

尊敬的 Messrs.

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## 承认申请书

Application For Approval

产品类型 Product Type	铝电解电容器 Aluminum Electrolytic Capacitors
产品系列 Product Series	BT
产品规格 Product Description	400V10UF 10x20
产品编码 Product P/N.	400BT100M1020
客户产品编码 Customer P/N.	

客户确认栏 Approved By User	( 客户确认后请回签一份副本给予宏强公司, 谢谢! ) ( Please kindly send us one copy after you approve our products, Thanks. )

东莞宏强电子有限公司

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# DECON

NO	Cust. P/N	DESCRIPTION	Temp.range (°C)	I = 0.02CV + 25µA (after 5 minutes)	D.F.(Max.) (120Hz, 20°C)	Ripple Current (mA rms) (105°C, 100kHz)	Endurance (hours) (105°C)
1		ECAP.400V10UF -20~+20% BT 10x20	-40~+105	105	0.20	310	10000
		400BT100M1020					

Approved by:蔡海涛

Check by:王亚

Designed by:汤淑兰

Date:2021-03-19

**DONGGUAN WIN SHINE ELECTRONIC CO., LTD.**

## PART NUMBER SYSTEM

For Example:      P      016      SH      102      M      1016      T50  
                          (1)      (2)      (3)      (4)      (5)      (6)      (7)

(1) P=PET Sleeve      Blank=PVC Sleeve (Sleeveness SMD type is Blank also.)

### (2) Rated Working Voltage

WV	4	6.3	10	16	25	35	50	63	80	100	160	200	250	315
Code	004	006	010	016	025	035	050	063	080	100	160	200	250	315

WV	350	400	450	500	550	600	630
Code	350	400	450	500	550	600	630

### (3) Series Name (Per DECON's Products Catalogue)

### (4) Capacitance ex)

uF	0.1	1	10	100	1000	10000	100000
Code	R10	1R0	100	101	102	103	104

### 5) Capacitance Tolerance

Tolerance (%)	-10 ~ +10	-20 ~ +20	-10 ~ +20
Code	K	M	V

### (6) Case Size (mm)

ΦD	3	4	5	6.3	8	10	12.5	16	18	22	25	30	35	40
Code	03	04	05	06	08	10	13	16	18	22	25	30	35	40

ΦD	51	64	76	90	100
Code	51	64	76	90	100

L	5~5.4	5.8~6.2	7	7.7	9	10.5~11	11.5	12.5	13.5~14	16	16.5
Code	05	06	07	08	09	11	12	13	14	16	17

L	20	25	31.5	35.5	40	45	50	~	100	236
Code	20	25	32	36	40	45	50	~	100	236

### (7) Package & Lead Style

Blank=Bulk & Standard Long Lead Style Package xx=Ammo Taping Package(See Taping Specifications)

BL=Bending to Left

BR=Bending to Right

Cxx=Cutting xx Length

BCLxxxx=xx Length Bending to Left & Cutting xx Length

F=Forming 5mm Ptich

BCRxxxx=xx Length Bending to Right & Cutting xx Length

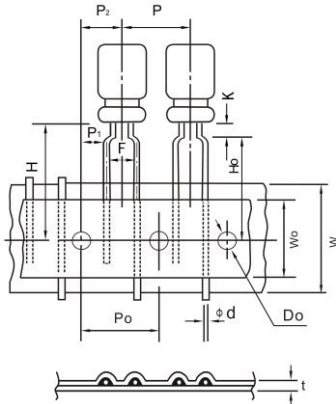
FCxx=Forming 5mm Ptich & Cutting xx Length

xx:

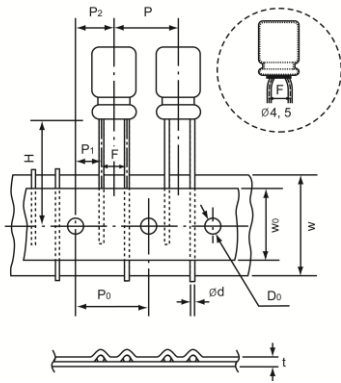
mm	3.0	3.5	4.0	4.5	~	10	15	~	20	25
Code	30	35	40	45	~	A0	A5	~	B0	B5

# TAPING AND LEAD FORMING & CUTTING SPECIFICATIONS FOR CAPACITORS

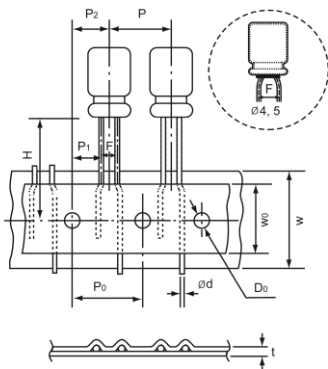
## (Formed lead type)



