SPECIFICATIONS

Customer	
Product Name	**Wire Wound Chip Ceramic Inductor**
Sunlord Part Number	**SDWL2012C□□□□STF**
Customer Part Number	

[☒New Released, □Revised] **SPEC No.: SDWL0514230000**

【This SPEC is total 13 pages including specifications and appendix.】

【ROHS, Compliant Parts】

Approved By	Checked By	Issued By

Shenzhen Sunlord Electronics Co., Ltd.

Address: Sunlord Industrial Park, Dafuyuan Industrial Zone, Baoan, Shenzhen, China 518110
Tel: 0086-755-29832660 Fax: 0086-755-82269029 E-Mail: sunlord@sunlordinc.com

【For Customer approval Only】 Date:_____

Qualification Status: □ Full □ Restricted □ Rejected

Approved By	Verified By	Re-checked By	Checked By

Comments:

_____

【Version change history】

Rev.	Effective Date	Changed Contents	Change reasons	Approved By
01	/	New Release	/	Chuanli Long

Caution

All products listed in this specification are developed, designed and intended for use in general electronics equipment. The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require especially high reliability, or whose failure, malfunction or trouble might directly cause damage to society, person, or property. Please understand that we are not responsible for any damage or liability caused by use of the products in any of the applications below. Please contact us for more details if you intend to use our products in the following applications.

1. Aircraft equipment
2. Aerospace equipment
3. Undersea equipment
4. nuclear control equipment
5. military equipment
6. Power plant equipment
7. Medical equipment
8. Transportation equipment (automobiles, trains, ships,etc.)
9. Traffic signal equipment
10. Disaster prevention / crime prevention equipment
11. Applications of similar complexity or with reliability requirements comparable to the applications listed in the above

【Precautions】

1. Magnetic materials shall be far away from parts to avoid impacts on their electrical characteristics.
2. Parts could be damaged by external mechanical pressure or stacked heavy objects, as well as strong shaking & dropping.
3. Please do not store parts in bulk to prevent coils and parts being damaged.
4. Oversized external force to parts on PCB may lead to parts being damaged or slipped off.
5. Please do not use parts on edge or top of PCB board in your design to avoid parts being damaged during PCB is moved.
6. Please use flux contained with resin since the highly acidic (Chlorine content more than 0.2 wt%) or water-soluble one could damage the insulation film of wires, then causing short circuit of parts.
7. Please do not use the brush to clean product or its surroundings. If you use the brush to clean product or its surroundings on PCB,copper wire may be broke, causing the product open .

1. Scope

This specification applies to the SDWL2012C□□□□STF of wire wound chip ceramic inductor.

2. Product Description and Identification (Part Number)

1) Description

Wire Wound Chip Ceramic Inductor, 2012, XXX nH± X% @XXXMHz, XXXΩ, XXX mA

2) Product Identification (Part Number)

SDWL	2012	C	□□□	□	S	T	F
①	②	③	④	⑤	⑥	⑦	⑧

①	Type
SDWL	wire wound Chip inductor

②	External Dimensions [mm]
2012	

③	Material Code
C	Ceramic

④	Nominal Inductance
Example	Nominal Value
1N0	1.0nH
10N	10nH
R10	100nH
1R0	1000nH

⑤	Inductance Tolerance
G	±2%
J	±5%
K	±10%

⑥	Feature type
S	Sn Plating Five-faces Coating

⑦	Packing
T	Tape Carrier Package

⑧	HSF products
Hazardous Substance Free Products	

3. Electrical Characteristics

Please refer to **Item 5.**

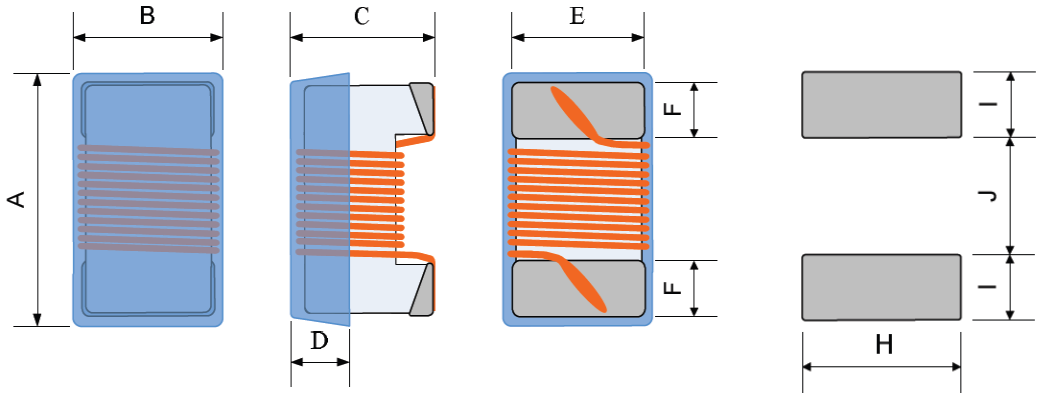
1) Operating and storage temperature range (individual chip without packing): -40℃ to +125℃
2) Storage temperature range (packaging conditions): -10℃~+40℃ and RH 70% (Max.)

