M1C1_Mini
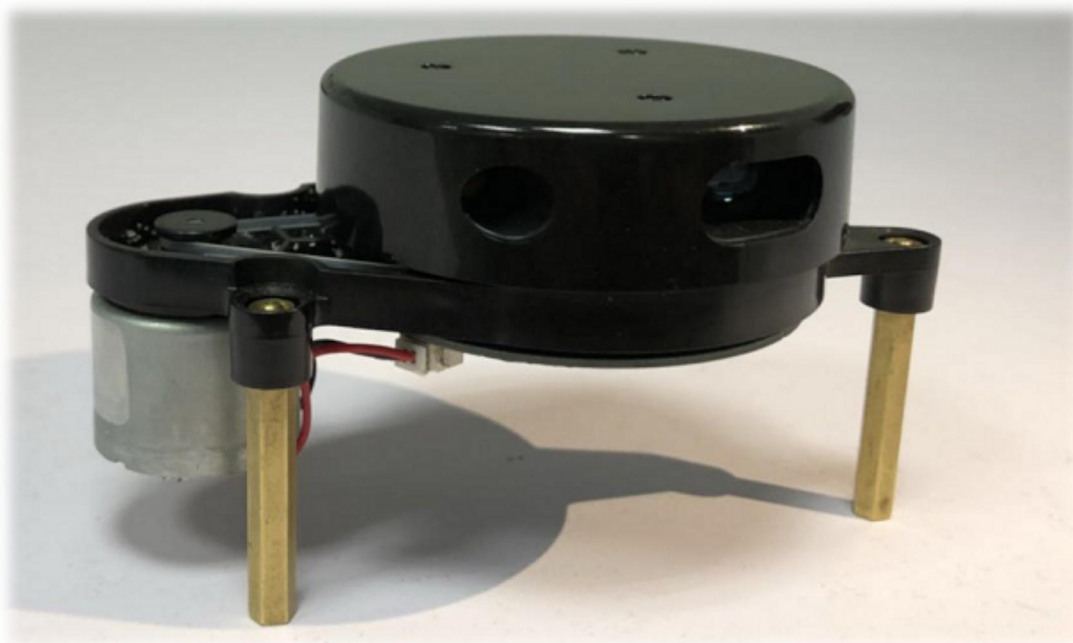# 360° 2D scanning LiDAR specification


Version 1.0

China Science Photon Chip (Haining) Technology Co., Ltd

M1C1_Mini Specification

General instruction:

M Series mechanical LiDAR include single and multi-lines products. M1C1_Mini is a single-line 360° 2D scanning LiDAR base on Triangulation method and equipped with relevant optics, electrical and algorithm design to achieve high-frequency and high-precision distance measurement. It can generate corresponding spatial points cloud information in the range of 0.10~8.0m, it is suitable mapping, intelligent equipment obstacle avoidance, robot autonomous positioning navigation, etc.
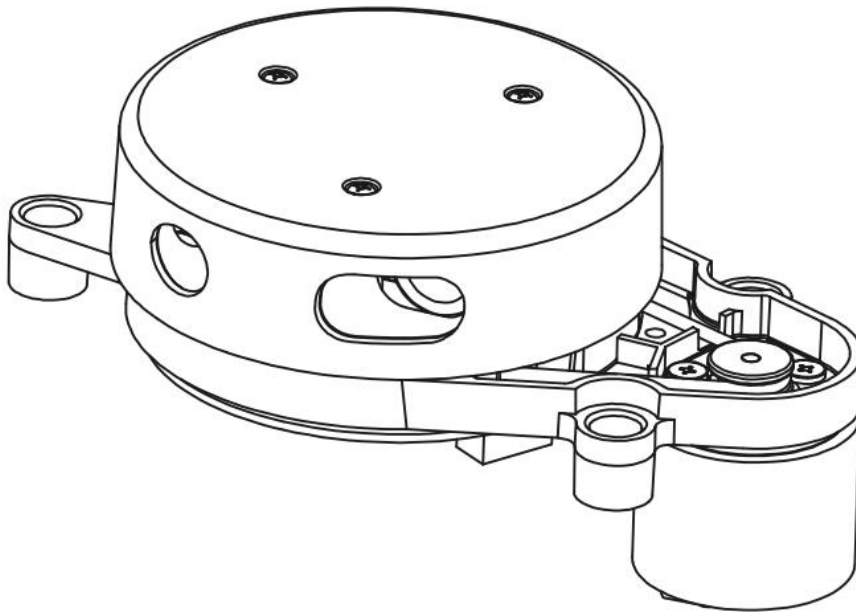

