

NO.: JSB210507005

TO: Ozdisan

APPROVAL SHEET No. : B-7602C

Series No.: KLH

Specification No.:

Halogen-Free Rohs2.0

APPROVAL SHEET FOR AL. ELECTROLYTIC CAPACITORS

No.	Customer No.	Koshin Part No.	Description	ΦD x L
1		PKLH-500V2R2MF115-T/A3.5	500V2.2UF	8X11.5

APPROVED BY:

PLEASE SIGN RETURN US ONE COPY OF THE APPROVAL SHEET

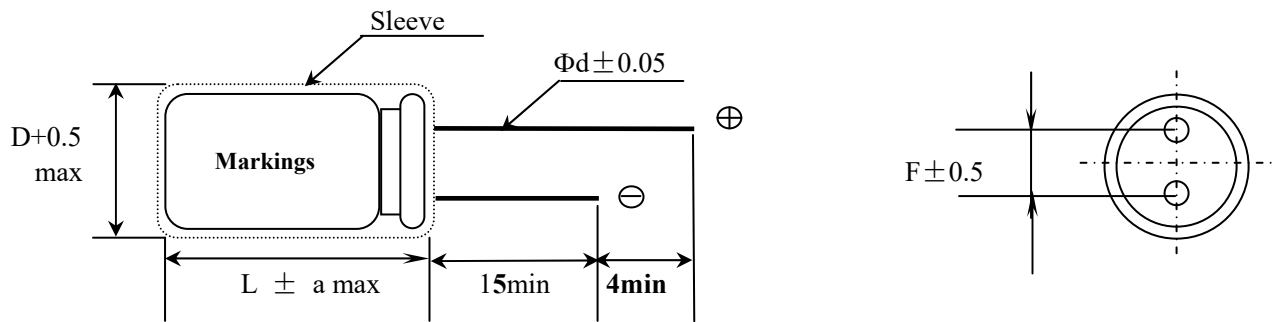
DESIGNED BY: LUOLI CHECKEDBY: CAOGUIHUA APPROVED BY: SHENZHIHONG

DATE: 2021-5-7

KOSHIN

DJS-DS-0013

Standard Size map:



Unit: mm

ΦD	8
F	3.5
Φd	0.5
L	11.5
a	1.5

Coefficient of Frequency for Ripple Current

Frequency (Hz) \ Capacitance (μF)	50•60	120	1K	10K	100K
$CAP \leq 10$	0.47	0.59	0.85	0.97	1.00
$10 < CAP \leq 100$	0.52	0.65	0.89	0.97	1.00
$100 < CAP \leq 1000$	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 (°C)	45	60	85	95	105
Coefficient	2.10	1.90	1.65	1.25	1.00



KOSHIN INTERNATIONAL LIMITED

ELECTROLYTIC CAPACITORS

ADDR. : SHANGXUE TECHNOLOGY INDUSTRIAL CITY, BANTIAN, SHENZHEN

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Email: szkoshin@koshin.com.hk

TEST REPORT OF ELECTROLYTIC CAPACITORS SAMPLE

DATE :	2021/5/7	Quantity :	20	PCS
Customer:	Ozdisan	Customer'S part No.:		
Ratings :	500V2.2	Part No.:	PKLH-500V2R2MF115-T/A3.5	
Series :	PKLH	Case Size:	D8XL11.5(± 1.5 max mm	
Taping space:	3.5 \pm 0.5 mm	Lead Dia.:	0.5 \pm 0.05	mm
Terminal Length:	+19min-15min mm	Load Life:	3000	hrs
Sleeve Color:	Deep Green (PET)	Marking Color:	White	

Capacitance Tolerance at 120Hz/20°C	Max.TAN δ at 120 Hz 20°C	Max.Leakage Current(μ A) Afte 2 min.	Max.ESR (Ω) At 100KHz/20°C	Max. Ripple Current(mArms) At100KHz/105°C	WORKING TEMP (°C)	SURGE VOLT. (V)
$\pm 20\%$	0.15	33	20	85	-25+105	550

