



FCC RF Test Report

APPLICANT : Motorola Mobility, LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : 5137
FCC ID : IHDT56UC2
STANDARD : FCC Part 15 Subpart C §15.225
CLASSIFICATION : (DXX) Low Power Communication Device Transmitter

The testing was completed on May 17, 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.

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B.1. Test Result of 20dB Spectrum Bandwidth

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C.1 Test Result of Field Strength of Fundamental Emissions

C.2 Results of Radiated Emissions (9 kHz~30MHz)

C.3 Results of Radiated Emissions (30MHz~1GHz)



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	6.30 dB at 13.558MHz
3.2	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Complies	65.56 dB at 13.560 MHz
3.3	2.1049	20dB Spectrum Bandwidth	Complies	-
3.4	15.225(d) 15.209	Radiated Emissions	Complies	5.65 dB at 138.000 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	±2.26dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±4.70dB	Confidence levels of 95%



1. GENERAL INFORMATION

1.1 Applicant

Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

1.2 Manufacturer

Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
FCC Model Name	5137
FCC ID	IHDT56UC2
IMEI Code	355486060017458 355486060017680
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/NFC 2.4GHz WLAN 11b/g/n HT20 WLAN 11ac VHT20 5GHz WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth v3.0 EDR Bluetooth v4.1 - LE
HW Version	P2
EUT Stage	Identical Prototype



Accessory List	
AC Adapter 1	Brand Name : Motorola
	Model Name : SPN5791A
AC Adapter 2	Brand Name : Motorola
	Model Name : SPN5864A
AC Adapter 3	Brand Name : Motorola
	Model Name : SPN5886A
Battery	Brand Name : Motorola
	Model Name : FX30
USB Cable	Brand Name : Motorola
	Model Name : SKN6461A
Earphone	Brand Name : Motorola
	Model Name : SJYN1305A

1.4 Product Details

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

1.5 Modification of EUT

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



1.6 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.		
	TH02-HY	CO05-HY	03CH07-HY
Test Engineer	Danny Chen	Eric Jeng	Nick Yu and James Chiu
Temperature	22~24°C	22~24°C	20~23°C
Relative Humidity	53~55%	49~51%	50~55%

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

1.7 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

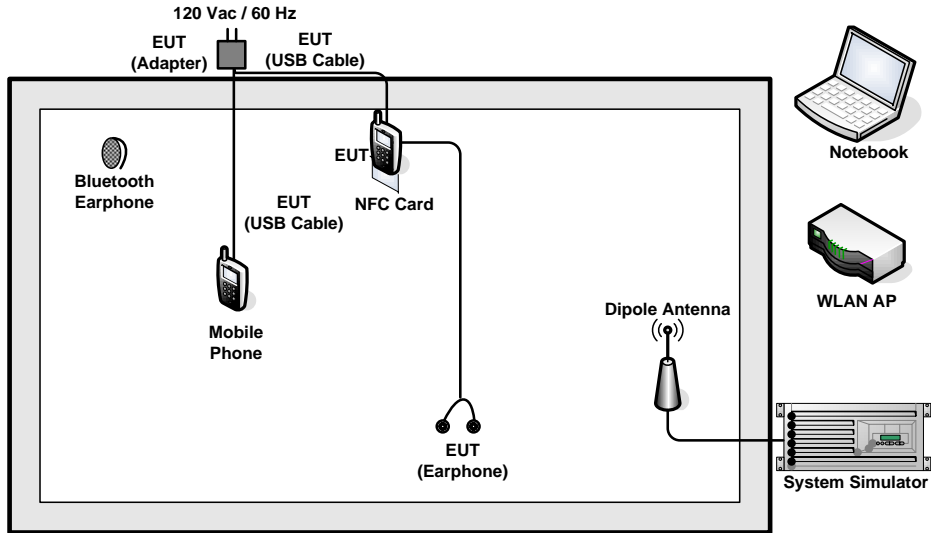
1.8 Test Modes

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.

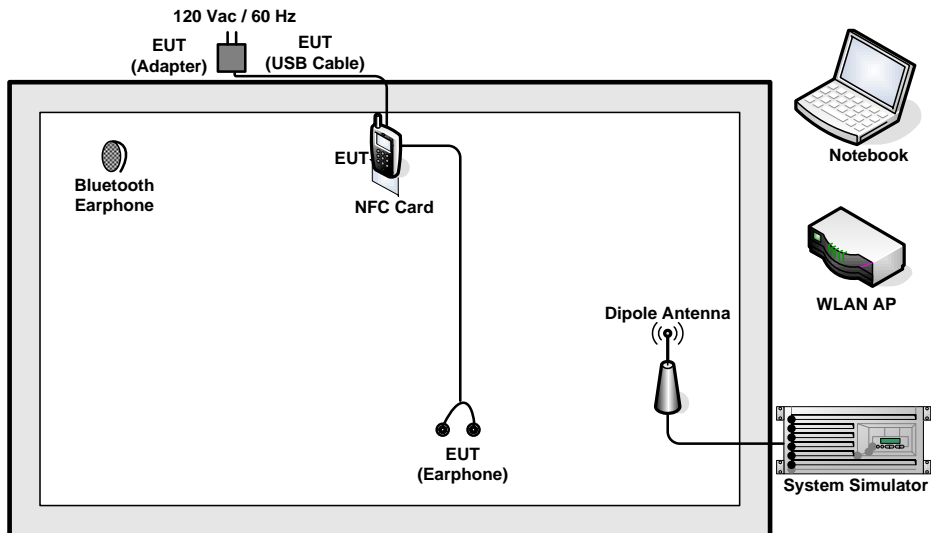
Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz
Note:	
1. The EUT was programmed to be in continuously transmitting mode.	
2. The ancillary equipment, NFC card,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