Product key features:

- 360° omnidirectional scanning distance measurement
- Triangulation ranging principle
- The measuring range >6m, actual Max distance is up to 8m
- High frequency scanning with an angular resolution of 0.93°
- High precision detection accuracy to meet robot vision requirements
- Excellent performance in various indoor environments
- Small size, low power consumption, stable performance and long life cycle
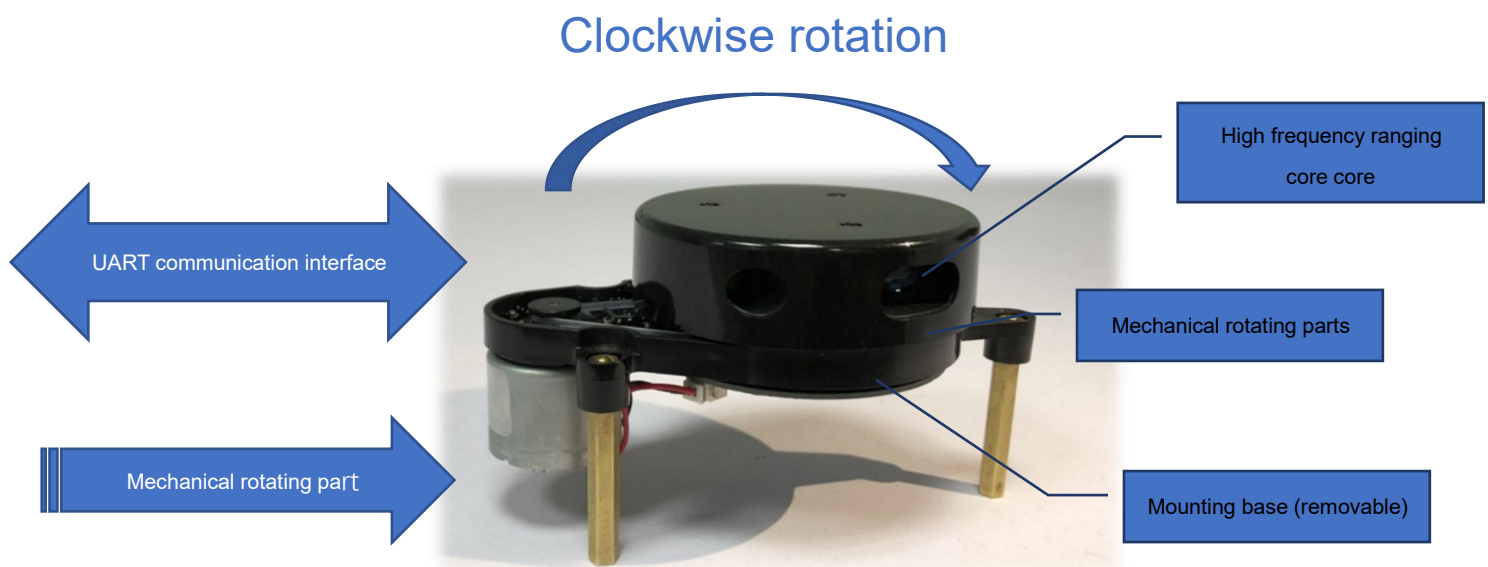
Main specification:

Item	Parameter
Light source	Laser@780nm, Class1
Working principle	Triangulation
Detection distance	0.10~8.0m@90%
Measurement accuracy	mm level@ < 1m; 2%@1m-6m
Field of view	360° horizontal
Angle resolution	≈0.93°
Measuring frequency	3860points/s (default)
Rotating speed	10Hz
Power consumption	Typ. 1.0W
Operating Voltage	5V
Dimensions	L100.95 * W60.50 * H45.30mm
Weight	98 g
Communication Interface	UART serial port
Signal format	Angle, distance, etc.

