



Laser Distance Module Datasheet

Product Name	CLDM-150mm
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Approval		Notes			
		Preliminary			
CMOS Sensor Inc		QA	PD	Check	Eng
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All specifications of this device are subject to change without notice					

Revision History

Rev.	Date	DCN No	Author	Description
0.1	07/21/2021		Richard	Preliminary
0.2	07/29/2021		Richard	1. Revised system block diagrams 2. Revised product spec.
0.21	10/07/2021		Harbor	Eng version; page 12 – typo “Mini” USB Product name changed to CLDM-150mm
0.22	01/07/2022		Richard	Revised for figures and specs.

CMOS Sensor Inc.

CLDM-150mm

Laser displacement sensors
(triangulation)

1. Introduction

The laser displacement sensor can make use of the high directivity, high mono-chromaticity and high brightness of the laser to realize non-contact measurement. Because of its high measurement accuracy and non-contact measurement characteristics, it is widely used in research institutions and automobiles. Precision measurement and testing in industry, machinery manufacturing industry, electronic and motor manufacturing industry, aviation and military industry, metallurgy and material industry.

The laser displacement sensor can accurately measure without contact the changes in the position and displacement of the measured object, and is mainly used to measure the displacement, thickness, vibration, distance, diameter and other geometric quantities of the detected object.

According to the measurement principle, the principle of the laser displacement sensor is divided into the laser triangulation method and the laser echo analysis method. The laser triangulation method is generally suitable for high-precision and short-distance measurement, while the laser echo analysis method is used For long-distance measurement, this product uses the principle of laser triangulation. The following table 1 is the product line series.

Product name	Distance range
CLDM-150mm	100 mm ~ 200 mm

Table 1: Product line series

1.1 Product Description

CLDM-150mm module (Figure 1) laser displacement sensor is often used to measure physical data such as length, distance, vibration, speed, and orientation.

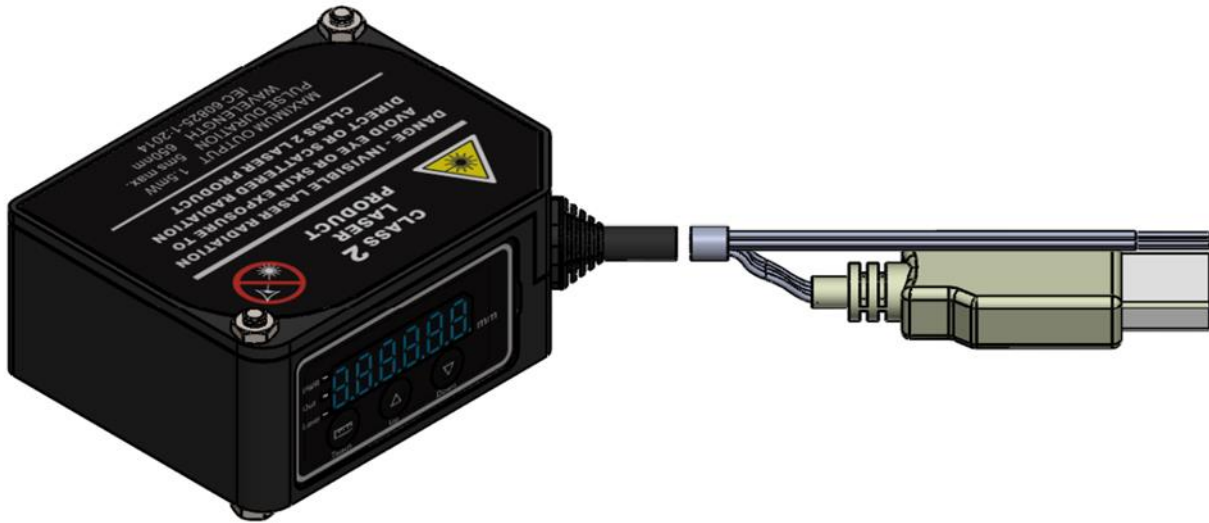


Figure 1. CLDM-150mm module

1) Monitoring and measurement:

Location identification of small parts; monitoring of the presence or absence of parts on the conveyor belt; detection of material overlap and coverage; control of the position of the manipulator (tool center position); detection of device status; detection of device position (through small holes); monitoring of liquid level; thickness measurement; vibration analysis; crash test measurement; automobile related tests, etc.

