



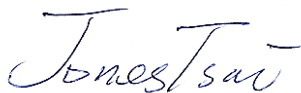
NCC RADIO TEST REPORT

Equipment : RFID 13.56MHz Wireless Module
Brand Name : DELL
Model Name : DWRFID1801
Applicant : DELL Inc.
One Dell Way, Round Rock, TX 78682, USA
Manufacturer : DELL Inc.
One Dell Way, Round Rock, TX 78682, USA
Standard : NCC LP0002 (2018-01-10)

The product was received on Nov. 28, 2018, and testing was started from Dec. 07, 2018 and completed on Jan. 18, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in NCC LP0002 (2018-01-10) and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Jones Tsai

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issue Date
TR8N2826	01	Initial issue of report	Jan. 24, 2019

Summary of the Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	LP0002 2.3	AC Power Line Conducted Emissions	Pass	Under limit 3.36 dB at 13.560MHz
3.2	-	20dB Bandwidth	Pass	-
	-	99% Occupied Bandwidth	Pass	-
3.3	LP0002 3.2.1.3	Frequency Stability	Pass	-
3.4	LP0002 3.2.1.2	Field Strength of Fundamental Emissions	Pass	Max level 60.39 dB μ V/m at 13.560 MHz
3.5	LP0002 2.8 3.2.1.2	Radiated Spurious Emissions	Pass	Under limit 7.62 dB at 40.680MHz
3.6	LP0002 2.11	Receiver Radiated Emission	Pass	Under limit 4.24 dB at 73.74 MHz
3.7	LP0002 2.2	Antenna Requirements	Pass	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Joseph Lin

Report Producer: Natasha Hsieh

1. General Description

1.1 Product Feature of Equipment Under Test

NFC

Product Specification subjective to this standard	
Sample 1	EUT with NFC Antenna 1 (Manufacturer: ACON)
Sample 2	EUT with NFC Antenna 2 (Manufacturer: SPEEDWIRE)
Installed into Portable Computer	Brand Name: DELL Model Name: P80F
Antenna Type	NFC: Loop Antenna

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH03-HY	CO05-HY
Test Engineer	George Chen	Jimmy Chang
Temperature	22~24℃	22~23℃
Relative Humidity	53~55%	56~58%

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

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
Test Site No.	Sporton Site No.	
	03CH11-HY	
Test Engineer	HAO HSU	
Temperature	23~25℃	
Relative Humidity	54~57%	

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

FCC Designation No. TW1190 and TW0007

1.4 Applicable Standards

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

- ♦ NCC LP0002 (2018-01-10)
- ♦ FCC Part 15 Subpart C §15.225
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ ANSI C63.10-2013

2. Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

Investigation has been done on all the possible configurations.

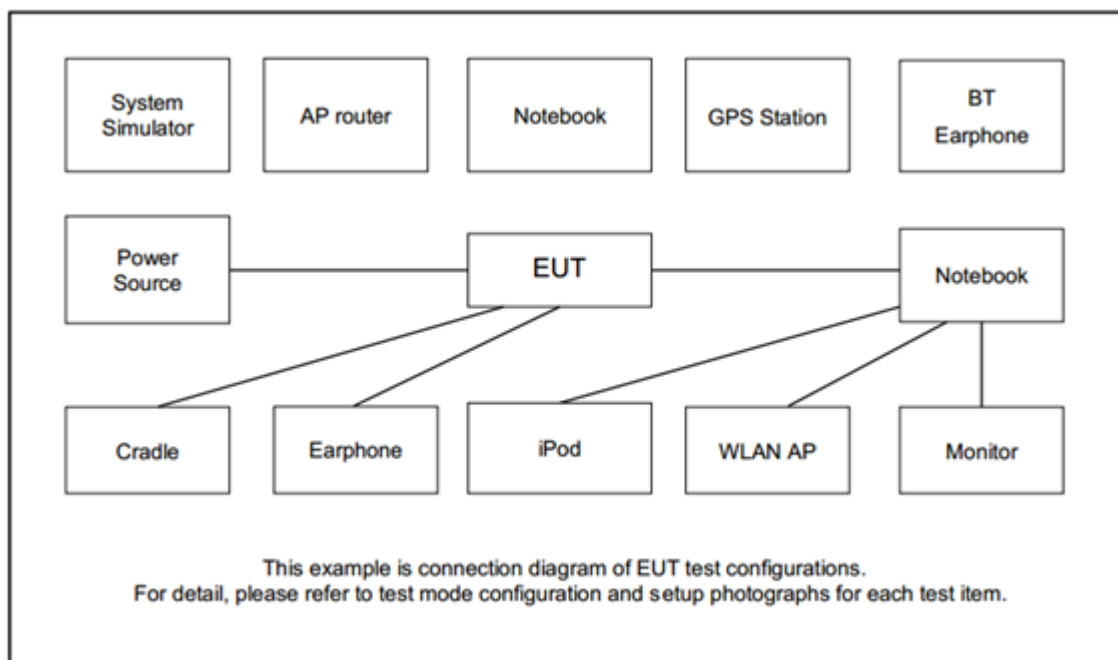
The following table is a list of the test modes shown in this test report.

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 four NFC type, A, B, F, V. The worst type (type F) was recorded in this report.

Test Cases	
AC Conducted Emission	Mode 1 : NFC Tx for Sample 1
	Mode 2 : NFC Tx for Sample 2
Receiver Radiated Emission	Mode 1 : NFC Idle for Sample 1
	Mode 2 : NFC Idle for Sample 2
Remark: The worst case of conducted emission is mode 2; only the test data of it was reported.	

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	USB HD	WD	WDBAAR3200ABK-PESN	FCC DoC	Unshielded, 0.5 m	N/A
2.	USB HD	PQI	H568V	FCC DoC	Shielded, 0.5m	N/A
3.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,1.8m
4.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
5.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
6.	iPod Earphone	aibo	IP-E1	Verification	Unshielded, 1.0 m	N/A
7.	LCD Monitor	ASUS	PB27U	FCC DoC	Shielded, 1.6m	Unshielded,1.8m
8.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
9.	NFC Card	Metro Taipei	Easy Card	N/A	N/A	N/A
10.	Smart Card	N/A	N/A	N/A	N/A	N/A

2.4 EUT Operation Test Setup

The EUT was programmed to be in continuously transmitting mode.

The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 0 cm gap to the EUT.

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 (dB μ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

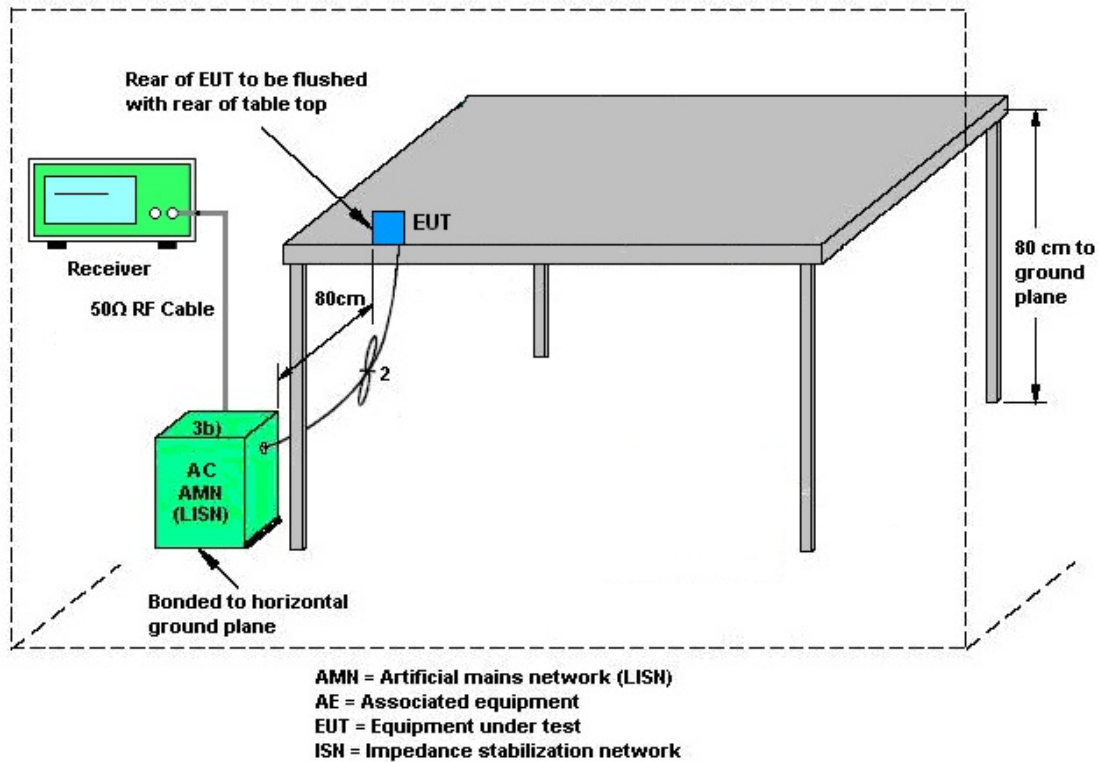
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was 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 should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.1.4 Test setup



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 20dB and 99% emission bandwidth in the specific band 13.553~13.567MHz.

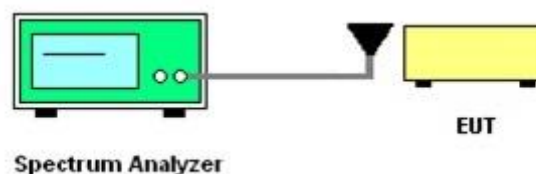
3.2.2 Measuring Instruments

See list of measuring instruments of 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 20dB below carrier.
4. Measured the 99% OBW.

3.2.4 Test Setup



3.2.5 Test Result of Conducted 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 using a new battery.

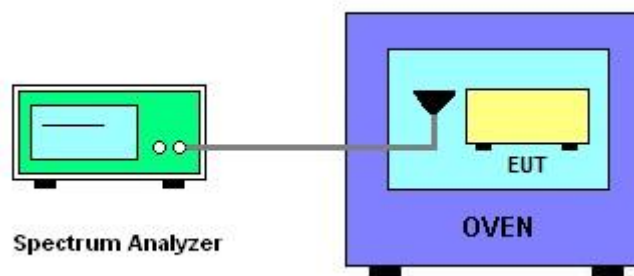
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT.
2. EUT have 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 f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 100 ppm.
6. Extreme temperature rule is -20°C~50°C.

