CHIP COMMON MODE CHOKE COIL for Automotive infotainment/comfort equipment DLW5ATZ□□□TQ2□ Murata Standard Reference Specification [AEC-Q200]

1. Scope

This reference specification applies to Chip Common Mode Choke Coil DLW5ATZ_TQ 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.)	DL	W	5A	T	Z	111	T	Q	2	L
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(1) Chip Common Mode Choke Coil
(2) Structure (W : Winding Type)
(3) Dimension (L × W)
(4) Type
(5) Category
(6) Impedance (Typ. at 100MHz)
(7) Circuit
(8) Features
(9) Number of Line
(10) Packaging Code L : Taping (ϕ180mm/reel)
K : Taping (ϕ330mm/reel)
B : Bulk

3.Rating

Customer Part Number	MURATA Part Number	Impedance at 10MHz, Under Standard Testing Conditions (Ω +/-25%)	Impedance at 100MHz, Under Standard Testing Conditions (Ω Typ.)	Rated Voltage V(DC)	Withstanding Voltage V(DC)	Rated Current (A)	DC Resistance (Rdc) (Ωmax.)	Insulation Resistance (MΩ min.)	ESD Rank 2.2kV
	DLW5ATZ450TQ2L	4.7	45	100	250	4.0	0.013	10	2
	DLW5ATZ450TQ2K								
	DLW5ATZ450TQ2B								
	DLW5ATZ111TQ2L	12	110			3.0	0.020		
	DLW5ATZ111TQ2K								
	DLW5ATZ111TQ2B								
	DLW5ATZ231TQ2L	22	230			2.5	0.027		
	DLW5ATZ231TQ2K								
	DLW5ATZ231TQ2B								
	DLW5ATZ401TQ2L	35	400			2.0	0.034		
	DLW5ATZ401TQ2K								
	DLW5ATZ401TQ2B								
	DLW5ATZ501TQ2L	55	500			1.5	0.056		
	DLW5ATZ501TQ2K								
	DLW5ATZ501TQ2B								

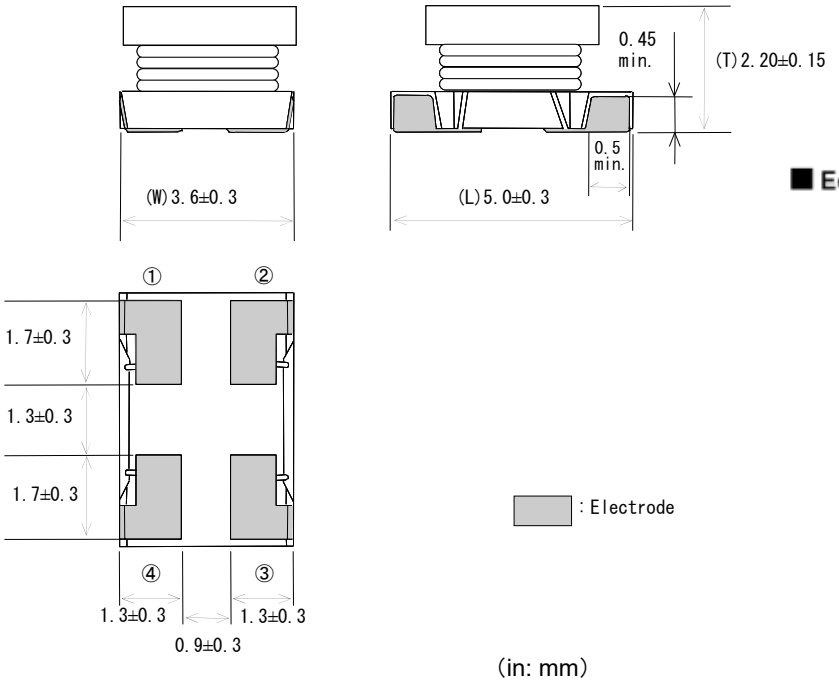
・Operating Temperature : - 40 °C to + 105 °C ・Storage Temperature : - 40 °C to + 105 °C

