



Variant FCC RF Test Report

APPLICANT : ASUSTeK COMPUTER INC.
EQUIPMENT : ASUS Phone
BRAND NAME : ASUS
MODEL NAME : ASUS_Z00AD
FCC ID : MSQZ00AD
STANDARD : FCC Part 15 Subpart C §15.225
CLASSIFICATION : (DXX) Low Power Communication Device Transmitter

This is a variant report which is only valid together with the original test report. The testing was completed on Jul. 10, 2015. 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



SPORTON INTERNATIONAL INC.

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



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR520232-06D	Rev. 01	This is a variant report which can be referred to Product Equality Declaration. All the test cases were performed on original report which can be referred to Sporton Report Number FR520232D as appendix D. Based on the original report, the conducted emissions and radiated test cases were verified.	Jul. 27, 2015

**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	4.20 dB at 13.558MHz
3.2	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Complies	66.97 dB at 13.560 MHz
3.4	15.225(d) 15.209	Radiated Emissions	Complies	27.63 dB at 1.380 MHz
3.6	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.26dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±5.2dB	Confidence levels of 95%



1. GENERAL INFORMATION

1.1 Applicant

ASUSTeK COMPUTER INC.

4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

1.2 Manufacturer

QM (Shanghai) Technology Co., Ltd.

Building 7, No. 1-8, Alley 18, Sanzhuang Road, Songjiang Export Zone, Shanghai 201613, P.R. China

1.3 Product Details

Items	Description
Tx/Rx Frequency Range	13.553 ~ 13.567MHz
Sample 1	EUT with SKU1
Sample 2	EUT with SKU2
Sample 3	EUT with SKU3
Sample 4	EUT with SKU4
Sample 5	EUT with SKU5
Sample 6	EUT with SKU6
Sample 7	EUT with SKU7
Channel Number	1
Antenna Type	Loop 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.

SKU	SKU 1	SKU 2	SKU 3	SKU 4	SKU 5	SKU 6	SKU7
CPU	2.3GHz						
Memory	Samsung 2G	Hynix 4G					
EMMC	Hynix 16G	Sandisk 32G	Hynix 64 G	Hynix 32G	Samsung 64 G	Sandisk 64 G	
NFC	GEMALTO						MaxEcho
Front Camera	Liteon		Chicony				Chicony
Rear Camera	CHICONY		LITEON				
Battery	NVT	CPT	SMP				

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. TW1022 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.	
	CO05-HY	03CH07-HY
Test Engineer	Eric Jeng	James Chiu
Temperature	25~27	20~22
Relative Humidity	58~61	56~60

Note: The test site complies with ANSI C63.4 2009 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 C63.10-2009

