DS77 Series ToF Camera Specification

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1 General Information

The purpose of this document is to familiarize the customer with the correct operation of the Vzense ToF DS77 Series products family. This document provides important information about the camera's features, hardware specification, safe use of the camera, and installation procedures.

DS77 series have four configuration, DS77 Pro, DS77 Lite, DS77C Pro and DS77C Lite.

Model	IP67 Housing	PoE+	RGB
DS77 Lite	No	No	No
DS77 Pro	Yes	Yes	No
DS77C Lite	No	No	Yes
DS77C Pro	Yes	Yes	Yes

DS77 Pro and DS77C Pro can be powered either by DC power or Power over Ethernet, and IP67 rating enclosure to resist dust and water.

While DS77 Lite and DS77C Lite can only be powered by DC power and NOT IP67 rating.

1.1   Terms of Use

Vzense offers a 1-year-warranty for this ToF product.

Warranty Information

Please do follow the guidelines below when using the Vzense camera:

Do not remove the product's serial number label

Warranty will be void, if the label is damaged or removed and the serial number can't be read from the camera's registers.

Do not disassemble the product housing

Do not disassemble the housing. Touching any internal components may damage the products.

Prevent any objects or substances from entering the product housing, otherwise the product may fail or damaged.

Avoid electromagnetic areas

Do not use the camera near strong electromagnetic areas. Prevent the product from electrostatic charging.

Transport in original packaging

Transport and store the camera in its original packaging only. Suggest not to discard the packaging.

Clean with care

If you have to clean the housing of the camera, follow the guidelines in the notice as below:

- Use a soft, dry cloth that won't generate static during cleaning;
- To remove tough stains, use a soft cloth dampened with a small amount of neutral detergent(Pure water or alcohol); after that wipe dry;
- Make sure no any residual detergent after cleaning, before reconnecting the camera to power

Read the manual

Do read the manual carefully before using the camera.

2 Precautions

2.1 Safe Usage Instructions

	DANGER
	Electric Shock Risk Non-standard and improper power supplies may result in fire and electric shock. You must confirm the camera power supply used that meets the absolute specification of voltage and current.

	CAUTION
	Invisible Radiation This camera uses laser to work, improper use may damage the eye. Lasers are classified as risk group 1 (low risk) according to EN 60825 which means that the product presents no risk related to exposure limits under normal usage conditions. Eye safety is only guaranteed when the camera is used properly

2.2 Power

The DS77 Pro and DS77C Pro can work with either Power over Ethernet or external DC power; DS77 Lite and DS77C Lite can only work with external DC power.

For PoE power source, the PSE device shall apply the PoE+ standard (802.3at) or above, lower than that may cause the product doesn't work well or even be damaged.

The DC power can accept 11V~26V power source. For higher than 26V or lower than 11V, the device shall not work well or even be damaged.

Vzense doesn't produce PoE injector, but we can purchase it from 3rd party and ship to customer at original cost.

Below is the PoE+ injector available vendor list.

Vendor	Model Number
H3C	EWPAM2NPOE
TP LINK	TL-POE170S

2.3 Usage

Don't try to open the camera housing. Each camera has been calibrated at the factory to achieve precise measurements. Touching internal components may damage the camera and cause calibration data lost.

Incorrect plugging in and unplugging of the camera's power cable can damage the camera. To avoid switch-on surges damaging the camera, please plug in the power cable into the camera's power connector firstly before getting power source on.
Don't try to change the position of the lens, may cause damage to the camera.
Do store the camera carefully when not in use, in original package the best.

2.4   Temperature

To avoid damaging the camera and to achieve best performance, please observe the maximum and minimum housing temperatures in Section 3.1

3 Specifications and Requirement

3.1   General Specifications

Specification	Vzense DS77
Technology	ToF (Time-of-flight) Depth Camera
Depth Sensor Resolution and Frame rate	640 x 480(VGA)@25FPS
ToF HDR Mode	Supported with Max. 15fps
Output Formats	16bit (Depth) + 8bit (IR)
Depth Sensor Field of View H-Horizontal, V-Vertical(degree)	Typical: H-70°V-50°
RGB Sensor Resolution and Frame Rate	1600*1200@25fps
RGB Sensor FOV	H-77 °V-55°
Use Range	0.15m～5m*
Accuracy	<1%*
Power Consumption	Average Max. 7W(Ref)
Illumination	940nm, 2 x 6W Optical Power VCSEL
Dimension(L*W*H)	DS77 Pro:65mm*65mm*72.65mm DS77 Lite: 65mm*65mm*60mm DS77C Pro:105mm*65mm*72.65mm DS77C Lite: 105mm*65mm*60mm
Weight	DS77 Pro: 342g DS77 Lite: 312g DS77C Pro:581g DS77C Lite: 551g
Power Supply	DS77 Pro: PoE+ or DC power DS77 Lite: DC power DS77C Pro: PoE+ or DC power DS77C Lite: DC power
Interface	Gigabit Ethernet and RS485
Digital I/O (Exposure Control, Synchronization etc.)	1in/1out Passive Sync Signal
Enclosure Rating	DS77 Pro&DS77C Pro: IP67 DS77 Lite&DS77C Lite: IP42
Working/Storage Temperature	-20℃~50℃/-30℃~70℃
Software	C/C++/Python/ROS SDK
Operation System	Windows 7/8/10/11, Linux, Arm Linux/ROS
Cooling	Passive, no fan
Certification	FCC/CE/FDA
Eye safety	Class 1

*Accuracy error and Use Range vary with the reflectivity of the measured object

3.2   Electrical Specifications

3.2.1 Recommended Operating Conditions

Parameter	Symbol	Conditions	Min	Typ.	Max	Units
DC Power	VDD		11	12	26	V
Digital I/O (Ext_Trigger)	Vin		3.3		24	V
RS485			-12		12	V
Operating Temperature	Ta		-20		50	°C
Operating humidity			20		80	%
Storage humidity			20		80	%
Storage temperature			-30		70	°C

3.2.2 Power Consumption

Parameter	Model	Conditions	Average	Max	Units
Active Mode	DS77 Pro/DS77 Lite	400mm-5000mm @25fps	612	704	mA
	DS77C Pro/DS77C Lite		642	761	
Broadcast Mode	DS77 Pro/DS77 Lite		141	190	mA
	DS77C Pro/DS77C Lite		159	171	

Note: 12V input voltage

3.2.3 Absolute Maximum Ratings

This is a stress rating only and functional operation of the devices at those or any other conditions above those indicated in the operation listings of this specification is not promised. Exposure to maximum rating conditions for extended periods may affect device reliability

Parameter	Symbol	Conditions	Min	Typ.	Max	Units
DC Power	VDD		9	12	28	V
Digital I/O (Ext_Trigger)	Vin		-0.3		24	V
RS485			-13.2		13.2	V
Operating Temperature	Ta		-20		50	°C

3.3   DS77 Pro Dimension

This drawing contains information about the dimensions and user mounting location of the ToF Camera

Front View

Back View

Bottom View

Top View

Left View

Right View

Fig. 3.1: ToF Camera Dimensions (Unit:mm)

3.4   DS77 Lite Dimension

This drawing contains information about the dimensions and user mounting location of the ToF Camera.

Front View

Back View

Bottom View

Top View

Left View

Right View

Fig. 3.2: ToF Camera Dimensions (Unit:mm)

