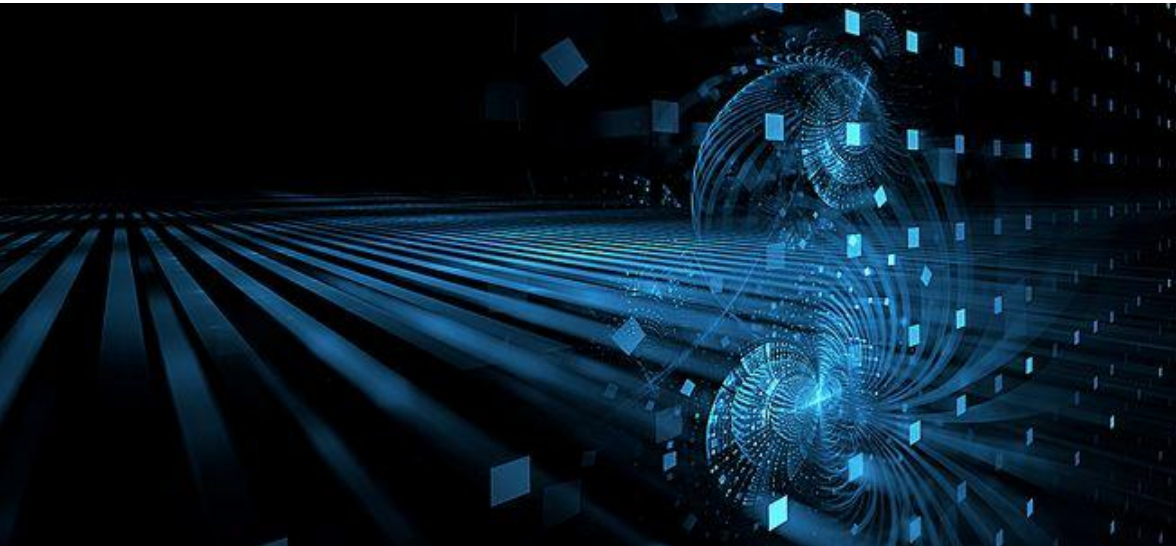




# DATA SHEET

**Product Name** Mini Molding Power Inductors

**Part Name** PIM: Series

## **Huacui Micro Inductance Electronics(Jiangsu) Co., Ltd.**

NO.229, Yuanfeng Road, Xianglong Science Park, Kunshan, Jiangsu, China

Tel +86 512 55139598 50127111 50127333

Web [www.toyougood.com](http://www.toyougood.com)

Email [tg01@toyogood.com](mailto:tg01@toyogood.com)

Manufacture Plant Huacui Micro Inductance Electronics(Jiangsu) Co., Ltd.

Toyog Intelligent Equipment(Jiangsu) Co., Ltd.

Toyog Micro Electronics( Sichuan) Co., Ltd

## 1. Scope

### Features

- 1.1 Metal material for large current and low loss.
- 1.2 High performance (Isat) realized by metal dust core.
- 1.3 Low loss realized with low Rdc.
- 1.4 Closed magnetic circuit design reduces leakage flux.
- 1.5 Vinyl thermal spray, better surface compactness.
- 1.6 Environmental requirements must comply with the QESP-44 document
- 1.7 100% lead (Pb) free meet RoHS2.0 and Halogen , Reach and other legal and regulatory requirements standard.

### Application

- 2.1 DC/DC converters.
- 2.2 Pad,Smart phone.
- 2.3 Portable gaming devices, Smart wear, Wi-Fi module.
- 2.4 Notebooks, VR, AR.
- 2.5 LCD displays, HDDs, DVCs, DSCs, etc.
- 2.6 Baseband power supply, Amplifier, Power management, Module power supply, Camera power manageme.