1.9 Test Configurations

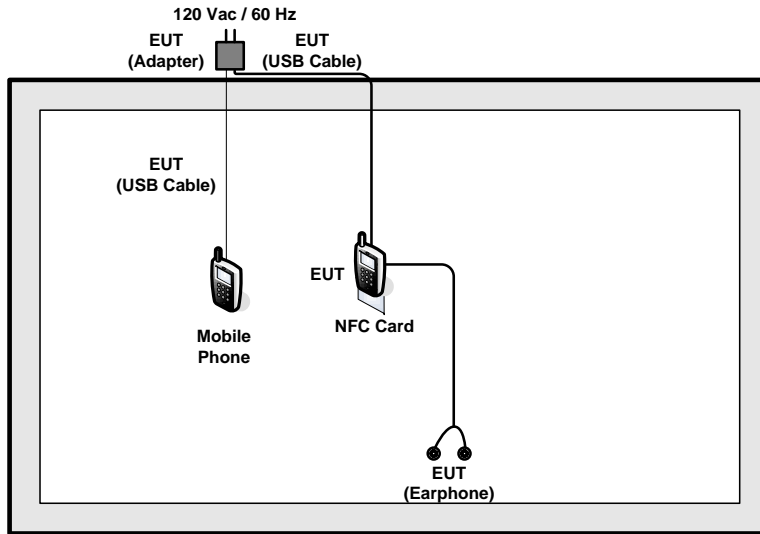
<AC Conducted Emissions for Adapter 1>



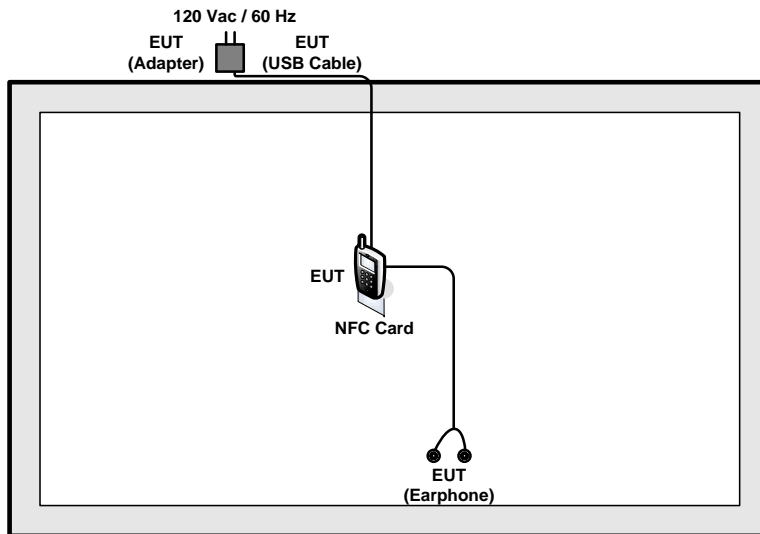
<AC Conducted Emissions for Adapter 2 and 3>



< For Fundamental Emissions and Mask and Radiated Emissions Measurement for Adapter 1 >



<For Fundamental Emissions and Mask and Radiated Emissions Measurement for Adapter 2 and 3>





1.10 Table for Supporting Units

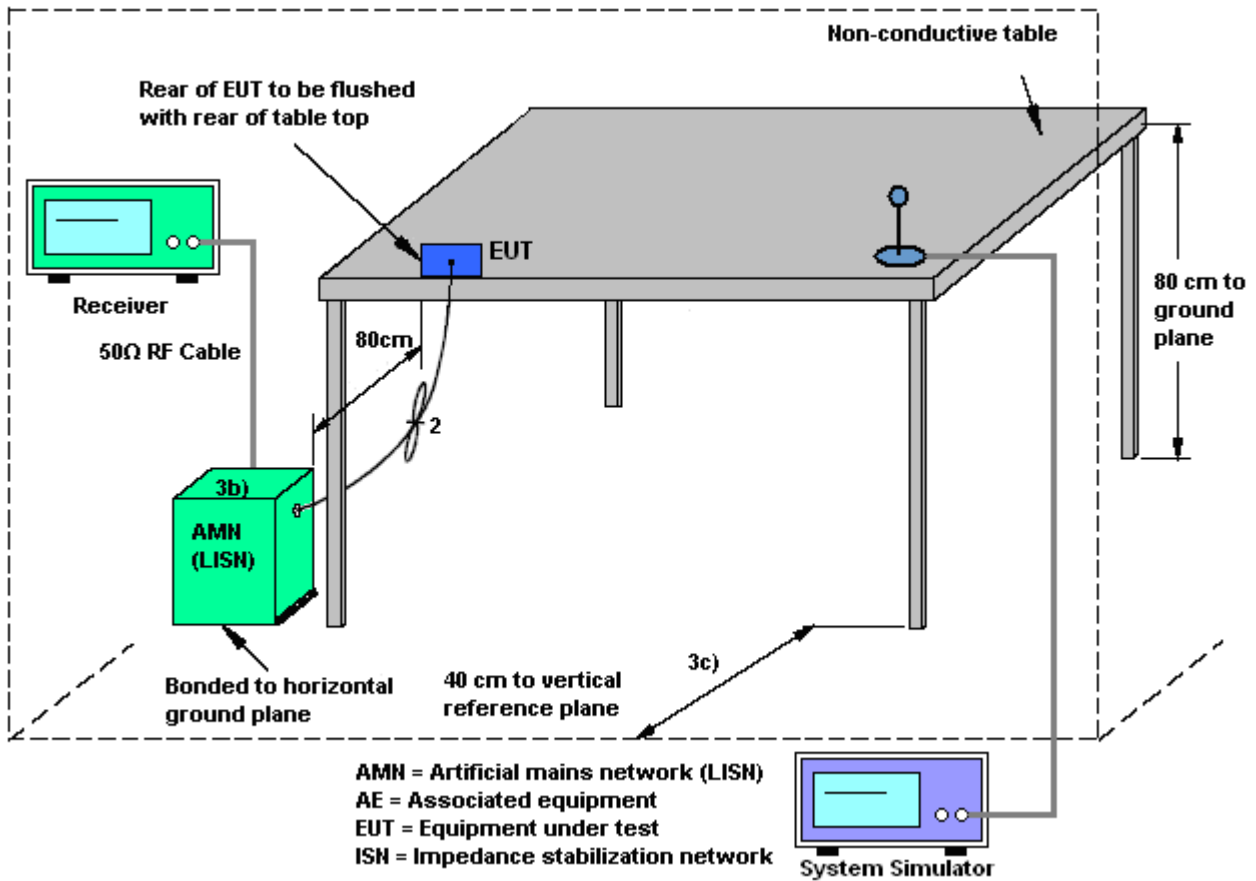
Support Unit	Manufacturer	Model	FCC ID
System Simulator	Anritsu	MT8820C	N/A
WLAN AP	D-Link	DIR-865L	KA2IR865LA1
Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054
Bluetooth Earphone	Sony Ericsson	MW600	PY70DA2029
SD Card	SanDisk	16G	FCC DoC
NFC Card	Metro Taipei	Easy Card	N/A
Mobile Cellular Phone	Motorola Mobility, LLC	5137	IHDT56UC2

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 (dB μ V)	
	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.

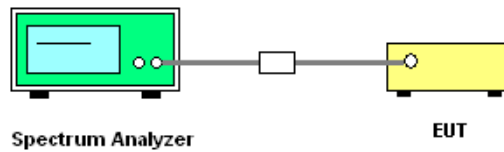
3. CONDUCTED TEST ITEMS

3.1 Measuring Instruments

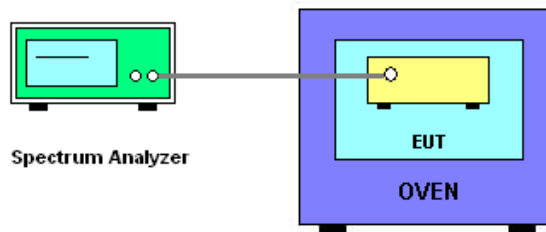
See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 20dB Spectrum Bandwidth



3.2.2 Frequency Stability



3.3 Test Result of Conducted Test Items

Please refer to Appendix C.



