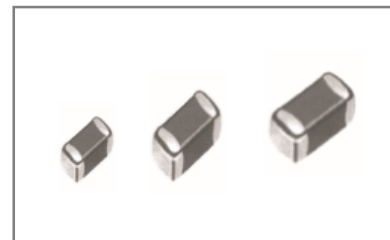


## ■ 叠层片式铁氧体音频磁珠

### Multilayer Chip Ferrite Audio Beads



#### ◆ 特征

##### Feature

- \* 体积小  
Miniature volume.
- \* 漏磁小，不产生耦合，可靠性高  
No cross coupling between inductors due to low magnetic shield and high reliability.
- \* 无引线，适合高密度表面贴装  
No lead, ideal for high density SMT installation.
- \* 优良的可焊性及耐热冲击性，适合回流焊  
Superior solderability and resistance to soldering heat, suitable for reflow soldering.
- \* 适用于大电流信号的低直流电阻  
Low DC resistance suitable for large current signals

#### ◆ 应用

##### Application

- \* 音频磁珠应用于 D 级功放电路，可在保持良好音频信号的同时降低噪音。  
Used in Class D amplifier circuits, the audio beads provide noise reduction while maintaining a good audio signal.

#### ◆ 型号表示法

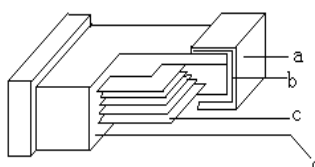
##### Part Number

CBE	322515	A	681	T
①	②	③	④	⑤

① 产 Product Code		② 规格尺寸(L×W×T) Dimensions (mm)		③ 材料代号 Material Code	④ 阻抗(Ω) Impedance		⑤ 包装方式 Packaging Style	
CBE	叠层片式铁氧体音频磁珠	201609	2.0×1.6×0.9	A	示例 Example 300 681	30 680	T	卷带盘装
	Multilayer Chip Ferrite	252011	2.5×2.0×1.1	B				Tape & Reel
	Audio Beads	321611	3.2×1.6×1.1	X			B	散装 Bulk
		322515	3.2×2.5×1.5					

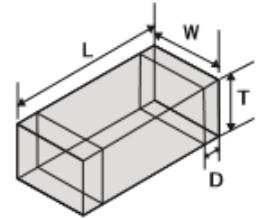
#### ◆ 产品结构 Product Structure

- a. 镀层 Ni/Sn plating
- b. 银层 Ag layer
- c. 内电极 Inner electrode
- d. 瓷体 Body



**◆规格尺寸**
**Dimension**

Part No	L (mm)	W (mm)	T (mm)	D (mm)
201609 (0806)	2.0±0.20 (0.079±0.008)	1.6±0.20 (0.063±0.008)	0.9±0.20 (0.035±0.008)	0.5±0.3 (0.020±0.012)
252011 (1008)	2.5±0.20 (0.098±0.008)	2.0±0.20 (0.079±0.008)	1.1±0.20 (0.043±0.008)	0.5±0.3 (0.020±0.012)
321611 (1206)	3.2±0.20 (0.126±0.008)	1.6±0.20 (0.063±0.008)	1.3 max (0.051)	0.5±0.3 (0.020±0.012)
322515 (1210)	3.2±0.20 (0.126±0.008)	2.5±0.20 (0.098±0.008)	1.5±0.20 (0.051±0.008)	0.5±0.3 (0.020±0.012)


**◆电性能参数**
**Electrical Characteristics**

\* 阻抗测试条件: E4982A 或等同仪器, 测试电压 50mV±5mV, 温度 15°C~35°C, 湿度 25%~75%。

Impedance testing conditions: E4982A or equivalent, test voltage 50mV ± 5mV, Temperature 15°C~35°C, Humidity 25%~75%.

\* 直流电阻测试条件: RM3542A 或等同仪器, 温度 15°C~35°C, 湿度 25%~75%。

RDC Testing conditions: RM3542A or equivalent, Temperature 15°C~35°C, Humidity 25%~75%.

