

NFT 2200

Fixed-position CCD Scanner

OPTICON

Specifications Manual



All information subject to change without notice.

Document History

Model Number:	NFT 2200	Specification Number:	SS07045
Edition:	4	Original Spec Number:	SS05072
Date:	2007-02-01		

Copyright 2007 Opticon. All rights reserved.

This manual may not, in whole or in part, be copied, photocopied, reproduced, translated or converted to any electronic or machine readable form without prior written consent of Opticon.

Limited Warranty and Disclaimers

PLEASE READ THIS MANUAL CAREFULLY BEFORE INSTALLING OR USING THE PRODUCT.

Serial Number

A serial number appears on all Opticon products. This official registration number is directly related to the device purchased. Do not remove the serial number from your Opticon device. Removing the serial number voids the warranty.

Warranty

Unless otherwise agreed in a written contract, all Opticon products are warranted against defects in materials and workmanship for two years after purchase. Opticon will repair or, at its option, replace products that are defective in materials or workmanship with proper use during the warranty period. Opticon is not liable for damages caused by modifications made by a customer. In such cases, standard repair charges will apply. If a product is returned under warranty and no defect is found, standard repair charges will apply. Opticon assumes no liability for any direct, indirect, consequential or incidental damages arising out of use or inability to use both the hardware and software, even if Opticon has been informed about the possibility of such damages.

Packaging

The packing materials are recyclable. We recommend that you save all packing material to use should you need to transport your scanner or send it for service. Damage caused by improper packaging during shipment is not covered by the warranty.

Trademarks

Trademarks used are the property of their respective owners.

Opticon Inc. and Opticon Sensors Europe B.V. are wholly owned subsidiaries of OPTOELECTRONICS Co., Ltd., 5-3, Tsukagoshi 5-chome, Warabi-shi, Saitama, Japan 335-0002. TEL +81-(0) 48-446-1183; FAX +81-(0) 48-446-1180

SUPPORT

USA

Phone: 800-636-0090

Email: support@opticonusa.com

Web: www.opticonusa.com

Europe

Email: support@opticon.com

Web: www.opticon.com

Contents

- 1. Abstract..... 6**
- 2. Overview 6**
- 3. Physical Features..... 7**
 - 3.1. Dimensions 7
 - 3.2. Weight..... 7
 - 3.3. Installation..... 7
- 4. Environmental Specifications 8**
 - 4.1. Operating Temperature and Humidity..... 8
 - 4.2. Storage Temperature and Humidity..... 8
 - 4.3. Ambient Light Immunity 8
- 5. Electrical Specifications 9**
 - 5.1. Electrical Characteristics..... 9
- 6. Optical Specifications..... 9**
- 7. Technical Specifications 10**
 - 7.1. High Resolution 10
 - 7.2. Print Contrast Signal (PCS) 10
 - 7.3. Scan Area and Resolution 10
 - 7.3.1. Focal Plane 11
 - 7.3.2. Scan Area 11
 - 7.3.3. Depth of Field..... 12
 - 7.3.4. Light Axis..... 13
 - 7.4. Pitch, Skew, and Tilt 13
 - 7.4.1. Pitch Angle 13
 - 7.4.2. Skew Angle 14
 - 7.4.3. Tilt Angle 14
 - 7.5. Curvature 15
 - 7.6. Scanning Barcodes on Moving Items 16
- 8. Interface Specifications 17**
 - 8.1. RS-232C Interface Spec..... 17
 - 8.1.1. Settings and Communication 17
 - 8.1.2. Signal Level..... 17
 - 8.1.3. Pin Assignment 17
 - 8.1.4. Interface Circuit..... 18

8.1.5.	Character Format.....	18
8.1.6.	Communication Format.....	18
8.1.7.	Handshaking	19
8.2.	USB Interface Specifications	24
8.2.1.	Settings	24
8.2.2.	Connector.....	24
8.2.3.	Interface Circuit.....	24
8.3.	DOS/V Wedge Interface Specification	25
8.3.1.	Settings	25
8.3.2.	Connectors.....	25
9.	Cable and Connector	27
9.1.	RS-232C Cable.....	27
9.2.	USB Cable	27
9.3.	Wedge Cable	28
10.	Default Settings.....	29
10.1.	Set Interface Default	29
10.2.	Default Settings 1: Readable Codes.....	30
10.3.	Default Settings 2: Read Options, Trigger, Buzzer	31
11.	Serial Number	31
12.	Packaging Specifications.....	32
12.1.	Individual Packaging Specification.....	32
12.2.	Collective Packaging Specification	32
13.	Durability.....	33
13.1.	Electrical Noise	33
13.2.	Static Electricity	33
13.3.	Shock.....	33
13.3.1.	Drop Test (without packaging).....	33
13.3.2.	Drop Test (with individual packaging).....	33
13.4.	Vibration Strength	33
14.	Reliability	34
15.	Regulatory Compliance	34
15.1.	Product Safety	34
15.2.	EMC.....	34
15.3.	RoHS	34

16. Safety	35
16.1. Shock.....	35
16.2. Temperature Conditions	35
16.3. Foreign Materials	35
16.4. Other.....	35
17. Mechanical Drawing.....	36

Table of Figures

Figure 1: Ambient light immunity	8
Figure 2: Focal plane.....	11
Figure 3: Scan width, low PCS, high resolution, scan area.....	12
Figure 4: Light axis	13
Figure 5: Pitch angle.....	13
Figure 6: Skew angle.....	14
Figure 7: Tilt angle	14
Figure 8: Curvature.....	15
Figure 9: Barcode moving vertically	16
Figure 10: Barcode moving horizontally	16
Figure 11: Interface circuit	18
Figure 12:Character format (same for sending and receiving).....	18
Figure 13: Communication format	18
Figure 14: No handshaking	19
Figure 15: Busy/Ready communication.....	19
Figure 16: Cannot receive command	20
Figure 17: Signal timing.....	20
Figure 18: Modem transmit data.....	21
Figure 19: ACK/NAK.....	22
Figure 20: ACK/NAK—No response.....	23
Figure 21: USB connector	24
Figure 22: Interface circuit.....	24
Figure 23: DOS/V host connector.....	25
Figure 24: DOS/V keyboard connector.....	26
Figure 25: RS-232C cable	27
Figure 26: USB cable	27
Figure 27: Wedge cable.....	28
Figure 28: Serial number diagram	31
Figure 29: Packaging.....	32
Figure 30: Screw holes—4 M3 (2 holes each on 2 sides).....	36

1. Abstract

This manual provides specifications for the NFT 2200 fixed position CCD scanner with a built-in decoder, which decodes colored or black barcodes on a white or colored background.

2. Overview

The NFT 2200 fixed position scanners are a miniature, 200 scan per second CCD barcode reader designed to be easily integrated into host equipment.

NFT 2000 series scanners are fully programmable, allowing the user to configure settings by scanning barcode menus or sending serial commands from a host computer.

