

This product is completed the Lead-free & RoHS2.0 & Halogen-free.

Customer : (客户) Ozdisan

发行日期 Issued Date	2023-8-19
承认书 No.	RD20230819001

## SPECIFICATION FOR APPROVAL

# 承认书

No.	客户编号 (Customer No.)	东佳编号 (Koshin Part No.)	Description	规格 ΦD x L
1		VR-016V471MG105-T/R	16V470μF	10X10.5

## KOSHIN INTERNATIONAL LIMITED

# 东佳电子有限公司

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KOSHIN 签章栏 APPROVED SIGNATURE FOR KOSHIN			客户签章栏 APPROVED SIGNATURE FOR CUSTOMER
核准 APPROVAL	确认 CHECK	作成 DESIGN	承认 APPROVED BY
			

Please return one copy with your authorized signature when you accept these specifications.

DJS-SD-001



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### 1. 概述 Scope

本承认书规定了 VR 系列径向引线引出铝电解电容器的技术规范

This specification covers “VR series” miniature single-ended aluminium electrolytic capacitors.

### 2. 使用温度范围 Operating Temperature Range

使用温度范围是指电容在额定电压下可以稳定运行的环境温度范围

Operating temperature range is the range of ambient temperature at which the capacitor can be operated continuously at rated voltage.

### 3. 特性 Characteristics

除非另有说明，标准的测量和测试环境条件如下：

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows.

环境温度 Ambient temperature : 15 to 35°C

大气力压 Air pressure: 86kpa to 106kpa

若对结果有疑问，测试则按如下标准进行

If there may be doubt on the results, measurements shall be made within the following limits.

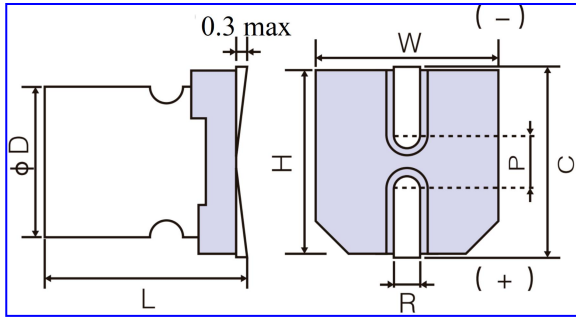
环境温度 Ambient temperature : 20±2°C

大气压 Air pressure: 86kpa to 106kpa

### 4. 特性表格 Characteristics Table

东佳规格	VR-16V470μF 10X10.5	东佳料号	VR-016V471MG105-T/R
客户 Customer	Ozdisan	客户型号 Customer No.	
规格 Specification	项目 Items	标准 Standard	
	使用温度范围 Operating temperature range	- 55°C ~ + 105 °C	
	容量偏差 Capacitance tolerance	±20 % ( 20°C, 120Hz )	
	损耗因子 Dissipation factor (MAX)	12 % ( 20°C, 120Hz )	
	漏电流 Leakage current (MAX)	1504 μA ( 20°C, 16V 2 min )	
	ESR值 ESR(MAX)	20 mΩ ( 100KHz, 20°C )	
	纹波电流 Ripple current (MAX)	5100 mArms (100KHz, 105°C)	
	浪涌电压 Surge Voltage	18.4 V <sub>DC</sub>	
	负荷寿命 Load life	2000 hrs	

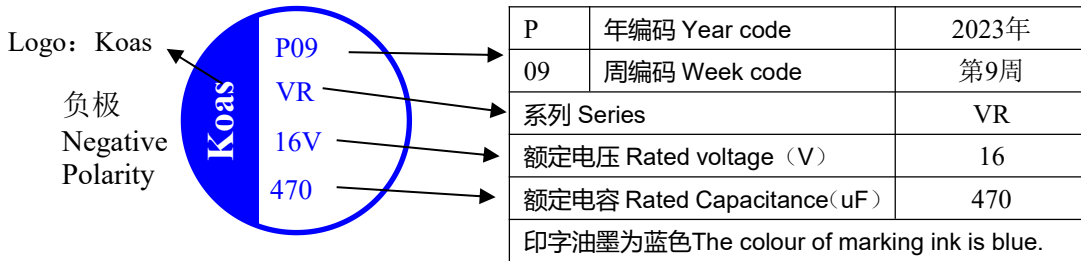
纹波电流与频率修正系数 Ripple Current (A) and Frequency Multipliers	频率 Frequency (Hz)	120 ≤ f < 1K	1K ≤ f < 10K	10K ≤ f < 100K	100K ≤ f < 500K
	系数 Multiplier	0.05	0.3	0.7	1.0



单位: mm

Size	ϕD	L	W	H	C	R	P
5X5.8	5.0±0.5	5.8±0.5	5.3±0.2	5.3±0.2	6.0±0.2	0.5~0.8	1.5±0.2
6.3X7.7	6.3±0.5	7.7±0.3	6.6±0.2	6.6±0.2	7.3±0.2	0.5~0.8	2.0±0.2
6.3X9	6.3±0.5	9±0.5	6.6±0.2	6.6±0.2	7.3±0.2	0.5~0.8	2.0±0.2
8X7.7	8.0±0.5	7.7±0.5	8.3±0.2	8.3±0.2	9.0±0.2	0.7~1.1	3.1±0.2
8X12	8.0±0.5	12±0.5	8.3±0.2	8.3±0.2	9.0±0.2	0.7~1.1	3.1±0.2
10X10.5	10.0±0.5	10.5±0.3	10.3±0.2	10.3±0.2	11.0±0.2	0.7~1.3	4.6±0.2
10X12.5	10.0±0.5	12.5±0.3	10.3±0.2	10.3±0.2	11.0±0.2	0.7~1.3	4.6±0.2

