DT-X10 Product Description

General

Model:	DT-X10M30E, DT-X10M20E,
CPU:	Intel® PXA250 Application Processor (300MHz max.)
Memory:	32MB RAM; 32MB Flash ROM (FlashFX built in)
OS:	Microsoft® Windows® CE.NET operating system,
Display:	3.5-inch, 240 × 320-dot color 2-Way TFT color LCD
Power	Consumption: 2.5A DC, 3.7/5V
Operating Temperature:	–20 °C to 50°C (–4 °F to 122°F)
Approximate Dimensions:	77(W) × 220(D) × 47(H) mm (3"H × 85/8"D × 17/8"H)
Approximate Weight:	350g (12.3oz)

BluetoothTM Data Communication:

Protocol:	BluetoothTM Specification Ver.1.1
Interface:	UART
Output level (Class2)	3dBm max.
Frequency	2402- 2480MHz
Modulation	FHSS
Channel intervals	1MHz
Number of channels	79CH
Power suppIy voltage	1.8-3.6V

Specification No. JBMM0-0013D

Messr CASIO Computer Co., Ltd.

Reference Sheet for Product Specification

Issued Date : 29/Nov/2002

Product description : Blue Module™

Customer Part Number :

MuRata Part Number : LBMA29BAE2-011

Date :
Company
Dept.
Approved By Signiture : Type :

The duplicate of this specification shall be returned to us with your authorised signiture. Unless it reaches us by 28,December,2002, it shall be mutually understood that this specification has been duly approved by you.

Prepared by

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Manager
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1. Scope

This specification is applied to the Bluetooth HCI module (Blue Module^{TM}).

2. Part Number

LBMA29BAE2-011

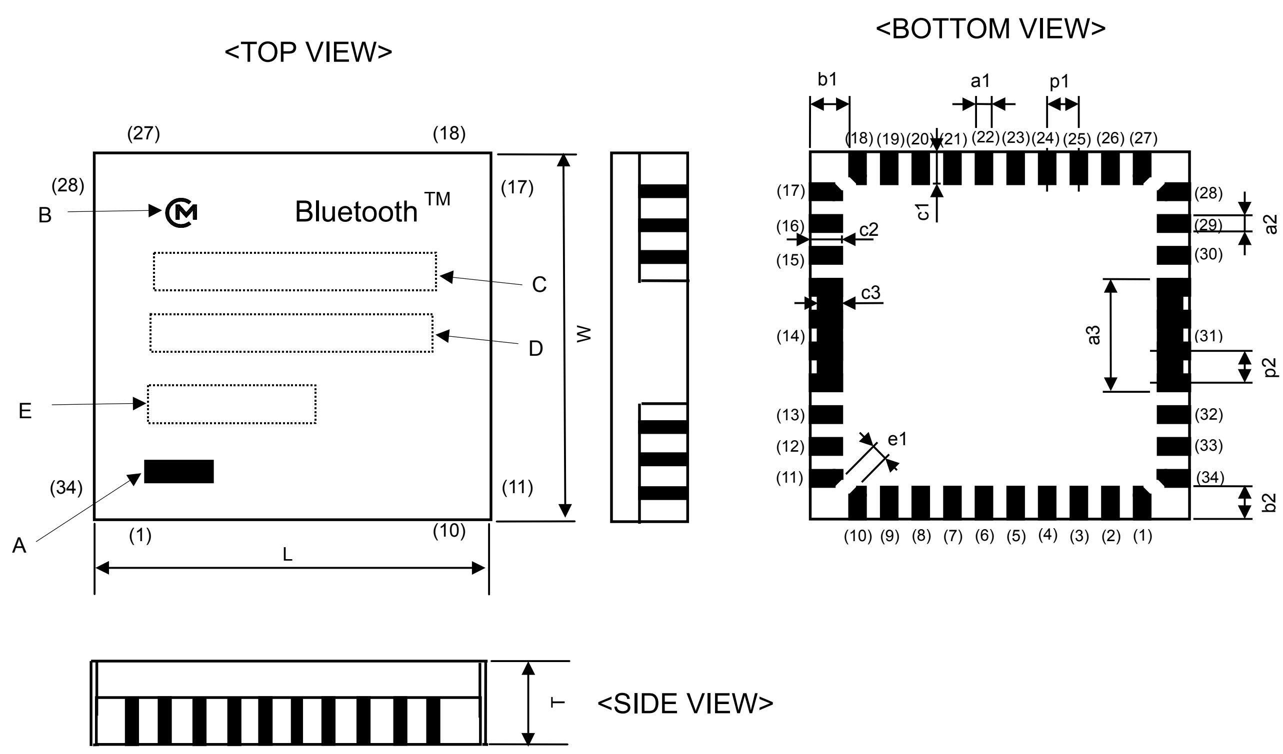
3. Rating

	Min	Max	Unit
Storage Temperature	-40	+85	deg.C
	Min	Max	Unit
Supply Voltage			
VDD_1.8V & VDD_VCO	-0.4	1.9	V
VDD	-0.4	3.6	V

4. Weight (nominal)

0.6 g

5. CONSTRUCTION, DIMENSIONS, MARKING and Terminal Configurations



Dimensions (Unit : mm)

Mark	Dimension	Mark	Dimension	Mark	Dimension
L	9.8±0.3	W	9.6±0.3	T	1.7±0.1
a1	0.4±0.2	a2	0.4±0.2	a3	2.8±0.2
b1	1.0±0.2	b2	1.0±0.2	c1	0.95±0.20
c2	0.95±0.20	c3	0.75±0.20	e1	0.42±0.20
p1	0.8±0.2	p2	0.8±0.2	-	-

Marking

Mark	Meaning	Mark	Meaning	Mark	Meaning
A	1 PIN INDEX	B	MURATA Logo	C	Part Number
D	BD_ADDR.	E	Lot No..	-	-