4. Standard Testing Conditions

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

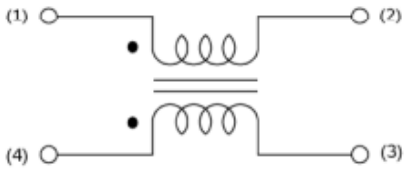
< In case of doubt >
Temperature : 20 °C ± 2 °C
Humidity : 60 %(RH) to 70 %(RH)
Atmospheric pressure : 86 kPa to 106 kPa

5. Style and Dimensions



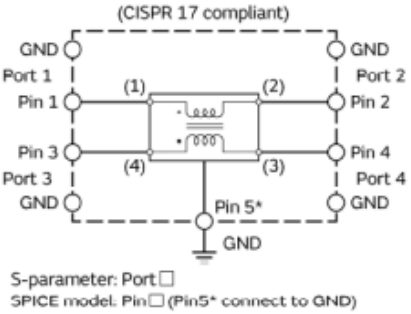
(in: mm)

■ Equivalent Circuit (Note 1)



No Polarity.

Note1: The Port/Pin No. of the Simulation Model provided by our company is as follows.



S-parameter: Port□
SPICE model: Pin□ (Pin5* connect to GND)

■ Unit Mass (Typical value)

0.14g

6. Marking

No marking.

7. Electrical Performance

No.	Item	Specifications	Test Method
7.1	Impedance (|Z|) (at 10MHz)	Meet item 3.	Measuring Equipment : KEYSIGHT 4191A or the equivalents. Measuring Frequency : 10MHz (ref. Item 9.)
7.2	Insulation Resistance (I.R.)		Measuring Equipment : R8340A or the equivalents. Measuring voltage : 100V Time : within 60 s (ref. Item 9.)
7.3	DC Resistance (Rdc)		Measuring Current : 100 mA max. (ref. Item 9.) (In case of doubt in the above mentioned standard condition,measure by 4 terminal method.)
7.4	Withstanding Voltage	Products shall not be damaged.	Test Voltage : 250 V(DC) Time : 1 to 5 seconds Charge Current : 1 mA max. (ref. Item 9.)

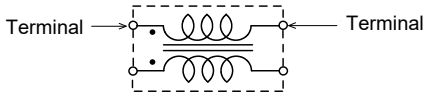
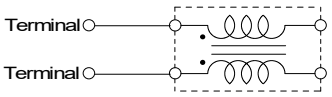
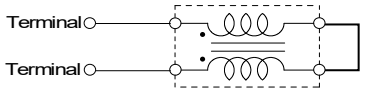
8. Q200 Requirement

8-1. Performance (based on Table 13 for Ferrite EMI SUPPRESSORS/FILTERS) AEC-Q200 Rev.D issued June 1. 2010

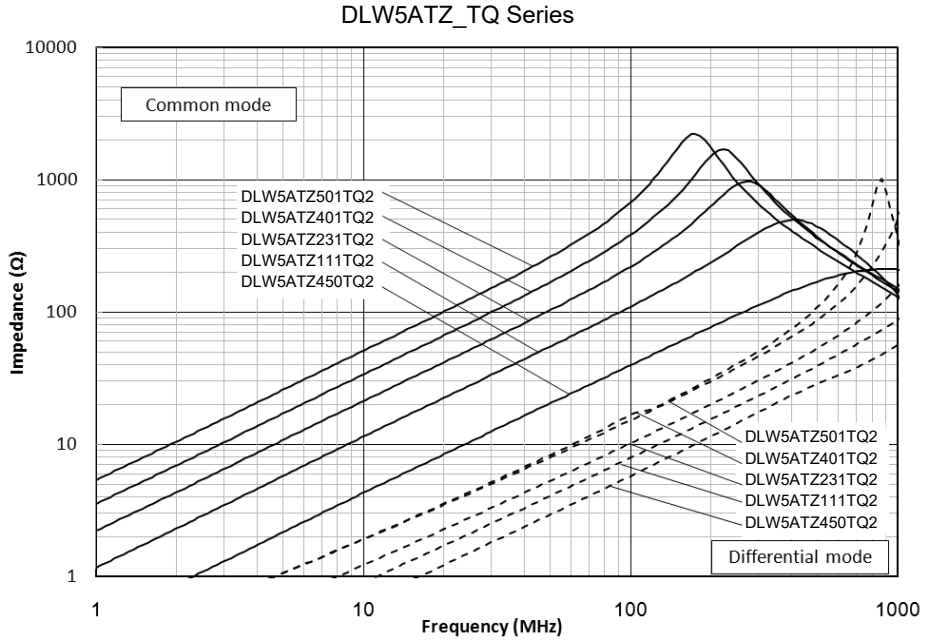
AEC-Q200			Murata Specification / Deviation
No.	Stress	Test Method	
3	High Temperature Exposure	1000hours at 105 deg C Set for 24hours at room temperature, then measured.	Meet Table A after testing. Table A Appearance: No damaged. Impedance change (at 10MHz): within ± 20% I.R.: 10MΩ min. Withstanding Voltage: No damaged.
4	Temperature Cycling	1000cycles -40 deg C to +105 deg C Set for 24hours at room temperature, then measured.	Meet Table A after testing.
5	Destructive Physical Analysis	Per EIA469 No electrical tests	Not Applicable
7	Biased Humidity	1000hours at 85 deg C, 85%RH Apply max rated voltage and current.	Meet Table A after testing. Apply rated voltage. (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 Conditon F: 1500g's(14.7N)/0.5ms/ Half sine	Meet Table A after testing.

