# CHIP COIL (CHIP INDUCTORS) LQW15AN□□□□0ZD
# Murata Standard Specification 【AEC-Q200】REFERENCE SPECIFICATION

## 1.Scope

This Reference Specification applies to LQW15AN_0ZD series, Chip coil(Chip Inductors) for automotive Electronics based on AEC-Q200 except for Power train and Safety.

## 2.Part Numbering

| (ex) | LQ | W | 15 | A | N | 1N5 | B | 0 | Z | D |
|---|---|---|---|---|---|---|---|---|---|---|
| | Product ID | Structure | Dimension (L×W) | Applications and Characteristics | Category | Inductance | Tolerance | Features | Application<br>Z:Automotive | Packaging<br>D:Taping |

## 3.Rating

・Operating Temperature Range. –55°C ~ +125°C
・Storage Temperature Range. –55°C ~ +125°C

| Customer Part Number | MURATA Part Number | Inductance(*1) refer to below comment | | Q (*1) | DC Resistance (*1) | Self Resonant Frequency (*1) | Rated Current | ESD Rank |
|---|---|---|---|---|---|---|---|---|
| | | (nH) | Tolerance | (min.) | (Ω max.) | (GHz min.) | (mA) | 6: 25kV |
| | LQW15AN1N5B0ZD | 1.5 | B:±0.1nH<br>C:±0.2nH<br>D:±0.5nH | 10 | 0.03 | 18.0 | 1000 | 6 |
| | LQW15AN1N5C0ZD | | | | | | | |
| | LQW15AN1N5D0ZD | | | | | | | |
| | LQW15AN1N6C0ZD | 1.6 | C:±0.2nH<br>D:±0.5nH | | 0.07 | 17 | 750 | |
| | LQW15AN1N6D0ZD | | | | | | | |
| | LQW15AN1N7C0ZD | 1.7 | | | 0.10 | | 640 | |
| | LQW15AN1N7D0ZD | | | | | | | |
| | LQW15AN1N8C0ZD | 1.8 | | | 0.16 | 16 | 460 | |
| | LQW15AN1N8D0ZD | | | | | | | |
| | LQW15AN2N4B0ZD | 2.4 | B:±0.1nH<br>C:±0.2nH<br>D:±0.5nH | 20 | 0.05 | 15.0 | 850 | |
| | LQW15AN2N4C0ZD | | | | | | | |
| | LQW15AN2N4D0ZD | | | | | | | |
| | LQW15AN2N5B0ZD | 2.5 | | | | | | |
| | LQW15AN2N5C0ZD | | | | | | | |
| | LQW15AN2N5D0ZD | | | | | | | |
| | LQW15AN2N6B0ZD | 2.6 | | | | | | |
| | LQW15AN2N6C0ZD | | | | | | | |
| | LQW15AN2N6D0ZD | | | | | | | |
| | LQW15AN2N7B0ZD | 2.7 | | | | | | |
| | LQW15AN2N7C0ZD | | | | | | | |
| | LQW15AN2N7D0ZD | | | | | | | |
| | LQW15AN2N8B0ZD | 2.8 | | | | | | |
| | LQW15AN2N8C0ZD | | | | | | | |
| | LQW15AN2N8D0ZD | | | | | | | |
| | LQW15AN2N9B0ZD | 2.9 | | | 0.07 | | 750 | |
| | LQW15AN2N9C0ZD | | | | | | | |
| | LQW15AN2N9D0ZD | | | | | | | |
| | LQW15AN3N0B0ZD | 3.0 | | | | | | |
| | LQW15AN3N0C0ZD | | | | | | | |
| | LQW15AN3N0D0ZD | | | | | | | |
| | LQW15AN3N1B0ZD | 3.1 | | | 0.13 | 14.0 | 570 | |
| | LQW15AN3N1C0ZD | | | | | | | |
| | LQW15AN3N1D0ZD | | | | | | | |
| | LQW15AN3N2B0ZD | 3.2 | | 15 | 0.17 | | 500 | |
| | LQW15AN3N2C0ZD | | | | | | | |
| | LQW15AN3N2D0ZD | | | | | | | |

