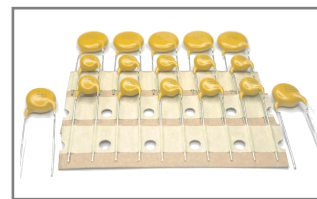


## ■CT7 交流(安规)陶瓷电容器--车规系列

CT7 AC (Safety Standard) Ceramic Capacitor - Vehicle-grade series



### ◆特征 Characteristics

- \* 电容器适合用于 PHEV/EV 交流线路滤波器。
- \* Capacitors are suitable for use in PHEV/EV AC line filters.
- \* 采用铜电极芯片。
- \* Utilize copper electrode chips.
- \* 符合 AEC-Q200 标准。
- \* Comply with AEC-Q200 standard.
- \* 热周期: 1000/周期 (-55/+125℃)。
- \* Thermal cycle: 1000 cycles (-55/+125℃)
- \* 介电强度: AC4000V (Y1) /AC2600V (Y2)。
- \* Dielectric strength: AC 4000V (Y1)/AC 2600V (Y2).
- \* 产品通过 VDE/UL/CQC/SEV/SEMKO/NEMKO/DEMKO/FIMKO/Korea 安规认证, 并且通过 DC1500V 认证。
- \* The product has passed VDE/UL/CQC/SEV/SEMKO/NEMKO/DEMKO/FIMKO/Korea safety regulations and has also passed DC 1500V certification.
- \* 包封层采用无卤素-阻燃环氧树脂(涂料符合 UL94V-0 规范/规格要求)。
- \* The encapsulation layer uses halogen-free - flame-retardant epoxy resin (the coating complies with UL94V-0 specification/requirement).
- \* 采用无铅镀锡铜引线及焊锡, 符合 RoHS 指令要求。
- \* Use lead-free tin-coated copper leads and solder, in compliance with the RoHS directive.
- \* 产品工作温度: -55℃~+125℃, 电容器最高使用温度为 125℃ (含自身发热 20℃ 以内)。
- \* Product operating temperature: -55℃ to +125℃, the maximum operating temperature of the capacitor is 125℃ (including the internal heat of 20℃).

### ◆应用领域 Application Fields

- \* 最为理想的用途是用作交流线路滤波器与及 PHEV/EV 初级二次级耦合蓄电池充电器的 Y 型电容器。
- \* The most ideal application is as a Y-type capacitor for use in communication line filters and for coupling primary and secondary charging circuits of PHEV/EV and EV batteries.
- \* 最为理想的用途是用作 PHEV/EV 和 HEV 直流-直流转换器用滤波电容器。
- \* The most ideal application is as a filter capacitor for use in DC-DC converters of PHEV/EV and HEV.

### ◆型号表示法 Model designation Method

CT7-	C	12	Y5U	0	E	472	M	T	E	CHG
产品类型 Product Type	额定电压 Rated Voltage	直径代码 Diameter Code	温度特性 Temperature Characteristics	引线样式 Lead wire Style	引线间距 Lead wire Spacing	额定容量 Rated Capacity	容量偏差 Capacity Deviation	包装方式 Packaging Method	产品颜色 Product Color	车规代码 Dedicated Code

**①产品类型 Product Type**

代码 Code	产品类型 Product Type
CT7-	交流-安规系列陶瓷电容器 AC - Safety Standards Series Ceramic Capacitors

**②额定电压 Rated Voltage**

代码 Code	B	C
电压 Voltage	300VAC	500VAC

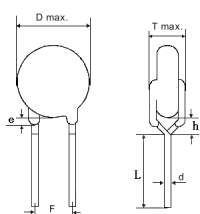
**③直径代码 Diameter Code**

代码 Code	4	5	6	7	8	9
芯片直径 Chip diameter (mm)	3.5~4.4	4.5~5.4	5.5~6.4	6.5~7.4	7.5~8.4	8.5~9.4
代码 Code	10	11	12	13	14	15
芯片直径 Chip diameter (mm)	9.5~10.4	10.5~11.4	11.5~12.4	12.5~13.4	13.5~14.4	14.5~15.4

**④温度特性 Temperature Characteristics**

材质代码 Material code		温度区间 Temperature range	容量允许偏差 Capacity tolerance deviation
EIA 代码 EIA Code	简称 Abbreviation		
Y5P	B	-25℃~+85℃	±10%
Y5U	E		-56% to +22%
Y5V	F		-82% to +22%

**⑤引线样式 Lead wire Style**

代码 Code	脚型 Foot shape	图示 Example diagram
0	前后打翘 Vertical	

**⑥引线间距 Lead wire Spacing**

代码 Code	B	D	E	注：Y1 仅生产 10.0mm 及以上脚距产品 Note: Y1 only produces products with a foot spacing of 10.0 mm or larger.
脚距 Foot distance (mm)	5.0±0.5	7.5±0.5	10.0±0.5	

**⑦标称容量 (额定容量) Nominal Capacity (Rated Capacity)**

代码 Code	容量 Capacity	注：标称容量以 pF 为单位，用 3 位数字表示。前两位数字表示有效数字，第三位为 0 的个数；R 表示小数点。 Note: The nominal capacity is expressed in picofarads (pF) and is represented by three digits. The first two digits indicate the significant figures, and the third digit represents the number of zeros; R indicates the decimal point.
4R7	4.7pF	
330	33pF	
103	1000pF	

**⑧容量偏差 Capacity Deviation**

代码 Code	K	M
容差 Capacity deviation	±10%	±20%

**⑨包装方式 Packaging Method**

代码 Code	S	T
包装方式 Packaging method	散装 Bulking	编带 Taping

**⑩产品颜色 Product Color**

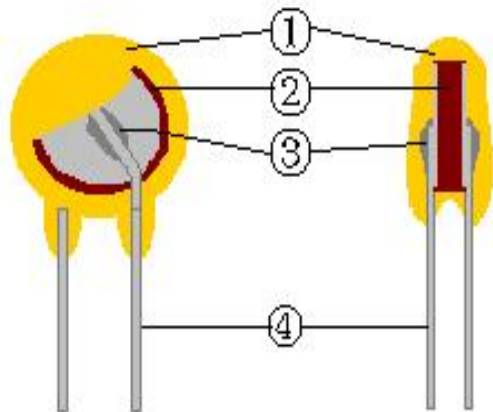
代码 Code	E	F
环氧树脂 Epoxy resin	黄色 Yellow	蓝色 Blue

**⑪车规代码 Dedicated Code**

代码 Code	CHG
电极 Electrode	铜 Cu (车规 Vehicle-grade)

**◆产品结构 Product Structure**

\* 瓷介电容剖面图 Sectional View of Ceramic Capacitor



序号 NO.	名称 Name	材料 Materials
①	外包封层 Outsourced seal layer	环氧树脂 Epoxy resin
②	芯片 Chip	电极-陶瓷介质 Electrode - Ceramic Medium
③	焊锡 Solder	无铅锡条 Lead-free tin rod
④	引线 Wiring lead	镀锡铜线 Tinned copper wire

**◆规格尺寸 Specification Dimensions**

\* 规格清单表-额定电压 Specification List - Rated Voltage: Y2=300VAC

风华型号 FH Model	温度特性 TC	额定容量 Rated Capacity	容量偏差 Capacity Deviation	成品直径 Product Diameter (mm Max)	成品宽度 Product Width (mm Max)	成品厚度 Product Thickness (mm Max)	引线线径 Wire Diameter (mm)
CT7-B4Y5P0D101KTECHG	B	100pF	±10%	7.0	5.5	0.60±0.08	7.5±0.5
CT7-B4Y5P0D151KTECHG	B	150pF	±10%	7.0	5.5	0.60±0.08	7.5±0.5
CT7-B5Y5P0D221KTECHG	B	220pF	±10%	8.0	5.5	0.60±0.08	7.5±0.5
CT7-B5Y5P0D271KTECHG	B	270pF	±10%	8.0	5.5	0.60±0.08	7.5±0.5
CT7-B5Y5P0D331KTECHG	B	330pF	±10%	8.0	5.5	0.60±0.08	7.5±0.5
CT7-B6Y5P0D471KTECHG	B	470pF	±10%	9.0	5.5	0.60±0.08	7.5±0.5
CT7-B6Y5P0D561KTECHG	B	560pF	±10%	9.0	5.5	0.60±0.08	7.5±0.5
CT7-B6Y5P0D681KTECHG	B	680pF	±10%	9.0	5.5	0.60±0.08	7.5±0.5
CT7-B7Y5P0D821KTECHG	B	820pF	±10%	10.0	5.5	0.60±0.08	7.5±0.5
CT7-B8Y5P0D102KTECHG	B	1000pF	±10%	11.0	5.5	0.60±0.08	7.5±0.5
CT7-B4Y5U0D471MTECHG	E	470pF	±20%	7.0	5.5	0.60±0.08	7.5±0.5
CT7-B4Y5U0D681MTECHG	E	680pF	±20%	7.0	5.5	0.60±0.08	7.5±0.5
CT7-B5Y5U0D102MTECHG	E	1000pF	±20%	8.0	5.5	0.60±0.08	7.5±0.5
CT7-B6Y5U0D122MTECHG	E	1200pF	±20%	9.0	5.5	0.60±0.08	7.5±0.5

