FCC RADIO TEST REPORT

FCC ID	:	2AW3A-2NAC24ACUCM
Equipment	:	EV Charger
Brand Name	:	RIVIAN
Model Name	:	2NAC24ACUCM
Marketing Name	:	RIVIAN WAYPOINTS CHARGER
Applicant	:	Rivian Automotive LLC. 14600 Myford Road, Irvine Irvine CA, 92606
Manufacturer	:	Lite-On Technology Corporation 29F , No.555, Siyuan Rd., Xinzhuang Dist., New Taipei City, Taiwan (R.O.C.)
Standard	:	FCC Part 15 Subpart C §15.225

The product was received on Mar. 27, 2024 and testing was performed from Jun. 05, 2024 to Jul. 05, 2024. We, Sporton International Inc. Wensan Laboratory, 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 Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory
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History of this test report

Report No.	Version	Description	Issue Date
FR432616C	01	Initial issue of report	Jul. 30, 2024
FR432616C	02	Revise Antenna Type This report is an updated version, replacing the report issued on Jul. 30, 2024.	Aug. 21, 2024

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.207	AC Power Line Conducted Emissions	Pass	0.44 dB under the limit at 0.27MHz
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	Max level 37.06 dBμV/m at 13.56 MHz
3.5	15.225(d) 15.209	Radiated Spurious Emissions	Pass	0.31 dB under the limit at 810.00MHz
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.

Reviewed by: Danny Lee

Report Producer: Michelle Chen

1. General Description

1.1 Product Feature of Equipment Under Test

Product Feature
General Specs GSM/LTE, Bluetooth - LE, Wi-Fi 2.4GHz 802.11b/g/n, and NFC. **Antenna Type** WWAN: FPC Antenna WLAN: FPC Antenna Bluetooth-LE: Internal Antenna NFC: Loop Antenna

Remark: The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

1.2 Modification of EUT

No modifications made to the EUT during the testing.

1.3 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH03-HY (TAF Code: 1190)
Test Engineer	Eric Wu
Temperature	21.8~23.8℃
Relative Humidity	34.2~36.2%
Remark	The Conducted test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory.

Test Site	Sporton International Inc. Wensan Laboratory	
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
Test Site No.	**Sporton Site No.**	
	CO07-HY	03CH11-HY
Test Engineer	Louis Chung	Yuan Lee
Temperature	23.7~26.5	20.1~20.7℃
Relative Humidity	43.5~55.2	54.1~64.1%

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

FCC designation No.: TW1190 and TW3786

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:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. The TAF code is not including all the FCC KDB listed without accreditation.

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.

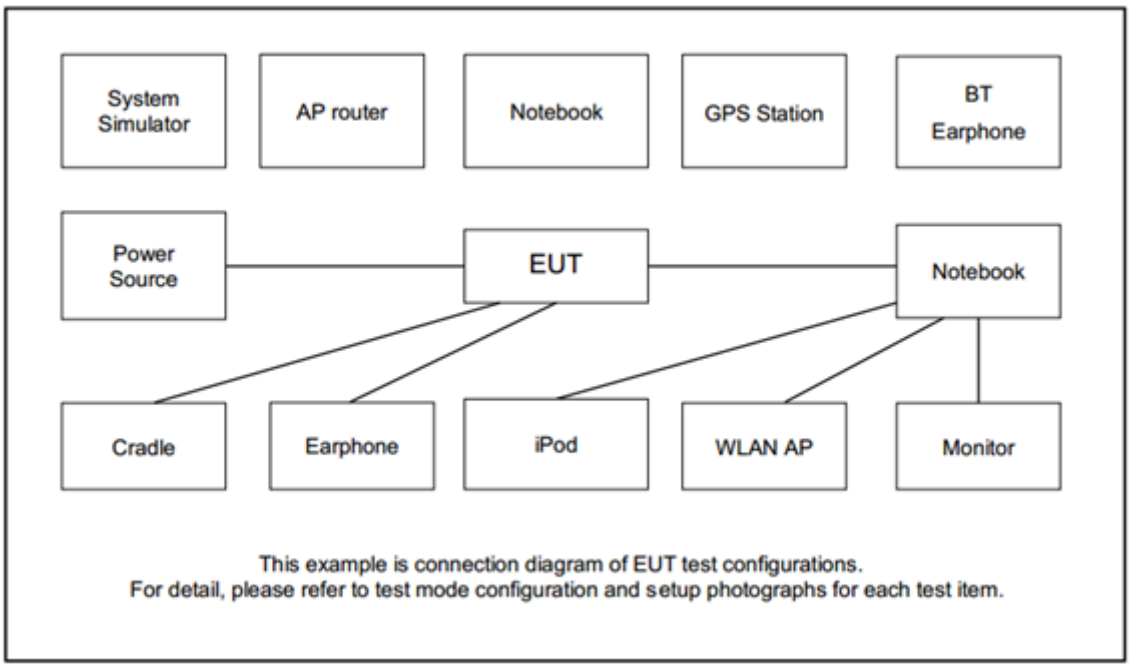
Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

The EUT pre-scanned in reader mode with NFC tag (two NFC type A, B) and without reading tag. Based on the highest field strength of fundamental and spurious emissions, the worst case 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 Loop 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: NFC Tx + Power Cable (240 Vac / 60Hz)

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.	NFC Card	NFC Card A	N/A	N/A	N/A	N/A
2.	NFC Card A	Winso	N/A	N/A	N/A	N/A
3.	NFC Card B	Winso	N/A	N/A	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.

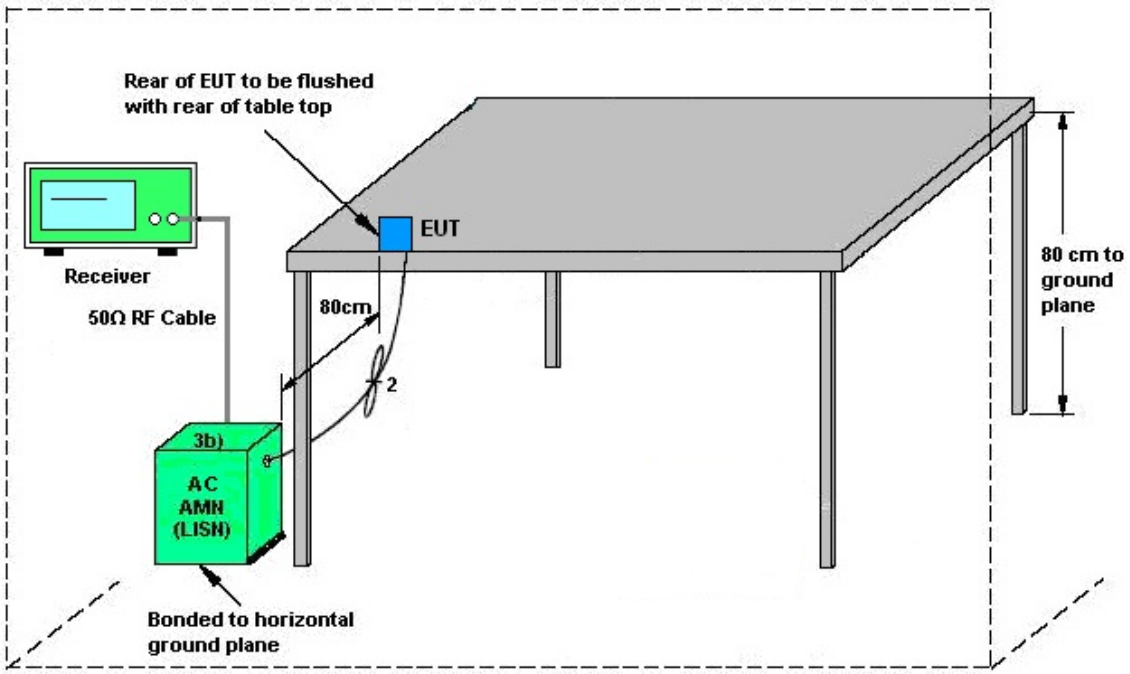
3.1.2 Measuring Instruments

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.

