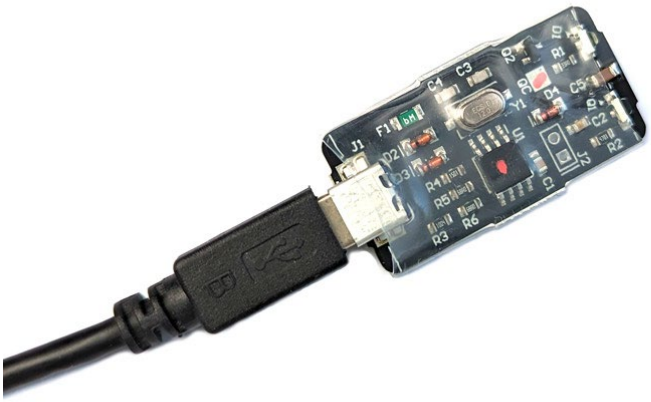
TOKYO DEVICES

TDSN450

General Purpose USB Proximity Sensor, Infrared reflection, Max. 100mm

Revision 1.0



The TDSN450 is a sensor that detects the presence of an object in front of it through the reflection of infrared light. It can be used in various fields such as automation, security, marketing, and robotics. The TDSN450 operates on USB bus power and does not require an external power source. It comes with a free control program that can be run on Windows/Linux, making it easy to integrate into custom applications.

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1. Specifications

Name	Value	Note
Detection Method	Infrared Pulse Modulation	
Wavelength	940nm typ.	
Max. Detection Distance	100mm typ.	※When using white letter-sized paper as the target object. The detection distance will decrease depending on the reflectivity of the infrared light.
Detection Range (Horizontal)	120 degrees	
Detection Range (Vertical)	60 degrees upwards 5 degrees downwards	※The side with the mounted components is considered the top.
Min. Detection Frequency	16msec	※ Corresponds to the minimum time resolution of USB interrupt transfer in Windows 10. This may vary with different operating systems.
Power Supply	USB 5V bus-powered	
Current Consumption	11mA typ.	
Communication	USB 2.0	
USB Connector Type	USB Type-B Mini	
Weight	10g typ.	※The weight does not include the cable.
Operating Temperature Range	0～55℃	※Must be free from condensation.
Dimensions	W: TBD D: TBD H: 8 mm max.	

2. Detection Range

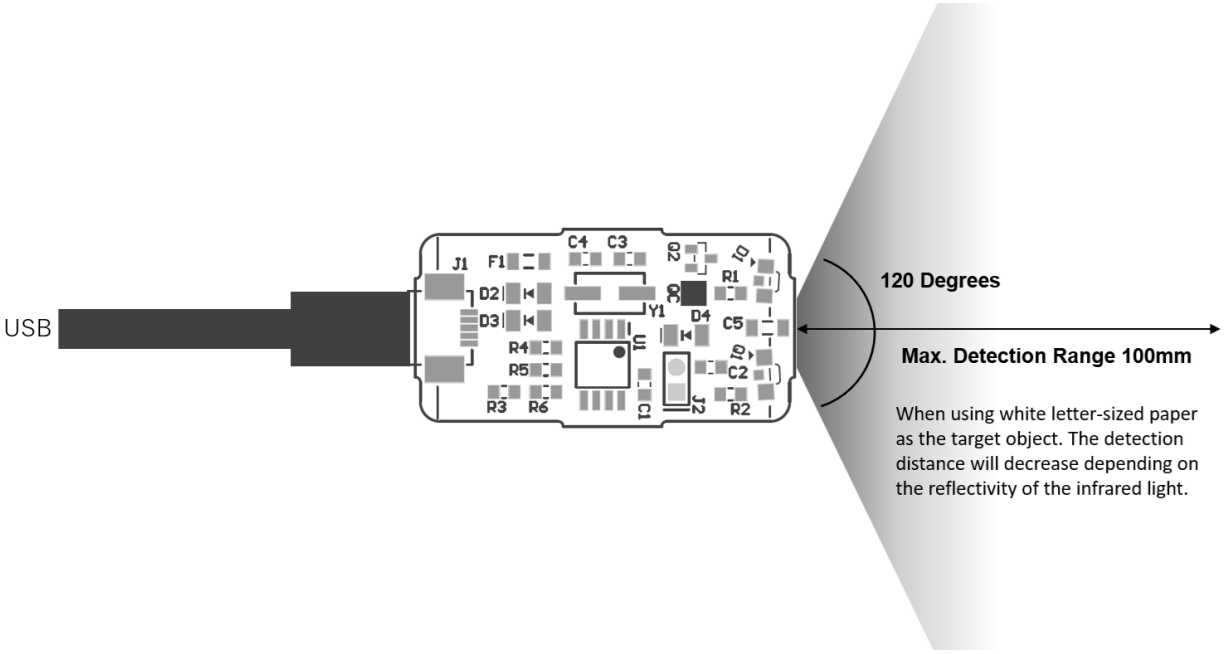

Figure. 1 Detection Range (Horizonal)

3. Quick Start (Windows)

- Connect the USB connector of the sensor module to the USB port of your computer.
- Search for the product page on the Tokyo Devices website (https://en.tokyodevices.com/) using the keyword "TDSN450" and install the demo application "TD-AppKit."
- Launch TD-AppKit and select "Open" from the "Device" menu. Choose "TDSN450" from the "Product Model" box and select the serial number displayed in the "Detected devices" box.
- The detection status, reflected light intensity, and other information will be displayed in real-time.

