



Xiamen Unique Technology Co., Ltd.

Progressive Safety System (BSIS+MOIS)



---77Ghz Millimeter wave
technology based

Automotive driving safety Profession

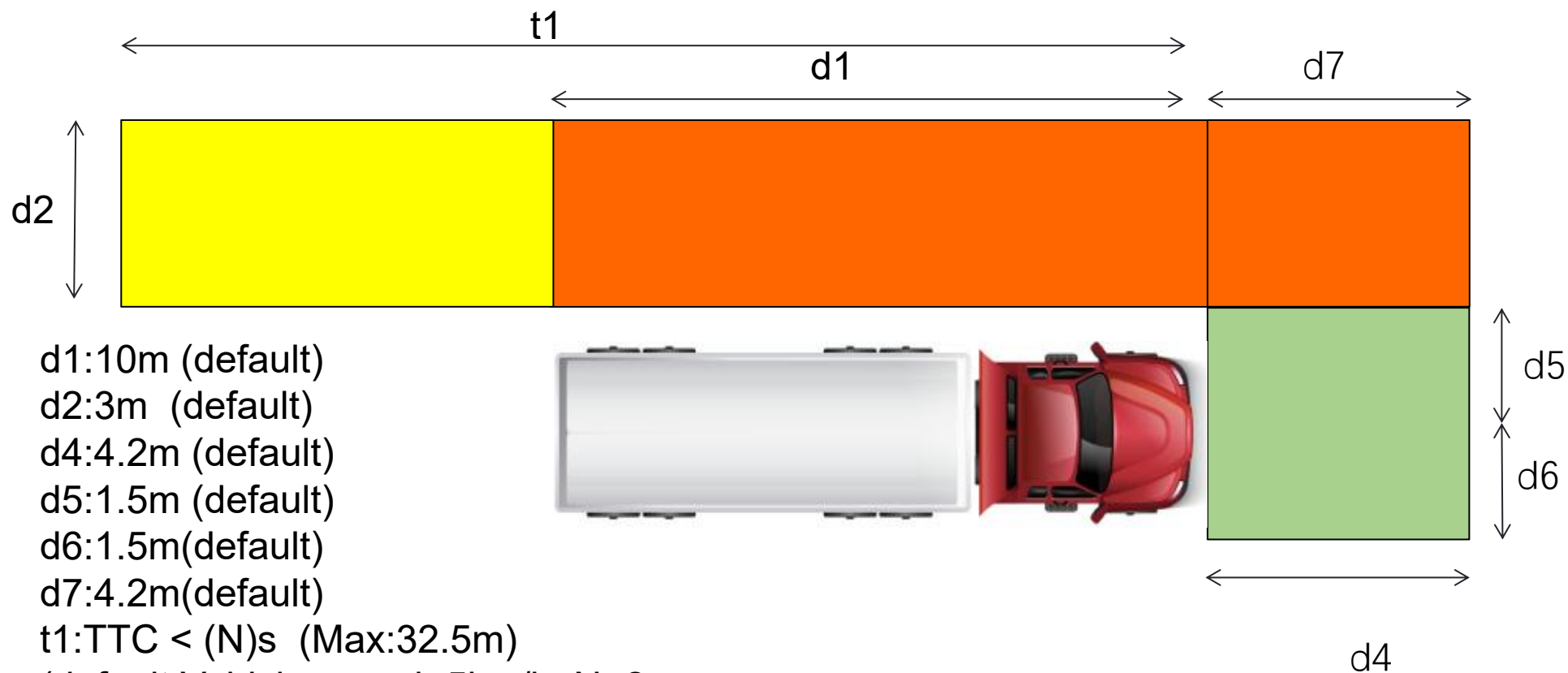
INTRODUCTION

The Progressive Safe System (PSS) is a collection of safety equipment designed to improve driver and VRU awareness of the dangers around them and physical safety barriers.

To meet this standard, Unique Technology develop a completely solution to solve this issue by using the latest 77Ghz millimetre-wave radar technology to meet the DVS 2024 requirements.



Warning Area



d1:10m (default)

d2:3m (default)

d4:4.2m (default)

d5:1.5m (default)

d6:1.5m (default)

d7:4.2m (default)

t1:TTC < (N)s (Max:32.5m)

(default:Vehicle speed < 5km/h, N=2,

Vehicle speed < 30km/h > 5km/h, N=12,

Vehicle speed > 30km/h, N=3)

