FCC RADIO TEST REPORT

FCC ID	:	2AEUPBHAKE001
Equipment	:	Ring WallCall
Model Name	:	8KCEA2 8KCEAB
Applicant	:	Ring LLC 12515 Cerise Ave, Hawthorne, CA 90250, USA
Standard	:	FCC Part 15 Subpart C §15.225

The product was received on May 06, 2024 and testing was performed from May 14, 2024 to May 30, 2024. We, Sporton International (USA) Inc. would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International (USA) Inc., the test report shall not be reproduced except in full.

Approved by: Neil Kao

Sporton International (USA) Inc.
1175 Montague Expressway, Milpitas, CA 95035

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History of this test report

Report No.	Version	Description	Issue Date
FR240326001	01	Initial issue of report	Jun. 17, 2024
FR240326001	02	Revise List of Measuring Equipment This report is an updated version, replacing the report issued on Jun. 17, 2024.	Jun. 20, 2024

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)
3.1	15.207	AC Power Line Conducted Emissions	Pass
3.2	15.215(c)	20dB Spectrum Bandwidth	Pass
	2.1049	99% OBW Spectrum Bandwidth	Reporting only
3.3	15.225(e)	Frequency Stability	Pass
3.4	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Pass
3.5	15.225(d) 15.209	Radiated Spurious Emissions	Pass
3.6	15.203	Antenna Requirements	Pass

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”.

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1. General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Ring WallCall
Model Name	8KCEA2 8KCEAB
Sample 1	8KCEA2 (A4)
Sample 2	8KCEAB (A5)
EUT supports Radios application	GSM/EGPRS/LTE/NFC

1.2 Modification of EUT

No modifications made to the EUT during the testing.

1.3 Testing Location

Test Site	Sporton International (USA) Inc.		
Test Site Location	1175 Montague Expressway, Milpitas, CA 95035 TEL: (408) 904-3300		
Test Site No.	**Sporton Site No.**		
	TH02-CA	CO01-CA	03CH01-CA
Test Engineer	Leon Huang	Jin Peng	Leo Liu
Temperature	22~24 ℃	19~22 ℃	21~23.2 ℃
Relative Humidity	53~55 %	42~45 %	42.1~46.7 %

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: US1250

1.4 Applicable Standards

According to the specifications declared by the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.225
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

Remark: All the test items were validated and recorded in accordance with the standards without any modification during the testing.

2. Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

Investigation has been done on all the possible configurations.

The following table is a list of the test modes shown in this test report.

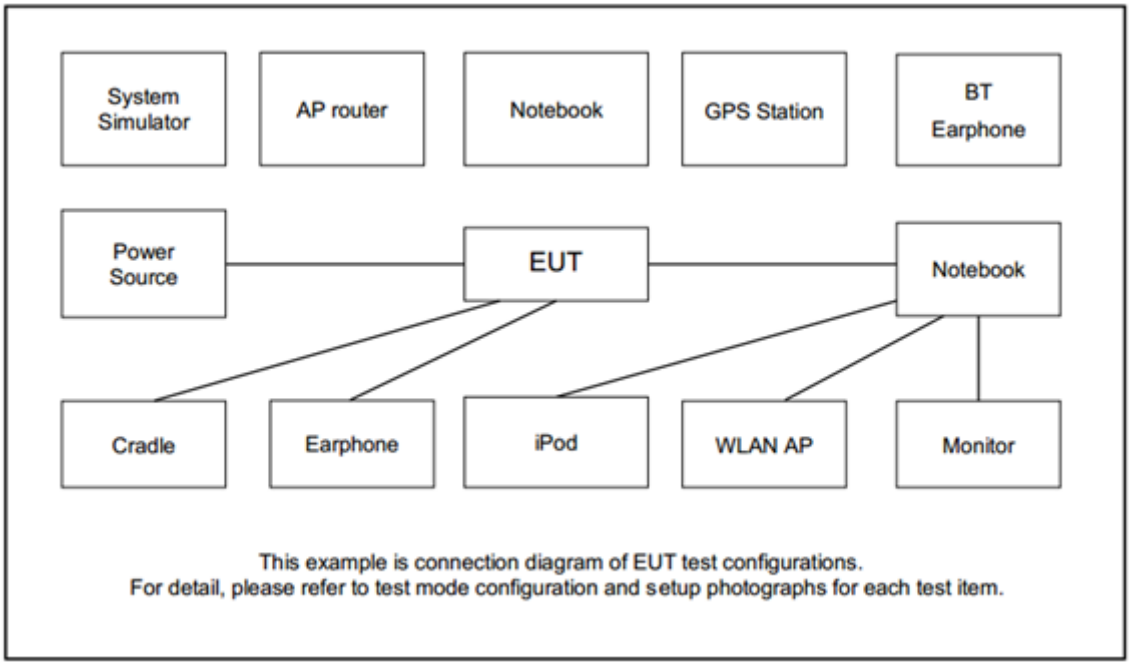
Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

The EUT pre-scanned in reader mode with NFC tag (four NFC type A) and without reading tag. Based on the highest field strength of fundamental and spurious emissions, the worst case type (type A) was recorded in this report.

The measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and three receiving antenna orientations (parallel, perpendicular, and ground-parallel) for Coil Antenna, and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and only the worst case emissions were reported in this report.

Test Cases	
AC Conducted Emission	Mode 1: GSM 1900 Idle– Mid channel + NFC Link + POE for Sample 1
Remark: For Radiated Test Cases, the tests were performed with Sample 2.	

2.2 Connection Diagram of Test System



2.3 Table for Supporting Units

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	POE Adapter	CUDY	POE400	POE Adapter	N/A	N/A

2.4 EUT Operation Test Setup

The EUT is programmed to be in continuously transmitting mode.

The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmitting signal (Power Level: Default) at 13.56MHz.

3. Test Results

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	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.

For terminal test result, the testing follows FCC KDB 174176.

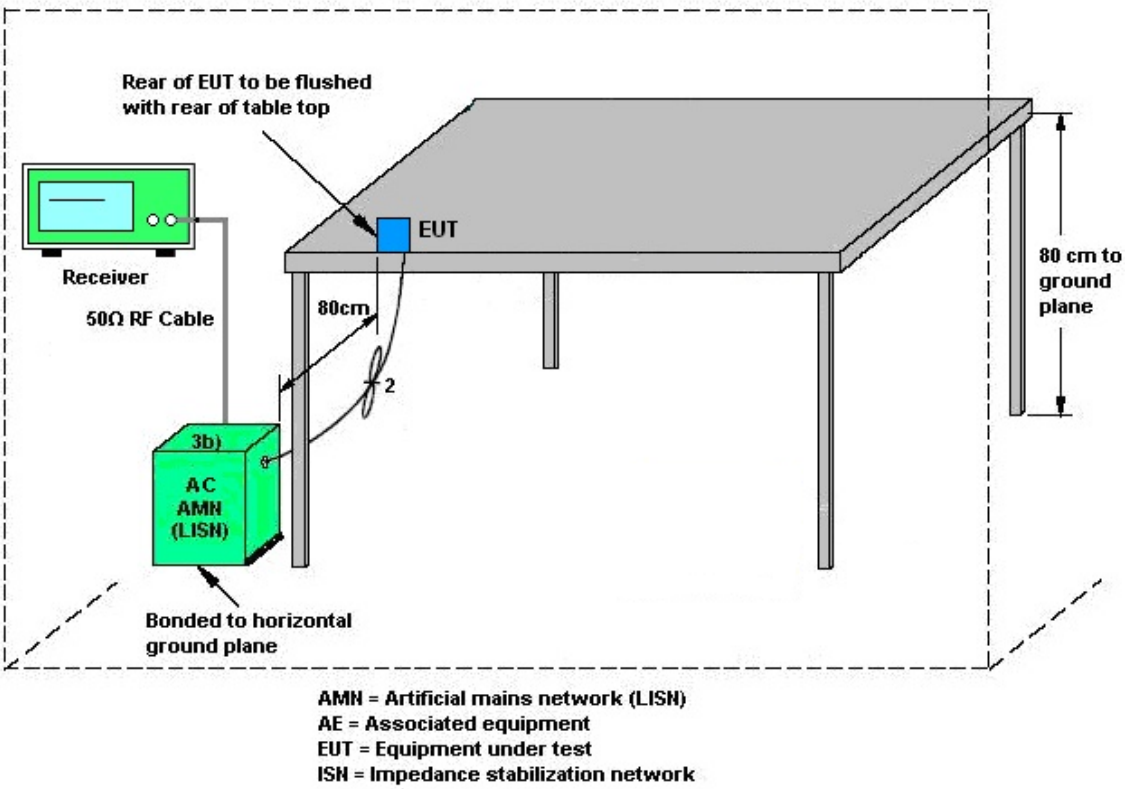
3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.1.3 Test Procedures