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.

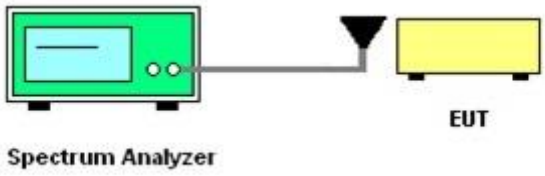
3.2.2 Measuring Instruments

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.

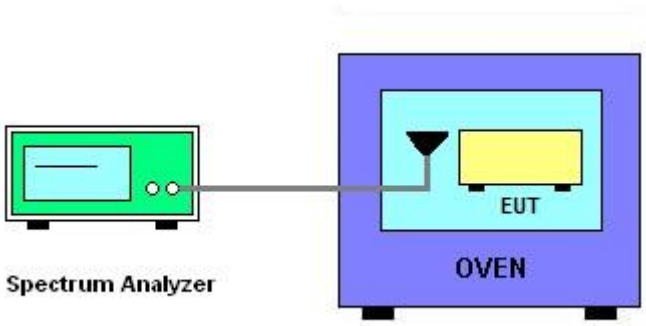
3.3.2 Measuring Instruments

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

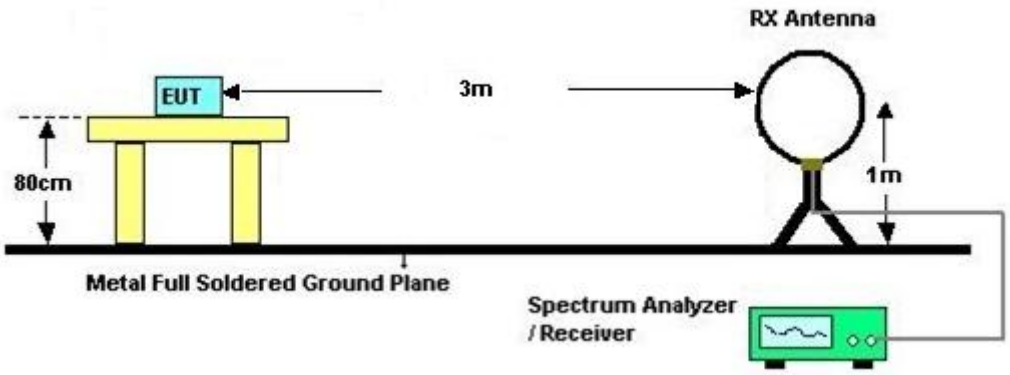
Please refer to the measuring equipment list in this test report.

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

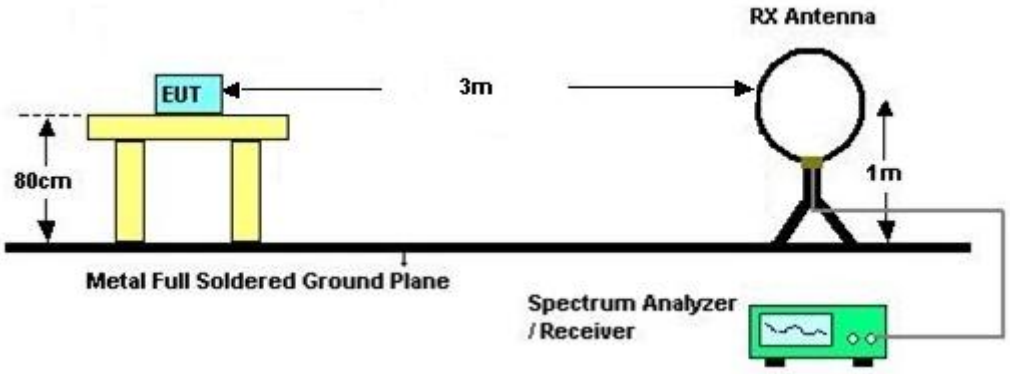
Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz and 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

3.5.4 Test Procedures

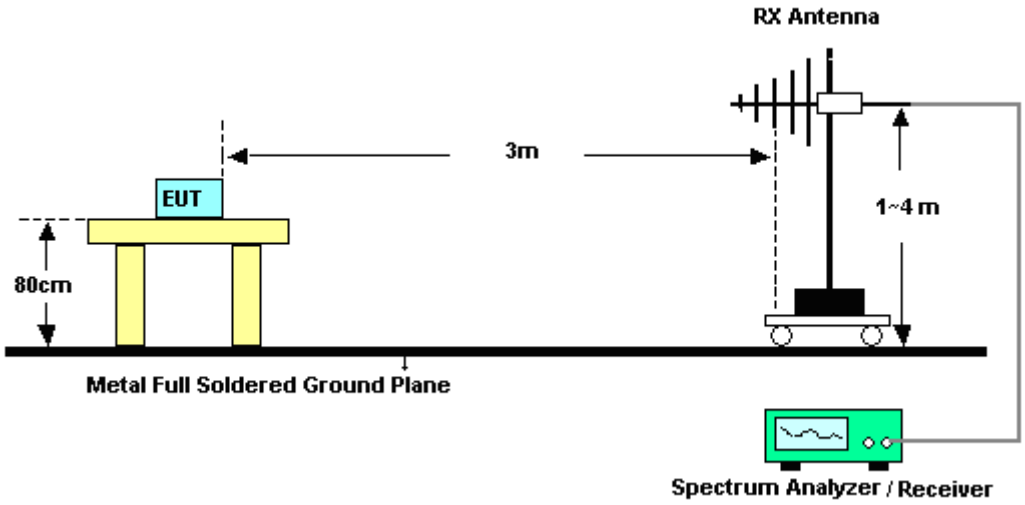
1. Configure the EUT according to ANSI C63.10. The EUT is placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower is placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Sep. 20, 2023	Jul. 05, 2024	Sep. 19, 2024	Near Field (TH03-HY)
Temperature & Humidity Cabinet	ESPEC	LHU-113	1012005860	-20℃ ~85℃	Dec. 13, 2023	Jul. 05, 2024	Dec. 12, 2024	Near Field (TH03-HY)
AC Power Source	AC POWER	AFC-500W	F104070011	50Hz~60Hz	Sep. 22, 2023	Jul. 05, 2024	Sep. 21, 2024	Near Field (TH03-HY)
Hygrometer	TECPEL	DTM-303B	TP200886	N/A	Mar. 14, 2024	Jul. 05, 2024	Mar. 13, 2025	Near Field (TH03-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 07, 2023	Jun. 05, 2024	Oct. 06, 2024	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 12, 2023	Jun. 05, 2024	Sep. 11, 2024	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 08, 2023	Jun. 05, 2024	Dec. 07, 2024	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 05, 2023	Jun. 05, 2024	Oct. 04, 2024	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY55420170	20MHz~8.4GHz	Aug. 02, 2023	Jun. 05, 2024	Aug. 01, 2024	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz~40GHz	Mar. 06, 2024	Jun. 05, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9K~30M	Mar. 06, 2024	Jun. 05, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	30M~40G	Mar. 06, 2024	Jun. 05, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
Filter	Wainwright	WHK20/1000C7 /40SS	SN2	20M High Pass	Sep. 11, 2023	Jun. 05, 2024	Sep. 10, 2024	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Jun. 05, 2024	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Jun. 05, 2024	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jun. 05, 2024	N/A	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	Jun. 05, 2024	N/A	Radiation (03CH11-HY)
AC Power Source	ACPOWER	AFC-11003G	F317040033	N/A	N/A	Jun. 28, 2024	N/A	Conduction (CO07-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Jun. 28, 2024	N/A	Conduction (CO07-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-F N	9561-F N00373	9kHz-200MHz	Oct. 20, 2023	Jun. 28, 2024	Oct. 19, 2024	Conduction (CO07-HY)
RF Cable	HUBER + SUHNER	RG 214/U	1358175	9kHz~30MHz	Mar. 14, 2024	Jun. 28, 2024	Mar. 13, 2025	Conduction (CO07-HY)
Two-Line V-Network	TESEQ	NNB 51	45051	N/A	Mar. 10, 2024	Jun. 28, 2024	Mar. 09, 2025	Conduction (CO07-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102317	9kHz~3.6GHz	Sep. 20, 2023	Jun. 28, 2024	Sep. 19, 2024	Conduction (CO07-HY)

