VT 型片式铝电解电容
VT Series Chip Type Aluminum Electrolytic Capacitors

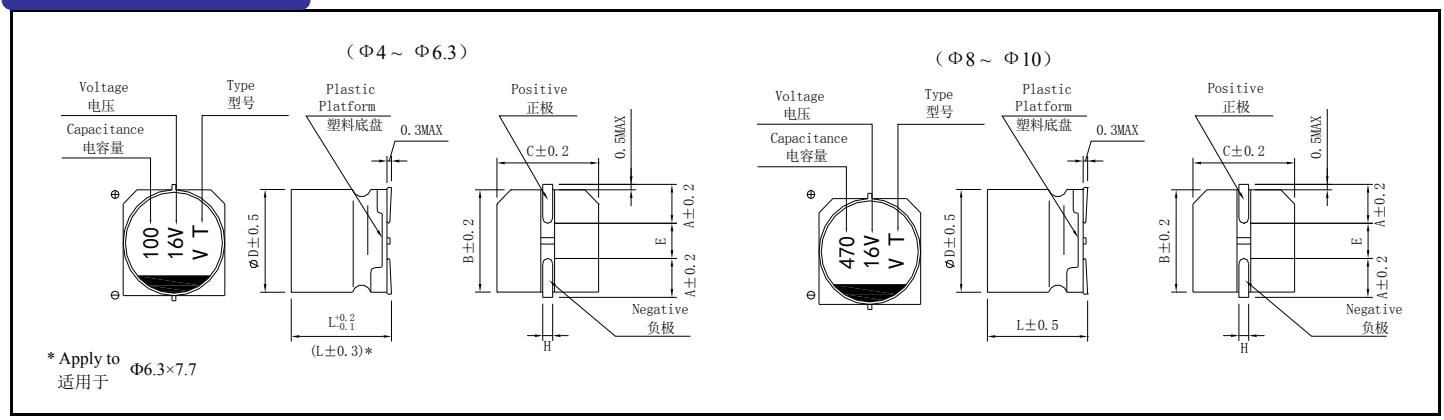
特点 Features

- 产品直径 Case diameter: Φ 4mm – Φ 10mm.
- 适用于再流焊。 Reflow soldering is available.
- 适用于高密度表面组装。Available for high density surface mounting.
- 工作温度范围宽（-40 ~ +105℃）Operating over wide temperature range.
- ROHS 指令已对应完毕。Adapted to the ROHS directive.

主要技术性能 Specifications

项目 Items	特性 Characteristics							
工作温度范围 Operating Temperature Range	-40℃ ~ +105℃							
额定电压范围 Rated Voltage Range	6.3V ~ 50V							
标称电容量范围 Nominal Capacitance Range	0.1 ~ 1500μF							
标称电容量允许偏差 Nominal Capacitance Tolerance	±20%（20℃，120Hz）							
漏电流 Leakage Current	I≤0.01$C_R V_R$ or 3(μA)，取较大者（2 分钟） C_R：标称电容量（μF） U_R：额定电压（V） I≤0.01$C_R V_R$ or 3(μA) Whichever is greater(at 20℃,After 2 minutes) C_R: Nominal Capacitance (μF) U_R: Rated voltages (V)							
损耗角正切（tgδ） Dissipation Factor (Max) 20℃, 120Hz	U_R (V)	4	6.3	10	16	25	35	50
	tgδ	0.35	0.28	0.24	0.20	0.16	0.14	0.12
耐久性 Load Life	+105℃施加额定电压 1000 小时后，电容器应满足以下要求： After 1000 hours' application of rated voltage at 105℃, the capacitor shall meet the following requirement:							
	电容量变化率 Capacitance Change	±20%初始值以内 Within ±20% of the initial value						
	损耗角正切 Dissipation Factor	≤ 200%初始规定值 Not more than 200% of the initial specified value						
	漏电流 Leakage Current	≤ 初始规定值 Not more than the initial specified value						
高温贮存 Shelf Life	+105℃贮存 1000 小时后，电容器应满足以上耐久性要求 After storage for 1000 hours at +105℃, the capacitors shall meet the requirement of load life above							
低温特性 Low Temperature Stability 阻抗比 Impedance Ratio (120Hz)	U_R (V)	4	6.3	10	16	25	35	50
	Z(-25℃)/Z(+20℃)	7	4	3	2	2	2	2
	Z(-40℃)/Z(+20℃)	15	8	6	4	4	3	3
耐焊接热 Resistance to Soldering Heat	在 250℃的条件下，电容器在热板上保持 30 秒，然后从热板上取出电容器，让其在室温下恢复，电容器应满足以下要求：The capacitors shall be kept on the hot plate maintained at 250℃ for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the following requirement.							
	电容量变化率 Capacitance Change	±10%初始值以内 Within ±10% of the initial value						
	损耗角正切（tgδ） Dissipation Factor	≤初始规定值 Not more than the initial specified value						
	漏电流 Leakage Current	≤初始规定值 Not more than the initial specified value						

尺寸图 Dimensions



(mm)

	4 × 5.4	5 × 5.4	6.3 × 5.4	6.3 × 7.7	8 × 6.5	8 × 10.5	10 × 10.5
A	1.8	2.1	2.4	2.4	2.9	2.9	3.2
B	4.3	5.3	6.6	6.6	8.3	8.3	10.3
C	4.3	5.3	6.6	6.6	8.3	8.3	10.3
E	1.0	1.3	2.2	2.2	2.3	3.1	4.5
L	5.4	5.4	5.4	7.7	6.5	10.5	10.5
H	0.5 ~ 0.8					0.8 ~ 1.1	

■ 标称电容量、额定电压、额定纹波电流与外形尺寸对应表

Nominal capacitance, rated voltage, rated ripple current and case size table

V / μF	6.3		10		16		25		35		50	
	D×L mm	I~ mA	D×L mm	I~ mA	D×L mm	I~ mA	D×L mm	I~ mA	D×L mm	I~ mA	D×L mm	I~ mA
0.1											4×5.4	2.3
0.22											4×5.4	3.4
0.33											4×5.4	4.1
0.47											4×5.4	5
1.0											4×5.4	10
2.2											4×5.4	16
3.3									4×5.4	13	4×5.4	16
4.7							4×5.4	22	4×5.4	22	5×5.4	23
10					4×5.4	28	5×5.4	28	5×5.4	30	6.3×5.4	32
22	4×5.4	29	5×5.4	30	5×5.4	39	6.3×5.4	55	6.3×5.4	60	6.3×7.7	51
33	5×5.4	34	5×5.4	34	5×5.4	35	6.3×5.4	65	8×6.5	84	6.3×7.7	70
47	5×5.4	46	6.3×5.4	48	6.3×5.4	70	6.3×5.4	70	6.3×7.7	80	6.3×7.7	80
100	6.3×5.4	71	6.3×5.4	69	6.3×5.4	70	6.3×7.7	100	8×10.5	296	8×10.5	230
220	6.3×7.7	120	6.3×7.7	120	6.3×7.7	120	8×10.5	320	10×10.5	435	10×10.5	375
330	8×10.5	290	8×10.5	305	8×10.5	425	10×10.5	450	10×10.5	450		
470	8×10.5	330	8×10.5	340	8×10.5	340	10×10.5	490				
1000	8×10.5	340	10×10.5	410	10×10.5	450						
1500	10×10.5	475										

I~=Rated ripple current (mA) (105℃, 120Hz) I~=额定纹波电流（mA）（105℃，120Hz）

■ 额定纹波电流的频率系数 Frequency coefficient of ripple current

Frequency 频率	50Hz	120Hz	300Hz	1KHz	10K~100Hz
Coefficient 系数	0.70	1.00	1.17	1.36	1.50

