

# MULTI-LAYER CERAMIC CHIP INDUCTORS SFI SERIES

## Introductions

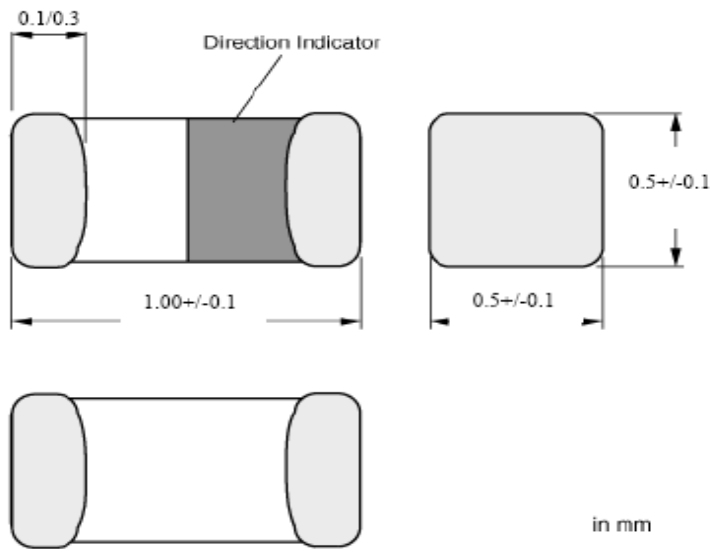
The SFI series is multi-layer ceramic chip inductors widely used in the communication applications such as cellular phones, cable modem, ADSL, repeaters, Bluetooth, and other electronic devices.

## 1 OUTLINE DRAWING AND DIMENSION

Part Number Code

<b>SFI</b>	<b>0402</b>	<b>C</b>	<b>T</b>	<b>10N</b>	<b>J</b>	□□
1	2	3 Taping	4	5	Internal Code	

- 1 Product Type
- 2 Chip Dimension



\*) Take care of direction of marking to prevent inductance unevenness. (There is no polarity, however unevenness of inductance could occur)

