Micro Chip Transformer for Automotive infotainment/comfort equipment DXW21BZ7511☐☐ Murata Standard reference Specification [AEC-Q200]

1. Scope

This reference specification applies to Micro Chip Transformer DXW21BZ Series based on AEC-Q200.

1.1 Specific applications:

- 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.
- 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.

This series is designed for use in Car Multimedia, Car Interior, Car Comfort application and General Electronic equipment. It is not appropriate for use in applications critical to passenger safety and car driving function (e.g. ABS, AIRBAG, etc.).

1.2 Unsuitable application:

Applications critical to passenger safety and car driving function (e.g. ABS, AIRBAG, etc.) and 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.) DX W 21 B Z 75 11 T L
(1) (2) (3) (4) (5) (6) (7) (8) (9)

(1) Micro Chip Transformer
(2) Structure (W: Winding Type)
(3) Dimension (L×W)
(4) Type of Transformer (B: Balun)
(5) Category
(6) Port Impedance (75: 75ohm)
(7) Impedance ratio (11: one to one)
(8) Main Application (T: Televisions/ S: Satellite STB)
(9) Packing Code L:Taping / B:Bulk

3. Electrical Specification 1

Customer Part Number	Murata Part Number	Freq. Range	Port Impedance [ohm]	Insertion Loss [dB max.] at Freq. Range	CMRR [dB min.] at Freq. Range	DC Resistance [ohm max.]
	DXW21BZ7511TL	50-870 MHz	75/75	1.0	20	0.77
	DXW21BZ7511TB					
	DXW21BZ7511SL	1-1.5 GHz	75/75	1.4	20	0.59
	DXW21BZ7511SB					

Electrical Specification 2

Rated Voltage [DCV]	Withstand Voltage [DCV]	Rated Power [dBm]	Insulation Resistance [Mohm min.]	ESD Rank 6:25kV
20	50	27	10	6

Operating Temperature : -40 to +105°C Storage Temperature : -40 to +105°C

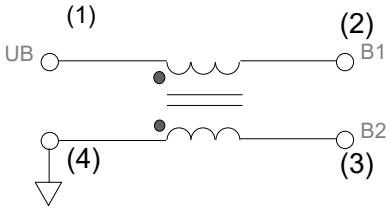
4. Standard Testing Condition

<Unless otherwise specified>
Temperature : Ordinary Temperature 15 to 35°C
Humidity : Ordinary Humidity 25 to 85%(RH)

<In case of doubt>
Temperature : 20 ± 2°C
Humidity : 60 to 70%(RH)
Atmospheric Pressure : 86 to106kPa

5. Style and Dimensions

■Eqivalent Circuit

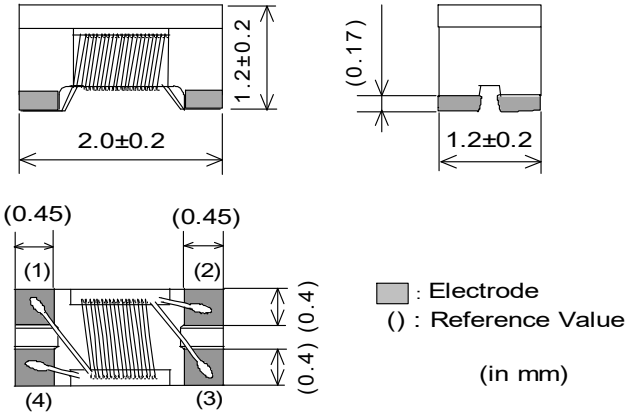


No Polarity

■Unit Mass (typ.)

0.011g

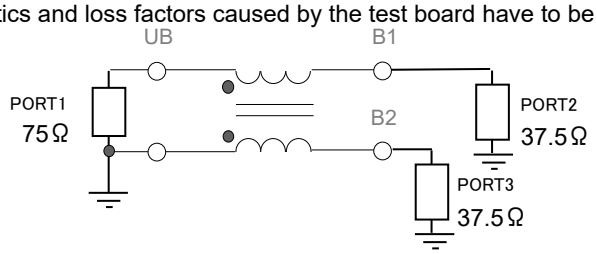
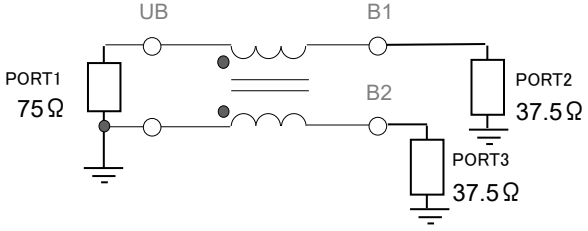
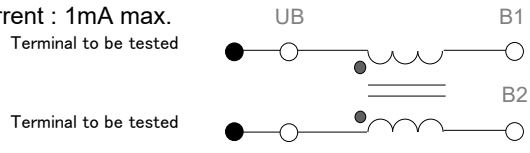
■Dimension