| Customer Part Number | MURATA Part Number | Inductance(*1) refer to below comment | | Q (*1) | DC Resistance (*1) | Self Resonant Frequency (*1) | Rated Current | ESD Rank |
|---|---|---|---|---|---|---|---|---|
| | | (nH) | Tolerance | (min.) | (Ω max.) | (GHz min.) | (mA) | 6: 25kV |
| | LQW15AN3N9B0ZD | 3.9 | B:±0.1nH<br>C:±0.2nH<br>D:±0.5nH | 25 | 0.07 | 10.0 | 750 | 6 |
| | LQW15AN3N9C0ZD | | | | | | | |
| | LQW15AN3N9D0ZD | | | | | | | |
| | LQW15AN4N1B0ZD | 4.1 | | | | | | |
| | LQW15AN4N1C0ZD | | | | | | | |
| | LQW15AN4N1D0ZD | | | | | | | |
| | LQW15AN4N3B0ZD | 4.3 | | | | | | |
| | LQW15AN4N3C0ZD | | | | | | | |
| | LQW15AN4N3D0ZD | | | | | | | |
| | LQW15AN4N4B0ZD | 4.4 | | | 0.07 | 8.0 | | |
| | LQW15AN4N4C0ZD | | | | | | | |
| | LQW15AN4N4D0ZD | | | | | | | |
| | LQW15AN4N5B0ZD | 4.5 | | | | | | |
| | LQW15AN4N5C0ZD | | | | | | | |
| | LQW15AN4N5D0ZD | | | | | | | |
| | LQW15AN4N6B0ZD | 4.6 | | | | | | |
| | LQW15AN4N6C0ZD | | | | | | | |
| | LQW15AN4N6D0ZD | | | | | | | |
| | LQW15AN4N7B0ZD | 4.7 | | | | | | |
| | LQW15AN4N7C0ZD | | | | | | | |
| | LQW15AN4N7D0ZD | | | | | | | |
| | LQW15AN4N8B0ZD | 4.8 | | | | | | |
| | LQW15AN4N8C0ZD | | | | | | | |
| | LQW15AN4N8D0ZD | | | | | | | |
| | LQW15AN4N9B0ZD | 4.9 | | | 0.12 | | 600 | |
| | LQW15AN4N9C0ZD | | | | | | | |
| | LQW15AN4N9D0ZD | | | | | | | |
| | LQW15AN5N0B0ZD | 5.0 | | | | | | |
| | LQW15AN5N0C0ZD | | | | | | | |
| | LQW15AN5N0D0ZD | | | | | | | |
| | LQW15AN5N1B0ZD | 5.1 | | | | | | |
| | LQW15AN5N1C0ZD | | | | | | | |
| | LQW15AN5N1D0ZD | | | | | | | |
| | LQW15AN5N8B0ZD | 5.8 | | | 0.09 | | 700 | |
| | LQW15AN5N8C0ZD | | | | | | | |
| | LQW15AN5N8D0ZD | | | | | | | |
| | LQW15AN6N2B0ZD | 6.2 | | | | | | |
| | LQW15AN6N2C0ZD | | | | | | | |
| | LQW15AN6N2D0ZD | | | | | | | |
| | LQW15AN6N3B0ZD | 6.3 | | | | 6.0 | | |
| | LQW15AN6N3C0ZD | | | | | | | |
| | LQW15AN6N3D0ZD | | | | | | | |
| | LQW15AN6N4B0ZD | 6.4 | | | | | | |
| | LQW15AN6N4C0ZD | | | | | | | |
| | LQW15AN6N4D0ZD | | | | | | | |
| | LQW15AN6N5B0ZD | 6.5 | | | | | | |
| | LQW15AN6N5C0ZD | | | | | | | |
| | LQW15AN6N5D0ZD | | | | | | | |
| | LQW15AN6N6B0ZD | 6.6 | | | | | | |
| | LQW15AN6N6C0ZD | | | | | | | |
| | LQW15AN6N6D0ZD | | | | | | | |
| | LQW15AN6N7B0ZD | 6.7 | | | | | | |
| | LQW15AN6N7C0ZD | | | | | | | |
| | LQW15AN6N7D0ZD | | | | | | | |

| Customer Part Number | MURATA Part Number | Inductance(*1) refer to below comment | | Q (*1) | DC Resistance (*1) | Self Resonant Frequency (*1) | Rated Current | ESD Rank |
|---|---|---|---|---|---|---|---|---|
| | | (nH) | Tolerance | (min.) | (Ω max.) | (GHz min.) | (mA) | 6: 25kV |
| | LQW15AN6N8G0ZD | 6.8 | G:±2%<br>H:±3%<br>J:±5% | 25 | 0.09 | 6.0 | 700 | 6 |
| | LQW15AN6N8H0ZD | | | | | | | |
| | LQW15AN6N8J0ZD | | | | | | | |
| | LQW15AN6N9B0ZD | 6.9 | | | 0.13 | | 570 | |
| | LQW15AN6N9C0ZD | | | | | | | |
| | LQW15AN6N9D0ZD | | | | | | | |
| | LQW15AN7N0G0ZD | 7.0 | | | | | | |
| | LQW15AN7N0H0ZD | | | | | | | |
| | LQW15AN7N0J0ZD | | | | | | | |
| | LQW15AN7N1G0ZD | 7.1 | | | | | | |
| | LQW15AN7N1H0ZD | | | | | | | |
| | LQW15AN7N1J0ZD | | | | | | | |
| | LQW15AN7N2G0ZD | 7.2 | | | | | | |
| | LQW15AN7N2H0ZD | | | | | | | |
| | LQW15AN7N2J0ZD | | | | | | | |
| | LQW15AN7N3G0ZD | 7.3 | | | | | | |
| | LQW15AN7N3H0ZD | | | | | | | |
| | LQW15AN7N3J0ZD | | | | | | | |
| | LQW15AN7N5G0ZD | 7.5 | | | | | | |
| | LQW15AN7N5H0ZD | | | | | | | |
| | LQW15AN7N5J0ZD | | | | | | | |
| | LQW15AN8N2G0ZD | 8.2 | | | 0.14 | 5.5 | 540 | |
| | LQW15AN8N2H0ZD | | | | | | | |
| | LQW15AN8N2J0ZD | | | | | | | |
| | LQW15AN8N6G0ZD | 8.6 | | | | | | |
| | LQW15AN8N6H0ZD | | | | | | | |
| | LQW15AN8N6J0ZD | | | | | | | |
| | LQW15AN8N7G0ZD | 8.7 | | | | | | |
| | LQW15AN8N7H0ZD | | | | | | | |
| | LQW15AN8N7J0ZD | | | | | | | |
| | LQW15AN8N8G0ZD | 8.8 | | | | | | |
| | LQW15AN8N8H0ZD | | | | | | | |
| | LQW15AN8N8J0ZD | | | | | | | |
| | LQW15AN8N9G0ZD | 8.9 | | | | | | |
| | LQW15AN8N9H0ZD | | | | | | | |
| | LQW15AN8N9J0ZD | | | | | | | |
| | LQW15AN9N0G0ZD | 9.0 | | | | | | |
| | LQW15AN9N0H0ZD | | | | | | | |
| | LQW15AN9N0J0ZD | | | | | | | |
| | LQW15AN9N1G0ZD | 9.1 | | | | | | |
| | LQW15AN9N1H0ZD | | | | | | | |
| | LQW15AN9N1J0ZD | | | | | | | |
| | LQW15AN9N2G0ZD | 9.2 | | | | | | |
| | LQW15AN9N2H0ZD | | | | | | | |
| | LQW15AN9N2J0ZD | | | | | | | |
| | LQW15AN9N3G0ZD | 9.3 | | | | | | |
| | LQW15AN9N3H0ZD | | | | | | | |
| | LQW15AN9N3J0ZD | | | | | | | |
| | LQW15AN9N4G0ZD | 9.4 | | | | | | |
| | LQW15AN9N4H0ZD | | | | | | | |
| | LQW15AN9N4J0ZD | | | | | | | |
| | LQW15AN9N5G0ZD | 9.5 | | | | | | |
| | LQW15AN9N5H0ZD | | | | | | | |
| | LQW15AN9N5J0ZD | | | | | | | |

