



CYNDAR-Guide to Obstacle Avoidance Software

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1 Overview

1.1 Document purpose

This document describes the usage and precautions of TOF-05D Designer software produced by CYNDAR.

OF-05D Designer is mainly used to control the TOF-05D obstacle avoidance single-line radar produced by CYNDAR.

1.2 System Requirements

CUP: Intel i5 dual-core 2.7G and above

OS: Windows 7 and Windows 10

Program type: GUI application, support Windows message loop

Data transmission: USB3.0

2 Software interface composition

2.1 Software working mode

There are 2 working modes in the software: editing mode and monitoring mode

Edit mode is used to edit the working area (group) of TOF-05D radar: monitoring mode user monitors the working status of TOF-05D radar.

2.2 Interface style

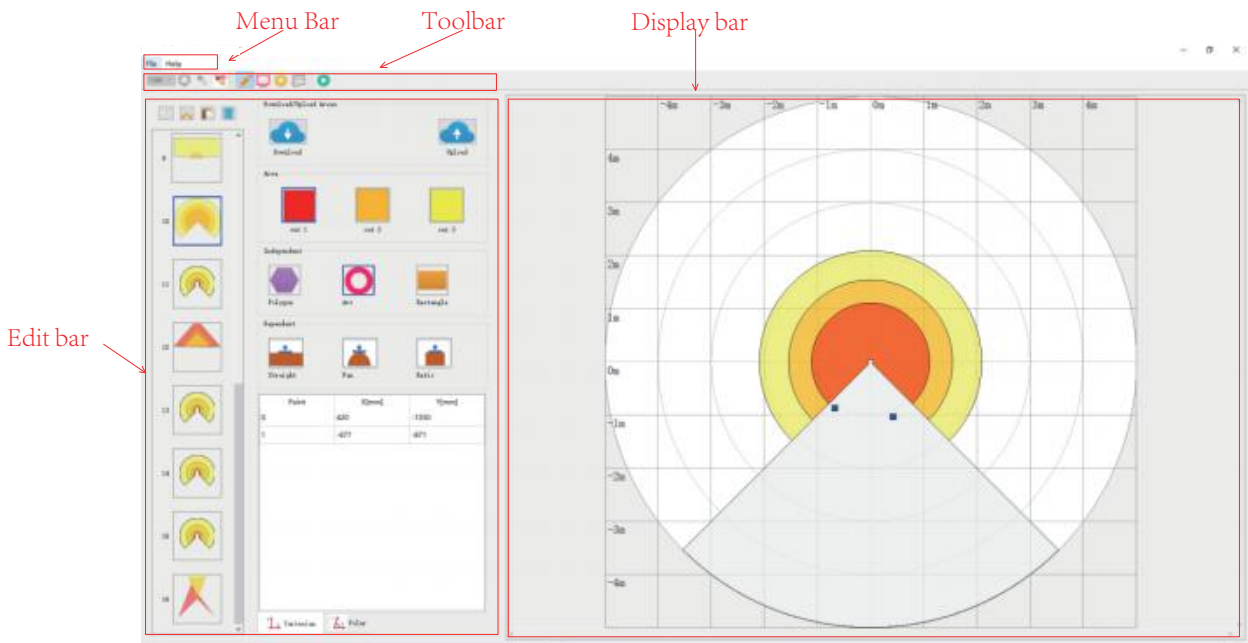


Figure 2-1 Edit interface

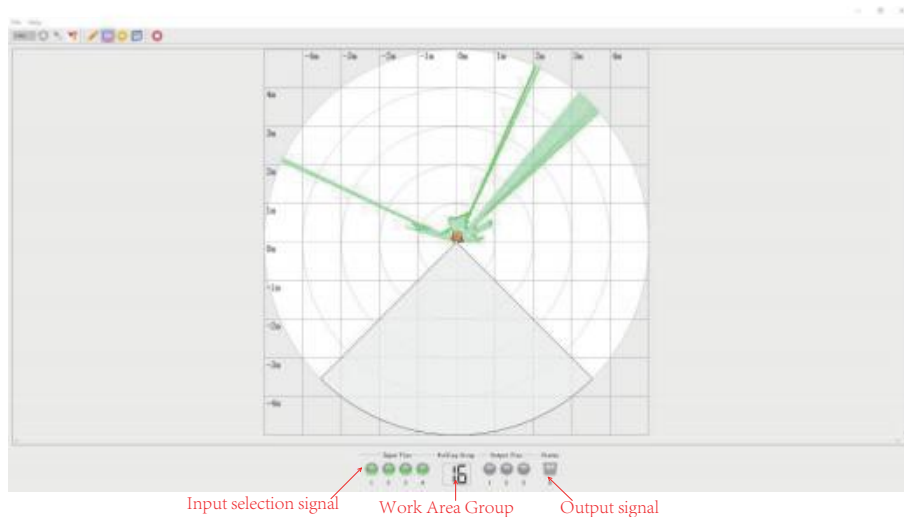


Figure 2-2 Monitoring interface

Edit bar: used to edit areas and area groups to meet user needs.

Display bar: Used to display the effect of area editing and point cloud data.

Input selection signal: Displays the status of the input selection signal on the device.

Working area group: The current working area group of the device.

Output signal: The current input signal of the device.

3 Detailed instructions

This section will describe in detail each functional module of the software and explain its physical meaning corresponding to radar.

