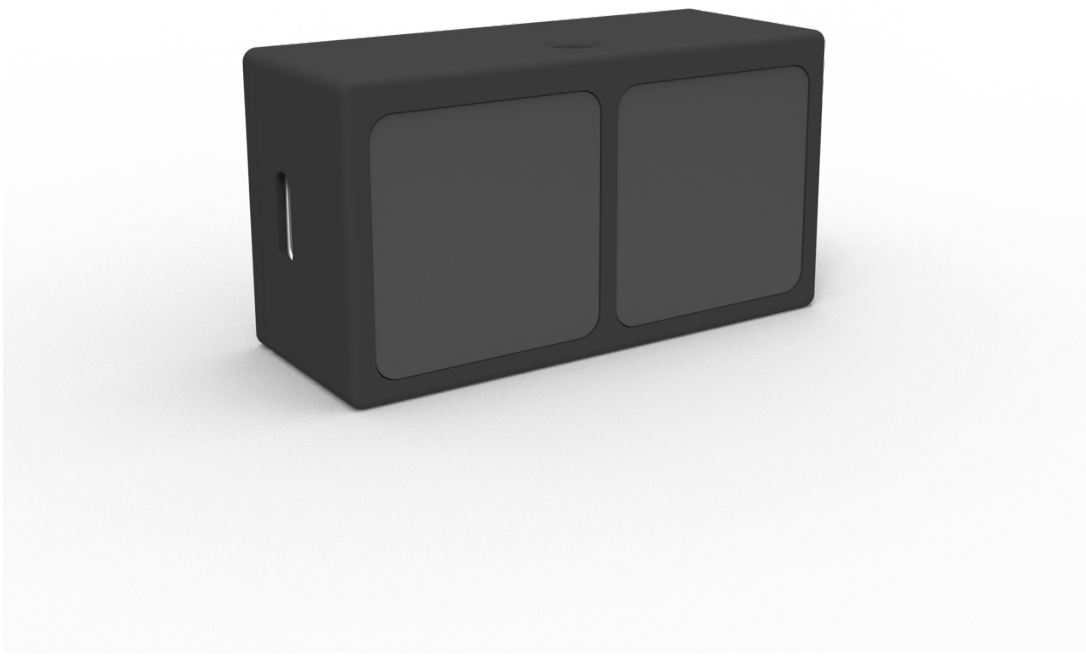
DFR1177 Product Manual



1 Product Overview

The MMPT044-940 is a solid-state Lidar developed by Alpha Cen. This device utilizes continuous wave Time of Flight (cwToF) technology, along with suitable optical and electrical designs, to measure distance with wide-angle coverage and exceptional accuracy. The product supports communication via UART and USB 2.0, allowing users to export depth images and infrared grayscale images.

2 Product Features

- Wide Field of View (FoV) 108°×41°
- Long Distance Measurement
  - 4.5m @ whiteboard with 90% reflectance
- Distance Measurement Accuracy
  - <= ±3cm，ranging from 0.1 to 3m
  - <= ±1%，ranging from 3m to 4.5m
- Horizontal Resolution 0.675° & Vertical Resolution 0.683°
- Frame Rate up to 15fps
- Multiple image formats are supported
  - Depth images
  - Infrared grayscale images
- Power Saving Mode & Operating Mode
  - Max 0.5mW standby power consumption in power saving mode
  - Max 1.5W operating power consumption in operating mode
- Multiple communication Interfaces
  - UART Communication, 10Mbps
  - USB 2.0 Full Speed,12Mbps

- Natural cooling
- Small size 61mm * 33mm * 24mm (L * W * H)
- Operating temperature from -20 ˚C to 60 ˚C
- Storage temperature from -40 ˚C to 85 ˚C