## 2. Ordering Procedure

|            |             |           |          |            |          |          |          |          |
|------------|-------------|-----------|----------|------------|----------|----------|----------|----------|
| <b>PIM</b> | <b>2520</b> | <b>12</b> | <b>S</b> | <b>1R0</b> | <b>M</b> | <b>B</b> | <b>C</b> | <b>A</b> |
| ①          | ②           | ③         | ④        | ⑤          | ⑥        | ⑦        | ⑧        | ⑨        |

①Series Name: Mini Molding Power Inductors

②External Dimensions(L×W):2520=2.5\*2.0 mm

③External Dimensions(H):12=1.2 mm

④Size Tolerance:S=±0.2mm

⑤Inductance value:1R0=1.0uH

⑥Tolerance: M=±20%

⑦Coating color:B=Black G=Gray

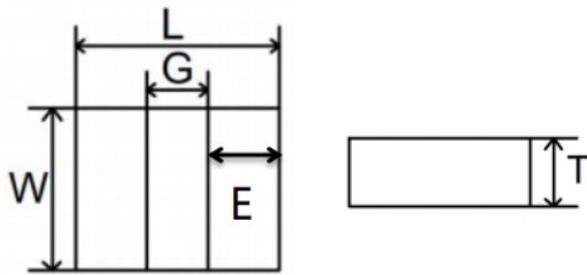
⑧Product type:C=Common

⑨Special define:A=Routine B~Z=Special

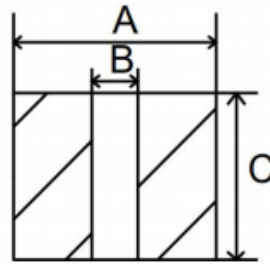
For special characteristics, please refer to the specific values in Item 5 "Specifications".

## 3. SHAPE AND DIMENSIONS

Outline Dimensions



Recommend Land Pattern Dimensions



Units:mm

| Series     | L       | G/Typ | W       | E        | T        | A/Typ | B/Typ | C/Typ |
|------------|---------|-------|---------|----------|----------|-------|-------|-------|
| PIM201208S | 2.0±0.2 | 0.6   | 1.2±0.2 | 0.70±0.2 | 0.80Max. | 2.10  | 0.50  | 1.30  |
| PIM201610S | 2.0±0.2 | 0.6   | 1.6±0.2 | 0.70±0.2 | 1.00Max. | 2.10  | 0.50  | 1.70  |
| PIM252010S | 2.5±0.2 | 0.8   | 2.0±0.2 | 0.85±0.2 | 1.00Max. | 2.60  | 0.70  | 2.10  |
| PIM252012S | 2.5±0.2 | 0.8   | 2.0±0.2 | 0.85±0.2 | 1.20Max. | 2.60  | 0.70  | 2.10  |

## 4. Marking

No Marking

## 5. Specifications

1>201208 Series

| P/N               | L0(μH)<br>@(0A) 1MHz | Rdc(mΩ) |     | Heat rating current<br>Irms(A) |     | Saturation current<br>Isat(A) |     |
|-------------------|----------------------|---------|-----|--------------------------------|-----|-------------------------------|-----|
|                   |                      | Typical | Max | Typical                        | Max | Typical                       | Max |
| PIM201208S1R0MBCA | 1.0                  | 55      | 70  | 3.3                            | 2.9 | 4.0                           | 3.5 |

2>201610 Series

| P/N               | L0(μH)<br>@(0A) 1MHz | Rdc(mΩ) |     | Heat rating current<br>Irms(A) |     | Saturation current<br>Isat(A) |     |
|-------------------|----------------------|---------|-----|--------------------------------|-----|-------------------------------|-----|
|                   |                      | Typical | Max | Typical                        | Max | Typical                       | Max |
| PIM201610SR33MBCA | 0.33                 | 17      | 22  | 5.7                            | 5.3 | 7.0                           | 6.5 |
| PIM201610SR47MBCA | 0.47                 | 22      | 25  | 5.5                            | 5.0 | 6.3                           | 5.5 |
| PIM201610S1R0MBCA | 1.0                  | 35      | 43  | 4.5                            | 4.1 | 4.6                           | 4.2 |
| PIM201610S4R7MBCA | 4.7                  | 190     | 220 | 1.6                            | 1.4 | 2.0                           | 1.8 |

3>252010 Series

| P/N               | L0(μH)<br>@(0A) 1MHz | Rdc(mΩ) |     | Heat rating current<br>Irms(A) |     | Saturation current<br>Isat(A) |     |
|-------------------|----------------------|---------|-----|--------------------------------|-----|-------------------------------|-----|
|                   |                      | Typical | Max | Typical                        | Max | Typical                       | Max |
| PIM252010S2R2MBCA | 2.2                  | 62      | 70  | 2.4                            | 2.1 | 3.3                           | 3.0 |

