Introduction

The TD53L1 is a laser-ranging module based on the VL53L1X from ST. The VL53L1X is a state-of-the-art Time-of-Flight (ToF) laser-ranging sensor that enhances the ST Flight Sense product family. It is the fastest miniature ToF sensor on the market, offering accurate ranging up to 4 meters and a fast-ranging frequency of up to 50 Hz.

The TD53L1 simplifies your work by utilizing a microcontroller. It sets up the sensor and provides distance output in three ways: analog, UART, and I2C.

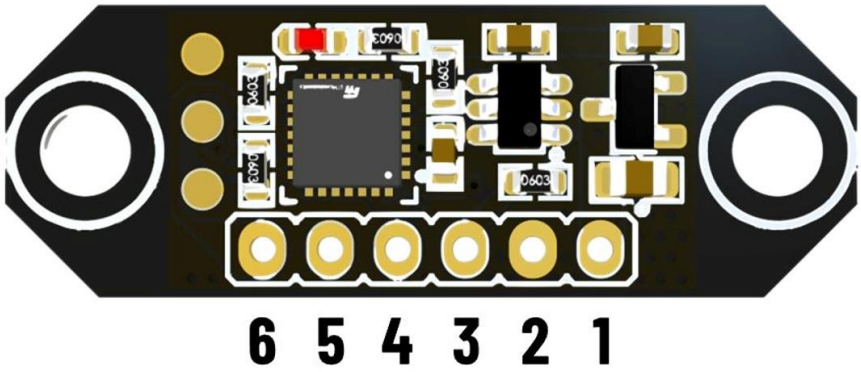
Features

- supply voltage: 3.3V to 5V
- Power consumption: Max 20mA
- Different outputs: Analog, I2C, UART
- Analog output: 1mV / 1mm
- UART Baudrate: 9600 to 256000 bps
- Update rate: 2 to 50 HZ
- Compact size, 32 x 11 mm
- Module weight: 1.2g

Power supply note

If you use a 3.3V supply to power the TD53L1, please note that noisy supplies derived from a switch-mode source can affect its performance. Ensure that the power supply is from a clean source for the best results. If you are uncertain about the cleanliness of your power supply, we recommend using a voltage between 4.5V and 5.0V.

Pinout



Bottom View

1) **+5V (VCC)**
2) **GND**
3) **Analog Output**
4) **SCL**
5) **SDA**
6) **UART TX**

RED LED

The red LED will toggle simultaneously with every data update and new output.

Analog output

With each update of the measured distance, a new voltage is generated on pin number 3. The ratio of output voltage to distance is 1:1, meaning that every 1 millivolt represents 1 mm.

UART TX data output

The new data can be read as a string from the TX pin. The string contains a number followed by the enter command. The printed number represents the distance in millimeters.

The output baud rate can be changed through the I2C and UART_BAUD register (address 0x02). By default, the output baud rate is set to 115200 bps.

I2C communication

Data output and settings are available via I2C. The maximum I2C clock frequency can be 400 kHz. It is possible to connect 3.3V or 5V microcontrollers (STM32, Arduino, etc.) directly without using a logic level converter circuit.

At startup, you can read the value of the WHO_AM_I register (Address 0x00) to ensure that the connection to the module is established. The read value should be equal to 0x22 (hex) or 34 (decimal).

Startup Time

After connecting the power, it takes 0.5 seconds for the output data to become usable

Changing the I2C Bus Address

To change the I2C address of the TD53L1, you must have only one module on the bus and write your new 8-bit address to the SLAVE_ADDRESS register.

Table 1: TD53L1 Register map

Name	Type	Address		Default	Comment
		Hex	Decimal		
WHO_AM_I	R	0x00	0	0x22	Who I am ID
SLAVE_ADDRESS	R/W	0x01	1	0x30	Device slave address (8Bit)
UART_BAUD	R/W	0x02	2	0x06	UART baud rate
SAMPLE_TIME	R/W	0x03	3	0x00	0-5
DIS_RANGE	R/W	0x04	4	0x00	0: Short, 1:Long
DISTANCE_H	R	0x05	5	Output	Distance in mm
DISTANCE _L	R	0x06	6	Output	

- **R: Read only**
- **W: Write Only**
- **R/W: Read/Write**

Table 2: Baud rate selection table (UART_BAUD Register)

Value (Hex)	Baud rate	Unit
0x00	9600	BPS
0x01	14400	
0x02	19200	
0x03	38400	
0x04	56000	
0x05	57600	
0x06 (Default)	115200	
0x07	128000	
0x08	256000	

Table 3: Sample time selection table (SAMPLE_TIME Register)

Value (Hex)	Sample Time (ms)	Sample Frequency (Hz)
0x00 (Default)	20	50
0x01	50	20
0x02	100	10
0x03	200	5
0x04	500	2

Table 4: Measuring distance range selection table (SAMPLE_TIME Register)

Value (Hex)	Measuring Distance (mm)
0x00 (Default)	10-2000
0x01	20-3300

Dimensions: