

# Specification for Approval

**Date:** 2019/03/26

**Customer :** 深圳臺慶

**TAI-TECH P/N:** TMPC0605HV-Series(G)-D

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

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

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

**REMARK:**

Customer Approval Feedback

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# SMD Power Inductor

TMPC0605HV-Series(G)-D

## 1. Features

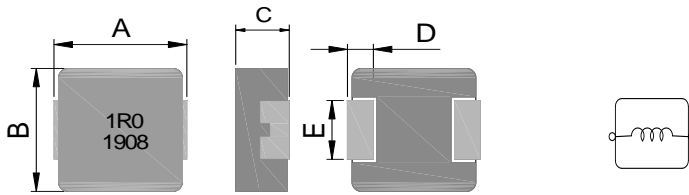
1. Carbonyl Powder.
2. Compact design.
3. High current , low DCR , high efficiency.
4. Very low acoustic noise and very low leakage flux noise.
5. High reliability.
6. 100% Lead(Pb)-Free and RoHS compliant.
7. High reliability -Reliability test complied to AEC-Q200.
8. Operating temperature -55~+125℃(Including self - temperature rise)



## 2. Applications

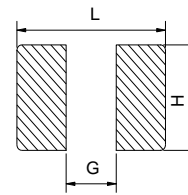
Note PC power system , incl. IMVP-6  
DC/DC converter .

## 3. Dimensions



| Series     | A(mm)   | B(mm)   | C(mm)   | D(mm)   | E(mm)   |
|------------|---------|---------|---------|---------|---------|
| TMPC0605HV | 7.3±0.3 | 6.6±0.3 | 4.8±0.2 | 1.8±0.3 | 3.0±0.3 |

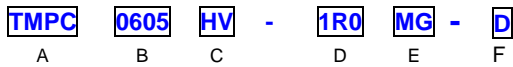
## Recommend PC Board Pattern



| L(mm) | G(mm) | H(mm) |
|-------|-------|-------|
| 8.4   | 2.5   | 3.5   |

Note: 1. The above PCB layout reference only.  
2. Recommend solder paste thickness at 0.15mm and above.

## 4. Part Numbering



- A: Series
- B: Dimension
- C: Type
- D: Inductance
- E: Inductance Tolerance
- F: Code
- BxC
- Carbonyl Powder.V:vehicle.
- 1R0=1.00uH
- M=±20%
- Marking: Black.1R0 and 1908(19 YY, 08 WW, follow production date).

