SPECIFICATIONS

Customer	
Product Name	**Thin Film RF Inductor**
Sunlord Part Number	**UHQ0402SL-P01 Series**
Customer Part Number	

[☒New Released, ☐Revised] **SPEC No.: UHQ02250003**

【This SPEC is total 12 pages. 】
【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	Sep.26,2025	New release	/	Jieyong Qin

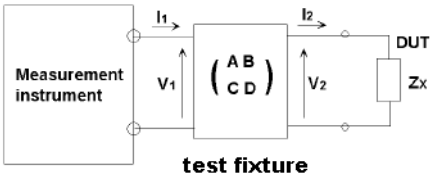
Caution

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 Super 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

Measuring Method of Inductance

a. Residual elements and stray elements of test fixture can be described by F-parameter as shown in the following:



test fixture

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

$$\begin{bmatrix} V_1 \\ I_1 \end{bmatrix} = \begin{bmatrix} AV_2 + BI_2 \\ CV_2 + DI_2 \end{bmatrix}$$

Measured open impedance: $Zom = \frac{A}{C}$

Measured short impedance: $Zsm = \frac{B}{D} \approx -Zsc$ (when uses short chip to short)

Measured short ship impedance: Zsc

Measured value: $Zxm=V_1/I_1$

Impedance of DUT: $Zx=V_2/I_2$

b. The relation between Zx and Zom, Zsm, Zxm is shown in the following:

$$Zx = \frac{V_2}{I_2} = \frac{D}{A} * \frac{\frac{V_1}{I_1} - \frac{B}{D}}{1 - \frac{V_1}{I_1} * \frac{C}{A}} = \frac{D}{A} * \frac{Zxm - \frac{B}{D}}{1 - Zxm * \frac{C}{A}} = \frac{D}{A} * \frac{Zxm - Zsm}{1 - Zxm / Zom}$$

c. Lx should be calculated with the following equation:

$$Lx = \frac{\mathrm{Im}(Zx)}{2\pi f} = \frac{\mathrm{Im}(Zxm + Zsc)}{2\pi f} = \frac{\mathrm{Im}(Zxm)}{2\pi f} + \frac{\mathrm{Im}(Zsc)}{2\pi f} = Lxm + Lsc$$

Lxm：Measured chip inductor inductance

Lsc：Measured short chip inductance

Lx：Nominal Inductance of chip inductor

Compensation Value（Lsc）of Short Chip

Series	Compensation Value
UHQ0402SL-P01	0.19nH

1. Scope

This specification applies to UHQ0402SL-P01 Series of thin film radio frequency inductor.

2. Product Description and Identification (Part Number)

1) Description

UHQ0402SL Series of thin film radio frequency inductor.

2) Product Identification (Part Number)

UHQ	0402	SL	XXX	□	P	01
①	②	③	④	⑤	⑥	⑦

① Type	
UHQ	Super Q Ceramic Chip Inductor

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

③ Applications and Characteristics Code	
SL	Chip Thickness=0.23mm

④ Nominal Inductance	
Example	Example
3N9	3N9
10N	10N

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

⑥ Packing	
P	Plastic Tape Carrier Package

⑦ Serial Code	
01	Internal code

3. Electrical Characteristics

Please refer to **Appendix A** (Page9-10).

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**.

