

承認書

SPECIFICATION FOR APPROVAL

客戶名稱：
CUSTOMERS:

品名規格：
SPECIFICATION:

BP 100uF/25V 8*11mm 透明绿黑字 2000H 铜导针

產品料號：
SUPPLIER P/N:

WBP025M101F11S35

客戶料號：
CUSTOMER P/N:

承認日期：
APPROVAL date:

2026/09/20

BUYER'S STAMP	Approval by (Please return one copy after approved ; 承认后请寄回一份给我司)			

WHC STAMP	Submitted by			
	Approval	Check	Affirm	Design
				



electrolytic capacitors



制造商：湖南建順電子有限公司

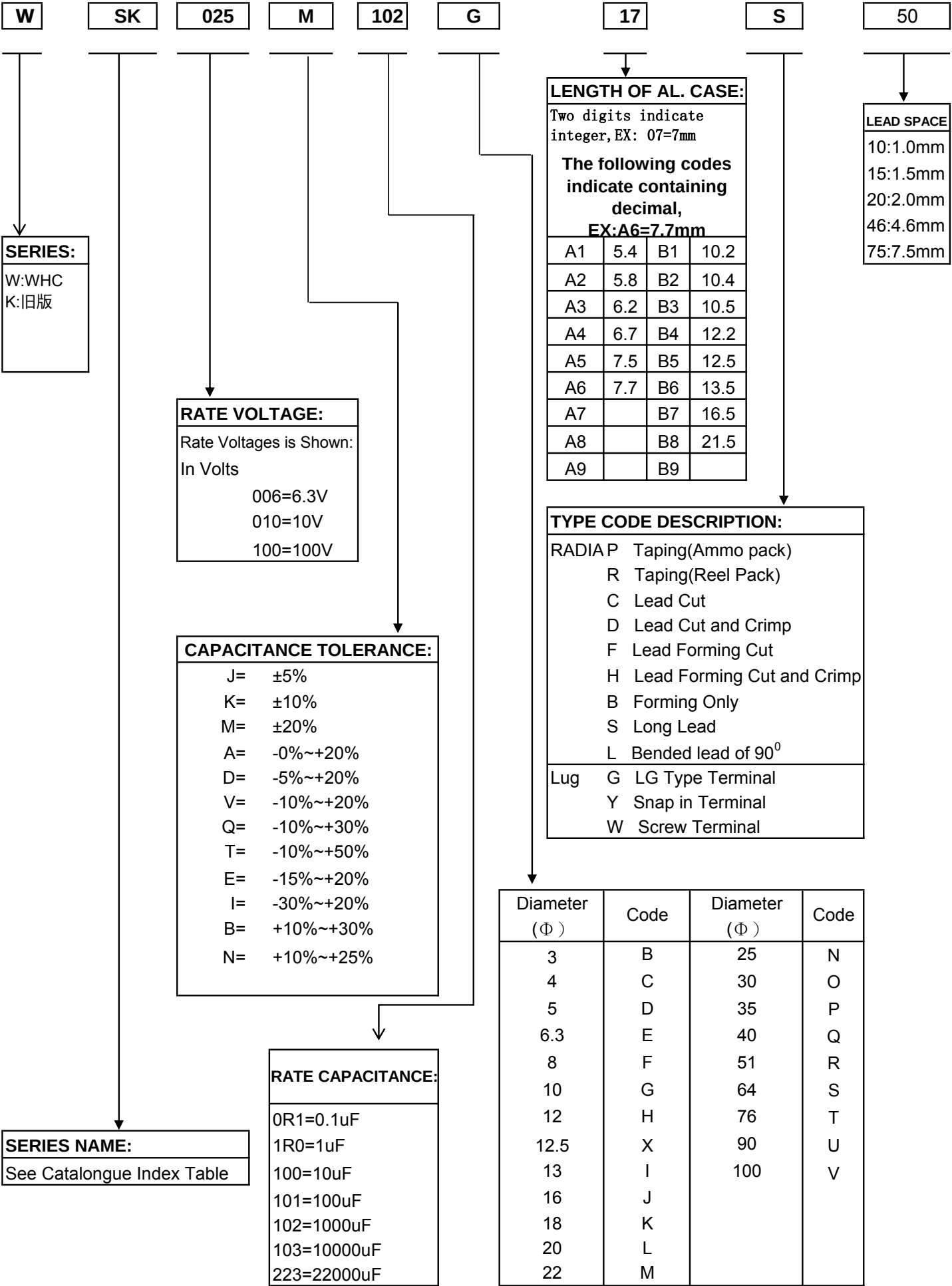
Manufacturer：Hunan JianShun Electronics Co.LTD

服务商：东莞市奥炳科技有限公司

Vendor：Dongguan Aobing Technology Co., Ltd.