#### 标识 Marking:



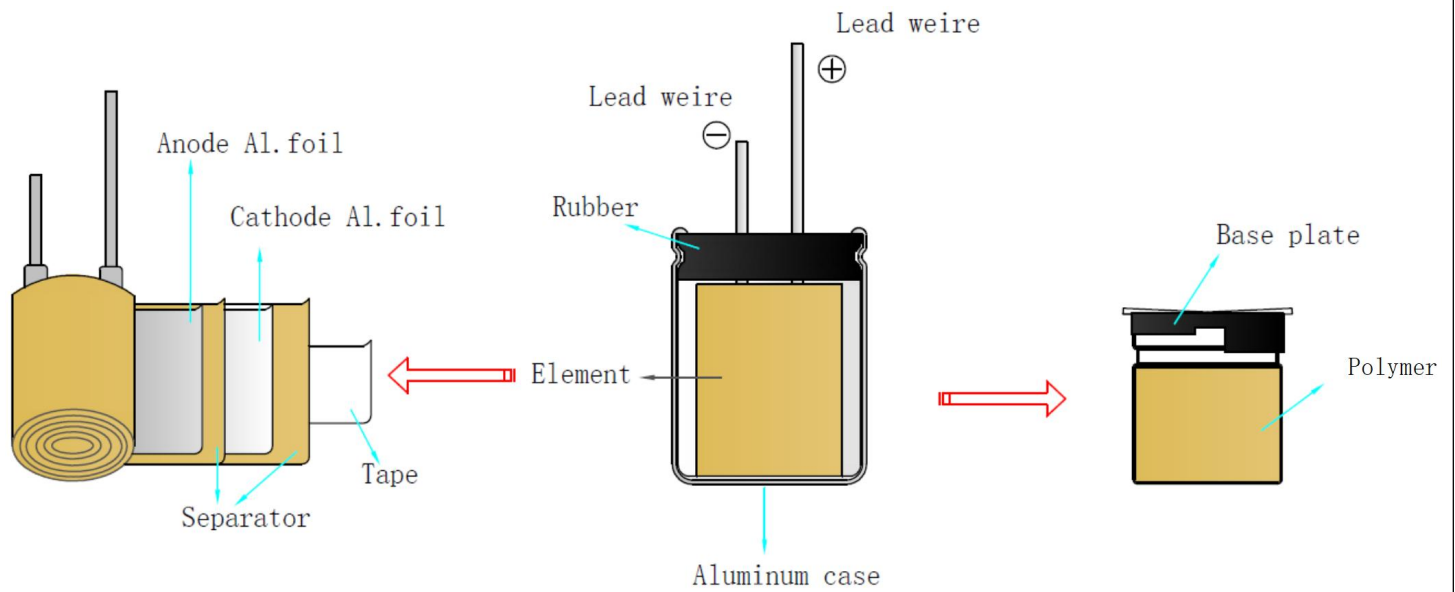
#### 年份代码 Year Code

年份 Year	2022	2023	2024	2025	2026	2027	2028	2029	2030
代码 Code	N	P	R	S	T	V	W	X	Y

Approved 核准	Checked 确认	Designed 作成

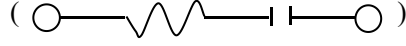
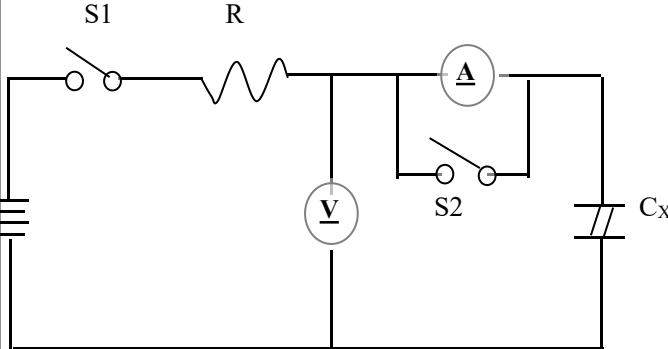
### 5. 内部构造图以及内部构成部品（简略图）

#### Inner conformation drawing and inner constitute parts (curtness drawing)



构成部品(Composing Part)	材质(Material)
引线 (Lead Wire)	镀锡铜包钢线(Fe+Al+Cu+Sn)
铝壳(Case)	铝(Aluminum)
座板(Base Plate)	聚邻苯二酰胺 (PPA)
电解纸(Paper)	纤维素(Cellulose)
正箔(Anode Foil)	铝箔(Aluminum Foil)
负箔(Cathode Foil)	铝箔(Aluminum Foil)
电解液(Chemical Liquid)	分散液 (Polymer)
封口材(Seal)	橡胶(Rubber)
素子专用胶带 (Tape)	OPP

### 6. 电气特性 Electrical characteristics :

NO.	项目 ITEM	测试方法 TEST METHOD	规格 SPECIFICATION																										
6.1	额定电压 Rated voltage		See 4.Characteristics Table 见 4.特性表																										
6.2	静电容量 Capacitance	1.Measuring frequency:120Hz±12Hz 测定频率 2.Measuring voltage:≤0.5Vrms+0.5VDC~2.0VDC 测定电压																											
6.3	散逸因素 (损失角) Dissipation factor	3.Measuring circuit: (  ) 测定电路	See 4.Characteristics Table 见 4.特性表																										
6.4	泄漏电流 Leakage current	在 20℃通过 1000 Ω 的电阻施加直流工作电压 1~2 分钟后测定直流泄漏电流 DC leakage current shall be measured after 1~2minutes application of the DC rated working voltage through the 1000 Ω resistor at 20℃    R: 1000 Ω A: DC current meter 直流电流计 V: DC voltage meter 直流电压计 S1:Switch 开关 S2:Switch for protect of current meter 直流电流计的保护开关 Cx: Testing capacitor 测试电容																											
6.5	温度特性 Temperature characteristics	<table border="1"> <thead> <tr> <th>STEP 步骤</th> <th>TEMPERATURE 温度</th> <th>ITEM 项目</th> <th>CHARACTERISTICS 特性</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20°C±2°C</td> <td>Measure: Capacitance 、 tan δ、 Impedance</td> <td>-----</td> </tr> <tr> <td>2</td> <td>-55°C±3°C</td> <td>Z-55°C/20°C</td> <td>≤1.25</td> </tr> <tr> <td>3</td> <td>Keep at 15 to 35°C for 15 minutes or more</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>4</td> <td>105°C±3°C</td> <td>Z105°C/20°C</td> <td>≤1.25</td> </tr> <tr> <td rowspan="2">5</td> <td rowspan="2">20°C±2°C</td> <td>ΔC/C 20°C</td> <td>Within ±5% of step1</td> </tr> <tr> <td>tan δ</td> <td>Less than or equal to the value</td> </tr> </tbody> </table> <p>a. Z-55°C or 105°C/ Z 20°C: impedance ratio at 100kHz; b. ΔC/C 20°C : Capacitance change at 120Hz; c. tan δ at 120Hz.</p>	STEP 步骤	TEMPERATURE 温度	ITEM 项目	CHARACTERISTICS 特性	1	20°C±2°C	Measure: Capacitance 、 tan δ、 Impedance	-----	2	-55°C±3°C	Z-55°C/20°C	≤1.25	3	Keep at 15 to 35°C for 15 minutes or more	-----	-----	4	105°C±3°C	Z105°C/20°C	≤1.25	5	20°C±2°C	ΔC/C 20°C	Within ±5% of step1	tan δ	Less than or equal to the value	
STEP 步骤	TEMPERATURE 温度	ITEM 项目	CHARACTERISTICS 特性																										
1	20°C±2°C	Measure: Capacitance 、 tan δ、 Impedance	-----																										
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3	Keep at 15 to 35°C for 15 minutes or more	-----	-----																										
4	105°C±3°C	Z105°C/20°C	≤1.25																										
5	20°C±2°C	ΔC/C 20°C	Within ±5% of step1																										
		tan δ	Less than or equal to the value																										

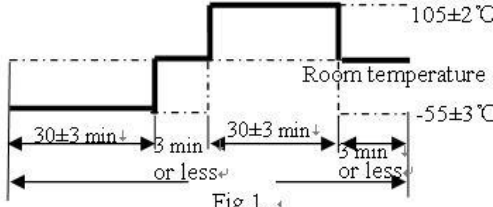
### 7.机械特性 Mechanical characteristics :

