# SPECIFICATIONS

| | |
|---|---|
| **Customer** | |
| **Product Name** | **Multi-layer Chip Ceramic Inductor** |
| **Sunlord Part Number** | **SDCL1005-M01 Series** |
| **Customer Part Number** | |

**[☒New Released, ☐Revised]** **SPEC No.: SDCL02130000**

**【This SPEC is total 9 pages including specifications and appendix.】**

**【ROHS Compliant Parts】**

| Approved By | Checked By | Issued By |
|---|---|---|
| | | |

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**【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 |

## 1. Scope

This specification applies to SDCL1005-M01 series of multi-layer ceramic chip inductor.

## 2. Product Description and Identification (Part Number)

1) Description

SDCL series of multi-layer ceramic chip inductor.

2) Product Identification (Part Number)

| SDCL | 1005 | C | XXX | □ | ◎ | D | F | M01 |
|---|---|---|---|---|---|---|---|---|
| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ |

| ① Type | |
|---|---|
| SDCL | Chip Ceramic Inductor |

| ② External Dimensions (L X W) (mm) | |
|---|---|
| 1005 [0402] | 1.0 X 0.5 |

| ③ Material Code |
|---|
| C |

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

| ⑤ Inductance Tolerance | |
|---|---|
| S | ±0.3nH |
| J | ±5% |
| k | ±10% |

| ⑥ Packing | |
|---|---|
| T | Tape Carrier Package |

| ⑧ HSF Products |
|---|
| Hazardous Substance Free Products |

| ⑦ Internal Code |
|---|
| D |

| ⑨ Design Code |
|---|
| M01 |

## 3. Electrical Characteristics

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

1) Operating and storage temperature range (individual chip without packing): -55℃~ +125℃

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**.

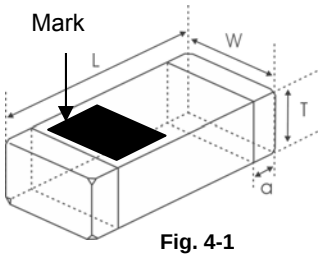



**Fig. 4-1**

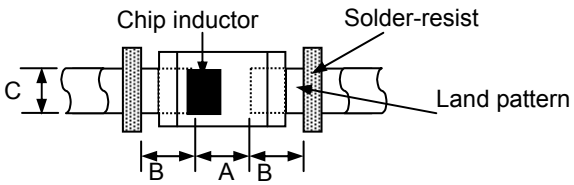



**Fig. 4-2**

**[Table 4-1]**

Unit: mm [inch]

| Type | L | W | T | a | A | B | C |
|---|---|---|---|---|---|---|---|
| 1005 [0402] | 1.0±0.15 [0.039±0.006] | 0.5±0.15 [0.020±0.006] | 0.5±0.15 [0.020±0.006] | 0.25±0.1 [0.010±0.004] | 0.45~0.55 | 0.40~0.50 | 0.45~0.55 |

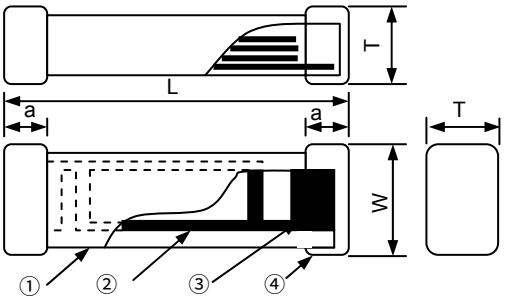



**Fig. 4-3**

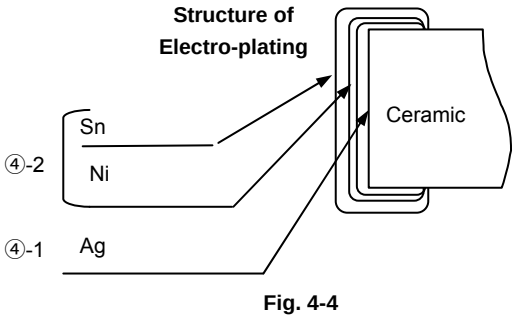



**Fig. 4-4**

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 |

## 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 or equivalent.

5.3.2 Inductance (L)

a. Refer to **Appendix A**.
b. Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A+HP16192Aor equivalent.
c. Test signal: -20dBm or 50mV
d. Test frequency refers to **Appendix A**.
e. Test compensation: product true value=test value + compensation value, the compensation value is -0.2nH.

