

# FrelTec GmbH

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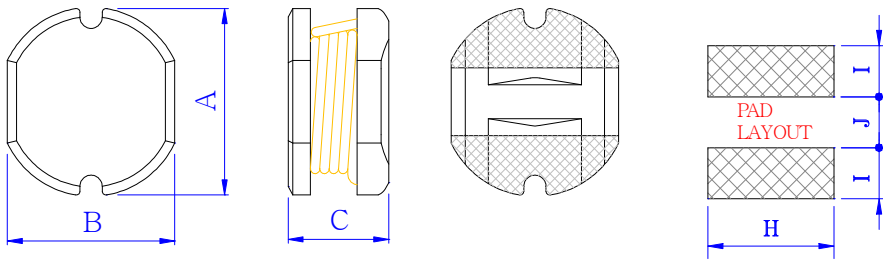
## **SMD Power Inductors**

## SPECIFICATION

## Part Number

162	0302*	1U5*	M	L02**
Type	Size	Value	Tolerance	Packing
162 : SMD Power Inductor	0302	The value is given in $\mu\text{H}$ and "u" indicates the decimal point. When higher than $100\mu\text{H}$ then the last digit is the multiplier	M: $\pm 20\%$	L02 : Embossed tape and reel for 2k pcs (13"reel)
	0403	which denotes the number of zero following	K: $\pm 10\%$	L0X : Embossed tape and reel for 1,5k pcs (13"reel)
	0504	Example:		L01 : Embossed tape and reel for 1k pcs (13"reel)
	0703	3U3 : $3,3 \mu\text{H}$		L0A : Embossed tape and reel for 500pcs (13"reel)
	0705	220 : $22 \mu\text{H}$		
	1005	151 : $150 \mu\text{H}$		
				* not all combination is possible

Dimensions and land pattern:



TYPE	A (mm)	B (mm)	C (mm)	H (Ref.)	I (Ref.)	J (Ref.)	Quantity per reel	Reel size
1620302	3,5 ± 0,3	3,0 ± 0,3	2,1 ± 0,3	3,5	1,5	1,0	2.000	13"
1620403	4,5 ± 0,3	4,0 ± 0,3	3,2 ± 0,3	4,5	1,8	1,5	1.500	13"
1620504	5,8 ± 0,3	5,2 ± 0,3	4,5 ± 0,4	5,5	2,2	1,7	1.000	13"
1620703	7,8 ± 0,3	7,0 ± 0,3	3,5 ± 0,5	7,5	3,0	2,0	1.000	13"
1620705	7,8 ± 0,3	7,0 ± 0,3	5,0 ± 0,5	7,5	3,0	2,0	1.000	13"
1621005	10,0 ± 0,4	9,0 ± 0,4	5,4 ± 0,4	9,5	3,8	2,5	500	13"

## Electrical Characteristics

1620302 Series Specification				
Part Number	Inductance (H)	Test Freq. (Hz)	DCR ( $\Omega$ ) Max.	Saturation Current (A) Max.
16203021U5	1,5 u	100 K	0,06	2,00
16203022U2	2,2 u	100 K	0,09	1,60
16203023U3	3,3 u	100 K	0,10	1,50
16203024U7	4,7 u	100 K	0,20	1,40
16203026U8	6,8 u	100 K	0,30	1,00
16203028U2	8,2 u	100 K	0,32	1,00
1620302100	10 u	100 K	0,35	1,00
1620302120	12 u	100 K	0,40	0,90
1620302150	15 u	100 K	0,60	0,60
1620302180	18 u	100 K	0,70	0,60
1620302220	22 u	100 K	1,00	0,50
1620302270	27 u	100 K	1,10	0,45
1620302330	33 u	100 K	1,30	0,40
1620302390	39 u	100 K	1,50	0,35
1620302470	47 u	100 K	2,00	0,35
1620302680	68 u	100 K	2,20	0,30
1620302820	82 u	100 K	2,80	0,25
1620302101	100 u	100 K	3,20	0,20
1620302121	120 u	100 K	4,00	0,18
1620302151	150 u	100 K	4,30	0,15
1620302301	300 u	100 K	7,00	0,10
1620302331	330 u	100 K	7,00	0,10

The operating temperature range is -40°C to +125°C  
 Isat: For Inductance drop 10% from its value without current.

1620403 Series Specification				
Part Number	Inductance (H)	Test Freq. (Hz)	DCR ( $\Omega$ ) Max.	Saturation Current (A) Max.
16204031U0	1,0 u	100 K	49 m	2,56
16204031U4	1,4 u	100 K	57 m	2,52
16204031U8	1,8 u	100 K	64 m	1,95
16204032U2	2,2 u	100 K	72 m	1,75
16204032U7	2,7 u	100 K	79 m	1,58
16204033U3	3,3 u	100 K	87 m	1,44
16204033U9	3,9 u	100 K	94 m	1,33
16204034U7	4,7 u	100 K	109 m	1,15
16204035U6	5,6 u	100 K	126 m	0,99
16204036U8	6,8 u	100 K	132 m	0,95
16204038U2	8,2 u	100 K	147 m	0,84
1620403100	10 u	100 K	182 m	1,04
1620403120	12 u	100 K	210 m	0,97
1620403150	15 u	100 K	235 m	0,85
1620403180	18 u	100 K	338 m	0,74
1620403220	22 u	100 K	378 m	0,68
1620403270	27 u	100 K	522 m	0,62
1620403330	33 u	100 K	540 m	0,56
1620403390	39 u	100 K	587 m	0,52
1620403470	47 u	100 K	844 m	0,44
1620403560	56 u	100 K	937 m	0,42
1620403680	68 u	100 K	1117 m	0,37

The operating temperature range is -40°C to +125°C  
 Isat: For Inductance drop 10% from its value without current.

1620504 Series Specification				
Part Number	Inductance (H)	Test Freq. (Hz)	DCR ( $\Omega$ ) Max.	Saturation Current (A) Max.
1620504100	10 u	100 K	0,10	1,44
1620504120	12 u	100 K	0,12	1,40
1620504150	15 u	100 K	0,14	1,30
1620504180	18 u	100 K	0,15	1,23
1620504220	22 u	100 K	0,18	1,11
1620504270	27 u	100 K	0,20	0,97
1620504330	33 u	100 K	0,23	0,88
1620504390	39 u	100 K	0,32	0,80
1620504470	47 u	100 K	0,37	0,72
1620504560	56 u	100 K	0,42	0,68
1620504680	68 u	100 K	0,46	0,61
1620504820	82 u	100 K	0,60	0,58
1620504101	100 u	100 K	0,70	0,52
1620504121	120 u	100 K	0,93	0,48
1620504151	150 u	100 K	1,10	0,40
1620504181	180 u	100 K	1,38	0,38
1620504221	220 u	100 K	1,57	0,35

The operating temperature range is  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$   
 Isat: For Inductance drop 10% from its value without current.

1620703 Series Specification				
Part Number	Inductance (H)	Test Freq. (Hz)	DCR ( $\Omega$ ) Max.	Saturation Current (A) Max.
1620703100	10 u	100 K	0,081	1,44
1620703120	12 u	100 K	0,090	1,39
1620703150	15 u	100 K	0,104	1,24
1620703180	18 u	100 K	0,111	1,12
1620703220	22 u	100 K	0,129	1,07
1620703270	27 u	100 K	0,153	0,94
1620703330	33 u	100 K	0,170	0,85
1620703390	39 u	100 K	0,217	0,74
1620703470	47 u	100 K	0,252	0,68
1620703560	56 u	100 K	0,282	0,64
1620703680	68 u	100 K	0,332	0,59
1620703820	82 u	100 K	0,406	0,54
1620703101	100 u	100 K	0,481	0,51
1620703121	120 u	100 K	0,536	0,49
1620703151	150 u	100 K	0,755	0,40
1620703181	180 u	100 K	1,022	0,36
1620703221	220 u	100 K	1,200	0,31
1620703271	270 u	100 K	1,306	0,29
1620703331	330 u	100 K	1,495	0,28

The operating temperature range is  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$   
 Isat: For Inductance drop 10% from its value without current.

