

产 品 承 认 书

Specification For Approval

客 户 名 称
Customer Nnme _____

客 户 品 名
Customer P/N _____

版 本
Release version _____ 1.0

品 名
P/N HCTC322512A Series

编 号
Spec No HC26010092

日 期
Date 2026.3.19

客户确认回签/Customer Approval Feedback

核准 APPROVED BY	审核 CHECKED BY	制定 DRAWN BY	发行章/Issuance
孟飞	王庆芳	杨洁	

工程变更履历/ECN History list

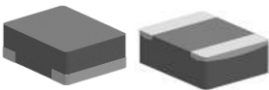
序号/No.	版本/Rev	变更内容/Change content	日期/Date	制定/Drawn
1	1.0	新发行/New release	2026/03/19	杨洁

说明Notes:

在使用产品前，用户应自行确定本产品是否适用于自身设计，本公司仅保证产品符合此规格承认书要求，或与提供样品等同货物。
本规格承认书如客户未回签即下订单，则视为承认此份承认书。
Before use, the user should determine whether this product is suitable for their own design. Our company only guarantees that the product meets the requirements of this specification, Or equivalent to the sample provided.This specification such as customers did not sign back under the orders, is that this specification.

特性/Features

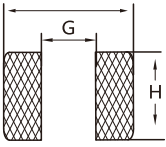
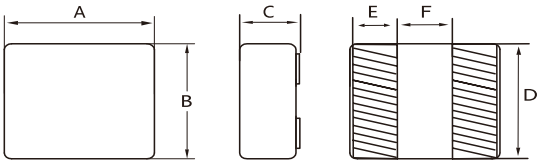
- 用于大电流和低损耗的金属材料。
- 通过金属粉尘核心实现高性能(Isat)通过低Rdc实现低损耗。
- 封闭磁路设计减少漏磁通。
- Metal material for large current and low loss.
- High performance (Isat) realized by metal dust core. Low loss realized with low Rdc.
- Closed magnetic circuit design reduces leakage flux.



应用/Applications

- 用于CPU/GPU/内存等大功率电源的DCDC转换器、笔记本电脑、PDA等便携式设备
- 电池供电设备
- DCDC converters for high power supplies like CPU/GPU/RAM,Portable devices like notebooks, PDA
- Battery powered devices

形状尺寸/Shapes and dimensions Unit: mm



焊盘尺寸/Pad size



原理图/Schematic diagram

Series	A	B	C	D	E	F	G	H	L
HCTC322512A	3.2±0.2	2.5 ±0.2	1.2±0.1	2.5±0.2	1.1 ±0.2	0.7±0.1	0.7Ref	2.8Ref	3.7Ref

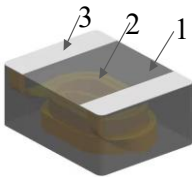
- 备注/Note:
- 1.PCB布局参考标准IPC-7351B。 PCB layout is referred to standard IPC-7351B
 - 2.上述PCB布局仅供参考。 The above PCB layout reference only.
 - 3.建议焊膏厚度在0.15毫米及以上。 Recommend solder paste thickness at 0.15mm and above.

产品标识/Product Identification

HCTC	322512	A	-	470	M	T
(1)	(2)	(3)		(3)	(4)	(5)

- (1): 类别/Product type 准磁+环形磁芯; HC:huaici, T:Toroidal,C: Core, (T-CORE)
- (2): 尺寸/Dimension 外形尺寸3.2x2.5x1.2; Appearance/BxC A:Alloy
- (3): 感值/Inductance 亨利H / R10=0.10uh ; 1R0=1.00uh ; 100=10.0uh ; 101=100.0uH
- (4): 公差/Tolerance 字母代码/letter code ; K=±10%, L=±15%, M=±20%, N=±30%
- (5): 包装/Packaging 编带/ T: Taping 袋装/B: bulk

