

Power Inductor



BMRA Series



Overview

BMRx series is designed for low profile type with low RDC and ultra large current. Its molded magnetic shielded type is suitable for high-density mounting and ultra low buzz noise. Soldering conditions can be easily confirmed when mounting onto the board. This series also provides customers with embossed carrier type packaging for automatic mounting machine.

Benefits

1. High rated current
2. Ultra low buzz noise

Applications

1. DC-DC converters
2. Switchs and servers
3. DC-DC converters, inverters, and battery management systems.
4. Base stations, 5G infrastructure
5. Consumer Electronics: Smartphones, laptops, tablets, wearable devices, and gaming consoles.

Product Information

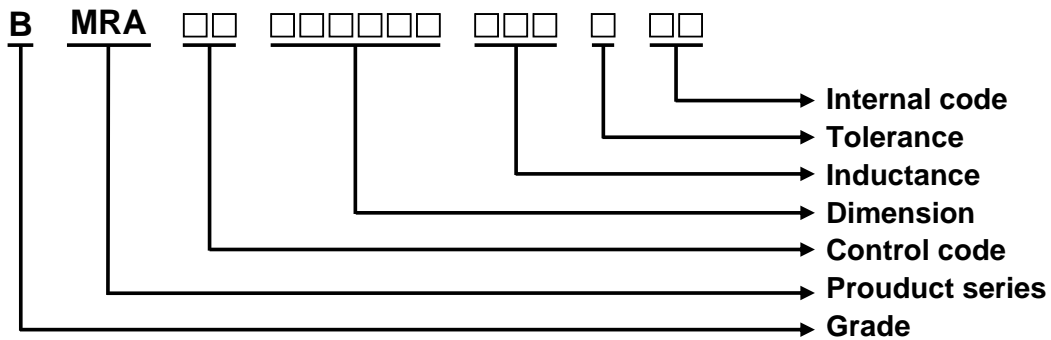
| Series | L (mm) | W(mm) | T (mm) | Inductance (μH) |
|--------|--------|-------|--------|-----------------|
| BMRA | 4.1 | 4.6 | 1.2 | 0.1 ~ 33 |
| | 4.1 | 4.6 | 1.5 | |
| | 4.1 | 4.6 | 2.0 | |
| | 5.2 | 5.4 | 1.2 | |
| | 5.4 | 5.7 | 1.5 | |
| | 5.4 | 5.7 | 1.8 | |
| | 5.4 | 5.7 | 3.0 | |
| | 6.6 | 7.3 | 1.3 | |
| | 6.6 | 7.3 | 3.0 | |



BMRA00040412 Series Specification

1 **Scope** This specification applies to large current and low loss SMD power inductor.

2 **Part numbering**

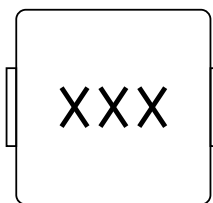


3 **Temperature rating**

Operating Temperature: -55°C to 125°C.

Storage Temperature: (on tape & reel): -20°C to +40°C; 75% RH max.

4 **Marking**



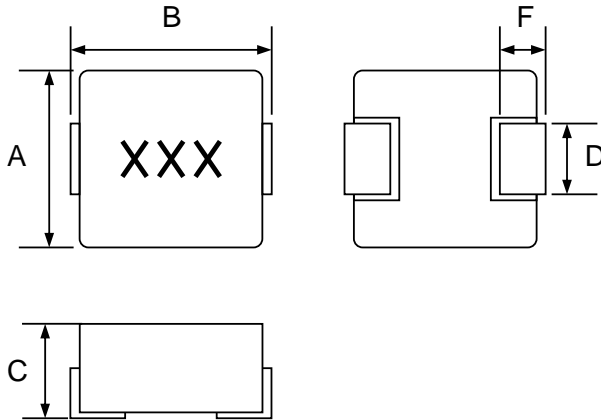
Marking : 1R0

5 **Standard testing condition**

| | Unless otherwise specified | In case of doubt |
|-------------|----------------------------------|------------------|
| Temperature | Ordinary Temperature(15 to 35°C) | 20 to 30°C |
| Humidity | Ordinary Humidity(25 to 85% RH) | 50 to 80 %RH |

BMRA00040412 Series Specification

6 Configuration and dimensions



Dimensions in mm

| Type | 040412 |
|------|-----------|
| A | 4.1 ± 0.2 |
| B | 4.6 ± 0.2 |
| C | 1.2 Max |
| D | 1.5 ± 0.3 |
| F | 1.0 ± 0.5 |

| Size Code | Net weight(grms) |
|-----------|------------------|
| 040412 | 0.12(typ.) |