铝电解电容器产品编码体系表

Product symbol system for Aluminum Electrolytic Capacitors

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Series Code		Voltage (WV)		Capacitance (μF)			Tolerance	Size Code				Terminal Code			Brand	Sleeve	Other	Supplement Code	

填写品种一览表的系列名称
Fill in Series Code Of Variety list

例：

Series	Code
CD110	GR
CD293	LP

Voltage	Code
2.5	0E
2.7	0F
4	0G
6.3	0J
8	0K
10	1A
16	1C
25	1E
35	1V
40	1G
50	1H
63	1J
80	1K
100	2A
125	2B
160	2C
180	2Z
200	2D
220	2P
250	2E
315	2F
330	2U
350	2V
400	2G
420	2M
450	2W
500	2H

Cap (μF)	Code
0.1	0R1
0.22	R22
0.47	R47
1	010
2.2	2R2
4.7	4R7
10	100
22	220
47	470
100	101
220	221
470	471
680	681
1000	102
2200	222
4700	472
10000	103

Cap (F)	Code
0.5	504
1	105
4.7	475
10	106
47	476
100	107

Tolerance (%)	Code
+5	J
-5	
+10	K
-10	
+15	Y
-15	
+20	M
-20	
+20	R
-0	
+20	H
-5	
+20	V
-10	
+30	F
-0	
+30	G
+10	
+30	Q
-10	
+20	E
-15	
-30	B
+20	

ΦD	Code
3	A
4	B
5	C
6	D
6.3	E
8	F
10	G
12	H
12.5	I
13	J
14	K
16	L
18	M
19	N
20	O
22	P
25.4	Q
30	R
35	S
40	T
50	U
51	V
63.5	W
76	X
89	Y
45	Z

L	Code
5	050
5.4	054
7	070
9	090
10	100
11	110
11.5	115
12	120
14	140
16	160
20	200
25	250
30	300
35	350
40	400
45	450
50	500
55	550
60	600
70	700
80	800
90	900
100	10A
105	10B
110	11A
115	11B
120	12A
130	13A
140	14A
150	15A
160	16A
200	20A
205	20B
210	21A
215	21B

Brand	Code
Chang	C

Sleeve	Code
PVC	V
PET	E

Terminal Code

1. 引线式

产品形式	代码	产品形式	代码
H=7	Z70	H=16	Z16
H=7.5	Z75	H=17	Z17
H=7.7	Z77	J1H=4	J40
H=8	Z80	LHB=11	L11
H=9	Z90	MH=3.3	M33
H=3.2	Z32	散装	A00
H=10	Z10	编带 F=2.5	B25
H=11	Z11	编带 F=3.5	B35
H=12	Z12	编带 F=5.0	B50
H=15	Z15	…	…

2. 焊针式

焊针类别	代码	焊针长 L1	E 尺寸
二针不自锁	N68	6.8	11.8
二针自锁(长)	S68	6.8	12.5
二针自锁(短)	S55	5.5	12.25～12.40
二针卧式	W15	15	
	W16	16	
	W17	17	
四焊针(弯形)	C68	6.8	
四焊针(直形)	C90	9.0	
五焊针(弯形)	X68	6.8	
五焊针(直形)	X90	9.0	

3. 焊片式

焊片类别	代 码	焊片长 L1
垂直形	K68	6.8
	K52	5.2
U 形	U12	12

4. 螺栓式

螺柱直径	代 码	
	底部无螺柱	底部有螺柱
8	R08	D08
10	R10	D10
17.2	R17	D17

For example: CD110 16WV 2200μF 20% 12.5×25 taping F=5.0 Brand: Chang PVC Sleeve

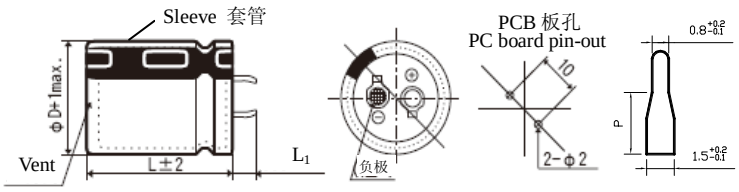
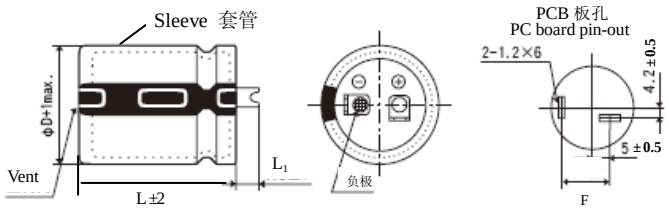
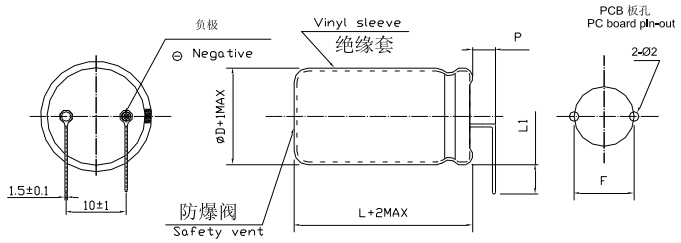
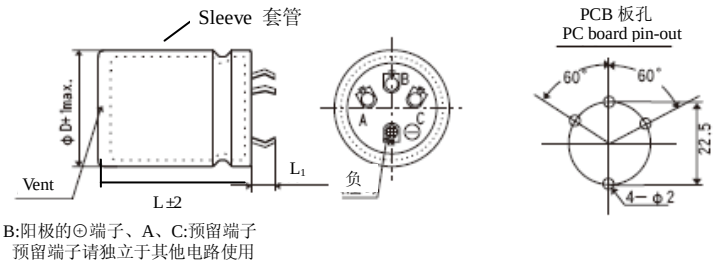
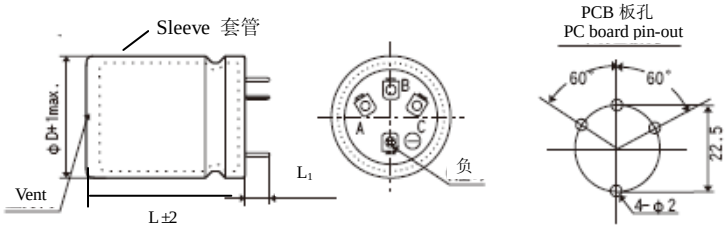
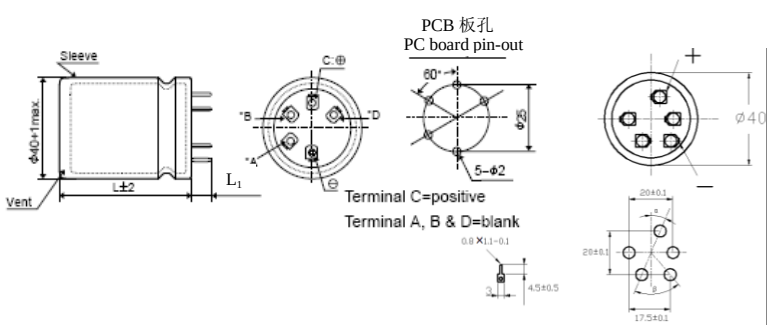
G	R	1	C	2	2	2	M	I	2	5	0	B	5	0	C	V	0

■基板自立型焊针产品特殊形状图及规格表

Aviailabl terminals for Snap-in table and figure

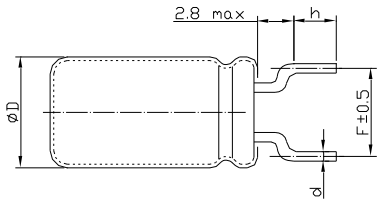
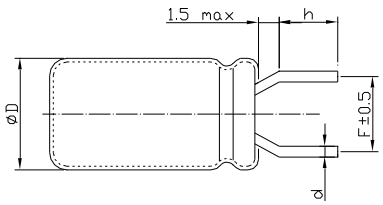
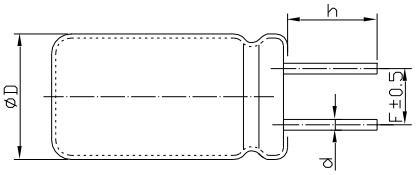
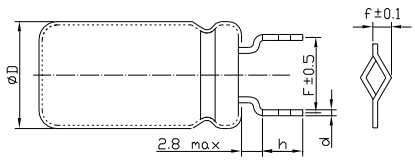
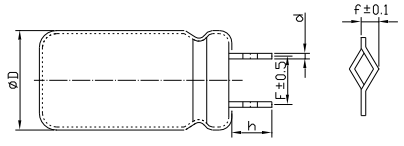
焊针形状可以定制

The following terminal options can be selected

代号 Code	尺寸 size				外形图 Figure
	D	F±0.5	L1±0.5	P	
S55(自锁) S68(自锁) N68(不自锁)	Ø 20~35	10	4.5	—	
			5.8	—	
K68	Ø 30~40	14.3	5.8	—	
K52	Ø 30~40	14.7	4.5	—	
W16	Ø 20	8	5.5	3.0±1	
W16	Ø 22	10	4.0	3.0±1	
W17	Ø 25.4	10	4.0	3.0±1	
C68	Ø 35~40	—	5.8	—	
C90	Ø 40	—	8.0	—	
X68(弯形端子)	Ø 40	—	5.8	—	
X90(直形端子)			8.0		

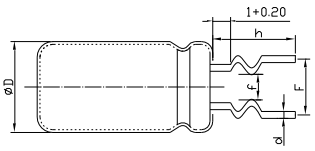
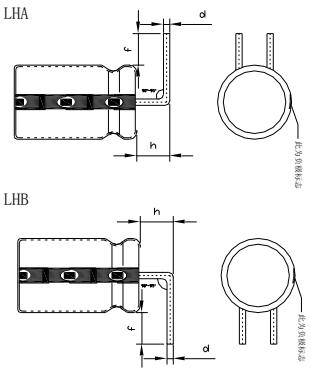
■ 引线成形产品外形图及规格表

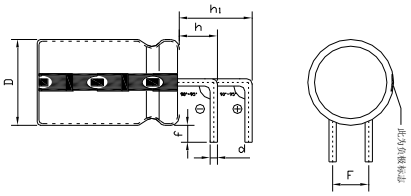
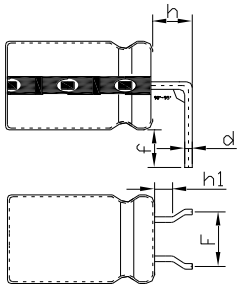
Leads forming size table and figure

代号	尺寸					外形图
	D	d±0.05	F±0.5	h	f	
M	Ø4	0.45	5	3.8 ± 0.2	—	
	Ø5	0.45、0.5	5	3.8 ± 0.2	—	
	Ø6	0.45、0.5	5	3.8 ± 0.2	—	
	Ø6.3	0.45、0.5	5	3.8 ± 0.2	—	
	Ø8	0.5、0.6	5	3.8 ± 0.2	—	
M_2	Ø4	0.45	2.5	3.8 ± 0.2	—	
	Ø5	0.45、0.5	2.5	3.8 ± 0.2	—	
Z	Ø4	0.45	1.5	3.8 ± 0.2	—	
	Ø5	0.45、0.5	2.0	3.8 ± 0.2	—	
	Ø6	0.45、0.5	2.5	3.8 ± 0.2	—	
	Ø6.3	0.45、0.5	2.5	3.8 ± 0.2	—	
	Ø8	0.5、0.6	3.5	3.8 ± 0.2	—	
	Ø10	0.6	5	3.8 ± 0.2	—	
	Ø12(Ø12.5)	0.6	5	3.8 ± 0.2	—	
	Ø13	0.6	5	3.8 ± 0.2	—	
	Ø16~ Ø18	0.8	7.5	3.8 ± 0.2	—	
	Ø19	0.8	7.5(10)	3.8 ± 0.2	—	
J2	Ø5	0.45、0.5	5	4.2 ± 0.2	1.1±0.1	
	Ø6~ Ø6.3	0.45、0.5	5	4.2 ± 0.2	1.1±0.1	
	Ø8	0.5、0.6	5	4.2± 0.2	1.1±0.1	
J1	Ø10	0.6	5	4.5± 0.2	1.2±0.1	
	Ø12（Ø 12.5）	0.6	5	4.5± 0.2	1.2±0.1	
	Ø16~ Ø 18	0.8	7.5	4.5 ± 0.2	1.3±0.1	
	Ø19	0.8	7.5(10)	4.5 ± 0.2	1.3±0.1	

■ 引线成形产品外形图及规格表

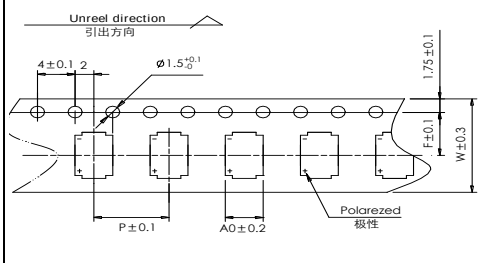
Leads forming size table and figure

代号	尺寸					外形图
	D	d±0.05	F±0.5	h	f	
E	Ø5	0.45、0.5	5±0.3	12±0.2	3.3±0.2	
	Ø6~ Ø6.3	0.45、0.5				
	Ø8	0.5、0.6				
LHA/ LHB	Ø5	0.5	2.0	2.0±0.5	3.2±0.2	
	Ø6~ Ø6.3	0.5	2.5	2.0±0.5	3.5±0.2	
	Ø8	0.5、0.6	3.5	2.0±0.5	4.0±0.2	
	Ø10	0.6	5	2.2±0.5	4.0±0.2	
	Ø12 （Ø 12.5）	0.6	5	2.2±0.5	3.5±0.2	
	Ø16~ Ø 20	0.8	7.5	2.2±0.5	4.5±0.2	

代号	尺寸						外形图
	D	d±0.05	F±0.5	h	h1	f	
LHD	ϕ12.5	0.6	5.0	4.0±0.5	10±0.5	3.8±0.5	
LHF	ϕ8	0.5	5.0	2.0～2.5	1 Max	3.7±0.3	

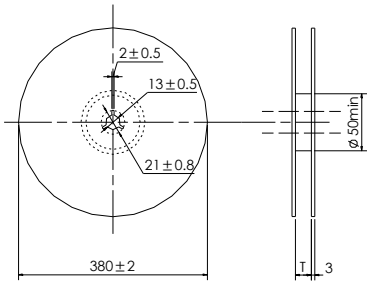
片式铝电解电容的编带、包装
Taping of Chip Type Aluminum Electrolytic Capacitors，Package

■ 编带 Carrier tape



ΦD×L	4×5.4	5×5.4	6.3×5.4	6.3×7.7	8×6.5	8×10.5	10×10.5
W	12.0	12.0	16.0	16.0	16.0	24.0	24.0
P	8.0	12.0	12.0	12.0	12.0	16.0	16.0
F	5.5	5.5	7.5	7.5	7.5	11.5	11.5
A_0	5.0	6.0	7.0	7.0	8.7	8.7	10.7
B_0	5.0	6.0	7.0	7.0	8.7	8.7	10.7
T_2	5.8	5.8	5.8	8.0	6.8	11.0	11.0

