



**SMD Power Inductor**

TMPC0412HP-Serise(G)-Z02

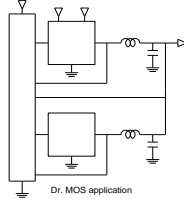
**1. Features**

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.

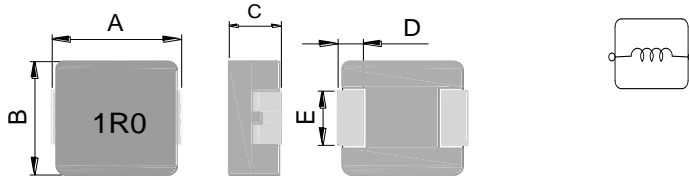


**2. Applications**

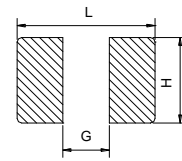
Note PC power system · incl. IMVP-6  
DC/DC converter .



**3. Dimensions**



**Recommend PC Board Pattern**



| Series     | A(mm)     | B(mm)     | C(mm)   | D(mm)     | E(mm)    |
|------------|-----------|-----------|---------|-----------|----------|
| TMPC0412HP | 4.45±0.25 | 4.06±0.25 | 1.0±0.2 | 0.76±0.30 | 2.0±0.20 |

| L(mm) | G(mm) | H(mm) |
|-------|-------|-------|
| 5.2   | 2.2   | 2.3   |

**4. Part Numbering**



- A: Series
- B: Dimension
- C: Type
- D: Inductance
- E: Inductance Tolerance
- F: Control S/N
- BxC
- H: Carbonyl Powder, P:PAD broaden.
- 1R0=1.0uH
- M=±20%
- 印字:黑色,單向印字

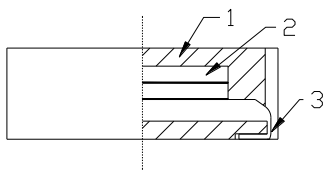
## 5. Specification

| Part Number          | Inductance<br>L0 (uH)<br>@ 0 A | I rms (A)<br>Typ. | I sat (A)<br>Typ. | DCR<br>(mΩ) Typ.<br>@25°C | DCR<br>(mΩ) Max.<br>@25°C |
|----------------------|--------------------------------|-------------------|-------------------|---------------------------|---------------------------|
| TMPC0412HP-R10YG-Z02 | 0.10±30%                       | 11.5              | 25                | 4.3                       | 5.5                       |
| TMPC0412HP-R15YG-Z02 | 0.15±30%                       | 10                | 21.5              | 5.5                       | 6.8                       |
| TMPC0412HP-R22MG-Z02 | 0.22±20%                       | 8.5               | 20                | 6.6                       | 8.0                       |
| TMPC0412HP-R36MG-Z02 | 0.36±20%                       | 6.5               | 8.5               | 15.5                      | 18                        |
| TMPC0412HP-R47MG-Z02 | 0.47±20%                       | 6.0               | 6.5               | 18                        | 20                        |
| TMPC0412HP-R60MG-Z02 | 0.60±20%                       | 5.3               | 6.0               | 22.5                      | 26                        |
| TMPC0412HP-R68MG-Z02 | 0.68±20%                       | 5.0               | 6.0               | 32                        | 37                        |
| TMPC0412HP-1R0MG-Z02 | 1.00±20%                       | 4.0               | 6.0               | 41                        | 47                        |
| TMPC0412HP-1R2MG-Z02 | 1.20±20%                       | 3.5               | 5.0               | 48                        | 56                        |
| TMPC0412HP-1R5MG-Z02 | 1.50±20%                       | 3.0               | 4.0               | 55                        | 63.3                      |
| TMPC0412HP-2R2MG-Z02 | 2.20±20%                       | 2.8               | 3.5               | 69.2                      | 80                        |
| TMPC0412HP-3R3MG-Z02 | 3.30±20%                       | 2.3               | 3.0               | 84                        | 97                        |
| TMPC0412HP-4R7MG-Z02 | 4.70±20%                       | 2.0               | 2.5               | 128                       | 145                       |
| TMPC0412HP-5R6MG-Z02 | 5.60±20%                       | 1.7               | 2.3               | 180                       | 208                       |
| TMPC0412HP-6R8MG-Z02 | 6.80±20%                       | 1.5               | 1.7               | 300                       | 360                       |
| TMPC0412HP-8R2MG-Z02 | 8.20±20%                       | 1.4               | 1.6               | 313                       | 376                       |
| TMPC0412HP-100MG-Z02 | 10.0±20%                       | 1.3               | 1.4               | 410                       | 463                       |

