Operation Manual

TFIR-31LAN series

TFIR-31LAN / -31LAN-H

Fixed mount 1D/2D Image Reader

2012/06/13

MTS MARS TOHKEN SOLUTION CO. LTD.

1st Edition

Update Information

Edition	Date	Update Contents
1st edition	2012/06/13	New release

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20120516a

Introduction

Thank you for purchasing this product.

This manual explains the specifications, setup, Installation, features, operation, and system configuration, of the TFIR-31LAN series image reader.

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

If any problems are encountered during normal use, please document it carefully to ensure our support team can accurately reproduce the situation.

The contents of this manual may change without notice. Please check our website for the most current version.

Safety notices

DO NOT disassemble. Disassembly will void the warranty and could cause damage or personal injury.

Ensure to follow all warnings or notices displayed by the host computer.

If smoke or odors begin to emit from the product, stop using and disconnect the unit immediately.

DO NOT use AC adapters other than the one recommended. Adapters with differing voltage or polarity may damage the unit.

MARS TOHKEN SOLUTION products are not designed or intended for the use as a component in life support appliances or as surgical implants nor in any other application where failure of the product could cause personal injury or death. The use of MARS TOHKEN SOLUTION products shall indemnify and hold harmless to MARS TOHKEN SOLUTION's and its shareholders against any claims of injury or death associated with unintended authorized use.

Handle with care

- DATA BACKUP

  This product has a memory backup function. This backup data restoration cannot be guaranteed if repair, reconstruction, or upgrades are performed on this product.

- DO NOT use this product at temperature or humidity ranges beyond that documented in the product specifications, or in direct sunlight.

- DO NOT expose this product to water, moisture, oil, etc.

- This product may be damaged in environments containing corrosive gas.

- DO NOT use any chemicals when cleaning.

  To clean the reading window, please follow the steps below:

  - Wipe lightly with cloth or swab (may be damp with alcohol).
  - Wipe off any residual alcohol using a dry cloth.

- This is a high-precision optical device, avoid exposing this product to excessive force such as that sustained by a drop.

Do not install electrical wiring or plugin/unplug of cable (except LAN cable) when this product is powered on. These may result in an electrical damage to this product.

Locations for operation and storage

Avoid the following locations that could cause an accident or damage to the product.

- Exposed to ambient temperature outside the rating
- Exposed to relative humidity outside the rating
- Exposed to rapid temperature fluctuations (causing condensation)
- Exposed to direct sunlight or near heaters
- Exposed to direct vibration or shock
- In the presence of dust, salt, or iron particles
- In environments where static electricity can build into siginificant charges
- In the presence of flammable or explosive gases
- In the presence of corrosive gas

Long-term storage

Store away from direct sunlight and direct vibration or shock for long term storage.
Do not store this product at temperature or humidity ranges beyond that documented in the product specifications.

Unpacking

Before unpacking the TFIR-31LAN series image reader check that there has been no damage to the packaging.

Check that the box includes the items listed below. If any items are missing or damaged, please contact your local sales representative.

Included items

Item	Qty
TFIR-31LAN series image reader	1 pcs

Table of Contents

INTRODUCTION 2

SAFETY NOTICES 2

HANDLE WITH CARE 3

LOCATIONS FOR OPERATION AND STORAGE 4

LONG-TERM STORAGE 4

UNPACKING 5

1 OVERVIEW 9

1.1 SUPPORTED SYMBOLOGIES 10

1.2 PRODUCT DESCRIPTION 11

2 CONFIGURATION 17

2.1 PREPARATION 17

2.2 READING FLOW 18

2.3 COMMUNICATION PORT SELECTION (RS232C, LAN) 19

2.4 CONFIGURATION 19

2.5 TRANSFER IMAGE DATA 19

3 OPERATION MODE 20

3.1 SINGLE READING MODE 21

3.2 READING TIMEOUT MODE 23

3.3 EXTERNAL TRIGGER MODE 27

3.4 CONTINUOUS READING MODE 29

3.5 TEST MODE 29

3.6 CYCLE BUFFER FUNCTION 30

3.7 AUTOSENSE MODE 31

4 CONFIGURATION FOR SYMBOL READING 36

4.1 CONFIGURATION PARAMETERS 36

4.2 CAMERA CONTROL MODE 39

4.3 DETAIL OF TABLE MODE 41

5 ADVANCED FUNCTIONS 43

5.1 PRESET MODE 43

5.2 OUTPUT ADDITIONAL INFORMATION 47

5.3 SAVE IMAGE 52
5.4 OUTPUT TRACE INFORMATION 55
5.5 AUTOMATIC TUNING FOR CAMERA SETTINGS 61

6 LAN(TCP/IP) CONNECTION 62

6.1 PREPARATION 62
6.2 CONFIGURE IP ADDRESS 62
6.3 DEFAULT SETTINGS 63
6.4 CHECK FOR LAN SETTINGS 65
6.5 CONNECT TO LAN 66
6.6 MANAGE COMMUNICATION STATUS 66
6.7 SERIAL COMMAND FOR LAN SETTINGS 67
6.8 INITIALIZE LAN SETTINGS 68

7 SERIAL COMMAND (RS232C, LAN) 69

7.1 COMMUNICATION 70
7.2 SYMBOLOGIES 71
7.3 SYMBOL READING 79
7.4 CAMERA CONTROL (1) (FOR FIXED GAIN AND AUTOMATIC GAIN CONTROL MODE) 81
7.5 CAMERA CONTROL (2) (FOR TABLE MODE) 82
7.6 CAMERA CONTROL (3) (FOR TABLE MODE) 82
7.7 DEFAULT TABLE SETTINGS (*) 83
7.8 IMAGE PREPROCESSING 84
7.9 PRESET MODE 85
7.10 CONFIGURATION REFERENCE 85
7.11 IMAGE OUTPUT, IMAGE SAVE 85
7.12 LAN SETTINGS 86
7.13 GENERAL OPERATION 86
7.14 TABLE OF CHARACTER CODE 87

8 SPECIFICATIONS 88

8.1 DIMENSIONS 90
8.2 INTERFACE 91
8.3 READING RANGE 93

9 EXAMPLE OF CONFIGURATION DIAGRAM 95

10 TROUBLESHOOTING 96

10.1 THE READER DOES NOT START UP OR CANNOT COMMUNICATE WITH A PC. 96
10.2 SYMBOL CANNOT BE DECODED 97
10.3 FAIL TO COMMUNICATE THROUGH TCP/IP PROTOCOL 98
10.4 AFTER GOOD READ, THE READER EMITS 7 SHORT BEEPS A FEW SECONDS LATER. 98

1 Overview

(1) TFIR-31LAN series image reader is fixed mount (stationary type) image reader capable of reading both linear (1D) bar codes and two-dimensional (2D) codes. These units incorporate the most innovative digital camera technologies, related image recognition, and processing software. The image reader can read both 1D and 2D symbols, with auto discrimination of symbol type and omni-directional (360-degree rotation) reading. This manual may also refer to 1-dimensional and 2-dimensional barcodes as “symbols”.

(2) The TFIR-31LAN series image reader has RS232C and Ethernet (10BASE-T) interface, and can be connected easily to a Windows PC.
Windows 2000, Windows XP, Windows Vista and Windows 7 are supported.

- Windows is a registered trademark or trademark of Microsoft Corporation in the United States or other countries.
- If the image reader does not work in your system environment with Windows PC, please contact your local sales representative.

(3) The TFIR-31LAN series image reader incorporates functionality to read DPM symbols (Direct part marking symbols) which are printed directly on objects such as Laser marking and Dot Peen Marking.

Image Preprocessing:

This function uses MARS TOHKEN SOLUTION’s latest image processing algorithms to improve deteriorated pictures to provide the user with the best reading performance.

Table Mode:

Combining multiple functions (Shutter Speed, Gain, Image Processing, etc), this function executes the image capture and image processing automatically in the order appointed to maximum of 8 configurations.

(4) If there are any difficulties configuring the input SYNC signal to a proper timing, please use the MAXIMG function to continuously capture images during the configuration period.

(5) The TFIR-31LAN series image reader has two types of internal illumination source as follows.

TFIR-31LAN-H : Spot illumination source and diffused illumination source
TFIR-31LAN : Spot illumination source A and spot illumination source B

1.1 Supported Symbologies

1D bar codes:

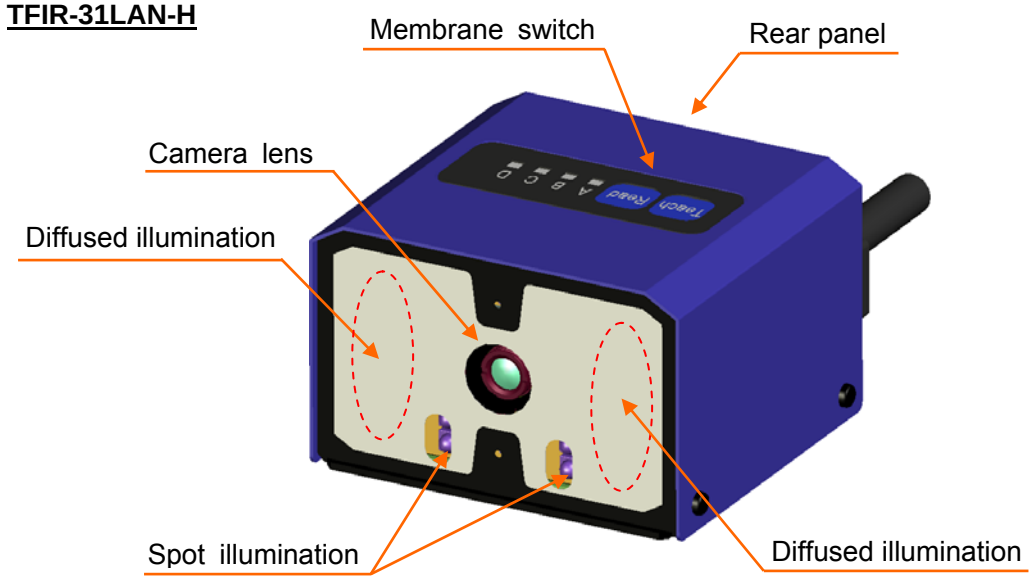
Code39
Code128
EAN128
Codabar
ITF (interleaved 2 of 5)
JAN / EAN / UPC
Code93
RSS

2D codes:

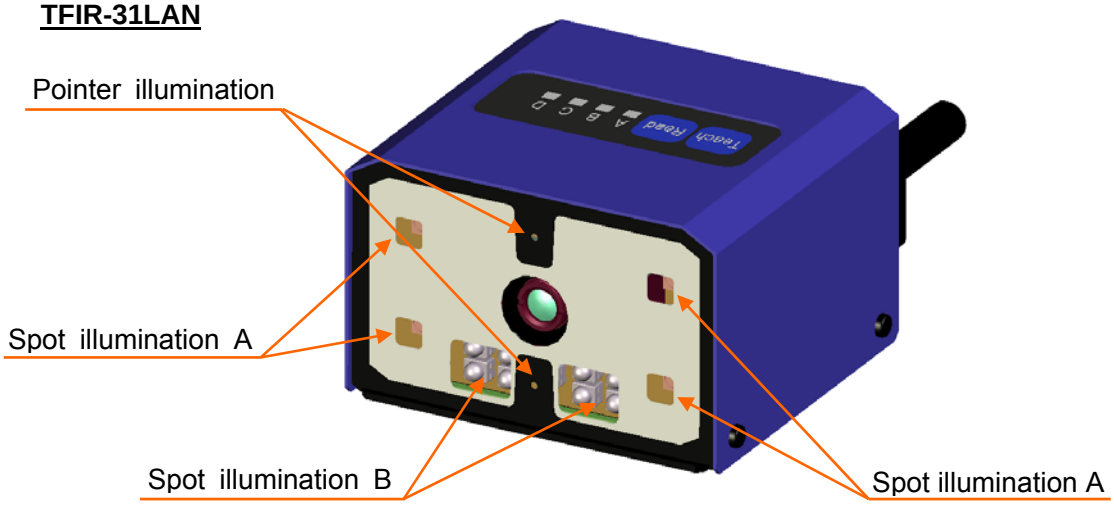
Data Matrix (ECC200)
QR Code, Micro QR
PDF 417, Micro PDF
Maxi Code
Composite
Postal (Japan Post)
Aztec Code

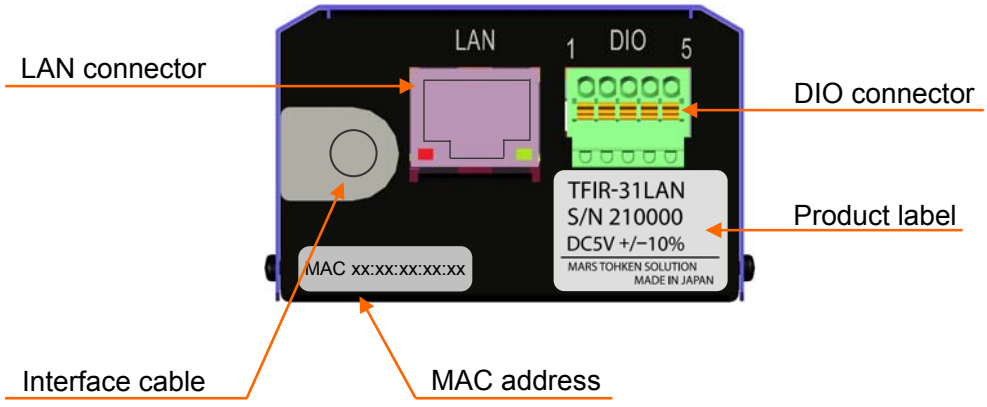
1.2 Product Description

TFIR-31LAN-H

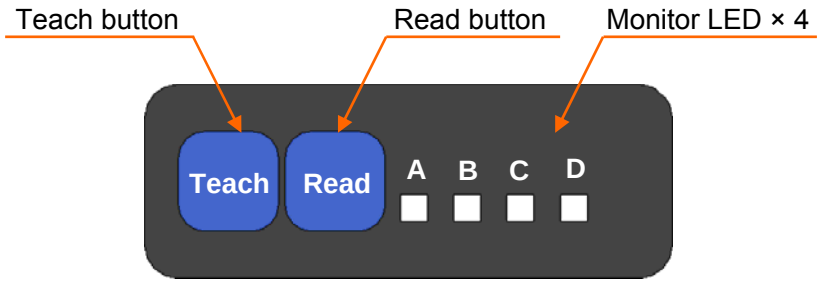


TFIR-31LAN





View from rear



Detail of membrane switch

1.2.1 Monitor LED

1.2.1.1 Function of monitor LED

LED	Color	Name	Description
A	Red	Ready	Turn on when the reader is ready to work
B	Green	Sync	Turn on when the reader receives SYNC signal
C	Green	GO	Turn on when the reader successfully reads symbol(s)
D	Red	NG	Turn on when the reader fails to read symbol(s)

Note: The function of monitor LED differs in automatic tuning mode for camera settings. Please refer to section 5.5 for the detailed information.

1.2.2 Teach button

The Teach button is used for automatic tuning (Refer to section 5.5).

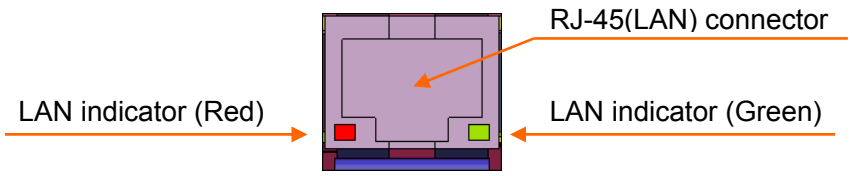
1.2.3 Read button

The Read button acts as a trigger for the reader. It is also used for automatic tuning (Refer to section 5.5).

1.2.4 LAN connector

- LAN interface (LAN)

  Send and receive data to/from host device. LAN cable is not included.



LAN indicator (Green): On when the LAN connection is established.

LAN indicator (Red): Blinking when data is being transferred.

1.2.5 DIO connector

- 2 Digital Outputs: GO, NG

  Three photo coupler isolated outputs are available.

  "GO" and "NG" are used to signal the result of decode. These signals can also be configured to be "Ready" and "Busy" by the serial command. Refer to section 7.13 General Operation for detailed information.

1.2.5.1 Detail of the GO & NG singnal

Signal name	Description
GO signal	GO signal is associated with Good Read, which is ON during the specified time set by the GOOUT command when the symbol is decoded successfully. And also this signal is OFF when starting the next reading.
NG signal	NG signal is associated with No Read, which is ON during the specified time set by the NGOUT command when the symbol is not decoded successfully. And also this signal is OFF when starting the next reading.
Ready signal	Ready signal is ON when the reader is ready for reading.
Busy #1 signal	Busy #1 signal is ON while the reader is reading (except switch chattering delay), and this signal will be OFF after decoding.
Busy #2 signal	Busy #2 signal is ON while the reader is reading (except switch chattering delay), and this signal will be OFF after transmission of the decoded data.

In the factory default settings the signals are as below:

GO → GO signal, NG → NG signal

When changing these parameters, save the settings to the internal flash memory (using the WSETS command) and turn off the power and on it again.
Using the "Busy #2 signal", make sure the settings of RSCS=1 and TCPCS=1.

- 1 Digital Input: SYNC

  This signal is used to initiate reading.

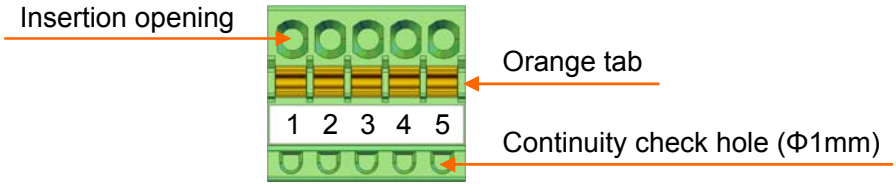
  (Sync signal can be sent by the serial command as well.)

- DIO cable assembly

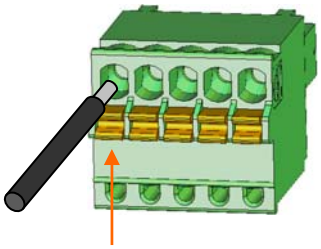
  To interface with external equipment, use an accompanying DIO-plug connector.

  - Stripped off about 8mm in length of the outer jacket of a wire, and then use a small screwdriver to hold down the small orange tab. After that, insert the wire into the insertion opening next to the tab of the DIO-plug connector.
  - The wire is locked when releasing the tab.

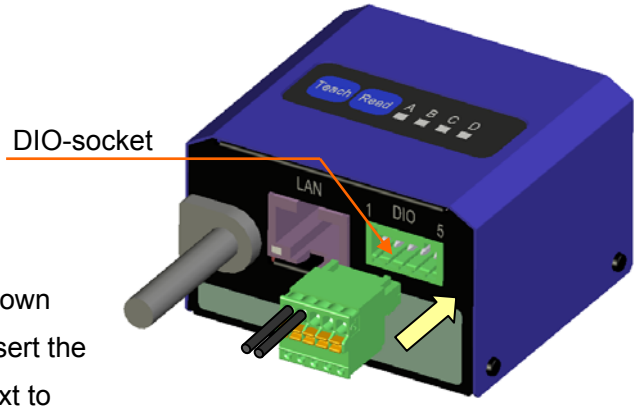
Note: The DIO-plug is attached to the DIO-socket (Factory default).



Detail of DIO-plug



Use a small screwdriver to hold down the small orange tab while you insert the wire into the insertion opening next to the tab.



Plug the DIO-plug into the DIO-socket.

Applicable wire	: AWG#20 to 26
Stripping length	: 8mm
DIO connector socket	: MC 0,5/ 5-G-2,5（PHOENIX CONTACT）
DIO connector plug	: FK-MC 0,5/ 5-ST-2,5（PHOENIX CONTACT）

DO NOT unplug the DIO-plug by grasping the cable. It may cause breaking of wire.

1.2.6 Interface cable

RS232C and power input for the reader.

- RS232C interface: RxD, TxD, CTS, RTS

  Through RS232C, the reader sends the reading data and status to the host computer. This interface also receives configuration commands from the host device.

- DC power jack

  5Vdc power is supplied from/through the optional AC adapter.

1.2.7 Internal illumination source

TFIR-31LAN-H

The spot type light source illuminates the central part of the image reader's field of view.

The diffused type light source illuminates the entire field of view.

TFIR-31LAN

The spot type-A light source illuminates the peripheral part of the field of view.

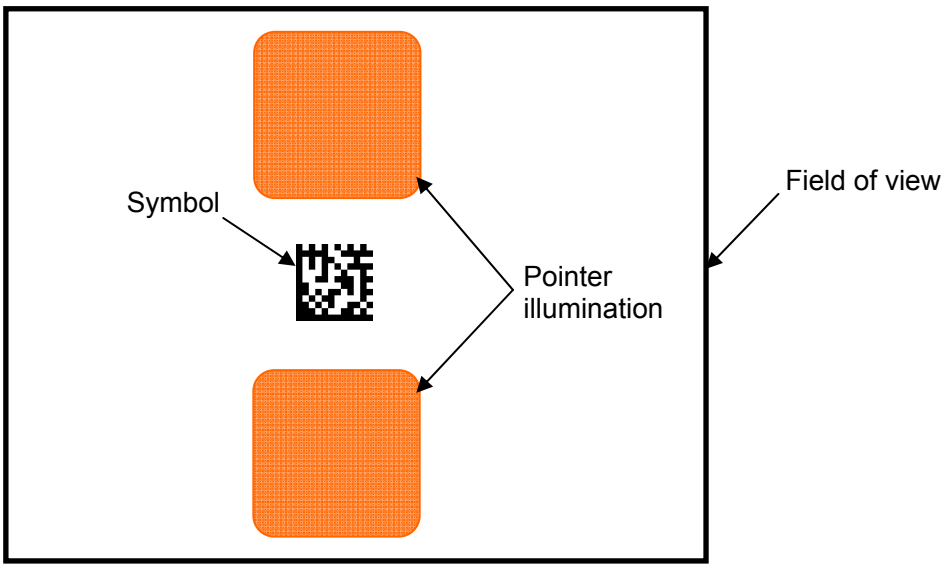
The spot type-B light source illuminates the central part of the field of view.