3.1 Coordinate system

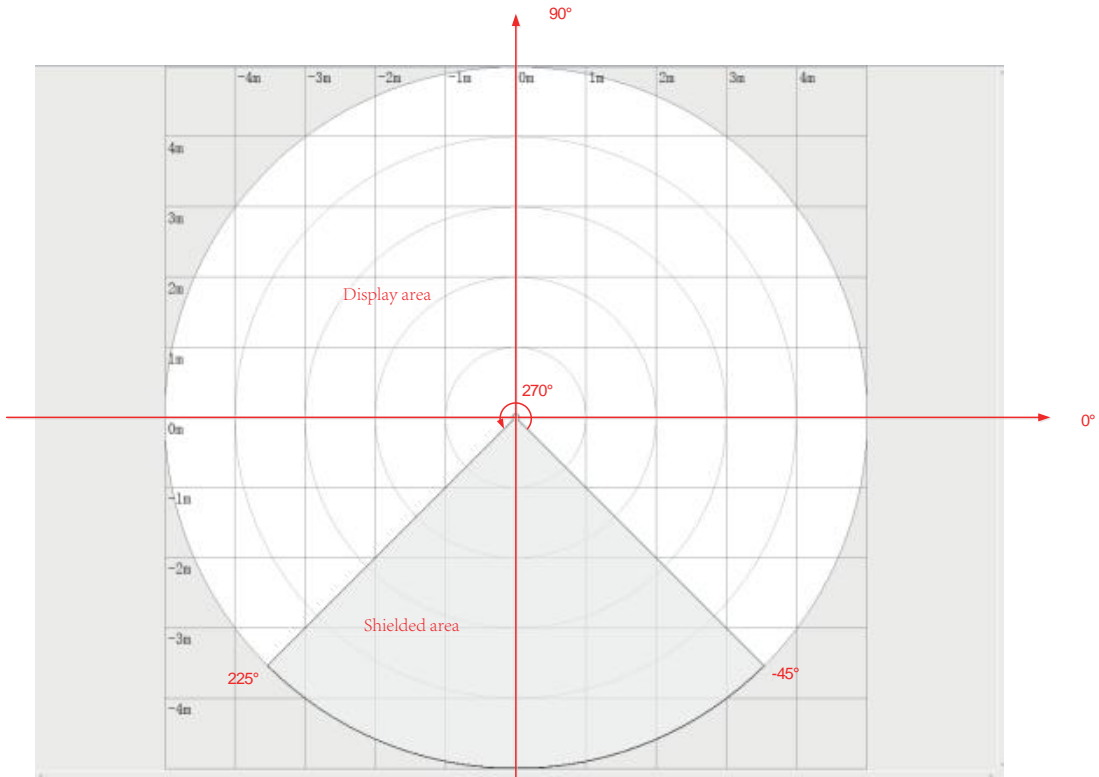


Figure 3-1TOF-05D coordinate system

Angle range: TOF-05D radar's angle scanning range is 270°, from -45° to 225°

Distance range: The scanning distance range defined by TOF-05D radar is 5cm-5m.

Display area: Due to the limitation of the TOF-05D radar angle scanning range and distance range, both the radar and the boundary defined by the area are meaningful only within a specific range. This range is defined as the "display area".

Masked area: All areas outside the display area are "shielded areas".

3.2 Menu Bar

TOF-05D Designer can edit the area groups used by TOF-05D radar, including:

1. Save the area group to a file to form a project file. The suffix is: *.apf
2. Load the area group from the project file and edit it.

3. Loading regional groups from TOF-05D radar
4. Download the regional group data to the TOF-05D radar
5. Create a new project to edit the area group.

The main purpose of the File item in the menu bar is to edit the zone group file.

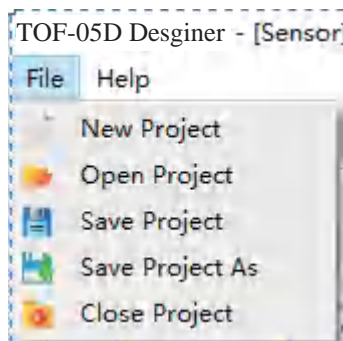


Figure 3-3 Menu bar File

3.3 Toolbar

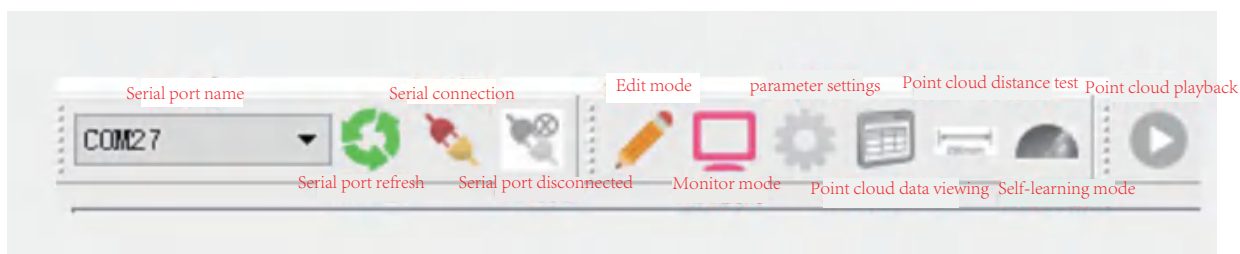


Figure 3-3 Toolbar

TOF-05D Designer software connects with TOF-05D radar through serial port.

Serial port name: The serial port name to be connected.

Serial port refresh: When the TOF-05D radar is connected to the device, the device is discovered by refreshing.

Edit mode: make TOF-05D software work in edit mode

Monitoring mode: make TOF-05D software work in monitoring mode

Parameter setting: The user can set the working parameters of TOF-05D radar through the parameter setting interface.

Point cloud data viewing: Users can view point cloud data in the form of a table.

Point cloud distance test: Test the currently selected point cloud distance.

Self-learning mode: The software starts the radar to enter the automatic learning environment mode.

Point cloud playback: Start or stop playing point cloud.

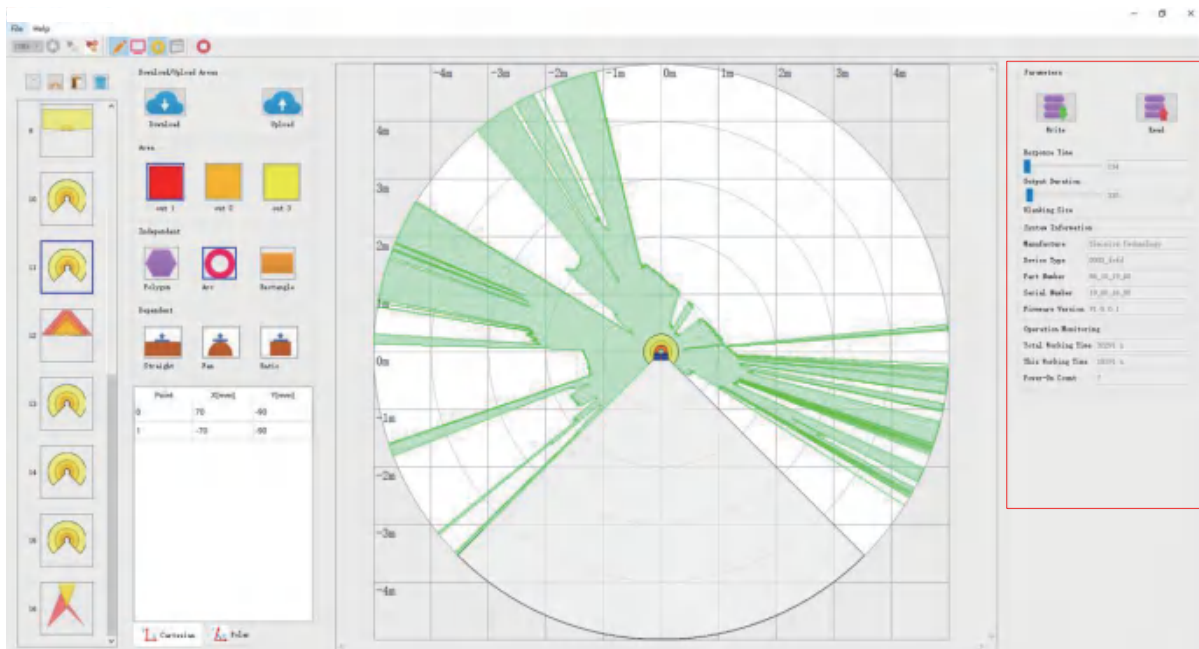


Figure 3-4 Parameter settings

The part in the red box is the parameter setting control.

