User manual

Model: ICR010

Revision 1.0

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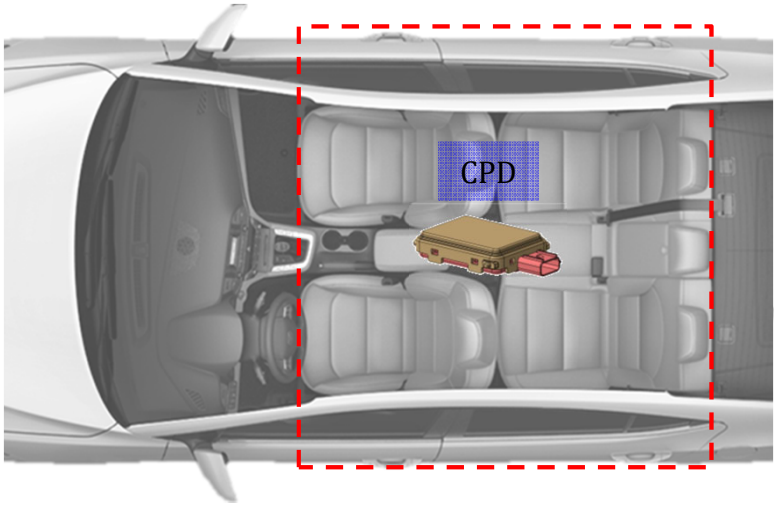
Chapter 1. Introduction & Specification

This guide provides information on the installation and operation of the *ICR010* (Vehicle Millimeter-wave radar sensor) for detection of children inadvertently left unattended in vehicles.

Spec.

< System >



1. Rated voltage: DC 12V
2. Operating-voltage range: DC 9V ~ 16V
3. Operating-temperature range: -40℃ ~ +85℃
4. Storage-temperature range: -40℃ ~ +95℃
5. Power consumption: < 1.6W

< Function >

Item	Performance/Quality
Detection	▪ Sensing area: ① 2/3 row seating surface of vehicle (MPV is 2/3/4 row) ② Space-connected trunk area (SUV tailgate) ▪ Performance: - Infant/Child (even if car seat is installed) - Pet (seat and floor position) ▪ Suppress false alarms: - Vehicle shaking/thumping/shock - Movement except based on human (Solar toy, cell phone, metal box) ▪ No impact from the environment - Day and night - All Weather - Unaffected by other radars
System	▪ Communication: HS-CAN ▪ Harmless to human body

ICR010 Radar		
Center Frequency[GHz]	Band	60-64
Range [m]	Max	3.31
	Min	0.1
	Resolution	0.058
Velocity [m/s]	Max	15.45 (55.62km/h)
	Min	-15.45 (-55.62km/h)
	Resolution	0.03
Azimuth (Angle) [°]	FoV	≤120
	Resolution	30
Elevation (Angle) [°]	FoV	≤120
	Resolution	30
Frame Interval [ms]	1 Frame	200

Chapter 2. Installation

The *ICR010* 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-21-816 waiver.

The final product , incorporating the *ICR010*, 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:
The *ICR010* connected firmly to the car's roof, either directly to the metal frame\plastic bracket on the cabin's frame, or behind of the headliner.

Examples of installations;

