

CUSTOMER: \_\_

JIA WEI CHENG ELECTRONICS CO.,LTD  
SPECIFICATION FOR APPROVAL



Product Name: Aluminium Electrolytic Capacitor



Item : KM 35V22UF 5\*11

Date : November. 20th, 2018

Environmental Protection Standard of Material: ROHS+REACH

**Confirmation from Manufacturer**

**Confirmation from User**

Drafted by	Verified by	Approved by		Verified by	Approved by
姚海洋					

Manufacturer: JIA WEI CHENG ELECTRONICS CO.,LTD

Address:Huabianling Industrial Zone, Xinxu Town, Huiyang District,  
Huizhou, Guangdong

Contact: 0755-89638912

Fax: 0755-89638916

Postcode: 51800

After signing, please kindly return one copy. Thanks.

# Content

1. Sample details and relevant parameters	Page 4
2. Related notes and product drawings of aluminum electrolytic capacitors	Page 5~6
3. Aluminum Electrolytic Capacitor Composition List	Page 7
4. Characteristic Principle	Page 8
5. Dimensions	Page 9~10
6. Checking Requirement	Page 11~13
7. Test Report	Page 14

Customer: \_\_\_\_\_

Item:

E-CAP

Page: 3/14

Version: A/1

Version	Revision Reason	Revision	Revisor	Effective from

## 1.SCOPE

This specification has specified the technical standard of miniature single-ended aluminum electrolytic capacitors.

## 2.APPLICABLE SPECIFICATION

This specification was made by referring to JIS C5141

## 3.OPERATING TEMPERATURE RANGE

-40~+105°C(≤100V)      -25~+105°C(≥160V)

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

-40~+105°C(≤100V)      -25~+105°C(≥160V)

## 2.APPLICABLE SPECIFICATION

This specification was made by referring to JIS C5141

## 3.OPERATING TEMPERATURE RANGE

-40~+105°C(≤100V)      -25~+105°C(≥160V)

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

-40~+105°C(≤100V)      -25~+105°C(≥160V)

## 4.CONTENTS OF QUALITY ASSURANCE

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

Ambient temperature : 15 to 35°C

Relative humidity : 45 to 75%

Air pressure : 86kpa to 106kpa

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

Ambient temperature : 20±2°C

Relative humidity : 60 to 70%

Air pressure : 86Kpa to 106Kpa

## **IMPORTANT INFORMATION ON THE APPLICATION OF ALUMINUM ELECTROLYTIC CAPACITORS**

### **(1) DC Capacitors Shall be Polarized**

When reverse voltage is applied on DC electrolytic capacitors, the capacitor will become short-circuited and get damaged because of the abnormal current flows. Where the positive voltage may be applied to the cathode terminal, please use no polarized capacitors

### **(2) Use Capacitor within Rated Voltage**

When a capacitor is used at a voltage higher than its rated one, leakage current will increase, and its characteristics drastically deteriorate and get damaged. Peak voltage shall not exceed the rated voltage.

### **(3) Charge and Discharge Application**

When aluminum electrolytic capacitors for general purpose are employed in rapid charge and discharge application, its life expectancy may be shortened by capacitance decrease, heat rise, etc.

### **(4) Capacitor Storage**

Increased leakage current is common in aluminum capacitors which have been stored for a long period of time. The Higher the storage temperature is, the higher the leakage current will be. In case where increased leakage current causes problems in the circuit, please apply voltage (aging) before using.

### **(5) Ripple current applied to capacitor should not exceed the rated value**

Excessive heat will reduce capacitance and result in shortened life of capacitor if ripple currents exceeding the specified rated value are applied. The peak value of the ripple voltage should be less than the rated voltage.

### **(6) Ambient Temperature.**

The ambient temperature affects life of the aluminum electrolytic capacitor. It is generally stated, that life doubles for each 10°C decrease in temperature.

