

TEST REPORT

Applicant: Acuity Brands Lighting, Inc.

Address: One Lithonia Way Conyers, Georgia, 30012, United States

Product Name: Infrared Wireless Programmer

FCC ID: 2ADCB-IWP

IC: 6715C-IWP

HVIN: IWP

47 CFR Part 15, Subpart C(15.225)

Standard(s): ANSI C63.10-2013

RSS-210 Issue 11, June 25, 2024

RSS-Gen, Issue 5, February 2021 Amendment 2

Report Number: 2402A30990E-RF-00A

Report Date: 2024/12/31

The above device has been tested and found compliant with the requirement of the relative standards by Bay Area Compliance Laboratories Corp. (Dongguan).

Reviewed By: Pedro Yun

Title: Project Engineer

Approved By: Gavin Xu

Title: RF Supervisor

Bay Area Compliance Laboratories Corp. (Dongguan)
No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China

Tel: +86-769-86858888

Fax: +86-769-86858891

www.baclcorp.com.cn

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	2402A30990E-RF-00A	Original Report	2024/12/31

1. GENERAL INFORMATION

1.1 General Description of Equipment under Test

EUT Name:	Infrared Wireless Programmer
EUT Model:	IWP
Operation Frequency:	13.56 MHz
Modulation Type:	ASK
Rated Input Voltage:	DC4.5V from 1.5V*3 Battery
Serial Number:	2VQG-1
EUT Received Date:	2024/12/11
EUT Received Status:	Good

1.2 Accessory Information

Accessory Description	Manufacturer	Model	Parameters
/	/	/	/

1.3 Antenna Information Detail ▲

Antenna Manufacturer	Antenna Type	input impedance (Ohm)	Frequency Range	Antenna Gain
Acuity Brands Lighting, Inc.	PCB	Unknown	13.56MHz	Unknown
The design of compliance with §15.203:				
☒ Unit uses a permanently attached antenna.				
☐ Unit uses a unique coupling to the intentional radiator.				
☐ Unit was professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.				

1.4 Equipment Modifications

No modifications are made to the EUT during all test items.

2. SUMMARY OF TEST RESULTS

Standard(s)/Rule(s)	Description of Test	Result
FCC§15.207 (a) RSS-Gen Clause 8.8	AC Line Conducted Emissions	Not Applicable
§15.225 §15.209; §15.205 RSS-Gen Clause 8.9 RSS-210 Annex B.6 (a)	Radiated Spurious Emissions	Compliant
§15.225(e) RSS-210 Annex B.6 (b)	Frequency Stability	Compliant
§15.215(c)	20 dB Bandwidth	Compliant
RSS-Gen Clause 6.7	99% Occupied Bandwidth	Compliant
FCC§15.203 RSS-Gen Clause 6.8	Antenna Requirement	Compliant
§1.1310&§2.1093	RF Exposure	Compliant
Note 1: Not Applicable, the device was powered by battery when operating.		

3. DESCRIPTION OF TEST CONFIGURATION

3.1 EUT Operation Condition

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.

3.2 EUT Exercise Software

No software was used in test.

3.3 Support Equipment List and Details

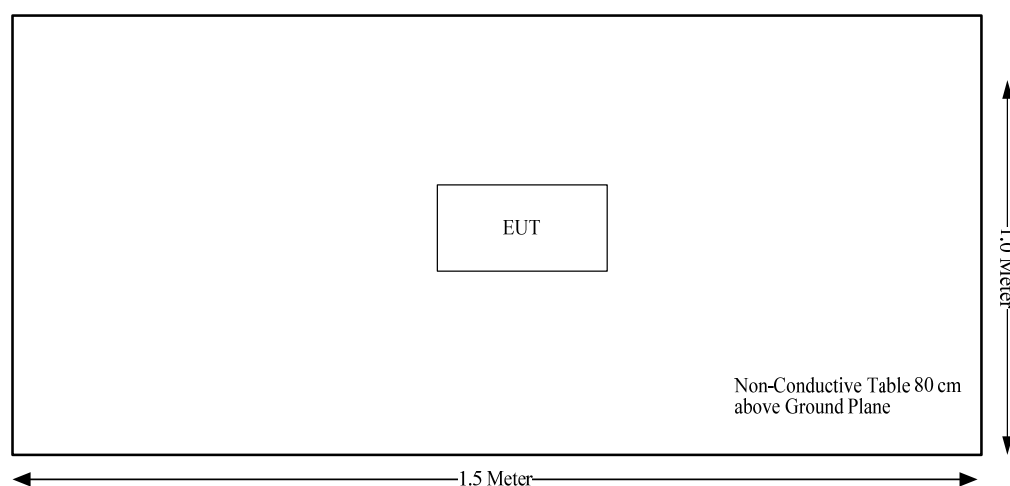
Manufacturer	Description	Model	Serial Number
/	/	/	/

3.4 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
/	/	/	/	/	/

3.5 Block Diagram of Test Setup

Spurious Emissions:



3.6 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 829273, the FCC Designation No. : CN5044.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

3.7 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	9kHz~30MHz: 3.3dB, 30MHz~200MHz: 4.55 dB, 200MHz~1GHz: 5.92 dB, 1GHz~6GHz: 4.98 dB, 6GHz~18GHz: 5.89 dB, 18GHz~26.5GHz:5.47 dB, 26.5GHz~40GHz:5.63 dB
Unwanted Emissions, conducted	±2.47 dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.11 dB (150 kHz to 30 MHz)

4. REQUIREMENTS AND TEST RESULTS

4.1 AC Line Conducted Emissions

Not Applicable, the device was powered by battery when operating.

4.2 Radiated Spurious Emissions

4.2.1 Applicable Standard

FCC Part 15.225

- (a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

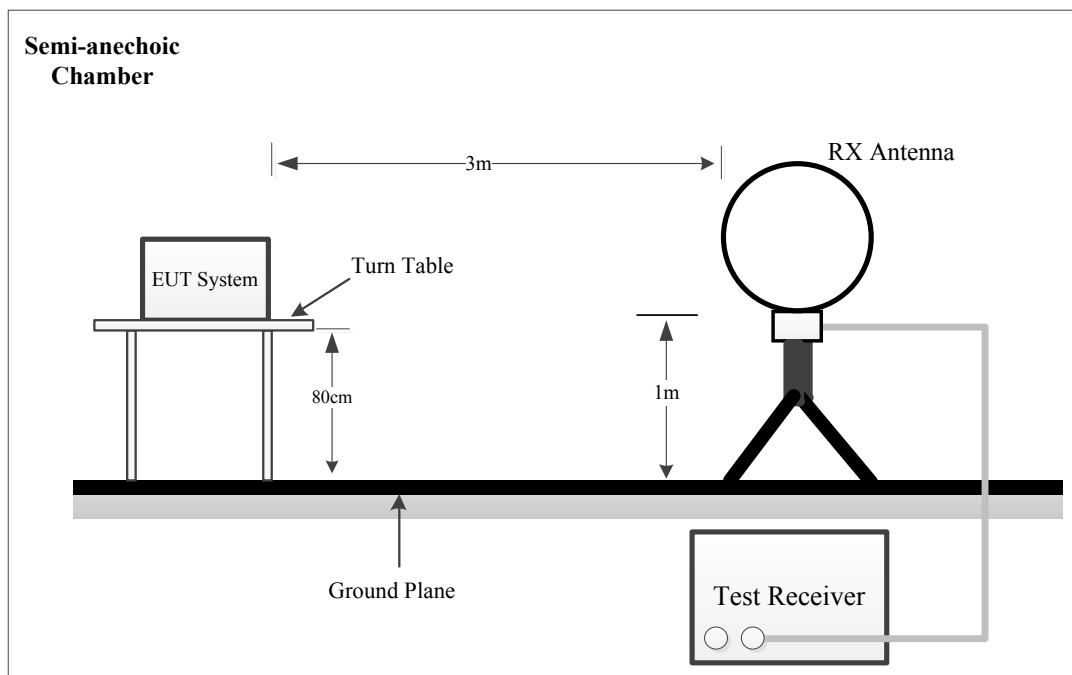
RSS-210 B.6(a)

