SPECIFICATIONS

Customer	
Product Name	**Chip High Frequency Inductor**
Sunlord Part Number	**SDHL1608 Series**
Customer Part Number	

[☒New Released, ☐Revised] **SPEC No.: SDHL0502222000**

【 This SPEC is total 9 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, Guanlan, Shenzhen, China 518110
Tel: 0086-755-29832333 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	/	Hai Guo

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. Data-processing equipment
12. Applications of similar complexity or with reliability requirements comparable to the applications listed in the above

1. Scope

This specification applies to SDHL1608 series of Chip High Freq. Inductor

2. Product Description and Identification (Part Number)

1) Description

SDHL1608 series of Chip High Frequency Inductor .

2) Product Identification (Part Number)

SDHL	1608	C	XXX	□	◎	F
①	②	③	④	⑤	⑥	⑦

①	Type
SDHL	Chip High Frequency Inductor.

②	External Dimensions（L X W） [mm]
1608 [0603]	1.6 X 0.8

③ Material Code
C

④	Nominal Inductance
Example	Nominal Value
10N	10nH
R10	100nH

⑤	Inductance Tolerance
J	±5%

⑦ HSF Products
Hazardous Substance Free Products

⑥	Packing
T	Tape Carrier Package

3. Electrical Characteristics

Please refer to **Appendix A** (Page 9).

1) Operating and storage temperature range (individual chip without packing): -40℃ to +85℃
2) Storage temperature range (packaging conditions): -10℃~+40℃ and RH 70% (Max.)

4. Shape and Dimensions

1) Dimensions and recommended PCB pattern for reflow soldering: See **Fig.4-1, Fig.4-2** and **Table 4-1**
2) Structure: See **Fig. 4-3** and **Fig. 4-4**

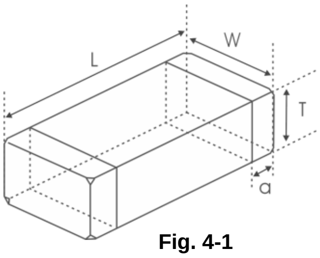


Fig. 4-1

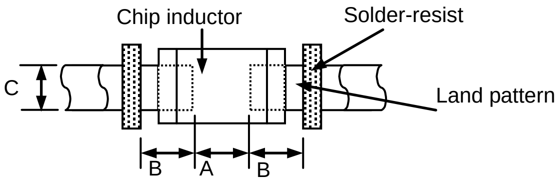


Fig. 4-2

[Table 4-1]

Unit: mm [inch]

Type	L	W	T	a	A	B	C
1608 [0603]	1.60±0.15 [0.063±0.006]	0.8±0.15 [0.031±0.006]	0.8±0.15 [0.031±0.006]	0.3±0.2 [0.012±0.008]	0.60~0.80	0.60~0.80	0.60~0.80

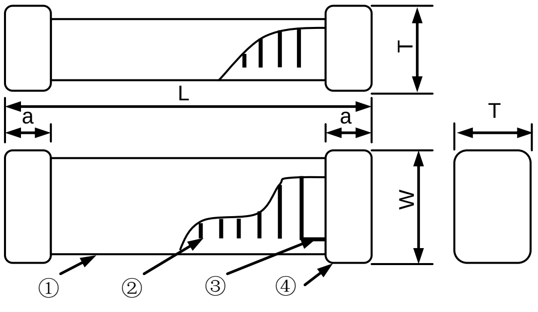


Fig. 4-3

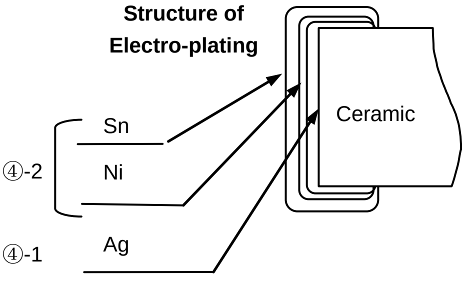


Fig. 4-4

① Ceramic for SDHL Series
② Internal electrode (Ag)
③ Pull out electrode(Ag)
④-1 Terminal electrode: Inside (Ag)
④-2 Outside (Electro-plating Ni-Sn)