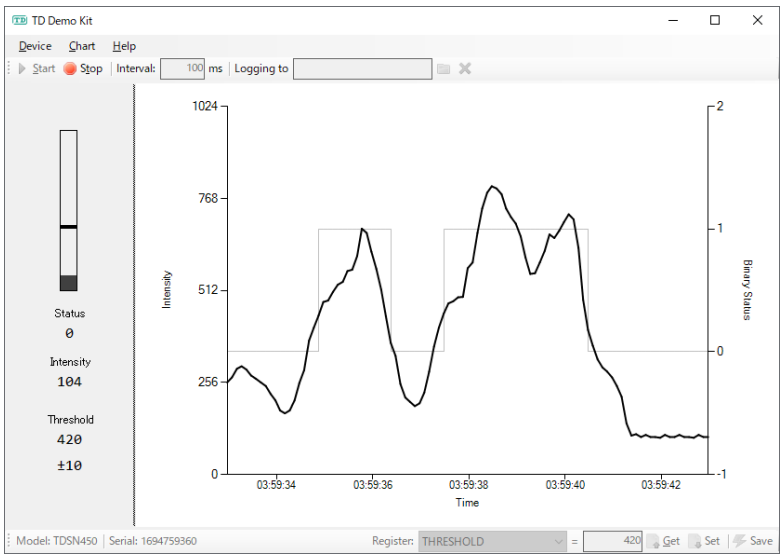

Figure 2 TD-AppKit Screenshot

4. Control TDSN450 with TD-USB Command

The TDSN450 is controlled by the "TD-USB" command. TD-USB is a command-line program that operates on Windows or Linux. To obtain TD-USB, search for "TDSN450" on the Tokyo Devices website or download it from the GitHub repository:

Tokyo Devices Website: https://en.tokyodevices.com/
TD-USB GitHub Repository: https://github.com/tokyodevices/td-usb/

4.1. Basic Usage

The basic arguments for TD-USB are as follows:

```
> td-usb tdsn450 (operation) [options]
```

The first argument "`tdsn450`" is a fixed string representing the target product model. The second argument "`(operation)`" is a fixed string representing a specific operation. Specify `options` as needed.

4.2. Retrieving Reflected Light Intensity

```
> td-usb tdsn450 get
300
```

`get` is a fixed string specifying the operation to read values from the device. On successful retrieval, a numerical value is returned to the standard output. This number represents the strength of the reflected light on a scale of 0 to 1023. A higher number is returned when an object is present in front of the sensor and the reflection is strong. A lower number is output when there is no reflection. Note that even in the absence of an object, the value might not be zero due to ambient light or other environmental factors. Also, the value might fluctuate slightly due to environmental light or noise from the USB power supply.

By specifying the --loop=N option, you can repeatedly obtain values. In this option, N represents the interval for data retrieval in milliseconds. The following example demonstrates how to read the strength of the reflected light every 3 seconds and output it to the standard output:

```
> td-usb tdsn450 get --loop=3000
300
310
320
```

4.3. Set the threshold and hysteresis and wait for object detection

First, use the `set` operation to configure the threshold (THRESHOLD) and hysteresis (HYSTERESIS). When in a non-detection

state, if the intensity of the reflected light exceeds the value of "threshold + hysteresis," it will be recognized as a detection state. Conversely, in a detection state, if the intensity falls below "threshold - hysteresis," it will switch back to a non-detection state. Determine these values considering the reflective properties of the target object and the impact of environmental light noise. The settings can be saved to the device's flash ROM using the `save` operation. The saved values will be the default settings upon the next power-on.

```
> td-usb tdsn450 set THRESHOLD=300
> td-usb tdsn450 set HYSTERESIS=10
> td-usb tdsn450 save
```

Next, begin monitoring the object detection status using the `listen` operation.

```
> td-usb tdsn450 listen
1
```

When specifying the `listen` operation, it will output "1" when the reflected light value exceeds the threshold in a non-detection state, and "0" will be output when the reflected light value falls below the threshold in a detection state. It will wait if there is no change.
Additionally, by adding the `--loop` option when executing the command, you can repeat the `listen` operation.

```
> td-usb tdsn450 listen --loop
1
0
1
```

If the object you are detecting moves rapidly or you require quick response times, it is recommended to use the `listen` operation mentioned here instead of the `get` operation for obtaining the reflection intensity.

4.4. identify multiple TDSN450

```
> td-usb tdsn450 list
XXXXXXXXXXXXXX, YYYYYYYYYYYYY
> td-usb tdsn450:XXXXXXXXXXXX get
300
```

The `list` operation of the TD-USB command allows you to retrieve the serial numbers of multiple TDSN450 sensors connected to a single computer. When you execute the `list` operation, the serial numbers of the recognized sensors are outputted to the standard output, with each serial number separated by a comma `,` and appearing on a single line.

By calling the TD-USB command from an external program, you can control it from your custom applications as well. Please refer to the manuals or documentation of your programming environment for the method to invoke external programs.

5. Accessories

Model Number	Name
TDAC-USB2B1M5	Tokyo Devices compatible USB cable Type A - Type B Mini 1.5m.

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