4. Shape and Dimensions

1) Chip body:

Ceramic body for SDWL2012C□□□□STF Series.

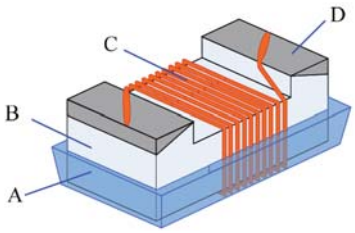
2) Dimensions: See the following.



Unit: mm

A MAX.	B MAX.	C MAX.	D REF.	E	F	H REF.	I REF.	J REF.
2.05±0.2	1.53±0.2	1.3±0.2	0.51	1.27±0.2	0.51±0.2	1.78	1.02	0.76

3) Structure: See the following.



No.	Components	Material
A	Coating	Ultraviolet epoxy resin
B	Core	Ceramic
C	Wire	Polyurethane system enameled copper wire
D	Electrodes	Mo-Mn with Ni and Sn plating

5. Electrical Characteristics

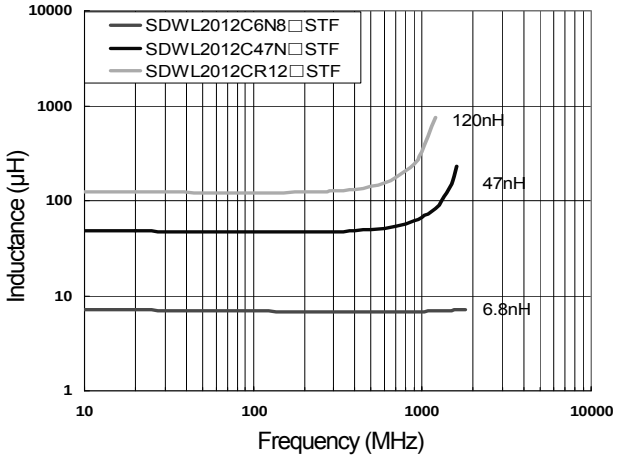
Ⅰ. SDWL2012C□□□□STF Series

Part Number	Inductance	L Tolerance	Min. Quality Factor	Max. DC Resistance	Max. Rated Current	Min. Self-resonant Frequency
Units	nH	-	-	Ω	mA	MHz
Symbol	L	-	Q	DCR	Ir	S.R.F
SDWL2012C2N2□STF	2.2@250MHz	J, K	40@1500MHz	0.10	600	＞6000
SDWL2012C2N5□STF	2.5@100MHz	J, K	25@250MHz	0.05	600	＞6000
SDWL2012C2N7□STF	2.7@250MHz	J	40@1500MHz	0.05	600	＞6000
SDWL2012C3N0□STF	3.0@250MHz	J, K	25@1500MHz	0.2	600	6000
SDWL2012C3N3□STF	3.3@250MHz	J, K	25@1500MHz	0.20	600	＞6000
SDWL2012C3N6□STF	3.6@250MHz	J, K	25@1500MHz	0.20	400	＞6000
SDWL2012C4N7□STF	4.7@250MHz	J	60@1500MHz	0.04	600	＞6000
SDWL2012C5N1□STF	5.1@250MHz	J K	35@1000MHz	0.10	600	5500
SDWL2012C5N6□STF	5.6@250MHz	J	43@1000MHz	0.10	600	5500
SDWL2012C6N8□STF	6.8@250MHz	J, K	40@1000MHz	0.11	600	5000
SDWL2012C8N2□STF	8.2@250MHz	J, K	40@1000MHz	0.19	600	4600
SDWL2012C10N□STF	10@250MHz	G, J, K	44@1000MHz	0.14	600	4500
SDWL2012C12N□STF	12@250MHz	G, J, K	40@500MHz	0.15	600	4000
SDWL2012C15N□STF	15@250MHz	G, J, K	40@500MHz	0.17	600	2900
SDWL2012C18N□STF	18@250MHz	G, J, K	50@500MHz	0.20	600	3300
SDWL2012C22N□STF	22@250MHz	G, J, K	55@500MHz	0.22	500	2000
SDWL2012C24N□STF	24@250MHz	G, J, K	50@500MHz	0.22	500	2000
SDWL2012C27N□STF	27@250MHz	G, J, K	55@500MHz	0.25	500	2500
SDWL2012C33N□STF	33@250MHz	G, J, K	60@500MHz	0.27	500	2000
SDWL2012C36N□STF	36@250MHz	G, J, K	55@500MHz	0.27	500	1700
SDWL2012C39N□STF	39@250MHz	G, J, K	60@500MHz	0.29	500	2000
