

TEST REPORT

Application No.: HKEM2211001010PF
Applicant: ECOLAB Inc.
Address of Applicant: FCC: 1 Ecolab Place, St Paul, Minnesota, United States, 55102
 IC: Ecolab Schuman Center-F6, 655 Lone Oak Drive, Eagan, MN United States, 55121

Equipment Under Test (EUT):

EUT Name: Bed Beacon
Model No.: 92053072
Trademark: EcoLab
FCC ID: Z9O-92053072
IC: 10060A-92053072
HVIN: 92053072
Standard(s) : 47 CFR Part 15, Subpart C 15.209
 RSS-210 Issue 10 December 2019+A1 April 2020
Date of Receipt: 2022-11-03
Date of Test: 2022-11-07 to 2022-11-10
Date of Issue: 2023-03-15

Test Result:	The submitted sample was found to comply with the test requirement
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Law Man Kit
EMC Manager

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Revision Record			
Revision No.	Date	Report superseded	Remark

Authorized for issue by:			
			
		<hr/> Panny Leung /Project Engineer	Date: 2022-11-15
			
		<hr/> Law Man Kit /Reviewer	Date: 2023-03-15

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.209	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Disturbance at AC Power Line(150kHz-30MHz)	47 CFR Part 15, Subpart C 15.207	ANSI C63.10: 2013 Section 6.2	47 CFR FCC Part 15, Subpart C 15.207	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.209	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.209	Pass
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C 15.209	ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C 15.209	Pass
Radiated Emissions (9kHz-30MHz)	47 CFR Part 15, Subpart C 15.209	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.209	Pass
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart C 15.209	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.209	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 (2013) Section 6.2	RSS-Gen Section 8.8	Pass
99% Bandwidth	RSS-Gen Issue 5: Amdt 2019	RSS-Gen Section 6.7	RSS-Gen Section 6.7	Pass
Field Strength of the Fundamental Signal	RSS-210 Issue 10 December 2019+A1 April 2020	ANSI C63.10 (2013) Section 6.5	RSS-210 Section 7.3	Pass
Radiated Emissions (9kHz-30MHz)	RSS-210 Issue 10 December 2019+A1 April 2020	ANSI C63.10 (2013) Section 6.5&6.6	RSS-210 Section 7.3	Pass
Radiated Emissions (30MHz-1GHz)	RSS-210 Issue 10 December 2019+A1 April 2020	ANSI C63.10 (2013) Section 6.5&6.6	RSS-210 Section 7.3	Pass

Note:

The product scope is extended with a new AC adaptor and two models of external Mat Antenna (125kHz antenna).

- There is no AC Adaptor in the previous scope of product.
- There is only one Internal 125kHz antenna in the previous scope of product. The extended scope



covers two additional External 125kHz antenna models (53003805 and 53003804) which would be used with the Bed Beacon product. The internal and external 125kHz antenna models are switchable by manual buttons on the Bed Beacon product. Only one 125kHz antenna can be turned on at a time.

There is no change on the main unit as in the previous version, hence, only 125kHz transmitter was tested and related new antenna specification were submitted in this application.

Abbreviation:

- Tx: In this whole report Tx (or tx) means Transmitter.
- Rx: In this whole report Rx (or rx) means Receiver.
- RF: In this whole report RF means Radiated Frequency.
- CH: In this whole report CH means channel.
- Volt: In this whole report Volt means Voltage.
- Temp: In this whole report Temp means Temperature.
- Humid: In this whole report Humid means humidity.
- Press: In this whole report Press means Pressure.
- N/A: In this whole report not application.

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4 General Information

4.1 Details of E.U.T.

Power supply:	Adaptor Model: ATS018T-W060U Input: AC 100-240V, 50/60Hz, 0.48A Output: DC 5.9V, 2.5A, 14.75W or DC 3 V ('D' size battery x 2)
Test voltage:	AC 120V or DC 3 V
Cable:	Power Cable: 197cm unshielded 2 wires DC cable
Antenna Gain:	-1dBi
Antenna Type:	Magnetic Loop Antenna
Modulation Type:	ASK
Number of Channels:	1
Operation Frequency:	125kHz
Series number:	A1
Hardware Version:	Rev.A
Software Version:	V1.01
	Remark: Power level setting was not adjustable and fixed default through SW Version.

EUT channels and frequencies list:

Channel	Frequency (kHz)
1	125

Test frequencies is 125kHz.

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

RF

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF conducted power (30MHz-40GHz)	1.5dB
5	RF power density	1.5dB
6	Conducted Spurious emissions	1.5dB
7	RF Radiated power & Radiated Spurious emission test	4.4dB (30MHz-1GHz)
		4.7dB (1GHz-6GHz)
		4.7dB (6GHz-18GHz)
		5.7dB (18GHz-40GHz)
8	Temperature test	$\pm 1^\circ\text{C}$
9	Humidity test	$\pm 3\%$
10	Supply voltages	$\pm 1.5\%$
11	Time	$\pm 3\%$

Remark:

The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

According to decision rule based on Clause 4.2 of CISPR 16-4-2, the EUT complied with the standards specified above.

4.4 Test Location

All tests were performed at:

SGS Hong Kong Limited
Unit 2 and 3, G/F, Block A, Po Lung Centre,
11 Wang Chiu Road, Kowloon Bay, Kowloon, Hong Kong
Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **IAS Accreditation (Lab Code: TL-817)**

SGS Hong Kong Limited has met the requirements of AC89, IAS Accreditation Criteria for Testing Laboratories, and has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories. This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

The report must not be used by the client to claim product certification, approval, or endorsement by IAS, NIST, or any agency of the Federal Government.

• **FCC Recognized Accredited Test Firm (CAB Registration No.: 514599)**

SGS Hong Kong Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0015, Test Firm Registration Number: 514599.

• **Industry Canada (Site Registration No.: 26103; CAB Identifier No.: HK0015)**

SGS Hong Kong Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0015, Site Registration Number: 26103.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

99% Bandwidth, 20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2022/08/17	2023/08/16
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2022/08/17	2023/08/16
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	2022/08/20	2023/08/19
OSP	Rohde & Schwarz	OSP-B157W8	E242	2022/04/20	2023/04/19
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2022/09/17	2023/09/16

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	ChamPro	N/A	E229	2022/08/08	2023/08/07
Coaxial Cable	SGS	N/A	E167	2022/07/15	2023/07/14
EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESR7 / 102298	E314	2022/06/29	2023/06/28
TRILOG Super Broadb. Test Antenna, (25) 30-1000MHz	Schwarzbeck	VULB 9168	E311	2021/10/18	2023/10/17
Active Loop Antenna 9k-30MHz	Schwarzbeck	FMZB 1513	E327	2020/11/23	2022/11/22
EMC32 Test software	Rohde & Schwarz	Version 10	N/A	N/A	N/A
Boresight Mast Controller	ChamPro	AM-BS-4500-E	E237	N/A	N/A
Turntable with Controller	ChamPro	EM1000	E238	N/A	N/A

Conducted Emissions at Mains Terminals (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver 9kHz to 3.6GHz	Rohde & Schwarz	ESR3 / 102326	E231	2022/08/17	2023/08/16
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127 / 8127312	E005	2022/04/13	2023/04/12
Impulse Limiter	Rohde & Schwarz	ESH-3-Z2 / 357881052	E028	2022/07/15	2023/07/14
EMC32 Test software	Rohde & Schwarz	Version 10	N/A	N/A	N/A

