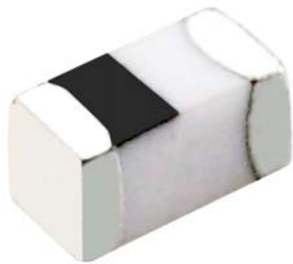
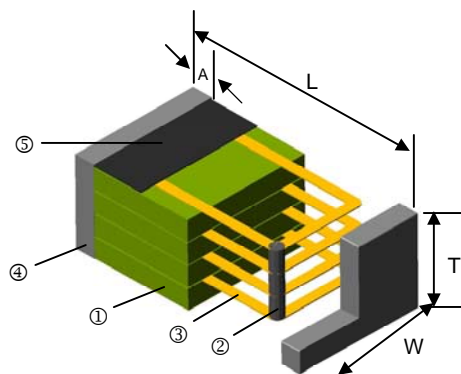


# Multilayer Chip Inductor – CL Series



## Construction



① Ceramic Material	③ Inner Electrode (Ag)	⑤ Direction Mark
② Through Hole	④ End-termination (Ag/Ni/Sn)	

## Features

- A ceramic material construction for high frequency application up to 10GHz
- Tight tolerance physical dimensions (+/-0.05mm)
- Tight inductance tolerance and excellent Q value
- Available in three compact sizes of 0201, 0402, 0603

## Dimensions

Unit: mm

Type	Size (Inch)	L	W	T	A (min. / max.)	Weight (g) (1000pcs)
CL01	0201	0.6±0.03	0.3±0.03	0.33 max.	0.1 / 0.2	0.28
CL02	0402	1.0±0.10	0.5±0.10	0.5±0.10	0.1 / 0.3	0.98
CL03	0603	1.6±0.15	0.8±0.15	0.8±0.15	0.2 / 0.6	3.47

## Applications

- High Frequency Application
- Cellular Phone
- EMI Countermeasure in High Frequency Circuits and Computer Communication etc.
- WLAN and RF module

## Part Numbering

CL	02	J	T	10N
Product Type	Dimensions	Inductance Tolerance	Packaging Code	Inductance
	01: 0201 02: 0402 03: 0603	J: ±5% K: ±10% S: ±0.3nH	T: Taping Reel	1N0: 1.0nH 39N: 39nH R10: 100nH

## Electrical Specifications

CL01 Multilayer Chip Inductors Type

Inductance (nH)	Tolerance	Quality Factor min.	L/Q Freq. (MHz)	Q (Typical) Freq. (MHz)			SRF (GHz) min.	DCR (Ω) max.	IDC (mA) max.
				100	500	800			
0.3	±0.3nH	4	100	5	13	18	10.0	0.07	250
0.4	±0.3nH	4	100	5	13	18	10.0	0.07	250
0.5	±0.3nH	4	100	5	13	18	10.0	0.08	250
0.6	±0.3nH	4	100	5	13	18	10.0	0.08	250
0.7	±0.3nH	4	100	5	13	18	10.0	0.09	250
0.8	±0.3nH	4	100	5	13	18	10.0	0.10	250
0.9	±0.3nH	4	100	5	13	18	10.0	0.10	250
1.0	±0.3nH	4	100	5	15	19	10.0	0.14	250
1.1	±0.3nH	4	100	5	15	19	10.0	0.14	250
1.2	±0.3nH	4	100	6	15	20	10.0	0.14	250
1.3	±0.3nH	4	100	6	15	20	10.0	0.14	250
1.5	±0.3nH	4	100	6	15	20	10.0	0.18	230
1.6	±0.3nH	4	100	6	15	20	10.0	0.18	230
1.8	±0.3nH	4	100	6	15	20	10.0	0.19	200
2.0	±0.3nH	4	100	6	15	20	8.8	0.20	200
2.2	±0.3nH	4	100	6	15	20	8.8	0.22	200
2.4	±0.3nH	4	100	6	15	20	8.3	0.24	200
2.7	±0.3nH	5	100	6	16	20	7.7	0.25	200
3.0	±0.3nH	5	100	6	16	20	7.2	0.28	180
3.3	±0.3nH	5	100	6	16	20	6.7	0.30	180