SDWL2012C43N□STF	43@200MHz	G, J, K	50@500MHz	0.34	500	1600
SDWL2012C45N□STF	45@200MHz	G, J, K	50@500MHz	0.31	500	1600
SDWL2012C47N□STF	47@200MHz	G, J, K	50@500MHz	0.31	500	1600
SDWL2012C56N□STF	56@200MHz	G, J, K	55@500MHz	0.32	500	1550
SDWL2012C68N□STF	68@200MHz	G, J, K	55@500MHz	0.38	500	1450
SDWL2012C82N□STF	82@150MHz	G, J, K	50@500MHz	0.42	400	1300
SDWL2012C91N□STF	91@150MHz	G, J, K	65@500MHz	0.48	400	1200
SDWL2012CR10□STF	100@150MHz	G, J, K	50@500MHz	0.46	400	1200

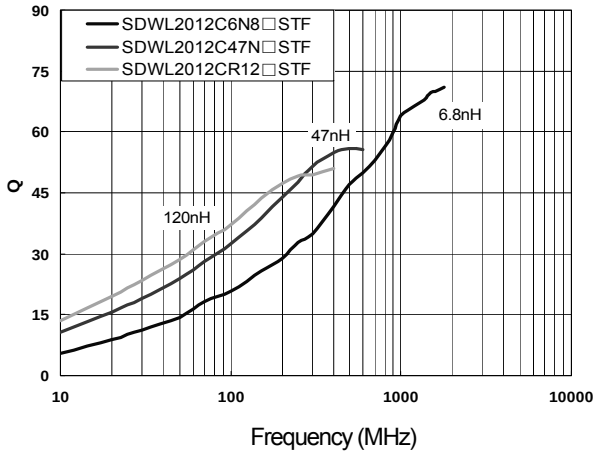
SDWL2012CR11□STF	110@150MHz	G, J, K	50@250MHz	0.48	400	1100
SDWL2012CR12□STF	120@150MHz	G, J, K	50@250MHz	0.51	400	1100
SDWL2012CR15□STF	150@100MHz	G, J, K	50@250MHz	0.56	400	920
SDWL2012CR16□STF	160@100MHz	G, J, K	45@250MHz	0.80	400	900
SDWL2012CR18□STF	180@100MHz	G, J, K	50@250MHz	0.64	400	870
SDWL2012CR20□STF	200@100MHz	G, J, K	45@250MHz	0.64	400	900
SDWL2012CR22□STF	220@100MHz	G, J, K	45@250MHz	1.10	400	850
SDWL2012CR24□STF	240@100MHz	G, J, K	40@250MHz	1.20	400	770
SDWL2012CR27□STF	270@100MHz	G, J, K	38@250MHz	1.00	350	650
SDWL2012CR30□STF	300@100MHz	G, J, K	40@250MHz	1.50	310	750
SDWL2012CR33□STF	330@100MHz	G, J, K	40@250MHz	1.40	310	600
SDWL2012CR39□STF	390@100MHz	G, J, K	35@250MHz	1.50	290	560
SDWL2012CR47□STF	470@50MHz	G, J, K	33@100MHz	1.72	250	375
SDWL2012CR56□STF	560@25MHz	G, J, K	23@50MHz	1.90	230	320
SDWL2012CR62□STF	620@25MHz	G, J, K	23@50MHz	1.95	200	280
SDWL2012CR68□STF	680@25MHz	G, J, K	23@50MHz	2.05	190	270
SDWL2012CR75□STF	750@25MHz	G, J, K	23@50MHz	2.10	180	240
SDWL2012CR82□STF	820@25MHz	G, J, K	23@50MHz	2.30	180	250
SDWL2012CR91□STF	910@25MHz	G, J, K	22@50MHz	2.40	160	230
SDWL2012C1R0□STF	1000@25MHz	G, J, K	20@50MHz	2.50	150	200
SDWL2012C1R2□STF	1200@25MHz	G, J, K	18@50MHz	3.50	100	200
SDWL2012C1R5□STF	1200@25MHz	G, J, K	15@50MHz	2.90	100	130
SDWL2012C1R8□STF	1800@7.9MHz	G, J, K	15@25MHz	3.50	120	120
SDWL2012C2R2□STF	2200@7.9MHz	G, J, K	16@25MHz	4.60	100	70
SDWL2012C3R3□STF	3300@7.9MHz	G, J, K	10@7.9MHz	5.40	50	80
SDWL2012C4R7□STF	4700@7.9MHz	G, J, K	18@25MHz	8.20	30	70

