

EMC TEST REPORT FCC 47 CFR Part 15B, ISED ICES-003 Issue 6	
Report Reference No	G0M-1805-7401-EF0115B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAKKS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-3 DAKKS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	GWA Hygiene GmbH
Address	Heinrich-Mann-Str. 11 18435 Stralsund GERMANY
Test Specification Standard(s)	47 CFR Part 15 Subpart B ISED ICES-003 Issue 6 ANSI C63.4:2014
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Hygiene-Monitoring-System
Model(s)	NosoEx® Sensormodul
Additional Model(s)	NosoEx® Transponder
Brand Name(s)	NosoEx
Hardware Version(s)	1.5
Software Version(s)	1.17
FCC-ID	2AU27NOSOEX001
IC	N/A
Test Result	PASSED

Possible test case verdicts:		
required by standard but not tested	N/T	
not required by standard	N/R	
required by standard but not appl. to test object	N/A	
test object does meet the requirement	P(PASS)	
test object does not meet the requirement	F(FAIL)	
Testing:		
Date of receipt of test item	2019-10-28	
Report:		
Compiled by	Marco Belz	
Tested by (+ signature) (Responsible for Test)	Marco Belz	
Approved by (+ signature) (Deputy Head of Lab)	Jens Marquardt	
Date of Issue	2019-12-10	
Total number of pages	25	
General Remarks:		
The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		
NosoEx® Transponder not tested		

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T _{NOM}	Nominal operating temperature
V _{NOM}	Nominal supply voltage

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2019-12-10	Initial Release	

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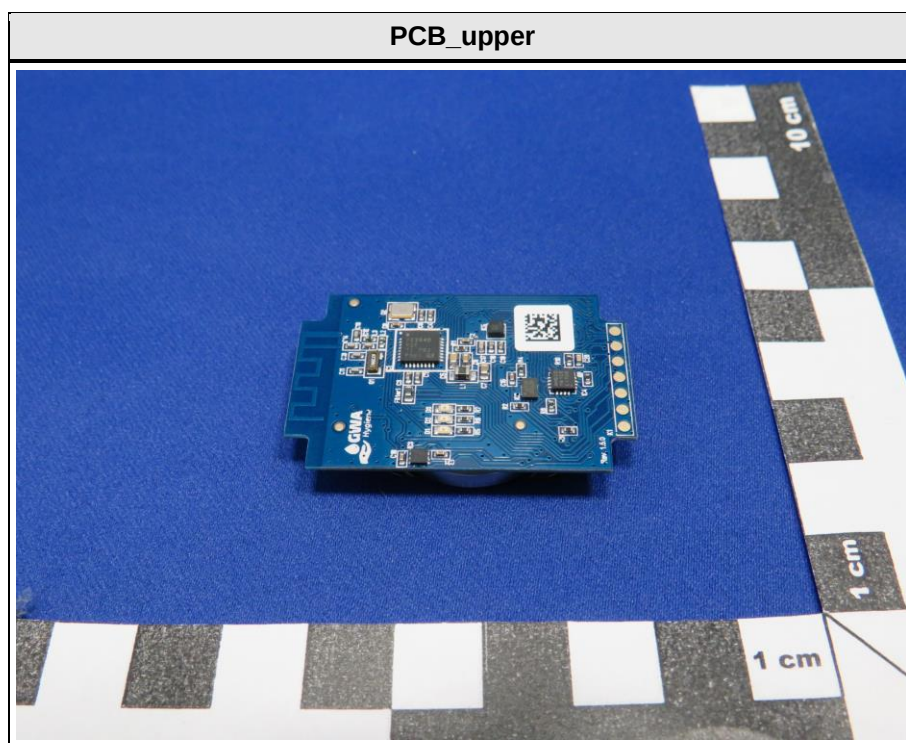
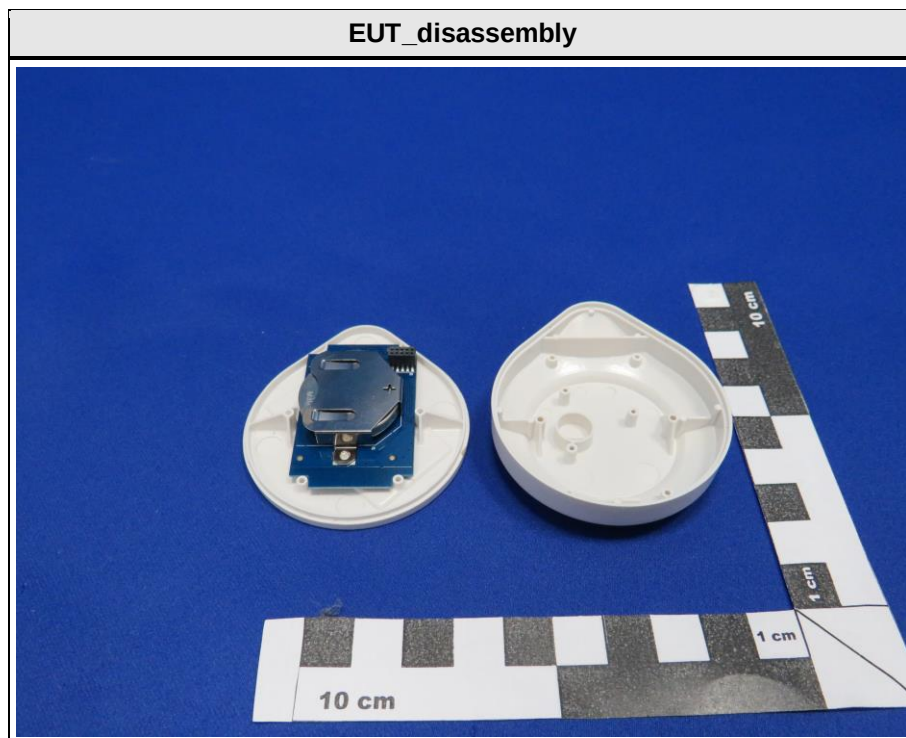
1 Equipment (Test Item) Under Test