CT7-B6Y5U0D152MTECHG	E	1500pF	±20%	9.0	5.5	0.60±0.08	7.5±0.5
CT7-B7Y5U0D182MTECHG	E	1800pF	±20%	10.0	5.5	0.60±0.08	7.5±0.5
CT7-B7Y5U0D202MTECHG	E	2000pF	±20%	10.0	5.5	0.60±0.08	7.5±0.5
CT7-B8Y5U0D222MTECHG	E	2200pF	±20%	11.0	5.5	0.60±0.08	7.5±0.5
CT7-B9Y5U0D272MTECHG	E	2700pF	±20%	12.0	5.5	0.60±0.08	7.5±0.5
CT7-B9Y5U0D332MTECHG	E	3300pF	±20%	12.0	5.5	0.60±0.08	7.5±0.5
CT7-B10Y5U0D392MTECHG	E	3900pF	±20%	13.0	5.5	0.60±0.08	7.5±0.5
CT7-B11Y5U0D472MTECHG	E	4700pF	±20%	14.0	5.5	0.60±0.08	7.5±0.5
CT7-B4Y5V0D102MTECHG	F	1000pF	±20%	7.0	5.5	0.60±0.08	7.5±0.5
CT7-B4Y5V0D122MTECHG	F	1200pF	±20%	7.0	5.5	0.60±0.08	7.5±0.5
CT7-B4Y5V0D152MTECHG	F	1500pF	±20%	7.0	5.5	0.60±0.08	7.5±0.5
CT7-B5Y5V0D202MTECHG	F	2000pF	±20%	8.0	5.5	0.60±0.08	7.5±0.5
CT7-B6Y5V0D222MTECHG	F	2200pF	±20%	9.0	5.5	0.60±0.08	7.5±0.5
CT7-B6Y5V0D282MTECHG	F	2800pF	±20%	9.0	5.5	0.60±0.08	7.5±0.5
CT7-B7Y5V0D332MTECHG	F	3300pF	±20%	10.0	5.5	0.60±0.08	7.5±0.5
CT7-B7Y5V0D392MTECHG	F	3900pF	±20%	10.0	5.5	0.60±0.08	7.5±0.5
CT7-B8Y5V0D472MTECHG	F	4700pF	±20%	11.0	5.5	0.60±0.08	7.5±0.5
CT7-B9Y5V0D562MTECHG	F	5600pF	±20%	12.0	5.5	0.60±0.08	7.5±0.5
CT7-B9Y5V0D682MTECHG	F	6800pF	±20%	12.0	5.5	0.60±0.08	7.5±0.5
CT7-B10Y5V0D822MTECHG	F	8200pF	±20%	13.0	5.5	0.60±0.08	7.5±0.5
CT7-B12Y5V0D103MTECHG	F	10000pF	±20%	15.0	5.5	0.60±0.08	7.5±0.5

\* 规格清单表-额定电压 Specification List - Rated Voltage: Y1=500VAC

风华型号 FH Model	温度特性 TC	额定容量 Rated Capacity	容量偏差 Capacity Deviation	成品直径 Product Diameter (mm Max)	成品宽度 Product Width (mm Max)	成品厚度 Product Thickness (mm Max)	引线线径 Wire Diameter (mm)
CT7-C4Y5P0E101KTECHG	B	100pF	±10%	7.0	6.5	0.60±0.08	10.0±0.5
CT7-C5Y5P0E181KTECHG	B	180pF	±10%	8.0	6.5	0.60±0.08	10.0±0.5
CT7-C5Y5P0E221KTECHG	B	220pF	±10%	8.0	6.5	0.60±0.08	10.0±0.5
CT7-C6Y5P0E271KTECHG	B	270pF	±10%	9.0	6.5	0.60±0.08	10.0±0.5
CT7-C5Y5P0E331KTECHG	B	330pF	±10%	8.0	6.5	0.60±0.08	10.0±0.5
CT7-C6Y5P0E391KTECHG	B	390pF	±10%	9.0	6.5	0.60±0.08	10.0±0.5
CT7-C6Y5P0E471KTECHG	B	470pF	±10%	9.0	6.5	0.60±0.08	10.0±0.5
CT7-C7Y5P0E561KTECHG	B	560pF	±10%	10.0	6.5	0.60±0.08	10.0±0.5
CT7-C7Y5P0E681KTECHG	B	680pF	±10%	10.0	6.5	0.60±0.08	10.0±0.5
CT7-C8Y5P0E821KTECHG	B	820pF	±10%	11.0	6.5	0.60±0.08	10.0±0.5
CT7-C9Y5P0E102KTECHG	B	1000pF	±10%	12.0	6.5	0.60±0.08	10.0±0.5
CT7-C4Y5U0E471MTECHG	E	470pF	±20%	7.0	6.5	0.60±0.08	10.0±0.5
CT7-C5Y5U0E681MTECHG	E	680pF	±20%	8.0	6.5	0.60±0.08	10.0±0.5
CT7-C6Y5U0E102MTECHG	E	1000pF	±20%	9.0	6.5	0.60±0.08	10.0±0.5
CT7-C6Y5U0E122MTECHG	E	1200pF	±20%	9.0	6.5	0.60±0.08	10.0±0.5
CT7-C7Y5U0E152MTECHG	E	1500pF	±20%	10.0	6.5	0.60±0.08	10.0±0.5
CT7-C8Y5U0E182MTECHG	E	1800pF	±20%	11.0	6.5	0.60±0.08	10.0±0.5
CT7-C9Y5U0E222MTECHG	E	2200pF	±20%	12.0	6.5	0.60±0.08	10.0±0.5

CT7-C11Y5U0E332MTECHG	E	3300pF	±20%	14.0	6.5	0.60±0.08	10.0±0.5
CT7-C12Y5U0E472MTECHG	E	4700pF	±20%	15.0	6.5	0.60±0.08	10.0±0.5
CT7-C5Y5V0E102MTECHG	F	1000pF	±20%	8.0	6.5	0.60±0.08	10.0±0.5
CT7-C5Y5V0E152MTECHG	F	1500pF	±20%	8.0	6.5	0.60±0.08	10.0±0.5
CT7-C5Y5V0E182MTECHG	F	1800pF	±20%	8.0	6.5	0.60±0.08	10.0±0.5
CT7-C7Y5V0E222MTECHG	F	2200pF	±20%	10.0	6.5	0.60±0.08	10.0±0.5
CT7-C7Y5V0E272MTECHG	F	2700pF	±20%	10.0	6.5	0.60±0.08	10.0±0.5
CT7-C7Y5V0E332MTECHG	F	3300pF	±20%	10.0	6.5	0.60±0.08	10.0±0.5
CT7-C8Y5V0E392MTECHG	F	3900pF	±20%	11.0	6.5	0.60±0.08	10.0±0.5
CT7-C9Y5V0E472MTECHG	F	4700pF	±20%	12.0	6.5	0.60±0.08	10.0±0.5
CT7-C9Y5V0E562MTECHG	F	5600pF	±20%	12.0	6.5	0.60±0.08	10.0±0.5
CT7-C11Y5V0E682MTECHG	F	6800pF	±20%	14.0	6.5	0.60±0.08	10.0±0.5
CT7-C12Y5V0E822MTECHG	F	8200pF	±20%	15.0	6.5	0.60±0.08	10.0±0.5
CT7-C13Y5V0E103MTECHG	F	10000pF	±20%	16.0	6.5	0.60±0.08	10.0±0.5


注：以上规格均为常用容量规格，如需其他容量规格请与我司客服沟通确认。

Note: The above specifications are for the standard capacity. If you need other capacity specifications, please contact our customer service for confirmation.