### **(7) Lead Stress**

When a strong force is applied to the lead wires or terminals, stress is put on the internal connections. This may result in short circuit, open circuit or increased leakage current. It is not advisable to bend or handle a capacitor after it has been soldered to the PC board.

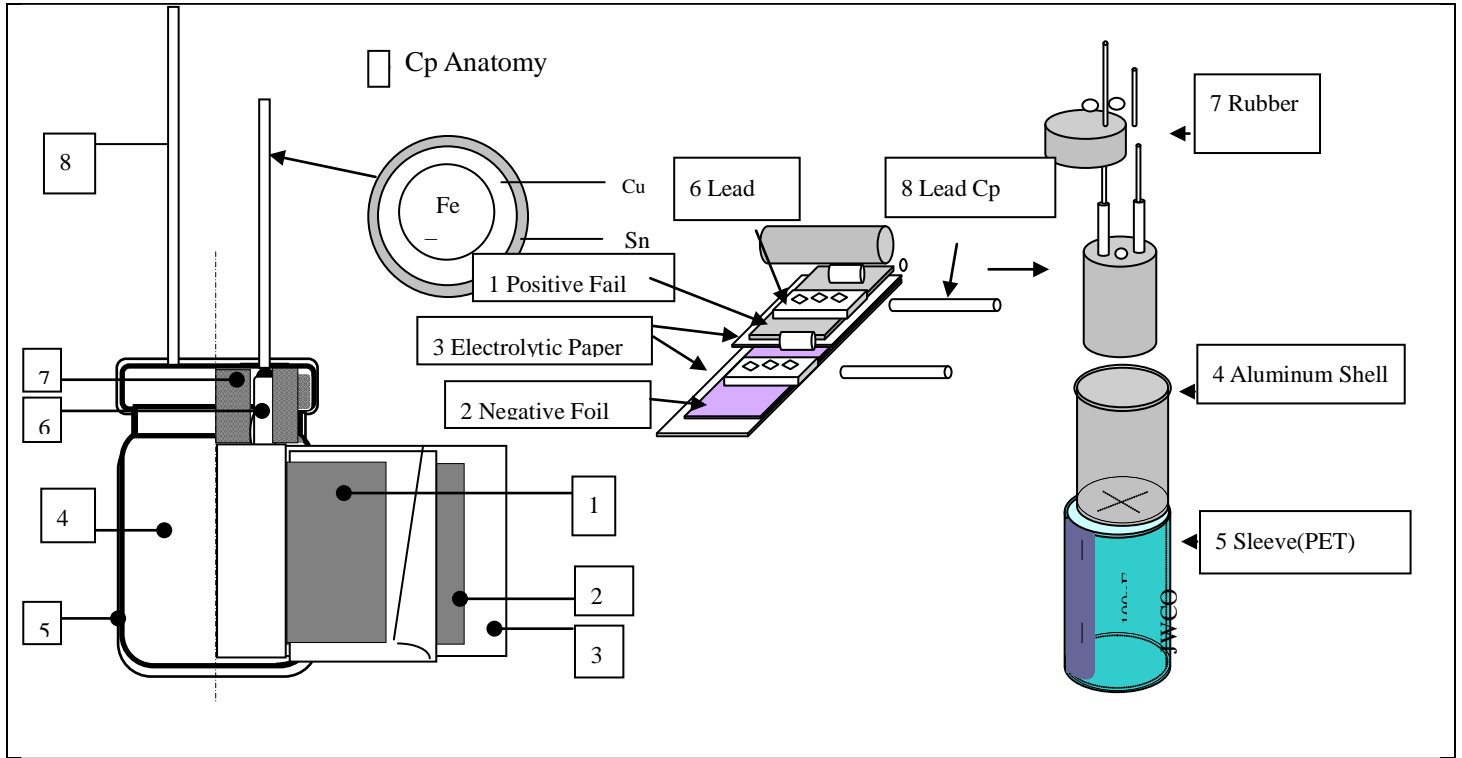
### **(8) Heat Resistance at the Soldering Process**

In the dip soldering process of PC board with aluminum electrolytic capacitors mounted, secondary shrinkage or crack of PVC sleeve may be observed when solder temperature is too high or dipping time is too long.

