



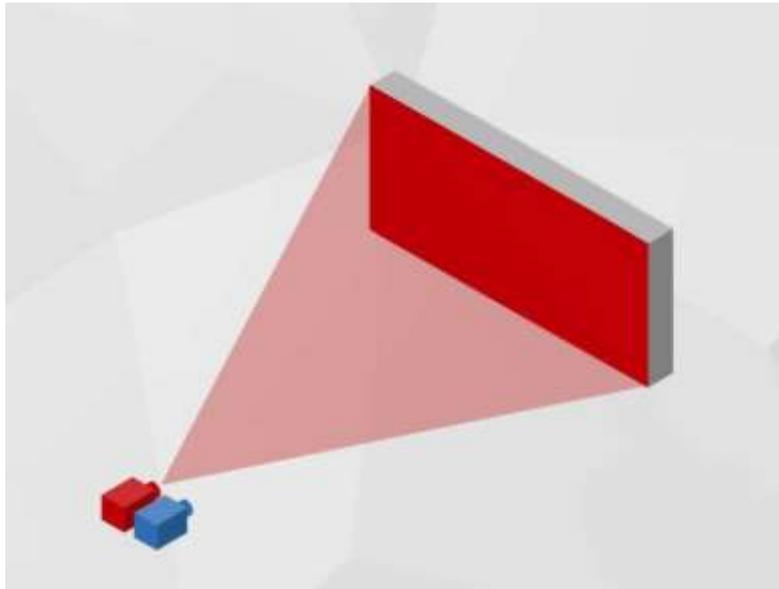
# WDR Function Application Note

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## 1. General Information

The purpose of this document is to familiarize the customer with the WDR (Wide Dynamic Range) function of the Vzense ToF Camera. This document explains the principle of WDR function, and the steps to implement it in several ways.

This document applies to Vzense ToF products, DCAM710 and DCAM550 series.



## 2. Detect Range of ToF

The ToF (Time-of-Flight) technology is a method for measuring the distance between a sensor and an object, based on the time difference between the emission of a laser pulse signal and its return to the sensor, after being reflected by an object.

The width of the laser pulse determines the detect range of the product.

It has the near limited distance due to the light saturation of the sensor and the far limited distance due to the too weak light strength to measure.



The below table shows the distance range of each range mode;

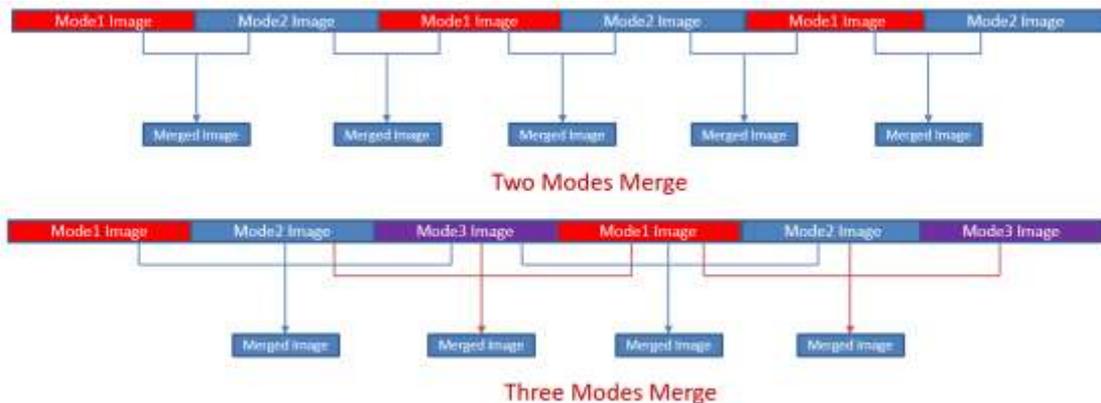
Range number	Distance range
Range 0	0.35m~1.5m
Range 2	0.8m~4.4m
Range 5	1.2m~6.2m

If the application requires wider range, to expand the range limitation, for example 0.35m~4.4m. the WDR function can be introduced.

### 3. WDR (Wide Dynamic Range)

In WDR(Wide Dynamic Range) mode, the ToF camera can work at more than one range modes alternately, the Vzense SDK can either outputs the depth images separately or merge the depth images into one, therefore can expand the range limitation from furthest distance to nearest distance.

However the frame rate will be reduced.



