RADIO REPORT

FCC 47 CFR Part 15C
ISED Canada RSS-247

Digital transmission systems operating within the 2400.0 MHz - 2483.5 MHz band

Report Reference No	G0M-2201-1259-TFC247BL-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 DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Valpas Enterprises Oy
Address	Katariinankatu 1A, 3.krs 00170 Helsinki Finland
Test Specification	47 CFR Part 15C RSS-247, Issue 2, 2017-02 RSS-Gen, Issue 5, Amendment 2, 2021-02
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	IoT device for autonomous bed bug prevention
Model(s)	PST
Additional Model(s)	None
Brand Name(s)	Valpas smart leg
Hardware Version(s)	PST_02
Software Version(s)	0.0.3
FCC ID	2A36RVLPLEG
IC	28100-VLPLEG
Test Result	**PASSED**

Possible test case verdicts:		
Required by standard but not tested	N/T	
Not required by standard	N/R	
Not applicable to EUT	N/A	
Test object does meet the requirement	P(PASS)	
Test object does not meet the requirement	F(FAIL)	
Testing:		
Test Lab Temperature	20 °C - 30 °C	
Test Lab Humidity	25 % - 55 %	
Date of receipt of test item	2022-02-28	
Report:		
Compiled by	Odai Qawasmeh	
Tested by (+ signature)	Odai Qawasmeh	
Supervised by (+ signature) (Responsible for Test)	Florian Voigt	
Approved by (+ signature) (Deputy Head of Lab)	Toralf Jahn	
Date of Issue	2022-04-26	
Total number of pages	86	
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:		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2022-04-26	Initial Release	

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V_{NOM}	Nominal supply voltage

REPORT INDEX

1 Equipment (Test Item) Under Test

Description	IoT device for autonomous bed bug prevention		
Model	PST		
Additional Model(s)	None		
Brand Name(s)	Valpas smart leg		
Serial Number(s)	Prototype Prototype	Radiated Test Sample ID 38746 Conducted Test Sample ID 38745	
Hardware Version(s)	PST_02		
Software Version(s)	0.0.3		
PMN	Valpas Smart Leg		
HVIN	PST		
FVIN	0.0.3		
HMN	N/A		
FCC ID	2A36RVLPLEG		
IC	28100-VLPLEG		
Equipment type	End Product		
Radio type	Transceiver		
Assigned frequency bands	2400.0 MHz - 2483.5 MHz		
Radio technology	Bluetooth LE 5.2		
Bluetooth Specification	LE 1M PHY		Yes
	LE 2M PHY		No
	LE Coded PHY S=8 (125 kbit)		No
	LE Coded PHY S=2 (500 kbit)		No
	Stable Modulation Index - Transmitter		No
	Stable Modulation Index - Receiver		No
Modulation	GFSK		
Number of antenna ports	1		
Antenna	Type	Integrated	
	Model	PWB Strip line	
	Manufacturer	Valpas Enterprises Oy	
	Gain	4.8 dBi (declared by customer)	
Supply Voltage	V_{NOM}	3 VDC	
Operating Temperature	T_{NOM}	25 °C	
Manufacturer	Valpas Enterprises Oy Katariinankatu 1A, 3.krs 00170 Helsinki Finland		

1.1 Photos – Equipment External

EUT top view

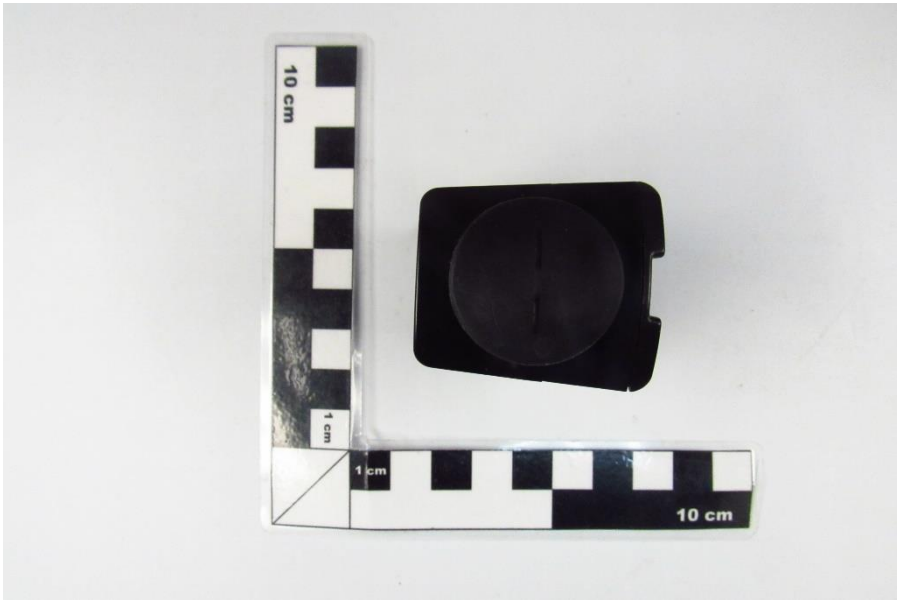

EUT radio device top side view


EUT radio device left side view

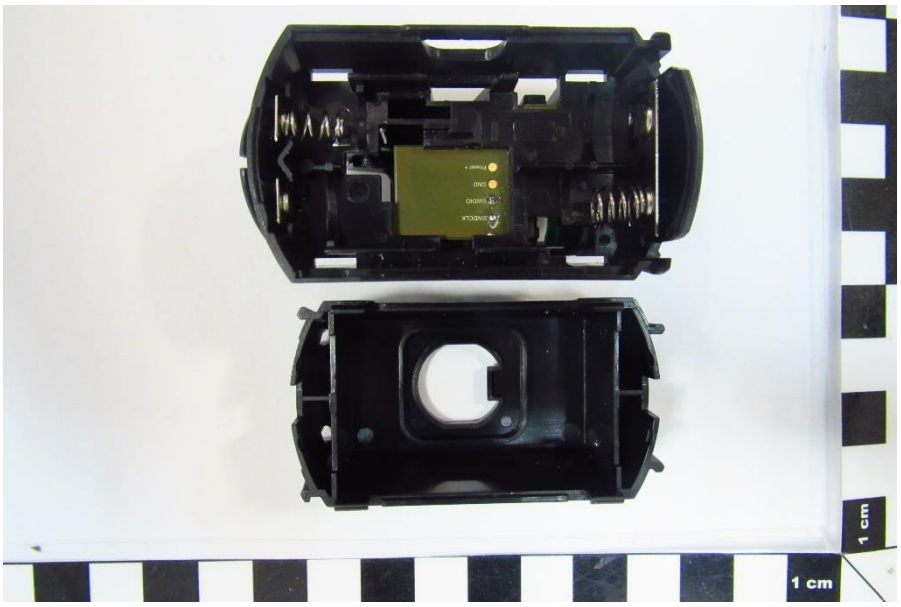

EUT radio device right side view

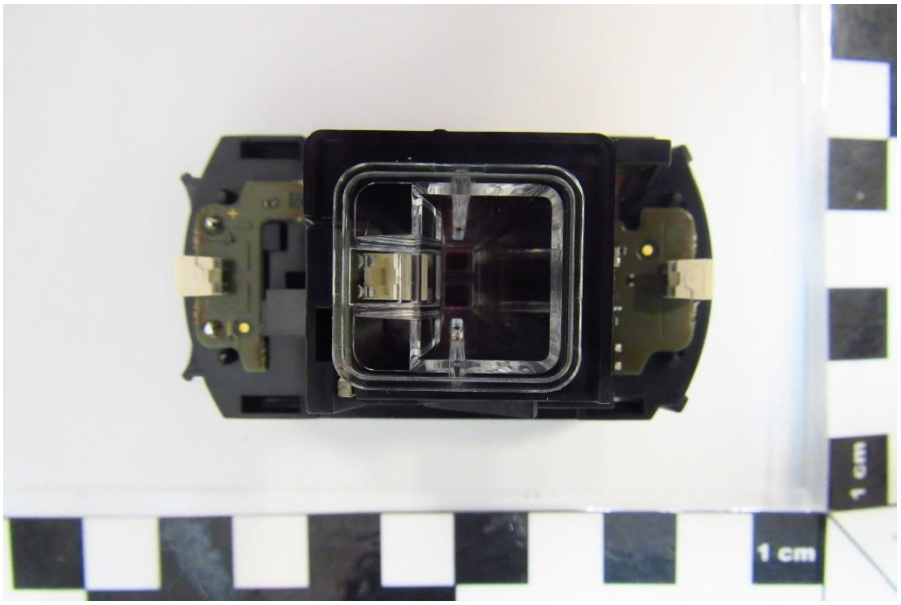

EUT radio device bottom side view

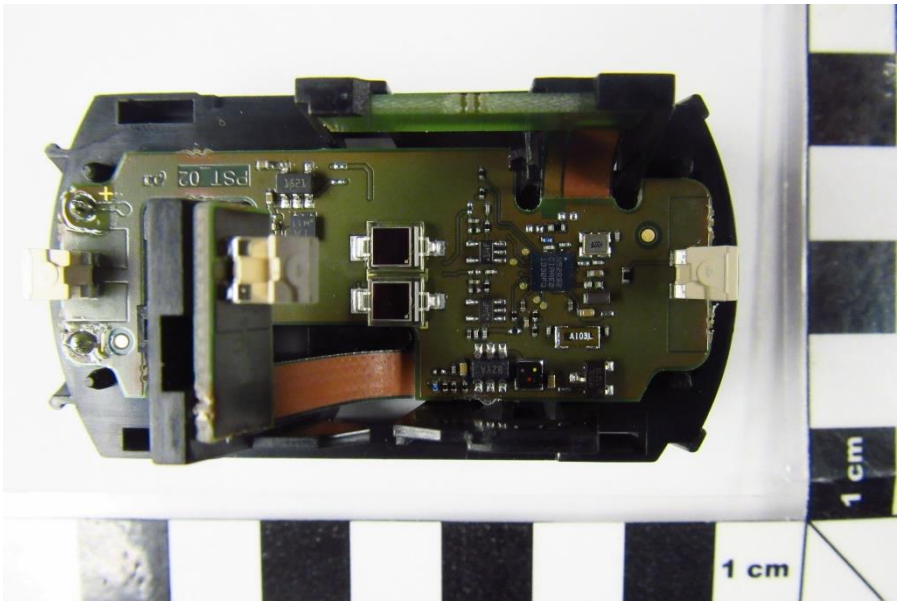

EUT radio device front side view


EUT radio device back side view


1.2 Photos – Equipment Internal

EUT battery housing


EUT with optics


EUT PCB top


1.3 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Development Board	Nordic	PCA10028	for configuring test modes
SFT	-	-	HEAT	for configuring test modes
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.4 Test Modes

Mode	Description
GFSK	Mode = Transmit Modulation = GFSK Spreading = None Data Rate = 1 Mbit/s Packet Type = PRBS9 Duty cycle = 89%
Receive	Mode = Receive
Comment:	

1.5 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx	0	2402
F2	Tx / Rx	19	2440
F3	Tx	39	2480

1.6 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 analyzer in dBµV. Any external preamplifiers used are taken into account through internal analyzer 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 analyzer. 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:

Reading on Analyzer (dBµV) + A.F. (dB/m) = Net field strength (dBµV/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:

Limit (dBµV/m) = 20*log (µV/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 15C, ISED RSS-247				
Product Standard Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
ISED RSS-Gen, Issue 5 A2 (section 6.7)	Occupied Bandwidth	ANSI C63.10-2013	N/R	Informational only
FCC § 15.247(a)(2) ISED RSS-247, Issue 2 (section 5.2)	6 dB Bandwidth	ANSI C63.10-2013	PASS	
FCC § 15.247(b) ISED RSS-247, Issue 2 (section 5.4)	Maximum peak conducted power	ANSI C63.10-2013	PASS	
FCC § 15.247(e) ISED RSS-247, Issue 2 (section 5.2)	Power spectral density	ANSI C63.10-2013	PASS	
FCC § 15.207 ISED RSS-247, Issue 2 (section 3.1)	AC power line conducted emissions	ANSI C63.10-2013	N/R	Not connected directly or indirectly to AC-mains network
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Band edge compliance	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Conducted spurious emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) FCC § 15.209 ISED RSS-Gen, Issue 5 A2 (section 6.13)	Transmitter radiated spurious emissions	ANSI C63.10-2013	PASS	
ISED RSS-247, Issue 2 (section 3.1)	Receiver radiated spurious emissions	ANSI C63.4-2014	PASS	
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

3 Test Conditions and Results

3.1 Test Conditions and Results - Occupied bandwidth

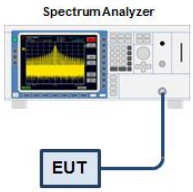
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen, Issue 5 A2 (section 6.7)
Measurement Method	ANSI C63.10 6.9.3
Measurement Uncertainty	± 1.26 %
Test Sample ID	38745
Operator	Odai Qawasmeh
Date	2022-04-08

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup

Test Setup


3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	– (diverse)	EF00779 CAABE	2022-02	2023-02

3.1.5 Procedure

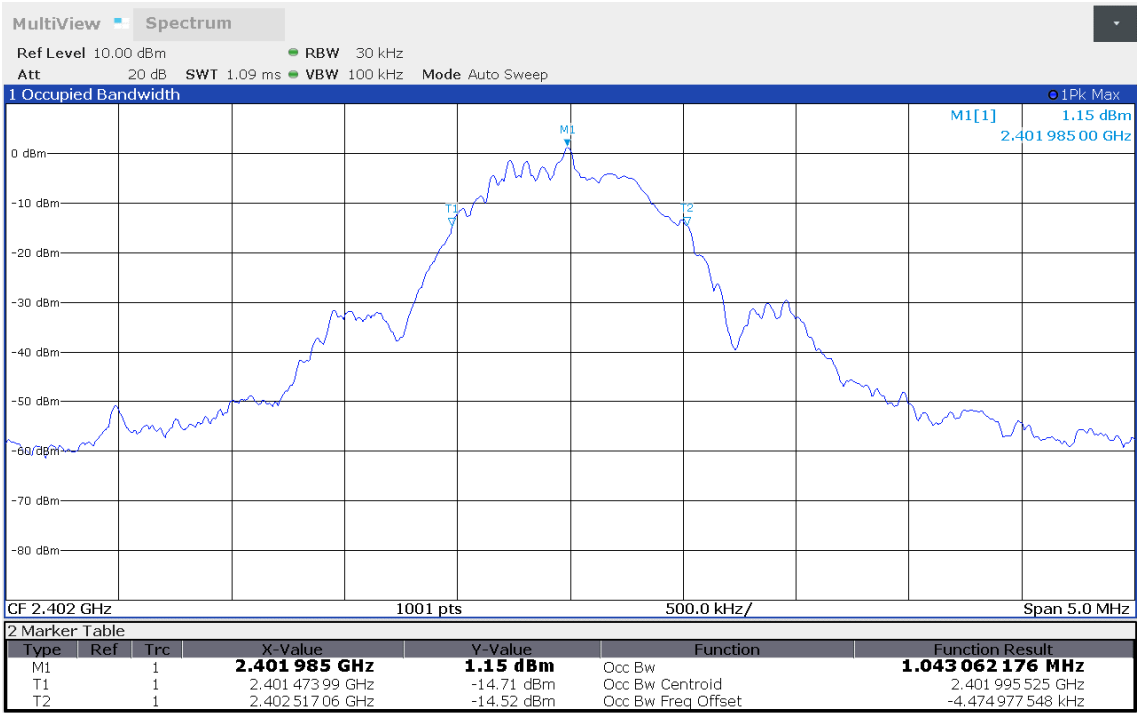
Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth 4. The occupied bandwidth is measured with the build-in analyzer function

3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK	2402	1.043
GFSK	2440	1.046
GFSK	2480	1.045

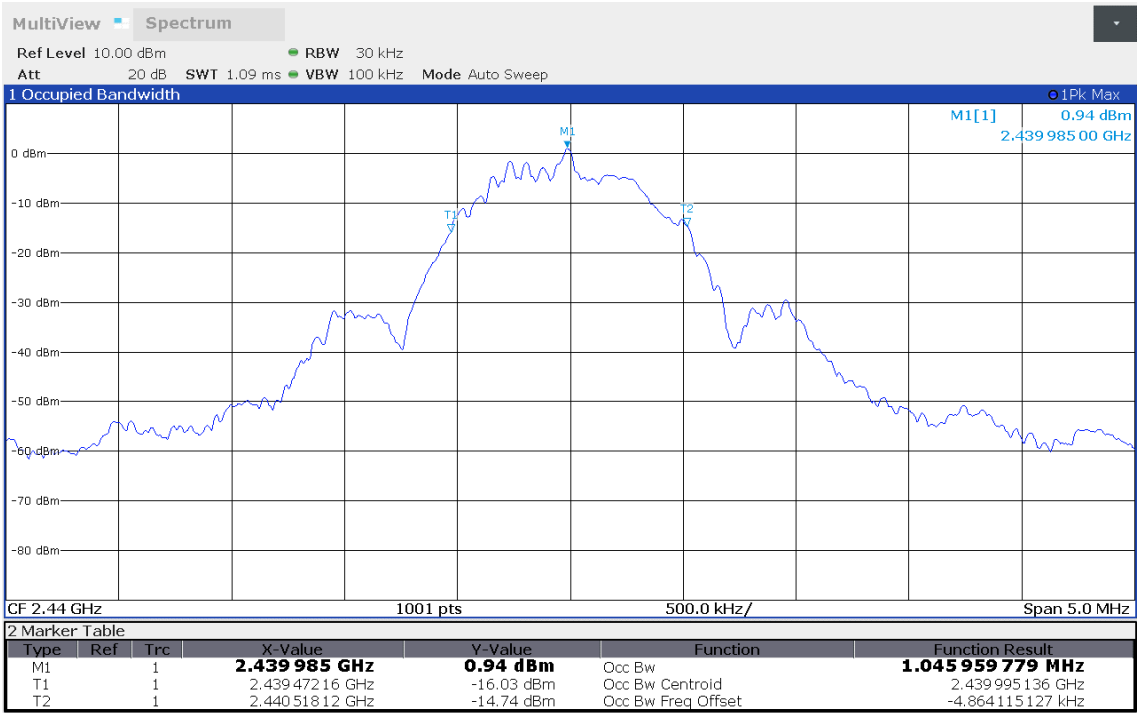
Occupied Bandwidth

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Occupied Bandwidth [MHz]:	1.043



Occupied Bandwidth

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Occupied Bandwidth [MHz]:	1.046



Occupied Bandwidth

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Occupied Bandwidth [MHz]:	1.045

3.2 Test Conditions and Results - 6 dB bandwidth

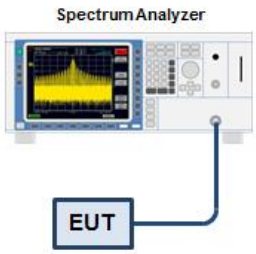
3.2.1 Information

Test Information	
Reference	FCC § 15.247(a)(2); ISED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.8
Measurement Uncertainty	± 1.26 %
Operator	Odai Qawasmeh
Date	2022-04-08

3.2.2 Limits

Limits
≥ 500kHz

3.2.3 Setup

Test Setup


3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	– (diverse)	EF00779 CAABE	2022-02	2023-02

3.2.5 Procedure

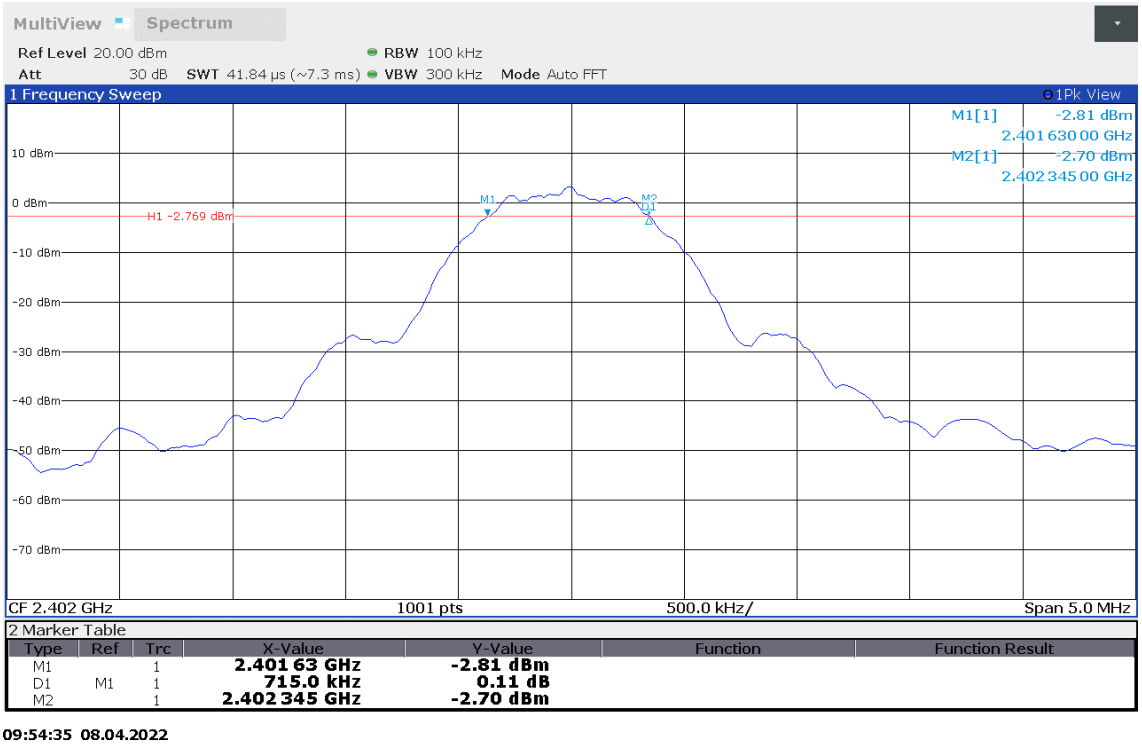
Test Procedure
1. EUT set to test mode 2. Span set to at least twice the emission spectrum 3. Detector set to peak and max hold and RBW is set to 100 kHz 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak 6. Marker on envelope of spectrum is set to level of -6 dB to the right of the peak 7. 6 dB Bandwidth is determined by marker frequency separation

3.2.6 Results

Test Results				
Mode	Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Verdict
GFSK	2402	715	500	PASS
GFSK	2440	745	500	PASS
GFSK	2480	750	500	PASS