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Digital temperature & humidity data logger	SATO	SK-L200TH II	E232	2022/08/15	2023/08/14
Electronic Digital Thermometer with Hygrometer	nil	2074/2075	E159	2022/08/15	2023/08/14
Barometer with digital thermometer	SATO	7612-00	E218	2022/03/29	2023/03/28
Conditional Chamber	Zhong Zhi Testing Instruments	CZ-E-608D	E216	2022/08/16	2023/08/15

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

Antenna 1: (53003804, Rubber-backed floor Antenna)



Antenna 2: (53003805, Adhesive-backed Floor Antenna)



7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15 Subpart C 15.207, RSS-Gen Section 8.8
Test Method: ANSI C63.10 (2013) Section 6.2
Limit:

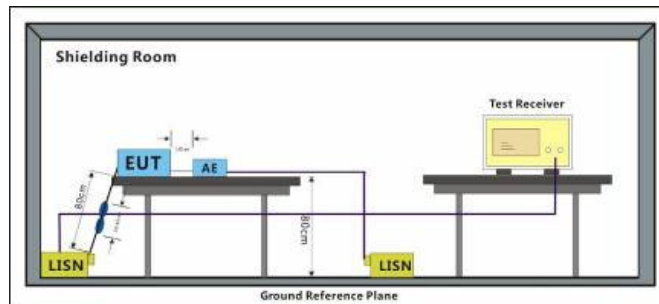
Frequency of emission(MHz)	Conducted limit(dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 22.0 C Humidity: 50.0 % RH
Test mode c: TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

7.1.2 Test Setup Diagram



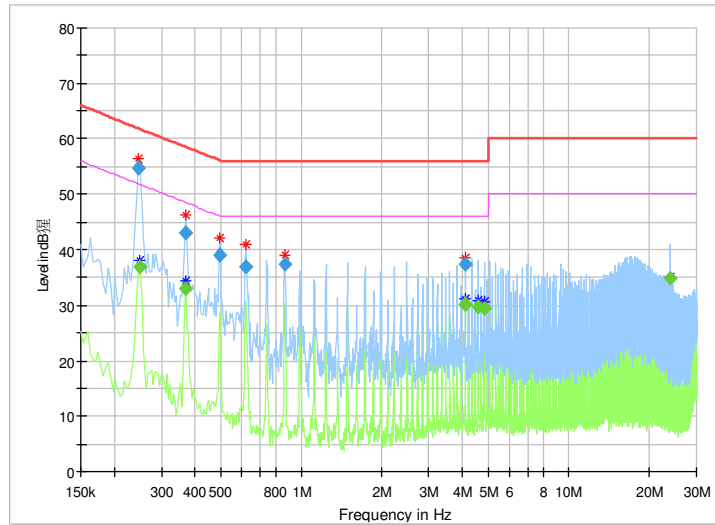
7.1.3 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50 μ H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor

Antenna 1:
Mode: c;
Line: Live Line

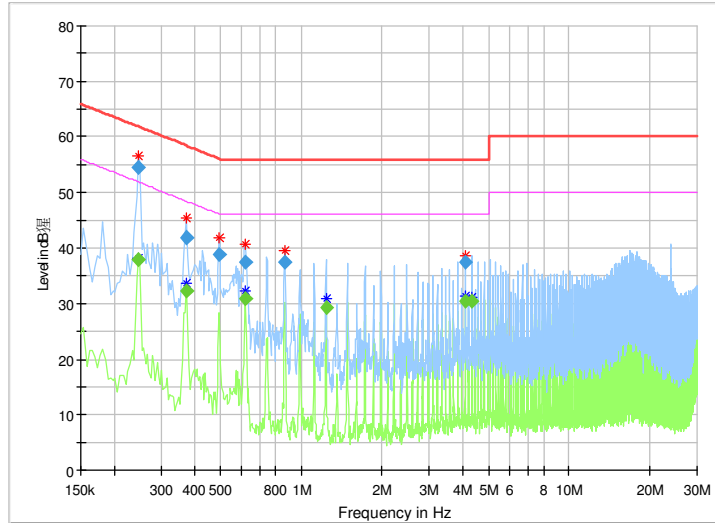
Full Spectrum



Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Corr. (dB)	Result
0.246000	54.75	---	61.89	7.15	11.0	Pass
0.250000	---	37.01	51.76	14.75	11.0	Pass
0.370000	---	32.92	48.50	15.58	10.9	Pass
0.370000	43.03	---	58.50	15.47	10.9	Pass
0.494000	38.97	---	56.10	17.13	10.8	Pass
0.622000	36.88	---	56.00	19.12	10.7	Pass
0.866000	37.34	---	56.00	18.66	10.4	Pass
4.086000	---	30.10	46.00	15.90	10.1	Pass
4.086000	37.42	---	56.00	18.58	10.1	Pass
4.582000	---	29.73	46.00	16.27	10.2	Pass
4.830000	---	29.42	46.00	16.58	10.2	Pass
24.022000	---	34.82	50.00	15.18	10.8	Pass

Mode: c;
Line: Neutral Line

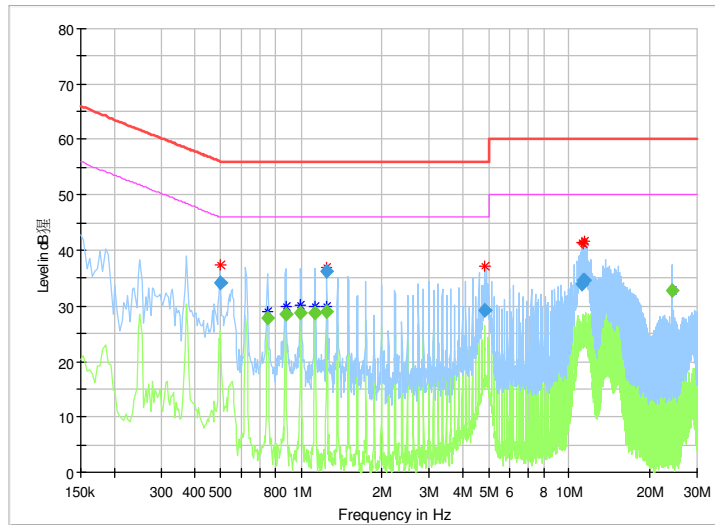
Full Spectrum



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.246000	---	37.87	51.89	14.02	11.0	Pass
0.246000	54.59	---	61.89	7.30	11.0	Pass
0.374000	---	32.16	48.41	16.25	10.9	Pass
0.374000	41.81	---	58.41	16.60	10.9	Pass
0.494000	38.93	---	56.10	17.17	10.8	Pass
0.618000	---	30.98	46.00	15.02	10.7	Pass
0.622000	37.49	---	56.00	18.51	10.7	Pass
0.866000	37.41	---	56.00	18.59	10.4	Pass
1.238000	---	29.20	46.00	16.80	10.3	Pass
4.086000	---	30.31	46.00	15.69	10.2	Pass
4.086000	37.42	---	56.00	18.58	10.2	Pass
4.334000	---	30.43	46.00	15.57	10.2	Pass