3.5   DS77C Pro Dimension

This drawing contains information about the dimensions and user mounting location of the ToF Camera
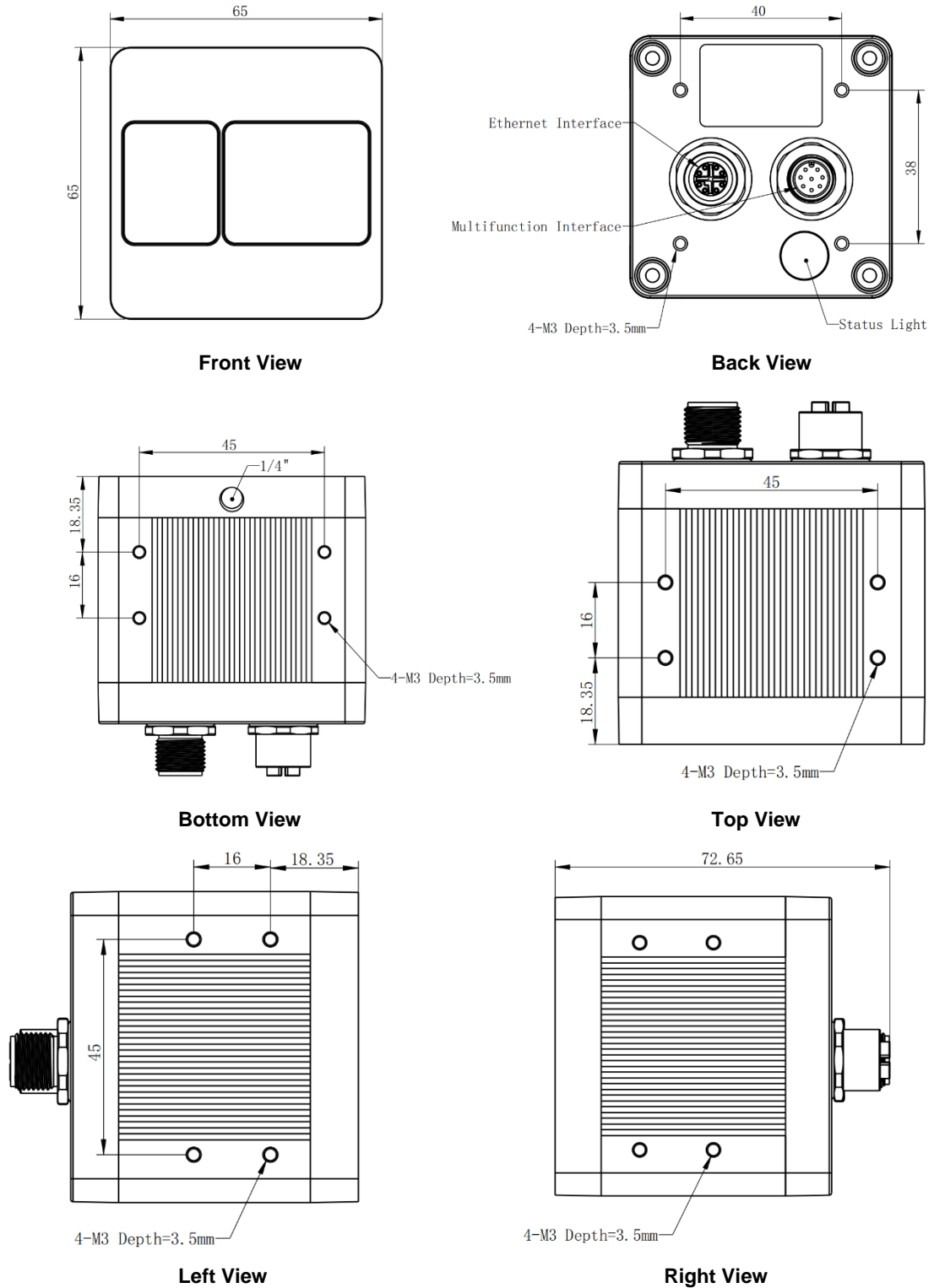

Fig. 3.3: ToF Camera Dimensions (Unit:mm)

3.6 DS77C Lite Dimension

This drawing contains information about the dimensions and user mounting location of the ToF Camera.
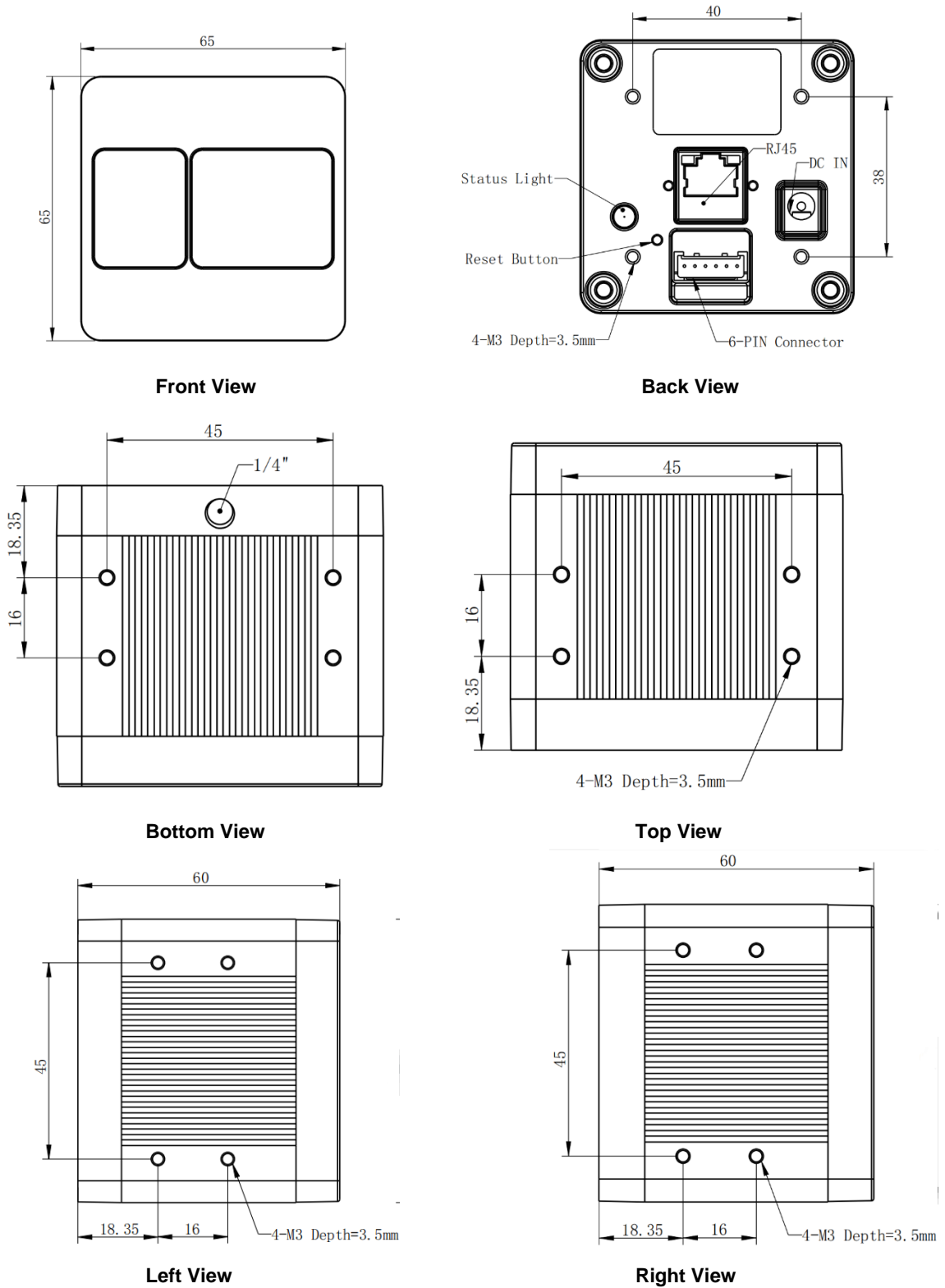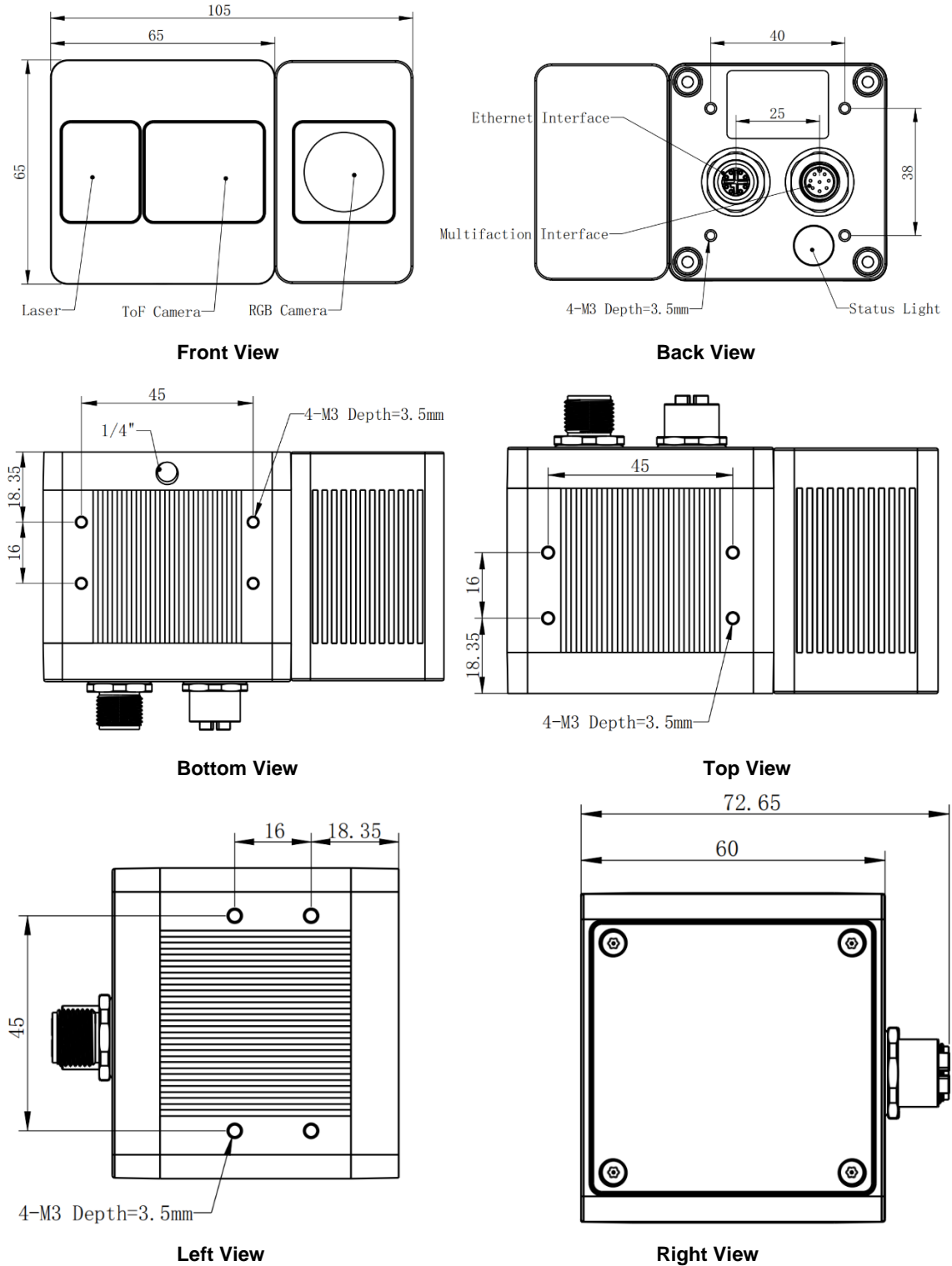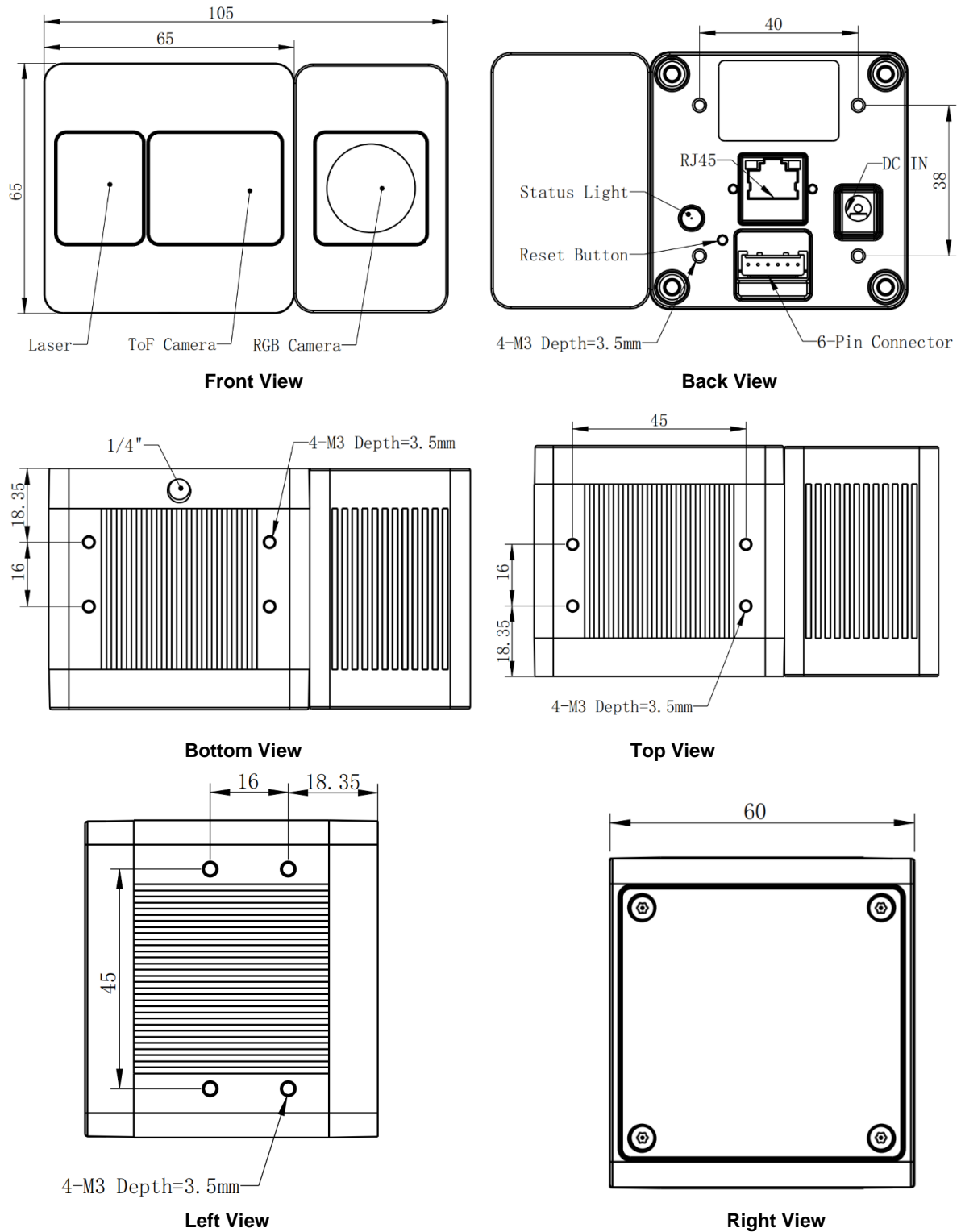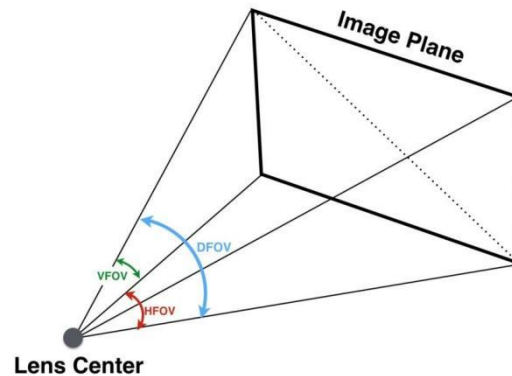

