# ***Data Sheet***

| | |
|---|---|
| **Customer:** | |
| **Product:** | **Automotive Grade Multilayer Chip Inductor – CL-GA Series** |
| **Sizes.:** | **0402/0603** |
| **Issued Date:** | **14-Apr-25** |
| **Edition:** | **REV.A2** |

RoHS Compliant


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| Produced by (QC) | Checked (QC) | Approved by (QC) | Prepared by (Sales) | Accepted by (Customer) |
|---|---|---|---|---|
| 14-Apr-25 | 14-Apr-25 | 14-Apr-25 | 14-Apr-25 | |
| *Mandy Chang* | *Ben Chang* | *Ben Chang* | | |

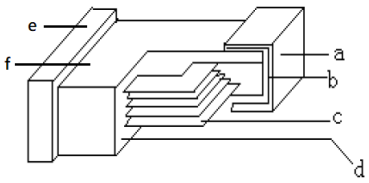
# Automotive Grade Multilayer Chip Inductor

## ■Scope

－This specification involved in the product is recommended for automotive multimedia, wireless connection system and body comfort system. It can be used for automobile power system and safety management system without special clarifications. Please contact with our company for further confirmation before the products to be used for the Automotive area.

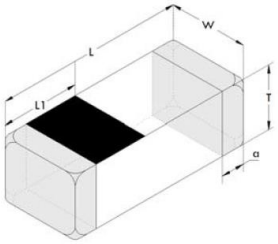
－AEC-Q200 Compliance

## ■Construction

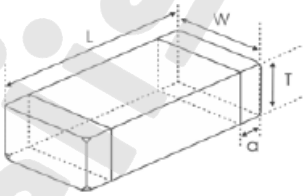



| | | | |
|---|---|---|---|
| a | Ni/Sn Plating | d | Body |
| b | Ag Layer | e | Terminal Electrode |
| c | Inner Electrode | F | Ceramic |

## ■Dimensions




CL02-GA




CL03-GA

Unit: mm

| Type | Size (Inch) | L | W | T | a | L1 |
|---|---|---|---|---|---|---|
| CL02-GA | 0402 | 1.00±0.15 | 0.50±0.15 | 0.50±0.15 | 0.25±0.10 | 0.50±0.15 |
| CL03-GA | 0603 | 1.60±0.20 | 0.80±0.20 | 0.80±0.20 | 0.30±0.20 | - |

## ■Part Numbering

| CL | 02 | J | T | HQ | R10 | -G | A |
|---|---|---|---|---|---|---|---|
| Product Type | Dimensions | Inductance Tolerance | Packaging Code | Material Code | Inductance | Special | Function Code |
| | 02: 0402<br>03: 0603 | B: ±0.1nH<br>C: ±0.2nH<br>S: ±0.3nH<br>G: ±2%<br>H: ±3%<br>J: ±5% | T: Taping Reel | H:H Material<br>HQ:HQ Material | 1N0: 1.0nH<br>10N: 10nH<br>R10: 100nH | | A: Automotive Grade |

