Reference Specification

Product Name: GLE02H Series

GOL Part Number: Thin Film RF Inductor

Customer:

Halogen Free & RoHS Compliance

Customer Authorized Signature		
Approved By	Verified By	Checked By
Qualification Status:☐Full ☐Restricted ☐Rejected Date:_____		

HANG ZHOU GOL DEVICES Ltd			
Approved By	Checked By	Issued By	Customer Manager

Address:
Tel: Fax: E-Mail:

【Version change history】

Rev.	Effective Date	Changed Contents	Change reasons	Approved By
01	2024/10/15	New release	/	Dafu Lu

1. Scope

This reference specification applies to Thin Film RF inductor GLE02H□ series for general electronic equipment.

2. Part Number

G	L	E	02	H	1N0	B	P	G	01
GOL	Product ID	Manufacturing technique	Dimension (L × W)	Category	Inductance	Tolerance	Packaging P:paper tape B:Bulk	Application and characteristic	Version number

3. Electrical Characteristics

Operating Temperature. –55°C to +125°C

Storage Temperature. –55°C to +125°C

GOL Part Number	L/Q Test Freq	Inductance		Min. Quality	DC Resistance (Ω max)	Self Resonant Frequency (GHzMin.)	Rated Current (mA)
		L（nH）	Tolerance				
GLE02H0N2□PG01	500MHz	0.2	B/C	-	0.1	16.6	990.0
GLE02H0N3□PG01	500MHz	0.3	B/C	-	0.1	16.6	990.0
GLE02H0N4□PG01	500MHz	0.4	B/C	11.0	0.1	16.6	990.0
GLE02H0N5□PG01	500MHz	0.5	B/C	11.0	0.1	16.6	730.0
GLE02H0N6□PG01	500MHz	0.6	B/C	11.0	0.1	16.6	730.0
GLE02H0N7□PG01	500MHz	0.7	B/C	11.0	0.15	16.6	630.0
GLE02H0N8□PG01	500MHz	0.8	B/C	11.0	0.15	16.6	630.0
GLE02H0N9□PG01	500MHz	0.9	B/C	11.0	0.15	16.6	580.0
GLE02H1N0□PG01	500MHz	1.0	B/C	11.0	0.15	16.6	580.0
GLE02H1N1□PG01	500MHz	1.1	B/C	11.0	0.2	16.6	570.0
GLE02H1N2□PG01	500MHz	1.2	B/C	11.0	0.2	16.6	550.0
GLE02H1N3□PG01	500MHz	1.3	B/C	11.0	0.2	15.0	400.0
GLE02H1N4□PG01	500MHz	1.4	B/C	11.0	0.2	15.0	400.0
GLE02H1N5□PG01	500MHz	1.5	B/C	11.0	0.2	15.0	400.0
GLE02H1N6□PG01	500MHz	1.6	B/C	11.0	0.3	15.0	390.0
GLE02H1N7□PG01	500MHz	1.7	B/C	11.0	0.3	15.0	380.0
GLE02H1N8□PG01	500MHz	1.8	B/C	11.0	0.3	15.0	380.0
GLE02H1N9□PG01	500MHz	1.9	B/C	11.0	0.3	13.0	380.0
GLE02H2N0□PG01	500MHz	2.0	B/C	11.0	0.3	13.0	380.0
GLE02H2N1□PG01	500MHz	2.1	B/C	11.0	0.3	13.0	380.0
GLE02H2N2□PG01	500MHz	2.2	B/C	11.0	0.3	13.0	380.0
GLE02H2N3□PG01	500MHz	2.3	B/C	11.0	0.4	13.0	370.0
GLE02H2N4□PG01	500MHz	2.4	B/C	11.0	0.4	13.0	370.0
GLE02H2N5□PG01	500MHz	2.5	B/C	11.0	0.4	11.5	370.0
GLE02H2N6□PG01	500MHz	2.6	B/C	11.0	0.4	11.5	370.0
GLE02H2N7□PG01	500MHz	2.7	B/C	11.0	0.4	11.5	370.0
GLE02H2N8□PG01	500MHz	2.8	B/C	11.0	0.5	10.0	360.0
GLE02H2N9□PG01	500MHz	2.9	B/C	11.0	0.5	10.0	360.0
GLE02H3N0□PG01	500MHz	3.0	B/C	11.0	0.5	10.0	360.0
GLE02H3N1□PG01	500MHz	3.1	B/C	11.0	0.9	10.0	290.0
GLE02H3N2□PG01	500MHz	3.2	B/C	11.0	0.9	10.0	290.0
GLE02H3N3□PG01	500MHz	3.3	B/C	11.0	0.9	10.0	290.0

