

Block Type EMIFIL or Automotive powertrain/safety equipment BNX012H01 Reference Specification [AEC-Q200]

1. Scope

This reference specification applies to Block Type EMIFIL BNX012H01 based on AEC-Q200.

1.1 Specific applications:

- Automotive powertrain/safety equipment: Products that can be used for automotive equipment related to running, turning, stopping, safety devices, etc., or equipment whose structure, equipment, and performance are legally required to meet technical standards for safety assurance or environmental protection.
- Automotive infotainment/comfort equipment: Products that can be used for automotive equipment such as car navigation systems and car audio systems that do not directly relate to human life and whose structure, equipment, and performance are not specifically required by law to meet technical standards for safety assurance or environmental protection.
- 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.

1.2 Unsuitable application:

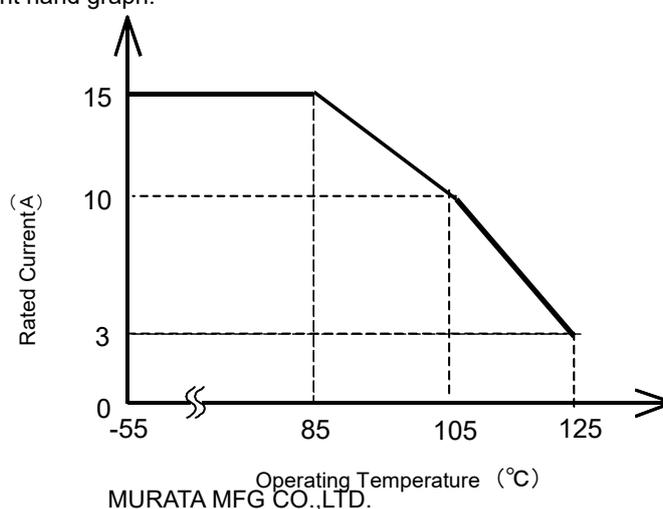
Applications listed in "Limitation of applications" in this reference specification.

2. Rating

2.1	Customer Part Number	
2.2	Murata Part Number	BNX012H01
2.3	Rated Voltage	50 V(DC)
2.4	Test Voltage	125 V(DC)
2.5	Rated Current (*1)	15 A(DC)
2.6	Insulation Resistance	500 MΩ min.
2.7	Voltage Drop	35 mV max.
2.8	Capacitance	1.0 μF ± 15 %
2.9	Insertion Loss	1 MHz to 1 GHz : 40dB min.
2.10	ESD Rank 2 : 2kV	2
2.11	Equivalent Circuits	See the item 4
2.12	Operating Temperature	- 55 °C to + 125 °C
2.13	Storage Temperature	- 55 °C to + 125 °C

(*1)

Rated current is derated according to operating temperature, as shown in the right hand graph.



