CL Series Ferrite Chip Inductors

CL series ferrite chip inductors are manufactured by using the latest innovations in multi-layer technology; ITG Chip inductors are available in 0402 to 1206 package design to meet today electronics industry's high performance and reliability requirements.

Features:

- ***High Performance Characteristics*:** CL series exhibit low DC resistance and high Q at high frequency.
- ***Wide Inductance Range*** Inductance values ranging from 0.047 μH to 33 μH.
- ***High Reliability:*** Monolithic inorganic material construction that effectively minimizes electromagnetic interference.
- ***Suitable for both wave and reflow soldering process.***
- ***Lead Free and Rohs Compliance Component***

Applications:

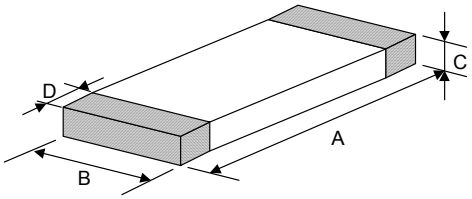
- Computer, Server & Printer
- Storage Device; Hard Disks, CD-Rom
- Telecom Equipment, Modem
- Portable Device; Mobile Phone, MP3 Player, Digital Camera

Part Numbering System

C L	-	0 6 0 3	-	1 R 0	x	x
①		②		③	④	⑤

① Product Family Code
② Dimension Code
③ Inductance
④ Tolerance Code: J=±5%, K=±10%, M=±20%
⑤ Code for Special Specification

Mechanical Dimensions



NOTE：Dimensions in mm (inches)

Product Series	A	B	C	D
CL0402	1.0±0.10 (0.039±0.004)	0.5±0.10 (0.019±0.004)	0.5±0.10 (0.019±0.004)	0.25±0.10 (0.0095±0.004)
CL0805A	2.0±0.20 (0.079±0.008)	1.2±0.20 (0.047±0.008)	1.2±0.20 (0.047±0.008)	0.5±0.30 (0.020±0.012)
CL0805B	2.0±0.20 (0.079±0.008)	1.2±0.20 (0.047±0.008)	0.9±0.20 (0.035±0.008)	0.5±0.30 (0.020±0.012)
CL0603	1.6±0.15 (0.063±0.006)	0.8±0.15 (0.031±0.006)	0.8±0.15 (0.031±0.006)	0.3±0.20 (0.012±0.008)
CL1206	3.2±0.20 (0.126±0.008)	1.6±0.20 (0.063±0.008)	1.1±0.20 (0.043±0.008)	0.5±0.30 (0.020±0.012)

CL0402 Series Electrical Specification:

Part Number	Inductance (μH)	Q Min.	Test Freq. (MHz)	S.R.F. (MHz) Min.	R_{DC} (Ω) Max.	Rated Current (mA) Max.
CL0402-R12x	0.12	10	25	180	0.70	25
CL0402-R15x	0.15			165	0.90	
CL-0402-R18x	0.18			150	1.10	
CL0402-R22x	0.22			135	1.30	
CL0402-R27x	0.27			120	1.50	
CL0402-R33x	0.33			105	1.70	
CL0402-R39x	0.39	20	10	85	0.60	10
CL0402-R47x	0.47			80	0.70	

Rated Current: DC current level where inductance rolls off max. of 10% from the initial inductance.

CL0603 Series Electrical Specification:

Part Number	Inductance (μH)	Q Min.	Test Freq. (MHz)	S.R.F. (MHz) Min.	R_{DC} (Ω) Max.	Rated Current (mA) Max.
CL0603-47N	0.047	10	50	260	0.30	50
CL0603-68N	0.068			250		
CL0603-82N	0.082			245		
CL0603-R10x	0.10	15	25	240	0.50	
CL0603-R12x	0.12			205		
CL0603-R15x	0.15			180	0.60	
CL0603-R18x	0.18			165		
CL0603-R22x	0.22			150	0.80	
CL0603-R27x	0.27			136		
CL0603-R33x	0.33			125	0.85	35
CL0603-R39x	0.39			110	1.00	
CL0603-R47x	0.47			105	1.35	
CL0603-R56x	0.56			95	1.55	
CL0603-R68x	0.68			90	1.70	
CL0603-R82x	0.82			85	2.10	
CL0603-1R0x	1.0	35	10	75	0.60	25
CL0603-1R2x	1.2			65	0.80	
CL0603-1R5x	1.5			60		
CL0603-1R8x	1.8			55	0.95	
CL0603-2R2x	2.2			50	1.15	15
CL0603-2R7x	2.7			45	1.35	
CL0603-3R3x	3.3			40	1.55	
CL0603-3R9x	3.9			35	1.70	
CL0603-4R7x	4.7			33	2.10	
CL0603-5R6x	5.6		4	22	1.55	5
CL0603-6R8x	6.8			20	1.70	
CL0603-8R2x	8.2			18	2.10	
CL0603-100x	10	30	2	17	1.85	3
CL0603-120x	12			15	2.10	
CL0603-150x	15	20	1	14	1.70	1

Rated Current: DC current level where inductance rolls off max. of 10% from the initial inductance.

CL0805 Series Electrical Specification:

Part Number	Inductance (μH)	Q Min.	Test Freq. (MHz)	S.R.F. (MHz) Min.	R_{DC} (Ω) Max.	Rated Current (mA) Max.
CL0805A-47N	0.047	15	50	320	0.20	300
CL0805A-68N	0.068			280		
CL0805A-82N	0.082			255		
CL0805A-R10x	0.10	20	25	235	0.30	250
CL0805A-R12x	0.12			220		
CL0805A-R15x	0.15			200	0.40	
CL0805A-R18x	0.18			185		
CL0805A-R22x	0.22			170	0.50	
CL0805A-R27x	0.27			150		
CL0805A-R33x	0.33			145	0.55	
CL0805A-R39x	0.39	25		135	0.65	200
CL0805A-R47x	0.47			125	0.65	
CL0805A-R56x	0.56			115	0.75	150
CL0805A-R68x	0.68			105	0.80	
CL0805A-R82x	0.82			100	1.00	
CL0805A-1R0x	1.0	45	10	75	0.40	50
CL0805A-1R2x	1.2			65	0.50	
CL0805A-1R5x	1.5			60		
CL0805A-1R8x	1.8			55	0.60	
CL0805A-2R2x	2.2			50	0.65	30
CL0805A-2R7x	2.7			45	0.75	
CL0805A-3R3x	3.3			41	0.80	
CL0805A-3R9x	3.9	45	10	38	0.90	15
CL0805A-4R7x	4.7			35	1.00	
CL0805A-5R6x	5.6	50	4	32	0.90	
CL0805A-6R8x	6.8			29	1.00	
CL0805A-8R2x	8.2			26	1.10	
CL0805B-100x	10		2	24	1.15	
CL0805B-120x	12		1	22	1.25	
CL0805B-150x	15	30		19	0.80	5
CL0805B-180x	18			18	0.90	
CL0805B-220x	22			16	1.10	
CL0805B-270x	27			14	1.15	
CL0805B-330x	33		0.4	13	1.25	

Rated Current: DC current level where inductance rolls off max. of 10% from the initial inductance.

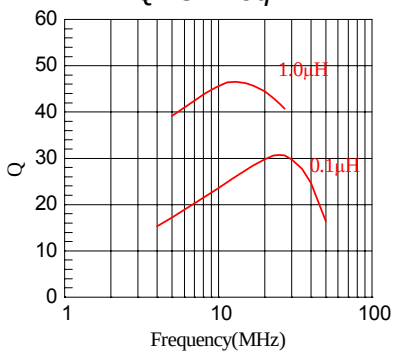
CL1206 Series Electrical Specification:

Part Number	Inductance (µH)	Q Min.	Test Freq. (MHz)	S.R.F. (MHz) Min.	R_{DC} (Ω) Max.	Rated Current (mA) Max.
CL1206-47N	0.047	20	50	320	0.15	300
CL1206-68N	0.068			280	0.25	
CL1206-R10	0.10		25	235		250
CL1206-R12x	0.12			250	0.30	
CL1206-R15x	0.15			200		
CL1206-R18x	0.18			185	0.40	
CL1206-R22x	0.22			170	050	
CL1206-R27x	0.27			150		
CL1206-R33x	0.33			145	0.60	
CL1206-R39x	0.39	25		135	0.50	200
CL1206-R47x	0.47			125	0.60	
CL1206-R56x	0.56			115	0.70	150
CL1206-R68x	0.68			105	0.80	
CL1206-R82x	0.82			100	0.90	
CL1206-1R0x	1.0	30	10	75	0.40	100
CL1206-1R2x	1.2			65	0.50	
CL1206-1R5x	1.5			60		50
CL1206-1R8x	1.8			55		
CL1206-2R2x	2.2			50	0.60	
CL1206-2R7x	2.7			45		
CL1206-3R3x	3.3			41	0.70	
CL1206-3R9x	3.9			38	0.80	
CL1206-4R7x	4.7			35	0.90	
CL1206-5R6x	5.6	35	4	32	0.70	25
CL1206-6R8x	6.8			29	0.90	
CL1206-8R2x	8.2			26		
CL1206-100x	10		2	24	1.00	25
CL1206-120x	12			22	1.05	15
CL1206-150x	15	30	1	19	0.70	5
CL1206-180x	18	30	1	18	0.70	
CL1206-220x	22			16	0.90	
CL1206-270x	27			14		
CL1206-330x	33		0.4	13	1.05	

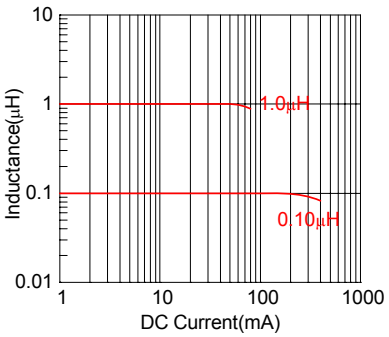
Electrical Characteristics (T=25ºC)

CL0603

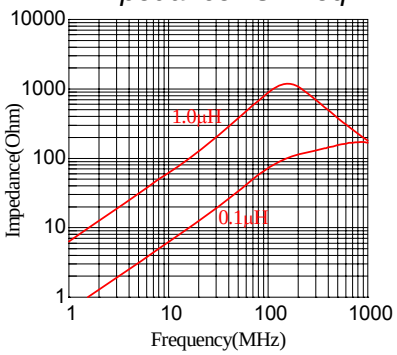
Q vs. Freq.



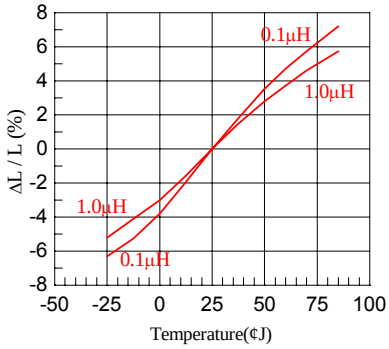
Inductance vs. Current



Impedance vs. Freq.

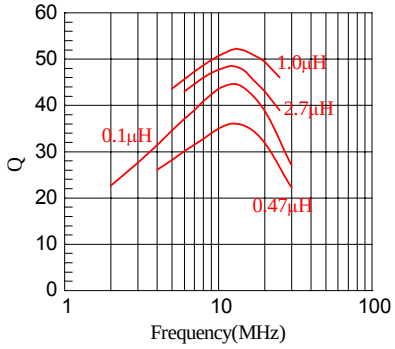


Inductance vs. Temp.