NO.	ITEM 项目	TEST METHOD 测试方法	SPECIFICATION 规格																
7.1	端子强度 Terminal Strength	<p>(A)Tensile strength 拉伸强度: wire lead terminal 导针型:</p> <table border="1"> <tr> <td>d(mm)</td> <td>≤0.5</td> <td>0.5&lt;d≤0.8</td> <td>0.8&lt;d≤1.25</td> </tr> <tr> <td>load(kg)</td> <td>0.5</td> <td>1.0</td> <td>2.0</td> </tr> </table> <p>The capacitor shall withstand the constant tensile force specified between the body and each lead for 10seconds without damage either mechanical or electrical. 电容器各端子要承受规定的荷重 10 秒，不能有电气或机械特性上的损伤。</p> <p>(B) Bending strength 弯曲强度: wire lead terminal 导针型:</p> <table border="1"> <tr> <td>d(mm)</td> <td>≤0.5</td> <td>0.5&lt;d≤0.8</td> <td>0.8&lt;d≤1.25</td> </tr> <tr> <td>load(kg)</td> <td>0.5</td> <td>0.5</td> <td>1.0</td> </tr> </table> <p>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 change and leads shall be undamaged. 给在竖直位置的电容器的每一端子以轴方向施加规定荷重，慢慢将电容器由竖直位置转至水平位置。然后向相反方向弯曲 90°，再回到原来位置。电容器性能不能有变化及端子不能有损伤。</p>	d(mm)	≤0.5	0.5<d≤0.8	0.8<d≤1.25	load(kg)	0.5	1.0	2.0	d(mm)	≤0.5	0.5<d≤0.8	0.8<d≤1.25	load(kg)	0.5	0.5	1.0	<p>When the capacitance is measured, there shall be no intermittent contacts, or open-or short-circuiting. 测定静电容量时，不能有接触不良，开路或短路。 There shall be no such mechanical damage as terminal damage etc. 不能有如端子受损之类的机械特性上的损伤。</p>
d(mm)	≤0.5	0.5<d≤0.8	0.8<d≤1.25																
load(kg)	0.5	1.0	2.0																
d(mm)	≤0.5	0.5<d≤0.8	0.8<d≤1.25																
load(kg)	0.5	0.5	1.0																
7.2	Vibration resistance 耐振性	<p>The frequency of the vibration shall vary uniformly within the range 10 to 55 Hz with the amplitude of 0.75mm, 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. 振动频率要均匀，范围为 10Hz 到 55Hz，振幅为 0.75mm，在 1 分钟内完成该 循环。 电容器将由端子牢固地固定。 电容器会被向三个互相垂直的方向每个方向振动 2 小时。</p>	<p>Capacitance: no unsteady. 静电容量：要稳定。 Appearance: no abnormal. 外观：无异常。 Capacitance change: within ±5% of initial measured value. 容量变化：最初规定值的 ±5% 之内。</p>																

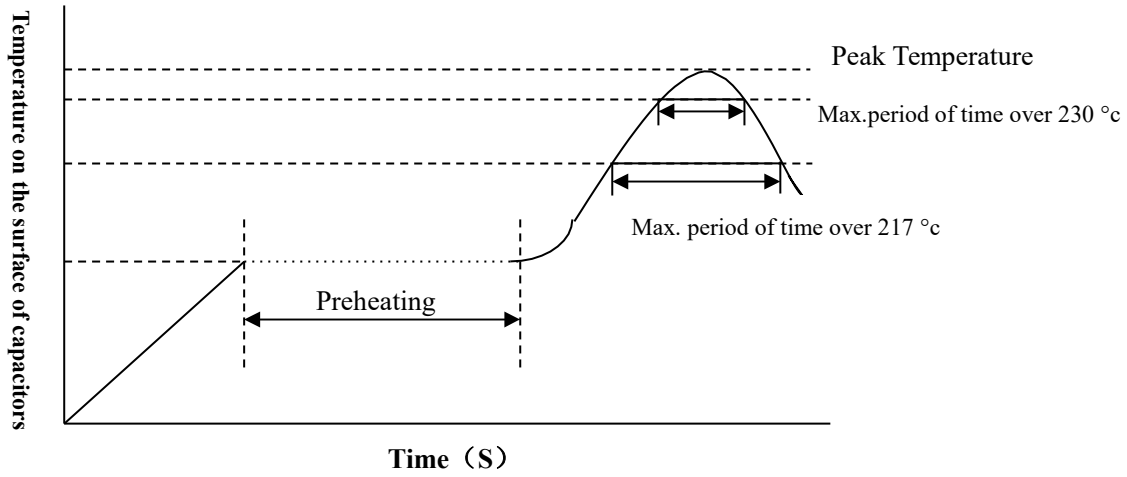


### 8. 信赖度 Reliability:

NO.	ITEM 项目	TEST METHOD 测试方法	SPECIFICATION 规格
8.1	Load life 高温负荷	After 2000 hours continuous application of DC rated working voltage and rated ripple current at 105°C ± 2°C, Measurements shall be performed after 16 hours exposed at room temperature. 在 105°C ± 2°C 环境当中连续施加直流定格电压与额定纹波电流 2000 小时后，测试在室温漏置 16 小时后进行。	No visible damage or leakage of electrolyte. 无明显的损伤或电解液漏出。 Capacitance change: Within ±20% of the initial measured value 容量变化: 最初测定值的 ±20% 以内。 Tan δ :Less than or equal to 1.5 times of the value. 损失角: ≤1.5 倍规定值。 ESR: Less than or equal to 1.5times of the value. ESR : ≤1.5 倍规定值。 Leakage current: Less than specified value 泄漏电流: 低于规定值。
8.2	Solder-ability 焊锡性	The leads are dipped in the solder bath of Sn at 245°C±5°C for 2±0.5 seconds. The dipping depth should be set at 1.5~2.0 mm. 端子浸没在 245°C±5°C 的锡中 2±0.5 秒。浸没深度设定为 1.5~2.0 mm.	The solder alloy shall cover the 95% or more of dipped lead's area. 锡液要覆盖导针浸入表面积 的 95% 以上。
8.3	Soldering heat resistance 焊锡耐热性	The leads immerse in the solder bath of Sn at 260°C±5°C for 10±1 seconds until a distance of 1.5~2.0mm from the case. 导针在 260°C±5°C 的锡中浸没至离本体 1.5~2.0mm 的地方 10±1 秒钟.	No visible damage or leakage of electrolyte. 无明显的损伤或电解液漏出。 Capacitance change: Within ±5% of the initial measured value 容量变化: 最初测定值的 ± 5% 以内。 Tan δ :Less than or equal to 1.3 times of the value. 损失角: ≤1.3 倍规定值。 ESR: Less than or equal to 1.3times of the value. ESR : ≤1.3 倍规定值。 Leakage current: Less than specified value 泄漏电流: 低于规定值。