材料表/Material List

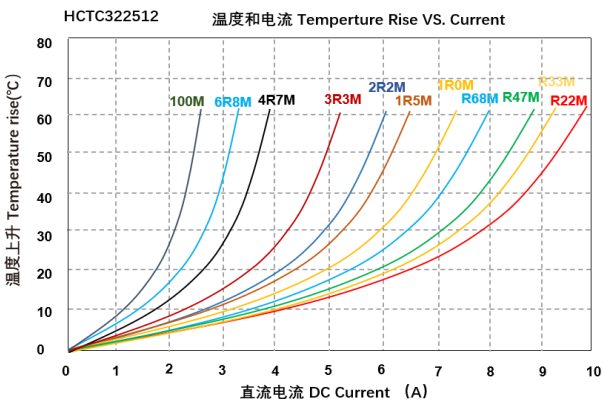
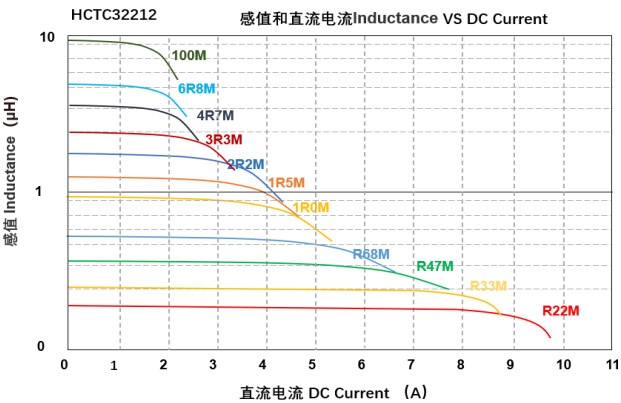


NO	项目/Items	材料/Materials
1	核心/Core	合金粉末/Alloy Powder
2	铜线/Wire	聚氨酯铜线/Polyurethane system enameled copper wire
3	外电极/Outer Electrodes	镍锡电镀/Ni+Sn Plating Chemicals

电性参数/Electronic Characteristics List

Part Number 产品型号	Inductance 感量	Resistance 直流电阻	Saturation Current 饱和电流		Heating Rating Current 温升电流	
	单位(μH)	DCR (mΩ)	Isat (A)		Irms (A)	
			Typ	Max	Typ	Max
HCTC322512A-R22M	0.22	8.5	9.5	9.0	9.3	8.7
HCTC322512A-R24M	0.24	12	9.0	8.5	11.0	10.5
HCTC322512A-R33M	0.33	12	8.5	8.0	9.2	8.6
HCTC322512A-R47M	0.47	19	7.1	6.6	8.3	7.5
HCTC322512A-R68M	0.68	24	6.3	5.8	7.4	6.9
HCTC322512A-1R0M	1.0	30	5.7	5.2	6.6	5.8
HCTC322512A-1R5M	1.5	44	4.7	4.3	5.1	4.7
HCTC322512A-2R2M	2.2	70	4.2	3.7	4.9	4.4
HCTC322512A-3R3M	3.3	95	3.2	2.8	3.5	3.1
HCTC322512A-4R7M	4.7	135	2.5	2.3	2.9	2.5
HCTC322512A-6R8M	6.8	177	2.4	2.2	2.2	1.9
HCTC322512A-100M	10	210	2.3	1.9	2.1	1.8