1620705 Series Specification				
Part Number	Inductance (H)	Test Freq. (Hz)	DCR ( $\Omega$ ) Max.	Saturation Current (A) Max.
1620705100	10 u	100 K	0,07	2,30
1620705120	12 u	100 K	0,08	2,00
1620705150	15 u	100 K	0,09	1,80
1620705180	18 u	100 K	0,10	1,60
1620705220	22 u	100 K	0,11	1,50
1620705270	27 u	100 K	0,12	1,30
1620705330	33 u	100 K	0,13	1,20
1620705390	39 u	100 K	0,16	1,10
1620705470	47 u	100 K	0,18	1,10
1620705560	56 u	100 K	0,24	0,94
1620705680	68 u	100 K	0,28	0,85
1620705820	82 u	100 K	0,37	0,78
1620705101	100 u	100 K	0,43	0,72
1620705121	120 u	100 K	0,47	0,66
1620705151	150 u	100 K	0,64	0,58
1620705181	180 u	100 K	0,71	0,51
1620705221	220 u	100 K	0,96	0,49
1620705271	270 u	100 K	1,11	0,42
1620705331	330 u	100 K	1,26	0,40
1620705391	390 u	100 K	1,77	0,36
1620705471	470 u	100 K	1,96	0,34

The operating temperature range is -40°C to +125°C

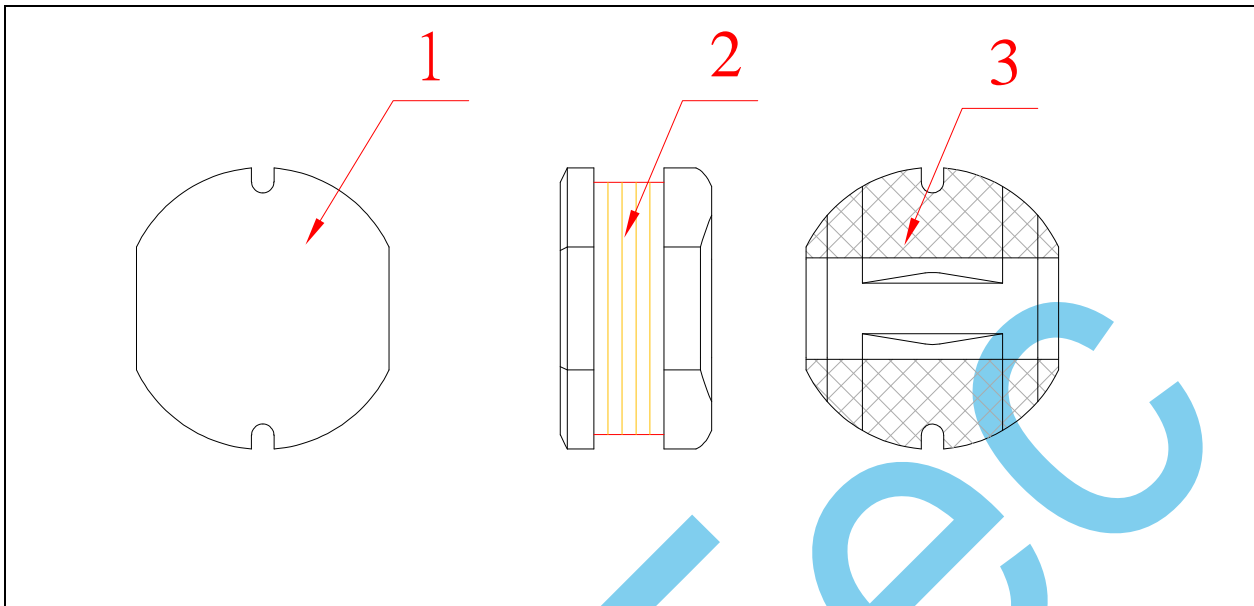
Isat: For Inductance drop 10% from its value without current.

1621005 Series Specification				
Part Number	Inductance (H)	Test Freq. (Hz)	DCR ( $\Omega$ ) Max.	Saturation Current (A) Max.
1621005100	10 u	100 K	0,06	2,60
1621005120	12 u	100 K	0,07	2,45
1621005150	15 u	100 K	0,08	2,27
1621005180	18 u	100 K	0,09	2,15
1621005220	22 u	100 K	0,10	1,95
1621005270	27 u	100 K	0,11	1,76
1621005330	33 u	100 K	0,12	1,50
1621005390	39 u	100 K	0,14	1,37
1621005470	47 u	100 K	0,17	1,28
1621005560	56 u	100 K	0,19	1,17
1621005680	68 u	100 K	0,22	1,11
1621005820	82 u	100 K	0,25	1,00
1621005101	100 u	100 K	0,35	0,97
1621005121	120 u	100 K	0,40	0,89
1621005151	150 u	100 K	0,47	0,78
1621005181	180 u	100 K	0,63	0,72
1621005221	220 u	100 K	0,73	0,66
1621005271	270 u	100 K	0,97	0,57
1621005331	330 u	100 K	1,15	0,52
1621005391	390 u	100 K	1,30	0,48
1621005471	470 u	100 K	1,48	0,42
1621005561	560 u	100 K	1,90	0,33
1621005681	680 u	100 K	2,25	0,28
1621005821	820 u	100 K	2,55	0,24

