OPTICON

CCD Linear Scan Engine with Built-in Decoder

MDC-100

MDC-100

This manual provides specifications for the MDC-100 linear CCD scan engine with built-in decoder.

Specifications Manual

All information subject to change without notice.

Document History

Model Number:	**MDC-100**	**Specification Number:**	**SS13070**
Edition:	**3**	**Original Spec Number:**	**SS13069**
Date:	**2015-01-19**		

Copyright 2014 Opticon. All rights reserved.

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., 12-17, Tsukagoshi 4-chome, Warabi-shi, Saitama, Japan 335-0002. TEL +81-(0) 48-446-1183; FAX +81-(0) 48-446-1184

SUPPORT

USA

Phone: 800-636-0090

Email: support@opticonusa.com

Web: www.opticonusa.com

Europe

Email: support@opticon.com

Web: www.opticon.com

Revision History

Specification No. : SS13070
Product name : MDC-100

Edition	Date	Page	Section	Description of Changes
1st	2014/09/10	-	-	Initial release
2nd	2014/10/24	3	5	Revised the statement of Low Power mode
3rd	2015/01/19	1	2	Added examples of LCD screens

Contents

1. Abstract

This manual provides specifications for the MDC-100 linear CCD scan engine with built-in decoder.

2. Overview

The MDC-100 is a compact barcode scan engine that can be installed in various handheld products such as a portable device. The use of short wavelength red LED illumination enhances the visibility when aiming at a barcode. The MDC-100 has a built-in decoder that enables this scan engine to decode the bar codes after scanning and output the information via its serial communication interface. The MDC-100 is RoHS compliant.

Features

- MDC-100's high definition glass imaging system ensures steady performance in various conditions.
- Glass-fiber reinforced polycarbonate body is very strong to mechanical shocks which extend the applications from general in-house environment to hard field applications.
- 50 degree scan angle is larger than any laser scan engine in equivalent class, best to read high capacity barcodes in space-limited applications.
- MDC-100's patented adaptive illumination technology allows it to automatically read barcodes either on paper or on LCD screens such as mobile phone / tablet / and PC monitor, while keeping the power consumption very low.
- MDC-100 features both RS-232C and USB interfaces.

3. Physical Features

3.1. Dimensions

22.8 × 15.0 × 11.5 (WDH mm)

3.2. Weight

3.5 g

4. Electrical Specifications

Absolute Maximum Ratings

Item	Symbol	Rated Value	Unit
Power Supply Voltage(Vcc to GND)	Vcc	3.9	V
Input Voltage	V1	-0.3 ～ Vcc +0.3	V

Electrical Characteristics VCC = 3.3 V、Ta = 25 °C

Item		Symbol	Conditions	Min	Typ	Max	Unit
Operating Voltage		V_{cc}		3.0	—	3.6	V
Operating Current		I_{OP}	READ State	—	110	120	mA
Idle Current		I_{IDL}	IDLE State	—	18	25	mA
Sleep Current		I_{SLP}	SLEEP State	-	100	-	uA
Peak Inrush Current		I_{PEEK}		—	150	200	mA
Input Voltage	High	V_{IH}		V_{CC}×0.8	—	—	V
	Low	V_{IL}		—	—	V_{CC}×0.2	V
Output Voltage	High	V_{OH}	I_{OH} =-1mA	V_{CC}—0.5	—	—	V
	Low	V_{OL}	I_{OL} =1.0mA	—	—	0.5	V
Input Current		I_{IN}	V_{IN}=Vcc V_{IN}=0V	—	—	1.0	uA