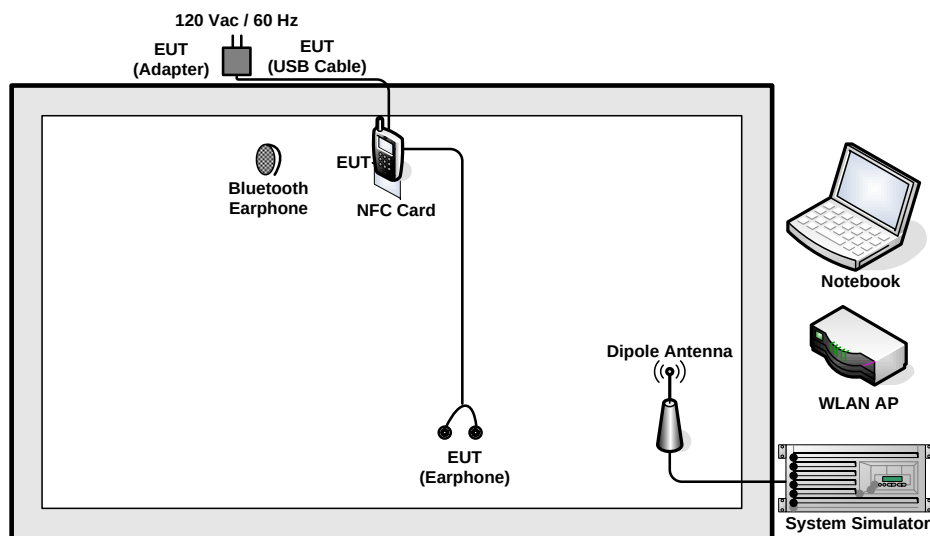
1.7 Test Modes

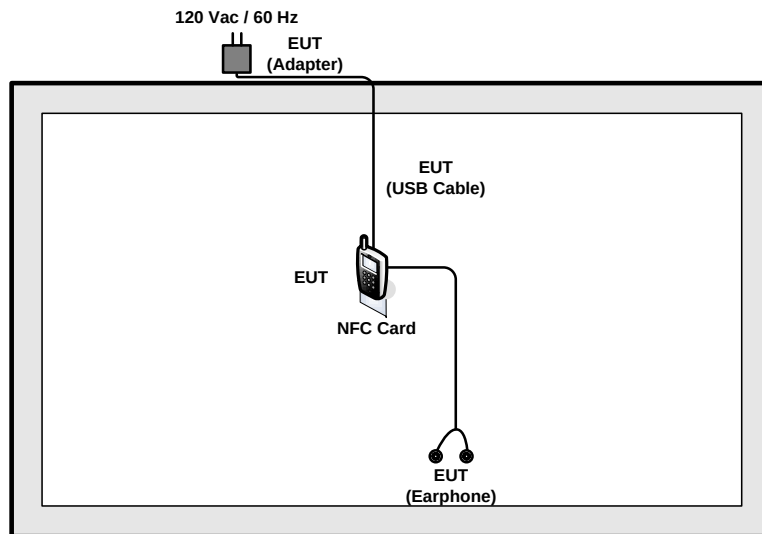
Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
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

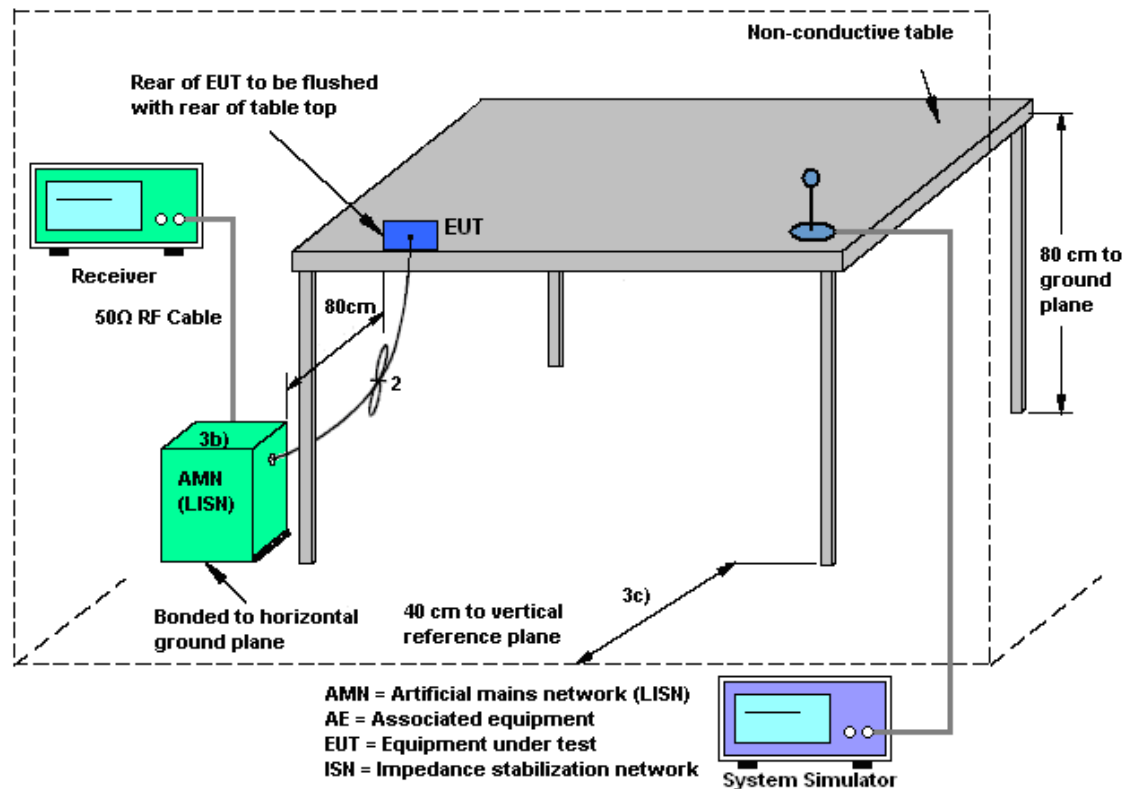
Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-865L	KA2IR865LA1	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
5.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
6.	NFC Card	Metro Taipei	Easy Card	N/A	N/A	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 B.

