

Chip Ferrite Bead Array for Consumer equipment & Industrial equipment BLA2A□□□□SN4□ Reference Specification

1.Scope

This reference specification applies to Chip Ferrite Bead Array BLA2A Series.

1.1 Specific applications:

- Power equipment: Products that can be used in power equipment such as renewable energy equipment, energy storage equipment and EV charging equipment and whose functions are not directly related to the protection of human life and property.
- Industrial equipment: Products that can be used in industrial equipment such as base stations, manufacturing equipment, industrial robotics equipment, and measurement equipment, and whose functions do not directly relate to the protection of human life and property.
- Medical equipment (GHTF Class C) *Except for implant/surgery/auto injector: Products that can be used for medical equipment of Class C of the international classification class GHTF and whose malfunction is considered to pose a relatively high risk to the human body.
- Medical equipment (GHTF Class A and B): Products that can be used for medical equipment regulated by Class A and Class B of the international classification class GHTF and whose functions do not directly relate to the protection of human life and property.
- Consumer equipment: Products that can be used in consumer equipment such as home appliances, audio/visual equipment, communication equipment, information equipment, office equipment, and household robotics, and whose functions are not directly related to the protection of human life and property.

1.2 Unsuitable application:

Applications listed in "Limitation of applications" in this reference specification.

WE DISCLAIM ANY LOSS AND DAMAGES ARISING FROM OR IN CONNECTION WITH THE PRODUCTS INCLUDING BUT NOT LIMITED TO THE CASE SUCH LOSS AND DAMAGES CAUSED BY THE UNEXPECTED ACCIDENT, IN EVENT THAT THE PRODUCT IS APPLIED FOR THE PURPOSE WHICH IS SPECIFIED ABOVE AS THE UNSUITABLE APPLICATION FOR THE PRODUCT.

2. Part Numbering

| | | | | | | | | | |
|-------|---------------------|----------|-----------|-----------|---------------------------------|----------|----------------------------|----------|----------|
| (ex.) | <u>BL</u> | <u>A</u> | <u>2A</u> | <u>AG</u> | <u>121</u> | <u>S</u> | <u>N</u> | <u>4</u> | <u>D</u> |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| | (1) Product ID | | | | (2) Type | | (3) Dimension (L×W) | | |
| | (4) Characteristics | | | | (5) Typical Impedance at 100MHz | | (6) Performance | | |
| | (7) Category | | | | (8) Numbers of Circuit | | (9) Packaging (D : Taping) | | |

