PRELIMINARY

MDL4000 Provisional Specifications			
Laser Scan Engine			
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Optoelectronics Co., Ltd.
4-12-17 Tsukagoshi
Warabi-shi, Saitama
335-0002 Japan
TEL: +81 (0) 48-446-1183
FAX: +81 (0) 48-446-1184

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Revision	Date	Section	Description of Change
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1. ABSTRACT

This master specification provides specifications of the MDL4000 laser scan engine. But the last specification may be changed because development is on the way for the MDL4000.

2. OVERVIEW

The MDL4000 laser scan engine is a compact laser bar code scan engine which is possible to be installed in various handheld products such as a handy terminal. When scanning a target at the closest point, it has the ability to scan up to 44 mm wide at an angle of 44º. The use of short wave-length red laser beam enhances the visibility when scanning lines. A decoder is built into the MDL4000 and it enables the scan engine to decode the bar codes after scanning and then to output the information in serial communication. The MDL4000 engine complies with the Restriction of Hazardous Substance (hereinafter referred to as “RoHS”).

3. PHYSICAL FEATURES

3.1 Outward Dimensions

W20.4 x D14 x H5.5 (mm)

3.2. Weight

3.9 g (max)

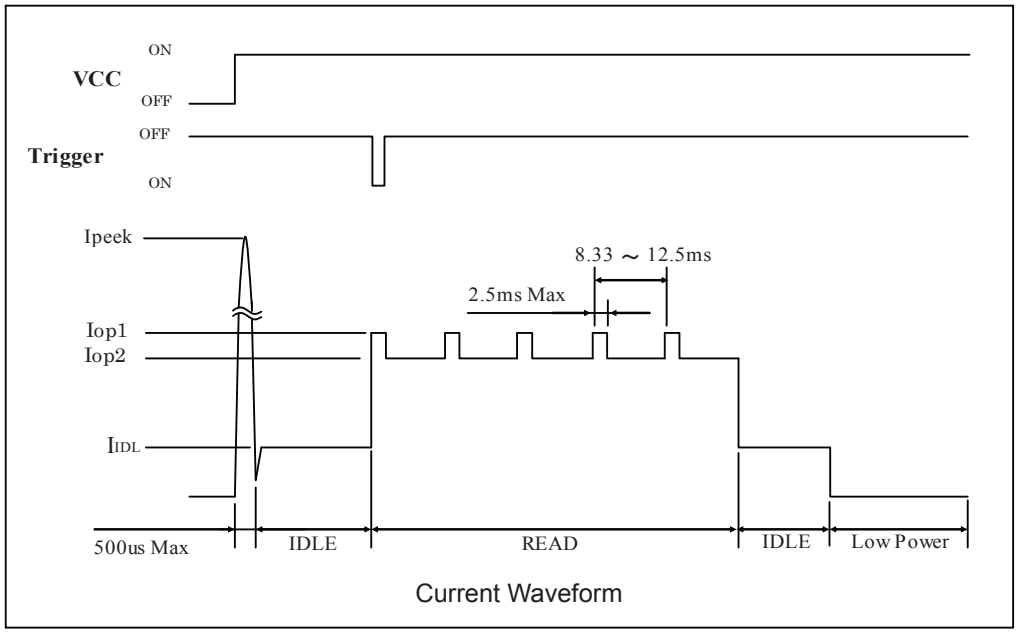
4. ELECTRICAL SPECIFICATIONS

Absolute Maximum Ratings

Item	Symbol	Value	Unit
Power Supply Voltage (V_{CC} to GND)	V_{cc}	3.9	V
Input Voltage	V_1	-0.3～3.9V	V

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

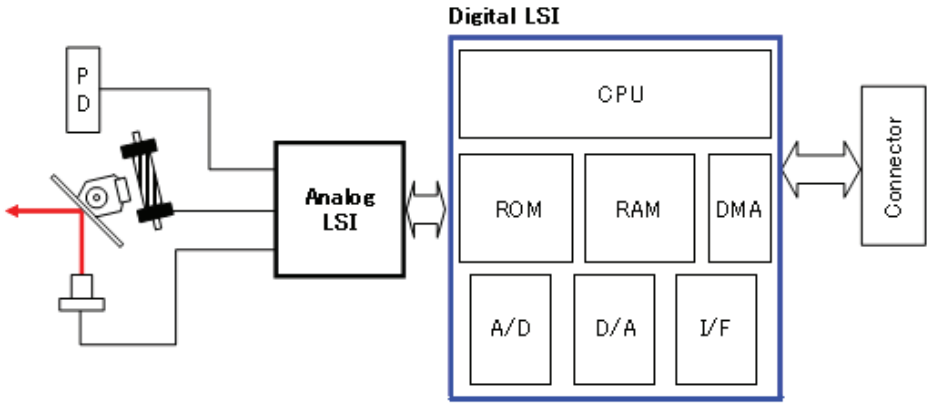
Item		Symbol	Conditions	Min	Typ	Max	Unit
Operating Voltage		V_{CC}		3.1	—	3.6	V
Operating Current 1		I_{OP1}	READ State	—	110	125	mA
Operating Current 2		I_{OP2}	READ State		95	110	mA
Idle Current		IIDL	IDLE State	—	30	40	mA
Aiming Current		I_{AIM}	AIMING State	—	50	65	mA
Low Power Current		I_{LOW}	Low Power State	—	-	500	μA
Rush Current Peak		I_{PEEK}		—	500	1000	mA
Input Voltage	High	V_{IH}		V_{CC} x 0.8	—	—	V
	Low	V_{IL}		—	—	V_{CC} x 0.2	V
Output Voltage	High	V_{OH}	I_{OH} < 4mA	V_{CC}-0.6	—	—	V
	Low	V_{OL}	I_{OL} < 4mA	—	—	0.4	V
Input Current		I_{IN}	VIN＝3.3V	—	—	50	μA
			VIN＝0V	—	—	-10	μA