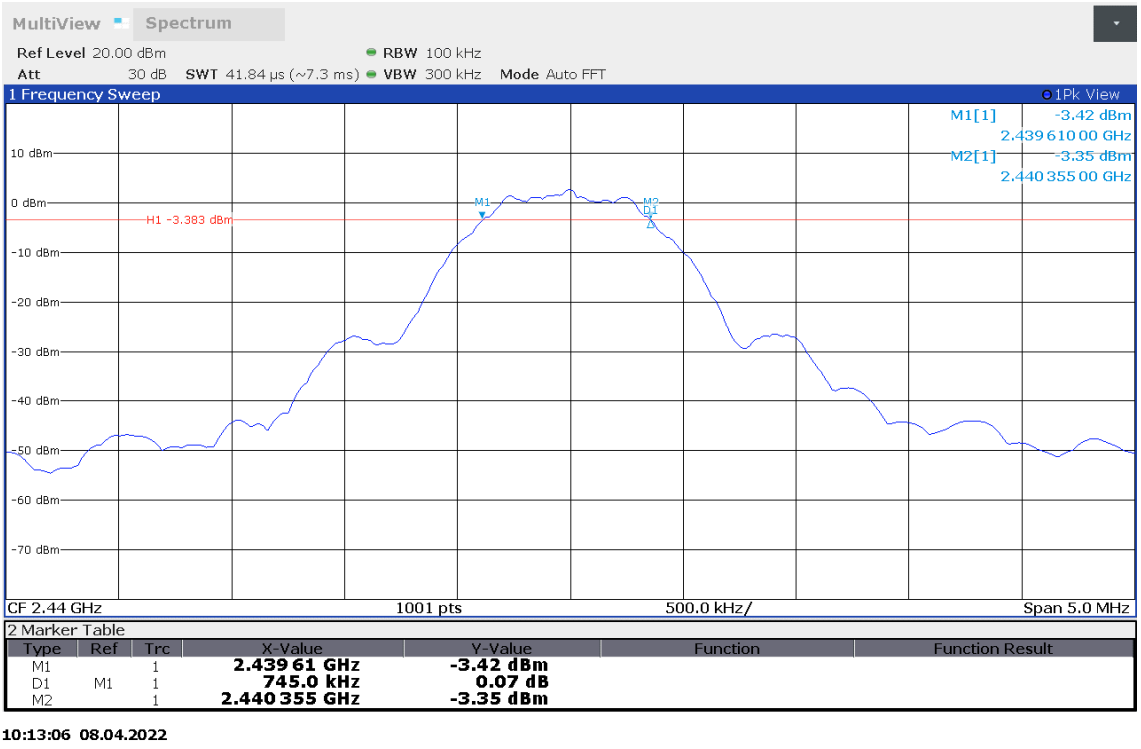
DTS (6 dB) Bandwidth

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Lower Frequency [MHz]:	2401.630
Upper Frequency [MHz]:	2402.345
6 dB Bandwidth [kHz]:	715



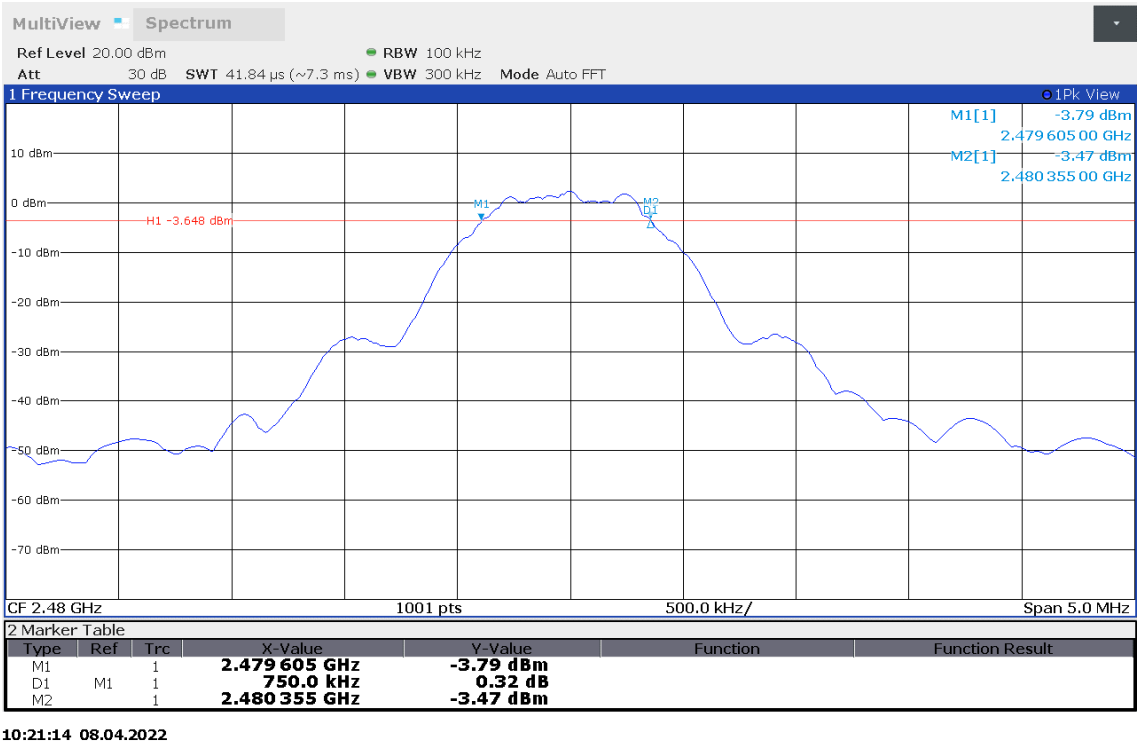
DTS (6 dB) Bandwidth

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Lower Frequency [MHz]:	2439.610
Upper Frequency [MHz]:	2440.355
6 dB Bandwidth [kHz]:	745



DTS (6 dB) Bandwidth

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Lower Frequency [MHz]:	2479.605
Upper Frequency [MHz]:	2480.355
6 dB Bandwidth [kHz]:	750



3.3 Test Conditions and Results - Maximum peak conducted output power

3.3.1 Information

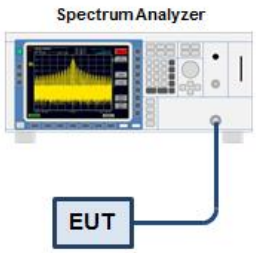
Test Information	
Reference	FCC § 15.247(b); ISED RSS-247, Issue 2 (section 5.4)
Measurement Method	ANSI C63.10 11.9.1
Measurement Uncertainty	± 2.86 dB
Operator	Odai Qawasmeh
Date	2022-04-08

3.3.2 Limits

Limits
1 W (30 dBm)
The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.3 Setup

Test Setup



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	– (diverse)	EF00779 CAABE	2022-02	2023-02

3.3.5 Procedure

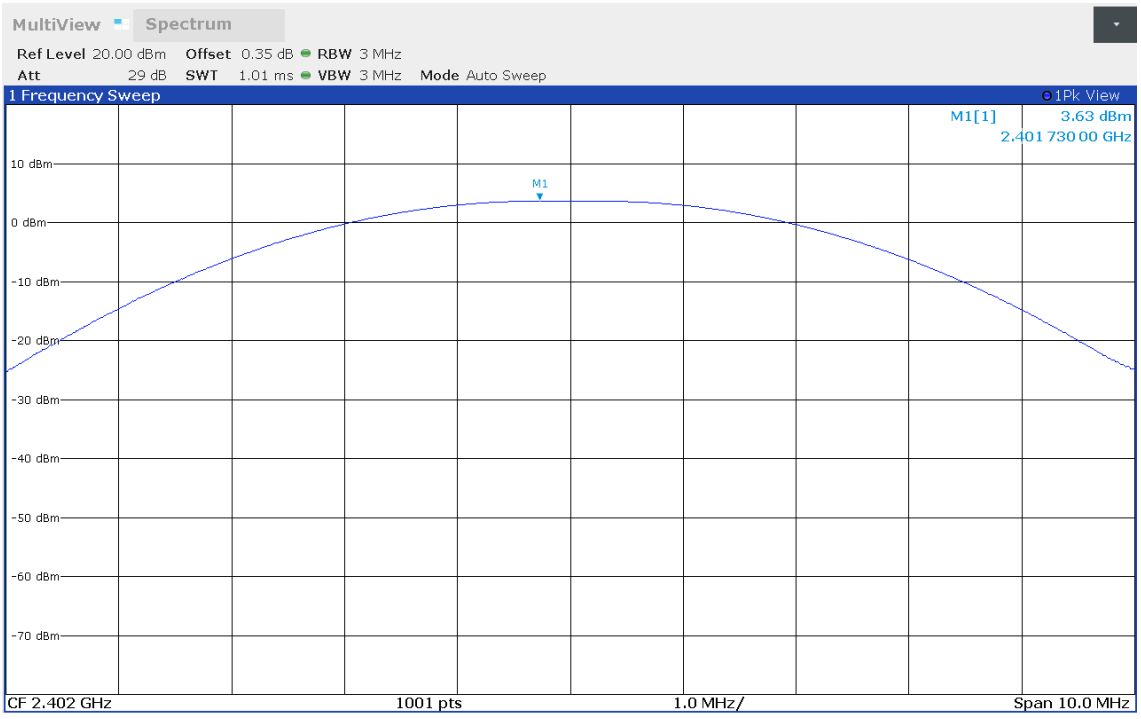
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Analyzer resolution bandwidth is set ≥ DTS bandwidth 3. Detector set to peak and max hold 4. Sweep time is set to auto 5. After the trace has stabilized a marker is set to peak of envelope

3.3.6 Results

Test Results				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2402	3.631	0.0023	1.0	PASS
2440	3.563	0.0023	1.0	PASS
2480	3.507	0.0022	1.0	PASS

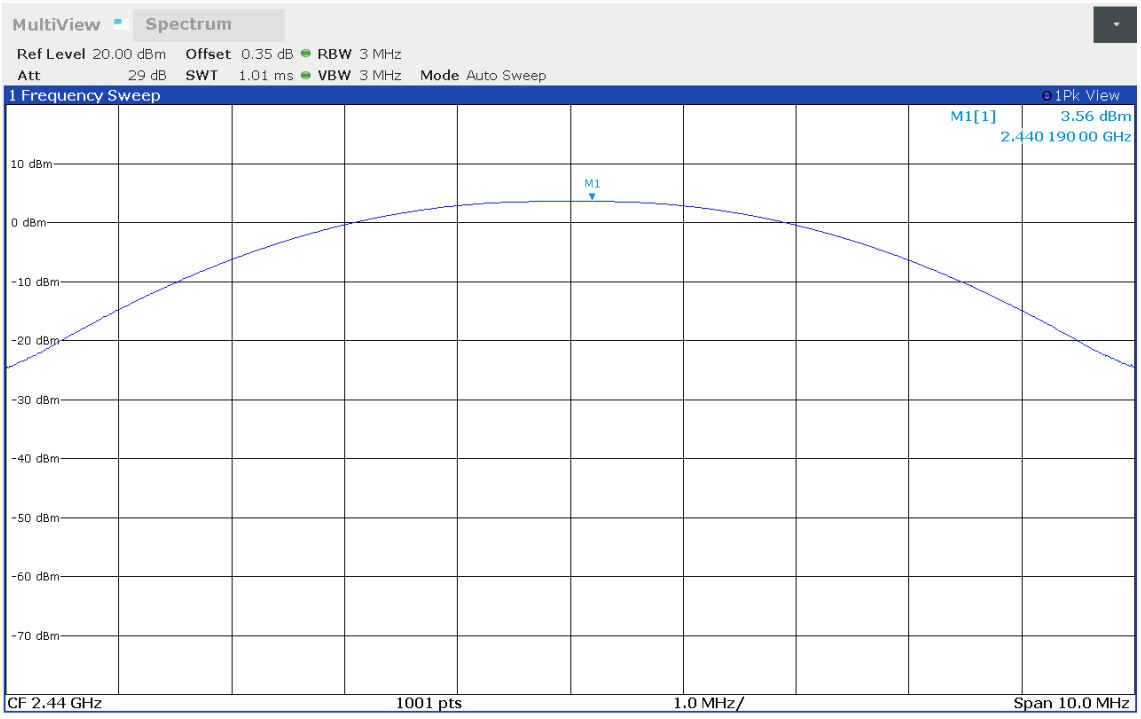
Peak Conducted Output Power

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.9.1.1
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Peak Power [dBm]:	3.631
Peak Power [W]:	0.0023



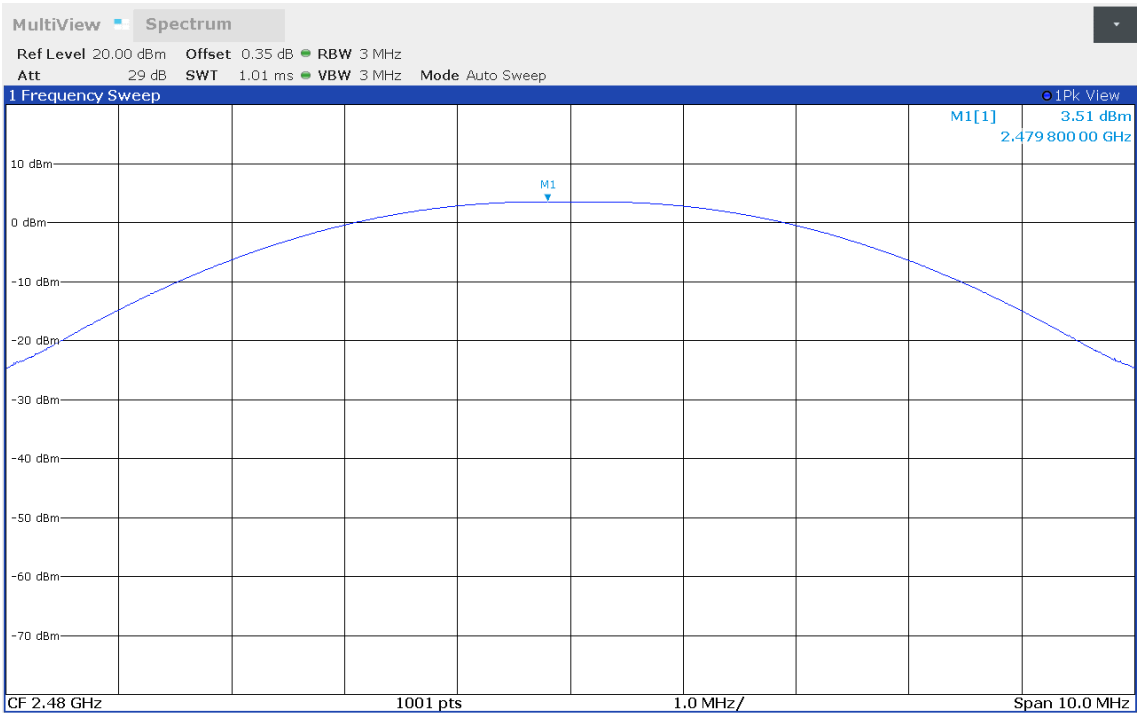
Peak Conducted Output Power

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.9.1.1
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Peak Power [dBm]:	3.563
Peak Power [W]:	0.0023



Peak Conducted Output Power

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.9.1.1
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Peak Power [dBm]:	3.507
Peak Power [W]:	0.0022



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3.4 Test Conditions and Results - Power spectral density

3.4.1 Information

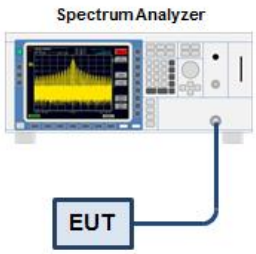
Test Information	
Reference	FCC § 15.247(e); ISED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Measurement Uncertainty	± 2.86 dB
Operator	Odai Qawasmeh
Date	2022-04-08

3.4.2 Limits

Limits
8 dBm / 3 kHz

3.4.3 Setup

Test Setup



3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	– (diverse)	EF00779 CAABE	2022-02	2023-02

3.4.5 Procedure

Test Procedure

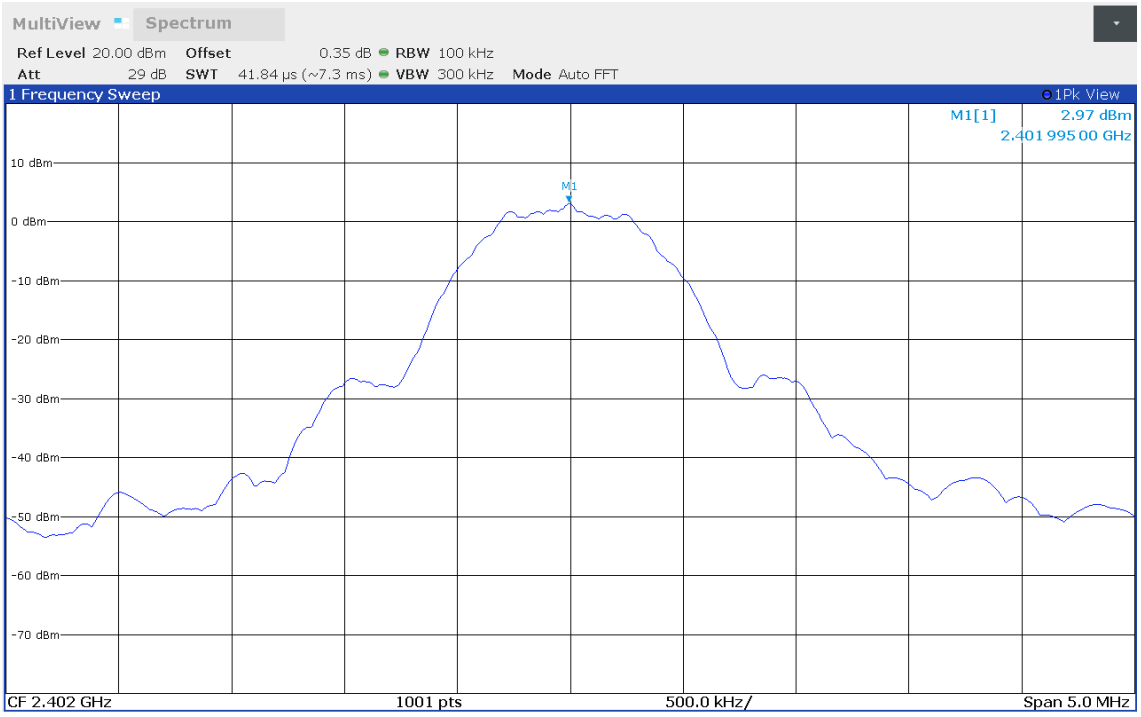
1. EUT set to test mode
2. The analyzer is set to DTS channel center frequency with a span of 1.5 times the DTS bandwidth
3. The RBW is set to 100 kHz with VBW ≥ RBW and the detector is set to peak with max hold
4. After the trace has stabilized a marker is set to the envelope maximum
5. If the power spectral density is above the limit the RBW is reduced (not lower than 3 kHz) and the measurement is repeated
6. If the EUT has more than one transmit chain the procedure is repeated for each transmit chain

3.4.6 Results

Test Results			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
2402	2.968	8.0	PASS
2440	3.315	8.0	PASS
2480	2.596	8.0	PASS
RBW = 100 kHz			

Peak Power Spectral Density

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Peak Frequency [MHz]:	2401.995
Spectral Density [dBm/RBW]:	2.968
Resolution Bandwidth [kHz]:	100 kHz



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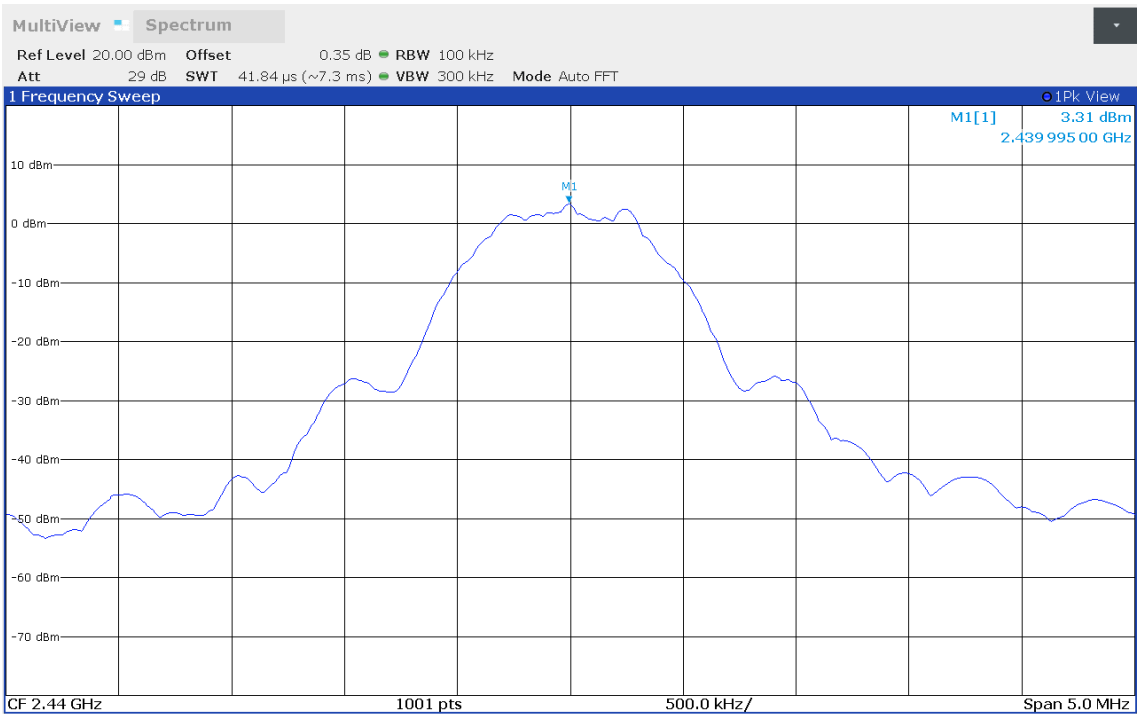
Peak Power Spectral Density

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Peak Frequency [MHz]:	2439.995
Spectral Density [dBm/RBW]:	3.315
Resolution Bandwidth [kHz]:	100 kHz