Fig. 3.4: ToF Camera Dimensions (Unit:mm)

3.7   Optical Specifications

3.7.1 Field of View

The field of view refers to the view angle of the ToF products. The ToF sensor's aspect ratio is 4:3, typically the horizontal field of view is larger than the vertical field of view. The DFOV (see figure below) is the angle subtended by the diagonal of the camera sensor onto the center of the lens.

The definition of HFOV and VFOV can be exchanged, i. e. we can rotate the camera sensor to have larger FOV at vertical direction.

3.8   Working Condition Requirements

3.8.1 Hardware Requirements

DS77 Pro&DS77C Pro:
■M12 X CODE CAT6a Ethernet cable (Aviation Connector to RJ45)(Included in package)
■M12 A CODE 8pin Multiple Functional cable (Aviation Connector to 8pin)(Included in package)
Or
■PoE+ Power Supplier. (Not included in package)

DS77 Lite&DS77C Lite:
■CAT5e Ethernet cable (CAT6 Included in package)
■6 PIN cable which provide interface with host. (Included in package)
■DC Power cable. (Included in package)

3.8.2 Software Requirements

Operating system
- 32-bit Windows 7/10/11
- 64-bit Windows 7/10 (recommended)/11
- Linux (x86, x64)

3.8.3 Temperature and Humidity

Housing temperature during operation:	-20–50 °C
Humidity during operation:	20–80 %, relative
Storage temperature:	-30–70 °C
Storage humidity:	20–80 %, relative

3.8.4 Coordinate of the Camera System

There are two coordinate system need to be understood, one is camera coordinate system (CCS), one is world coordinate system (WCS).
CCS: CCS describe the two-dimensional data, the origin of coordinates is the optic center.
WCS: WCS describe the three-dimensional information.
The CCS data can switch to the WCS data using the camera internal parameters.
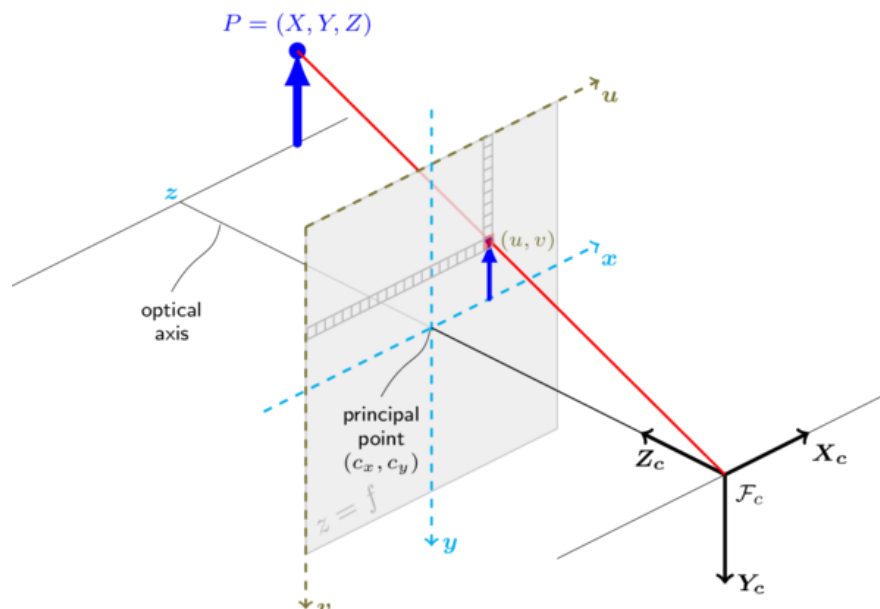
Fig. 3.5: Origin of the Coordinate System