Description	Hygiene-Monitoring-System	
Model	NosoEx® Sensormodul	
Additional Model(s)	NosoEx® Transponder	
Brand Name(s)	NosoEx	
Serial Number(s)	201801000001814	
Hardware Version(s)	1.5	
Software Version(s)	1.17	
FCC-ID	2AU27NOSOEX001	
IC	N/A	
Class	Class B	
Equipment type	Table top	
Highest internal frequency [MHz]	2483.5	
Radio Module	Type	BLE
	Model	CC2640R2F
	Manufacturer	Texas Instruments
	FCC-ID	-
	IC	-
Supply Voltage	V _{NOM}	3 VDC via internal Battery
Manufacturer	GWA Hygiene GmbH Heinrich-Mann-Str. 11 18435 Stralsund GERMANY	

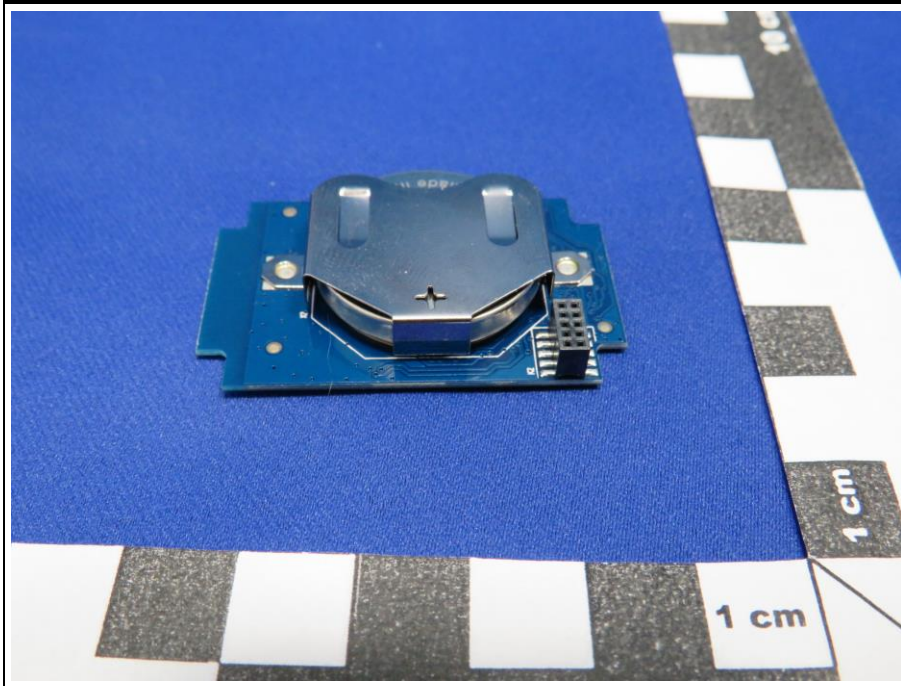
1.1 Equipment Ports

Name	Type	Attributes	Comment
None			
Description:			
AC	AC mains power input/output port		
DC	DC power input/output port		
BAT	DC power input port connected to external battery		
IO	Input/Output port		
TP	Telecommunication port		
NE	Non-electrical port		

