

<b>EMC TEST REPORT</b> Title 47 CFR Part 15B, ISED ICES-003 Issue 7	
<b>Report Reference No</b>	G0M-2201-1259-EF0115B-V01
<b>Testing Laboratory</b>	Eurofins Product Service GmbH
<b>Address</b>	Storkower Str. 38c 15526 Reichenwalde Germany
<b>Accreditation</b>	    <p>                         A2LA - Registration number: 1983.01 (ISED)                          ISED wireless device testing laboratory: CN 3470A                          DAkKS - Registration number : D-PL-12092-01-04 (FCC)                          FCC Filed Test Laboratory, Reg.-No.: 96970                     </p>
<b>Applicant</b>	Valpas Enterprises Oy
<b>Address</b>	Katariinankatu 1A, 3.krs 00170 Helsinki Finland
<b>Test Specification Standard(s)</b>	Title 47 CFR Part 15 Subpart B ISED ICES-Gen Issue 1 ; Amendment 1 (February 2021) ISED ICES-003 Issue 7 ANSI C63.4:2014+A1:2017
<b>Non-Standard Test Method</b>	None
<b>Equipment under Test (EUT):</b>	
<b>Product Description</b>	IoT device for autonomous bed bug prevention
<b>Model(s)</b>	PST
<b>Additional Model(s)</b>	None
<b>Brand Name(s)</b>	Valpas smart leg
<b>Hardware Version(s)</b>	PST_02
<b>Software Version(s)</b>	0.0.3
<b>FCC-ID</b>	2A36RVLPLEG
<b>IC</b>	28100-VLPLEG
<b>Test Result</b>	<b>PASSED</b>

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	2022-02-28	
Report:		
Compiled by	Manuel Engel	
Tested by (+ signature) (Responsible for Test)	Manuel Engel	
Approved by (+ signature) (Test Lab Engineer)	Andreas Pflug	
Date of Issue	2022-05-09	
Total number of pages	31	
General Remarks:		
<p>The test results presented in this report relate only to the object tested.</p> <p>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.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p>		
Additional Comments:		

## ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T <sub>NOM</sub>	Nominal operating temperature
V <sub>NOM</sub>	Nominal supply voltage

## VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2022-05-09	Initial Release	

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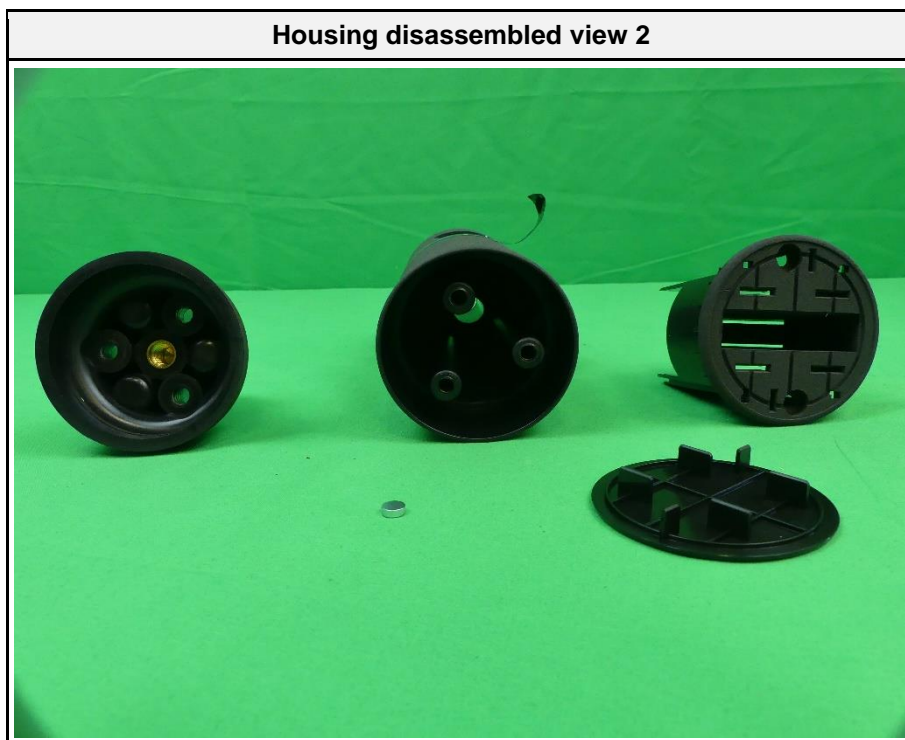
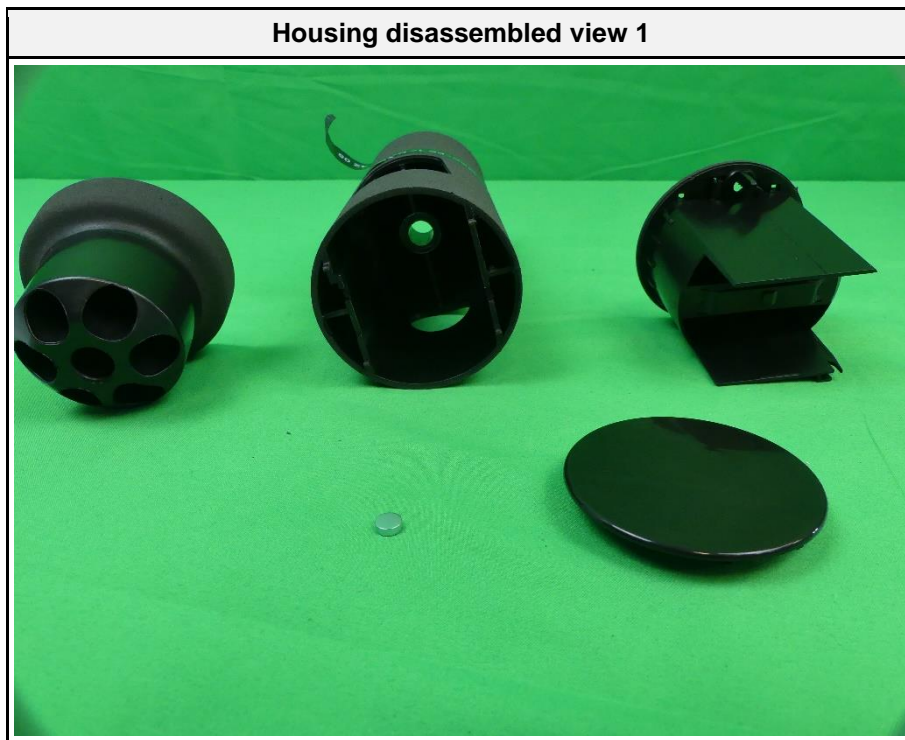
## 1 Equipment (Test Item) Under Test

Description	IoT device for autonomous bed bug prevention		
Intended Use	Automatically trapping bed bugs		
Model	PST		
Additional Model(s)	None		
Brand Name(s)	Valpas smart leg		
Hardware Version(s)	PST_02		
Software Version(s)	0.0.3		
Number of tested samples	1		
Sample Identification	EUT #	Sample-ID	Serial Number
	EUT 1	38746	2064314
EUT Dimensions [cm]	20.5 x 6.5 x 6.5		
FCC-ID	2A36RVLPLEG		
IC	28100-VLPLEG		
Class	Class B		
Equipment type	Table top		
Highest internal frequency [MHz]	2480		
Protective Earth	No		
Radio Module/ Chipset	Type	Wirepas	
	Model	nRF52832-CIAA-R	
	Manufacturer	Nordic Semiconductor	
	FCC-ID	2A36RVLPLEG	
	IC	28100-VLPLEG	
Supply Voltage	V <sub>NOM</sub>	3 V DC via internal non-rechargeable batteryies (2x1.5V AAA)	
AC/DC-Adaptor	None		
Manufacturer	Valpas Enterprises Oy Katariinankatu 1A, 3.krs 00170 Helsinki Finland		

