TM421-E1 Specifications

Version：V2.0

Date：2025.07.16

Technical Specifications

Parameters	Value
Technical principle	Indirect Time of Flight (IToF)
Illumination	1 x infrared laser (λ = 940 nm)
Latency of image acquisition[1]	158 ms
Frame rate[2] @ resolution (Depth)	Supported resolution: 640 x 480, 320 x 240, 160 x 120 Supported depth quality and corresponding frame rate: HIGH (5 fps), MEDIUM (10 fps)
Frame rate[2] @ resolution (RGB)	30 fps @ 1920 x 1080 @ JPEG 30 fps @ 1280 x 720 @ YUYV 30 fps @ 640 x 360 @ YUYV
RGB-D alignment	√
Output data	Depth, RGB, IR, point cloud images
ToF Channel	5 channels. At most 5 TM421-E1 cameras with different channels are allowed to run simultaneously at the same scene.

> [1] Latency of image acquisition: the latency time between the host computer sending the software trigger signal and receiving depth images (with a resolution of 640 x 480 and the Medium depth quality) from the camera when the camera is working in software trigger mode.
>
> [2] Frame rate of depth/RGB images: the number of depth/RGB images that the host computer receives every 1 second from the camera. This is when the camera is working in free acquisition mode.

Measurement Performance

Measurement Range & FOV

Parameters	Value
Working distance	150 mm ~ 5000 mm
Field of view (Depth)	Near: 190 mm x 140 mm @ 150 mm(H/V ≈ 65°/50°) Far: 6370 mm x 4665 mm @ 5000 mm(H/V ≈ 65°/50°)
Field of view (RGB)	1860 mm x 945 mm @ 1000 mm (H/V ≈ 85°/50°)

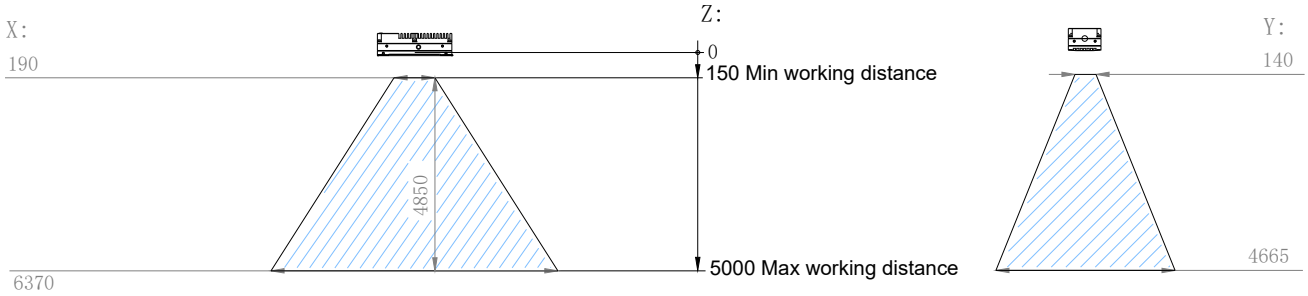
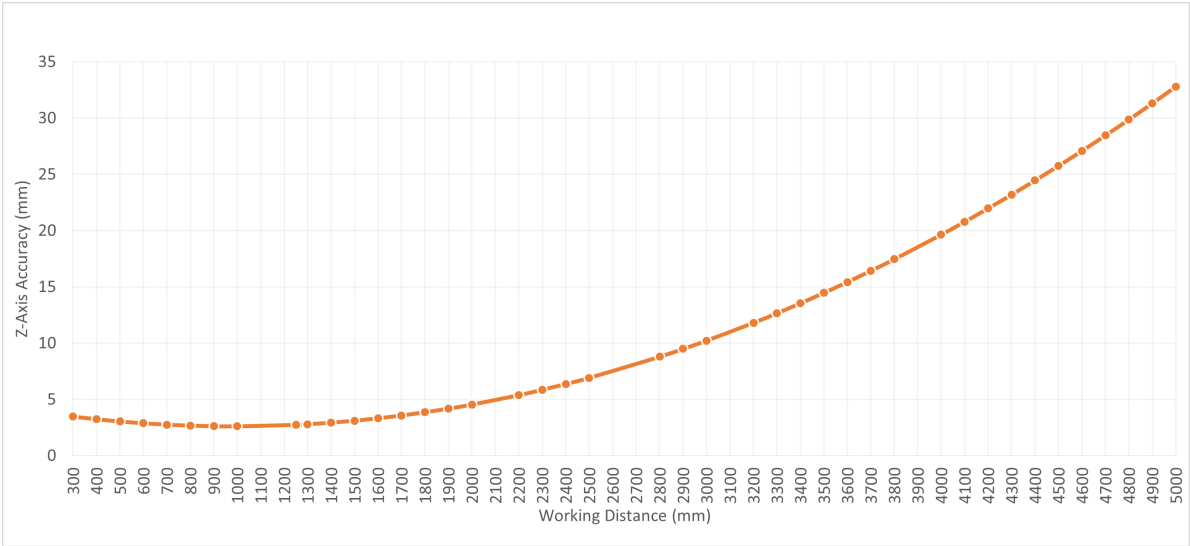


