

# I . SCOPE :

This specification applies to the Pb Free high current type SMD Coupled inductors for  
MSI-101004PF-SERIES-□

**Warn : It is here not to use synchronous rectification curcuit !**

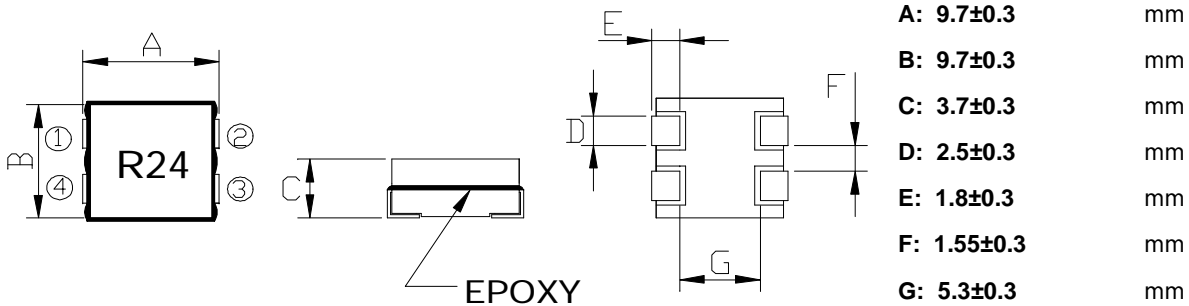
## PRODUCT IDENTIFICATION

**MSI - 101004PF - R20 M -E**

①      ②      ③ ④ ⑤

- ① Product Code
- ② Dimensions Code
- ③ Inductance Code
- ④ Tolerance Code
- ⑤ Inner Control Code

## (1) SHAPES AND DIMENSIONS



## (2) ELECTRICAL SPECIFICATIONS

**SEE TABLE 1**

### TEST INSTRUMENTS

- L : HP 4284A PRECISION LCR METER (or equivalent)
- RDC : CHROMA MODEL 16502 MILLIOHMETER (or equivalent)

## (3) CHARACTERISTICS

- (3)-1 Ambient temperature ..... +60°C Max.
- (3)-2 Operate temperature range ..... -40°C ~ +125°C  
(Including self temp. rise)
- (3)-3 Storage temperature range ..... -40°C ~ +125°C



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## TABLE

MAGLAYERS	Inductance ( $\mu\text{H}$ ) L(1-2),L(4-3)	Coupling Inductance 2Lk (nH) (1-4@2-3 short)	Resistance RDC(m $\Omega$ ) (1-2,4-3)	Rated DC Current (Max.)			Marking
				IDC1(A) (1-2,4-3)	IDC2(A) (1-4)@2-3 short	IDC3(A) (1-4)@2-3 short	
MSI-101004PF-R20M-E	0.20 $\pm$ 20%	100 $\pm$ 20%	0.252 $\pm$ 8%	20	55	33	R20
MSI-101004PF-R24M-E	0.24 $\pm$ 20%	100 $\pm$ 20%	0.252 $\pm$ 8%	20	55	33	R24

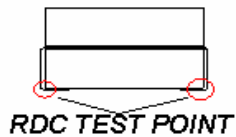
Test Frequency : 100KHz/0.1V

※ IDC1 : Based on inductance change ( $\Delta\text{L}/\text{Lo}$  : drop 20% Typ.) @ ambient temp. 25 $^{\circ}\text{C}$

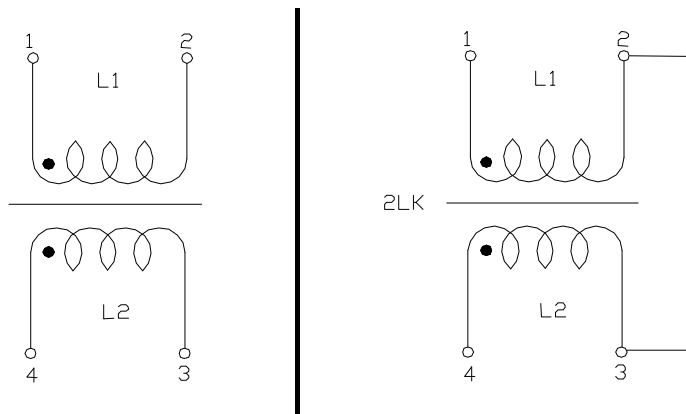
IDC2 : Based on inductance change ( $\Delta\text{L}/\text{Lo}$  : drop 20% Typ.) @ ambient temp. 25 $^{\circ}\text{C}$

IDC3 : Based on temperature rise ( $\Delta\text{T}$  : 40 $^{\circ}\text{C}$  TYP.)