| Customer Part Number | MURATA Part Number | Inductance(*1) refer to below comment |  | Q (*1) | DC Resistance (*1) | Self Resonant Frequency (*1) | Rated Current | ESD Rank |
|---|---|---|---|---|---|---|---|---|
|  |  | (nH) | Tolerance | (min.) | (Ω max.) | (GHz min.) | (mA) | 6: 25kV |
|  | LQW15AN9N6G0ZD | 9.6 | G:±2%<br>H:±3%<br>J:±5% | 25 | 0.14 | 5.5 | 540 | 6 |
|  | LQW15AN9N6H0ZD |  |  |  |  |  |  |  |
|  | LQW15AN9N6J0ZD |  |  |  |  |  |  |  |
|  | LQW15AN9N7G0ZD | 9.7 |  |  |  |  |  |  |
|  | LQW15AN9N7H0ZD |  |  |  |  |  |  |  |
|  | LQW15AN9N7J0ZD |  |  |  |  |  |  |  |
|  | LQW15AN9N8G0ZD | 9.8 |  |  |  |  |  |  |
|  | LQW15AN9N8H0ZD |  |  |  |  |  |  |  |
|  | LQW15AN9N8J0ZD |  |  |  |  |  |  |  |
|  | LQW15AN9N9G0ZD | 9.9 |  |  |  |  |  |  |
|  | LQW15AN9N9H0ZD |  |  |  |  |  |  |  |
|  | LQW15AN9N9J0ZD |  |  |  |  |  |  |  |
|  | LQW15AN10NG0ZD | 10 |  |  | 0.17 |  | 500 |  |
|  | LQW15AN10NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN10NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN11NG0ZD | 11 |  | 30 | 0.14 |  |  |  |
|  | LQW15AN11NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN11NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN12NG0ZD | 12 |  |  |  |  |  |  |
|  | LQW15AN12NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN12NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN13NG0ZD | 13 |  | 25 | 0.21 | 5.0 | 430 |  |
|  | LQW15AN13NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN13NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN15NG0ZD | 15 |  | 30 | 0.16 |  | 460 |  |
|  | LQW15AN15NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN15NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN16NG0ZD | 16 |  | 25 | 0.24 | 4.5 | 370 |  |
|  | LQW15AN16NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN16NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN18NG0ZD | 18 |  |  | 0.27 |  |  |  |
|  | LQW15AN18NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN18NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN19NG0ZD | 19 |  |  |  |  |  |  |
|  | LQW15AN19NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN19NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN20NG0ZD | 20 |  |  |  | 4.0 |  |  |
|  | LQW15AN20NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN20NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN22NG0ZD | 22 |  |  | 0.30 |  | 310 |  |
|  | LQW15AN22NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN22NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN23NG0ZD | 23 |  |  |  | 3.8 |  |  |
|  | LQW15AN23NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN23NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN24NG0ZD | 24 |  |  | 0.52 | 3.5 | 280 |  |
|  | LQW15AN24NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN24NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN27NG0ZD | 27 |  |  |  |  |  |  |
|  | LQW15AN27NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN27NJ0ZD |  |  |  |  |  |  |  |
|  | LQW15AN30NG0ZD | 30 |  |  | 0.58 | 3.3 | 270 |  |
|  | LQW15AN30NH0ZD |  |  |  |  |  |  |  |
|  | LQW15AN30NJ0ZD |  |  |  |  |  |  |  |

