

## Specification Sheet for Approved

|                    |                 |
|--------------------|-----------------|
| Customer Name:     |                 |
| Customer Part No.: |                 |
| Ceaiya Part No:    | MAI3012C Series |
| Spec No:           | L133            |

## 【For Customer Approval Only】

If you Approval, Please Stamp

## 【RoHS Compliant Parts】

| Approved By | Checked By | Prepared By |
|-------------|------------|-------------|
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【Version of Changed Record】

| Rev. | Effective Date | Changed Contents | Change Reasons | Approved By |
|------|----------------|------------------|----------------|-------------|
| A0   | 2024-04-25     | New release      | /              | Li qing hui |
|      |                |                  |                |             |

# Specification Sheet for SMD Power Inductor

## 1. Scope

This specification applies to the MAI3012C Series of wire wound SMD power inductor.

## 2. Product Description and Identification (Part Number)

1) Description:

MAI3012C series of Wire wound SMD power inductor.

2) Product Identification (Part Number)

MAI 3012 C - 3R3 M T  
① ② ③ ④ ⑤ ⑥

| ①   | Type                 |
|-----|----------------------|
| MAI | Metal Alloy Inductor |

| ②    | External Dimensions(L×W×H) 【mm】 |
|------|---------------------------------|
| 3012 | 3.0×3.0×1.2                     |

| ③ | Feature type |
|---|--------------|
| C | Coating      |

| ④       | Nominal Inductance |
|---------|--------------------|
| Example | Example            |
| R47     | 0.47uH             |
| 2R2     | 2.2uH              |
| 220     | 22uH               |

| ⑤ | Inductance Tolerance |
|---|----------------------|
| N | ± 30%                |
| M | ± 20%                |

| ⑥ | Packing              |
|---|----------------------|
| T | Tape Carrier Package |

## 3. Electrical Characteristics

Please refer to Item 5.

- Operating temperature range (individual chip without packing): -40℃ ~ +125℃ (Including Self-heating) .
- Storage temperature range (packaging conditions): -10℃ ~ +40℃ and RH 70% (Max.).

## 4. Shape and Dimensions (Unit:mm)

Dimensions and recommended PCB pattern for reflow soldering, please see Fig4-1 and Table4-1

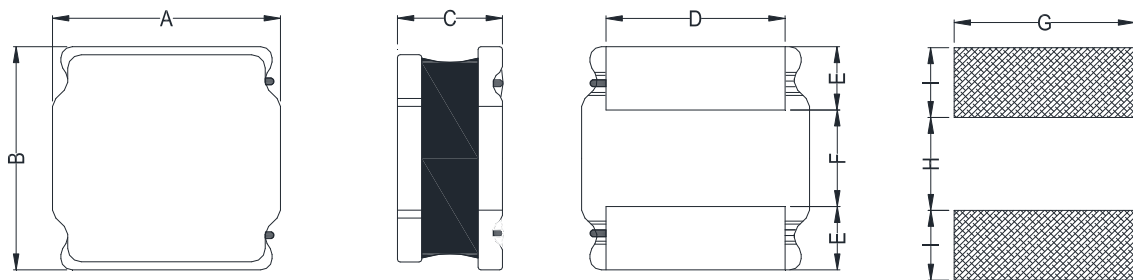


Fig4-1.

Table 4-1.

| A         | B        | C       | D       | E       | F       | G   | H   | I   |
|-----------|----------|---------|---------|---------|---------|-----|-----|-----|
| 3.0 ± 0.3 | 3.0± 0.3 | 1.25Max | 2.5±0.3 | 1.0±0.3 | 1.0±0.3 | 2.7 | 1.2 | 1.0 |

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## 5. Electrical Characteristics