II. Typical Electrical Characteristic

Inductance vs. Frequency Characteristics



Q vs. Frequency Characteristics



6. Test and Measurement Procedures

6.1 Test Conditions

Unless otherwise specified, the standard atmospheric conditions for measurement/test as:

a. Ambient Temperature: 20±15℃
b. Relative Humidity: 65%±20%
c. Air Pressure: 86 KPa to 106 KPa

If any doubt on the results, measurements/tests should be made within the following limits:

a. Ambient Temperature: 20±2℃
b. Relative Humidity: 65%±5%
c. Air Pressure: 86KPa to 106 KPa

6.2 Visual Examination

a. Inspection Equipment: 30X magnifier

6.3 Electrical Test

6.3.1 DC Resistance (DCR)

a. Refer to **Item 5.**
b. Test equipment: Agilent HP4286A+16193 or equivalent.

6.3.2 Inductance (L)

a. Refer to **Item 5.**
b. Test equipment: Agilent HP4286A+16193 or equivalent.
c. Test signal: -13dBm or 10mA
d. Test frequency refers to **Item 5.**

6.3.3 Q Factor (Q)

a. Refer to **Item 5.**
b. Test equipment: Agilent HP4286A+16193 or equivalent.
c. Test signal: -13dBm or 10mA
d. Test frequency refers to **Item 5.**

6.3.4 Self-Resonant Frequency (SRF)

a. Refer to **Item 5.**
b. Test equipment: Agilent HP4291A+16193 or Agilent E5071B.
c. Test signal: -20dBm or 50mV

6.3.5 Rated Current

a. Refer to **Item 5.**
b. Test equipment (see **Fig.6.3.5-1**): Electric Power, Electric current meter, Thermometer.
c. Measurement method (see **Fig.6.3.5-1**):
   1. Set test current to be 0 mA.
   2. Measure initial temperature of chip surface.
   3. Gradually increase voltage and measure chip temperature for corresponding current.
d. Definition of Rated Current (Ir): Ir is direct electric current as chip surface temperature rose just 20℃ against chip initial surface temperature (Ta) (see **Fig. 6.3.5-2**).