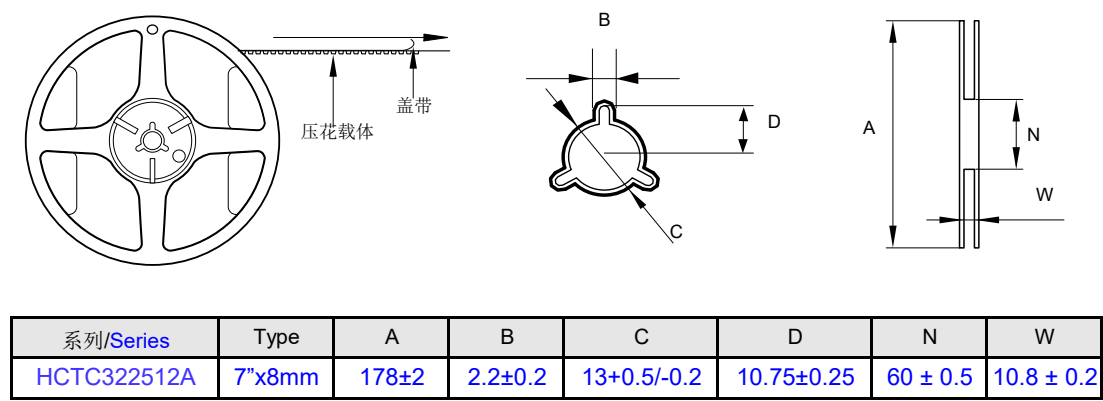
电性性能曲线/Typical Performance Curves



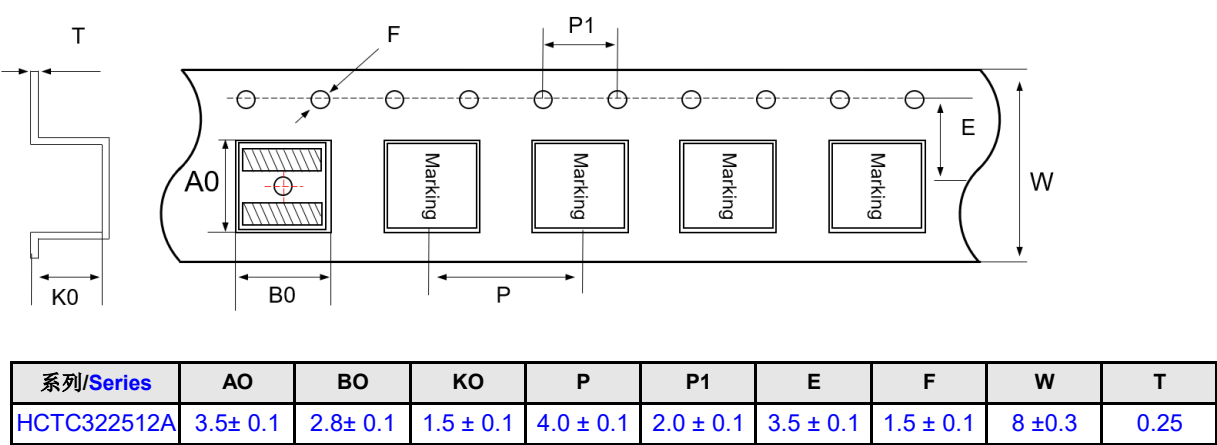
备注/Notes:
所有测试数据均以25°C环境为参考。测试频率100KHz /1.0V。工作温度范围-40°C至+125°C。
温升电流：使产品温度上升到ΔT40°C时所加载的实际直流电流值(Ta=25°C)。
饱和电流：电感值下降其初始值的30%时所加载的实际直流电流值。
在最坏情况下，零件温度(环境温度+温升)不应超过125°C。电路设计、元件放置、PCB走线尺寸和厚度、气流和其他冷却规都会影响零件温度。应在最终应用中验证器件温度。
All test data is referenced to 25° C ambient. Ls: 100KHz /1.0V. Operating temperature range - 40° C to +125° C.
Irms(A):DC current (A) that will cause an approximate ΔT of 40° C (reference ambient temperature is 25° C).
Isat (A):DC current (A) that will cause L0 to drop approximately 30%.
The part temperature (ambient + temp rise) should .ot exceed 125° C. under worst case operating conditions. Circuit design,component placement, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should beverified in the end application .