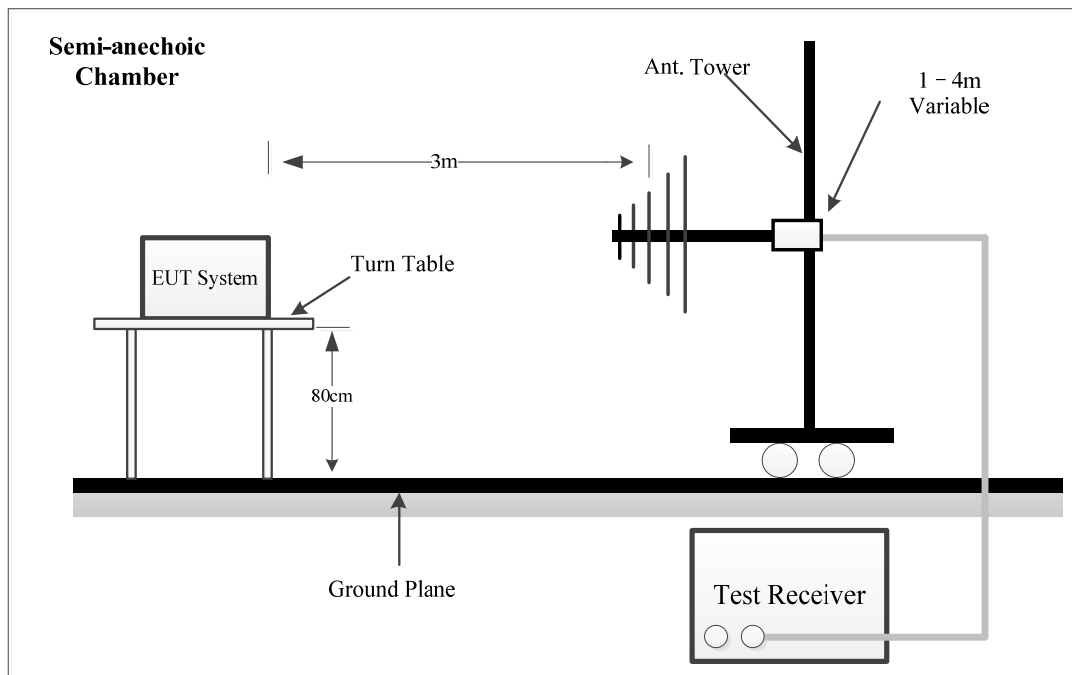
- (a) the field strength of any emission shall not exceed the following limits:

- (i) 15.848 mV/m (84 dB μ V/m) at 30 m, within the band 13.553-13.567 MHz
- (ii) 334 μ V/m (50.5 dB μ V/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz
- (iii) 106 μ V/m (40.5 dB μ V/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz
- (iv) RSS-Gen general field strength limits for frequencies outside the band 13.110-14.010 MHz

4.2.2 EUT Setup

9kHz~30MHz:



30MHz~1GHz:

The radiated emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.10-2013.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

For 9kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

4.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 1 GHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

Frequency Range	Measurement	RBW	Video B/W	IF B/W	Detector
9 kHz – 150 kHz	QP/AV	300 Hz	1 kHz	200 Hz	QP/AV
150 kHz – 30 MHz	QP/AV	10 kHz	30 kHz	9 kHz	QP/AV
30 MHz – 1000 MHz	PK	100 kHz	300 kHz	/	PK
	QP	/	/	120 kHz	QP

If the maximized peak measured value complies with the limit, then it is unnecessary to perform an QP measurement.

4.2.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 9 kHz-1 GHz except 9-90 kHz, 110-490 kHz, employing an average detector.

All emissions under the average limit and under the noise floor have not recorded in the report.

4.2.5 Corrected Result & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor

Factor = Antenna Factor + Cable Loss- Amplifier Gain

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

The limit of Magnetic field strength for 9 kHz-30MHz in RSS-Gen requirement was converted to E-Filed by add 51,5dB, which was identical with FCC Limits.

4.2.6 Test Data

Serial Number:	2VQG-1	Test Date:	2024/12/23
Test Site:	Chamber 10m	Test Mode:	Transmitting
Tester:	Leesin Xiang	Test Result:	Pass

Environmental Conditions:					
Temperature: (°C)	20.2	Relative Humidity: (%)	39	ATM Pressure: (kPa)	101.6

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop Antenna	6512	9706-1206	2023/10/25	2026/10/24
Sunol Sciences	Hybrid Antenna	JB3	A060611-1	2023/9/6	2026/9/5
Narda	Coaxial Attenuator	779-6dB	04269	2023/9/6	2026/9/5
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2024/7/1	2025/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2024/7/1	2025/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2024/7/1	2025/6/30
Sonoma	Amplifier	310N	185914	2024/8/26	2025/8/25
R&S	EMI Test Receiver	ESCI	100224	2024/8/26	2025/8/25
Audix	Test Software	E3	191218 V9	N/A	N/A

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

Please refer to the below table and plots.

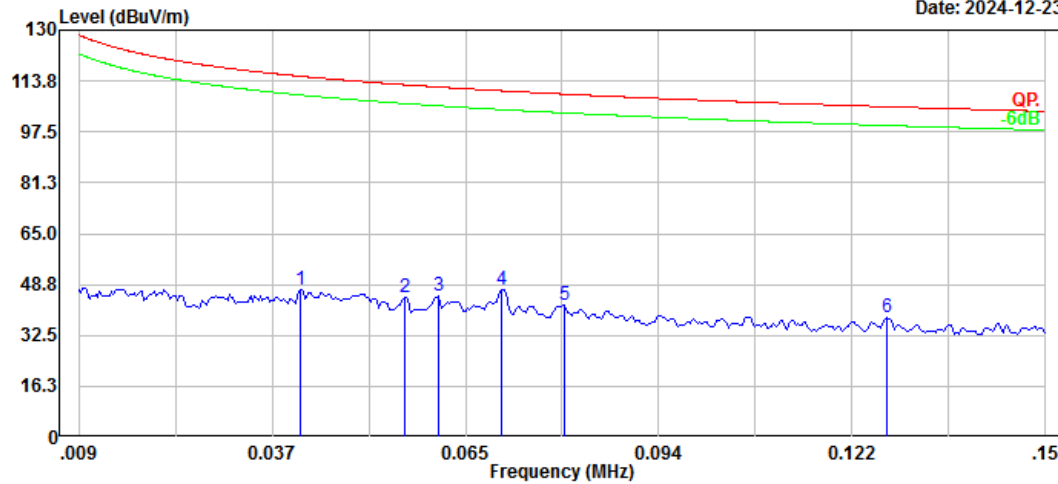
After pre-scan in the X, Y and Z axes of orientation, the worst case is refer to table and plots.