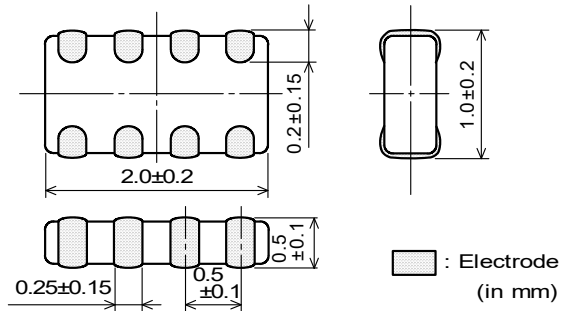
3. Rating

| Customer Part Number | MURATA Part Number | Impedance (Ω) at 100MHz, (Under Standard Testing Condition) | Rated Current (mA) | DC Resistance (Ω max.) | | Insulation Resistance between Elements | Remark |
|----------------------|--------------------|---|--------------------|------------------------|----------------------|--|----------------------------|
| | | | | Initial Values | Values After Testing | | |
| | BLA2AAG121SN4D | 120 ± 25 % | 100 | 0.5 | 0.6 | 100MΩ min. | For general use |
| | BLA2AAG221SN4D | 220 ± 25 % | 50 | 0.7 | 0.8 | | |
| | BLA2AAG601SN4D | 600 ± 25 % | | 1.1 | 1.2 | | |
| | BLA2AAG102SN4D | 1000 ± 25 % | | 1.3 | 1.4 | | |
| | BLA2ABB100SN4D | 10 ± 25 % | 200 | 0.1 | 0.2 | 100MΩ min. | For high speed signal Line |
| | BLA2ABB220SN4D | 22 ± 25 % | | 0.2 | 0.3 | | |
| | BLA2ABB470SN4D | 47 ± 25 % | | 0.35 | 0.45 | | |
| | BLA2ABB121SN4D | 120 ± 25 % | 50 | 0.6 | 0.7 | | |
| | BLA2ABB221SN4D | 220 ± 25 % | | 0.9 | 1.0 | | |
| | BLA2ABD750SN4D | 75 ± 25 % | 200 | 0.20 | 0.30 | | |
| | BLA2ABD121SN4D | 120 ± 25 % | | 0.35 | 0.45 | | |
| | BLA2ABD221SN4D | 220 ± 25 % | | 0.40 | 0.50 | | |
| | BLA2ABD471SN4D | 470 ± 25 % | 100 | 0.65 | 0.75 | | |
| | BLA2ABD601SN4D | 600 ± 25 % | | 0.80 | 0.90 | | |
| | BLA2ABD102SN4D | 1000 ± 25 % | 50 | 1.00 | 1.10 | | |

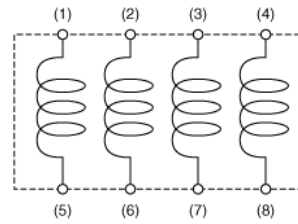
• Operating Temperature: - 55 °C to + 125 °C

• Storage Temperature: - 55 °C to + 125 °C

4. Style and Dimensions



■ Equivalent Circuit



No polarity

■ Unit Mass (Typical value)

0.005g

5. Marking

No marking.

6. Standard Testing Conditions

< Unless otherwise specified >

Temperature : Ordinary Temp. 15 °C to 35 °C

Humidity: Ordinary Humidity 25 %(RH) to 85 %(RH)

< In case of doubt >

Temperature: 20 °C ± 2 °C

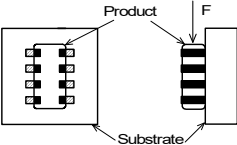
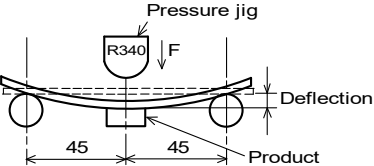
Humidity : 60 %(RH) to 70 %(RH)

Atmospheric pressure: 86 kPa to 106 kPa

7. Electrical Performance

| No. | Item | Specification | Test Method |
|-----|--|---------------|---|
| 7.1 | Impedance | Meet item 3. | Measuring Frequency : 100 MHz ± 1 MHz Measuring Equipment : KEYSIGHT 4291A or the equivalent (OSC = 0.05 V) Test Fixture : KEYSIGHT 16192A |
| 7.2 | DC Resistance | Meet item 3. | Measuring Equipment : Digital multi meter * Except resistance of the Substrate and Wire |
| 7.3 | Insulation Resistance between Elements | Meet item 3. | Measuring Voltage : 5 V(DC) Measuring Time : 1 min max. |

8. Mechanical Performance

| No. | Item | Specification | Test Method | | | | | | | | |
|------------------------------|---------------------------|---|--|--|------------|-----------|------------------------------|---------------|---------------|--------------|---|
| 8.1 | Appearance and Dimensions | Meet item 4. | Visual Inspection and measured with Slide Calipers or Micrometer or Measuring Microscope. | | | | | | | | |
| 8.2 | Bonding Strength | Meet Table 1. <table><tr><td colspan="2">Table 1</td></tr><tr><td>Appearance</td><td>No damage</td></tr><tr><td>Impedance Change (at 100MHz)</td><td>Within ± 30 %</td></tr><tr><td>DC Resistance</td><td>Meet item 3.</td></tr></table> | Table 1 | | Appearance | No damage | Impedance Change (at 100MHz) | Within ± 30 % | DC Resistance | Meet item 3. | It shall be soldered on the substrate. Applying Force(F) : 9.8 N Applying Time : 5 s ± 1 s  |
| Table 1 | | | | | | | | | | | |
| Appearance | No damage | | | | | | | | | | |
| Impedance Change (at 100MHz) | Within ± 30 % | | | | | | | | | | |
| DC Resistance | Meet item 3. | | | | | | | | | | |
| 8.3 | Bending Strength | | It shall be soldered on the substrate. Substrate : Glass-epoxy substrate (100mm × 40mm × 1.0mm) Deflection : 2.0 mm Speed of Applying Force : 0.5 mm / s Keeping Time : 30 s  | | | | | | | | |

