

## ■车规绕线型片式电感器

### Automotive Grade Wire Wound Chip Inductors

#### ◆特征 Feature

- \* 本产品满足 AEC-Q200 汽车标准相关条款

The products involved in this letter are compliant with AEC-Q200 standard.

- \* 适合高密度表面贴装

Small Size Suitable For SMT.



#### ◆应用 Application

- \* 推荐用于汽车信息系统、影音娱乐系统、车身与舒适系统等。

recommended for automobile information system, audio-visual entertainment system, body and comfort system, etc.

- \* 应用于同轴电源 (PoC)

Applications Power over Coaxial (PoC)

#### ◆型号表示法 Part Number

AHP	0603	PF	1R0	K	S	T	BEG
①	②	③	④	⑤	⑥	⑦	⑧

##### ①产品类型 Product Type:

AHP: 车规绕线型片式电感器系列

AHP: Automotive Grade Wire Wound Inductor Series

##### ②尺寸 Dimensions: 0402(1.0×0.5mm)、0603(1.6×0.8mm)、0805(2.0×1.2mm)

##### ③材料代号 Material Code: IF/PF---铁氧体芯 Ferrite core

##### ④标称电感量 Inductance: R10=0.1μH、1R0=1.0μH、100=10μH

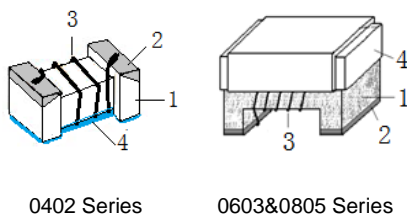
##### ⑤标称电感值偏差 Tolerance: J---±5%; K---±10%; M---±20%

##### ⑥电极表面镀层材料 Terminal: S---锡端头 Tin

##### ⑦包装 Packaging: T: 编带包装 Tape & Reel

##### ⑧设计代号 Design Code

#### ◆产品结构 Product Structure

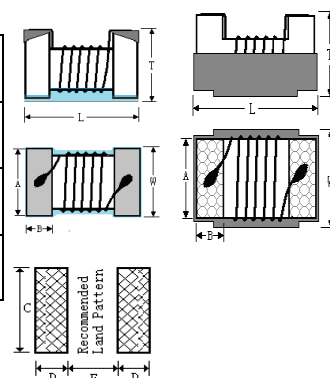


序号 No.	部位 Component	材料 Material
1	磁芯Core	镍锌铁氧体Ni-Zn ferrite
2	电极Electrode	锡Sn
3	漆包线wire	铜Cu
4	包封层encapsulation layer	树脂UV Adhesive

#### ◆规格尺寸 Dimension

单位 Unit: mm (inch)

Size	L (Max)	W (Max)	T (Max)	A(typ)	B(typ)	C(typ)	D(typ)	E(typ)
1005 (0402)	1.19 (0.047)	0.66 (0.026)	0.60 (0.024)	0.50 (0.020)	0.23 (0.009)	0.66 (0.026)	0.36 (0.014)	0.46 (0.018)
1608 (0603)	1.80 (0.071)	1.20 (0.047)	1.10 (0.043)	0.90 (0.035)	0.35 (0.014)	1.02 (0.040)	0.64 (0.025)	0.70 (0.028)
2012 (0805)	2.30 (0.091)	1.70 (0.067)	1.52 (0.060)	1.27 (0.050)	0.50 (0.020)	1.78 (0.070)	1.02 (0.040)	0.76 (0.030)



### ◆工作温度范围 Operating Temperature Range

工作温度范围,包括自身发热的上升温度:  $-40^{\circ}\text{C}\sim+125^{\circ}\text{C}$

Operating Temperature Range, Including self-heating temperature rise:  $-40^{\circ}\text{C}\sim+125^{\circ}\text{C}$ .

### ◆电性能参数 Electrical Characteristics

#### \* 测试条件 Testing conditions

电感量 Inductance: HP4286A 或 E4982A 电桥或等同测量仪器, 测试电压 500mV。HP4286A or E4982A bridge or equivalent measuring instrument, test voltage 500mV.

直流电阻 Rdc: HP4286A、RM3542 或等同测量仪器。HP4286A、RM3542 or equivalent measuring instrument.

额定电流 Rated current: 施加额定电流, 产品表面温升不超过  $40^{\circ}\text{C}$ 。使用直流电流源、LCR 测试仪与温表测试。Apply the rated current, and the surface temperature rise of the product shall not exceed  $40^{\circ}\text{C}$ . Use a DC current source, LCR tester, and temperature gauge for testing.

#### 0402IF Type

型号 Part NO	电感量 Inductance ( $\mu\text{H}$ )	偏差范围 Tolerance	自谐振频率 SRF (MHZ) Min	最大直流电阻 Rdc ( $\Omega$ ) Max	额定电流 Idc(mA) Max
AHP0402IFR18KST	0.18@100MHz	K	1000	0.312	560
AHP0402IFR27JST	0.27@100MHz	J	720	0.52	420
AHP0402IFR47JST	0.47@10MHz	J	380	0.66	350
AHP0402IFR88KST	0.88@1MHz	K	850	1.48	350
AHP0402IF1R2MST	1.2@1MHz	M	720	2.6	250

#### 0603PF Type

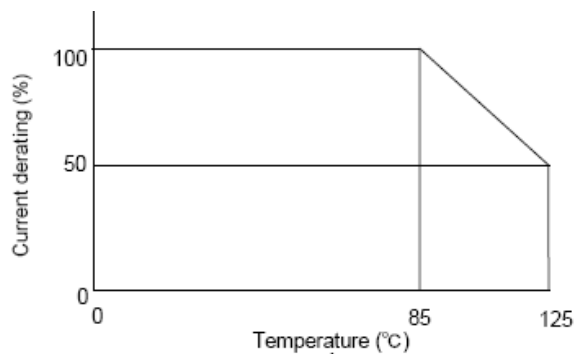
型号 Part NO	电感量 Inductance ( $\mu\text{H}$ )	偏差范围 Tolerance	自谐振频率 SRF (MHZ) Min	最大直流电阻 Rdc ( $\Omega$ ) Max	额定电流 Idc(mA) Max
AHP0603PFR22KST	0.22@7.9MHz	K	1000	0.20	1000
AHP0603PFR27KST	0.27@7.9MHz	K	1000	0.30	1000
AHP0603PFR33KST	0.33@7.9MHz	K	1000	0.35	1000
AHP0603PFR47KST	0.47@7.9MHz	K	750	0.45	550
AHP0603PFR47KSTBEG	0.47@7.9MHz	K	800	0.25	1200
AHP0603PFR56KST	0.56@7.9MHz	K	700	0.48	500
AHP0603PFR62KST	0.62@7.9MHz	K	600	0.55	500
AHP0603PFR65KSTBEG	0.65@7.9MHz	K	600	0.55	500
AHP0603PFR82KSTBEG	0.82@7.9MHz	K	580	0.62	430
AHP0603PF1R0KSTBEG	1.0@7.9MHz	K	550	0.65	400
AHP0603PF1R0KSTCEG	1.0@7.9MHz	K	550	0.63	520
AHP0603PF1R5KSTBEG	1.5@7.9MHz	K	400	0.85	390
AHP0603PF2R2KSTBEG	2.2@7.9MHz	K	110	1.00	380
AHP0603PF2R2KSTCEG	2.2@7.9MHz	K	290	1.30	350
AHP0603PF2R2KSTEEG	2.2@7.9MHz	K	100	0.95	410
AHP0603PF3R3KSTBEG	3.3@7.9MHz	K	85	1.35	350
AHP0603PF4R7KSTBEG	4.7@7.9MHz	K	80	1.56	330

0805PF Type

型号 Part NO	电感量 Inductance ( $\mu$ H)	偏差范围 Tolerance	自谐振频率 SRF (MHZ) Min	最大直流电阻 Rdc ( $\Omega$ ) Max	额定电流 Idc(mA) Max
AHP0805PFR47KSTBEG	0.47@7.9MHz	K	680	0.25	850
AHP0805PFR65KSTBEG	0.65@7.9MHz	K	560	0.25	820
AHP0805PFR82KST	0.82@7.9MHz	K	200	0.17	1300
AHP0805PF1R0KST	1.0@7.9MHz	K	200	0.17	1300
AHP0805PF1R2KSTBEG	1.2@7.9MHz	K	250	0.55	600
AHP0805PF1R5KSTBEG	1.5@7.9MHz	K	300	0.65	500
AHP0805PF2R2KSTBEG	2.2@7.9MHz	K	200	1.00	400
AHP0805PF3R3KSTBEG	3.3@7.9MHz	K	90	1.05	320
AHP0805PF4R7KSTBEG	4.7@7.9MHz	K	90	1.10	300

注：可根据客户需求做定制产品。Note: Customized products can be made according to customer needs.

\* 电流降额 Current derating.



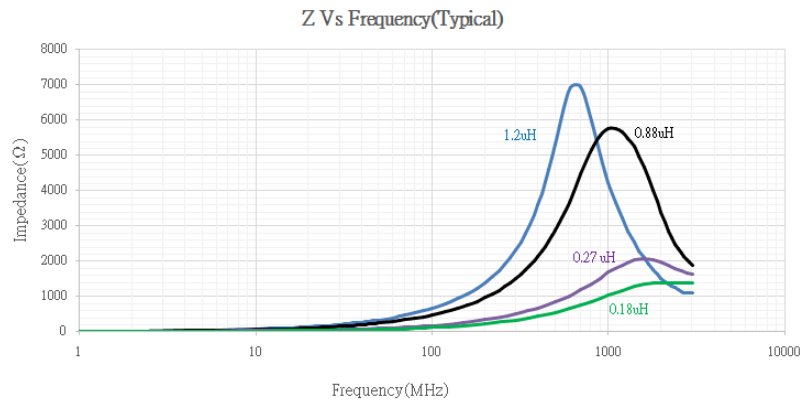
根据工作温度对额定电流进行降额使用。

Derating of Rated Current Depend on Operating Temperature.

