产品使用中的请求和注意事项

1. 使用时请务必索要本公司的产品规格书，确认使用条件,超出规定数据或有不明之处，敬请垂询。

2. 由于薄膜电容使用的是可燃性材料，可能有冒烟起火等极端情况发生,因此建议根据需要将电容器周边的树脂用阻燃材料及使用阻燃外壳。

3. 电路中如有其他零部件发生短路、开路等不良现象时，请提供必要的保护措施防止施加在薄膜电容上有超过额定电压、额定电流和额定温度的现象。

4. 使用之前，如果薄膜电容发生故障，对其他部品有无影响，以及对装置有无损害，请给予充分确认。薄膜电容的失效，直接或者间接地对机器会产生不安全状态，如下记ａ～ｃ３种状态。必要的场合,请作为安全对策，给予自我保护的电路设计。

a 对汽车的基本运行机能(行走，拐弯，停止)有影响
b 误动作
c 发烟，发火

5. 应用于直接影响生命的生命维持装置，特别是生命维持装置、航空控制装置、汽车驱动控制装置以及电机控制装置（燃料喷射，点火等）中使用时，本电子部品使用的适合性，请客户在进行了充分测试的基础上予以判定。

★备考

本产品目录中提供的信息截至2013年2月。

■订货注意事项

订货时请指定以下事项。

(1) 使用电压：DC,AC
(2) 静电容量
(3) 静电容量许容差
(4) 使用设备种类:电视机,音响,开关电源,荧光灯等
(5) 使用电路及用途：防止电源杂音，共振用等
(6) 使用条件：脉冲、频率、波形、电流等
(7) 使用温度
(8) 尺寸：本体尺寸(L*H*T)，引线间距等
(9) 形状:外形（封装，盒式等),引线（直脚,引线成型，带状包装等）

CAUTION AND WARNING

1.Please consult us in case that demand the specification of our company without fail and do the confirmation of the use condition and that exceeds the entry value and be indistinct when you use it.

2.The film capacitors contain a film based dielectric which may be flammable under certain operating conditions. While in use, they can either emit smoke and/or ignite, when the product is defective. It is recommended covering the surrounding resin with flame-resistant materials or case as needed particularly.

3.In the event of troubles of other parts on the circuit such as shortening and opening, provide with proper means for preventing excessive voltage, current or temperature exceeding the rating from being applied to the film capacitor.

4.Prior to use, please make sure that failure of the film capacitors does not have any negative effects on other surrounding electronic circuit components and devices that would possibly cause damage. Proper safety measures should be taken using fail-safe protective circuit designs to help prevent other devices of becoming unsafe.

a. State in which basic performance of automobiles (run, turn and stop).
b. False operations.
c. Smoke emission/ignitions.

5.It is strongly recommended that further investigation or analysis is performed to verify the compatibility of the film capacitors when used in conjunction with any life-supporting equipment like electronic aviation controllers,automotive driving controllers and engine controllers (i.e.:fuel injection, ignition,etc.).

★Note

The informations in this catalog is finished in February 2013.

■When placing an order or making an inquiry

please specify the following items.

(1) Working voltage : DC, AC
(2) Capacitance value
(3) Capacitance tolerance
(4) Applied Equipment: color TV, stereo, switching power supply, lighting fixture, etc.
(5) Application or circuit diagram: noise suppression,resonance, etc.
(6) Operating condition:pulse, frequency,waveform, current,etc
(7) Operating temperature
(8) Dimensions : size (L*H*T), lead pitch, etc.
(9) Shape: enclosure(dip,case,etc.),lead wire (straight, crimped, taping ,etc.)

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

（10）安全性：

a）使用的电容发生短路或开路时，对其他零部件及设备电路动作产生的影响（引起燃烧等）

b）其他零部件或电路发生异常动作时，对使用的电容产生的影响（引起燃烧等）

（11）其他

※本产品介绍中记录的产品规格，材质及其他内容，可能在无预先通知的情况下发生变更，敬请理解。

(10) Safety :

a) There is an affect(arising ignite etc.) on other components and circuit operation of device when the capacitor becomes short-circuited or open.

b) There is an affect(arising ignite etc.) on the capacitor, when the other component or the circuit works irregularly.

(11)Others

※Product specifications, materials and other points mentioned in the catalog are subject to change without notification.

■使用安全注意事项

1.使用电压!（注意）

根据对薄膜电容施加不同的电压波形，电流波形，频率，外围温度（电容表面温度），电容量值等，其可用的最大电压值也不同。使用时，在确认过电容两端所加电压波形，电流波形，频率之后，务必在规定值以内使用。（高频条件下，不同电容类型其容许电压值随之不同，详细参数请索要产品规格书或与我公司联络加以确认）

1.1额定电压

额定电压是指在额定分类温度范围内可连续施加的最大电压。超出额定值使用会引发薄膜层的绝缘损坏导致短路。此外，电容类型不同，其最大额定条件下的产品寿命也随之不同。

金属化薄膜电容有自我复原作用，在施加超出额定电压以上电压时，虽不会立刻造成短路，但会导致绝缘电阻下降，可能因电路条件不同引发冒烟或起火

电子设备中使用电容的额定电压除特殊情况外通常DC表示。

在AC电路中使用DC额定电压（电源降噪电容除外）时，发热或放电等因素将限制最大使用电压。电容类型不同，其AC换算最大使用电压也不同，详情请咨询我们。

1.2高温时降低额定电压、允许电流、脉冲电流

金属化薄膜电容可使用的上限温度（电容表面温度）取决于电介质的种类。超过额定上限温度使用时，有需要降低电压、允许电流、脉冲电流的电容类型（品种）和超过额定上限温度将无法使用的电容类型（品种），请务必确认其区分。超出额定上限温度时虽可使用但务必降低电压、允许电流、脉冲电流，确认电容表面温度不超出下一页规定的使用上限温度。另外，在高频下使用时，电容会自行升温，不适用下一页的电压、允许电流、脉冲电流降低率。

■Cautions about Safety in Use

1. Operating voltage!（Caution）

For the film capacitor varies in the maximum applicable voltage depending on the applied voltage waveform, current waveform, frequency, ambient temperature (capacitor surface temperature), capacitance value, etc. Use it within the specified values by checking the voltage waveform, current waveform, and frequency applied to the terminals of the capacitor. (In the case of high frequency, the permissible voltage varies with the type of the capacitor. Please see the relevant specifications for the details or consult us)

1.1 Rated voltage

The rated voltage refers to the maximum voltage that can be applied continuously within the rated operating temperature range. If used beyond the rating, it may induce insulation breakdown of the film and cause short circuit. The product lifetime on the maximum rated condition depends on the kind of the capacitor.

For a metalized capacitor, which has a self-healing action, short circuit or other failure may not occur immediately after applying over the rated voltage, but the insulation resistance is lowered, and it may lead to smoke or fire depending on the circuit conditions.

