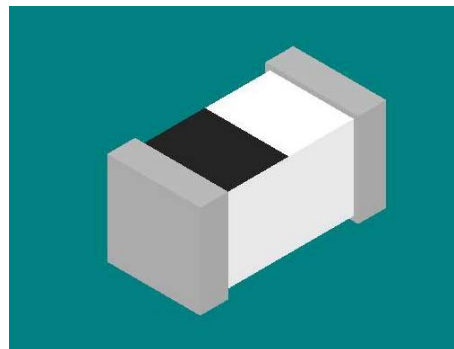


# MLCI 1005 Series Approval Sheet

## Multi-layer Chip Inductor



### ORDERING CODE



## High Frequency MLCI Series

HI      1005      15N      J      T  
 ①            ②            ③            ④            ⑤

① Product ID

Code	Definition
HI	High Frequency Inductor (Lead Free)

③ Inductance

Code	Design
1N5	1.5nH
12N	12nH
R12	120nH

⑤ Packaging

Code	Packaging
B	Bulk
T	Tape

② Dimension(LXW)

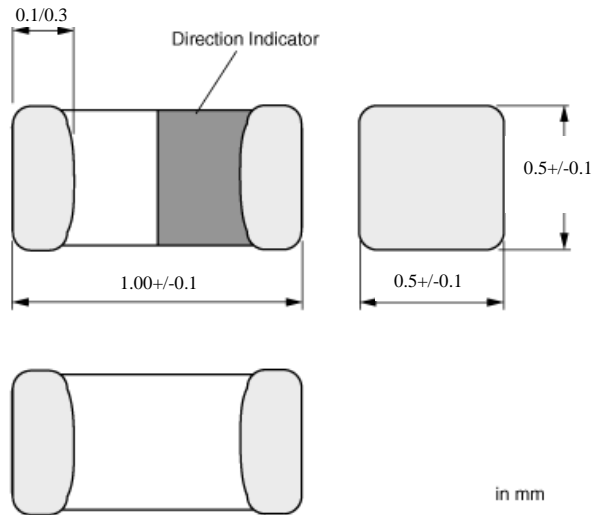
Code	Dimension( L x W)	EIA
1005	1.0x0.5 mm	0402
1608	1.60X0.8mm	0603

④ Tolerance Code

Code	Tolerance
D	+/- 0.1nH
C	+/- 0.2nH
S	+/- 0.3nH
G	+/- 2%
J	+/- 5%
K	+/- 10%

# HI 1005 Specifications

## 1. SHAPE AND SIZE (mm)



## 2. SPECIFICATION

### 2.1 Dimension and Inductance tolerance

DIMENSION CODE (EIA CODE)	AVAILABLE INDUCTANCE	RATINGS	NORMAL TOLERANCE
1005 (0402)	1.0 nH ~ 120 nH	1.0 nH ~ 5.6 nH	C: $\pm 0.2$ nH S: $\pm 0.3$ nH
		6.2 nH ~ 120 nH	G: $\pm 2\%$ J: $\pm 5\%$ , K: $\pm 10\%$

