

*Appendix*

***PTD- x x x 0D***  
***TouchPanel***  
***Reference manual***

Revision:TD4-24175-03

## **FCC NOTICE**

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES.  
OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITION:  
(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND  
(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED,  
INCLUDING INTERFERENCE THAT MAY CAUSE UNDERSIRED  
OPERATION.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures :

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit difference from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE : The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

# 1. About this manual

This manual describes the specification of the PTD-××00-D-××.

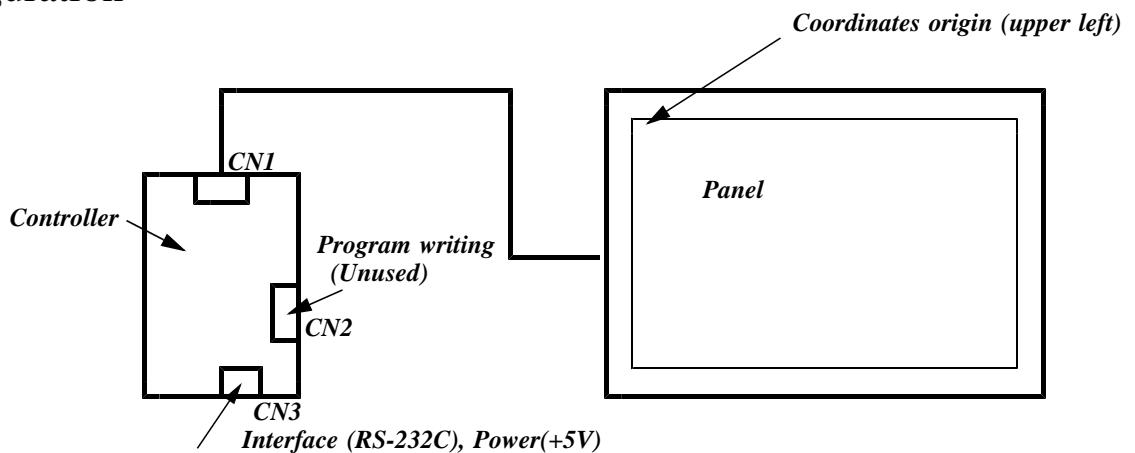
Product name: Pentel touchpanel  
Type name: PTD- × × 00-D- × ×

×× refer to **9.Appendix**.

## 2. Overview

The PTD-××00-D-×× is a touchpanel unit, detects contact of a finger, and changes it into the coordinates data of X and Y, data is sent to a host system, and it operates by supplying +5V.

## 3. Configuration



## 4. Specifications

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<b>Power requirements:</b>	<b>+5V DC <math>\pm</math> 5%, less than 150mA</b>
<b>Panel dimensions:</b>	<b>(Cf. drawing)</b>
<b>Weight:</b>	<b>(Cf. 9. Appendix)</b>
<b>Input method:</b>	<b>Finger input (Electrostatic capacity coupling)</b>
<b>Active area:</b>	<b>(Cf. 9. Appendix)</b>
<b>Coordinates resolution:</b>	<b>0.05mm to 6.4mm</b>
<b>Linearity:</b>	<b>Less than <math>\pm</math> 3%</b>
<b>Speed:</b>	<b>More than 100 Points/sec</b>
<b>haze value :</b>	<b>Less than 5%</b>
<b>Interface:</b>	<b>RS-232C (Signal compatible)</b>
<b>Surface hardness:</b>	<b>More than 9H</b> (9.8 Newtons, 5mm horizontal press)
<b>Tapping test:</b>	<b>More than 20,000,000 times</b> (2.94 Newtons, #20 Silicon rubber)
<b>Scratch test:</b>	<b>More than 10,000 times</b> (2.45 Newtons, #8000 lapping film sheet, Scratch stroke 25mm)
<b>Operation environment:</b>	<b>Temperature 0 to +40</b> <b>Humidity 30% to 85% RH (Without dew condensation)</b>
<b>Storage environment:</b>	<b>Temperature -20 to +60</b> <b>Humidity 30% to 85% RH (Without dew condensation)</b>