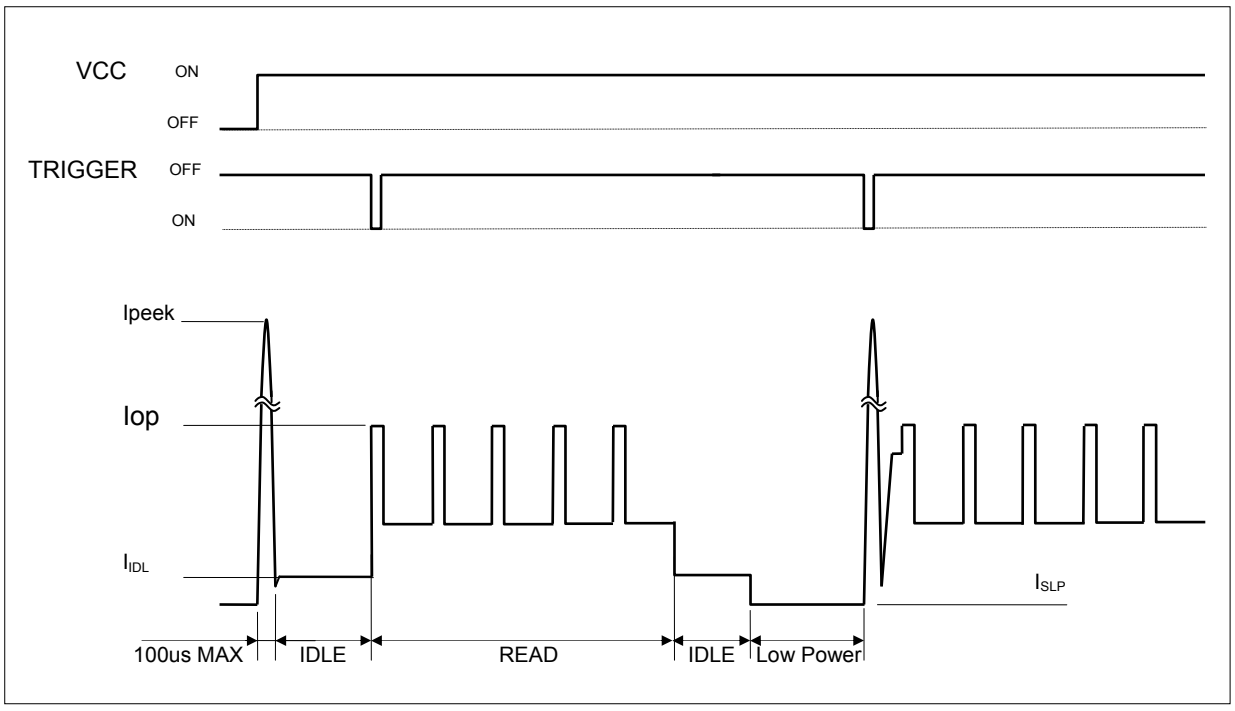


Figure 1: Current Waveform

5. Power Mode Transition

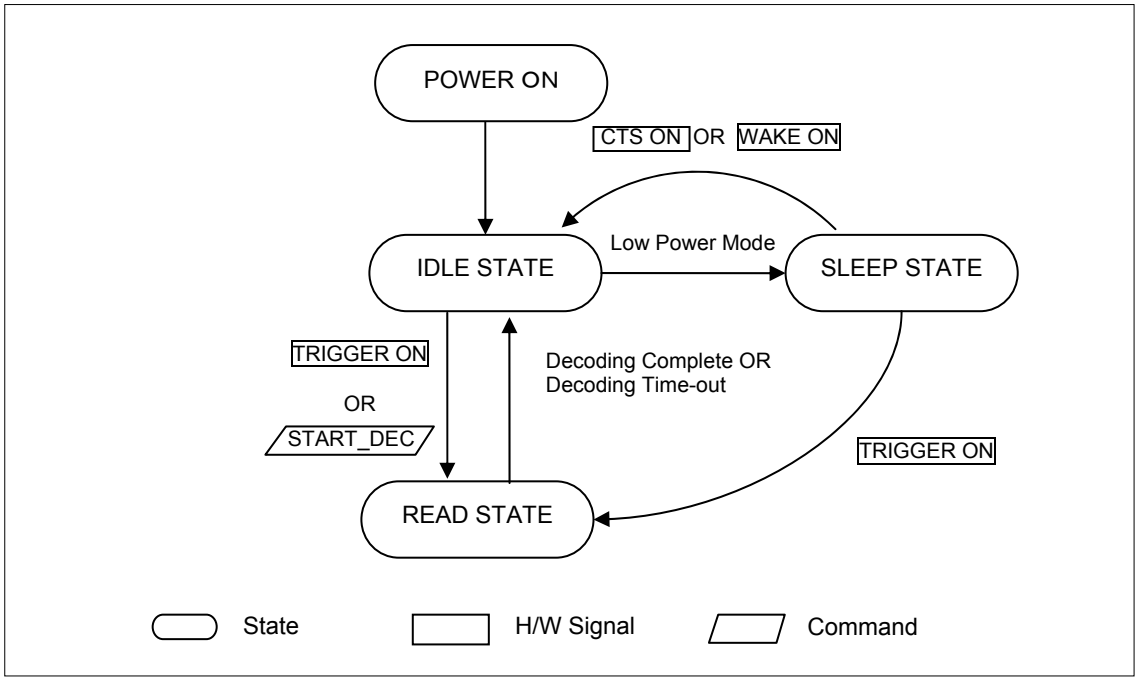


Figure 2: Power Mode Transition

*** Low Power mode is ONLY available when using RS-232C interface.**

- When “Low Power" mode is enabled, the MDC-100 automatically enters “SLEEP” state from “Power-ON”.
- When moving to “IDLE” state by “CTS ON” or “WAKE ON” from “SLEEP” state, MDC-100 goes back to “SLEEP” state in two seconds if no event occurs to move to other states.

Universal ID	Description	Default
Z5	Disable Low Power mode	Y
Z6	Enable Low Power mode	

6. Interface Specifications

Connector used: IRISO Electoronics Co.,LTD."IMSA-9681S-12",
12-pin, 0.5 mm pitch, FFC connector, bottom contact type (gold-plated)

Signal	Pin No.	I/O	Functions
Trigger	1	I	Trigger input, CMOS logic level: Low = Trigger
Wake	2	I	Wakeup input, CMOS logic level: Low = Wake
Decode LED	3	O	LED output, CMOS logic level: Low = LED On
Buzzer	4	O	Buzzer control pulse output, CMOS logic level: Low = Buzzer On
Power Down	5	O	Power down output, CMOS logic level: High = Low Power state
RTS	6	O	Request to send, CMOS logic level
CTS/USB+	7	I/O	Clear to send, CMOS logic level / USB + data signal
Txd	8	O	Serial data output, CMOS logic level
Rxd/USB-	9	I/O	Serial data input, CMOS logic level / USB- data signal
GND	10	—	Ground
VDD	11	I	Power supply: DC 3.0V ~ 3.6V
Boot	12	I	Start signal input, CMOS logic level : High = normal operation