Current Waveform

5. INTERFACE SPECIFICATIONS

Signal	Pin No.	I/O	Features	
TEST	1	I		
VCC	2	-	Power Supply: DC 3.0V to 3.6V	
GND	3	-	Ground	
Rxd	4	I	Input Serial Data, CMOS Logic Level	
Txd	5	O	Output Serial Data, CMOS Logic Level	
CTS	6	I	Clear to Send, CMOS Logic Level	
RTS	7	O	Request to Send, CMOS Logic Level	
Power Down	8	O	Power Down Output, CMOS Logic Level	High = Low Power State
Buzzer	9	O	Buzzer Control Pulse Output, CMOS Logic Level	Low = Buzzer On
Decode LED	10	O	LED Output, CMOS Logic Level	Low = LED On
Aim/Wake	11	I	Aiming / Wakeup Input, CMOS Logic Level	Low = Aim/Wake
Trigger	12	I	Trigger Input, CMOS Logic Level	Low = Trigger



6. OPTICAL SPECIFICATIONS

Item		Specification	Unit
Light Source		Red Laser Diode	-
Wave Length		655±10 (25℃)	nm
Output Power		＜0.38	mW
Scanning Method		Bi-directional Scanning Method	-
Scanning Speed		100±20	scan/sec
Scanning Angle	54±5	Deg	deg
	44 (Min)	Deg	deg

7. TECHNICAL SPECIFICATIONS

Except as otherwise noted in each section, the conditions for technical specifications are as follows.

Conditions:

Ambient Temperature and Humidity	: Room temperature and room humidity
Ambient Light	: 500 lux to 900 lux (excluding high-frequency lighting)
Background	: Black
Power Supply Voltage	: 3.3 V
Decoding Test	: Approve the performance when decoding is successful in successful in all ten tests.

(Decoding is deemed successful when completed in 0.5 seconds or less.)

7-1. Print Contrast Signal

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

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

7-2. Decode Area and Resolution

Resolution	Symbology	PCS	Range
1.0 mm	Code 39	0.9	70 ~ 250
0.5 mm	Code 39	0.9	50 ~ 250
0.25 mm	Code 39	0.9	50 ~ 200
0.15 mm	Code 39	0.9	50 ~ 130
0.127 mm	Code 39	0.9	60 ~ 110

Bar Code Sample : Optoelectronics Test Sample (N/W ratio = 1:2.5)

Angle : $\alpha = 0° \ \beta = 15° \ \gamma = 0°$

Curvature : $R = \infty$

7-3. Pitch, Skew and Tilt

Pitch Angle $\alpha \leqq \pm 25°$

Skew Angle $\beta \leqq \pm 40°$(Exclude the dead zone)

Dead Zone $\beta \leqq \pm 8°$(There is an area in which decoding fails due to specular reflection)

Tilt Angle $\gamma \leqq \pm 10°$

7-4. Curvature

In case with JAN bar codes with 8 digits, decoding performance is guaranteed when R≧15mm.

In case with JAN bar codes with 13 digits, decoding performance is guaranteed when R≧20mm.

8. ENVIRONMENTAL SPECIFICATIONS

8-1. Temperature

Operation Temperature : T.B.D.

Storage Temperature : T.B.D.

8-2. Humidity

Operating Humidity : 5% to 80% RH (without dew condensation nor gelation)

Storage Humidity : 5% to 85% RH (without dew condensation nor gelation)

8-3. Ambient Light Immunity

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

Incandescent Light : T.B.D.

Fluorescent Light : T.B.D.

Sunlight : T.B.D.

Conditions:

Bar Code Sample : Optoelectronics Test Sample

PCS = 0.9, Resolution = 0.25 mm, Symbology = Code 39,
9 digit bar code, Quiet Zone = 10 mm
N/W Ratio = 1:2.5

Distance : Measured at a point 150 mm away from the exit window

Pitch Angle : $\alpha = 0°$,

Skew Angle : $\beta = 15°$

Tilt Angle : $\gamma = 0°$

Curvature : $R = \infty$

Power Supply Voltage : 3.3 V

Performance is guaranteed unless the direct light or direct reflection from the source falls on the area within which the MDL4000 senses the light.