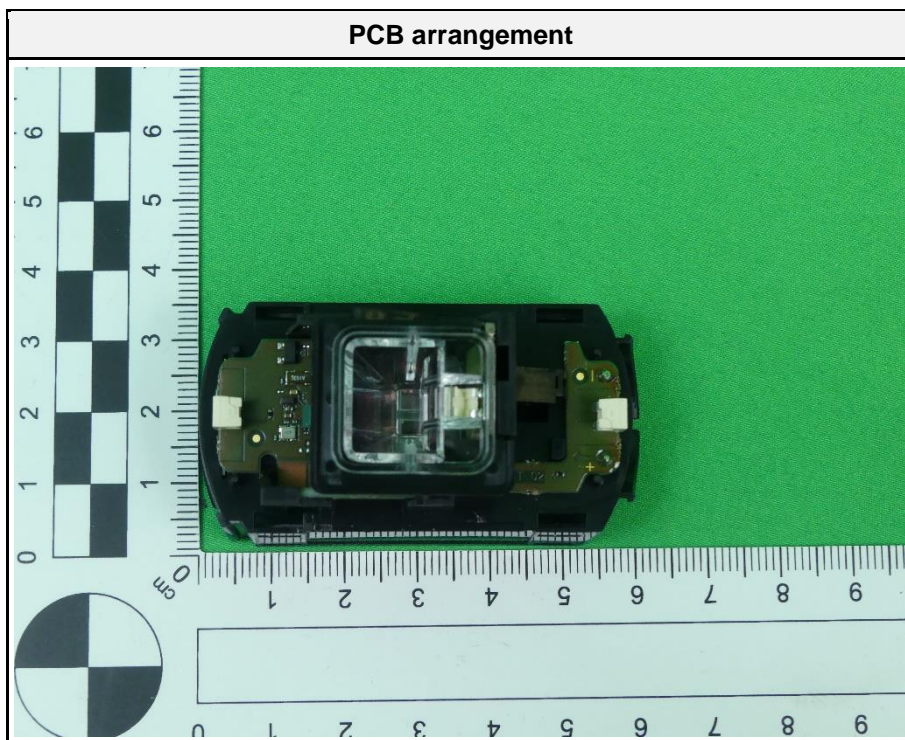
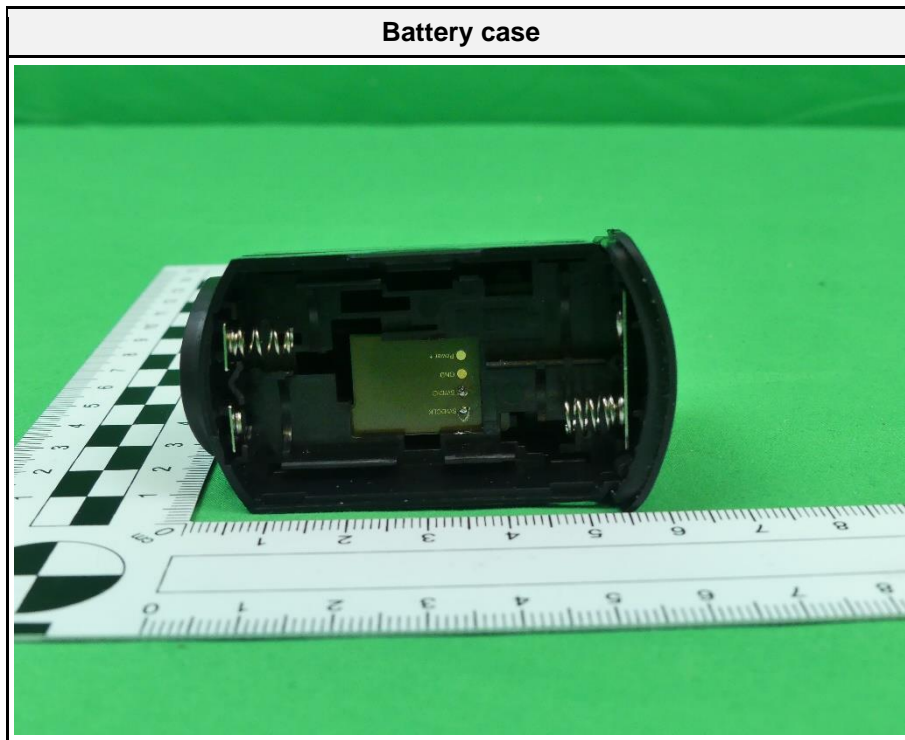
## 1.1 Equipment Ports

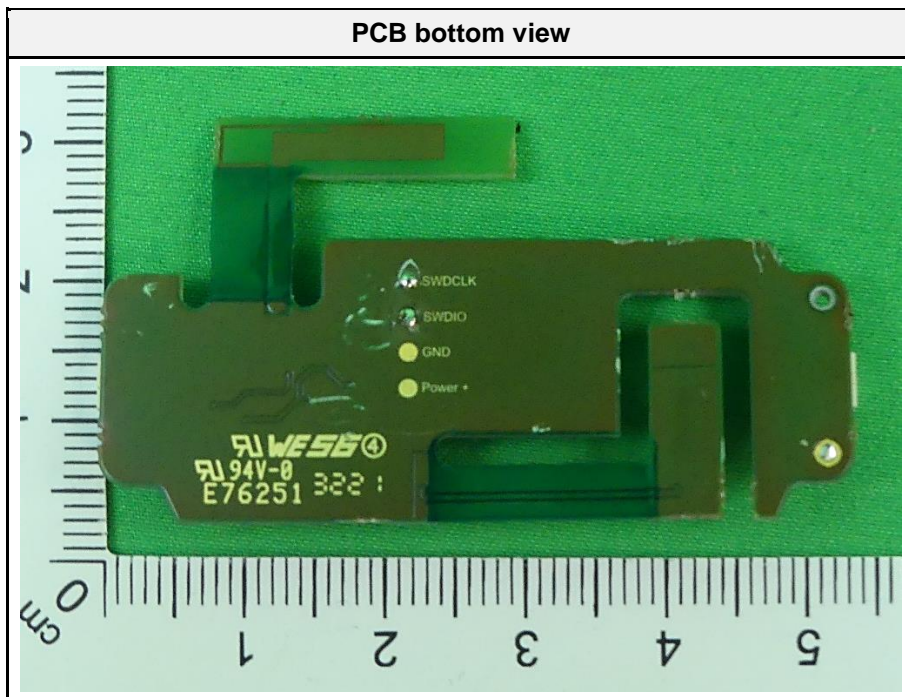
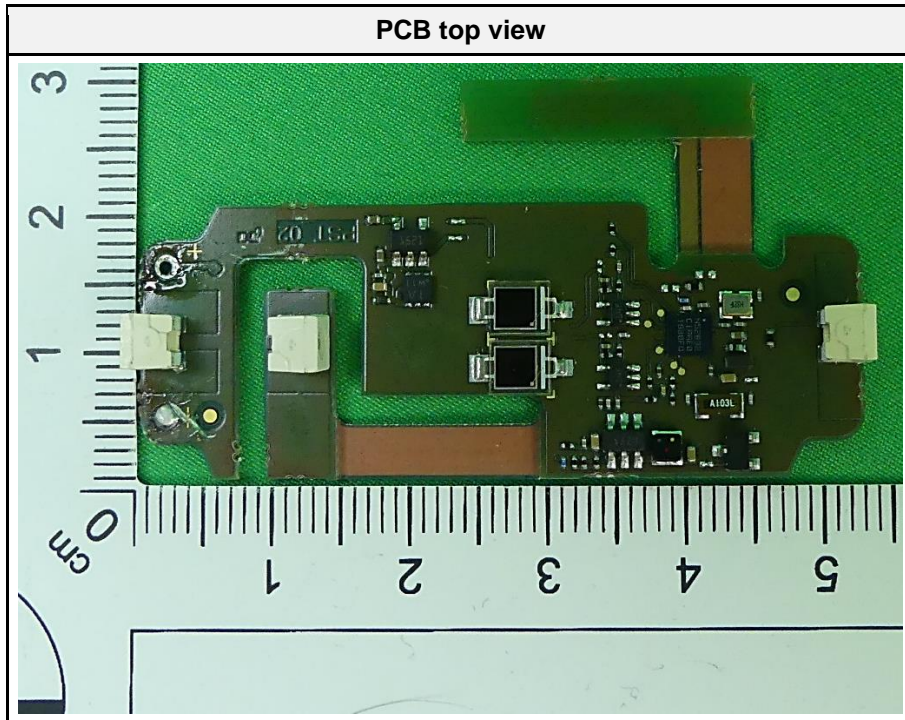
Name	Type	Attributes	Comment
-			
Description:			
AC	AC mains power input/output port		
DC	DC power input/output port		
BAT	DC power input port connected to external battery		
IO	Input/Output port		
TP	Telecommunication port		
NE	Non-electrical port		