| No. | Item | Specification | Test Method |
|-----|------------------------------|--|---|
| 8.4 | Solderability | The electrodes shall be at least 95 % covered with new solder coating. | Flux : Ethanol solution of rosin, 25 (wt)% Pre-Heating : 150 °C ± 10 °C, 60 s ~ 90 s Solder : Sn-3.0Ag-0.5Cu Solder Temperature : 240 °C ± 5 °C Immersion Time : 3 s ± 1 s Immersion and emersion rates : 25 mm / s |
| 8.5 | Resistance to Soldering Heat | Meet Table 1. | Flux : Ethanol solution of rosin, 25 (wt)% Pre-Heating : 150 °C ± 10 °C, 60 s ~ 90 s Solder : Sn-3.0Ag-0.5Cu Solder Temperature : 270 °C ± 5 °C Immersion Time : 10 s ± 1 s Immersion and emersion rates : 25 mm / s Then measured after exposure in the room condition for 48 h ± 4 h. |
| 8.6 | Vibration | | It shall be soldered on the substrate. Oscillation Frequency : 10Hz to 55Hz to 10Hz for 1 min Total Amplitude : 1.5 mm Testing Time : A period of 2 hours in each of 3 mutually erpendicular directions. |
| 8.7 | Drop | Product shall be no failure after tested. | It shall be dropped on concrete or steel board. Method : free fall Height : 75 cm Attitude from which the product is dropped : 3 directions The Number of Time : 3 times for each direction (Total 9 times) |

9. Environmental Performance (It shall be soldered on the substrate.)

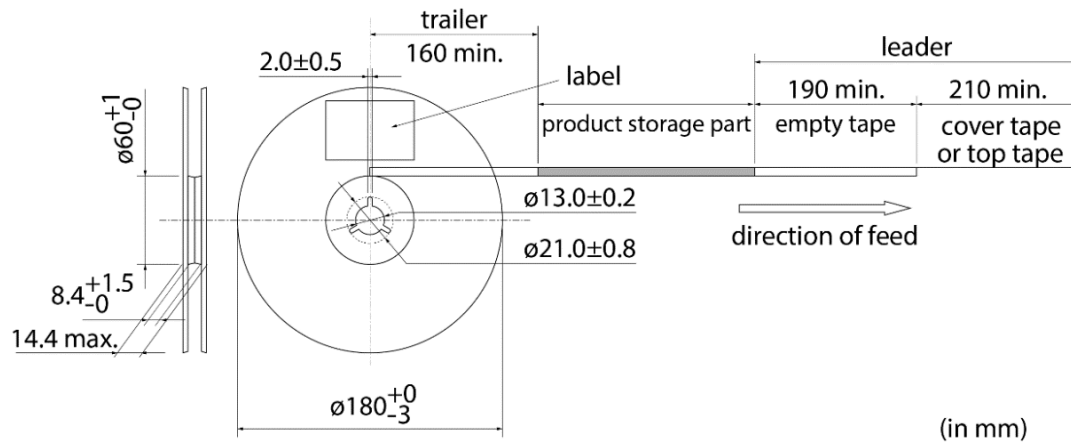
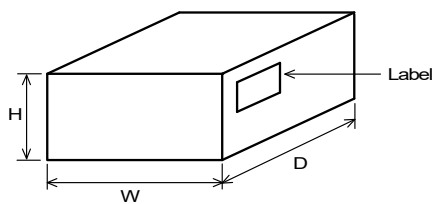
| No. | Item | Specification | Test Method |
|-----|-------------------|---------------|--|
| 9.1 | Temperature Cycle | Meet Table 1. | 1 cycle 1 step : -55 °C (+0 °C , -3 °C) / 30min ± 3min 2 step: Ordinary temp. / 10min to 15min 3 step : +125 °C (+3 °C , -0 °C) / 30min ± 3min 4 step: Ordinary temp. / 10min to 15min Total of 100 cycles Then measured after exposure in the room condition for 48 h ± 4 h. |
| 9.2 | Humidity | | Temperature : 40 °C ± 2 °C Humidity : 90 %(RH) to 95 %(RH) Time : 1000 h (+48 h , -0 h) Then measured after exposure in the room condition for 48 h ± 4 h. |
| 9.3 | Heat Life | | Temperature : 125 C ± 3 °C Applying Current : Rated Current Time : 1000 h (+48 h , -0 h) Then measured after exposure in the room condition for 48 h ± 4 h. |
| 9.4 | Cold Resistance | | Temperature : - 55 °C ± 2 °C Time : 1000 h (+48 h , -0 h) Then measured after exposure in the room condition for 48 h ± 4 h. |