**1) 9kHz~30MHz
Parallel**

Project No.: 2402A30990E-RF
Polarization: Parallel
Test Mode: Transmitting
RBW:300Hz VBW:1kHz

Serial No.: 2VQG-1
Tester: Leesin Xiang

Date: 2024-12-23

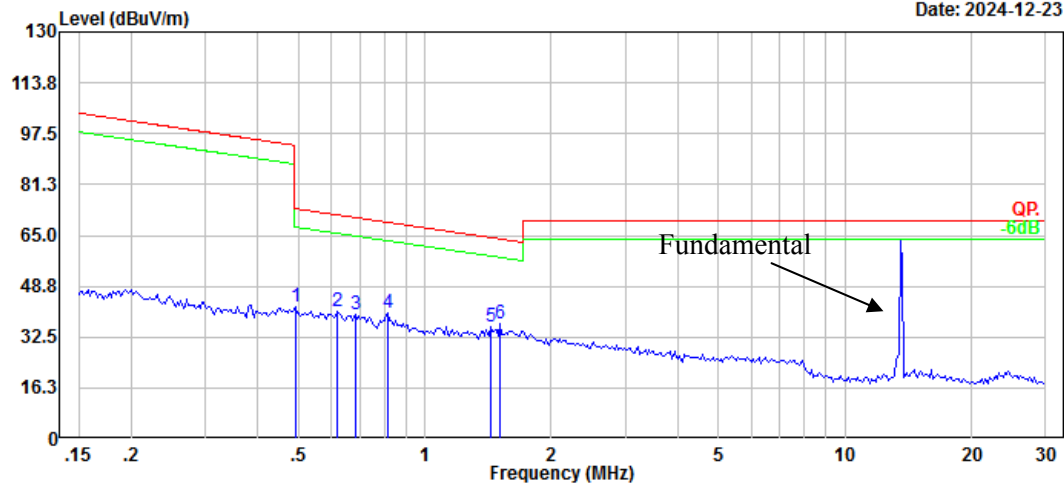


No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	0.041	1.37	45.52	46.89	115.26	68.37	Peak
2	0.057	1.72	42.91	44.63	112.54	67.91	Peak
3	0.061	3.07	42.09	45.16	111.83	66.67	Peak
4	0.071	6.75	40.46	47.21	110.61	63.40	Peak
5	0.080	3.00	38.96	41.96	109.57	67.61	Peak
6	0.127	4.14	33.92	38.06	105.54	67.48	Peak

Project No.: 2402A30990E-RF
Polarization: Parallel
Test Mode: Transmitting
RBW:10kHz VBW:30kHz

Serial No.: 2VQG-1
Tester: Leesin Xiang

Date: 2024-12-23

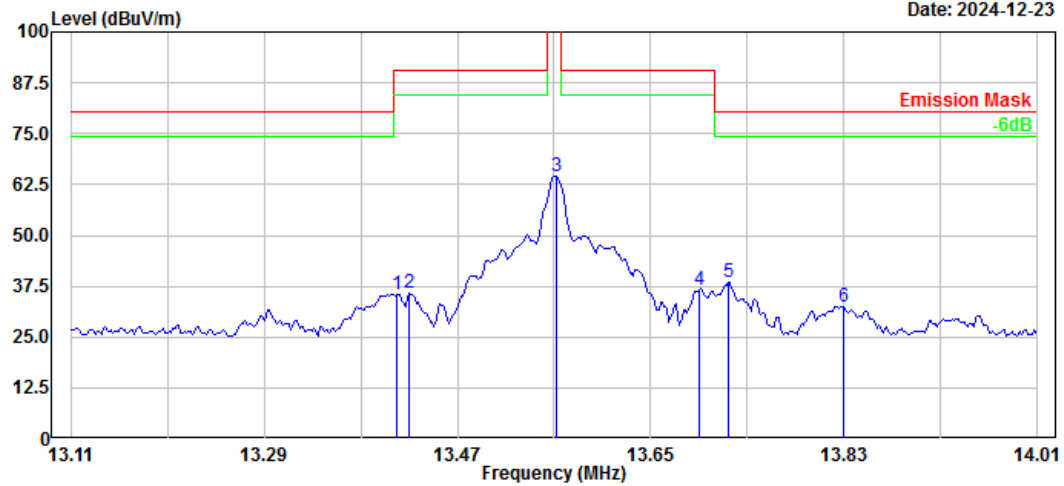


No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	0.492	18.41	23.55	41.96	73.77	31.81	Peak
2	0.621	18.52	22.25	40.77	71.71	30.94	Peak
3	0.683	18.05	21.64	39.69	70.86	31.17	Peak
4	0.817	19.86	20.21	40.07	69.26	29.19	Peak
5	1.433	21.39	14.64	36.03	64.28	28.25	Peak
6	1.511	22.51	14.29	36.80	63.81	27.01	Peak

Project No.: 2402A30990E-RF
Polarization: Parallel
Test Mode: Transmitting
RBW:10kHz VBW:30kHz

Serial No.: 2VQG-1
Tester: Leeson Xiang

Date: 2024-12-23

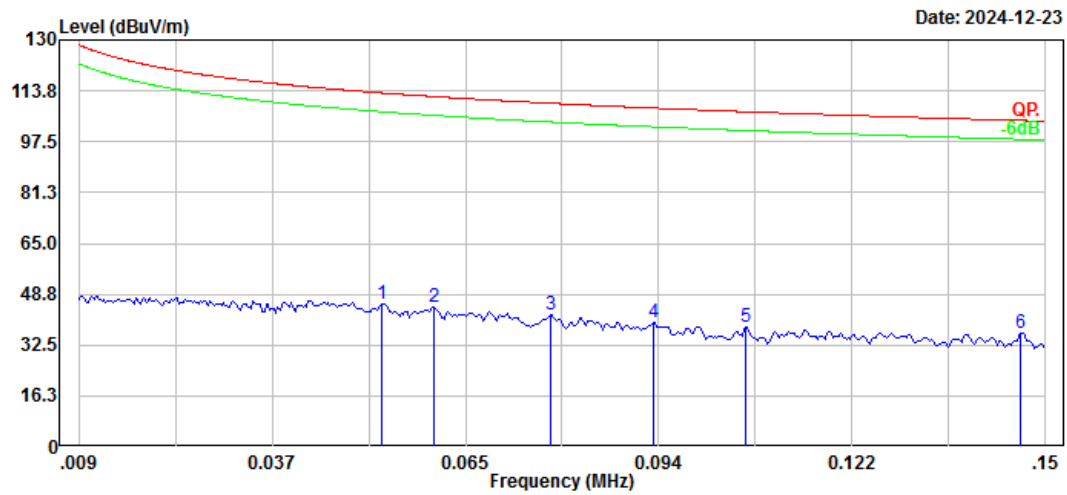


No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	13.414	31.00	4.55	35.55	90.47	54.92	Peak
2	13.425	31.16	4.55	35.71	90.47	54.76	Peak
3	13.562	59.99	4.53	64.52	124.00	59.48	Peak
4	13.695	32.23	4.51	36.74	90.47	53.73	Peak
5	13.722	33.89	4.51	38.40	80.51	42.11	Peak
6	13.830	28.12	4.50	32.62	80.51	47.89	Peak