## 4>252010 Series

| P/N               | L0(μH)<br>@ (0A) 1MHz | Rdc(mΩ) |     | Heat rating current<br>Irms(A) |      | Saturation current<br>Isat(A) |      |
|-------------------|-----------------------|---------|-----|--------------------------------|------|-------------------------------|------|
|                   |                       | Typical | Max | Typical                        | Max  | Typical                       | Max  |
| PIM252012SR33MBCA | 0.33                  | 11      | 17  | 6.8                            | 6.4  | 8.3                           | 7.8  |
| PIM252012S1R0MBCA | 1.0                   | 35      | 42  | 4.0                            | 3.6  | 5.6                           | 5.0  |
| PIM252012S4R7MBCA | 4.7                   | 150     | 170 | 1.8                            | 1.5  | 2.4                           | 2.1  |
| PIM252012S100MBCA | 10.0                  | 330     | 400 | 1.2                            | 1.05 | 1.6                           | 1.45 |

### Test remarks

Note 1.: All test data is referenced to 25 °C ambient.

Note 2.: Test Condition:1MHz, 1.0Vrms.

Note 3.: Irms:DC current (A) that will cause an approximate ΔT of 40 °C.

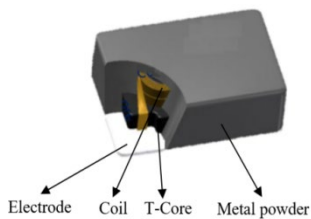
Note 4.: Isat:DC current (A) that will cause L0 to drop approximately 30%.

Note 5.: Operating Temperature Range -55°C to + 125°C.

Note 6.: The part temperature (ambient + temp rise) should not exceed 125 under °C the worst case operating conditions. Circuit design, component placement, PCB trace size and thickness, airflow and other cooling provision all affect the part temperature. Part temperature should be verified in the end application.

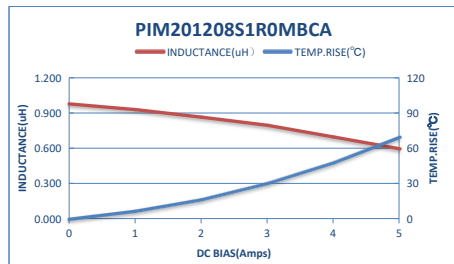
Note 7.: The rated current as listed is either the saturation current or the heating current depending on which value is lower.

## 6. Structure

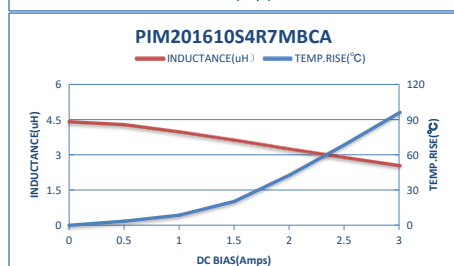
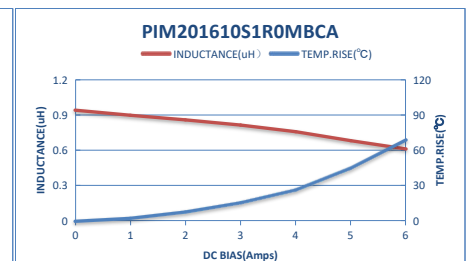
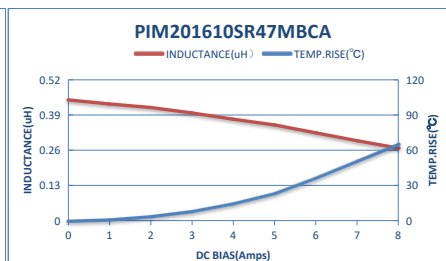
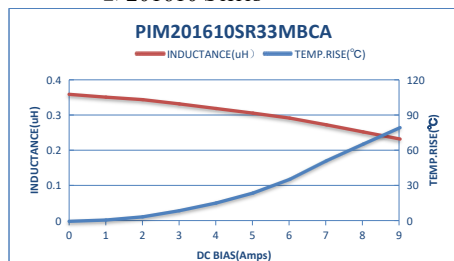