(5) Outside package

These reels shall be packed in the corrugated cardboard package and the following items shall be marked on a label and the label is stuck on the box.

(Customer name, Purchasing Order Number, Customer Part Number, MURATA part number, RoHS discrimination(*2), Quantity, etc)

(6) Dimensions of reel and taping (leader-tape, trailer-tape)

**10-4. 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.

11. ⚠Caution**11.1. Surge current**

Excessive surge current (pulse current or rush current) than specified rated current applied to the product may cause a critical failure, such as an open circuit, burnout caused by excessive temperature rise.

Please contact us in advance in case of applying the surge current.

11.2. Limitation of Applications

The products listed in the reference specification (hereinafter the product(s) is called as the "Product(s)") are designed and manufactured for applications specified in the reference specification (hereinafter called as the "Specific Application").

We shall not warrant anything in connection with the Products including fitness, performance, adequateness, safety, or quality, in the case of applications listed in from (1) to (11) written at the end of this precautions, which may generally require high performance, function, quality, management of production or safety. Therefore, the Product shall be applied in compliance with the specific application.

WE DISCLAIM ANY LOSS AND DAMAGES ARISING FROM OR IN CONNECTION WITH THE PRODUCTS INCLUDING BUT NOT LIMITED TO THE CASE SUCH LOSS AND DAMAGES CAUSED BY THE UNEXPECTED ACCIDENT, IN EVENT THAT (i) THE PRODUCT IS APPLIED FOR THE PURPOSE WHICH IS NOT SPECIFIED AS THE SPECIFIC APPLICATION FOR THE PRODUCT, AND/OR (ii) THE PRODUCT IS APPLIED FOR ANY FOLLOWING APPLICATION PURPOSES FROM (1) TO (11) (EXCEPT THAT SUCH APPLICATION PURPOSE IS UNAMBIGUOUSLY SPECIFIED AS SPECIFIC APPLICATION FOR THE PRODUCT IN OUR CATALOG SPECIFICATION FORMS, DATASHEETS, OR OTHER DOCUMENTS OFFICIALLY ISSUED BY US*).

- (1) Aircraft equipment
- (2) Aerospace equipment
- (3) Undersea equipment
- (4) Power plant control equipment
- (5) Medical equipment
- (6) Transportation equipment
- (7) Traffic control equipment
- (8) Disaster prevention/security equipment
- (9) Industrial data-processing equipment
- (10) Combustion/explosion control equipment
- (11) Equipment with complexity and/or required reliability equivalent to the applications listed in the above.

For exploring information of the Products which will be compatible with the particular purpose other than those specified in the reference specification, please contact our sales offices, distribution agents, or trading companies with which you make a deal, or via our web contact form.

Contact form: <https://www.murata.com/contactform>

* We may design and manufacture particular Products for applications listed in (1) to (11). Provided that, in such case we shall unambiguously specify such Specific Application in the reference specification without any exception. Therefore, any other documents and/or performances, whether exist or non-exist, shall not be deemed as the evidence to imply that we accept the applications listed in (1) to (11).