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## 5. CN3 pin assignment

Connector: DF13B-10P-1.25H (product of "HIROSE")

(Pin assignment)

<b>Pin #</b>	<b>Assign</b>	<b>Description</b>	<b>Pin #</b>	<b>Assign</b>	<b>Description</b>
1	G N D	Signal ground	6	D T R	Control line from the touchpanel
2	T X D	Sending data line from the touchpanel	7	C T S	Control line from the host system
3	R X D	Sending data line from the host system	8	R T S	Control line from the touchpanel
4	D S R	Control line from the host system	9	+ 5 V	+ 5 V D C (INPUT)
5	G N D	Signal ground	10	+ 5 V	+ 5 V D C (INPUT)

## 6. The PTD-××00-D-×× interface

The PTD-××00-D-×× and the host system are connected by the RS-232C serial communication interface. You can utilize mouse emulation software.  
"Mouse emulator" for Windows are prepared.

### 6.1 Communication parameters

The following communication parameters are set in the initial state (after the PTD-××00-D-×× start-up).

**Communication method:** RS-232C asynchronous serial communication (Signal compatible)  
\*Baud rate: 9600bps ( $\pm 2\%$ )  
Data length: 8bit  
Parity: None  
Stop bit: 1

*\*Baud rate is fixed in 9600bps in the initial state.  
It is possible to change into 4800bps or 19200bps by the commands.*

### 6.2 Interface connector pin assignment (option)

Connector: 9pin Dsub (female)

Pin #	Assign	Description	Pin #	Assign	Description
1	-	No connection	6	D T R	Control line from the touchpanel
2	T X D	Sending data line from the touchpanel	7	C T S	Control line from the host system
3	R X D	Sending data line from the host system	8	R T S	Control line from the touchpanel
4	D S R	Control line from the host system	9	-	No connection
5	G N D	Signal ground			

### 6.3 The timing of the coordinates data sending and receiving

T X D : The sending data line from the touchpanel

D T R : The control line from the touchpanel  
It is impossible for the host system among OFF to send data.  
For doing the can which is sent in command data output from the host system

R T S : The control line from the touchpanel  
It is impossible for the host system among OFF to send data.  
For doing the can which is sent in command data output from the host system  
the impossible check  
RTS and DTR line are connected.

R X D : The sending data line from the host system

D S R : The control line from the host system  
The touchpanel doesn't check.  
As for the terminal, a pull is downed by the 4.7 K resistance.

C T S : The control line from the host system  
It is impossible for the touchpanel among OFF to send data.  
For doing the can which is sent in data sending from the touchpanel  
the impossible check

## [ format ]

- In OFF, the touchpanel stops at the control mode in the entering coordinates detection operation.
- For the connection condition check of the host system
  - Among OFF, the touchpanel doesn't work in the coordinates detection.
  - When becoming OFF in the Coordinates mode, it returns in the Control mode.

It becomes StartCmd reception wait.

### *Notice*

*To receive StartCnd and to enter from the side of the host system to the coordinates mode, the turning on do the side of the touchpanel earlier.*

## 7 Communicating with the PTD-××00-D-××

### 7.1 Coordinates mode

Coordinates mode is the mode when the PTD-××00-D-×× receives the start command (*StartCmd*) from the host system.

The PTD-××00-D-×× returns a response. (*Resp1 and Resp2*)

It is finished when the PTD-××00-D-×× receives the stop command (*StopCmd*) from the host system.

The PTD-××00-D-×× returns a response. (*Resp1*)

The command except the StopCmd from the host system is ignored during the coordinates mode execution.

## (1) Coordinates data format

	MSB				LSB				
	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	Remarks
1st Byte	1	TYP	C O		0	R e s o l			Status
2nd Byte	0	EXT	P e n I D		P e n S W			Status	
3rd Byte	0	0	0	0	0	0	0	0	Reserve
4th Byte	0	0	0	0	0	0	0	0	Reserve
5th Byte	0	X <sub>6</sub>	X <sub>5</sub>	X <sub>4</sub>	X <sub>3</sub>	X <sub>2</sub>	X <sub>1</sub>	X <sub>0</sub>	X lower coordinate
6th Byte	0	X <sub>13</sub>	X <sub>12</sub>	X <sub>11</sub>	X <sub>10</sub>	X <sub>9</sub>	X <sub>8</sub>	X <sub>7</sub>	X higher coordinate
7th Byte	0	Y <sub>6</sub>	Y <sub>5</sub>	Y <sub>4</sub>	Y <sub>3</sub>	Y <sub>2</sub>	Y <sub>1</sub>	Y <sub>0</sub>	Y lower coordinate
8th Byte	0	Y <sub>13</sub>	Y <sub>12</sub>	Y <sub>11</sub>	Y <sub>10</sub>	Y <sub>9</sub>	Y <sub>8</sub>	Y <sub>7</sub>	Y higher coordinate

(Contents)

Item	Code	Description
T Y P	0	Command type
C O	D5 D4 0 0 0 1 1 0 1 1	Coordinates origin Upper Left Lower Left Upper Right Lower Right
R e s o l	D2 D1 D0 0 0 0 0 0 1 0 1 0 0 1 1 1 0 0 1 0 1 1 1 0 1 1 1	Coordinates resolution 0 . 0 5 mm 0 . 1 0 mm 0 . 2 0 mm 0 . 4 0 mm 0 . 8 0 mm 1 . 6 0 mm 3 . 2 0 mm 6 . 4 0 mm
E X T	0 1	Valid area Invalid area
I D	D5 D4 0 0	Entry identifying
S W	D3 D2 D1 D0 0/1 * * * * 0/1 * * * * 0/1 * * * * 0/1	Switch ( 0:Pen up, 1:Pen down ) Pen4 status Pen3 status Pen2 status Pen1/Finger status 1
Reserve	0	( 0 fixations )
X <sub>13</sub> ~ X <sub>0</sub>	0 ~ 1 6 3 8 3	X coordinates value. 2
Y <sub>13</sub> ~ Y <sub>0</sub>	0 ~ 1 6 3 8 3	Y coordinates value. 2

Default setting

1 Only Pen1/Finger is effective

2 The unit depends on the resolution

Note) When the coordinates data is valid, it is (EXT:0,SW:1)

## 7.2 Control mode

In the following case, the PTD- $\times\times$ 00-D- $\times\times$  becomes the control mode.

- After a power supply injection. (start-up)
- When the StopCmd is received in the coordinates mode.

Control mode has the commands to change the PTD- $\times\times$ 00-D- $\times\times$  parameters.  
The baud rate is fixed in 9600bps in the control mode.

### (1) Resp1

Resp1 is the response data of the StartCmd or the StopCmd.

	MSB								LSB							
	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	Remark							
1st Byte	1	TYP	r e s p T y p e						Status (C1h)							
2nd Byte	0	r e s p L e n g s								Length (03h)						
3rd Byte	0	r e s p C o d e								Response code						

(Contents)

Item	Code	Description
T Y P	1	Command type
respType	0 0 0 0 0 1	response type
respLengs	0 0 0 0 1 1	Resp1 length
respCode	D6 ~ D1 D0 0 0 0 1	Response code accept reject

### (2) Resp2

Resp2 is the response data replying next to the Resp1 after the StartCmd reception.  
Resp2 includes parameters of the PTD- $\times\times$ 00-D- $\times\times$ .