1. The EUT is placed 0.4 meter away from the conducting wall of the shielding room, and is kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN shall be used.
6. Both Line and Neutral shall be tested in order to find out the maximum conducted emission.
7. The frequency range from 150 kHz to 30 MHz is scanned.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9 kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.1.4 Test setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.1.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

Note:

(1) with antenna

Remark: 13.560MHz is the NFC RF fundamental signal.

(2) with dummy load

Remark: Only the fundamental NFC signal needs to be retested per C63.4.

3.2 20dB and 99% OBW Spectrum Bandwidth Measurement

3.2.1 Limit

Intentional radiators must be designed to ensure that the 20 dB and 99% emission bandwidth in the specific band 13.553~13.567 MHz.

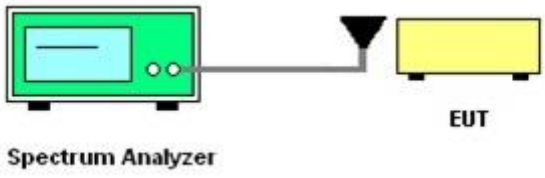
3.2.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.2.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max Hold Mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
3. Measured the spectrum width with power higher than 20 dB below carrier.
4. Measured the 99% OBW.

3.2.4 Test Setup



3.2.5 Test Result of Near Field Test Items

Please refer to Appendix B.

3.3 Frequency Stability Measurement

3.3.1 Limit

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% (100ppm) 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 by using a new battery.

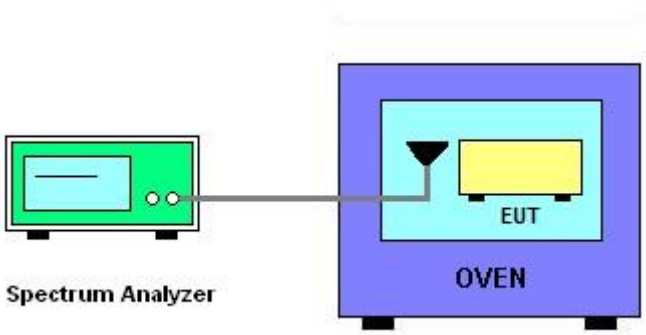
3.3.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.3.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT.
2. EUT has transmitted signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 3 kHz with peak detector and maxhold settings.
5. The fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10^6 ppm and the limit is less than ±100ppm.
6. Extreme temperature rule is -20°C~50°C.

3.3.4 Test Setup



3.3.5 Test Result of Near Field Test Items

Please refer to Appendix B.

3.4 Field Strength of Fundamental Emissions and Mask Measurement

3.4.1 Limit

Rules and specifications	FCC CFR 47 Part 15 section 15.225			
Description	Compliance with the spectrum mask is tested with RBW set to 9kHz.			
Freq. of Emission (MHz)	Field Strength (μV/m) at 30m	Field Strength (dBμV/m) at 30m	Field Strength (dBμV/m) at 10m	Field Strength (dBμV/m) at 3m
1.705~13.110	30	29.5	48.58	69.5
13.110~13.410	106	40.5	59.58	80.5
13.410~13.553	334	50.5	69.58	90.5
13.553~13.567	15848	84.0	103.08	124.0
13.567~13.710	334	50.5	69.58	90.5
13.710~14.010	106	40.5	59.58	80.5
14.010~30.000	30	29.5	48.58	69.5

Remark:

1. The field strength test result is in 3m test distance, follow test rules the test data use distance extrapolation factor and reported in this report at 30m test result.
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)

3.4.2 Measuring Instruments

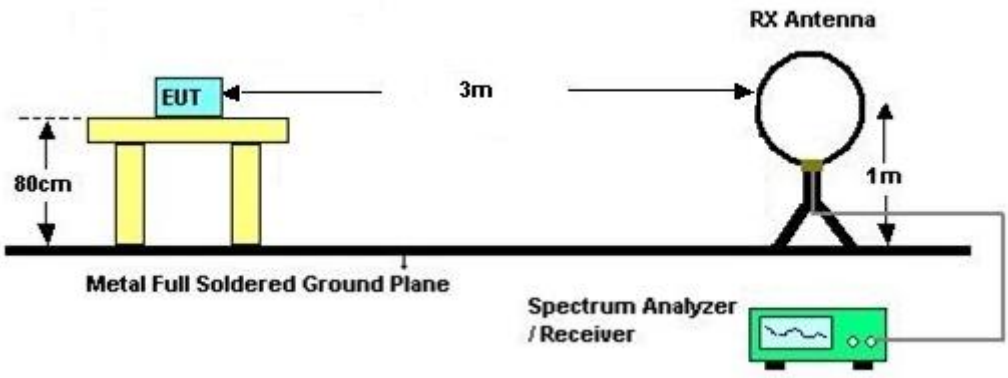
Please refer to the measuring equipment list in this test report.

3.4.3 Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT is placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower is placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable is rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna is fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure QP reading.
5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
6. Compliance with the spectrum mask is tested with RBW set to 9 kHz.
   Note: Emission level (dBμV/m) = 20 log Emission level (μV/m).

3.4.4 Test Setup

For radiated test below 30MHz



3.4.5 Test Result of Field Strength of Fundamental Emissions and Mask

Please refer to Appendix C.

3.5 Radiated Emissions Measurement

3.5.1 Limit

The field strength of any emissions which appear outside of 13.110 ~14.010MHz band shall not exceed the general radiated emissions limits.

