NO.: JSB190323020 **TO: Ozdisan**

APPROVAL SHEET No. : B-7602C

Series No. : KLH

Specification No.:

RoHS

APPROVAL SHEET

FOR AL. ELECTROLYTIC CAPACITORS

No.	(Customer No.)	(Koshin Part No.)	Description	ΦD x L
1		PKLH-025V471MF120-T/A5.0	25V470UF	8X12

APPROVED BY:

PLEASE SIGN RETURN US ONE COPY OF THE APPROUAL SHEET.

DESIGNED BY: LUOLI **CHECKEDBY: CAOGUIHUA** **APPROVED BY: SHENZHIHONG**
DATE: 2019-3-23

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DJS-DS-0013

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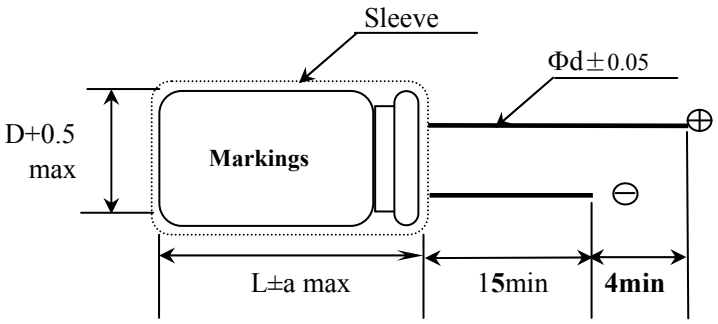
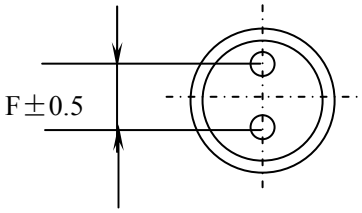
Standard Size map:





D	5	6.3	8	10	12.5	16	18	22	25
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	12.0
Φd	0.5	0.5	0.6/0.5	0.6	0.6	0.8	0.8	0.8/1.0	0.8/1.0
a	1.5			1.5for L16max 2.0for L20min					

Coefficient of Frequency for Ripple Current

Frequency (Hz) / Capacitance(μF)	50•60	120	1K	10K	100K
CAP≤10	0.47	0.59	0.85	0.97	1.00
10＜CAP≤100	0.52	0.65	0.89	0.97	1.00
100＜CAP≤1000	0.58	0.72	0.90	0.98	1.00
CAP＞1000	0.63	0.78	0.91	0.98	1.00

Coefficient of Temperature for Ripple Current

Temperature (℃)	45	60	85	95	105
Coefficient	2.10	1.90	1.65	1.25	1.00

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Series KLH Capacitor

1. Our part No. : **For example:**

PKLH	025V	471	M	F120
Se rise code	rated voltage	capacitance	tolerance	case size symbol
PKLH	25 v	470μF	±20%	Φ8X12

2. Your part No.:

3. Marking:

Include company's brand "Koshin", series code, rated voltage, capacitance ,rated temperature range, polarity and tolerance of capacitance.

4. Specifications:

4.1 Temperature range : -40~+105℃

4.2 Electrical characteristics

4.2.1 Capacitance tolerance : ±20%

4.2.2 Tangent of loss angle (tan δ) :

Rated voltage(V)	6.3	10	16	25	35	50	63	100	160
tan δ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.15

Rated voltage(V)	200	250	350	400	450	500
tan δ (max.)	0.15	0.15	0.15	0.15	0.15	0.15

Note: 0.02 is added to each 1000μF increase over 1000μf.

4.2.3 Leakage current (μA) :

Rated voltage (V)	6.3-100	160-500
Leakage Current (μA)	Less than 0.01CV or 3 whichever is large (after 2 minutes)	Less than 0.03CV (after 2 minutes)

Note: I : Leakage current (μA) , C : Capacitance (μF) , V : Rated DC working voltage (V)

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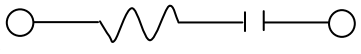
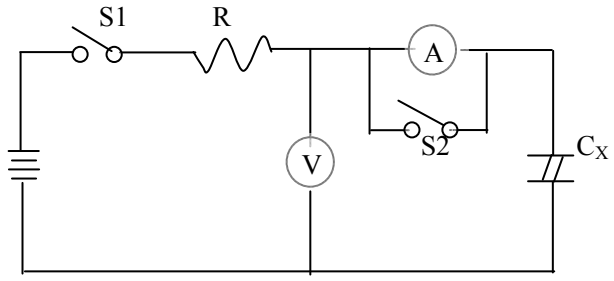
1. Scope：

