

Multilayer Chip Inductor—CL Series



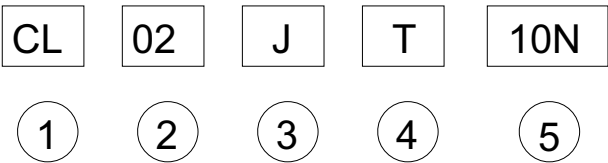
Features

- For High Frequency Application (~10GHz)
- Tight Tolerance Physical Dimensions(+/-0.05mm)
- Tight Inductance Tolerance and Excellent Q Value

Application

- High Frequency Application
- Cellular Phone, Pagers,
- EMI Countermeasure in High Frequency Circuits and Computer Communication etc.

Part Numbering



① Product Type

Product Type	
CL	Multilayer Chip Inductor (SMD)

② Dimensions (L×W)

Codes	Dimensions (L×W)	EIA
CL02	1.00×0.50mm	0402
CL03	1.60×0.80mm	0603
CL05	2.00×1.20mm	0805

③ Inductance Tolerance

Codes	Type
S	±0.3nH
J	±5%
K	±10%

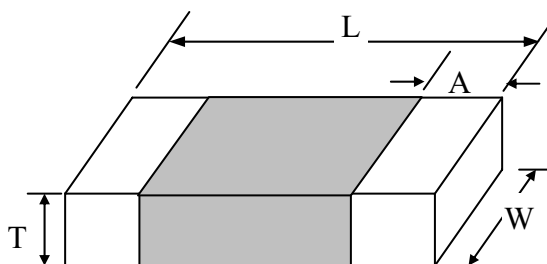
④ Packaging

Codes	Type
T	Taping Reel

⑤ Inductance

Codes	Type
1N0	1.0nH
39N	39nH
R10	100nH

Dimensions



Unit: mm

Size	L	W	T	A (Min/Max)
CL0402	1.0±0.10	0.5±0.10	0.5±0.10	0.1 / 0.30
CL0603	1.6±0.15	0.8±0.15	0.8±0.15	0.2 / 0.6
CL0805	2.0±0.15	1.2±0.20	0.9±0.20	0.2 / 0.8
			1.2±0.30	

Electrical Specifications

0402 Multilayer Chip Inductors

Inductance (nH)	Tolerance	Quality Factor /min.	L/Q Freq. (MHz)	Q(Typical) Freq.(MHz)			Resistance DC/Max (Ohm)	Self Resonant Frequency /min. (GHz)	Current DC/Max (mA)
				100	500	800			
1.0	±0.3nH	8	100	11	33	37	0.12	10.0	300
1.2	±0.3nH	8	100	11	29	26	0.12	10.0	300
1.5	±0.3nH	8	100	12	29	40	0.13	6.00	300
1.8	±0.3nH	8	100	11	26	34	0.14	6.00	300
2.2	±0.3nH	8	100	11	26	36	0.16	6.00	300
2.7	±0.3nH	8	100	12	29	38	0.17	6.00	300
3.3	±0.3nH, ±10%	8	100	11	28	37	0.19	6.00	300
3.9	±0.3nH, ±10%	8	100	11	26	32	0.22	4.00	300
4.7	±0.3nH, ±10%	8	100	12	28	37	0.24	4.00	300
5.6	±0.3nH, ±10%	8	100	11	26	35	0.27	4.00	300
6.8	±5%, ±10%	8	100	11	26	34	0.32	3.90	300
8.2	±5%, ±10%	8	100	12	26	34	0.37	3.50	300
10	±5%, ±10%	8	100	11	25	31	0.42	3.20	300
12	±5%, ±10%	8	100	11	25	31	0.50	2.60	300
15	±5%, ±10%	8	100	11	24	30	0.55	2.30	300
18	±5%, ±10%	8	100	11	24	30	0.65	2.00	300
22	±5%, ±10%	8	100	12	24	30	0.80	1.60	300
27	±5%, ±10%	8	100	11	24	28	0.90	1.40	300
33	±5%, ±10%	8	100	12	23	26	1.00	1.20	200
39	±5%, ±10%	8	100	11	21	24	1.20	1.10	150
47	±5%, ±10%	8	100	11	21	23	1.30	0.90	150
56	±5%, ±10%	8	100	12	21	21	2.00	0.75	150
68	±5%, ±10%	8	100	11	19	19	2.20	0.75	100
82	±5%, ±10%	8	100	10	19	16	2.50	0.60	100
100	±5%, ±10%	8	100	10	18	-	2.50	0.60	100