包装信息(单位:毫米)/Packaging Information (unit: mm)

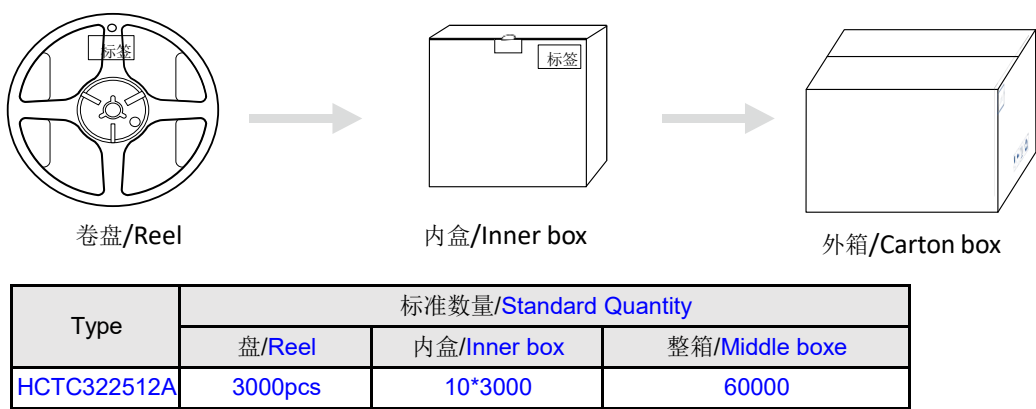
1、卷盘尺寸/Reel dimension



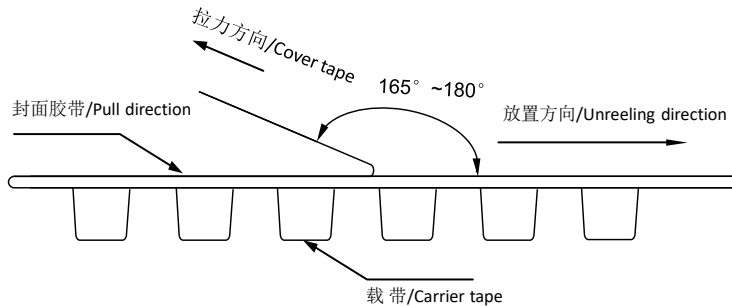
2、载带尺寸(单位:毫米)/Tape packaging dimensions (unit: mm)



3、包装数量/Packaging Quantity(PCS)



4、载带封面胶剥离/Peel force of top cover tape



剥离速度应约为 300 毫米/分钟。

The peel speed shall be about 300mm/minute.

顶盖胶带的剥离力应在 0.1 至 1.3 扭力之间。The peel force of top cover tape shall be between 0.1 to 1.3 N.

5、储存与操作事项/Cautions and Warnings

存储条件/Storage Conditions:

1、保存时间为 12 个月以内，保存条件(温度-5~ 35°C、湿度 10~ 75%RH以下)。

需注意若超过保存时间，端子电极的可焊性将可能老化。

2、产品不应暴露在高温、高湿、灰尘、腐蚀性气体等环境中。

3、本产品勿裸手接触，避免因汗液和皮肤油脂造成损坏或污染。

4、请始终小心放置产品，以防因跌落或不当拆卸造成损坏。

1、The storage period is within 12 months after the completion of production, Be sure to follow the storage conditions (temperature: -5 to 35°C, humidity: 10%-75% RH Max).

If the storage period elapses, the soldering of the terminal electrodes may deteriorate.

2、Product should not be exposed to environment with high temperature, high humidity, dust, corrosive gas and etc.

3、Products should be handled with care to avoid damage or contamination from perspiration and skin oils.

4、Please always handle products carefully to prevent any damage caused by dropping down or Inappropriate removing.

