FCC RF Test Report

APPLICANT	:	Acer Incorporated
EQUIPMENT	:	Smart HandHeld
BRAND NAME	:	Acer
MODEL NAME	:	S55
MARKETING NAME	:	Liquid Jade
FCC ID	:	HLZDMS55
STANDARD	:	FCC Part 15 Subpart C §15.225
CLASSIFICATION	:	(DXX) Low Power Communication Device Transmitter

The product was received on Jul. 09, 2014 and testing was completed on Jul. 30, 2014. 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

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

Table of Contents

1. SUMMARY OF THE TEST RESULT 4

2. GENERAL INFORMATION 5

2.1 Applicant 5
2.2 Manufacturer 5
2.3 Product Details 5
2.4 Modification of EUT 5
2.5 Testing Location 6
2.6 Applicable Standards 7
2.7 Test Modes 7
2.8 Test Configurations 8
2.9 Table for Supporting Units 8

3. CONDUCTED EMISSION TEST 9

3.1 Measuring Instruments 9
3.2 Test setup 9
3.3 Test Result of Conducted Emission Test 9
3.4 AC Power Line Conducted Emissions Measurement 10

4. CONDUCTED TEST ITEMS 11

4.1 Measuring Instruments 11
4.2 Test Setup 11
4.3 Test Result of Conducted Test Items 11
4.4 20dB Spectrum Bandwidth Measurement 12
4.5 Frequency Stability Measurement 12

5. RADIATED TEST ITEMS 13

5.1 Measuring Instruments 13
5.2 Test Setup 13
5.3 Test Result of Radiated Test Items 13
5.4 Field Strength of Fundamental Emissions and Mask Measurement 14
5.5 Radiated Emissions Measurement 15

6. LIST OF MEASURING EQUIPMENT 17

APPENDIX A SETUP PHOTOGRAPHS

APPENDIX B. TEST RESULTS OF CONDUCTED EMISSION TEST

APPENDIX C. TEST RESULTS OF CONDUCTED TEST ITEMS

C.1.Test Result of 20dB Spectrum Bandwidth
C.2 Test Result of Frequency Stability

APPENDIX D. TEST RESULTS OF RADIATED TEST ITEMS

D.1 Test Result of Field Strength of Fundamental Emissions
D.2 Results of Radiated Emissions (9 kHz~30MHz)
D.3 Results of Radiated Emissions (30MHz~1GHz)

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR470901D	Rev. 01	Initial issue of report	Aug. 06, 2014

1. 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	8.39 dB at 0.430MHz
3.2	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Complies	71.86 dB at 13.560 MHz
3.3	2.1049	20dB Spectrum Bandwidth	Complies	-
3.4	15.225(d) 15.209	Radiated Emissions	Complies	16.10 dB at 1.226 MHz for Quasi-Peak
3.5	15.225(e)	Frequency Stability	Complies	-
3.6	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±4.5dB	Confidence levels of 95%

2. GENERAL INFORMATION

2.1 Applicant

Acer Incorporated

8F, No. 88, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22181, Taiwan (R.O.C.)

2.2 Manufacturer

Shanghai Sunrise Simcom Limited

No. 888, Shengli Rd., Qingpu, Shanghai, P. R. China 201700

2.3 Product Details

Items	Description
Tx/Rx Frequency Range	13.553 ~ 13.567MHz
Channel Number	1
20dBW	2.64KHz
99%OBW	2.24KHz
Antenna Type	FPC NFC 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.

2.4 Modification of EUT

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

2.5 Testing Location

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	**Sporton Site No.**		**FCC/IC Registration No.**
	TH02-HY	03CH07-HY	TW1022/4086B-1
Test Engineer	Tommy Lee	Eric Shih	
Temperature	22-24℃	21-23℃	
Relative Humidity	53-55%	47~49%	

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.	
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958	
Test Site No.	**Sporton Site No.**	**FCC/IC Registration No.**
	CO01-KS	149928/4086E-1
Test Engineer	Eligah Wang	
Temperature	22-24℃	
Relative Humidity	37~39%	

2.6 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 C63.4-2003
- IC RSS-210 Issue 8
- IC RSS-Gen Issue 3
- NOTICE 2012-DRS0126

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.
3. Per the section 2.2.3 of Notice of 2012-DRS0126, " Receivers Excluded from Industry Canada Requirements", only radiocommunication receivers operating in stand-alone mode within the band 30-960 MHz and scanner receivers are subject to Industry Canada requirements.

2.7 Test Modes

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.