3.3.4 Test Setup



3.3.5 Test Result of Conducted Test Items

Please refer to Appendix B.

3.4 Field Strength of Fundamental Emissions and Mask Measurement

3.4.1 Limit

Rules and specifications	NCC LP0002 3.2.1.1			
Description	Compliance with the spectrum mask is tested with RBW set to 9kHz.			
Freq. of Emission (MHz)	Field Strength ($\mu\text{V/m}$) at 30m	Field Strength (dB $\mu\text{V/m}$) at 30m	Field Strength (dB $\mu\text{V/m}$) at 10m	Field Strength (dB $\mu\text{V/m}$) at 3m
13.553~13.567	15848	84.0	103.08	124.0

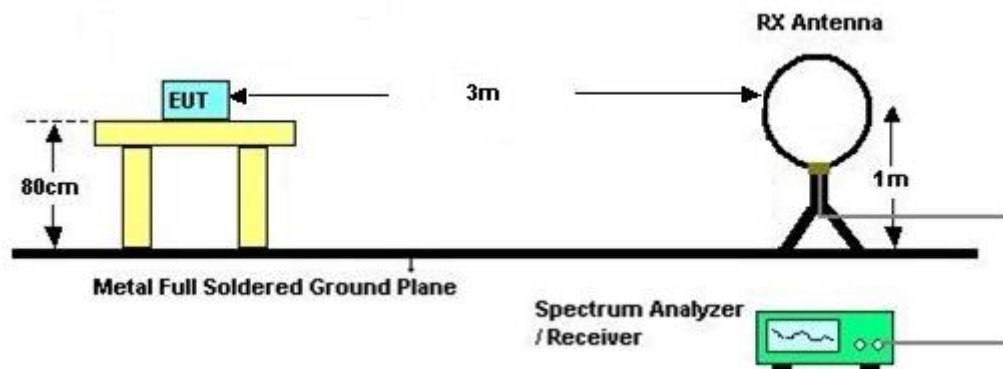
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was 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 9kHz.
Note: Emission level (dB $\mu\text{V/m}$) = 20 log Emission level ($\mu\text{V/m}$).

3.4.4 Test Setup



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 ($\mu\text{V/m}$)	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

See list of measuring instruments of 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

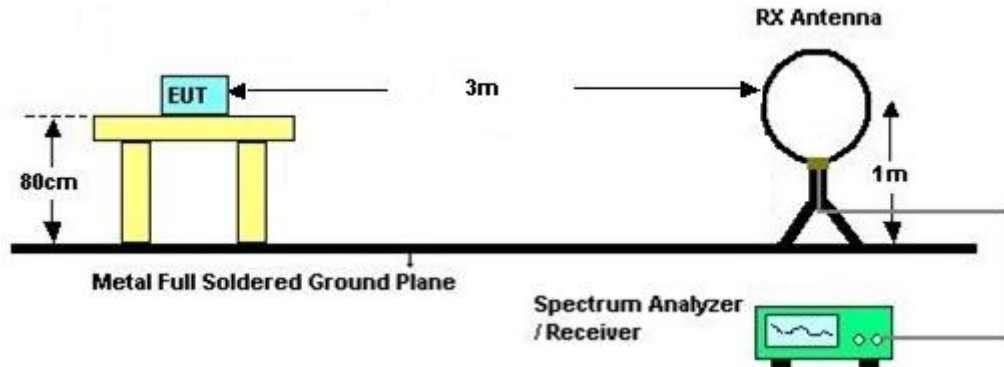
Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

3.5.4 Test Procedures

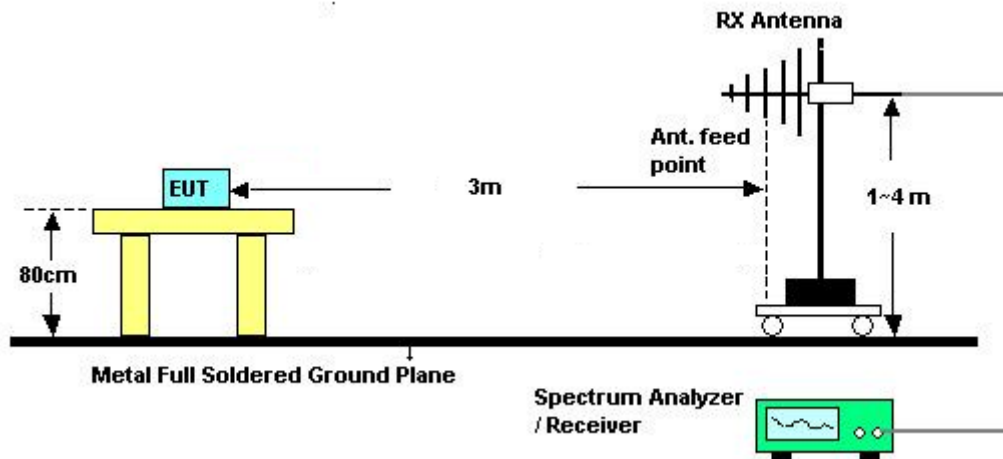
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was 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 was scan (from 1 M to 4 M) and then the turntable was 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 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. Antenna Requirements

3.5.5 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.5.6 Test Result of Radiated Emissions Measurement

Please refer to Appendix C

Remark: There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.6 Receiver Radiated Emission Measurement

3.6.1 Limit of Receiver Radiated Emission

Frequency (MHz)	Field Strength (microvolts/meter)	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

3.6.2 Measuring Instruments

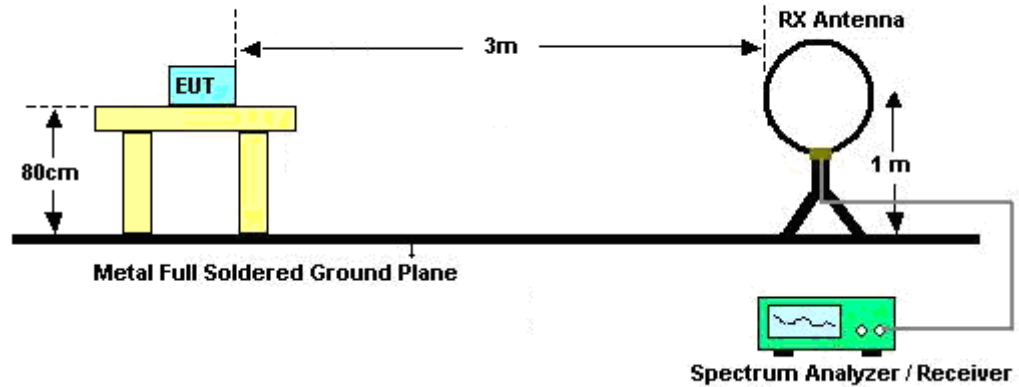
See list of measuring instruments of this test report.

3.6.3 Test Procedures

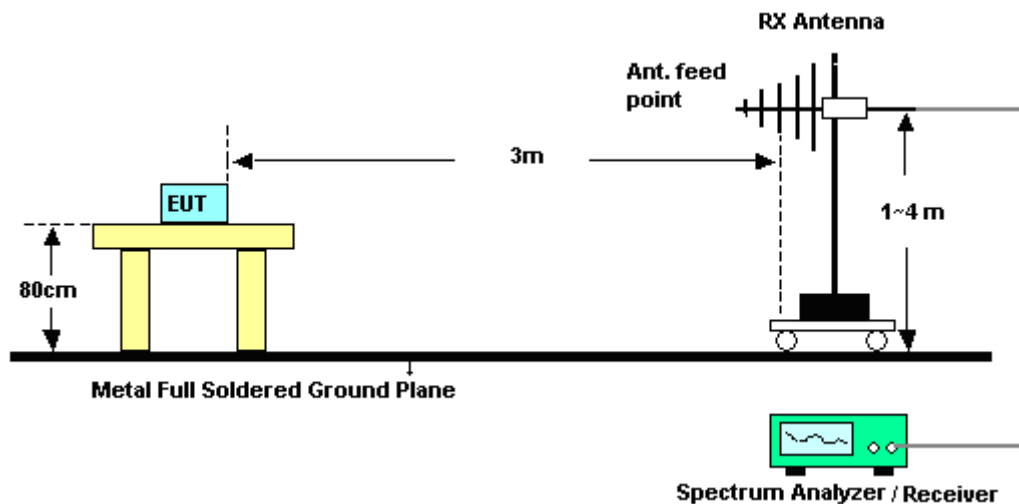
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.6.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.6.5 Test Result of Receiver Radiated Spurious Emission

Please refer to Appendix C

Remark: There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.7 Antenna Requirements

3.7.1 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 LP0002 Section 2.2.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.



