

# CL Series

## SMD Multilayer Chip Inductors

### APPLICATIONS

Personal computers, HDDs, or other various electronic appliances.

Any general circuit of portable equipment in which compact size and high mounting densities are required.

### OUTLINE

Yageo's SMD multi-layered ferrite chip inductors provide a cost-effective solution for densely packed PC board designs.

CL series is suitable for low frequency applications.

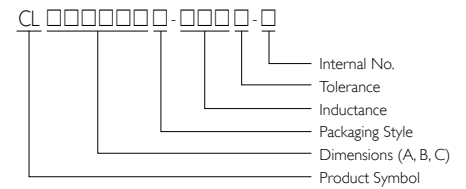
### FEATURES

High mounting density of compact circuit due to crosstalk elimination that results from a closed magnetic flux in a ferrite material.

Suitable for flow and re-flow soldering



### PRODUCT IDENTIFICATION

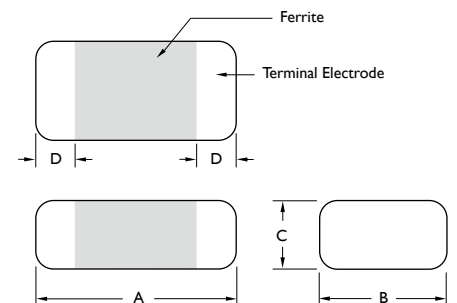


- Packaging: T = Tape and Reel, B = Bulk
- Internal No.: N = Lead-Free

### SHAPES AND DIMENSIONS

Unit: mm

TYPE	A	B	C	D
CL100505	1.0 ± 0.10	0.50 ± 0.10	0.50 ± 0.10	0.25 ± 0.10
CL160808	1.6 ± 0.20	0.80 ± 0.20	0.80 ± 0.20	0.30 ± 0.20
CL201209	2.0 ± 0.20	1.25 ± 0.20	0.90 ± 0.20	0.50 ± 0.30
CL201212	2.0 ± 0.20	1.25 ± 0.20	1.25 ± 0.20	0.50 ± 0.30
CL321611	3.2 ± 0.20	1.60 ± 0.20	1.10 ± 0.20	0.50 ± 0.30





## ELECTRICAL CHARACTERISTICS CLI00505

PART NO.	IMPEDANCE ( $\mu$ H)	TOLERANCE ( $\pm$ %)	Q Min.	TEST FREQUENCY (MHz)	SRF (MHz) Min.	DC RESISTANCE ( $\Omega$ ) Max.	IDC (mA) Max.
CLI00505T-10NM-N	0.010	20	8	50	500	0.45	50
CLI00505T-12NM-N	0.012	20	8	50	500	0.45	50
CLI00505T-47NM-N	0.047	20	10	50	500	0.45	50
CLI00505T-68NM-N	0.068	20	10	50	480	0.45	50
CLI00505T-82NM-N	0.082	20	10	50	480	0.45	50
CLI00505T-R10□-N	0.10	10 / 20	15	25	450	0.60	50
CLI00505T-R12□-N	0.12	10 / 20	15	25	400	0.70	25
CLI00505T-R15□-N	0.15	10 / 20	15	25	350	0.80	25
CLI00505T-R18□-N	0.18	10 / 20	15	25	320	0.90	25
CLI00505T-R22□-N	0.22	10 / 20	15	25	290	1.10	25
CLI00505T-R27□-N	0.27	10 / 20	15	25	260	1.30	25
CLI00505T-R33□-N	0.33	10 / 20	15	25	230	1.50	25
CLI00505T-R39□-N	0.39	10 / 20	20	10	210	0.60	10
CLI00505T-R47□-N	0.47	10 / 20	20	10	190	0.65	10
CLI00505T-R56□-N	0.56	10 / 20	20	10	170	0.70	10
CLI00505T-R68□-N	0.68	10 / 20	20	10	150	0.80	10
CLI00505T-R82□-N	0.82	10 / 20	20	10	130	0.90	10
CLI00505T-1R0□-N	1.00	10 / 20	20	10	120	1.00	15
CLI00505T-1R2□-N	1.20	10 / 20	20	10	110	1.10	15
CLI00505T-1R5□-N	1.50	10 / 20	20	10	100	1.20	10
CLI00505T-1R8□-N	1.80	10 / 20	20	10	90	1.30	10

Note:

Tolerance: K =  $\pm$  10%, M =  $\pm$  20%

**ELECTRICAL CHARACTERISTICS** CL160808

<b>PART NO.</b>	<b>IMPEDANCE (<math>\mu</math>H)</b>	<b>TOLERANCE (<math>\pm</math>%)</b>	<b>Q Min.</b>	<b>TEST FREQUENCY (MHz)</b>	<b>SRF (MHz) Min.</b>	<b>DC RESISTANCE (<math>\Omega</math>) Max.</b>	<b>IDC (mA) Max.</b>
CL160808T-10NM-N	0.010	20	15	50	300	0.20	50
CL160808T-33NM-N	0.033	20	15	50	270	0.20	50
CL160808T-47NM-N	0.047	20	15	50	260	0.30	50
CL160808T-56NM-N	0.056	20	15	50	255	0.30	50
CL160808T-68NM-N	0.068	20	15	50	250	0.30	50
CL160808T-82NM-N	0.082	20	15	50	245	0.30	50
CL160808T-R10□-N	0.10	10 / 20	25	25	240	0.50	50
CL160808T-R12□-N	0.12	10 / 20	25	25	205	0.50	50
CL160808T-R15□-N	0.15	10 / 20	25	25	180	0.60	50
CL160808T-R18□-N	0.18	10 / 20	25	25	165	0.60	50
CL160808T-R22□-N	0.22	10 / 20	25	25	150	0.80	50
CL160808T-R27□-N	0.27	10 / 20	25	25	136	0.80	50
CL160808T-R33□-N	0.33	10 / 20	25	25	125	0.85	35
CL160808T-R39□-N	0.39	10 / 20	25	25	110	1.00	35
CL160808T-R47□-N	0.47	10 / 20	25	25	105	1.35	35
CL160808T-R56□-N	0.56	10 / 20	25	25	95	1.50	35
CL160808T-R68□-N	0.68	10 / 20	25	25	85	1.70	35
CL160808T-R82□-N	0.82	10 / 20	25	25	75	2.10	35
CL160808T-1R0□-N	1.00	10 / 20	35	10	65	0.60	25
CL160808T-1R2□-N	1.20	10 / 20	35	10	60	0.80	25
CL160808T-1R5□-N	1.50	10 / 20	35	10	55	0.80	25
CL160808T-1R8□-N	1.80	10 / 20	35	10	50	0.95	25
CL160808T-2R2□-N	2.20	10 / 20	35	10	45	1.00	15
CL160808T-2R7□-N	2.70	10 / 20	35	10	40	1.15	15
CL160808T-3R3□-N	3.30	10 / 20	35	10	38	1.30	15
CL160808T-3R9□-N	3.90	10 / 20	35	10	36	1.50	15
CL160808T-4R7□-N	4.70	10 / 20	35	10	33	1.60	15
CL160808T-5R6□-N	5.60	10 / 20	35	4	22	1.10	5
CL160808T-6R8□-N	6.80	10 / 20	35	4	20	1.30	5
CL160808T-8R2□-N	8.20	10 / 20	30	4	18	1.50	5
CL160808T-100□-N	10	10 / 20	30	2	17	1.70	5
CL160808T-120□-N	12	10 / 20	30	2	15	1.80	3
CL160808T-150□-N	15	10 / 20	20	1	14	1.50	1
CL160808T-180□-N	18	10 / 20	20	1	13	1.60	1
CL160808T-220□-N	22	10 / 20	20	1	11	1.70	1
CL160808T-270□-N	27	10 / 20	20	1	10	1.80	1
CL160808T-330□-N	33	10 / 20	20	1	9	2.20	1