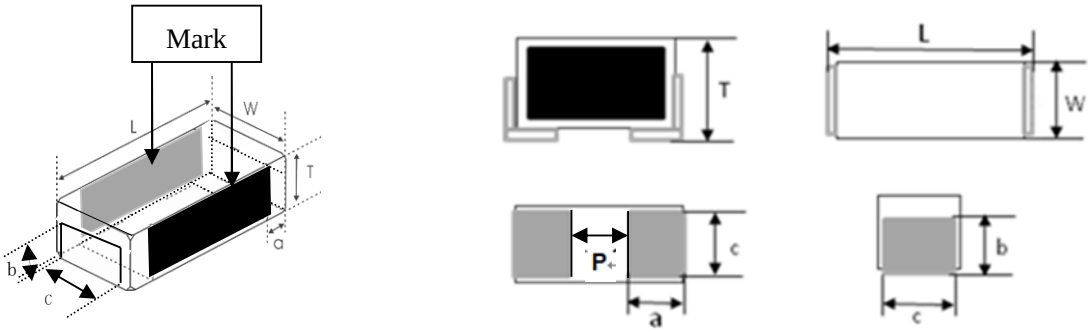


Fig. 4-1

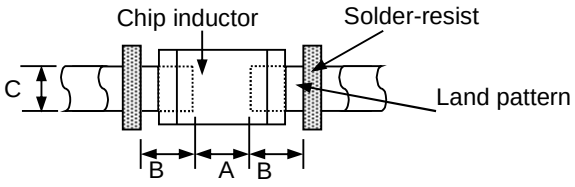
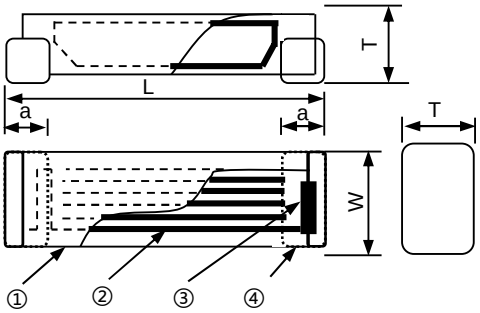


Fig. 4-2

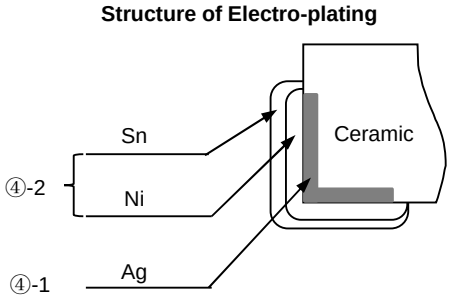
[Table 4-1]

Unit: mm [inch]

Type	L	W	T	a	b	c	P	A	B	C
0402 [01005]	0.4±0.02 [.016±.0008]	0.2±0.02 [.008±.0008]	0.23±0.02 [.009±.0008]	0.14±0.03 [.006±.0012]	0.14±0.03 [.006±.0012]	0.17±0.03 [.007±.0012]	0.12~0.16	0.15~0.19	0.18~0.22	0.18~0.22



[Fig 4-3]



[Fig 4-4]

① Ceramic for UHQ 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	Silver Paste
④-2	Electro-Plating: Ni/Sn plating	Plating Chemicals

4) Soldering Notice: The surface with the mark should be on the two beside when soldering

5. Test and Measurement Procedures

5.1 Test Conditions

5.1.1 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

5.1.2 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

5.2 Visual Examination

a. Inspection Equipment: 60 X magnifier

5.3 Electrical Test

5.3.1 DC Resistance (DCR)

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

5.3.2 Inductance (L)

a. Refer to **Appendix A**.
b. Test equipment: Super Accuracy RF Impedance /Material Analyzer-E4991B+16198A or equivalent.
c. Test signal: -20dBm or 50mV
d. Test frequency refers to **Appendix A**.
e. Short bar residual inductance=0.19nH

5.3.3 Q Factor (Q)

a. Refer to **Appendix A**.
b. Test equipment: Super Accuracy RF Impedance /Material Analyzer-E4991B+16198A 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: -20 dBm 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 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. 5.3.5-2**).