## 7. Current Characteristic

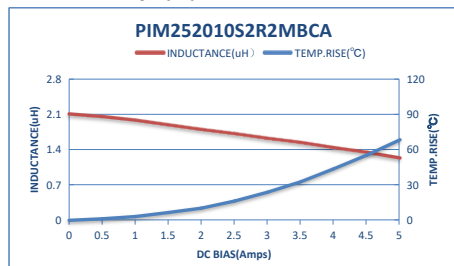
### 1>201208 Series



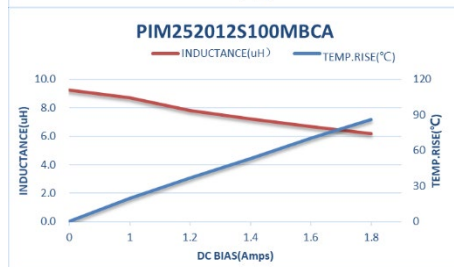
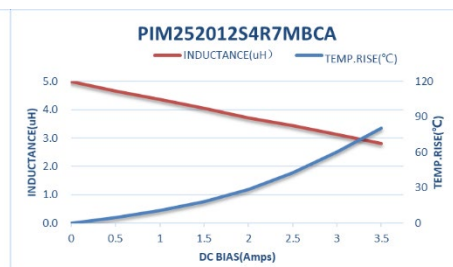
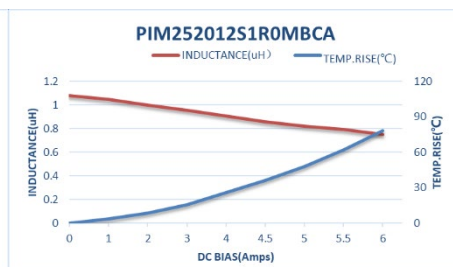
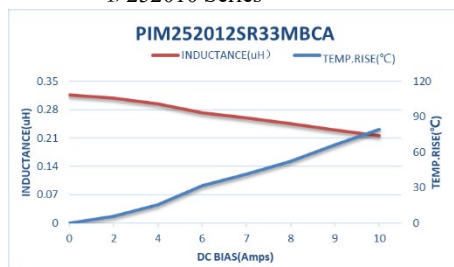
### 2>201610 Series



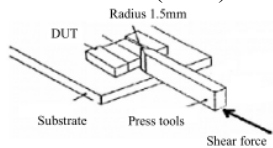
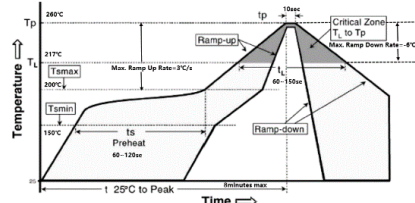
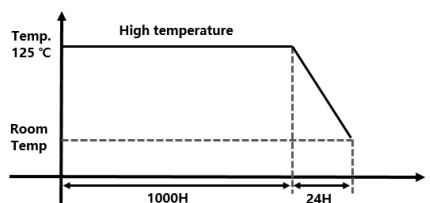
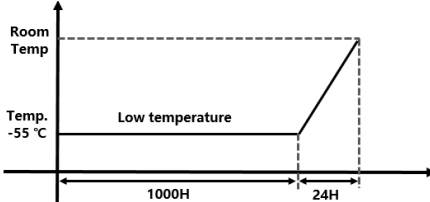
## 3>252010 Series



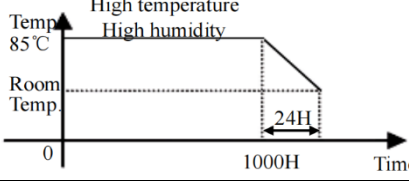
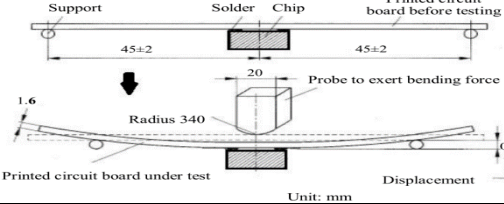
## 4>252010 Series



