

# Specification for Approval

**Date:** 2019/06/18

**Customer :** 深圳台慶

**TAI-TECH P/N:** HPC4012TF-SERIES

**CUSTOMER P/N:** \_\_\_\_\_

**DESCRIPTION:** \_\_\_\_\_

**QUANTITY:** \_\_\_\_\_ pcs

<b>REMARK:</b>		
Customer Approval Feedback		

- 西北臺慶科技股份有限公司  
 TAI-TECH Advanced Electronics Co., Ltd  
Headquarter:  
 NO.1 YOU 4TH ROAD, YOUTH INDUSTRIAL DISTRICT, YANG-MEI,  
 TAO-YUAN HSIEN, TAIWAN, R.O.C.  
 TEL: +886-3-4641148 FAX: +886-3-4643565  
 http://www.tai-tech.com.tw  
 E-mail: sales@tai-tech.com.tw
- Office:  
 深圳辦公室  
 11BC,Building B Fortune Plaza,NO.7002, Shennan Avenue, Futian  
 District Shenzhen  
 TEL: +86-755-23972371 FAX: +86-755-23972340
- 臺慶精密電子(昆山)有限公司  
 TAI-TECH ADVANCED ELECTRONICS(KUNSHAN) CO., LTD  
 SHINWHA ROAD, KUNJIA HI-TECH INDUSTRIAL PARK, KUN-SHAN,  
 JIANG-SU, CHINA  
 TEL: +86-512-57619396 FAX: +86-512-57619688  
 E-mail: sales@tai-tech.cn
- Office:  
 北欣國際有限公司  
 NORTH STAR INTERNATIONAL LIMITED  
 TEL: +86-512-57619396 FAX: +86-512-57619688
- 慶邦電子元器件(泗洪)有限公司  
 TAIPAQ ELECTRONICS(SIHONG) CO., LTD  
 Sihong development zone Suqian City, Jiangsu , CHINA.  
 TEL: +86-527-88601191 FAX: +86-527-88601190  
 E-mail: sales@taipaq.cn

**Sales Dep.**

APPROVED	CHECKED
管哲頌 Eric Kuan	劉瓊瑄 Aries Liu

**R&D Center**

APPROVED	CHECKED	DRAWN
羅宜春	梁周虎	張麗麗

<b>ECN HISTORY LIST</b>					
-------------------------	--	--	--	--	--

REV	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN
1.0	19/06/18	新 發 行	羅宜春	梁周虎	張麗麗

備 註	
--------	--

# Power Inductor

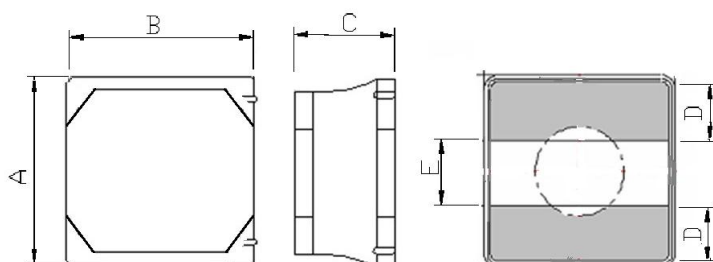
HPC4012TF-SERIES

## 1. Features

1. This specification applies Low Profile Power Inductors.
2. 100% Lead(Pb) & Halogen-Free and RoHS compliant.
3. Operating temperature :-40~+125°C (Including self - temperature rise)

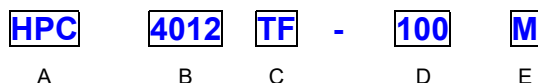


## 2. Dimension



Series	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)
HPC4012TF	4.0±0.2	4.0±0.2	1.2 max.	1.2 ref.	1.6 ref.