Aluminum Electrolytic Capacitors

Explanation of parts numbers
for Aluminum Electrolytic Capacitors

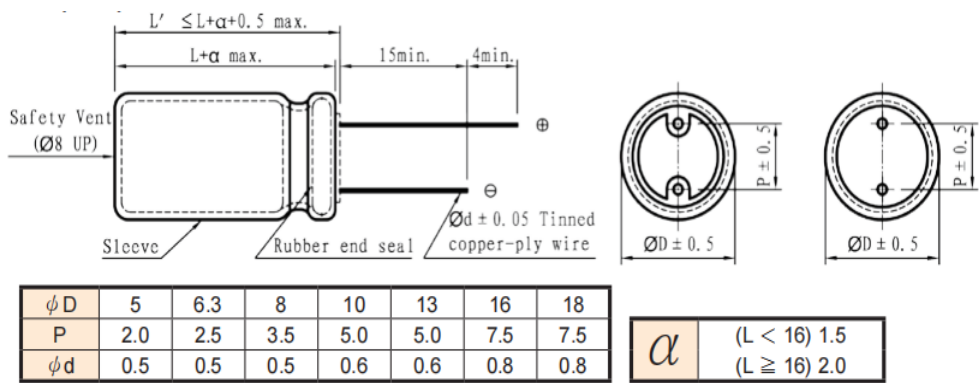




DIMENSIONS(mm)

Customer :		Electrolytic Capacitors										
		BP Series										
Electric Characteristics :												
P/N	WHC P/N	Cap. 120Hz (uF)	Cap. Tol. (%)	Rate Volt. (V-DC)	Surge Volt. (V-DC)	Oper. Temp. (℃)	Nominal Case Size D*L(mm)	Leakage Current Max(uA)	D.F. Max ()	RC 120HZ (mArms)	ESR 100KHZ (Ω) at25℃	Normal service life (Hours)
	WBP025M101F11S35	100	±20	25	32	-40 S +85	8*11	75	0.20	118	/	2000

备注：铜导针



BP series

- Non-polarity standard product , 85°C 2000hours.
- Suitable for DC two-way return circuit.
- RoHS Compliance
- 無極性 85°C 2000小時標準品。
- 適用於直流雙向迴路。

SPECIFICATIONS

Items 項目	Characteristics 特性								
Capacitance Tolerance 靜電容量誤差	± 20%(120Hz,20℃)								
Operating Temperature Range 適用溫度範圍	-40 ~ +85℃								
Rated Voltage Range 額定電壓範圍	6.3 ~ 100VDC								
Leakage Current 洩漏電流	I ≤ 0.03CV or 3 (μA) which is greater.(After 5 minutes application of DC rated voltage, at 20 °C)								
Dissipation Factor 散逸因素(tan δ)	Measurement Frequency: 120Hz. Temperature: 20℃								
	Rated Voltage(V)	6.3	10	16	25	35	50	63	100
	tan δ(Max)	0.26	0.24	0.22	0.20	0.16	0.14	0.12	0.10
	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	63	100
	Z(-25℃)/Z(20℃)	4	3	2	2	2	2	2	2
	Z(-40℃)/Z(20℃)	10	8	6	5	4	4	3	3
Load Life 負荷壽命	2000hours with the polarity inverted every 250 hours at 85℃								
	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℃ after exposing them for 1,000 hours 85℃ 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)								

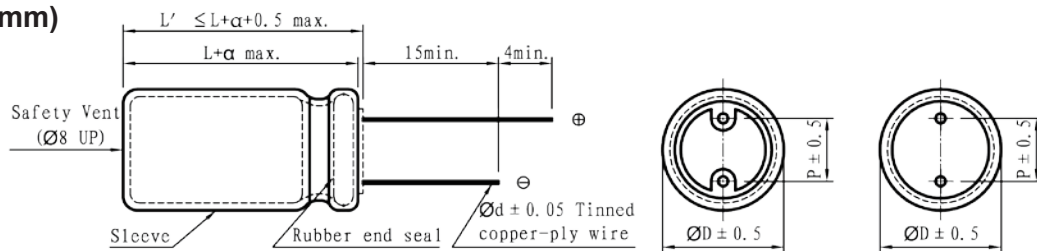
Frequency Coefficient of Permissible Ripple Current

Capacitance (μF)	Frequency (Hz)			
	50	120	1K	$\geq 10K$
< 100	0.80	1.00	1.30	1.50
≥ 100	0.80	1.00	1.15	1.20

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.

BP series

DIMENSIONS(mm)



ϕD	4	5	6.3	8	10	13	16	18
P	1.5	2.0	2.5	3.5	5.0	5.0	7.5	7.5
ϕd	0.45	0.5	0.5	0.5	0.6	0.6	0.8	0.8

α	(L < 16) 1.5 (L ≥ 16) 2.0
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STANDARD RATINGS