### **(9) Hole Pitch and Position of PC board.**

A PC board must be designed so its hole pitch coincides with the lead pitch (lead spacing) of the capacitor specified by the catalog or specifications. When a capacitor is forcibly inserted into an unmatched hole pitch, a stress is put on the leads This could result in a short circuit or increased leakage current.

# Product Diagram



# ALUMINIUM ELECTROLYTIC CAPACITOR

## COMPOSITION LIST

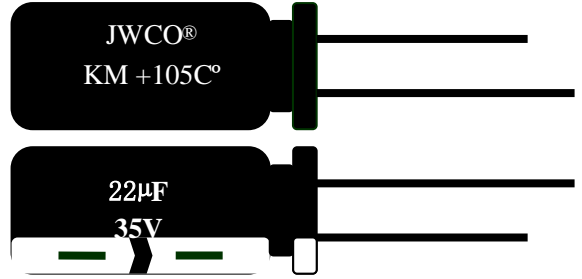
MATERIALS		COMPOSITION OF MATERIALS	
SLEEVE TUBE		POLYETHYLENE TEREPHTHALATE PVC	90%
		STABILILER	0.2%
		(LUBRICANT)	0.15%
		(PIGMENT)	1.0%
RUBBER		(TOUGHENER)	8.65%
		EPDM	40%
		CLAY	45%
		CARBON	9.0%
LEAD WIRE		OTHER	6.0%
		AL	99.91%
		Si	0.03%
		Fe	0.05%
TIN PLATED COPPER COVERED SLEEL WIRE		Cu	0.01%
		Fe	71.35%
		Cu	20%
		Sn	8.65%
AL-CASE		AL	99.3%
		Cu	0.20%
		Mn	0.20%
		Zn	0.20%
		OTHER	0.1%
ALUMINUM FOIL		AL	99.98%
		$Al_2O_3$	0.02%
PAPER		CELLULOSE	100%
ELECTROLYTE		ETHYL GLYCL	50%
		AMMONIUM ADIPATE	Confidential
		ADIPIC ACID	Confidential
		AMMOUIUN BENZOATE	Confidential
		CITRIC ACID	Confidential
		PARA-NITORO BENZOIE ACID	Confidential
		AMMDIHYDROGEN PHOSPHLATE	Confidential
		PURE WATER , AMMONIUM ACETATE	Confidential

# JWCO® KM Series

## KM Series 105°C

### Features

- ◆ Used in communication equipment, switching power supply, etc.
- ◆ Load life 2000 hours at 105°C
- ◆ Safety vent construction design



### Specifications

Item	Performance Characteristics														
Operating Temperature Range	-40to+105°C							-25to+105°C							
Rated Voltage Range	6.3to100VDC							160to450VDC							
Capacitance Range	0.1to4700 µ F							0.47to220 µ F							
Capacitance Tolerance	±20% (100Hz or 120Hz, +20°C)														
Leakage Current (+20°C, max)	I ≤ 0.01CV or 3 (µ A) After 1 minutes, whichever is greater measured with rated working voltage applied							I ≤ 0.03CV+10 (µ A) After 1 minutes, whichever is greater measured with rated working voltage applied							
Dissipation Factor (tg δ)	Working Voltage (VDC)	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
	D.F(%)	22	20	16	15	14	10	9	8	12	20	20	20	25	25
For capacitance > 1000 µ F, Add 2% per another 1000 µ F (100Hz or 120Hz, +20°C)															
Low Temperature Characteristics (120Hz)	Impedance ratio ,max														
	Working Voltage(VDC)	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
	Z-25°C / Z+20 °C	4	3	2	2	2	2	2	2	2	2	3	5	6	15
Z-40°C / Z+20 °C	8	6	4	3	3	3	3	3	-	-	-	-	-	-	
Fpr capacitance > 1000 µ F , and 0.5% per another 1000 µ F for Z-25°C/Z+20°C, add 1% per another 1000 µ F for Z-40°C/Z+20°C															
Load Life	Test conditions														
	Duration time: 2000hours														
	Ambient temperature: +105°C														
	Applied voltage: Rated Working Voltage(DVC)														
	After test requirements: Resumde 16 hours at normal temperature														
	Capacitance change: ≤20% of the initial measured value														
	Dissipation Factor: ≤200% of the initial specified value														
Leakage Current: ≤The initial specified value															
Shelt Life	Test conditions														
	Duration time: 1000hours														
	Ambient temperature: +105°C														
	Applied voltage: None														
	After test requirements: Resumed 16 hours at normal temperature														
	Capacitance change: ≤20% of the initial measured value														
	Dissipation Factor: ≤200% of the initial specified value														
Leakage Current: ≤200% of the initial specified value															



