DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29 507 456

Test report No:
NIE: 66947REM.001

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)

(*) Identification of item tested	Washroom occupancy status indicator with Wirepas mesh network connectivity
(*) Trademark	BrightShield Smart Occupancy Light
(*) Model and /or type reference	LOP / Z-LIGHT-W1
Other identification of the product	FCC ID: 2AY4MZURNOL IC: 27057-ZURNOL HW version: LOP_01 SW version: 2021.02.04.1_lolpwp50
(*) Features	IR sensor for movement detection, LEDs for occupancy indication, Wirepas protocol stack using BT LE radio.
Manufacturer	WhiffAway Ltd Queensmead Rd, HP10 9XA High Wycombe, United Kingdom.
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José de la Plaza EMC Lab Director 33357065G JOSE DE LA PLAZA (C:A29507456) Firmado digitalmente por 33357065G JOSE DE LA PLAZA (C:A29507456) Fecha: 2021.04.26 13:52:51 +02'00'
Date of issue	2021-04-26
Report template No	FDT08_23 (*) “Data provided by the client”

Index

Acronyms

Acronym ID	Acronym Description
Code	EMC Test Code
Freq Rng	Frequency Range
Line	Conducted Emissions - Tested Line
OM	Operation Mode
S/	Sample
V	Verdict

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the measured conducted disturbance characteristics of EUT from 150 kHz to 30 MHz is I = ± 3,9 dB for quasi-peak measurements, I = ± 3,2 dB for peak measurements (k = 2).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is I = ± 4,9 dB for quasi-peak measurements, I = ± 4,6 dB for peak measurements (k= 2).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1000 MHz to 12.75 GHz is I = ± 2,6 dB for peaks and average measurements (k = 2).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested"

2. The sample consists of a Washroom occupancy status indicator with Wirepas mesh network connectivity.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial Nº	Date of Reception	Application
S/01	66947B_5.1	Box	---	--	2021-03-12	Element Under Test
S/01	66947B_6.1	Washroom occupancy status indicator with Wirepas mesh network connectivity	LOP / Z-LIGHT-W1	--	2021-03-12	Element Under Test
S/01	66947B_9.1	Control module	--	--	2021-03-12	Auxiliary Element

Notes referenced to samples during the project.

Test sample description

Test Sample description (compulsory information for EMC and RF testing services

Ports…… :	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)	
	.....	.....	[ ]	[ ]	[ ]	
Supplementary information to the ports…… :	.....					
Rated power supply .....:	Voltage and Frequency		Reference poles			
			L1	L2	L3	N	PE
	[X] AC: 230 V		[X]	[ ]	[ ]	[X]	[ ]
	[ ] AC:		[ ]	[ ]	[ ]	[ ]	[ ]
	[X] DC: 12 V (provided by IRM-90-12ST power source)						
	[ ] DC:						
Rated Power .....:	Peak 24mW (12V x 2mA), average 120uW (12V x 10uA)						
Clock frequencies.....:	BT IC clocks 32.768kHz, 32MHz						
Other parameters .....:	.....						
Software version .....:	2021.02.04.1_lolpwp50						
Hardware version .....:	LOP_01						
Dimensions in cm (W x H x D) ....:	Round, max diameter 12.3 cm, min diameter 7 cm, height 10.5 cm						
Mounting position .....:	[ ] Table top equipment						
	[X] Wall/Ceiling mounted equipment						
	[ ] Floor standing equipment						
	[ ] Hand-held equipment						
	[ ] Other:						
Modules/parts.....:	Module/parts of test item			Type		Manufacturer
	nRF52832			BT IC		Nordic Semicond.

	AMG8833	IR array sensor	Panasonic
	.....	.....	.....
	.....	.....	.....
Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	.....	.....	.....
Documents as provided by the applicant.....:	Description	File name	Issue date
	.....	.....	.....

(3) Only for Medical Equipment

Identification of the client

WhiffAway Ltd
Queensmead Rd, HP10 9XA High Wycombe, United Kingdom

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-03-25
Date (finish)	2021-03-25

Document history

Report number	Date	Description
66947REM.001	2021-04-23	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Victoria Olmedo Villalba.