## ◆产品认证及产品丝印 Product Certification and Product printing labels

### \* 产品认证 Product Certification

CT7 安规（交流） CT7 Safety Standard (AC)				
证书名称 Certificate Name	认证标志 Institutional logo	认证标准 Certification standards	Y1-系列 Y1 Series	Y2-系列 Y2 Series
中国 CQC		GB/T6346.14-2015	CQC03001007930	CQC03001007929
德国 VDE		IEC 60384-14 (ed.4)	40013874	40013869
美国 UL		IEC 60384-14 (ed.4)	E219015	
CB 证书	—	EN 60384-14:2013 /AMD1:2016	DE1-62035	DE1-62042
瑞士 SEV		IEC 60384-14 (ed.4) : 2013	19.0469	19.0470
瑞典 SEMKO		EN 60384-14:2013	1911979	1911982
挪威 NEMKO		IEC 60384-14: 2013	P19223835	P19223836
丹麦 DEMKO		EN 60384-14:2013	D-06110-M1	D-06111-M1
芬兰 FIMKO		EN 60384-14:2013 +AMD1:2016	FI/40255	FI/40256

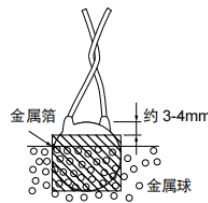
韩国 Korea		KC 60384-1 (2015-09) KC 60384-14 (2015-09)	SU03101-17002	SU03101-17001
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**\* 产品丝印 Product printing labels**

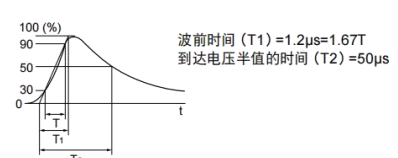
序号 No.	标示名称 Label name	代码 Code	图例 Example diagram
1	风华商标 FH logo	FH	
2	产品类型 Product type	CT7-Y1 交流（安规）系列电容器	
3	安规认证 Safety certification		
4	温度特性(TC)	E(Y5U)	
5	标称容量 Nominal Capacity	472(4700pF)	
6	容量偏差 Capacity Deviation	M(±20%)	
7	额定电压 Rated Voltage	500VAC	

**◆可靠性测试方法**

序号 No.	项目 Items		性能 Performance		试验条件 Test conditions			
					符合标准 Compliant standard: AEC-Q200 REV E 2023, 参考标准 Reference standards: IEC 60384-14: 2023、AEC-Q200 REV E 2023			
1	外观构造及尺寸 Appearance, Structure and Dimensions		外观无异常, 构造及尺寸依图示规定 The appearance shows no abnormalities. The structure and dimensions are in accordance with the illustrated specifications.		目视检验尺寸以游标卡尺测量 Visual inspection of dimensions is carried out using a vernier caliper for measurement.			
2	静电容量 Electrostatic capacitance		规定之容许误差以内 Within the allowable error range specified		测量频率: 1kHz 测量电压: 1.0 V ± 0.2 V			
3	损耗角正切值 Dissipation factor		Y5P (B)	≤2.5%	测试温度: 25±2℃			
			Y5U (E)	≤3.0%	Measurement frequency: 1 kHz			
			Y5V (F)	≤3.5%	Measurement voltage: 1.0 V ± 0.2 V Test temperature: 25±2℃			
4	绝缘电阻 (端子间) Insulation resistance (Between terminals)		≥10000MΩ		测试电压 Test Voltage	500±50V DC	施加时间 Time	60s±5s
5	耐电压 Withstand voltage	端子间 Between terminals	无永久性击穿或飞弧 No permanent breakdown or arcing		测试电压 Test Voltage	Y2: 2600V AC Y1: 4000V AC		
					施加时间 Time	逐批检验 Batch-by-batch inspection: 3s		
						鉴定和周期检验 Periodic Test: 60s		
					充放电流 Charge/discharge current: ≤50mA			

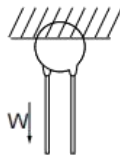
序号 No.	项目 Items		性能 Performance	试验条件 Test conditions
				符合标准 Compliant standard: AEC-Q200 REV E 2023, 参考标准 Reference standards: IEC 60384-14: 2023、AEC-Q200 REV E 2023
		端子与 外装间 Between terminal and Exterior cladding	无永久性击穿或飞弧 No permanent breakdown or arcing	 <p>如右图所示, 将电容器的端子连接, 在距各端子约 3mm-4mm 处, 用金属箔包裹电容器, 将电容器置于盛有直径为 1mm 金属球的容器内, 在电容器引线与金属球之间施加 Y2 (2600V AC)、Y1 (4000V AC) 电压 60 秒钟。(充电电流≤50mA)</p> <p>As shown in the figure on the right, connect the terminals of the capacitor. At a distance of about 3mm-4mm from each terminal, wrap the capacitor with a metal foil. Place the capacitor in a container filled with metal balls with a diameter of 1mm. Apply a voltage of Y2 (2600V AC) and Y1 (4000V AC) between the capacitor leads and the metal balls for 60 seconds.</p> <p>(Current charging and discharging ≤ 50mA)</p>
6	温度循环 Temperature cycle	外观 Appearance	无可见损伤、标志清晰 No visible damage, clear markings	<p>预处理: 在 125℃±2℃的条件下放置 1h 进行热处理, 在室温下放置 24h±2h 后进行测量</p> <p>TL= 下限类别温度 (-55<sup>+0</sup><sub>-3</sub>℃), TU= 上限类别温度 (125<sup>+3</sup><sub>-0</sub>℃)</p> <p>在 TL 或 TU 的放置时间: 30 分钟</p> <p>TL 与 TU 间转换时间: 1 分钟之内</p> <p>循环次数: 1000 次</p> <p>后处理: 室温放置 24h±2h 后进行测量</p> <p>Pre-treatment: Heat treatment at 125℃ ± 2℃ for 1 hour, then measure at room temperature after 24 h ± 2 h.</p> <p>TL = Lower limit category temperature (-55<sup>+0</sup><sub>-3</sub>℃), TU = Upper limit category temperature (125<sup>+3</sup><sub>-0</sub>℃)</p> <p>Time for placement at TL or TU: 30 minutes</p> <p>Conversion time between TL and TU: within 1 minute</p> <p>Number of cycles: 1000 times</p> <p>Post-treatment: Measure after being placed at room temperature for 24 hours ± 2 hours.</p>
		静电容量 变化 Capacity change	$ \Delta C/C  \leq 15\%$	
		损耗角 正切值 Dissipation factor	损耗因数: ≤2X 初始规格上限 DF: ≤ 2X initial specification upper limit	
		耐电压 (端子间) Withstand Voltage	参照项目 5 内容 Refer to the content of Project 5	
		绝缘电阻 Insulation resistance	>3000MΩ	
7	耐湿负荷 Moisture resistance loading	外观 Appearance	无可见损伤、标志清晰 No visible damage, clear markings	<p>预处理: 在 125℃±2℃的条件下放置 1h 进行热处理, 在室温下放置 24h±2h 后进行测量</p> <p>温度: 85℃</p> <p>湿度: 85%RH</p> <p>电压: 额定电压</p> <p>时间: 1000 小时</p>
		静电容量 变化 Capacity change	$ \Delta C/C  \leq 15\%$	