Terminal Configurations

Terminal No.	Terminal Name	Pad Type	Description
(1)	GND		
(2)	VDD_1.8V	VDD	Positive supply for RF, analogue and digital circuitry (1.8V)
(3)	GND		
(4)	VDD	VDD	Power supply for others and memory (3V)
(5)	GND		
(6)	NC		
(7)	NC		
(8)	NC		
(9)	NC		
(10)	RST	CMOS input with weak internal pull-down	Reset if high. Input debounced so must be high for >5ms to cause a reset
(11)	UART_CTS	CMOS input with weak internal pull-down	UART clear to send active low
(12)	UART_RTS	CMOS output, tristatable with internal pull-up	UART request to send active low
(13)	UART_Tx	CMOS output	UART data output active high
(14)	GND		
(15)	UART_Rx	CMOS input with weak internal pull-down	UART data input active high
(16)	PCM_IN	CMOS input, with internal weak pull-down	Synchronous data input
(17)	PCM_SYNC	Bi-directional with weak internal pull-down	Synchronous data SYNC
(18)	PCM_OUT	CMOS output, tristatable with internal weak pull-down	Synchronous data output
(19)	PCM_CLK	Bi-directional with weak internal pull-down	Synchronous data clock
(20)	NC		
(21)	NC		
(22)	NC		
(23)	NC		
(24)	NC		
(25)	NC		
(26)	NC		
(27)	NC		
(28)	NC		
(29)	NC		
(30)	NC		
(31)	GND		
(32)	ANT		For Antenna / 50ohm
(33)	GND		
(34)	VDD_VCO	VDD	Positive supply for VCO and synthesiser circuitry (1.8V)

6. Electrical Characteristics

6-1 Operating Conditions

	Min	Typ	Max	Unit
Operating Temperature	-20	+25	+85	deg.C
Supply Voltage, VDD_1.8V & VDD_VCO VDD	 1.7 2.7	 1.8 3.0	 1.9 3.6	 V V

Input/Output Terminal Characteristics				
Digital Terminals	Min	Typ	Max	Unit
Input Voltage				
VIL input logic level low (VDD=3.0V) (VDD=1.8V)	-0.4 -0.4		+0.8 +0.4	V V
VIH input logic level high	0.7VDD		VDD+0.4	V
Output voltage				
VOL output logic lebel low, (IO = 4.0mA), VDD=3.0V VOL output logic lebel low, (IO = 4.0mA), VDD=1.8V	- -	- -	0.2 0.4	V V
VOH output logic level high, (IO = -4.0mA), VDD=3.0V	VDD-0.2	-	-	V
VOH output logic level high, (IO = -4.0mA), VDD=1.8V	VDD-0.4	-	-	V
Input and Tristate Current with:				
Strong pull-up	-100	-20	-10	μA
Strong pull-down	+10	+20	+100	μA
Weak pull-up	-5	-1	0	μA
Weak pull-down	0	+1	+5	μA
I/O pad leakage current	-1	0	+1	μA
Ci Input Capacitance	2.5	-	10	pF

6-2 Radio Characteristics

6-2-1 Normal conditoin 25 deg.C, VDD_1.8V=1.8V, VDD_VCO=1.8V, VDD=3.0V

Items	Contents			
Bluetooth specification	Ver 1.1			
Channel spacing	1MHz			
Number of RF channel	79			
Power class	2			
Operation mode(Rx/Tx)	Time division multiplex either transmit or receive frequency hopping after one Rx/Tx cycle			
	Min	Typ (nominal)	Max	Unit
1.DC Current				
1.1 DH1 Packet	-	55	75	mA
1.2 DH3 Packet	-	59	80	mA
1.3 DH5 Packet	-	60	85	mA
-TX characteristics-				
2.Output Power	-4	0	+3	dBm
3.Frequency range	2400 to 2483.5			MHz
4.20 dB Bandwidth	-	0.8	1	MHz

5. Adjacent channel power [*1]				
5.1 [M-N]=-2,+2	-	-	-26	dBm
5.2 [M-N]=-3,-4,-5	-	-	-47	dBm
5.3 [M-N]=+3,+4,+5	-	-	-46	dBm
6.Modulation Characteristics				
6.1 Modulation δ f1avg	142	165	172	kHz
6.2 Modulation δ f2max	120	144	-	kHz
6.3 δ f2avg/ δ f1avg	0.85	1	-	
7.Initial Carrier Frequency Tolerance	-45	-	+45	kHz
8.Carrier Frequency Drift				
8.1 1slot	-25	-	+25	kHz
8.2 3slot	-40	-	+40	kHz
8.3 5slot	-40	-	+40	kHz
8.4 Maximum drift rate	-20	-	+20	kHz/50 μs
9.Out-of-Band Spurious Emissions				
9.1 1220.5 MHz (Operation mode)	-	-70	-40	dBm
9.2 1850.0 MHz (Operation mode)	-	-70	-40	dBm
9.3 2150.0 MHz (Operation mode)	-	-60	-40	dBm
9.4 3661.5 MHz (Operation mode)	-	-70	-40	dBm
9.5 4882.0 MHz (Operation mode)	-	-60	-40	dBm
9.6 6102.5 MHz (Operation mode)	-	-75	-40	dBm
9.7 7323.0 MHz (Operation mode)	-	-70	-40	dBm
-RX Characteristics-	Min	Typ (nominal)	Max	Unit
10.Sensitivity (BER≤0.1%)				
10.1 2402MHz	-	-83	-75	dBm
10.2 2441MHz	-	-84	-77	dBm
10.3 2480MHz	-	-83	-77	dBm
11.C/I performance (BER≤0.1%) [*2]				
11.1 co-channel ratio (-60dBm input)	-	-	+14	dB
11.2 1 MHz ratio (-60dBm input)	-	-	+4	dB
11.3 2 MHz ratio (-60dBm input)	-	-	-30	dB
11.4 3 MHz ratio (-67dBm input)	-	-	-40	dB
11.5 image ratio (-67dBm input)	-	-	-6	dB
11.6 image±1MHz ratio (-67dBm input)	-	-	-16	dB
12. Blocking performance (BER≤0.1%) [*3]				
12.1 30MHz to 2000MHz	-10	-	-	dBm
12.2 2000MHz to 2400MHz	-27	-	-	dBm
12.3 2500Mhz to 3000MHz	-27	-	-	dBm
12.4 3000MHz to 12.75GHz	-10	-	-	dBm
13.Intermoduration performance (BER≤0.1%), (-64dBm input)	-39	-31	-	dBm
14. Maximum Input Level (BER≤0.1%)	0	5	-	dBm

*1 Up to three spurious responses within Bluetooth limits are allowed.
*2 Up to five spurious responses within Bluetooth limits are allowed.
*3 Up to twenty-four spurious responses within Bluetooth limits are allowed.

