THIR-6000 Series

Handheld Image Reader
(Linear / 2D Scanner)

OPERATION MANUAL

TOHKEN CO., LTD.

3rd Edition
January 9, 2007

TOHKEN

[Memorandum]

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APPLICATION NOTICE

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TRADEMARKS

CONTACT INFORMATION

Tohken Ltd., 2-7-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo Japan 163-0710
Tel: +81-3-5325-4311
www.tohken.co.jp

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Introduction

Thank you for purchasing this product.

This manual explains the features of this product, operation, system configuration, specifications, etc.

In order to use the product properly, please read this manual carefully.

When there is any problem during normal use, please document it carefully to be reproduced by our support team.

The contents of this manual may be changed without a notice. Please check our website for regular updates

Safety Notice

DO NOT DISASSENBLE

Please do not disassemble this product as this will void the warranty and might cause an accident.

Follow

Please follow the warnings or notices of computers to be used with this product.

PULL OFF

Please stop using the product when there is smoke smell or strange sound to avoid fire.

CAUTION

Please do not use AC adapters other than the recommend AC power adaptor which is described in the “unpacking the carton” section. Failure to do so might affect the performance of the unit.

If the voltage or polarity used is different from the specification, it might cause product failure and could be the cause of an accident.

Handling with care

CAUTION

About backup data

This product has a memory backup function. This backup can not guaranteed if repair, reconstruction, and upgrade are performed on this Image Reader.

CAUTION

Please do not use this product at temperature or humidity ranges that are different from the product specifications or under the direct sunshine.

CAUTION

Please do not drip water, moisture, oil, etc. on the unit.

CAUTION

When stain or dust is stuck on the reading window, please follow the following steps to clean it:

- Wipe off stain lightly with cloth or swab (wet with alcohol)
- Wipe off again with the dry clothes.

DON NOT Wipe off with any chemicals.

CAUTION

This is a high-precision optical device. Avoid shocking the product such as fall.

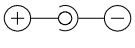
Unpacking the product

After you open the shipping package containing the THIR-6000, take the following steps:

1- Check for damage that might occur during the shipping process. Report the damage immediately to the carrier who delivered the shipment.
2- Save the shipping container for later storage or shipping.
3- Make sure everything ordered is present.

Items included with the product

- AC Power Adaptor (Optional): In case of purchase separately, select an adapter with output DC3V to DC6V range and more than 10W. Please confirm polarity and DC plug type as below.

Polarity: 

DC plug type: EIAJ RC5320A Voltage Segment 2

CAUTION

For THIR-6000U
The current drawn is sometimes over 500mA standard of USB which means that there is possibility for some problems when THIR-6000 is connected directly to the host.
Tohken recommends the use of an exclusive USB HUB (TUR-100) between THIR and host PC, or please supply power by using branched USB cable (CA-3000USB) and AC.
To use the branched USB cable, follow the following procedures:

① Connect THIR's USB connector to USB jack of branched USB cable.
Connect USB plug of branched USB cable to the USB connector of host PC.
② Connect AC adopter's plug to the jack of branched USB cable.
③ If the power is supplied correctly, there will be three continuous beeps.

Table of Content

1. Getting started

Equipped with a powerful state-of-the-art 2D Imager Scanner and processing CPU, the THIR-6000 is ready to capture images as well as decoding 1D or 2D bar codes.
The THIR-6000 is a 2D Imager Scanner that reads Liner, 2D, and Postal barcodes to meet many different requirements in Delivery, Transportation, Meter Reading, and many other applications.

The ergonomic design of the THIR-6000 provides user comfort even during lengthy scanning sessions.

The THIR-6000 is available with different interfaces to accommodate various applications. The THIR-6000 has an RS-232C interface to connect to the host computer. The THIR-6000U has USB interface to connect to a host computer that runs Windows2000/XP. THIR-6000U can be used as a Human Interface device. The configuration barcodes are prepared to change THIR-6000U's interface from USB to HID and vice versa. Human Interface Device function can send data to application software same as keyboard input.

1) Supported barcodes

The unit can read the following symbols:

1D bar codes:
Code39
Code128
Codabar
ITF (interleaved 2 of 5)
JAN/EAN/UPC
RSS
Code93

2D codes:
Data Matrix (ECC200)
QR Code
Micro QR
PDF 417
Micro PDF
Maxi Code
Composite

2) Picture taking (except THIR-6000U as a Human Interface Device)

The THIR-6000 can take 24bit color and Grey scale pictures for example signature

capture.

3) EMC (Electromagnetic compatibility) regulatory

This unit is designed for the following regulatory.

Europe	: CE Class A
United States	: FCC Class A
Taiwan	: BSMI Class

4) Ordering information

THIR-6000 U
1

1. Interface
   If “U” follows “THIR-6000”, the scanner has USB interface.
   Otherwise its interface is RS232C.

According to this rule, there are 3 types of THIR-6000 family.