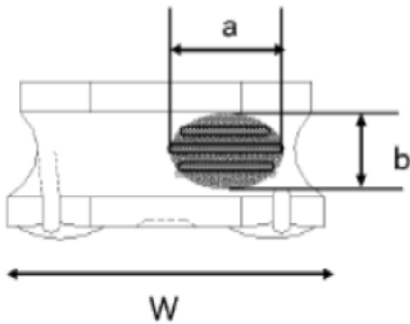
The operating temperature range is -40°C to +105°C

Isat: For Inductance drop 10% from its value without current.

### Material list



NO.	ITEM	MATREIAL
1	Core	Ni-Zn Ferrite
2	Wire	Copper Wire
3	Electrode	Ag-Ni-Sn
	Electrode (top surface solder coating)	Sn-Cu

**Void appearance tolerance limit**

## Void appearance tolerance limit

Size of voids occurring to coating resin is specified below.

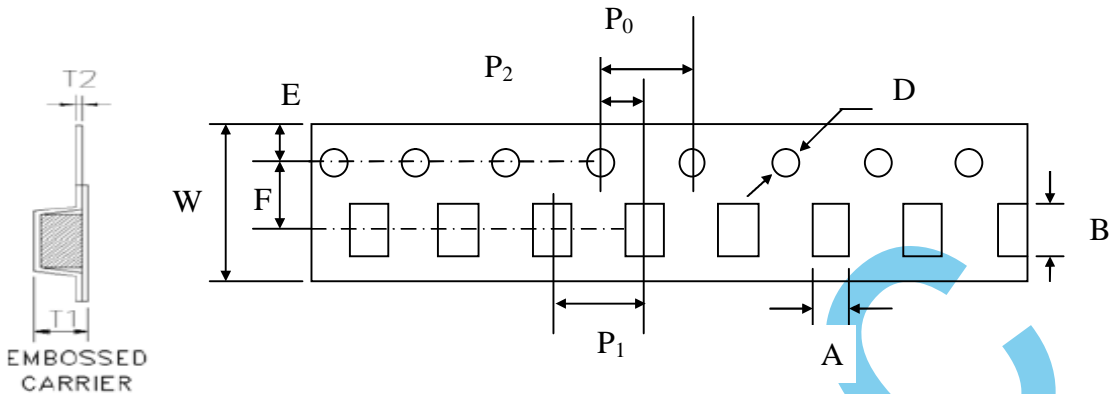
- ①Width direction(dimension a): Acceptable when  $a \leq w/2$   
Nonconforming when  $a > w/2$
- ②Length direction(dimension b): Dimension b is not specified.
- ③When total area of voids (including one exposing coil) occurring to each sides is not greater than 50% of coating resin area, that is acceptable.