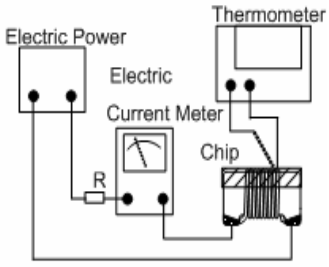


Fig. 6.3.5-1

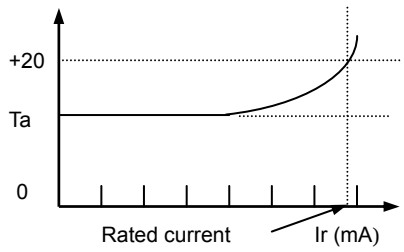
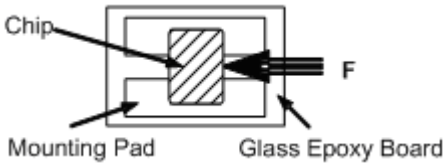
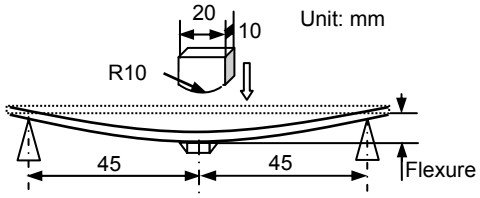
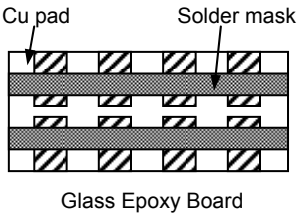
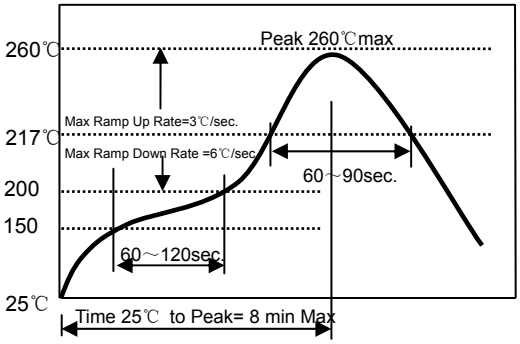
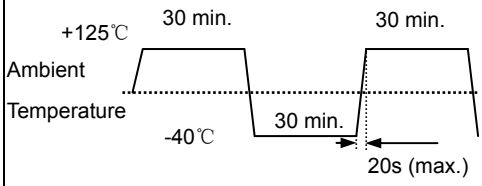


Fig. 6.3.5-2

6.4 Reliability Test

Items	Requirements	Test Methods and Remarks
6.4.1 Terminal Strength	No removal or split of the termination or other defects shall occur. 	① Solder the inductor to the testing jig (glass epoxy board) using eutectic solder. Then apply a force in the direction of the arrow. ② 20N force. ③ Keep time: 10±1s ④ Speed: 1.0 mm/s.
6.4.2 Resistance to Flexure	No visible mechanical damage. 	① Solder the inductor to the test jig. Using a eutectic solder. Then apply a force in the direction shown as left. ② Flexure: 2mm ③ Pressurizing Speed: 0.5mm/sec. ④ Keep time ≥ 5 s.
6.4.3 Vibration	① No visible mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20% 	① Solder the inductor to the testing jig (glass epoxy board) using eutectic solder. ② The inductor shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours)
6.4.4 Dropping	① No visible mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20%	Drop chip inductor 10 times on a concrete floor from a height of 100 cm.
6.4.5 Temperature coefficient	+50±100ppm/℃	① Between -40℃ and +125℃ ② With a reference value of +20℃
6.4.6 Solderability	80% or more of electrode area shall be Coated by new solder.	① Electrode of the coil shall be immersed in flux for 5 to 10 Seconds. ② The coil shall be immersed in solder bath at a temperature of 240±5℃, Duration for 3±0.5 seconds. ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight.
6.4.7 Resistance to Soldering Heat	① No visible mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20%	Re-flowing Profile: 

6.4.8 Thermal Shock	① No visible mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20%	① Temperature, Time: -40℃ for 30±3 min→+125℃ for 30±3min ② Transforming interval: 20s (max.) ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
		
6.4.9 Resistance to Low Temperature	① No visible mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20%	① Temperature: -40±2℃ ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
6.4.10 Resistance to High Temperature	① No mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20%	① Temperature: 125±2℃ ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
6.4.11 Damp Heat (Steady States)	① No mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20%	① Temperature: 60±2℃, Humidity: 90% to 95% RH ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
6.4.12 Loading Under Damp Heat	① No mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20%	① Temperature: 60±2℃ ,Humidity: 90% to 95% RH ② Duration: 1000^{+24}hours ③ Applied current: Rated current. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
6.4.13 Loading at High Temperature (Life Test)	① No mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20%	① Temperature: 125±2℃ ② Duration: 1000^{+24}hours ③ Applied current: Rated current. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

7. Packaging, Storage and Transportation

7.1 Packaging

There is one type of packaging for the chip inductors. Please specify the packing code when ordering.

