



承 认 书

APPROVAL SHEET

客 户:

CUSTOMER: _____

品 名:

PARTNAME: _____ 铝电解电容器(E-CAP)

系 列:

SERIES: _____ (MH) 系列

规 格:

SPECIFICATION: _____ 见尺寸表

版本号:

VERSION: _____ QWH-22.001

日 期:

DATE: _____ 2022.01.01

制 造 MANUFACTURE		客 户 CUSTOMER	
拟 制 FORMULATE	批 准 APPROVAL	检 验 CHECK	批 准 APPROVAL
郭嘉敏	技术部		



修改记录

REVISION RECORD

[illegible]



序号 No	目 录 INDEX	页 page
1	概述 SCOPE	4
2	订货方式 HOW TO ORDER	4
3	主要特性表 MAIN SPECIFICATIONS	5
4	外形尺寸图 SHAPE AND DIMENSIONS	8
5	纹波电流频率因子 RIPPLE CURRENT FREQUENCY COEFFICIENT	10
6	尺寸表、允许纹波电流 DIMENSIONS AND RIPPLE CURRENT	10
7	包装 PACKING	11
8	贮存方法 STORAGE METHODS	12
9	其他说明 OTHERS	13



1. 概述 SCOPE

1.1 概述 SCOPE

本承认书规定了铝电解电容器的技术规范。

This specification contains descriptions of the quality of aluminum electrolytic capacitors.

1.2 参考标准 APPLICABLE SPECIFICATION

本承认书参考 JISC-5141 和 JISC-5102 制定。

This specification is made based on the Japanese Industrial Standard JISC-5141 Characteristics and JIS C-5102.

