



FCC RF Test Report

APPLICANT : MITAC International Corp
EQUIPMENT : Tablet
BRAND NAME : Mio, Mitac, Magellan
MODEL NAME : N564
FCC ID : P4Q-N564
STANDARD : FCC Part 15 Subpart C §15.225
CLASSIFICATION : (DXX) Low Power Communication Device Transmitter

The testing was completed on Mar. 28, 2017. 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 test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



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FCC ID : P4Q-N564

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR722135D	Rev. 01	Initial issue of report	Apr. 19, 2017



SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	FCC Rule	Description of Test	Result	Under Limit
3.1	15.207	AC Power Line Conducted Emissions	Complies	9.80 dB at 0.558MHz
3.2	15.215(c)	20dB Spectrum Bandwidth	Complies	-
	-	99% OBW Spectrum Bandwidth	Complies	-
3.3	15.225(e)	Frequency Stability	Complies	-
3.4	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Complies	60.88 dB at 13.560 MHz
3.5	15.225(d) 15.209	Radiated Emissions	Complies	6.35 dB at 30.270 MHz for Peak
3.6	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	$\pm 2.70\text{dB}$	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	$\pm 5.70\text{dB}$	Confidence levels of 95%

1. GENERAL INFORMATION

1.1 Applicant

MITAC International Corp

No. 200, Wen Hwa 2nd Rd., Kuei Shan Dist., Taoyuan City 33383, Taiwan, R.O.C.

1.2 Manufacturer

MITAC Computer (Kunshan) Co., Ltd.

No. 269, 2nd Avenue, District A, Comprehensive Free Trade Zone, 300 Kunshan, China

1.3 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, GPS, and NFC

Product Specification subjective to this standard	
Sample 1	EUT with SKU 1
Sample 2	EUT with SKU 2
Antenna Type	WLAN: PIFA Antenna Bluetooth: PIFA Antenna GPS / GLONASS: PATCH Antenna NFC: Loop Antenna

Sample List		
SKU	SKU 1	SKU 2
WLAN	Support	Support
WWAN	Not Support	Not Support
RFID(13.56MHz)	Support	Not Support
RAM	2G	1G
Storage	16G	8G
Camera	Support	Not Support

1.4 Modification of EUT

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

1.5 Testing Location

Sporton 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, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		
	TH03-HY	CO05-HY	03CH07-HY
Test Engineer	William Liao	Eric Jeng	James Chiu
Temperature	22~24°C	22~25°C	23~24°C
Relative Humidity	53~55%	44~47%	48~49%

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

1.6 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
- ♦ 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 for searching the worst cases.

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

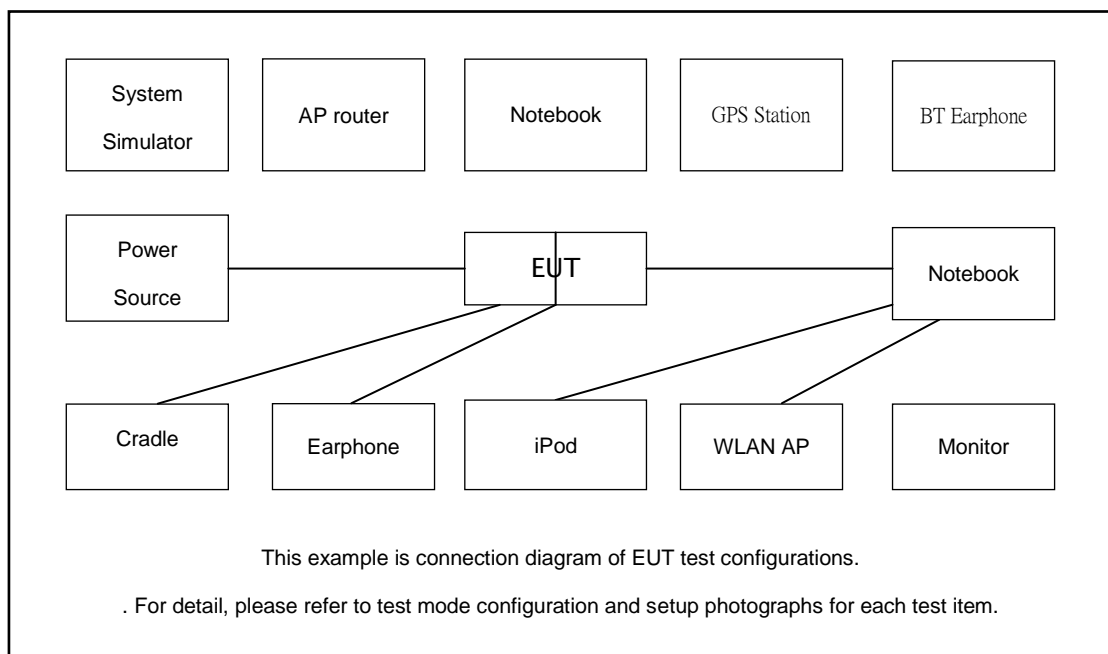
Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

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 (Z plane as worst plane) from all possible combinations.