## RDC TEST POINT



## SCHEMATIC

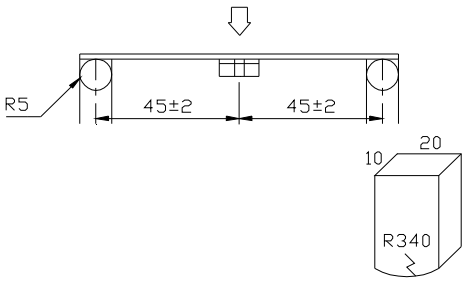


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#### (4) RELIABILITY TEST METHOD MECHANICAL

TEST ITEM	SPECIFICATION	TEST DETAILS
Substrate bending	$\Delta L/L_0 \leq \pm 5\%$  There shall be no mechanical damage or electrical damage.	<p>The sample shall be soldered onto the printed circuit board in figure 1 and a load applied until the figure in the arrow direction is made approximately 3mm.(keep time 30 seconds) PCB dimension shall the page 7/9</p> <p>F(Pressurization)</p>  <p>PRESSURE ROD figure-1</p>
Vibration	$\Delta L/L_0 \leq \pm 5\%$  There shall be no mechanical damage.	<p>The sample shall be soldered onto the printed circuit board and when a vibration having an amplitude of 1.52mm and a frequency of from 10 to 55Hz/1 minute repeated should be applied to the 3 directions (X,Y,Z) for 2 hours each. (A total of 6 hours)</p>
Solderability	New solder More than 90%	<p>Flux (rosin, isopropyl alcohol{JIS-K-1522}) shall be coated over the whole of the sample before hard, the sample shall then be preheated for about 2 minutes in a temperature of 130~150°C and after it has been immersed to a depth 0.5mm below for 3±0.2 seconds fully in molten solder M705 with a temperature of 245±5°C.</p> <p>More than 90% of the electrode sections shall be covered with new solder smoothly when the sample is taken out of the solder bath.</p>

## MECHANICAL

TEST ITEM	SPECIFICATION	
Resistance to Soldering heat (reflow soldering)	There shall be no damage or problems.	<p style="text-align: center;"><b>Temperature profile of reflow soldering</b></p> <p>The specimen shall be passed through the reflow oven with the condition shown in the above profile for 1 time.</p> <p>The specimen shall be stored at standard atmospheric conditions for 1 hour, after which the measurement shall be made.</p>

## ELECTRICAL

TEST ITEM	SPECIFICATION	TEST DETAILS
Temperature characteristics	$\Delta L/L20^{\circ}\text{C} \leq \pm 10\%$ $0 \sim 2000 \text{ ppm}/^{\circ}\text{C}$	The test shall be performed after the sample has stabilized in an ambient temperature of $-20$ to $+85^{\circ}\text{C}$ , and the value calculated based on the value applicable in a normal temperature and normal humidity shall be $\Delta L/L20^{\circ}\text{C} \leq \pm 10\%$ .