**Alternation Mode:** ToF camera outputs depth image of two ranges separately and alternately. You can get each of the two images by the SDK separately. For instance, one range 0 image for 0.35m~1.5m, another one range 2 image for 0.8m~4.4m.

**Fusion Mode:** Vzense SDK can merge the two images into one, and output to the application.

## 4. WDR Implementation

### 4.1 Vzense UTool

1. Open and modify the UTool.ini in the folder of uTool;

Example 1: WDR mode of range 0 and range 2

```
#WDR1
t1_totalRange=2 //how many range modes in WDR
t1_range1=0//The first range mode in WDR, 0 refers range 0;
t1_range1Count=1//must be 1;
t1_range2=2 // The second range mode in WDR, 2 refers range 2
t1_range2Count=1//must be 1;
t1_range3=0//The second range mode in WDR mode, because t1_totalRange=2, so
//only two ranges in the WDR mode, so t1_range3 doesn' t take effect.
t1_range3Count=1//must be 1;
```

例二：WDR mode which includes range 0, range 1, range 2

```
#WDR2
```

```
t1_totalRange=3 //how many range modes in WDR
```

```
t1_range1=0//The first range mode in WDR, 0 refers range 0;
```

```
t1_range1Count=1//must be 1;
```

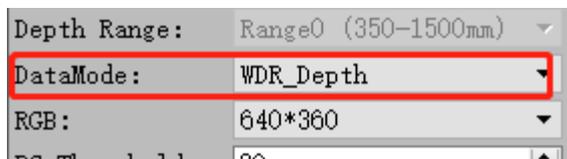
```
t1_range2=1 //The first range mode in WDR, 1 refers range 1;
```

```
t1_range2Count=1//must be 1;
```

```
t1_range3=2//The first range mode in WDR, 2 refers range 2;
```

```
t1_range3Count=1//must be 1;
```

2. Start uTool.exe, and set the data mode to WDR mode;



## 4.2 SDK implementation

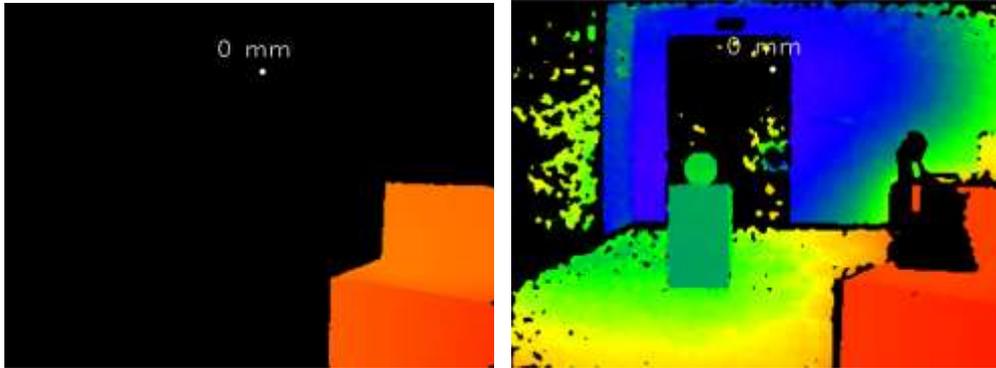
### Alternation WDR mode example :

```

PsWDROutputMode wdrMode = { PsWDRTotalRange_Two, PsNearRange, 1, PsFarRange, 1, PsXFarRange, 1 };// set
WDR parameters
Ps2_SetWDROutputMode(deviceHandle, sessionIndex, &wdrMode);//enable WDR mode
Ps2_SetDataMode(deviceHandle, sessionIndex, PsWDR_Depth);// set the data mode as WDR depth mode
Ps2_SetWDRStyle(deviceHandle, sessionIndex, PsWDR_ALTERNATION);//set the WDR style as alternation mode
PsFrame depthFrame = {0};
PsFrameReady frameReady = {0};
Ps2_ReadNextFrame(deviceHandle, sessionIndex, &frameReady);
if (1 == frameReady.depth)
{
    Ps2_GetFrame(deviceHandle,sessionIndex,PsDepthFrame, &depthFrame);
    cout << "current image range : " << depthFrame.depthRange << endl;
}

