

24 GHz NB Radar Sensor
User Manual
Product Model: NB24G20V0

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1 Abbreviations

1.1 List of Terminology and Acronyms

BSD	Blind Spot Detection
CAN	Controller Area Network
DSP	Digital Signal Processor
EMC	ElectroMagnetic Compliance (regulatory standards)
FM	Frequency Modulation
GHZ	Giga-Hertz (10 ⁹)
HP	Host Processor
LCA	Lane Change Assist
MMIC	Monolithic Microwave Integrated Circuit
MCU	MicroController Unit
NB	Narrow Band
PCB	Printed Circuit Board
RADAR	RAdio Detection and Ranging
RCTA	Rear Cross Traffic Alert
RF	Radio Frequency (or Microwave)

2 Product Overview

2.1 Product Description

The products described here are part of a family of radars offered by Veoneer. They are intended for automotive use, operating in the 24.050 - 24.250GHz band.

The radars are integrated into a vehicle to enhance vehicle safety systems. They can be integrated as a standalone sensor or sensors, or as part of more complex system that also may include cameras, lidar, and other type of sensors to provide features like Automatic Cruise Control, Automatic Emergency Break, Free Space Detections and other Autonomous Driving functions.

2.2 Product Application Examples

The product can be used, but is not limited to the following applications:

- Blind Spot Detection
- Rear Cross Traffic
- Lane change warning
- Rear collision prevention systems
- Automatic lane change systems
- Pedestrian and Bicycle collision prevention

3 Typical Installation

The radar is typically installed in the positions of the vehicle depicted in Figure 1 often mounted behind a bumper or emblem.

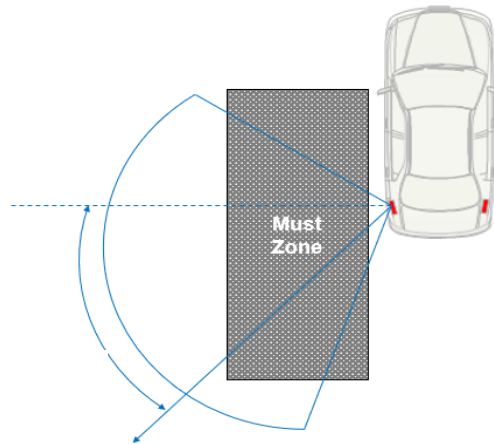


Figure 1: Typical Installation Positions

4 Hardware Description

The NB RADAR is a fully integrated 24GHz radar sensor with both RF and DSP modules on the same PCB. The design supports a combination of pulsed Doppler and chirped FM waveforms that can detect moving or stationary vehicles in a high clutter environment.

The sensor's DSP – a multicore processor - controls all signal processing, diagnostics and communications. The RF module generates, transmits, receives and demodulates radar signals using two Veoneer MMICs. Software algorithms calculate target parameters such as range, speed and angle and this information is sent out to the vehicle over the CAN bus.

The components are assembled into a plastic housing that is laser welded together. The sensor has no serviceable parts and can't be opened without permanent damage.

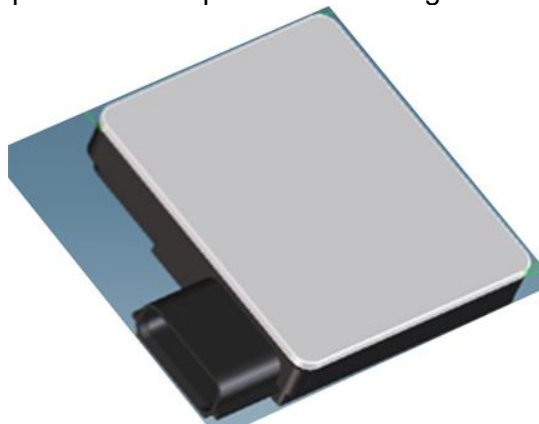


Figure 2: Generic Sensor

5 Sensor Generic Specifications

Sensor Specifications & Functions	Value	Unit
Operating Conditions		
Frequency Band	24.050 – 24.250 (ISM)	GHz
Vehicle Network Interface	CAN 2.0B	-
Operating Temperature	-40C to +85	C (External Ambient)
Input Operating Voltage	8.0-16.0	VDC
RF Output Power (EIRP)	13.26	dBm
Operating Life	15	yrs.
Waveform Parameters		
Cycle Time	81.62	ms
Bandwidth	<200	MHz
Physical Parameters		
Size	72 x 63 x 16	mm (excluding connector)
Weight	<75	g
Vehicle Physical Interface	Standard is 6 Pin DUAL CAN	-

Table 1: Sensor Specifications

6 Sensor Features

The **BSD algorithm** detects and reports “Objects of Interest” on either side of the vehicle, within a specified “blind spot” zone. The feature generates a signal which is used to drive a visual display placed in the outside view mirror to alert the driver to the presence of objects of interest within the defined SBZA zone.

The **LCA algorithm** detects and reports to the driver that a vehicle is rapidly approaching the host vehicle in one of the adjacent lanes. The feature generates a signal which is used to drive a visual display placed in the outside view mirror and/or request a chime or vibrating seat cushion, to alert the driver to the approach of objects of interest within the defined LCA zone.

The **RCTA algorithm** detects and reports “Objects of Interest” behind the host vehicle, within a specified RCTA coverage zone. The feature generates a signal which is used to drive a visual display to alert the driver of the presence of objects of interest that may cause a collision with the host vehicle within the defined RCTA zone.

7 Conformance Statements

7.1 USA

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. CAUTION TO USERS Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Additionally, it should be mentioned, that the integrator is advised to have this statement in their user manual as well.

CAUTION TO USERS

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

7.2 Canada

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.

7.3 Radio Frequency Exposure Information

This equipment should be operated at a minimum distance of 20 cm from the user.

This equipment complies with FCC and IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de

20 cm de distance entre la source de rayonnement et votre corps. Ce transmetteur ne doit pas être placé au même endroit ou utilisé simultanément avec un autre transmetteur ou antenne.

7.4 Europe

Hereby, Veoneer US, Inc declares that the radio equipment type NB24G20V0 is in compliance with Directive 2014/53/EU.

Operational frequency band: 24.050 – 24.250GHz

Maximum radio-frequency output power: < 20dBm peak eirp

The full text of the EU declaration of conformity is available at the following internet address:
<https://www.veoneer.com/en/regulatory>

8 Revision History

The revision number in table below is the PLM revision and version number. The Description/Comment is the same description that is found in PLM in check comment.

Revision	Date	Author(s)	Description/comment
000 v1	2021-01-07	Harsha Deshpande	Initial release
000 v2	2021-04-12	Harsha Deshpande	Added FCC 15.21 conformance statement

Table 2: Revision History