

## Data Sheet

**Customer:**

**Product:** Automotive Grade Multilayer Chip Inductor – CL-SA Series

**Sizes.:** 0201/0402/0603

**Issued Date:** 9-Aug-21

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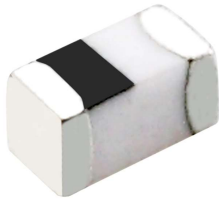
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## Automotive Grade Multilayer Chip Inductor



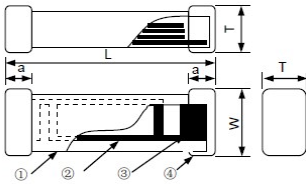
### ■ Features

- Particular ceramic material and coil structure provide high frequency application range up to 10GHz
- Small size and low profile
- Available in various sizes
- Excellent solderability and heat resistance
- AEC-Q200 Compliance

### ■ Applications

- RF and Wireless Communication
- Information Technology Equipment Which Includes Computer
- Telecommunications, Rated Detectors, Automotive Electronics, Cellular Phones
- Pagers, Audio Equipment, PDAs, Keyless Remote System and Low-voltage Power Supply Modules.

### ■ Construction



① Ceramic Material	③ Pull Out Electrode
② Internal Electrode	④ End-termination

### ■ Dimensions

Unit: mm

Type	Size (Inch)	L	W	T	a
CL01-SA	0201	0.60±0.03	0.30±0.03	0.30±0.03	0.10~0.20
CL02-SA	0402	1.00±0.10	0.50±0.10	0.50±0.10	0.10~0.30
CL03-SA	0603	1.60±0.15	0.80±0.15	0.80±0.15	0.20~0.60

### ■ Part Numbering

CL	02	J	T		1N0	-S	A
Product Type	Dimensions	Inductance Tolerance	Packaging Code	Appearance	Inductance	Special	Function Code
	01: 0201 02: 0402 03: 0603	B: ±0.1nH C: ±0.2nH S: ±0.3nH G: ±2% H: ±3% J: ±5%	T: Taping Reel	: Standard Q: High Q	0N3: 0.3nH 1N0: 1.0nH 10N: 10nH R10: 100nH		A: Automotive Grade

**Standard Electrical Specifications**

CL01-SA Multilayer Chip Inductors / Standard Type

Inductance (nH)	Tolerance	Quality Factor /min.	L/Q Freq. (MHz)	SRF min. (GHz)	RDC (Ω) max.	IDC (mA) max.
0.3	±0.1nH	4	100	10.00	0.07	850
0.4	±0.1nH	4	100	10.00	0.07	850
0.5	±0.1nH	4	100	10.00	0.08	800
0.6	±0.1nH	4	100	10.00	0.08	800
0.7	±0.1nH	4	100	10.00	0.09	750
0.8	±0.1nH	4	100	10.00	0.10	750
0.9	±0.1nH	4	100	10.00	0.10	750
1.0	±0.1, 0.2, 0.3nH	4	100	10.00	0.14	600
1.1	±0.1, 0.2, 0.3nH	4	100	10.00	0.14	600
1.2	±0.1, 0.2, 0.3nH	4	100	10.00	0.14	600
1.3	±0.1, 0.2, 0.3nH	4	100	10.00	0.14	600
1.4	±0.1, 0.2, 0.3nH	4	100	10.00	0.18	550
1.5	±0.1, 0.2, 0.3nH	4	100	10.00	0.18	550
1.6	±0.1, 0.2, 0.3nH	4	100	10.00	0.18	500
1.7	±0.1, 0.2, 0.3nH	4	100	10.00	0.19	500
1.8	±0.1, 0.2, 0.3nH	4	100	10.00	0.19	500
1.9	±0.1, 0.2, 0.3nH	4	100	10.00	0.20	450
2.0	±0.1, 0.2, 0.3nH	4	100	10.00	0.20	450
2.1	±0.1, 0.2, 0.3nH	4	100	10.00	0.20	450
2.2	±0.1, 0.2, 0.3nH	4	100	10.00	0.22	450
2.3	±0.1, 0.2, 0.3nH	4	100	10.00	0.22	450
2.4	±0.1, 0.2, 0.3nH	4	100	10.00	0.24	450
2.5	±0.1, 0.2, 0.3nH	4	100	10.00	0.24	450
2.6	±0.1, 0.2, 0.3nH	4	100	10.00	0.25	450
2.7	±0.1, 0.2, 0.3nH	5	100	10.00	0.25	450
2.9	±0.1, 0.2, 0.3nH	5	100	9.50	0.28	450
3.0	±0.1, 0.2, 0.3nH	5	100	9.50	0.28	450
3.1	±0.1, 0.2, 0.3nH	5	100	9.50	0.28	450
3.2	±0.1, 0.2, 0.3nH	5	100	9.50	0.30	450
3.3	±0.1, 0.2, 0.3nH	5	100	9.50	0.30	450
3.4	±0.1, 0.2, 0.3nH	5	100	8.00	0.30	400
3.5	±0.1, 0.2, 0.3nH	5	100	8.00	0.30	400
3.6	±0.1, 0.2, 0.3nH	5	100	8.00	0.30	400
3.7	±0.1, 0.2, 0.3nH	5	100	8.00	0.30	400
3.8	±0.1, 0.2, 0.3nH	5	100	6.50	0.30	400
3.9	±0.1, 0.2, 0.3nH	5	100	6.50	0.30	400
4.3	±0.1, 0.2, 0.3nH	5	100	6.50	0.40	350
4.7	±0.1, 0.2, 0.3nH	5	100	6.50	0.40	350
5.1	±0.1, 0.2, 0.3nH	5	100	6.50	0.40	350
5.6	±0.1, 0.2, 0.3nH	5	100	6.00	0.40	350
6.2	±0.1, 0.2, 0.3nH	5	100	6.00	0.44	300
6.8	±3, 5%	5	100	5.40	0.50	300
7.5	±3, 5%	5	100	4.80	0.53	300
8.2	±3, 5%	5	100	4.80	0.55	250
9.1	±3, 5%	5	100	4.50	0.62	250
10	±3, 5%	5	100	4.50	0.65	250
12	±3, 5%	5	100	3.70	0.70	250
15	±3, 5%	5	100	2.20	0.80	250
18	±3, 5%	5	100	2.20	0.90	200