## ENVIROMENT CHARACTERISTICS

TEST ITEM	SPECIFICATION																
High temperature storage	$\Delta L/Lo \leq \pm 5\%$  There shall be no mechanical damage.	The sample shall be left for $96 \pm 4$ hours in an atmosphere with a temperature of $125^\circ\text{C}$ and a normal humidity.  Upon completion of the measurement shall be made after the sample has been left in a normal temperature and normal humidity for 1 hour.															
Low temperature storage	$\Delta L/Lo \leq \pm 5\%$  There shall be no mechanical damage.	The sample shall be left for $96 \pm 4$ hours in an atmosphere with a temperature of $-25 \pm 3^\circ\text{C}$ .  Upon completion of the test, the measurement shall be made after the sample has been left in a normal temperature and normal humidity for 1 hour.															
Change of temperature	$\Delta L/Lo \leq \pm 5\%$  There shall be no other damage of problems	The sample shall be subject to 5 continuous cycles, such as shown in the table 2 below and then it shall be subjected to standard atmospheric conditions for 1 hour, after which measurement shall be made.  <div style="text-align: center;">                         table 2  <table border="1" style="margin: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">Temperature</th> <th style="text-align: center;">Duration</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;"><math>-25 \pm 3^\circ\text{C}</math> (Thermostat No.1)</td> <td style="text-align: center;">30 min.</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Standard atmospheric</td> <td style="text-align: center;">No.1→No.2</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;"><math>85 \pm 2^\circ\text{C}</math> (Thermostat No.2)</td> <td style="text-align: center;">30 min.</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Standard atmospheric</td> <td style="text-align: center;">No.2→No.1</td> </tr> </tbody> </table> </div>		Temperature	Duration	1	$-25 \pm 3^\circ\text{C}$ (Thermostat No.1)	30 min.	2	Standard atmospheric	No.1→No.2	3	$85 \pm 2^\circ\text{C}$ (Thermostat No.2)	30 min.	4	Standard atmospheric	No.2→No.1
	Temperature	Duration															
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2	Standard atmospheric	No.1→No.2															
3	$85 \pm 2^\circ\text{C}$ (Thermostat No.2)	30 min.															
4	Standard atmospheric	No.2→No.1															
Moisture storage	$\Delta L/Lo \leq \pm 5\%$  There shall be no mechanical damage.	The sample shall be left for $96 \pm 4$ hours in a temperature of $40 \pm 2^\circ\text{C}$ and a humidity(RH) of 90~95%.  Upon completion of the test, the measurement shall be made after the sample has been left in a normal temperature and normal humidity more than 1 hour.															
Test conditions :  The sample shall be reflow soldered onto the printed circuit board in every test.																	



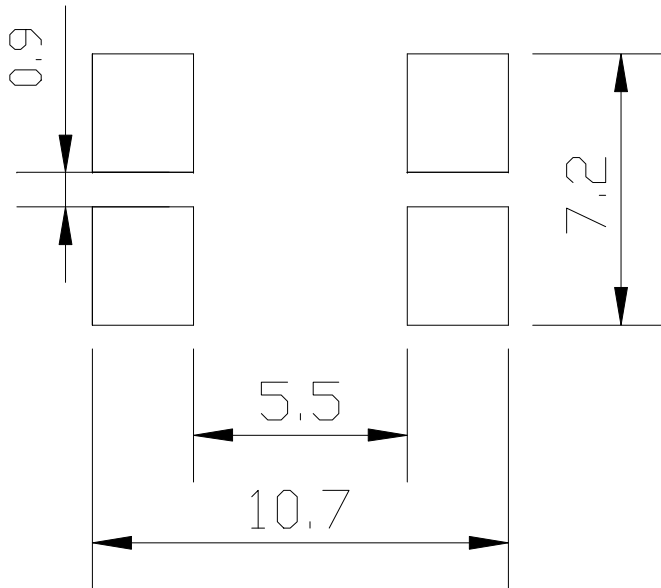
## (5) LAND DIMENSION (Ref.)

PCB: GLASS EPOXY t=1.6mm

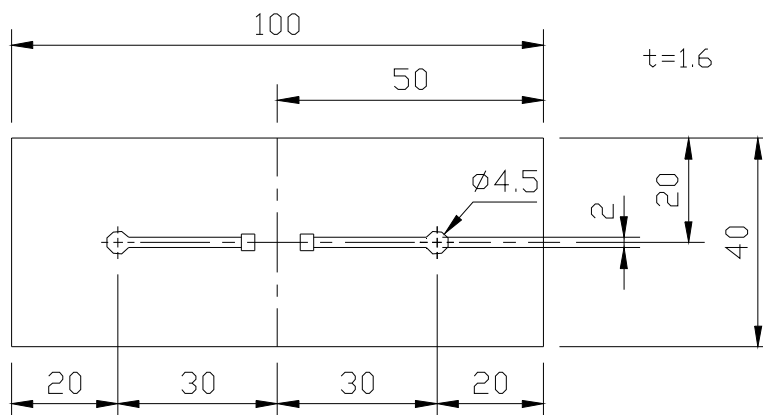
### (5)-1 LAND PATTERN DIMENSIONS(mm)

