Walabot (VSENSE) Environment Sensor User Manual

Models:

VM20SQ, VS21CBT, VS40SBT

Draft version for FCC and CE evaluation

June 2018

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Introduction

Walabot is a programmable 3D sensor that looks around using radio frequency technology that breaks through known barriers, bringing highly sophisticated sensing capabilities to your fingertips. The Walabot family of products is based on VSENSE/VMAKER family of sensor modules. The VSENSE family expands the capabilities of the previous VMAKER family, primarily for larger-area indoor coverage and higher angular resolution, and specifically useful for smart-home applications.

The devices under VSENSE family are UWB modules to be used with an external host, or to be incorporated together with a host in a full device, serving as the sensing product.

Features

Three-dimensional radio-frequency based sensor, based on VAYYR2401-A3 System-on-Chip for signal generation and recording. A MIMO array of linearly-polarized broadband antennas is used to obtain high-resolution image.

The device is operated by a stand-alone host (PC, Smartphone, or other proprietary host), through a USB-2 interface. The power is supplied either by the USB interface, or by an external power supply.
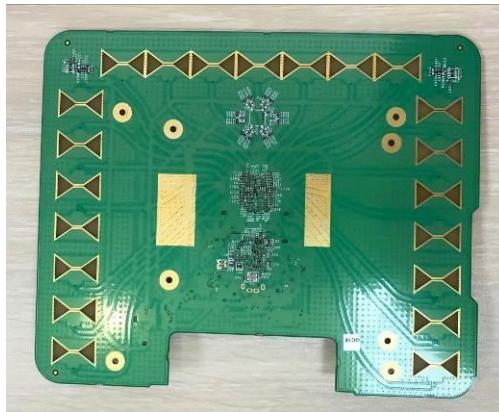
VSENSE models

VSENSE comes in several models. See the table below for details on the differences in the models.

Capability \ Model	VM20SQ	VS21CBT	VS40SBT
Physical			
Number of antennas	20	21	40
Board size	107 mm * 115 mm	72 mm * 140 mm	330 mm * 330 mm
External powering option	No	No	Yes
Antenna Type	Printed Dipole	Slot Embedded	Slot Embedded
Frequency ranges	3.3-10.3GHz 6.3-8.3GHz	6.3-8.3GHz	6.3-8.3GHz
Power supply	USB, 4.5-5.5V	USB, 4.5-5.5V	External, 5V

VM20SQ:
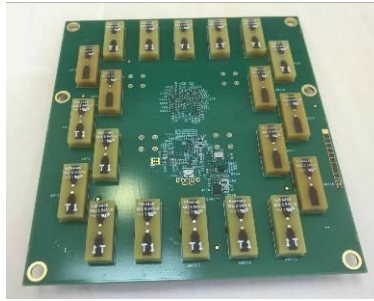
VS21CBT:

VS40SBT:

Regulatory domains

VSENSE models have been manufactured in accordance with the regulatory domains in which they are to be operated. Currently FCC (for operation in the US) models and CE (for operation in EU and other countries using CE certification) models are available. If in doubt, consult your local experts before ordering.

The FCC model is restricted in its operation to the 3.1-10.6 GHz range of frequencies. Specifically, the VS21CBT model is restricted to 6.2-8.4GHz band.

The CE model is restricted to 6-8.5 GHz band and to stricter out-of-band emissions.

Technology

The VSENSE products are multi-antenna sensors that characterize the environment in the vicinity of the sensor. It is done by collecting and analyzing propagation information between the antennas, which is affected by the environment. The propagation response information is collected by VSENSE and processed at the hosting device to obtain spatial information about the environment.
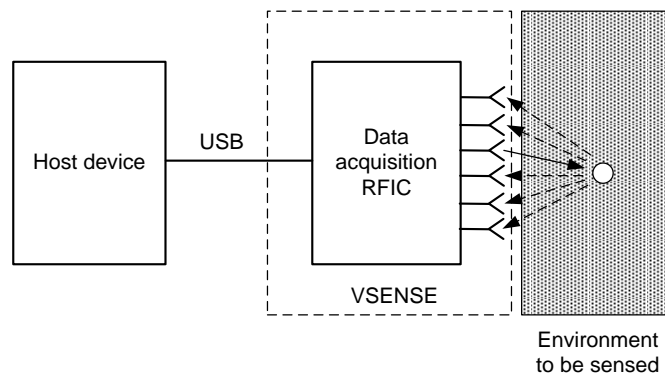
Block Diagram