## ■Electrical Specifications

CL02-GA / HQ Material

| Inductance (nH) | Tolerance | Q min | Test Frequency (MHz) | Test Voltage (mV) | SRF min. (MHz) | RDC (Ω) max. | IDC (mA) max. |
|---|---|---|---|---|---|---|---|
| 1.0 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 10000 | 0.06 | 1000 |
| 1.1 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 10000 | 0.07 | 1000 |
| 1.2 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 10000 | 0.07 | 1000 |
| 1.3 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 10000 | 0.07 | 1000 |
| 1.5 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 6000 | 0.08 | 1000 |
| 1.6 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 6000 | 0.08 | 1000 |
| 1.8 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 6000 | 0.08 | 900 |
| 2.0 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 6000 | 0.09 | 900 |
| 2.2 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 6000 | 0.09 | 900 |
| 2.4 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 6000 | 0.10 | 800 |
| 2.7 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 6000 | 0.12 | 800 |
| 3.0 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 6000 | 0.12 | 800 |
| 3.3 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 6000 | 0.13 | 800 |
| 3.6 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 4000 | 0.15 | 700 |
| 3.9 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 4000 | 0.16 | 700 |
| 4.3 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 4000 | 0.16 | 700 |
| 4.7 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 4000 | 0.16 | 700 |
| 5.1 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 4000 | 0.16 | 600 |
| 5.6 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 4000 | 0.20 | 600 |
| 6.2 | ±0.1nH,±0.2nH,±0.3nH | 8 | 100 | 50 | 3900 | 0.20 | 600 |
| 6.8 | ±3%,±5% | 8 | 100 | 50 | 3900 | 0.20 | 600 |
| 7.5 | ±3%,±5% | 8 | 100 | 50 | 3700 | 0.24 | 500 |
| 8.2 | ±3%,±5% | 8 | 100 | 50 | 3600 | 0.24 | 500 |
| 9.1 | ±3%,±5% | 8 | 100 | 50 | 3400 | 0.26 | 500 |
| 10 | ±3%,±5% | 8 | 100 | 50 | 3200 | 0.26 | 500 |
| 12 | ±3%,±5% | 8 | 100 | 50 | 2700 | 0.50 | 400 |
| 15 | ±3%,±5% | 8 | 100 | 50 | 2300 | 0.50 | 400 |
| 18 | ±3%,±5% | 8 | 100 | 50 | 2100 | 0.60 | 350 |
| 20 | ±3%,±5% | 8 | 100 | 50 | 2000 | 0.60 | 350 |
| 22 | ±3%,±5% | 8 | 100 | 50 | 1900 | 0.60 | 350 |
| 27 | ±3%,±5% | 8 | 100 | 50 | 1600 | 0.70 | 300 |
| 33 | ±3%,±5% | 8 | 100 | 50 | 1300 | 0.80 | 300 |
| 39 | ±3%,±5% | 8 | 100 | 50 | 1200 | 1.00 | 250 |
| 43 | ±3%,±5% | 8 | 100 | 50 | 1100 | 1.10 | 250 |
| 47 | ±3%,±5% | 8 | 100 | 50 | 1000 | 1.10 | 250 |
| 56 | ±3%,±5% | 8 | 100 | 50 | 750 | 1.20 | 200 |
| 68 | ±3%,±5% | 8 | 100 | 50 | 750 | 1.40 | 200 |
| 82 | ±3%,±5% | 8 | 100 | 50 | 750 | 1.60 | 200 |
| 100 | ±3%,±5% | 8 | 100 | 50 | 700 | 2.00 | 200 |
| 120 | ±3%,±5% | 8 | 100 | 50 | 600 | 2.50 | 150 |
| 150 | ±3%,±5% | 8 | 100 | 50 | 550 | 3.00 | 150 |
| 180 | ±3%,±5% | 8 | 100 | 50 | 500 | 3.50 | 150 |
| 220 | ±3%,±5% | 8 | 100 | 50 | 450 | 3.70 | 100 |
| 270 | ±3%,±5% | 8 | 100 | 50 | 400 | 4.50 | 100 |
| 330 | ±3%,±5% | 6 | 50 | 50 | 350 | 5.00 | 80 |
| 360 | ±3%,±5% | 6 | 50 | 50 | 300 | 6.00 | 80 |