The origin of the coordinate system is defined as the below figure shows:
1. X coordinate locates 32.5mm from the top edge of the camera;

2. Y coordinate locates 42.25mm from the left edge of the camera;
3. Z coordinate is zero offset at the front of the camera housing;
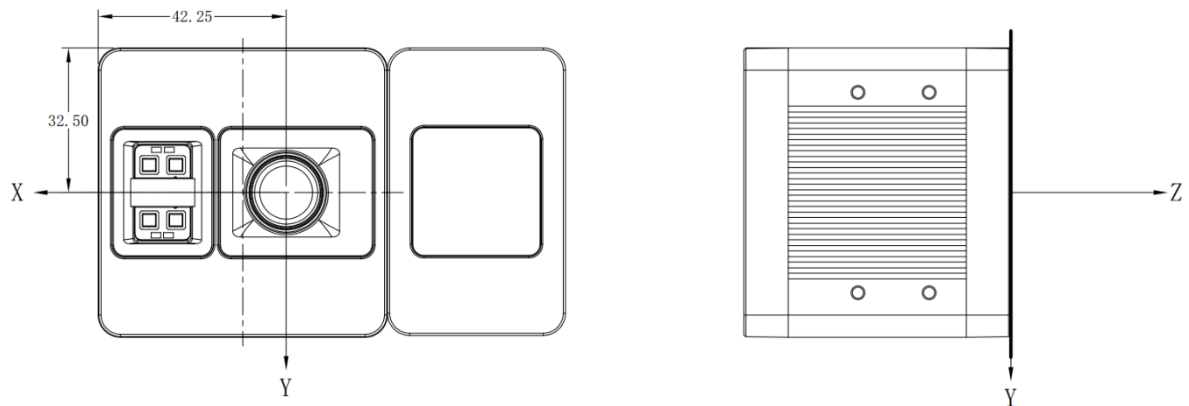
MeshLab and CloudCompare tools are recommended to analyze the point cloud data saved by Vzense software or SDK method.

4 Interface with Host

4.1　DS77 Pro&DS77C Pro Interface

DS77 Pro&DS77C Pro is equipped with two M12 aviation connectors at the back of its housing as shown in below figure.

For more information about pin assignments and connector types, see the following sections.

Figure 4.1 DS77 Pro Interface

Figure 4.2 DS77C Pro Interface

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M12 X CODE 8PIN Ethernet Interface

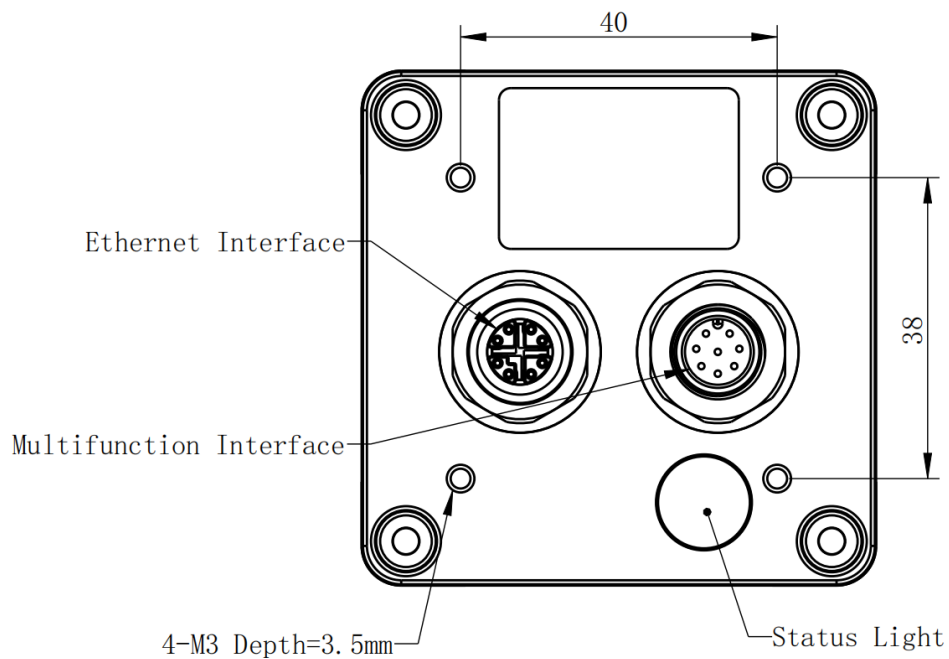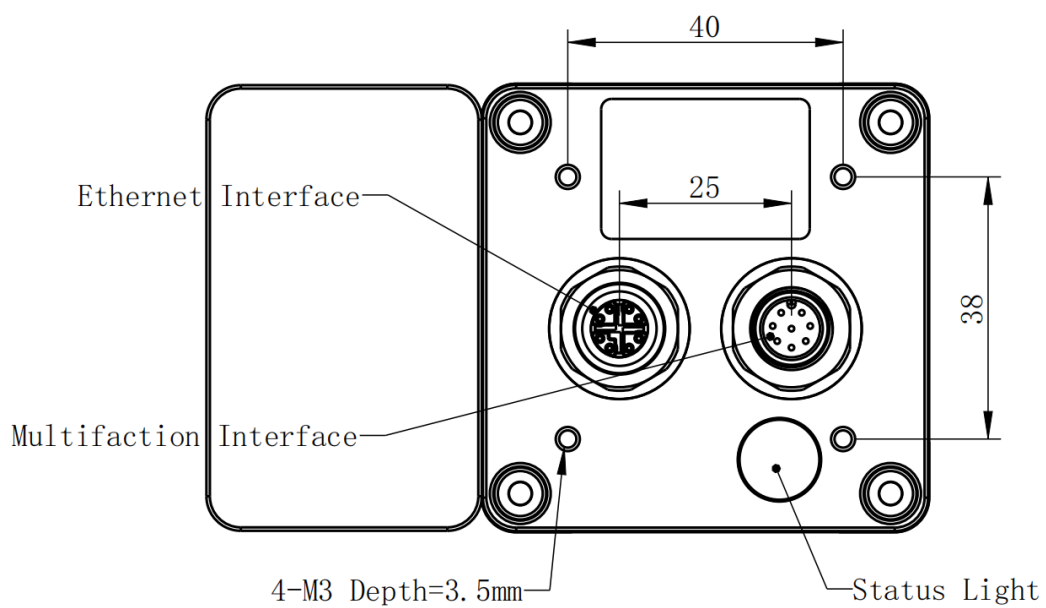| Pin	Designation	Description
1	TX_D1+	Tranceive Data+
2	TX_D1-	Tranceive Data-
3	RX_D2+	Receive Data+
4	RX_D2-	Receive Data-
5	BI_D4+	Bi-directional Data+
6	BI_D4-	Bi-directional Data-
7	BI_D3-	Bi-directional Data-
8	BI_D3+	Bi-directional Data+

M12 A CODE 8PIN Multiple Functional Interface

Pin	Line Color	Designation
1	BLACK	GND
2	RED	VCC
3	BROWN	RS485-A
4	GREEN	RS485-B
5	WHITE	Ext_Trigger
6	YELLOW	NC
7	BLACK	GND
8	BLUE	IP RESET

Pin	Designation	Direction	Description
1.7	GND	GND	GND
2	VCC	Power	DC 12-24V
3	RS485-A	I/O	RS485-A
4	RS485-B	I/O	RS485-B
5	Ext_Trigger	INPUT	External trigger input（3.3v-24v）
8	IP RESET	INPUT	Pull high (3.3v-24v) for 10 seconds then the IP is reset as 192.168.1.101.

Hardware Trigger Function

Hardware trigger mode is available only when the camera works at slave mode, in slave mode the camera will wait for the hardware trigger signal on Ext_Trigger.

The EXT_Trigger signal is to driver the MOSFET, External input trigger signal voltage should range 3.3v-24v, driving current ability should be more than 5mA;

You can use input pin Ext_Trigger to send a hardware trigger signal to the camera. The hardware trigger can be used to trigger the acquisition start. **A hardware debounce circuit shall be considered on the EXT_Trigger line.**

By default, the hardware trigger is **rising edge** activated, refer to below exposure timing:
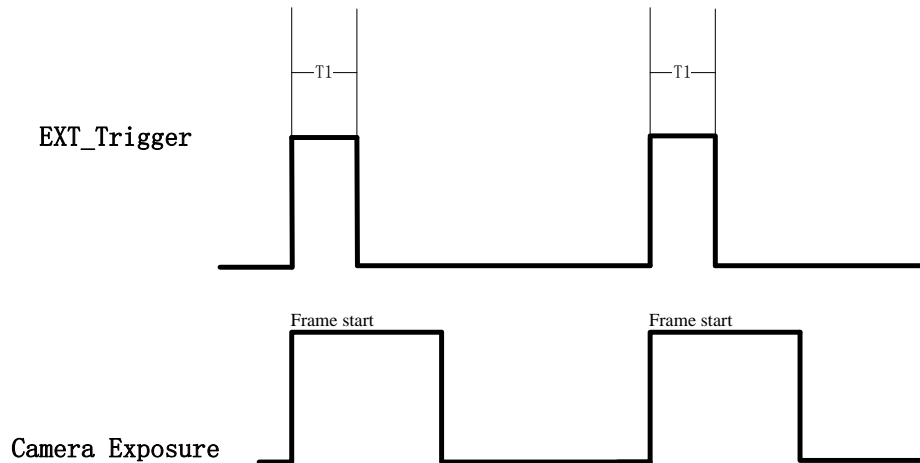
The requirement to T1 should be above 1ms.

