

客户

CUSTOMER: \_\_\_\_\_

NA CHUAN ELECTRONICS CO.,LTO

# 承認書

SPECIFICATION FOR APPROVAL

# Hyncdz<sup>®</sup>

產品名稱：铝电解电容器

客戶物料編號：

承制方型號：CD288 400V4.7μF 8X12

日期：

物料环保标准： ROHS



### 承制方確認

拟制	审核	批准
姚海洋		涂斯淇

### 使用方確認

	审核	批准

承制方：

地址：

電話：

傳真：

郵編：

签认后, 敬请返回一份, 多谢!

## 1、概述 SCOPE

本承认书规定了径向引出铝电解电容器的技术规范.

This specification covers miniature single-ended aluminum electrolytic capacitors.

## 2、参考标准 APPLICABLE SPECIFICATION

本承认书参考 JIS C5141 制定.

JIS C5141 Characteristics as specified in this specification.

## 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.

$$-40\sim+105^{\circ}\text{C}(\leq 100\text{V}) \quad -25\sim+105^{\circ}\text{C}(\geq 160\text{V})$$

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

$$-40\sim+105^{\circ}\text{C}(\leq 100\text{V}) \quad -25\sim+105^{\circ}\text{C}(\geq 160\text{V})$$

## 4、品质保证项目 CONTENTS OF QUALITY ASSURANCE

4.1、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: 15 至 35°C

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:  $20\pm 2^{\circ}\text{C}$

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 : 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 :  $20\pm 2^{\circ}\text{C}$

Relative humidity : 60 to 70%

Air pressure : 86Kpa to 106Kpa

## 铝电解电容器使用注意事项

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

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

当直流铝电解电容器按反极性接入电路时，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，请选无极性产品。

When reverse voltage is applied on DC electrolytic capacitor, the capacitor will become short-circuited please use no polarized capacitors in the circuit 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 expectancy may be shortened by capacitance decrease, heat rise, 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 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). 施加纹波电流应少于额定值 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少于额定工作电压。

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。

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). 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 PC 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。

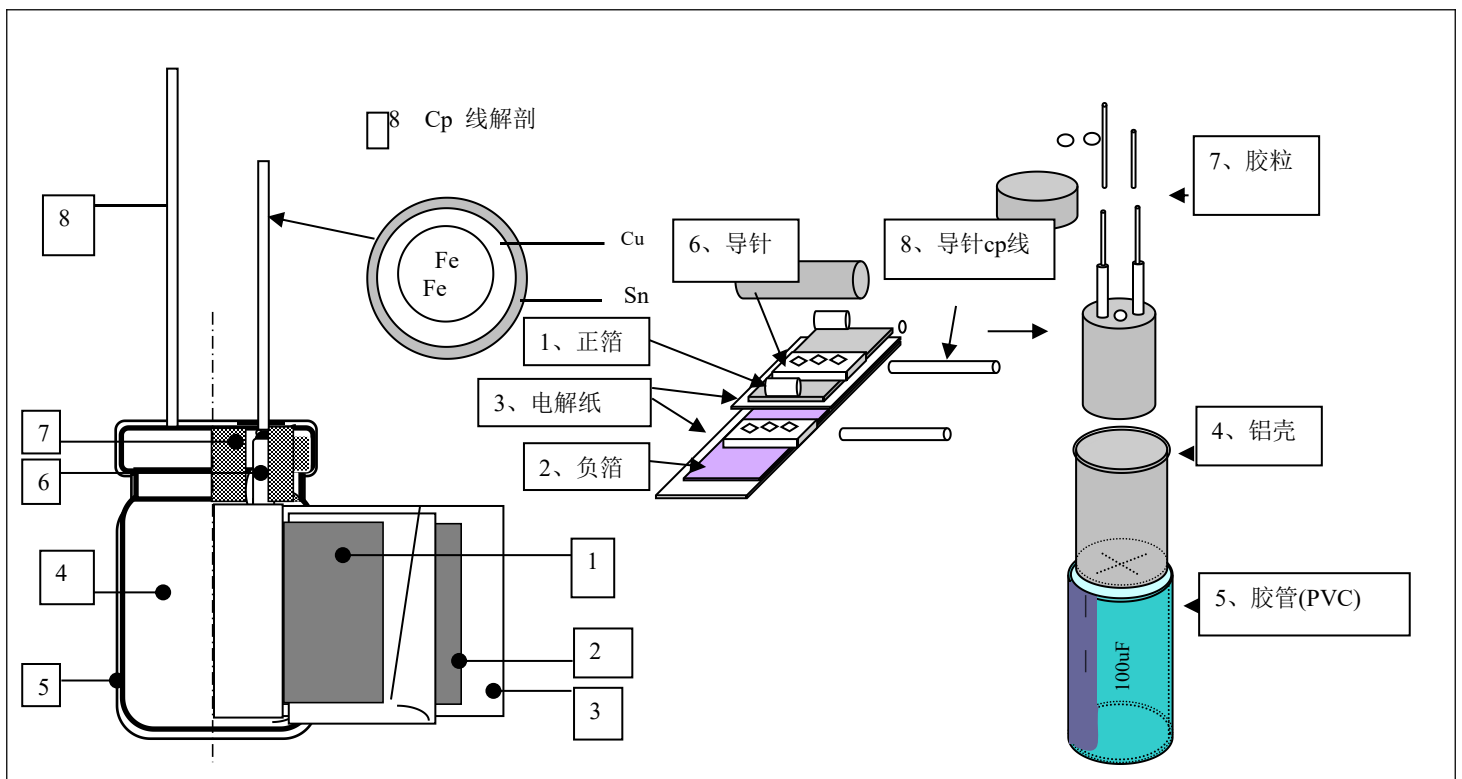
In the dip soldering process of PC board with aluminum electrolytic capacitors mounted, secondary shrinkage or crack of PVC sleeve may be observed when solder temperature is too high or dipping time is too long.