Scanned data is transferred via an RS-232C, USB, or Wedge interface.

The NFT 2200 complies with RoHS.

Supported symbologies:

Linear (1D)

JAN/UPC/EAN (WPC), incl. add-on

Codabar/NW-7

Code 39

Code 93

Code 128: EAN-128

IATA

Industrial 2of5

Interleaved 2of5

ISBN (13-digit JAN + 5-digit add-on)

MSI/Plessey

3. Physical Features

3.1. Dimensions

W 55.0 x D 52.0 x H 20.0 mm

3.2. Weight

110 g (maximum, including cable)

3.3. Installation

Fixing screws: two M3 screws (when installing on one side only).

- Make sure that the screws do not come in any deeper than 3 mm inside the scanner.
- Refer to Chapter 17, “Mechanical Drawing” for the locations of the screw holes.

Screw holes: four holes (2 holes each on 2 sides)

- Refer to Chapter 17, “Mechanical Drawing” for the locations of the screw holes.
- Tape up any of the screw holes that are not used for installation.

4. Environmental Specifications

4.1. Operating Temperature and Humidity

Temperature: 0 to +45° C

Humidity: 20 to 85% RH

4.2. Storage Temperature and Humidity

Temperature: -10 to +60° C

Humidity: 20 to 90% RH

4.3. Ambient Light Immunity

Decoding performance is guaranteed when the range of illumination on a barcode surface is between zero and the following values:

Incandescent light	5,000 lx
Fluorescent light	5,000 lx

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

PCS	0.9
Resolution	0.33 mm
Symbology	JAN-13
N/W Ratio	1:2.5
Distance	31.4 mm
Angle*	$\alpha = 10^\circ \beta = 0^\circ \theta = 0^\circ$
Curvature	$R = \infty$
Power supply voltage	5.0 V

Direct light or specular reflection light from a source should be prevented from entering the acceptance area.

* α , β and γ respectively represent pitch, skew and tilt. Please see section 7.4 for how these values are defined.

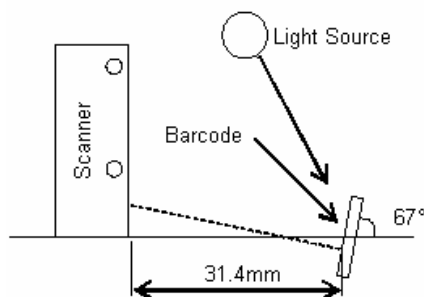


Figure 1: Ambient light immunity

5. Electrical Specifications

5.1. Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Power supply voltage	V _{DD}	4.5	5.0	5.5	V	
Operating current 1	I _{OP1}	-	80	130	mA	When not scanning
Operating current 2	I _{OP2}	-	130	190	mA	When scanning, buzzer is on or LED is blinking for "Good Read"
Stand-by current	I _{PRE}	-	35	45	mA	When using trigger for RS-232C settings
Rush current peak	I _{PEAK}	-	400	1000	mA	
Power supply ripple	-	-	100	0.1	Vp-p	(10 Hz to 100 kHz)

Conditions

- Connect 1Ω resistance to a power supply line in series and measure the current by the voltage between both ends of resistance.
- Power supply voltage is measured at a connector terminal area.
- The power current values may differ depending on the host system and Interfaces.

6. Optical Specifications

Parameter	Specification	Unit
Light-emitting element	Red LED diode	-
Emission wavelength	660	nm
Light receiving element	CCD linear sensor	
Scanning speed	200	scans/s

7. Technical Specifications

The conditions for technical specifications are as follows, unless otherwise specified in each section.

Conditions

Ambient temperature and humidity	Room temperature and room humidity
Ambient light	500 to 1,000 lx
Background	Barcode = black Space = white Margin = white Background of label = black
Power supply voltage	5.0 V
Decoding test	Approve the performance when decoding is successful in over 70% of the tests.

7.1. High Resolution

0.15 mm

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

Distance	-1 to 3 mm from the focal plane of the scanner
Label	PCS = 0.9, Resolution = 0.26 mm, Quiet Zone = 10 mm
Angle	Curvature: $R = \infty$, Skew Angle = $\alpha_2 = 10^\circ$

7.2. Print Contrast Signal (PCS)

0.45 or higher (over 70% of reflectivity of space and quiet zone).

7.3. Scan Area and Resolution

The scan area of the scanner expands to the + and – directions centered on the focal plane (h = 31.4 mm).

7.3.1. Focal Plane

The optical performance of the scanner is the highest when the focal plane is located 31.4 mm from the edge of the scanner. Therefore, set objective barcodes at about 31.4 mm from the scanner.

This is helpful especially when scanning a barcode with high resolution or low PCS.

It is possible to scan barcodes up to 80 mm wide when the barcode is located on the focal plane.

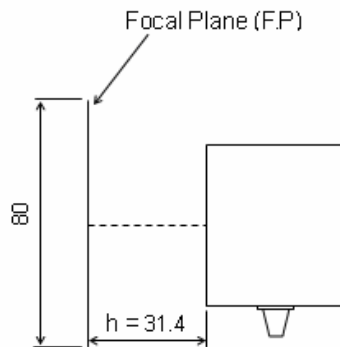


Figure 2: Focal plane

7.3.2. Scan Area

Scan width: 80 mm (inc. quiet zone)

Scan width + Low PCS: 60 mm (inc. quiet zone)

Conditions

When scanning barcodes 80 mm wide or barcodes 60 mm and wider with low PCS and curvature, scanning performance is guaranteed only when they are scanned at the focal point.

7.3.3. Depth of Field

-5mm ≤ X ≤ 6mm from focal plane

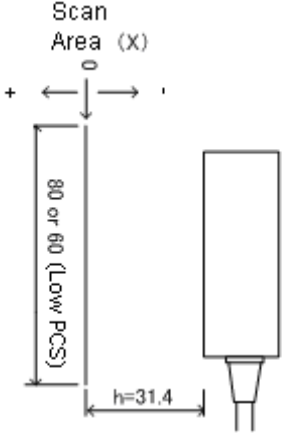


Figure 3: Scan width, low PCS, high resolution, scan area

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

- Distance 0 mm from the focal plane of the scanner
- Label PCS = 0.9, Resolution = 0.26 mm, Quiet Zone = 10 mm
- Angle Curvature: R = ∞, Skew Angle = α2=10°

Barcode #	PCS	Resolution (mm)	Symbology
1	0.9	0.2	Code 39
2	.45	0.2	Code 39
3	.9	0.15	Code 39
4-8	.9	0.26	JAN-13

Set an objective barcode in front of the center of the scanner optical window.

7.3.4. Light Axis

The light axis appears at a point 2 mm above or below the 77-degree inclined angle. The location of the light axis may vary in the said range (1 ± 2 mm) for each unit. Please set the objective barcode within this range.