## 3. Part Numbering



- A: Series  
 B: Dimension  
 C: Lead Free  
 D: Inductance                      100=10uH  
 E: Inductance Tolerance        M=±20% ; Y=±30%

## 4. Specification

TAI-TECH Part Number	Inductance (uH)	Tolerance (%)	Test Frequency (Hz)	DCR (Ω) ±20%	I sat (A)typ.	I sat (A)Max.	I rms (A)typ.	I rms (A)Max.
HPC4012TF-1R0Y	1.0	±30%	1V100K	0.042	3.30	2.80	2.50	2.20
HPC4012TF-2R2M	2.2	±20%	1V100K	0.060	1.95	1.65	2.20	1.90
HPC4012TF-3R3M	3.3	±20%	1V100K	0.070	1.60	1.40	1.90	1.70
HPC4012TF-4R7M	4.7	±20%	1V100K	0.095	1.40	1.20	1.70	1.50
HPC4012TF-6R8M	6.8	±20%	1V100K	0.125	1.10	0.90	1.50	1.30
HPC4012TF-100M	10	±20%	1V100K	0.180	1.00	0.80	1.30	1.10
HPC4012TF-150M	15	±20%	1V100K	0.260	0.80	0.65	0.95	0.75
HPC4012TF-220M	22	±20%	1V100K	0.400	0.60	0.50	0.72	0.62

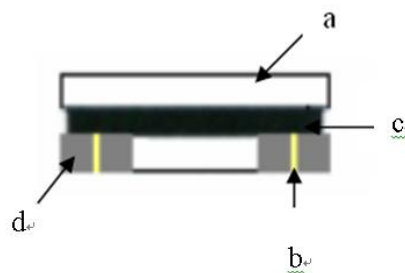
Note:

I<sub>sat</sub>: Saturation Current (I<sub>sat</sub>) will cause L0 to drop approximately 30%.

I<sub>rms</sub>: Heat Rated Current (I<sub>rms</sub>) will cause the coil temperature rise approximately ΔT of 40°C

5. Material

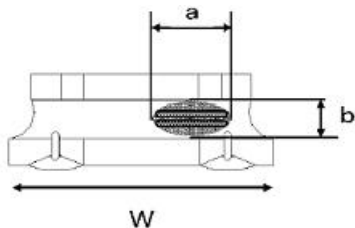
No.	Description	Specification
a.	Core	Ferrite Core
b.	Wire	Enameled Copper Wire
c.	Glue	Epoxy / Epoxy with magnetic powder
d.	Terminal	Ag/Ni/Sn



TAI-TECH Part Number	膠&粉
HPC4012TF-1R0M	純膠
HPC4012TF-2R2M	磁粉
HPC4012TF-3R3M	磁粉
HPC4012TF-4R7M	磁粉
HPC4012TF-6R8M	磁粉
HPC4012TF-100M	磁粉
HPC4012TF-150M	磁粉
HPC4012TF-220M	磁粉

Void appearance tolerance Limit

Size of voids occurring to coating resin is specified below.

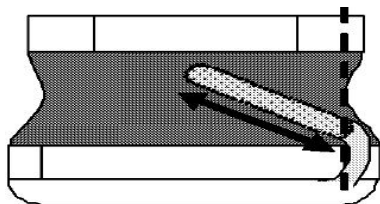


Appearance of exposed wire tolerance limit :

1. Width direction (dimension a) : Acceptable when  $a \leq w/2$   
Nonconforming when  $a > w/2$
2. Length direction (dimension b) : Dimension b is not specified.
3. The total area of exposed wire occurring to each sides is not greater than 50% of coating resin area, and is acceptable.

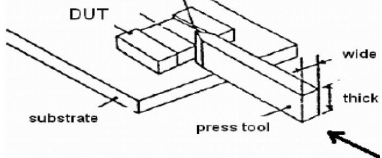
External appearance criterion for exposed wire

Exposed end of the winding wire at the secondary side should be 2mm and below.



