



vayyar vSILSA_RevC_CTPB0 Three-Dimensional mm-Wave Sensor Module User Manual

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vayyar vSILSA_RevC_CTPB0 Three-Dimensional mm-Wave Sensor Module



Notice

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Revision History

Revision	Date	Author	Description
1.0	December 2021		
2.0	December 2021		Minor edits
2.0.2	Feb 2022		
2.0.3	March 2022		

Introduction

This guide provides information on the installation and operation of the Vayyar vSILSA_RevC_CTPB0 Module. vSILSA_RevC_CTPB0 is a three-dimensional mm-wave sensor used as a short-range device for interactive motion sensing. The operational flow, as described in this document, is one realization for the usage of the vSILSA_RevC_CTPB0 device, while other possible realizations could be integrated with a hosting-product, operate in conjunction with various hosts other than a PC, communicate through various API-s and SW environments. All control and operation options preserve the same operation of the device in terms of transmitted RF waveform (output power, bandwidth), according to the regulated values. The device should be installed inside a vehicle cabin, to detect and monitor objects in a defined arena. The module provides a real-time image of objects positions within the arena.

Typical applications for the device can be in-cabin monitoring for detection of infants left in car and more.

Release Information

This document provides basic description of the system and its operation flow. The same device can be provided with other operation environments (host, API, SDK), and a dedicated user-guide will be provided for every option. As described above – the device will preserve, under all conditions, a similar transmitted waveform (output-power, bandwidth). For more details – contact Vayyar LTD through – www.vayyar.com.

Glossary

Term	Definition
GUI	Graphical User Interface
IP	Internet Protocol. An IP address is a numerical identifier assigned to a computing device or node in a TCP/IP network. The address is used to locate and identify the node in communications with other nodes on the network.
RF	Radio Frequency

Sensor Integration instructions

The vSILSA_RevC_CTPB0 shall be installed inside a car's cabin. There are several potential installation locations inside car's cabin, which must support both functional performance and are applicable by the conditions of the DA 21-407 waiver. The final product, incorporating the vSILSA_RevC_CTPB0 module, shall be restricted to factory installation in the interior of new passenger motor vehicles for the primary purpose of in-cabin monitoring functions, and shall not be marketed in after-market add-on products.

Adequate installation would be:

1. The sensor connected firmly to the car's roof, either directly to the metal frame \ plastic bracket on the cabin's frame, or on top of the headliner.
2. The sensor connected firmly to the car's A/B/C Pillar, either directly to the metal frame \ plastic bracket on the pillars, or on top of the pillar covers.
3. The sensor is connected firmly to the car seat / headrest either directly to the metal frame or on top of the upholstery.
4. Alternative installation locations may also be possible – as long as the sensor is positioned inside the cabin, according to the conditions of the DA 21-407 waiver.

Examples of installations options:

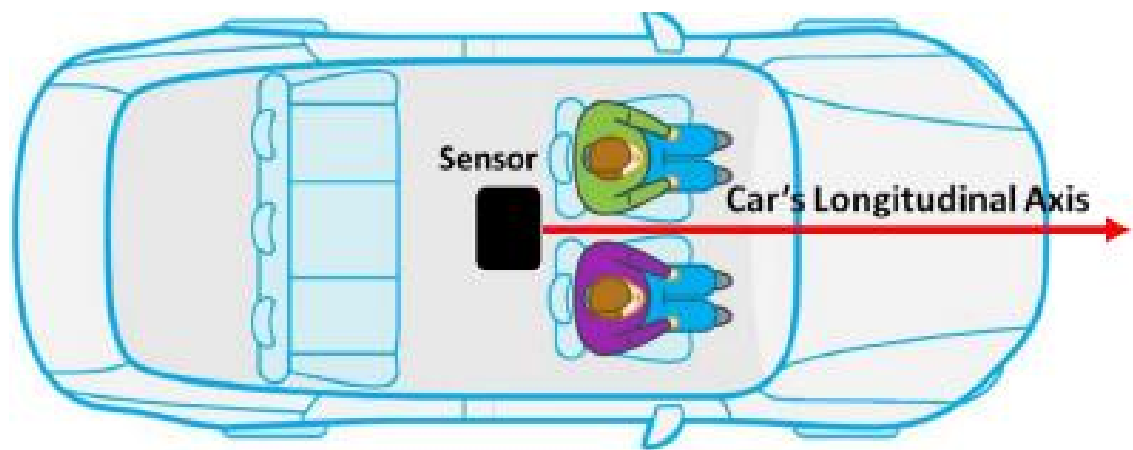


Figure 30: Sensor Centralization

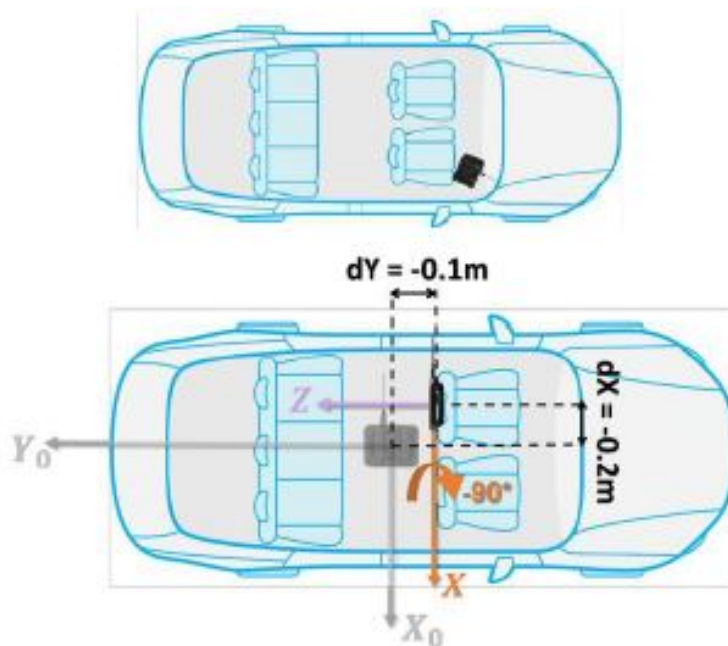
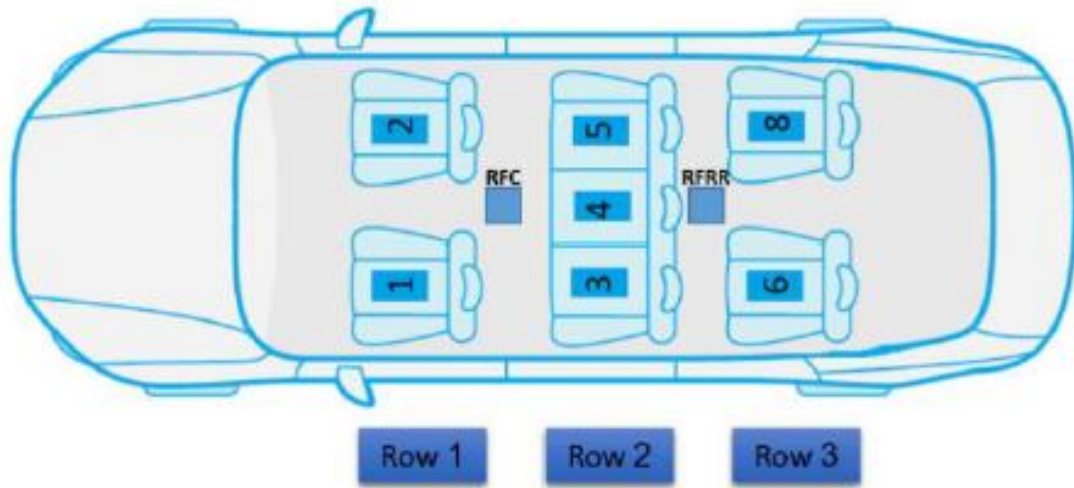
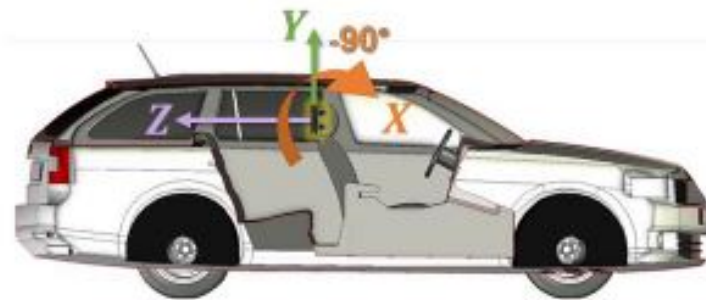


