NO：JXP0024-29 **TO: Ozdisan**

APPROVAL SHEET No. : B-7706A

Series No.: KPH

Specification No.:

RoSH

APPROVAL SHEET

FOR AL. ELECTROLYTIC CAPACITORS

No.	(Customer No.)	(Koshin Part No.)	Description	ΦD x L
1		PKPH-450V151MN350	450V150UF	25X35

APPROVED BY：

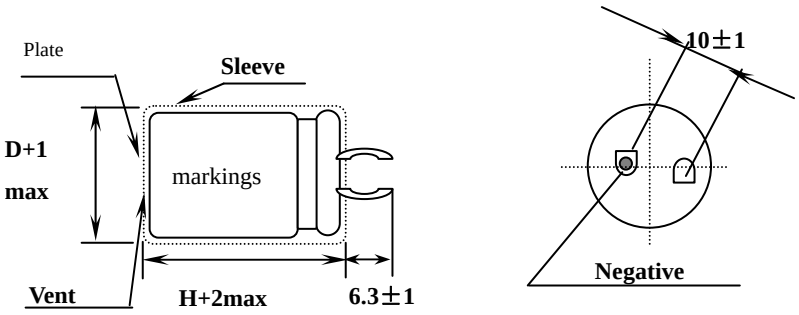
PLEASE SIGN RETURN US ONE COPY OF THE APPROUAL SHEET

APPROVED BY: Shenzhihong **CHECKED BY: Dingchanghua** **DESIGNED BY: Luoli**
DATE: 2015-12-16

KOSHIN

DJS-DS-0013

Snap-in type map:



Coefficient of Frequency for Ripple Current

Frequency (Hz) / Rate voltage (v)	50	120	300	1K	10K	100K
10~50	0.95	1.00	1.03	1.05	1.08	1.08
63~100	0.92	1.00	1.07	1.13	1.19	1.20
160~250	0.81	1.00	1.17	1.32	1.45	1.50
350~450	0.77	1.00	1.16	1.30	1.41	1.43

Series KPH Capacitor

1. Our part No. :

For example :

PKPH	450 V	151	M	N350
Series code	rated voltage	capacitance	tolerance	case size symbol
PKPH	450v	150UF	±20%	Φ25X35

2.Marking :

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

2. Specifications :

3.1 Temperature range : -25 ~ +105 ℃

3.2 Electrical characteristics

3.2.1 Capacitance tolerance : ±20%

3.2.2 Tangent of loss angle (tan δ) :

Rated Voltage	10	16	25	35	50	63-400	450
tan δ	0.55	0.40	0.30	0.25	0.20	0.15	0.15

3.2.3 Leakage current (μ A) :

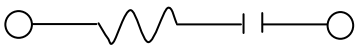
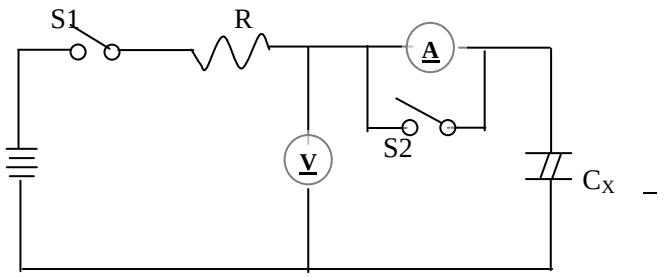
Rated voltage(v)	**10 ~ 450**
Leakage current (μ A)	Less than 0.02CV or 3.0mA whichever is smaller (after 5 minutes)

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 ：

<table>
<tr><th>NO</th><th>ITEM</th><th>TEST METHOD</th><th>SPECIFICATION</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 S1:Switch
A: DC current meter S2:Switch for protect of current meter
V: DC voltage meter C_X: 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>

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： snap-in terminal： d(mm) | snap-in terminal load(kg) | 2.0 The capacitor shall withstand the constant tensile force specified between the body and each lead for 10 seconds without damage either mechanical or electrical. （B）Bending strength： snap-in terminal： Cross section area of terminal 端子截面积（mm^2） | Force 拉伸力（N） S>1 | 25 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.

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.	Capacitance : no unsteady. 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 at 245℃±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 280℃±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	Moisture Resistance	Subject the capacitor to40℃±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

<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 5000 hours continuous application of DC rated working voltage at 105℃ ± 2℃,the measurements shall meet the following limits.
Measurements shall be performed after 16 hours exposed at room temperature.</td><td>Capacitance change:
within ± 20% of the initial specified value.

