FCC RF Test Report

APPLICANT	:	SAFRAN Identity&Security
EQUIPMENT	:	MorphoTablet 2
BRAND NAME	:	SAFRAN MORPHO
MODEL NAME	:	MPH-MB001A
FCC ID	:	ZBW-MPHMB001A
STANDARD	:	FCC Part 15 Subpart C §15.225
CLASSIFICATION	:	(DXX) Low Power Communication Device Transmitter

The product was received on Apr. 06, 2016 and testing was completed on May 11, 2016. 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.

James Huang

Prepared by: James Huang / Manager

Jones Tsai

Approved by: Jones Tsai / Manager

Testing Laboratory
2627

SPORTON INTERNATIONAL (KUNSHAN) INC.

No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR640601D	Rev. 01	Initial issue of report	Jun. 28, 2016

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	6.89 dB at 1.010MHz
3.2	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Complies	51.77 dB at 13.560 MHz
3.3	2.1049	20dB Spectrum Bandwidth	Complies	-
3.3	-	99% OBW Spectrum Bandwidth	Complies	-
3.4	15.225(d) 15.209	Radiated Emissions	Complies	4.86 dB at 38.730 MHz
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)	±5.1dB	Confidence levels of 95%

1. GENERAL INFORMATION

1.1 Applicant

SAFRAN Identity&Security

11, boulevard Galliéni 92130 - Issy-les-Moulineaux France

1.2 Manufacturer

SAFRAN Identity&Security

11, boulevard Galliéni 92130 - Issy-les-Moulineaux France

1.3 Product Details

Items	Description
Tx/Rx Frequency Range	13.553 ~ 13.567MHz
Channel Number	1
20dBW	2.64KHz
99%OBW	2.24KHz
Antenna Type	Loop Antenna
IMEI Code	Conducted: 123456789012345 Conduction: 123456789012345 Radiation: 357079070007821
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

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	**Sporton Site No.**			**FCC Registration No.**
	TH01-KS	CO01-KS	03CH02-KS	418269
Test Engineer	Issac Song	Amos Zhang	Star Wei	
Temperature	24~25℃	22~24℃	22~23℃	
Relative Humidity	49~51%	44~47%	42~43%	

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

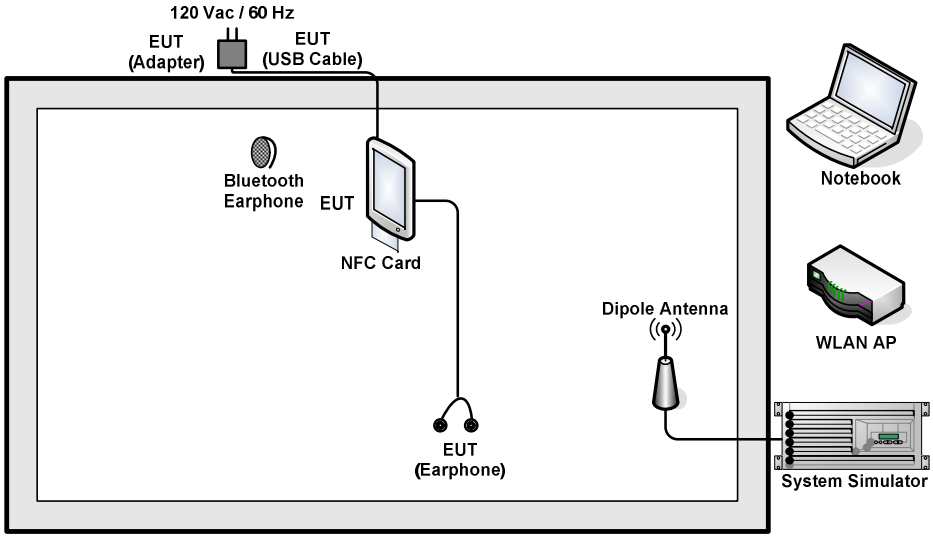
1.7 Test Modes

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.

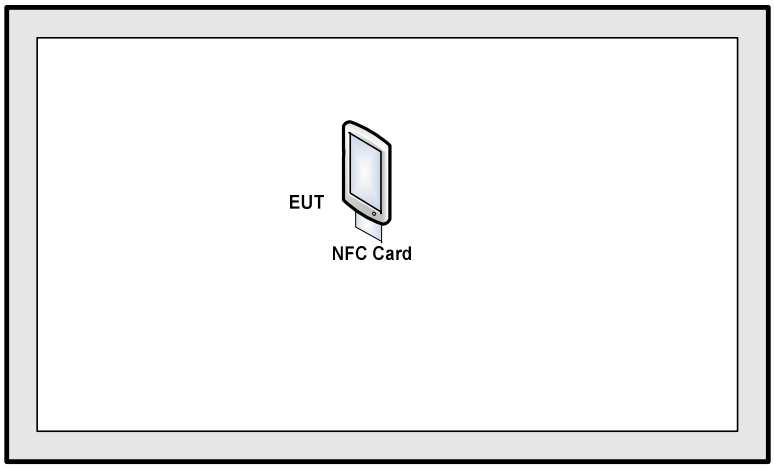
Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz
Note: 1. The EUT was programmed to be in continuously transmitting mode. 2. The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 3 cm gap to the EUT.	