The following figure presents a high-level block diagram of the VSENSE platform.
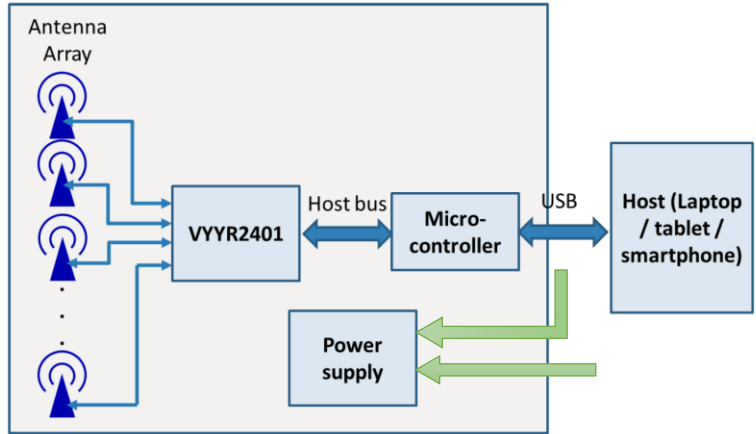
Interfaces

The module main interface is USB for communication and configuration.

USB Interface and Powering Options

The onboard USB 2.0 connector supports USB 2.0 in High-Speed mode (480Mbit). The power can be provided either by

Connector and powering options:

Capability \ Model	VM20SQ	VS21CBT	VS40SBT
Connector types	µUSB	µUSB 40-pin BTB connector	USB-2\3 type-B
Power Supply Connector	µUSB	µUSB 40-pin BTB connector	USB-3 type-B Power jack, diameter 2.5 / 6.3 mm
Voltage supply	5V +/-10%	5V +/-10%	5V
Power Consumption	0.4-0.9A	0.4-0.9A	0.8-1.2A

Software Installation

VSENSE is to be operated with dedicated SW per model, project and final product. In addition, software installation depends on the platform and OS (Windows, Android etc). Some of the devices can be operated using the Walabot API - check on the Walabot site (http://api.walabot.com/_install.html) for the latest instructions and documentation.

If relevant, download the appropriate software to begin developing your own applications.
- The software contains a driver through which the application software communicates with VSENSE device.
- The driver translates your commands into VSENSE's actions.
- Moreover, the driver is in charge of enforcing certain regulatory restrictions.
- Be sure to communicate with the VSENSE device only through the driver using the provided API.

In general – the relevant SW and instructions will be given per device and project, and will appear at the full product user manual.

Mechanical placement

The VSENSE are provided as bare boards or with an optional mechanical housing and case. The mounting instructions shall be provided per specific module. In the case that a proprietary case is used, make sure that the front cover is nonmetallic (e.g. plastic) and preferably thin (not exceeding 2 mm).

Safety

Legal Information

Disclaimers

Trademarks and patents

Regulatory Information

Regulatory Conformance

The VSENSE device has been designed to be in compliance with the FCC regulations governing UWB hand-held systems (Part 15.519) also known as "battery powered devices" or "mobile devices." This means that the device can be incorporated in a wide variety of products including educational robots, pipe locators, breathing monitors, etc. Note that there are other applications which are specifically forbidden, such as use of the devices in toys. See FCC Parts 15.519 and 15.521 for more details.

Certain models of the VSENSE device have been designed and tested to be in compliance with CE requirements, and in particular to conform to ETSI standards EN 302 065-1, EN 301 489-33 and EN 301 489-1. In particular, the CE compliant devices are restricted to operation in the 6-8.5 GHz band. **Make sure that if you use the device outside US, that you order the appropriate model number.**

FCC regulatory statements

This device complies with 47 CFR Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device may not be employed for the operation of toys. Operation onboard an aircraft, a ship or a satellite is prohibited.

The use of this device mounted on outdoor structures, e.g., on the outside of a building or on a telephone pole, or any fixed outdoors infrastructure is prohibited.

Moreover, the following statements apply:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

FCC ID Labels

The VSENSE products have a FCC ID of 2AHIS-VSENSE. The FCC ID marking is found per specific model, in general on the right front side of the printed circuit board:
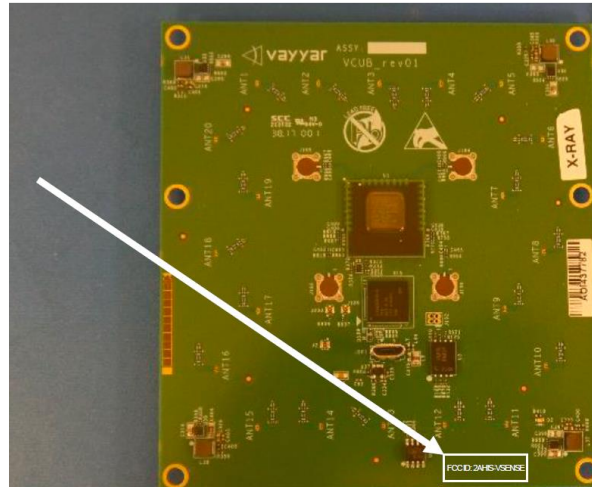
Per device, the FCC ID will appear on the package of the product, or specified in the user-manual.

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC ID: 2AHIS-VSENSE"

Instructions for the Integrator

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.