Note:  
Tolerance: K =  $\pm$  10%, M =  $\pm$  20%



## ELECTRICAL CHARACTERISTICS CL201209

PART NO.	IMPEDANCE ( $\mu$ H)	TOLERANCE ( $\pm$ %)	Q Min.	TEST FREQUENCY (MHz)	SRF (MHz) Min.	DC RESISTANCE ( $\Omega$ ) Max.	IDC (mA) Max.
CL201209T-47NM-N	0.047	20	20	50	320	0.20	300
CL201209T-68NM-N	0.068	20	20	50	280	0.20	300
CL201209T-82NM-N	0.082	20	20	50	255	0.20	300
CL201209T-R10□-N	0.10	10 / 20	25	25	235	0.30	250
CL201209T-R12□-N	0.12	10 / 20	25	25	220	0.30	250
CL201209T-R15□-N	0.15	10 / 20	25	25	200	0.40	250
CL201209T-R18□-N	0.18	10 / 20	25	25	185	0.40	250
CL201209T-R22□-N	0.22	10 / 20	25	25	170	0.50	250
CL201209T-R27□-N	0.27	10 / 20	25	25	150	0.50	250
CL201209T-R33□-N	0.33	10 / 20	25	25	145	0.55	250
CL201209T-R39□-N	0.39	10 / 20	25	25	135	0.65	250
CL201209T-R47□-N	0.47	10 / 20	25	25	125	0.65	250
CL201209T-R56□-N	0.56	10 / 20	25	25	115	0.75	150
CL201209T-R68□-N	0.68	10 / 20	25	25	105	0.80	150
CL201209T-R82□-N	0.82	10 / 20	25	25	100	1.00	150
CL201209T-1R0□-N	1.00	10 / 20	45	10	75	0.40	50
CL201209T-1R2□-N	1.20	10 / 20	45	10	65	0.50	50
CL201209T-1R5□-N	1.50	10 / 20	45	10	60	0.50	50
CL201209T-1R8□-N	1.80	10 / 20	45	10	55	0.60	50
CL201209T-2R2□-N	2.20	10 / 20	45	10	50	0.65	30

## ELECTRICAL CHARACTERISTICS CL201212

PART NO.	IMPEDANCE ( $\mu$ H)	TOLERANCE ( $\pm$ %)	Q Min.	TEST FREQUENCY (MHz)	SRF (MHz) Min.	DC RESISTANCE ( $\Omega$ ) Max.	IDC (mA) Max.
CL201212T-2R7□-N	2.70	10 / 20	45	10	45	0.75	30
CL201212T-3R3□-N	3.30	10 / 20	45	10	41	0.80	30
CL201212T-3R9□-N	3.90	10 / 20	45	10	38	0.90	30
CL201212T-4R7□-N	4.70	10 / 20	45	10	35	1.00	30
CL201212T-5R6□-N	5.60	10 / 20	45	4	32	0.90	15
CL201212T-6R8□-N	6.80	10 / 20	45	4	29	1.00	15
CL201212T-8R2□-N	8.20	10 / 20	45	4	26	1.10	15
CL201212T-100□-N	10	10 / 20	45	2	24	1.10	15
CL201212T-120□-N	12	10 / 20	45	2	22	1.20	15
CL201212T-150□-N	15	10 / 20	30	1	19	0.80	5
CL201212T-180□-N	18	10 / 20	30	1	18	0.90	5
CL201212T-220□-N	22	10 / 20	30	1	16	1.10	5

Note:

Tolerance: K =  $\pm$  10%, M =  $\pm$  20%

**ELECTRICAL CHARACTERISTICS** CL321611

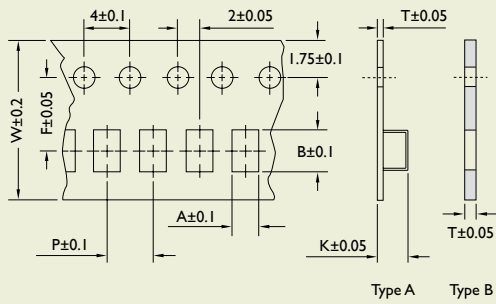
<b>PART NO.</b>	<b>IMPEDANCE (μH)</b>	<b>TOLERANCE (±%)</b>	<b>Q Min.</b>	<b>TEST FREQUENCY (MHz)</b>	<b>SRF (MHz) Min.</b>	<b>DC RESISTANCE (Ω) Max.</b>	<b>IDC (mA) Max.</b>
CL321611T-47NM-N	0.047	20	20	50	320	0.15	300
CL321611T-68NM-N	0.068	20	20	50	280	0.25	300
CL321611T-82NM-N	0.082	20	20	50	250	0.25	300
CL321611T-R10□-N	0.10	10 / 20	25	25	235	0.25	250
CL321611T-R12□-N	0.12	10 / 20	25	25	220	0.30	250
CL321611T-R15□-N	0.15	10 / 20	25	25	200	0.30	250
CL321611T-R18□-N	0.18	10 / 20	25	25	185	0.40	250
CL321611T-R22□-N	0.22	10 / 20	25	25	170	0.40	250
CL321611T-R27□-N	0.27	10 / 20	25	25	150	0.50	250
CL321611T-R33□-N	0.33	10 / 20	25	25	145	0.50	250
CL321611T-R39□-N	0.39	10 / 20	25	25	135	0.50	200
CL321611T-R47□-N	0.47	10 / 20	25	25	125	0.60	200
CL321611T-R56□-N	0.56	10 / 20	25	25	115	0.70	150
CL321611T-R68□-N	0.68	10 / 20	25	25	105	0.80	150
CL321611T-R82□-N	0.82	10 / 20	25	25	100	0.90	150
CL321611T-1R0□-N	1.00	10 / 20	45	10	75	0.40	100
CL321611T-1R2□-N	1.20	10 / 20	45	10	65	0.50	100
CL321611T-1R5□-N	1.50	10 / 20	45	10	60	0.50	80
CL321611T-1R8□-N	1.80	10 / 20	45	10	55	0.50	70
CL321611T-2R2□-N	2.20	10 / 20	45	10	50	0.60	60
CL321611T-2R7□-N	2.70	10 / 20	45	10	45	0.60	60
CL321611T-3R3□-N	3.30	10 / 20	45	10	41	0.70	60
CL321611T-3R9□-N	3.90	10 / 20	45	10	38	0.80	50
CL321611T-4R7□-N	4.70	10 / 20	45	10	35	0.90	50
CL321611T-5R6□-N	5.60	10 / 20	45	4	32	0.70	25
CL321611T-6R8□-N	6.80	10 / 20	45	4	29	0.80	25
CL321611T-8R2□-N	8.20	10 / 20	45	4	26	0.90	25
CL321611T-100□-N	10	10 / 20	45	2	24	1.00	25
CL321611T-120□-N	12	10 / 20	45	2	22	1.00	15
CL321611T-150□-N	15	10 / 20	35	1	19	0.70	5
CL321611T-180□-N	18	10 / 20	35	1	18	0.75	5
CL321611T-220□-N	22	10 / 20	35	1	16	0.90	5
CL321611T-270□-N	27	10 / 20	35	1	14	0.90	5
CL321611T-330□-N	33	10 / 20	35	1	13	1.05	5

Note:  
Tolerance: K = ± 10%, M = ± 20%



## TAPE DIMENSIONS

Unit: mm

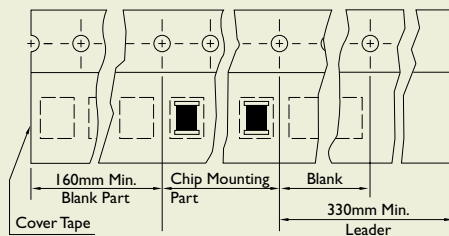


TYPE	A	B	T	W	P	F	K	TAPE TYPE
CL100505	0.65	1.15	0.60	8.0	2.0	3.5	-	B
CL160808	1.05	1.85	0.95	8.0	4.0	3.5	-	B
CL201209	1.50	2.30	0.97	8.0	4.0	3.5	-	B
CL201212	1.35	2.25	0.22	8.0	4.0	3.5	1.35	A
CL321611	1.88	3.50	0.22	8.0	4.0	3.5	1.27	A

## TAPE MATERIAL

Carrier Tape : Polystyrene (Type A), Paper (Type B)

Cover Tape : Polyethyeniene

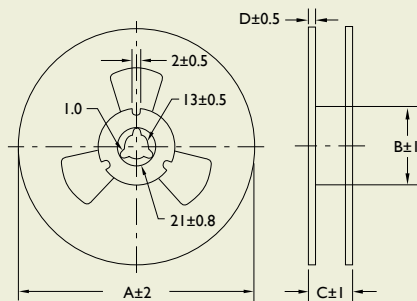


## PACKAGING QUANTITY

TYPE	QUANTITY/REEL
CL100505	10,000
CL160808	4,000
CL201209	4,000
CL201212	3,000
CL321611	3,000

## REEL DIMENSIONS

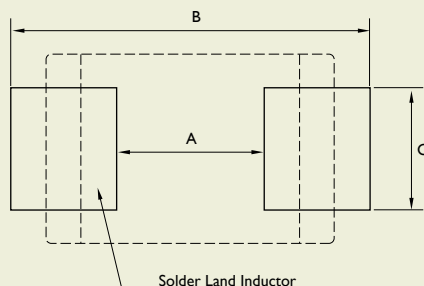
Unit: mm



TYPE	A	B	C	D
CL100505	178	60	12	1.5
CL160808	178	60	12	1.5
CL201209	178	60	12	1.5
CL201212	178	60	12	1.5
CL321611	178	60	12	1.5