2.2 ELECTRICAL SPECIFICATIONS { 1005 (0402) SERIES }

Ordering Code	Inductance	Tolerance	Q	L, Q		Q(Typical)			SRF Self-Resonance Frequency	RDC	Rated Current	Packing Amount of 7" reel
				Measuring Frequency	Frequency(MHz)					DC-Resistance		
	(nH)					min	(MHz)	100	500	800	(MHz) min.	(Ω) max.
HI1005 1N0 S X	1.0	C,S	8	100	11	33	43	10000	0.12	300	10000	
HI1005 1N1 S X	1.1	C,S	8	100	11	33	43	10000	0.12	300		
HI1005 1N2 S X	1.2	C,S	8	100	11	33	43	10000	0.12	300		
HI1005 1N3 S X	1.3	C,S	8	100	11	33	43	10000	0.13	300		
HI1005 1N5 S X	1.5	C,S	8	100	11	33	43	6000	0.13	300		
HI1005 1N6 S X	1.6	C,S	8	100	11	31	41	6000	0.14	300		
HI1005 1N8 S X	1.8	C,S	8	100	11	31	41	6000	0.14	300		
HI1005 2N0 S X	2.0	C,S	8	100	11	26	36	6000	0.16	300		
HI1005 2N2 S X	2.2	C,S	8	100	11	26	36	6000	0.16	300		
HI1005 2N4 S X	2.4	C,S	8	100	11	26	36	6000	0.17	300		
HI1005 2N7 S X	2.7	C,S	8	100	12	29	38	6000	0.17	300		
HI1005 3N0 S X	3.0	C,S	8	100	11	28	37	6000	0.19	300		
HI1005 3N3 □X	3.3	C,S,K	8	100	11	28	37	6000	0.19	300		
HI1005 3N6 □X	3.6	C,S,K	8	100	11	26	32	5000	0.22	300		
HI1005 3N9 □X	3.9	C,S,K	8	100	11	26	32	4000	0.22	300		
HI1005 4N3 □X	4.3	C,S,K	8	100	11	26	32	4000	0.24	300		
HI1005 4N7 □X	4.7	C,S,K	8	100	12	28	37	4000	0.24	300		
HI1005 5N1 □X	5.1	C,S,K	8	100	11	26	35	4000	0.27	300		
HI1005 5N6 □X	5.6	C,S,K	8	100	11	26	35	4000	0.27	300		
HI1005 6N2 □X	6.2	G,J,K	8	100	11	26	34	3900	0.32	300		
HI1005 6N8 □X	6.8	G,J,K	8	100	11	26	34	3900	0.32	300		
HI1005 7N5 □ X	7.5	G,J,K	8	100	11	26	34	3700	0.35	300		
HI1005 8N2 □X	8.2	G,J,K	8	100	11	26	34	3500	0.37	300		
HI1005 9N1 □ X	9.1	G,J,K	8	100	11	25	31	3400	0.40	300		
HI1005 10N □X	10	G,J,K	8	100	11	25	31	3200	0.42	300		
HI1005 12N □X	12	G,J,K	8	100	11	25	31	2600	0.50	300		
HI1005 15N □X	15	G,J,K	8	100	11	24	30	2300	0.55	300		
HI1005 18N □X	18	G,J,K	8	100	11	24	30	2000	0.65	300		
HI1005 22N □X	22	G,J,K	8	100	12	24	30	1600	0.80	300		
HI1005 27N □X	27	G,J,K	8	100	11	24	28	1400	0.90	300		
HI1005 33N □X	33	G,J,K	8	100	12	23	26	1200	1.00	200		
HI1005 39N □X	39	G,J,K	8	100	11	21	24	1100	1.20	200		
HI1005 47N □X	47	G,J,K	8	100	11	21	23	900	1.30	200		
HI1005 56N □X	56	G,J,K	8	100	12	21	21	750	1.40	200		
HI1005 68N □X	68	G,J,K	8	100	11	19	19	750	1.40	180		
HI1005 82N □X	82	G,J,K	8	100	10	19	16	600	1.60	150		
HI1005 R10 □X	100	G,J,K	8	100	10	18	-	600	1.60	100		
HI1005 R12 □X	120	G,J,K	8	100	11	15	-	600	1.60	100		