4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	AC POWER	AFC-500W	F10407001 1	50Hz~60Hz	Mar. 21, 2018	Dec. 07, 2018 ~ Dec. 10, 2018	Mar. 20, 2019	Conducted (TH03-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 06, 2018	Dec. 07, 2018 ~ Dec. 10, 2018	Mar. 05, 2019	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Jun. 29, 2018	Dec. 07, 2018 ~ Dec. 10, 2018	Jun. 28, 2019	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30℃ ~70℃	Dec. 06, 2017	Dec. 07, 2018 ~ Dec. 10, 2018	Dec. 05, 2019	Conducted (TH03-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jan. 09, 2019~ Jan. 18, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9KHz~3.6GHz	Nov. 12, 2018	Jan. 09, 2019~ Jan. 18, 2019	Nov. 11, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	Jan. 09, 2019~ Jan. 18, 2019	Nov. 13, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 09, 2018	Jan. 09, 2019~ Jan. 18, 2019	Nov. 08, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Jan. 09, 2019~ Jan. 18, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	Jan. 09, 2019~ Jan. 18, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	Jan. 09, 2019~ Jan. 18, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Software	Audix	E3 6.2009-8-24	RK-00104 2	N/A	N/A	Jan. 11, 2019~ Jan. 14, 2019	N/A	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 04, 2018	Jan. 11, 2019~ Jan. 14, 2019	Dec. 03, 2019	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D& N-6-06	35414&AT- N0602	30MHz~1GHz	Oct. 13, 2018	Jan. 11, 2019~ Jan. 14, 2019	Oct. 12, 2019	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY542004 86	10Hz ~ 44GHz	Oct. 19, 2018	Jan. 11, 2019~ Jan. 14, 2019	Oct. 18, 2019	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Jan. 11, 2019~ Jan. 14, 2019	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500- B	N/A	1~4m	N/A	Jan. 11, 2019~ Jan. 14, 2019	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jan. 11, 2019~ Jan. 14, 2019	N/A	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A (MXE)	MY554201 70	N/A	Mar. 06, 2018	Jan. 11, 2019~ Jan. 14, 2019	Mar. 05, 2019	Radiation (03CH11-HY)
Filter	Wainwright	WHK20/1000 C7/40SS	SN2	20M High Pass	Sep. 16, 2018	Jan. 11, 2019~ Jan. 14, 2019	Sep. 15, 2019	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4 PE	9kHz-30MHz	Mar. 14, 2018	Jan. 11, 2019~ Jan. 14, 2019	Mar. 13, 2019	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4 PE	30M-18G	Mar. 14, 2018	Jan. 11, 2019~ Jan. 14, 2019	Mar. 13, 2019	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 14, 2018	Jan. 11, 2019~ Jan. 14, 2019	Mar. 13, 2019	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 07, 2019	Jan. 11, 2019~ Jan. 14, 2019	Jan. 06, 2020	Radiation (03CH11-HY)

5. Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.20
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Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.45
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.20
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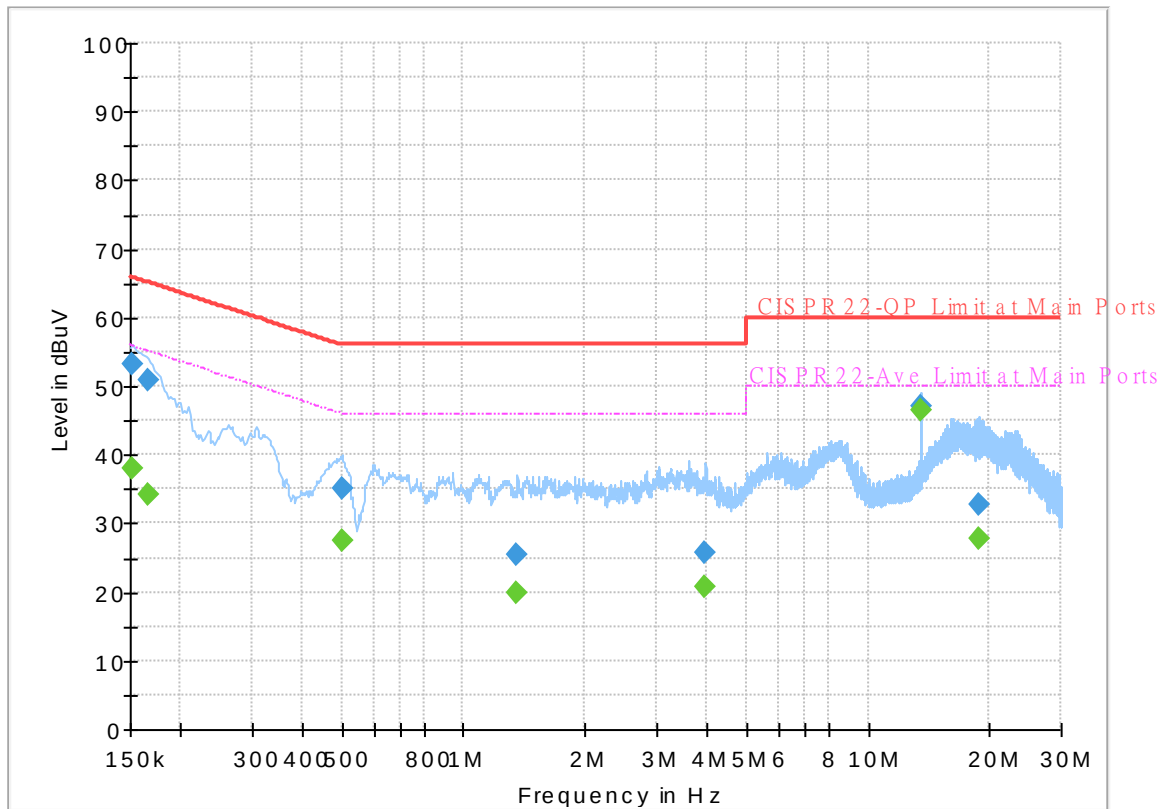
Appendix A. Test Results of Conducted Emission Test

Test Engineer :	Jimmy Chang	Temperature :	22~23℃
		Relative Humidity :	56~58%

EUT Information

Report NO : 8N2826
Test Mode : Mode 2
Test Voltage : 110Vac/60Hz
Phase : Line

Full Spectrum



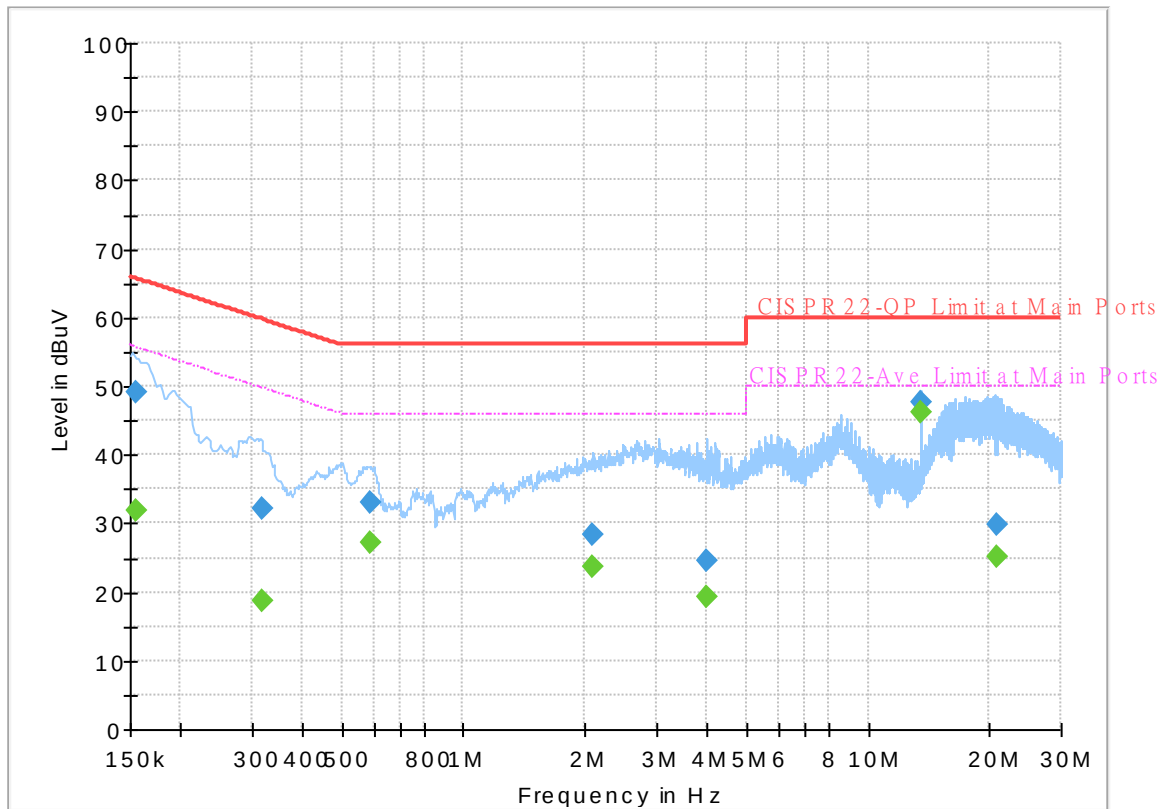
Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	38.08	55.88	17.80	L1	OFF	19.5
0.152250	53.23	---	65.88	12.65	L1	OFF	19.5
0.165750	---	34.13	55.17	21.04	L1	OFF	19.5
0.165750	50.77	---	65.17	14.40	L1	OFF	19.5
0.501000	---	27.55	46.00	18.45	L1	OFF	19.5
0.501000	35.07	---	56.00	20.93	L1	OFF	19.5
1.358250	---	19.89	46.00	26.11	L1	OFF	19.6
1.358250	25.57	---	56.00	30.43	L1	OFF	19.6
3.968250	---	20.68	46.00	25.32	L1	OFF	19.6
3.968250	25.59	---	56.00	30.41	L1	OFF	19.6
13.560000	---	46.64	50.00	3.36	L1	OFF	19.7
13.560000	47.15	---	60.00	12.85	L1	OFF	19.7
18.726000	---	27.69	50.00	22.31	L1	OFF	19.8
18.726000	32.85	---	60.00	27.15	L1	OFF	19.8

EUT Information

Report NO : 8N2826
Test Mode : Mode 2
Test Voltage : 110Vac/60Hz
Phase : Neutral

Full Spectrum

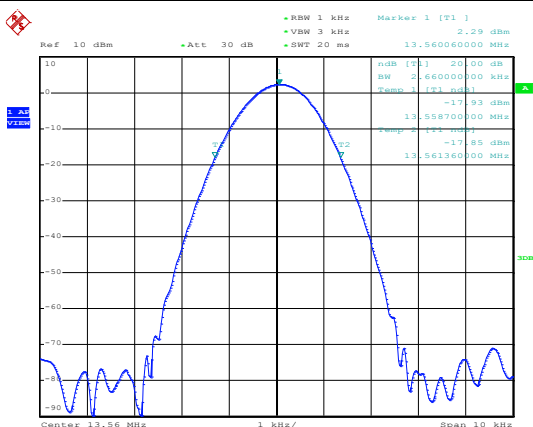
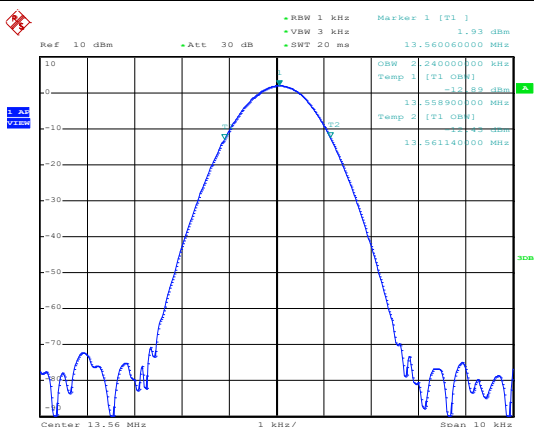