11.3. Corrosive gas

Please refrain from use since contact with environments with corrosive gases (sulfur gas [hydrogen sulfide, sulfur dioxide, etc.], chlorine, ammonia, etc.) or oils (cutting oil, silicone oil, etc.) that have come into contact with the previously stated corrosive gas environment will result in deterioration of product quality or an open from deterioration due to corrosion of product electrode, etc. We will not bear any responsibility for use under these environments.

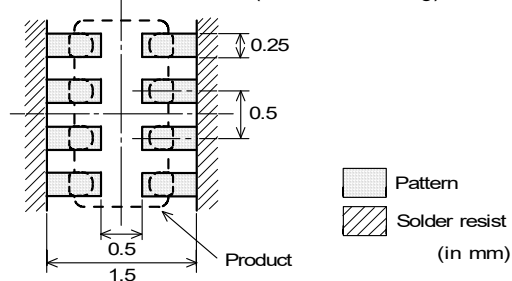
12. Notice

This product is designed for solder mounting.

Please consult us in advance for applying other mounting method such as conductive adhesive.

12.1. Land pattern designing

- Standard land dimensions (Reflow soldering)



* The excessive heat by land pads may cause deterioration at joint of products with substrate.

12.2. Soldering Conditions

Products can be applied to reflow soldering.

(1) Flux , Solder

| | |
|--------|---|
| Flux | Use rosin-based flux, but not highly acidic flux (with chlorine content exceeding 0.2(wt)%.) Do not use water-soluble flux. |
| Solder | Use Sn-3.0Ag-0.5Cu solder Standard thickness of solder paste : 100 μ m to 200 μ m Use of Sn-Zn based solder will deteriorate performance of products. In case of using Sn-Zn based solder, please contact Murata in advance. |

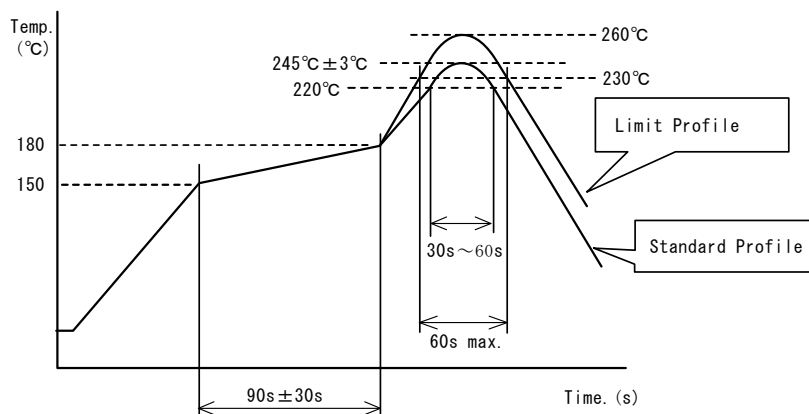
(2) Soldering conditions

- Pre-heating should be in such a way that the temperature difference between solder and ferrite surface is limited to 150°C max. Also cooling into solvent after soldering should be in such a way that the temperature difference is limited to 100 °C max.

Insufficient pre-heating may cause cracks on the ferrite, resulting in the deterioration of product 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.



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

12.3. Reworking with soldering iron

- Pre-heating : 150 °C , 1 min
- Soldering iron output : 80W max.
- Tip temperature: 350°C max.
- Tip diameter: φ 3mm max.
- Soldering time : 3(+1,-0) seconds.
- Times : 2times max.

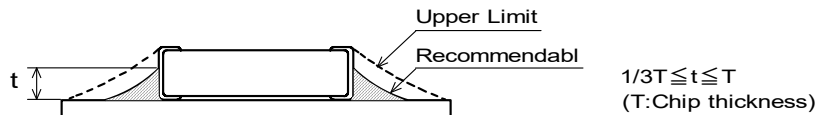
Note : Do not directly touch the products with the tip of the soldering iron in order to prevent the crack on the ferrite material due to the thermal shock.

12.4. Solder Volume

Solder shall be used not to be exceeded as shown below.

Accordingly increasing the solder volume, the mechanical stress to product is also increased.