| Part Number    | Inductance | DC Resistance |       | Saturation Current |      | Heat Rating Current |      |
|----------------|------------|---------------|-------|--------------------|------|---------------------|------|
|                | 1MHz/1V    | Max.          | Typ.  | Max.               | Typ. | Max.                | Typ. |
| Units          | μH         | Ω             | Ω     | A                  | A    | A                   | A    |
| Symbol         | L          | DCR           |       | Isat               |      | Irms                |      |
| MAI3012C-R22MT | 0.22 ± 20% | 0.026         | 0.020 | 9.30               | 10.0 | 4.20                | 4.80 |
| MAI3012C-R33MT | 0.33 ± 20% | 0.032         | 0.024 | 7.20               | 8.90 | 4.10                | 4.80 |
| MAI3012C-R47MT | 0.47 ± 20% | 0.040         | 0.031 | 6.80               | 8.00 | 3.80                | 4.20 |
| MAI3012C-R68MT | 0.68 ± 20% | 0.046         | 0.038 | 5.80               | 6.80 | 3.10                | 3.60 |
| MAI3012C-1R0MT | 1.0 ± 20%  | 0.054         | 0.046 | 4.20               | 5.40 | 2.70                | 3.10 |
| MAI3012C-1R5MT | 1.5 ± 20%  | 0.074         | 0.062 | 3.40               | 4.10 | 2.50                | 2.90 |
| MAI3012C-2R2MT | 2.2 ± 20%  | 0.108         | 0.090 | 2.80               | 3.35 | 2.05                | 2.35 |
| MAI3012C-3R3MT | 3.3 ± 20%  | 0.185         | 0.144 | 2.20               | 2.60 | 1.50                | 1.80 |
| MAI3012C-4R7MT | 4.7 ± 20%  | 0.255         | 0.215 | 2.00               | 2.50 | 1.15                | 1.35 |
| MAI3012C-6R8MT | 6.8 ± 20%  | 0.340         | 0.290 | 1.60               | 1.90 | 1.10                | 1.25 |
| MAI3012C-100MT | 10 ± 20%   | 0.474         | 0.395 | 1.20               | 1.45 | 1.00                | 1.15 |
| MAI3012C-150MT | 15 ± 20%   | 0.740         | 0.610 | 1.10               | 1.30 | 0.53                | 0.60 |
| MAI3012C-220MT | 22 ± 20%   | 1.20          | 0.960 | 0.96               | 1.15 | 0.40                | 0.46 |

Note:※1: Rated current: Isat(max.)or Irms(max.),whichever is smaller;

※2: Saturation Current: Max. Value, DC current at which the inductance drops less than 30% from its value without current; Typ. Value, DC current at which the inductance drops 30% from its value without current;

※3: Irms: DC current that causes the temperature rise ( $\Delta T$ ) from 20°C ambient.

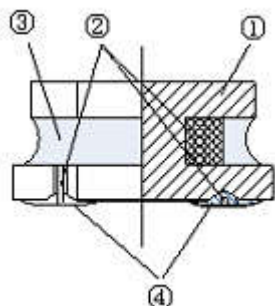
For Max. Value,  $\Delta T < 40^{\circ}\text{C}$ ; for Typ. Value,  $\Delta T$  is approximate  $40^{\circ}\text{C}$ .

The part temperature (ambient + temp. rise) should not exceed  $125^{\circ}\text{C}$  under worst case operating conditions. Circuit design, component placement, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.

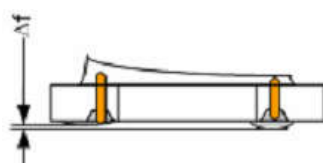
Absolute Maximum Voltage : DC 40V

## 6. Structure

The structure of MAI3012C product.



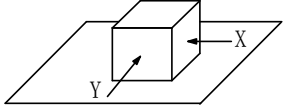
| NO. | Components    | Material                                 |
|-----|---------------|------------------------------------------|
| ①   | Core          | Soft magnetic Metal                      |
| ②   | Wire          | Polyurethane system enameled copper wire |
| ③   | Magnetic Glue | Epoxy resin and magnetic powder          |
| ④   | Electrodes    | AgNiSn or FeNiCu + Sn Alloy              |

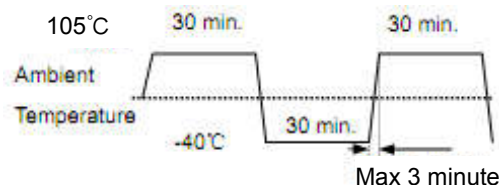
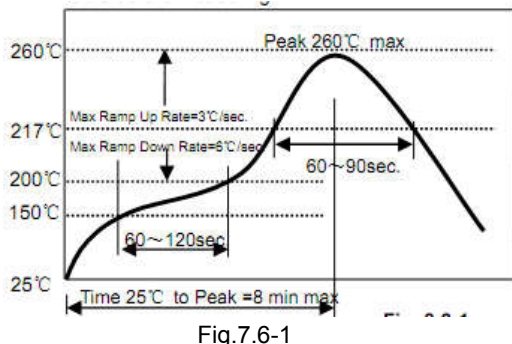


Δf: Clearance between terminal and the surface of plate must be 0.1mm max when coil is placed on a flat plate.