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154500	---	31.76	55.75	23.99	N	OFF	19.5
0.154500	49.26	---	65.75	16.49	N	OFF	19.5
0.316500	---	18.65	49.80	31.15	N	OFF	19.5
0.316500	32.07	---	59.80	27.73	N	OFF	19.5
0.591000	---	27.32	46.00	18.68	N	OFF	19.5
0.591000	33.00	---	56.00	23.00	N	OFF	19.5
2.073750	---	23.75	46.00	22.25	N	OFF	19.3
2.073750	28.34	---	56.00	27.66	N	OFF	19.3
3.990750	---	19.35	46.00	26.65	N	OFF	19.6
3.990750	24.66	---	56.00	31.34	N	OFF	19.6
13.560000	---	46.20	50.00	3.80	N	OFF	19.8
13.560000	47.56	---	60.00	12.44	N	OFF	19.8
20.901750	---	25.14	50.00	24.86	N	OFF	19.9
20.901750	29.91	---	60.00	30.09	N	OFF	19.9

Appendix B. Test Results of Conducted Test Items

B1. Test Result of 20dB Spectrum Bandwidth

Test mode		Test Frequency (MHz)	
NFC Tx		13.56	
 Date: 7.DEC.2018 14:20:46		 Date: 7.DEC.2018 14:14:19	
20dB Bandwidth (kHz)	2.660	99% OccupiedBW(kHz)	2.240
Frequency range (MHz)	$f_L > 13.553$	13.55870	Test Result
	$f_H < 13.567$	13.56136	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 (°C)	Time	Measurement Frequency (MHz)
110	13.560020	-20	0	13.560100
93.5	13.560020		2	13.560100
126.5	13.560030		5	13.560100
			10	13.560100
		-10	0	13.560100
			2	13.560100
			5	13.560100
			10	13.560100
		0	0	13.560080
			2	13.560060
			5	13.560080
			10	13.560070
		10	0	13.560040
			2	13.560050
			5	13.560060
			10	13.560050
		20	0	13.560030
			2	13.560030
			5	13.560030
			10	13.560040
		30	0	13.560040
			2	13.560040
			5	13.560040
			10	13.560040
		40	0	13.560040
			2	13.560040
			5	13.560040
			10	13.560040



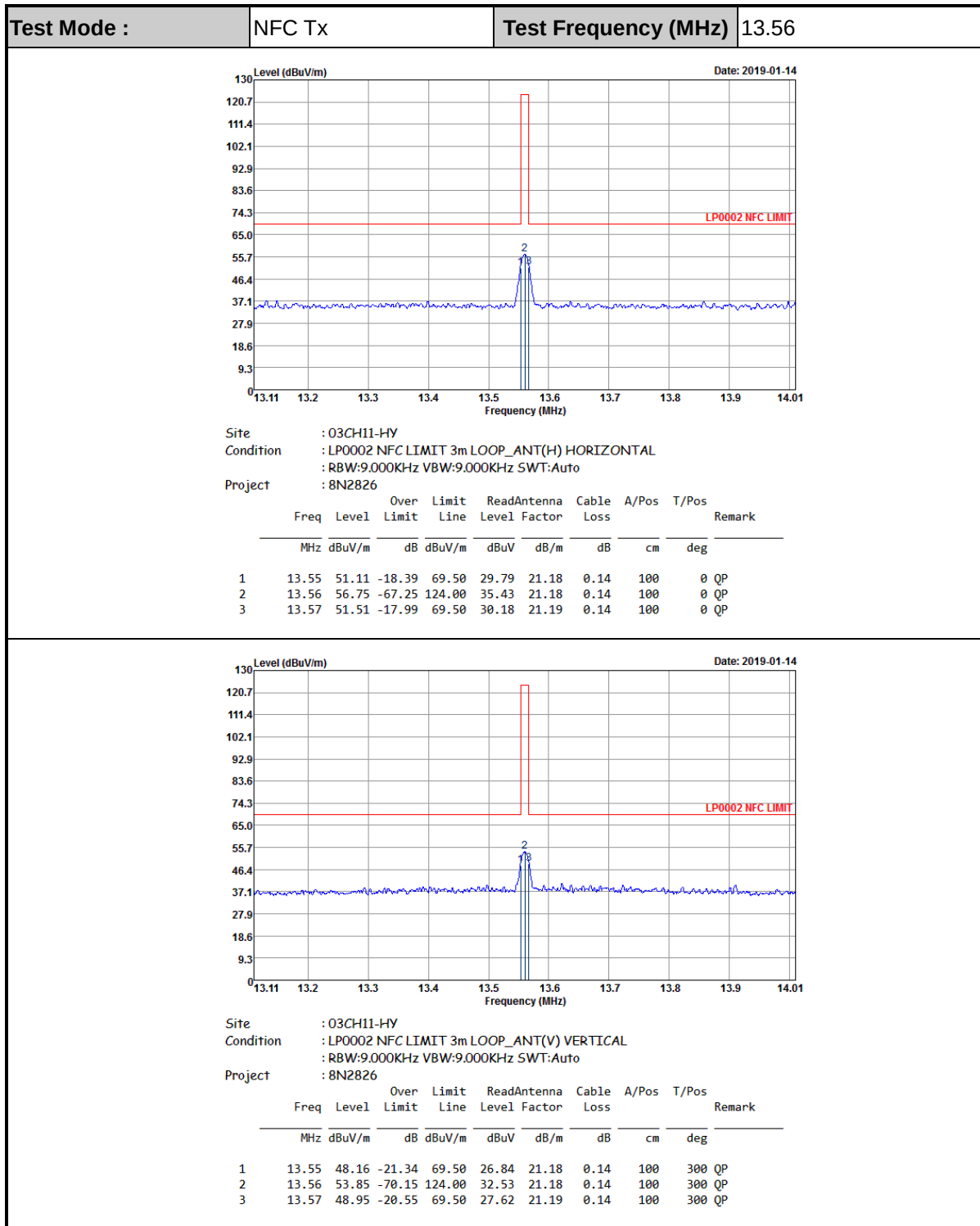
Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
		50	0	13.560040
			2	13.560040
			5	13.560040
			10	13.560040
Max.Deviation (MHz)	0.000030	Max.Deviation (MHz)		0.000100
Max.Deviation (ppm)	2.2124	Max.Deviation (ppm)		7.3746
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