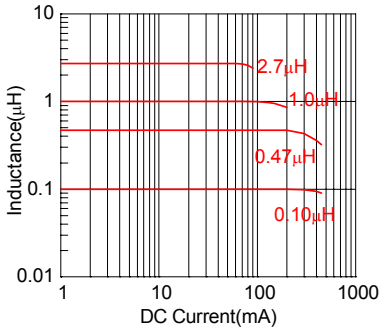


CL0805

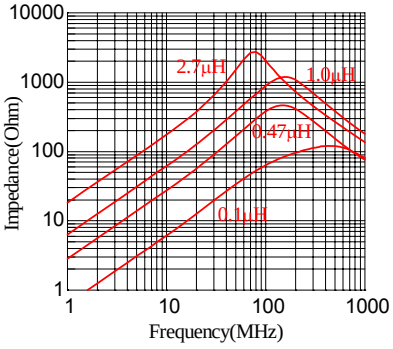
Q vs. Freq



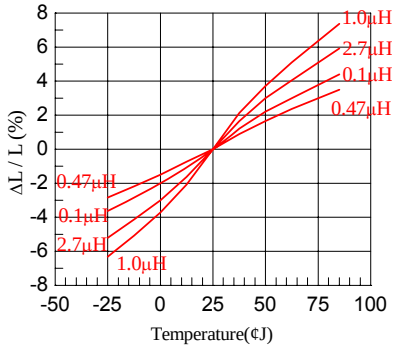
Inductance vs. Current



Impedance vs. Freq.

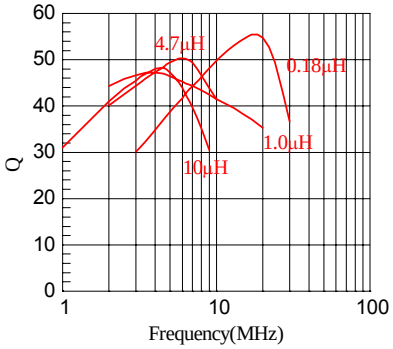


Inductance vs. Temp.

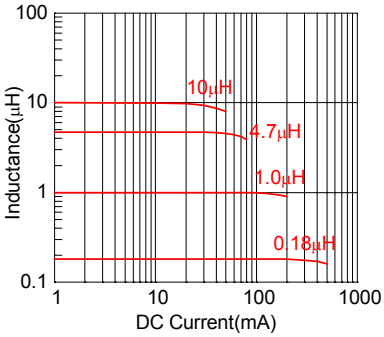


CL1206

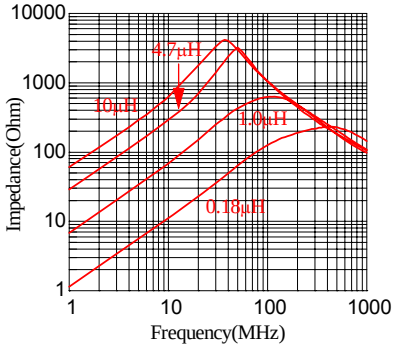
Q vs. Freq.



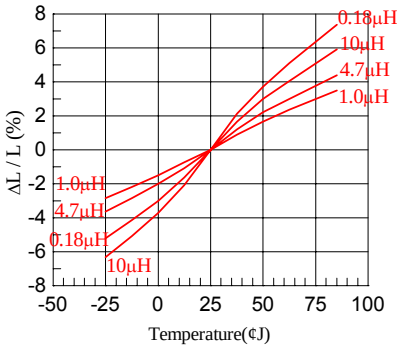
Inductance vs. Current



Impedance vs. Freq.



Inductance vs. Temp.



Test Instrument:

L/Q: Agilent 4291B Impedance Analyzer

Test Fixture: Agilent 16192

Osc. Level: 500mV for L 8.2μH

100mV for L.: 10μH

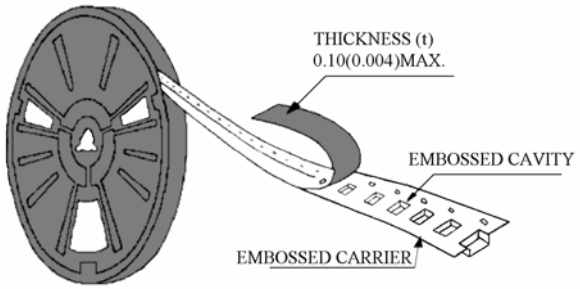
SRF: Agilent 4291B Impedance Analyzer

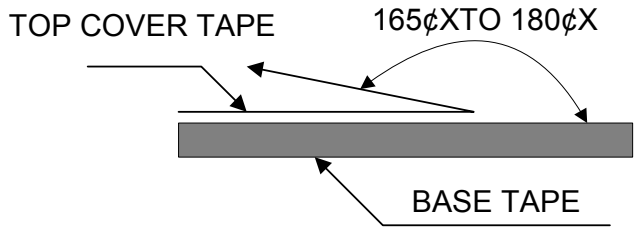
R_{DC}: Agilent 34401A

Test Condition: Temperature: 25°C ± 2°C Humidity: 60% to 70% RH

Rated Current: DC current level where inductance rolls off max. of 10% from the initial inductance.

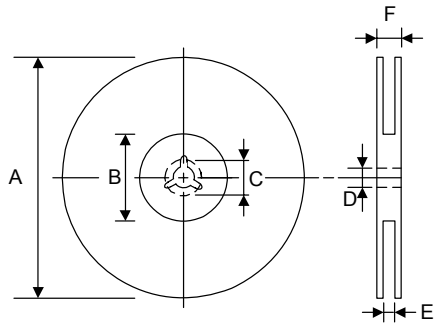
PACKAGING



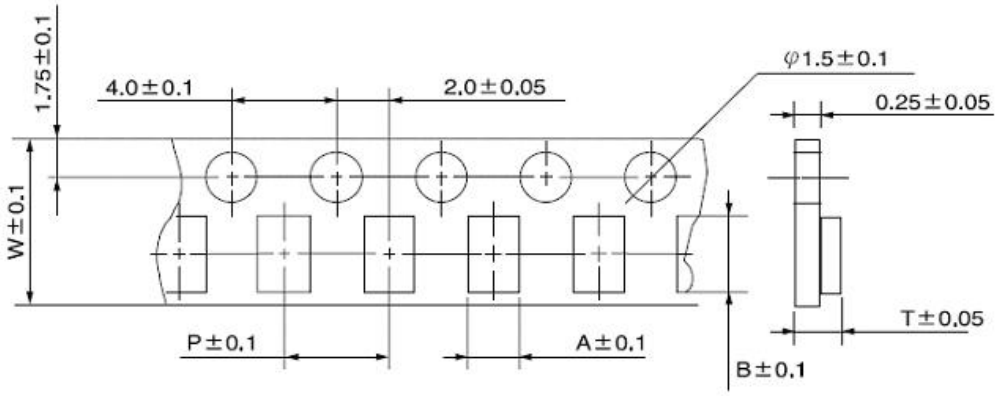


The force for peeling off cover tape is 10 grams in the arrow direction.

Dimension (Unit: mm)

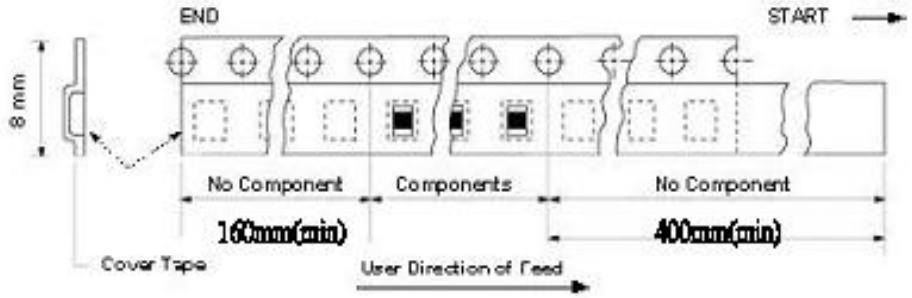


TYPE	A	B	C	D	E	F
8 mm	178±1	60 +0.5 -0	-	13 ±0.2	9 ±0.5	12 ±0.5
12 mm	178 ±0.3	60 ±0.2	19.3 ±0.1	13.5 ±0.1	13.6 ±0.1	-



