OPTICON

Portable Terminal

H-32

The H-32 is a portable Windows CE terminal with a color display and a built-in laser scan engine (1D or 2D).

Specifications Manual

All information subject to change without notice.

Document History

Model Number:	H-32	**Specification Number:**	
Edition:	1.08	**Original Spec Number:**	
Date:	2013-10-21		

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.

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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.

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1. Abstract

This manual provides specifications for the H-32 portable terminal (hereafter referred to as “scanner”).

2. Overview

The H-32 is a fully programmable portable Windows CE terminal with a built-in laser scan engine. Applications can be developed in C++/C# and all other languages supported by Windows CE and can be installed in the H-32’s internal flash memory. The H-32 also features a Micro SD memory expansion option on which e.g. a product database can be stored. The H-32’s also features an easy to use very rugged keyboard for data entry. For data communication, a WiFi (802.11 a/b/g/n/), Bluetooth V 2.1 + EDR and USB active sync interface is added.

An application development kit, required to write, compile and install applications on the H-32 is available as a free download. This kit has to be used in combination with the standard Microsoft development tools (Visual Studio). The kit contains libraries for both C++ and .Net for easy access to the barcode scanner.

3. Physical Features

3.1. Dimensions

W 62.3 x D 25.5 x H 146 mm **(TBD)**

3.2. Weight

195 g (including battery) **(TBD)**

4. Environmental Specifications

4.1. Operating Temperature and Humidity

Temperature: -10 to 50° C

Humidity: 20% to 80% RH

4.2. Charging Temperature

Temperature: 0 to 40° C

4.3. Storage Temperature and Humidity

Temperature: -20 to 60° C

Humidity: 20% to 90% RH

4.4. 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	4,000 lx
Fluorescent light	4,000 lx
Sunlight	80,000 lx

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

PCS = 0.9, Resolution = 0.25 mm, Quiet Zone = 15 mm, Symbology = 9-digit Code 39, N/W Ratio = 1:2.5	
Distance	96 mm from the edge of the scanner
Angle	α = 0° β = 15° γ = 0°
Curvature	R = ∞

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

Note: α, β and γ respectively represent pitch, skew and tilt. Please see section 8 for how these values are defined.

4.5. Static Electricity

Air discharge: ± 8 kV MAX (No malfunction)

Contact discharge: ± 4 kV MAX (No malfunction)

The criteria minimum performance level (or the permissible performance loss) is specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the H-32 if used as intended.

Performance criterion A

During and after the test the H-32 shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the H-32 is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by

what the user may reasonably expect from the H-32 if used as intended.

Performance criterion B
During and after testing, a temporary loss of function is allowed, provided the function is self recoverable, or can be restored by the operation of the controls or cycling of the power to the H-32 by the user in accordance with the manufacturer's instructions.
If performance drop of USB Datalink occurs due to ESD please remove and re insert the USB connector.

Performance criterion C
During and after testing, Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
After testing can be recovered to normal operation by reboot, are permissible by the user in accordance with the manufacturer's instructions.

4.6. Drop resistance.

There will be no sign of decreased performance after the following drop test:

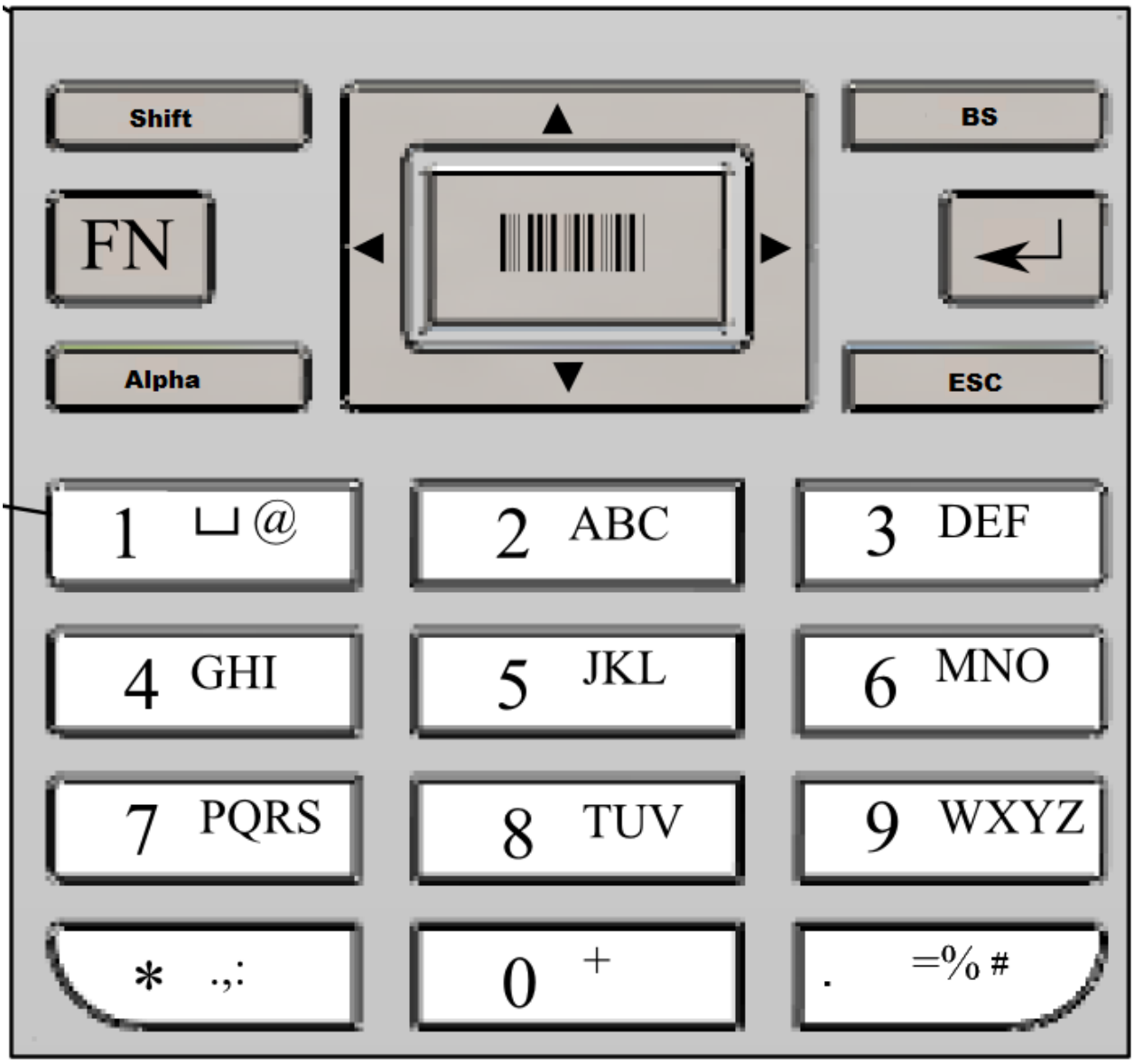
Drop the scanner from 1.5 M above the concrete floor (6 sides, 3 times each).

Scratches or discoloration of the casing do not decrease product performance.

5. Controls

Items	Specifications		Remarks
CPU	Type	AM3354 ARM Cortex A8	
	Internal ROM	176K Internal Boot ROM	
	Internal RAM	64 KB	Excluding cache memory
	Clock frequency	720 MHz	Maximum
Memory	ROM	256 MB	NAND Flash
	RAM	256 MB	Mobile DDR2
	SD Card	Micro SD card, HC support	When booting, max 4GB
LCD	Active area	W 43.2 x H 57.6 mm	2.8 Inch
	Number of dots	W 240 x H 320	QVGA
	Color depth	262144	
	Backlight	White LED	
Indicators & Audio	LED	Two two-color LED (red/green)	When lit at the same time, red and green appear as orange
	Speaker	Mono, 700~20,000 Hz	The speaker is used only for WM notifications and scan engine successful scan confirmation. The speaker is not intended to be used for audio playback files such as MP3.
	Vibrating motor	Yes	
	Microphone	No	
Keyboard	Material	Silicone rubber with protective coating	
	Side keys	Scan button on left side Scan button on right side	
	Top key	Power button	Hold 8 seconds to reset terminal
	keys	ESC, Fn, Alpha, Shift, Backspace (BS), Enter, 4 way navigation, scan, 10 numeric keys, * and a # key.	See 5.1 Keyboard
Clock	Built-in RTC	YY/MM/DD/HH/MM/SS (Leap-year supported) Accurate within 90 seconds per month	Battery backed up
Communications	WiFi	802.11 a/b/g/n	Summit, SD-SSD40NBT. 2.4GHz only
	Bluetooth	2.1 + EDR	Summit, SD-SSD40NBT
	USB 2.0	Micro USB OTG	

5.1. Keyboard


Shift
BS
FN
Alpha
ESC
1 ␣ @
2 ABC
3 DEF
4 GHI
5 JKL
6 MNO
7 PQRS
8 TUV
9 WXYZ
* .,:
0 +
. =% #

6. Electrical Specifications

6.1. Electrical Characteristics (Current measured at 3.7V operating voltage)

Parameter	Typ	Unit	Remarks
Operating voltage	3.4–4.2	V	Lithium-ion battery
Operating current	300	mA	Backlight on, WLAN connected, 1 scan/minute
Stand-by current	<200	mA	Not scanning, WiFi off, backlight on.
Sleep current	<4	mA	When the power is OFF

6.2. Main Battery

The main battery is a lithium-ion battery:

- Nominal capacity: 1800 mAh (NP120)
- Nominal voltage: 3.7 V.
- Low voltage: Less than 3.4 V
- Usable time: Approx 4 hours.
- Data hold time (clock and SRAM): 2 hours

The backup battery is an 15 mAh secondary battery.

6.3. Operating time

Parameter	Typ	Unit	Remarks
Operating time	4	Hours	Backlight on, WLAN connected, 1 scan/minute
Stand-by time	6	Hours	Not scanning, WiFi off, backlight on.
Off time	11	Days	When the power is OFF

7. Optical Specifications

7.1. Laser Scan Specifications MDL2001

Parameter	Specification	Unit
Light-emitting element	Red laser diode	-
Emission wavelength	650 ±10 (25° C)	nm
Light output	Light output 1.0 or less	mW
Scanning method	Bi-directional scanning	-
Scanning speed	100 ±20	scans/s
Scan angle °	Scan angle: 54 ±5	°
	Read angle: 44 (Min)	°

Notes:

Refer to chapter 8, “Technical Specifications,” to read about scanning performance.

7.1.1. Tilt of Laser Scan Line

Maximum tilt between both ends of laser scan line Less than 0.92° upward tilt from the scan origin. Maximum of 2.46 mm when measured at the point 150 mm away from the scan origin. (Measurement was done from the center of the scan line.)

7.1.2. Curvature of Scan

Maximum gap between the straight line connecting both ends of the laser scan line and the actual laser scan line. Less than 1.17° curvature from the scan origin (from a mirror motor mirror). Maximum of 3.06 mm when measured at the point 150 mm away from scan origin. (Measurement was done from the center of the scan line.)

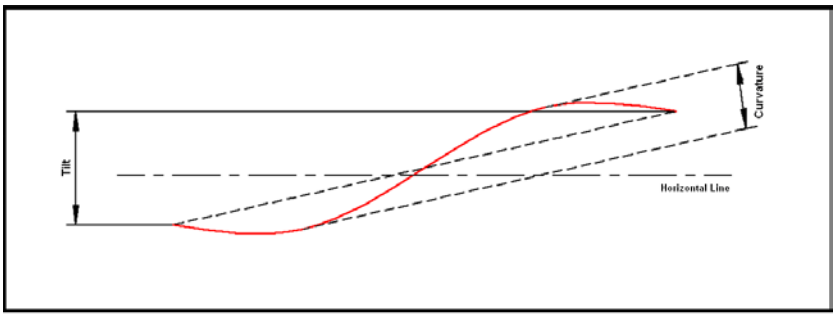


Figure 1: Scan tilt and curvature

7.2. Basic Optical Specifications MDI3100

Item		Characteristics
Scan method	CMOS area sensor (black and white)	-
Number of effective pixel	(H) × (V)	752 × 480 dot
Image capture speed (*1)	Frame rate	60 fps
Focal distance	From the front edge of scan engine	130 mm
View angle	Horizontal	Approx. 40.6°
	Vertical	Approx. 26.4°
Auxiliary light source (LED × 2)	Red LED	-
	Peak Wave Length	617 nm
	Directivity angle 2θ1/2 (*2)	60°
	Maximum radiation output (*3)	15000 mcd
Light source for aiming (LED x 1)	Green LED	-
	Peak Wave Length	528 nm
	Maximum radiation output (*4)	18700 mcd

*1 The fastest seed of image capture
*2 The reference value extracted from the LED datasheet
*3 *4 The reference value extracted from the datasheet (conditions: 25 °C, IF = 140 mA)

7.2.1. Aiming pattern

The aiming is used for the following purpose:
1. Fill light to recognize the appropriate reading range.
2. Fill light when auto trigger is used.
The aiming specifications are as follows:
- An optical axis of imaging field of view and the center of horizontal aiming width coincide at a distance of L=110±20 mm from the front edge of the camera module.
- The aiming horizontal width to the horizontal width of imaging filed of view at a distance of L=110 is 80%±10%.

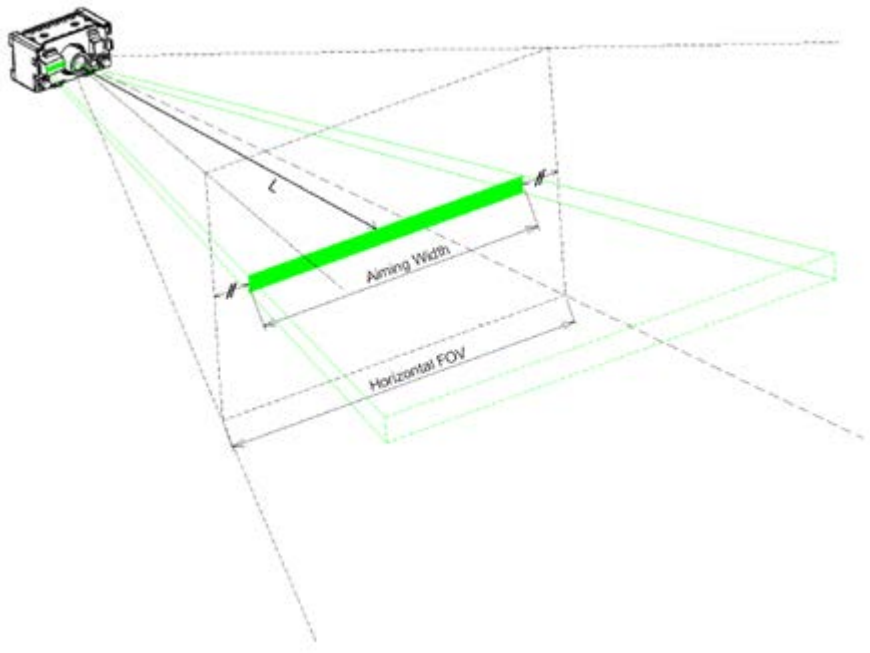


Figure 2: Aiming Pattern MDI3100

8. Technical Specifications MDL2001

The conditions are as follows, unless otherwise specified.

Conditions

Ambient temperature and humidity:	Room temperature (5 to 35º C) Room humidity (45% to 85% RH)
Ambient light:	500 to 900 lx
Background:	Barcode = black Space = white Margin = white Background of label = black
Power supply voltage	3.3 V
Decoding test:	Approve the performance when decoding is successful in all ten tests. (Decoding is deemed successful when completed in 0.5 seconds or less.)

8.1. Print Contrast Signal (PCS)

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

Scanning performance may decline if dirt or scratches mark the optical window. Keep the optical window clean.

8.2. Minimum Resolution

0.127 mm

8.3. Supported symbologies:

Linear (1D)

JAN/UPC/EAN, incl. add-on	S-Code
Codabar/NW-7	Telepen
Code 11	Tri-Optic
Code 39	UK/Plessey
Code 93	
Code 128	**Postal codes (1D)**
GS1-128 (EAN-128)	Chinese Post
GS1 Databar (RSS)	Korean Postal Authority Code
IATA	
Industrial 2of5	**2D codes**
Interleaved 2of5	GS1 Composite Codes
ISBN-ISMN-ISSN	MicroPDF417
Matrix 2of5	PDF417
MSI/Plessey	

8.4. Scan Area and Resolution

8.4.1. Depth of Field

The depth of field is measured from the edge of the scanner. The scanning range is within the circular arc centered on the scan origin.

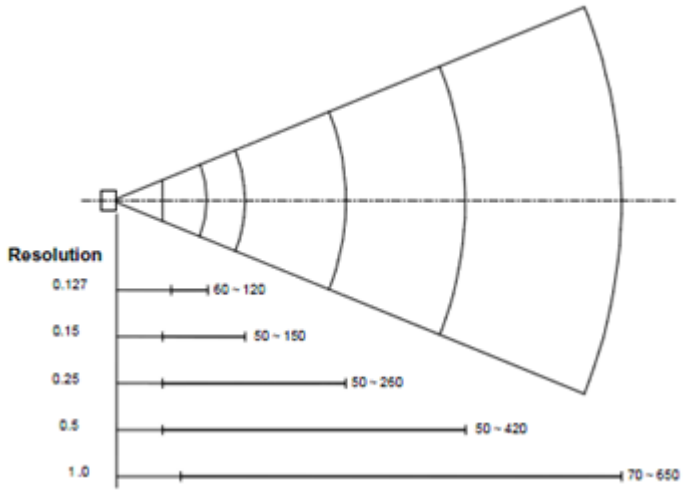


Figure 3: Depth of field MDL2001

PCS	Resolution (mm)	Decode Depth (mm)
0.9	1.0	70–650
	0.5	50–420
	0.25	50–260
	0.15	50–150
	0.127	60–120

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample

N/W Ratio: 1:2.5

Angle: α = 0°, β = 15°, γ = 0°

Curvature: R = ∞

Resolution (mm)	Symbology	PCS	Quiet Zone	Digits
1.0	Code 39	0.9	25 mm	1
0.5	Code 39	0.9	18 mm	3
0.25	Code 39	0.9	10 mm	8
0.15	Code 39	0.9	7 mm	10
0.127	Code 39	0.9	5 mm	4