■ Operating temperature range: -55~+125℃

**Standard Electrical Specifications**

CL02-SA Multilayer Chip Inductors / Standard Type

Inductance (nH)	Tolerance	Quality Factor /min.	L/Q Freq. (MHz)	SRF min. (GHz)	RDC (Ω) max.	IDC (mA) max.
0.3	±0.1nH	8	100	10.00	0.08	1000
0.4	±0.1nH	8	100	10.00	0.08	1000
0.5	±0.1nH	8	100	10.00	0.08	1000
0.6	±0.1nH	8	100	10.00	0.08	1000
0.7	±0.1nH	8	100	10.00	0.08	1000
0.8	±0.1nH	8	100	10.00	0.08	1000
1.0	±0.1, 0.2, 0.3nH	8	100	10.00	0.08	1000
1.1	±0.1, 0.2, 0.3nH	8	100	10.00	0.08	1000
1.2	±0.1, 0.2, 0.3nH	8	100	10.00	0.09	1000
1.3	±0.1, 0.2, 0.3nH	8	100	10.00	0.09	1000
1.5	±0.1, 0.2, 0.3nH	8	100	10.00	0.10	1000
1.6	±0.1, 0.2, 0.3nH	8	100	10.00	0.10	1000
1.8	±0.1, 0.2, 0.3nH	8	100	10.00	0.12	900
2.0	±0.1, 0.2, 0.3nH	8	100	10.00	0.12	900
2.2	±0.1, 0.2, 0.3nH	8	100	10.00	0.13	900
2.4	±0.1, 0.2, 0.3nH	8	100	10.00	0.13	800
2.7	±0.1, 0.2, 0.3nH	8	100	6.00	0.16	800
3.0	±0.1, 0.2, 0.3nH	8	100	6.00	0.16	800
3.3	±0.1, 0.2, 0.3nH	8	100	6.00	0.16	800
3.6	±0.1, 0.2, 0.3nH	8	100	6.00	0.20	700
3.9	±0.1, 0.2, 0.3nH	8	100	6.00	0.20	700
4.3	±0.1, 0.2, 0.3nH	8	100	6.00	0.20	700
4.7	±0.1, 0.2, 0.3nH	8	100	6.00	0.20	700
5.1	±0.1, 0.2, 0.3nH	8	100	5.30	0.23	600
5.6	±0.1, 0.2, 0.3nH	8	100	4.50	0.23	600
6.2	±0.1, 0.2, 0.3nH	8	100	4.50	0.25	600
6.8	±2, 3, 5%	8	100	4.50	0.25	600
7.5	±2, 3, 5%	8	100	4.20	0.28	500
8.2	±2, 3, 5%	8	100	3.70	0.28	500
9.1	±2, 3, 5%	8	100	3.40	0.30	500
10	±2, 3, 5%	8	100	3.40	0.30	500
12	±2, 3, 5%	8	100	3.00	0.45	400
15	±2, 3, 5%	8	100	2.50	0.55	400
18	±2, 3, 5%	8	100	2.20	0.65	300
22	±2, 3, 5%	8	100	1.90	0.70	300
27	±2, 3, 5%	8	100	1.70	0.80	300
33	±2, 3, 5%	8	100	1.60	0.90	200
39	±2, 3, 5%	8	100	1.20	1.00	200
47	±2, 3, 5%	8	100	1.10	1.10	200
56	±2, 3, 5%	8	100	1.00	1.10	200
68	±2, 3, 5%	8	100	0.80	1.20	200
82	±5%	8	100	0.60	1.30	200
100	±5%	8	100	0.60	1.60	200