\* 额定电流: 施加额定电流, 产品表面温升不超过 40°C。

Rated current: Apply the rated current, and the surface temperature rise of the product shall not exceed 40°C.

**2016 Type**

型号 Part NO	精度范围 Tolerance	标称阻抗 Impedance (Ω)	测试频率 Test frequency (MHz)	直流电阻 DCR (mΩ) Max	额定电流 I <sub>r</sub> (A) Max
CBE201609B181T	±25%	180	100	25	3.4
CBE201609B301T	±25%	300	100	30	3.1
CBE201609B601T	±25%	600	100	46	2.5

**2520 Type**

型号 Part NO	精度范围 Tolerance	标称阻抗 Impedance (Ω)	测试频率 Test frequency (MHz)	直流电阻 DCR (mΩ) Max	额定电流 I <sub>r</sub> (A) Max
CBE252011B101T	±25%	100	100	20	6.0
CBE252011B121T	±25%	120	100	25	6.0
CBE252011A301T	±25%	300	100	30	4.0
CBE252011B301T	±25%	300	100	30	4.0
CBE252011B601T	±25%	600	100	30	4.0

**3216 Type**

型号 Part NO	精度范围 Tolerance	标称阻抗 Impedance (Ω)	测试频率 Test frequency (MHz)	直流电阻 DCR (mΩ) Max	额定电流 I <sub>r</sub> (A) Max
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CBE321611X300T	±25%	30	100	9	8.0
型号 Part NO	精度范围 Tolerance	标称阻抗 Impedance (Ω)	测试频率 Test frequency (MHz)	直流电阻 DCR (mΩ) Max	额定电流 Ir (A) Max
CBE321611X330T	±25%	33	100	9	8.0
CBE321611A500T	±25%	50	100	1.6	12.0
CBE321611X500T	±25%	50	100	10	6.0
CBE321611X600T	±25%	60	100	10	6.0
CBE321611X800T	±25%	80	100	15	6.0
CBE321611X101T	±25%	100	100	15	6.0
CBE321611X111T	±25%	110	100	15	6.0
CBE321611B121T	±25%	120	100	20	6.0
CBE321611B151T	±25%	150	100	30	6.0
CBE321611B221T	±25%	220	100	35	5.0
CBE321611B301T	±25%	300	100	40	4.0
CBE321611B471T	±25%	470	100	20	4.0
CBE321611B601T	±25%	600	100	40	4.0

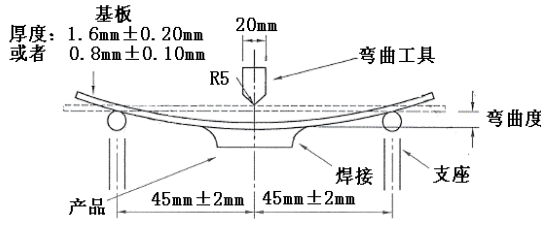
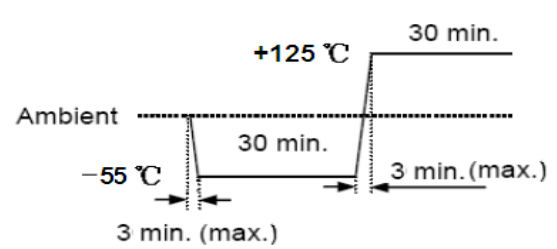
**3225 Type**

型号 Part NO	精度范围 Tolerance	标称阻抗 Impedance (Ω)	测试频率 Test frequency (MHz)	直流电阻 DCR (mΩ) Max	额定电流 Ir (A) Max
CBE322515A300T	±25%	30	100	1.6	10.0
CBE322515A600T	±25%	60	100	7	8.0
CBE322515A301T	±25%	300	100	28	6.0
CBE322515B471T	±25%	470	100	30	4.5
CBE322515A681T	±25%	680	100	35	4.0
CBE322515A681TA01	±25%	680	100	35	4.0

