

## Multilayer Ceramic Chip Inductor (CI SERIES)

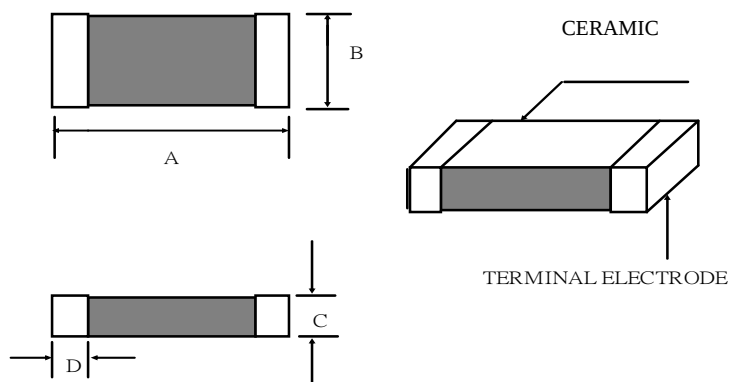
### ●FEATURE

1. Support operating frequency bands up to 10GHz
2. Provides high Q characteristics
3. Monolithic structure for high reliability

### ●Applications

1. Mobile phones
2. Cordless phone or pagers and Other various electronic appliances

### ●Shape and Dimension



### ●Specification

Dimension in m/m(in inches)

| TYPE         | A                     | B                      | C                     | D        |
|--------------|-----------------------|------------------------|-----------------------|----------|
| 100505(0402) | 1.0±0.05(0.039±0.002) | 0.50±0.05(0.019±0.002) | 0.5±0.05(0.019±0.002) | 0.2±0.10 |
| 160808(0603) | 1.6±0.15(0.063±0.006) | 0.80±0.15(0.031±0.006) | 0.8±0.15(0.031±0.006) | 0.5±0.30 |

Note1: Test equipment: HP 4291A Impedance analyzer

Note2: Inductance tolerance: S: ±0.3nH; J: ±5%; K: ±10%

Note3.Packaging: Taping ; Quantity: CI100505:10000 Pieces/reel ; CI160808:4000 Pieces/reel

## ●Electrical characteristics

| Part Number   | Inductance<br>(nH) | Q-value<br>(Min) | Test Frequency<br>(MHz) | Self-resonant<br>Frequency(GHz) Min | DC Resistance<br>(Ω)Max | Rated Current (mA)<br>Max |
|---------------|--------------------|------------------|-------------------------|-------------------------------------|-------------------------|---------------------------|
| CI100505-1N0S | 1.0                | 8                | 100                     | 10                                  | 0.08                    | 300                       |
| CI100505-1N2S | 1.2                | 8                | 100                     | 10                                  | 0.09                    | 300                       |
| CI100505-1N5S | 1.5                | 8                | 100                     | 6                                   | 0.10                    | 300                       |
| CI100505-1N8S | 1.8                | 8                | 100                     | 6                                   | 0.12                    | 300                       |
| CI100505-2N2S | 2.2                | 8                | 100                     | 6                                   | 0.13                    | 300                       |
| CI100505-2N4S | 2.4                | 8                | 100                     | 6                                   | 0.13                    | 300                       |
| CI100505-2N7S | 2.7                | 8                | 100                     | 6                                   | 0.13                    | 300                       |
| CI100505-3N0S | 3.0                | 8                | 100                     | 6                                   | 0.16                    | 300                       |
| CI100505-3N3S | 3.3                | 8                | 100                     | 6                                   | 0.16                    | 300                       |
| CI100505-3N9S | 3.9                | 8                | 100                     | 4                                   | 0.21                    | 300                       |
| CI100505-4N7S | 4.7                | 8                | 100                     | 4                                   | 0.21                    | 300                       |
| CI100505-5N6S | 5.6                | 8                | 100                     | 4                                   | 0.23                    | 300                       |
| CI100505-6N8J | 6.8                | 8                | 100                     | 3.9                                 | 0.25                    | 300                       |
| CI100505-8N2J | 8.2                | 8                | 100                     | 3.6                                 | 0.28                    | 300                       |
| CI100505-10NJ | 10                 | 8                | 100                     | 3.2                                 | 0.31                    | 300                       |
| CI100505-12NJ | 12                 | 8                | 100                     | 2.7                                 | 0.40                    | 300                       |
| CI100505-15NJ | 15                 | 8                | 100                     | 2.3                                 | 0.46                    | 300                       |
| CI100505-18NJ | 18                 | 8                | 100                     | 2.1                                 | 0.55                    | 300                       |
| CI100505-22NJ | 22                 | 8                | 100                     | 1.9                                 | 0.60                    | 300                       |
| CI100505-27NJ | 27                 | 8                | 100                     | 1.6                                 | 0.70                    | 300                       |
| CI100505-33NJ | 33                 | 8                | 100                     | 1.3                                 | 0.80                    | 200                       |
| CI100505-39NJ | 39                 | 8                | 100                     | 1.2                                 | 0.90                    | 200                       |
| CI100505-47NJ | 47                 | 8                | 100                     | 1.0                                 | 1.00                    | 200                       |
| CI100505-56NJ | 56                 | 8                | 100                     | 0.75                                | 1.00                    | 200                       |
| CI100505-68NJ | 68                 | 8                | 100                     | 0.75                                | 1.20                    | 180                       |
| CI100505-82NJ | 82                 | 8                | 100                     | 0.60                                | 1.30                    | 150                       |
| CI100505-R10J | 100                | 8                | 100                     | 0.60                                | 1.50                    | 150                       |
| CI100505-R12J | 120                | 8                | 100                     | 0.60                                | 1.60                    | 150                       |
| Part Number   | Inductance<br>(nH) | Q-value<br>(Min) | Test Frequency<br>(MHz) | Self-resonant<br>Frequency(GHz) Min | DC Resistance<br>(Ω)Max | Rated Current (mA)<br>Max |
| CI160808-1N0S | 1.0                | 8                | 100                     | 10                                  | 0.05                    | 300                       |
| CI160808-1N2S | 1.2                | 8                | 100                     | 10                                  | 0.05                    | 300                       |
| CI160808-1N5S | 1.5                | 8                | 100                     | 6                                   | 0.1                     | 300                       |
| CI160808-1N8S | 1.8                | 8                | 100                     | 6                                   | 0.1                     | 300                       |