AEC-Q200			Murata Specification / Deviation
No.	Stress	Test Method	
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.
15	Resistance to Soldering Heat	No-heating Solder temperature 260C+/-5 deg C Immersion time 10s	Pre-heating：150C / 60s min. 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 90% 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 : Impedance	No defects
20	Flammability	Per UL-94	Not Applicable
21	Board Flex	Epoxy-PCB(1.6mm) Deflection 2mm(min) 60 sec minimum holding time	Meet Table A after testing.
22	Terminal Strength	Per AEC-Q200-006 A force of 17.7N for 60sec	No defects
30	Electrical Transient Conduction	Per ISO-7637-2	Not Applicable

9. Terminal to be Tested When measuring and supplying the voltage, the following terminal is applied.

No.	Item	Terminal to be Tested
9.1	Impedance (|Z|) (Measurement Terminal)	
9.2	DC Resistance (Rdc) (Measurement Terminal)	
9.3	Insulation Resistance (I.R.) (Measurement Terminal)	
9.4	Withstanding Voltage (Measurement Terminal)	
9.5	Biased Humidity (Supply Terminal)	
9.6	Operational Life (Supply Terminal)	

10. Impedance Frequency Characteristics (Typical)

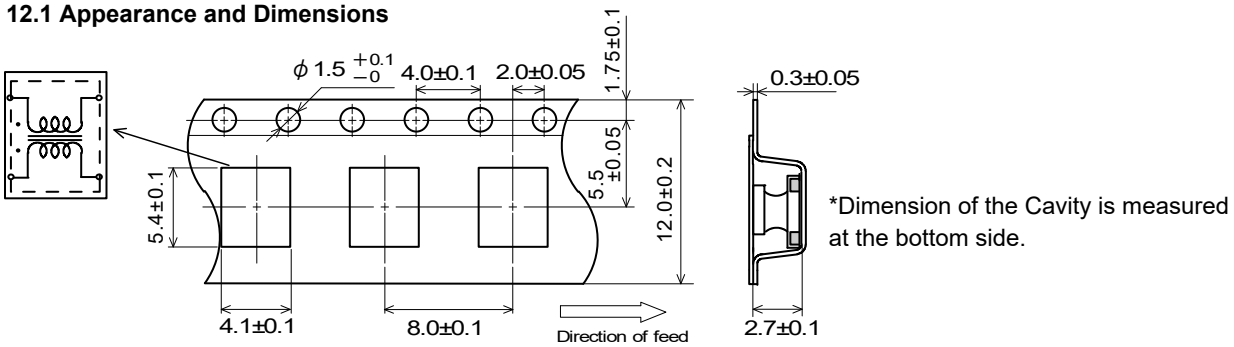


11. P.C.B., Flux, Solder and Soldering condition

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.

