



FCC RADIO TEST REPORT

FCC ID : A4RG020H
Equipment : Smartphone
Model Name : G020H
Applicant : Google LLC
1600 Amphitheatre Parkway,
Mountain View, CA 94043, USA
Standard : FCC Part 15 Subpart C §15.225

The product was completed on Dec. 13, 2018. We, SPORTON INTERNATIONAL 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 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



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	Under limit 14.03 dB at 0.065MHz
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 63.04 dB _u V/m at 13.56 MHz
3.5	15.225(d) 15.209	Radiated Spurious Emissions	Pass	Under limit 6.11 dB at 30.270MHz
3.6	15.203	Antenna Requirements	Pass	-

Reviewed by: Wii Chang

Report Producer: Natasha Hsieh



1. General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smartphone
Model Name	G020H
Sample 1	The device with 1st battery
Sample 2	The device with 2nd battery
FCC ID	A4RG020H
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/NFC/GNSS WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer.

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency	13.56MHz
Channel Number	1
Type of Modulation	ASK

Remark: The above EUT's information was declared by manufacturer.

1.3 Modification of EUT

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



1.4 Testing Location

Sportun Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

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.	Sportun Site No.		
	TH03-HY	CO05-HY	03CH07-HY
Test Engineer	Louis Chung	Rick Lin	Stan Hsieh
Temperature	22~24°C	22~23°C	23~24°C
Relative Humidity	53~55%	54~56%	51~53%

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

1.5 Applicable Standards

According to the specifications of 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

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.

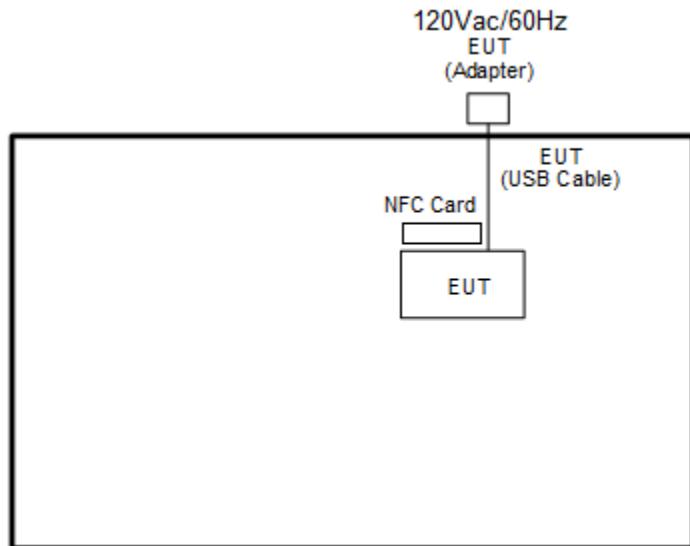
Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

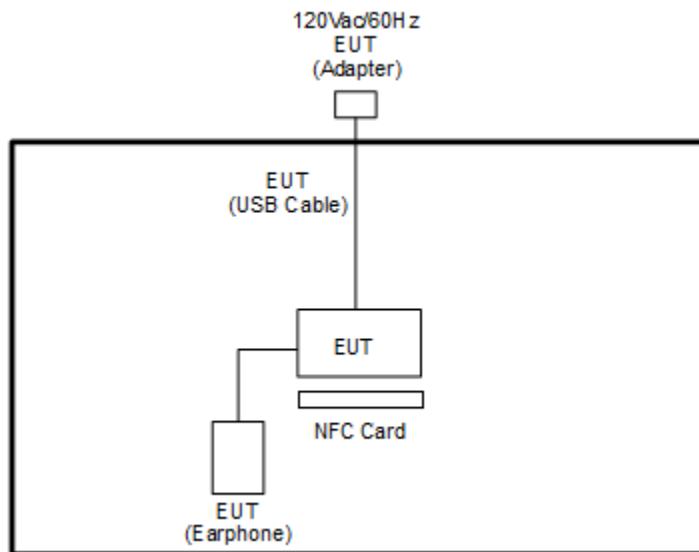
The EUT pre-scanned in four NFC type, A, B, F, V. The worst type (type F) was recorded in this report. Pre-scanned tests, X, Y, Z in three orthogonal panels to determine the final configuration (Y plane as worst plane) from all possible combinations.

Test Cases	
AC Conducted Emission	Mode 1: NFC Tx + Battery + USB Type C Cable 1 (Charging from Adapter 1) for Sample 1
Remark: For Radiated Test Cases, the tests were performed with USB Type C Cable 1.	

2.2 Connection Diagram of Test System

<AC Conducted Emissions>



<For Radiated Emissions Measurement>**2.3 Table for Supporting Units**

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	NFC Card	Metro Taipei	Easy Card	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 2 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.

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

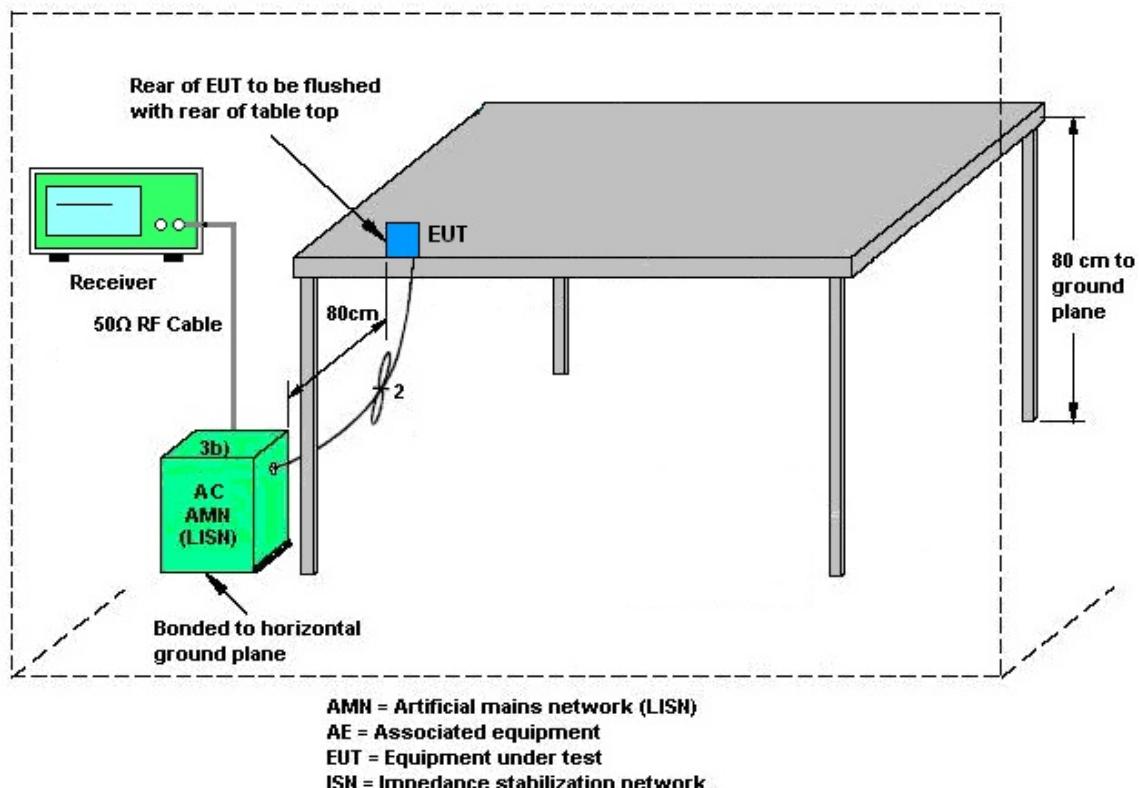
3.1.2 Measuring Instruments

See list of measuring equipment 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.

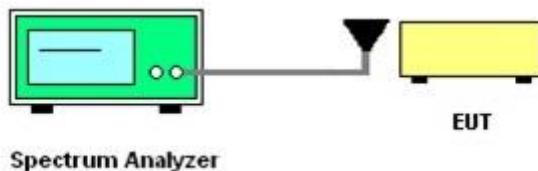
3.2.2 Measuring Instruments

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.

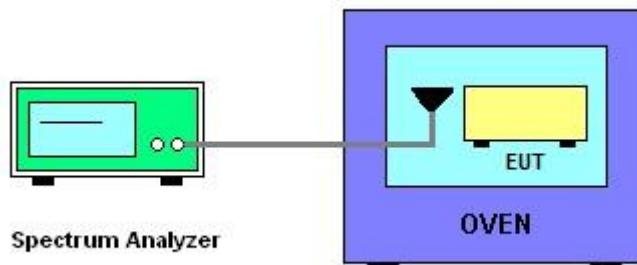
3.3.2 Measuring Instruments

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 fc is declaring of channel frequency. Then the frequency error formula is $(fc-f)/fc \times 10^6$ 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 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	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 (μ V/m) at 30m	Field Strength (dB μ V/m) at 30m	Field Strength (dB μ V/m) at 10m	Field Strength (dB μ V/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

3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

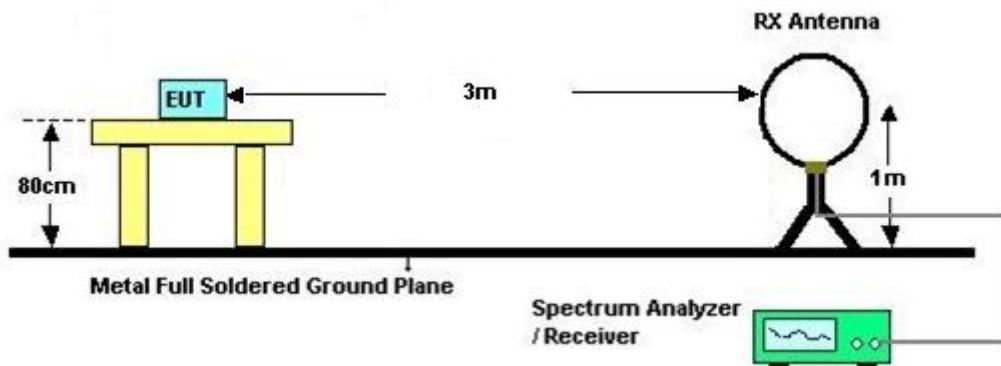
3.4.3 Test Procedures

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 μ V/m) = 20 log Emission level (μ V/m).

3.4.4 Test Setup

For radiated emissions 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 (μ 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 and 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

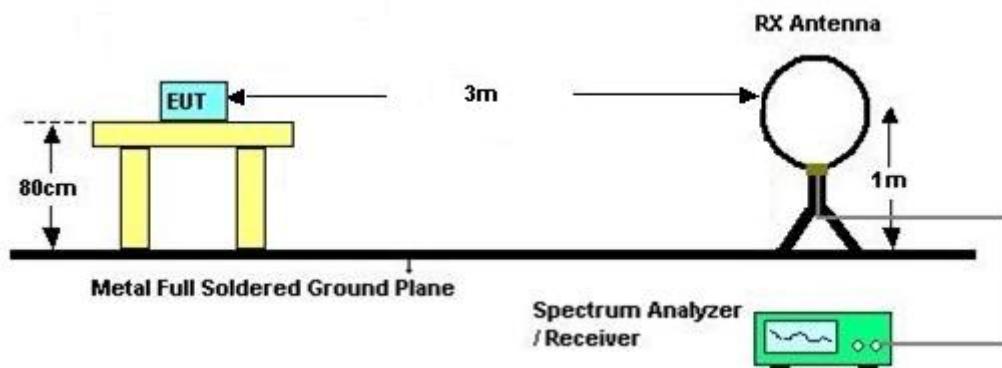


3.5.4 Test Procedures

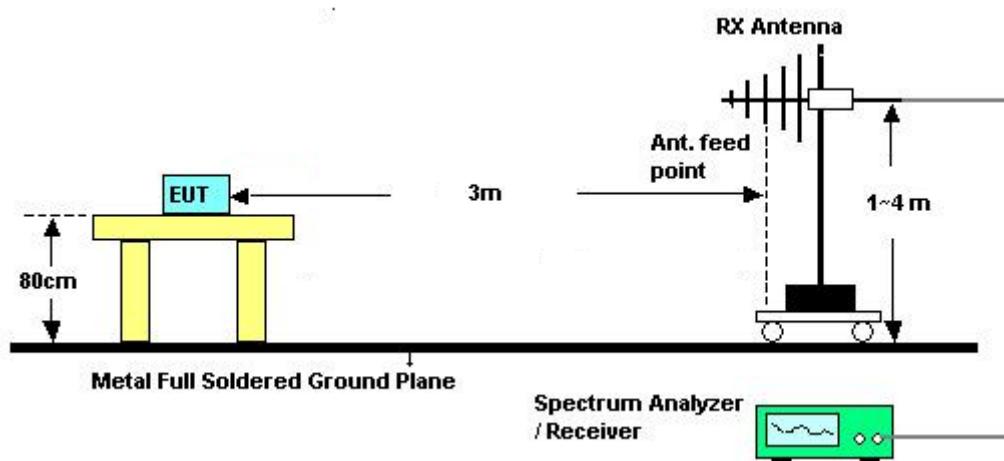
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.