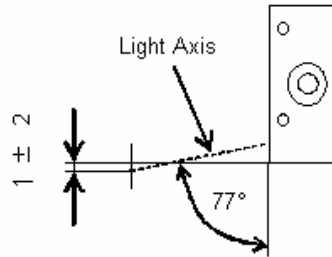


Figure 4: Light axis

7.4. Pitch, Skew, and Tilt

Scanning performance is guaranteed within the following skew, pitch, and tilt angles.

7.4.1. Pitch Angle

Pitch angle: $\beta = \pm 6^\circ$

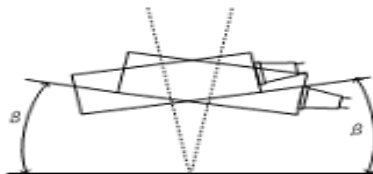


Figure 5: Pitch angle

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

Distance	0 mm from the focal plane of the scanner
Label	PCS = 0.9, Resolution = 0.26 mm, Quiet Zone = 10 mm
Angle	Curvature: $R = \infty$, Skew Angle = $\alpha_2 = 10^\circ$ (for measuring Pitch Angle and Tilt Angle)

7.4.2. Skew Angle

Skew angle: $\alpha = \pm 30^\circ$

Dead zone: $\beta = \pm 10^\circ$

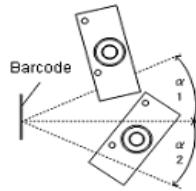


Figure 6: Skew angle

In the skew angle drawing, the position of the 77° beam axis is shown as $\alpha=0^\circ$.

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

Distance 0 mm from the focal plane of the scanner

Label PCS = 0.9, Resolution = 0.26 mm, Quiet Zone = 10 mm

Angle Curvature: $R = \infty$, Pitch Angle = $\beta 0^\circ$, Tilt Angle = $\gamma 0^\circ$ (for measuring Skew Angle)

7.4.3. Tilt Angle

$\gamma = \pm 20^\circ$

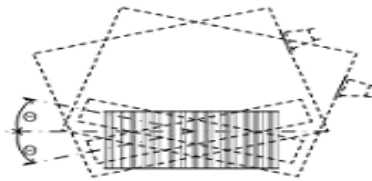


Figure 7: Tilt angle

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

Distance 0 mm from the focal plane of the scanner

Label PCS = 0.9, Resolution = 0.26 mm, Quiet Zone = 10 mm

Angle Curvature: $R = \infty$, Skew Angle = $\alpha 2=10^\circ$ (for measuring Pitch Angle and Tilt Angle)

7.5. Curvature

With 8-digit JAN/UPC/EAN barcodes, decoding performance is guaranteed when $R \geq 30$ mm.

With 13-digit JAN/UPC/EAN barcodes, decoding performance is guaranteed when $R \geq 20$ mm.

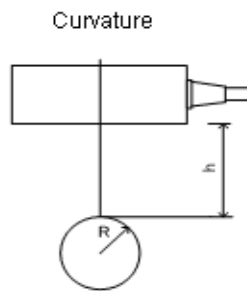


Figure 8: Curvature

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

Distance	0 mm from the focal plane of the scanner
Label	PCS = 0.9, Resolution = 0.26 mm, Quiet Zone = 10 mm
Angle	Skew Angle $\alpha_2 = 10^\circ$

7.6. Scanning Barcodes on Moving Items

Scanning barcodes on moving objects requires that the speed of the barcode be adjusted to optimize the scanner's reading performance. The orientation of the barcode is another consideration and plays an important part in determining the speed.

The barcode label can be oriented horizontally (ladder) and vertically (picket-fence). The scanner's reading performance is improved when barcodes are moving vertically (see Figure 9).

Scanning performance may differ depending on the moving speed of the barcode. The achievable label speed can be calculated and depends on the following input values:

- Scan speed = 200 scans/s
- Redundancy = minimum 3 scans per label, plus the redundancy as set by user
- Label height
- Label speed

The label height and speed influence each other. It is necessary to keep enough height between barcodes.

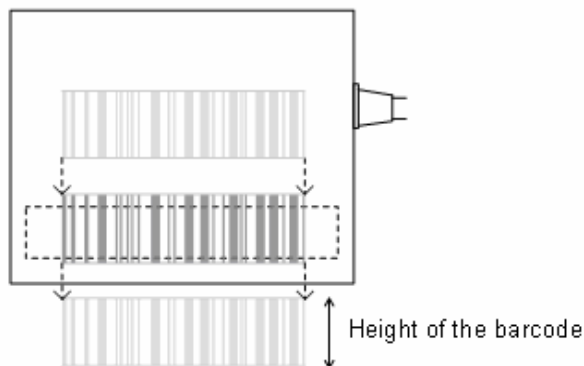


Figure 9: Barcode moving vertically

However, when scanning barcodes that are moving horizontally, the optical capabilities of the scanner are reduced (see Figure 10). Therefore, be sure to stop the barcode for about 200 ms when the barcode is aligned with the center of the scanner.

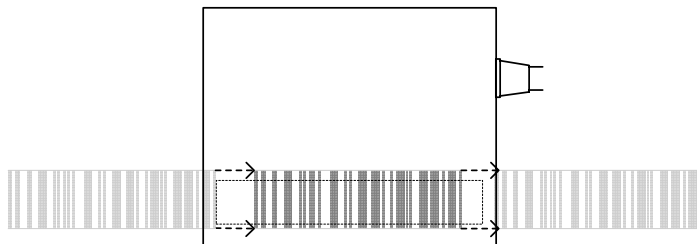


Figure 10: Barcode moving horizontally

When scanning barcodes on moving items as described above, scanning performance may decline rapidly, depending on operating conditions.

8. Interface Specifications

8.1. RS-232C Interface Spec

8.1.1. Settings and Communication

Reading the menu barcodes in section 10.1 can set the RS-232C interface default.

Item	[U2] setting
Baud rate	9600 bps
Start/stop bits	1 bit
Data bits	8 bits
Parity bits	No parity
Handshaking	No handshake
Flow control time out	Indefinitely

8.1.2. Signal Level

Signal Name	I/O	RS-232C Level (V)	
		Mark/OFF	Space/ON
SC	OUT	-5 to -15	+5 to +15
RD	IN	-3 to -15	+3 to +15
RS	OUT	-5 to -15	+5 to +15
CS	IN	-3 to -15	+3 to +15
TRIGGER	IN	Low active	

8.1.3. Pin Assignment

Signal	Pin
F.GND	Shield (Black)
S-GND	Brown
VCC (+5V)	Orange
SD	Green
RD	White
RS	Grey
CS	Blue
TRIGGER	Yellow