Note:

1. Test frequency : L/Q : 100KHz /1.0V;
2. All test data referenced to 25°C ambient.
3. Testing Instrument : L/Q: HP4284A,CH11025,CH3302,CH1320 ,CH1320S LCR METER / Rdc:CH16502,Agilent33420A MICRO OHMMETER.
4. Heat Rated Current (I<sub>rms</sub>) will cause the coil temperature rise approximately Δt of 40°C(keep 1min.).
5. Saturation Current (I<sub>sat</sub>) will cause L0 to drop 20% typical. (keep quickly).
6. The part temperature (ambient + temp rise) should not exceed 125°C 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.

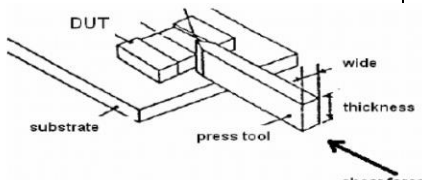
### 6. Material List



| NO | Items          | Materials                     |
|----|----------------|-------------------------------|
| 1  | Core           | Carbonyl powder or equ.       |
| 2  | Wire           | Polyester Wire or equivalent. |
| 3  | Solder Plating | 100% Pb free solder           |

### 7. Reliability and Test Condition

| Item                               | Performance   | Test Condition  |           |                            |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
|------------------------------------|---|---|-----------|----------------------------|--------------------------|-----------|----------------------------|-----|------|-----|-----------|------|------|-----|---|-----------|------|
| Operating temperature              | -40~+125°C (Including self - temperature rise)  |   |           |                            |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| Storage temperature                | -40~+125°C (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)          | $\Delta L \leq 20\%$ typical.   | Saturation DC Current (Isat) will cause L0 to drop $\Delta L(\%)$ (keep quickly).   |           |                            |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| Heat Rated Current (Irms)          | Approximately $\Delta T \leq 40^\circ C$  | Heat Rated Current (Irms) will cause the coil temperature rise $\Delta T(^\circ C)$ without core loss.<br>1. Applied the allowed DC current(keep 1 min.).<br>2. Temperature measured by digital surface thermometer   |           |                            |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| <b>Reliability Test</b>            |   |   |           |                            |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| Life Test                          | Appearance : No damage.<br>Inductance : within $\pm 10\%$ of initial value<br>Q : Shall not exceed the specification value. | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles)<br>Temperature : 125 $\pm 2^\circ C$ (Bead)<br>Temperature : 85 $\pm 2^\circ C$ (Inductor)<br>Applied current : rated current<br>Duration : 1000 $\pm 12$ hrs<br>Measured at room temperature after placing for 24 $\pm 2$ hrs  |           |                            |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| Load Humidity                      | 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)<br>Humidity : 85 $\pm 2\%$ R.H,<br>Temperature : 85 $\pm 2^\circ C$<br>Duration : 1000hrs Min. with 100% rated current<br>Measured at room temperature after placing for 24 $\pm 2$ hrs   |           |                            |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| Thermal shock                      |   | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles)<br>Condition for 1 cycle<br>Step1 : -40 $\pm 2^\circ C$ 30 $\pm 5$ min<br>Step2 : 25 $\pm 2^\circ C$ $\leq 0.5$ min<br>Step3 : 105 $\pm 2^\circ C$ 30 $\pm 5$ min<br>Number of cycles : 500<br>Measured at room temperature after placing for 24 $\pm 2$ hrs          |           |                            |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| Vibration                          |   | Oscillation Frequency: 10 ~ 2K ~ 10Hz for 20 minutes<br>Equipment : Vibration checker<br>Total Amplitude: 1.52mm $\pm 10\%$<br>Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations) *  |           |                            |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| Shock                              |   | <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>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> </tbody> </table> | Type      | Peak value (g's)           | Normal duration (D) (ms) | Wave form | Velocity change (V)/ft/sec | SMD | 1500 | 0.5 | Half-sine | 15.4 | Lead | 100 | 6 | Half-sine | 12.3 |
| Type                               | Peak value (g's)  | Normal duration (D) (ms)  | Wave form | Velocity change (V)/ft/sec |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| SMD                                | 1500  | 0.5   | Half-sine | 15.4                       |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| Lead                               | 100   | 6   | Half-sine | 12.3                       |                          |           |                            |     |      |     |           |      |      |     |   |           |      |
| Bending                            |   | Shall be mounted on a FR4 substrate of the following dimensions: $\geq 0805: 40 \times 100 \times 1.2$ mm<br>$< 0805: 40 \times 100 \times 0.8$ mm<br>Bending depth: $\geq 0805: 1.2$ mm<br>$< 0805: 0.8$ mm<br>duration of 10 sec.   |           |                            |                          |           |                            |     |      |     |           |      |      |     |   |           |      |