## SMD

### SPECIFICATION

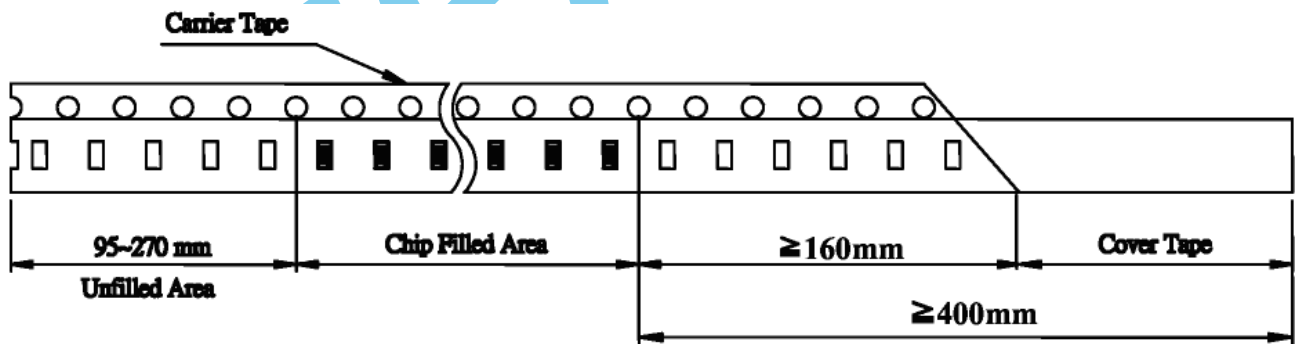
### *Tape And Reel Package*



In Accordance with EIA 481-1

Size	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D	T <sub>1</sub>	T <sub>2</sub>
0302	3,20±0,10	3,60±0,10	12,0±0,3	5,5±0,1	1,75±0,10	8,0±0,1	2,0±0,1	4,0±0,1	1,50+0,1/-0	2,35±0,10	0,30±0,05
0403	4,20±0,10	4,60±0,10	12,0±0,3	5,5±0,1	1,75±0,10	8,0±0,1	2,0±0,1	4,0±0,1	1,50+0,1/-0	3,60±0,10	0,40±0,05
0504	5,50±0,10	6,10±0,10	12,0±0,3	5,5±0,1	1,75±0,10	8,0±0,1	2,0±0,1	4,0±0,1	1,50+0,1/-0	4,80±0,10	0,35±0,05
0703	7,50±0,10	8,30±0,10	16,0±0,3	7,5±0,1	1,75±0,10	12,0±0,1	2,0±0,1	4,0±0,1	1,50+0,1/-0	4,00±0,10	0,35±0,05
0705	7,50±0,10	8,30±0,10	16,0±0,3	7,5±0,1	1,75±0,10	12,0±0,1	2,0±0,1	4,0±0,1	1,50+0,1/-0	5,35±0,10	0,35±0,05
1005	9,50±0,10	10,5±0,10	24,0±0,3	11,5±0,1	1,75±0,10	16,0±0,1	2,0±0,1	4,0±0,1	1,50+0,1/-0	5,90±0,10	0,35±0,05

### Lead Dimensions:

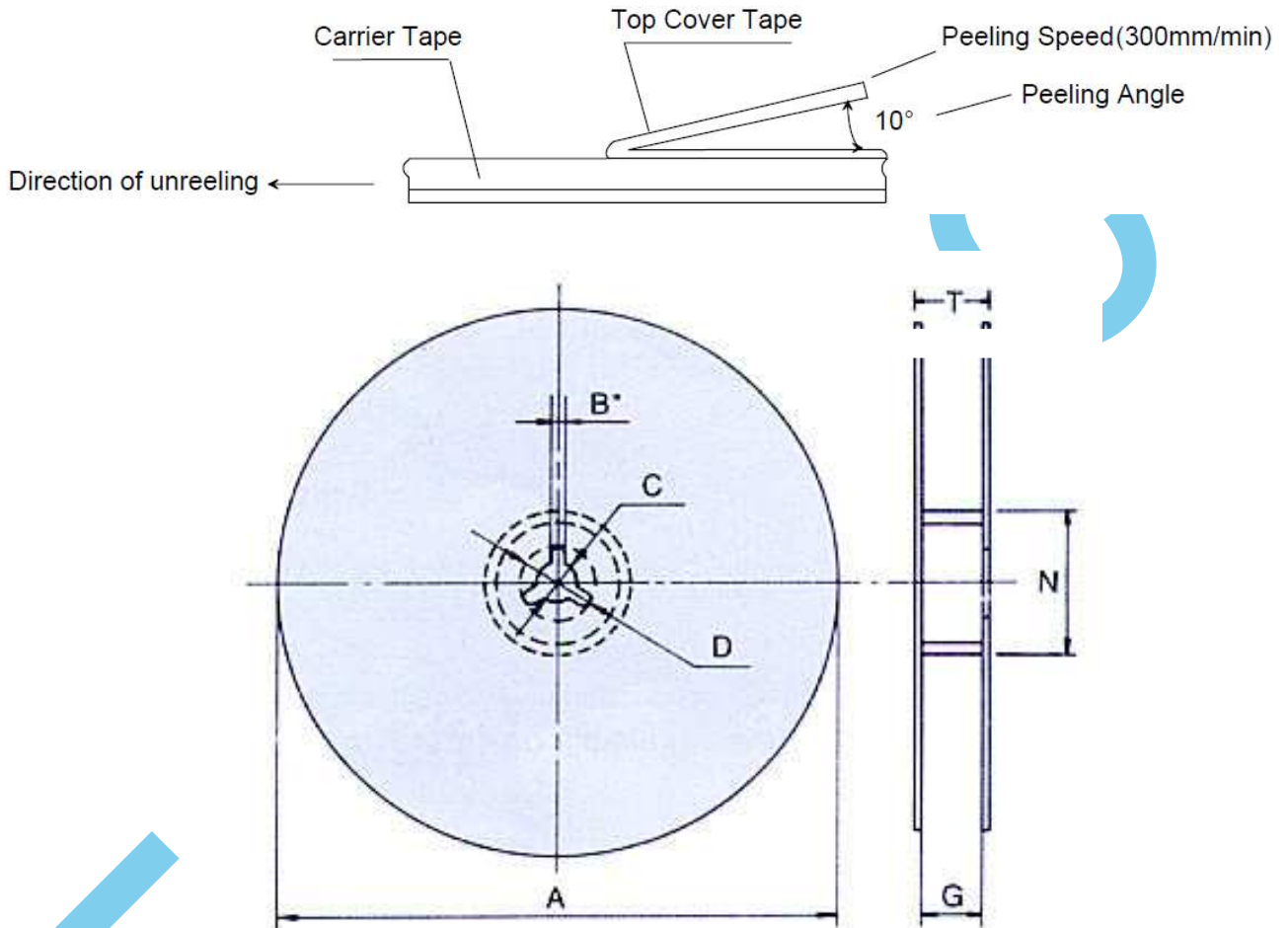


Unfilled Area(Front) ≤ 200mm ; Unfilled Area (Back) ≤ 300mm

### Cover Tape Peel off Strength

Specifications: 0,01N~1,3 N

Angle of between 165 and 180 degrees with the top of the carries tape. The cover tape, shall be pulled with a velocity of 300 mm ± 10 mm/ minute, relative to the carrier tape, during peeling, which results in the cover/carrier tape seal being separated at a rate of 150 mm/minute.



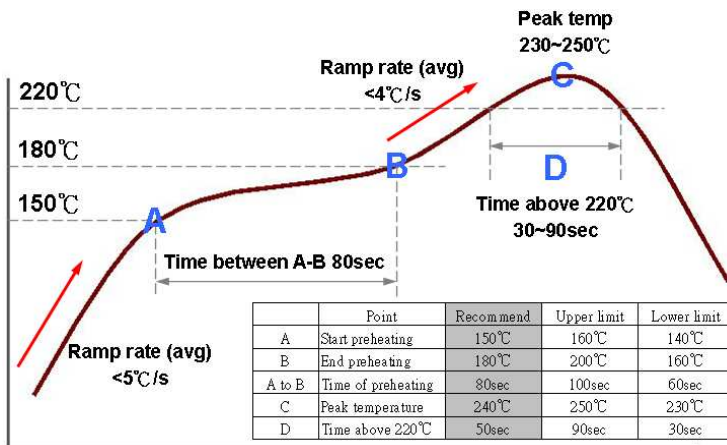
Symbol	Reel Type / Tape	A	N	C	D	B	G	T
Dimension	0302	330±2	90 Min	13,0±0,5	21,0±1,0	2,0±0,5	12,4 <sup>+0,1</sup> <sub>-0</sub>	16,4±0,4
	0403							
	0504							
	0703	330±2	90 Min	13,0±0,5	21,0±1,0	2,0±0,5	16,4 <sup>+0,1</sup> <sub>-0</sub>	20,4±0,4
	0705							
1005	330±2	90 Min	13,0±0,5	21,0±1,0	2,0±0,5	24,4 <sup>+0,1</sup> <sub>-0</sub>	28,4±0,4	

in mm

### Stock period

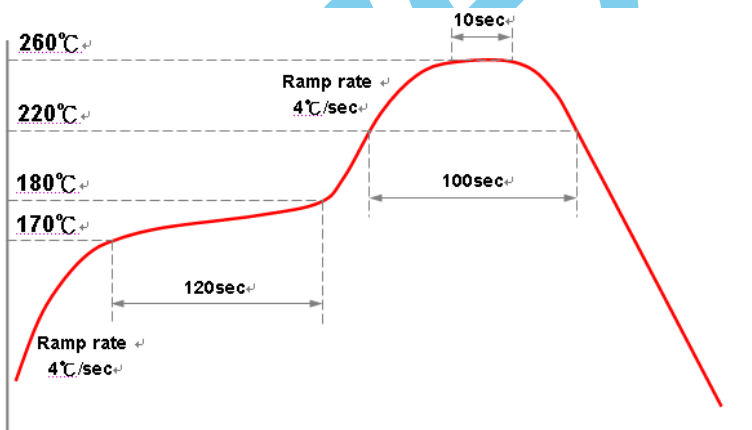
The performance of these products, including the solderability, is guaranteed for one year after production date code, provided that they remain packed as they were when delivered and stored at a temperature of  $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$  and a relative humidity less than 80%RH

### Lead Free Reflow Soldering Profile by using lead-free solder paste



The reflow condition recommended above is according to the machine used by our company. Big differences will arise as a result of the type of machine, reflow conditions, method, etc used. Hence, before setting up your reflow conditions, please confirm with the above.

### Head endurance test



The test should be made under the conditions according to the chart, after the test it is kept for 2 hours under the normal temperature and humidity. The reflow test can be done twice, but the interval should be more than one hour under the normal conditions.

## Reliability Test

0302, 0403, 0504, 0703, 0705

Test Items	Test Conditions	Criteria
Low temperature storage	Placed at -40°C for 500 hours, then measured at room ambient temperature after placing 24 hours.	change from an initial value L: within±10%
High temperature storage	Placed at +125°C for 500 hours, then measured at room ambient temperature after placing 24 hours.	change from an initial value L: within±10%
Thermal shock	Condition for 1 cycle: -40°C, 30min. ~ +125°C,30min. Number of cycles:5	change from an initial value L: within±10%
Humidity resistance	Placed at 90 to 95%RH,+60±2°C for 500 hours, then measured at room ambient temperature after placing 24 hours.	change from an initial value L: within±10%
Drop	Drop specimen three times on concrete floor from a height of 1 meter which mounted on test board.	Inductance shall be within ±10% of the initial value.
Vibration	Frequency: 10~55~10Hz Amplitude: 1,5mm or 10G Sweep time: 1oct/min Test Directions: X,Y,Z Test Time: 2 hours each direction	Inductance shall be within ±10% of the initial value.
Terminal strength	Add static load 4,9N (500gf) to inductor through hole of test board for 10±2 sec.	No detachment of terminal pin and no breakage of wire.
Soldering heat resistance	Dip inductor's terminal in solder bath of following conditions: 1) 260±5°C, 10±1sec, 2) 350±10°C, 3,5±0,5sec	Inductance shall be within ±10% of the initial value. Appearance: No damage

## SMD

Reliability Test  
1005

Test Items	Test Conditions	Criteria
Low temperature storage	Placed at -40°C for 500 hours, then measured at room ambient temperature after placing 24 hours.	change from an initial value L: within±10%
High temperature storage	Placed at +105°C for 500 hours, then measured at room ambient temperature after placing 24 hours.	change from an initial value L: within±10%
Thermal shock	Condition for 1 cycle: -40°C, 30min. ~ +105°C,30min. Number of cycles:5	change from an initial value L: within±10%
Humidity resistance	Placed at 90 to 95%RH,+60°C for 500 hours, then measured at room ambient temperature after placing 24 hours.	change from an initial value L: within±10%
Drop	Drop specimen three times on concrete floor from a height of 1 meter which mounted on test board.	Inductance shall be within ±10% of the initial value.
Vibration	Frequency: 10~55~10Hz Amplitude: 1,5mm or 10G Sweep time: 1oct/min Test Directions: X,Y,Z Test Time: 2 hours each direction	Inductance shall be within ±10% of the initial value.
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**For this part: It does not use the materials that include the substances specified in RoHS, the detail refer to the part of prohibition or exclusion items in RoHS (2011/65/EC),**

Cadmium and cadmium compounds (permissive content < 100 ppm)

Lead and lead compounds (permissive content < 1000 ppm)

Exceptions specified:

Lead contained in the glass of cathode ray tubes, electronic components and fluorescent tubes.

The glass material used in the electronic components, which includes resistor elements, conductive pastes (silver or copper ones), adhesives, glass frit and sealing materials.

Mercury and its mercury compounds (permissive content < 1000 ppm)

Hexavalent chromium compounds (permissive content < 1000 ppm)

Polybrominated biphenyls (PBB) (permissive content < 1000 ppm)

Polybrominated diphenylethers (PBDE) (permissive content < 1000 ppm)

FrelTec

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