Tape Carrier Packaging:

Packaging code: T

a. Tape carrier packaging are specified in attached figure **Fig.7.1-1~4**

b. Tape carrier packaging quantity please see the following table:

Type	2012	
Tape	Embossed Tape	
Quantity	Standard	2K

(1) Taping Drawings (Unit: mm)

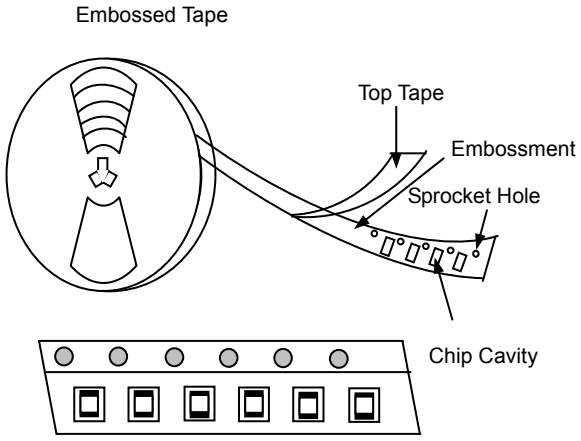
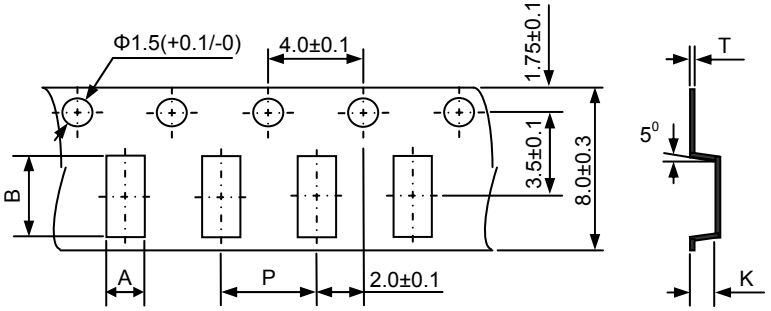


Fig. 7.1-1

(2) Taping Dimensions (Unit: mm)



Type	A	B	P	K	T
2012	1.88±0.2	2.4±0.2	4.0±0.1	1.35±0.2	0.22±0.1

Fig. 7.1-2

(3) Leader and blank portion

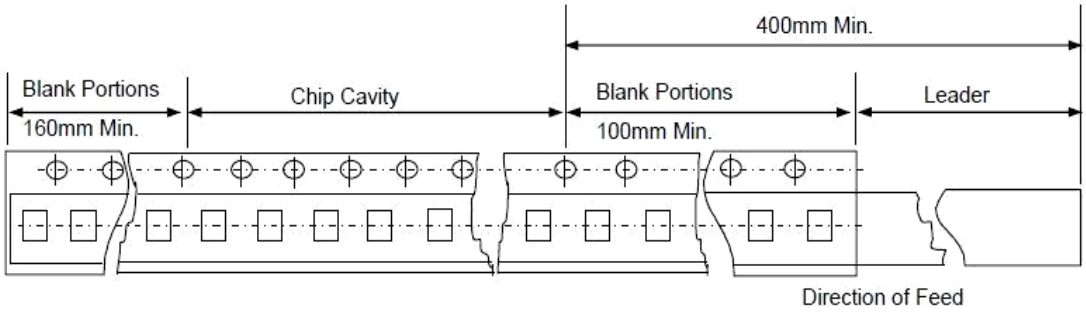


Fig. 7.1-3

(4) Reel Dimensions (Unit: mm)

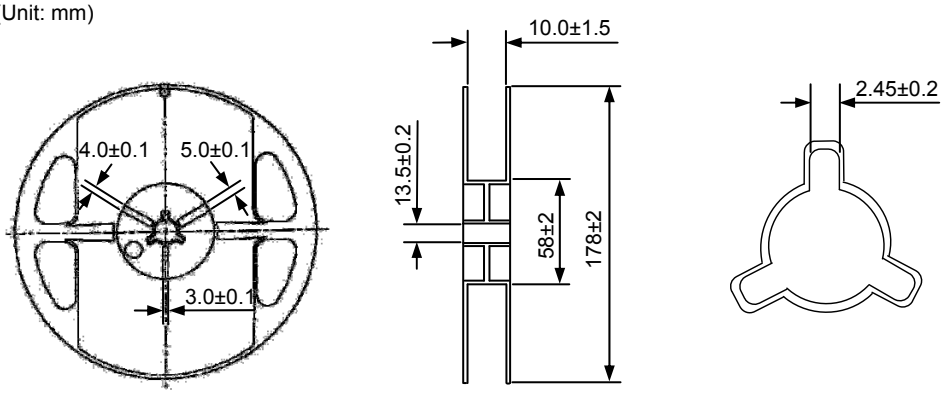


Fig. 7.1-4

7.2 Storage

a. The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to high humidity. Package must be stored at 40℃ or less and 70% RH or less.

b. The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to dust of harmful gas (e.g. HCl, sulfurous gas of H_2S)

c. Packaging material may be deformed if package are stored where they are exposed to heat of direct sunlight.

d. Minimum packages, such as polyvinyl heat-seal packages shall not be opened until they are used. If opened, use the reels as soon as

possible.

e. Solderability shall be guaranteed for 3 months from the date of delivery on condition that they are stored at the environment specified in **Clause 4** .For those parts, which passed more than 3 months shall be checked solder-ability before use.