NO.	CAPACITANCE (μ F)	TAN δ	Leakage Current (μ A)	ESR (Ω)	Remarks
1	2.02	0.062	1.96	16.5	
2	2.04	0.064	2.12	16.3	
3	2.01	0.061	2.24	16.7	
4	2.03	0.063	1.86	16.9	
5	2.02	0.062	1.93	16.4	
6	2.05	0.064	2.04	16.8	
7	2.03	0.061	1.75	16.5	
8	2.04	0.063	1.86	17.0	
9	2.02	0.062	1.93	16.6	
10	2.03	0.061	1.81	16.9	
AVE.	2.029	0.0623	1.950	16.66	
MAX.	2.05	0.064	2.24	17.0	
MIN.	2.01	0.061	1.75	16.3	

TESTED BY:Chenxiaoyu

CHECKED BY: LuoLi

APPROVED BY:Shenzhihong

版次: 1.0 修改次号: 00 生效日期: 2008.10.10

DJS-SD-0010



Series KLH Capacitor

1. Our part No. : For example

<u>PKLH</u>	<u>500V</u>	<u>2R2</u>	<u>M</u>	<u>F115</u>
Se rise code	rated voltage	capacitance	tolerance	case size symbol
PKLH	500 v	2.2 μ F	$\pm 20\%$	$\Phi 8 \times 11.5$

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 : -25~+105°C

4.2 Electrical characteristics

4.2.1 Capacitance tolerance : $\pm 20\%$

4.2.2 Tangent of loss angle ($\tan \delta$) :

Rated voltage(V)	6.3	10	16	25	35	50	63	100	160
$\tan \delta$ (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
$\tan \delta$ (max.)	0.15	0.15	0.15	0.15	0.15	0.15

Note: 0.02 is added to each 1000 μ F increase over 1000 μ F

4.2.3 Leakage current (μ A) :

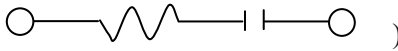
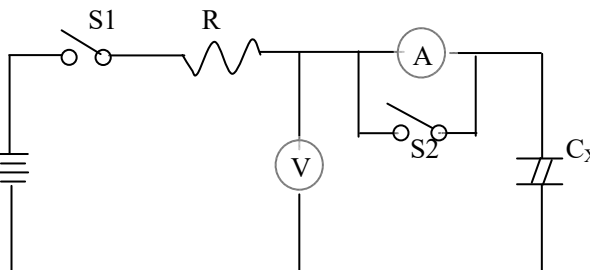
Rated voltage (V)	6.3-100	160-500
Leakage Current (μ A)	Less than 0.01CV or 3 whichever is large (after 2 minutes)	Less than 0.03CV (after 2 minutes)

Note: I : Leakage current (μ A) , C : Capacitance (μ F) , V : Rated DC working voltage (V)

1. Scope:

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

2. Electrical characteristics:

NO.	ITEM	TEST METHOD			SPECIFICATION
2.1	Rated voltage				Voltage range、capacitance range ,see specification of this series
2.2	Capacitance	1.Measuring frequency:120Hz±12Hz			
2.3	Dissipation factor	2.Measuring voltage:≤0.5Vrms+0.5VDC~2.0VDC 3.Measuring circuit: ()			Dissipation factor, leakage current, see specification of this series.
2.4	Leakage current	<p>DC leakage current shall be measured after 1~2minutes application of the DC rated working voltage through the 1000 Ω resistor at 20℃</p>  <p>R: 1000 Ω 100 Ω S1:Switch A: DC current meter S2:Switch for protect of current meter V: DC voltage meter Cx: Testing capacitor</p>			
2.5	Temperature characteristics	STEP	TEMPERATURE	STORAGE TIME	
		1	20℃±2℃	30minutes	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.
		2	-40℃±3℃、-25℃±3℃	2hours	
		3	20℃±2℃	4hours	
		4	105℃±2℃	2hours	
		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.			

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.