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 alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.



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	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	AC POWER	AFC-500W	F104070011	50Hz~60Hz	Mar. 21, 2018	Oct. 15, 2018	Mar. 20, 2019	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Jun. 25, 2018	Oct. 15, 2018	Jun. 24, 2019	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30°C ~70°C	Dec. 06, 2017	Oct. 15, 2018	Dec. 05, 2019	Conducted (TH03-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 06, 2018	Oct. 15, 2018	Mar. 05, 2019	Conducted (TH03-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Dec. 05 , 2018	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9KHz~3.6GHz	Nov. 12, 2018	Dec. 05 , 2018	Nov. 11, 2019	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Mar. 06, 2018	Dec. 05 , 2018	Mar. 05, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	Dec. 05 , 2018	Nov. 13, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 09, 2018	Dec. 05 , 2018	Nov. 08, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Dec. 05 , 2018	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 03, 2018	Dec. 05 , 2018	Jan. 02, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 03, 2018	Dec. 05 , 2018	Jan. 02, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Dec. 05, 2018	N/A	Conduction (CO05-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	35419&03	30MHz to 1GHz	Dec. 18, 2017	Nov. 20, 2018~ Dec. 13, 2018	Dec. 17, 2018	Radiation (03CH07-HY)
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	May 29, 2018	Nov. 20, 2018~ Dec. 13, 2018	May. 28 2019	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz to 26.5GHz	Jan. 16, 2018	Nov. 20, 2018~ Dec. 13, 2018	Jan. 15, 2019	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz-1GHz	May 21, 2018	Nov. 20, 2018~ Dec. 13, 2018	May 20, 2019	Radiation (03CH07-HY)
Filter	Wainwright	WHK20/1000 C7/40SS	SN3	20M High Pass	Nov. 02, 2018	Nov. 20, 2018~ Dec. 13, 2018	Nov. 01, 2019	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971/4, MY28655/4	9KHz~30MHz	Jan. 02, 2018	Nov. 20, 2018~ Dec. 13, 2018	Jan. 01, 2019	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4, MY24971/4, MY15682/4	30MHz~1GHz	Feb. 27, 2018	Nov. 20, 2018~ Dec. 13, 2018	Feb. 26, 2019	Radiation (03CH07-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Nov. 20, 2018~ Dec. 13, 2018	N/A	Radiation (03CH07-HY)
Controller	ChainTek	Chaintek 3000	N/A	Control Turn table	N/A	Nov. 20, 2018~ Dec. 13, 2018	N/A	Radiation (03CH07-HY)
Controller	Max-Full	MF7802	MF78020836 8	Control Ant Mast	N/A	Nov. 20, 2018~ Dec. 13, 2018	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Nov. 20, 2018~ Dec. 13, 2018	N/A	Radiation (03CH07-HY)
Hygrometer	Testo	DTM-303A	TP157075	N/A	Nov. 05, 2018	Nov. 21, 2018~ Dec. 18, 2018	Nov. 04, 2019	Radiation (03CH07-HY)
Software	Audix	E3 6.2009-8-2 4	80504004656 H	N/A	N/A	Nov. 20, 2018~ Dec. 13, 2018	N/A	Radiation (03CH07-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% ($U = 2U_c(y)$)	3.40
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.70
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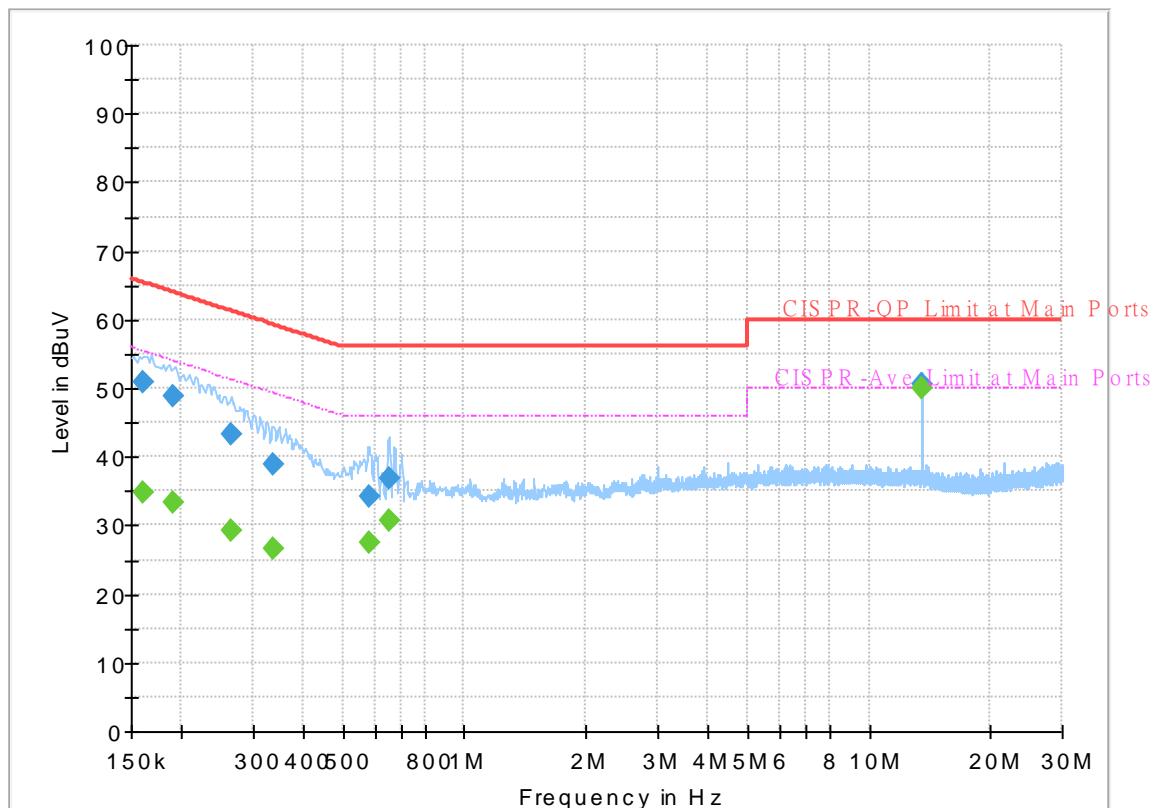
Appendix A. Test Results of Conducted Emission Test

Test Engineer :	Rick Lin	Temperature :	22~23°C
		Relative Humidity :	54~56%

EUT Information

Report NO : 891148-01
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Line

Full Spectrum



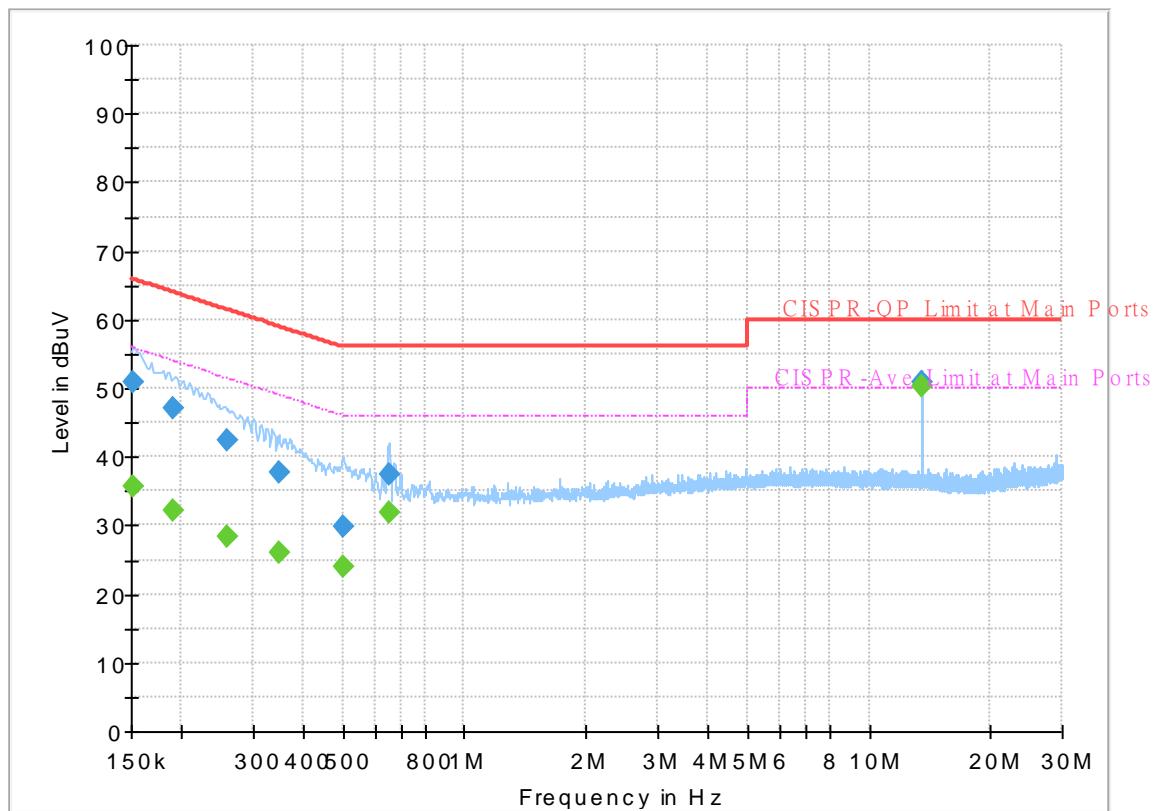
Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.161250	---	34.79	55.40	20.61	L1	OFF	19.5
0.161250	50.93	---	65.40	14.47	L1	OFF	19.5
0.190500	---	33.20	54.02	20.82	L1	OFF	19.5
0.190500	48.72	---	64.02	15.30	L1	OFF	19.5
0.264750	---	29.27	51.28	22.01	L1	OFF	19.5
0.264750	43.19	---	61.28	18.09	L1	OFF	19.5
0.336750	---	26.60	49.28	22.68	L1	OFF	19.5
0.336750	38.95	---	59.28	20.33	L1	OFF	19.5
0.579750	---	27.47	46.00	18.53	L1	OFF	19.5
0.579750	34.18	---	56.00	21.82	L1	OFF	19.5
0.651750	---	30.57	46.00	15.43	L1	OFF	19.6
0.651750	36.83	---	56.00	19.17	L1	OFF	19.6
13.560000	---	49.94	50.00	0.06	L1	OFF	20.0
13.560000	50.54	---	60.00	9.46	L1	OFF	20.0

EUT Information

Report NO : 891148-01
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Neutral