1.2.8 Camera lens

The reader captures images through the lens.

1.2.9 Camera and pointer illumination

Two pointer illuminations (aiming beam) indicate the central area of the image reader's field of view.



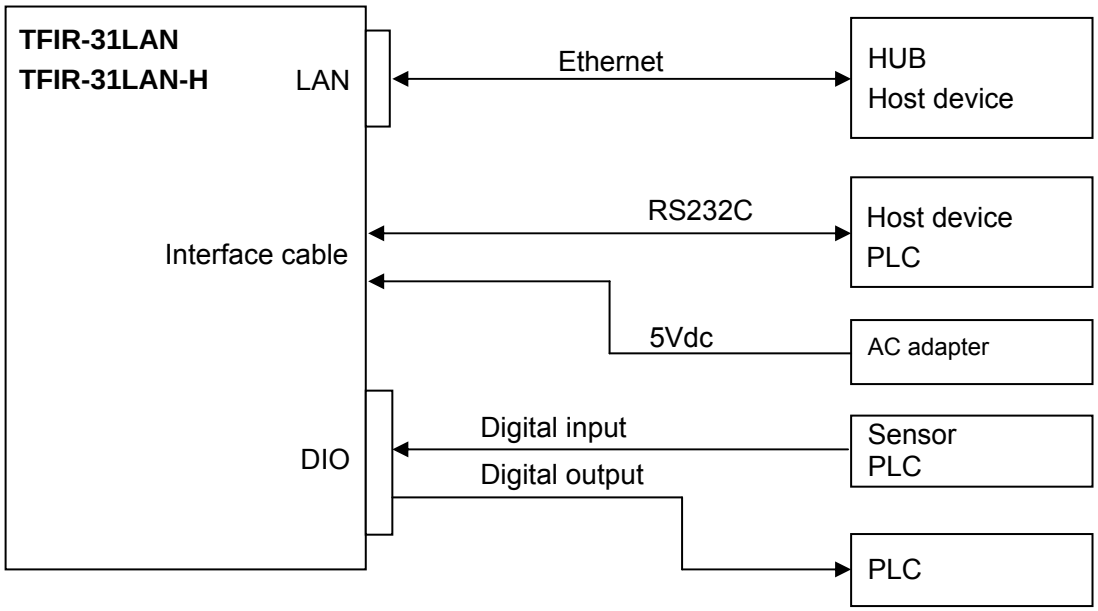
2 Configuration

2.1 Preparation

1- Establish communication between the reader and a host device. Please refer to section 2.3 Communication port selection (RS232C, LAN) for detailed information.

2- Supply power from the interface cable to the reader. The LED-A (Ready) turns on (red) if the reader is correctly powered. A combination of 2 long beeps and 3 short beeps will indicate that the reader has started up correctly.

< Block diagram of TFIR-31LAN's connection >



Refer to section 9 for example configuration.

2.2 Reading flow

1. Input a trigger signal that is one of 3 types below:
   - Serial command
   - Digital input (SYNC input)
   - Press the Read button on the membrane switch

   The LED-B (SYNC) turns on (green) and the reader start reading.

2. Result of reading

(1) Good Read

- 1 short beep
- Symbol's data will be sent through the interface (RS232C, LAN).
- Digital output "GO" is ON.
- LED-C (GO) turns on (green).

Note: The activated period of "GO" and the monitor LED-C are configurable through serial commands.

(2) No Read

- No beep
- Error code will be sent through the interface (RS232C, LAN).
- Digital output "NG" is ON.
- LED-D (NG) turns on (red).

Note: The activated period of "NG" and the monitor LED-D are configurable through serial commands.

2.3 Communication port selection (RS232C, LAN)

The communication port, which can be either RS232C and/or LAN as selected by the "COMFROM" command, is used for the following purposes:

- Receive serial commands such as reading trigger (SYNC input)
- Send the result of reading.

RS232C interface is selected as default.

Command	Description
COMFROM=0	Only RS232C (default)
COMFROM=1	Only LAN
COMFROM=2	RS232C and LAN *

Note: With COMFROM=2, the reader needs to send data through both the RS232C and LAN interfaces. If one or both of them do not receive data correctly, the reader will stop sending data until the data on the interfaces is cleared. To avoid this situation, turn off RSCS control (RSCS=0) or establish both connections correctly.

2.4 Configuration

TFIR-31LAN can be configured by sending the serial command through the communication port selected.

2.5 Transfer image data

Using "TECT for TFIR-317x" software allows the download of images from the reader. The image size is 752 x 480 pixels and is in BMP format.

The estimated transfer time through RS232C and LAN interfaces are as below:

RS232C : 60 seconds (Baud rate is 115.2Kbps)

LAN (10BASE-T) : Less than 1 second (varies due network conditions)

3 Operation Mode

TFIR-31LAN series image reader can operate in “Operational Mode” or “Diagnostic Mode”.

Operational Mode	Command	Description
Single Reading Mode	**SYNCMODE=0**	**The reader performs a single read for each SYNC input.**
Reading Timeout Mode	**SYNCMODE=1**	**The reader reads repeatedly for the duration time, set by “TOTALLIM” after the SYNC input, or reads until the decoding is successful. “TOTALLIM” is set through the serial commands (see Chapter 4 for more details)**
External Trigger Mode	**SYNCMODE=2**	**The reader reads continuously while the SYNC input is active.**
Autosense Mode	**SYMCMODE=3**	**The reader detects a symbol coming into the field of view automatically and starts reading it.**

“Read” includes capturing and decoding an image.”

Diagnostic Mode	Command	Description
Normal Mode	**TEST=0**	**Use this command to return to Normal Mode.**
Test Mode	**TEST=1**	**Use this command to set the reader to TEST mode. The SYNC signal will start the test operation.**
Continuous Reading Mode	**continue**	**Use this command to set the reader to Continuous Reading Mode. To release the reader from Continuous Reading Mode, send a “stop” command.**

Diagnostic Mode is used to configure the reader. Do not use the Diagnostic Mode in normal operation.

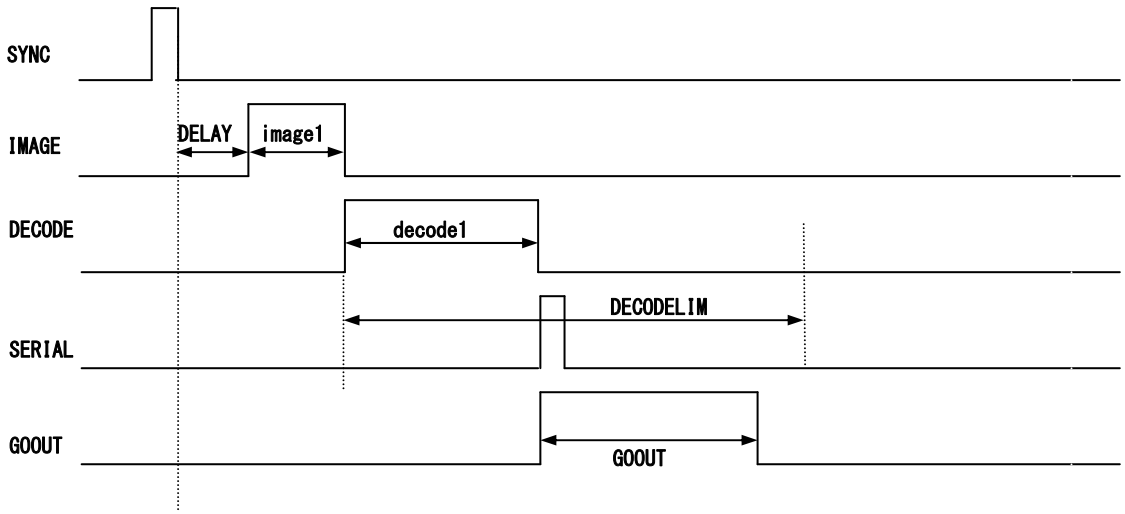
Timing Chart

DELAY:	The time from SYNC ON to reading.
CHATT:	The time needed for eliminating the chattering.
image:	The time duration for capturing an image.
decode:	The time duration for decoding.
DECODELIM:	The maximum time limit for decoding.
GOOUT:	The length of time the GO signal is asserted.
NGOUT:	The length of time the NG signal is asserted.
SERIAL:	The time the data is output through the serial interface.
MAXIMG:	The maximum number of images in the buffer.
WAITIMG:	The interval time between capturing images.

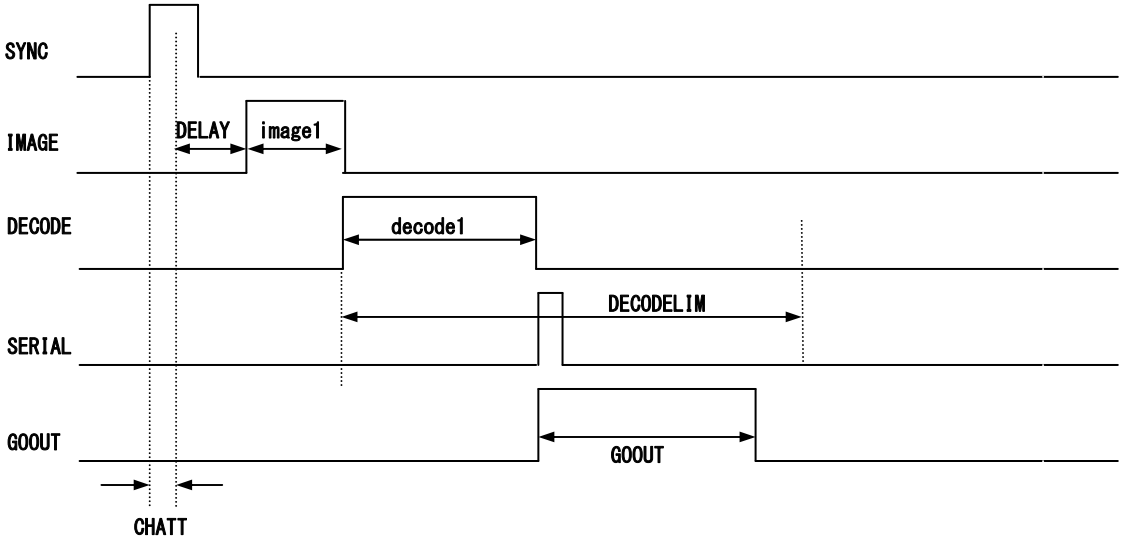
3.1 Single Reading Mode

The image reader performs a single read for each SYNC input.

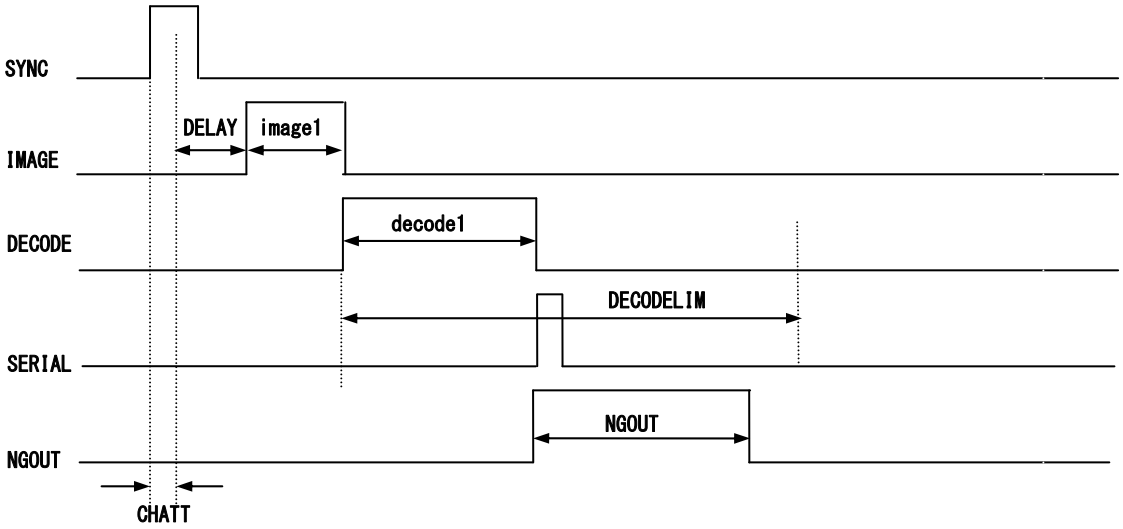
3.1.1 Soft trigger, Good Read, Data transmission: After decode



3.1.2 Hard trigger, Good Read, Data transmission: After decode



3.1.3 Hard trigger, No Read, Data transmission: After decode

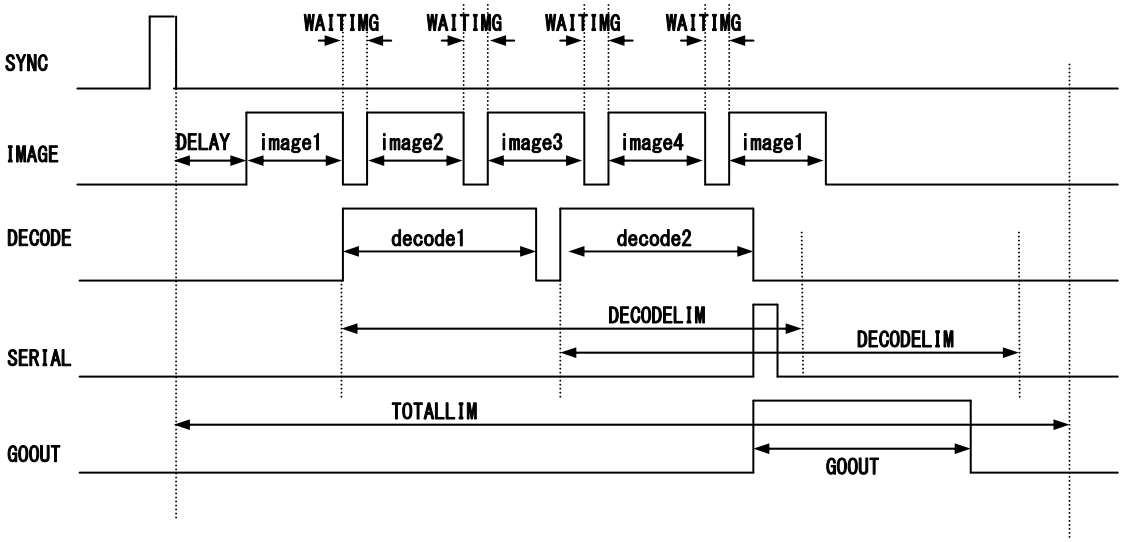


3.2 Reading Timeout Mode

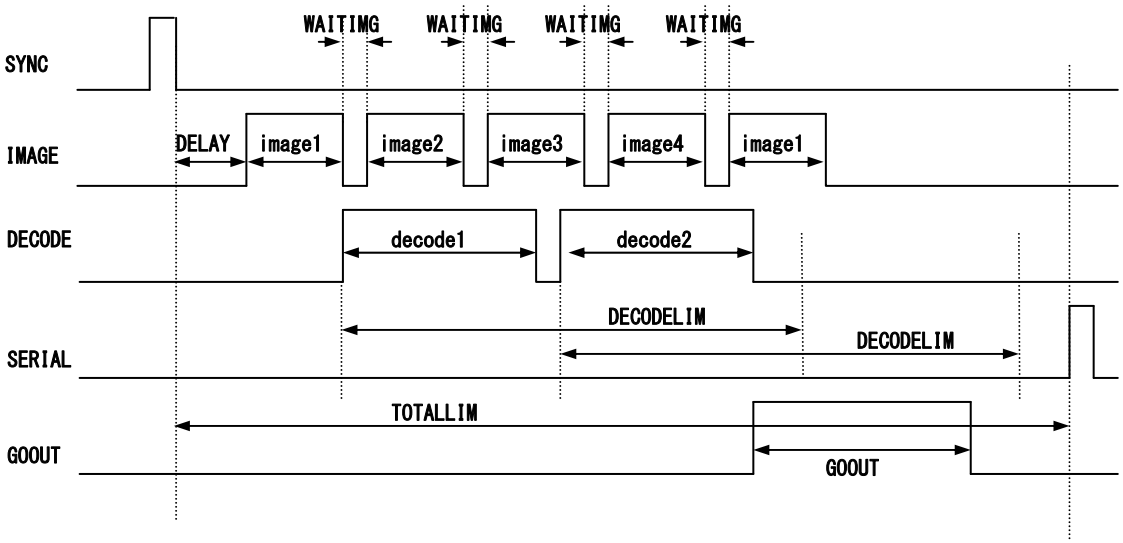
The image reader reads the symbol repeatedly during the specified time, set by “TOTALLIM” after the SYNC input, or reads until the decodeing is successful. If the reader cannot decode successfully in the specified time, the reader will stop reading and send the error code to the host.

Typically MAXIMG is set to a number greater than 1. The reader tries to decode the image while capturing.

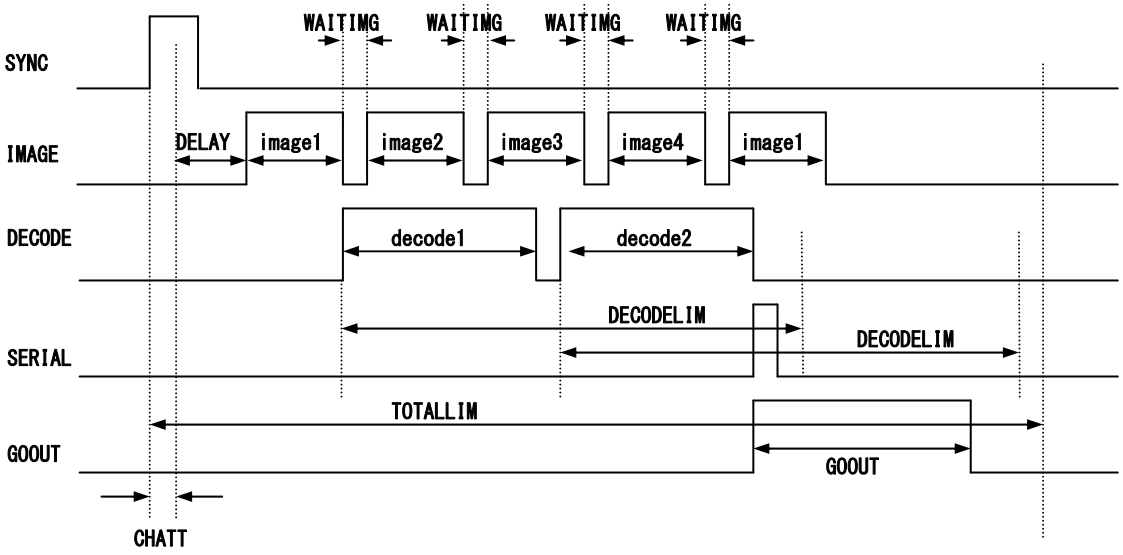
3.2.1 Soft trigger, Good Read, Data transmission: After decode



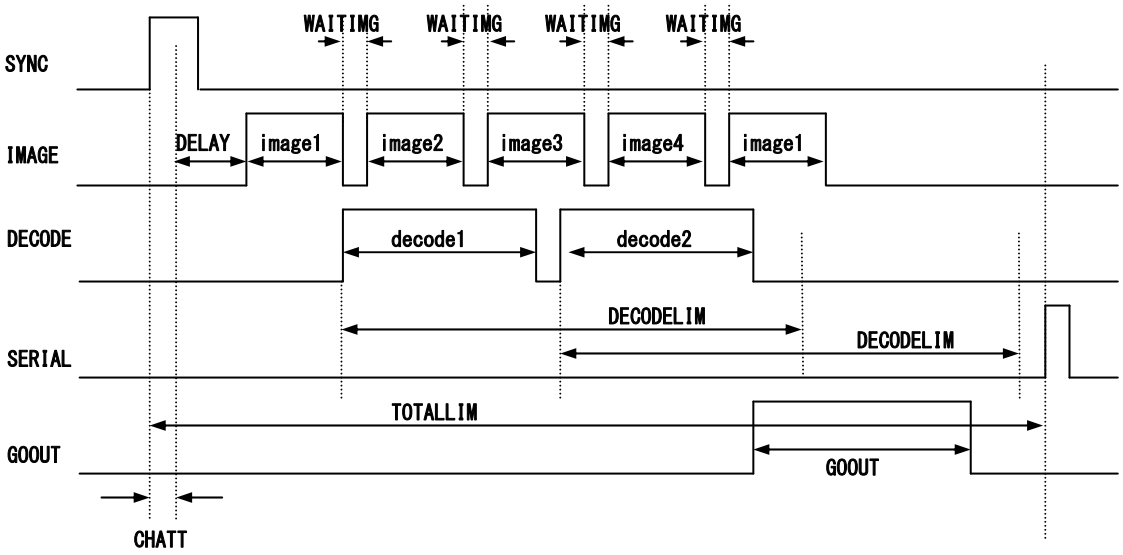
3.2.2 Soft trigger, Good Read, Data transmission: After SYNC OFF