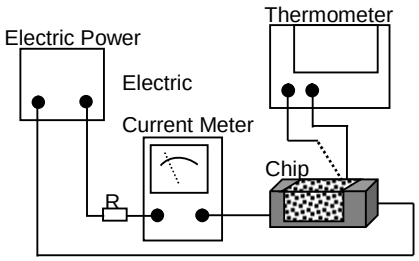


Fig. 5.3.5-1

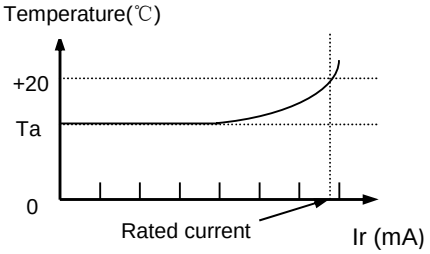
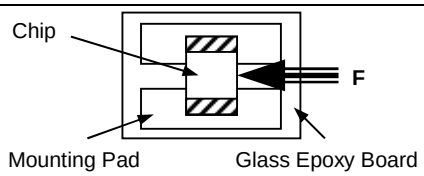
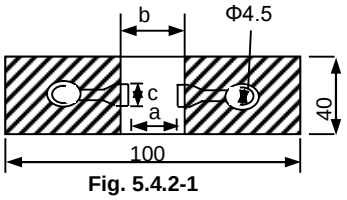
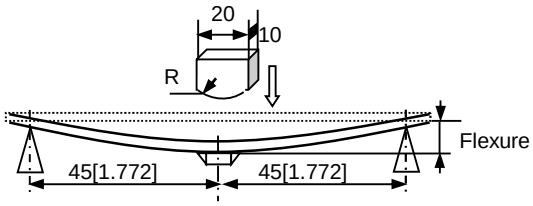
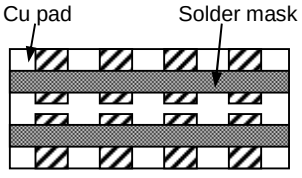
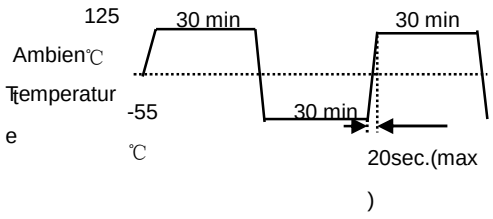


Fig. 5.3.5-2

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.  **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 Test position: the test head is placed at the midpoint of the product thickness direction. ③ 1N force for UHQ0402SL-P01 series. ④ Keep time: 10±1s ⑤ Speed: 1.0mm/s.
5.4.2 Resistance to Flexure	No visible mechanical damage. Unit: mm [inch] Type / a / b / c 0402[01005] / 0.18 / 0.8 / 0.2  **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 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**
5.4.3 Vibration	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.  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 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).
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℃.	Temperature range: UHQ0402SL-P01: -55℃ to +125℃, Reference temperature: +20℃
5.4.6 Solderability	① No visible mechanical damage. ② Wetting shall exceed 95% coverage.	① Solder temperture:240±2℃ 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℃ 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.

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**) UHQ0402SL-01: -55℃ for 30±3 min→125℃ 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: -55±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 Super Temperature	① No mechanical damage. ② Inductance change: Within ±10%. 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.
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 Super Temperature (Life Test)	① No visible mechanical damage. ② Inductance change: Within ±10%. 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.

6. Packaging and Storage

6.1 Packaging

Tape Carrier Packaging:

Packaging code: P

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

b. Plastic tape and Cover tape has no spliced point.

c. Missing components number within 0.01% of the number per reel or 1 pcs. whichever is greater, and are not continuous. The Specified quantity per reel is kept

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

Type	0402[01005]
Thickness (mm)	0.23±0.02
Tape	Plastic Tape
Quantity	30K

(1) Taping Drawings (Unit: mm)

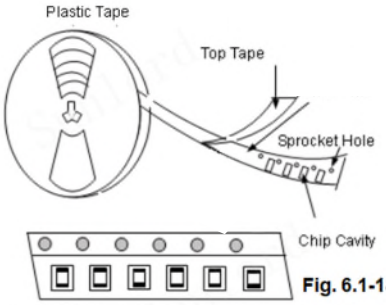


Fig. 6.1-1

③ **Remark:** The sprocket holes are to the right as the tape is pulled toward the user.

(2) Taping Dimensions (Unit: mm)