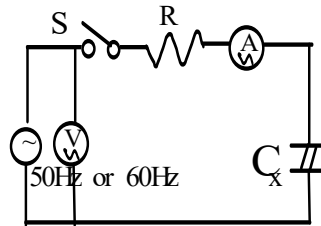
3.Mechanical characteristics:

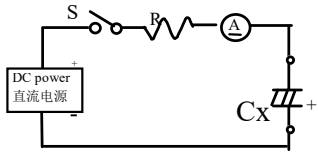
NO	ITEM	TEST METHOD	SPECIFICATION																
3.1	Lead strength	<p>(A)Tensile strength: wire lead terminal:</p> <table border="1"> <tr> <td>d(mm)</td><td>≤0.5</td><td>0.5<d≤0.8</td><td>0.8<d≤1.25</td></tr> <tr> <td>load(kg)</td><td>0.5</td><td>1.0</td><td>2.0</td></tr> </table> <p>The capacitor shall withstand the constant tensile force specified between the body and each lead for 10seconds without damage either mechanical or electrical.</p> <p>(B) Bending strength: wire lead terminal:</p> <table border="1"> <tr> <td>d(mm)</td><td>≤0.5</td><td>0.5<d≤0.8</td><td>0.8<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.</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.</p> <p>There shall be no such mechanical damage as terminal damage etc. Capacitance change: within±5% of the initial specified value.</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																

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 $\pm 5\%$ of initial measured value.
3.3	Solder ability	The leads are dipped in the solder bath of Sn at $245^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 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 $280^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 10 ± 1 seconds until a distance of 1.5~2.0mm from the case.	No visible damage or leakage of electrolyte. Capacitance change: Within $\pm 5\%$ 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 $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and 90% to 95% relative humidity for 504 hours.	Capacitance change: Within $\pm 20\%$ 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.

NO.	ITEM	TEST METHOD	SPECIFICATION														
4.3	Load life	After 3000 hours continuous application of max allowable ripple current and DC rated voltage at $105^{\circ}\text{C} \pm 2^{\circ}\text{C}$, Measurements shall be performed after 16 hours exposed at room temperature.	Capacitance change: Within $\pm 20\%$ of the initial value. Tan δ :less than 200% specified value														
4.4	Shelf life	After storage for 1000 hours at $105^{\circ}\text{C} \pm 2^{\circ}\text{C}$ without voltage application ,Measurements shall be performed after exposed for 16 hrs at room temperature after application of Testing	Leakage current: Less than initial specified value. Appearance :no Abnormal														
4.5	Storage at low temperature	The capacitor shall be stored at temperature of $-40^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 16 hours, during which time be subjected to standard atmospheric conditions for 16 hours or more. After which measurements shall be made.	Capacitance change: Within $\pm 10\%$ of the initial value. Tan δ :less than specified value Leakage current: Less than specified value. Appearance :no Abnormal.														
4.6	Pressure relief	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>$C < 1\mu\text{F}$</td><td>1000 Ω</td></tr><tr><td>$1\mu\text{F} < C \leq 10\mu\text{F}$</td><td>100 Ω</td></tr><tr><td>$10\mu\text{F} < C \leq 100\mu\text{F}$</td><td>10 Ω</td></tr><tr><td>$100\mu\text{F} < C \leq 1000\mu\text{F}$</td><td>1 Ω</td></tr><tr><td>$1000\mu\text{F} < C \leq 10000\mu\text{F}$</td><td>0.1 Ω</td></tr><tr><td>$10000\mu\text{F} < C$</td><td>*</td></tr></table> Resistance is equivalent to a half impedance by test frequency.	Capacitance(C)	Series resistor	$C < 1\mu\text{F}$	1000 Ω	$1\mu\text{F} < C \leq 10\mu\text{F}$	100 Ω	$10\mu\text{F} < C \leq 100\mu\text{F}$	10 Ω	$100\mu\text{F} < C \leq 1000\mu\text{F}$	1 Ω	$1000\mu\text{F} < C \leq 10000\mu\text{F}$	0.1 Ω	$10000\mu\text{F} < C$	*	AC test circuit  \sim : AC power S : Switch \odot : AC voltage meter \odot : AC current meter R : protection resistor C_x : testing capacitor
Capacitance(C)	Series resistor																
$C < 1\mu\text{F}$	1000 Ω																
$1\mu\text{F} < C \leq 10\mu\text{F}$	100 Ω																
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$100\mu\text{F} < C \leq 1000\mu\text{F}$	1 Ω																
$1000\mu\text{F} < C \leq 10000\mu\text{F}$	0.1 Ω																
$10000\mu\text{F} < C$	*																