3 Applications

- Mobile Robots
- Industrial Automation
- Area Security

4 Application Information

4.1 System Field of View (FoV)

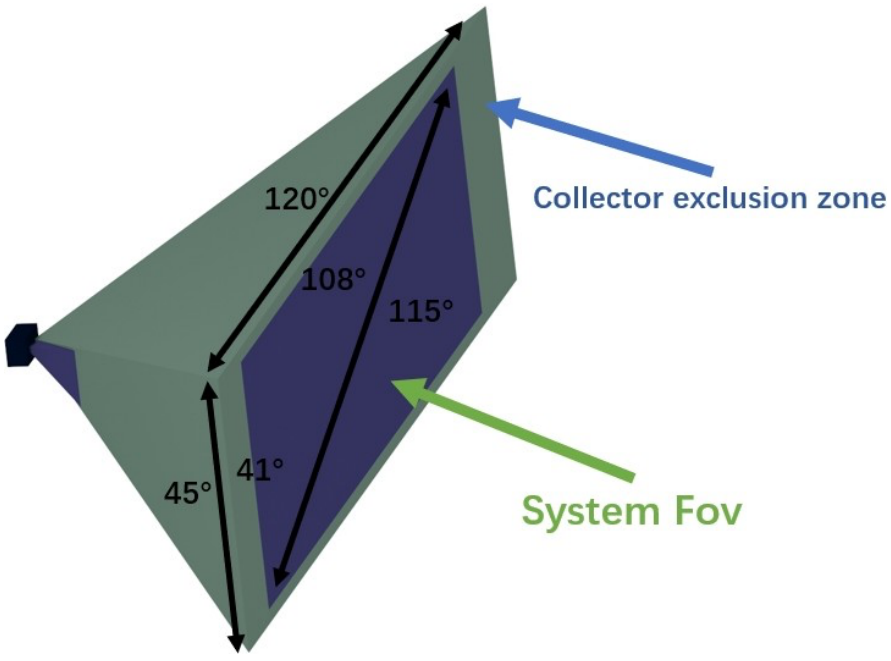


Figure 4-1: MMPT044-940 System FoV

4.2 Specification Parameter

Parameter	Min	Type	Max	Units	Notes
Measurement Range	0.1		4.5	m	Whiteboard with 90% reflectance
Distance Measurement Accuracy	-3		3	cm	0.1m~3m
	-1		1	%	3m~4.5m
Frame Rate			15	fps	
Horizontal FoV			108	°	
Vertical FoV			41	°	
Horizontal Resolution		0.675		°	
Vertical Resolution		0.683		°	
Operating Temperature Range	-20		60	˚C	
Storage Temperature Range	-40		85	˚C	
Eye Safety Certification	IEC60825 Class 1				
Waterproof & Dustproof	IP54				Tested in labs
Ambient-light Tolerance			60	KLux	

4.3 Electrical & Mechanical Parameters

Parameter	Min	Type	Max	Units	Notes
Input Voltage	4.75	5	5.25	V	
Input Current			100	uA	In power saving mode
Input Average Current			0.26	A	In operating mode, t_{int}=0.8ms, 15fps
Input Average Current			0.32	A	In operating mode, t_{int}=1.6ms, 15fps
Input Peak Current			3	A	In operating mode, t_{int}=1.6ms, 15fps
ESD Protection	Air Discharge: +-10kV Contact Discharge: +-8kV				Refer to IEC61000-4-2
Communication Interface	Support 3.3V UART Communication				
	Support USB2.0 Full Speed Communication				
Size	61mm * 33mm * 24mm (L * W * H)				
Cooling Method	Natural Cooling				

4.4 Emitter Parameter

Parameter	Min	Type	Max	Units	Notes
Emitter Wavelength	934	940	946	nm	50˚C Temperature Condition
Wavelength Variation with Temperature		0.07		mm/˚C	-40˚C~105˚C
Operating Temperature	-20	50	85	˚C	

4.5 Sensor Parameter

Parameter	Min	Type	Max	Units	Notes
Pixel-Field	160 * 60 pixel-field				
Operating Temperature	-20	50	85	˚C	

4.6 Data Communication

4.6.1 UART Communication

This product can be easily connected to an external system via its physical ports using 3.3V level serial port (UART) communication. By adhering to the system's communication protocol, users can access real-time scan depth data, device details, and status, as well as configure the operating mode of the device, among other functions. Communication parameters details are as follows:

Parameter	Min	Type	Max	Units	Notes
Baud Rate		10		Mbps	
VIH	0.7*VDD			V	
VIL			0.3*VDD	V	
VOH	2.8		3.6	V	
VOL			0.3	V	

4.6.2 USB 2.0 Communication

This product can connect with an external system by its built-in physical interface based on USB 2.0 full-speed communication. Once connected, users can get access to its real-time scan depth data, device information, and status. Additionally, the product supports operating mode configuration. The communication parameters table is down below:

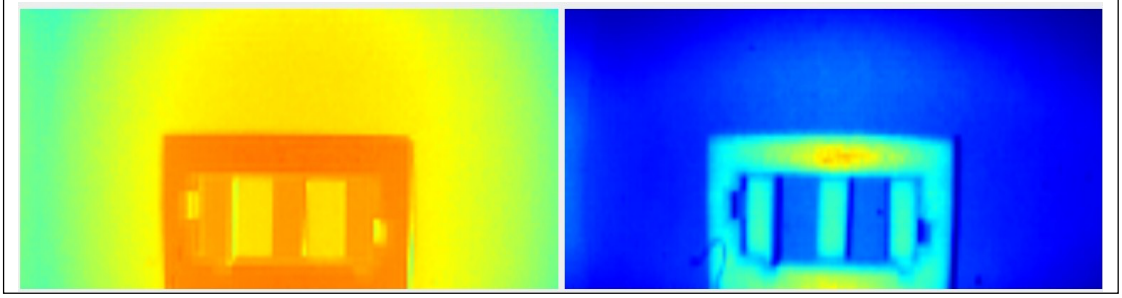
Parameter	Min	Type	Max	Units	Notes
Baud Rate		12		Mbps	
Differential VIH	0.3		2.8	V	D+>2.8V, D-<0.3V
Differential VIL	0.3		2.8	V	D->2.8V, D+<0.3V
VOH	2.8		3.6	V	RL=1.5kohm
VOL			0.3	V	RL=1.5kohm

4.7 Object Recognition Notification

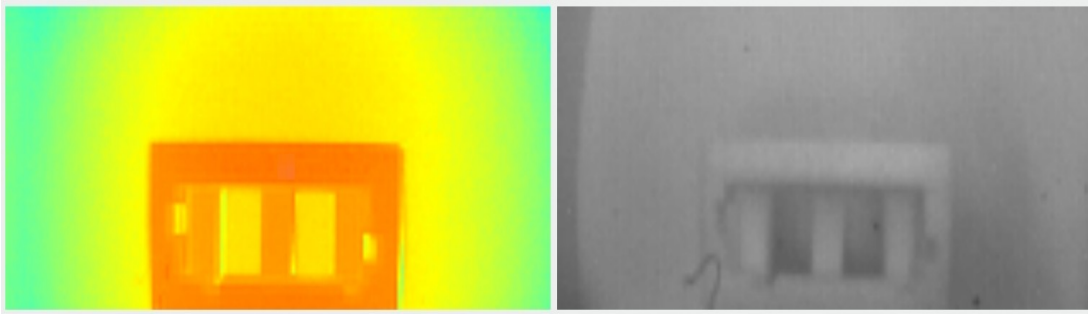
4.7.1 Recognition of Holes

For the target object with a hole, the product will provide different distance information from the target object without a hole. In the no-hole area, the accurate distance information can be calculated; on the other side, the distance in the hole area will be longer due to the longer flying time of the reflection light.