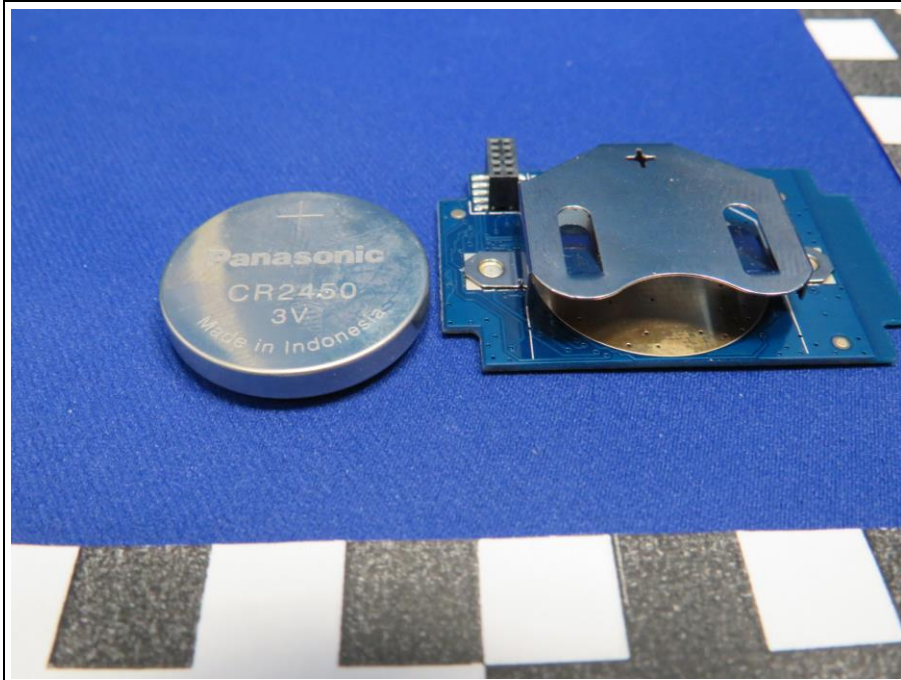
1.2 Equipment Photos - Internal



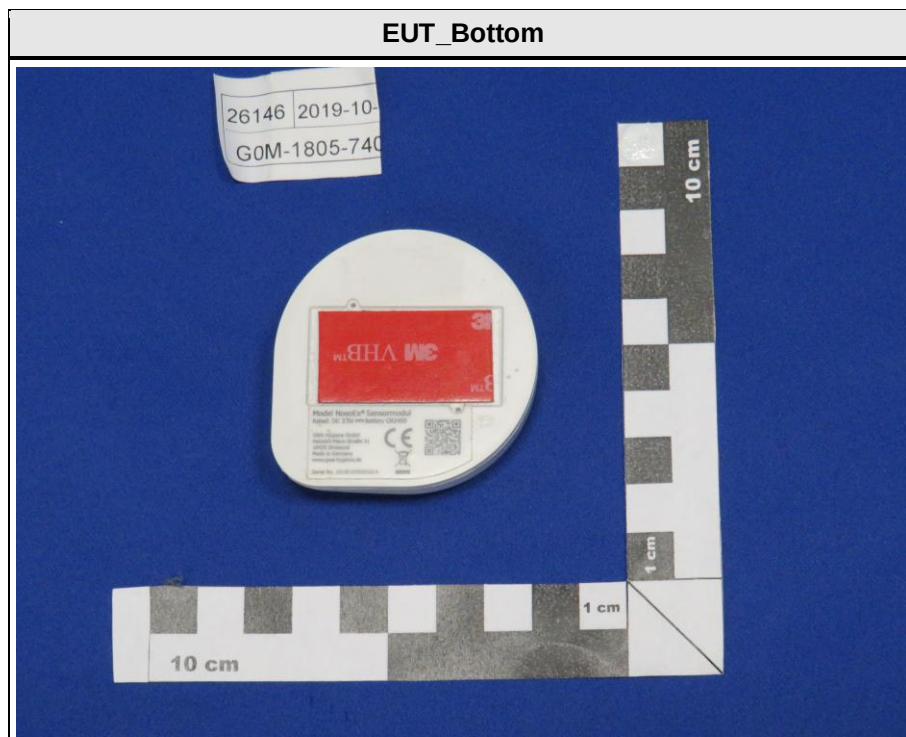
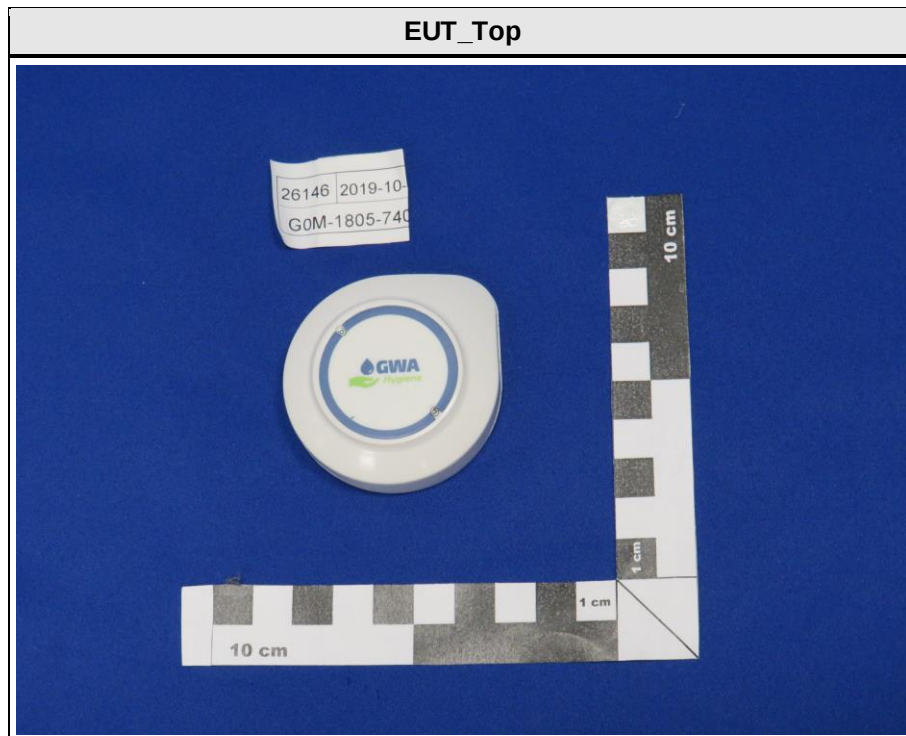
PCB_lower



PCB with internal battery



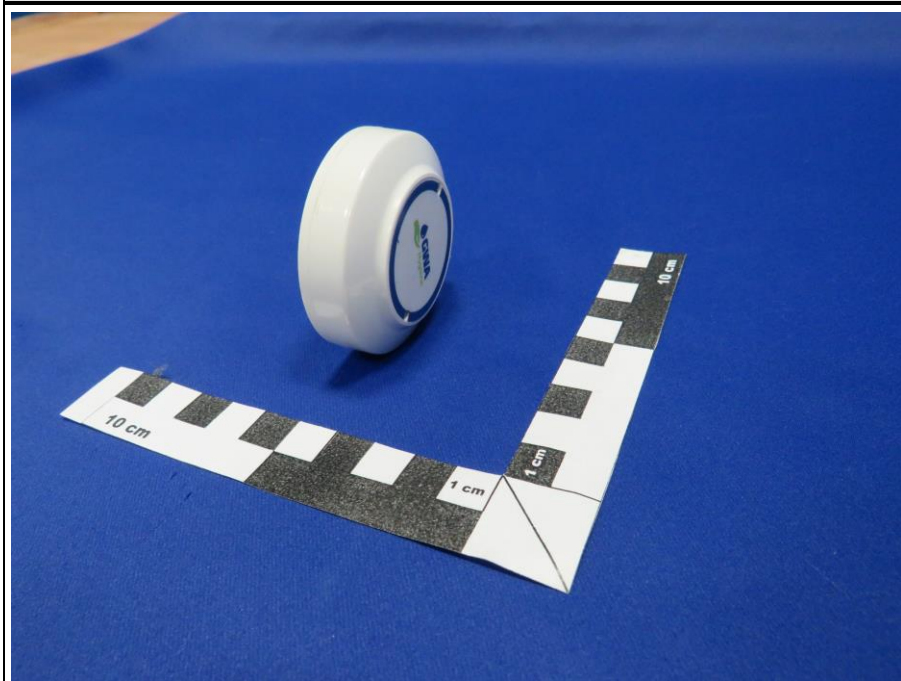
1.3 Equipment Photos - External



EUT_Label



EUT_Side



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Tablet	Samsung	Galaxy Tab A	Monitoring app on device
AE	Dongle	Samsung	BLE Adapter	
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	EUT is powered by internal battery. Bluetooth connection to tablet. Waiting for activities.
Comment:	

1.6 EUT Configuration

Configuration #	Description
1	EUT is placed on the table next to the tablet
Comment:	