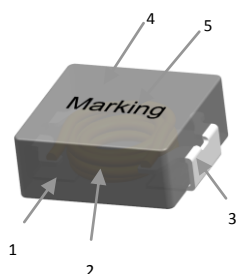
## 5. Specification

| Part Number        | Inductance<br>L0 (uH)±20% | I rms ( A )<br>Typ | I sat ( A )<br>Typ | DCR<br>(mΩ) Typ.<br>@25℃ | DCR<br>(mΩ) Max.<br>@25℃ |
|--------------------|---------------------------|--------------------|--------------------|--------------------------|--------------------------|
| TMPC0605HV-R22MG-D | 0.22                      | 25                 | 35                 | 1.6                      | 1.9                      |
| TMPC0605HV-R33MG-D | 0.33                      | 25                 | 32                 | 2.5                      | 3.0                      |
| TMPC0605HV-R40MG-D | 0.40                      | 23                 | 31                 | 3.1                      | 3.7                      |
| TMPC0605HV-R47MG-D | 0.47                      | 22                 | 30                 | 3.5                      | 3.9                      |
| TMPC0605HV-R56MG-D | 0.56                      | 20                 | 27                 | 3.6                      | 4.2                      |
| TMPC0605HV-R60MG-D | 0.60                      | 19                 | 25                 | 3.8                      | 4.3                      |
| TMPC0605HV-R68MG-D | 0.68                      | 18                 | 24                 | 4.0                      | 4.5                      |
| TMPC0605HV-R82MG-D | 0.82                      | 16.5               | 22                 | 4.6                      | 4.9                      |
| TMPC0605HV-1R0MG-D | 1.00                      | 15                 | 20                 | 6.1                      | 6.5                      |
| TMPC0605HV-1R2MG-D | 1.20                      | 14                 | 18                 | 6.7                      | 7.5                      |
| TMPC0605HV-1R5MG-D | 1.50                      | 12                 | 16.5               | 8.6                      | 9.0                      |
| TMPC0605HV-1R8MG-D | 1.80                      | 12                 | 15                 | 9.5                      | 11.0                     |
| TMPC0605HV-2R2MG-D | 2.20                      | 10                 | 14                 | 11.2                     | 12.0                     |
| TMPC0605HV-3R3MG-D | 3.30                      | 8                  | 12                 | 19                       | 20.9                     |
| TMPC0605HV-4R7MG-D | 4.70                      | 6.5                | 10                 | 28                       | 30.8                     |
| TMPC0605HV-5R6MG-D | 5.60                      | 6.0                | 9.0                | 43.5                     | 49                       |
| TMPC0605HV-6R8MG-D | 6.80                      | 5.5                | 8.5                | 46                       | 51.5                     |
| TMPC0605HV-8R2MG-D | 8.20                      | 5.0                | 8.0                | 56                       | 63                       |
| TMPC0605HV-100MG-D | 10.0                      | 4.0                | 7.5                | 60                       | 69                       |
| TMPC0605HV-150MG-D | 15.0                      | 3.5                | 6.0                | 81                       | 92                       |
| TMPC0605HV-220MG-D | 22.0                      | 2.5                | 5.5                | 140                      | 170                      |
| TMPC0605HV-470MG-D | 47.0                      | 1.9                | 2.7                | 290                      | 330                      |
| TMPC0605HV-560MG-D | 56.0                      | 1.6                | 2.1                | 342                      | 396                      |
| TMPC0605HV-680MG-D | 68.0                      | 1.2                | 2.0                | 386                      | 445                      |

Note:

1. Test frequency : Ls : 100KHz /1.0V.
2. All test data referenced to 25℃ ambient.
3. Testing Instrument(or equ) : L: HP4284A,CH11025,CH3302,CH1320,CH1320S LCR METER / Rdc:CH16502,Agilent33420A MICRO OHMMETER.
4. Heat Rated Current (Irms) will cause the coil temperature rise approximately ΔT of 40℃
5. Saturation Current (Isat) will cause L0 to drop approximately30%.
6. 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.
7. Special inquiries besides the above common used types can be met on your requirement.

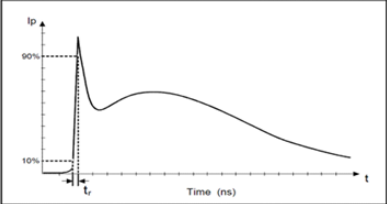
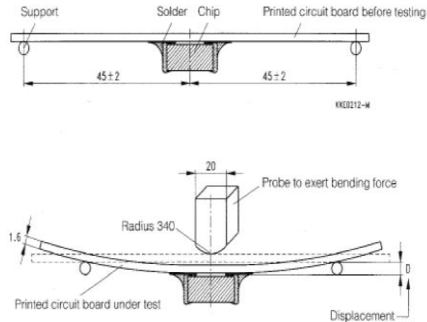
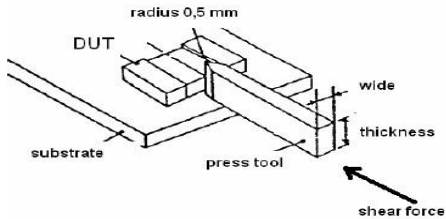
## 6. Material List



| NO | Items | Materials                            |
|----|-------|--------------------------------------|
| 1  | Core  | Carbonyl Powder.                     |
| 2  | Wire  | Polyester Wire or equivalent.        |
| 3  | Clip  | 100% Pb free solder(Ni+Sn---Plating) |
| 4  | paint | Epoxy resin                          |
| 5  | Ink   | Halogen-free ketone                  |