操作说明/Operation Instructions:

1、装置会因通电而自我发热(温度上升)，因此在热设计方面需留有充分余地。

2、在实施焊接前，请务必进行预热，预热温度与焊接温度及芯片温度的温度差要在150°C以内。

3、安装后的焊接修正应在规格书规定的条件范围内，若加热过度可能导致短路、性能降低、寿命减少。

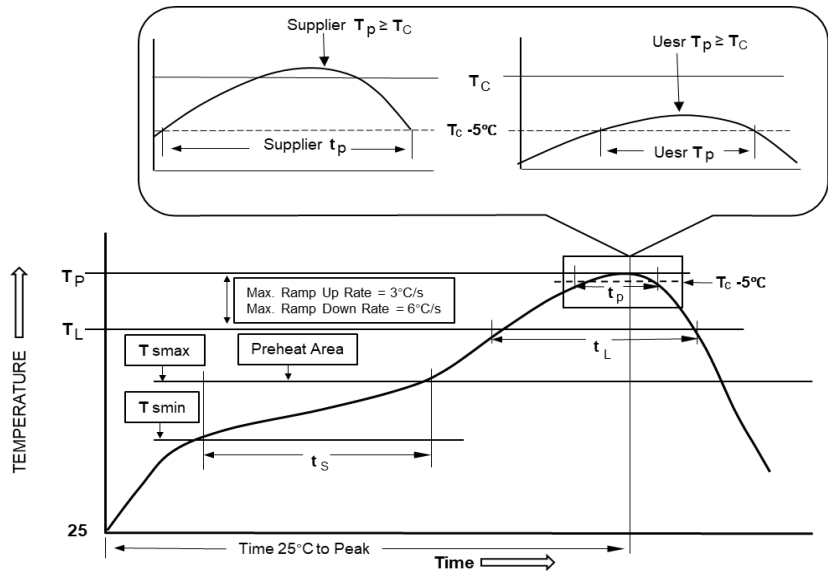
1、Self heating (temperature increase) occurs when the power is turned ON, so the tolerance should be sufficient for the set.

2、Before soldering, be sure to preheat components. The preheating temperature should be set so that the temperature difference between the solder temperature and chip temperature does not exceed 150°C.

3、Soldering corrections after mounting should be within the range of the conditions determined in the specifications. If overheated, a short circuit, performance deterioration, or lifespan shortening may occur.

焊接规范/Soldering Specifications

- 1、图中所示的无铅回流焊推荐温度曲线
- 2、焊接回流(回流次数:最多3次)
- 1、Recommended temperature profiles for lead free re-flow soldering in Figure
- 2、Soldering Reflow (Reflow times: 3 times max)



回流曲线/Reflow Profiles

配置类型/Profile Type:	无铅装配/Pb-Free Assembly
预热/Preheat	
温度最低值-Temperature Min(Tsmin)	150℃
温度最高值-Temperature Max(Tsmax)	200℃
时间从低到高-Time(ts)from(Tsmin to Tsmax)	60-120seconds
上升率(TL到Tp)/Ramp-up rate(TLto Tp)	3℃/second max.
液相线温度/Liquidus temperature(TL)	217℃
时间(tL)维持在TL以上Time(tL)maintained above TL	60-150 seconds
分类温度(Tc)/Classification temperature(Tc)	See Table (1.2)
在Tc-5℃时的时间(tp)(Tp应等于或小于Tc。) Time(tp) at Tc- 5℃ (Tp should be equal to or less than Tc.)	* > 30 seconds
降速率(Tp到TL)/Ramp-down rate(Tp to TL)	6℃ / second max.
从25℃到峰值温度所需时间/Time 25℃ to peak temperature	8 minutes max.

Tp: maximum peak package body temperature, **Tc**: the classification temperature。
For user (customer) **Tp** should be equal to or less than **Tc**。
* Tolerance for peak profile temperature (**Tp**) is defined as a supplier minimum and a user maximum。

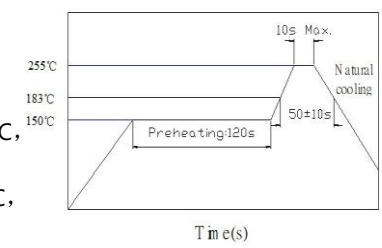
封装厚度/体积和分类温度(Tc)/Package Thickness/Volume and Classification Temperature (Tc)

PB-Free Assembly	Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
	<1.6mm	260℃	260℃	260℃
	1.6-2.5mm	260℃	250℃	245℃
	≥2.5mm	250℃	245℃	245℃