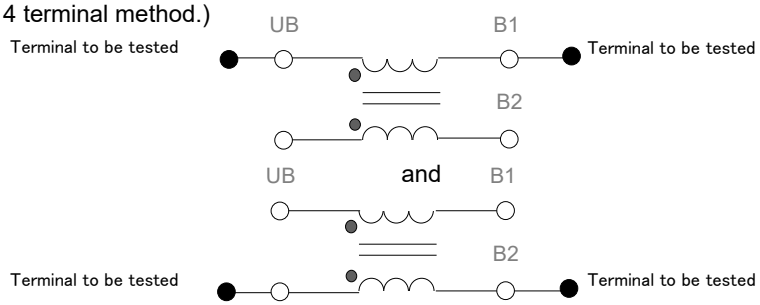
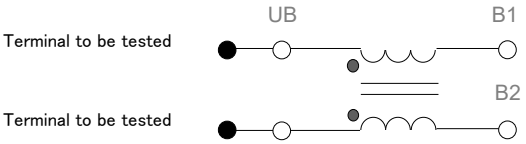


6. Marking

No Marking.

7. Electrical Performance

No.	Item	Specification	Definition and Measurement Method
7.1	Insertion Loss (IL)	Meet item 3.	Insertion Loss is given by Sds21 mag. extracted from the below circuit. IL[dB] = $20\log_{10}$(Sds21) Where Sds21 is S-parameter of single mode stimulus - Differential mode response Parasitics and loss factors caused by the test board have to be removed. 
7.2	CMRR	Meet item 3.	CMRR is given by the following equation, S-parameters are extracted from the below circuit. CMRR[dB] = 20log10(Sds21/Scs21)=20log10{(S21+S31)/(S21-S31)} Where Sds21 is S-parameter of single mode stimulus - Differential mode response Scs21 is S-parameter of single mode stimulus - Common mode response Parasitics and loss factors caused by the test board have to be removed. 
7.3	Withstand Voltage	No damage.	Test Voltage : 50V Time : 5 seconds Charge Current : 1mA max. 

No.	Item	Specification	Definition and Measurement Method
7.4	DC Resistance (Rdc)	Meet item 3.	Measuring current : 10mA max. (In case of doubt in the above mentioned standard condition, measure by 4 terminal method.) 
7.5	Insulation Resistance (I.R.)	Meet item 3.	Measuring voltage : Rated Voltage Measuring time : 1 minute max. 

8. Q200 Requirement

8-1. Performance (based on Table 5 for Magnetics(Inductors / Transformer)

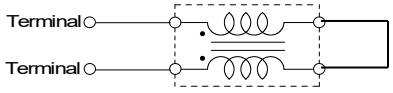
AEC-Q200 Rev.D issued June 1. 2010

AEC-Q200			Murata Specification / Deviation
No.	Stress	Test Method	
3	High Temperature Exposure	1000hours at t 105 deg C Set for 24hours at room temperature, then measured.	Meet Table A after testing. Table A Appearance: No damaged IL, CMRR, I.R., Withstand Voltage: Meet Item 3.
4	Temperature Cycling	1000cycles -40 deg C to +105 deg C Set for 24hours at room temperature, then measured.	Meet Table A after testing.
7	Biased Humidity	1000hours at 85 deg C, 85%RH unpowered.	Meet Table A after testing. (ref.item 9)
8	Operational Life	Apply 105 deg C 1000hours Set for 24hours at room temperature, then measured	Meet Table A after testing. Apply rated current. (ref.item 9)
9	External Visual	Visual inspection	No abnormalities
10	Physical Dimension	Meet ITEM 5 （Style and Dimensions）	No defects
12	Resistance to Solvents	Per MIL-STD-202 Method 215	Not Applicable
13	Mechanical Shock	Per MIL-STD-202 Method 213 Condition C: 100g's/6ms/Half sine Half sine	Meet Table A after testing.
14	Vibration	5g's(0.049N) for 20 minutes, 12cycles each of 3 oritentations Test from 10-2000Hz. 12cycles each of 3 orientations	Meet Table A after testing.