1.2 Equipment Photos - Internal

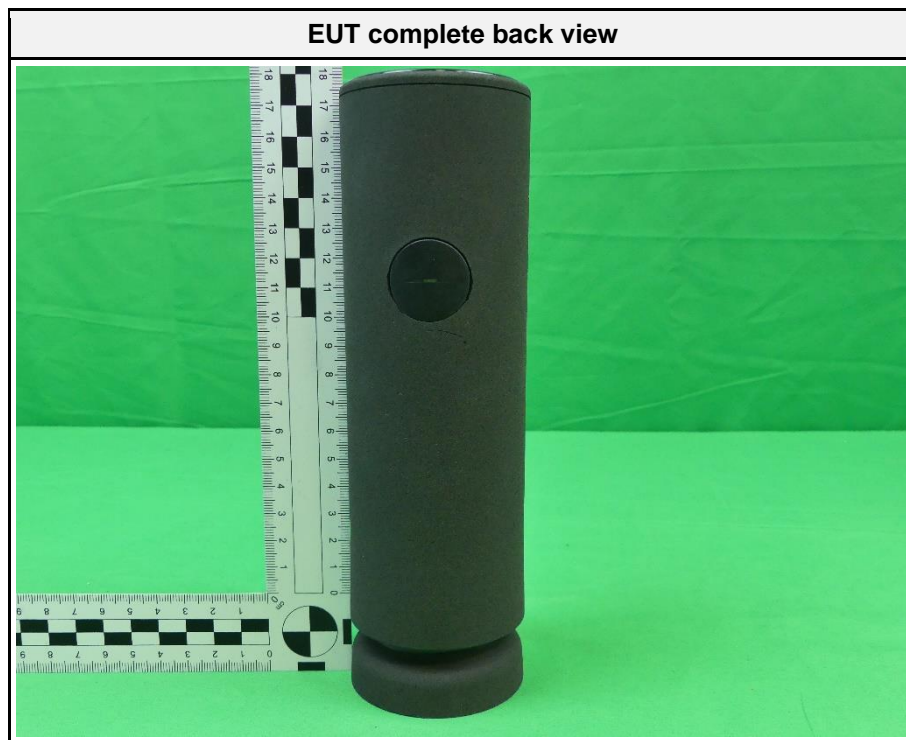




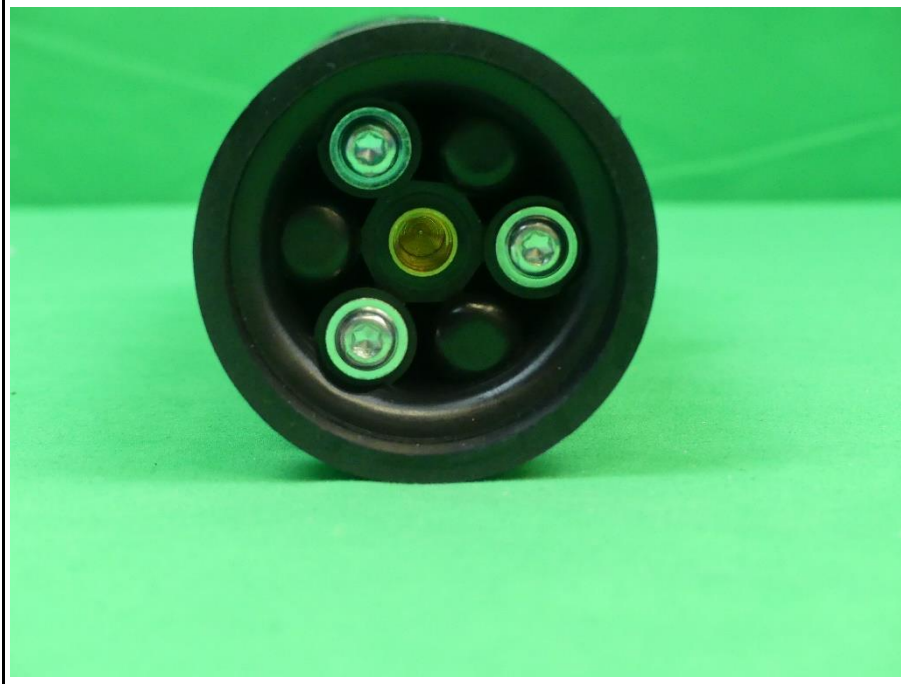




### 1.3 Equipment Photos - External



**EUT complete bottom view**



**EUT complete top view**



**EUT electronic part front view**



**EUT electronic part right view**



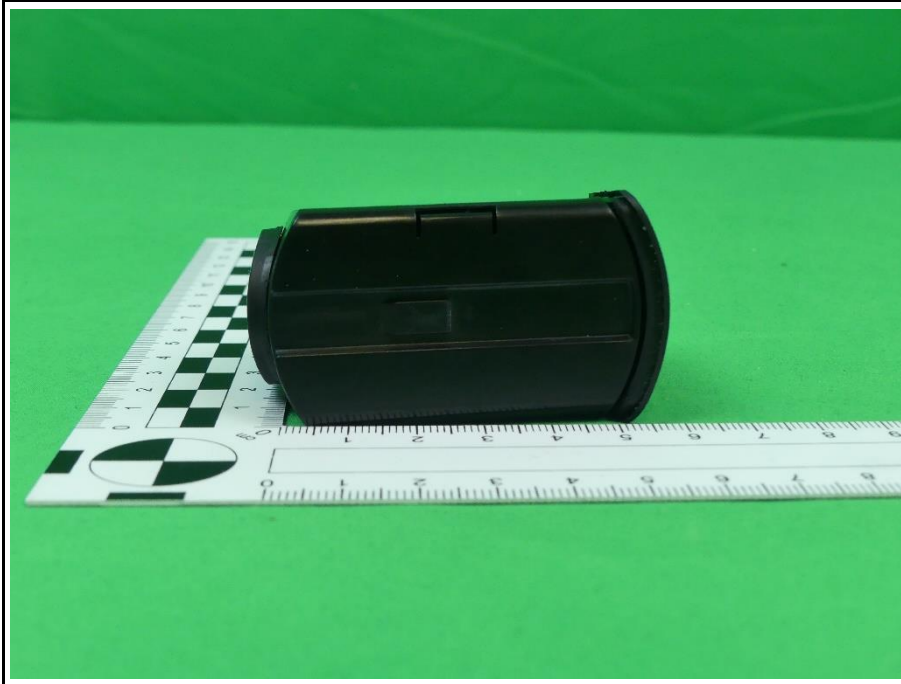
**EUT electronic part back view**



**EUT electronic part left view**



**EUT electronic part top view**



**EUT electronic part bottom view**



Label EUT





#### 1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Battery	Varta	INDUSTRIAL PRO LR03	Device need 2 batteries
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