8. Warning and Attentions

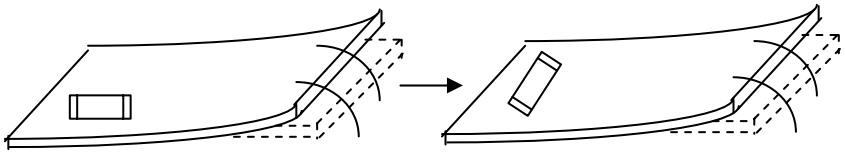
8.1 Precautions on Use

a. Always wear static control bands to protect against ESD.
b. Any devices used (soldering iron, measuring instruments) should be properly grounded.
c. Use non-magnetic tweezers when handing the chips.
d. Pre-heating when soldering, and refer to the recommended condition specified in specification.
e. Don't apply current in excess of the rated current value. It may cause damage to components due to over-current.
f. Keep clear of anything that may generate magnetic fields such as speakers, coils.
g. When soldering, the electrical characteristics may be varied due to hot energy and mechanical stress.
h. When coating products with resin, the relatively high resin curing stress may change the electrical characteristics. For exterior coating, select resin carefully so that electrical and mechanical performance of the product is not affected. Before using, please evaluate reliability with the product mounted in your application set.
i. When mount chips with adhesive in preliminary assembly, do appropriate check before the soldering stage, i.e., the size of land pattern, type of adhesive, amount applied, hardening of the adhesive on proper usage and amounts of adhesive to use.
j. Mounting density: Add special attention to radiating heat of products when mounting other components nearby. The excessive heat by other products may cause deterioration at joint of this product with substrate.
k. Since some products are constructed like an open magnetic circuit, narrow spacing between components may cause magnetic coupling.
l. Please do not give the product any excessive mechanical shocks in transportation.
m. Please do not touch wires by sharp terminals such as tweezers to avoid causing any damage to wires.
n. Please do not add any shock and power to the soldered product to avoid causing any damage to chip body.
o. Please do not touch the electrodes by naked hand as the solderability of the external electrodes may deteriorate by grease or oil on the skin.

8.2 PCB Bending Design

The following shall be considered when designing and laying out PCB's.

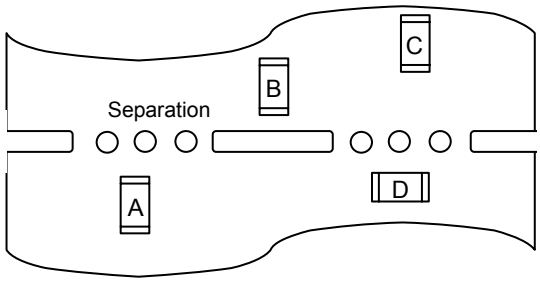
a. PCB shall be designed so that products are not subjected to the mechanical stress from board warp or deflection.



(Poor example) (Good example)

Products shall be located in the sideways direction to the mechanical stress.

b. Products location on PCB separation.



Product shall be located carefully because they may be subjected to the mechanical stress in order of A>C=B>D.

c. When splitting the PCB board, or insert (remove) connector, or fasten thread after mounting components, care is required so as not to give any stress of deflection or twisting to the board. Because mechanical force may cause deterioration of the bonding strength of electrode and solder, even crack of product body. Board separation should not be done manually, but by using appropriate devices.

8.3 Recommended PCB Design for SMT Land-Patterns

When chips are mounted on a PCB, the amount of solder used (size of fillet) and the size of PCB Land-Patterns can directly affect chip performance (such as Q). And they can also cause other soldering question (such as offset and side lap). Therefore, the following items must be carefully considered in the design of solder land patterns.

a. Please use the PCB pad and solder paste we recommend, and contact us in advance if they need to be changed.
b. Please use flux contained with resin since the highly acidic (Chlorine content more than 0.2 wt%) or water-soluble one could damage the insulation film of wires, then causing short circuit of parts.
c. The amount of solder applied can affect the ability of chips to withstand mechanical stresses which may lead to breaking or cracking. Therefore, when designing land-patterns it is necessary to consider the appropriate size and configuration of the solder pads which in turn determines the amount of solder necessary to form the fillets.
d. When more than one part is jointly soldered onto the same land or pad, the pad must be designed that each component's soldering point is separated by solder-resist.