\* X= Packaging: T=Tape, B=Bulk

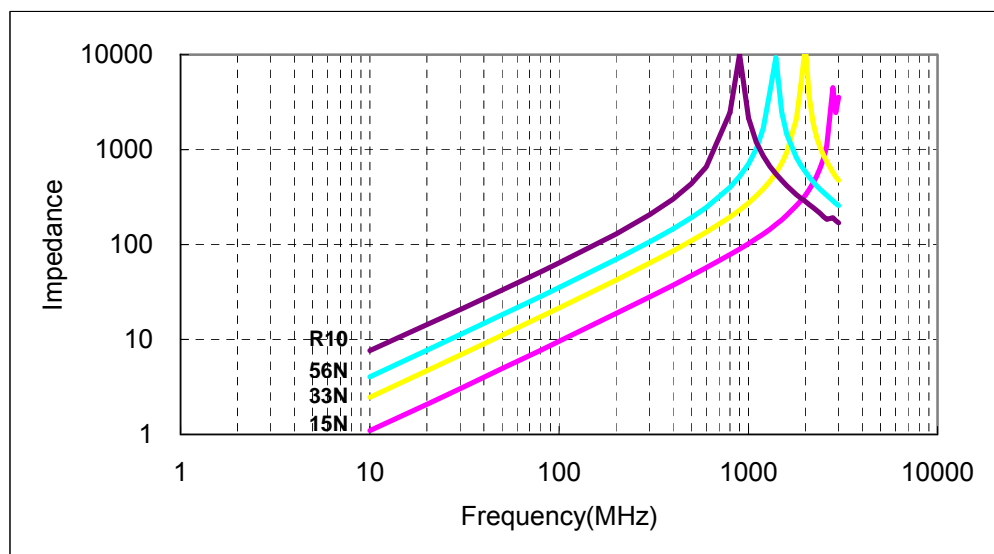
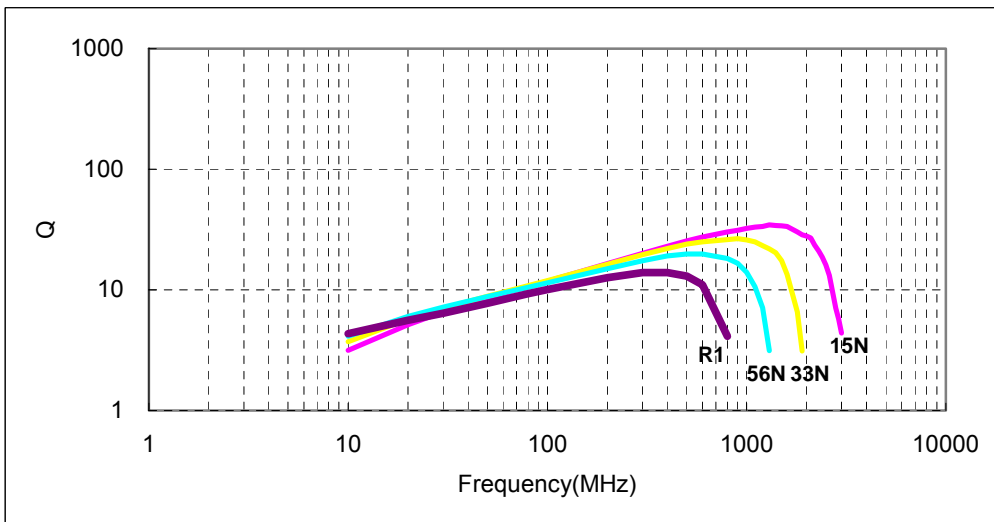
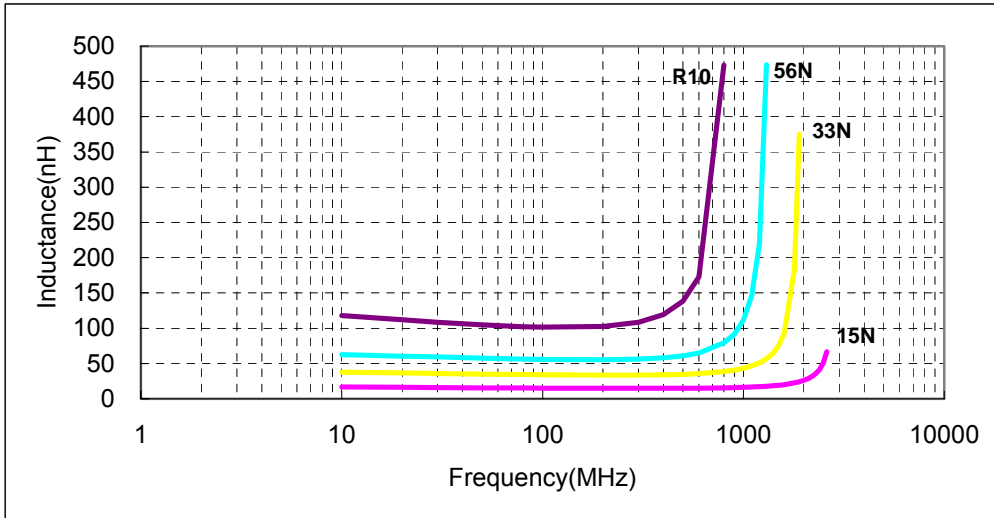
\*\* □= Tolerance: S=+/-0.3nH, J=+/-5%, K=+/-10%  
C=±0.2nH, G=±2%

- MEASURING EQUIPMENT: HP4287+16193A
- MEASURING TEMPERATURE: 25 +/- 3 °C
- OPERATING TEMPERATURE RANGE: -55°C TO +125°C

## 3. TESTING CONDITION AND REQUIREMENTS

Item	Test Condition	Requirements
<b>Inductance</b>	a. Temperature: 25 +/- 3°C b. Relative Humidity: 45 to 75%RH c. Measuring equipment and fixture: 1005(0402) HP 4287+16193A	Within specified tolerance.
<b>Q Value</b>	a. Temperature: 25 +/- 3°C b. Relative Humidity: 45 to 75%RH c. Measuring equipment and fixture: 1005(0402) HP 4287+16193A	In accordance with electrical specification.
<b>DC Resistance</b>	a. Temperature: 25 +/- 3°C b. Relative Humidity: 45 to 75%RH c. Measuring equipment: HP 4338	In accordance with electrical specification.