8.5. Pitch, Skew, and Tilt

Pitch angle: α = ±35°
Skew angle: β = ±50° (Excluding dead zone)
Dead zone: β = ±8° (There are some areas in which decoding fails due to specular reflection)
Tilt Angle: γ = ±20°

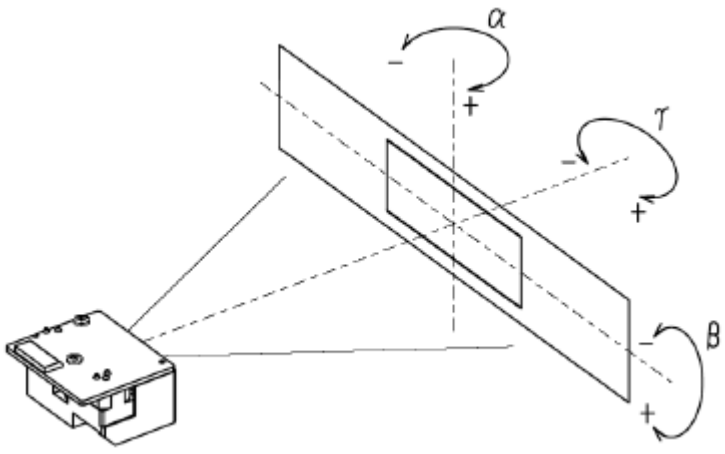


Figure 4: Pitch, skew, and tilt MDL2001

Conditions
Barcode Sample: OPTOELECTRONICS Test Sample

Distance	110 mm from the exit window
Label	**Pitch, Skew Angle, Dead Zone** PCS = 0.9, Resolution = 0.25 mm, Symbology = 9-digit Code 39, Quiet Zone = 10 mm, N/W Ratio = 1:2.5 **Tilt Angle** PCS = 0.9, Resolution = 0.26 mm, Symbology = 13-digit JAN, Quiet Zone = 10 mm
Angle	Curvature: R = ∞, Skew Angle = β +15° (for measuring Pitch Angle and Tilt Angle)

8.6. Curvature

With 8-digit JAN/UPC/EAN barcodes, decoding performance is guaranteed when R≥15 mm.
With 13-digit JAN/UPC/EAN barcodes, decoding performance is guaranteed when R≥20 mm.

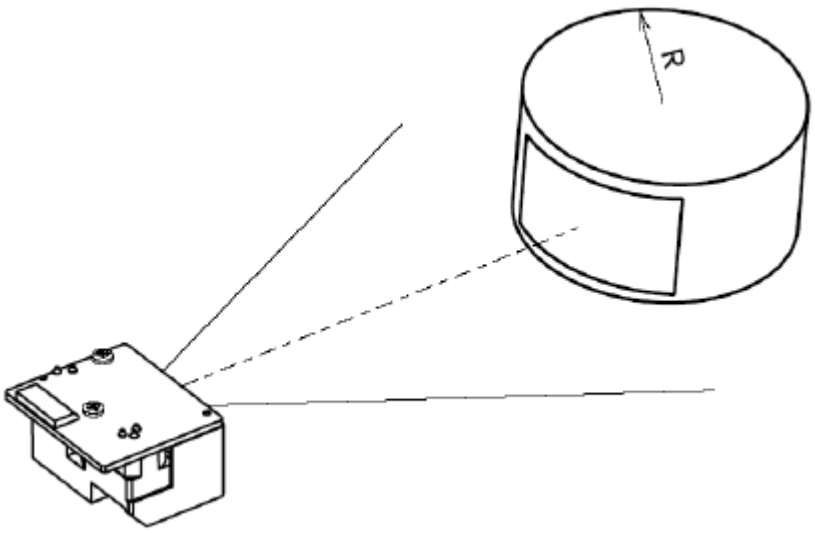


Figure 5: Curvature MDL2001

Conditions
Barcode Sample: OPTOELECTRONICS Test Sample

PCS = 0.9, Resolution = 0.26 mm, Quiet Zone = 10 mm
Distance 110 mm from the edge of the exit window
Angle Skew Angle β = +15°

9. Technical Specifications MDI3100

Emit aiming light of the MDI-3100-SR to the center of a bar code for scanning. 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	: 100 ~200 lux (on the surface of a bar code)
Pitch Angle	: α= 0°
Skew Angle	: β = 15°
Tilt Angle	: γ = 0°
Curvature	: R = ∞
Power Supply Voltage	: 3.3 and 5.0 V
PCS (1D and 2D)	: 0.9 or higher
Scanning Test	: Accept the performance with 90% or more success rate for 10 tries of scan. One scan should be tested within 2 seconds
Bar Code Test Sample (1D and 2D)	: Specified below

< Test chart >
For 1D codes, OPTOELECTRONICS test samples
For GS1 Databar, stacked codes and 2D codes, printed by a dedicated printer for bar code

9.1. Print Contrast Signal (PCS)

PSC 0.3 or higher

<Conditions> MRD	: 32% and higher (70% or higher reflectivity of space and quiet zone)
Distance	130 mm from the front edge of the camera module
Bar Code Sample	: UPC specified in Chapter 8. (Resolution: 0.33 mm, PCS: 0.3)

$$PCS = \frac{\text{Reflectance of white bar} - \text{Reflectance of black bar}}{\text{Reflectance of white bar}}$$

9.2. Minimum Resolution

1D Code	: 0.127 mm (5 mil)	Code 39 specified in Chapter 8
GS1-Databar	: 0.169 mm (6.7 mil)	GS1 Databar-Limited specified in Chapter 8
Stacked Code	: 0.169 mm (6.7 mil)	PDF417, GS1 Databar-Limited Composite specified in Chapter 8
2D Code	: 0.212 mm (8.4 mil)	OR Code and Data Matrix specified in Chapter 8

<Conditions>
Bar Code Sample : The above codes specified in Chapter 8
Distance : 100 mm from the front edge of the camera module
Angle : α = 0°, β =＋15°, γ = 0°
Curvature : R = ∞
For the pitch angle and tilt angle measurement, set the skew angle β = +15°

9.3. Wide Bar Code

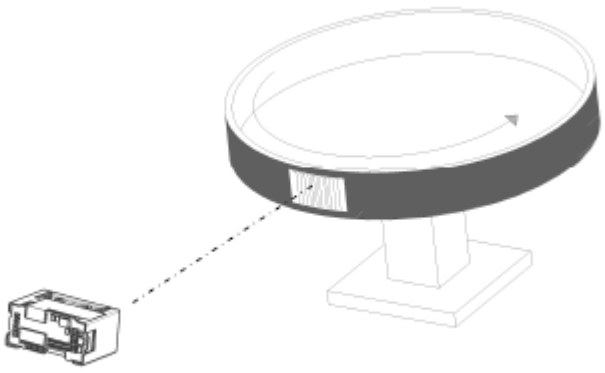
Code 39 with width of 100 mm and resolution of 0.2 mm can be read.

Conditions> : 0.20 mm Code 39 specified in
Bar Code Sample Chapter 8
Distance : 160 mm from the front edge of the camera module
Angle : α = 0°, β =＋15°, γ = 0°
Curvature : R = ∞

9.4. Motion Tolerance

UPC bar code 100% can be read when it is moving at 2m/s.

<Conditions>
Ambient Temperature and Humidity : Room temperature and Room humidity
Ambient Light : 500 lux to 1000 lux (on the surface of a bar code)
Distance : 130 mm from the front edge of the camera module
Angles : α= 0°
Skew : β = 15°
Tilt : γ = 0°
Curvature : R = ∞
Power Supply Voltage : 3.3 and 5.0 V
PCS (1D and 2D) : 0.9 or higher
Bar Code Sample : UPC with 0.33 mm resolution specified in Chapter 8



Note: The above shows the possible speed of reading, but no guarantee of 100% reading.
: Scanning may fail due to the specular reflection of illumination LEDs when the reflectivity is high.

Figure 6: Motion tolerance MDI3100

9.5. Barcode Test Sample

1 D Bar Codes

<Code 39>

Resolution	Symbology	PCS	Size (mm)	No. of Digits
0.127 mm (5mil)	Code 39	0.9	32 × 10	15
0.20 mm (7.9mil)			100 × 10	31
0.254 mm (10mil)			32.5 × 12	7
0.508 mm (20mil)			36 × 25	4

<Code 128>

Resolution	Symbology	PCS	Size (mm)	No. of Digits
0.20 mm (7.9mil)	Code 128	0.9	42 × 10	16

<UPC>

Resolution	Symbology	PCS	Size (mm)	No. of Digits
0.330 mm (13mil)	12-digit UPC	0.9/0.3	31.5 × 25.0	12

<Codabar>

Resolution	Symbology	PCS	Size (mm)	No. of Digits
0.15 mm (6mil)	Codabar	0.9	20 × 10	10

GS1 Databar

<GS1-limited>

Resolution	Symbology	PCS	Size (mm)	No. of Digits
0.169 mm (6.7mil)	Limited	0.9	12 × 1.5	14
0.169 mm (6.7mil)	Limited-Composite	0.9	12 × 3.0	26

2 D Codes

<PDF417>

Resolution	Error Correction	PCS	Size (mm)	No. of Character
0.169 mm (6.7mil)	Level-3	0.9	23 × 10	58
0.254 mm (10mil)			35 × 15	

<QR Code: Model-2>

Resolution	Error Correction	PCS	Size (mm)	No. of Character
0.212 mm (8.4mil)	M	0.9	6 × 6	44
0.381 mm (15mil)			11 × 11	

<Data Matrix>

Resolution	Model	PCS	Size (mm)	No. of Character
0.212 mm (8.4mil)	ECC2000	0.9	5 × 5	40
0.254 mm (10mil)			6 × 6	

Note: The size is outline dimensions excluding quiet zone.