序号 No.	项目 Items		性能 Performance	试验条件 Test conditions
				符合标准 Compliant standard: AEC-Q200 REV E 2023, 参考标准 Reference standards: IEC 60384-14: 2023, AEC-Q200 REV E 2023
		损耗角 正切值 Dissipation factor	损耗因数: $\leq 2X$ 初始规格上限 DF: $\leq 2X$ initial specification upper limit	后处理: 室温放置 24h $\pm$ 2h 后进行测量 Pre-treatment: Heat treatment was conducted at 125 $^{\circ}$ C $\pm$ 2 $^{\circ}$ C for 1 hour, and then the measurement was carried out after being left at room temperature for 24 hours $\pm$ 2 hours. Temperature: 85 $^{\circ}$ C Humidity: 85%RH Voltage: Rated voltage Time: 1000 hours Post-treatment: Measure after leaving at room temperature for 24 hours $\pm$ 2 hours.
		耐电压 (端子间) Withstand Voltage	参照项目 5 内容 Refer to the content of Project 5	
		绝缘电阻 Insulation resistance	>3000M $\Omega$	
8	脉冲电压 Pulse voltage		无永久性击穿或飞弧 No permanent breakdown or arcing	参考波形: 1.2/50us; 每个电容器施加 24 次脉冲, 脉冲间隔 $\geq$ 10s, 峰值电压: 5KV(Y2)或 8KV(Y1) 24 次脉冲中有连续 3 次以上, 未发生自愈性击穿或闪火的情况为通过。 Reference waveform: 1.2/50us; Each capacitor is subjected to 24 pulses, with a pulse interval of $\geq$ 10s. Peak voltage: 5KV (Y2) or 8KV (Y1). If among the 24 pulses, there are 3 or more consecutive pulses without self-healing breakdown or flashover, it is considered passed.
9	耐久性 Endurance test	外观 Appearance	无可见损伤、标志清晰 No visible damage, clear markings	在试验前, 应对每个电容器实施 (Y2 为 5KV、Y1 为 8KV) 三次电压脉冲 Before the experiment, a voltage pulse of (Y2 is 5KV, Y1 is 8KV) should be applied to each capacitor three times.  波前时间 (T1) = 1.2 $\mu$ s=1.67T 到达电压半值的时间 (T2) = 50 $\mu$ s 预处理: 在 125 $^{\circ}$ C $\pm$ 2 $^{\circ}$ C 的条件下放置 1h 进行热处理, 在室温下放置 24h $\pm$ 2h 后进行测量 Pre-treatment: Heat treatment was conducted at 125 $^{\circ}$ C $\pm$ 2 $^{\circ}$ C for 1 hour, and then the measurement was carried out after being left at room temperature for 24h $\pm$ 2h. 在 125 $\pm$ 2/ $-0^{\circ}$ C 及相对湿度低于 50% 的条件下施加 170%UR
		静电容量 变化 Capacity change	$ \Delta C/C  \leq 20\%$	
		损耗角 正切值 Dissipation factor	损耗因数: $\leq 2X$ 初始规格上限 DF: $\leq 2X$ initial specification upper limit	
		耐电压 (端子间) Withstand Voltage	参照项目 5 内容 Refer to the content of Project 5	

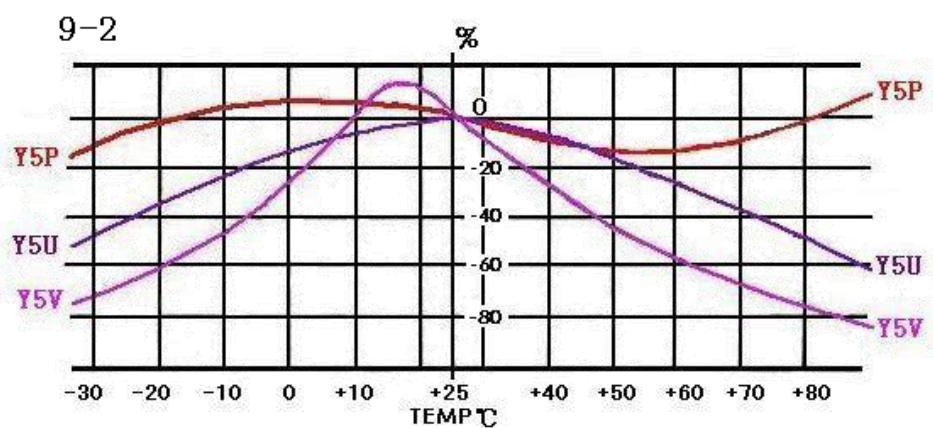


序号 No.	项目 Items		性能 Performance		试验条件 Test conditions 符合标准 Compliant standard: AEC-Q200 REV E 2023, 参考标准 Reference standards: IEC 60384-14: 2023、AEC-Q200 REV E 2023							
		绝缘电阻 Insulation resistance	>3000MΩ		电压 1000 小时。 Apply a voltage of 170% UR for 1000 hours under the conditions of 125 ± 2 / -0 °C and a relative humidity lower than 50%. 后处理: 室温放置 1h 至 2h 后进行测量 Post-treatment: Measure after leaving at room temperature for 1 to 2 hours.							
10	耐振性 Vibration resistance	外观 Appearance	无可见损伤 No visible damage		频率: 10Hz-2000Hz(每个循环 20 分钟); 加速度: **g; (如无特殊要求, 默认为 5g) 方向与时间: 每个方向 12 个循环 (4 小时), 3 个方向共 12 小时 Frequency: 10Hz - 2000Hz (each cycle lasts for 20 minutes); Acceleration: **g; (If no special requirements, it defaults to 5g) Direction and Time: 12 cycles in each direction (4 hours), a total of 12 hours for 3 directions.							
		静电容量 Capacity	规定之容许误差以内 Within the allowable error range specified									
		损耗角正切值 Dissipation factor	Y5P (B)	≤2.5%								
			Y5U (E)	≤3.0%								
			Y5V (F)	≤3.5%								
11	耐焊接热 Resistance to welding heat	外观 Appearance	无可见损伤 No visible damage		预处理: 初次测量之前, 将电容器在 125±2℃条件下存放 1 小时, 然后在室内条件下放置 24±2 小时。 Pre-treatment: Before the initial measurement, store the capacitor at 125 ± 2℃ for 1 hour, and then place it in an indoor environment for 24 ± 2 hours. <table><tr><td>焊锡温度 Temperature</td><td>260℃±3℃</td></tr><tr><td>浸入时间 Time</td><td>10 s±1 s</td></tr></table> <div><div>绝热屏蔽 thermal screen</div><div>电容 capacitor</div><div>8-1</div><div>1.5~2.0mm</div><div>焊锡槽 molten solder</div></div> 后处理: 将电容器在室内条件下存放至 1 至 2 小时。 Post-processing: Store the capacitor in an indoor environment for 1 to 2 hours.	焊锡温度 Temperature	260℃±3℃	浸入时间 Time	10 s±1 s			
		焊锡温度 Temperature	260℃±3℃									
		浸入时间 Time	10 s±1 s									
		静电容量变化 Capacity change	ΔC/C ≤10%									
		耐电压 (端子间) Withstand Voltage	参照项目 5 内容 Refer to the content of Project 5									
绝缘电阻 Insulation resistance	≥10000MΩ											
12	可焊性 Weldability	引线表面均匀沾锡, 上锡面积不小于总面积的 95% The surface of the lead wire is evenly coated with tin, and the area of tin coating should be no less than 95% of the total area.		<table><tr><td>试验焊料 Solder</td><td>Sn96,5Ag3Cu,5</td></tr><tr><td>焊锡温度 Temperature</td><td>245℃±3℃</td></tr><tr><td>浸入时间 Time</td><td>3s±0.3s</td></tr><tr><td>上锡面积 The area of tin plating</td><td>≥95%</td></tr></table> 浸入深度:距离电容本体 2.0±0.5mm Immersion depth: 2.0 ± 0.5 mm from the capacitor body	试验焊料 Solder	Sn96,5Ag3Cu,5	焊锡温度 Temperature	245℃±3℃	浸入时间 Time	3s±0.3s	上锡面积 The area of tin plating	≥95%
		试验焊料 Solder	Sn96,5Ag3Cu,5									
焊锡温度 Temperature	245℃±3℃											
浸入时间 Time	3s±0.3s											
上锡面积 The area of tin plating	≥95%											

序号 No.	项目 Items		性能 Performance	试验条件 Test conditions
				符合标准 Compliant standard: AEC-Q200 REV E 2023, 参考标准 Reference standards: IEC 60384-14: 2023, AEC-Q200 REV E 2023
13	机械冲击	外观 Appearance	无可见损伤、标志清晰 No visible damage, clear markings	半正弦波; 峰值加速度: 100g; 脉冲持续时间: 6ms; 三轴六向各 3 次, 共 18 次。 Half-sine wave; Peak acceleration: 100g; Pulse duration: 6ms; Three axes and six directions each 3 times, totaling 18 times.
		静电容量 Capacity	规定之容许误差以内 Within the allowable error range specified	
		绝缘电阻 Insulation resistance	$\geq 10000\text{M}\Omega$	
		损耗角 正切值 Dissipation factor	损耗因数: $\leq 2X$ 初始规格上限 DF: $\leq 2X$ initial specification upper limit	
14	静电放电 ESD	外观 Appearance	无可见损伤、标志清晰 No visible damage, clear markings	静电 2kV 测试
		静电容量 变化 Capacity change	$ \Delta C/C  \leq 10\%$	
		耐电压 (端子间) Withstand Voltage	参照项目 5 内容 Refer to the content of Project 5	
		绝缘电阻 Insulation resistance	$\geq 10000\text{M}\Omega$	
15	端子强度 Strength of terminal	抗拉强度 Tensile strength	引线不断裂, 电容器不破损 The leads do not break and the capacitors do not get damaged.	<p>如右图所示, 固定住电容器, 在引线上逐步施加径向拉力直至 10N, 并保持 <math>10 \pm 1</math> 秒钟。</p> <p>As shown in the figure on the right, fix the capacitor, and gradually apply radial tension on the lead wire until it reaches 10N, and maintain this tension for <math>10\text{s} \pm 1\text{s}</math>.</p> 
		弯曲强度 Bending strength	引线不断裂, 电容器不破损 The leads do not break and the capacitors do not get damaged.	<p>在引线出口处沿一个方向施加 5N、90° 的弯曲压力, 然后恢复至原始状态。之后在 2 至 3 秒内再以相反方向施加一次 90° 的弯曲压力。</p> <p>Apply a 5N bending force at a 90° angle in one direction at the end of the lead wire, then return to the original state. Afterwards, apply a 90° bending force in the opposite direction again within 2 to 3 seconds.</p>