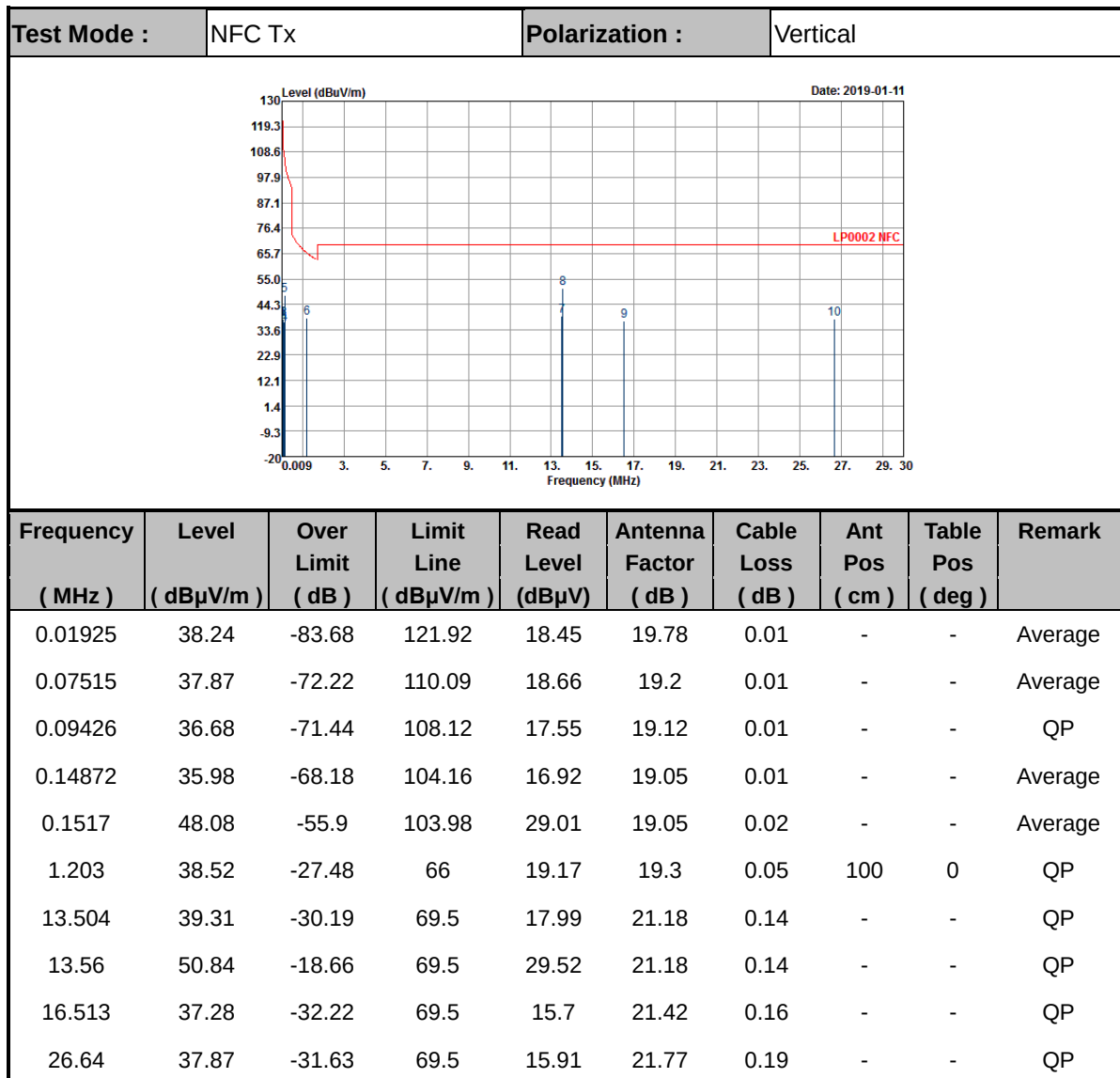
<For Sample 1>

Test Mode :		NFC Tx				Test Frequency (MHz)		13.56	

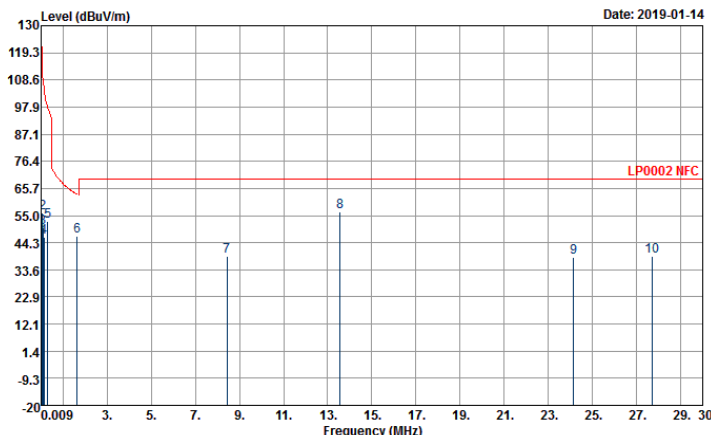
<For Sample 2>


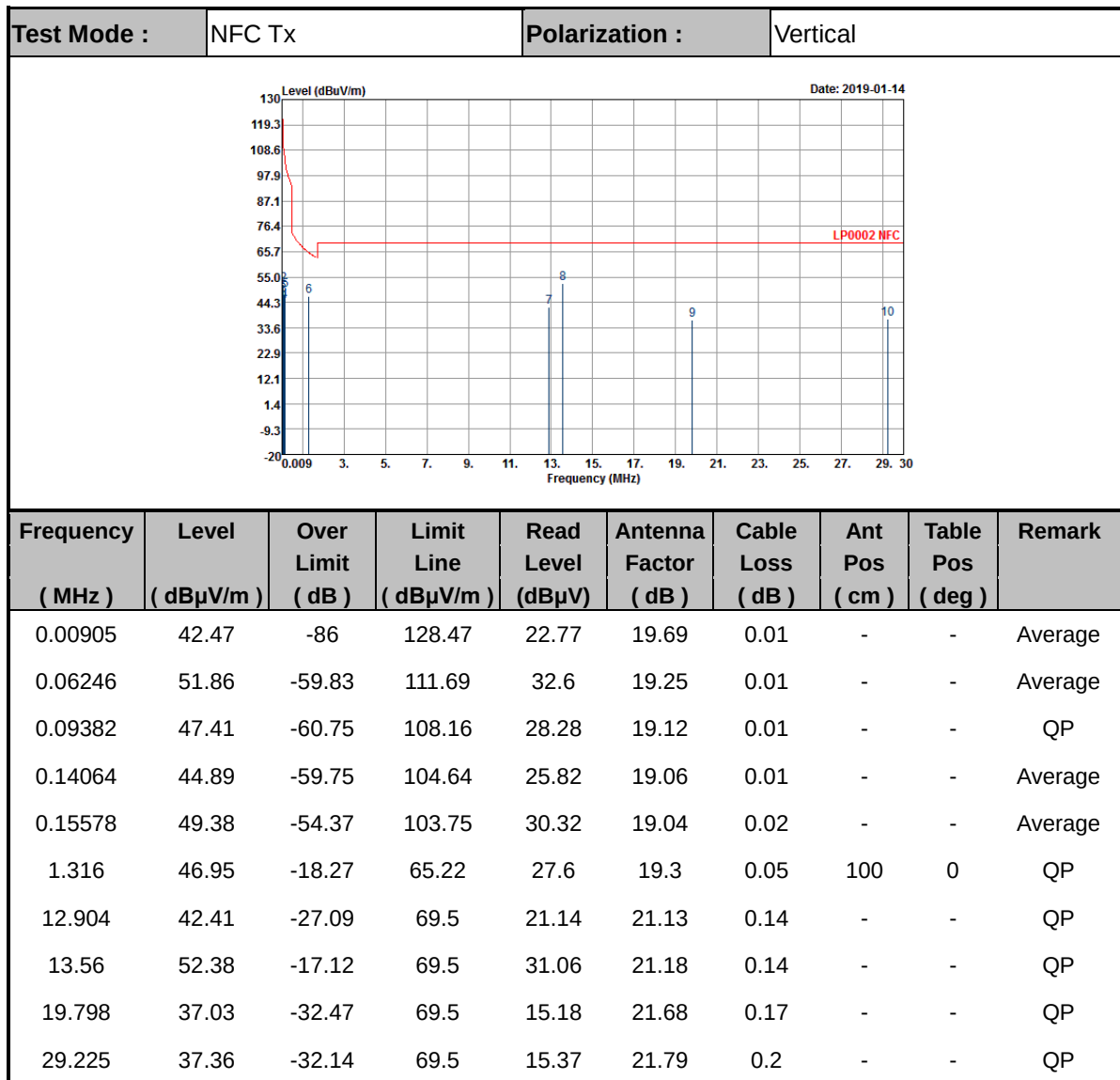
C2.Results of Radiated Spurious Emissions (9 kHz~30MHz)
<For Sample 1>

Test Mode :	NFC Tx	Polarization :	Horizontal						
Level (dBuV/m) 130 119.3 108.6 97.9 87.1 76.4 65.7 55.0 44.3 33.6 22.9 12.1 1.4 -9.3 -20 0.009 3 5 7 9 11 13 15 17 19 21 23 25 27 29 30 6 7 8 9 10 Date: 2019-01-11 LP0002 NFC Frequency (MHz)									
Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Ant Pos	Table Pos	Remark
(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB)	(dB)	(cm)	(deg)	
0.00966	45.65	-82.25	127.9	26.07	19.57	0.01	-	-	Average
0.06249	56.24	-55.45	111.69	36.98	19.25	0.01	-	-	Average
0.09378	51.68	-56.48	108.16	32.55	19.12	0.01	-	-	QP
0.125	47.99	-57.68	105.67	28.9	19.08	0.01	-	-	Average
0.1908	54.56	-47.43	101.99	35.53	19.01	0.02	-	-	Average
1.294	48.04	-17.33	65.37	28.69	19.3	0.05	100	0	QP
13.56	59.04	-10.46	69.5	37.72	21.18	0.14	-	-	QP
13.632	44.59	-24.91	69.5	23.26	21.19	0.14	-	-	QP
21.859	38.54	-30.96	69.5	16.64	21.72	0.18	-	-	QP
28.11	38.23	-31.27	69.5	16.25	21.78	0.2	-	-	QP



<For Sample 2>

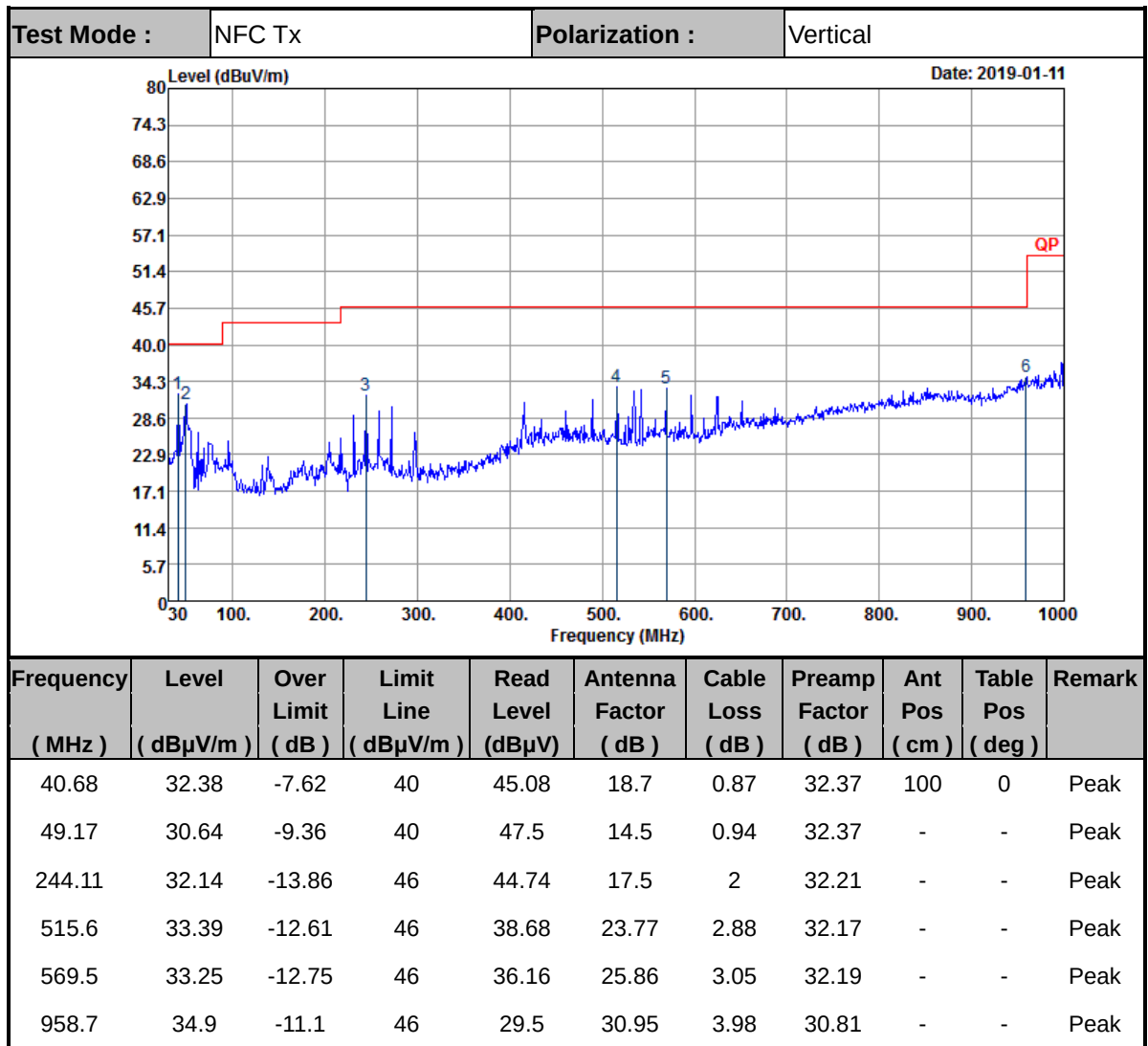
Test Mode :	NFC Tx	Polarization :	Horizontal						
Level (dBuV/m) Date: 2019-01-14 									
Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Ant Pos	Table Pos	Remark
(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB)	(dB)	(cm)	(deg)	
0.0091	48.17	-80.25	128.42	28.48	19.68	0.01	-	-	Average
0.06246	55.87	-55.82	111.69	36.61	19.25	0.01	-	-	Average
0.0938	50.28	-57.88	108.16	31.15	19.12	0.01	-	-	QP
0.14064	46.46	-58.18	104.64	27.39	19.06	0.01	-	-	Average
0.29688	52.78	-45.37	98.15	33.86	18.9	0.02	-	-	Average
1.639	46.77	-16.54	63.31	27.41	19.3	0.06	100	0	QP
8.44	39.08	-30.42	69.5	18.47	20.49	0.12	-	-	QP
13.56	56.47	-13.03	69.5	35.15	21.18	0.14	-	-	QP
24.154	38.31	-31.19	69.5	16.38	21.74	0.19	-	-	QP
27.735	38.75	-30.75	69.5	16.77	21.78	0.2	-	-	QP

