DMC Co., Ltd.

Mutli-touch Resistive (MTR) Controller
MTR2000 Product Specification

DMC Co., Ltd.

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1. Product Overview

1.1. Applicable Product

This specification sheet is applied to MTR2000 series, the Multi-touch Resistive controller.

1.2. Overview

MTR2000 series is Multi-touch Resistive (MTR) touch screen controller board that recognizes dual inputs and is suitable for pen writing applications.

1.3. Touch Detection Principle

MTR Touch Screen is composed of matrix CELLs.
Multiple touch inputs are recognized by detecting a touch input in each CELL.
The top left of the active area is (X=0, Y=0), while the bottom right is (X=0x03FF, Y=0x03FF).

Fig1 Touch Detection Range (case of 15x12)

(X=0 , Y=0)
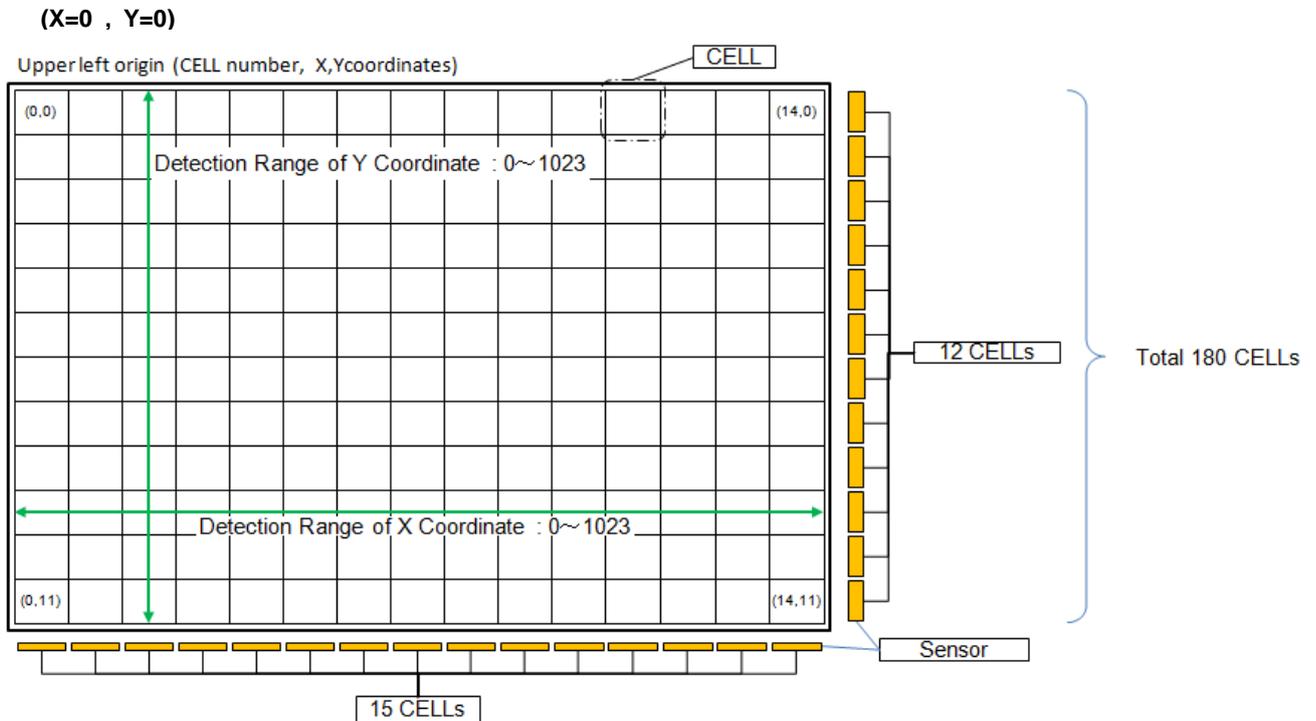
1.4. Cases that the controller does not recognize the correct coordinate points

1. Controller does not recognize dual touch inputs in the same CELL. (Fig 2.)
   (In case of multiple touch inputs in the same CELL, middle point will be outputted.)