AEC-Q200			Murata Specification / Deviation
No.	Stress	Test Method	
15	Resistance to Soldering Heat	Solder temperature 260C+/-5 deg C Immersion time 10s	Meet Table A after testing.
17	ESD	Per AEC-Q200-002	Meet Table A after testing. ESD Rank: Refer to Item 3. Rating.
18	Solderbility	Per J-STD-002	Method b : Not Applicable 95% of the terminations is to be soldered. (except partly-exposed wire) Flux:Ethanol solution of rosin,25(wt)% includes activator equivalent to 0.06 to 0.10(wt)% chlorine
19	Electrical Characterization	Measured : Insertion Loss	No defects
20	Flammability	Per UL-94	Not Applicable
21	Board Flex	Epoxy-PCB(1.6mm) Deflection 2mm(min) 60 sec minimum holding time	Holding time: 5s Meet Table A after testing.
22	Terminal Strength	Per AEC-Q200-006 A force of 17.7N for 60sec	10N for 30s No defects

9. Terminal to be Tested.

When measuring and suppling the voltage, the following terminal is applied.

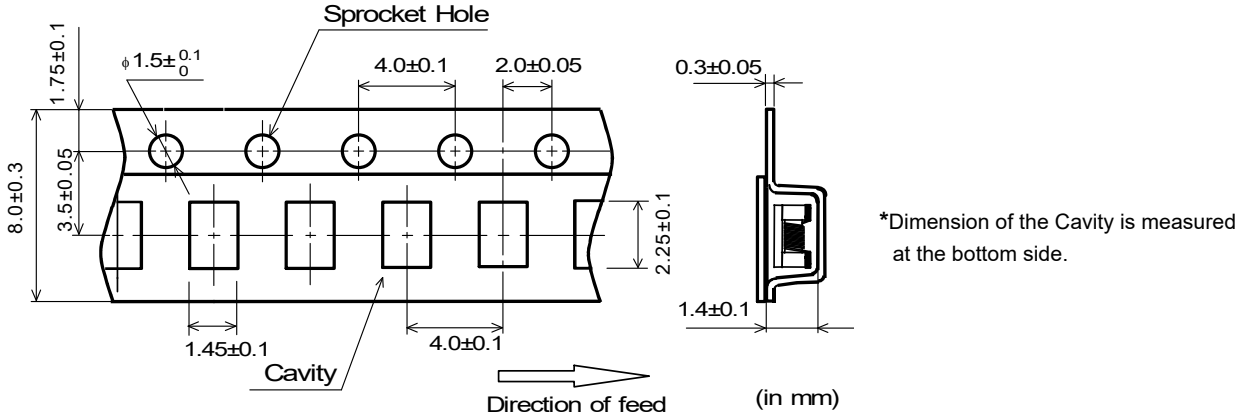
No.	Item	Terminal to be Tested
9.1	Biased Humidity (Supply Terminal)	
9.2	Operational Life (Supply Terminal)	

10. P.C.B., Flux, Solder and Soldering condition

Test shall be done using P.C.B., Flux, Solder and Soldering condition which are specified in item 14 except the case of being specified special condition.

11. Specification of Packaging

10.1 Appearance and Dimensions (8mm-wide,Plastic tape)



*Dimension of the Cavity is measured at the bottom side.

11.2 Specification of Taping

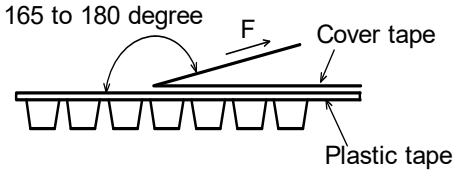
(1)Packing quantity(Standard quantity) 2000 pcs. / reel
(2)Packing Method
Products shall be packaged in each embossed cavity of plastic tape and sealed with cover tape.
(3) Spliced point
The cover tape have no spliced point.
(4) Sprocket Hole
Sprocket hole shall be located on the left hand side toward the direction of feed.
(5)Missing components number
Missing components number within 0.025% of the number per reel or 1 pc, whichever is greater, and are not continuous. The specified quantity per reel is kept.

