

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.

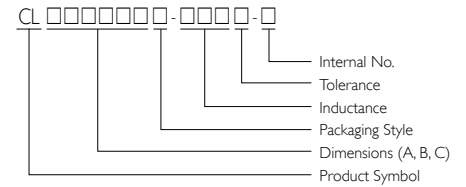
FEATURES

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

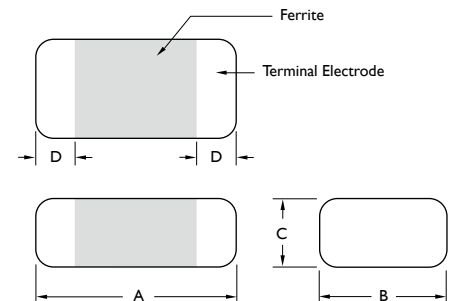


- Packaging: T = Tape and Reel, B = Bulk
- Internal No.: N = Lead-Free

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 (μ H)	TOLERANCE (\pm %)	Q Min.	TEST FREQUENCY (MHz)	SRF (MHz) Min.	DC RESISTANCE (Ω) 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

PART NO.	IMPEDANCE (μH)	TOLERANCE (±%)	Q Min.	TEST FREQUENCY (MHz)	SRF (MHz) Min.	DC RESISTANCE (Ω) Max.	IDC (mA) Max.
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 = ± 10%, M = ± 20%



ELECTRICAL CHARACTERISTICS CL201209

PART NO.	IMPEDANCE (μ H)	TOLERANCE (\pm %)	Q Min.	TEST FREQUENCY (MHz)	SRF (MHz) Min.	DC RESISTANCE (Ω) 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 (μ H)	TOLERANCE (\pm %)	Q Min.	TEST FREQUENCY (MHz)	SRF (MHz) Min.	DC RESISTANCE (Ω) 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

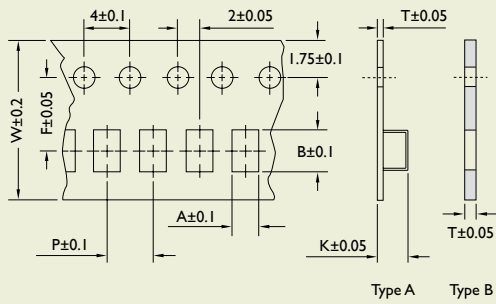
PART NO.	IMPEDANCE (μH)	TOLERANCE (\pm%)	Q Min.	TEST FREQUENCY (MHz)	SRF (MHz) Min.	DC RESISTANCE (Ω) Max.	IDC (mA) Max.
CL321611T-47NM-N	0.047	20	20	50	320	0.15	300
CL321611T-68NM-N	0.068	20	20	50	280	0.25	300
CL321611T-82NM-N	0.082	20	20	50	250	0.25	300
CL321611T-R10□-N	0.10	10 / 20	25	25	235	0.25	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 = \pm 10%, M = \pm 20%



TAPE DIMENSIONS

Unit: mm

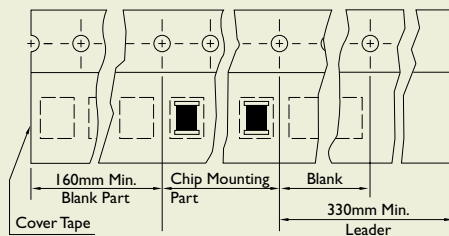


TYPE	A	B	T	W	P	F	K	TAPE TYPE
CL100505	0.65	1.15	0.60	8.0	2.0	3.5	-	B
CL160808	1.05	1.85	0.95	8.0	4.0	3.5	-	B
CL201209	1.50	2.30	0.97	8.0	4.0	3.5	-	B
CL201212	1.35	2.25	0.22	8.0	4.0	3.5	1.35	A
CL321611	1.88	3.50	0.22	8.0	4.0	3.5	1.27	A

TAPE MATERIAL

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

Cover Tape : Polyethyeniene

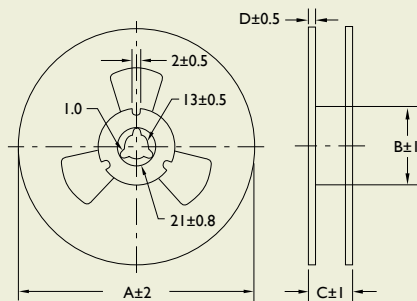


PACKAGING QUANTITY

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

REEL DIMENSIONS

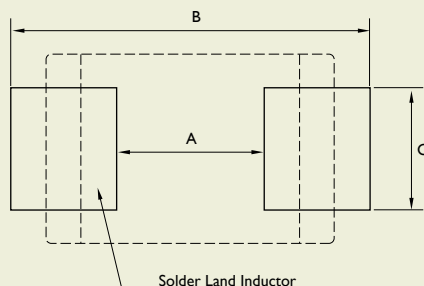
Unit: mm



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

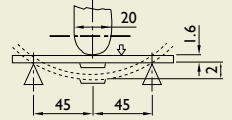


TYPE	A	B	C
CL100505	0.40	1.2 ~ 1.4	0.50
CL160808	0.7 ~ 0.8	1.8 ~ 2.0	0.6 ~ 0.8
CL201209	1.0 ~ 1.2	2.6 ~ 4.0	1.0 ~ 1.2
CL201212	1.0 ~ 1.2	2.6 ~ 4.0	1.0 ~ 1.2
CL321611	2.00	4.2 ~ 5.2	1.20

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 \pm 3</td> <td>30</td> </tr> <tr> <td>2</td> <td>-25 \pm 2</td> <td>3</td> </tr> <tr> <td>3</td> <td>85 \pm 3</td> <td>30</td> </tr> <tr> <td>4</td> <td>25 \pm 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.															