(9). 电路板的安装孔孔距及安装位置 Hole pitch and position of PC 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。

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.

## 产品结构图



# ALUMINIUM ELECTROLYTIC CAPACITOR

## 铝电解电容器

### COMPOSITION LIST(物质成份表)

MATERIALS (材料名称)		COMPOSITION OF MATERIALS (材料成分表)			
SLEEVE TUBE (套管)		POLYETHYLENE TEREPHTHALATE PET (PVC 聚对苯二甲酸乙二酯)	90%		
		STABILILER (稳定剂)	0.2%		
		润滑剂 (LUBRICANT)	0.15%		
		颜料 (PIGMENT)	1.0%		
RUBBER (胶粒)		强韧剂 (TOUGHENER)	8.65%		
		EPDM(三元乙丙胶)	40%		
		CLAY(白土)	45%		
		CARBON(碳烟)	9.0%		
OTHER(其它)			6.0%		
		LEAD WIRE (导针)	AL-WIRE (铝线)	AL (铝)	99.91%
				Si (硅)	0.03%
				Fe 铁)	0.05%
Cu (铜)	0.01%				
TIN PLATED COPPER COVERED SLEEL WIRE(镀锡铜包钢线)	Fe (铁)		71.35%		
	Cu (铜)		20%		
AL-CASE(铝壳)		Sn (锡)	8.65%		
		AL (铝)	99.3%		
		Cu (铜)	0.20%		
		Mn (锰)	0.20%		
		Zn (锌)	0.20%		
ALUMINUM FOIL(铝箔)		OTHER(其它)	0.1%		
		AL (铝)	99.98%		
PAPER(电解纸)		$Al_2O_3$ (三氧化二铝)	0.02%		
		CELLULOSE (纸纤维素)	100%		
ELECTROLYTE(电解液)		ETHYL GLYCL(乙二醇)	50%		
		AMMONIUM ADIPATE(己二酸铵)	机密		
		ADIPIC ACID(己二酸)	机密		
		AMMOUIUN BENZOATE(安息香酸铵)	机密		
		CITRIC ACID(柠檬酸)	机密		
		PARA-NITORO BENZOIE ACID (对硝基安息香酸)	机密		
		AMMDIHYDROGEN PHOSPHLATE (磷酸二氰氨)	机密		
		PURE WATER 、 AMMONIUM ACETATE (纯水、甲酸铵)	机密		