5. Measurement Uncertainty

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.44 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.80 dB

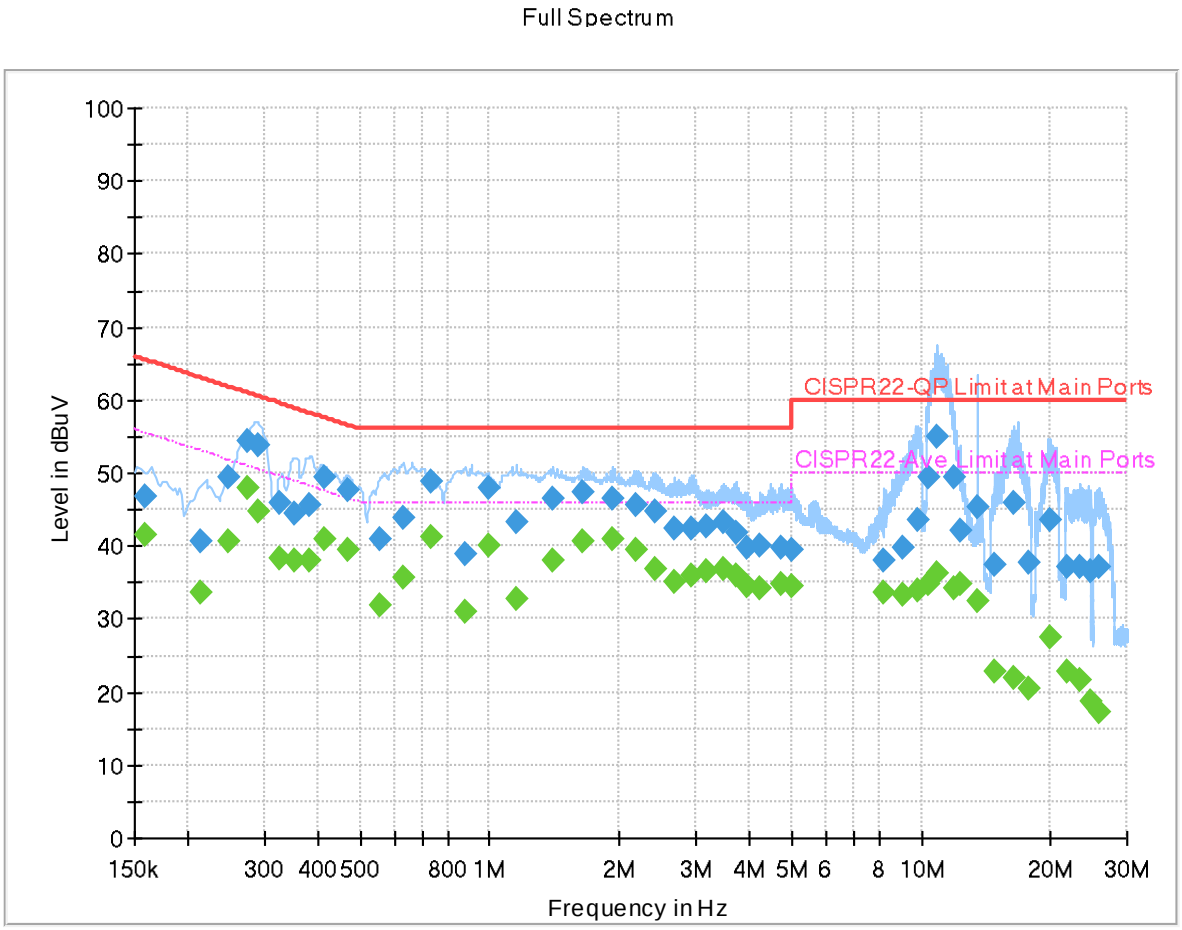
Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.10 dB

Appendix A. Test Results of Conducted Emission Test

EUT Information

Report NO :	432616
Test Mode :	Mode 1
Test Voltage :	240Vac/60Hz
Phase :	Line



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.159270	---	41.43	55.50	14.07	L1	OFF	19.9
0.159270	46.90	---	65.50	18.60	L1	OFF	19.9
0.214170	---	33.70	53.04	19.34	L1	OFF	19.9
0.214170	40.76	---	63.04	22.28	L1	OFF	19.9
0.247740	---	40.78	51.83	11.05	L1	OFF	19.9
0.247740	49.44	---	61.83	12.39	L1	OFF	19.9
0.272850	---	47.90	51.03	3.13	L1	OFF	19.9
0.272850	54.32	---	61.03	6.71	L1	OFF	19.9
0.289230	---	44.84	50.55	5.71	L1	OFF	19.9
0.289230	53.85	---	60.55	6.70	L1	OFF	19.9
0.325500	---	38.40	49.57	11.17	L1	OFF	19.9
0.325500	45.90	---	59.57	13.67	L1	OFF	19.9
0.352500	---	37.91	48.90	10.99	L1	OFF	19.9
0.352500	44.31	---	58.90	14.59	L1	OFF	19.9
0.382110	---	37.96	48.23	10.27	L1	OFF	19.9
0.382110	45.67	---	58.23	12.56	L1	OFF	19.9
0.412440	---	40.82	47.60	6.78	L1	OFF	19.9
0.412440	49.32	---	57.60	8.28	L1	OFF	19.9
0.466980	---	39.41	46.57	7.16	L1	OFF	19.9

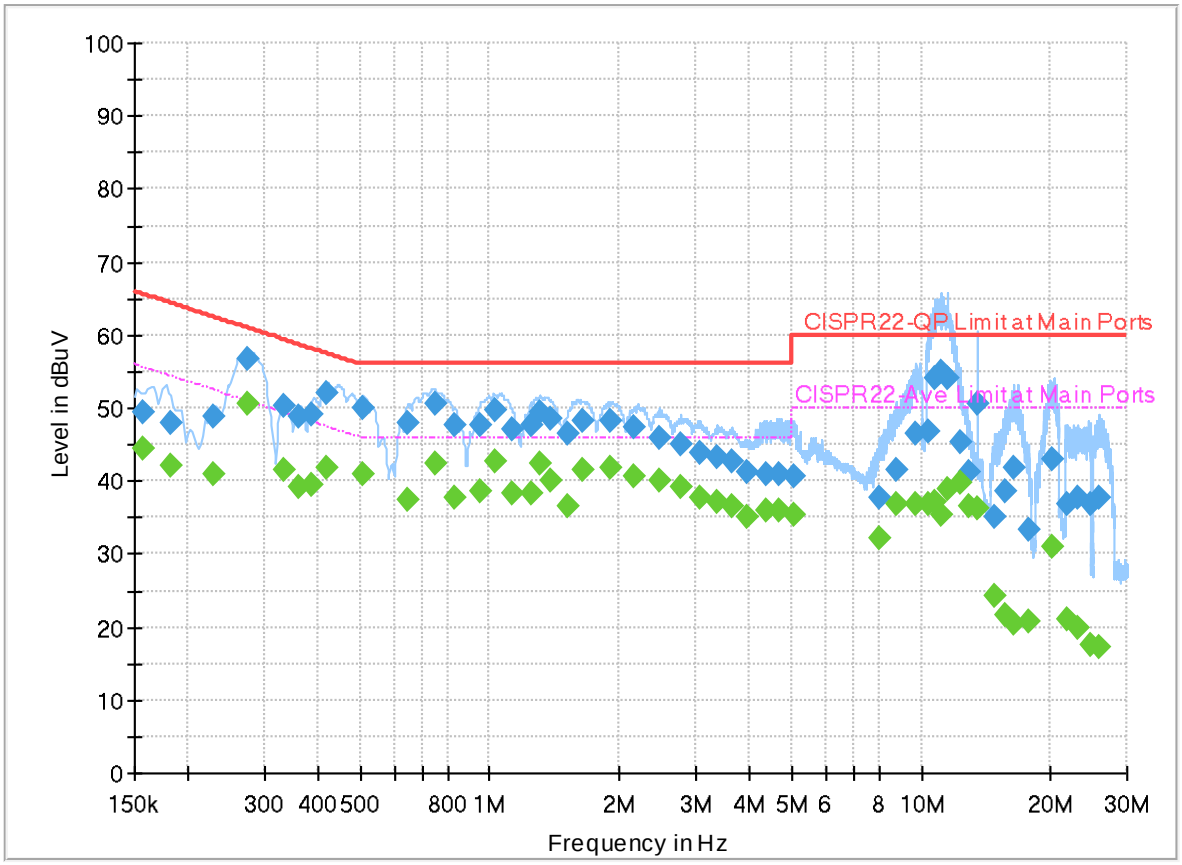
0.466980	47.61	---	56.57	8.96	L1	OFF	19.9
0.557250	---	31.74	46.00	14.26	L1	OFF	19.9
0.557250	41.06	---	56.00	14.94	L1	OFF	19.9
0.632940	---	35.74	46.00	10.26	L1	OFF	19.9
0.632940	43.79	---	56.00	12.21	L1	OFF	19.9
0.730140	---	41.37	46.00	4.63	L1	OFF	19.9
0.730140	48.71	---	56.00	7.29	L1	OFF	19.9
0.874500	---	30.85	46.00	15.15	L1	OFF	19.9
0.874500	38.91	---	56.00	17.09	L1	OFF	19.9
0.991500	---	40.16	46.00	5.84	L1	OFF	19.9
0.991500	47.88	---	56.00	8.12	L1	OFF	19.9
1.155840	---	32.76	46.00	13.24	L1	OFF	19.9
1.155840	43.14	---	56.00	12.86	L1	OFF	19.9
1.404780	---	37.87	46.00	8.13	L1	OFF	19.9
1.404780	46.42	---	56.00	9.58	L1	OFF	19.9
1.650930	---	40.79	46.00	5.21	L1	OFF	19.9
1.650930	47.29	---	56.00	8.71	L1	OFF	19.9
1.923000	---	40.82	46.00	5.18	L1	OFF	19.9
1.923000	46.46	---	56.00	9.54	L1	OFF	19.9
2.179500	---	39.39	46.00	6.61	L1	OFF	20.0
2.179500	45.63	---	56.00	10.37	L1	OFF	20.0
2.422590	---	36.74	46.00	9.26	L1	OFF	20.0
2.422590	44.71	---	56.00	11.29	L1	OFF	20.0
2.674500	---	35.14	46.00	10.86	L1	OFF	20.0
2.674500	42.53	---	56.00	13.47	L1	OFF	20.0
2.949000	---	35.94	46.00	10.06	L1	OFF	20.0
2.949000	42.39	---	56.00	13.61	L1	OFF	20.0
3.162750	---	36.42	46.00	9.58	L1	OFF	20.0
3.162750	42.71	---	56.00	13.29	L1	OFF	20.0
3.465780	---	36.84	46.00	9.16	L1	OFF	20.0
3.465780	43.16	---	56.00	12.84	L1	OFF	20.0
3.720750	---	35.92	46.00	10.08	L1	OFF	20.0
3.720750	41.75	---	56.00	14.25	L1	OFF	20.0
3.941250	---	34.46	46.00	11.54	L1	OFF	20.0
3.941250	39.83	---	56.00	16.17	L1	OFF	20.0
4.243290	---	34.13	46.00	11.87	L1	OFF	20.0
4.243290	39.94	---	56.00	16.06	L1	OFF	20.0
4.730820	---	34.68	46.00	11.32	L1	OFF	20.0
4.730820	39.69	---	56.00	16.31	L1	OFF	20.0
5.010630	---	34.60	50.00	15.40	L1	OFF	20.0
5.010630	39.47	---	60.00	20.53	L1	OFF	20.0
8.226870	---	33.75	50.00	16.25	L1	OFF	20.1
8.226870	38.08	---	60.00	21.92	L1	OFF	20.1
9.031740	---	33.24	50.00	16.76	L1	OFF	20.1
9.031740	39.90	---	60.00	20.10	L1	OFF	20.1
9.824010	---	33.87	50.00	16.13	L1	OFF	20.1
9.824010	43.48	---	60.00	16.52	L1	OFF	20.1
10.398750	---	34.86	50.00	15.14	L1	OFF	20.1
10.398750	49.46	---	60.00	10.54	L1	OFF	20.1
10.917780	---	36.40	50.00	13.60	L1	OFF	20.1
10.917780	55.03	---	60.00	4.97	L1	OFF	20.1
11.924700	---	34.31	50.00	15.69	L1	OFF	20.1
11.924700	49.35	---	60.00	10.65	L1	OFF	20.1
12.326640	---	34.67	50.00	15.33	L1	OFF	20.1
12.326640	42.02	---	60.00	17.98	L1	OFF	20.1
13.564050	---	32.35	50.00	17.65	L1	OFF	20.1
13.564050	45.41	---	60.00	14.59	L1	OFF	20.1
14.813610	---	22.68	50.00	27.32	L1	OFF	20.1
14.813610	37.37	---	60.00	22.63	L1	OFF	20.1
16.403910	---	21.82	50.00	28.18	L1	OFF	20.1
16.403910	45.95	---	60.00	14.05	L1	OFF	20.1
17.783790	---	20.38	50.00	29.62	L1	OFF	20.1
17.783790	37.81	---	60.00	22.19	L1	OFF	20.1
19.894380	---	27.48	50.00	22.52	L1	OFF	20.1
19.894380	43.62	---	60.00	16.38	L1	OFF	20.1
21.824250	---	22.70	50.00	27.30	L1	OFF	20.1
21.824250	37.17	---	60.00	22.83	L1	OFF	20.1
23.264250	---	21.51	50.00	28.49	L1	OFF	20.1
23.264250	37.06	---	60.00	22.94	L1	OFF	20.1
24.577530	---	18.76	50.00	31.24	L1	OFF	20.2
24.577530	36.59	---	60.00	23.41	L1	OFF	20.2

25.955250	**---**	**17.35**	**50.00**	**32.65**	**L1**	**OFF**	**20.2**
25.955250	**37.12**	**---**	**60.00**	**22.88**	**L1**	**OFF**	**20.2**

EUT Information

Report NO :	432616
Test Mode :	Mode 1
Test Voltage :	240Vac/60Hz
Phase :	Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	---	44.39	55.63	11.24	N	OFF	19.9
0.156750	49.28	---	65.63	16.35	N	OFF	19.9
0.181500	---	42.24	54.42	12.18	N	OFF	19.9
0.181500	47.92	---	64.42	16.50	N	OFF	19.9
0.229380	---	40.96	52.47	11.51	N	OFF	19.9
0.229380	48.76	---	62.47	13.71	N	OFF	19.9
0.274830	---	50.53	50.97	0.44	N	OFF	19.9
0.274830	56.81	---	60.97	4.16	N	OFF	19.9
0.333510	---	41.40	49.36	7.96	N	OFF	19.9
0.333510	50.33	---	59.36	9.03	N	OFF	19.9
0.362310	---	39.10	48.68	9.58	N	OFF	19.9
0.362310	48.95	---	58.68	9.73	N	OFF	19.9
0.387690	---	39.55	48.11	8.56	N	OFF	19.9
0.387690	49.23	---	58.11	8.88	N	OFF	19.9
0.417750	---	41.80	47.49	5.69	N	OFF	19.9
0.417750	51.96	---	57.49	5.53	N	OFF	19.9
0.507660	---	40.90	46.00	5.10	N	OFF	19.9
0.507660	50.00	---	56.00	6.00	N	OFF	19.9
0.644100	---	37.42	46.00	8.58	N	OFF	19.9

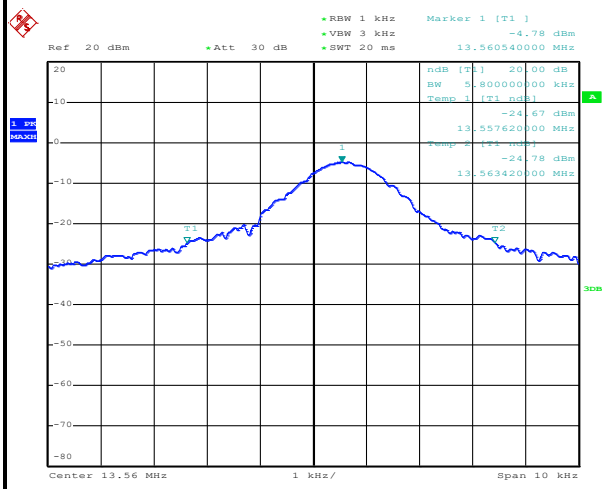
0.644100	47.98	---	56.00	8.02	N	OFF	19.9
0.744540	---	42.38	46.00	3.62	N	OFF	19.9
0.744540	50.48	---	56.00	5.52	N	OFF	19.9
0.831030	---	37.58	46.00	8.42	N	OFF	19.9
0.831030	47.53	---	56.00	8.47	N	OFF	19.9
0.946860	---	38.50	46.00	7.50	N	OFF	19.9
0.946860	47.70	---	56.00	8.30	N	OFF	19.9
1.023450	---	42.56	46.00	3.44	N	OFF	19.9
1.023450	49.72	---	56.00	6.28	N	OFF	19.9
1.126500	---	38.25	46.00	7.75	N	OFF	19.9
1.126500	47.09	---	56.00	8.91	N	OFF	19.9
1.243410	---	38.27	46.00	7.73	N	OFF	19.9
1.243410	47.66	---	56.00	8.34	N	OFF	19.9
1.308210	---	42.42	46.00	3.58	N	OFF	19.9
1.308210	49.49	---	56.00	6.51	N	OFF	19.9
1.389930	---	40.03	46.00	5.97	N	OFF	19.9
1.389930	48.49	---	56.00	7.51	N	OFF	19.9
1.520700	---	36.51	46.00	9.49	N	OFF	19.9
1.520700	46.40	---	56.00	9.60	N	OFF	19.9
1.637250	---	41.56	46.00	4.44	N	OFF	19.9
1.637250	48.32	---	56.00	7.68	N	OFF	19.9
1.908690	---	41.74	46.00	4.26	N	OFF	19.9
1.908690	48.27	---	56.00	7.73	N	OFF	19.9
2.168970	---	40.74	46.00	5.26	N	OFF	20.0
2.168970	47.28	---	56.00	8.72	N	OFF	20.0
2.469570	---	39.98	46.00	6.02	N	OFF	20.0
2.469570	45.87	---	56.00	10.13	N	OFF	20.0
2.769810	---	39.06	46.00	6.94	N	OFF	20.0
2.769810	44.99	---	56.00	11.01	N	OFF	20.0
3.057000	---	37.83	46.00	8.17	N	OFF	20.0
3.057000	43.97	---	56.00	12.03	N	OFF	20.0
3.369750	---	37.20	46.00	8.80	N	OFF	20.0
3.369750	43.28	---	56.00	12.72	N	OFF	20.0
3.642000	---	36.45	46.00	9.55	N	OFF	20.0
3.642000	42.75	---	56.00	13.25	N	OFF	20.0
3.954030	---	35.02	46.00	10.98	N	OFF	20.0
3.954030	41.13	---	56.00	14.87	N	OFF	20.0
4.380000	---	36.00	46.00	10.00	N	OFF	20.0
4.380000	40.90	---	56.00	15.10	N	OFF	20.0
4.708500	---	35.89	46.00	10.11	N	OFF	20.0
4.708500	40.81	---	56.00	15.19	N	OFF	20.0
5.048250	---	35.25	50.00	14.75	N	OFF	20.0
5.048250	40.53	---	60.00	19.47	N	OFF	20.0
7.989720	---	32.29	50.00	17.71	N	OFF	20.1
7.989720	37.84	---	60.00	22.16	N	OFF	20.1
8.806380	---	36.87	50.00	13.13	N	OFF	20.1
8.806380	41.49	---	60.00	18.51	N	OFF	20.1
9.763890	---	36.70	50.00	13.30	N	OFF	20.1
9.763890	46.60	---	60.00	13.40	N	OFF	20.1
10.338180	---	36.97	50.00	13.03	N	OFF	20.1
10.338180	46.79	---	60.00	13.21	N	OFF	20.1
10.713750	---	37.03	50.00	12.97	N	OFF	20.1
10.713750	54.14	---	60.00	5.86	N	OFF	20.1
11.139000	---	35.51	50.00	14.49	N	OFF	20.1
11.139000	55.02	---	60.00	4.98	N	OFF	20.1
11.540310	---	38.75	50.00	11.25	N	OFF	20.1
11.540310	54.16	---	60.00	5.84	N	OFF	20.1
12.322500	---	39.64	50.00	10.36	N	OFF	20.1
12.322500	45.40	---	60.00	14.60	N	OFF	20.1
12.885720	---	36.44	50.00	13.56	N	OFF	20.1
12.885720	41.20	---	60.00	18.80	N	OFF	20.1
13.560720	---	36.32	50.00	13.68	N	OFF	20.1
13.560720	50.44	---	60.00	9.56	N	OFF	20.1
14.823150	---	24.40	50.00	25.60	N	OFF	20.1
14.823150	35.06	---	60.00	24.94	N	OFF	20.1
15.700200	---	21.72	50.00	28.28	N	OFF	20.2
15.700200	38.48	---	60.00	21.52	N	OFF	20.2
16.397790	---	20.33	50.00	29.67	N	OFF	20.2
16.397790	41.73	---	60.00	18.27	N	OFF	20.2
17.785770	---	20.84	50.00	29.16	N	OFF	20.2
17.785770	33.27	---	60.00	26.73	N	OFF	20.2