## 8. Reliability

| No.       | Item                        | Requirements                                                                                              | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Reference                             | Sample Size |      |   |           |   |      |    |                            |    |
|-----------|-----------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------|------|---|-----------|---|------|----|----------------------------|----|
| 1         | Solderability               | (1) No case deformation or change in appearance.<br>(2) Terminal area must have 95% min. Solder coverage. | ①Temperature:245± 5°C.<br>②Solder Composition: Sn/Ag3.0/Cu0.5(Pb-Free).<br>③Sample immersion tin furnace 5 ±0.5s.                                                                                                                                                                                                                                                                                                                                                                                   | AEC-Q200<br>(J-STD 002)               | 32          |      |   |           |   |      |    |                            |    |
| 2         | Adhesion of teral electrode | (1)Strong bond between the pad and the core, without come off PCB.                                        | ①Preconditioning : 245°CReflow 3 times<br>②Inductors shall be subjected to (260+0/-5°C.)°C for (10±5)s Soldering in the base whit 0.3mm solder.<br>③Aplombelectrode way plus tax X N for (10±1) seconds.<br><table border="1"><thead><tr><th>series</th><th>"X" N</th></tr></thead><tbody><tr><td>1008</td><td>6</td></tr><tr><td>1210~1608</td><td>8</td></tr><tr><td>2012</td><td>12</td></tr></tbody></table>  | series                                | "X" N       | 1008 | 6 | 1210~1608 | 8 | 2012 | 12 | AEC-Q200<br>(AEC-Q200-006) | 32 |
| series    | "X" N                       |                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |             |      |   |           |   |      |    |                            |    |
| 1008      | 6                           |                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |             |      |   |           |   |      |    |                            |    |
| 1210~1608 | 8                           |                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |             |      |   |           |   |      |    |                            |    |
| 2012      | 12                          |                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |             |      |   |           |   |      |    |                            |    |
| 3         | Reflow test                 | (1) No physical damage.<br>(2)   ΔL0/L0   ≤10%                                                            | ① The peak temperature: 260+0/-5°C.<br>② Reflow:3times.<br>③ Temperature curve is as below<br>                                                                                                                                                                                                                                                                                                                   | AEC-Q200<br>(MIL-STD-202 Method 210)  | 32          |      |   |           |   |      |    |                            |    |
| 4         | High temperature            | (1) No physical damage.<br>(2)   ΔL0/L0   ≤10%                                                            | ① Preconditioning: Bake at 125+5°C for 24±0.5H , 245°CReflow 3 times<br>②Temperature: 125±2°C.<br>③ Time : 1000 hours.<br>④Measurement at 24±4 hours after test conclusion<br>                                                                                                                                                                                                                                  | AEC-Q200<br>(MIL-STD -202 Method 108) | 77          |      |   |           |   |      |    |                            |    |
| 5         | Low temperature             | (1) No physical damage.<br>(2)   ΔL0/L0   ≤10%                                                            | ①Preconditioning: Bake at 125+5°C for 24±0.5H , 245°CReflow 3 times<br>②Temperature: -55±2°C.<br>③Time : 1000 hours.<br>④ Measurement at 24±4 hours after test conclusion<br>                                                                                                                                                                                                                                   | JESD22-A119A                          | 77          |      |   |           |   |      |    |                            |    |
| 6         | Thermal shock               | (1) No physical damage.<br>(2)   ΔL0/L0   ≤10%                                                            | ①Preconditioning: Bake at 125+5°C for 24±0.5H , 245°CReflow 3 times<br>②Repeat 500 cycle as follow : (-55±2 °C ,30±3minutes) 、(Room temperature, 5 minutes)、(+125±2 °C ,30±3minutes)、(Room temperature, 5 minutes)<br>③Measurement at 24±4 hours after test conclusion                                                                                                                                                                                                                              | MIL-STD -202 Method 107               | 77          |      |   |           |   |      |    |                            |    |