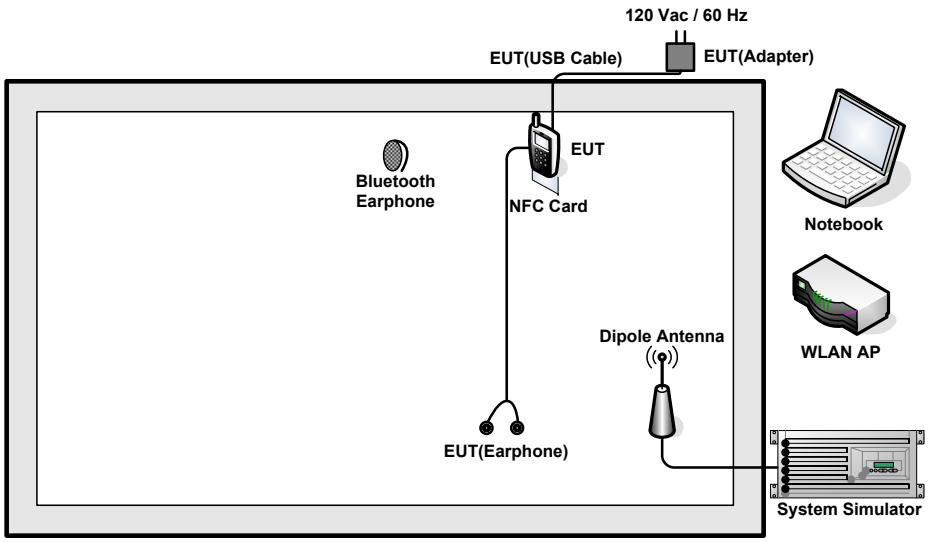
Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

Note:

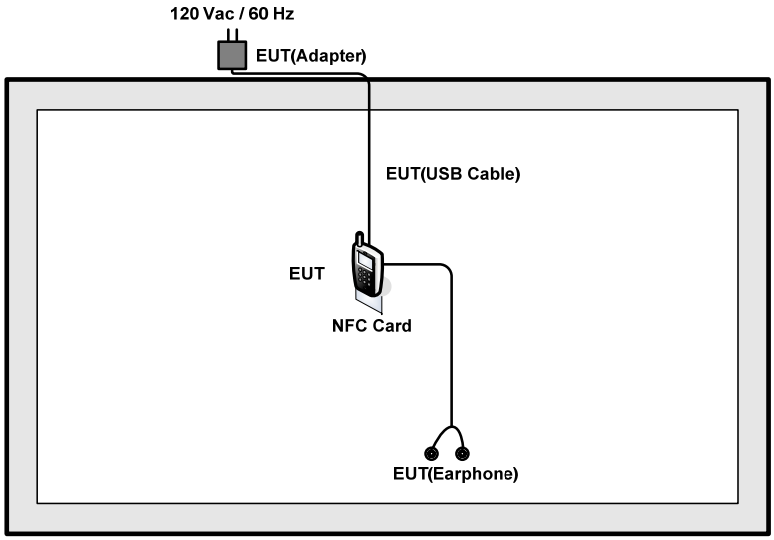
1. The EUT was programmed to be in continuously transmitting mode.
2. The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 3 cm gap to the EUT.

2.8 Test Configurations

<AC Conducted Emissions>



< For Fundamental Emissions and Mask and Radiated Emissions Measurement >



2.9 Table for Supporting Units

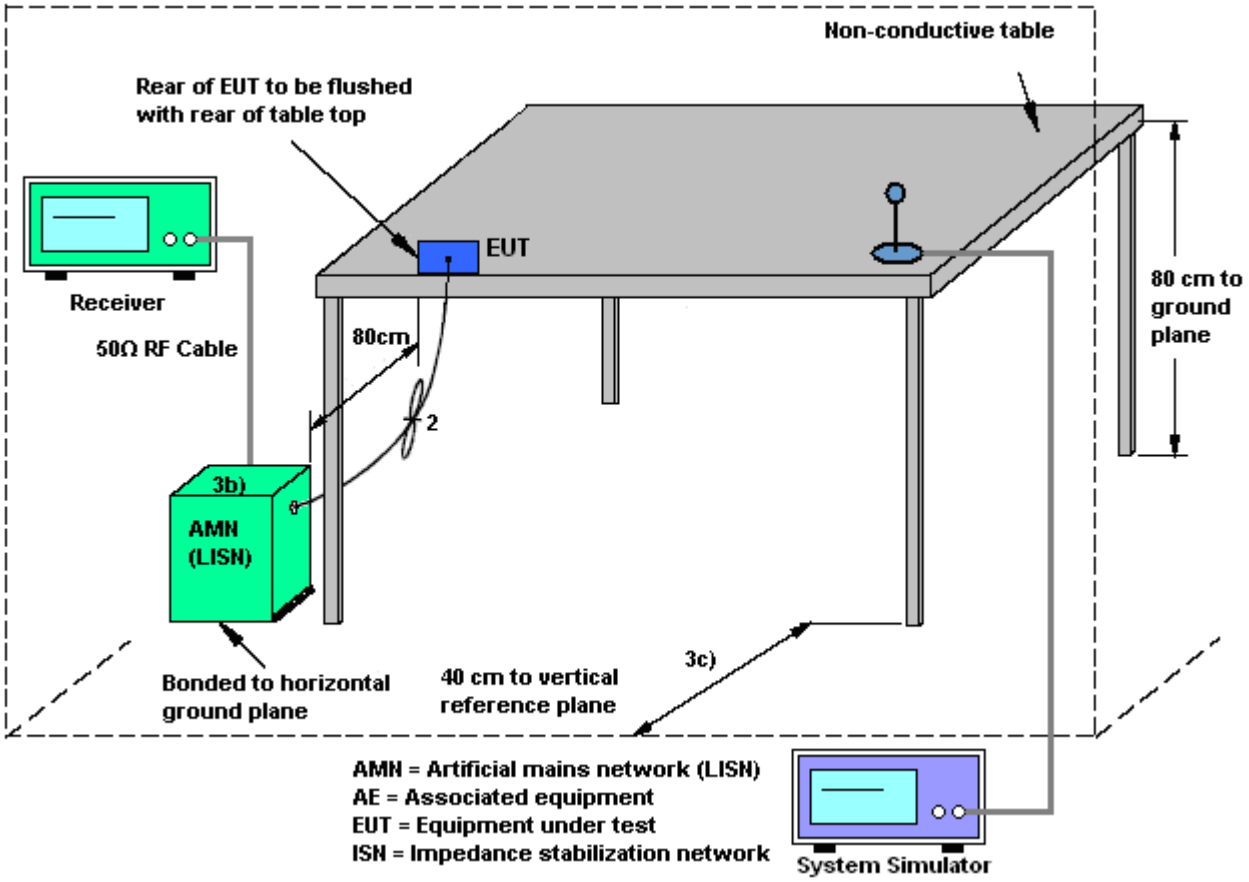
Support Unit	Manufacturer	Model	FCC ID
System Simulator	R&S	CMU 200	N/A
WLAN AP	D-Link	DIR-855	KA2DIR855A2
Bluetooth Earphone	Lenovo	LBH505	N/A
Notebook	Lenovo	G480	FCC DoC
NFC Card	N/A	N/A	N/A