Frequencies (MHz)	Field Strength (μV/m)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.5.3 Measuring Instrument Setting

The following table is the setting of receiver:

Receiver Parameter	Setting
Attenuation	Auto
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

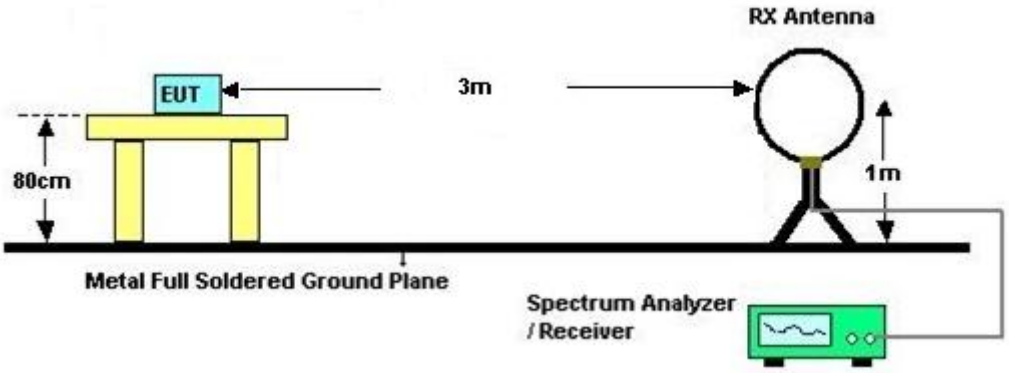
Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz and 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

3.5.4 Test Procedures

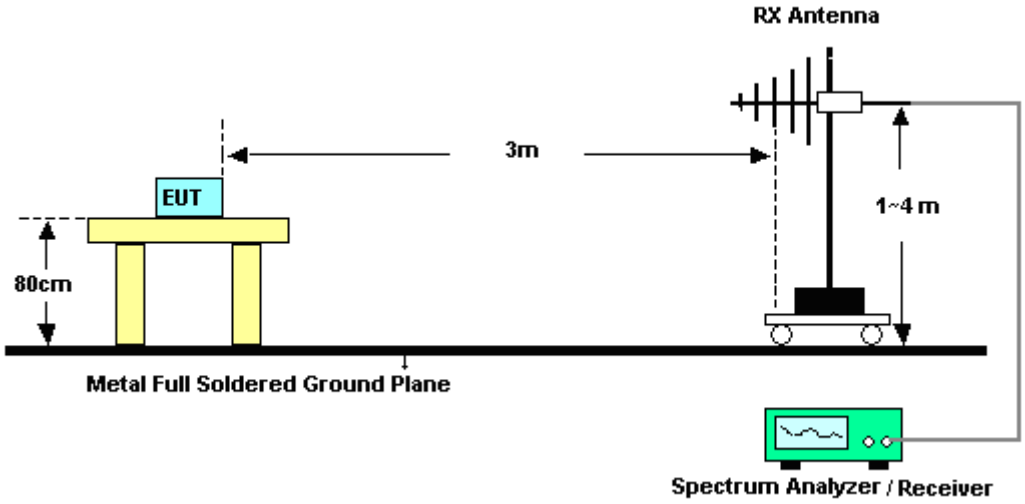
1. Configure the EUT according to ANSI C63.10. The EUT is placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower is placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable is rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna is varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower is scanned (from 1 M to 4 M) and then the turntable is rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
7. In case the emission is lower than 30 MHz, loop antenna has to be used for measurement and the recorded data shall be QP measured by receiver.
8. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as “-“.

3.5.5 Test Setup

For radiated test below 30MHz



For radiated test above 30MHz



3.5.6 Test Result of Radiated Emissions Measurement

Please refer to Appendix C.

Remark:

1. There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.
2. According to C63.10 radiated test, the EUT pre-scanned horizontal, vertical, and ground-parallel three polarization's, the worst case is horizontal & vertical polarization, test data of two modes was reported.

3.6 Antenna Requirements

3.6.1 Standard Applicable

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. 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 the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

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 rule.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

4. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TESTO	608-H1	45141354	N/A	Jul. 26, 2023	May 23, 2024	Jul. 25, 2024	Near Field (TH02-CA)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101545	10Hz~40GHz	Apr. 25, 2024	May 23, 2024	Apr. 24, 2025	Near Field (TH02-CA)
Temperature and Humidity chamber	ESPEC	SH-642	93012171	N/A	Sep. 06, 2023	May 23, 2024	Sep. 05, 2024	Near Field (TH02-CA)
DC Power Supply	GW Instek	SPS-606	GEW870184	N/A	Apr. 24, 2024	May 23, 2024	Apr. 23, 2025	Near Field (TH02-CA)
Coupling loop antenna	EMV-TECHNIK	LF-R 400	02-1641; 101067	N/A	Aug. 31, 2023	May 23, 2024	Aug. 30, 2024	Near Field (TH02-CA)
LISN	TESEQ	NNB51	47415	N/A	Aug. 04, 2023	May 14, 2024 ~ May 16, 2024	Aug. 03, 2024	Conduction (CO01-CA)
LISN	TESEQ	NNB51	47407	N/A	Apr. 23, 2024	May 14, 2024 ~ May 16, 2024	Apr. 22, 2025	Conduction (CO01-CA)
EMI Test Receiver	R&S	ESR7	102177	9kHz~7GHz	Apr. 23, 2024	May 14, 2024 ~ May 16, 2024	Apr. 22, 2025	Conduction (CO01-CA)
Pulse limiter with 10dB attenuation	R&S	VTSD 9561-F N	9561-F-N00412	N/A	Jun. 05, 2023	May 14, 2024 ~ May 16, 2024	Jun. 04, 2024	Conduction (CO01-CA)
Test Software	R&S	EMC32 V10.30.0	N/A	N/A	N/A	May 14, 2024 ~ May 16, 2024	N/A	Conduction (CO01-CA)
Bilog Antenna	TESEQ	6111D	54683	30MHz~1GHz	Nov. 13, 2023	May 30, 2024	Nov. 12, 2024	Radiation (03CH01-CA)
Loop Antenna	R&S	HFH2-Z2E	100840	9kHz~30MHz	Jun. 29, 2023	May 30, 2024	Jun. 28, 2024	Radiation (03CH01-CA)
Preamplifier	SONOMA	310N	372241	9kHz~1GHz	Apr. 24, 2024	May 30, 2024	Apr. 23, 2025	Radiation (03CH01-CA)
EMI Test Receiver	R&S	ESU26	100049	20Hz~26.5GHz	Apr. 25, 2024	May 30, 2024	Apr. 24, 2025	Radiation (03CH01-CA)
RF Cable	HUBER+SUHNER	SUCOFLEX 102	8015932/2,8015762/2, 804938/2	NA	Mar. 05, 2024	May 30, 2024	Mar. 04, 2025	Radiation (03CH01-CA)
Hygrometer	TESTO	608-H1	45141354	NA	Jul. 26, 2023	May 30, 2024	Jul. 25, 2024	Radiation (03CH01-CA)
Controller	Chaintek	EM-1000	060881	Control Turn Table & Antenna Mast	N/A	May 30, 2024	N/A	Radiation (03CH01-CA)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	May 30, 2024	N/A	Radiation (03CH01-CA)
Test Software	Audix E3	E6.2009-8-24d	PK-002093	N/A	N/A	May 30, 2024	N/A	Radiation (03CH01-CA)

5. Measurement Uncertainty

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.7 dB**

Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.7 dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.6 dB**

