

# User Manual

## VitaSense

### 60-64GHz

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User Manual

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# CONFIDENTIAL

## VitaSense User Manual

## Introduction

This document describes the RF system “VitaSense” for occupancy detection in vehicles. It covers sensors that are identified FCC ID: NSZVITA001 on the label.

## Abbreviations

FMCW	Frequency Modulated Continuous Wave
MMIC	Monolithic Microwave Integrated Circuit
CAN	Controller Area Network
RF	Radio Frequency

## General system description

The interior temperature of a vehicle can reach a critical level in 15 - 20 minutes and, as children are affected by heatstroke faster than adults, the results can be deadly.

VitaSense is a RF system that detects children left in vehicles and provides this information to the vehicle’s warning systems. It detects children, including new-borns, based on their movements or breathing – even when they are sleeping. The VitaSense sensor is operating using the frequency modulated continuous wave radar concept (FMCW) and does not transmit any data.

The sensor may only be installed such that it is connected to a vehicle CAN bus. The sensor is operational for several minutes after each activation.

## Usage restrictions

This device is restricted to factory installation in the interior cabin of a passenger motor vehicle—i.e., a “passenger car” or a “multipurpose passenger vehicle” that has more than one row of seats, as those terms are defined at 49 CFR § 571.3, as described in this technical description, for the primary purpose of in-cabin monitoring functions and shall not be marketed in after-market add-on products.

The VitaSense sensor is subject to the conditions under the FCC waiver order DA 21-407.

## Hardware

### VitaSense sensor

The system transmits a frequency modulated signal, a low-power electromagnetic wave, that is then reflected by occupants or objects in the vehicle’s interior. As, due to their movement, occupants modify these reflected signals differently, the system can discriminate between them and inanimate objects.

### RF-Transceiver

The MMIC is a system based on FMCW radar technology and it is operating in the 60 GHz to 64 GHz band.

Data Interface

The VitaSense sensor is connected to the vehicle via the CAN bus.

Connectors

The sensor connector mates with 4-pin female connector of the vehicle. The pin assignment of the mail connector (sensor side) is shown in Table 1 "Connector pinout".

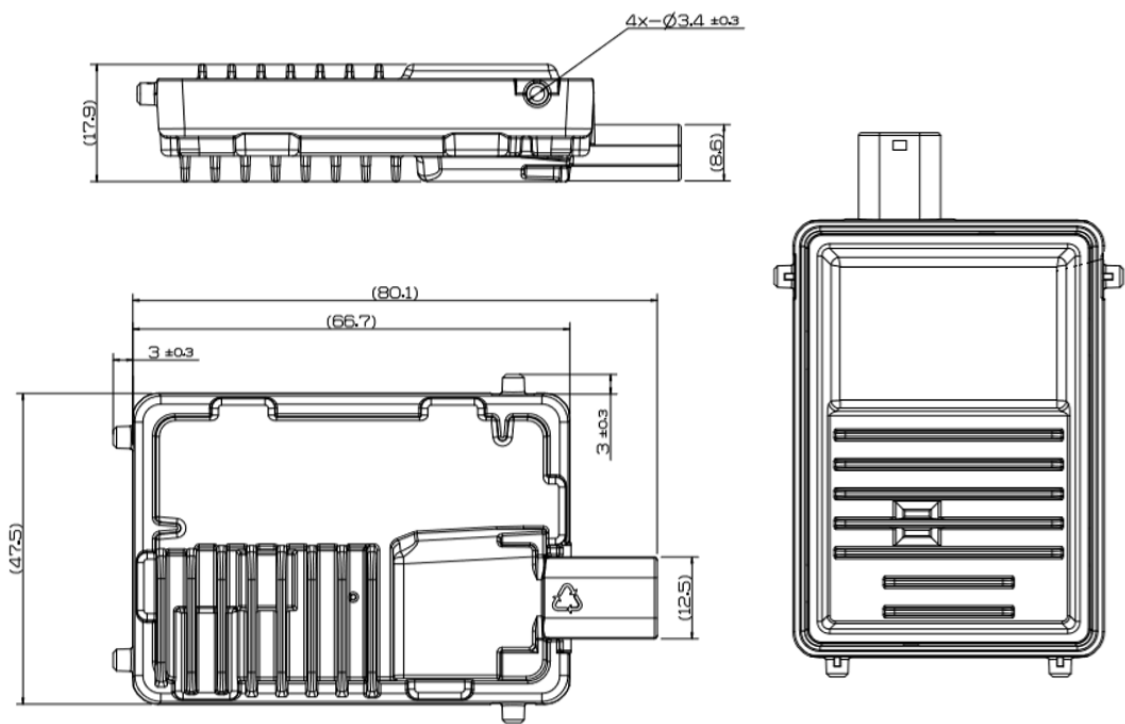


Figure 1 "Dimensions of the VitaSense sensor module"

Pin	
1	GND
2	CAN LOW
3	CAN HIGH
4	VBatt

Table 1 "Connector pinout"