NO.	ITEM 项目	TEST METHOD 测试方法	SPECIFICATION 规格
8.4	Moisture Resistance 耐湿性 稳定状态	Subject the capacitor to $60\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and 90% to 95% relative humidity for 1000 hours. 电容器在 $60\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ 及相对湿度 90% 到 95% 的条件下经历 1000 小时.	No visible damage or leakage of electrolyte. 无明显的损伤或电解液漏出。 Capacitance change: Within $\pm 5\%$ of the initial measured value 容量变化: 最初测定值的 $\pm 5\%$ 以内。 Tan $\delta$ : Less than or equal to 1.3 times of the value. 损失角: $\leq 1.3$ 倍规定值。 ESR: Less than or equal to 1.3 times of the value. ESR: $\leq 1.3$ 倍规定值。 Leakage current: Less than specified value 泄漏电流: 低于规定值。
8.5	快速变温 Rapid change of temperature	 <p>使用电压: 无负荷 Applied voltage: without load 循环次数: 10 次 Cycle number: 10 Cycles 测试图: Fig. 1 Test diagram: Fig. 1</p>	Capacitance change: Within $\pm 10\%$ of the initial value. 容量变化: 最初值的 $\pm 10\%$ 以内 Tan $\delta$ : less than specified value 损失角: 低于规定值。 Leakage current: Less than specified value. 泄漏电流: 低于规定值。 Appearance: no Abnormal. 外观: 无异常。
8.6	Surge test 突破试验	Rated surge voltage shall be applied (switch on) for $30 \pm 5$ second and then shall be applied (switch off) with discharge for 5.5 min at room temperature. This cycle shall be repeated for 1000 cycles. Duration of one cycle is $6 \pm 0.5$ minutes  在常温下施加 (合上开关) 额定涌浪电压 $30 \pm 5$ 秒, 然后停止施加 (断开开关) 涌浪电压并且放电 5.5 分钟。这个循环要重复 1000 次。以 $6 \pm 0.5$ 分钟为一个循环周期	Capacitance change: within $\pm 20\%$ of the initial specified value. 静电容量变化: 最初规定值的 $\pm 20\%$ 以内。  Dissipation factor: Less than or equal to 1.5 times of the value. 损失角: $\leq 1.5$ 倍规定值。 ESR: Less than or equal to 1.5 times of the value. ESR: $\leq 1.5$ 倍规定值。 Leakage current: Within initial specified value. 泄漏电流: 在最初规定值以内

## 9. 焊接推荐条件 Recommended soldering heat conditions



preheating	Time maintained over 217 °c	Time maintained over 230 °c	Peak temperature	Reflow number
150~200°C ≤180Sec.	≤70 Sec	≤60 Sec	≤260 °c	≤1 times
	≤70 Sec	≤60 Sec	≤250 °c	≤2 times

### 10. 东佳料号 Koshin Part No

#### Part Number System 编码原则

**VR-016V 471 M G 105-T/R**

① ② ③ ④ ⑤ ⑥ ⑦

#### (1) Series 系列

VR	VT	VX
VR	VT	VX

#### (2) Voltage(WV)电压

Voltage(WV)	4	6.3	10	16	25	35	50	63	80	100	110	115
Code	004	6R3	010	016	025	035	050	063	080	100	110	115

Voltage(WV)	125	160	165	200	220	250	330	350	400	450	500	550
Code	125	160	165	200	220	250	330	350	400	450	500	550

#### (3) Capacitance 容量

Capacitance is show in microfarads (  $\mu$  F)

$\mu$ F	0.1	0.47	1	2.2	22	220	2200	22000	21~25(KLT)
Code	0R1	R47	010	2R2	220	221	222	223	21T25

#### (4) Capacitance tolerance 容差

Tolerance%	$\pm 5$	$\pm 10$	$\pm 15$	$\pm 20$	-0 to +100	-0 to +20	-10 to +20	-10 to +100
Code	J	K	L	M	P	R	V	W

Tolerance%	-15 to +20	-20 to +40	-20 to +80	-20 to +5	+5 to +20	-10 to +5	-30 to +20	-15 to +5
Code	N	X	E	A	B	C	D	F

#### (5) Case (D: mm) 直径

Diameter	3	4	5	6	6.3	7	8	10	12.5	13	16	18	20	22	25	30	34
Code	A	B	C	D	E	1E	F	G	H	I	J	K	L	M	N	O	P

Diameter	35	36.5	40	42	45	46	50	51	52.3	55	60	63.5	65.5	76	90	100
Code	Q	R	S	T	U	V	W	X	Y	Z	1A	1B	1C	1D	1E	1F

#### (6) Case (L: mm) 高度

Description	5	7	11	12.5	25	35.5	40	100	110	111	120	130	140	150	220	250
Code	050	070	110	125	250	355	400	A00	A10	A11	A20	A30	A40	A50	B20	B50

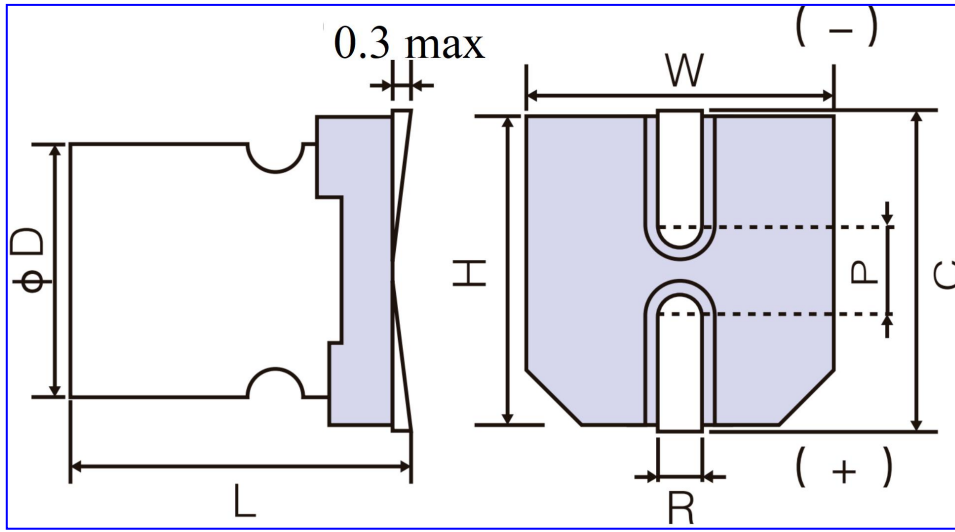
#### (7) Lead treatment 加工方式

Description	Taping(F:2.5mm) Ammo Packing	Taping(F:3.5mm) Ammo Packing	Taping(F:5.0mm) Ammo Packing	Taping(F7.5mm) Ammo Packing
Code	T2.5(T/A2.5)	T/A3.5	T/A5.0(S)	T/A7.5

Description	Lead cut		Lead forming cut			Lead forming cut	Lead forming cut	Frog forming cut
Code	F10	L/C	F4	F12	F/C	S1	F/S	F/W