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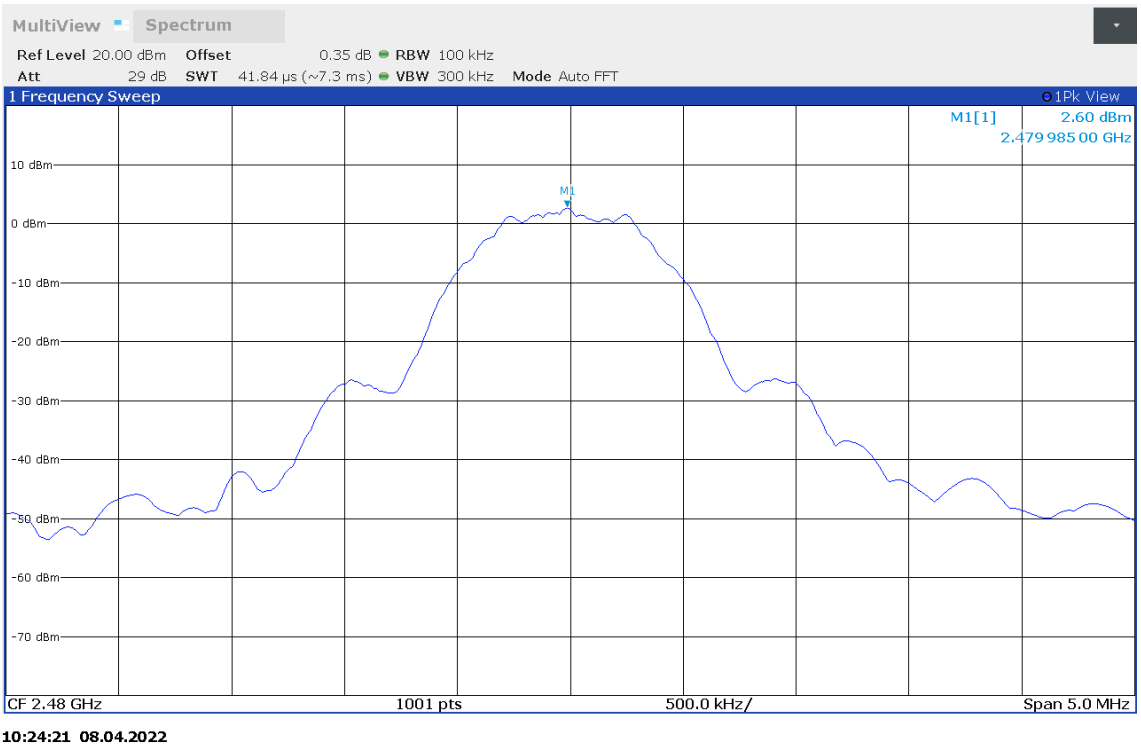
Peak Power Spectral Density

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Peak Frequency [MHz]:	2479.985
Spectral Density [dBm/RBW]:	2.596
Resolution Bandwidth [kHz]:	100 kHz



3.5 Test Conditions and Results - Band-edge compliance

3.5.1 Information

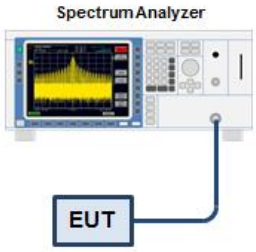
Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 3.64 dB
Measurement Method	ANSI C63.10 11.13
Operator	Odai Qawasmeh
Date	2022-04-08

3.5.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.5.3 Setup

Test Setup



3.5.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	– (diverse)	EF00779 CAABE	2022-02	2023-02

3.5.5 Procedure

Test Procedure

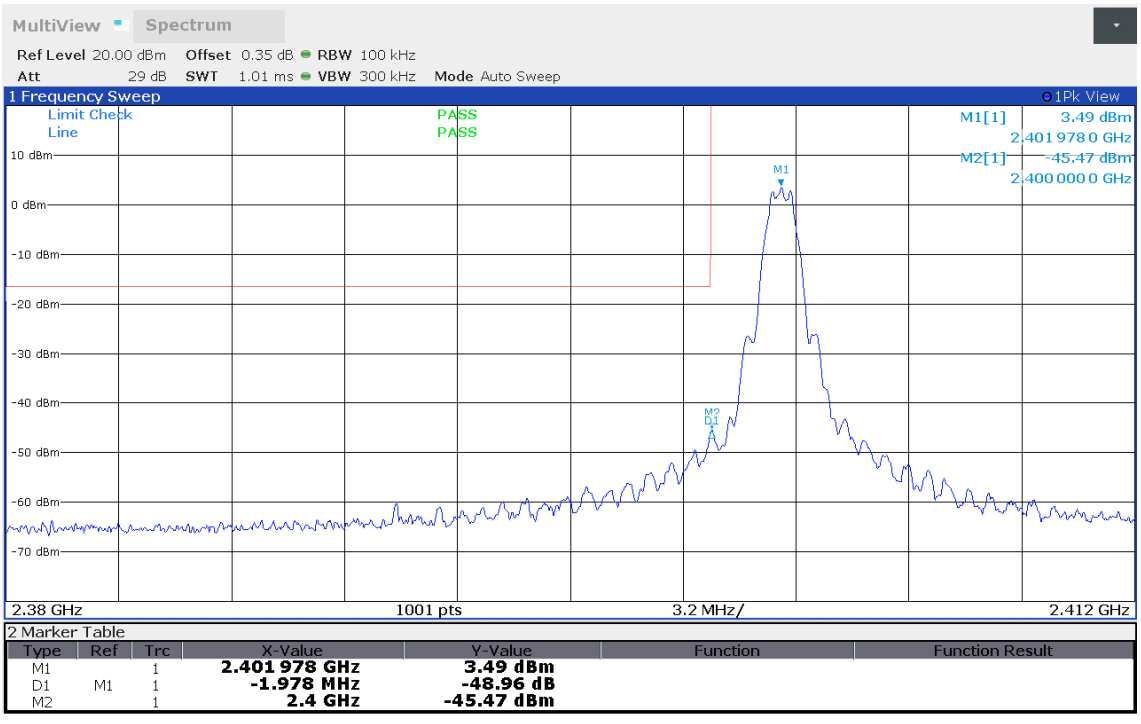
1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is determined from level difference

3.5.6 Results

Test Results				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
GFSK	2402	-48.96	-20	PASS
GFSK	2480	-54.46	-20	PASS

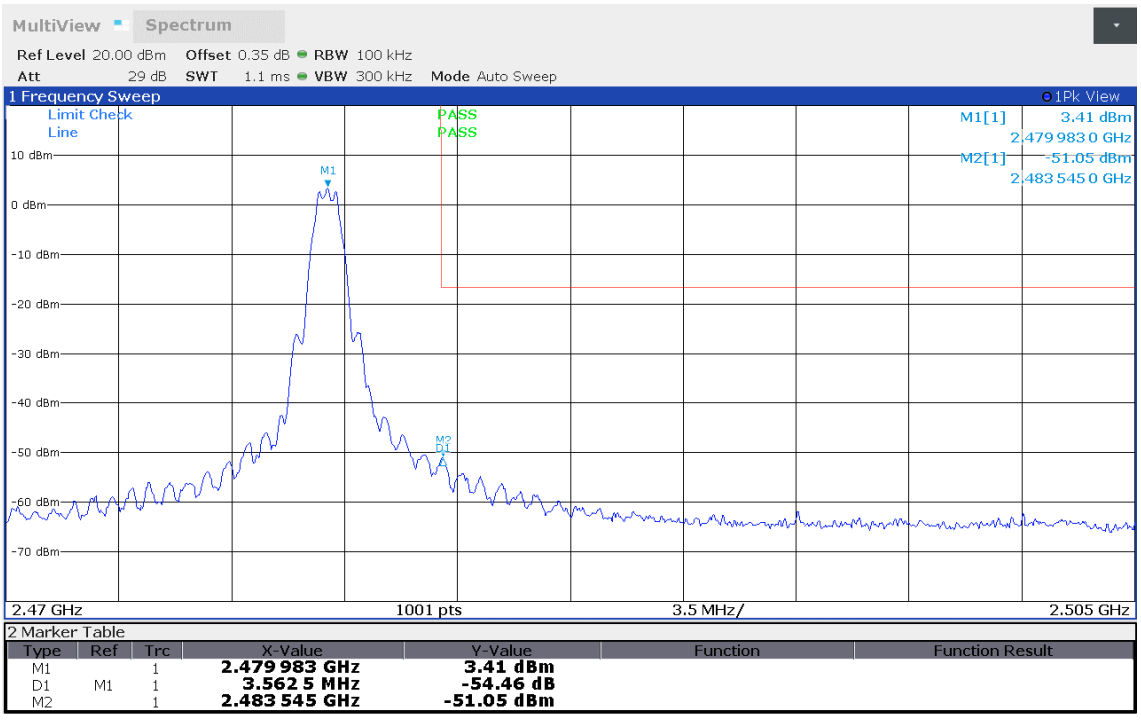
Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Band-edge	Lower
In-band Frequency [MHz]:	2401.978
Max. in-band Level [dBm/100 kHz]:	3.492
Out-of-band Frequency [MHz]:	2400.0
Max. out-of-band Level [dBm/100 kHz]:	-45.472
Attenuation [dB]:	-48.96



Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Band-edge	Upper
In-band Frequency [MHz]:	2479.983
Max. in-band Level [dBm/100 kHz]:	3.413
Out-of-band Frequency [MHz]:	2483.545
Max. out-of-band Level [dBm/100 kHz]:	-51.05
Attenuation [dB]:	-54.46



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3.6 Test Conditions and Results - Conducted spurious emissions

3.6.1 Information

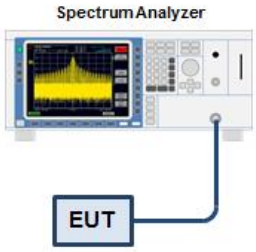
Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 4.25 dB
Measurement Method	ANSI C63.10 11.11
Operator	Odai Qawasmeh
Date	2022-04-08

3.6.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.6.3 Setup

Test Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	– (diverse)	EF00779 CAABE	2022-02	2023-02

3.6.5 Procedure

Test Procedure

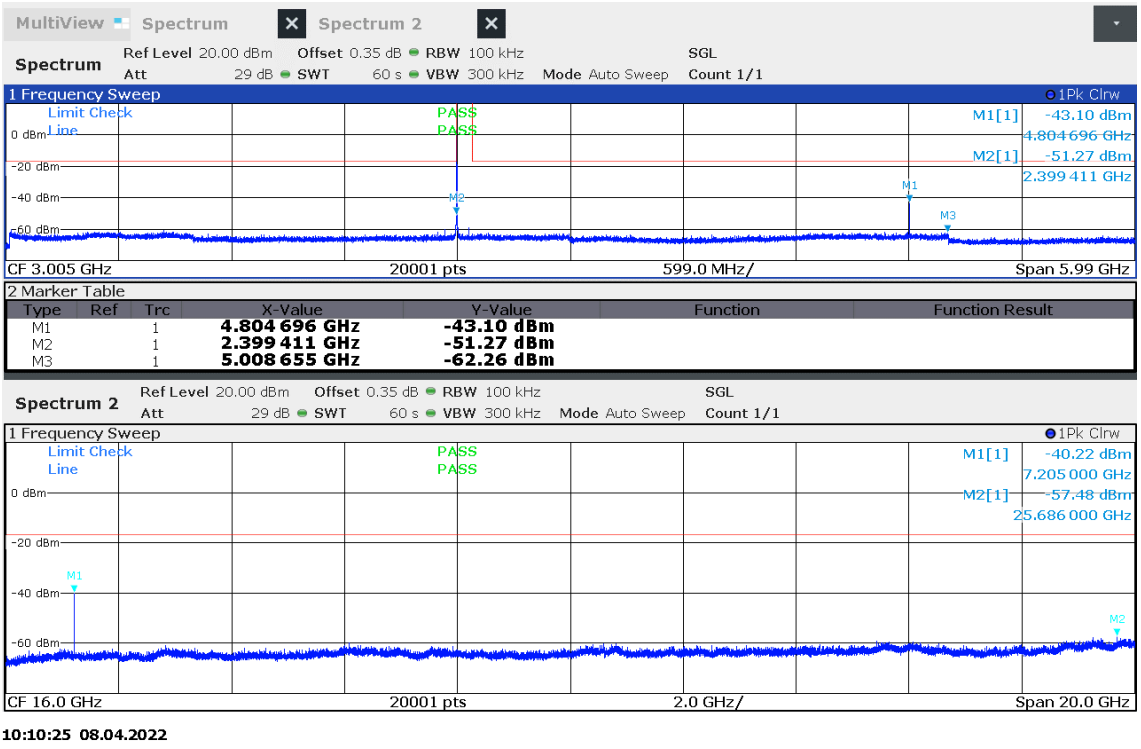
1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels outside frequency band

3.6.6 Results

Test Results		
Mode	Channel [MHz]	Verdict
GFSK	2402	PASS
GFSK	2440	PASS
GFSK	2480	PASS

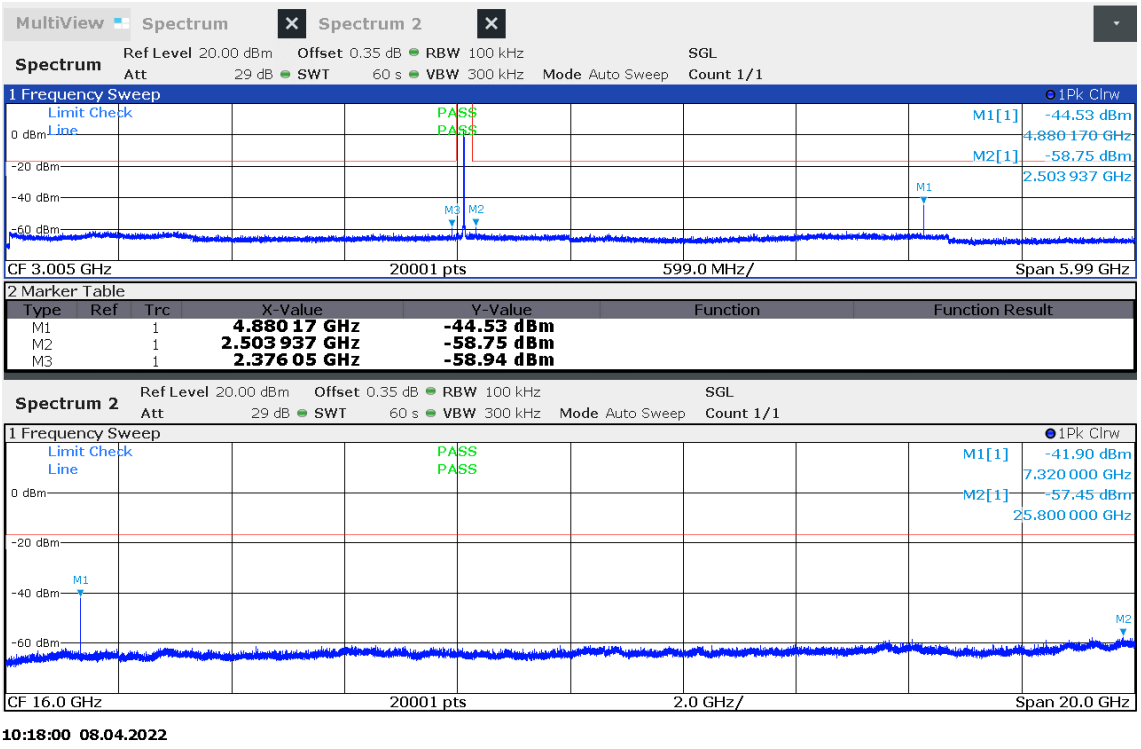
Conducted Spurious Emissions

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Max. in-band Frequency [MHz]:	2402.0
Max. in-band Level [dBm/100 kHz]:	3.1
Out-of-band Limit [dBm/100 kHz]:	-16.9



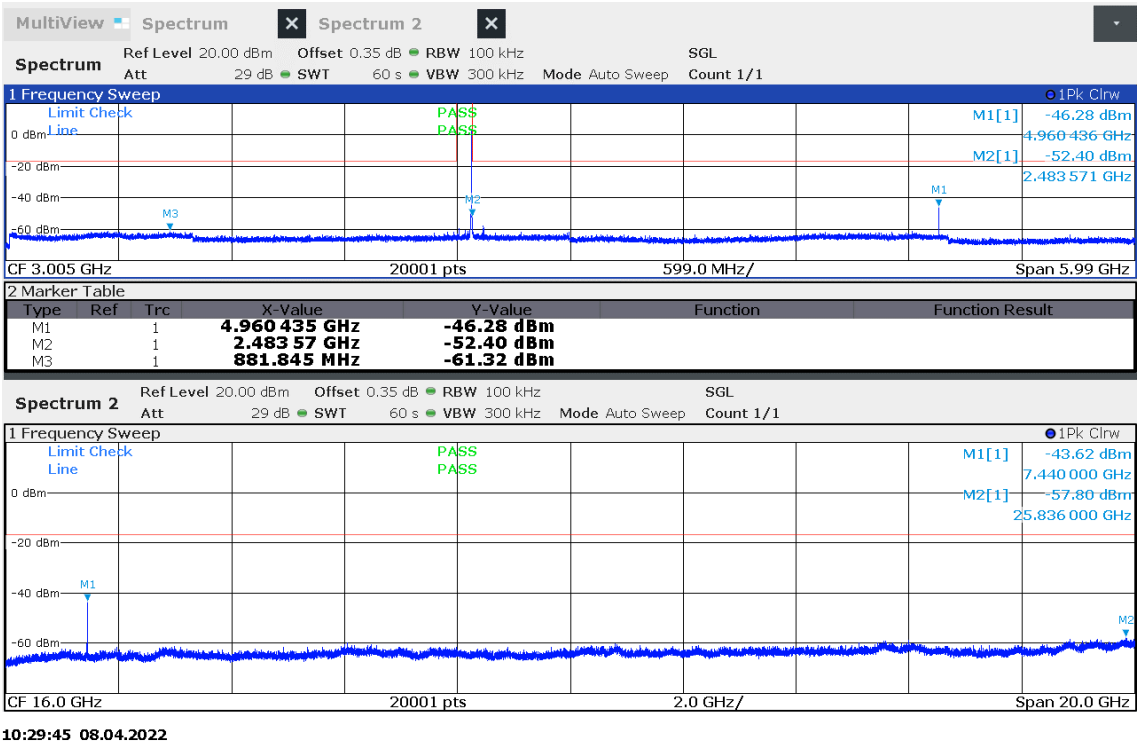
Conducted Spurious Emissions

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Max. in-band Frequency [MHz]:	2440.0
Max. in-band Level [dBm/100 kHz]:	3.4
Out-of-band Limit [dBm/100 kHz]:	-16.6



Conducted Spurious Emissions

Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38745
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-08
Max. in-band Frequency [MHz]:	2480.0
Max. in-band Level [dBm/100 kHz]:	3.2
Out-of-band Limit [dBm/100 kHz]:	-16.8



3.7 Test Conditions and Results - Transmitter radiated emissions

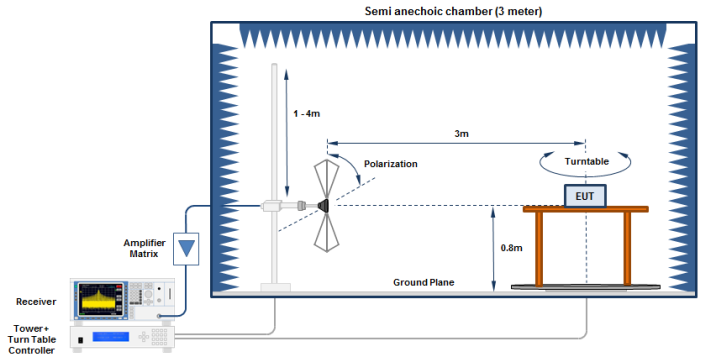
3.7.1 Information

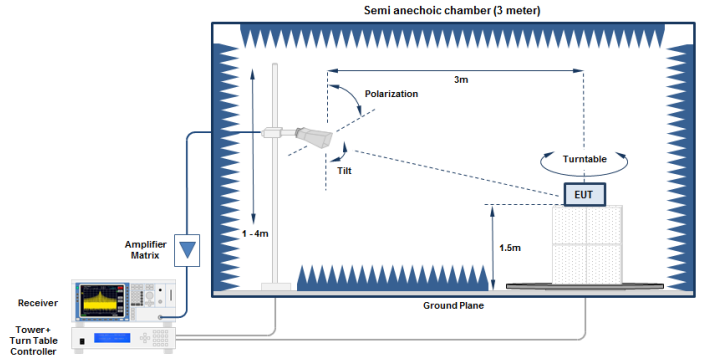
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209; ISED RSS-Gen, Issue 5 A2 (section 6.13)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Florian Voigt
Date	2022-03-29

3.7.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.7.3 Setup

Test Setup 30 MHz - 1000 MHz


Test Setup > 1 GHz


3.7.4 Equipment

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

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00212	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF01011	2019-06	2022-06
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10
Antenna	Schwarzbeck	HWRD 650	EF01679	2021-03	2024-03
Antenna	Amplifier Research	AT4560	EF00302	2021-06	2023-06

3.7.5 Procedure

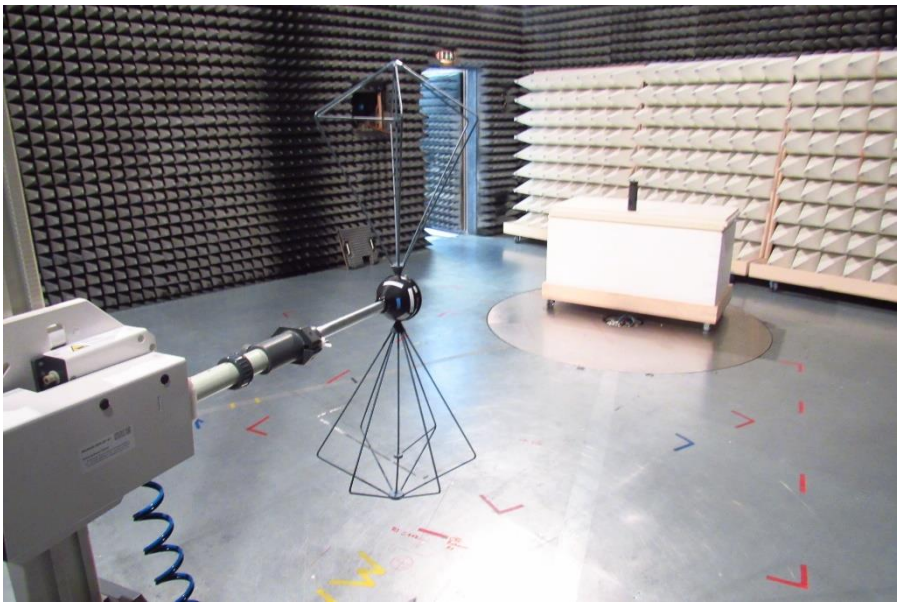
Test Procedure 30 MHz - 1000 MHz
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground
2. EUT set to test mode
3. The receiver is set to peak detection with max hold
4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5. All significant emissions are measured again using the corresponding final detector