Full Spectrum



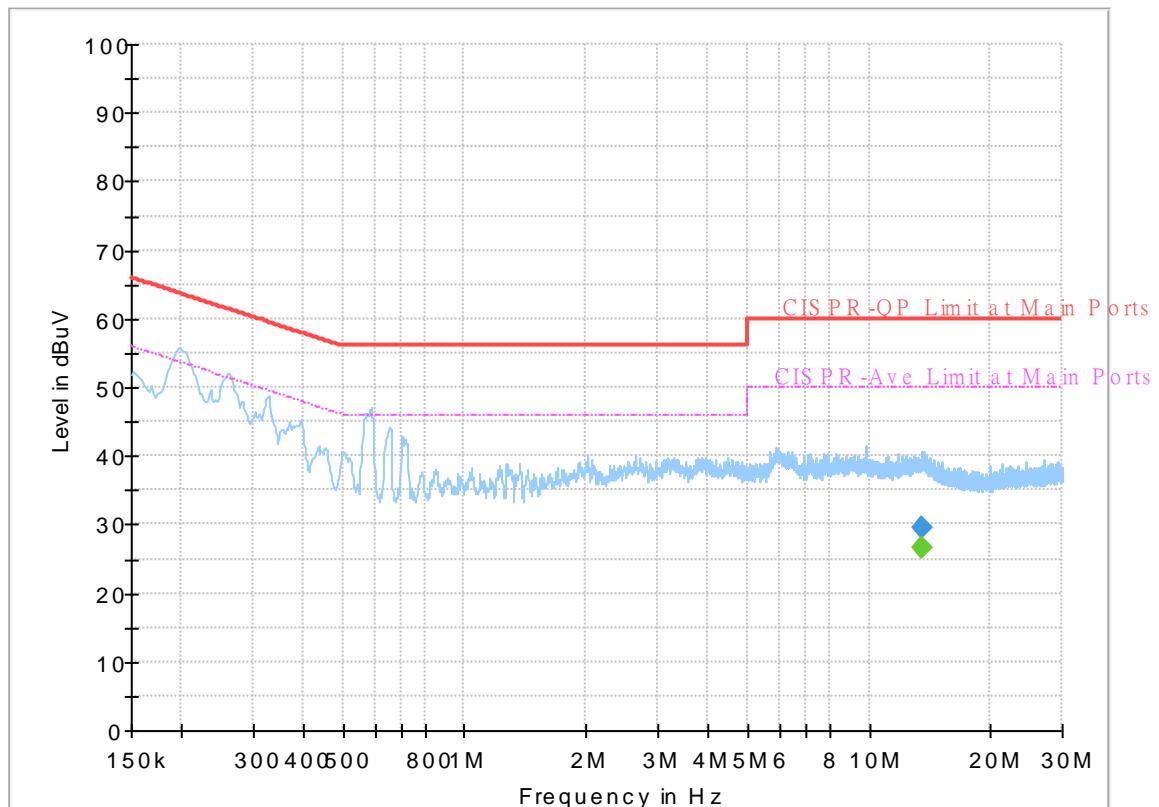
Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	35.79	55.88	20.09	N	OFF	19.5
0.152250	50.96	---	65.88	14.92	N	OFF	19.5
0.190500	---	32.16	54.02	21.86	N	OFF	19.5
0.190500	47.02	---	64.02	17.00	N	OFF	19.5
0.260250	---	28.48	51.42	22.94	N	OFF	19.5
0.260250	42.37	---	61.42	19.05	N	OFF	19.5
0.348000	---	26.15	49.01	22.86	N	OFF	19.5
0.348000	37.82	---	59.01	21.19	N	OFF	19.5
0.501000	---	24.02	46.00	21.98	N	OFF	19.5
0.501000	29.90	---	56.00	26.10	N	OFF	19.5
0.649500	---	31.97	46.00	14.03	N	OFF	19.6
0.649500	37.46	---	56.00	18.54	N	OFF	19.6
13.560000	---	50.34	50.00	-0.34	N	OFF	20.1
13.560000	51.01	---	60.00	8.99	N	OFF	20.1

EUT Information

Report NO : 891148-01
Test Mode : Mode 1
Test Voltage : 120Vac/60Hz
Phase : Line
Terminal

Full Spectrum



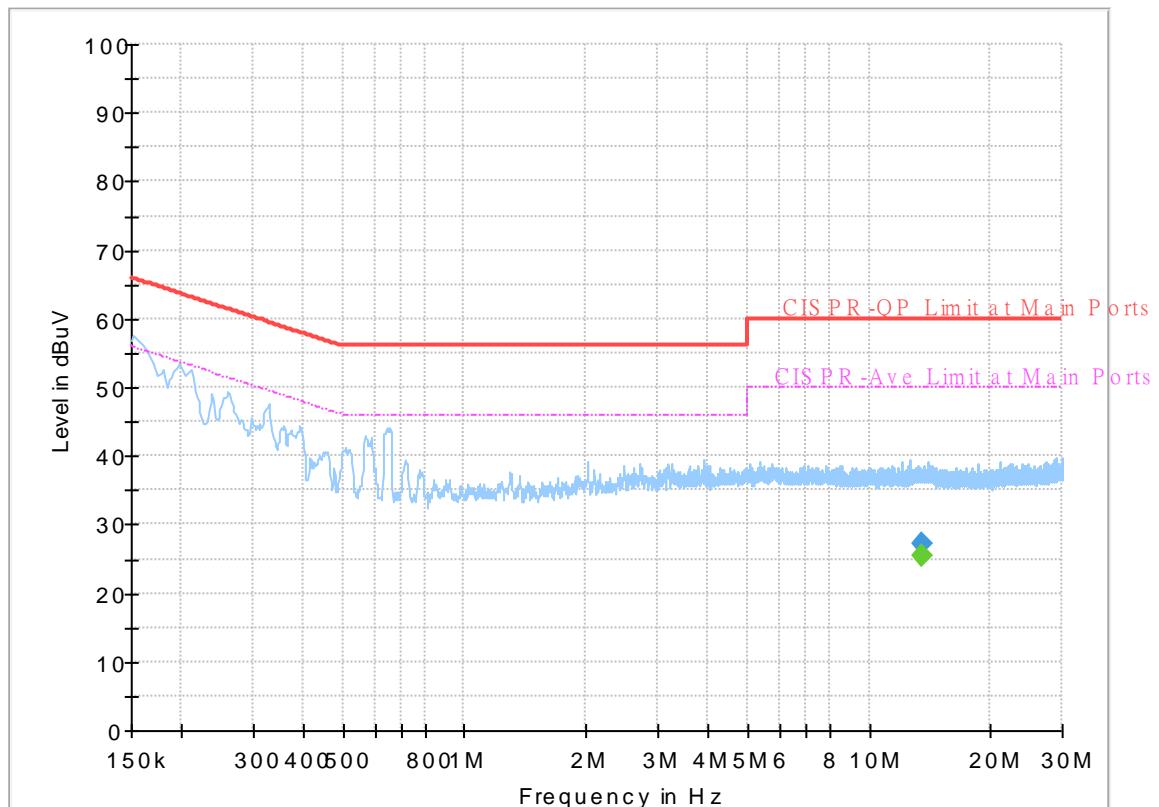
Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
13.560000	---	26.63	50.00	23.37	L1	OFF	20.0
13.560000	29.63	---	60.00	30.37	L1	OFF	20.0

EUT Information

Report NO : 891148-01
Test Mode : Mode 1
Test Voltage : 120Vac/60Hz
Phase : Neutral
Terminal

Full Spectrum

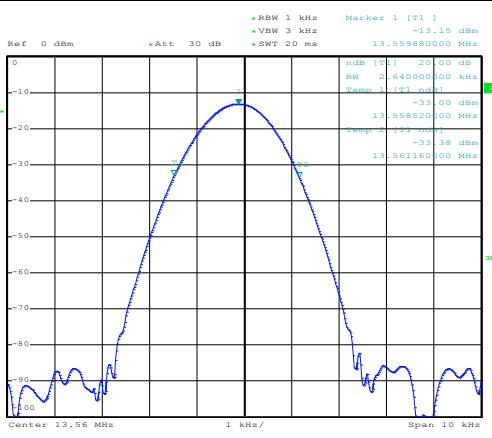
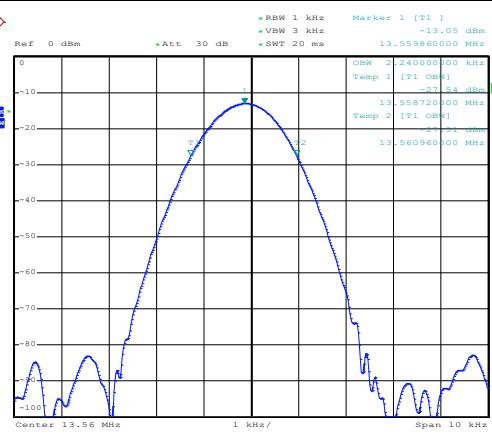


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
13.560000	---	25.44	50.00	24.56	N	OFF	20.1
13.560000	27.13	---	60.00	32.87	N	OFF	20.1

Appendix B. Test Results of Conducted Test Items

B1. Test Result of 20dB Spectrum Bandwidth

Test mode	NFC Tx	Test Frequency (MHz)	13.56
	 <p>RBW 1 kHz Marker 1 [T1] -13.15 dBm RBW 3 kHz VSWR 3 kHz SWT 20 ms 13.559860000 MHz</p> <p>0 dBm 20.00 dB BW 2.640000000 kHz Temp 1 [T1 n/a] Temp 2 [T1 n/a] -33.00 dBm 13.558520000 MHz -33.14 dBm 13.558516000 MHz -33.38 dBm 13.561160000 MHz</p> <p>100 1 kHz / Span 10 kHz</p>		 <p>RBW 1 kHz Marker 1 [T1] -13.05 dBm RBW 3 kHz VSWR 3 kHz SWT 20 ms 13.559860000 MHz</p> <p>0 dBm 2.240000000 kHz Temp 1 [T1 n/a] Temp 2 [T1 n/a] -27.54 dBm 13.558720000 MHz -27.55 dBm 13.560960000 MHz</p> <p>100 1 kHz / Span 10 kHz</p>
20dB Bandwidth (kHz)	2.64	99% OccupiedBW(kHz)	2.24
Frequency range (MHz)	f_L > 13.553 f_H < 13.567	13.55852 13.56116	Test Result 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

B3. Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
120	13.559840	-20	0	13.559840
102	13.559840		2	13.559840
138	13.559840		5	13.559840
			10	13.559850
		-10	0	13.559870
			2	13.559870
			5	13.559880
			10	13.559880
		0	0	13.559880
			2	13.559880
			5	13.559880
			10	13.559880
		10	0	13.559880
			2	13.559880
			5	13.559880
			10	13.559880
		20	0	13.559840
			2	13.559840
			5	13.559840
			10	13.559840
		30	0	13.559860
			2	13.559860
			5	13.559860
			10	13.559860
		40	0	13.559850
			2	13.559860
			5	13.559840
			10	13.559840



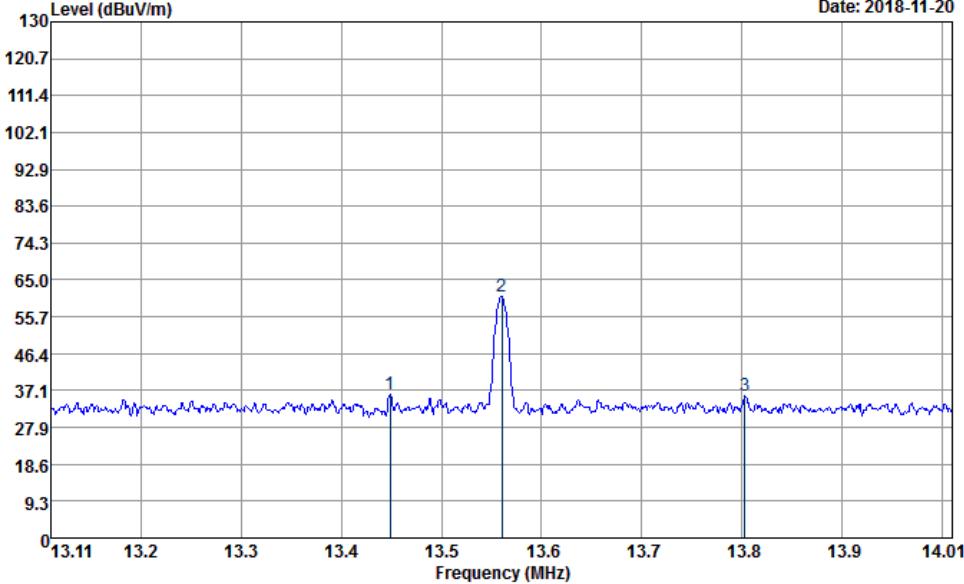
Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
		50	0	13.559840
			2	13.559840
			5	13.559840
			10	13.559840
Max. Deviation (MHz)	-0.000160	Max. Deviation (MHz)		-0.000160
Max. Deviation (ppm)	-11.7994	Max. Deviation (ppm)		-11.7994
Limit	FS < ±100 ppm	Limit		FS < ±100 ppm
Test Result	PASS	Test Result		PASS