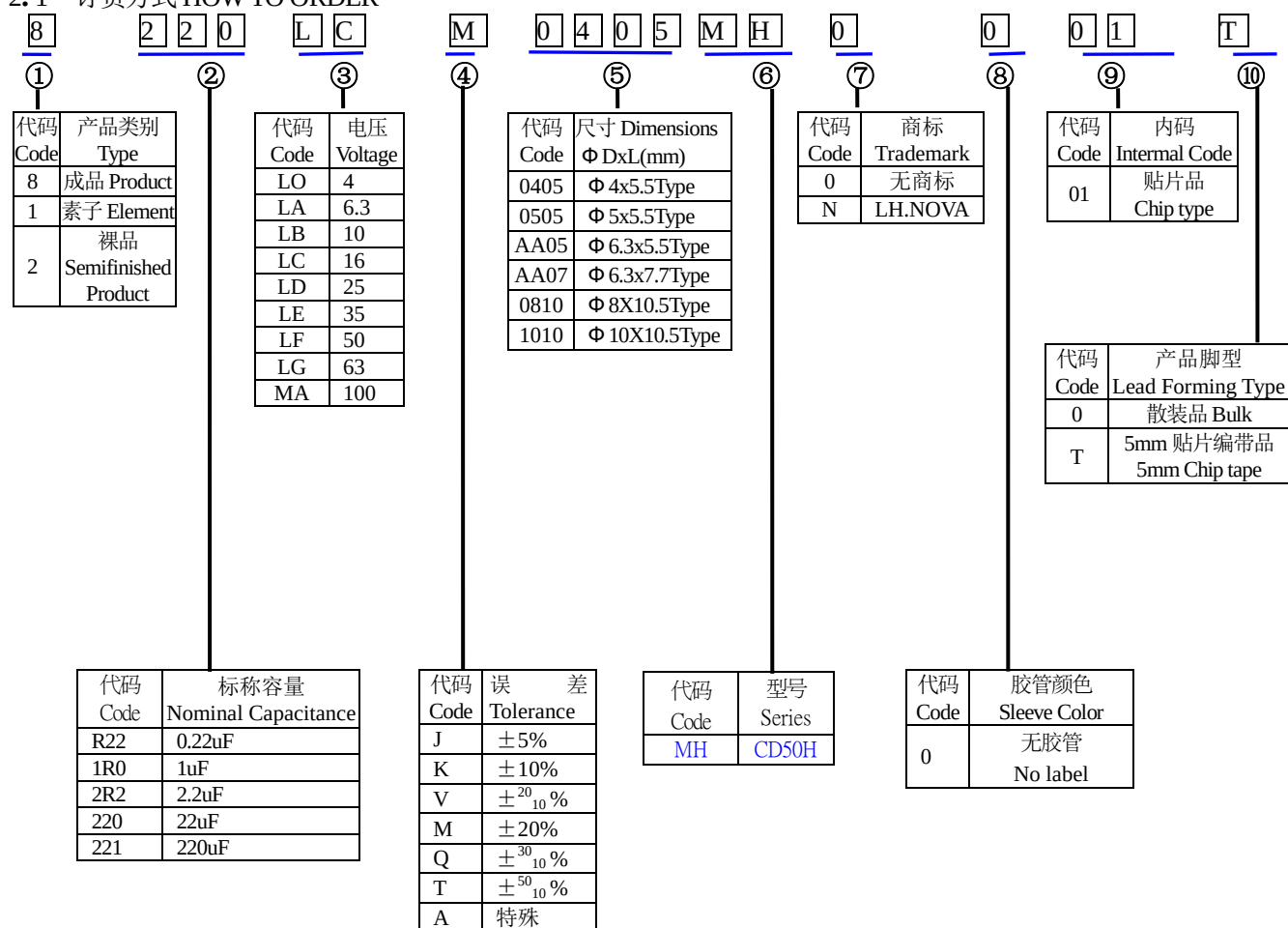
1.3 工作温度范围 OPERATING TEMPERATURE RANGE

工作温度范围是电容器在施加额定工作电压条件下，可以长期可靠工作的环境温度范围。

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

2. 订货方式 HOW TO ORDER

2.1 订货方式 HOW TO ORDER



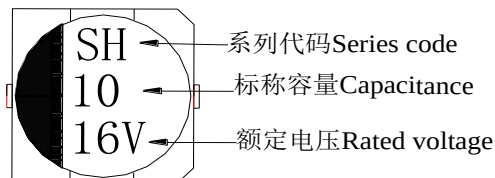


2.2 标记 MARKING

2.2.1 在电容器体上应注明如下内容 The following items shall be marked indelibly on the surface of capacitor:

- (1) 电容量 Capacitance.
- (2) 工作电压 Rated voltage.
- (3) 负极标志 Polarity of the terminals.

(4) 系列代码 Series Code 示例 Sample: SH
系列代码
Series Code



2.2.2 标记颜色: 黑色

Marking color: Black

2.2.3 系列代码与印字代码对照表:

The relationship between the series and the code:

系列代码 series	印字代码 code
MS	SS
MH	SH
MT	ST
MG	SG
MF	SF

3. 主要特性表 MAIN SPECIFICATIONS

项目 Item	主要特性 Performance Characteristics									
额定工作电压范围 Rated Voltage Range	4~100V.DC									
使用温度范围 Operating Temperature Range	-40℃~+105℃									
标称静电容量范围 Nominal Capacitance Range	0.1~220μ F									
静电容量允许偏差 Capacitance Tolerance	±20%（M， +25℃， 120Hz）									
漏电流 Leakage Current (25℃)	额定工作电压(V) Rated working voltage	4~100								
	漏电流 Leakage current	2 分钟后 I≤0.01CV 或 3(μ A),取最大值 After 2 min. I≤0.01CV or 3(μ A), Whichever is greater.								
C: 标称静电容量 (μ F) Nominal Capacitance in μ F V: 额定工作电压 (V) Rated working voltage in V										
损耗角正切 DF Dissipation Factor	额定工作电压(V) Rated working voltage	4	6.3	10	16	25	35	50	63	100
	DF(MAX) (25℃,120Hz)	0.26	0.26	0.22	0.18	0.16	0.14	0.12	0.12	0.12
浪涌电压 Surge Voltage	额定工作电压(V) Rated working voltage	4	6.3	10	16	25	35	50	63	100
	浪涌电压 Surge voltage (V)	6.3	8	13	20	32	44	63	79	125
温度特性 Temperature Stability	额定工作电压(V) Rated working voltage					4~6.3	10	16	25	35~100
	阻抗比(120Hz) Impedance Ratio		z-25℃/z+25℃		4	4	2	2	2	
			z-40℃/z+25℃		8	8	4	4	3	



