TAI-TECH

Form No: XXXXXX-7-0000-PBM02-170400173

# Specification for Approval

**Date:** 2017/04/19

**Customer :** 深圳台慶

**TAI-TECH P/N:** HPC4030NF-Series

**CUSTOMER P/N:**

**DESCRIPTION:**

**QUANTITY:** pcs

| **REMARK:** | | |
|---|---|---|
| Customer Approval Feedback | | |
| | | |


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|---|---|---|
| 羅宜春 | 梁周虎 | 張光 |

SMD Power Inductor HPC4030NF-Series

# ECN HISTORY LIST

| REV | DATE | DESCRIPTION | APPROVED | CHECKED | DRAWN |
|---|---|---|---|---|---|
| 1.0 | 17/04/19 | 新發行 | 羅宜春 | 梁周虎 | 張光 |
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| 備注 | | | | | |

# SMD Power Inductor

**HPC4030NF-Series**

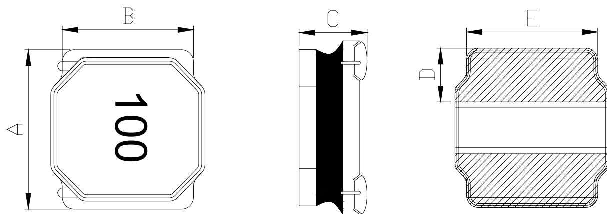
## 1. Features

1. Magnetic-resin shielded construction reduces buzz noise to ultra-low levels
2. Metallization on ferrite core results in excellent shock resistance and damage-free durability
3. Closed magnetic circuit design reduces leakage flux and Electro Magnetic Interference (EMI)
4. 30% higher current rating than conventional nductors of equal size
5. Takes up less PCB real estate and save more power

## 2. Applications

1. LED Lighting
2. Next-generation mobile devices with multifunction such as mobile TV and digital movie cameras
3. Flat-screen TVs, blue-ray disc recorders, set top box
4. Notebooks, desktop computers, servers, graphic cards cards
5. Portable gaming devices, personal navigation systems, personal multimedia devices
6. Automotive systems
7. Telecomm base stations

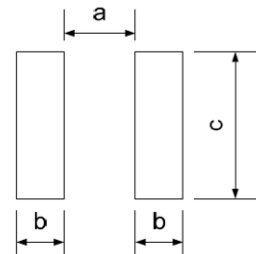
## 3. Dimension




| Series | *A(mm) | *B(mm) | C(mm) | D(mm) | E(mm) |
|---|---|---|---|---|---|
| HPC4030NF | 4.0±0.2 | 4.0±0.2 | 3.0Max. | 1.35±0.3 | 3.4±0.2 |

*Dimensions are not including the termination. For maximum overall dimensions with tenrmination , add 0.1mm.

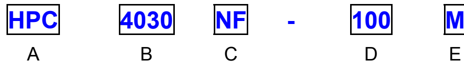
### Recommendend Land pattern




| a(mm) | b(mm) | c(mm) |
|---|---|---|
| 1.3Typ | 1.5Typ | 3.7Typ |

Note: 1. The above PCB layout reference only.
2. Recommend solder paste thickness at 0.12mm and above.

## 4. Part Numbering




A B C D E

A: Series
B: Dimension A/B*C
C: Type
D: Inductance 1R0=1.00uh 100=10uh,101=100uh,102=1000uh
E: Inductance Tolerance K=±10%, L=±15%,M=±20%,Y=±30%.
marking direction cannot decide polarity. Color: Black, unidirectional.
magnetic shielding

.