3) Material Information: See **Table 4-2**

[Table 4-2]

Code	Part Name	Material Name
①	Ceramic Body	Ceramic Powder
②	Inner Coils	Silver Paste
③	Pull-out Electrode (Ag)	Silver Paste
④-1	Terminal Electrode: Inside Ag	Termination Silver Composition
④-2	Electro-Plating: Ni/Sn plating	Plating Chemicals

5. Test and Measurement Procedures

5.1 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: 86kPa to 106kPa

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 106kPa

5.2 Visual Examination

- a. Inspection Equipment: 20× magnifier

5.3 Electrical Test

5.3.1 DC Resistance (DCR)

- a. Refer to Appendix A.
- b. Test equipment (Analyzer): High Accuracy Milliohmmeter-HP4338B

5.3.2 Inductance (L)

- a. Refer to Appendix A.
- b. Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A +HP16192A
- c. Test signal: -20dBm or 50mV
- d. Test frequency refers to Appendix A.

5.3.3 Q Factor (Q)

- a. Refer to Appendix A.
- b. Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A+HP16192A
- c. Test signal: -20dBm or 50mV
- d. Test frequency refers to Appendix A.

5.3.4 Self-Resonant Frequency (SRF)

- a. Refer to Appendix A.
- b. Test equipment: Agilent 8719ES or equivalent.
- c. Test signal: -20dBm or 50 mV

5.3.5 Rated Current

- a. Refer to Appendix A.
- b. Test equipment (see **Fig.5.3.5-1**): Electric Power, Electric current meter, Thermometer.
- c. Measurement method (see **Fig. 5.3.5-1**):
  - 1. Set test current to be 0mA.
  - 2. Measure initial temperature of chip surface.
  - 3. Gradually increase voltage and measure chip temperature for corresponding current.
- d. Definition of Rated Current (Ir): IDC is direct electric current as chip surface temperature rose just 20℃ against chip initial surface temperature(Ta) (see **Fig. 5.3.5-2**).

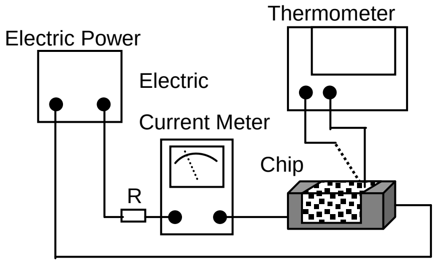


Fig. 5.3.5-1

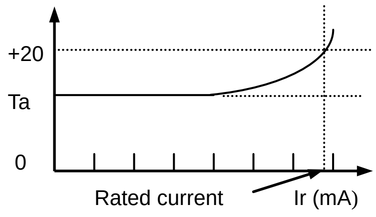


Fig. 5.3.5-2

5.4 Reliability Test

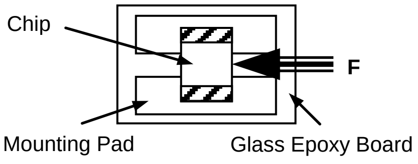
<table>
<tr><th>Items</th><th>Requirements</th><th>Test Methods and Remarks</th></tr>
<tr><td>5.4.1
Terminal Strength</td><td>No removal or split of the termination or other defects shall occur.


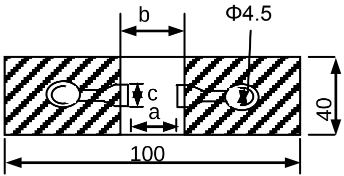
Fig.5.4.1-1</td><td>① Solder the inductor to the testing jig (glass epoxy board shown in **Fig.5.4.1-1**) using leadfree solder. Then apply a force in the direction of the arrow.
② 5N force for SDHL 1608 series.
③ Keep time: 10±1s
④ Speed: 1.0mm/s.</td></tr>
<tr><td>5.4.2
Resistance to Flexure</td><td>No visible mechanical damage.
<table><tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr><tr><td>1608[0603]</td><td>1.0</td><td>3.0</td><td>1.2</td></tr></table>Unit: mm [inch]


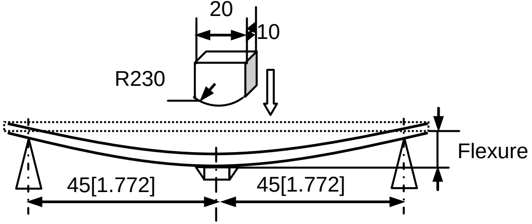
Fig.5.4.2-1</td><td>① Solder the inductor to the test jig (glass epoxy board shown in **Fig.5.4.2-1**) Using a leadfree solder. Then apply a force in the direction shown **Fig. 5.4.2-2.**
② Flexure: 2mm
③ Pressurizing Speed: 0.5mm/sec.
④ Keep time: 30 sec.