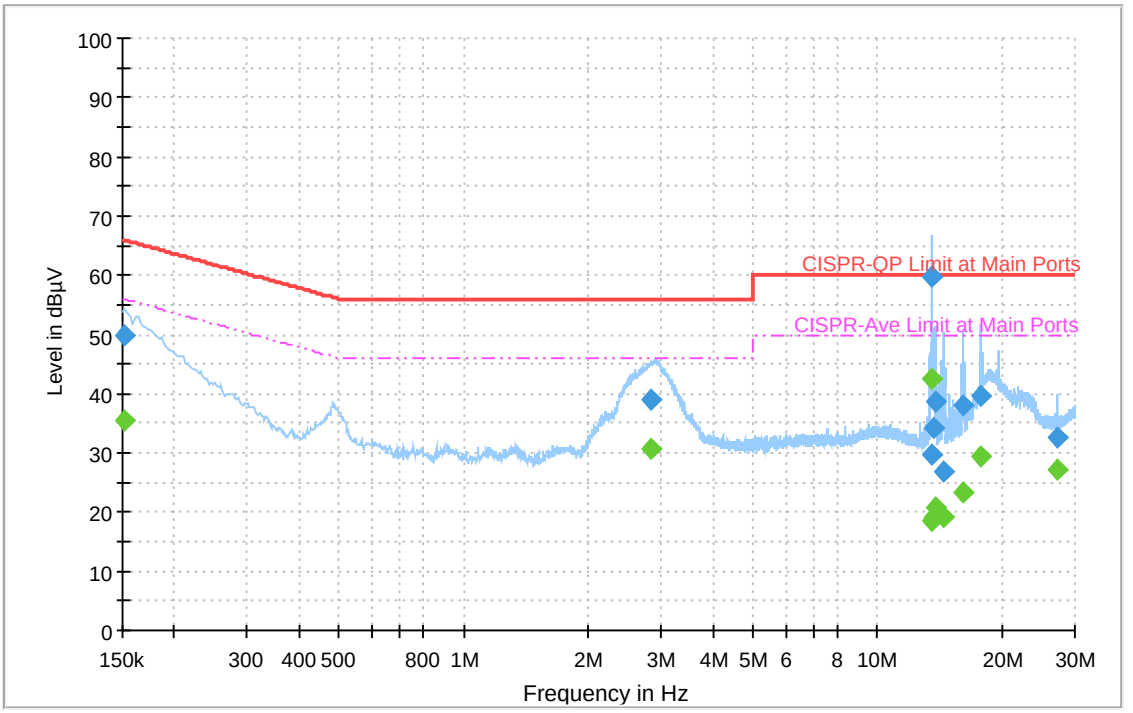
Appendix A. Test Results of Conducted Emission Test

<Original>

EUT Information

Test Site Location :	CO01-CA
Project	240326001
Power:	120Vac/60Hz
Mode	1

Full Spectrum



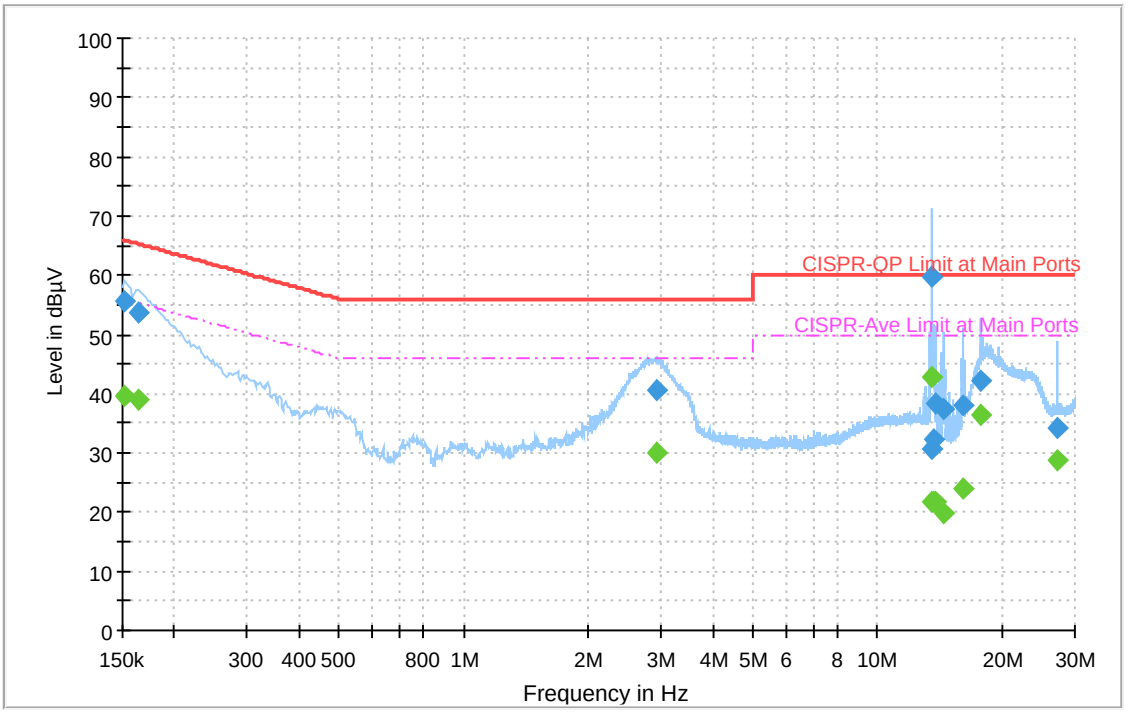
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	35.46	55.88	20.42	L1	OFF	20.3
0.152250	49.89	---	65.88	15.99	L1	OFF	20.3
2.843250	---	30.73	46.00	15.27	L1	OFF	20.5
2.843250	38.87	---	56.00	17.13	L1	OFF	20.5
13.456500	---	18.57	50.00	31.43	L1	OFF	21.7
13.456500	29.79	---	60.00	30.21	L1	OFF	21.7
13.562250	---	42.63	50.00	7.37	L1	OFF	21.7
13.562250	59.60	---	60.00	0.40	L1	OFF	21.7
13.668000	---	19.10	50.00	30.90	L1	OFF	21.7
13.668000	34.17	---	60.00	25.83	L1	OFF	21.7
13.773750	---	20.69	50.00	29.31	L1	OFF	21.7
13.773750	38.70	---	60.00	21.30	L1	OFF	21.7
14.408250	---	19.03	50.00	30.97	L1	OFF	21.8
14.408250	26.69	---	60.00	33.31	L1	OFF	21.8
16.104750	---	23.39	50.00	26.61	L1	OFF	22.0
16.104750	38.16	---	60.00	21.84	L1	OFF	22.0
17.799000	---	29.40	50.00	20.60	L1	OFF	22.2
17.799000	39.68	---	60.00	20.32	L1	OFF	22.2
27.123000	---	27.12	50.00	22.88	L1	OFF	22.8
27.123000	32.50	---	60.00	27.50	L1	OFF	22.8

EUT Information

Test Site Location :	CO01-CA
Project	240326001
Power:	120Vac/60Hz
Mode	1

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	39.69	55.88	16.19	N	OFF	20.3
0.152250	55.52	---	65.88	10.36	N	OFF	20.3
0.163500	---	38.99	55.28	16.29	N	OFF	20.3
0.163500	53.74	---	65.28	11.54	N	OFF	20.3
2.924250	---	30.12	46.00	15.88	N	OFF	20.5
2.924250	40.47	---	56.00	15.53	N	OFF	20.5
13.481250	---	21.73	50.00	28.27	N	OFF	21.7
13.481250	30.67	---	60.00	29.33	N	OFF	21.7
13.562250	---	42.78	50.00	7.22	N	OFF	21.7
13.562250	59.61	---	60.00	0.39	N	OFF	21.7
13.641000	---	21.71	50.00	28.29	N	OFF	21.7
13.641000	32.40	---	60.00	27.60	N	OFF	21.7
13.773750	---	21.84	50.00	28.16	N	OFF	21.8
13.773750	38.37	---	60.00	21.63	N	OFF	21.8
14.408250	---	19.66	50.00	30.34	N	OFF	21.8
14.408250	37.32	---	60.00	22.68	N	OFF	21.8
16.104750	---	23.82	50.00	26.18	N	OFF	22.0
16.104750	38.06	---	60.00	21.94	N	OFF	22.0
17.799000	---	36.53	50.00	13.47	N	OFF	22.1
17.799000	42.33	---	60.00	17.67	N	OFF	22.1
27.123000	---	28.89	50.00	21.11	N	OFF	22.8