3.4 20dB Spectrum Bandwidth Measurement

3.4.1 Limit

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

3.4.2 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.

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 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 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.

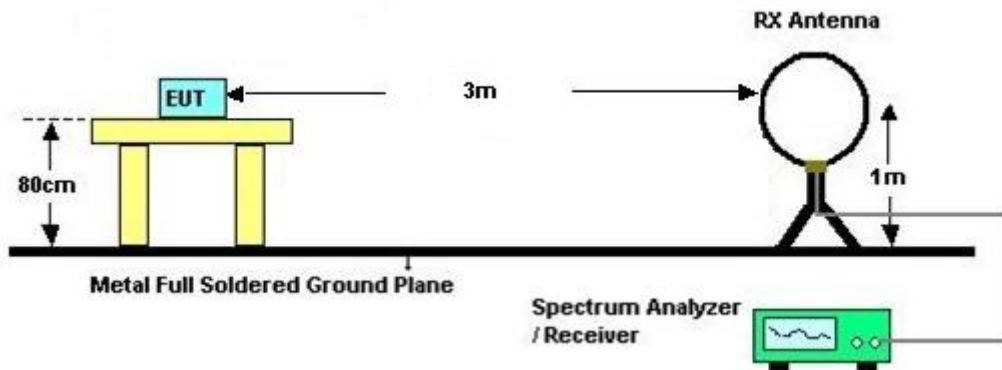
4. RADIATED TEST ITEMS

4.1 Measuring Instruments

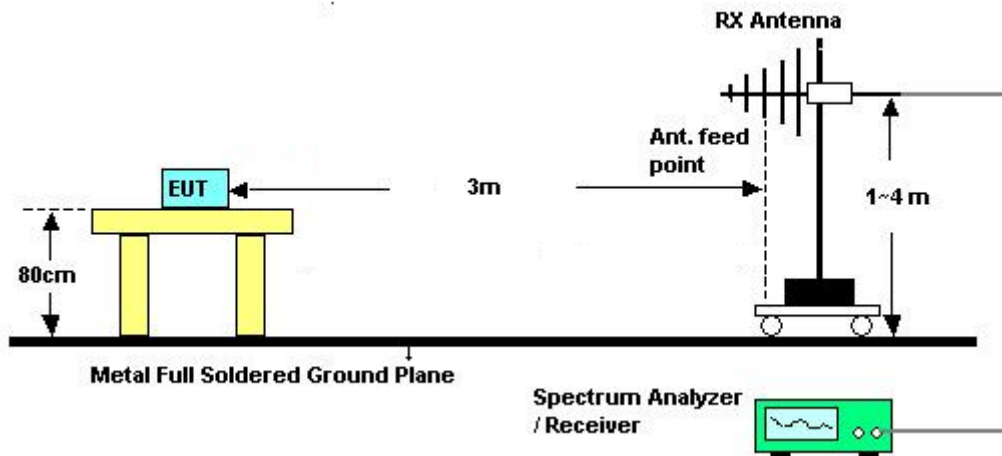
See list of measuring instruments of this test report.

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 D.



4.4 Field Strength of Fundamental Emissions and Mask Measurement

4.4.1 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

4.4.2 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).



4.5 Radiated Emissions Measurement

4.5.1 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

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 C63.4. 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

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.

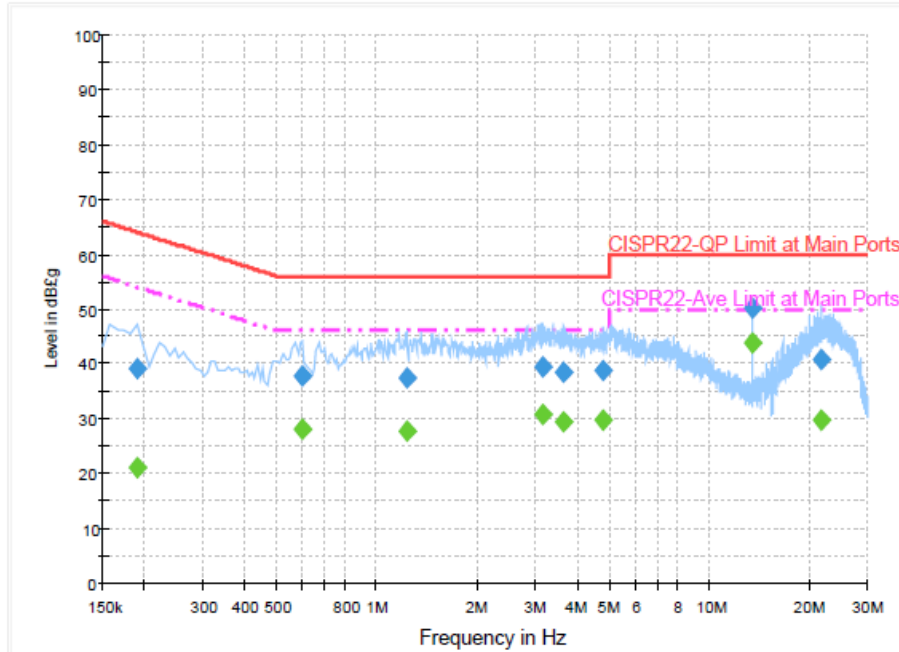


5. LIST OF MEASURING EQUIPMENT

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	Apr. 17, 2015	Jun. 08, 2015	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 17, 2014	Apr. 17, 2015	Jul. 16, 2015	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Dec. 01, 2014	Apr. 21, 2015 ~ May 17, 2015	Nov. 30, 2015	Conduction (CO05-HY)
LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 08, 2014	Apr. 21, 2015 ~ May 17, 2015	Dec. 07, 2015	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 02, 2014	Apr. 21, 2015 ~ May 17, 2015	Dec. 01, 2015	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Apr. 21, 2015 ~ May 17, 2015	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9 kHz~7 GHz	Aug. 30, 2014	Apr. 20, 2015 ~ May 17, 2015	Aug. 29, 2015	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	100315	9 kHz~30 MHz	Jul. 28, 2014	Apr. 20, 2015 ~ May 17, 2015	Jul. 27, 2015	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Sep. 27, 2014	Apr. 20, 2015 ~ May 17, 2015	Sep. 26, 2015	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10 MHz ~ 1000MHz	Mar. 12, 2015	Apr. 20, 2015 ~ May 17, 2015	Mar. 11, 2016	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Apr. 20, 2015 ~ May 17, 2015	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Apr. 20, 2015 ~ May 17, 2015	N/A	Radiation (03CH07-HY)