**◆可靠性测试方法**
**Reliability Test Method**

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks
1	工作温度范围 Operating Temperature Range	-55℃~+125℃	包含产品表面温升 Includes product surface temperature rise

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks
2	可焊性 Solder ability	无可见损伤; 电极面 95%以上覆盖新的焊料。 95% or more of electrode area shall be coated by new solder.	预热温度:120℃ ~ 150℃ 预热时间: 60s 焊料: (96.5%Sn/3.0%Ag/0.5%Cu) 焊锡 焊锡温度: 245℃±3℃ 浸锡深度:10mm 浸锡时间 :3±0.3s 浸渍到助焊剂约:3 ~ 5 s Preheating temperature:120℃ to 150℃ Preheating time: 60s Solder 96.5%Sn/3.0%Ag/0.5%Cu of the Sn solder. Solder temperature: 245±3℃ Immersion tin depth:10mm Duration : 3±0.3s Dip performance to a flux of about:3 ~ 5 s
3	耐焊接热 Resistance to Soldering Heat	至少 95%的焊锡覆盖在端电极表面, 无可见机械损伤。 阻抗变化率小于±30%。 At least 95% of terminal electrode should be covered with solder. No mechanical damage. Inductance : Impedance change: within ±30%	预热温度: 120℃~150℃ 预热时间: 60s 焊料: (96.5%Sn/3.0%Ag/0.5%Cu) 焊锡 浸锡温度: 260℃±5℃ 浸锡深度:10mm 浸锡时间 : 10±1s 浸渍到助焊剂约:3~5 s Preheating temperature: 120℃ to 150℃ Preheating time: 60s Solder 96.5%Sn/3.0%Ag/0.5%Cu of the Sn solder. Solder temperature: 260℃±5℃ Immersion tin depth:10mm Duration : 10±1s Dip performance to a flux of about:3~5 s
4	端电极强度 Adhesion of electrode	端电极与磁体不应受损, 无可见机械损伤。 The termination and body should be no damage.	施加力: 2016、2520 系列为 10N; 3216 系列为 10N ;3225 系列为 15N。 保持时间: 10±1S Applied force: 10N force for 2016、2520 series. 10N force for 3216 series. 15N force for 3225series. Keep time : 10±1S 
5	耐低温 Low temperature resistance	无可见机械损伤, 阻抗变化率小于±30%。 No mechanical damage. Impedance change: within ±30%	测试温度:-55±2℃ 测试时间:1000 <sup>+24</sup> <sub>0</sub> h Temperature:-55±2℃ Testing time: 1000 <sup>+24</sup> <sub>0</sub> h