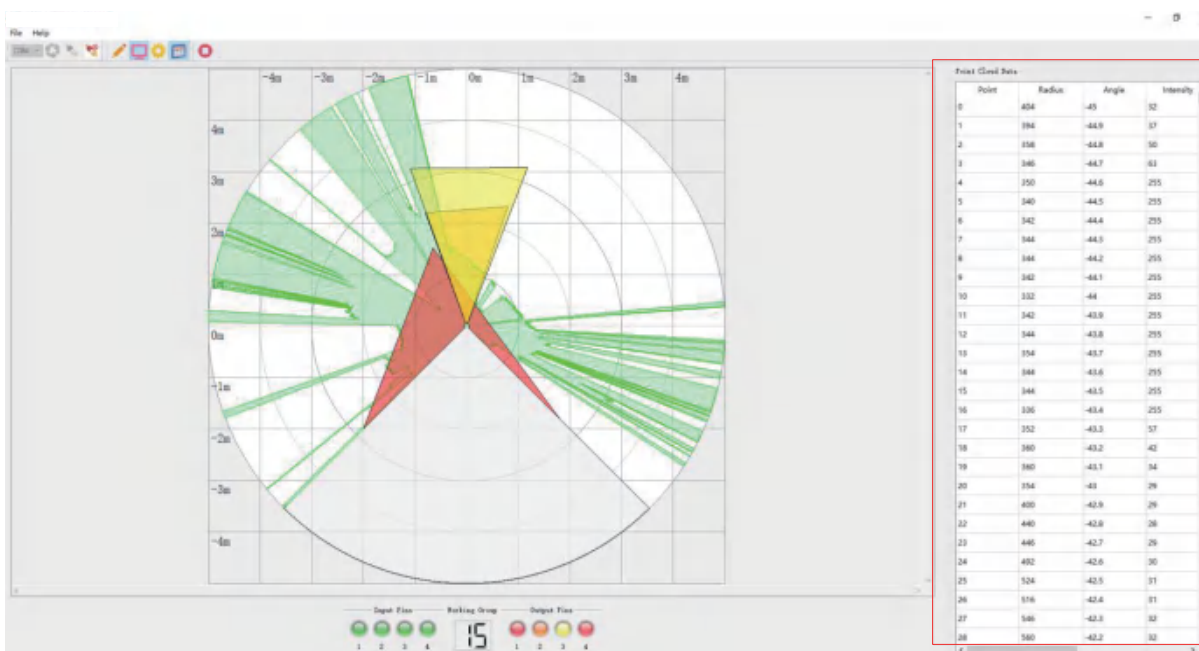


Figure 3-5 Point cloud data view

3.4 Area (group) editing

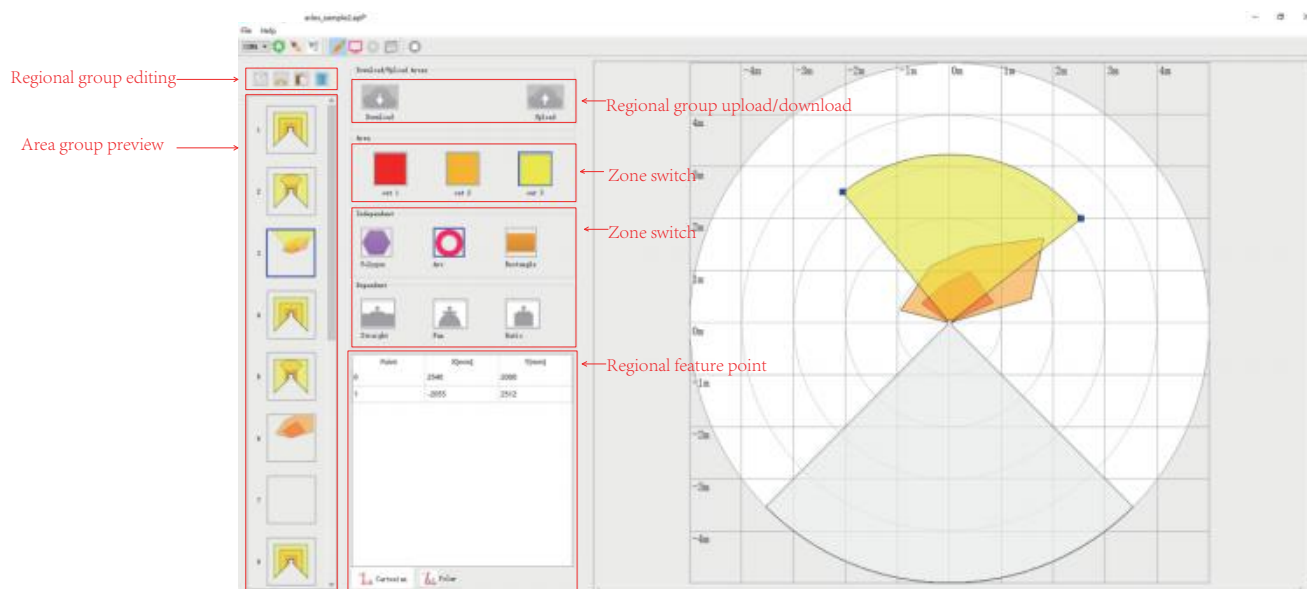


Figure 3-6 Area (group) editing

1. Regional group editing

The editing function includes 4 operation buttons, whose functions are:

- a) Copy: Copy the area group currently being edited.
- b) Cut: Cut the area group currently being edited.
- c) Paste: Paste the "Copy" or "Cut" area group to this area group, the original area group will be replaced.
- d) Delete: delete the current zone group.

2. Area group preview

TOF-05D Designer can manage 16 area groups, and the graphical preview of each area group is presented here. The user can switch to the corresponding workgroup for editing by clicking the corresponding preview pattern.

3. Regional group upload/download

- a) Upload: upload the regional group in TOF-05D radar to TOF-05D Designer
- b) Download the regional group managed by TOF-05D Designer to the radar. These regional groups may come from files, or they may be loaded from this radar or other radars.

4. Zone switch

Each area group contains three areas, namely red, orange and yellow, and their area numbers are 1, 2, and 3. With these three buttons, users can switch between different areas.