Recommended land dimensions please refer to product specification.

9. Recommended Soldering Technologies

9.1 IR Re-flowing Profile:

△ Preheat condition: 150~200℃/60~120sec

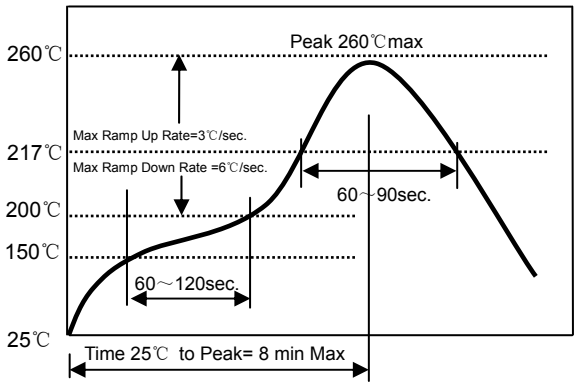
△ Allowed time above 217C: 60~90sec.

△ Max temp: 260℃

△ Max time at max temp: 10sec

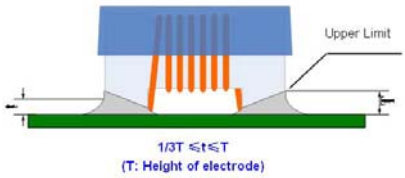
△ Solder paste: Sn/3.0Ag/0.5Cu

△ Allowed Reflow time: 2 times max



10. Solder Volume

Solder shall be used not to exceed as shown below.



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

b. Before soldering, please ensure that the solder should not adhere to the wire part of chip.

c. Please pay particular attention to whether there is flux remaining on surface of the wire part of chip after subjected to reflow soldering since this may causing short circuit of parts.

11. Cleaning

Products shall be cleaned on the following conditions:

a. Cleaning temperature shall be limited to 60℃ Max. (40℃ Max. for fluoride and alcohol type cleaner.)

b. Ultrasonic cleaning shall comply with the following conditions, avoiding the resonance phenomenon at the mounted products and PCB.

Power: 20W/l Max.

Frequency: 28 KHz to 40 KHz

Time: 5 minutes Max

c. Cleaner

i. Alternative cleaner

- Isopropyl alcohol (IPA)
- HCFC-225

ii. Aqueous agent

- Surface Active Agent Type (Clean through-750H)
- Hydrocarbon Type (Techno Cleaner-335)
- Higher Alcohol Type (Pine Alpha ST-100S)
- Alkali saponifier Type (※ Aqua Cleaner 240)

※ Alkali saponification shall be diluted to 20% volume with de-ionized water.

※ Please contact our technical service department before using other cleaner.

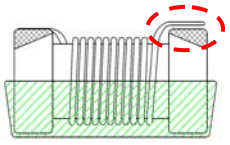
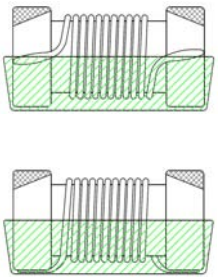
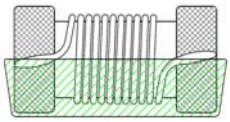
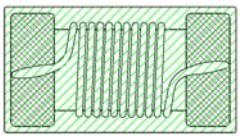
d. There shall be no residual flux and residual cleaner after cleaning. In the case of using aqueous agent, product shall be dried completely after rinse with de-ionized water in order to remove the cleaner.

e. Some products may become slightly whitened. However, product performance or usage is not affected.

f. Please take care of winding part while cleaning.

g. After cleaning, parts could be subjected to the next reflow soldering till the solvent remaining on surface of parts being volatilized.

Appendix : Appearance standard

File No:		Applied to Wire Wound Ceramic Inductor Series	
Effective date:			
No.	**Defect Item Item**	**Graphic Schematic Drawing**	**Rejection identification Criteria**
1	Wire off/ Welding Spot Off		The solder joint Welding Spot of wire break away from electrodes, or over the electrodes.
2	Solder misplace		Solder joints are not at electrode side but at the coating side or flank.
3	Coating misplace		Coating at flank
			Coating at electrodes side