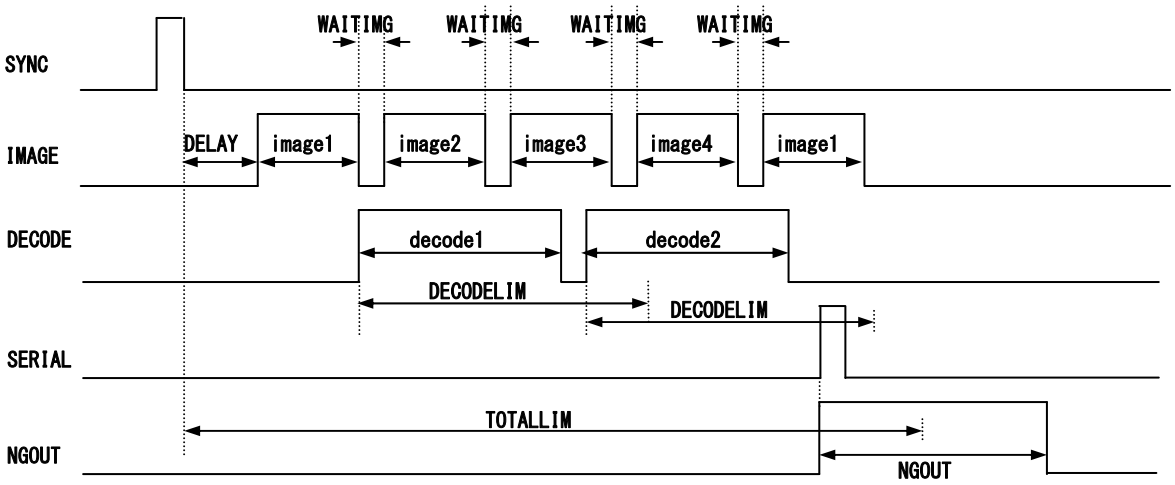
3.2.3 Hard trigger, Good Read, Data transmission: After decode



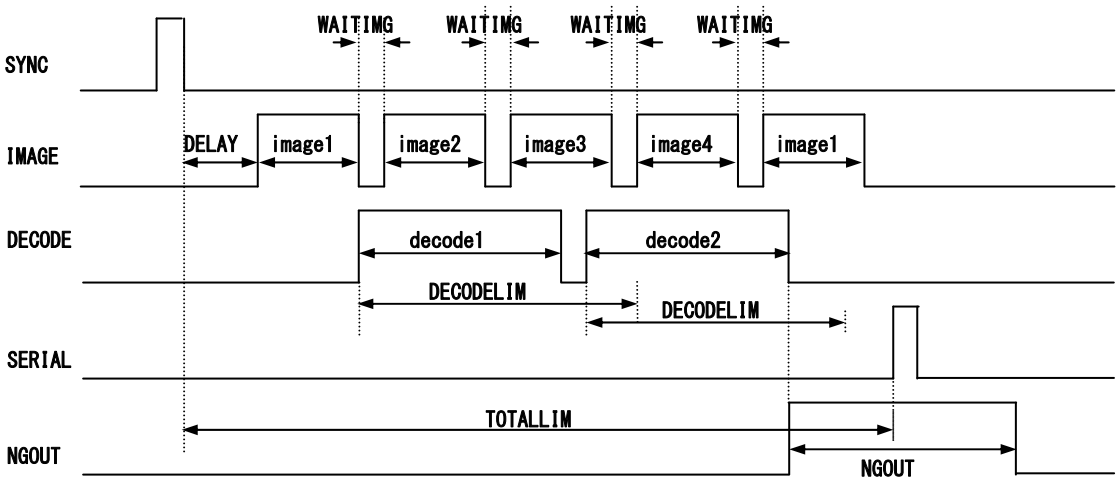
3.2.4 Hard trigger, Good Read, Data transmission: After SYNC OFF



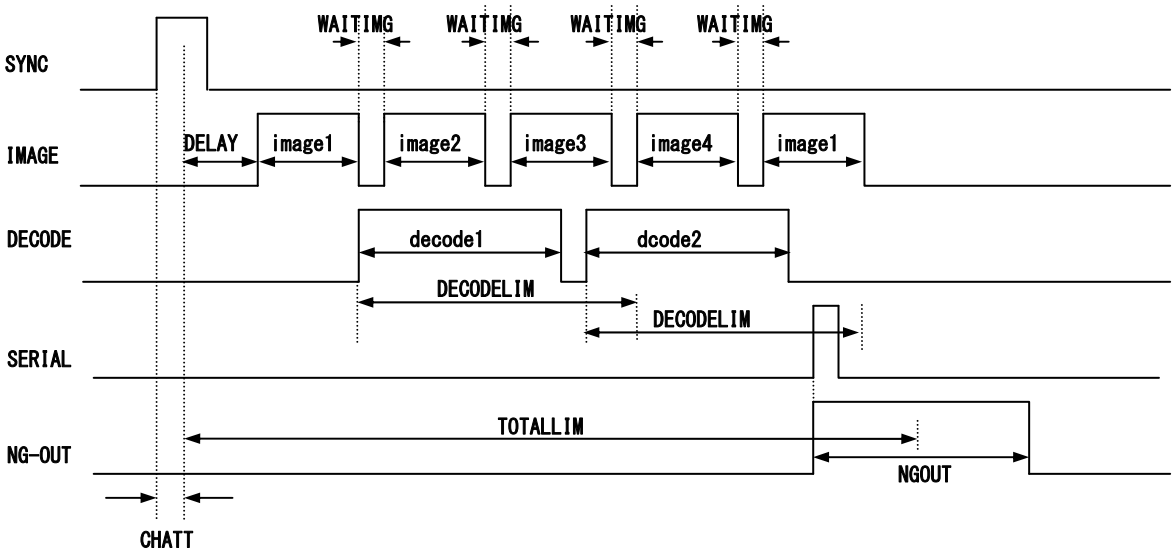
3.2.5 Soft trigger, No Read, Data transmission: After decode



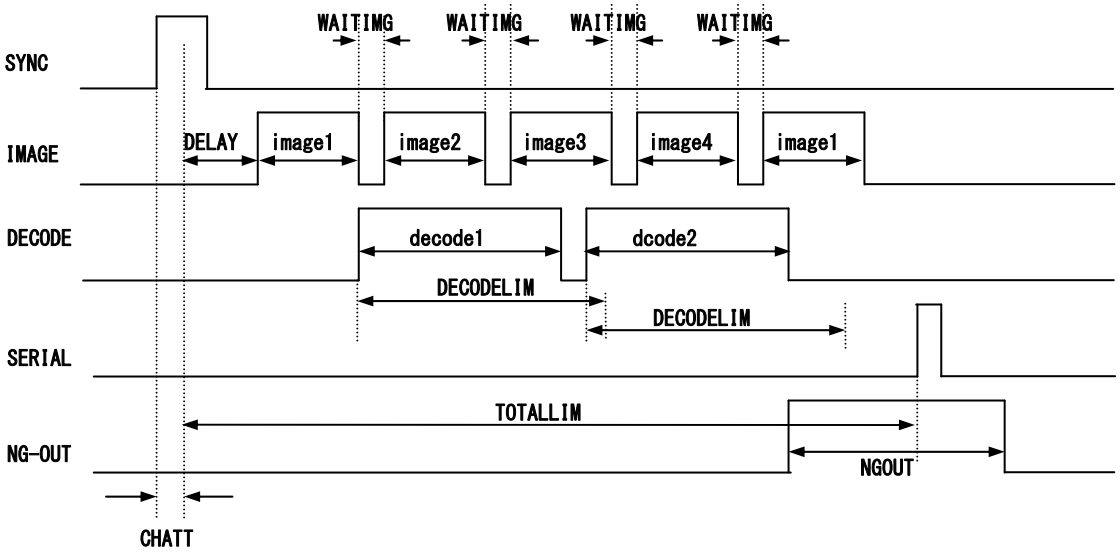
3.2.6 Soft trigger, No Read, Data transmission: After SYNC OFF



3.2.7 Hard trigger, No Read, Data transmission: After decode



3.2.8 Hard trigger, No Read, Data transmission: SYNC OFF

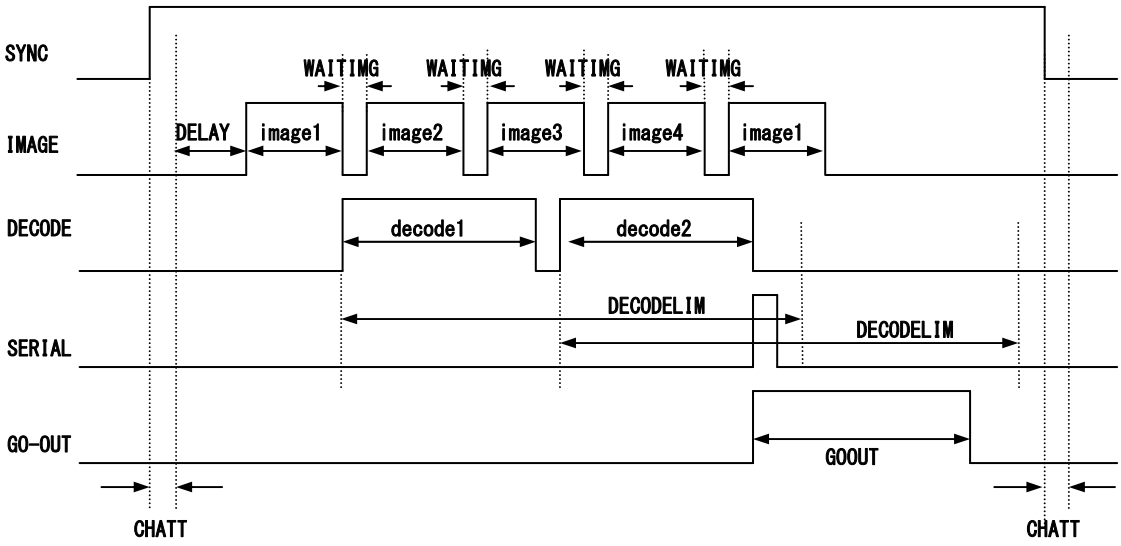


3.3 External Trigger Mode

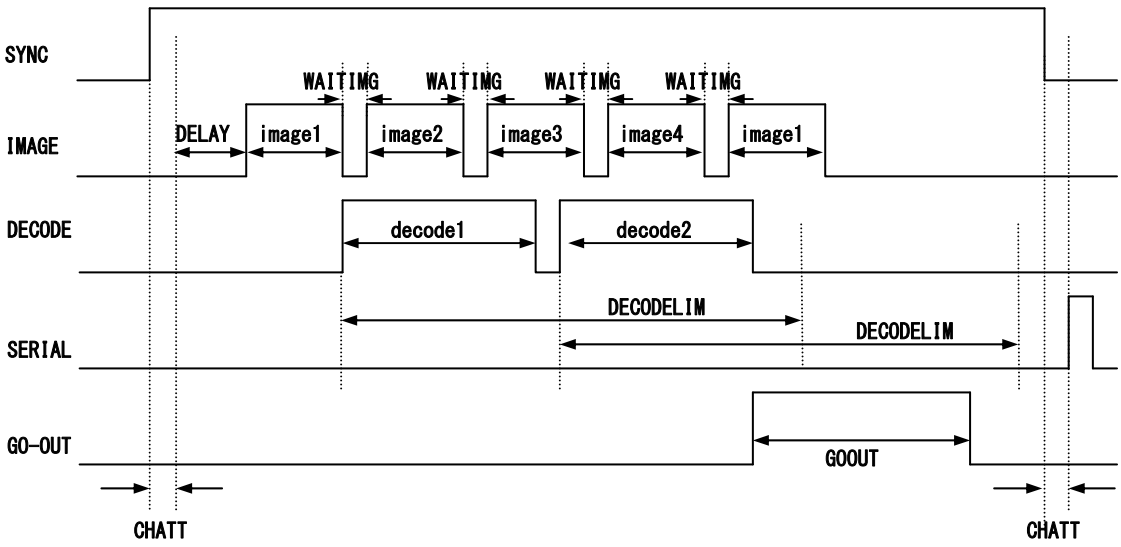
The image reader reads continuously while the SYNC input is active.

Typically MAXIMG is set to a number greater than 1. The reader tries to decode the image while capturing.

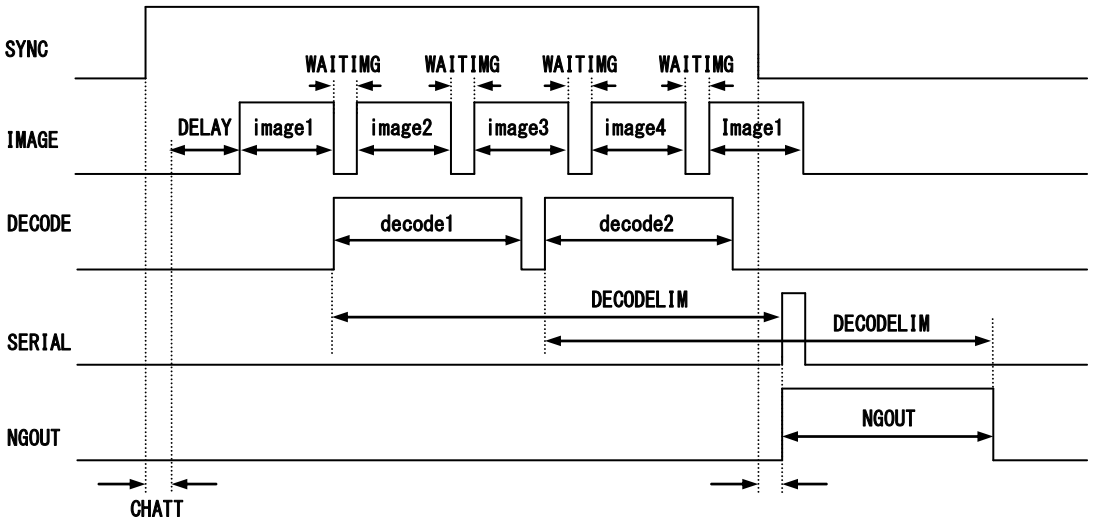
3.3.1 Hard trigger, Good Read, Data transmission: After decode



3.3.2 Hard trigger, Good Read, Data transmission: After SYNC OFF



3.3.3 Hard trigger, No Read, Data transmission: After decode or SYNC OFF



3.4 Continuous Reading Mode

In Continuos Reading Mode the reader read repeatedly. It is used for camera adjustments.

To put the reader in Continuous Reading Mode, send the serial command “continue” to the reader, and then send the serial command “g” to start reading.

To exit the Continuous Reading Mode, send the serial command “stop” to the reader.

3.5 Test Mode

In Test Mode the reader can measure the reading ratio. It is used for checking of the reading condition and stability.

To put the reader in Test Mode and start reading, send the serial command “TEST=1” to the reader.

To exit the Test Mode, send the serial command “TEST=0” to the reader.

With Test Mode, the reader will output an asterisk (*) to the host for each 10% of total number of reading. The reader will stop the Test Mode after output an asterisk 10 times.

(Example output)

```
*** TEST MODE   ***
1 2 3 4 5 6 7 8 9 10
*  *  *  *  *  *  *  *  *  *
NG      1:OK     99/SYNC    100
NG    1.00%:OK 99.00%
```

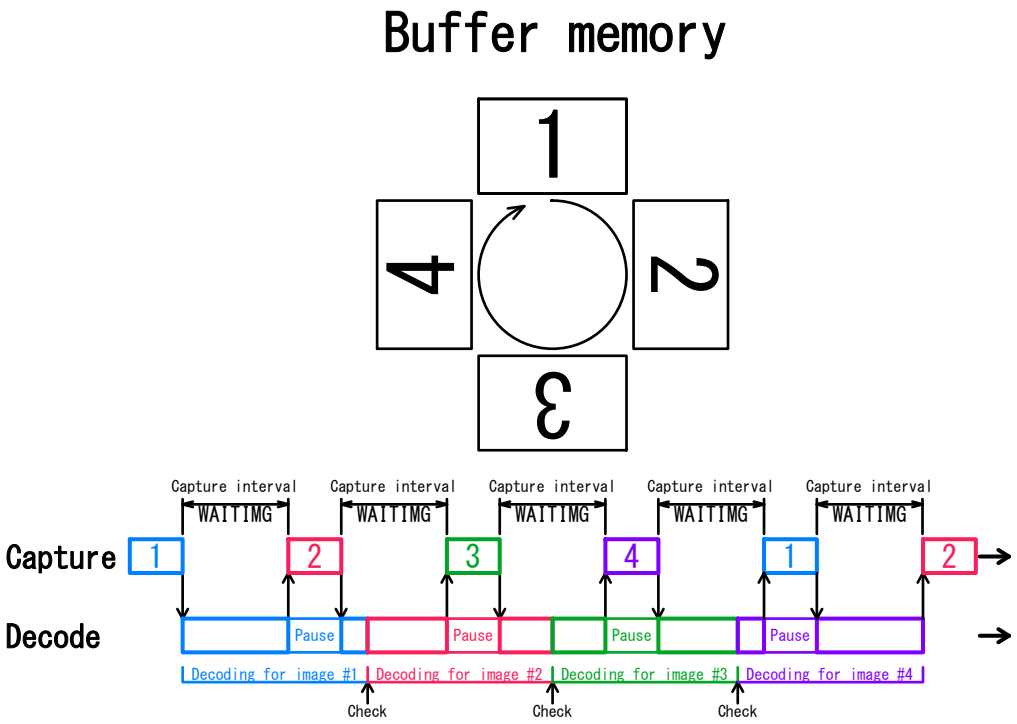
(Output format)

NGaaaaa:OKbbbbb/SYNCccccc[CR]
NGddd.dd%:Okeee.ee%[CR]

aaaaa : NG Count	(0 - 65535, maximum number is 65535)
bbbbb : OK Count	(0 - 65535, maximum number is 65535)
ccccc : SYNC Input	(NOT displayed more than 65535)
ddd.dd: NG Rate	(0.00-100.00, Displayed to the second decimal place)
eee.ee: OK Rate	(0.00-100.00, Displayed to the second decimal place)

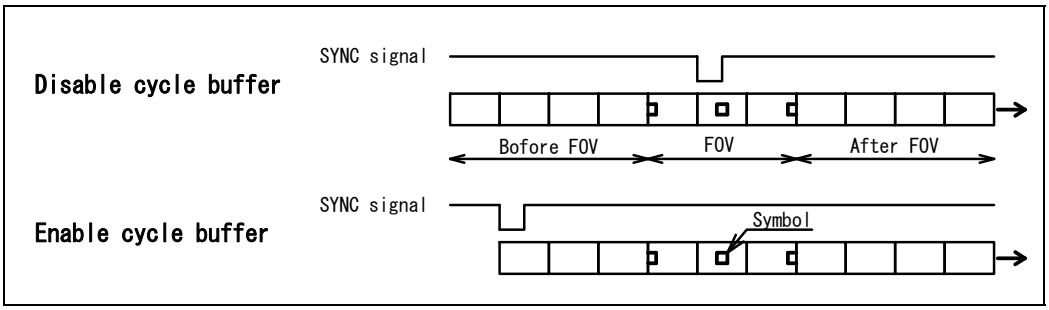
3.6 Cycle Buffer Function

In SYNCMODE=1 (Reading Timeout Mode) or SYNCMODE=2 (External Trigger Mode), the Cycle Buffer Function is enabled when the MAXIMG number is greater than 1 (default is 4). Set with the MAXIMG command. If the Cycle Buffer Function is enabled, the reader captures multiple images after receiving the SYNC signal and then stores the images to the buffer memory (up to 4 images). The reader starts decoding from memory location #1, if it is not successful, the reader will attempt to decode the image stored in memory location #2. The decoding is attempted during the interval between capturing images. When the buffer memory reaches the final location, the next image will be stored into buffer memory location #1 if the reader has finished decoding that image. If the reader has not finished with that image, it will wait until the decoding has finished.



How to use

Input the SYNC signal before the symbol comes into the reader's field of view. If the decoding is not successful, please adjust the timing of SYNC signal and the interval (WAITIMG command).



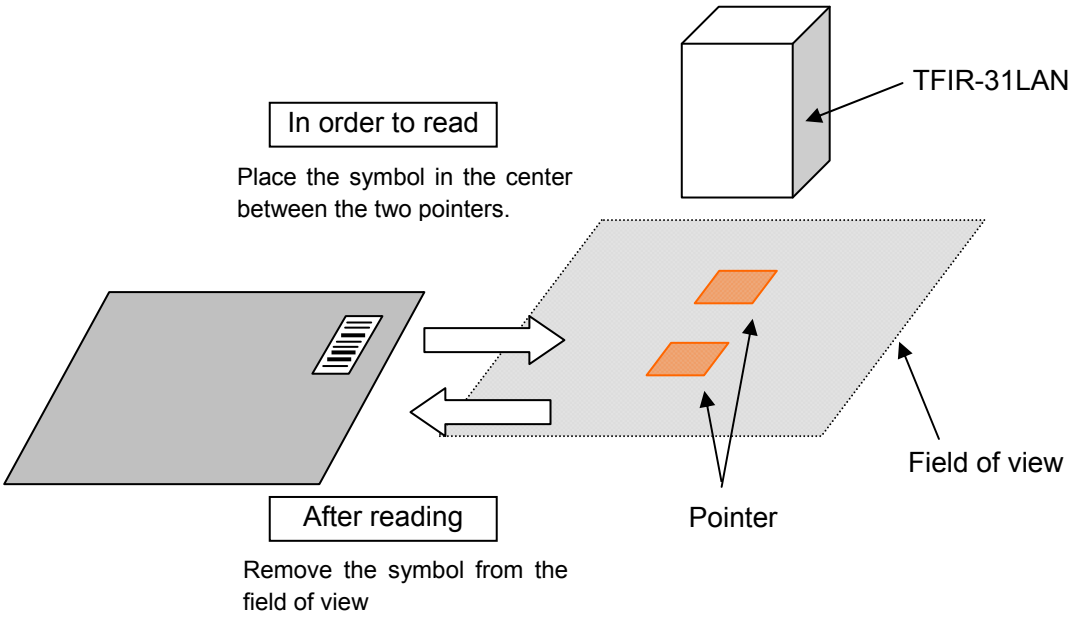
3.7 Autosense Mode

In Autosense Mode the TFIR-31LAN can detect and decode symbols automatically. The TFIR-31LAN detects changes in its field of view, such as changes of environmental brightness or the motion of an object, the TFIR-31LAN begins capturing images in an attempt to decode a symbol.

This function is suitable for reading a symbol printed on a document in the case of inserting it in the field of view manually or reading a symbol without using of any detection sensors.

With Autosense Mode, neither the trigger input through serial command nor digital input affects on the reader. Other functions such as capturing an image, receiving a Hex file and executing a Macro program, and putting the reader in Continuous Reading Mode or Test Mode are disabled during Autosense Mode. Please turn Autosense Mode OFF if any of the disabled function are needed.

3.7.1 How to use



To put the TFIR-31LAN in Autosense Mode,
send the serial command "SYNCMODE=3" to the reader.
To exit the Autosense Mode,
send the serial command "SYNCMODE=0 (or 1 or 2) " to the reader.

#1 The reader waits for a symbol to come into the field of view.

#2 Place the symbol in the center between the two pointers.

#3 The reader detects the motion of an object in its field of view, it starts reading the symbol on the object.

#4 In case of Good Read, the reader will send the decoded data and turn on LED-C (green) and GO signal (digital output).

#5 In case of No Read, the reader will send the error code and turn on LED-D (red) and NG signal (digital output).

#6 The reader is set in LFVERIFY=1 (double-read prevention), it will not send decoded data and GO/NG status, and it will not increment the counter of SYNC signal.

#7 The reader will stop reading if it cannot decode successfully within the decode timeout (default is 5 sec).

#8 After reading, remove the symbol from the field of view.

#9 When the reader detects the object goes out from the field of view, the reader goes back to #1. It is the same when the reader detects absence of the object within the detection ignored time (default is 0.5 second). In case the object goes out while reading or is left in the field of view after reading, the reader stops reading when the decode timeout is passed (#7).

3.7.2 In case the reader cannot read symbols in Autosense Mode.

Please remove the object from the field of view and wait until the pointer starts blinking, and then place it in again (step #1 in section 3.7.1).

3.7.3 Serial command

Please refer to section 7.3 Symbol Reading for the serial commands related to Autosense Mode.

3.7.4 Enable/Disable Autosense Mode

Enable : SYNCMODE=3

Disable : SYNCMODE=0 or 1 or 2

3.7.5 Detection ignored time **[LFMOVELIM]**

In case the object remains at the position beyond the time limit after reading, the reader will handle as the object goes out from the field of view and start next reading.

If the time limit is set short, please remove the object from the field of view immediately. If the reader takes long time to remove it due to large object size, please set the time limit longer.

3.7.6 Decode Timeout **[TOTALLIM]**

If the reader cannot decode a symbol successfully within the timeout, the reader will stop decoding. In case the reader takes a long time to decode symbols which contain a large amount of data, the timeout should be set longer. On the other hand, in case the data amout is small, the timeout can be set short.

3.7.7 Sensitivity against brightness **[VSENSE]**

The value of the sensitivity should be set higher in case the reader tends to miss the object coming into the field of view. On the other hand, the value should be set lower in case the reader is highly sensitive to detect motion change of the object.

3.7.8 Double-read prevention **[LFVERIFY]**

When the reader reads the same symbol again within the specified time, the second read will be ignored.

3.7.9 Double-read prevention time **[LFVWAIT]**

This setting is for LFVERIFY.

3.7.10 Illumination setting with Autosense Mode **[LFLIGHT]**

The reader flashes the internal illumination in Autosense Mode if this setting is enabled.

3.7.11 Output the status of Autosense Mode

?LF[CR] : Output the status of Autosense Mode

(Example of output)

******** STATUS ******** TFIR-31LAN
LFMOVELIM=2 (0:100ms 1:300ms 2:500ms 3:1000ms
4:1500ms 5:2000ms 6:2500ms 7:3000ms)
LFVERIFY=1 (0:OFF 1:ON) LFVWAIT=6 (x500ms 1-40)
LFLIGHT=1(0:OFF 1:ON)
VSENS=2 (0-4)
********* END ********** TFIR-31LAN
System version = M21C-V1.0a
Decode version = M21A-V1.0a

Note: TOTALLIM can be checked in the status of ?4.

?4

******** STATUS ******** TFIR-31LAN
MODE=0 0:normal 1:image-out
3:OK,NG 4:OK 5:NG
SYNCMODE=1 0:normal 1:time out 2:hard trig
TEST=0 (0:normal 1:test mode)
TMN=10 TEST=1;n-times(10-1000)
DECODELIM=500 100-10000 step10
TOTALLIM=5000 100-30000
DTTX=0 0:non 1:add(****ms)

[…]

POINTER=1 (0:OFF 1:ON)
********* END ********** TFIR-31LAN
System version = M21C-V1.0a
Decode version = M21A-V1.0a

4 Configuration for symbol reading

4.1 Configuration parameters

The following parameters are set to get decodable images:

(1)	Decode area	[DDMwindow]
(2)	Illumination control	[DDMlight]
(3)	Internal illumination	[DDMled]
(4)	Illumination intensity	[DDMbrightness]
(5)	Shutter speed	[DDMshutt]
(6)	Extra gain value	[DDMexgain]
(7)	Black level adjustment	[DDMblack]
(8)	Image preprocessing	[DDMpreproc]
(9)	Mirrored symbol	[DDMmirror]

4.1.1 Decode area

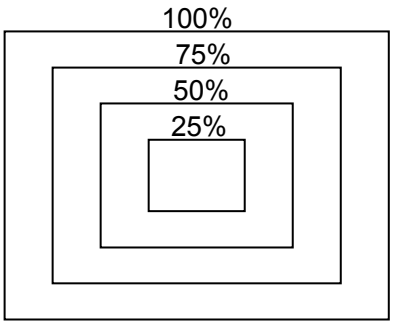
(1) Decode area **[DDMwindow]**

Decode area is used to specify the the area of the image to be decoded (Shown below). Smaller decode area can lead to a faster decoding speed, but smaller areas may make it difficult to position the symbol within the smaller decode area.

Horizontal:	100% (752)	75% (564)	50% (376)	25% (188)
Vertical:	100% (480)	75% (360)	50% (240)	25% (120)

DDMwindow=a,b (a, b=0,1,2,3 0:100%,1:75%,2:50%,3:25%)

a: for Horizontal, b: for Vertical



Sketch of decode area

Generally, a smaller reading area will lead to a shorter decode time. However if the reading area is too small, the reading ratio could be decreased due to the smaller margin between code size and the decoding window size.

4.1.2 Illumination

(2) Illumination control **[DDMlight]**

DDMlight=a (a: 2,3)

2: Turn Internal illumination OFF when capturing an image.
3: Turn Internal illumination ON (with pulsed operation) when capturing an image.

(3) Internal illumination source **[DDMled]**

DDMled=c,b (c,b: 0,1)

TFIR-31LAN-H

c 0: Disable spot illumination
1: Enable spot illumination
b 0: Disable diffused illumination
1: Enable diffused illumination

TFIR-31LAN

c 0: Disable spot illumination B
1: Enable spot illumination B
b 0: Disable spot illumination A
1: Enable spot illumination A

(4) Illumination Intensity **[DDMbrightness]**

DDMbrightness=a (a: 0 to 50)

Adjust the illumination intensity from 0 to 50 (0: Off to 50: Brightest).

4.1.3 Shutter speed

(5) Shutter speed **[DDMshutt]**

Configure the shutter speed of the reader's camera module. This parameter affects the brightness of the images taken by the reader. To make the image brighter, the shutter speed can be lowered, but low shutter speeds may introduce motion blur into the image.

DDMshutt=a (a: 0 to 8)

0: 1/60 (second),
1: 1/125,
2: 1/250,
3: 1/500,
4: 1/1000,
5: 1/2000,
6: 1/4000,
7: 1/6000,
8: 1/8000

4.1.4 Extra gain value

(6) Extra gain value **[DDMexgain]**

Extra gain value also affects the brightness of the images taken by the reader. While a higher extra gain value will brighten the image, it could also introduce noise at the higher settings.

DDMexgain = a (a: 1 to 15)

4.1.5 Black level adjustment

(7) Black level adjustment **[DDMblack]**

The black level can improve the contrast of the images taken by the reader by controlling the black level of the CMOS sensor. Better contrast can lead to a higher reading ratio. However higher black level will make the image too dark for optimal decoding.

DDMblack=a (a: -127 to 127)

4.1.6 Image preprocessing

(8) Image preprocessing **[DDMpreproc]**

Image processing filters are available for difficult to decode symbols. Under certain circumstances enlarging, black/white reversal, or applying contrast enhancement will increase the decodability of the images captured. Please refer to section 7.8 Image Preprocessing for more imformation.

4.1.7 Mirrored symbol

(9) Mirrored symbol **[DDMmirror]**

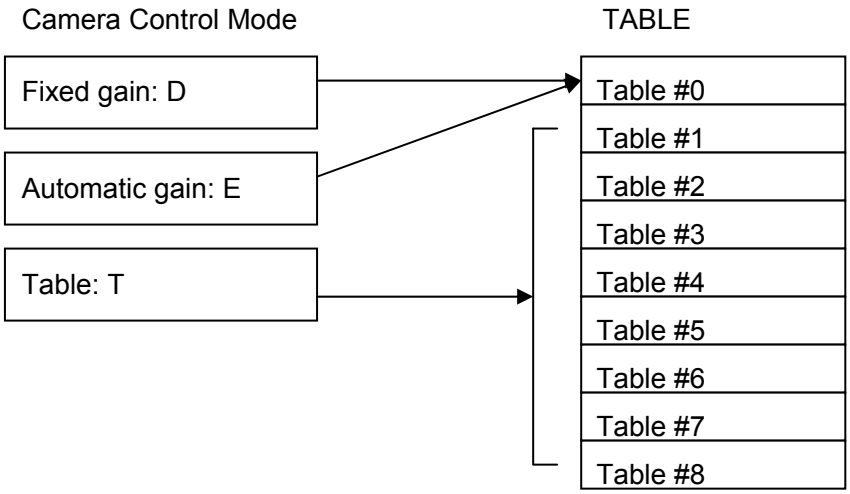
The reader can decode symbols that are mirrored by settings the DDMmirror command appropriately.

DDMmirror=a (a: 0 to 3)

0: Read only normal type (not mirrored)
1: Read only mirrored type
2: Read normal type and if it fails, try to read it as mirrored type
3: Read mirrored type and if it fails, try to read it as normal type

4.2 Camera Control Mode

The TFIR-31LAN series image reader can store multiple settings in TABLE. The TABLE consists of 9 tables (#0 to #8). In “AGC=D” (Fixed Gain Mode) and “AGC=E” (Automatic Gain Control Mode), the reader uses Table #0. In “AGC=T” (Table Mode), the reader uses Table #1 to #“n”. The “n” can be configured by ENABLEDDMTBL=n command.



■Fixed Gain Mode **[AGC=D]**

In Fixed Gain Mode, the reader uses only Table #0 settings. The settings in Table #0 will not be changed automatically.

■Automatic Gain control mode **[AGC=E]**

In Automatic Gain Control Mode, the reader uses only Table #0 settings and gain value in Table #0 will be changed automatically through instructions from decoder. This mode is useful especially for symbols printed on paper.

This mode is effective in Reading Timeout Mode or External Trigger Mode.

■Table Mode **[AGC=T] (Default)**

In Table Mode, the reader uses the settings stored in tables. There are eight tables available, numbered from #1 to #8. The ENABLEDDMTBL command determines the number of tables to be used when the reader is attempting to decode a symbol.

This mode is most effective for still objects. To use this mode, select Reading Timeout Mode or External Trigger Mode.

4.3 Detail of Table Mode

Up to 8 tables can be used while the trigger is activated.

ENABLEDDMTBL=a (a: 1 to 8)

e.g.1) Use 3 tables (a=3)

Table #1, #2 and #3 are enabled and Table #4 through #8 will not be used. If the reader successfully decodes a symbol with Table #1, Table #1 will be used in the next reading.

If the reader failed to decode a symbol with Table #1, the settings will switch to Table #2, etc.

If the reader failed to decode with Table #3, the settings will switch back to Table #1.

e.g.2) Use 1 table (a=1)

Only Table #1 is enabled. Table #2 through #8 will not be used. As the result, Table #1 is always used every reading.

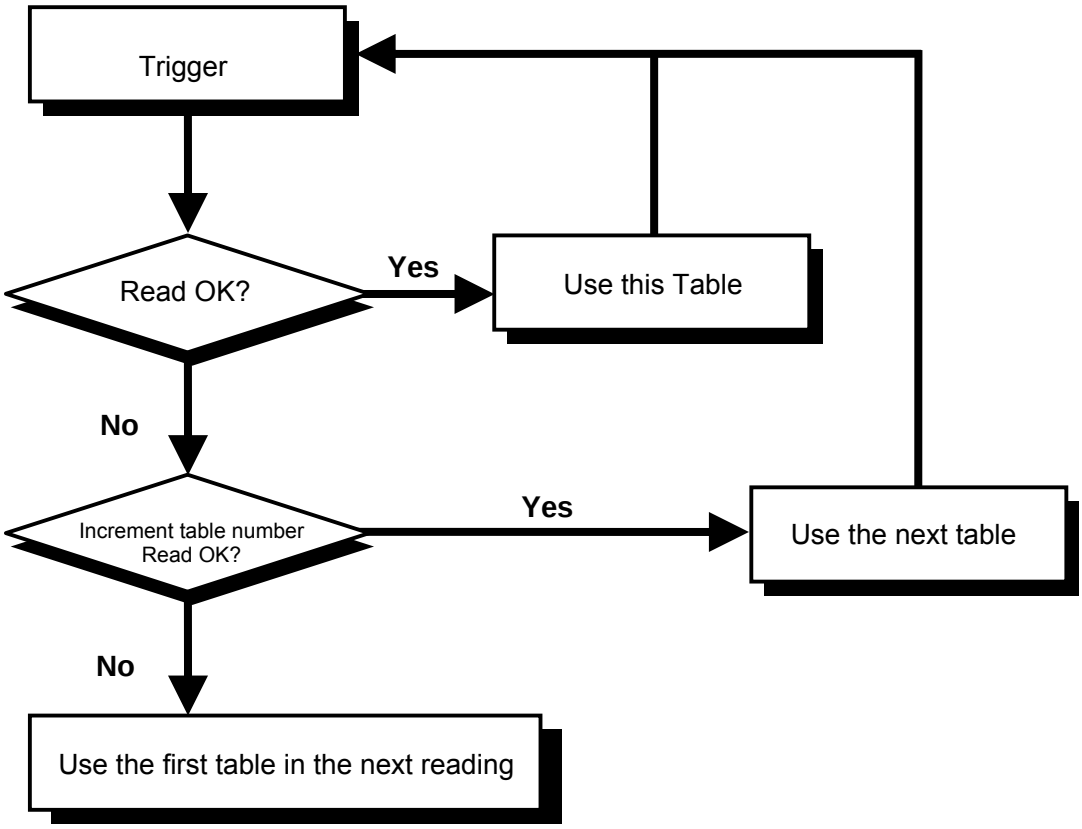
The following shows the structure of the Table. Each table has 9 types of parameters:

(1)	Decode area	[DDMwindow]
(2)	Illumination control	[DDMlight]
(3)	Internal illumination	[DDMled]
(4)	Illumination intensity	[DDMbrightness]
(5)	Shutter speed	[DDMshutt]
(6)	Extra gain value	[DDMexgain]
(7)	Black level adjustment	[DDMblack]
(8)	Image preprocessing	[DDMpreproc]
(9)	Mirrored symbol	[DDMmirror]

Table #0	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Table #1	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Table #2	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Table #3	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Table #4	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Table #5	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Table #6	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Table #7	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Table #8	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

The following flow chart shows the procedure of Table Mode operation:

＜ Flow chart of Table mode ＞



4.3.1 Edit table

1. Set the target Table #.
   Send the serial command below to assign the table number to be edited.
   EDITDDMTBL=a (a: 1 to 8)

2. Configure the parameters.
   Refer to section 4.1 Configuration parameters for detailed information.

3. Edit another table
   Repeat the step 1 & 2.

5 Advanced Functions

5.1 Preset Mode

TFIR-31LAN series image reader has the function of Preset Mode that is used for verification. The reader compares the decoded data with the preset data (Registered data) and will output only if the data is matched (It does not compared the type of symbol).

If the Preset data is “ABCDEFG”, the reader will output the data of Symbol A and B.

e.g.)

	Data	Symbol type
Symbol A	ABCDEFG	Data Matrix
Symbol B	ABCDEFG	Code39
Symbol C	ABCDEFGH	Data Matrix

This function has two modes, Preset Mode 1 and Preset Mode 2.

PREM=0[CR](*) : Preset Mode 0 (Preset Mode is disabled）

PREM=1[CR] : Preset Mode 1 (Preset data is the first decoded one after power up)

PREM=2[CR] : Preset Mode 2 (Preset data is registered in advance)

To disable Preset Mode, send the command “PREM=0”.

5.1.1 Preset Mode 1

In this mode, the preset data is the first decoded data after power up.

Data comparison is only successful when the code matches completely.

The preset data must be set as every time the reader is powered on because the data is not saved to internal flash memory.

Setup procedure of Preset Mode 1

1. Send the following commands

   PREM=1[CR]

   WSETS[CR] : Save the settings to internal flash memory.

2. Power-on reset
3. Read the symbol that contains the data to be used as the preset data.

5.1.2 Preset Mode 2

In this mode, the preset data is configured by the serial command. Data comparison is completed by both complete and partial matching. It is possible to save the preset data to internal flash memory.

Send the following command to set this mode:

PREM=2[CR]
SET=PREDabcd[CR] : Set the preset data (data is “abcd”)
SET=PRENa[CR] : Set the number of digits (a: 0 to 100)
WSETS[CR] : Save the settings to internal flash memory

e.g.1) Example 1: Only ”12345” is valid

12345 : match
1234 : mismatch
123456 : mismatch
012345 : mismatch

PREM=2[CR]
SET=PRED12345[CR] : Set the preset data (data is “12345”)
SET=PREN5[CR] : Set the number of digits (5 digits)
WSETS[CR] : Save the settings to internal flash memory

e.g.2) Example 2: Valid when first 4 digits are “ABCD”.

ABCD : match
ABCD333 : match
ABCD777777 : match
ABC : mismatch
DABC333 : mismatch
77**ABCD**77777 : mismatch

PREM=2[CR]
SET=PREDABCD[CR] : Set the preset data (data is “ABCD”)
SET=PREN0[CR] : Set the number of digits (no count)
WSETS[CR] : Save the settings to internal flash memory

e.g.3) Example 3: Valid when the length is 10 digits and the data from 3rd-digits to 6th-digits are “ALFA”.

00**ALFA**1234 : match

AA**ALFA**AAAA : match

00**ALFA**12345 : mismatch

0A**LFA1**2345 : mismatch

PREM=2[CR]

SET=PRED??ALFA????[CR] : Set the preset data (data is “??ALFA????” and “?” is mask.)

SET=PREN10[CR] : Set the number of digits (10 digits)

WSETS[CR] : Save the settings to internal flash memory

5.1.3 Output the status of Preset Mode

?pre[CR] : Output the preset status

(Example output)

PREM=0 (0:non 1:power on 2:saved)
PRESET LENGTH:13
DATA(HEX):
34 39 3F 3F 3F 3F 3F 3F 3F 3F
3F 3F 3F
DATA(ASCII):
49???????????

(Output format)

PREM=a (0:non 1:power on 2:saved)[CR]
PRESET LENGTH:b[CR]
DATA(HEX):[CR]
XX XX XX XX XX XX XX XX XX XX[CR]
XX XX XX XX XX XX XX XX XX XX[CR]
XX XX XX XX [CR]
DATA(ASCII):[CR]
xxxxxxxxxxxxxxxxxxxxxxxx

a	: Preset Mode
b	: The digit of the length of the preset data
XX XX …	: Preset data character (in hex)
xxxxxx…	: Preset data character (in ASCII/JIS)

If the preset data include control code, it is transferred to “*”.

5.2 Output additional information

5.2.1 ID Number

Add the ID Number (4 digits) at the beginning of the decoded data. It can be used for multi-configuration with the reader. Host computer can recognize the data which reader has sent. The ID is set by the serial command “BTID=xxxx”. “xxxx” is the ID Number. To disable this function, send the command “BTID=0000” to the reader.

5.2.2 Warning Information

Add the Warning Information for monitoring the decode condition at the beginning of the reading data. This setting is enabled by sending the serial command “CHKBCR=a,b”. “a” is for RS232C interface and “b” is for LAN interface.

e.g.1)

CHKBCR=0,1 : Added only for RS232C.
CHKBCR=1,1 : Added for both interface.
CHKBCR=1 : Same as “CHKBCR=1,1”.
CHKBCR=0 : Same as “CHKBCR=0,0” (Disable).