### 1.5 Operational Modes

Mode #	Description
1	Sensor active, Wirepas TX
Comment:	

### 1.6 EUT Configuration

Configuration #	Description
1	EUT powered via two batteries.
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

Title 47 CFR Part 15B, ISED ICES-003 Issue 7				
Reference	Requirement	Reference Method	Result	Remarks
Emission				
FCC 15.109 ICES-003, 3.2.2	Radiated emissions	ANSI C63.4:2014 +A1:2017	PASS	-
FCC 15.107 ICES-003, 3.2.1	AC power line conducted emissions	ANSI C63.4:2014 +A1:2017	N/R	-
Comment:				

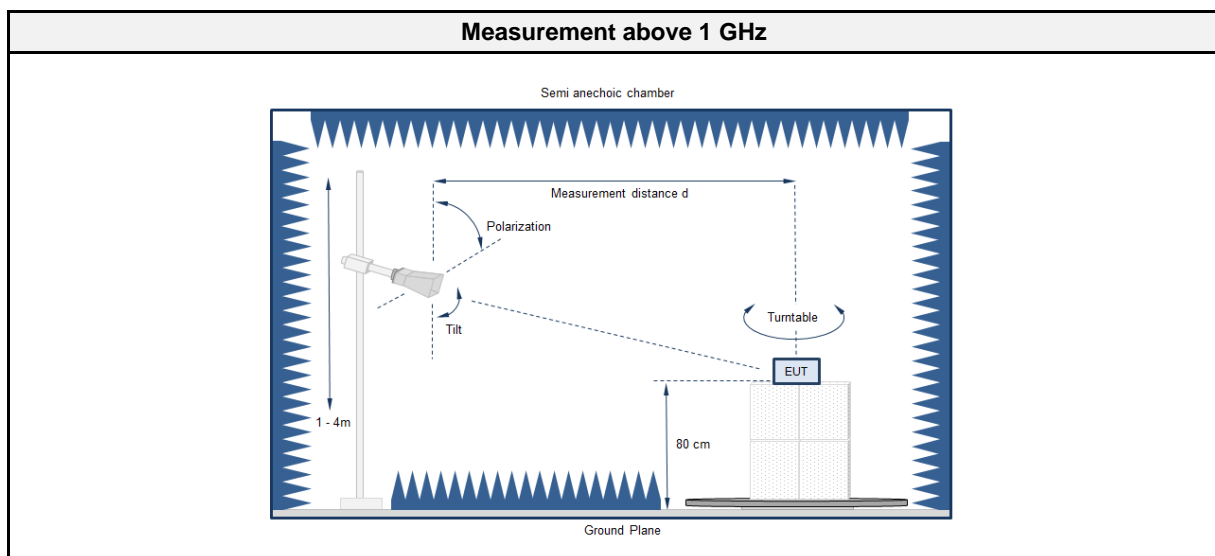
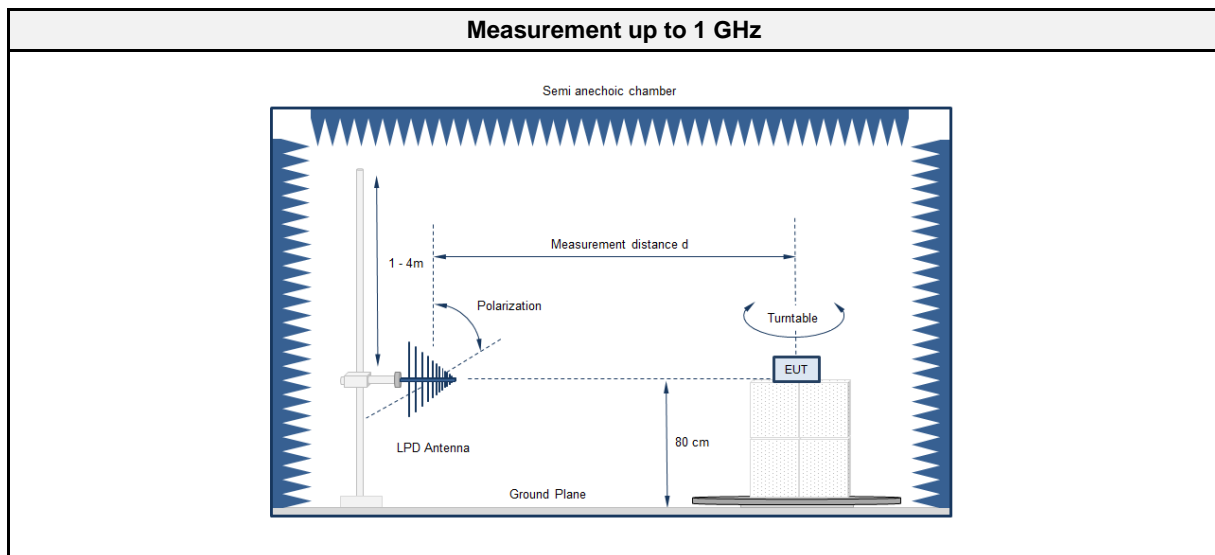
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