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

2. Electrical characteristics：

<table>
<tr><th>NO.</th><th>ITEM</th><th>TEST METHOD</th><th>SPECIFICATION 规格</th></tr>
<tr><td>2.1</td><td>Rated voltage</td><td></td><td rowspan="2">Voltage range、capacitance range ,see specification of this series</td></tr>
<tr><td>2.2</td><td>Capacitance</td><td rowspan="2">1. Measuring frequency:120Hz±12Hz
2. Measuring voltage:≤0.5Vrms+0.5VDC~2.0VDC
3. Measuring circuit: ()</td></tr>
<tr><td>2.3</td><td>Dissipation factor</td><td rowspan="2">Dissipation factor, leakage current, see specification of this series.</td></tr>
<tr><td>2.4</td><td>Leakage current</td><td>DC leakage current shall be measured after 1~2minutes application of the DC rated working voltage through the 1000Ω resistor at 20℃
 

R: 1000Ω 100Ω
A: DC current meter
V: DC voltage meter
S1:Switch 开关
S2:Switch for protect of current meter
Cx: Testing capacitor</td></tr>
<tr><td>2.5</td><td>Temperature characteristics</td><td>
<table>
<tr><th>STEP</th><th>TEMPERATURE</th><th>STORAGE TIME</th></tr>
<tr><td>1</td><td>20℃±2℃</td><td>30minutes</td></tr>
<tr><td>2</td><td>-40℃±3℃、-25℃±3℃</td><td>2hours</td></tr>
<tr><td>3</td><td>20℃±2℃</td><td>4hours</td></tr>
<tr><td>4</td><td>105℃±2℃</td><td>2hours</td></tr>
</table>
Step1.Measure the impedance.
(|Z| , 20℃, 120Hz±2HZ)
Step2. Measure the impedance at thermal balance after 2 hours.
(|Z| , -40℃, -25℃ 120Hz±2HZ)
Step4.Measure the leakage current at thermal balance after 2 hours.</td><td>Step2.
Low temperature impedance stability
Less than specified value.

Step4.
Capacitance change:
within±10% of the initial measured value.

Dissipation factor:
Less than specified value.</td></tr>
</table>

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NO.	ITEM	TEST METHOD	SPECIFICATION
2.6	Surge test	Rated surge voltage shall be applied (switch on)for 30±5 second and then shall be applied (switch off) with discharge for 5.5min at room temperature. This cycle shall be repeated for 1000 cycles. Duration of one cycle is 6±0.5 minutes	Capacitance change: within±15% of the initial specified value. Dissipation factor: Less than specified value. Leakage current: Within initial specified value.

3.Mechanical characteristics：

NO.	ITEM	TEST METHOD	SPECIFICATION
3.1	Lead strength	(A)Tensile strength： wire lead terminal： d(mm) ≤0.45 | 0.5~0.8 | 0.8＜d≤1.25 load(kg) 0.5 | 1.0 | 2.0 The capacitor shall withstand the constant tensile force specified between the body and each lead for 10seconds without damage either mechanical or electrical. （B）Bending strength： wire lead terminal： d(mm) ≤0.45 | 0.5~0.8 | 0.8＜d≤1.25 load(kg) 0.5 | 0.5 | 1.0 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.	When the capacitance is measured, there shall be no intermittent contacts, or open-or short-circuiting. There shall be no such mechanical damage as terminal damage etc. Capacitance change: within ± 5% of the initial specified value.

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NO.	ITEM	TEST METHOD	SPECIFICATION
3.2	Vibration resistance	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.	Appearance: no abnormal. Capacitance change: within ± 5% of initial measured value.
3.3	Solder ability	The leads are dipped in the solder bath of Sn at245℃±5℃for 2±0.5 seconds. The dipping depth should be set at 1.5~2.0 mm.	The solder alloy shall cover the 95% or more of dipped lead's area.

4. Reliability:

NO.	ITEM	TEST METHOD	SPECIFICATION
4.1	Soldering heat resistance	The leads immerse in the solder bath of Sn at 260℃±5℃ for 10±1seconds until a distance of 1.5~2.0mm from the case.	No visible damage or leakage of electrolyte. Capacitance change: Within ± 5% of the initial measured value Tan δ : Less than specified value. Leakage current: Less than specified value
4.2	Damp head（ steady state）	Subject the capacitor to 40℃±2℃ and 90% to 95% relative humidity for 504 hours.	Capacitance change: Within ± 20% of the initial measured value Tan δ : Less than 1.2 specified value. Leakage current: Less than specified value Impedance: Less than 1.2 specified value.

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<table>
<tr><th>NO.</th><th>ITEM</th><th>TEST METHOD</th><th>SPECIFICATION</th></tr>
<tr><td>4.3</td><td>Load life</td><td>After 3000 hours continuous application of max allowable ripple current and DC rated voltage at 105℃±2℃, Measurements shall be performed after 16 hours exposed at room temperature.</td><td rowspan="2">Capacitance change:
Within ±20% of the initial value.