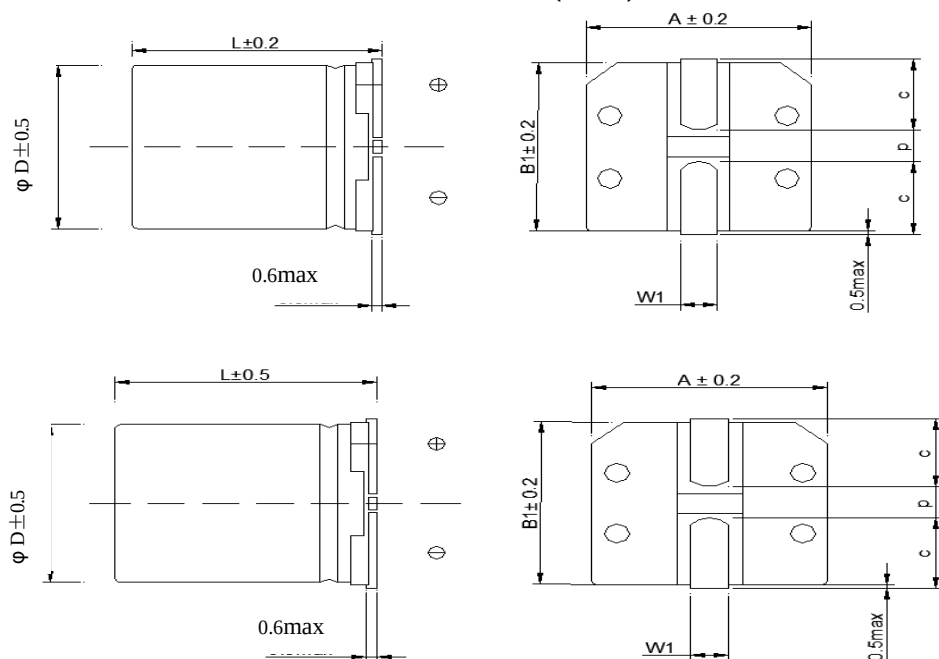
项目 Item	主要特性 Performance Characteristics		
高温负荷特性 Load life	在+105℃ 环境中施加额定工作电压和最大允许纹波电流 1000 小时后,电容器的性能符合下面要求: After application of rated working voltage with max permissible ripple current specified at +105℃ for 1000 hours, capacitors meet the characteristics requirements measured at +25℃ listed at below: 1、电容量变化率:±30%初始测量值以内 Capacitance change : ±30% initial measured value 2、漏电流: ≤初始规定值 Leakage current:≤initial specified value 3、损耗角正切值≤300%倍初始规定值 Dissipation factor: ≤300% initial specified value		
高温贮存特性 Shelf life	在+105℃环境无负荷放置 1000 小时后,电容器的性能符合高温负荷特性中所列的规定值 After leaving capacitors under no load at +105℃for 1000 hours, capacitors meet the characteristics listed above.		
耐焊接热试验 Test of resistance to soldering heat	电容引脚向下放置在一块金属板上,在 250℃下放置 10 秒,取出后放置于空气中到达室温,测试性能符合下表要求。 Capacitors placed on a 250℃ hot plat for 10 seconds with their electrode terminals facing downward will fulfill following conditions after being cooled to room temperature. 1、电容量变化率:±10%初始测量值以内 Capacitance change : ±10% initial measured value 2、漏电流: ≤初始规定值 Leakage current:≤initial specified value 3、损耗角正切值≤初始规定值 Dissipation factor: ≤initial specified value		
浪涌电压 Surge Voltage	在常温下,串联电阻为 1KΩ 的环境下使用最大浪涌电压充电 30 秒和在不充电情况下放电 1 分钟 30 秒,循环 1000 次,电容器的性能符合以下要求: The capacitors shall be subjected to 1000 cycle each consisting of charge with the surge voltages specified at 105℃ for 30 seconds through a protective resistor (R=1KΩ) and discharge for 5 minutes 30 seconds.		
	外观 Appearance	没有明显变化 No significant damage	
	容量变化 Capacitance Charge	小于初始值的±20% ≤±20% of the initial specified value	
	损失 DF	小于初始值的 150% ≤±150% of the initial specified value	
	阻抗 ESR	小于初始值的 150% ≤±150% of the initial specified value	
	漏电流 Leakage current	小于初始值 ≤the initial specified value	
	端子强度 Terminal strength	1) 拉力(tensile)	
d(mm)		[N]	Duration time
0.3<d≤0.5		5	10±2sec(秒)
0.5<d≤0.8		10	
0.8<d≤1.25		20	
2) 抗弯强度 (Bending)			
端子应该在每一方向上折弯一次, 总共两次 The terminal shall be subjected to 1 bend in each direction to give a total 2 bends.			