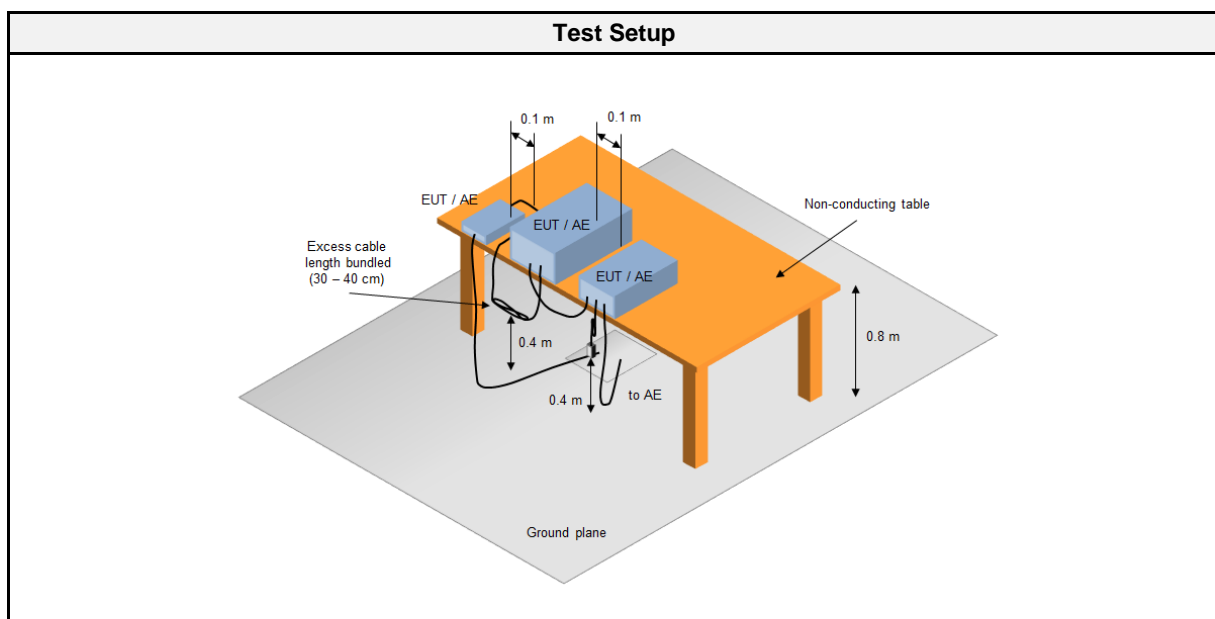
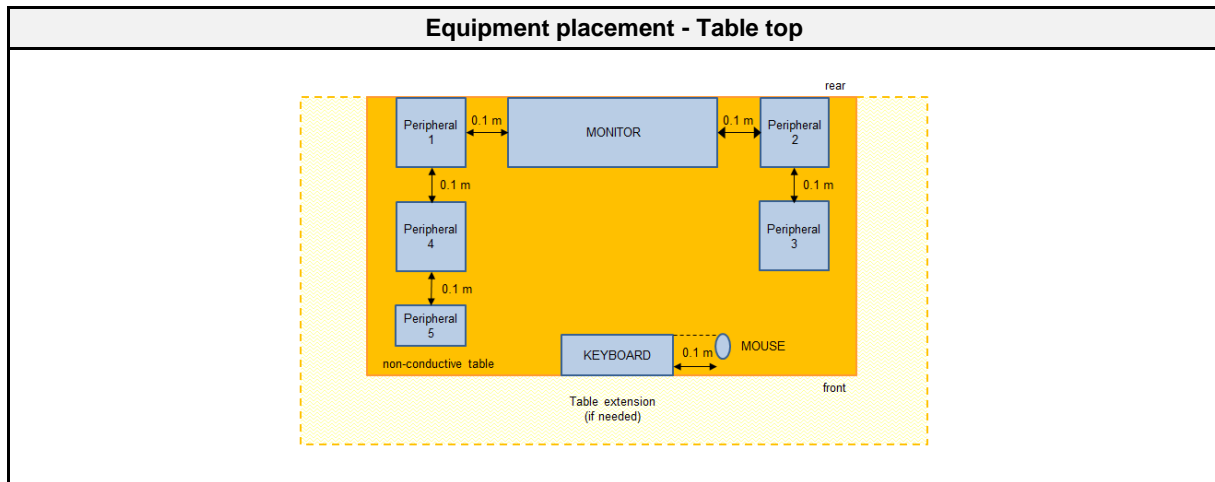
## 2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

### 2.1.1 Information

Test Information	
Reference	FCC 15.109, ICES-003, 3.2.2
Reference method	ANSI C63.4:2014+A1:2017 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	2480
Measurement range	30 MHz to 13000 MHz
Temperature [°C]	23 ±1
Humidity [%]	40 ± 2
Operator	Manuel Engel
Date	2022-05-03

### 2.1.2 Setup





2.1.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2020.1.8

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber (NSA)	Frankonia	AC6	EF00910	2021-07	2024-07
Anechoic chamber (SVSWR)	Frankonia	AC6	EF00899	2021-07	2024-07
EMI Test Receiver	R&S	ESU26	EF00887	2021-07	2022-07
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162	EF00978	2019-10	2022-10
Horn Antenna	ETS-Lindgren	3117	EF00976	2022-03	2025-03
Climatic Sensor	Embedded Data Systems, LLC.	9A00100000254 77E	EF01124	2021-03	2022-05

2.1.4 Procedure

<b>Exploratory measurement</b>	
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 2.1.2

<b>Final measurement</b>	
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.

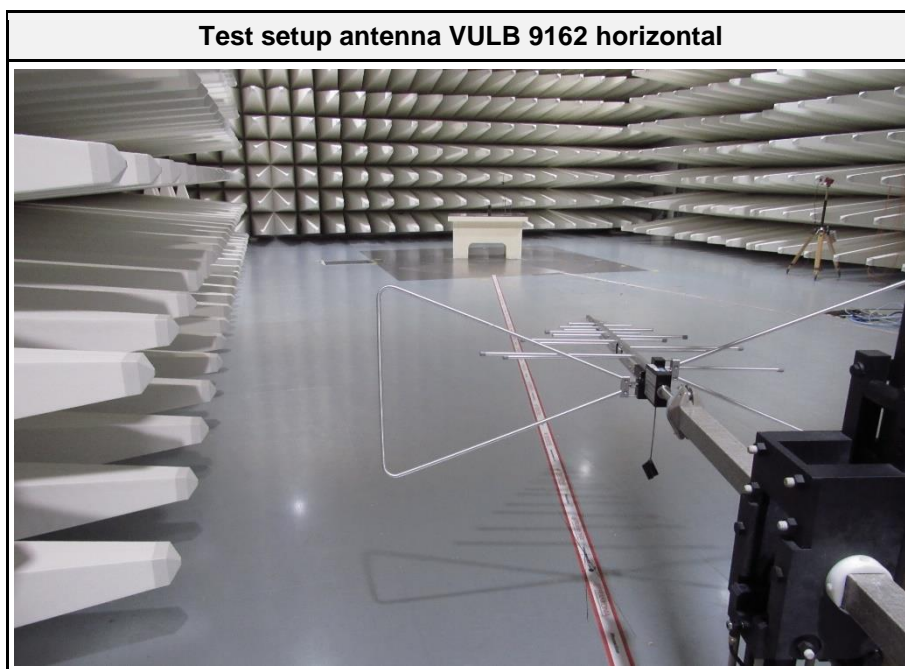
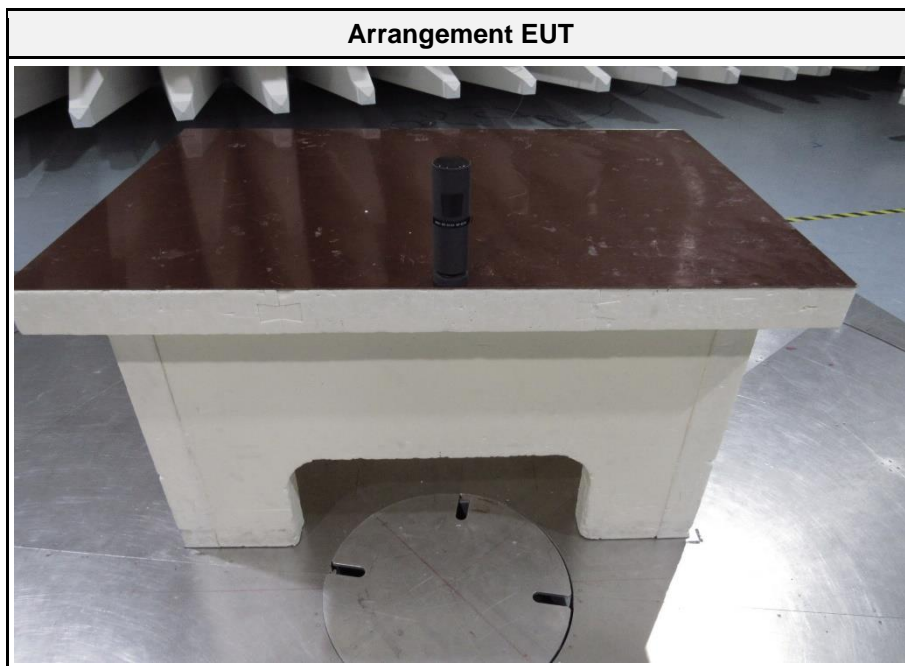
2.1.5 Limits