■**Operating temperature range: -55~+125℃ (including self-heating temperature)**

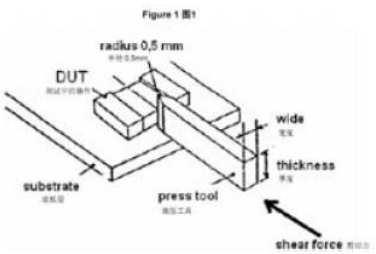
## ■Electrical Specifications

CL03-GA / H Material

| Inductance (nH) | Tolerance | Q min | Test Frequency (MHz) | Test Voltage (mV) | SRF min. (MHz) | RDC (Ω) max. | IDC (mA) max. |
|---|---|---|---|---|---|---|---|
| 1.0 | ±0.3nH,±0.5nH | 8 | 100 | 50 | 10000 | 0.05 | 500 |
| 1.2 | ±0.3nH,±0.5nH | 8 | 100 | 50 | 10000 | 0.05 | 500 |
| 1.5 | ±0.3nH,±0.5nH | 8 | 100 | 50 | 6000 | 0.10 | 500 |
| 1.8 | ±0.3nH,±0.5nH | 8 | 100 | 50 | 6000 | 0.10 | 500 |
| 2.0 | ±0.3nH,±0.5nH | 8 | 100 | 50 | 6000 | 0.10 | 500 |
| 2.2 | ±0.3nH,±0.5nH | 8 | 100 | 50 | 6000 | 0.10 | 500 |
| 2.4 | ±0.3nH,±0.5nH | 8 | 100 | 50 | 6000 | 0.12 | 500 |
| 2.7 | ±0.3nH,±0.5nH | 10 | 100 | 50 | 6000 | 0.12 | 500 |
| 3.3 | ±0.3nH,±0.5nH | 10 | 100 | 50 | 6000 | 0.15 | 500 |
| 3.6 | ±0.3nH,±0.5nH | 10 | 100 | 50 | 6000 | 0.16 | 500 |
| 3.9 | ±0.3nH,±0.5nH | 10 | 100 | 50 | 6000 | 0.16 | 500 |
| 4.3 | ±0.3nH,±0.5nH | 10 | 100 | 50 | 6000 | 0.18 | 500 |
| 4.7 | ±0.3nH,±0.5nH | 10 | 100 | 50 | 6000 | 0.20 | 500 |
| 5.1 | ±0.3nH,±0.5nH | 10 | 100 | 50 | 5500 | 0.25 | 500 |
| 5.6 | ±0.3nH,±0.5nH | 10 | 100 | 50 | 5000 | 0.25 | 500 |
| 6.8 | ±5%,±10% | 10 | 100 | 50 | 5000 | 0.30 | 500 |
| 7.5 | ±5%,±10% | 10 | 100 | 50 | 4500 | 0.35 | 500 |
| 8.2 | ±5%,±10% | 10 | 100 | 50 | 4500 | 0.35 | 500 |
| 9.1 | ±5%,±10% | 10 | 100 | 50 | 3500 | 0.40 | 300 |
| 10 | ±5%,±10% | 12 | 100 | 50 | 3500 | 0.40 | 300 |
| 12 | ±5%,±10% | 12 | 100 | 50 | 3000 | 0.45 | 300 |
| 15 | ±5%,±10% | 12 | 100 | 50 | 2300 | 0.50 | 300 |
| 18 | ±5%,±10% | 12 | 100 | 50 | 2200 | 0.55 | 300 |
| 22 | ±5%,±10% | 12 | 100 | 50 | 2000 | 0.60 | 300 |
| 27 | ±5%,±10% | 12 | 100 | 50 | 1700 | 0.65 | 300 |
| 33 | ±5%,±10% | 12 | 100 | 50 | 1500 | 0.70 | 300 |
| 39 | ±5%,±10% | 12 | 100 | 50 | 1400 | 0.70 | 300 |
| 47 | ±5%,±10% | 12 | 100 | 50 | 1200 | 0.70 | 300 |
| 56 | ±5%,±10% | 12 | 100 | 50 | 1100 | 0.75 | 300 |
| 68 | ±5%,±10% | 12 | 100 | 50 | 900 | 0.85 | 300 |
| 82 | ±5%,±10% | 8 | 100 | 50 | 800 | 1.00 | 300 |
| 100 | ±5%,±10% | 8 | 100 | 50 | 700 | 1.20 | 300 |
| 120 | ±5%,±10% | 8 | 50 | 50 | 600 | 1.40 | 200 |
| 150 | ±5%,±10% | 8 | 50 | 50 | 500 | 1.60 | 200 |
| 180 | ±5%,±10% | 8 | 50 | 50 | 400 | 1.90 | 200 |
| 220 | ±5%,±10% | 8 | 50 | 50 | 350 | 2.40 | 200 |
| 270 | ±5%,±10% | 8 | 50 | 50 | 350 | 2.60 | 150 |
| 330 | ±5%,±10% | 8 | 50 | 50 | 350 | 2.80 | 150 |
| 390 | ±5%,±10% | 8 | 50 | 50 | 300 | 3.20 | 150 |
| 430 | ±5%,±10% | 8 | 50 | 50 | 280 | 3.40 | 150 |
| 470 | ±5%,±10% | 8 | 50 | 50 | 250 | 3.60 | 150 |