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 1) + NFC Tx		



Final Result : Quasi-Peak

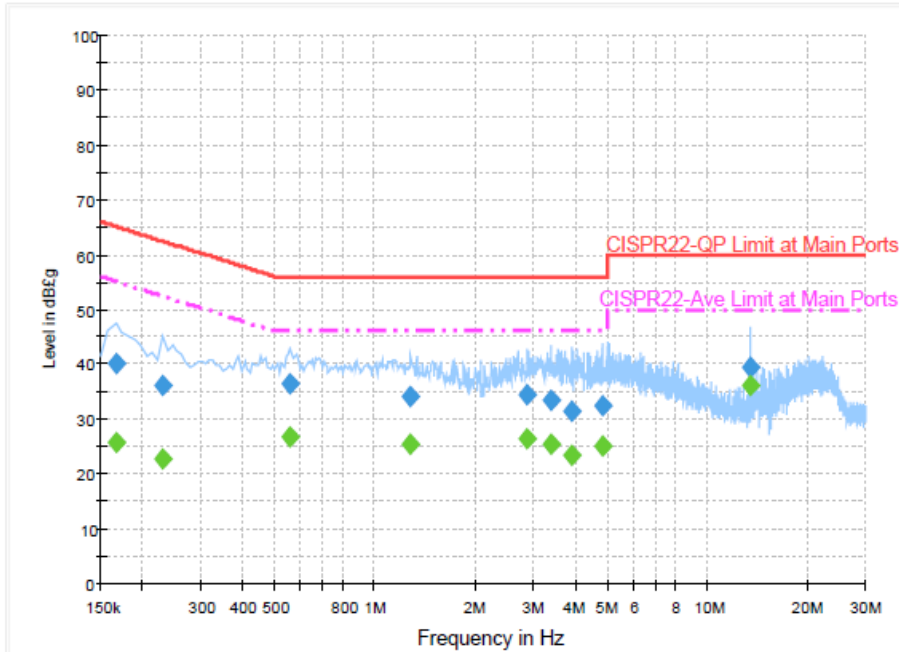
Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	39.0	Off	L1	19.5	25.0	64.0
0.598000	37.9	Off	L1	19.4	18.1	56.0
1.230000	37.4	Off	L1	19.6	18.6	56.0
3.158000	39.4	Off	L1	19.7	16.6	56.0
3.662000	38.4	Off	L1	19.7	17.6	56.0
4.814000	38.7	Off	L1	19.8	17.3	56.0
13.558000	50.2	Off	L1	19.9	9.8	60.0
21.806000	40.8	Off	L1	19.9	19.2	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	21.1	Off	L1	19.5	32.9	54.0
0.598000	28.0	Off	L1	19.4	18.0	46.0
1.230000	27.9	Off	L1	19.6	18.1	46.0
3.158000	30.8	Off	L1	19.7	15.2	46.0
3.662000	29.3	Off	L1	19.7	16.7	46.0
4.814000	29.8	Off	L1	19.8	16.2	46.0
13.558000	43.7	Off	L1	19.9	6.3	50.0
21.806000	29.7	Off	L1	19.9	20.3	50.0



Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter 1) + NFC Tx		



Final Result : Quasi-Peak

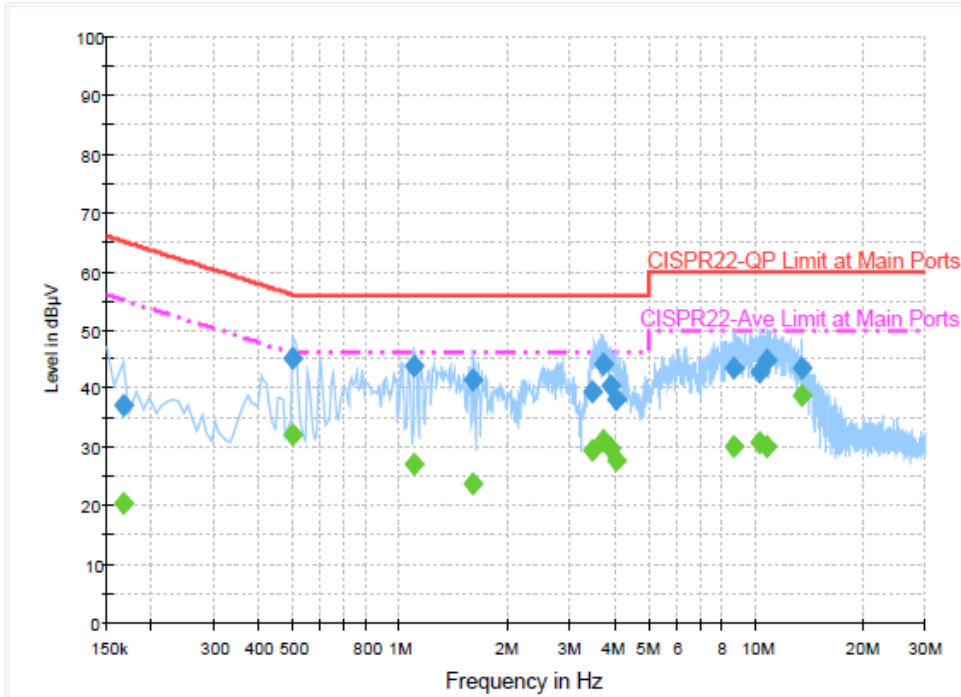
Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	40.2	Off	N	19.4	25.0	65.2
0.230000	36.2	Off	N	19.6	26.2	62.4
0.558000	36.6	Off	N	19.4	19.4	56.0
1.286000	34.0	Off	N	19.6	22.0	56.0
2.870000	34.3	Off	N	19.7	21.7	56.0
3.390000	33.3	Off	N	19.7	22.7	56.0
3.918000	31.3	Off	N	19.7	24.7	56.0
4.830000	32.3	Off	N	19.7	23.7	56.0
13.558000	39.4	Off	N	20.0	20.6	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	25.7	Off	N	19.4	29.5	55.2
0.230000	22.7	Off	N	19.6	29.7	52.4
0.558000	26.7	Off	N	19.4	19.3	46.0
1.286000	25.3	Off	N	19.6	20.7	46.0
2.870000	26.3	Off	N	19.7	19.7	46.0
3.390000	25.5	Off	N	19.7	20.5	46.0
3.918000	23.3	Off	N	19.7	22.7	46.0
4.830000	25.1	Off	N	19.7	20.9	46.0
13.558000	36.2	Off	N	20.0	13.8	50.0



Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter 2) + NFC Tx		

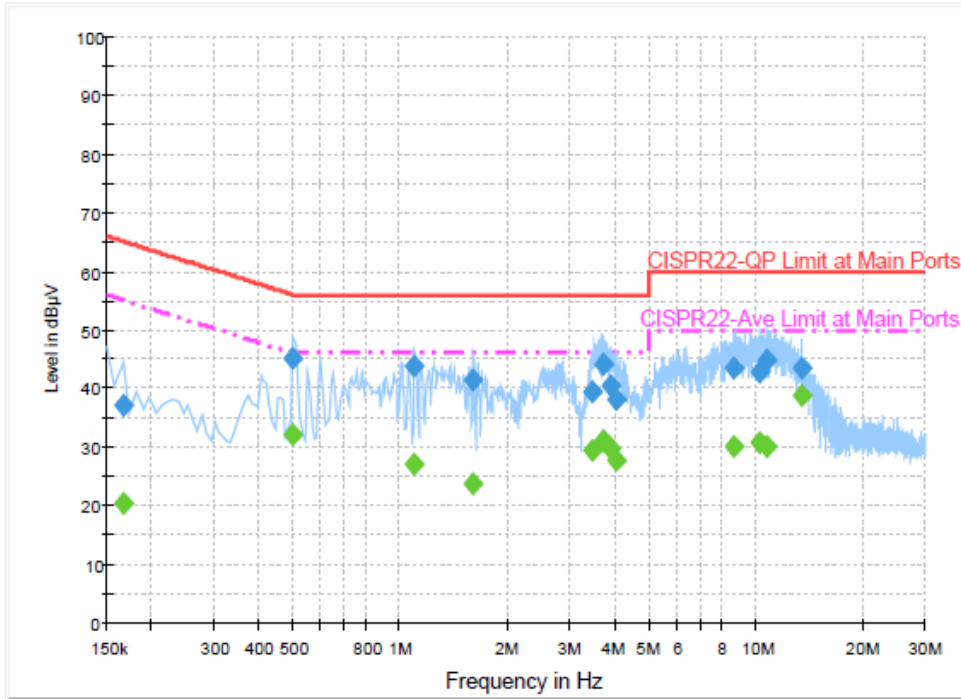


Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	37.0	Off	L1	19.4	28.2	65.2
0.502000	45.1	Off	L1	19.5	10.9	56.0
1.102000	43.8	Off	L1	19.6	12.2	56.0
1.606000	41.6	Off	L1	19.5	14.4	56.0
3.486000	39.4	Off	L1	19.7	16.6	56.0
3.718000	44.3	Off	L1	19.7	11.7	56.0
3.910000	40.3	Off	L1	19.7	15.7	56.0
4.062000	38.1	Off	L1	19.7	17.9	56.0
8.718000	43.3	Off	L1	19.9	16.7	60.0
10.230000	42.8	Off	L1	19.9	17.2	60.0
10.830000	44.7	Off	L1	19.9	15.3	60.0
13.558000	43.6	Off	L1	19.9	16.4	60.0



Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter 2) + NFC Tx		

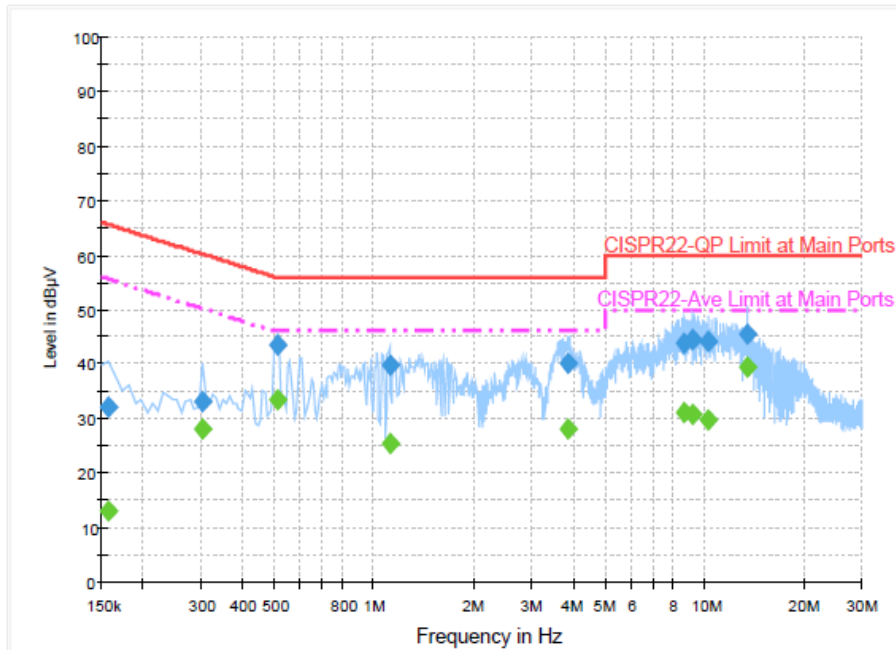


Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	20.3	Off	L1	19.4	34.9	55.2
0.502000	32.0	Off	L1	19.5	14.0	46.0
1.102000	27.2	Off	L1	19.6	18.8	46.0
1.606000	23.6	Off	L1	19.5	22.4	46.0
3.486000	29.3	Off	L1	19.7	16.7	46.0
3.718000	30.9	Off	L1	19.7	15.1	46.0
3.910000	29.7	Off	L1	19.7	16.3	46.0
4.062000	27.7	Off	L1	19.7	18.3	46.0
8.718000	30.1	Off	L1	19.9	19.9	50.0
10.230000	30.7	Off	L1	19.9	19.3	50.0
10.830000	30.2	Off	L1	19.9	19.8	50.0
13.558000	38.9	Off	L1	19.9	11.1	50.0



Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter 2) + NFC Tx		



Final Result : Quasi-Peak

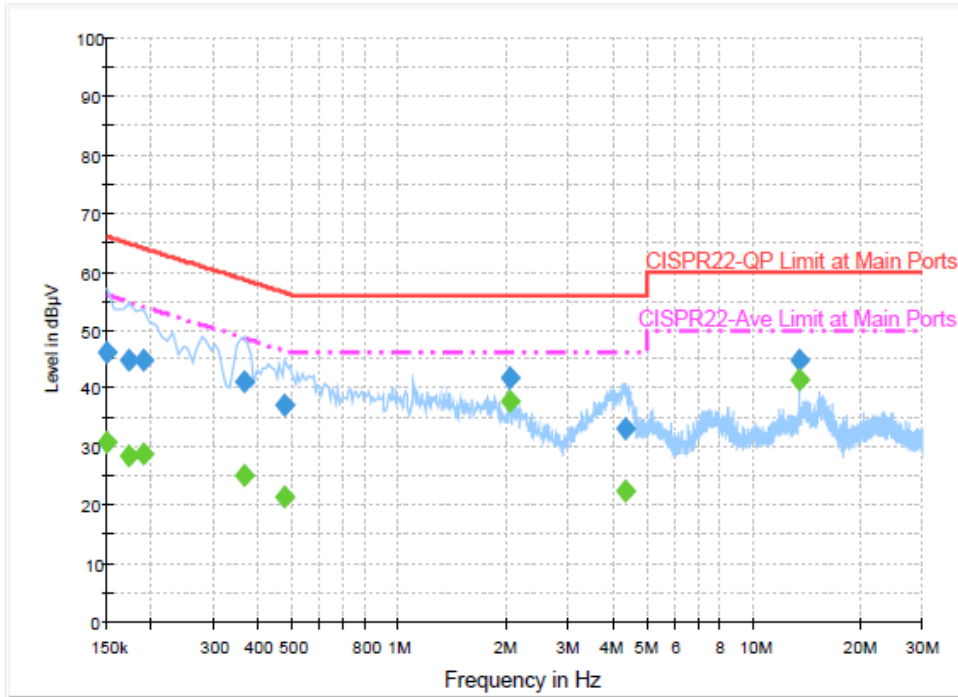
Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	32.0	Off	N	19.4	33.6	65.6
0.302000	33.2	Off	N	19.4	27.0	60.2
0.510000	43.6	Off	N	19.5	12.4	56.0
1.118000	39.6	Off	N	19.6	16.4	56.0
3.862000	40.2	Off	N	19.7	15.8	56.0
8.702000	43.9	Off	N	19.9	16.1	60.0
9.262000	44.4	Off	N	19.7	15.6	60.0
10.278000	44.0	Off	N	19.9	16.0	60.0
13.558000	45.6	Off	N	20.0	14.4	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	12.9	Off	N	19.4	42.7	55.6
0.302000	27.9	Off	N	19.4	22.3	50.2
0.510000	33.5	Off	N	19.5	12.5	46.0
1.118000	25.4	Off	N	19.6	20.6	46.0
3.862000	28.2	Off	N	19.7	17.8	46.0
8.702000	31.0	Off	N	19.9	19.0	50.0
9.262000	30.8	Off	N	19.7	19.2	50.0
10.278000	29.7	Off	N	19.9	20.3	50.0
13.558000	39.3	Off	N	20.0	10.7	50.0



Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter 3) + NFC Tx		



Final Result : Quasi-Peak

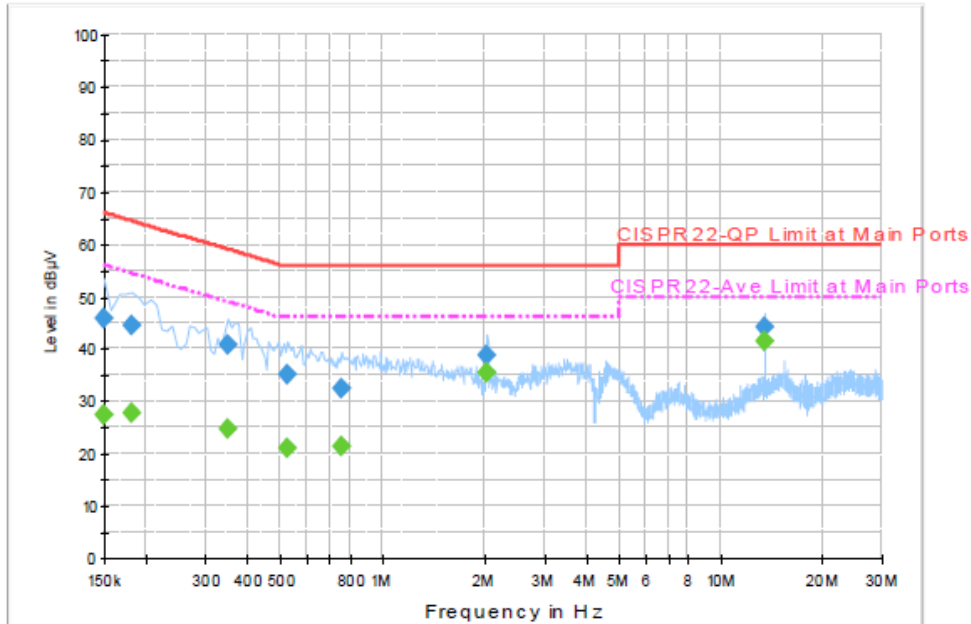
Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	46.0	Off	L1	19.5	20.0	66.0
0.174000	44.9	Off	L1	19.4	19.9	64.8
0.190000	44.8	Off	L1	19.5	19.2	64.0
0.366000	41.2	Off	L1	19.5	17.4	58.6
0.478000	37.2	Off	L1	19.5	19.2	56.4
2.054000	41.8	Off	L1	19.7	14.2	56.0
4.334000	33.2	Off	L1	19.7	22.8	56.0
13.558000	44.7	Off	L1	19.9	15.3	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	30.7	Off	L1	19.5	25.3	56.0
0.174000	28.4	Off	L1	19.4	26.4	54.8
0.190000	28.6	Off	L1	19.5	25.4	54.0
0.366000	25.2	Off	L1	19.5	23.4	48.6
0.478000	21.3	Off	L1	19.5	25.1	46.4
2.054000	37.7	Off	L1	19.7	8.3	46.0
4.334000	22.5	Off	L1	19.7	23.5	46.0
13.558000	41.3	Off	L1	19.9	8.7	50.0



Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter 3) + NFC Tx		



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
0.182000	44.4	Off	N	19.5	20.0	64.4
0.350000	40.9	Off	N	19.5	18.1	59.0
0.526000	35.3	Off	N	19.5	20.7	56.0
0.758000	32.6	Off	N	19.6	23.4	56.0
2.046000	38.8	Off	N	19.7	17.2	56.0
13.558000	44.2	Off	N	20.0	15.8	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	27.4	Off	N	19.5	28.6	56.0
0.182000	27.7	Off	N	19.5	26.7	54.4
0.350000	24.9	Off	N	19.5	24.1	49.0
0.526000	21.0	Off	N	19.5	25.0	46.0
0.758000	21.3	Off	N	19.6	24.7	46.0
2.046000	35.4	Off	N	19.7	10.6	46.0
13.558000	41.6	Off	N	20.0	8.4	50.0

Remark: 13.558MHz is the NFC RF fundamental signal.