3. CONDUCTED EMISSION TEST

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.2 Test setup



3.3 Test Result of Conducted Emission Test

Please refer to Appendix B.

3.4 AC Power Line Conducted Emissions Measurement

3.4.1 Limit

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

3.4.2 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 with Maximum Hold Mode.
9. Compliance with the limit is tested using a receiver with RBW set to a 9kHz

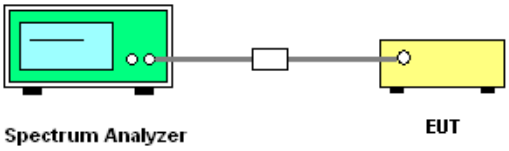
4. CONDUCTED TEST ITEMS

4.1 Measuring Instruments

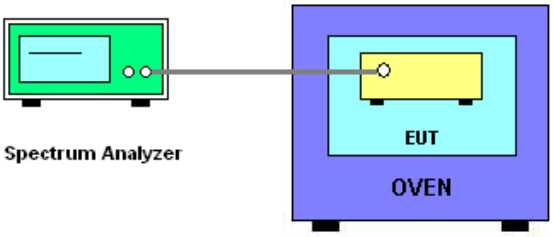
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 20dB Spectrum Bandwidth



4.2.2 Frequency Stability



4.3 Test Result of Conducted Test Items

Please refer to Appendix C.

4.4 20dB Spectrum Bandwidth Measurement

4.4.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band 13.553~13.567MHz

4.4.2 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer 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.

4.5 Frequency Stability Measurement

4.5.1 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.

4.5.2 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
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.