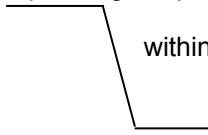
4. ELECTRICAL CHARACTERISTICS



## TEST CONDITIONS AND REQUIREMENTS

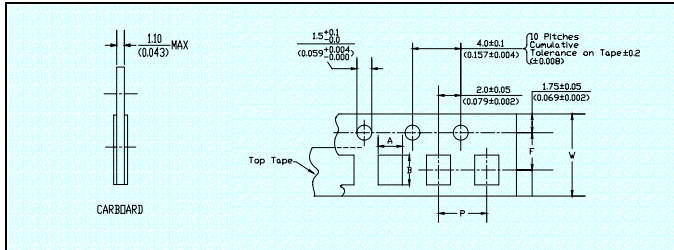
Item	Test Condition	Requirements
Appearance	Inductors shall be visually inspected for visible evidence of defect.	In accordance with specification.
Dimension	Dimension shall be measured with caliper or micrometer	In accordance with dimension specification.
Solder-ability	Immerse a test sample into a methanol solution containing rosin and immerse into molten solder of $230\pm 5^{\circ}\text{C}$ for $5\pm 1$ seconds.	More than 75% of the terminal electrode part shall be covered with fresh solder.
Bending Strength	<p>Solder the chip to test jig then apply a force in the direction shown in below. The soldering shall be done with the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock.</p> <p style="text-align: center;"><b>Mounting Samples</b></p>	<ol style="list-style-type: none"> <li>1. No mechanical damage shall be observed.</li> <li>2. Rdc-value: to meet the initial Spec.</li> </ol>
Resistance to Soldering Heat	Immerse a test sample into a methanol solution containing resin, preheat it at $120$ to $150^{\circ}\text{C}$ for 1 minutes and immerse into molten solder of $270\pm 5^{\circ}\text{C}$ for $10\pm 1$ second so that both terminal electrodes are completely submerged.	No visible damage Inductance variation within 10% Q variation within 20%

## ■ Reliability

Item	Test Condition	Requirements
Thermal Shock	<p>Solder a test sample to printed circuit board, and conduct 5 cycles of test under the conditions shown as below.</p> <p>0603 &amp; 1005 operating temp. range: -55~125°C 1608 operating temp. range: -40~85°C</p> <p>Cycle: Maximum operating temp. <math>\pm(30\pm 3\text{min})</math></p>  <p>Minimum operating temp. <math>(30\pm 3\text{min})</math></p>	<p>No visible damage Inductance variation within 10% Q variation within 20%</p>
High Humidity State Life Test	<p>Keep a test sample in an atmosphere with a temperature of <math>40\pm 2^\circ\text{C}</math>, 90~95%RH for 500±12 hours. After the removal from test chamber, 2 to 3 hours of recovery under standard condition, and measurement shall be made after 24±2 hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 10%. Q variation within 20%.</p>
High Humidity Load Life Test	<p>Solder a test sample to printed circuit board then keep the test sample in an atmosphere with a temperature of <math>40\pm 2^\circ\text{C}</math>, 90~95%RH for 500±12 hours while supplying the rated current. After the removal from test chamber, 2 to 3 hours of recovery under standard condition, and measurement shall be made after 24±2 hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 10%. Q variation within 20%.</p>
High Temperature State Life Test	<p>Keep a test sample in an atmosphere with a temperature of <math>85\pm 2^\circ\text{C}</math> for 500±12 hours. After the removal from test chamber, 2 to 3 hours of recovery under standard condition, and measurement shall be made after 24±2 hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 10%. Q variation within 20%.</p>
High Temperature Load	<p>Solder a test sample to printed circuit board then keep the test sample in an atmosphere with a temperature of <math>85\pm 2^\circ\text{C}</math> for 500±12 hours while supplying the rated current. After the removal from test chamber, 2 to 3 hours of recovery under standard condition, and measurement shall be made after 24±2 hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 10%. Q variation within 20%.</p>