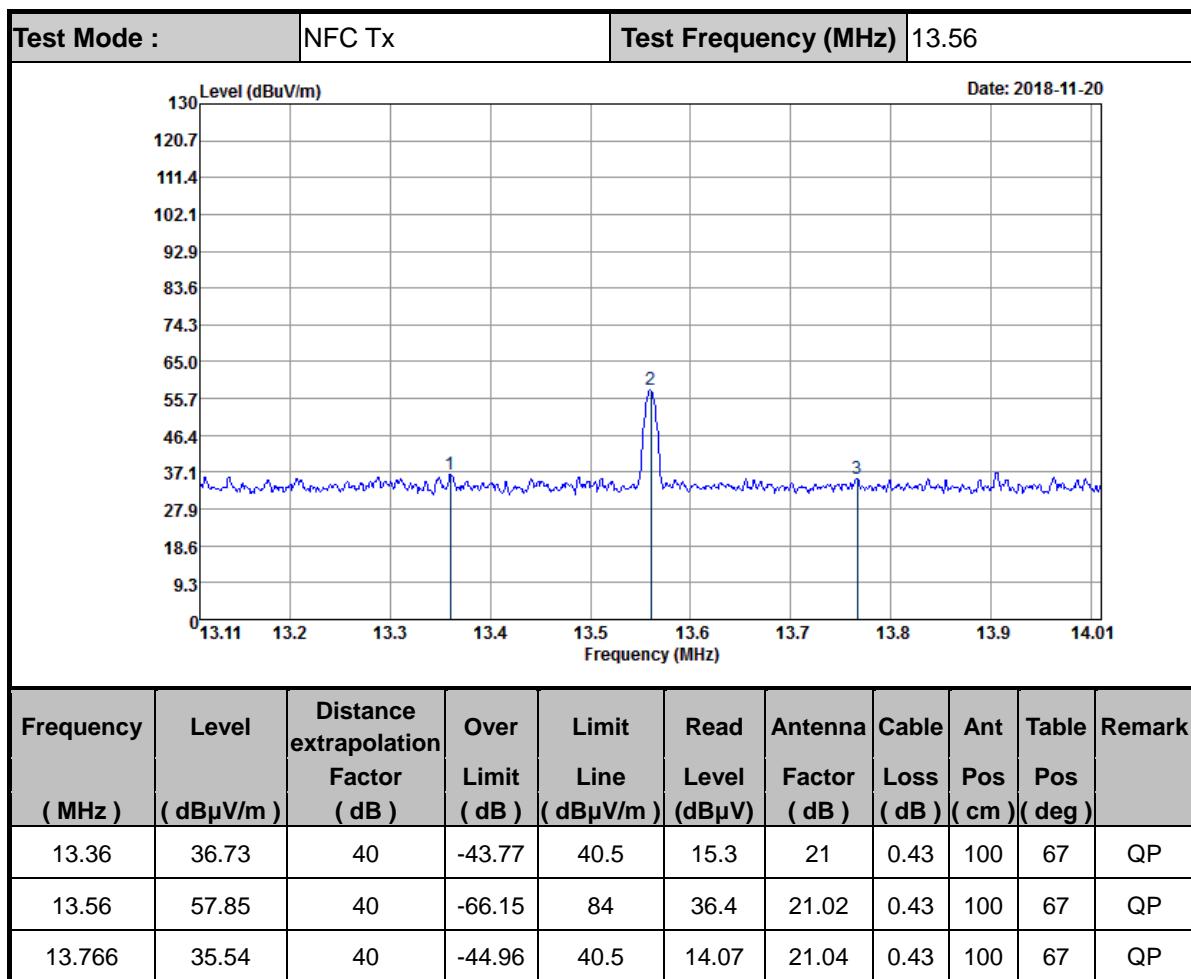


Appendix C. Test Results of Radiated Test Items

C1. Test Result of Field Strength of Fundamental Emissions

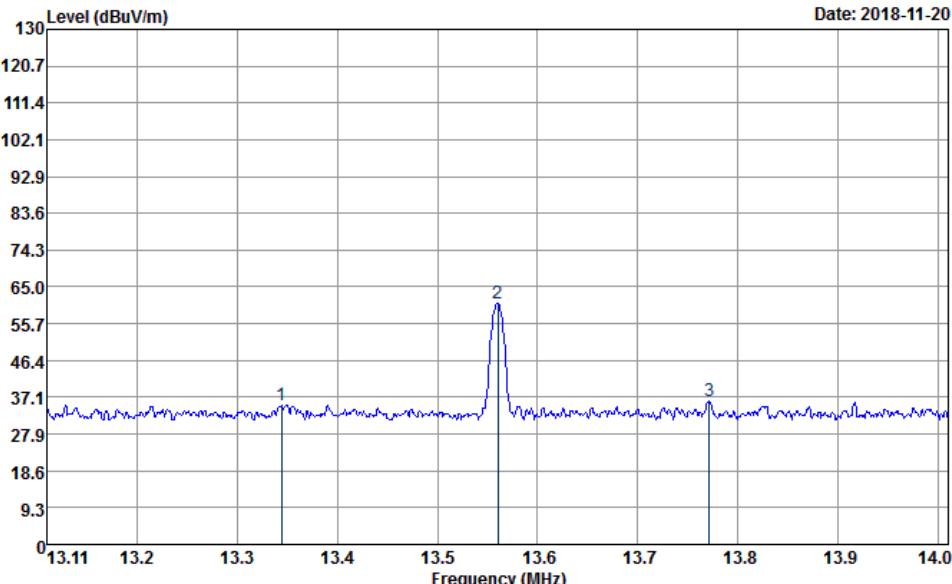
<For Sample 1 with Adapter 1>

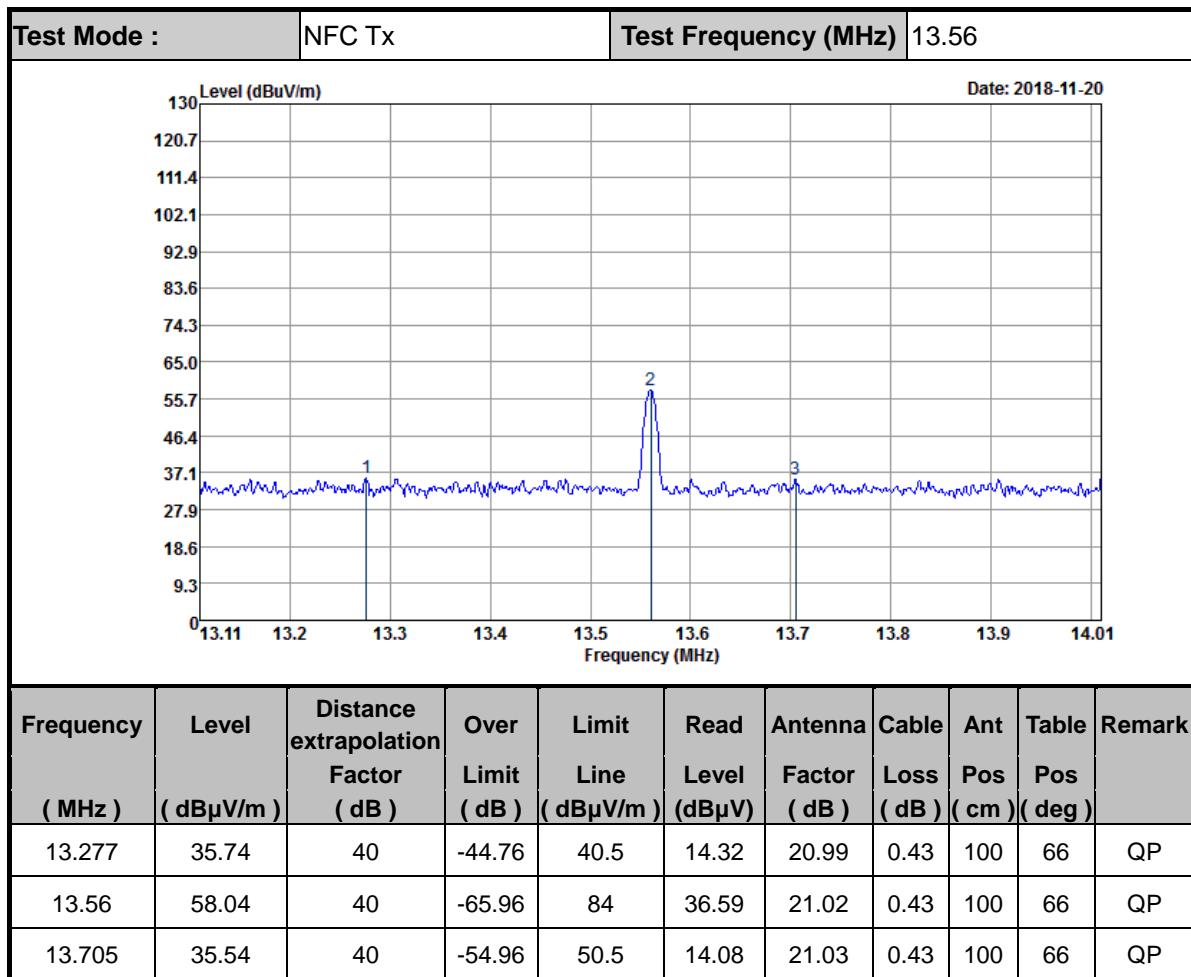
Test Mode :	NFC Tx	Test Frequency (MHz)	13.56							
			Date: 2018-11-20							
Frequency (MHz)	Level (dB μ V/m)	Distance extrapolation Factor (dB)	Over Limit	Line Limit (dB)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
13.448	36.15	40	-54.35	50.5	14.71	21.01	0.43	100	0	QP
13.56	60.87	40	-63.13	84	39.42	21.02	0.43	100	0	QP
13.803	35.7	40	-44.8	40.5	14.23	21.04	0.43	100	0	QP





<For Sample 1 with Adapter 2>

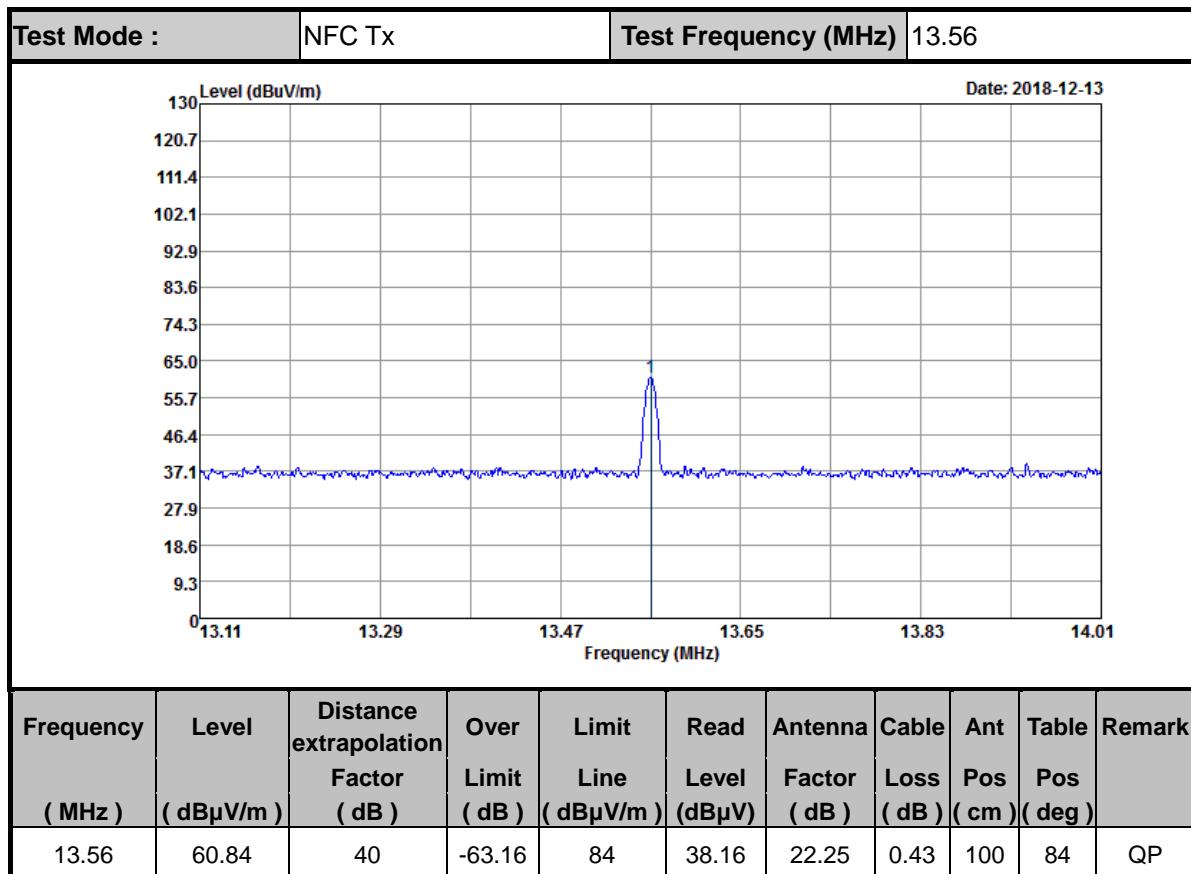
Test Mode :		NFC Tx		Test Frequency (MHz)		13.56								
Level (dB μ V/m)									Date: 2018-11-20					
														