# CD288 (G) Series

## CD288G 系列 105℃ 低阻抗品

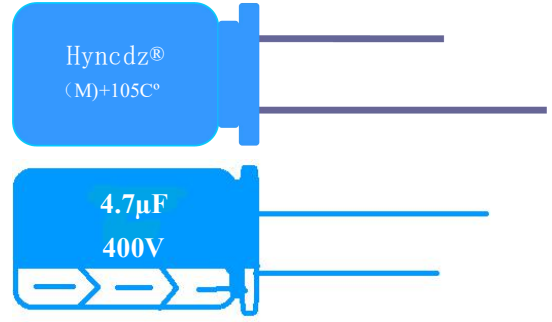
### 特点

- ◆ 适用于通信设备、开关电源、工业测量仪器等电路中。
- ◆ 105℃负荷寿命达5000小时。
- ◆ 安全防爆阀设计。

## CD288G Series Low Impedance Features

- ◆ Used in communication equipments、switching power supply Industrial measuring instruments ,etc.
- ◆ Load life 5000 hours at 105℃.
- ◆ Safety vent construction design .

### 技术要求 Specifications



项目Item	特性Performance Characteristics																																											
使用温度范围 Operating Temperature Range	-40to+105℃	-25to+105℃																																										
额定电压范围 Rated Voltage Range	10to100VDC	160to400VDC																																										
电容量范围 Capacitance Range	0.47to4700 μ F	0.47to220 μ F																																										
电容量允差 Capacitance Tolerance	±20% (100Hz or 120 Hz, +20℃)																																											
漏电流Leakage Current (+20℃, 最大max)	I ≤ 0.01CV 或 2 (μ A) 额定工作电压充电2分钟后读数, 取大者 After 2 minutes, whichever is greater measured with rated working voltage applied																																											
损耗角正切值 Dissipation Factor (tg δ)	<table border="1"> <tr> <td>工作电压Working Voltabe (VDC)</td> <td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>80</td><td>100</td><td>120</td><td>160</td><td>200</td><td>250</td><td>350</td><td>400</td> </tr> <tr> <td>D.F.(%)最大</td> <td>14</td><td>12</td><td>10</td><td>9</td><td>8</td><td>8</td><td>8</td><td>8</td><td>12</td><td>12</td><td>12</td><td>15</td><td>15</td> </tr> </table>		工作电压Working Voltabe (VDC)	16	25	35	50	63	80	100	120	160	200	250	350	400	D.F.(%)最大	14	12	10	9	8	8	8	8	12	12	12	15	15														
	工作电压Working Voltabe (VDC)	16	25	35	50	63	80	100	120	160	200	250	350	400																														
D.F.(%)最大	14	12	10	9	8	8	8	8	12	12	12	15	15																															
容量>1000 μ F时, 每增加1000 μ F D.F值增加2%(100Hz or 120Hz, +20℃) For capacitance 1000 μ F, Add 2% per another 1000 μ F (100Hz or 120Hz, +20℃)																																												
低温特性 Low Temperature Characteristics (120Hz)	阻抗比, 最大 Impedance ratio ,max																																											
	<table border="1"> <tr> <td>工作电压Working Voltage(VDC)</td> <td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>80</td><td>100</td><td>120</td><td>160</td><td>200</td><td>250</td><td>350</td><td>400</td> </tr> <tr> <td>Z - 25℃ / Z+20 ℃</td> <td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>3</td><td>5</td><td>5</td> </tr> <tr> <td>Z - 40℃ / Z+20 ℃</td> <td>4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td> </tr> </table>		工作电压Working Voltage(VDC)	16	25	35	50	63	80	100	120	160	200	250	350	400	Z - 25℃ / Z+20 ℃	3	3	3	3	2	2	2	2	2	2	3	5	5	Z - 40℃ / Z+20 ℃	4	3	3	3	3	3	3	3					
	工作电压Working Voltage(VDC)	16	25	35	50	63	80	100	120	160	200	250	350	400																														
Z - 25℃ / Z+20 ℃	3	3	3	3	2	2	2	2	2	2	3	5	5																															
Z - 40℃ / Z+20 ℃	4	3	3	3	3	3	3	3																																				
容量>1000 μ F时, 每增加1000 μ F, Z - 25℃ / Z+20 ℃值增加0.5%, Z - 40℃ / Z+20 ℃值增加1% For capacitance>1000 μ F, and 0.5% per another 1000 μ F for Z-25℃/Z+20℃, add 1% per another 1000 μ F for Z-40℃/Z+20℃																																												
负荷寿命Load Life	试验条件 持续时间: 负荷寿命 5000h	Test conditions Duration time: LoadLife 5000h																																										
	环境温度:+105℃	Ambient temperature: +105℃																																										
	施加电压:额定工作电压(VDC)	Applied voltage: Rated Working Voltage(DVC)																																										
	试验后要求:室温下恢复16小时,+20℃测试	After test requirements: Resumde 16 hours at normal temperature																																										
	电容量变化:≤±25%规定值	Capacitance change:≤±25% of the initial measured value																																										
	损耗角正切值:≤200%初始值	Dissipation Factor:≤200% of the initial specified value																																										
	漏电流:≤规定值	Leakage Current:≤The initial specified value																																										
储存寿命Shelt Life	试验条件	Test conditions																																										
	持续时间:500小时	Duration time: 500hours																																										
	环境温度:+105℃	Ambient temperature:+105℃																																										
	施加电压:无	Applied voltage: None																																										
	试验后要求:室温下恢复16小时,+20℃测试	After test requirements: Resumed 16 hours at normal temperature																																										
	电容量变化:≤±20%规定值	Capacitance change:≤±20% of the initial measured value																																										
	漏电流:≤200%规定值	Leakage Current:≤200% of the initial specified value																																										