9.6. **Scan Area and depth of Field**

The scan area is measured from the front edge of the camera module.

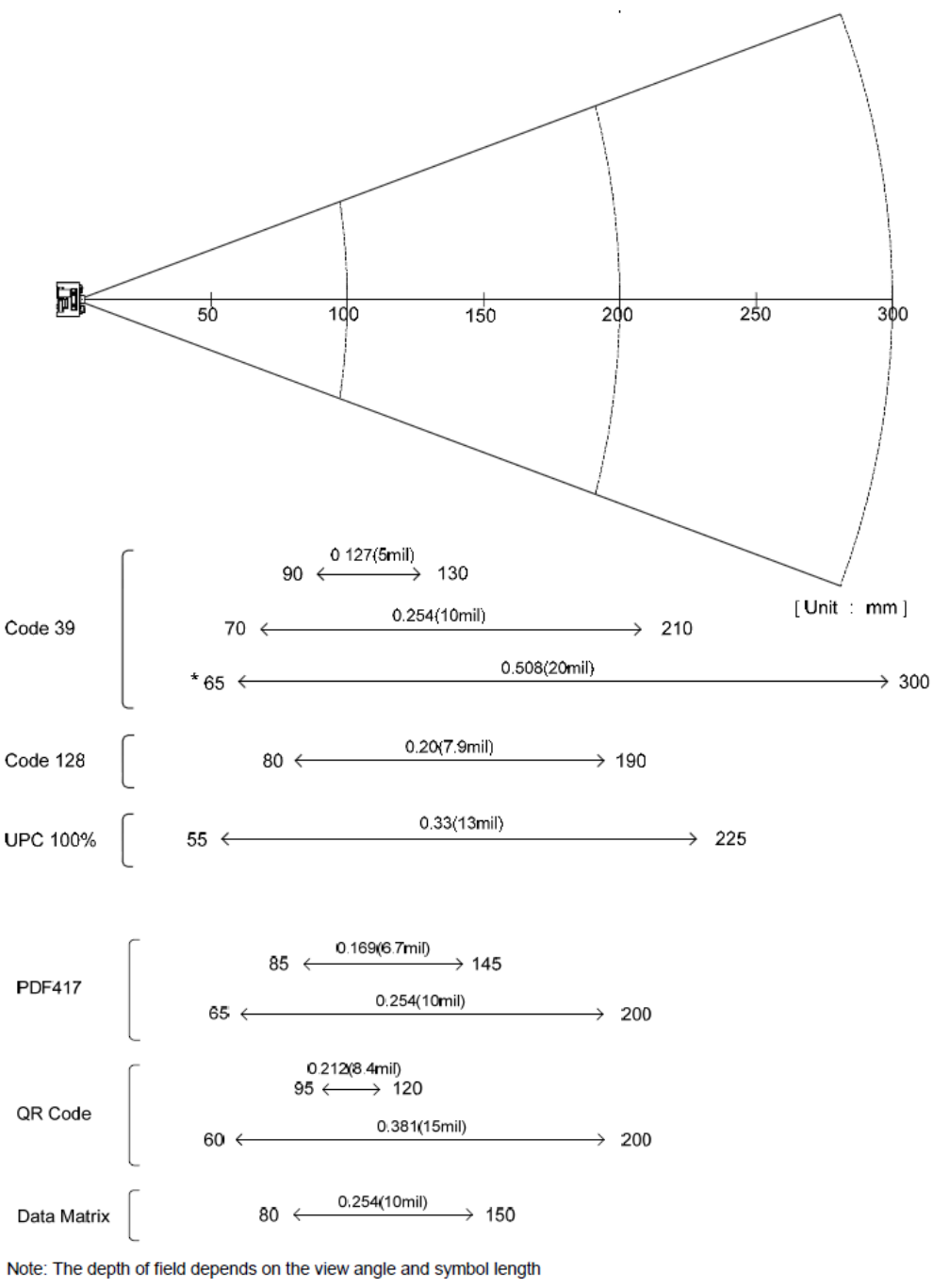


Figure 7: Depth of field MDI3100

9.7. Pitch, Skew, and Tilt

Pitch : α = ±50°
Skew : β = ±50°
Tilt : γ = ±180°

<Condition s>
Bar Code Sample : 0.33 mm UPC specified in Chapter 8
Distance : 130 mm from the front edge of the camera module
Curvature : R = ∞
For the pitch angle and tilt angle measurement, set the skew angle β = +15°