## (Straight lead type)

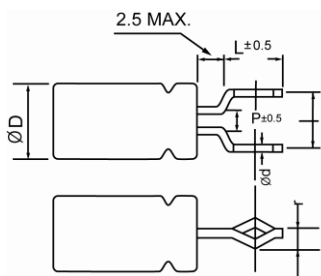


## (Straight lead type)

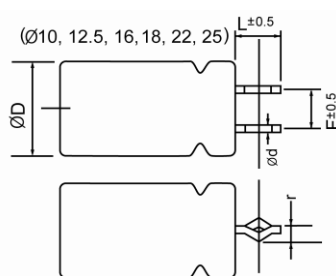


## (Lead Forming & Cutting)

Code: FC



Code: C



Item	Case Size Taping code	Tolerance	Formed Lead Type Case dia (Φ) × Length (L)			
			Φ3×5	Φ4×5 Φ5×5 Φ6.3×5 Φ4×7 Φ5×7 Φ6.3×7	Φ6.3×11 Φ5×11 Φ6.3×15	Φ8×5 Φ8×7 Φ8×9 Φ8×11.5 Φ8×16 Φ8×20
			T25	T50	T50	T50
Φd Lead-wire diameter		±0.05	0.40	0.45	0.5	0.5 (Φ8×5, Φ8×7, 0.45)
P Pitch of component		±1.0	12.7	12.7	12.7	12.7
P <sub>0</sub> Feed hole pitch		±0.2	12.7	12.7	12.7	12.7
P <sub>1</sub> Hole center to lead		±0.5	5.1	5.1	5.1	5.1
P <sub>2</sub> Feed hole center to component center		±1.0	6.35	6.35	6.35	6.35
F Lead-to-lead distance		+0.8 -0.2	2.5	5.0	5.0	5.0
K Clinch height		MAX		2.5	2.5	2.5
H Height of component from tape center		+0.75 -0.5	18.5	18.5	18.5	18.5
H <sub>0</sub> Lead-wire clinch height		±0.5	16.0	16.0	16.0	16.0
W Tape width		±0.5	18.0	18.0	18.0	18.0

Item	Case Size Taping code	Tolerance	Straight Lead Type Case dia (Φ) × Length (L)								
			Φ4	Φ5	Φ6.3	Φ8×5	Φ8×7	Φ8	Φ10	Φ12.5 Φ18	Φ16 Φ18
			T25	T25	T25	T35	T35	T35	T50	T50	T75
Φd lead-wire diameter		±0.05	0.45	0.45 0.5	0.45 0.5	0.45	0.45	0.5	0.6	0.6	0.8
P Pitch of component		±1.0	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.0	30.0
P <sub>0</sub> Feed hole pitch		±0.2	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.0	15.0
P <sub>1</sub> Hole center to lead		±0.5	5.1	5.1	5.1	5.1	4.6	4.6	3.85	5.0	3.75
P <sub>2</sub> Feed hole center to component center		±1.0	6.35	6.35	6.35	6.35	6.35	6.35	6.35	7.5	7.5
F Lead-to-lead distance		+0.8 -0.2	2.5	2.5	2.5	3.5	3.5	3.5	5.0	5.0	7.5
H Height of component from tape center		+0.75 -0.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
W Tape width		±0.5	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
W <sub>0</sub> Hold down tape width		M N	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Φ <sub>0</sub> Feed hole diameter		±0.2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
t Total tape thickness		±0.2	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

**1 Scope 范围**

This standard applies to aluminum electrolytic capacitors with non-solid electrolyte primarily intended for d.c. applications for use in electronic equipment.

本标准适用于非固体电解质铝电容器。该电容器主要用于电子设备中的直流电路。

**2 Normative references 有关文件**

IEC 60062; IEC 60063; IEC 60068; IEC 60384; IEC 60410; IEC QC 001001; IEC QC 001002; ISO 3 & JIS.

**3 Marking 标志**

The capacitor shall be clearly marked with rated capacitance, rated voltage, Max. operating temperature, polarity of the terminations, tolerance on rated capacitance, DECON trademark & type designation.