Series	Case Size	A	B	W	P	T	CHIPS/REEL
CL	0402	0.6	1.1	8	2	1.0	10000
	0603	1.1	1.9	8	4	1.1, *0.95±0.05	4000
	0805A	1.5	2.3	8	4	1.3, *0.95±0.10	4000
	0805B	1.5	2.3	8	4	1.3	4000
	1206	1.9	3.5	8	4	1.5	3000

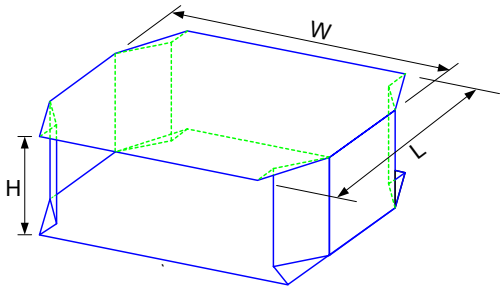
*For Paper Reels



Tape & Reel Quantity

Case Size	1812	1806	1210	1206	0805 0603	0402
PCS/Reel	1000	2000	2500	3000	4000	10000

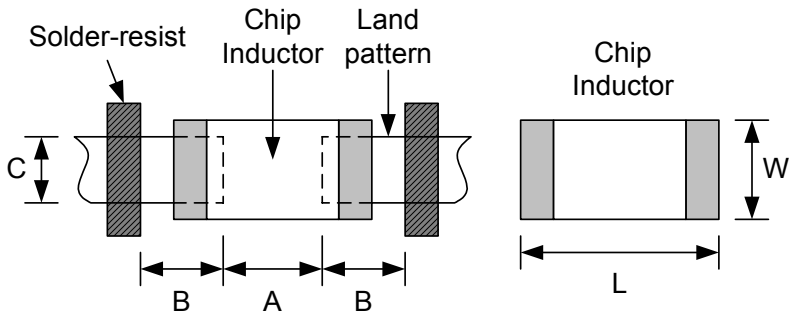
Tape Packing Case



Unit: in cm

No. of Reels	W	L	H
2	18±0.5	18±0.5	2.4±0.2
3	18±0.5	18±0.5	3.6±0.2
4	18±0.5	18±0.5	4.8±0.2
5	18±0.5	18±0.5	6.0±0.2

RECOMMENDED PCB LAYOUT

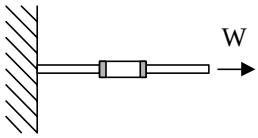
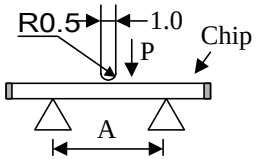


Unit: mm

Product Series		CL0402	CL0603	CL0805	CL1206
Size	L	1.0	1.6	2.0	3.2
	W	0.5	0.8	1.2	1.6
A		0.45~0.55	0.6~0.8	0.8~1.2	1.8~2.2
B		0.40~0.50	0.6~0.8	0.8~1.2	1.1~1.6
C		0.40~0.50	0.6~0.8	0.9~1.6	0.9~1.6