5. Area type change

TOF-05D Designer and Radar can handle 6 types of areas, respectively:

a) Polygonal area, example:

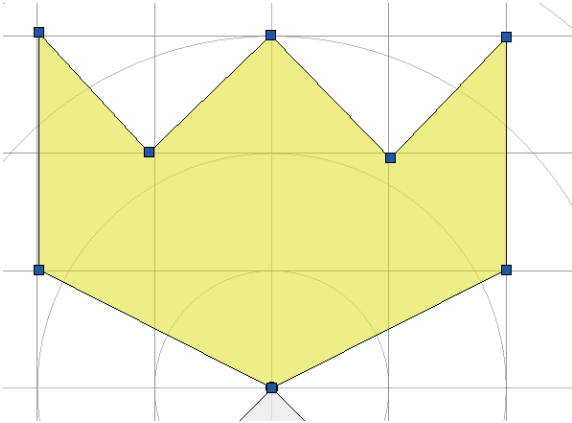


Figure 3-7 Example of polygon area

b) Rectangular area, example:

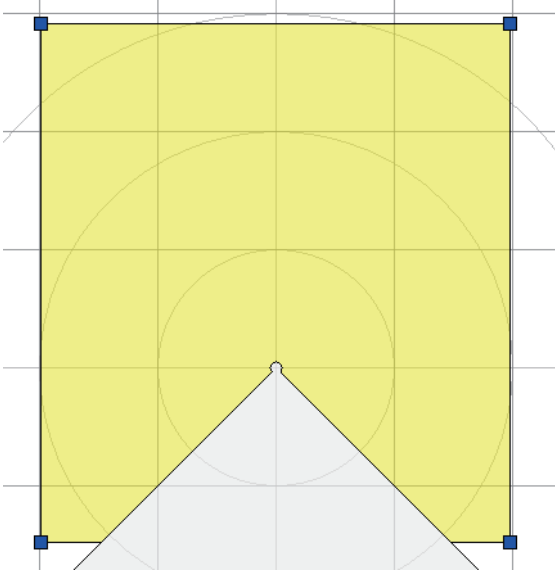


Figure 3-8 Example of rectangular area

c) Curved area, example:

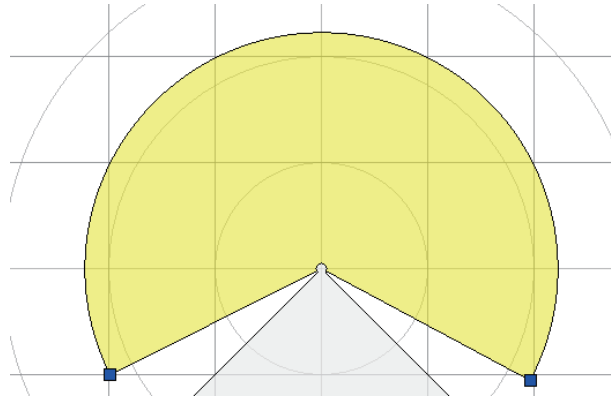


Figure 3-9 Example of curved area

d) Linear scale area, example:

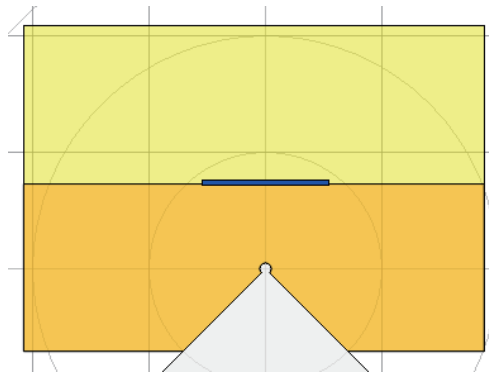


Figure 3-10 Linear proportional area

e) Sectoral proportional area, example:

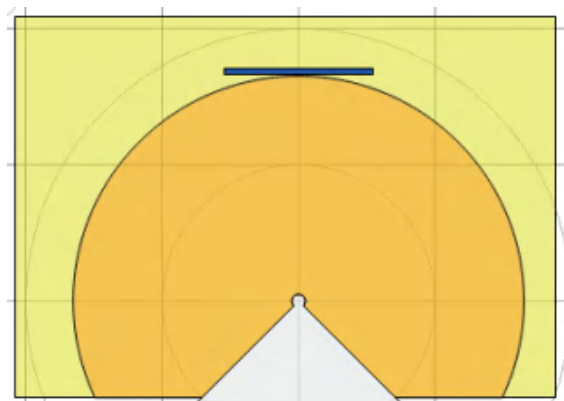


Figure 3-11 Example of fan-shaped proportional area

f) Full scale area, example:

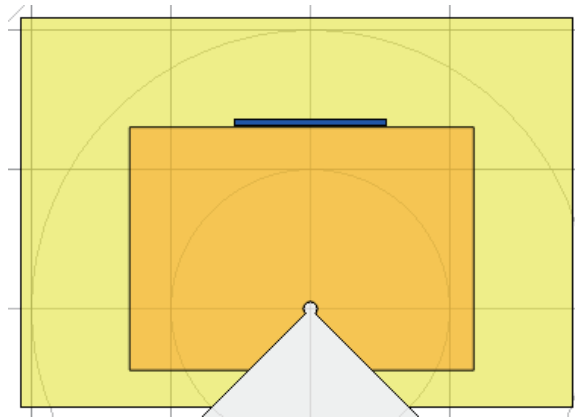


Figure 3-12 Example of full-scale area

By clicking the corresponding button, the area group will become the area type marked by this button.

6. Regional feature point

In terms of geometric structure, each area can be expressed by points and lines of points. For example, a polygonal area can be represented as a series of points; a rectangular area is defined by two points on the upper left and lower right; an arc area is composed of the start and end points of the arc plus arc segments. These points are characteristic points for the area.