### 11 产品加工图 Product processing diagram:

#### 11.1 产品尺寸图:

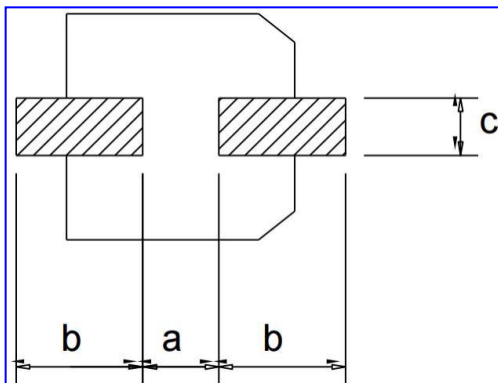


单位: mm

Size	$\phi D$	L	W	H	C	R	P
5X5.8	$5.0 \pm 0.5$	$5.8 \pm 0.3$	$5.3 \pm 0.2$	$5.3 \pm 0.2$	$6.0 \pm 0.2$	0.5~0.8	$1.5 \pm 0.2$
6.3X7.7	$6.3 \pm 0.5$	$7.7 \pm 0.3$	$6.6 \pm 0.2$	$6.6 \pm 0.2$	$7.3 \pm 0.2$	0.5~0.8	$2.0 \pm 0.2$
6.3X9	$6.3 \pm 0.5$	$9.0 \pm 0.5$	$6.6 \pm 0.2$	$6.6 \pm 0.2$	$7.3 \pm 0.2$	0.5~0.8	$2.0 \pm 0.2$
8X7.7	$8.0 \pm 0.5$	$7.7 \pm 0.3$	$8.3 \pm 0.2$	$8.3 \pm 0.2$	$9.0 \pm 0.2$	0.7~1.1	$3.1 \pm 0.2$
8X12	$8.0 \pm 0.5$	$12 \pm 0.5$	$8.3 \pm 0.2$	$8.3 \pm 0.2$	$9.0 \pm 0.2$	0.7~1.1	$3.1 \pm 0.2$
10X10.5	$10.0 \pm 0.5$	$10.5 \pm 0.3$	$10.3 \pm 0.2$	$10.3 \pm 0.2$	$11.0 \pm 0.2$	0.7~1.3	$4.6 \pm 0.2$
10X12.5	$10.0 \pm 0.5$	$12.5 \pm 0.3$	$10.3 \pm 0.2$	$10.3 \pm 0.2$	$11.0 \pm 0.2$	0.7~1.3	$4.6 \pm 0.2$

#### 11.2 焊盘尺寸 Land/Pad Pattern

单位: mm



Size	a	b	c
$\Phi 5$	1.4	3.0	1.6
$\Phi 6.3$	2.1	3.5	1.6
$\Phi 8$	2.8	4.2	1.9
$\Phi 10$	4.3	4.4	1.9

### 12. 包装 Packing

#### 12.1 SMD 类型的胶带规范 Taping Specification for SMD Type

##### 12.1.1 载带 Carrier Tape

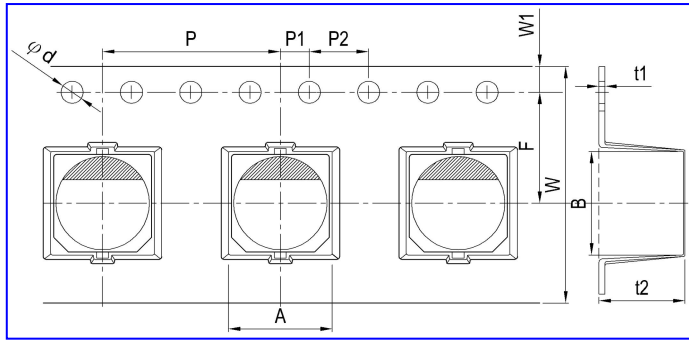


Fig. 1-1

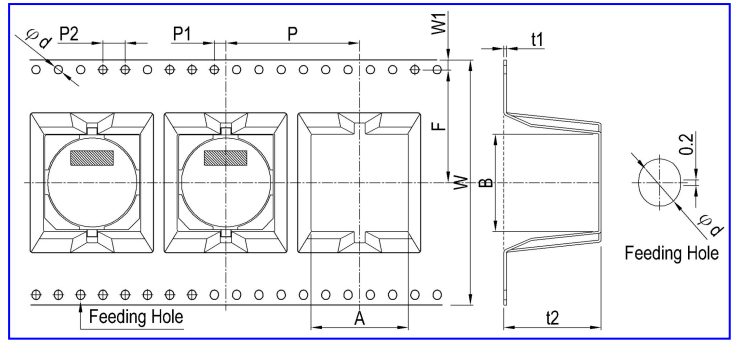
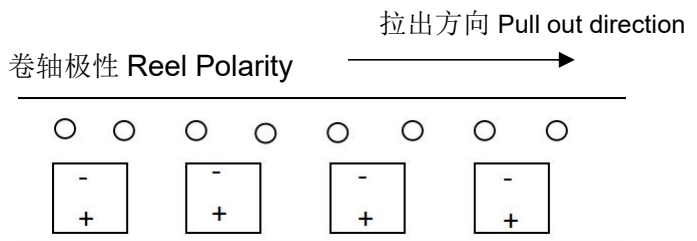
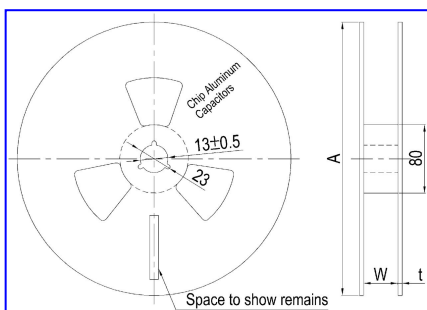


Fig. 1-2

单位: mm (Unit: mm)

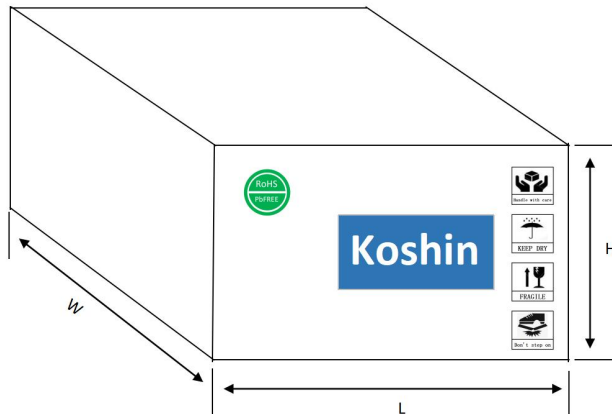
φ DXL	A	B	φ d	F	P	P1	P2	t1	t2	W	W1	Fig.No.
	±0.2	±0.2	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.2	±0.3	±0.15	
5X5.8	5.7	5.7	1.5	5.5	12	2.0	4.0	0.4	6.2	12	1.75	1-1
6.3X6	7.0	7.0	1.5	7.5	12	2.0	4.0	0.4	6.2	16	1.75	1-1
6.3X7.0	7.0	7.0	1.5	7.5	12	2.0	4.0	0.4	7.4	16	1.75	1-1
6.3X7.7	7.0	7.0	1.5	7.5	12	2.0	4.0	0.4	8.3	16	1.75	1-1
6.3X9	7.0	7.0	1.5	7.5	12	2.0	4.0	0.4	10.5	16	1.75	1-1
8X7	8.7	8.7	1.5	7.5	12	2.0	4.0	0.4	7.4	16	1.75	1-1
8X10.5	8.7	8.7	1.5	11.5	16	2.0	4.0	0.4	11.0	24	1.75	1-1
8X12	8.7	8.7	1.5	11.5	16	2.0	4.0	0.4	13	24	1.75	1-1
10X7.7	10.7	10.7	1.5	11.5	16	2.0	4.0	0.4	8.3	24	1.75	1-1
10X10.5	10.7	10.7	1.5	11.5	16	2.0	4.0	0.4	11.0	24	1.75	1-1
10X12.5	10.7	10.7	1.5	11.5	16	2.0	4.0	0.4	13.0	24	1.75	1-1
12.5X13.5	13.4	13.4	1.5	14.2	24	2.0	4.0	0.5	15	32	1.75	1-2
12.5X16	13.4	13.4	1.5	14.2	24	2.0	4.0	0.5	17.5	32	1.75	1-2