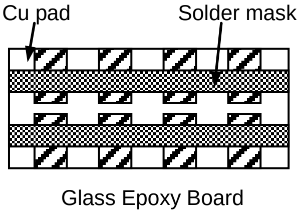
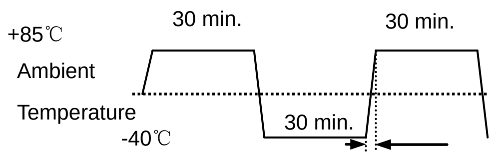
Fig.5.4.2-2</td></tr>
<tr><td>5.4.3 Vibration</td><td>① No visible mechanical damage.
② Inductance change: Within ±10%
③ Q factor change: Within ±20%


Fig. 5.4.3-1</td><td>① Solder the inductor to the testing jig (glass epoxy board shown in **Fig.5.4.3-1**) using leadfree 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 3mutually perpendicular directions (total of 6 hours)</td></tr>
<tr><td>5.4.4 Dropping</td><td>① No visible mechanical damage.
② Inductance change: Within ±10%
③ Q factor change: Within ±20%</td><td>Drop chip inductor 10 times on a concrete floor from a height of 100 cm.</td></tr>
<tr><td>5.4.5
Temperature</td><td>Inductance change should be within ±10% of initial value measuring at 20℃.</td><td>Temperature range:-40℃ to +85℃.
Reference temperature: +20℃</td></tr>
<tr><td>5.4.6
Solderability</td><td>① No visible mechanical damage.
② Wetting shall exceed 95% coverage.</td><td>① Solder temperture:240±2℃
② Duration: 3sec.
③ Solder: Sn/3.0Ag/0.5Cu
④ Flux: 25% Resin and 75% ethanol in weight.</td></tr>
<tr><td>5.4.7
Resistance to Soldering Heat</td><td>① No visible mechanical damage.
② Wetting shall exceed 95% coverage.
③ Inductance change: Within ±10%
④ Q factor change: Within ±20%</td><td>① Solder temperature :260±3℃
② Duration: 5 sec.
③ Solder: Sn/3.0Ag/0.5Cu
④ Flux: 25% Resin and 75% ethanol in weight
⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.</td></tr>
</table>

5.4.8 Thermal Shock	① No mechanical damage. ② Inductance change: Within ±10% ③ Q factor change: Within ±20%  **Fig. 5.4.8-1**	① Temperature, Time: (See **Fig.5.4.8-1**). -40℃for 30±3 min→+85℃ for 30±3min ② Transforming interval: Max. 20 sec. ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
5.4.9 Resistance to Low Temperature	① No mechanical damage. ② Inductance change: Within ±10% 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.
5.4.10 Resistance to High Temperature	① No mechanical damage. ② Inductance change: Within ±10% ③ Q factor change: Within ±20%	① Temperature: 85±2℃; ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
5.4.11 Damp Heat (Steady States)	① No visible mechanical damage. ② Inductance change: Within ±10% ③ Q factor change: Within ±20%	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
5.4.12 Loading Under Damp Heat	① No visible mechanical damage. ② Inductance change: Within ±10% ③ Q factor change: Within ±20%	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ Applied current: Rated current. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
5.4.13 Loading at High Temperature (Life Test)	① No visible mechanical damage. ② Inductance change: Within ±10% ③ Q factor change: Within ±20%	① Temperature: 85±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.