RELIABILTY TEST

• Mechanical Strength Test

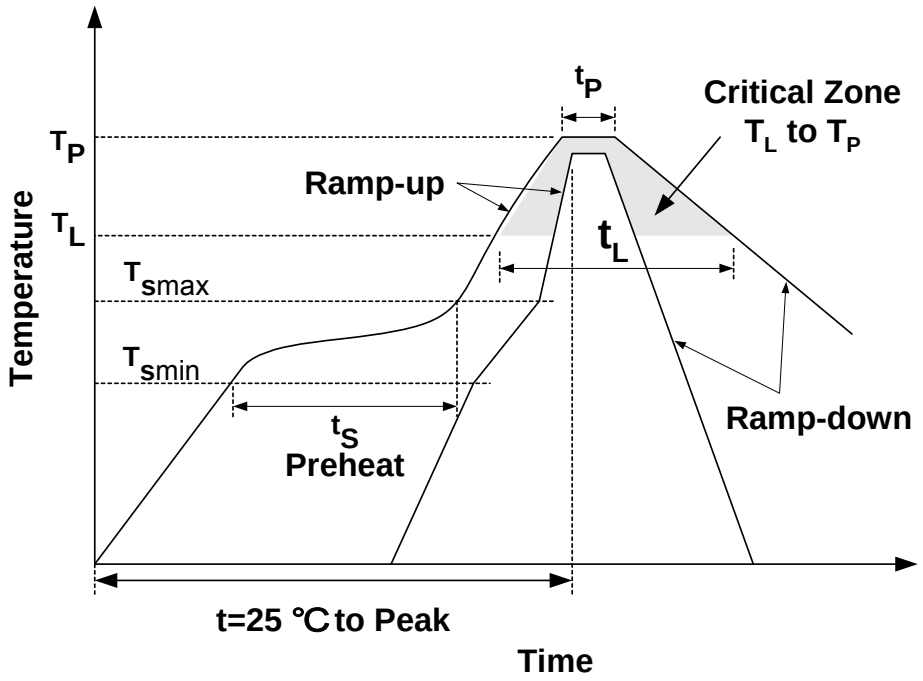
Type of Test	SPECIFICATION	TEST CONDITION
Solderability	More than 90% of the terminal electrode shall be covered with fresh solder.	Solder: Sn-3.0Ag-0.5Cu Solder Temperature: 240 ºC ± 5 ºC Flux: Rosin Dip Time: 3 ± 1 Seconds
Solder Heat Resistance Test	The chip shall not crack. More than 75% of the terminal electrode shall be covered with solder.	Solder temperature : 260 ºC ± 5 ºC Flux: Rosin Dip time: 10 ± 1 seconds
Terminal Strength	The terminal electrode shall not be broken off nor the ferrite damaged. 	Product Series / W(KGF) / Time (Sec) CL0402 / 0.2 / 30±5 CL0603 / 0.6 CL0805A&B / 0.6 CL1206 / 1.0
Bending Strength	No mechanical damage. The ferrite shall not be damaged. 	Product Series / A(MM) / P(KGF) CL0402 / 0.4 / 0.2 CL0603 / 1.0 / 0.6 CL0805A&B / 1.4 / 1.0 CL1206 / 2.0 / 2.0

• Thermal Cycle Test

Type of Test	SPECIFICATION	TEST CONDITION
Thermal Shock Test (Temperature Cycle)	No mechanical damage. Inductance shall be within ± 5% of the initial value, and Q (shall be) within ± 30% of the initial value.	Temperature: -40ºC, 85ºC for 30 minutes each, 100 cycles.
High Humidity Test		Temperature : 60ºC Humidity: 95% RH Time: 1000 ± 12 HOURS
High Temperature Test		Temperature : 85ºC ± 2ºC Time: 1000 ± 12 hours
Low Temperature Resistance		Temperature : -40 ºC ± 2 ºC Time: 1000 ± 12 hours

Operating Temperature Range: -55 ºC TO +125 ºC
Storage Condition: The temperature should be within -40ºC ~85 ºC and humidity should be less than 75% RH. The product should be used within 6 months from the time of delivery.

CL Family Chip Inductor Recommended Reflow Soldering Profile



Profile Feature		Sn-Pb	Pb-Free
Preheat	t_s	60~120 seconds	60~180 seconds
	T_{smin}	100ºC	150ºC
	T_{smax}	150ºC	200ºC
Average ramp-up rate (T_{smax} to T_P)		3ºC /second max.	3ºC /second max.
Time main above	Temperature (T_L)	183ºC	217ºC
	Time (t_L)	60~150 seconds	60~150 seconds
Peak temperature (T_P)		230ºC	250~260ºC
Dwell Time within 5°C of actual peak temperature (t_P)		10 seconds	10 seconds
Ramp-down rate		6ºC /sec max.	6ºC /sec max.
Dwell Time (25°C to peak temperature)		6 minutes max.	8 minutes max.