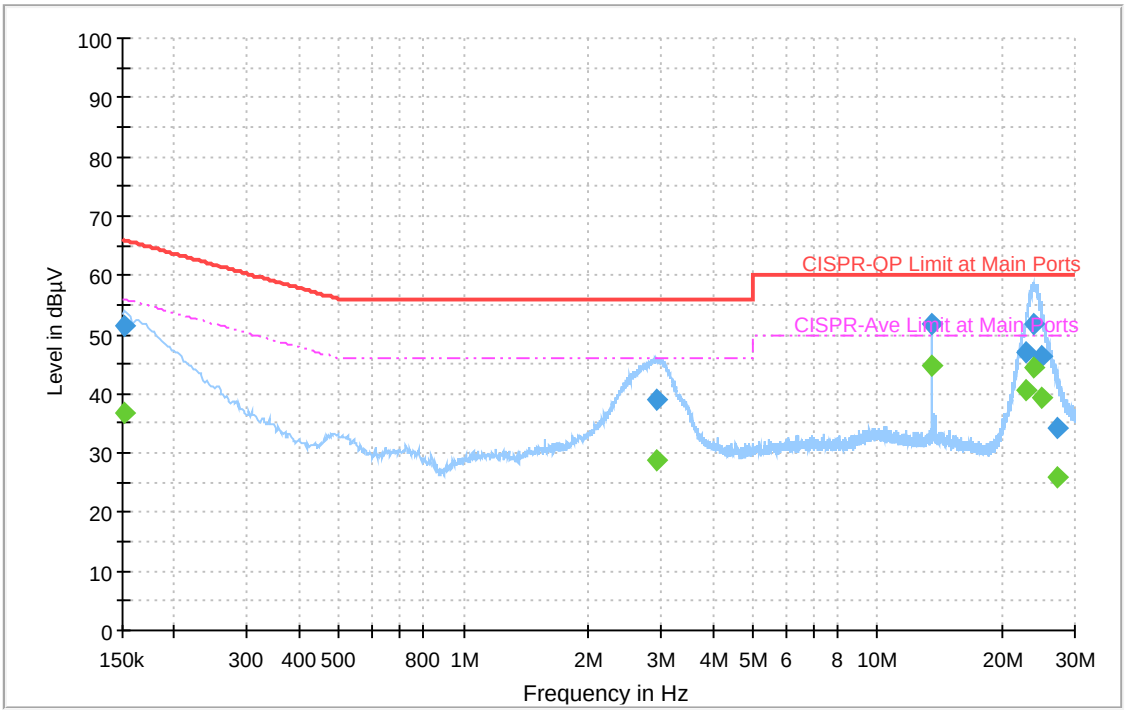
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
27.123000	34.19	---	60.00	25.81	N	OFF	22.8

<Terminal>

EUT Information

Test Site Location :	CO01-CA
Project	240326001
Power:	120Vac/60Hz
Mode	1

Full Spectrum



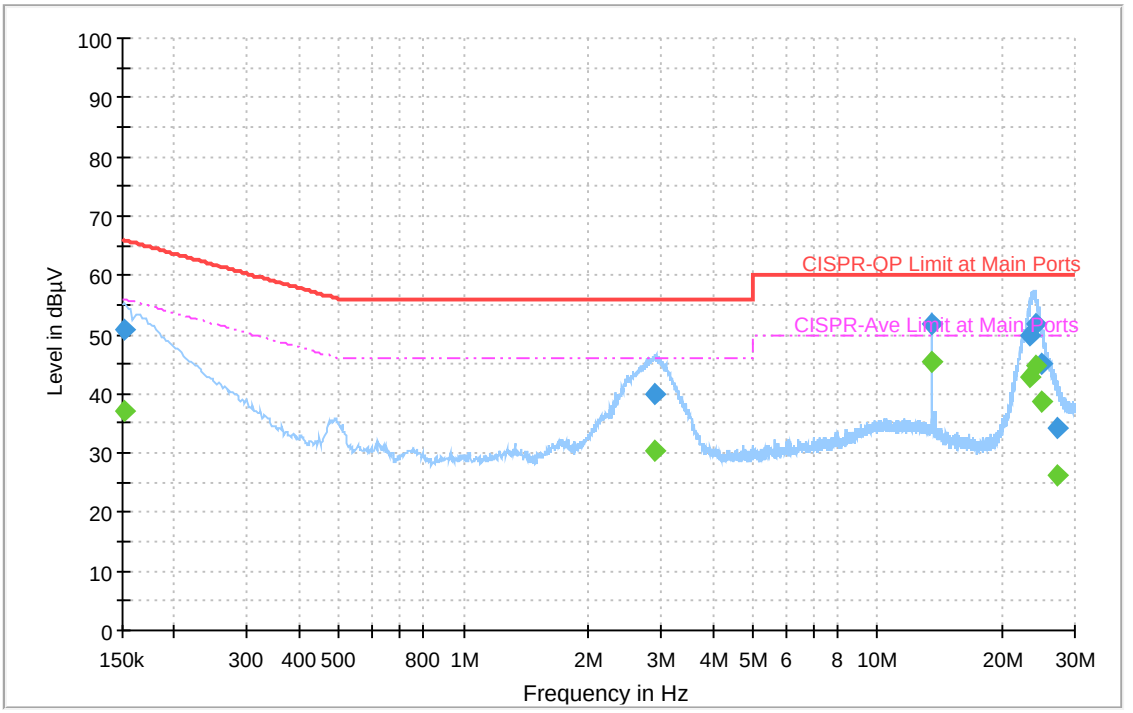
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	36.77	55.88	19.11	L1	OFF	20.3
0.152250	51.30	---	65.88	14.58	L1	OFF	20.3
2.942250	---	28.77	46.00	17.23	L1	OFF	20.5
2.942250	39.10	---	56.00	16.90	L1	OFF	20.5
13.562250	---	44.79	50.00	5.21	L1	OFF	21.7
13.562250	51.78	---	60.00	8.22	L1	OFF	21.7
22.834500	---	40.52	50.00	9.48	L1	OFF	22.6
22.834500	47.09	---	60.00	12.91	L1	OFF	22.6
23.752500	---	44.48	50.00	5.52	L1	OFF	22.6
23.752500	51.88	---	60.00	8.12	L1	OFF	22.6
24.927000	---	39.19	50.00	10.81	L1	OFF	22.7
24.927000	46.18	---	60.00	13.82	L1	OFF	22.7
27.129750	---	25.90	50.00	24.10	L1	OFF	22.8
27.129750	34.20	---	60.00	25.80	L1	OFF	22.8