Note:

The above-mentioned values have been obtained according to our own measuring methods(testing jig : Fig.1) and may vary depending on the circuit, in which this component is actually incorporated.
You are, therefore, kindly requested to test the performance of this component incorporating in your set.

6-2-2 Extreme condition -20 to +85 deg.C, VDD_1.8V=VDD_VCO=1.7 to 1.9V, VDD=2.7 to 3.6V

Items	Contents		
	Min	Max	Unit
1.DC current			
1.1 DH1 Packet	-	80	mA
1.2 DH3 Packet	-	85	mA
1.3 DH5 Packet	-	90	mA
-Tx Characteristics-			
2.Output Power	-6	+4	dBm
3.Frequency range	2400 to 2483.5		MHz
4.20 dB Bandwidth	-	1	MHz
5.Adjacent channel power *1			
5.1 [M-N]＝2	-	-20	dBm
5.2 [M-N]≧3	-	-40	dBm
6.Modulation Characteristics			
6.1 Modulation δf1avg	140	175	kHz
6.2 Modulation δf2max	115	-	kHz
6.3 δf2avg/δf1avg	0.8	-	
7.Initial Carrier Frequency Tolerance	-75	+75	KHz
8.Carrier Frequency Drift			
8.1 1slot	-25	+25	kHz
8.2 3slot	-40	+40	kHz
8.3 5slot	-40	+40	kHz
8.4 Maximum drift rate	-20	+20	kHz/50μs
9.Out-of-Band Spurious Emissions			
9.1 1220.5MHz(Operation Mode)	-	-30	dBm
9.2 1850.0MHz(Operation Mode)	-	-30	dBm
9.3 2150.0MHz(Operation Mode)	-	-30	dBm
9.4 3661.5MHz(Operation Mode)	-	-30	dBm
9.5 4882.0MHz(Operation Mode)	-	-30	dBm
9.6 6102.5MHz(Operation Mode)	-	-30	dBm
9.7 7323.0MHz(Operation Mode)	-	-30	dBm
-Rx Characteristics-			
10.Sensitivity (BER≦0.1%)			
10.1 2402MHz	-	-73	dBm
10.2 2441MHz	-	-75	dBm
10.3 2480MHz	-	-75	dBm

*1 Up to three spurious responses within Bluetooth limits are allowed.

7. OTHER SPECIFICATION AND METHODS

No.	Items		Specifications	Test Methods
1	Vibration Resistance	Appearance	No severe damages	Solder specimens on the testing jig shown in appended Fig.1 by an solder. The soldering shall be done either by iron or reflow and be conducted with care so that the soldering is uniform and free of defect such as by heat shock. Frequency : 10 to 2000 to 10 Hz Acceleration : 196 m/s^2 Direction : X,Y,Z 3axes Period : 2 h on each direction(Total 6 h.)
		Electrical Specifications	Satisfy specifications listed in paragraph 6-2-2.	
2	Shock	Appearance	No severe damages	Solder specimens on the testing jig shown in appended Fig.1 by an solder. The soldering shall be done either by iron or reflow and be conducted with care so that the soldering is uniform and free of defect such as by heat shock. Pulse Wave : Sine Half Wave Acceleration : 980 m/s^2 (Peak) Period : 6 ms. Cycle : 10 times
		Electrical Specifications	Satisfy specifications listed in paragraph 6-2-2.	
3	Deflection		No damage with 1mm deflection	Solder specimens on the testing jig shown in appended Fig.3 by an solder. The soldering shall be done either by iron or reflow and be conducted with care so that the soldering is uniform and free of defect such as by heat shock.
4	Soldering strength (Push Strength)		9.8 N Minimum	Solder specimens on the testing jig shown in appended Fig.3 by an solder. As shown below, apply pushing force at 0.5 mm/s until electrode pads are pealed off or ceramics are broken. Pushing force is applied as show below. Specimen Pushing Direction Jig
5	Solderability of Termination		75% of the terminations is to be soldered evenly and continuously.	Immerse specimens first a ethanol solution of rosin (25% rosin in weight proportion), then in an solder solution for 2+/-0.5 s at 230+/-5 deg.C. Preheat : 100 to 120 deg.C, 60 s Solder Paste : Eutectic Solder Flux : Solution of ethanol and rosin (25% rosin in weight proportion)
6	Resistance to Soldering Heat (Dipping)	Appearance	No severe damages	Immerse the chip in an solder solution of 270+/-5 deg.C for 20+/-0.5 s (flow soldering bath) after preheating for 1min at 120 to 150 deg.C. Then set it for 2 to 24 h at room temperature and measure.

No.	Item		Specification	Test condition
7	Resistance to Soldering Heat (Reflow)	Appearance	No severe damages	Preheat Temperature : 150+/-10 deg.C Preheat Period : 60 s min. Peak Temperature : 230+/-5 deg.C Peak Temp. Period : 10 s Specimens are soldered twice with the above condition, then kept in room condition for 24 h before measurements.
		Electrical specifications	Satisfy specifications listed in paragraph 6-2-2.	
8	Temperature Cycle	Appearance	No severe damages	Set the specimens to the supporting jig in the same manner and under the same condition as Fig.1 and conduct the 100 cycles according to the temperatures and time shown in the following table.
		Electrical specifications	Satisfy specifications listed in paragraph 6-2-2.	
9	Humidity Load Life	Appearance	No severe damages	Temperature : 85+/-2 deg.C Humidity : 80 to 85%RH Period : 500+48/-0 h Room Condition : 2 to 24 h Supply Voltage : 3.6V D.C./1.9V D.C.
		Electrical specifications	Satisfy specifications listed in paragraph 6-2-2.	
10	High Temp. Load Life	Appearance	No severe damages	Temperature : 85+/-2 deg.C Period : 500+48/-0 h Room Condition : 2 to 24 h Supply Voltage : 3.6V D.C./1.9V D.C.
		Electrical specifications	Satisfy specifications listed in paragraph 6-2-2.	

Step	1	2
Temp.(deg.C)	Min Operating Temp. +0/-3	Max Operating Temp. +3/-0
Time (min)	30+/-3	30+/-3

Excessive mechanical force or thermal stress may damage the products. Appropriate handling is required.