	d(mm)	[N]
	0.3<d≤0.5	2.5 (0.25KG)
	0.5<d≤0.8	5.0 (0.51KG)
	0.8<d≤1.25	10.0(1.0KG)
端子没有破损或松动 SPEC: No breaking and loosening of terminal		
可焊性 solderability	焊料(Solder) : H60A. H60S or(或)H63A 焊接温度(Solder temperature) : 245±2℃ 浸入时间(Immersion time) : 3±0.5sec(秒) 浸入深度(Immersion depth) : 2mm 熔化: 松香在酒精的浓度是 25 % Flux: 25% by weight of rosin in ethanol 从含浸处到顶部, 至少要有 3/4 的部分覆盖有新焊料 SPEC:1)3/4 of the circumference of the surface up to the immersed shall be covered with new solder.	
抗振性 Vibration	试验电容器的耐振性。在整个频率范围内, 从 10 赫兹到 55 赫兹, 然后再返回到 10 赫兹, 就这样在一分钟内往返循环。振幅为 1.5mm。在三个垂直方向上, 每一方向要持续 2 小时, 总共 6 小时 Only endurance conditioning by sweeping shall be made. The entire frequency range, from 10 to 55Hz and return to 10Hz, shall be transversed in 1min. Amplitude(total excursion)1.5mm, This motion shall be applied for a period of 2hours in each of 3 mutually perpendicular directions(a total of 6 hours) SPEC: 1) 电容量的变化(change in capacitance) : ±5%初始值以内(within ±5%of the initial value) 2) 无可见损伤(No visible damage)	
稳态湿热 Damp heat	在 60℃,湿度为 90~95%, 无直流电的环境中放置 1000 小时后,电容器的性能符合以下的要求: The specifications shall be satisfied when the capacitors are restored to 20℃ after subjecting them to store at 60℃,90 to 95% RH for 1000 hours,without DC applied.	
	外观 Appearance	没有明显变化 No significant damage
	容量变化 Capacitance Change	小于初始值的±20% ≤±20% of the initial specified value
	损失 DF	小于初始值的 150% ≤±150% of the initial specified value
	阻抗 ESR	小于初始值的 150% ≤±150% of the initial specified value
	漏电流 Leakage current	小于初始值 ≤the initial specified value



4. 外形尺寸 SHAPE AND DIMENSIONS (mm)



注: L=5.5mm L±0.2; L=7.7mm L±0.3; L=10.5-12.5mm L±0.5

$\phi D \pm 0.5$	L	$A \pm 0.2$	B_1	$C \pm 0.2$	W_1	$P \pm 0.2$
4	5.5	4.3	4.3	1.8	0.5~0.8	1.0
5	5.5	5.3	5.3	2.1	0.5~0.8	1.4
6.3	5.5	6.6	6.6	2.5	0.5~0.8	2.0
6.3	7.7	6.6	6.6	2.5	0.5~0.8	2.0
8	10.5	8.5	8.5	2.9	0.8-1.1	3.1
10	10.5	10.3	10.3	3.2	0.8~1.1	4.5

4. 1 回流焊温度曲线 REFLOW SOLDERING CURVE OF TEMPERATURE

4. 1. 1 电容表面温度不超过 260℃

Temperature at surface of capacitor shall not exceed 260℃.