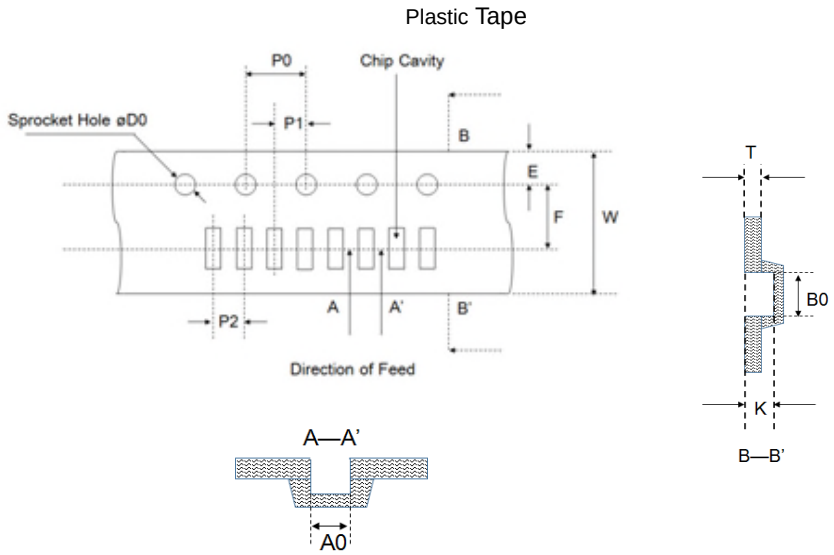


Fig. 6.1-2

Table 6.1-1 Unit:mm

Type	A0	B0	T	W	K	P0	P1	P2	D0	F	E
0402	0.24± 0.02	0.44± 0.02	0.2± 0.05	4.0± 0.05	0.27± 0.02	2.0± 0.04	1.0± 0.03	1.0± 0.03	0.80± 0.04	1.8± 0.03	0.9± 0.05

(1) Reel Dimensions (Unit: mm)

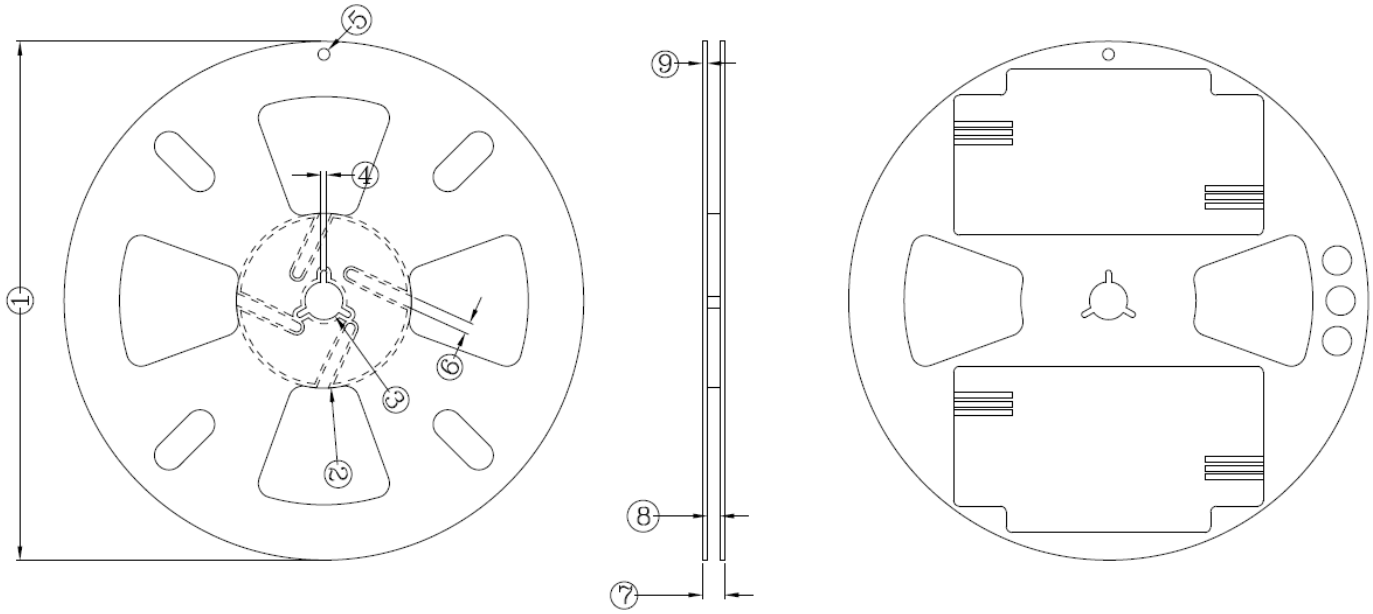


Fig. 6.1-3

Table 6.1-2 Unit:mm

①	②	③	④	⑤	⑥	⑦	⑧	⑨
178±1.0	60±1.0	13±0.3	2.0±0.5	4±0.2	4±0.5	7.5±1	4.5±0.5	1.5±0.3

6.2 Storage

a. The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to Super 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.