12. Specification of Packaging

12.1 Appearance and Dimensions



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

(in mm)

12.2 Specification of Taping

(1) Packing quantity (Standard quantity) φ180 mm reel : 700 pcs. / reel φ330 mm reel :2500 pcs. / reel

(2) Packing Method

Products shall be packaged in each embossed cavity of plastic tape and sealed with cover tape.

(3) Sprocket Hole

The sprocket holes are to the right as the tape is pulled toward the user.

(4) Spliced point

The cover tape have no spliced point.

(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.

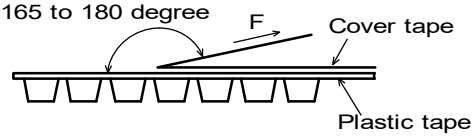
12.3 Pull Strength of Plastic Tape

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

12.4 Peeling off force of Cover Tape

0.2N to 0.7N (minimum value is typical.)

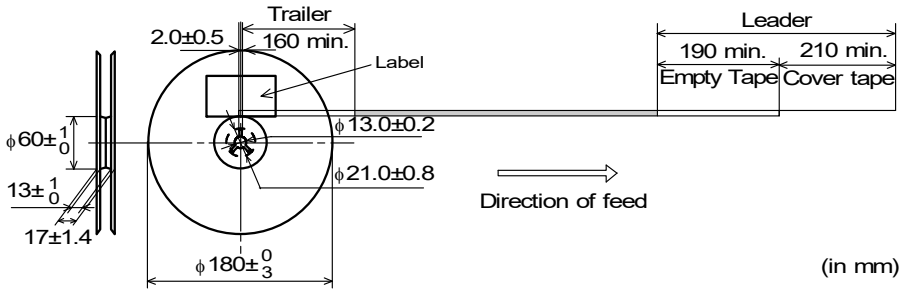
Speed of Peeling off : 300 mm / min



12.5 Dimensions of Leader-tape, Trailer and Reel

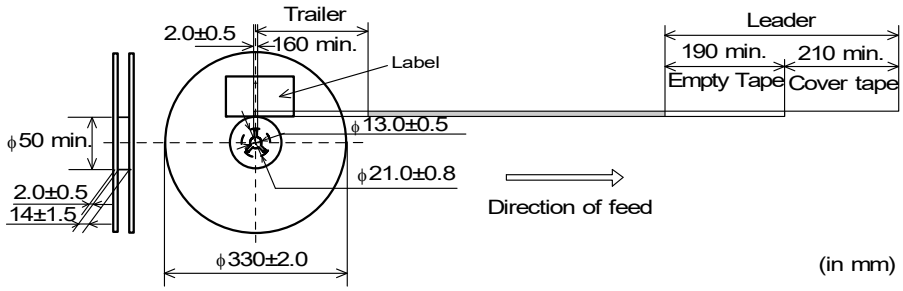
There shall be leader-tape (cover tape only and empty tape) and trailer-tape (empty tape) as follows.

« Packaging Code : L (ϕ 180mm reel) »



(in mm)

« Packaging Code : K (ϕ 330mm reel) »



(in mm)

12.6 Marking for reel

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

∗1) « Expression of Inspection No. » $\underset{(1)}{\square\square}$ $\underset{(2)}{OOOO}$ $\underset{(3)}{\times\times\times}$

(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.

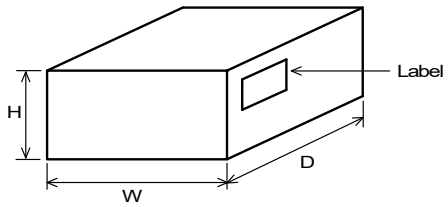
∗2) « Expression of RoHS marking » ROHS – $\underset{(1)}{Y}$ ($\underset{(2)}{\triangle}$)

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

12.7 Marking for Outside package

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

12.8 Specification of Outer Case



Reel	Outer Case Dimensions (mm)			Standard Reel Quantity in Outer Case (Reel)
	W	D	H	
ϕ 180mm	186	186	93	4
ϕ 330mm	340	340	85	4

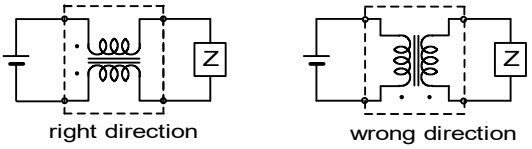
∗ Above Outer Case size is typical. It depends on a quantity of an order.

