Dersonic®
德信立業 創新開拓

超高压陶瓷电容器产品承认书

APPROVAL SPECIFICATIONS

FOR ULTRA-HIGH VOLTAGE TYPE CERAMIC CAPACITORS

客户 CUSTOMER	立创商城		
客户料号 CUSTOMER P/N			
产品编码 PART NUMBER	CC4A472ME1IEF4AH7100		
规格描述 DESCRIPTION	10KV/472/M/F10/直脚/L24/环氧(蓝)/Y5V/AH/ZNR		
日期 DATE	2021-03-18	文件编号 DOC. NO.	DEC-SA-WI002

德尔创承认栏 APPROVED BY DERSONIC			客户承认栏 APPROVED BY CUSTOMER	
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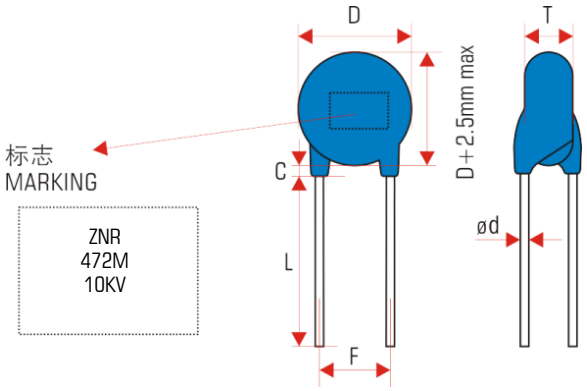
1. 规格表
DATA SHEET



本体颜色: Body color:	蓝色 Blue
包封层: Coating:	环氧树脂 (UL94 V-0) Epoxy resin (UL94 V-0)
导线: Lead wire:	CP 线 CP wire
脚型: Lead style:	直脚 Straight leads

产品编码 PART NUMBER		CC4A472ME1IEF4AH7100
客户料号 CUSTOMER P/N		
产品类别 PRODUCT SUBCLASS		Hi-k type
额定电压 RATED VOLTAGE		10kVdc Remark: Rated ac voltage (50/60Hz) ≈ 280% rated dc voltage, e.g.: Rated dc voltage 10 000V ≈ rated ac voltage 3 600V; Rated dc voltage 15 000V ≈ rated ac voltage 5 400V Rated dc voltage 20 000V ≈ rated ac voltage 7 200V
电容量 CAPACITANCE		4700pF ±20% @ 1kHz 1.0V_{RMS} 25.0ºC
损耗角正切 TANGENT OF LOSS ANGLE		0.025 max @ 1kHz 1.0V_{RMS} 25.0ºC
耐电压 TESTING VOLTAGE		NO FAILURE @ 15kVdc (150% rated voltage) 2mA 60s
绝缘电阻 INSULATION RESISTANCE		10 000MΩ min @ 1000VDC 60s
温度特性 TEMPERATURE CHARACTERISTIC		Y5V (ΔC/C: ±10% @ -25ºC ~+85ºC)
工作温度范围 OPERATING TEMPERATURE RANGE		-25ºC ~+85ºC
尺寸 DIMENSIONS	D (DIAMETER)	15.0mm max
	T (THICKNESS)	7.0mm max
	F (LEAD SPACING)	10.0mm±1.0mm
	L (LEAD LENGTH)	24.0mm min
	ød (LEAD DIAMETER)	0.60mm±0.10mm
	C (COATING RUNDOWN ON LEADS)	3.0mm max

符合RoHS 2.0标准，无卤。

Comply with RoHS 2.0, halogen-free available.

2. 应用
APPLICATION

本规格书适用于额定电压超过6kVdc电子设备用超高压陶瓷电容器。

This specification is applied to Ultra-high Voltage type Ceramic Capacitors used for electric equipment with a rated voltage exceeding 6kV dc.

