

SPECIFICATIONS

Customer	
Product Name	Multi-layer Chip Ceramic Inductors
A-PLUS Part Number	SDCL0402H-01 Series
Customer Part Number	

New Released.
 Revised
SPEC No.: **SDCL03150000**

Rev.	Effective Date	Changed Contents	Change reasons	Approved By
01	/	New release	/	

【This SPEC is total 8 pages including specifications and appendix. 】
【RoHS Compliant Parts】

Approved By	Checked By	Issued By

A-PLUS POWER TECHNOLOGY CO., LTD.

【For Customer approval Only】 Date: Qualification Status:

Full
 Restricted
 Rejected

Approved By	Verified By	Re-checked By	Checked By

Comments:

1. Scope

This specification applies to SDCL0402H-01 series of multi-layer ceramic chip inductors.

2. Product Description and Identification (Part Number)

- 1) Description
SDCL0402H-01 series of multi-layer ceramic chip inductors.
- 2) Product Identification (Part Number)

SDCL
0402
H
XXX
□
◎
01
 ① ② ③ ④ ⑤ ⑥ ⑦

①	Type
SDCL	Ceramic Chip Inductor

②	External Dimensions (L X W) (mm)
0402 [01005]	0.4 X 0.2

③	Applications and Characteristics Code
Q	

④	Nominal Inductance
Example	Nominal Value
3N9	3.9nH
10N	10nH

⑤	Inductance Tolerance
B、C、S	±0.1、±0.2、±0.3nH
G、H、J	±2%、±3%、±5%

⑥	Packing
T	Tape Carrier Package

⑦	Serial Code
01	

3. Electrical Characteristics

Please refer to Appendix A (Page8).

- 1) Operating and storage temperature range (individual chip without packing): -55°C ~ +125°C,
- 2) Storage temperature range (packaging conditions): -10°C ~ +40°C 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.

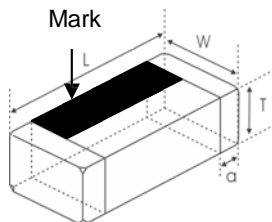


Fig. 4-1

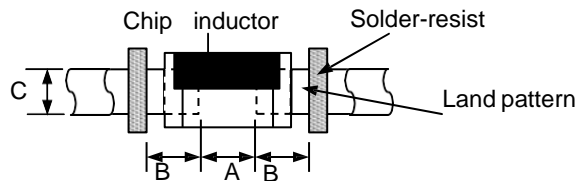


Fig. 4-2

[Table 4-1]

Unit: mm [inch]

Type	L	W	T	a	A	B	C
0402	0.4±0.02	0.2±0.02	0.2±0.02	0.08±0.025	0.15~0.19	0.18~0.22	0.18~0.22
[01005]	[.016±.0008]	[.008±.0008]	[.008±.0008]	[.003±.0010]			

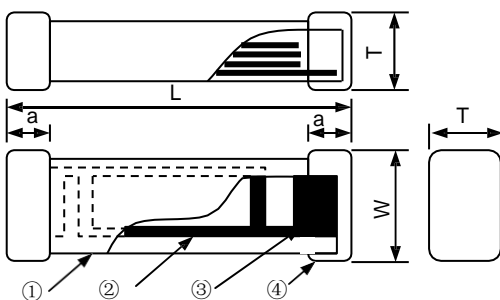


Fig. 4-3

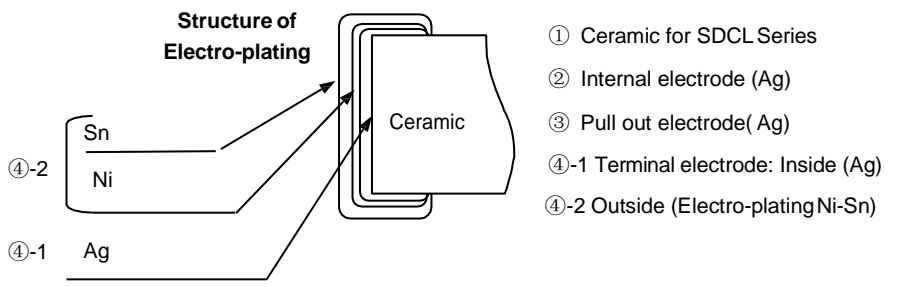


Fig. 4-4

- ① Ceramic for SDCL 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

4) Soldering Notice: The surface with the mark should be on the top side when soldering, but it is not necessary to identify the mark's direction towards left or right.