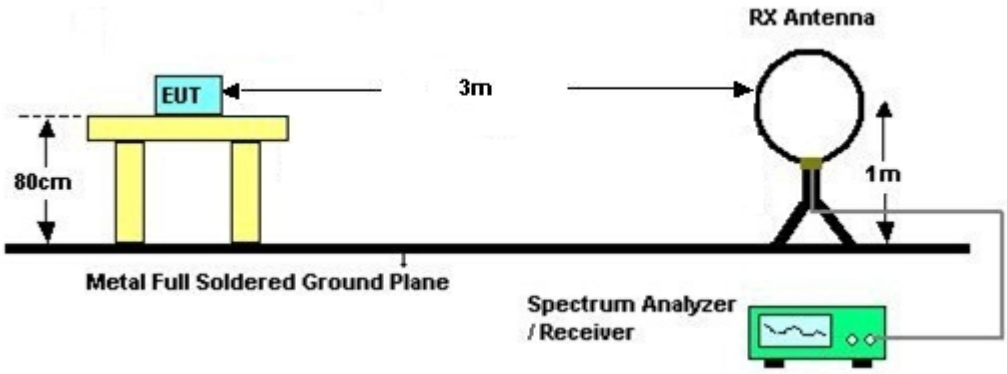
5. RADIATED TEST ITEMS

5.1 Measuring Instruments

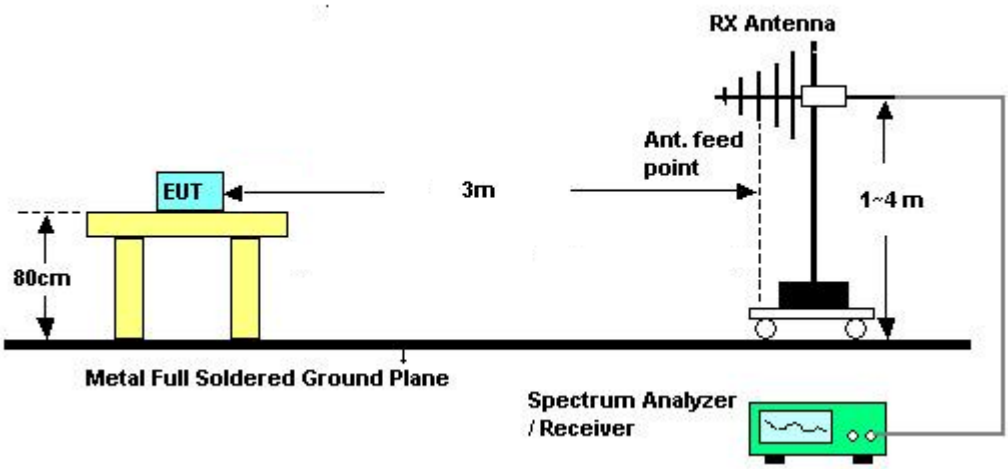
See list of measuring instruments of this test report.

5.2 Test Setup

5.2.1 For radiated emissions below 30MHz



5.2.2 For radiated emissions above 30MHz



5.3 Test Result of Radiated Test Items

Please refer to Appendix D.

5.4 Field Strength of Fundamental Emissions and Mask Measurement

5.4.1 Limit

Rules and specifications	CFR 47 Part 15 section 15.225(a)-(d)			
Description	Compliance with the spectrum mask is tested using a spectrum analyzer with RBW set to a 9kHz for the band 13.553~13.567MHz			
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

5.4.2 Test Procedures

1. Configure the EUT according to ANSI C63.4. 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 using a spectrum analyzer with RBW set to a 9kHz for the band 13.553~13.567MHz.

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

5.5 Radiated Emissions Measurement

5.5.1 Limit

The field strength of any emissions which appear outside of 13.553~13.567MHz 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

5.5.2 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.

5.5.3 Test Procedures

1. Configure the EUT according to ANSI C63.4. 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

5.5.4 Limit

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.

5.5.5 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

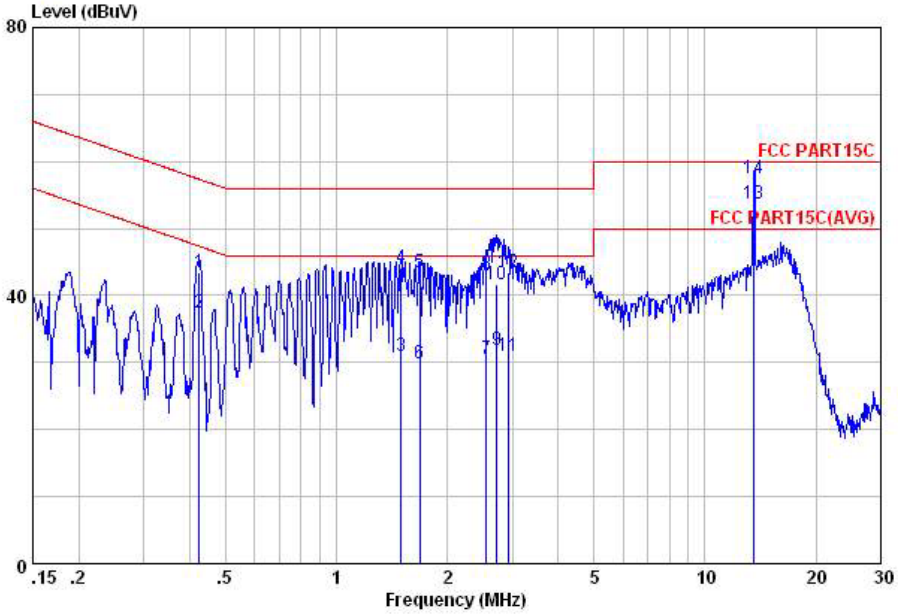
6. LIST OF MEASURING EQUIPMENT

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	Jul. 28, 2014	Jun. 08, 2015	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Aug. 17, 2013	Jul. 28, 2014	Aug. 16, 2014	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 17, 2013	Jul. 28, 2014	Aug. 16, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 06, 2013	Jul. 29, 2014~ Jul. 30, 2014	Sep. 05, 2014	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100330	9 kHz~30 MHz	Nov. 15, 2012	Jul. 29, 2014~ Jul. 30, 2014	Nov. 14, 2014	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 10, 2013	Jul. 29, 2014~ Jul. 30, 2014	Oct. 09, 2014	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10 MHz ~ 1000MHz 32dB GAIN	Mar. 17, 2014	Jul. 29, 2014~ Jul. 30, 2014	Mar. 16, 2015	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Jul. 29, 2014~ Jul. 30, 2014	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Jul. 29, 2014~ Jul. 30, 2014	N/A	Radiation (03CH07-HY)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 04, 2014	Jul. 17, 2014	May 03, 2015	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Dec. 10, 2013	Jul. 17, 2014	Dec. 09, 2014	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Dec. 10, 2013	Jul. 17, 2014	Dec. 09, 2014	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000 811	AC 0V~300V, 45Hz~1000Hz	Nov. 12, 2013	Jul. 17, 2014	Nov. 11, 2014	Conduction (CO01-KS)

※ Calibration Interval of Loop Antenna is two years.