Figure 13: 90 Degree Back-seat Installation – Top view

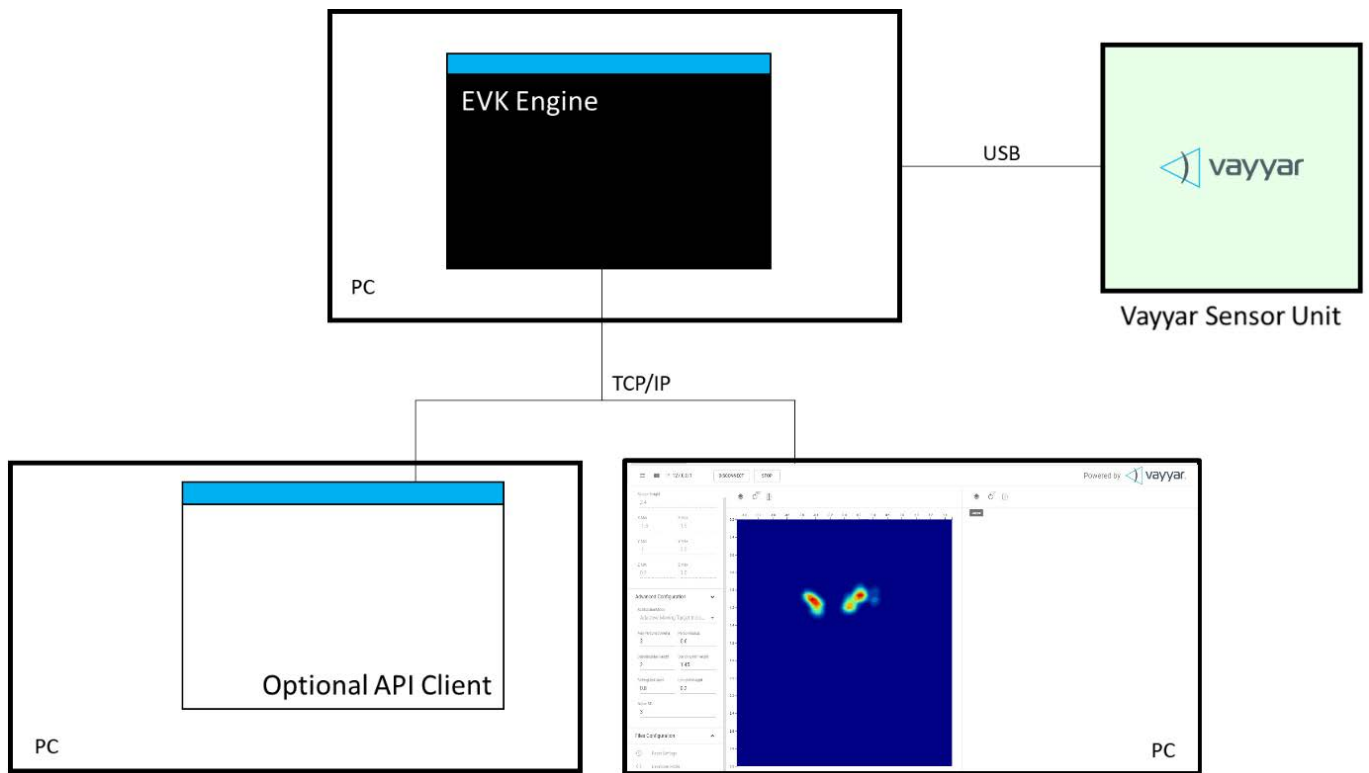


System Overview

The vSILSA_RevC_CTPB0 is designed to demonstrate Vayyar's 4D interactive motion sensing, which enables identifying multiple objects ("blobs") in a defined space ("arena").

System Architecture

The vSILSA_RevC_CTPB0 system architecture and connectivity scheme is illustrated in the figure below.



The vSILSA_RevC_CTPB0 system is comprised of the following components:

- The vSILSA_RevC_CTPB0 RF Sensor Unit.
- The SW Engine. Host software that performs signal processing functions. The software runs in a command window on a PC, which is connected to the vSILSA_RevC_CTPB0 sensor by a USB cable.
- Web GUI. User-interface client software that communicates with the SW Engine via a TCP/IP connection. The Web GUI client is supported by the following browsers:
 - Google Chrome
 - Mozilla

Digital Interface

The digital interface connects the host PC with the board. The interface is implemented on the board using an MCU and a micro-USB connector. The onboard micro-USB-B 2.0 connector (appears in red in the figure below) is used for data transfer between the sensor unit and the host PC. The connector supports the USB 2.0 protocol in High-Speed Mode (480 Mbps).