5. Test and Measurement Procedures

Test Conditions

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

- a. Ambient Temperature: $20 \pm 15^\circ\text{C}$
- b. Relative Humidity: $65 \pm 20\%$
- 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: $20 \pm 2^\circ\text{C}$
- b. Relative Humidity: $65 \pm 5\%$
- c. Air Pressure: 86KPa to 106 KPa

Visual Examination

- a. Inspection Equipment: 60 X magnifier

Electrical Test

DC Resistance (DCR)

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

Inductance (L)

- a. Refer to **Appendix A**.
- b. Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A+16196D orequivalent.
- c. Test signal: -20dBm or 50mV
- d. Test frequency refers to Appendix A.
- e. Short bar residual inductance=0.11nH

Q Factor (Q)

- a. Refer to **Appendix A**.
- b. Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A+16196D orequivalent.
- c. Test signal: -20dBm or 50mV
- d. Test frequency refers to Appendix A.

Self-Resonant Frequency (SRF)

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

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 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°C against chip initial surface temperature(Ta) (see **Fig. 5.3.5-2**).

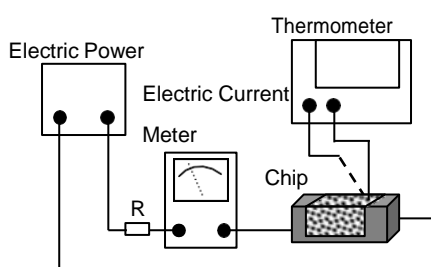


Fig. 5.3.5-1

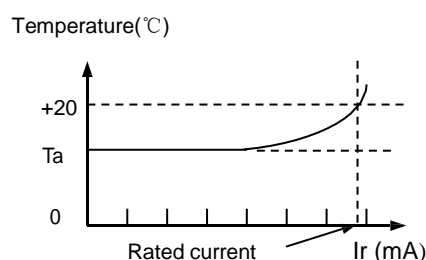
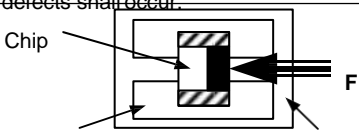
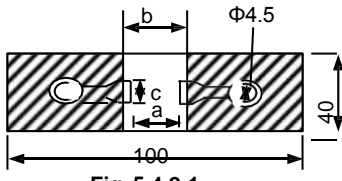
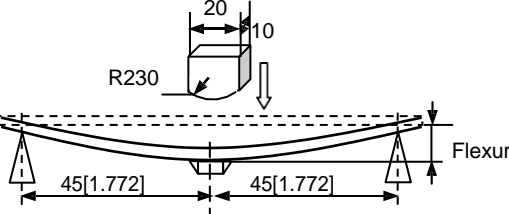
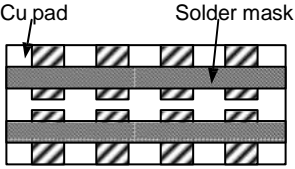
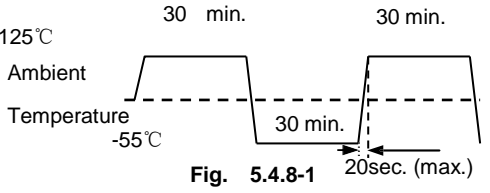


Fig. 5.3.5-2

5.4 Reliability Test

Items	Requirements	Test Methods and Remarks								
5.4.1 Terminal Strength	No removal or split of the termination or other defects shall occur.  Chip Mounting Pad Glass Epoxy Board Fig.5.4.1-1	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 1.5N force for SDCL0402H-01 series. ③ Keep time: 10±1s ④ Speed: 1.0mm/s.								
5.4.2 Resistance to Flexure	No visible mechanical damage. Unit: mm [inch] <table border="1" data-bbox="279 537 710 638"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>0402[01005]</td> <td>0.18</td> <td>0.8</td> <td>0.2</td> </tr> </tbody> </table>  Fig. 5.4.2-1	Type	a	b	c	0402[01005]	0.18	0.8	0.2	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
Type	a	b	c							
0402[01005]	0.18	0.8	0.2							
5.4.3 Vibration	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.  Cu pad Solder mask Glass Epoxy Board Fig. 5.4.3-1	① Solder the inductor to the testing jig (glass epoxy board shown in Fig. 5.4.3-1) using lead free 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).								
5.4.4 Dropping	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.	Drop chip inductor 10 times on a concrete floor from a height of 100 cm.								
5.4.5 Temperature	Inductance change should be within ±10% of initial value measuring at 20°C.	Temperature range: SDCL0402H-01: -55°C to +125°C, Reference temperature: +20°C								
5.4.6 Solderability	① No visible mechanical damage. ② Wetting shall exceed 95% coverage.	① Solder temperature: 240±2°C ② Duration: 3 sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight.								
5.4.7 Resistance to Soldering Heat	① No visible mechanical damage. ② Wetting shall exceed 75% coverage. ③ Inductance change: Within ±10%. ④ Q factor change: Within ±20%.	① Solder temperature: 260±3°C 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.								

<p>5.4.8 Thermal Shock</p>	<p>① No mechanical damage. ② Inductance change: Within $\pm 10\%$. ③ Q factor change: Within $\pm 20\%$.</p>  <p>Fig. 5.4.8-1</p>	<p>① Temperature, Time: (See Fig. 5.4.8-1) SDCL0402H-01: -55°C for 30 ± 3 min \rightarrow 125°C for 30 ± 3 min, 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.</p>
<p>5.4.9 Resistance to Low Temperature</p>	<p>① No mechanical damage. ② Inductance change: Within $\pm 10\%$. ③ Q factor change: Within $\pm 20\%$.</p>	<p>① Temperature: $-55\pm 2^{\circ}\text{C}$, ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1-2 hours before measuring.</p>
<p>5.4.10 Resistance to High Temperature</p>	<p>① No mechanical damage. ② Inductance change: Within $\pm 10\%$. ③ Q factor change: Within $\pm 20\%$.</p>	<p>① Temperature: $125\pm 2^{\circ}\text{C}$, ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1-2 hours before measuring.</p>
<p>5.4.11 Damp Heat (Steady States)</p>	<p>① No visible mechanical damage. ② Inductance change: Within $\pm 10\%$. ③ Q factor change: Within $\pm 20\%$.</p>	<p>① Temperature: $60\pm 2^{\circ}\text{C}$ 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.</p>
<p>5.4.12 Loading Under Damp Heat</p>	<p>① No visible mechanical damage. ② Inductance change: Within $\pm 10\%$. ③ Q factor change: Within $\pm 20\%$.</p>	<p>① Temperature: $60\pm 2^{\circ}\text{C}$ 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.</p>
<p>5.4.13 Loading at High Temperature (Life Test)</p>	<p>① No visible mechanical damage. ② Inductance change: Within $\pm 10\%$. ③ Q factor change: Within $\pm 20\%$.</p>	<p>① Temperature: $125\pm 2^{\circ}\text{C}$, 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.</p>