2) Thickness measurement of metal sheets and thin plates:

The laser displacement sensor measures the thickness of the thin metal sheets (thin plates). Detection of changes in thickness can help find wrinkles, small holes or overlaps to avoid machine failure.

3) Measurement of cylinder barrel:

Angle, length, inner and outer diameter eccentricity, conicity, concentricity and surface profile.

4) Length measurement:

Place the measured component on the conveyor belt at the designated position. The laser displacement sensor detects the component and performs measurement simultaneously with the triggered laser scanner, and finally obtains the length of the component.

5) Uniformity inspection:

Place several laser displacement sensors in a row in the tilt direction of the workpiece to be measured, and directly output the measurement value through one sensor. In addition, you can also use a software to calculate the measurement value and read the result based on the signal or data.

6) Inspection of electronic components:

Use two laser displacement sensors, place the component under test between them, and finally read the data through the sensor to detect the accuracy and completeness of the component size.

7) Inspection of filling level on the production line:

The laser displacement sensor is integrated into the production and manufacturing of the filling product. When the filling product passes the sensor, it can be detected whether it is full or not. The sensor uses the extended program of the reflective surface of the laser beam to accurately identify whether the filling product is qualified and the quantity of the product.

1.2 Scanning system

Figure 2 is the block diagram of the CLDM-150mm scanning system. It is composed of an LDS module, USB interface, WIFI interface, photoelectric encoder, power supply, control board, Laser module, and scanning mechanism. The system can generate up to 1500 per second distance.

Figure 3 is the Structure diagram of the finished product of CLDM-150mm scanning system.