	MSB								LSB							
	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	Remark							
1st Byte	1	TYP	R e s p T y p e						Status (C2h)							
2nd Byte	0	R e s p L e n g s								Length (0Eh)						
3rd Byte	0	P r o d C o d e								Product code (00h)						
4th Byte	0	r s r v								Reserve (00h)						
5th Byte	0	BaudRate		C O		R e s o l			Setting inf.							
6th Byte	0	0	0	0	0	x f e r R a t e			Transfer rate							
7th Byte	0	0X <sub>6</sub>	0X <sub>5</sub>	0X <sub>4</sub>	0X <sub>3</sub>	0X <sub>2</sub>	0X <sub>1</sub>	0X <sub>0</sub>	X offset low.							
8th Byte	0	Sign	0X <sub>12</sub>	0X <sub>11</sub>	0X <sub>10</sub>	0X <sub>9</sub>	0X <sub>8</sub>	0X <sub>7</sub>	X offset hi.							
9th Byte	0	0Y <sub>6</sub>	0Y <sub>5</sub>	0Y <sub>4</sub>	0Y <sub>3</sub>	0Y <sub>2</sub>	0Y <sub>1</sub>	0Y <sub>0</sub>	Y offset low.							
10th Byte	0	Sign	0Y <sub>12</sub>	0Y <sub>11</sub>	0Y <sub>10</sub>	0Y <sub>9</sub>	0Y <sub>8</sub>	0Y <sub>7</sub>	Y offset hi.							
11th Byte	0	LX <sub>6</sub>	LX <sub>5</sub>	LX <sub>4</sub>	LX <sub>3</sub>	LX <sub>2</sub>	LX <sub>1</sub>	LX <sub>0</sub>	X size low. *							
12th Byte	0	LX <sub>13</sub>	LX <sub>12</sub>	LX <sub>11</sub>	LX <sub>10</sub>	LX <sub>9</sub>	LX <sub>8</sub>	LX <sub>7</sub>	X size hi. *							
13th Byte	0	LY <sub>6</sub>	LY <sub>5</sub>	LY <sub>4</sub>	LY <sub>3</sub>	LY <sub>2</sub>	LY <sub>1</sub>	LY <sub>0</sub>	Y size low. *							
14th Byte	0	LY <sub>13</sub>	LY <sub>12</sub>	LY <sub>11</sub>	LY <sub>10</sub>	LY <sub>9</sub>	LY <sub>8</sub>	LY <sub>7</sub>	Y size hi. *							

\* Size means the size of the LCD.

(Contents)

Item	Code			Description
T Y P	1			Type (always 1)
ResponseType	0 0 0 0 1 0			response Type (always 2)
RespLengs	0 0 1 1 1 0			Resp1 Length (always 14)
ProdCode	0 0 0 0 0 0			Product code (always 0)
rsrv	0 0 0 0 0 0			Reserve
BaudRate	D6 D5 0 0 0 1 1 0 1 1	Baud Rate 4 8 0 0 bps 9 6 0 0 bps 1 9 2 0 0 bps 3 8 4 0 0 bps (It doesn't support)		
C O	D5 D4 0 0 0 1 1 0 1 1	coordinates origin Left Upper Left Lower Right Upper Right Lower		
R e s o l	D2 D1 D0 0 0 0 0 0 1 0 1 0 0 1 1 1 0 0 1 0 1 1 1 0 1 1 1	Resolution 0 . 0 5 mm 0 . 1 0 mm 0 . 2 0 mm 0 . 4 0 mm 0 . 8 0 mm 1 . 6 0 mm 3 . 2 0 mm 6 . 4 0 mm		
xferRate	D2 D1 D0 0 0 0 0 0 1 0 1 0 0 1 1 1 0 0 1 0 1 1 1 0 1 1 1	Tranfer rate (Points/sec) 1 0 2 0 4 0 8 0 1 0 0 1 5 0 2 0 0 MAX		
Sign OX <sub>0</sub> ~ OX <sub>12</sub> OY <sub>0</sub> ~ OY <sub>12</sub>	0:Positive,1:Negative ± 8 1 9 1 ± 8 1 9 1	Offset X offset Y offset		
LX <sub>0</sub> ~ LX <sub>13</sub> LY <sub>0</sub> ~ LY <sub>13</sub>	* * * * * * * *	X LCD size (0.1mm) Y LCD size (0.1mm)		

[nnnn] means default value.

## 7.3 Control command

Control command is the command demanding from the host system to the PTD-xx00-D-xx.

The PTD-xx00-D-xx returns the response for the StartCmd. (Resp1 and Resp2)

The PTD-xx00-D-xx returns the response for the StopCmd. (Resp1)

The PTD-xx00-D-xx does not reply for the other requirement commands.

All requirement commands are effective only during the control mode.

### (1) StartCmd

It is the command to change into the coordinates mode.