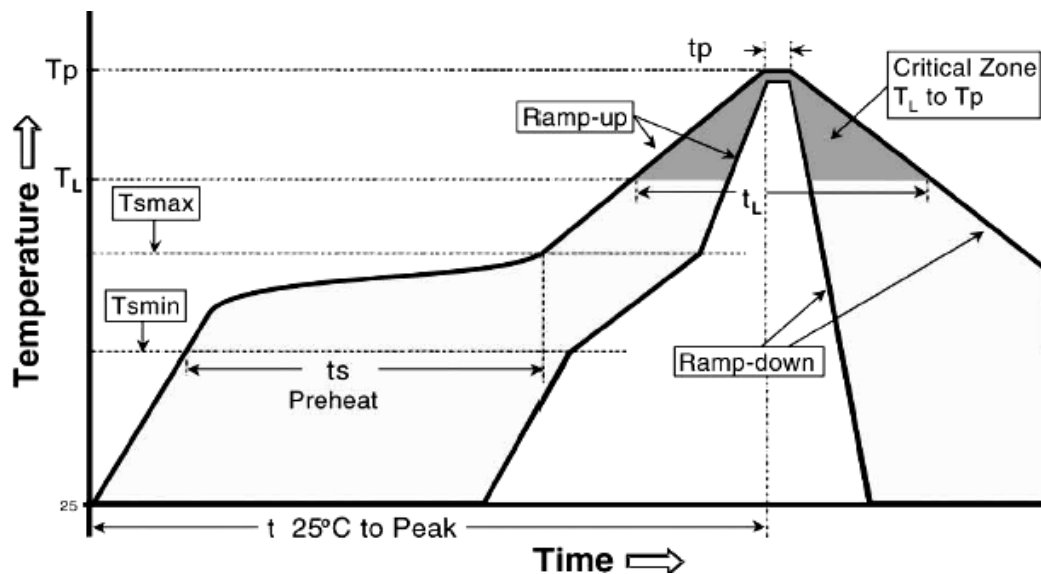
## Mini Molding Power Inductors

| No. | Item                         | Requirements                                                | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                 | Reference                            | Sample Size |
|-----|------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------|
| 7   | Resistance to Soldering Heat | (1) No physical damage.<br>(2) $ \Delta L_0/L_0  \leq 10\%$ | ① Solder Composition: Sn/Ag3.0/Cu0.5(Pb-Free).<br>② Solder Temperature: $260 \pm 5^\circ\text{C}$ .<br>③ Immersion Time: $10 \pm 1\text{sec}$ .                                                                                                                                                                                                                                                                                          | AEC-Q200<br>(MIL-STD-202 Method 210) | 32          |
| 8   | Static Humidity              | (1) No physical damage.<br>(2) $ \Delta L_0/L_0  \leq 10\%$ | ① Preconditioning: Bake at $125 \pm 5^\circ\text{C}$ for $24 \pm 0.5\text{H}$ , $245^\circ\text{C}$ Reflow 3 times<br>② 1000 hours, $85^\circ\text{C}/85\%\text{RH}$ .<br>③ Unpowered.<br>④ Measurement at $24 \pm 4$ hours after test conclusion<br>                                                                                                  | AEC-Q200<br>(MIL-STD-202 Method 103) | 77          |
| 9   | Board Flex                   | (1) No physical damage.<br>(2) $ \Delta L_0/L_0  \leq 10\%$ | ① Preconditioning : $245^\circ\text{C}$ Reflow 3 times<br>② Part mounted on a $100\text{mm} \times 40\text{mm}$ FR4 PCB board, which is $1.6 \pm 0.2\text{mm}$ thick and as a Layer-thickness $35\text{ }\mu\text{m} \pm 10\text{ }\mu\text{m}$ .<br>③ Bending speed is $1\text{mm/s}$ .<br>④ Keeping the P.C Board 2 mm minimum for 60 seconds.<br> | AEC-Q200<br>(AEC-Q200-005)           | 30          |
| 10  | Vibration                    | (1) No physical damage.<br>(2) $ \Delta L_0/L_0  \leq 10\%$ | ① Preconditioning : $245^\circ\text{C}$ Reflow 3 times<br>② Frequency range : $10 \sim 2000\text{Hz}$ .<br>③ Amplitude: $1.5\text{mm}$ or $20\text{g}$ .<br>④ Sweep time and duration: $10 \sim 2000 \sim 10\text{Hz}$ for 20 minutes.<br>⑤ Each four hours in X,Y,Z direction, 12hours in total.                                                                                                                                        | AEC-Q200<br>(MIL-STD-202 Method 204) | 32          |
| 11  | Mechanical Shock             | (1) No physical damage.<br>(2) $ \Delta L_0/L_0  \leq 10\%$ | ① Preconditioning : $245^\circ\text{C}$ Reflow 3 times<br>② Peak acceleration: $100\text{G/S}$<br>③ Duration of pulse: $6\text{ms}$<br>④ 3times in each of $6(\pm X, \pm Y, \pm Z)$ axes.                                                                                                                                                                                                                                                | AEC-Q200<br>(MIL-STD-202 Method 213) | 32          |
| 12  | Loading at High Temperature  | (1) No physical damage.<br>(2) $ \Delta L_0/L_0  \leq 10\%$ | ① Preconditioning: Bake at $125 \pm 5^\circ\text{C}$ for $24 \pm 0.5\text{H}$ , $245^\circ\text{C}$ Reflow 3 times<br>② Temperature: $85 \pm 2^\circ\text{C}$ .<br>③ Time : 1000 hours.<br>④ Applied Current : Rated current.<br>⑤ Measurement at $24 \pm 4$ hours after test conclusion                                                                                                                                                 | AEC-Q200<br>(MIL-STD-202 Method 108) | 77          |