Output format: (CcccEeeeDddd)

ccc: Contrast Information for the captured image
eee: Unused Error Correction rate
ddd: Decodability margin

e.g.2) Good Read

Data output: (C082D091E100)A123456A

Calculate contrast value of a symbol including quiet zone. The decoder determines a rectangular area for the symbol and calculates the contrast value from its brightness level. If there are multiple symbols, the calculated value is for the first decoded symbol.

e.g.3) No Read

Data output: (C000E000D000)BR

“000” is added in case of No Read.

5.2.3 Symbol Type Information

By enabling this setting (SYMBOLTX=1), the reader can add the Symbol Type Information (symbol identifier) at the beginning of the decoded data. It is not added in case of No Read.

Symbol Type	Symbol Identifier	Symbol Type	Symbol Identifier
Code39	]A0	Data Matrix	]d1
Code128	]C0	Maxi Code	]U1
EAN128	]C1	PDF417	]L0
Codabar	]F0	QR Code	]Q1
ITF	]I0	Composite	]e0
UPC/EAN/JAN	none	Customer code	none
RSS	]e0	Aztec Code	[z3
Code93	]G0		

5.2.4 Decode time

By enabling this setting (DTTX=1), the reader can add decode time at the end of decoded data.

5.2.5 Total time and number of images captured after trigger input

Add number of images captured after trigger input and Total time from trigger input to serial data output. It is not added in case of No Read.

Output format: (aa, bbbbbms)

aa: Number of images, bbbbb: Total time [ms]

5.2.6 Contrast Information

Add the Contrast Information of the last decoded image.

1. Good Read

   Calculate contrast value of a symbol including quiet zone. The decoder determines a rectangular area for the symbol and calculates the contrast value from its brightness level.

   If there are multiple symbols, the calculated value is for the first decoded symbol.

2. No Read

   Calculate contrast value for the whole image.

Output format: (aaa, bbb, ccc) 13 bytes

aaa	: Maximum value of reflectance	(000 to 255)
bbb	: Minimum value of reflectance	(000 to 255)
ccc	: Contrast [%] =100 x (aaa - bbb) / 255	(000 to 100)

5.2.7 Quality Information (Unused Error Correction)

The percentage of the Unused Error Correction codeword of the 2D code is added to the decoded data.

For example, if the decoder does not use any error correction, this value would be 100. If the symbol is not decodable, the Quality Information will not be added.

Output format: (QT: ddd) 8 bytes

ddd: Quality (000 to 100)

5.2.8 Symbol Coordinates

The positional data of the symbol in the image is output along with the decoded data. There are three types of outputs; Barycentric coordinates, Rectangular coordinates and Barycentric / Rectangular coordinates.

(1) Barycentric coordinates

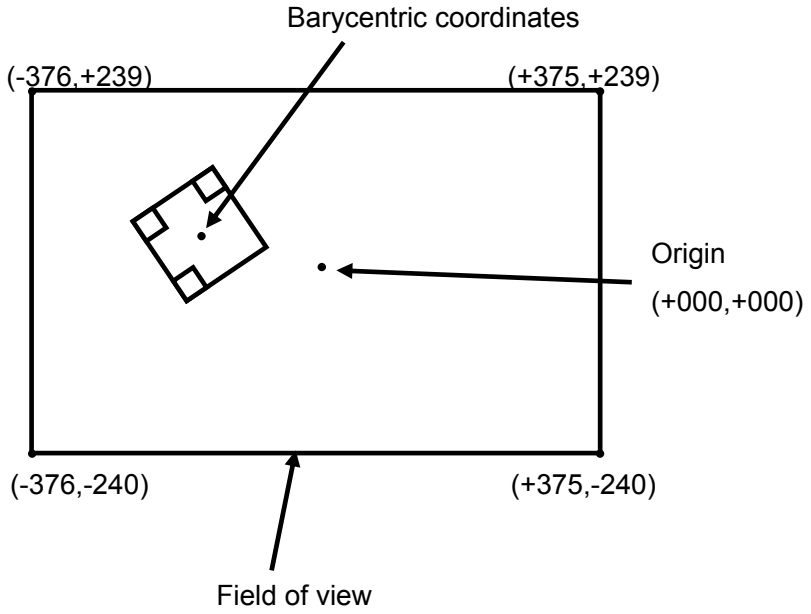
The origin (000, 000) of the barycentric coordinates is the center of the field of view.

(Example output)

100000000990703(-122,+024)

Output format: Header + Data + (abbb,accc) + Terminator

a : + or -
b : x (0 to 999)
c : y (0 to 999)



(2) Rectangular coordinates

The origin (000, 000) is the left-top edge of the field of view.

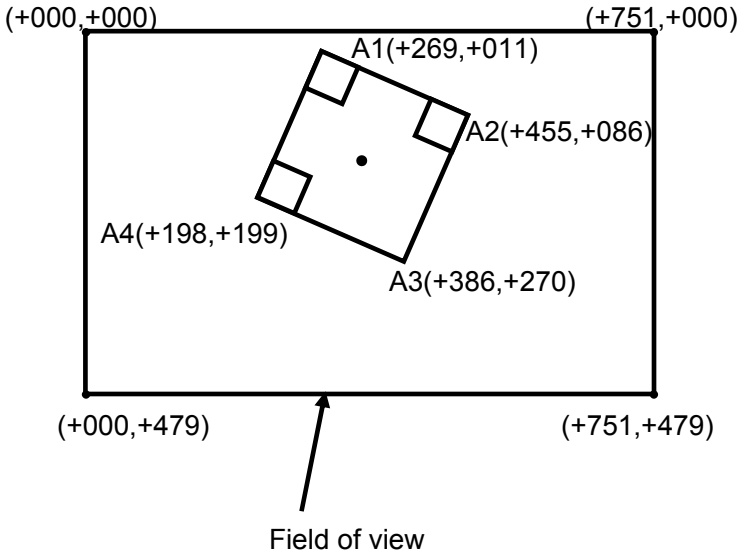
(Example output)

100000000990703(+269,+011)(+455,+086)(+386,+270)(+198,+199)

Output format: Header + Data + (A1) + (A2) + (A3) + (A4) + Terminator

A1 – A4	: (abbb,accc)
a	: + or -
b	: x (0 to 999)
c	: y (0 to 999)

Origin for rectangular coordinates



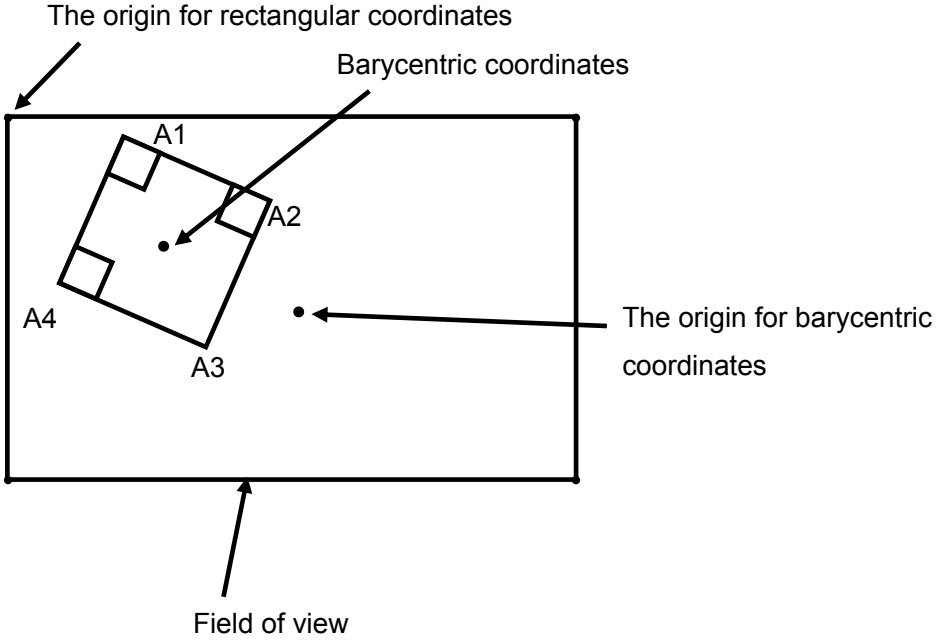
(3) Barycentric / Rectangular coordinates

(Example output)

100000000990703(+007,+103)(+269,+011)(+455,+086)(+386,+270)(+198,+199)

Output format: Header + Data + B + (A1) + (A2) + (A3) + (A4) + Terminator

B : The center of a symbol
B, A1 – A4: (abbb,accc)
a : + or -
b : x (0 to 999)
c : y (0 to 999)



5.2.9 Table Number

(Example output)

100000000990703(ddmtbl=3)

Output format: Header + Data + (ddmtbl=a) + Terminator

a: Table Number

5.3 Save Image

Up to 4 images can be stored to internal memory (Buffer #1 to #4).
The images need to be transferred to a host before turing off the power to the reader.
The images will be deleted from the internal memory when turning the power off.

Select type of image to be saved as follows:

- Image of Good Read
- Image of No Read
- Captured image (Raw image)
- Decoded image (Using the function of image preprocessing.)

Default settings:

IMGSAVE=1[CR] (*)	: Save image of No Read.
IMGSEL=1[CR] (*)	: Save preprocessed image when this function is enabled.
IMGFULL=1[CR] (*)	: After images are stored in buffer from #1 through #4, latest images will be overwritten in buffer #4.

To delete the image, send the “IMGCLEAR” command to the reader.

5.3.1 Select type of save image

Select type of image to be saved as follows:

IMGSAVE=0[CR]	: Disable this function
IMGSAVE=1[CR] (*)	: Save image of No Read
IMGSAVE=2[CR]	: Save image of Good Read
IMGSAVE=3[CR]	: Save image of Good Read and No Read

5.3.2 Save preprocessed image

IMGSEL=0[CR]	: Save captured image (Raw image)
IMGSEL=1[CR] (*)	: Save decoded image

In case of “IMGSEL=1”, the flame number used in cycle buffer memory need to be identified.

OKFRAME=0[CR] (*)	: Decoded image
OKFRAME=1 to 4[CR]	: The image stored in the specified memory in case of Good Read.

NGFRAME=0[CR] (*) : The last image attempted to decode when No Read.

NGFRAME=1 to 4[CR] : The image stored in the specified memory in case of No Read.

5.3.3 Overwrite save

If the number of saved images is more than 4, latest image is stored in buffer #4 or other #.

IMGFULL=0[CR] : Stored to internal buffer from #1 to #4 in order.

IMGFULL=1[CR] (*) : After images are stored in buffer from #1 through #4, latest image will be overwritten in buffer #4.

5.3.4 Preparation for transmitting the saved image

Using “TECT for TFIR-317x” software allows the download of the saved image that has been completed the preparation of transmission.

IMGVIEW=1[CR] : Preparation for last saved image.

IMGVIEW=2[CR] : Preparation for the 2nd to last saved image

IMGVIEW=3[CR] : Preparation for the 3rd to last saved image

IMGVIEW=4[CR] : Preparation for the 4th to last saved image

If there are images stored in the reader, the reader will output the result of reading corresponding to the image to be transmitted.

5.3.5 Clear saved image

IMGCLEAR[CR] : Clear all saved image

5.3.6 Output the settings of save image (?IMG)

?IMG[CR] : Output the status

(Example output)

```
******** STATUS ******** TFIR-31LAN
 IMODE=0   PX=0   PY=0   WX=752   WY=480
 CAPMODE=0,0,752,480
 DECMODE=0,0,0,752,480
 IMGSAVE=1
 IMGFULL=1
 SAVEDIMGNUM=0
 IMGSEL=1 ( 0:captured image 1:decoded image )
********* END ********** TFIR-31LAN
System version = M21C-V1.0a
Decode version = M21A-V1.0a
```

(Output format)

```
******** STATUS ******** TFIR-31LAN[CR]
 IMODE=a   PX=b   PY=c   WX=d   WY=e[CR]
 CAPMODE=f,g,h,i[CR]
 DECMODE=j,k,l,m,n[CR]
 IMGSAVE=o[CR]
 IMGFULL=p[CR]
 SAVEDIMGNUM=q[CR]
 IMGSEL=r ( 0:captured image 1:decoded image ) [CR]
********* END ********** TFIR-31LAN[CR]
System version = M21C-V1.0a[CR]
Decode version = M21A-V1.0a[CR]
```

a	: Trimming
b,c,d,e	: Trimming position (Left, Top, Width, Height)
f,g,h,i	: Capture area (Left, Top, Width, Height)
j	: Decoder works in “Capture area” or “Decode area”.
k,l,m,n	: Decode area (Left, Top, Width, Height)
o	: Type of image saved
p	: Overwrite save
q	: Number of saved image
r	: Image type (Captured image, Decoded image)

5.4 Output trace information

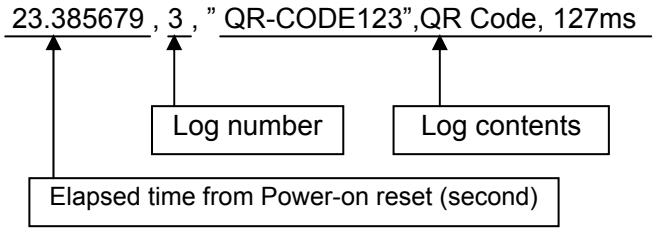
The TFIR-31LAN series image reader has the function of recording the trace. To get the trace information, sending the serial command as shown below.

Type	Command
Boot trace	PRNTBOOT[CR]
Log trace	PRNTLOG[CR]
Output trace	PRNTOUTPUT[CR]

This information can help to analyze the reason of No Read and trouble, etc.
Trace data include the following contents:

1	TCP/IP connections	: Connect, Disconnect
2	Change history of settings	: Serial command
3	Symbol information	: Decoded data (first 20 bytes)
4	Error log	: Error log
5	Read score	: OK / NG / SYNC
6	No Read	: Record only if the number of read symbol less than “LABELS”.
7	SYNC on/off	: External trigger
8	Received data	: Received data except serial command
9	Camera settings	: Illumination and shutter speed, etc.
10	Membrane switch	: Teach and Read button operation
11	Boot log	: Mode name, Firmware version
12	Output data	: Output of decoded data
13	LAN settings	: LAN settings

(Output format)



5.4.1 Boot trace and Log trace

(Example output of Boot trace)

```
PRNTBOOT
    7.935205,11, TFIR-31LAN M21C-V1.0a M21A-V1.0a
    7.935316,11,Build Version     : V1.0a-01
    7.947346,11,Successed : Initialize Gpio
    8.324616,11,Successed : Initialize Camera
    8.529470,11,Successed : Initialize Decode
    8.532093,11,IP address          : 192.168.209.032
    8.532162,11,Sub net mask       : 255.255.255.000
    8.532216,11,Default gateway : 192.168.209.254
    8.532269,11,MAC address         : 00:16:fc:01:23:20
    8.532441,11,Service port       : 27110
    8.533362,11,Successed : Initialize RS-232C
    8.534169,11,Successed : Initialize TCP
    8.534934,11,Successed : Initialize UDP
```

(Example output of Log trace)

```
PRNTLOG
    7.935205,11, TFIR-31LAN M21C-V1.0a M21A-V1.0a
    7.935316,11,Build Version     : V1.0a-01
    7.947346,11,Successed : Initialize Gpio
    8.324616,11,Successed : Initialize Camera
    8.529470,11,Successed : Initialize Decode
    8.532093,11,IP address          : 192.168.209.032
    8.532162,11,Sub net mask       : 255.255.255.000
    8.532216,11,Default gateway : 192.168.209.254
    8.532269,11,MAC address         : 00:16:fc:01:23:20
    8.532441,11,Service port       : 27110
    8.533362,11,Successed : Initialize RS-232C
    8.534169,11,Successed : Initialize TCP
    8.534934,11,Successed : Initialize UDP
   11.962036, 1,LAN CONNECT COMPLETE.
   18.173803, 2,[TCP]Cmd:PRNTLOG
   18.174035, 5,NG          0:OK          0/SYNC          0
```

(Example output)

(1) Connection history of TCP/IP connections

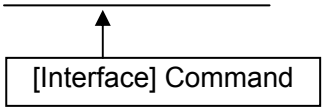
Connection: 34.194021 ,1, LAN CONNECT COMPLETE.

Disconnection: 34.194021 ,1, LAN DISCONNECT.

(2) Change history of the settings

Example: “SET=DFT” command is received through RS232C interface

21.436618,2,[232]Cmd:SET=DFT



[232]Cmd : The command via RS232C

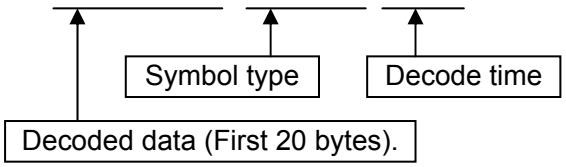
[TCP]Cmd : The command via TCP/IP

[UDP]Cmd : The command via UDP

(3) Decoded data

Example: QR Code (Data is QR-CODE123, data size is 10 bytes)

23.385679,3,” QR-CODE123”,QR-Code, 127ms



(4) Error log

e.g.1) Communication failure with the camera

213.512220,4,I2C Communication Error.

e.g.2) Communication failure because CS signal (RS232C) is Low.

123.112903,4, Send Error CS OFF

e.g.3) Communication failure because TCP/IP is in disconnect state

28.561922,4,Send Error Close Port

(5) Read score

643.138620,5, OK　935 /NG　65 /SYNC　1000

(6) No Read

212.547732,6,Read NG

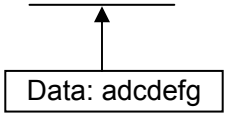
(7) SYNC on/off

External trigger on　: 16.364451,7, Sync ON

External trigger off　: 19.134123,7, Sync OFF

(8) Received data

243.154387,8,[232]RecvData0 “abcedfg”



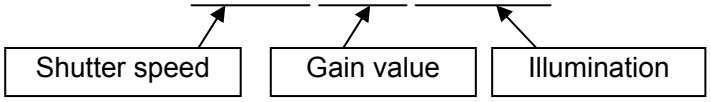
[232]RecvData　: Data via RS232C

[TCP]RecvData　: Data via TCP/IP

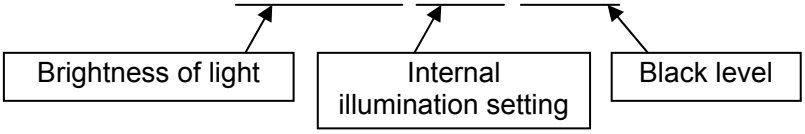
[UDP]RecvData　: Data via UDP

(9) Camera settings

17.580325, 9,SHUTT=4,GCV=5,LIGHT=3



17.580367, 9,brightness=25,led=1,0,black=0



(10) Membrane switch

Read button　: 138.373294,10,Sync Membrane READ Key ON

Teach button　: 136.761621,10,Sync Membrane TEACH Key ON

(11) Boot log

Model name, firmware version

9.161517,11,TFIR-31LAN M21C-V1.0a M21A-V1.0a

Build version

9.161681,11,Build Version :V1.0a-01

GPIO initialization

Success : 9.173982,11,Successed : Initialize Gpio

Failure : 9.173982,11,Failed: Initialize Gpio

Camera initialization

Success : 9.556437,11,Successed : Initialize Camera

Failure : 9.556437,11,Failed: Initialize Camera

Decoder initialization

Success : 9.706128,11,Successed : Initialize Decode

Failure : 9.706128,11,Failed: Initialize Decode

IP address

9.708538,11,IP address : 192.168.209.032

Sub net mask

9.708607,11,Sub net mask : 255.255.255.000

Default gateway

9.708662,11,Default gateway : 192.168.209.254

MAC address

9.708715,11,MAC address : 00:16:fc:01:23:20

TCP service port

9.708891,11,Service port : 27110

RS232C initialization

Success : 9.710568,11,Successed : Initialize RS-232C

Failure : 9.710568,11,Failed: Initialize RS-232C

TCP initialization

Success : 9.712239,11,Successed : Initialize TCP

Failure : 9.712239,11,Failed: Initialize TCP

UDP initialization

Success : 9.713987,11,Successed : Initialize UDP

Failure : 9.713987,11,Failed: Initialize UDP

(13) LAN settings

- IP address

  148.039127,13,IP address : 192.168.209.034

- Sub net mask

  148.039253,13,Sub net mask : 255.255.255.000

- Default gateway

  148.039298,13,Default gateway : 192.168.209.254

- MAC address

  148.039340,13,MAC address : 00:16:fc:02:22:22

- Service port

  148.039387,13,Service port : 27110

5.4.2 Output trace

(12) Output data

e.g.1)

Good Read (data: 1234567890ABCDEFGHIJKLMNOPQRSTUVWXYZ), No Read, Terminator setting is [CR][LF]

```
PRNTOUTPUT
  525.949514,12,OUTPUT"1234567890ABCDEFGHIJKLMNOPQRSTUVWXYZ
"
  547.185818,12,OUTPUT"BR
"
  555.483151,12,OUTPUT"1234567890ABCDEFGHIJKLMNOPQRSTUVWXYZ
"
```

e.g.2)

Good Read (data: QR-CODE1234567890), Terminator setting is [CR][LF]

```
PRNTOUTPUT
  25.128114,12,OUTPUT "QR-CODE1234567890
"
```

5.5 Automatic tuning for camera settings

The TFIR-31LAN series has the function of automatic tuning for camera settings with simple operation.

5.5.1 Operating procedure

Monitor LED status: ■,■ means LED is on, □ means LED is off
The location of monitor LEDs and buttons are shown below:

1. Enter the setup function by pressing and holding the Teach button until LED-A (■) starts blinking.
   * It is automatically switch back to stand-by state after a certain period.