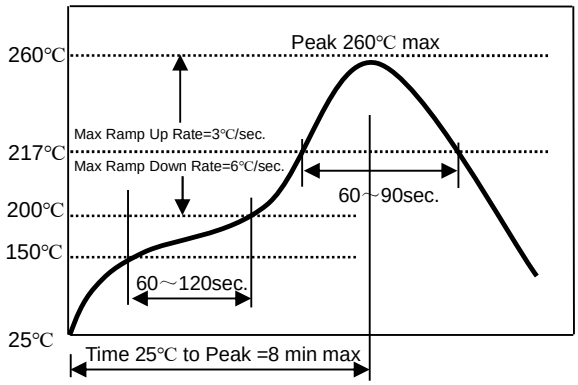
d. Solderability specified in **Clause 5.4.6** shall be guaranteed for *12* months from the date of delivery on condition that they are stored at the environment specified in **Clause 3**. For those parts, which passed more than *12* months shall be checked solder-ability before use.

7. Recommended Soldering Technologies

7.1 Reflow Profile

△ Preheat condition: 150 ~200℃/60~120sec.
△ Allowed time above 217℃: 60~90sec.
△ Max temp: 260℃
△ Max time at max temp: 10sec.
△ Solder paste: Sn/3.0Ag/0.5Cu
△ Allowed Reflow time: 2x max

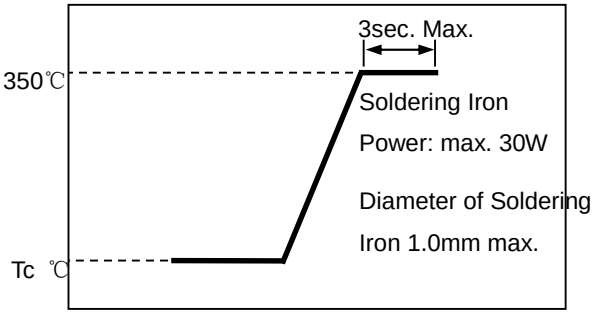
[Note: The reflow profile in the above table is only for qualification and is not meant to specify board assembly profiles. Actual board assembly profiles must be based on the customer's specific board design, solder paste and process, and should not exceed the parameters as the Reflow profile shows.]



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.]



8. Appendix A: Electrical Characteristics (UHQ0402SL Series of Inductors)

UHQ0402SL-P01 **Series of Inductor**

Part Number	Inductance	Min. Quality Factor	L, Q Test Freq . L/Q	Typical Q @ Freq. (GHz)					Min .Self-resonant Frequency	Max. DC Resistance	Max .Rated Current	Thickness
				0.5	0.8	1.8	2.0	2.4				
Units	nH	-	MHz	-					MHz	Ω	mA	mm [inch]
Symbol	L	Q	Freq	Q					S.R.F	DCR	Ir	T
UHQ0402SL0N3□P01	0.3		500	-	-	-	-	-	19000	0.01	1000	
UHQ0402SL0N4□P01	0.4		500	-	-	-	-	-	19000	0.02	990	
UHQ0402SL0N5□P01	0.5		500						19000	0.11	630	
UHQ0402SL0N6□P01	0.6	14	500	28	31	44	51	60	19000	0.05	630	
UHQ0402SL0N7□P01	0.7	14	500	28	31	44	47	56	19000	0.05	630	
UHQ0402SL0N8□P01	0.8	14	500	28	31	44	47	56	19000	0.04	630	
UHQ0402SL0N9□P01	0.9	14	500	28	31	44	47	56	18000	0.05	630	
UHQ0402SL1N0□P01	1.0	14	500	25	28	42	45	52	18000	0.06	630	
UHQ0402SL1N1□P01	1.1	14	500	25	28	42	45	52	18000	0.09	630	
UHQ0402SL1N2□P01	1.2	14	500	25	28	42	45	52	16000	0.08	630	
UHQ0402SL1N3□P01	1.3	14	500	22	26	41	44	48	16000	0.08	630	
UHQ0402SL1N4□P01	1.4	14	500	22	26	41	44	48	16000	0.08	630	
UHQ0402SL1N5□P01	1.5	14	500	22	25	39	42	47	15000	0.10	580	0.23±0.02
UHQ0402SL1N6□P01	1.6	14	500	22	26	40	43	48	15000	0.09	580	[.009±.0008]
UHQ0402SL1N7□P01	1.7	14	500	22	26	40	43	48	15000	0.12	580	
UHQ0402SL1N8□P01	1.8	14	500	22	25	39	42	47	14000	0.14	580	
UHQ0402SL1N9□P01	1.9	14	500	22	25	39	42	47	14000	0.13	580	
UHQ0402SL2N0□P01	2.0	14	500	22	25	39	42	47	14000	0.18	550	
UHQ0402SL2N1□P01	2.1	14	500	22	25	39	42	47	14000	0.17	550	
UHQ0402SL2N2□P01	2.2	14	500	22	25	39	42	47	14000	0.20	390	
UHQ0402SL2N3□P01	2.3	14	500	22	25	39	42	47	14000	0.14	390	
UHQ0402SL2N4□P01	2.4	14	500	21	25	38	41	47	13000	0.14	390	
UHQ0402SL2N5□P01	2.5	14	500	21	25	38	41	47	11000	0.15	390	
UHQ0402SL2N6□P01	2.6	14	500	21	25	38	41	47	11000	0.14	390	
UHQ0402SL2N7□P01	2.7	14	500	21	25	38	41	47	11000	0.19	390	
UHQ0402SL2N8□P01	2.8	14	500	21	25	38	41	47	11000	0.18	390	

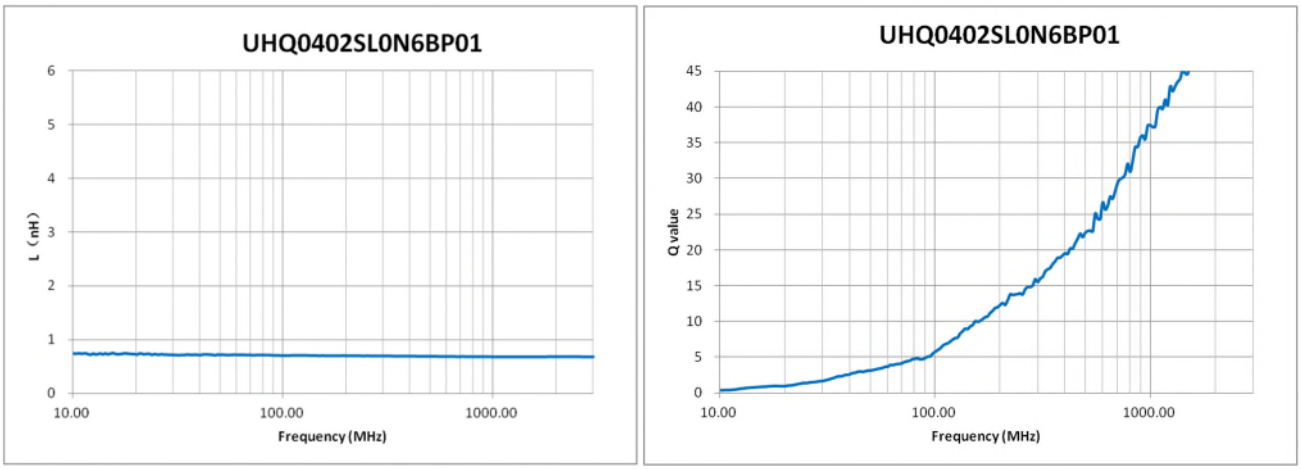
UHQ0402SL2N9□P01	2.9	14	500	21	25	38	41	47	11000	0.18	390	
UHQ0402SL3N0□P01	3.0	14	500	21	25	38	41	47	10000	0.23	380	
UHQ0402SL3N1□P01	3.1	14	500	21	25	38	41	46	9500	0.24	380	
UHQ0402SL3N2□P01	3.2	14	500	20	25	38	41	46	9500	0.24	380	
UHQ0402SL3N3□P01	3.3	14	500	20	24	36	40	44	8800	0.24	380	
UHQ0402SL3N4□P01	3.4	14	500	20	24	36	40	44	8800	0.22	380	
UHQ0402SL3N5□P01	3.5	14	500	20	24	36	40	44	8800	0.21	380	
UHQ0402SL3N6□P01	3.6	14	500	20	24	36	40	44	7500	0.21	380	
UHQ0402SL3N7□P01	3.7	14	500	20	24	35	38	42	7500	0.24	380	
UHQ0402SL3N8□P01	3.8	14	500	20	24	35	38	42	7500	0.213	380	
UHQ0402SL3N9□P01	3.9	14	500	20	24	35	38	42	7500	0.225	380	
UHQ0402SL4N0□P01	4.0	14	500	20	24	35	38	42	6500	0.29	370	
UHQ0402SL4N1□P01	4.1	14	500	20	24	35	38	42	6500	0.34	370	
UHQ0402SL4N2□P01	4.2	14	500	20	24	35	38	42	6500	0.33	370	
UHQ0402SL4N3□P01	4.3	14	500	20	24	35	38	42	6000	0.25	370	
UHQ0402SL4N7□P01	4.7	14	500	19	23	34	37	39	6000	0.35	360	
UHQ0402SL5N1□P01	5.1	14	500	19	23	34	37	39	6000	0.51	270	
UHQ0402SL5N6□P01	5.6	14	500	19	23	34	37	39	5500	0.42	270	
UHQ0402SL6N2□P01	6.2	14	500	18	24	33	35	37	5500	0.42	270	
UHQ0402SL6N8□P01	6.8	14	500	18	24	33	35	37	5500	0.52	270	
UHQ0402SL7N5□P01	7.5	14	500	18	24	33	35	37	5500	0.60	270	
UHQ0402SL8N2□P01	8.2	14	500	18	24	32	34	35	4500	0.65	270	
UHQ0402SL9N1□P01	9.1	14	500	18	24	32	34	35	4500	0.79	210	
UHQ0402SL10N□P01	10	14	500	18	24	32	34	35	4500	0.85	200	
UHQ0402SL11N□P01	11	14	500	18	24	32	34	35	4500	0.75	200	
UHQ0402SL12N□P01	12	14	500	18	24	31	33	32	4300	0.81	200	
UHQ0402SL13N□P01	13	13	500	17	23	30	32	31	4300	1.03	170	
UHQ0402SL14N□P01	14	13	500	17	22	30	31	31	4000	1.15	140	
UHQ0402SL15N□P01	15	13	500	17	22	29	31	30	3500	1.12	140	
UHQ0402SL16N□P01	16	13	500	17	22	29	31	30	3500	1.38	140	
UHQ0402SL18N□P01	18	13	500	17	21	27	30	29	3500	1.72	120	
UHQ0402SL19N□P01	19	13	500	17	21	27	30	29	3000	1.74	120	
UHQ0402SL20N□P01	20	12	500	17	20	26	27	25	3000	1.72	120	
UHQ0402SL22N□P01	22	12	500	17	20	26	27	25	3000	1.76	120	