```

You can know the range mode of the depth image by the depthFrame.depthRange

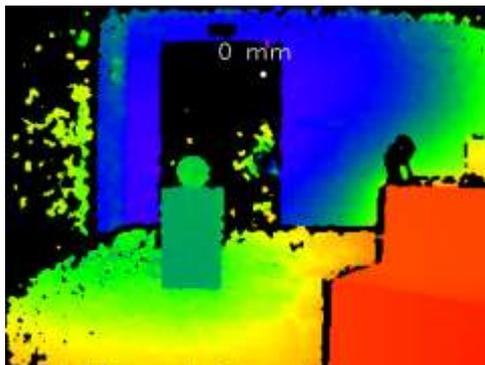


### Fusion WDR mode example :

```

PsWDROutputMode wdrMode = { PsWDRTotalRange_Two, PsNearRange, 1, PsFarRange, 1, PsXFarRange, 1 };// set
WDR parameters
Ps2_SetWDROutputMode(deviceHandle, sessionIndex, &wdrMode);//enable WDR mode
Ps2_SetDataMode(deviceHandle, sessionIndex, PsWDR_Depth);// set the data mode as WDR depth mode
Ps2_SetWDRStyle(deviceHandle, sessionIndex, PsWDR_FUSION);//set the WDR style as alternation mode
PsFrame depthFrame = {0};
PsFrameReady frameReady = {0};
Ps2_ReadNextFrame(deviceHandle, sessionIndex, &frameReady);
if (1 == frameReady.depth)
{
    Ps2_GetFrame(deviceHandle,sessionIndex,PsDepthFrame, &depthFrame);
    cout << "current image range : " << depthFrame.depthRange << endl;
}

```

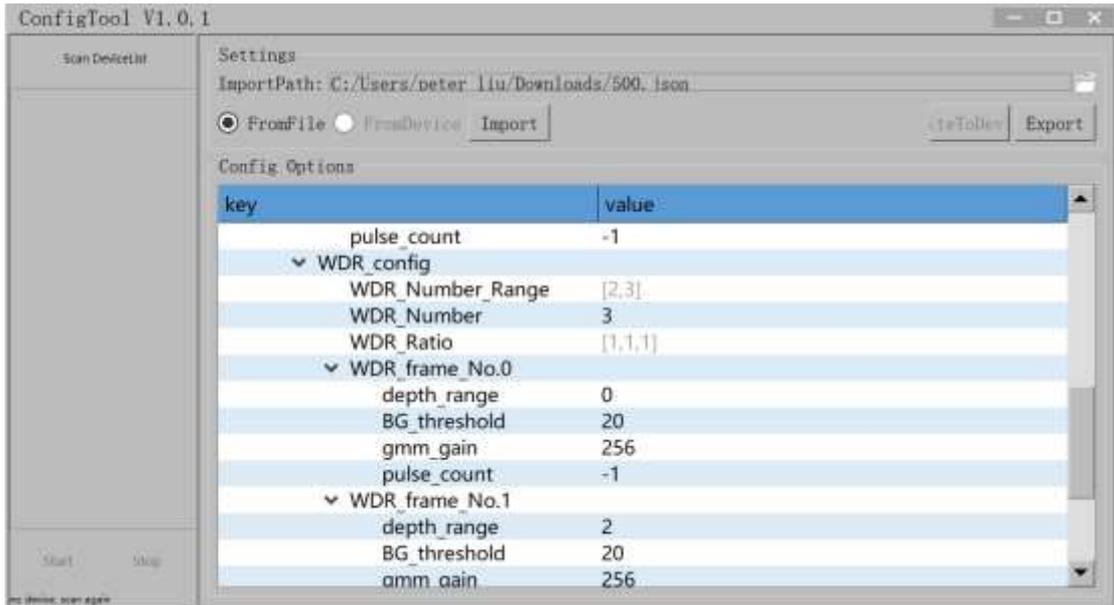


### 4.3 Set WDR mode by config Tool

You can also set WDR mode by Vzense config tool, please refer to the Vzense\_ConfigTool\_User\_Guide.pdf.

Please note after configured by this tool, the product always works at WDR mode, even after power cycle.

The Vzense\_Config\_tool is only available for the B72 and above firmware of DCAM710, B13 and above firmware of DCAM550.



## 5. Appendix

SDK download link:

<https://gitee.com/Vzense>

<https://github.com/Vzense>

UTool download link:

<https://gitee.com/Vzense/UTool>

<https://github.com/Vzense/UTool>

ConfigTool download link:

<https://gitee.com/Vzense/VzenseConfigTool>

<https://github.com/Vzense/VzenseConfigTool>