	MSB								LSB
	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	Remark
1st Byte	1	0	0	0	0	0	0	1	Command (81h)
2nd Byte	0	0	0	0	0	0	1	0	Length (02h)

## (2) StopCmd

It is the command to change into the control mode.

The commands except the StopCmd from the host system are ignored during the coordinates mode execution.

	MSB								LSB
	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	Remark
1st Byte	1	0	0	0	0	0	1	0	Command (82h)
2nd Byte	0	0	0	0	0	0	1	0	Length (02h)

## (3) BaudRate

It is the command demanding modification of the baud rate.

	MSB								LSB
	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	Remark
1st Byte	1	1	0	0	0	0	0	1	Command (C1h)
2nd Byte	0	0	0	0	0	0	1	1	Length (03h)
3rd Byte	0	0	0	0	0	0	BaudRate		Requirement code

(Contents)

Item	Code			Description					
BaudRate	D6 D5 0 0 0 1 1 0 1 1			Baud Rate 4 8 0 0 bps 9 6 0 0 bps 1 9 2 0 0 bps 3 8 4 0 0 bps (It doesn't support)					

## (4) XferRate

It is the command demanding modification of the transfer rate of the coordinates data during the coordinates mode.

	MSB								LSB
	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	Remark
1st Byte	1	1	0	0	0	0	1	1	Command (C3h)
2nd Byte	0	0	0	0	0	0	1	1	Length (03h)
3rd Byte	0	0	0	0	0	XferRate			Requirement code

(Contents)

Item	Code			Description					
xferRate	D2 D1 D0 0 0 0 0 0 1 0 1 0 0 1 1 1 0 0 1 0 1 1 1 0 1 1 1			Trasfer rate ( Points/sec ) 1 0 2 0 4 0 8 0 1 0 0 1 5 0 2 0 0 MAX					

*The transfer rate is limited by the baud rate. Please use it less than 150 Points/sec.*

## (5) Offset

It is the command demanding modification of the offset.

The offset is added to the native coordinates, and the calculated value is outputted as the coordinates of the PTD- $\times\times$ 00-D- $\times\times$ . The amount of movements is calculated by the following formula:

The amount of movements = offset  $\times$  'Resol'

	MSB								LSB
	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	Remark
1st Byte	1	1	0	0	0	1	0	0	Command
2nd Byte	0	0	0	0	0	1	1	0	(C4h) (06h)
3rd Byte	0	OX <sub>6</sub>	OX <sub>5</sub>	OX <sub>4</sub>	OX <sub>3</sub>	OX <sub>2</sub>	OX <sub>1</sub>	OX <sub>0</sub>	X offset low.
4th Byte	0	Sign	OX <sub>12</sub>	OX <sub>11</sub>	OX <sub>10</sub>	OX <sub>9</sub>	OX <sub>8</sub>	OX <sub>7</sub>	X offset hi.
5th Byte	0	OY <sub>6</sub>	OY <sub>5</sub>	OY <sub>4</sub>	OY <sub>3</sub>	OY <sub>2</sub>	OY <sub>1</sub>	OY <sub>0</sub>	Y offset low.
6th Byte	0	Sign	OY <sub>12</sub>	OY <sub>11</sub>	OY <sub>10</sub>	OY <sub>9</sub>	OY <sub>8</sub>	OY <sub>7</sub>	Y offset hi.

(Contents)

Item	Code	Description
Sign OX <sub>0</sub> ~ OX <sub>12</sub> OY <sub>0</sub> ~ OY <sub>12</sub>	0:Positive,1:Negative $\pm 8191$	Offset X offset Y offset

*It makes input impossibility area when it sets more (less) than +2mm (-2mm) in the offset.*

## (6) CO

It is the modification requirement command of the coordinates origin.