- **THIR-6000**
- **THIR-6000U**

1.1 Scanner components

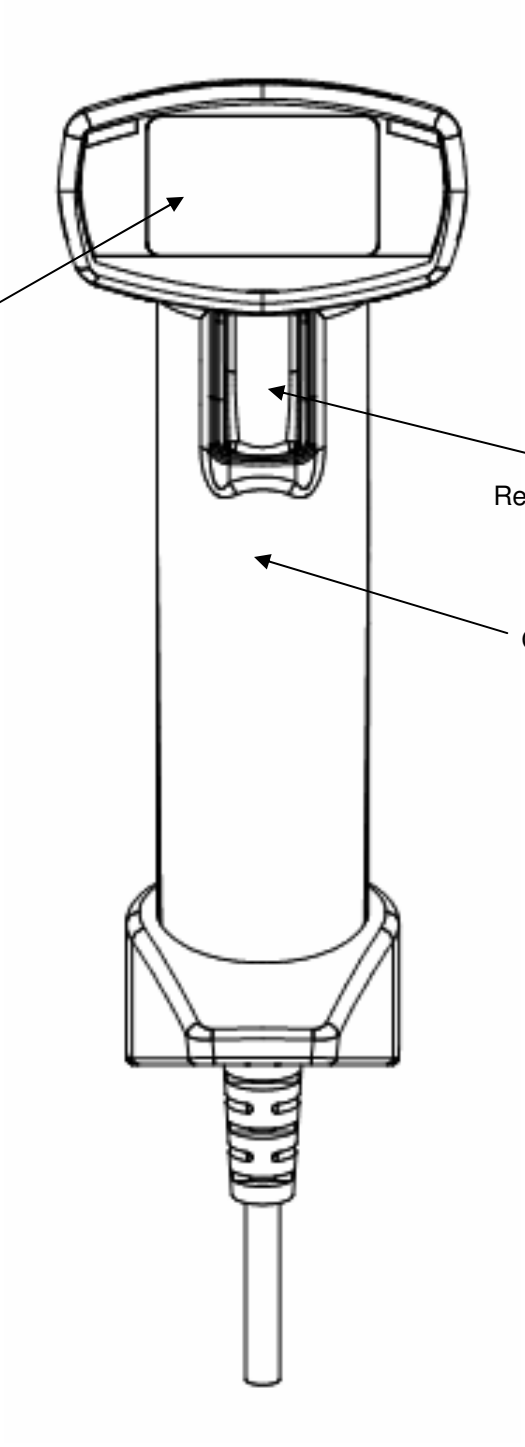


Figure1a. Front View

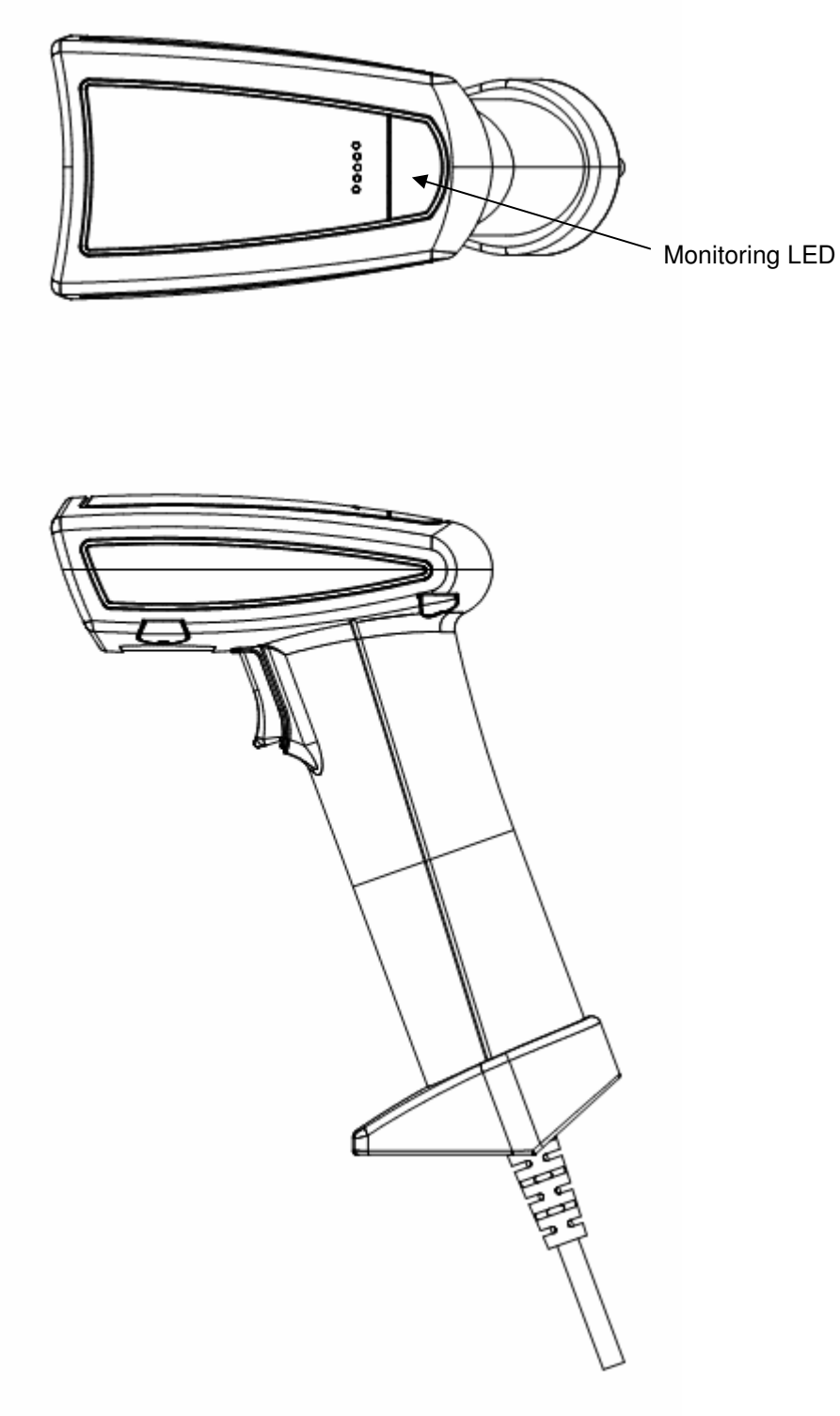


Figure1b. Side and rear View

1.2 How it works

- Monitoring LED

  The monitoring LED lights up either GREEN or RED depending on the operation:

  - ✓ GREEN light indicates the completion of successful decoding of a symbol.
  - ✓ Flashing GREEN light indicates the image data transmission in progress.
  - ✓ RED light indicates the failure of data transmission.

- Triggering Switch

  This switch is used to initiate the read and decode of a symbol.

- Connecting Cable

  - THIR-6000: RS-232C

  When connecting to host computers, a cable with D-sub 9P connector should be utilized. For supplying the power to the unit, the AC power adapter should be plugged into its mating receptacle on the RS232 connector housing next to the D-sub 9P connector.

  - THIR-6000U : USB

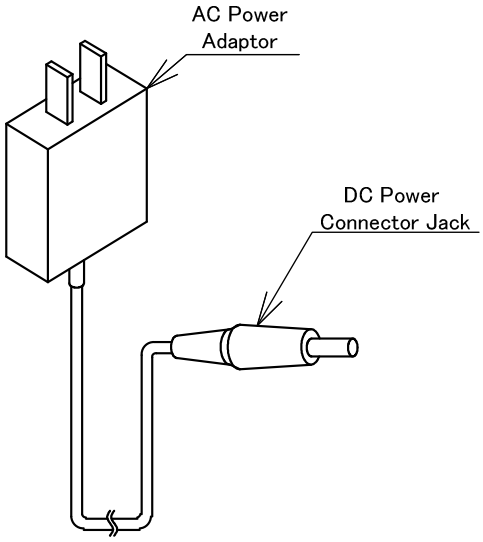
  The unit is supplied its power through USB cable via host computer.