3. 料号组成
PART NUMBER CONFIGURATION

CC	**4A**	**472**	**M**	**E1I**	**E**	**F4**	**AH7**	**100**
系列 Serise	额定电压 Rated voltage	标称容量 Nominal capacitance	容量偏差 Capacitance tolerance	引线成型方式 Leads format	包封材质 Coating material	温度特性 Temperature characteristic	生产识别码 Production identification code	标志 Marking

■ 额定电压 Rated voltage

3J: 6.3kV
3K: 8kV
4A: 10kV
4N: 15kV
4D: 20kV

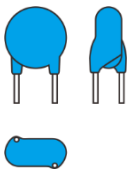
■ 标称容量 Nominal capacitance

三位数表示，单位pF。如：
Three-digit representation, in pF. Ex.
501= 500pF
472= 4 700pF
103=10 000pF (0.01μF)

■ 容量偏差 Capacitance tolerance

K：±10%
M：±20%

■ 引线成型方式 Leads format

代码 Code	脚型 Lead style	脚距 Lead spacing	脚长 Lead length
E1I	 直脚 Straight leads	10.0mm±1.0mm	24.0mm±4.0mm

■ 包封材质 Coating material

E：环氧树脂包封(蓝色)，UL94 V-0
Epoxy coating (blue), UL94 V-0

■ 温度特性 Temperature characteristic

B4: Y5P
E4: Y5U
F4: Y5V

■ 生产识别码 Production identification code

本规格书不作说明。
This specification does not explain.

■ 标志 Marking

100：打印"ZNR"商标
Printing "ZNR" logo

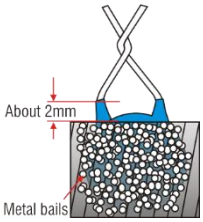
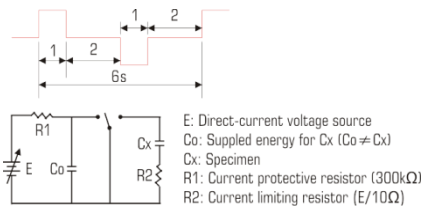
4. 标准和测试方法
SPECIFICATION AND TEST METHODS

试验与测试必须在标准条件（温度15～30ºC，相对湿度45～75%）下进行。

Test and measurement shall be made at the standard condition (Temperature 15～35ºC, relative humidity 45～75%).

除非另有说明，如果对测量结果有疑问和被特别要求的情况下，电容必须在基准条件（温度25±2ºC，相对湿度60～70%）下进行测试。

Unless otherwise specified herein. If doubt occurred on the value of measurement, and measurement was requested by customer capacitors shall be measured at the reference condition (Temperature 25±2ºC, relative humidity 60～70%.)

No.	项目 Item		标准 Specification	测试方法 Test method
1	外观和尺寸 Appearance (APP) & dimensions		外观和尺寸没有明显的缺陷 No marked defect on appearance form and dimensions. 尺寸请参考“规格表” Please refer to “DATA SHEET”.	用目视检查电容器表面明显的缺陷 The capacitor should be inspected by naked eyes for visible evidence of defect. 尺寸用游标卡尺测量。 Dimensions should be measured with slide calipers.
2	标志 Marking		清晰易于识别 To be easily legible.	目视检查。 The capacitor should be inspected by naked eyes.
3	介质强度 Dielectric Strength	引线之间 Between Lead wires (TV)	无失效 No failure	在绝缘油或气体中，两引线间施加150%额定直流电压60秒钟，电容器不应损坏（充放电流小于50mA）。 The capacitors shall not be damage when DC voltage of 150% of the rated voltage is applied between the lead wires for 60 s in insulate liquid or gas. (Charge/discharge current: 50mA max.)
		本体绝缘 Body insulation	无失效 No failure	将电容器放入填充满直径为1mm金属球的容器中，然后将两根引线短路，并且使电容器根部离金属球2mm，如图所示，在金属与两根引线之间施加3kV的直流电压10s（充放电流小于50mA）。 The capacitors is placed in the container with metal balls of diameter 1mm so that each lead wires, Short-circuited, is kept approximately 2mm off the balls as shown in the figure, and DC voltage of 3kV is applied for 10 s between capacitor lead wires and small metals. (Charge/discharge current: 50mA max.) 
4	绝缘电阻 Insulation Resistance (IR)		10,000MΩ min.	在电容器两引线间施加1 000V的直流电压，时间60±5。 The insulation resistance shall be measured with DC 1 000V within 60±5 s of charging.
5	电容量 Capacitance		在允许误差范围内 Within the specified tolerance.	电容量、损耗应在25ºC的环境下，使用1±0.1kHz、1.0Vrms的条件进行测试。 The capacitance and DF shall be measured at 25ºC with 1±0.1kHz and 1.0V(r.m.s.)..
6	损耗因素 Dissipation Factor (DF)		0.025 max.	
7	充放电试验 Charge Discharge Test	APP	无可见损伤 No marked defect.	充电放电试验应在下列试验电路和循环中测量。 Charge discharge test shall be measured in the following test circuit and cycle.  施加电压：额定电压 Applied voltage: rated voltage 循环次数：5,000次 Cycle numbers: 5,000 cycles 试验后处理：电容器应在室温下储存4小时。 Post-treatment: Capacitor shall be stored for 4 h at room condition.
		ΔC/C	Y5P: ±10% Y5U: ±15% Y5V: ±20%	
		D.F.	5.0% max.	
		I.R.	10,000MΩ min.	
		TV	无失效 No failure	