	MSB								LSB
	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	Remark
1st Byte	1	1	0	0	0	1	0	1	Command
2nd Byte	0	0	0	0	0	0	1	1	Length
3rd Byte	0	0	0	0	0	0	C O		(C5h) (03h)

(Contents)

Item	Code	Description
C O	D1 D0 0 0 0 1 1 0 1 1	coordinates origin Left Upper Left Lower Right Upper Right Lower

## (7) Resol

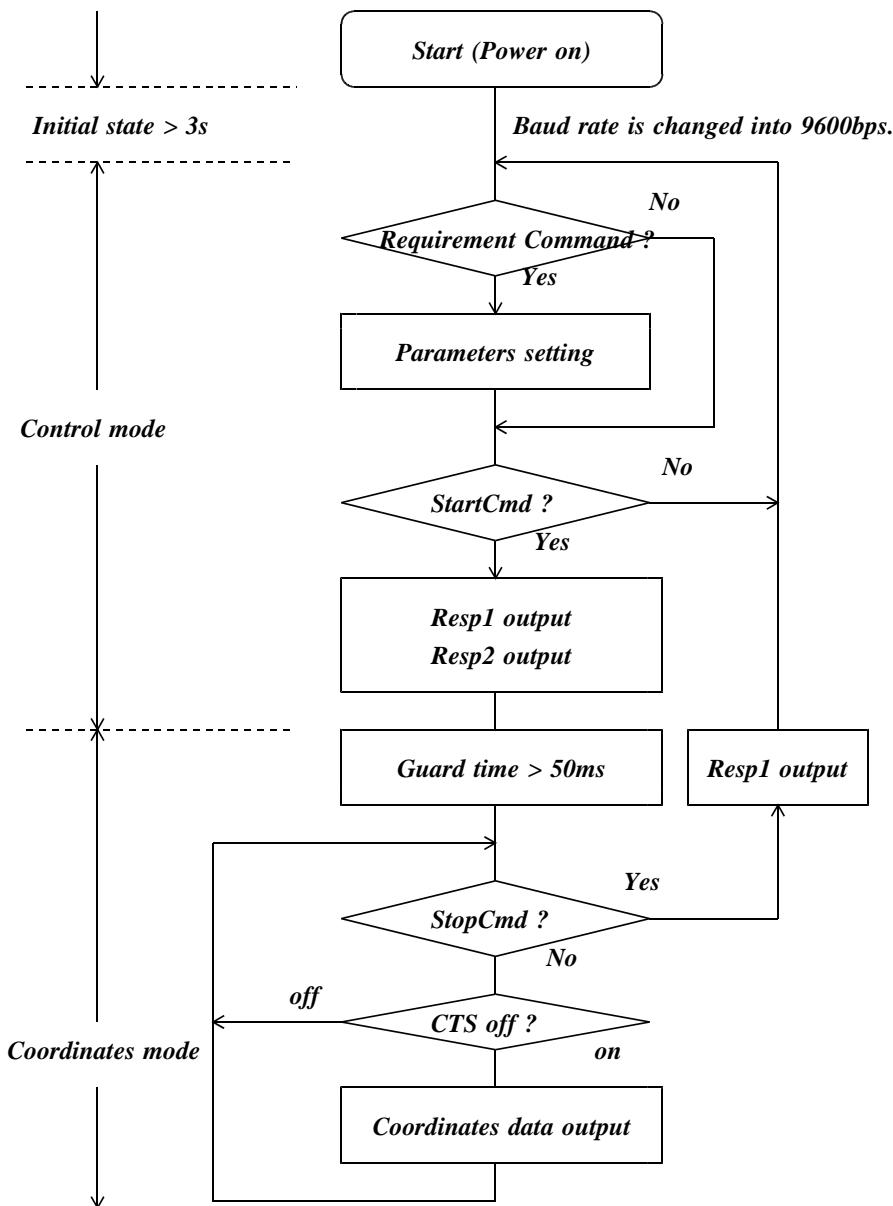
It is the modification requirement command of the coordinates resolution.

	MSB								LSB
	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	Remark
1st Byte	1	1	0	0	0	1	1	1	Command
2nd Byte	0	0	0	0	0	0	1	1	Length
3rd Byte	0	0	0	0	0	Resol			(C7h) (03h)

(Contents)

Item	Code			Description
Resol1	D2	D1	D0	Resolution
	0	0	0	0 . 05 mm (It doesn't support)
	0	0	1	0 . 10 mm
	0	1	0	0 . 20 mm
	0	1	1	0 . 40 mm
	1	0	0	0 . 80 mm
	1	0	1	1 . 60 mm
	1	1	0	3 . 20 mm
	1	1	1	6 . 40 mm

## 7.4 Flow chart



## 8. Note

(1) Don't apply this unit to the following apparatus. Even if damage occurs, we will not take the responsibility.