■ 编带包装盘 Reel



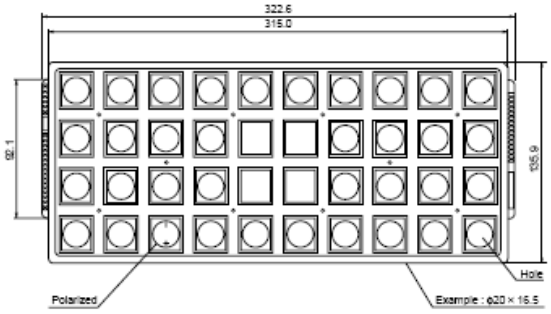
Package quantity 包装数量

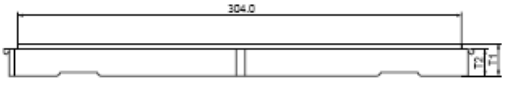
ΦD×L	Quantity / Reel 数量 / 每盘	pcs/bag 数量/箱
4×5.4	2000pcs	24000pcs
5×5.4	1000pcs	12000pcs
6.3×5.4 6.3×7.7 8×6.5	1000pcs	10000pcs
8×10.5 10×10.5	500pcs	3500pcs

（mm）

ΦD×L	4×5.4	5×5.4	6.3×5.4	6.3×7.7	8×6.5	8×10.5	10×10.5
T	14	14	18	18	18	26	26

φ12.5~φ20 的包装 φ12.5~φ20Package





(mm)

Size (φD×L)	T_1	T_2
12.5×13.5, 12.5×16	22	18
16×16.5, 18×16.5, 20×16.5	22.5	18.5
12.5×21	28	23
16×21.5, 18×21.5, 20×21.5	28.5	23.5

Package quantity

φD	Q'ty / tray
12.5	70pcs.
16	60pcs.
18, 20	40pcs.

铝电解电容器编带形状及尺寸要求（标准品）
Taping of Aluminum Electrolytic Capacitor and size （Standard products）

Fig-1

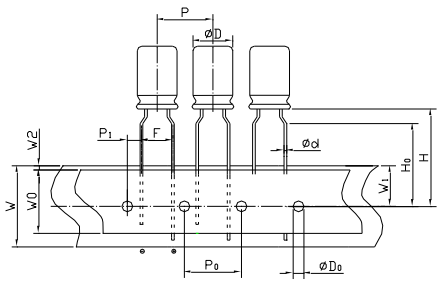


Fig-2

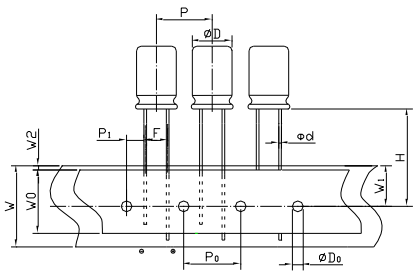
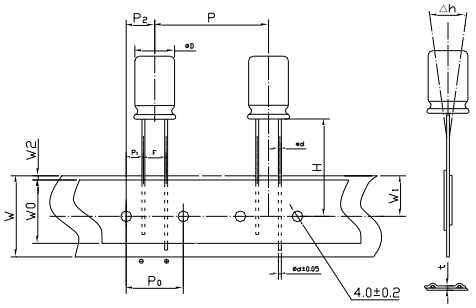


Fig-3



■ 编带尺寸表 Size table

代号	公差.	外径（D）									
		Ø5	Ø6 (6.3)	Ø8	Ø10	Ø12-13	Ø12-13	Ø16-19	Ø5	Ø6 (6.3、8)	Ø8
d	±0.05	0.5	0.5	0.5、0.6	0.6		0.6	0.8	0.5		0.5、0.6
P	±1.0	12.7			12.7	15.0	25.4	30.0	12.7		
P_0	±0.2	12.7			12.7	15.0	12.7	15.0	12.7		
P_1	±0.5	3.85	3.85	3.85	3.85	5.0	3.85	3.75	5.35	5.1	4.6
F	+0.5 -0.2	5.0	5.0	5.0	5.0		5.0	7.5	2.0	2.5	3.5
W	±0.5	18.0			18.0		18.0		18.0		
W_1	±0.5	9.0			9.0		9.0		9.0		
W_2		≤1.5			≤1.5		≤1.5		≤1.5		
W_0		≥12			≥12		≥12		≥12		
H	±0.75	18.5			18.5		18.5		18.5		
H_0	±0.5	16			-		-		-		
D_0	±0.2	Ø4.0			Ø4.0		Ø4.0		Ø4.0		
t	±0.2	0.6			0.7		0.7		0.6		
Δh		≤2.0			≤2.0		≤2.0		≤2.0		
Reference figure		Fig-1			Fig-2		Fig-3		Fig-4		

■ 编带产品包装量 Packaging Specification

产品直径 Parts diameter (mm)	折叠式 Ammunition 每盒产品数（只）Quantity/Box(pcs)	折叠盒中包装尺寸 Ammunition packing dimensions (mm)
Ø5	2000	325 × 229 × 51
Ø6(6.3)	1500	325 × 229 × 51
Ø8	1000	330 × 240 × 51
Ø10	500	330 × 191 × 51
Ø12.5	450	325 × 267 × 58
Ø16	250	315 × 221 × 63

铝电解电容器编带形状及尺寸要求 （超小型）

Taping of Aluminum Electrolytic Capacitor and size （Super miniature products）

Fig-4

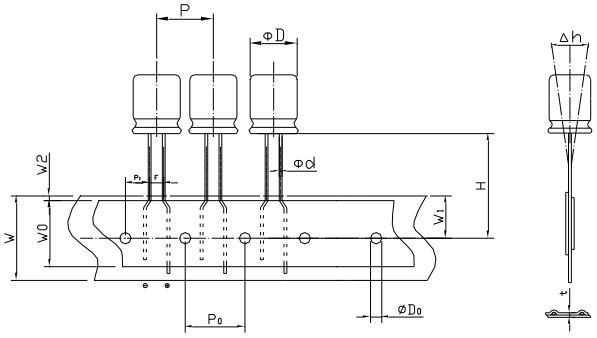
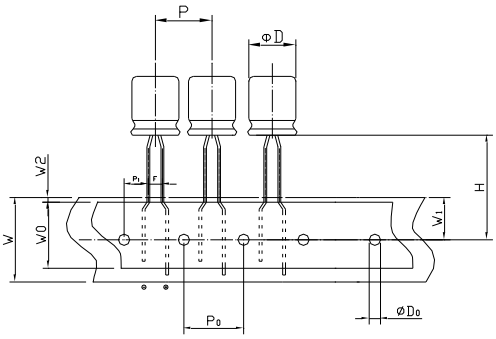


Fig-5



■ 编带尺寸表 Size table

代号	公差	外径（D）												
		Ø3	Ø4	Ø5	Ø 6.3	Ø8	Ø3	Ø4	Ø5	Ø 6.3	Ø8	Ø3	Ø4	Ø5
d	±0.05	0.4	0.45		0.5	0.5	0.4	0.45		0.5	0.5	0.4	0.45	
P	±1.0	12.7					12.7					12.7		
P_0	±0.2	12.7					12.7					12.7		
P_1	±0.5	3.85					5.85	5.6	5.35	5.1	**5.1**	4.6	5.1	
F	+0.5 -0.2	5.0					1.0	1.5	2.0	2.5	**2.5**	3.5	2.5	
W	±0.5	18.0					18.0					18.0		
W_1	±0.5	9.0					9.0					9.0		
W_2		≤3					≤3					≤3		
W_0		≥7.0					≥7.0					≥7.0		
H	±0.75	18.5					18.5					18.5		
H_0	±0.5	16					-					-		
D_0	±0.2	Ø4.0					Ø4.0					Ø4.0		
t	±0.2	0.6					0.6					0.6		
Δh		≤2.0					≤2.0					≤2.0		
Reference figure		Fig-1					Fig-4					Fig-5		