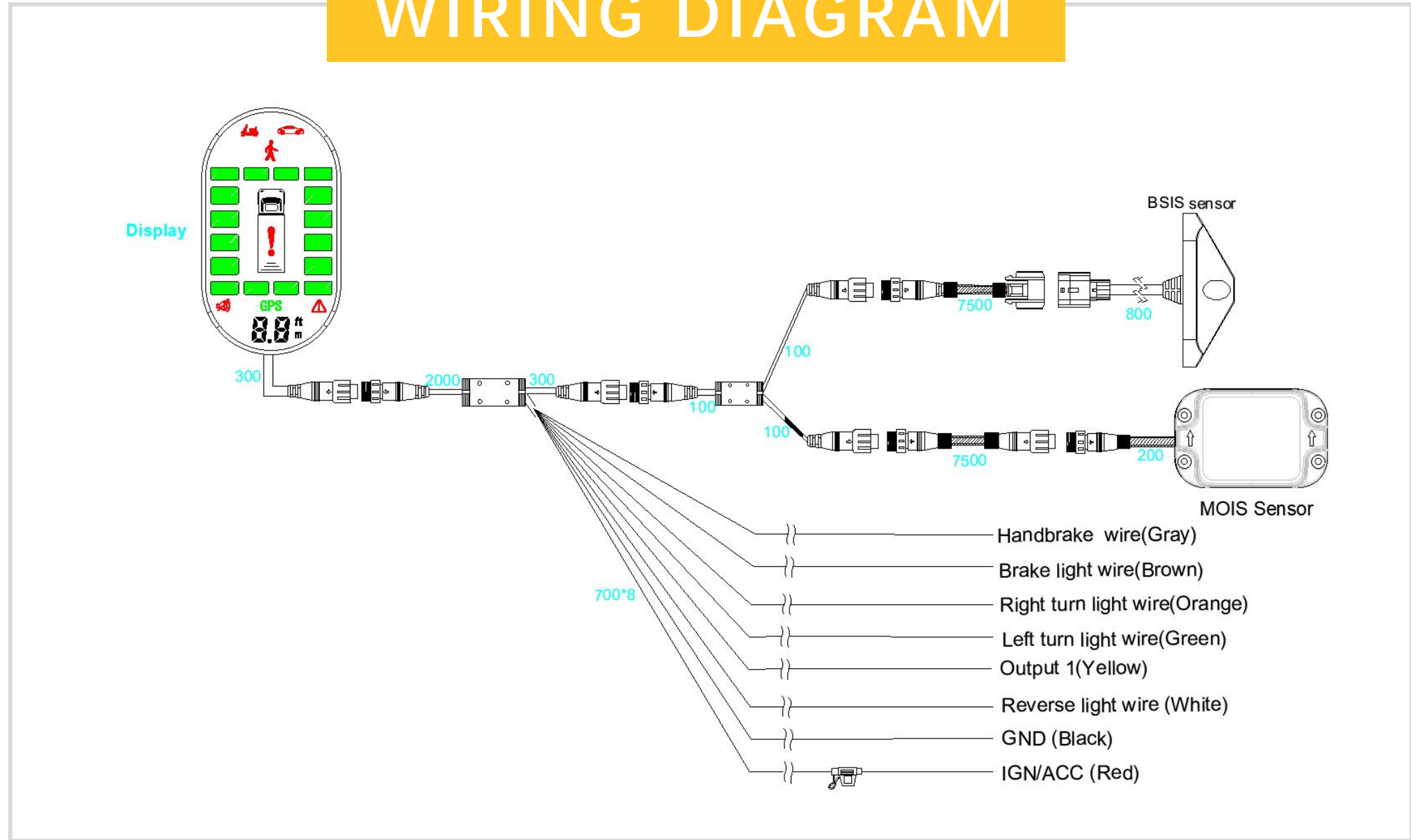
Parameter d1,d2,d4,d5,d6,t1 can be set via handheld setup tool.

MAIN PARTS

| Part Name | Qty |
|------------------------------------|-------|
| MOIS radar | 1 pc |
| BSIS radar | 1 pc |
| LED display (with GPS built in) | 1 pc |
| Harness | 1 set |
| Installation kits | 1 set |



WIRING DIAGRAM



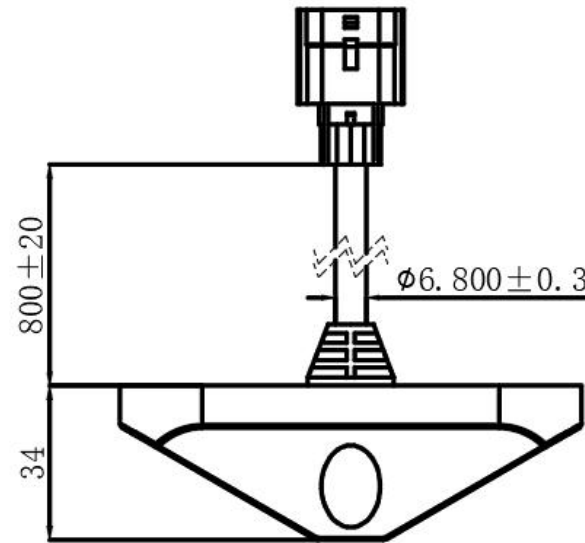
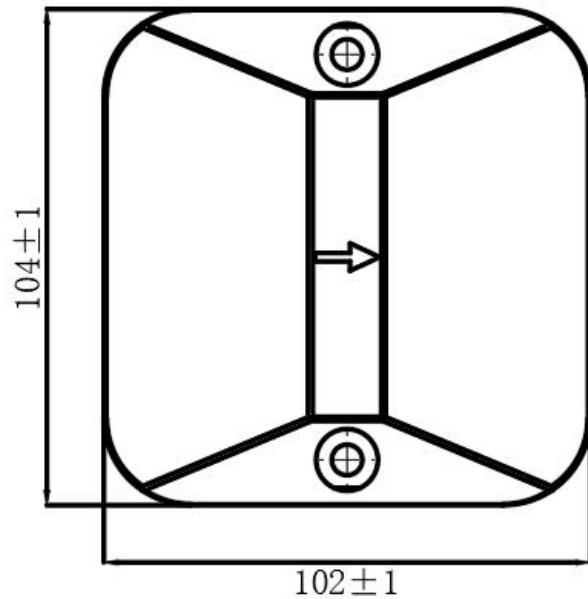