7. Optical Specifications

7.1. General Factors

Item		Characteristics		Unit
Illumination		Amber LED		–
Peak wavelength		624		nm
Scan rate		300 Maximum		scans
FOV	Horizontal	50		deg
	Vertical	±0.25	TYP	deg
		±(1.3 ~ 1.8)	MAX	

7.2. Optical Clear Zone for Decoding

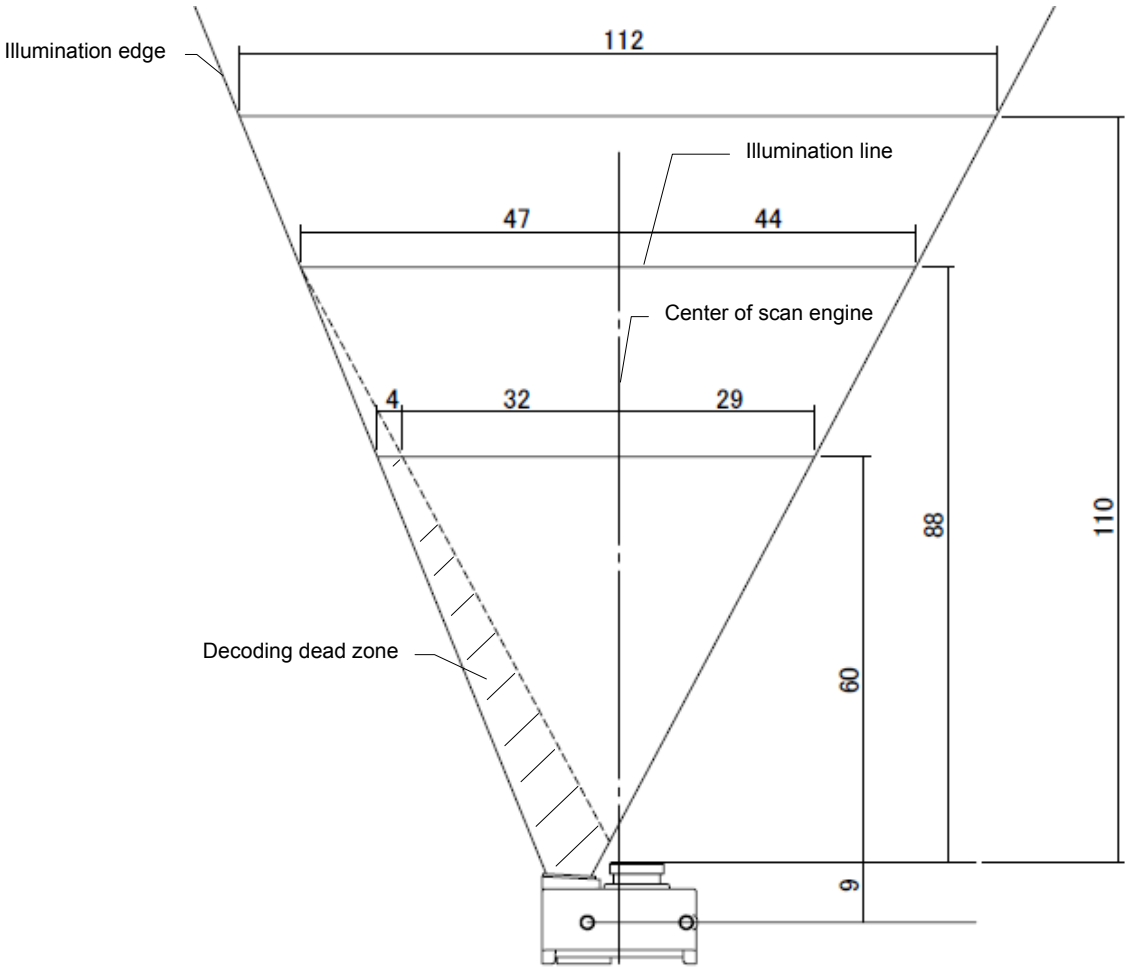


Figure 3: Optical Clear Zone for Decoding

1: Illumination line except the dead zone (out of the FOV of imaging lens) is defined as optical clear path, where the MDC-100 is able to decode.
2: Illumination edge is defined by 90% peak luminance of illumination line.