Fig 2.   2 points in the same matrix CELL

The middle point between the touched 2 points will be recognized.
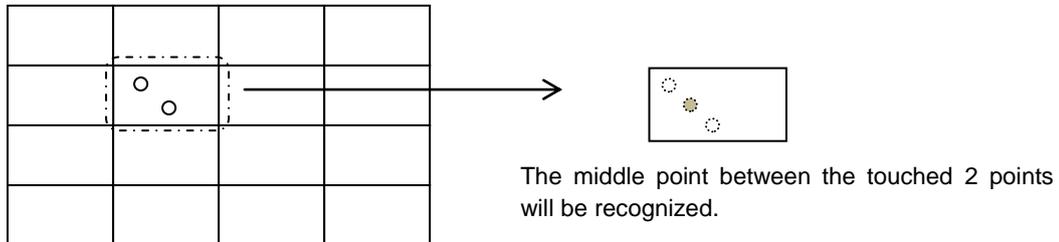
2. 2nd touched point can be affected if 1st touched point is on boundary of a CELL.

    Looking at the touch screen as its FPC tail is on the bottom side, when the 1st touched point is on horizontal boundary of a CELL (indicated as yellow circle in Fig3), and the 2nd touched point is either on the top or bottom boundary of the right-side adjacent CELLs (red lines "A" in Fig3), or the top or bottom boundary of 3 CELLs away in right direction (red lines "B" in Fig3), then the 2nd touched point can be unstable. (Either unstable output, or coordinate can be away from actual touched point in inner direction).

Fig3 1st and 2nd touched points on boundaries of CELLS
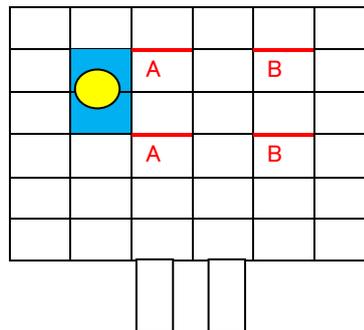
3. 2nd touched point can be affected if 1st touched point is on an intersection of CELLs.

    If the 1st touched point is on an intersection of CELLs, then the 2nd touched point is on an intersection of 1 CELL away in X direction and 3 CELLS away in Y direction from the 1st touched point (indicated in Fig4), or intersection of 2 CELLs away in X direction and 1 CELL away in Y direction from the 1st touched point (indicated in Fig5), the 2nd touched point can be unstable. (Either unstable output, or coordinate can be away from actual touched point in inner direction).

Fig4. 2nd touched intersection is 1 CELL in X and 2 CELLs in Y away from 1st touched intersection.
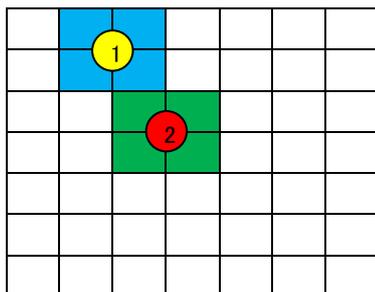
Fig5. 2nd touched intersection is 2 CELLs in X and 1 CELL in Y away from 1st touched intersection.

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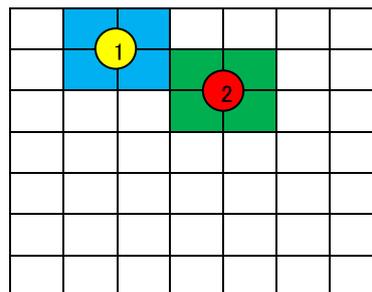
2. Specifications

2.1. General Specification

Item	Rating	Remark
Operating Temp.	-20ºC to +85ºC (No condensation)	
Storage Temp	-20ºC to +85ºC (No condensation)	
Supply Voltage	DC 4.75V to 5.25V	
Consumption Current	DC 45 mA (Typical)	5.0V at multi touch
Communication Method	USB / UART	MTR2000-1215-00* supports USB only. MTR2000-1215-10* supports USB/UART.
Linearity Error	±2LSB or lower	
External Dimensions	65×35 (mm)	
Max Height of Component	2.9 (mm)	

2.2. Performance Specification

Item	Rating	Remark
Max Multi-touch Points	2 points	
Coordinate Resolution	10bit (1024×1024)	
* Input Response Time	12x15 matrix CELLs 1 point detection: 10ms 2 points detection: 12.5ms	Typical (When used with MTR-G150A100B, 15inch standard touch screen)

*The input response times described above are actual values of when 1 finger touches only 1 CELL. If 1 finger touches over several CELLs, the input repose time will be affected.