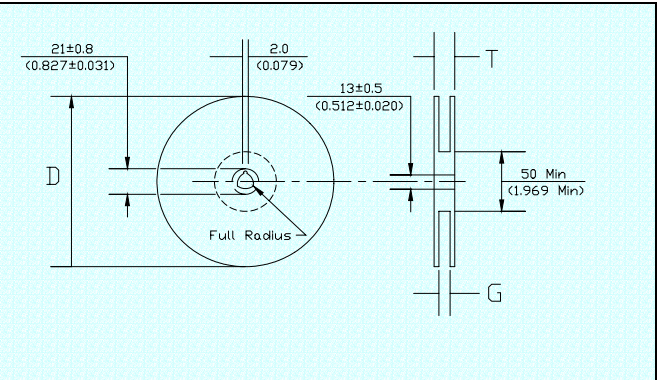
# PACKAGING

## Paper tape specifications(1005)



SYMBOL	1005	
	Size (mm)	Tolerance (mm)
A	0.62	+/-0.04
B	1.12	+/-0.04
F	3.50	+/-0.05
P	2.00	+/-0.10
W	8.00	+/-0.20

## Reel specifications

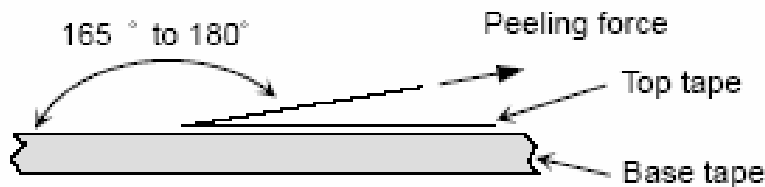


Tape Width (mm)	G (mm)	T MAX(mm)	D (mm)
8	10.0+/-1.5	14.5	180

## Peel strength of top cover tape

The peel speed shall be about 300 mm/min.

The peel strength of top cover tape shall be between 0.1 to 1.0N.



## Quantity per reel

1005 (0402): 10,000 pieces / reel

## The contents of a box

1005 (0402): 5 reels / box

## Marking

The following item shall be marked on the reel.

- Manufactures parts number.
- Manufacturing date code.
- Manufacturer name.
- Manufactures lot number.
- Quantity.



## CAUTIONS

### ■ Storage

1. The chip inductor shall be packaged in carrier tapes.
2. To keep storage place temperature from +5 to 35°C, humidity from 45 to 70% RH.
3. The storage atmosphere must be free of gas containing sulfur and chlorine. Also, avoid exposing the product to saline moisture. If the product is exposed to such atmospheres, the terminals will oxidize and solder-ability will be affected.
4. The solder-ability is assured for 12 months from our final inspection date if the above storage condition is followed.

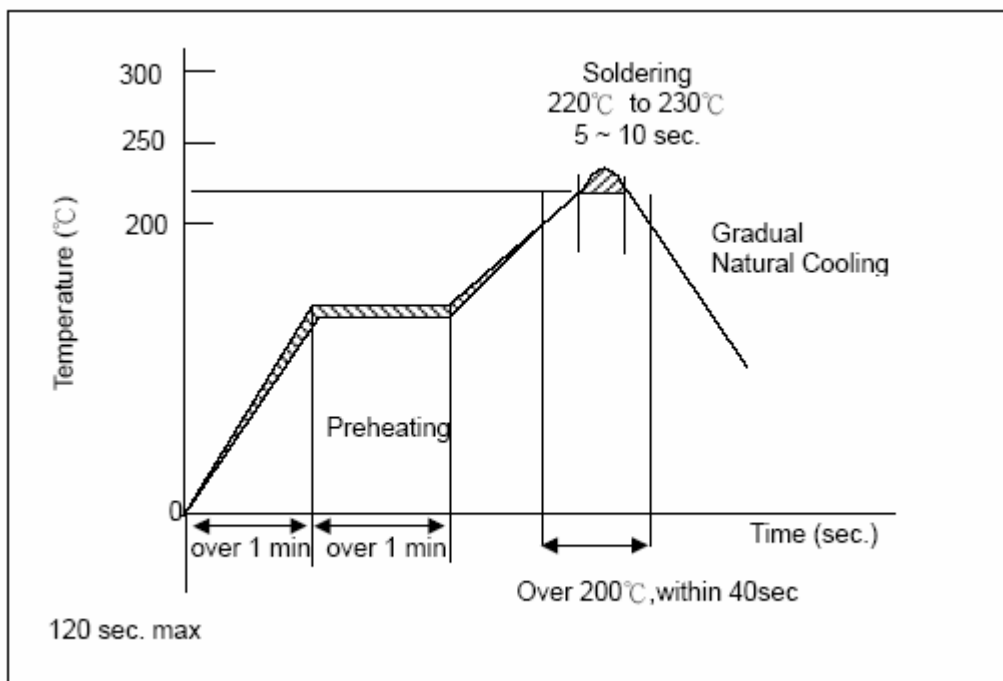
### ■ Handling

Chip inductor should be handled with care to avoid contamination or damage. The use of vacuum pick-up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machine.