Perpendicular

Project No.: 2402A30990E-RF
Polarization: Perpendicular
Test Mode: Transmitting
RBW:300Hz VBW:1kHz

Serial No.: 2VQG-1
Tester: Leesin Xiang

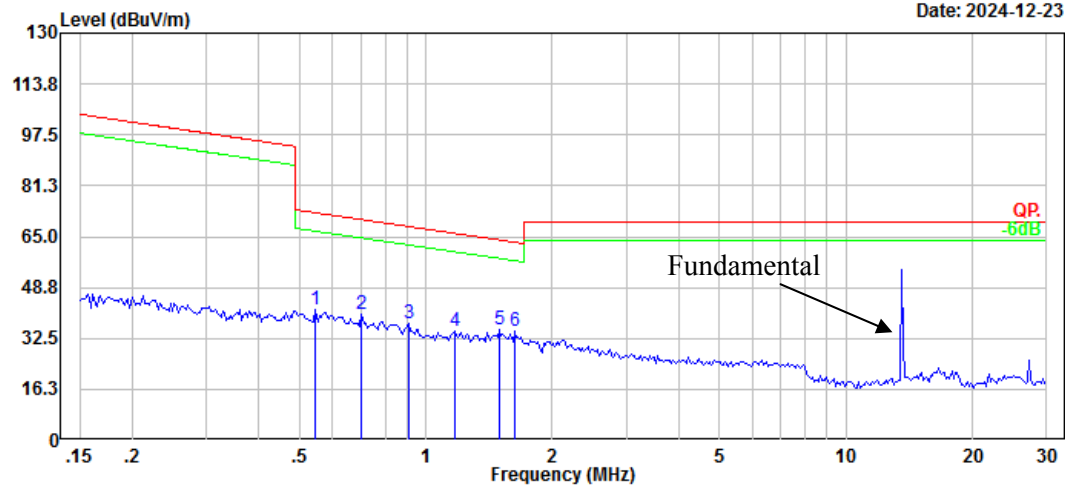


No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	0.053	2.01	43.49	45.50	113.07	67.57	Peak
2	0.061	2.59	42.19	44.78	111.91	67.13	Peak
3	0.078	2.76	39.29	42.05	109.78	67.73	Peak
4	0.093	2.91	36.66	39.57	108.26	68.69	Peak
5	0.106	3.15	35.05	38.20	107.07	68.87	Peak
6	0.146	3.59	32.84	36.43	104.30	67.87	Peak

Project No.: 2402A30990E-RF
Polarization: Perpendicular
Test Mode: Transmitting
RBW:10kHz VBW:30kHz

Serial No.: 2VQ6-1
Tester: Leesin Xiang

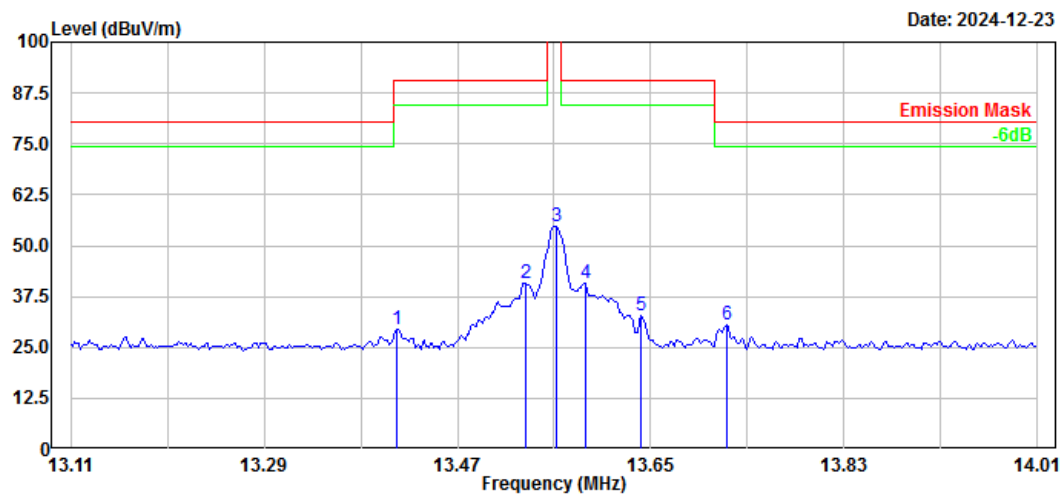
Date: 2024-12-23



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	0.546	18.57	23.03	41.60	72.83	31.23	Peak
2	0.705	18.65	21.42	40.07	70.58	30.51	Peak
3	0.909	18.86	18.39	37.25	68.32	31.07	Peak
4	1.172	18.93	15.80	34.73	66.07	31.34	Peak
5	1.495	20.94	14.36	35.30	63.90	28.60	Peak
6	1.628	20.83	13.78	34.61	63.15	28.54	Peak

Project No.: 2402A30990E-RF
Polarization: Perpendicular
Test Mode: Transmitting
RBW:10kHz VBW:30kHz

Serial No.: 2VQ6-1
Tester: Leesin Xiang

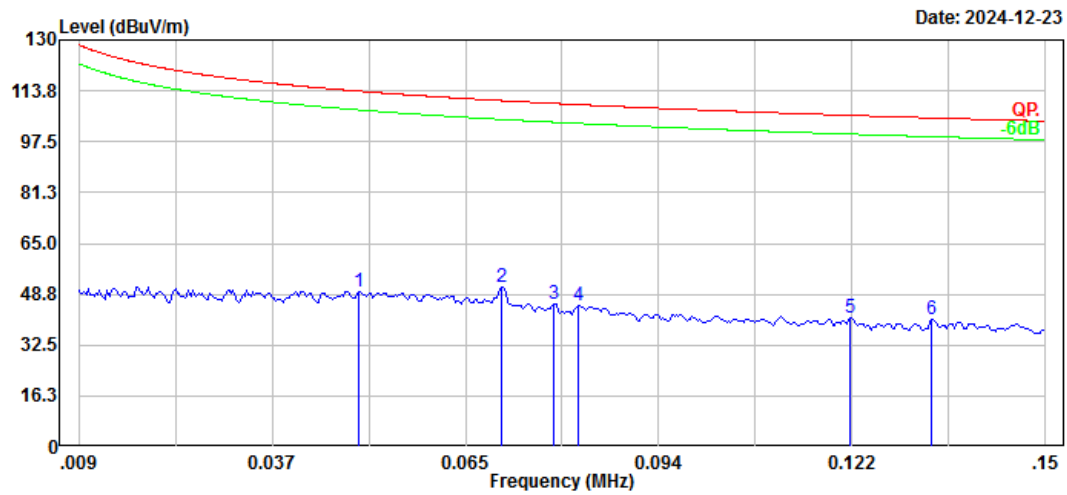


No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	13.414	24.72	4.55	29.27	90.47	61.20	Peak
2	13.533	36.14	4.53	40.67	90.47	49.80	Peak
3	13.562	50.26	4.53	54.79	124.00	69.21	Peak
4	13.589	36.05	4.53	40.58	90.47	49.89	Peak
5	13.641	28.12	4.52	32.64	90.47	57.83	Peak
6	13.720	26.06	4.51	30.57	80.51	49.94	Peak