##### 12.1.2 纸盘 Reel Package



Case size	Φ 5	Φ 6.3	Φ 8x7	Φ 8x8~12.5	Φ 10	Φ 12.5
W	14	18	18	26	26	34
A	380	380	380	380	380	380
t	3.0	3.0	3.0	3.0	3.0	3.0

### 12.1.3 包装数量 Packing specification




尺寸	外箱尺寸 (mm)			Q'ty / Reel	Q'ty / Box
	L	W	H		
5X5.2~7	410	410	285	1000	12000
6.3X5.2~7.7	410	410	285	1000	10000
6.3X11	410	410	285	500	5000
8X6.5~11	410	410	285	500	4000
8X12	410	410	285	400	3200
10X8~10.5	410	410	285	500	4000
10X13.5	410	410	285	400	3200
12.5X13.5	410	410	285	200	1200
18X16.5	410	410	285	125	500

### 12.1.4 标签 Label:

系列 series	尺寸 Size(mm)	样图
标签 Labe	90×40	如右

Koshin Electrolytic Capacitors	
<b>OPN:</b>	×××× ②
	③
Type:	⑤⑥⑦ Qty: ⑨ pcs
CPN:	④ 生产日期:
①	⑩



①客户名 Customer name

⑥标称电压 Voltage

②周期 D/C

⑦标称容量 Capacity

③本厂 PART No. Koshin Part No.

⑧产品尺寸 Size

④客户的 PART No. Customer Part No.

⑨数量 Quantity

⑤系列 Series

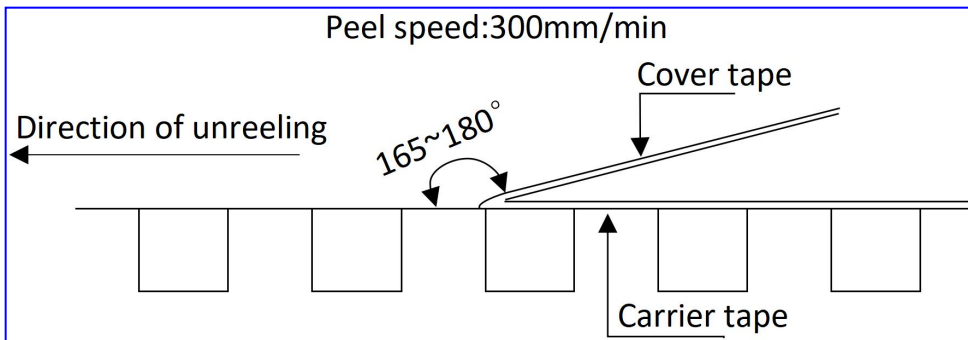
⑩传票编号 Work order number

### 12.1.5 Sealing Tape Reel Strength

12.1.5.1 Peel angle: 165 to 180°C referred to the surface on which the tape is glued

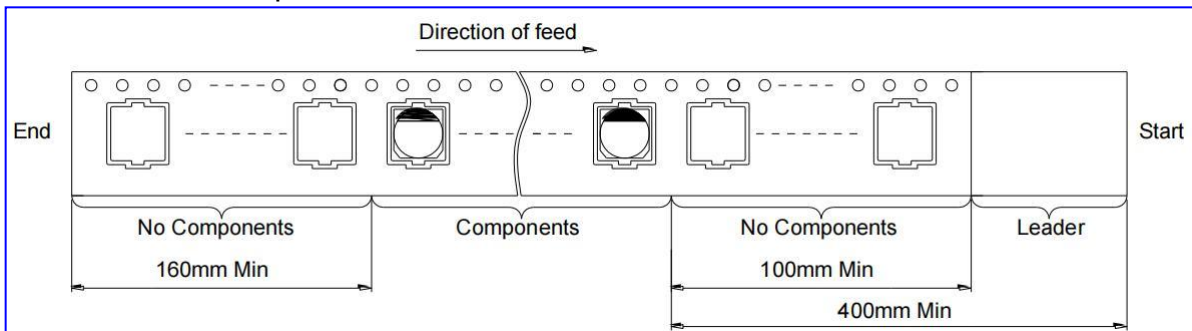
12.1.5.2 Peel speed: 300mm per minutes

12.1.5.3 The peel strength must be 0.1 ~ 0.7N under these conditions.

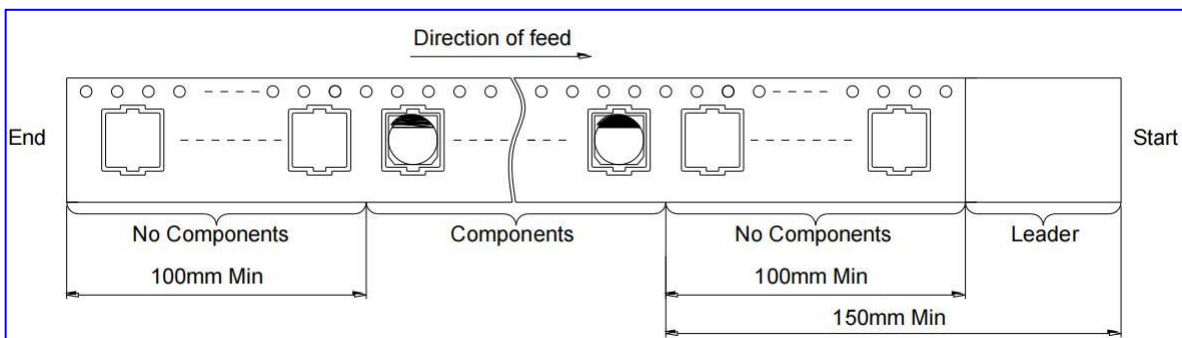


### 12.1.6 Taping method and polarity

#### 12.1.6.1 5、6、8 phi



#### 12.1.6.2 10 phi





## 使用时的注意事项

### Guidelines and Precautions

#### 1、关于电路设计 Circuit design

##### 1-1 禁止使用的线路

(a) OS-CON 的漏电流会在以下情况下增大

(1) 焊接时

(2) 高温无负荷试验，高温高湿无负荷试验，温度急变试验等无电压施加的状态下

(b) 为避免漏电流增加而带来的影响，请不要在以下线路环境中使用 OS-CON。

(1) 高阻抗线路

(2) 耦合电路

(3) 时间恒定线路

(4) 对漏电流敏感的线路

※ 为提高耐压性而将两个或两个以上 OS-CON 串联连接时请另行洽询

##### 1-1 Prohibited circuits

(a) Leakage current of the OS-CON may increase in the following conditions.