## 9. Soldering Condition

(This is for recommendation, please customer perform adjustment according to actual application)

Recommend Reflow Soldering Profile : (solder : Sn96.5 / Ag3 / Cu0.5)



| Profile Feature                                                                    | Lead (Pb)-Free solder |
|------------------------------------------------------------------------------------|-----------------------|
| Preheat:                                                                           |                       |
| Temperature Min ( $T_{smin}$ )                                                     | 150°C                 |
| Temperature Max ( $T_{smax}$ )                                                     | 200°C                 |
| Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )                                        | 60 -120 seconds       |
| Average ramp-up rate:<br>( $T_{smax}$ to $T_p$ )                                   | 3°C / second max.     |
| Time maintained above :                                                            |                       |
| Temperature ( $T_L$ )                                                              | 217°C                 |
| Time ( $t_L$ )                                                                     | 60-150 seconds        |
| Peak Temperature ( $T_p$ )                                                         | 260°C                 |
| Time within $+0^{\circ}\text{C}$ of actual peak Temperature ( $t_p$ ) <sup>2</sup> | 10 seconds            |
| Ramp-down Rate                                                                     | 6°C/second max.       |
| Time 25°C to Peak Temperature                                                      | 8minutes max.         |

Allowed Re-flow times : 2 times

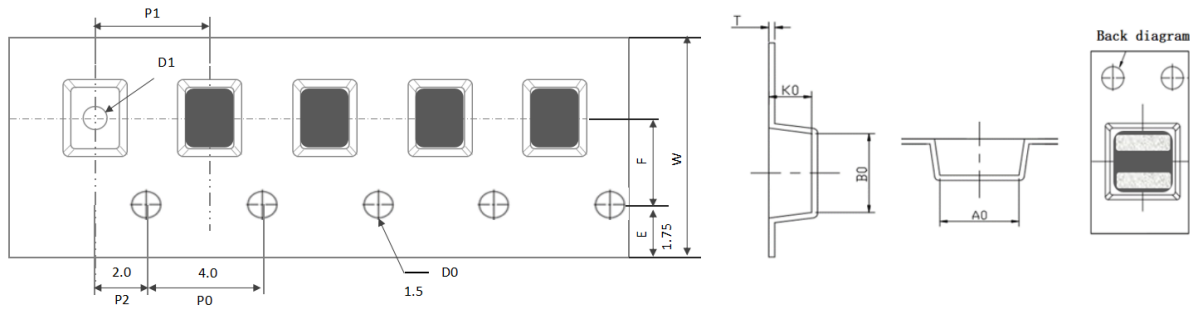
Remark : To avoid discoloration phenomena of chip on terminal electrodes, please use N<sub>2</sub> Re-flow furnace .



## 10. Packing

### 10.1 Dimension of plastic taping: (Unit: mm)

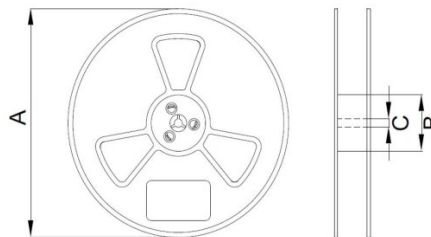
The following dimensions are related to the actual fit of the machine, for reference only.



| Series    | W              | A0                     | B0                     | D1         | F          | K0              | P1         | T          | Packing Quantity |
|-----------|----------------|------------------------|------------------------|------------|------------|-----------------|------------|------------|------------------|
| Tolerance | /              | /                      | /                      | $\pm 0.20$ | $\pm 0.10$ | /               | $\pm 0.10$ | $\pm 0.05$ |                  |
| 201208    | $8.0 \pm 0.10$ | $1.50 \pm 0.10$        | $2.30 \pm 0.10$        | 1.0        | 3.5        | $1.00 \pm 0.10$ | 4.0        | 0.22       | 3K               |
| 201610    | $8.0 \pm 0.10$ | $1.95 \pm 0.10$        | $2.35 \pm 0.10$        | 1.0        | 3.5        | $1.15 \pm 0.10$ | 4.0        | 0.25       |                  |
| 252010    | $8.0 \pm 0.10$ | $2.45 \pm 0.10$        | $2.80 \pm 0.10$        | 1.0        | 3.5        | $1.20 \pm 0.10$ | 4.0        | 0.25       |                  |
| 252012    | $8.0 \pm 0.10$ | $2.35 + 0.10 / - 0.05$ | $2.80 + 0.10 / - 0.05$ | 1.0        | 3.5        | $1.35 \pm 0.10$ | 4.0        | 0.23       |                  |