7.3. Recommended Installation Condition of Exit Window

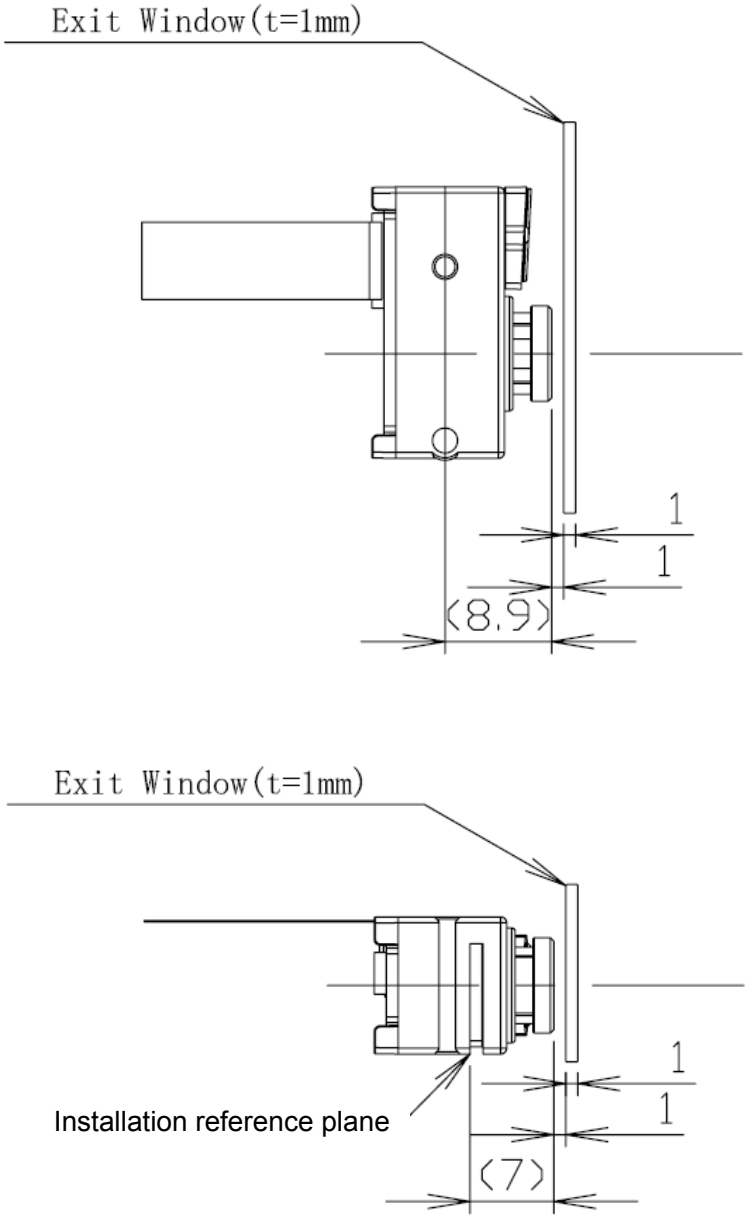


Figure 4: Recommended Installation Condition of Exit Window

To avoid direct reflection from the illumination LED by the exit window, the following precautions are recommended:

1. The exit window should be parallel to the tip surface of the imaging lens with a 1 mm distance.
2. The thickness of the exit window should be less than 1 mm.
3. The material of the exit window should be transparent colorless PMMA. The plate should have optical flatness and optical anti-reflective coating on both surfaces.

7.4. Optical Clear Area of Exit Window

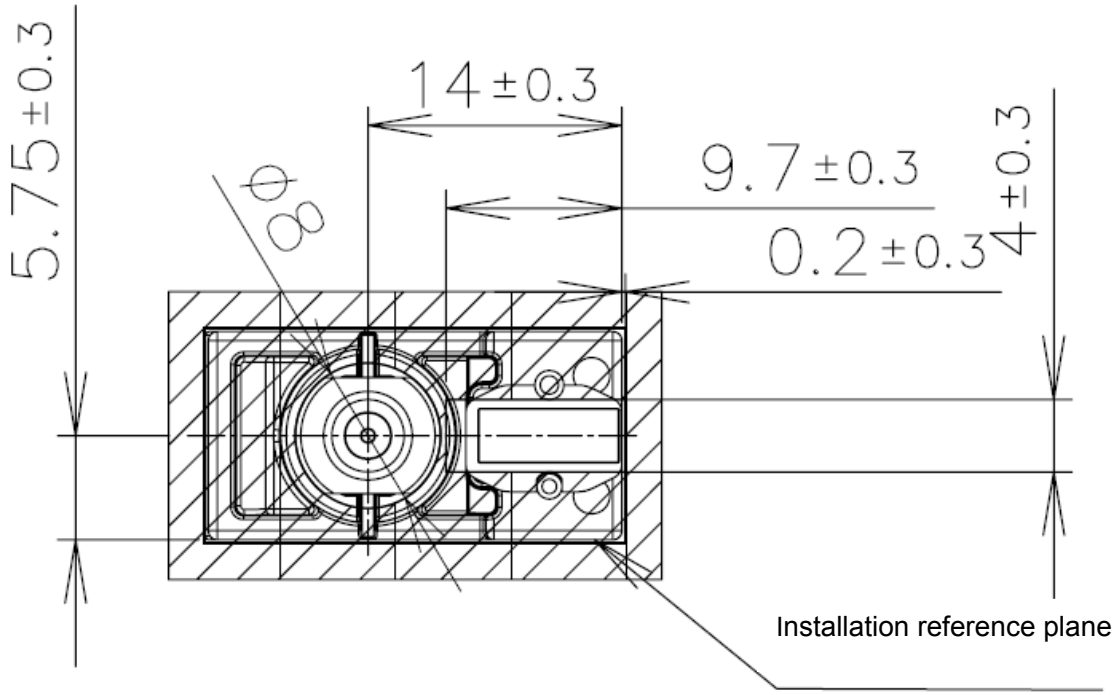


Figure 5: Optical Clear Area of Exit Window

From front view of the scan engine, the non-shaded area indicates the optical clear area. It is recommended to coat the shaded area matt-black. The dimension of the shaded area is based on the condition where the exit window is parallel located at 1 mm distance to the tip surface of the imaging lens and that there is a reasonable installation precision.