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
<p>Ref 20 dBm Att 50 dB SWT 20 ms 13.559900000 MHz</p> <p>Marker 1 [T1] 4.32 dBm Marker 2 [T2] 4.57 dBm</p> <p>ndB [T1] 20.00 dB BW 2.640000000 kHz Temp 1 [T1 ndB] -15.65 dBm 13.558540000 MHz Temp 2 [T2 ndB] -15.54 dBm 13.561180000 MHz</p> <p>Center 13.56 MHz 1 kHz/ Span 10 kHz</p> <p>Date: 17.APR.2015 10:06:12</p>		<p>Ref 20 dBm Att 40 dB SWT 20 ms 13.559900000 MHz</p> <p>Marker 1 [T1] 4.57 dBm Marker 2 [T2] 4.32 dBm</p> <p>OBW 2.240000000 kHz Temp 1 [T1 OBW] -15.26 dBm 13.558740000 MHz Temp 2 [T2 OBW] -15.54 dBm 13.560980000 MHz</p> <p>Center 13.56 MHz 1 kHz/ Span 10 kHz</p> <p>Date: 17.APR.2015 10:00:56</p>	
20dB Bandwidth (kHz)	2.64	99% OccupiedBW(kHz)	2.24
Frequency range (MHz)	$f_L > 13.553$	13.55854	Test Result
	$f_H < 13.567$	13.56118	Complies



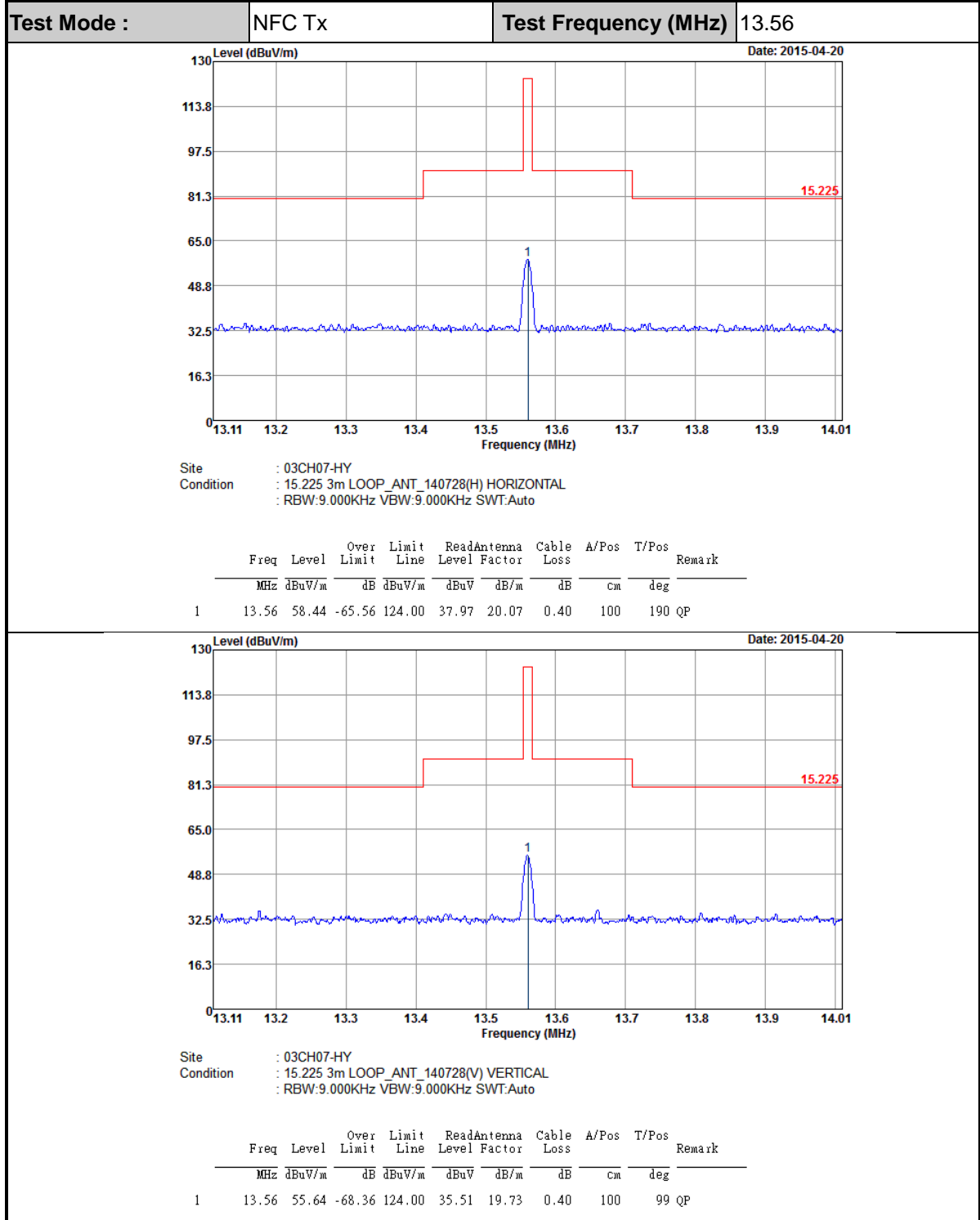
B.2 Test Result of Frequency Stability

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Measurement Frequency (MHz)
120	13.559860	-20	13.559940
102	13.559860	-10	13.559940
138	13.559860	0	13.559940
		10	13.559900
		20	13.559880
		30	13.559860
		40	13.559840
		50	13.559820
Max.Deviation (MHz)	-0.000140	Max.Deviation (MHz)	-0.000180
Max.Deviation (ppm)	-10.3245	Max.Deviation (ppm)	-13.2743
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



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



C.2 Results of Radiated Emissions (9 kHz~30MHz)

<EUT with Adapter 1>

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
0.00956	25.41	-102.58	127.99	4.88	20.24	0.29	-	-	Average
0.06906	22.38	-88.44	110.82	2.08	20.01	0.29	-	-	Average
0.09178	21.25	-87.1	108.35	1	19.96	0.29	-	-	QP
0.14992	20.43	-83.66	104.09	0.22	19.92	0.29	-	-	Average
0.45906	40.98	-53.39	94.37	20.81	19.88	0.29	-	-	Average
0.50502	37.92	-35.62	73.54	17.75	19.88	0.29	-	-	QP
11.176	35.77	-34.23	70	15.32	20.06	0.39	-	-	QP
13.56	56.67	-13.33	70	36.2	20.07	0.4	-	-	QP
20.455	38.23	-31.77	70	17.32	20.48	0.43	100	154	QP
25.645	36.35	-33.65	70	15.21	20.67	0.47	-	-	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
0.00966	26.1	-101.8	127.9	5.55	20.26	0.29	-	-	Average
0.06483	22.37	-89	111.37	2.05	20.03	0.29	-	-	Average
0.10432	21.87	-85.37	107.24	1.59	19.99	0.29	-	-	QP
0.118	20.53	-85.64	106.17	0.28	19.96	0.29	-	-	Average
0.46144	40.14	-54.18	94.32	19.95	19.9	0.29	-	-	Average
2.435	43	-27	70	22.71	19.96	0.33	-	-	QP
12.184	36.07	-33.93	70	15.88	19.79	0.4	-	-	QP
13.56	53.73	-16.27	70	33.6	19.73	0.4	-	-	QP
19.933	43.04	-26.96	70	22.69	19.92	0.43	100	15	QP
25.28	36.44	-33.56	70	15.92	20.07	0.45	-	-	QP