| Customer Part Number | MURATA Part Number | Inductance(*1) refer to below comment | | Q (*1) | DC Resistance (*1) | Self Resonant Frequency (*1) | Rated Current | ESD Rank |
|---|---|---|---|---|---|---|---|---|
| | | (nH) | Tolerance | (min.) | (Ω max.) | (GHz min.) | (mA) | 6: 25kV |
| | LQW15AN33NG0ZD | 33 | G:±2%<br>H:±3%<br>J:±5% | 25 | 0.63 | 3.2 | 260 | 6 |
| | LQW15AN33NH0ZD | | | | | | | |
| | LQW15AN33NJ0ZD | | | | | | | |
| | LQW15AN36NG0ZD | 36 | | | | 3.1 | | |
| | LQW15AN36NH0ZD | | | | | | | |
| | LQW15AN36NJ0ZD | | | | | | | |
| | LQW15AN39NG0ZD | 39 | | | 0.70 | 3.0 | 250 | |
| | LQW15AN39NH0ZD | | | | | | | |
| | LQW15AN39NJ0ZD | | | | | | | |
| | LQW15AN40NG0ZD | 40 | | | | | | |
| | LQW15AN40NH0ZD | | | | | | | |
| | LQW15AN40NJ0ZD | | | | | | | |
| | LQW15AN43NG0ZD | 43 | | | | | | |
| | LQW15AN43NH0ZD | | | | | | | |
| | LQW15AN43NJ0ZD | | | | | | | |
| | LQW15AN47NG0ZD | 47 | | | 1.08 | 2.9 | 210 | |
| | LQW15AN47NH0ZD | | | | | | | |
| | LQW15AN47NJ0ZD | | | | | | | |
| | LQW15AN51NG0ZD | 51 | | | | 2.85 | | |
| | LQW15AN51NH0ZD | | | | | | | |
| | LQW15AN51NJ0ZD | | | | | | | |
| | LQW15AN56NG0ZD | 56 | | | 1.17 | 2.8 | 200 | |
| | LQW15AN56NH0ZD | | | | | | | |
| | LQW15AN56NJ0ZD | | | | | | | |
| | LQW15AN62NG0ZD | 62 | | 20 | 1.82 | 2.6 | 145 | |
| | LQW15AN62NH0ZD | | | | | | | |
| | LQW15AN62NJ0ZD | | | | | | | |
| | LQW15AN68NG0ZD | 68 | G:±2%<br>J:±5% | | 1.96 | 2.5 | 140 | |
| | LQW15AN68NJ0ZD | | | | | | | |
| | LQW15AN72NG0ZD | 72 | | | 2.10 | | 135 | |
| | LQW15AN72NJ0ZD | | | | | | | |
| | LQW15AN75NG0ZD | 75 | | | | 2.4 | | |
| | LQW15AN75NJ0ZD | | | | | | | |
| | LQW15AN82NG0ZD | 82 | | | 2.24 | 2.3 | 130 | |
| | LQW15AN82NJ0ZD | | | | | | | |
| | LQW15AN91NG0ZD | 91 | | | 2.38 | 2.1 | 125 | |
| | LQW15AN91NJ0ZD | | | | | | | |
| | LQW15ANR10J0ZD | 100 | J:±5% | | 2.52 | 1.5 | 120 | |
| | LQW15ANR12J0ZD | 120 | | | 2.66 | 1.0 | 110 | |

**(*1)**

## 4. Testing Conditions

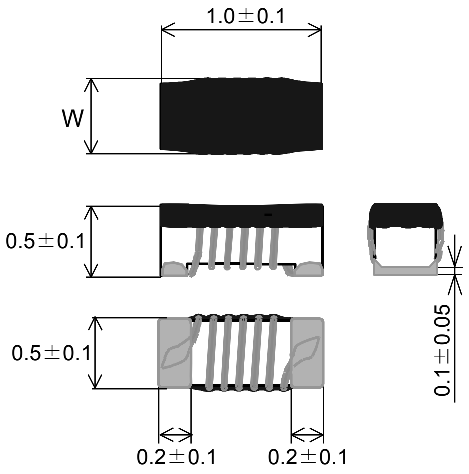
《Unless otherwise specified》

Temperature : Ordinary Temperature / 15°C to 35°C
Humidity : Ordinary Humidity / 25%(RH) to 85%(RH)

《In case of doubt》

Temperature : 20°C±2°C
Humidity : 60%(RH) to 70%(RH)
Atmospheric Pressure : 86kPa to 106 kPa

## 5. Appearance and Dimensions



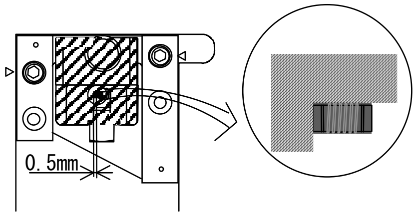
■Unit mass (Typical value)
0.0008g

(in mm)