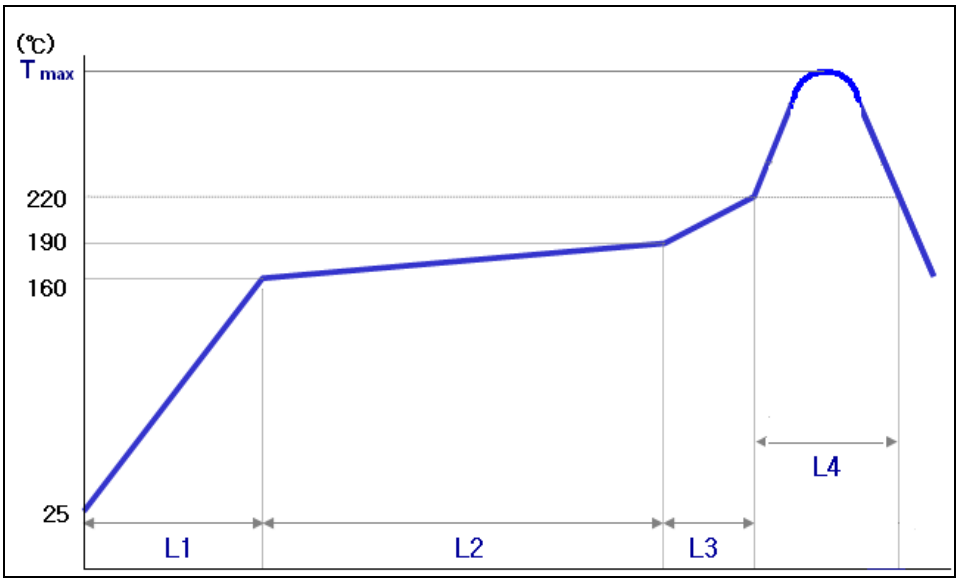
■ 编带产品包装量 Packaging Specification

产品直径 Parts diameter (mm)	折叠式 Ammunition 每盒产品数（只）Quantity/Box(pcs)	折叠盒中包装尺寸 Ammunition packing dimensions (mm)
Ø4 × 5	2500	325× 229 × 45
Ø4 × 7		
Ø5 × 5	2000	325× 229 × 45
Ø5 × 7		
Ø6.3 × 5	1500	325× 229 × 45
Ø6.3 × 7		
Ø8 × 5	1000	325× 240 × 45
Ø8 × 7		

LEAD FREE TYPE REFLOW SOLDERING CONDITION

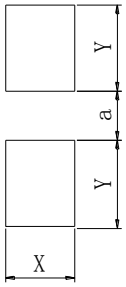
无 铅 焊 料 片 式 电 容 的 回 流 焊 条 件

- Temperature / Time profile 回流焊温度与时间曲线图



温度区域	L1	L2	L3	L4	Tmax
温区温度(℃)	25~160	160~190	190~217	220~220	260
各温区时间(sec)	45～135	90 ± 30	9～27	40～70	5
升温斜率(℃/sec)	1～3		1～3		

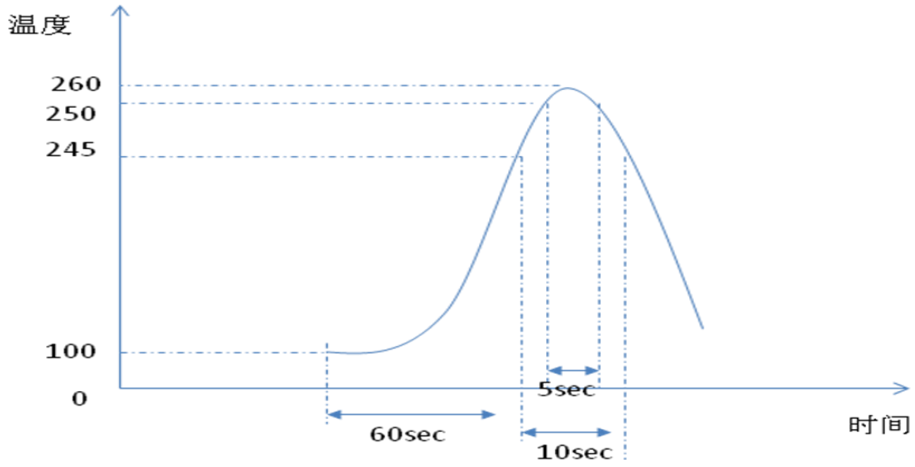
- Recommended Land Size 各种壳号的安装尺寸



（mm）

Size	X	Y	a
Φ4	1.6	2.6	1.0
Φ5	1.6	3.0	1.4
Φ6.3	1.6	3.5	2.1
Φ8×10.5L	2.5	3.5	3.0
Φ10×10.5L	2.5	4.0	4.0

波峰焊曲线图



铝电解电容器的使用事项

1.电路设计中的注意事项

(1) 要在确认使用及安装环境的基础上,在电容器的产品目录或承认书、图纸交货申请书（以下简称交货承认书）中规定的电容器额定性能的范围内进行设计。

(2) 使用温度及使用纹波电流不可超出产品目录或交货承认书中规定的范围。

①不可在超出分类上限温度(最高使用温度)的温度下使用。

②不可接通过电流(超过额定纹波电流的电流)。

(3) 进行电路设计时，请选用与机器寿命相符的电容器。

(4) 电容器为极性电容器。要确认有无连接反向电压或交流电压。在极性反转电路中请选用双极性电容器。但是,双极限电容器也不可以用于交流电路。

(5) 在重复进行急速充放电的电路中请选用与使用条件相符的电容器。

作为重复进行急速充放电的电路，有电焊机、相机闪光灯等。此外，电路电压变动较大的伺服马达等旋转机器的控制电路也会重复进行急速的充放电。

关于重复进行急速充放电电路中使用的电容器，请咨询我们。

(导电性高分子铝固体电解电容器有急速充放电所产生的超负荷高峰电流通过时，有时会导致短路或大漏损电流。请注意不要让高峰电流超过 10A。)

(6) 请确认电容器上是否有过电压(超过额定电压的电压)。

①要注意纹波电压(交流部分)重叠到直流电压上时的峰值不可超过额定电压。

②将两个以上的电容器串联连接时，要将通过各个电容器的电压控制在额定电压以下。而且，此时要将考虑漏损电流的分压电阻器与各个电容器并联加入。

(将导电性高分子铝固体电解电容器用以下电路时，预计会无法充分发挥其能力而造成故障，因此不可使用。1)耦合电路、2)时间常数电路、3)高电阻电压保持电路、4)对额定电压只印加极低电压的电路、5）漏损电流影响较大的电路，关于其他直接连接多个电容器的特殊用途，请另行咨询我们。)

(7) 电容器在以下之间要从电路中完全隔离开。

(电容器的铝壳和阴极端子之间由盒内侧的自然氧化皮膜和电解液的不稳定电阻部分连接在一起。)

①铝壳和阴极端子及阳极端子和电路型板之间。

②基板自立型空白端子和其他阳极端子及阴极端子和电路型板之间。

③双极性电容的两个端子与铝壳之间。

(8) 电容器的封装套筒非绝缘保证型。请勿用于需要绝缘功能的地方。需要外套具有绝缘功能时，请咨询我们。

(9) 电容器如果在以下环境中使用，有时可能会发生故障。

①周围环境(耐气候性)条件

(a) 直接溅水的环境中、高温高湿的环境及结露的环境

(b) 直接溅油的环境及充满油雾的环境

(c) 直接溅盐水的环境及充满盐分的环境

(d) 充满有毒气体(硫化氢、亚硫酸、氯气、溴气、溴甲烷、氨气等)的环境

(e) 有直射日光、臭氧、紫外线及放射线照射的环境

(f) 有酸性及碱性溶剂溅落的环境

②振动或冲击条件超过交货仕样书规定范围的苛刻环境

(10) 将电容器安装到印刷电路板上时，请事先确认以下内容后再进行设计。

①将印刷电路板的孔间隔与电容器的端子间隔对合。

②设计时不可将配线及电路型板靠近到电容器的压力阀部分。

③只要交货承认书中没有规定，电容器的压力阀部分上面均应保留出如下所述的间隔。

Application Guidelines for Aluminum Electrolytic Capacitors

1. Circuit Design

(1) Please make sure the application and mounting conditions to which the capacitor will be exposed to are within the conditions specified in catalog or alternate product specification (Referred to as specification here after).