The rated voltage of the capacitor for electronic appliance is usually indicated in the DC voltage except for special purposes.

If a capacitor of DC rating is used in an AC circuit(except for interference suppression and for electric appliances), the maximum operating voltage is limited by heat generation or electric discharge . The maximum operating voltage converted to AC varies with each type. Please consult us for details.

1.2 Derating of rated voltage, allowable current, pulse current while operating in high temperature.

For film capacitors,the usable upper limit temperature (the capacitor surface temperature)is due to the kind of dielectric materials.When used beyond the rated upper limit temperature, it is necessary to derate the voltage, allowable current, pulse current in certain types (models). For the other types (models) can not be used beyond the rated upper limit temperature. Be sure to confirm the type of capacitors before using, and when using beyond the rated upper limit temperature, be sure to reduce the voltage ,allowable current, pulse current and make sure the capacitor surface temperature is within the usable upper limit temperature as below. But when using at a high frequency, since the capacitor itself has its own temperature rise, the following derating ratio cannot be applied.

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

※由于聚酯（PET）电容的电介质损耗因数（tanδ）较高，因此聚酯（PET）电容在高频下使用时，自行升温扩大。使用时，请将电容自行升温控制在10℃以下，且电容表面温度在额定上限温度以内使用。

※ Because the dissipation factor(tanδ) of polyester(PET) capacitor is relatively high, when used at high frequency,the self-rise temperature is expanded. Please use it within 10℃ or less,and the capacitor surface temperature is not exceeding the rated upper limit temperature.

DC使用时，不同类型电容的额定上限温度，使用上限温度时的电压、电流下降率（范例）

Rated upper limit temperature, usable upper limit temperature , and derating ratio of usable upper limit temperature by types in DC use(example)

电介质 Dielectric	类型 Type	额定上限温度 Rated upper limit temperature	使用上限温度 Usable upper limit temperature	使用上限电压 Usable upper limit voltage	使用上限电流 Usable upper limit current
聚酯膜Polyester	KCQE/KCQB	85℃	105℃	Rated Volt.×75%	Allowable current×75%
聚丙烯膜 Polypropylene	KCWF/KCWH	85℃	105℃	Rated Volt.×100%	Allowable current×60%
	KCQP	70℃	85℃	Rated Volt.×70%	Allowable current×70%

备注：

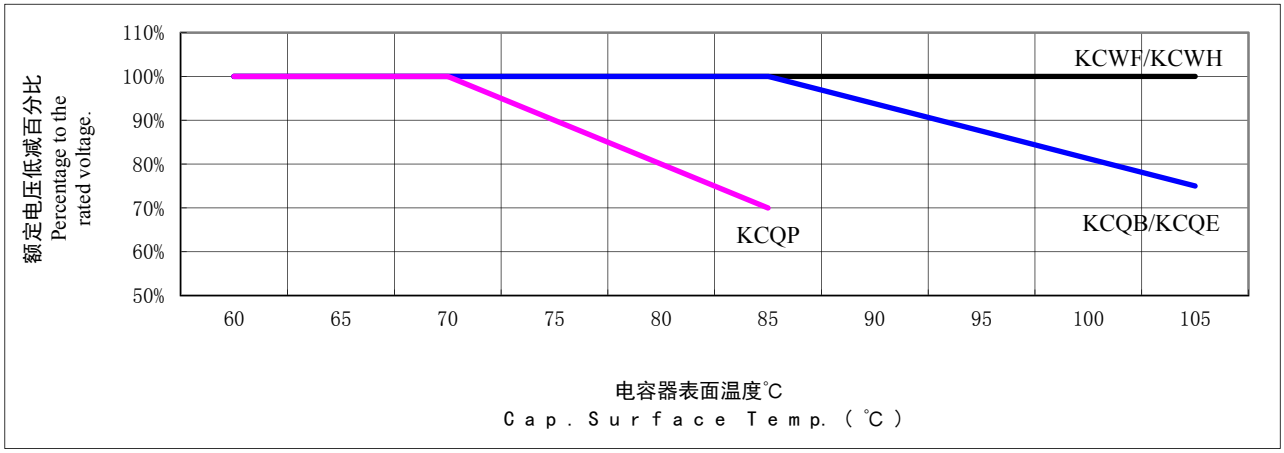
1. 额定上限温度：在DC额定电压下可连续使用的上限温度（含自行升温值）
2. 使用上限温度：降低DC额定电压可连续使用的上限温度（含自行升温值）
3. 使用上限电压：在使用上限温度下可连续使用的上限电压

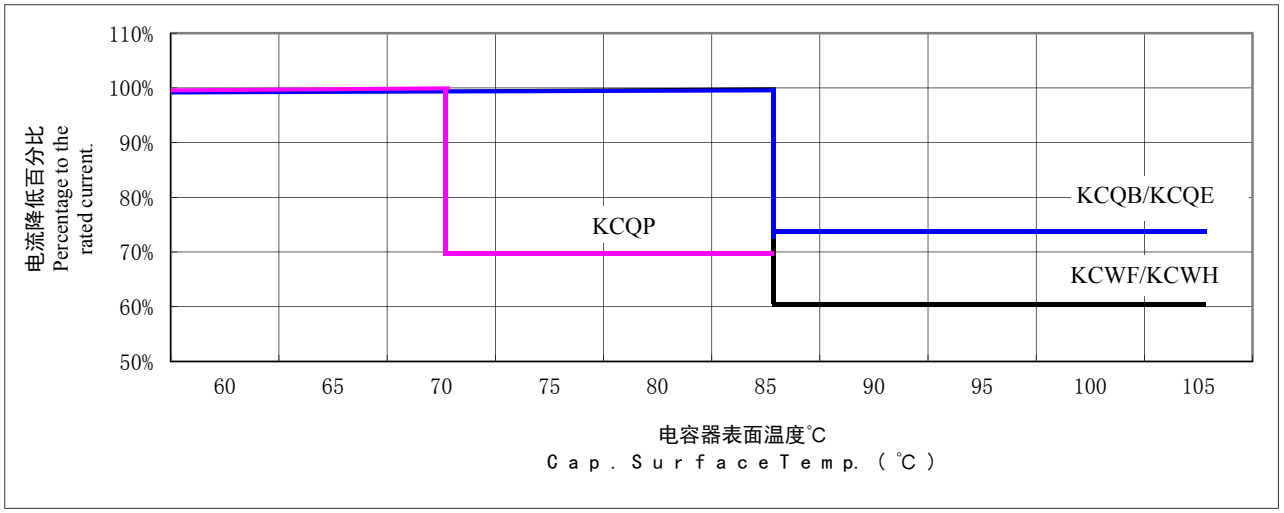
Remark:

1.Rated upper limit temperature ： The highest environmental temperature in which capacitor applied continuously with the rated voltage.