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## 7. Reliability Test

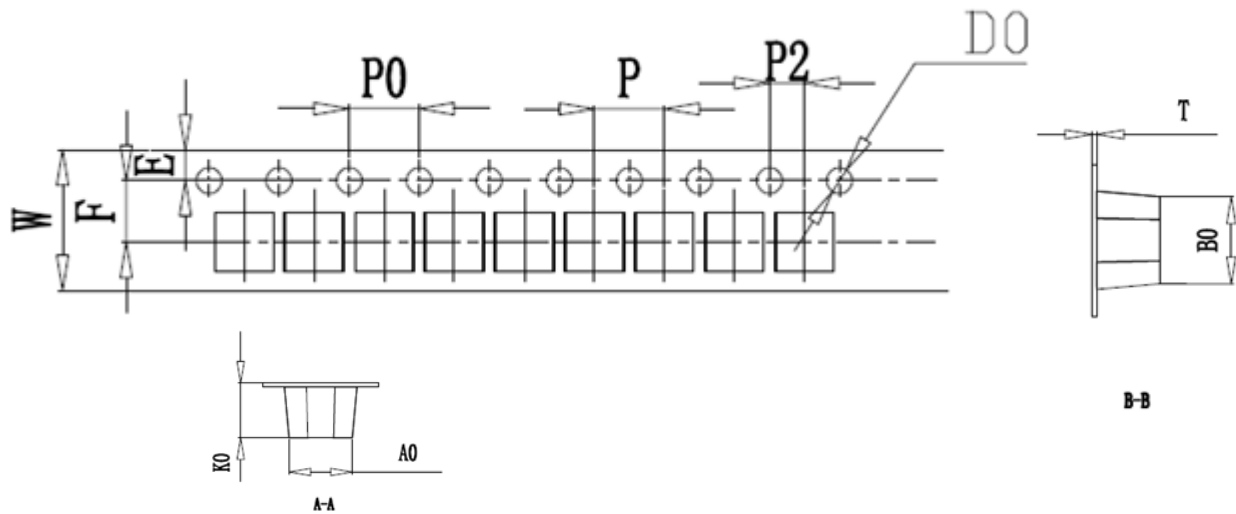
| Items                                        | Requirements                                                                                                                                                               | Test Methods and Remarks                                                                                                                                                                                                                                  |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7.1<br>Terminal<br>Strength                  | No removal or split of the termination or other defects shall occur.<br><br><br>Fig.7.1-1 | 1) Solder the inductor to the testing jig (glass epoxy board shown in Fig.7.1-1) using eutectic solder. Then apply a force in the direction of the arrow.<br>2) 10N force.<br>3) Keep time: 5±2s                                                          |
| 7.2<br>High<br>Temperature                   | 1. No visible mechanical damage.<br>2. Inductance change: Within ±10%                                                                                                      | 1) Storage Temperature :125+/-5℃<br>2) Duration : 96 ±4 Hours<br>3) Recovery : then measured at room ambient temperature after placing 24 hours.                                                                                                          |
| 7.3<br>Low<br>Temperature                    | 1. No visible mechanical damage<br>2. Inductance change: Within ±10%                                                                                                       | 1) Temperature and time: -40±5℃<br>2) Duration: 96±4 hours<br>3) TRecovery : then measured at room ambient temperature after placing 24 hours.                                                                                                            |
| 7.4<br>Vibration test                        | 1. No visible mechanical damage.<br>2. Inductance change: Within ±10%                                                                                                      | 1) Frequency range:10HZ~55HZ~10HZ<br>2) Amplitude:1.5mm p-p<br>3) Direction:X,Y,Z<br>4) Time:1 minute/cycle,2hours per axis                                                                                                                               |
| 7.5<br>High<br>Temperature<br>Storage Tested | 1. No visible mechanical damage.<br>2. Inductance change: Within ±10%                                                                                                      | 1) Storage Temperature :60+/-2℃<br>2) Relative Humidity :90-95% RH<br>3) Duration : 96 ±4 Hours<br>4) Recovery : then measured at room ambient temperature after placing 24 hours.                                                                        |
| 7.6<br>Resistance to<br>Soldering Heat       | 1. No visible mechanical damage.<br>2. Inductance change: Within ±10%                                                                                                      | 1) Re-flowing Profile: Please refer to Fig.7.6-1<br>2) Test board thickness: 1.0mm<br>3) Test board material: glass epoxy resin<br>4) The chip shall be stabilized at normal condition for 1~2 hours before measuring                                     |
| 7.7<br>Thermal Shock                         | 1. No visible mechanical damage.<br>2. Inductance change: Within ±10%                                                                                                      | 1) Temperature and time: -40±3℃ for 30±3 min→105℃ for 30±3min, please refer to Fig.7.7-1.<br>2) Transforming interval: Max, 3 minute<br>3) Tested cycle: 100 cycles<br>4) The chip shall be stabilized at normal condition for 1~2 hours before measuring |