For reference: 1 finger over 4 CELLs   approx. 35ms (TYP)

                2 fingers over 8 CELLs   approx. 60ms (TYP)

*Drawing operability may depend on specifications of PC in use.

2.3. Host Interface

2.3.1. USB

Item	Value	Note
Host Interface	USB 2.0 Full speed 12 [Mbps]	
Power supply	Bus-powered	
Power type	Low power device	
Vendor ID / Product ID	TP : 0x0AFA / 0x03F1 At Firmware Update : 0x0AFA / 0x07D4	For MTR2000-1215-002 (TP) Vendor ID / Product ID : 0x0AFA / 0x03F3
Power save mode	USB Suspend mode	Compliant with USB except for current value

2.3.2. UART

Item	Value	Note
Host Interface	UART Baud Rate 57.6 [kbps]	
Data bits	8	
Stop bit	1	
Parity check	None	

2.4. Electrical specifications

2.4.1. Maximum absolute rating

Item	Specifications			Unit	Note
	Min.	Typ.	Max.		
Supply Voltage	-0.3	-	6	V	

2.4.2. USB signal (D+, D-) DC characteristics

Item	Specifications			Unit	Note
	Min.	Typ.	Max.		
Input High Voltage	2.0	-	3.3	V	
Input Low Voltage	0	-	0.8	V	
Output High Voltage	2.8	-	3.6	V	
Output Low Voltage	0	-	0.3	V	

2.4.3. UART signal (Tx, Rx) DC characteristics

Item	Specifications			Unit	Note
	Min.	Typ.	Max.		
Input High Voltage (Rx)	2.0	-	3.6	V	
Input Low Voltage (Rx)	-0.3	-	0.8	V	
Output High Voltage (Tx)	2.2	-	3.6	V	
Output Low Voltage (Tx)	-0.3	-	0.45	V	

2.4.4. RESETn Signal DC characteristics

| Item	Specifications			Unit	Note
	Min.	Typ.	Max.		
Input High Voltage	2.3	-	3.6	V	
Input Low Voltage	-0.3	-	0.6	V	
Input pulse width	1	-	-	ms	

2.5. Minimum Distance between Fingers

If there are 2 input points detected within the electrode width (within a CELL), MTR will recognize 1 point only. Even if a distance between 2 input points is greater than electrode width, input detection may be affected according to size of the touching finger.

For how to calculate the minimum distance which can detect 2 points, refer to the following

Size of finger   → C

Width of Electrode → Xw, Yx
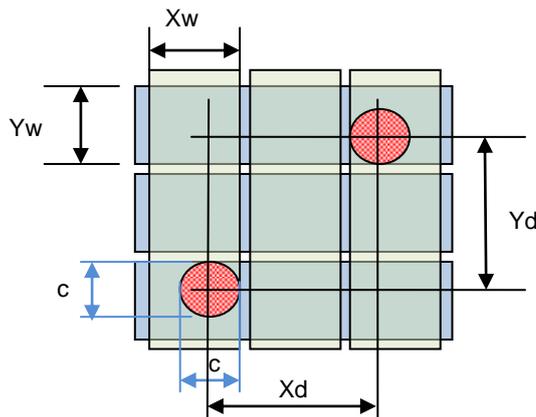
Item	Formula	Remarks
X-axis minimum disance (Xd)	(Xw * √2) + c	
Y-axis minimum distance (Yd)	(Yw * √2) + c	

If distance between 2 points is shorter than the minimum, detection of X or Y-axis can be 1 point only, or detection can be invalid.