Appearance dimension (mm):
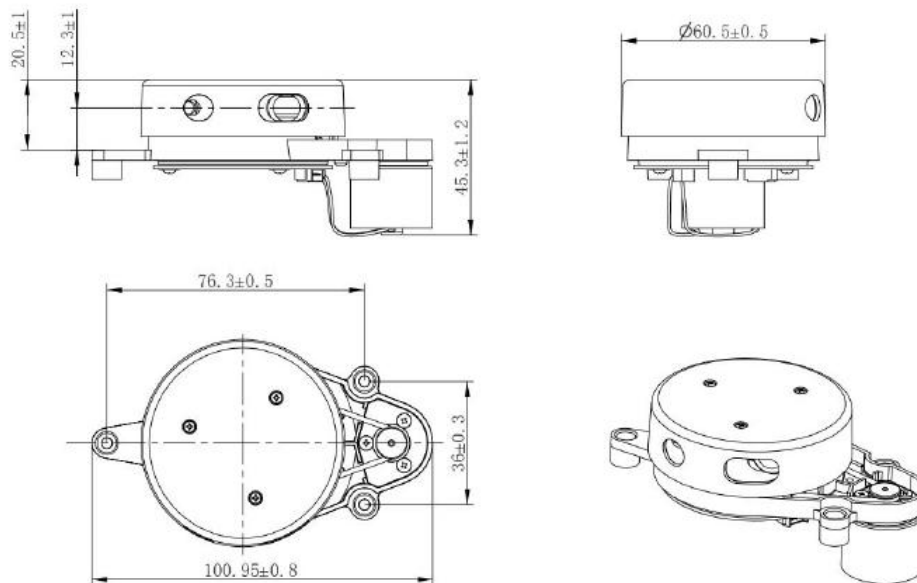
Component connection:

M1CT_Mini adopts Triangulation ranging principle, which is mainly composed of high frequency ranging core and rotating sub-system. The external power supply is 5V DC. The rotating sub-system controls the scanning frequency by changing the PWM. The signal line of the ranging core can be directly connected to the UART port of the FPGA/DSP/ARM/MCU, and no chip conversion such as RS232 or 422 is required. After the system power on correctly, the user can obtain the ranging data of the high-frequency ranging core scan through the UART serial port.

Clockwise rotation

UART communication interface

Mechanical rotating part

High frequency ranging core core

Mechanical rotating parts

Mounting base (removable)

The M1C1_Mini LiDAR has its own speed detection function to detect speed and adjust motor speed by itself to ensure the LiDAR working smoothly according to the established speed without complicated command control and data processing modules, which can reduce the customer cost.

Communication Interface:

The M1C1_Mini standard configuration uses a 5V level UART serial port as the communication interface. The following table shows the specification information based on the UART serial interface. If such as SDK adtain, detailed communication protocol, and parameter customization information are requested, please contact CSPC Technology Support for the details.
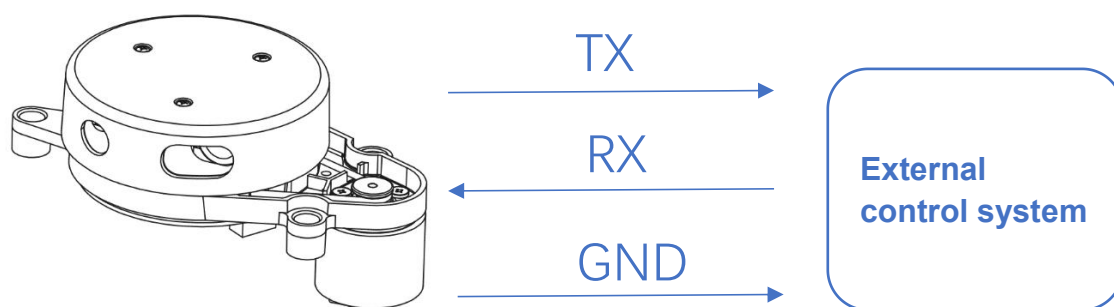

ITEM	UNIT	MIN	TYPICAL	MAX	COMMENTS
Band rate	bps	-	115200	-	Sampling frequency
Working mode	-	-	8N1	-	
Output high voltage	V	2.9	-	3.3	Logic High
Output low voltage	V	-	-	0.4	Logic Low
Input high voltage	V	1.6	-	5.2	Logic High
Input low voltage	V	-0.3	-	1.17	Logic Low

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Data message format:

When M1C1_Mini works, each group of sampled data is output through the communication interface with the uniform message format. If detailed communication protocols and data packet formats are requested, please contact with CSPC Technical Support for the details.