*Dimension of W

| Inductance | W (in mm) |
|---|---|
| 1N5～23N | 0.6±0.1 |
| 24N～R12 | 0.5±0.1 |

## 6.Electrical Performance

| No. | Item | Specification | Test Method |
|---|---|---|---|
| 6.1 | Inductance | Inductance shall meet item 3. | Measuring Equipment:<br>KEYSIGHT E4991A or equivalent<br>Measuring Frequency:<br><Inductance> 100MHz<br><Q> 250MHz/ 1.5nH~43nH<br>200MHz/ 47nH~68nH<br>150MHz/ 72nH~120nH<br>Measuring Condition:<br>Test signal level / about 0dBm<br>Electrical length / 0.94cm<br>Measuring Fixture: KEYSIGHT 16193A<br>Position coil under test as shown in below and contact coil with each terminal by adding weight.<br> <br>Measuring Method:See P.13<br><Electrical Performance:Measuring Method of Inductance/Q> |
| 6.2 | Q | Q shall meet item 3. | |
| 6.3 | DC Resistance | DC Resistance shall meet item 3. | Measuring Equipment:Digital multi meter |
| 6.4 | Self Resonant Frequency(S.R.F) | S.R.F shall meet item 3. | Measuring Equipment: KEYSIGHT N5230A or equivalent |
| 6.5 | Rated Current | Self temperature rise shall be limited to 20°C max. | The rated current is applied. |

## 7. Q200 Requirement

### 7.1.Performance (based on Table 5 for Magnetics(Inductors / Transformer)

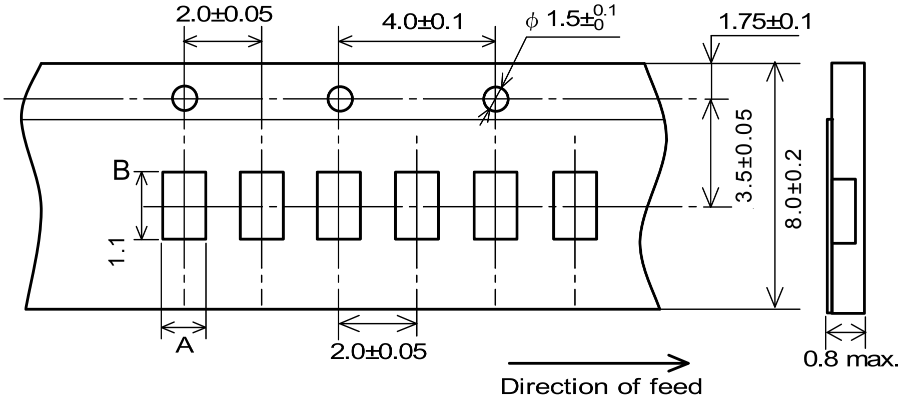
**AEC-Q200 Rev.D issued June 1. 2010**

<table>
<tr><th colspan="3">AEC-Q200</th><th rowspan="2">Murata Specification / Deviation</th></tr>
<tr><th>No</th><th>Stress</th><th>Test Method</th></tr>
<tr><td>3</td><td>High Temperature Exposure</td><td>1000hours at 125 deg C<br>Set for 24hours at room temperature, then measured.</td><td>Meet Table A after testing.<br>Table A<table><tr><td>Appearance</td><td>No damage</td></tr><tr><td>Inductance (at 100MHz)</td><td>Within ±5%</td></tr></table></td></tr>
<tr><td>4</td><td>Temperature Cycling</td><td>1000cycles<br>-40 deg C to +125 deg C<br>Set for 24hours at room temperature,then measured.</td><td>Meet Table A after testing.</td></tr>
<tr><td>7</td><td>Biased Humidity</td><td>1000hours at 85 deg C, 85%RH<br>unpowered..</td><td>Meet Table A after testing.</td></tr>
<tr><td>8</td><td>Operational Life</td><td>Apply 125 deg C 1000hours<br>Set for 24hours at room temperature, then measured</td><td>Meet Table A after testing.</td></tr>
<tr><td>9</td><td>External Visual</td><td>Visual inspection</td><td>No abnormalities</td></tr>
<tr><td>10</td><td>Physical Dimension</td><td>Meet ITEM 5<br>（Style and Dimensions）</td><td>No defects</td></tr>
<tr><td>12</td><td>Resistance to Solvents</td><td>Per MIL-STD-202 Method 215</td><td>Not Applicable</td></tr>
<tr><td>13</td><td>Mechanical Shock</td><td>Per MIL-STD-202 Method 213<br>Condition C : 100g’s(0.98N), 6ms, Half sine, 12.3ft/s</td><td>Meet Table A after testing.</td></tr>
<tr><td>14</td><td>Vibration</td><td>5g's(0.049N) for 20 minutes, 12cycles each of 3 orientations<br>Test from 10-2000Hz.</td><td>Meet Table A after testing.</td></tr>
<tr><td>15</td><td>Resistance to Soldering Heat</td><td>No-heating<br>Solder temperature 260C+/-5 deg C<br>Immersion time 10s</td><td>Pre-heating: 150C +/-10 deg C, 60s to 90s<br>Meet Table A after testing.</td></tr>
</table>