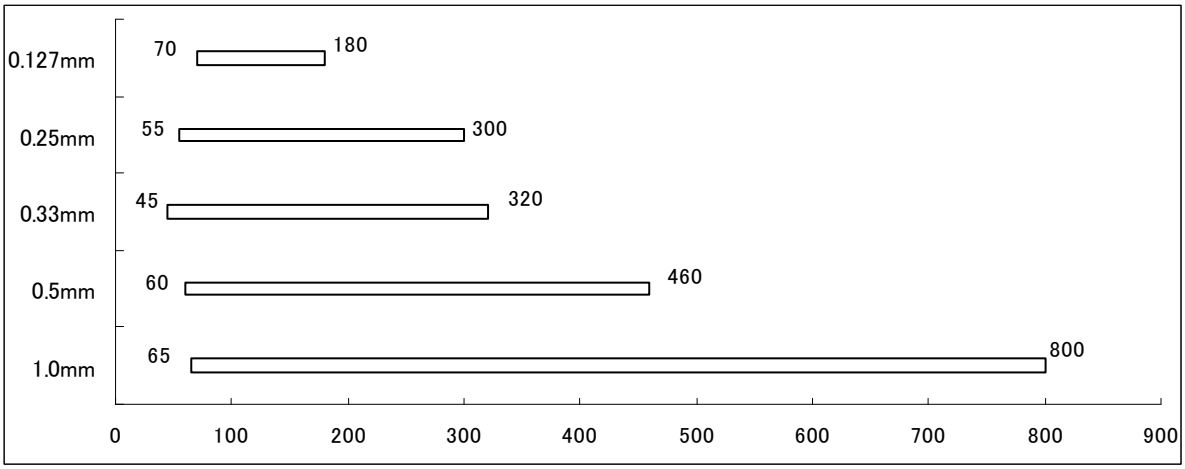
8. Technical Specifications

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

<Conditions>

Temperature and humidity	: Room temperature, room humidity
Ambient light	: 500 lx
Background	: White
Power supply voltage	: 3.3 V
Test PCS	: PCS 0.9 PCS = (Reflectance of white bar-Reflectance of black bar) / Reflectance of white bar
Reading test	: Accept 4 successful reading within 5 consecutive attempts. Each successful reading is in 0.25 seconds or less.

8.1. Depth of Field



*The decoding range is from the edge of the imaging lens.

<Conditions>

Resolution	Symbology	PCS	Quiet Zone	No. of Digits
1.0 mm	Code 39	0.9	20 mm	1
0.5 mm	Code 39	0.9	10 mm	4
0.33 mm	EAN-13	0.9	10 mm	13
0.25 mm	Code 39	0.9	5 mm	9
0.127 mm	Code 39	0.9	7 mm	4

Bar Code Sample	: Optoelectronics Test Chart, N/W ratio = 1 : 2.5
Angle	: α = 0° β = 15° γ = 0°
Curvature	: R = ∞

8.2. Pitch, Skew and Tilt

Pitch	: α ≦ ±50°
Skew	: β ≦ ±65°
Tilt	: γ ≦ ±25°
<Conditions>	
Bar code	: Optoelectronics Test Sample
Distance	: 110 mm from the edge of the scan engine PCS 0.9, Resolution 0.33 mm, EAN-13, Quiet Zone 15 mm
Angle	: Pitch and Tilt angles calculated with Skew angle β = +15 degree
Curvature	: R = ∞

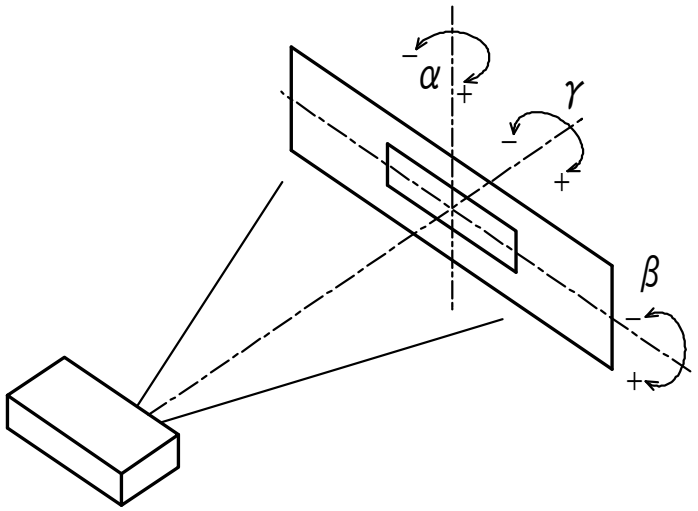


Figure 6: Pitch, Skew and Tilt

8.3. Curvature

JAN-8	: R ≥ 15 mm
<Conditions>	
Bar code	: Optoelectronics Test Sample PCS 0.9, Resolution 0.26 mm, EAN-8, Quiet Zone 10 mm
Distance	: 110 mm from the edge of the scan engine
Angle	: Skew angle β = +15°