(STANDARD PATTERN)

Unit:mm

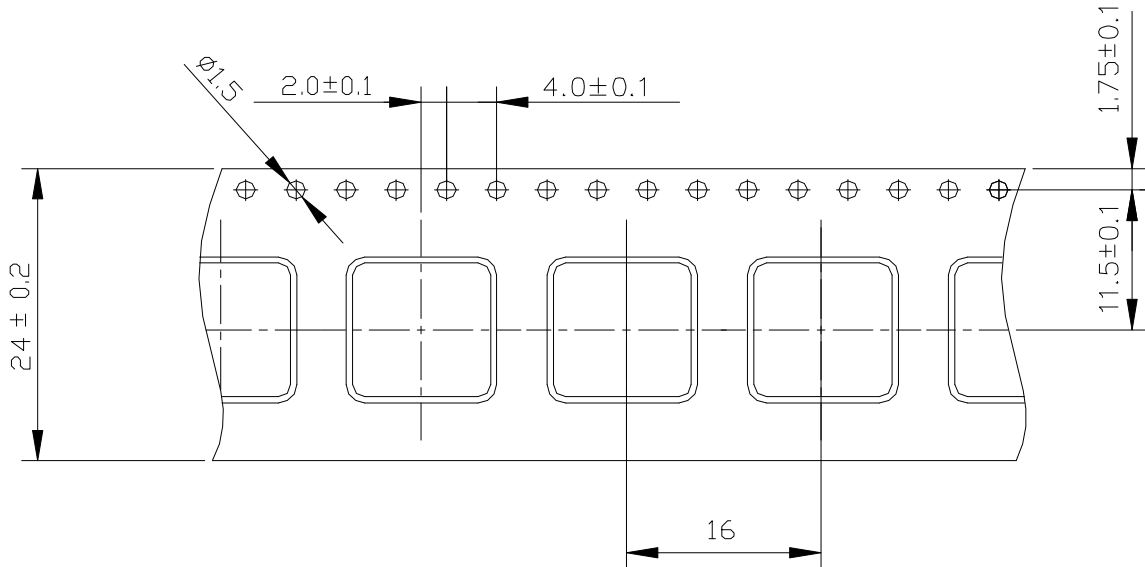


### (5)-2 SUBSTRATE BENDING TEST BENDING TEST BOARD

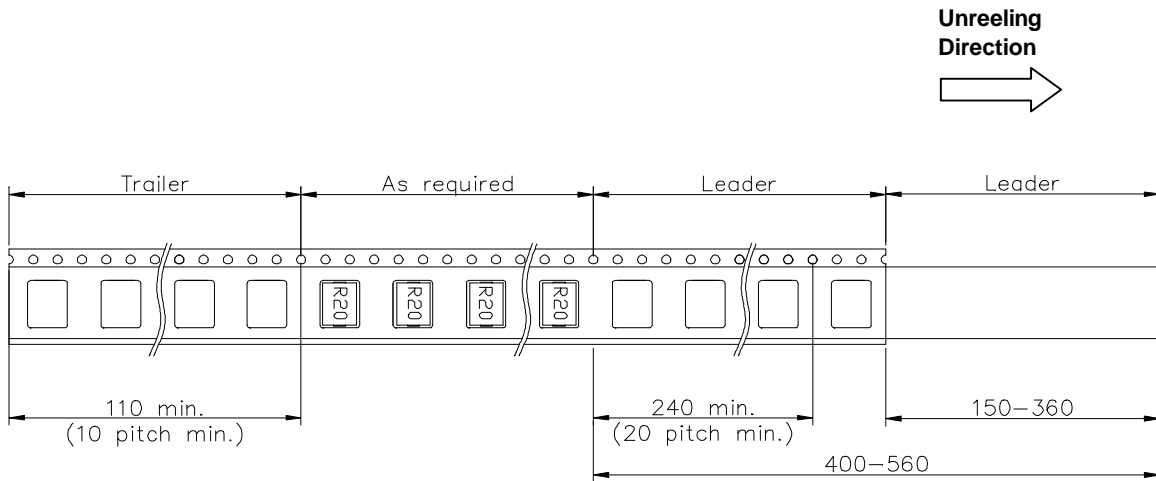


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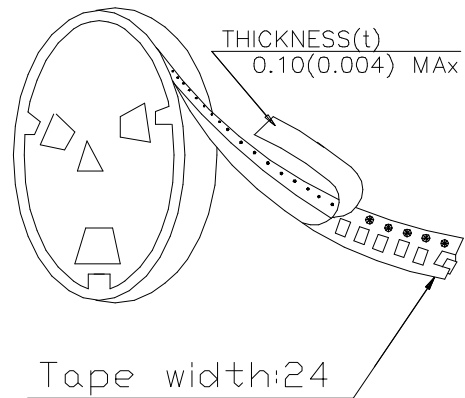
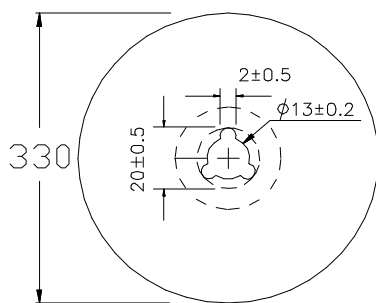
**(6) PACKAGING**  
**(6)-1 CARRIER TAPE DIMENSIONS (mm)**



**(6)-2 TAPING DIMENSIONS (mm)**



