1

MDI-4700
2D Imager

Specification Manual – Rev 2.0

The information in this document is subject to change without notice.

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, excluding batteries. 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 may 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. Root cause analysis report services to troubleshoot defects or application issues are not covered under this limited warranty.

Packaging

The packing materials are recyclable. We recommend that you save all packing material to use should you need to transport your imager engine 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.

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Revision History

Product Name : MDI-4700 Specifications manual

Edition	Date	Page	Section	Description of Changes
1st	2024/04/15	-	-	First release
2nd	2024/07/16	-	-	Updated to new layout

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Table of Figures

1   Overview

This manual provides specifications for the MDI-4700 (SR :Standard range) imager engine.

2   About the MDI-4700 Imager Engine

The MDI-4700 is a low-profile, imager-based, barcode imager engine with an integrated decoder that enables high-speed scanning of 1D (linear) and 2D codes, as well as OCR fonts.

The MDI-4700 includes these features:

- Best-in-class depth of field (DOF) and minimum resolution
  The MDI-4700 provides best-in-class DOF and minimum resolution, such as a 0.127 mm (5 mil) 2D barcode with a high-quality optical design and components and an enhanced decoder.

- World's fastest motion tolerance
  The MDI-4700 provides the world's fastest motion tolerance (10 m/s), which enables snappy scanning performance.

- Low power consumption
  The high-performance and customized low-power 800MHz CPU has drastically minimized the power consumption in operating, standby, low power states, and booting.

- Upward compatibility
  The MDI-4700 has the same form factor, mounting holes, and 12-pin connector as the MDI-4100 series to enable quick migration.

- High-speed image sensor
  The high-speed CMOS image sensor in the MDI-4700 captures images at a speed of up to 120 fps. Combined with the fastest global shutter speed in the industry, this enables fast and accurate scanning.

- Green LED aiming and warm-white LED illumination
  A well-defined single line of green LED light and efficient warm-white LED illumination supports easy aiming scanner while providing safety and long-life.

- Data Edit Programing
  Capable of batch reading 1D codes (up to 16 pieces), 2D codes, and OCR. The combined output is highly configurable using regular expressions.

- RoHS compliance
  The MDI-4700 is a RoHS compliant product, as declared by Optoelectronics Co., Ltd.

3 Physical Features

3.1 Dimensions

Imager Engine (MDI-4700): W: 25.3 mm × D: 21.0 mm × H: 10.0 mm
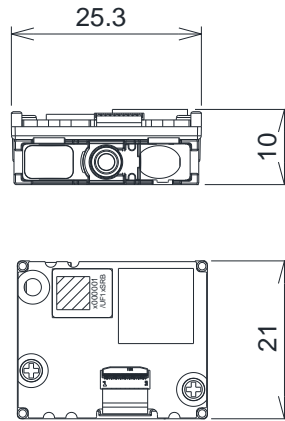
Figure 1: Dimensions of the MDI-4700

3.2 Weight

Imager Engine (MDI-4700): 7.1 g (max)

4   Electrical Specifications

4.1   Absolute Maximum Ratings

Note: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute maximum rated conditions for extended periods of time may affect device reliability.

Voltage	Symbol	Rated Value	Unit
Power Supply Voltage (V_{CC} to GND)	V_{CC}	-0.3 to 6.0	V
Input Voltage	V_I	-0.3 to V_{CC} +0.3	V

4.2   Recommended Operating Conditions

Voltage or Current		Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage		V_{CC}		3.0	3.3/5.0	5.5	V
Input Voltage	Low	V_{IL}	Vcc=3.0 to 3.6V	0	-	0.8	V
			Vcc=4.5 to 5.5V	0		0.3*Vcc	
	High	V_{IH}	Vcc=3.0 to 3.6V	2.0	-	V_{CC}	V
			Vcc=4.5 to 5.5V	0.7*Vcc	-	V_{CC}	
Output Voltage	Low	V_{OL}	I_{OL} = 100µA		-	0.1	V
	High	V_{OH}	I_{OH} = -100µA	V_{CC}-0.1	-	V_{CC}	V
Output current	Low	I_{OL}				-25	mA
	High	I_{OH}				25	mA

* Measured at the MDI-4700 connector.

4.3 Current Consumption

(IF:UART/USB, V_{CC} = 3.3V T_A = 25°C)

Current	State	Symbol	Conditions	Min.	Typ.	Max.	Unit
Peak Rush Current *	Boot	I_{PK}	-	-	1000	-	mA

* Measured at the MDI-4700 connector.
Note: In-rush-current waveform is equivalent to the MDI-41x0.

UART

[V_{CC} = 3.3V]   (IF:UART, T_A = 25°C)

Current	State	Recovery Time *	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating Current	Read	-	I_{OP}	-	-	240	300	mA
Standby Current	Standby	0 ms	I_{STB}	-	-	29	-	mA
Low Power Current	Low Power	37 ms	I_{LOW}	Configured**	-	0.8	-	mA

[V_{CC} = 5.0V]   (IF:UART, T_A = 25 °C)

Current	State	Recovery Time *	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating Current	Read	-	I_{OP}	-	-	150	210	mA
Standby Current	Standby	0 ms	I_{STB}	-	-	19	-	mA
Low Power Current	Low Power	37 ms	I_{LOW}	Configured**	-	0.6	-	mA

* Recovery time is time until ready to scan.
**Refer to the "Serial Interface Specifications" for details.

USB

[V_{CC} = 3.3V]   (IF:USB, T_A = 25°C)

Current	State	Recovery Time *	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating Current	Read	-	I_{OP}	-	-	290	380	mA
Standby Current	Standby	0 ms	I_{STB}	**	-	65	-	mA
Low Power Current	Low Power	37 ms	I_{LOW}	Configured**	-	1.0	-	mA

[V_{CC} = 5.0V]   (IF:USB, T_A = 25°C)

Current	State	Recovery Time *	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating Current	Read	-	I_{OP}	-	-	175	250	mA
Low Power Current	Standby	0 ms	I_{STB}	**	-	42	-	mA
Low Power Current	Low Power	37 ms	I_{LOW}	Configured**	-	0.8	-	mA

* Recovery time is time until ready to scan.
** Current value when USB is "Selective Suspend" mode. When using as USB-COM (USB as virtual COM), use USB driver "Opticon USB Code Reader driver" version 3.x.x.x. Refer to the "Serial Interface Specifications" for details.

4.4 Recovery Time from Power Down State

(IF=UART/USB, V_{CC} = 3.3V T_A = 25°C)

Boot Time	Conditions	Min	Typ.	Max	Unit
Boot time	*	-	360	1000	ms

* Refer to the "Serial Interface Specifications" for details.