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.

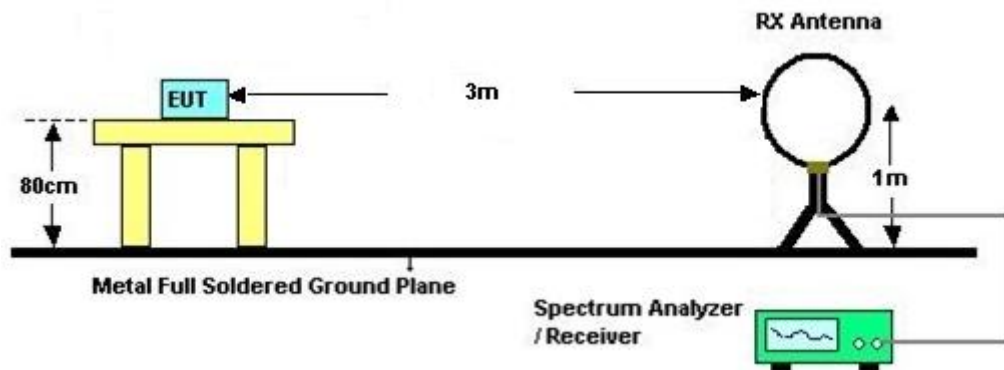
3. RADIATED TEST ITEMS

3.1 Measuring Instruments

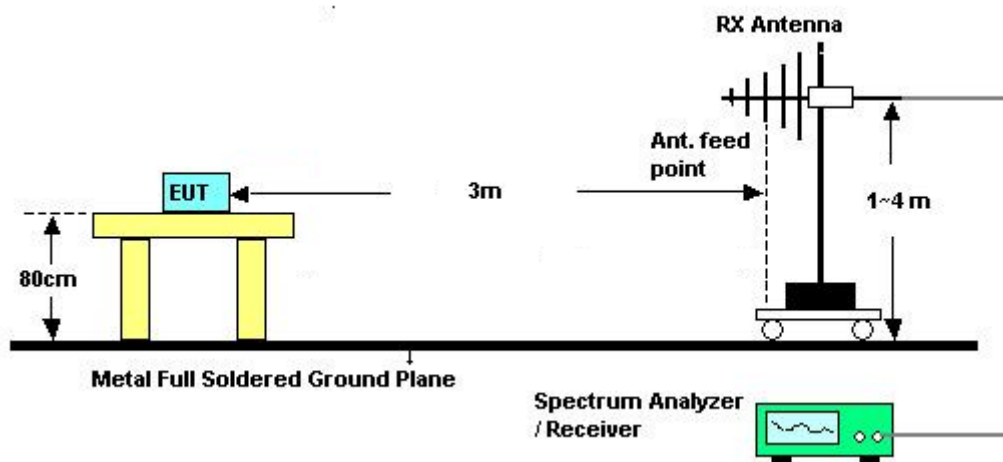
See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 For radiated emissions below 30MHz



3.2.2 For radiated emissions above 30MHz



3.3 Test Result of Radiated Test Items

Please refer to Appendix C.