2.Usable upper limit temperature: The highest environmental temperature determined by capacitors design and in which capacitor may continuously work.

3. Usable upper limit voltage: The maximum D.C voltage or peak value of pulse voltage that can be applied continuously to capacitor at usable upper limit temperature.





本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

1.3高频时降低额定电压

高频率下使用的场合，由于电容器自身的发热有可能引起热突发（冒烟、冒火）的危险性。请按下面的例子降低使用电压，推荐使用KCWF,KCWH型号

＜降低额定电压的例子＞

使用电容器:KCWH1600V/0.047μF 使用频率:40KHz
容许电流值（纳入仕样书记载值):40KH 2.9Arms

$$V=\frac{I}{2\pi fC}=\frac{2.9}{2\times 3.14\times 40X10^{3}\times 0.047X10^{-6}}=245Vrms$$

使用上限电压：上面计算的结果 40KHz 时245Vrms。KCWH1600V的产品在市电（60Hz正弦波)使用电压为425Vrms,但在40KHz时使用的电压只允许245Vrms，降低比率58%（同时要考虑保证电容器自身的温度上升值在规定的范围内的轻减）。

1.3 Derating of rated voltage when using at high frequency

When using at high frequency, there is a risk of thermal runaway (smoke, fire) due to self heat generation in the capacitor. Derate the operating voltage according to the example below. If use at high frequency, we recommend KCWF,KCWH types.

＜Derating example of operating voltage＞

Capacitor: KCWH 1600V/0.047μF
Operating frequency : 40kHz (sine wave)
Permissible current (from specification) : 40kHz, 2.9Arms

Maximum operating voltage : 40kHz, 245Vrms Therefore, the operating voltage at sine wave 40 kHz is lower than 425V rms (derating ratio 58%), as compared with AC permitted voltage at commercial frequency. (It is necessary to consider the derating that the self heating temperature rise of the capacitor is below the specified value.)

2. 容许电流!（注意）

因薄膜电容的内部阻抗较低，可能会在某些电路中，流过非常大的电流。尤其在开关电源时，可能会有强脉冲电流流过，请务必确认。此外，在变频电路、开关电路等高频电路中使用时，也可能有大电流流过，请务必注意。

当超过允许值的电流流过电容时可能导致电容容量降低或开路，电流引起的电容自身发热可能会导致耐压退化引起短路甚至冒烟，起火。

使用时，请务必确认是否在规定的容许电流值范围内，是否是各自产品规格书中所记录的容许电流值，以及是否在自行升温值的规定范围内。

2.Permitted current !（Caution)

The internal impedance of film capacitors is low, and hence a very large current may flow depending on the special circuit. In particular, when turning power switch on and off, a very high pulse current may flow.

When a current exceeding the permissible range flows into capacitor, this can cause the capacitance value to deteriorate or an open circuit status. Temperature rise occurs due to self heat generation, this can deteriorate the withstand voltage and result in short circuit, possibly leading to smoke or fire.

In the application, make sure the current is within permissible current or self heating temperature is within permissible self heating temperature rise limit shown on each specifications.

2.1容许电流

电流容值根据破坏模式的不同，有必要考虑区分脉冲电流（电流峰值）和连续电流（有效值电流),使用时请确认两者的电流是否在容许值以内。

2.1 Permissible current

The permissible current must be considered with pulse current (peak current) and continuous current(rms current) regarding with the breakdown mode, and when using, please make sure the both currents are within the permissible values.

!注意

(1) 请在电容两端所加脉冲电压之峰值（Vo-p）低于DC额定电压时使用。
(2) 高频下使用时，电容自身发热引起的耐压退化可能导致毁坏，请对电容自行升温值进行测量，确认使其在规定值以内。
(3) 针对由其他零部件故障等引起的异常动作导致对电容外加超过额定电压值（容许电压）的电压时，请采取相应安全防护措施。

!Notice

(1)Please make sure that the peak value (Vo-p) of the pulse voltage applied between the terminals of the capacitor within the DC rated voltage.
(2)When using at high frequency, it may lead to breakdown due to withstand voltage deterioration by self heat generation. Therefore, measure the self heating temperature rise value of the capacitor, and make sure it is within the specified.
(3)Protection for safety should be required in the case of the voltage over the rated voltage (permitted voltage) applied to the capacitor due to abnormal action such as trouble elsewhere in the circuit.

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

2. 2针对使用频率的容许电流值

由于薄膜电容使用的电介质材料不同，介质损耗因数（tanδ）的频率特性也不同，故不同类型的电容其针对使用频率的容许有效值电流也随之不同

尤其在高频下使用时，因介质损耗因数（tanδ）扩大，故超出电流容值使用的话可能会发生热失控导致冒烟或起火，请务必注意。

下面的图表记载了聚酯膜代表类型KCQE和聚丙烯膜代表类型KCWF的频率别许容电流值(实效值)的例子，详细内容可提供动作条件并咨询本公司，或确认在不良动作状态下电容自行升温值以及电容表面温度是否在容许范围内。

2.2 Permissible current to operating frequency

The film capacitor varies in the frequency characteristic of the dissipation factor (tanδ) depending on the type of based film, and hence the permissible rms current at operating frequency is different depending on the capacitor type.

In particular,when using at high frequency, the dissipation factor (tanδ) increases, and when using over the permissible current, it may occur the thermal runaway, possibly leading to smoke or fire.

Shown as below are typical examples of permissible current by frequency (rms value) of the KCQE type using polyester film and KCWF type using polypropylene film. For details, please inquire us by presenting the operating conditions, or make sure the temperature rise and the surface temperature are within the permissible range in the worst operating conditions.

2. 3静电容量大小和容许电流值

容许电流值（有效值）随静电容量不同而不同，实际使用之际，在测量电压•电流频率及周围温度自行升温值后，请再咨询本公司技术人员详细内容。

2.3 The capacitance and the permissible currents

The permissible rms current varies with the capacitance value. In actual use, inquire us for details by measuring the voltage and current waveforms, ambient temperature, and own temperature rise.