(2) Operating temperature and applied ripple current shall be within the specification.

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) Appropriate capacitors which comply with the life requirement of the products should be selected when designing the circuit.

(4) Aluminum electrolytic capacitors are polarized .Make sure that no reverse Voltage or AC voltage is applied to the capacitors. Please use bi-polar Capacitors for a circuit that can possibly see reversed polarity.
Note: Even bi-polar capacitors can not be used for AC voltage application.

(5) For a circuit that repeats rapid charging / discharging of electricity, an appropriate capacitor that is capable If enduring such a condition must be used. Welding machines and photo flash are a few examples of products that contain such a circuit voltage fluctuates substantially.
For appropriate choice of capacitors for circuit that repeat rapid charging / discharging, please consult Nichicon.
If excess a rush current due to drastic charge / dis-charge was applied to conductive polymer aluminum solid electrolytic capacitors, it may cause a short circuit or an increase in leakage current. Therefore, please do not apply a rush current that is larger that 10A.

(6) Make sure that no excess voltage (that is, higher than the rated voltage) is applied to the capacitor.

① Please pay attention so that the peak voltage, which is DC voltage overlapped by ripple current, will not exceed the rated voltage.

② 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.
Please do not use conductive polymer aluminum solid electrolytic capacitors for the application listed below, since the solid organic polymer aluminum electrolytic capacitor cannot reach its maximum performance.

1) Coupling circuits
2) R-C timing circuit
3) High impedance voltage retention circuit
4) Circuits, which extremely low voltage in compared to the rated voltage is only applied
5) Circuits, which are greatly affected by leakage currents for special use such as multiple parts used in a series, please contact us for recommendations.

(7) Aluminum electrolytic capacitors must be electrically isolated as follows:
The aluminum case and the cathode foil are connected by the unstable resistance of a naturally formed oxide layer inside the aluminum case and the electrolyte.

① Case and negative terminal, Case and positive terminal, Case and circuit Pattern.

② Auxialiary terminal of can type and negative and positive terminal, including the circuit pattern.

③ Case and both terminals of a bi-polarized capacitor.

(8) Outer sleeve of the capacitor is not guaranteed as an electrical insulator.
Do not use a standard sleeve on a capacitor
in applications that require the electrical insulation. When the application requires special insulation, please contact our sales office for details.

(9) Capacitors may fail if they are used under the following conditions:

① Environmental (climatic) conditions

(a) Being exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.
(b) Being exposed to oil or an atmosphere that is filled with particles of oil.
(c) Being exposed to salty water or an atmosphere that is filled with particles of salt.
(d) In an atmosphere filled with toxic gasses (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, ammonia, etc.).
(e) Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.
(f) Being exposed to acidic or alkaline solutions.

② Under severe conditions where vibration and/or mechanical shock exceed the applicable ranges of the specifications.

(10) When designing a P.C. board, please pay attention to the following:

① Have the hole spacing on the P.C. board match the lead spacing of the capacitor.

② There should not be any circuit pattern or circuit wire above the capacitor pressure relief vent.

③ Unless otherwise specified, following clearance should be made above the pressure relief vent.

产品直径	间隔
φ6.3~φ16mm	2mm 以上
φ18~φ35mm	3mm 以上
φ40mm 以上	5mm 以上

④印刷电路板一侧装有电容器的压力阀时，请对准压力阀的位置，将压力阀工作时的排气孔打开。

⑤请将螺纹端子型的封口部朝上。另外，横向放置时，请将压力阀朝上或将阳极端子朝上。

(11) 电容器封口部的下面如果有型板，一旦发生电解液泄露时，可能会造成电路图案短路，引起漏电起痕或迁移，因此，请勿在电容器封口部的下面进行电路型板配线。

(12) 请勿在电容器的周围及印刷电路板的背面（电容器下面）配置发热部件。

(13) 芯片电容器用印刷电路板的焊盘图形要参照产品目录或交货仕样书的推荐图形进行电路设计。

(14) 电容器的电气特性会根据温度及频率的变动而变化。请确认该变化量的基础上进行电路设计。

(15) 在双面印刷电路板上安装电容器时，在进行电路设计时请将电路设计成电容器下面没有多余的印刷电路板孔及反面连接用贯通孔的样式。

(16) 螺纹端子的紧固及电容器主题安装用螺丝的紧固扭矩不可超出交货仕样书中规定的范围。

(17) 并联两个以上的电容器时，需要充分考虑电流平衡。（特别是并联导电性高分子钽固体电解电容器和普通铝电解电容器时，更需要考虑。）

(18) 串联两个以上的电容器时，要考虑电压平衡，并将分压电阻器插入，使其与电容器并联。

2. 安装注意事项

(1) 对组装到设备上已经通电的电容器，请勿再次使用。除了定期检修时为检测电气性能而拆卸的电容器外，均不能再次使用。

(2) 即使将电容器放电后，端子间仍有可能产生电压（再闪击电压）。此时，请通过 1kΩ 的电阻器进行电压处理。

(3) 保管达 2 年以上的电容器的漏损电流有可能会增大。此时，请通过 1kΩ 的电阻器进行放电处理。

(4) 请确认电容器的额定值（静电容量及电压）后，进行安装。

(5) 请确认电容器的极性后，进行安装。

(6) 请勿将电容器跌落到地上，请勿使用跌落后的电容器。

(7) 安装时请勿使电容器主体变形。

(8) 请确认电容器的端子间隔和印刷电路板孔间隔一致后，再进行安装。

(9) 基板自立形电容器在安装时要推入到和其基板密合的程度（非浮起状态）。

(10) 利用自动插入机扭结固定电容器引线的强度不可过大。

(11) 请注意由自动插入机及装配机的吸附器、产品检验器及对中操作所引起的冲击力。

(12) 利用烙铁进行的焊接

①焊接条件（温度、时间）不可超出交货仕样书中规定的范围。

②因端子间隔和印刷电路板孔间隔不一致而需要加工引线端子时，在进行焊接之前，加工时不可使电容器主体承受力。

③利用烙铁进行修整时，如果需要先将焊接的电容器卸下，请将焊锡充分融化后再拆卸，以免使电容器的端子承受压力。

④请勿让烙铁的烙铁头接触到电容器的主体。

(13) 流动焊

①进行焊接时，请勿将电容器主体浸入焊料中。插入印刷电路板，只有对电容器一侧的相反侧背面进行焊接。

②焊接条件（预热、焊接温度、端子浸渍时间）不可超出交货仕样书中规定的范围。

③除端子部以外，不可附着有焊剂。

④进行焊接时，要注意避免其他部件翻倒接触到电容器。

Case Diameter	Clearance Required
φ 6.3 to 16mm	2mm or more
φ 18 to 35mm	3mm or more
φ 40mm or more	5mm or more

④ In case the vent side is placed toward P.C. board (such as end seal vented parts), make a corresponding hole on the P. C. board to release the gas when vent is operated. The hole should be made to match the capacitor vent position.