GLE02H3N4□PG01	500MHz	3.4	B/C	11.0	1.0	9.7	280.0
GLE02H3N5□PG01	500MHz	3.5	B/C	11.0	1.0	9.7	280.0
GLE02H3N6□PG01	500MHz	3.6	B/C	11.0	1.0	9.7	280.0
GLE02H3N7□PG01	500MHz	3.7	B/C	11.0	1.0	9.7	270.0
GLE02H3N8□PG01	500MHz	3.8	B/C	11.0	1.0	9.7	270.0
GLE02H3N9□PG01	500MHz	3.9	B/C	11.0	1.0	9.0	270.0
GLE02H4N0□PG01	500MHz	4.0	B/C	11.0	1.0	9.0	270.0
GLE02H4N1□PG01	500MHz	4.1	B/C	11.0	1.0	9.0	270.0
GLE02H4N2□PG01	500MHz	4.2	B/C	11.0	1.0	9.0	270.0
GLE02H4N3□PG01	500MHz	4.3	H/J	11.0	1.0	9.0	270.0
GLE02H4N7□PG01	500MHz	4.7	H/J	11.0	1.0	8.5	270.0
GLE02H5N1□PG01	500MHz	5.1	H/J	11.0	1.2	7.8	250.0
GLE02H5N6□PG01	500MHz	5.6	H/J	11.0	1.3	7.8	230.0
GLE02H6N2□PG01	500MHz	6.2	H/J	11.0	1.3	7.2	220.0
GLE02H6N8□PG01	500MHz	6.8	H/J	11.0	1.4	6.6	210.0
GLE02H7N5□PG01	500MHz	7.5	H/J	11.0	1.5	6.6	200.0
GLE02H8N2□PG01	500MHz	8.2	H/J	11.0	1.6	6.6	190.0
GLE02H9N1□PG01	500MHz	9.1	H/J	11.0	1.7	5.9	170.0
GLE02H10N□PG01	500MHz	10.0	H/J	11.0	1.7	5.5	170.0
GLE02H11N□PG01	500MHz	11.0	H/J	11.0	1.9	3.5	140.0
GLE02H12N□PG01	500MHz	12.0	H/J	11.0	2.1	3.5	140.0
GLE02H15N□PG01	500MHz	15.0	H/J	10.0	2.3	3.0	140.0
GLE02H18N□PG01	500MHz	18.0	H/J	9.0	2.5	2.5	140.0
GLE02H20N□PG01	500MHz	20.0	H/J	9.0	2.9	2.7	140.0
GLE02H22N□PG01	500MHz	22.0	H/J	9.0	3.2	2.3	120.0
GLE02H24N□PG01	500MHz	24.0	H/J	9.0	3.2	2.2	120.0
GLE02H27N□PG01	500MHz	27.0	H/J	9.0	3.5	2.0	120.0
GLE02H30N□PG01	500MHz	30.0	H/J	7.0	3.6	1.8	120.0
GLE02H33N□PG01	300MHz	33.0	H/J	7.0	3.8	1.8	120.0

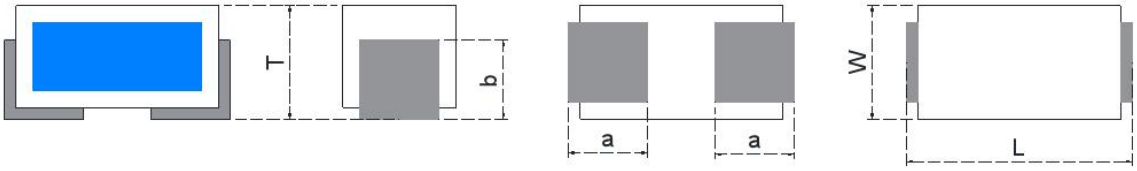
＊Typical value is actual performance.