NO.	ITEM	TEST METHOD	SPECIFICATION
4.7	Pressure relief	<p>DC test</p> <p>Send the following electricity while applying the inverse voltage.</p> <p>Where case size $D \leq 22.4\text{mm}$: 1 A d.c.max $D > 22.4\text{mm}$: 10 A d.c.max</p> <p>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.</p>	<p>DC test circuit</p>  <p>S : Switch Ⓐ : DC current meter C x: testing capacitor</p> <p>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.</p>
4.8	Temp cycle	<p>LSL temperature(°C): -25 ± 3 time(H): 0.5H/timeX5 times USL temperature(°C): 105 ± 2 time(H): 0.5H/timeX5 times Judgment: CAP: $\Delta C/C \leq \pm 10\%$, Appearance no Abnormal. No electrolyte leakage.</p>	
4.9	Thermal shock	<p>dry heat temperature (°C): 105 ± 2 time(H): 16 moist heat temperature(°C): 55 time(H): 24/ cold temperature(°C): -25 ± 2 time(H): 2/ moist heat temperature(°C): 55 time(H): 24 : Judgment: CAP, $\Delta C/C \leq \pm 10\%$, Tan δ : Less than 1.2 specified value, Leakage current: Less than specified value. Appearance no Abnormal. No electrolyte leakage.</p>	

5. Marking

5.1. Marking on capacitors includes:

a. Manufacture's name or trade mark

Koshin

b. Rated voltage and capacity

--V --uF

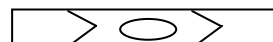
c. Sleeve material-Series

Ⓟ KLH

d. Capacitance tolerance code-Rated temperature

(M)105°C

e. Polarity of the terminals



5.2 Marking color:

Sleeve color: Deep Green PET

Marking color: White

Detergent needing attention

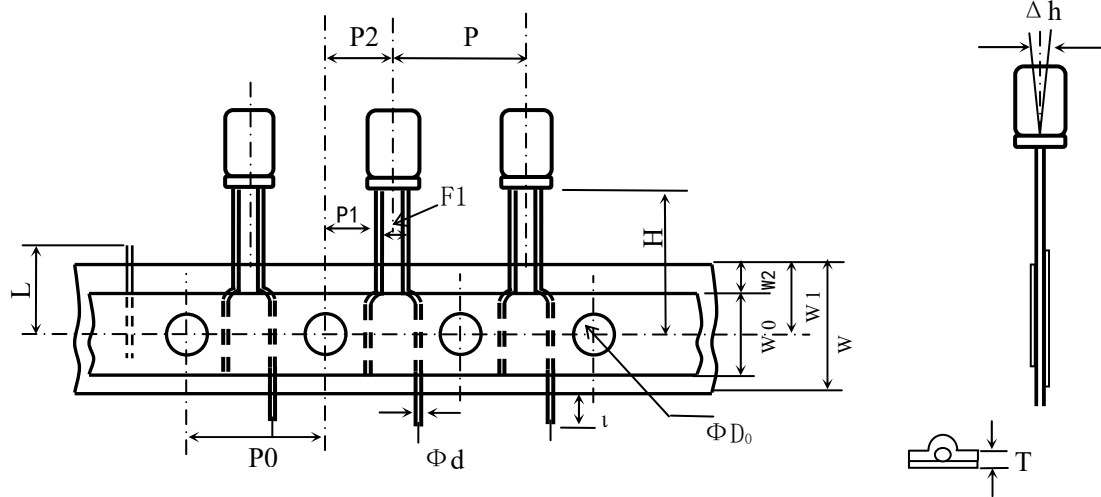
Hydrogen carbide liquid and halogen liquid can cause Aluminium Electrolytic Capacitor to corrode. Some of Safe and Unsafe detergent are as follows