Test Cases	
AC Conducted Emission	Mode 1: Bluetooth Idle + WLAN (2.4GHz) Idle + NFC Link + USB Cable (Charging from AC Adapter) for Sample 1

Remark: All radiated emission tests are performed on sample 1.

2.2 Connection Diagram of Test System



2.3 Table for Supporting Units

Support Unit	Manufacturer	Model	FCC ID
Bluetooth Earphone	SonyEricsson	MW600	PY700A2029
WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U
SD Card	SanDisk	MicroSD HC	FCC DoC
NFC Card	Metro Taipei	Easy Card	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 0.5 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 (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

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

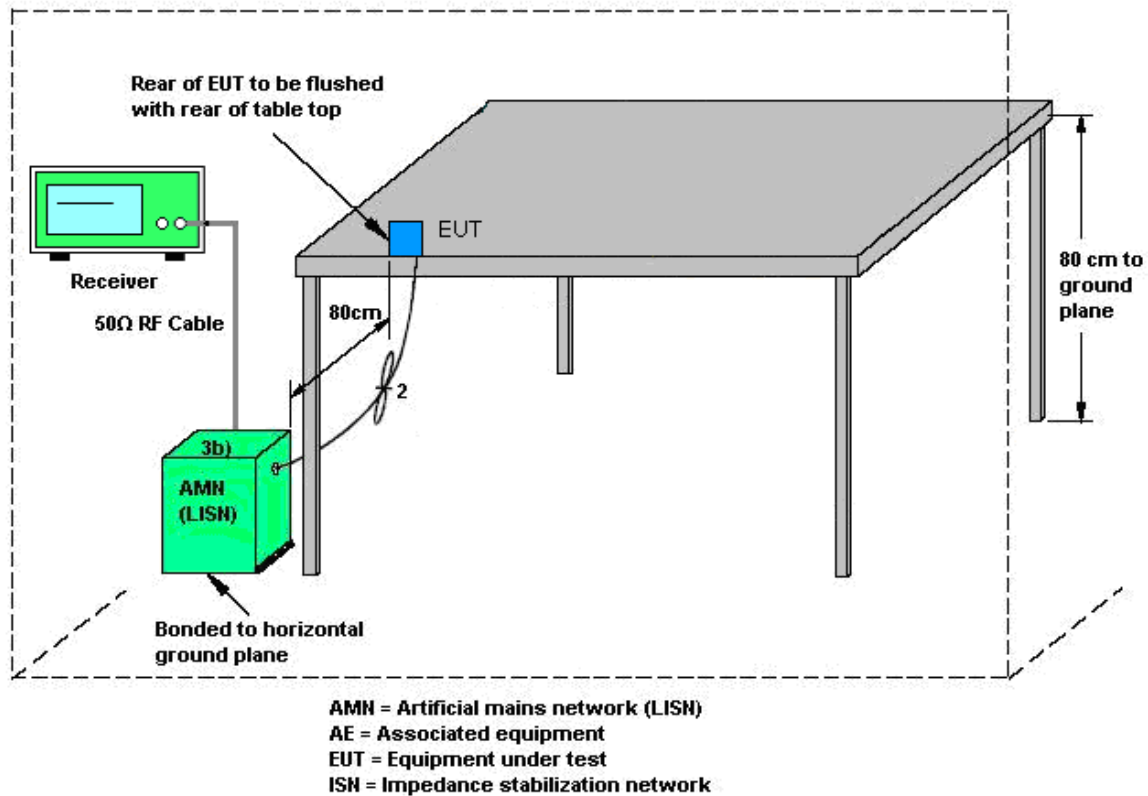
3.1.2 Measuring Instruments

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.

Note:

(1) with antenna

Remark: 13.558MHz is the NFC RF fundamental signal.

(2) with dummy load

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

3.2 20dB and 99% OBW Spectrum Bandwidth Measurement

3.2.1 Limit

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

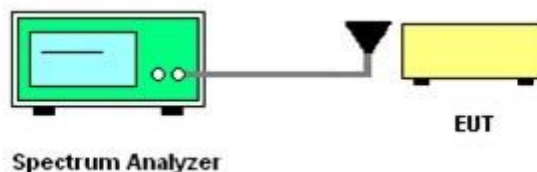
3.2.2 Measuring Instruments

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.