Ground-parallel

Project No.: 2402A30990E-RF
Polarization: Ground-parallel
Test Mode: Transmitting
RBW:300Hz VBW:1kHz

Serial No.: 2VQG-1
Tester: Leesin Xiang

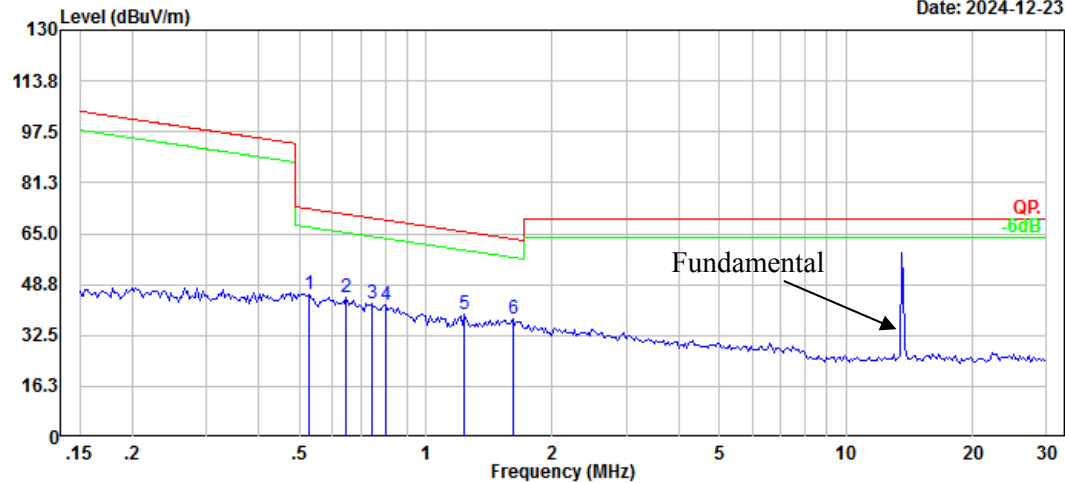


No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	0.050	5.68	44.07	49.75	113.64	63.89	Peak
2	0.071	10.32	40.46	50.78	110.61	59.83	Peak
3	0.078	6.24	39.20	45.44	109.72	64.28	Peak
4	0.082	6.42	38.61	45.03	109.35	64.32	Peak
5	0.122	6.93	34.21	41.14	105.91	64.77	Peak
6	0.133	7.10	33.56	40.66	105.10	64.44	Peak

Project No.: 2402A30990E-RF
Polarization: Ground-parallel
Test Mode: Transmitting
RBW:10kHz VBW:30kHz

Serial No.: 2VQ6-1
Tester: Leesin Xiang

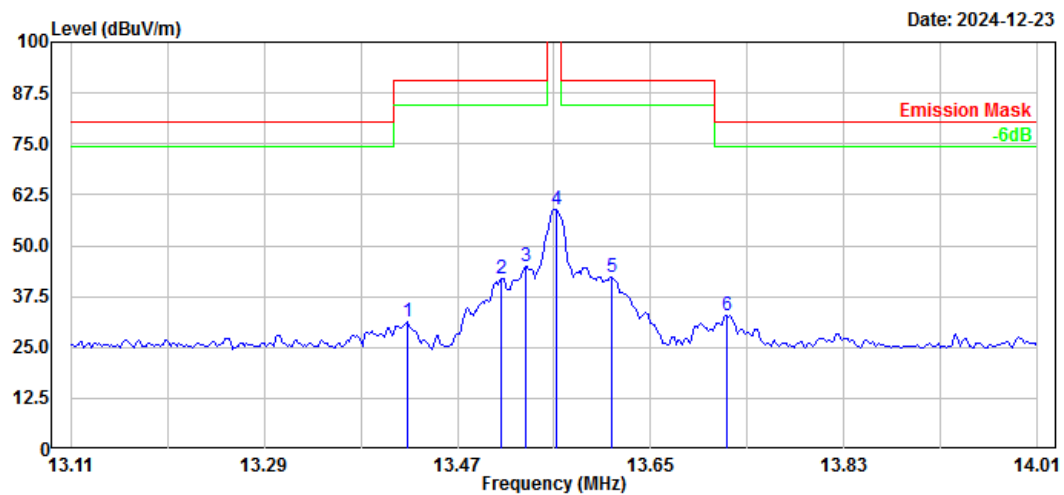
Date: 2024-12-23



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	0.529	22.63	23.22	45.85	73.11	27.26	Peak
2	0.647	22.70	22.00	44.70	71.33	26.63	Peak
3	0.743	21.68	21.08	42.76	70.11	27.35	Peak
4	0.800	21.51	20.56	42.07	69.45	27.38	Peak
5	1.236	23.96	15.51	39.47	65.60	26.13	Peak
6	1.610	23.70	13.85	37.55	63.25	25.70	Peak

Project No.: 2402A30990E-RF
Polarization: Ground-parallel
Test Mode: Transmitting
RBW:10kHz VBW:30kHz

Serial No.: 2VQ6-1
Tester: Leesin Xiang

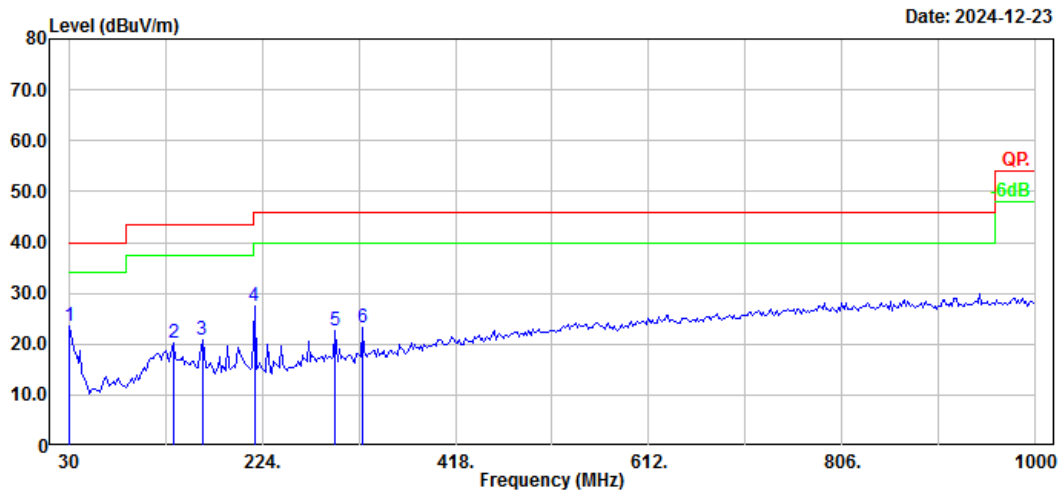


No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	13.423	26.69	4.55	31.24	90.47	59.23	Peak
2	13.511	37.33	4.53	41.86	90.47	48.61	Peak
3	13.533	40.49	4.53	45.02	90.47	45.45	Peak
4	13.562	54.39	4.53	58.92	124.00	65.08	Peak
5	13.614	37.90	4.53	42.43	90.47	48.04	Peak
6	13.720	28.31	4.51	32.82	80.51	47.69	Peak