CL01 Multilayer Chip Inductors Type

Inductance (nH)	Tolerance	Quality Factor min.	L/Q Freq. (MHz)	Q (Typical) Freq. (MHz)			SRF (GHz) min.	DCR ( $\Omega$ ) max.	IDC (mA) max.
				100	500	800			
3.6	$\pm 0.3nH$	5	100	6	16	20	6.4	0.30	170
3.9	$\pm 0.3nH$	5	100	7	16	20	6.0	0.30	170
4.3	$\pm 0.3nH$	5	100	7	16	20	5.7	0.40	150
4.7	$\pm 0.3nH$	5	100	7	16	20	5.3	0.40	150
5.1	$\pm 0.3nH$	5	100	7	16	20	5.0	0.40	150
5.6	$\pm 0.3nH$	5	100	7	16	20	4.2	0.40	150
6.2	$\pm 5\%$	5	100	7	16	20	3.8	0.44	150
6.8	$\pm 5\%$	5	100	7	16	20	3.5	0.50	150
7.5	$\pm 5\%$	5	100	7	15	20	3.3	0.53	150
8.2	$\pm 5\%$	5	100	7	15	20	3.2	0.55	150
9.1	$\pm 5\%$	5	100	7	15	20	3.0	0.62	150
10	$\pm 5\%$	5	100	7	15	19	2.8	0.65	150
12	$\pm 5\%$	5	100	7	14	18	2.4	0.70	100
15	$\pm 5\%$	5	100	7	14	18	2.2	0.80	100
18	$\pm 5\%$	5	100	7	14	18	2.1	0.90	100
22	$\pm 5\%$	5	100	7	14	18	1.8	1.20	100
27	$\pm 5\%$	4	100	6	13	16	1.8	1.80	50
33	$\pm 5\%$	4	100	6	12	14	1.7	2.10	50
39	$\pm 5\%$	4	100	6	12	14	1.5	2.40	50
47	$\pm 5\%$	4	100	6	11	13	1.3	2.80	50
56	$\pm 5\%$	4	100	6	11	12	1.1	3.00	50

CL02 Multilayer Chip Inductors Type

Inductance (nH)	Tolerance	Quality Factor min.	L/Q Freq. (MHz)	Q (Typical) Freq. (MHz)							SRF (GHz) min.	DCR ( $\Omega$ ) max.	IDC (mA) max.
				100	500	800	900	1800	2000	2400			
1.0	$\pm 0.3nH$	8	100	9	25	34	36	57	63	73	10.0	0.12	300
1.1	$\pm 0.3nH$	8	100	9	25	34	36	57	63	73	10.0	0.12	300
1.2	$\pm 0.3nH$	8	100	11	28	37	40	63	70	82	10.0	0.12	300
1.3	$\pm 0.3nH$	8	100	11	29	39	42	65	73	85	10.0	0.13	300
1.5	$\pm 0.3nH$	8	100	11	27	35	38	38	65	75	6.00	0.13	300
1.6	$\pm 0.3nH$	8	100	11	30	39	42	64	71	81	6.00	0.14	300
1.8	$\pm 0.3nH$	8	100	11	28	36	40	57	61	73	6.00	0.14	300
2.0	$\pm 0.3nH$	8	100	11	26	34	37	55	61	68	6.00	0.16	300
2.2	$\pm 0.3nH$	8	100	10	23	30	32	48	52	61	6.00	0.16	300
2.4	$\pm 0.3nH$	8	100	10	24	30	33	48	52	61	6.00	0.17	300
2.7	$\pm 0.3nH$	8	100	12	29	38	42	42	67	74	6.00	0.17	300
3.0	$\pm 0.3nH$	8	100	11	27	34	37	53	58	67	6.00	0.19	300
3.3	$\pm 0.3nH, \pm 10\%$	8	100	10	25	32	34	49	52	60	6.00	0.19	300
3.6	$\pm 0.3nH, \pm 10\%$	8	100	10	23	30	32	46	50	56	5.00	0.22	300
3.9	$\pm 0.3nH, \pm 10\%$	8	100	11	26	33	35	50	54	61	4.00	0.22	300
4.3	$\pm 0.3nH, \pm 10\%$	8	100	10	23	29	31	43	46	50	4.00	0.24	300
4.7	$\pm 0.3nH, \pm 10\%$	8	100	10	23	30	33	46	49	55	4.00	0.24	300
5.1	$\pm 0.3nH, \pm 10\%$	8	100	11	25	32	35	47	49	52	4.00	0.27	300
5.6	$\pm 0.3nH, \pm 10\%$	8	100	11	25	32	35	47	49	52	4.00	0.27	300
6.2	$\pm 0.3nH, \pm 10\%$	8	100	11	25	31	33	45	47	52	3.90	0.32	300
6.8	$\pm 5, \pm 10\%$	8	100	11	25	31	34	45	48	51	3.90	0.32	300
8.2	$\pm 5, \pm 10\%$	8	100	11	25	31	34	43	44	44	3.50	0.37	300
10	$\pm 5, \pm 10\%$	8	100	11	24	31	33	39	39	37	3.20	0.42	300
12	$\pm 5, \pm 10\%$	8	100	11	24	31	33	39	39	37	2.60	0.50	300
15	$\pm 5, \pm 10\%$	8	100	11	23	30	32	35	33	28	2.30	0.55	300
18	$\pm 5, \pm 10\%$	8	100	11	23	30	30	29	27	18	2.00	0.65	300
22	$\pm 5, \pm 10\%$	8	100	12	24	30	31	27	24	14	1.60	0.80	300
27	$\pm 5, \pm 10\%$	8	100	11	24	29	30	21	16	2	1.40	0.90	300