<table>
<tr><th>No.</th><th>项目
Item</th><th></th><th>标准
Specification</th><th>测试方法
Test method</th></tr>
<tr><td>8</td><td>温度特性
Temperature Characteristic</td><td></td><td>ΔC/C:
Y5P: ±10%
Y5U: +22%/-56%
Y5V: +22%/-82%</td><td>电容量应在表中规定的每个步骤进行测量。
The capacitance measurement shall be made at each step specified in table.
<table><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>温度
Temperature(ºC)</td><td>20</td><td>-25</td><td>20</td><td>+85</td><td>20</td></tr></table>针对第3步骤的容量变化率不能超过指定值。
Capacitance change from the value of step 3 shall not exceed the limit specified.</td></tr>
<tr><td>9</td><td>导线抗张强度
Terminal Tensile Strength</td><td></td><td>导线无折断，电容无破损。
Lead wire should not be cut off.
Capacitor should not be broken.</td><td>固定电容器的本体，使电容器每支导线均承受10N垂直力，保持10±1秒钟
Fix the body of capacitor, apply a tensile weight gradually to each lead wire in the radial direction of capacitor up to 10N, and keep it for 10±1 s.</td></tr>
<tr><td>10</td><td>导线抗折强度
Terminal Bending Strength</td><td></td><td>导线无折断。
Lead wire should not be cut off.</td><td>电容器导线应承受5N重量，然后向外弯折成90º，然后回复到原来位置；接着往反方向弯折90º，再复原；弯折一次2-3秒钟。
Each lead wire shall be subjected to 5N weight and then a 90º to bend, at the point of egress, in one direction, return to original position, and then a 90º bend in the opposite direction at the rate of one bend in 2 to 3 s.</td></tr>
<tr><td>11</td><td>可焊性
Solderability of Leads</td><td></td><td>导线必须有3/4以上的面积均匀附着焊锡。
Lead wire shall be soldered with uniformly coated on the axial direction over 3/4 of the circumferential direction.</td><td>将引线应浸入浓度为25%的乙醇溶液中，然后浸泡在熔融焊料中2±0.5秒钟，浸泡深度为距引线根部约1.5至2.0mm处。
The lead wire shall be dipped into a 25% ethanol solution of rosin and then into molten solder of below temperature for 2±0.5 s. In both cases the depth of dipping is up to about 1.5 to 2.0mm from the root of lead wires.
焊锡温度
Temp. of solder :
无铅焊锡(Sn-3Ag-0.5Cu)245±5ºC
Lead Free Solder (Sn-3Ag-0.5Cu) 245±5ºC</td></tr>
<tr><td rowspan="2">12</td><td rowspan="2">焊锡耐热性
Soldering effect</td><td>APP</td><td>无可见损伤
No marked defect.</td><td rowspan="2">将引线浸泡在260±5℃的焊料中10±0.5秒钟，其深度为距端子根部1.5至2.0mm处。
