

承 认 书

APPROVAL SHEET

客 户 :
CUSTOMER

ARROW

承认书编号 :
APP. NO.

D240021713


系 列 :
SERIES

SK

使用温度范围 :
OPERATION TEMP.
RANGE

-40~+85°C

凯美品牌料号 JAMICON PART No. :	客户产品料号 CUSTOMER PART No. :
JSK477M050T1G5H21L (Old PN:SKP471M1HG21M)	

客户承认印 CUSTOMER'S APPROVAL STAMP	凯美电机股份有限公司(总部) KAIMEI ELECTRONIC CORP.(Headquarters)	
		
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Table of specification and characteristics 规格和特性表

NO.	料号 Part NO.	静电容量	容量公差	工作电压	损失角DF(%)	漏电流LC(μA)	纹波电流RC(mArms)	纹波寿命Ripple Life	尺寸 Dimensions (mm)		
		CAP(μF)	CAP Tol. (%)	WV	(MAX)	(MAX)	(MAX)	(Hrs)	φD	L	F
		120Hz 20°C			120Hz 20°C	20°C	85°C	85°C			
1	JSK477M050T1G5H21L	470	±20	50	10	235	820	2000	10	21	5.0

I. Scope 范围

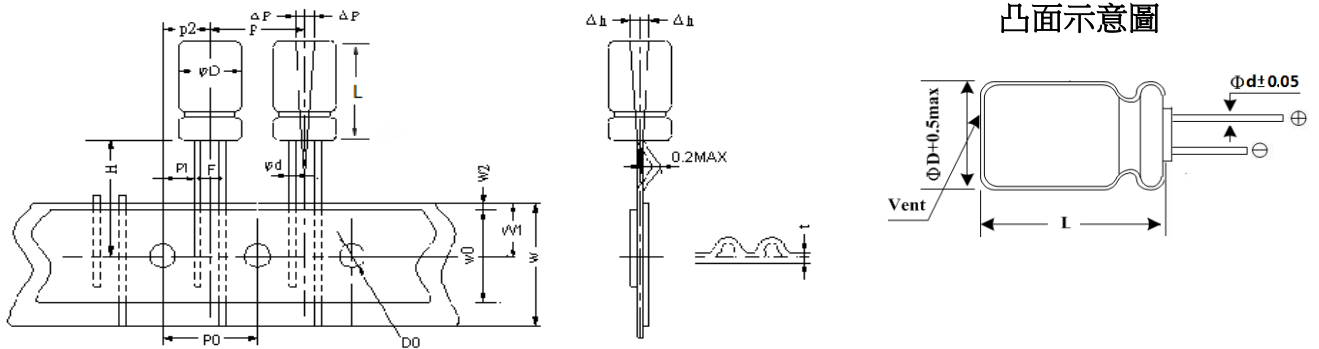
This standard defines characteristics and dimensions for aluminum electrolytic capacitors named SK series is standard product.

此标准描述了铝电解电容器标准品SK系列的特性和尺寸。

II. Construction & Dimensions 尺寸图

Code : T1 Packaging for the folding type 包装为折迭型式

Diagram of convex rubber cover 凸面示意图



Size F means the distance after forming between the centers of the two lead pins.

尺寸表(mm)，F表示成型后两导针中心之间的距离。

Symbol 符号	Size尺寸	Tolerance 公差
	10 (10.2) × 10 ~ 30	
φD	10	+0.5
L	21	±1.5
φd	0.6	±0.05
P	12.7	±1.0
P0	12.7	±0.3
P1	3.85	±0.5
P2	6.35	±1.0
F	5.0	+0.6/-0.2
W	18	±0.5
W0	8min	-
W1	9	±0.5
W2	2.0max	-
H	18.5	±0.5
D0	4	±0.3
Δp	0.2max	-
Δh	0.2max	-
t	0.7	±0.2

III. Characteristics 特性

Standard test condition 标准试验条件

Unless otherwise specified all tests shall be performed at, or referred to, an ambient temperature of 20°C and a relative humidity not greater than 60%.