4.5 Current Waveform
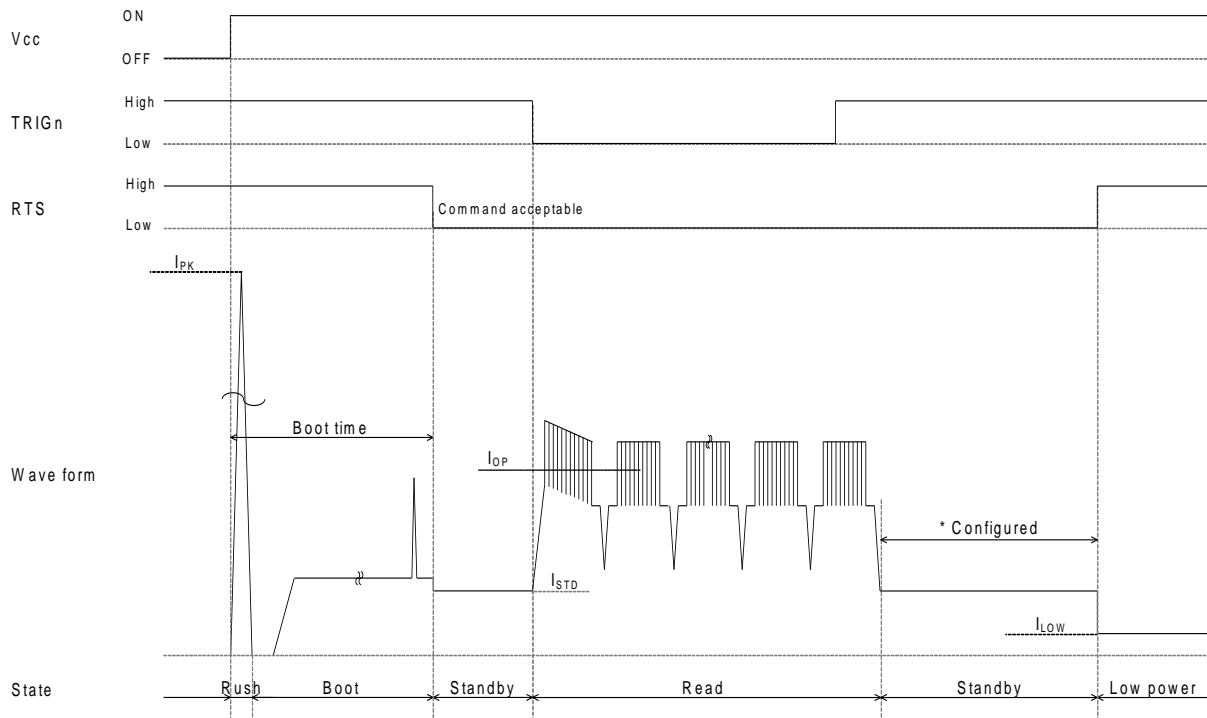
Note: When Low Power Mode is enabled, the MDI-4700 automatically enters Low Power state after Power On.

Figure 2: Current Waveform

5   Power Mode Transition


```
                           ┌──────────┐
                           │ Power-OFF │
                           └──────────┘
                                │                    Command
                          Power applied                or
                                │                   TRIGn ON
                                ▼                      or
                                                     CTS ON
                                                       or
                          AIM/WAKEn OFF           AIM/WAKEn ON
   ┌─────┐  ──────────────►  ┌─────────┐  ──────────────►  ┌───────────┐
   │ AIM │                   │ Standby │                   │ Low Power │
   └─────┘  ◄──────────────  └─────────┘  ◄──────────────  └───────────┘
            AIM/WAKEn ON          │        Automatic when"Low Power"
                                  │              is configured *
                          TRIGn ON│
                             or   │      Scanning completes
                          Trigger │           or
                                  ▼         time_out
                             ┌──────┐
                             │ Read │
                             └──────┘
```
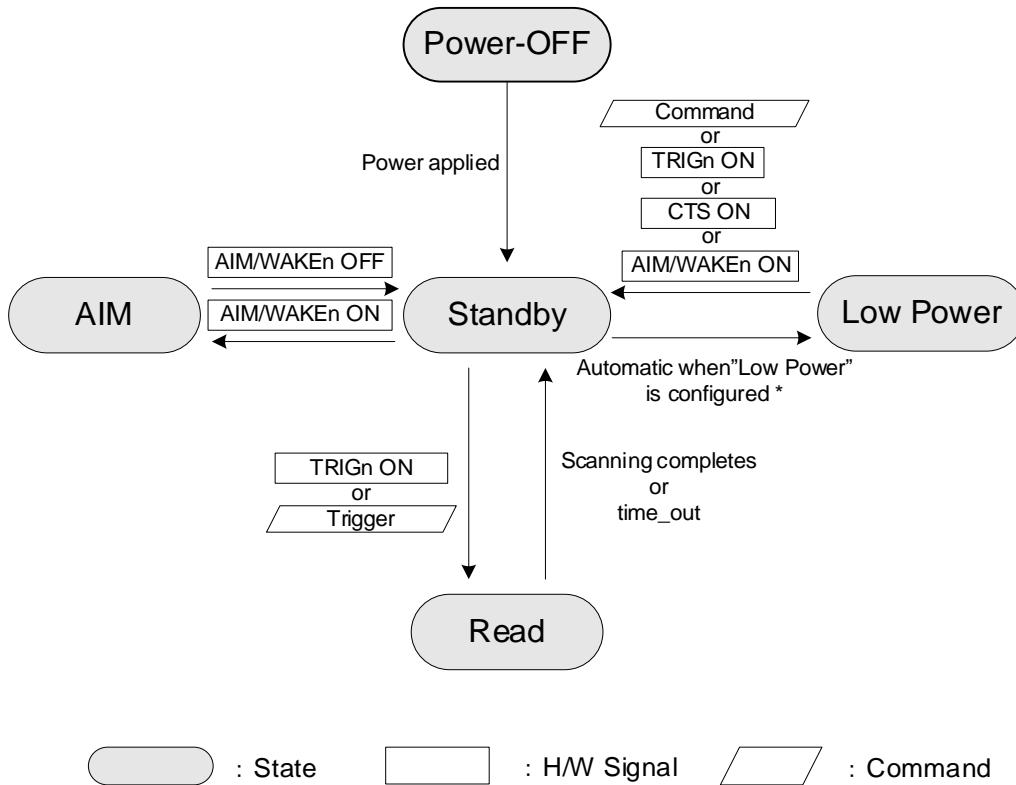
⬭ : State   ▭ : H/W Signal   ▱ : Command

*   When Low Power is enabled, the MDI-4600 automatically enters Low Power mode after being in Standby for the specified time.

Figure 3: Power Mode Transition

Power Mode Status

Status	Description
Read	White LED illumination and laser aiming light. Reading is processed.
Standby	Ready to read. The state that can read immediately.
Low Power	Low current consumption status. The amount of time to move from Standby is configurable.
AIM	When the AIM signal is ON, a single line green aiming light is on.