<针对使用频率的容许电流值(例)>

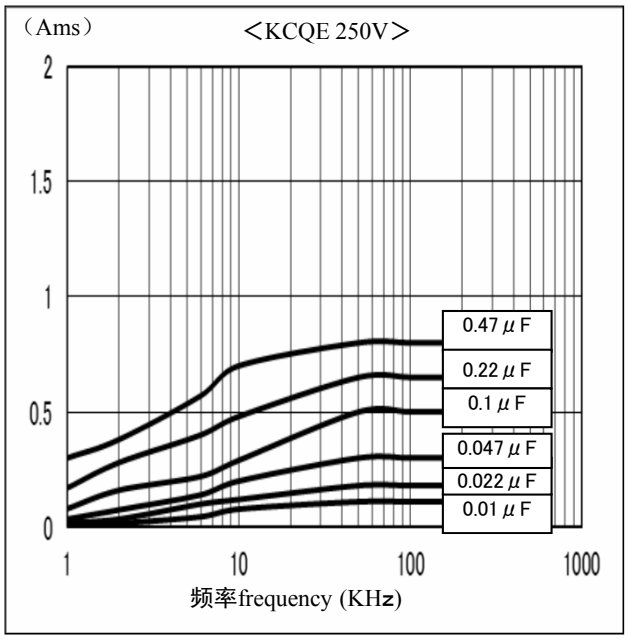
品种:KCQE(聚酯膜)
额定电压: 250 VDC ⇒ 150 Vrms 60Hz(正弦波)
温度范围: - 40 ℃ to 85 ℃ (Cap. surface)

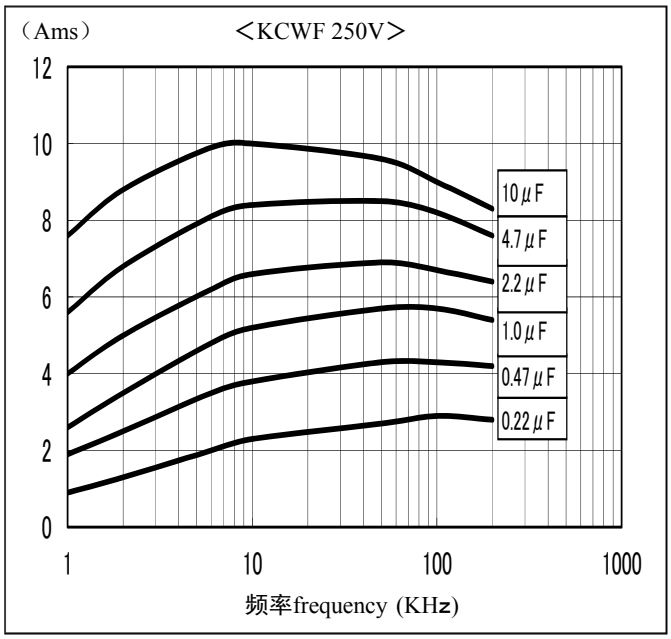
品种:KCWF(聚丙烯膜)
额定电压:250 VDC ⇒ 125 Vrms 60Hz（正弦波）
温度范围: - 25 ℃ to 85 ℃ (Cap. surface)

<Permissible current at operating frequency （example）>

Type : KCQE (PET)
Rated Voltage: 250 VDC ⇒ 150 Vrms 60Hz(at sine wave)
Operating temp.: - 40 ℃ to 85 ℃ (Cap. surface)

Type : KCWF (PP)
Rated Voltage: 250 VDC ⇒ 125 Vrms 60Hz（at sine wave）
Operating temp.: - 25 ℃ to 85 ℃ (Cap. surface)





备注：

所示的图表资料仅供参考。根据额定电压，使用温度不同容许电流也不同，使用时先确认电流波形、电容器温度上升情况，再咨询我司销售部门或技术部门。

Note:

The graphs illustrated are for reference only. Waveform of current and temperature rise of capacitor are key factors to determine permissible current. For actual application, please consult our sales department or technichal department.

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

2.4针对脉冲电流的容许电流值

用在开关电路，缓冲电路上时，瞬间大电流脉冲可能引起局部发热，导致蒸镀薄膜飞散，致使容量下降、开路。此外，局部发热还可能诱发冒烟或起火。脉冲电流值（10000次）可根据产品规格书中的dv/dt(V/us)值与容量值(uF)的乘积计算得出。

薄膜电容的dv/dt值由元件结构决定，尤其是金属化薄膜型电容采用金属喷涂法将内部蒸镀电极和外部输出电极连接，其dv/dt 的上限值较低，须引起注意。

下面记录的是针对代表性类型的额定电压•电容量值的dv/dt 值。用在大电流脉冲电路上时，请确认容许脉冲电流值（Ao-p）。

此外，要外加10000次以上的脉冲次数时，请另行垂询。

2.4 Permissible current of pulse current

When used in switching circuits or snubber circuits a momentary high pulse current may cause local heat generation. This causing the capacitance value to deteriorate or an open circuit. Local heat generation may also induce smoke or fire.The permissible pulse current (10,000 times) is obtained by the dV/dt (V/μs) value that is written in the specification and capacitance (μF).

The dV/dt (V/μs) value of the film capacitor is determined by the element structure. For the metalized type, in particular, the internal evaporated electrode and external takeout electrode are connected by metal (metal spraying). So the upper limit of dV/dt value is low and hence we should be pay attention to it.

The dV/dt values corresponding to rated voltage and capacitance value of representative types are shown as below. When used in a high pulse current circuit, please check the permissible pulse current (Ao-p).

If the times of applied pulse is more than 10,000, please contact with us.

＜脉冲电流容值的计算方法＞

1）在电容C（F 法拉）上外加电压V（V）时的其电荷量Q（C） 按公式①计算。Q=C x V…公式①

2）此时流向过电容的充电电流值I（A）按公式②计算 I＝dQ/dt……公式②

3）将公式①的两边用时间t进行微分，代入到公式②，形成公式③。dQ/dt＝C ・dv/dt
I ＝ C ・ dv/dt…公式③ 因此脉冲电流值可根据电容量值C(uF)与每μS电压的变化量dv/dt值的乘积计算得出。

（例）
KCQE4474KF （可参照下表）
额定电压:400VDC 电容量 :0.47uF
允许dv/dt值：12
允许脉冲电流溶值：0.47(uF)×12≒5.64Ao-p（但重复次数在10,000次以下）即，对于瞬间脉冲电流值，最高可使用5.64Ao-p。

<How to determine permissible pulse current>

1) When voltage V(V) is applied to capacitor C (F for farad), the electric charge Q(C) is expressed in formula ①.Q=C x V .....①

2) The charging current I(A)flow in the capacitor at this time is expressed in formula ②.I=dQ/dt ……②

3) Differentiating both sides of formula ① by time t and putting into formula ② yields formula ③.dQ/dt=C.dV/dt
I=C.dV/dt .....③
Therefore, the pulse current is determined as the product of the capacitance value C (μF) and dV/dt(voltage change per μs).

（example.）
In the case of KCQE4474KF (permissible dV/dt)
Rated voltage : 400VDC, Capacitance : 0.47μF,
permissible dV/dt value : 12
pulse permissible current : 0.47 (μF)×12 ≒ 5.64Ao-p (however, number of repetitions is 10,000 times or less), that is, momentary pulse current can be used up to 5.64 Ao-p.