Frequency (MHz)	Level (dB μ V/m)	Distance extrapolation Factor (dB)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark				
13.344	35.26	40	-45.24	40.5	13.83	21	0.43	100	0	QP				
13.56	61	40	-63	84	39.55	21.02	0.43	100	0	QP				
13.772	36.23	40	-44.27	40.5	14.76	21.04	0.43	100	0	QP				





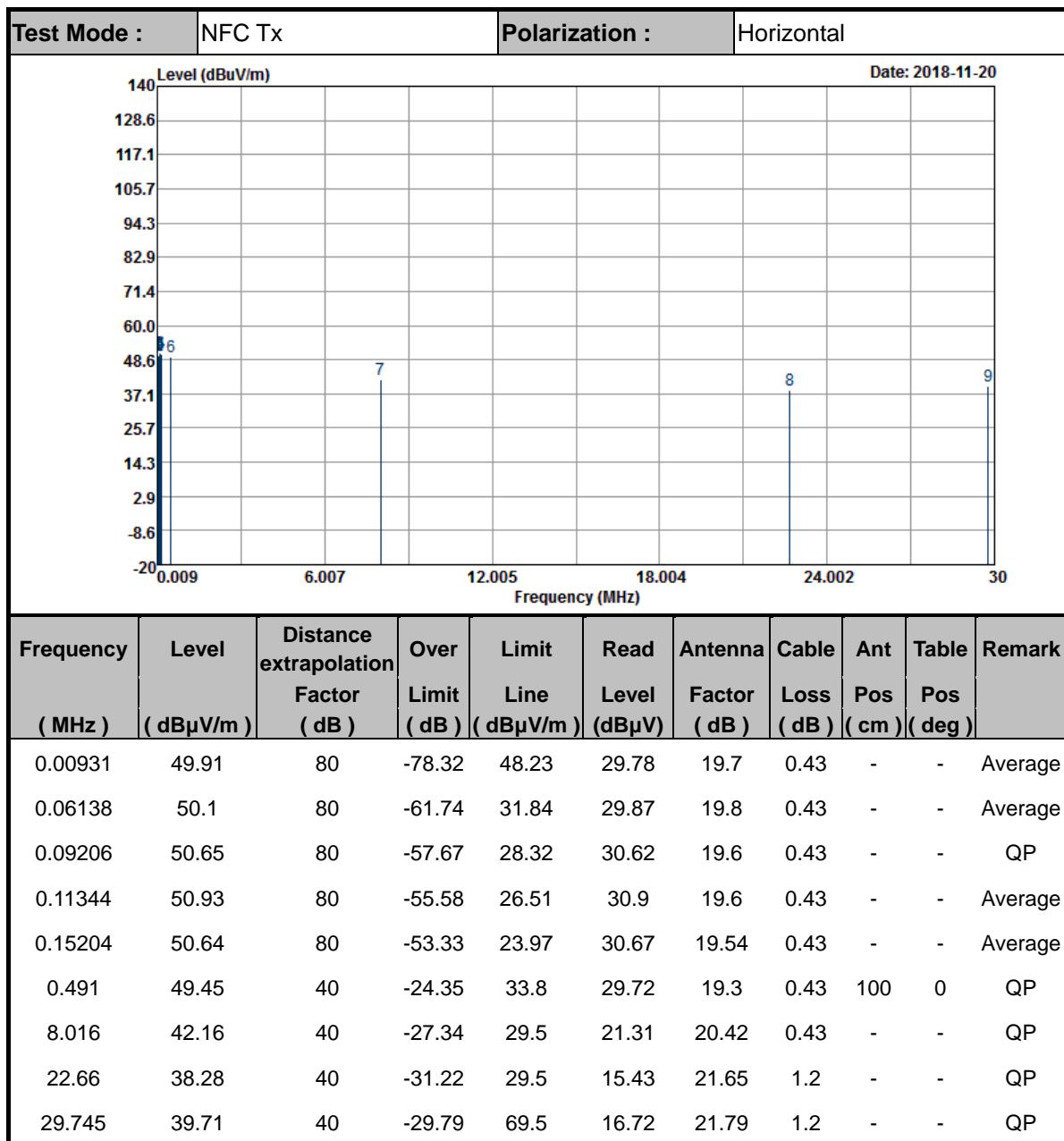
<For Sample 2 with Adapter 1>

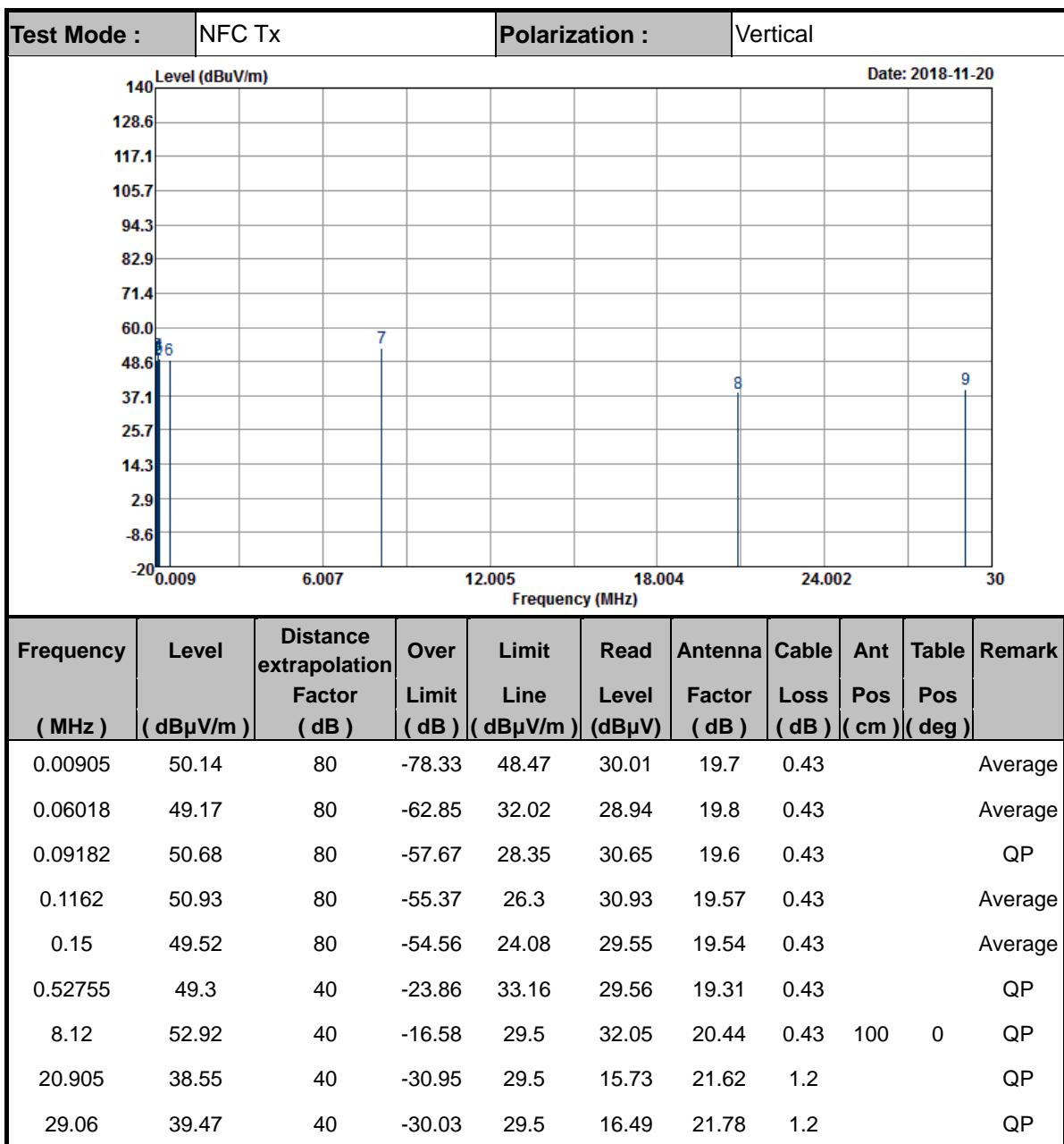
Test Mode :	NFC Tx	Test Frequency (MHz)	13.56								
			Date: 2018-12-13								
Frequency (MHz)	Level (dBµV/m)	Distance extrapolation Factor (dB)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark	
13.56	63.04	40	-60.96	84	40.36	22.25	0.43	100	358	QP	