6   Interface Specifications

6.1   Interface Signals

The connector used is equivalent to the one produced by IRISO Electronics Co., Ltd.
Product No.: 9681-12 (12-pin, 0.5 mm pitch bottom contact, 0.3 mm thick FPC/FFC connector)

No.	Name	Function	I/O	Conditions	State	Note
1	TRIGn	Trigger	In		L: Start operation H: No action	100kΩ pull up on imager engine
2	AIM/WAKEn	Recovery signal from Low Power state	In		L: Recover from low power state H: No action	100kΩ pull up on imager engine
		Aiming control signal in states other than Low Power	In		L: Aiming LED on H: Aiming LED off	
3	GR_LEDn	Good read LED	Out		L: LED on H: LED off	4.7kΩ pull up on imager engine
	EX_ILLUM	Control of an external light source.	Out	Configured	L: External Illumination On H: External Illumination Off	
4	BUZZERn	Buzzer	Out		ACTIVE: PWM signal (frequency and duration configurable) IDLE: Steady high or low (configurable idle state)	A transistor or FET should be used to drive a buzzer.
5	POWERDWN	Indicates Low Power state	Out		L: Normal state H: Low Power state	4.7kΩ pull up on imager engine
6	RTS	Communication control signal to host system	Out			10kΩ pull up on imager engine
7	CTS	Communication control signal from host system	In	Interface configured as UART		100kΩ pull up on imager engine
	USB+	D+ signal for USB	In/Out	Interface configured as USB		
8	TxD	Transmitted data signal	Out			10kΩ pull up on imager engine
9	RxD	Received data signal	In	Interface configured as UART		100kΩ pull up on imager engine
	USB-	D- signal for USB	In/Out	Interface configured as USB		
10	GND	System ground				
11	V_{CC}	Power input	In		3.3V / 5.0V	
12	Reserve		In			N.C

* Refer to the "Serial Interface Specifications" for details.
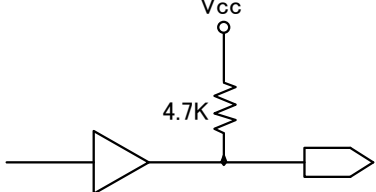
6.2 Interface Circuit
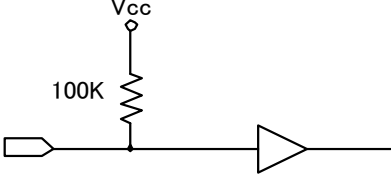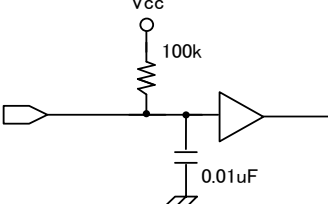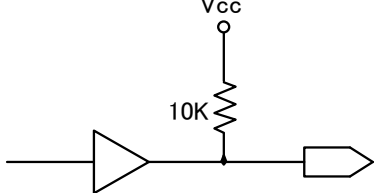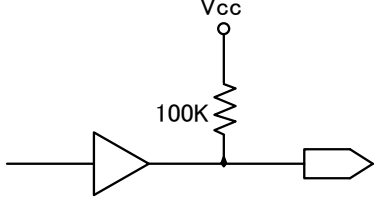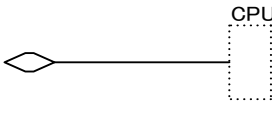
Signal Name	Circuit
AIM/WAKEn RxD CTS	
TRIGn	
RTS TxD	
GR_LEDn	
POWERDWN	
BUZZERn	
USB+ USB-	

Figure 4: Interface Circuit

7 Optical Specifications

7.1 Basic Optical Specifications

Specification		Characteristics
Scan method	CMOS area sensor (Monochrome)	-
Number of effective pixels	(H) × (V)	640 × 480 pixel
Image capture speed	Frame rate*	120 fps
Sensor shutter speed	Minimum shutter speed	30µs
Focal distance	From the front edge of imager engine	Approx. 115 mm
View angle	Horizontal	Approx. 38.0°
	Vertical	Approx. 28.9°
	Diagonal	Approx. 46.4°
Auxiliary light source (LED × 1)	LED	Warm white
	Color temperature	Approx.2700K
	Maximum Optical Efficiency **	150 lm/W
Light source for aiming (LED x 1)	Single Line Green LED	-
	Peak wavelength	539nm
	Maximum Optical Efficiency**	200 lm/W

*   The fastest speed of image capture.
**   The reference value extracted from the LED datasheets of NICHIA Corporation.

7.2   Aiming Specifications

Aiming is used to indicate the appropriate reading distance by projecting a bar of green light. The aiming specifications are as follows:

- The optical axis of the imaging field of view and the center of the horizontal aiming bar coincide at a distance of L=150±40 mm from the front edge of the engine.
- The width of the aiming bar at a distance of L=150 mm is 90%±10% of the width of the field of view.
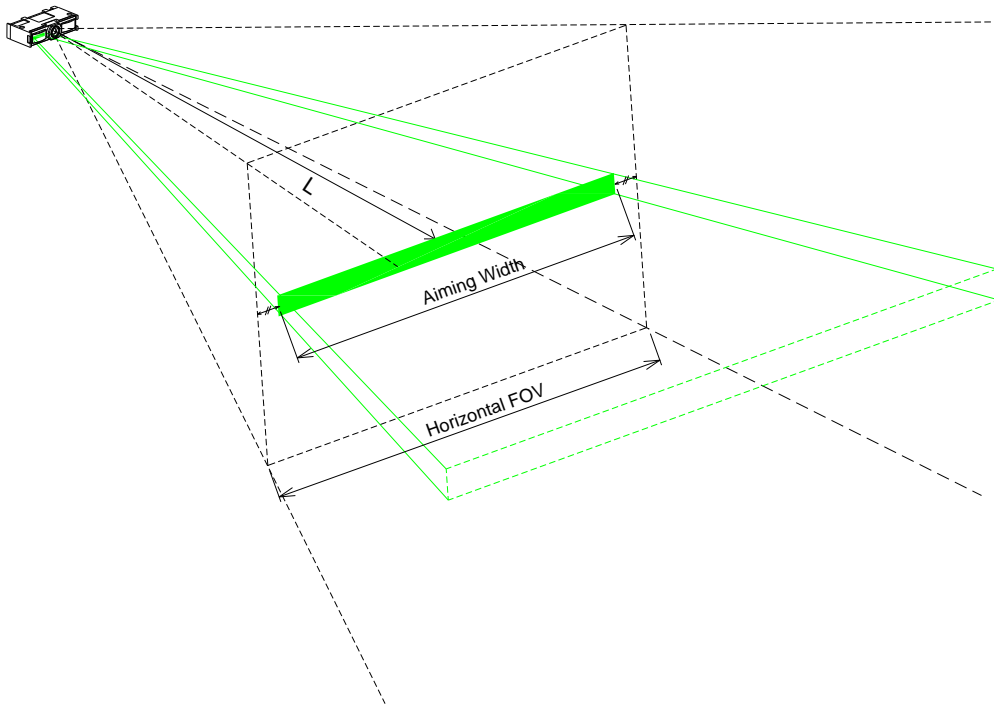