Appendix B. Test Results of Conducted Emission Test

Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + NFC Tx + Earphone + USB Cable (Charging from Adapter)		



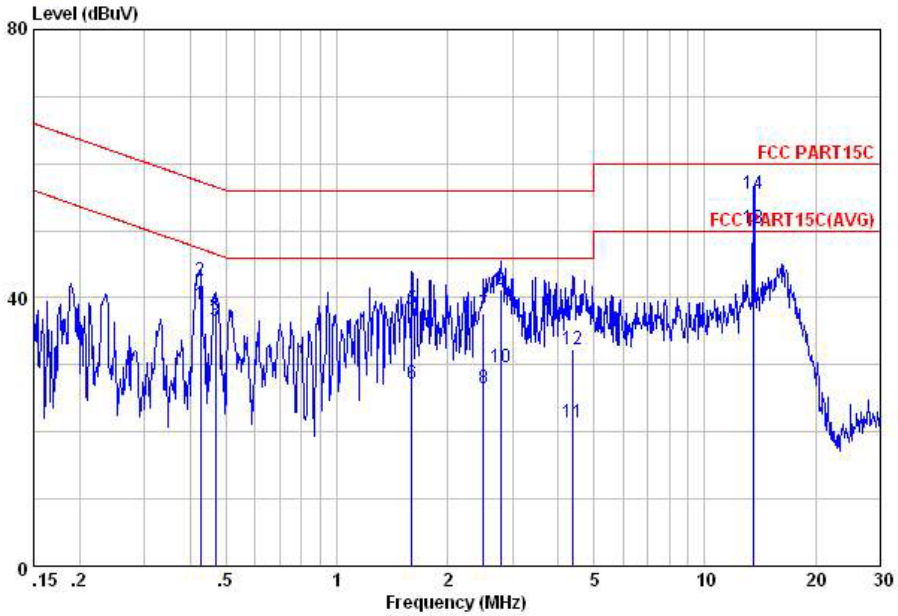
Site : C001-KS
Condition: FCC PART15C LISN-L20130306 LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.42	43.36	-14.01	57.37	32.80	0.28	10.28	QP
2		0.42	37.36	-10.01	47.37	26.80	0.28	10.28	Average
3		1.50	31.09	-14.91	46.00	20.80	0.10	10.19	Average
4		1.50	44.19	-11.81	56.00	33.90	0.10	10.19	QP
5		1.68	43.39	-12.61	56.00	33.10	0.10	10.19	QP
6		1.68	29.89	-16.11	46.00	19.60	0.10	10.19	Average
7		2.55	30.62	-15.38	46.00	20.30	0.12	10.20	Average
8		2.55	43.22	-12.78	56.00	32.90	0.12	10.20	QP
9		2.72	31.93	-14.07	46.00	21.60	0.12	10.21	Average
10		2.72	41.63	-14.37	56.00	31.30	0.12	10.21	QP
11		2.93	30.95	-15.05	46.00	20.60	0.13	10.22	Average
12		2.93	43.45	-12.55	56.00	33.10	0.13	10.22	QP
13	X	13.56	53.74	3.74	50.00	43.20	0.20	10.34	Average
14		13.56	57.54	-2.46	60.00	47.00	0.20	10.34	QP

(1) with antenna

Remark: 13.56MHz is the NFC RF fundamental signal.

Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + NFC Tx + Earphone + USB Cable (Charging from Adapter)		