INSTALLATION



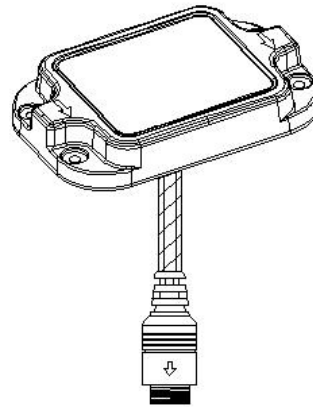
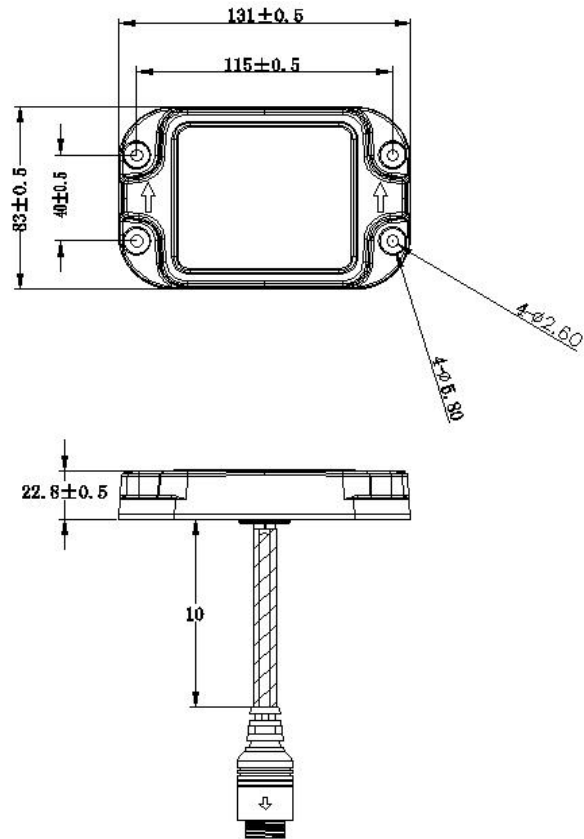
APPEARANCE&SIZE-BSIS RADAR

Unit: mm



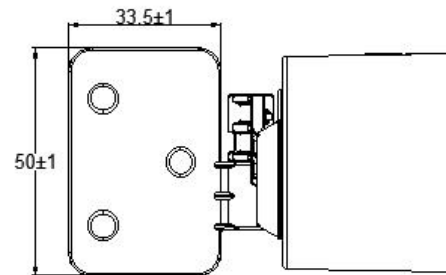
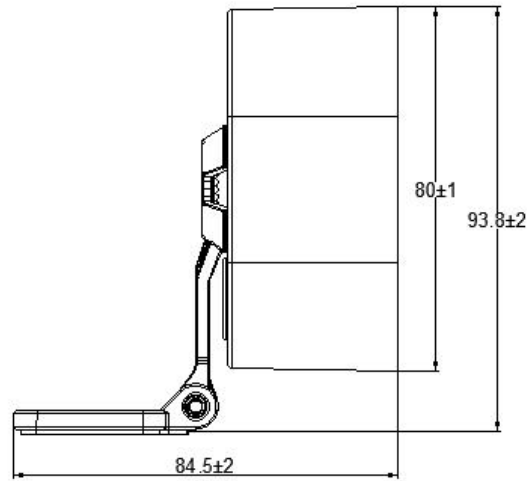
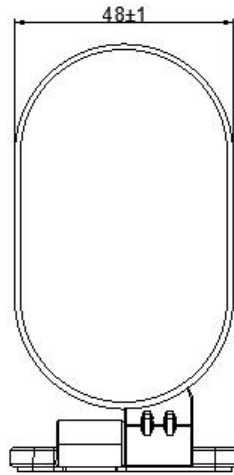
APPEARANCE&SIZE-MOIS RADAR

Unit: mm



APPEARANCE&SIZE-DISPLAY

Unit: mm





BSIS Radar Specifications

| ITEM | Parameter | ITEM | Parameter |
|--|-------------|-------------------------|-------------|
| Rated working voltage (V) | 12V/24V | Horizontal angle (°) | 180° |
| Operating voltage range (V) | 9-32V | Vertical angle (°) | 30° |
| Power consumption | < 6W | Angle accuracy (°) | ±0.5 @ 40° |
| Operating temperature range (°C) | -40 ~ +85°C | Angular resolution (°) | 18 |
| Storage temperature range (°C) | -40 ~ +95°C | Speed Range (km/h) | -150 ~ +150 |
| Working frequency (GHz) | 76-77 | Speed Accuracy (m/s) | 0.15 |
| Transmit power (dBm) | 12 | Detectability (m) | 65m |
| Modulation mode | FMCW | Distance Accuracy (m) | 0.13 |
| Antenna form | 4TX, 4RX | Distance Resolution (m) | 0.19 |
| Traceable target number _{MAX} | 31 | Waterproof grade | IP6K7 |



MOIS Radar Specifications

| ITEM | Parameter | ITEM | Parameter |
|--|-------------|-------------------------|-------------|
| Rated working voltage (V) | 12V/24V | Horizontal angle (°) | 140° |
| Operating voltage range (V) | 9-32V | Vertical angle (°) | 30° |
| Power consumption | < 6W | Angle accuracy (°) | ±0.5 @ 40° |
| Operating temperature range (°C) | -40 ~ +85°C | Angular resolution (°) | 15 |
| Storage temperature range (°C) | -40 ~ +95°C | Speed Range (km/h) | -144 ~ +144 |
| Working frequency (GHz) | 77G | Speed Accuracy (m/s) | 0.2 |
| Transmit power (dBm) | 12 | Detectability (m) | 70 |
| Modulation mode | FMCW | Distance Accuracy (m) | 0.1 |
| Antenna form | 1TX, 4RX | Distance Resolution (m) | 0.2 |
| Traceable target number _{MAX} | 31 | Waterproof grade | IP6K7 |