| Data Type	Unit	Description
Distance	mm	The actual distance between LIDAR and the current sampling point
Heading	degree	The angle of the current sampling point relative to the LIDAR reference orientation
Start Flag	(Boolean)	Indicates whether the current sampling point belongs to a new scan
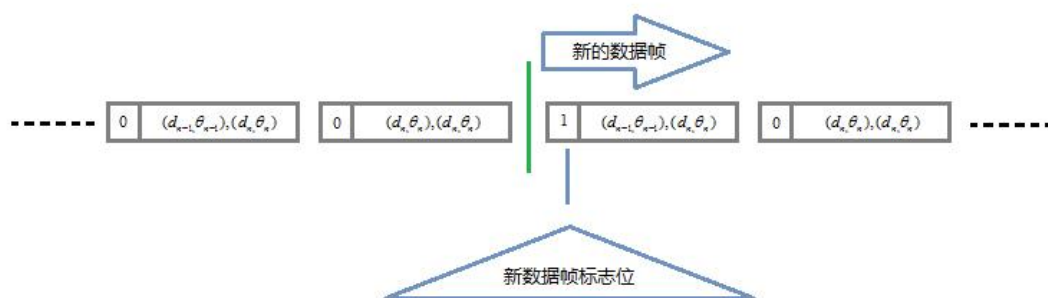
The M1C1_Mini measurement data output base on above message format, and the external system can control it by instruction of request, stop, etc., or configure output data format. Please contact CSPC Technology Support for details if any questions.

Power supply information and Speed control:

M1C1_Mini adopts external 5V DC power supply to drive the mechanical rotation module, and uses electromagnetic conversion to supply power wirelessly to the ranging module. The external DC power supply is simple and safe.

The figure below shows the recommended power supply mode. Please refer to the table below for specific specifications.
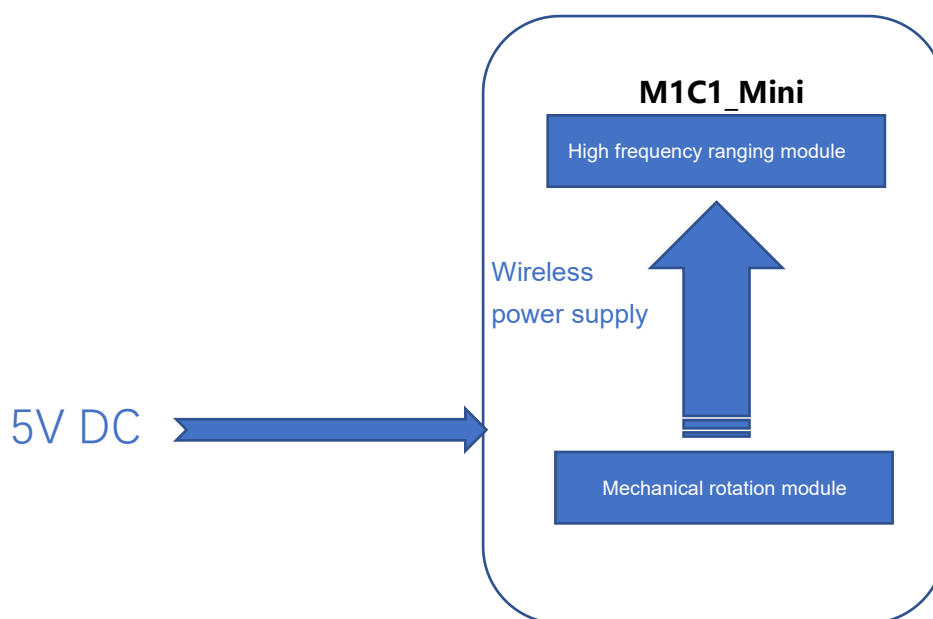
ITEM	UNIT	MIN	TYP	MAX	REMARK
System supply voltage	voltage（V）	-	5	-	Recommended to use the power supply with a ripple of less than 300mV
Peak current	mA	-	500	-	Peak current request to guarantee 0.5A to stabilize the system operation
Motor voltage	voltage（V）	1.5	2.2	3.3	
System operating current	mA	150	200	300	@5V

Safety and Product protection:

The M1C1_Mini LiDAR uses a low-power infrared laser as the emission source and is driven by a modulated pulse. The laser emission unit emits laser light only when the system is rotating at a high speed with the CLASS 1 level laser safety standard to ensures the safety of humans and pets. In order to avoid sudden changes in laser power caused by external collisions and abnormal conditions at work, and to ensure that the laser power output is always within the safe output range of <1mW, we designed the product protection module function to shut down the laser output, stop scanning and measuring when the following fault occurs to avoid damage to itself and the outside world:

● Laser transmit power exceeds the threshold

● Laser does not work

● The high frequency ranging core is not working properly.

● Radar scan speed is too low (3Hz below the threshold)

● Motor speed is unstable

Development tools and Support:

CSPC provides customers the SDK development kit for M1C1_Mini, which can process scanned data in real time and display it as the image. The SDK development kit provides users a convenience tool of familiarity with the products to shorten the project development cycle.