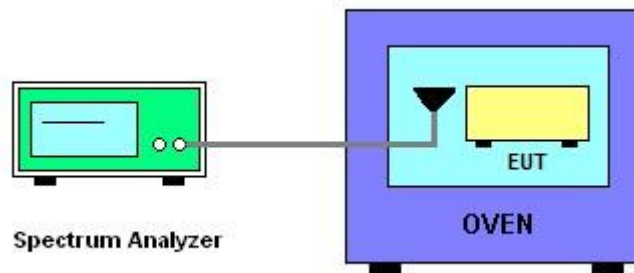
3.3.2 Measuring Instruments

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	FCC CFR 47 Part 15 section 15.225			
	IC RSS-210 B.6			
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.

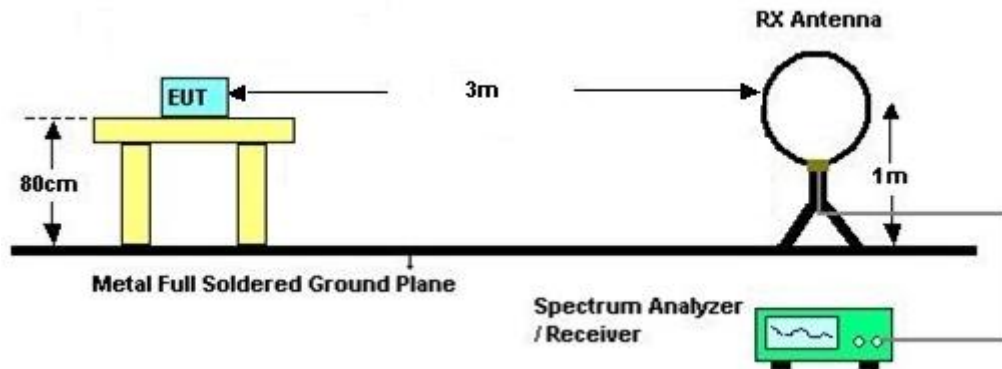
3.4.3 Test Procedures

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

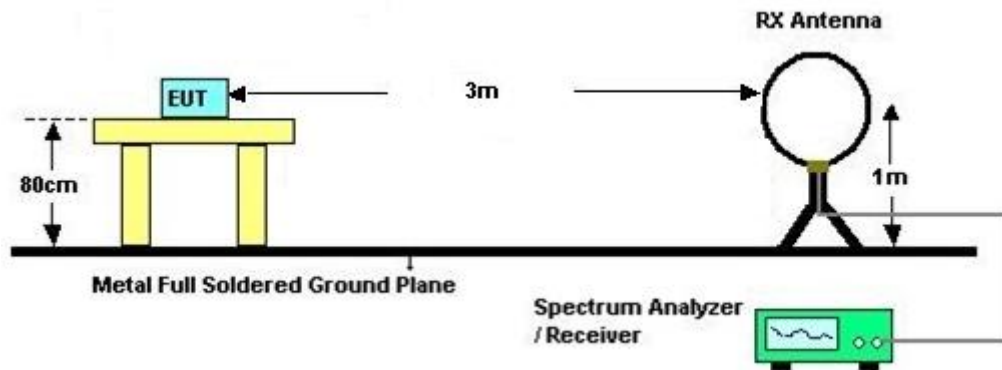
Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

3.5.4 Test Procedures

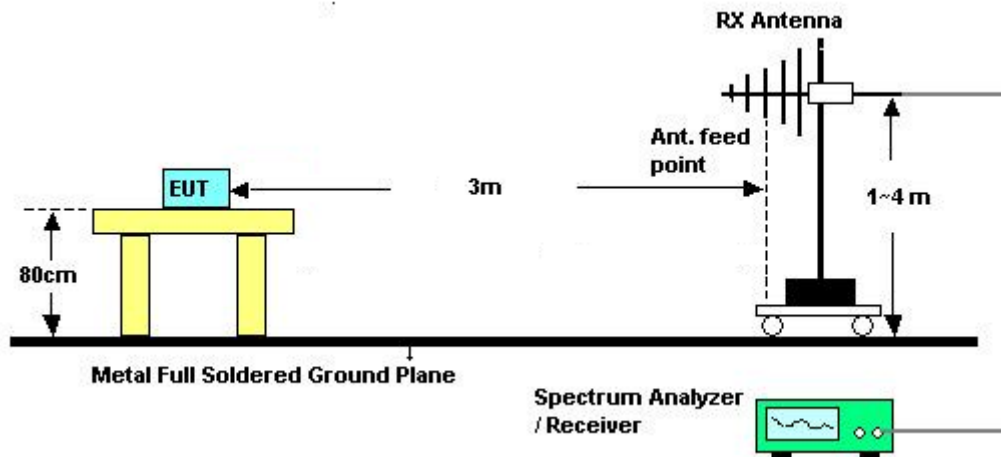
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
1. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
2. 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.
3. 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.
4. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
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. 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.



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 FCC rule.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.