8.4 Electrical Noise

There was no sign of defects in output signals when sinusoidal electrical noise (50Hz to 100kHz, smaller than 0.1Vp-p) was added to the power supply line.

Conditions :

Bar Code Sample	: Optoelectronics Test Sample PCS = 0.9, Resolution = 0.25 mm, Symbology = Code 39, 9 digit bar code, Quiet Zone = 10 mm N/W Ratio = 1:2.5
Distance	: Measured at a point 150 mm away from the exit window
Pitch Angle	: α = 0°,
Skew Angle	: β = 15°
Tilt Angle	: γ = 0°
Curvature	: R = ∞
Power Supply Voltage	: 3.3 V

9. COMPLIANCE TO LAWS AND STANDARDS

9.1 Laser Safety

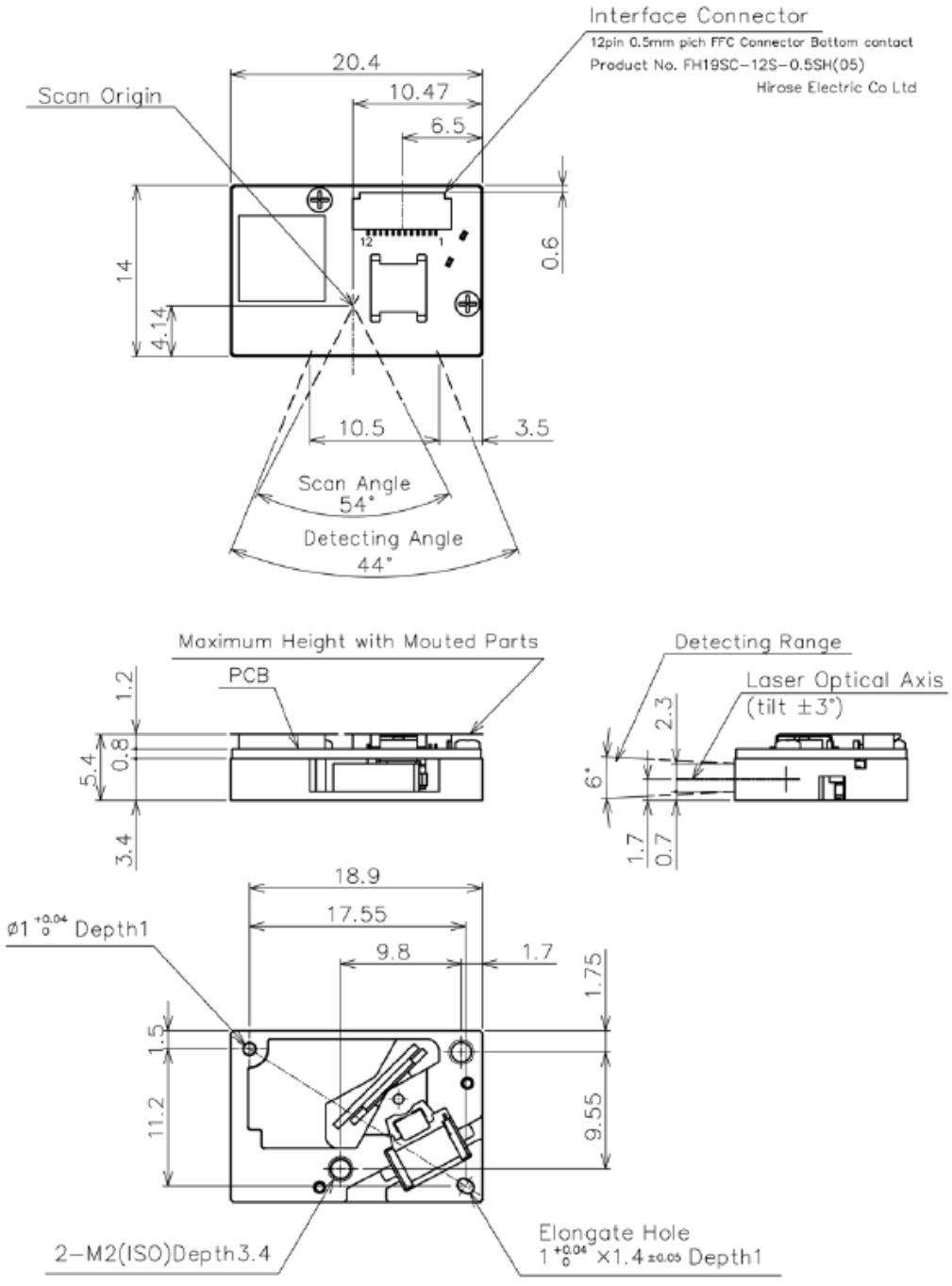
IEC60825-1+A2:2001 Class 1
JIS-C-6802 Class 1

9.2 Compliance to RoHS

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

10. DIAGRAM

MDL-4000 Outline Drawing



11. **NOTE: For the MDL4000 working sample, the following should be noted.**

1. Since the PCB needed modification, a few wires are currently used on the PCB to make a connection.
2. Due to the above modification, the sample cannot enter Low Power mode.
3. When incorporating the module into any metal material surface, it cannot read a barcode normally.