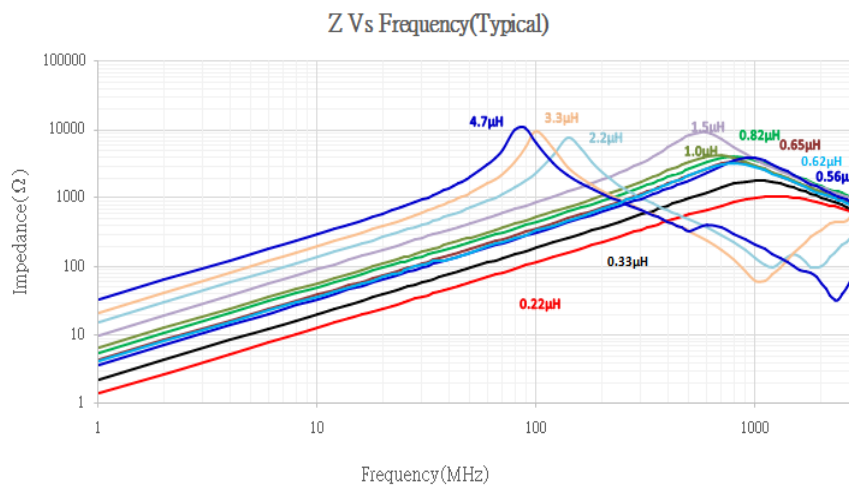
# ◆产品特性曲线图 Product Characteristic Curve

\* 阻抗频率曲线 Impedance frequency curve

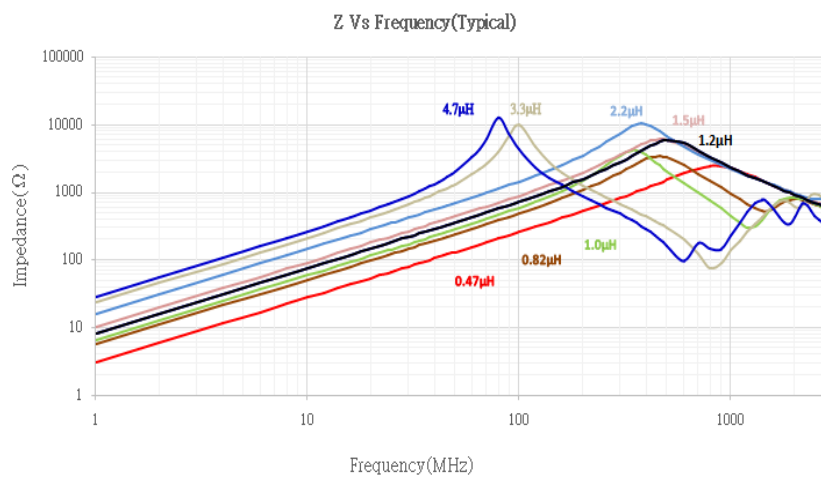
## 0402 Series



## 0603 Series

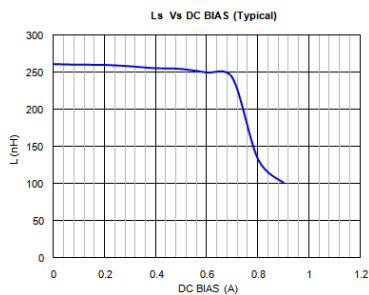


## 0805 Series

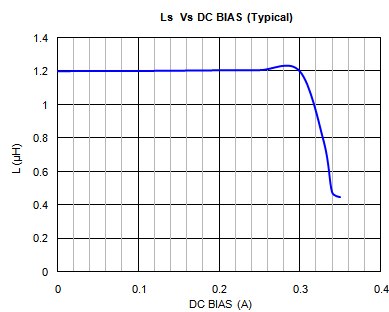


\* 饱和电流曲线 Isat curve(25°C)

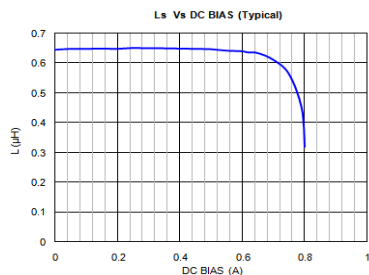
0402IFR27



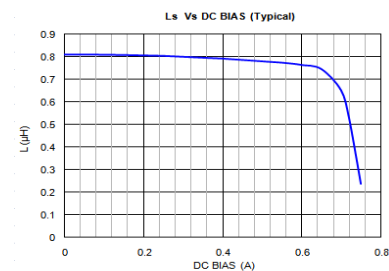
0402IF1R2



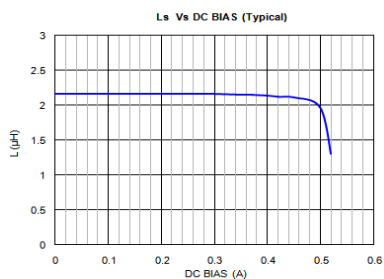
0603PFR65



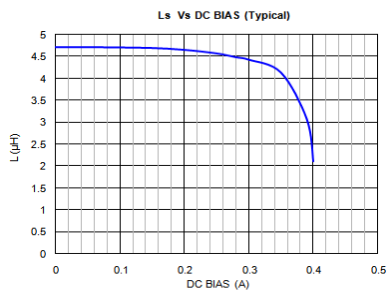
0603PFR82



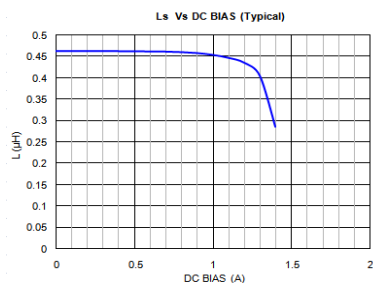
0603PF2R2



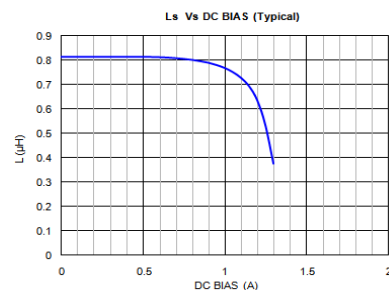
0603PF4R7



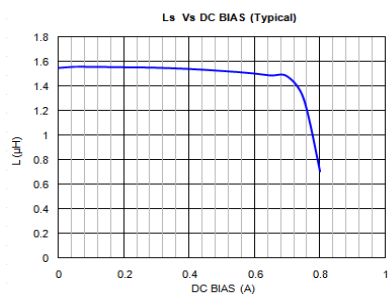
0805PFR47



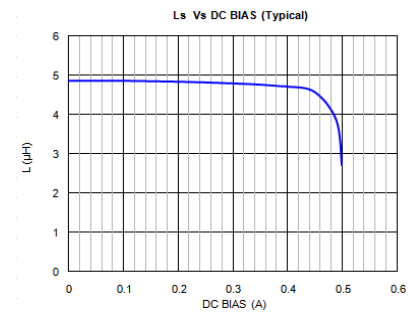
0805PFR82



0805PF1R5

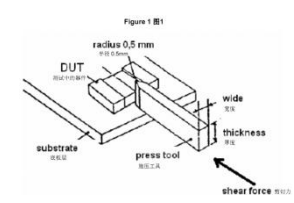
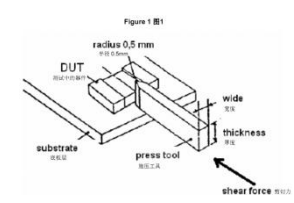


0805PF4R7



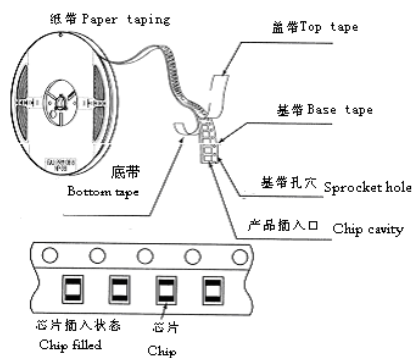
**◆可靠性测试方法 Reliability Test Method**

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks
1	高温存储 High Temperature Exposure (Storage)	无可见损伤; 电感量: $\Delta L/L \leq \pm 10\%$ . No Visible damage; Inductance: $\Delta L/L \leq \pm 10\%$ .	温度 125℃; 不通电; 持续时间 1000h; 试验结束后 (24±4)h 内进行电性能测量。 Temperature 125℃; Unpowered; Duration 1000h; Measurement at (24±4) hours after test conclusion.
2	温度循环 Temperature Cycling	无可见损伤; 电感量: $\Delta L/L \leq \pm 10\%$ . No Visible damage; Inductance: $\Delta L/L \leq \pm 10\%$ .	高温 125℃; 低温 -40℃; 高、低温下暴露时间各 30 分钟; 转换时间 ≤ 1min; 循环次数 1000 次。 试验结束后 24±4 小时内进行测试。 High Temperature +125℃; low temperature -40℃; Duration at each temperature 30 min; Transition time ≤ 1 min. Severity 1000 cycles; Measurement at 24±4 hours after test conclusion.
3	偏高湿度(高温高湿) Biased Humidity	无可见损伤; 电感量: $\Delta L/L \leq \pm 10\%$ . No Visible damage; Inductance: $\Delta L/L \leq \pm 10\%$ .	温度 85℃; 湿度 85RH%; 持续时间 1000 小时, 不通电。 试验结束后 24±4 小时内进行测试。 Temperature 85℃; Relative humidity 85%; Duration 1000 h; Unpowered. Measurement at 24±4 hours after test conclusion.
4	工作寿命 Operational Life	无可见损伤; 电感量: $\Delta L/L \leq \pm 10\%$ . No Visible damage; Inductance: $\Delta L/L \leq \pm 10\%$ .	温度 85℃; 施加电流: 额定电流; 持续时间: 1000 小时。 试验结束后 24±4 小时内进行测试。 Temperature 85℃; Test current: Rated current; Duration 1000 h; Measurement at 24±4 hours after test conclusion.
5	机械冲击 Mechanical Shock	无可见损伤; 电感量: $\Delta L/L \leq \pm 10\%$ . No Visible damage; Inductance: $\Delta L/L \leq \pm 10\%$ .	正半弦波; 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 value 100g. Normal duration 6 ms; Three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen (18 shocks)