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

List of equipment used during the test

Control Number	Description	Model	Manufacturer	Next Calibration
2942	EMI TEST RECEIVER 20Hz-40GHz	ESU40	ROHDE AND SCHWARZ	2021-09-17
4523	EMI TEST RECEIVER 20Hz-26.5GHz	ESU26	ROHDE AND SCHWARZ	2023-03-15
4612	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2021-06-14
5641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2021-07-31
6195	PRE-AMPLIFIER G>55dB 1-18GHz	AMF-7D-01001800-22-10P	NARDA	2021-05-19
7853	EMI RECEIVER 10Hz-30MHz	PMM 9010F	NARDA	2021-10-30
7859	THREE-PHASE ARTIFICIAL NETWORK 32A	PMM L3-32	NARDA	2021-11-20

Summary

Test Specification.	Requirement – Test case	Verdict	Remark
FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)	CE Continuous conducted emission	Pass	---
FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)	RE Radiated emission. Electromagnetic field measure	Pass	---

Supplementary information and remarks:
None

Appendix A: Test results

Appendix A context

Description of the operation modes

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

The operation modes used by the samples to which the present report refers, are shown in the following table:

Id	Description
01	EUT ON. BLE OFF. Led in blue color (special use). Power supply: 115Vac.
02	EUT ON. BLE ON without communication established. Led in blue color (special use). Power supply: 115Vac.
03	EUT ON. BLE ON with communication established. Led in blue color (special use). Power supply: 115Vac.

Test standards version applied

The product standards and test standards applied for each test cases are shown in the following table:

Product Test Standard	Test standard	Requirement – Test case
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) Secs. 15.109 & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	RE Radiated emission.
FCC CFR 47, Part 15, Subpart B and C (10-1-19 Edition) Secs. 15.107 and 15.207 & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	CE Continuous conducted emission

Test Cases Details

FCC CFR 47, Part 15, Subpart B and C (10-1-19 Edition)
Secs. 15.107 and 15.207
& ICES-003 Issue 7 (October 2020).
ANSI C63.4 (2014)
CE Continuous conducted emission

Limits of interference Class B

The applied limit for continuous conducted emissions in power leads, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B and C (10-1-19 Edition), Secs. 15.107 and 15.207 & ICES-003 Issue 7 (October 2020), in the frequency range 0,15 to 30 MHz, for Class B equipment was:

Frequency range	Limit (dBµV)	
(MHz)	Quasi-Peak	Average
0,15 to 0,5	66 - 56	56 - 46
0,5 to 5	56	46
5 to 30	60	50

Results

S/	OM	Code	Freq Rng (MHz)	Line	Comments	V
01	02	CE0102L1	[0.15, 30]	L1	---	P
01	02	CE01020N	[0.15, 30]	N	---	P
01	03	CE0103L1	[0.15, 30]	L1	---	P
01	03	CE01030N	[0.15, 30]	N	---	P