4.2 DS77&DS77C Lite Interface

DS77C Lite is equipped with RJ45, LED, 6pin connector, IP reset button at the back of its housing as shown in below figure.

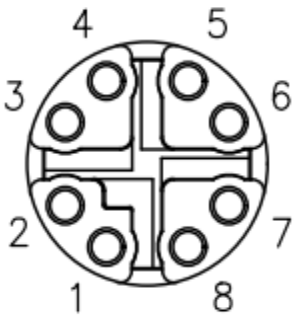For more information about pin assignments and connector types, see the following sections.
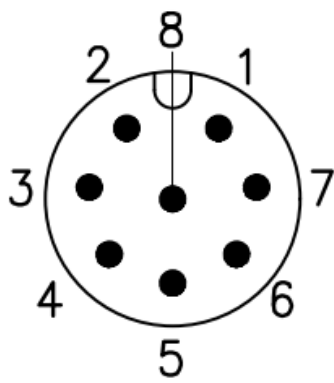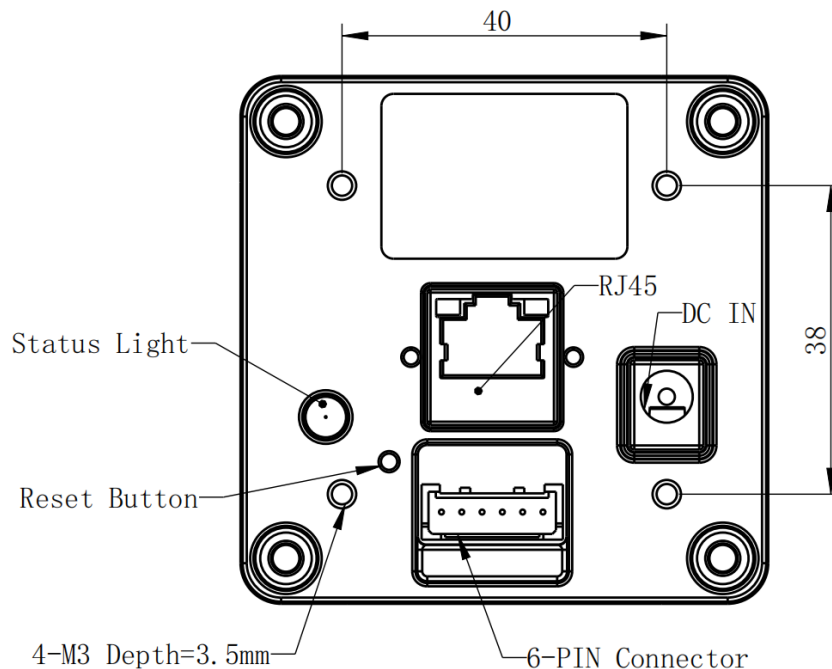

Figure 4.3 DS77 Lite Interface
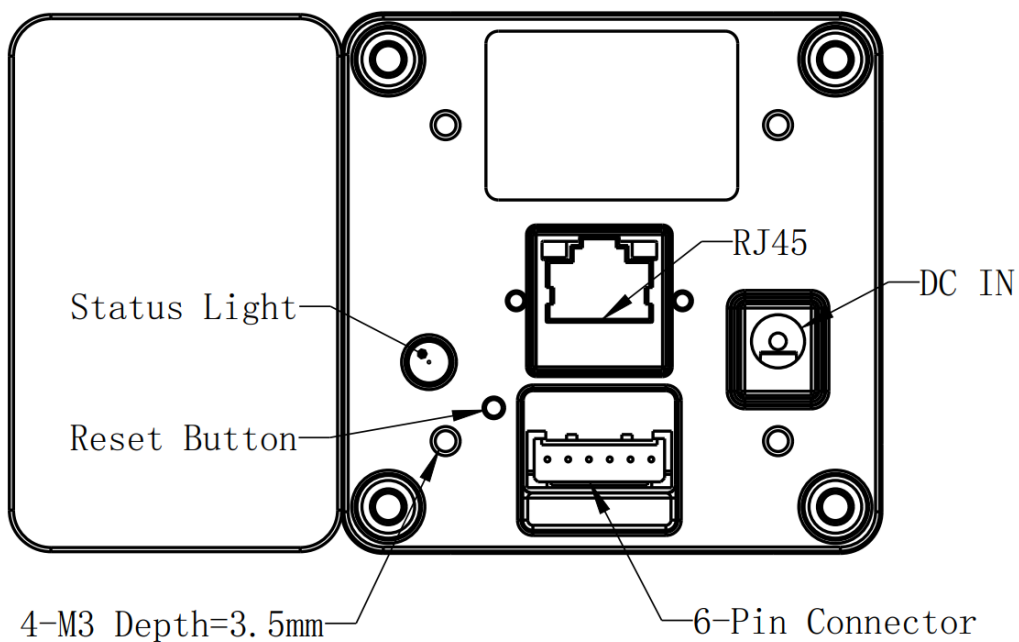
Figure 4.4 DS77C Lite Interface

6PIN Connector for DS77C Lite

The 6pin connector includes the one physical input signals and one physical output signal, RS485 signal.

The pin assignments and pin numbering for the receptacle are as shown in below table.

The connector of the camera is a Molex receptacle, part number 535170630. The recommended mating connector is a Molex plug, part number 511030600.

Pin	Line Color	Designation
1	BROWN	RS485-A
2	GREEN	RS485-B
3	WHITE	Ext_Trigger
4	YELLOW	NC
5	BLACK	GND
6	RED	NC

Pin Description

| Pin	Designation	Direction	Description
1	RS485-A	I/O	RS485-A
2	RS485-B	I/O	RS485-B
3	Ext_Trigger	INPUT	External trigger input（3.3v-24v）
5	GND	GND	System ground

Hardware Trigger Function

Hardware trigger mode is available only when the camera works at slave mode, in slave mode the camera will wait for the hardware trigger signal on Ext_Trigger.

The EXT_Trigger signal is to driver the MOSFET, External input trigger signal voltage should range 3.3v-24v, driving current ability should be more than 5mA;

You can use input pin Ext_Trigger to send a hardware trigger signal to the camera. The hardware trigger can be used to trigger the acquisition start. **A hardware debounce circuit shall be considered on the EXT_Trigger line.**

By default, the hardware trigger is **rising edge** activated, refer to below exposure timing:

EXT_Trigger

Camera Exposure

The requirement to T1 should be above 1ms.

IP Reset Button for DS77C Lite
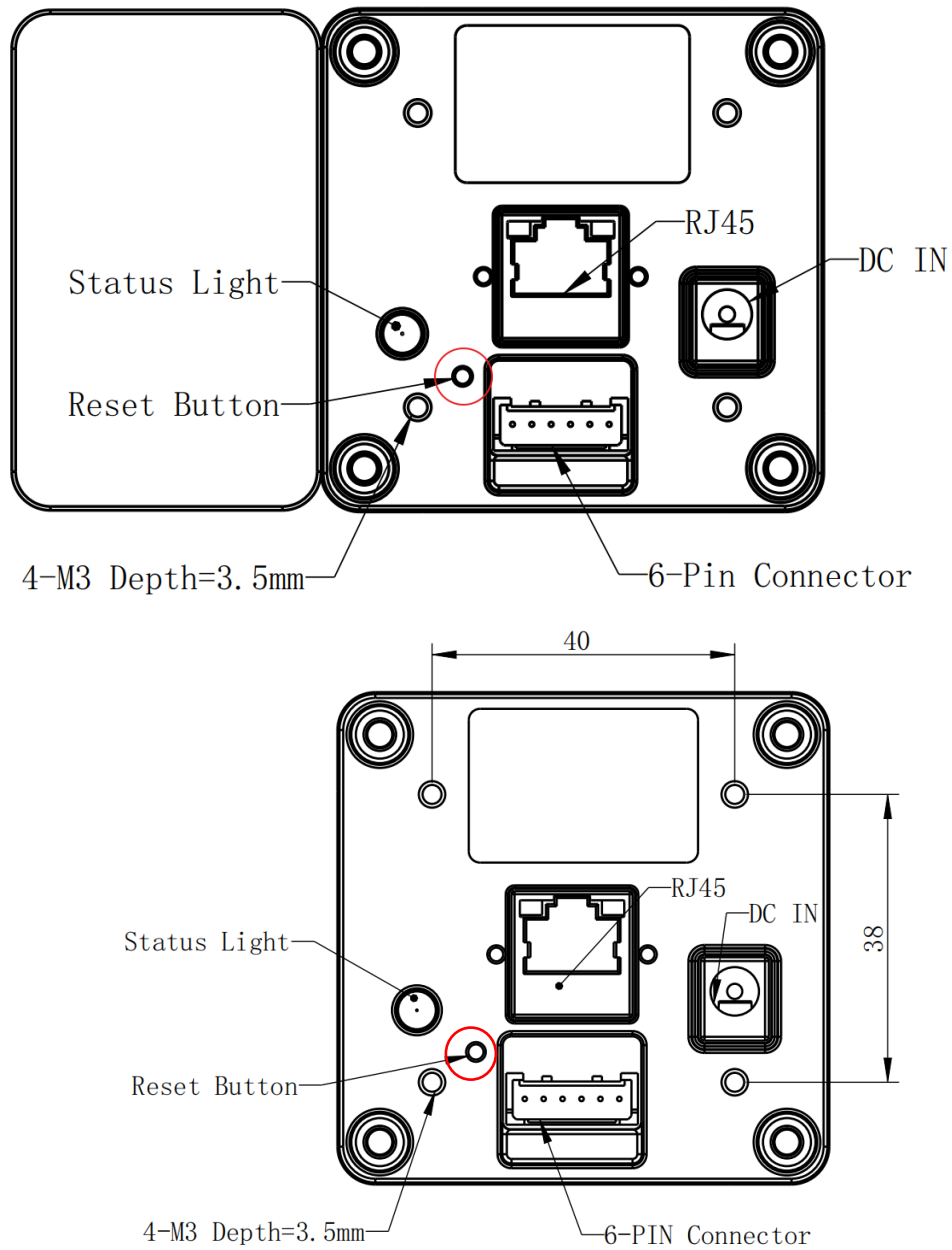
A hidden button hole is for IP reset, a pin shall be used to press the button.
While the camera is powered on, long pressing the button for 10 seconds until the LED is off. Then the IP is reset as 192.168.1.101.