所有的试验应在环境温度20°C和相对湿度小于等于60%的条件下进行，除非另有规定。

Operating Temperature Range 工作温度范围

- 6.3~100VDC -40~+85°C
- 160~450VDC -40~+85°C
- 500~550VDC -25~+85°C

1. Electrical characteristics 电气特性

(1). Rated Voltage and Surge Voltage 额定电压和浪涌电压

WV: Working Voltage 工作电压(VDC)

SV: Surge Voltage 浪涌电压 (V)

WV	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450	500	550
SV	8	13	20	32	44	63	79	125	200	250	300	400	450	500	550	600

(2). Leakage Current 漏电流

The maximum leakage current is specified in the following formula after DC working voltage applied for 2 minutes.

印加直流工作电压2分钟后的最大漏电流值如下列公式所示：

6.3~100WV $I=0.01CV$ or $3(\mu A)$, Whichever is greater 任意一个较大值。.

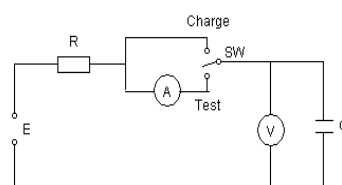
160~550WV $I=0.03CV+10(\mu A)$.

where I: Leakage Current (漏电流) (μA)

C: Nominal Capacitance (标称容量) (μF)

V: Rated Voltage (额定电压) (V)

Measurement circuit 测试电路



(3). Dissipation Factor 损失角

Dissipation Factor at 120Hz/ 20°C shall not exceed the values given in the table below.

在120 Hz / 20°C条件下的DF值不应超过下表中给出的值。

WV	6.3	10	16	25	35	50	63	100	160~250	350~450	500~550
DF(%)	22	19	16	14	12	10	10	8	20	20	24

Note: Above DF specifications shall be 2% added for every 1000 μF capacitor exceeding 1000 μF .

注：当静容量超过1000 μF 时，每增加1000 μF ，则以上损失角规格值应增加2%。

(4). Low Temperature Characteristics 低温特性

The ratio of impedance at -25°C/+20°C and -40°C/+20°C of the capacitor shall be less than the following value at 120Hz.

电容器在120Hz的条件下，分别在-25°C/+20°C和-40°C/+20°C的阻抗比，应小于以下的规格值：

WV 额定电压	6.3	10	16	25	35~100	160~250	315~400	450~550
Z阻抗(120Hz)								
Z(-25°C) / Z(+20°C)	8	6	5	3	3	3	6	15
Z(-40°C) / Z(+20°C)	10	8	6	4	3	6	6	-

(5). Multiplier for Ripple Current 纹波电流频率修正系数

Frequency coefficient 频率系数

Frequency 频率(Hz)	60	120	1k	$\geq 10k$
W.V	Multiplier			
6.3~25	0.85	1.00	1.10	1.20
35~100	0.80	1.00	1.15	1.25
160~250	0.75	1.00	1.25	1.40
350~450	0.70	1.00	1.30	1.50
500~550	0.60	1.00	1.10	1.15

Temperature coefficient 温度系数

Ambient Temperature (°C) 环境温度 (°C)	≤ 50	70	85
Coefficient 系数	1.36	1.25	1.00

2. Mechanical Characteristics 机械特性

Lead Pull Test 导针拉力测试

Capacitors shall be with stand the pull test shown in the following table.

电容器的导针应能承受下表所示的拉力测试

Lead diameter 线径(mm)	Load 负荷(kg)	Test time 测试时间(sec)
d ≤ 0.5	0.5	30 ± 1
0.5 < d ≤ 0.8	1.0	30 ± 1
0.8 < d ≤ 1.2	2.5	30 ± 1

3. Endurance characteristics 耐久特性

(1). Ripple Life 纹波寿命

After apply rated voltage for 2000+12/-0 hours at 85±2°C, when the capacitors are restored to 20°C, the capacitors shall meet the following requirements.