D×L(mm) ; R.C.(mA rms) at 85°C 120Hz

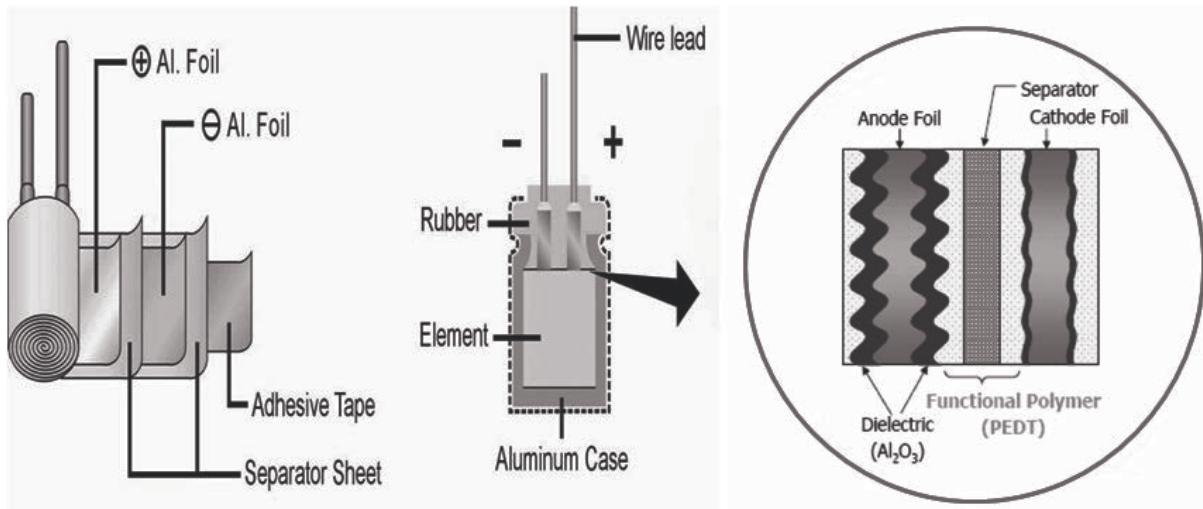
Cap (μF)	V (Code)	6.3 (0J)		10 (1A)		16 (1C)		25 (1E)	
	Item	D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L	R.C.
4.7						4x7	19	5x7	22
10						5x7	30	5x11	45
				4x7	24	5x11	42	6.3x7	35
22				5x7	41	5x11	59	6.3x7	53
				5x11	57	6.3x7	51	6.3x11	66
33	5x7	43		5x11	67	6.3x7	64	6.3x11	88
	5x11	63		6.3x7	56	6.3x11	80	8x7	74
47	6.3x7	58		6.3x7	67	6.3x7	75	8x7	87
	5x11	76		6.3x11	83	6.3x11	95	8x12	100
100	6.3x11	125		6.3x11	128	8x7	125	8x14	160
	8x7	96		8x7	110	8x12	160		
220	8x7	140		8x14	215	10x16	300	10x16	385
	8x12	210							
330	8x14	270		10x16	350	10x16	375	13x21	460
470	10x16	370		10x20	410	10x20	480	13x21	540
1000	10x20	650		13x21	720	13x25	855	16x26	950
2200	13x25	1160		16x26	1280	16x32	1510	18x35	1620
3300	16x26	1570		16x32	1690	18x35	1980		
4700	16x32	2020		18x35	2160				
6800	18x35	2600							

Cap (μF)	V (Code) Item	35 (1V)		50 (1H)		63 (1J)		100 (2A)	
		D x L	R.C.	D x L	R.C.	D x L	R.C.	D x L	R.C.
0.10				4x7	4				
0.22				4x7	6				
0.33				4x7	7.3				
0.47				4x7	8.9				
0.1~0.47				5x11	11	5x11	11	5x11	14
1.0				4x7	12	5x11	17	5x11	21
				5x11	17				
2.2				4x7	19	5x11	25	6.3x11	33
				5x11	25				
3.3				5x7	25	5x11	37	6.3x11	39
	4x7	20		5x11	28				
4.7	5x7	30		5x11	34	6.3x11	47	8x12	57
	5x11	34		6.3x7	38				
10	5x11	45		6.3x11	52	8x12	68	8x14	80
	6.3x7	48		8x7	54				
22	6.3x11	74		8x7	66	8x14	95	10x16	135
	8x7	62		8x12	88				
33	8x7	76		8x14	105	10x16	135	13x21	220
	8x12	105							
47	8x14	125		10x16	150	10x20	180	13x21	240
100	10x16	230		10x20	265	13x21	320	16x26	430
220	13x21	420		13x25	480	16x26	570	18x35	720
330	13x21	510		16x26	650	16x32	660		
470	13x25	660		16x32	840	18x35	965		
1000	16x32	1140							