2. To start the setup function press the “Read” button once while LED-A is blinking. The reader will start tuning procedure.

3. After the procedure the reader will indicate the result as below:
   Success : LED status (□■■□), 3 long beeps
   Failure : LED status (■□□□), 7 short beeps
   LED indicator is switched back to stand-by state after a certain period.

4. Press the “Read” button once to save new settings if needed while LED indicator is active. The reader will indicate the status for a certain period as below, and then will switch back to stand-by state.
   LED status (■■■■), 3 long beeps

DO NOT turn off power during operation.

6 LAN(TCP/IP) connection

6.1 Preparation

Configure network setting to use the LAN interface.

6.2 Configure IP address

6.2.1 Configure through RS232C interface

Connect the reader to a PC through a RS232C cable.

Configure IP address and subnet mask by the command below.

```
IPADR=192.168.0.101/24
```

* The subnet mask can be omitted (“/24” will be assigned).

Configure the port number by the command below.

```
IPPORT=60000
```

Configure the default gateway address by the command below.

```
GWADR =192.168.0.1
```

* Set the same network as IP address.

Confirm the LAN settings by the command below.

```
?LAN
```

Save the settings to internal flash memory by the command below.

```
WSETS
```

* “Write OK” is sent when the settings are saved.

Turn off power and restart the reader.

6.2.2 Configure through LAN interface

Configure settings through LAN interface, if the IP address and the port number of the reader are known. Make sure the IP address of the host computer is set into the same network as the reader.

- Configuration procedure is same as RS232C.

6.3 Default settings

IP address	: 192.168.209.xxx
Sub net mask	: /24 (same as 255.255.255.0)
Port number	: 27110
Default Gateway address	: 192.168.209.254

Note: Default IP address is configured from the MAC address. “xxx” is decimal number that is converted from the HEX number (The last 2 digits of the MAC address).

e.g.)

00-16-FC-02-00-0A → xxx=10 (192.168.209.10)

00-16-FC-02-00-10 → xxx=16 (192.168.209.16)

Example output

```
IPADR=192.168.0.101/24
IPPORT=60000
GWADR=192.168.0.1
?LAN

******** STATUS ******** TFIR-31LAN
IP address          (IPADR) : 192.168.209.036    [>> 192.168.000.101]
Sub net mask        (/n)       : 255.255.255.000    [>> 255.255.255.000]
Default gateway (GWADR) : 192.168.209.254    [>> 192.168.000.001]
Service port       (IPPORT): 27110    [>> 60000]
MAC address                    : 00:16:fc:02:00:24
USBCOMPAT                      : 0
********* END ********** TFIR-31LAN
System version = M21C-V1.0a
Decode version = M21A-V1.0a
```

These values shown between “[>>” and “]” will be activated after Power-on reset.

Current Settings

IP address	: 192.168.209.036
Sub net mask	: /24
Default Gateway	: 192.168.209.254
Service port	: 27110

Settings after Reset

IP address	: 192.168.0.101
Sub net mask	: /24
Default Gateway	: 192.168.0.001
Service port	: 60000

Note: Save the settings to internal flash memory by the serial command “WSETS”. These settings will be activated after Power-on reset.

6.4 Check for LAN settings

6.4.1 Through RS232C interface

Confirm the LAN settings by the command below.

?LAN

The following parameters are sent to the host:

- IP address
- Sub net mask
- Default Gateway
- Port number

6.4.2 Through LAN interface

Communication state can be checked by UDP (User Datagram Protocol), if the network address is already known.

1. Set IP address of the host into the same network as the reader.
2. Set the UDP settings.
   * Remote IP address (TFIR-31LAN) for broadcasting.
     e.g.) If remote IP address is “192.168.209.255”, all TFIR-31LAN units will respond which IP address is “192.168.209.xxx”.
   * Port number is always 49460

Confirm the settings by the command below.

?who

The following parameters are output in a line:

- Local IP address (IP address of TFIR-31LAN)
- Local port number (Port number of TCP/IP server of TFIR-31LAN)
- Sub net mask
- Gateway IP address
- MAC address (last 3 bytes)

6.5 Connect to LAN

TFIR-31LAN series image reader has a RJ-45 connector. Please use a UTP cable of category 3 or greater. The reader is equipped with automatic negotiation function for both transfer speed (10Mbps) and communication mode (Full Duplex, Half Duplex). Ensure to set the host PC's LAN settings (transfer speed and communication mode) to automatic if the reader is connected to the PC through a cross-over cable (peer-to-peer communication).

6.6 Manage communication status

The TFIR-31LAN series image reader supports the TCP/IP and the UDP/IP (for administration).

[TCP/IP connection]

The reader works as a TCP/IP server whose port number can be set to any value. Only one client can be connected at a time.

The reader will disconnect in the following situations:

- Receive close request from the client
- Detect transmission error

In the following cases, the reader cannot detect disconnect state:

- A UTP cable was removed before the client sent close request.
- The client aborted the system without sending close request.

To recover the connection, send the command "discon" through RS232C interface for forced termination, and then retry the connection.

e.g.)

(Command) → discon 27110

(Responce) → disconnected

[UDP/IP connection]

The reader also works as an UDP/IP server whose port number is always 49460. Multiple units can be connected to a host by UDP/IP protocol.

By using a broadcast address, it is possible to send packets to all units in the local network at the sametime. Broadcast address can make the followings

possible:

- Get a list of all TFIR-31LAN units on the local network.
- Get unknown IP address, TCP/IP port number of connected devices.

By using UDP/IP connections, a host can disconnect TCP/IP connections forcibly.

6.7 Serial command for LAN settings

?LAN

Get a list of settings for LAN connection

IPADR=<IP address in dotted notation>/<Bit number of subnet mask>

Set IP address and subnet mask of the reader.

GWADR=<IP address in dotted notation>

Set default gateway address of the reader.

IPPORT=<TCP/IP port number> (decimal)

Set TCP/IP port number of the reader.

TCPCS=a (a=0; Disable a=1; Enable)

Set the function of data arrival confirmation. If enabled, the reader will wait to send the next data until receiving “Ack”, which is associated with the previous data, from the host.

?who

Get the following status:

- Local IP address (IP address of the reader)
- Local Port number (TCP server port number of the reader)
- Subnet mask
- Gateway IP address
- MAC address (last 3 digits only)

?netstat

Get the following status in a line:

- Local IP address (IP address of the reader)

- Local Port number (TCP server port number of the reader)
- Remote IP address (IP address of the connected PC)
- Remote Port number (Port number of the connected PC)
- TCP/IP server socket status

?version

- Local IP address (IP address of the reader)
- Local Port number (TCP server port number of the reader)
- System version
- Decoder version
- Model name

discon<TCP/IP port number>

Shut down TCP/IP connection of the specified port number.

* <TCP/IP port number> should be set in decimal.
  e.g.) discon 27110

The command “?who”, “?netstat”, “?version” and “discon” can be used in UDP/IP connections.

6.8 Initialize LAN settings

If the LAN settings are unknown, the following steps will reset the LAN settings:

- Turn off power of the reader.
- Turn on power pressing the “Teach” button on membrane switch.

Default settings

IP address	: 192.168.209.xxx
Sub net mask	: /24
Default Gateway	: 192.168.209.254
Port	: 27110

7 Serial Command (RS232C, LAN)

The following serial commands can be used through both RS232C and LAN (TCP/IP) interface unless otherwise specified.

- Serial command format

  Serial command + [CR] Default (Backward compatible)

  [Header] + Serial command + [Terminator]

- To add header and terminator characters to a serial command, send the command "CMDFORM=1".

  The header and terminator characters set by "HEAD=" and "TERM=" command will be applied to decoded data as well.

- To return the default settings of header and terminator characters, send the command “CMDFORM=0”.

- For Code39 and Codabar, should be included start and stop codes if the digit number is specified.

Default: **(*)**

7.1 Communication

Term	Command	Description
Baud rate	BAUD=aaaa	[1200bps] aaaa=1200 [2400bps] aaaa=2400 [4800bps] aaaa=4800 [9600bps **(*)**] aaaa=9600 [19200bps] aaaa=19200 [38400bps] aaaa=38400 [57600bps] aaaa=57600 [115200bps] aaaa=115200
Frame	FRAME=0 FRAME=1 FRAME=2 FRAME=3 FRAME=4 FRAME=5 FRAME=6 FRAME=7 FRAME=8 FRAME=9	7 bits, Odd, Stop bit 1 7 bits, Odd, Stop bit 2 7 bits, Even, Stop bit 1 7 bits, Even, Stop bit 2 8 bits, None, Stop bit 1 **(*)** 8 bits, None, Stop bit 2 8 bits, Odd, Stop bit 1 8 bits, Odd, Stop bit 2 8 bits, Even, Stop bit 1 8 bits, Even, Stop bit 2
Header	HEAD=a	Header character a=0; None **(*)** a=1; [SX] a=2; [EC]
Terminator	TERM=a	Terminator character a=0; None a=1; [EX] a=2; [EX][CR] a=3; [CR][LF] **(*)** a=4; [CR] a=5; [CR][TAB] a=6; [TAB][CR]
Command Format	CMDFORM=0 CMDFORM=1	Command+[CR] or Command+[CR][LF] **(*)** [Header]+Command+[Terminator]
Separator	SEPA=a	Character code a=0; None a=1; & a=2; , (Comma) **(*)** a=3; [FS] (1C hex) a=4; [GS] (1D hex) a=5; [SP] (20 hex)
Prefix	PREFIX=a =a,¥bb =a,c =a,[dd]	Prefix character a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
Suffix	SUFFIX=a =a,¥bb =a,c =a,[dd]	Suffix character a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
RS/CS control	RSCS=0 RSCS=1	Disable RTS/CTS flow control **(*)** Enable RTS/CTS flow control
TCP/IP arrival confirmation	TCPCS=0 TCPCS=1	Disable data arrival confirmation **(*)** Enable data arrival confirmation
COM Port (Sync command, Data output)	COMFROM=0 COMFROM=1 COMFROM=2	RS232C only **(*)** LAN only RS232C and LAN
Control Code	LABELTX=0 LABELTX=1	Pass through **(*)** Change Control code to ASCII code within [hex].

Term	Command	Description
Timeout period	TXWAIT=a	Timeout period for decoded data a=1000 to 2500 [ms]; 10[ms] step 1000[ms] **(*)**

7.2 Symbologies

Term	Command	Description
Common	SET=#M0	Disable all symbologies
	SET=#M1	Enable all symbologies
	SYMHEAD=#a =#a,¥bb =#a,c =#a,[dd]	Header character for all symbologies a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=#a =#a,¥bb =#a,c =#a,[dd]	Footer character for all symbologies a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
Code39	SET=AM0	Disable Code39
	SET=AM1	Enable Code39, Disable C/D check **(*)**
	SET=AM2	Enable Code39, Enable C/D check, Enable C/D transmission
	SET=AM3	Enable Code39, Enable C/D check, Disable C/D transmission
	SET=AM4	Enable Code39, Disable C/D check, Enable Full ASCII
	SET=AM5	Enable Code39, Enable C/D check, Enable C/D transmission, Enable Full ASCII
	SET=AM6	Enable Code39, Enable C/D check, Disable C/D transmission, Enable Full ASCII
	C39SS=0	Disable Code39 Start/Stop code transmission **(*)**
	C39SS=1	Enable Code39 Start/Stop code transmission
	DIGIT=Ab,c	Set minimum (b) and maximum (c) digit numbers of Code39
	EDIT=Ab,c	Output Code39 data within a range of b-digits to c-digits
	SYMHEAD=Aa =Aa,¥bb =Aa,c =Aa,[dd]	Set header character of Code39 a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=Aa =Aa,¥bb =Aa,c =Aa,[dd]	Set footer character of Code39 a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
Code128	SET=CM0	Disable Code128
	SET=CM1	Enable Code128 **(*)**
	DIGIT=Cb,c	Set minimum (b) and maximum (c) digit numbers of Code128
	EDIT=Cb,c	Output Code128 data within a range of b-digits to c-digits
	SYMHEAD=Ca =C,¥bb =C,c =C,[dd]	Set header character of Code128 a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.

Term	Command	Description
Code128	SYMFOOT=Ca =C,¥bb =C,c =C,[dd]	Set footer character of Code128 a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
EAN128	SET=eM0 SET=eM1	Disable EAN128 Enable EAN128 **(*)**
	E128GS=a =a,¥bb =a,c =a,[dd]	Set Enable/Disable transmission of Control code [GS] a=0; Disable a=1; Enable **(*)**, Default: [GS] bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	DIGIT=eb,c	Set minimum (b) and maximum (c) digit numbers of EAN128
	EDIT=eb,c	Output EAN128 data within a range of b-digits to c-digits
	SYMHEAD=ea =ea,¥bb =ea,c =ea,[dd]	Set header character of EAN128 a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=ea =ea,¥bb =ea,c =ea,[dd]	Set footer character of EAN128 a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
Codabar	SET=FM0 SET=FM1 SET=FM2 SET=FM3	Disable Codabar Enable Codabar, Disable C/D check **(*)** Enable Codabar, Enable C/D check, Enable C/D transmission Enable Codabar, Enable C/D check, Disable C/D transmission
	CODASS=0 CODASS=1	Disable Codabar Start/Stop code transmission Enable Codabar Start/Stop code transmission **(*)**
	CODACS=0 CODACS=1	Transmit Codabar Start/Stop code in lowecase Transmit Codabar Start/Stop code in lowercase in uppercase **(*)**
	CODACHK=a	Codabar Check digit calculation a=0; Modulus 16 **(*)** a=1; 7DR
	DIGIT=Fb,c	Set minimum (b) and maximum (c) digit numbers of Codabar
	EDIT=Fb,c	Output Codabar data within a range of b-digits to c-digits
	SYMHEAD=Fa =Fa,¥bb =Fa,c =Fa,[dd]	Set header character of Codabar a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=Fa =Fa,¥bb =Fa,c =Fa,[dd]	Set footer character of Codabar a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.

Term	Command	Description
ITF	SET=IM0	Disable ITF
	SET=IM1	Enable ITF, Disable C/D check **(*)**
	SET=IM2	Enable ITF, Enable C/D check, Enable C/D transmission
	SET=IM3	Enable ITF, Enable C/D check, Disable C/D transmission
	DIGIT=Ib,c	Set minimum (b) and maximum (c) digit numbers of ITF
	EDIT=Ib,c	Output ITF data within a range of b-digits to c-digits
	SYMHEAD=Ia =Ia,¥bb =Ia,c =Ia,[dd]	Set header character of ITF a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=Ia =Ia,¥bb =Ia,c =Ia,[dd]	Set footer character of ITF a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
Code93	SET=GM0	Disable Code93
	SET=GM1	Enable Code93 **(*)**
	DIGIT=Gb,c	Set minimum (b) and maximum (c) digit numbers of Code93
	EDIT=Gb,c	Output Code93 data within a range of b-digits to c-digits
	SYMHEAD=Ga =Ga,¥bb =Ga,c =Ga,[dd]	Set header character of Code93 a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=Ga =Ga,¥bb =Ga,c =Ga,[dd]	Set footer character of Code93 a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
UPC/EAN/JAN	SET=EM0	Disable UPC/EAN/JAN
	SET=EM1	Enable UPC/EAN/JAN **(*)**
	JE13SUM=0	Transmit JAN/EAN (standard) data with Checksum **(*)**
	JE13SUM=1	Transmit JAN/EAN (standard) data without Checksum
	JE8SUM=0	Transmit JAN/EAN (short) data with Checksum **(*)**
	JE8SUM=1	Transmit JAN/EAN (short) data without Checksum
	UASUM=0	Transmit UPC-A data with Checksum **(*)**
	UASUM=1	Transmit UPC-A data without Checksum
	UESUM=0	Transmit UPC-E data with Checksum **(*)**
	UESUM=1	Transmit UPC-E data without Checksum
	UPCANS=0	Transmit UPC-A data with Number system **(*)**
	UPCANS=1	Transmit UPC-A data without Number system
	UPCENS=0	Transmit UPC-E data with Number system **(*)**
	UPCENS=1	Transmit UPC-E data without Number system
	UPCE=0	Transmit UPC-E data in **UPC-A** format **(*)**
	UPCE=1	Transmit UPC-E data in **UPC-E** format
	UPCTX=0	Add “0” at the beginning of UPC-A formatted data **(*)**
	UPCTX=1	Not added “0” to UPC-A formatted data

Term	Command	Description
UPC/EAN/JAN	DIGIT=Eb,c	Set minimum (b) and maximum (c) digit numbers of UPC/EAN/JAN
	EDIT=Eb,c	Output UPC/EAN/JAN data within a range of b-digits to c-digits
	SYMHEAD=Ea =Ea,¥bb =Ea,c =Ea,[dd]	Set header character of UPC/EAN/JAN a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=Ea =Ea,¥bb =Ea,c =Ea,[dd]	Set footer character of UPC/EAN/JAN a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
DataMatrix	SET=dM0 SET=dM1 SET=dM2 SET=dM3 SET=dM5 SET=dM6 SET=dM7	Disable DataMatrix Enable only for square shaped and normal DataMatrix Enable only for square shaped and inverse DataMatrix Enable only for square shaped and normal/inverse DataMatrix Enable only for square/rectangle shaped and normal DataMatrix Enable only for square/rectangle shaped and inverse DataMatrix Enable all types of DataMatrix **(*)**
	DIGIT=db,c	Set minimum (b) and maximum (c) digit numbers of DataMatrix
	EDIT=db,c	Output DataMatrix data within a range of b-digits to c-digits
	SYMHEAD=da =da,¥bb =da,c =da,[dd]	Set header character of DataMatrix a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=da =da,¥bb =da,c =da,[dd]	Set footer character of DataMatrix a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	DMSIZE=a	Set the size of DataMatrix relative to field of view a=0; Normal (*) a=1; Small a=2; Much smaller
	DMGS=a =a,¥bb =a,c =a,[dd]	Set Enable/Disable transmission of Control code [GS] a=0; Disable a=1; Enable **(*)**, Default: [GS] bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.

Term	Command	Description
MaxiCode	SET=UM00	Disable MaxiCode
	SET=UM01	Enable MaxiCode (Mode 0)
	SET=UM02	Enable MaxiCode (Mode 1)
	SET=UM04	Enable MaxiCode (Mode 2)
	SET=UM08	Enable MaxiCode (Mode 3)
	SET=UM10	Enable MaxiCode (Mode 4)
	SET=UM20	Enable MaxiCode (Mode 5)
	SET=UM3F	Enable MaxiCode (All modes) **(*)**
	MAXIPS=0	Output MaxiCode data even if the data is Primary message only **(*)**
	MAXIPS=1	Do not output MaxiCode data if the data is Primary message only
	DIGIT=Ub,c	Set minimum (b) and maximum (c) digit numbers of MaxiCode
	EDIT=Ub,c	Output MaxiCode data within a range of b-digits to c-digits
	SYMHEAD=Ua =Ua,¥bb =Ua,c =Ua,[dd]	Set header character of MaxiCode a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=Ua =Ua,¥bb =Ua,c =Ua,[dd]	Set footer character of MaxiCode a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
PDF417	SET=LM0	Disable PDF417
	SET=LM1	Enable PDF417 **(*)**
	DIGIT=Lb,c	Set minimum (b) and maximum (c) digit numbers of PDF417
	EDIT=Lb,c	Output PDF417 data within a range of b-digits to c-digits
	SYMHEAD=La =La,¥bb =La,c =La,[dd]	Set header character of MaxiCode a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=La =La,¥bb =La,c =La,[dd]	Set footer character of MaxiCode a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.

Term	Command	Description
QR-Code	SET=QM0 SET=QM1 SET=QM2 SET=QM3	Disable QR-Code Enable only for normal QR-Code Enable only for inverse QR-Code Enable QR-Code (normal/inverse) **(*)**
	DIGIT=Qb,c	Set minimum (b) and maximum (c) digit numbers of QR-Code
	EDIT=Qb,c	Output QR-Code data within a range of b-digits to c-digits
	SYMHEAD=Qa =Qa,¥bb =Qa,c =Qa,[dd]	Set header character of QR-Code a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT=Qa =Qa,¥bb =Qa,c =Qa,[dd]	Set footer character of QR-Code a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	QRSIZE=a	Set the size of QR-Code relative to field of view a=0; Normal (*) a=1; Small
RSS	SET=eM00-RSS SET=eM01-RSS SET=eM02-RSS SET=eM04-RSS SET=eM08-RSS SET=eM10-RSS SET=eM1F-RSS	Disable RSS **(*)** Enable RSS Expanded Enable RSS Expanded Stacked Enable RSS Limited Enable RSS-14 and RSS-14 Truncated Enable RSS-14 Stacked and RSS-14 Stacked Omni directional Enable all types of RSS
	DIGIT=eb,c-RSS	Set minimum (b) and maximum (c) digit numbers of RSS
	EDIT=eb,c-RSS	Output RSS data within a range of b-digits to c-digits
	SYMHEAD =ea,¥bb-RSS =ea,c-RSS =ea,[dd]-RSS	Set header character of RSS a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT =ea,¥bb-RSS =ea,c-RSS =ea,[dd]-RSS	Set footer character of QR-Code a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.