Figure 5: Aiming Pattern

8 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	100 to 200 lux (on the surface of a barcode)
Pitch Angle	α = 0°
Skew Angle	β = 15°
Code Position	Center of the image
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 scan attempts.
Barcode Test Sample (1D and 2D)	Specified in "Barcode Test Labels" on page 17.
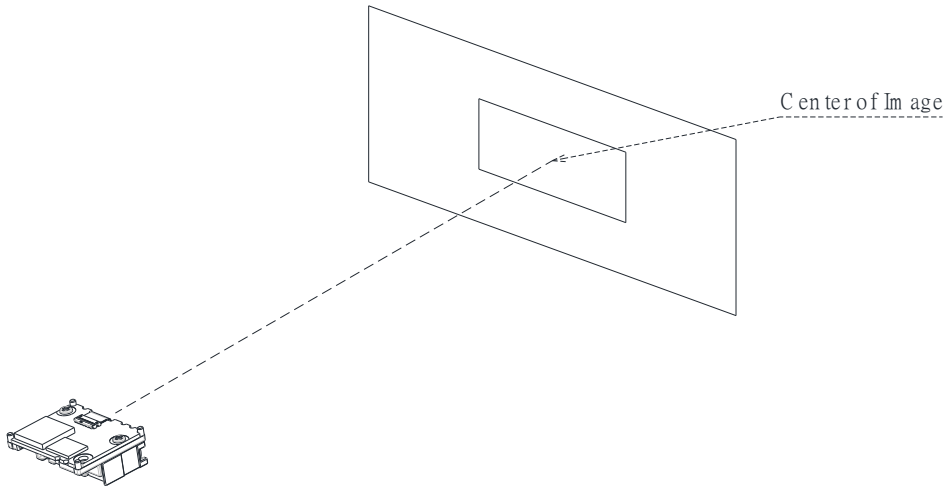
Figure 6: Test Condition of Depth of Field

8.1 Barcode Test Labels

This section describes the barcode labels used when the depth of field was measured.

1D Barcode Test Labels

Code 39

Resolution	Symbology	PCS (MRD)	Size (mm)	No. of Digits
0.076 mm (3 mil)	Code 39	0.9 (80)	24 × 10	5
0.127 mm (5 mil)			11 × 10	4
0.20 mm (7.9 mil)			100 × 10	31
0.254 mm (10 mil)			32.5 × 10	7
0.508 mm (20 mil)			43 × 25	4

Code 128

Resolution	Symbology	PCS (MRD)	Size (mm)	No. of Digits
0.20 mm (7.9 mil)	Code 128	0.9 (80)	52 × 10	16

UPC/EAN

Resolution	Symbology	PCS(MRD)	Size (mm)	No. of Digits
0.330 mm (13 mil)	UPC/EAN	0.9/0.2 (80/13)	31.5 × 24.5	12/13

GS1 DataBar / Composite Test Labels

GS1-Limited

Resolution	Symbology	PCS(MRD)	Size (mm)	No. of Digits
0.127 mm (6.7 mil)	Limited	0.9 (80)	12 × 1.8	14
0.127 mm (6.7 mil)	Limited-Composite		12 × 3.0	26

2D Codes Test Labels

PDF417

Resolution	Error Correction	PCS(MRD)	Size (mm)	No. of Character
0.127 mm (6.7 mil)	Level-3	0.9 (80)	23 × 10	58
0.254 mm (10 mil)			35 × 15	

QR Code: Model-2

Resolution	Error Correction	PCS(MRD)	Size (mm)	No. of Character
0.127 mm (10 mil)	M	0.9 (80)	4 × 4	44
0.381 mm (15 mil)			11 × 11	

Data Matrix

Resolution	Model	PCS(MRD)	Size (mm)	No. of Character
0.127 mm (5.0 mil)	ECC200	0.9 (80)	3 × 3	40
0.254 mm (10 mil)			6 × 6	

Note: Size is measured using the outline dimensions, excluding the quiet zone.

8.2 Scan Area and Depth of Field

The scan area is measured from the front edge of the engine. The depth of field depends on the view angle and symbol length. The depth of field values provided are the typical values measured at an ambient temperature of 25°C.
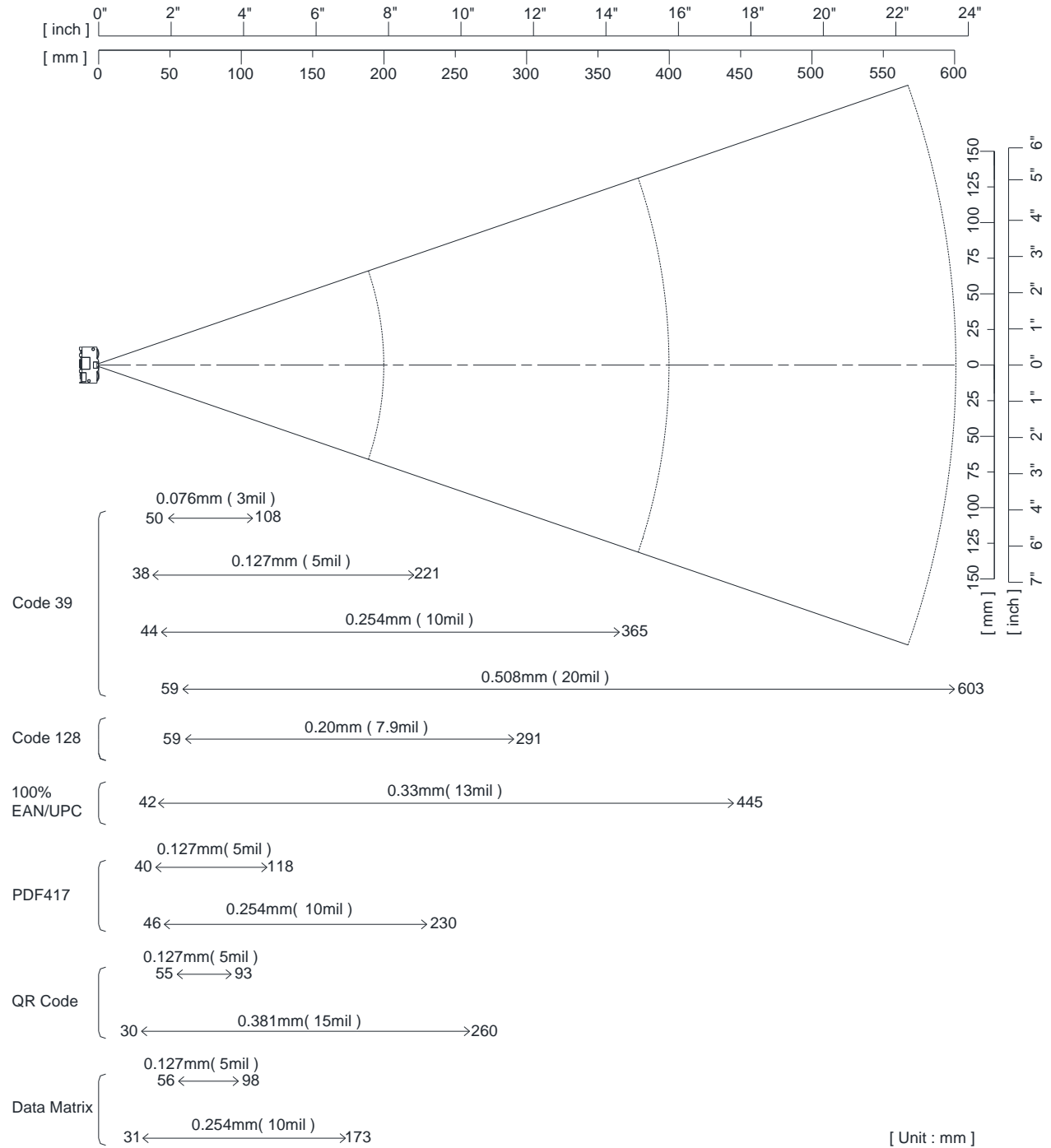