4.3   LED Indication

An LED at the back side of the camera indicates the camera status.
The LED animation table is shown as below:

Ethernet Broadcast, no connection established, BLUE LED blinking repeatedly

Ethernet connection established, BLUE LED constantly on

IP RESET, Press the IP RESET button for 5 seconds, PURPLE LED is on for 5 seconds and blink twice then the product reset itself.

Firmware Upgrade, WHITE LED is on until firmware upgrade finished

5 Installation

5.1   Hardware Installation

You have read and understood the warnings listed under "Precautions" on Chapter 2;
To achieve reliable distance measurements, please follow below tips:
- Better not using the camera in strong sunlight. If have to, keep the ambient light
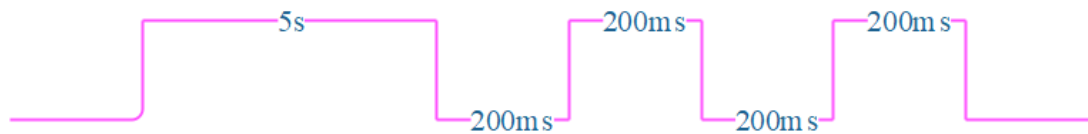- below 50k Lux.
- Do NOT place any objects in the scene that are not part of your intended
- target, especially mirrors or other shiny surfaces/objects.
- Maintain a stable housing temperature during operation.
- Take measures to provide cooling to camera
- Mount the camera robustly.
- All accessories are ready

5.1.1 DS77 Pro&DS77C Pro Installation Steps

The steps are as below:
1. Mount the camera in an appropriate fixture, e.g. a camera bracket;
2. Connect the DS77 Pro&DS77C Pro ToF camera to the host processor with the Ethernet cable, the standard RJ45 socket locates at the back of the DS77 Pro&DS77C Pro camera;
3. Insert the DC connector of the power supply adaptor into the Multifunction Interface at the back of the camera;
4. Connect the adaptor to power source;
5. Please do set the IP address of the camera and host PC in the same segment;
6. The default IP address of DS77 Pro&DS77C Pro is 192.168.1.101, you can change the IP address by the NebulaGUITool;

Please do read the document before reconfigure the camera:
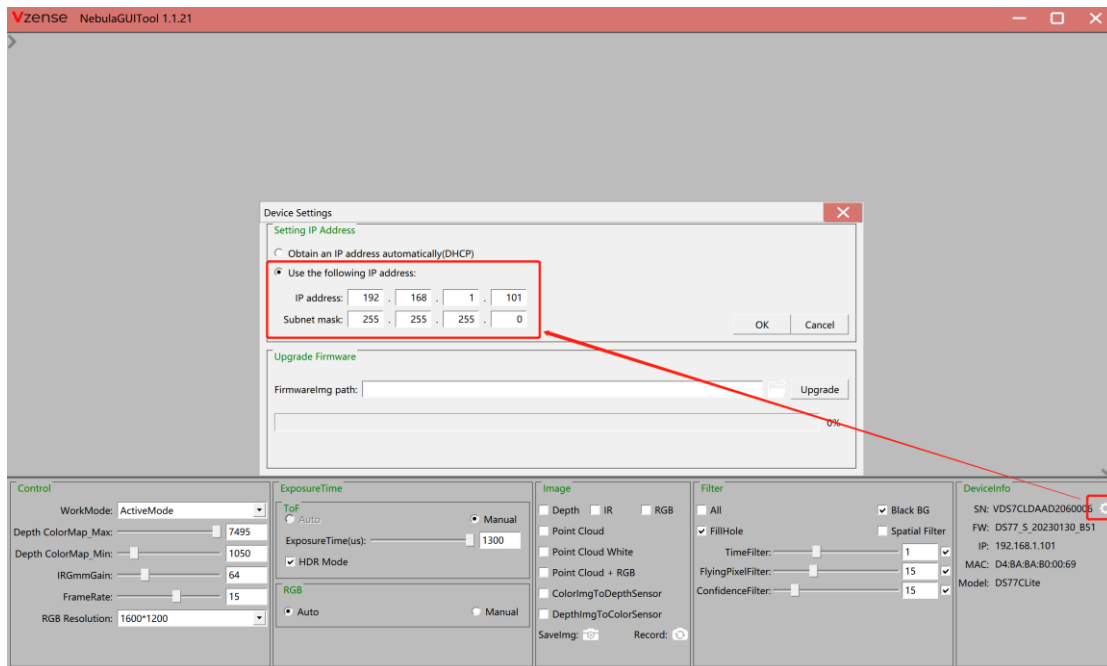
5.1.2 DS77 Lite&DS77C Lite Installation Steps

DS77 Lite&DS77C Lite product transmits the required data to host by Ethernet cable, and it doesn't support Power over Ethernet, so the power adaptor shall be used.
The steps are as below:
1. Mount the camera in an appropriate fixture, e.g. a camera bracket;
2. Insert the DC connector of the power supply adaptor into the 12V~24V DC Jack at the back of the camera;
3. Connect the adaptor to power source;
4. Please do set the IP address of the camera and host PC in the same segment;
5. The default IP address of DS77 Lite&DS77C Lite is 192.168.1.101, you can change the IP address by the NebulaGUITool ;

Please do read the document before reconfigure the camera.

5.1.3 POE Mode Installation (DS77 Pro&DS77C Pro)

What is PoE+ (Power Over Ethernet)
Power over Ethernet (PoE+) is a technology that lets network cables carry electrical power. It simplifies the topology of the Ethernet system by reducing the dedicated power cable, a PoE switch or injector shall be in use to support the PoE feature.

For Vzense DS77 Series camera, the POE Switch or POE injector needs to support IEEE 802.3at-2009 standard also known as PoE+, which can provide up to 25.5W, or IEEE 802.3bt-2018 standard also known as PoE++, which can provide up to 60W. Otherwise the product

may not work well at long range mode.

We can provide optional PoE switch or PoE injector to our customers, please try to contact the sales for the quotation and more information.

Steps to Setup PoE Mode

As mentioned above, a PoE switch or PoE injector shall be in use to setup the PoE;

The steps are as below:

1. Mount the camera in an appropriate fixture, e.g. a camera bracket;

2. Plug one end of the Ethernet cable into the RJ45 socket at the back of the camera, and plug the RJ45 end into the Ethernet port of your PoE switch or PoE injector;

3. Connect the PoE switch or PoE injector to your host processor by Ethernet cable;

4. Connect the PoE switch or PoE injector to power source;

5.2   Nebula SDK

Nebula SDK is a cross platform software development kit designed by Vzense team. It can support DS77 series products and contains multiple versions on different operation systems, including **Windows, Linux, Arm Linux, ROS, PYTHON** etc.

Download or clone SDK project from our GitHub /Gitee:

China：https://gitee.com/Vzense/NebulaSDK

Oversea：https://github.com/Vzense/NebulaSDK

5.2.1 Frameviewer

Frameviewer is an opensource application in SDK project that can guide user how to call the SDK APIs. It has a pre-build version app in Tools folder, the source code is in Samples folder. See the document for the details.