## 6. Reliability and Test Condition

Item	Performance	Test Condition
Operating temperature	-40~+125°C (Including self - temperature rise)	
Storage temperature	1. -10~+40°C, 50~60%RH (Product with taping) 2. -40~+125°C (on board)	
<b>Electrical Performance Test</b>		
Inductance	Refer to standard electrical characteristics list.	HP4284A, CH11025, CH3302, CH1320, CH1320S LCR Meter.
DCR		CH16502, Agilent33420A Micro-Ohm Meter.
Saturation Current (Isat)	Approximately $\Delta L 30\%$	Saturation DC Current (Isat) will cause L0 to drop $\Delta L(\%)$
Heat Rated Current (Irms)	Approximately $\Delta T 40^{\circ}\text{C}$	Heat Rated Current (Irms) will cause the coil temperature rise $\Delta T(^{\circ}\text{C})$ without core loss. 1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer
<b>Reliability Test</b>		
Life Test	Appearance: No damage. Inductance: within $\pm 10\%$ of initial value Q: Shall not exceed the specification value. RDC: within $\pm 15\%$ of initial value and shall not exceed the specification value	Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Temperature: $125 \pm 2^{\circ}\text{C}$ (Inductor) Applied current: rated current Duration: 1000 $\pm$ 12hrs Measured at room temperature after placing for 24 $\pm$ 2 hrs
Load Humidity		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Humidity: $85 \pm 2\%$ R.H. Temperature: $85^{\circ}\text{C} \pm 2^{\circ}\text{C}$ Duration: 1000hrs Min. with 100% rated current Measured at room temperature after placing for 24 $\pm$ 2 hrs
Moisture Resistance		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) 1. Baked at $50^{\circ}\text{C}$ for 25hrs, measured at room temperature after placing for 4 hrs. 2. Raise temperature to $65 \pm 2^{\circ}\text{C}$ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to $25^{\circ}\text{C}$ in 2.5hrs. 3. Raise temperature to $65 \pm 2^{\circ}\text{C}$ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to $25^{\circ}\text{C}$ in 2.5hrs, keep at $25^{\circ}\text{C}$ for 2 hrs then keep at $-10^{\circ}\text{C}$ for 3 hrs 4. Keep at $25^{\circ}\text{C}$ 80-100%RH for 15min and vibrate at the frequency of 10 to 55 Hz to 10 Hz, measure at room temperature after placing for 1~2 hrs.
Thermal shock		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Condition for 1 cycle Step1: $-40 \pm 2^{\circ}\text{C}$ 30 $\pm$ 5min Step2: $25 \pm 2^{\circ}\text{C}$ $\cong$ 0.5min Step3: $125 \pm 2^{\circ}\text{C}$ 30 $\pm$ 5min Number of cycles: 500 Measured at room temperature after placing for 24 $\pm$ 2 hrs
Vibration		Oscillation Frequency: 10~2K~10Hz for 20 minutes Equipment: Vibration checker Total Amplitude: $1.52\text{mm} \pm 10\%$ Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations).

Item	Performance	Test Condition															
Bending	Appearance: No damage.	Shall be mounted on a FR4 substrate of the following dimensions: >=0805 inch(2012mm):40x100x1.2mm <0805 inch(2012mm):40x100x0.8mm Bending depth: >=0805 inch(2012mm):1.2mm <0805 inch(2012mm):0.8mm duration of 10 sec.															
Shock	Impedance: within±15% of initial value Inductance: within±10% of initial value Q: Shall not exceed the specification value. RDC: within ±15% of initial value and shall not exceed the specification value	<table border="1"> <thead> <tr> <th>Type</th> <th>Peak value (g's)</th> <th>Normal duration (D) (ms)</th> <th>Wave form</th> <th>Velocity change (V)ft/sec</th> </tr> </thead> <tbody> <tr> <td>SMD</td> <td>50</td> <td>11</td> <td>Half-sine</td> <td>11.3</td> </tr> <tr> <td>Lead</td> <td>50</td> <td>11</td> <td>Half-sine</td> <td>11.3</td> </tr> </tbody> </table>	Type	Peak value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (V)ft/sec	SMD	50	11	Half-sine	11.3	Lead	50	11	Half-sine	11.3
Type	Peak value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (V)ft/sec													
SMD	50	11	Half-sine	11.3													
Lead	50	11	Half-sine	11.3													
Solder ability	More than 95% of the terminal electrode should be covered with solder.	Preheat: 150°C,60sec. Solder: Sn96.5% Ag3% Cu0.5% Temperature: 245±5°C. Flux for lead free: Rosin. 9.5%. Dip time: 4±1sec. Depth: completely cover the termination															
Resistance to Soldering Heat		Depth: completely cover the termination <table border="1"> <thead> <tr> <th>Temperature(°C)</th> <th>Time(s)</th> <th>Temperature ramp/immersion and emersion rate</th> <th>Number of heat cycles</th> </tr> </thead> <tbody> <tr> <td>260 ±5 (solder temp)</td> <td>10 ±1</td> <td>25mm/s ±6 mm/s</td> <td>1</td> </tr> </tbody> </table>	Temperature(°C)	Time(s)	Temperature ramp/immersion and emersion rate	Number of heat cycles	260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s	1							
Temperature(°C)	Time(s)	Temperature ramp/immersion and emersion rate	Number of heat cycles														
260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s	1														
Terminal Strength	Appearance: No damage. Impedance: within±15% of initial value Inductance: within±10% of initial value Q: Shall not exceed the specification value. RDC: within ±15% of initial value and shall not exceed the specification value e	Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles With the component mounted on a PCB with the device to be tested, apply a force(>0805:1kg , <=0805:0.5kg)to the side of a device being tested. This force shall be applied for 60 +1 seconds. Also the force shall be applied gradually as not to apply a shock to the component being tested. 															