Verdict

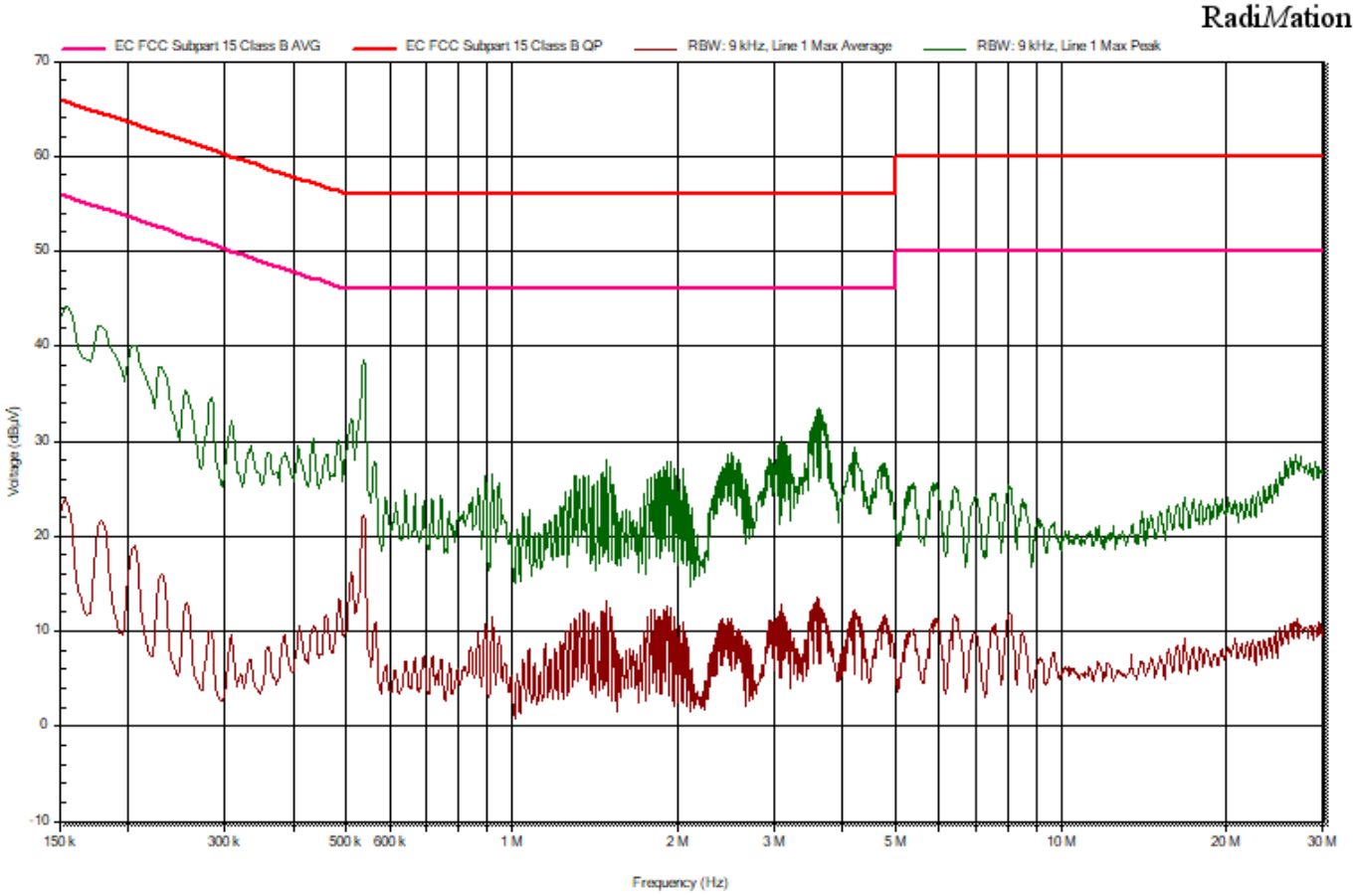
Pass

Attachments

EMC Test Code = CE0102L1, Frequency Range MHz = [0.15, 30], Conducted Emissions - Tested Line = L1

Sample ID: S/01