<For Reference>

In case of MTR-150A100B (15inch standard touch screen), its electrode width is as follows.

Xw=20.3mm

Yw=19.0mm

Given that size of finger is 5cm, Xd, Yd, and minimum linear distance will be as follows.

Xd= about 3.7mm、

Yd= about 31.9mm

Minimum linear distance between 2 points =about 46.4mm

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3. Connector

3.1. Connector Terminal

USB Connector

CN	Terminal No.	Terminal Name	Function
CN1	1	Vbus	USB power input (5V)
	2	D-	USB D-
	3	D+	USB D+
	4	GND	USB GND
	5	RESET	Terminal for rest, Active L
	6	GND	GND for reset

UART Connector

CN	Terminal No.	Terminal Name	Function
CN2	1	VCC	DC power input
	2	TXD	UART Communications
	3	RXD	UART Communications
	4	GND	GND

Touch screen connector 1

CN	Function
CN4	Touch screen connector 34pins

Touch screen connector 2

CN	Function
CN5	Touch screen connector 26pins

3.2. Mounted Connector

CN	P/N	Manufacturer
CN1	SM06B-SRSS-TB	J.S.T.MFG. CO., LTD.
CN2	SM04B-SRSS-TB	J.S.T.MFG. CO., LTD.
CN4	FH34SRJ-34S-0.5SH	HIROSE ELECTRIC CO., LTD.
CN5	FH34SRJ-26S-0.5SH	HIROSE ELECTRIC CO., LTD.

4.　Dimension

4.1.　Controller　Board
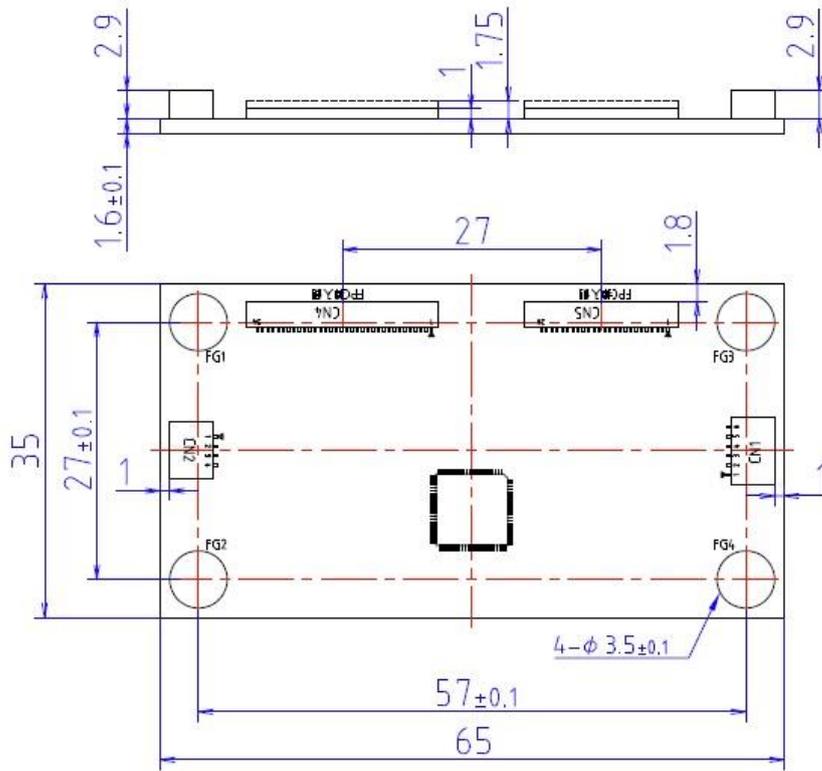
Unit:　mm

Tolerance:　+/-0.3mm　except　for　hole　diameter

Material:　FR-4

Mass:　TYP　9g

5. Packing specifications

5.1. Packing form

Box

We will wrap the MTR2000 controller with an antistatic type bubble wrap.

Note 1) Scotch tape is not attached to the bubble wrap.