13. ⚠ Caution

13.1 Mounting Direction

Mount products in right direction.

Wrong direction which is 90 ° rotated from right direction cause not open or short circuit but also flames or other serious trouble.



right direction wrong direction

13.2 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).

13.3 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.

13.4 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.

13.5 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.

14. Notice

This product is designed for solder mounting.

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

14.1 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

14.2 Assembling

< Exclusive use of Reflow soldering >

Flow soldering may cause deterioration in insulation resistance.
So,reflow soldering shall be applied for this product.

< Thermal Shock >

Pre-heating should be in such a way that the temperature difference between solder and ceramic 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.
Not enough preheating may cause deterioration in insulation resistance and / or crank or ceramic body.

14.3 Cleaning Conditions

Do not clean after soldering.

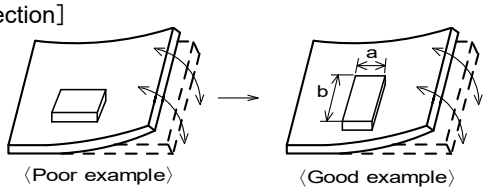
14.4 Resin coating

The impedance 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.

14.5 Attention regarding P.C.B. bending

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

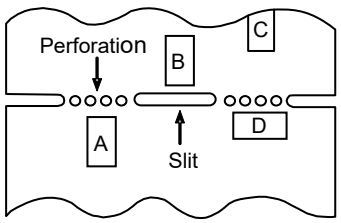
(1) P.C.B. shall be designed so that products are not subject to the mechanical stress due to warping the board.
[Products direction]



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

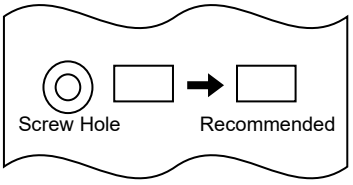
(2) Components location on P.C.B. separation.
It is effective to implement the following measures, to reduce stress in separating the board.
It is best to implement all of the following three measures; however, implement as many measures as possible to reduce stress.

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.

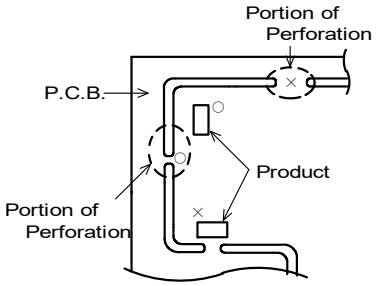


14.6 Attention Regarding P.C.B. Design

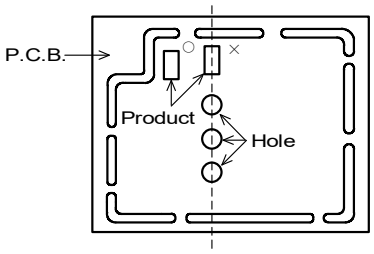
< The Arrangement of Products >

•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.

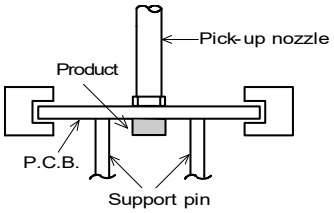


•Products shall not be arranged on the line of a series of holes when there are big holes in P.C.B. (Because the stress concentrate on the line of holes.)



< Products Placing >

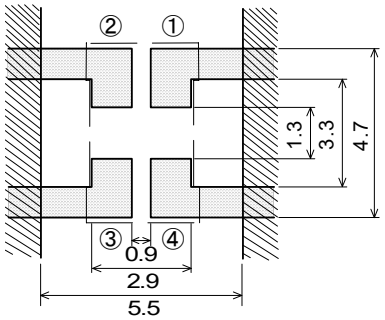
•Support pins shall be set under P.C.B. to prevent causing a warp to P.C.B. during placing the products on the other side of P.C.B..