电容器上应清楚地标出额定容量，额定电压，最高工作温度，引出端的极性，标称电容量偏差，DECON 商标和型号名称。

**4 Operating temperature range 工作温度范围**

-40 ~ +105°C(160V~450V); -25 ~ +105°C(500V)

**5 Tests and measurement procedures 试验和测量程序**

**Pre-conditioning 预处理**

Before starting the test programmer, all capacitors shall be pre-conditioned by the application of the rated voltage from a direct voltage source having a low internal resistance, such as a regulated power supply. The voltage shall be applied to the capacitor through a resistor the value of which shall be approximately 100 Ω for rated voltages up to and including 100V, and approximately 1000 Ω for rated voltages above 100V. The voltage shall be maintained for 1 h after its value across the capacitor has become equal to the rated voltage with a tolerance of ± 3%. After this pre-conditioning, the capacitors shall be discharged through a resistor of approximately 1 Ω per applied volt.

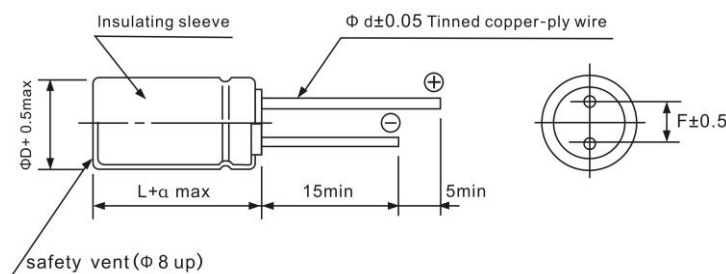
试验开始前，所有电容器加额定电压进行预处理，这个电压由一低内阻的直流电压源如稳压电源供给。对额定电压小于或等于 100V 的电容器，通过一个大约为 100Ω 的电阻器在电容器上加电压，对额定电压大于 100V 的电容器，通过一个大约为 1000Ω 的电阻器在电容器上加电压。以不超过±3% 的误差在电容器两端加额定电压，保持一小时。经预处理后，电容器应通过大约 1Ω/V 的电阻器放电。

**5.1 Standard atmospheric conditions for testing 试验用标准大气条件**

temperature 温度: 15°C to 35°C  
 relative humidity 相对湿度: 25% to 75%;  
 air pressure 气压: 86kPa to 106kPa.

**5.2 Visual examination and check of dimensions 外观检查和尺寸检查**

(Unit: mm)



φD	8	10	12.5	16	18	22
F	3.5	5.0	5.0	7.5	7.5	10.0
φd	0.5	0.6		0.8		
α	1.5	2.0			3.0	

**5.3 Electrical tests 电气试验**

### 5.3.1 Leakage current 漏电流

#### 5.3.1.1 Measuring conditions 测量条件

The rated voltage shall be applied across the capacitor and its protective resistor. Unless otherwise stated, the protective resistor shall be approximately 100Ω for rated voltages ≤100V and approximately 1000Ω for rated voltages >100V.

额定电压应施加在电容器及其保护电阻的两端。测量条件除非另有规定，对于额定电压小于或等于 100V 的电容器，保护电阻约为 100Ω；对于额定电压大于 100V 的电容器，约为 1000Ω。

#### 5.3.1.2 Requirements 要求

The leakage current shall not exceed the values given as below

漏电流应不超过下表给出的数值(Unit: uA)

Leakage current max.	$I = 0.02CV + 25\mu A$ (After 5 minutes)
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C: Capacitance (uF)

### 5.3.2 Capacitance 电容量

#### 5.3.2.1 Measuring conditions 测量条件

Measuring voltage: max. 0.5 V r.m.s or such lower voltage as is required in order not to exceed the rated ripple current.

测量电压：最大 0.5V 交流有效值或不超过额定纹波电流要求的较低电压。

The frequency of the measuring voltage shall be 120 Hz.

测量电压频率应为 120 Hz.

#### 5.3.2.2 Requirement 要求

The capacitance shall be within the rated tolerance. (+-20%)

电容量应在额定偏差之内。(±20%)

### 5.3.3 Tangent of loss angle 损耗角正切(tanδ)

#### 5.3.3.1 Measuring conditions 测量条件

Measuring voltage: max. 0.5 V r.m.s or such lower voltage as is required in order not to exceed the rated ripple current.

测量电压：最大 0.5V 交流有效值或不超过额定纹波电流要求的较低电压。

The frequency of the measuring voltage shall be 120 Hz.

测量电压频率应为 120 Hz.