| Part Number   | Inductance<br>(nH) | Q-value<br>(Min) | Test Frequency<br>(MHz) | Self-resonant<br>Frequency(GHz) Min | DC Resistance<br>(Ω)Max | Rated Current (mA)<br>Max |
|---------------|--------------------|------------------|-------------------------|-------------------------------------|-------------------------|---------------------------|
| CI160808-2N2S | 2.2                | 8                | 100                     | 6                                   | 0.10                    | 300                       |
| CI160808-2N7S | 2.7                | 8                | 100                     | 6                                   | 0.10                    | 300                       |
| CI160808-3N3S | 3.3                | 10               | 100                     | 6                                   | 0.12                    | 300                       |
| CI160808-3N9S | 3.9                | 10               | 100                     | 6                                   | 0.14                    | 300                       |
| CI160808-4N7S | 4.7                | 10               | 100                     | 4                                   | 0.16                    | 300                       |
| CI160808-5N6S | 5.6                | 10               | 100                     | 4                                   | 0.18                    | 300                       |
| CI160808-6N8J | 6.8                | 10               | 100                     | 4                                   | 0.22                    | 300                       |
| CI160808-8N2J | 8.2                | 12               | 100                     | 3.5                                 | 0.24                    | 300                       |
| CI160808-10NJ | 10                 | 12               | 100                     | 3.4                                 | 0.26                    | 300                       |
| CI160808-12NJ | 12                 | 12               | 100                     | 2.6                                 | 0.28                    | 300                       |
| CI160808-15NJ | 15                 | 12               | 100                     | 2.3                                 | 0.32                    | 300                       |
| CI160808-18NJ | 18                 | 12               | 100                     | 2.0                                 | 0.35                    | 300                       |
| CI160808-22NJ | 22                 | 12               | 100                     | 1.6                                 | 0.40                    | 300                       |
| CI160808-27NJ | 27                 | 12               | 100                     | 1.4                                 | 0.45                    | 300                       |
| CI160808-33NJ | 33                 | 12               | 100                     | 1.2                                 | 0.55                    | 300                       |
| CI160808-39NJ | 39                 | 12               | 100                     | 1.1                                 | 0.60                    | 300                       |
| CI160808-47NJ | 47                 | 12               | 100                     | 0.9                                 | 0.70                    | 300                       |
| CI160808-56NJ | 56                 | 12               | 100                     | 0.9                                 | 0.75                    | 300                       |
| CI160808-68NJ | 68                 | 12               | 100                     | 0.7                                 | 0.85                    | 300                       |
| CI160808-82NJ | 82                 | 12               | 100                     | 0.6                                 | 0.95                    | 300                       |
| CI160808-R10J | 100                | 12               | 100                     | 0.6                                 | 1.00                    | 300                       |
| CI160808-R12J | 120                | 8                | 50                      | 0.5                                 | 1.20                    | 300                       |
| CI160808-R15J | 150                | 8                | 50                      | 0.5                                 | 1.20                    | 300                       |
| CI160808-R18J | 180                | 8                | 50                      | 0.4                                 | 1.30                    | 300                       |
| CI160808-R22J | 220                | 8                | 50                      | 0.4                                 | 1.50                    | 300                       |