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks
6	抗弯强度 Bending strength	无可见机械损伤 No mechanical damage	<p>测试基板:玻璃环氧树脂基板 加压速度为 <math>(1 \pm 0.5)</math> mm/s, 弯度:2mm, 保持时间 20s <math>\pm 1</math>s Testing board: glass epoxy-resin substrate For <math>(1 \pm 0.5)</math> mm/s compression speed, curvature: 2mm, hold time 20s <math>\pm 1</math>s .</p> 
7	振动 Vibration	无可见机械损伤, 阻抗变化率小于 $\pm 30\%$ 。 No mechanical damage. Impedance change: within $\pm 30\%$	<p>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.</p>
8	耐高温 High temperature resistance	无可见机械损伤, 阻抗变化率小于 $\pm 30\%$ 。 No mechanical damage. Impedance change: within $\pm 30\%$	<p>测试时间: <math>1000^{+24}_{-0}</math> h 测试温度: <math>125 \pm 2^\circ\text{C}</math> Testing time: <math>1000^{+24}_{-0}</math> h Temperature: <math>125 \pm 2^\circ\text{C}</math></p>
9	恒定湿热 Static Humidity	无可见机械损伤, 阻抗变化率小于 $\pm 30\%$ 。 No mechanical damage. Impedance change: within $\pm 30\%$	<p>湿度:90%~95% RH, 温度:<math>60^\circ\text{C} \pm 2^\circ\text{C}</math> 测试时间: <math>1000^{+24}_{-0}</math> h Humidity: 90% to 95% RH Temperature: <math>60^\circ\text{C} \pm 2^\circ\text{C}</math> Testing time: <math>1000^{+24}_{-0}</math> h</p>
10	高温负载 High temperature load	无可见机械损伤, 阻抗变化率小于 $\pm 30\%$ 。 No mechanical damage. Impedance change: within $\pm 30\%$	<p>施加电流: 额定电流 测试时间: <math>1000^{+24}_{-0}</math> h 测试温度:<math>85^\circ\text{C} \pm 2^\circ\text{C}</math> impose current: at room Testing time: <math>1000^{+24}_{-0}</math> h Temperature: <math>85 \pm 2^\circ\text{C}</math></p>
11	温度冲击 Temperature Shock	无可见机械损伤, 阻抗变化率小于 $\pm 30\%$ 。 No mechanical damage. Impedance change: within $\pm 30\%$	<p>温度: <math>-55^\circ\text{C}</math>, <math>30 \pm 3</math> 分钟 <math>+125^\circ\text{C}</math>, <math>30 \pm 3</math> 分钟 循环次数: 100 Temperature: <math>-55^\circ\text{C}</math> for <math>30 \pm 3</math>min <math>+125^\circ\text{C}</math> for <math>30 \pm 3</math>min Number of cycles: 100</p> 

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks
注：以上要求测试电性能的项目，应试验后在标准条件下放置 24 小时后测试。 Note: When there are questions concerning, measurement shall be made after 24±2hrs of recovery under the standard condition.			

## ◆产品特性曲线图

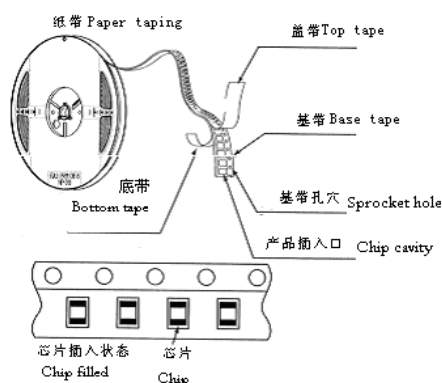
### Product Characteristic Curve

见附表。See attached table.