EUT Information

Test Site Location :	CO01-CA
Project	240326001
Power:	120Vac/60Hz
Mode	1

Full Spectrum



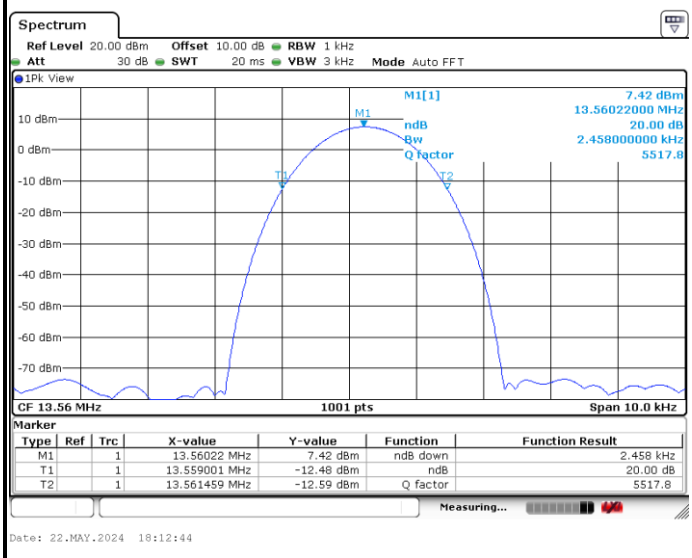
Final_Result

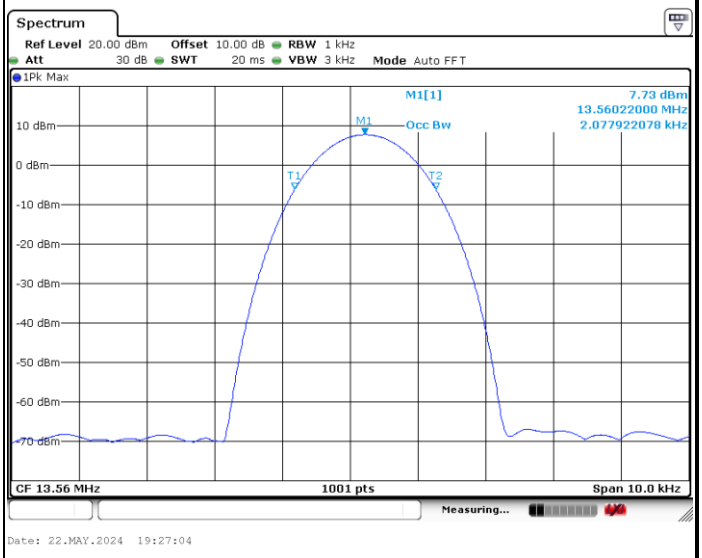
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	37.14	55.88	18.74	N	OFF	20.3
0.152250	50.87	---	65.88	15.01	N	OFF	20.3
2.886000	---	30.31	46.00	15.69	N	OFF	20.5
2.886000	39.80	---	56.00	16.20	N	OFF	20.5
13.562250	---	45.22	50.00	4.78	N	OFF	21.7
13.562250	51.85	---	60.00	8.15	N	OFF	21.7
23.250750	---	42.76	50.00	7.24	N	OFF	22.5
23.250750	49.86	---	60.00	10.14	N	OFF	22.5
24.067500	---	44.59	50.00	5.41	N	OFF	22.6
24.067500	51.60	---	60.00	8.40	N	OFF	22.6
24.913500	---	38.79	50.00	11.21	N	OFF	22.6
24.913500	45.14	---	60.00	14.86	N	OFF	22.6
27.125250	---	26.28	50.00	23.72	N	OFF	22.8
27.125250	34.20	---	60.00	25.80	N	OFF	22.8

Appendix B. Test Results of Near Field Test Items

B1. Test Result of 20dB Spectrum Bandwidth

Test mode	NFC Tx	Test Frequency (MHz)	13.56





20dB Bandwidth (kHz)	2.46	99% OccupiedBW(kHz)	2.08
Frequency range (MHz)	**f_L > 13.553**	13.559001	**Test Result**
	f_H < 13.567	13.561459	**Complies**

Remark: Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

B2. Test Result of Frequency Stability

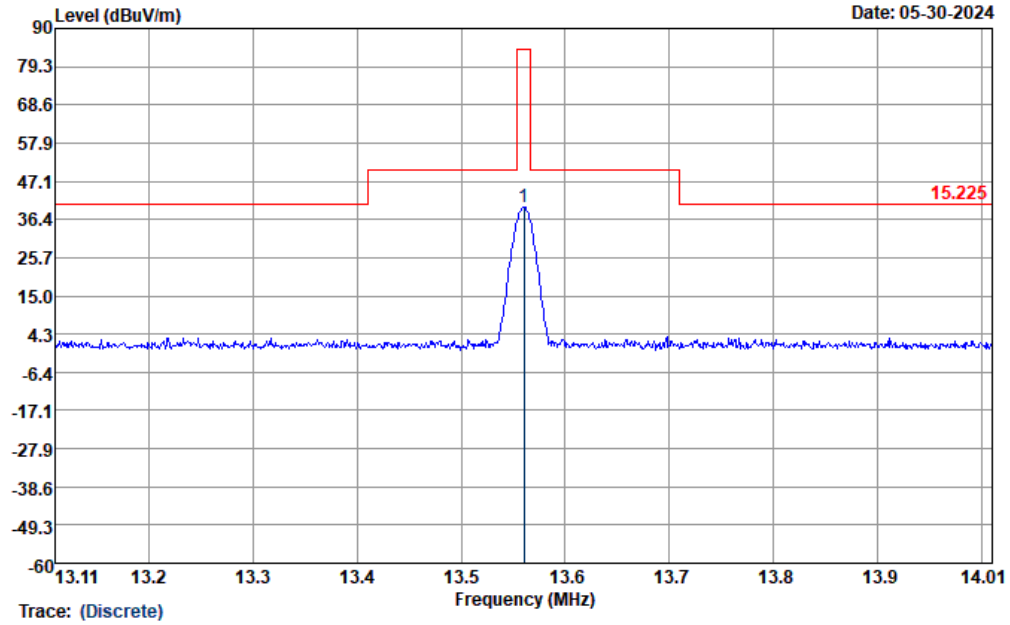
Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vdc)	Measurement Frequency (MHz)	Temperature (℃)	Time (min)	Measurement Frequency (MHz)
25.5	13.560230	**-20**	**0**	13.560260
30	13.560230		**2**	13.560260
34.5	13.560230		**5**	13.560260
			10	13.560250
		-10	**0**	13.560265
			2	13.560265
			5	13.560265
			10	13.560265
		0	**0**	13.560265
			2	13.560265
			5	13.560265
			10	13.560260
		10	**0**	13.560260
			2	13.560260
			5	13.560250
			10	13.560250
		20	**0**	13.560245
			2	13.560240
			5	13.560240
			10	13.560230
		30	**0**	13.560225
			2	13.560220
			5	13.560220
			10	13.560220
		40	**0**	13.560220
			2	13.560220
			5	13.560220
			10	13.560220

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vdc)	Measurement Frequency (MHz)	Temperature (℃)	Time (min)	Measurement Frequency (MHz)
		50	0	13.560220
			2	13.560225
			5	13.560225
			10	13.560230
Max.Deviation (MHz)	0.000230	Max.Deviation (MHz)		0.000265
Max.Deviation (ppm)	16.9617	Max.Deviation (ppm)		19.5428
Limit	FS < ±100 ppm	Limit		FS < ±100 ppm
Test Result	PASS	Test Result		PASS