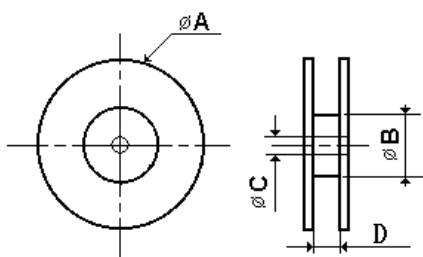
6	振动 Vibration	无可见损伤; 电感量: $\Delta L/L \leq \pm 10\%$ . No Visible damage; Inductance: $\Delta L/L \leq \pm 10\%$ .	频率 10Hz~2000Hz; 加速度 5g; 一个循环 20 分钟; X、Y、Z 三个方向每个方向 12 个循环,共 36 个循环; . The entire frequency range of 10 to 2000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be preformed 12 time in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Peak value 5g.
7	耐焊接热 Resistance to Soldering Heat	无可见损伤; 电感量: $\Delta L/L \leq \pm 10\%$ . No Visible damage; Inductance: $\Delta L/L \leq \pm 10\%$ .	模拟电磁器件回流焊, 3 次 Simulate electromagnetic device reflow soldering, 3 times
8	可焊性 Solder Ability	无可见损伤; 电极面 95%以上覆盖新的焊料(不包含焊点)。 95% or more of electrode area shall be coated by new solder (Except exposed wire) .	焊槽法; 无铅焊锡; 温度(245±5) °C; 浸渍时间 (3±0.3) s。 Solder bath; Lead-free solder; Temperature (245±5) °C; Immersion timer (3±0.3) seconds.
9	弯曲 Board Flex	无可见损伤; 直流电阻: 符合性能标准值. No Visible damage; Rdc: Meets performance standard values.	电感器安装在厚 1.6mm 环氧玻璃布板上, 以 1mm/s 的速度向下弯曲 2mm; 维持时间 60s±5s。 The testing samples shall be mounted on a 100mm×40mm FR4 PCB board, which is 1.6mm±0.2mm thick. Bending shall be applied to the 2.0mm with 1.0mm/sec; Duration: 60s(+5s)。 
10	端子强度 Terminal Strength (SMD)	无可见损伤; No Visible damage;	试样安装在环氧玻璃布板上, 施加 0402 规格: 2N, 0603 规格: 7N, 0805 规格: 13N 的力到试样的侧面, 保持 60s±1s。 The testing samples shall be mounted on the testing epoxy boards, exerting force on side of the samples, Size 0402: 2N ; Size 0603: 7N ; Size 0805: 13N, Duration 60s±1s. 