1.8 Test Configurations

<AC Conducted Emissions>



< For Fundamental Emissions and Mask and Radiated Emissions Measurement >



1.9 Table for Supporting Units

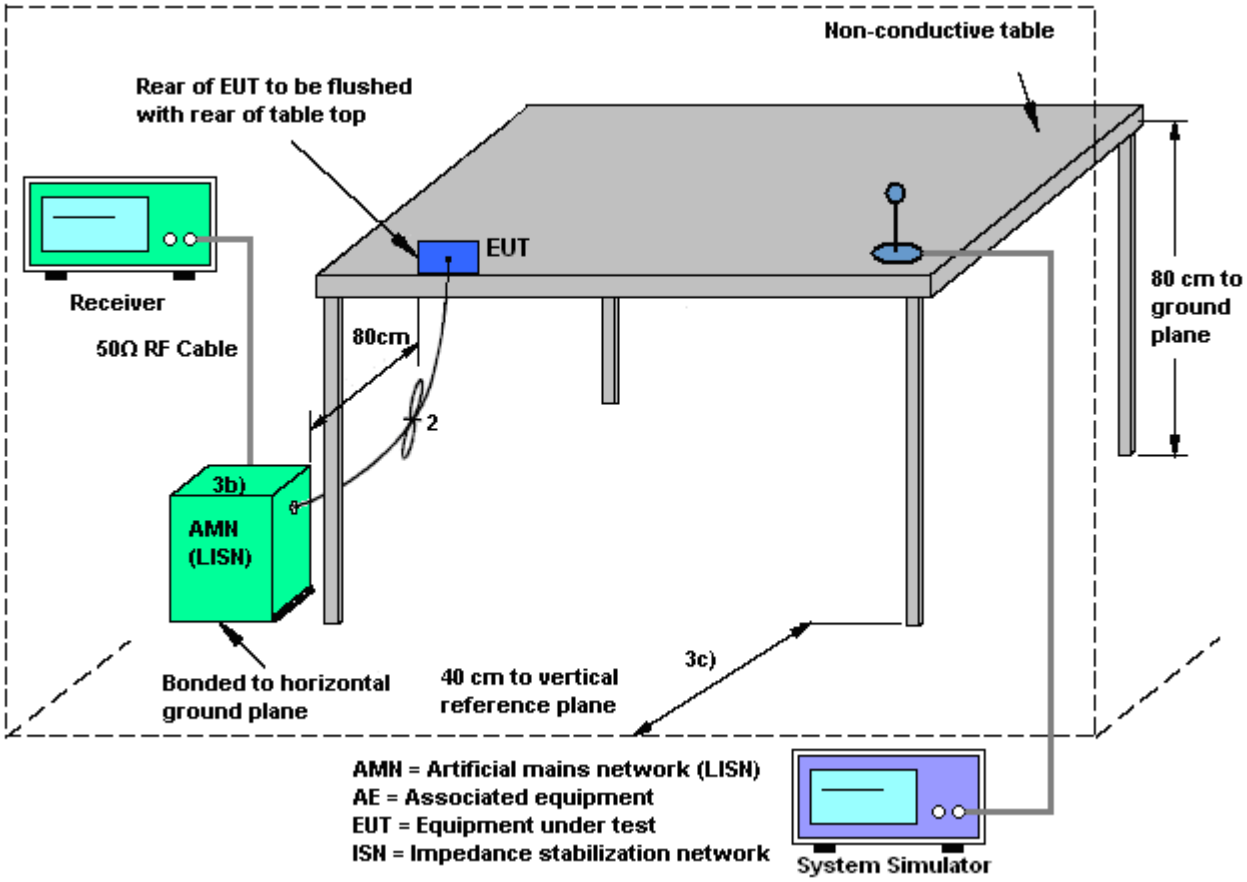
Support Unit	Manufacturer	Model	FCC ID
System Simulator	Anritus	MT8820C	N/A
WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11
Notebook	Lenovo	G480	N/A
Bluetooth Earphone	Nokia	BH-106	QTLBH-106
NFC Card	N/A	N/A	N/A
DC Power Supply	GW INSTEK	GPD-2303S	N/A

2. CONDUCTED EMISSION TEST

2.1 Measuring Instruments

See list of measuring instruments of this test report.

2.2 Test setup



2.3 Test Result of Conducted Emission Test

Please refer to Appendix A.

2.4 AC Power Line Conducted Emissions Measurement

2.4.1 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.

2.4.2 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 (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

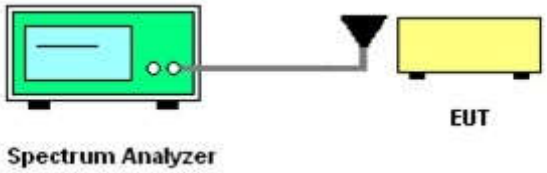
3. CONDUCTED TEST ITEMS

3.1 Measuring Instruments

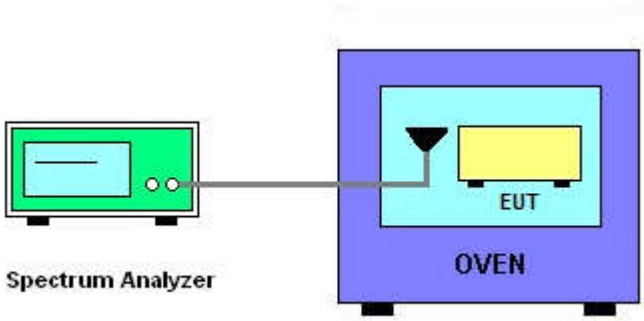
See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 20dB and 99% OBW Spectrum Bandwidth



3.2.2 Frequency Stability



3.3 Test Result of Conducted Test Items

Please refer to Appendix B.

3.4 20dB and 99% OBW Spectrum Bandwidth Measurement

3.4.1 Limit

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

3.4.2 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.

3.5 Frequency Stability Measurement

3.5.1 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.

3.5.2 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 × 10^6 ppm and the limit is less than ±100ppm.
6. Extreme temperature rule is -20°C~50°C.