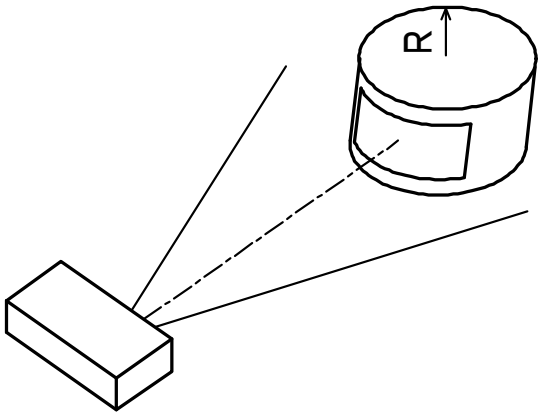


Figure 7: Curvature

9. Environmental Specifications

9.1. Temperature

Operating temperature : -20 ~ 60 °C
Storage temperature : -40 ~ 70 °C

9.2. Humidity

Operating humidity : 5 ~ 90% RH (no condensation, no frost)
Storage humidity : 5 ~ 90% RH (no condensation, no frost)

9.3. Ambient Light Immunity

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

Incandescent light : 4,000 lx
Fluorescent light : 4,000 lx
Sunlight : 100,000 lx

* Be sure that direct light or specular reflection from the light source does not enter the light receiving area of the scan engine.

9.4. Electrostatic Noise

There shall be no abnormalities in the output signals when sinusoidal electrical noise (50 Hz to 100 kHz, smaller than 0.1 Vpp) is added to the power supply line.

9.5. Vibration Strength

There shall be no sign of malfunction after the following vibration test.
Vibration test: Increase the frequency of the vibration from 12 Hz to 200 Hz at an accelerated velocity of 32.3 m/s^2 (3.3 G) for 10 minutes per cycle. Repeat this for 2 hours in X-direction, 2 hours in Y-direction and 4 hours in Z-direction.

9.6. Drop Impact Strength

There shall be no sign of malfunction after the following drop test.
Drop test: Fix the scan engine in a specific dummy case and drop it 10 times in total, at top, bottom, front, back, left, right, top-left, top-right, bottom-left and bottom-right faces, from a height of 180 cm onto a concrete floor.

10. Regulatory Compliance

LED Safety: IEC 62471-1:2006 Exempt_Group

11. RoHS

The MDC-100 is compliant with RoHS.

RoHS: The restriction of the use of certain hazardous substances in electrical and electronic equipment, 2011/65/EU

12. Reliability

MTBF (Mean Time Between Failures) 100,000 hours

* It is calculated based on standard operation of the product within the recommended temperature range and without extreme electronic or mechanical shock.

13. Precautions

- All work-benches, tools, measuring instruments and any part of human body which have come into contact with MDC-100 must undergo preliminary antistatic treatments.
- Do not touch the optical and electrical components. If the MDC-100 needs to be picked up, hold it on the camera body.
- Avoid handling MDC-100 in a dusty area. In case dust gets on MDC-100, gently blow it off with dry air. Direct contact of swabs and such on its optical part may cause deterioration of its performance.