There are two ways to display the coordinates of regional feature points: Cartesian coordinates and polar coordinates, as shown in the figure:

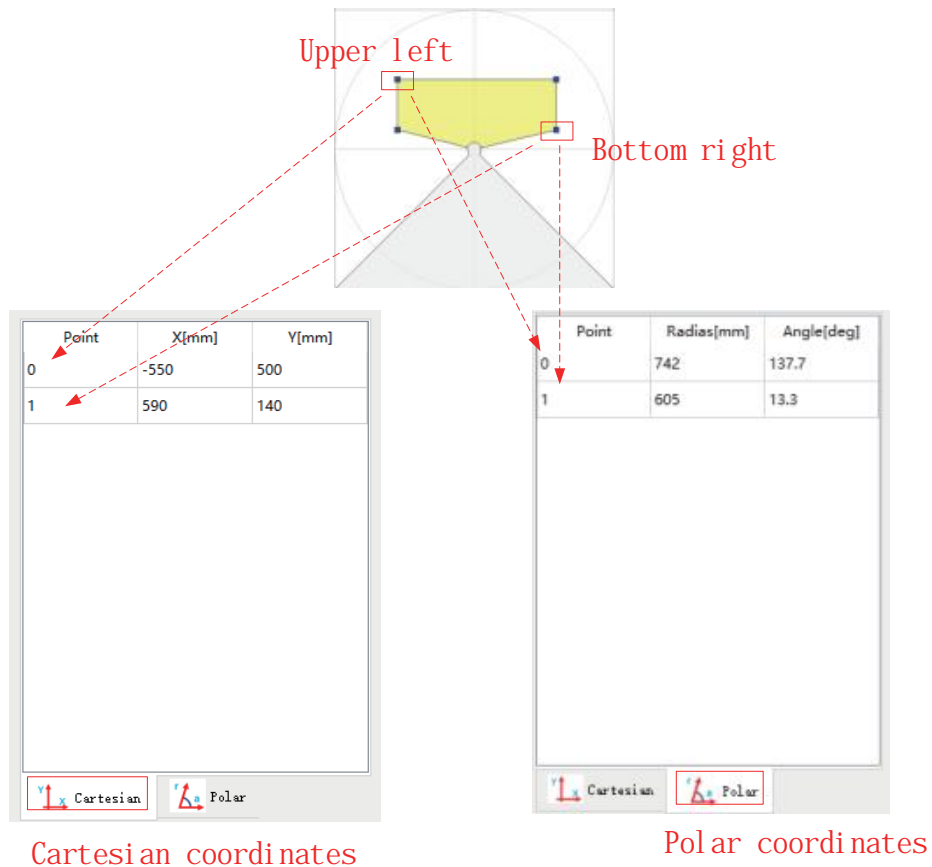


Figure 3-13 Coordinates of feature points

3.5 Area edit on display

3.5.1 Polygon area

Move the origin of the coordinates out to add a vertex to the polygon.

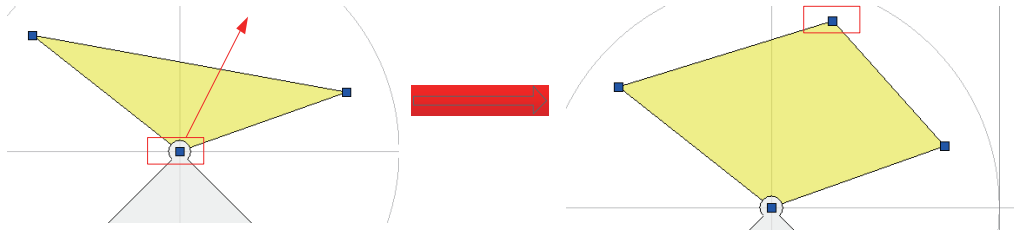


Figure 3-14 Editing the polygon area 1

You can change the shape of the polygon by moving the vertices of the polygon

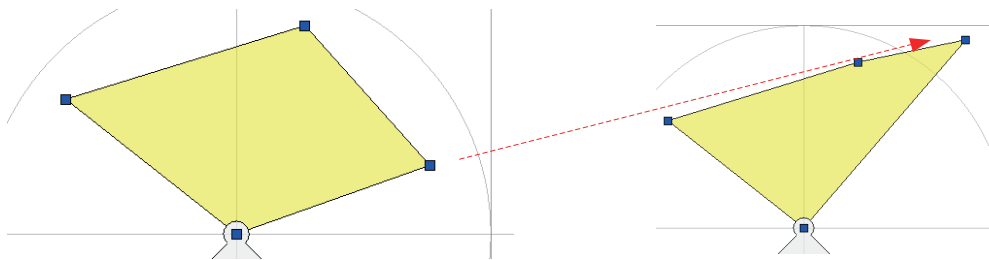


Figure 3-15 Editing the polygon area 2

Press the "DEL" key to delete a vertex of the polygon. When all vertices are deleted, the polygon is deleted.

The user can also edit the shape of the area by directly modifying the coordinates of the vertex, as shown in the figure:

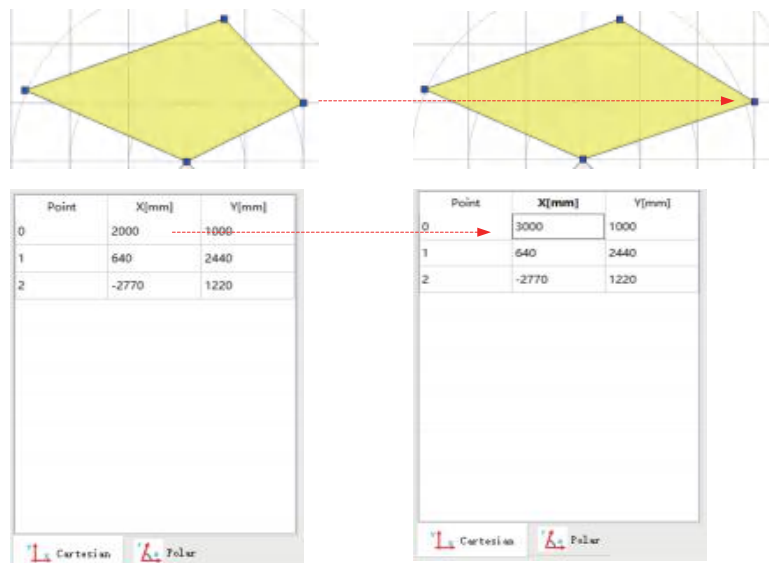


Figure 3-16 Editing the polygon area

3.5.2 Rectangular area

Due to the limitation of the radar scanning angle range, the rectangular area defined by TOF-05D is actually a geometric pattern composed of the intersection of the rectangular area defined by 4 points and the radar scanning area, as shown in the figure:

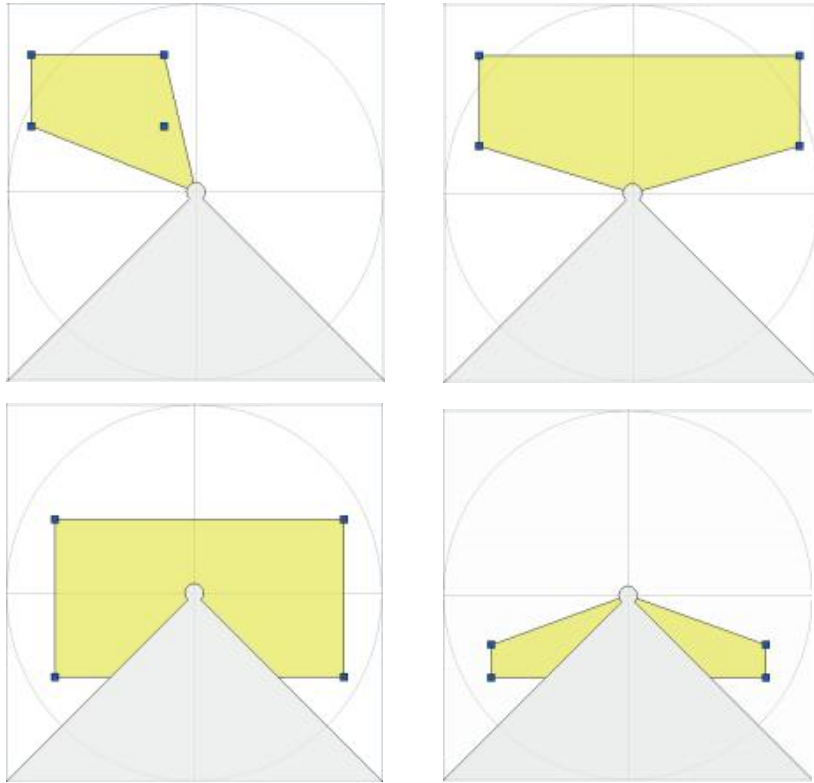


Figure 3-17 The shape of a rectangular area

Drag any vertex of the rectangle to change the shape of the rectangle.

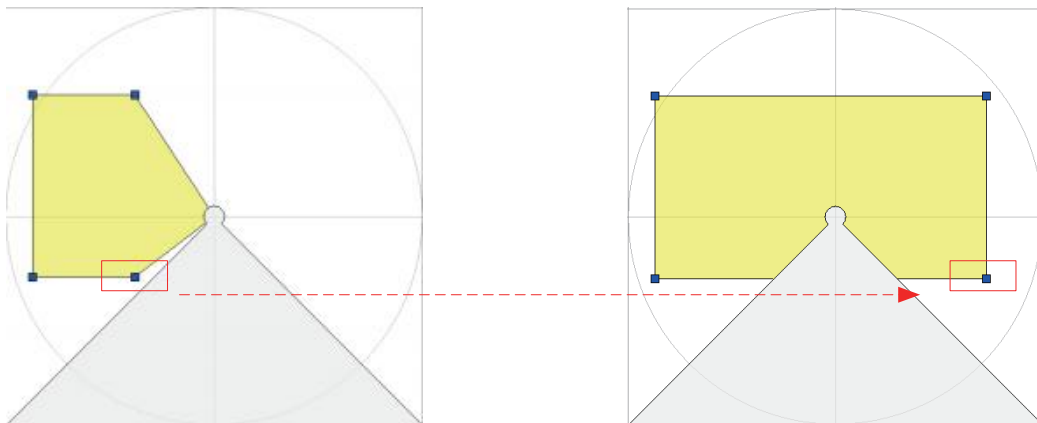


Figure 3-18 Changes in the rectangular area

The rectangular area cannot be deleted, you need to change its type to polygon, and then delete it.

Like the polygon area, the rectangular area can also be changed by editing its "TopLeft" and "BottomDown" points.

3.5.3 弧形区域

The fan-shaped area is a fan-shaped starting point and end point defined by the user and the center of the radar.

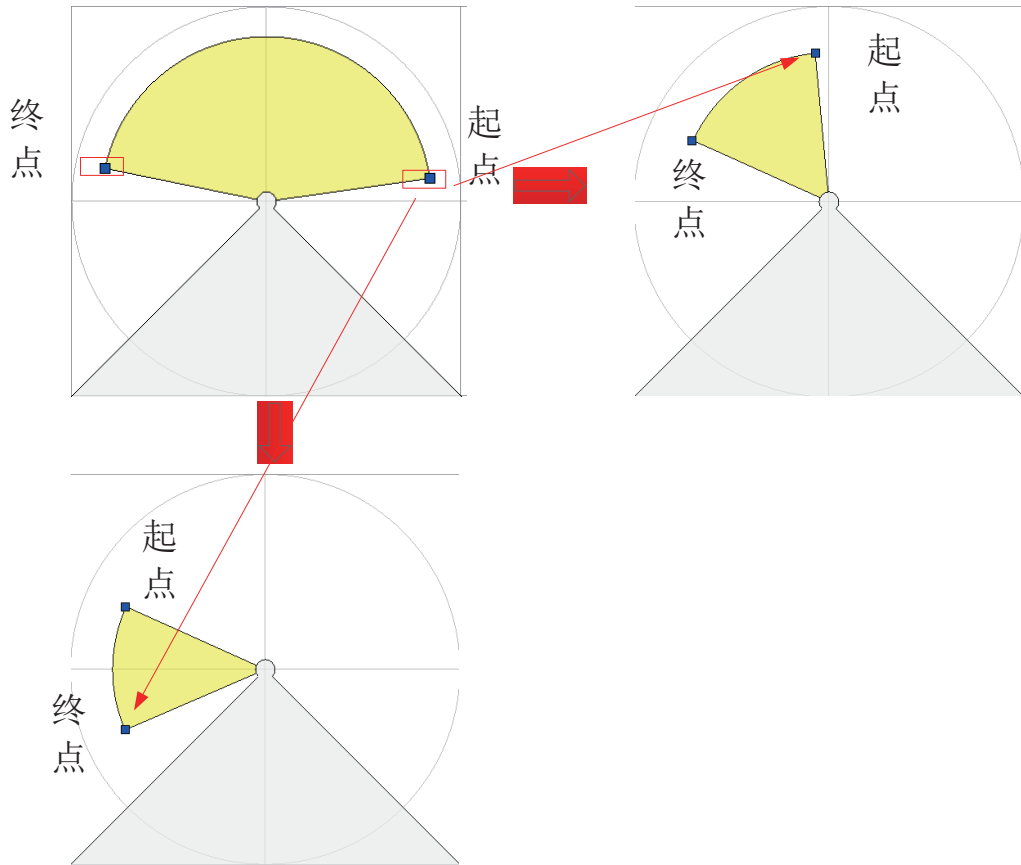


Figure 3-19 Editing the curved area

The starting point of the arc area is always the point with the smaller angle between the two points.

When changing the fan-shaped area, if the angle of the starting point is still smaller than the ending point, the fan-shaped topology remains unchanged; if the starting point exceeds the ending point, the ending point becomes the starting point and the starting point becomes the ending point.

Like the polygon area and the rectangular area, the arc area can also be changed by editing the coordinates of the arc endpoints.

3.5.4 Linear scale area

Straight line proportional area takes a straight line as a scale, and the area of the upper layer area smaller than this scale constitutes a linear scale area. By changing the position of this straight line, the shape of the area is changed.

Area 1 is the lowermost layer, area 2 is the middle layer, and area 3 is the uppermost layer.

Area 2 has no corresponding upper layer area, so it cannot be converted into a linear proportional area.