## 7. Soldering and Mounting

### 7-1. Soldering

Mildly activated rosin fluxes are preferred. TAI-TECH terminations are suitable for all wave and re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

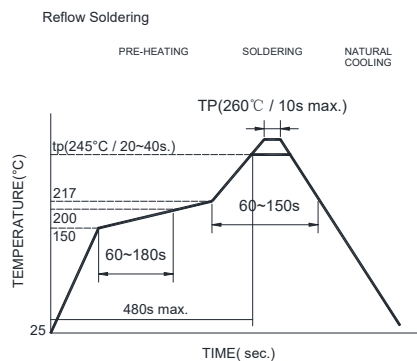
#### 7-1.1 Solder re-flow:

Recommended temperature profiles for re-flow soldering in Figure 1.

#### 7-1.2 Soldering Iron(Figure 2):

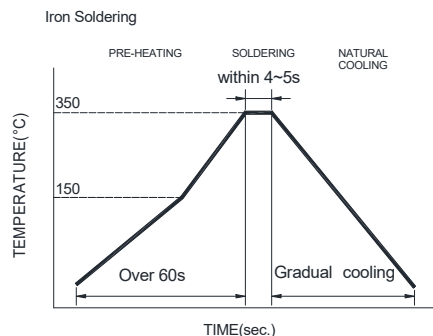
Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

- Preheat circuit and products to 150°C
- Never contact the ceramic with the iron tip
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- 355°C tip temperature (max)
- 1.0mm tip diameter (max)
- Limit soldering time to 4~5 sec.



Reflow times: 3 times max.

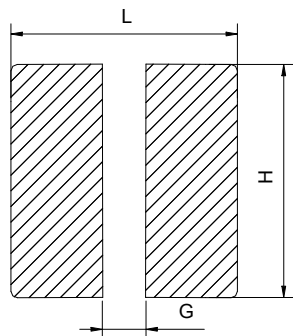
Fig.1



Iron Soldering times: 1 times max.