The lead wires shall be immersed into the melted solder of 260±5ºC up to about 1.5 to 2.0mm from the main body for 10.0±0.5 s.
试验后处理：电容器应在室温下储存1到2小时。
Post-treatment: Capacitor shall be stored for 1 to 2 h at room condition</td></tr>
<tr><td>ΔC/C</td><td>Y5P: ±10%　Y5U: ±15%
Y5V: ±20%</td></tr>
<tr><td rowspan="4">13</td><td rowspan="4">稳态湿热
Humidity (under steady state)</td><td>APP</td><td>无可见损伤
No marked defect.</td><td rowspan="4">将电容器储存温度40±2ºC、相对温度为90～95%的环境中500±8小时。
Set the capacitor for 500±8 h at 40±2ºC in 90 to 95% humidity.
试验后处理：电容器应在室温下储存1到2小时。
Post-treatment: Capacitor shall be stored for 1 to 2 h at room condition.</td></tr>
<tr><td>ΔC/C</td><td>Y5P: ±10%　Y5U: ±15%
Y5V: ±30%</td></tr>
<tr><td>D.F.</td><td>5.0% max.</td></tr>
<tr><td>I.R.</td><td>6,000MΩ min.</td></tr>
<tr><td rowspan="5">14</td><td rowspan="5">寿命
Life
(高温负荷)
(high temperature load)</td><td>APP</td><td>无可见损伤
No marked defect.</td><td rowspan="5">电容器浸入105±2ºC绝缘油中，施加100%的额定电压1000+48/-0小时。
Apply a DC voltage of 100% of the rated voltage for 1,000+48/-0 h in insulating oil at 105±2ºC.
试验后处理：电容器应在室温下储存24±2小时。
Post-treatment: Capacitor shall be stored for 24±2 h at room condition.</td></tr>
<tr><td>ΔC/C</td><td>Y5P: ±10%　Y5U: ±15%
Y5V: ±20%</td></tr>
<tr><td>D.F.</td><td>5.0% max.</td></tr>
<tr><td>I.R.</td><td>10,000MΩ min.</td></tr>
<tr><td>TV</td><td>无失效
No failure</td></tr>
<tr><td rowspan="5">15</td><td rowspan="5">温度循环
Temperature Cycling</td><td>APP</td><td>无可见损伤
No marked defect.</td><td rowspan="5">温度循环试验按以下条件进行试验和测量
Temperature cycling shall be measured in the following test.
<table><tr><th>步骤
Step</th><th>温度
Temperature(ºC)</th><th>时间
Time</th></tr><tr><td>1</td><td>--30</td><td>30 min</td></tr><tr><td>2</td><td>+105</td><td>30 min</td></tr></table>循环次数：5次
Cycle numbers: 5 cycles
试验后处理：电容器应在室温下储存4小时。
Post-treatment: Capacitor shall be stored for 4 h at room condition.</td></tr>
<tr><td>ΔC/C</td><td>Y5P: ±10%　Y5U: ±15%
Y5V: ±30%</td></tr>
<tr><td>D.F.</td><td>5.0% max.</td></tr>
<tr><td>I.R.</td><td>5,000MΩ min.</td></tr>
<tr><td>TV</td><td>无失效
No failure</td></tr>
</table>