CL02 Multilayer Chip Inductors Type

Inductance (nH)	Tolerance	Quality Factor min.	L/Q Freq. (MHz)	Q (Typical) Freq. (MHz)							SRF (GHz) min.	DCR ( $\Omega$ ) max.	IDC (mA) max.
				100	500	800	900	1800	2000	2400			
33	$\pm 5, \pm 10\%$	8	100	12	23	26	27	11	4	-	1.20	1.00	200
39	$\pm 5, \pm 10\%$	8	100	11	22	24	24	1	-	-	1.10	1.20	200
47	$\pm 5, \pm 10\%$	8	100	11	21	23	23	-	-	-	0.90	1.30	200
56	$\pm 5, \pm 10\%$	8	100	11	21	22	22	-	-	-	0.75	1.40	200
68	$\pm 5, \pm 10\%$	8	100	12	21	21	19	-	-	-	0.75	1.40	180
82	$\pm 5, \pm 10\%$	8	100	11	18	15	13	-	-	-	0.60	1.60	150
100	$\pm 5, \pm 10\%$	8	100	11	19	15	12	-	-	-	0.60	1.60	150
120	$\pm 5, \pm 10\%$	8	100	11	15	7	2	-	-	-	0.60	1.60	150
150	$\pm 5, \pm 10\%$	8	100	12	18	9	4	-	-	-	0.55	2.40	140