Figure 7: Scan Area and Depth of Field

Depth of Field

$(T_A = 25°C)$

Resolution mm (mil)	Symbology Type	PCS (MRD)	Guaranteed Value		Typical Value	
			Near	Far	Near	Far
0.076 mm (3 mil)	Code 39	0.9 (80)	59 mm (2.3″)	87 mm (3.4″)	50 mm (2.0″)	108 mm (4.2″)
0.127 mm (5 mil)	Code 39	0.9 (80)	50 mm (2.0″)	151 mm (5.9″)	38 mm (1.5″)	221 mm (8.7″)
0.254 mm (10 mil)	Code 39	0.9 (80)	52 mm (2.1″)	261 mm (10.3″)	44 mm (1.7″)	365 mm (14.3″)
0.508 mm (20 mil)	Code 39	0.9 (80)	68 mm (2.7″)	443 mm (17.4″)	59 mm (2.3″)	603 mm (23.7″)
0.2 mm (7.9 mil)	Code 128	0.9 (80)	68 mm (2.7″)	189 mm (7.4″)	59 mm (2.3″)	291 mm (11.5″)
0.33 mm (13 mil)	UPC/EAN	0.9 (80)	49 mm (1.9″	328 mm (12.9″)	42 mm (1.7″)	445mm (17.5″)
0.127 mm (5.0 mil)	PDF417	0.9 (80)	51 mm (2.01″)	102 mm (4.0″)	40 mm (1.6″)	118 mm (6.7″)
0.254 mm (10 mil)	PDF417	0.9 (80)	52 mm (2.1″)	192 mm (7.6″)	46 mm (1.8″)	230 mm (9.0″)
0.127 mm (5.0 mil)	QR Code	0.9 (0.8)	72mm (2.8″)	84 mm (3.1″)	55 mm (2.2″)	93 mm (3.6″)
0.381 mm (15 mil)	QR Code	0.9 (80)	39mm (1.5″)	231 mm (9.1″)	30 mm (1.2″)	260 mm (10.2″)
0.127 mm (5.0 mil)	Data Matrix	0.9 (80)	77 mm (2.7″)	88 mm (2.9″)	56 mm (2.2″)	98 mm (3.8″)
0.254 mm (10 mil)	Data Matrix	0.9 (80)	39 mm (1.5″)	155 mm (6.1″)	31 mm (1.2″)	173 mm (6.8″)

8.3   Print Contrast Signal (PCS)

PCS: 0.2 or higher

Conditions
MRD   13 and higher
                   (70% or higher reflectivity of space and quiet zone)
Barcode Sample   UPC specified in "Barcode Test Labels" on page 17.
                   (Resolution: 0.33 mm, PCS: 0.2)

MRD = Minimum reflectance of white space - Maximum reflectance of black bar

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

8.4   Minimum Resolution

1D Barcode   0.076 mm (3.0 mil) Code 39
GS1-DataBar   0.127 mm (5.0 mil) GS1 DataBar Limited
Stacked Code   0.127 mm (5.0 mil) PDF417, GS1 DataBar Limited Composite
2D Code   0.127 mm (5.0 mil) QR Code and Data Matrix

For details, see "Barcode Test Labels" on page 17.

Conditions
Angle $\alpha = 0°$, $\beta = +15°$
Curvature $R = \infty$

8.5   Barcode Width

100 mm

Conditions
Barcode Sample   0.20 mm Code 39 specified in "Barcode Test Labels" on page 17
Distance   170 mm from the front edge of the imager engine
Angle $\alpha = 0°$, $\beta = +15°$
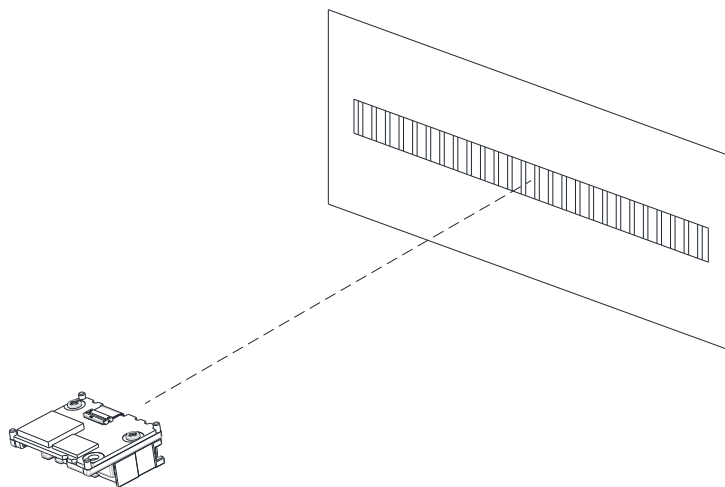Curvature $R = \infty$

Figure 8: Barcode Width

8.6 Pitch, Skew, and Tilt

Pitch: α = ±65°
Skew: β = ±65°
Tilt: γ = 360°

Conditions

Barcode Sample	0.5 mm Code 39 specified in "<u>Barcode Test Labels</u>" on page 17
Distance	180 mm from the front edge of the imager engine
Curvature	R = ∞