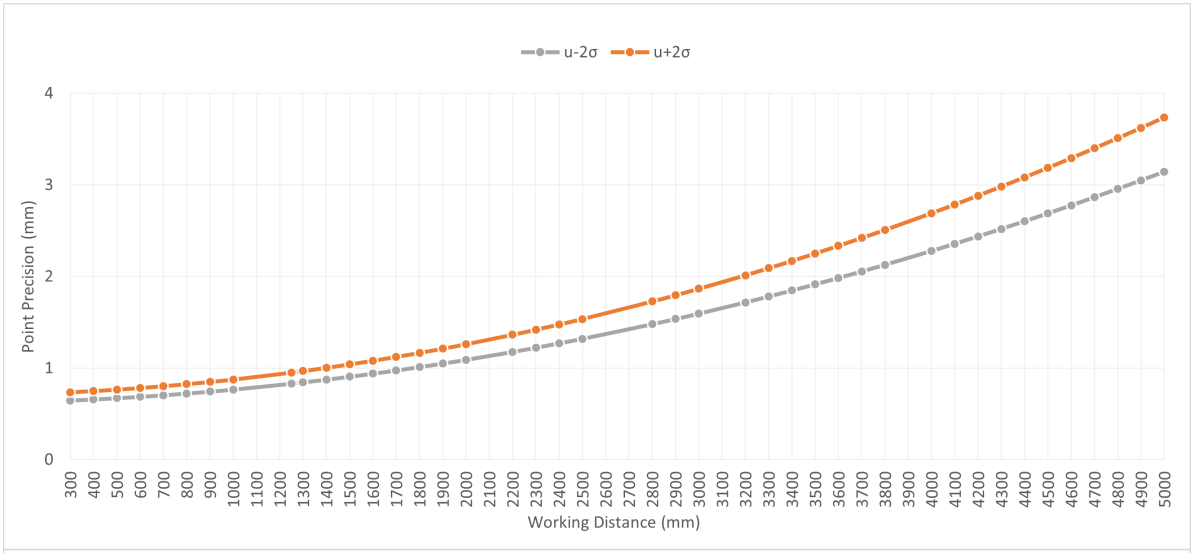
Figure 1 Depth FOV (unit: mm)