■ Operating temperature range: -55~+125°C

**Standard Electrical Specifications**

CL03-SA Multilayer Chip Inductors / Standard Type

Inductance (nH)	Tolerance	Quality Factor /min.	L/Q Freq. (MHz)	SRF min. (GHz)	RDC (Ω) max.	IDC (mA) max.
1.0	±0.3nH	8	100	10.00	0.05	1000
1.2	±0.3nH	8	100	10.00	0.05	1000
1.5	±0.3nH	8	100	10.00	0.10	1000
1.8	±0.3nH	8	100	10.00	0.10	1000
2.2	±0.3nH	8	100	8.00	0.10	1000
2.7	±0.3nH	10	100	7.00	0.13	1000
3.3	±0.3nH	10	100	6.00	0.13	1000
3.9	±0.3nH	10	100	6.00	0.15	1000
4.7	±0.3nH	10	100	5.00	0.20	1000
5.6	±0.3nH	10	100	4.00	0.23	700
6.8	±5%	10	100	4.00	0.25	700
8.2	±5%	10	100	3.50	0.28	600
10	±5%	12	100	3.40	0.30	600
12	±5%	12	100	2.60	0.35	600
15	±5%	12	100	2.30	0.40	600
18	±5%	12	100	2.00	0.45	600
22	±5%	12	100	1.60	0.50	600
27	±5%	12	100	1.40	0.55	600
33	±5%	12	100	1.20	0.60	600
39	±5%	12	100	1.10	0.65	500
47	±5%	12	100	0.90	0.70	500
56	±5%	12	100	0.90	0.75	500
68	±5%	12	100	0.70	0.85	400
82	±5%	12	100	0.60	0.95	300
100	±5%	12	100	0.60	1.00	300
120	±5%	8	50	0.50	1.20	300