在85±2°C环境中，连续加载额定电压2000+12/-0小时后，待温度恢复到20°C进行测量时，电容器应满足以下要求：

Capacitance Change 容量变化	Within ±20% of initial value 在初始值的±20%以内
Dissipation Factor 损失角	Not more than 200% of specified value 不超过规格值的200%
Leakage Current 漏电流	Not more than the specified value 不超过规格值

(2). Shelf life 高温无负荷寿命

The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000+12/-0 hours at 85±2°C without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.

在85°C±2°C环境中，无负荷放置1000+12/-0小时后待温度恢复到20°C，特性测量前需先进行试验前处理（处理方法参照JIS C 5101-4 4.1项），测量时应满足以下要求。

Capacitance Change 容量变化	Within ±20% of initial valu 在初始值的±20%以内
Dissipation Factor 损失角	Not more than 200% of specified value 不超过规格值的200%
Leakage Current 漏电流	Not more than the specified value 不超过规格值

(3). Solderability test 焊锡性试验

The following specifications shall be satisfied when the lead wires are tested in solder bath at 245±5°C for 2.5±0.5 seconds, more than 95% of the terminal surface shall be covered with new solder.

当导针在245±5°C的焊锡槽中试验2.5±0.5秒后，95%以上的端子表面应当要被新焊料覆盖。

(4). Solder Heat Resistance Test 焊锡耐热试验

The following specifications shall be satisfied when the lead wires are tested in solder bath at 275+2/-0°C for 20±0.5 seconds.

当导针在275+2/-0°C的焊锡槽中试验20±0.5秒后，应当满足以下要求：

Capacitance Change 容量变化	≤±5% of the initial value ≤初始值的±5%
Dissipation factor 损失角	≤ Initial specified value 低于初始规格值
Leakage Current 漏电流	≤ Initial specified value 低于初始规格值

IV. Mounting 安装

The paper separators and the electrolytic-conductive electrolytes in a non-solid aluminum electrolytic capacitor is flammable.

非固态电容器内的电解纸和电解液都是易燃品。

Leaking electrolyte on a PC board can gradually erode the copper traces, possibly causing smoke or burning by short-circuiting the copper traces.

PC板上漏液会逐渐侵蚀铜丝，很可能由于铜丝短路导致冒烟或燃烧。

Verify the following points when designing a PC board.

在设计PC板时需验证以下要点：

- (1) Provide the appropriate hole spacing on the PC board to match the terminal spacing of the capacitor.在PC板上保留适当的孔距以匹配电容器的端子间距。
- (2) Make the following open space over the vent so that the vent can operate correctly.

Case diameter 铝壳直径	Clearance 间隔
φ6.3 ~ φ13 mm	≥ 2 mm
φ16 ~ φ35 mm	≥ 3 mm
≥ φ40 mm	≥ 5 mm

- (3) Do not place any wires or copper traces over the vent of the capacitor.

请不要在电容器的防爆阀上方放置任何电线或铜丝。

- (4) Installing a capacitor with the vent facing the PC board needs an appropriate ventilation hole in PC board. 在安装电容器时，如果防爆阀正对PC板，则PC板上需要开一个适当的通风孔。

- (5) Do not pass any copper traces beneath the seal side of a capacitor.

The trace must pass 1 or 2 mm to the side of the capacitor.

请不要在电容器的封口部下面进行电路配线。如果在电容器附近配线，请确保线路与电容器间隔1~2mm。

- (6) Avoid placing any heat-generating objects adjacent to a capacitor or even on the reverse side of the PC board.