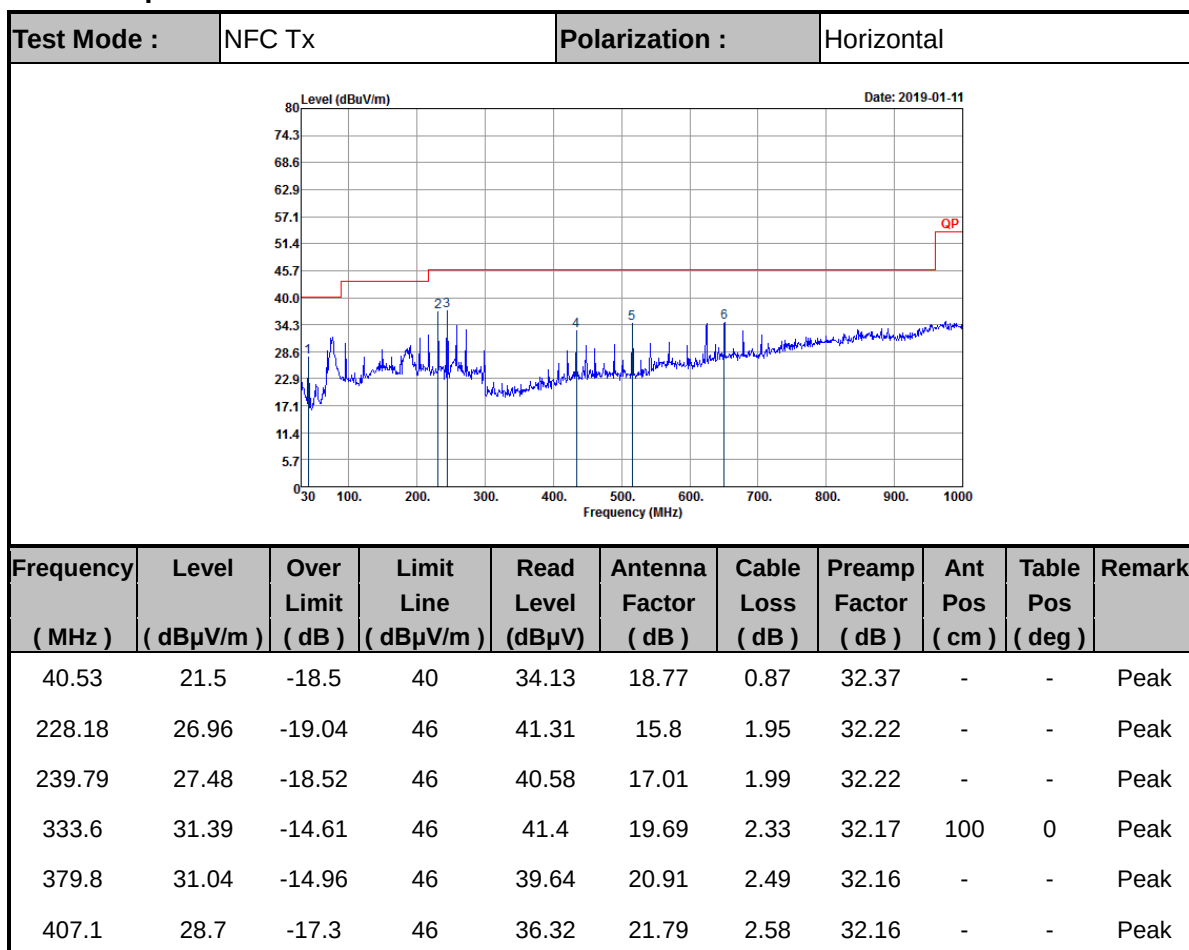

Note:

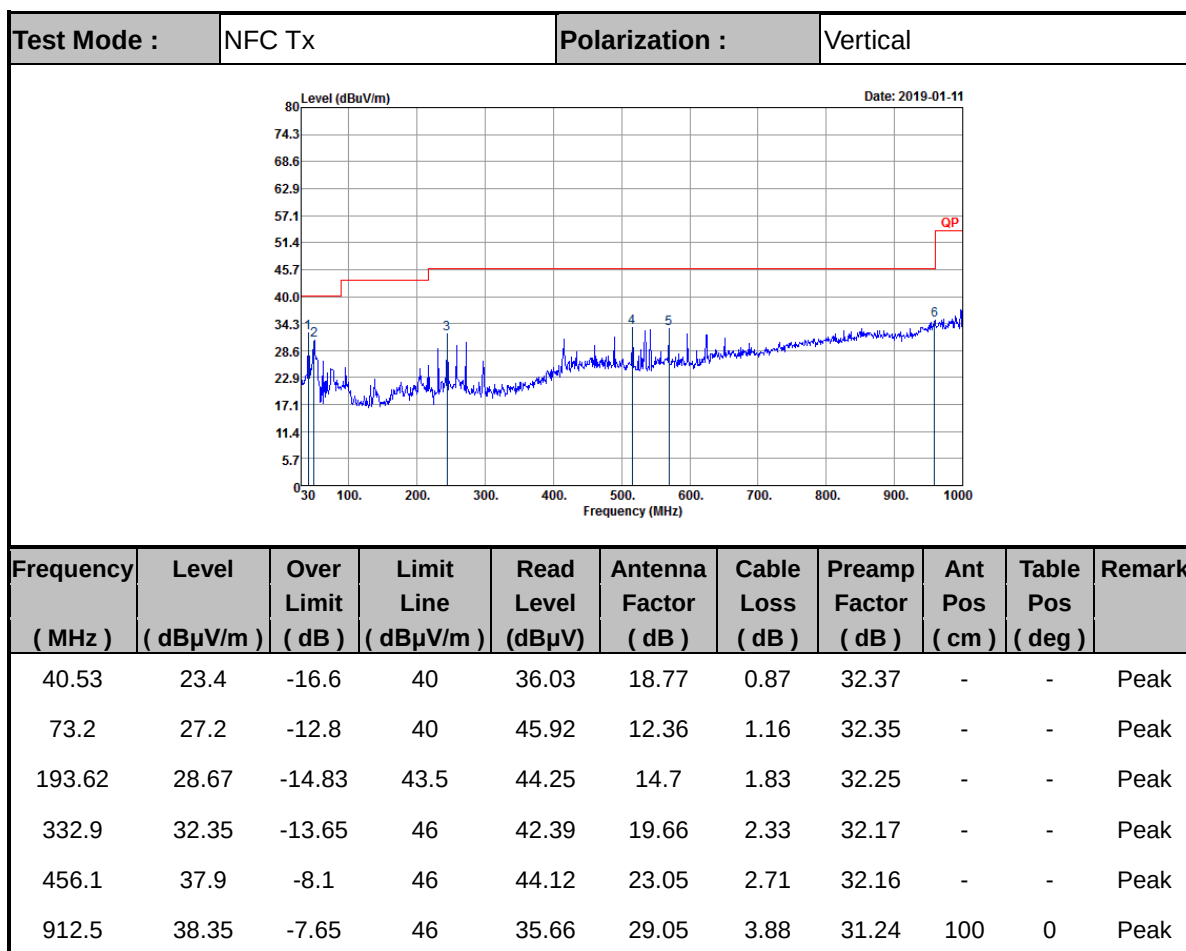
1. 13.56 MHz is fundamental signal which can be ignored.
2. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
3. Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);
4. Limit line = specific limits (dBμV) + distance extrapolation factor.