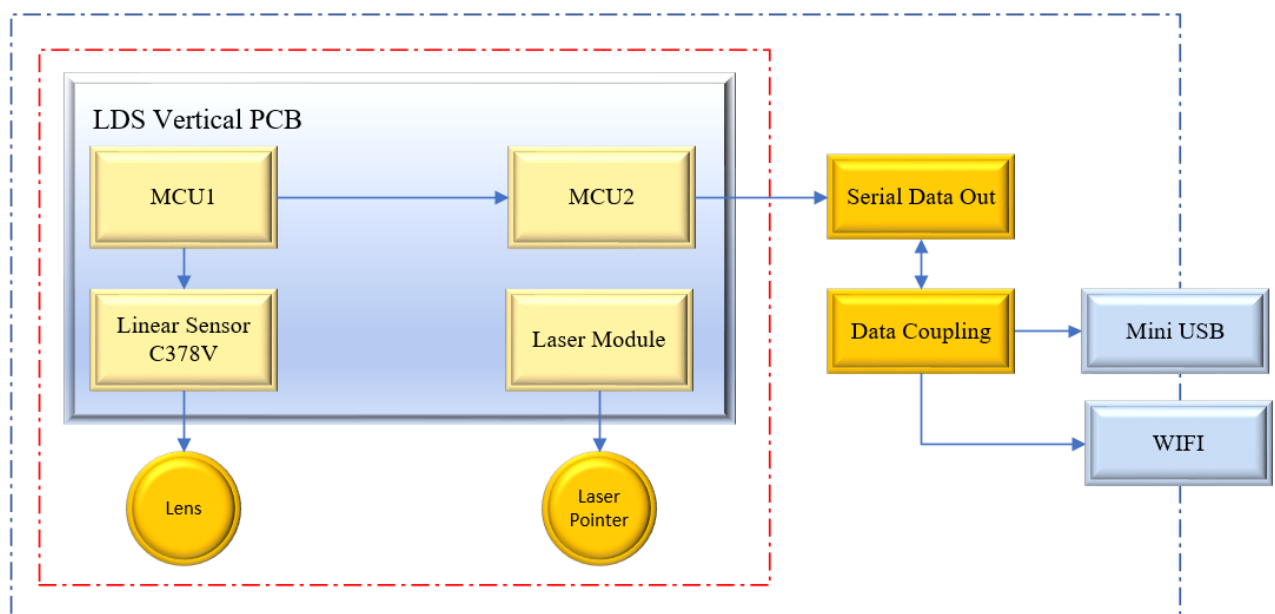


Figure 2. Block diagram of CLDM-150mm scanning system

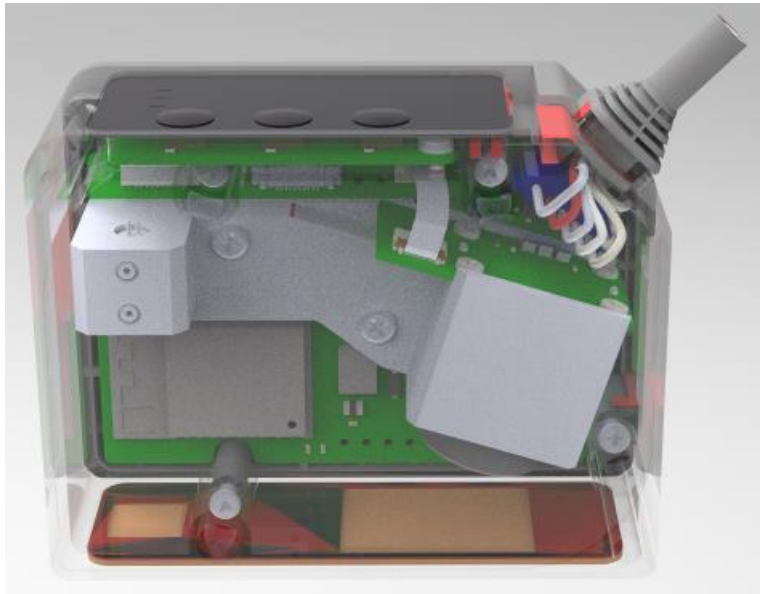


Figure 3. The structure of the CLDM-150mm finished product

1.3 Product features

- Ambient light elimination, suitable for lighting environment/non-lighting environment, indoor environment, strong anti-interference ability.
- The laser power complies with Class 2 laser safety standards.
- The detection distance range is 100 mm ~ 200 mm (support customer customization).
- High-speed ranging, ranging up to 1500 Hz (support customer customization).
- Low power consumption, small size, stable performance and long life.
- The ranging error is small, the ranging stability is good, and the accuracy is high.
- Complete usage data and technical support.
- Connect to the computer through the USB data cable, no additional coding, plug and play.

1.4 Product applications

- Electrical and electronic industries
- Semiconductor and LCD industry
- Food and pharmaceutical industry
- Resin and rubber industry
- Automotive industry

2. Product specifications

2-1 Performance parameters

Item	Spec.	Unit	Remarks
Detection method	Diffuse reflection		
Measurement center distance	150	mm	
Measuring range	± 50	mm	
Repeat accuracy	0.1	mm	
Smallest measured object	1	mm	
Minimum measuring thickness	1	mm	
Sampling frequency	1000 ~ 1500	Hz	
Sampling period	1 ~ 0.66	ms	
Reaction time	2	ms	(Average 1 time)
Linearity	± 0.8%	F.S.	

2-2 Electrical/mechanical parameters

Item	Minimum	Typical	Maximum	Unit	Remarks
Supply voltage	4.75	5.0	5.25	VDC	± 5% (USB)
Operating current	-	250	-	mA	
Dimension	W65 x H50 x D27			mm	
Product weight	THB			g	
Shell protection grade	IP65				
Connection method *1	Cable Ø5 x 1M / 28AWG PCB BLACK / USB + 6 Wires (VDC+ , VDC- , NPN , PNP)				
Material	Core: plastic (ABC+PC) Housing: plastic (ABC+PC) Front cover: Optical PMMA				

*1 **VDC+ = DC5V 5mA Output**

VDC+ = max DC24V 50mA Input

2-3 Laser parameters

Item	Minimum	Typical	Maximum	Unit	Remarks
Laser wavelength	-	650	-	nm	Red semiconductor laser (visible light)
Laser power	-	-	1	mW	Peak power
Laser safety level	-	IEC-60825 Class 2	-	-	
Light spot diameter		1		mm	

*Note 1: The laser power is the continuous luminous power, the actual average power will be much lower than this value.