■ Operating temperature range: -55~+125°C

**High Q Electrical Specifications**

CL01-SA Multilayer Chip Inductors / High Q Type

Inductance (nH)	Tolerance	Quality Factor /min.	L/Q Freq. (MHz)	SRF min. (GHz)	RDC (Ω) max.	IDC (mA) max.
0.3	±0.1, 0.2nH	11	100	18.00	0.07	850
0.4	±0.1, 0.2nH	11	100	18.00	0.07	850
0.5	±0.1, 0.2nH	11	100	18.00	0.08	850
0.6	±0.1, 0.2nH	11	100	18.00	0.08	850
0.7	±0.1, 0.2nH	12	100	18.00	0.09	750
0.8	±0.1, 0.2nH	12	100	18.00	0.10	750
0.9	±0.1, 0.2nH	12	100	18.00	0.12	700
1.0	±0.1, 0.2nH	12	100	17.00	0.14	600
1.1	±0.1, 0.2nH	12	100	17.00	0.14	600
1.2	±0.1, 0.2nH	12	100	15.00	0.14	600
1.3	±0.1, 0.2nH	12	100	15.00	0.15	600
1.4	±0.1, 0.2nH	12	100	14.00	0.15	600
1.5	±0.1, 0.2nH	12	100	13.50	0.15	600
1.6	±0.1, 0.2nH	12	100	13.00	0.15	600
1.7	±0.1, 0.2nH	12	100	12.50	0.19	500
1.8	±0.1, 0.2nH	12	100	12.50	0.20	500
1.9	±0.1, 0.2nH	12	100	12.50	0.20	450
2.0	±0.1, 0.2nH	12	100	12.50	0.20	450
2.1	±0.1, 0.2nH	12	100	12.00	0.22	450
2.2	±0.1, 0.2nH	12	100	12.00	0.22	450
2.3	±0.1, 0.2nH	12	100	11.50	0.24	450
2.4	±0.1, 0.2nH	12	100	11.00	0.25	450
2.5	±0.1, 0.2nH	12	100	11.00	0.25	450
2.6	±0.1, 0.2nH	12	100	11.00	0.25	450
2.7	±0.1, 0.2nH	12	100	11.00	0.25	450
2.8	±0.1, 0.2nH	12	100	9.50	0.25	450
2.9	±0.1, 0.2nH	12	100	9.50	0.25	450
3.0	±0.1, 0.2nH	12	100	9.50	0.25	450
3.1	±0.1, 0.2nH	12	100	9.50	0.30	450
3.2	±0.1, 0.2nH	12	100	9.50	0.30	450
3.3	±0.1, 0.2nH	12	100	9.50	0.30	400
3.4	±0.1, 0.2nH	12	100	8.00	0.30	400
3.5	±0.1, 0.2nH	12	100	8.00	0.30	400
3.6	±0.1, 0.2nH	12	100	8.00	0.30	400
3.7	±0.1, 0.2nH	12	100	7.00	0.30	400
3.8	±0.1, 0.2nH	12	100	7.00	0.35	350
3.9	±0.1, 0.2nH	12	100	6.50	0.35	350
4.3	±3, 5%	12	100	6.50	0.40	350
4.7	±3, 5%	12	100	6.50	0.40	350
5.1	±3, 5%	12	100	6.50	0.40	350
5.6	±3, 5%	12	100	6.00	0.44	300
6.2	±3, 5%	12	100	6.00	0.50	300
6.8	±3, 5%	12	100	5.40	0.53	300
7.5	±3, 5%	12	100	4.80	0.55	250
8.2	±3, 5%	12	100	4.80	0.62	250
9.1	±3, 5%	12	100	4.50	0.65	250
10	±3, 5%	11	100	4.00	0.70	250
12	±3, 5%	11	100	3.70	0.75	250
15	±3, 5%	11	100	3.10	0.85	250
18	±3, 5%	11	100	2.80	1.00	200

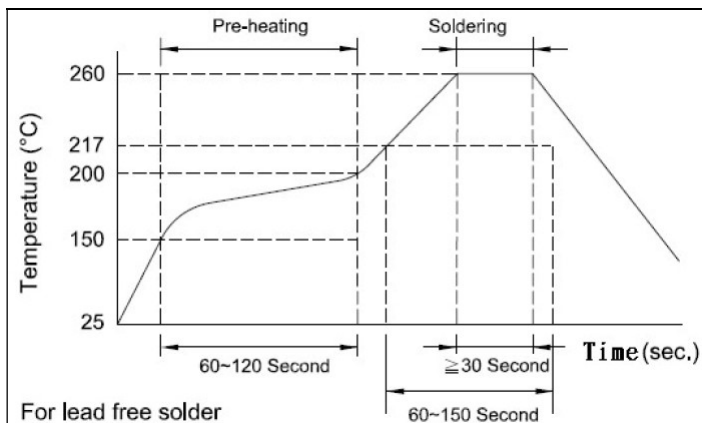
Operating temperature range: -55~+125°C

**Environmental Characteristics**

Item	Requirement	Test Condition												
High Temperature Expose (Storage)	Appearance: No damage Inductance: Within $\pm 10\%$ of initial value Q: Within $\pm 20\%$ of initial value	at $+125\pm 5^\circ\text{C}$ for 1000 hrs Measurement at $24\pm 4$ hrs after test conclusion												
Temperature Cycle	Appearance: No damage Inductance: Within $\pm 10\%$ of initial value Q: Within $\pm 20\%$ of initial value	$-55^\circ\text{C}$ to $+125^\circ\text{C}$ , 1000 cycles Dwell time: 30 min Transition time $\leq 1$ min												
Biased Humidity	Appearance: No damage Inductance: Within $\pm 10\%$ of initial value Q: Within $\pm 20\%$ of initial value	1000 hrs $85\pm 2^\circ\text{C}/85\%\text{RH}$ , full rated current Measurement at $24\pm 4$ hrs after test conclusion												
Operational Life	Appearance: No damage Inductance: Within $\pm 10\%$ of initial value Q: Within $\pm 20\%$ of initial value	1000 hrs @ $125\pm 5^\circ\text{C}$ , full rated current Measurement at $24\pm 4$ hrs after test conclusion												
Mechanical Shock	Appearance: No damage Inductance: Within $\pm 10\%$ of initial value Q: Within $\pm 20\%$ of initial value	Condition F: 1500g's / 0.5ms / Half sine												
Vibration Test	Appearance: No damage Inductance: Within $\pm 10\%$ of initial value Q: Within $\pm 20\%$ of initial value	5g's for 20min, 12cycles each of 3 orientations Test form 10-2000Hz., 12cycles each of 3 orientations												
Solderability	More than 95% of terminal electrode should be Covered with new solder Appearance: No damage	$235\pm 5^\circ\text{C}$ for $5\pm 1$ seconds												
Resistance to Soldering Heat	More than 95% of terminal electrode should be Covered with new solder Appearance: No damage Inductance: Within $\pm 10\%$ of initial value Q: Within $\pm 20\%$ of initial value	$265\pm 5^\circ\text{C}$ for $10\pm 1$ seconds												
Board Flex	Appearance: No damage	Epoxy-PCB(1.6mm) Deflection 2mm(min) 60s minimum holding time												
Terminal Strength	Appearance: No damage	<table border="1"> <thead> <tr> <th>Size</th> <th>Apply Force(F)</th> <th>Test Time</th> </tr> </thead> <tbody> <tr> <td>0201</td> <td>2N</td> <td><math>10\pm 1</math> sec</td> </tr> <tr> <td>0402</td> <td>5N</td> <td><math>10\pm 1</math> sec</td> </tr> <tr> <td>0603</td> <td>10N</td> <td><math>10\pm 1</math> sec</td> </tr> </tbody> </table>	Size	Apply Force(F)	Test Time	0201	2N	$10\pm 1$ sec	0402	5N	$10\pm 1$ sec	0603	10N	$10\pm 1$ sec
Size	Apply Force(F)	Test Time												
0201	2N	$10\pm 1$ sec												
0402	5N	$10\pm 1$ sec												
0603	10N	$10\pm 1$ sec												
ESD	Appearance: No damage Inductance: Within $\pm 10\%$ of initial value Q: Within $\pm 20\%$ of initial value	Classification levels 1C												

■ Storage Temperature:  $15\sim 28^\circ\text{C}$ ; Humidity < 80%RH

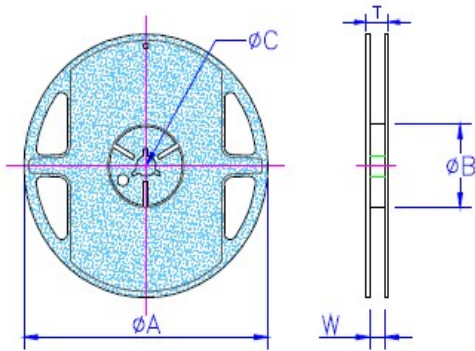
**Reflow Soldering Profile**



**■ Packaging Specifications**

Reel Dimension

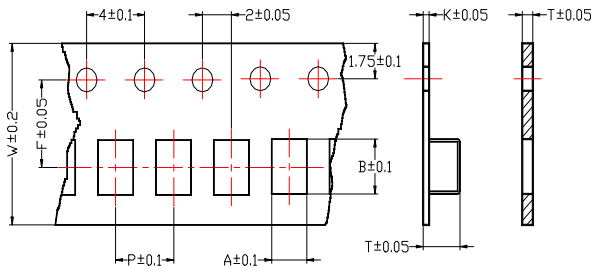
Unit: mm



Type	A	B	C	W	T	Quantity (EA)
CL01-SA	178±1	60.0±0.5	13.0±0.20	9.00±0.5	12.0±0.15	15,000
CL02-SA	178±1	60.0±0.5	13.0±0.20	9.00±0.5	12.0±0.15	10,000
CL03-SA	178±2	50 or more	13.2±1.00	10.00±1.5	-	4,000

Tape Specifications

Unit: mm

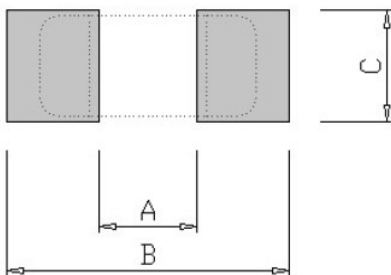


Type	A	B	T	W	P	F	K	Tape
CL01-SA	0.36	0.66	0.42	8	2	3.5	-	B
CL02-SA	0.60	1.12	0.60	8	2	3.5	-	B
CL03-SA	0.98	1.80	0.95	8	4	3.5	-	B

**Type A** **Type B**

**■ Recommend Land Pattern**

Unit: mm



Type	A	B	C
CL01-SA	0.20-0.30	0.80-0.90	0.20-0.30
CL02-SA	0.40	1.40-1.50	0.50-0.60
CL03-SA	0.70	1.90-2.30	0.60-0.80