Fig.2

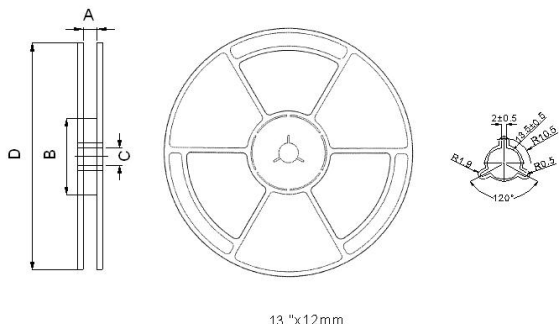
### 7-2. Recommended PC Board Pattern



L(mm)	G(mm)	H(mm)
4.2	1.2	4.2

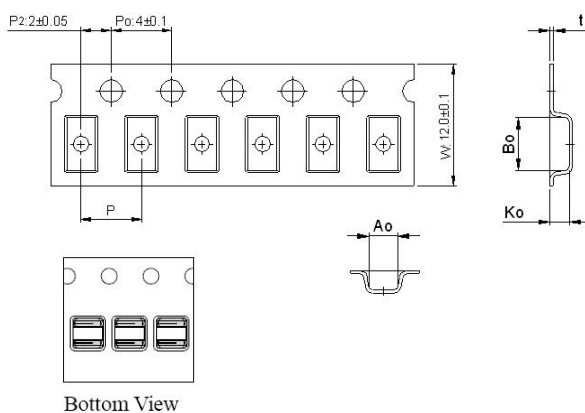
## 8. Packaging Information

### 8-1. Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)
13"x12mm	12±1.5	100±0.5	13.2±0.5	330±0.5

### 8-2. Tape Dimension / 12mm

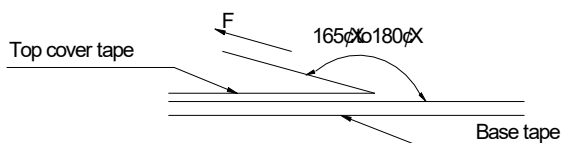


Series	Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
HPC	4012	4.35±0.1	4.50±0.1	1.55±0.1	8.0±0.10	0.25±0.05

### 8-3. Packaging Quantity

Chip size	4012
Chip / Reel	4500

### 8-4. Tearing Off Force



The force for tearing off cover tape is 10 to 100 grams in the arrow direction under the following conditions.

