VL53L7CH

Artificial intelligence enabler, Time-of-Flight (ToF) 8x8 multizone sensor with 90° FoV

Features

- Compact and normalized histogram (CNH) data output for AI
    - Multizone data output up to 64 separate zones
    - Histogram output with signal count for each bin
    - Histogram size programmable up to 128 bins
    - Minimum bin width down to 37 mm
    - Maximum frequency up to 30 Hz through I²C
    - Ambient IR light level reported for each zone
    - All Time-of-Flight (ToF) processed data (distance, signal amplitude, reflectance etc...) are available, in addition to CNH
- Highly configurable CNH in order to meet user expectations
    - 64 zones with 18 bins at 15 Hz
    - 32 zones with 36 bins at 15 Hz
    - 16 zones with 48 bins at 25 Hz
- Ultrawide ToF sensor with 90° field of view (FoV)
    - 60° x 60° square FoV (90° diagonal)
    - Autonomous low-power mode with interrupt programmable thresholds to wake up the host
    - Up to 350 cm ranging
    - Motion indicator for each zone to detect if targets have moved and how they have moved
- Fully integrated miniature module
    - Emitter: 940 nm invisible light vertical cavity surface emitting laser (VCSEL)
    - Diffractive optical elements (DOE) on both transmitter and receiver enabling square FoV
    - Receiving array of single photon avalanche diodes (SPADs)
    - Low-power microcontroller running firmware
    - Size: 6.4 x 3.0 x 1.6 mm
- Easy integration
    - Single reflowable component
    - Flexible power supply options, single 3.3 V or 2.8 V operation, or combination of either 3.3 V or 2.8 V AVDD with 1.8 V IOVDD
    - Compatible with wide range of cover glass materials
    - Driver compatible with VL53L8CH
    - Pin-to-pin compatible with VL53L5CX and VL53L7CX

Application

- AI applications requiring multizone raw data
- Cup rim detection for coffee machine and beverage dispenser
- Floor sensing for robotics and vacuum cleaners
- Gesture motion and hand posture recognition
- People counting for smart building and smart home

Product status link
VL53L7CH

DB4984 - Rev 2 - June 2023
For further information contact your local STMicroelectronics sales office.

www.st.com

Description

The VL53L7CH is the perfect Time-of-Flight sensor enabling AI applications, with ultrawide 90° diagonal FoV and low power consumption. The compact and normalized histogram (CNH) innovative data output is specially designed for artificial intelligence (AI) applications requiring multizone raw data from a high performance multizone ToF sensor.

The IR signal measured in each zone is sent as raw data to the host through each bin of the histogram. Highly configurable, the user can program the resolution of the VL53L7CH up to 64 zones (8x8 zones), modify the histogram resolution up to 128 bins, and define the bin width. All this CNH data is transmitted to the host through I²C, up to 30 Hz, in addition to the standard processed data of the ToF sensor (ranging distance, signal level, reflectance etc.).

The CNH data transform ST Time-of-Flight ranging sensor into a versatile optical sensor, which can enable endless AI-based applications. This CNH raw data sent to the host, on top of the standard ranging data, opens the door to many new applications beyond simple distance measurements. From solid material (carpet, wood, glass, mirror...) to gas or liquid (water, oil, chemical...), it becomes possible to detect the location and the size of a cup in a coffee machine or beverage dispenser, to sense the floor material for robotics, and develop advanced shape, motion, or hand posture recognition.

The VL53L7CH Time-of-Flight sensor offers an ultrawide 90° diagonal FoV, shaped as a square 60° x 60° FoV, thanks to the innovative metalens surface ODIF lenses. The integrated VCSEL emits fully invisible 940 nm IR light, which is Class 1 certified and safe for the eyes.

1 System block diagram

Figure 1. **VL53L7CH block diagram**
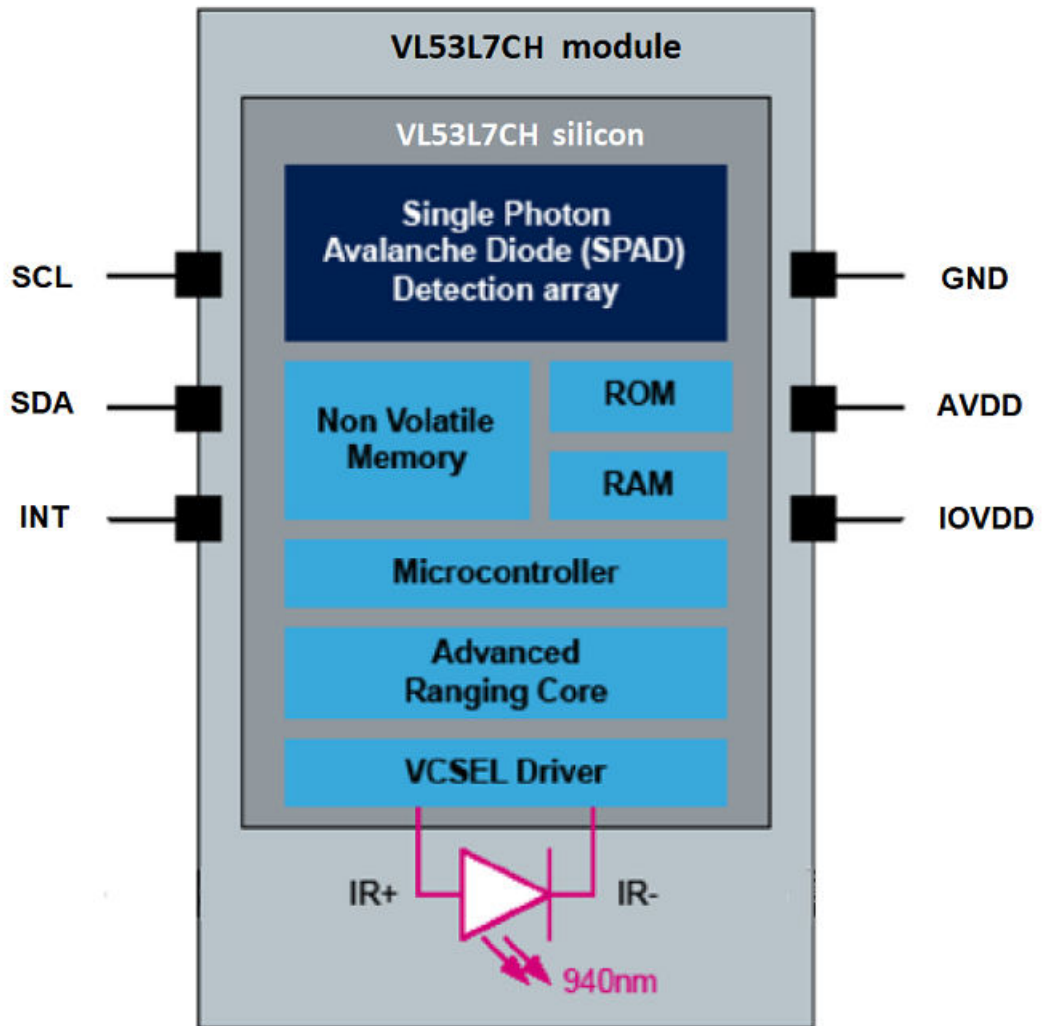
Revision history

Table 1. Document revision history

Date	Version	Changes
01-Jun-2023	1	Initial release
06-Jun-2023	2	Updated maximum frequency value to up to 30 Hz.

IMPORTANT NOTICE – READ CAREFULLY