8. Interface

UART (H4)
115.2 kbps

9. Firmware

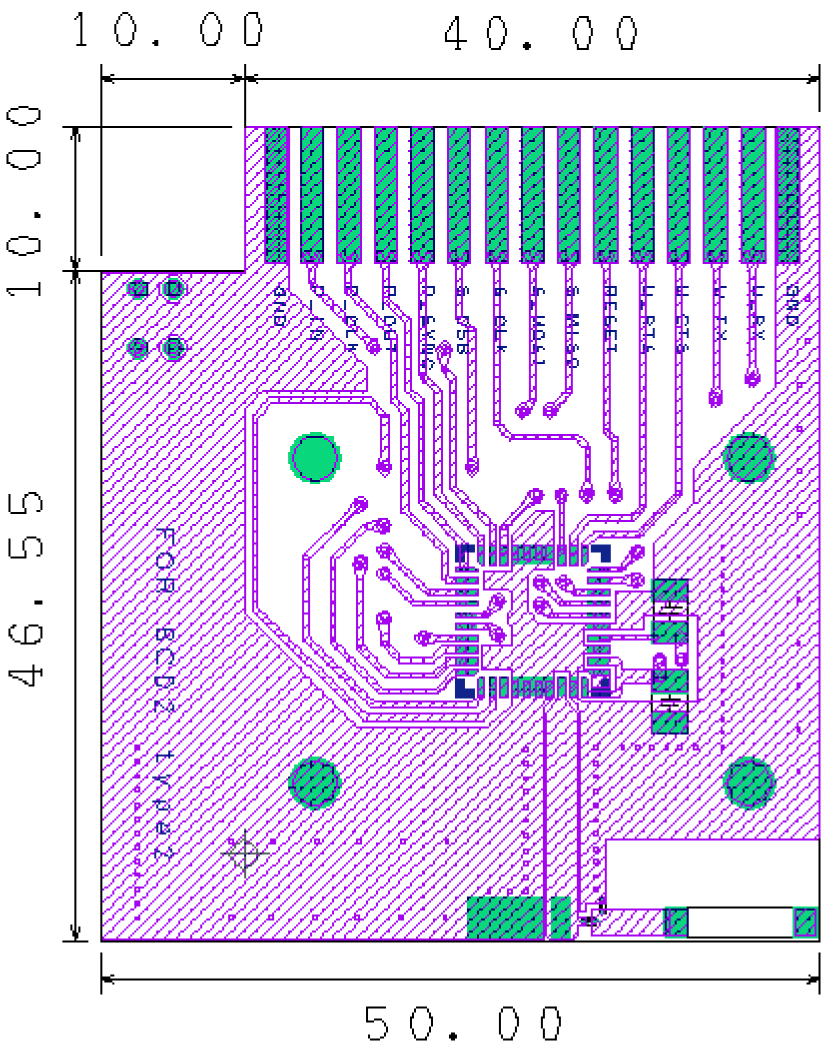
CSR Firmware Version Ver.14.7

10.Production Site

FUKUI MURATA MFG.CO.,LTD.

Fig.1

Measurement Boardy

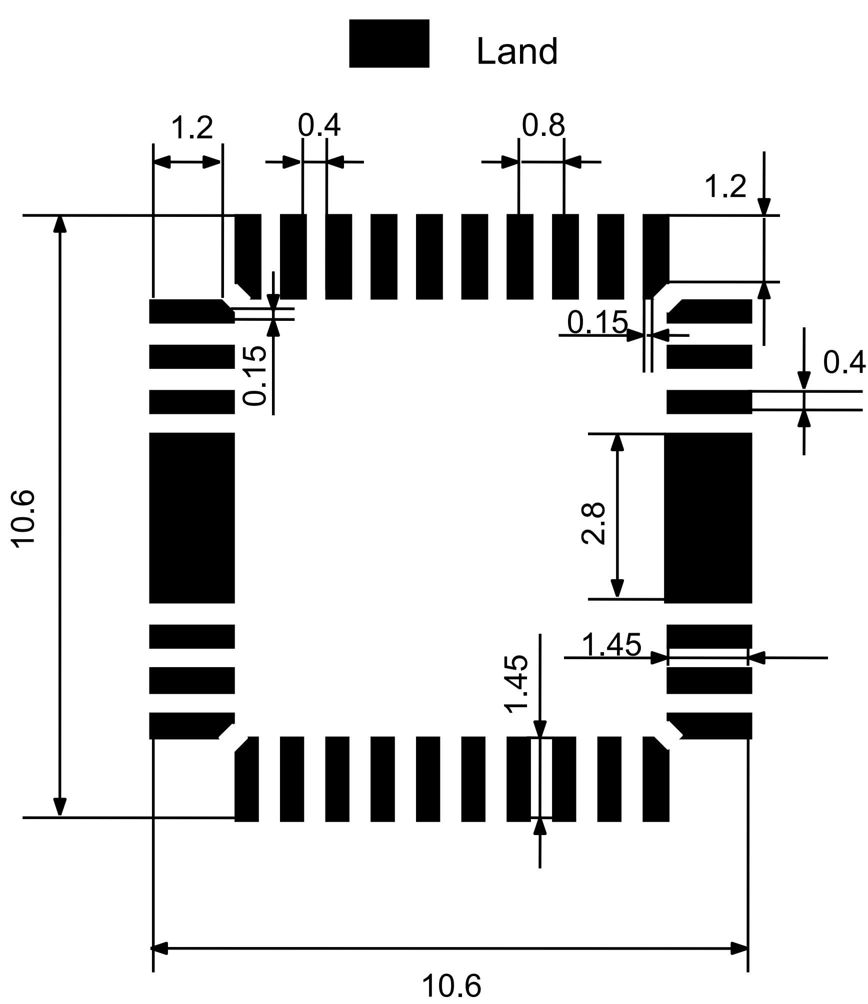


(Unit : mm)