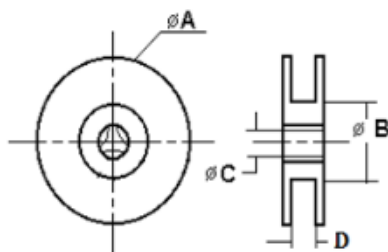
## ◆包装

### Packaging

#### ● 编带图 Taping drawings



#### ● 卷盘尺寸 Reel dimensions (Unit: mm)

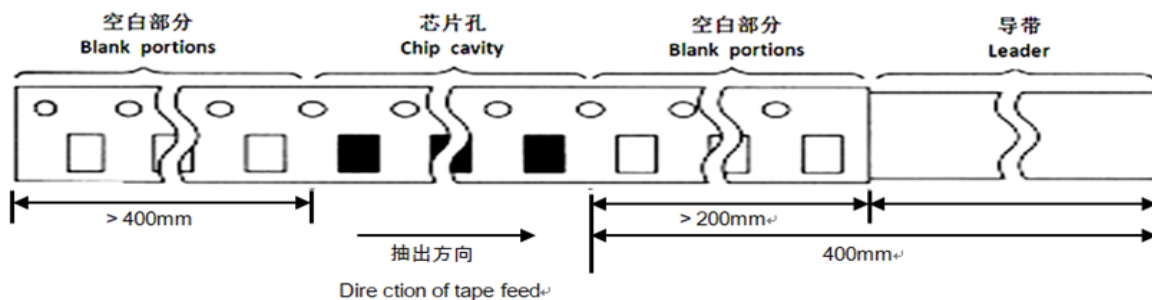


型号 Size	A	B	C	D
7 inch	178±2.0	60±2.0	13.0±1.0	9.5±2.0

说明：7 inch 适用 060303、100505、160808、201209、321609、322513、451616 尺寸。

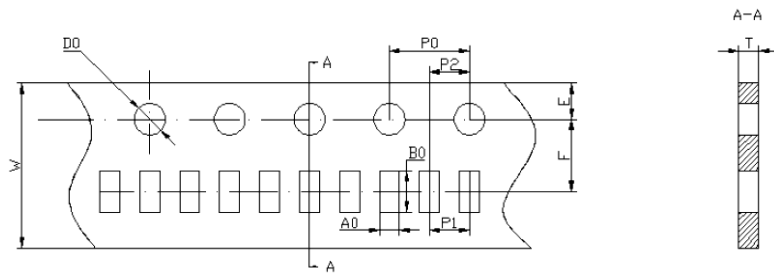
Note: 7 inch is available in 060303, 100505, 160808, 201209, 321609, 322513, 451616 sizes.

#### ● 导带及空格部分 Leader and blank portion



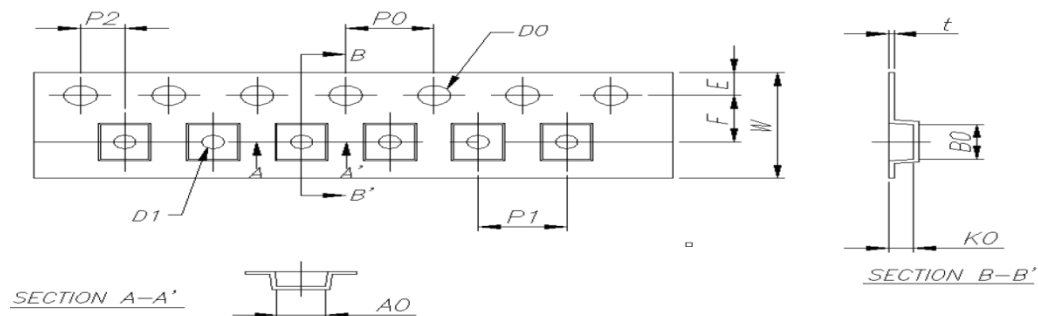
● 编带尺寸 Taping dimensions (Unit: mm)

\* 纸带 Paper tape



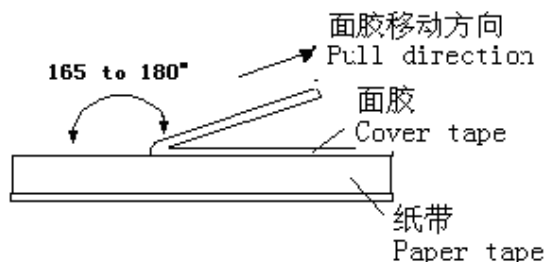
Part NO.	A0	B0	W	F	E	P1	P2	P0	D0	T
201609	$1.85 \pm 0.20$	$2.35 \pm 0.20$	$8.00 \pm 0.20$	$3.50 \pm 0.10$	$1.75 \pm 0.20$	$4.00 \pm 0.20$	$2.00 \pm 0.10$	$4.00 \pm 0.20$	$1.55 \pm 0.10$	$0.95 \pm 0.10$