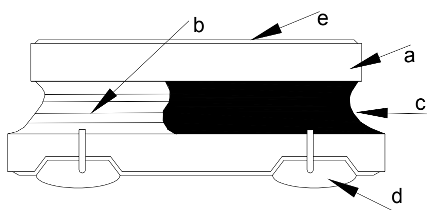
## 5. Specification

| Part Number | Inductance L0 (uH)±20% @ 0 A | Rated current | | DCR (mΩ) @25℃ ±20%. |
|---|---|---|---|---|
| | | Tempetature current I rms (A) | Saturation current I sat (A) | |
| HPC4030NF-R68M | 0.68 | 4.60 | 6.80 | 10 |
| HPC4030NF-1R0M | 1.00 | 4.20 | 5.30 | 14 |
| HPC4030NF-1R5M | 1.50 | 3.40 | 4.90 | 20 |
| HPC4030NF-2R2M | 2.20 | 3.00 | 4.90 | 30 |
| HPC4030NF-3R3M | 3.30 | 2.40 | 3.30 | 40 |
| HPC4030NF-4R7M | 4.70 | 2.05 | 2.90 | 60 |
| HPC4030NF-5R6M | 5.60 | 1.95 | 2.60 | 65 |
| HPC4030NF-6R8M | 6.80 | 1.80 | 2.75 | 90 |
| HPC4030NF-8R2M | 8.20 | 1.60 | 2.10 | 90 |
| HPC4030NF-100M | 10.0 | 1.50 | 2.00 | 100 |
| HPC4030NF-120M | 12.0 | 1.30 | 1.80 | 135 |
| HPC4030NF-150M | 15.0 | 1.20 | 1.70 | 190 |
| HPC4030NF-180M | 18.0 | 1.10 | 1.50 | 200 |
| HPC4030NF-220M | 22.0 | 1.00 | 1.30 | 225 |
| HPC4030NF-330M | 33.0 | 0.85 | 1.10 | 330 |
| HPC4030NF-470M | 47.0 | 0.72 | 0.95 | 445 |

Note:

1. All test data referenced to 25℃ ambient , Ls:100KHz/1V.
2. Testing Instrument : HP4284A,CH11025,CH3302,CH1320 ,CH1320S LCR METER / Rdc:CH502BC MICRO OHMMETER.
3. Heat Rated Current (Irms) will cause the coil temperature rise approximately △t of 40℃.
4. Saturation Current ( Isat ) will cause L0 to drop approximately 30%.
5. The part temperature (ambient + temp rise) should not exceed 125℃under worst case operating conditions.Circuit design,component,PCB trace size and thickness,airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
6. Special inquiries besides the above common used types can be met on your requirement.