3. Standard Testing Condition

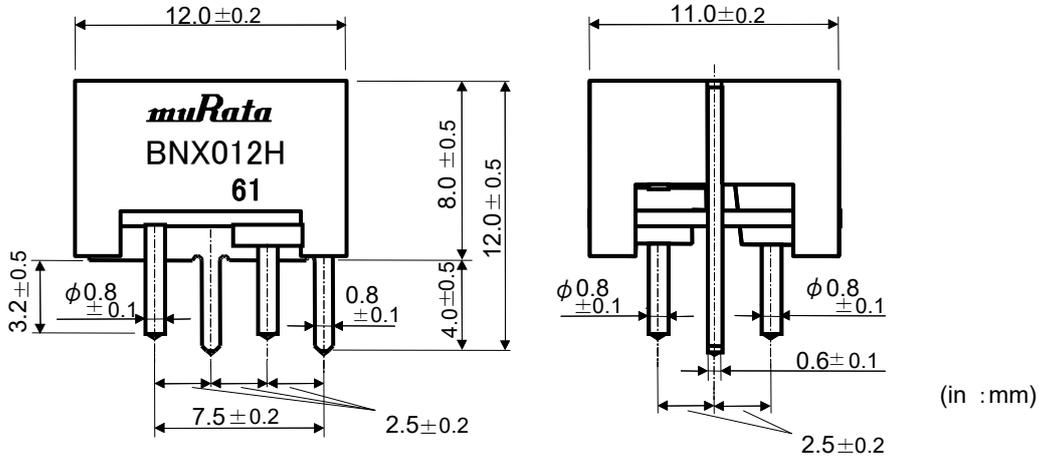
<Unless otherwise specified>

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

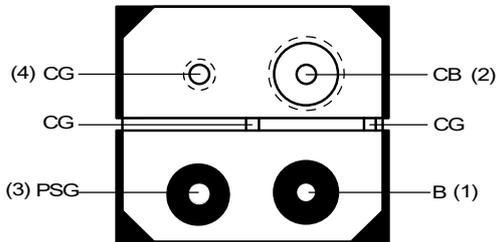
4. Style and Dimensions



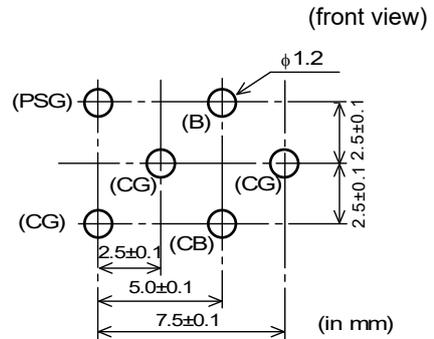
(The tip by solder of terminal is not included in the dimension values.)

Note) Although some part of the product surface seems to be white in some cases, do not care because it is the result of waxing process for humidity resistance improvement. This wax does not make bad affection to mechanical or electrical performance, reliability of the product.

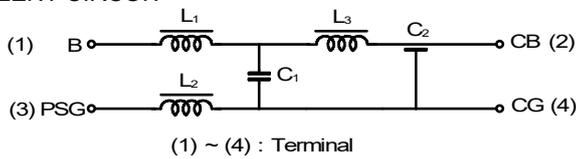
• TERMINAL LAYOUT (BOTTOM FIGURE)



• DIMENSIONS OF INSTALLATION HOLES (front view)



• EQUIVALENT CIRCUIT



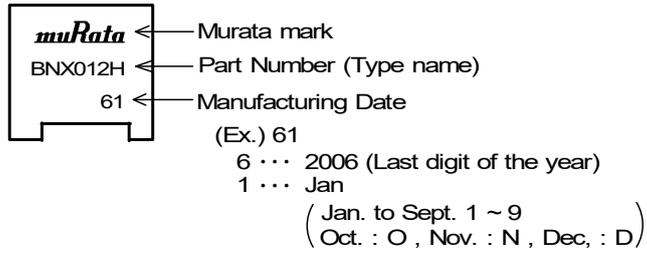
- B : Bias
- PSG : Power Supply Ground
- CG : Circuit Ground
- CB : Circuit + Bias

• Unit Mass (Typical value)

2.0g

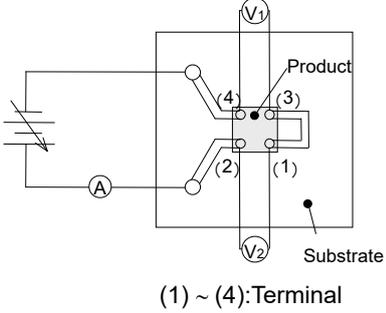
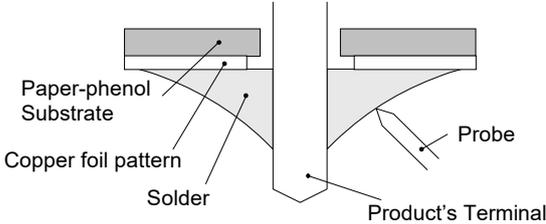
5. Marking

Filter shall be marked as follows.



