wave soldering as totally immerses components into a solder bath.

Reflow soldering

Reflow the capacitors within recommended reflow soldering conditions. Verify no temperature stress to the capacitors because the following differences might degrade capacitors electrically and mechanically. Please consult us if other reflow conditions are employed

1. Location of components : Temperature increases at the edge of PC board more than the center.
2. Population of PC board : The less the component population is the more temperature rises.
3. Material of PC board : A ceramic made board needs more heat than a glass epoxy made board. The heat increase may cause damage of the capacitors.
4. Thickness of PC board : A thicker board needs more heat than a thinner board. The heat increase may damage the capacitors.
5. Size of PC board : A larger board needs more heat than a smaller board. The heat increase may damage the capacitors.
6. Location of infrared ray lamps : IR reflow as well as hot plate reflow applies heat only on the reverse side of the PC board to lessen heat stress to the capacitors.
7. Vapor heat transfer systems (VPS) are not recommended.

Rework of soldering

Avoid reflow soldering more than once. Use a soldering iron for rework. Do not exceed an iron tip temperature of $380 \pm 10^{\circ}\text{C}$ and an exposure time of 3 ± 0.5 seconds.

Mechanical stress

Do not use the capacitors for lifting the PC board and give stress to the capacitor. Avoid bending the PC board. These may damage the capacitors.

Cleaning assembly board

Immediately after solvent cleaning, remove residual solvent for at least 10 minutes with an air knife. The solvent is so insufficiently dry for a long period of time that the capacitors may be cored.

Coating on assembly board

1. Before curing coating material remove the cleaning solvents from the assembly board.
2. Before conformal coating, a chloride free pre-coat material is recommended to use for lessening stress to the capacitors.

Molding with resin

Internal chemical reaction gradually produces gas in the capacitor; then, internal pressure is increasing. If the end seal of the capacitor is completely molded with a resin. The gas stays inside the capacitor. It will face dangerous situation. The chlorine contained resin will penetrate into the end seal, reach the inside element, and cause damage of the capacitor.

Others

Precautions and Guidelines for Aluminum Electrolytic Capacitors shall be referred.

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Analysis of Failure Mode