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

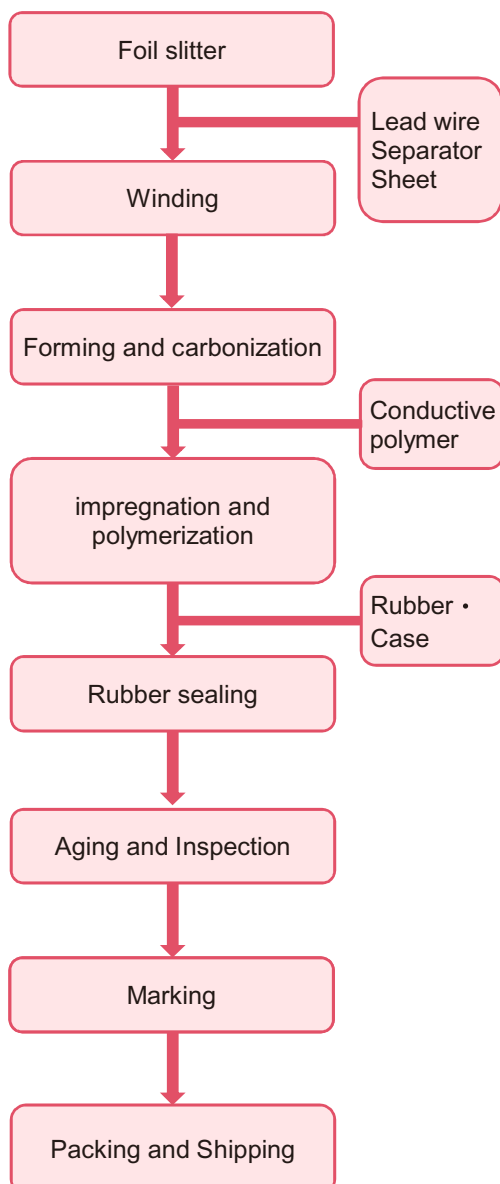
Aluminum Electrolytic Capacitor

Basic structure

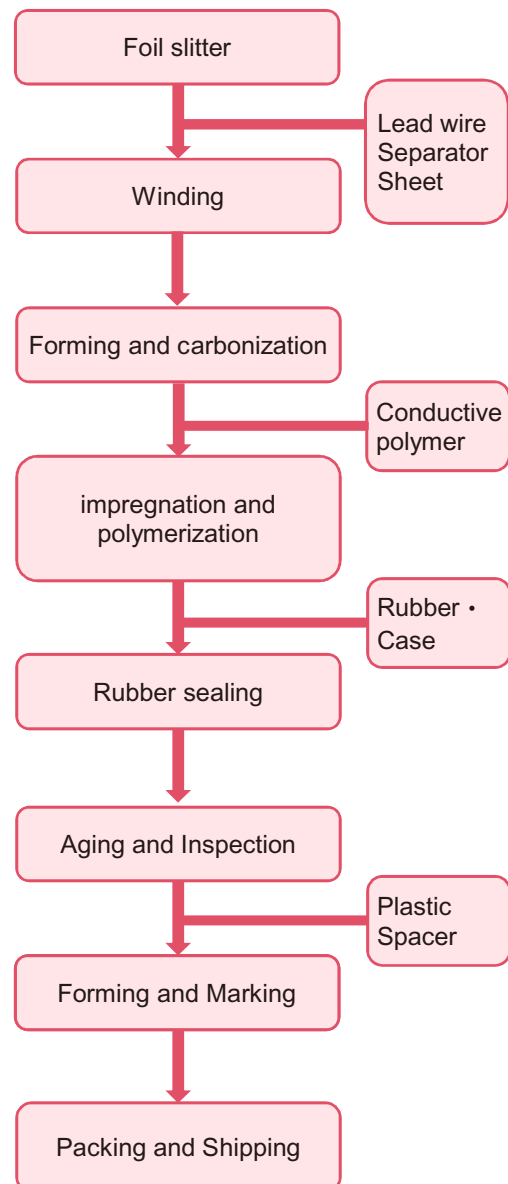


Manufacturing Method

Radial lead type



V-CHIP type

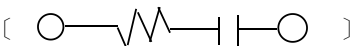
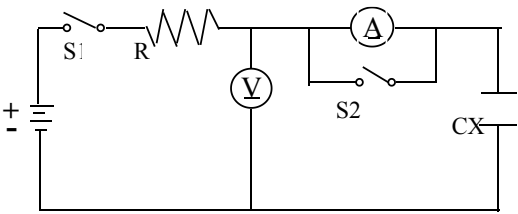


1. Scope 適用範圍：

This specification applies to aluminium electrolytic capacitor, used in electronic equipment.

本說明對於用電子儀器設備進行檢測之鋁電解電容器適用。

2. Electrical characteristics 電氣特性：

NO.	ITEM 項目	TEST METHOD 測試方法			SPECIFICATION 規格
2.1	Rated voltage 額定電壓	1. Measuring frequency : 120 ± 12Hz 測 定 頻 率 2. Measuring voltage : ≤0.5Vrms + 0.5 ~ 2.0VDC 測 定 電 壓 3. Measurement circuit :  測 定 電 路			Voltage range、capacitance range, see specification of this series. 電壓、容量範圍請看該系列之規格說明.
2.2	Capacitance 靜電容量				
2.3	Dissipation factor 散逸因素 (損失角)				
2.4	Leakage current 泄 漏 電 流	DC leakage current shall be measured after 1~2 minutes application of the DC rated working voltage through the 1000 Ω resistor at 20℃. 在20 ℃通過1000Ω的電阻施加直流工作電壓1~2分鐘後測定直流泄漏電流.  R : 1000 ± 100 Ω S1 : Swich 開關 A : DC current meter S2 : Swich for protect of 直流電流計 current meter V : DC voltage meter 直流電流計的保護開關 直流電壓計 CX : Testing capacitor 測試電容			Dissipation factor、leakage current, see specification of this series. 損失角、泄漏電流請看該系列之規格說明.
2.5	Temperature characteristics 溫度特性	STEP 步驟	TEMPERATURE 溫 度	STORAGE TIME 放置時間	Step 2. Impedance ratio (Zr / Zr0) less than specified value. 阻抗比：低于規定值 .
		1	20 ± 2 ℃	30 minutes	
		2	-40 ± 3 ℃	2 hours	
		3	20 ± 2 ℃	15 minutes	
		4	105 ± 2℃	2 hours	
		Step 1. Measure the capacitance and impedance. 測定靜電容量及阻抗 (Zr0) . (Z , 20℃ , 120Hz ± 10%)			Step 4 Capacitance change : within ± 20% of the initial measured value. 靜電容量變化：最初測定值的 ± 20%以內. Leakage current : Less than 10 times of initial specified value . 泄漏電漏:初期規格值的10倍以下.
Step 2. Measure the impedance at thermal balance after 2 hours. 達到熱平衡2小時後測定阻抗 (Zr) . (Z , -40℃, 120Hz ± 10%)					
Step 4. Measure the capacitance and leakage current at thermal balance after 2 hours. 達到熱平衡2小時後測定靜電容量及漏電流 .					