Term	Command	Description
Composite	SET=eM00-CC	Disable Composite **(*)**
	SET=eM01-CC	Enable UPC Composite
	SET=eM02-CC	Enable RSS Composite
	SET=eM04-CC	Enable Code128 Composite
	SET=eM07-CC	Enable all types of Composite
	SET=eM10-CC	Output only the linear components data (select either eM10 or eM20)
	SET=eM20-CC	EAN128 symbol emulation mode (select either eM10 or eM20)
	DIGIT=eb,c-CC	Set minimum (b) and maximum (c) digit numbers of Composite
	EDIT=eb,c-CC	Output Composite data within a range of b-digits to c-digits
	SYMHEAD =ea,¥bb-CC =ea,c-CC =ea,[dd]-CC	Set header character of Composite a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT =ea,¥bb-CC =ea,c-CC =ea,[dd]-CC	Set footer character of Composite a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
Postal **(Japan Post)**	SET=pM0	Disable Postal **(*)**
	SET=pM2	Enable Postal
	DIGIT=pb,c	Set minimum (b) and maximum (c) digit numbers of Postal
	EDIT=pb,c	Output Postal data within a range of b-digits to c-digits
	SYMHEAD =pa,¥bb =pa,c =pa,[dd]	Set header character of Postal a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT =pa,¥bb =pa,c =pa,[dd]	Set footer character of Postal a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.

Term	Command	Description
Aztec Code	SET=zM0	Disable Aztec Code
	SET=zM1	Enable only for normal Aztec Code
	SET=zM2	Enable only for inverse Aztec Code
	SET=zM3	Enable Aztec Code (normal/inverse) **(*)**
	DIGIT=zb,c	Set minimum (b) and maximum (c) digit numbers of Aztec Code
	EDIT=zb,c	Output Aztec Code data within a range of b-digits to c-digits
	SYMHEAD =za,¥bb =za,c =za,[dd]	Set header character of Aztec Code a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
	SYMFOOT =za,¥bb =za,c =za,[dd]	Set footer character of Aztec Code a=0; Disable **(*)** a=1; Enable bb; Hexadecimal code c; Character dd; ASCII code (¥00 to ¥1F) When omitting “bb”, “c” and “dd”, those settings will be remained.
Multi-Labels	LABELS=a	Number of labels a=1 to 4; a=1**(*)**
	OUTFORM=0	Output in the order of decoding **(*)**
	OUTFORM=1	Output in the order of the specified digit-number
	OUTFORM=2	Output in the order of the specified characters
	OUTFORM=3	Output in the order of the specified symbologies
	SET=$Na-b	Set label number and verification digit number a=1 to 4; Label number b=0 to 2047; Digit number
	SET=$Ca-bbcc	Set label number and verification character a=1 to 4; Label number bb; The first character in Hexadecimal cc; The second character inHexadecimal
	SET=$Sa-b	Set label number and verification symbologies a=1 to 4; Label number b; Symbol identifier

7.3 Symbol Reading

Term	Command	Description
Reading	g	Start Reading
	BR=a	No Read message a=0; None a=1; "BR" **(*)** a=2; "ERROR" a=3; "?"
	DECODELIM=a	Set the time limit for decoding process a=100 to 10000 [ms], 10[ms] step a=500 [ms] **(*)**
Operation Mode	SYNCMODE=a	a=0; Normal Mode a=1; Reading Timeout Mode **(*)** a=2; External Trigger Mode a=3; Autosense Mode
	VOUT=a	Output timing a=0,1 (0: After decoding **(*),** 1: After SYNC off)
	TOTALLIM=a	Decode timeout a=XXXX [ms], 10[ms] step a=5000 [ms] **(*)**
Continuous Reading Mode	continue	Enable Continuous Reading Mode
	stop	Stop Continuous Reading Mode (back to Normal Mode) **(*)**
	contintvl=a	Set a time interval of reading a= 0 to 9 [Unit: s] a=1 [s] **(*)** a=10 to 999 [Unit: ms]
	?contintvl	Check the value of contintvl
Test Mode	TEST=a	a=0; Normal Mode **(*)** a=1; Test Mode
	TMN=a	Number of reading times in Test Mode a=10 to 1000, 10 step a=10 (*)
Reading Statistics	?total	Check number of times for SYNC, Good Read, No Read from Power-on reset
	clrtotal	Clear the value of number of times
	?dect	Check decoding time of Good Read, No Read
	clrdect	Clear the value of decoding time
ID Number	BTID=aaaa	aaaa=0000; Disable **(*)** aaaa=XXXX (except 0000); Add ID number
Warning Information	CHKBCR=a (,b)	a=0; Disable addiction for RS232C **(*)** a=1; Enable addiction for RS232C b=0; Disable addiction for LAN **(*)** b=1; Enable addiction for LAN When omitting ",b", the value of 'b' will be set the same as 'a'.
Symbology Information	SYMBOLTX=a	a=0; Disable addiction of SYMBOLTX **(*)** a=1; Enable addiction of SYMBOLTX
Decoding time	DTTX=a	a=0; Disable addiction of DTTX **(*)** a=1; Enable addiction of DTTX
Total time of decoding	TTTX=a	a=0; Disable addiction of TTTX **(*)** a=1; Enable addiction of TTTX
Swing Value	AGCTX=a	a=0; Disable addiction of AGCTX **(*)** a=1; Enable addiction of AGCTX
Table Number	TBLTX=a (,b)	a=0; Disable addiction for RS232C **(*)** a=1; Enable addiction for RS232C b=0; Disable addiction for LAN **(*)** b=1; Enable addiction for LAN When omitting ",b", the value of 'b' will be set the same as 'a'.
Contrast Information	CONTTX=a	a=0; Disable addiction of CONTTX **(*)** a=1; Enable addiction of CONTTX
	CSX=aaa	X-coordinate point of caluculation (Origin) a=0 to 751 a=0 **(*)**
	CSY=aaa	Y-coordinate point of caluculation (Origin) a=0 to 479 a=0**(*)**
	CWX=aaa	X-coordinate point of caluculation (Width) a=10 to 752 a=752**(*)**
	CWY=aaa	Y-coordinate point of caluculation (Width) a=10 to 480 a=480**(*)**
Quality Information	QTTX=a	a=0; Disable addiction of QTTX **(*)** a=1; Enable addiction of QTTX

Term	Command	Description
Mirrored Image Information	MRTX=a	a=0; Disable addiction of MRTX **(*)** a=1; Enable addiction of MRTX "MIRROR_ON" is added for mirrored image "MIRROR_OFF" is added for mirrored image
Symbol Position Information	XYTX=a	a=0; Disable **(*)** a=1; Barycentric coordinates a=2; Rectangular coordinates a=3; Barycentric and Rectangular coordinates
Delay Time	DELAY=a	Delay time between SYNC input and start capturing a=0 to 30000 [ms], 10ms step a=0 [ms] **(*)**
Cycle Buffer Function	MAXIMG=a	Number of captured images a=1 to 4 a=1 **(*)**
	WAITIMG=a	Capture interval of time when MAXIMG is greater than 1 a=0 to 1000 [ms] a=100 [ms] **(*)**
Pointer	POINTER=a	Pointer control a=0; Disable a=1; Enable **(*)**
Autosense Mode	LFLIGHT=a	Illumination control (ON/OFF) in Autosense Mode a=0; OFF a=1; ON **(*)**
	LFMOVELIM=n	Detection ignored time n=0 to 7 0; 100 [ms] 1; 300 2; 500 **(*)** 3; 1000 4; 1500 5; 2000 6; 2500 7; 3000
	LFVERIFY=a	Double-read prevention a=0; Disable a=1; Enable **(*)**
	LFVWAIT=a	Time limit of LFVERIFY (500 x a [ms]) a=1 to 40 a=6 **(*)**
	VSENS=a	Sensitivity level against brightness a=0 to 4 0; Level 0 (Highest) 1; Level 1 2; Level 2 (Normal) **(*)** 3; Level 3 4; Level 4 (Lowest)

7.4 Camera Control (1) (for Fixed Gain and Automatic Gain Control Mode)

Term	Command	Description
Camera Control Mode	AGC=D AGC=E	Set in Fixed Gain Mode Set in Automatic Gain Control Mode
Capture area	CAPMODE= Left, Top, Width, Height	Capture area Left 0 to 751 0 **(*)** Top 0 to 479 0 **(*)** Width 1 to 752 752 **(*)** Height 1 to 480 480 **(*)**
Decode area	DECMODE= Mode, Left, Top, Width, Height	Decode area Mode 0; Disable 1; Enable (*) Left 0 to 751 0 **(*)** Top 0 to 479 0 **(*)** Width 1 to 752 752 **(*)** Height 1 to 480 480 **(*)** Note: Mode=0; The reader decodes in the Decode area. Mode=1; The reader decodes in the Capture area.
Illumination Control	LIGHT=a	a=2; Internal illumination is OFF a=3; Internal illumination is ON (with pulsed operation) when capturing **(*)**
Illumination Intensity	CAMbrightness=a	Brightness level is set in 50 steps a : 0 to 50 (0 : Off, 50**(*)** : Brightest)
Internal Illumination	CAMled=c,b	Set the type of internal illumination source <u>TFIR-31LAN-H</u> (Both type spot and diffused can be used in reading) c=0; Disable spot type c=1; Enable spot type b=0; Disable diffused type b=1; Enable diffused type <u>TFIR-31LAN</u> (Both spot type A and B can be used in reading) c=0; Disable spot type-B c=1; Enable spot type-B b=0; Disable spot type-A b=1; Enable spot type-A
Shutter Speed	SHUTT=a	a=0 to 8 0; 1/60 [sec] **(*)** 1; 1/125 2; 1/250 3; 1/500 4; 1/100 5; 1/2000 6; 1/4000 7; 1/6000 8; 1/8000
Extra gain value	GCV=a	a=1 to 15 a=10 **(*)**
Black Level adjustment	CAMblack=a	a=0 (*); Disable a=-127 to +127
Image Preprocessing	IPFUNC0= a,b,c,d,e	Set the type of preprocessing a,b,c,d,e =0,0,0,0,0 **(*)** a,b,c,d,e; (Refer to section 7.8)
Mirrored image	MIRROR=a	a=0; Read only normal type (not mirrored) **(*)** a=1; Read only mirrored type a=2; Read normal type and if it fails, try to read it as mirrored type a=3; Read mirrored type and if it fails, try to read it as normal type

7.5 Camera Control (2) (for Table Mode)

Term	Command	Description
Camera Control Mode	AGC=T	Set in Table mode **(*)**
Number of Tables	ENABLEDDMTBL=a	a=1 to 8 a=8 **(*)** e.g.) Table #1, #2, #3 are enabled and Table #4 through $8 are disabled in case of a=3. In case of a=1, Table Mode will work the same as Fixed Gain Mode.
Editing Table number	EDITDDMTBL=a	a=1 to 8 a=1 **(*)** Set the table parameters after the editing Table number should be set.
Copy Table settings	CPDDMTBL=a,b or a,b-c	The settings of Table #a are copied to Table #b. The settings of Table #a are copied from Table #b through Table #c.

7.6 Camera Control (3) (for Table Mode)

Term	Command	Description
Decode area	DDMwindow=a,b	a=0 to 3 (Horizontal) b=0 to 3 (Vertical) 0 : 100% (H: 752 V: 480) **(*)** 1 : 75% (H: 564 V: 360) 2 : 50% (H: 376 V: 240) 3 : 25% (H: 188 V: 120)
Illumination Control	DDMlight=a	a=2; Internal illumination is OFF a=3; Internal illumination is ON (with pulsed operation) when capturing **(*)**
Illumination Intensity	DDMbrightness=a	Brightness level is set in 50 steps a : 0 to 50 (0 : Off, 50 : Brightest **(*)**)
Internal Illumination	DDMled=c,b	Set the type of internal illumination source TFIR-31LAN-H (Both type spot and diffused can be used in reading) c=0; Disable spot type c=1; Enable spot type b=0; Disable diffused type b=1; Enable diffused type TFIR-31LAN (Both spot type A and B can be used in reading) c=0; Disable spot type-B c=1; Enable spot type-B b=0; Disable spot type-A b=1; Enable spot type-A Note: Refer to section 7.7 for the default table settings.
Shutter Speed	DDMshutt=a	a=0 to 8 0; 1/60 [sec] 1; 1/125 2; 1/250 3; 1/500 4; 1/100 5; 1/2000 6; 1/4000 7; 1/6000 8; 1/8000 Note: Refer to section 7.7 for the default table settings.
Extra gain value	DDMexgain=a	a=1 to 15 Note: Refer to section 7.7 for the default table settings.
Black Level adjustment	DDMblack=a	a=0; Disable a=-127 to +127 Note: Refer to section 7.7 for the default table settings.
Image Preprocessing	DDMpreproc= a,b,c,d,e	Set the type of preprocessing a,b,c,d,e; (Refer to section 7.8) Note: Refer to section 7.7 for the default table settings.

Term	Command	Description
Mirrored Image	DDMmirror=a	a=0; Read only normal type (not mirrored) a=1; Read only mirrored type a=2; Read normal type and if it fails, try to read it as mirrored type a=3; Read mirrored type and if it fails, try to read it as normal type Note: Refer to section 7.7 for the default table settings.

7.7 Default Table settings (*)

TFIR-31LAN / -31LAN-H

Table	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
#0	0,0	3	1,0	50	0	-50	6	0,0,0,0,0	0
#1	0,0	3	1,0	50	0	-50	6	0,0,0,0,0	0
#2	0,0	3	1,0	50	1	0	6	0,0,0,0,0	0
#3	0,0	3	0,1	50	1	0	8	0,0,0,0,0	0
#4	0,0	3	0,1	50	1	-100	7	27,0,0,0,0	0
#5	0,0	3	0,1	50	2	0	5	27,0,0,0,0	0
#6	0,0	3	0,1	50	3	0	5	27,0,0,0,0	2
#7	0,0	3	1,0	50	1	50	6	1,0,0,0,0	0
#8	0,0	3	0,1	50	1	0	8	2,0,0,0,0	0

(1) DDMwindow
(2) DDMlight
(3) DDMled
(4) DDMbrightness
(5) DDMshutt
(6) DDMblack
(7) DDMexgain
(8) DDMproc
(9) DDMmirror

7.8 Image Preprocessing

Term	Command	Description
None	0	No Image Preprocessing
Black Erosion	1	Erosion 2x2
	3	Erosion 3x3
	5	Erosion 5x5
	7	Erosion 2x1 (w)
	9	Erosion 1x2 (h)
White Dilation	2	Dilation 2x2
	4	Dilation 3x3
	6	Dilation 5x5
	8	Dilation 2x1 (w)
	10	Dilation 1x2 (h)
Reverse	20	Reverse White & Black
Contrast Enhancement	21	Cont (L12cut): Removes the darkest 12.5% of the gray-scale values from the image and makes them black. Then stretches the contrast to fill the entire 256 gray-scale values.
	22	Cont (L25cut): Removes the darkest 25% of the gray-scale values from the image and makes them black. Then stretches the contrast to fill the entire 256 gray-scale values.
	23	Cont (H12cut): Removes the brightest 12.5% of the gray-scale values from the image and makes them white. Then stretches the contrast to fill the entire 256 gray-scale values.
	24	Cont (H25cut): Removes the brightest 25% of the gray-scale values from the image and makes them white. Then stretches the contrast to fill the entire 256 gray-scale values.
	25	Cont (LH12cut): Removes the darkest and brightest 12.5% of the gray-scale values from the image and makes them black/white. Then stretches the contrast to fill the entire 256 gray-scale values.
	26	Cont (LH25cut): Removes the darkest and brightest 25% of the gray-scale values from the image and makes them black/white. Then stretches the contrast to fill the entire 256 gray-scale values.
Gamma Correction	27	Gamma(r=0.5) Perform a Gamma Correction (0.5)
Smoothing Filter	40	3x3 Smoothing Filter
Median Filter	41	3x3 Median Filter
Down Size	70	Down Size (Quick) in speeding up mode
Down Size	71	Down Size (Average) in brightness averaging mode

7.9 Preset Mode

Term	Command	Description
Preset	?pre	Get the status of Preset Mode settings
	PREM=0	Disable Preset Mode **(*)**
	PREM=1	Enable Preset Mode 1 Preset data is the first decoded one after power up
	PREM=2	Enable Preset Mode 2 Preset data is registered in advance
	SET=PRENa	Set the number of digits for comparing a=0 to 100 a=0; No count
	clrpren	Initialize number of digits (No count)
	SET=PREDa	Set the preset data
	clrpred	Initialize preset data

7.10 Configuration reference

Term	Command	Description
Status	?	Status Transmission (1^{st} page)
	??	Status Transmission (2^{nd} page)
	???	Status Transmission (3^{rd} page)
	?4	Status Transmission (4^{th} page)
	?5	Status Transmission (5^{th} page)
	?6	Status Transmission (6^{th} page)
	?LF	Status Transmission (for Autosense mode)
	?IMG	Status Transmission (for Image ouput and Image save)
	?ddmtbl	Status Transmission (for Table settings)

7.11 Image output, Image save

Term	Command	Description
Select type of image	IMGSEL=a	a=0 to 1 0; Captured image 1; Decoded image **(*)**
	OKFRAME=a	**Good Read;** a=0 ; Decoded image (Not specified) **(*)** a=1 to 4 ; The specified image stored internal memory
	NGFRAME=a	**No Read;** a=0 ; Decoded image (Not specified) **(*)** a=1 to 4 ; The specified image stored internal memory
Trimming	IMODE=a	a=0; Disable **(*)** a=1; Enable
Trimming posion	PX=aaa	The origin of X-coordinate aaa=0 to 751 0 **(*)**
	PY=aaa	The origin of Y-coordinate aaa=0 to 479 0 **(*)**
	WX=aaa	The width of X-coordinate aaa=1 to 752 752 **(*)**
	WY=aaa	The width of Y-coordinate aaa=1 to 480 480 **(*)**
Image save	IMGSAVE=a	Storage condition a=0 to 3 a=1 **(*)** 0; Disable 1; No Read 2; Good Read 3; SYNC input
	IMGFULL=a	Overwrite condition a=0 to 1 a=1 **(*)** 0; Overwrite all stored images 1; Overwrite the image stored in buffer #4

Term	Command	Description
Image save	IMGVIEW=a	Preparation for transmitting the saved image a=1; Preparation for last saved image **(*)** a=2; Preparation for the 2nd to last saved image a=3; Preparation for the 3rd to last saved image a=4; Preparation for the 4th to last saved image
	IMGCLEAR	Clear all stored image

7.12 LAN Settings

Term	Command	Description
LAN settings	SET=LAN	Set to default for all LAN settings
	?LAN	Get the list of settings for LAN connection
	IPADR=aaa.bbb.ccc.ddd/ee	Set IP address and subnet mask. e.g. IPADR=192.168.101.40/24
	IPPORT=aaaaa	Set Port number
	GWADR =aaa.bbb.ccc.ddd	Set default gateway address
	?who	Get the status for LAN settings
	?netstat	Get the status for TCP/IP connection
	?version	Get the model name and firmware version
	discon aaaaa	Disconnect the specified TCP/IP connection forcibly aaaaa; Port number (Decimal)

7.13 General Operation

Term	Command	Description
Initialization	SET=DFT	Reset to factory default
Save	WSETS	Save settings to internal flash memory
Buzzer	buz=a	a=0; Buzzer OFF a=1; Buzzer ON **(*)** **(Except start-up period)**
Digital I/O	CHATT=a	Debouncing time a=0; None **(*)** a=1; 10ms a=2; 20ms
	GOOUT=a	a=0; GO output is holded until next SYNC input a=100 to 20000; GO output time [unit:ms] a=300 **(*)**
	NGOUT=a	a=0; NG output is holded until next SYNC input a=100 to 20000; NG output time [unit:ms] a=300 **(*)**
	DOUT1=a	a=0; Disable a=1; GO(Good Read) **(*)** a=2; NG(No Read) a=3; Ready a=4; Busy1 a=5;Busy2
	DOUT2=a	a=0; Disable a=1; GO(Good Read) a=2; NG(No Read) **(*)** a=3; Ready a=4; Busy1 a=5;Busy2
Log output	PRNTBOOT	Boot trace transmission
	PRNTLOG	Log trace transmission
	PRNTOUTPUT	Output trace transmission