☐ Include	update ver1.0.8
☐ Lib	update ver1.0.8
☐ Samples	update ver1.0.8
☐ Thirdparty/opencv-3.4.1	first version on ubuntu18.04
☐ Tools	update ver1.0.8
☐ ReleaseNotes.txt	update ver1.0.8
☐ install.sh	first version on ubuntu18.04

5.3 NebulaGUITool

NebulaGUITool is a graphic tool on windows for the all Vzense DS77 Series products.
Download or clone NebulaGUITool evaluation tool from our GitHub /Gitee:
China：https://gitee.com/Vzense/NebulaGUITool
Oversea：https://github.com/Vzense/NebulaGUITool

Please do read the NebulaGUITool_UserGuide.pdf in the folder before using.

5.4 Default IP address

The default IP address of the DS77 Series is 192.168.1.101, if you want to set the IP with others or enable DHCP method, please use Vzense NebulaGUITool to change the default setting:
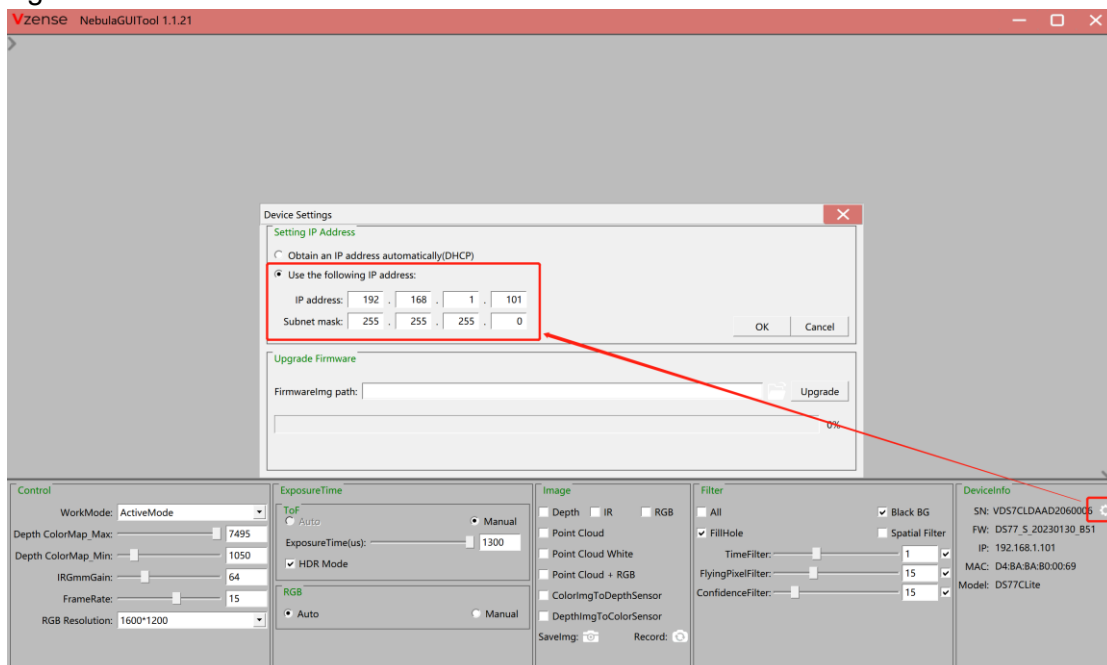
5.5 DHCP to get IP

You can set the product IP to be obtained by DHCP, and you need to connect the product to a DHCP-enabled server network, such as a router.
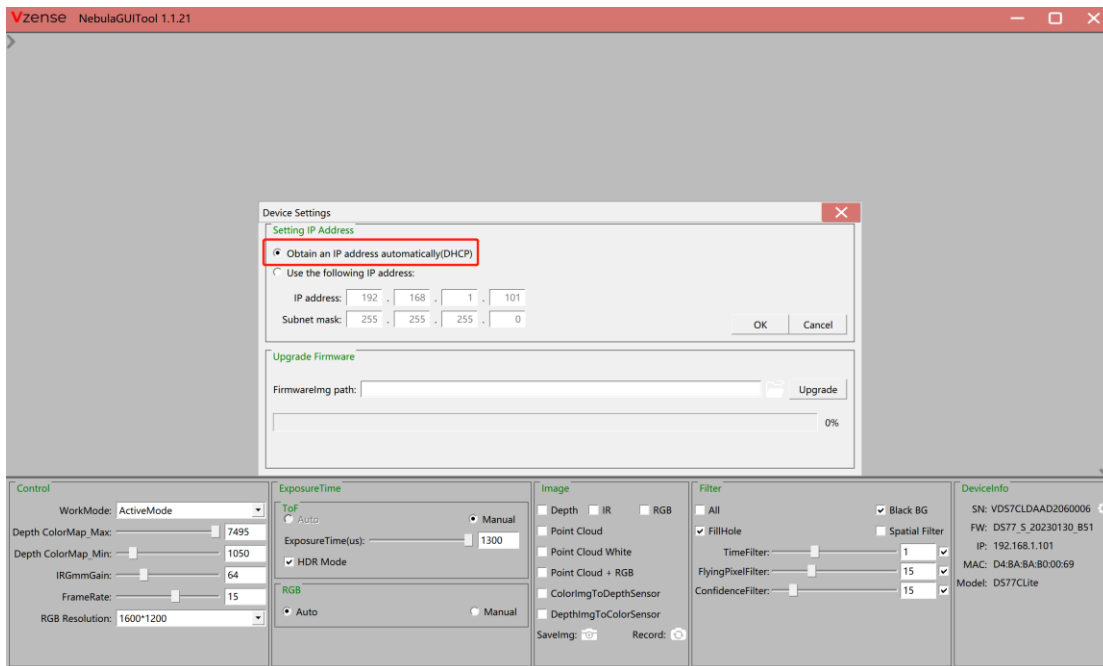
5.6   Firmware Upgrade

The user can use NebulaGUITool to upgrade the firmware of the DS77 products
The specific steps for use are as follows:
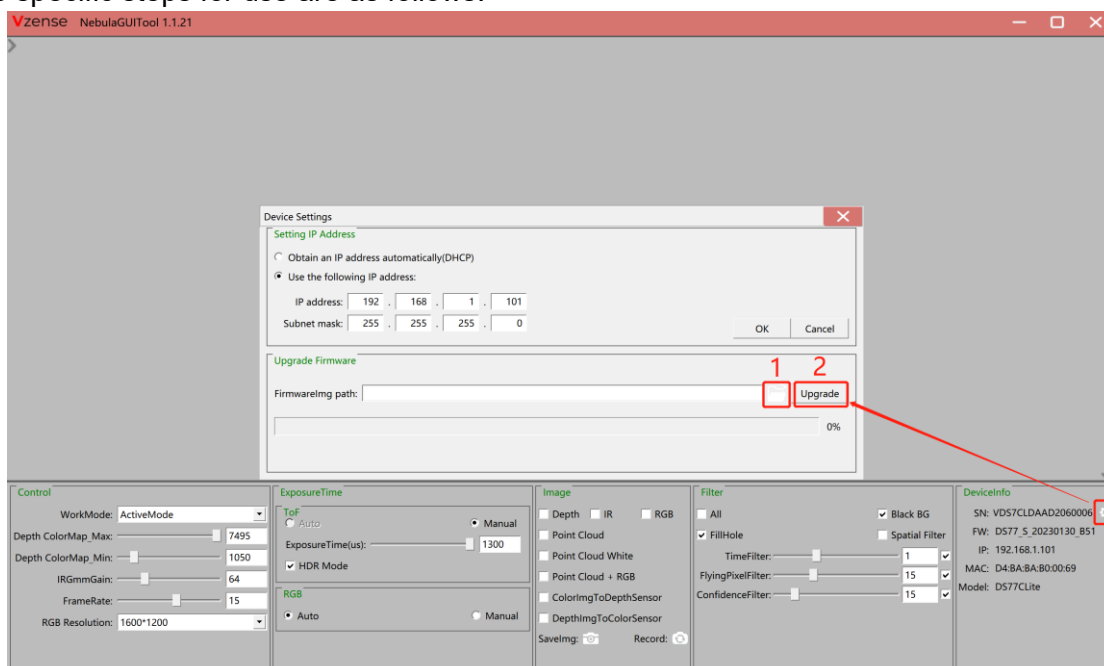
1. Click "⬚" and select the path where the firmware is located.
2. Click the "Upgrade" button and wait for the upgrade.
3. Progress bar to "100%" upgrade is complete, wait for the camera to reboot

6 Features

6.1   Slave Trigger Mode

6.1.1 Hardware Trigger Mode

At Hardware slave trigger mode, the DS77 product outputs image only at every trigger signal happens.

Step 1: set the DS77 product as hardware slave trigger mode by a software API;

Please refer to the sample code of Vzense DS77 hardware slave trigger mode;

Step 2: Feed the DS77 with a correct hardware trigger signal.
Please refer to **Chapter 4.1 or Chapter 4.2** for the requirement to the hardware trigger signal;
A hardware trigger source could be generated by a MCU GPIO or any clock source which can meet the requirement.

6.1.2 Software Slave Trigger Mode

At software slave trigger mode, the DS77 product outputs image only at every trigger API call.