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyser in dBµV. Any external preamplifiers used are taken into account through internal analyser settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyser. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyser (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dBµV + 26 dB/m	= 47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15B, ISED ICES-003 Issue 6				
Reference	Requirement	Reference Method	Result	Remarks
Emission				
FCC 15.109 ICES-003, 8, 6.1	Radiated emissions	ANSI C63.4:2014	PASS	
FCC 15.107 ICES-003, 8, 6.2	AC power line conducted emissions	ANSI C63.4:2014	N/R	
Comment:				

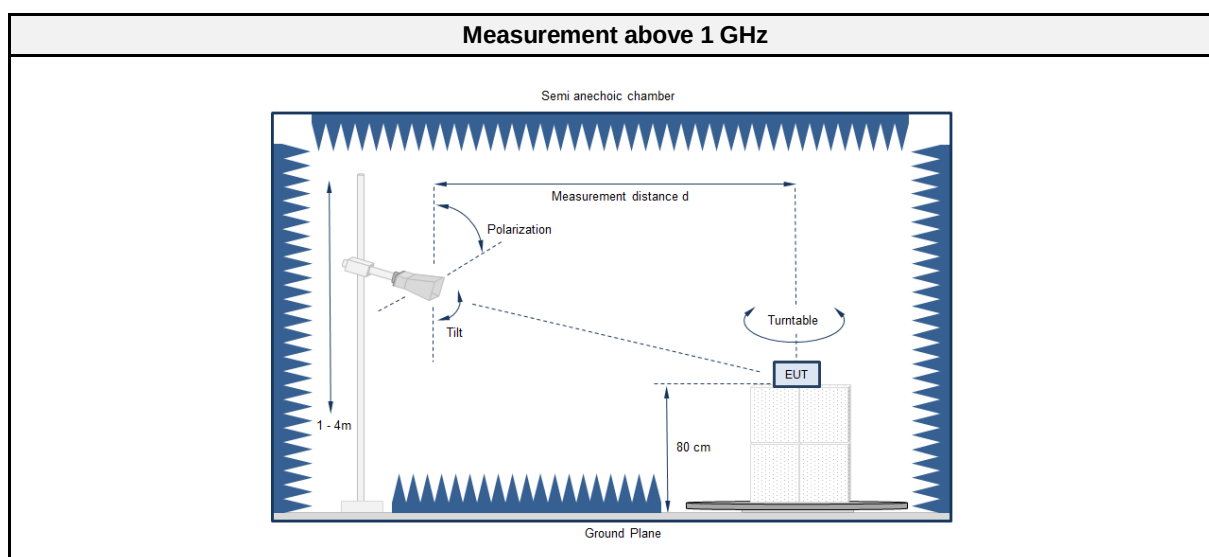
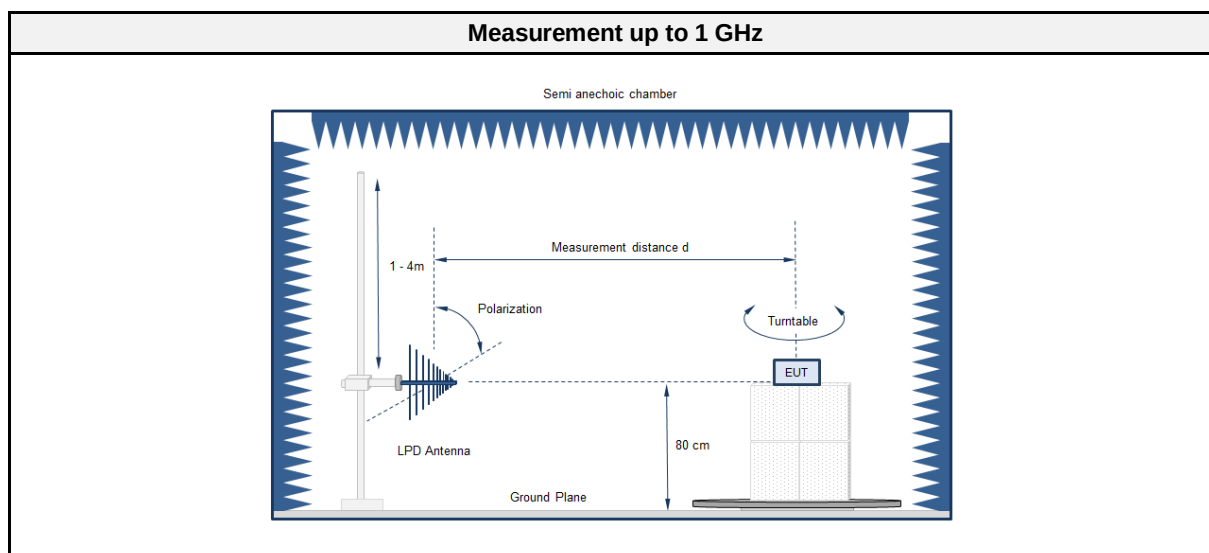
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