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

2.1.6 Results

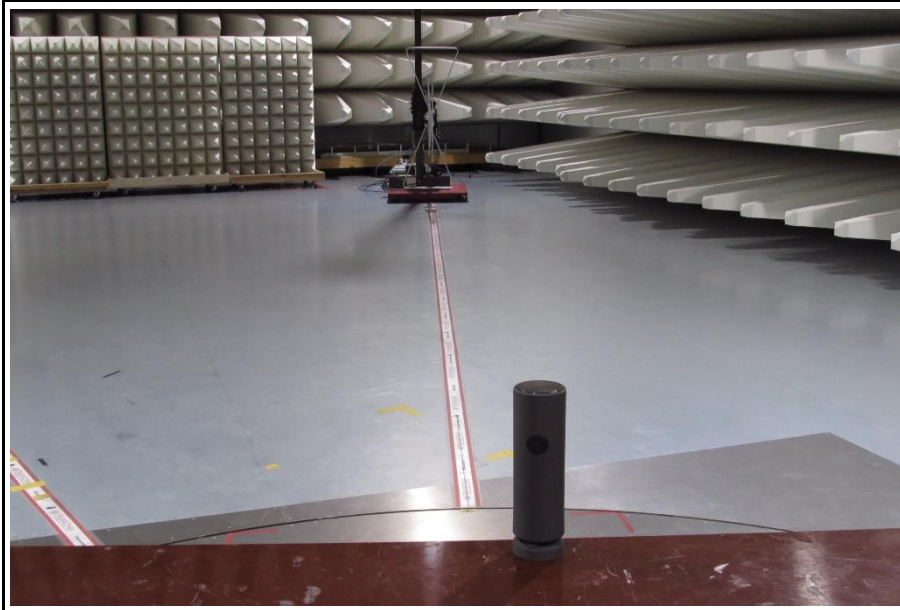
<b>Test Results</b>			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	-