Note□: Please specify the inductance tolerance. For L≤4.2nH, choose B=±0.1nH, C=±0.2nH; For L≥4.3nH, choose, H=±3%, J=±5%

4. Testing Conditions

Unless otherwise specified	Temperature: ordinary temperature (15°C to 35°C) Humidity: ordinary humidity [25% to 85% (RH)]
In case of doubt	Temperature: 20°C±2°C Humidity: 60% to 70% (RH) Atmospheric pressure: 86 kPa to 106 kPa

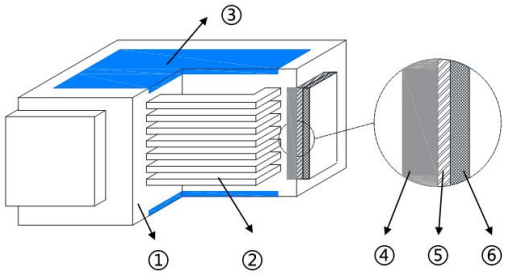
5. Appearance and Dimensions



Side surface identification marking(Both side) :Blue

Unit: mm

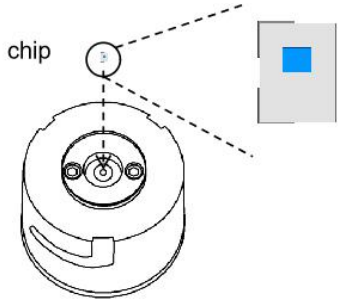
L	W	T	a	b
0.40±0.02	0.20±0.02	0.20±0.02	0.14±0.03	0.14±0.03



	Name	Material
①	Chip body	Dielectric glass ceramic
②	Internal coil	Ag
③	Marking	Dielectric glass ceramic
④	Terminal Electrodes (Base)	Ag
⑤	Terminal Electrodes (Plating)	Ni
⑥	Terminal Electrodes (Surface)	Sn

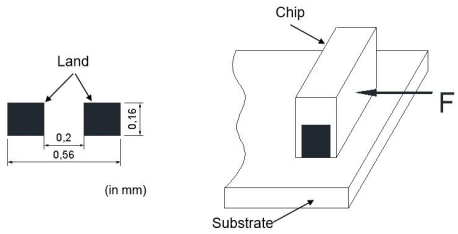
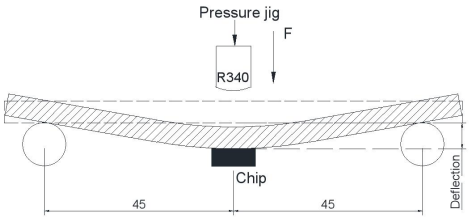
Unit mass (typical value): 0.050 mg

6. Electrical Performance

No.	Item	Specification	Test method
6.1	Inductance	Meet chapter 3 ratings.	Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A+16196D or equivalent. Test signal: -20dBm or 50mV Test frequency :Meet chapter 3 ratings. Short bar residual inductance=0.11nH Measurement example:  Product insertion hole: ø0.3 mm Measuring method: see "Electrical performance: Measuring method for inductance/Q" in the Appendix.
6.2	Q	Meet chapter 3 ratings.	
6.3	DC resistance	Meet chapter 3 ratings.	Measuring equipment: digital multimeter
6.4	Self-resonant frequency	Meet chapter 3 ratings.	Measuring equipment:Keysight N5080B or the equivalent