7 Electrical characteristics

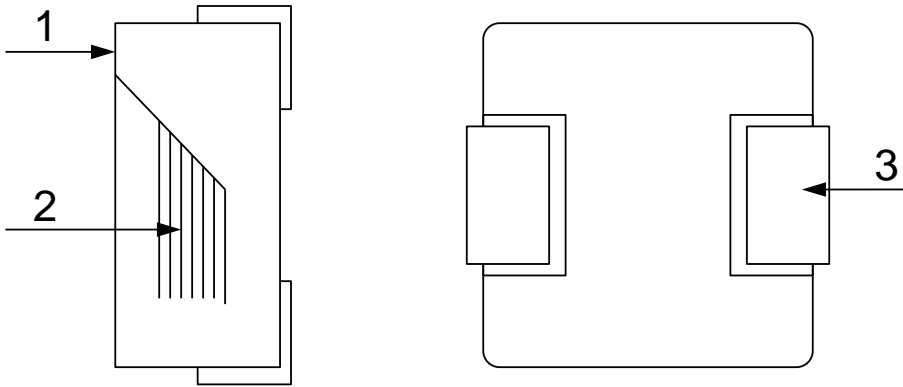
| Part number | Inductance (uH) | Tolerance (±%) | Test Freq. | I _{rms} (A) Typ. | I _{sat} (A) Typ. | RDC (mΩ) Max.(Typ.) | Marking |
|--------------------|-----------------|----------------|-------------|---------------------------|---------------------------|---------------------|---------|
| BMRA00040412R22MA1 | 0.22 | 20 | 100kHz,0.5V | 8.5 | 11.5 | 12(11) | R22 |
| BMRA00040412R33MA1 | 0.33 | 20 | 100kHz,0.5V | 6.5 | 8.5 | 19(17) | R33 |
| BMRA00040412R47MA1 | 0.47 | 20 | 100kHz,0.5V | 5 | 7 | 25(20) | R47 |
| BMRA00040412R68MA1 | 0.68 | 20 | 100kHz,0.5V | 4.5 | 6 | 36(32) | R68 |
| BMRA000404121R0MA1 | 1 | 20 | 100kHz,0.5V | 4.2 | 5.2 | 47(43) | 1R0 |
| BMRA000404121R5MA1 | 1.5 | 20 | 100kHz,0.5V | 3.25 | 4 | 75(68) | 1R5 |
| BMRA000404122R2MA1 | 2.2 | 20 | 100kHz,0.5V | 2.75 | 3.5 | 83.5(79.4) | 2R2 |
| BMRA000404123R3MA1 | 3.3 | 20 | 100kHz,0.5V | 2 | 3 | 165(150) | 3R3 |
| BMRA000404124R7MA1 | 4.7 | 20 | 100kHz,0.5V | 1.8 | 2.8 | 195(175) | 4R7 |

Note:

1. Operating temperature range -55°C to 125°C.
2. I_{sat} for Inductance drop 30% from its value without current.
3. I_{rms} for a 40°C temperature rise from 25°C ambient.
4. The part temperature (ambient + temp rise) should not exceed 125°C under worst case operating conditions. Circuit design 125°C under worst case operating conditions. 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.
5. Absolute maximum voltage 30V DC. (Based on test method, it may not the same under different application, it is recommended to verify first.)

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8 BMRA00040412 Series 8.1 Construction



8.2 Material List

| Item | Part | Description |
|------|---------------|-----------------------|
| 1 | Magnetic core | Magnetic metal powder |
| 2 | Coil | Enameled copper wire |
| 3 | Terminals | Copper based terminal |