## 7. Reliability and Test Condition

| Item  | Performance   | Test Condition   |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
|---|---|--|-----------|---------------------------|--------------------------|-----------|---------------------------|-----|-----|---|-----------|------|------|-----|---|-----------|------|
| Operating temperature                           | -55~+125℃ (Including self - temperature rise)   |  |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| Storage temperature and Humidity range          | 1. -10~+40℃,50~60%RH (Product with taping)<br>2. -55~+125℃ (on board)   |  |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| <b>Electrical Performance Test</b>              |   |  |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| 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 $\Delta$ L30%   | Saturation DC Current (Isat) will cause L0 to drop $\Delta$ L(%)   |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| Heat Rated Current (Irms)                       | Approximately $\Delta$ T40℃   | Heat Rated Current (Irms) will cause the coil temperature rise $\Delta$ T(℃).<br>1.Applied the allowed DC current<br>2.Temperature measured by digital surface thermometer   |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| <b>Reliability Test</b>                         |   |  |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| High Temperature Exposure(Storage)<br>AEC-Q200  | Appearance : No damage.<br>Impedance : within $\pm$ 15% of initial value<br>Inductance : within $\pm$ 10% of initial value<br>Q : Shall not exceed the specification value.<br>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-020DClassification Reflow Profiles<br>Temperature : 125 $\pm$ 2℃ (Inductor)<br>Duration : 1000hrs Min.<br>Measured at room temperature after placing for 24 $\pm$ 2 hrs   |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| Temperature Cycling<br>AEC-Q200                 |   | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles<br>Condition for 1 cycle<br>Step1 : -55 $\pm$ 2℃ 30min Min.(Inductor)<br>Step2 : 125 $\pm$ 2℃ transition time 1min MAX.<br>Step3 : 125 $\pm$ 2℃ 30min Min.<br>Step4 : Low temp. transition time 1min MAX.<br>Number of cycles : 1000<br>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-020DClassification Reflow Profiles<br>1.Baked at50℃ for 25hrs, measured at room temperature after placing for 4 hrs.<br>2.Raise temperature to 65 $\pm$ 2℃ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to 25℃ in 2.5hrs.<br>3.Raise temperature to 65 $\pm$ 2℃ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to 25℃ in 2.5hrs,keep at 25℃ for 2hrs then keep at -10℃ for 3hrs<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. |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| Biased Humidity<br>(AEC-Q200)                   |   | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles<br>Humidity : 85 $\pm$ 3% R.H,<br>Temperature : 85 $\pm$ 2℃<br>Duration : 1000hrs Min<br>Measured at room temperature after placing for24 $\pm$ 2hrs   |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| High Temperature Operational Life<br>(AEC-Q200) |   | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles<br>Temperature : 125 $\pm$ 2℃ (Inductor)<br>Duration : 1000hrs Min. with 100% rated current.<br>Measured at room temperature after placing for24 $\pm$ 2hrs  |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| External Visual                                 | Appearance : No damage.   | Inspect device construction, marking and workmanship. Electrical Test not required.  |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| Physical Dimension                              | According to the product specification size measurement   | According to the product specification size measurement  |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| Resistance to Solvents                          | Appearance : No damage.   | Add aqueous wash chemical - OKEM clean or equivalent.  |           |                           |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| Mechanical Shock                                | Appearance : No damage.<br>Impedance : within $\pm$ 15% of initial value<br>Inductance : within $\pm$ 10% of initial value<br>Q : Shall not exceed the specification value.<br>RDC : within $\pm$ 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>100</td> <td>6</td> <td>Half-sine</td> <td>12.3</td> </tr> <tr> <td>Lead</td> <td>100</td> <td>6</td> <td>Half-sine</td> <td>12.3</td> </tr> </tbody> </table> shocks in each direction along 3 perpendicular axes.   | Type      | Peak value (g's)          | Normal duration (D) (ms) | Wave form | Velocity change (V)ft/sec | SMD | 100 | 6 | Half-sine | 12.3 | Lead | 100 | 6 | Half-sine | 12.3 |
| Type  | Peak value (g's)  | Normal duration (D) (ms)   | Wave form | Velocity change (V)ft/sec |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| SMD   | 100   | 6  | Half-sine | 12.3                      |                          |           |                           |     |     |   |           |      |      |     |   |           |      |
| Lead  | 100   | 6  | Half-sine | 12.3                      |                          |           |                           |     |     |   |           |      |      |     |   |           |      |