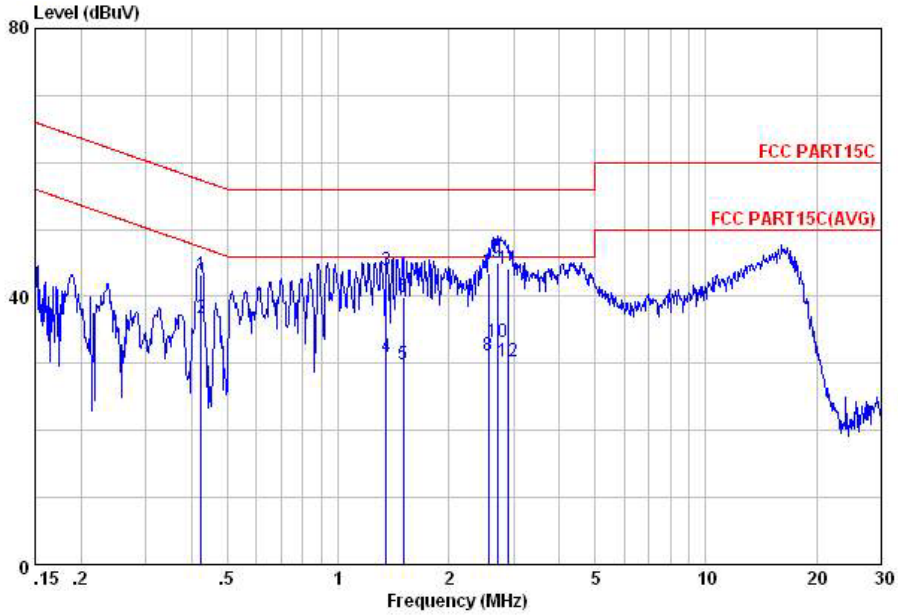
Site : C001-KS
Condition: FCC PART15C LISN-N20130306 NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.43	38.94	-8.39	47.33	28.29	0.37	10.28	Average
2		0.43	42.54	-14.79	57.33	31.89	0.37	10.28	QP
3		0.47	36.49	-10.05	46.54	25.90	0.32	10.27	Average
4		0.47	38.19	-18.35	56.54	27.60	0.32	10.27	QP
5		1.60	38.39	-17.61	56.00	28.10	0.10	10.19	QP
6		1.60	27.19	-18.81	46.00	16.90	0.10	10.19	Average
7		2.50	37.62	-18.38	56.00	27.31	0.11	10.20	QP
8		2.50	26.62	-19.38	46.00	16.31	0.11	10.20	Average
9		2.79	41.24	-14.76	56.00	30.90	0.13	10.21	QP
10		2.79	29.64	-16.36	46.00	19.30	0.13	10.21	Average
11		4.36	21.34	-24.66	46.00	10.90	0.19	10.25	Average
12		4.36	32.24	-23.76	56.00	21.80	0.19	10.25	QP
13	X	13.56	50.43	0.43	50.00	39.81	0.28	10.34	Average
14		13.56	55.53	-4.47	60.00	44.91	0.28	10.34	QP

(1) with antenna

Remark: 13.56MHz is the NFC RF fundamental signal.

Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + NFC Tx + Earphone + USB Cable (Charging from Adapter)		



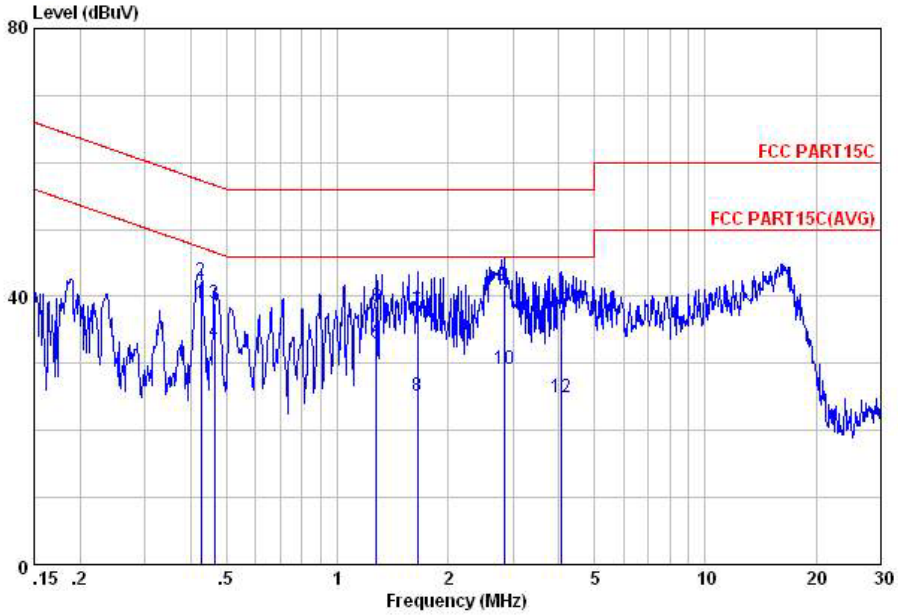
Site : C001-KS
Condition: FCC PART15C LISN-L20130306 LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.42	43.16	-14.21	57.37	32.60	0.28	10.28	QP
2	0.42	36.86	-10.51	47.37	26.30	0.28	10.28	Average
3	1.35	43.88	-12.12	56.00	33.60	0.10	10.18	QP
4	1.35	30.88	-15.12	46.00	20.60	0.10	10.18	Average
5	1.50	29.89	-16.11	46.00	19.60	0.10	10.19	Average
6	1.50	39.89	-16.11	56.00	29.60	0.10	10.19	QP
7	2.57	43.52	-12.48	56.00	33.20	0.12	10.20	QP
8	2.57	31.22	-14.78	46.00	20.90	0.12	10.20	Average
9	2.71	44.93	-11.07	56.00	34.60	0.12	10.21	QP
10	2.71	33.23	-12.77	46.00	22.90	0.12	10.21	Average
11	2.90	44.15	-11.85	56.00	33.80	0.13	10.22	QP
12	2.90	30.25	-15.75	46.00	19.90	0.13	10.22	Average

(2) with dummy load

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

Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + NFC Tx + Earphone + USB Cable (Charging from Adapter)		