| Item                         | Performance   | Test Method and Remarks  |                  |         |  |                     |       |                |
|------------------------------|---|--|------------------|---------|--|---------------------|-------|----------------|
| Soderability                 | More than 95% of the terminal electrode should be covered with solder °   | 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  |                  |         |  |                     |       |                |
| Resistance to Soldering Heat |   | Number of heat cycles: 1<br><table border="1"> <thead> <tr> <th>Temperature (°C)</th> <th>Time(s)</th> <th>Temperature ramp/immersion and emersion rate</th> </tr> </thead> <tbody> <tr> <td>260 ±5(solder temp)</td> <td>10 ±1</td> <td>25mm/s ±6 mm/s</td> </tr> </tbody> </table>   | Temperature (°C) | Time(s) | Temperature ramp/immersion and emersion rate | 260 ±5(solder temp) | 10 ±1 | 25mm/s ±6 mm/s |
| Temperature (°C)             | Time(s)   | Temperature ramp/immersion and emersion rate   |                  |         |  |                     |       |                |
| 260 ±5(solder temp)          | 10 ±1   | 25mm/s ±6 mm/s   |                  |         |  |                     |       |                |
| Terminal Strength            | 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>With the component mounted on a PCB with the device to be tested, apply a force (>0.805:1kg , <=0.805:0.5kg) 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.<br> |                  |         |  |                     |       |                |

## 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.

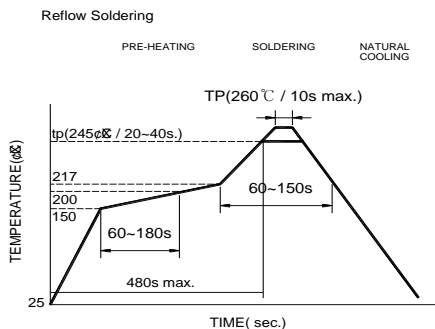
### (2) Solder re-flow:

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

### (3) Soldering Iron:

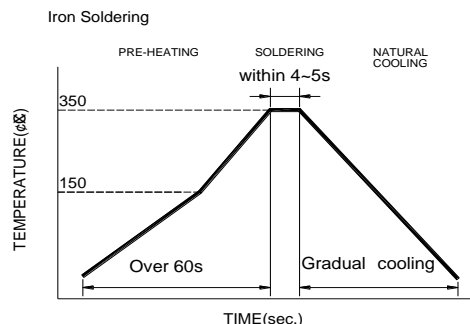
Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