NO.	ITEM 項目	TEST METHOD 測試方法	SPECIFICATION 規格
2.6	Surge test 突波試驗	Rated surge voltage shall be applied (switch on) for 30 ± 5 seconds and then shall be applied (switch off) with discharge for 5 ± 0.5 min at room temperature . This cycle shall be repeated for 1000 cycles . Duration of one cycle is 6 ± 0.5 minutes . 在常溫下施加 (合上開關) 額定涌浪電壓 30 ± 5 秒, 然後停止施加 (斷開開關) 涌浪電壓並且放電 5 ± 0.5 分鐘. 這個循環要重複 1000 次. 以 6 ± 0.5 分鐘為一個循環周期 .	Capacitance change : within $\pm 20\%$ of the initial specified value. 靜電容量變化 : 最初規定值的 $\pm 20\%$ 以內. Dissipation factor : less than 200% of the initial specified value. 損失角 : 低於最初規定值的 200%.
2.7	APPLICABLE RIPPLE CURRENT 最大紋波電流 測試	The maximum A.C.current having frequency of 100K Hz which can be applied to the capacitor at $105 \pm 2^\circ\text{C}$ continuously. Peak voltage not to exceed rated D.C.voltage. 在 100K HZ 頻率條件下施加最大的紋波電流, 溫度 $105 \pm 2^\circ\text{C}$. 施加的 AC 及 DC 偏壓不能超過 DC 電壓.	Leakage current : within initial specified value. 泄漏電流: 在最初規定值以內

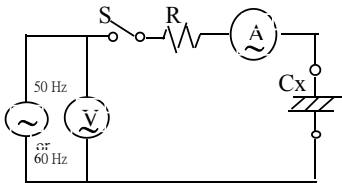
3. Mechanical characteristics 機械特性：

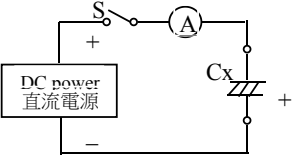
NO.	ITEM 項目	TEST METHOD 測試方法	SPECIFICATION 規格																										
3.1	Lead strength 端 子 強 度	(A) Tensile strength 拉伸強度： wire lead terminal 導針型： <table><tr><td>d (mm)</td><td>≤0.45</td><td>0.5 ~ 0.8</td><td>0.8 < d ≤ 1.25</td></tr><tr><td>load (Kg)</td><td>0.51</td><td>1.0</td><td>2.0</td></tr></table> snap-in terminal 尖腳型： <table><tr><td>d (mm)</td><td>snap-in terminal 尖腳端子</td></tr><tr><td>load (Kg)</td><td>2.0</td></tr></table> The capacitor shall withstand the constant tensile force specified between the body and each lead for 10 seconds without damage either mechanical or electrical. 電容器各端子要承受規定的荷重 10 秒, 不能有電氣或機械特性上的損傷. (B) Bending strength 彎曲強度： wire lead terminal 導針型： <table><tr><td>d (mm)</td><td>≤0.45</td><td>0.5 ~ 0.8</td><td>0.8 < d ≤ 1.25</td></tr><tr><td>load (Kg)</td><td>0.25</td><td>0.51</td><td>1.0</td></tr></table> snap-in terminal 尖腳型： <table><tr><td>cross section area of terminal 端 子 截 面 積 (mm²)</td><td>force 拉 伸 力 (Kg)</td></tr><tr><td>0.5 < S ≤ 1</td><td>1.0</td></tr><tr><td>S > 1</td><td>2.5</td></tr></table> With the capacitor in a vertical position apply the load specified axially to each lead . The capacitor shall be rotated slowly from the vertical to the horizontal position , back to the vertical position . The 90° in the opposite direction and back the original position . Performance of capacitor shall not have changed and leads shall be undamaged . 給在豎直位置的電容器的每一端子以軸方向施加規定荷重 , 慢慢將電容器由豎直位置轉至水平位置 . 然後向相反方向彎曲 90° , 再回到原來位置 . 電容器性能不能有變化及端子不能有損傷 .	d (mm)	≤0.45	0.5 ~ 0.8	0.8 < d ≤ 1.25	load (Kg)	0.51	1.0	2.0	d (mm)	snap-in terminal 尖腳端子	load (Kg)	2.0	d (mm)	≤0.45	0.5 ~ 0.8	0.8 < d ≤ 1.25	load (Kg)	0.25	0.51	1.0	cross section area of terminal 端 子 截 面 積 (mm ²)	force 拉 伸 力 (Kg)	0.5 < S ≤ 1	1.0	S > 1	2.5	When the capacitance is measured, there shall be no intermittent contacts, or open- or short- circuiting. 測定靜電容量時, 不能有接觸不良, 開路或短路. There shall be no such mechanical damage as terminal damage etc. 不能有如端子受損之類的機械特性上的損傷.
d (mm)	≤0.45	0.5 ~ 0.8	0.8 < d ≤ 1.25																										
load (Kg)	0.51	1.0	2.0																										
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0.5 < S ≤ 1	1.0																												
S > 1	2.5																												

NO.	ITEM 項目	TEST METHOD 測試方法	SPECIFICATION 規格
3.2	Vibration resistance 耐振性	The frequency of the vibration shall vary uniformly within the range 10 to 55 Hz with the amplitude of 1.5 mm, completing the cycle in the internal of one minute. The capacitor shall be securely mounted by its leads with hold the body of capacitor. The capacitor shall be vibrated in three mutually perpendicular directions for a period of 2 hours in each direction. 振動頻率要均勻, 範圍為 10 Hz, 到 55 Hz, 振幅為 1.5 mm, 在 1 分鐘內完成該循環. 電容器將由端子牢固地固定. 電容器會被向三個互相垂直的方向每個方向振動 2 小時.	Capacitance : no unsteady . 靜電容量 : 穩定 . Appearance : no abnormal . 外觀 : 無異常 . Capacitance change : within $\pm 5\%$ of initial measured value . 容量變化 : 最初測得值的 $\pm 5\%$ 之內 .
3.3	Solderability 焊錫性	The leads are dipped in the solder bath of Sn at $260 \pm 5^\circ\text{C}$ for 2 ± 0.5 seconds. The dipping depth should be set at 1.5 ~ 2.0 mm. 端子浸沒在 $260 \pm 5^\circ\text{C}$ 的錫焊液中 2 ± 0.5 秒. 浸沒深度設定為 1.5 ~ 2.0 mm.	The solder alloy shall cover the 95% or more of the dipped lead's area . 錫液要覆蓋導針浸入表面積的 95% 以上 .