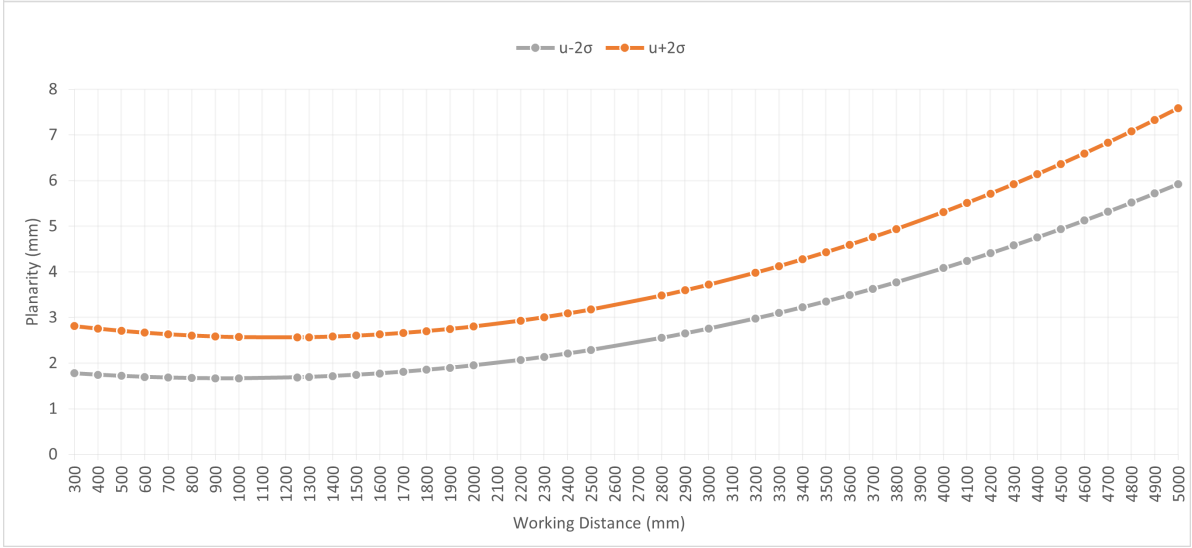
Performance Evaluation Metrics

Parameters	Descriptions
Z-axis accuracy	The average deviation between measured distance values and true distance values in the Z-direction.
Point precision	The degree of oscillation of depth values for all pixel points in the central region of the field of view over time.
Planarity	The dispersion of all pixel points in the central ROI relative to the desired plane.

> The line charts below illustrate the measured distribution ranges of Z-Axis Accuracy, Point Precision, and Planarity. The horizontal axis represents the distance values, with the unit in millimeters (mm).




u-2σ
u+2σ
Point Precision (mm)
0
1
2
3
4
300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100 4200 4300 4400 4500 4600 4700 4800 4900 5000
Working Distance (mm)


u-2σ
u+2σ
Planarity (mm)
0
1
2
3
4
5
6
7
8
300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100 4200 4300 4400 4500 4600 4700 4800 4900 5000
Working Distance (mm)

Software Specifications

Parameters	Value
OS	Linux/Windows/ROS
SDK	Percipio Camport SDK; Supported programming language: C/C++, C#, Python See Percipio Technical Documentation for more SDK tutorials.
ToF features	Depth Quality ToF Channel Filter Threshold ToF Modulation Threshold ToF Jitter Threshlod HDR (High Dynamic Range) Ratio For the settings of ToF features, see API Descriptions.

Hardware Specifications

Parameters	Value
Dimension (excl. the cable)	114 mm x 50 mm x 34 mm
Weight (incl. the cable)	311 g
Data connector	M12 A-Code, 8-pin, female connector Gigabit Ethernet
Power & trigger connector	4-pin bare wire See Power & Trigger Connector for its pinout.
Power supply	DC 24V ±10%
Hardware trigger	Supports 1 channel of hardware trigger input/output: rising-edge trigger
Power consumption	≤ 8 W
Housing material	Aluminum alloy
Ingress protection	IP65
Thermal dissipation	Passive [3]
Temperature	Operating: 0 ℃ ~ 45 ℃ Storage：-10 ℃ ~ 55 ℃

> [3] The camera's outer casing is designed to meet the heat dissipation requirements without the need for additional cooling methods. It is recommended that the installation location allows for adequate ventilation and airflow, and ensure that the metal mounting surface is in contact with the camera for optimal heat transfer during camera installation.

Power & Trigger Connector

Pin No.	Name	Description
1	P_24V	DC power (camera or trigger circuit)
2	P_GND	GND (camera or trigger circuit)
3	TRIG_IN	Trigger input signal (rising-edge)
4	TRIG_OUT	Trigger output signal (rising-edge)

Trigger Circuit Schematic Diagram

The camera supports one channel of rising-edge hardware trigger input/output. The trigger circuit schematic diagram is shown as follows.

For details about hardware connection, see Percipio Technical documentation.