Note 2) There are no accessories other than the controller.

Note 3) One controller is packed in one packing box.

Tray

Place the MTR2000 controller on the tray and stack the other tray on top.

Note 1) There are no accessories other than the controller.

Note 2) Up to 20 controllers can be stored in one tray.

5.2. Packing Material

For boxes

Box (WxDxH): Approx. 75 mm x Approx. 55 mm x Approx. 15 mm, coated ball

Cushioning material (WxD): Approx. 130 mm x Approx. 70 mm: bubble wrap, anti-static type

For trays

Tray (WxDxH): Approx. 330 mm x Approx. 255 mm x Approx. 13 mm

The height of the two layers is 21 mm.

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5.3. Logo and lot number diagram on the box

Top view of the box

Lot No

How to add No

Example: 8D20

8: The last digit of the year

D: Month

January: A	July: G
February: B	August: H
March: C	September: I
April: D	October: J
May: E	November: K
June: F	December: L

20: Date of manufacture

MTR2000-1215-0001
DMC Co.,Ltd

Product model number & DMC logo
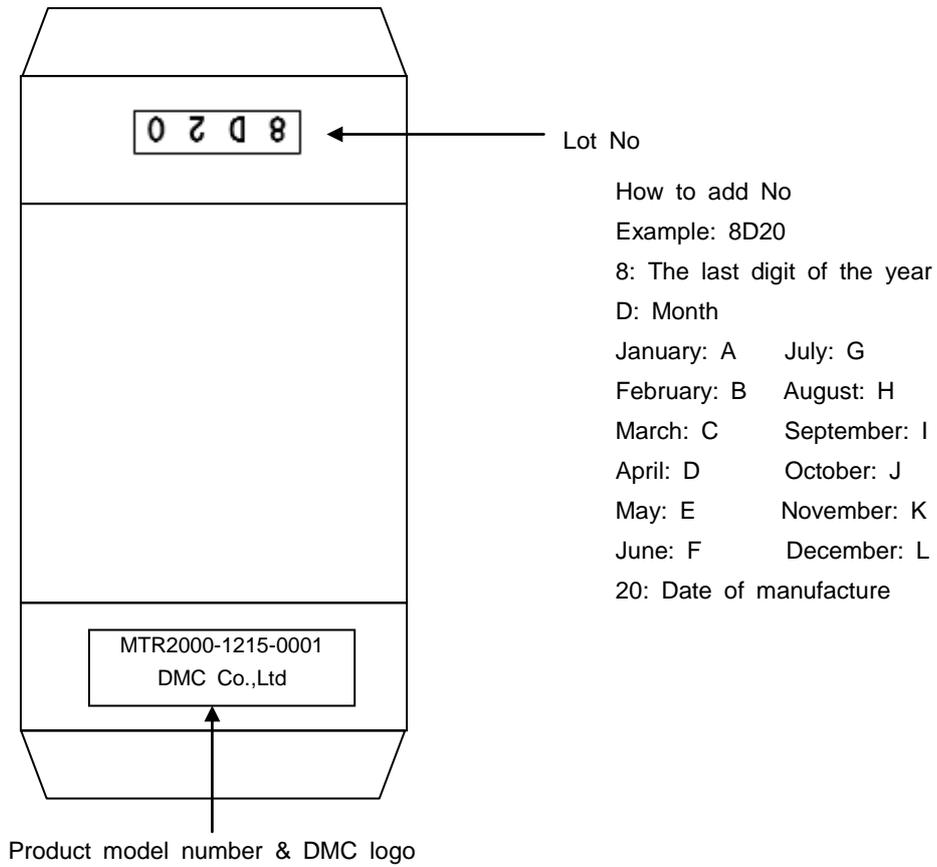
5.4. Product name label

Backside of board
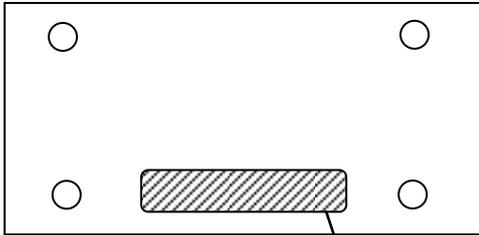
Seal specifications for controller
　　Image diagram
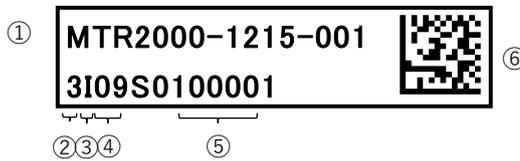
1. Product model: Indicates the shipping product number.