(1) Soldering

(2) When voltage is not applied: high temperature no-load test, high temperature and high humidity no-load test, rapidly changing temperature test, etc.

(b) Avoid the use of the OS-CON in the following type of circuits because leakage current may increase.

(1) High-impedance circuits

(2) Coupling circuits

(3) Time constant circuits

(4) Other circuits that are significantly affected by leakage current

※ If you plan to use 2 or more OS-CONs in a series connection, please contact us before use

##### 1-2 关于故障和寿命

故障率为依据 JIS C 5003(故障率水平)规定的 0.5 %/1000 h(可信度水准 60 %), 但并非万无一失。OS-CON 的主要故障模式如下所示。

##### 1-2-1 偶发故障

故障模式主要是以焊接或使用温度环境导致的热应力，电气应力，机械应力等为主因的短路模式，原因列举如下。

(1) 施加电压超过额定电压

(2) 施加反向电压

(3) 过度的机械应力

(4) 施加超过规格的快速充放电造成冲击电流

(a) 如果短路电流流过 OS-CON 会造成如下现象。

(1) 短路后若通电电流较小( $\phi 10$ :约 1 A 以下,  $\phi 8$ :约 0.5 A 以下,  $\phi 6.3$ :约 0.2 A 以下)时 OS-CON 自身稍许发热, 即使连续通电外观也无异常。

(2) 短路电流值超过上述数值时

OS-CON 内部温度升高封装胶垫鼓起有味气体外溢。

(b) 万一发生短路时为保证安全请采取以下对策。

(1) 如发生有味气体外溢时, 立即切断设备主电源并停止使用。此时, 脸和手部切勿接近碰触。

(2) 因条件不同而异到发生有味气体的时间一般需要数秒至数分钟。使用保护电路时, 务必将其设计为在这期间内动作。

(3) 如果发生气体进入眼内时应立即清洗, 如果吸入口中时应立即漱口。

(4)不要舔电解质。如果电解质接触到皮肤上立即用肥皂冲洗。

(5)OS-CON 包括可燃性物质。当短路后的电流值过大时，短路部位可能会产生火花甚至导致起火。请采用冗余设计，保护回路等对策以确保安全性。

### 1-2-2 磨损故障(寿命)

主要是在超过耐久性和高温高湿的保证时间后，电气特性会发生较大变化，最终因电解质的不断绝缘化(劣化)导致开路模式。即使在额定性能，电气和机械性能条件下，电容量和 ESR 等电气特性也可能会在规定范围内发生变动。因此，在设计时务必加以注意。

### 1-2 Failure and life-span

The failure rate is 0.5 % /1000 h (Confidence level: 60 %) based on JIS C 5003.

The prospective failure is not zero. The mainly failure modes are as follows.

### 1-2-1 Contingency failure

The most common failure mode is a short circuit. Mainly caused by the soldering or operating temperature environment, along with heat stresses, electrical stresses or mechanical stresses as follows.

- Applying voltage over the rated voltage.
- Applying reverse voltage
- Excessive mechanical stress
- Applying rush current by sudden charge or discharge out of the specification.

(a) The following phenomenon is seen when short-current is applied to the OS-CON.

(1) When current is relatively low ( $\phi$  10: approx 1 A or less,  $\phi$  8: approx 0.5 A or less,  $\phi$  6.3: approx 0.2 A or less) The OS-CON becomes heated, but no effects are visible even when the current is continuously carried.

(2) When the short circuit currents exceed the mentioned value above. After internal temperature increase, sealing rubber may be turned over. In some cases, odorous gas may be produced.

(b) In case a short circuit occurs, ensure safety by fully considering the followings.

(1) If odorous gas is released, turn off the main power of the equipment.

In this case, keep your face and hands away from the area.

(2) Though it depends on the conditions, it takes seconds to minutes before odorant gas generates. Protective circuit should operate in this period.

(3) If the gas comes into eyes, rinse immediately. If the gas is inhaled, gargle immediately.

(4) Do not lick the electrolyte. If the electrolyte touches skin, wash it off with soap immediately.

(5) The OS-CON contains combustible substances. In case a large current continues to flow after a short circuit, in the worst case, the shorted-out section may ignite. For safety, install a redundant circuit or a protective circuit, etc.

### 1-2-2 Wear-out failure (life time)

When life time span exceeded the specified guarantee time of endurance and damp heat, electrolyte might insulate and cause electric characteristic changed. This is called an open circuit. The electric characteristics of capacitance and ESR may possibly change within the specified range in specifications even if it is used under the condition of the rated voltage, electric and mechanical performance. Please note it when designing.

### 1-3 关于漏电流 Leakage current

OS-CON 的漏电流会由于机械应力的影响而增大。

在这种情况下若 OS-CON 在最高使用温度范围以下外加电压漏电流会在自我修复的作用下逐渐减小。

Mechanical stress may cause OS-CON's leakage current increased.

In such a case, leakage current will gradually decrease by applying voltage (within the category voltage and the upper limit of category temperature).

### 1-4 快速充放电的限制

急速充放电所导致的过大冲击电流会造成电容短路或使漏电流增加。

当冲击电流值为以下条件时，建议使用保护线路以保持高可靠性。

(a)对允许纹波电流的 10 倍低于 10 A 的产品, 通入 10 A 以上的冲击电流时

(b)对允许纹波电流的 10 倍高于 10 A 的产品, 通入 10 A 以上的冲击电流时

1-4 Rapid charge and discharge limitation

Allowance of a large rush current to flow due to rapid charge and discharge may result in short circuit or large leakage current. The protection circuit, to maintain high reliability, is recommended when rush current to flow to the OS-CON is in the following cases.

(a) Products which 10 times of allowable ripple current is less than 10 A: It is when 10 A or over of rush current is applied.

(b) Products which 10 times of allowable ripple current is 10 A or over: It is when rush current, which the figure is over 10 times of allowable ripple current, is applied.

## 2、关于贴装 Mounting

### 2-1 关于电烙铁焊接

(a)插装型的引线间距和电路板孔间距不符而需要加工引线时应避免对 OS-CON 主体施加应力。

(b)焊接时避免对 OS-CON 本体施加过度应力。

(c)需要取下焊接后的 OS-CON 时, 请充分熔化焊料后, 在不对 OS-CON 主体施加应力的情况下实施。

(d)不要让电烙铁的尖端触及 OS-CON 本体。

### 2-1 Soldering with a soldering iron

(a) When lead terminals for radial lead type must be processed because the lead pitch and the PCB holes do not match, process them without any stresses to the OS-CON before soldering.

(b) Solder without any excessive stresses to the OS-CON itself.

(c) When the OS-CON has been soldered once and needs to be removed, remove it after the solder has been completely melted.