3 C: Ceramic

4 Inductance Value

1N0 = 1 nH

10N = 10 nH

R10 = 100 nH

5 Tolerance

S =  $\pm 0.3$  nH

J =  $\pm 5\%$

K =  $\pm 10\%$

ELECTRICAL CHARACTERISTICS AND RELIABILITY SPECIFICATION

Electrical Characteristics

Part No.	Inductance (nH)	Percent Tolerance	Q Min	Q (Typical)			S.R.F. Min (MHz)	RDC Max (Ω)	IDC Max (mA)	
				100	500	800				
				Frequency (MHz)						
SFI 0402 CT 1N0 □-	1.0 @	100 MHz	S	8	11	33	43	10000	0.12	300
SFI 0402 CT 1N1 □-	1.1 @	100 MHz	S	8	11	33	43	10000	0.12	300
SFI 0402 CT 1N2 □-	1.2 @	100 MHz	S	8	11	33	43	10000	0.12	300
SFI 0402 CT 1N3 □-	1.3 @	100 MHz	S	8	11	33	43	10000	0.13	300
SFI 0402 CT 1N5 □-	1.5 @	100 MHz	S	8	11	33	43	6000	0.13	300
SFI 0402 CT 1N6 □-	1.6 @	100 MHz	S	8	11	31	41	6000	0.14	300
SFI 0402 CT 1N8 □-	1.8 @	100 MHz	S	8	11	31	41	6000	0.14	300
SFI 0402 CT 2N0 □-	2.0 @	100 MHz	S	8	11	26	36	6000	0.16	300
SFI 0402 CT 2N2 □-	2.2 @	100 MHz	S	8	11	26	36	6000	0.16	300
SFI 0402 CT 2N4 □-	2.4 @	100 MHz	S	8	11	26	36	6000	0.17	300
SFI 0402 CT 2N7 □-	2.7 @	100 MHz	S	8	12	29	38	6000	0.17	300
SFI 0402 CT 3N0 □-	3.0 @	100 MHz	S	8	11	28	37	6000	0.19	300
SFI 0402 CT 3N3 □-	3.3 @	100 MHz	S,K	8	11	28	37	6000	0.19	300
SFI 0402 CT 3N6 □-	3.6 @	100 MHz	S,K	8	11	26	32	5000	0.22	300
SFI 0402 CT 3N9 □-	3.9 @	100 MHz	S,K	8	11	26	32	4000	0.22	300
SFI 0402 CT 4N3 □-	4.3 @	100 MHz	S,K	8	11	26	32	4000	0.24	300
SFI 0402 CT 4N7 □-	4.7 @	100 MHz	S,K	8	12	28	37	4000	0.24	300
SFI 0402 CT 5N1 □-	5.1 @	100 MHz	S,K	8	11	26	35	4000	0.27	300
SFI 0402 CT 5N6 □-	5.6 @	100 MHz	S,K	8	11	26	35	4000	0.27	300
SFI 0402 CT 6N2 □-	6.2 @	100 MHz	J,K	8	11	26	34	3900	0.32	300
SFI 0402 CT 6N8 □-	6.8 @	100 MHz	J,K	8	11	26	34	3900	0.32	300
SFI 0402 CT 7N5 □-	7.5 @	100 MHz	J,K	8	11	26	34	3700	0.35	300
SFI 0402 CT 8N2 □-	8.2 @	100 MHz	J,K	8	11	26	34	3500	0.37	300
SFI 0402 CT 9N1 □-	9.1 @	100 MHz	J,K	8	11	25	31	3400	0.40	300
SFI 0402 CT 10N □-	10 @	100 MHz	J,K	8	11	25	31	3200	0.42	300
SFI 0402 CT 12N □-	12 @	100 MHz	J,K	8	11	25	31	2600	0.50	300
SFI 0402 CT 15N □-	15 @	100 MHz	J,K	8	11	24	30	2300	0.55	300
SFI 0402 CT 18N □-	18 @	100 MHz	J,K	8	11	24	30	2000	0.65	300
SFI 0402 CT 22N □-	22 @	100 MHz	J,K	8	12	24	30	1600	0.80	300
SFI 0402 CT 27N □-	27 @	100 MHz	J,K	8	11	24	28	1400	0.90	300
SFI 0402 CT 33N □-	33 @	100 MHz	J,K	8	12	23	26	1200	1.00	200
SFI 0402 CT 39N □-	39 @	100 MHz	J,K	8	11	21	24	1100	1.20	200
SFI 0402 CT 47N □-	47 @	100 MHz	J,K	8	11	21	23	900	1.30	200
SFI 0402 CT 56N □-	56 @	100 MHz	J,K	8	12	21	21	750	1.40	200
SFI 0402 CT 68N □-	68 @	100 MHz	J,K	8	11	19	19	750	1.40	180
SFI 0402 CT 82N □-	82 @	100 MHz	J,K	8	10	19	16	600	1.60	150
SFI 0402 CT R10 □-	100 @	100 MHz	J,K	8	10	18	-	600	1.60	100
SFI 0402 CT R12 □-	120 @	100 MHz	J,K	8	11	15	-	600	1.60	100

1. When ordering, please specify tolerance

SFI0402CTR12J

Tolerance :S=±0.30nH, J=±5%, K=±10%

2. Measurement Equipment : HP-4287A + 16193A

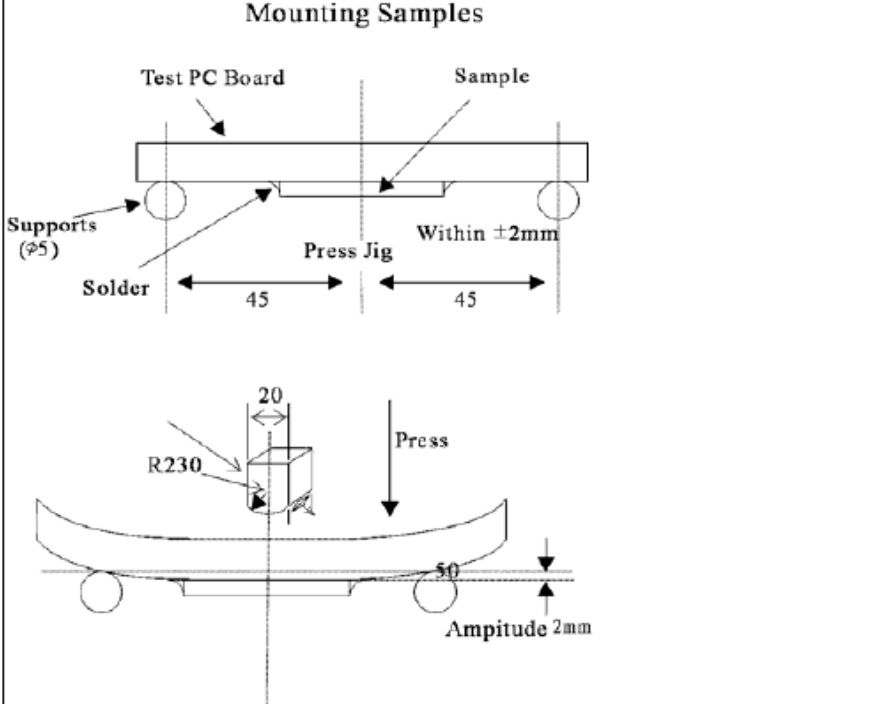
3. Measuring Temperature: 25 ± 3°C

4. Operating Temperature Range: -55~+125°C

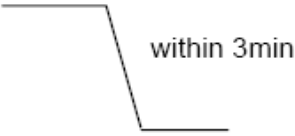
### 3. MEASUREMENT METHOD

<b>Item</b>	<b>Test Condition</b>	<b>Requirements</b>
<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. RELIABILITY TEST