[KCQE(F)＜脉冲次数在10000次以内＞的容许dv/dt值] 单位：V/μS

[KCQE (F) Permissible dV/dt value <within 10,000 times>] Unit: V/μS

品番 Part No	静电容量（μF） Cap. (μF)	容许dv/dt值 Permissible dV/dt value				
		63VDC	100VDC	250VDC	400VDC	630VDC
103	0.01	14	37	47	47	38
123	0.012	14	38	42	47	38
153	0.015	14	30	42	42	38
183	0.018	14	30	37	37	38
223	0.022	14	30	31	37	38
273	0.027	14	30	31	37	38
333	0.033	14	30	26	37	38
393	0.039	14	16	26	22	38
473	0.047	14	16	26	22	38

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

品番 Part No	静电容量（μF） Cap. (μF)	容许dv/dt值 Permissible dV/dt value				
		63VDC	100VDC	250VDC	400VDC	630VDC
563	0.056	14	16	26	22	20
683	0.068	14	14	19	22	20
823	0.082	14	14	19	22	20
104	0.1	14	14	19	22	20
124	0.12	14	14	19	12	20
154	0.15	14	14	19	12	20
184	0.18	14	14	12	12	20
224	0.22	14	14	12	12	20
274	0.27	14	14	12	12	12
334	0.33	14	14	12	12	12
394	0.39	14	14	7	12	12
474	0.47	14	14	7	12	12
564	0.56	14	14	7	8	12
684	0.68	14	14	7	8	12
824	0.82	14	14	7	8	8
105	1	14	14	7	8	8
125	1.2	8	8	7	8	7
155	1.5	8	8	7	6	6
185	1.8	8	8	4	5	7
225	2,2	8	8	4	5	8
275	2.7			4		
335	3.3			4		
395	3.9			4		
475	4.7			4		
565	5.6			4		
685	6.8			4		
825	8.2			4		
106	10			4		

!注意

由其他零部件故障等引起异常动作导致脉冲及有效值电流值超出允许值时，请采取相应安全防护措施。

!Caution

Protective means for safety should be provided in case the pulse and rms current may exceed the permissible values due to abnormal action such trouble elsewhere in the circuit.

3．使用温度

3.1自行温升

在AC电路尤其是高频中使用薄膜电容时，流通的电流会造成电容自身发热。自身发热过热时可能引起电容老化，甚至冒烟或起火。在确认过实际使用条件中的自行升温值后，请在规定值范围内使用。请在室温，无风状态下测量自行温升值。

※自行温升值的详细参数请参考产品规格书(电容类型不同，其规定值也不同，详情请咨询我们)。

3.Operating temperature

3.1 Own temperature rise

When the film capacitor is used in an AC circuit, especially in high frequency application, the capacitor generates heat by itself from the flow of current. If the self heat generation is large, the capacitor may deteriorate, and smoke or fire may be occur. Check the self heating temperature rise value in actual conditions of use, and use it within the limit specified value. Measure the own temperature rise value in indoor, wind-free condition.

※The details of self heating temperature rise value are described in the specification. (Please contact us details as the specifies value varies by each type.)

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

3.2 使用温度范围（类别温度范围）

薄膜电容的使用温度范围根据电介质的材料（薄膜种类）不同而不同，产品目录中记录了不同类型电容的可使用温度范围。必须注意的是，产品目录中提到的使用温度是电容表面的温度，不是环境温度。在实际使用的时候，确保环境温度+电容的自己温升在规定温度以下。也就是说，电容的表面温度必须在使用温度范围之内。

3.2 Operating temperature range

The operating temperature range of the film capacitors varies with the dielectric material (kind of films), and the usable temperature range is specified in the each model. It must be noted, however, that the temperature range mentioned in the catalog is the surface temperature of the film capacitor, not the ambient temperature of the capacitor. In actual use, make sure the sum of the ambient temperature + capacitor ' s self heating temperature rise value (within specified value), that is, the capacitor surface temperature should be within the rated operating temperature.

!注意

在超过使用温度范围状态下使用时，可能造成介质损耗因数（tanδ）变大，自身发热超出允许值，导致介质膜老化引发短路，甚至有冒烟，起火的危险。

薄膜电容附近如有其他零部件的散热片，高温电阻等的话，辐射热会对电容局部性加热，使其超出使用温度范围，导致冒烟，起火。请务必确认热源一侧的电容表面温度。

!Caution

When used over the specified operating temperature, dissipation factor (tanδ) increases, and the self heat generation may exceed the permissible value, possibly causing deterioration of dielectric film, short circuit, and smoke or fire. If there is cooling plate of other part or any resistance heated to high temperature near the film capacitor, the capacitor may be locally heated by the radiation heat, exceeding the operating temperature range, and smoke or fire may be caused. Check the capacitor surface temperature at the heat source side.

4. 其他注意事项

4.1 AC电源(跨线)降防噪声用电容

将电容作为预防跨线噪声使用时，不仅会发生外加普通电源电压现象，还会有雷涌等异常电涌发生，这可能会引起冒烟或起火。因此，对插入电源之间的电容各国都制定了严格的安全规格，使用符合安全规格的产品是一种义务。

4.Other cautions

4.1 Capacitor for prevention of AC power supply (across the line) noise.

When using a capacitor across the line as means for prevention of noise, not only the supply voltage is always applied, but also abnormal surge such as lightning is applied, which may lead to smoke or fire. Therefore, the across-the-line capacitors are strictly regulated in safety standard in each nation, and it is necessary to use the product conforming to the standard.

＜参考＞海外安全规格 oversea safety standard	
机构名（国名）	规格号Standard NO
UL(美国American)	UL 60384-14
CQC(中国 China)	IEC60384-14
ENEC （欧盟European Union）	IEC60384-14

但是，如果使用KCQE 1A/2A的产品用于预防跨线噪声使用时，下面的条件至少满足1项。

However, when using the KCQE 1A/2A rating model as across-the-line capacitor, at least one of the following conditions must be satisfied.

1） 和电容器并联的电阻电压不能超过下表中的电阻电压值。

1) Varistor with the varistor voltage not more than the value shown in the table below should be connected parallel to the capacitor.

2） 加在电容器两端的脉冲电压不能超过下表中的脉冲电压值。

2) Pulse voltage more than the value shown in the table below should not be applied across the capacitor

电容器额定电压 Cap. Rated Voltage	电阻电压 Varistor Voltage	脉冲电压 Pulse Voltage
AC125V	250V	$250V_{0-P}$
AC250V	470V	630V0-P

4.2阻燃性

1）介质膜不是阻燃性材料。

4.2Flame retardation

1）The dielectric film is not a flame retardant material.