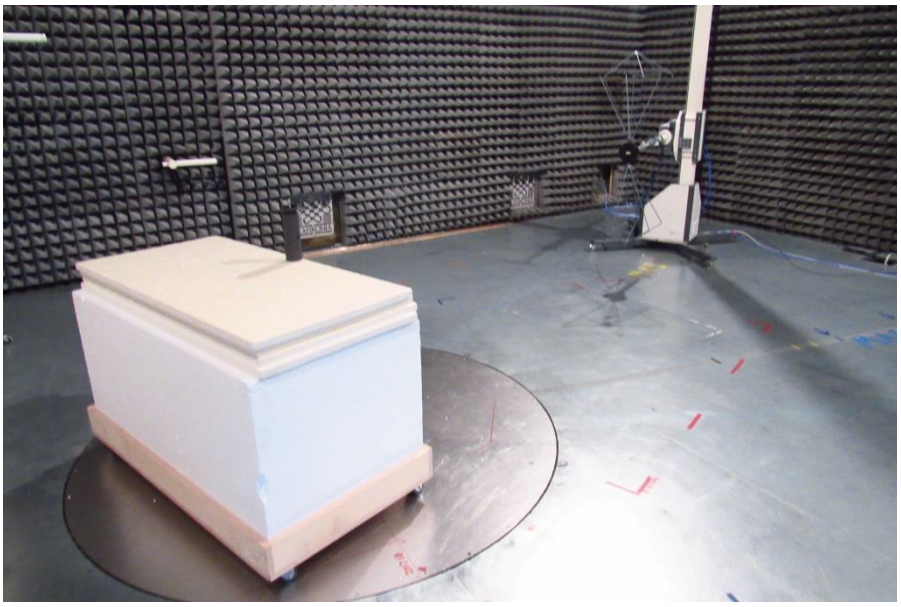
Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground
2. EUT set to test mode
3. The receiver is set to peak detection with max hold
4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5. All significant emissions are measured again using the corresponding final detector

3.7.6 Results

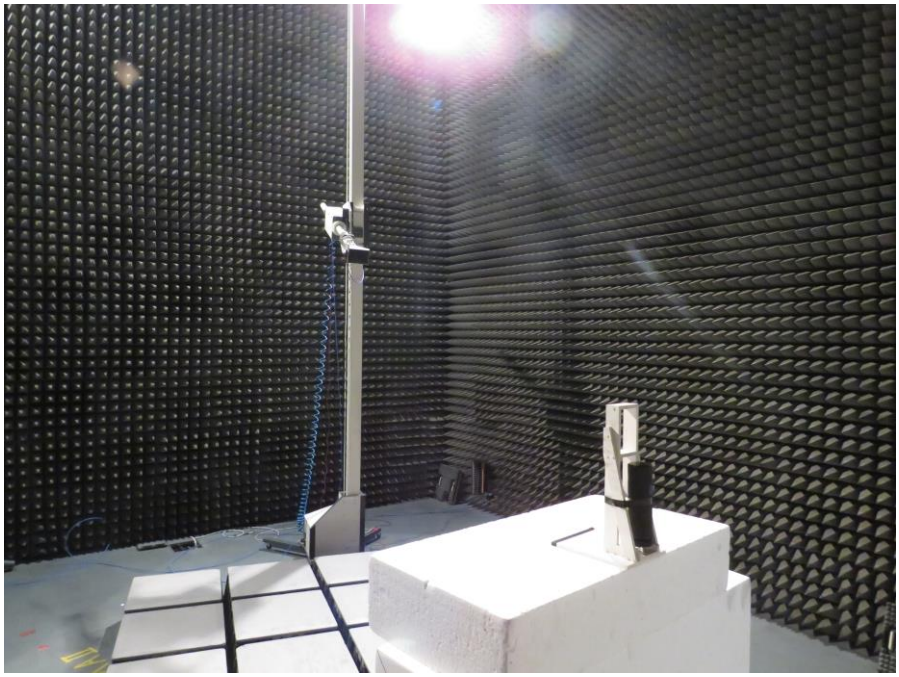
Test Results						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2402	73.9747	16.00	pk	ver	40.00	-24.02
2402	163.7433	21.40	pk	ver	43.50	-22.12
2402	265.22	23.50	pk	ver	46.00	-22.53
2402	2338	43.18	pk	ver	74.00	-30.82
2402	2338	34.47	avg	ver	54.00	-19.53
2402	4803.7	52.64	pk	hor	74.00	-21.36
2402	4803.7	48.71	avg	hor	54.00	-05.29
2402	4804.2	48.91	pk	ver	74.00	-25.09
2402	4804.2	44.77	avg	ver	54.00	-09.23
2440	124.7452	22.60	pk	ver	43.50	-20.93
2440	164.0238	21.10	pk	ver	43.50	-22.43
2440	247.7	19.20	pk	ver	46.00	-26.83
2440	264.12	20.50	pk	ver	46.00	-25.50
2440	4880	54.53	pk	hor	74.00	-19.47
2440	4880	50.88	avg	hor	54.00	-03.12
2440	7319	56.77	pk	hor	74.00	-17.23
2440	7319	51.01	avg	hor	54.00	-02.99
2440	4880	54.72	pk	ver	74.00	-19.28
2440	4880	50.32	avg	ver	54.00	-03.68
2440	7319	54.05	pk	ver	74.00	-19.95
2440	7319	47.33	avg	ver	54.00	-06.67
2480	120.9967	23.50	pk	ver	43.50	-20.01
2480	162.4088	23.10	pk	ver	43.50	-20.41
2480	263.96	20.10	pk	ver	46.00	-25.85
2480	2483.5	56.98	pk	ver	74.00	-17.02
2480	2483.5	37.37	avg	ver	54.00	-16.63
2480	4960	55.30	pk	hor	74.00	-18.70
2480	4960	53.69	pk	ver	74.00	-20.31
2480	4960	52.38	avg	hor	54.00	-01.62
2480	4960	49.61	avg	ver	54.00	-04.39
2480	7439	57.34	pk	hor	74.00	-16.66
2480	7439	51.30	avg	hor	54.00	-02.70
2480	7439	57.77	pk	ver	74.00	-16.23
2480	7439	51.78	avg	ver	54.00	-02.22

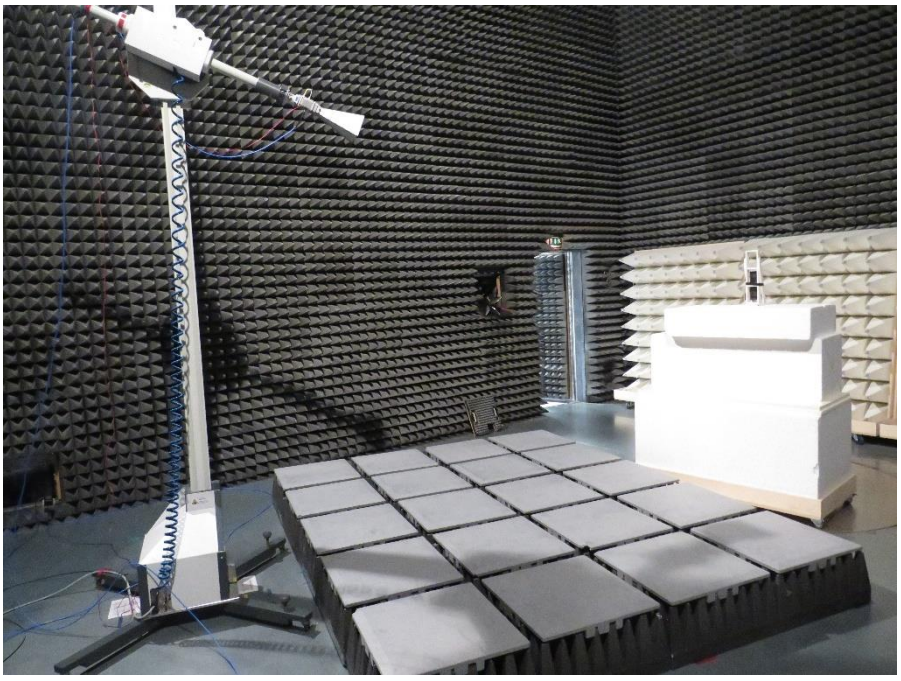
3.7.7 Setup Photos

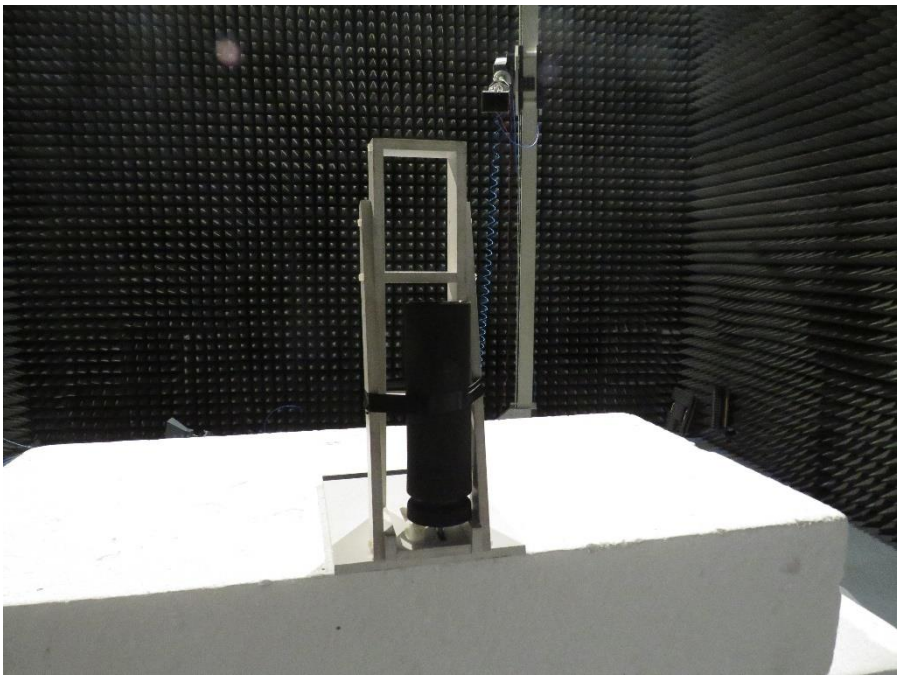
Setup for measurements below 1 GHz


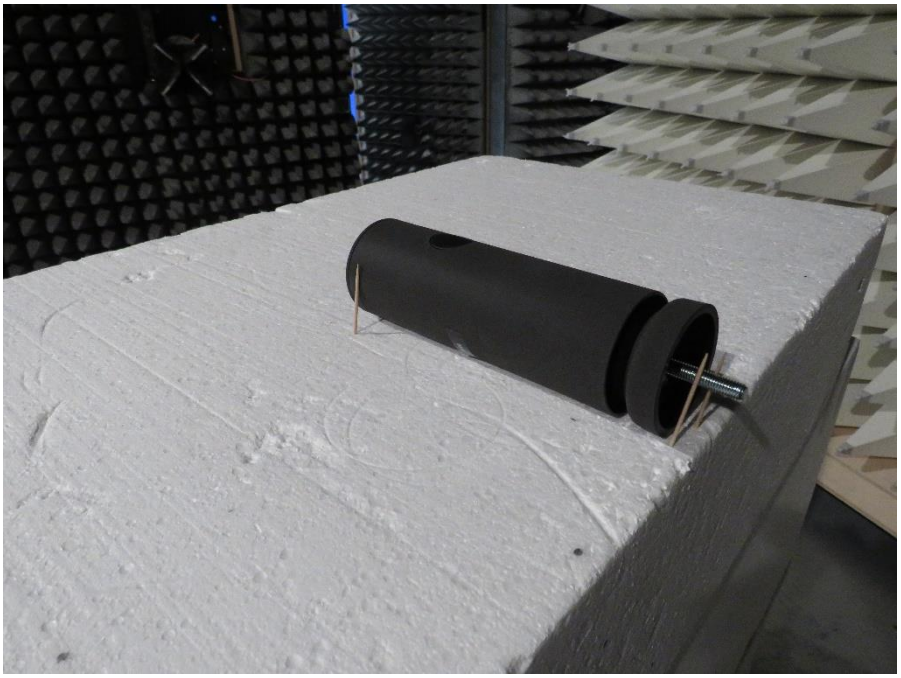
Setup for measurements below 1 GHz


Setup for measurements below 1 GHz


Setup for measurements above 1 GHz


Setup for measurements above 1 GHz


Setup EUT alignment vertical


Setup EUT alignment horizontal


Setup EUT alignment horizontal2


3.8 Test Conditions and Results - Receiver radiated emissions

3.8.1 Information

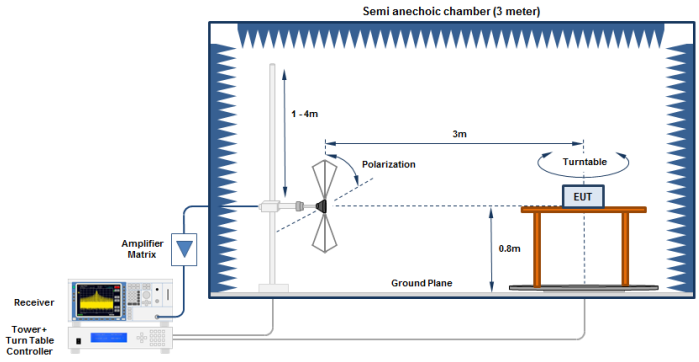
Test Information	
Reference	ISED RSS-247, Issue 2 (section 3.1)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.4-2014 8.1-8.3
Operator	Odai Qawasmeh
Date	2022-03-28

3.8.2 Limits

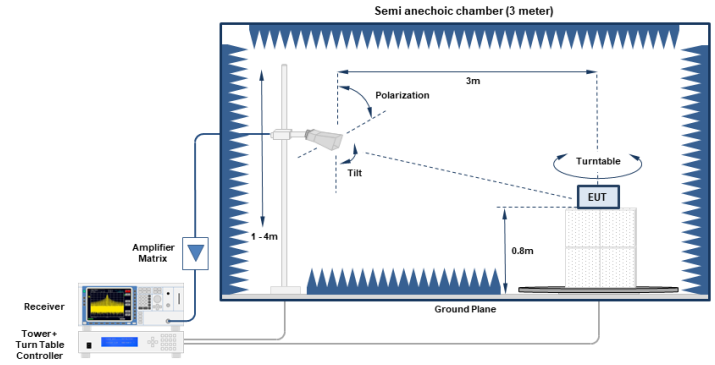
Limits			
Frequency range [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.8.3 Setup

Test Setup 30 MHz - 1000 MHz



Test Setup > 1 GHz



3.8.4 Equipment

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

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00212	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF01011	2019-06	2022-06
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10
Antenna	Schwarzbeck	HWRD 650	EF01679	2021-03	2022-03

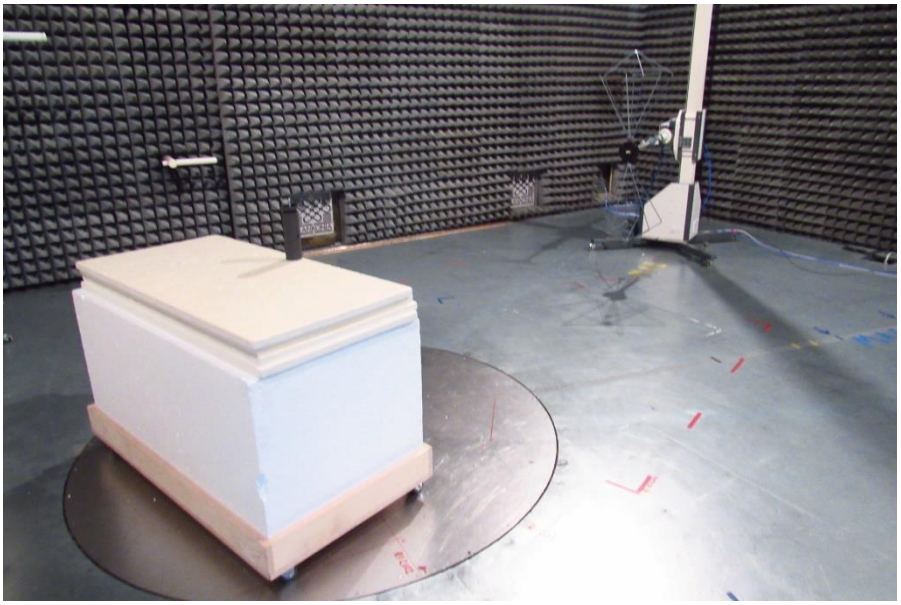
3.8.5 Procedure

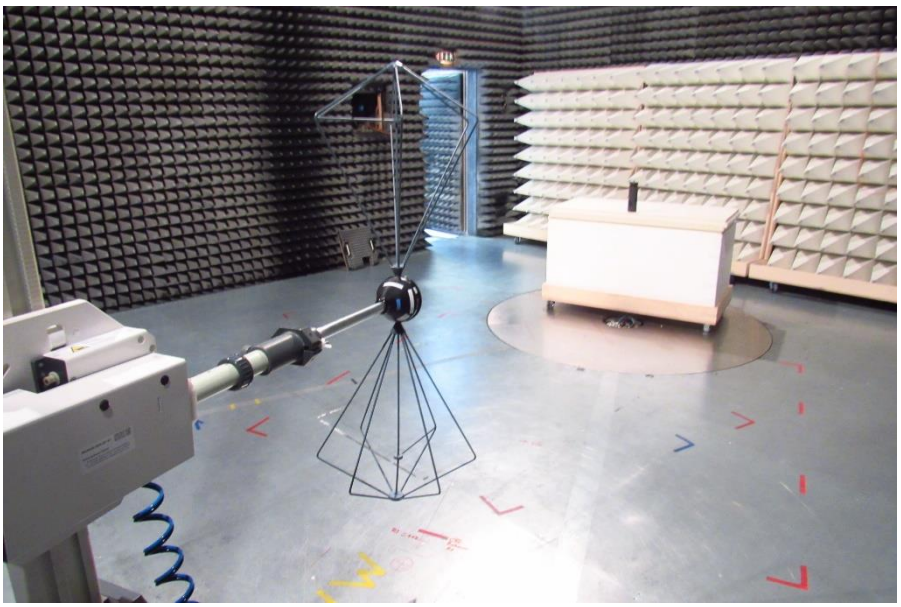
Test Procedure
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground
2. EUT is set to test mode
3. The receiver is set to peak detection with max hold
4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5. All significant emissions are measured again using the corresponding final detector

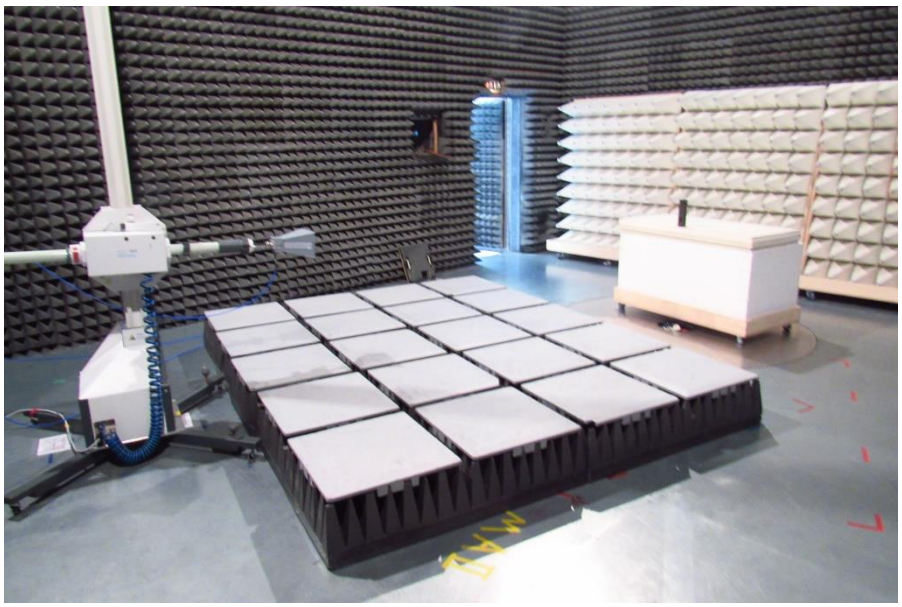
3.8.6 Results

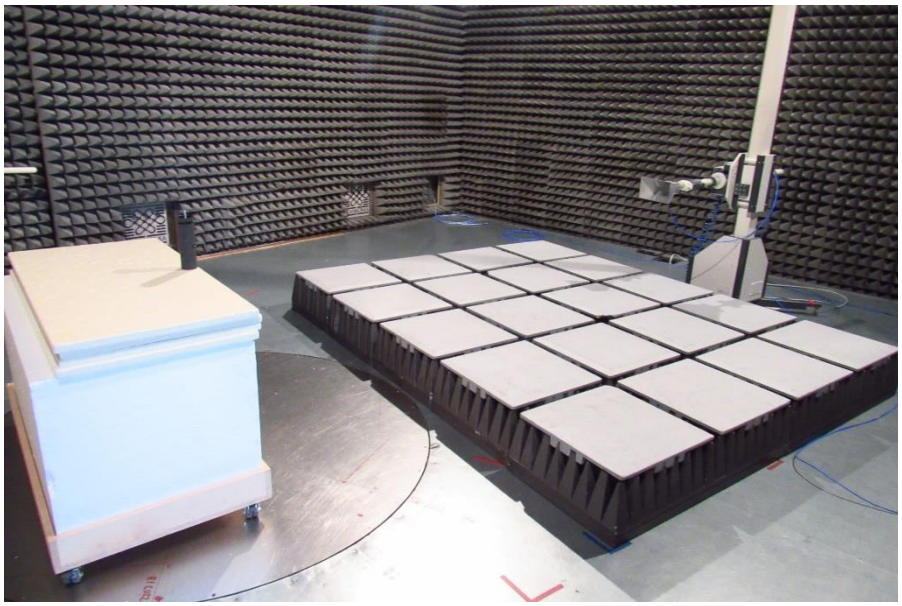
Test Results						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2440	85.5857	20.00	pk	ver	40.00	-20.01
2440	96.5975	21.80	pk	ver	43.50	-21.65
2440	149.85	22.00	pk	ver	43.50	-21.49
2440	230.16	22.30	pk	ver	46.00	-23.69
2440	258.2	20.50	pk	ver	46.00	-25.52
2440	906.28	30.70	pk	ver	46.00	-15.27
2440	6430	48.88	pk	ver	74.00	-25.12
2440	6430	40.08	avg	ver	53.98	-13.90