### 10.2 Dimension of Reel : (Unit: mm)

| Type | A<br>$\pm 2.0$ | B<br>$\pm 2.0$ | C<br>$\pm 2.0$ |
|------|----------------|----------------|----------------|
| All  | 178            | 60             | 13             |



## 11. Note

### 11.1 Storage Period

To maintain the solderability of terminal electrodes and to keep the packing material in good condition, product should be used within 12 months from the time of delivery. And the solderability of products electrodes may decrease as time passes, so in case of storage over 12 months, solderability shall be checked before actual usage.

### 11.2 Storage Conditions

Store products in a warehouse in compliance with the following condition:

Temperature: Inductors (product with taping)  $+15$  to  $+35^{\circ}\text{C}$ ; Humidity: 25~70%RH.

If the product is not used up 24H after opening, desiccant should be placed in the package and sealed

### 11.3 Do not subject products to rapid changes in temperature and humidity.

11.4 Do not store the products in chemical atmosphere such as one containing sulfurous acid gas or alkaline gas, that will causes poor solderability and corrosion of inductors.

11.5 Do not store products in bulk packaging to prevent collision among inductors which causes core chipping and wire breakage.

11.6 Store products on pallets to protect from humidity, dust, etc.

11.7 Avoid heat shock, vibration, direct sunlight, etc.

11.8 When designing the PCB, please consider the installation position of the non-magnetic shielded components to avoid failures caused by magnetic interference.

11.9 Do not place this product near magnets or objects with magnetic force.

11.10 The product will self-heat (temperature rise) due to power-on, and sufficient margin should be left in thermal design.

### 11.11 Mounting density

If this product is placed near heat-generating products, be sure to implement sufficient heat-dissipating measures. If this product is subjected to a significant amount of heat from other products, this could adversely affect product quality, resulting in a circuit malfunction or failure of the mounted section. Also, be sure that the product is used in a manner so that the heat that the product is subjected to from other products does not exceed the upper limit of the rated operating temperature for the product.

11.12 Since the static electricity carried by the human body will be transmitted to the ground wire, please use an anti-static wrist strap.

11.13 Grease on human hands may lead to decreased solderability. Please avoid direct contact with the terminals.

11.14 This product refers to the general standard used in audio-visual entertainment, home appliances, computers, office automation, communications, power modules, LED lighting, measuring equipment. Machine tools, industrial control panels and other general electronic equipment. And the general electronic equipment should be used under the usual operation and usage methods.

11.15 When this product is used in occasions other than general electronic equipment, such as: Automotive Electronic products, medical equipment, military equipment, Aerospace equipment, submarine equipment, etc., please be sure to contact the company's sales department, the company will cooperate with customer needs, and negotiate different intended use described in this product

11.16 Reworking with soldering iron

| ITEM                                                                                | Requirement          |
|-------------------------------------------------------------------------------------|----------------------|
| Pre-heating                                                                         | 150° C/approx. 1 min |
| Tip temperature of soldering iron                                                   | 350° C max.          |
| Soldering time                                                                      | 3 s (+1 s, -0 s)     |
| Number of reworking operations                                                      | 1 times max.         |
| It is recommended to replace the product directly, rework may cause poor appearance |                      |

11.17 We cannot warrant against failure caused by any use of our product that deviates from the intended use as described in this product specification.

11.18 Please approve our product specifications or transact the approval sheet for product specifications before ordering.

11.19 Our specification limits the quality of the component as a single unit. Please ensure the component is thoroughly evaluated in your application circuit.

## 12. Record

| Version | Description   | Date       |
|---------|---------------|------------|
| A0      | First version | Nov.4.2023 |

© Huacui Micro Inductance Electronics(Jiangsu) Co., Ltd.. All rights reserved. Specification herein will be changed at any time without prior notice.