Tan δ :less than 200% specified value

Leakage current:
Less than initial specified value.

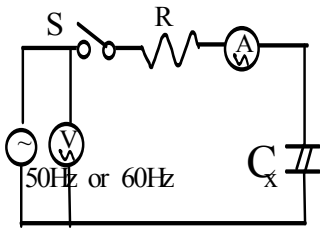
Appearance :no Abnormal</td></tr>
<tr><td>4.4</td><td>Shelf life</td><td>After storage for 1000 hours at 105℃±2℃without voltage application ,Measurements shall be performed after exposed for 16 hrs at room temperature after application of Testing</td></tr>
<tr><td>4.5</td><td>Storage at low temperature</td><td>The capacitor shall be stored at temperature of -40℃±3℃ for 16 hours, during which time be subjected to standard atmospheric conditions for 16 hours or more. After which measurements shall be made.</td><td>Capacitance change:
Within ±10% of the initial value.

Tan δ :less than specified value

Leakage current:
Less than specified value.

Appearance :no Abnormal.</td></tr>
<tr><td>4.6</td><td>Pressure relief</td><td>AC test:
Applied voltage: AC voltage not exceeding 0.7 times of the rated direct voltage or 250V AC whichever is the lower.

Frequency ： 50Hz or 60Hz.
Series resistor :refer to the table below

<table>
<tr><th>Capacitance(C)</th><th>Series resistor</th></tr>
<tr><td>C<1uF</td><td>1000 Ω</td></tr>
<tr><td>1uF<C≦10uF</td><td>100 Ω</td></tr>
<tr><td>10uF<C≦100uF</td><td>10 Ω</td></tr>
<tr><td>100uF<C≦1000uF</td><td>1 Ω</td></tr>
<tr><td>1000uF<C≦10000uF</td><td>0.1 Ω</td></tr>
<tr><td>10000uF<C</td><td>*</td></tr>
</table>
* Resistance is equivalent to a half impedance by test frequency.</td><td>AC test circuit
 

~ : AC power
S : Switch
V : AC voltage meter
A : AC current meter
R : protection resistor
C_X : testing capacitor</td></tr>
</table>

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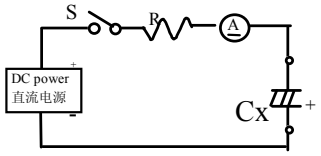
NO.	ITEM	TEST METHOD	SPECIFICATION
4.7	Pressure relief	DC test Send the following electricity while applying the inverse voltage. Where case size D≤22.4mm:1 A d.c.max D > 22.4mm:10 A d.c.max Note: 1.This requirement applies to capacitors with a diameter of 6 mm or more. 2. When the pressure relief device does not open even 30 minutes after commencement of test, the test may be ended.	DC test circuit  S : Switch Ⓐ: DC current meter C x: testing capacitor The pressure relief device shall open in such a way as to avoid any damage of fire or explosion of capacitor elements (terminal and metal foil etc.) or cover.
4.8	Temp cycle	LSL temperature(℃):-40±3 time(H)：0.5H/timeX5 times USL temperature(℃):105±2 time(H)：0.5H/timeX5 times Judgment：CAP：△C/C≤±10%，Appearance no Abnormal. No electrolyte leakage。	
4.9	Thermal shock	dry heat temperature（℃)：105±2 time(H)：16 moist heat temperature(℃)：55 time(H)：24/ cold temperature(℃)：-40±2 time(H)：2/ moist heat temperature(℃)：55 time(H)：24 ：Judgment：CAP,△C/C≤±10%, Tan δ :Less than 1.2 specified value, Leakage current: Less than specified value. Appearance no Abnormal. No electrolyte leakage。	

5．Marking

Marking on capacitors include:

Koshin trade-mark

Koshin
Working voltage

Normal capacitance

Tolerance

Polarity

Operating temperature range

Sleeving pipe basic: Coffee PET

Printing color: White

Required space above the valve (mm): 2.0mm

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Detergent needing attention

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

Safe	**Unsafe**
Dimethylbenzene Ethanol Butanol Methanol Propanol Detergent	1,1,2-trichloroethane 1,2,2- trichloroethane Tetrachloroethylene Chloroform(colorless volatilizable liquid) Dichloromethane Trichloroethylene