BMRA00040412 Series Specification

9 Reliability test items

1-1.Mechanical Performance

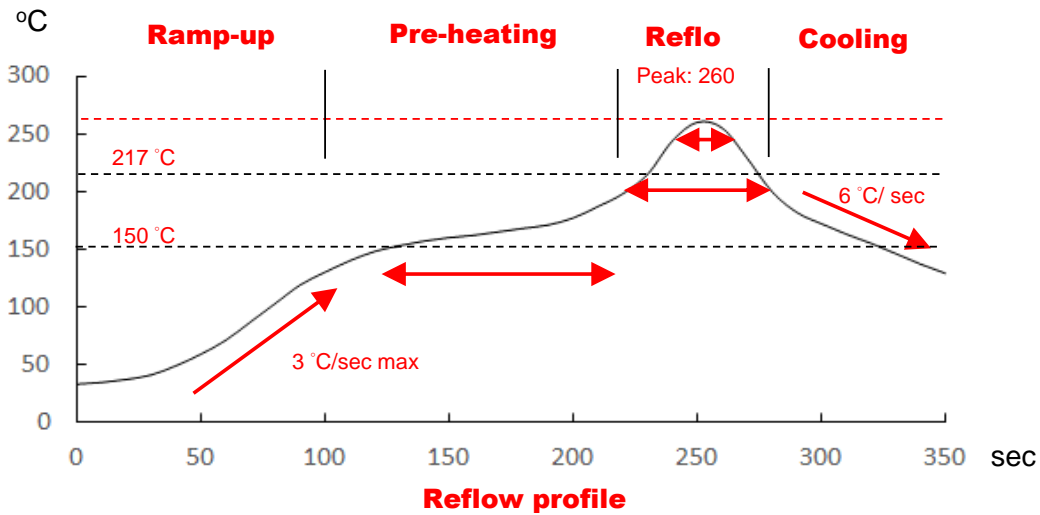
| No | Item | Specification | Test Method |
|-------|------------------------------|---|---|
| 1-1-1 | Vibration | Appearance: No damage Inductance: within $\pm 10\%$ of initial value | Test device shall be soldered on the substrate Oscillation Frequency: 10 to 55 to 10Hz for 1min Amplitude: 1.5mm Time: 2hrs for each axis (X, Y & Z), total 6hrs |
| 1-1-2 | Resistance to Soldering Heat | Appearance: No damage | Pre-heating: 150°C, 1min Solder Composition: Sn/Ag3.0/Cu0.5 Solder Temperature: 260 \pm 5°C Immersion Time: 10 \pm 1sec |
| 1-1-3 | Solder ability | The electrodes shall be at least 95% covered with new solder coating | Pre-heating: 150°C, 1min Solder Composition: Sn/Ag3.0/Cu0.5 Solder Temperature: 245 \pm 5°C Immersion Time: 4 \pm 1sec |
| 1-1-4 | Resistance to solvent | There must be no change in appearance or obliteration of marking. | Inductors must withstand 6 minutes of alcohol or water. |

1-2.Environmental Performance

| No | Item | Specification | Test Method | | | | | | | | | | | | | | |
|-------|---------------------|---|--|------|------------------|------------|---|-------------|----|---|------------|---|---|-------------|----|---|------------|
| 1-2-1 | Temperature Shock | Appearance: No damage Inductance: within $\pm 10\%$ of initial value | 10 cycles (Air to Air) 1 cycles shall consist of: 30 minutes exposure to -55°C 30 minutes exposure to 125°C 15 seconds maximum transition between temperatures | | | | | | | | | | | | | | |
| 1-2-2 | Temperature Cycle | | One cycle: <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55\pm3</td> <td>30</td> </tr> <tr> <td>2</td> <td>25\pm2</td> <td>3</td> </tr> <tr> <td>3</td> <td>125\pm3</td> <td>30</td> </tr> <tr> <td>4</td> <td>25\pm2</td> <td>3</td> </tr> </tbody> </table> | Step | Temperature (°C) | Time (min) | 1 | -55 \pm 3 | 30 | 2 | 25 \pm 2 | 3 | 3 | 125 \pm 3 | 30 | 4 | 25 \pm 2 |
| Step | Temperature (°C) | Time (min) | | | | | | | | | | | | | | | |
| 1 | -55 \pm 3 | 30 | | | | | | | | | | | | | | | |
| 2 | 25 \pm 2 | 3 | | | | | | | | | | | | | | | |
| 3 | 125 \pm 3 | 30 | | | | | | | | | | | | | | | |
| 4 | 25 \pm 2 | 3 | | | | | | | | | | | | | | | |
| 1-2-3 | Humidity Resistance | | Temperature: 40 \pm 2°C Relative Humidity: 90 ~ 95% Time: 1000hrs Measured after exposure in the room condition for 24hrs | | | | | | | | | | | | | | |
| 1-2-4 | Heat Life | | Temperature: 85 \pm 3°C Relative Humidity: 20% Applied Current: Rated Current Time: 1000hrs Measured after exposure in the room condition for 24hrs | | | | | | | | | | | | | | |
| 1-2-5 | Cold Resistance | | Temperature: -55 \pm 3°C Relative Humidity: 0% Time: 1000hrs Measured after exposure in the room condition for 24hrs | | | | | | | | | | | | | | |

BMRA00040412 Series Specification

10 Recommended IR reflow profile



Lead-Free(LF)