Appendix C. Test Results of Radiated Test Items

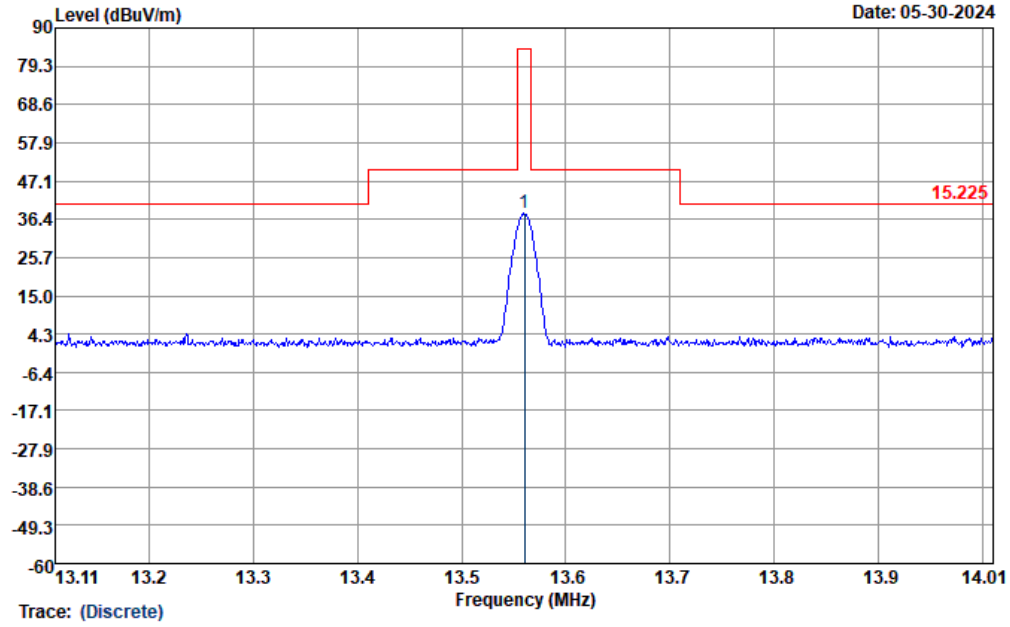
C1. Test Result of Field Strength of Fundamental Emissions

Test Mode :	NFC Tx	Test Frequency (MHz)	13.56



Frequency (MHz)	Level (dBµV/m)	Distance extrapolation Factor (dB)	Margin (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
13.56	39.86	40	-44.14	84	47.94	31.38	0.54	100	17	QP

Test Mode :	NFC Tx	Test Frequency (MHz)	13.56



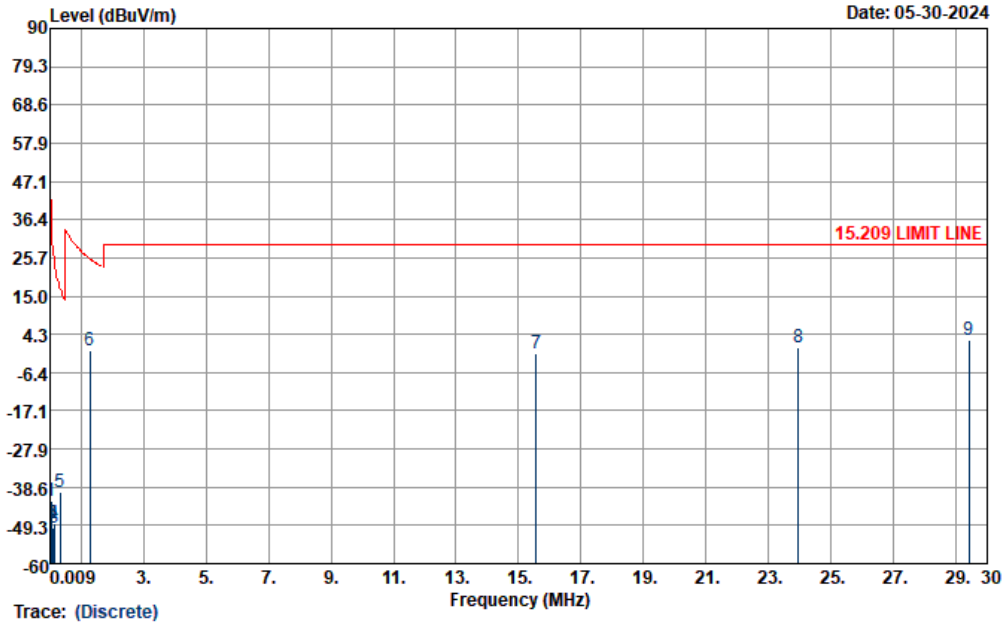
Frequency (MHz)	Level (dBµV/m)	Distance extrapolation Factor (dB)	Margin (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
13.56	37.98	40	-46.02	84	46.06	31.38	0.54	100	280	QP

Note :

1. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
2. Level = Antenna Factor + Cable Loss + Read Level - Distance extrapolation factor.

C2. Results of Radiated Spurious Emissions (9 kHz~30MHz)

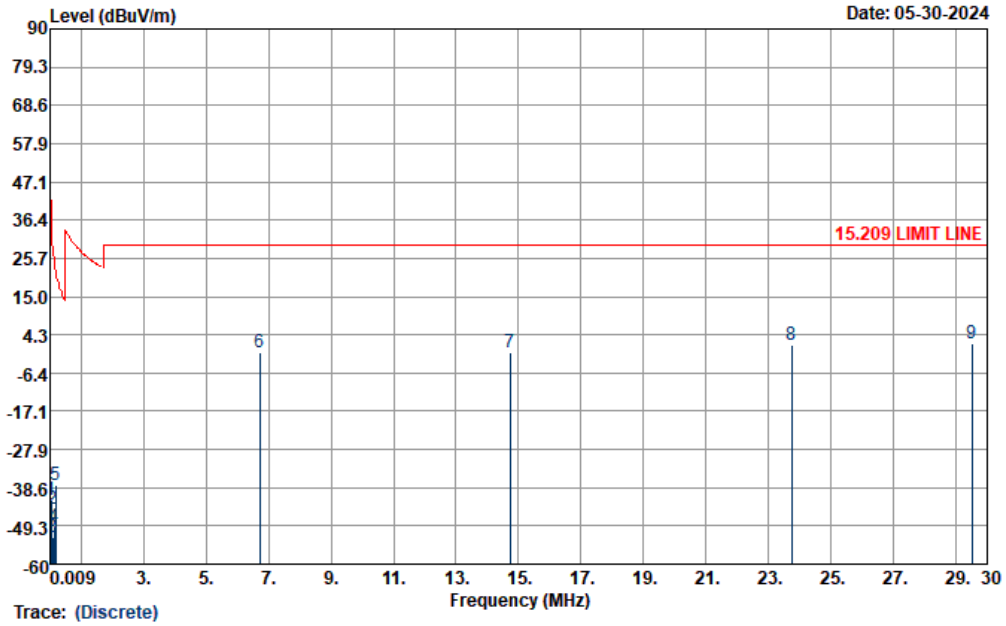
Test Mode :	NFC Tx	Polarization :	Horizontal



Site : 03CH01-CA
Condition : 15.209 LIMIT LINE 3m LOOP_100840_ON230629 HORIZONTAL
: RBW:9.000KHz VBW:27.000KHz SWT:Auto

Frequency (MHz)	Level (dBµV/m)	Distance extrapolation Factor (dB)	Margin (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.03547	-42.4	80	-79.01	36.61	6.65	30.91	0.04	-	-	Average
0.07008	-48.63	80	-79.32	30.69	1	30.33	0.04	-	-	Average
0.1077	-49.86	80	-76.82	26.96	0.21	29.87	0.06	-	-	QP
0.13692	-48.74	80	-73.61	24.87	1.31	29.88	0.07	-	-	Average
0.32102	-40.11	80	-57.58	17.47	9.99	29.81	0.09	-	-	Average
1.286	-0.17	40	-25.59	25.42	9.34	30.32	0.17	-	-	QP
15.568	-0.93	40	-30.43	29.5	6.92	31.57	0.58	-	-	QP
23.956	0.67	40	-28.83	29.5	7.43	32.49	0.75	-	-	QP
29.415	2.63	40	-26.87	29.5	8.61	33.2	0.82	-	-	QP