4. Reliability 信賴度 .

NO.	ITEM 項目	TEST METHOD 測試方法	SPECIFICATION 規格
4.1	Soldering heat resistance 焊錫耐熱性	The leads immerse in the solder bath of Sn at $260 \pm 5^\circ\text{C}$ for 10 ± 1 seconds until a distance of 1.5 ~ 2mm from the case . 導針在 $260 \pm 5^\circ\text{C}$ 的錫焊液中浸沒至離本體 1.5 ~ 2 mm 的地方 10 ± 1 秒鐘 .	No damage or leakage of electrolyte . 無損傷或電解液漏出 . Capacitance change : within $\pm 10\%$ of the initial measured value . 容量變化 : 最初測定值的 $\pm 10\%$ 以內 . Tan δ : less than specified value . 損失角 : 低於規定值 . Leakage current : less than specified value . 泄漏電流 : 低於規定值 .
4.2	Damp heat (steady state) 耐濕性 (穩定狀態)	Subject the capacitors to $40 \pm 2^\circ\text{C}$ and 90% to 95% relative humidity for 240 ± 8 hours . 電容器在 $40 \pm 2^\circ\text{C}$ 及相對濕度 90% 到 95% 的條件下經歷 240 ± 8 小時 .	Capacitance change : within $\pm 10\%$ of the initial measured value . 容量變化 : 最初測定值的 $\pm 10\%$ 以內 . Tan δ : less than specified value . 損失角 : 低於規定值 . Leakage current : less than specified value . 泄漏電流 : 低於規定值 .

NO.	ITEM 項目	TEST METHOD 測試方法	SPECIFICATION 規格														
4.3	Load life 高溫負荷	After X hours continuous application of DC rated working voltage at $105 \pm 2^{\circ}\text{C}$,the measurements shall meet the following limits . Measurements shall be performed after 2 hours exposed at room temperature . 在 $105 \pm 2^{\circ}\text{C}$ 環境當中連續施加直流定格電壓 X小時後，按以下條件測試 . (X: see specification of this series. 見該系列規格說明 .)	Standard of judgement is according to requirement of this series . 判定標準依該系列要求 .														
4.4	Shelf life 高溫無負荷	After storage for Y hours at $105 \pm 2^{\circ}\text{C}$ without voltage application , the measurements shall meet the following limits . Measurements shall be performed after exposed for 1 to 2 hrs at room temperature after application of DC rated voltage to the capacitor for Z minutes . 在 $105 \pm 2^{\circ}\text{C}$ 環境當中不施加直流定格電壓放置Y 小時後，按以下條件測試 . 測試在室溫露置 1 到 2 小時，施加直流定格電壓 Z 分鐘後進行 . (Y , Z : see specification of this series. 見該系列規格說明 .)															
4.5	Storage at low temperature 低溫貯存	The capacitor shall be stored at temperature of $-40 \pm 3^{\circ}\text{C}$ for 240 ± 8 hours , during which time no voltage shall be applied . And then the capacitor shall be subjected to standard atmospheric conditions for 16 hours or more , after which measurements shall be made . 電容器在 $-40 \pm 3^{\circ}\text{C}$ 環境當中貯存 240 ± 8 小時，其間不施加電壓 . 之後，在標準大氣壓中露置 16 小時以上，然後進行測試 .	Capacitance change : within $\pm 10\%$ of the initial value . 容量變化：最初值的 $\pm 10\%$ 以內 . Tan δ : less than specified value . 損失角：低于規定值 . Leakage current : less than specified value . 泄漏電流：低于規定值 . Appearance : no abnormal . 外 觀 ：無異常 .														
4.6	Pressure relief 防 爆 試 驗	AC test 交流試驗： Applied voltage : AC voltage not exceeding 0.7 times of the rated direct voltage or 250 V AC whichever is the lower . 施 加 電 壓：不超過定格電壓 0.7 倍的交流電壓或低于交流電壓 250 V 的任意電壓 . Frequency 頻率：50 Hz or 60 Hz . Series resitor：refer to the table below . 串 聯 阻 抗：參照下表 . <table><tr><th>Capacitance (C) 容 量</th><th>Series resistor 串 聯 阻 抗</th></tr><tr><td>$C \leq 1 \mu\text{F}$</td><td>1000 Ω</td></tr><tr><td>$1 \mu\text{F} < C \leq 10 \mu\text{F}$</td><td>100 Ω</td></tr><tr><td>$10 \mu\text{F} < C \leq 100 \mu\text{F}$</td><td>10 Ω</td></tr><tr><td>$100 \mu\text{F} < C \leq 1000 \mu\text{F}$</td><td>1 Ω</td></tr><tr><td>$1000 \mu\text{F} < C \leq 10000 \mu\text{F}$</td><td>0.1 Ω</td></tr><tr><td>$10000 \mu\text{F} < C$</td><td>*</td></tr></table> * Resistance is equivalent to a half impedance by test frequency . 相當于試驗頻率的一半阻抗值 .	Capacitance (C) 容 量	Series resistor 串 聯 阻 抗	$C \leq 1 \mu\text{F}$	1000 Ω	$1 \mu\text{F} < C \leq 10 \mu\text{F}$	100 Ω	$10 \mu\text{F} < C \leq 100 \mu\text{F}$	10 Ω	$100 \mu\text{F} < C \leq 1000 \mu\text{F}$	1 Ω	$1000 \mu\text{F} < C \leq 10000 \mu\text{F}$	0.1 Ω	$10000 \mu\text{F} < C$	*	AC test circuit 交流試驗回路  $\sim$: AC power 交流電源 S : Switch 開關 V : AC voltage meter 交流電壓計 A : AC current meter 交流電流計 R : protection resistor 保護電阻 Cx : testing capacitor 供試電容器
Capacitance (C) 容 量	Series resistor 串 聯 阻 抗																
$C \leq 1 \mu\text{F}$	1000 Ω																
$1 \mu\text{F} < C \leq 10 \mu\text{F}$	100 Ω																
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$1000 \mu\text{F} < C \leq 10000 \mu\text{F}$	0.1 Ω																
$10000 \mu\text{F} < C$	*																