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

2）尽管在薄膜电容器外封装中使用了耐火性阻燃材料-阻燃环氧树脂或塑壳，但外部持续高温或火焰仍可使电容器芯子变形而产生外封装破裂，导致电容器芯子熔化或燃烧。

2）Although flame retardation epoxy resin or plastic case is used in the coating or encapsulating of plastic film capacitor,continuous outer high temperature or firing will break the coating layer or plastic case of the capacitor,and may lead to melting and firing of the capacitor element.

4.3使用环境

4.3.1 高湿度环境下使用时

在高湿度环境下长时间使用时，随着时间的推移，元件会通过外包装吸收湿气。水分会造成蒸镀薄膜、金属喷涂部氧化，引发故障。此外，由于电容的类型不同，有时电容量值会变大。

4.3 Environments of use

4.3.1 When used in humid environments

When used for a long period in humid environments, the elements absorb moisture through the coating with the passing of the time. The water oxidizes the electrode (evaporated film and metalized contact), and leads to trouble. Increasing rate of capacitance varies because moisture absorptance differs with types of film. Sometimes it is very large.

4.3.2气体环境下使用时的注意点

在氯化氢，硫化氢，亚硫酸气体等氧化性气体环境中使用时，可能引发蒸镀薄膜（铝），金属喷涂部（锌）的氧化，有诱发起火，冒烟的危险，请避免在该环境下使用。

4.3.2 Cautions on gas atmosphere

When using in the oxidizing gas such as hydrogen chloride, hydrogen sulfide and sulfurous acid, the evaporated electrode (Aluminum) or metalized contact (zinc compound) may be oxidized, may result in smoke or fire. Avoid such atmosphere.

4.3.3 树脂涂层后使用时

使用前，以提高耐湿性，耐气体性能或固定零部件为目的进行树脂涂层或树脂埋设时请另行垂询。

1）树脂中所含化学成分溶剂渗入到金属喷涂部分或电极部分（蒸镀薄膜），有引发特性老化的可能
2）硬化树脂时，会产生化学反应热（硬化发热），可能给电容带来不良影响。
3）电容整体埋入树脂中时，请充分评估由热膨胀，收缩引起的热机械应力对电容的影响。

4.3.3 When using by resin coating

When using resin coating or resin potting components to improve humidity resistance or gas resistance, or to fix parts in place, please consult us.

1) The solvent or the constituent in the resin may permeate into the metalized contact or electrode (aluminum foil or evaporated film) to deteriorate characteristics.
2) When curing the resin, chemical reaction heat (curing heat generation) occurs, which may adversely affect the capacitor.
3) In the case of the lead type capacitors, when use the resin for embedding, please be sure to test and evaluate enough for the thermal mechanical stress to the capacitor.

■贴装注意事项

1. 电容的焊接

薄膜电容的耐热温度随其使用的介质薄膜类型，电容结构•制造方法等不同而不同。设定贴装温度时，务必使电容内部（元件）温度不高于下表贴装耐热温度。通过焊接后的高温环境时，请将该情况考虑在内进行确认。

■Cautions for Mounting

1.Soldering of capacitor

The heat resisting temperature of the film capacitor varies with the type of dielectric film, structure of the capacitor, manufacturing method, etc. When mounting, set the mounting temperature, the capacitor inside (element) temperature should be lower than the mounting heat resisting temperature given below. If the capacitors go through the high temperature after soldering, please consider this and be sure to check the temperature.

电介质 Dielectric	品種 Type	贴装耐热温度（峰值） Mounting heat resisting temperature
聚丙烯膜Polypropylene Film	KCWF/KCWH	135℃
聚酯膜Polyester Film	KCQB/KCQE	160℃

＜贴装注意点＞

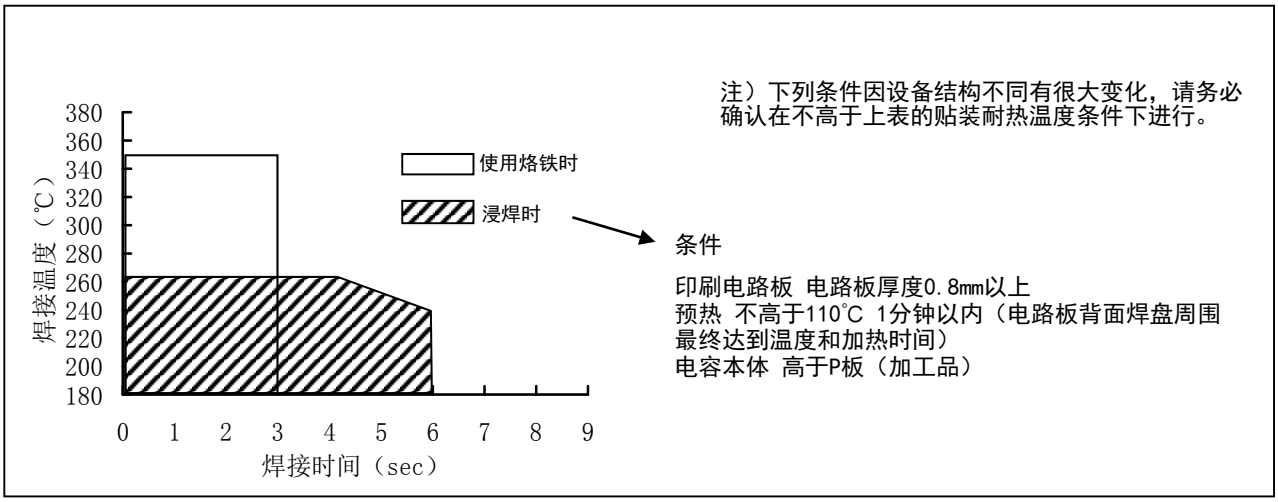
焊接请在以下温度条件范围内进行。（但焊接次数最多为2次，第2次须在第1次完成后且恢复到常温后才能进行）