\* 塑料胶带 Embossed tape



型号 Size	322515	321611	252011
W	$8.00 \pm 0.20$	$8.00 \pm 0.20$	$8.00 \pm 0.20$
E	$1.75 \pm 0.10$	$1.75 \pm 0.10$	$1.75 \pm 0.10$
F	$3.50 \pm 0.10$	$3.50 \pm 0.10$	$3.50 \pm 0.10$
D0	$1.50 \pm 0.10$	$1.50 \pm 0.10$	$1.50 \pm 0.10$
D1	$1.00 \pm 0.10$	$1.00 \pm 0.10$	$1.00 \pm 0.10$
P0	$4.00 \pm 0.10$	$4.00 \pm 0.10$	$4.00 \pm 0.10$
P010	$40.0 \pm 0.20$	$40.0 \pm 0.20$	$40.0 \pm 0.20$
P1	$4.00 \pm 0.10$	$4.00 \pm 0.10$	$4.00 \pm 0.10$
P2	$2.0 \pm 0.05$	$2.0 \pm 0.05$	$2.0 \pm 0.10$
A0	$2.77 \pm 0.10$	$1.88 \pm 0.10$	$1.52 \pm 0.10$
B0	$3.42 \pm 0.10$	$3.50 \pm 0.10$	$2.75 \pm 0.10$
K0	$1.55 \pm 0.10$	$1.27 \pm 0.10$	$1.05 \pm 0.10$
t	$0.22 \pm 0.10$	$0.23 \pm 0.10$	$0.23 \pm 0.10$

\* 剥离力检验 Peeling off force



(1) 盖带的剥离力：沿面胶移动方向拉时要求剥离力为 0.1N~0.7N。

Peeling force should be 0.1~0.7N pulling in the direction of arrow.

(2) 剥离速度：300mm/min。

Speed of peeling off: 300mm/min.

(3) 在纸带剥落时，面胶不能有破损，不能粘纸带。

The cover bond should not be damaged and bond the tape when it peeled off.

● 包装数量（单位：粒）Packaging number (Unit: Pcs)

型号 Size	322515	321611	252011	201609
每卷数量 REEL	3000	3000	3000	4000
每盒数量 BOX	30000	30000	30000	40000
每箱数量 CASE	180000	180000	180000	240000

● 标签粘贴位置 Label stick station

卷盘标签 Reel label	纸盒标签 Carton label	纸盒标签 Carton label	外箱标签 Outer box label
			

◆ 推荐焊接条件 Recommend Soldering Conditions

● 焊接条件 Soldering Conditions

\* 产品适用于回流焊 Products can be applied to reflow soldering.

\* 焊接要求

(1) 预热时，产品表温与焊料温度的温差最大不允许超出 150℃，焊接完冷却时，产品表温与溶剂温度之间的温差最大不超过 100℃。预热不足有可能引发产品表面裂纹，从而导致产品质量下降。

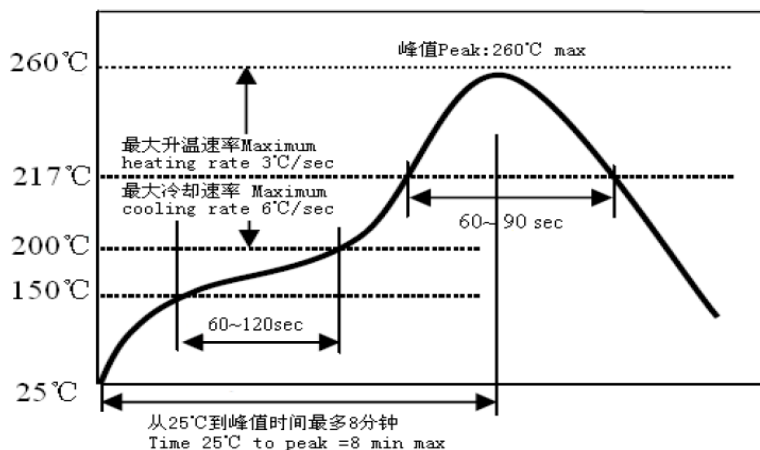
Pre-heating should be in such a way that the temperature difference between solder and ferrite surface is limited to 150℃ max. Also cooling into solvent after soldering should be in such way that the temperature difference is limited to 100℃ max. Un-enough pre-heating may cause cracks on the ferrite, resulting in the deterioration of product quality.