3.4 Field Strength of Fundamental Emissions and Mask Measurement

3.4.1 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

3.4.2 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).

3.5 Radiated Emissions Measurement

3.5.1 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 ($\mu\text{V/m}$)	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 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.

3.5.3 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

3.5.4 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.

3.5.5 Antenna Anti-Replacement Construction

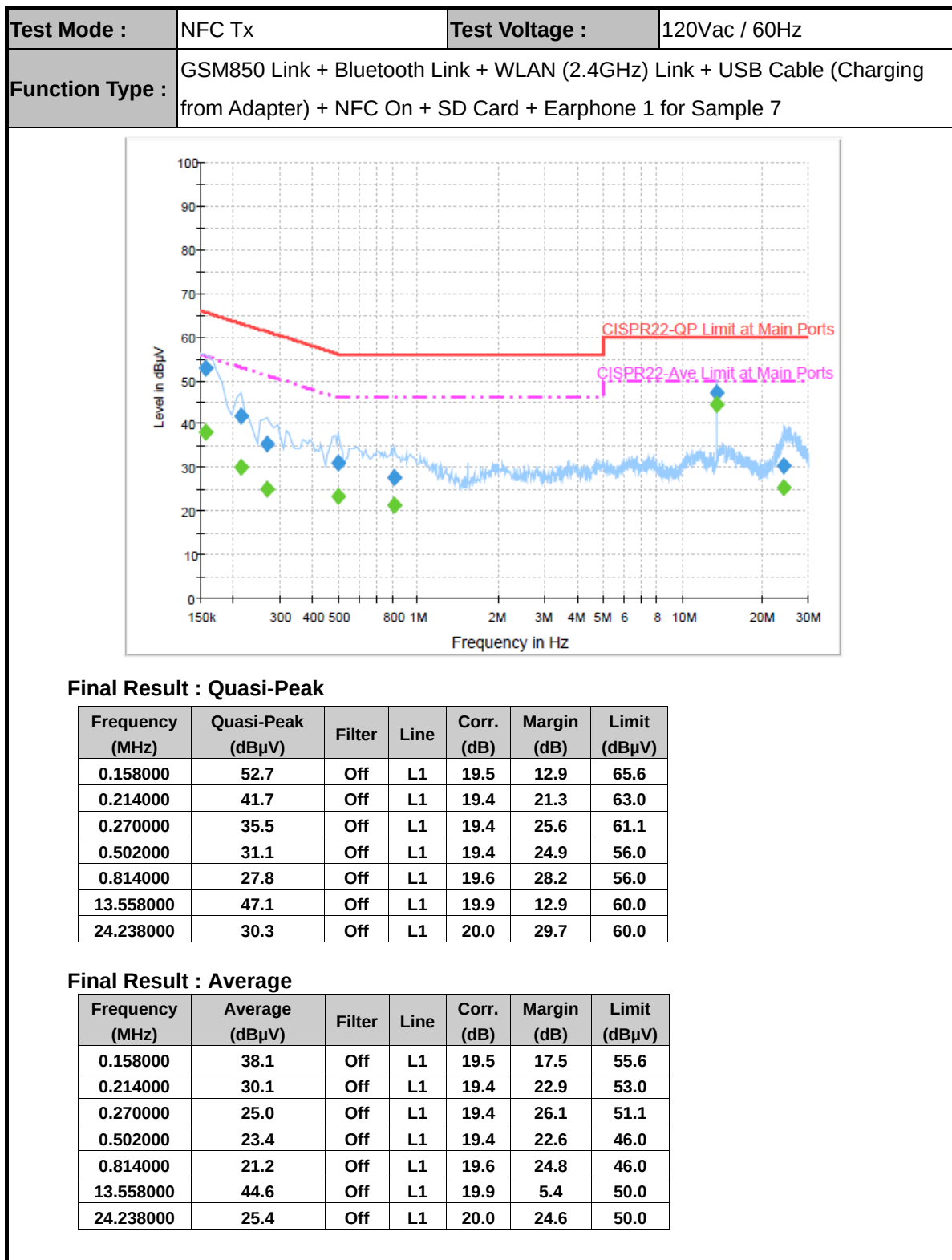
An embedded-in antenna design is used.