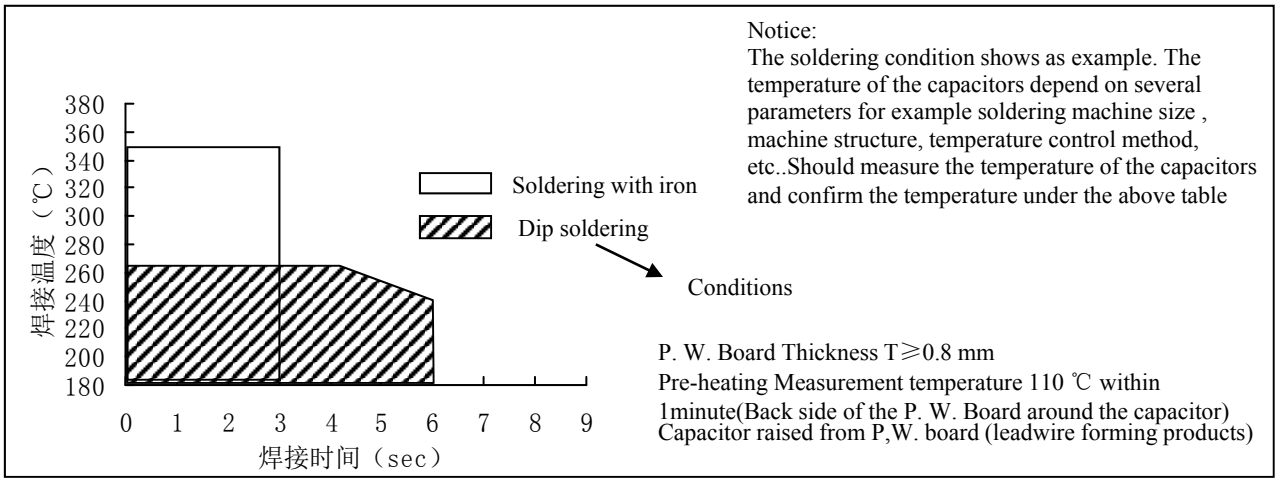
<Cautions for mounting>

Solder within the following temperature condition range. (Dipping times is within twice, the second dipping should be carried after the capacitor itself has returned to the normal temperature.)

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

例（Example）





薄膜电容器相比其他部品耐热温度较低，应避免通过给片式电容器固定胶硬化的炉子（会施加贴装耐热温度以上的高热，使介质膜热收缩从而导致短路等不良发生）与片式零部件并用时，待粘接剂硬化后再插入薄膜电容进行焊接。

引线型电容的零部件请勿使用回流焊。（施加超过耐热温度的高热会导致外封装树脂破损，电容特性老化。）如果通过粘接剂硬化炉，可能对树脂涂层有影响，请另行垂询。

用于多层电路板或引线为铜线的电容时，由于铜线热传导率高，所以电容内部温度容易上升，可能会超过贴装耐热温度，请另行垂询。

The film capacitor has lower mounting heat resisting temperature than other components, therefore the following cautions are needed.
Avoid passing through an adhesive curing oven in order to cure the resin for fixing the chip parts, in combination with chip parts. (Otherwise,exceeding the mounting heat resisting temperature, the dielectric film has a heat shrinkage and induces short-circuiting.)
When combining with chip parts after curing the adhesive, insert film capacitor, and solder.
Avoid reflow soldering by combining the lead type with chip parts. (Or excessive heat beyond the mounting heat resisting temperature may be applied,leading to breakage of coating resin or deterioration of capacitor characteristic.)Also, please consult us, if passing through an adhesive curing oven, possibly causing damage of coating resin.
When using in multilayer printed wiring board, or in the case of a capacitor with a copper lead wire, please contact with us. (In the case of copper lead wire, the thermal conductivity of the copper wire is high, and the internal temperature of the capacitor rises rapidly and may exceed the mounting heat resisting temperature.)

2. 清洗

引线形电容器，外装层大多使用耐药性优良的环氧树脂，虽然基本不会受到清洗剂的影响，但还是要尽量缩短清洗时间。

2.Washing

The lead type film capacitor is coated with an epoxy resin excellent in chemical resistance, and is hardly affected by detergent, but it is recommended to be washed for short duration.

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

3. 薄膜电容焊接时的温度测量

使用贴装耐热温度低的薄膜电容器的时候按照下记方法测定贴装时的芯子温度曲线，并确保是在耐热温度以下进行焊接的。

＜制作测量用样品＞

在电容上部开一个Φ0.3～0.8㎜的孔至元件中央部，插入热电偶（Φ0.1Ｔ线）用粘接剂固定

＜温度曲线的测量＞

如下图所示将和插入电容中的热电偶相同类型的热电偶（3～4m)与电容的热电偶相连接，将样品贴装在电路板上，转到焊接贴装工序测量温度曲线

3.Temperature measuring in soldering of film capacitor

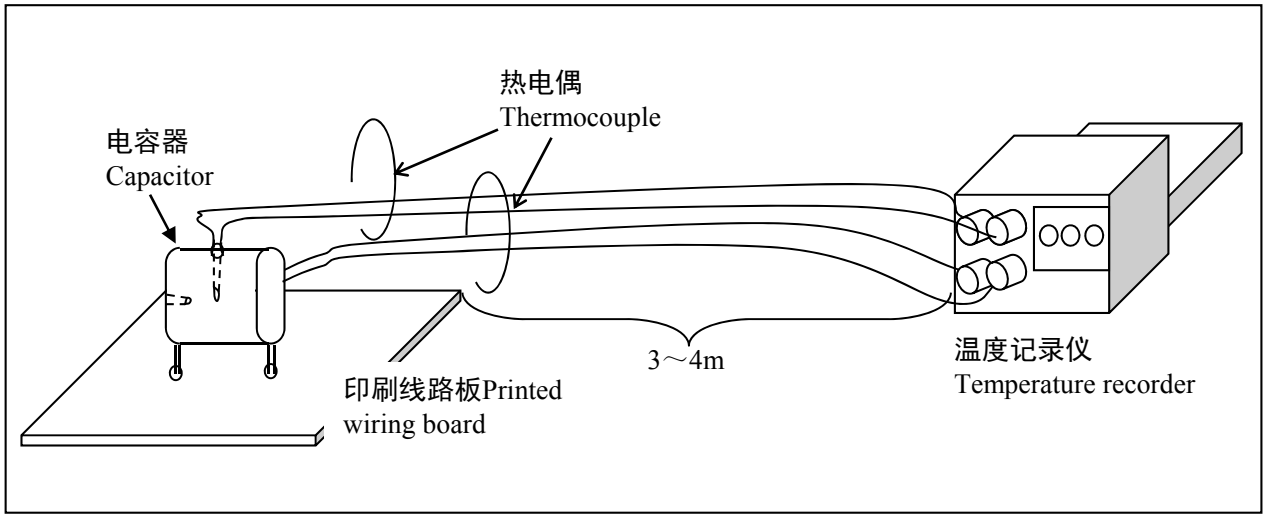
When using film capacitor of low heat resisting temperature in mounting, please measure the element temperature profile in mounting in the following manner, and make sure the soldering is done below the heat resisting temperature.

<Preparation of measuring sample>

Open a hole of about Φ0.3 mm to 0.8 mm in the top of the capacitor to the middle of the element, and insert thermocouple (Φ0.1T wire), and fix with adhesive.

<Measurement of temperature profile>

As shown below, connect a thermocouple (3 m to 4 m) of same type as the thermocouple attached to the capacitor, to the thermocouple of the capacitor as shown below. Mount the sample on the mounting printed wiring board, and pass into the soldering and mounting process, and measure the temperature profile.