6. Packaging and Storage

Packaging

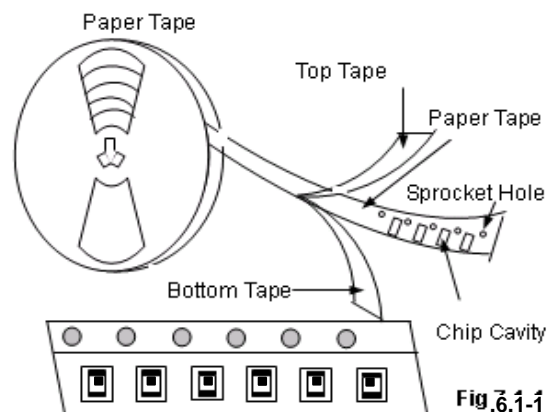
Tape Carrier Packaging:

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	0402[01005]
Thickness (mm)	0.2 \pm 0.02
Tape	Paper Tape
Quantity	20K

(1) Taping Drawings (Unit: mm)



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

8. Supplier Information

a) Supplier:

A-PLUS POWER TECHNOLOGY CO., LTD.

Appendix A: Electrical Characteristics (SDCL0402H-01 Series)

SDCL0402H-01 Series

Part Number 型号	Inductance 电感量	Min. Quality Factor 品质因子	L, Q Test Freq. L/Q 测试频率	Typical Q @ Freq. (GHz)					Min. Self-resonant Frequency 自谐振频率	Max. DC Resistance 直流电阻	Max. Rated Current 额定电流	Thickness 厚度
				0.5	0.8	1.8	2.0	2.4				
Units 单位	nH	-	MHz	-					MHz	Ω	mA	mm [inch]
Symbol 符号	L	Q	Freq	Q					SRF	DCR	I _r	T
SDCL0402H1N0□T01	1.0	8	500	10	12	19	21	23	11500	0.4	220	0.2±0.02 [.008±.0008]
SDCL0402H1N3□T01	1.3	8	500	10	12	19	21	23	11500	0.4	220	
SDCL0402H1N6□T01	1.6	8	500	10	12	19	21	23	11500	0.4	220	
SDCL0402H2N2□T01	2.2	8	500	9.5	11	18	20	22	7500	0.5	200	
SDCL0402H2N4□T01	2.4	8	500	9.5	11	18	20	22	7500	0.5	200	
SDCL0402H2N5□T01	2.5	8	500	9.5	11	18	20	22	7500	0.6	200	
SDCL0402H3N0□T01	3.0	8	500	9	11	19	20	22	7500	0.8	200	
SDCL0402H3N3□T01	3.3	8	500	9	11	18	20	22	7500	0.8	180	
SDCL0402H3N9□T01	3.9	8	500	9	11	18	19	21	7500	1.0	180	
SDCL0402H4N7□T01	4.7	8	500	9	11	19	20	22	6500	1.2	160	
SDCL0402H5N1□T01	5.1	8	500	9	11	18	19	20	6500	1.3	160	
SDCL0402H5N6□T01	5.6	8	500	10	12	17	22	24	6000	1.5	140	
SDCL0402H6N8□T01	6.8	8	500	10	11	16	20	23	5500	1.8	140	
SDCL0402H7N5□T01	7.5	8	500	10	13	17	22	24	4500	1.8	140	
SDCL0402H8N2□T01	8.2	8	500	10	12	16	20	21	4500	2.0	140	
SDCL0402H9N1□T01	9.1	8	500	10	13	17	21	23	4000	2.0	140	
SDCL0402H15N□T01	12	7	500	8	12	16	15	14	4000	3.0	140	
SDCL0402H16N□T01	16	7	500	8	11	13	12	11	2500	3.2	140	
SDCL0402H18N□T01	18	7	500	7.5	10	11	10	9	2500	3.2	140	

Note: □: Please specify the inductance tolerance. For L ≤ 4.2nH, choose B=±0.1nH, C=±0.2nH or S=±0.3nH; For 4.2nH < L < 5.6nH, choose, H=±3%, J=±5%. or S=±0.3nH; For L ≥ 5.6nH, choose, H=±3%, J=±5%