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%

TYPICAL ELECTRICAL CHARACTERISTICS

Inductance-Frequency Characteristics(Typ.) Q-Frequency Characteristics(Typ.)

UHQ0402SL0N6BP01



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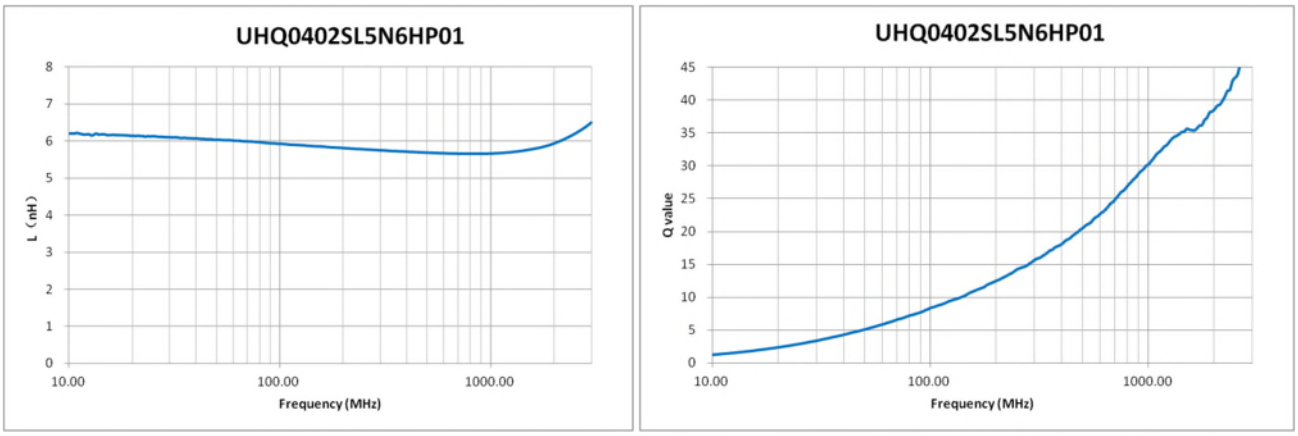