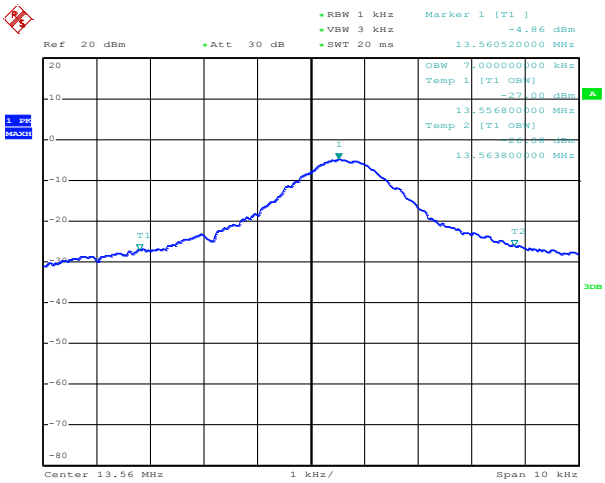
20.091480	---	30.97	50.00	19.03	N	OFF	20.2
20.091480	42.88	---	60.00	17.12	N	OFF	20.2
21.775650	---	21.19	50.00	28.81	N	OFF	20.2
21.775650	36.96	---	60.00	23.04	N	OFF	20.2
23.071290	---	19.77	50.00	30.23	N	OFF	20.2
23.071290	37.62	---	60.00	22.38	N	OFF	20.2
24.578250	---	17.64	50.00	32.36	N	OFF	20.2
24.578250	36.80	---	60.00	23.20	N	OFF	20.2
25.924470	---	17.25	50.00	32.75	N	OFF	20.2
25.924470	37.70	---	60.00	22.30	N	OFF	20.2

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)	5.80	99% OccupiedBW(kHz)	7.00
Frequency range (MHz)	**f_L > 13.553**	13.55762	**Test Result**
	f_H < 13.567	13.56342	**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

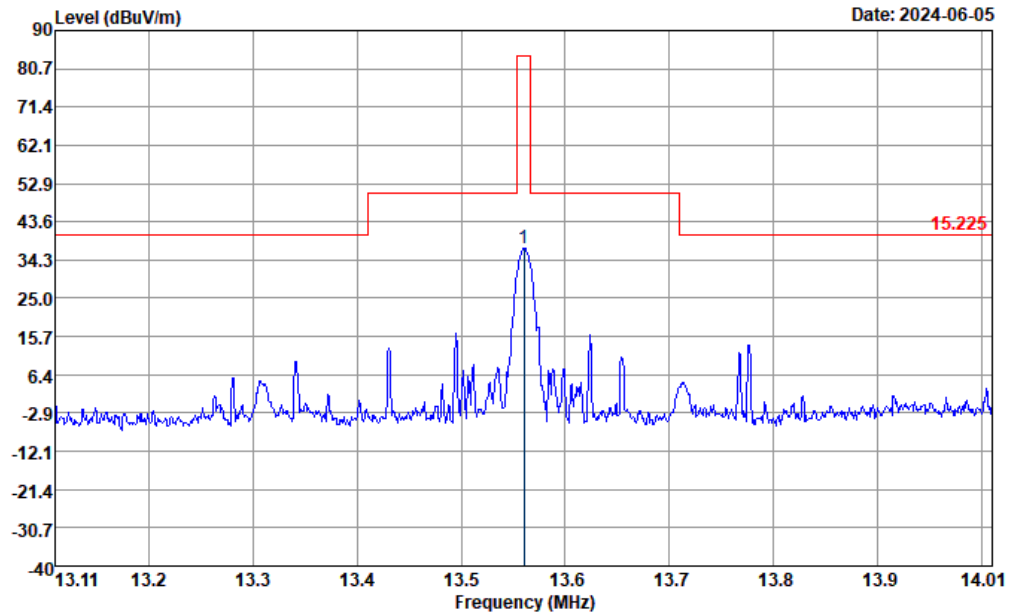
Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (℃)	Time (min)	Measurement Frequency (MHz)
240	13.560520	**-20**	**0**	13.560380
216	13.560570		**2**	13.560630
264	13.560380		**5**	13.560720
			10	13.560630
		-10	**0**	13.560710
			2	13.560690
			5	13.560650
			10	13.560690
		0	**0**	13.560530
			2	13.560720
			5	13.560700
			10	13.560570
		10	**0**	13.560420
			2	13.560560
			5	13.560510
			10	13.560570
		20	**0**	13.560600
			2	13.560240
			5	13.560600
			10	13.560780
		30	**0**	13.560610
			2	13.560440
			5	13.560590
			10	13.560450
		40	**0**	13.560580
			2	13.560570
			5	13.560270
			10	13.560490

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vdc)	Measurement Frequency (MHz)	Temperature (℃)	Time (min)	Measurement Frequency (MHz)
		50	0	13.560510
			2	13.560760
			5	13.560250
			10	13.560640
Max.Deviation (MHz)	0.000570	Max.Deviation (MHz)		0.000780
Max.Deviation (ppm)	42.0354	Max.Deviation (ppm)		57.5221
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