### ■ MLCI Soldering Profile

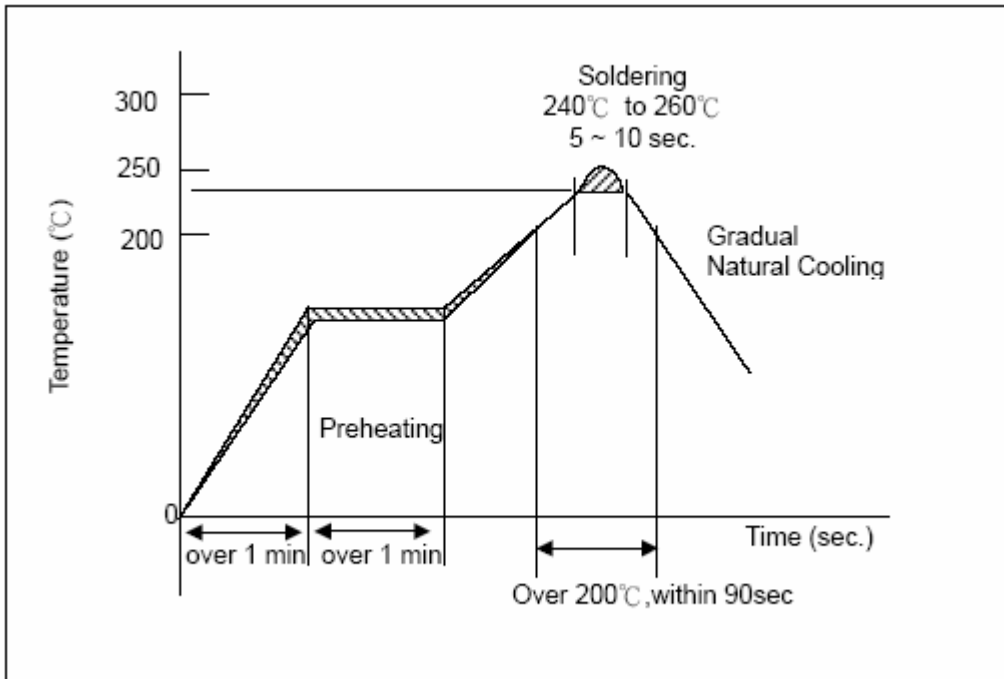
### ■ Soldering Profile for SMT Process with SnPb Solder Paste.

The rate of preheat should not exceed 4°C/sec and a target of 2°C/sec is preferred. Ceramic chip components should be preheated to within 100 to 130 °C of the soldering.

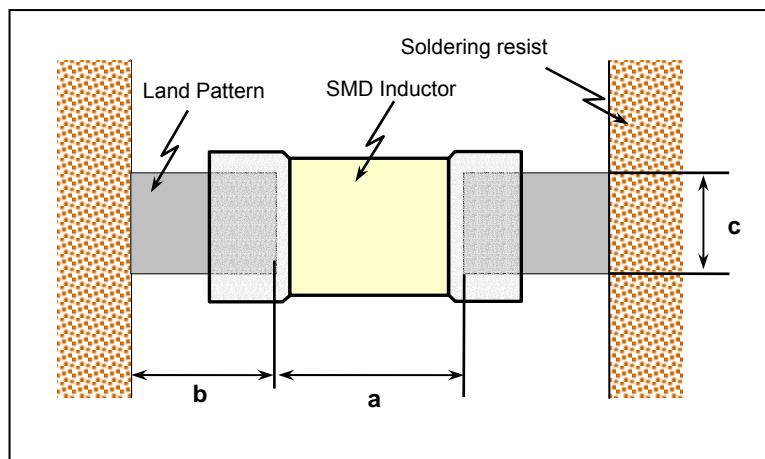


■ Soldering Profile for SMT Process with Lead Free Solder Paste.

The rate of preheat should not exceed 4°C/sec and a target of 2°C/sec is preferred. Ceramic chip components should be preheated to within 100 to 130 °C of the soldering.



■ Recommended pad dimensions



Size mm (EIA)	L x W (mm)	a (mm)	b (mm)	c (mm)
1005 (0402)	1.0*0.5	0.3 to 0.5	0.35 to 0.45	0.4 to 0.5