- Measuring Equipment : HP-4291B+16192A
- Storage Temperature :25±3°C; Humidity<80%RH



Inductance (nH)	Tolerance	Quality Factor /min.	L/Q Freq. (MHz)	Q(Typical) Freq.(MHz)			Resistance DC/Max (Ohm)	Self Resonant Frequency /min. (GHz)	Current DC/Max (mA)
				100	500	800			
1.0	±0.3nH	8	100	15	36	49	0.10	6.0	500
1.2	±0.3nH	8	100	15	36	49	0.10	6.0	500
1.5	±0.3nH	8	100	14	34	47	0.10	6.0	500
1.8	±0.3nH	8	100	17	40	55	0.10	6.0	500
2.2	±0.3nH	8	100	15	38	49	0.10	6.0	500
2.7	±0.3nH	8	100	14	37	48	0.10	6.0	500
3.3	±0.3nH, ±10%	10	100	16	40	51	0.13	6.0	500
3.9	±0.3nH, ±10%	10	100	14	36	48	0.15	6.0	500
4.7	±0.3nH, ±10%	10	100	14	37	48	0.20	4.0	500
5.6	±0.3nH, ±10%	10	100	14	36	46	0.23	4.0	500
6.8	±5%, ±10%	10	100	15	37	48	0.25	3.75	500
8.2	±5%, ±10%	10	100	16	39	50	0.28	3.30	500
10	±5%, ±10%	12	100	16	37	47	0.30	3.0	300
12	±5%, ±10%	12	100	15	36	45	0.35	2.6	300
15	±5%, ±10%	12	100	16	38	48	0.40	2.3	300
18	±5%, ±10%	12	100	17	38	47	0.45	2.0	300
22	±5%, ±10%	12	100	18	40	49	0.50	1.6	300
27	±5%, ±10%	12	100	18	40	47	0.55	1.4	300
33	±5%, ±10%	12	100	17	40	46	0.60	1.2	300
39	±5%, ±10%	12	100	19	40	46	0.65	1.1	300
47	±5%, ±10%	12	100	17	36	39	0.70	0.9	300
56	±5%, ±10%	12	100	18	36	37	0.75	0.9	300
68	±5%, ±10%	12	100	18	35	36	0.85	0.7	300
82	±5%, ±10%	12	100	18	33	29	1.00	0.6	300
100	±5%, ±10%	12	100	18	28	16	1.20	0.6	300

- Measuring Equipment : HP-4291B+16192A
- Storage Temperature :25±3℃; Humidity <80%RH



Inductance (nH)	Tolerance	Quality Factor /min.	L/Q Freq. (MHz)	Self Resonant Frequency /min. (GHz)	Resistance DC/Max (Ohm)	Current DC/Max (mA)
1.0	±0.3nH	10	100	>6.00	0.10	300
1.2	±0.3nH	10	100	>6.00	0.10	300
1.5	±0.3nH	10	100	>6.00	0.10	300
1.8	±0.3nH	10	100	>6.00	0.10	300
2.2	±0.3nH	10	100	>6.00	0.10	300
2.7	±0.3nH	12	100	>6.00	0.10	300
3.3	±0.3nH, ±10%	12	100	>6.00	0.13	300
3.9	±0.3nH, ±10%	12	100	5.40	0.15	300
4.7	±0.3nH, ±10%	12	100	4.50	0.20	300
5.6	±0.3nH, ±10%	12	100	4.00	0.23	300
6.8	±5%, ±10%	15	100	3.65	0.25	300
8.2	±5%, ±10%	15	100	3.00	0.28	300
10	±5%, ±10%	15	100	2.50	0.30	300
12	±5%, ±10%	15	100	2.45	0.35	300
15	±5%, ±10%	15	100	2.00	0.40	300
18	±5%, ±10%	15	100	1.75	0.45	300
22	±5%, ±10%	15	100	1.70	0.50	300
27	±5%, ±10%	15	100	1.55	0.55	300
33	±5%, ±10%	15	100	1.35	0.60	300
39	±5%, ±10%	18	100	1.30	0.65	300
47	±5%, ±10%	18	100	1.20	0.70	300
56	±5%, ±10%	18	100	1.15	0.75	300
68	±5%, ±10%	18	100	1.00	0.80	300
82	±5%, ±10%	18	100	0.85	0.90	300
100	±5%, ±10%	18	100	0.73	1.00	300

- Measuring Equipment : HP-4291B+16197A
- Storage Temperature :25±3℃ ; Humidity <80%RH

