

**RF Exposure Report
(mobile devices)
47 CFR 2.1091**

Report No.: WIRS137766 – FCC RF Exposure

Test Model: PROX Controller

Received Date: 10/14/2025

Test Date(s): 10/14/2025 – 01/07/2026

Issued Date: 03/03/2026

Applicant: Zoon

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1. Certificate of Conformity

Product: Zoox

Brand: Zoox

Test Model: PROX Controller

Sample Status: Production

Applicant: Zoox

Test Date(s): 10/14/2025 – 01/07/2026

Standard: 47 CFR FCC Part 2.1091 and FCC Part 1.1310



Chin Ming Lui
Senior Wireless Test Engineer

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 22 Subpart H and Part 24 Subpart E and Part 27 Subpart L of the FCC Rules under normal use and maintenance.

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	March 3, 2026	Initial Issue.

1. EUT General info

Overview:

The PROX system, short for Proximity Detection ECU (Electronic Control Unit), is a proprietary technology developed by Zoox to facilitate a seamless and automated entry and exit experience for riders. PROX is used for authentication and distance estimation of a rider when they are near a Zoox vehicle at a pick up or drop off location. PROX communicates with the rider's mobile app using Bluetooth and Ultra-wideband radios.

System Specifications:

Function	Spec	Frequency Bands Supported	Antenna Type	Antenna Gain (Typical) Per Datasheet
MCU	NXP S32K148	-----	-----	-----
RF (BLE)	ublox NINA-B416 (Bluetooth v5.1)	2402 – 2480 MHz	Chip Antenna	~3 dBi
RF (UWB)	Murata Type 2BP	CH5: 6489.6 MHz CH9: 7987.2 MHz	Chip Antenna	~ 3.7 dBi
CAN Transceiver	TJA1043	-----	-----	-----

PROX Technical Specifications:

Function	Parameter
Operating Voltage	9-16 VDC
I _{max} (mA)	~500 mA
Operating temperature	-10°C – 85°C
Storage temperature	-30°C – 85°C

PROX Dimensions (in mm):	
Length	88
Width	89
Height	12

Note: The information in this section was leveraged from PROX Operational Description supplied by the client. Eurofins did not verify the Transmit Power or Antenna Gain.

2. RF Exposure Limits

In this document, we evaluate the RF Exposure to human body due the intentional transmission from the transmitter (EUT). The limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 were followed.

2.1 FCC ID

- Contains FCC ID: 2BNNA-2BP0300-07-AB
- Contains FCC ID: XPNINAB4

2.2 FCC Limits

According to FCC 1.1310 Table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to Radio-Frequency (RF) radiation as specified in 1.1307(b)

Table 1 to § 1.1310(e)(1) – LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
(A) Limits For Occupational / Controlled Exposure				
0.3 – 3.0	614	1.63	*100	6
3.0 – 30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300 - 1500	...	...	F/300	6
1500 - 100,000	...	...	5	6
(B) Limits For General Population / Uncontrolled Exposure				
0.3 – 1.34	614	1.63	*100	30
1.34 – 30	824/f	2.19/f	*180/f ²	30
30 – 300	27.5	0.073	0.2	30
300 - 1500	...	...	F/1500	30
1500 - 100,000	...	...	1.0	30

F = Frequency in MHz

* = plane wave equivalent density

3 Test Results (Mobile Configuration)

3.1 Classification

Radio is installed inside a mobile host device. The antenna of the product, under normal use condition, is at least 20 cm away from the body of the user and accessible to the end user. Warning statement to the user for keeping at least 20 cm or more separation distance with the antenna should be included in user's manual.

3.2 Maximum RF Power

BLE Radio:

Modulation	Frequency Range (MHz)	Max. Conducted Output Power ¹ (W)	Max. Conducted Output Power (dBm)	Max. Conducted Output Power with Tune Up ² (dBm)	Max. Antenna Gain ³ (dBi)
GFSK	2400 – 2483.5	0.00815	9.112	10.112	3

Modulation	Frequency Range (MHz)	Max. EIRP ⁴ (dBm)	Max. EIRP (mWatts)
GFSK	2400 – 2483.5	13.112	20.474

¹**Note:** Obtained from “Grant of Equipment Authorization” issued by the FCC for “u-blox AG” (FCC ID: XPYNINAB4)

²**Note:** Tune-up tolerance of +1 dB.

³**Note:** Antenna gain and information obtained from “NINA-B4 series certification Stand-alone Bluetooth 5.1 low energy modules” datasheet by ublox:

- Specification: ublox NINA-B416
- Antenna Type: PCB trace
- Gain: +3 dBi

⁴**Note:** Max. EIRP (dBm) = Max Conducted Output Power with Tune Up (dBm) + Max Antenna Gain (dBi)

UWB Radio:

Change of UWB antenna from MTD-ANT-027-1-A_UWB_ANT18mm patch antenna by Murata Manufacturing Co., Ltd. to ZDEA167250T-0222A1 multilayer antenna by TDK Corporation.