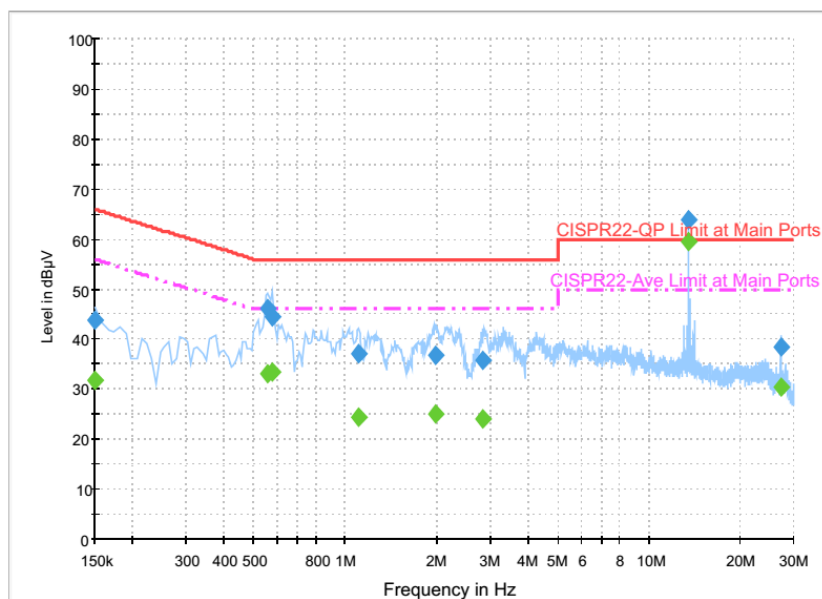
4. LIST OF MEASURING EQUIPMENT

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	AC POWER	AFC-500W	F104070011	50Hz~60Hz	Dec. 01, 2016	Mar. 13, 2017	Nov. 30, 2017	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Jun. 27, 2016	Mar. 13, 2017	Jun. 26, 2017	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30℃ ~70℃	Nov. 16, 2016	Mar. 13, 2017	Nov. 15, 2017	Conducted (TH03-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Mar. 26, 2017 ~ Mar. 28, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Mar. 26, 2017 ~ Mar. 28, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Mar. 26, 2017 ~ Mar. 28, 2017	Nov. 28, 2017	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 05, 2017	Mar. 26, 2017 ~ Mar. 28, 2017	Jan. 04, 2018	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 05, 2017	Mar. 26, 2017 ~ Mar. 28, 2017	Jan. 04, 2018	Conduction (CO05-HY)
Bilog Antenna	TESEQ	CBL 6111D&0080 0N1D01N-06	35419&03	30MHz to 1GHz	Jan. 07, 2017	Mar. 07, 2017 ~ Mar. 08, 2017	Jan. 06, 2018	Radiation (03CH07-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20Hz ~ 8.4GHz	Oct. 26, 2016	Mar. 07, 2017 ~ Mar. 08, 2017	Oct. 25, 2017	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Mar. 07, 2017 ~ Mar. 08, 2017	Sep. 01, 2017	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz-1GHz	Mar. 18, 2016	Mar. 07, 2017 ~ Mar. 08, 2017	Mar. 17, 2017	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	10Hz~44GHz	Mar. 21, 2016	Mar. 07, 2017 ~ Mar. 08, 2017	Mar. 20, 2017	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Mar. 07, 2017 ~ Mar. 08, 2017	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Mar. 07, 2017 ~ Mar. 08, 2017	N/A	Radiation (03CH07-HY)

Appendix A. Test Results of Conducted Emission Test

<Original Test Result with NFC Antenna>

Test Engineer :	Eric Jeng	Temperature :	22~25℃
		Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line