< 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.

14.7 Standard Land Dimensions



*①②③④ indicates terminal number.

Resist

Copper foil pattern

No pattern

(in mm)

14.8 Reflow Soldering

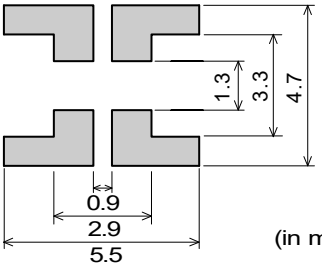
(1) Standard printing pattern of solder paste

・Standard thickness of solder paste should be 150 to 200μm. Solderability is subject to reflow condition and thermal conductivity. Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.

・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.



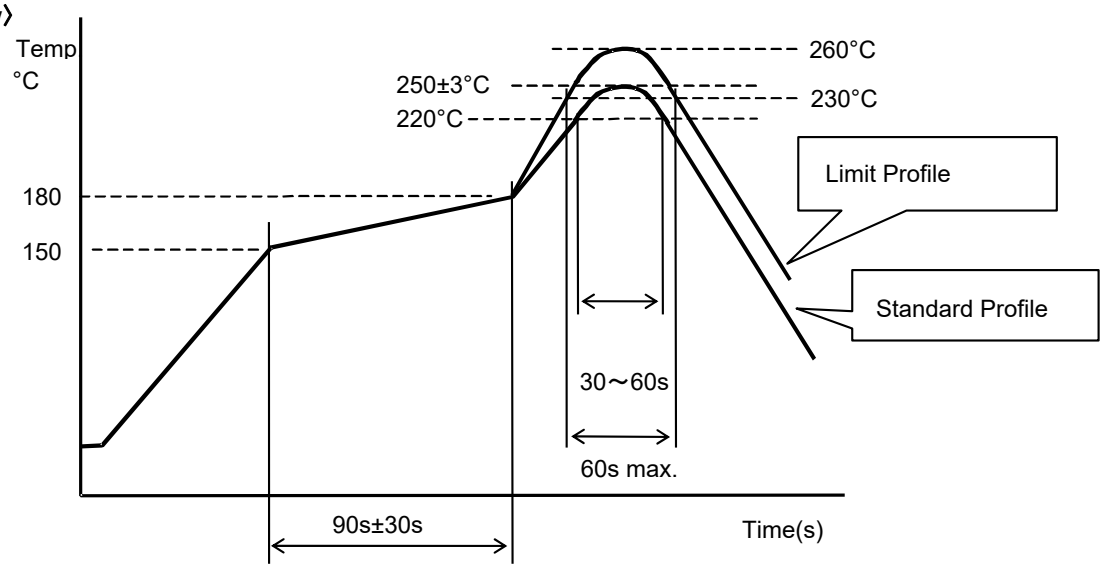
(in mm)

(2) Soldering Conditions

Standard soldering profile and the limit soldering profile is as follows.

The excessive soldering conditions may cause leaching of the electrode and/or resulting in the deterioration of product quality.

〈Reflow〉



	Standard Profile	Limit Profile
Pre-heating	150～180°C 、90s±30s	
Heating	above 220°C、30s～60s	above 230°C、60s max.
Peak temperature	250±3°C	260°C, 10s
Cycle of reflow	2 times	2 times

14.9 Reworking with Soldering iron

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

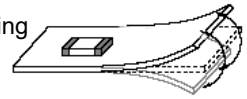
- Pre-heating: 150°C, 1 min
- Soldering iron output: 30W max.
- Tip temperature: 350°C max.
- Tip diameter:φ3mm max.
- Soldering time : 3(+1,-0) seconds.
- Times : 2times max.

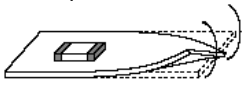
Notes: Do not touch the products directly with the soldering iron.

14.10 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 

14.11 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.

14.12 Operating Environment

Do not use this product under the following environmental conditions,on deterioration of the performance, such as inslation 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.

14.13 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 °C to +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 solderabirity 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.

15. ⚠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.