6.5	Rated current	Product temperature rise: 20°C max.	Apply the rated current specified in chapter 3.

7. Mechanical Performance

No.	Item	Specification	Test method
7.1	Terminal Strength	No significant mechanical damage or no sign of electrode peeling off shall be observed.	① Solder the inductor to the testing jig (glass epoxy board) using leadfree solder. Then apply a force in the direction of the arrow. ② 1N force for GLE02H series. ③ Keep time: 10±1s ④ Speed: ≤0.02mm/s. ⑤ The scratch tool shall be kept distance of 0.1mm from the board. 
7.2	Board Flex	No significant mechanical damage or no sign of electrode peeling off shall be observed.	① Test substrate: glass-epoxy substrate (100 mm × 40 mm × 0.8 mm) ② Pressurizing speed: 1 mm/s ③ Pressure jig: R340 ④ Deflection: 1 mm ⑤ Holding time: 30 s 
7.3	Vibration	Appearance shall have no significant mechanical damage. Inductance change rate: within ±10%	① Oscillation frequency: 10 Hz to 2000 Hz to 10 Hz, for approx. 20 min ② Total amplitude: total amplitude of 1.5 mm or acceleration amplitude of 196 m/s2, whichever is smaller ③ Test time: 3 directions perpendicular to each other, 2 h for each direction (6 h in total)
7.4	Solderability	90% or more of the outer electrode shall be covered with new solder seamlessly.	① Flux: immersed in ethanol solution with a rosin content ② of 25(wt)% for 5 s to 10 s ③ Solder: Sn-3.0Ag-0.5Cu solder ④ Pre-heating: 150°C±10°C/60 s to 90 s ⑤ Solder temperature: 240°C±5°C ⑥ Immersion time: 3 s±1 s
7.5	Resistance to soldering heat	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±10%	① Flux: immersed in ethanol solution with a rosin content of 25(wt)% for 5 s to 10 s ② Solder: Sn-3.0Ag-0.5Cu solder ③ Pre-heating: 150°C±10°C/60 s to 90 s ④ Solder temperature: 260°C±5°C ⑤ Immersion time: 5 s±1 s ⑥ Post-treatment: left at a room condition for 24 h±2 h

8. Environmental Performance

No.	Item	Specification	Test method
8.1	Heat resistance	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±10%	① Temperature: 125±2℃ ② Duration: 1000^{+24} hours. ③ Set for 24hours at room temperature, then measured.
8.2	Cold resistance	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±10%	① Temperature: -55°C±3°C ② Test time: 1000 h (+48 h, -0 h) ③ Post-treatment: left at a room condition for 24 h±2 h
8.3	Humidity	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±10%	① Temperature: 40°C±2°C ② Humidity: 90% (RH) to 95% (RH) ③ Test time: 1000 h (+48 h, -0 h) ④ Post-treatment: left at a room condition for 24 h±2 h
8.4	Temperature cycle	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±10%	Single cycle conditions: Step 1: -55°C±2°C/30 min±3 min Step 2: ordinary temperature/10 min to 15 min Step 3: +125°C±2°C/30 min±3 min Step 4: ordinary temperature/10 min to 15 min Number of testing: 10 cycles Post-treatment: left at a room condition for 24 h±2 h

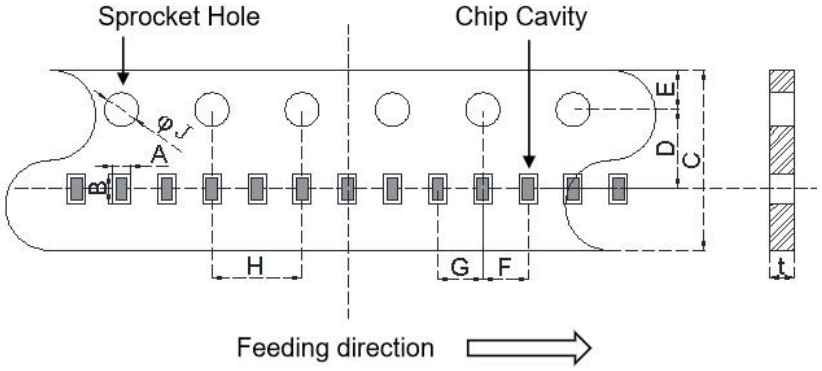
9. Specification of Packaging

9.1 Taping specifications

Packing quantity (Standard quantity)	20000 pcs/reel (carrier tape: 8 mm width, 2 mm pitch)