8.1.4. Interface Circuit

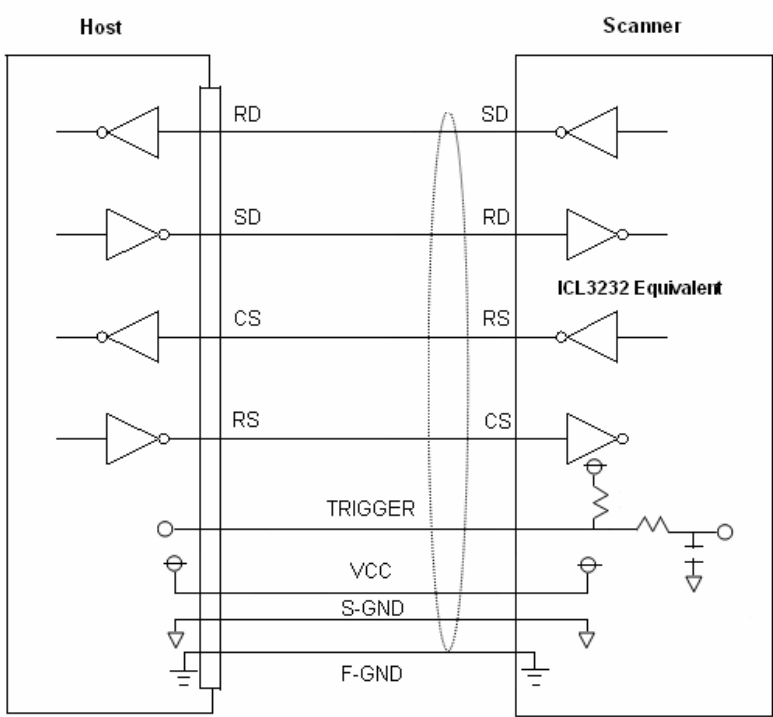


Figure 11: Interface circuit

8.1.5. Character Format

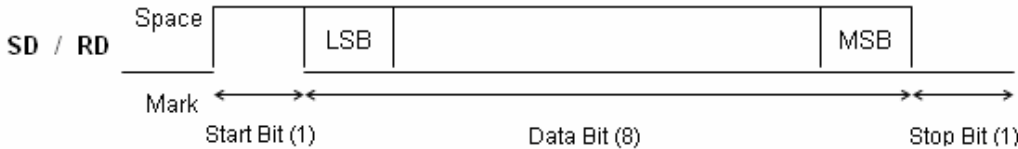


Figure 12: Character format (same for sending and receiving)

8.1.6. Communication Format

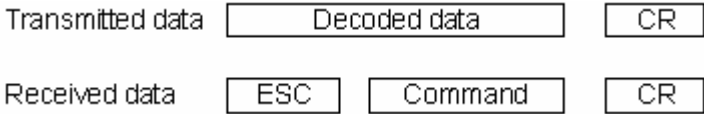


Figure 13: Communication format

8.1.7. Handshaking

Select handshaking options using the menu or command listed below.

Handshaking	Menu/Command
Uncontrolled (No handshake)	P0
BUSY/READY	P1
MODEM	P2
ACK/NAK	P3
ACK/NAK NO RESPONSE	P4

a) No Handshaking

The scanner attempts the communication regardless of the state of the host computer.

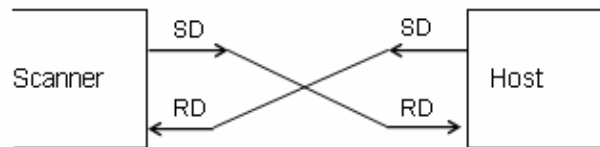


Figure 14: No handshaking

b) BUSY/READY

The scanner and the host computer notify each other of their state and whether they can receive data with BUSY/READY through an RS line. They can communicate state to each other through a CS line when connected as in the following figure.

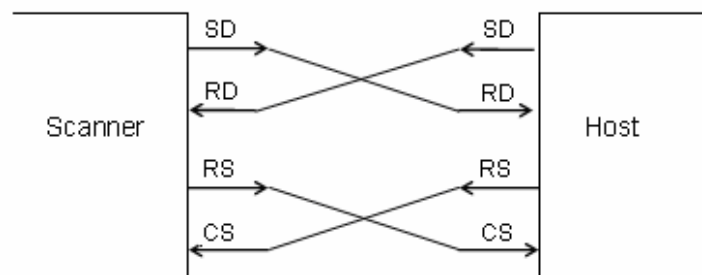


Figure 15: Busy/Ready communication

The scanner stays ON (is able to receive data) except during certain parts of the process, such as receiving data (buzzer command execution), transmitting data, and menu processing. The scanner checks the CTS line before transmitting data. When it is ON, the scanner transmits data. When it is OFF, the scanner waits for it to turn ON within a set time. The scanner will abort transmission with an error indication (buzzer) when the CTS line is not ON within a specified period. The Flow Control time-outs are as follows, and the default setting is "indefinitely" (I0).

Flow Control Time Out	Menu/Command
Indefinitely	I0
100 ms	I1
200 ms	I2
400 ms	I3

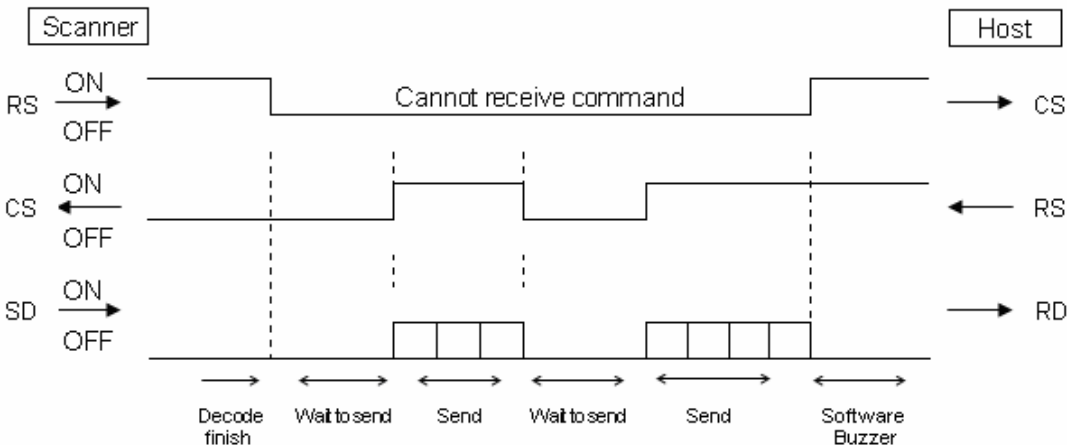


Figure 16: Cannot receive command

CS, SD signal timing

When the CS line (RTS signal of the host) is turned OFF while sending an SD signal, the scanner transmits one character and waits. When the CS signal is turned ON while transmitting a character, the character will be transmitted.



Figure 17: Signal timing

Note: When using loopback (wire connection) for RTS, CTS line of the scanner in this setting, *No handshake* is not enabled.

c) MODEM

The scanner turns RTS line ON before transmitting data. Other processes are the same as BUSY/READY.