7.14 Table of Character code

Upper 4bits

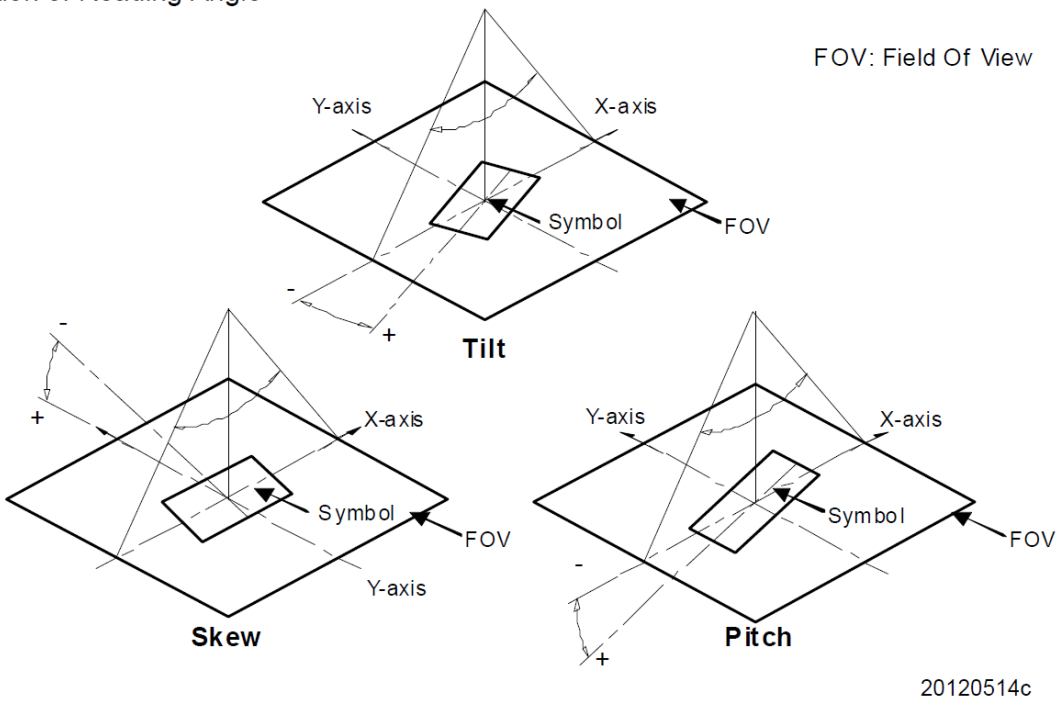
Lower 4bits	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p				ー	タ	ミ		
1	SOH	DC1	!	1	A	Q	a	q			。	ア	チ	ム		
2	STX	DC2	”	2	B	R	b	r			「	イ	ツ	メ		
3	ETX	DC3	#	3	C	S	c	s			」	ウ	テ	モ		
4	EOT	DC4	$	4	D	T	d	t			、	エ	ト	ヤ		
5	ENQ	NAK	%	5	E	U	e	u			・	オ	ナ	ユ		
6	ACK	SYN	&	6	F	V	f	v			ヲ	カ	ニ	ヨ		
7	BEL	ETB	’	7	G	W	g	w			ァ	キ	ヌ	ラ		
8	BS	CAN	(	8	H	X	h	x			ィ	ク	ネ	リ		
9	HT	EM	)	9	I	Y	i	y			ゥ	ケ	ノ	ル		
A	LF	SUB	*	:	J	Z	j	z			ェ	コ	ハ	レ		
B	VT	ESC	+	;	K	[	k	{			ォ	サ	ヒ	ロ		
C	FF	FS	,	<	L	¥	l	|			ャ	シ	フ	ワ		
D	CR	GS	−	=	M	]	m	}			ュ	ス	ヘ	ン		
E	SO	RS	.	>	N	^	n	—			ョ	セ	ホ	゛		
F	SI	US	/	?	O	_	o	DEL			ッ	ソ	マ	゜		

20120514b

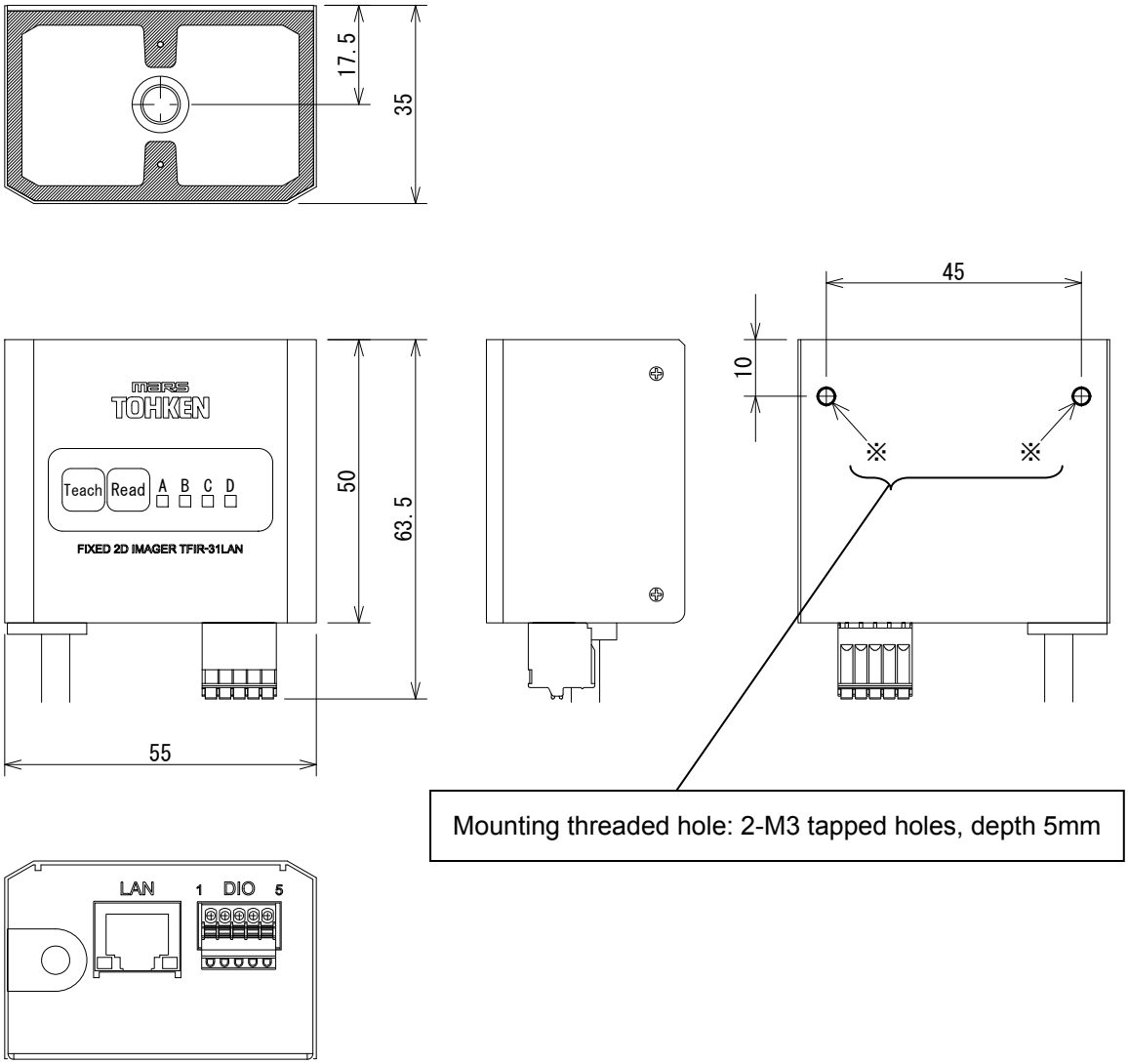
8 Specifications

Dimensions	35(H) x 55(W) x 50(D) mm
Weight	Approx. 130g
Reading angle	PITCH: ± 35° SKEW: ± 35° TILT: 360°
Operating temparature	0 to 40°C
Operating humidity	35 to 85%R.H. (non-condensing)
Storage temperature	-20 to 65°C
Storage humidity	35 to 85%R.H. (non-condensing)
Power (Supply voltage, Power consumption)	[TFIR-31LAN] 5Vdc ±10%, Approx.1A [TFIR-31LAN-H] 5Vdc ±10%, Approx.0.8A
Serial interface	RS232C (1200 to 115.2k bps)
LAN interface	Ethernet (10Base-T)
Data format	ASCII
Image sensor	1/3 inch monochrome CMOS
Image format	WVGA (752x480)
Digital input	1 opto-isolated Input registance: 1kΩ OFF voltage: 0 to 0.8Vdc ON voltage: 6 to 28Vdc
Digital output	2 opto-isolated Maximum rating 30Vdc 50mA
Supported symbols	1D barcode Code39, Code128, EAN128 Codabar, ITF(Interleaved 2 of 5) JAN / EAN / UPC, Code93, RSS 2D code Data Matrix(ECC200), QR Code, Micro QR PDF 417, Micro PDF, Maxi Code, Composite, Postal(Japan Post), Aztec Code

Definition of Reading Angle



8.1 Dimensions



[Units: mm]

8.2 Interface

8.2.1 LAN interface

- Ethernet networks : 10BASE-T
- Maximum data rate : 10M bps
- Connector : RJ-45

Please use a Category 3 or better cable.

8.2.2 Interface cable

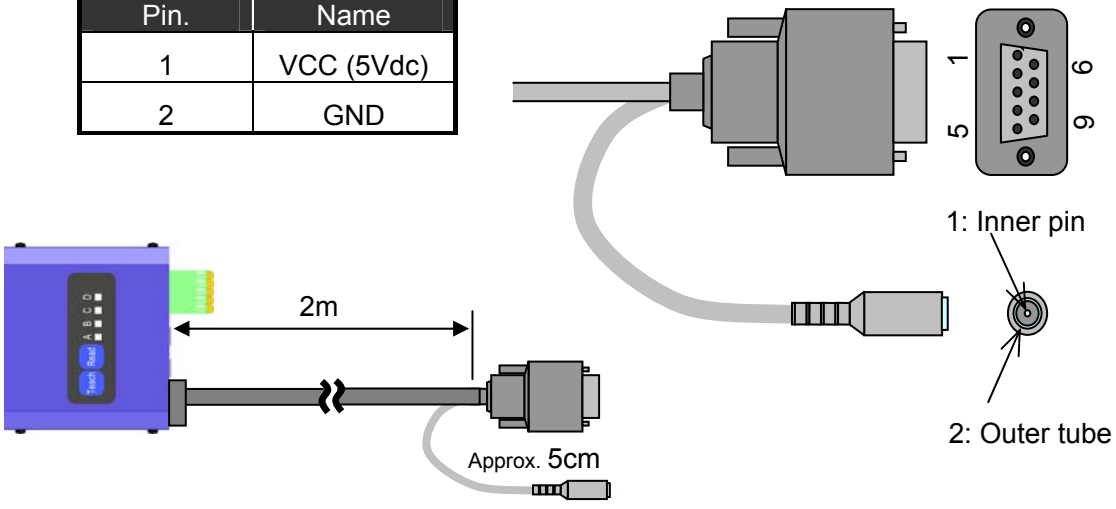
Host connector: D-sub 9-pin female connector (4-40 UNC screw locks)

Pin	Name	Function	Direction
1	NC	OPEN	
2	SD	Transmit data (RS232C)	Output
3	RD	Receive data (RS232C)	Input
4	NC	OPEN	
5	GND	GND	
6	NC	OPEN	
7	CS	Clear to send (RS232C)	Input
8	RS	Request to send (RS232C)	Output
9	NC	OPEN	

Note: The above is listed realative to the reader (TFIR-31LAN) end of the INPUT/OUTPUT transactions with the host.

DC power Jack (optional): EIAJ

Pin.	Name
1	VCC (5Vdc)
2	GND

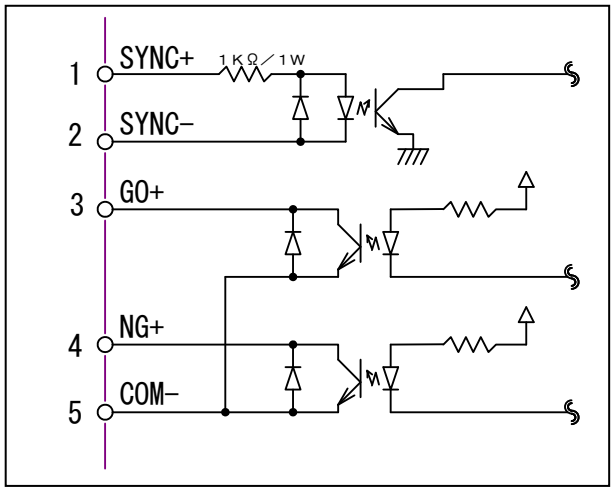


8.2.3 DIO (Digital Input/Output)

Terminal block (opto-isolated digital input/output)

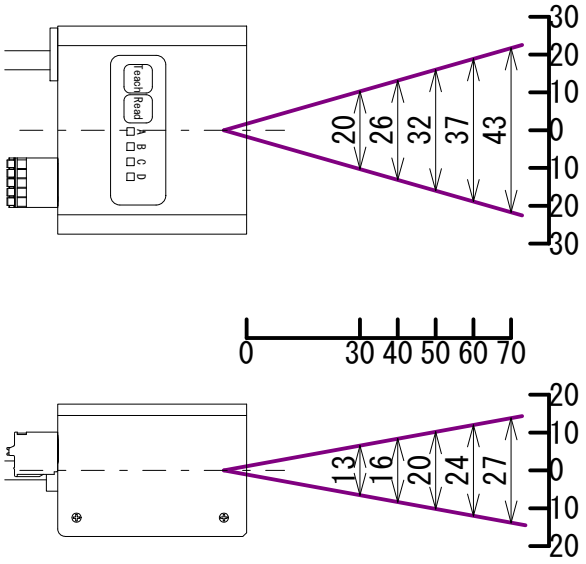
Pin	Name	Function	Direction
1	SYNC+	Sync input +	Input
2	SYNC-	Sync input -	Input
3	GO+	OK output +	Output
4	NG+	NG output +	Output
5	COM-	Common -	Output

Internal Circuit Diagram



8.3 Reading Range

8.3.1 TFIR-31LAN-H

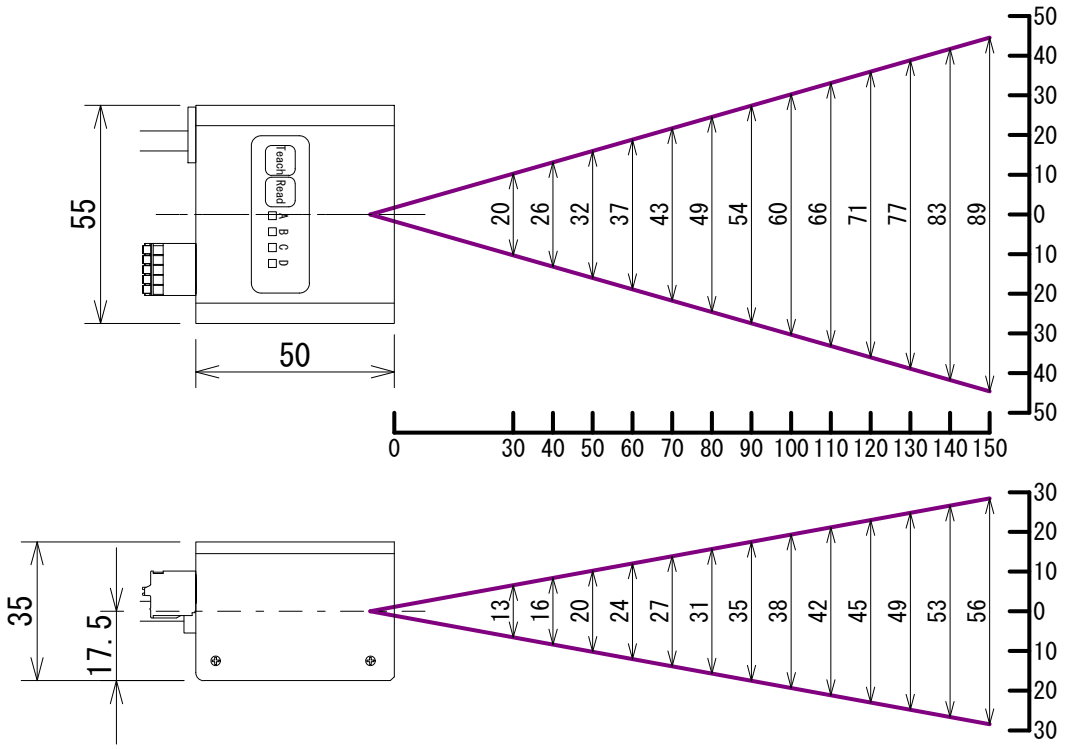


[Units: mm]

Symbologies	Cell size	Near	Far
Data Matrix	0.125	36	54
	0.167	32	58
	0.25	28	68
QR Code	0.125	36	54
	0.167	32	58
	0.25	28	68

[Units: mm]

8.3.2 TFIR-31LAN



[Units: mm]

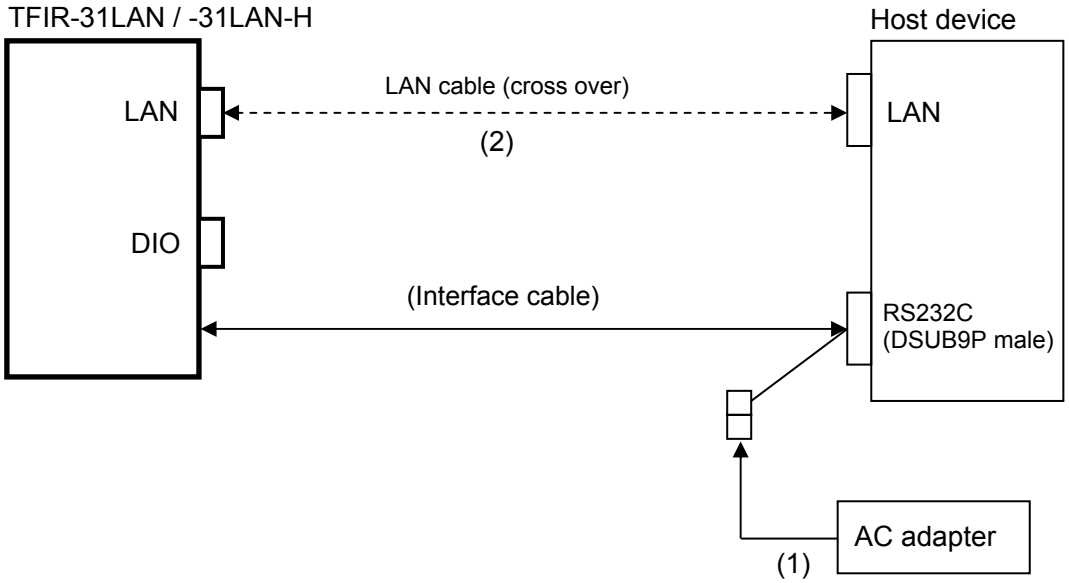
Symbologies	Cell size	Near	Far
Data Matrix	0.125	50	74
	0.167	43	85
	0.25	40	95
	0.33	30	115
	0.42	25	130
	0.5	25	135
QR Code	0.125	50	73
	0.167	45	85
	0.25	35	95
	0.33	30	110
	0.42	30	130
	0.5	30	135

[Units: mm]

9 Example of configuration diagram

The followings are the conditions that are used for this configuration:

- ■ Reading trigger must be input by serial command
- ■ Does not use digital output (GO and NG)



No.	Product name	Model name	Note
(1)	AC adapter (5Vdc)	KSAC0500160W1UV-1	Optional
(2)	LAN cable (cross over)	Not specified (greater than category 3)	Optional

Note: While a LAN cable is optional, the setup time of the image reader can be reduced with its fast transfer speed.

10 Troubleshooting

10.1 The reader does not start up or cannot communicate with a PC.

■ Is power supply voltage within the specifications?

Power supply voltage should be DC 5V ± 10%.

If the DC voltage is not within the specified range, the reader may not work properly and there is a possibility of damaging the reader.

■ Is the host port settings the same as the reader port settings?

Make sure the connection and the communication settings (e.g. Baud rate, Character format, COM port number for RS232C settings).

The reader port is set by the serial command “COMFROM”. If the port is set to RS232C (COMFROM=0), both way LAN data communication between the reader and the host would not work.

■ Is the format of serial command correct?

Serial commands input are effective in stand-by state.

Add a carriage return code [CR] at the end of the serial command.
Push the Enter key at the end to input the serial command by typing on Terminal software.

Transmit the serial command ”WSETS” to save the settings to internal flash memory. If the reader is turned off the power without saving settings, the reader will start up in the previous settings next time.

An interval of 500ms between each command will avoid unwanted error during

settings.

10.2 Symbol cannot be decoded

■ Is the symbol-code settings correct?

Make sure that the symbologies and the digit number are set up correctly. If the settings differ from the input symbologies, the reader would not decode the image.

■ Are the reading distance and the print quality suitable?

To ensure the reading distance from the code to the reading window must be within the specified reading distance.
If the code is damaged or the print quality is low, it may not be decodable even if the reading depth requirements have been met.

■ Is the reading window clean?

The quality of captured image is affected by the condition of the reading window. Dust, dirt, etc. on the reading window may alter the reading performance. Clean with a lens cleaner or similar non-abrasive method.

■ Is the print quality of the symbol good?

Make sure the quality of the symbol (1D: Module width and Wide/Narrow bar width ratio, 2D: Cell size) meet the standards.

■ Is ITF set to a fixed length?

When using ITF (Interleaved 2 of 5) it is possible that the number of digits read will be less than the actual digits encoded in the barcode. We recommend setting the specific digit length for ITF.

10.3 Fail to communicate through TCP/IP protocol

Fail to communicate through TCP/IP protocol due to accidental unplug/plugin of the LAN cable while the reader is in working mode.

■ Retry the connection process after disconnection.

To recover the connection, send the command “discon” through RS232C interface for forced termination, and then retry the connection.

10.4 After Good Read, the reader emits 7 short beeps a few seconds later.

Communication error can be caused by the following reasons:

- The reader is set to COMFROM=0 or 2, but a serial cable is not connected.
- The reader is set to COMFROM=1 or 2, but a LAN cable is not connected.

[Memorandom]

[Memorandom]

[Memorandom]

Warranty Obligations

Exclusive of the cases with special mentions in quotations, contracts or specifications, MARS TOHKEN SOLUTION warrants this product as follows.

1. Term of warranty

   One year from the date of purchase.

2. Warranty Coverage

   MARS TOHKEN SOLUTION shall repair or replace the product at no charge if any defects in the Products are suspected to be due to design or manufacturing error.

   This warranty does not cover, and MARS TOHKEN SOLUTION will not be held liable, for any damages incurred by the use of this product. The above warranty shall not apply to any Product; (1) which has not been used and maintained in accordance with the operating instructions, (2) which has been repaired or altered by anyone other than MARS TOHKEN SOLUTION authorized personnel, (3) which has been subject to unusual physical or electrical stress, misuse, abuse, negligence, natural disasters, fire, pollution etc., (4) other defects that may arise through no fault of MARS TOHKEN SOLUTION.

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