6. Electrical Performance

No.	Item	Specification	Test Method
6.1	Insulation Resistance	Meet item 2.6.	Measured at DC rated voltage between terminal (1)(2) and (3)(4). Time : 2 minutes Suitable resistor : 1MΩ.
6.2	Dielectric Strength	Filter shall be no failure.	Test voltage shall be applied between terminal (1)(2) and terminal (3)(4). Time : 1 to 5 seconds. Charging current : 50 mA max.
6.3	Capacitance	Meet item 2.8.	Measured at the following condition between terminal (1)(2) and (3)(4). Frequency : 1 ± 0.1kHz Voltage : 1 V(rms) max.
6.4	Insertion Loss	Meet item 2.9.	Measured by the following circuit. Measuring Equipment : R3767 C (manufactured by ADVANTEST) or the equivalent . Sample : build product into Balun . <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center; margin: 0;">NETWORK ANALYZER</p> <p style="text-align: center; margin: 0;">Port 1(50 Ω) Port 2(50 Ω)</p> </div> (※) :It uses the Balun or 1 to 1 transformer.

No.	Item	Specification	Test Method
6.5	Voltage Drop	Meet item 2.7.	<p>Rated Current : 15 A Substrate : 100 × 100 × 1.6mm (paper-phenol) Soldering : Insert the terminals into the holes on P.C. board completely. Voltage Drop Value : V1 + V2</p>  <p style="text-align: center;">(1) ~ (4): Terminal</p> <p>Probe of each voltmeter shall be contacted to the center of soldering parts as following figure.</p> 

7. Q200 Requirement

7-1. Performance (based on Table 13 for Ferrite EMI SUPPRESSORS/FILTERS)

AEC-Q200 Rev.D issued June. 1 2010

AEC-Q200			Murata Specification / Deviation								
No.	Stress	Test Method									
3	High Temperature Exposure (Storage)	1000hours at 125C Set for 24hours at room temperature, then measured. Measurement at 24+/-2 hours after test conclusion.	Meet Table 1 after testing. <u>Table 1</u> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Appearance</td> <td>No damaged</td> </tr> <tr> <td>Insulation Resistance</td> <td>50 MΩ min.</td> </tr> <tr> <td>Capacitance Change</td> <td>within ± 12.5%</td> </tr> </table>	Appearance	No damaged	Insulation Resistance	50 MΩ min.	Capacitance Change	within ± 12.5%		
Appearance	No damaged										
Insulation Resistance	50 MΩ min.										
Capacitance Change	within ± 12.5%										
4	Temperature Cycling	1000cycles(-55C to 125C) Measurement at 24±2 hours after test conclusion.	Meet Table 2 after testing. <u>Table 2</u> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Appearance</td> <td>No damaged</td> </tr> <tr> <td>Insulation Resistance</td> <td>Meet item 2.6</td> </tr> <tr> <td>Dielectric Strength</td> <td>No failure</td> </tr> <tr> <td>Capacitance Change</td> <td>within ± 7.5%</td> </tr> </table>	Appearance	No damaged	Insulation Resistance	Meet item 2.6	Dielectric Strength	No failure	Capacitance Change	within ± 7.5%
Appearance	No damaged										
Insulation Resistance	Meet item 2.6										
Dielectric Strength	No failure										
Capacitance Change	within ± 7.5%										
5	Destructive Physical Analysis	Per EIA469 No electrical tests	Not Applicable								

AEC-Q200			Murata Specification / Deviation								
No.	Stress	Test Method									
7	Biased Humidity	1000hours 85C/85%RH. Apply Maximum rated Voltage. Measurement at 24+/-2 hours after test conclusion.	Meet Table 1 after testing.								
8	Operational Life	1000hours at 125C Apply Maximum rated Voltage. Measurement at 24+/-2 hours after test conclusion.	Meet Table 1 after testing.								
9	External Visual	Visual inspection	No abnormalities								
10	Physical Dimension	Meet ITEM 4 (Style and Dimensions)	No defects								
11	Terminal Strength (Leaded)	Per MIL-STD-202 Method 211 Conditions:A,C	Condition E: Not Applicable Lead wire should not cut off.								
12	Resistance to Solvents	Per MIL-STD-202 Method 215	Not Applicable								
13	Mechanical Shock	Per MIL-STD-202 Method 213 Figure 1 of Method 213. Condition C(100g's/6ms/Half sine) Three times each 6 direction.	Meet Table 3 after testing. Table 3 <table border="1" data-bbox="804 840 1150 1016"> <tr> <td>Appearance</td> <td>No damaged</td> </tr> <tr> <td>Insulation Resistance</td> <td>Meet item 2.6</td> </tr> <tr> <td>Dielectric Strength</td> <td>No failure</td> </tr> <tr> <td>Capacitance</td> <td>Meet item 2.8</td> </tr> </table>	Appearance	No damaged	Insulation Resistance	Meet item 2.6	Dielectric Strength	No failure	Capacitance	Meet item 2.8
Appearance	No damaged										
Insulation Resistance	Meet item 2.6										
Dielectric Strength	No failure										
Capacitance	Meet item 2.8										
14	Vibration	5g's for 20 minutes, 12cycles each of 3 orientations Osscillation Frequency : 10-2000Hz.	Meet Table 3 after testing.								
15	Resistance to Soldering Heat	260C +/-5 degree C Immersion time 10s	Meet Table 2 after testing.								
17	ESD	Per AEC-Q200-002	Meet Table 3 after testing. ESD Rank: Refer to Item 2. Rating.								
18	Solderbility	Per J-STD-002 Method A	The lead is covered with a new solder coating at least 95% of the total surface of the immersed part.								
19	Electrical Characterization	Measured :Capacitance	No defects								
20	Flammability	Per UL-94	Not Applicable								
21	Board Flex	Per AEC Q200-005	Not Applicable								
30	Electrical Transient Conduction	Per ISO-7637-2	Not Applicable								