- Apparatus which affects a human life by failure of the apparatus.
- Apparatus which does harm to a human body by failure of the apparatus.
- Apparatus of which high reliability is required.

(Example)

*Space apparatus,  
Airplane,  
Submarine relay apparatus,  
Medical apparatus directly to affect a human life,  
Nuclear control apparatus,  
The unit in connection with control of transport machines (a train, a car, vessel, etc.) and safety,  
Fuel control device,  
Safeguard,  
Traffic light,  
Disaster prevention apparatus,  
Crime prevention apparatus,  
etc...*

(2) The panel is glassware. Since it will damage if a shock is added or dropped, it must be cautious of handling.

(3) Supposing this unit is damaged, be careful not to cut a hand with a glass fragment.

(4) Do it according to regulation of municipality when it disposes of this unit.

(5) Don't use the unit neither in an unstable place nor the place where a foreign substance, water, and waterdrop go into an inside.

(6) Don't make the dew. If the unit dews, make it dry.

(7) Don't save in high temperature, high humidity, and an environment with much dirt.

Don't operate in high temperature, high humidity, and an environment with much dirt.

When you save for a long period of time, avoid dirt and an ultraviolet ray.

Save in normal temperature (20° to 30°).

(8) Please touch the panel using a finger-tip. The input in a sharp thing causes failure.

### 8.1 Cleaning • Care

(1) Waterdrop, oil, dirt, and the conductor (clip, core of a pencil, etc...) are not placed on the panel.

- Please wipe off waterdrop with soft cloth.
- Please wipe off oil.
- Please remove the conductor from the panel.

### 8.2 Two or more sets of simultaneous use ( How to stabilize coordinates data )

(1) When you use two or more sets simultaneously, detach 500mm or more.

(2) Detach the touchpanel, when coordinates data is greatly unsteady.

(3) One person must not touch two or more sets of the touchpanels simultaneously.  
(*There is no problem of safety.*)

(4) While two persons shake hands, don't touch two or more sets of the touchpanels simultaneously.  
(*There is no problem of safety.*)

## 8.3 Supplying power

- (1) In order to acquire exact coordinates, don't touch the panel while 3 seconds after a power supply injection.
- (2) Supply power source again when the unit does not output whether the coordinates data sways greatly.
- (3) If the supplying voltage is raised slowly, the reset circuit in the controller may not operate and the unit may not operate normally.

## RoHS compliance

This product are manufactured according to the RoHS compliance.

## 9. Appendix

The model number and active area

Model No.	Active area W× H (mm)	Weight typ.(IncludePCB)(g)
<b>PTD-1130-D</b>	<b>214 ×161</b>	<b>500</b>
<b>PTD-1210-D</b>	<b>249 ×188</b>	<b>600</b>
<b>PTD-1510-D</b>	<b>308 ×231</b>	<b>900</b>
<b>PTD-1710-D</b>	<b>338.8×271.2</b>	<b>1250</b>
<b>PTD-1810-D</b>	<b>360 ×288</b>	<b>1350</b>
<b>PTD-1910-D</b>	<b>378 ×303</b>	<b>1450</b>
<b>PTD-2110-D</b>	<b>410 ×308</b>	<b>1550</b>
<b>PTD-2210-D</b>	<b>476 ×298</b>	<b>1750</b>
<b>PTD-2410-D</b>	<b>520 ×326</b>	<b>2100</b>
<b>PTD-2710-D</b>	<b>584 ×366</b>	<b>2650</b>
<b>PTD-3110-D</b>	<b>643 ×403</b>	<b>3200</b>
<b>PTD-3210-D</b>	<b>700 ×394</b>	<b>3400</b>
<b>PTD-3710-D</b>	<b>822 ×463</b>	<b>4700</b>