14. Packaging Specifications

14.1. Packaging

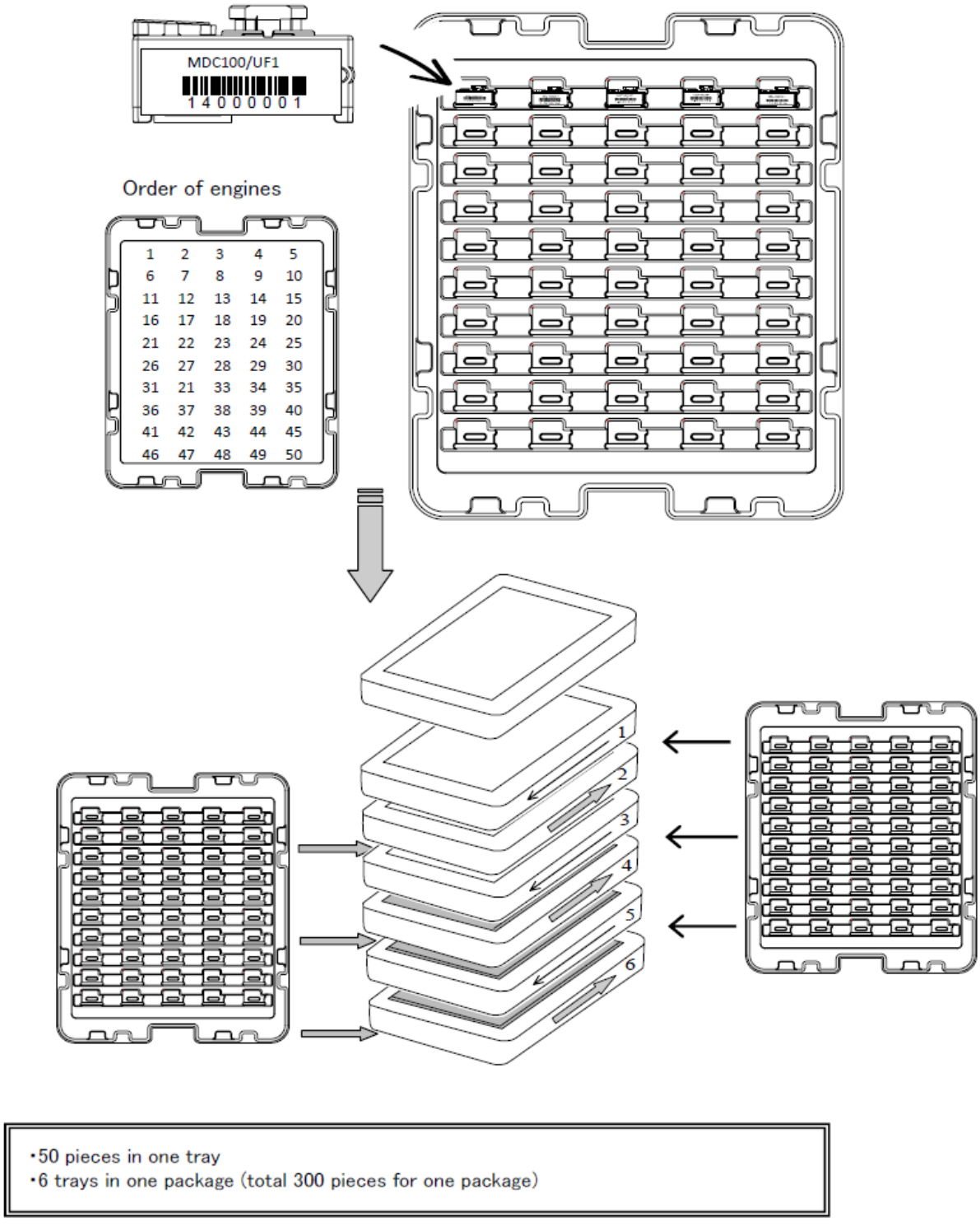
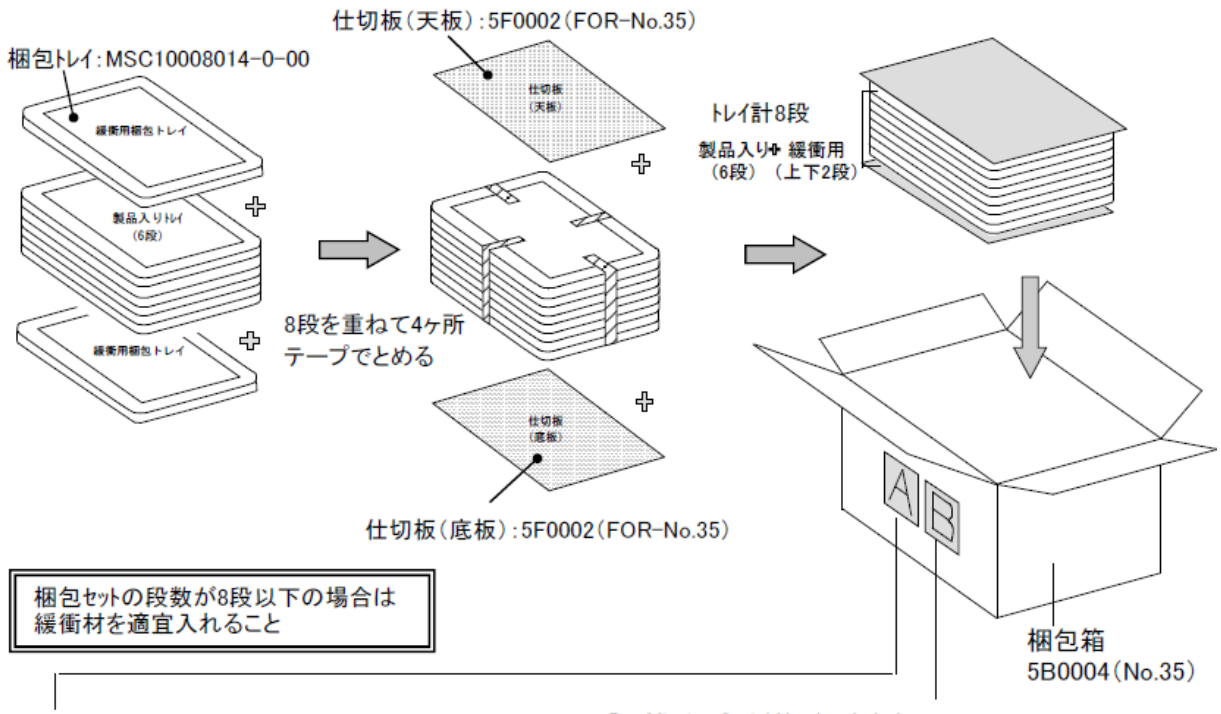


Figure 8: Packaging 1



梱包セットの段数が8段以下の場合は
緩衝材を適宜入れること

A : Barcode Serial Label for Packaging Box:
Stick the labels on both front and back side of the box.

B : Missing Serial Number Label:
Attach this label when there are more than 3 labels of which serial numbers are out of order (not in a correct sequence).

(3C0006)

UNIVERSAL C/No. △△
MADE IN ▲▲▲▲▲
Product MDC-100-CMOS
P0# *△△△△-△△*
Spec#JPN +UF1MDC100C+
Spec#EUR +13349+
Q'ty *△△*
S/N(from) *00000001*
△△/△△△
S/N(to) *000▲▲▲▲▲*
Missing Serial Number Missing Q'ty △
1 *△△△△△△△△△*
2 *△△△△△△△△△*
ROM-Ver. TC06J△△
Shipping Date 20△△/△△/△△
Ro
OPTOELECTRONICS CO.,LTD.

(3C0007)

UNIVERSAL C/No. △△
MADE IN ▲▲▲▲▲
Missing Serial Number Missing Q'ty △△
3 *△△△△△△△△△*
4 *△△△△△△△△△*
5 *△△△△△△△△△*
6 *△△△△△△△△△*
7 *△△△△△△△△△*
8 *△△△△△△△△△*
9 *△△△△△△△△△*
10 *△△△△△△△△△*
11 *△△△△△△△△△*
12 *△△△△△△△△△*
OPTOELECTRONICS CO.,LTD.