2) 30MHz-1GHz

Project No.: 2402A30990E-RF
Polarization: Horizontal
Test Mode: Transmitting
RBW:100kHz VBW:300kHz

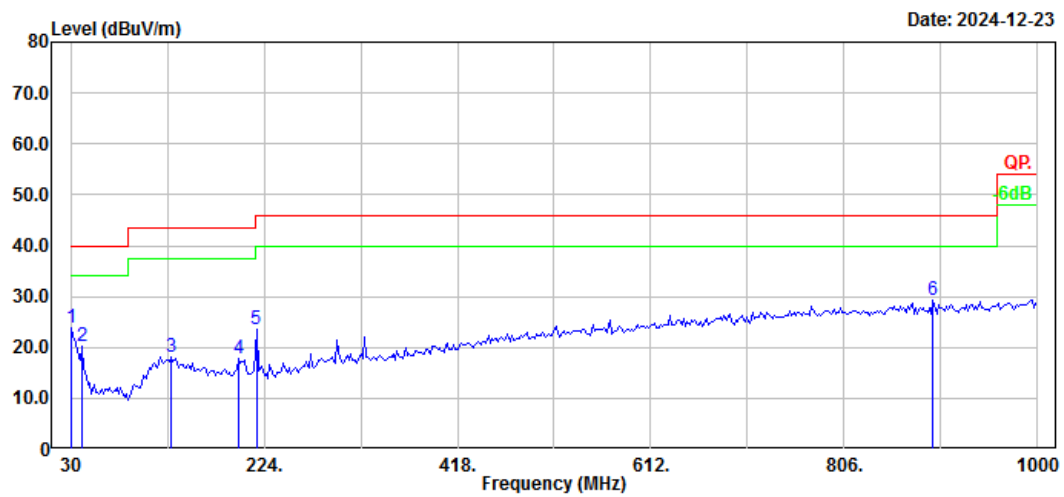
Serial No.: 2VQG-1
Tester: Leesin Xiang



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	30.00	27.34	-3.80	23.54	40.00	16.46	Peak
2	134.76	30.38	-10.14	20.24	43.50	23.26	Peak
3	163.86	32.17	-11.39	20.78	43.50	22.72	Peak
4	216.24	39.86	-12.52	27.34	46.00	18.66	Peak
5	297.72	32.22	-9.53	22.69	46.00	23.31	Peak
6	324.88	32.07	-8.97	23.10	46.00	22.90	Peak

Project No.: 2402A30990E-RF
Polarization: Vertical
Test Mode: Transmitting
RBW:100kHz VBW:300kHz

Serial No.: 2VQ6-1
Tester: Leesin Xiang



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	30.00	27.72	-3.80	23.92	40.00	16.08	Peak
2	41.64	31.94	-11.82	20.12	40.00	19.88	Peak
3	130.88	28.00	-9.91	18.09	43.50	25.41	Peak
4	198.78	29.38	-11.60	17.78	43.50	25.72	Peak
5	216.24	36.04	-12.52	23.52	46.00	22.48	Peak
6	895.24	27.81	1.36	29.17	46.00	16.83	Peak

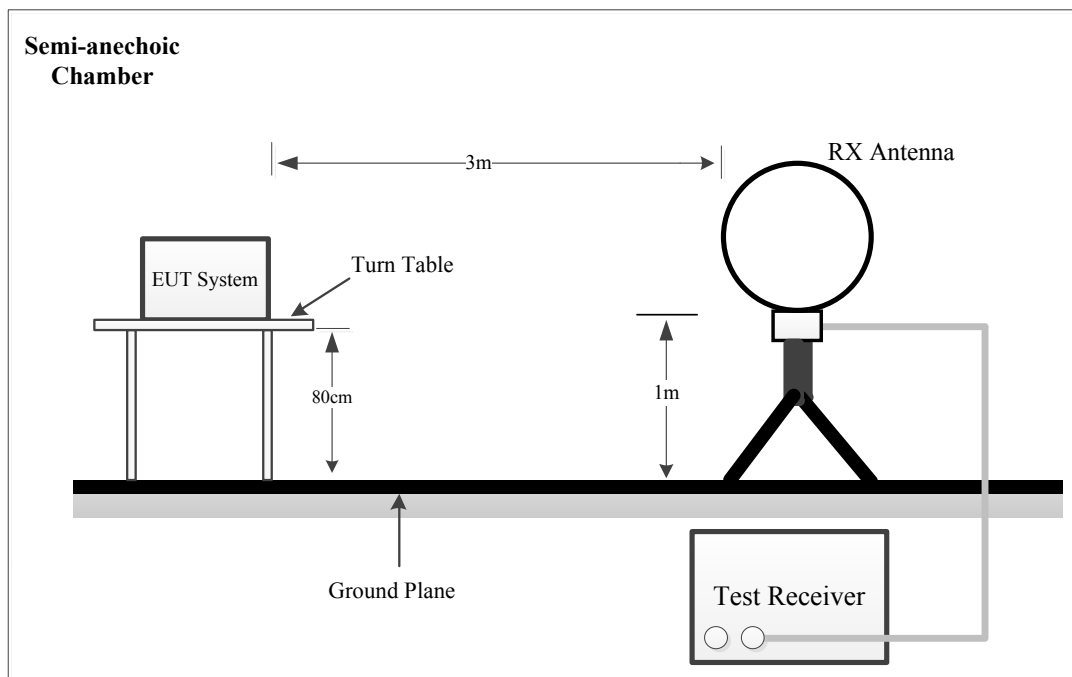
4.3 20 dB Emission Bandwidth

4.3.1 Applicable Standard

FCC §15.215

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through § 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of band operation.

4.3.2 EUT Setup



4.3.3 Test Procedure

According to ANSI C63.10-2013 Section 6.9.2

- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
- The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
- Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2
- Steps a) through c) might require iteration to adjust within the specified tolerances.
- The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target

“-xx dB down” requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the “-xx dB down amplitude” using [(reference value) - xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-xx dB down amplitude” determined in step h). If a marker is below this “-xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “-xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

4.3.4 Test Data

Serial Number:	2VQG-1	Test Date:	2024/12/23
Test Site:	Chamber 10m	Test Mode:	Transmitting
Tester:	Leesin Xiang	Test Result:	Pass

Environmental Conditions:			
Temperature: (°C)	20.2	Relative Humidity: (%)	39
		ATM Pressure: (kPa)	101.6