## ◆包装 Packaging

### \* 编带图 Taping drawings

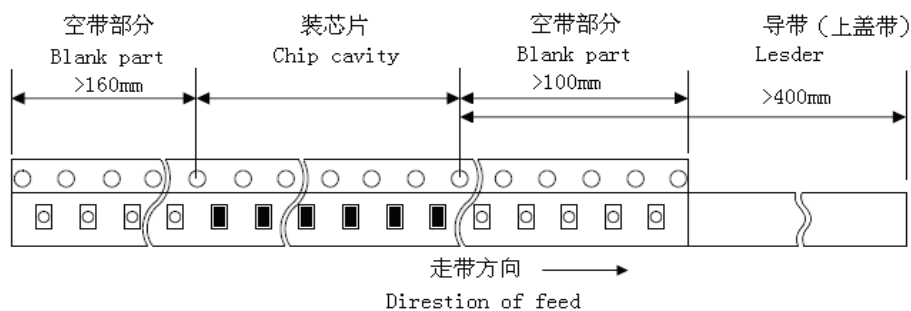


### \* 卷盘尺寸 Reel dimensions (Unit:mm)



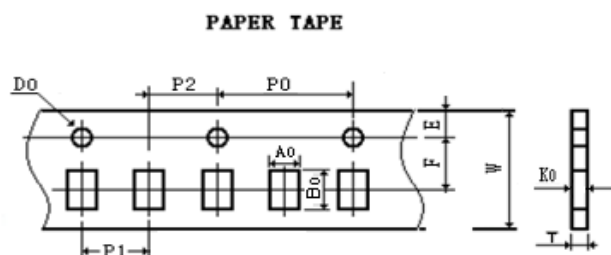
Part NO.	ΦA typ.	ΦB typ.	ΦC typ.	D typ.
0402-0805	178	60	13	8.4

### \* 导带及空格部分 Leader and blank portion



### \* 编带尺寸 Taping dimensions (Unit: mm)

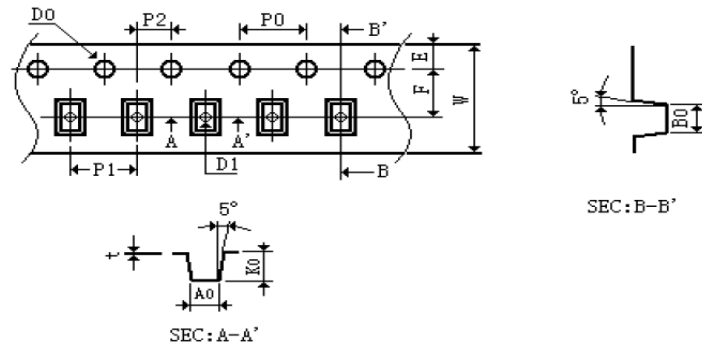
纸带 Paper tape



Part NO.	W	E	F	D0	P0	P1	P2	P0x10	A0	B0	K0	T
0402	8.00	1.75	3.50	1.55	4	2	2	40	0.66	1.20	0.60	0.75

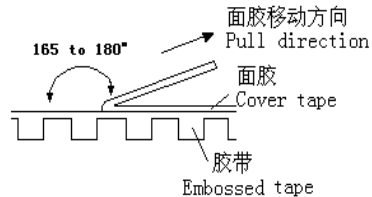
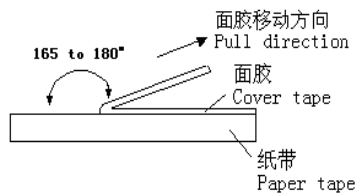


塑料胶带 Embossed tape



Part NO.	W	E	F	D0	D1	P0	P1	P2	P0×10	t	A0	B0	K0
0603	8.00	1.75	3.50	1.55	0.60	4	4	2	40	0.22	1.20	1.85	1.10
0805	8.00	1.75	3.50	1.55	0.65	4	4	2	40	0.23	1.85	2.45	1.50

\* 剥离力检验 Peeling off force



盖带的剥离力要求 Peeling required

0402-0805 series : 10g~80g

测试条件 Test condition

盖带剥离速度: 300mm/min±10%

Speed of peeling off : 300mm/min±10%

盖带剥离角度: 165° ~180°

Angle of peeling off: 165°~180°

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

类型 Size		0402	0603	0805
每卷数量 Per Reel		5000	4000	3000
每盒数量 Per Box	3 卷盒	15000	12000	9000
	5 卷盒	25000	20000	15000
	10 卷盒	50000	40000	30000
每箱数量 Per Case	1.5 盒箱	75000	60000	45000
	2 盒箱	100000	80000	60000
	3 盒箱	150000	120000	90000
	4 盒箱	200000	160000	120000
	6 盒箱	300000	240000	180000

## ◆推荐焊接条件 Recommended Soldering Conditions

### \* 焊接条件 Soldering Conditions

本产品使用回流焊接法。

Applicable soldering process to the products is reflow soldering.