Antenna 2:
Mode: c;
Line: Live Line

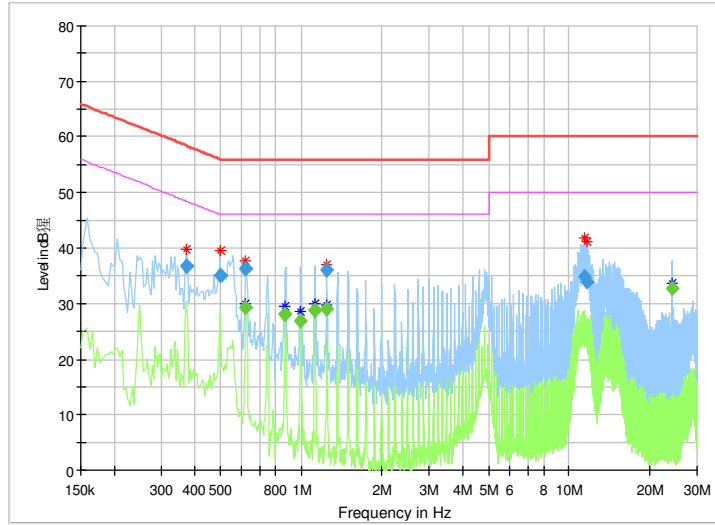
Full Spectrum



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.498000	34.23	---	56.03	21.80	10.9	Pass
0.746000	---	27.80	46.00	18.20	10.7	Pass
0.874000	---	28.60	46.00	17.40	10.6	Pass
0.998000	---	28.83	46.00	17.17	10.6	Pass
1.122000	---	28.79	46.00	17.21	10.5	Pass
1.246000	36.20	---	56.00	19.80	10.5	Pass
1.246000	---	28.97	46.00	17.03	10.5	Pass
4.866000	29.28	---	56.00	26.72	10.3	Pass
11.162000	33.82	---	60.00	26.18	10.5	Pass
11.226000	34.64	---	60.00	25.36	10.5	Pass
11.382000	34.59	---	60.00	25.41	10.5	Pass
24.174000	---	32.82	50.00	17.18	10.7	Pass

Mode: c;
Line: Neutral Line

Full Spectrum



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.374000	36.80	---	58.41	21.61	11.0	Pass
0.498000	35.16	---	56.03	20.87	10.9	Pass
0.622000	---	29.13	46.00	16.87	10.8	Pass
0.622000	36.16	---	56.00	19.84	10.8	Pass
0.870000	---	28.11	46.00	17.89	10.6	Pass
0.994000	---	26.89	46.00	19.11	10.5	Pass
1.122000	---	28.83	46.00	17.17	10.4	Pass
1.246000	36.13	---	56.00	19.87	10.5	Pass
1.246000	---	28.93	46.00	17.07	10.5	Pass
11.342000	34.95	---	60.00	25.05	10.5	Pass
11.610000	33.81	---	60.00	26.19	10.5	Pass
24.174000	---	32.78	50.00	17.22	10.6	Pass

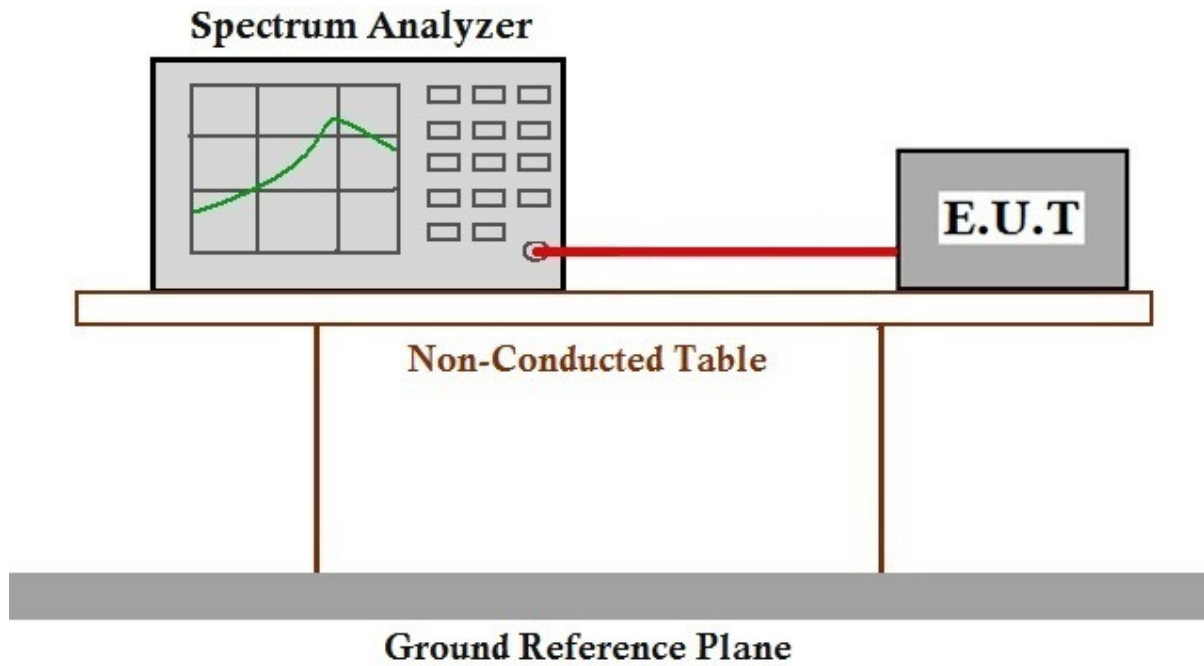
7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.209
 Test Method: ANSI C63.10 (2013) Section 6.9
 Limit: <200 kHz

7.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.2 °C Humidity: 51.1 % RH
 Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

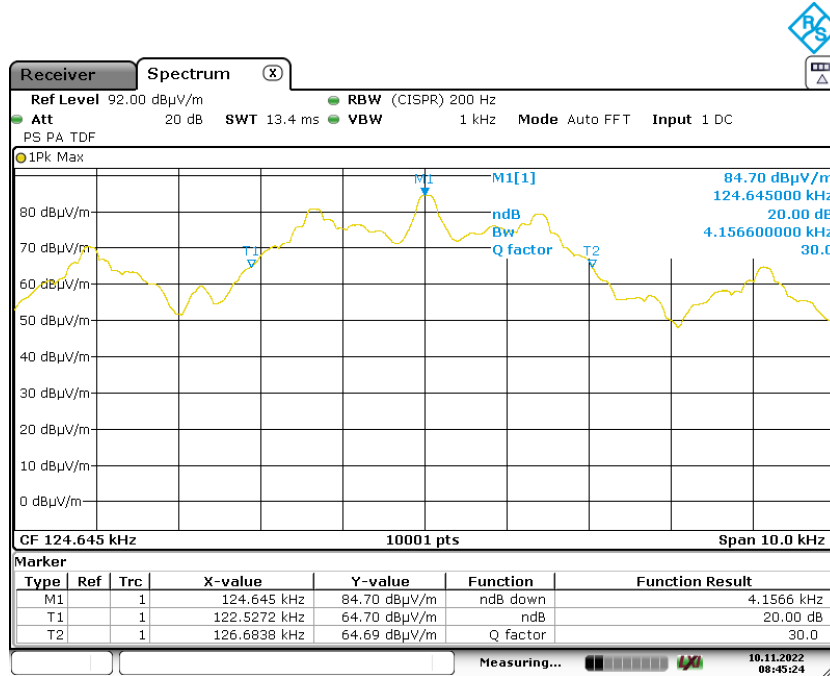
7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

Test Plot :

Antenna 1:

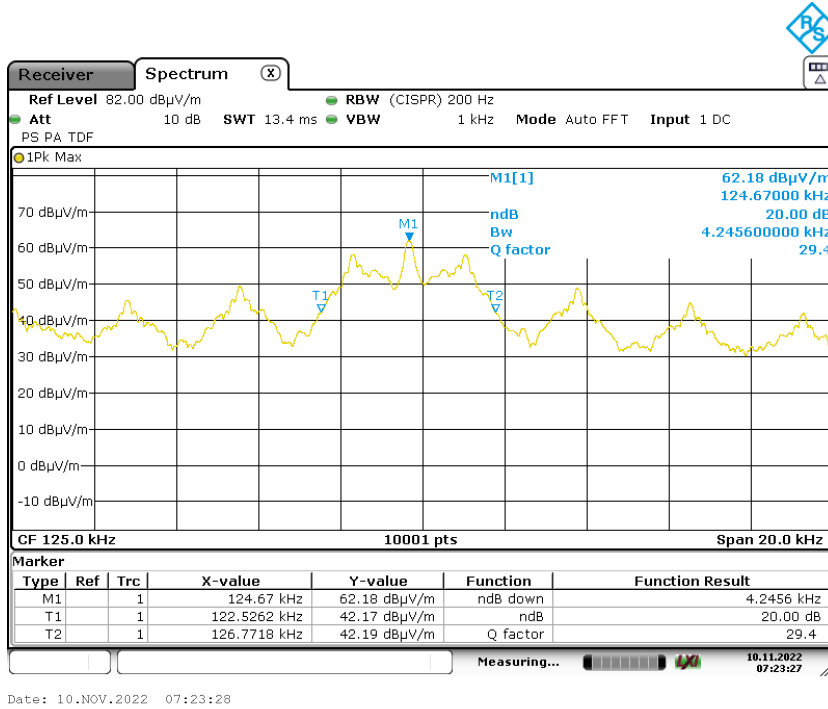


Date: 10.NOV.2022 08:45:24

Test Results:

Frequency (kHz)	20dB Bandwidth (kHz)	Result
125	4.16	PASS

Antenna 2:



Test Results:

Frequency (kHz)	20dB Bandwidth (kHz)	Result
125	4.25	PASS

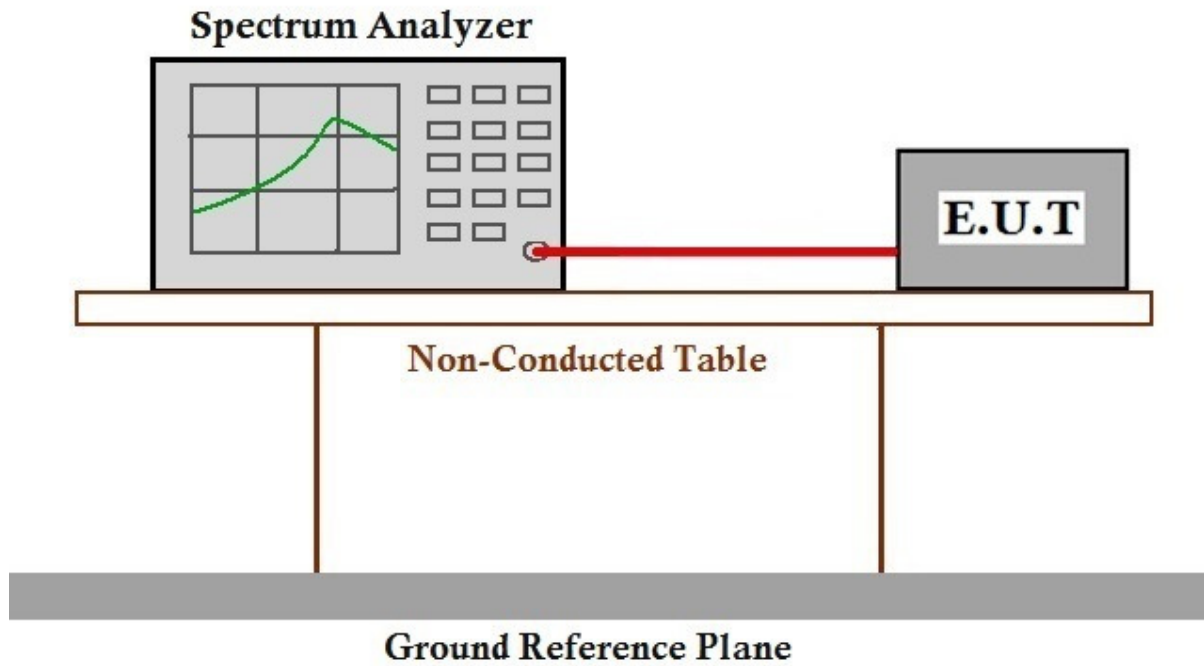
7.3 99% Bandwidth

Test Requirement RSS-Gen Section 6.7
 Test Method: RSS-Gen Section 6.7
 Limit: N/A

7.3.1 E.U.T. Operation

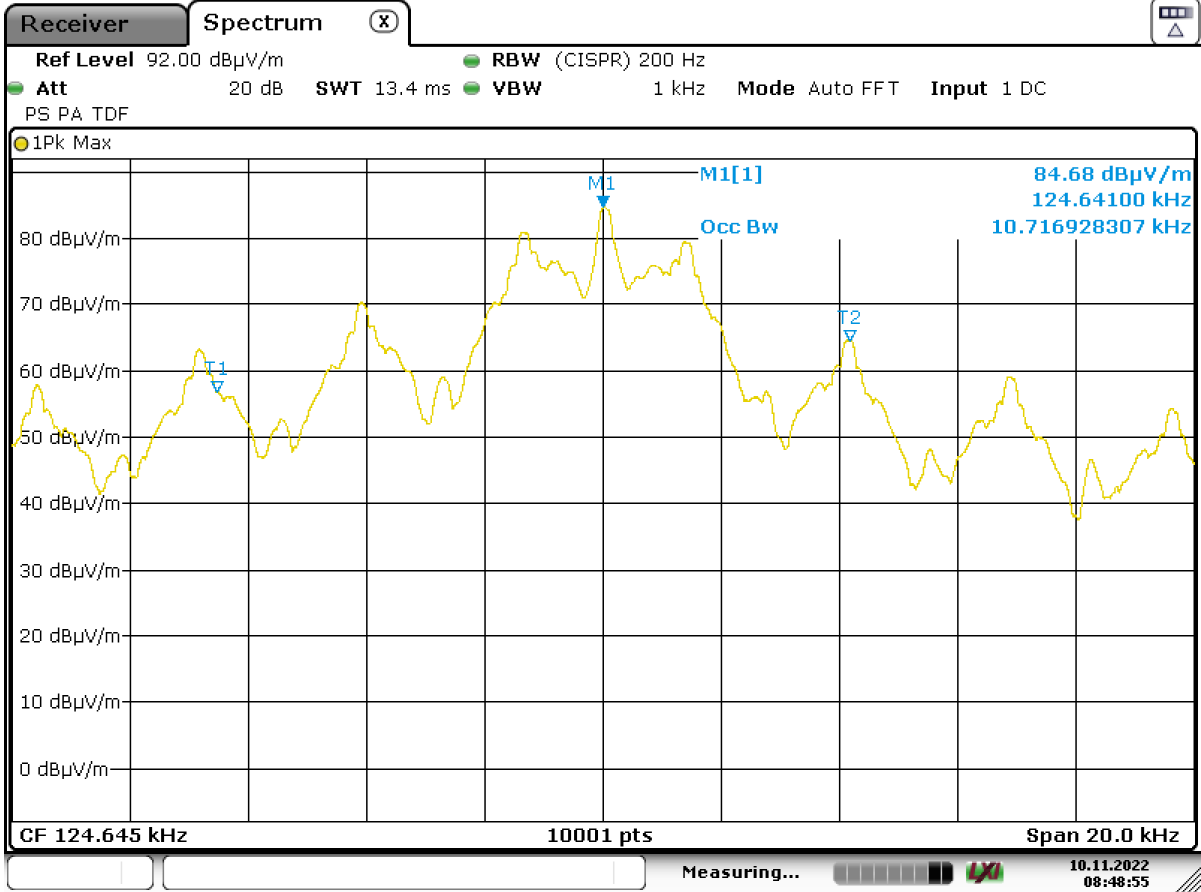
Operating Environment:
 Temperature: 25 °C Humidity: 50 % RH
 Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