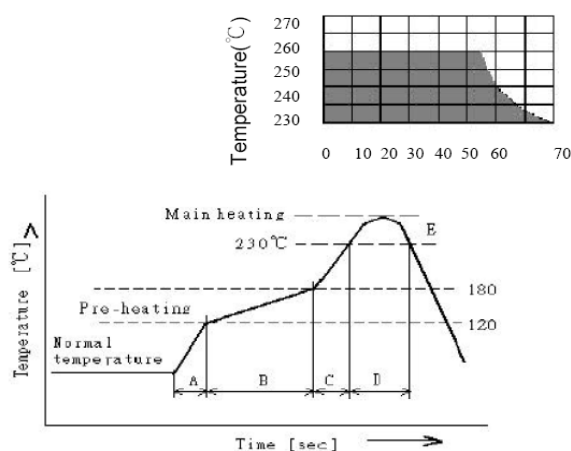
## ●Reliability Test

### 1. Reflow soldering conditions

Pre—heating should be in such a way that the temperature difference between solder and ferrite surface is limited to 150°C max. Also cooling into solvent after soldering should be in such a way that the temperature difference is limited to 100°C max.

Unenough pre—heating may cause cracks on the ferrite, resulting in the deterioration of product quality.

Products should be soldered within the following allowable range indicated by the slanted line. The excessive soldering conditions may cause the corrosion of the electrode, When soldering is repeated, allowable time is the accumulated time.



|                 |                     |            |        |
|-----------------|---------------------|------------|--------|
| A               | Slope of temp. rise | 1 to 5     | °C/sec |
| B               | Heat time           | 50 to 150  | sec    |
|                 | Heat temperature    | 120 to 180 | °C     |
| C               | Slope of temp. rise | 1 to 5     | °C/sec |
| D               | Time over 230°C     | 90~120     | sec    |
| E               | Peak temperature    | 255~260    | °C     |
|                 | Peak hold time      | 10 max.    | sec    |
| No. of mounting |                     | 3          | times  |

### 1.1 Reworking with soldering iron

|                       |                |
|-----------------------|----------------|
| Preheating            | 150°C, 1minute |
| Tip temperature       | 280°C max      |
| Soldering time        | 3seconds max.  |
| Soldering iron output | 30w max.       |
| End of soldering iron | § 3mm max.     |

- Reworking should be limited to only one time.

Note : Do not directly touch the products with the tip of the soldering iron in order to prevent the crack on the ferrite material due to the thermal shock.

### 1.2 Solder Volume

Solder shall be used not to be exceed the upper limits as shown below.

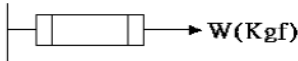
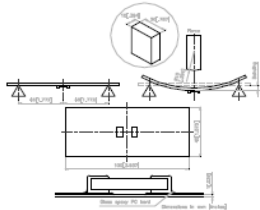
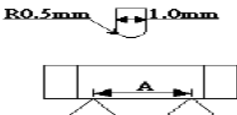


Accordingly increasing the solder volume, the mechanical stress to product is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance.