9.2 Appearance and dimensions of tape

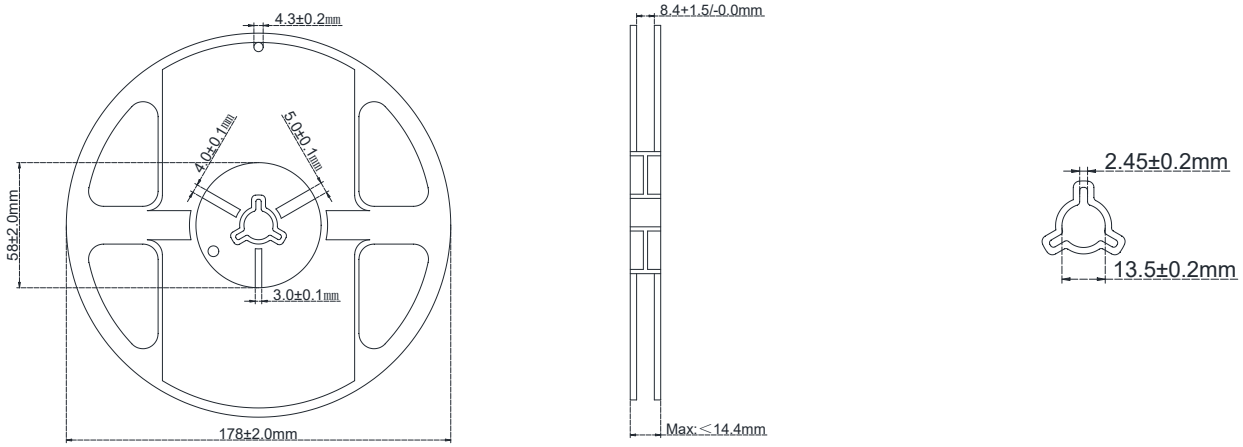
9.2.1 8 mm width/paper tape(F:2mm)



Unit[mm]

Type	A	B	C	D	E	F	G	H	φJ	t
01005	0.24±0.02	0.44±0.02	8.0±0.2	3.5±0.05	1.75±0.1	2.0±0.05	2.0±0.05	4.0±0.1	$1.5^{+0.1}_{-0}$	0.35 max

9.2.2 Reel Dimensions(Unit: mm)



10. Caution

The products in this specification are only applicable to general electronic equipment. The products have not been verified for the following applications, please contact us in advance if you want to use it for the following applications. These applications require particularly high reliability in order to prevent defects which may directly cause damage to the third party's life, body or property. Please understand that we will not be liable for any damage or liability resulting from the use of the products in the following applications.

①Aircraft equipment ②Aerospace equipment ③Undersea equipment
④Atomic energy-related equipment ⑤Military equipment ⑥Medical equipment
⑦Traffic signal equipment ⑧Disaster prevention/crime prevention equipment
⑨Data-processing equipment ⑩Transportation equipment (vehicles, trains, ships, etc.)
⑪Applications of similar complexity and/or reliability requirements to the applications listed in the above

11. Precautions for Use

① Pre-heating should be in such a way that the temperature difference between solder and product surface is limited to 150°C max.

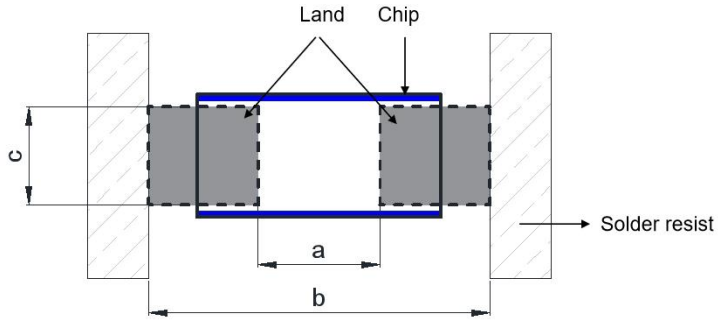
② Cooling into solvent after soldering also should be in such a way that the temperature difference is limited to 100°C max.

③ Insufficient pre-heating may cause cracks on the product, resulting in the deterioration of product quality.

④ Do not perform reworking with a soldering iron on this product.

11.1 Land dimensions

The following diagram shows the recommended land dimensions for reflow soldering:



		Unit: mm
a	b	c
0.2	0.56	0.16

11.2 Flux and solder used

① Use a rosin-based flux.

② Do not use a highly acidic flux with a halide content exceeding 0.2(wt)% (chlorine conversion value).