Display Specifications

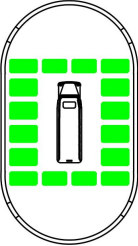

| ITEM | Parameter |
|----------------------------------|----------------|
| Rated working voltage (V) | 12V/24V |
| Operating voltage range (V) | 9-32V |
| Working current | < 500mA@12V |
| Operating temperature range (°C) | -40 ~ 80 |
| Storage temperature range (°C) | -40 ~ 85 |
| Volume | ≥90dB@12V/10cm |

Function



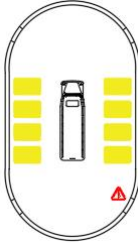
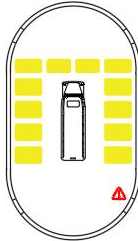
Self-diagnosis

When the system IGN is on and the reverse gear is engaged in, the system starts self-diagnosis, the result showed as below:

| No. | Self-diagnosis result | LED bar | Buzzer built-in | Note |
|-----|-----------------------|--|-----------------|------------------------------|
| 1 | Pass |  | Beep once | Normal working |
| 2 | MOIS Radar Missed |  | Beep twice | Only BSIS function available |

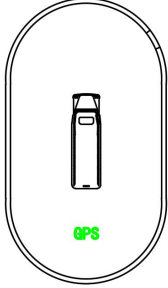
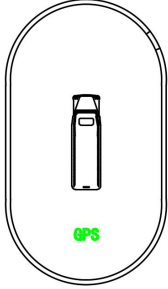
Function



| No. | Self-diagnosis result | LED bar | Buzzer built-in | Note |
|-----|----------------------------|---|-----------------|------------------------------|
| 1 | BSIS Radar Disconnect |  A top-down view of a car with a central LED bar. The bar consists of 10 segments. The 4 segments on the left and 4 segments on the right are illuminated yellow. A red triangle warning symbol is located at the bottom right of the car's outline. | Beep once | Only MOIS function available |
| 2 | MOIS And BSIS Radar Missed |  A top-down view of a car with a central LED bar. The bar consists of 10 segments. All 10 segments are illuminated yellow. A red triangle warning symbol is located at the bottom right of the car's outline. | Beep twice | Not working completely |


Function



| No. | Self-diagnosis result | LED bar | Buzzer built-in | Note |
|-----|-----------------------|---|-----------------|--|
| 3 | GPS Signal Valid |  An oval-shaped LED bar with a vertical rectangle in the center. Below the rectangle, the word "GPS" is written in green. | GPS ON | Normal |
| 4 | GPS Signal Invalid |  An oval-shaped LED bar with a vertical rectangle in the center. Below the rectangle, the word "GPS" is written in green. | GPS Blink | The working performance of this system might not good as designed. |

Function



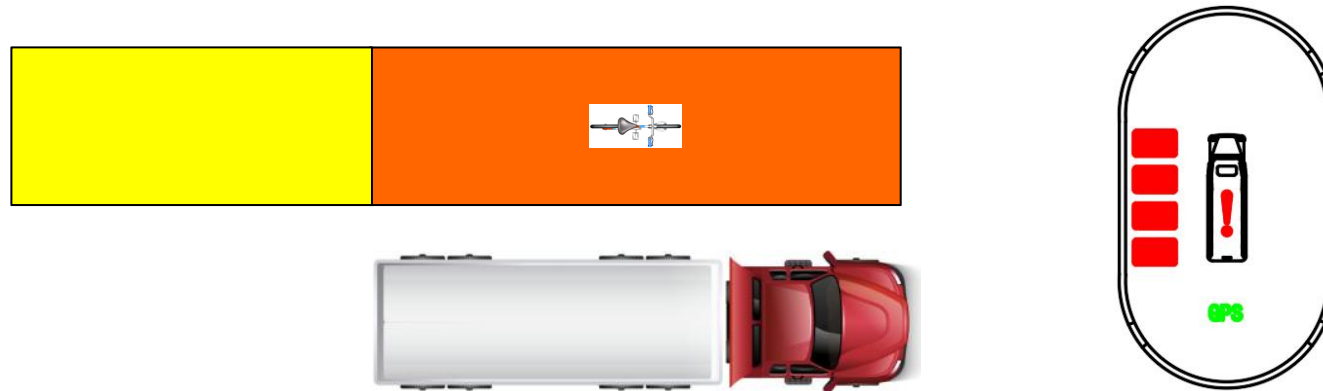
| No. | Self-diagnosis result | LED bar | Buzzer built-in | Note |
|-----|-----------------------|--|-----------------|--|
| 5 | GPS disconnect |  A diagram of an LED bar, which is a vertical rectangular component with rounded ends, centered within a larger oval frame. | GPS OFF | The working performance of this system might not good as designed. |

Function



BSIS static detection function (Vehicle speed $V_{\text{vehicle}} \leq 5\text{km/h}$)

a. When there's pedestrian or cyclist come into the red area from rear, the display will provide warning signal (LED bar keeps on in red color), as below picture. If the driver turn on the corresponding turning signal, the display will provide collision warning (color bar show in red and blink, buzzer beeps twice), the external output cable will provide a high level output.