CL03 Multilayer Chip Inductors Type

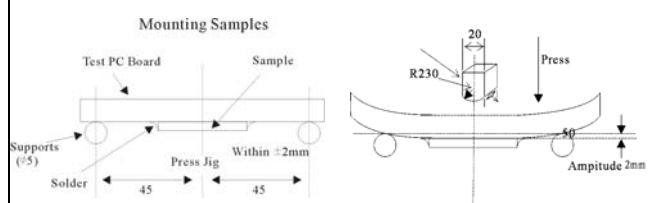
Inductance (nH)	Inductance Tolerance (nH or %)	Quality Factor min.	L/Q Freq. (MHz)	Q (Typical) Freq. (MHz)			SRF (GHz) min.	DCR ( $\Omega$ ) max.	IDC (mA) max.
				100	500	800			
1.0	$\pm 0.3\text{nH}$	8	100	15	36	49	6.0	0.10	500
1.2	$\pm 0.3\text{nH}$	8	100	15	36	49	6.0	0.10	500
1.5	$\pm 0.3\text{nH}$	8	100	14	34	47	6.0	0.10	500
1.8	$\pm 0.3\text{nH}$	8	100	17	40	55	6.0	0.10	500
2.2	$\pm 0.3\text{nH}$	8	100	15	38	49	6.0	0.10	500
2.7	$\pm 0.3\text{nH}$	8	100	14	37	48	6.0	0.10	500
3.3	$\pm 0.3\text{nH}, \pm 10\%$	10	100	16	40	51	6.0	0.13	500
3.9	$\pm 0.3\text{nH}, \pm 10\%$	10	100	14	36	48	6.0	0.15	500
4.7	$\pm 0.3\text{nH}, \pm 10\%$	10	100	14	37	48	4.0	0.20	500
5.6	$\pm 0.3\text{nH}, \pm 10\%$	10	100	14	36	46	4.0	0.23	500
6.8	$\pm 5, \pm 10\%$	10	100	15	37	48	3.75	0.25	500
8.2	$\pm 5, \pm 10\%$	10	100	16	39	50	3.30	0.28	500
10	$\pm 5, \pm 10\%$	12	100	16	37	47	3.0	0.30	300
12	$\pm 5, \pm 10\%$	12	100	15	36	45	2.6	0.35	300
15	$\pm 5, \pm 10\%$	12	100	16	38	48	2.3	0.40	300
18	$\pm 5, \pm 10\%$	12	100	17	38	47	2.0	0.45	300
22	$\pm 5, \pm 10\%$	12	100	18	40	49	1.6	0.50	300
27	$\pm 5, \pm 10\%$	12	100	18	40	47	1.4	0.55	300
33	$\pm 5, \pm 10\%$	12	100	17	40	46	1.2	0.60	300
39	$\pm 5, \pm 10\%$	12	100	19	40	46	1.1	0.65	300
47	$\pm 5, \pm 10\%$	12	100	17	36	39	0.9	0.70	300
56	$\pm 5, \pm 10\%$	12	100	18	36	37	0.9	0.75	300
68	$\pm 5, \pm 10\%$	12	100	18	35	36	0.7	0.85	300
82	$\pm 5, \pm 10\%$	12	100	18	33	29	0.6	1.00	300
100	$\pm 5, \pm 10\%$	12	100	18	28	16	0.6	1.20	300
120	$\pm 5, \pm 10\%$	8	50	-	-	-	0.5	2.3	250
150	$\pm 5, \pm 10\%$	8	50	-	-	-	0.5	2.4	250
180	$\pm 5, \pm 10\%$	8	50	-	-	-	0.4	2.7	250
220	$\pm 5, \pm 10\%$	8	50	-	-	-	0.4	3.0	250

## ■ Environmental Characteristics

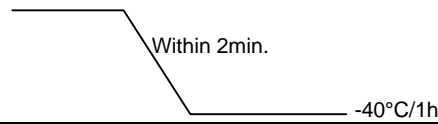
### Electrical Performance Test

Item	Requirement	Test Condition
Inductance	In within specified tolerance	a. Temperature: $25 \pm 1^\circ\text{C}$ b. Relative Humidity: 45 to 85%RH c. Atmospheric Pressure: 86 to 106kpa d. Measuring equipment and fixture: 0201: HP4291B+Agilent16196C 0402: HP4291B+Agilent16193A 0603: HP4291B+Agilent16192A
Q Value	In accordance with electrical specification	a. Temperature: $25 \pm 1^\circ\text{C}$ b. Relative Humidity: 45 to 85%RH c. Atmospheric Pressure: 86 to 106kpa
DC Resistance	In accordance with electrical specification	a. Temperature: $25 \pm 1^\circ\text{C}$ b. Relative Humidity: 45 to 85%RH c. Atmospheric Pressure: 86 to 106kpa d. Measuring equipment: HP 4338
Temperature Characteristics	Within specified tolerance	a. Temperature range: $-30$ to $+85^\circ\text{C}$ b. Reference temperature: $25^\circ\text{C}$