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%

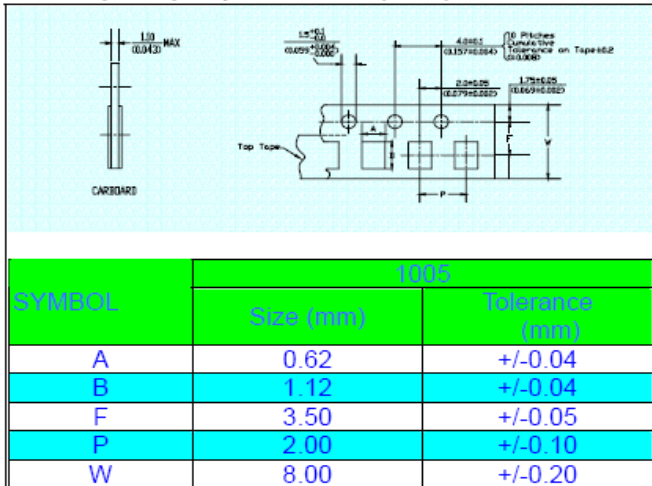
#### 4. RELIABILITY TEST

Item	Test Condition	Requirements
<p><b>Thermal Shock</b></p>	<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>\pm(30\pm 3\text{min})</math></p>	<p>No visible damage Inductance variation within 10% Q variation within 20%</p>
<p><b>High Humidity State Life Test</b></p>	<p>Keep a test sample in an atmosphere with a temperature of <math>40\pm 2^\circ\text{C}</math>, 90~95%RH for <math>500\pm 12</math> hours. After the removal from test chamber, 2 to 3 hours of recovery under standard condition, and measurement shall be made after <math>24\pm 2</math> hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 10%. Q variation within 20%.</p>
<p><b>High Humidity Load Life Test</b></p>	<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 <math>500\pm 12</math> 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 <math>24\pm 2</math> hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 10%. Q variation within 20%.</p>
<p><b>High Temperature State Life Test</b></p>	<p>Keep a test sample in an atmosphere with a temperature of <math>85\pm 2^\circ\text{C}</math> for <math>500\pm 12</math> hours. After the removal from test chamber, 2 to 3 hours of recovery under standard condition, and measurement shall be made after <math>24\pm 2</math> hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 10%. Q variation within 20%.</p>
<p><b>High Temperature Load</b></p>	<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 <math>500\pm 12</math> 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 <math>24\pm 2</math> hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 10%. Q variation within 20%.</p>