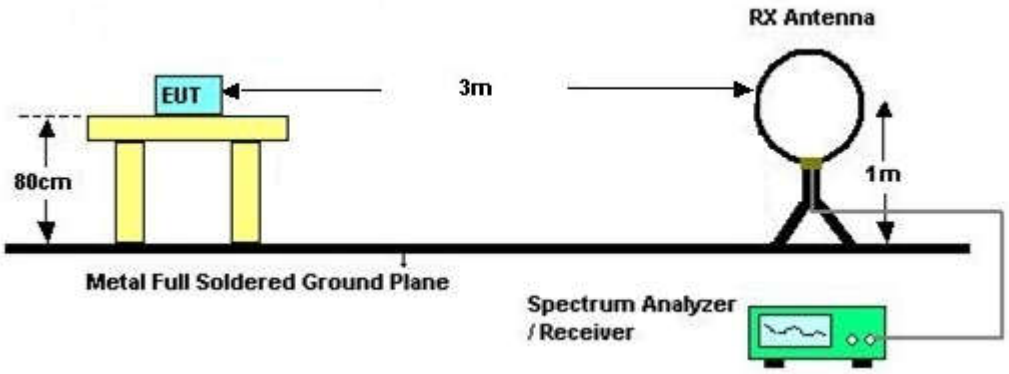
4. RADIATED TEST ITEMS

4.1 Measuring Instruments

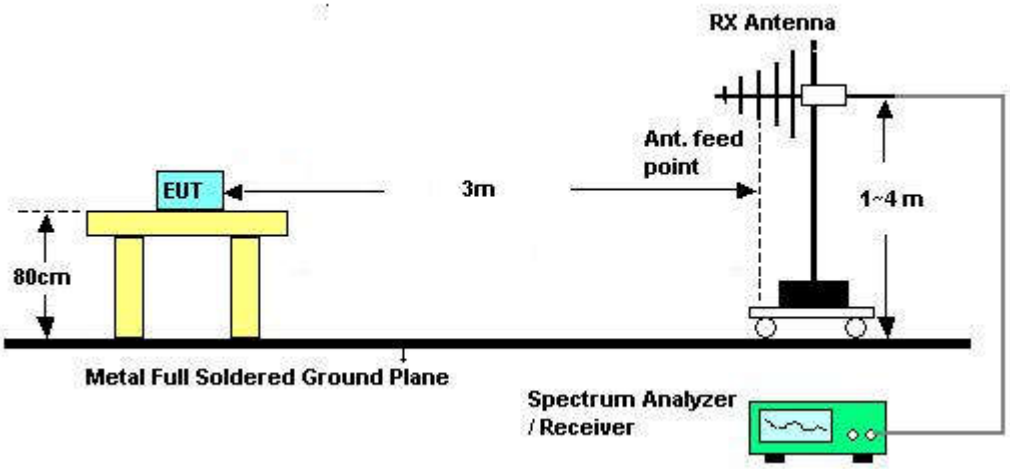
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated emissions below 30MHz



4.2.2 For radiated emissions above 30MHz



4.3 Test Result of Radiated Test Items

Please refer to Appendix C.

4.4 Field Strength of Fundamental Emissions and Mask Measurement

4.4.1 Limit

Rules and specifications	FCC CFR 47 Part 15 section 15.225 IC RSS-210 A2.6			
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

4.4.2 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).

4.5 Radiated Emissions Measurement

4.5.1 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 (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

4.5.2 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.

4.5.3 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 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

4.5.4 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.

4.5.5 Antenna Anti-Replacement Construction

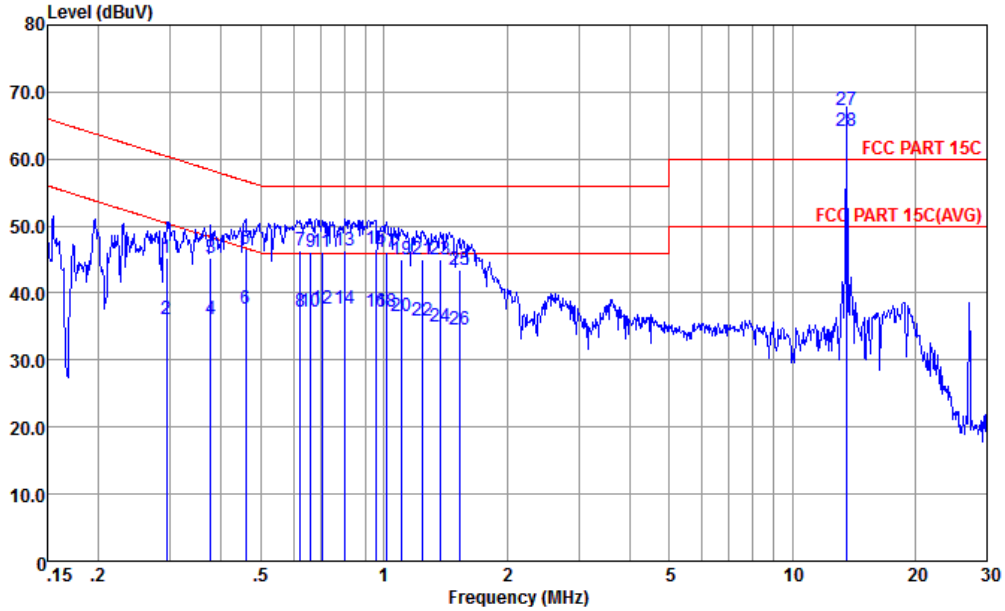
An embedded-in antenna design is used.

5. LIST OF MEASURING EQUIPMENT

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 24, 2015	Apr. 27, 2016~ May 10, 2016	Oct. 23, 2016	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 24, 2015	Apr. 27, 2016~ May 10, 2016	Oct. 23, 2016	Conducted (TH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	Apr. 29, 2016	May 11, 2016	Apr. 28, 2017	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 24, 2015	May 11, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 24, 2015	May 11, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000 811	AC 0V~300V, 45Hz~1000Hz	Oct. 24, 2015	May 11, 2016	Oct. 23, 2016	Conduction (CO01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	May 04, 2016	Sep. 09, 2016	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 07, 2015	May 04, 2016	Nov. 06, 2016	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	37879	30MHz~2GHz	Sep. 12, 2015	May 04, 2016	Sep. 11, 2016	Radiation (03CH02-KS)
Amplifier	com-power	PA-103A	161069	1kHz~1000MHz / 32 dB	Apr. 22, 2016	May 04, 2016	Apr. 21, 2017	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	6160100024 73	N/A	NCR	May 04, 2016	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	May 04, 2016	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	May 04, 2016	NCR	Radiation (03CH02-KS)