C3.Results of Radiated Spurious Emissions (30MHz~1GHz)
<For Sample 1>

Test Mode :		NFC Tx			Polarization :			Horizontal		
Level (dBuV/m)										



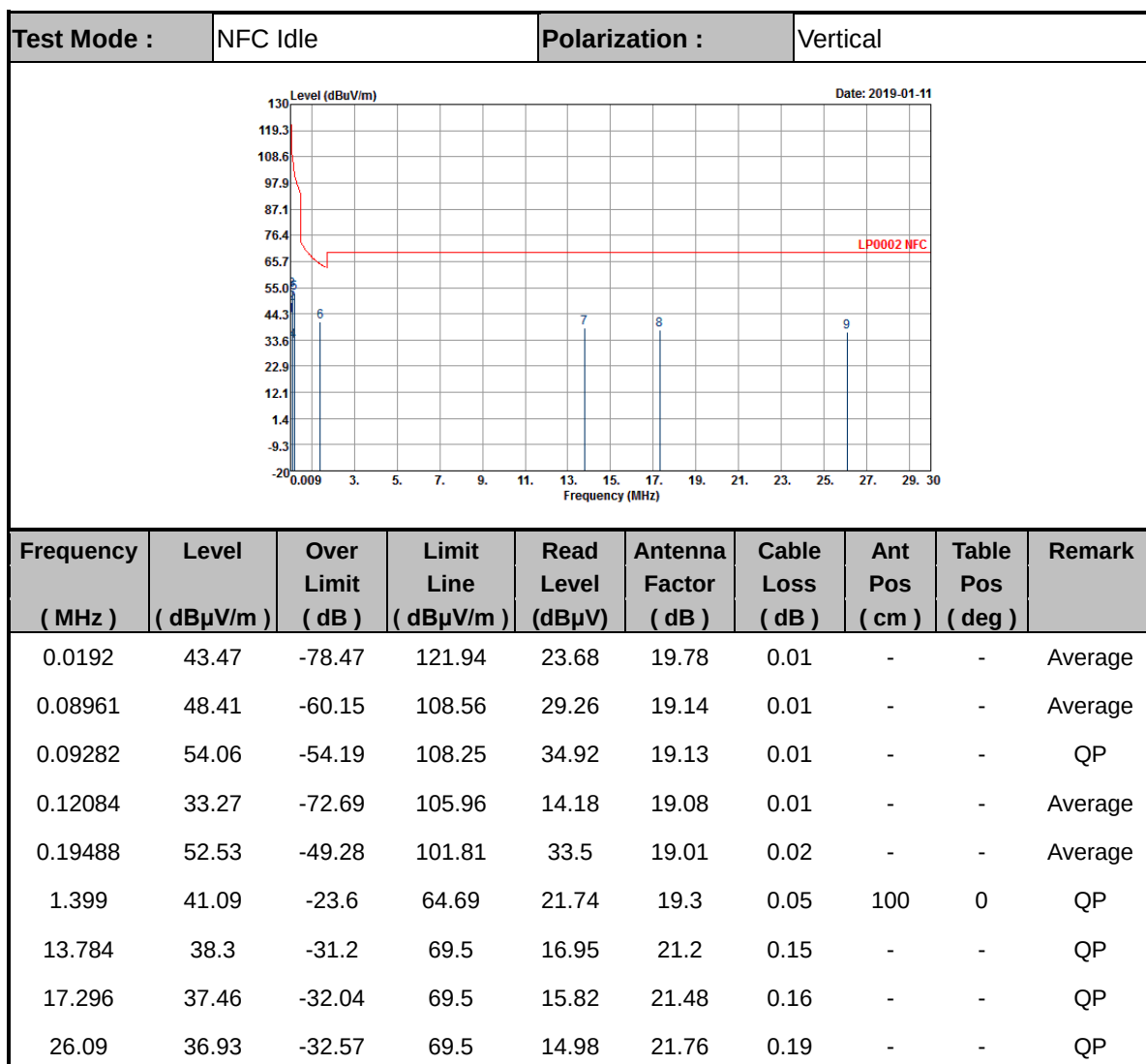
<For Sample 2>


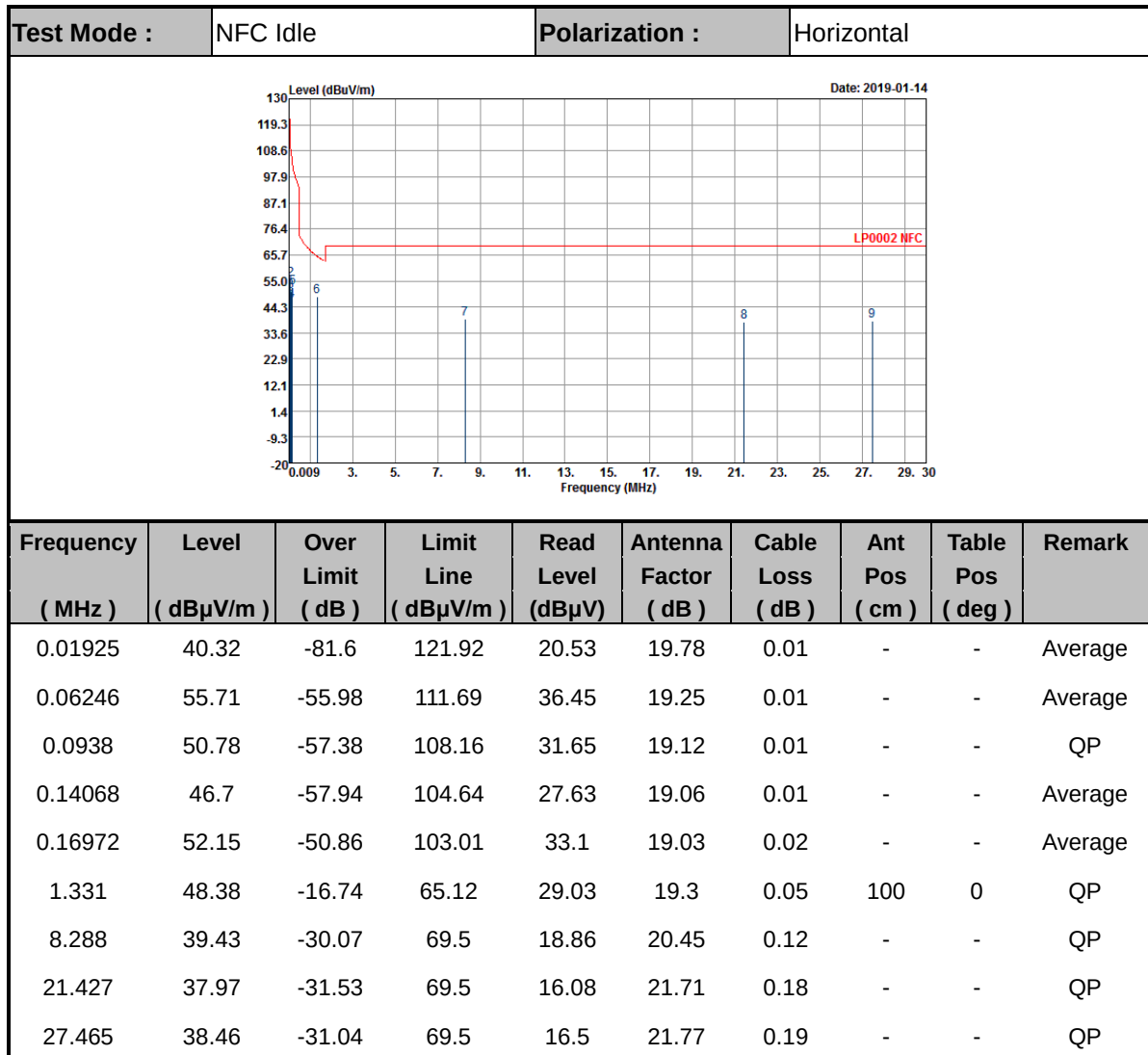

Note:

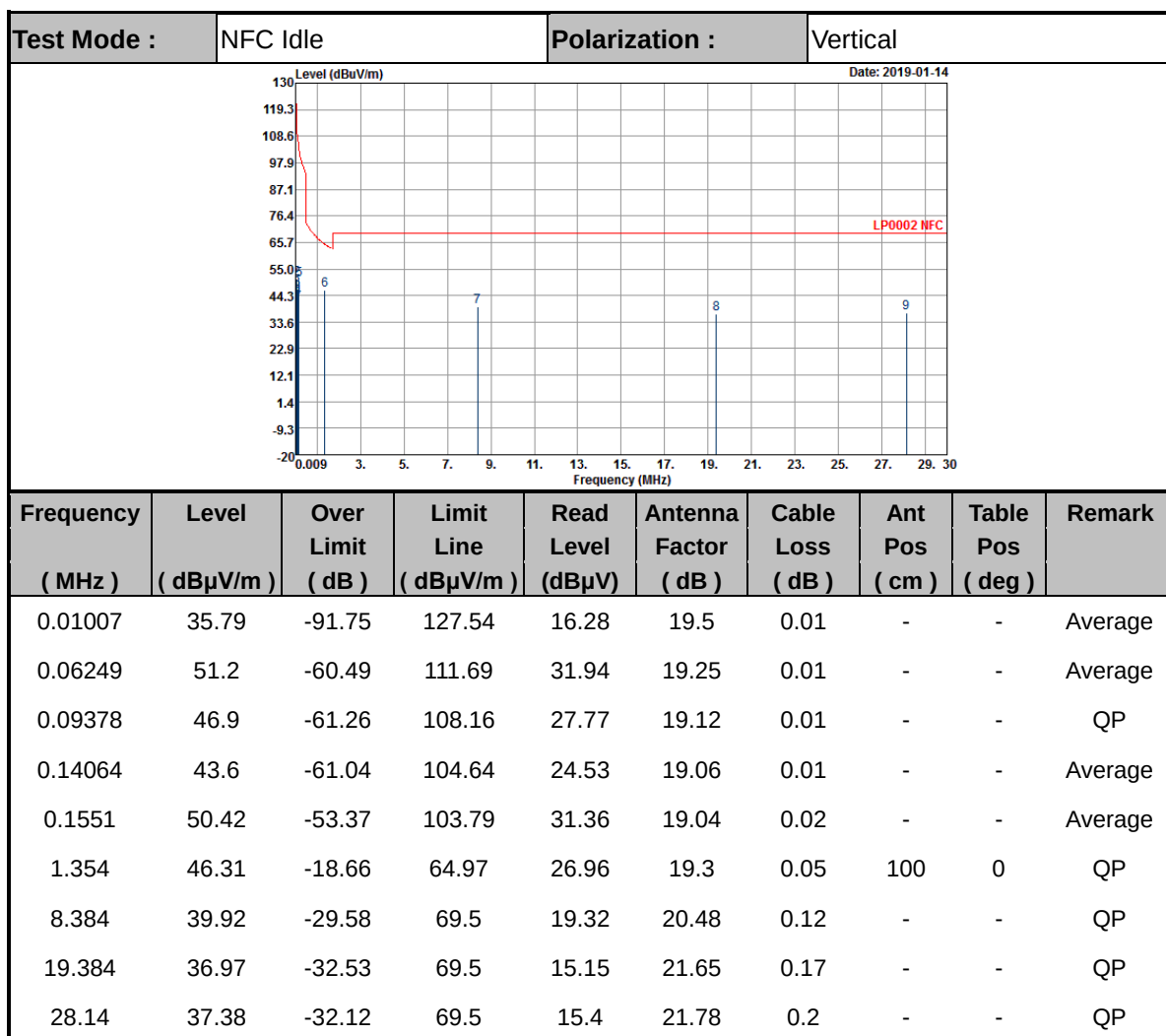
1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.