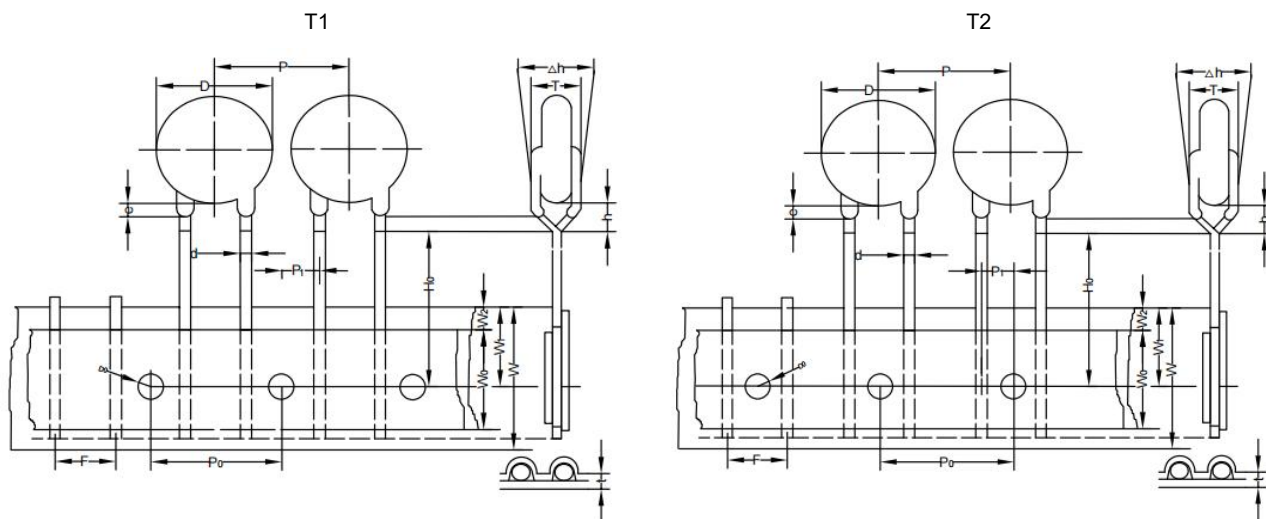
序号 No.	项目 Items		性能 Performance	试验条件 Test conditions  符合标准 Compliant standard: AEC-Q200 REV E 2023, 参考标准 Reference standards: IEC 60384-14: 2023, AEC-Q200 REV E 2023												
16	冷热冲击 Thermal shock	外观 Appearance	无可见损伤、标志清晰 No visible damage, clear markings	预处理: 在 125℃±2℃的条件下放置 1h 进行热处理, 在室温下放置 24h±2h 后进行测量  TL= 下限类别温度 ( -55 <sup>+0</sup> <sub>-.3</sub> ℃ ) , TU= 上限类别温度 (125 <sup>+3</sup> <sub>-.0</sub> ℃) ;  在 TL 或 TU 的放置时间: 15 分钟; TL 与 TU 间转换时间: 20s 之内;  循环次数: 300 次; 后处理: 试验后室温下 24±2 hrs 后进行测量 Pre-treatment: Place at 125℃ ± 2℃ for 1 hour for heat treatment, and then measure after being left at room temperature for 24 hours ± 2 hours.  TL = Lower limit category temperature(-55 <sup>+0</sup> <sub>-.3</sub> ℃), TU = Upper limit category temperature(125 <sup>+3</sup> <sub>-.0</sub> ℃); The duration of placement at TL or TU: 15 minutes; The conversion time between TL and TU: within 20 seconds;  Number of cycles: 300 times; Post-treatment: Measure after leaving at room temperature for 24 ± 2 hours after the test.												
		静电容量变化 Capacity change	ΔC/C ≤15%													
		绝缘电阻 Insulation resistance	>3000MΩ													
		耐电压 (端子间) Withstand Voltage	参照项目 5 内容 Refer to the content of Project 5													
		损耗角正切值 Dissipation factor	损耗因数: ≤2X 初始规格上限 DF: ≤ 2X initial specification upper limit													
17	温度特性 Temperature characteristics		在允许规格范围内 Within the permitted specifications range	预处理: 初次测量之前, 将电容器在 125±3℃条件下存放 1 小时, 然后在室内条件下放置 24±2 小时。 Pre-treatment: Before the initial measurement, the capacitor should be stored at 125 ± 3℃ for 1 hour, and then placed in an indoor environment for 24 ± 2 hours.  依次按以下温度循环阶段测定: Measure successively in the following temperature cycling stages: <table><tr><td>阶段 Step</td><td>温度 Temperature(℃)</td></tr><tr><td>1</td><td>20℃±2℃</td></tr><tr><td>2</td><td>-25℃±2℃</td></tr><tr><td>3</td><td>20℃±2℃</td></tr><tr><td>4</td><td>85℃±2℃</td></tr><tr><td>5</td><td>20℃±2℃</td></tr></table>	阶段 Step	温度 Temperature(℃)	1	20℃±2℃	2	-25℃±2℃	3	20℃±2℃	4	85℃±2℃	5	20℃±2℃
阶段 Step	温度 Temperature(℃)															
1	20℃±2℃															
2	-25℃±2℃															
3	20℃±2℃															
4	85℃±2℃															
5	20℃±2℃															
预处理(仅针对 II 类电容器): 在 140℃~150℃下预热 1h±10min 后, 在室温下放置 24±2h。 实验结束后处理(仅针对 II 类电容器): 在 140℃~150℃下预热 1h±10min 后, 在室温下放置 24±2h。 Pre-treatment (only for type II capacitors): Preheat at 140℃~150℃ for 1h±10min, then leave at room temperature for 24±2h. Post-experiment treatment (only for type II capacitors): Preheat at 140℃~150℃ for 1h±10min, then leave at room temperature for 24±2h.  “室内条件”—— 温度: 15℃~35℃, 相对湿度: 25%~75 %, 大气压力: 86kPa~106kPa "Indoor conditions" - Temperature: 15℃ to 35℃, Relative humidity: 25% to 75%, Atmospheric pressure: 86kPa to 106kPa																

◆产品特性曲线图 Temperature characteristic curve graph



◆包装 Packaging (示例为 0 脚型 Example: 0)