## RECOMMENDED PATTERN

Unit: mm

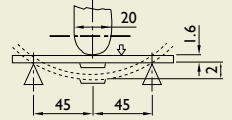


TYPE	A	B	C
CL100505	0.40	1.2 ~ 1.4	0.50
CL160808	0.7 ~ 0.8	1.8 ~ 2.0	0.6 ~ 0.8
CL201209	1.0 ~ 1.2	2.6 ~ 4.0	1.0 ~ 1.2
CL201212	1.0 ~ 1.2	2.6 ~ 4.0	1.0 ~ 1.2
CL321611	2.00	4.2 ~ 5.2	1.20

## CL SERIES RELIABILITY TEST

### I-1 MECHANICAL PERFORMANCE

NO.	ITEM	SPECIFICATION	TEST CONDITIONS
I-1-1	Flexure Strength	The forces applied on the right conditions must not damage the terminal electrode and the ferrite.	Test device shall be soldered on the substrate. Substrate Dimension: 100 x 40 x 1.6 mm Deflection: 2.0 mm Keeping Time: 30 sec *For: I00505, substrate dimension is 100 x 40 x 0.8 mm
I-1-2	Vibration		Test device shall be soldered on the substrate. Oscillation Frequency: 10 to 55 to 10 Hz for 1 Min. Amplitude: 1.5 mm Time: 2 Hrs. for each Axis (X,Y & Z), Total 6 Hrs.
I-1-3	Resistance to Soldering Heat	Appearance: No damage More than 75% of the terminal electrode should be covered with solder. Inductance: within $\pm 15\%$ of initial value Q change: within $\pm 30\%$ of initial value	Pre-heating: 150 °C, 1 Min. Solder Composition: Sn/Pb = 63/37 Solder Composition: Sn/Ag/Cu = 96.5/3.0/0.5 (Pb-Free) Solder Temperature: 260 $\pm$ 5 °C Immersion Time: 10 $\pm$ 1 Sec.
I-1-4	Solderability	The electrodes shall be at least 90% covered with new solder coating.	Pre-heating: 150 °C, 1 Min. Solder Composition: Sn/Pb = 63/37 Solder Temperature: 220 $\pm$ 5 Solder Composition: Sn/Ag/Cu = 96.5/3.0/0.5 (Pb-Free) Solder Temperature: 245 $\pm$ 5 °C Immersion Time: 4 $\pm$ 1 Sec.



### I-2 ENVIRONMENTAL PERFORMANCE

NO.	ITEM	SPECIFICATION	TEST CONDITIONS															
I-2-1	Temperature Cycle	Appearance: No damage Inductance: within $\pm 10\%$ of initial value Q change: within $\pm 30\%$ of initial value	One Cycle <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (Min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25 <math>\pm</math> 3</td> <td>30</td> </tr> <tr> <td>2</td> <td>-25 <math>\pm</math> 2</td> <td>3</td> </tr> <tr> <td>3</td> <td>85 <math>\pm</math> 3</td> <td>30</td> </tr> <tr> <td>4</td> <td>25 <math>\pm</math> 2</td> <td>3</td> </tr> </tbody> </table> Total: 100 Cycles Measured after exposure in the room condition for 24 Hrs.	Step	Temperature (°C)	Time (Min.)	1	-25 $\pm$ 3	30	2	-25 $\pm$ 2	3	3	85 $\pm$ 3	30	4	25 $\pm$ 2	3
Step	Temperature (°C)	Time (Min.)																
1	-25 $\pm$ 3	30																
2	-25 $\pm$ 2	3																
3	85 $\pm$ 3	30																
4	25 $\pm$ 2	3																
I-2-2	Humidity Resistance		Temperature: 40 $\pm$ 2 °C Relative Humidity: 90 ~ 95% Time: 1,000 Hrs. Measured after exposure in the room condition for 24 Hrs.															
I-2-3	High Temperature Resistance		Temperature: 85 $\pm$ 3 °C Relative Humidity: 20% Applied Current: Rated Current Time: 1,000 Hrs. Measured after exposure in the room condition for 24 Hrs.															
I-2-4	Low Temperature Resistance		Temperature: -25 $\pm$ 3 °C Relative Humidity: 0% Time: 1,000 Hrs. Measured after exposure in the room condition for 24 Hrs.															