# JWCO® KM Series

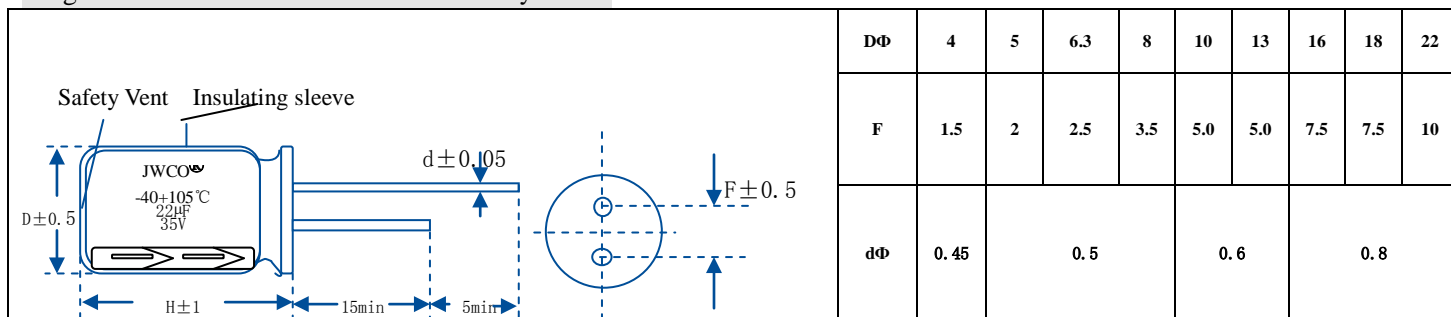
Multiplier for ripple current vs.frequency

Capacitance ( $\mu$ F ) / Hz		60(50)	120	400	1K	10K	50K~100K
Data	$\leq 10$	0.8	1	1.30	1.30	1.65	1.70
	10~100	0.8	1	1.23	1.23	1.48	1.53
	100~1000	0.8	1	1.16	1.16	1.35	1.38
	>1000	0.8	1	1.11	1.11	1.25	1.28

Multiplier for ripple current vs.temperature

$^{\circ}$ C	45	60	70	85	105
Data	2.10	1.90	1.40	1.25	1.00

Diagram of Dimension ( $\geq D\Phi 8$  with safety vent)



Sleeve Marks Information(Applied to all series)

JWCO®	VENT	-40+105 $^{\circ}$ C	22 $\mu$ F	35V	5*11	--
Brand	Anti-explosion valve	Operating Temperature	Mark Capacitance	Working Voltage	size	--