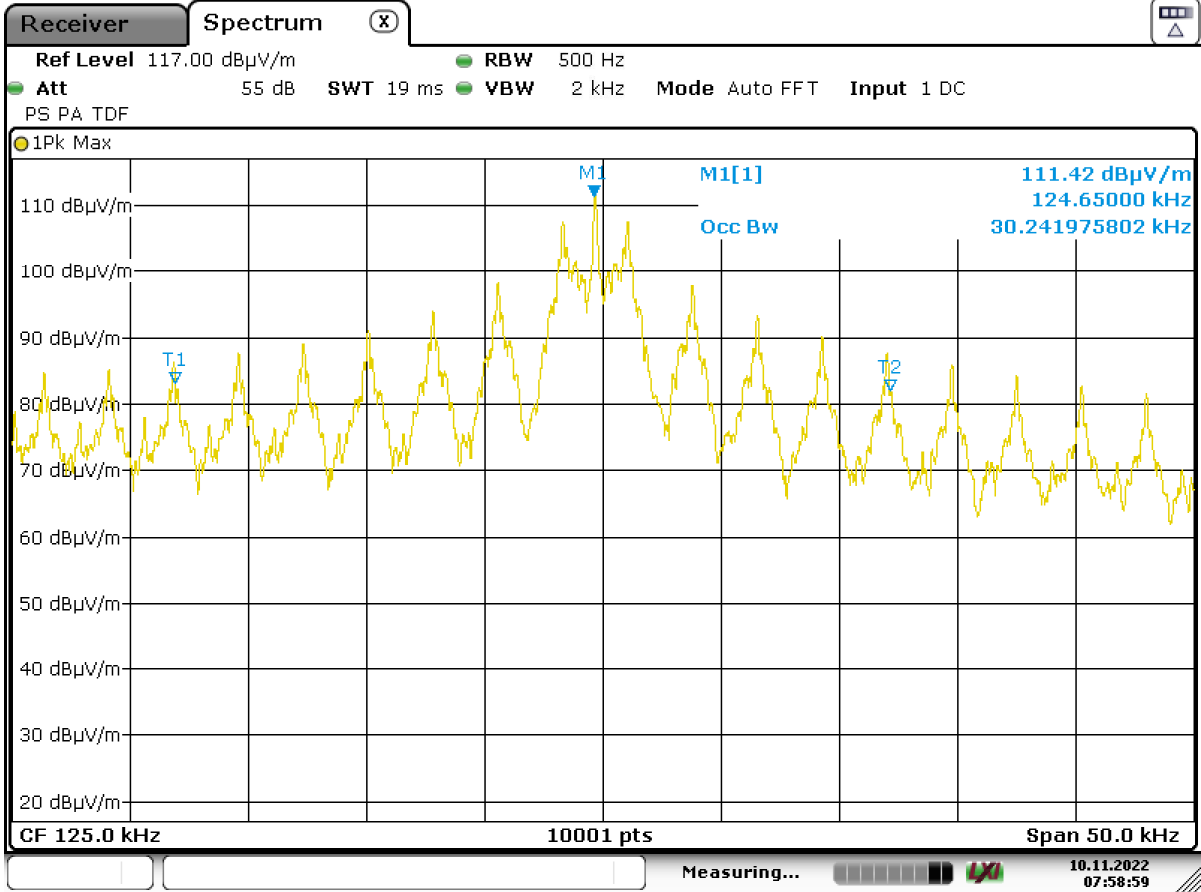
Mode: a;
Antenna 1:



Date: 10.NOV.2022 08:48:55

99% Bandwidth = 10.72kHz

Mode: a;
 Antenna 2:



Date: 10.NOV.2022 07:58:59

99% Bandwidth = 30.24kHz

7.4 Field Strength of the Fundamental Signal

Test Requirement	47 CFR Part 15, Subpart C 15.209 RSS-210 Section 7.3
Test Method:	ANSI C63.10 (2013) Section 6.5
Measurement Distance:	3m
Limit:	For frequency range between 0.009-0.490 (MHz), the emissions from an intentional radiator shall not exceed the field strength levels $2400/F$ (F in kHz) (microvolts/meter) for FCC and $63.7/F$ (F in kHz) ($\mu\text{A}/\text{m}$).

7.4.1 E.U.T. Operation

Operating Environment:	
Temperature:	22.5 °C Humidity: 49.7 % RH
Test mode	a:TX mode_Keep the EUT in transmitting with modulation mode.

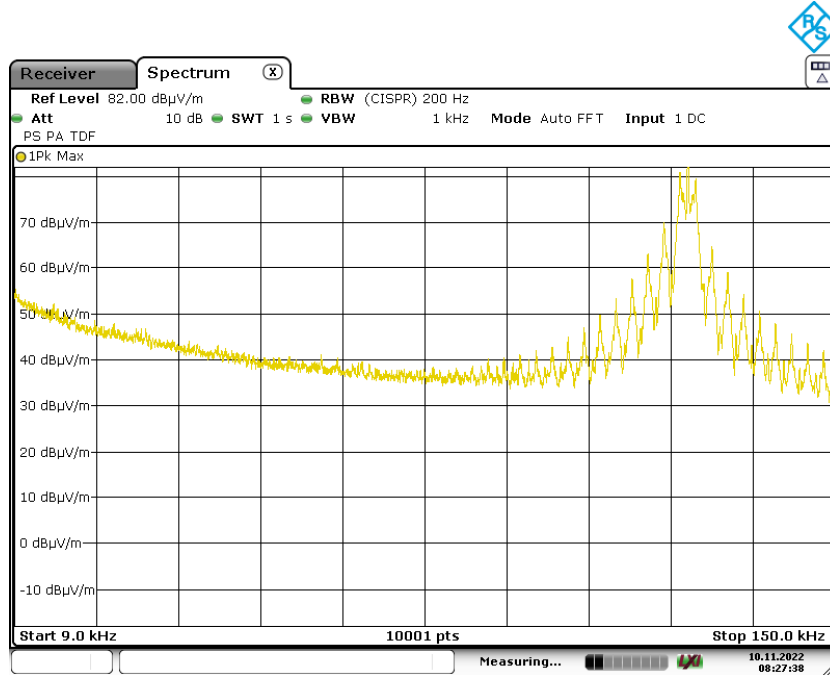
7.4.2 Test Setup Diagram

7.4.3 Measurement Procedure and Data

- The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- Test the EUT in the lowest channel, the middle channel, the Highest channel
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.
- Repeat above procedures until all frequencies measured was complete.