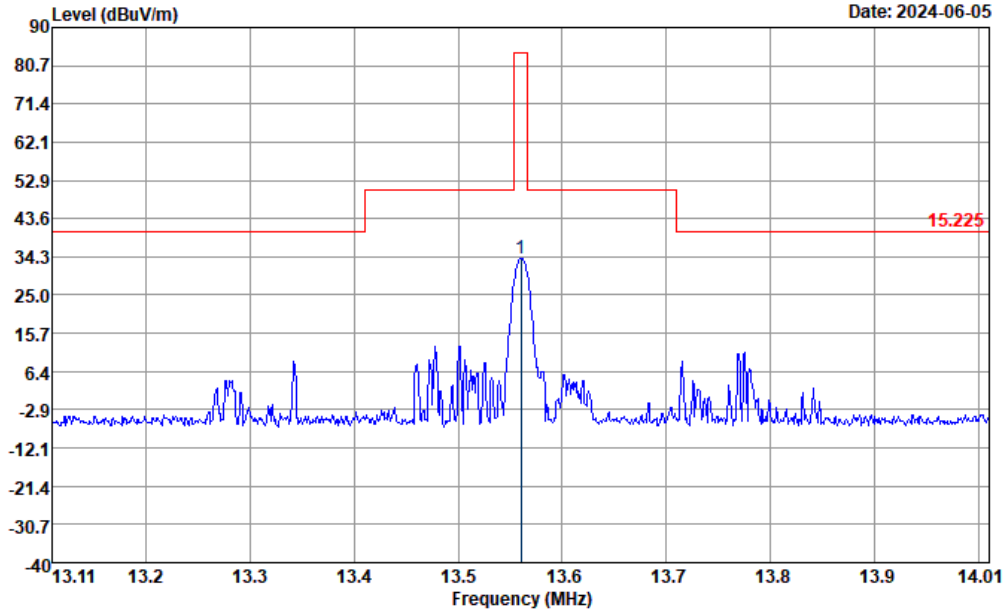
Test Mode :	NFC Tx	Test Frequency (MHz)	13.56



Site : 03CH11-HY
Condition : 15.225 3m LOOP_100488_230912 HORIZONTAL
: RBW:9.000KHz VBW:9.000KHz 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
13.56	37.06	40	-46.94	84	56.29	20.64	0.13	100	177	QP

Test Mode :	NFC Tx	Test Frequency (MHz)	13.56

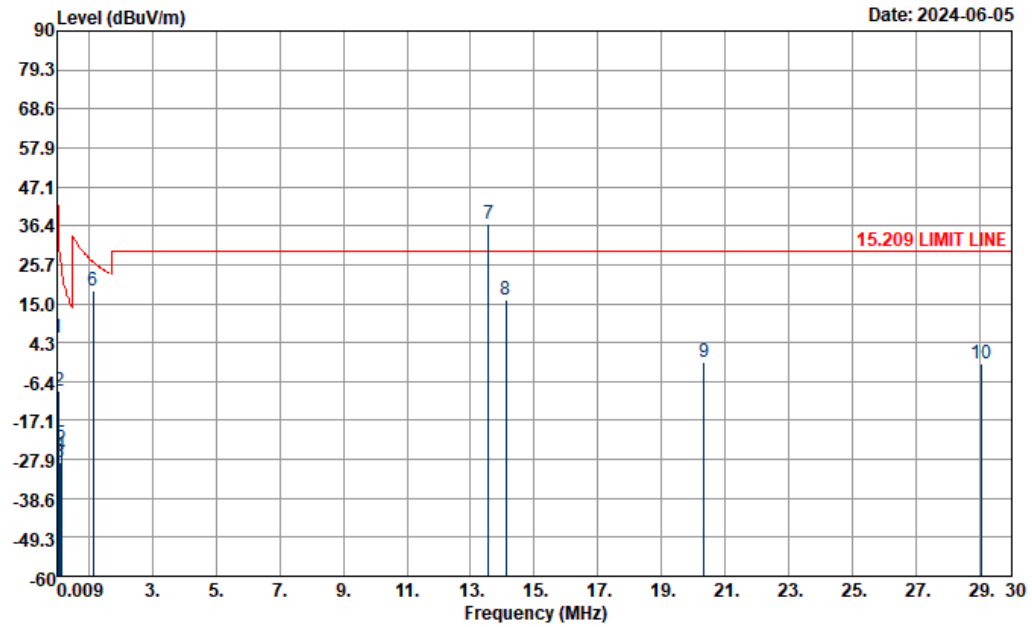


Site : 03CH11-HY
Condition : 15.225 3m LOOP_100488_230912 VERTICAL
: RBW:9.000KHz VBW:9.000KHz SWT:Auto

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
13.56	33.99	40	-50.01	84	53.22	20.64	0.13	100	97	QP

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

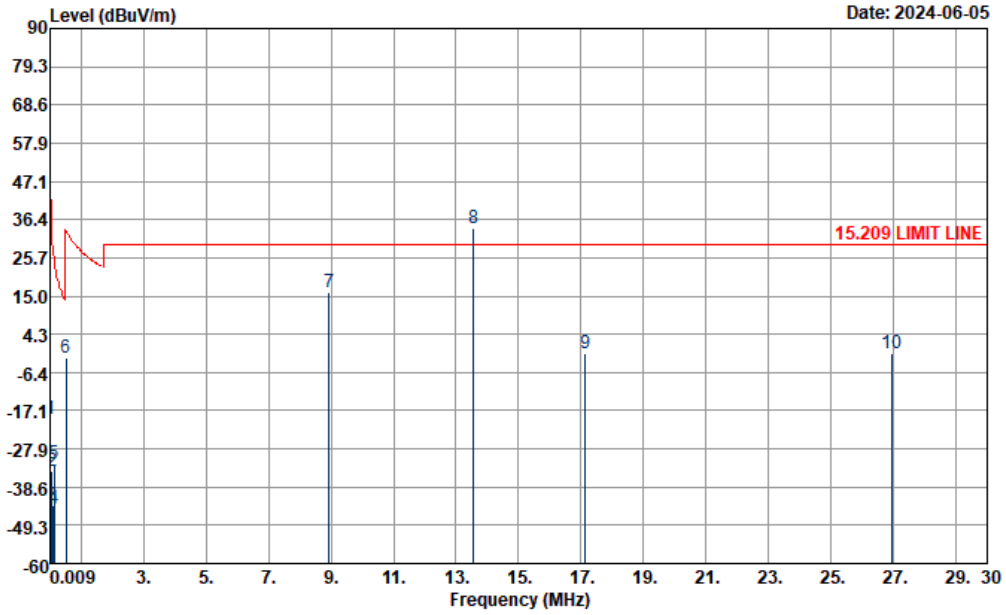
Test Mode :	NFC Tx	Polarization :	Horizontal



Site : 03CH11-HY
Condition : 15.209 LIMIT LINE 3m LOOP_100488_230912 HORIZONTAL

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
0.01925	5.43	80	-36.49	41.92	66.05	19.32	0.06	-	-	Average
0.06636	-9.15	80	-40.32	31.17	52.59	18.19	0.07	-	-	Average
0.09576	-28.73	80	-56.71	27.98	33.14	18.06	0.07	-	-	QP
0.135	-26.67	80	-51.67	25	35.02	18.24	0.07	-	-	Average
0.15	-23.81	80	-47.89	24.08	37.82	18.3	0.07	-	-	Average
1.136	18.42	40	-8.08	26.5	39.67	18.69	0.06	-	-	QP
13.56	36.82	40	7.32	29.5	56.05	20.64	0.13	-	-	QP
14.112	15.93	40	-13.57	29.5	35.19	20.61	0.13	-	-	QP
20.329	-1.12	40	-30.62	29.5	16.95	21.83	0.1	-	-	QP
29.06	-1.46	40	-30.96	29.5	15.47	22.87	0.2	-	-	QP