| Item                         | Performance  | Test Condition  |                       |         |  |                       |               |      |                |   |
|------------------------------|--|---|-----------------------|---------|--|-----------------------|---------------|------|----------------|---|
| Vibration                    |  | IPC/JEDEC J-STD-020D Classification Reflow Profiles<br>Oscillation Frequency: 10~2K~10Hz for 20 minute<br>Equipment : Vibration checker<br>Total Amplitude: 1.52mm±10%<br>Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations) ◦   |                       |         |  |                       |               |      |                |   |
| Resistance to Soldering Heat | Appearance : No damage.<br>Impedance : within±15% of initial value<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 | Test condition : <table border="1" data-bbox="963 427 1417 510"> <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)</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) | 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)                | 10±1   | 25mm/s ±6 mm/s  | 1                     |         |  |                       |               |      |                |   |
| Thermal shock (AEC-Q200)     |  | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles<br>Condition for 1 cycle<br>Step1 : -55±2°C 15±1min(Inductor)<br>Step2 : 125±2°C within 20Sec.<br>Step3 : 125±2°C 15±1min<br>Number of cycles : 300<br>Measured at room tempraturc after placing fo24±2hrs   |                       |         |  |                       |               |      |                |   |
| ESD                          | Appearance : No damage.  |   |                       |         |  |                       |               |      |                |   |
| Solderability                | More than 95% of the terminal electrode should be covered with solder ◦  | a. Method B, 4 hrs @155°C dry heat @235°C±5°C<br>b. Method B @ 215°C±5°C category 3.(8hours ± 15 min)<br>c. Method D category 3. (8hours ± 15 min) @ 260°C±°C<br>Preheat: 150°C, 60sec.<br>Solder: Sn96.5% Ag3% Cu0. 5%<br>Temperature: 245±5°C ◦<br>Flux for lead free: Rosin. 9.5% ◦<br>Dip time: 4±1sec.<br>Depth: completely cover the termination  |                       |         |  |                       |               |      |                |   |
| Electrical Characterization  | Refer Specification for Approval   | Summary to show Min, Max, Mean and Standard deviation .   |                       |         |  |                       |               |      |                |   |
| Flammability                 | Electrical Test not required.  | V-0 or V-1 are acceptable.  |                       |         |  |                       |               |      |                |   |
| Board Flex                   | Appearance : No damage   | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles<br>Place the 100mm X 40mm board into a fixture similar to the one shown in below Figure with the component facing down. The apparatus shall consist of mechanical means to apply a force which will bend the board (D) x = 2 mm minimum. The duration of the applied forces shall be 60 (+ 5) sec. The force is to be applied only once to the board.  |                       |         |  |                       |               |      |                |   |
| Terminal Strength(SMD)       | Appearance : No damage   | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles<br>With the component mounted on a PCB with the device to be tested, apply a 17.7 N (1.8 Kg) force 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.   |                       |         |  |                       |               |      |                |   |