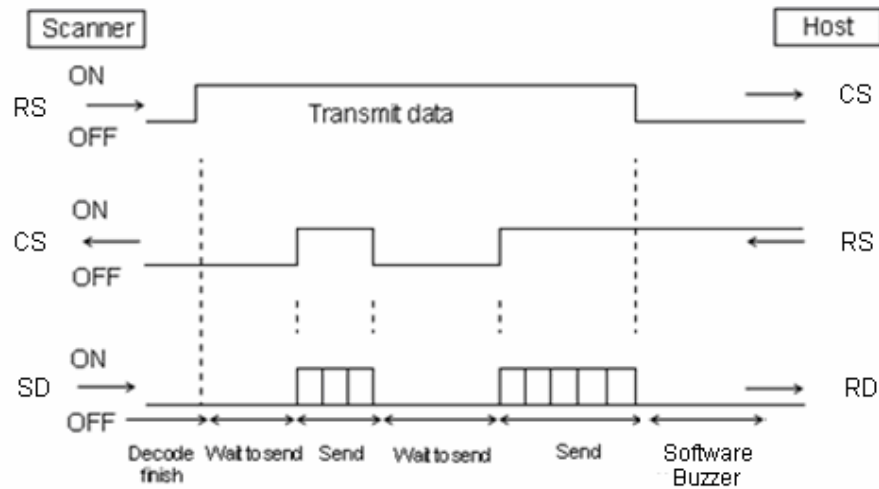


Figure 18: Modem transmit data

d) ACK/NAK

After data has been transmitted, the scanner expects to receive one of the following responses from the host:

- **ACK response**—Action: The scanner completes transmission with the good-read buzzer and returns to the initial state.
- **NAK response**—Action: The scanner sends the data again and waits for the response from the host.
- **DC1 response**—Action: The scanner returns to waiting for the trigger, if it has a trigger (the initial state).
- **None response**—Action: The scanner sounds the error buzzer and returns to the initial state.

ACK/NAK timeout can be set as follows using the menu or commands.

- I4: Indefinitely (default)
- I5: 100 ms
- I6: 500 ms

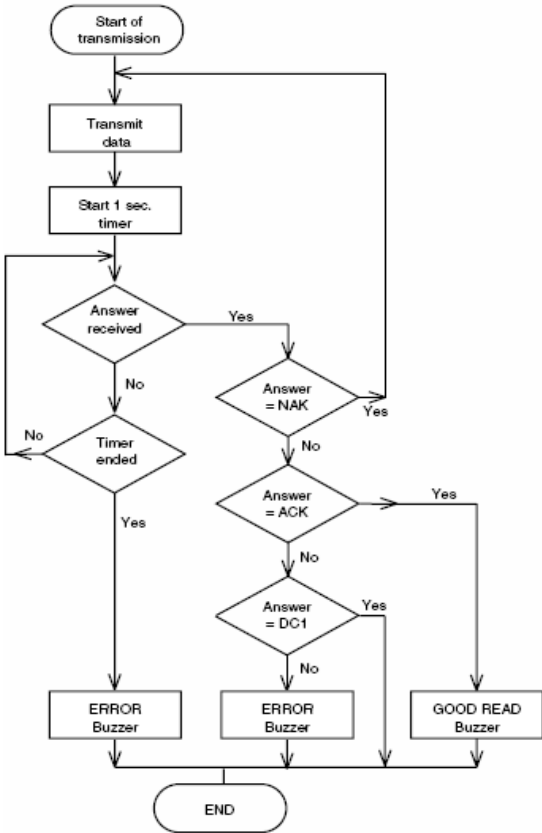


Figure 19: ACK/NAK

e) ACK/NAK NO RESPONSE

When no response from the host is received within the setting time, the scanner assumes an ACK response, and returns to the initial state without the error buzzer. The other actions are the same as ACK/NAK.

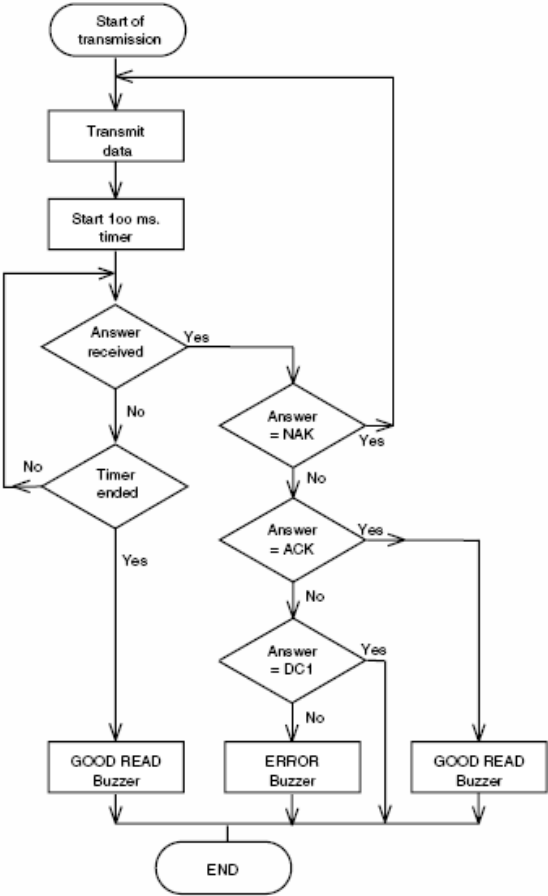


Figure 20: ACK/NAK—No response

8.2. USB Interface Specifications

8.2.1. Settings

Reading the menu barcodes in section 10.1 can set the USB Interface default. The NFT 2200 USB model uses a low-speed USB interface.