2.1.7 Setup Photos

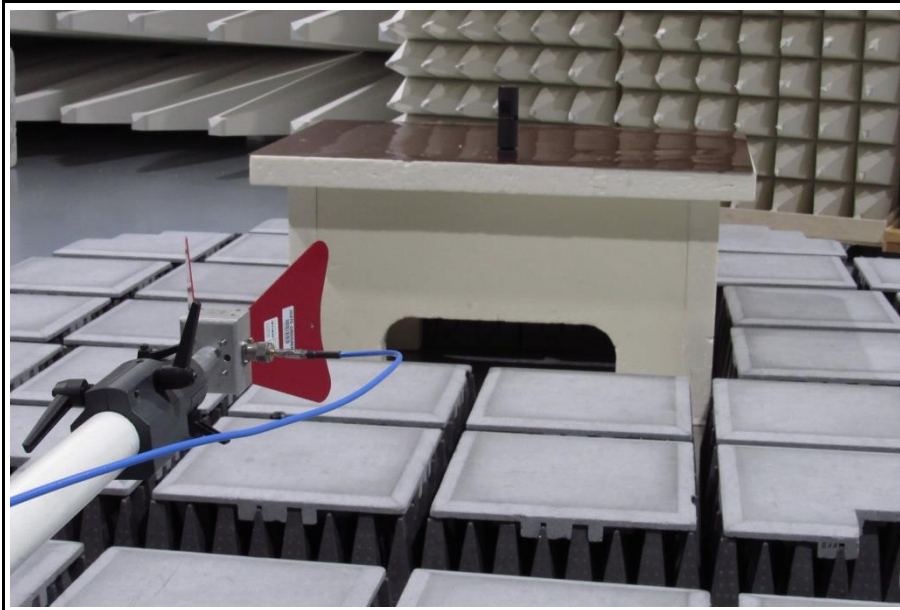


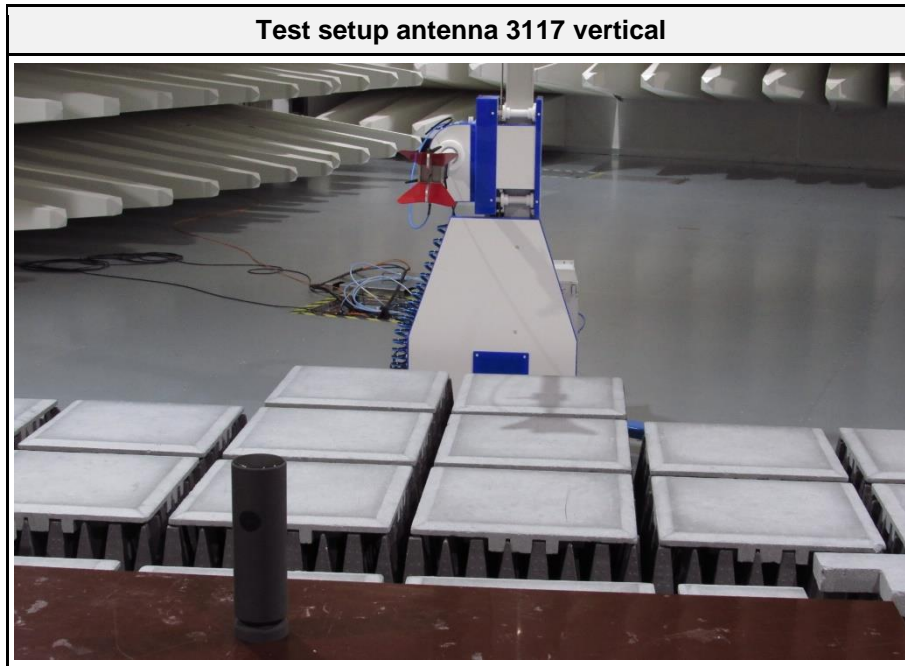


**Test setup antenna VULB 9162 vertical**



**Test setup antenna 3117 horizontal**





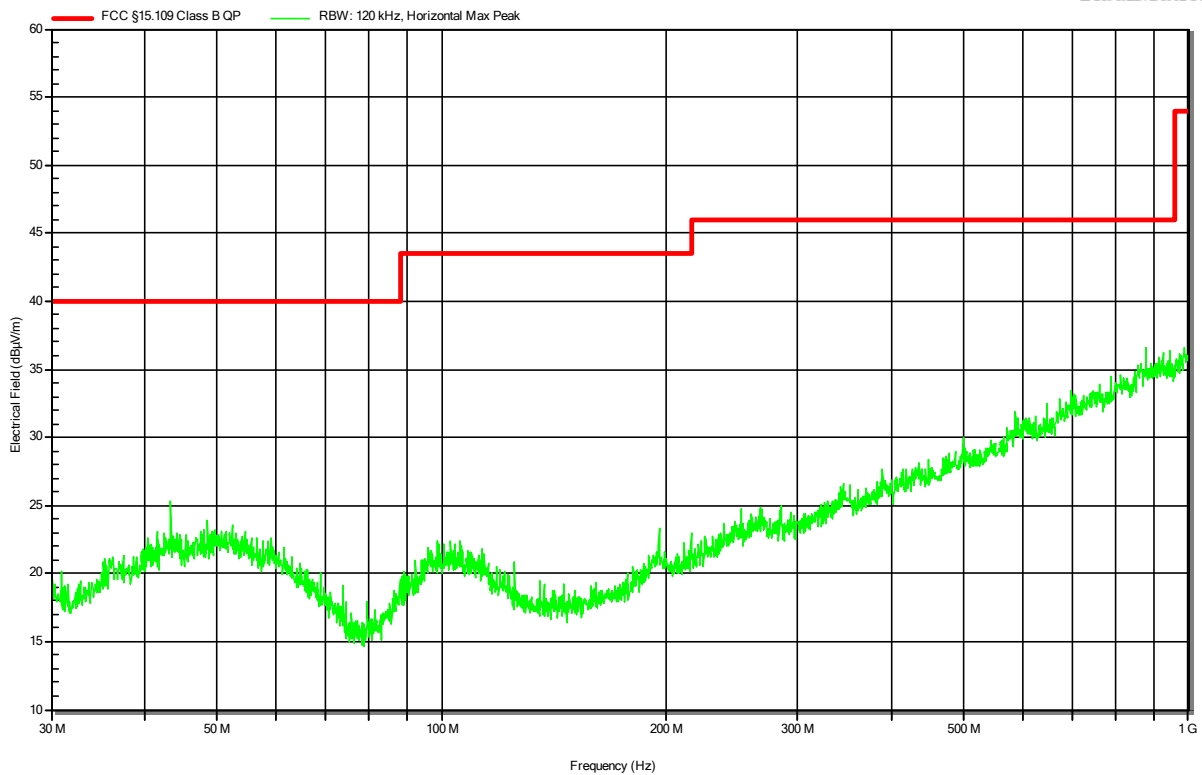
2.1.8 Records

**Radiated emissions according to FCC 15B**

Project Number: G0M-2201-1259  
 Applicant: Valpas Enterprises Oy  
 Model Description: IoT device for autonomous bed bug prevention  
 Model: PST  
 Test Sample ID: 38746  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Engel  
 Test Date: 2022-05-03  
 Operating Conditions: ambient temperature: 22 °Celsius  
 power input: 3 V DC via internal battery  
 Antenna: Schwarzbeck VULB 9162, Horizontal  
 Measurement Distance: 10 m, converted to 3 m  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Note 1: Height 1 m, angle 0°

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**RadiMation**

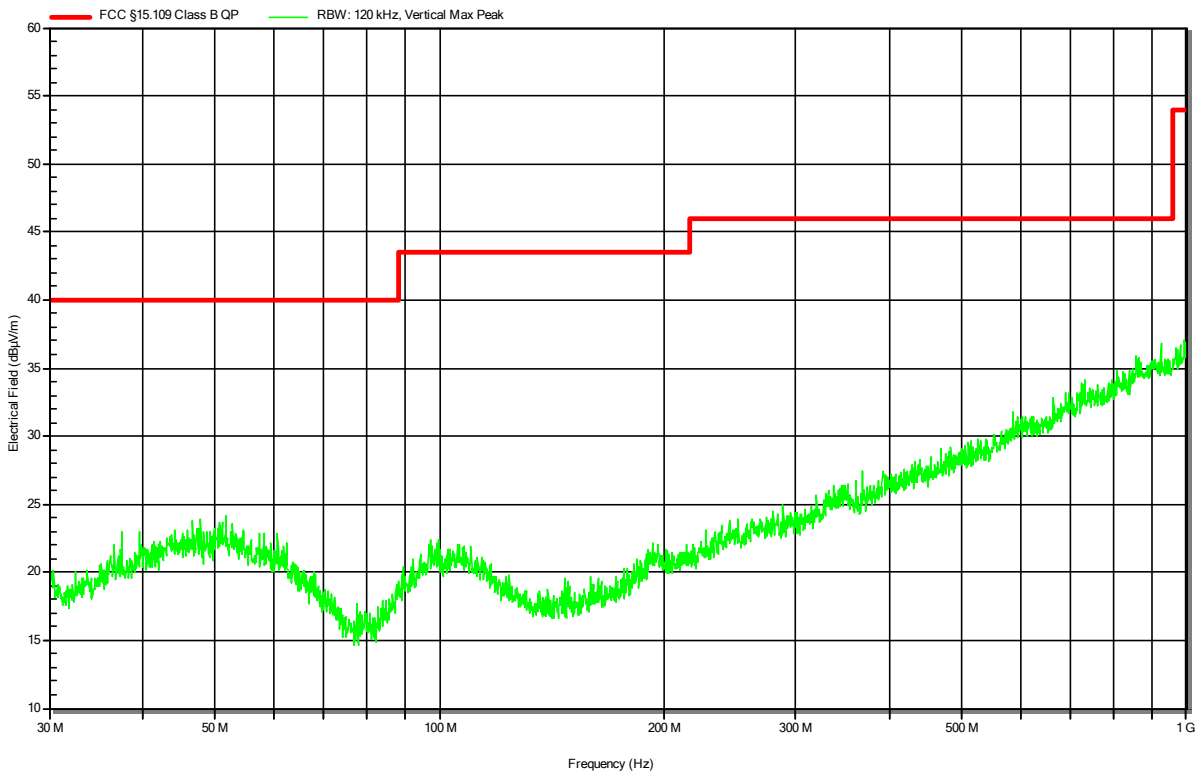


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 Model Description: IoT device for autonomous bed bug prevention  
 Model: PST  
 Test Sample ID: 38746  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Engel  
 Test Date: 2022-05-03  
 Operating Conditions: ambient temperature: 22 °Celsius  
 power input: 3 V DC via internal battery  
 Antenna: Schwarzbeck VULB 9162, Vertical  
 Measurement Distance: 10 m, converted to 3 m  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Note 1: Height 1 m, angle 0°