Appendix A. Test Results of Conducted Emission Test

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

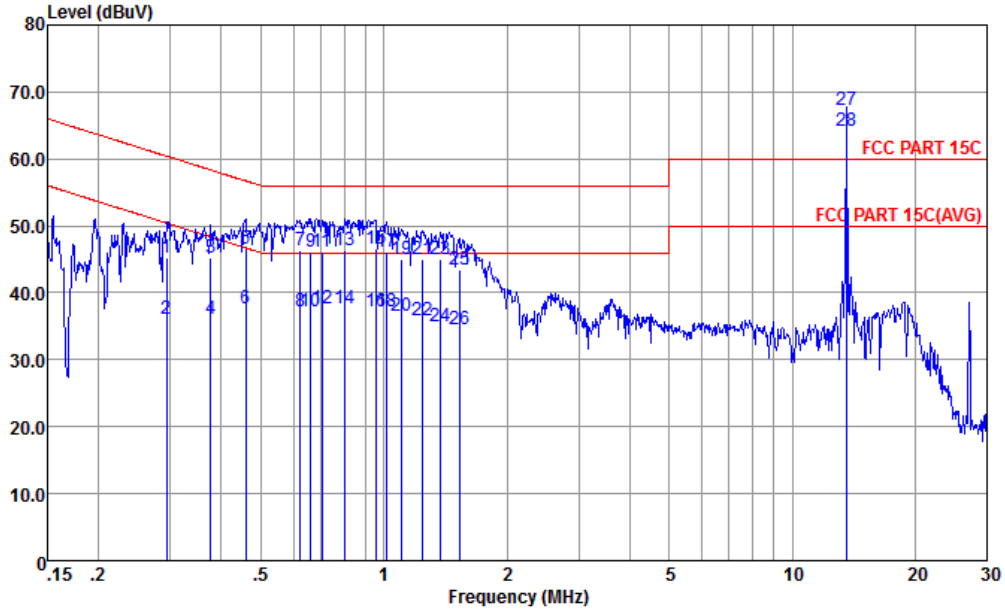


Site : CO01-KS
Condition : FCC PART 15C LISN-L-20151024 LINE

IMEI : 123456789012345

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.29	45.27	-15.14	60.41	34.90	0.22	10.15	QP
2	0.29	36.07	-14.34	50.41	25.70	0.22	10.15	Average
3	0.38	45.20	-13.14	58.34	34.80	0.23	10.17	QP
4	0.38	36.20	-12.14	48.34	25.80	0.23	10.17	Average
5	0.46	46.60	-10.11	56.71	36.20	0.23	10.17	QP
6	0.46	37.60	-9.11	46.71	27.20	0.23	10.17	Average
7	0.62	46.29	-9.71	56.00	35.89	0.24	10.16	QP
8	0.62	37.29	-8.71	46.00	26.89	0.24	10.16	Average
9	0.66	46.19	-9.81	56.00	35.80	0.24	10.15	QP
10	0.66	37.19	-8.81	46.00	26.80	0.24	10.15	Average
11	0.70	46.19	-9.81	56.00	35.80	0.24	10.15	QP
12	0.70	37.69	-8.31	46.00	27.30	0.24	10.15	Average
13	0.80	46.29	-9.71	56.00	35.90	0.24	10.15	QP
14	0.80	37.59	-8.41	46.00	27.20	0.24	10.15	Average
15	0.95	46.49	-9.51	56.00	36.10	0.25	10.14	QP
16	0.95	37.19	-8.81	46.00	26.80	0.25	10.14	Average
17	1.02	46.18	-9.82	56.00	35.79	0.25	10.14	QP

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

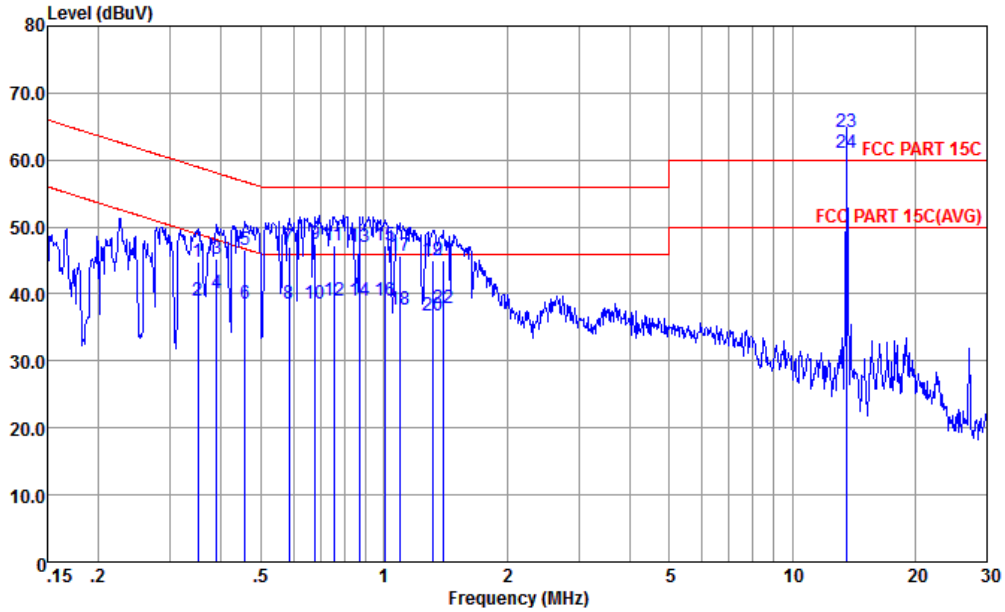


Site : CO01-KS
Condition : FCC PART 15C LISN-L-20151024 LINE

IMEI : 123456789012345

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18		1.02	37.28	-8.72	46.00	26.89	0.25	10.14	Average
19		1.11	45.08	-10.92	56.00	34.70	0.24	10.14	QP
20		1.11	36.58	-9.42	46.00	26.20	0.24	10.14	Average
21		1.24	44.97	-11.03	56.00	34.60	0.23	10.14	QP
22		1.24	35.77	-10.23	46.00	25.40	0.23	10.14	Average
23		1.37	44.96	-11.04	56.00	34.60	0.22	10.14	QP
24		1.37	35.06	-10.94	46.00	24.70	0.22	10.14	Average
25		1.53	43.55	-12.45	56.00	33.20	0.21	10.14	QP
26		1.53	34.55	-11.45	46.00	24.20	0.21	10.14	Average
27	*	13.56	67.21	7.21	60.00	56.60	0.26	10.35	QP
28	*	13.56	64.11	14.11	50.00	53.50	0.26	10.35	Average