请不要在电容器周围或PC板的背面放置任何发热部件。

- (7) Do not pass any via holes or underneath a capacitor.
请不要从电容器通孔或电容器底部穿过。
- (8) In designing double-sided PC boards, do not locate any copper trace under the seal side of capacitor. 设计双面PC板时，请不要在电容器的封口面放置任何铜丝。
- (9) The liquid aluminum electrolytic capacitor can't be reflow soldering, please contact us if you need to do that. 液态铝电解电容器不能进行回流焊，如需进行回流焊请与我司联系。
- (10) For the capacitor that diameter > 13φ and All Pen-cap that diameter, it is recommended to be fixed on the PCB with fixed adhesive when installed, so as to enhance their vibration resistance.
直径>13φ的电容和所有笔形电容，为增强其抗振动能力，建议安装时用固定胶辅助其固定于PCB上。

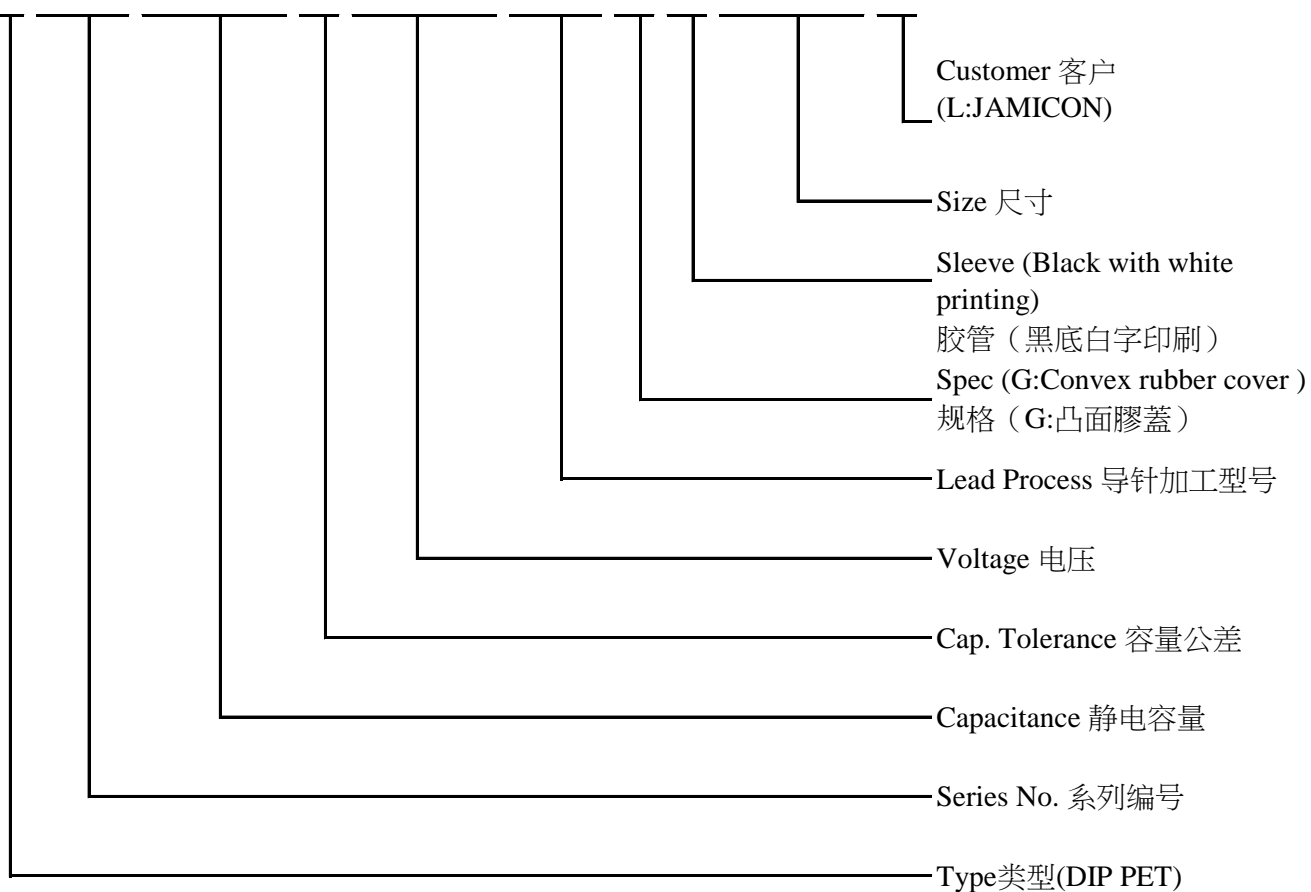
V. Storage Condition 储存条件

- (1) Aluminum Electrolytic Capacitors should not be stored in high temperatures or where there is a high level of humidity. The suitable storage condition is 5~35°C and less than 75% in relative humidity.
铝电解电容器不应当储存在高温或高湿的条件下。合适的储存条件为5~35°C，相对湿度低于75%。
- (2) Aluminum Electrolytic Capacitors should not be stored in damp conditions such as water, saltwater spray or oil spray.
铝电解电容器不应当储存在潮湿的条件下，如水、盐水喷雾或油雾。