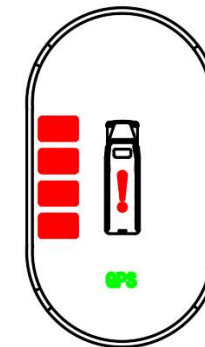
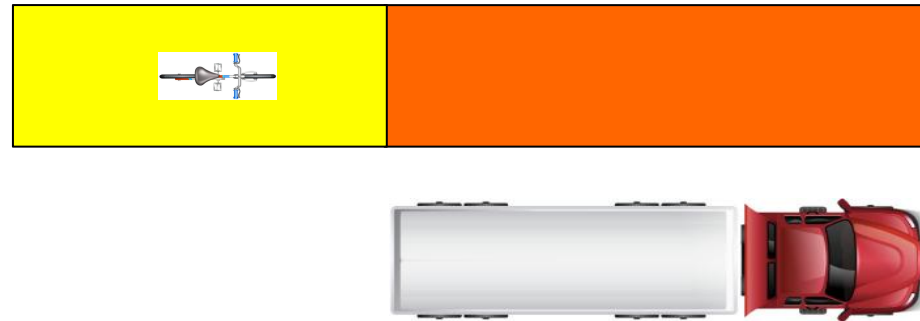


Function



b. When there's pedestrian or cyclist come into the yellow area from rear and will overtake the subject vehicle in 12s(TTC), the display will provide warning signal (LED bar keeps on in red color) .

----When $TTC < 2s$, If the driver turn on the corresponding turning signal, the display will provide collision warning (color bar show in red and blink, buzzer beeps twice). the external output cable will provide a high level output.



Function



BSIS dynamic test detection function ($30\text{km/h} \geq \text{Vehicle speed } V_{\text{vehicle}} \geq 5\text{km/h}$)

a. When there's pedestrian or cyclist come into the red area from rear or stay in the red area, the display will provide warning signal (LED bar keeps on in red color), as below picture.

----If the driver turn on the corresponding turning signal, the display will provide collision warning (color bar show in red and blink, buzzer beeps twice).the external output cable will provide a high level output.

----If the VRU enters the area near the front of the vehicle (the distance to the side of the vehicle is less than 1m, and the distance to the front of the vehicle is less than 5m), the display will provide collision warning (color bar show in red and blink, buzzer beeps twice).the external output cable will provide a high level output.



Function



b. When there's pedestrian or cyclist come into the yellow area from rear and will overtake the subject vehicle in 12s(TC), the display will provide warning signal (LED bar keeps on in red color) .

----when $TTC < 3s$, If the driver turn on the corresponding turning signal, the display will provide collision warning (color bar show in red and blink, buzzer beeps twice). the external output cable will provide a high level output.



Function



Blind spot detection function (Vehicle speed $V_{\text{vehicle}} > 30\text{km/h}$)

a. When there's moving object come into the red area from rear or stay in the red area, the display will provide warning signal (LED bar keeps on in red color), as below picture.

----If the driver turn on the corresponding turning signal, the display will provide collision warning (color bar show in red and blink, buzzer beeps twice).the external output cable will provide a high level output.

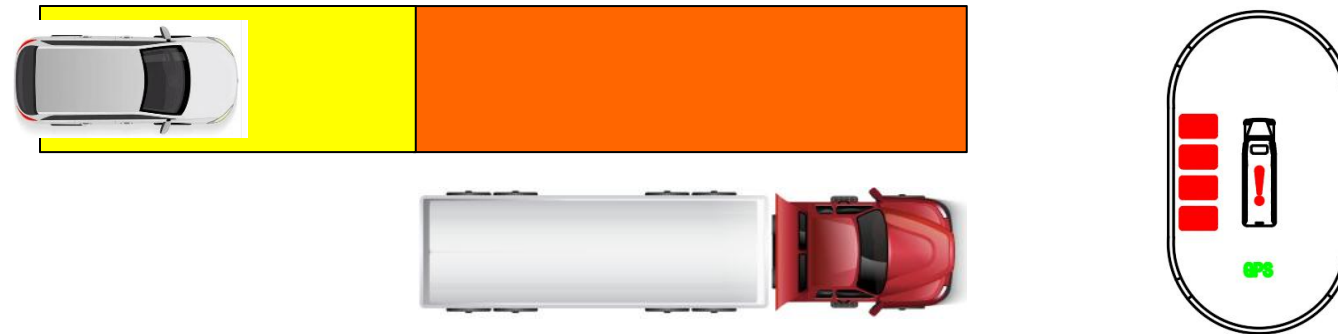


Function



b. When there's moving object come into the yellow area from rear and will overtake the subject vehicle in 3s(TTC), the display will provide warning signal (LED bar keeps on in red color) .

----If the driver turn on the corresponding turning signal, the display will provide collision warning (color bar show in red and blink, buzzer beeps twice). the external output cable will provide a high level output.