5.3.3 Q Factor (Q)

a. Refer to **Appendix A**.
b. Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A+HP16192A or equivalent.
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): Ir is direct electric current as chip surface temperature rose just 20℃ against chip initial surface temperature(Ta) (see **Fig. 5.3.5-2**).

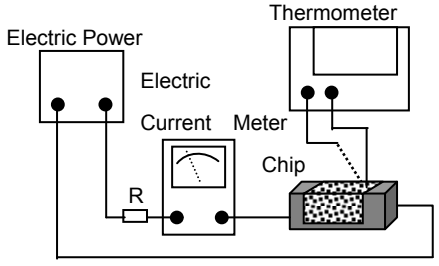



**Fig. 5.3.5-1**

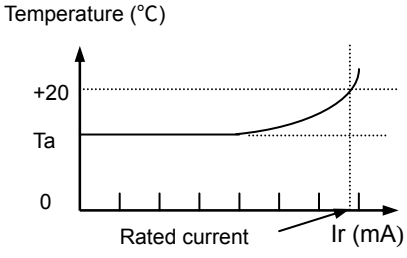
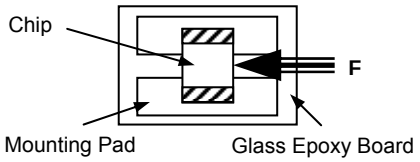
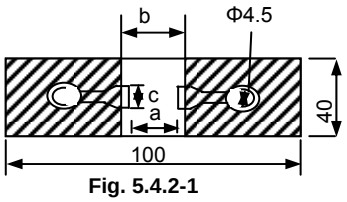
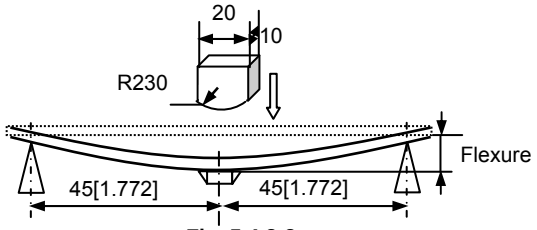
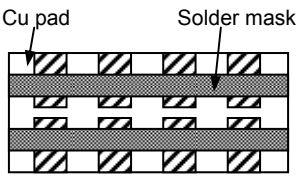
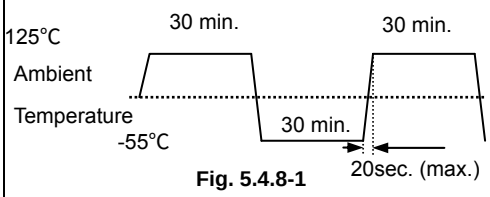



**Fig. 5.3.5-2**

**5.4 Reliability Test**

| Items | Requirements | Test Methods and Remarks |
|---|---|---|
| 5.4.1 Terminal Strength | No removal or split of the termination or other defects shall occur.<br>  <br><br>**Fig.5.4.1-1** | ① Solder the inductor to the testing jig (glass epoxy board shown in **Fig. 5.4.1-1**) using eutectic solder. Then apply a force in the direction of the arrow.<br>② 5N force for 1005 series.<br>③ Keep time: 10±1s Speed: 1.0mm/s. |
| 5.4.2 Resistance to Flexure | No visible mechanical damage.<br>Unit: mm [inch]<br>Type \| a \| b \| c<br>1005[0402] \| 0.4 \| 1.5 \| 0.5<br>  <br><br>**Fig. 5.4.2-1** | ① Solder the inductor to the test jig (glass epoxy board shown in **Fig. 5.4.2-1**) Using a eutectic solder. Then apply a force in the direction shown **Fig. 5.4.2-2.**<br>② Flexure: 2mm.<br>③ Pressurizing Speed: 0.5mm/sec.<br>④ Keep time: 30 sec.<br>  <br><br>**Fig. 5.4.2-2** |
| 5.4.3 Vibration | ① No visible mechanical damage.<br>② Inductance change: Within ±10%.<br>③ Q factor change: Within ±20%.<br>  <br><br>**Fig. 5.4.3-1** | ① Solder the inductor to the testing jig (glass epoxy board shown in **Fig. 5.4.3-1**) using eutectic solder.<br>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.<br>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). |
| 5.4.4 Dropping | ① No visible mechanical damage.<br>② Inductance change: Within ±10%.<br>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: -55°C to +125°C,<br>Reference temperature: 20°C |
| 5.4.6 Solderability | ① No visible mechanical damage.<br>② Wetting shall exceed 95% coverage | ① Solder temperture:240±2°C<br>② Duration: 3 sec.<br>③ Solder: Sn/3.0Ag/0.5Cu.<br>④ Flux: 25% Resin and 75% ethanol in weight. |
| 5.4.7 Resistance to Soldering Heat | ① No visible mechanical damage.<br>② Wetting shall exceed 95% coverage<br>③ Inductance change: Within ±10%.<br>④ Q factor change: Within ±20%. | ① Solder temperature: 260±3°C<br>② Duration: 5 sec.<br>③ Solder: Sn/3.0Ag/0.5Cu.<br>④ Flux: 25% Resin and 75% ethanol in weight.<br>⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring. |