2. Indicates the year: Indicates the year of manufacture (The last digit of the year).

   Example: Year of manufacture 2013

   Notation: 3

3. Manufacturing month: Shows the production month in the alphabet.

   For the notation method, refer to "5.3. Packing box logo and lot number location map" above.

   Example: When manufacturing is in September, the notation is I

4.Manufacturing date: Shows the date of manufacture 2-digit.

   Example: When manufactured on the 9th, the notation is 09.

5. Serial No Initial value: Notated in 5 digits.

   If the date of manufacture changes, it will start at 00001.

6. Data Matrix: Same content as2 + 3 + 4 + "S01" + 5

5.5. Tray dimensional drawing

Unit: mm

NOTES
1. GENERAL TOLERANCE, ±0.5
2. MATERIAL, PS 0.5t (COLOR, BLACK) CONDUCTIVE
3. DRAFT ANGLE, 5° MAX, TYP.
4. INDICATE THE P/N (5m/m CHARACTER SIZE)
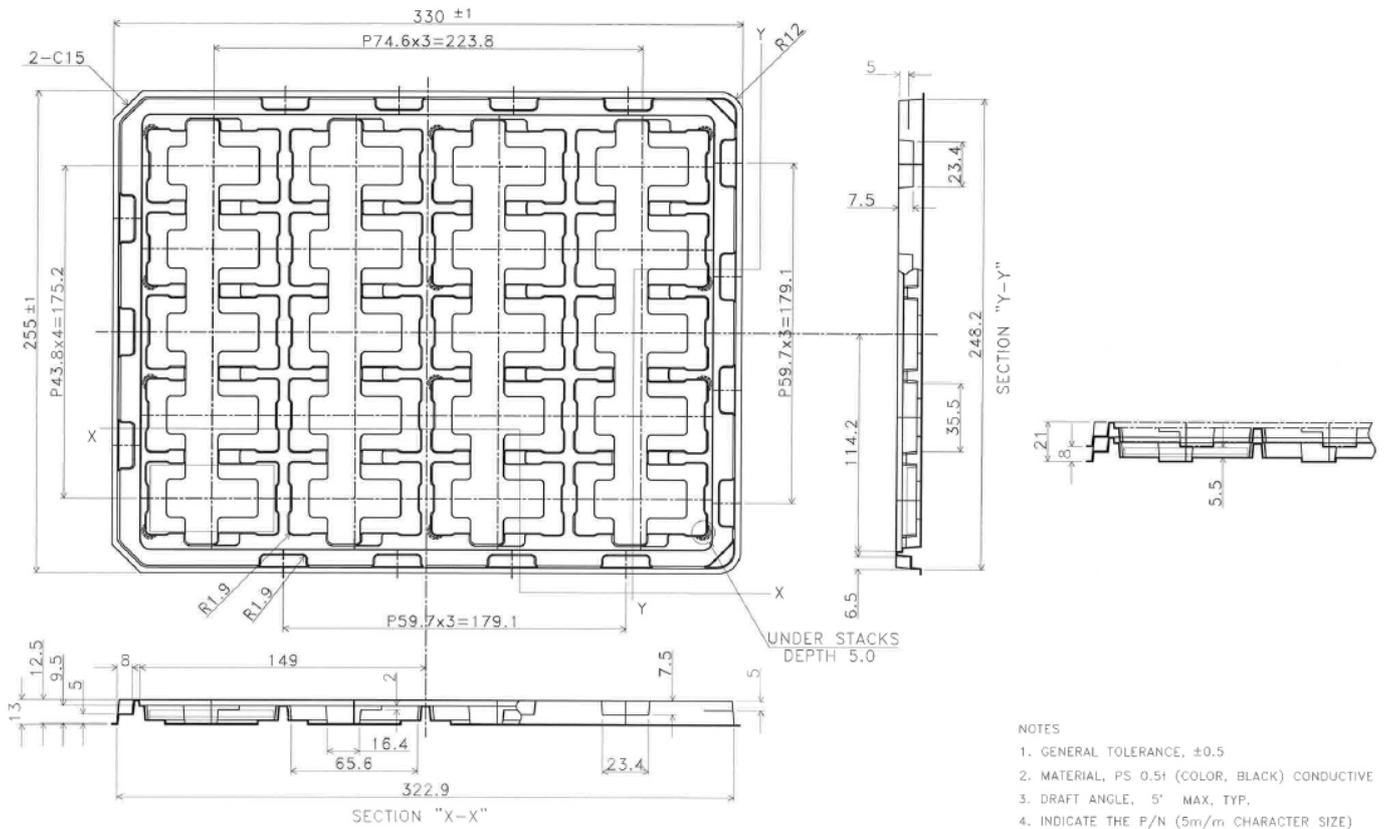
6. Warranty