Refer to J-STD-020F

| Item | Ramp-up | Pre-heating | Reflow | Peak Temp. | Cooling |
|-------------|--------------|---------------|------------|------------|----------------------|
| Temp. scope | R.T. ~150 °C | 150 °C~200 °C | 217 °C | 260±5 °C | Peak Temp. 150 °C |
| Time spec | - | 60~120 sec | 60~150 sec | 20~40 sec | - |

Note:

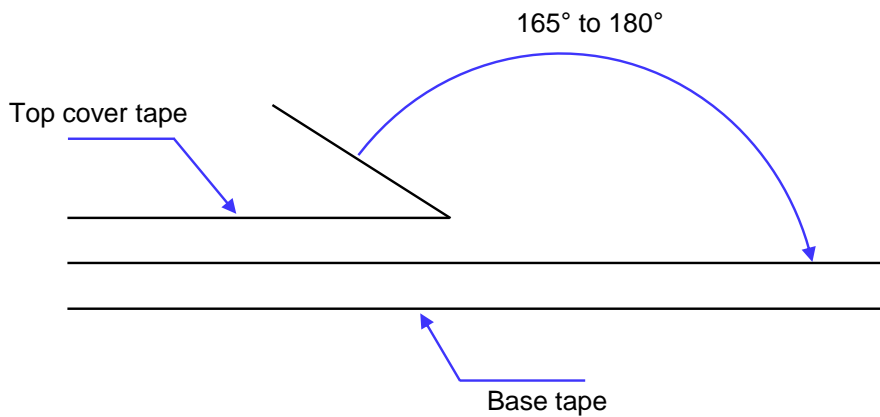
1. IR reflow times: within 3 times.
2. Nitrogen adopted is recommended while in IR reflow.

BMRA00040412 Series Specification

11 Packaging

11.1 Packaging-cover tape

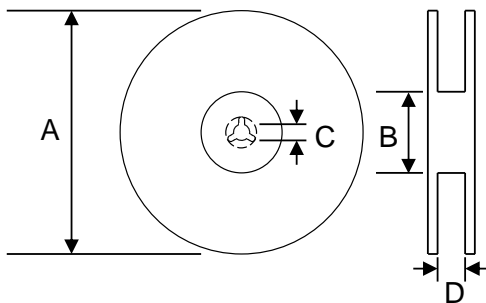
The force for tearing off cover tape is 10 to 130 grams.



11.2 Packaging quantity

| Type | pcs/reel |
|--------|----------|
| 040412 | 2000 |

11.3 Reel dimensions



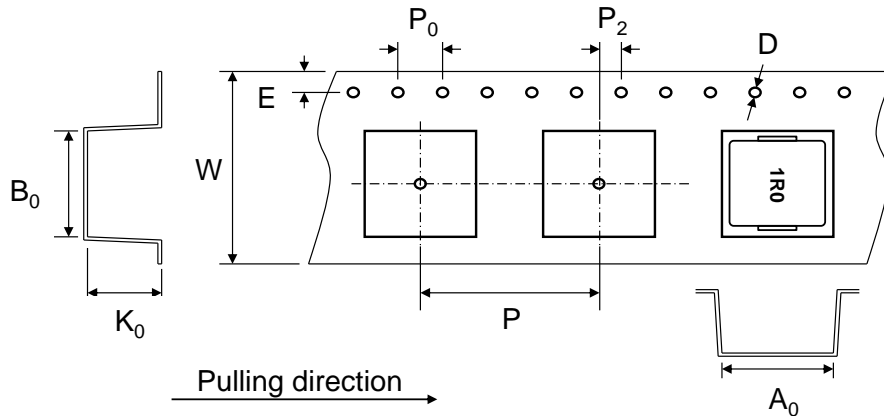
Dimensions in mm

| Type | A | B | C | D |
|--------|-----|-----|----|----|
| 040412 | 330 | 100 | 13 | 13 |

BMRA00040412 Series Specification

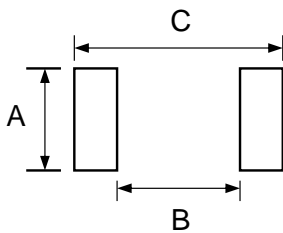
11 Packaging

11.4 Tape dimensions in mm



| Type | A ₀ | B ₀ | K ₀ | D | E | W | P | P ₀ | P ₂ |
|--------|----------------|----------------|----------------|-----|------|----|---|----------------|----------------|
| 040412 | 4.3 | 4.9 | 1.5 | 1.5 | 1.75 | 12 | 8 | 4 | 2 |