| | | |
|---|---|---|
| 5.4.8<br>Thermal Shock | ① No mechanical damage.<br>② Inductance change: Within ±10%.<br>③ Q factor change: Within ±20%.<br>  <br><br>**Fig. 5.4.8-1** | ① Temperature, Time: (See **Fig. 5.4.8-1**)<br>-55°Cfor 30±3 min→125°C for 30±3min,<br>② Transforming interval: Max. 20 sec.<br>③ Tested cycle: 100 cycles.<br>④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. |
| 5.4.9<br>Resistance to Low Temperature | ① No mechanical damage.<br>② Inductance change: Within ±10%.<br>③ Q factor change: Within ±20%. | ① Temperature: -55±2°C,<br>② Duration: $1000^{+24}$ hours.<br>③ The chip shall be stabilized at normal condition for 1~2 hours before measuring. |
| 5.4.10<br>Resistance to High Temperature | ① No mechanical damage.<br>② Inductance change: Within ±10%.<br>③ Q factor change: Within ±20%. | ① Temperature: 125±2°C,<br>② Duration: $1000^{+24}$ hours.<br>③ The chip shall be stabilized at normal condition for 1~2 hours before measuring. |
| 5.4.11<br>Damp Heat (Steady States) | ① No visible mechanical damage.<br>② Inductance change: Within ±10%.<br>③ Q factor change: Within ±20%. | ① Temperature: 60±2°C<br>② Humidity: 90% to 95% RH.<br>③ Duration: $1000^{+24}$ hours.<br>④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. |
| 5.4.12<br>Loading Under Damp Heat | ① No visible mechanical damage.<br>② Inductance change: Within ±10%.<br>③ Q factor change: Within ±20%. | ① Temperature: 60±2°C<br>② Humidity: 90% to 95% RH.<br>③ Duration: $1000^{+24}$ hours.<br>④ Applied current: Rated current.<br>⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring. |
| 5.4.13<br>Loading at High Temperature (Life Test) | ① No visible mechanical damage.<br>② Inductance change: Within ±10%.<br>③ Q factor change: Within ±20%. | ① Temperature:125±2°C,<br>② Duration: $1000^{+24}$ hours.<br>③ Applied current: Rated current.<br>④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. |

## 6. Packaging and Storage

### 6.1 Packaging

Tape Carrier Packaging:

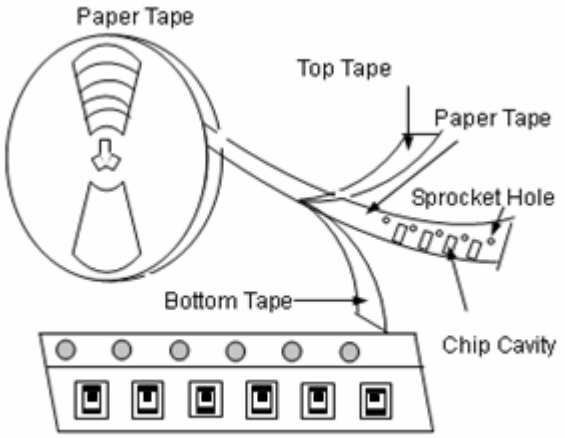
Packaging code: T

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 | 1005[0402] |
|---|---|
| T(mm) | 0.5±0.15 |
| Tape | Paper Tape |
| Quantity | 10K |

(1) Taping Drawings (Unit: mm)




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

**Fig. 6.1-1**

(2) Taping Dimensions (Unit: mm)