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

## 8. 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.

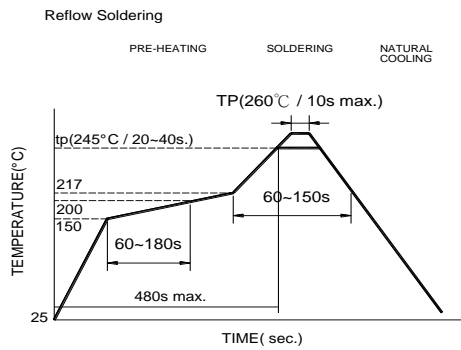
### (2) Solder re-flow:

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

### (3) Soldering Iron:

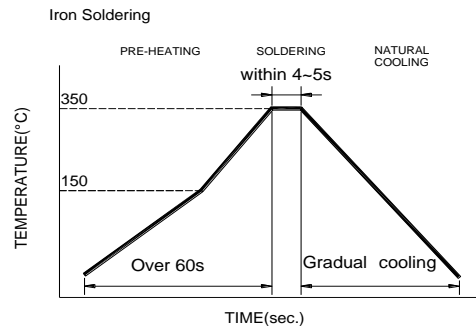
Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

- Preheat circuit and products to 150°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 4-5sec.



Reflow times: 3 times max.

Fig.1

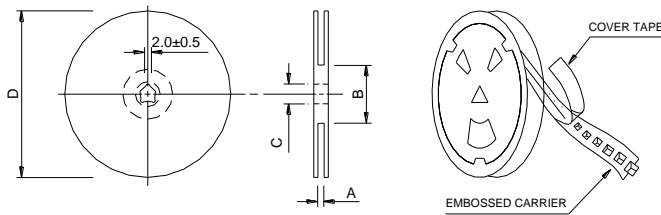


Iron Soldering times: 1 times max.

Fig.2

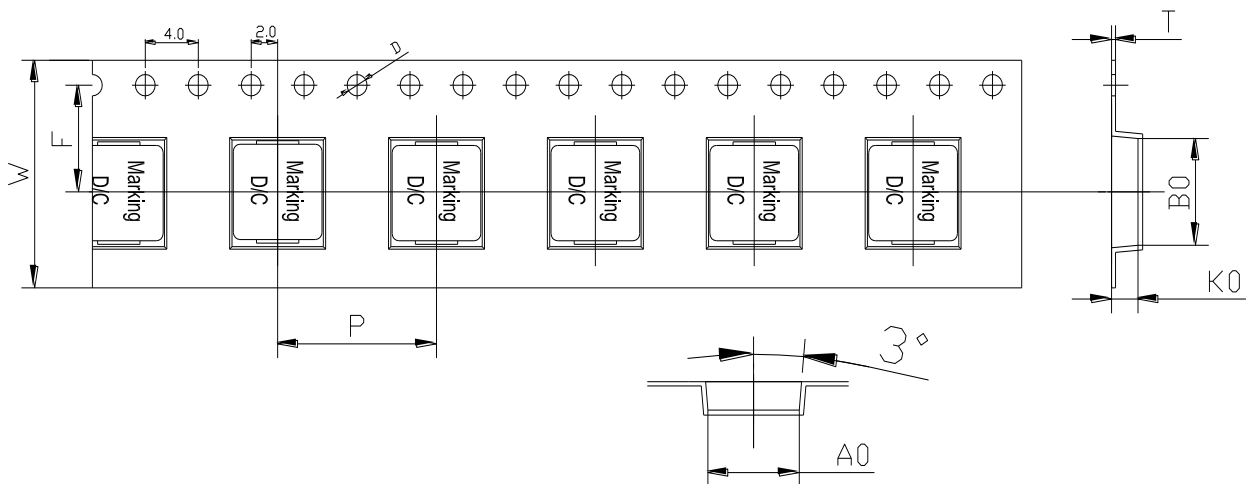
## 9. Packaging Information

### (1) Reel Dimension



| Type     | A(mm)     | B(mm) | C(mm)       | D(mm) |
|----------|-----------|-------|-------------|-------|
| 13"x16mm | 16.4+2/-0 | 100±2 | 13+0.5/-0.2 | 330   |