6. Packaging, Storage

6.1 Packaging

Tape Carrier Packaging:

Packaging code: T

a Tape carrier packaging are specified in attached figure **Fig.6.1-1~3**

b Tape carrier packaging quantity please see the following table:

Type	1608[0603]
T(mm)	0.8±0.15
Tape	Paper Tape
Quantity	4K

(1) Taping Drawings (Unit: mm)

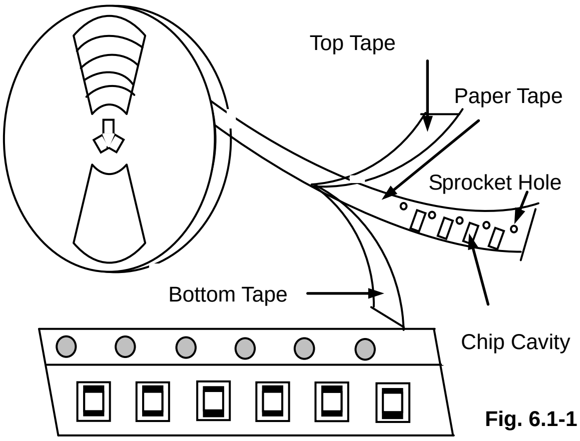


Fig. 6.1-1

Remark: The sprocket holes are to the right as the tape is pulled toward the user.

(2) Taping Dimensions (Unit: mm)

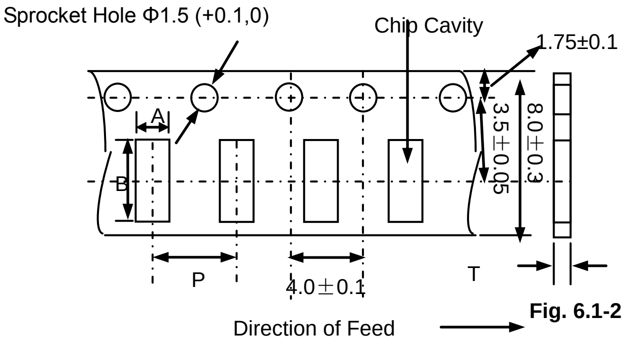


Fig. 6.1-2

Paper Tape

Type	A	B	P	T max
1608 [0603]	1.0±0.2	1.8±0.2	4.0±0.1	1.1

(3) Reel Dimensions (Unit: mm)

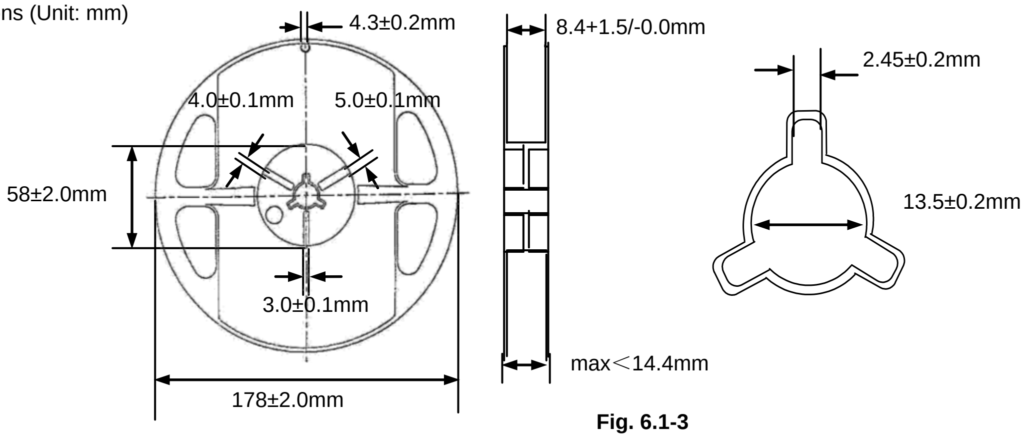


Fig. 6.1-3

6.2 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).