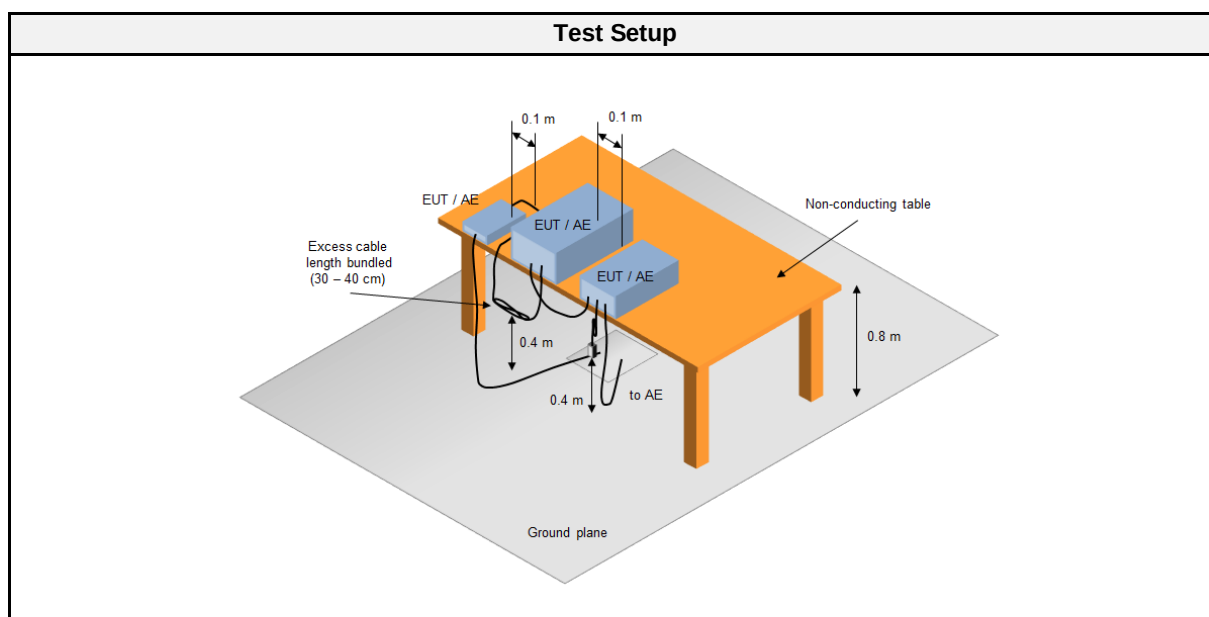
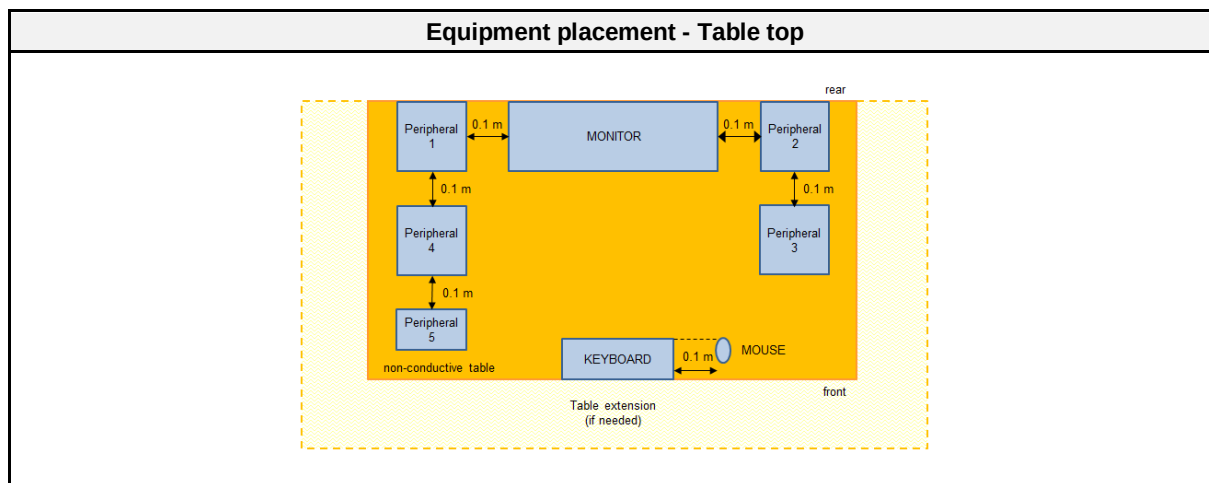
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

Test Information	
Reference	FCC 15.109, ICES-003, 8, 6.1
Reference method	ANSI C63.4:2014 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	2483.5
Measurement range	30 MHz to 12500 MHz
Temperature [°C]	22 – 23
Humidity [%]	36 – 40
Operator	Marco Belz
Date	2019-11-22

2.1.2 Setup





2.1.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2016.1.10

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC6	EF00910	2019-05	2022-05
Horn Antenna	ETS-Lindgren	3117	EF00976	2019-03	2022-03
Climatic Sensor	Embedded Data Systems, LLC.	020010000025377E	EF01336	2019-05	2020-05
EMI Test Receiver	Rohde & Schwarz Vertriebs GmbH	ESU26	EF00887	2019-07	2020-07
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162 (30MHz - 7GHz, 100W)	EF00978	2016-11	2019-11

2.1.4 Procedure

Exploratory measurement	
1.	The EUT was placed on a non-conductive table at a height of 0.8m.
2.	The EUT and support equipment, if needed, were set up to simulate typical usage.
3.	Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage.
4.	The antenna was placed at a distance of 3 or 10 m.
5.	The received signal was monitored at the measurement receiver.
6.	This procedure has to be performed in both antenna polarizations, horizontal and vertical.
7.	The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 1.3

Final measurement	
1.	The EUT was placed on a 0.8 m non-conductive table at a 3 m distance from the receive antenna. The antenna output was connected to the measurement receiver.
2.	A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast.
3.	The EUT and cable arrangement were based on the exploratory measurement results.
4.	Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.
5.	The test data of the worst-case conditions were recorded and shown on the next pages.