8.2.2. Connector

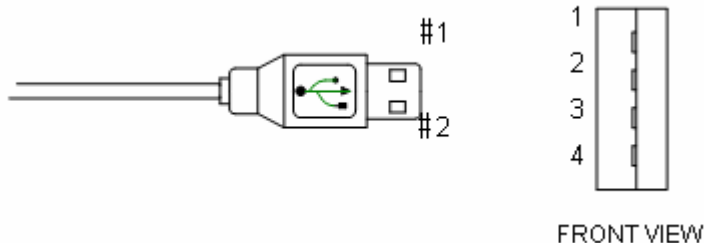


Figure 21: USB connector

Contact Number	Signal Name
1	VCC
2	-DATA
3	+DATA
4	GND

8.2.3. Interface Circuit

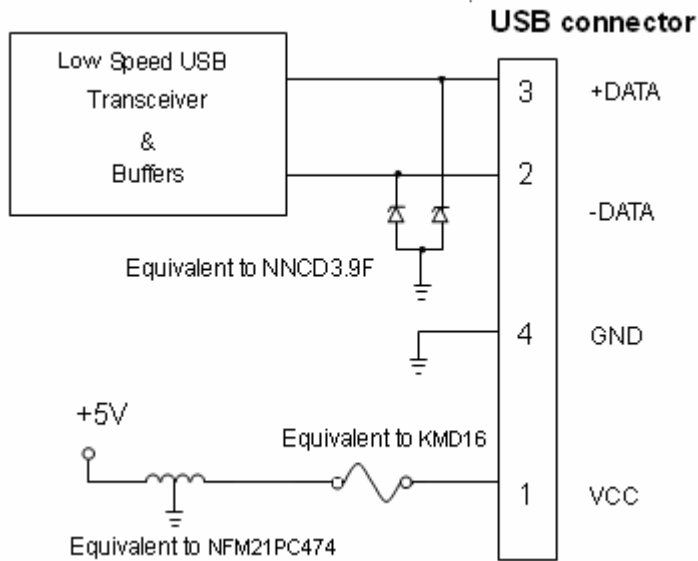


Figure 22: Interface circuit

8.3. DOS/V Wedge Interface Specification

8.3.1. Settings

With a desktop PC (when using the external keyboard) or with a notebook PC (when not using the external keyboard), reading the menu barcodes in section 10.1 can set the DOS/V Wedge interface default.

8.3.2. Connectors

a) DOS/V Host Connector

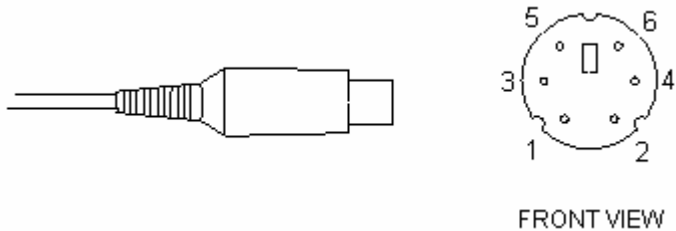


Figure 23: DOS/V host connector

Contact Number	Signal Name
1	CPU DATA
2	OPEN
3	GND
4	VCC
5	CPU CLOCK
6	OPEN

b) DOS/V Keyboard Connector

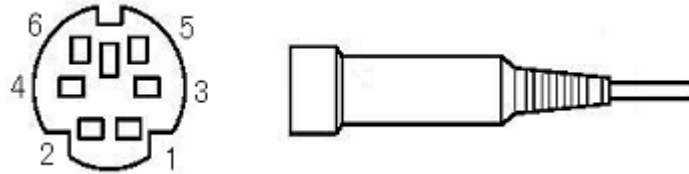


Figure 24: DOS/V keyboard connector

Contact Number	Signal Name
1	KEY DATA
2	OPEN
3	GND
4	VCC
5	KEY CLOCK
6	OPEN

9. Cable and Connector

9.1. RS-232C Cable

(Basic specification)

Type:	Straight
Diameter:	$\Phi 4.8 \pm 0.5$ mm
Length:	2000 +100 mm
Color:	Black
UL Standard:	UL AWM 2835 VW-1

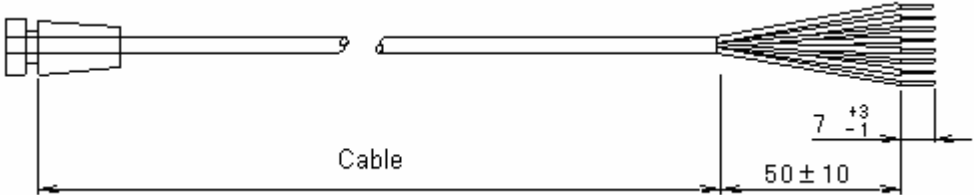


Figure 25: RS-232C cable

9.2. USB Cable

(Basic specification)

Type:	Straight
Diameter:	$\Phi 4.8 \pm 0.5$ mm
Length:	2000 +100 mm
Color:	Black
UL Standard:	UL AWM 20379 VW-1

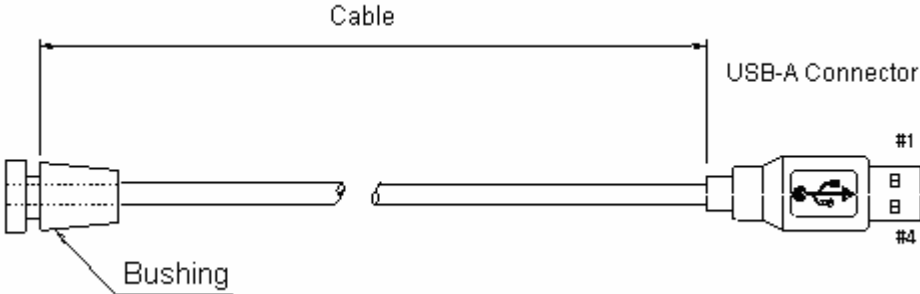


Figure 26: USB cable

9.3. Wedge Cable

(Basic specification)

Type:	Straight
Diameter:	$\phi 3.8 \pm 0.5$ mm
Length:	2000 +100 mm
Color:	Black
UL Standard:	UL AWM 2835 VW1

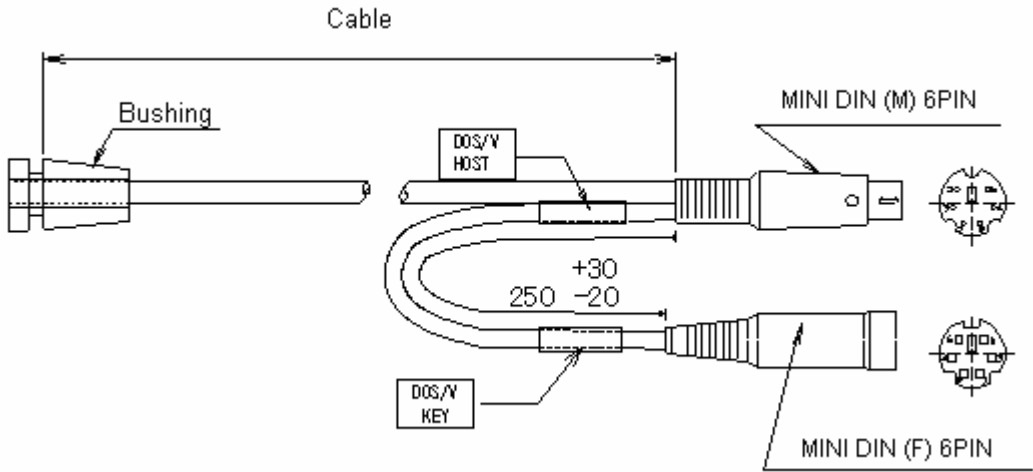





Figure 27: Wedge cable

10. Default Settings




10.1. Set Interface Default

Scanners are set to the default settings suitable for each interface before being shipped from the factory.