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

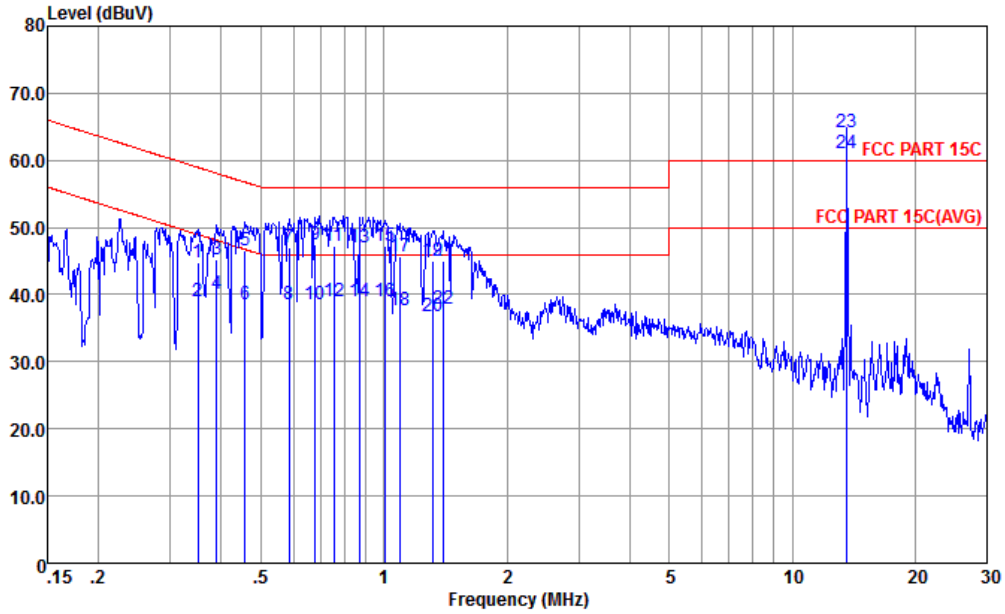


Site : CO01-KS
Condition : FCC PART 15C LISN-N-20151024 NEUTRAL

IMEI : 123456789012345

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.35	44.88	-14.08	58.96	34.40	0.32	10.16	QP
2	0.35	39.08	-9.88	48.96	28.60	0.32	10.16	Average
3	0.39	45.19	-12.89	58.08	34.70	0.32	10.17	QP
4	0.39	40.19	-7.89	48.08	29.70	0.32	10.17	Average
5	0.46	46.59	-10.17	56.76	36.10	0.32	10.17	QP
6	0.46	38.49	-8.27	46.76	28.00	0.32	10.17	Average
7	0.59	46.99	-9.01	56.00	36.50	0.33	10.16	QP
8	0.59	38.59	-7.41	46.00	28.10	0.33	10.16	Average
9	0.68	47.39	-8.61	56.00	36.90	0.34	10.15	QP
10	0.68	38.59	-7.41	46.00	28.10	0.34	10.15	Average
11	0.75	47.30	-8.70	56.00	36.80	0.35	10.15	QP
12	0.75	39.10	-6.90	46.00	28.60	0.35	10.15	Average
13	0.87	47.10	-8.90	56.00	36.60	0.36	10.14	QP
14	0.87	39.00	-7.00	46.00	28.50	0.36	10.14	Average
15	1.01	47.31	-8.69	56.00	36.80	0.37	10.14	QP
16	1.01	39.11	-6.89	46.00	28.60	0.37	10.14	Average
17	1.09	45.71	-10.29	56.00	35.20	0.37	10.14	QP

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



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Condition : FCC PART 15C LISN-N-20151024 NEUTRAL

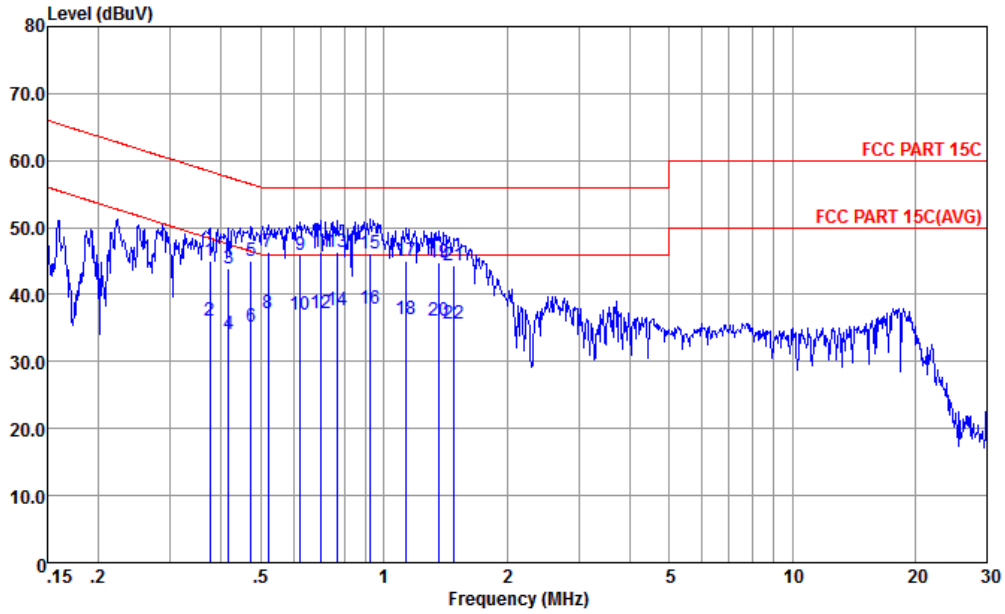
IMEI : 123456789012345

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18		1.09	37.71	-8.29	46.00	27.20	0.37	10.14	Average
19		1.32	44.91	-11.09	56.00	34.40	0.37	10.14	QP
20		1.32	36.71	-9.29	46.00	26.20	0.37	10.14	Average
21		1.40	45.01	-10.99	56.00	34.50	0.37	10.14	QP
22		1.40	37.81	-8.19	46.00	27.30	0.37	10.14	Average
23	*	13.56	64.22	4.22	60.00	53.60	0.27	10.35	QP
24	*	13.56	61.12	11.12	50.00	50.50	0.27	10.35	Average

(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 + USB Cable (Charging from Adapter) + Earphone + NFC Tx		