#### 5.3.3.2 Requirement 要求

The limits for tangent of loss angle shall be specified as below

损耗角正切值应不超过下表给出的数值

Rated voltage (V)	160	200	250	350	400	420	450	500
tanδ	0.15	0.15	0.15	0.20	0.20	0.20	0.20	0.24

### 5.3.4 Temperature Characteristics 温度特性

5.3.4.1 The capacitor shall be subjected in turn to the procedures specified below. 电容器根据下表的次序处理

Step 阶段	Temperature 温度	Time 时间
1	20±2°C	thermal stability

		热平衡状态
2	lower category temperature 下限类别温度	*2hours
3	20±2°C	thermal stability 热平衡状态
4	upper category temperature 上限类别温度	*2hours

The capacitor should be stored at each temperature until measured impedance or capacitance are stabilized. 电容器放置在每一温度下，待阻抗或电容量稳定后方可测试。

Step2 阶段 2	Impedance ratio 阻抗比 (对阶段 1)	Refer to 5.3.4.4 见 5.3.4.4 项
Step4 阶段 4	Change in capacitance 静电容量变化率 (对阶段 1)	Within -20~+20% of step 1 -20~+20%

Step 1: Capacitance and impedance shall be measured.  
阶段 1：测定容量和阻抗值。

Step2: After the capacitor being stored for 2 hours, impedance shall be Measured, The measurement shall be made at thermal stability.  
阶段 2：放置 2 个小时后，达到热平衡状态再测阻抗。

Step4: After the capacitor being stored for 2 hours, Capacitance shall be Measured, The measurement shall be made at thermal stability.  
阶段 4：放置 2 个小时后，达到热平衡状态再测容量。

#### 5.3.4.2 Measuring conditions 测量条件

The voltage used for the measurement shall be as small as practicable and shall be applied for a time short enough to avoid undue heating of the capacitor. To demonstrate that the voltage is sufficiently small, it shall be applied to one of the capacitors in each sample for 1 min during which time there shall be no readable change in the impedance of the capacitor. The error of measurement shall not exceed 5% of the requirement of 0.02Ω, whichever is the greater.

测量用电压应尽可能低，同时加电压的时间尽可能的短，以避免电容器过热。为了证明电压足够低，可把电压加在每个电容器样品上一分钟，在加电压时间内电容器阻抗不应有明显变化。测量误差应不超过要求值的 5% 或 0.02Ω (取二者较大的数值)。

#### 5.3.4.3 Measurement at lower category temperature 下限类别温度下的测量

The frequency shall be 120 Hz unless otherwise specified.  
除非另有规定，频率应为 120 Hz。

#### 5.3.4.4 Requirements 要求

The impedance ratio shall meet the requirements as below  
阻抗比应符合下表的要求

Rated voltage (V)	160	200	250	350	400	420	450	500
Z <sub>-25°C</sub> /Z <sub>+20°C</sub>	3	3	3	4	6	6	6	6
Z <sub>-40°C</sub> /Z <sub>+20°C</sub>	4	4	4	6	6	6	6	-

### 5.4 Robustness of terminations 引出端强度

#### 5.4.1 Tensile 拉力

Nominal cross-sectional area (S)	Corresponding diameter (d) for	Force with tolerance of ± 10%
----------------------------------	--------------------------------	-------------------------------

(mm <sup>2</sup> )	Circular-section wires (mm)	(N)
0.07 ~ 0.2	0.35 ~ 0.5	5
0.2 ~ 0.5	0.5 ~ 0.8	10
0.5 ~ 1.2	0.8 ~ 1.25	20

#### 5.4.2 Bending(half of the sample)弯曲(引出端的一半)

Two consecutive bends shall be applied in each direction.

应在每个方向上连续进行两次弯曲。

#### 5.4.3 Torsion(remaining sample)扭转(引出端的另一半)

Two successive rotations of 180 degree.

两次连续扭转 180 度。

#### 5.4.4 Visual examination 外观检查

After each of these tests, the capacitors shall be visually examined. There shall be no visible damage.

这些试验的每一试验后，电容器应进行外观检查，并应无可见损伤。

### 5.5 Resistance to soldering heat 耐焊接热

#### 5.5.1---temperature of the solder bath: 260°C±5°C

焊槽温度

---depth of immersion from the seating plane 2.0 mm,using a thermal insulating screen of 1.5mm±0.5mm thickness

浸入深度为离安装面 2.0 mm，采用厚度为 1.5mm±0.5mm 的绝热屏蔽板

---Immersion time: 10 s

持续时间

#### 5.5.2 The period of recovery shall, unless otherwise specified, be not less than 1 h or more than 2 h.

除非另有规定，恢复时间应为 1 h ~ 2 h。

#### 5.5.3

---When the test has been carried out the capacitors shall be visually examined

当试验后，电容器应进行外观检查

---There shall be no visible damage and the marking shall be legible

无可见损伤，标志清晰

### 5.6 Solder ability 可焊性

Unless otherwise stated, the test shall be carried out with non-activated flux.