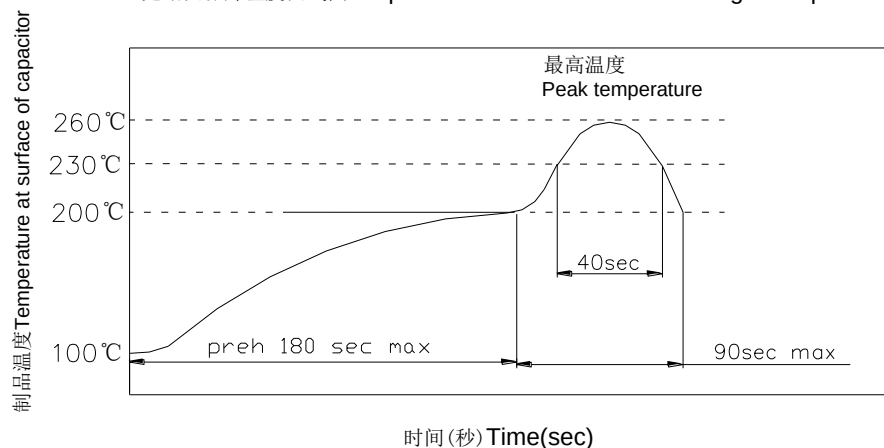
4. 1. 2 电容表面温度超过 200℃ 的时间不超过 90 秒

Period that temperature at surface of capacitor becomes more than 200℃ shall not exceed 90 seconds.

4. 1. 3 预热温度不超过 200℃, 时间不超过 180 秒

Preheat shall be made at maximum 200℃ and for maximum 180 seconds.

无铅回流焊温度曲线图 Graph for Lead-free reflow soldering temperature

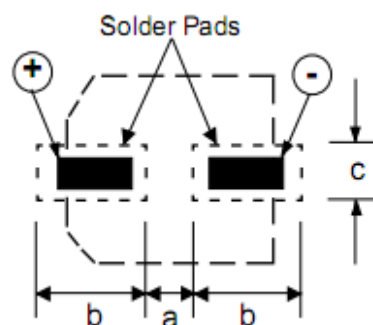




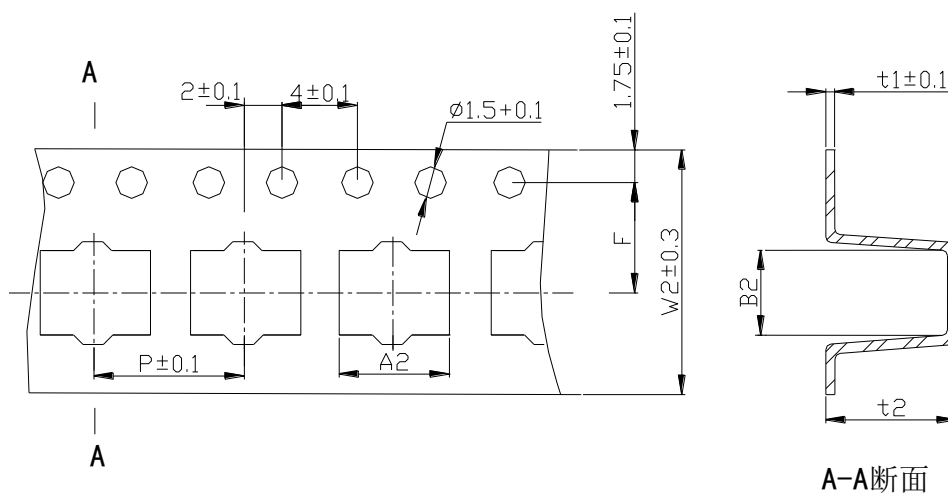
4. 1. 4 建议 PCB 焊盘设计标准 Recommended Land Pattern(mm)

Standard Termina

Case Dia	a	b	c
4	1.0	2.6	1.8
5	1.4	3.0	1.8
6.3	2.1	3.5	1.8
8	2.8	4.1	2.1
10	4.3	4.4	2.5



4. 2 编带 TAPING METHOD (mm)



系列 Series	尺寸 Size	W ₂	A ₂	B ₂	P	t ₂	F	t ₁
MH	φ 4×5.5	12.0	4.7	4.7	8	5.7	5.5	0.4
	φ 5×5.5	12.0	5.7	5.7	12	5.7	5.5	0.4
	φ 6.3×5.5	16.0	7.0	7.0	12	5.7	7.5	0.4
	φ 6.3×7.7	16.0	7.0	7.0	12	8.3	7.5	0.4
	φ 8×10.5	24.0	8.7	8.7	16	11	11.5	0.4
	φ 10×10.5	24.0	10.7	10.7	16	11.0	11.5	0.4