(2) 产品要在以下画出的曲线允许的范围进行焊接。其它焊接条件可能引起产品电极的腐蚀。当焊接重复时，允许的时间为第一次做的累计时间。

Products should be soldered within the following allowable range indicated by the slanted line. The excessive soldering conditions may cause the corrosion of the electrode. When soldering is repeated, allowable time is the accumulated time.



● 回流焊曲线 Reflow soldering profile



- (1) 预热条件: 150 ~ 200°C / 60 ~ 120 秒; PREHEAT CONDITION: 150 ~ 200°C / 60 ~ 120 SEC
- (2) 允许大于 217°C 时间: 60—90 秒; ALLOWED TIME ABOVE 217°C: 60 ~ 90 SEC
- (3) 最大温度: 260 °C; MAX TEMP: 260 °C
- (4) 最高温的最大时间: 10 秒; MAX TIME AT MAX TEMP: 10 SEC
- (5) 焊膏: SN/3.0Ag/0.5Cu; SOLDER PASTE: SN/3.0Ag/0.5Cu
- (6) 回流焊次数: 最多 2 次; ALLOWED REFLOW TIME: 2X MAX

● 手工焊接 Iron soldering

烙铁温度: 350°C Perform soldering at 350°C on 30W max

功率: 最大为 30W Time: < 5S

烙铁停留时间: < 5S (注意不要将烙铁碰到产品端电极) Take care not to apply the tip of the soldering iron to the terminal electrodes



◆ 清洗 Cleaning

● 清洗条件 Cleaning Conditions

- (1) 清洗温度: 60°C (最高) Cleaning temperature : 60°C max
- (2) 清洗时间: 1 分钟 (最少) Cleaning time: 1 minute min.
- (3) 超声波功率: 最大为 200W Ultrasonic output power: 200W max

◆ 存储要求 Storage Requirements

● 存储期限 Storage period

距电感公司出厂检验时间 1 年内, 产品可以使用检验时间可以通过包装外侧标记的检验号确认。若时间超过 1 年, 应检查焊接性能后方可使用。

Products which inspected inductor company over 1 year ago should be examined and used, which can be Confirmed with inspection No. marked on the container. Solder ability should be checked if this period is exceeded.

● 存储条件 Storage conditions

- (1) 存放货物的库房应满足以下条件: 温度: -10 ~ +40°C, 相对湿度: 30 ~ 70%。
- (2) 禁止将产品保管在腐蚀性物质中, 如硫磺、氯气或酸, 否则将引起端头氧化, 导致降低焊接性。
- (3) 为了避免受潮气、灰尘等物质的影响, 产品应保管于货架上。

(4) 产品保管在库房中，应避免热冲击、振动以及直接光照等等。

(5) 产品应密封包装。

(1) Products should be storage in the warehouse on the following conditions:

Temperature : -10~+40℃ Humidity: 30~70% relative humidity

(2) Don't keep products in corrosive gases such as sulfur, chlorine gas or acid , or it may case oxidization of Electrodes resulting in poor solder ability.

(3) Products should be stored on the palette for the prevention of the influence from humidity, dust and so on.

(4) Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.

(5) Products should be stored under the airtight packaged condition.

### ◆ODS（消耗臭氧层物质）的使用情况 Usage Of ODS

对于以下所列物质，我公司在生产过程中绝不使用。

ODS: CCl<sub>4</sub>（四氯化碳）、HCFC 等。

For ODS listed below , we don't use in process.

ODS: CCl<sub>4</sub>, HCFC, etc.

### ◆注意事项 Notes

(1) 若本次承认的为“整体无铅”产品，则表明该产品符合 RoHS 指令的要求。

(2) 本承认书保证我司产品作为一个单体时的质量情况，当我司产品被安装到贵司产品上时请保证贵司的产品已根据贵司的规范进行了有效评价和确认。

(3) 如果贵司对我司产品的试用已超过了本测试规范所界定的产品功能，对于此所引发的失效我司将不予保证。

(1) If the parcel label on product is "Unitary lead free" that indicate the products in accord with ROHS appointed requests.