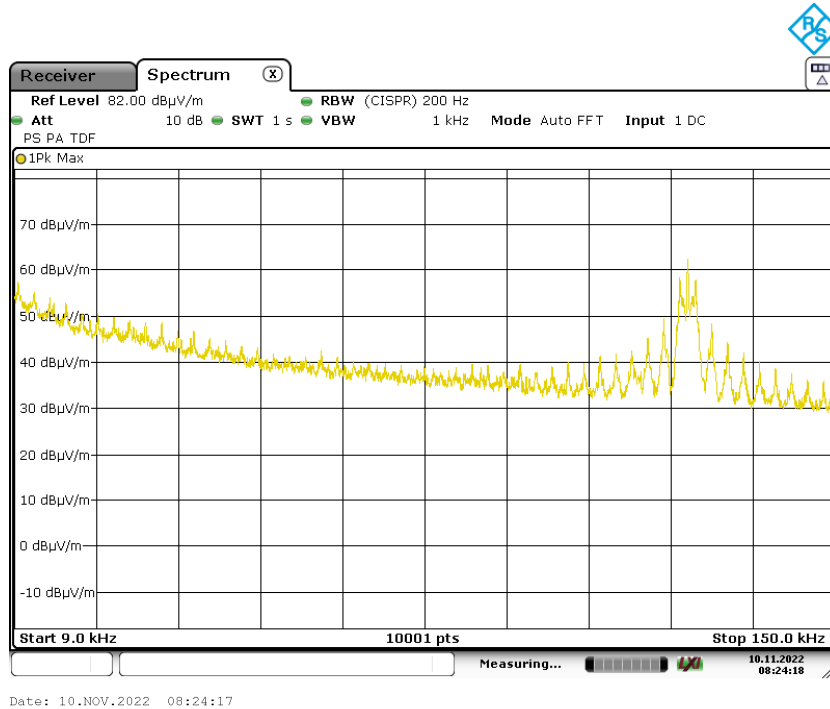
Remark: $\text{Level (dB}\mu\text{V}/\text{m)} = \text{Read Level (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)} - \text{Preamp Factor (dB)}$

Measurement data:
 Antenna 1:



Frequency (MHz)	Emission Level (dBµV/m) @3m	Distance factor (dB)	Emission Level (dBµV/m) @300m	Limit (dBµV/m) @300m	Margin (dB)
0.125	77.5	80.0	-2.5	25.6	28.1

Antenna 2:



Frequency (MHz)	Emission Level (dBµV/m) @3m	Distance factor (dB)	Emission Level (dBµV/m) @300m	Limit (dBµV/m) @300m	Margin (dB)
0.125	59.3	80.0	-20.7	25.6	46.3

Remark: The test was performed at 3m test distance, i.e. the distance between measuring antenna and EUT boundary. The results were extrapolated by using the square of an inverse linear distance factor DF:

DF (distance factor) = $40 \log (D1/D2) = 80 \text{ dB}$, where
 D1 is the 300m specified measurement distance,
 D2 is the 3m test measurement distance.

For 125kHz frequency the calculated level is:

Level (dBµV/m) @300m = Level (dBµV/m) @3m - DF (dB) = 59.3 dBµV/m - 80 dB = -20.7 dBµV/m

7.5 Radiated Emissions (9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.209
RSS-210 Section 7.3
Test Method: ANSI C63.10 (2013) Section 6.4&6.5
Measurement Distance: 3m
Limit:

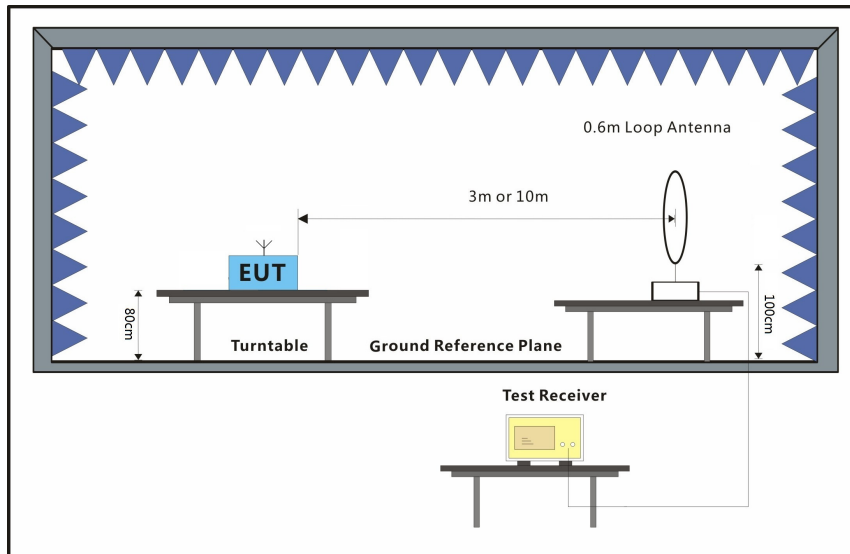
Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for above 1000MHz. Radiated emission limits above 1000MHz is based on measurements employing an average detector.

7.5.1 E.U.T. Operation

Operating Environment:
Temperature: 25.1 °C Humidity: 51.2 % RH
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.5.2 Test Setup Diagram

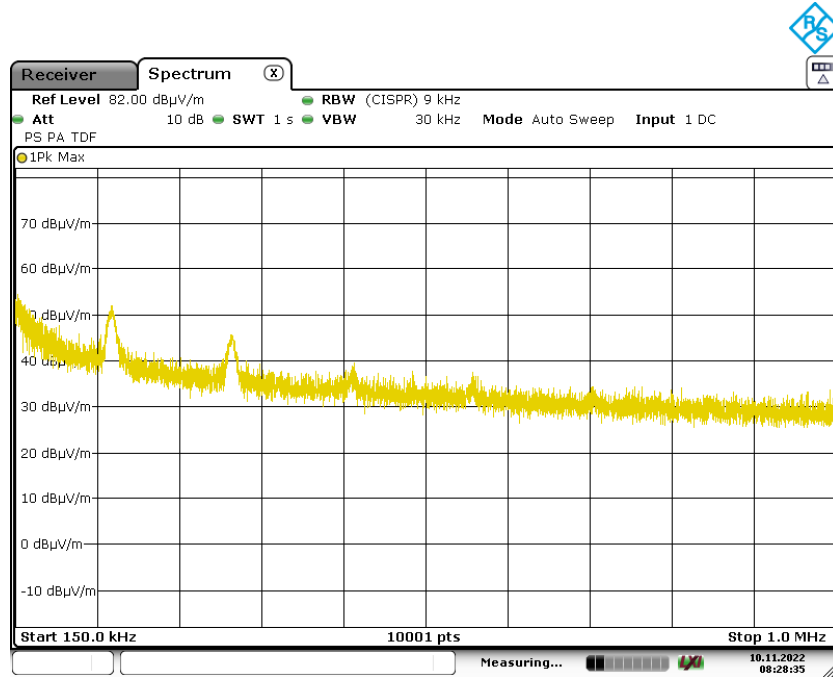


7.5.3 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

Remark: Level (dBµV/m) = Read Level (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m) - Preamp Factor (dB)

Mode: a
Antenna 1:

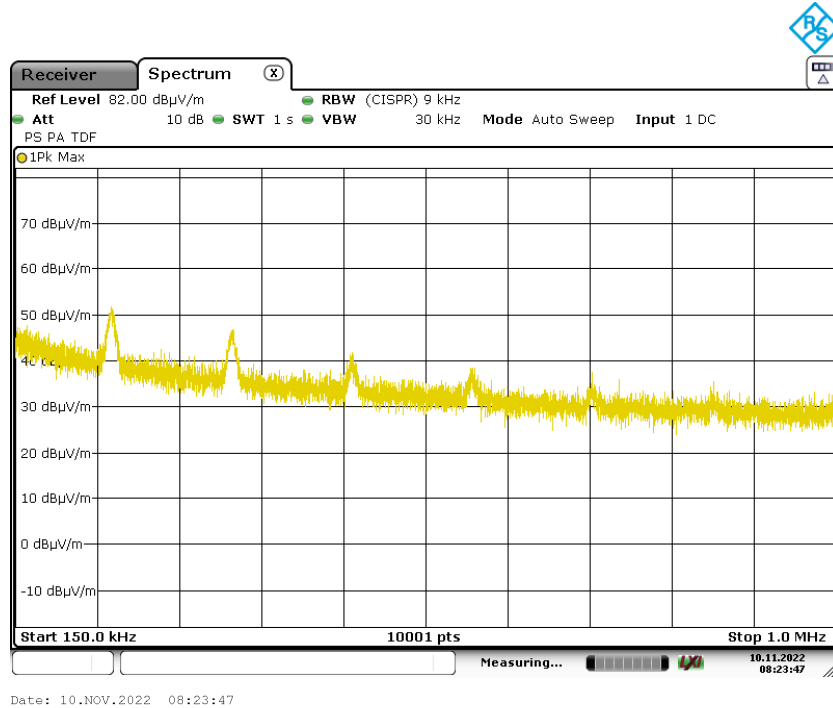


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Frequency (MHz)	Emission Level (dBµV/m) @3m	Distance factor (dB)	Emission Level (dBµV/m) @300m	Limit (dBµV/m) @300m	Margin (dB)	Result
0.250	50.2	80.0	-29.8	19.6	49.4	Pass
0.375	43.6	80.0	-36.4	16.1	52.5	Pass

Frequency (MHz)	Emission Level (dBµV/m) @3m	Distance factor (dB)	Emission Level (dBµV/m) @30m	Limit (dBµV/m) @30m	Margin (dB)	Result
0.500	35.3	40.0	-4.7	33.6	38.3	Pass
0.625	32.9	40.0	-7.1	31.6	38.7	Pass
0.750	30.3	40.0	-9.7	30.1	39.8	Pass
0.875	28.4	40.0	-11.6	28.7	40.3	Pass

Antenna 2:



Frequency (MHz)	Emission Level (dBµV/m) @3m	Distance factor (dB)	Emission Level (dBµV/m) @300m	Limit (dBµV/m) @300m	Margin (dB)	Result
0.250	49.3	80.0	-30.7	19.6	50.3	Pass
0.375	43.9	80.0	-36.1	16.1	52.2	Pass

Frequency (MHz)	Emission Level (dBµV/m) @3m	Distance factor (dB)	Emission Level (dBµV/m) @30m	Limit (dBµV/m) @30m	Margin (dB)	Result
0.500	37.7	40.0	-2.3	33.6	35.9	Pass
0.625	34.9	40.0	-5.1	31.6	36.7	Pass
0.750	31.4	40.0	-8.6	30.1	38.7	Pass
0.875	29.4	40.0	-10.6	28.7	39.3	Pass

Remark: The test was performed at 3m test distance, i.e. the distance between measuring antenna and EUT boundary. The results were extrapolated by using the square of an inverse linear distance factor DF:

$$DF (\text{distance factor}) = 40 \log (D1/D2) \text{ where}$$

For D1 is the 300m specified measurement distance,

D2 is the 3m test measurement distance.



The DF = 80 dB was applied for limited calculation at 3m test distance measurements.

For D1 is the 30m specified measurement distance,
D2 is the 3m test measurement distance.

The DF = 40 dB was applied for limited calculation at 3m test distance measurements.

If the frequency between 9 – 490 kHz,
Level (dB μ V/m) @300m = Level (dB μ V/m) @3m – 80 dB

If the frequency between 490 – 1705 kHz,
Level (dB μ V/m) @300m = Level (dB μ V/m) @3m – 40 dB

If the frequency between 1705 – 30000 kHz,
Level (dB μ V/m) @300m = Level (dB μ V/m) @3m – 40 dB

7.6 Radiated Emissions (30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.209
RSS-210 Section 7.3

Test Method: ANSI C63.10 (2013) Section 6.4&6.5

Measurement Distance: 3m

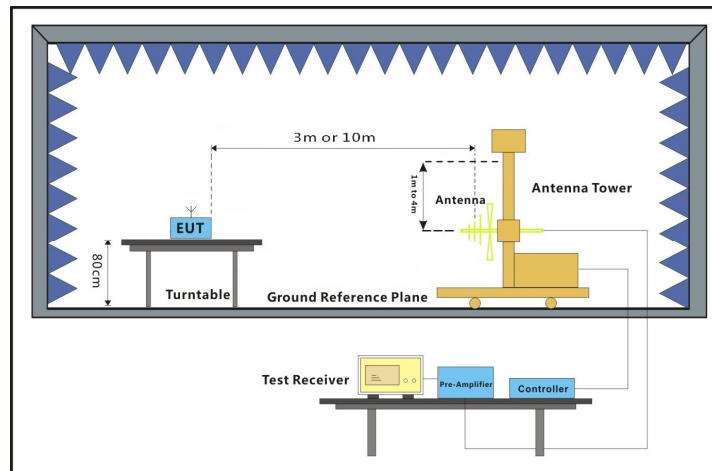
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 21.0 °C Humidity: 55.0 % RH

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.6.2 Test Setup Diagram

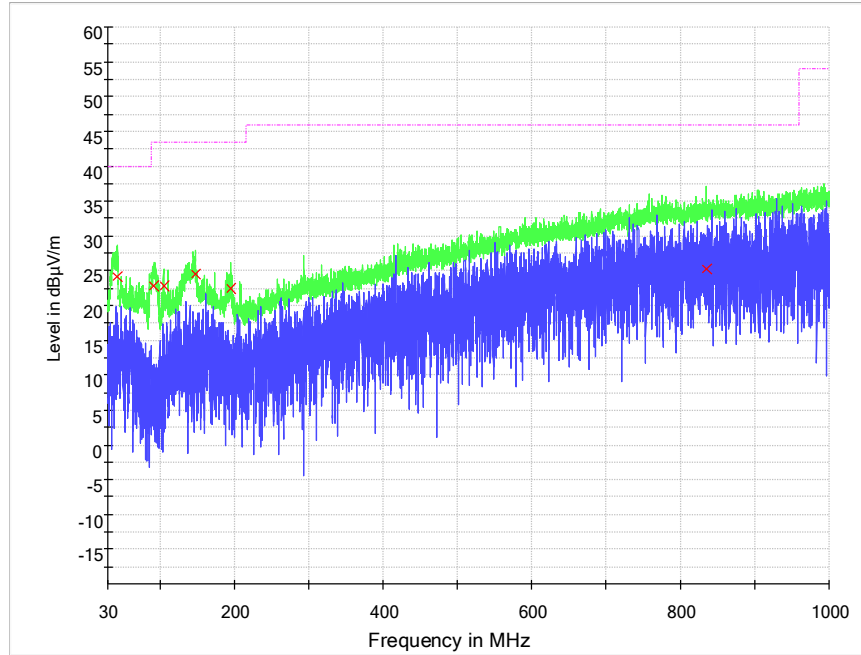


7.6.3 Measurement Procedure and Data

- The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- Test the EUT in the lowest channel, the middle channel, the Highest channel
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.
- Repeat above procedures until all frequencies measured was complete.