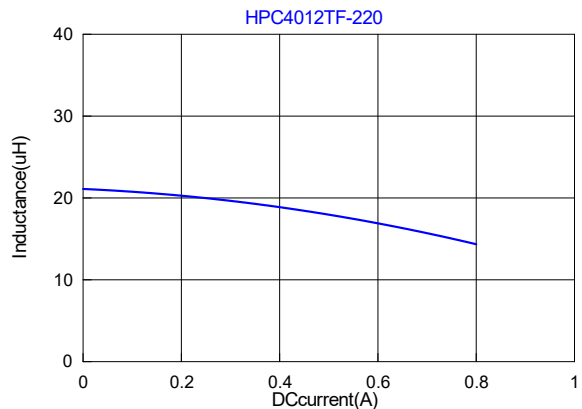
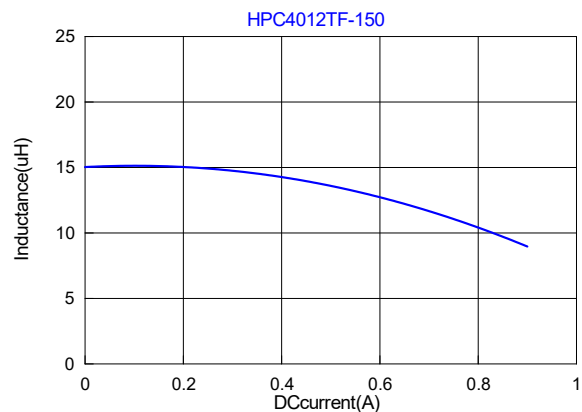
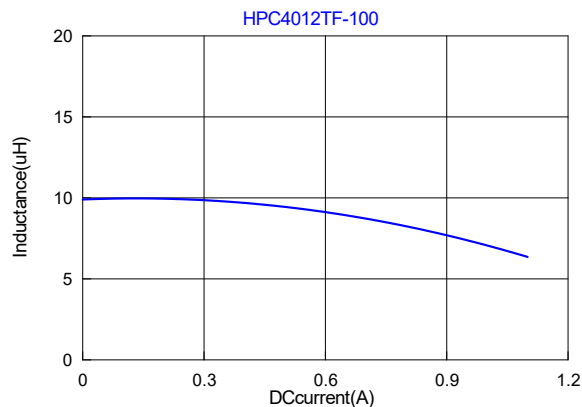
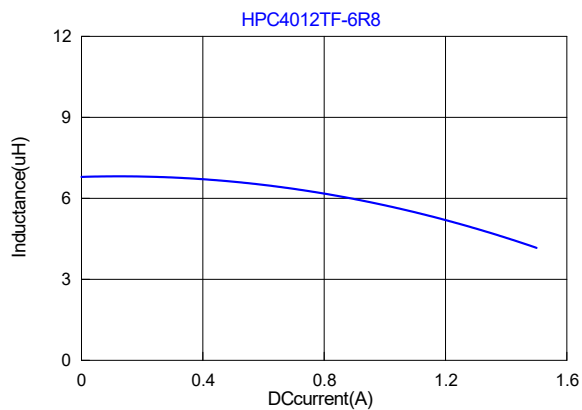
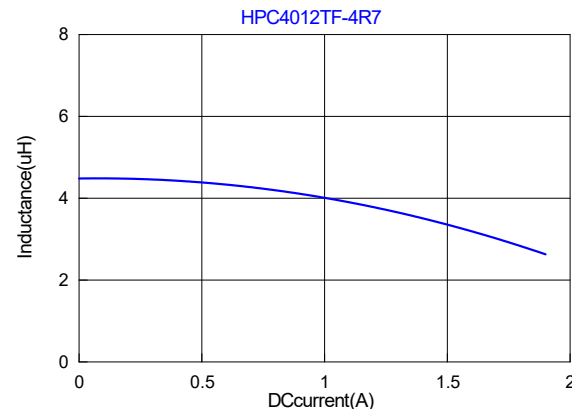
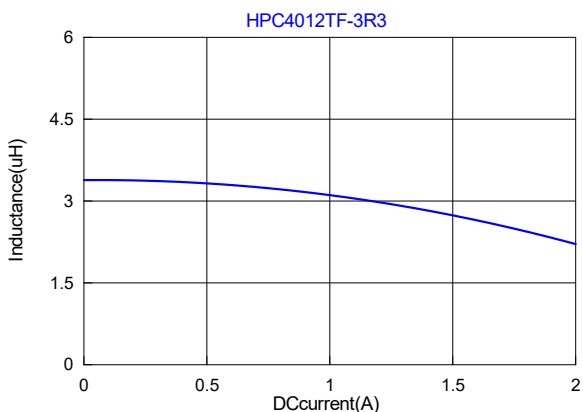
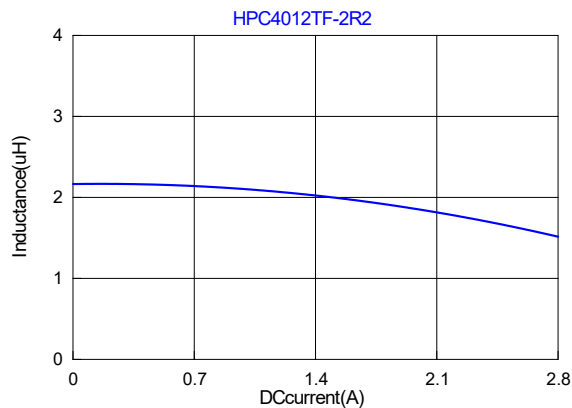
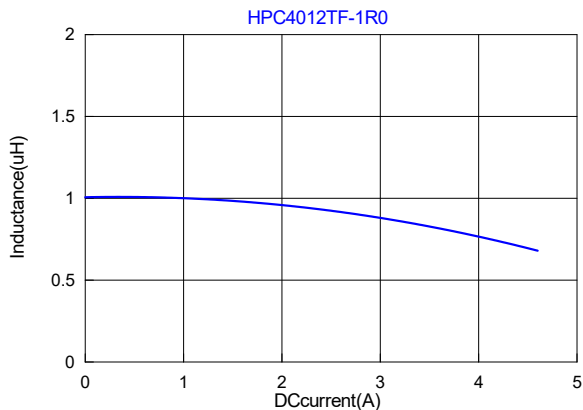
Room Temp. (°C)	Room Humidity (%)	Room atm (hPa)	Tearing Speed mm/min
5~35	45~85	860~1060	300

#### Application Notice

- Storage Conditions(component level)
  - To maintain the solderability of terminal electrodes:
    1. TAI-TECH products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
    2. Temperature and humidity conditions: Less than 40°C and 60% RH.
    3. Recommended products should be used within 12 months form the time of delivery.
    4. The packaging material should be kept where no chlorine or sulfur exists in the air.
- Transportation
  1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
  2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
  3. Bulk handling should ensure that abrasion and mechanical shock are minimized.



### 9. Typical Performance Curves



单击下面可查看定价，库存，交付和生命周期等信息

[>>TAI-TECH\(台庆\)](#)