Testing Condition and Requirements



Electrical Characteristics

Test Items	Test Condition	Requirements
Inductance	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: 1608(0603) HP 4291+16192A 1005(0402) HP 4291+16193A	Within specified tolerance.
Q Value	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: 1608(0603) HP 4291+16192A 1005(0402) HP 4291+16193A	In accordance with electrical specification.
DC Resistance	a. Temperature: $25 \pm 1^\circ\text{C}$ b. Relative Humidity: 45 to 85%RH c. Atmospheric Pressure: 86 to 106kpa Measuring equipment: HP 4338	In accordance with electrical specification.
Temperature Characteristics	a. Temperature range: -30 to $+85^\circ\text{C}$ Reference temperature: 25°C	Within specified tolerance.

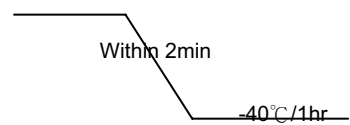
Mechanical Characteristics

Item	Test Condition	Requirements
Appearance	Inductors shall be visually inspected for visible evidence of defect.	In accordance with specification.
Dimension	Dimension shall be measured with caliper or micrometer	In accordance with dimension specification.
Solderability	Immerse a test sample into a methanol solution containing rosin, preheat it at 150 to 180°C for 3 to 5 seconds and immerse into molten solder of $245 \pm 5^\circ\text{C}$ for 5 ± 1 seconds.	More than 75% of the terminal electrode part shall be covered with fresh solder.
Resistance to Soldering Heat	Immerse a test sample into a methanol solution containing rosin, preheat it at 150 to 180°C for 2 to 3 minutes and immerse into molten solder of $260 \pm 5^\circ\text{C}$ for 10 ± 0.5 seconds so that both terminal electrodes are completely submerged.	No visible damage
Bending Strength	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.	No mechanical damage shall be observed.

Testing Condition and Requirements

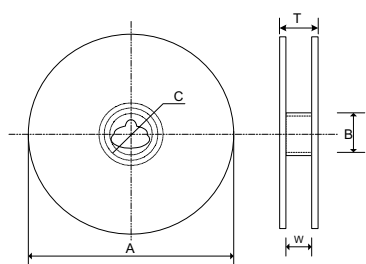


Reliability

Item	Test Condition	Requirements
Thermal Shock	Solder a test sample to printed circuit board, and conduct 100 cycles of test under the conditions shown as below. Cycle: 85°C/1hr  Within 2min -40°C/1hr	No visible damage Inductance variation within 10% Q variation within 20%
High Humidity State Life Test	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.	No visible damage. Inductance variation within 10%. Q variation within 20%.
High Humidity Load Life Test	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.	No visible damage. Inductance variation within 10%. Q variation within 20%.
High Temperature State Life Test	Keep a test sample in an atmosphere with a temperature of 85±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.	No visible damage. Inductance variation within 10%. Q variation within 20%.
High Temperature Load	Solder a test sample to printed circuit board then keep the test sample in an atmosphere with a temperature of 85±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.	No visible damage. Inductance variation within 10%. Q variation within 20%.

Packaging Specifications

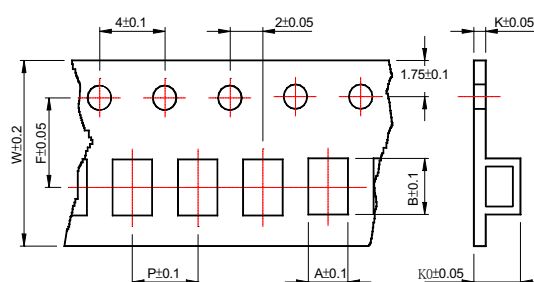
Reel Dimensions



Unit: mm

Series	A	B	C	W	T	Tape (EA)
CL02	178±1	60.2±0.5	13.0±0.50	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
CL05 < 180nH	178±1	60.0±0.5	13.0±0.20	9.00±0.5	12.0±0.15	4,000
CL05 ≥180nH	178±1	60.0±0.5	13.0±0.20	12.0±0.5	12.0±0.15	3,000

Tape Specifications



Unit: mm

Series	A	B	K0	W	P	F	K
CL02	0.6	1.15	0.60	8	2	3.5	0.60
CL03	1.1	1.90	0.95	8	4	3.5	0.95
CL05 < 180nH	1.42	2.25	1.04	8	4	3.5	0.22
CL05 ≥180nH	1.42	2.25	1.40	8	4	3.5	0.22