Site : C001-KS
Condition: FCC PART15C LISN-N20130306 NEUTRAL

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.43	38.94	-8.39	47.33	28.29	0.37	10.28	Average
2	0.43	42.24	-15.09	57.33	31.59	0.37	10.28	QP
3	0.46	38.90	-17.73	56.63	28.30	0.33	10.27	QP
4	0.46	33.20	-13.43	46.63	22.60	0.33	10.27	Average
5	1.28	32.88	-13.12	46.00	22.60	0.10	10.18	Average
6	1.28	38.58	-17.42	56.00	28.30	0.10	10.18	QP
7	1.65	37.89	-18.11	56.00	27.60	0.10	10.19	QP
8	1.65	25.09	-20.91	46.00	14.80	0.10	10.19	Average
9	2.84	41.74	-14.26	56.00	31.39	0.13	10.22	QP
10	2.84	29.24	-16.76	46.00	18.89	0.13	10.22	Average
11	4.07	38.03	-17.97	56.00	27.60	0.19	10.24	QP
12	4.07	25.03	-20.97	46.00	14.60	0.19	10.24	Average

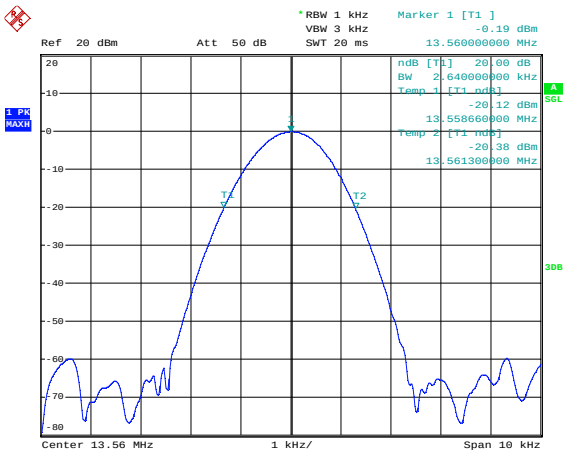
(2) with dummy load

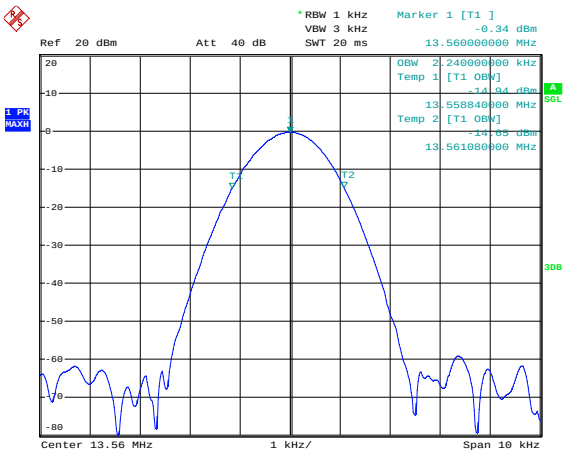
Remark: Only the fundamental NFC signal needs to be retested per C63.4.

Appendix C. Test Results of Conducted Test Items

C.1 Test Result of 20dB Spectrum Bandwidth

Test mode	NFC Tx	Test Frequency (MHz)	13.56





20dB Bandwidth (kHz)	2.64	99% OccupiedBW(kHz)	2.24
Frequency range (MHz)	$f_L > 13.553$	13.55866	Test Result
	$f_H < 13.567$	13.56130	Complies

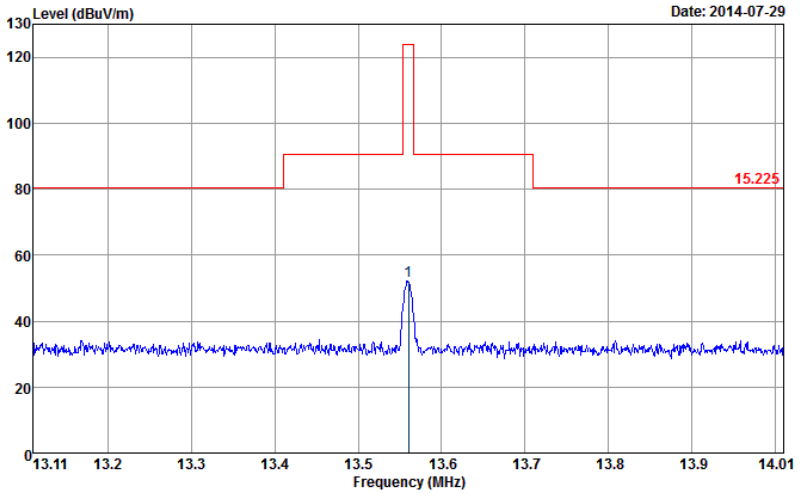
C.2 Test Result of Frequency Stability

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (℃)	Measurement Frequency (MHz)
3.80	13.559970	-20	13.560020
3.60	13.559960	-10	13.560040
4.35	13.560720	0	13.560040
		10	13.560020
		20	13.560000
		30	13.559980
		40	13.559960
		50	13.559930
Max.Deviation (MHz)	0.000720	Max.Deviation (MHz)	-0.000070
Max.Deviation (ppm)	53.0973	Max.Deviation (ppm)	-5.1622
Limit	FS < ±100 ppm	Limit	FS < ±100 ppm
Test Result	PASS	Test Result	PASS