Operation Mode: 02. EUT ON. BLE ON without communication established. Led in blue color (special use). Power supply: 115Vac.



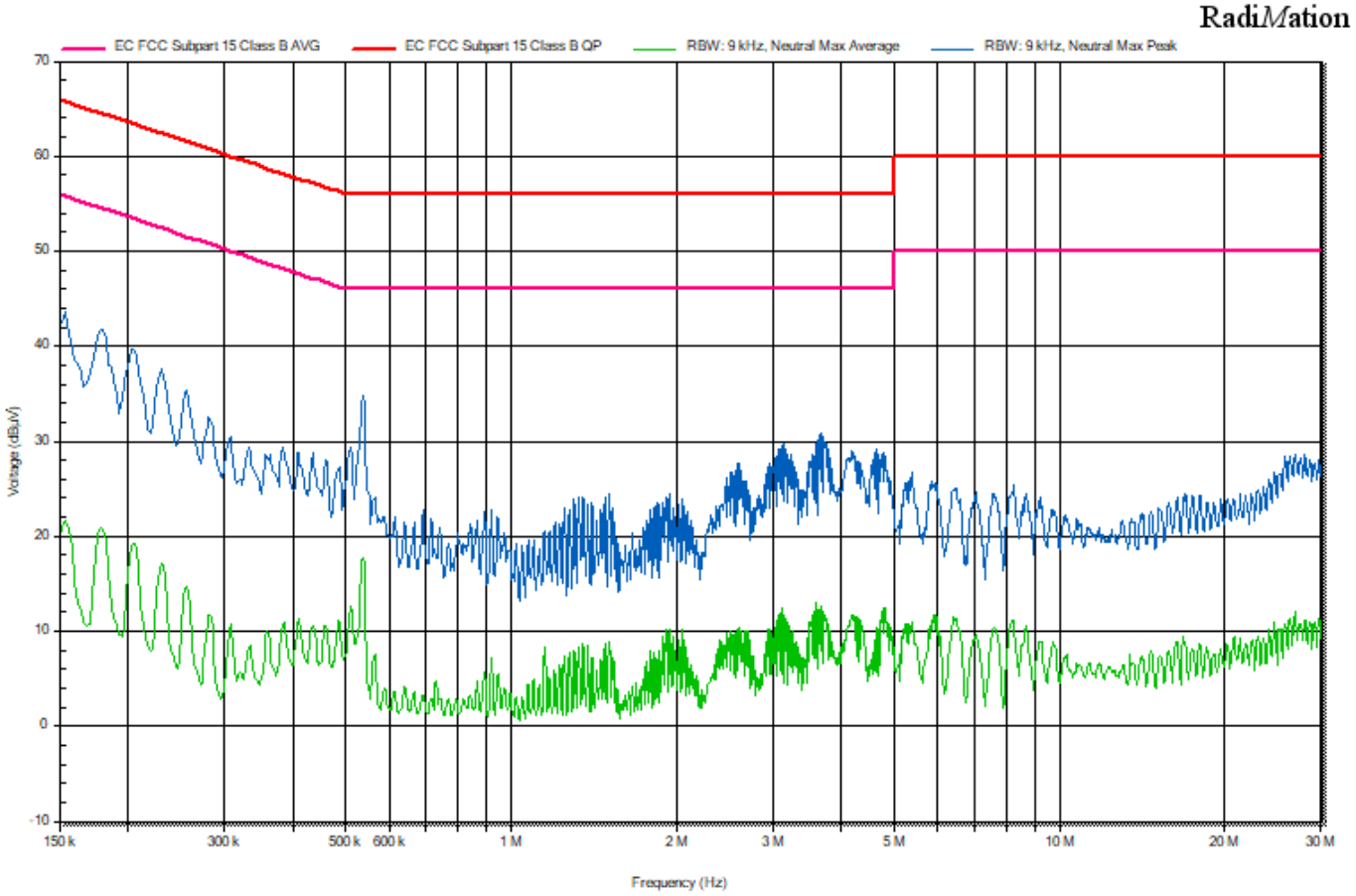
Documents:

Frequency(MHz)	Average(dBµV)	QuasiPeak(dBµV)	Line
0,152 MHz	23,1 dBµV	37,5 dBµV	L1
0,179 MHz	21,3 dBµV	36,1 dBµV	L1
0,205 MHz	18,6 dBµV	33,9 dBµV	L1
0,232 MHz	15,4 dBµV	31,1 dBµV	L1
0,256 MHz	12,6 dBµV	28,8 dBµV	L1
0,536 MHz	21,7 dBµV	34,2 dBµV	L1
3,09 MHz	12,1 dBµV	25 dBµV	L1
3,601 MHz	13 dBµV	28,5 dBµV	L1
3,628 MHz	12,8 dBµV	28,6 dBµV	L1
4,188 MHz	12,1 dBµV	23,8 dBµV	L1

EMC Test Code = CE0102N, Frequency Range MHz = [0.15, 30], Conducted Emissions - Tested Line = N

Sample ID: S/01

Operation Mode: 02. EUT ON. BLE ON without communication established. Led in blue color (special use). Power supply: 115Vac.



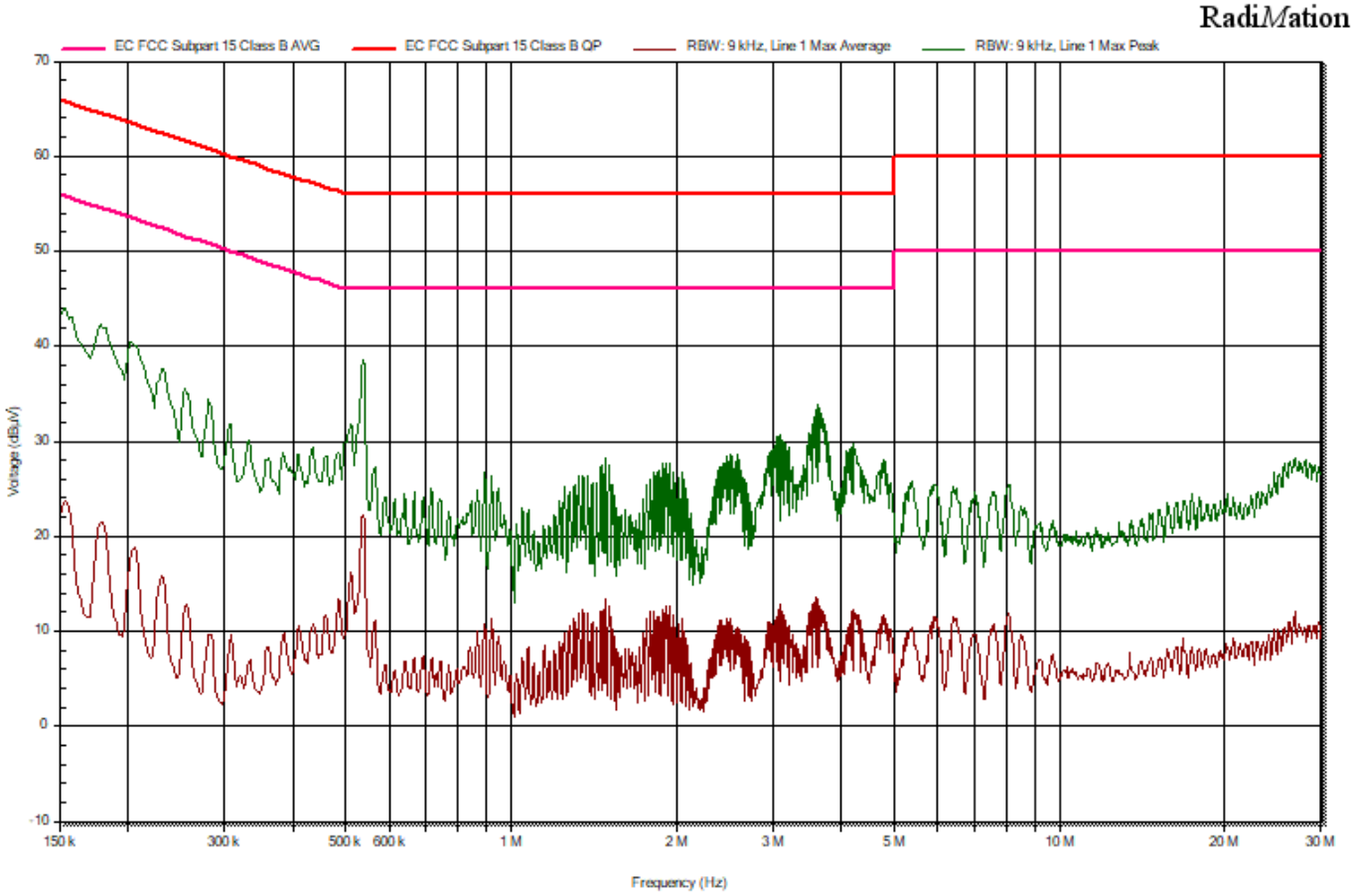
Documents:

Frequency(MHz)	Average(dBµV)	QuasiPeak(dBµV)	Line
0,15 MHz	19,5 dBµV	35,3 dBµV	N
0,179 MHz	20,4 dBµV	36 dBµV	N
0,205 MHz	18,7 dBµV	34,1 dBµV	N
0,23 MHz	16,6 dBµV	31,7 dBµV	N
0,256 MHz	14,4 dBµV	29,4 dBµV	N
0,536 MHz	17,2 dBµV	30,5 dBµV	N
3,113 MHz	11,6 dBµV	23 dBµV	N
3,599 MHz	12,5 dBµV	23,9 dBµV	N
3,675 MHz	12,1 dBµV	24,9 dBµV	N
4,646 MHz	9,5 dBµV	21,7 dBµV	N

EMC Test Code = CE0103L1, Frequency Range MHz = [0.15, 30], Conducted Emissions - Tested Line = L1

Sample ID: S/01

Operation Mode: 03. EUT ON. BLE ON with communication established. Led in blue color (special use). Power supply: 115Vac.