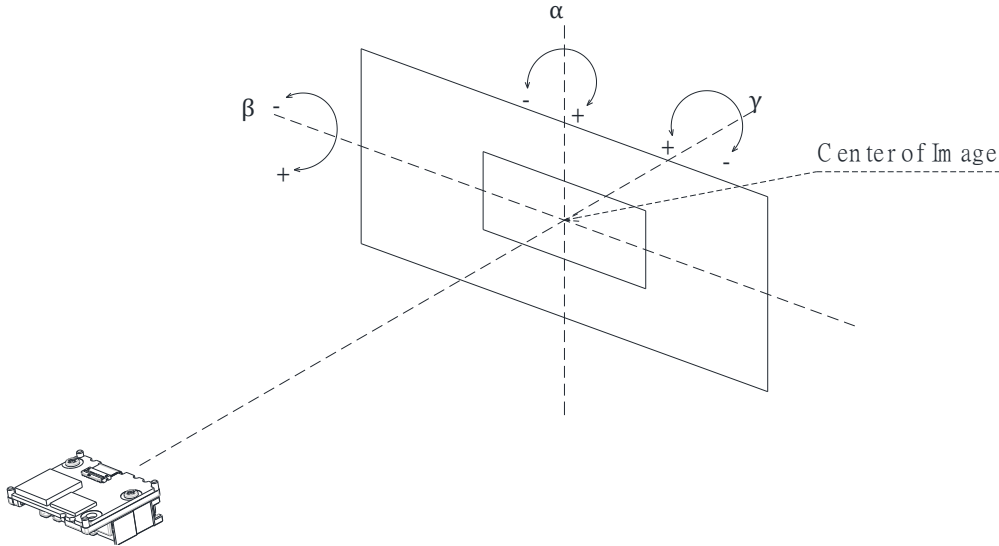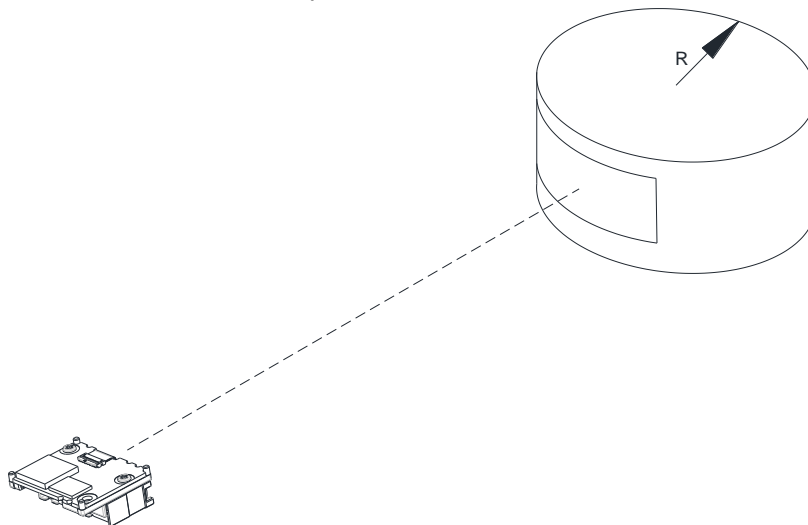For pitch angle and tilt angle measurements, set the skew angle β to +15°

Figure 9: Pitch, Skew, and Tilt

8.7 Curvature

0.33 mm 12-digit UPC: R ≧ 20 mm

Conditions

Barcode Sample	0.33 mm UPC specified in "<u>Barcode Test Labels</u>" on page 17
Distance	180 mm from the front edge of the imager engine
Angle	α = 0°, β =＋15°

Figure 10: Curvature

8.8   Motion Tolerance

10 m/s

Conditions

Ambient Temperature and Humidity	Room temperature and Room humidity
Ambient Light	500 lux to 1000 lux (on the surface of the barcode)
Distance	130 mm from the front edge of the imager engine
Skew	α = 0°, β =+15°
Curvature	R = ∞
PCS	0.9 or higher
Barcode Sample	UPC with 0.33 mm resolution specified in "Barcode Test Labels" on page 17

Note: Successful reading at the indicated speed cannot be guaranteed. If the surface is highly reflective, the illumination LED may be reflected and cause scanning to fail.
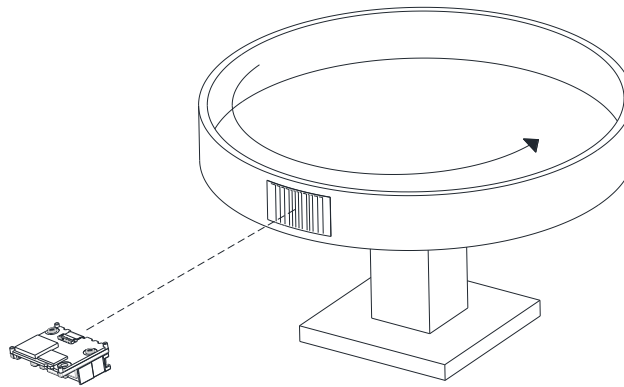

Figure 11: Motion Tolerance

8.9   Scan Speed

The number of scans per second
1D barcode: 40 Scans/Second
2D code: 25 Scans/Second

Conditions

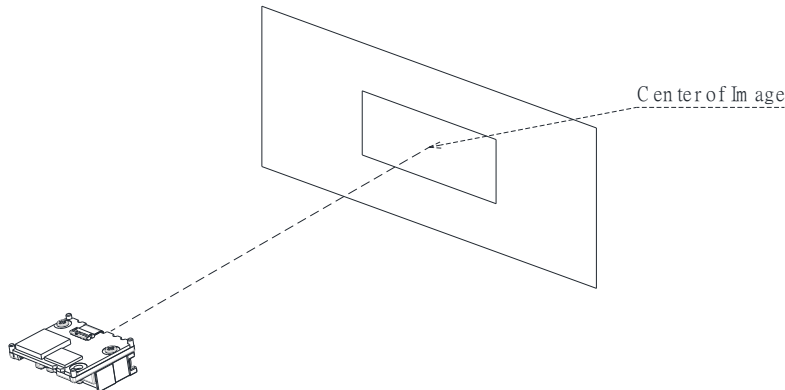|	
Ambient Light	500 lux to 1000 lux (on the surface of a barcode)
Distance	115 mm from the front edge of the imager engine
Scan Mode	Continuous scan
Angle	α = 0°, β =+15°
Code position	Center of the image
PCS (1D and 2D)	0.9 or higher
1D Code	UPC/EAN with 0.33 mm specified in "Barcode Test Labels" on page 17
2D Code	Data Matrix with 0.254 mm specified in "Barcode Test Labels" on page 17

Figure 12: Scan Speed

9   Environmental Specifications

9.1   Temperature

Operating Temperature: -20 to 60 ℃
Storage Temperature: -40 to 70 ℃

Conditions
Barcode Sample   0.33 mm UPC. For details, see "Barcode Test Labels" on page 17
Distance   130 mm from the front edge of the imager engine
Angle   α = 0°, β =+15°
Curvature   R = ∞
Scanning Test   Read at intervals of 300 ms
Power Supply Voltage 3.3 and 5.0 V

9.2   Humidity

Operating Humidity: 5 to 90% RH (no condensation, no frost)
Storage Humidity: 5 to 90% RH (no condensation, no frost)

Conditions
Barcode Sample   0.33 mm UPC specified in "Barcode Test Labels" on page 17
Distance   130 mm from the front edge of the imager engine
Angle   α = 0°, β =+15°
Curvature   R = ∞
Power Supply Voltage 3.3 and 5.0 V

9.3   Ambient Light Immunity

Scanning performance is guaranteed when the illuminance on the surface of a barcode is between zero and the following values:

Incandescent Light: 10,000 lux
Fluorescent Light: 10,000 lux
Sunlight: 100,000 lux

Conditions
Barcode Sample   0.33 mm UPC specified in "Barcode Test Labels" on page 17
Distance   130 mm from the front edge of the imager engine
Angle   α = 0°, β =+15°
Curvature   R = ∞
Power Supply Voltage 3.3 and 5.0 V

Note: To achieve the best scanning performance, make sure that direct ambient light and specular reflection do not enter the light receiving section of the MDI-4700.