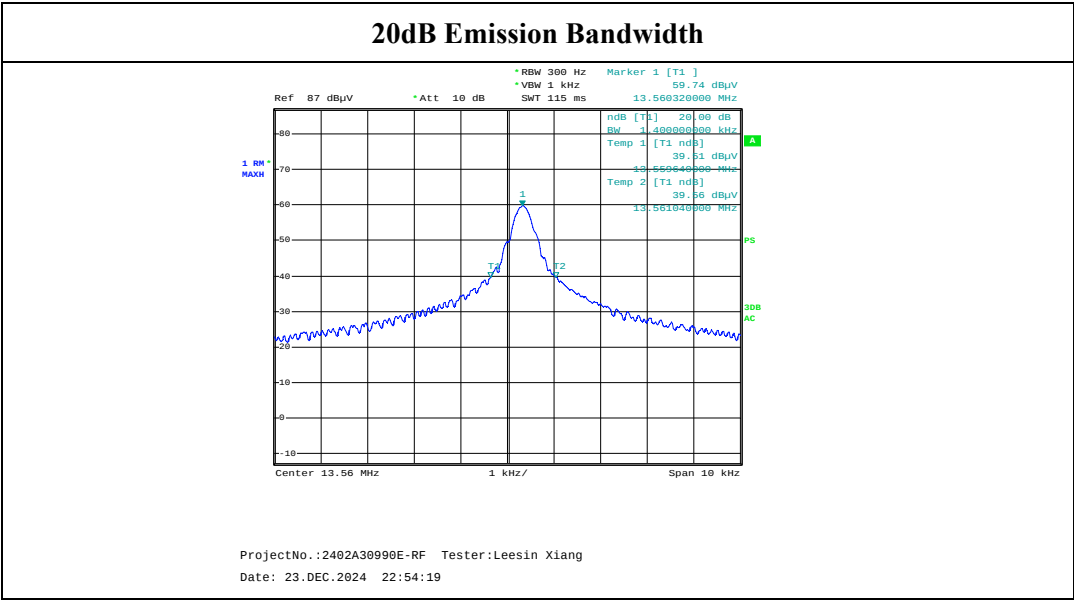
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop Antenna	6512	9706-1206	2023/10/25	2026/10/24
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2024/7/1	2025/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2024/7/1	2025/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2024/7/1	2025/6/30
Sonoma	Amplifier	310N	185914	2024/8/26	2025/8/25
R&S	EMI Test Receiver	ESCI	100224	2024/8/26	2025/8/25

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

Test Frequency (MHz)	20 dB Emission Bandwidth (kHz)
13.56	1.4



4.4 99% Occupied Bandwidth:

4.4.1 Applicable Standard

RSS-Gen Clause 6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs. In some cases, the “x dB bandwidth” is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth: The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.

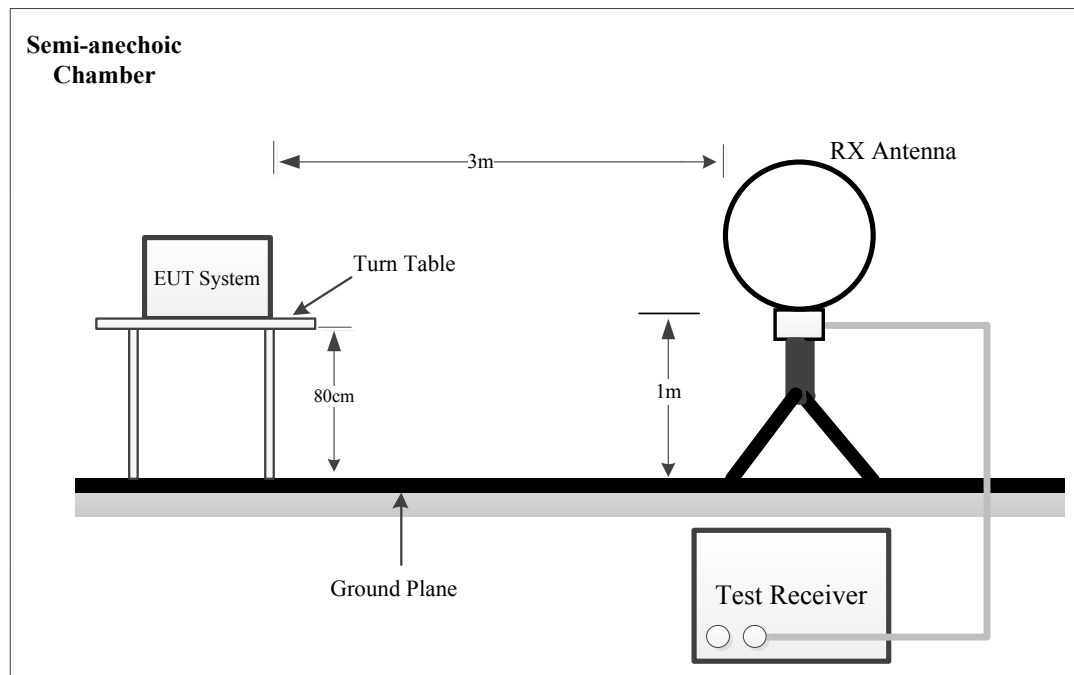
The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value.

Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

4.4.2 EUT Setup



4.4.3 Test Procedure

According to ANSI C63.10-2013 Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

- The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (\text{OBW}/\text{RBW})]$ below the reference level. Specific guidance is given in 4.1.5.2.
- Step a) through step c) might require iteration to adjust within the specified range.
- Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

4.4.4 Test Data And Result

Serial Number:	2VQG-1	Test Date:	2024/12/23
Test Site:	Chamber 10m	Test Mode:	Transmitting
Tester:	Leesin Xiang	Test Result:	Pass

Environmental Conditions:			
Temperature: (°C)	20.2	Relative Humidity: (%)	39
		ATM Pressure: (kPa)	101.6

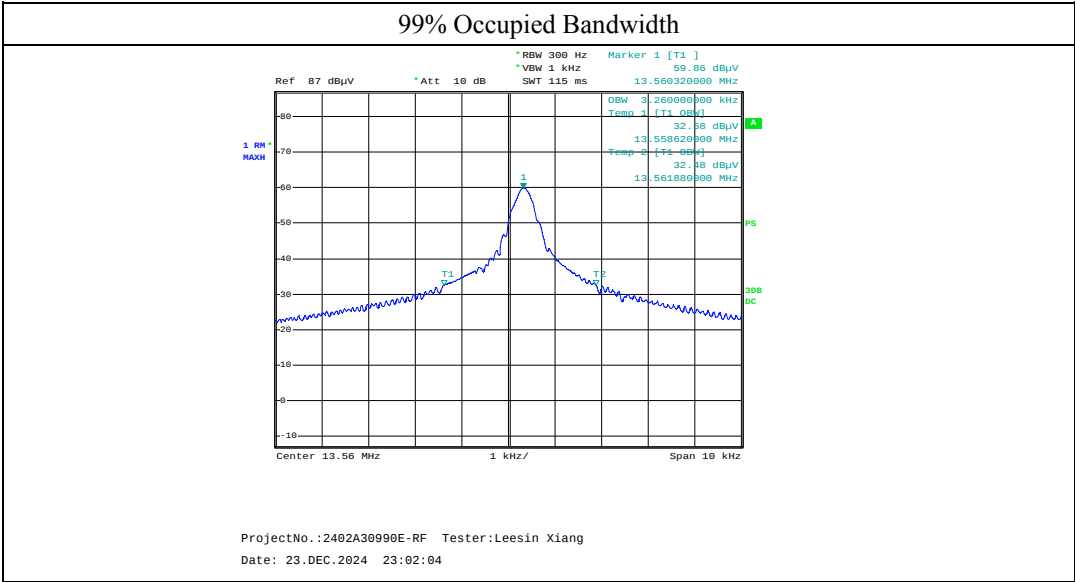
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop Antenna	6512	9706-1206	2023/10/25	2026/10/24
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2024/7/1	2025/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2024/7/1	2025/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2024/7/1	2025/6/30
Sonoma	Amplifier	310N	185914	2024/8/26	2025/8/25
R&S	EMI Test Receiver	ESCI	100224	2024/8/26	2025/8/25