- 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

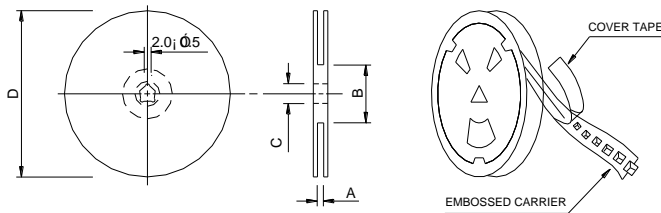


Iron Soldering times: 1 times max.

Fig.2

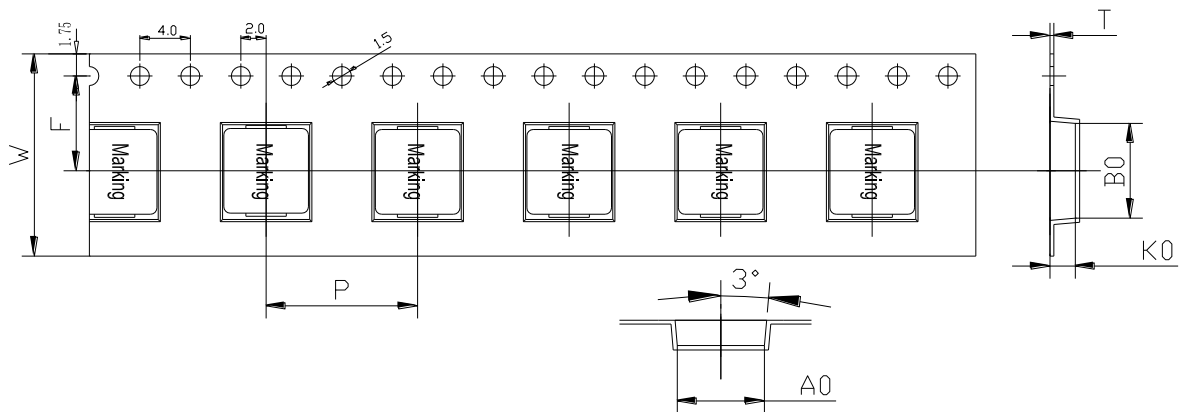
## 9. Packaging Information

### (1) Reel Dimension



| Type     | A(mm)     | B(mm) | C(mm)    | D(mm) |
|----------|-----------|-------|----------|-------|
| 13"x12mm | 12.4±2/-0 | 100±2 | 13.5±0.5 | 330   |

### (2) Tape Dimension

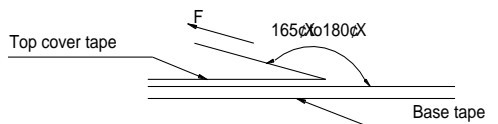


| Series | Size | Bo(mm)  | Ao(mm)   | Ko(mm)  | P(mm)   | W(mm)  | F(mm)   | t(mm)     |
|--------|------|---------|----------|---------|---------|--------|---------|-----------|
| TMPC   | 0412 | 5.0±0.1 | 4.40±0.1 | 1.5±0.1 | 8.0±0.1 | 12±0.3 | 5.5±0.1 | 0.35±0.05 |

### (3) Packaging Quantity

| TMPC        | 0412  |
|-------------|-------|
| Chip / Reel | 4000  |
| Inner box   | 8000  |
| Carton      | 32000 |

### (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 standard).

| 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:

- TAI-TECH products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
- Temperature and humidity conditions: Less than 40°C and 60% RH.
- Recommended products should be used within 12 months form the time of delivery.
- The packaging material should be kept where no chlorine or sulfur exists in the air.

- Transportation

- Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
- The use of tweezers or vacuum pick up is strongly recommended for individual components.
- Bulk handling should ensure that abrasion and mechanical shock are minimized.

### 10. Typical Performance Curves