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

<For Sample 1 with Adapter 1>

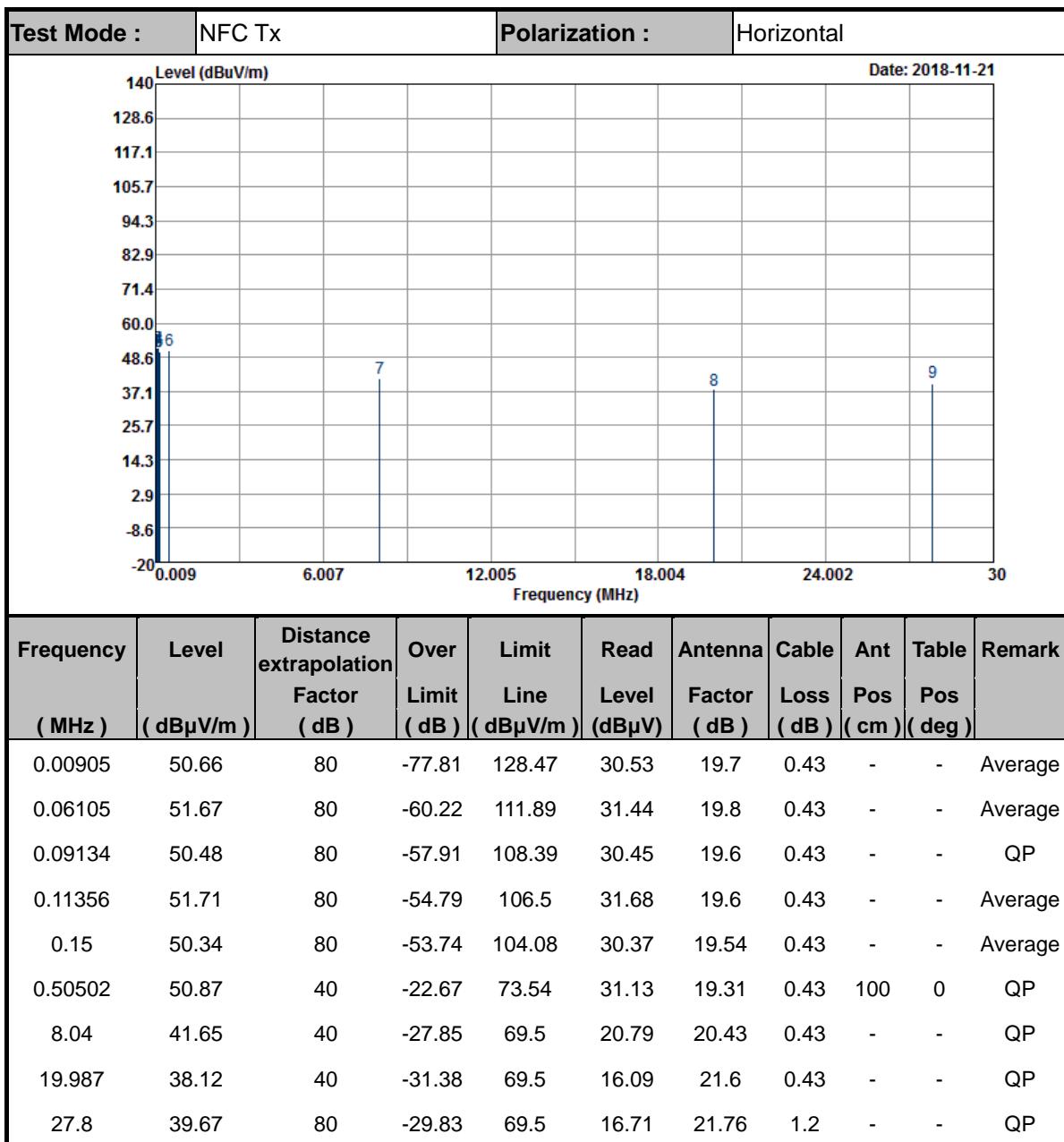


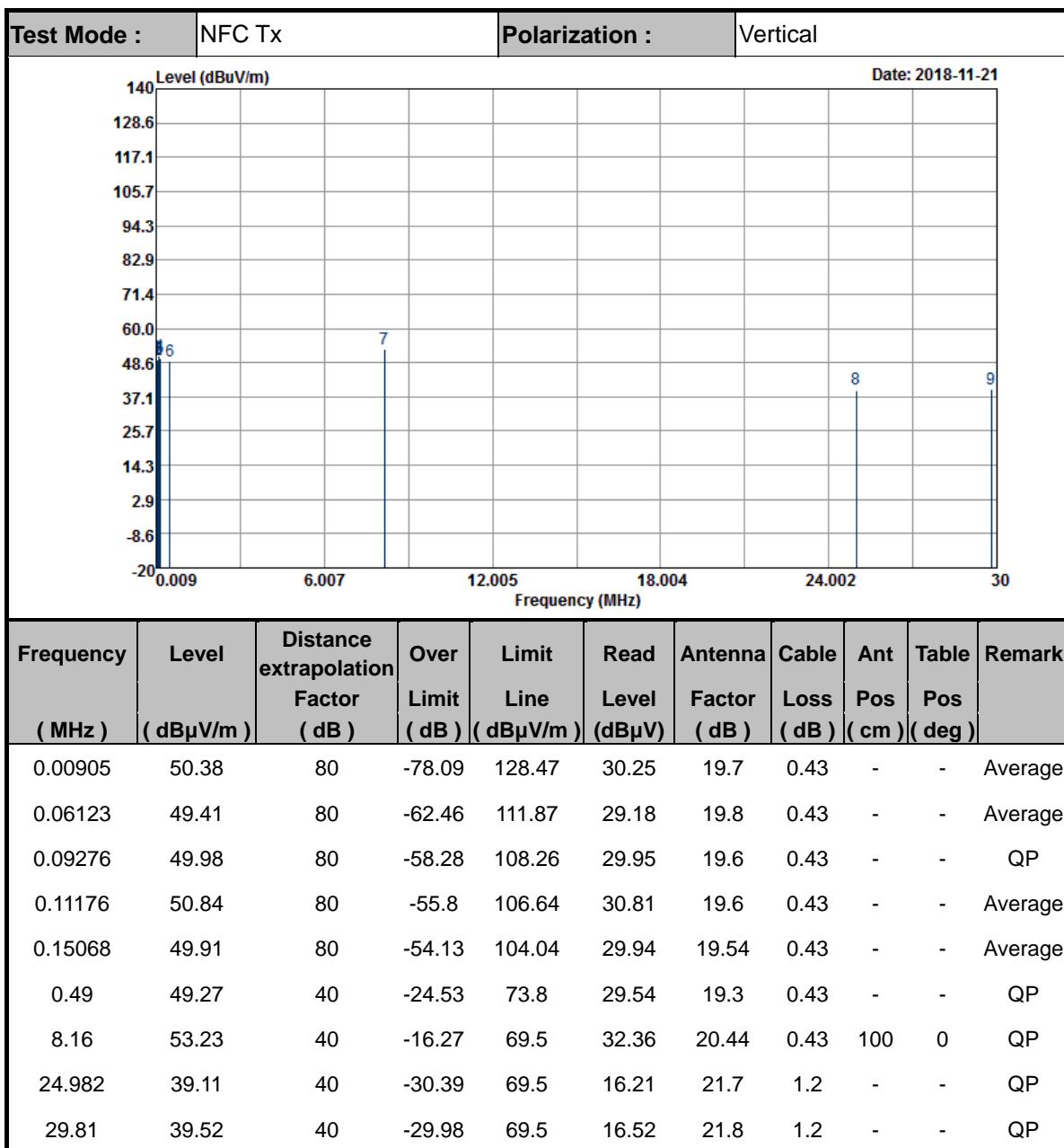
**Note:**

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 = $40 \log(\text{specific distance} / \text{test distance})$ (dB).



<For Sample 1 with Adapter 2>

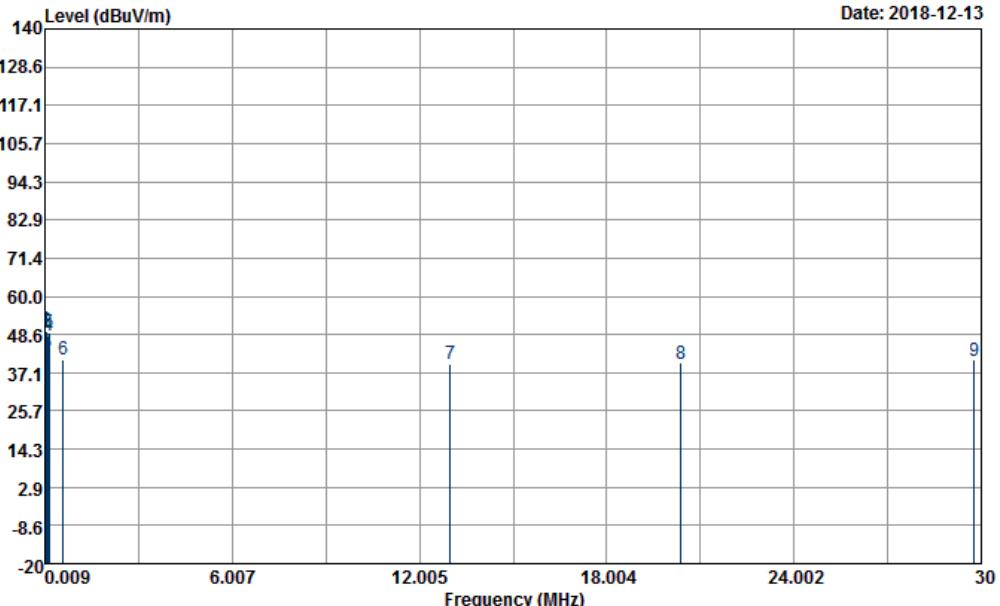


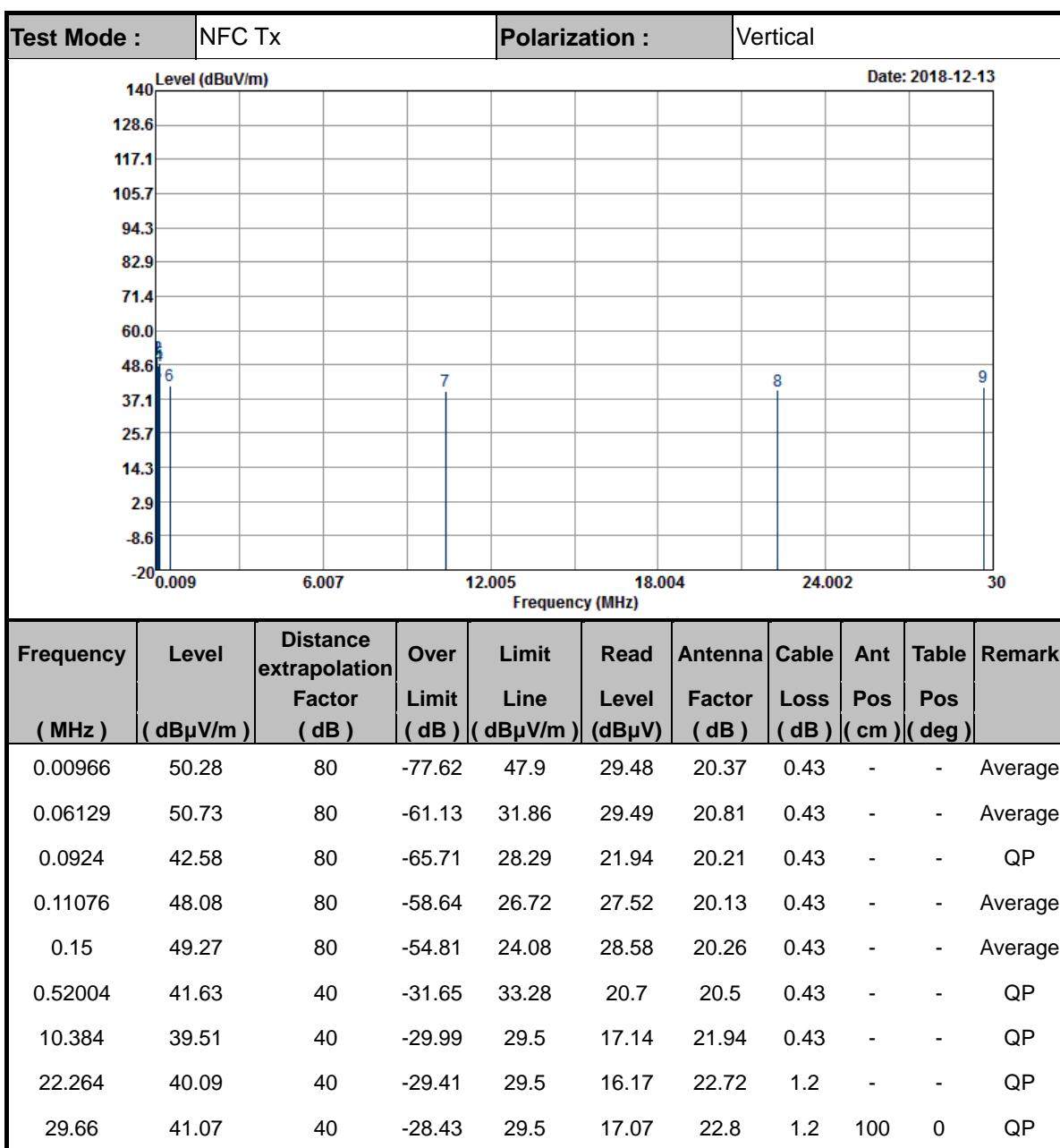
**Note:**

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 = $40 \log(\text{specific distance} / \text{test distance})$ (dB).



<For Sample 2 with Adapter 1>

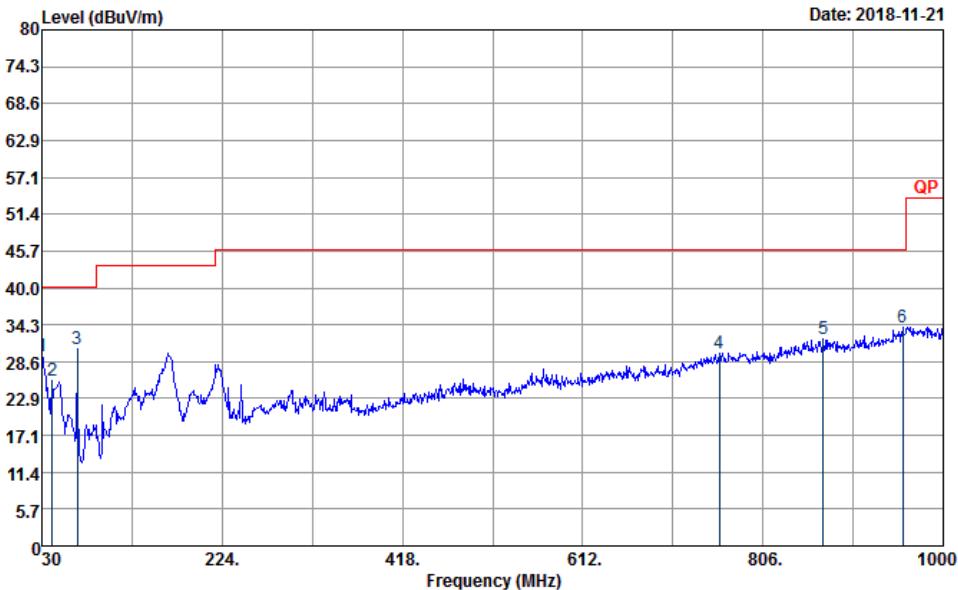
Test Mode :		NFC Tx		Polarization :		Horizontal									
Level (dBuV/m)										Date: 2018-12-13					
										30					
Frequency (MHz)	Level (dB μ V/m)	Distance extrapolation Factor (dB)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark					
0.00946	50.12	80	-77.97	48.09	29.34	20.35	0.43	-	-	Average					
0.06144	49.69	80	-62.15	31.84	28.45	20.81	0.43	-	-	Average					
0.09104	43.43	80	-64.99	28.42	22.77	20.23	0.43	-	-	QP					
0.11516	48.34	80	-58.04	26.38	27.76	20.15	0.43	-	-	Average					
0.15	49.08	80	-55	24.08	28.39	20.26	0.43	-	-	Average					
0.60265	41.22	40	-30.78	32	20.29	20.5	0.43	-	-	QP					
13	39.52	40	-29.98	29.5	16.89	22.2	0.43	-	-	QP					
20.356	40.11	40	-29.39	29.5	16.21	22.7	1.2	-	-	QP					
29.76	40.87	40	-28.63	29.5	16.87	22.8	1.2	100	0	QP					