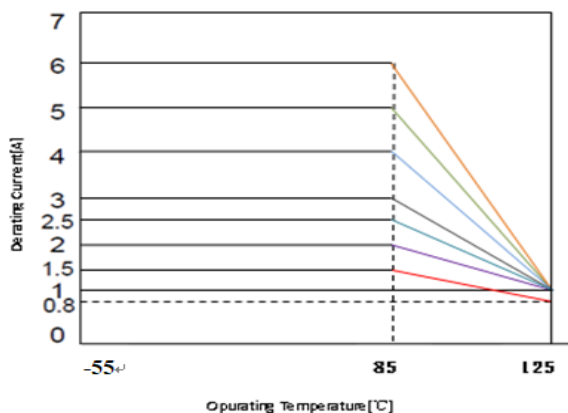
(2) This product specification guarantees the quality of our product as a single unit, Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.

(3) We can't warrant against failure caused by any use of our product that deviates from the intended use as described in this product specification.

### ◆备注 Remark

当工作温度超过+85℃时，额定电流>1A 的铁氧体磁珠的额定电流必须降额使用。具体请根据工作温度使用图示的降额曲线。

When Operating temperatures exceed +85℃,derating of current is necessary for chip ferrite beads for which rated current is1A and over. Please apply the derating curve shown in chart according to the operating temperature.



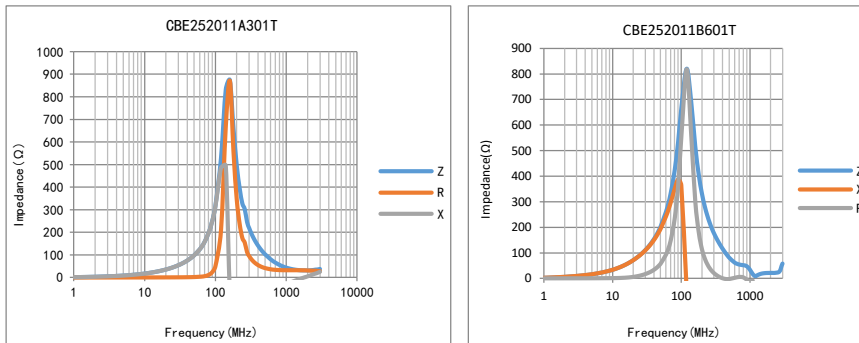
[illegible]

注：上述所提供之内容为产品规格说明。在产品未变更时，风华保有修改此内容不另行通知之所有权利，任何产品变更将会

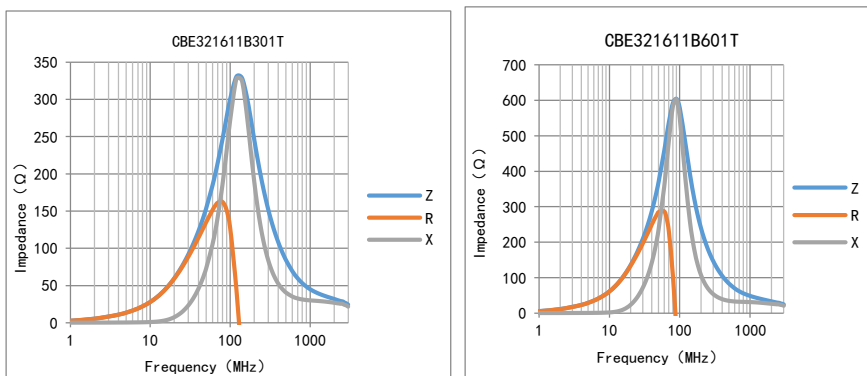
以 P C N 通知客户。The information provided above is the product specifications. Until the product is changed, Fenghua reserves the right to modify this content without notice. Any product changes will be notified to customers via PCN.

## 附表 Schedule

### CBE252010 Type



### CBE3216 Type



### CBE322515 Type