Test Mode :	NFC Tx	Polarization :	Vertical



Site : 03CH11-HY
Condition : 15.209 LIMIT LINE 3m LOOP_100488_230912 VERTICAL

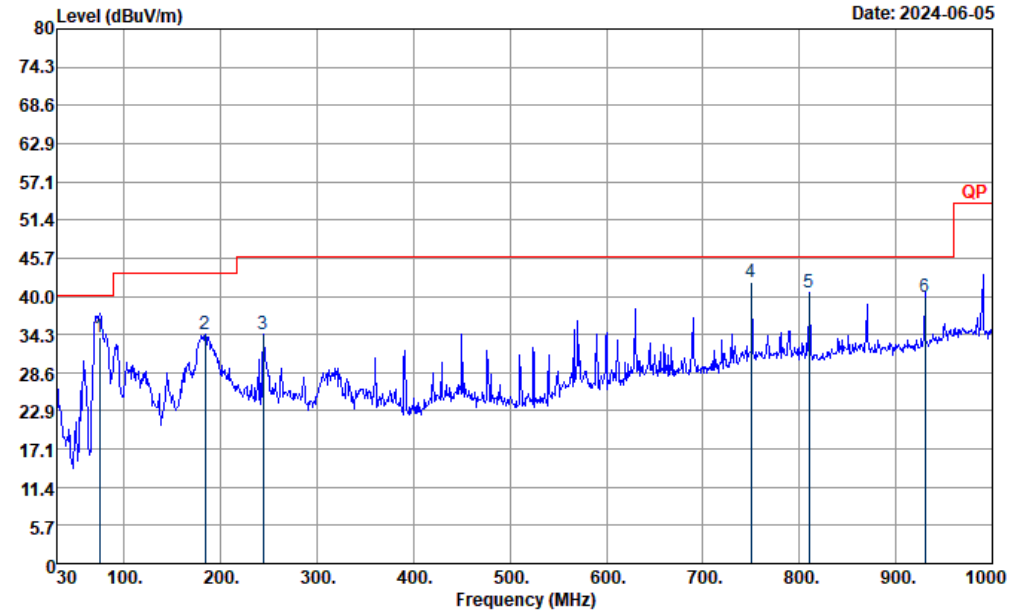
Frequency (MHz)	Level (dBµV/m)	Distance extrapolation Factor (dB)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.0192	-19.55	80	-61.49	41.94	41.08	19.31	0.06	-	-	Average
0.06642	-34.22	80	-65.38	31.16	27.52	18.19	0.07	-	-	Average
0.1016	-43.58	80	-71.05	27.47	18.24	18.11	0.07	-	-	QP
0.13496	-44.56	80	-69.56	25	17.13	18.24	0.07	-	-	Average
0.15	-31.91	80	-55.99	24.08	29.72	18.3	0.07	-	-	Average
0.52004	-2.32	40	-35.6	33.28	18.74	18.88	0.06	-	-	QP
8.928	16.06	40	-13.44	29.5	35.84	20.1	0.12	-	-	QP
13.56	33.9	40	4.4	29.5	53.13	20.64	0.13	-	-	QP
17.143	-1.06	40	-30.56	29.5	17.38	21.44	0.12	-	-	QP
26.945	-0.94	40	-30.44	29.5	16.13	22.78	0.15	-	-	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

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

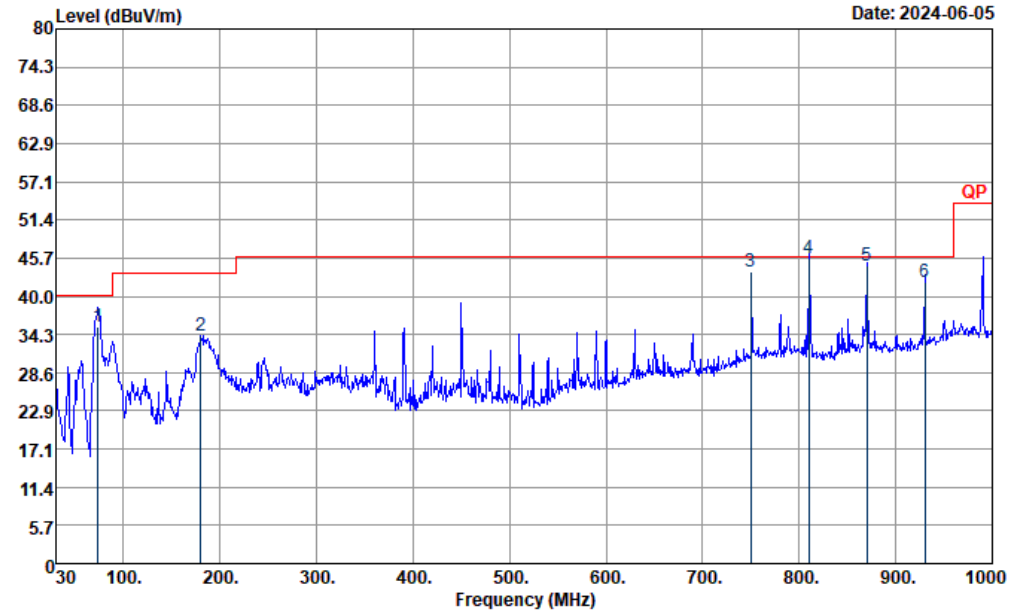
Test Mode :	NFC Tx	Polarization :	Horizontal



Site : 03CH11-HY
Condition : QP 3m 2_BILOG_35414_231007 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
74.28	33.88	-6.12	40	52.52	12.59	1.01	32.24	262	288	QP
183.63	34.37	-9.13	43.5	50.01	14.65	1.75	32.04	-	-	Peak
244.11	34.37	-11.63	46	46.95	17.51	2.09	32.18	-	-	Peak
750	42.11	-3.89	46	41.37	27.99	4.28	31.53	152	282	QP
810	40.5	-5.5	46	39.01	27.95	5.08	31.54	100	36	QP
930	39.91	-6.09	46	36.5	29.49	5.12	31.2	113	160	QP

Test Mode :	NFC Tx	Polarization :	Vertical



Site : 03CH11-HY
Condition : QP 3m 2_BILOG_35414_231007 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
73.2	35.33	-4.67	40	54.1	12.45	1	32.22	127	274	QP
179.85	34.14	-9.36	43.5	49.67	14.7	1.74	31.97	-	-	Peak
750	43.67	-2.33	46	42.93	27.99	4.28	31.53	121	188	QP
810	45.69	-0.31	46	44.2	27.95	5.08	31.54	100	176	QP
870	44.62	-1.38	46	41.99	29.11	5.1	31.58	100	163	QP
930	42.14	-3.86	46	38.73	29.49	5.12	31.2	100	175	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. 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.