⑤ Screw terminal capacitors must be installed with their end seal side facing up. When you install a screw terminal capacitor lying down, the upper side must be the pressure relief vent or a positive terminal.

(11) The main chemical solution of the electrolyte and the separator paper used in the capacitors are combustible. The electrolyte is conductive. When it comes in contact with the P.C. board, there is a possibility of pattern corrosion or short circuit between the circuit pattern which could result in smoking or catching fire.
Do not locate any circuit pattern beneath the capacitor end seal.

(12) 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).

(13) Please refer to the pad size layout recommendations in our catalog when designing in surface mount capacitors.

(14) Electrical characteristics may vary depending on changes in temperature and frequency. Please consider this variation when you design circuits.

(15) When you mount capacitors on the double-sided P.C. boards, do not place capacitors on circuit patterns or over on unused holes.

(16) The torque for terminal screw or brackets screws shall be within the specified value on Nichicon's drawings.

(17) When you install more than 2 capacitors in parallel, consider the balance of current flowing through the capacitors. Especially, when a solid conductive polymer aluminum electrolytic capacitor and a standard aluminum electrolytic capacitor are connected in parallel, special consideration must be given.

(18) 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

2. Mounting

(1) Once a capacitor has been assembled in the set and power applied, Even if a capacitor is discharged, an electric potential (restriking 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 the parts that have been stored for more than 2 years may increase. If leakage current has increased, please perform a voltage treatment using 1kΩ resistor.

(4) Please confirm ratings before installing capacitors on the P.C. board.

(5) Please confirm polarity before installing capacitors on the P.C. board.

(6) Do not drop capacitors on the floor, nor use a capacitor that was dropped.

(7) Do not damage the capacitor while installing.

(8) Please confirm that the lead spacing of the capacitor matches the hole spacing of the P.C. board prior to installation.

(9) Snap-in can type capacitor such as JIS style symbol 692, 693, 694 and 695 type should be installed tightly to the P.C. board (allow no gap between the P.C. board an bottom of the capacitor).

(10) Please pay attention that the clinch force is not too strong when capacitors are placed and fixed by an automatic insertion machine.

(11) Please pay attention to that the mechanical shock to the capacitor by suction nozzle of the automatic insertion machine or automatic mounter, or by product checker, or by centering mechanism.

(12) Hand soldering.

① Soldering condition shall be confirmed to be within the specification.

② If it is necessary that the leads must be formed due to a mismatch of the lead space to hole space on the board, bend the lead prior to soldering without applying too much stress to the capacitor.

③ If you need to remove parts which were soldered, please melt the solder enough so that stress is not applied to lead.

④ Please pay attention so that solder iron does not touch any portion of capacitor body.

(13) Flow soldering (Wave solder)

① Aluminum capacitor body must not be submerged into the solder bath. Aluminum capacitors must be mounted on the "top side" of the P.C. board and only allow the bottom side of the P.C. board to come in contact with the solder.

② Soldering condition must be confirmed to be within Nichicon specification. Solder temperature: 260 5oC Immersing lead time:10 1 second, Thickness of P.C. board : 1.6mm.

③ Please avoid having flux adhere to any portion except the terminal.

④ Please avoid contact between other components and the aluminum capacitor.

(14) 回流焊

①焊接条件（预热、焊接温度、时间、回流次数）不可超出交货仕样书中规定的范围。

②使用红外线加热器时，由于红外线吸收率根据电容器的颜色及材料的不同而不同，因此需要注意加热的程度。

(15) 在无卤类焊剂中，有一些虽然不含离子性卤化合物，但却有大量的非离子性卤化物，当这类化合物进入电容器时，将与电解液发生化学反应，可能产生与清洗后结果相同的不良影响。请选用不含有非离子性卤化合物的焊剂。

(16) 焊接时以及因固定电容器用的树脂的硬化等而使电容器在150℃以上的环境大气中放置 2 分钟以上，或者让高温气体、热射线直接接触电容器时，外装套筒有时会发生收缩、膨胀、龟裂。

(17) 将电容器焊接到印刷电路板上之后，不可将电容器主体倾斜、放倒或扭曲。

(18) 将电容器焊接到印刷电路板上之后，不可将电容器当把手来移动印刷电路板。

(19) 将电容器焊接到印刷电路板之后，不可让其他物体碰撞到电容器。此外，重叠放置印刷电路板时，不可使印刷电路板或其他部件等碰到电容器。

(20) 清洗

① 清洗方法

对象：所以品种，所以规格

乙醇类清洗剂

异丙醇

水性清洗剂

高级乙醇类

界面活性剂

碱性皂化剂类

清洗条件：使用浸渍、超声波等方法、清洗时间总计不超过 5 分钟。（清洗液温度为 60℃以下）

清洗后，请将电容器和安装完毕的印刷电路板同时以热风干燥 10 分钟以上。另外，当洗涤液落入了外壳和封套之间时，如果热风的温度过高，封套就会变软、膨胀，所以请使热风的温度不要超过封套变软的温度（80℃）。

此外，水洗后如果干燥不充分，可能会引起封套二次收缩、底板膨胀等外观不良。需加以注意。请充分做好清洗剂的污染管理工作（电导率，PH 值，比重，含水量等）.

清洗后，请勿将其保管在清洗液的环境中或密封容器中。另外，在进行喷射洗净的时候，由于喷射角度和强度的不同，可能会造成外壳膨胀，谨请注意。对于别的洗净方法，也有可能造成产品表示信息消失或者模糊褪色.

HCFC 的换代产品氟利昂在将来将不能使用，

而且，从地球环境角度而言，我们也不推荐将其作为清洗液来使用。

(21) 固定剂、被膜剂

①请勿使用含卤素类溶剂等固定剂，被膜剂。

②在使用固定剂、被膜剂之前，请将基板和电容器的封口部之间清扫干净，不可留有焊剂残渣及污垢。

③在使用固定剂、被膜剂之前，请对清洗剂等进行干燥.

④在使用固定剂、被膜剂时，请勿将电容器封口部的整个面堵塞。

固定剂、被膜剂的种类很多，使用时详情请咨询我们。

(22) 关于熏制处理

在出口时的防虫对策中，有时会利用甲基溴等卤素化合物进行熏制处理。

对铝电解电容器及装配了铝电解电容器的机器进行直接熏蒸或者将经过熏蒸处理的木材用作托盘时，有时会因熏蒸剂中所含的卤素引起电容器内部的腐蚀反应.

3. **设备使用注意事项**

(1) 直接接触电容器的端子有导致触电的危险。

(14) Reflow soldering(SMD only)

① Soldering condition must be confirmed to be within Huawei Specification.

② When an infrared heater is used, please pay attention to the extent of heating since the absorption rate of infrared, will vary due to difference in the color of the capacitor body, material of the sleeve and capacitor size.

(15) Soldering flux

There are non-halogen types of flux that do not contain ionic halides, but contain many non-ionic halides. When there non-ionic halides infiltrate the capacitor, they cause a chemical reaction that is just as harmful as the use of cleaning agents. Use soldering flux that dose not contain non-ionic halides.

(16) Shrinkage, bulging and/or cracking could be seen on the outer sleeve of the capacitor when capacitors are kept in for more than 2 minutes at 150 ℃ ambient temperature during soldering at reflow process or resin curing process. Applying high temperature gas or heat ray to capacitor can cause the same phenomenon.

(17) Do not tilt lay down or twist the capacitor body after the capacitor are soldered to the P.C. board.

(18) Do not carry the P.C. board by grasping the soldered capacitor.