# CD288 (G) Series

纹波电流频率调整系数

Multiplier for ripple current vs. frequency

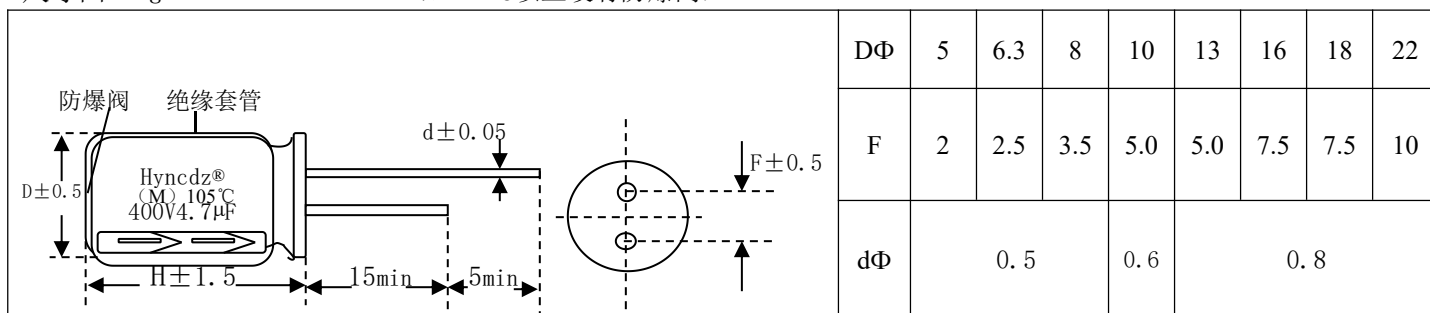
容量 (μF) / Hz		60(50)	120	400	1K	10K	50K~100K
系数	≤10	0.47	0.59	0.76	0.85	0.97	1
	10~100	0.52	0.62	0.80	0.89	0.97	1
	100~1000	0.58	0.72	0.84	0.90	0.98	1
	>1000	0.63	0.78	0.87	0.91	0.98	1

纹波电流温度调整系数

Multiplier for ripple current vs. temperature

温度℃	45	60	75	85	105
系数	2.10	1.90	1.40	1.25	1.00

尺寸图Diagram of Dimension (≥DΦ8以上设有防爆阀)



套管标识说明: (其它类同)