2-4 Other parameters

Item	Minimum	Typical	Maximum	Unit	Remarks
Operating temperature	-10	-	+50	°C	No condensation or icing
Operating humidity	35		85	%RH	
Storage temperature	-20	-	+60	°C	No condensation and freezing
Storage humidity	35		85	%RH	No condensation
Optical lens	-	Size: 1/2.5 inch F: 16 mm	-	-	
Interface	Mini USB or WIFI (option)			-	
Control output	Open collector (NPN / PNP). Maximum 50 mA / 24V or below / 5V can be built-in				
Service life	-	10000	-	Hour	
Ambient brightness	-	7500	-	Lux	Incandescent
Vibration	10 to 55 Hz, composite amplitude 1.5mm X, Y, Z axis each 2 hours				

3. UI control display interface

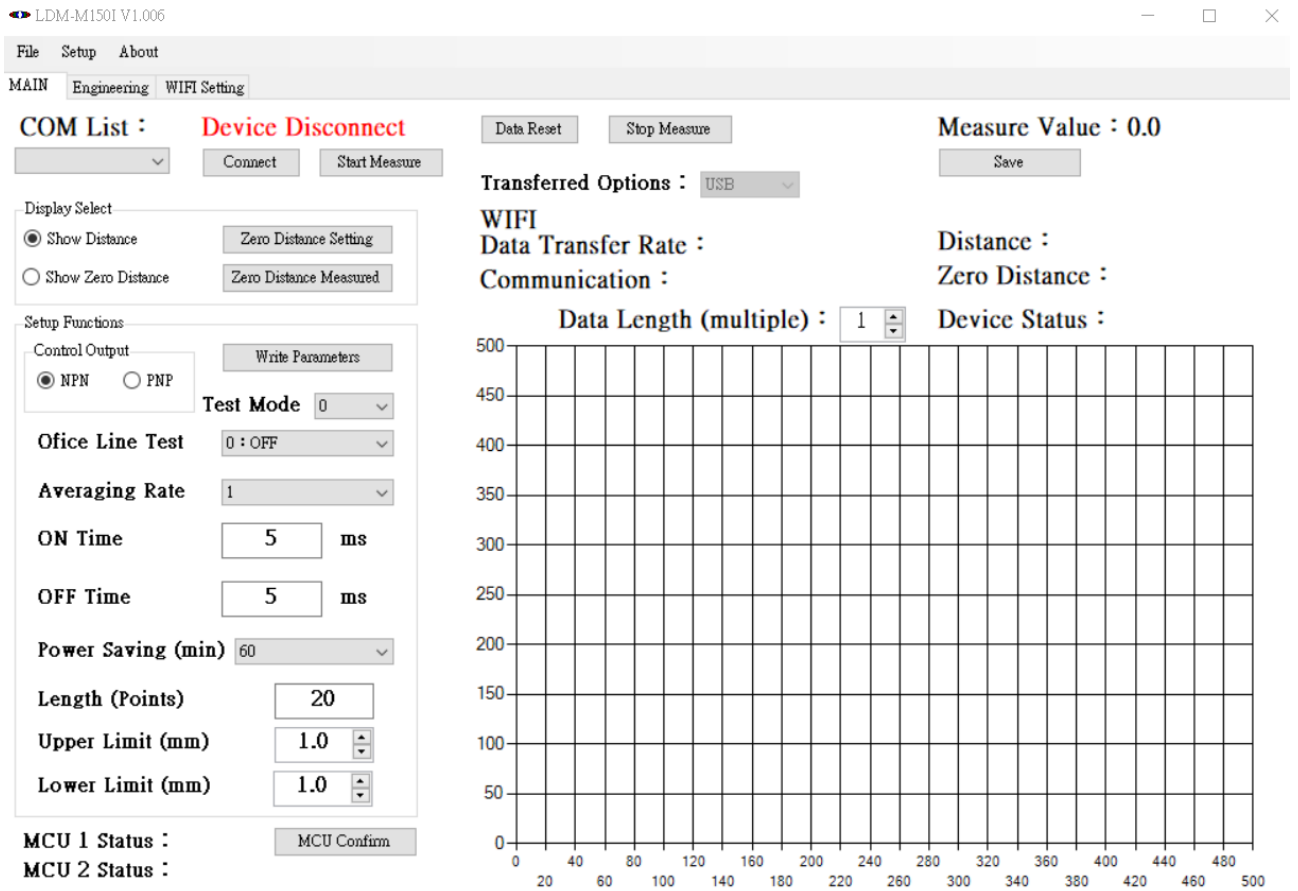
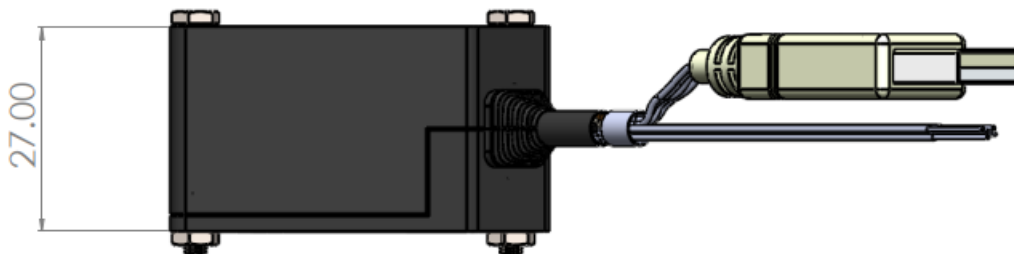
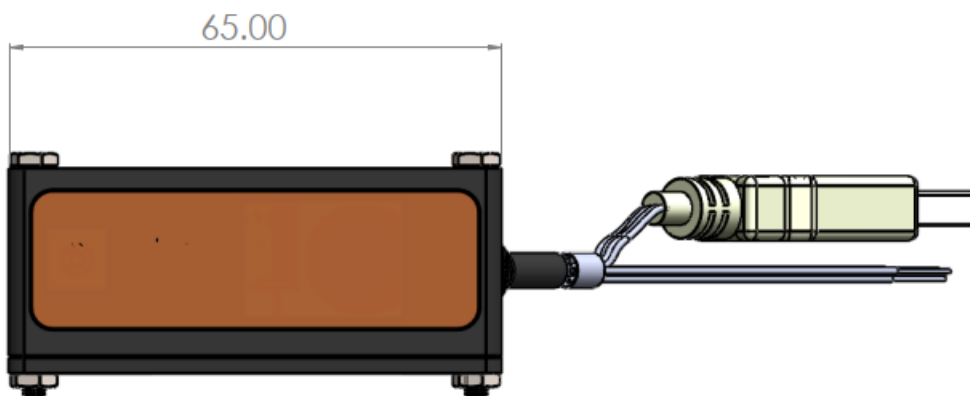
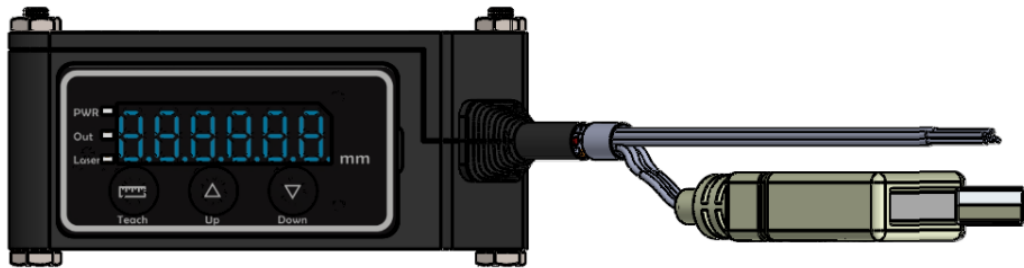