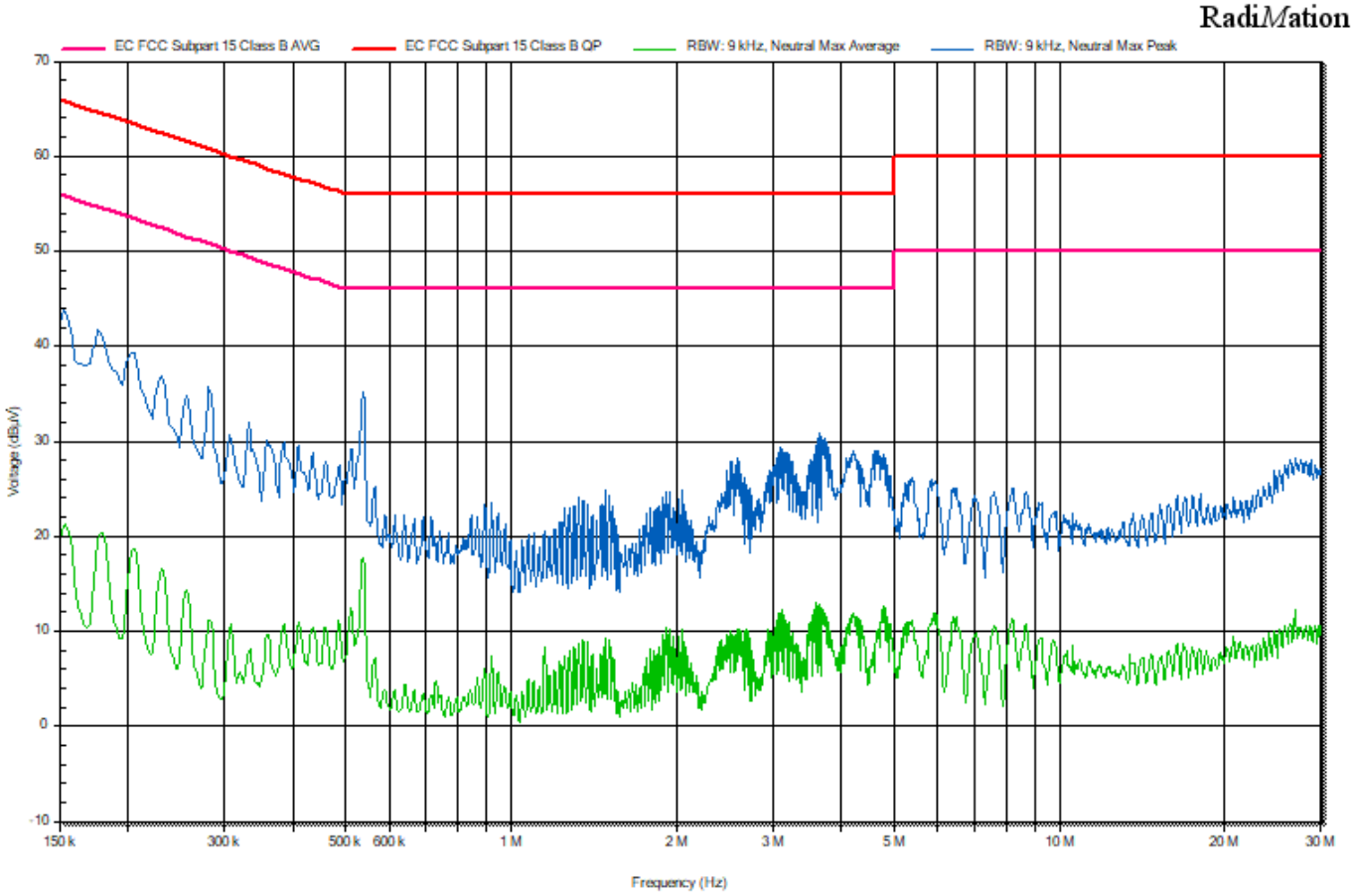
Documents:

Frequency(MHz)	Average(dBµV)	QuasiPeak(dBµV)	Line
0,152 MHz	22,9 dBµV	37,4 dBµV	L1
0,179 MHz	21,1 dBµV	35,9 dBµV	L1
0,205 MHz	18,3 dBµV	33,8 dBµV	L1
0,23 MHz	15,4 dBµV	31,3 dBµV	L1
0,256 MHz	12,4 dBµV	28,6 dBµV	L1
0,536 MHz	21,8 dBµV	34,2 dBµV	L1
3,09 MHz	12,2 dBµV	25,1 dBµV	L1
3,601 MHz	13,1 dBµV	28,5 dBµV	L1
3,626 MHz	12,8 dBµV	28,7 dBµV	L1
4,188 MHz	11,8 dBµV	23,8 dBµV	L1

EMC Test Code = CE0103N, Frequency Range MHz = [0.15, 30], Conducted Emissions - Tested Line = N

Sample ID: S/01

Operation Mode: 03. EUT ON. BLE ON with communication established. Led in blue color (special use). Power supply: 115Vac.