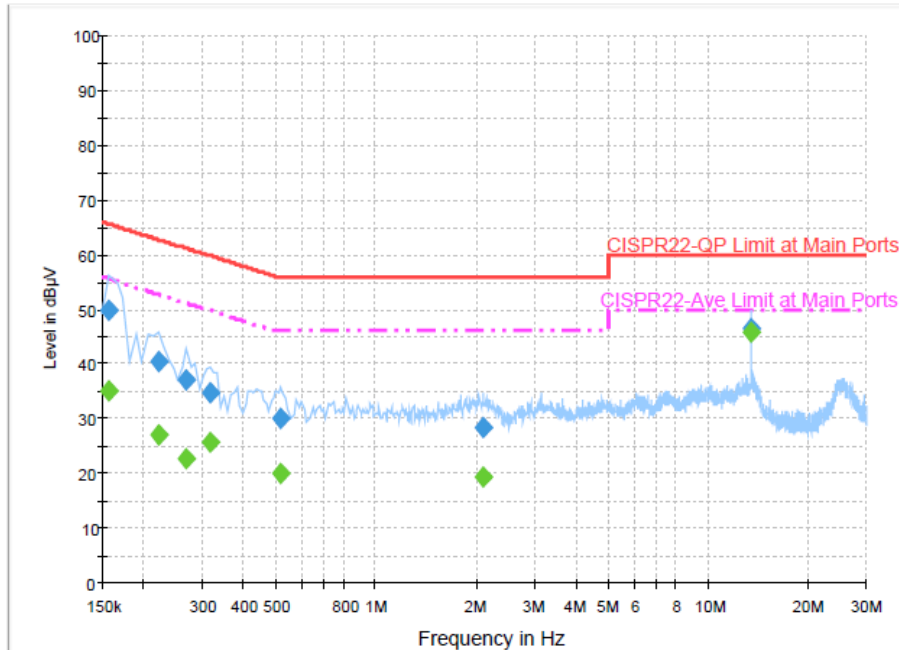
4. LIST OF MEASURING EQUIPMENT

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz – 2.75GHz	Dec. 01, 2014	Jul. 09, 2015	Nov. 30, 2015	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 02, 2014	Jul. 09, 2015	Dec. 01, 2015	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jul. 09, 2015	N/A	Conduction (CO05-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Sep. 27, 2014	Jul. 09, 2015 ~ Jul. 10, 2015	Sep. 26, 2015	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jul. 28, 2014	Jul. 09, 2015 ~ Jul. 10, 2015	Jul. 27, 2015	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz-1000MHz	Mar. 12, 2015	Jul. 09, 2015 ~ Jul. 10, 2015	Mar. 11, 2016	Radiation (03CH07-HY)
Signal Analyzer	Rohde & Schwarz	FSV 30	101749	10Hz~30GHz	Mar. 10, 2015	Jul. 09, 2015 ~ Jul. 10, 2015	Mar. 09, 2016	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Jul. 09, 2015 ~ Jul. 10, 2015	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 degree	N/A	Jul. 09, 2015 ~ Jul. 10, 2015	N/A	Radiation (03CH07-HY)

Appendix B. Test Results of Conducted Emission Test



Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Link + Bluetooth Link + WLAN (2.4GHz) Link + USB Cable (Charging from Adapter) + NFC On + SD Card + Earphone 1 for Sample 7		


Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	49.7	Off	N	19.5	15.9	65.6
0.222000	40.6	Off	N	19.4	22.1	62.7
0.270000	37.2	Off	N	19.4	23.9	61.1
0.318000	34.6	Off	N	19.5	25.2	59.8
0.518000	30.0	Off	N	19.4	26.0	56.0
2.110000	28.6	Off	N	19.7	27.4	56.0
13.558000	46.5	Off	N	20.0	13.5	60.0