<table>
<tr><th colspan="3">AEC-Q200</th><th rowspan="2">Murata Specification / Deviation</th></tr>
<tr><th>No</th><th>Stress</th><th>Test Method</th></tr>
<tr><td>17</td><td>ESD</td><td>Per AEC-Q200-002</td><td>ESD Rank: Refer to Item 3. Rating.<br>Meet Table A after testing</td></tr>
<tr><td>18</td><td>Solderbility</td><td>Per J-STD-002</td><td>Method b : Not Applicable<br>95% of the terminations is to be soldered.<br>(Except exposed wire)</td></tr>
<tr><td>19</td><td>Electrical Characterization</td><td>Measured : Inductance</td><td>No defects</td></tr>
<tr><td>20</td><td>Flammability</td><td>Per UL-94</td><td>Not Applicable</td></tr>
<tr><td>21</td><td>Board Flex</td><td>Epoxy-PCB(1.6mm)<br>Deflection 2mm(min)<br>Holding time 60s</td><td>Meet Table B after testing.<br>Table B<table><tr><td>Appearance</td><td>No damage</td></tr><tr><td>DC resistance change</td><td>Within ±10%</td></tr></table></td></tr>
<tr><td>22</td><td>Terminal Strength</td><td>Per AEC-Q200-006<br>A force of 17.7N<br>for 60s</td><td>No defects<br>Murata Deviation Request: 5N/60s</td></tr>
</table>

## 8.Specification of Packaging

### 8.1 Appearance and Dimensions of paper tape (8mm-wide)



(in mm)

| Inductance | A* (mm)<br>(Tolerance ±0.03) | B* (mm)<br>(Tolerance ±0.03) |
|---|---|---|
| 1N5, 2N4～2N8, 3N9～4N8, 5N8～6N8, 8N2～9N9, 11N, 12N, 15N | 0.69 | 1.18 |
| 1N6～1N8, 2N9, 3N0, 3N1, 3N2, 4N9～5N1, 6N9-7N5, 10N, 13N, 16N～23N, R10, R12 | 0.66 | 1.18 |
| 24N～91N | 0.64 | 1.18 |

∗Typical value

### 8.2 Specification of Taping

(1) Packing quantity (standard quantity)
10,000 pcs. / reel

(2) Packing Method
Products shall be packed in the cavity of the base tape and sealed by Cover tape.

(3) Sprocket hole
The sprocket holes are to the right as the tape is pulled toward the user.

(4) Spliced point
Base tape and Cover tape has no spliced point.

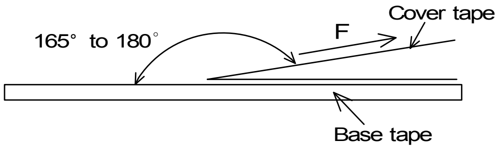
(5) Missing components number
Missing components number within 0.1% of the number per reel or 1 pc., whichever is greater, and are not continuous. The Specified quantity per reel is kept.

### 8.3 Pull Strength

| | |
|---|---|
| Cover tape | 5N min. |

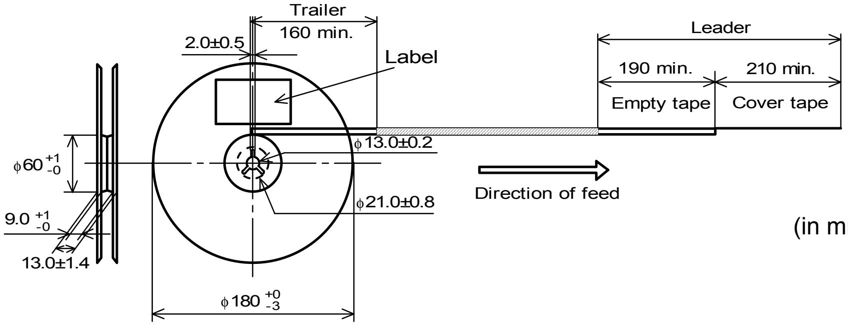
### 8.4 Peeling off force of cover tape

| | |
|---|---|
| Speed of Peeling off | 300mm/min |
| Peeling off force | 0.1 to 0.6N<br>(minimum value is typical) |



### 8.5 Dimensions of Leader-tape,Trailer and Reel

There shall be leader-tape ( cover tape and empty tape) and trailer-tape (empty tape) as follows.



(in mm)

### 8.6 Marking for reel

Customer part number, MURATA part number, Inspection number(∗1) , RoHS Marking (∗2), Quantity etc ･･･

∗1) <Expression of Inspection No.> □□ OOOO ×××
(1) (2) (3)

(1) Factory Code
(2) Date First digit : Year / Last digit of year
Second digit : Month / Jan. to Sep. → 1 to 9, Oct. to Dec. → O, N, D
Third, Fourth digit : Day
(3) Serial No.

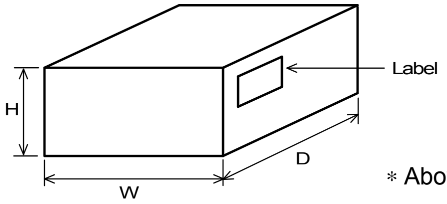
∗2) <Expression of RoHS Marking > ROHS – Y (△)
(1) (2)

(1) RoHS regulation conformity parts.
(2) MURATA classification number

### 8.7 Marking for Outside package (corrugated paper box)

Customer name, Purchasing order number, Customer part number, MURATA part number, RoHS Marking (∗2) ,Quantity, etc ･･･

### 8.8. Specification of Outer Case



| Outer Case Dimensions (mm) | | | Standard Reel Quantity in Outer Case (Reel) |
|---|---|---|---|
| W | D | H | |
| 186 | 186 | 93 | 5 |

∗ Above Outer Case size is typical. It depends on a quantity of an order.