### Mechanical Characteristics Test

Item	Requirement	Test Condition
Bending Strength	No mechanical damage shall be observed	<p>Solder the chip to test jig then apply a force in the direction shown in below. The soldering shall be done with the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock.</p> 
Solderability	More than 75% of the terminal electrode part shall be covered with fresh solder	Immerse a test sample into a methanol solution containing rosin, preheat it at $150$ to $180^\circ\text{C}$ for 3 to 5 seconds and immerse into molten solder of $245 \pm 5^\circ\text{C}$ for $5 \pm 0.5$ seconds.
Resistance to Soldering Heat	No visible damage	Immerse a test sample into a methanol solution containing rosin, preheat it at $150$ to $180^\circ\text{C}$ for 2 to 3 minutes and immerse into molten solder of $260 \pm 5^\circ\text{C}$ for $10 \pm 0.5$ seconds so that both terminal electrodes are completely submerged.
Appearance	In accordance with specification	Inductors shall be visually inspected for visible evidence of defect
Dimension	In accordance with dimension specification	Dimension shall be measured with caliper or micrometer

Climatic Test

Item	Requirement	Test Condition
Thermal Shock	No visible damage Inductance variation within 10% Q variation within 20%	Solder a test sample to printed circuit board, and conduct 100 cycles of test under the conditions shown as below. Cycle: 100°C/1hr  -40°C/1hr
High Humidity State Life	No visible damage Inductance variation within 10% Q variation within 20%	Keep a test sample in an atmosphere with a temperature of 70±2°C, 90~95%RH for 500±12 hours. After the test, keep the test sample at a normal temperature for 1 to 2 hours, and then carry out measurement.
High Humidity Load Life	No visible damage Inductance variation within 10% Q variation within 20%	Solder a test sample to printed circuit board then keep the test sample in an atmosphere with a temperature of 70±2°C, 90~95%RH for 500±12 hours while supplying the rated current. After the test, keep the test sample at a normal temperature for 1 to 2 hours, and then carry out measurement.
High Temperature State Life	No visible damage Inductance variation within 10% Q variation within 20%	Keep a test sample in an atmosphere with a temperature of 100±2°C for 500±12 hours. After the test, keep the test sample at a normal temperature for 1 to 2 hours, and then carry out measurement.
High Temperature Load	No visible damage Inductance variation within 10% Q variation within 20%	Solder a test sample to printed circuit board then keep the test sample in an atmosphere with a temperature of 100±2°C for 500±12 hours while supplying the rated current. After the test, keep the test sample at a normal temperature for 1 to 2 hours, and then carry out measurement.

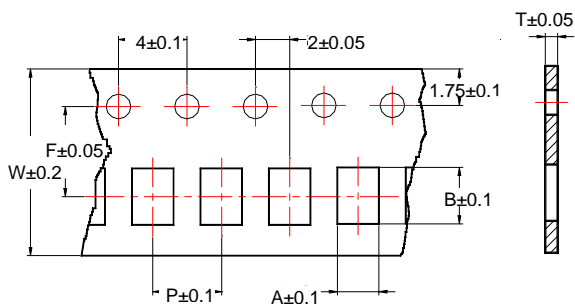
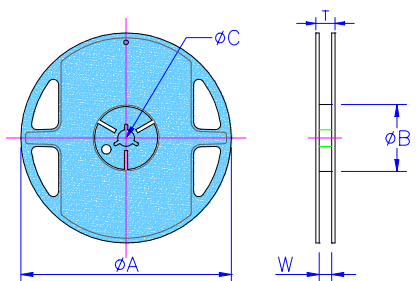
■ Storage Temperature: 25±3°C; Humidity < 80%RH

■ Packaging

Reel Dimensions

Unit: mm

Type	A	B	C	W	T	Quantity (EA)
CL01	178±1	60.2±0.5	13.0±0.20	9.00±0.5	12.0±0.15	15,000
CL02	178±1	60.2±0.5	13.0±0.20	9.00±0.5	12.0±0.15	10,000
CL03	178±1	60.0±0.5	13.0±0.20	9.00±0.5	12.0±0.15	4,000



Unit: mm

Type	A	B	T	W	P	F
CL01	0.38	0.68	0.42	8	2	3.5
CL02	0.65	1.12	0.60	8	2	3.5
CL03	1.10	1.80	0.95	8	4	3.5