Final Result : Average

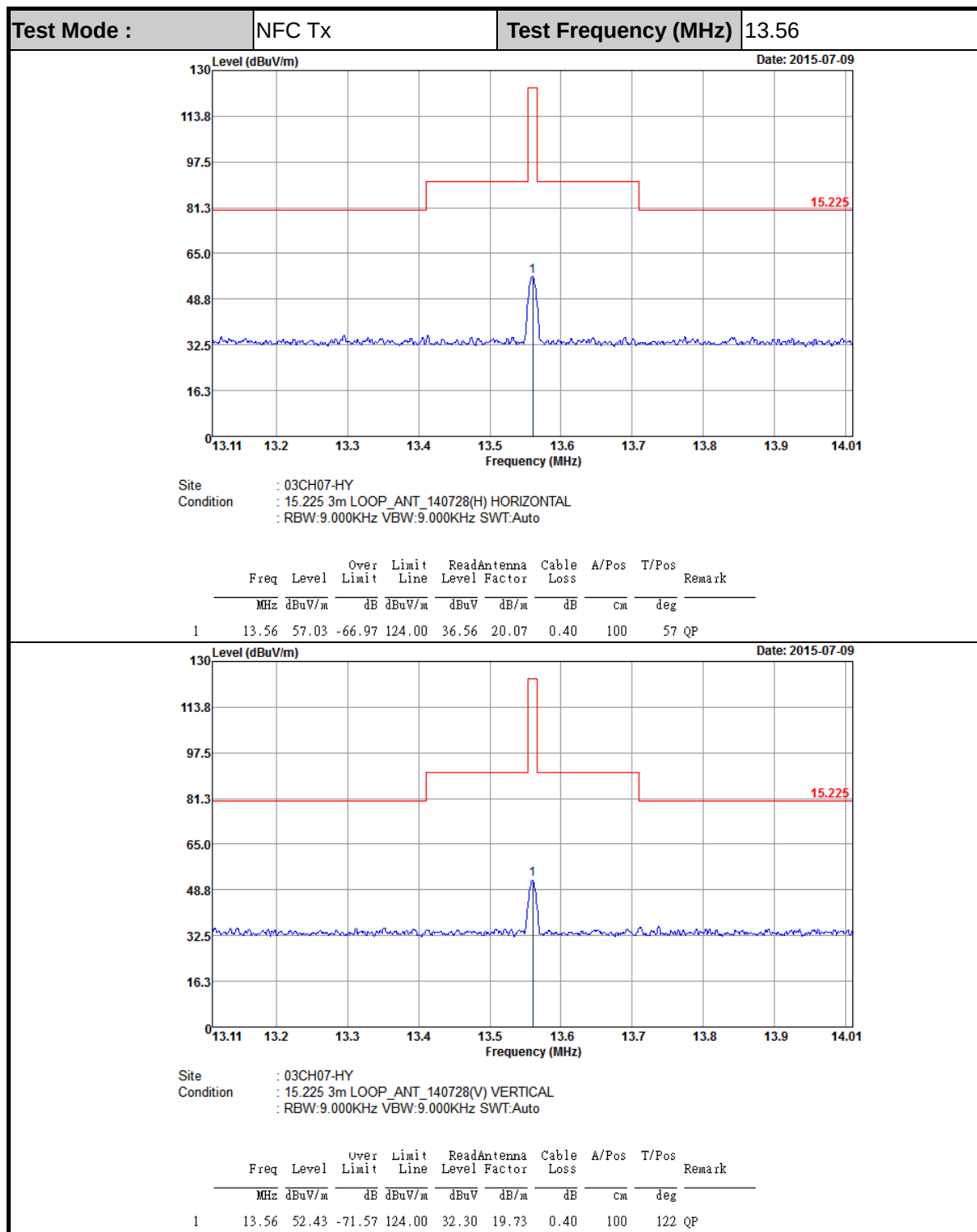
Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	35.0	Off	N	19.5	20.6	55.6
0.222000	27.0	Off	N	19.4	25.7	52.7
0.270000	22.8	Off	N	19.4	28.3	51.1
0.318000	25.8	Off	N	19.5	24.0	49.8
0.518000	20.1	Off	N	19.4	25.9	46.0
2.110000	19.6	Off	N	19.7	26.4	46.0
13.558000	45.8	Off	N	20.0	4.2	50.0

Remark: with antenna: 13.558MHz is the NFC RF fundamental signal.