C4.Results of Receiver Radiated Spurious Emissions (9 kHz~30MHz)
<For Sample 1>

Test Mode :		NFC Idle			Polarization :		Horizontal		
Level (dBuV/m)									



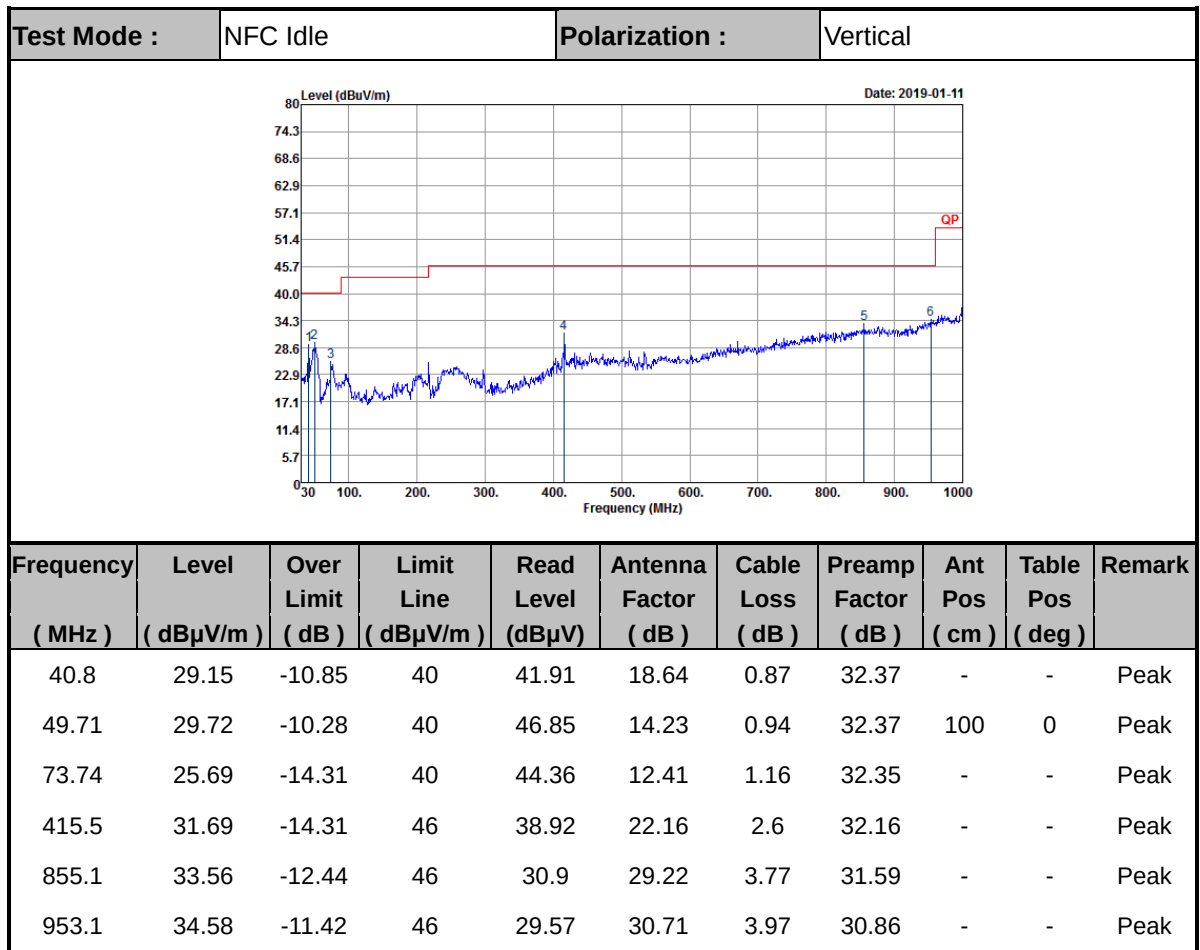
<For Sample 2>



Note:

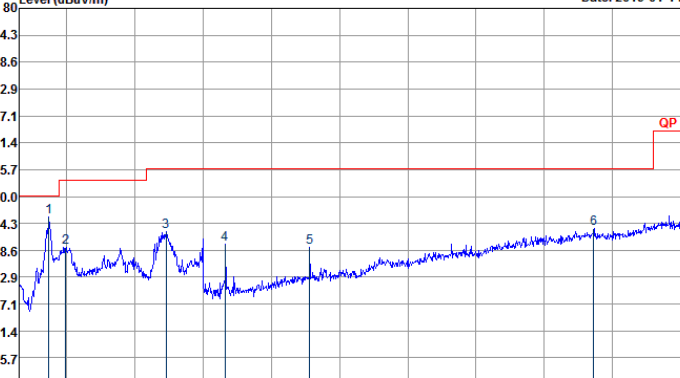
1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
3. Limit line = specific limits (dBμV) + distance extrapolation factor.

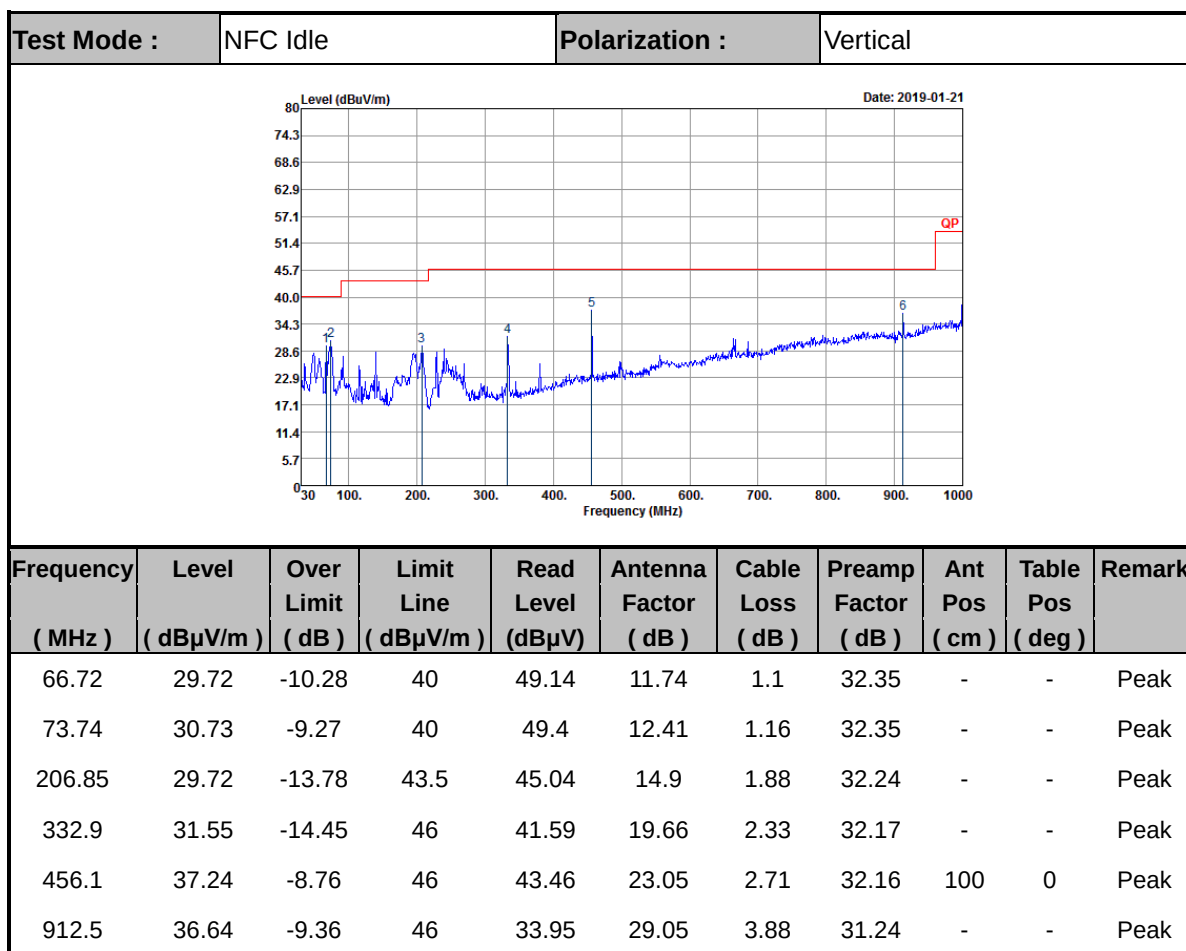
C5.Results of Receiver Radiated Spurious Emissions (30MHz~1GHz)
<For Sample 1>

Test Mode :		NFC Idle			Polarization :			Horizontal		
Level (dBuV/m) </										



<For Sample 2>

Test Mode :	NFC Idle	Polarization :	Horizontal							
Level (dBuV/m) Date: 2019-01-14  Frequency (MHz)										
Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB)	(dB)	(dB)	(cm)	(deg)	
73.74	35.76	-4.24	40	54.43	12.41	1.16	32.35	100	0	Peak
98.04	29.17	-14.33	43.5	44.54	15.46	1.35	32.32	-	-	Peak
245.19	32.46	-13.54	46	44.93	17.63	2	32.21	-	-	Peak
332.2	29.8	-16.2	46	39.86	19.64	2.33	32.17	-	-	Peak
456.1	29.18	-16.82	46	35.4	23.05	2.71	32.16	-	-	Peak
872.6	33.11	-12.89	46	30.43	29.23	3.81	31.5	-	-	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.