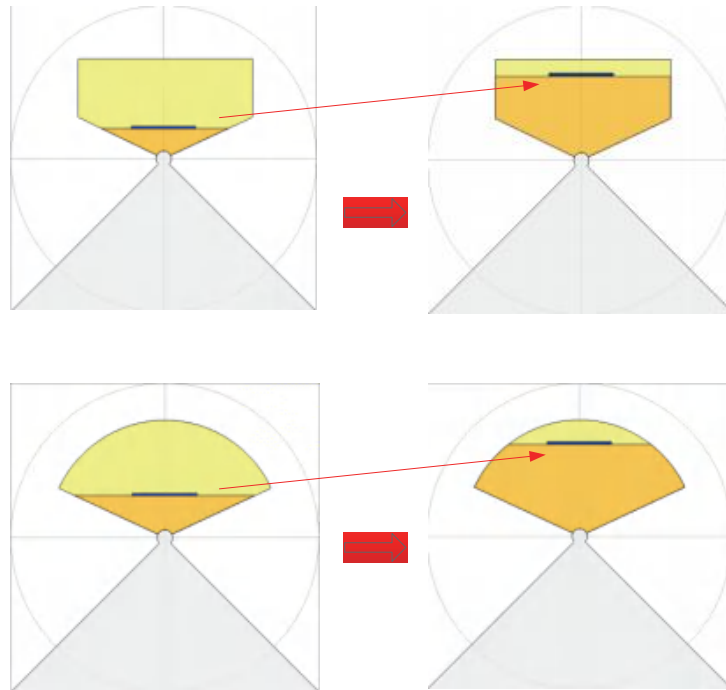


Figure 3-20 Editing the linear scale area

The shape of the linear proportional area can also be changed by editing the coordinates of "ChangeBar", as shown in the figure:

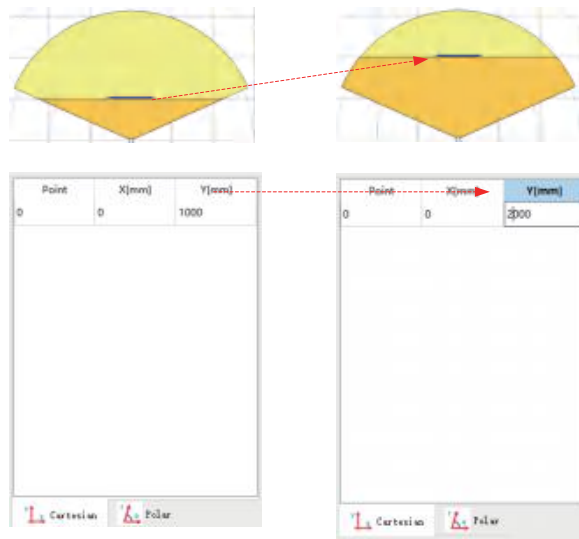


Figure 3-21 Editing the linear scale area 2

3.5.5 Sector proportional area

The fan-shaped proportional area is formed by the intersection of the upper layer area and the circle, and the radius of the circle is specified by the user dragging the corresponding control.

As mentioned in the previous section, area 2 cannot be transformed into a fan-shaped proportional area.

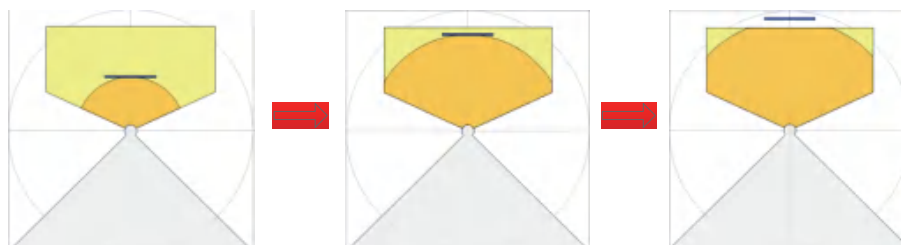


Figure 3-22 Fan-shaped proportional area editing

3.5.6 Full scale area

The area above the full scale area is used as a reference and is a similar shape to the area above. The user changes the similar ratio by dragging the corresponding control.

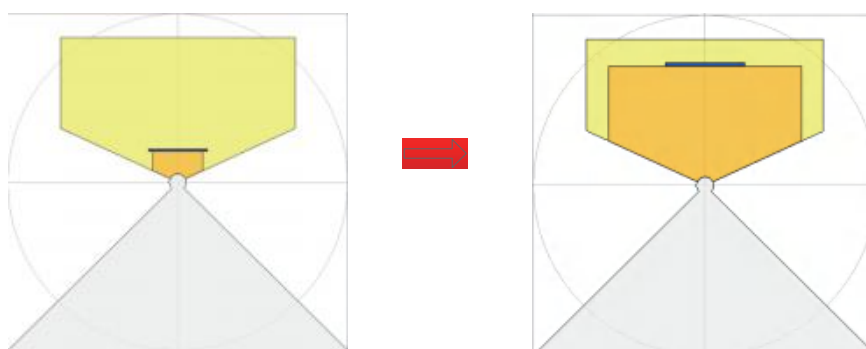


Figure 3-23 Editing the full-scale area

3.6 Parameter settings

When the radar is connected with TOF-05D Designer through the serial port, its operating parameters can be viewed and edited.



Figure 3-24 Device parameter settings

"Upload parameters" button: Download all parameters to TOF-05D radar.

"Download parameter" button: Read the parameters of TOF-05D radar.

Total working time: how long the radar connected to TOF-05D Designer has been working.

Working time this time: how long the radar connected to TOF-05D Designer has been working this time.

Power-on times: The radar connected to TOF-05D Designer has been powered on several times in total.

3.7 Point cloud view

3.7.1 Point cloud image

Whether in editing mode or monitoring mode, users can view the point cloud of the radar through "TOF-05D Designer". There are two differences here

1. In edit mode, TOF-05D Designer will display all point clouds.
2. In monitor mode, TOF-05D Designer will only display point cloud data within the angle range defined by the work area group.