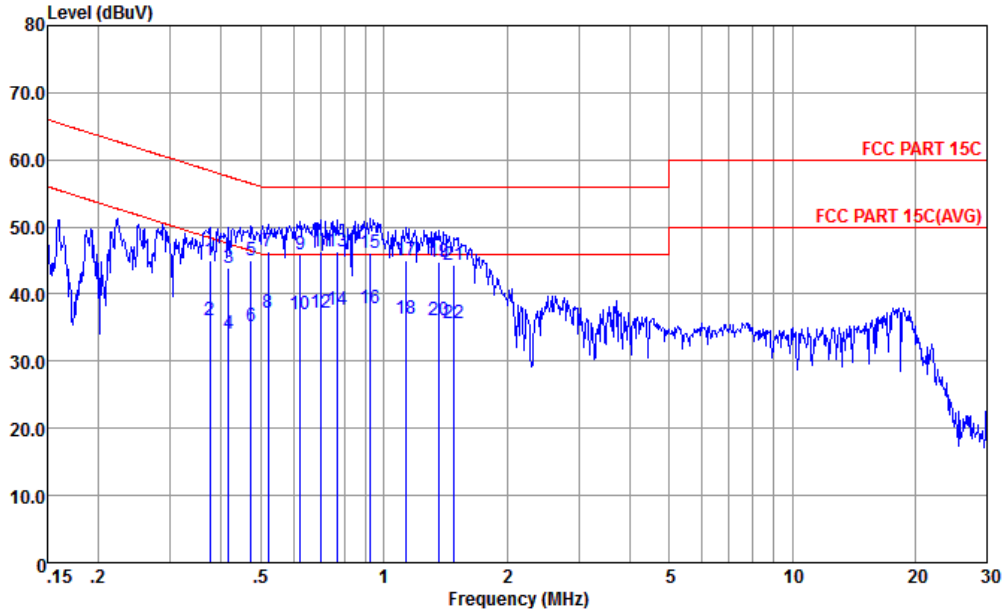


Site : CO01-KS
Condition : FCC PART 15C LISN-L-20151024 LINE

IMEI : 123456789012345

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.38	45.00	-13.39	58.39	34.60	0.23	10.17	QP
2	0.38	36.10	-12.29	48.39	25.70	0.23	10.17	Average
3	0.42	43.90	-13.61	57.51	33.50	0.23	10.17	QP
4	0.42	34.20	-13.31	47.51	23.80	0.23	10.17	Average
5	0.47	44.99	-11.46	56.45	34.60	0.23	10.16	QP
6	0.47	35.19	-11.26	46.45	24.80	0.23	10.16	Average
7	0.52	46.29	-9.71	56.00	35.90	0.23	10.16	QP
8	0.52	37.19	-8.81	46.00	26.80	0.23	10.16	Average
9	0.62	45.99	-10.01	56.00	35.59	0.24	10.16	QP
10	0.62	36.89	-9.11	46.00	26.49	0.24	10.16	Average
11	0.70	46.29	-9.71	56.00	35.90	0.24	10.15	QP
12	0.70	37.19	-8.81	46.00	26.80	0.24	10.15	Average
13	0.77	46.29	-9.71	56.00	35.90	0.24	10.15	QP
14	0.77	37.59	-8.41	46.00	27.20	0.24	10.15	Average
15	0.93	46.19	-9.81	56.00	35.80	0.25	10.14	QP
16 *	0.93	37.79	-8.21	46.00	27.40	0.25	10.14	Average

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

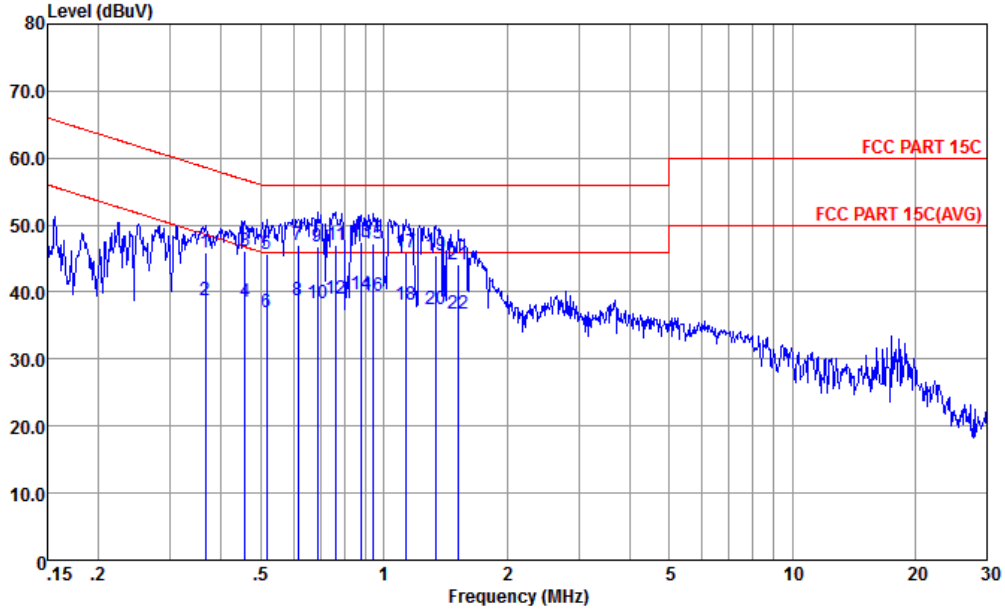


Site : CO01-KS
Condition : FCC PART 15C LISN-L-20151024 LINE

IMEI : 123456789012345

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
17	1.14	45.07	-10.93	56.00	34.69	0.24	10.14	QP
18	1.14	36.27	-9.73	46.00	25.89	0.24	10.14	Average
19	1.37	44.86	-11.14	56.00	34.50	0.22	10.14	QP
20	1.37	36.06	-9.94	46.00	25.70	0.22	10.14	Average
21	1.49	44.25	-11.75	56.00	33.90	0.21	10.14	QP
22	1.49	35.55	-10.45	46.00	25.20	0.21	10.14	Average