除非另有说明，试验用非活性焊料进行。

#### 5.6.1 Test conditions 试验条件

Bath temperature: 235°C±5°C

焊槽温度

Immersion time: 2.0 s ±0.5 s

浸入时间

Depth of immersion (from the seating plane or component body): from the seating plane 2.0 mm, using a thermal insulating screen of 1.5mm±0.5mm thickness

浸入深度(离安装面或电容器本体)

离安装面 2.0 mm，采用厚度为 1.5mm±0.5mm 的绝热屏蔽板

#### 5.6.2 The terminations shall be examined for good tinning as evidenced by free flowing of the solder with wetting of the terminations.

应检查引出端，以引出端的焊料自由流动来说明包锡良好。



## 5.7 Rapid change of temperature 温度快速变化

### 5.7.1 Initial measurement 初始测量

The capacitance shall be measured according to 5.3.2  
电容量应按 5.3.2 条进行测量

### 5.7.2 Conditioning

The capacitors shall be subjected to test Na for 5 cycles. The duration  $t_1$  of the exposure at each temperature limit shall be 30 min or 3 h as specified. The recovery period shall be 16 h.  
电容器应经受试验 Na 的五次循环。在每个极限温度下放置时间为 30min 或 3h。恢复周期应为 16h。

### 5.7.3 Final inspection, measurements and requirements 最后检查和测量和要求

After recovery, the capacitors shall be visually examined and measured and shall meet the requirements.  
电容器恢复之后应进行外观检查和测量并应符合有关要求。

## 5.8 Vibration 振动

Frequency: 10~55 Hz

频率

Amplitude or acceleration (whichever is the lower acceleration): 0.75mm or 98 m/s (10g)

振幅或加速度

Duration (h): 3 x 2

持续时间

### Final inspection, measurements and requirements 最后检查和测量和要求

The capacitors shall be visually examined and measured and shall meet the requirements.  
电容器应进行外观检查和测量并应符合有关要求。

## 5.9 Bump 碰撞

Total number of bumps: 1000

碰撞总次数

Acceleration: 390 m/s (or 40g)

加速度

Duration of pulse: 6 ms

脉冲宽度

### Final inspection, measurements and requirements 最后检查和测量和要求

The capacitors shall be visually examined and measured and shall meet the requirements.  
电容器应进行外观检查和测量并应符合有关要求。

## 5.10 Endurance 耐久性

### 5.10.1 Initial measurement 初始测量

The capacitance shall be measured according to 5.3.2  
电容量应按 5.3.2 条进行测量

### 5.10.2

Duration: 10000 h

持续时间

Ambient temperature: upper category temperature

环境温度 上限类别温度

Applied voltage: category voltage (unless otherwise specified)

施加电压 除非有规定外, 为类别电压

### Final inspection, measurements and requirements 最后检查和测量和要求

After recovery, for a minimum of 16 h, the capacitors shall be visually examined and measured and shall meet the requirements given in table I.

恢复至少 16 h 之后, 电容器应进行外观检查和测量并应符合表 I 给出的要求。

Table I

Item 项目	Performance 性能
Appearance 外观	Prominent anomalies not allowed 无明显异常
Capacitance Change 电容量变化	Within $\pm 20\%$ of initial value 在初始值的 $\pm 20\%$ 以内
Leakage Current 漏电流	Below initial standard value 低于初始标准值
$\tan\delta$ 损耗角正切	Below 200% of initial standard value 低于初始标准值的 2 倍

## 5.11 Surge 浪涌

### 5.11.1 Initial measurement 初始测量

The capacitance shall be measured according to 5.3.2  
电容量应按 5.3.2 条进行测量

### 5.11.2 Test procedure 实验步骤

The capacitors shall be submitted to 1000 cycles, each consisting of charge as described below, followed by a no-load period of 5 min 30 s with the capacitor disconnected and allowed to discharge internally. The test temperature shall be room temperature.

电容器应经 1000 次循环, 每次循环由下述的充电,接着为 5 min 30 s 无载周期组成. 试验温度为室温.