Documents:

Frequency(MHz)	Average(dBµV)	QuasiPeak(dBµV)	Line
0,15 MHz	19,4 dBµV	34,8 dBµV	N
0,179 MHz	20,2 dBµV	35,4 dBµV	N
0,205 MHz	18,3 dBµV	33,5 dBµV	N
0,23 MHz	16,2 dBµV	31,1 dBµV	N
0,256 MHz	13,9 dBµV	28,8 dBµV	N
0,307 MHz	10,2 dBµV	24,3 dBµV	N
0,536 MHz	17,1 dBµV	30,5 dBµV	N
3,115 MHz	11,7 dBµV	23,6 dBµV	N
3,601 MHz	12,6 dBµV	24 dBµV	N
3,653 MHz	12,4 dBµV	24,9 dBµV	N

FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) Secs. 15.109 & ICES-003 Issue 7 (October 2020). ANSI C63.4 (2014) RE Radiated emission

Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.109 & ICES-003 Issue 7 (October 2020)

Table 2: Radiated emission limits

Frequency range (MHz)	FCC Part 15B Class B (3 m) Quasi-Peak (dBµV/m)	ICES-003 Issue 7 Limit for 3 m Quasi-Peak (dBµV/m)	FCC Part 15B & ICES-003 Issue 7	
			PK Limit for 3m (dBµV/m)	AVG Limit for 3m (dBµV/m)
30-88	40.0	40.0	---	---
88-216	43.5	43.5	---	---
216-230	46.0	46.0	---	---
230-960	46.0	47.0	---	---
960-1000	54.0	54.0	---	---
1 GHz – F_M	---	---	74	54

Above 1 GHz, except for outdoor units of home satellite receiving systems, the ITE or digital apparatus shall comply with the limits specified in table 2 up to the frequency F_M, which shall be determined as per table 3.

Table 3: Required highest measurement frequency for radiated emission

Highest internal Frequency (F_x)	Highest measurement Frequency (F_M)
$F_X \leq 108$ MHz	1 GHz
108 MHz < $F_X \leq 500$ MHz	2 GHz
500 MHz < $F_X \leq 1$ GHz	5 GHz
$F_X > 1$ GHz	5 x F_X up to a maximum of 40 GHz
*F_x is the highest fundamental frequency generated and/or used in the ITE or digital apparatus under test.	

Results

S/	OM	Code	Freq Rng (MHz)	V
01	01	RE0101HR	[1000, 12750]	P
01	01	RE0101LR	[30, 1000]	P

Verdict

Pass

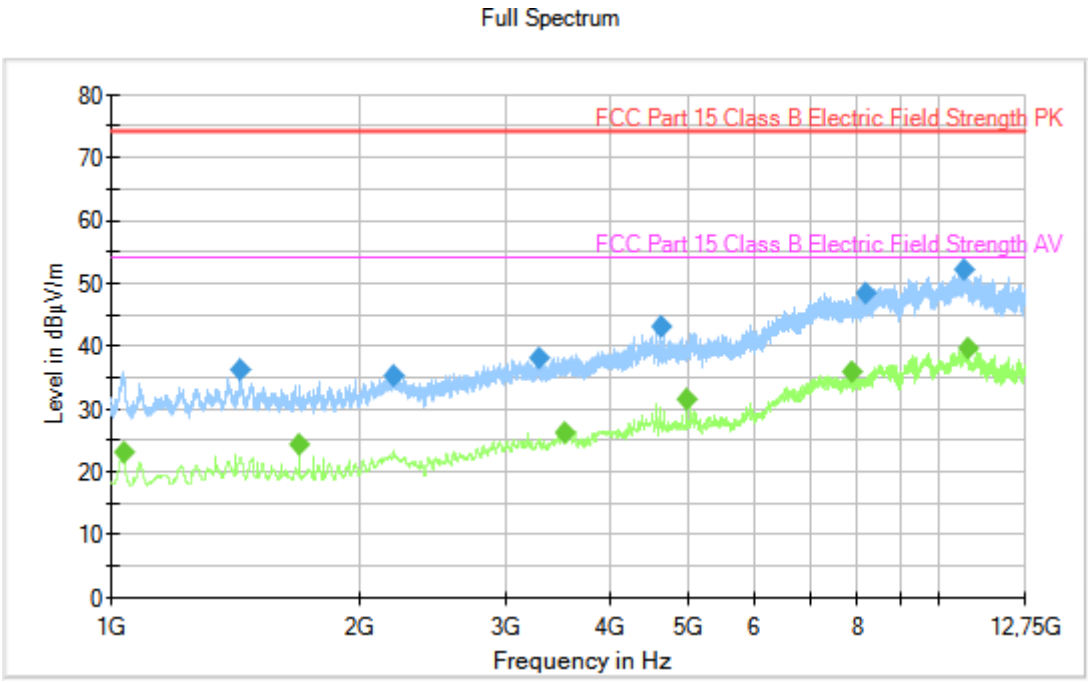
Attachments

EMC Test Code = RE0101HR, Frequency Range MHz = [1000, 12750]

Sample ID: S/01

Operation Mode: 01. EUT ON. BLE OFF. Led in blue color (special use). Power supply: 115Vac..