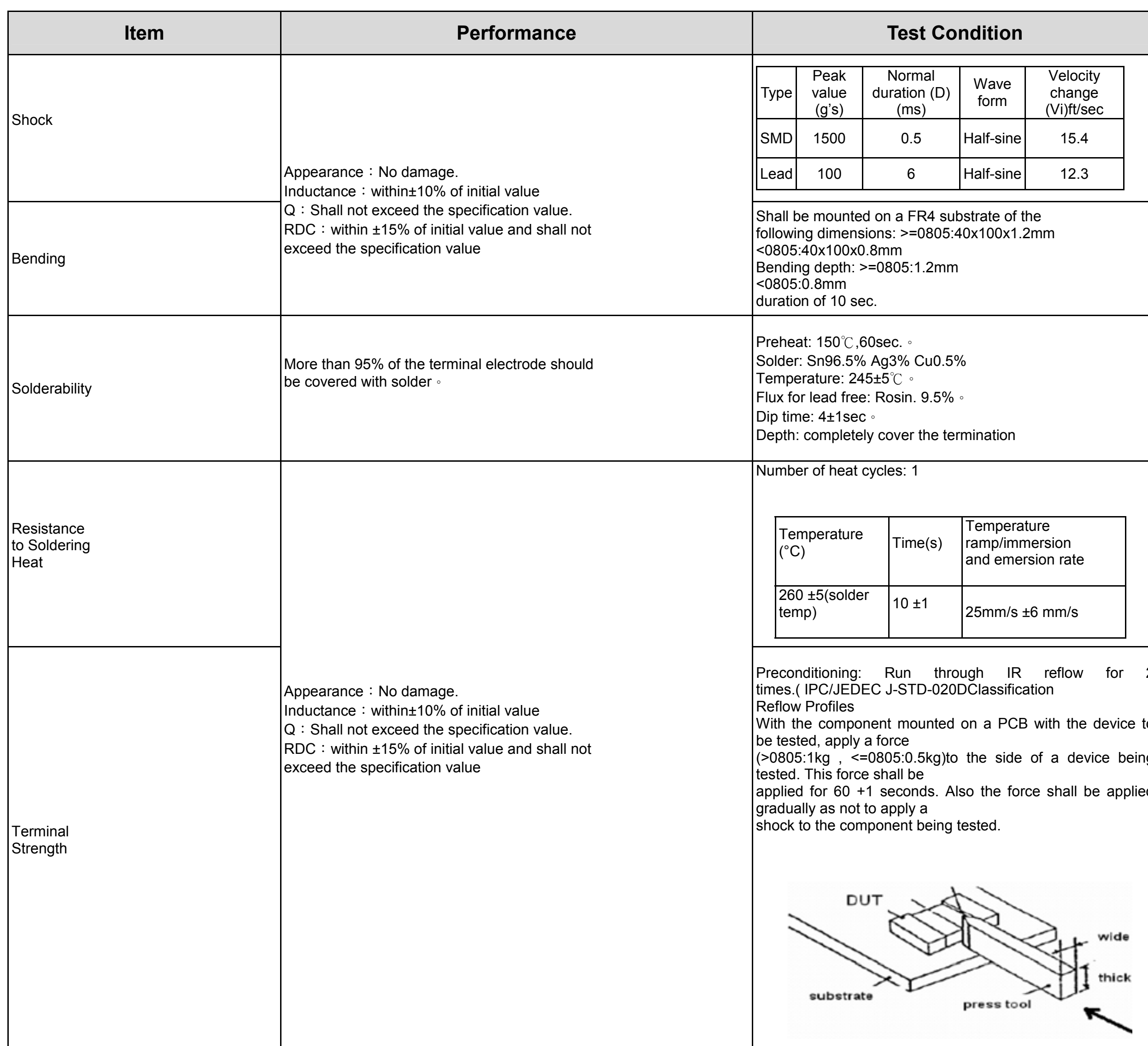
# 5. Material List




| NO | Items | Materials |
|---|---|---|
| a | Core | Ferrite Core |
| b | Wire | Enameled Copper Wire |
| c | Glue | Epoxy with magnetic powder |
| d | Terminal | Ag/Ni/Sn+ Sn Solder |
| e | Ink | Halogen-free ketone |