### (2) Tape Dimension

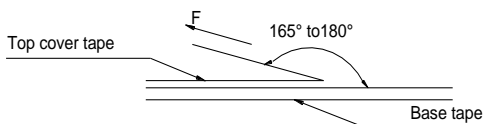


| Series | Size | Bo(mm)  | Ao(mm)  | Ko(mm)  | P(mm)    | W(mm)  | F(mm)   | t(mm)     | D(mm)   |
|--------|------|---------|---------|---------|----------|--------|---------|-----------|---------|
| TMPC   | 0605 | 7.7±0.1 | 7.0±0.1 | 5.3±0.1 | 12.0±0.1 | 16±0.3 | 7.5±0.1 | 0.35±0.05 | 1.5±0.1 |

### (3) Packaging Quantity

| TMPC        | 0605 |
|-------------|------|
| Chip / Reel | 800  |
| Inner box   | 1600 |
| Carton      | 6400 |

### (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-D-2008 of 4.11 stadnard).

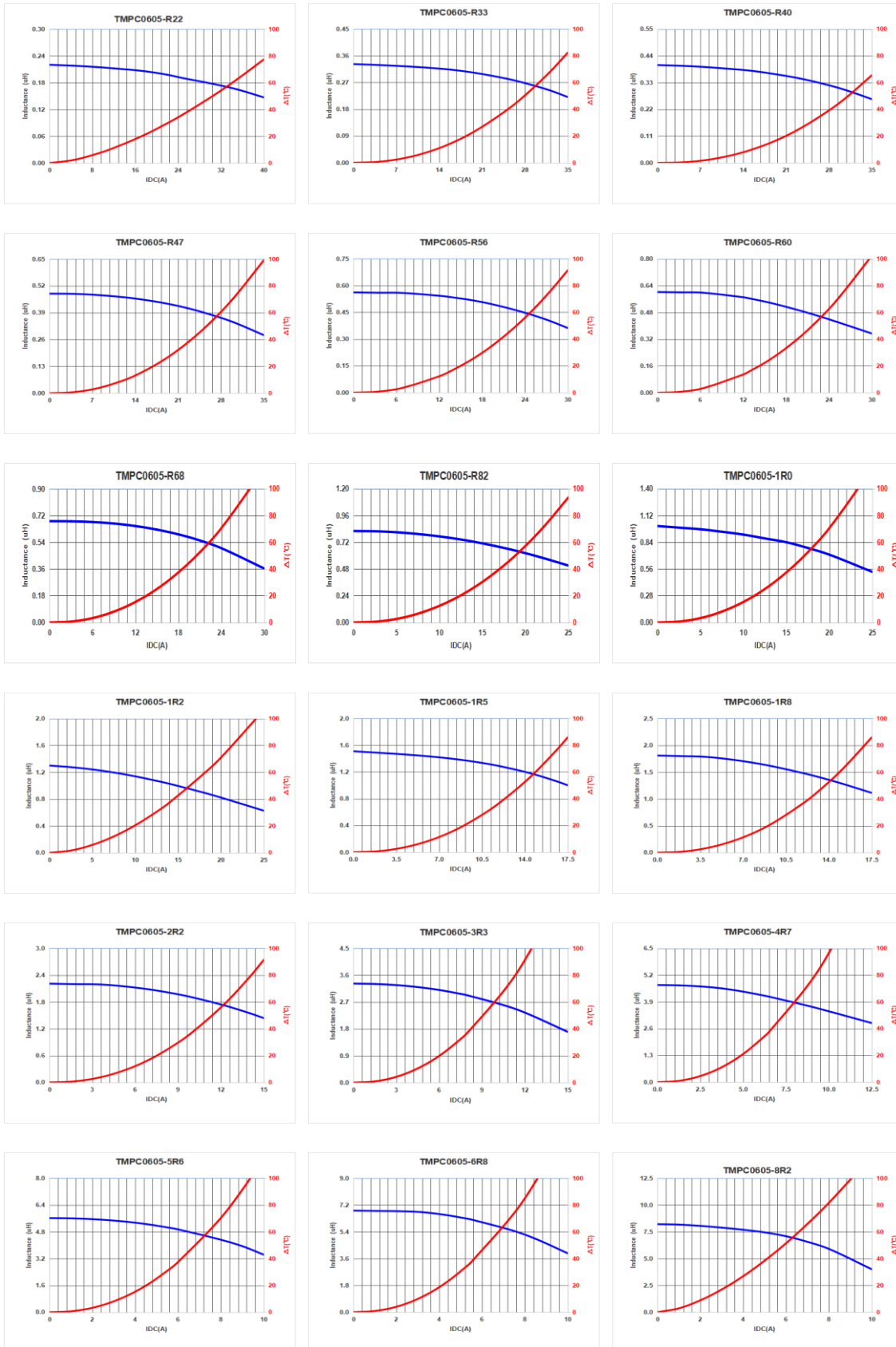
| Room Temp. (°C) | Room Humidity (%) | Room atm (hPa) | Tearing Speed mm/min |
|-----------------|-------------------|----------------|----------------------|
| 5~35            | 45~85             | 860~1060       | 300                  |