### (6)-3 REEL DIMENSIONS (mm)



### (6)-4 QUANTITY

900 pcs/Reel

The products are packaged so that no damage will be sustained.



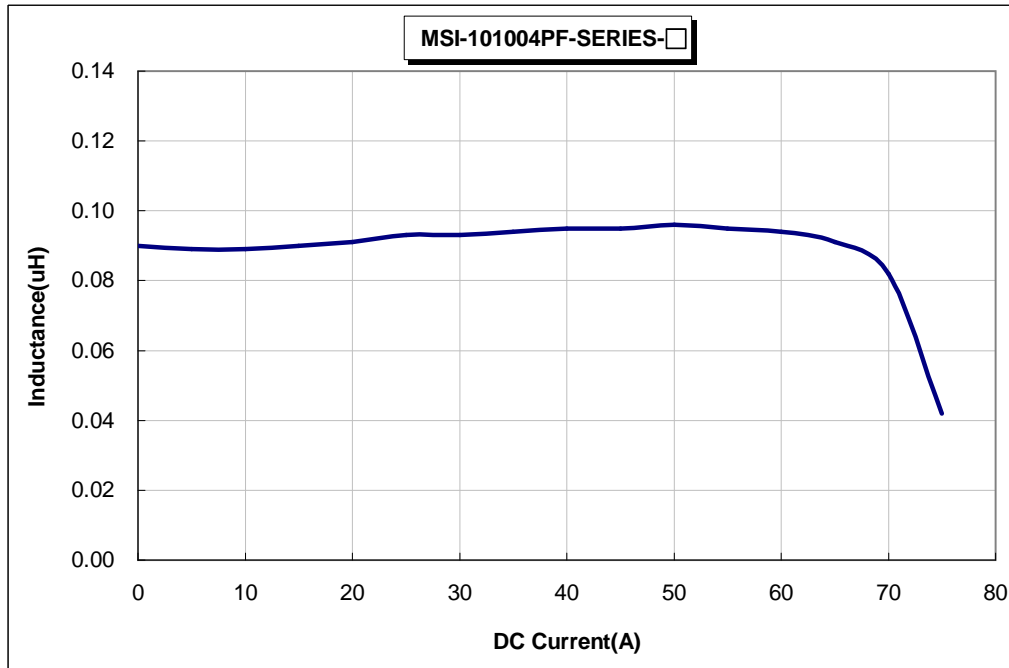
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## TYPICAL ELECTRICAL CHARACTERISTICS

### INDUCTANCE vs. DC CURRENT@100kHz/1.0V 【2LK】

Ambient Temperature : 25°C



### Temperature Rise vs. DC Current 【L1 , L2】