# 6. Reliability and Test Condition

| Item | Performance | Test Condition |
|---|---|---|
| Operating temperature | -40~+125℃ (Including self - temperature rise) | |
| Storage temperature | 1.-10~+40℃,50~60%RH (Product without taping)<br>2.-40~+125℃ (on board) | |
| **Electrical Performance Test** | | |
| Inductance | Refer to standard electrical characteristics list. | HP4284A,CH11025,CH3302,CH1320,CH1320S<br>LCR Meter. |
| DCR | | CH16502,Agilent33420A Micro-Ohm Meter. |
| Saturation Current (Isat) | Approximately △L30%. | Saturation DC Current (Isat) will cause L0 to drop △L(%) |
| Heat Rated Current (Irms) | Approximately △T40℃ | Heat Rated Current (Irms) will cause the coil temperature rise △T(℃) without core loss.<br>1.Applied the allowed DC current.<br>2.Temperature measured by digital surface thermometer |
| **Reliability Test** | | |
| Life Test | Appearance：No damage.<br>Inductance：within±10% of initial value<br>Q：Shall not exceed the specification value.<br>RDC：within ±15% of initial value and shall not exceed the specification value | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles)<br>Temperature： 125±2℃(Inductor)<br>Applied current：rated current<br>Duration：1000±12hrs<br>Measured at room temperature after placing for 24±2 hrs |
| Load Humidity | | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles<br>Humidity：85±2% R.H,<br>Temperature：85℃±2℃<br>Duration：1000hrs Min. with 100% rated current<br>Measured at room temperature after placing for 24±2 hrs |
| Moisture Resistance | | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles<br>1. Baked at50℃ for 25hrs, measured at room temperature after placing for 4 hrs.<br>2. Raise temperature to 65±2℃ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to 25℃ in 2.5hrs.<br>3. Raise temperature to 65±2℃ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to 25℃ in 2.5hrs,keep at 25℃ for 2 hrs then keep at -10℃ for 3 hrs<br>4. Keep at 25℃ 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-020DClassification Reflow Profiles<br>Condition for 1 cycle<br>Step1：-40±2℃ 30±5min<br>Step2：25±2℃ ≦0.5min<br>Step3：125±2℃ 30±5min<br>Number of cycles： 500<br>Measured at room temperature after placing for 24±2 hrs |
| Vibration | | Oscillation Frequency: 10～2K～10Hz for 20 minutes<br>Equipment： Vibration checker<br>Total Amplitude:1.52mm±10%<br>Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations)。 |




<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td>Shock</td><td rowspan="2">Appearance：No damage.<br>Inductance：within±10% of initial value<br>Q：Shall not exceed the specification value.<br>RDC：within ±15% of initial value and shall not exceed the specification value</td><td><table><tr><th>Type</th><th>Peak value (g's)</th><th>Normal duration (D) (ms)</th><th>Wave form</th><th>Velocity change (Vi)ft/sec</th></tr><tr><td>SMD</td><td>1500</td><td>0.5</td><td>Half-sine</td><td>15.4</td></tr><tr><td>Lead</td><td>100</td><td>6</td><td>Half-sine</td><td>12.3</td></tr></table></td></tr>
<tr><td>Bending</td><td>Shall be mounted on a FR4 substrate of the following dimensions: >=0805:40x100x1.2mm<br><0805:40x100x0.8mm<br>Bending depth: >=0805:1.2mm<br><0805:0.8mm<br>duration of 10 sec.</td></tr>
<tr><td>Solderability</td><td>More than 95% of the terminal electrode should be covered with solder。</td><td>Preheat: 150℃,60sec.。<br>Solder: Sn96.5% Ag3% Cu0.5%<br>Temperature: 245±5℃ 。<br>Flux for lead free: Rosin. 9.5%。<br>Dip time: 4±1sec。<br>Depth: completely cover the termination</td></tr>
<tr><td>Resistance to Soldering Heat</td><td rowspan="2">Appearance：No damage.<br>Inductance：within±10% of initial value<br>Q：Shall not exceed the specification value.<br>RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Number of heat cycles: 1<table><tr><th>Temperature (°C)</th><th>Time(s)</th><th>Temperature ramp/immersion and emersion rate</th></tr><tr><td>260 ±5(solder temp)</td><td>10 ±1</td><td>25mm/s ±6 mm/s</td></tr></table></td></tr>
<tr><td>Terminal Strength</td><td>Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles<br>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.</td></tr>
</table>

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

# 7. Soldering and Mounting

### (1) Soldering

Mildly activated rosin fluxes are preferred. The minimum amount of solder can lead to damage from the stresses caused by the difference in coefficients of expansion between solder, chip and substrate. TAI-TECH terminations are suitable for re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

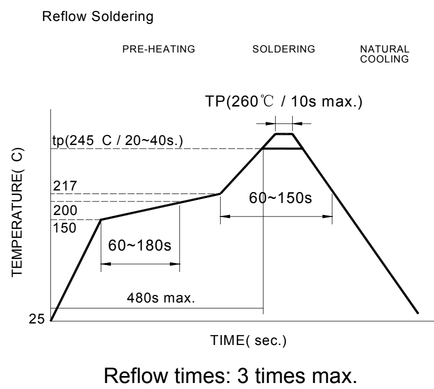
### (2) Solder re-flow:

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

### (3) Soldering Iron:

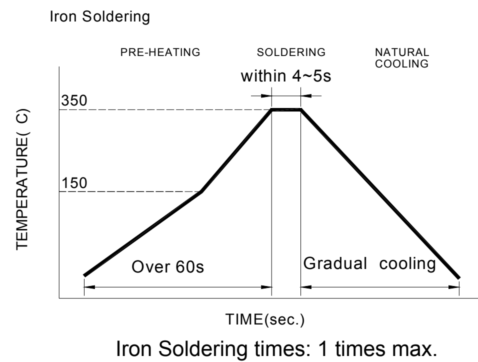
Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

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




Reflow times: 3 times max.

Fig.1

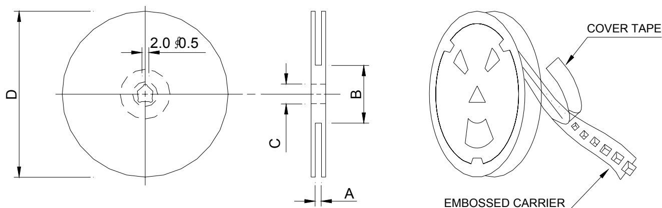



Iron Soldering times: 1 times max.

Fig.2

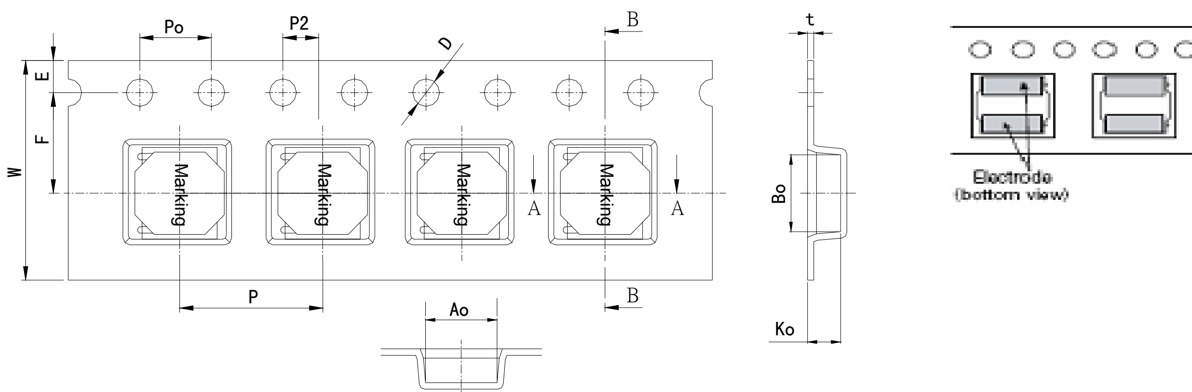
# 8. Packaging Information

### (1) Reel Dimension




| Type | A(mm) | B(mm) | C(mm) | D(mm) |
|---|---|---|---|---|
| 13"x12mm | 12.4+2/-0 | 100±2.0 | 13+0.5/-0.2 | 330±3.0 |

### (2) Tape Dimension

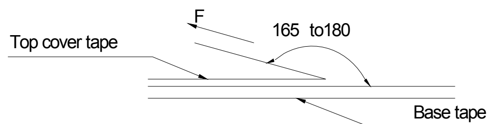



| Series | Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | w(mm) | Emm) | F(mm) | D(mm) | Po(mm) | P2(mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HPC | 4030 | 4.25±0.1 | 4.25±0.1 | 3.2±0.1 | 8.0±0.1 | 12±0.3 | 1.75±0.1 | 5.5±0.1 | 1.5±0.1 | 4.0±0.1 | 2.00±0.1 |