2. Assembling the hardware

2.1.1 THIR-6000 Cable Connection

Connecting with a Host Computer

1) Plug the host connecting cable connector into the host serial port.
2) Plug the AC adapter plug into the host connecting cable connector jack.



3) Plug the AC Power Adapter to the AC power receptacle. When the unit is correctly powered up, it beeps 3 times.
4) Power up the host.

2.1.2 THIR-6000U

①1 Please confirm that the USB port of the host PC is available.

②2 Plug into the USB port when the host PC is running.

3 Please install the USB driver. This operation is needed only in the first time.

4 Please confirm the communication between the THIR and the host is successful by using communication software such as Hyperterminal or USBTerm, which is our original.

The driver can be downloaded from our secure web site.

URL: http://www.tohken.co.jp/

2.1.3 THIR-6000U as a HID

□1 Please confirm that the USB port of the host PC is available.

□2 Plug into the USB port when the host PC is running.

□3 The host PC will recognize the THIR as a human interface device.

□4 When the THIR read symbols, the data from THIR is inputted like it is done through keyboard.

2.2 Setting up the Host Computer

1) Communication Conditions

It is required to match the set up values between the THIR-6000 unit and the host computer. Please refer to Section 5.5, conditions for RS-232C setup, for the default settings.

2) Transmission Protocol

Data transactions between the reader and the host should be carried out in the prefixed communication protocol. The host side computer should be provided with the required software for this transaction control. For details of the required software, please refer to Chapter 4.

The symbol data transmitted from the THIR-6000 unit to the host computer is accepted as a **data receiving transaction**.

Command signals are transmitted from the host to the THIR-6000 unit. This is required when setting up the operation from the host.

Image data can be transmitted from the THIR-6000 unit to the host computer. Unless specifically required, leave the picture image capturing function to be “Invalid” or “Off” position.

Please feel free to call sales department for further information about communication software.

2.3 Changing the settings of the scanner

Follow the following steps to change the settings of the handheld scanner:

Connect the free side of the USB/serial cable from the handheld unit to the host computer.

If the USB interface is being used, the “New Hardware Wizard” will detect the scanner and try to find its driver. Use the USB driver that comes with the unit.

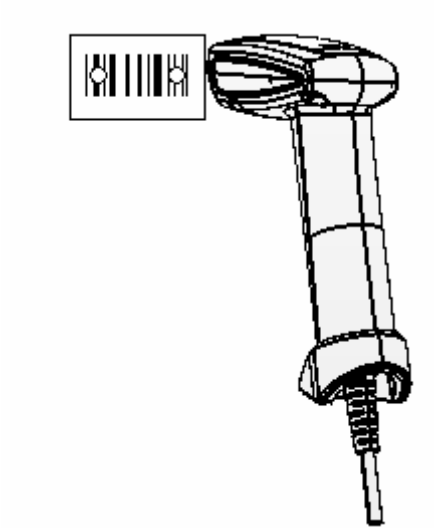
If the serial interface is being used, connect the power supply by plugging the free end dangling from the hand held to the power supply then insert the other side of the power supply to the wall socket.

You can now change the different settings of the unit by simply scanning the appropriate configuration barcodes as your application may require. (The Barcode Menu list is attached.)

3. Operation

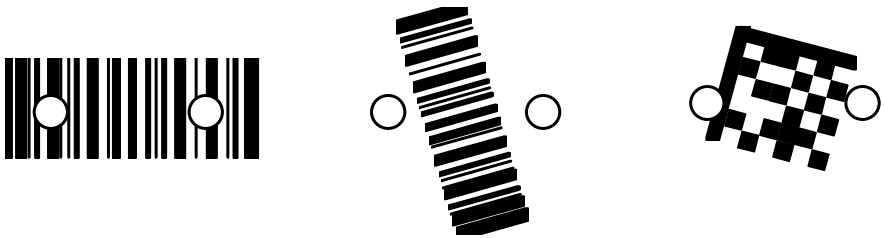
3.1 Barcode reading

- Once the user pulls the reading switch, the THIR-6000 shows two red points by LED light to indicate the proper reading area.



Note: The unit turns off the red dot-shaped laser pointer automatically after 30 seconds if there is no reading operation. Triggering the READ switch, the unit again dispalys the red laser dot.

- The unit will try to read the target symbol which is in the center of red pointers as shown in the figure below:



β• Upon completion of successful reading, the monitoring LED lights up “GREEN” and the unit beeps once.

χ• Release the reading switch.

3.2 Beeping Sounds

Event or Status of scanner	Sounds
Power ON	beeps 5 times
Succeeded in reading	beeps 1 time
Fails to transmit the data	beeps 7 times
On all the other occasions	remains silent

3.3 Image data transaction

*) THIR-6000U as a HID can not capture images.

Bitmap/image (name*.bmp, 1280 x 1024 pixel)

- Transmitting the data with serial interface takes 2 min. with baud rate 15.2Kbps (THIR-6000).
- In case of USB1.1, (THIR-6000U), transmitting the data takes approximately 10 seconds.

Notes:

A) The receiving unit should be kept “ready” when it starts receiving the data.
B) The host computer should be provided with software to receive the transmitted data.
C) The image size is changeable.

3.3 Vibration

When this unit can decode a symbol successfully, it vibrates itself.

To enable/disable this function, the setting barcode menu is available.

4. RS-232C Serial Communications

- Bar Code Data Transmission:

The unit transmits the scanned data to the host computer.

- Command Signal Receipt:

The host computer transmits the command signals to the unit and sets up the operation of the unit.

- Image Data Transmission:

The unit transmits the captured image data to the host computer.

Refer the section 5.5 for the communication parameter conditions.

4.1 Data Transaction

Data transaction setup should be accomplished with sending command from host computer. Asynchronous protocol is used for barcode data transmission and serial commands transmission.

4.2 Image Data Transaction

The communication protocol utilizes XMODEM (SUM128) in the case of the image data output.

The host side computer should be provided with the software to receive the transmitted data. The receiving unit should also be kept “ready” before receiving the data.