Step 1: set the DS77 product as software slave trigger mode by a software API;
Step 2: Call the API of software trigger to issue a frame start;
Please refer to the sample code of Vzense DS77 software slave trigger mode;

6.2   Exposure Time Configuration

6.2.1 Auto Exposure

At auto exposure mode, the DS77 products can automatically set the exposure time, according to the environment around. Basically, the more near object, the lower the exposure time will be, it has maximum exposure time limitation. And the maximum exposure time depends on the frame rate, the lower frame rate, the bigger maximum exposure time.

Frame rate	Maximum exposure time
5fps	4000
10fps	2000
15fps	1300
25fps	1000

6.2.2 Manual Exposure

The user can set the DS77 product at manual exposure mode, with a fixed exposure time. The value of maximum exposure time depends on the frame rate.

Frame rate	Maximum exposure time(us)
5fps	4000
10fps	2000
15fps	1300
25fps	1000

6.3　Data Filtering

In the software SDK and Frameviewer, we implemented data filtering to improve the depth data performance.
The filtering algorithm includes:
- Median filtering;
- Gaussian filtering;
- Bilateral filtering;
- Timing filtering;
- Confidence filtering;
- Flying pixel removing;

6.4　IR Image

Besides the depth image, Vzense DS77 Series camera can also output a VGA resolution IR image. And the IR image is exactly timing synchronized with the depth image. Pixel to pixel mapping is also exactly aligned.
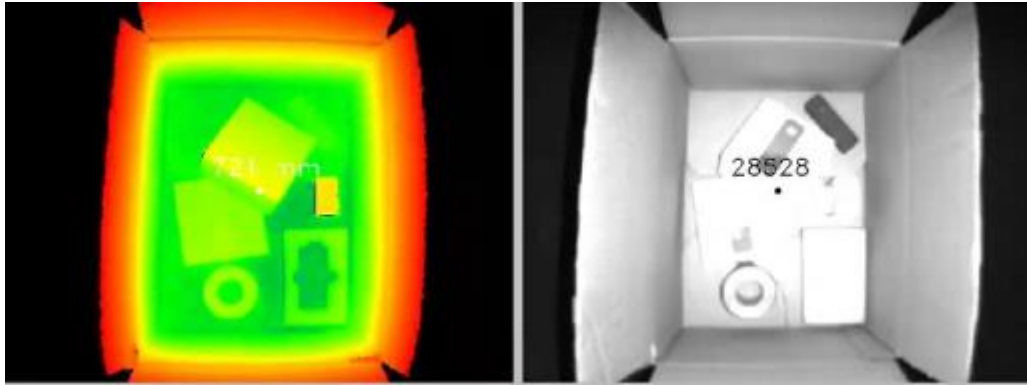
6.5   HDR Mode

Vzense DS series supports HDR mode, High Dynamic Range (HDR) is used to achieve a larger exposure dynamic range than ordinary digital image technology. After the DS series camera turns on the HDR mode, for the overexposed area under the long exposure time, use the short exposure time to measure, and combine the two to obtain a more accurate depth image, reducing the impact of distance and object reflectivity on ToF imaging.

6.6   RGBD Map(DS77C)

Vzense DS77C series supports RGBD Map function.

6.6.1 ColorImgToDepthSensor

RGB image map to Depth domain. When enabled, images with RGB pixels map to Depth pixel space are output and displayed, that is, RGB images corresponding to depth pixels one by one.

Depth Image   ColorImgToDepthSensor Image
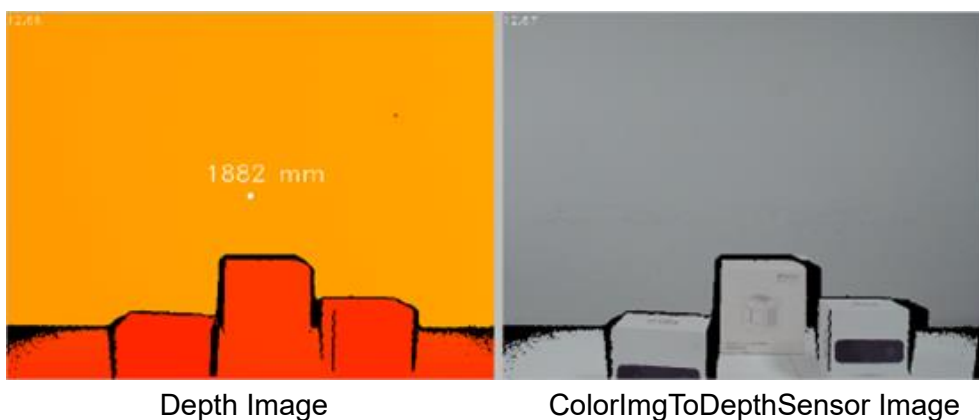
6.6.2 DepthImgToColorSensor

Depth image map to RGB domain. When enabled, the images with Depth pixels aligned to the RGB pixel space are output and displayed, that is, the depth image corresponding to RGB pixel one by one.

DepthImgToColorSensor Image   RGB Image

7 DS77 Series Accessories and Package

In package item list:

DS77 Pro&DS77C Pro

Part No.	Description				Picture
DS77 Pro DS77C Pro	Vzense DS77 Pro & DS77C Pro Depth Camera Module				
814000300025	-M12 X CODE 8PIN CAT6a Ethernet Cable,　26AWG 4 Pair,　shielded Twisted Pair;				
	-Aviation Connector to RJ45				
	-Cord Length: 3m				
814000300026	- M12 A CODE 8PIN Multiple Functional Cable				
	-Cord Length: 2m				
	No.	Color	Wire Gauge	Signal	
	1	BLACK	22AWG	GND(Power GND)	
	2	RED	22AWG	DC 12-24V	
	3	BROWN	28AWG	RS485-A	
	4	GREEN	28AWG	RS485-B	
	5	WHITE	28AWG	EXT_TRIGGER	
	6	YELLOW	28AWG	NC	
	7	BLACK	28AWG	GND(Signal GND)	
	8	BLUE	28AWG	IP RESET	
VZENSE-UGDS77	User guide				

DS77 Lite&DS77C Lite

Part No.	Description	Picture
DS77 Lite DS77C Lite	Vzense DS77 Lite & DS77C Lite Depth Camera Module	
814000600027	-CAT6 Ethernet Cable, 23AWG 4 Pair, Shielded Twisted Pair -Cord Length: 3m	
814000300019	-DC 12V~24V Input -DC Plug: 5.5±0.1mm*2.1+0.1/-0mm*11.5±0.5mm -Cord Length: 2m -RED: DC 12V~24V input, BLACK: GND	
814000300014	-6pin Multiple Functional Cable(RS485, EXT IO) -Cord Length: 1m <table><tr><td>No.</td><td>Color</td><td>Signal</td></tr><tr><td>1</td><td>BROWN</td><td>RS485-A</td></tr><tr><td>2</td><td>GREEN</td><td>RS485-B</td></tr><tr><td>3</td><td>WHITE</td><td>Ext_Trigger</td></tr><tr><td>4</td><td>YELLOW</td><td>NC</td></tr><tr><td>5</td><td>BLACK</td><td>GND</td></tr><tr><td>6</td><td>RED</td><td>NC</td></tr></table>	
VZENSE-UGDS77	User guide	

You can ask Vzense to do customization to the cable for any reason, for example extending the cable length.

Please do NOT use the accessories from other parts except Vzense Company, otherwise warranty will void.

Optional item list:

Item	Component	Description	Quantity
1	H3C EWPAM2NPOE	802.3at PoE Injector	1

Optional items need customer to pay for.

Appendix

RoHS Compliance

This product complies with the limits of Pb, Hg, Cd, Cr (VI), PBB，PBDE，DEHP，BBP，DBP，DIBP as set by RoHS Directive (EU)2015/863 amending Annex II to Directive 2011/65/EU.

Laser Specification

⚠️**CAUTION**

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed.3

The following Class1 laser label is located on the bottom of the sensor.

CLASS 1 LASER PRODUCT
IEC 60825-1:2014

US FDA Accession Numbers

Camera	US FDA Accession Numbers	Date Loaded	Document Date
DS77 Lite	2221428-000	Oct 21, 2022	Oct 21, 2022
DS77 Pro			
DS77C Lite			
DS77C Pro			

Manufacturer

Name: Qingdao Vzense Technology Co., Ltd.
Address: 3 Building, Qingdao Research Institute of Beihang University, No. 393 Songling Road, Laoshan District, Qingdao, Shandong

Factory

Name: Qingdao Vzense Technology Co., Ltd.
Address: 3 Building, Qingdao Research Institute of Beihang University, No. 393 Songling Road, Laoshan District, Qingdao, Shandong

FCC Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Caution: Any changes or modifications not expressly approved by Vzense Technology for compliance could void the user's authority to operate this equipment.

Revision History

Revised on	Version	Description	Approved by
25-Jul-2022	1.0	Add appendix with laser spec and manufacturer information per requirement by compliance test	
27-May-2023	2.0	Fixed some descriptions, added descriptions for HDR, RGBD Map and US FDA Accession Numbers	
20-June-2023	3.0	Updated RoHS info	