### \* 焊剂要求 Flux, Solder

使用松香基助焊剂，禁止使用卤化物含量超过 0.2(wt)%的强酸性助焊剂。

Don't use highly acidic flux with halide content exceeding 0.2(wt)%(chlorine conversion value).

使用无铅焊料(96.5Sn /3.0Ag/0.5Cu)。

Using lead-free solder (96.5Sn /3.0Ag/0.5Cu)。

### \* 焊接要求 Soldering conditions

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，从而导致产品品质下降。

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.

产品要在以下画出的曲线允许的范围内进行焊接。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

预热条件: 150~200℃/60~120 秒

Preheat condition: 150 ~200℃/60~120sec

最大温度: 260℃

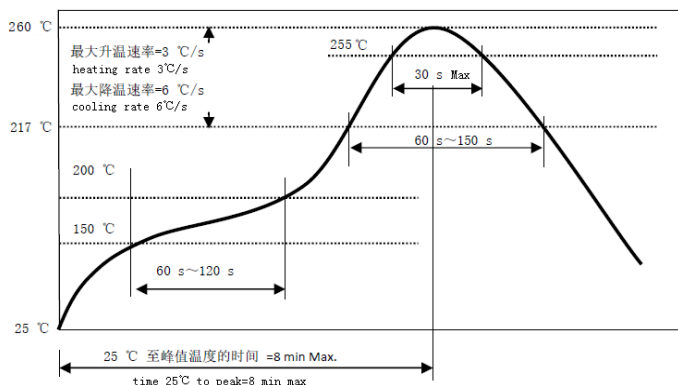
max temp: 260 °C

最高温的最大时间: 10 秒

max time at max temp: 10 sec

回流焊次数: 最多 3 次

Allowed Reflow time: 3x max



### \* 手工焊接 Iron soldering

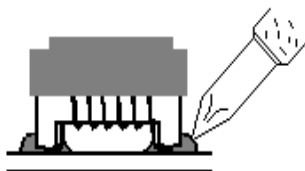
烙铁温度: 350℃ (Max)

功率: 最大为 30W

烙铁停留时间: <5S (注意不要将烙铁碰到产品线圈及包封层)。

Perform soldering at 350℃ on 30W max.

Soldering Time: < 5S (Take care not to apply the tip of the soldering iron to the terminal electrodes)。



## ◆贮存方法 Storage Methods

### \* 存储期限 Storage period

距电感公司出厂检验时间 1 年内正常使用。若时间超过 1 年，应检查焊接性能后方可使用。

Please use the products within 1 year since the factory inspection before the delivery, the welding performance should be checked before use if the storage time exceeds 1 year.

### \* 存储条件 Storage conditions

存放货物的库房应满足以下条件：温度：-10 ~ +40℃，相对湿度：30 ~ 70%。

Products should be storage in the warehouse on the following conditions:

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

### \* 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。Don't keep products in corrosive gases such as sulfur, chlorine gas or acid, or it may cause oxidation of Electrodes resulting in poor solder ability.

### \* 为了避免受潮气、灰尘等物质的影响，产品应保管于货架上。

Products should be stored on the pallet for the prevention of the influence from humidity, dust and so on.

### \* 产品保管在库房中，应避免热冲击、振动以及直接光照等等。

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

### \* 产品应密封包装。

Products should be stored under the airtight packaged condition.

## ◆使用注意事项 Precautions For Use

### \* 本证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。

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.

### \* 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。

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.

### \* 为防止断线，请不要使用锋利的物体接触线圈，如镊子。

Do not touch wire with sharp objects such as tweezers to prevent wire breakage.

正确方法 Correct method (夹端头两端 Tweezers should support on both sides of the chip)	错误方法 Wrongly method (夹到产品线圈 Tweezers should not support on enameled wire of the chip)
 	     

[illegible]

Note: The above content is the specification of products, Fenghua reserves the right to modify this content without prior notice, and any product changes will be notified to customers via PCN.