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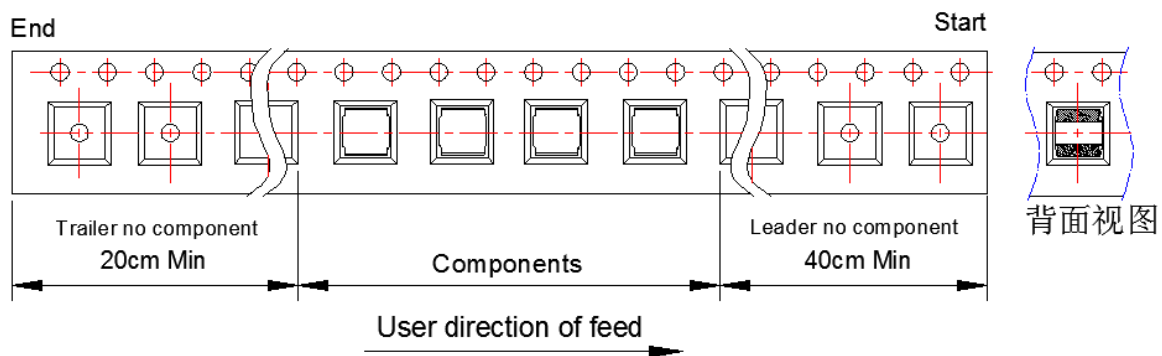
## 8.Packaging and Marking:

### 8-1.Carrier Tape Dimensions:

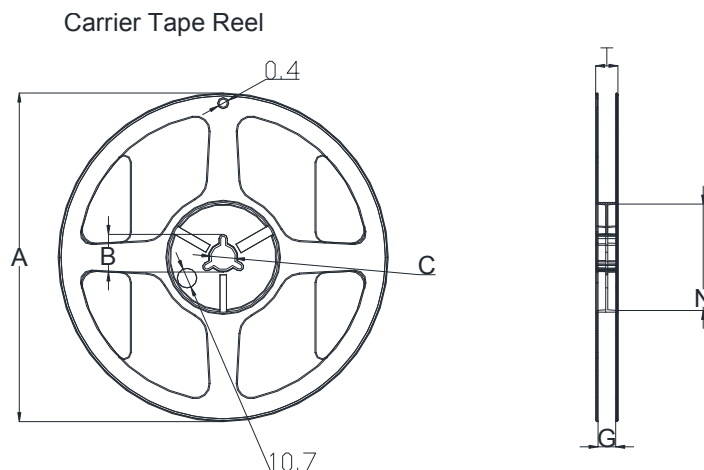


| ITEM | W    | A0    | B0    | K0   | P    | F    | E    | D0   | P0   | P2   | T     |
|------|------|-------|-------|------|------|------|------|------|------|------|-------|
| DIM  | 8.00 | 3.3   | 3.3   | 1.6  | 4.00 | 3.50 | 1.75 | 1.50 | 4.00 | 2.00 | 0.25  |
| TOLE | ±0.1 | ±0.05 | ±0.05 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | +0.1 | ±0.1 | ±0.1 | ±0.05 |

### 8-2.Taping Dimensions:



### 8-3.Reel Dimensions:



| Type | A   | B        | C      | G | N  | T    |
|------|-----|----------|--------|---|----|------|
| 8mm  | 178 | 20.7±0.8 | 13±0.4 | 9 | 60 | 10.8 |

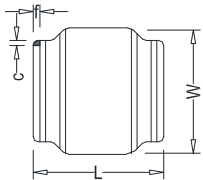
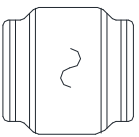
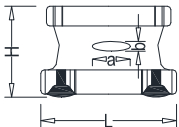
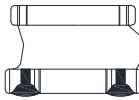
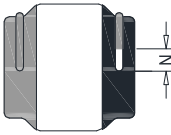
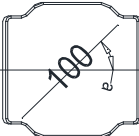
### 8-4. Packaging Quantity:

2KPCS/ Reel    20KPCS/ Inner Box    80KPCS/ Outer Box

# Specification Sheet for SMD Power Inductor

## 9. Visual Inspection Standard of Product

### Visual Inspection Standard of Product

| No. | Defect Item    | Figure                                                                              | Rejection Identification                                                                                 | Acceptance |
|-----|----------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------|
| 1   | Core Defect    |    | The defect length(c or f)more than L/6 or W/6 , NG                                                       | AQL=0.65   |
| 2   | Core Crack     |    | Visual cracks , NG                                                                                       | AQL=0.65   |
| 3   | Starvation     |  | (1)Resin starved length a more than L/2, NG<br>(2)When L>2mm,b>H/2, NG<br>(3)When L≤2mm, b don't control | AQL=0.65   |
| 4   | Excessive glue |  | The length, width or height of product beyond specified value, NG                                        | AQL=0.65   |
| 5   | Cold Solder    |  | (1)For CR2520** Series , cold solder N>0.5mm,NG<br>(2)For other series, cold solder N>1mm,NG             | AQL=0.65   |
| 6   | Marking Defect |  | The marking angle a>45° , NG                                                                             | AQL=0.65   |

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