12 Recommended pattern



Dimensions in mm

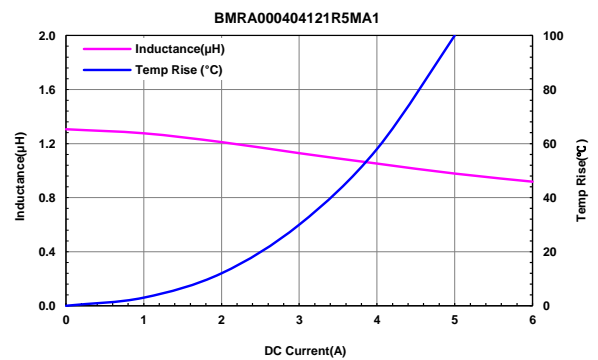
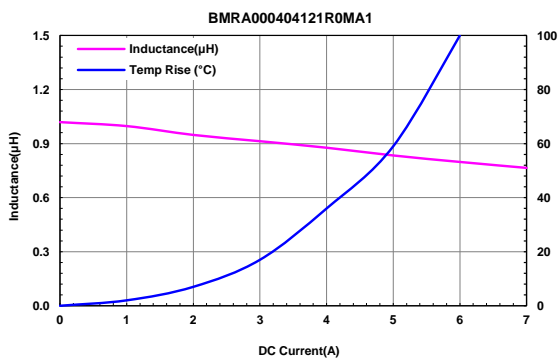
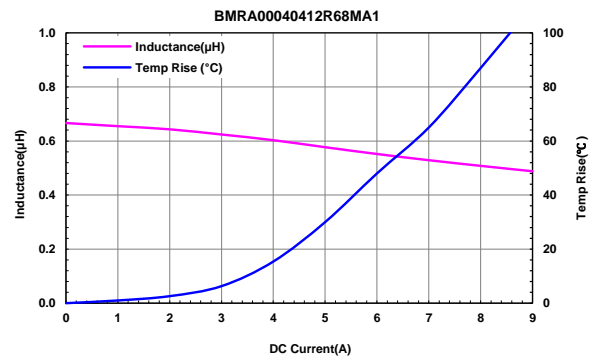
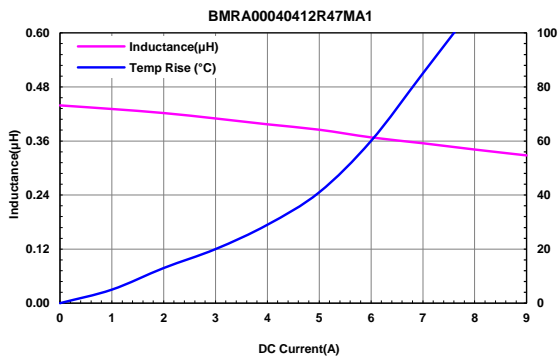
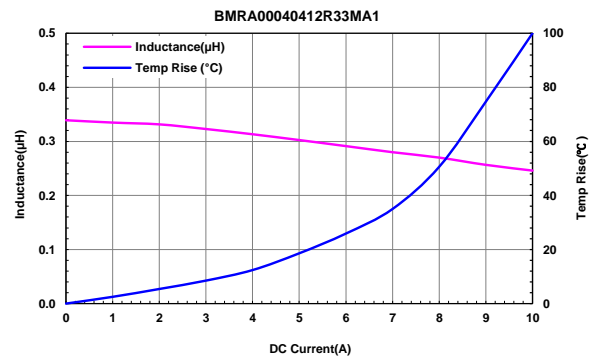
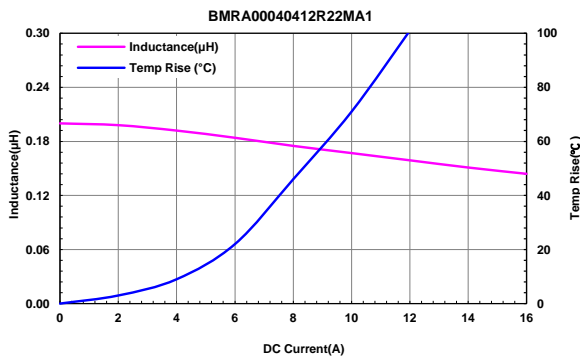
| Type | A | B | C |
|--------|-----|-----|-----|
| 040412 | 2.5 | 2.2 | 5.2 |

13 Note

1. Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
2. Don't design/ mount any components in contact with this product.
3. The moisture sensitivity level (MSL) of products is classified as level 1.
4. Shelf life: 1 years from the date of shipment.

BMRA00040412 Series Specification

14 Graph



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14 Graph