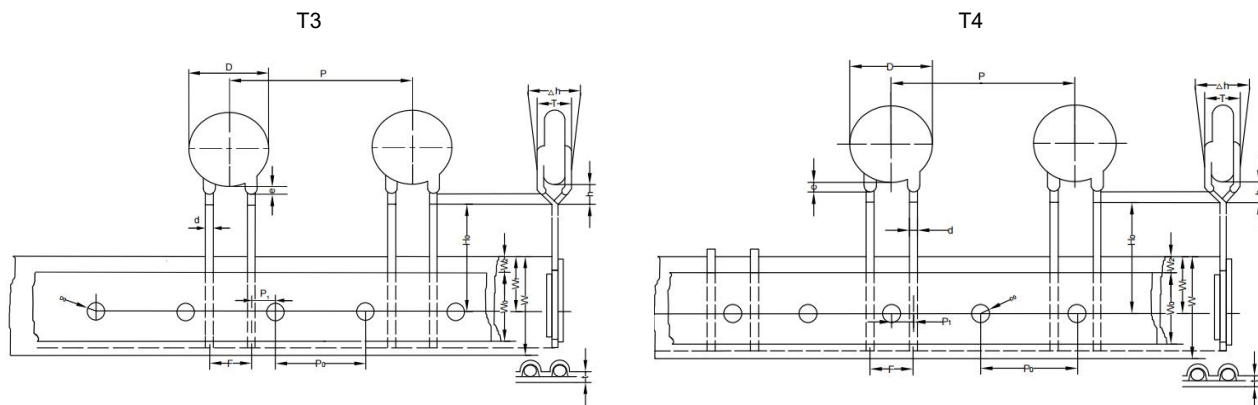
\* 编带样式及尺寸 Tape style and size



单位: mm

编带样式代码 Tape style code			T1	T2	T1	T1	T2
序号 NO.	符号 Code	尺寸定义 Code definition	尺寸 Size		尺寸 Size		
1	P	元件间距	12.7±2.0		15.0±2.0		
2	P <sub>0</sub>	纸带孔距	12.7±0.3		15.0±0.3		
3	F	引线间距	5.0±0.5	7.5±0.5	5.0±0.5	7.5±0.5	10.0±0.5
4	P <sub>1</sub>	引线偏距	3.85±0.7	3.75±0.7	5.0±0.7	3.75±0.7	5.0±0.7
5	D	成品直径	见规格尺寸-成品直径				
6	T	成品厚度	见规格尺寸-成品厚度				
7	d	引线线径	0.60±0.08				
8	e	涂装脚长	弯折卡位内				
9	H <sub>0</sub>	引线高度 (纸带孔-引线弯折位高度)	18.0±2.0				
10	Δh	元件前后偏距	2.0 Max				
11	h	元件底部-折弯位底部距离	4.0Max				
12	D <sub>0</sub>	孔径	4.0±0.2				
13	W	纸带宽度	18.0±0.5				
14	W <sub>0</sub>	胶带宽度	7.5 min				
15	W <sub>1</sub>	纸带孔-纸带边偏距	9.0±0.5				
16	W <sub>2</sub>	胶带-纸带边偏距	1.5±1.5				
17	t	纸带-胶带厚度	0.7Max				

\* 编带样式及尺寸 Tape style and size



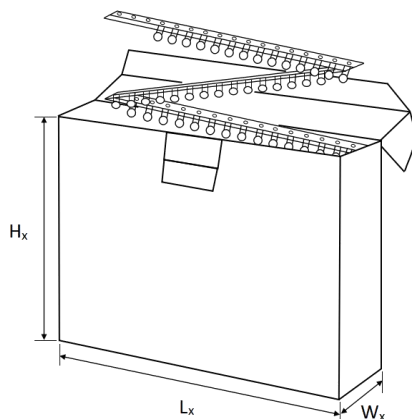
单位: mm

编带样式代码 Tape style code			T3	T4	T4	T3	T3	T4
序号 NO.	符号 Code	尺寸定义 Code definition	尺寸 Size			尺寸 Size		
1	P	元件间距	25.4±2.0			30.0±2.0		
2	P <sub>0</sub>	纸带孔距	12.7±0.3			15.0±0.3		
3	F	引线间距	5.0±0.5	7.5±0.5	10.0±0.5	5.0±0.5	7.5±0.5	10.0±0.5
4	P <sub>1</sub>	引线偏距	3.85±0.7	3.75±0.7	5.0±0.7	5.0±0.7	3.75±0.7	5.0±0.7
5	D	成品直径	见规格尺寸-成品直径					
6	T	成品厚度	见规格尺寸-成品厚度					
7	d	引线线径	0.60±0.08					
8	e	涂装脚长	弯折卡位内					
9	H <sub>0</sub>	引线高度 (纸带孔-引线弯折位高度)	18.0±2.0					
10	Δh	元件前后偏距	2.0 Max					
11	h	元件底部-折弯位底部距离	4.0Max					
12	D <sub>0</sub>	孔径	4.0±0.2					
13	W	纸带宽度	18.0±0.5					
14	W <sub>0</sub>	胶带宽度	7.5 min					
15	W <sub>1</sub>	纸带孔-纸带边偏距	9.0±0.5					
16	W <sub>2</sub>	胶带-纸带边偏距	1.5±1.5					
17	t	纸带-胶带厚度	0.7Max					

### \* 包装数量 Packaging quantity

#### 编带包装 Strapping packaging

内箱包装 Inner box packaging:



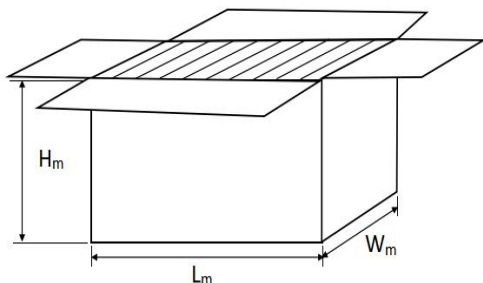
芯片直径φ (mm) Chip diameter	L <sub>x</sub> (mm)	W <sub>x</sub> (mm)	H <sub>x</sub> (mm)
<10	330	48	265
≥10	330	54	265

产品类型 Product type	元件间距 P (mm) Component spacing			
	包装数量 (Kpcs/盒) Quantity(K/crate)			
	12.7	15.0	25.4	30.0
Y1	1.0	0.5	1.0	0.5
Y2	1.0	1.0	1.0	1.0

注：以上包装数量为常用包装数量，由于不同规格产品尺寸间存在差异，有些规格实际包装数量可能存在一定的差异，包装数量仅供参考。

Note: The above packaging quantities represent the commonly used quantities. Due to the differences in size among various product specifications, the actual packaging quantities for some specifications may vary slightly. These quantities are for reference only.

#### 外箱包装 Outer box packaging:



产品规格 (mm)	L <sub>m</sub> (mm)	W <sub>m</sub> (mm)	H <sub>m</sub> (mm)
芯片直径<10	285	170	345
	535	288	350
芯片直径≥10	280	183	345
	595	288	350

注：以上外箱尺寸为常用包装尺寸，根据不同的装箱数量及包装要求外箱之间可能会存在有一定的差异，尺寸仅供参考。

Note: The above dimensions of the outer box are the commonly used packaging sizes. Depending on the different quantities of packing and packaging requirements, there may be some variations between the outer boxes. These dimensions are for reference only.

#### 散装包装 Bulk packaging

车规产品推荐使用编带样式包装，如需散装包装请与我司客服沟通确认。

For automotive-grade products, we recommend using tape packaging. If you need loose packaging, please contact our customer service for confirmation.



## ◆储存方法 Storage method

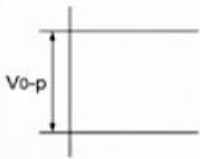
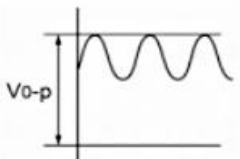
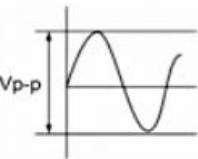
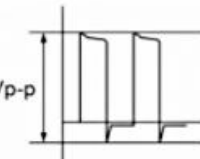
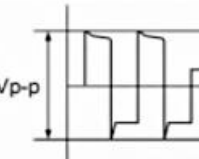
- ① 产品储存场地要整洁、干燥、通风、无漏水、无污染。
- ② 产品长时间储存时不应直接放在地面，应放在托架上进行防潮。
- ③ 注意按包装箱上的堆放高度对产品进行堆放。
- ④ 储存环境温度：-25℃~+40℃；储存期限：2年（附注：由于瓷介电容器具有老化特性，因此建议在收到货后尽快检测确认容量参数。经过检验合格的产品储存一段时间后再次检测可能会发现容量偏低，属于正常现象，无需进行专门处理，只需将产品于产线上正常经过波峰焊/回流焊后，容量将恢复到正常规格内。）
- ① The storage area for the products should be clean, dry, well-ventilated, free from water leakage and pollution.
- ② When the products are stored for a long time, they should not be placed directly on the ground. Instead, they should be placed on racks to prevent moisture.
- ③ Pay attention to stacking the products according to the stacking height indicated on the packaging boxes.
- ④ Storage environment temperature: -25℃ to +40℃; Storage period: 2 years (Note: Due to the aging characteristic of ceramic capacitors, it is recommended to test and confirm the capacity parameters as soon as possible after receiving the goods. After the products pass the inspection, if their capacity is found to be lower after being stored for a period of time, this is a normal phenomenon and no special treatment is required. Just let the products go through the normal wave soldering/reflow soldering process on the production line, and their capacity will return to the normal specification.)