Case Size

D x L(mm)

wv $\mu$ F	6.3 (8)	10 (13)	16 (20)	25 (32)	35 (44)	50 (63)	63 (79)	100 (125)	160 (200)	200 (250)	250 (300)	350 (400)	400 (450)	450 (500)
0.1						4x8	5x11	5x11						
0.22						4x8	5x11	5x11						
0.33						4x8	5x11	5x11						
0.47						4x8	5x11	5x11	5x11	5x11	5x11	6.3x11	6.3x11	8x12
1						4x8	5x11	5x11	6.3x12	6.3x12	6.3x12	8x12	6.3x12	8x12
2.2						5x11	5x11	5x11	6x12	6x12	6.3x12	8x12	6.3x12	8x12
3.3						5x11	5x11	5x11	6.3x12	6.3x12	8x12	8x12	8x12	8x16
4.7						5x11	5x11	5x11	6.3x12	8x12	8x12	8x12	8x12	10x13
6.8						5x11	5x11	5x11	6.3x12	8x12	8x12	8x12	10x13	10x15
10			4x8	4x8	5x11	5x11	6.3x12	6.3x12	8x12	10x13	10x17	10x15	10x17	10x20
15			4x8	5x11	5x11	5x11	6.3x12	6.3x12	8x12	10x13	10x17	10x15	10x17	10x20
22			4x8	5x11	5x11	5x11	6.3x12	8x12	10x17	10x17	10x20	13x21	13x21	16x25
33			4x8	5x11	5x11	6.3x12	8x12	10x13	10x20	13x20	13x25	16x21	16x21	16x30
47			4x8	5x11	5*11	6 x12	8x12	10x16	13x25	13x25	13x25	13x25	16x25	16x30
68	5x11	5x11	5x11	6.3x12	6.3x12	6.3x12	8x12	10x16	13x25	13x25	13x25	13x25	18x25	18x25
82	5x11	5x11	5x11	6.3x12	8x12	8x12	10x16	13x20	16x25	16x32	16x32	18x25	18x25	
100	5x11	5x11	5x11	6.3x12	6.3*12	8x12	10x16	13x20	16x25	16x32	16x32	18x30	18x32	
120	5x11	6.3x12	6.3x12	6.3x12	8x12	10x13	10x16	13x20	16x25	16x32	16x32	18x35	18x35	
150	6.3x12	6.3x12	6.3x12	8x12	8x12	10x14	10x20	13x25	13x36	16x36	18x36	22x26	22x36	
220	6.3x12	6.3x12	6.3x12	8x12	8x12	10x16	10x20	16x25	16x36	18x41	18x41			
330	8x12	8x12	8x12	8x12	10x13	10x20	13x20	16x32						
470	8x12	6x12	6x12.8	8*12	10x17	10x20	13x25	16x36						
680	8x12	8x12	8x14	10x16	10x25	13x25	16x25	18x41						
1000	8x12	8x12	10x13	10x17	10x20	13x25	16x32	18x41						
2200	10x20	10x17	13x20	13x25	16x32	18x36	18x41							
3300	10x25	13x20	13x25	16x26	18x36	18x36								
4700	13x25	16x25	16x26	16x26	18x40									

# JWCO® KM Series

Maximum Ripple Current

(mA 120 Hz at 105°C)

WV UF	6.3 (8)	10 (13)	16 (20)	25 (32)	35 (44)	50 (63)	63 (79)	100 (125)	160 (200)	200 (250)	250 (300)	350 (400)	400 (450)	450 (500)
0.1						1.3	1.3	1.9						
0.22						2.9	2.9	3.4						
0.33						4	4.5	5						
0.47						7	7	10	11	12	12	14	15	17
1						10	12	15	16	16	17	20	20	22
2.2						18	20	25	25	25	28	35	35	36
3.3						25	26	35	35	40	45	45	48	48
4.7						30	35	45	45	50	52	55	57	60
6.8						34	35	50	50	52	55	60	62	72
10			35	38	45	50	50	56	59	59	64	79	79	87
15			42	45	50	52	60	64	79	84	89	92	95	98
22			54	54	60	68	82	96	96	96	110	130	145	165
33			56	67	75	90	100	120	125	140	140	175	185	210
47			57	70	76	125	135	160	165	165	180	230	240	260
68	70	80	105	112	120	135	150	180	195	195	210	240	260	290
82	75	85	110	115	135	145	178	210	225	248	265	285	310	320
100	95	105	110	130	140	180	225	245	270	285	310	335	350	380
120	115	125	130	162	205	216	270	294	325	342	375	405	420	
150	135	140	170	205	255	270	340	365	405	430	465	500	525	
220	160	175	180	230	235	345	400	450	480	625	680			
330	195	245	260	310	350	460	540	700	890	940				
470	250	262	278	360	460	610	700	880	960					
680	390	420	535	635	752	880	1010							
1000	460	460	500	630	685	1080	1210							
2200	810	860	1000	1170	1340	1530								
3300	960	1100	1300	1460	1650	1750								
4700	1330	1400	1600	1780	1900									