Software

The vSILSA_RevC_CTPB0 system software performs signal processing and generation of the arena image. It communicates with the Web GUI by a TCP/IP connection, which displays images and blobs that correspond to the detected objects.

NOTE

The Graphical User Interface supports use of a single sensor only.

Module Outputs

Outputs from the sensor can be presented either through the Web GUI or a corresponding API. The data can be saved as MAT files (compatible with MathWorks MATLAB). The system's outputs can be further processed or analyzed in parallel to the saving process. The output data is available either in its raw data form or as a 3D/2D image.

Regulatory section

Compliance

FCC

The device is certified under FCC DA 21-407 waiver conditions, as – FCC-ID: 2AHIS-V60GINCAR-SL. This vSILSA_RevC_CTPB0 device 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 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. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The device shall not be used on an airplane while airborne. This device complies with 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.

Instructions for the Integrator

The vSILSA_RevC_CTPB0 device should be installed inside a vehicle interior and used primarily for in-cabin monitoring functions. When used as an end-product and not solely as an evaluation-kit, the device shall be restricted to factory installation in the interior cabin of new passenger motor vehicles, and shall not be marketed in after-market add-on products. The OEM integrator is responsible for ensuring that the end-user has no manual instructions to remove or install the module.

OEM Integrators Notices

This device is intended only for OEM integrators under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna. As long as this condition above is met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed. **IMPORTANT NOTE:** In the event that this condition cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID number cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Users of these devices must be made aware through disclosure in the vehicle Owner's Manual or an equivalent means that operation is subject to the conditions that no harmful interference is caused and that any interference must be accepted.

End Product Labeling

Visible area with the following: "Contains FCC ID: 2AHIS-V60GINCAR-SL " (either in user-manual, on the package or the product case). When the hosting device uses an electric-display in a product, it should be possible to display electronically the FCC-ID. If the radar is installed such that it is not visible (e.g., behind the headliner), then the required equipment labeling in accordance with the provisions of 47 CFR §§ 2.925 and 15.19 shall be provided in the vehicle's Owner's Manual.

OEM Manual Information that Must be Included

The OEM integrator has to be aware not to provide information to the end-user regarding how to install or remove this RF module in the user manual of the end product which integrates this module. The user manual for OEM integrators must include the following information in a prominent location: **IMPORTANT NOTE:** To comply with FCC/ISED RF exposure requirements, this device and its antennas must not be co-located or used in conjunction with any other antenna or transmitter except under the conditions shown in the FCC/ISED filing and/or in accordance with FCC/ISED multi-transmitter product guidelines.


Modular Approval under DA 21-407 waiver

Limited modular transmitter approval under 47 CFR § 15.212 shall also comply with the following conditions:

- the operators manual shall provide clear and complete installation instructions that explain the applicable restrictions and a copy of these instructions shall be submitted along with the application for equipment authorization;
- the certification grant conditions shall clearly state that the module is limited to factory installation in new passenger motor vehicles;
- the device shall be installed only inside the cabin of a vehicle, according to the conditions of the DA 21-407 waiver.

The module integrator must include the below interference statement in the vehicle owner's manual: This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. The final product, covered by FCC-ID: 2AHIS-V60GINCAR-SL and incorporating the vSILISA_RevC_CTPB0 module, shall be restricted to factory installation in the interior of new passenger motor vehicles for the primary purpose of in-cabin monitoring functions, and shall not be marketed in after-market add-on products. The waiver conditions granted herein are not transferable to any third party via §2.933 or any other means of technology transfer. The grantee is responsible for continued FCC compliance in any end product embodiment.

Documents / Resources

 <p>vayyar vSILISA_RevC_CTPB0 User Manual Revision 2.0.3</p>	vayyar vSILISA_RevC_CTPB0 Three-Dimensional mm-Wave Sensor Module [pdf] User Manual V60GINCAR-SL, V60GINCARSL, 2AHIS-V60GINCAR-SL, 2AHISV60GINCARSL, vSILISA_RevC_CTPB0 Three-Dimensional mm-Wave Sensor Module, vSILISA_RevC_CTPB0, Three-Dimensional mm-Wave Sensor Module
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References

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