FCC RF Test Report

APPLICANT	:	Xiaomi Communications Co., Ltd.
EQUIPMENT	:	Mobile Phone
BRAND NAME	:	MI
MODEL NAME	:	M1903F10G
FCC ID	:	2AFZZ-XMSF10G
STANDARD	:	FCC Part 15 Subpart C §15.225
CLASSIFICATION	:	(DXX) Low Power Communication Device Transmitter

The product was received on Jun. 11, 2019 and testing was completed on Jun. 19, 2019. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Jason Jia

Reviewed by: Jason Jia / Supervisor

James Huang

Approved by: James Huang / Manager

ACCREDITED Cert #5145.02

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR931204-03D	Rev. 01	Initial issue of report	Jun. 24, 2019

SUMMARY OF THE TEST RESULT

Report Section	FCC Rule	Description of Test	Result	Remark
-	15.207	AC Power Line Conducted Emissions	Not Required	-
-	15.215(c)	20dB Spectrum Bandwidth	Not Required	-
	-	99% OBW Spectrum Bandwidth	Not Required	-
-	15.225(e)	Frequency Stability	Not Required	-
3.1	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Complies	Max level 54.85 dBμV/m at 13.560 MHz
3.2	15.225(d) & 15.209	Radiated Spurious Emissions	Complies	Under limit 3.61 dB at 40.670MHz
3.3	15.203	Antenna Requirements	Complies	-
Remark: Not required means after assessing, test items are not necessary to carry out.				

1. General Description

1.1 Applicant

Xiaomi Communications Co., Ltd.

The Rainbow City of China Resources,NO.68,Qinghe Middle Street,Haidian District,Beijing,China

1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	MI
Model Name	M1903F10G
FCC ID	2AFZZ-XMSF10G
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/ DC-HSDPA/HSPA+(16QAM uplink is not supported)/LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR /EDR/ LE FM Receiver / GNSS
IMEI Code	Radiation: 866962041542170/866962041542188
HW Version	P2
SW Version	MIUI 10
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT sample 1 and sample 2, the differences between two samples is for memory, sample 1 is 6+64GB capacity and sample 2 is 6+128GB capacity.
3. This is a variant report for M1903F10G. The change note could be referred to the product equality declaration which is exhibit separately. Based on the similarity between current and previous project, only the test cases of RSE from original test report (Sporton Report Number FR931204D) were verified for the differences.

1.3 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	13.553 ~ 13.567MHz
Antenna Type	FPC antenna
Type of Modulation	ASK

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Modification of EUT

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

1.5 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH02-KS	CN1257	314309
Test Engineer	Carl N		
Temperature	21℃~22℃		
Relative Humidity	41%~42%		

1.6 Applicable Standards

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

- 47 CFR Part 15 Subpart C §15.225
- ANSI C63.10-2013

2. Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

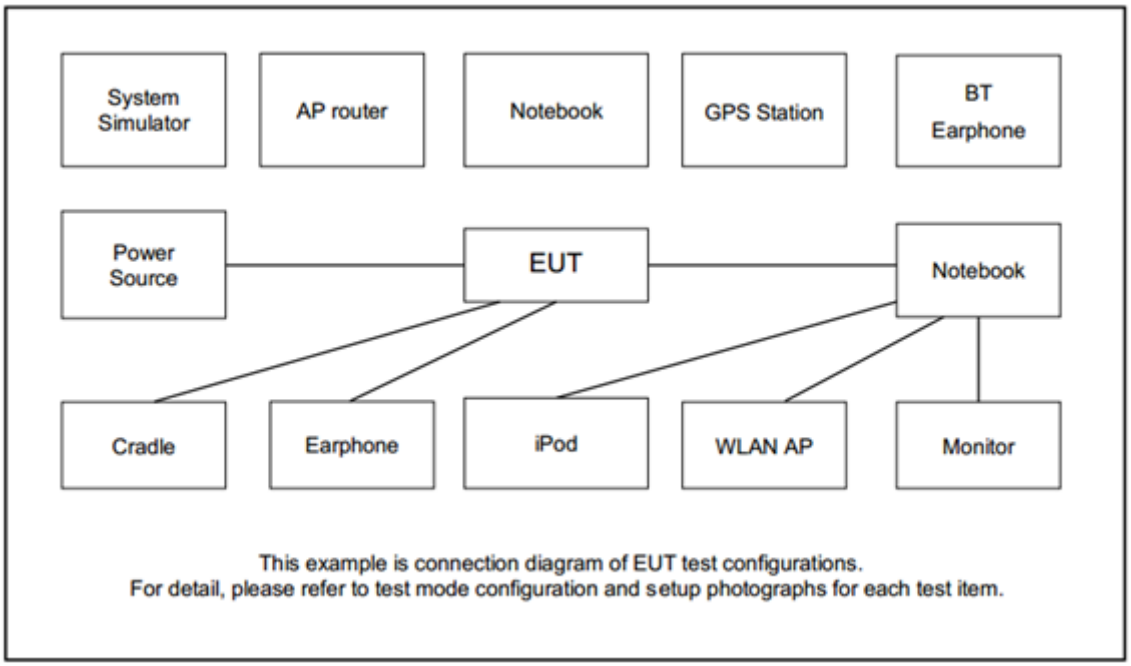
Investigation has been done on all the possible configurations.

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

Test Items	
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

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

2.2 Connection Diagram of Test System



2.3 Table for Supporting Units

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Earphone	Lenovo	SH100	N/A	Unshielded, 1.2 m	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 3 cm gap to the EUT.

3. Test Results

3.1 Field Strength of Fundamental Emissions and Mask Measurement

3.1.1 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

3.1.2 Measuring Instruments

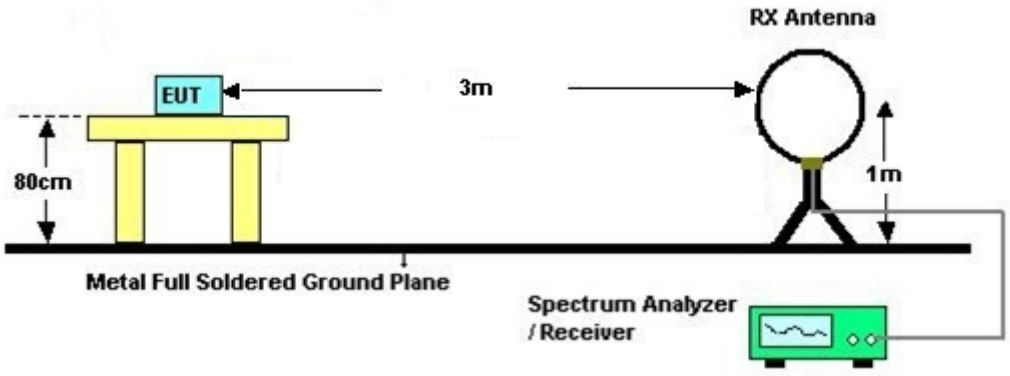
See list of measuring instruments of this test report.

3.1.3 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 (dBμV/m) = 20 log Emission level (μV/m).

3.1.4 Test Setup

For radiated emissions below 30MHz



3.1.5 Test Result of Field Strength of Fundamental Emissions and Mask

Please refer to Appendix A.

3.2 Radiated Emissions Measurement

3.2.1 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

3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 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

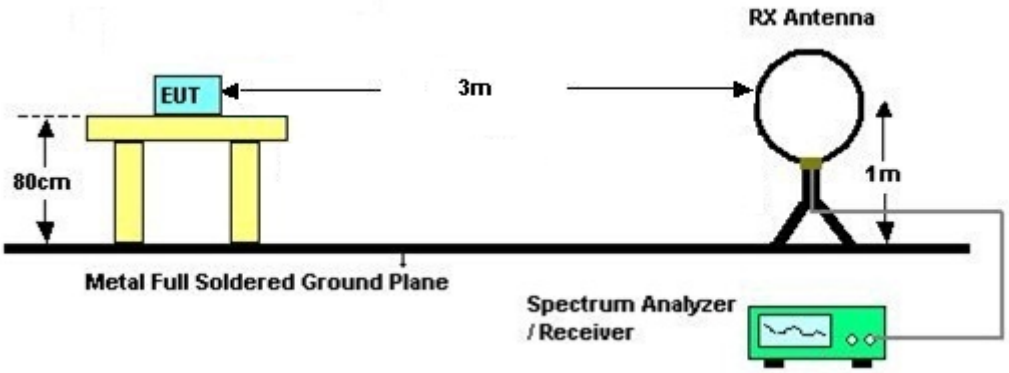
Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

3.2.4 Test Procedures

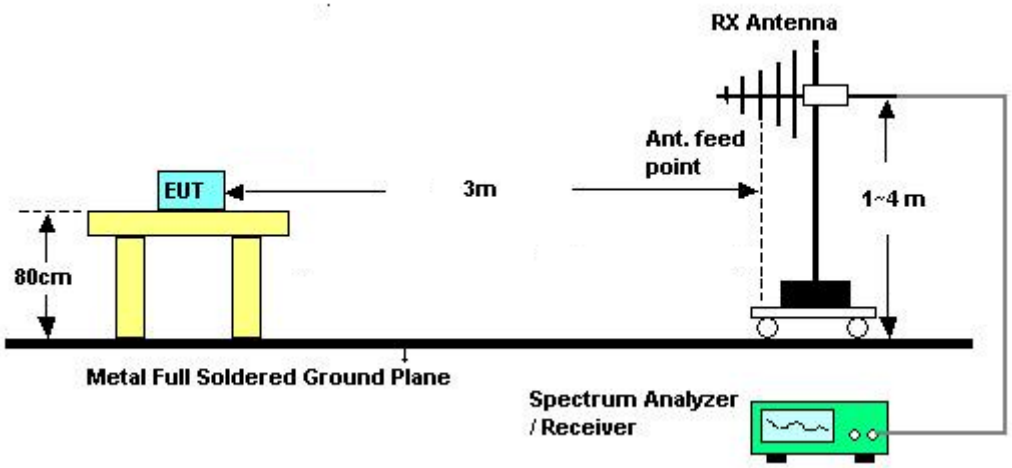
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

3.2.5 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.2.6 Test Result of Radiated Emissions Measurement

Please refer to Appendix B.

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

3.3 Antenna Requirements

3.3.1 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.

3.3.2 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
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Aug. 06, 2018	Jun. 20, 2019	Aug. 05, 2019	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Jun. 20, 2019	Oct. 18, 2019	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz-2GHz	Dec. 29, 2018	Jun. 20, 2019	Dec. 28, 2019	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 06, 2018	Jun. 20, 2019	Aug. 05, 2019	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jun. 20, 2019	NCR	Radiation (03CH02-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jun. 20, 2019	NCR	Radiation (03CH02-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jun. 20, 2019	NCR	Radiation (03CH02-KS)

NCR: No Calibration Required

5. Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

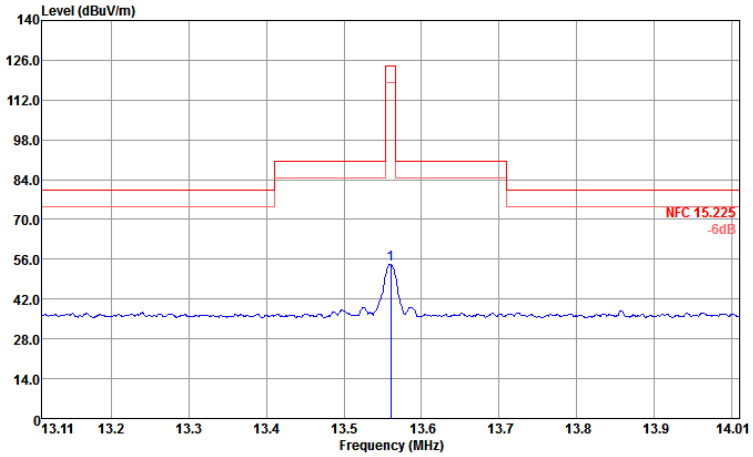
Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.8dB**

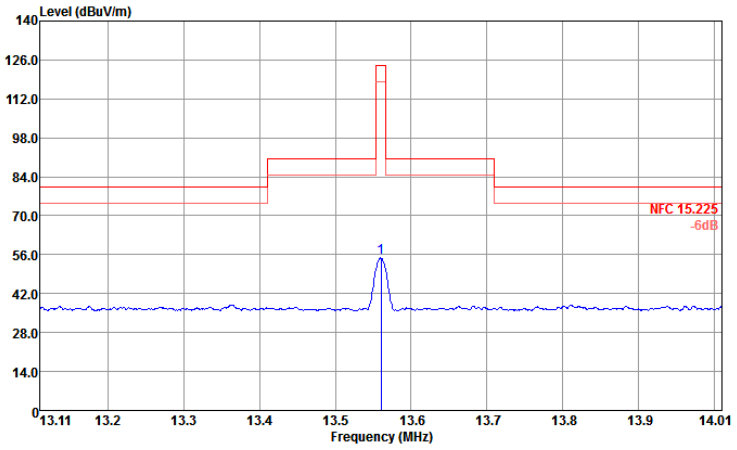
Appendix A. Test Results of Radiated Test Items