Images:



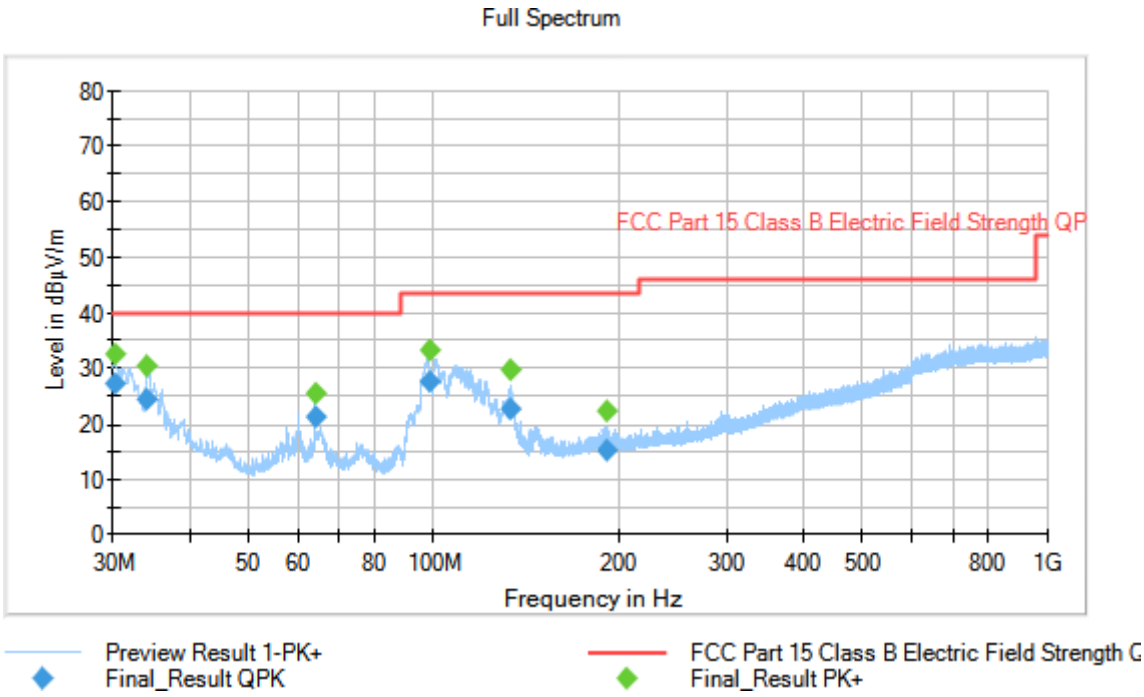
Documents:

Frequency(MHz)	MaxPeak(dBµV/m)	Average(dBµV/m)	Limit(dBµV/m)	Margin(dB)
1032.000000	---	22.97	53.97	31.00
1431.200000	36.10	---	73.97	37.87
1687.600000	---	24.22	53.97	29.75
2195.200000	35.25	---	73.97	38.72
3290.800000	38.28	---	73.97	35.69
3524.800000	---	26.27	53.97	27.70
4625.200000	43.00	---	73.97	30.97
4958.000000	---	31.52	53.97	22.45
7852.400000	---	36.07	53.97	17.90
8154.000000	48.43	---	73.97	25.54
10753.600000	52.08	---	73.97	21.89
10846.000000	---	39.61	53.97	14.36

EMC Test Code = RE0101LR, Frequency Range MHz = [30, 1000]

Sample ID: S/01

Operation Mode: 01. EUT ON. BLE OFF. Led in blue color (special use). Power supply: 115Vac.



Documents:

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin(dB)	Height (cm)	Pol	Azimuth (deg)
30.159080	---	32.54	---	---	115.0	V	146.0
30.159080	27.26	---	40.00	12.74	115.0	V	146.0
34.089000	---	30.55	---	---	118.0	V	-146.0
34.089000	24.45	---	40.00	15.55	118.0	V	-146.0
64.015000	---	25.63	---	---	143.0	V	157.0
64.015000	21.34	---	40.00	18.66	143.0	V	157.0
98.264000	---	33.22	---	---	115.0	V	-110.0
98.264000	27.76	---	43.52	15.76	115.0	V	-110.0
133.225000	22.75	---	43.52	20.77	100.0	V	-170.0
133.225000	---	29.91	---	---	100.0	V	-170.0
190.786000	15.39	---	43.52	28.13	190.0	H	-84.0
190.786000	---	22.38	---	---	190.0	H	-84.0