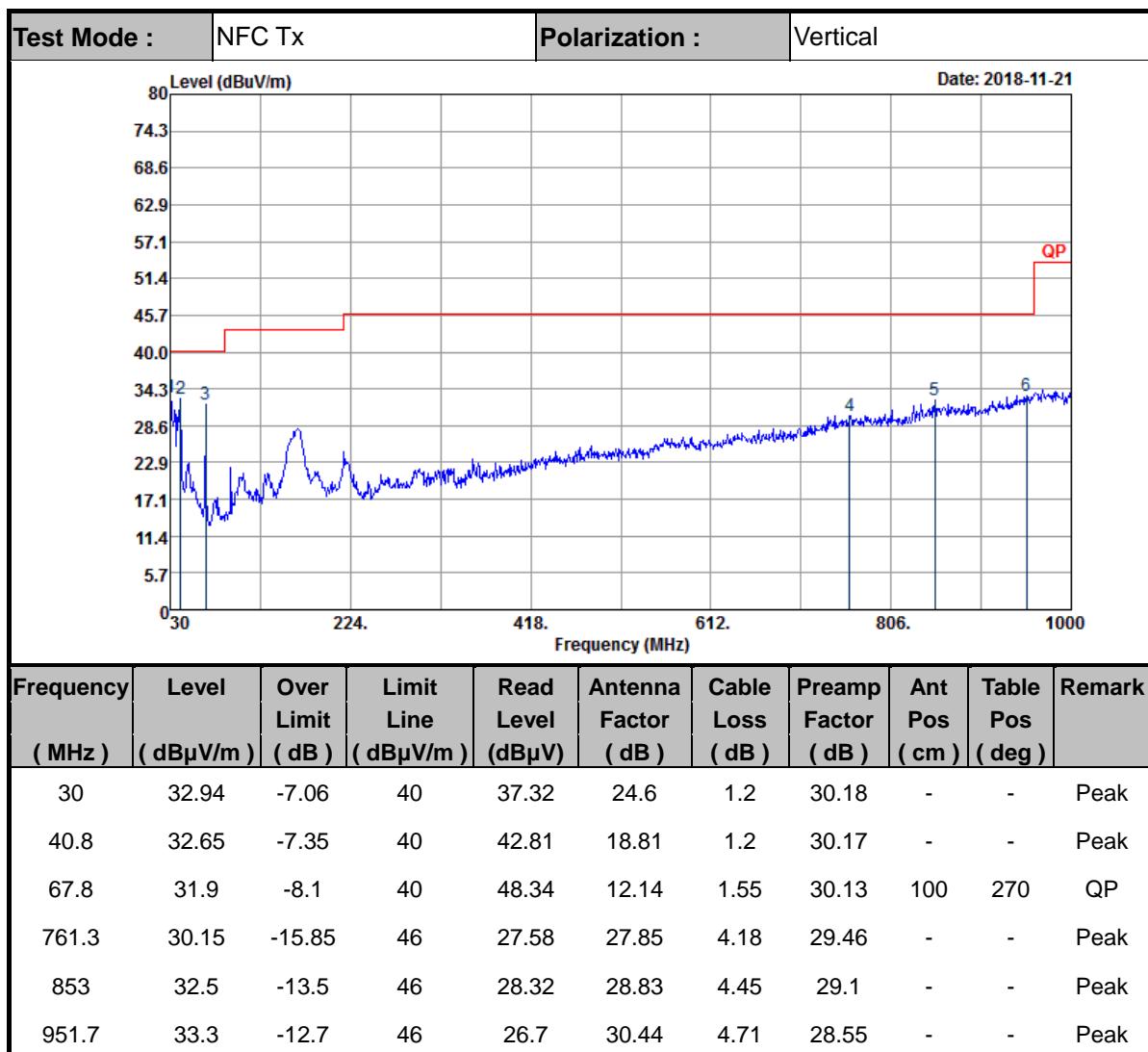
**Note:**

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 = $40 \log(\text{specific distance} / \text{test distance})$ (dB).

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

<For Sample 1 with Adapter 1>

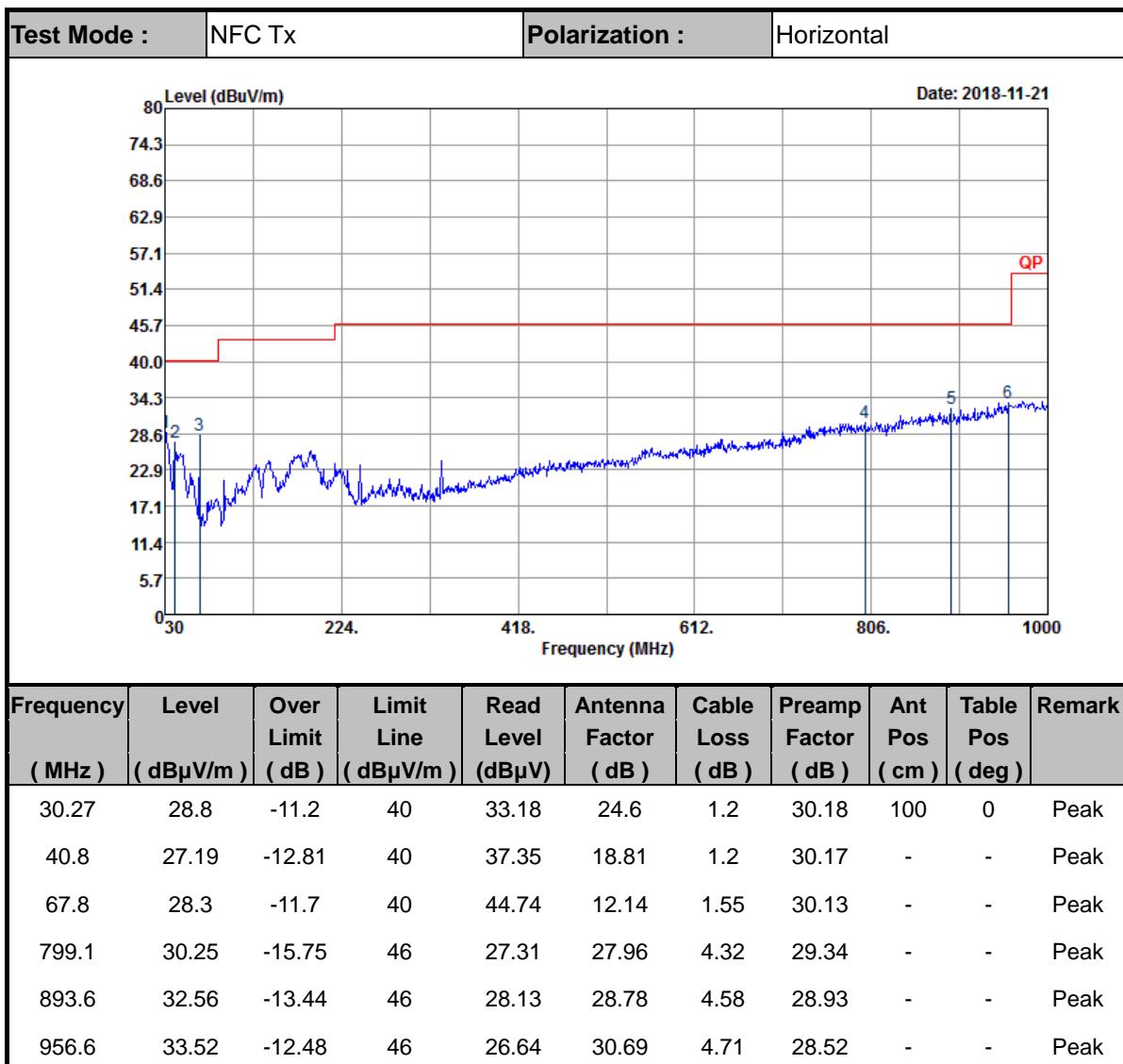
Test Mode :	NFC Tx		Polarization :		Horizontal																																																																																	
																																																																																						
<table><thead><tr><th>Frequency (MHz)</th><th>Level (dBμV/m)</th><th>Over Limit (dB)</th><th>Limit Line (dBμV/m)</th><th>Read Level (dBμV)</th><th>Antenna Factor (dB)</th><th>Cable Loss (dB)</th><th>Preamp Factor (dB)</th><th>Ant Pos (cm)</th><th>Table Pos (deg)</th><th>Remark</th></tr></thead><tbody><tr><td>30</td><td>29.43</td><td>-10.57</td><td>40</td><td>33.81</td><td>24.6</td><td>1.2</td><td>30.18</td><td>-</td><td>-</td><td>Peak</td></tr><tr><td>40.8</td><td>25.6</td><td>-14.4</td><td>40</td><td>35.76</td><td>18.81</td><td>1.2</td><td>30.17</td><td>-</td><td>-</td><td>Peak</td></tr><tr><td>67.8</td><td>30.52</td><td>-9.48</td><td>40</td><td>46.96</td><td>12.14</td><td>1.55</td><td>30.13</td><td>100</td><td>0</td><td>Peak</td></tr><tr><td>759.2</td><td>29.96</td><td>-16.04</td><td>46</td><td>27.42</td><td>27.83</td><td>4.18</td><td>29.47</td><td>-</td><td>-</td><td>Peak</td></tr><tr><td>871.2</td><td>32.19</td><td>-13.81</td><td>46</td><td>27.68</td><td>28.96</td><td>4.58</td><td>29.03</td><td>-</td><td>-</td><td>Peak</td></tr><tr><td>956.6</td><td>33.88</td><td>-12.12</td><td>46</td><td>27</td><td>30.69</td><td>4.71</td><td>28.52</td><td>-</td><td>-</td><td>Peak</td></tr></tbody></table>										Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark	30	29.43	-10.57	40	33.81	24.6	1.2	30.18	-	-	Peak	40.8	25.6	-14.4	40	35.76	18.81	1.2	30.17	-	-	Peak	67.8	30.52	-9.48	40	46.96	12.14	1.55	30.13	100	0	Peak	759.2	29.96	-16.04	46	27.42	27.83	4.18	29.47	-	-	Peak	871.2	32.19	-13.81	46	27.68	28.96	4.58	29.03	-	-	Peak	956.6	33.88	-12.12	46	27	30.69	4.71	28.52	-	-	Peak
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark																																																																												
30	29.43	-10.57	40	33.81	24.6	1.2	30.18	-	-	Peak																																																																												
40.8	25.6	-14.4	40	35.76	18.81	1.2	30.17	-	-	Peak																																																																												
67.8	30.52	-9.48	40	46.96	12.14	1.55	30.13	100	0	Peak																																																																												
759.2	29.96	-16.04	46	27.42	27.83	4.18	29.47	-	-	Peak																																																																												
871.2	32.19	-13.81	46	27.68	28.96	4.58	29.03	-	-	Peak																																																																												
956.6	33.88	-12.12	46	27	30.69	4.71	28.52	-	-	Peak																																																																												
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark																																																																												
30	29.43	-10.57	40	33.81	24.6	1.2	30.18	-	-	Peak																																																																												
40.8	25.6	-14.4	40	35.76	18.81	1.2	30.17	-	-	Peak																																																																												
67.8	30.52	-9.48	40	46.96	12.14	1.55	30.13	100	0	Peak																																																																												
759.2	29.96	-16.04	46	27.42	27.83	4.18	29.47	-	-	Peak																																																																												
871.2	32.19	-13.81	46	27.68	28.96	4.58	29.03	-	-	Peak																																																																												
956.6	33.88	-12.12	46	27	30.69	4.71	28.52	-	-	Peak																																																																												