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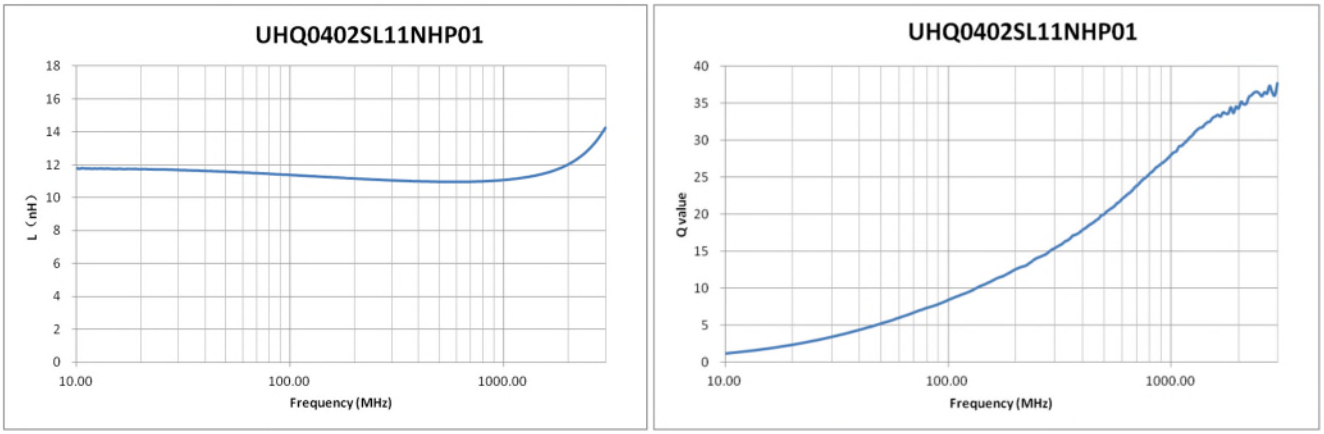

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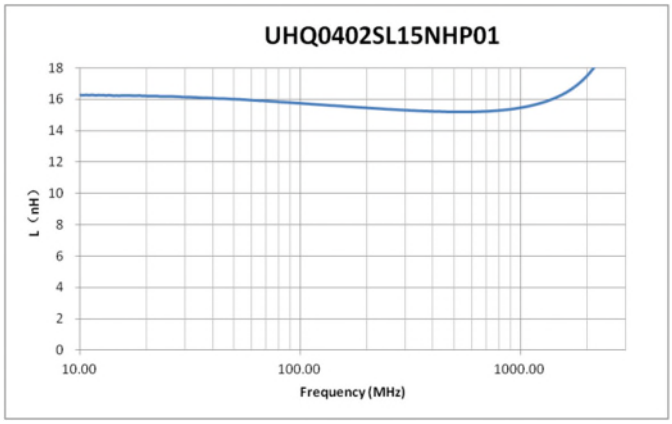

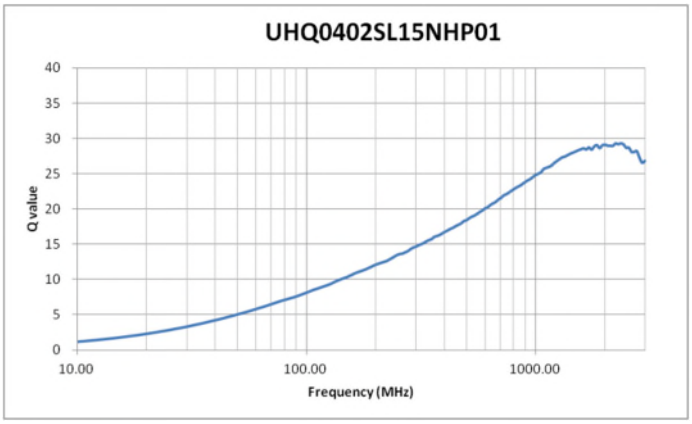

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