5. Specifications

5.1 General specifications

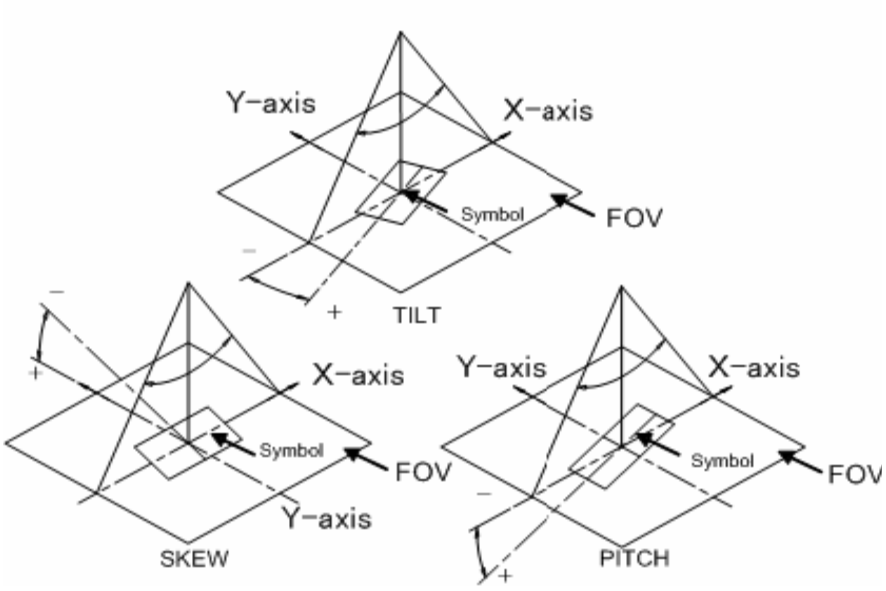
Type	THIR-6000	THIR-6000U-HID
Dimensions	150(H)×60(W)×98(D)mm	
Weight	Nearly 130 g (not include the weight of cable)	
Illumination	White LED	
Aiming beam	Red LED (peak wave length is 644nm)	
Indicator	Monitoring LED (3 colors), Vibration	
Image sensor	CMOS area sensor (1.3M pixel)	
Serial I/F	RS232C(Dsub9p)	USB1.1
Format	ASCII or Bitmap(image)	
Baud rate	1.2kbps to 115.2 kbps	-
Power requirement	5.0±5%	
Operating average power consumptions	Nearly 300 mA @5.0V	Nearly 400 mA @5.0V
Environmental specifications		
Operational Temperature	0 to 40 degrees centigrade	
Storage Temperature	-20 to 65 degrees centigrade	
Operational Humidity	35 to 85 %RH (Non-condensing)	
Storage Humidity	35 to 85 %RH(Non-condensing)	
Vibration	10 to 55 Hz(max. 4G)	
Shock	Durable multiple drops to concrete from 7ft. * The unit's outlook might be damaged somewhat.	
EMC regulatory		
Europe CE EMC Directive	Class A	
USA FCC part15, Subpart B	Class A	
Taiwan BSMI	Class A	

5.2 Functional specification

Reading Direction

- PITCH : ±35 degree
- SKEW : ±35 degree
- TILT : 360 degree
- Ambient Light : 0 to 10,000 lx

Viewing angle



Regulatory/EMC

- Europe : CE EMC Directive Class A
- United States : FCC Part15, Subpart B, Class A
- Taiwan : BSMI Class A

5.3 Reading Range/Depth

Decodable Symbols

Liner: Code39, Code128, EAN128, Codabar, ITF, JAN / EAN / UPC, RSS

Check digit calculation method:

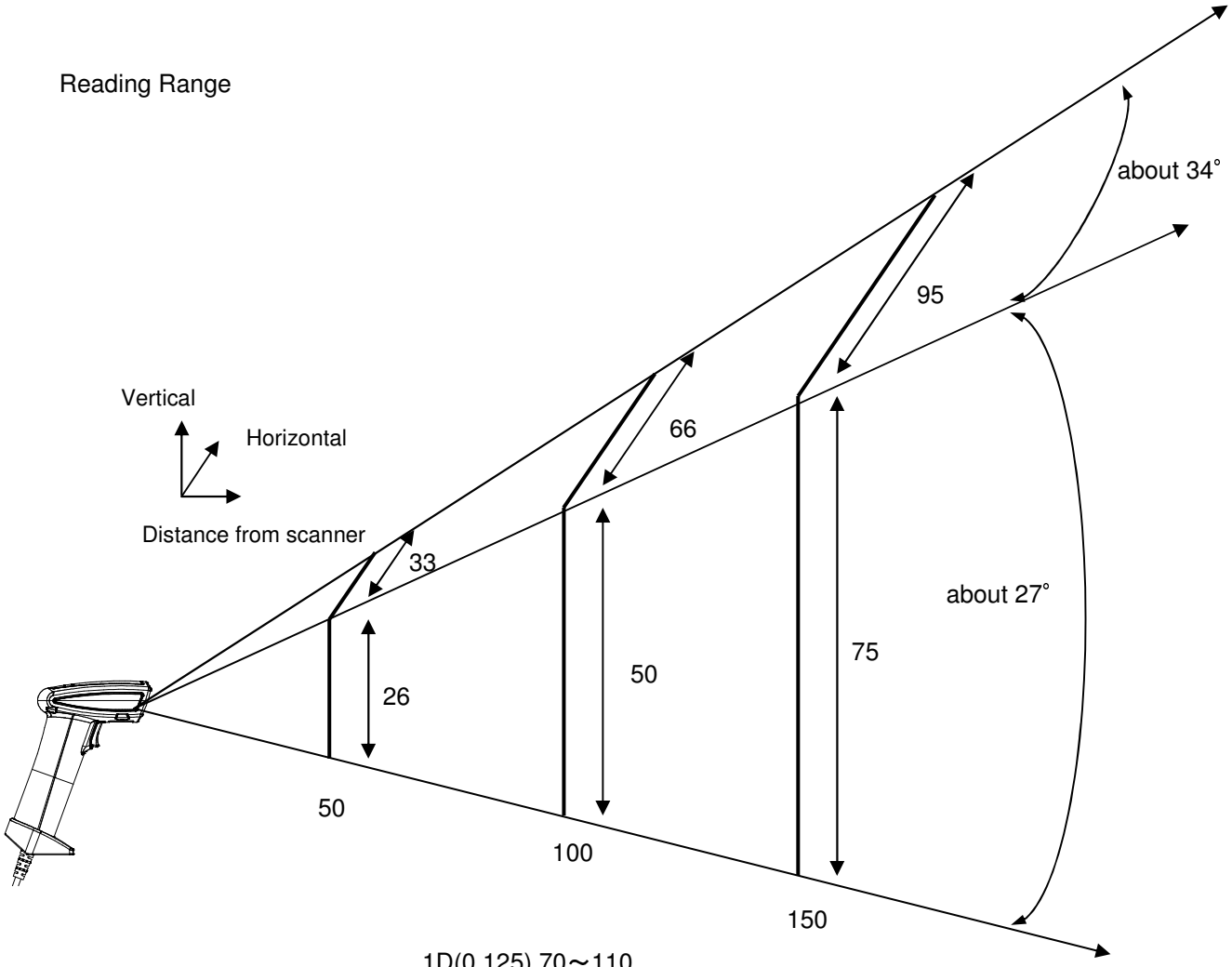
Code39	Modulus 43
Codabar	Modulus 16
ITF	Modulus 10