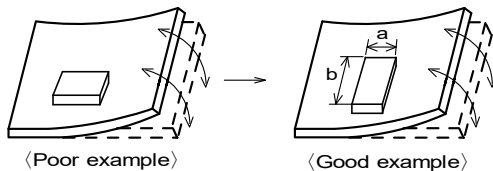
Exceeding solder volume may cause the failure of mechanical or electrical performance.

**12.5. Attention regarding P.C.B bending**

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 for board warpage.

<Products direction>



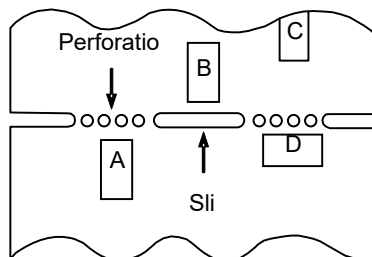
Products shall be located in the sideways direction (Length : $a < b$) to the mechanical stress.

- (2) Components location on P.C.B. separation.

It is effective to implement the following measures, to reduce stress in separating the board.

It is best to implement all of the following three measures; however, implement as many measures as possible to reduce stress.

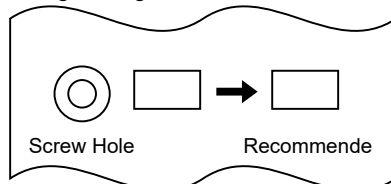
| Contents of Measures | Stress Level |
|--|--------------|
| (1) Turn the mounting direction of the component parallel to the board separation surface. | A > D *1 |
| (2) Add slits in the board separation part. | A > B |
| (3) Keep the mounting position of the component away from the board separation surface. | A > C |



*1 A > D is valid when stress is added vertically to the perforation as with Hand Separation.
If a Cutting Disc is used, stress will be diagonal to the PCB, therefore A > D is invalid.

- (3) Mounting Components Near Screw Holes

When a component is mounted near a screw hole, it may be affected by the board deflection that occurs during the tightening of the screw. Mount the component in a position as far away from the screw holes as possible.

**12.6. Potential between Elements**

Products should be used within 5 V(DC) between elements.

When the products are used the excessive voltage over 5 V(DC) , it may cause breaking of inner electrode and / or decreasing o insulation resistance between elements.

12.7. Mounting density

Add special attention to radiating heat of products when mounting the inductor near the products with heating. The excessive heat by other products may cause deterioration at joint of this product with substrate.

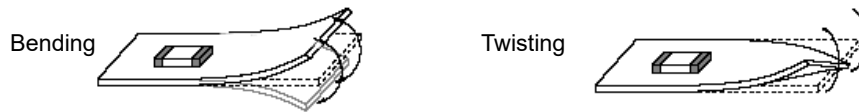
12.8. Cleaning

Excessive ultrasonic oscillation during cleaning can cause the PCBs to resonate, resulting in cracked chips or broken solder joints. Before starting your production process, test your cleaning equipment / process to insure it does not degrade this product.

12.9. 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.

**12.10. Operating Environment**

Do not use this product under the following environmental conditions, on deterioration of the Insulation Resistance of the Ferrite material and/or corrosion of Inner Electrode may result from the use.

- (1) In the corrodible atmosphere such as acidic gases, alkaline gases, chlorine, sulfur gases, organic gases and etc.
(the sea breeze, Cl₂, H₂S, NH₃, SO₂, NO₂, etc)
- (2) In the atmosphere where liquid such as organic solvent, may splash on the products.
- (3) In the atmosphere where the temperature / humidity changes rapidly and it is easy to dew.

12.11. Resin coating

The impedance value may change and/or it may affect on the product's performance due to high cure-stress of resin to be used for coating / molding products. So please pay your careful attention when you select resin. In prior to use, please make the reliability evaluation with the product mounted in your application set.

12.12. Storage Conditions

- (1) Storage period
Use the products within 6 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 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.
 - Avoid storing the product by itself bare (i.e. exposed directly to air).
- (3) Delivery
Care should be taken when transporting or handling product to avoid excessive vibration or mechanical shock.

13. ⚠ Notes

- (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.