Hyncdz®	±20%	105℃	4.7UF	400V	CD288	套管颜色
商标	(M) 容值偏差	使用温度	标称容量	工作电压	高频低阻	棕底白字

尺寸表 Case Size

WV (SV) μF	D x L(mm)											
	16			25			35			50		
	Size	Ripple	Impedance	Size	Ripple	Impedance	Size	Ripple	Impedance	Size	Ripple	Impedance
1										5x11	40	4.00
2.2										5x11	55	2.80
3.3										5x11	60	2.20
4.7										5x11	90	2.00
10				5x11	85	2.56	5x11	105	2.37	5x11	120	1.82
22				5x11	125	1.95	5x11	150	1.50	5x11	135	1.35
33	5x11	100	2.60	5x11	155	1.42	5x11	180	1.21	5x11	250	0.80
47	5x11	114	2.00	5x11	205	1.1	5x11	280	0.80	6.3x12	280	0.65
68	5x11	155	1.10	6.3x12	280	0.65	6.3x12	350	0.52	6.3x12	375	0.33
100	5x11	195	0.69	6.3x12	320	0.35	6.3x12	450	0.25	8x12	480	0.17
120	5x11	265	0.50	6.3x12	380	0.33	8x12	510	0.220	10x13	530	0.156
150	6.3x12	270	0.47	8x12	410	0.31	8x12	540	0.191	10x13	590	0.132
220	6.3x12	290	0.41	8x12	550	0.25	8x12	750	0.114	10x13	930	0.096
330	6.3x12	400	0.25	8x12	820	0.114	8x16	1050	0.079	10x17	1150	0.065
470	8x12	590	0.156	8x12	1200	0.076	10x17	1200	0.065	10x20	1590	0.055
680	8x16	750	0.124	10x17	1320	0.065	10x20	1570	0.056	13x21	1930	0.044
1000	8x16	1100	0.092	10x17	1450	0.055	10x20	1800	0.032	13x25	2300	0.036
	10x17	1350	0.065	10x20	1650	0.045	13x21	1900	0.042	16x25	2400	0.046
1500	10x20	1350	0.065	13x21	2210	0.038	13x25	2270	0.036	16x30	2750	0.034
2200	10x20	1630	0.056	13x21	2650	0.036	16x25	2850	0.034	16x30	3040	0.032
3300	13x21	2000	0.038	16x26	3240	0.026	16x30	3100	0.026	18x36	3100	0.025
4700	13x25	2790	0.033	16x25	3650	0.024	18x30	3500	0.024			
6800	16x25	2880	0.026	16x30	3850	0.024						

Ripple Current(mA,rms)at 105℃ 100KHZ

Max Impedance (Ω)at 25℃ 100KHZ

# CD288 (G) Series

尺寸表 Case Size

D x L(mm)

WV (SV) μ F	63			80			100			120		
	Size	Ripple	Impedance	Size	Ripple	Impedance	Size	Ripple	Impedance	Size	Ripple	Impedance
2.2	5x11	45	2.80	5x11	42	3.30	5x11	42	3.30	5x11	42	3.30
3.3	5x11	58	2.20	5x11	56	2.40	5x11	55	2.80	5x11	55	2.80
4.7	5x11	65	2.00	5x11	68	2.20	5x11	72	2.60	5x11	72	2.60
10	5x11	110	1.75	6.3x12	120	1.76	6.3x12	130	1.77	6.3x12	130	1.77
22	6.3x12	240	0.80	6.3x12	230	0.85	6.3x12	220	0.85	6.3x12	220	0.85
33	6.3x12	270	0.61	10x13	290	0.69	8x12	320	0.69	10x13	320	0.69
47	6.3x12	300	0.56	8x12	300	0.69	8x12	320	0.69	10x14	370	0.58
	8x12	300	0.56	10x17	320	0.58	10x13	340	0.58			
68	8x14	480	0.41	10x13	475	0.35	10x17	470	0.35	10x17	470	0.35
100	8x12	500	0.40	10x17	510	0.34	10x17	510	0.33	13x21	560	0.30
	8x16	520	0.20	10x20	580	0.30	10x20	560	0.30			
120	10x15	620	0.125	10x20	640	0.22	10x20	580	0.28	13x21	660	0.22
150	10x20	700	0.111	13x21	740	0.174	10x20	680	0.21	13x21	780	0.174
220	10x17	800	0.120	13x21	920	0.13	13x21	800	0.16	16x25	780	0.16
	10x20	920	0.110	13x25	1050	0.110	13x25	880	0.13	16x32	880	0.13
330	10x20	1250	0.105	13x21	1100	0.12	13x25	920	0.13	16x25	950	0.13
				13x25	1200	0.10	16x25	1440	0.10	16x32	1440	0.10
470	13x21	1300	0.100	16x22	1310	0.10	16x27	920	0.13	16x36	1650	0.09
	13x25	1620	0.093	16x25	1430	0.09	18x25	1650	0.09	18x25	1650	0.09
680	13x25	1950	0.090	18x30	1860	0.08	18x36	1790	0.080	18x41	1790	0.080
1000	16x25	2050	0.090	18x25	1550	0.09						
	16x32	2350	0.074	18x30	1620	0.08						
1500	18x30	2710	0.061									
2200	18x36	2850	0.060									
3300												