#### Charge 充电

Applied voltage: 1.15 times the rated voltage for rated voltages  $\leq 315V$

施加电压 对于额定电压小于或等于 315V 者为 1.15 倍的额定电压

1.10 times the rated voltage for rated voltage  $>315V$

对于额定电压大于 315V 者为 1.10 倍的额定电压

Internal resistance of the voltage sources: as required for  $RC=0.1s\pm 0.05s$

电源内阻: 按  $RC=0.1s\pm 0.05s$  要求

### 5.11.3 Final inspection, measurements and requirements 最后检查和测量和要求

After recovery, the capacitors shall be visually examined and measured and shall meet the requirements given in table II.

恢复之后, 电容器应进行外观检查和测量并应符合表 II 给出的要求.

Table II

Item 项目	Performance 性能
Appearance 外观	Prominent anomalies not allowed 无明显异常
Capacitance Change 电容量变化	Within $\pm 15\%$ of initial value 在初始值的 $\pm 15\%$ 以内
Leakage Current 漏电流	Below initial standard value 低于初始标准值
$\tan\delta$ 损耗角正切	Below initial standard value 低于初始标准值

## 5.12 Storage at high temperature 高温贮存

### 5.12.1 Initial measurement 初始测量

The capacitance shall be measured according to 5.3.2  
电容量应按 5.3.2 条进行测量

### 5.12.2

Temperature: Upper category temperature

温度 上限类别温度

Duration: 1000 h ± 4 h

持续时间

### 5.12.3 Final inspection, measurements and requirements 最后检查和测量和要求

After recovery, for a minimum of 16 h, the capacitors shall be visually examined and measured and shall meet the requirements given in table I.

恢复至少 16 h 之后, 电容器应进行外观检查和测量并应符合表 I 给出的要求.

### 5.13 Storage at low temperature 低温贮存

#### 5.13.1 Initial measurement 初始测量

The capacitance shall be measured according to 5.3.2

电容量应按 5.3.2 条进行测量

#### 5.13.2 Final inspection, measurements and requirements 最后检查和测量和要求

After recovery, for a minimum of 16 h, the capacitors shall be visually examined and measured and shall meet the requirements given in table III.

恢复至少 16 h 之后, 电容器应进行外观检查和测量并应符合表 III 给出的要求.

Table III

Item 项目	Performance 性能
Appearance 外观	Prominent anomalies not allowed 无明显异常
Capacitance Change 电容量变化	Within ±10% of initial value 在初始值的±10%以内
Leakage Current 漏电流	Below initial standard value 低于初始标准值
tanδ 损耗角正切	Below initial standard value 低于初始标准值

### 5.14 Pressure relief 压力减弱试验

Unless otherwise specified, one of the following tests shall be used to test the pressure relief device of the capacitors.

除非另有规定, 应用下述规定之一来试验电容器的减压装置.

#### 5.14.1 AC test 交流试验

Applied voltage: alternating voltage with r.m.s. value not exceeding 0.7 times the rated direct voltage.

施加电压 交流电压的有效值不超过额定直流电压的 0.7 倍

Frequency of the applied voltage: 60 Hz

施加电压的频率

Series resistor: R=0.5 times the impedance of the capacitor at the test frequency

串联电阻为在试验频率下电容器阻抗的 0.5 倍

#### 5.14.2 DC test 直流试验

Applied voltage: direct voltage applied in the reverse direction, of an amplitude necessary to produce a current of 1 A to 10 A.

施加电压: 在相反方向上施加的直流电压, 其值必需产生 1 A ~ 10 A 的电流.

#### 5.14.3 Pneumatic test 充气试验

Applied pneumatic pressure: gas pressure introduced from outside shall be increased at a rate of 20 kPa/s continuously.

施加气体的压力: 从外面充进的的气体的压力应以 20 kPa/s 的速率连续增加.

### 5.15 Standard case size & Max. ripple current (See attached)

## 电容器本体标准尺寸和最大承受纹波电流

### Frequency coefficient of permissible ripple current

纹波电流频率校正系数

Miniature aluminum electrolytic capacitors

Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz≤
Coefficient	0.35	0.50	0.80	0.90	0.95	1.00

### 6 Others 其他

To use DECON product correctly and safety, please read and obey "Warning & Cautions" and "Application Guidelines for Aluminum Electrolytic Capacitors" very carefully in DECON product catalog.

为了正确安全地使用 DECON 产品,请仔细阅读和遵循 DECON 产品目录中“警示及注意”和“铝电解电容器使用指引”提及的内容。

### Warning & Cautions

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