回流焊指的是标准/Reflow is referred to standard IPC/JEDEC J-STD-020F。

可靠性与测试条件/Reliability and Test Condition

可靠性测试参考标准/Reliability Test Referred to standard: **MIL-STD-202G**

NO.	项目/ITEM	要求/Request	测试条件/Test Condition
1	端电极强度 Adhesion of electrode	无可见机械损伤. 电感量变化不超过10%. No mechanical damage. Inductance should not change more than $\pm 10\%$.	施加一个17.7N (1.8kg) 的力到测试器件的侧面, 施加时间为60 $\pm$ 1秒. A 17.7N(1.8kg) force is applied to the side of the inductance for 60($\pm$ 1)s.
2	可焊性测试 Solder ability test	至少95%的焊锡覆盖在电极表面. 无可见机械损伤. 电感量变化不超过10%. At least 95% of terminal electrode should be covered with solder. No mechanical damage. Inductance should not change more than $\pm 10\%$.	预热温度: 150°C, 预热时间: 120s , 焊锡温度: 255°C $\pm$ 5°C, 浸锡时间: 10s Max Preheating temperature: 150°C, Preheating time: 120s Solder temperature: 255 $\pm$ 5°C, Duration: 10s Max 
3	耐焊性 Resistance to soldering		参照回流焊曲线过3次. Repeat the reflow curve twice.
4	恒定湿热 Static humidity		湿度: 85% RH 温度: 85°C $\pm$ 2°C, 测试时间: 1000 $\pm$ 2 h , Humidity: 85% RH, Temperature: 85°C $\pm$ 2°C , Testing time: 1000 $\pm$ 2h
5	耐高温 High temperature resistance	无可见机械损伤. 电感量变化不超过10%.	+ 125°C $\pm$ 2°C / 1000h, 在室温下放置24 $\pm$ 2小时后测量。 Measured at room temperature after placing for 24 $\pm$ 2 hrs.
6	耐低温 Low temperature resistance	No mechanical damage. Inductance should not change more than $\pm 10\%$	- 45°C $\pm$ 2°C / 1000h 在室温下放置24 $\pm$ 2小时后测量。 Measured at room temperature after placing for 24 $\pm$ 2 hrs.
7	温度冲击 Temperature shoc		温度: - 45°C, 30 $\pm$ 3 分钟, + 125°C, 30 $\pm$ 3 分钟, 循环次数: 1000 Temperature: - 45°C for 30 $\pm$ 3min, + 125°C for 30 $\pm$ 3min, Number of cycles: 1000h
8	振动测试 Vibration test		振幅: 1.5mm , 测试时间: 沿三个垂直方向各做2小时 频率范围: 10Hz~55Hz~10Hz (1分钟) Amplitude modulation: 1.5mm Test time: A period of 2h in each of 3 mutually perpendicular directions. Frequency range: 10Hz to 55Hz to 10Hz for 1min.
9	冲击测试 Shock test	无可见机械损伤. 电感量变化不超过10%. No mechanical damage. Inductance should not change more than $\pm 10\%$	持续时间: 6ms , 峰值加速度: 100g , 方向: $\pm X \pm Y \pm Z$ (6个方向) 冲击次数: 每个方向施加三次连续冲击 (共18次) . Duration: 6ms, Peak acceleration: 100g Direction: $\pm X \pm Y \pm Z$ (6 directions) Number of shocks: Three consecutive shocks in each direction (total 18 times).
10	板弯曲测试 Circuit board bending test		施加使线路板弯曲至少 (D) x = 2mm 的力, 施加外力的持续时间应为60 ($\pm$ 5) 秒. Apply a force to bend the circuit board at least (D)x=2mm, and the duration of the applied force should be 60($\pm$ 5)s.

注意: 当测量结果有问题时, 应在标准条件下恢复48 $\pm$ 2小时后进行测量。

Note : When there are questions concerning measurement result : measurement shall be made after 48 $\pm$ 2 hours of recovery under the standard condition.