Dissipation factor:
Less than 200% of the initial specified value.

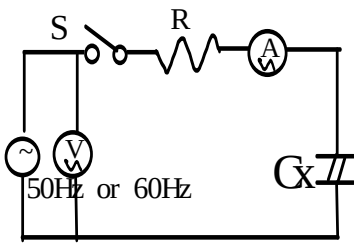
Leakage current:
Within initial specified value.</td></tr>
<tr><td>4.4</td><td>Shelf life</td><td>After storage for 1000 hours at 105℃ ± 2℃ without voltage application ,the measurements shall meet the following limits.
Measurements shall be performed after exposed for 16 hrs at room temperature after application of Testing.</td><td></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

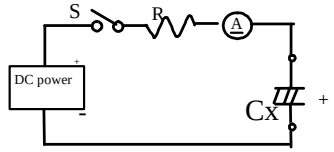
<table>
<tr><th>Capacitance(C)</th><th>Series resistor</th></tr>
<tr><td>C＜1uF</td><td>1000 Ω</td></tr>
<tr><td>1uF＜C ≦ 10uF</td><td>100 Ω</td></tr>
<tr><td>10uF＜C ≦ 100uF</td><td>10 Ω</td></tr>
<tr><td>100uF＜C ≦ 1000uF</td><td>1 Ω</td></tr>
<tr><td>1000uF＜C ≦ 10000uF</td><td>0.1 Ω</td></tr>
<tr><td>10000uF＜C</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

CX : testing capacitor</td></tr>
</table>

NO.	ITEM	TEST METHOD	SPECIFICATION
4.6	Pressure relief	DC test Send the following electricity while applying the inverse voltage. Where case size D 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.
4.7	Temp cycle	LSL temperature(℃):-25±3 time(H)：0.5H/timeX5 times USL temperature(℃):105±2 time(H)：0.5H/timeX5 times Judgement：CAP：△C/C≤±10%，Appearance no Abnormal. No electrolyte leakage。	
4.8	Thermal shock	dry heat temperature（℃)：105±2 time(H)：16 moist heat temperature(℃)：55 time(H)：24/ cold temperature(℃)：-25±2 time(H)：2/ moist heat temperature(℃)：55 time(H)：24 ：Judgement：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: Black(PET)
- Printing color: White

Detergent needing attention

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

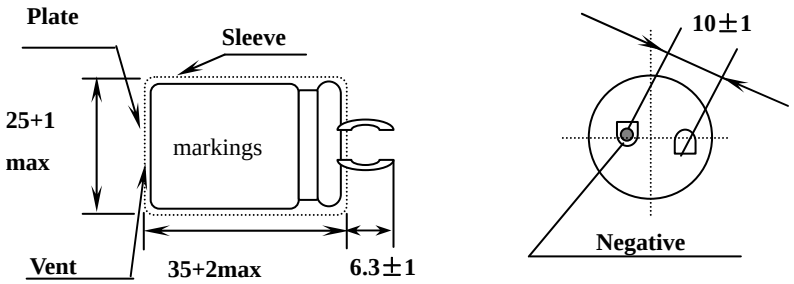
Safe	**Unsafe**
Dimethylbenzene	1,1,2-trichloroethane
Ethanol	1,2,2- trichloroethane
Butanol	Tetrachloroethylene
Methanol	Chloroform(colorless volatilizable liquid)
Propanol	Dichloromethane
Detergent	Trichloroethylene

KOSHIN

Aluminum Electrolytic Capacitor Specification

Series	PKPH	450 V 150 μF	Part No.	PKPH-450V151MN350
Customer No.	/		Case size	ΦD25 X L35

	Items	Standard
Specification	Operating temperature range	**- 25~ + 105 ℃**
	Capacitance tolerance	**±20%** (20℃ ,120Hz)
	Dissipation factor (MAX)	(Less than) **0.15** (20℃ ,120Hz)
	Leakage current (MAX)	(Less than) **1350 μA** (20℃ 450 V 5 min)
	Ripple current (MAX)	**730 mArms** (120Hz ,105℃)
	Load life	**5000 hrs**
Outline	Sleeve color	Black (PET)
	Marking color	White
	(Dimensions)	



(unit): mm

Recorder	(The first edition) : 2015-12-16

Wrote by: Luoli	Checked by: Dingchanghua	Approved by: Shenzhihong

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