11.3 Pull Strength of the Tape Package

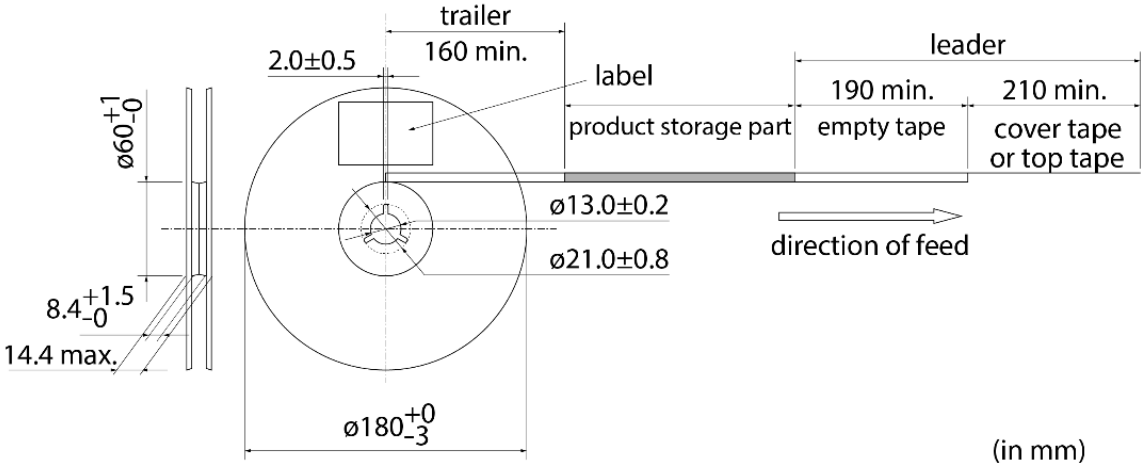
Plastic Tape	5N min.
Cover Tape	10N min.

11.4 Peeling force of the Cover Tape

0.2 to 0.7N(Minimum value is Typical)
Peeling verosity is 300 mm / min



11.5 Dimensions of Leader-tape, Trailer and Reel



(in mm)

11.6 Marking for reel

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

∗1) « Expression of Inspection No. » □□ (1) OOOO (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.

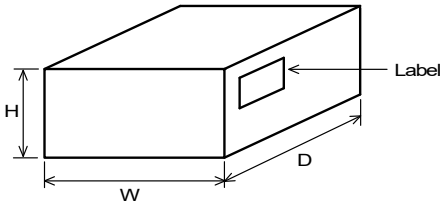
∗2) « Expression of RoHS Marking » ROHS – Y (△) (1) (2)

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

11.7 Marking for Outside package

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

11.8 Specification of Outer Case



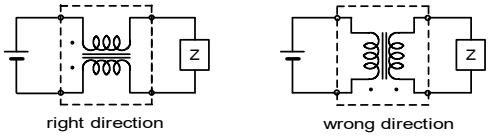
Outer Case Dimensions (mm)			Standard Reel Quantity in Outer Case (Reel)
W	D	H	
186	186	93	5

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

12. ⚠Caution

12.1 Mounting Direction

Mount products in right direction.
Wrong direction which is 90° rotated from right direction causes not only open or short circuit but also flames or other serious trouble.



right direction wrong direction

12.2 Limitation of Application

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).

12.3 Caution(Rating)

Do not exceed maximum rated current of the product. Thermal stress may be transmitted to the product and short/open circuit of the product or falling off the product may be occurred.

12.4 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.

12.5 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.

13. 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.

13.1 Flux and Solder

Flux	Use rosin-based flux, (with converting chlorine content 0.06 to 0.1(wt)%.), but not highly acidic flux (with Halogen content exceeding 0.2(wt)% conversion to chlorine). Do not use water-soluble flux.
Solder	Use Sn-3.0Ag-0.5Cu solder

13.2 Assembling

<Exclusive use of Reflow soldering>
Flow soldering may cause deterioration in insulation resistance.
So, reflow soldering shall be applied for this product.

13.3 Cleaning Conditions

Do not clean after soldering. Some cleaning agents may degrade bonding strength,and characteristics of products by detaching. If cleaning,please contact us.