■其他注意事项

1. 薄膜电容的经时变化（经年）

电容的特性因所处周边条件，环境条件的不同，而发生变化。即便是自然环境状态下，也可能因空气中的湿气渗透导致容量发生若干变化。其变化程度因电介质材料，外封装材料，结构的不同而不同。因此，产品出货时有考虑到以上变化，但对电容量值的保证为（除个别约定外）收货日（搬入日）为止。

在对时间常数等要求容量精度的电路中，请使用经时变化（经年)较少的聚丙烯系列KCQP/KCWF/KCWH。

■Other cautions

1.Changes in capacitance value over time

The capacitor changes characteristic depending on its ambient conditions and environmental conditions. In natural conditions, there is a certain capacitance change due to the humidity of the circumstance. The degree of such capacitance changes varies with the dielectric material, coating material, and structure.Therefore, we consider these changes, but we only guarantee capacitance value until delivery (without special agreement)

For use in a circuit where time constant and capacitance precision are required, please use the products of polypropylene Film KCQP/KCWF/KCWH which vary less with time.

2. 蜂鸣音

从电容传出的蜂鸣音是作用于异极之间的库仑力使电介质薄膜引发机械性振动所产生的。尤其是在电源电压畸变、含谐波分量的波形等状态下，会形成高分贝音。虽然电气特性上没什么问题，但在音频附近使用时，须加以确认。

2.Hum (Buzz)

Hum produced by capacitors due to mechanical vibration of the film is caused by the coulomb force which exists between electrodes of opposite polarity. A louder hum is produced when applied voltage waveform has distortion,and/or higher frequency component, etc. Although hum does not spoil characteristics of capacitors.

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

3. 保管方法，保管条件

3.1在有湿气，灰尘，腐蚀性气体（氯化氢，硫化氢亚酸气体，氨气等）的环境中，可能会造成电气性能劣化和外部电极可焊性老化，敬请留意。
3.2尤其要避开高温多湿的场所。务必在35℃，65%RH以下环境中保存。
3.3如无特殊约定，通常电容的保修期限为收货后3个月。超过3个月，使用之前，请确认焊接性和容量。

3.Storing method, storing conditions

3.1 Keep the products away from humidity, dust, and corrosion/oxidized gas(hydrogen chloride, sulfur dioxide, hydrogen sulfide) etc. which may bring deterioration of electric characteristics and solderability of lead wire.
3.2 Should not keep with particularly high temperature and high humidity, and keep the products at below temperature of 35 ℃ and humidity of 65%RH.
3.3 If there is no special agreement usually capacitance warranty period of 6 months after receipt. For the products which are stored over 6months, check the solderability and capacitance before use.

4. 使用环境

4.1长时间在高湿度环境下使用的话，随着时间的推移，元件会吸收湿气，使绝缘电阻降低，蒸镀薄膜氧化从而导致性能老化。因此在高湿度环境下使用时，事先咨询我们。
4.2在腐蚀性气体等较多（氯化氢，硫化氢亚硫酸气体，氨气等）的环境下使用时，容易造成特性老化，请尽量不要使用。

4.Using environment

4.1 Consult us when used in high humidity for a long period, because characteristic deterioration as low insulation resistance and oxidized electrode may occur due to the humidity absorbed through the enclosure of the components.
4.2 When using in an oxidizing gas such as hydrogen chloride, hydrogen sulfide and sulfurous acid, the evaporated film or metallized contact may be oxidized and may result in smoke or fire. Please avoid use in this condition.

5. 操作注意事项

5.1骤然进行充放电的话，产生的充放电电流可能引起短路，开路等现象，导致电容特性能老化。充放电时,请务必通过20～1000Ω/V以上的电阻来进行。

5.Handling Pre cautions

5.1 Sudden charging or discharging may cause deterioration of capacitor such as shorting and opening due to charging or discharging current. When charging or discharging, pass through a resistance of 20 to 1000Ω/V or more.

5.2在并联连接多个薄膜电容来进行电容耐压测试，寿命测试时，往每个电容上串联连接20～1000Ω/V以上的电阻。

5.2 When connecting multiple film capacitors in parallel in withstand voltage test or life test, a resistor of a resistance value of (20～1000)Ω/V or more is series-connected to each capacitor.

5.3注意不要让电容表面受到尖锐物件（螺丝刀，烙铁，镊子、底盘边角等）的强力碰撞，此外，勿对引线施加不必要的重量。（引线的再加工等）

5.3 Be careful not to scratch the capacitor surface with sharp edges (such as screwdriver, soldering iron, tweezers, corner of chassis etc.). Don't apply excessive stress to the leadwire (such as re-forming of leadwire, etc.).

5.4如不慎使电容坠落，可能导致其特性老化，请勿再使用。（再使用时，请充分确认其质量）

5.4 If the capacitor is dropped by mistake, its characteristics may be damaged. Don't use it. (If reusing, please check the quality sufficiently.)

5.5引线型电容的引线根部勿过分加力，要注意其根部附近的外封装树脂处勿有开裂或间隙产生。

5.5 In the case of leadwire type capacitor, be careful, not to apply excessive force to the leadwire root area, which may cause cracking or separation in the coating resin.

5.6电容的端子面上注意不要积水或积灰。可能成为漏电腐蚀的原因。

5.6 No dust or water should be permitted to remain on the surface of capacitor terminals. Because this may cause electrical leakage or corrosion.

5.7使用电压在30VAC以上，45VDC以上，用于防止线与地或线与线之间的噪声时，建议用阻燃材料及阻燃箱覆盖其周围树脂零部件（以防起火）。

5.7 When used for noise suppression between lines and between line to earth when operating voltage is more than 30VAC and more than 45VDC, covering peripheral resin part by flame retardant material or flame retardant case (for avoiding fire) is recommended.

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

6. 其他

(1) 晶松科技有限公司的制品满足RoHS和REACH指令。

(2) 使用条件上的问题请按照下面的联系方式联络。

黄山晶松薄膜电容器制造有限公司
技术开发科：担当：路彦东(中国语)
部长：坂田幹夫（日本语）
营业：田千锐（英语）
地址：安徽省黄山市歙县经济技术开发区经春路5#
电话：0559-6668998　传真：0559-6668989
邮箱：luyandong@kingsonic.cn

6.Additional Points

(1) Kingsonic products in the catalogue are RoHS and REACH compliant.

(2) For further information regarding usage conditions, please contact the following department

Huangshan Kingsonic Film Capacitor Manufacturing Co.,Ltd
Technology Development Division Person-in-charge：luyandong（Chinese）
Manager:sakata mikio(Japanese)
Sales manager sales manager:Richard.tian （English）
Address: 5,Jingchun Road，Economic Development Area, Shexian county Anhui
TEL:0559-6668998转849　FAX:0559-6668989
Email: luyandong@kingsonic.cn

本公司在更改设计、规格时可能不予事先通知，敬请谅解。请务必在购买及使用本公司产品前向本公司索要相关技术规格书。如对产品的安全性有疑义时，请与本公司联系
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.