Appendix D. Test Results of Radiated Test Items

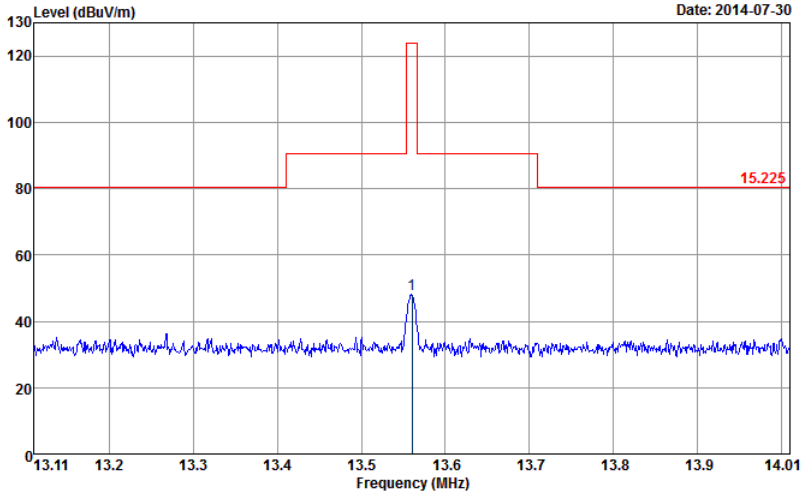
D.1 Test Result of Field Strength of Fundamental Emissions

Test Mode :	NFC Tx	Test Frequency (MHz)	13.56



Site : 03CH07-HY
Condition : 15.225 3m LOOP_ANT(ICC) HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	13.56	52.14	-71.86	124.00	32.12	19.62	0.40	100	13	QP



Site : 03CH07-HY
Condition : 15.225 3m LOOP_ANT(ICC) VERTICAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	13.56	48.17	-75.83	124.00	28.15	19.62	0.40	100	287	QP

Note: All NFC's spurious emissions are below 20dB of limits.

D.2 Results of Radiated 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
0.01323	35.26	-89.91	125.17	14.69	20.28	0.29	-	-	Average
0.0672	21.96	-89.10	111.06	1.6	20.07	0.29	-	-	Average
0.09946	22.31	-85.34	107.65	1.97	20.05	0.29	-	-	QP
0.14176	22.44	-82.13	104.57	2.13	20.02	0.29	-	-	Average
0.46042	45.93	-48.41	94.34	25.74	19.9	0.29	-	-	Average
1.226	49.73	-16.10	65.83	29.49	19.93	0.31	100	17	QP
11.312	35.84	-34.16	70	15.73	19.72	0.39	-	-	QP
13.56	54.86	-	-	34.84	19.62	0.4	-	-	QP
20.59	37.65	-32.35	70	17.15	20.07	0.43	-	-	QP
28.44	36.44	-33.56	70	15.62	20.32	0.5	-	-	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
0.0113	32.60	-93.95	126.55	12.03	20.28	0.29	-	-	Average
0.07875	22.43	-87.25	109.68	2.07	20.07	0.29	-	-	Average
0.10362	21.90	-85.40	107.3	1.56	20.05	0.29	-	-	QP
0.11024	23.74	-83.02	106.76	3.4	20.05	0.29	-	-	Average
0.45906	43.20	-51.17	94.37	23.01	19.9	0.29	-	-	Average
1.241	44.13	-21.60	65.73	23.89	19.93	0.31	100	299	QP
10.536	35.89	-34.11	70	15.76	19.74	0.39	-	-	QP
13.56	48.21	-	-	28.19	19.62	0.4	-	-	QP
20.77	37.33	-32.67	70	16.82	20.08	0.43	-	-	QP
26.9	35.97	-34.03	70	15.15	20.34	0.48	-	-	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 (specific distance / test distance) (dB);
4. Limit line = specific limits (dBμV) + distance extrapolation factor.

D.3 Results of Radiated 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
61.86	22.01	-17.99	40	46.35	6.14	0.78	31.26	-	-	Peak
122.07	28.05	-15.45	43.5	46.34	11.7	1.11	31.1	-	-	Peak
189.84	37.09	-6.41	43.5	57.91	9	1.28	31.1	152	55	Peak
406.4	37.85	-8.15	46	50.42	16.14	2.16	30.87	-	-	Peak
569.5	23.72	-22.28	46	32.57	19.27	2.6	30.72	-	-	Peak
903.4	26.56	-19.44	46	30.38	23.14	3.35	30.31	-	-	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
40.53	33.18	-6.82	40	50.85	12.9	0.63	31.2	102	187	Peak
108.3	28.32	-15.18	43.5	47.85	10.61	1.04	31.18	-	-	Peak
203.34	21.95	-21.55	43.5	42.35	9.37	1.33	31.1	-	-	Peak
325.2	18.91	-27.09	46	34.1	13.98	1.83	31	-	-	Peak
406.4	31.54	-14.46	46	44.11	16.14	2.16	30.87	-	-	Peak
569.5	23.98	-22.02	46	32.83	19.27	2.6	30.72	-	-	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.