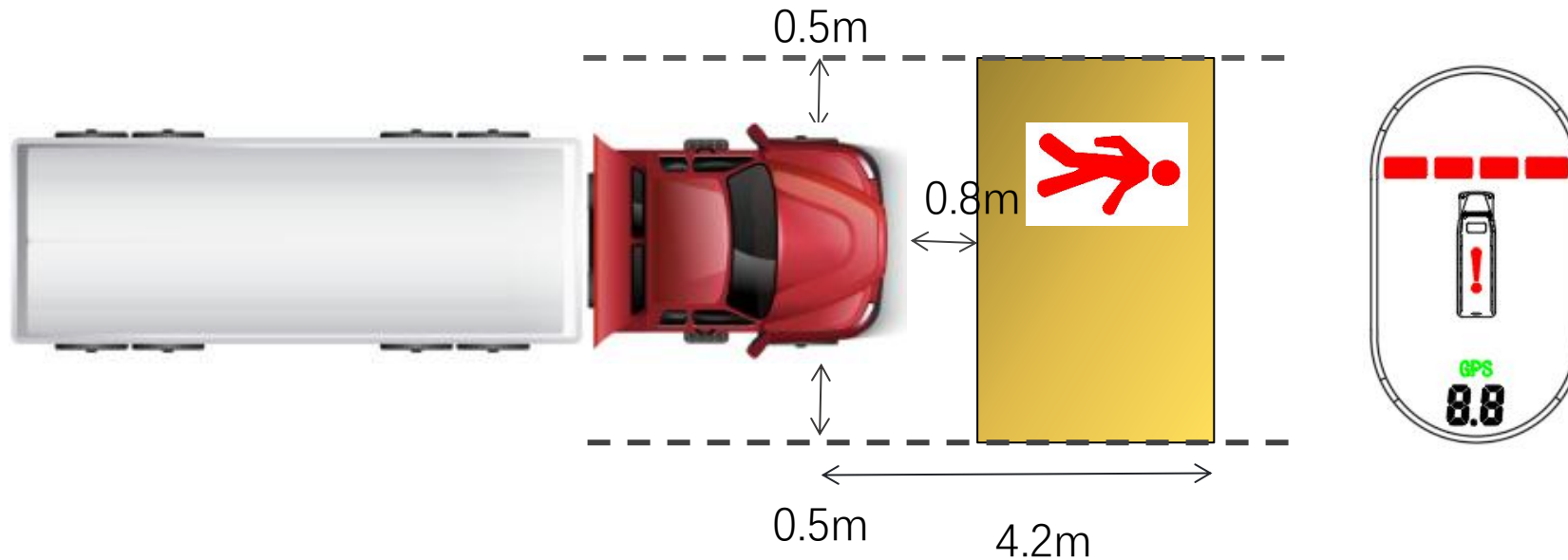


Function



MOIS static detection function (Vehicle speed $V_{\text{vehicle}} = 0\text{km/h}$)

- a. When pedestrians or bicycles (VRUs) appear in the yellow area(see below picture), the display will show obstacle distance.

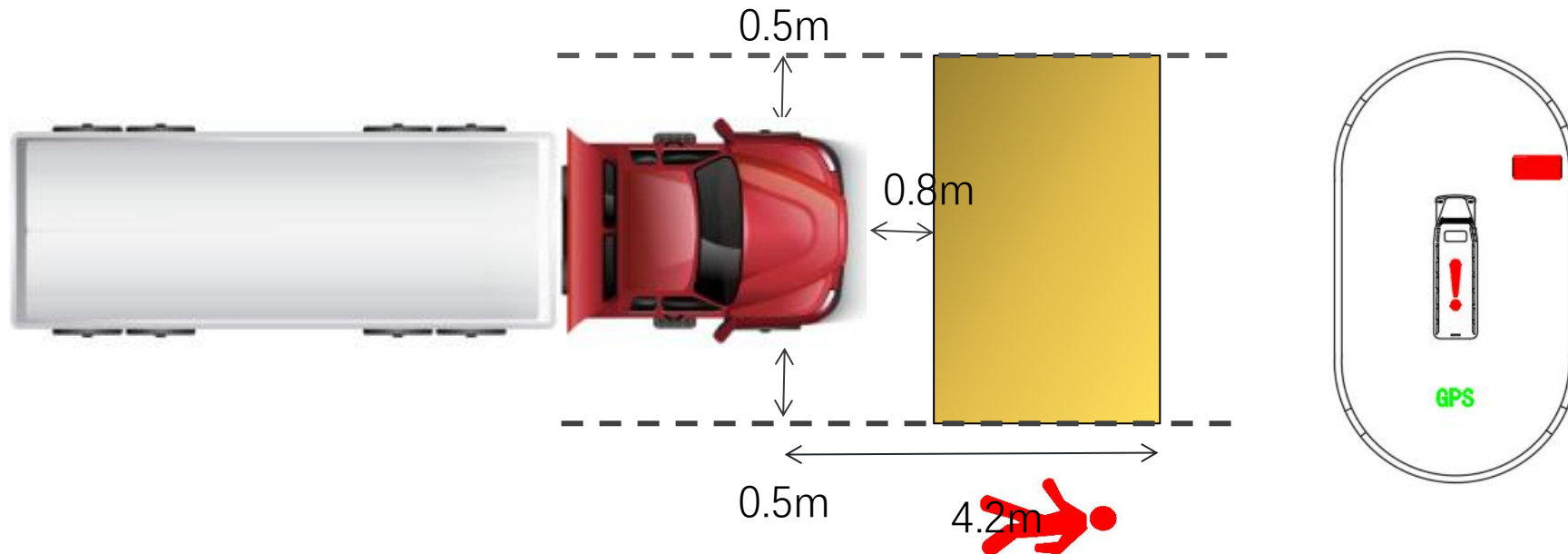


Function



MOIS static detection function (Vehicle speed $V_{\text{vehicle}} = 0\text{km/h}$)

c. When pedestrians or bicycles (VRUs) appear from the right side of the yellow area(see below picture), and the $TTC < 1.4\text{S}$, the display show as below:

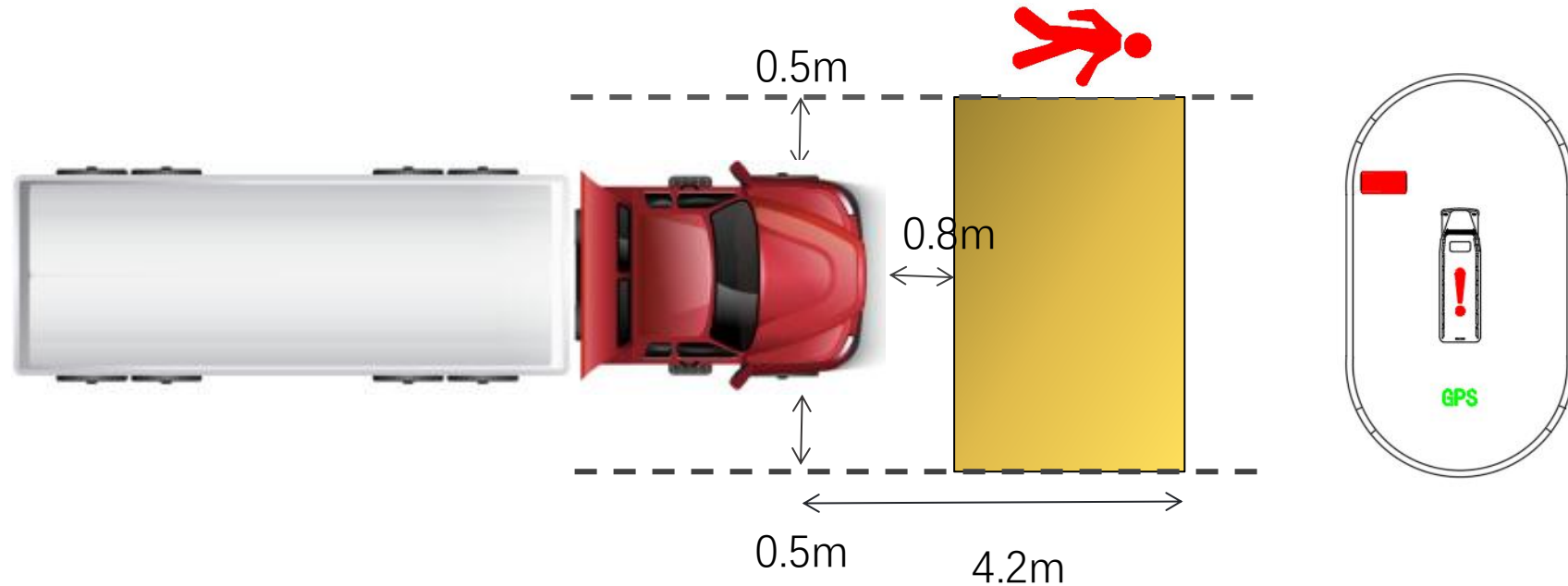


Function



MOIS static detection function (Vehicle speed $V_{\text{vehicle}} = 0\text{km/h}$)

b. When pedestrians or bicycles (VRUs) appear from the left side of the yellow area (see below picture), and the $TTC < 1.4\text{S}$, the display show as below:

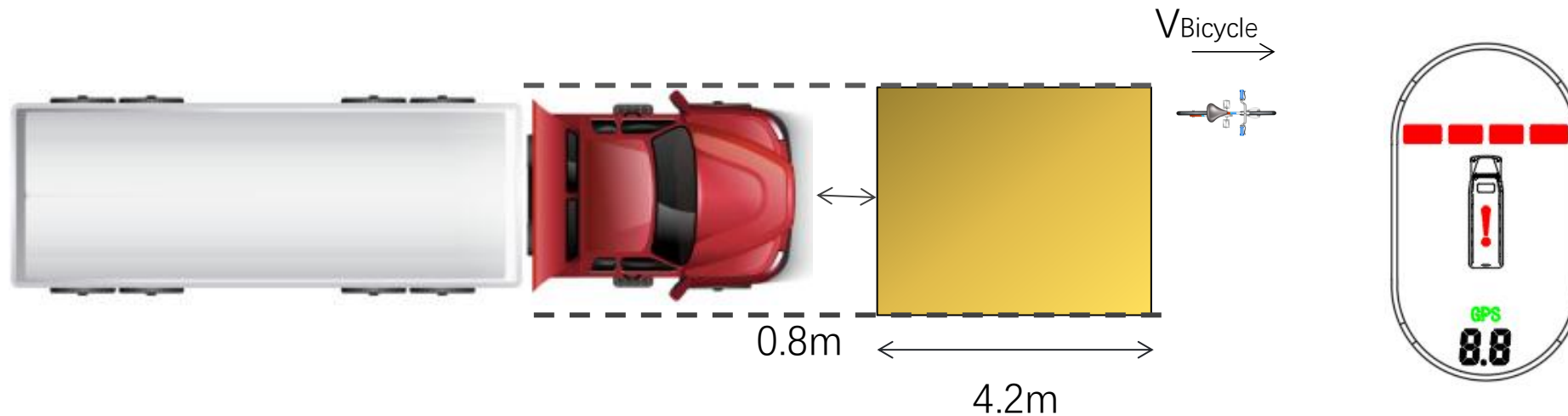


Function



MOIS dynamic detection function (Vehicle speed $0\text{km/h} < V_{\text{vehicle}} \leq 15\text{km/h}$)

- a. When pedestrians or bicycles (VRUs) appear in the front of the yellow area as below picture, and $TTC < 2S$, the display will show obstacle distance.