## ◆使用前的注意事项 Pre-use precautions

### \* 工作电压 Working voltage

在交流电路或纹波电流电路中使用直流额定电压电容器时，请务必确保外加电压的  $V_{p-p}$  值或包含直流偏置电压的  $V_{o-p}$  值保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不规则电压，请务必使用额定电压范围大于此不规则电压的电容器。

When using DC rated voltage capacitors in AC circuits or ripple current circuits, it is essential to ensure that the  $V_{p-p}$  value of the applied voltage or the  $V_{o-p}$  value including the DC bias voltage remains within the rated voltage range. If a voltage is applied to the circuit, temporary irregular voltages may occur due to resonance or switching when starting or stopping. Therefore, it is necessary to use capacitors with a rated voltage range greater than this irregular voltage.

直流电压 DC voltage	直流+交流电压 DC+AC voltage	交流电压 AC voltage	冲击电压 (1) Pulse voltage(1)	冲击电压 (2) Pulse voltage(2)
				

### \* 工作温度和自身发热（适用于 B/E/F 特性）

#### Working temperature and self-heating (applicable to B/E/F characteristics)

电容器的表面温度应保持在额定工作温度范围内，务必考虑到电容器自身发出的热量。电容器在高频电流、冲击电流等使用时可能会因介电损耗自身发热，所施加的正弦波电压的频率应低于 300 kHz。外加电压应使自身发热等负荷在 25℃ 周围温度条件下不超过 20℃ 范围，测量时应使用  $\phi 0.1\text{mm}$  小热容量的 (K) 的热电偶，而且电容器不应受到其它组件的散热或周围温度波动影响。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）。

The surface temperature of the capacitor should be maintained within its rated operating temperature range, taking into account the heat generated by the capacitor itself. When the capacitor is used in high-frequency currents, impulse currents, etc., it may generate heat due to dielectric loss. The applied sinusoidal voltage frequency should be lower than 300 kHz. The applied voltage should ensure that the

load causing self-heating does not exceed 20°C within the temperature range of 25°C. During measurement, a (K) type thermocouple with  $\varnothing 0.1\text{mm}$  small heat capacity should be used. The capacitor should not be affected by the heat dissipation of other components or temperature fluctuations in the surrounding environment. Overheating may lead to a decline in the characteristics and reliability of the capacitor (Do not measure when the cooling fan is running, otherwise the accuracy of the measurement data cannot be ensured).

#### \* 耐电压的测试条件 Test conditions for withstanding voltage

##### 测试设备 Testing equipment

交流耐电压的测试设备应具有能够产生类似于 50/60Hz 正弦波的功能，如果施加变形的正弦波或超过规定电压值的超载电压，则可能会导致故障。

The testing equipment for alternating voltage withstand capability should be capable of generating a function similar to a 50/60Hz sine wave. If distorted sine waves or overload voltages exceeding the specified value are applied, it may cause faults.

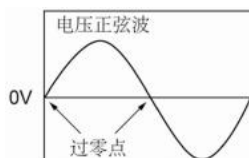
##### 电压外加方法 Voltage application method

施加耐电压时，电容器的引线或端子应与耐电压测试设备的输出端连接牢固，然后再将电压从近零增加到测试电压。如果测试电压不从近零逐渐提高而是直接施加在电容器上，则施加时应包含过零点，测试结束时，测试电压应降到近零，然后再将电容器引线或端子从耐电压测试设备的输出端取下。如果测试电压不从近零逐渐提高而是直接施加在电容器上，则可能会出现浪涌电压，从而导致故障。

When applying the withstand voltage, the leads or terminals of the capacitor should be firmly connected to the output terminal of the withstand voltage testing equipment, and then the voltage should be increased from nearly zero to the test voltage. If the test voltage is not gradually raised from nearly zero but is directly applied to the capacitor, then during the application process, the zero point should be included. At the end of the test, the test voltage should be reduced to nearly zero, and then the leads or terminals of the capacitor should be disconnected from the output terminal of the withstand voltage testing equipment. If the test voltage is not gradually raised from nearly zero but is directly applied to the capacitor, then a surge voltage may occur, which could lead to a fault.

过零点是指电压正弦通过 0V 的位置。

The zero-crossing point refers to the position where the voltage sine wave passes through 0V.



参见右图 Refer to the right figure:

#### \* 失效安全性 Failure safety

如果电容器破损，会导致短路电路故障。务必在本产品上适当提供例如保险丝等自动防故障功能，以免导致电击、火灾、或冒烟等。

If the capacitor is damaged, it will cause a short circuit fault in the circuit. It is essential to provide appropriate automatic fault prevention functions such as fuses on this product to avoid electric shock, fire, or smoke emission.

#### \* 焊接、安装与使用 Welding, installation and usage

##### 振荡与冲击 Vibration and Impact

使用时请勿使电容器或引线受到过度冲击或振荡。

When using, please avoid subjecting the capacitors or leads to excessive shock or vibration.

##### 焊接 Welding

将该产品焊接在 PCB/PWB 上时，不应超出电容器的耐焊接热规格，本产品过热会使内部接点锡焊料熔化，导致温度骤变，从而造成陶瓷组件产生裂纹。当使用烙铁焊接电容器时，应遵循以下条件：烙铁头温度：最高 400°C；烙铁功率：最大 50W；焊接时间：最多 3.5 秒。

When welding this product onto a PCB/PWB, it should not exceed the soldering temperature limit of the capacitor. If this product overheats, the internal soldering material of the contact points will melt, causing a sudden temperature change and thereby causing cracks in the ceramic component. When using a soldering iron to solder capacitors, the following conditions should be followed: Soldering iron tip temperature: maximum 400°C; Soldering iron power: maximum 50W; Soldering time: up to 3.5 seconds.

#### \* 清洗（超声波清洗） Cleaning (Ultrasonic cleaning)

进行超声波清洗时,应遵守下列条件:“洗涤槽容量: 20 瓦特输出功率 / 每升或以下; 洗涤时间: 最多 5 分钟; 不得直接振荡 PCB/PWB”。过度的超声波洗涤会导致引线的超载损坏。

When conducting ultrasonic cleaning, the following conditions should be followed: "Washing tank capacity: 20 watt output power / per liter or less; washing time: no more than 5 minutes; Do not directly oscillate PCB/PWB". Excessive ultrasonic cleaning can cause overload damage to the leads.

#### ●警告（使用与保管环境） Kindly note (Usage and Storage Environment)

电容器的绝缘涂层不形成完美的密封; 因此, 请勿在腐蚀性环境中使用或存放电容器, 尤其是存在氯气、硫气、酸、碱、盐等地方。同时应防潮。在对本产品进行清洗、覆膜或包装前, 请先在指定设备上测试经清洗、覆膜或封膜的产品的性能, 以确认这些过程不会影响电容器的质量。电容器应存放在温度及相对湿度分别不超过-10℃到 40℃及 15%RH 至 85%RH 范围的地方。

使用本产品时如未能遵循上述警告事项, 则在严重情况下, 可能导致短路, 并引起冒烟或局部离散。

The insulating coating of the capacitor does not form a perfect seal; therefore, do not use or store the capacitor in corrosive environments, especially in places with chlorine, sulfur, acids, alkalis, salts, etc. At the same time, it should be protected from moisture. Before cleaning, coating or packaging this product, please first test the performance of the cleaned, coated or sealed product on the designated equipment to confirm that these processes will not affect the quality of the capacitor. The capacitor should be stored in a place where the temperature and relative humidity do not exceed -10°C to 40°C and 15%RH to 85%RH respectively.

If the above warning matters are not followed when using this product, in severe cases, it may cause short circuits and result in smoke or local disintegration.

#### ●警告（焊接与安装） Kindly note (Welding and Installation)

##### 振荡与冲击 Vibration and Impact

使用时请勿使电容器或引线受到过度冲击或振动。过度冲击或振荡会对安装在电路板上的引线造成疲劳性破坏。请采取措施, 使用粘合剂、封膜树脂或其它涂层将电容器安装在电路板上。使用指定设备进行固定时, 请确认固定措施对产品不会造成影响。

When using, please avoid subjecting the capacitors or leads to excessive shock or vibration. Excessive shock or vibration can cause fatigue damage to the leads installed on the circuit board. Please take measures by using adhesives, encapsulation resins or other coatings to install the capacitors on the circuit board. When using the specified equipment for fixation, please confirm that the fixation measures will not affect the product.