(19) Please do not allow anything to touch the capacitor after soldering. If P.C. board are stored in a stack, please make sure P.C. board or the other components do not touch the capacitor.

The capacitors shall not be effected by any radiated heat from the soldered P.C. board or other components after soldering.

(20) Recommended Cleaning Condition

Applicable : Any type, any ratings.

Cleaning Agents

Based Alcohol solvent cleaning agent

Isopropyl Alcohol

Based water solvent cleaning agent

Premium alcohol solvent type

Cleaning Conditions :

Total cleaning time shall be no greater than 5 minutes by immersion, ultrasonic or other method.

(Temperature of the cleaning agent shall be 60℃ maximum.)

After the board cleaning has been completed, the capacitors should be dried using hot air for a minimum of 10 minutes.

If the cleaning solution is infiltrated between the case and the sleeve, the sleeve might soften and swell when hot air temperature is too high. Therefore, hot air temperature should not exceed softening temperature (80℃) of the sleeve.

Insufficient dries after water rinse may cause appearance problems, such as sleeve shrinking, bottom-plate bulging.

In addition, a monitoring of the contamination of cleaning agents (electric conductivity, pH, specific gravity, water content, etc.) must be implemented.

After the cleaning, do not keep the capacitors in an atmosphere containing the cleaning agent or in an air tight container.

In addition regarding jet washing, please use caution since the sleeve may expand cause of the angle and / or the strength of the water jet. Depending on the cleaning method, the marking on a capacitor may be erased or blurred.

Consult Nichicon before using a cleaning method or a cleaning agent other than those recommended.

(21) Fixing Material and Coating Material

① Do not use any affixing or coating materials, which contain halide substance.

② Remove flux and any contamination, which remains in the gap between the end seal and PC board.

③ Please dry the cleaning agent on the PC board before using affixing or coating materials.

④ Please do not apply any material all around the end seal when using affixing or coating materials.

There are variations of cleaning agents, fixing and coating materials, so please contact those manufacture or our sales office to make sure that the material would not cause any problems.

(22) Others

Wooden package material may be subjected to fumigation by a halogen (e.g. methyl bromide) before they are exported in order to protect them against pests. If devices with aluminum electrolytic capacitors or capacitors themselves are directly fumigated or packed with the pallet that is fumigated, the capacitors may internally corrode due to the halogen contents of fumigation agents.

3. In the equipment

(1) Do not directly touch terminal by hand.

(2) 不可以导电体使电容器端子之间短路。此外，不可使电容器接触酸或碱的水溶液等导电性溶液。

(3) 要确认装配了电容器的设备的安装环境不属于以下环境。

①直接溅水的场所、高温高湿的场所、易结露的场所。

②直接溅油的场所及充满油雾的场所。

③直接溅落盐水的场所、高温高湿的场所、易结露的场所。

④充满酸性有机气体（硫化氢及亚硫酸、亚硝酸、氯气、溴气、溴甲烷）的场所。

⑤充满碱性有毒其他（氨气等）的场所。

⑥有酸性及碱性溶剂溅落的场所。

⑦结露环境有可能导致外套发生收缩、膨胀、破裂，因此在使用时请进行充分确认。此外，因温度剧烈变化、高温高湿试验等而结露时，也可能导致同样的外套异常。

4. 保养检修

(1) 对于工业机器中使用的电容器要进行定期检修。检修项目括如下内容。

①外观：有无压力阀的动作、液体泄漏等明显异常。

②电气性能：漏损电流、静电容量、损失角的正切值及产品目录或交货仕样书中规定的项目。

5. 紧急情况

(1) 在使用装置的过程中，电容器的压力阀动作，出现蒸汽时，切断装置的主电源或者电源线的插头从插座中拔出。

(2) 电容器的压力阀工作时，将喷出超过+100℃的高温气体，此时不可将脸部靠近。一旦喷出的气体进入眼睛或吸入时，应立即用水清洗眼部或漱口。

不可舔食电容器电解液。如果电解液溅到皮肤上，应使用肥皂进行冲洗。

6. 保管条件

(1) 关于电容器的保管，建议在室温 5~35℃、相对湿度 75%的条件下进行保管。

(2) 请确认保管场所不属于『3 项　装配使用中注意事项　（3）中记载的环境』

（为使导电性高分子铝电解电容器保持良好的焊接性，请遵守以下项目。）

1） 在使用前，请在用塑料袋密封的状态下保管。

2） 请在即将使用前将塑料袋开封，并将产品一次用完。如果不能一次用完，请将剩余产品放回包装袋，并用胶带等密封。

3） 为保持良好的焊接性，请将产品保管期限控制在一年以内。

7. 废弃处理

(1) 在废弃电容器时，可采取以下任意一种方法。

①在电容器上开孔或充分破碎后焚烧。

②不焚烧电容器时，应交与专业的工业废弃物处理厂，由其进行填拓等处理。

(2) 废弃电容器（从与之相连的基板上卸下）时，请确认其是否已被放电。

关于商品目录中记载的 ESR 阻抗值

引线型：测定位置为引线端子底部。

芯片型：测定位置为距离树脂板的孔口最近的电极部。

(2) Do not short between terminals with conductor, nor spill conductible liquid such as alkaline or acidic solution on or near the capacitor.

(3) Please make sure that the ambient conditions where the set is installed not have any of the following conditions:

① Where capacitors are exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.

② Where capacitors are exposed to oil or an atmosphere that is filled with particles of oil.

③ Where capacitors are exposed to salty water, high temperature & high humidity atmosphere, or condensation of moisture.

④ The atmosphere is filled with toxic acid gasses (e.g. hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methy bromide, etc.)

⑤ The atmosphere is filled with toxic alkaline gasses (e.g. ammonia)

⑥ Where capacitors are exposed to acidic or alkaline solutions.

⑦ Since shrinkage, bulging and/or crack could be seen on outer sleeve of capacitor when capacitors are used in atmosphere where condensation of moisture occures, please confirm their adaptation before the use. The condensation of moisture could occure when temperature cycling test/ Rapid change of temperature test is performed, in this case, aforementioned sleeve problem could be seen.

4. Maintenance Inspection

(1) Please periodically inspect the aluminum capacitors that are installed in industrial equipment. The following items should be checked:

① Appearance : Remarkable abnormality such as vent operation, leaking electrolyte etc.

② Electrical characteristic: Capacitance, dielectric loss tangent, leakage current, and items specified in the specification.

5. In an Emergency

(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. The gasses emitted from that are over 100℃.
If the gas gets into your eyes, please flush your eyes immediately in pure water.
If you breathe the gas, immediately wash out your mouth and throat with water.
Do not ingest electrolyte. If your skin is exposed to electrolyte, please wash it away using soap and water.

6. Storage

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

(2) Please make sure the ambient storage conditions will be free from the conditions that are listed in clause 3. "In the equipment" at (3).
In order to maintain the satisfactory soldering condition for conductive polymer aluminum solid electrolytic capacitors, the following items must be strictly adhered to.

1) Parts should be stored sealed in a bag until they are actually used.

2) Once the sealed bag is cut open, all the parts should be used at one time. If not, then the remaining parts should be places in a bag and sealed with tape.

3) In order to maintain a good solderability of the parts, shelf life of parts should not exceed 1 year.

7. Disposal

(1) Take either of the following methods in disposing of capacitors.

① Make a hole 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.

(2) When removing a capacitor from the circuit board or when disposing of capacitor please ensure that the capacitor is properly discharged.

ESR, Impedance Measuring Point

Radial lead type

ESR should be measured at both of the terminal ends closest to the capacitor body.

Chip type

ESR should be measured at both of the terminal ends closest where the terminals protrude through the plastic platform.