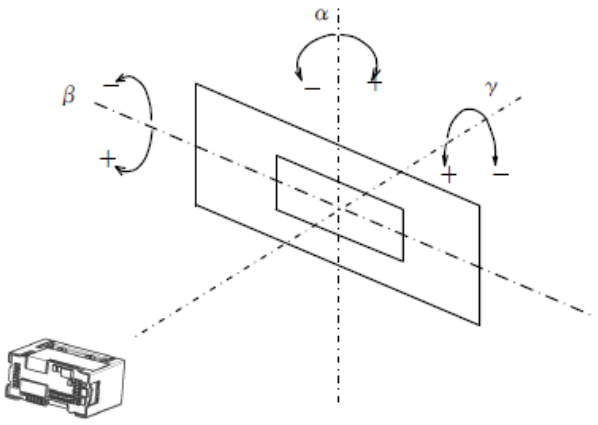


Figure 8: Pitch, Skew, and Tilt MDI3100

9.8. Curvature

0.33 mm 12-digit UPC : R ≧ 20 mm
0.15 mm 10-digit Codabar : R ≧ 16 mm

Conditions>
Bar Code Sample : 0.33 mm UPC specified in Chapter 8
Distance : 110 mm from the front edge of the camera module
Angle : α = 0°, β =＋15°, γ = 0°

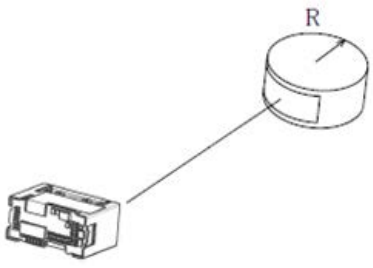


Figure 9: Curvature MDI3100

Note: Scanning may fail due to the specular reflection of illumination LEDs when the reflectivity is high.

10. Labeling

10.1. Product label

The product label with the serial number as shown below is affixed to the scanner.

Figure 10: Product labels

The serial number consists out of 6 numeric digits. It starts with 000001 and is incremented with 1 for each scanner. The serial number is also stored in the scanners non volatile memory and API functions are available to retrieve the serial number for use in user applications.

Material: Base + laminate protection against wear.
Base: PP film, thickness 80µm, backing with glue.
Laminate: PET film, clear, thickness 50µm.

10.2. White box label

Size **TBD**
Label material: Paper, white, with permanent adhesive backing.

Article number: Standard code 39 + human readable text , data = 12964

Serial number: Standard code 39 + human readable text, data should match that of the product inside the box.

11. Packaging Specifications

11.1. Individual Packaging Specification

TBD

Figure 11: Individual packaging

11.2. Collective Packaging Specification

TBD

Figure 12: Collective 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.

12. Regulatory Compliance

12.1. **Laser Safety** (1D model)

IEC 60825-1:2007 Laser Class 2

CDRH Laser Class 2

FDA CDRH Laser class II. Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50 dated June 24, 2007.

Class II laser devices are not considered to be hazardous when used for their intended purpose. Avoid staring into the laser beam.

12.2. **EMC**

EN55022

EN55024

Federal Communications Commission (FCC) Statement

15.21

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

15.105(b)

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

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

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

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) this device may not cause interference and

2) this device must accept any interference, including interference that may cause undesired operation of the device.

FCC RF Radiation Exposure Statement:
For body worn operation, this phone has been tested and meets FCC RF exposure guidelines when used with an accessory that contains no metal and that positions the handset a minimum of 5.0mm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

12.3. RoHS

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

13. Safety

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

13.1. Shock

Do not throw or drop the scanner.

Do not place heavy objects on the scanner.

13.2. 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 leave the scanner on the dashboard of a car.

13.3. Foreign Materials

Do not immerse the scanner in liquids.

Do not subject the scanner to chemicals.

13.4. Battery

Do not overcharge nor over discharge the battery.

Do not charge the battery at freezing temperatures.

Do not charge the battery at very high temperatures.

When the scanner is not used for a very long time, remove the battery from the battery compartment.

Replace the battery when its lifetime has expired. This is after two years of operation or 500 charge/discharge cycles. (When a half discharged battery is recharged, this counts as only half a cycle.)

CAUTION
RISK OF EXPLOSION IF BATTERY IS REPLACED
BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING
TO THE INSTRUCTIONS

13.5. WiFi 5GHz

Operations in 5150-5250 MHz band is for indoor use only.

13.5. Other

Do not disassemble this product.

The scanner may be damaged by high voltage discharges.

14. Mechanical Drawing

TBD

Figure13: Mechanical drawing