Appendix C. Test Results of Radiated Test Items

C.1 Test Result of Field Strength of Fundamental Emissions

**Note:**

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



2. The tests were performed with USB Cable, Adapter, Earphone 1, and sample 7.

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
0.0167	25.99	-97.16	123.15	5.46	20.24	0.29	-	-	Average
0.06255	39.91	-71.77	111.68	19.61	20.01	0.29	-	-	Average
0.0994	21.13	-86.53	107.66	0.88	19.96	0.29	-	-	QP
0.12188	31.09	-74.8	105.89	10.86	19.94	0.29	-	-	Average
0.2605	43.79	-55.5	99.29	23.61	19.89	0.29	-	-	Average
0.49	38.71	-35.09	73.8	18.54	19.88	0.29	-	-	QP
11.32	37	-33	70	16.55	20.06	0.39	100	0	QP
13.56	56.94	-	-	36.47	20.07	0.4	-	-	QP
19.141	36.49	-33.51	70	15.73	20.33	0.43	-	-	QP
25.05	35.97	-34.03	70	14.86	20.66	0.45	-	-	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
0.05148	34.14	-79.23	113.37	13.82	20.03	0.29	-	-	Average
0.06855	21.78	-89.1	110.88	1.46	20.03	0.29	-	-	Average
0.10412	28.27	-78.98	107.25	7.99	19.99	0.29	-	-	QP
0.14644	22.55	-81.74	104.29	2.31	19.95	0.29	-	-	Average
0.26016	40.81	-58.49	99.3	20.6	19.92	0.29	-	-	Average
1.376	37.2	-27.63	64.83	16.96	19.93	0.31	100	0	QP
11.776	35.69	-34.31	70	15.49	19.8	0.4	-	-	QP
13.56	52.13	-	-	32	19.73	0.4	-	-	QP
18.835	37.34	-32.66	70	17.1	19.81	0.43	-	-	QP
29.12	35.72	-34.28	70	15.27	19.94	0.51	-	-	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 = $40 \log (\text{specific distance} / \text{test distance})$ (dB);
4. Limit line = specific limits (dBμV) + distance extrapolation factor.
5. The tests were performed with USB Cable, Adapter, Earphone 1, and sample 7.

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
58.35	17.46	-22.54	40	40.79	6.16	1.77	31.26	-	-	Peak
117.75	22.86	-20.64	43.5	40.36	11.24	2.38	31.12	-	-	Peak
208.74	19.45	-24.05	43.5	38.68	9.18	2.69	31.1	-	-	Peak
493.2	21.16	-24.84	46	30.12	17.94	3.77	30.67	-	-	Peak
629.7	23.89	-22.11	46	29.83	20.38	4.22	30.54	-	-	Peak
843.2	27.41	-18.59	46	29.87	23.23	4.7	30.39	100	0	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
65.91	28.52	-11.48	40	51.6	6.08	2.06	31.22	100	0	Peak
167.97	16.65	-26.85	43.5	35.42	9.74	2.61	31.12	-	-	Peak
208.74	18.52	-24.98	43.5	37.75	9.18	2.69	31.1	-	-	Peak
503.7	21.29	-24.71	46	29.99	18.03	3.89	30.62	-	-	Peak
736.8	26.29	-19.71	46	30.14	22.14	4.41	30.4	-	-	Peak
819.4	27.23	-18.77	46	30.45	22.5	4.62	30.34	-	-	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.
4. The tests were performed with USB Cable, Adapter, Earphone 1, and sample 7.



Appendix D. Original Report

Please refer to Sporton report number FR520232D as below.