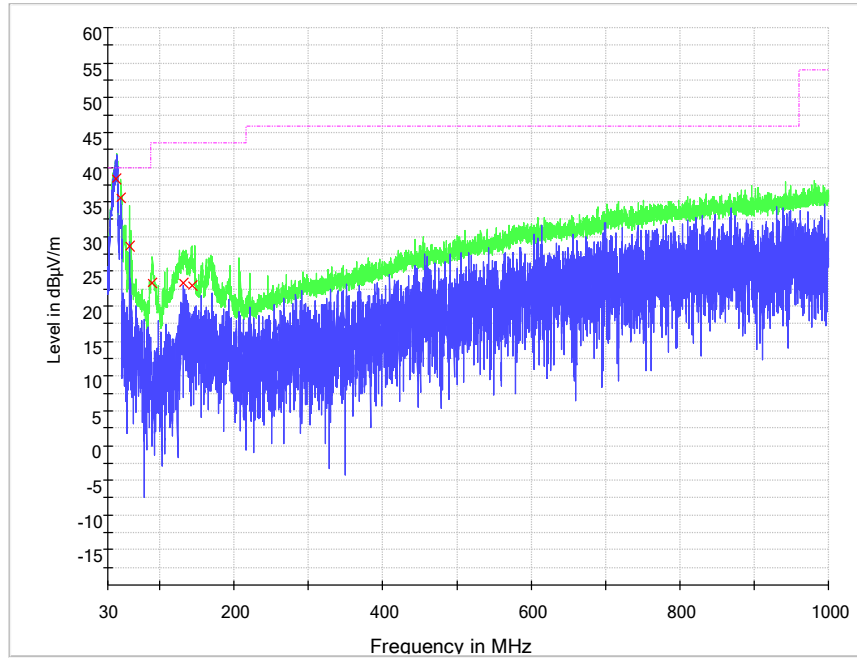
Remark: Level (dB μ V/m) = Read Level (dB μ V) + Cable Loss (dB) + Antenna Factor (dB/m) - Preamp Factor (dB)

Antenna 1:
 Mode: a
 Antenna Pol.: Horizontal



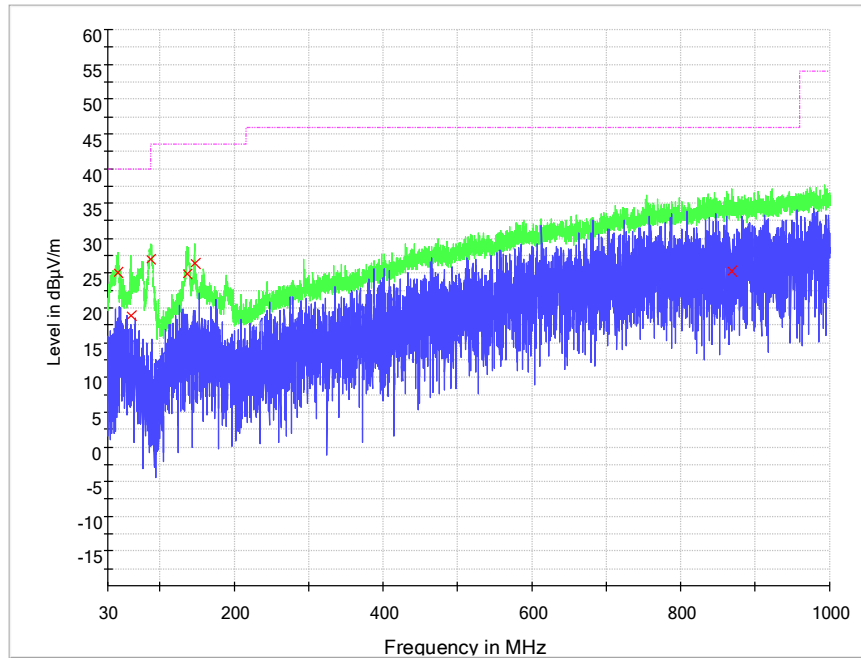
Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
41.834000	24.1	H	13.6	15.9	40.0	Pass
92.177000	22.9	H	8.4	20.6	43.5	Pass
104.593000	22.8	H	10.1	20.7	43.5	Pass
146.885000	24.6	H	14.1	18.9	43.5	Pass
195.191000	22.5	H	10.8	21.0	43.5	Pass
835.391000	25.3	H	25.2	20.7	46.0	Pass

Mode: a
 Antenna Pol.: Vertical



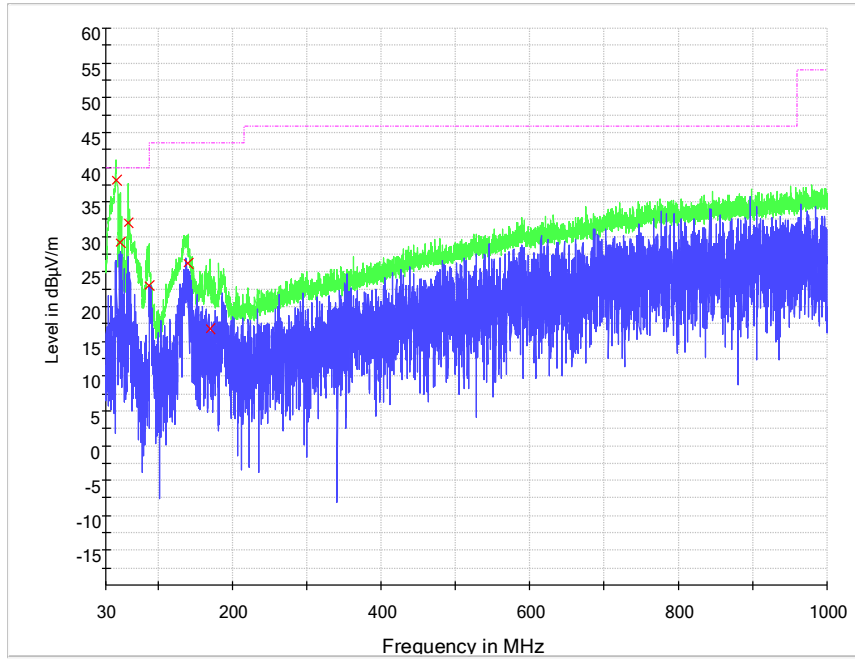
Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
42.125000	37.7	V	13.7	2.3	40.0	Pass
48.333000	35.6	V	14.3	4.4	40.0	Pass
60.361000	28.7	V	13.6	11.3	40.0	Pass
90.431000	23.5	V	8.3	20.0	43.5	Pass
132.335000	23.4	V	13.0	20.1	43.5	Pass
143.199000	23.0	V	13.8	20.5	43.5	Pass

Antenna 2:
 Mode: a
 Antenna Pol.: Horizontal



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
44.259000	25.1	H	14.0	14.9	40.0	Pass
61.816000	18.8	H	13.4	21.2	40.0	Pass
88.685000	26.9	H	8.4	16.6	43.5	Pass
137.476000	24.9	H	13.4	18.6	43.5	Pass
146.982000	26.4	H	14.1	17.1	43.5	Pass
867.886000	25.3	H	25.2	20.7	46.0	Pass

Mode: a
Antenna Pol.: Vertical



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
44.259000	36.8	V	14.0	3.2	40.0	Pass
49.788000	29.2	V	14.3	10.8	40.0	Pass
60.361000	32.0	V	13.6	8.0	40.0	Pass
87.521000	23.0	V	8.6	17.0	40.0	Pass
139.998000	26.1	V	13.5	17.4	43.5	Pass
170.068000	16.9	V	14.1	26.7	43.5	Pass



8 Photographs

Remark: Photos refer to Appendix: External Photo, Internal Phot, and Setup Photo

- End of the Report -