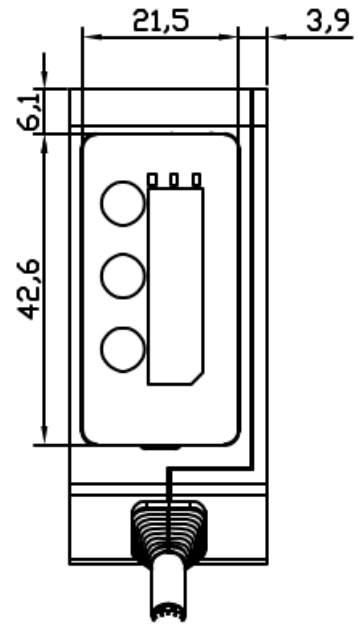
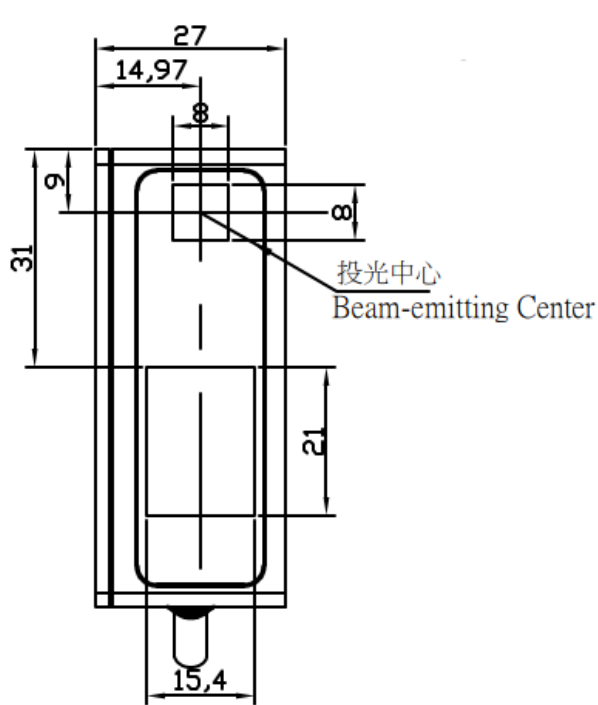
Figure 4. UI control display interface diagram

4. Product structure size

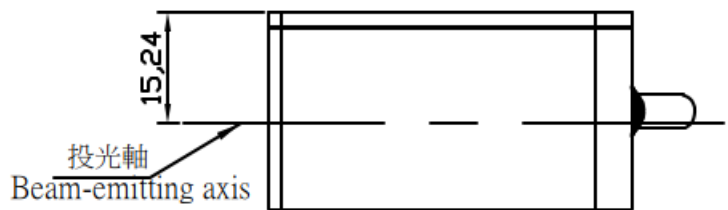
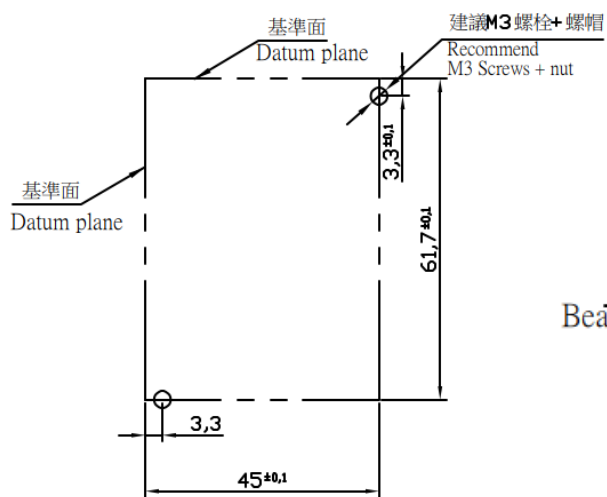
CLDM-150mm product size