RS-232C

Functions	Menu labels	Menu codes
SET		ZZ
RS-232C		U2
END		ZZ





USB-HID

Functions	Menu labels	Menu codes
SET		ZZ
USB-HID		SU
END		ZZ

Wedge (with keyboard)

Functions	Menu labels	Menu codes
SET		ZZ
AT-Wedge		UB
END		ZZ

Wedge (without keyboard)

Functions	Menu labels	Menu codes
SET		ZZ
AT-Wedge (without keyboard)		UB
		KL
END		ZZ

10.2. Default Settings 1: Readable Codes

Symbology	Read	Transmit Code Length	Transmit CD	Calculate CD
UPC-A	■	X	■	■
UPC-A Add-on	X	X	■	■
UPC-E	■	X	■	■
UPC-E Add-on	X	X	■	■
EAN-13	■	X	■	■
EAN-13 Add-on	X	X	■	■
EAN-8	■	X	■	■
EAN-8 Add-on	X	X	■	■
Code 39	■	X	■	X
Code 93	■	X	—	■
Code 128	■	X	—	■
IATA	■	X	■	X
Industrial2of5	■	X	■	X
Interleaved2of5	■	X	■	X
MSI/Plessey	■	X	■	■
NW-7 (Codabar)	■	X	■	X

Notes:

- In the “Reading” column, “■” means “Enable reading” and “X” means “Disable reading.”
- In the “Transmit code length” column, “■” means “Transmit code length” and “X” means “Do not transmit code length.”
- In the “Transmit CD” column, “■” means “Transmit check digit” and “X” means “Do not transmit check digit.”
- In the “Calculate CD” column, “■” means “Calculate check digit” and “X” means “Do not calculate check digit.”
- “— “ means “not supported.”

10.3. Default Settings 2: Read Options, Trigger, Buzzer

Item	Default Setting
Setting the number of characters	Fixed length OFF all codes (except for the first digit of Industrial2of5, NW-7 or Code 39 and first 2 digits of Interleaved2of5)
Read mode	Multiple read
Multiple read reset time	500 ms
Redundancy	2 times
Trigger switch	RS-232C: Enabled; USB/Wedge: Disabled
Read time	2 seconds (Trigger enable mode only)
Buzzer duration	200 ms
Buzzer tone	3 kHz + 2.5 kHz
Buzzer loudness	Maximum
Indicator duration	200 ms

11. Serial Number

The serial number shown below is affixed to the scanner.



Figure 28: Serial number diagram

12. Packaging Specifications

12.1. Individual Packaging Specification

Put the NFT 2200 in a protective foam bag and place it in a single packing box.

Size of the package (after assembly: 245 (W) x 115 (D) x 40 (H) mm

12.2. Collective Packaging Specification

Put 50 individually packaged NFT 2200s in a collective packaging box. (If there are fewer than 50 scanners to be shipped, we will change the size of the packaging box.)

Size of the package (after assembly: 520 (W) x 380 (D) x 350 (H) mm

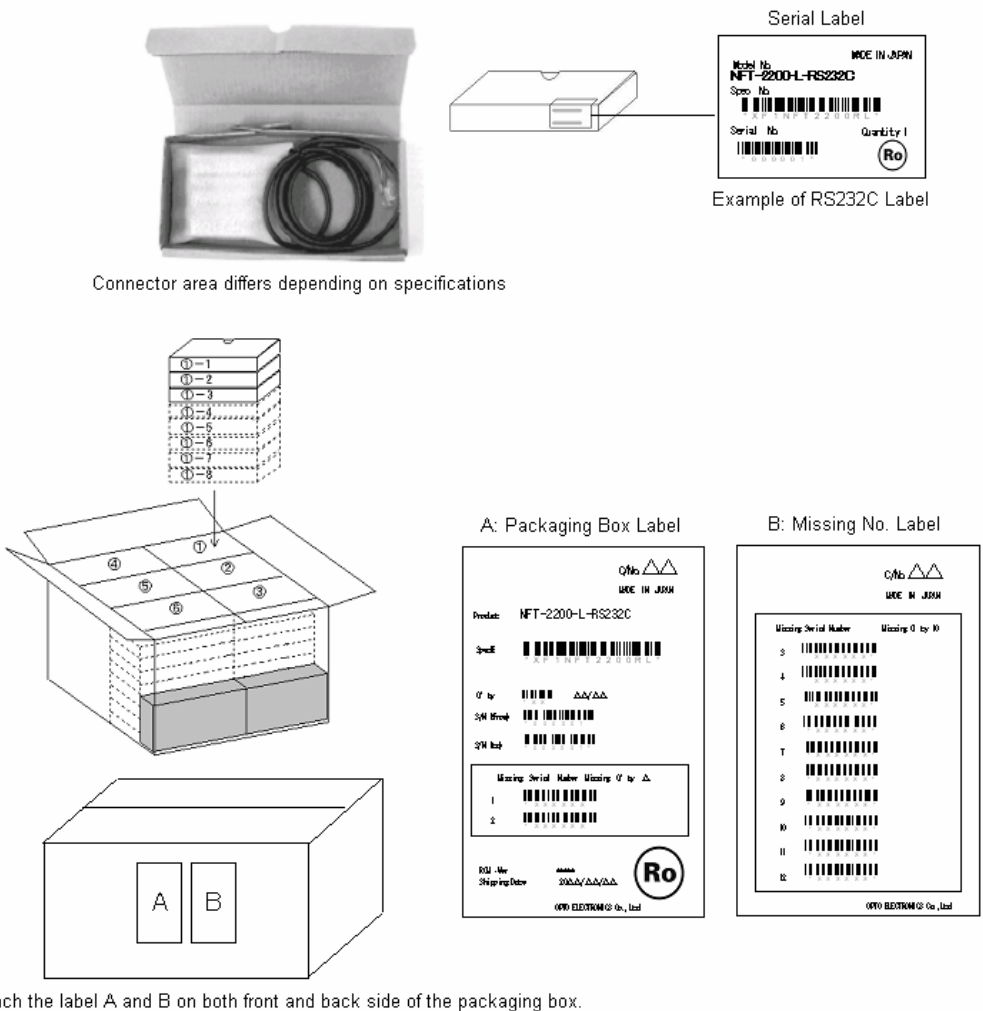


Figure 29: Packaging

Note: The “RO” mark labeled on the package tray or package box guarantees that the applicable product has passed our test of RoHS restrictions compliance (the restriction of the use of certain hazardous substances in electrical and electronic equipment, 2002/95 EC). However, this document does **not** have any legal weight in the European Union.

13. Durability

13.1. Electrical Noise

No malfunction occurred when sinusoidal electrical noise (10 Hz–100 kHz, < 0.1Vpp) was added to a power supply line.

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

PCS:	0.9
Resolution:	0.33 mm
Symbology:	JAN
Distance:	31.4 mm
Angle:	$\alpha = 10^\circ \beta = 0^\circ \theta = 0^\circ$
Curvature:	$R = \infty$
Power Supply Voltage:	5.0 V

13.2. Static Electricity

Air discharge:	7 kV MAX (No malfunction) 15 kV MAX (No destruction)
Measurement environment:	Use electrostatic testing device compliant with IEC 61000-4-2
Discharge resistance:	330 Ω
Capacitor charging:	150 pF

13.3. Shock

13.3.1. Drop Test (without packaging)

No malfunction occurred after the following drop test.