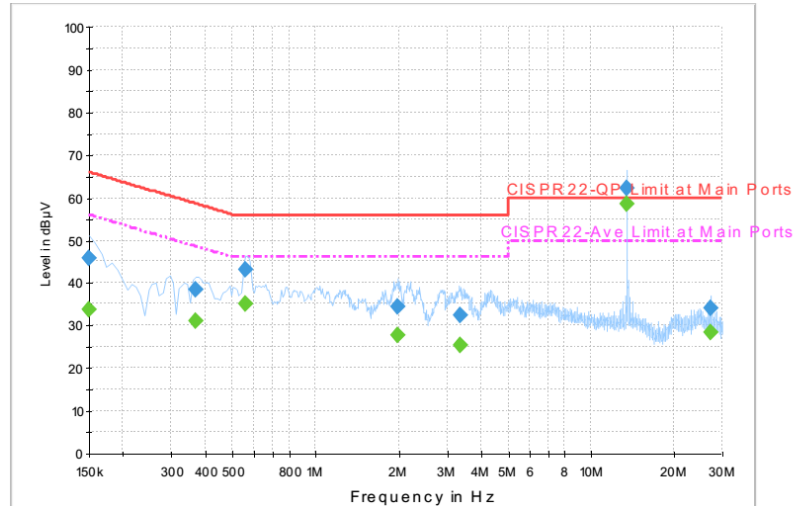
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	43.8	Off	L1	19.6	22.2	66.0
0.558000	46.2	Off	L1	19.6	9.8	56.0
0.574000	44.5	Off	L1	19.6	11.5	56.0
1.110000	37.1	Off	L1	19.6	18.9	56.0
1.998000	36.9	Off	L1	19.6	19.1	56.0
2.846000	35.9	Off	L1	19.5	20.1	56.0
13.558000	63.7	Off	L1	20.2	-3.7	60.0
27.118000	38.4	Off	L1	20.9	21.6	60.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	31.9	Off	L1	19.6	24.1	56.0
0.558000	33.1	Off	L1	19.6	12.9	46.0
0.574000	33.4	Off	L1	19.6	12.6	46.0
1.110000	24.5	Off	L1	19.6	21.5	46.0
1.998000	25.2	Off	L1	19.6	20.8	46.0
2.846000	24.2	Off	L1	19.5	21.8	46.0
13.558000	59.7	Off	L1	20.2	-9.7	50.0
27.118000	30.6	Off	L1	20.9	19.4	50.0

Test Engineer :	Eric Jeng	Temperature :	22~25°C
		Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral


Final Result : Quasi-Peak

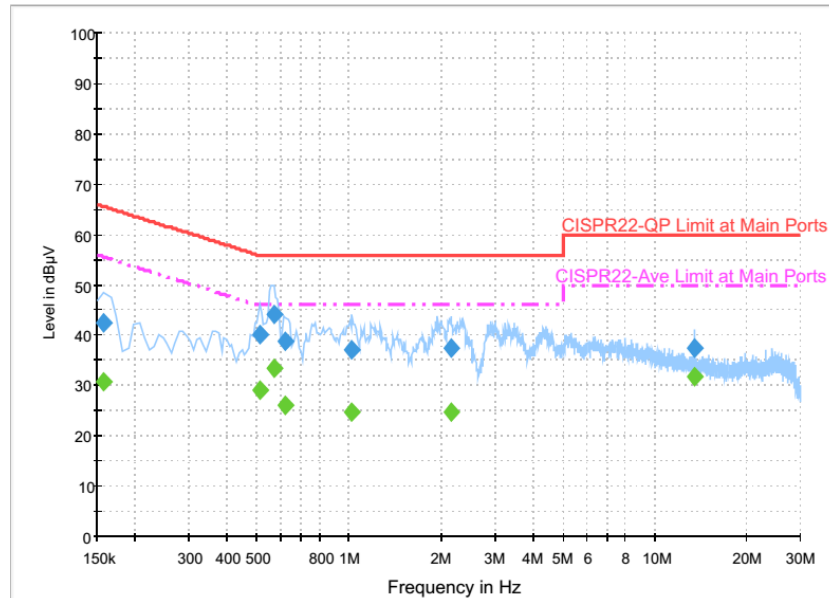
Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	45.7	Off	N	19.5	20.3	66.0
0.366000	38.4	Off	N	19.5	20.2	58.6
0.558000	43.0	Off	N	19.5	13.0	56.0
1.990000	34.4	Off	N	19.6	21.6	56.0
3.374000	32.6	Off	N	19.6	23.4	56.0
13.558000	62.3	Off	N	20.3	-2.3	60.0
27.118000	34.0	Off	N	21.1	26.0	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	33.9	Off	N	19.5	22.1	56.0
0.366000	31.0	Off	N	19.5	17.6	48.6
0.558000	35.0	Off	N	19.5	11.0	46.0
1.990000	27.9	Off	N	19.6	18.1	46.0
3.374000	25.6	Off	N	19.6	20.4	46.0
13.558000	58.5	Off	N	20.3	-8.5	50.0
27.118000	28.5	Off	N	21.1	21.5	50.0

<Terminal Test Result with Dummy Load>

Test Engineer :	Eric Jeng	Temperature :	22~25°C
		Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line

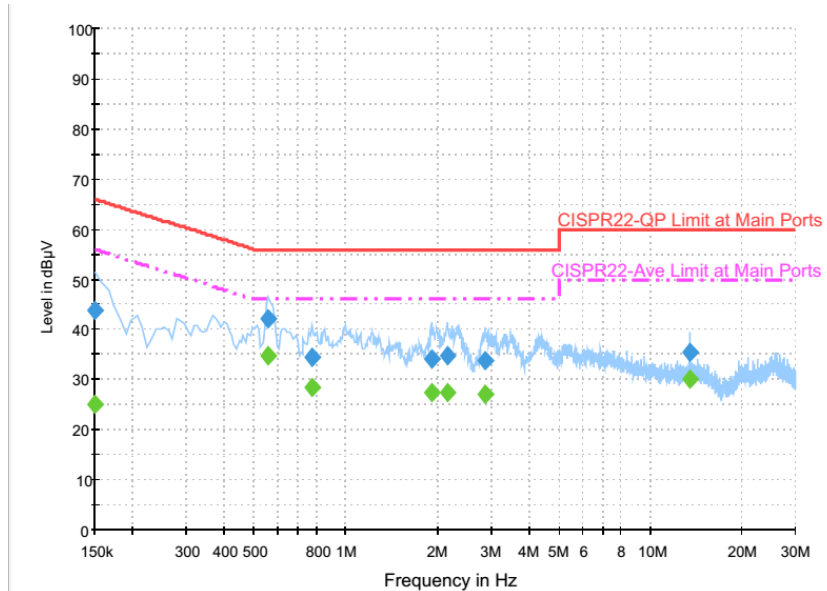

Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	42.6	Off	L1	19.6	23.0	65.6
0.510000	40.1	Off	L1	19.6	15.9	56.0
0.566000	44.2	Off	L1	19.6	11.8	56.0
0.622000	38.7	Off	L1	19.6	17.3	56.0
1.022000	37.2	Off	L1	19.6	18.8	56.0
2.158000	37.6	Off	L1	18.4	18.4	56.0
13.558000	37.5	Off	L1	20.2	22.5	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	30.7	Off	L1	19.6	24.9	55.6
0.510000	29.0	Off	L1	19.6	17.0	46.0
0.566000	33.4	Off	L1	19.6	12.6	46.0
0.622000	26.1	Off	L1	19.6	19.9	46.0
1.022000	24.8	Off	L1	19.6	21.2	46.0
2.158000	24.8	Off	L1	18.4	21.2	46.0
13.558000	31.7	Off	L1	20.2	18.3	50.0

Test Engineer :	Eric Jeng	Temperature :	22~25°C
		Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral


Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	43.9	Off	N	19.5	22.1	66.0
0.558000	42.0	Off	N	19.5	14.0	56.0
0.774000	34.5	Off	N	19.5	21.5	56.0
1.910000	34.2	Off	N	19.6	21.8	56.0
2.158000	34.8	Off	N	18.4	21.2	56.0
2.878000	33.8	Off	N	19.5	22.2	56.0
13.558000	35.6	Off	N	20.3	24.4	60.0

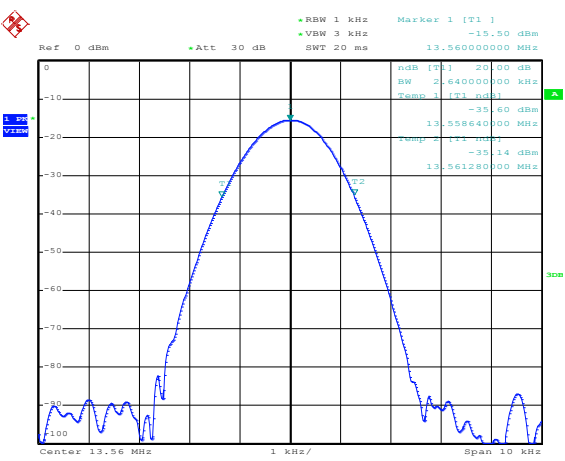
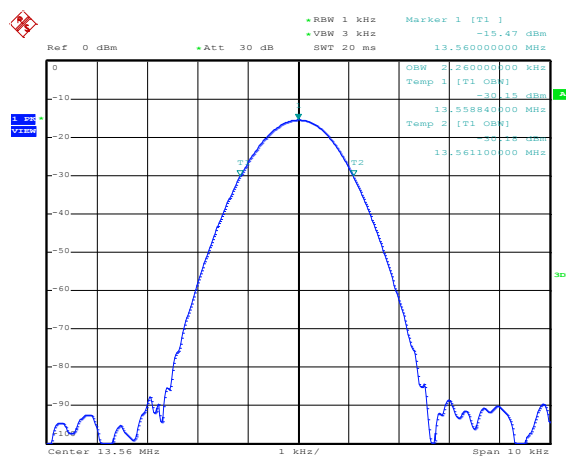
Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	25.1	Off	N	19.5	30.9	56.0
0.558000	34.9	Off	N	19.5	11.1	46.0
0.774000	28.3	Off	N	19.5	17.7	46.0
1.910000	27.4	Off	N	19.6	18.6	46.0
2.158000	27.5	Off	N	18.4	18.5	46.0
2.878000	27.2	Off	N	19.5	18.8	46.0
13.558000	30.2	Off	N	20.3	19.8	50.0



Appendix B. Test Results of Conducted Test Items

B1. Test Result of 20dB Spectrum Bandwidth

Test mode		NFC Tx		Test Frequency (MHz)	13.56
					
20dB Bandwidth (kHz)		2.64		99% OccupiedBW(kHz)	2.26
Frequency range (MHz)		$f_L > 13.553$		13.558640000	Test Result
		$f_H < 13.567$		13.561280000	Complies