9. ⚠ Caution**9.1. Operating Environment**

Do not use this product under the following environmental conditions, on deterioration of the performance, such as insulation resistance may result from the use.

- (1) in the corrodible atmosphere (acidic gases, alkaline gases, chlorine, sulfur gases, organic gases and etc.)
- (2) in the atmosphere where liquid such as organic solvent, may splash on the products.
- (3) in the atmosphere where dust rises.
- (4) in the atmosphere where rapidly thermal change occurs.

9.2. Caution (Rating)

Do not use products beyond the Operating Temperature Range, Rated Voltage and Rated Current.

9.3. Attention regarding product's lay out

< Attention regarding the heat generated by other products >

Please provide special attention when mounting products in close proximity to other products that radiate heat.

Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or firing when the product is used.

9.4. Note for Assembling

< Thermal Shock >

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

Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or firing when the product is used.

<Caution for residual flux>

There shall be no residual flux and residual cleaner after cleaning.

Unless the residual flux, in particular containing halide, is removed, the component may exhibit critical mechanical or electrical degradation, such as burning as a result of short circuit caused by IR degradation, after exposure to a high temperature high humidity environment.

9.5 Fail-safe

Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

9.6 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).

9.7 Corrosive gas

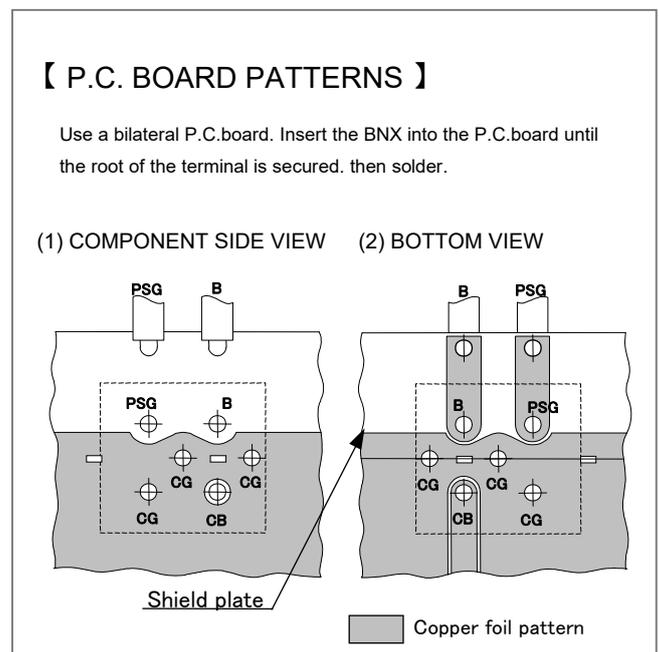
Please refrain from use since contact with environments with corrosive gases (sulfur gas [hydrogen sulfide, sulfur dioxide, etc.], chlorine, ammonia, etc.) or oils (cutting oil, silicone oil, etc.) that have come into contact with the previously stated corrosive gas environment will result in deterioration 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.