Drop test: Drop the scanner from a height of 60 cm onto a concrete floor three times on each of 4 sides.

13.3.2. Drop Test (with individual packaging)

No malfunction occurred after the following drop test.

Drop test: Drop an individually packaged scanner from a height of 150 cm onto a concrete floor once on its 1 corner, 3 edges, and 6 sides. (10 drop tests in total.)

13.4. Vibration Strength

No malfunction occurred after the following vibration test.

Vibration test: Increase the frequency of the vibration from 10 Hz to 100 Hz with accelerated velocity 19.6m/s^2 (2G) and sweep for 30 minutes (60 minutes in one cycle) in non-operating state. Repeat this routine in each X, Y, Z direction.

14. Reliability

MTBF (Mean Time Between Failures) of this product is 300,000 hours (calculated value).

LED reliability is as follows:

- According to the guarantee of the LEDs used for this scanner manufacturer, the power-down occurrence ratio after lighting the LED for over 1,000 hours shall be lower than 50% of the time.
- The power current that should be applied for actual LED operation is lower than 50% of its absolute rated value. Based on that condition, we estimate that the LED used for this scanner shall be reliable for around 10,000 hours.

The estimate of MTBF and product life cycle is based on standard operation of the product within the recommended temperature range and without extreme electronic or mechanical shock.

15. Regulatory Compliance

15.1. Product Safety

EN60950-1: 2001

IEC60950-1: 2001

15.2. EMC

EN55022

EN55024

VCCI Class B: This is a Class B product, to be used in a domestic environment based on the Technical Requirement of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Please install and use the equipment according to the instruction manual.

FCC Part 15 Subpart B Class B: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

15.3. RoHS

RoHS: The restriction of the use of certain hazardous substances in electrical and electronic equipment, 2002/95 EC

16. Safety

Handle this product carefully. Do not deliberately subject it to any of the following.

16.1. Shock

- Do not throw or drop the scanner.
- Do not place heavy objects on the cables.

16.2. Temperature Conditions

- Do not use the scanner at temperatures outside the specified range.
- Do not pour boiling water on the scanner.
- Do not throw the scanner into the fire.
- Do not forcibly bend the cables at low temperatures.

16.3. Foreign Materials

- Do not immerse the scanner in liquids.
- Do not subject the scanner to chemicals.

16.4. Other

- Do not plug/unplug the connectors before disconnecting the power.
- Do not disassemble this product.
- Do not use the scanner near a radio or a TV receiver. It may cause reception problems.
- The scanner may be damaged by voltage drops.
- The scanner may not perform properly in environments when placed near a flickering light, such as a computer monitor, television, etc.

17. Mechanical Drawing

All dimensions in mm [inches]

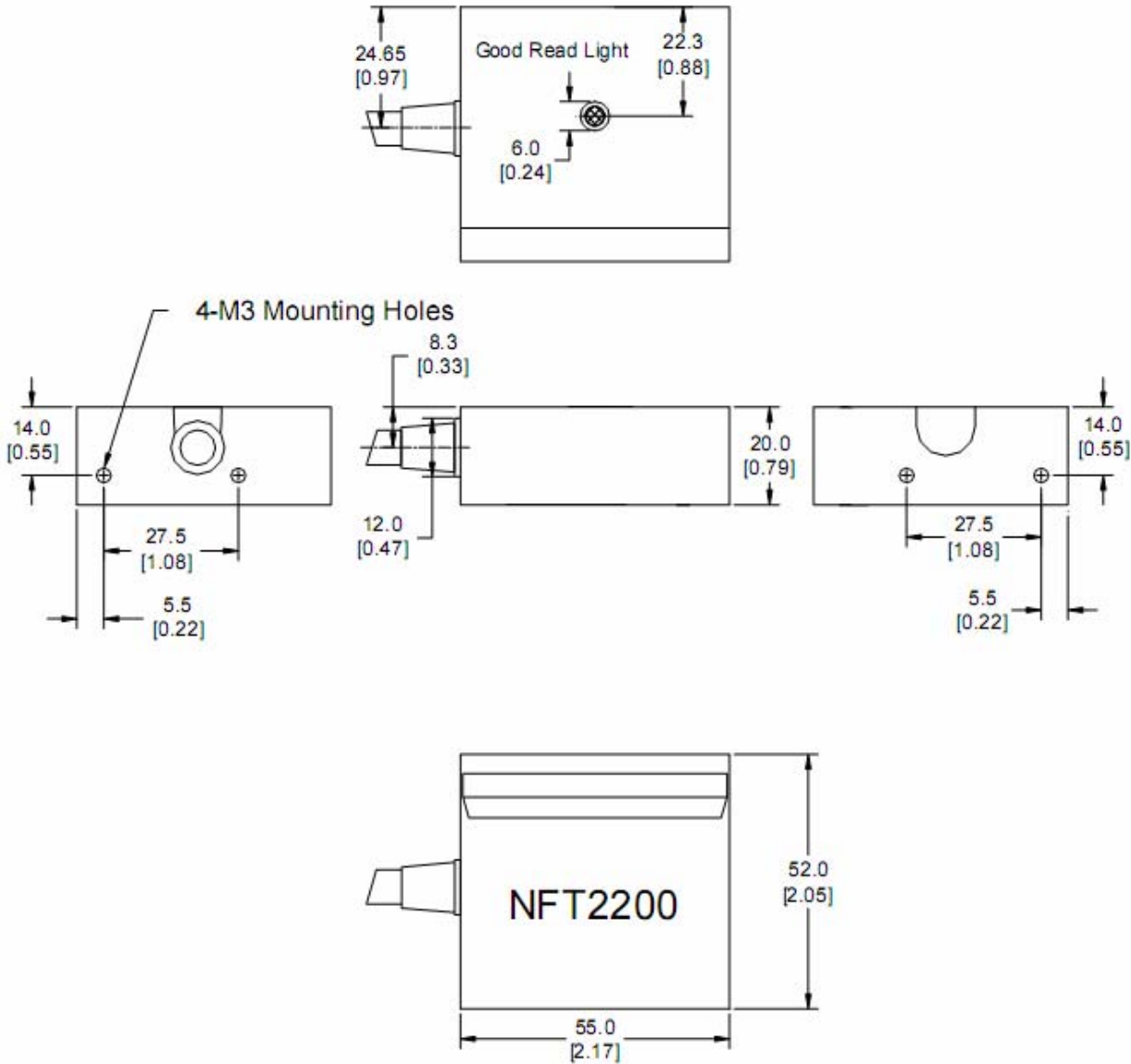


Figure 30: Screw holes—4 M3 (2 holes each on 2 sides)