- (3) Do not store Aluminum Electrolytic Capacitors in an environment full of hazardous gas (hydrogen sulfide, sulfurous acid gas, nitrous acid, chlorine gas, ammonium, etc...).
请不要将铝电解电容器存储在一个充满有害气体的环境下(硫化氢、二氧化硫、亚硝酸、氯气、铵气等...)。
- (4) Aluminum Electrolytic Capacitors should not be stored under exposure to ozone, ultraviolet rays or radiation.
铝电解电容器储存不应暴露在臭氧、紫外线辐射和射线中。
- (5) In principle, aluminum electrolytic capacitors should be used within one year after production. If a capacitor has been stored for more than one year under normal temperature (not more than one year at >35°C) and it shows increased leakage current, then a treatment by voltage application is recommended. The capacitor which hasn't been treated mustn't be used directly. If the capacitor is stored at room temperature for more than two years, it shall be scrapped.
保管期限，原则上为制造后一年。
如果电容器在常温下储存超过一年(>35°C条件下不超过一年)，出现漏电流上升现象，那么建议对电容器进行加压处理。未被处理过的电容器不能直接使用。
如果电容器常温下储存超过两年则请报废处理。

VII. Catalog numbering

JAMICON TYPE 类型(Part Number 料号) :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
J	S	K	4	7	7	M	0	5	0	T	1	G	5	H	2	1	L