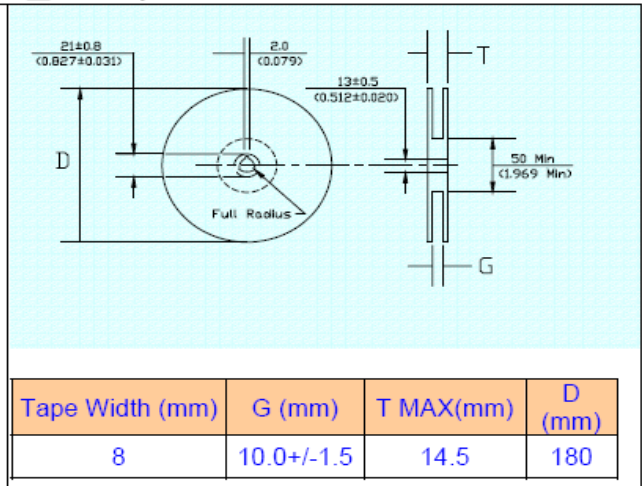
## 5. PACKAGING

# PACKAGING

### Paper tape specifications(1005)



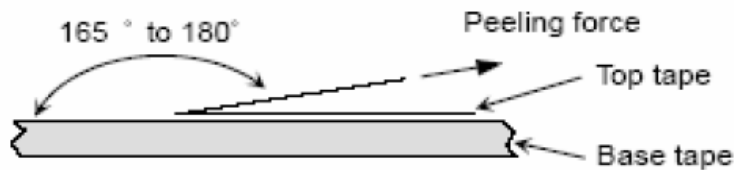
### Reel specifications



### 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.

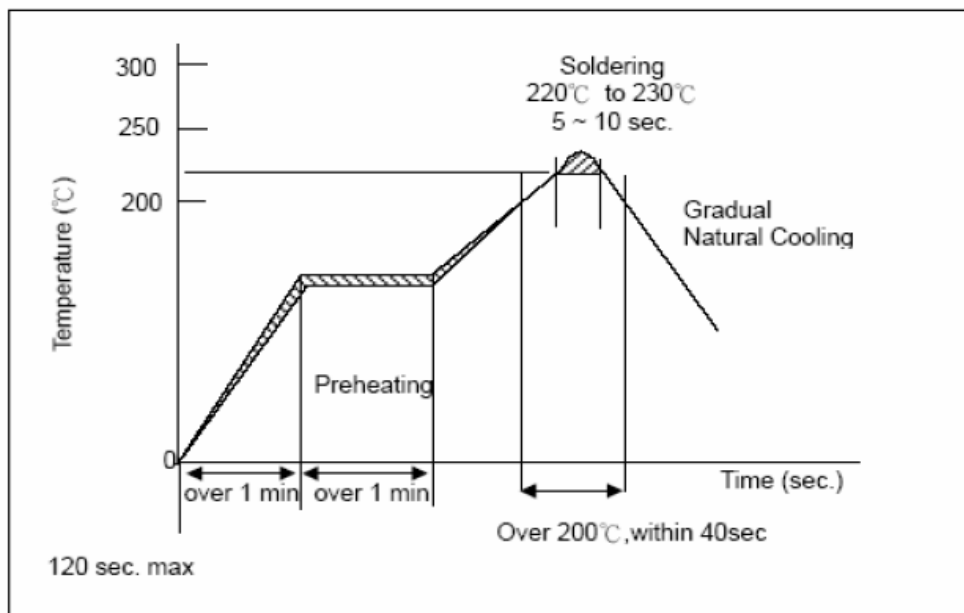
## ■ Handling

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

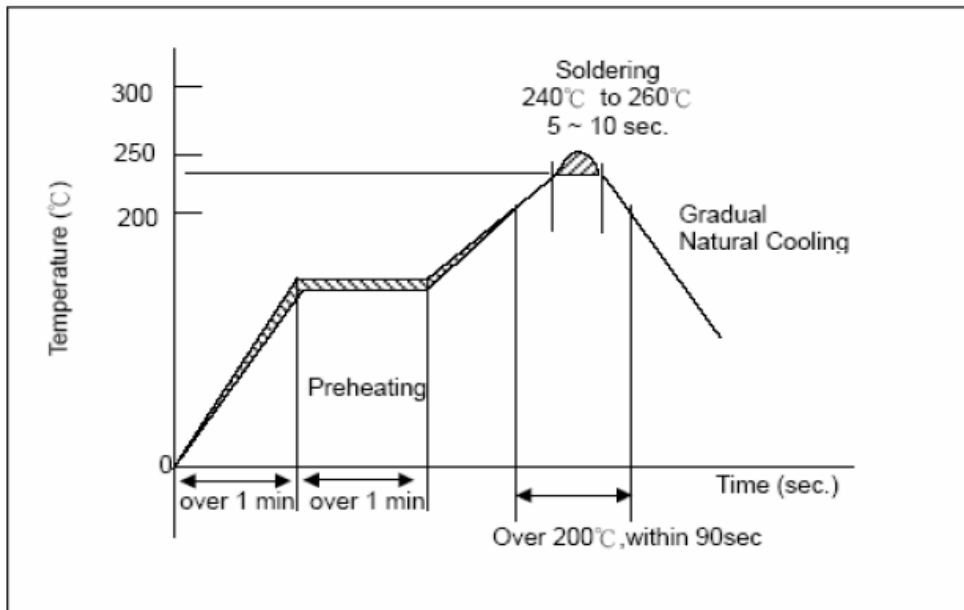
### ■ Soldering Profile for SMT Process with SnPb Solder Paste.

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.

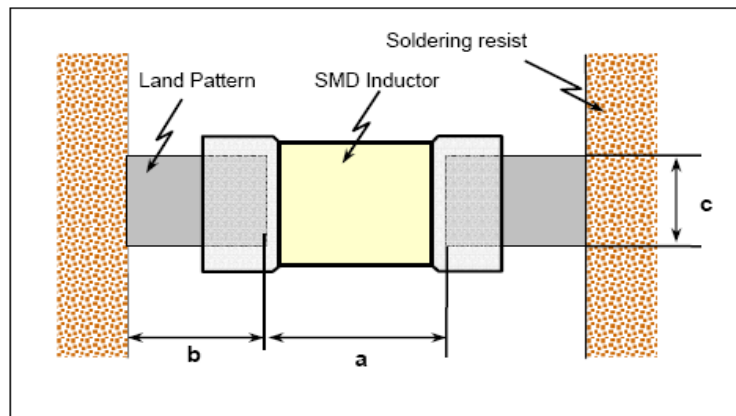


■ Soldering Profile for SMT Process with Lead Free Solder Paste.

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

# Electrical Characteristics