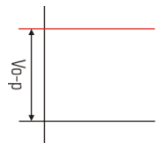
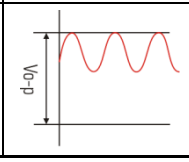
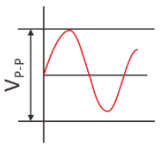
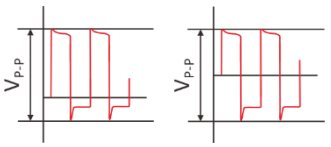
警告
CAUTION

A. 工作电压

OPERATING VOLTAGE

在交流电路或纹波电路中使用直流额定电压电容器时，请务必将外加电压的Vp-p值或包含直流偏置电压的Vo-p值维持在额定电压范围内。若向电路施加电压，开始或停止时可能会因谐振或切换产生暂时的异常电压。请务必使用额定电压范围包含这些异常电压的电容器。

When DC- rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the Vp-p value of the applied voltage or the Vo-p which contains DC bias within the rated voltage range. When the voltage is started to apply to the circuit or it is stopped applying, the irregular voltage may be generated for a transit period because of resonance or switching. Be sure to use a capacitor within rated voltage containing these irregular voltages.

电压 Voltage	直流电压 DC Voltage	直流+交流电压 DC+AC Voltage	交流电压 AC Voltage	脉冲电压 Pulse Voltage
测量位置 Positional Measurement				

B. 工作温度与自生热

OPERATING TEMPERATURE AND SELF-GENERATED HEAT

电容器的表面温度应保持在其额定工作温度范围的上限以下。务必考虑到电容器的自生热。

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself.

电容器在高频电流、脉冲电流等中使用时可能会因介电损耗发出自生热。外加电压应使自生热等负荷在25ºC周围温度条件下不超过20ºC范围。测量时应使用Ø0.1mm小热容量（K）的热电偶，而且电容器不应受到其它元件的散热或环境温度波动影响。

When the capacitor is used in a high-frequency current, pulse current or the like, it may have the self-generated heat due to dielectric-loss. Applied voltage should be the load such as self-generated heat is within 20ºC on the condition of atmosphere temperature 25ºC. When measuring, use a thermocouple of small thermal capacity-K of ϕ0.1mm and be in the condition where capacitor is not affected by radiant heat of other components and wind of surroundings.

过热可能会导致电容器特性及可靠性下降。（切勿在冷却风扇运转时进行测量。否则无法确保测量数据的精确性。）

Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

C. 贮存与使用条件

OPERATING AND STORAGE ENVIRONMENT

电容器绝缘包封层不是完美的密封形式，因此，请勿将电容器存放在腐蚀性气体中，尤其是存在氯气、硫气、酸、碱、盐等场所，同时应防潮。

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture.

在对本产品进行清洗、焊接或成型前，请先在指定设备上测试经清洗、焊接或成型的产品的性能，以确定上述过程不会影响产品质量。

In case of cleaning, bonding, or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment.

电容器应存放在温度及相对湿度分别不超出-10～40ºC及15～85%范围的场所。请在6个月内使用电容器。

Store the capacitors where the temperature and relative humidity do not exceed -10 to 40ºC and 15% to 85%. Use capacitors within 6 months after delivered.

D. 压焊、树脂涂层与包封

BONDING, RESIN MOLDING AND COATING, BOARD TO AVOID

在压焊、树脂涂层和封膜之前，请先使用指定设备确认对产品没有影响，然后再进行使用。

In case of bonding, molding or coating this product, verify that these processes do not affect the quality of capacitor by testing the performance of the bonded, molded or coated product in the intended equipment.

在粘合、树脂涂层、封膜的干燥、硬化条件使用到有机溶剂（乙酸乙酯、甲基乙酮、甲苯等），可能会破坏电容器的包封树脂，而造成短路不良。

In case of the amount of applications, dryness / hardening conditions of adhesives and molding resins containing organic solvents (ethyl acetate,

methyl ethyl ketone, toluene, etc.) are unsuitable, the outer coating resin of a capacitor is damaged by the organic solvents and it may result, worst case, in a short circuit.

粘合、树脂涂层、封膜厚度的偏差可能会在冷却与加热过程中使电容器的包封树脂和/或陶瓷介质破裂。

The variation in thickness of adhesive, molding resin or coating may cause a outer coating resin cracking and/or ceramic element cracking of a capacitor in a temperature cycling.

树脂材料在热条件下（超过100℃）的强度较弱。 因此，在这种情况下，为了避免机械应力，请小心处理。

Resin material to hot conditions (over 100ºC) was weaker to intensity. So such with board to avoid mechanical stress in this state, please handle it with care.