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

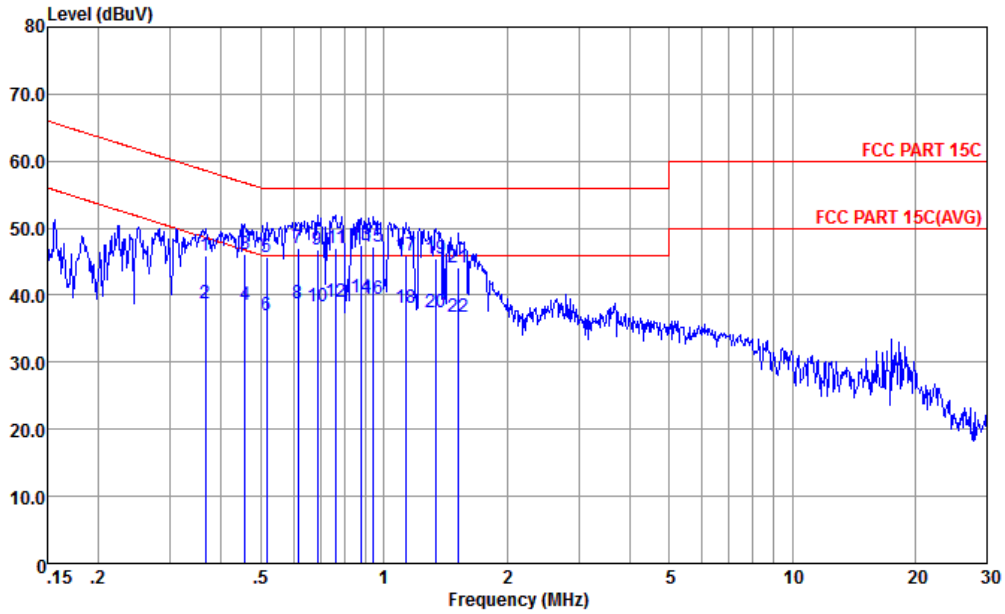


Site : CO01-KS
Condition : FCC PART 15C LISN-N-20151024 NEUTRAL

IMEI : 123456789012345

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.37	45.88	-12.73	58.61	35.40	0.32	10.16	QP
2		0.37	38.88	-9.73	48.61	28.40	0.32	10.16	Average
3		0.46	46.19	-10.57	56.76	35.70	0.32	10.17	QP
4		0.46	38.59	-8.17	46.76	28.10	0.32	10.17	Average
5		0.52	45.69	-10.31	56.00	35.21	0.32	10.16	QP
6		0.52	37.04	-8.96	46.00	26.56	0.32	10.16	Average
7		0.62	46.99	-9.01	56.00	36.50	0.33	10.16	QP
8		0.62	38.69	-7.31	46.00	28.20	0.33	10.16	Average
9		0.69	46.69	-9.31	56.00	36.20	0.34	10.15	QP
10		0.69	38.39	-7.61	46.00	27.90	0.34	10.15	Average
11		0.76	47.09	-8.91	56.00	36.59	0.35	10.15	QP
12		0.76	39.09	-6.91	46.00	28.59	0.35	10.15	Average
13		0.88	47.40	-8.60	56.00	36.90	0.36	10.14	QP
14	*	0.88	39.60	-6.40	46.00	29.10	0.36	10.14	Average
15		0.94	47.30	-8.70	56.00	36.80	0.36	10.14	QP
16		0.94	39.40	-6.60	46.00	28.90	0.36	10.14	Average

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



Site : CO01-KS
Condition : FCC PART 15C LISN-N-20151024 NEUTRAL

IMEI : 123456789012345

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
17	1.13	45.91	-10.09	56.00	35.40	0.37	10.14	QP
18	1.13	38.11	-7.89	46.00	27.60	0.37	10.14	Average
19	1.34	45.41	-10.59	56.00	34.90	0.37	10.14	QP
20	1.34	37.41	-8.59	46.00	26.90	0.37	10.14	Average
21	1.52	44.02	-11.98	56.00	33.50	0.38	10.14	QP
22	1.52	36.82	-9.18	46.00	26.30	0.38	10.14	Average

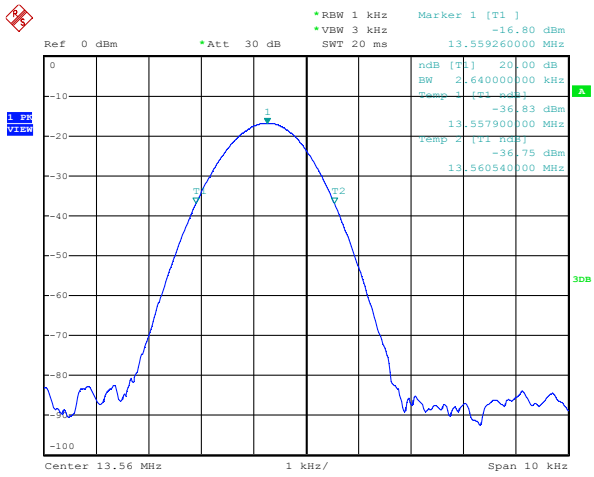
(1) with dummy load

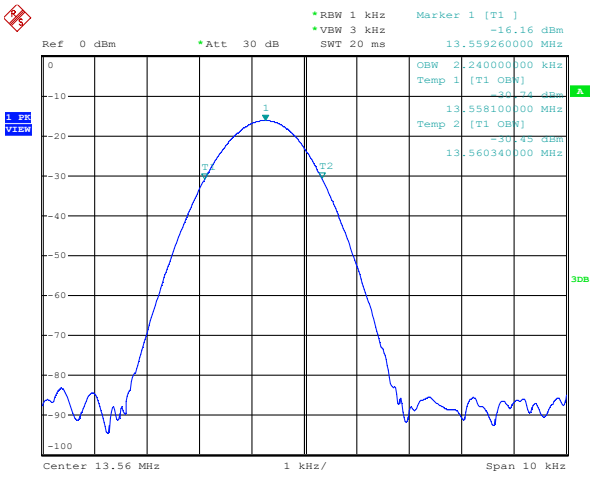
Remark: Only the fundamental NFC signal needs to be retested per C63.4.

Appendix B. Test Results of Conducted Test Items

B.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**	13.55790	**Test Result**
	f_H < 13.567	13.56054	**Complies**