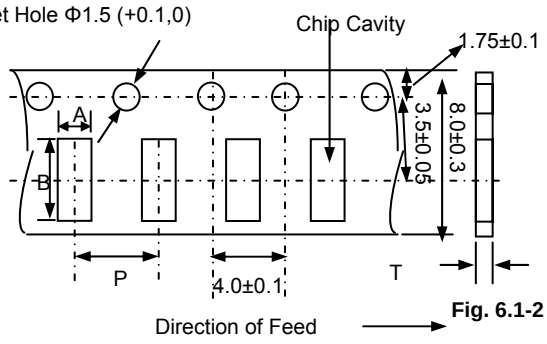



**Fig. 6.1-2**

Paper Tape

| Type | A | B | P | T max |
|---|---|---|---|---|
| 1005[0402] | 0.65±0.1 | 1.15±0.1 | 2.0±0.05 | 0.8 |

(3) Reel Dimensions (Unit: mm)

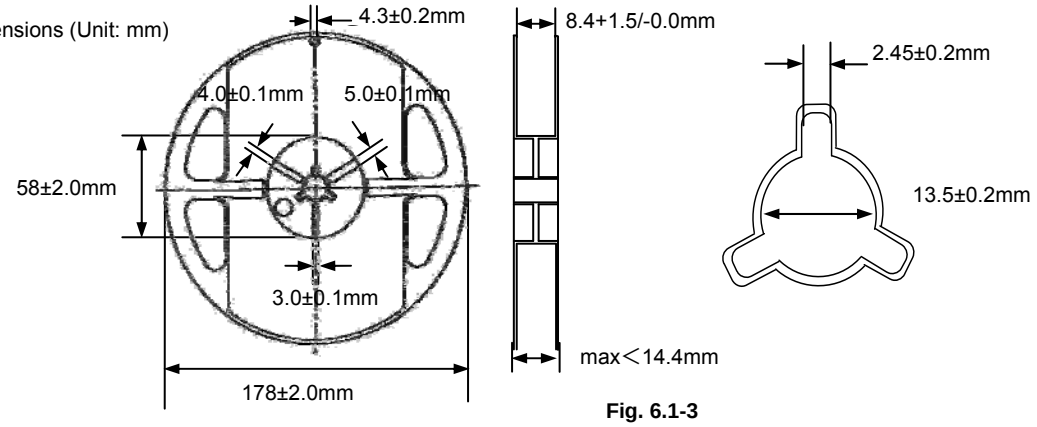



**Fig. 6.1-3**

**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°C 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 $H_2S$).

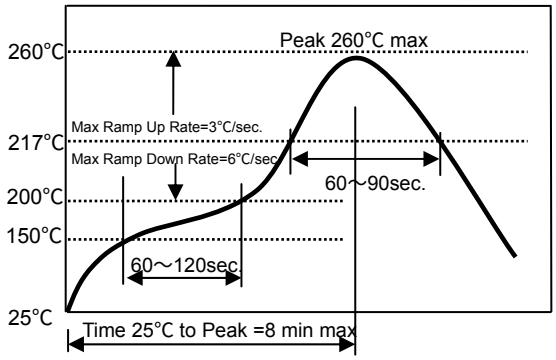
c. Packaging material may be deformed if package are stored where they are exposed to heat of direct sunlight.

d. Solderability specified in **Clause 5.4.6** shall be guaranteed for 12 months 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:

△ 1~2 ℃/sec. Ramp.
△ Pre-heating: 150~190°C/90±30 sec.
△ Time above 240°C: 20~40sec.
△ Peak temperature: 260°C Max. /10sec.
△ Solder paste: Sn/3.0Ag/0.5Cu.
△ Max.2 times for re-flowing.

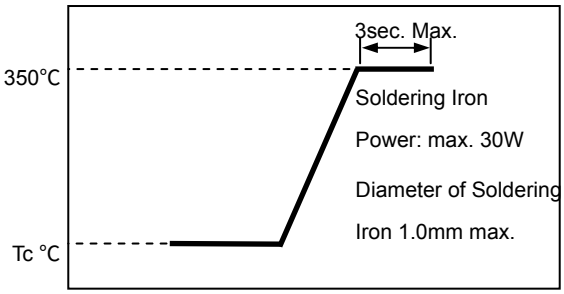



[Note: The reflow profile in the above table is only for qualification and is not meant to specify board assembly profiles. Actual board assembly profiles must be based on the customer's specific board design, solder paste and process, and should not exceed the parameters as the Reflow profile shows.]

### 7.2 Iron Soldering Profile.

△ Iron soldering power: Max.30W.
△ Pre-heating: 150 °C / 60 sec.
△ Soldering Tip temperature: 350°CMax.
△ 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.]