### (3) Packaging Quantity

| HPC | 4030 |
|---|---|
| Reel | 2000 |
| Inner box | 4000 |
| Carton | 16000 |

### (4) Tearing Off Force



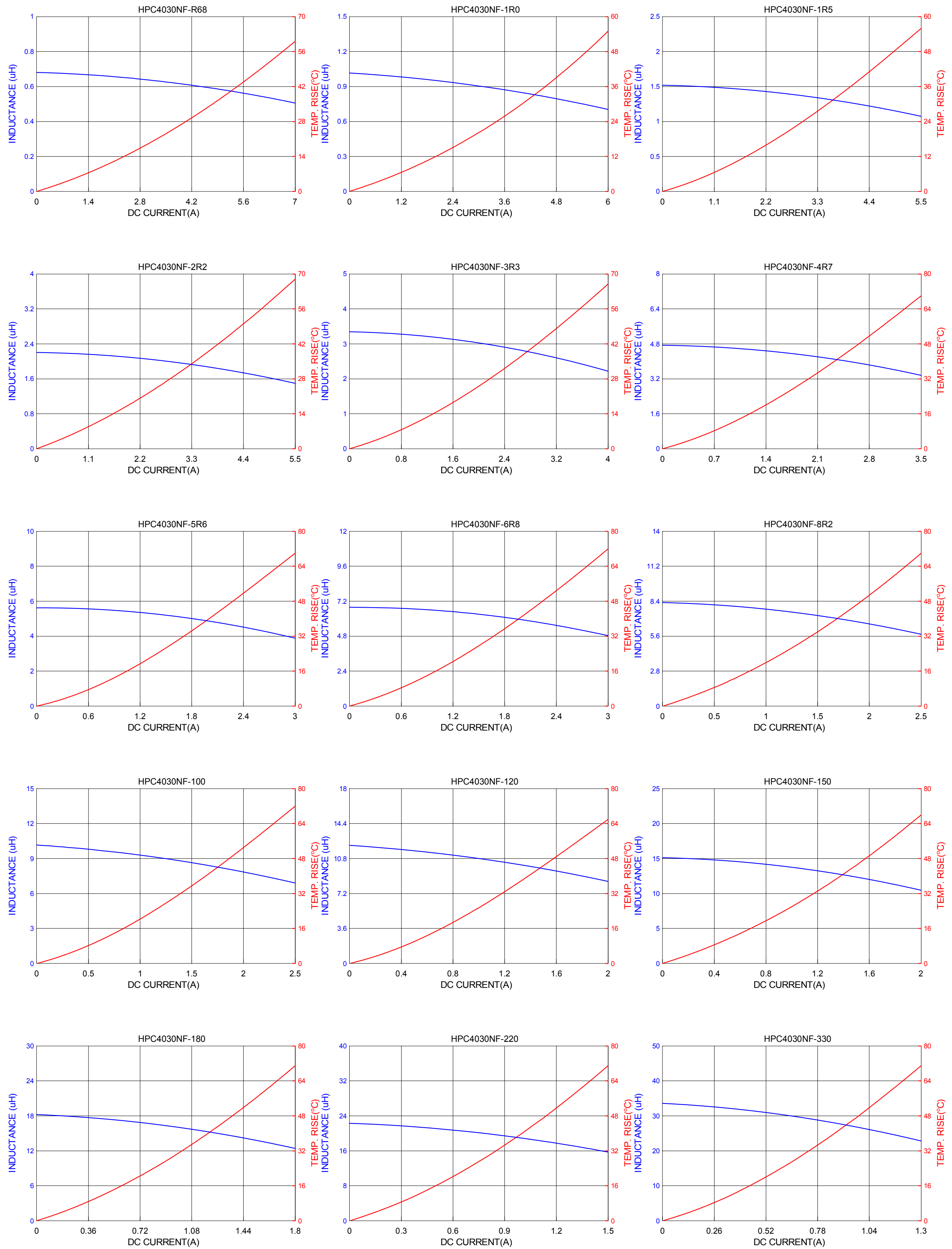

The force for tearing off cover tape is 10 to 130 grams in the arrow direction under the following conditions(referenced ANSI/EIA-481-C-2003 of 4.11 stadnard).