WV (SV) μ F	160			200			250			400		
	Size	Ripple	Impedance	Size	Ripple	Impedance	Size	Ripple	Impedance	Size	Ripple	Impedance
1							6.3x12	50	6.54	6.3x12	36	16.5
2.2	6.3x12	55	5.21	6.3x12	55	5.18	6.3x12	72	4.12	8x12	65	9.58
3.3	6.3x12	70	4.31	8x12	71	4.25	8x12	75	3.85	8x12	86	5.01
4.7	6.3x12	72	4.16	8x12	85	4.12	8x12	100	2.95	8x12	120	4.82
5.6	8x12	91	3.61	8x12	92	3.55	8x12	105	2.72	8x12	130	4.81
6.8	8x12	100	3.12	8x12	115	2.71	8x12	140	1.86	8x12	160	3.55
10	10x13	100	2.69	10x16	132	2.02	10x17	160	1.4	10x17	245	3.32
22	10x17	205	1.30	10x17	205	1.20	10x17	185	1.3	13x21	305	2.65
33	10x20	260	1.10	13x20	330	0.62	13x21	260	0.9	16x21	335	1.21
47	13x20	320	0.91	13x20	400	0.51	13x21	405	0.45	16x25	560	0.92
68	13x20	410	0.56	13x20	540	0.35	13x25	490	0.38	18x25	750	0.75
82	13x21	460	0.51	16x25	620	0.26	16x25	570	0.32	18x25	860	0.63
100	13x21	500	0.47	16x25	700	0.19	16x25	675	0.25	18x30	950	0.52
120	16x25	520	0.35	16x30	820	0.17	16x30	730	0.24	18x30	1150	0.34
150	16x25	660	0.26	16x30	840	0.16	18x30	750	0.23	18x35	1350	0.22
220	16x25	660	0.26	18x30	1080	0.14	18x30	910	0.20	型号众多, 未能尽录。		
330	18x32	910	0.18									

Ripple Current(mA,rms)at 105°C 100KHZ

Max Impedance(Ω)at 25°C 100KHZ



检验项目	检验标准	AQL		不良数	不良原因	判定
		Ac	Re			
外观检查	外观无异常、标志清晰、无可见损伤、尺寸符合《尺寸图》要求	0	1	0	/	OK
静电容量 (C)	3.76~5.64 $\mu$ F	0	1	0	/	OK
损失角正切值(DF)	$\leq 15\%$	0	1	0	/	OK
漏电流 (充电 2 分钟)	$\leq 37.6 \mu$ A	0	1	0	/	OK
外套绝缘电阻	$\geq 100 \text{ m}\Omega$	0	1	0	/	OK
可焊性	引出端有良好的镀层焊料	0	1	0	/	OK
引出端抗拉力、折弯强度	外观无异常、无可见损伤、电气特性稳定	0	1	0	/	OK
耐焊接热	外观无可见损伤，容值变化率 $\leq 5\%$	0	1	0	/	OK
压力释放	防爆阀打开、无爆炸、无燃烧	0	1	0	/	OK
振动	外观无可见损伤、无漏液，容值变化率 $\leq 5\%$	0	1	0	/	OK

检验员：黄烈群



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