13.4 Resin coating

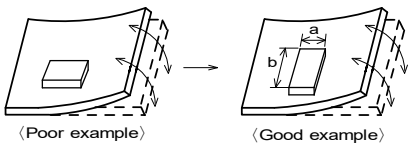
The electrical performance may change due to high cure-stress of resin to be used for coating/molding products. An open circuit issue may occur by mechanical stress caused by the resin, amount/cured shape of resin, or operating condition etc. Some resin contains some impurities or chloride possible to 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.

13.5 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 due to warping the board.

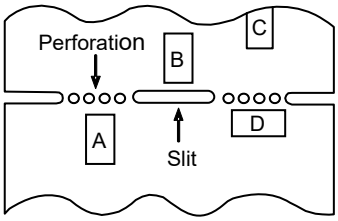
[Products direction]



Products shall be location 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.

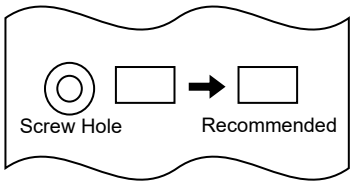
Contents of Measures	Stress Level
(1) Turn the mounting direction of the component parallel to the board separation surface.	A > D *1
(2) Add slits in the board separation part.	A > B
(3) Keep the mounting position of the component away from the board separation surface.	A > C



*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

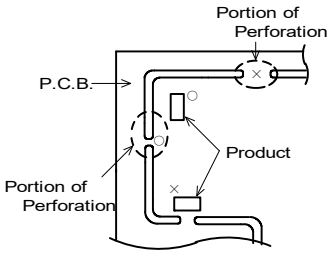
When a component is mounted near a screw hole, it may be affected by the board deflection that occurs during the tightening of the screw. Mount the component in a position as far away from the screw holes as possible.



13.6 Attention Regarding P.C.B. Design

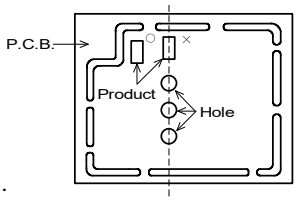
< The Arrangement of Products >

P.C.B. shall be designed so that products are far from the portion of perforation.



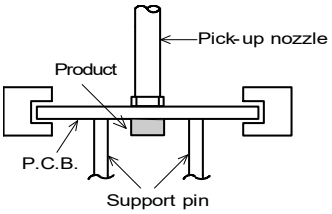
The portion of perforation shall be designed as narrow as possible and shall be designed so as not to be applied the stress in the case of P.C.B. separation.

Products shall not be arranged on the line of a series of holes when there are big holes in P.C.B. (Because the stress concentrate on the line of holes.)



< Products Placing >

Support pins shall be set under P.C.B . to prevent causing a warp to P.C.B. during placing the products on the other side of P.C.B.

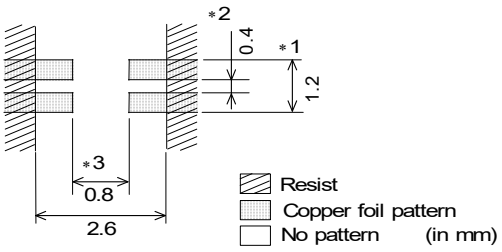


< P.C.B. Separation >

P.C.B. shall not be separated with hand.

P.C.B. shall be separated with the fixture so as not to cause P.C.B. bending.

13.7 Standard Land Dimensions (Reflow)



*1 If the pattern is made with wider than 1.2mm. It will result to let component turn around, because melting speed is different. In the worst case, short circuit between lines may be occured.

*2 If the pattern is made with less than 0.4mm , in the worst case , short circuit between lines may be occurred deu to the spread of soldering paste or mount placeing accuracy.

*3 If the pattern is made with wider than 0.8mm, the strength of bending will be reduced.

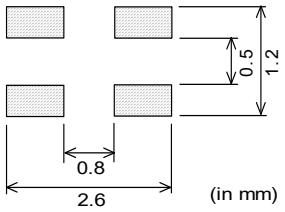
*4 Do not use gilded pattern. A copper wire may cause open by dissolution of metallization.

13.8 Standard Soldering Condition

1. Reflow Soldering

(1) Standard printing pattern for soldering.