NO.	ITEM 項目	TEST METHOD 測試方法	SPECIFICATION 規格
4.6	Pressure relief 防爆試驗	DC test 直流測試 : Send the following electricities while applying the inverse voltage . 施加反向電壓時通入下記電流 . where case size 外殼尺寸 (D 直徑) : $D \leq 22.4 \text{ mm} : 1 \text{ A d.c. max}$ $D > 22.4 \text{ mm} : 10 \text{ A d.c. max}$ Note : 1. This requirement applies to capacitors with a diameter of 6 mm or more . the test may be ended . 注 : 1. 此要求對於直徑 6 mm 或以上之電容器適用 . 2. 試驗開始 , 經 30 分鍾後防爆裝置仍不動作 , 試驗終止 .	DC test circuit 直流試驗回路  S : Switch 開關 (A) : DC current meter 直流電流計 Cx : testing capacitor 供試電容器 of fire or explosion of capacitor elements (terminal and metal foil etc) or cover . 防爆裝置必須動作 , 以防止發生火災、爆炸或金屬片飛濺 .

5 Marking 標識 :

Marking on capacitors include :

電容器上的標識包括

trade-mark 商標 WHC	330μF 35 V 330μF 35 V 330μF 35 V 330μF 35 V
Working voltage 工作電壓 例如 35v	
Norminal capacitance 標準靜電容量 例如 330uF	WHC MF(M)105°C WHC MF(M)105°C WHC MF(M)105°C WHC MF(M)105°C
Tolerance 靜電容量許容差 例如 M	
Polarity 負極線 	WHC 68μF 450 v WHC 68μF 450 v
Operating temperature range 工作溫度範圍, 例如 105°C	MF(M)105°C MF(M)105°C MF(M)105°C
Product seriation 产品系列, 例如 MF	11.4

鋁電解電容器存放環境與控制

Storage Conditions and Control for Aluminum Electrolytic Capacitor

1. 環境溫度：5℃ ~ 35℃，環境相對濕度：75%以下。

Store the capacitor at a temperature of 5℃ to 35℃ and at a relative humidity of less than 75%.

2. 存放環境不應有陽光直射，不宜高溫。

Store the capacitor in low temperature places free from direct sun shine.

3. 存放環境不能有鹽分、油含量高的霧氣。

Store the capacitor in places free from oil vapor、salt water vapor.

4. 存放在遠離氯氣、氨氣、硫化氫、亞硫酸、硝酸等有害氣體含量高的地方。

Store the capacitor in places far from toxic gases (chlorine、ammonium、hydrogen sulfide、sulphurous acid、nitric acid, etc)

5. 儲存環境不能有臭氧、紫外線或輻射。

Store the capacitor in place free from Ozone、ultraviolet ray or radiation.

使用清潔劑之注意事項：

Detergent needing attention:

鋁質電解電容器會受含有碳化氫鹵素溶劑之侵蝕，下列為各種安全與不安全之清潔劑，為避免不必要的損失，您所使用有關印刷基板之清潔劑名請事先告知本公司。

Hydrogen carbide liquid and halogen liquid can cause Aluminium Electrolytic Capacitor to corrode. Some of Safe and Unsafe detergent are as follows;

Safe 安全	Unsafe 不安全
Dimethybenzene 二甲苯	1.1.2- Trichloroethane 1.1.2- 三氯乙烷
Methanol 甲醇	Tetrachloroethylene 四氯化碳
Ethanol 乙醇	Chloroform(colorless volatilizable liquid) 哥羅仿(無色揮發性液體)
Propanol 丙醇	Dichloromethane 二氯甲烷
Butanol 丁醇	Trichlorethylene 三氯甲烯
Detergent 去垢劑	

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-polarized capacitor to reverse polarity circuit but bi-polarized 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.