9.4   Electrical Noise

a) Scanning Symbologies
Scanning performance is not affected when the electrical noise added to the Input Power pin is less than 0.1Vpp and has a frequency between 50 Hz and 100 kHz.

Conditions

Scan Method	Continuous scanning
Barcode Sample	0.33 mm UPC specified in "Barcode Test Labels" on page 17
Distance	130 mm from the front edge of the imager engine
Angle	α = 0°, β =+15°
Curvature	R = ∞
Scanning Test	Read at intervals of 300 ms
Power Supply Voltage	3.3 and 5.0V

b) Image Data Acquisition
There shall be no excessive noise or misalignments in acquired images when sinusoidal electrical noise (50 Hz to 100 kHz, smaller than 20 mVp-p) is added to the power supply line.

Note: There may be a case where the electrical noise affects the quality of captured images. The signal processing system of the MDI-4700 is especially designed for the purpose of scanning symbologies but not for the acquisition of image data. Therefore, the quality of captured images of the MDI-4700 may be lower than that of general purpose digital cameras.

9.5   Vibration Tolerance

The MDI-4700 is designed to withstand the conditions of the following vibration test.

Vibration Test: Increase the frequency of the vibration from 12Hz to 200Hz at a maximum acceleration of 32.3m/s^2(3.3G) for 10 minutes. Continue the process for 2 hours in the X-direction, 2 hours in the Y-direction, and 4 hours in the Z-direction.

Conditions

Barcode Sample	0.33 mm UPC specified in "Barcode Test Labels" on page 17
Distance	130 mm from the front edge of the imager engine
Angle	α = 0°, β =+15°
Curvature	R = ∞
Power Supply Voltage	3.3 and 5.0 V

9.6   Drop Impact Tolerance

The MDI-4700 is designed to withstand the conditions of the following drop test.

Drop Test: Fix the MDI-4700 in a specific aluminum made dummy case with these dimensions: W = 100 mm, D = 70 mm, H = 50 mm. Drop the case a total of 10 times (from the top, bottom, front, back, left, right, top-left, top-right, bottom-left, and bottom-right faces) from a height of 1.8 meters onto a concrete floor.

Conditions

Barcode Sample	0.33 mm UPC specified in "Barcode Test Labels" on page 17
Distance	130 mm from the front edge of the imager engine
Angle	α = 0°, β =+15°
Curvature	R = ∞
Power Supply Voltage	3.3 and 5.0 V

10 Integration Specifications

To connect the MDI-4700 to a host system, use an FFC or FPC cable designed to meet the specifications provided by the connector manufacturer.

Recommended connector: Product No.: 9681-12 (12-pin, 0.5 mm pitch, 0.3 mm thick), produced by IRISO Electronics Co., Ltd.

Recommended cable length: Max. 50 mm. The resistance caused by the length of the cable must not drop the voltage to the imager engine below 3.0 V. For USB connections, design the differential impedance of the transmission line to be 90Ω±15%.

11 Regulatory Specifications

11.1 LED safety

IEC 62471: 2006
Lamp classification group; Exempt

12 RoHS

The MDI-4700 is compliant with RoHS.

RoHS: The restriction of the use of certain hazardous substances in electrical and electronic equipment.
Directive 2011/65/EU.
Commission Delegated Directive (EU) 2015/863.

13 Reliability

The imager engine will perform reliably if it is operated under normal operating conditions in the range of advised operating temperature and without excessive electrical or mechanical shock.

MTBF (Mean Time Between Failures) of this product is 444,514 hours.

14 Precautions

The use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure:
- All work benches, tools, measuring instruments and any part of the human body which may come into contact with the MDI-4700 must use ESD anti-static precautions.
- Do not touch the optical and electrical components. When possible, hold the camera body when handling the MDI-4700.
- Avoid handling the MDI-4700 in a dusty area. If dust gets on the MDI-4700, gently blow it off with dry air. Direct contact with the optics of the MDI-4700 may reduce its performance.
- Do not drop the MDI-4700.

15 Product Label
The product labels are affixed to the MDI-4700 as indicated:
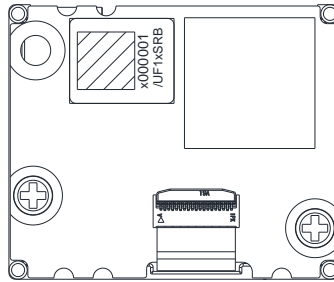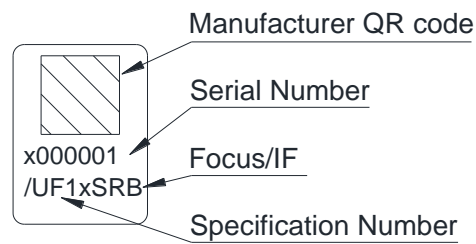

Label details:

Figure 13: Product Label

The serial number (seven-digits) starts from 1000001 and is sequentially numbered.

Note: SR stands for Standard Range Focus.
HD stands for High Density Focus.
UD stands for Ultra-High Density Focus

B stands for UART interface in default.
DC stands for USB-COM interface in default.
D stands for USB-HID interface in default.

16 Packaging Specifications

Note: The "RO" mark labelled 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, Directive 2011/65/EU, Commission Delegated Directive (EU) 2015/863.). However, this mark does not have any legal weight in the European Union.

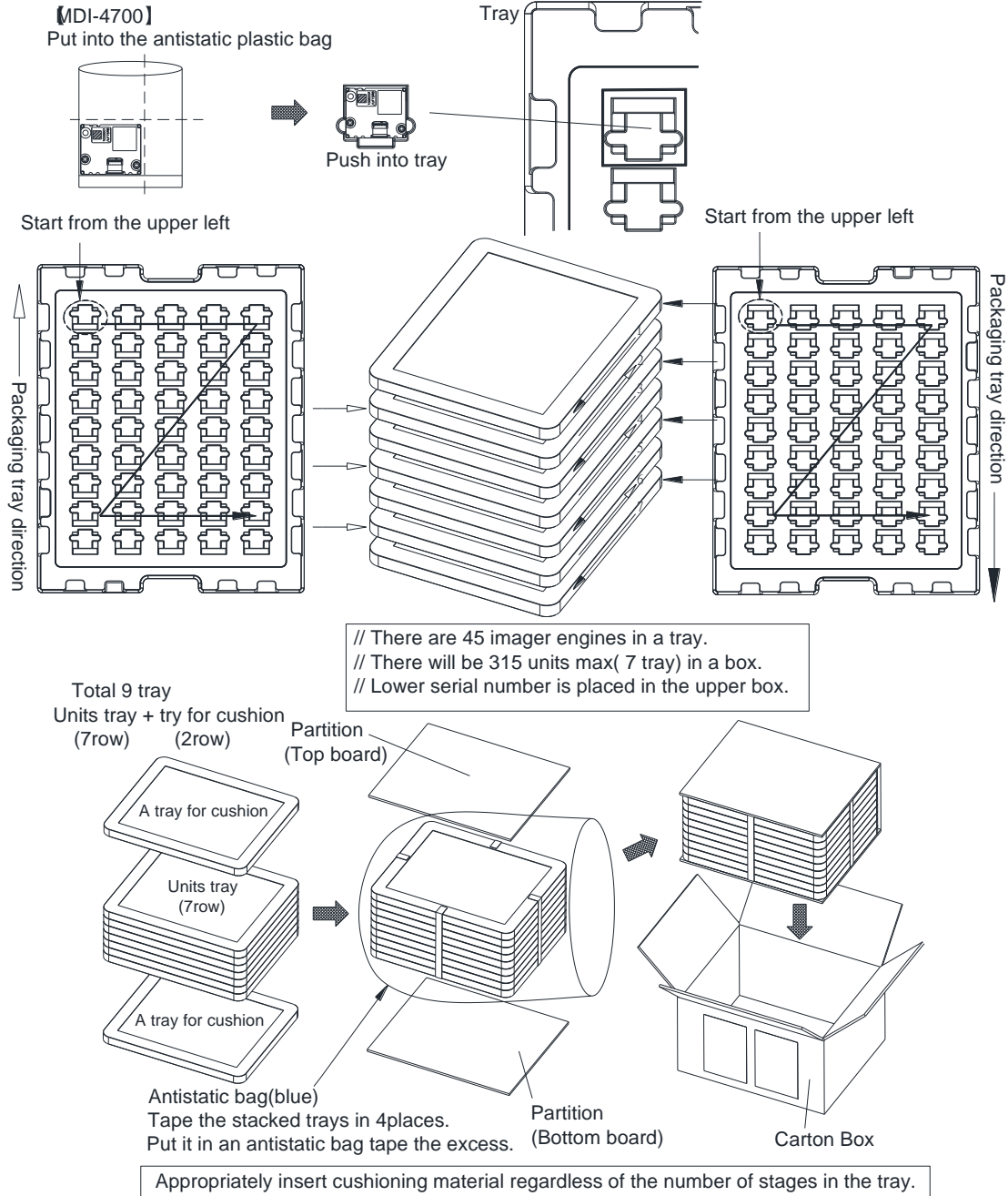## 16.1 Packaging

A carton box: 315 pieces MDI-4700 (max)

// There are 45 imager engines in a tray.
// There will be 315 units max(7 tray) in a box.
// Lower serial number is placed in the upper box.

Appropriately insert cushioning material regardless of the number of stages in the tray.

Figure 14: Packaging

16.2 Package Size

Outer dimensions are approximately W: 365 mm × D: 295 mm × H: 180 mm

17 Mechanical Drawing

Product Label

Imaging Lens
25.3± 0.3
3 ± 0.2
$10^{+0.3}_{-0.4}$

Aming LED Lens

Illumination LED Lens

21.6± 0.1
13.6 ± 0.3
2.5 ± 0.1
7.2 ± 0.2
21 ± 0.3

Machine Screw
M2x0.4 Depth2.5
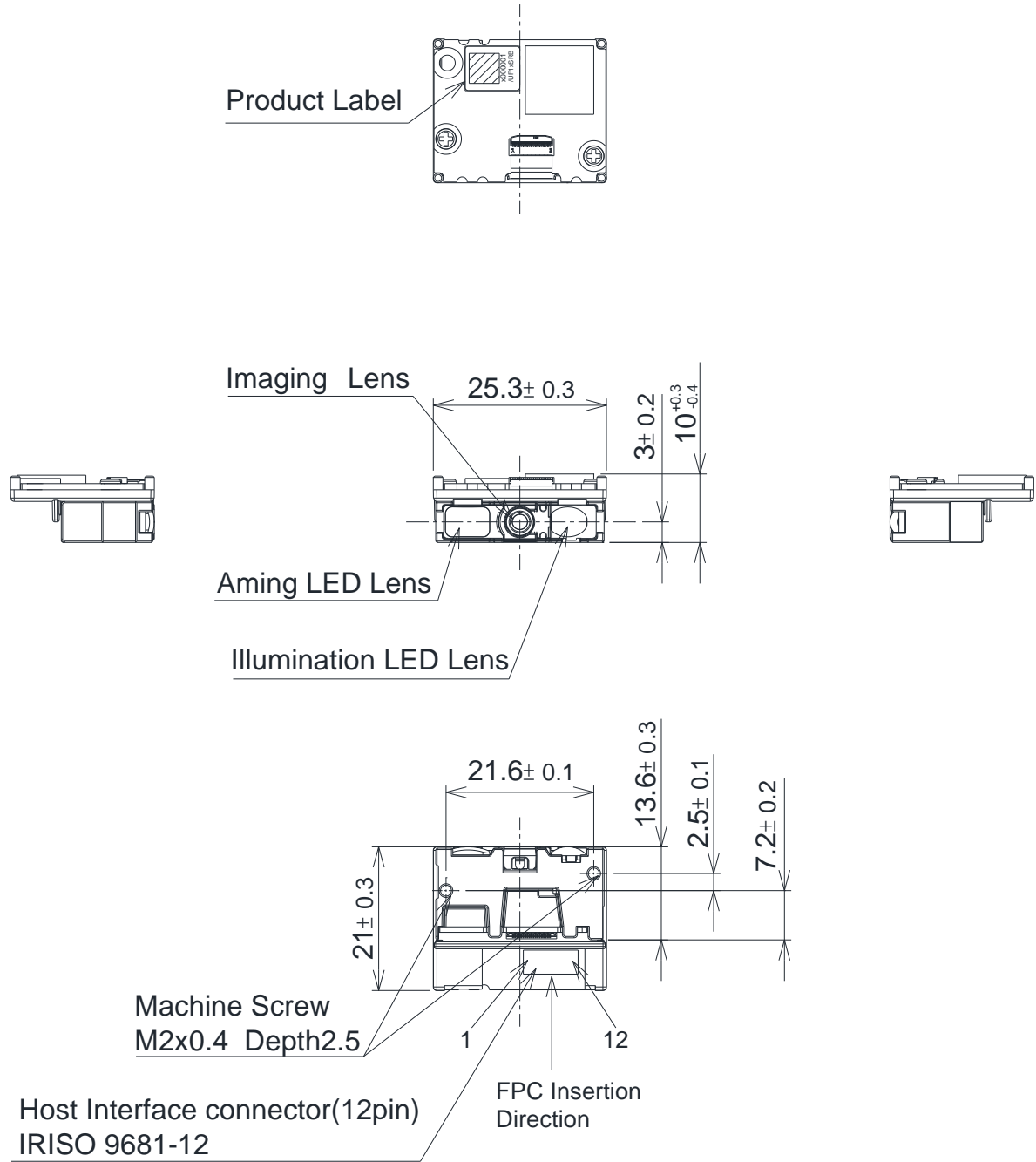1   12

FPC Insertion
Direction

Host Interface connector(12pin)
IRISO 9681-12

Figure 15: Drawing (MDI-4700)