## 2. IMPEDANCE

2.1 Impedance shall be measured with HP—4291A impedance analyzer or equivalent system

### 3. MECHANICAL CHARACTERISTICS

| ITEM                      | REQUIREMENTS                                                                                                                                                                                                             | TEST CONDITIONS                                                                                                                                                                        |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TERMINAL STRENGTH         | THE TERMINAL ELECTRODE AND THE FERRITE MUST NOT BE DAMAGED BY THE FORCE APPLIED ON THE RIGHT CONDITIONS.                                                                                                                 | AFTER SOLDERING A LEAD WIRE TO A TERMINAL ELECTRODE, APPLY A LOAD POWER IN THE ARROW DIRECTION.<br> |
| FLEXURE STRENGTH          | THE TERMINAL ELECTRODE AND THE FERRITE MUST NOT BE DAMAGED BY THE FORCE APPLIED ON THE RIGHT CONDITIONS.                                                                                                                 | AFTER SOLDERING A CHIP TO A TEST SUBSTRATE, BEND THE SUBSTRATE BY 2m/m AND THEN RETURN.<br>         |
| BODY STRENGTH             | THE FERRITE SHALL NOT BE DAMAGED BY FORCES APPLIED ON THE RIGHT SPECIFICATION $\geq 1.0W(Kgf)$                                                                                                                           | <br>A : 0.9(mm) 0.04 (INCHES)                                                                      |
| RESISTANCE TO SOLDER HEAT | THE CHIPS MUST HAVE NO CRACKS. MORE THAN 75% OF THE TERMINAL ELECTRODE MUST BE COVERED WITH NEW SOLDER. IMPEDANCE & RDC SHALL BE WITHIN $\pm 30\%$ OF THE INITIAL VALUE. INDUCTANCE: WITHIN $\pm 20\%$ OF INITIAL VALUE. | PREHEAT TEMP : 100 TO 150°C<br>PREHEAT TIME : 1 MINUTE<br>SOLDER TEMP : $275 \pm 5^\circ C$<br>DIPPING TIME : $5 \pm 1$ sec                                                            |
| SOLDER ABILITY            | MORE THAN 90% OF THE TERMINAL ELECTRODES SHALL BE COVERED WITH NEW SOLDER.                                                                                                                                               | PREHEAT TEMP : 100 TO 150°C<br>PREHEAT TIME : 1 MINUTE<br>SOLDER TEMP : $215 \pm 5^\circ C$<br>DIPPING TIME : $3 \pm 1$ sec                                                            |

## 4. RELIABILITY AND TEST CONDITIONS

#### 4.1 HIGH TEMPERATURE RESISTANCE

- a. Performance specification
  1. Appearance : no mechanical damage
  2. Impedance shall be with  $\pm 30\%$  of the initial value
- b. Test condition
  1. Temperature  $125^{\circ}\text{C} \pm 2^{\circ}\text{C}$
  2. Applied current : Rated current
  3. Testing time :  $1008 \pm 12$  hrs (maximum value)
  4. Measurement : After placing at room ambient temperature for 24 hours minimum

#### 4.2 HUMIDITY RESISTANCE

##### a. Performance specification

1. Appearance : no mechanical damage
2. Impedance shall be with  $\pm 30\%$  of the initial value

##### b. Test condition

1. Humidity : 90 to 95% RH
2. Temperature :  $40 \pm 2^\circ\text{C}$
3. Applied current : Rated current (maximum value)
4. Testing time :  $1008 \pm 12$  hours
5. Measurement : After placing at room ambient temperature for 24 hours minimum

#### 4.3 TEMPERATURE CYCLE

##### a. Performance specification

1. Appearance : no mechanical damage
2. Impedance shall be with  $\pm 30\%$  of the initial value

##### b. Test condition

1. Temperature  $-55^\circ\text{C}, +125^\circ\text{C}$  kept stabilized for 30 minutes each
2. Cycle : 100 cycles
3. Measurement : After placing for 24 hours minimum at room ambient temperature
4. step1.  $-55^\circ\text{C}$  temp  $\pm 3^\circ\text{C}$   $30 \pm 3$  minutes  
step2. Room temperature 2 to 5 minutes  
step3.  $+125^\circ\text{C}$  temp  $\pm 2^\circ\text{C}$   $30 \pm 3$  minutes  
step4. room temperature 2 to 5 minutes

#### 4.4 LOW TEMPERATURE STORAGE LIFE TEST

##### a. Performance specification

1. Appearance : no mechanical damage
2. Impedance shall be with  $\pm 30\%$  of the initial value

##### b. Test condition

1. Temperature  $-55^\circ\text{C} \pm 2^\circ\text{C}$
2. Testing time :  $1008 \pm 12$  hours
3. Measurement : After placing for 24 hours minimum at room ambient temperature

#### 5. STORAGE

5.1 The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to high humidity. Packages must be stored at  $40^\circ\text{C}$  or less and 70% RH or less.

5.2 The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to dust or harmful gas (hydrogen chloride, sulfurous acid gas or hydrogen sulfide).

5.3 Packaging material may be deformed if packages are stored where they are exposed to heat or direct sun—light.

5.4 Minimum packages, such as polyvinyl heat — seal packages shall not be opened until just before they are used. If opened, use the reels as soon as possible.

5.5 Solderability specified in composite specification page.3 shall be for 6 months from the date of delivery on condition that they are stored at the environment specified clause 5-1 & 5-2.

For those parts which passed more than 6 months shall be checked solderability before it is used.