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- (5) 振動或衝擊條件超過交貨仕様書規定範圍的惡劣環境。 .
- (5) Under severe conditions where vibration and / or mechanical shock exceed the applicable ranges of the specification.
8. 在設計電容器的安裝時，必須確認下述內容：
8. In designing a circuit, the following matters should be ensured in advance to the capacitor assembly on the P.C. board.
- (1) 線路板的孔距必須與電容器兩端子的間距相吻合。
- (1) Design the appropriate hole spacing to match the lead pitch of capacitors.
- (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。
- (2) Do not locate any wiring and circuit patterns directly above the capacitor vent. Ensure enough free space above the capacitor vent.
- (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。
- (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. 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。
9. Electrical characteristics may vary depending on changes in temperature and frequency. Please consider this variation when you design circuits.
- 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。
10. When you mount capacitors on the double-sided P.C. boards, avoid excess substrate holes and vias to capacitor location.
- 11.並聯兩個以上的電容器時，要充分考慮電流平衡。
11. When you install more than 2 capacitors in parallel, consider the balance of current flowing through the capacitors.
- 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。
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1K Ω 的電阻器進行放電。
3. 長期保存的電容器，需通過約1K Ω 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 1K Ω 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.

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- (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℃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℃、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 from 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℃. 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℃ to 35℃ 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。

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、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。

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、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，請直接與我司的業務部或研發部聯繫，我司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。

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 EIAJ RCR-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.

鋁電解電容器使用需知

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

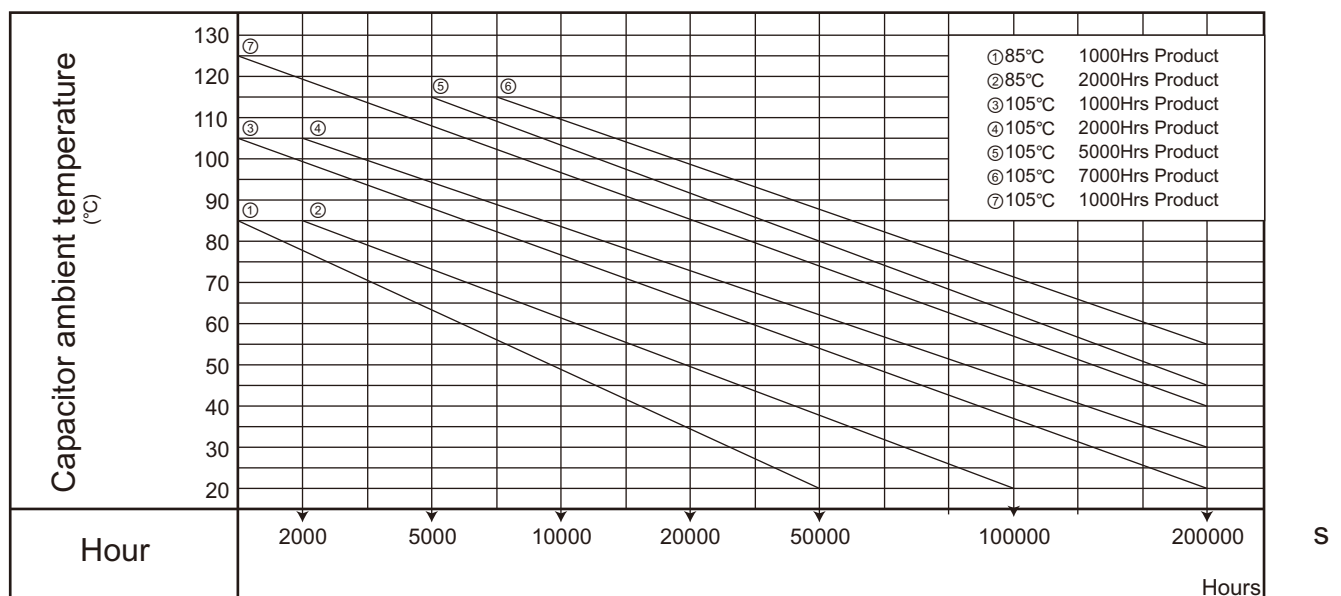
T_x = Actual ambient temperature (°C) of capacitor

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 .

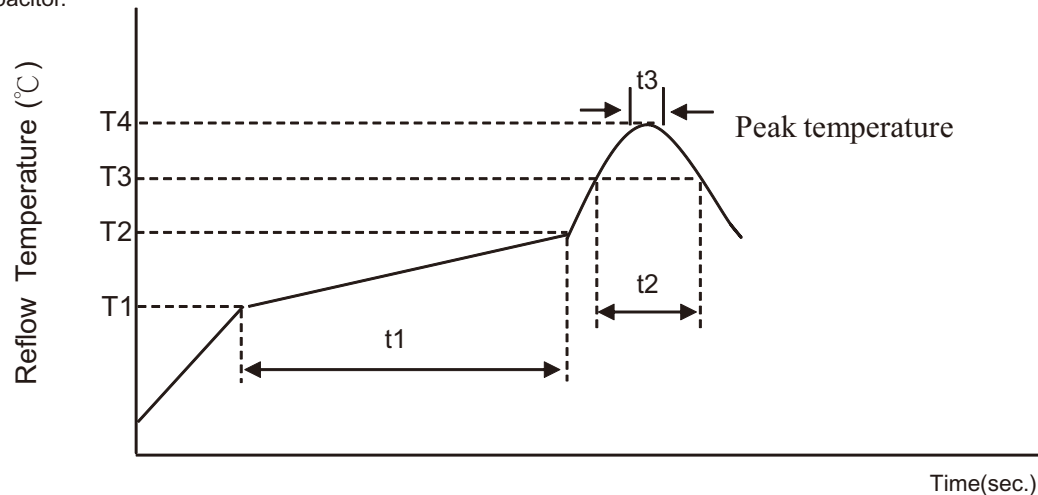


- ※ 1. A guide limit of the calculated like Aimo is 15 years max
2. $T_x \geq 40^\circ\text{C}$

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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

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