2-D: Data Matrix(ECC200),QR Code, Micro QR Code,PDF417, Micro PDF, Maxi Code, Composite

Reading Digit:

(Except ITF)	1～2047
(Only ITF)	2,4,6～2047

Reading Range



1D(0.125) 70～110

1D(0.15) 60～130

1D(0.25) 40～160

1D(0.33) 40～180

2D(0.167) 77～107

2D(0.25) 57～127

2D(0.33) 52～162

unit : mm

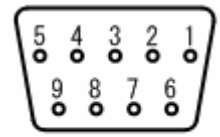
- Reading ability depends on environment (brightness etc) and the printing quality of scanned barcodes.
- Measured in 500 to 1000(lx) of homogeneous brightness, printed with good quality, no pitch and no skew.

5.4 Serial Interface

・THIR-6000

Connector pins for connecting with the host computer: D-sub 9-PIN Plug

PIN	Signal	Function
1	NC	OPEN
2	TxD	Serial Data Output
3	RxD	Serial Data Input
4	NC	OPEN
5	GND	Power Return / Signal Earth
6	NC	OPEN
7	CTS	OK to transmit INPUT
8	RTS	Demand to transmit OUTPUT
9	NC	OPEN



Pin Assignment

Note: The above is listed relative to the imager (THIR-6000) end of INPUT/OUTPUT transactions with the host.

Note: For THIR-6000U, a USB connector plug A is used

5.5 Communication settings (RS232C)

When the unit is shipped from the factory, the initial setup is as follows:

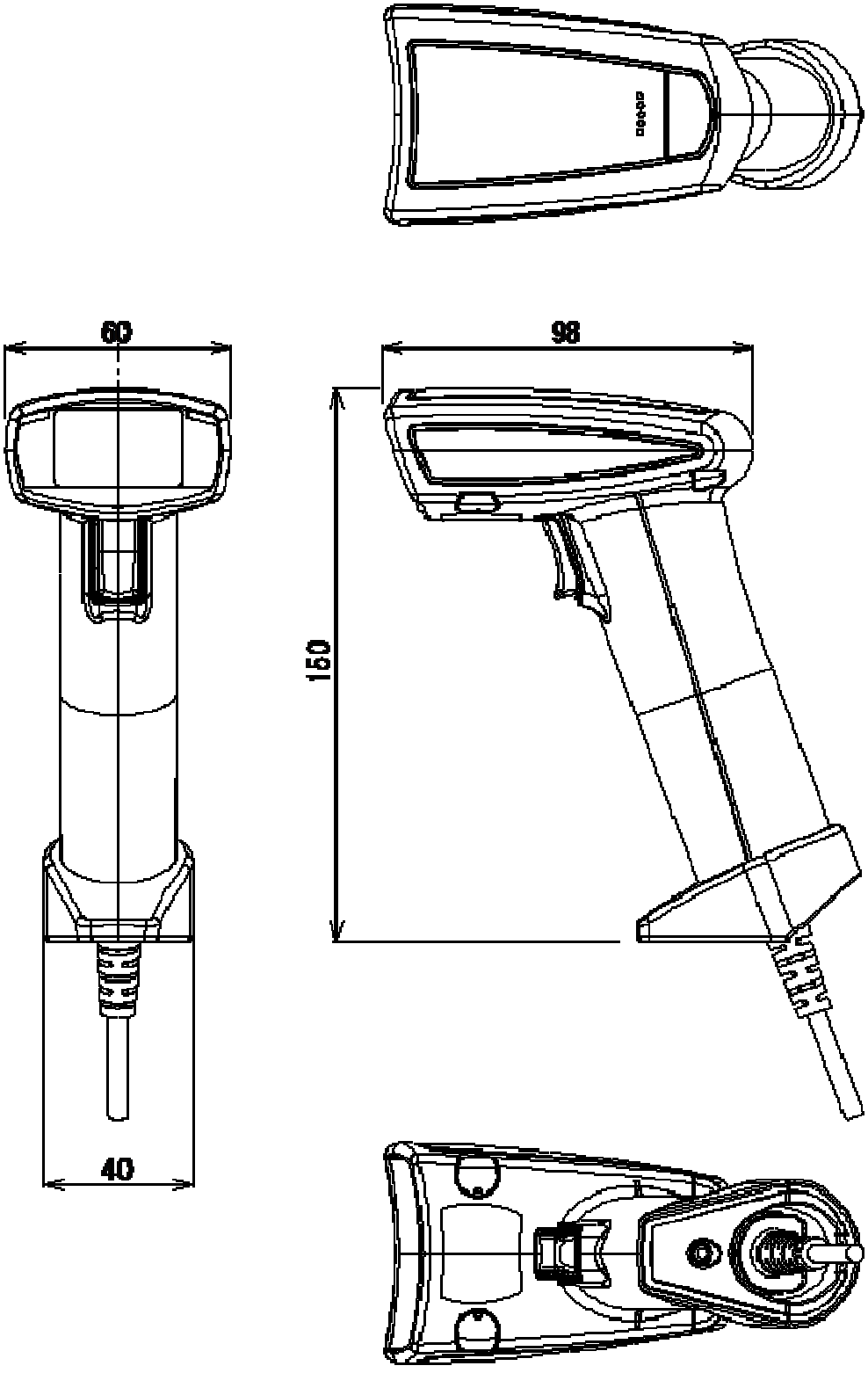
・Enabled Symbols: all symbols.