A1. Test Result of Field Strength of Fundamental Emissions

Test Mode :	NFC Tx	Test Frequency (MHz)	13.56




```
Site          : 03CH02-KS
Condition     : NFC 15.225 3m NFC ANT 100321 HORIZONTAL
Project       : (FR) 931204-03
Mode          : 1
Plan          : Z
IMEI          : 866962041542170 866962041542188 #14
              : B  Card
              : worse
                        Over  Limit   ReadAntenna  Cable  A/Pos  T/Pos
          Freq  Level   Limit  Line   Level Factor   Loss                 Remark
          MHz dBuV/m     dB dBuV/m   dBuV  dB/m     dB    cm     deg
 1      13.56  54.39 -69.61 124.00  33.93  20.30   0.16   ---     --- QP
```




```
Site          : 03CH02-KS
Condition     : NFC 15.225 3m NFC ANT 100321 VERTICAL
Project       : (FR) 931204-03
Mode          : 1
Plan          : Z
IMEI          : 866962041542170 866962041542188 #14
              : B  Card
              : worse
                        Over  Limit   ReadAntenna  Cable  A/Pos  T/Pos
          Freq  Level   Limit  Line   Level Factor   Loss                 Remark
          MHz dBuV/m     dB dBuV/m   dBuV  dB/m     dB    cm     deg
 1      13.56  54.85 -69.15 124.00  34.39  20.30   0.16   ---     --- QP
```

A2. Results of Radiated Spurious Emissions (9 kHz~30MHz)

Test Mode :	NFC Tx	Polarization :	Horizontal

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.03903	53.24	-62.53	115.77	33.43	19.8	0.01	-	-	Average
0.08063	41.02	-68.44	109.46	21.61	19.4	0.01	-	-	Average
0.15185	41.49	-62.47	103.96	22.31	19.17	0.01	-	-	Average
3.584	36.56	-32.98	69.54	15.51	21	0.05	-	-	QP
21.243	37.06	-32.48	69.54	16.32	20.5	0.24	-	-	QP
25.585	36.16	-33.38	69.54	15.75	20.12	0.29	-	-	QP

Test Mode :	NFC Tx	Polarization :	Vertical

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.03396	52.07	-64.91	116.98	32.26	19.8	0.01	-	-	Average
0.06808	40.01	-70.92	110.93	20.6	19.4	0.01	-	-	Average
0.1648	39.73	-63.52	103.25	20.55	19.17	0.01	-	-	Average
4.256	36.92	-32.62	69.54	15.86	21	0.06	-	-	QP
9.207	37.44	-32.10	69.54	16.9	20.43	0.11	-	-	QP
25.405	36.94	-32.6	69.54	16.51	20.14	0.29	-	-	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. Limit line = specific limits (dBμV) + distance extrapolation factor.

A3.Results of Radiated Spurious Emissions (30MHz~1GHz)

Test Mode :	NFC Tx	Polarization :	Horizontal

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	19.78	-20.22	40	25.92	25.2	0.64	31.98	-	-	Peak
166.77	31.52	-11.98	43.5	45.97	15.97	1.51	31.93	-	-	Peak
176.47	32.79	-10.71	43.5	47.86	15.32	1.53	31.92	-	-	Peak
203.63	38.65	-4.85	43.5	53.72	15.17	1.66	31.9	100	0	Peak
392.78	29.4	-16.6	46	37.39	21.89	2.23	32.11	-	-	Peak
911.73	28.55	-17.45	46	27	29.44	3.47	31.36	-	-	Peak

Test Mode :	NFC Tx	Polarization :	Vertical

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	28.62	-11.38	40	34.76	25.2	0.64	31.98	-	-	Peak
40.67	36.39	-3.61	40	48.38	19.26	0.71	31.96	100	0	QP
42.61	34.61	-5.39	40	47.64	18.18	0.74	31.95	-	-	Peak
176.47	29.44	-14.06	43.5	44.51	15.32	1.53	31.92	-	-	Peak
203.63	34.23	-9.27	43.5	49.3	15.17	1.66	31.90	-	-	Peak
951.5	28.85	-17.15	46	26.35	29.92	3.55	30.97	-	-	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.