Distance Image + Amplitude Image



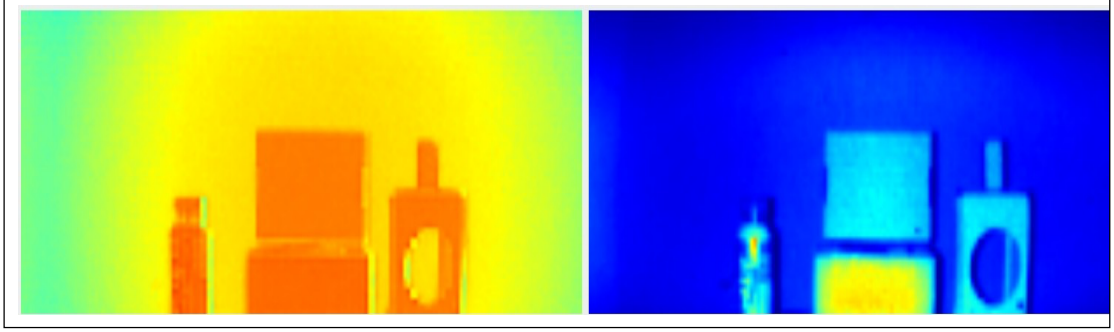
Distance Image + Grayscale Image



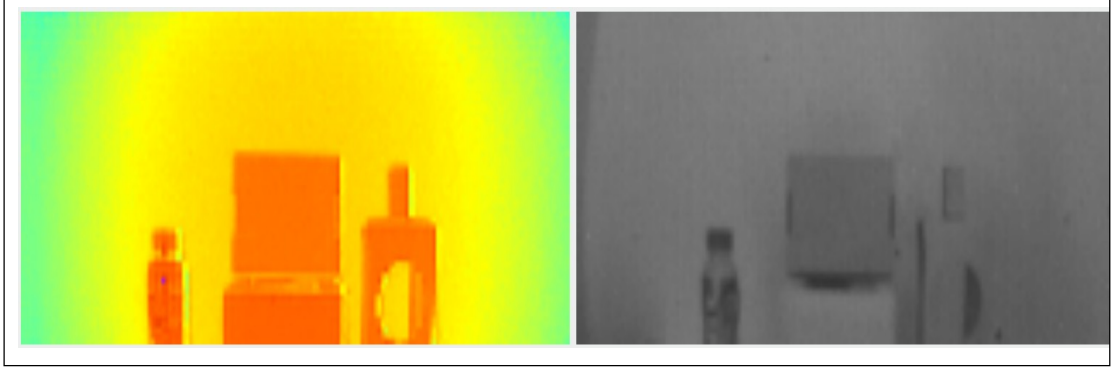
4.7.2 Recognition of Size

This product recognizes the distance data of the target object and uploads the distance information of all objects in the entire image to the upper computer. The upper computer determines the size information of the object by analyzing the distance data.

Distance Image + Amplitude Image



Distance Image + Grayscale Image



5 Mechanical Information

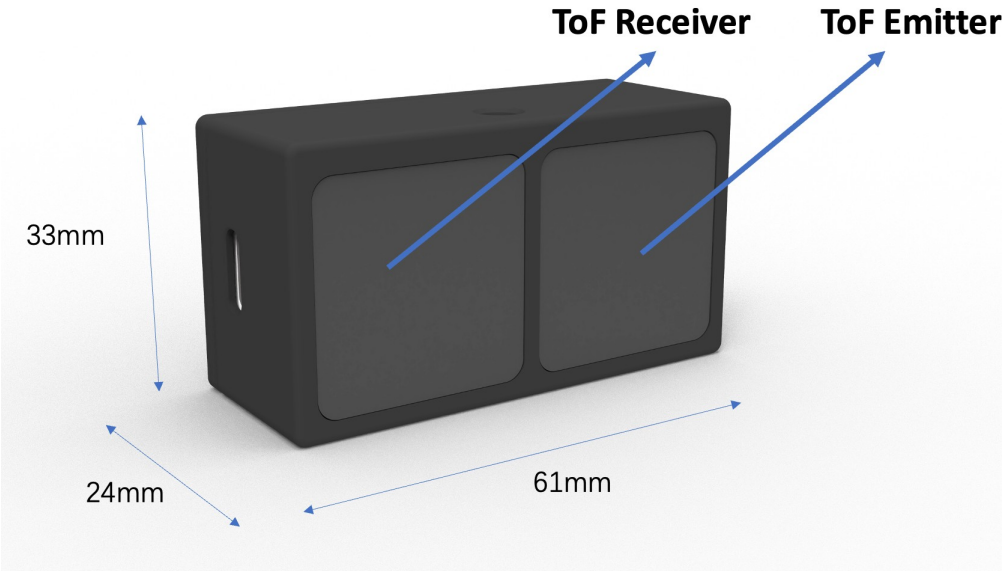


Figure 5-1: MMPT044-940 Product Appearance

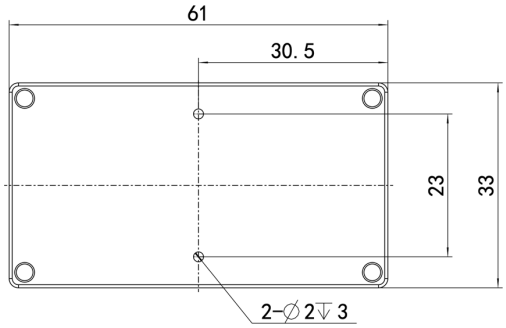


Figure 5-2: Assembly Method on the back side of the product

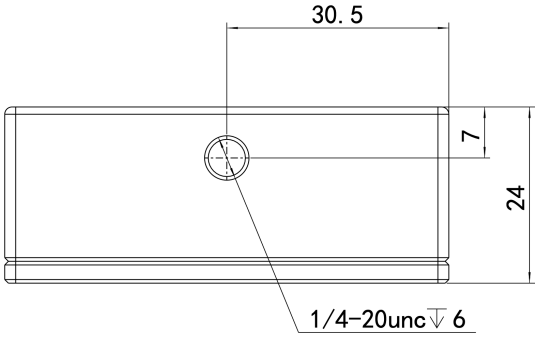


Figure 5-3: Side View of Assembly

6 Revision Information

Version	Date	Notes
V0.1	08/22/2023	Initial Version Released
V1.0	10/8/2023	Formal Version Released