Test Mode :	NFC Tx	Polarization :	Vertical



Site : 03CH01-CA
Condition : 15.209 LIMIT LINE 3m LOOP_100840_ON230629 VERTICAL
: RBW:9.000KHz VBW:27.000KHz SWT:Auto

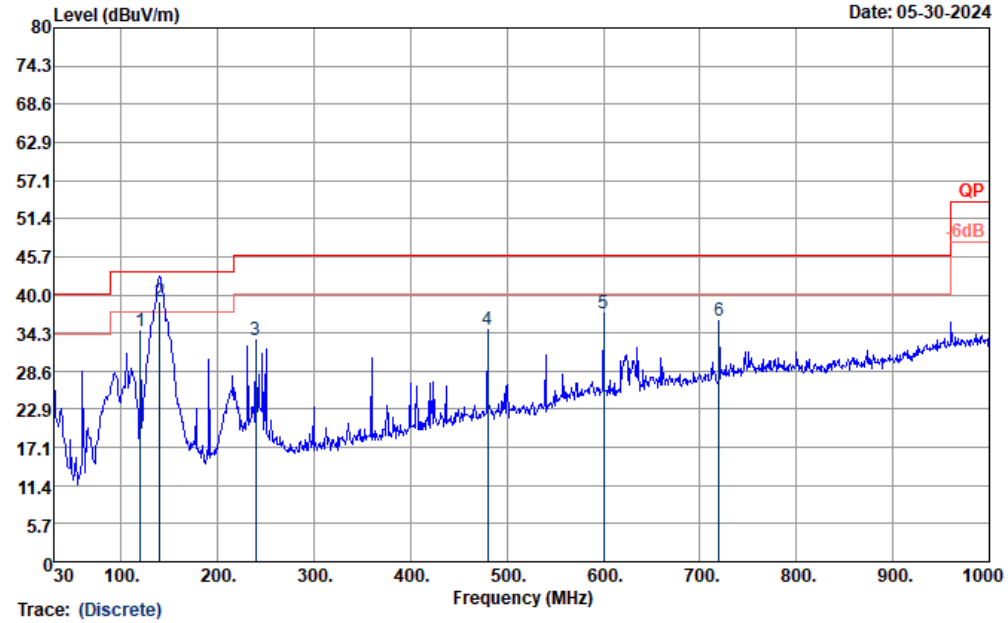
Frequency (MHz)	Level (dBµV/m)	Distance extrapolation Factor (dB)	Margin (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.03516	-42.16	80	-78.84	36.68	6.88	30.92	0.04	-	-	Average
0.07005	-44.67	80	-75.37	30.7	4.96	30.33	0.04	-	-	Average
0.0991	-52.34	80	-80.02	27.68	-2.3	29.9	0.06	-	-	QP
0.1454	-49.73	80	-74.08	24.35	0.31	29.89	0.07	-	-	Average
0.1891	-37.83	80	-59.9	22.07	12.18	29.91	0.08	-	-	Average
6.716	-0.62	40	-30.12	29.5	8.48	30.53	0.37	-	-	QP
14.736	-0.68	40	-30.18	29.5	7.27	31.49	0.56	-	-	QP
23.74	1.5	40	-28	29.5	8.3	32.46	0.74	-	-	QP
29.51	1.8	40	-27.7	29.5	7.77	33.21	0.82	-	-	QP

Note :

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
3. Level = Antenna Factor + Cable Loss + Read Level - Distance extrapolation factor.
4. 13.56 MHz is fundamental signal which can be ignored.
5. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.

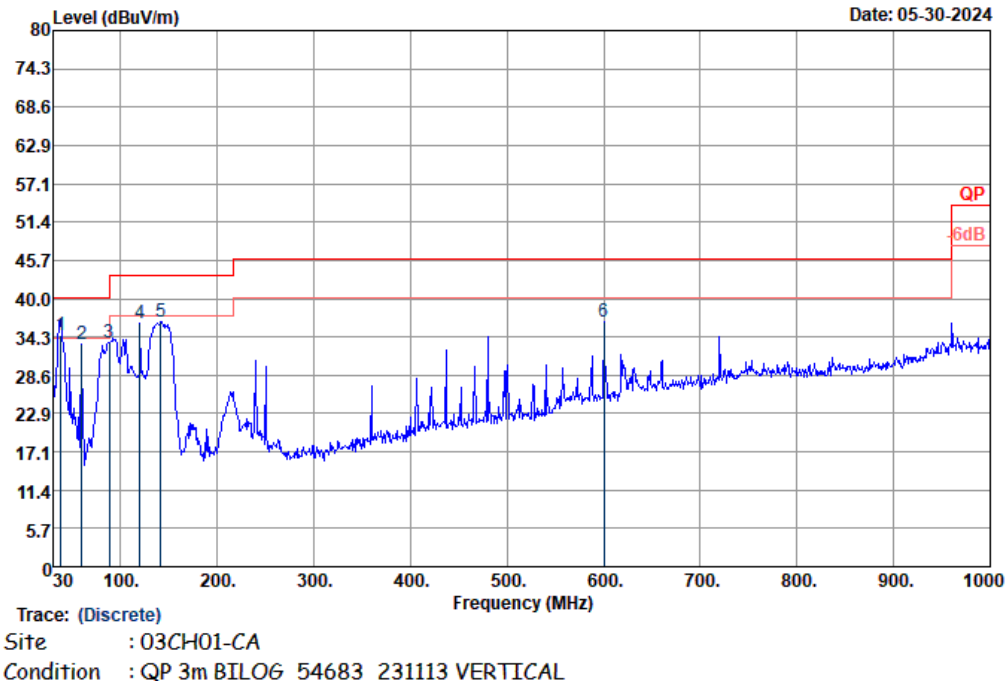
C3. Results of Radiated Spurious Emissions (30MHz~1GHz)

Test Mode :	NFC Tx	Polarization :	Horizontal



Frequency (MHz)	Level (dBµV/m)	Margin (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
120.21	34.63	-8.87	43.5	47.82	17.4	1.86	32.45	-	-	Peak
139.61	38.99	-4.51	43.5	52	17.5	1.93	32.44	284	297	QP
239.52	33.31	-12.69	46	46.04	17.24	2.46	32.43	-	-	Peak
480.08	34.72	-11.28	46	39.99	23.7	3.61	32.58	-	-	Peak
600.36	37.3	-8.7	46	39.52	25.89	4.52	32.63	-	-	Peak
719.67	36.15	-9.85	46	35.82	27.08	5.75	32.5	-	-	Peak

Test Mode :	NFC Tx	Polarization :	Vertical



Frequency (MHz)	Level (dBµV/m)	Margin (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
37.76	34.52	-5.48	40	45	20.92	1.06	32.46	101	7	QP
60.07	33.17	-6.83	40	52.49	11.8	1.35	32.47	-	-	Peak
88.2	33.46	-10.04	43.5	50.01	14.42	1.48	32.45	-	-	Peak
120.21	36.31	-7.19	43.5	49.5	17.4	1.86	32.45	-	-	Peak
141.55	36.53	-6.97	43.5	49.56	17.47	1.94	32.44	-	-	Peak
600.36	36.59	-9.41	46	38.81	25.89	4.52	32.63	-	-	Peak

Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dBµV/m) = 20 log Emission level (µV/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.
4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.

————THE END————