(d) Do not let the tip of the soldering iron touch (a) the OS-CON itself.

### 2-2 波峰焊

(a)不要对贴装品进行波峰焊。

(b)不要将 OS-CON 主体浸在溶解的焊料中。

(c)焊接部位只限于电路板与 OS-CON 相反的一侧。

(d)焊剂不要溅到电极端子部以外的部位。

(e)焊接时避免其它零件倒卧触及 OS-CON。

### 2-2 Flow soldering

(a) Do not apply flow soldering to OS-CON SMD type.

(b) Do not solder the OS-CON itself by submerging it in melted solder.

(c) Solder the opposite side that the OS-CON is mounted on.

(d) Note that flux does not adhere to anywhere except the lead terminal.

(e) Note that other components do not fall over and touch the OS-CON when soldering.

### 2-3 回流焊

(a)不要对插装品进行回流焊。

(b)使用 VPS 条件焊接时请另行洽询。

### 2-3 Reflow soldering

(a) Do not apply reflow soldering to OS-CON Radial Lead type.

(b) Please contact us for setting VPS conditions.

### 2-4 焊接后的注意事项

注意不要对 OS-CON 施加以下过度应力。

- (a) 不要倾斜扳倒或扭曲 OS-CON。
- (b) 移动电路板时不得用 OS-CON 作把手。
- (c) 不要碰撞 OS-CON。
- (d) 叠放电路板时不要使 OS-CON 触及电路板或其它元件。

### 2-4 Capacitor handling after soldering

Do not subject the OS-CON to excessive stress as follows.

- (a) Do not tilt, bend or twist the OS-CON.
- (b) Do not move the PCB with holding the OS-CON itself.
- (c) Do not hit the OS-CON with objects.
- (d) When stacking PCBs, make sure that the OS-CON does not touch other PCBs or components.

### 2-5 关于电路板的清洗

可以使用 Pine-a ST-100S、Clean thru 750H、750L、710M、750K、Techno Care FRW 14~17 等高级乙醇类清洗液，AK-225AES 等氟利昂代替品或 IPA 等清洗剂清洗，在清洗电路板时请先确认以下内容。

- (a) 采用浸渍，超声波等清洗方法时，导电性高分子型的清洗时间应控制在 2 分钟以内。
- (b) 洗液温度请控制在 60 °C 以下。
- (c) 执行清洗剂防污染管理(导电度、pH 值、比重、含水量等)。
- (d) 清洗后不要在清洗液环境中或密封容器中保管。
- (e) 烘干电路板和 OS-CON 时请在使用温度范围内进行。
- (f) 清洗后擦拭电容时有可能抹去电容表面的标记应予以注意。
- (g) 关于清洗剂和清洗方法等详细情况或者使用其它清洗剂时请另行洽询。

### 2-5 Circuit board cleaning

Check the following items before washing PC board with these detergents: high quality alcohol-based cleaning fluid such as Pine- $\alpha$  ST-100S, clean thru 750H, 750L, 710M, 750K or Techno Care FRW 14 through 17 or detergents including substitute freon as AK-225AES or IPA.

- (a) Use immersion or ultrasonic waves to clean within 2 minutes.
- (b) The temperature of the cleaning fluid should be less than 60 °C.
- (c) Watch the contamination of the detergent (a) such as conductivity, pH, specific gravity, water content, etc.
- (d) Do not store the OS-CON in a location subject to gases from the cleaning fluid or in an airtight container after cleaning.
- (e) Dry the PCB or OS-CON with hot air that should be less than the upper category temperature.
- (f) Please note that indication may disappear when rubbing print side after washing depending on a cleaner.
- (g) Please contact us for details about detergents, cleaning methods and detergents other than those listed above.

### 2-6 固定剂和涂层剂

- (a) 选择适合于 OS-CON 外装材质和封装材质的材料。特别是固定剂和涂层剂或稀释剂中不得含有丙酮。
- (b) 使用固定剂和涂层剂时注意不要在电路板和 OS-CON 封装部之间留下焊剂残渣及污垢。
- (c) 注意使用固定剂和涂层剂前请烘干清洗剂等。
- (d) 关于固定剂和涂层剂的热固化条件请另行洽询。

### 2-6 Fixatives and coating materials

- (a) Select the appropriate covering and sealant materials for the OS-CON. In particular, don't use acetone in the fixative, coating agent and diluent.
- (b) Before applying the fixative or coating, completely remove any flux residue and foreign matter from the area where the board and the OS-CON will be jointed together.
- (c) Allow any detergent to dry before applying the fixative or coating.
- (d) Please contact us for the fixative and coating heat curing conditions.

### 2-7 电容器的绝缘

保证外壳与正负极端子以及电路板的线路间完全隔离。

- (a)外壳表面的树脂不保证绝缘。
- (b)外壳和负极端子之间含有不稳定电阻未绝缘。

### 2-7 Capacitor insulation

Be sure to completely separate the case, negative lead terminal, positive lead terminal and PC board patterns with each other due to the following reasons.

- (a) Insulation is not guaranteed at a part of resin on the surface of a case.
- (b) It offers inconstant resistance between a case and a negative lead terminal and it isn't insulated.

### 3.关于保管

建议 OS-CON 使用时打开并用完，开封后保存时为保持良好的焊接性请遵守以下保管期限。请保管在室温 5~35℃，湿度 75%以下的环境 (即使在下表所列的期限内，引线端子电镀材质的性质也可能导致偶尔出现发暗的现象，但不影响焊接性能)

		开封前	开封后
表面贴装型		出货后 24 个月以内	开封日算起 30 天以内 (载带包装状态)
径向引线型	袋装品	出货后 30 个月以内	开封日算起 7 天以内
	编带品	出货后 24 个月以内	

### 3.Storage

Open the bags just before mounting and use up all products once opened, For keeping a good solderability, store the OS-CON as follows.We recommend the following conditions for storage: Ambient temperature : 5~35 °C ,Ambient humidity: <75%RH. Due to the feature of the plating material of the lead terminal, it may rarely become dull color during the specified period as follow, but it will not affect the solderability

		Before unsealing	After unsealing
SMD type		Within 24 months after shipment	Within 30 days from opening (packaged with carrier tape)
Radial lead type	Bag packing product	Within 30 months after shipment	Within 7 days from opening
	Taping product	Within 24 months after shipment	

### 4. 关于体系 Certificates

- ① ISO 9001:2008 质量管理体系认证 ISO 9001:2008 Certificate
- ② ISO 14001:2004 环境管理体系认证 ISO 14001:2004 Certificate
- ③ ISO/TS 16949:2009 质量管理体系 (汽车行业生产件与相关服务件) 认证 ISO/TS 16949:2009 Certificate
- ④ OHSAS 18001:2007 职业健康安全管理体系认证 OHSAS 18001:2007 Certificate

### 5. 关于环保

符合 RoHS2.0 RoHS compliance

符合欧盟 RoHS2.0 的最新标准，若客户有特殊要求，按照双方签订的相关协议为准。

Accord with the latest standard of RoHS2.0 , if customers have any special requirments, according to the relevant agreements which signed by both parts.