3.8.7 Setup Photos

Setup for measurements below 1 GHz


Setup for measurements below 1 GHz


Setup for measurements above 1 GHz


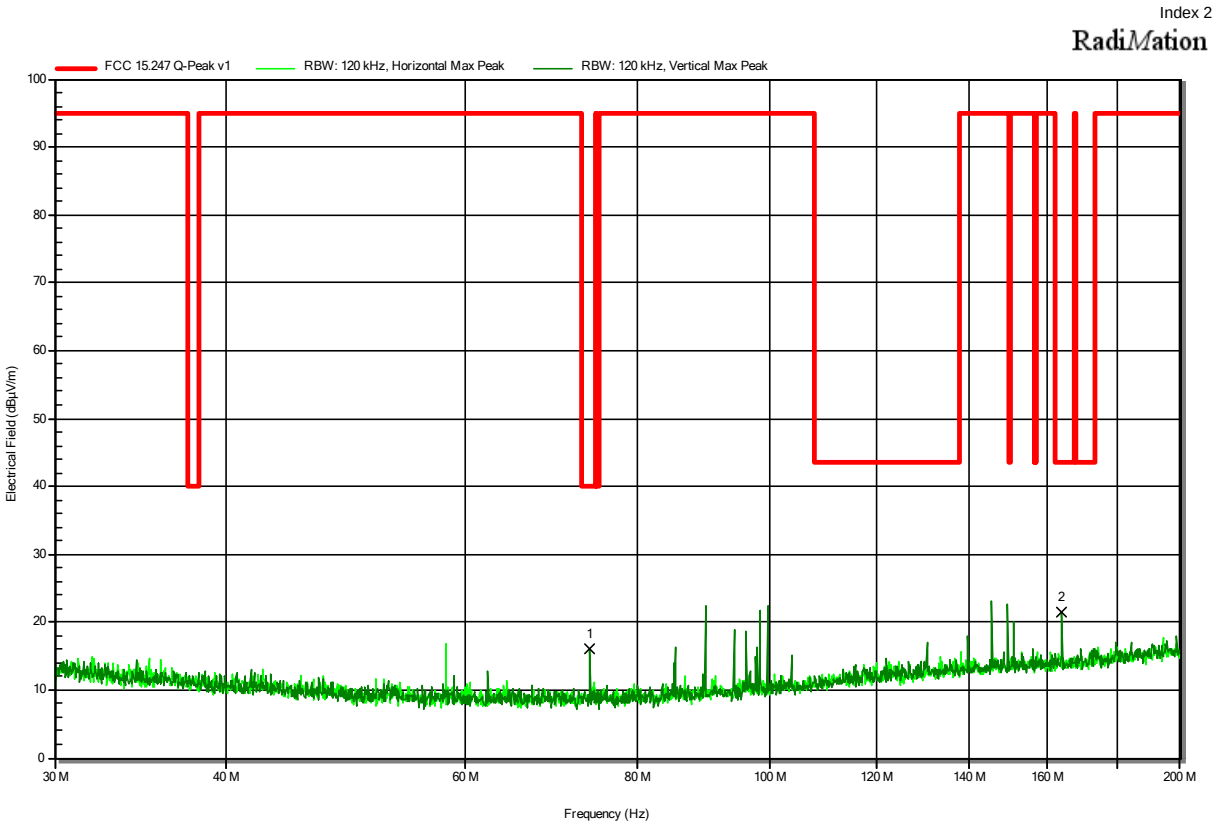
Setup for measurements above 1 GHz


EUT Setup


ANNEX A Transmitter spurious emissions

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

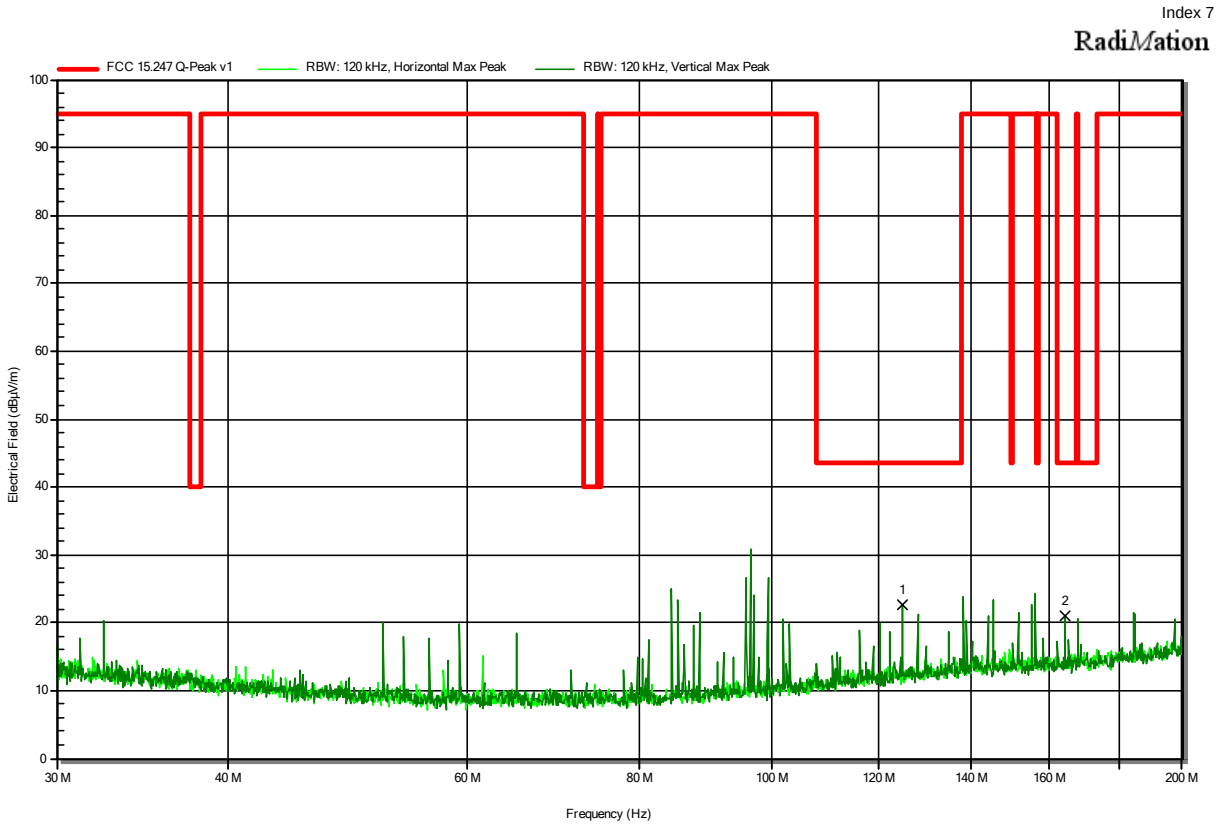
Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38746
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Rohde & Schwarz HK 116
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2402 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-03-29
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
73.9747 MHz	16 dBµV/m	40 dBµV/m	-24.02 dB	Pass	Vertical
163.7433 MHz	21.4 dBµV/m	43.5 dBµV/m	-22.12 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

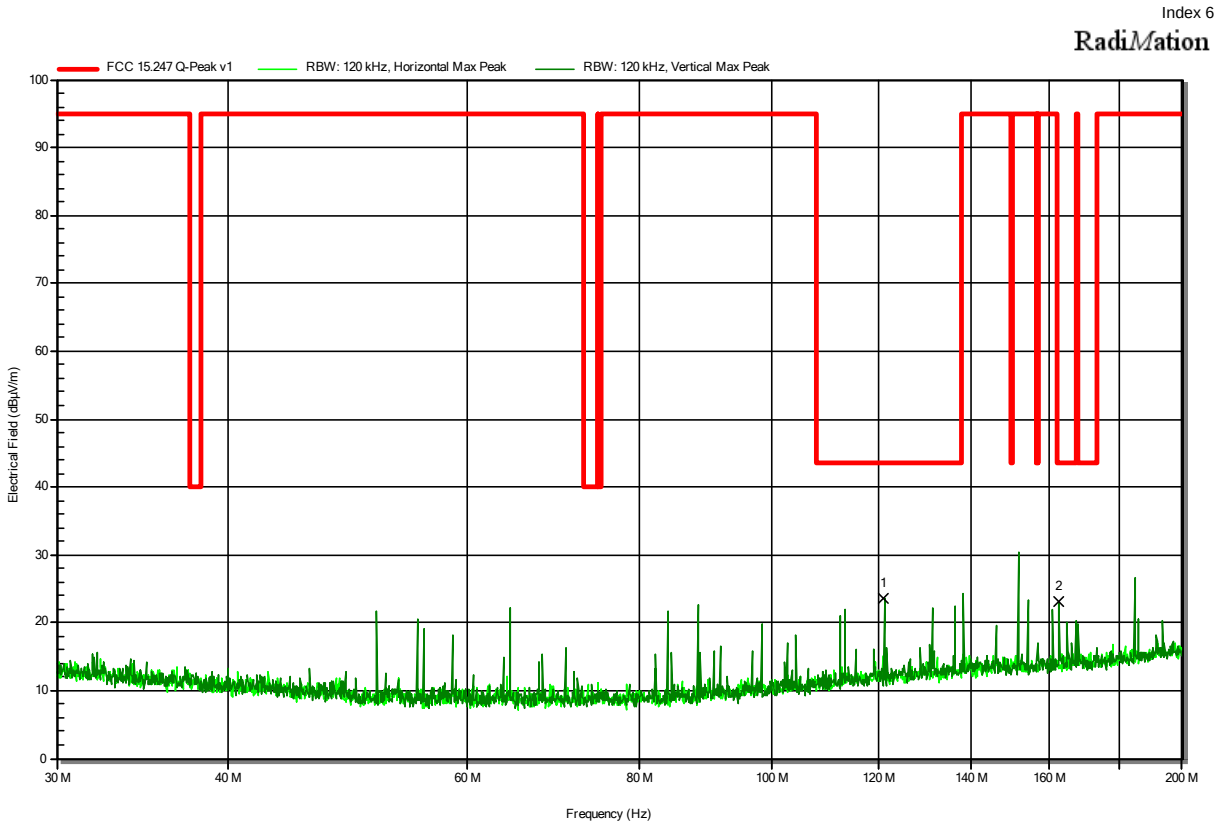
Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38746
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Rohde & Schwarz HK 116
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2440 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-04
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
124.7452 MHz	22.6 dBµV/m	43.5 dBµV/m	-20.93 dB	Pass	Vertical
164.0238 MHz	21.1 dBµV/m	43.5 dBµV/m	-22.43 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

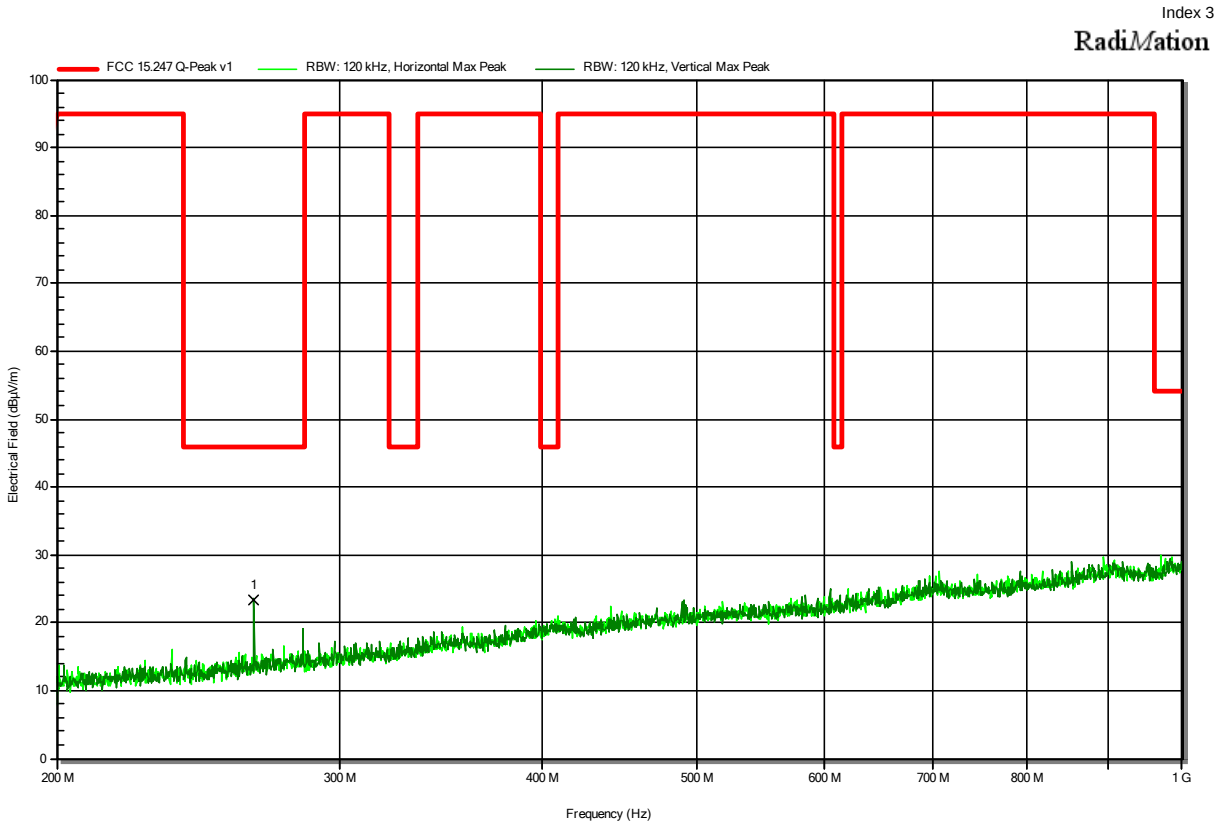
Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38746
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Rohde & Schwarz HK 116
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-04
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
120.9967 MHz	23.5 dBµV/m	43.5 dBµV/m	-20.01 dB	Pass	Vertical
162.4088 MHz	23.1 dBµV/m	43.5 dBµV/m	-20.41 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

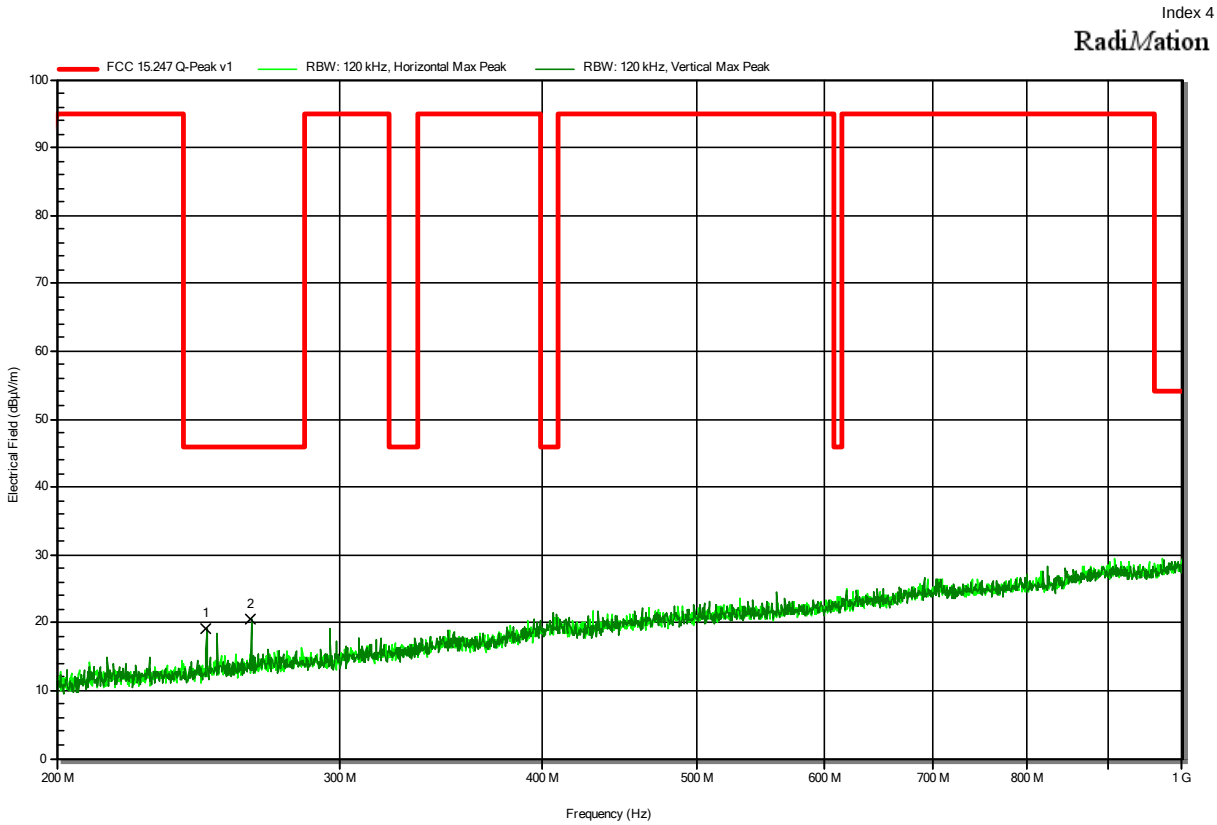
Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38746
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Rohde & Schwarz HL 223
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2402 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-04
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
265.22 MHz	23.5 dBµV/m	46 dBµV/m	-22.53 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

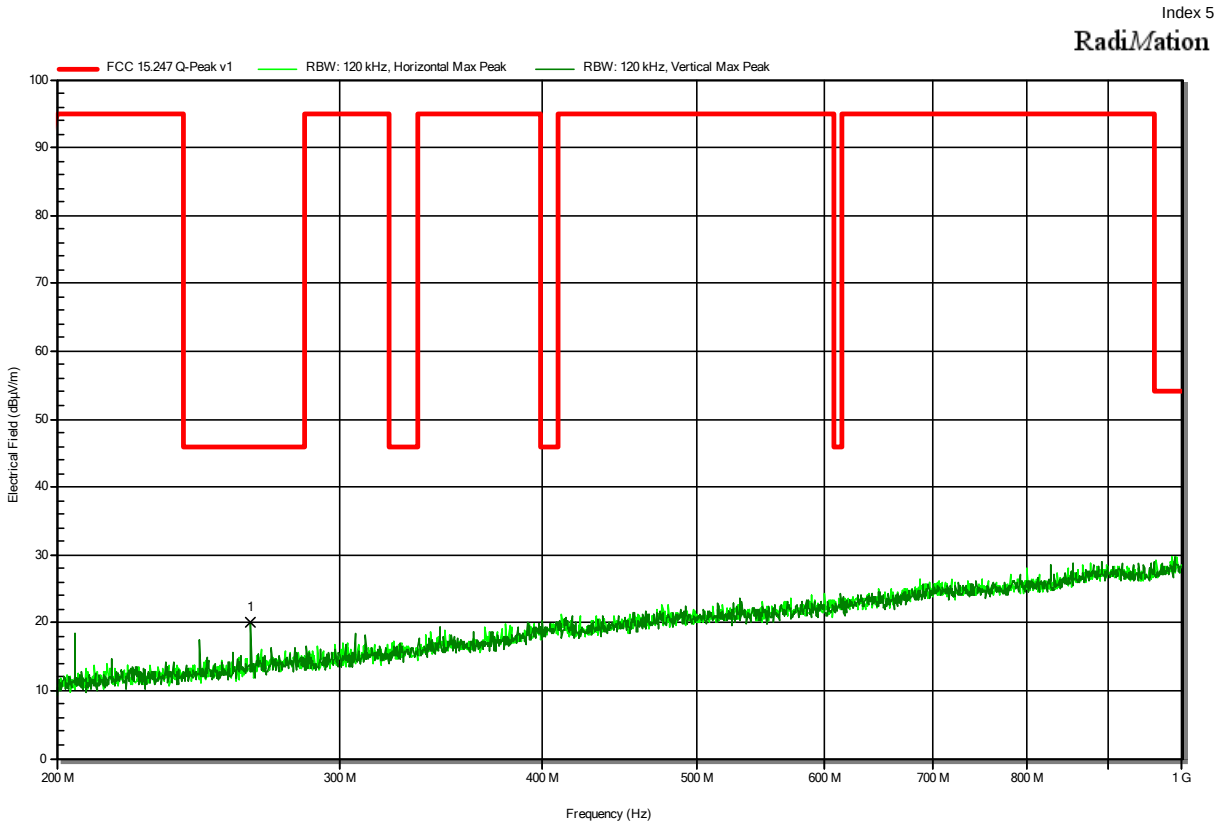
Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38746
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Rohde & Schwarz HL 223
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2440 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-04
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
247.7 MHz	19.2 dBµV/m	46 dBµV/m	-26.83 dB	Pass	Vertical
264.12 MHz	20.5 dBµV/m	46 dBµV/m	-25.5 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Rohde & Schwarz HL 223
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-04
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
263.96 MHz	20.1 dBµV/m	46 dBµV/m	-25.85 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck BBHA 9120D
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2402 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-06
Note:	

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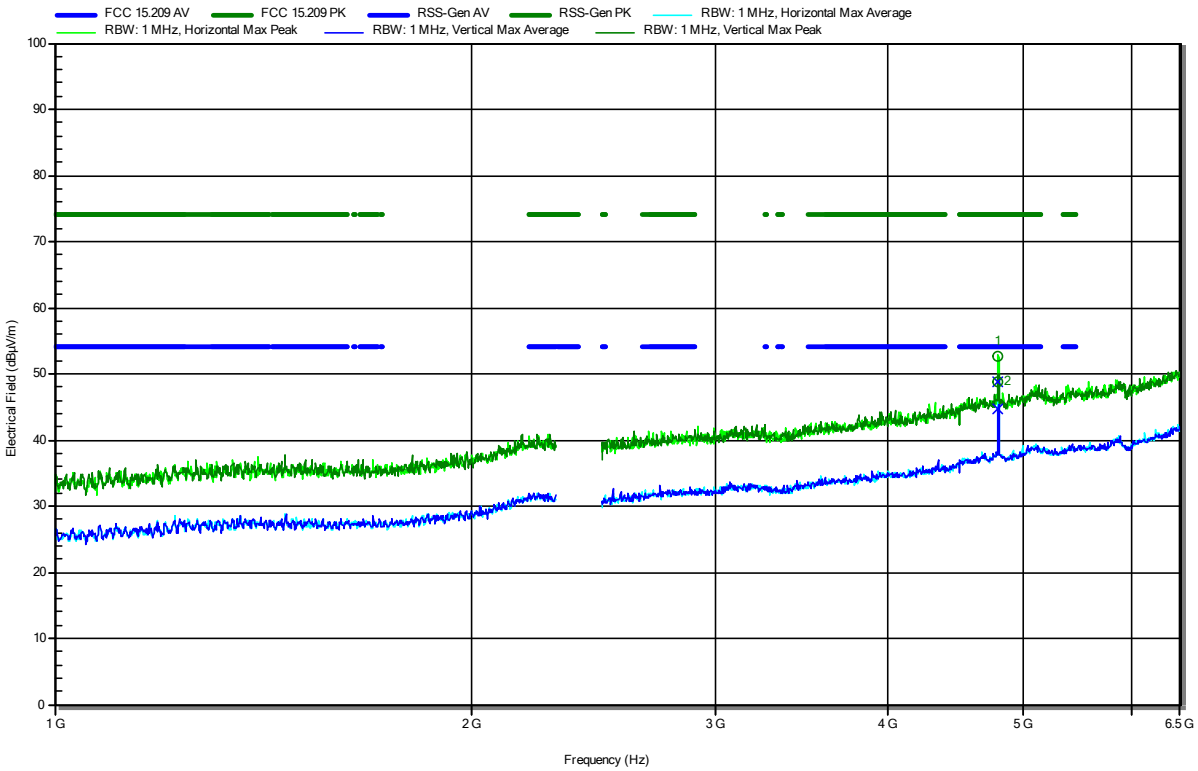
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.8037 GHz	52.64 dBµV/m	74 dBµV/m	-21.36 dB	Pass	Horizontal
4.8042 GHz	48.91 dBµV/m	74 dBµV/m	-25.09 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
4.8037 GHz	48.71 dBµV/m	54 dBµV/m	-5.29 dB	Pass	Horizontal
4.8042 GHz	44.77 dBµV/m	54 dBµV/m	-9.23 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck BBHA 9120D
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2440 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-06
Note:	