2.1.5 Limits

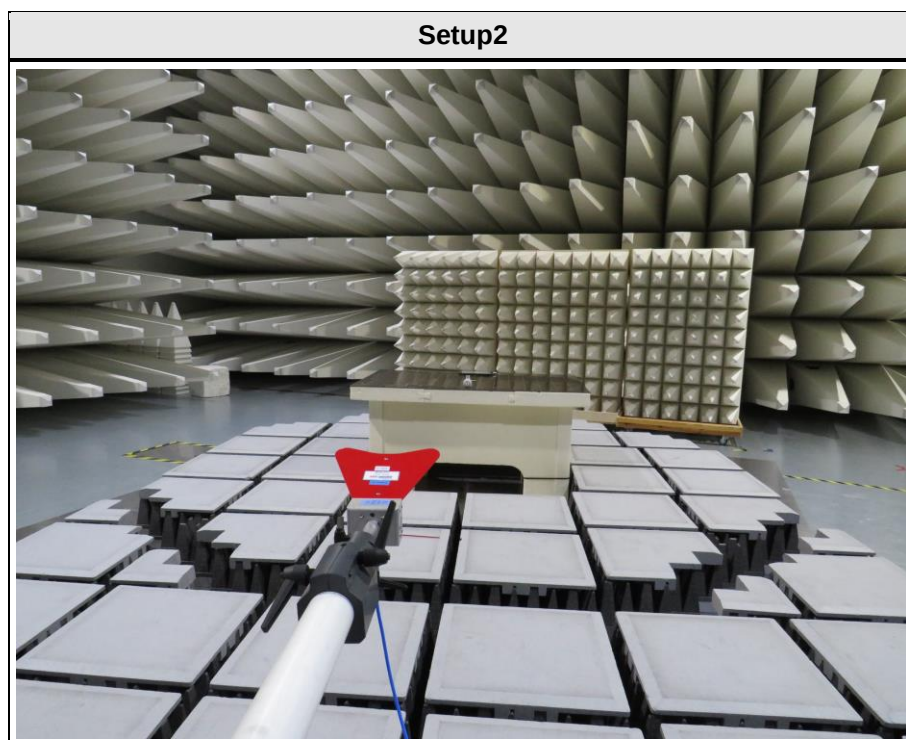
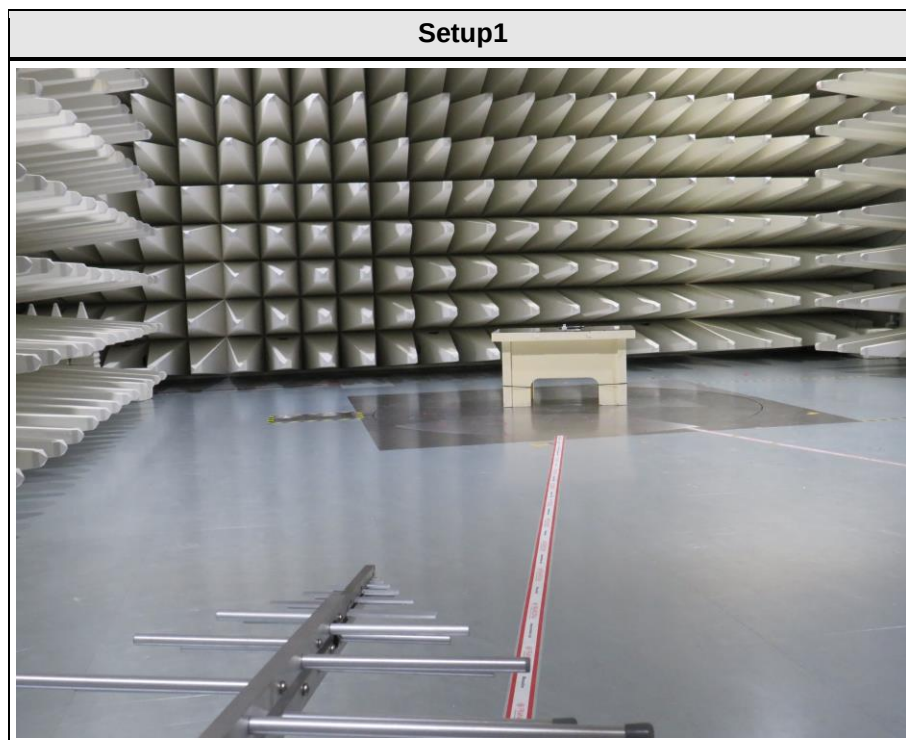
Class B @ 3 m		
Frequency [MHz]	Detector	Limit [dB μ V/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak	74
	Average	54

Class A @ 10 m		
Frequency [MHz]	Detector	Limit [dB μ V/m]
30 - 88	Quasi-peak	39
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46.5
960 - 1000	Quasi-peak	49.5
> 1000	Peak	69.5
	Average	49.5