## 8. Supplier Information

a) Supplier:
**Shenzhen Sunlord Electronics Co., Ltd.**
b) Manufacturer:
**Shenzhen Sunlord Electronics Co., Ltd.**
c) Manufacturing Address:
**Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110**

**Appendix A: Electrical Characteristics**

**SDCL1005-M01 Series**

| 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. | Thickness (mm) [inch] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 100 | 800 | 1000 | | | | |
| SDCL1005C1N0STDFM01 | 1.0±0.3 | 8 | 100 | 11 | 34 | 36 | 10000 | 0.10 | 400 | 0.5±0.15 [.020±.006] |
| SDCL1005C1N1STDFM01 | 1.1±0.3 | 8 | 100 | 11 | 34 | 36 | 10000 | 0.10 | 400 | |
| SDCL1005C1N2STDFM01 | 1.2±0.3 | 8 | 100 | 11 | 34 | 36 | 10000 | 0.10 | 400 | |
| SDCL1005C1N3STDFM01 | 1.3±0.3 | 8 | 100 | 11 | 34 | 36 | 10000 | 0.10 | 400 | |
| SDCL1005C1N5STDFM01 | 1.5±0.3 | 8 | 100 | 11 | 34 | 36 | 6000 | 0.10 | 300 | |
| SDCL1005C1N6STDFM01 | 1.6±0.3 | 8 | 100 | 11 | 32 | 35 | 6000 | 0.10 | 300 | |
| SDCL1005C1N8STDFM01 | 1.8±0.3 | 8 | 100 | 11 | 30 | 34 | 6000 | 0.10 | 300 | |
| SDCL1005C2N0STDFM01 | 2.0±0.3 | 8 | 100 | 10 | 29 | 33 | 6000 | 0.20 | 300 | |
| SDCL1005C2N2STDFM01 | 2.2±0.3 | 8 | 100 | 10 | 29 | 33 | 6000 | 0.20 | 300 | |
| SDCL1005C2N4STDFM01 | 2.4±0.3 | 8 | 100 | 10 | 29 | 32 | 6000 | 0.20 | 300 | |
| SDCL1005C2N7STDFM01 | 2.7±0.3 | 8 | 100 | 10 | 29 | 32 | 6000 | 0.20 | 300 | |
| SDCL1005C3N0STDFM01 | 3.0±0.3 | 8 | 100 | 10 | 29 | 32 | 6000 | 0.20 | 300 | |
| SDCL1005C3N3STDFM01 | 3.3±0.3 | 8 | 100 | 10 | 29 | 32 | 6000 | 0.20 | 300 | |
| SDCL1005C3N6STDFM01 | 3.6±0.3 | 8 | 100 | 10 | 28 | 31 | 4000 | 0.20 | 300 | |
| SDCL1005C3N9STDFM01 | 3.9±0.3 | 8 | 100 | 10 | 28 | 31 | 4000 | 0.20 | 300 | |
| SDCL1005C4N3STDFM01 | 4.3±0.3 | 8 | 100 | 10 | 28 | 31 | 4000 | 0.20 | 300 | |
| SDCL1005C4N7STDFM01 | 4.7±0.3 | 8 | 100 | 10 | 28 | 31 | 4000 | 0.20 | 300 | |
| SDCL1005C5N1STDFM01 | 5.1±0.3 | 8 | 100 | 10 | 28 | 30 | 4000 | 0.30 | 300 | |
| SDCL1005C5N6STDFM01 | 5.6±0.3 | 8 | 100 | 10 | 28 | 30 | 4000 | 0.30 | 300 | |
| SDCL1005C6N2STDFM01 | 6.2±0.3 | 8 | 100 | 10 | 27 | 30 | 3900 | 0.30 | 300 | |
| SDCL1005C6N8□TDFM01 | 6.8 | 8 | 100 | 10 | 27 | 30 | 3900 | 0.30 | 300 | |
| SDCL1005C7N5□TDFM01 | 7.5 | 8 | 100 | 10 | 27 | 30 | 3700 | 0.40 | 300 | |
| SDCL1005C8N2□TDFM01 | 8.2 | 8 | 100 | 10 | 27 | 30 | 3600 | 0.40 | 300 | |
| SDCL1005C9N1□TDFM01 | 9.1 | 8 | 100 | 10 | 27 | 30 | 3400 | 0.40 | 300 | |
| SDCL1005C10N□TDFM01 | 10 | 8 | 100 | 10 | 27 | 30 | 3200 | 0.40 | 300 | |

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