- Standard thickness of the solder paste should be 100 µm.
- Use the solder paste printing pattern of the right pattern.
- For the resist and copper foil pattern, use standard land dimensions.
- Use the Solder Sn-3.0Ag-0.5Cu for pattern printing.
- Spread of soldering paste between lines may cause short circuit of lines.

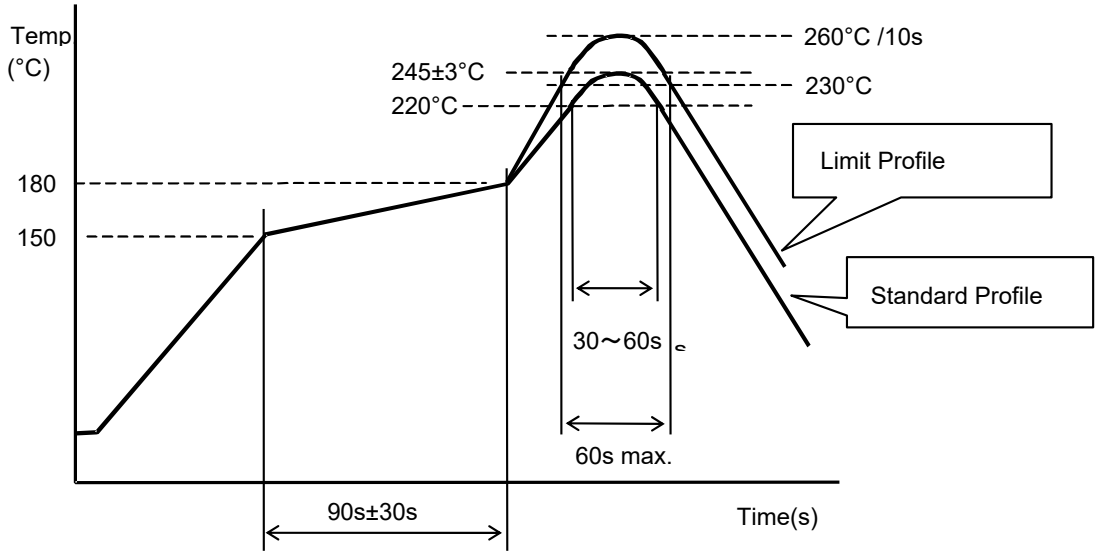


(2) Soldering Temperature

Temperature difference between soldering and surface of components must be within 150°C, in preheating. When components are immersed in liquid after soldering, temperature difference should be within 100°C. If preheating is not enough, components may be cracked and cause deterioration in insulation resistance.

(3) Soldering Condition

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

2. Reworking with Soldering iron

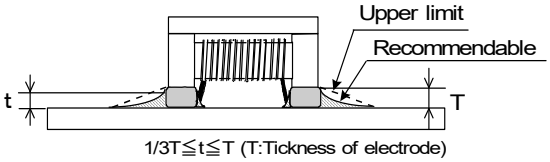
The following conditions must be strictly followed when using a soldering iron after being mounted by reflow soldering.

- Pre-heating: 150°C, 1 min
- Soldering iron output: 30W max.
- Tip temperature: 350°C max.
- Tip diameter:φ3mm max.
- Soldering time : 3(+1,-0) seconds.
- Times : 2times max.

Notes: Do not touch the products directly with the soldering iron.

3. Solder Volume

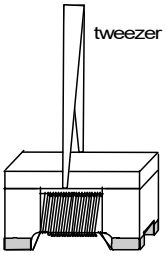
Solder shall be used not to be exceeded the upper limits as shown below.



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.

13.9 Caution for use

- When you hold products with a tweezer, please hold like a figure of the right side, and sharp material, such as a pair of tweezers, 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.



13.10 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



13.11 Brushing of neighborhood of products

When you clean the neighborhood of products such as connector pins, bristles of cleaning brush shall not be touched to the winding portion to prevent the breaking of wire.

13.12 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 corrosive gases (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.

13.13 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 conditions
・Products should be stored in the warehouse on the following conditions.
Temperature : -10 ~ +40°C
Humidity : 15 to 85% relative humidity No rapid change on temperature and humidity.
・ Products should not be stored in corrosive gases, such as sulfureous, acid gases, alkaline gases, to prevent the following deterioration. Poor solderability due to the oxidized electrode.
・ 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.

14. ⚠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.