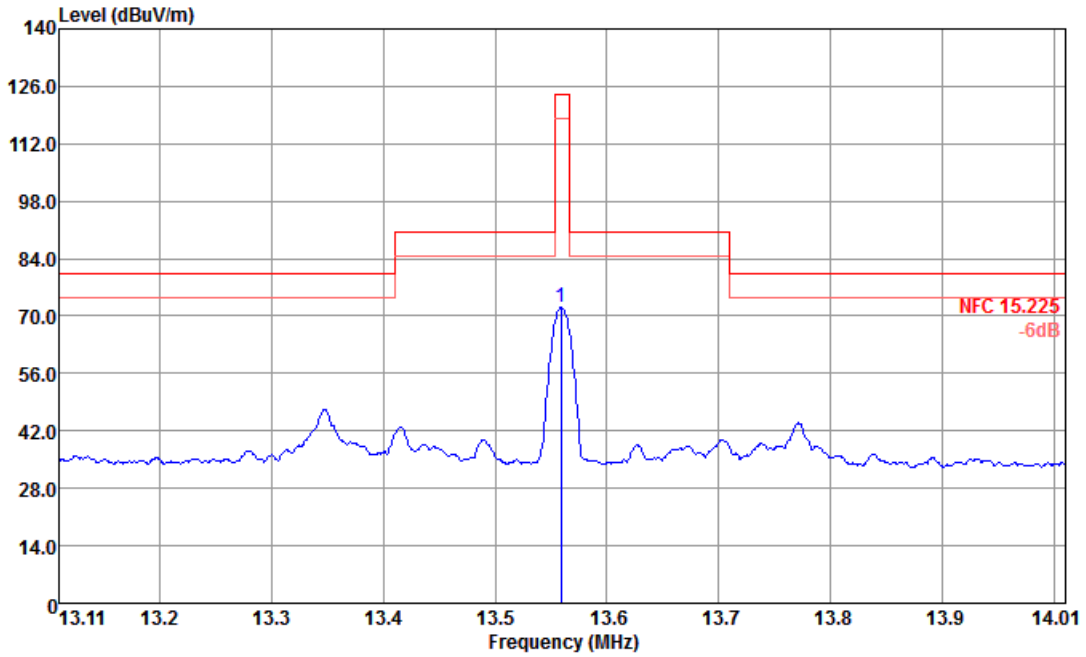
B.2 Test Result of Frequency Stability

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (℃)	Measurement Frequency (MHz)
120	13.559220	-20	13.559220
102	13.559220	-10	13.559220
138	13.559220	0	13.559220
		10	13.559220
		20	13.559220
		30	13.559220
		40	13.559220
		50	13.559220
Max.Deviation (MHz)	-0.000780	**Max.Deviation (MHz)**	-0.000780
Max.Deviation (ppm)	-57.5221	**Max.Deviation (ppm)**	-57.5221
Limit	**FS < ±100 ppm**	**Limit**	**FS < ±100 ppm**
Test Result	**PASS**	**Test Result**	**PASS**

Appendix C. Test Results of Radiated Test Items

C.1 Test Result of Field Strength of Fundamental Emissions

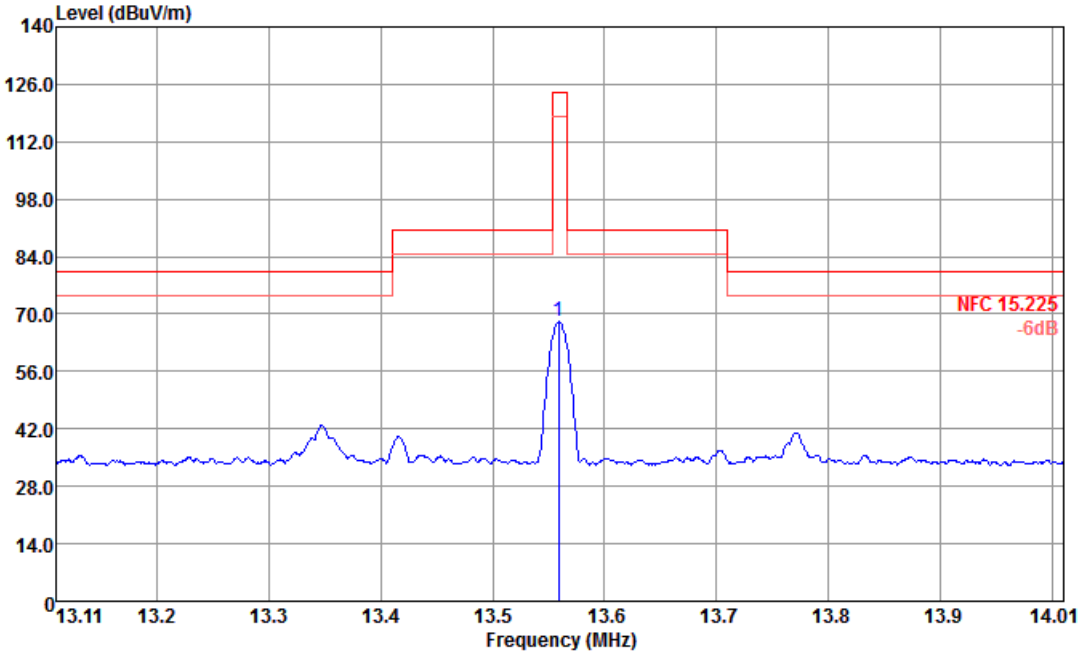
Test Mode :	NFC Tx	Test Frequency (MHz)	13.56



Site : 03CH02-KS
Condition : NFC 15.225 3m NFC ANT HORIZONTAL

IMEI : 357079070007821
: F Card

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg		
1	13.56	72.23	-51.77	124.00	52.17	19.90	0.16	---	---	QP	HORIZONTAL



Site : 03CH02-KS
Condition : NFC 15.225 3m NFC ANT VERTICAL

IMEI : 357079070007821
: F Card

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg		
1	13.56	68.18	-55.82	124.00	48.12	19.90	0.16	---	---	QP	VERTICAL

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

C.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
0.00999	50.91	-76.71	127.62	30.3	20.6	0.01	-	-	Average
0.06554	33.75	-77.51	111.26	13.39	20.35	0.01	-	-	Average
0.43675	43.75	-51.03	94.78	23.54	20.2	0.01	-	-	Average
4.058	51.68	-17.86	69.54	31.84	19.79	0.05	-	-	QP
11.894	46.81	-22.73	69.54	26.68	19.99	0.14	-	-	QP
24.522	45.16	-24.38	69.54	24.64	20.24	0.28	-	-	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
0.00971	50.47	-77.39	127.86	29.86	20.6	0.01	-	-	Average
0.07894	37.5	-72.15	109.65	17.14	20.35	0.01	-	-	Average
0.43675	56.32	-38.46	94.78	36.11	20.2	0.01	-	-	Average
4.64	46.86	-22.68	69.54	27.09	19.71	0.06	-	-	QP
11.674	43.74	-25.8	69.54	23.59	20.01	0.14	-	-	QP
24.61	46.63	-22.91	69.54	26.1	20.25	0.28	-	-	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.

C.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
30	34.39	-5.61	40	39.58	25.8	0.11	31.1	-	-	Peak
38.73	35.14	-4.86	40	42.82	23.1	0.12	30.9	100	195	Peak
53.28	31.76	-8.24	40	48	14.33	0.15	30.72	-	-	Peak
101.78	28.17	-15.33	43.5	40.03	18.3	0.24	30.4	-	-	Peak
411.21	24.76	-21.24	46	29.37	25.11	0.94	30.66	-	-	Peak
683.78	26.08	-19.92	46	29.03	26.29	1.13	30.37	-	-	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	33.89	-6.11	40	39.08	25.8	0.11	31.1	100	0	Peak
38.73	32.46	-7.54	40	40.14	23.1	0.12	30.9	-	-	Peak
47.46	33.17	-6.83	40	46.48	17.35	0.14	30.8	-	-	Peak
57.16	27.12	-12.88	40	44.31	13.3	0.16	30.65	-	-	Peak
101.78	30.17	-13.33	43.5	42.03	18.3	0.24	30.4	-	-	Peak
711.91	27.2	-18.8	46	29.74	26.66	1.22	30.42	-	-	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.