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

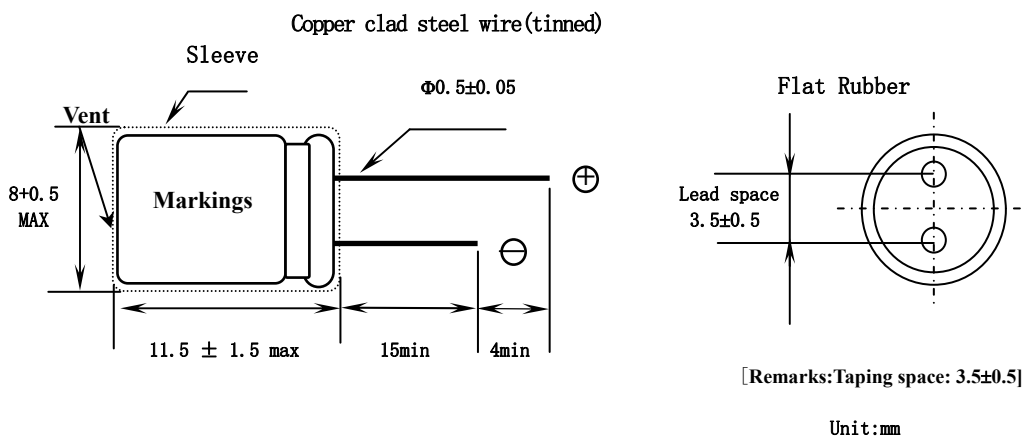
Taping size $\Phi 8$

TP3.5mm pitch tape packing

Taping code number: T/A3.5



Item	Symbol	Dimension	Tolerance	Reference
Lead-wire diameter	Φd	0.5	± 0.05	
Distance between centers of leads	F1	3.5	± 0.5	
Height of component from tape center	H	18.5	$+0.75$ -0.5	
Component spacing	P	12.7	± 1.0	
Perforation pitch	P0	12.7	± 0.3	
Hole center to lead distance	P1	4.6	± 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	± 0.1	
Feed hole position	W1	9.0	± 0.5	
Hole down tape width	W2	0.5-1.5	-----	
Diameter of sprocket holes	$\Phi D0$	4.0	± 0.2	
Body inclination forward or backward	Δh	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	

Aluminum Electrolytic Capacitor Specification				
Series	PKLH	500 V 2.2 μ F	Part No.	PKLH-500V2R2MF115-T/A3.5
Customer No.	/		Case size	Φ D 8 X L 11.5
Specification	Items		Standard	
	Operating temperature range		- 25 ~ + 105 $^{\circ}$ C	
	Capacitance tolerance		\pm 20% (20 $^{\circ}$ C , 120Hz)	
	Dissipation factor (MAX)		(Less than) 0.15 (20 $^{\circ}$ C , 120Hz)	
	Leakage current (MAX)		(Less than) 33 μ A (20 $^{\circ}$ C 500 V 2 min)	
	ESR (MAX)		20 Ω (100KHZ, 20 $^{\circ}$ C)	
	Ripple current (MAX)		85 mArms (100KHZ , 105 $^{\circ}$ C)	
	Load life		3000hrs	
Outline	Sleeve color		Deep Green PET	
	Marking color		White	
	Dimensions			
	<div><div><p>Copper clad steel wire(tinned)</p><p>Sleeve</p><p>Vent</p><p>8+0.5 MAX</p><p>Markings</p><p>11.5 \pm 1.5 max</p><p>15min</p><p>4min</p><p>Φ0.5\pm0.05</p><p>\oplus</p><p>\ominus</p></div><div><p>Flat Rubber</p><p>Lead space 3.5\pm0.5</p><p>[Remarks:Taping space: 3.5\pm0.5]</p><p>Unit:mm</p></div></div>			
Recorder	The first edition: 2021-5-7			
Wrote by: LUOLI		Checked by: CAOGUIHUA		Approved by: SHENZHIHONG