VIII.PACKAGING SPECIFICATION 包装规范

Radial Lead Type Aluminium Electrolytic Capacitors 引线型铝电解电容器

For Bulk: Standard Cutting & Forming 针对散装：标准切脚&成型

Classification 分类	Standard Bulk 标准品散装				Cutting & Forming 切脚&成型			
	Case size 尺寸 D*L(mm)	Vinyl bag Qty 袋装数 量(pcs)	inner box 内箱数量 (pcs)	outer carton 外箱数量 (pcs)	gross weight 总重(kg)	Vinyl bag Qty 袋装数 量(pcs)	inner box 内箱数量 (pcs)	outer carton 外箱数量 (pcs)
4x5	2,000	24,000	48,000	13	2,000	40,000	80,000	13
4x7	2,000	20,000	40,000	12	2,000	32,000	64,000	15
5x5	2,000	20,000	40,000	11	2,000	32,000	64,000	14
5x7	2,000	16,000	32,000	14	2,000	32,000	64,000	17
5x9~5x11	1,000	12,000	24,000	11	1,000	20,000	40,000	17
5x15	1,000	10,000	20,000	13	1,000	14,000	28,000	14
6.3x5	2,000	16,000	32,000	13	2,000	20,000	40,000	17
6.3x7	2,000	12,000	24,000	11	2,000	20,000	40,000	18
6.3x9~6.3x14	1,000	10,000	20,000	14	1,000	14,000	28,000	19
6.3x15~6.3x17	1,000	10,000	20,000	14	1,000	10,000	20,000	15
8x5~8x7	500	10,000	20,000	14	500	8,000	16,000	12
8x9~8x12	500	7,500	15,000	16	500	8,000	16,000	15
8x14~8x15	500	5,000	10,000	13	500	6,000	12,000	15
8x16	500	5,000	10,000	14	200	4,000	8,000	11
8x20~8x25	200	4,000	8,000	14	200	4,000	8,000	13
10x9~10x13	200	4,000	8,000	14	200	4,000	8,000	13
10x14~10x15	200	3,600	7,200	15	200	4,000	8,000	15
10x16~10x18	200	3,600	7,200	15	200	3,200	6,400	14
10x20~10x21	200	3,000	6,000	16	200	2,800	5,600	13
10x22~10x25	200	2,400	4,800	16	200	2,400	4,800	15
10x26	200	2,400	4,800	17	200	1,600	3,200	13
10x27~10x35	200	1,800	3,600	16	200	1,600	3,200	14
12.5x13~12.5x16	100	2,400	4,800	15	200	1,600	3,200	11
12.5x20~12.5x22	100	1,800	3,600	15	200	1,200	2,400	10
12.5x23~12.5x26	100	1,200	2,400	13	200	1,200	2,400	12
12.5x30	100	1,200	2,400	15	100	1,000	2,000	11
13x13~13x16	100	2,400	4,800	15	200	1,600	3,200	11
13x18~13x21	100	1,800	3,600	16	200	1,200	2,400	11
13x24~13x26	100	1,200	2,400	12	200	1,200	2,400	11
13x30	100	1,200	2,400	13	100	1,000	2,000	13
13x35~13x36	100	1,000	2,000	14	100	600	1,200	9
13x38~13x40	100	800	1,600	13	100	600	1,200	12
16x15~16x20	-	-	-	-	200	1,000	2,000	14
18x15~18x20	-	-	-	-	200	1,000	2,000	17

Note: Inner box size LxBxH(mm) 290*170*265, Outer carton size LxBxH (mm) 360*305*280

注：内箱尺寸LxBxH(mm)290*170*265，外箱尺寸LxBxH(mm) 360*305*280

For lattice bar type packing of standard cutting&Forming 针对排装: 標準品 切脚&成型

Classification 分类	For lattice bar type packing of standard 排装/標準品				Classification 分类	For lattice bar type packing of cutting&Forming 排装/切脚&成型			
Case size D*L(mm)	inner box 内盒 (mm)	quantity 数量(pcs)	outer carton 外箱(mm) 360*305*280	gross weight 总重(kg)	Case size D*L(mm)	inner box 内盒 (mm)	quantity 数量(pcs)	outer carton 外箱(mm) 360*305*280	gross weight 总重(kg)
8φ×50~60L	340*288*130	1000	2000	10	8φ×30~45L	340*288*65	1000	4000	13
10φ×30~45L	340*288*85	700	2100	16	8φ×46~50L	340*288*85	1000	3000	14
10φ×46~60L	340*288*130	700	1400	13	10φ×30~45L	340*288*65	700	2800	15
12.5φ×30~40L	340*288*85	460	1380	12	10φ×46~60L	340*288*85	700	2100	16
12.5φ×41~50L	340*288*130	460	920	10	12.5φ×40~45L	340*288*65	460	1840	13
12.5φ×55~60L	340*288*130	460	920	13	12.5φ×46~55L	340*288*85	460	1380	12
13φ×16~20L	340*288*65	450	1800	9	16φ×21~30L	340*288*65	300	1200	13
13φ×35L	340*288*85	450	1350	10	16φ×31~45L	340*288*65	300	1200	16
16φ×15~20L	340*288*65	300	1200	9	18φ×21~30L	340*288*65	250	1000	13
16φ×21~26L	340*288*85	300	900	8	18φ×31~45L	340*288*65	250	1000	19
16φ×27~32L	340*288*85	300	900	9	18φ×50L	340*288*85	250	750	16
16φ×33~40L	340*288*85	300	900	14	22φ×25~30L	340*288*65	160	640	11
16φ×45L	340*288*130	300	600	12	22φ×31~45L	340*288*65	160	640	16
18φ×15~20L	340*288*65	250	1000	9	22φ×50L	340*288*85	160	480	13
18φ×21~42L	340*288*85	250	750	14	-	-	-	-	-
18φ×43~50L	340*288*130	250	500	11	-	-	-	-	-
22φ×25~40L	340*288*85	160	480	13	-	-	-	-	-
22φ×41~50L	340*288*130	160	320	12	-	-	-	-	-