6.1. Warranty Period

§ The warranty period is limited to 1 year from the date of shipping. The warranty for the initial defection such as appearance defection is limited to 1 month.

§ Any defected parts under proper use will be examined by the supplier and replaced by the new parts if the defection is considered to be caused by the supplier.

§ The replacement is subject to be included in the next lot.

6.2. Warranty Target

§ The warranty only covers the product itself and does not cover any damage to others caused by using this product. Onsite repair or replacement is not supported.

§ We will do our best for delivery problem and product defections, but the warranty for the production line is not covered.

6.3. Warranty Exceptions

Following conditions are not covered with the warranty and subject to charge.

§ Any malfunctions and damages during transportation and transfer by the user.

§ Any malfunctions and damages caused by a natural disaster or a fire.

§ Any malfunctions and damages caused by static electricity

§ Any malfunctions and damages caused by the failure of the associated equipment.

§ If the product is remodeled, disassembled or repaired by the user.

§ If the product is glued onto the equipment and uninstalled.

§ Any malfunctions and damages caused by an improper usage and handling against the specifications and notes.

7. Handling notes

7.1. Overall handling notes

§ Keep the product away from any conductive objects while in use.

§ Do not touch the conductive part of the product to avoid being damaged by the electrostatic discharge. Follow the proper procedure for handling.

§ Keep the product in the proper storing environment and avoid any load to the product.

§ Do not use or store the product in the severe condition like following:

　Wet environment or a condition where the product is likely to get wet.

　Where dew condensation is likely to occur.

　Near solvent or acid.

§ Do not take apart or alter the product.

7.2. Others

§ The contents of this document are subject to change without notice.

§ The manufacturer or sales representatives will not be liable for any damages or loss arising from use of this product.

§ This product is intended for use in standard applications (computers, office automation, and other office equipment, industrial, communications, and measurement equipment, personal and household devices, etc.) Please avoid using this product for special applications where failure or abnormal operation may directly affect human lives, or cause physical injury or property damage, or where extremely high levels of reliability are required (such as aerospace systems, vehicle operating control, atomic energy controls, medical devices for life support, etc.).

§ Any semiconductor devices have inherently a certain rate of failure. The user must protect against injury, damage, or loss from such failures by incorporating safety design measures into the user's facility and equipment.

8. Revision History

8.1. Revision History

Rev. 1.0 (June 6, 2018)

    Initial Release

Rev. 2.0 (June 7, 2021)

    2.Specification

        Added UART communication item

        Move vendor ID to 2.3.1.USB

    2.1.General Specification

        Added UART to communication method

        Fixed maximum component height

    2.3. Added host interface item

    2.4. Added electrical specification items

    3.1. Added UART connector item to connector terminal

    3.2. Added CN2 item to mounting connector

    Added item "5. Packing specifications"