Modulation	Channel	Frequency (MHz)	Old Max. EIRP ¹ (W)	Old Max. EIRP (dBm)	Old Max. Antenna Gain ² (dBi)	Max. Conducted Output Power ³ (dBm)
BPM-BPSK	5	6489.6	0.0008	-0.969	0.9	-1.869
	9	7987.2	0.0009	-0.458	2.7	-3.158

Modulation	Channel	Frequency (MHz)	Max. Conducted Output Power with Tune Up ⁴ (dBm)	New Max. Antenna Gain ⁵ (dBi)	New Max. EIRP ⁶ (dBm)	New Max. EIRP (mWatts)
BPM-BPSK	5	6489.6	-0.869	3.7	2.831	1.919
	9	7987.2	-2.158	3.7	1.542	1.426

¹**Note:** Obtained from “Grant of Equipment Authorization” issued by the FCC for “Murata Manufacturing Co., Ltd.” (FCC ID: VPYLB2BP)

²**Note:** Antenna gain and information obtained from “MTD-ANT-027-1-A_UWB_ANT18mm Antenna performance” report by Murata Manufacturing Co., Ltd.:

- P/N: MTD-ANT-027-1-A_UWB_ANT18mm
- Antenna Type: Patch
- Antenna Gain: 0.9 dBi for Channel 5 and 2.7 dBi for Channel 9

³**Note:** Max Conducted Output Power (dBm) = Old Max. EIRP (dBm) – Old Max. Antenna Gain (dBi)

⁴**Note:** Tune-up tolerance of +1 dB.

⁵**Note:** Antenna gain and information obtained from “Multilayer Antenna For UWB” datasheet by TDK Corporation:

- P/N: ZDEA167250T-0222A1
- Antenna Type: Multilayer, ZDE Series 1.6x0.8mm [EIA 0603] TYPE
- Antenna Gain: 3.7 dBi Typ. for frequency range 6200 MHz to 8300 MHz

⁶**Note:** New Max. EIRP (dBm) = Max Conducted Output Power with Tune Up (dBm) + New Max Antenna Gain (dBi)

3.3 RF Exposure Calculation

FCC limits

Calculations for this report are based on the highest power leveraged from the “Grant of Equipment Authorization” issued by the FCC for each radio.

BLE Radio:

Evaluation of 20cm distance:

Modulation	Frequency Range (MHz)	Max. EIRP ¹ (dBm)	Max. EIRP (mW)	Power Density (mW/cm ²) @20 cm	FCC Limit (mW/cm ²)	Results
GFSK	2400 – 2483.5	13.112	20.474	0.0407	1.0	Complies

¹**Note:** Max. EIRP (dBm) = Max RF Output Power with Tune Up (dBm) + Max Antenna Gain (dBi)

UWB Radio:

Evaluation of 20cm distance:

Modulation	Channel	Frequency (MHz)	Max. EIRP ¹ (dBm)	Max. EIRP (mW)	Power Density (mW/cm ²) @20 cm	FCC Limit (mW/cm ²)	Results
BPM-BPSK	5	6489.6	2.831	1.919	0.0038	1.0	Complies
	9	7987.2	1.542	1.426	0.0028	1.0	Complies

¹**Note:** Max. EIRP (dBm) = Max RF Output Power with Tune Up (dBm) + Max Antenna Gain (dBi)

BLE + UWB Simultaneous Transmission:

Worst-case scenario: BLE and UWB Channel 5 transmitting simultaneously.

Power Density of Simultaneous Transmitting Radios = $0.0407 \text{ mW/cm}^2 + 0.0038 \text{ mW/cm}^2 = 0.0445 \text{ mW/cm}^2$, which complies with the FCC limit of 1.0 mW/cm^2 .

Power Density Calculation

$$P_d = (P_{out} * G) / (4 * \pi * R^2)$$

Where:

P_d = Power density in W/m²

P_{out} = Output power from the antenna in watts (W)

G = Gain of the antenna in linear scale

R = Distance between observation point and center of the radiator in meters (m)

4 Conclusion

This device is compliant with RF Exposure requirements of the limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 for General Public (Uncontrolled Environment).

The BLE and UWB radios are capable of simultaneous transmission. Worst-case scenario of BLE and UWB Channel 5 simultaneous transmission comply with FCC MPE limits. The BLE and UWB radios comply to the FCC limits at 20cm away from the body of the user.