## 9. ⚠ Caution

### Limitation of Applications

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

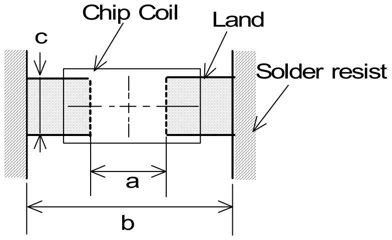
(1) Aircraft equipment
(2) Aerospace equipment
(3) Undersea equipment
(4) Power plant control equipment
(5) Medical equipment
(6) Transportation equipment (trains, ships, etc.)
(7) Traffic signal equipment
(8) Disaster prevention / crime prevention equipment
(9) Data-processing equipment
(10) Applications of similar complexity and /or reliability requirements to the applications listed in the above

## 10. Notice

Products can only be soldered with reflow.
This product is designed for solder mounting.
Please consult us in advance for applying other mounting method such as conductive adhesive.

### 10.1 Land pattern designing

Recommended land patterns for reflow soldering are as follows:
These have been designed for Electric characteristics and solderability.
Please follow the recommended patterns. Otherwise, their performance which includes electrical performance or solderability may be affected, or result to "position shift" in soldering process.



| | |
|---|---|
| a | 0.50 |
| b | 1.2 |
| c | 0.65 |

(in mm)

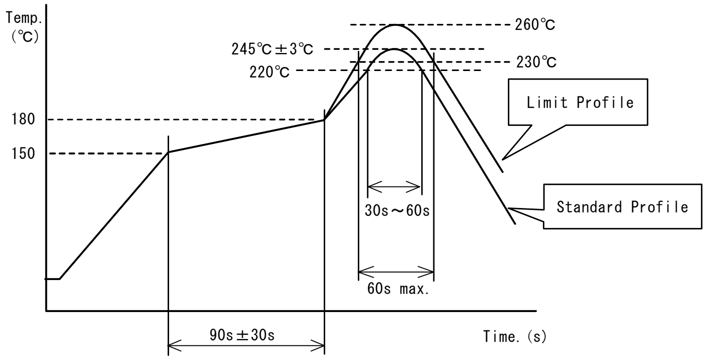
### 10.2 Flux, Solder

・Use rosin-based flux.
Includes middle activator equivalent to 0.06(wt)% to 0.1(wt)% Chlorine.
Don’t use highly acidic flux with halide content exceeding 0.2(wt)% (chlorine conversion value).
Don’t use water-soluble flux.
・Use Sn-3.0Ag-0.5Cu solder.
・Standard thickness of solder paste : 100 μm to 150 μm.

### 10.3 Reflow soldering conditions

・Pre-heating should be in such a way that the temperature difference between solder and product surface is limited to 150°C max. Cooling into solvent after soldering also should be in such a way that the temperature difference is limited to 100°C max.
Insufficient pre-heating may cause cracks on the product, resulting in the deterioration of products quality.
・Standard soldering profile and the limit soldering profile is as follows.
The excessive limit soldering conditions may cause leaching of the electrode and / or resulting in the deterioration of product quality.

・Reflow soldering profile



| | Standard Profile | Limit Profile |
|---|---|---|
| Pre-heating | 150°C～180°C 、90s±30s | |
| Heating | above 220°C､30s～60s | above 230°C､60s max. |
| Peak temperature | 245°C±3°C | 260°C,10s |
| Cycle of reflow | 2 times | 2 times |

### 10.4 Reworking with soldering iron

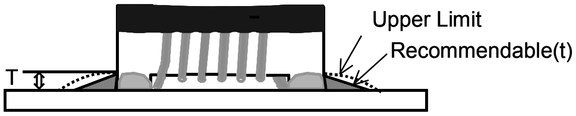
The following conditions must be strictly followed when using a soldering iron.

| | |
|---|---|
| Pre-heating | 150°C,1 min |
| Tip temperature | 350°C max. |
| Soldering iron output | 80W max. |
| Tip diameter | $\phi$3mm max. |
| Soldering time | 3(+1,-0)s |
| Time | 2 times |

Note :Do not directly touch the products with the tip of the soldering iron in order to prevent the crack on the products due to the thermal shock.

### 10.5 Solder Volume

- Solder shall be used not to be exceeded the upper limits as shown below.
- Accordingly increasing the solder volume, the mechanical stress to Chip is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance.



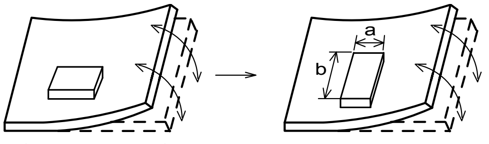
1/3T≦t≦T
T：thickness of product

### 10.6 Product's location

The following shall be considered when designing and laying out P.C.B.'s.

(1) P.C.B. shall be designed so that products are not subject to the mechanical stress due to warping the board.

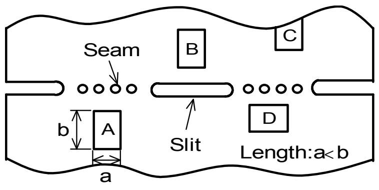
［Products direction］



〈Poor example〉 〈Good example〉

Products shall be located in the sideways direction (Length:a＜b) to the mechanical stress.