##### 焊接 Welding

当将本产品焊接到 PCB/PWB 上时, 不得超过电容器的焊接耐热性。如果本产品过热, 可能导致内部连接点焊料熔化, 并且可能导致热冲击, 从而导致陶瓷元件破裂。当使用烙铁焊接电容器时, 应遵循以下条件:

烙铁头温度: 最高 400℃

烙铁功率: 最大 50W

焊接时间: 最长 3.5s

When soldering this product onto a PCB/PWB, the temperature must not exceed the soldering tolerance of the capacitor. If this product overheats, it may cause the solder at the internal connection points to melt, and it may also lead to thermal shock, thereby causing the ceramic components to crack. When using a soldering iron to solder capacitors, the following conditions should be followed:

Soldering iron tip temperature: Maximum 400℃

Soldering iron power: Maximum 50W

Soldering time: Up to 3.5 s

#### \* 粘合、树脂封膜和树脂涂敷 Bonding, resin sealing film and resin coating

在对本产品进行覆膜、封膜或施加涂层时，请先在指定设备上测试经覆膜、封膜或涂敷的产品的性能，以确认这些工艺不会影响电容器的质量。当含有有机溶剂（乙酸乙酯、甲基乙基酮、甲苯等等）的粘合剂和封膜树脂的使用量、干燥/硬化条件不适当时，有机溶剂可能损坏电容器的外涂层树脂，最坏情况下可能导致短路。粘合剂、封膜树脂或涂层的厚度变化可能导致处于温度周期变化中的电容器的外涂层树脂破裂或陶瓷元件破裂。

When applying film coating, sealing film or applying coating to this product, please first test the performance of the coated, sealed or coated product on the designated equipment to ensure that these processes do not affect the quality of the capacitor. When the usage amount of adhesives and sealing resins containing organic solvents (ethyl acetate, methyl ethyl ketone, toluene, etc.) and the drying/hardening conditions are inappropriate, the organic solvents may damage the outer coating resin of the capacitor, and in the worst case, may cause a short circuit. Changes in the thickness of adhesives, sealing resins or coatings may cause the outer coating resin of the capacitor or ceramic components to crack under temperature cycle variations.

#### \* 粘合、树脂封膜和树脂涂敷后的处理 Bonding, resin sealing film and resin coating treatment

焊接后，当外涂层很热（超过 100℃）时，外涂层会变得很软、易碎。因此，请注意不要对涂层施加机械冲击力。

使用本产品时如未能遵循上述警告事项，则在严重情况下，可能导致短路，并引起冒烟或局部离散。

After welding, when the outer coating is very hot (above 100℃), it becomes very soft and brittle. Therefore, please be careful not to apply mechanical impact force to the coating.

If the above warnings are not followed when using this product, in severe cases, it may cause a short circuit and result in smoke or local detachment.

#### ●警告（使用方面） Kindly note (Usage)

##### 振荡与冲击 Vibration and Impact

使用时请勿使电容器或引线受到过度冲击或振动。过度冲击或振荡会对安装在电路板上的引线造成疲劳性破坏。请采取措施，使用粘合剂、封膜树脂或其它涂层将电容器安装在电路板上。使用指定设备进行固定时，请确认固定措施对产品不会造成影响。

使用本产品时如未能遵循上述警告事项，则在严重情况下，可能导致短路，并引起冒烟或局部离散。

When using, please avoid subjecting the capacitors or leads to excessive shock or vibration. Excessive shock or vibration can cause fatigue damage to the leads installed on the circuit board. Please take measures by using adhesives, encapsulation resins or other coatings to install the capacitors on the circuit board. When using the specified equipment for fixation, please confirm that the fixation measures will not affect the product.

If the above warning matters are not followed when using this product, in severe cases, it may lead to short circuit, and cause smoking or local disintegration.

#### \* 应用限制 Application Instructions

- ① 本规格书中记载的产品规格仅适用车载电子设备的一般用途，并且一般电子设备仅限常规的操作和使用方法。
- ② 对于要求高安全性与高可靠性的应用场景，或因设备故障、失误操作、运行异常可能导致人身伤亡、财产损失及重大社会影响的特定用途（定义如下），本公司不对产品的适用性、性能表现及品质提供任何保证。
- ① The product specifications recorded in this specification are only applicable to the general purposes of vehicle-mounted electronic devices, and the general electronic devices are limited to conventional operation and usage methods.
- ② For application scenarios that require high safety and reliability, or for specific purposes where equipment failure, improper operation, or abnormal operation may lead to personal injury, property loss, and significant social impact (as defined below), our company does not provide any guarantees regarding the applicability, performance, and quality of the products.

1、	航空，航天设备 Aerospace and aviation equipment	6、	公共性的高度信息处理设备 Highly sophisticated public information processing equipment
2、	军用设备	7、	电热用品，燃烧设备

	Military equipment		Electric heating appliances, combustion equipment
3、	交通工具控制设备 Transportation vehicle control equipment	8、	核动力相关设备 Nuclear power-related equipment
4、	医疗设备 Medical equipment	9、	防灾防盗设备 Disaster prevention and theft prevention equipment
5、	发电控制设备 Power generation control equipment	10、	其他被认定为特定用途的应用 Other applications that have been identified as being for specific purposes

- ③ 若客户拟在本产品目录所说明的适用范围、使用条件之外使用产品，或计划将产品用于特定用途，敬请事先向本公司相关部门咨询。本公司将根据客户实际需求，协同商议与本产品目录所记载内容不同的使用方案。
- ④ 除非客户事先获得本公司的书面同意，否则对于客户或第三方因将公司产品用于第②点所述特定用途而产生的任何损害，本公司均不承担任何责任。
- ③ If the customer intends to use the product beyond the applicable scope and usage conditions specified in this product catalogue, or plans to use the product for specific purposes, please consult the relevant department of our company in advance. Our company will, based on the actual needs of the customer, jointly discuss and formulate alternative usage plans that differ from the contents recorded in this product catalogue.
- ④ Unless the customer obtains the written consent of our company in advance, our company shall not be liable for any damages incurred by the customer or a third party due to the use of our products for the specific purposes mentioned in point 2.

## ◆推荐安装/焊接方法 Recommended installation/welding method

### \* 焊接建议 Welding Suggestions

#### 1.波峰焊外形 Wave soldering shape

建议流量的温度条件如图所示。The recommended temperature conditions for the flow rate are shown in the figure below.

必须进行预热。Preheating must be carried out.

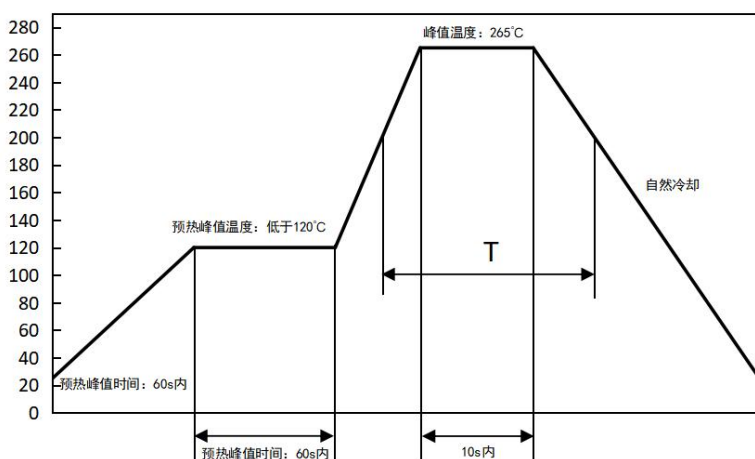
建议最高峰值流量温度为 265℃。The recommended peak flow temperature is 265℃.

当温度超过 200℃ 时，在 20 秒内执行图表中建议的时间“T”。

When the temperature exceeds 200℃, the time indicated in the chart "T" should be executed within 20 seconds.

注意流动焊料，不要在安装时直接接触电容器本体。

Be careful with the flow of solder, do not directly touch the capacitor body during installation.



#### 2.使用烙铁的推荐返工条件 Recommended rework conditions for using the soldering iron

烙铁头温度：最高 400℃。Soldering iron tip temperature: Maximum 400℃.

烙铁功率：最大 50W。Soldering iron power: Maximum 50W.

焊接时间：最长 3.5s。Welding time: Maximum 3.5 seconds.

与涂层主体的距离：2 mm（最小值）。Distance from the coating body: 2 mm (minimum value).

◆修订履历 Modification Log

版本 Version	日期 Date	修订内容 Revision Content	修订人 Reviser
A0	2024-12-01	新修订	黄晓雯
A1	2025-11-06	1.按照股份要求对全文格式进行调整; 2.参考 IEC 标准, 细化可靠性测试方法; 3.增加包装数量及产品应用限制。	陆雨