Glass epoxy board t= 1.6mm
Copper thickness 35 u m

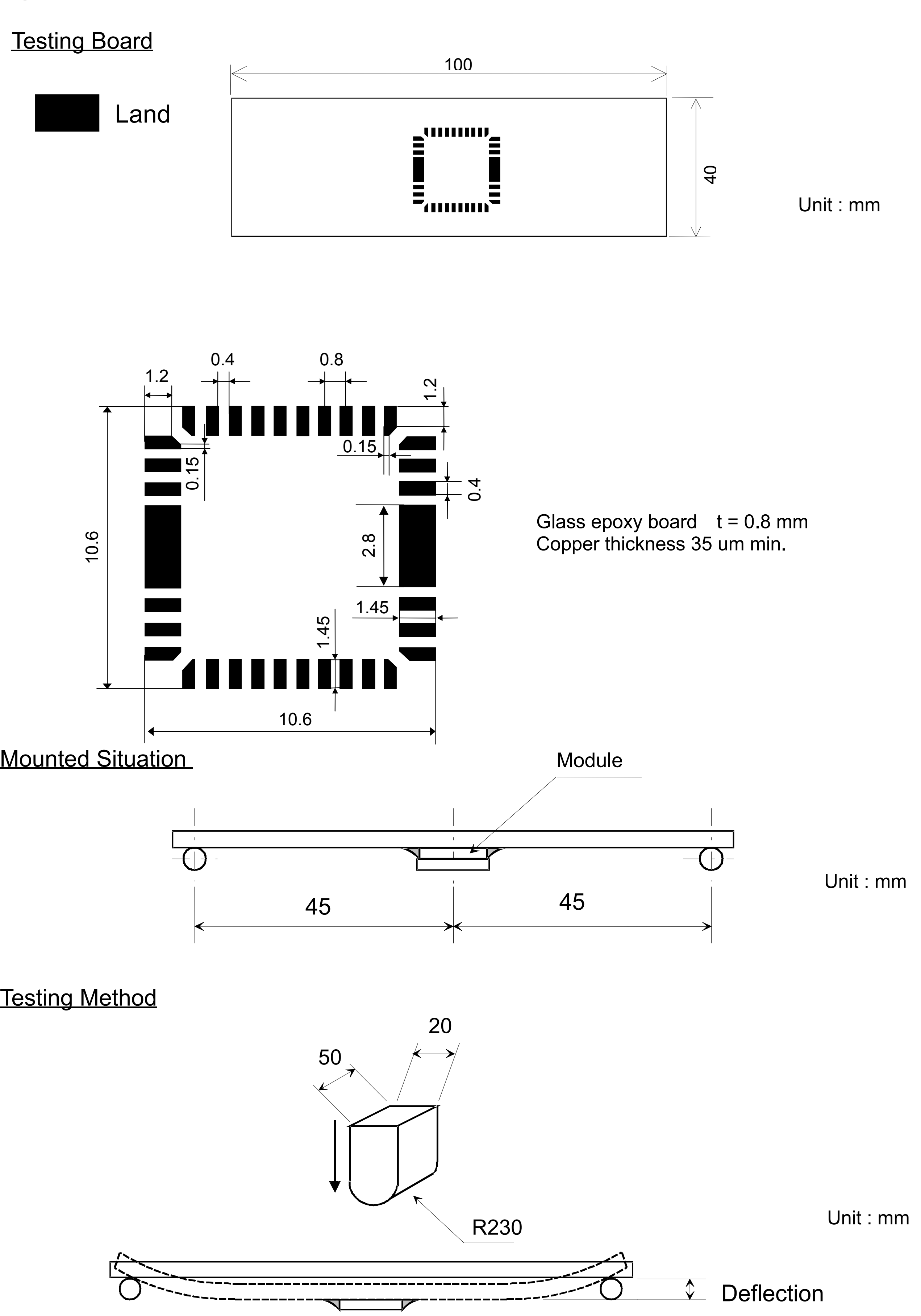
Fig.2

Land Patterns



Unit : mm

Fig.3

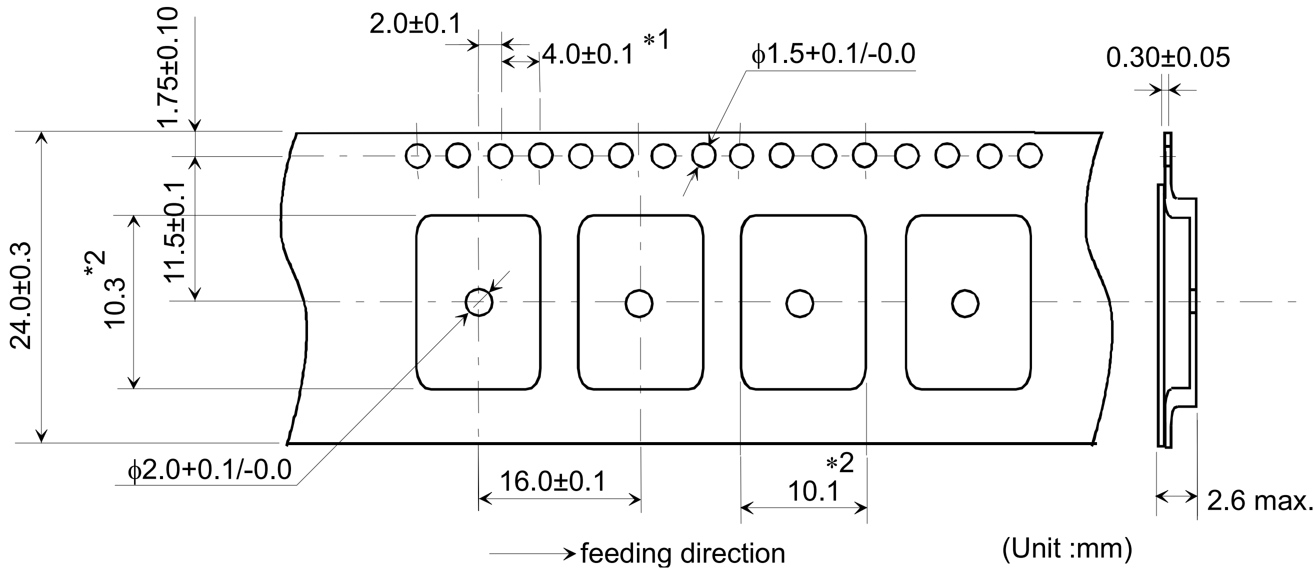


10. Tape and Reel Packing

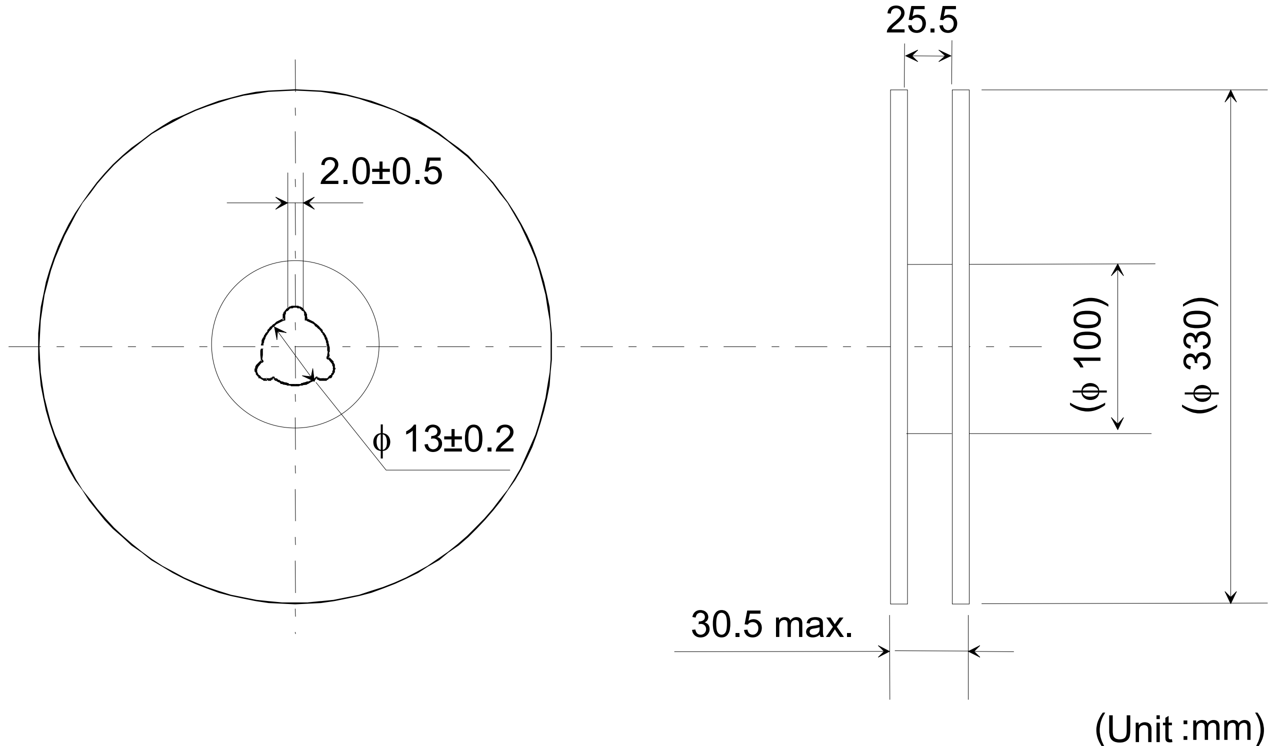
(1) Dimensions of Tape (Plastic tape)

*1.Cumulative tolerance of max. ± 0.3 every 10 pitches

*2.Reference value



(2) Dimensions of Reel



(3) Taping Diagrams

[1] Feeding Hole : As specified in (1)

[2] Hole for Chip : As specified in (1)