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

Test Frequency (MHz)	99% Occupied Bandwidth (kHz)
13.56	3.26



4.5 Frequency Stability

4.5.1 Applicable Standard

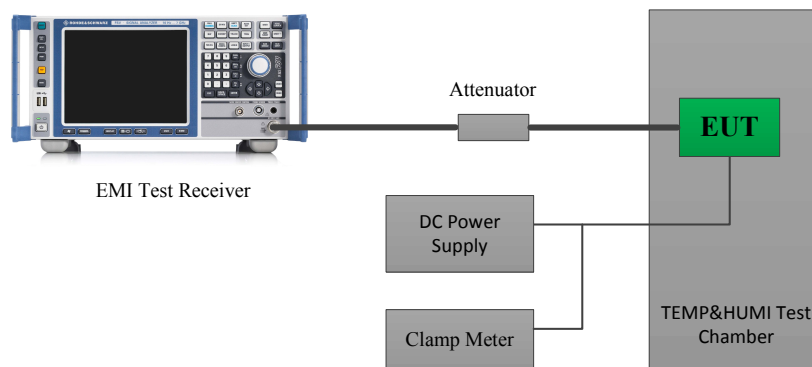
FCC Part 15.225:

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

RSS-210 B.6:

(b) the carrier frequency stability shall not exceed ± 100 ppm

4.5.2 EUT Setup



4.5.3 Test Procedure

According to ANSI C63.10-2013 Section 6.8

Frequency stability with respect to ambient temperature

a) Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT. If possible, a dummy load shall be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, then the EUT shall be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn ON the EUT and tune it to one of the number of frequencies shown in 5.6.

b) Couple the unlicensed wireless device output to the measuring instrument by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away), or by connecting a dummy load to the measuring instrument, through an attenuator if necessary.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.

c) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

- d) Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.
- e) Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.
- f) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.
- g) Measure the frequency at each of frequencies specified in 5.6.
- h) Switch OFF the EUT but do not switch OFF the oscillator heater.
- i) Lower the chamber temperature by not more than 10 °C, and allow the temperature inside the chamber to stabilize.
- j) Repeat step f) through step i) down to the lowest specified temperature.

Frequency stability when varying supply voltage

Unless otherwise specified, these tests shall be made at ambient room temperature (+15 °C to +25 °C). An antenna shall be connected to the antenna output terminals of the EUT if possible. If the EUT is equipped with or uses an adjustable-length antenna, then it shall be fully extended.

- a) Supply the EUT with nominal voltage or install a new or fully charged battery in the EUT. Turn ON the EUT and couple its output to a frequency counter or other frequency-measuring instrument.
NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.
- b) Tune the EUT to one of the number of frequencies required in 5.6. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).
- c) Measure the frequency at each of the frequencies specified in 5.6.
- d) Repeat the above procedure at 85% and 115% of the nominal supply voltage as described in 5.13.

4.5.4 Test Result

Serial Number:	2VQG-1	Test Date:	2025/2/12
Test Site:	RF	Test Mode:	Transmitting
Tester:	Leesin Xiang	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	20.1	Relative Humidity: (%)	43	ATM Pressure: (kPa)	101.1
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2024/7/1	2025/6/30
Narda	Coaxial Attenuator	779-6dB	04269	2023/9/6	2026/9/5
R&S	EMI Test Receiver	ESCI	100224	2024/8/26	2025/8/25
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30173	2024/9/6	2025/9/5
All-sun	Clamp Meter	EM305A	8348897	2024/8/16	2025/8/15
TDK-Lambda	DC Power Supply	Z+60-14	F-08-EM038-1	N/A	N/A

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

$f_0 = 13.56 \text{ MHz}$				
Temperature	Voltage	Measured frequency	Frequency Error	Limit
°C	V _{DC}	MHz	Hz	Hz
-20	4.5	13.56057	570	±1356
-10		13.56054	540	±1356
0		13.56053	530	±1356
10		13.56046	460	±1356
20		13.56037	370	±1356
30		13.56039	390	±1356
40		13.56045	450	±1356
50		13.56041	410	±1356
20	3.0	13.56038	380	±1356

4.6 Antenna Requirement

4.6.1 Applicable Standard

FCC §15.203

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 a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

RSS-Gen §6.8

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

4.6.2 Judgment

Please refer to the Antenna Information detail in Section 1.3.

EXHIBIT A - EUT PHOTOGRAPHS

Please refer to the attachment 2402A30990E-RF-EXP EUT external photographs and 2402A30990E-RF-INP EUT internal photographs.

EXHIBIT B - TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2402A30990E-RF-00A-TSP test setup photographs.

EXHIBIT C - RF EXPOSURE EVALUATION

Applicable Standard

According to KDB447498 D01 General RF Exposure Guidance v06: 4.3. General SAR test exclusion guidance

c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):

- 1) For *test separation distances* > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by $[1 + \log(100/f_{\text{(MHz)}})]$
- 2) For *test separation distances* ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$
- 3) SAR measurement procedures are not established below 100 MHz

Measurement Result:

For NFC, the power of EUT: E Field@3m is 64.52 dBuV/m = -30.68dBm (0.001mW)

Note: $E[\text{dB}\mu\text{V/m}] = \text{EIRP}[\text{dBm}] + 95.2$ for $d = 3$ m.

SAR test exclusion threshold for NFC(13.56MHz) separation distance < 50 mm

$$= [474 * (1 + \log(100/f_{\text{(MHz)}}))] / 2$$

$$= 443\text{mW}$$

$$> 0.001\text{mW}$$

Result: Compliant.

Exemption Limits For Routine Evaluation-RF Exposure Evaluation

Applicable Standard

RSS-102, Issue 6, Clause 6.3:

Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in table 11, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

Table 11: Power limits for exemption from routine SAR evaluation based on the separation distance

Frequency (MHz)	≤ 5 mm (mW)	10 mm (mW)	15 mm (mW)	20 mm (mW)	25 mm (mW)	30 mm (mW)	35 mm (mW)	40 mm (mW)	45 mm (mW)	> 50 mm (mW)
≤ 300	45	116	139	163	189	216	246	280	319	362
450	32	71	87	104	124	147	175	208	248	296
835	21	32	41	54	72	96	129	172	228	298
1900	6	10	18	33	57	92	138	194	257	323
2450	3	7	16	32	56	89	128	170	209	245
3500	2	6	15	29	50	72	94	114	134	158
5800	1	5	13	23	32	41	54	74	102	128

Measurement Result:

For NFC, the power of EUT: E Field@3m is 64.52 dBuV/m = -30.68dBm (0.001mW)

Note: $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2$ for $d = 3$ m.

The exemption power(P) limits for routine evaluation in 13.56MHz is:

$P = 45 \text{ mW}@13.56 \text{ MHz}$

$> 0.001\text{mW}$

So the stand-alone SAR evaluation can be exempted.

***** END OF REPORT *****