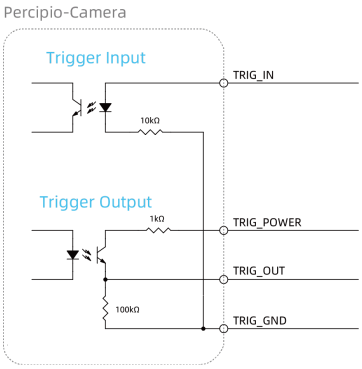


Figure 2 Trigger circuit schematic diagram (rising edge)

Mechanical Dimensions

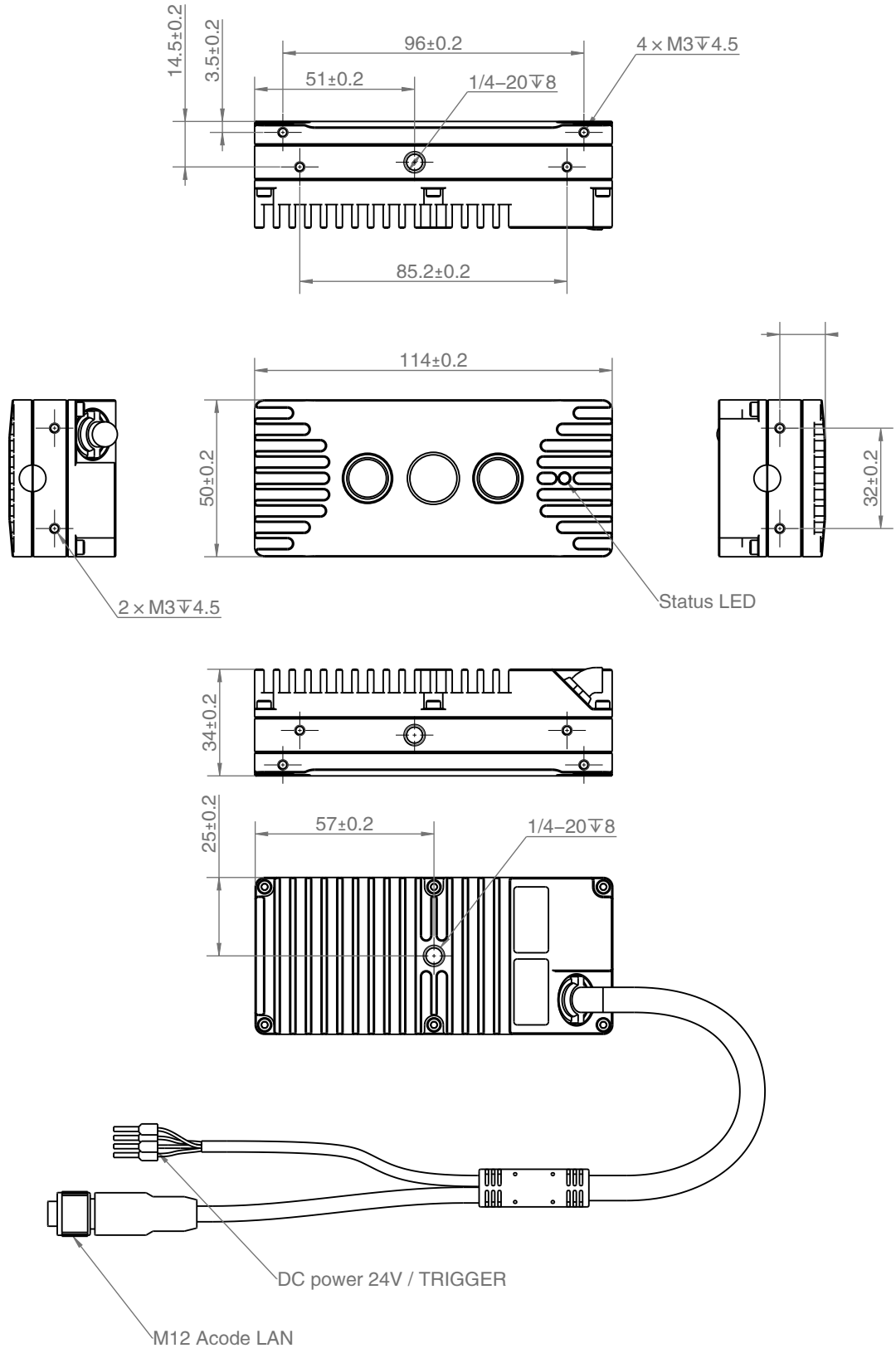


Figure 3 TM421-E1 Mechanical dimensions (unit: mm)

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Percipio is an independent vendor of 3D machine vision solutions. We provide products and services to system integration customers rather than end users. This marketing strategy allows us to serve multiple sectors and segments, and also means that our success will be based on our customer's success. Together with our customer's industry specific expertise, we can support end users with implementing machine intelligence, which will improve productivity and/or reduce cost.

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