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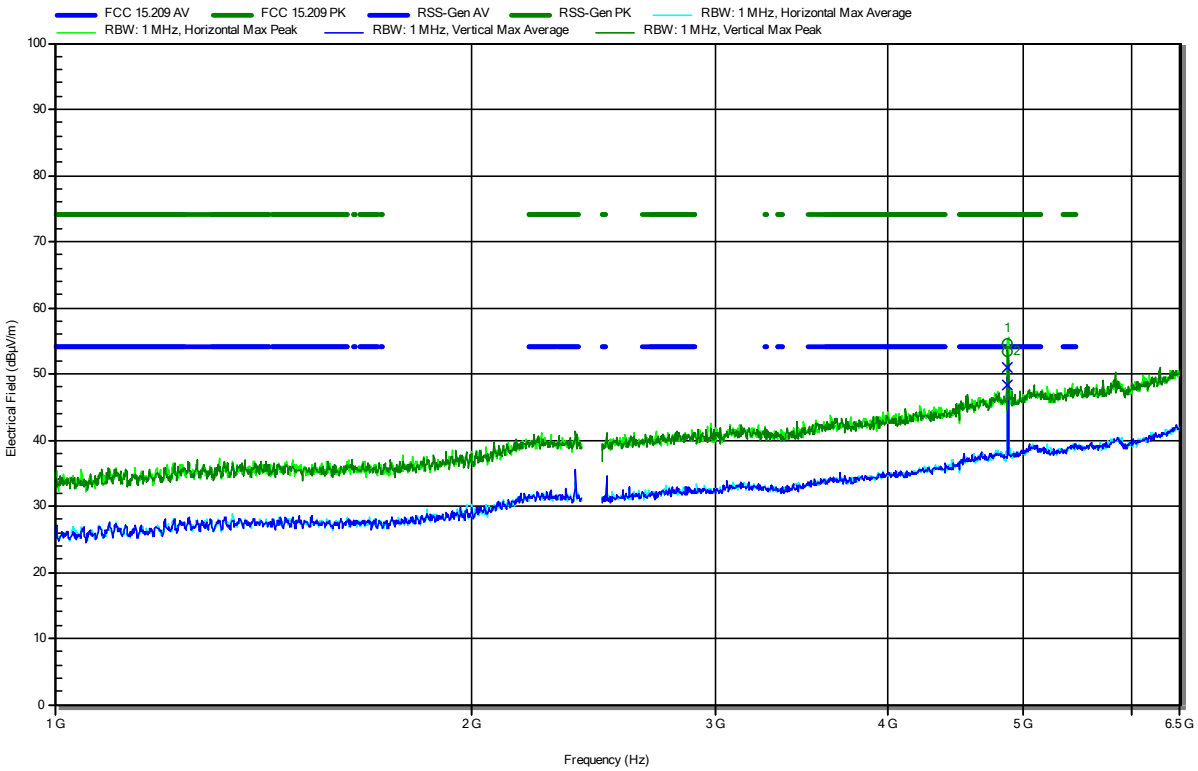
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.88 GHz	54.53 dBµV/m	74 dBµV/m	-19.47 dB	Pass	Horizontal
4.88 GHz	53.3 dBµV/m	74 dBµV/m	-20.7 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
4.88 GHz	50.88 dBµV/m	54 dBµV/m	-3.12 dB	Pass	Horizontal
4.88 GHz	48.23 dBµV/m	54 dBµV/m	-5.77 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck BBHA 9120D
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2440 MHz, PRBS9, 1 Mbit/s, EUT Horizontal2
Test Date:	2022-04-06
Note:	

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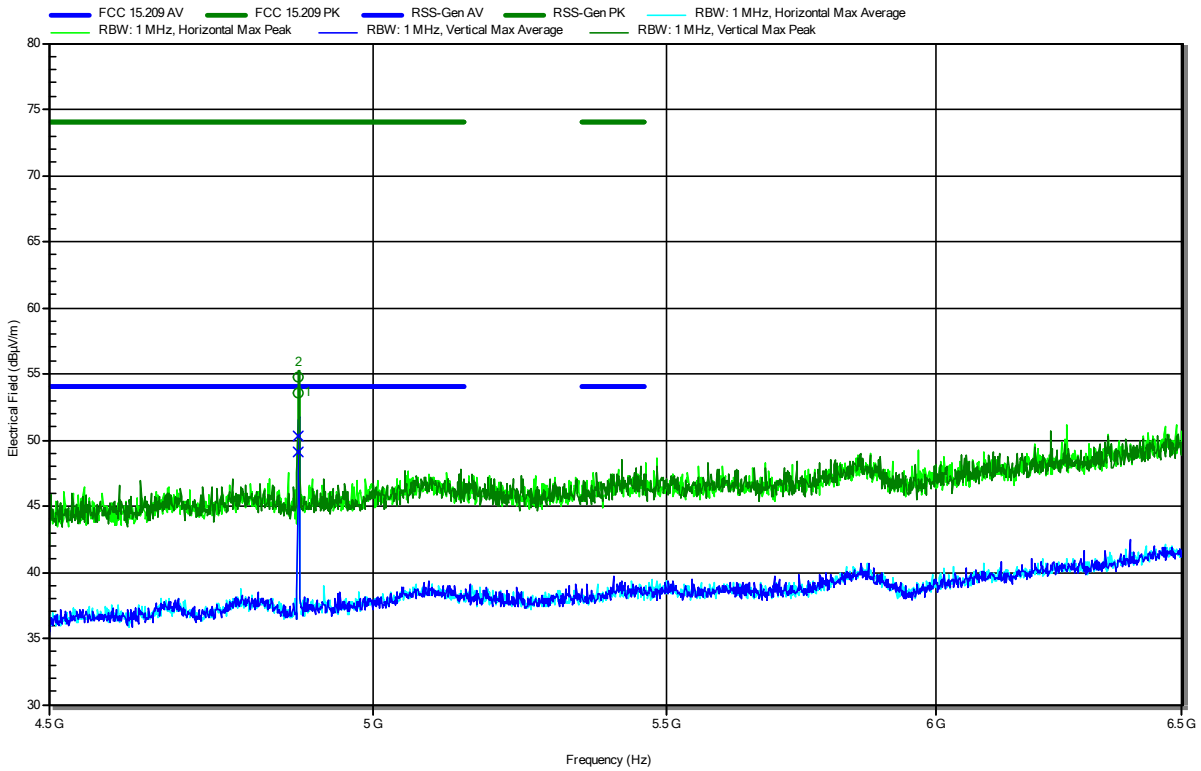
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.88 GHz	53.57 dBµV/m	74 dBµV/m	-20.43 dB	Pass	Horizontal
4.88 GHz	54.72 dBµV/m	74 dBµV/m	-19.28 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
4.88 GHz	49.07 dBµV/m	54 dBµV/m	-4.93 dB	Pass	Horizontal
4.88 GHz	50.32 dBµV/m	54 dBµV/m	-3.68 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-06
Note:	

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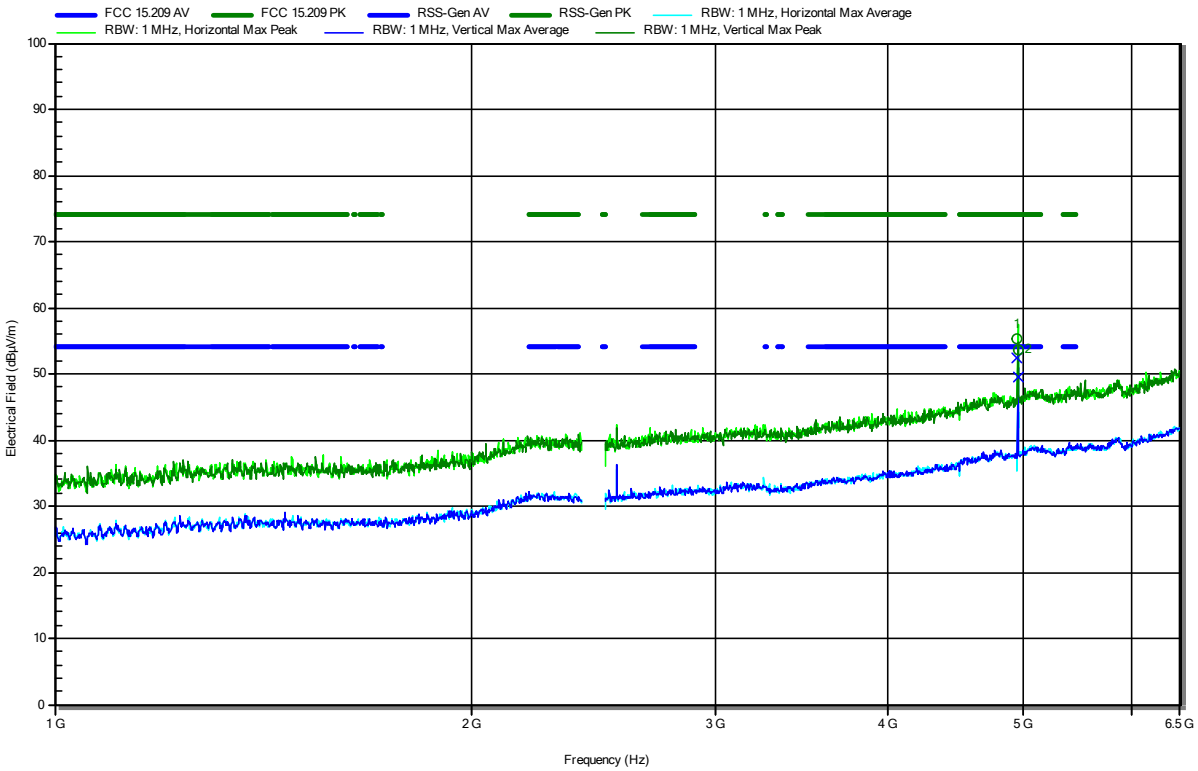
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.96 GHz	55.3 dBµV/m	74 dBµV/m	-18.7 dB	Pass	Horizontal
4.96 GHz	53.69 dBµV/m	74 dBµV/m	-20.31 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
4.96 GHz	52.38 dBµV/m	54 dBµV/m	-1.62 dB	Pass	Horizontal
4.96 GHz	49.61 dBµV/m	54 dBµV/m	-4.39 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck BBHA 9120D
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, PRBS9, 1 Mbit/s, EUT Horizontal
Test Date:	2022-04-06
Note:	

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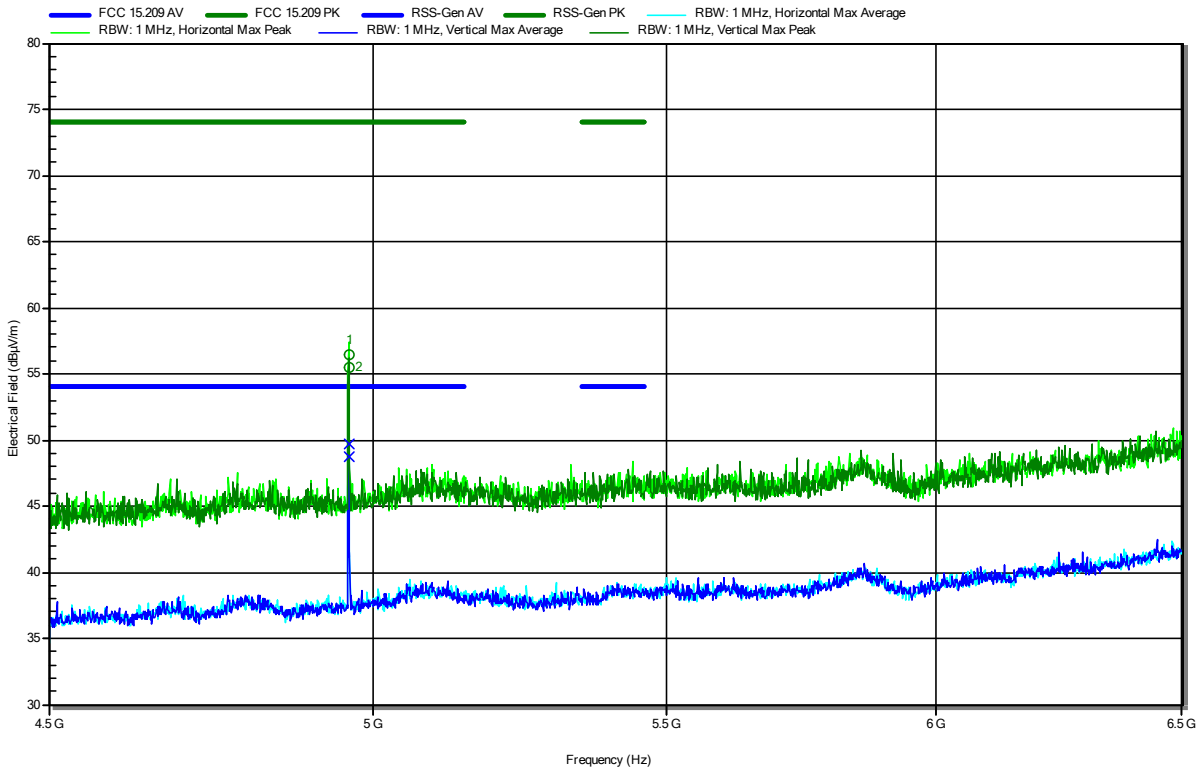
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.9598 GHz	56.45 dBµV/m	74 dBµV/m	-17.55 dB	Pass	Horizontal
4.9602 GHz	55.52 dBµV/m	74 dBµV/m	-18.48 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
4.9598 GHz	49.74 dBµV/m	54 dBµV/m	-4.26 dB	Pass	Horizontal
4.9602 GHz	48.71 dBµV/m	54 dBµV/m	-5.29 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck BBHA 9120D
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2402 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-06
Note:	

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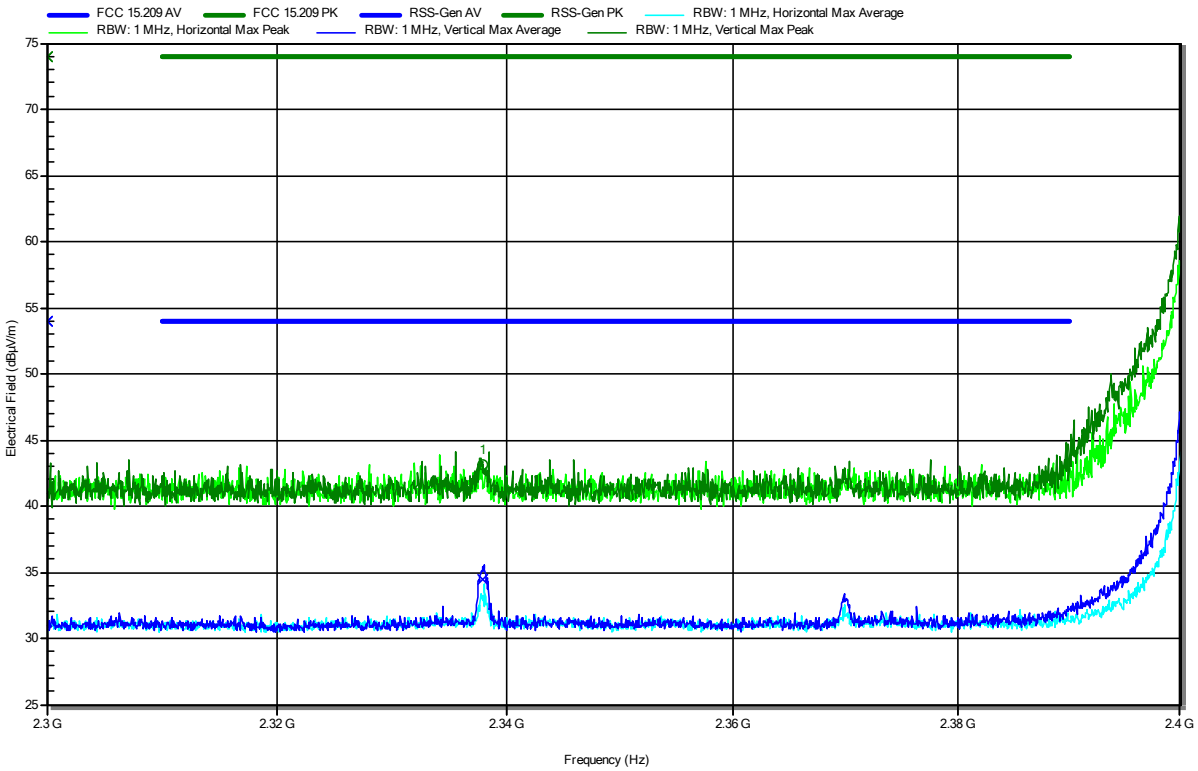
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.338 GHz	43.18 dBµV/m	74 dBµV/m	-30.82 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.338 GHz	34.47 dBµV/m	54 dBµV/m	-19.53 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck BBHA 9120D
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-06
Note:	

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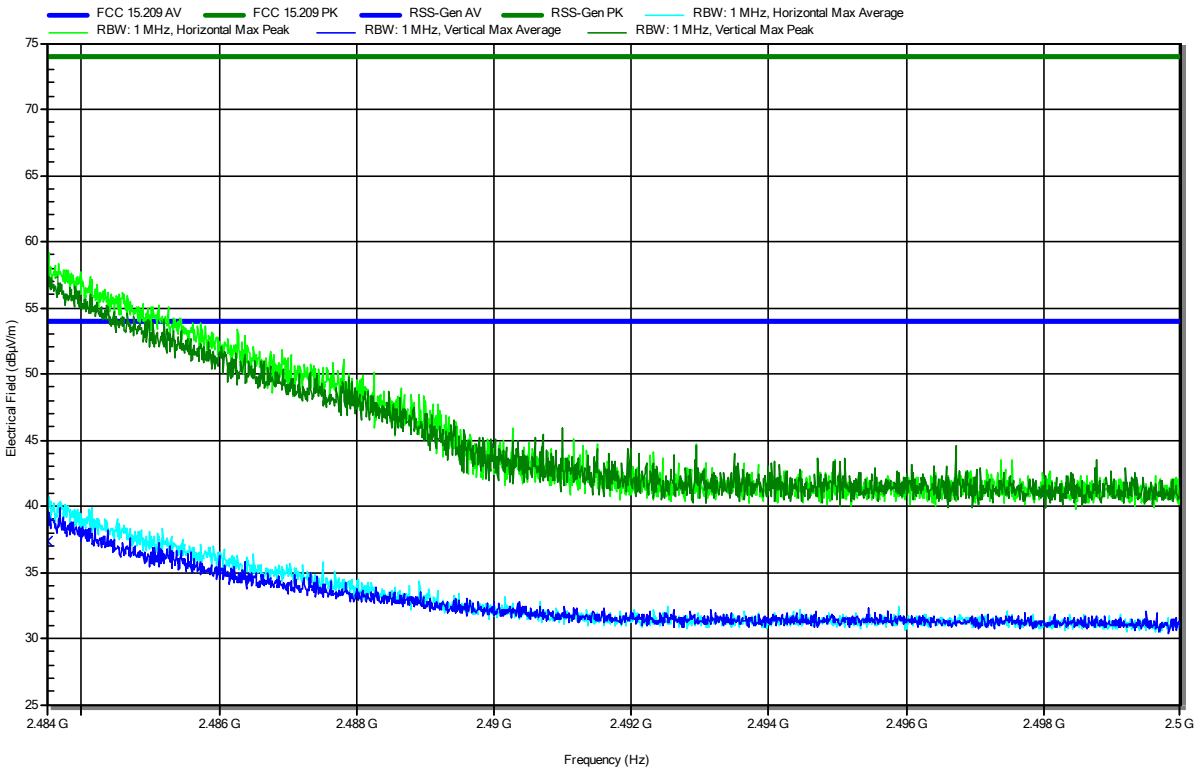
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.4835 GHz	56.98 dBµV/m	74 dBµV/m	-17.02 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.4835 GHz	37.37 dBµV/m	54 dBµV/m	-16.63 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2402 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-06
Note:	

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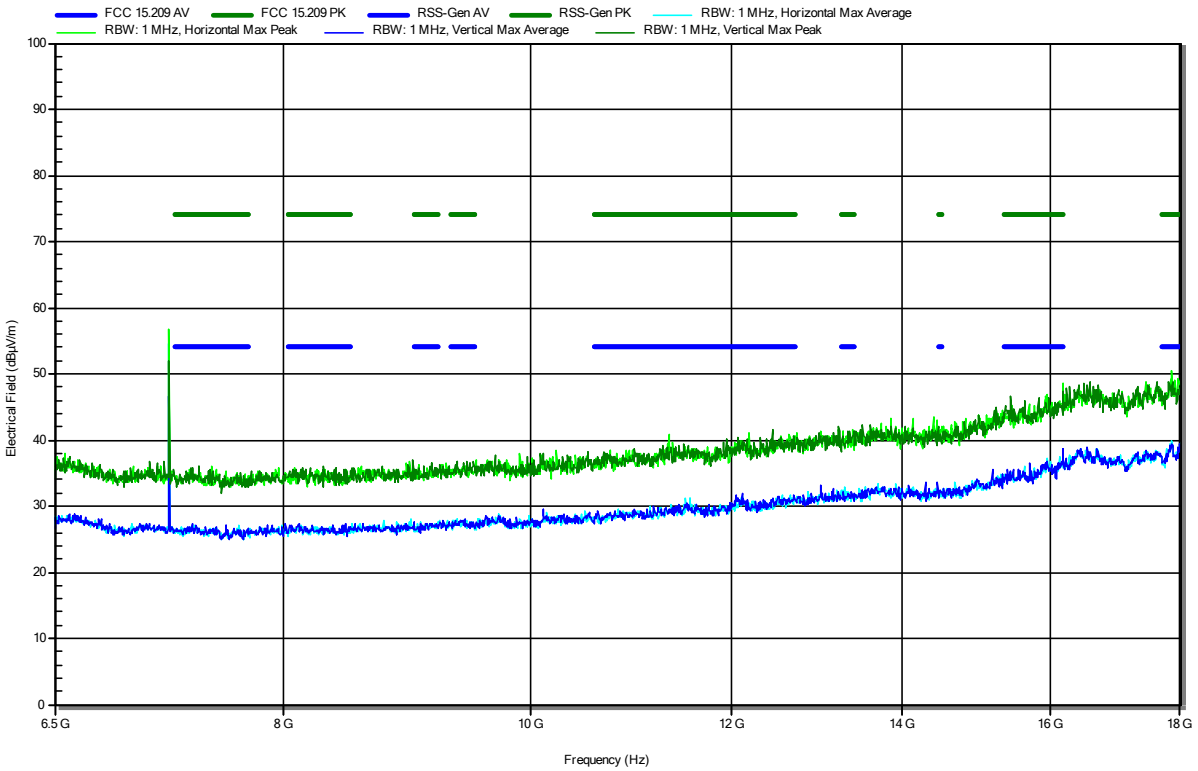
RadiMation



Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2440 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-06
Note:	

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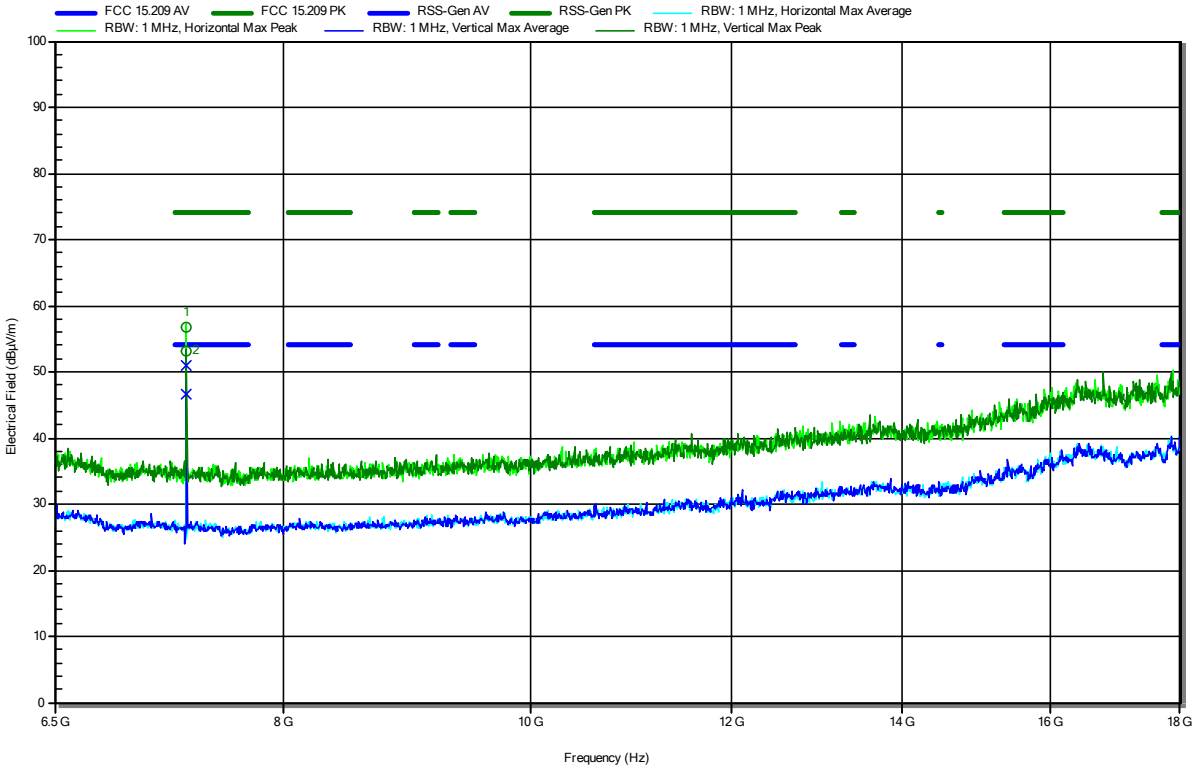
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
7.319 GHz	53.25 dBµV/m	74 dBµV/m	-20.75 dB	Pass	Vertical
7.319 GHz	56.77 dBµV/m	74 dBµV/m	-17.23 dB	Pass	Horizontal

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
7.319 GHz	46.65 dBµV/m	54 dBµV/m	-7.35 dB	Pass	Vertical
7.319 GHz	51.01 dBµV/m	54 dBµV/m	-2.99 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

Project Number:	G0M-2201-1259
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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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2440 MHz, PRBS9, 1 Mbit/s, EUT Horizontal2
Test Date:	2022-04-06
Note:	

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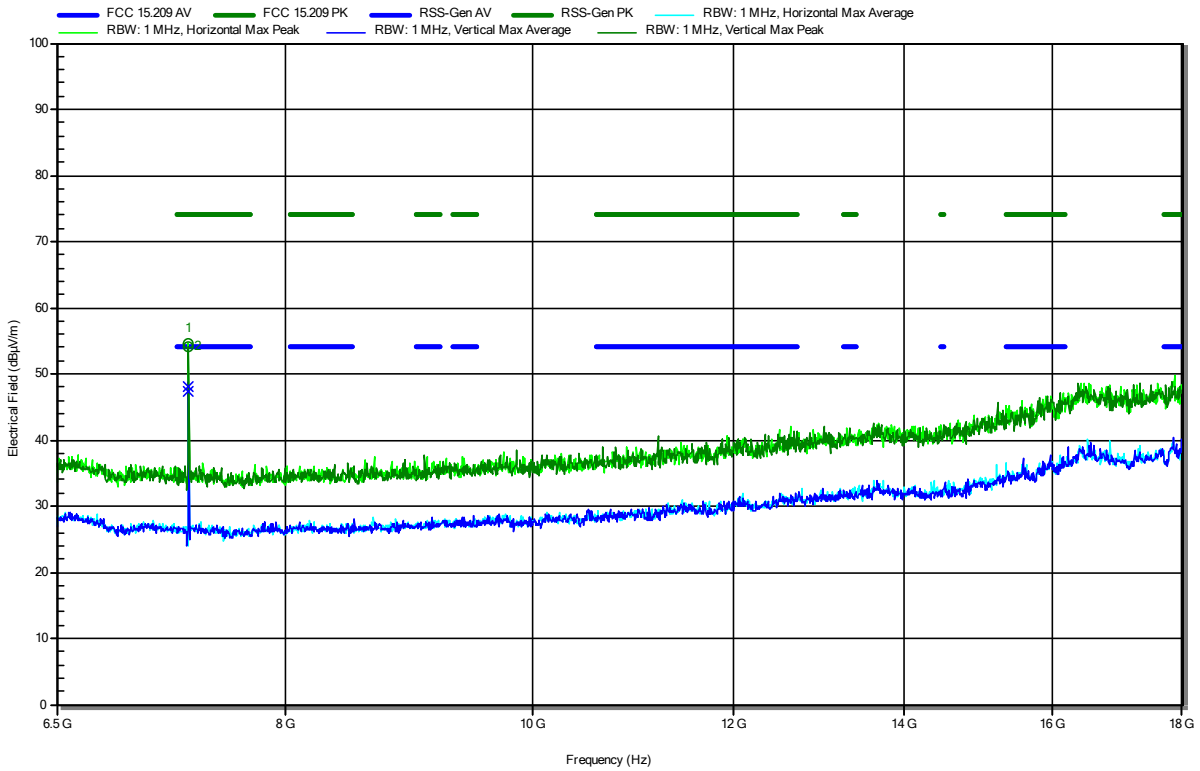
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
7.319 GHz	54.05 dBµV/m	74 dBµV/m	-19.95 dB	Pass	Vertical
7.319 GHz	54.55 dBµV/m	74 dBµV/m	-19.45 dB	Pass	Horizontal

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
7.319 GHz	47.33 dBµV/m	54 dBµV/m	-6.67 dB	Pass	Vertical
7.319 GHz	48.09 dBµV/m	54 dBµV/m	-5.91 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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Model:	PST
Test Sample ID:	38746
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-06
Note:	

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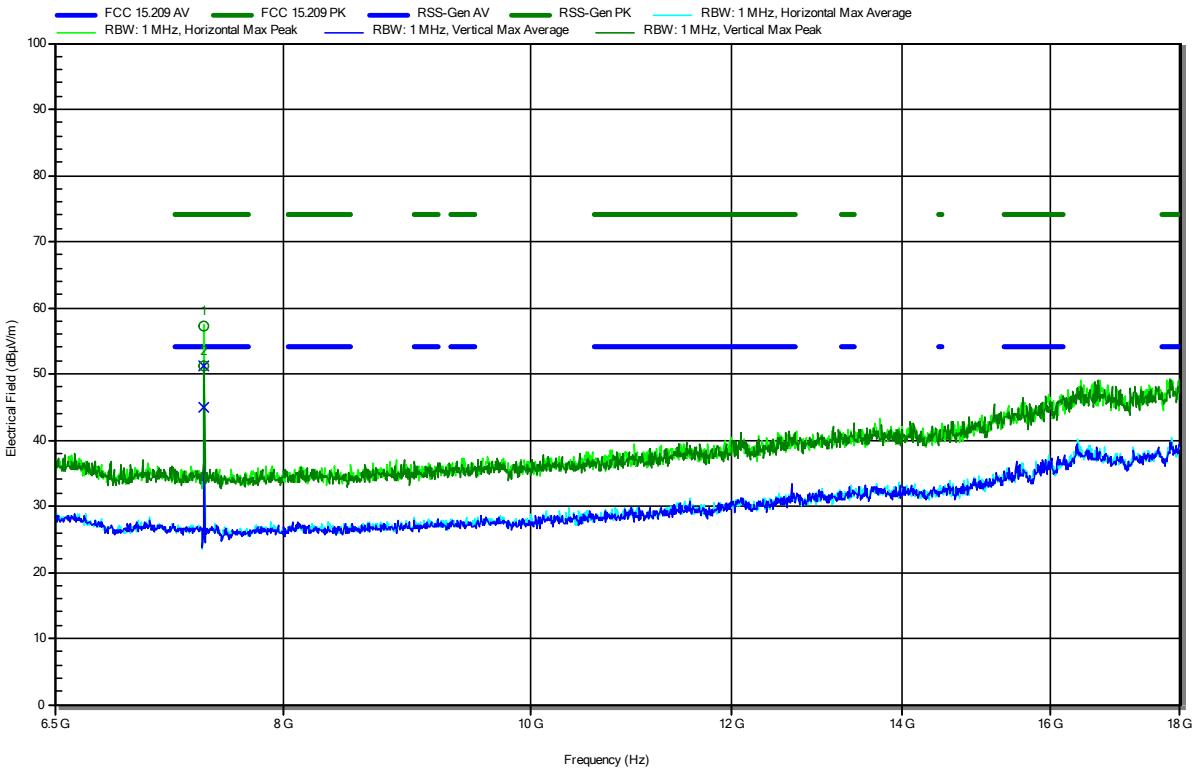
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
7.439 GHz	57.34 dBµV/m	74 dBµV/m	-16.66 dB	Pass	Horizontal
7.439 GHz	51.3 dBµV/m	74 dBµV/m	-22.7 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
7.439 GHz	51.3 dBµV/m	54 dBµV/m	-2.7 dB	Pass	Horizontal
7.439 GHz	44.95 dBµV/m	54 dBµV/m	-9.05 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, PRBS9, 1 Mbit/s, EUT Horizontal
Test Date:	2022-04-06
Note:	

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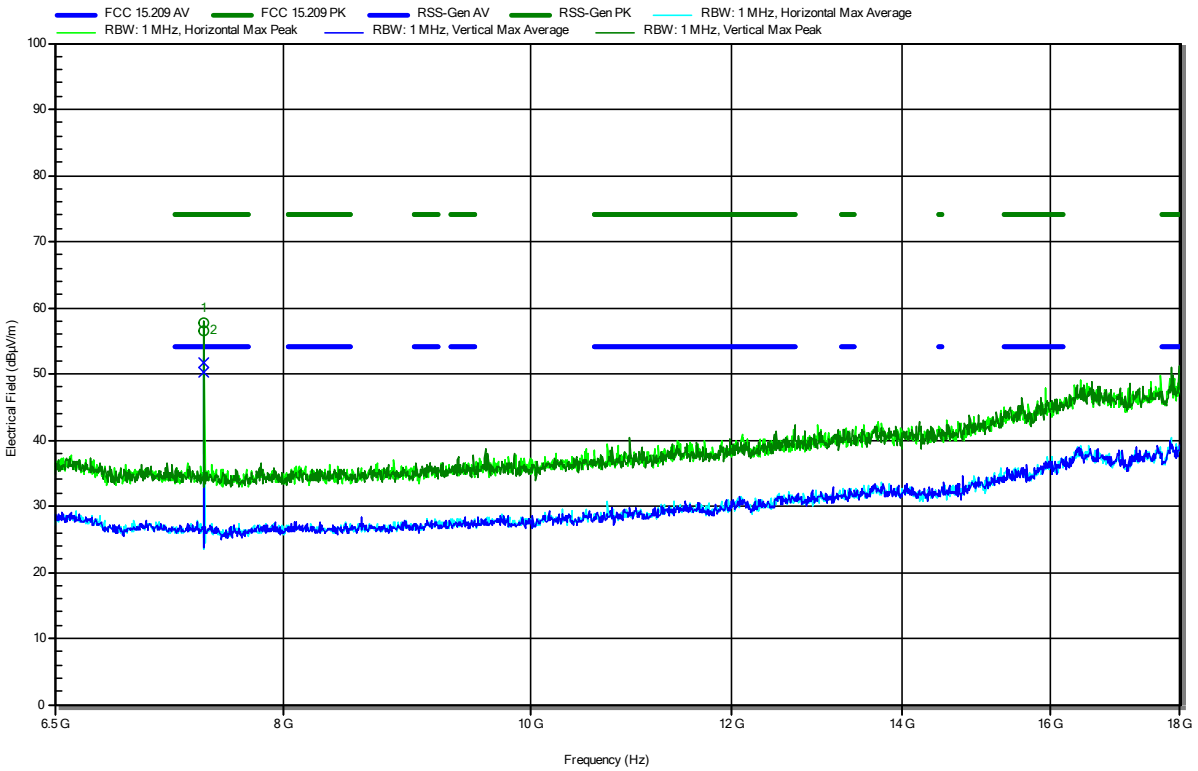
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
7.439 GHz	57.77 dBµV/m	74 dBµV/m	-16.23 dB	Pass	Vertical
7.439 GHz	56.54 dBµV/m	74 dBµV/m	-17.46 dB	Pass	Horizontal

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
7.439 GHz	51.78 dBµV/m	54 dBµV/m	-2.22 dB	Pass	Vertical
7.439 GHz	50.15 dBµV/m	54 dBµV/m	-3.85 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2402 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-07
Note:	

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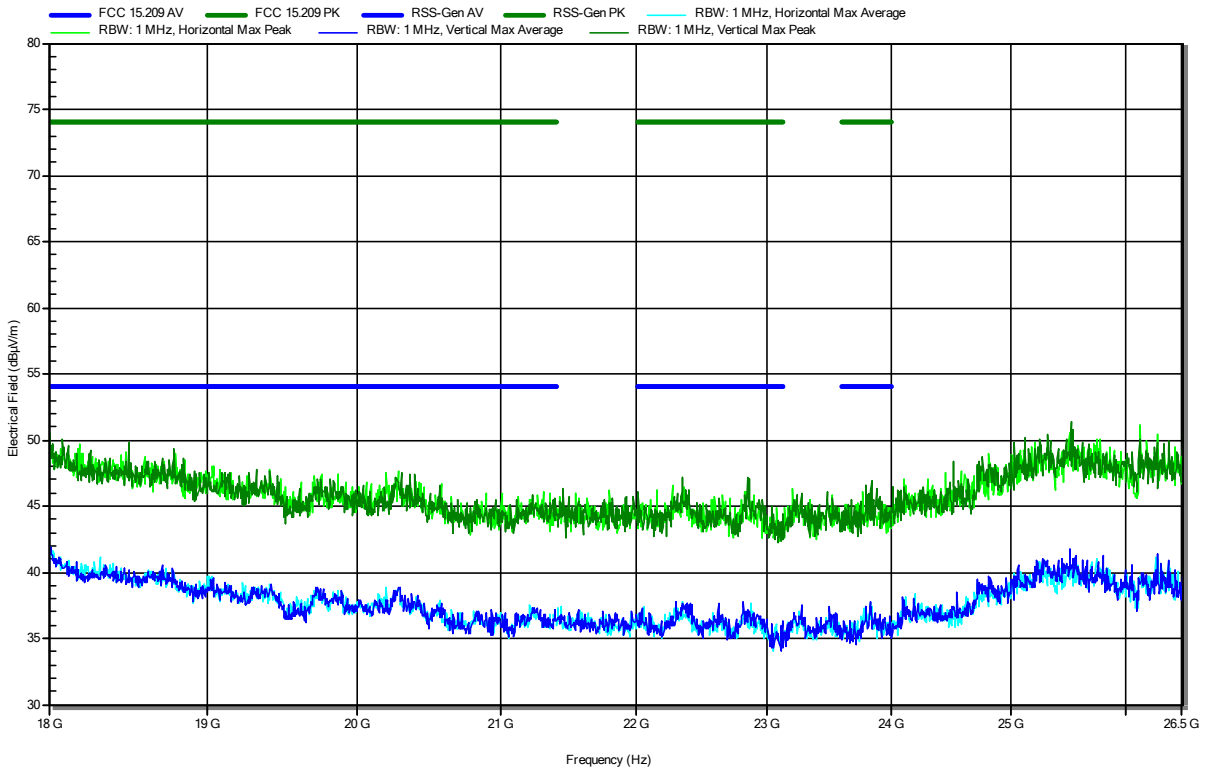
RadiMation



Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2402 MHz, PRBS9, 1 Mbit/s, EUT Horizontal2
Test Date:	2022-04-07
Note:	

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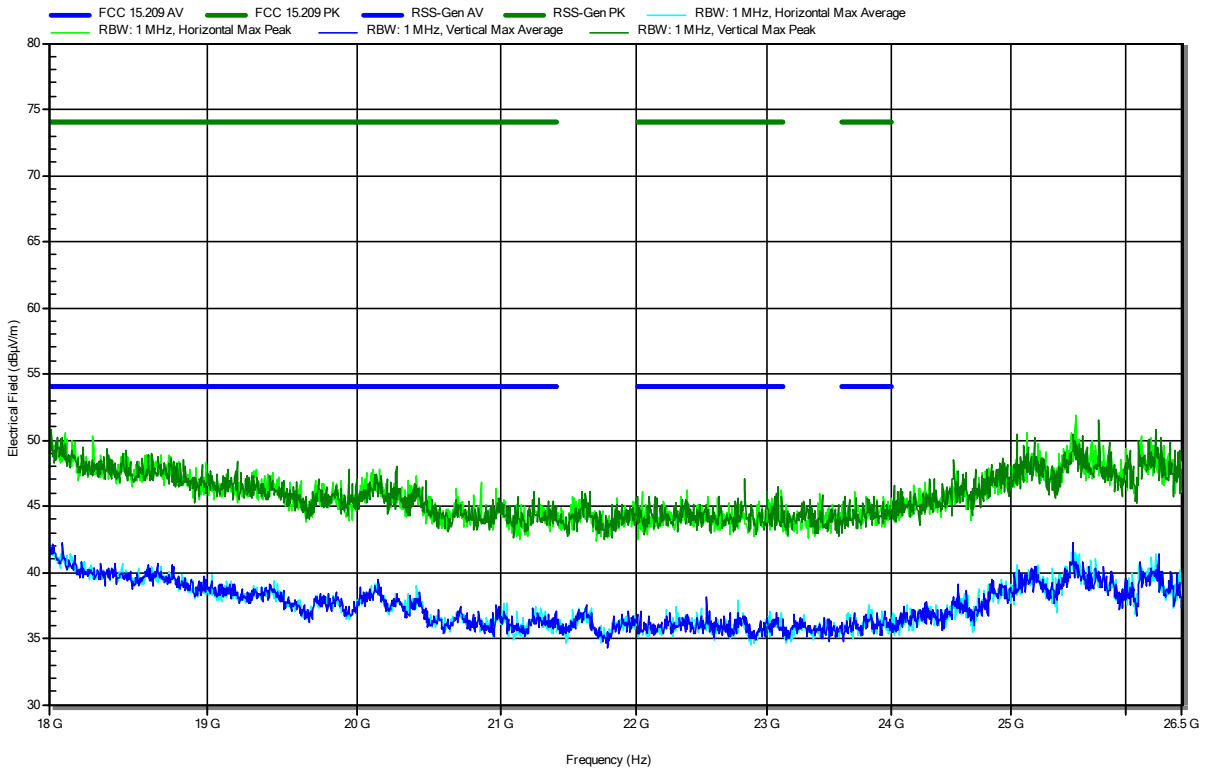
RadiMation



Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2440 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-07
Note:	

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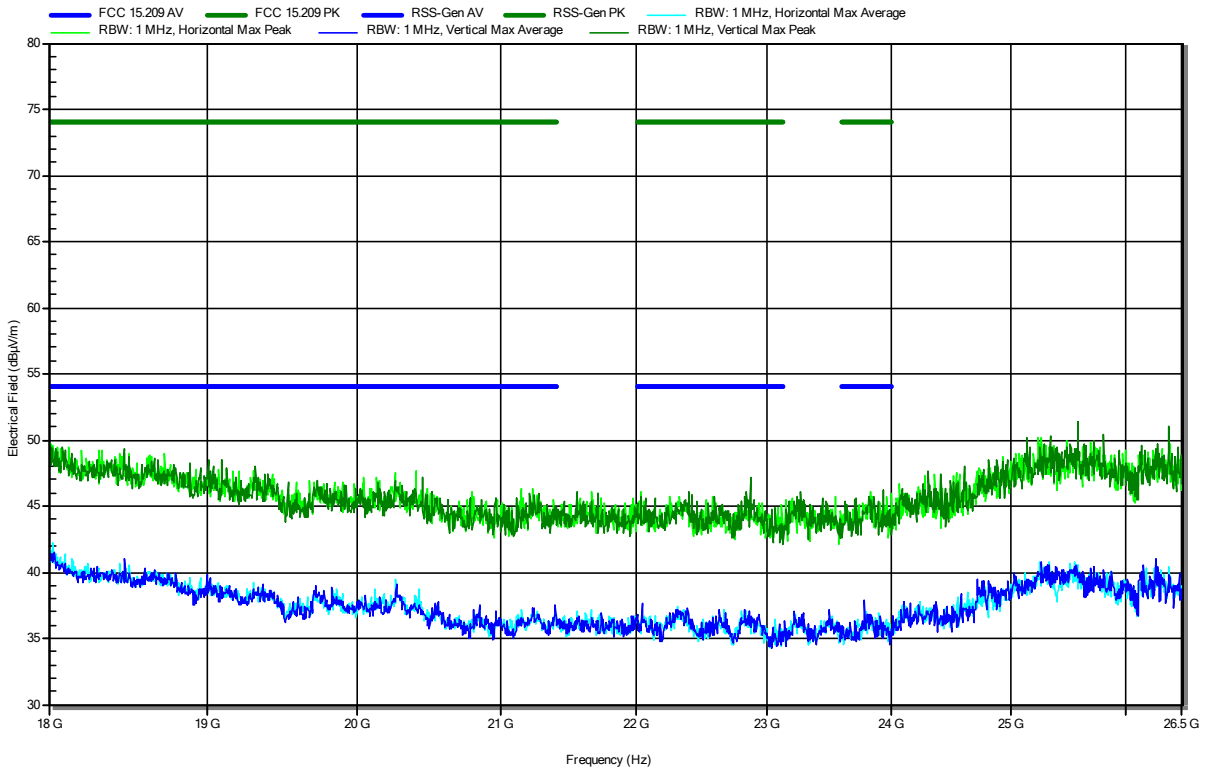
RadiMation



Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, PRBS9, 1 Mbit/s
Test Date:	2022-04-07
Note:	

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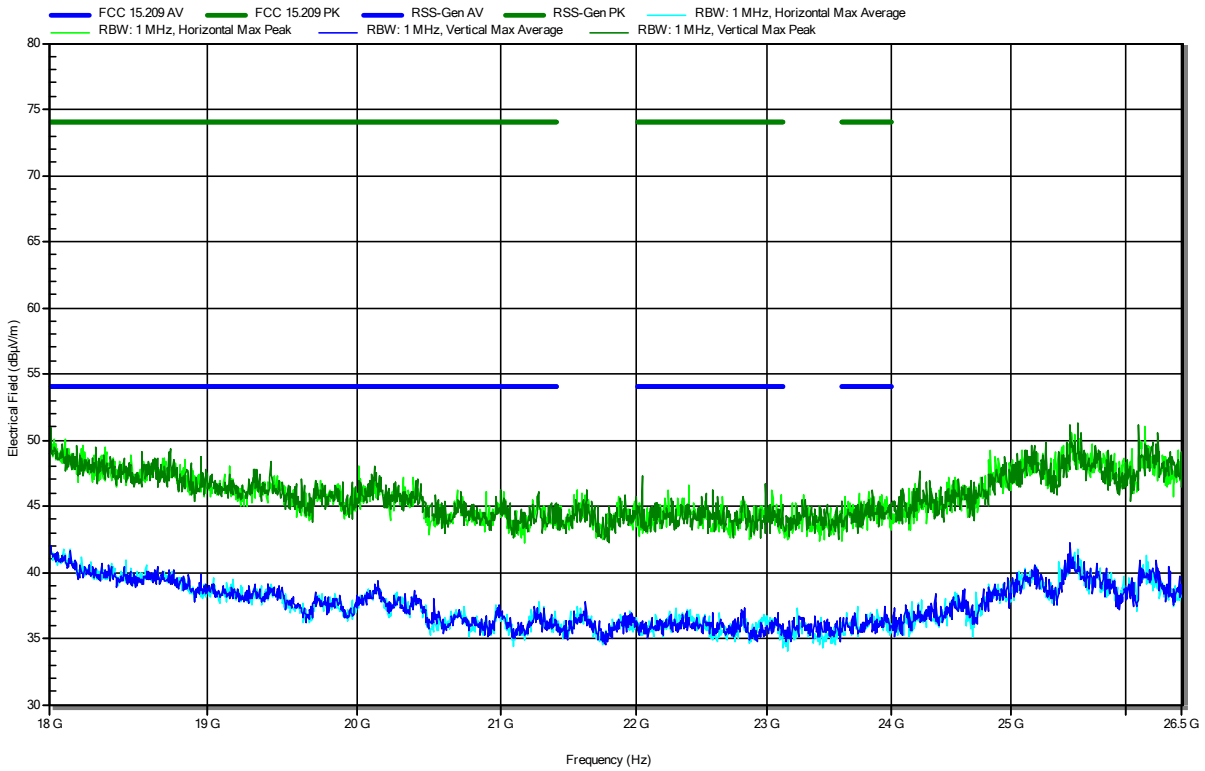
RadiMation



Radiated Spurious Emissions according to FCC 15.247, RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3 VDC Battery
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, PRBS9, 1 Mbit/s, EUT Horizontal
Test Date:	2022-04-07
Note:	

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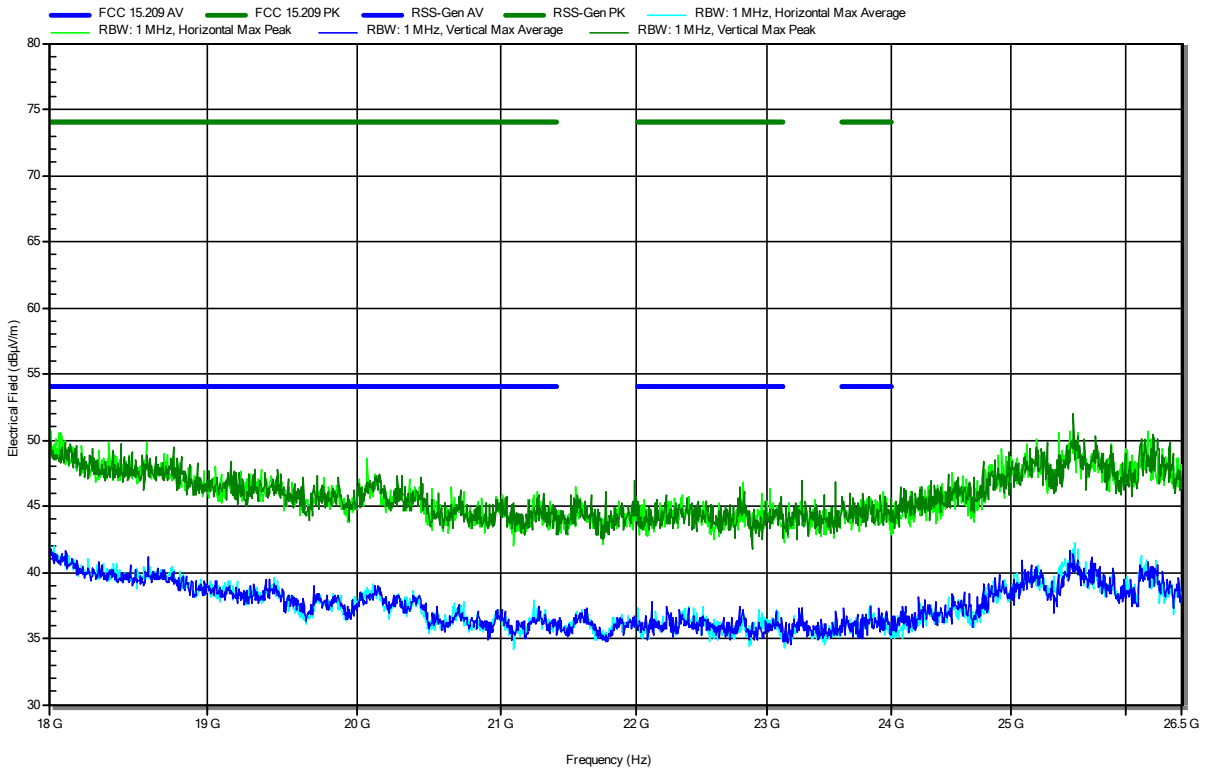
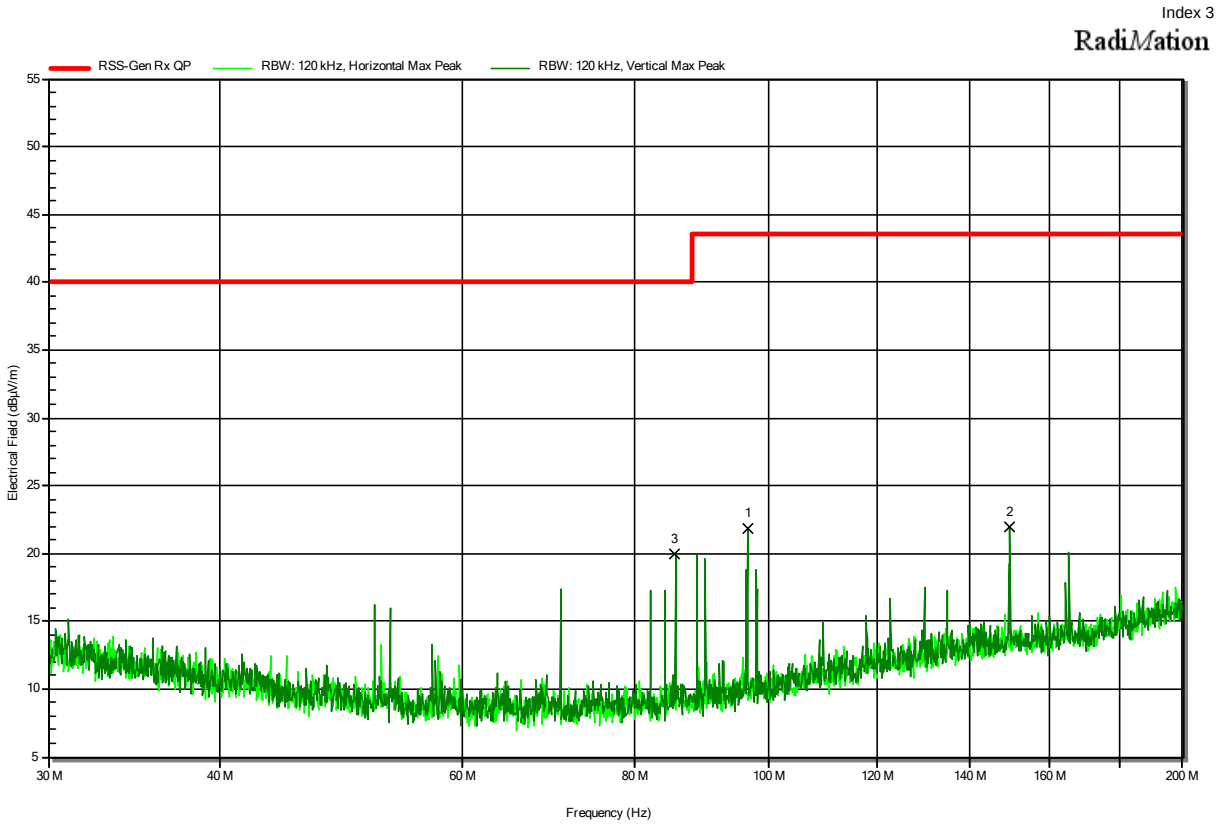
RadiMation



ANNEX B Receiver spurious emissions

Radiated Spurious Emissions according to RSS-247 Issue 2

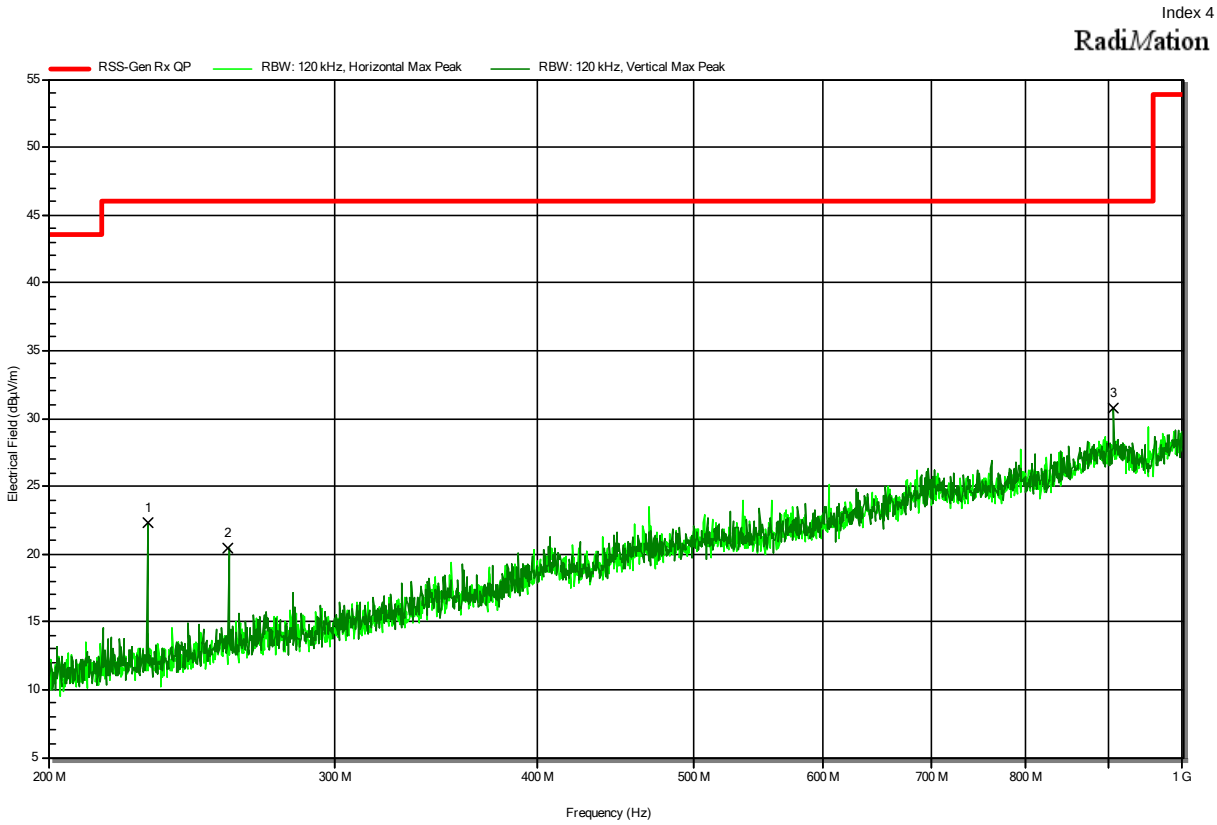
Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38746
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3 VDC Battery
Antenna:	Rohde & Schwarz HK 116
Measurement distance:	3 m
Mode:	Rx; BT-LE; 2440 MHz
Test Date:	2022-03-28
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
85.5857 MHz	20 dBµV/m	40 dBµV/m	-20.01 dB	Pass	Vertical
96.5975 MHz	21.8 dBµV/m	43.5 dBµV/m	-21.65 dB	Pass	Vertical
149.85 MHz	22 dBµV/m	43.5 dBµV/m	-21.49 dB	Pass	Vertical

Radiated Spurious Emissions according to RSS-247 Issue 2

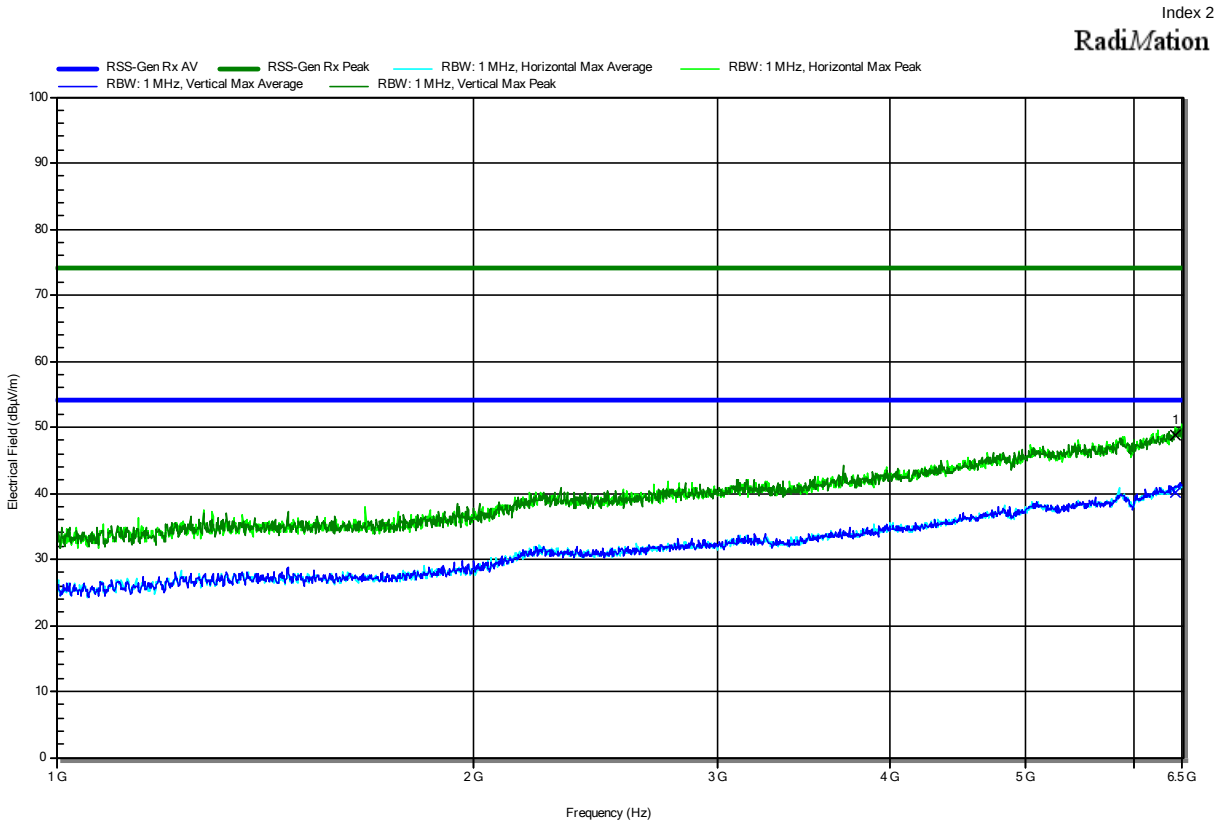
Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38746
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3 VDC Battery
Antenna:	Rohde & Schwarz HL 223
Measurement distance:	3 m
Mode:	Rx; BT-LE; 2440 MHz
Test Date:	2022-03-28
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
230.16 MHz	22.3 dBµV/m	46 dBµV/m	-23.69 dB	Pass	Vertical
258.2 MHz	20.5 dBµV/m	46 dBµV/m	-25.52 dB	Pass	Vertical
906.28 MHz	30.7 dBµV/m	46 dBµV/m	-15.27 dB	Pass	Vertical

Radiated Spurious Emissions according to RSS-247 Issue 2

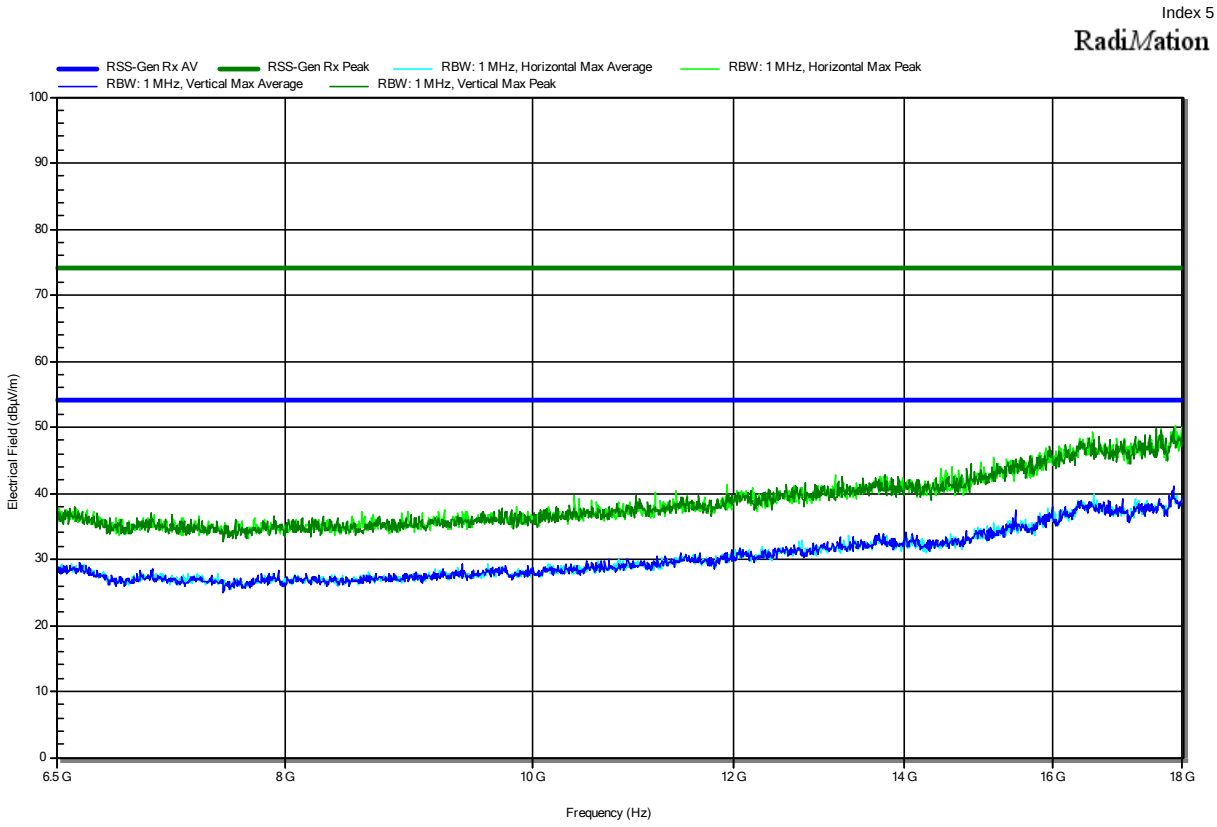
Project Number:	G0M-2201-1259
Applicant:	Valpas Enterprises Oy
Model Description:	IoT device for autonomous bed bug prevention
Model:	PST
Test Sample ID:	38746
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck BBHA 9120D
Measurement distance:	3 m
Mode:	Rx; BT-LE; 2440 MHz
Test Date:	2022-03-28
Note:	



Frequency 6.43 GHz	Peak 48.88 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -25.12 dB	Peak Status Pass	Polarization Vertical
Frequency 6.43 GHz	Average 40.08 dBµV/m	Average Limit 53.98 dBµV/m	Average Difference -13.9 dB	Average Status Pass	Polarization Vertical

Radiated Spurious Emissions according to RSS-247 Issue 2

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. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3 VDC Battery
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Rx; BT-LE; 2440 MHz
Test Date:	2022-04-05
Note:	



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