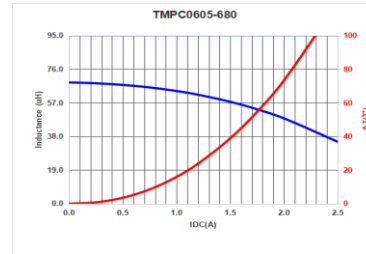
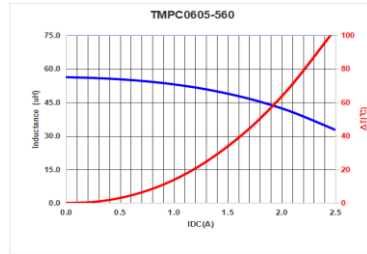
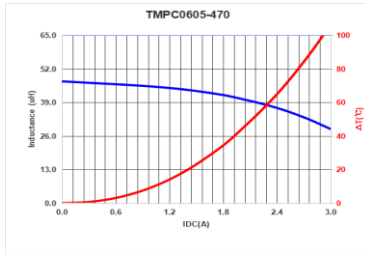
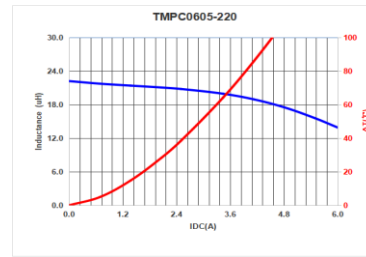
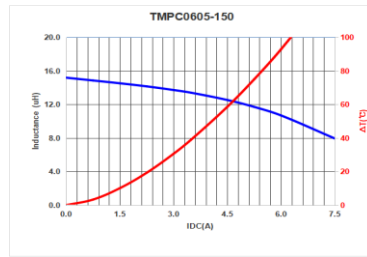
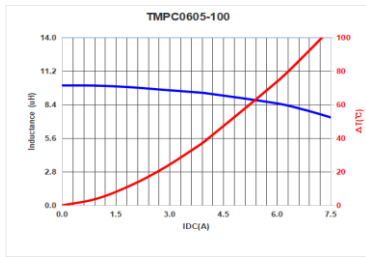
#### Application Notice

- Storage Conditions
  - To maintain the solderability of terminal electrodes:
    1. 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.



### 10. Typical Performance Curves





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