**B2. Test Result of Frequency Stability**

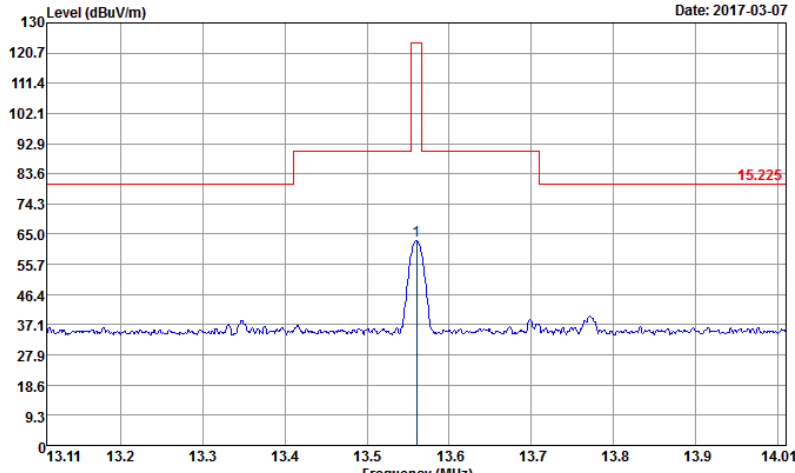
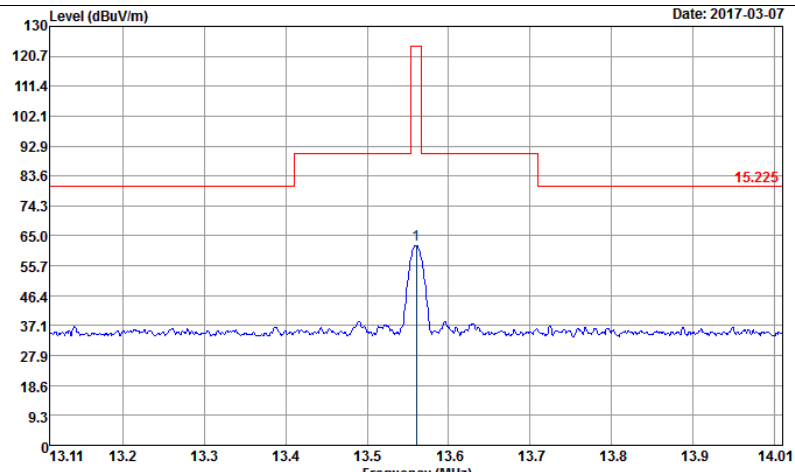
B3. Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
120	13.559880	-20	0	13.559970
102	13.559880		2	13.559980
138	13.559880		5	13.559960
			10	13.559960
		-10	0	13.559960
			2	13.559960
			5	13.559960
			10	13.559960
		0	0	13.559950
			2	13.559960
			5	13.559950
			10	13.559950
		10	0	13.559950
			2	13.559950
			5	13.559950
			10	13.559950
		20	0	13.559960
			2	13.559960
			5	13.559960
			10	13.559960
		30	0	13.559940
			2	13.559940
			5	13.559940
			10	13.559930
		40	0	13.559900
			2	13.559900
			5	13.559900
			10	13.559900



Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
		50	0	13.559900
			2	13.559880
			5	13.559890
			10	13.559880
Max.Deviation (MHz)	-0.000120	Max.Deviation (MHz)		-0.000120
Max.Deviation (ppm)	-8.8496	Max.Deviation (ppm)		-8.8496
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																																																									
<div></div> <p>Date: 2017-03-07</p> <p>Site : 03CH07-HY Condition : 15.225 3m LOOP_ANT(H) HORIZONTAL RBW:9.000KHz VBW:9.000KHz SWT:Auto Project : 722135 Mode : 1 Plane : Z_With Adapter Type : F</p> <table><tr><th>Freq</th><th>Level</th><th>Over</th><th>Limit</th><th>ReadAntenna</th><th>Cable</th><th>A/Pos</th><th>T/Pos</th><th>Remark</th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dB</th><th>dBuV/m</th><th>dBuV</th><th>dB/m</th><th>dB</th><th>cm</th><th>deg</th></tr><tr><td>1</td><td>13.56</td><td>63.12</td><td>-60.88</td><td>124.00</td><td>41.89</td><td>20.51</td><td>0.72</td><td>100</td><td>55 QP</td></tr></table>				Freq	Level	Over	Limit	ReadAntenna	Cable	A/Pos	T/Pos	Remark	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	1	13.56	63.12	-60.88	124.00	41.89	20.51	0.72	100	55 QP	<div></div> <p>Date: 2017-03-07</p> <p>Site : 03CH07-HY Condition : 15.225 3m LOOP_ANT(V) VERTICAL RBW:9.000KHz VBW:9.000KHz SWT:Auto Project : 722135 Mode : 1 Plane : Z_With Adapter Type : F</p> <table><tr><th>Freq</th><th>Level</th><th>Over</th><th>Limit</th><th>ReadAntenna</th><th>Cable</th><th>A/Pos</th><th>T/Pos</th><th>Remark</th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dB</th><th>dBuV/m</th><th>dBuV</th><th>dB/m</th><th>dB</th><th>cm</th><th>deg</th></tr><tr><td>1</td><td>13.56</td><td>62.21</td><td>-61.79</td><td>124.00</td><td>40.98</td><td>20.51</td><td>0.72</td><td>100</td><td>217 QP</td></tr></table>				Freq	Level	Over	Limit	ReadAntenna	Cable	A/Pos	T/Pos	Remark	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	1	13.56	62.21	-61.79	124.00	40.98	20.51	0.72	100	217 QP
Freq	Level	Over	Limit	ReadAntenna	Cable	A/Pos	T/Pos	Remark																																																							
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg																																																							
1	13.56	63.12	-60.88	124.00	41.89	20.51	0.72	100	55 QP																																																						
Freq	Level	Over	Limit	ReadAntenna	Cable	A/Pos	T/Pos	Remark																																																							
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg																																																							
1	13.56	62.21	-61.79	124.00	40.98	20.51	0.72	100	217 QP																																																						

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

Test Mode :	NFC Tx	Polarization :	Horizontal
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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
0.01369	45.58	-79.3	124.88	21.96	22.9	0.72	-	-	Average
0.07533	45.39	-64.68	110.07	25.67	19	0.72	-	-	Average
0.0964	40.52	-67.4	107.92	21	18.8	0.72	-	-	QP
0.11552	35.77	-70.58	106.35	16.26	18.79	0.72	-	-	Average
0.41826	45.02	-50.16	95.18	25.67	18.63	0.72	-	-	Average
0.50502	37.84	-35.7	73.54	18.5	18.62	0.72	-	-	QP
11.288	35.88	-33.62	69.5	15.1	20.06	0.72	-	-	QP
13.56	62.65	-6.85	69.5	41.42	20.51	0.72	-	-	QP
23.299	39.11	-30.39	69.5	15.4	22	1.71	-	-	QP
26.595	39.36	-30.14	69.5	15.46	22.19	1.71	100	81	QP

Test Mode :	NFC Tx	Polarization :	Vertical
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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
0.01323	46.45	-78.72	125.17	22.83	22.9	0.72	-	-	Average
0.07461	46.2	-63.95	110.15	26.48	19	0.72	-	-	Average
0.09444	30.95	-77.15	108.1	11.43	18.8	0.72	-	-	QP
0.11296	30.99	-75.56	106.55	11.47	18.8	0.72	-	-	Average
0.4169	45.24	-49.96	95.2	25.89	18.63	0.72	-	-	Average
0.54257	35.87	-37.04	72.91	16.51	18.64	0.72	-	-	QP
13.424	36.26	-33.24	69.5	15.06	20.48	0.72	-	-	QP
13.56	60.84	-8.66	69.5	39.61	20.51	0.72	-	-	QP
24.937	38.78	-30.72	69.5	14.97	22.1	1.71	-	-	QP
28.075	38.95	-30.55	69.5	14.96	22.28	1.71	100	14	QP

Note:

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

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

Test Mode :	NFC Tx	Polarization :	Horizontal
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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	28.62	-11.38	40	32.26	26	1.71	31.35	100	0	Peak
98.31	24.41	-19.09	43.5	37.68	16.14	2.11	31.52	-	-	Peak
149.07	29.75	-13.75	43.5	40.9	17.73	2.62	31.5	-	-	Peak
552.7	28.75	-17.25	46	30.82	24.65	4.2	30.92	-	-	Peak
639.5	30.02	-15.98	46	30.42	25.79	4.59	30.78	-	-	Peak
998.6	34.69	-19.31	54	29.37	30.3	5.54	30.52	-	-	Peak

Test Mode :	NFC Tx	Polarization :	Vertical
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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
30.27	33.65	-6.35	40	37.29	26	1.71	31.35	100	258	Peak
40.53	31.14	-8.86	40	41.08	19.84	1.71	31.49	-	-	Peak
149.07	29.86	-13.64	43.5	41.01	17.73	2.62	31.5	-	-	Peak
582.8	29.6	-16.4	46	30.94	25.12	4.39	30.85	-	-	Peak
804	31.66	-14.34	46	29.49	27.78	4.98	30.59	-	-	Peak
956.6	35.32	-10.68	46	30.24	30.21	5.4	30.53	-	-	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.