2.1.6 Results

Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	

2.1.7 Setup Photos



Setup3



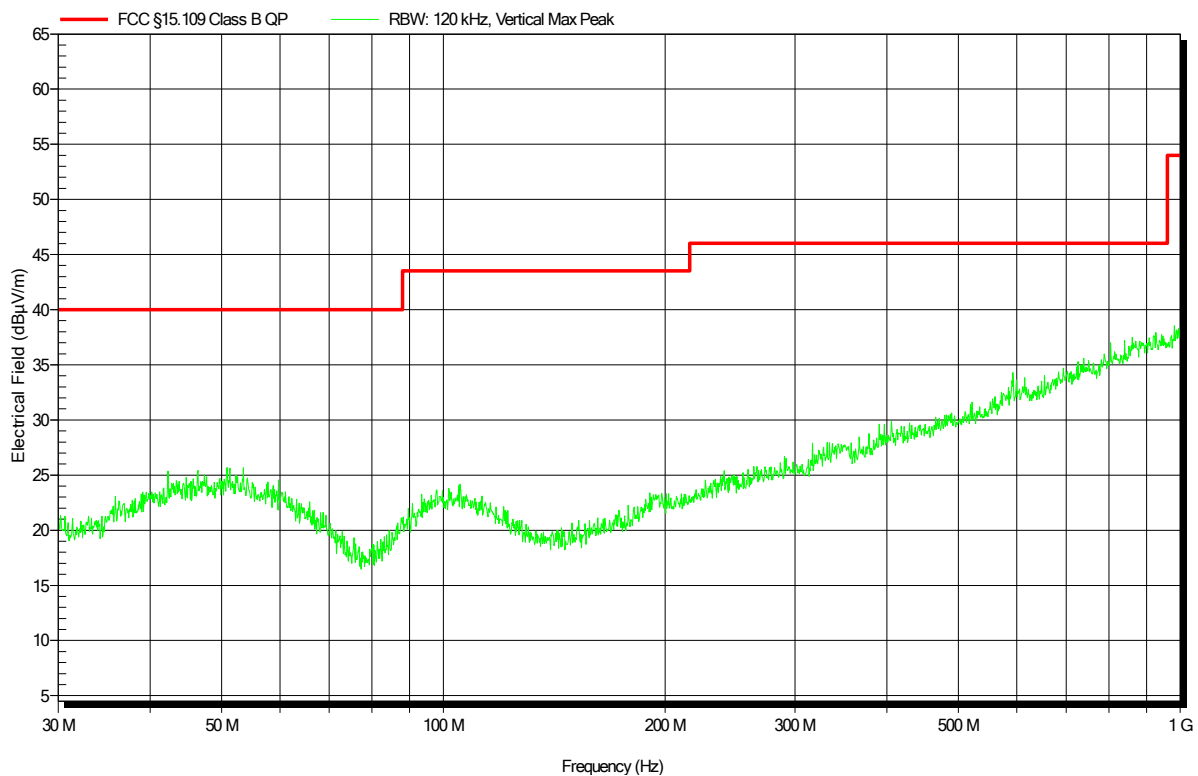
2.1.8 Records

Radiated emissions according to FCC 15B

Project number: G0M-1805-7401

Applicant:	GWA Hygiene GmbH
EUT Name:	Hygiene-Monitoring-System
Model:	NosoEx Sensormodul
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Conditions:	Tnom: 22°C, Unom: 3 V DC via internal Battery
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement distance:	10 m, converted to 3 m
Mode:	1
Test Date:	2019-11-21
Note:	Table 0°, Antenna 1 m

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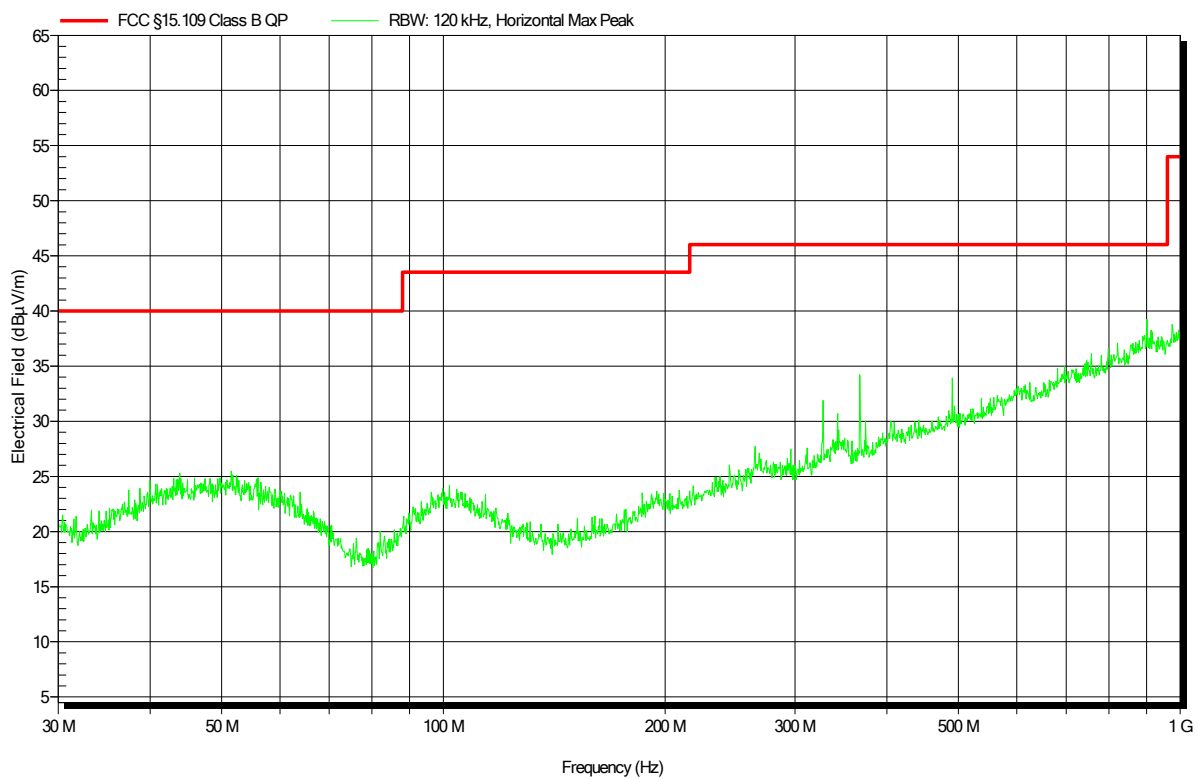


Radiated emissions according to FCC 15B

Project number: G0M-1805-7401

Applicant:	GWA Hygiene GmbH
EUT Name:	Hygiene-Monitoring-System
Model:	NosoEx Sensormodul
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Conditions:	Tnom: 22°C, Unom: 3 V DC via internal Battery
Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement distance:	10 m, converted to 3 m
Mode:	1
Test Date:	2019-11-21
Note:	Table 0°, Antenna 3 m

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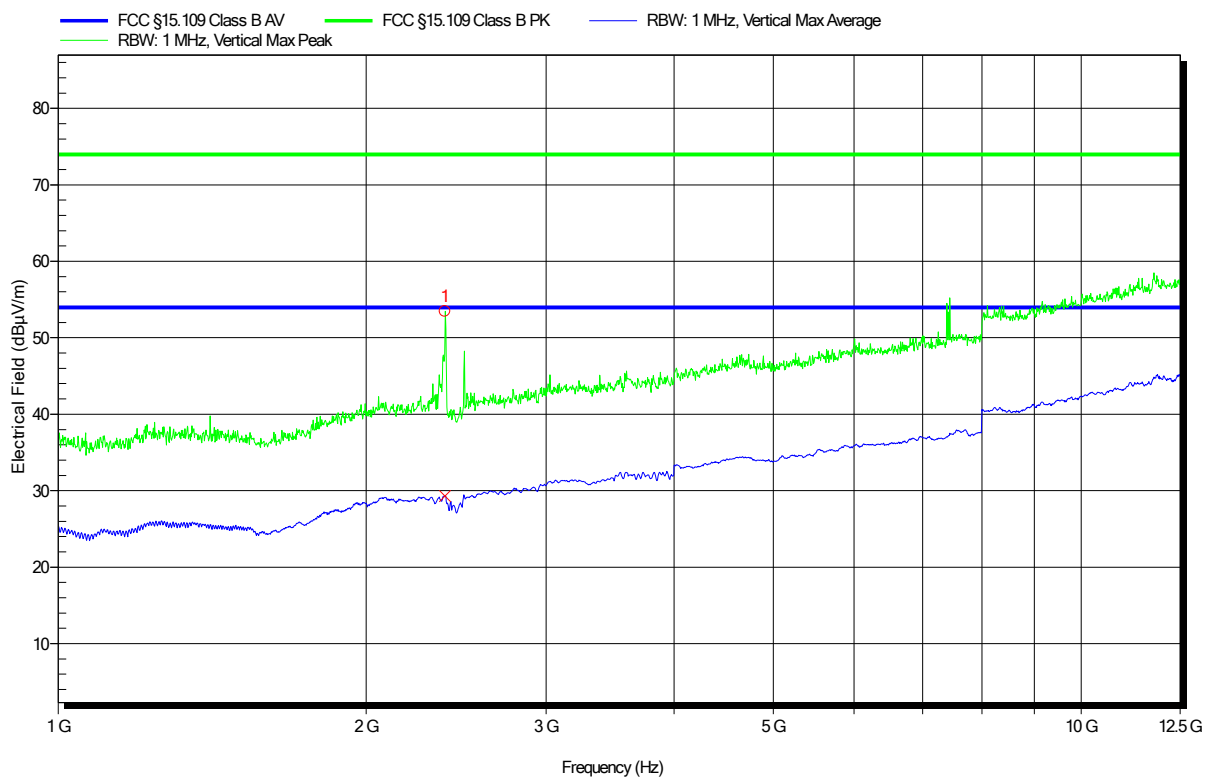