Examination requirements Inspection level and acceptable quality level according to GB2828-87 “batch inspection count sampling procedure and sampling table”.

No.	Inspection item	Test condition	IL	AQL	Characteristic requirement
1	Appearance inspection	In accordance with the shape shown, check appearance by visual method, dimension by vernier caliper and micrometer.	General inspection level 1	0.1	The appearance isn't abnormal with clear and no visible signs of damage, comply with the provisions of the sixth. Dimensions are in accordance with Table 1 and Table 3.
2	Leakage current	$V_R \leq 100V$ approx. $100\Omega$ $V_R \geq 160V$ approx. $1000\Omega$ Protective resistance $V_R \leq 100V$ about $100\Omega$ $V_R \geq 160V$ about $1000\Omega$ Read the numbers after rated working voltage charging for 2 minutes.		0.04	$V_R \leq 100V$ $I \leq 0.01C_R$ $V_R$ or $3\mu A$ larger one applied $V_R \geq 160V$ $I \leq 0.03C_R$ $V_R + 10\mu A$
3	Capacitance	Frequency is 100HZ or 120HZ. Temperature $25 \pm 2^\circ C$			$\leq \pm 20\%$
4	Dissipation Factor				
5	Outer insulation resistance	Add 100V voltage for one minute between insulation bush and lead wire.			1.0
6	Solderability	Solderability tester by solder bath method 1 Welding temperature: $235 \pm 5^\circ C$ Immersion time: $2.0 \pm 0.5S$	S-3	2.5	Good solder at the end
7	Terminal tensile strength	Tension: 10N, 10S, no visible damage. Bend: Half of tension, bend twice with $45^\circ$ , no visible damage.	9	1	No abnormal appearance, clear signs, no visible damage
8	Soldering heat resistance	$260 \pm 5^\circ C$ , 10S, Immersion depth: 2mm			$\Delta C/C = 5\%$ No visible damage
9	Solvent resistance	Softened water as solvent Temperature: $20-25^\circ C$ Immersion time: $30 \pm 0.5S$			No abnormal appearance, clear signs.

No.	Inspection item	Test condition	IL	AQL	Characteristic requirement
10	Rapid change of temperature	$\Theta A: -40^{\circ}\text{C}$ $\Theta A: -25^{\circ}\text{C}$ ; $\Theta B: 85^{\circ}\text{C}$ T1: 30min T2: $\leq 5\text{min}$ Five cycles	18	1	No visible damage of appearance, no leakage. Capacitance change rate $\leq \pm 10\%$ initial measurements
11	Vibration	F=10-55HZ, A=1.5mm or 98m/s <sup>2</sup> , Solid body; three directions; 6 hours in total.			$\Delta C/C=5\%$ No visible damage of appearance, no leakage, clear signs.
12	Charge & discharge	Apply the rated voltage, charging time: 30s(charge for 25s, discharge for 5s), 500 times(+20-0times)			No visible damage of appearance, no leakage. Capacitance change rate: $\leq \pm 10\%$ initial measurements; Leakage current: $\leq 150\%$ initial measurements. Dissipation factor $\leq 150\%$ initial measurements.
13	Climatic sequence(temperature characteristic)	First stage: $+20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ; Second stage: Minimum allowable temperature; Third stage: $+20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ (15 minutes); Fourth stage: Minimum allowable temperature $+0^{\circ}\text{C}$ , $-3^{\circ}\text{C}$ (2h); Fifth stage: $+20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ (2h)	9	1	No visible damage of appearance, no leakage.
14	Hot and humid in steady state	$+40 \pm 2^{\circ}\text{C}$ , Humidity 90-95% 21 days			No visible damage of appearance, no leakage, clear signs.
15	High temperature load(Apply ripple current)	$+105^{\circ}\text{C}$ under voltage with Ripple Current 2000hours, recovering 16hours;	21	1	No abnormal appearance, clear signs, no visible damage, no leakage. Capacitance change rate: $\leq \pm 20\%$ initial measurements; Leakage current: $\leq$ initial measurements; Dissipation factor: $\leq 200\%$ initial measurements.

No.	Inspection item	Test condition	IL	AQL	Characteristic requirement
16	Surge voltage	1000 times, indoor temperature; Charge: 30s Discharge: 5min 30s; Applied voltage(DC)	6	1	No visible damage of appearance, no leakage, clear signs. Leakage current: $\leq$ initial measurements.
17	Pressure release	DC-method			Equipment should be open, no explosion, no burning.
18	Low temperature storage	-40℃, 16h; 16hours later;			No visible damage of appearance, clear signs, no leakage. Capacitance change rate: $\leq$ 10% initial measurements; Leakage current: $\leq$ initial measurements. Dissipation factor: $\leq$ initial measurements.
19	High temperature storage	+105℃, 1000h; 16hours later;	12	1	No visible damage of appearance, no leakage, clear signs. Capacitance change rate: $\leq$ ±20% initial measurements; Leakage current: $\leq$ 200% initial measurements. Dissipation factor: $\leq$ 200% initial measurements.
20	Hose melting point	Melt: Silicone oil Temperature: 220℃ (Lowest temperature)	6	1	Hose can not have broken phenomenon in the specified time.

# JIA WEI CHENG ELECTRONICS CO.,LTD

## Aluminum Electrolytic Capacitors Sample Test Report

Test Date: 2018-11-21

Customer		Series	KM	Sleeve Color	Black
Sample Qty	10 pcs	Specification	22 $\mu$ F/35V	Part Number	KM220M1VBKJ051 1VBK
Test Qty	10 pcs	Size	5X11	PO No.	
ROHS Report			REACH Report		

Items	Test Standard	AQL		Failed Qty	Failure Reason	Conclusion
		Ac	Re			
Out-looking Check	Normal outlooking, Clear marks, No noticeable damage, Size compliant to diagram	0	1	0	/	OK
Capacitance (C)	17.6~26.4 $\mu$ F	0	1	0	/	OK
Dissipation Factor( (DF)	$\leq 14\%$	0	1	0	/	OK
Leakage Current(charge 120s)	$\leq 7.7\mu$ A	0	1	0	/	OK
Weldability	Lead well coated	0	1	0	/	OK
Leas tensile	Normal outlooking, Clear marks, No noticeable damage, Stable Features	0	1	0	/	OK
Welding Heat Resistance	No noticeable damage, Capacitance Fluctuation $\leq 5\%$	0	1	0	/	OK
Stress Release	Safety Vent Open, no explosion nor burning	0	1	0	/	OK

### Electrolytic Features Test

Data No.	Capacitance ( $\mu$ F) (120HZ)	Dissipation (tan $\delta$ ) % (120HZ)	Leakage Current ( $\mu$ A) (charge for 120s)
1	21.2	4.35	1.62
2	20.3	4.25	1.32
3	22.1	4.92	1.02
4	21.2	5.02	1.25
5	20.3	5.11	1.32
6	20.9	4.86	1.42
7	21.2	4.53	1.25
8	22.3	5.00	1.36
9	22.2	4.62	1.52
10	21.6	4.52	1.62

Inspected by: 李红梅

Approved by: 梁斌