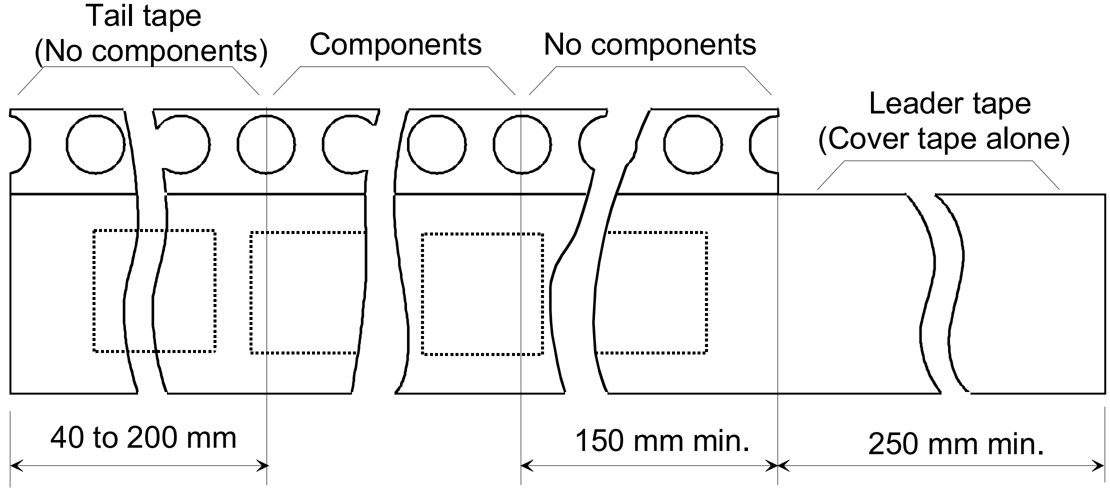
[3] Cover Tape : 62 μm in thickness

[4] Base Tape : As specified in (1)

[3]
[1]
[2]
[3]
[4]

Feeding Hole
Bluetooth
Feeding Direction
Chip

(4) Leader and Tail Tape



Feeding direction

(5) The tape for chips are wound clockwise, the Feeding Holes to the right side as the tape is

pulled toward the user.

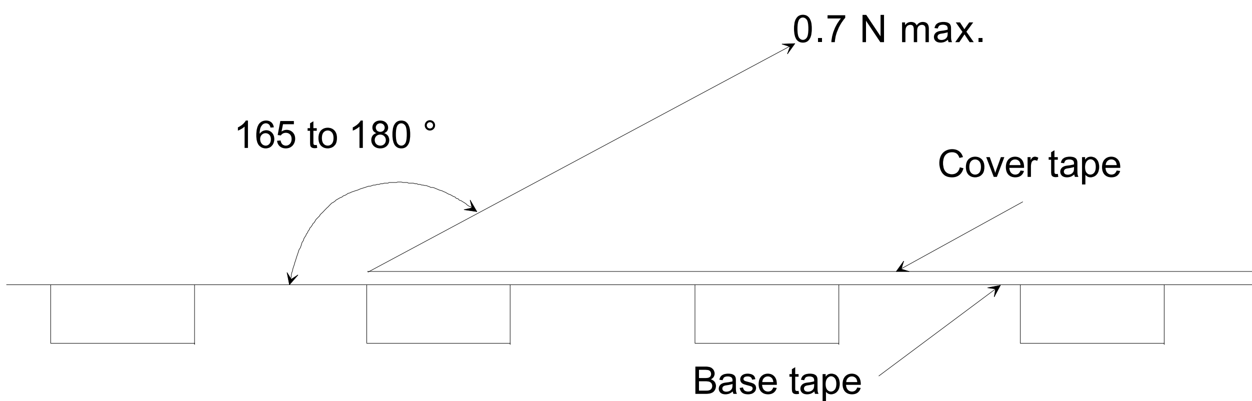
(6) The Cover Tape and Base Tape are not adhered at no components area for 250 mm min.

(7) Tear off strength against pulling of Cover Tape : 5 N min.

(8) Packaging unit : 1000 pcs./ Reel

(9) Material
Base Tape : Plastic
Reel : Plastic
Cover Tape , Base Tape and Reel are made the anti-static processing.

(10) Peeling of force : 0.7 N max. in the direction of peeling as shown below.



NOTICE

1. Storage Conditions:

To avoid damaging the solderability of the external electrodes, be sure to observe the following points.

- Store products where the ambient temperature is 5 to 30 deg.C and humidity 60% RH min.
  (Packing materials, in particular, may be deformed at the temperature over 40 deg.C.)

- Store products in non corrosive gas (Cl_2, NH_3, SO_2, No_x, etc.).

- Stored products shall be used within 6 months of receipt. If the product is stored more than this period, the product shall be baked with the following baking condition and solderability should be verified.

- Baking condition.
  125+/-5 deg.C, 18 hours, 1 time
  The products shall be baked on the heat-resistant tray because the material (Base Tape, Reel Tape and Cover Tape) are not heat-resistant.

- When the indicator in the packing has changed its color, the product shall be baked before soldering.

- After opening the packing, the product shall be stored at 5 to 30 deg.C / <60% RH and the product shall be used within 48 hours.

2. Handling Conditions:

Be careful in handling or transporting products because excessive stress or mechanical shock may break products due to the nature of ceramics structure.

Handle with care because the characteristics of products may change if products may have cracks or damages on their terminals. Do not touch products with bear hands that may result in poor solderability.

3. Standard PCB Design (Land Patterns and Dimensions):

All the ground terminals should be connected to the ground patterns. Please refer to Fig.2 for the standard land dimensions.

The recommended land patterns and dimensions are as Murata's standard. The characteristics of products may vary depending on the pattern drawing method, grounding method, land dimensions, land forming method of the NC terminals and the PCB material and thickness. Therefore, be sure to verify the characteristics in the actual set. When using non-standard lands, contact Murata beforehand.

4. Notice for Chip Placer:

When placing products on the PCB, products may be stressed and broken by uneven forces from a worn-out chucking locating claw or a suction nozzle. To prevent products from damages, be sure to follow the specifications for the maintenance of the chip placer being used. For the positioning of products on the PCB, be aware that mechanical chucking may damage products.

5. Soldering Conditions:

Carefully perform preheating so that the temperature difference (delta T) between the solder and products surface should be in the following range. When products are immersed in solvent after mounting, pay special attention to maintain the temperature difference within 100 deg.C. Soldering must be carried out by the above mentioned conditions to prevent products from damage. Contact Murata before use if concerning other soldering conditions.

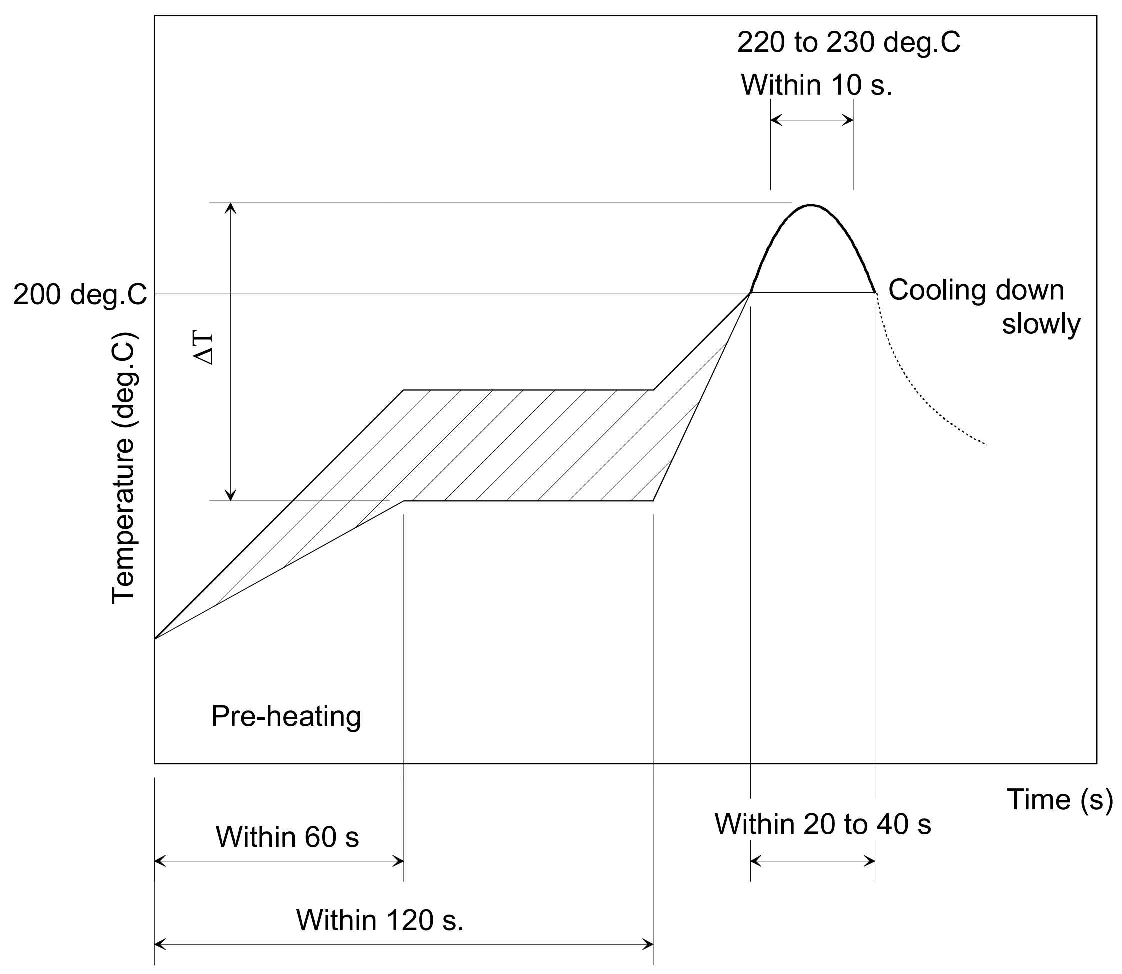
Soldering methods	Temperature
Soldering iron method	delta T<=130 deg.C
Reflow method	

- Soldering iron method conditions are indicated below.