10. Notice

10.1. Using the block type EMIFIL® (BNX) effectively

This product effectively prevents undesired radiation and external noise from going out / entering the circuit by grounding the high frequency components which cause noise problem. Therefore, grounding condition may affect on the performance of the filter and following attentions should be paid for effective use.

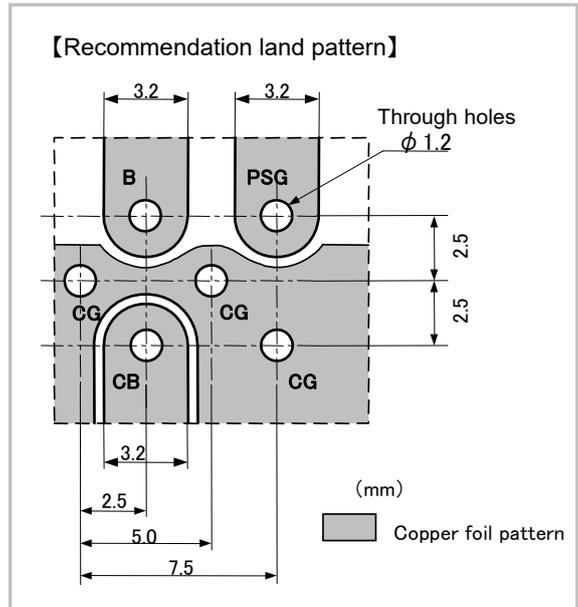
- (1) Design maximized grounding area in the P.C. board, and grounding pattern for all the grounding terminals of the product to be connected. (Recommended to use our recommendation in this spec.)
- (2) Minimize the distance between ground of the P.C. board and the ground plate of the product. (Recommended to use through-hole connection between grounding area both of component side and bottom side.
- (3) Insert the terminals into the holes on P.C. board completely.
- (4) Don't connect PSG terminal with CG terminal directly. (See the item 4. TERMINAL LAYOUT)



10.2. Self-heating

Though this product has a large rated current, the localized self-heating may be caused depending on soldering conditions. To avoid this, following attention should be paid.

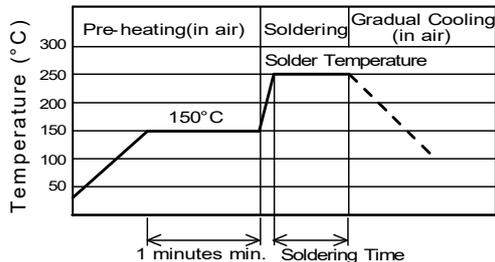
- (1) Use P.C. board with our recommendation on hole diameter / land pattern dimensions, mentioned in the right hand drawing, especially for 4 terminals which pass current.
- (2) Solder the terminals to the P.C. board with solder-cover area at least 90%. Otherwise, excess self-heating at connection between terminals and P.C. board may lead to smoke and / or fire of the product even when operating at rated current.
- (3) After installing this product in your product, please make sure of the self-heating with the rated current.



10.3. Soldering

Products can only be soldered with flow and soldering iron. Please consult us in advance for applying other mounting method such as conductive adhesive.

- (1) Flux, Solder
 - Rosin-based flux should be used.
 - Do not use strong acidic flux with halide content exceeding 0.2(wt)% (chlorine conversion value.)
 - Use Sn-3.0Ag-0.5Cu solder.
- (2) Standard flow soldering profile.



Solder Temperature	Soldering Time
250 ~ 260 °C	4 ~ 6 s

- (3) Resistance to soldering iron goes in the following condition that tip temperature is 350 °C max. and soldering time is 5 s max. Times is 2times max.
- (4) Products and the leads should not be subjected to any mechanical stress during soldering process. (and also while subjected to the equivalent high temperature.)

10.4. 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 : 20W / l max. Frequency : 28kHz to 40kHz Time : 5 minutes max.

- (3) Cleaner
 - 1. Alternative 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) The surface of products may become dirty whitely after cleaning.
But there is no deterioration on mechanical, electrical characteristics and reliability.
- (6) Other cleaning
Please contact us.

10.5. Storage condition

(1) Storage period

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

(2) Storage environment condition

- 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..

11. 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.