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Taping size Φ8

TP5mm pitch tape packing

Taping cod number: T/A5.0

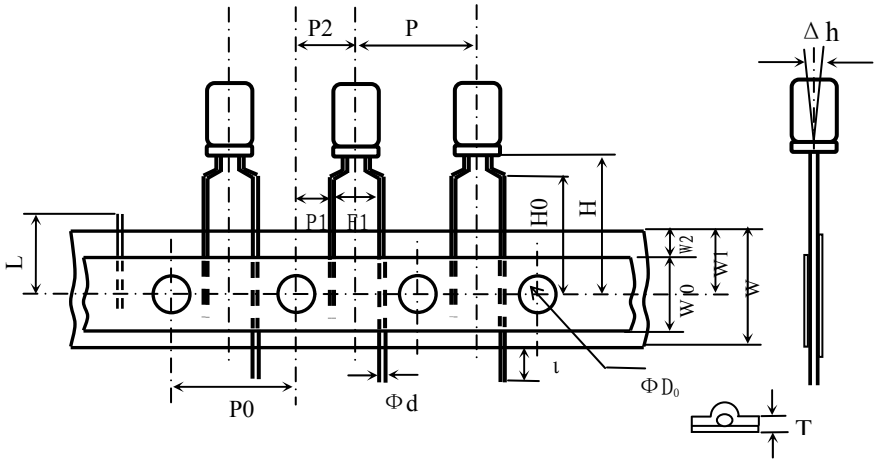

Table of dimensions

Item	Symbol	Dimension	Tolerance	Reference
Lead-wire diameter	Φd	0.5	±0.05	
Distance between centers of leads	F1	5.0	±0.5	
Height of component from tape center	H	18.5	+0.75 -0.5	
Lead clinch level	H 0	16.0	±0.5	
Lead clinch level above base	H 2	6.5	以上	
Component spacing	P	12.7	±1.0	
Perforation pitch	P0	12.7	±0.3	
Hole center to lead distance	P1	3.85	±0.5	
Hole center to component center	P2	6.35	±1.0	
Carrier tape width	W	18.0	±0.5	
Hole down tape width	W0	6.0-13.0	±0.5	
Feed hole position	W1	9.0	±0.5	
Hole down tape width	W2	0.5-1.5	-----	
Diameter of sprocket holes	ΦD0	4.0	±0.2	
Body inclination forward or backward	△h	0	±1.0	
Tape base thickness	t0	0.38	±0.05	
Total thickness of the combined carrier tape and hold down tape	T	0.7	±0.2	
Protrusion of lead beyond carrier tape	l	0	----	
Cut off position of defectives	L	11.0	or less	

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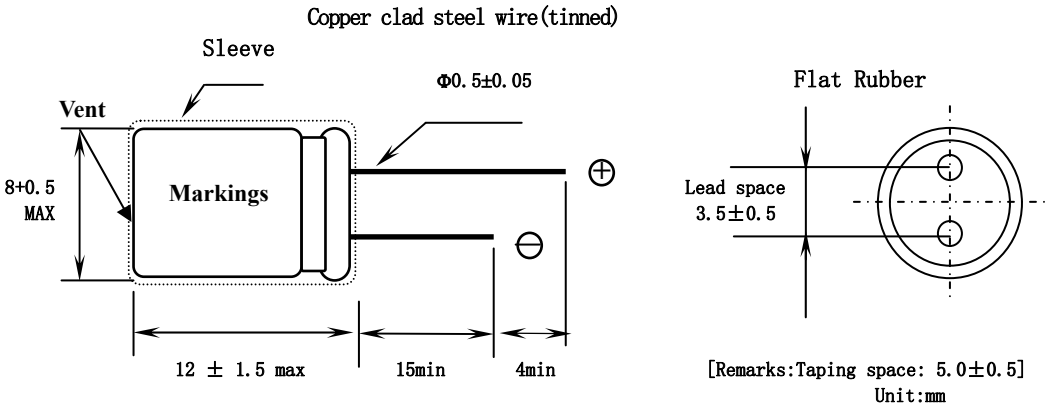
Aluminum Electrolytic Capacitor Specification

Series	PKLH	25 V 470 μF	Part No.	PKLH-025V471MF120-T/A5.0
Customer No.	/		Case size	ΦD 8 X L 12

Specification	Items	Standard
	Operating temperature range	-40～+105 ℃
	Capacitance tolerance	±20% (20℃ ,120Hz)
	Dissipation factor (MAX)	(Less than) 0.14 (20℃ ,120Hz)
	Leakage current (MAX)	(Less than) 117.5 μA (20℃ 25 V 2 min)
	Impedance (MAX)	0.12 Ω (100kHZ, 20℃)
	Ripple current (MAX)	700 mArms (100kHz ,105℃)
	Load life	3000hrs
Outline	Sleeve color	Coffee PET
	Marking color	White
	(Dimensions)	



[Remarks:Taping space: 5.0±0.5]
Unit:mm

Recorder	(The first edition) : 2019-3-23

Wrote by: LUOLI	Checked by: CAOGUIHUA	Approved by: SHENZHIHONG

(Issue No.): DJJ-2875