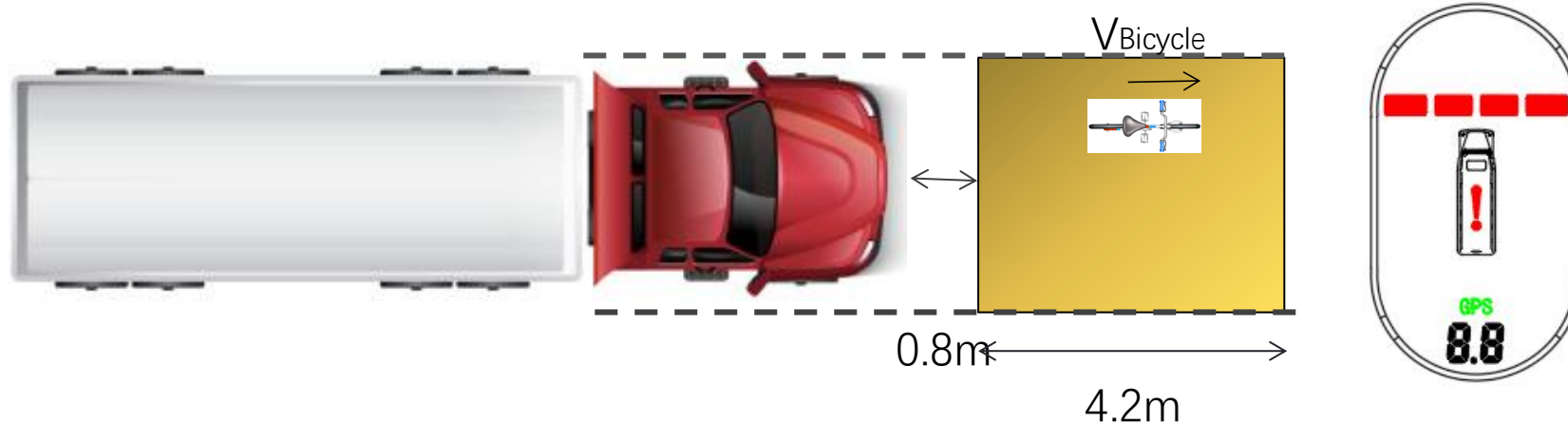


Function



MOIS dynamic detection function (Vehicle speed $0\text{km/h} < V_{\text{vehicle}} \leq 15\text{km/h}$)

b. When pedestrians or bicycles (VRUs) appear in the yellow area as below picture, and $TTC > 2S$, the display will show obstacle distance;

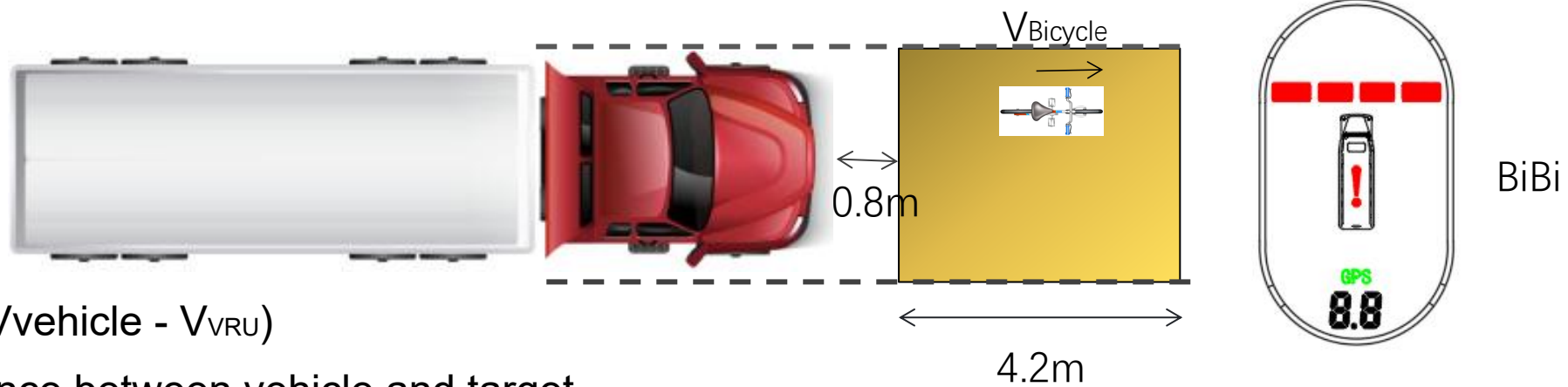


Function



MOIS dynamic detection function (Vehicle speed $0\text{km/h} < V_{\text{vehicle}} \leq 15\text{km/h}$)

c. When pedestrians or bicycles (VRUs) appear in the yellow area(see below picture), and the collision time $TTC < 2\text{s}$, the external output cable will provide a high level output, the display will show obstacle distance, and the buzzer built in display will beep twice (Bi-Bi-).



Note: $TTC = D / (V_{\text{vehicle}} - V_{\text{VRU}})$

D: The distance between vehicle and target

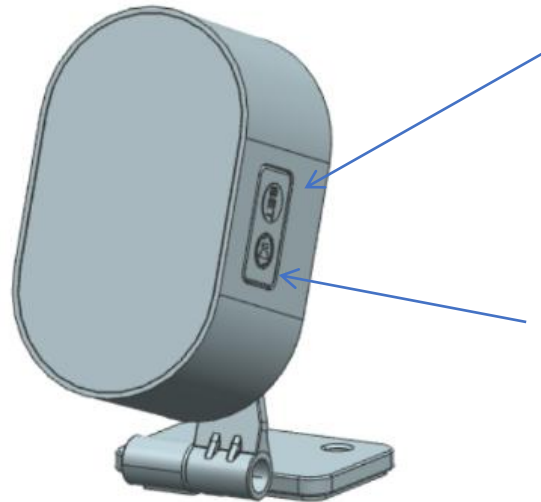
V_{VRU} : Target object speed

V_{vehicle} : Vehicle speed

Function



Display setup function



Setup button:

1. Setup the radar Installation position (Left or right)
2. Turn on & off the system

Volume button

Adjust the buzzer volume

Function



Detection area and Sensor Location setup by handheld setup tool

t1: The time of the target vehicle overtake the subject vehicle (Default: 3s)

d1:BSIS hazardous area length (Default: 10m)

d2:BSIS hazardous area width (Default: 3m)

d3:BSIS radar position to frontmost of vehicle (Set according to actual installation position)

d7:BSIS front extension area (Default: 4.2)

d4:MOIS warning area length (Default:4.2m)

d5:MOIS warning area width of left side (Default:1.5m)

d6:MOIS waring area width of right side (Default:1.5m)