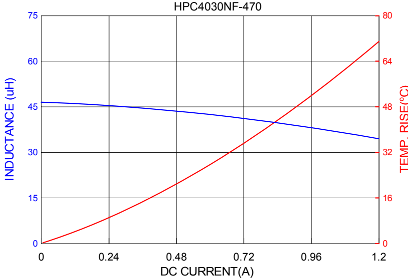
| Room Temp. (℃) | Room Humidity (%) | Room atm (hPa) | Tearing Speed mm/min |
|---|---|---|---|
| 5~35 | 45~85 | 860~1060 | 300 |

**Application Notice**

- Storage Conditions
  To maintain the solderability of terminal electrodes:
  1. TAIPAQ products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
  2. Temperature and humidity conditions: Less than 40℃ 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.

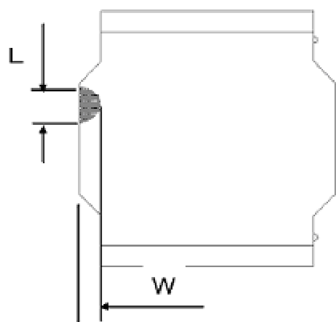
# 9. Typical Performance Curve




HPC4030NF-470
INDUCTANCE (uH)
TEMP. RISE(°C)
DC CURRENT(A)
75
60
45
30
15
0
80
64
48
32
16
0
0
0.24
0.48
0.72
0.96
1.2

Core chipping

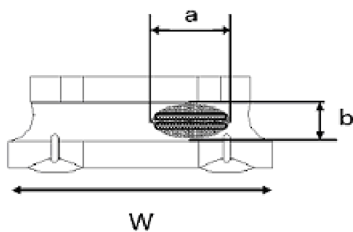
The appearance standard of the chipping size on top side, and bottom side ferrite core is listed below.




| L | W |
|---|---|
| 0.8mm Max. | 0.8mm Max. |

Void appearance tolerance Limit

Size of voids occurring to coating resin is specified below.



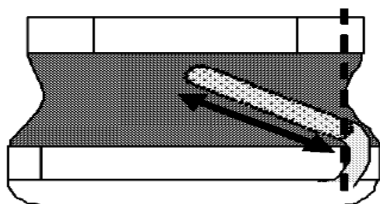

Exposed wire tolerance limit of coating resin part on product side.

Size of exposed wire occurring to coating resin is specified below.

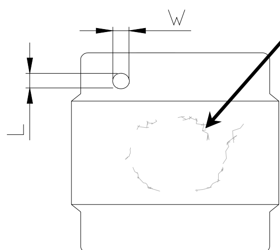
1. Width direction（dimension a）: Acceptable when a≦w/2.
2. Length direction（dimension b）: Dimension b is not specified.
3. The total area of exposed wire occurring to each sides is not greater than 50% of coating resin area, and is acceptable.

External appearance criterion for exposed wire

Exposed end of the winding wire at the secondary side should be 1.5mm and below.



## Exectrde appearance criterion for exposed wire




Visual check on core surface with no crack means pass.

Only top side of wire is exposed.
(regardless of whole tope side of wire exposed)

Conforming

Wire is soldered insufficiently and less than half of outer diameter is covered with solder.

Less than 1/2 of joint side length.
(More than 1/2 is selected as defect)

| L | W |
|---|---|
| 0.8mm Max. | 0.8mm Max. |

Electrodes with foreign body (dirt) appearance standards

Foreign materials (dirt) will not affect the coplanarity of PAD,

below the example of foreign materials (dirt) quantity ≤2PCS on single PAD.

dimension range as below.