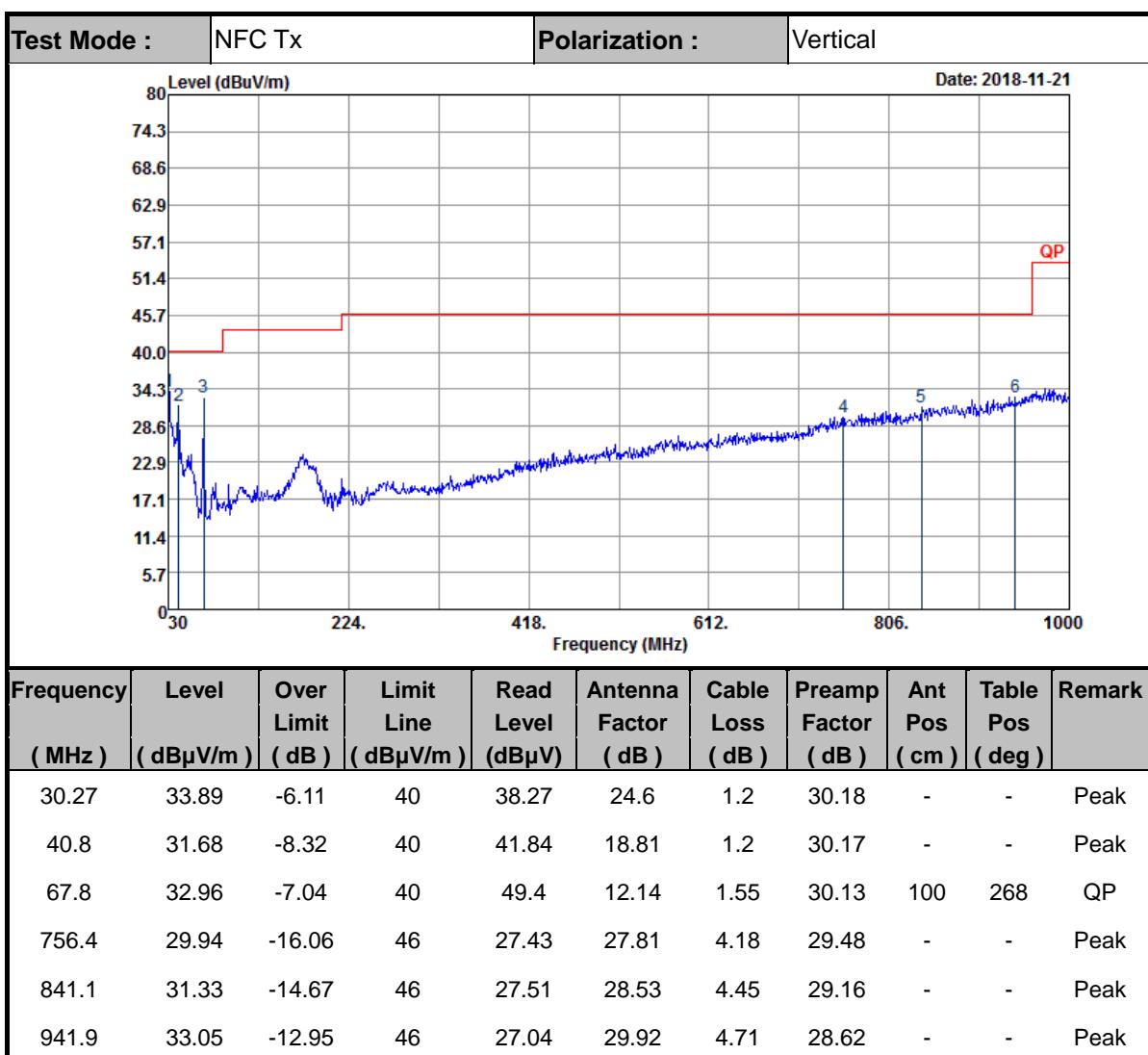
**Note:**

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 (dB μ V/m) = 20 log Emission level (μ V/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.



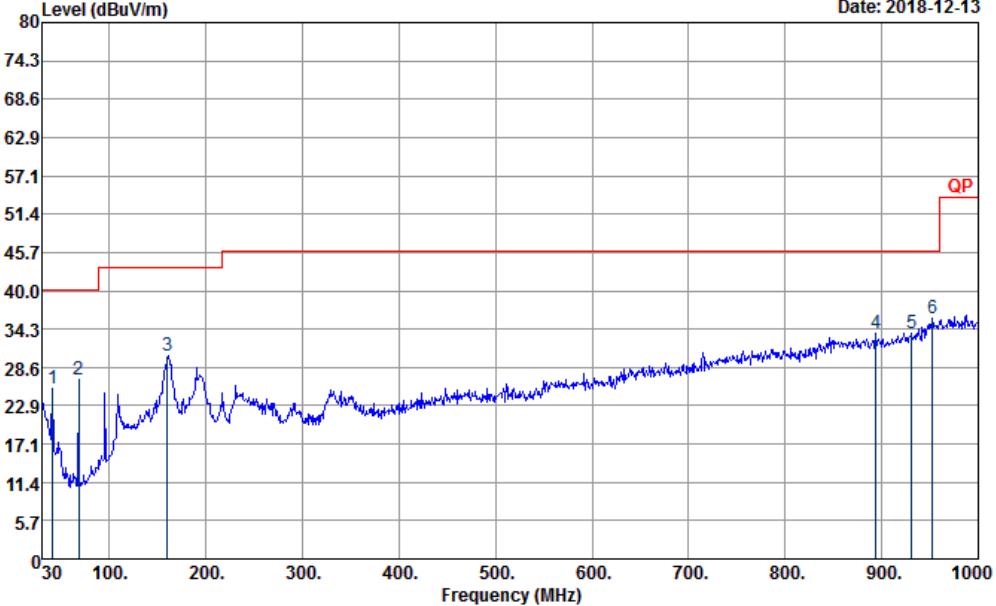
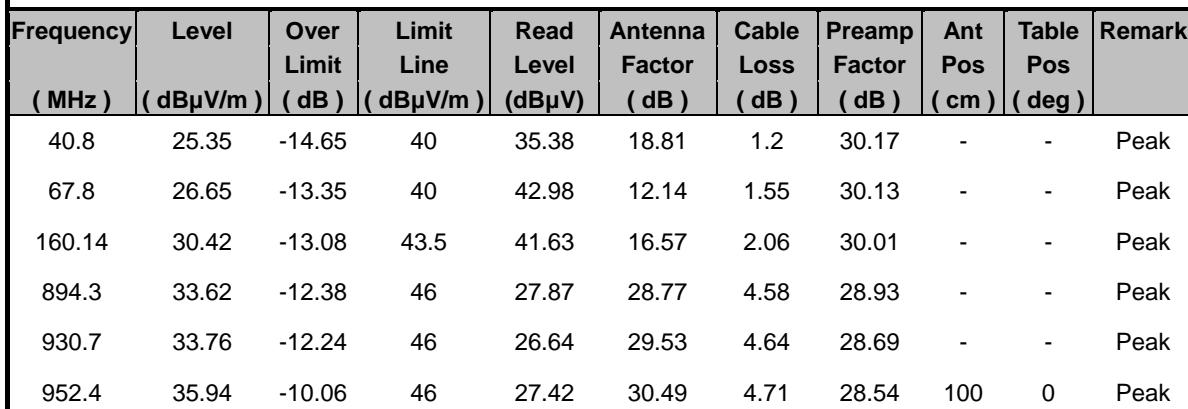
<For Sample 1 with Adapter 2>

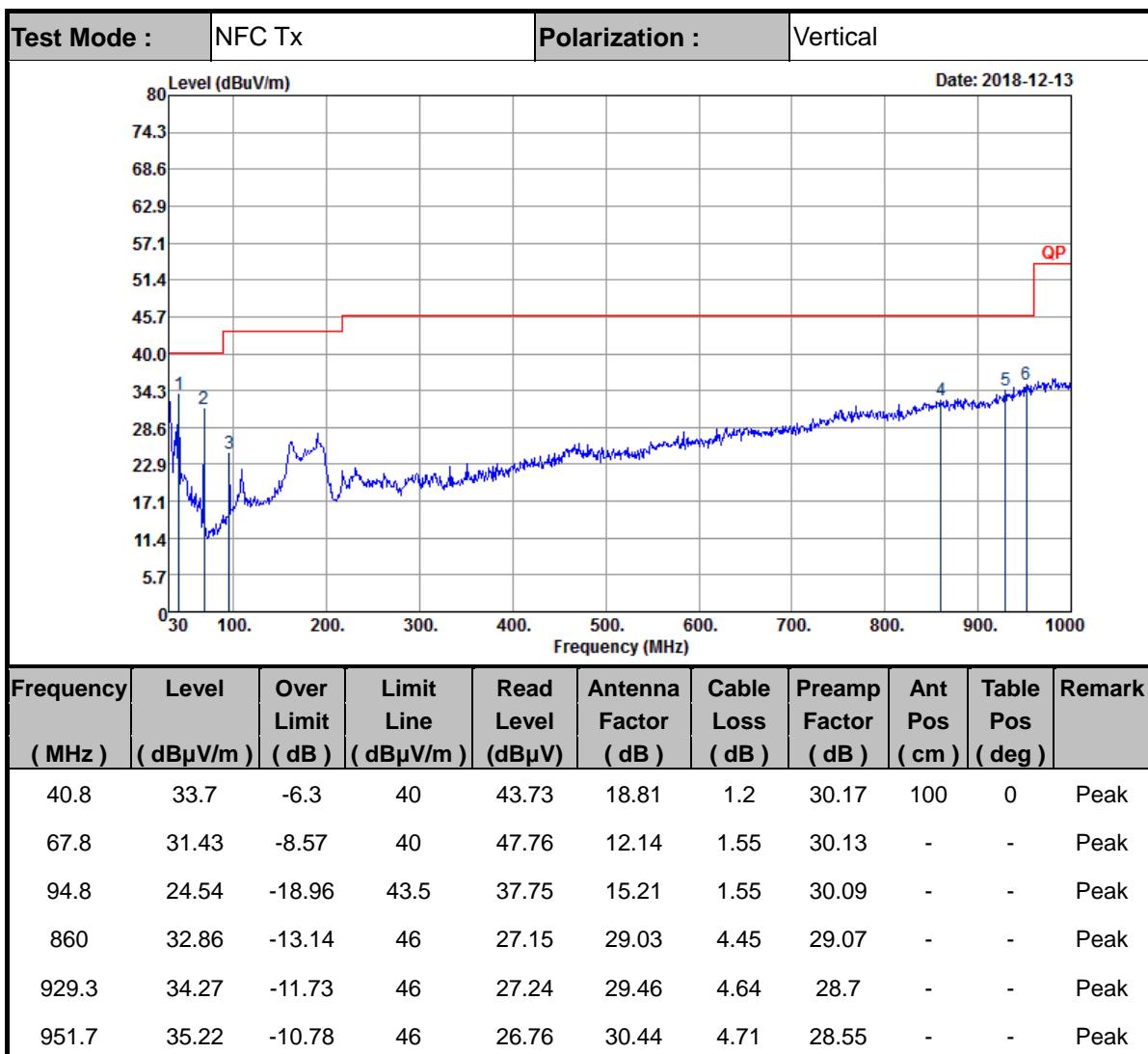


**Note:**

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 (dB μ V/m) = 20 log Emission level (μ V/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.

<For Sample 2 with Adapter 1>

Test Mode :	NFC Tx	Polarization :	Horizontal							
			Date: 2018-12-13							
										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
40.8	25.35	-14.65	40	35.38	18.81	1.2	30.17	-	-	Peak
67.8	26.65	-13.35	40	42.98	12.14	1.55	30.13	-	-	Peak
160.14	30.42	-13.08	43.5	41.63	16.57	2.06	30.01	-	-	Peak
894.3	33.62	-12.38	46	27.87	28.77	4.58	28.93	-	-	Peak
930.7	33.76	-12.24	46	26.64	29.53	4.64	28.69	-	-	Peak
952.4	35.94	-10.06	46	27.42	30.49	4.71	28.54	100	0	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 (dB μ V/m) = 20 log Emission level (μ V/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.

—————THE END—————