

# Nexxiot AG

## RF Exposure Exhibit

**SCOPE OF WORK**

EMC TESTING – Vector sensor, Model: HSV.1A

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**RF Exposure Exhibit  
(mobile devices)**

**Report Number: 105220135MPK-006**

**Project Number: G105220135**

**Report Issue Date: January 31, 2023**

**Product Designation: Vector sensor**

**Model Tested: HSV.1A**

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**to**

**47CFR 2.1091**

**RSS-102 Issue 5**

**for**

**Nexxiot AG**

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Report No. 105220135MPK-006	
<b>Equipment Under Test:</b>	Vector sensor
<b>Model(s) Tested:</b>	HSV.1A
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<b>Applicable Regulation:</b>	47CFR 2.1091 RSS-102 Issue 5

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## 1.0 RF Exposure Summary

Test	Reference FCC	Reference Industry Canada	Result
Radio frequency Radiation Exposure Evaluation	47 CFR§2.1091	RSS-102 Issue 5	Complies

## 2.0 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 and RSS-102 are followed.

### 2.1 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)

#### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

## 2.2 Industry Canada Limits

According to RSS-102, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

<b>Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)</b>				
Frequency Range	Electric Field	Magnetic Field	Power Density	Reference Period
(MHz)	(V/m rms)	(A/m rms)	(W/m <sup>2</sup> )	(minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$
Note: $f$ is frequency in MHz. * Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

### 3.0 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 EIRP calculations

The EUT, Model: HSV.1A consists of a single radio that transmits either a BLE signal or OQPSK signal. The two signals cannot be broadcasted at the same time.

#### 3.3 Maximum RF Power

Frequency Range (MHz)	RF Output (dBm)	Antenna Gain <sup>1</sup> (dBi)	Note
2402-2480 (BLE)	5.51	3.0	Conducted power measurements were taken from Report # 105220135MPK-001.
2405-2480 (OQPSK)	5.46	3.0	Conducted power measurements were taken from Report # 105220135MPK-003.

<sup>1</sup>As declared by the manufacturer.

### 3.4 RF Exposure Calculation

#### 3.4.1 RF Exposure calculation for BLE radio.

Calculations for this report are based on highest power measured for BLE.

Frequency Range (MHz)	EIRP <sup>1</sup> (dBm)	EIRP <sup>1</sup> (mW)	Power Density (W/m <sup>2</sup> ) @20 cm	RSS Limit (W/m <sup>2</sup> )	Results
2402-2480	8.51	7.096	0.01412	5.469	Complies

Frequency Range (MHz)	EIRP <sup>1</sup> (dBm)	EIRP <sup>1</sup> (mW)	Power Density (mW/cm <sup>2</sup> ) @20 cm	FCC Limit (mW/cm <sup>2</sup> )	Results
2402-2480	8.51	7.096	0.00141	1	Complies

<sup>1</sup>Note: Antenna gains below 0 are considered as 0dBi.

Calculations for this report are based on highest power measured for QPSK.

Frequency Range (MHz)	EIRP <sup>1</sup> (dBm)	EIRP <sup>1</sup> (mW)	Power Density (W/m <sup>2</sup> ) @20 cm	RSS Limit (W/m <sup>2</sup> )	Results
2405-2480	8.46	7.015	0.01396	5.469	Complies

Frequency Range (MHz)	EIRP <sup>1</sup> (dBm)	EIRP <sup>1</sup> (mW)	Power Density (mW/cm <sup>2</sup> ) @20 cm	FCC Limit (mW/cm <sup>2</sup> )	Results
2405-2480	8.46	7.015	0.00140	1	Complies

<sup>1</sup>Note: Antenna gains below 0 are considered as 0dBi.



## **Appendix A: Power Density Calculation**

The Power Density can be calculated using the formula

$$S = \text{EIRP} / 4\pi D^2$$

Where: S is Power Density in mW/cm<sup>2</sup>

D is the distance from the antenna in cm.

#### 4.0 Document History

Revision/ Job Number	Writer Initials	Reviewer Initials	Date	Change
1.0/ G105220135	BT	ML	January 31, 2023	Original document