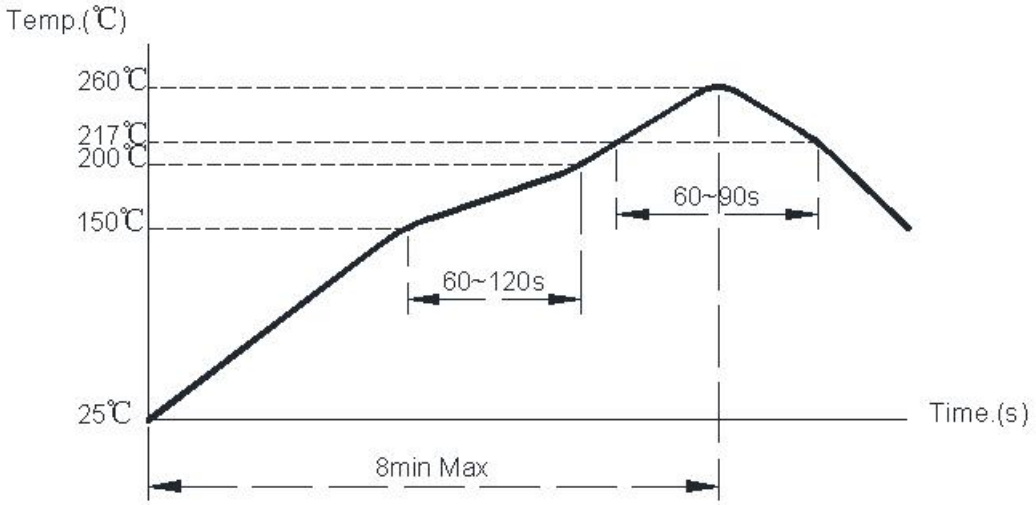
③ Do not use a water-soluble flux.

④ Use Sn-3.0Ag-0.5Cu solder.

⑤ Standard thickness of solder paste: 50 μm to 65 μm

11.3 Soldering conditions (reflow)

	Profile
Pre-heating	150℃ to 180℃ 90s±30s
Heating	Above 217℃ 60s to 90s
Max temp	260℃
Number of reflow cycles	2 times



Storage period：Use the product within 12 months after delivery. If you do not use the product for more than 12 months, check solderability before using it.

12. Note

Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.

You are requested not to use our product deviating from the reference specifications.

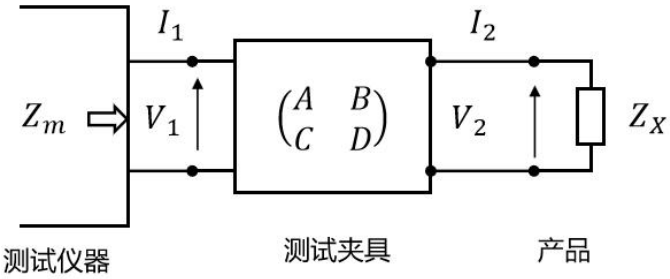
The contents of this reference specification are subject to change without advance notice. Please approve our product specifications or transact the approval sheet for product specifications before ordering.

Appendix:Measuring Method of Inductance

Electrical performance: Measuring method for inductance/Q (Q measurement is applicable only when the Q value is included in the rating table.)

Perform measurement using the method described below. (Perform correction for the error deriving from the measuring terminal.)

(1) Residual elements and stray elements of the measuring terminal can be expressed by the F parameter for the 2-pole terminal as shown in the figure below.



$$\begin{pmatrix} V_1 \\ I_1 \end{pmatrix} = \begin{pmatrix} A & B \\ C & D \end{pmatrix} \begin{pmatrix} V_2 \\ I_2 \end{pmatrix}$$

The product's impedance value (Zx) and measured impedance value (Zm) can be expressed as shown below, by using the respective current and voltage for input/output.

$$Z_m = \frac{V_1}{I_1} \qquad Z_X = \frac{V_2}{I_2}$$

Thus, the relationship between the product's impedance value (Zx) and measured impedance value (Zm) is as follows.

$$Z_X = \frac{D}{A}\frac{Z_m - \frac{B}{D}}{1 - Z_m\frac{C}{A}}$$

$$D/A = 1$$

$$B/D = Z_{sm} - \left(1 - \frac{C}{A}Z_{sm}\right)Z_{ss}$$

Z_{sm}:measured impedance of short chip,

Z_{ss}:residual impedance of short chip (0.110 nH),

$\frac{C}{A}$:measured admittance when measuring terminal is open

Calculate inductance Lx and Qx using the equations shown below.

$$L_x = \frac{im(Z_x)}{2\pi f} \qquad Q_x = \frac{im(Z_x)}{Re(Z_x)}$$