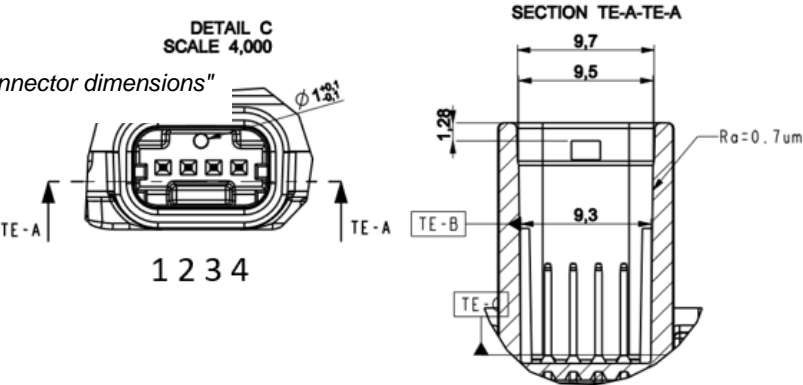
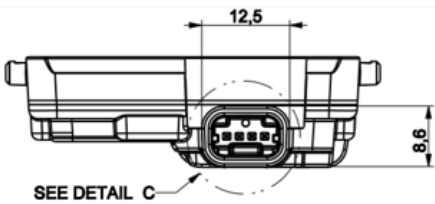


Figure 2 "Connector dimensions"

## System integration and use cases

The VitaSense sensor is designed to be installed hidden behind the head liner of the vehicle with the antenna oriented towards the observation region of interest in the vehicle's interior. In regular use cases, detection of children left behind in a vehicle, the minimal distance between the VitaSense sensor is greater than 20cm.

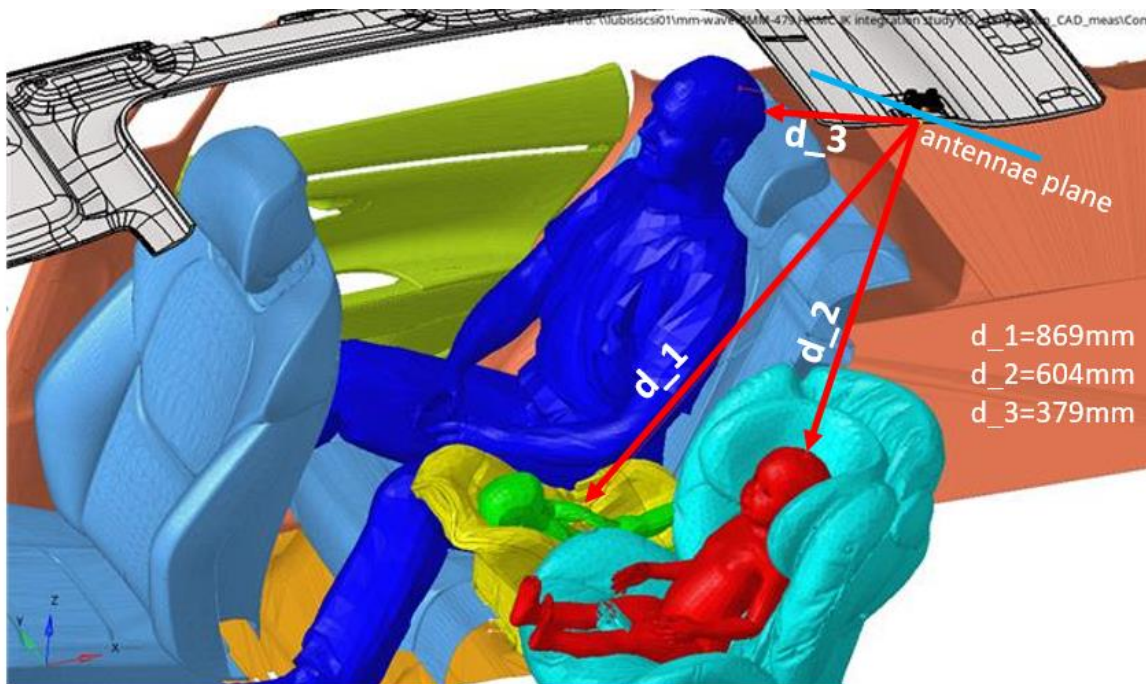


Figure 3 Regular use case vs. worst case distances in vehicle.

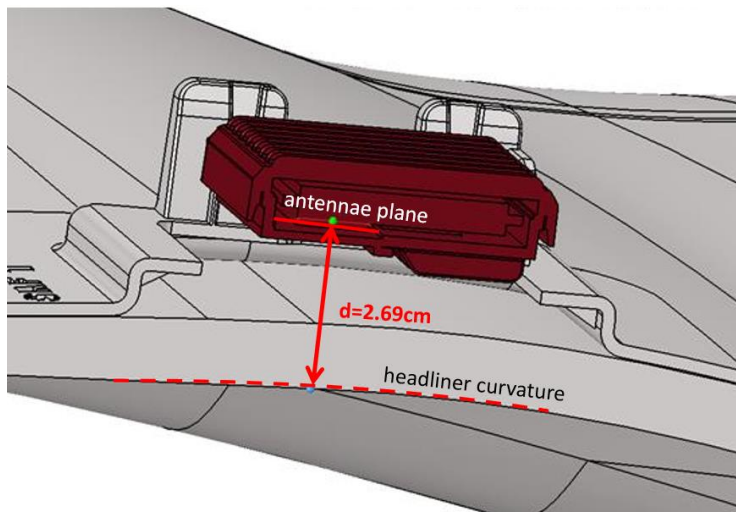


Figure 4 Assessment of min. distance between the sensor and the headliner of the vehicle.

## **Declaration of conformity**

### **Declaration of conformity for USA (FCC ID: NSZVITA001)**

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.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.