【原産国表示】～country of origin～
中国生産（produced in China）＝MADE IN CHINA　日本生産（produced in Japan）＝MADE IN JAPAN

Figure 9: Packaging 2

14.2. Package Size

355 × 290 × 185 (WDH mm)

* ‘Ro mark’ on the trays or boxes for the product indicates that the product is RoHS compliant.

15. Serial Label

The following label with serial number is attached to the product.

Top	: Product name
Middle	: Bar code (Code 128, Resolution 0.2, N/W 2.5)
Bottom	: Serial number

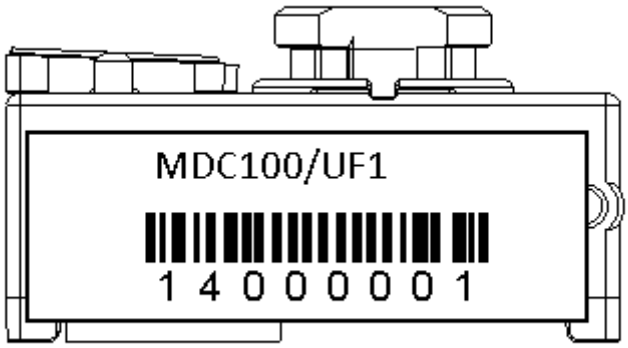


Figure 10: Serial Label

16. Mechanical Drawing

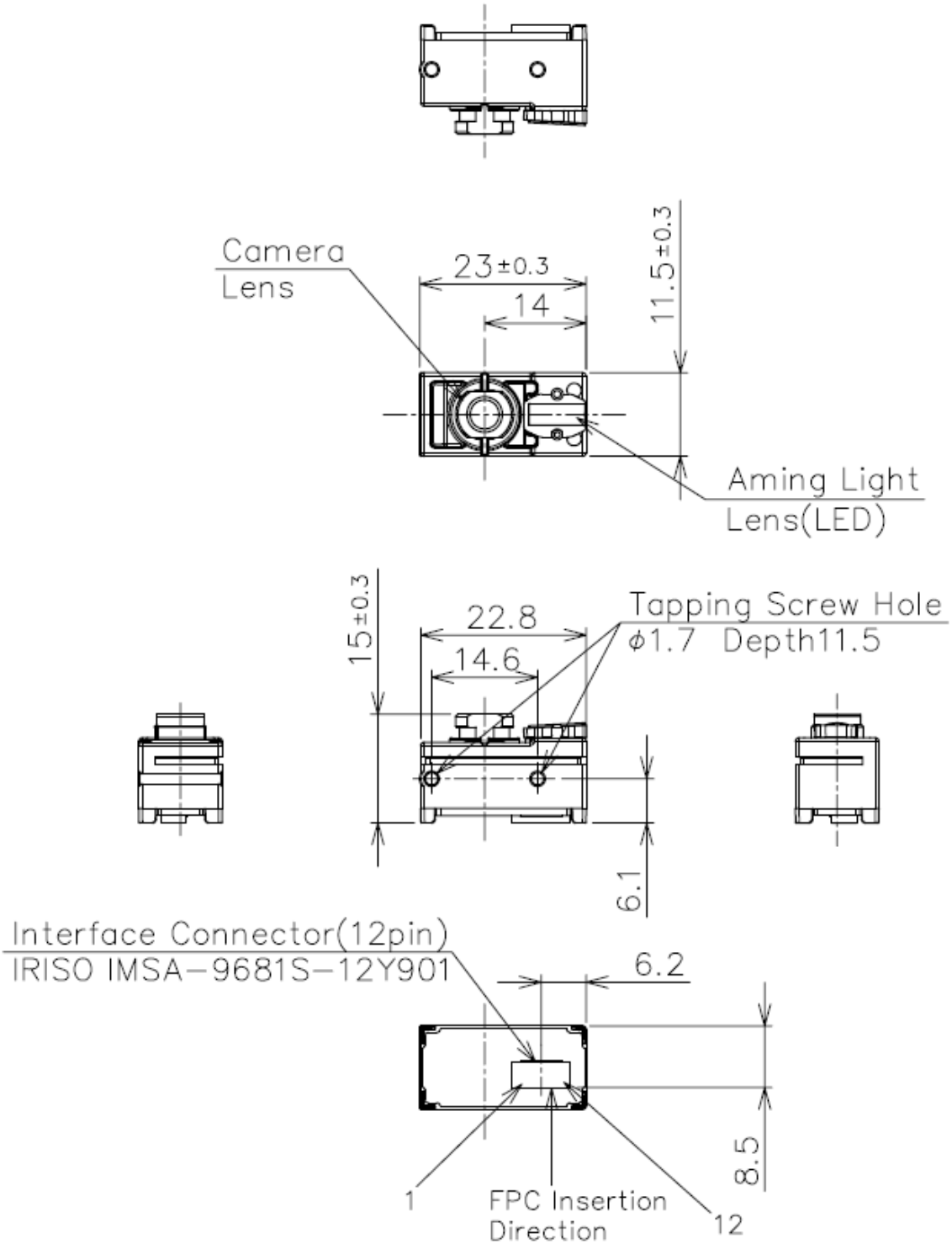


Figure 11: Mechanical Drawing