For Taping Ammo & Reel 针对编带折迭式&圆盘式:

Classification 分类	Ammo Tape 折迭式编带				Reel Tape 圆盘式编带		
Case size D*L(mm)	inner box 内盒 (mm)	quantity 数量(pcs)	outer carton 外箱(mm) 360*305*280	gross weight 总重(kg)	inner carton 内箱(mm) 350*350*110	outer carton 外箱(mm) 370*370*600	gross weight 总重(kg)
4φ×5~7L	340*288*50	3000	15000	5	3,000	15,000	6
5φ×5~15L	340*288*50	2600	13000	8	2,400	12,000	8
6.3φ×5~17	340*288*50	2000	10000	8	2,000	10,000	9
8φ×5~17L	340*288*50	1200	6000	10	1,600	8,000	12
8φ×18~30L	340*288*65	1200	4800	13	1,000	5,000	12
10φ×9~17L	340*288*50	800	4000	10	-	-	-
10φ×18~32L	340*288*65	800	3200	11	-	-	-
10φ×35L	340*288*85	800	2400	14	-	-	-
12.5φ×12.5~31 13φ×13~31L	340*288*65	500	2000	14	-	-	-
12.5φ×35~41L 13φ×35~41L	340*288*85	500	1500	12	-	-	-
16φ×15~32L	340*288*65	300	1200	14	-	-	-
16φ×35~40L	340*288*85	300	900	13	-	-	-
18φ×16~32L	340*288*65	250	1000	16	-	-	-
18φ×35~35.5L	340*288*85	250	750	14	-	-	-

Note : For 10φ Reel Tape : 备注 : 对于10φ圆盘式编带

size 尺寸	inner carton 内箱(pcs)	outer carton 外箱(pcs)
10φ×10~16L	1,200	6,000
10φ×17~20L	1,000	5,000

IX. Others

(1) All the Jamicon capacitors, which are authenticated by the SGS, and the test report shows that the inspection results of Hexavalent Chromium VI(Cr(VI)), Cadmium (Cd), Mercury (Hg), Lead (Pb), Polybrominated Biphenyls (PBBs), Polybrominated Diphenyl Ether (PBDEs), Bis(2-ethylhexyl) phthalate (DEHP), Dibutyl phthalate (DBP), Butyl benzyl phthalate (BBP), Diisobutyl phthalate (DIBP), chlorine (Cl) and bromine (Br) are comply with ROHS and halogen-free requirements.

凱美所有電容器經SGS認證測試報告中所檢測的六價鉻(Cr⁺⁶)，鎘(Cd)，汞(Hg)，鉛(Pb)，多溴聯苯(PBBs)，多溴聯苯醚(PBDEs)，鄰苯二甲酸二(2-乙基己基)酯(DEHP)，鄰苯二甲酸二丁酯(DBP)，鄰苯二甲酸甲苯基丁酯(BBP)，鄰苯二甲酸二異丁酯(DIBP)，氯(Cl)，溴(Br)均符合RoHS及無鹵要求。

(2) Satisfied characteristic JIS C 5101. 符合JIS C 5101特性.

(3) Aluminum Electrolytic Capacitors may be damaged by corrosion which is caused by any halogenated hydrocarbon solvents.

鋁電解電容器可能會被鹵化烴類溶劑導致的腐蝕而損壞。

Please let us know in advance the solvent name and conditions for your PCB cleaning

請讓我們事先了解貴司印刷線路板使用的清洗劑的名稱和清洗條件。