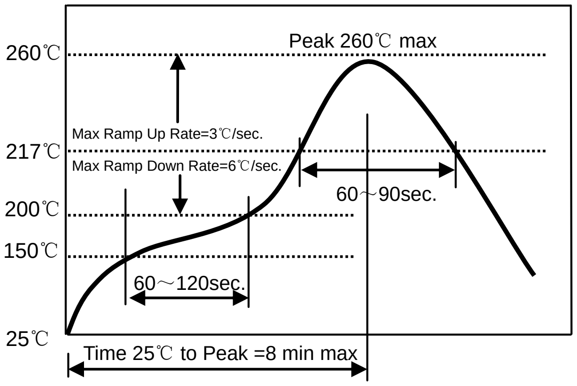
c. Packaging material may be deformed if package are stored where they are exposed to heat of direct sunlight.

d. Solderability specified in **Clause 5.4.7** shall be guaranteed for 12months from the date of delivery on condition that they are stored at the environment specified in **Clause 3**. For those parts, which passed more than 12 months shall be checked solder-ability before use.

7. Recommended Soldering Technologies

7.1 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: 2x max

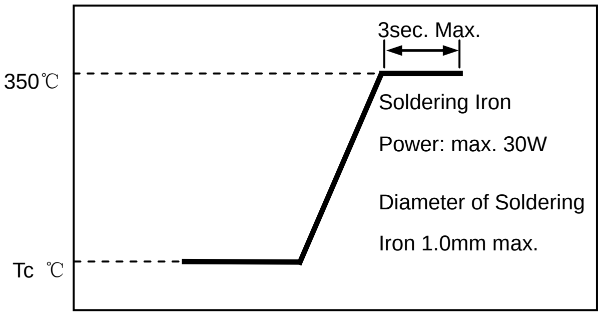


[Note: The reflow profile in the above table is only for qualification and is not meant to specify board assembly profiles. Actual board assembly profiles must be based on the customer's specific board design, solder paste and process, and should not exceed the parameters as the Reflow profile shows.]

7.2 Iron Soldering Profile.

△ Iron soldering power: Max.30W
△ Pre-heating: 150 ℃/60sec.
△ Soldering Tip temperature: 350℃Max.
△ Soldering time: 3sec Max.
△ Solder paste: Sn/3.0Ag/0.5Cu
△ Max.1 times for iron soldering

[Note: Take care not to apply the tip of the soldering iron to the terminal electrodes.]



Appendix A: Electrical Characteristics (SDHL Series of Inductors)

SDHL1608 Series of Inductors

Part Number	L (nH)	Q Min.	L, Q Test. Freq (MHz)	Q (Typ.) Freq. (MHz)						S.R.F (MHz) Min.	DCR (Ω) Max.	Ir (mA) Max.	Length (mm) [inch]
				100	300	500	800	1000	1800				
SDHL1608C10N□TF	10	8	100	10	22	28	35	39	45	>6000	0.6	500	1.60±0.15 [0.063±0.006]
SDHL1608C12N□TF	12	8	100	10	18	23	26	32	42	6000	0.7	500	
SDHL1608C15N□TF	15	8	100	12	22	28	35	39	42	5500	0.8	500	
SDHL1608C18N□TF	18	8	100	10	18	22	25	30	43	5200	0.9	300	
SDHL1608C22N□TF	22	8	100	12	21	27	34	37	37	5000	1.0	300	
SDHL1608C27N□TF	27	8	100	10	18	24	26	32	38	4800	1.2	300	
SDHL1608C33N□TF	33	8	100	12	21	27	33	35	31	4500	1.4	300	
SDHL1608C39N□TF	39	8	100	11	20	26	32	34	29	4000	1.5	200	
SDHL1608C47N□TF	47	8	100	12	20	26	31	34	27	3500	1.6	200	
SDHL1608C56N□TF	56	8	100	11	20	26	31	34	24	3000	1.8	200	
SDHL1608C68N□TF	68	8	100	10	18	21	24	28	20	2800	2.0	200	
SDHL1608C82N□TF	82	8	100	10	19	22	26	26	15	2500	2.2	200	
SDHL1608CR10□TF	100	8	100	10	19	24	27	25	-	2000	2.5	150	
SDHL1608CR12□TF	120	8	100	10	19	23	26	24	-	1600	2.8	150	
SDHL1608CR15□TF	150	8	100	10	18	24	26	23	-	1400	3.0	150	
SDHL1608CR18□TF	180	8	100	10	17	22	23	-	-	1000	3.4	150	

※□: Please specify the inductance tolerance: H=±3%, J=±5% or K=±10%.