・Communication parameters:（only THIR-6000）

Baud Rate	9600 bps
Terminator	CR/LF
Header	none
Start Bit	1
Stop Bit	1
Data Length	8
Parity	none

6. Dimensions

6.1 Housing dimensions



Unit: mm

7. Specialty Function

7.1 Global Shutter

Cropping is a method to remove unwanted areas from the image to make the image small.

Following is the procedure to set up this function through the serial interface.

Confirming the cropping status

Serial Command ?IMG<cr>

<< Example of reply>>

```
******** STATUS ******** THIR-6000
 BBC=0  0:256 1:16 2:RLE 3:AVE 4:AVERLE 9:Color
 IMODE=0  PX=0  PY=0  WX=1280  WY=1024
 CAPMODE=0,0,1280,1024
 CAPX=0 ( 0:100%, 1:75%, 2:50%, 3:25% )
 CAPY=0 ( 0:100%, 1:75%, 2:50%, 3:25% )
 VMODE=0 (0:Mono 1:Color )
********* END ********** THIR-6000
System version = K85C-V1.0c
Decode version = K85A-V1.0c
```

Bolded is status of cropping.

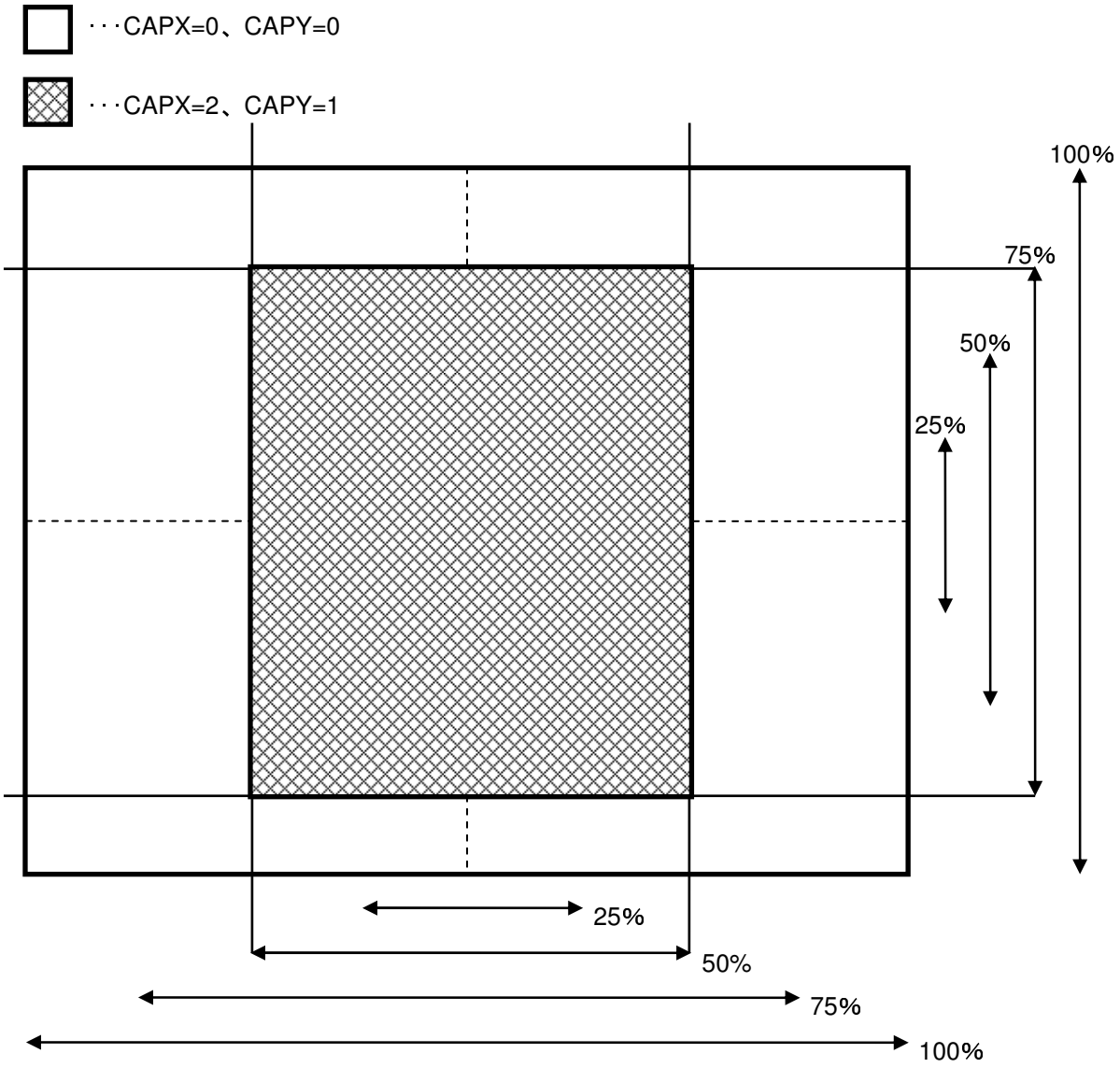
【 Setting for

Serial Command CAPX=*m*, CAPY=*n* (*m,n*=0,1,2,3)

<< Value >>

```
0…100%
1…75%
2…50%
3…25%
```

Cropping



7.2 Auto detection mode

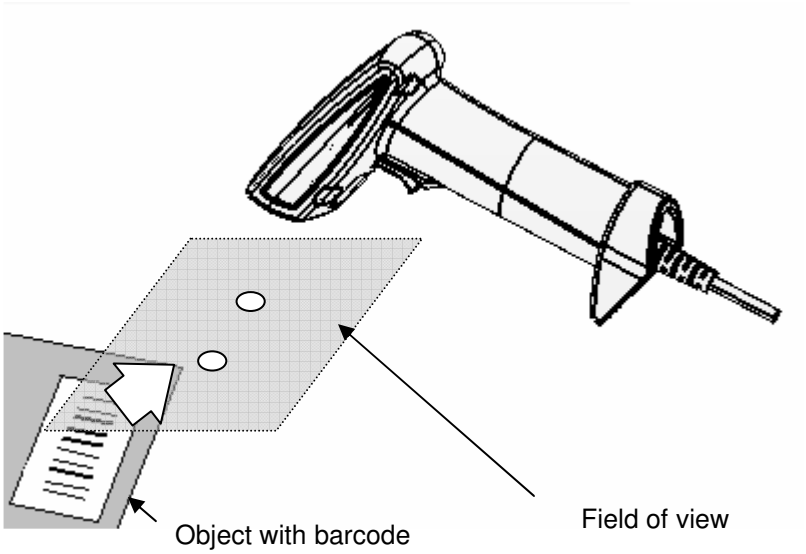
7.2.1 Overview

By using this mode, THIR-6000 can read and decode symbols automatically.
THIR-6000 detects changes of image in its field of view, like change of environmental brightness, motion of objects. When there is such a change, THIR-6000 starts to capture an image and tries to decode.

This function is designed for stand mounting use to read documents with printed barcodes. For example, it is suitable for using on the counter at post office.

CAUTION

With Auto Detection mode, trigging switch does not work.
Plus, neither does capturing an image, receiving a Hex program and executing a Macro program. Please turn Auto Detection mode OFF if those function are needed to be used.
THIR-6000 does not vibrate when it decodes a symbol successfully with Auto Detection mode regardless of current setting of the vibration.
Auto Detection mode may not work well under the too high, too low or unstable brightness.



7.2.2 How to use

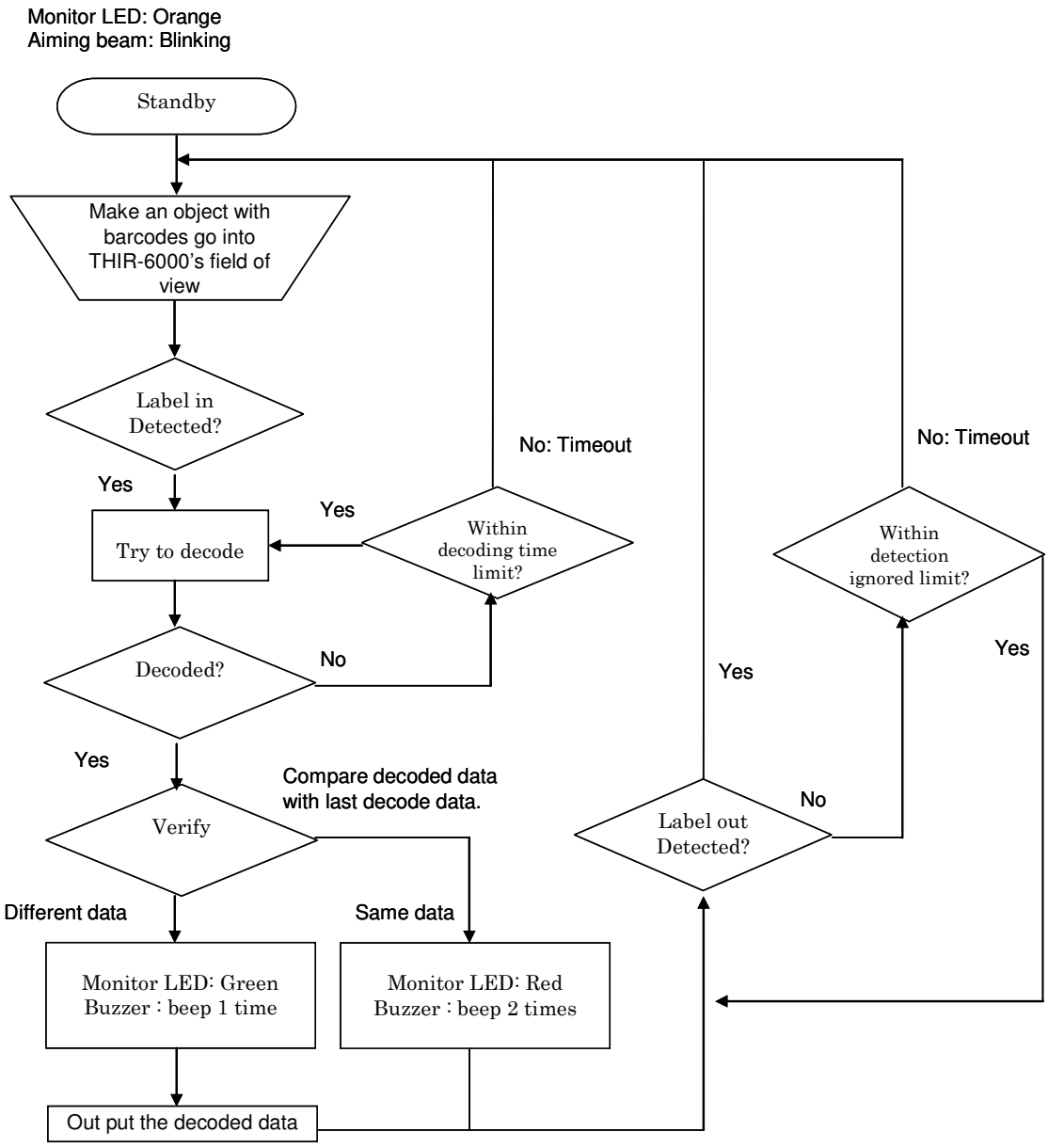
To put the THIR-6000 in the auto detection mode, please follow one of the following methods:

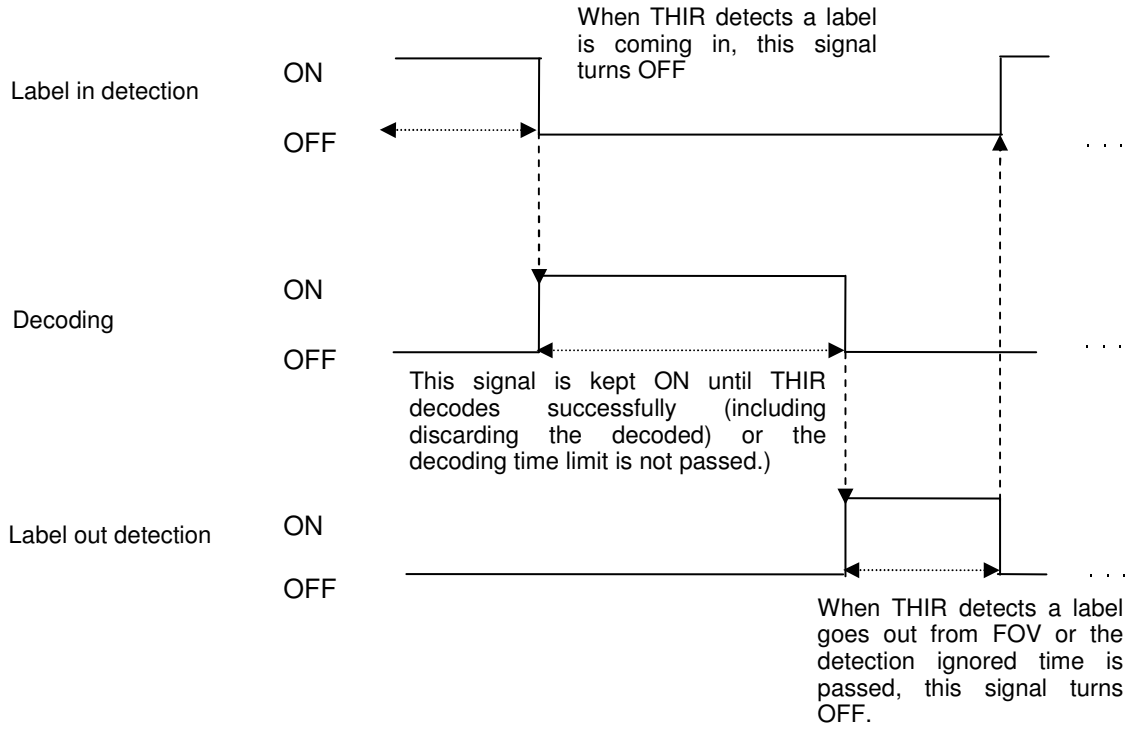
- Send the serial command "LFMODE=1<CR>" to the scanner.
- Read the corresponding barcode from the configuration barcode set.

To exit the auto detection mode, please follow one of the following methods:

- Send the serial command "LFMODE=0<CR>" to the scanner.
- Read the corresponding barcode from the configuration barcode set.

At any time, you can send the serial command "?LF<CR>" to check which mode the scanner is set to.


Monitor LED: Orange
Aiming beam: Blinking
Standby
Make an object with barcodes go into THIR-6000's field of view
Label in Detected?
Yes
Try to decode
Yes
Within decoding time limit?
No: Timeout
Decoded?
No
Yes
Compare decoded data with last decode data.
Verify
Different data
Same data
Monitor LED: Green
Buzzer : beep 1 time
Monitor LED: Red
Buzzer : beep 2 times
Out put the decoded data
Yes
Label out Detected?
No
Within detection ignored limit?
No: Timeout
Yes



Timing chart

7.3 Choosing High Speed mode or Normal mode

High Speed mode is designed to read barcodes faster. To enter this mode, please read the appropriate configuration barcode from barcode menu.

High Speed mode (default)
This mode makes THIR-6000 read barcodes faster than Normal mode. In this mode, LED aiming beam keeps blinking.

Normal mode
In this mode, aiming beam does not keep blinking. Please use this mode to make LED aiming beam stay not blinking.

7.4 High Speed mode

There are two minor modes in High Speed mode. These two minor modes can be configured by using configuration barcode.
[Mode 1]
The decoding speed for high density barcodes is preceded.

[Mode 2 (default)]
The decoding speed for normal or large size of barcodes is preceded.

8. Troubleshooting

~~7.1~~8.1 The unit does not work while pushing the read trigger switch.

Is power supply voltage within specification?

Power supply voltage should be DC 3V-6V. If the DC voltage is not within the specified range not only the unit will not operate, but there is a strong possibility of damaging the unit.

Is power supply polarity correct?

When it is connected with reverse polarity, the unit does not operate. In this case there is no damage happen to the unit.

Is the power rating of the power supply enough?

Unless the power supply capacity is enough, the reader may not operate.

~~7.2~~8.2 Barcode Cannot be Read.

Is a code setup correct?

Check the settings of the reader and that the 2D code is enabled

Is reading distance suitable?

Reading may be impossible when the reading distance is outside the working range of reading depth. Moreover the printing quality of the code may make it non-readable even if it is within the reading range limits.

Is the surface of the code glossy?

If the surface of the code is glossy, the illumination will be sometimes reflected like a mirror. To avoid this, put the scanner in angle relative to the symbol.

Is the reading window clean?

If the window becomes dirty or stained, the image taken by the reader might not be good enough for reading. Clean with a lens cleaner or similar anti-scratching (non-abrasive) method.

Is the print quality of the code good?

Please check whether print quality of the cells, code size, etc. conforms to the standard.

8.3 The data does not transmit or the data itself is corrupted.

Is the setup with host computer correct?

Please check whether the baud rate and frame format is the same as that of the host computer. If frame format differs, it may seem that data is transmitted incorrectly.

Do you set fixed digit for ITF

In some cases, cancellation of significant digits (reading it through with a few digits than a printed digits) in ITF(Interleaved 2 of 5) might be used. We recommend setting specific digit of ITF.

[Memorandum]

Warranty Obligations

This warranty obligation is limited to terms set forth below: TOHKEN warrants this hardware product against defects one year form the date of purchase.

＜Warranty Coverage＞

1. TOHKEN will repair the product at no charge, for hardware defects occurring when used in accordance with the manual and catalog, under normal operating conditions.

2. Warranty is not covered in following cases:

a.) Defects or damage as a result of improper usage or modification.

b.) Defects or damage caused by fire, pollution, abnormal voltage, or natural disasters, such as earthquake, thunderstorm or flood.

When you are not sure about repairs outside of these terms, please ask your local representative or the manufacturer.

TOHKEN CO., LTD

Head quarters

2-7-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo Japan 163-0710

Sales	03-5325-4311 to 4315
Sales Promotion	03-5325-4322

Nagoya office

4-2-12 Meieki, Nakamura-ku, Nagoya Japan 450-0002

Sales	052-565-9091

Osaka office

2-9-1 Higashi-Tenman, Kita-ku, Osaka Japan 530-0044

Sales	06-6353-5476

Fukuoka office

8-36 Hakata-eki Chuogai, Hakata-ku, Fukuoka Japan 812-0012

Sales	092-441-3638

Hitachi office

2-1-10 Hashikabe, Hitachinaka, Ibaragi Japan 312-054

Sales	029-276-9555

Field support department (Technical Center 3)

1-43-2 Tamagawa, Chofu, Tokyo Japan 182-0025

Field support	042-484-5190