Radiated emissions according to FCC 15B

Project number: G0M-1805-7401

Applicant: GWA Hygiene GmbH
EUT Name: Hygiene-Monitoring-System
Model: NosoEx Sensormodul
Test Site: Eurofins Product Service GmbH
Operator: Mr. Belz
Test Conditions: Tnom: 22°C, Unom: 3 V DC via internal Battery
Antenna: ETS-Lindgren 3117, Vertical
Measurement distance: 3 m
Mode: 1
Test Date: 2019-11-22
Note: Table 0°, Antenna 1 m

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Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.389 GHz	53.5 dBµV/m	74 dBµV/m	-20.5 dB	Bluetooth Link		

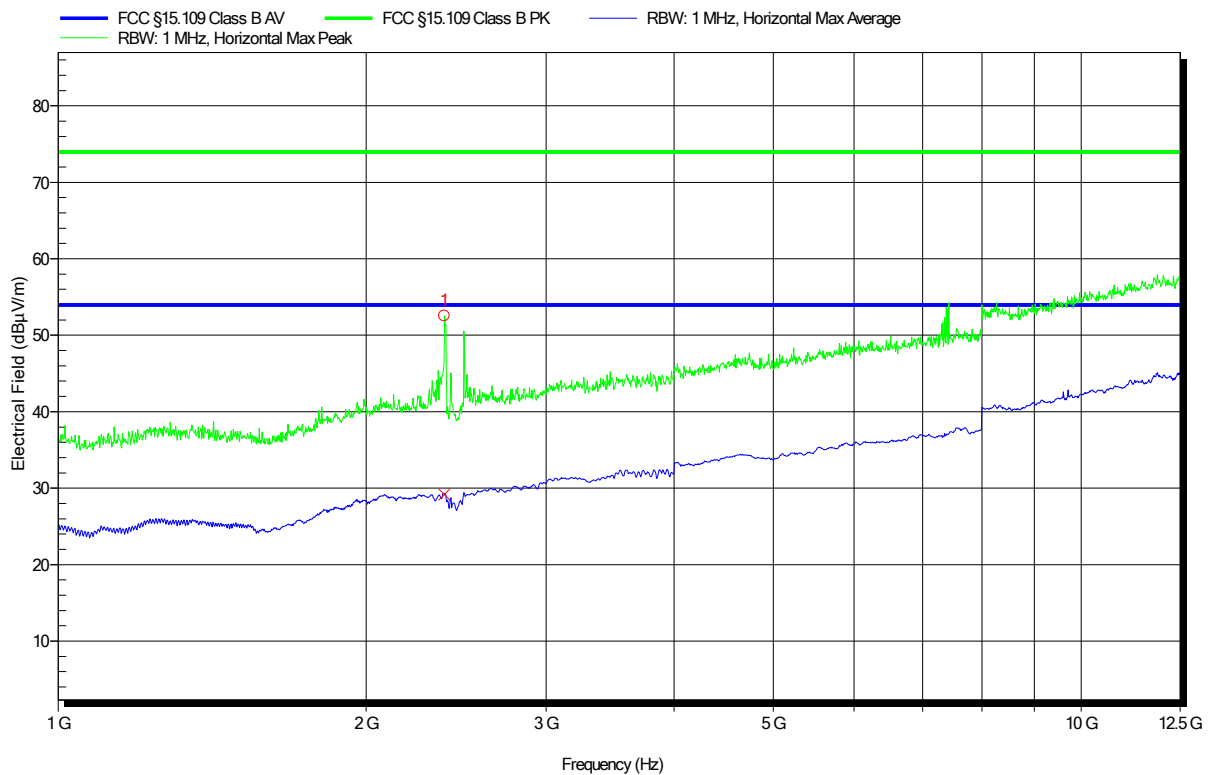
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.389 GHz	29.3 dBµV/m	54 dBµV/m	-24.7 dB	Bluetooth Link		

Radiated emissions according to FCC 15B

Project number: G0M-1805-7401

Applicant: GWA Hygiene GmbH
EUT Name: Hygiene-Monitoring-System
Model: NosoEx Sensormodul
Test Site: Eurofins Product Service GmbH
Operator: Mr. Belz
Test Conditions: Tnom: 22°C, Unom: 3 V DC via internal Battery
Antenna: ETS-Lindgren 3117, Horizontal
Measurement distance: 3 m
Mode: 1
Test Date: 2019-11-22
Note: Table 0°, Antenna 1 m

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Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.386 GHz	52.5 dBμV/m	74 dBμV/m	-21.5 dB	Bluetooth Link		

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.386 GHz	29.2 dBμV/m	54 dBμV/m	-24.8 dB	Bluetooth Link		