(2) Products location on P.C.B. separation



Products (A,B,C,D) shall be located carefully so that products are not subject to the mechanical stress due to warping the board. Because they may be subjected the mechanical stress in order of A＞C＞B≅D.

### 10.7 Cleaning Conditions

Products shall be cleaned on the following conditions.

(1) Cleaning temperature shall be limited to 60°C max.(40°C max for IPA)
(2) Ultrasonic cleaning shall comply with the following conditions with avoiding the resonance phenomenon at the mounted products and P.C.B.
Power : 20 W / l max. Frequency : 28kHz to 40kHz Time : 5 min max.
(3) Cleaner
1. Alcohol type cleaner
Isopropyl alcohol (IPA)

2. Aqueous agent
PINE ALPHA ST-100S

(4) There shall be no residual flux and residual cleaner after cleaning.
In the case of using aqueous agent, products shall be dried completely after rinse with de-ionized water in order to remove the cleaner.
(5) Other cleaning Please contact us.

### 10.8 Resin coating

The inductance value may change due to high cure-stress of resin to be used for coating/molding products. An open circuit issue may occur by mechanical stress caused by the resin, amount/cured shape of resin, or operating condition etc. Some resin contains some impurities or chloride possible to generate chlorine by hydrolysis under some operating condition may cause corrosion of wire of coil, leading to open circuit. So, please pay your careful attention when you select resin in case of coating/molding the products with the resin. Prior to use the coating resin, please make sure no reliability issue is observed by evaluating products mounted on your board.

### 10.9 Caution for use

- Sharp material such as a pair of tweezers or other material such as bristles of cleaning brush , shall not be touched to the winding portion to prevent the breaking of wire.
- Mechanical shock should not be applied to the products mounted on the board to prevent the breaking of the core.

### 10.10 Notice of product handling at mounting

In some mounting machines,when picking up components support pin pushes up the components from the bottom of base tape. In this case, please remove the support pin. The support pin may damage the components and break wire.

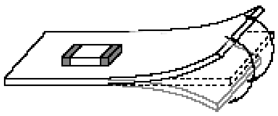
In rare case ,the laser recognition can not recognize this component. Please contact us when you use laser recognition. (There is no problem with the permeation and reflection type.)

### 10.11 Handling of a substrate

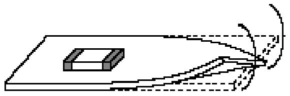
After mounting products on a substrate, do not apply any stress to the product caused by bending or twisting to the substrate when cropping the substrate, inserting and removing a connector from the substrate or tightening screw to the substrate.

Excessive mechanical stress may cause cracking in the product.

Bending



Twisting



### 10.12 Storage and Handing Requirements

(1) Storage period

Use the products within 12 months after delivered.
Solderability should be checked if this period is exceeded.

(2) Storage conditions

・Products should be stored in the warehouse on the following conditions.

Temperature : -10°C to 40°C
Humidity : 15% to 85% relative humidity No rapid change on temperature and humidity

・Don't keep products in corrosive gases such as sulfur,chlorine gas or acid, or it may cause oxidization of electrode, resulting in poor solderability.

・Products should not be stored on bulk packaging condition to prevent the chipping of the core and the breaking of winding wire caused by the collision between the products.

・Products should be stored on the palette for the prevention of the influence from humidity, dust and so on.

・Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.

(3) Handling Condition

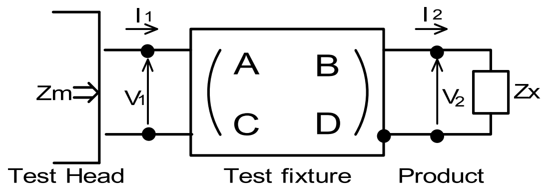
Care should be taken when transporting or handling product to avoid excessive vibration or mechanical shock.

## 11. ⚠ Note

(1)Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
(2)You are requested not to use our product deviating from the reference specifications.
(3)The contents of this reference specification are subject to change without advance notice.
Please approve our product specifications or transact the approval sheet for product specifications before ordering.

### <Electrical Performance:Measuring Method of Inductance/Q>

(1) Residual elements and stray elements of test fixture can be described by F-parameter shown in following.



$$\begin{bmatrix} V_1 \\ I_1 \end{bmatrix} = \begin{bmatrix} A & B \\ C & D \end{bmatrix} \begin{bmatrix} V_2 \\ I_2 \end{bmatrix}$$

(2) The impedance of chip coil Zx and measured value Zm can be described by input/output current/voltage.

$$Zm=\frac{V_1}{I_1}\ ,\qquad Zx=\frac{V_2}{I_2}$$

(3) Thus,the relation between Zx and Zm is following;

$$Zx=\alpha\,\frac{Zm-\beta}{1-Zm\Gamma}$$

where, $\alpha = D / A = 1$
$\beta = B / D = Zsm-(1-Yom\ Zsm)Zss$
$\Gamma = C / A = Yom$

Zsm : measured impedance of short chip
Zss : residual impedance of short chip (0.556nH)
Yom: measured admittance when opening the fixture

(4) Lx and Qx shall be calculated with the following equation.

$$Lx=\frac{Im(Zx)}{2\pi f},\qquad Qx=\frac{Im(Zx)}{Re(Zx)}$$

Lx : Inductance of chip coil
Qx : Q of chip coil
f : Measuring frequency