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Rear Occupant Alert

60-64GHz

26.04.2022 v1.0

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	CHILD PRESENT DETECTION User Manual		1.0	26.04.2022

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1. Introduction

This document describes 60-64GHz RF system of "child present detection" for in-vehicle occupancy detection.

2. Abbreviations

Abbreviation	Description
FMCW	Frequency Modulated Continuous Wave
RFIC	Radio Frequency Integratied Circuit
RF	Radio Frequency
CPD	Child Present Detection
CAN	Controller Area Network

3. Sensor system overview

CPD detects large movements, such as movement of a child's arms, legs, and seat, to small movements of a sleeping newborn's breathing. Since it is a motion sensor, it does not detect stationary objects. The CPD is connected to the car's CAN bus and controlled, and it operates for several minutes when the driver gets off and the vehicle's ignition is turned off.

4. Hardware

4.1. CPD Sensor

In hot weather, the temperature inside a parked vehicle can become very high, which is fatal to children left in the vehicle. CPD prevents these accidents by detecting the occupancy of children left behind and alerting the driver.

4.2. RF-Transceiver

RFIC uses the FMCW radar method and uses a frequency band of 60~64GHz.

4.3. Data interface

The CPD is connected to the CAN bus. It is controlled and communicates with the CAN signal.

4.4. **Connectors**

The CPD connector consists of 4 male pins and is connected to the vehicle's 4 female connector. Table 1 sh ows the pin arrangement of the connector.

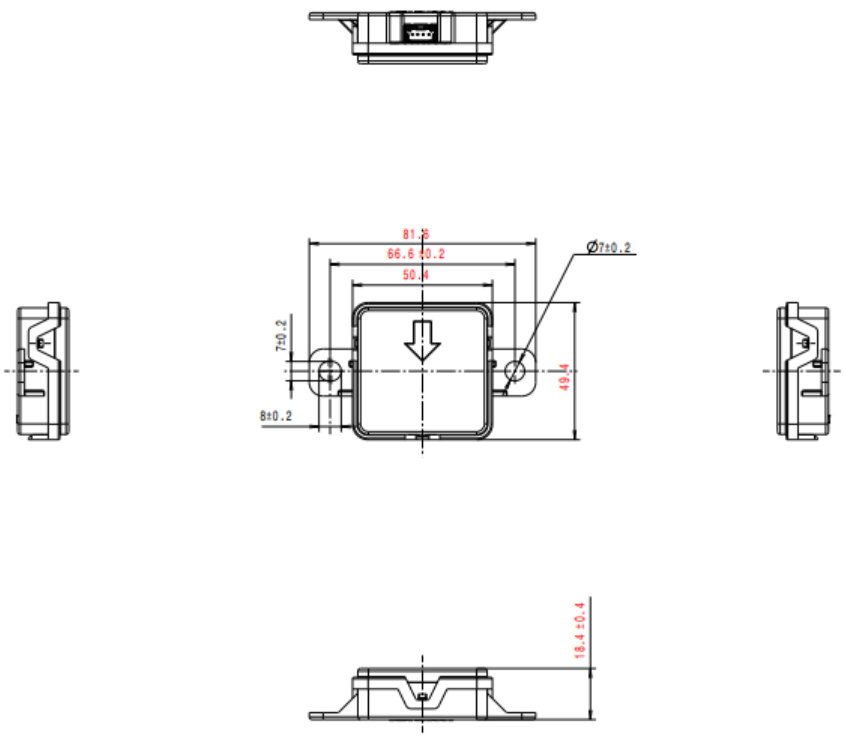

Figure 1. Child Present Detection sensor

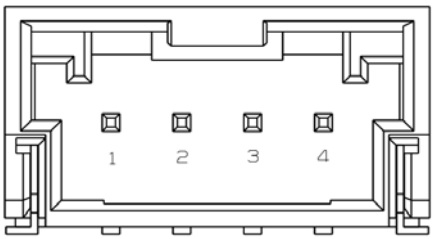

Figure 2. Connector

Pin No	Pin Name
1	CAN L
2	CAN H
3	GND
4	Vbat

Table 1. Pin arrangement

5. System integration and use cases

The CPD is installed above the headliner and is not visible from the inside of the vehicle. The CPD is install ed facing the detection area. The installation angle and location of the CPD can be adjusted with a bracket that connects and fixes the sensor to the vehicle, and it depends on the relative position of the sensor and the seat and sensing space inside the vehicle. In a use case, children can sit on a car seat in the rear seat and the distance from the sensor is greater than that of an adult.

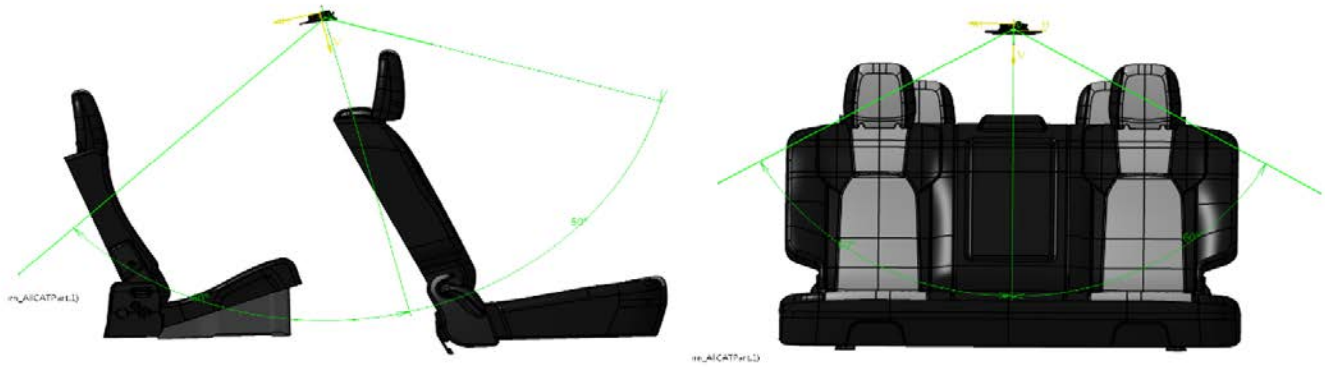

Figure 3. CPD vehicle interior cover area

6. Warning Statement

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