■**Operating temperature range: -55~+125℃ (including self-heating temperature)**

## ■Environmental Characteristics

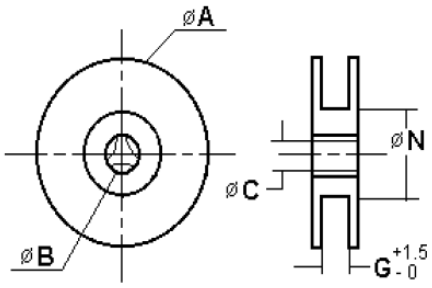
| Item | Requirement | Test Condition |
|---|---|---|
| High Temperature Exposure (Storage) | No visible damage.<br>Inductance: ΔL/L within ≦±10%<br>Q: ΔQ/Q within ≦±20% | Temperature: 125℃<br>Unpowered<br>Duration 1000h<br>Examination at 250h, 500h and 1000h<br>Measurement at 24±4 hours after test conclusion. |
| Temperature Cycle | No visible damage.<br>Inductance: ΔL/L within ≦±10%<br>Q: ΔQ/Q within ≦±20% | High Temperature: 125℃<br>Low Temperature: -55℃<br>Duration at each temperature 30 min<br>Transition time ≦ 1 min<br>Severity 1000 cycles<br>Measurement at 24±4 hours after test conclusion. |
| Biased Humidity | No visible damage.<br>Inductance: ΔL/L within ≦±10%<br>Q: ΔQ/Q within ≦±20% | Temperature: 85℃<br>Relative humidity: 85%<br>Duration 1000h ; Unpowered.<br>Examination at 250h, 500h and 1000h<br>Measurement at 24±4 hours after test conclusion. |
| Operational Life | No visible damage.<br>Inductance: ΔL/L within ≦±10%<br>Q: ΔQ/Q within ≦±20% | Temperature: 125℃<br>Testing current: Rated current at normal temperature.<br>Duration 1000h ;<br>Measurement at 24±4 hours after test conclusion. |
| Mechanical Shock | No visible damage.<br>Inductance: ΔL/L within ≦±10%<br>Q: ΔQ/Q within ≦±20% | Half sine wave.<br>Peak value 100g.<br>Normal duration 6 ms<br>Three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen (18 shocks) |
| Vibration | No visible damage.<br>Inductance: ΔL/L within ≦±10%<br>Q: ΔQ/Q within ≦±20% | The entire frequency range of 10~2000 Hz and return to 10Hz shall be traversed in 20 minutes. This cycle shall be preformed 12 time in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours.<br>Peak value 5g. |
| Resistance to Soldering Heat | No visible damage.<br>Inductance: ΔL/L within ≦±10%<br>Q: ΔQ/Q within ≦±20% | Solder bath<br>Temperature: 260±5℃<br>Immersion timer: 10±1 seconds |
| Solderability | 95% or more of electrode area shall be coated by new solder. | Solder bath: Lead-free solder<br>Temperature: 245±5℃<br>Immersion timer: 3±0.3 seconds. |
| Board Flex | No visible damage.<br>Inductance: ΔL/L within ≦±10%<br>Q: ΔQ/Q within ≦±20% | The testing samples shall be mounted on a 100m x 40mm FR4 PCB board, which is 1.6mm ± 0.2mm thick.<br>Bending shall be applied to the 2.0mm with 1.0mm/sec.<br>Duration: 60±5s. |
| Terminal Strength (SMD) | No visible electrode damage or electrode detachment. | The testing samples shall be mounted on the testing epoxy boards,exerting force on side of the samples, Size 0603:2N；Size1005:5N；≧Size 1608:17.7N,<br>Duration 60s±1s.<br> |

**■Storage Temperature: -10~40℃; Humidity: 30~70%RH**

**■Shelf life: 1 years Max**

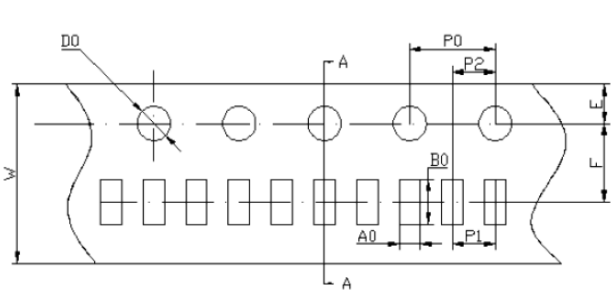
## ■Packaging Specifications

Reel Dimension



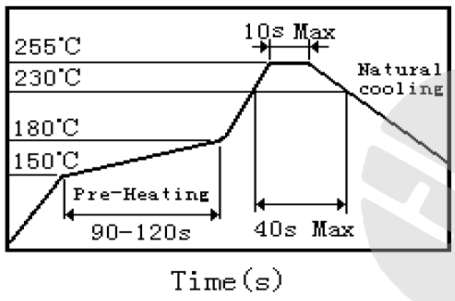

| Type | A (mm) | B (mm) | C (mm) | N (mm) | G (mm) | Quantity (EA) |
|---|---|---|---|---|---|---|
| CL02-GA | 178±2 | 22±2 | 12.5±1.5 | 57±2 | 8 | 10,000 |
| CL03-GA | 178±2 | 22±2 | 13.0±1.0 | 60±2 | 9.5±2 | 4,000 |

Tape Specifications




| Type | A0 (mm) | B0 (mm) | W (mm) | F (mm) | E (mm) | P1 (mm) | P2 (mm) | P0 (mm) | D0 (mm) | T (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| CL02-GA | 0.59±0.1 | 1.12±0.1 | 8.0±0.2 | 3.5±0.1 | 1.75±0.2 | 2.0±0.1 | 2.0±0.1 | 4.0±0.2 | 1.55±0.1 | 0.60±0.1 |
| CL03-GA | 1.05±0.2 | 1.85±0.2 | 8.0±0.2 | 3.5±0.1 | 1.75±0.2 | 2.0±0.2 | 2.0±0.1 | 4.0±0.2 | 1.55±0.1 | 0.95±0.1 |

## ■Reflow Soldering Profile



## REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|---|---|---|---|
| Version A2 | Apr 14,2025 | | -Add Shelf life. |