E. 振动与碰撞

VIBRATION AND IMPACT

使用时请勿使电容器受到过度冲击或振动。

Do not expose a capacitor or its leads to excessive shock or vibration during use.

F. 焊锡

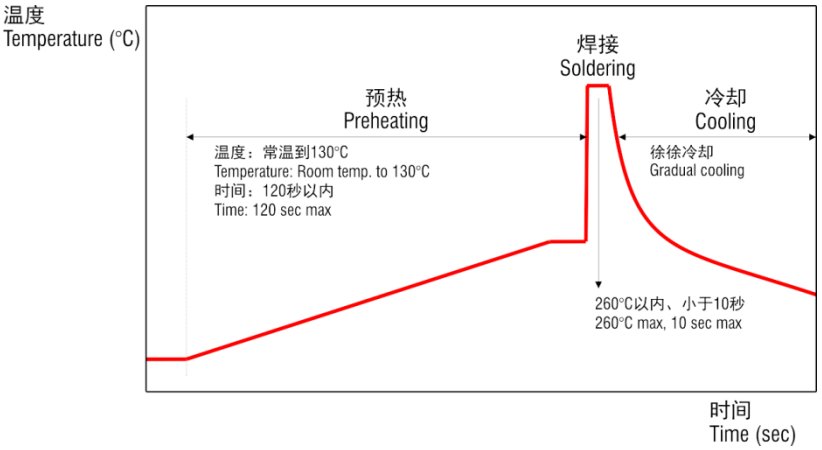
SOLDERING

当在PCB/PWB焊锡这个产品时，不要超过电容器的焊锡耐热性标准。过度的热量会使电容器内部焊锡熔化，可能导致热冲击而使陶瓷介质出现暗裂。

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element.

右图是推荐的波峰焊曲线，请参考!

On the right is the recommended wave-soldering curve, please refer to!



当使用烙铁进行手工焊锡时，应该遵照下列条件：

When soldering capacitor with a soldering iron, it should be performed in following conditions.

- 焊锡温度：350ºC最大
  Temperature of iron-tip: 350 ºC max.
- 烙铁头：不超过40W
  Soldering iron wattage: 40W max.
- 焊锡时间：不超过5.0秒
  Soldering time: 5.0s max.

使用本产品时如忽略上述警告事项，则在严重情况下可能导致短路，并引起冒烟或局部破裂。

Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used.

注意事项
NOTICE

G. 清洗

CLEANING

要进行超声波清洗，应遵守下列条件。

To perform ultrasonic cleaning, observe the following conditions.

- 清洗槽容量：每升输出功率小于20W。
  Rinse bath capacity : Output of 20 watts per liter or less.
- 清洗时间：最多5分钟。
  Rinsing time: 5min maximum
- 不得直接振动 PCB/PWB。
  Do not vibrate the PCB/PWB directly.
- 过度的超声波清洗会导致导线的过载损坏。
  Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires.

H. 电容器容量变化

CAPACITANCE CHANGE OF CAPACITOR

- 1类瓷电容器
  Class 1 capacitors
  电容量可能会因环境温度或外加电压而发生轻微变化。若要将本产品用于严格的时间常数电路，请与我公司联系。
  Capacitance might change a little depending on a surrounding temperature or an applied voltage. Please contact us if you use for the strict time constant circuit.
- 2类瓷电容器
  Class 2 capacitors
  2类瓷像Y5P、Y5U和Y5V等温度特性具有老化特性，因此，电容器若长时间不使用，其电容量会逐渐降低。而且，电容量还可能会因周围温度或外加电压而发生巨大变化。所以不适合用于时间常数电路。若需详情，请与我公司联系。
  Class 2 capacitors like temperature characteristic Y5P, Y5U and Y5V have an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor leaves for a long time. Moreover, capacitance might change greatly depending on a surrounding temperature or an applied voltage. So, it is not likely to be able to use for the time constant circuit. Please contact us if you need a detail information.

请确保我们的产品已安装到您的产品上前已根据您的规格进行了评估。

Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.

请您使用我们的产品时，不要偏离此标准。

You are requested not to use our product deviating from this specification.

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