Dimensions unit: mm





Mounting hole Distance



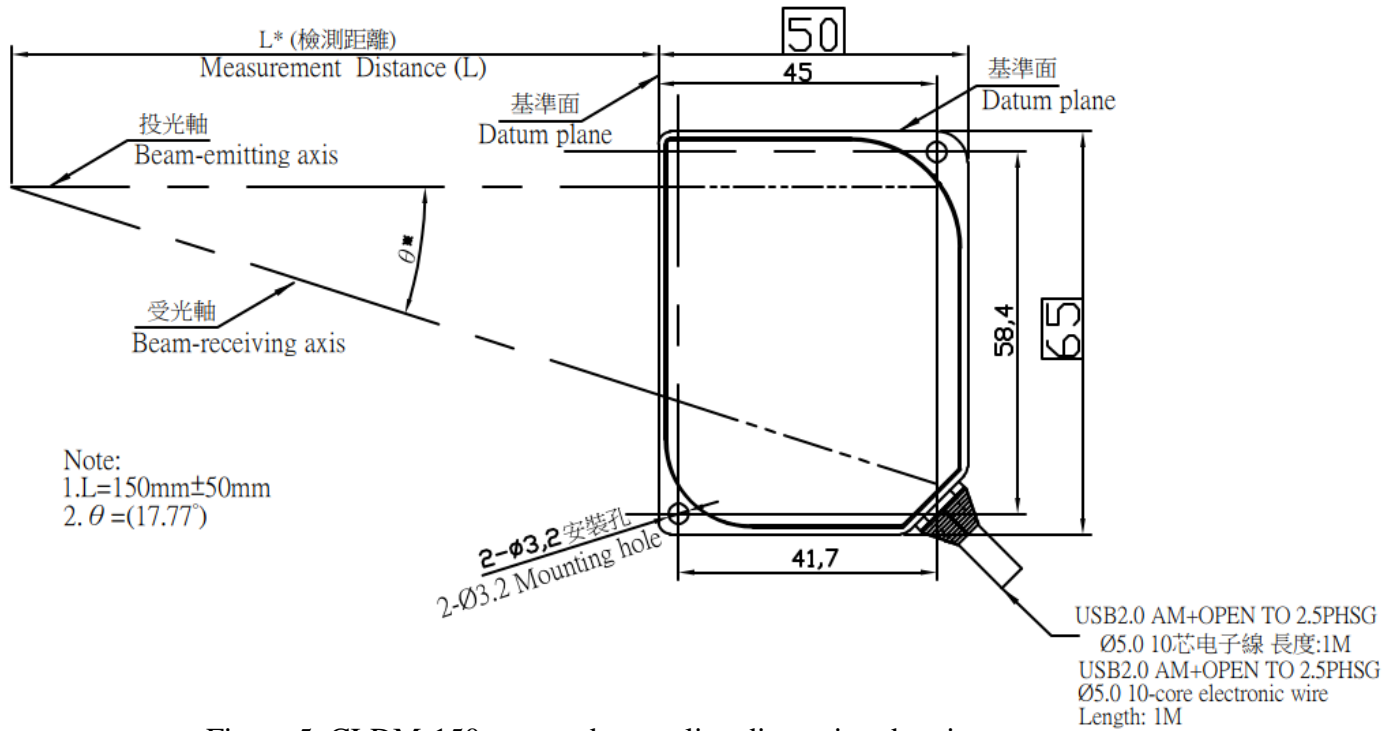


Figure 5. CLDM-150mm product outline dimension drawing

5. Output connection definition

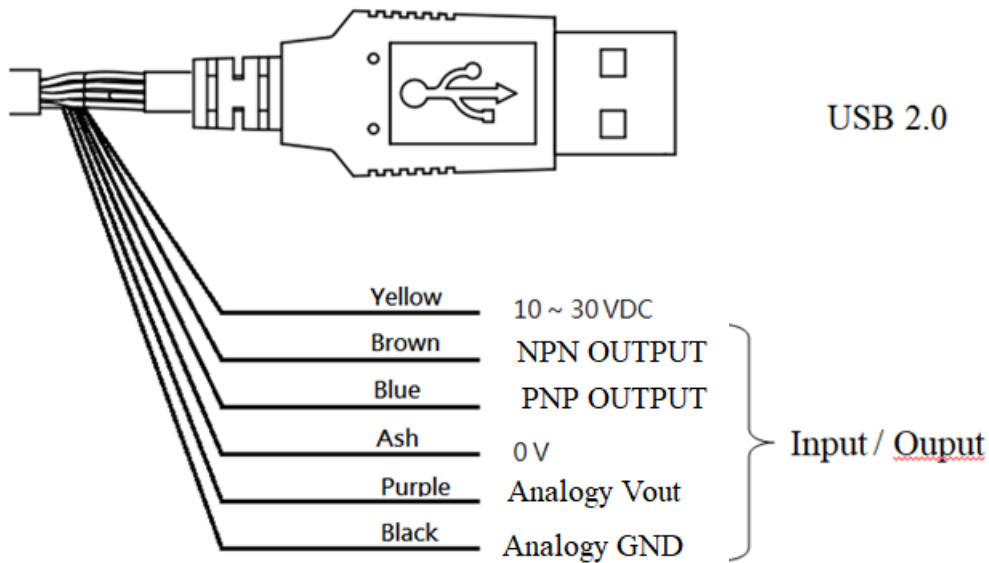
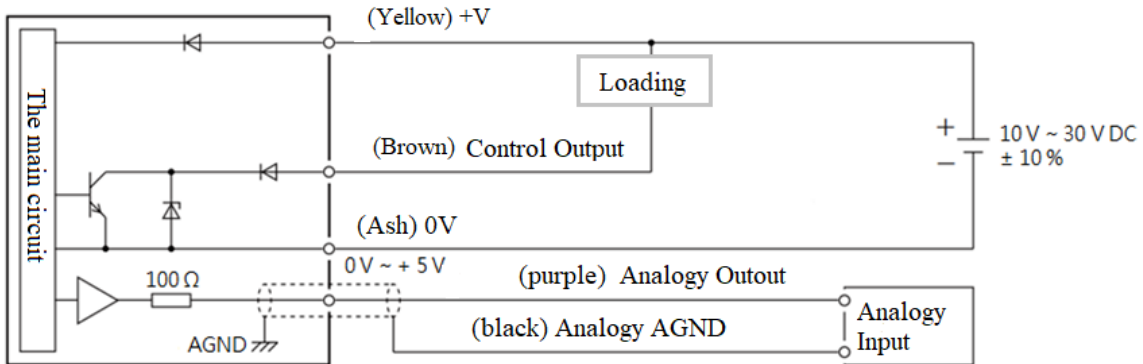


Figure 6. Output connection definition diagram

6. Circuit diagram

When NPN output is selected;



When PNP output is selected

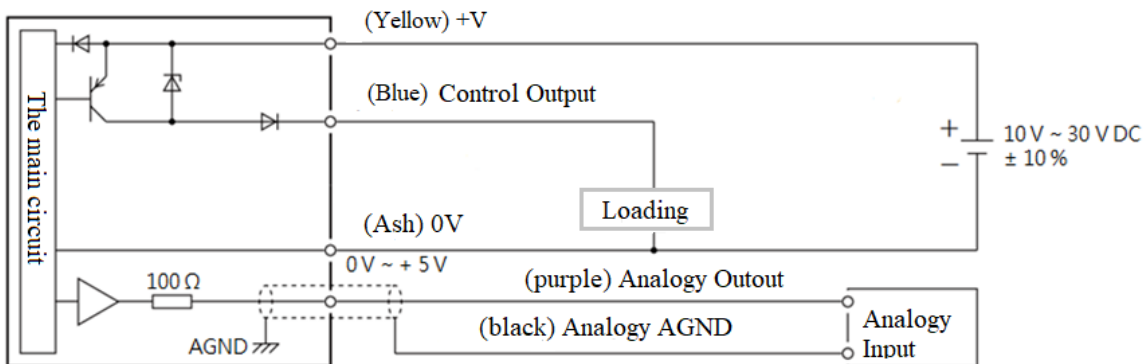


Figure 7. Input and output circuit diagram

Appendix 1:

Reaction time

The reaction time refers to the time from the sensor detecting the change of the target to the output of the result.

(ms)

Sampling period	Average times						
	1	2	4	8	16	32	64
1 ms	2	2	4	8	16	32	64

(ms)

Sampling period	Average times					
	128	256	512	1024	2048	4096
1 ms	128	256	512	1024	2048	4096

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