Items / Kind of iron	Nichrome heater	Ceramics heater
Soldering iron wattage	<=30 W	<=18 W
Temperature of iron-tip	<=280 deg.C	<=250 deg.C

- Diameter of iron-tip : 3.0 mm max.
- Do not touch the module itself directly by the iron-tip.

Infrared reflow soldering standard conditions(Example)

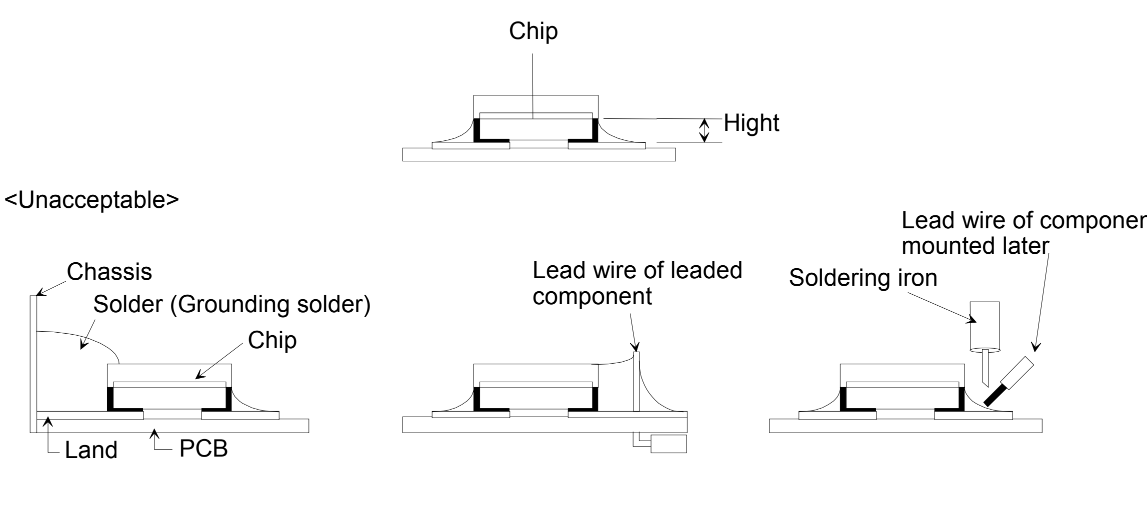


Use rosin type flux or weakly active flux with a chlorine content of 0.2 wt % or less. Be careful so as not to remain the flux residue around products. Because there are possibilities to become worse the characteristics.

Amount of Solder Paste:

- Ensure that solder is applied smoothly to a minimum height of 0.2 to 0.5 mm at the end surface of the external electrodes. If too much or little solder is applied, there is high possibility that the mechanical strength will be insufficient, creating the variation of characteristics.

Amount of solder paste



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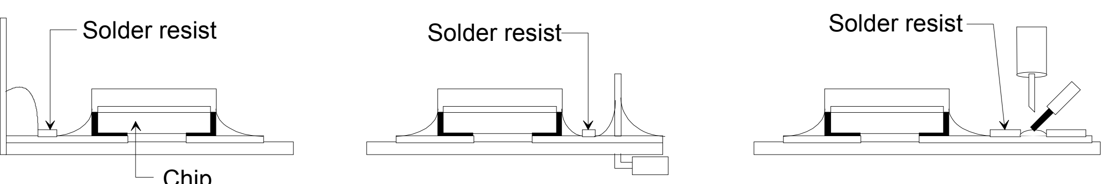

6. Cleaning Conditions:

The total cleaning time of soaking, ultrasonic and steam methods should be within 5 minutes.

Consult with Murata concerning the cleaning solvent. In order to totally abolish ODC (Freon, Trichrolethan), Murata has carried out testing on non-cleaning and water cleaning (water- soluble flux, water-soluble cream solder, water-based cleaning solvent). Therefore, be sure to contact Murata beforehand for details when applying any of the above mentioned cleaning fluid.

The ultrasonic cleaning conditions are indicated below :

Power	15 W min. per liter(1 cyc)(0.25 W min. per sq cm)
Frequency	28 to 29 kHz
Temperature	Normal temperature

If the ultrasonic output power is too high, the PCB may resonate and products mounted on the PCB may be damaged. The ultrasonic cleaning conditions may change depending on the size of the vessel and the size of the PCB. Contact Murata regarding conditions other than those stated above.

Dry the products immediately after cleaning. And bake the products according to the specification before soldering.

7. Operational Environment Conditions:

Products are designed to work for electronic products under normal environmental conditions (ambient temperature, humidity and pressure). Therefore, products have no problems to be used under the similar conditions to the above-mentioned. However, if products are used under the following circumstances, it may damage products and electric shock and abnormal temperature may occur.

- In an atmosphere containing corrosive gas (CL_2, NH_3, SO_x, NO_x etc.).
- In an atmosphere containing combustible and volatile gases.
- Dusty place.
- Direct sunlight place.
- Water splashing place.
- Humid place where water condenses.
- Freezing place.

If there are possibilities for products to be used under the preceding clause, consult with Murata before actual use.

As it might be a cause of degradation or destruction to apply static electricity to products, do not apply static electricity or excessive voltage while assembling and measuring.

8. Limitation of Applications:

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

- Aircraft equipment.
- Aerospace equipment.
- Undersea equipment.
- Medical equipment.
- Transportation equipment (vehicles, trains, ships, etc.).
- Traffic signal equipment.
- Disaster prevention / crime prevention equipment.
- Data-processing equipment
- Application of similar complexity and/ or reliability requirements to the applications listed in the above.

Note:

Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.

All the items and parameters in this product specification have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment agreed upon between you and us. You are requested not to use our product deviating from such agreement.

We consider it not appropriate to include other terms and conditions for transaction warranty in product specifications, drawings or other technical documents. Therefore, even if your original part of this product specification includes such terms and conditions as warranty clause, product liability clause, or intellectual property infringement liability clause, we are not able to accept such terms and conditions in this product specification unless they are based on the governmental regulation or what we have agreed otherwise in a separate contact. We would like to suggest that you propose to discuss them under negotiation of contract.