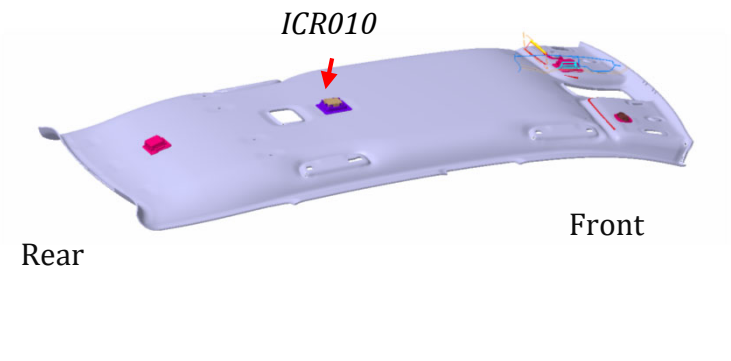


Figure 1. Option 1

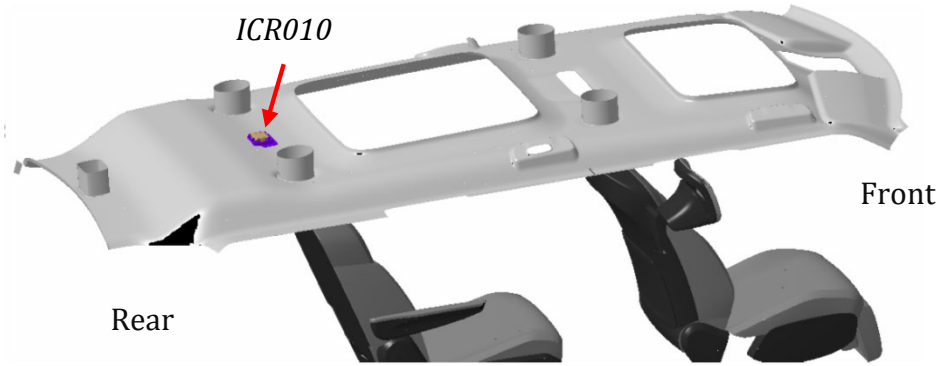


Figure 2. Option 2

If the *ICR010* is installed such that it is not visible (e.g., behind the headliner), then the *ICR010* integrator must include the below interference statement in accordance with the provisions of 47 CFR §§ 2.925 and 15.19 in the vehicle's 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 harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

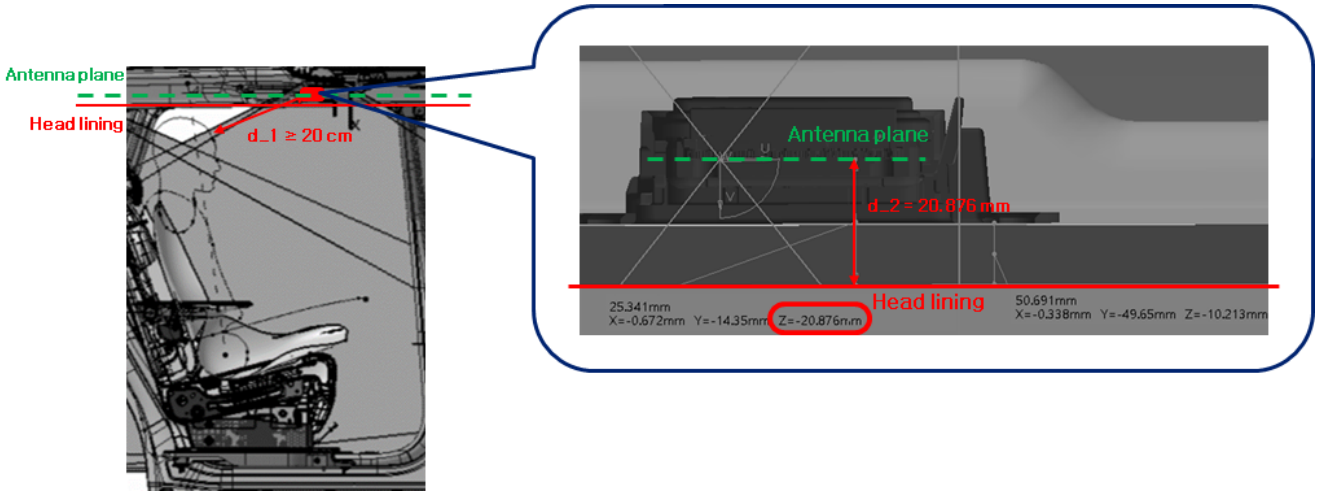
Chapter 2. Installation - New condition

When *ICR010* (60 GHz Radar sensor) is installed behind of headliner under normal conditions,
the distance of 20 cm between the antenna and the person is maintained.

However, the vehicle manufacturer wishes to add extremely extreme conditions where a tall adult can touch the vehicle ceiling.

Considering the thickness of the headliner and the antenna surface, the distance to the antenna when a person's head touches the ceiling becomes a minimum of about 2 cm (Please see d_2 below)

We evaluated this by touching (2 mm) the SAR assessment to consider a worst-case scenario. Please refer to the SAR report.



d_1 (Normal distance): 20 cm or more

d_2 (Minimum distance): 20.876 mm (Worst vehicle type)

3-1. FCC Compliance

FCC Part 15.105 statement (Class B)

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 Part 15.21
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

3-2. DA-21-816 waiver

The device is certified under FCC DA-21-816 waiver conditions, as FCC-ID: TQ8-ICR010.
So, it shall also comply with the following conditions:

(a) The operator's 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;

(b) The certification grant conditions shall clearly state that the device is limited to factory installation in new passenger motor vehicles and shall not be marketed in after-market add-on products.;

(c) The device shall be installed only inside the cabin of a vehicle, according to the conditions of the DA 21-407 waiver.

(d) The waiver conditions granted herein are not transferable to any third party via §2.933 or any other means of technology transfer.

3-3. IC Compliance

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions: (1) This device may not cause interference. (2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : 1) L'appareil ne doit pas produire de brouillage; 2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.