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**RadiMation**

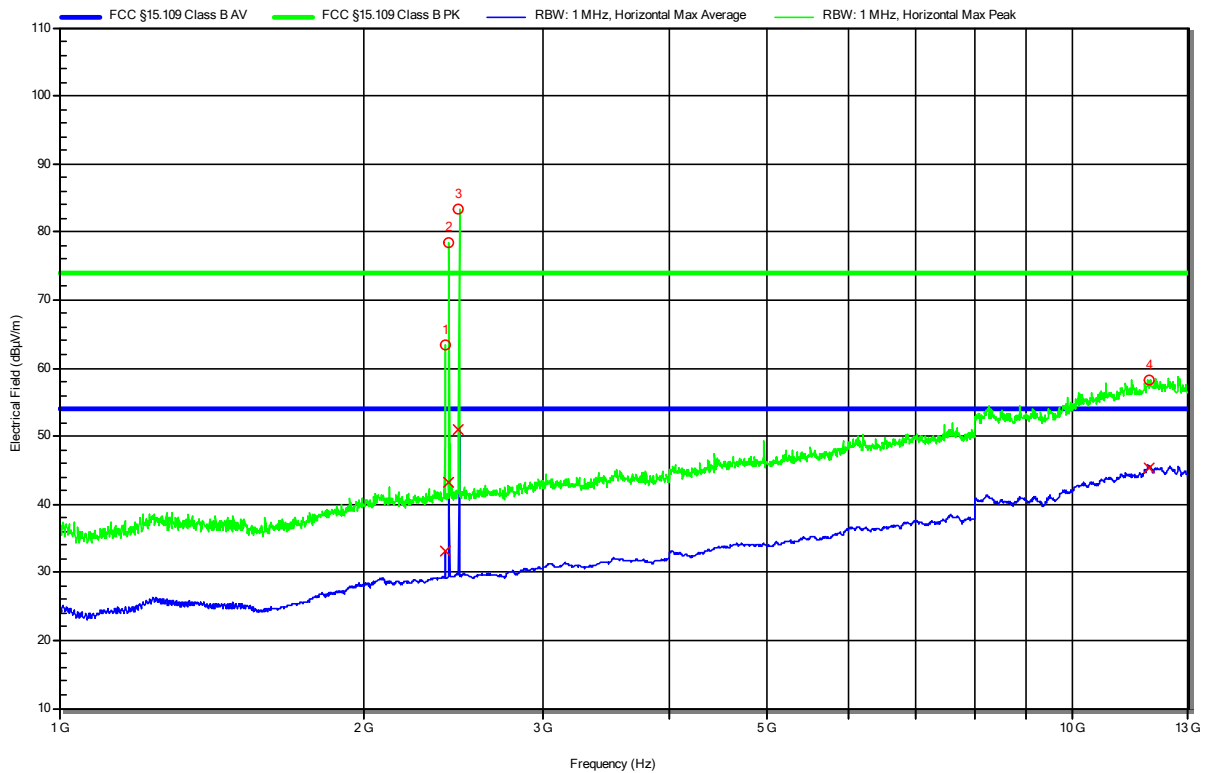


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Project Number: G0M-2201-1259  
 Applicant: Valpas Enterprises Oy  
 Model Description: IoT device for autonomous bed bug prevention  
 Model: PST  
 Test Sample ID: 38746  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Engel  
 Test Date: 2022-05-03  
 Operating Conditions: ambient temperature: 22 °Celsius  
 power input: 3 V DC via internal battery  
 Antenna: ETS-Lindgren 3117, Horizontal  
 Measurement Distance: 3 m  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Note 1: Height 1 m, angle 0°

Index 1

**RadiMation**



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.403 GHz	63.4 dBµV/m	74 dBµV/m	-10.6 dB	Carrier signal Wirepas		
2	2.426 GHz	78.4 dBµV/m	74 dBµV/m	4.4 dB	Carrier signal Wirepas		
3	2.48 GHz	83.4 dBµV/m	74 dBµV/m	9.5 dB	Carrier signal Wirepas		
4	11.875 GHz	58.3 dBµV/m	74 dBµV/m	-15.7 dB	Pass	0 degrees	1 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.403 GHz	33 dBµV/m	54 dBµV/m	-20.9 dB	Carrier signal Wirepas		
2	2.426 GHz	43.3 dBµV/m	54 dBµV/m	-10.7 dB	Carrier signal Wirepas		
3	2.48 GHz	51 dBµV/m	54 dBµV/m	-3.0 dB	Carrier signal Wirepas		
4	11.875 GHz	45.4 dBµV/m	54 dBµV/m	-8.6 dB	Pass	0 degrees	1 m

Test Report No.: G0M-2201-1259-EF0115B-V01

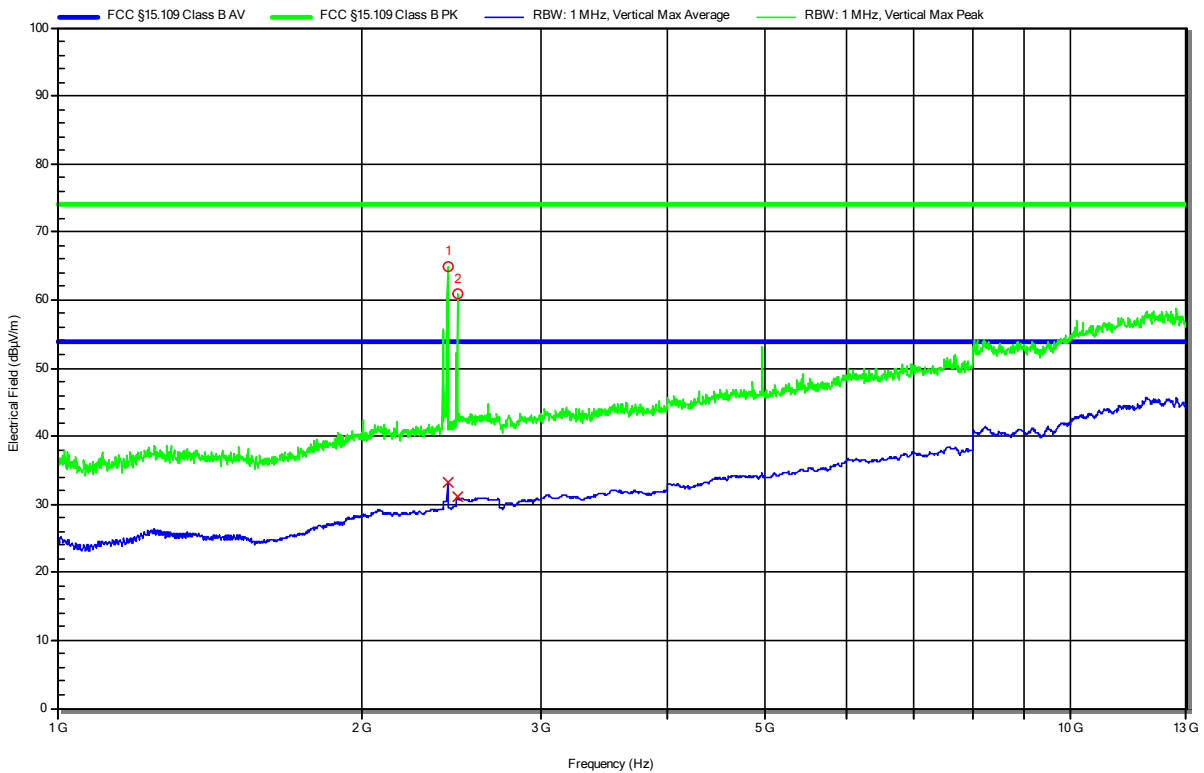
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

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 Model Description: IoT device for autonomous bed bug prevention  
 Model: PST  
 Test Sample ID: 38746  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Engel  
 Test Date: 2022-05-03  
 Operating Conditions: ambient temperature: 22 °Celsius  
 power input: 3 V DC via internal battery  
 Antenna: ETS-Lindgren 3117, Vertical  
 Measurement Distance: 3 m  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Note 1: Height 1 m, angle 0°

Index 2

**RadiMation**



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.428 GHz	64.9 dBµV/m	74 dBµV/m	-9.0 dB	Carrier signal Wirepas		
2	2.482 GHz	61 dBµV/m	74 dBµV/m	-13.0 dB	Carrier signal Wirepas		

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.428 GHz	33.3 dBµV/m	54 dBµV/m	-20.7 dB	Carrier signal Wirepas		
2	2.482 GHz	31.2 dBµV/m	54 dBµV/m	-22.8 dB	Carrier signal Wirepas		

### 3 Measurement Uncertainty

All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2.

Test Name	Measurement Uncertainty
Radiated Emission	30 MHz to 1 GHz @ 10 m, 6.25 dB 1 GHz to 6 GHz @ 3 m, 4.86 dB 6 GHz to 18 GHz @ 3 m, max. 5.39 dB