

Veoneer US, LLC
Application for Experimental License

Purpose of Experiment

Veoneer US, LLC (“Veoneer”) hereby requests experimental authorization for two years, commencing April 1, 2023, to conduct testing of its 60 GHz In-Cabin Sensing Radar (“ICSR”) consistent with the performance conditions requested herein.¹

Veoneer is an automotive technology company and world leader in active safety and restraint control systems focused on delivering innovative, best-in-class products and solutions to our customers. Our purpose is to create trust in mobility. Veoneer is a major hardware supplier and system integrator with products included in over 125 vehicle launches in 2022. The company continues to build on a heritage of close to 70 years of automotive safety development. Selected customers for our radar systems include GAC, Geely, General Motors, Honda, Mercedes-Benz, Renault Nissan Mitsubishi, Stellantis, and Volvo Cars.

As described in more detail below, Veoneer and its prospective commercial customers, including car manufacturers, will conduct market and user testing of the ICSR in the 60 GHz band. The ICSR can, when operating at the power levels requested, be used in vehicles to save the lives of children inadvertently left in a hot car and provide additional safety benefits without causing harmful interference to co-frequency users, and grant of experimental license is therefore in the public interest.

1. Description of Experiment

The ICSR is an in-cabin monitoring solution capable of identifying unattended children left in vehicles, a functionality that the Chairwoman has noted “could save their lives.”² Additional use cases include monitoring driver attentiveness, evaluating occupant vital signs in the event of a crash, and using gestures to control certain vehicle functions. The ICSR operates in a 3.7 gigahertz bandwidth between 60.090 GHz and 63.841 GHz and is based on frequency modulated continuous wave (“FMCW”) radar technology. It is housed in a sealed plastic box that is designed to be installed in the interior roof or a pillar within the vehicle cabin. The antennas are microstrip patches on the circuit board that supports the rest of the device’s circuitry.

Veoneer and select commercial customers will conduct performance testing, evaluation, and iterative development to assess and improve on the accuracy and capability of the ICSR for the purposes of increasing reliability as a means to detect and identify unattended children left in

¹ These performance conditions are consistent with waivers of Sections 15.255(a)(2) and (c)(3) of the Federal Communications Commission’s (“FCC” or “Commission”) rules granted to permit the certification and marketing of similar radar devices operating in the 60 GHz band. *See infra* n.4. Veoneer has also petitioned the FCC for waiver to permit the certification and marketing of the ICSR. *See* Veoneer US, LLC, Request for Waiver of Sections 15.255(a)(2) and (c)(3) of the Commission’s Rules (filed Feb. 10, 2023).

² *Amendment of Section 15.255 of the Commission’s Rules*, Statement of Acting Chairwoman Jessica Rosenworcel, 36 FCC Rcd 11901, 11930 (2021).

vehicles. Data gathered during evaluation and performance testing will be used to tune the system and assess performance in vehicle context during static and driving conditions on public roads and in test facilities. In particular, Veoneer and its partners will test and demonstrate ICSR capabilities through evaluation of occupant detection, classification, and localization to areas within a vehicle in both static and dynamic (public road driving) scenarios, data collection and analysis of challenging “false positive” test cases to determine and improve the reliability and accuracy of the product, and data gathering for additional development applications of the ICSR including but not limited to intrusion detection, seat belt reminder, and gesture control.

Testing will be conducted in vehicles operating throughout the continental United States, including in test facilities and on open roads.

2. Requested Frequencies and Operations

Veoneer proposes to perform the requested tests in the 60.090-63.841 GHz band with up to +10 dBm peak transmitter conducted output power, +13 dBm peak EIRP level, +13 dBm/MHz power spectral density, and within a maximum transmit duty cycle of 10% in any 33 ms interval.³ Such operations are consistent with waivers of Section 15.255 of the Commission’s rules granted to permit the certification and marketing of similar radar devices operating in the 60 GHz band.⁴

A report demonstrating that Veoneer’s testing in this band will comply with the limits requested herein is available upon request subject to confidential treatment.

3. Antennas

As described above, the antennas sought to be used in this testing are microstrip patches attached to the ICSR’s circuit board, which use FMCW radar technology.

4. Public Interest

The ICSR enables a critical safety capability: sensing the presence of a child in a vehicle, which can prevent inadvertently leaving the child unattended, and in turn help prevent severe injury or death from heatstroke. The radar can sense the motion associated with breathing as well as other movement, both in magnitude and for cyclic motion. It can also detect the distance and angle, relative to the sensor, of that movement. Using these capabilities, it can discriminate between animate and inanimate, as well as determine an animate object’s location. The ICSR can therefore also support secondary functions including targeted airbag deployment, seatbelt reminders, and intrusion detection. Veoneer further foresees additional device use cases, such as

³ For purposes of computing the duty cycle, Veoneer will consider any radar off-time period between two successive radar pulses that is less than 2 ms would be considered “on time.”

⁴ See, e.g., *Vayyar Imaging Ltd. Request for Waiver of Section 15.255(c)(3) of the Commission’s Rules for Radars used for Interactive Motion Sensing in the Frequency Band 57-64 GHz*, 36 FCC Rcd 7218 (OET 2021) (“2021 Waiver Order”) (granting similar waivers to six petitioners). See generally *Google LLC Request for Waiver of Section 15.255(c)(3) of the Commission’s Rules Applicable to Radars used for Short Range Interactive Motion Sensing in the 57 64 GHz Frequency Band*, Order, 33 FCC Rcd 12542 (OET 2018) (“Google Waiver Order”).

monitoring driver attentiveness, evaluating occupant vital signs in the event of a crash, and using gestures to control certain vehicle functions. These use cases are limited to in-cabin operation and do not intentionally cause emissions outside the vehicle. The ICSR therefore offers the potential for substantial public safety enhancements, while minimizing the potential for harmful interference to authorized radio services or other operations in the 60 GHz band.

Veoneer has sourced business with global car manufacturers to bring this technology into production in the next 2 years. Prototype development shows promising results of application of the technology to detect unattended children in vehicles, potentially providing lifesaving benefits to society through radar application. Further experimentation will support secondary functions including targeted airbag deployment, seatbelt reminders, intrusion detection, vital sign monitoring in the event of a crash, and gesture control for certain vehicle functions.

5. Interference Prevention

As described above, the design of the ICSR minimizes the potential for emissions outside the vehicle, and Veoneer complies with the limits established for waivers granted to permit the certification and marketing of similar radar devices operating in the 60 GHz band. Additionally, Veoneer will conduct operations under the experimental license on a non-interference basis consistent with Section 5.84 of the FCC's rules.⁵

6. Stop Buzzer Point of Contact

Pursuant to Section 5.308 of the Commissions' rules, a Veoneer point of contact will be reachable with the contact information below at any time during the experiment to immediately address interference concerns:

Matthew Lambert
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⁵ 47 C.F.R. § 5.84.