5. 纹波电流频率因子 RIPPLE CURRENT FREQUENCY COEFFICIENT

Freq (Hz)	50 (60)	100 (120)	500	1K	≥10K
Cap (μ F)					
0.1~1	0.50	1.00	1.20	1.30	1.50
2.2~4.7	0.65	1.00	1.20	1.30	1.50
10~47	0.80	1.00	1.20	1.30	1.50
100~1000	0.80	1.00	1.10	1.15	1.20



6. 尺寸表、允许纹波电流 DIMENSIONS AND RIPPLE CURRENT (MH)

WV/V Cap/μ F	4(LO)		6.3(LA)		10(LB)		16(LC)		25(LD)		35(LE)		50(LF)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
0.1(R10)													4×5.5	1.0
0.22(R22)													4×5.5	2.0
0.33(R33)													4×5.5	2.5
0.47(R47)													4×5.5	4.0
1 (1R0)													4×5.5	8.4
2.2 (2R2)													4×5.5	14
3.3 (3R3)													4×5.5	17
4.7 (4R7)									4×5.5	16	4×5.5	18	4×5.5	18
10 (100)							4×5.5	25	4×5.5 5×5.5	25 27	5×5.5	30	5×5.5 6.3×5.5	30 35
22 (220)			4×5.5	29	5×5.5	27	4×5.5 5×5.5	30 39	5×5.5 6.3×5.5	36 37	6.3×5.5	48	6.3×5.5	48
33 (330)	4×5.5	18	4×5.5 5×5.5	31 27	4×5.5 5×5.5	23 43	6.3×5.5 5×5.5	37 43	6.3×5.5	54	6.3×5.5	58	6.3×7.7	60
47 (470)	5×5.5	34	5×5.5	46	6.3×5.5	56	5×5.5 6.3×5.5	37 56	6.3×5.5	56	6.3×5.5 6.3×7.7	50 61	6.3×7.7	75
68 (680)	5×5.5	58	5×5.5 6.3×5.5	58 71	6.3×5.5	71	6.3×5.5	86	6.3×5.5 6.3×7.7	91	6.3×7.7	91	8×10.5	190
100(101)	5×5.5	61	6.3×5.5	71	5×5.5 6.3×5.5	56 71	6.3×5.5	86	6.3×7.7	91	6.3×7.7 8×10.5	77 252	8×10.5	190
150(151)	6.3×5.5	61	6.3×5.5	55	6.3×5.5	62	6.3×7.7	95	8×10.5	140	8×10.5	155	10×10.5	300
220(221)	6.3×5.5	96	6.3×5.5	105	6.3×7.7	130	6.3×7.7	135	8×10.5	270	8×10.5 10×10.5	270 370	10×10.5	320
330(331)	6.3×7.7	130	6.3×7.7	150	8×10.5	290	8×10.5	290	10×10.5	400	10×10.5	400		
470(471)	8×10.5	290	6.3×7.7 8×10.5	280 290	8×10.5 10×10.5	300 400	10 × 10.5	400	10×10.5	400	10×10.5	400		
680(681)	8×10.5	210	8×10.5	290	10×10.5	410	10× 10.5	410						
1000(102)	8×10.5	260	10×10.5	430	10×10.5	430								

VDC		63V(LG)		100V(MA)	
uF	Contents	ΦD×L	mA	ΦD×L	mA
0.1	R10	4×5.5	1.0		
0.22	R22	4×5.5	2.0		
0.33	R33	4×5.5	2.5		
0.47	R47	4×5.5	4.0		
1	1R0	4×5.5	8.4		
2.2	2R2	4×5.5	14		
3.3	3R3	4×5.5	22		
4.7	4R7	5×5.5	25	5×5.5	20
10	100	5×5.5 6.3×5.5	30 35		
22	220			8×10.5	87
33	330	8×10.5	139		
47	470	10×10.5	200		
68	680	10×10.5	226		
100	101	10×10.5	226		
220	221	10×10.5	332		

(1) 外形尺寸 Case Size D×L(mm)

(2) 最大允许纹波电流 Max allowable ripple current (mA rms +105℃,120Hz)

6.1 客户料号与风华物料对照表 Customer P/N and Fenghua P/N collate list

客户 P / N	风华 P / N
--	8220LCM0405MH0001T



7. 包装 PACKING

7.1 包装标签 PACKING LABEL



规格、尺寸 Specification and dimensions

批号的填写 LOT:

1	2	3	4	5	6	7	8	9	10	11	12	13	14
---	---	---	---	---	---	---	---	---	----	----	----	----	----

类别 年份 月份 日期 区别号

流传单号码

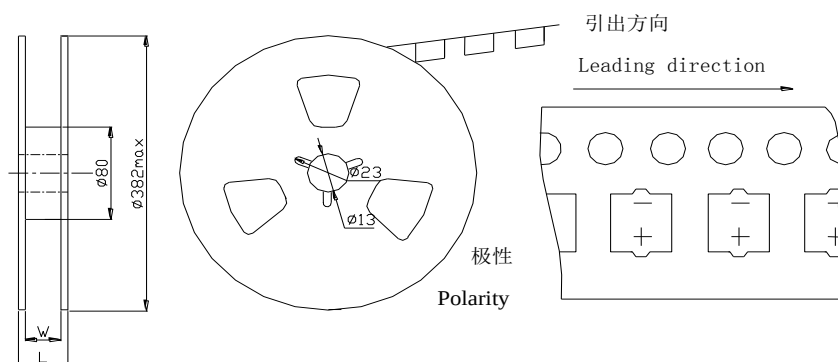
Sort Year Month Date Discriminate mark

Sequence number

(标签示例)

7.2 编带产品按下图包装

Taped capacitors are packed into carton, according to the following drawing.



垂直安装 Vertical Mount			
尺寸 Size	L	W ₃	数量 Quantity/reel
Φ 4×5.5	19	14	2000pcs
Φ 5×5.5	19	14	1000pcs
Φ 6.3×5.5	23	18	1000pcs
Φ 6.3×7.7	23	18	1000pcs
Φ 8×10.5	28	26	500pcs
Φ 10×10.5	28	26	500pcs



7.3 散装、编带品外包装箱标签，实用尺寸为 148mmX105mm。

The dimension of the label on the carton is 148mmX105mm

 广东风华高新科技股份有限公司 FENGHUA ADVANCED TECHNOLOGY HOLDING CO., LTD						
发货申请号：-----			箱号：---			
客户名称	XXX			业务员	XXX	
订单号	SA-----		业务部	XXX		
净重Kg：		毛重Kg：				
序号	型号规格	客户料号	客户PO	数量 (千只)	备注	
1	8220LCM0405MH0001T 22uF/16V Φ4X5.5			---		
合计						
日期：22/01/01						

(标签示例)

8. 贮存方法 STORAGE METHODS

8.1 请保管在室温 5~35℃，湿度 75%以下的环境。

We recommend the following conditions for storage: Ambient temperature: 5~35℃, Ambient humidity: Less than 75% RH;

(1)产品储存期限：≤12 个月； Storage life:≤12 months;

(2)产品储存期限超 12 个月时，需充电后再使用； If storage life time is over 12 months,the products need to be recharged;

(3)产品储存时间超过 3 年的应报废处理； If storage life time is over three years, the product need to be discarded;

(4)库存有效期以套管上印刷的时间开始计算； Expiry date:calculating from the date marked on the sleeve;

(5)请尽量以包装状态保管； Please keep capacitors in the original package;

(6)请避免在以下环境中保管： Avoid storing the capacitors under such circumstances:

*①溅水、高温高湿及结露的环境。 Environment of water splashing, high temperature, high humidity and dewing;

* 溅油、或者充满气体油成分的环境。 The environment that splashes oil, or is filled with gas oil;

*③充满酸性有毒气体（硫化氢、亚硫酸、亚硝酸、氯、溴、溴化甲烷等）的环境。 With full of acid toxic gases environment such as(hydrogen sulfide , sulfurous acid, nitrous acid, chlorine , bromine, methyl bromide, etc.)

8.2 当电容器长期储存后，漏电流会升高，温度越高，漏电流上升越快，因此应注意储存环境。如铝电解电容器的漏电流上升对电路有不良影响，请在使用前充电处理。

Leakage current tends to increase when capacitors have been stored for long period of time. The higher temperature , the higher leakage current increase. Please take caution when selecting the storage location. The leakage decrease gradually as voltage is applied to the capacitor. The capacitor is subjected to aging before using, leakage may cause problems in the circuit.

8.3 如果没有其他规定，标准的测试、检验环境条件如下所示：

环境温度：5 至 35℃；相对湿度：45 至 75%；大气压力：86kpa 至 106kpa。

如果对测试结果有异议，可以在以下条件测试：

环境温度：25±2℃；相对湿度：60 至 70%；大气压力：86kpa 至 106kpa。

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

Ambient temperature: 5 to 35℃ 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: 25±2℃ Relative humidity: 60 to 70% Air pressure: 86kpa to 106kpa.



9. 其它说明 OTHERS

9.1 铝电解电容器使用注意事项 Important information on the application of aluminium electrolytic capacitors

(1). 直流铝电解电容器应按正确的极性使用 DC electrolytic capacitors are polarized

当直流铝电解电容器被反极性接入电路时, 电容器会导致电子线路短路, 由此产生的电流会引致电容器损坏。若电路中有可能在负引线施加正极电压, 请选用无极性产品。

When reverse voltage is applied on DC electrolytic capacitor, the capacitor will become short-circuited please use non-polarized capacitors in the circuit or the capacitor will be damage due to abnormal current flows through the capacitors since the circuit where the positive voltage may be applied to the cathode terminal.

(2). 在额定工作电压以下作用 Use capacitor within rated voltage

当电容器上所施加电压高于额定工作电压时, 电容器的漏电流将上升, 其电气特性将在短时间内劣化直至损坏。请注意电压峰值勿超出额定工作电压。

When capacitor is used at higher voltage than the rated voltage, leakage current increases, characteristics drastically deteriorate and damage in a short period may occur as a result. Please take extra caution that the peak voltage should not exceed the rated voltage.

(3). 作快速充放电使用 Charge and discharge application.

当常规电容器被用作快速充电用途。其使用寿命可能会因为容量下降, 温度急剧上升等而缩减

When aluminum electrolytic capacitors for general purpose are employed in rapid charge and discharge application, its life may be shorted by capacitance decreasing, heat rising, etc.

(4). 电容器贮存 Store the capacitor.

当铝电解电容器作了长期贮存后, 其漏电流通常升高, 贮存温度愈高, 漏电流上升愈快。因此应注意贮存环境的选择, 在电容器上施加电压后, 漏电流值将不断下降, 在铝电解电容器的漏电流值上升对电路有不良影响的, 请在使用前充电处理。

Increased leakage current is common in aluminum capacitors which have been stored for long period of time. The Higher the storage temperature, the higher the leakage current increase, therefore please take precautions concerning the storage location. The leakage current decreases gradually as voltage is applied to the capacitor. In cases where increased leakage current causes problems in the circuit, apply voltage (aging) before using.

(5). 施加纹波电流应小于额定值 Ripple current applied to capacitor should not exceed the rated value.

施加纹波电流超过额定值后, 会导致电容器体过热, 容量下降, 寿命缩短。所施加纹波电压的峰值应小于额定工作电压。

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). 使用环境温度 Ambient temperature.

铝电解电容器的使用寿命会受到环境温度的影响。据科学统计, 使用环境温度下降 10℃ 其使用寿命增加 1 倍。

Its ambient temperature closely affects the life of an aluminum electrolytic capacitor. It is generally stated, that life doubles for each 10℃ decrease in temperature.

(7). 引出线强度 Lead stress

当拉力施加到电容器引出线, 该拉力将作用于电容器内部, 这将导致电容器内部短路, 开路或漏电流上升。在电容器焊装到电路板, 请勿强烈摇动电容器。

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 PCB board.

(8). 焊接过程耐热性 Heat resistance at the soldering process

铝电解电容器装至电路板进行浸焊或波峰焊时, 其塑料套管可能因焊接时间过长、温度过高而发生破裂或二次收缩。

In the dip soldering process of PCB 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). 电路板的安装孔距及安装位置 Hole pitch and position of PCB board.

电路板安装孔的设计应与产品说明书的引线脚距相一致, 如果将电容器强行插入孔距不配套的电路板, 那么会有应力作用于引出线, 这将导致短路或漏电流上升。

PCB board must be designed so its hole 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, a stress is put on the leads. This could result in a short circuit or increased leakage current.

(10). 铝电解电容可能会有残留电压, 请在使用前对电容器进行放电。

Aluminum electrolytic capacitor may have residual voltage, please discharge the capacitor before use.

9.2 本产品不含铅、镉等元素 This product does not include Plumbum or Cadmium.