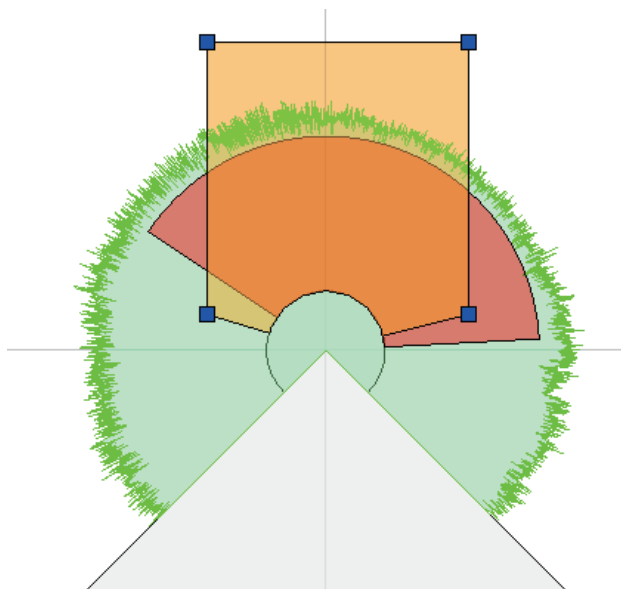


Figure 3-25 Point cloud display in edit mode

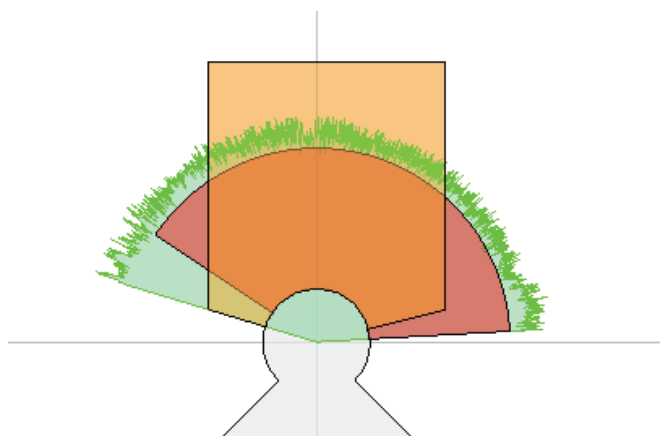


Figure 3-26 Point cloud display in monitoring mode

Point cloud viewing refers to viewing the specific values of point cloud data.

In monitoring mode, click the following button to view the point cloud data:

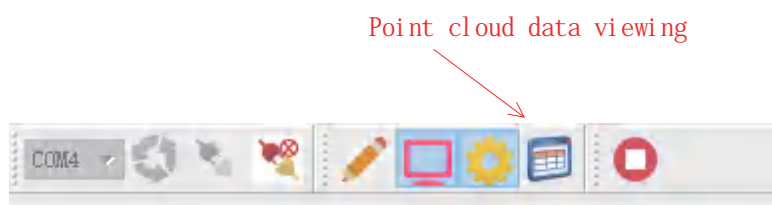


Figure 3-27 Point cloud data view button

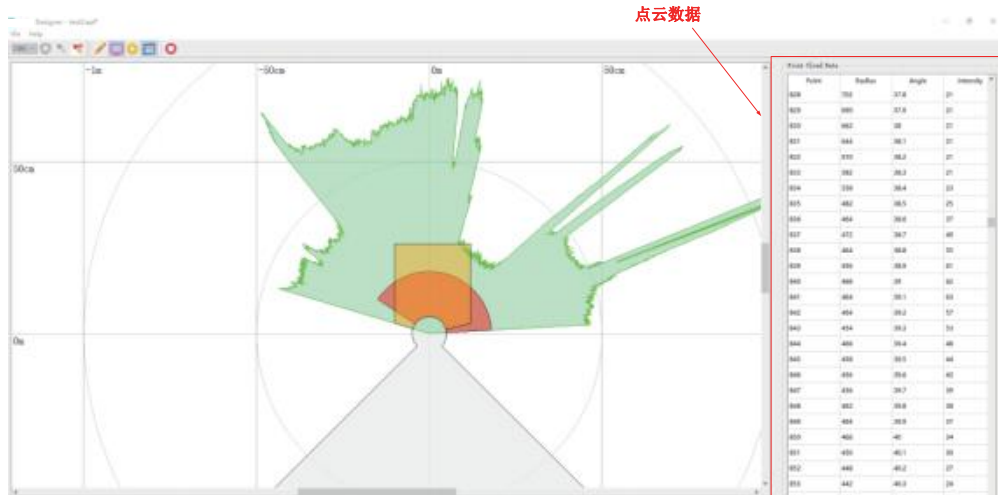


Figure 3-28 Point cloud data viewing

3.7.2 Point cloud measurement

TOF-05D Designer provides distance and angle measurement tools, which can measure point clouds, as shown in the figure:



Point cloud measurement tool

Figure 3-29 Point cloud measurement tool

Users only need to open and move the ruler to measure the point cloud:

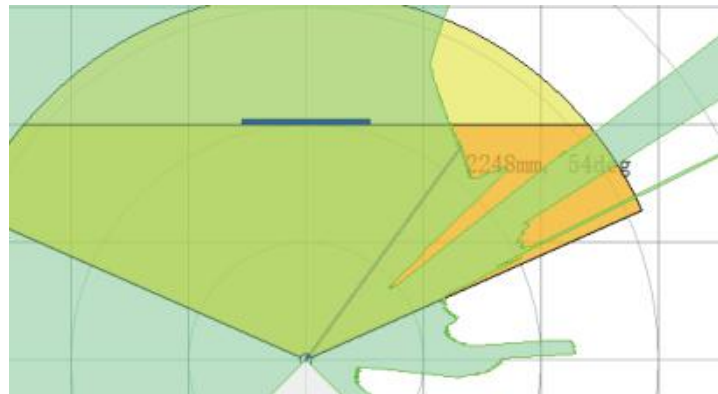


Figure 3-30 Point cloud measurement

3.8 Input/output signal

The input signal of TOF-05D radar is determined by the user's wiring, which is the choice of the radar working area group.

The output signal indicates the alarm status (Output1~Output3) and running status (Output4) of the radar.

Through TOF-05D Designer, users can know the input signal status, output signal status and working status of the radar.

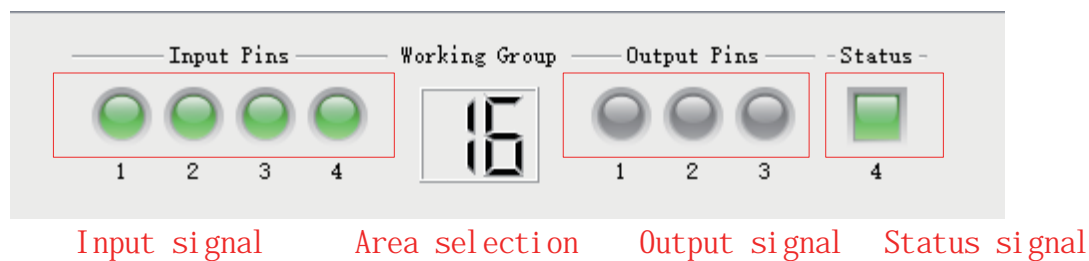


Figure 3-31 Input/output signals

For the specific meaning of the signal, please refer to "Obstacle Avoidance Software User Guide".

CYNDAR

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