<EUT with Adapter 2>

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
0.00966	28.12	-99.78	127.9	7.59	20.24	0.29	-	-	Average
0.06273	21.14	-90.51	111.65	0.84	20.01	0.29	-	-	Average
0.0905	21.52	-86.95	108.47	1.27	19.96	0.29	-	-	QP
0.13896	21.15	-83.6	104.75	0.92	19.94	0.29	-	-	Average
0.45192	41.48	-53.02	94.5	21.31	19.88	0.29	-	-	Average
0.51253	38.47	-34.94	73.41	18.28	19.88	0.31	-	-	QP
12.344	35.9	-34.1	70	15.42	20.08	0.4	-	-	QP
13.56	54.49	-15.51	70	34.02	20.07	0.4	-	-	QP
21.13	37.41	-32.59	70	16.44	20.54	0.43	100	265	QP
26.61	36.11	-33.89	70	14.95	20.68	0.48	-	-	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
0.01038	27.13	-100.15	127.28	6.58	20.26	0.29	-	-	Average
0.06546	22.76	-88.52	111.28	2.44	20.03	0.29	-	-	Average
0.09654	20.97	-86.94	107.91	0.69	19.99	0.29	-	-	QP
0.1124	20.61	-85.98	106.59	0.36	19.96	0.29	-	-	Average
0.45124	41.17	-53.35	94.52	20.98	19.9	0.29	-	-	Average
0.49	39.32	-34.48	73.8	19.13	19.9	0.29	-	-	QP
10.104	37.01	-32.99	70	16.81	19.81	0.39	-	-	QP
13.56	50.24	-19.76	70	30.11	19.73	0.4	-	-	QP
19.204	36.73	-33.27	70	16.45	19.85	0.43	100	162	QP
26.025	35.7	-34.3	70	15.14	20.09	0.47	-	-	QP



<EUT with Adapter 3>

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
0.01308	26.85	-98.42	125.27	6.32	20.24	0.29	-	-	Average
0.06462	23.34	-88.06	111.4	3.04	20.01	0.29	-	-	Average
0.09536	21.41	-86.61	108.02	1.16	19.96	0.29	-	-	QP
0.13196	20.98	-84.22	105.2	0.75	19.94	0.29	-	-	Average
0.46042	41.08	-53.26	94.34	20.91	19.88	0.29	-	-	Average
0.49751	39.35	-34.32	73.67	19.18	19.88	0.29	-	-	QP
11.384	36.31	-33.69	70	15.85	20.07	0.39	-	-	QP
13.56	54.56	-15.44	70	34.09	20.07	0.4	-	-	QP
20.455	37.11	-32.89	70	16.2	20.48	0.43	-	-	QP
28.955	36.58	-33.42	70	15.5	20.57	0.51	100	256	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
0.01313	26.89	-98.35	125.24	6.34	20.26	0.29	-	-	Average
0.06846	23.15	-87.75	110.9	2.83	20.03	0.29	-	-	Average
0.10784	23.07	-83.88	106.95	2.79	19.99	0.29	-	-	QP
0.1196	21.25	-84.8	106.05	1	19.96	0.29	-	-	Average
0.44682	40.48	-54.12	94.6	20.29	19.9	0.29	-	-	Average
0.53506	37.19	-35.85	73.04	16.98	19.9	0.31	-	-	QP
11.472	36.03	-33.97	70	15.83	19.81	0.39	-	-	QP
13.56	50.06	-19.94	70	29.93	19.73	0.4	-	-	QP
20.482	36.7	-33.3	70	16.3	19.97	0.43	100	128	QP
26.84	36.16	-33.84	70	15.59	20.09	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.



C.3 Results of Radiated Emissions (30MHz~1GHz)

<EUT with Adapter 1>

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
50.52	25.87	-14.13	40	46.9	8.4	1.77	-	-	Peak
111.54	28.6	-14.9	43.5	46.49	10.91	2.38	-	-	Peak
166.35	30.87	-12.63	43.5	49.64	9.76	2.61	124	111	Peak
520.5	31.89	-14.11	46	40.56	18.12	3.89	-	-	Peak
665.4	24.4	-21.6	46	30.17	20.35	4.35	-	-	Peak
826.4	27.15	-18.85	46	30.11	22.69	4.7	-	-	Peak

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
92.1	31.2	-12.3	43.5	51.34	8.9	2.06	-	-	Peak
138	37.85	-5.65	43.5	55.07	11.5	2.38	200	211	Peak
221.7	27.67	-18.33	46	46.25	9.46	2.96	-	-	Peak
476.4	24.42	-21.58	46	33.89	17.56	3.77	-	-	Peak
725.6	25.7	-20.3	46	29.96	21.73	4.41	-	-	Peak
876.8	28.85	-17.15	46	31.61	22.93	4.66	-	-	Peak



<EUT with Adapter 2>

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
44.85	32.58	-7.42	40	51.51	10.5	1.77	105	254	Peak
76.98	31.49	-8.51	40	53.76	6.87	2.06	-	-	Peak
221.7	29.14	-16.86	46	47.72	9.46	2.96	-	-	Peak
310.5	30.03	-15.97	46	44.45	13.3	3.28	-	-	Peak
561.1	29.18	-16.82	46	35.97	19.95	4.01	-	-	Peak
899.9	30.71	-15.29	46	33.15	23.2	4.66	-	-	Peak

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
84.27	30.76	-9.24	40	51.94	7.88	2.06	100	137	Peak
94.8	30.17	-13.33	43.5	50.01	9.2	2.06	-	-	Peak
226.56	25.25	-20.75	46	43.43	9.86	2.96	-	-	Peak
421.1	34.51	-11.49	46	44.96	16.72	3.63	-	-	Peak
773.2	27.52	-18.48	46	31.32	22.07	4.48	-	-	Peak
976.9	30.48	-23.52	54	30.89	24.94	4.94	-	-	Peak



<EUT with Adapter 3>

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
40.53	32.27	-7.73	40	48.4	13.3	1.77	104	256	Peak
166.35	30.87	-12.63	43.5	49.64	9.76	2.61	-	-	Peak
221.7	31.14	-14.86	46	49.72	9.46	2.96	-	-	Peak
385.4	32	-14	46	44.15	15.3	3.52	-	-	Peak
524.7	35.23	-10.77	46	43.84	18.2	3.89	-	-	Peak
909	32.49	-13.51	46	34.54	23.47	4.8	-	-	Peak

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
80.76	33.83	-6.17	40	55.95	7	2.06	101	163	Peak
168.51	26.73	-16.77	43.5	45.52	9.72	2.61	-	-	Peak
280.02	27.26	-18.74	46	42.2	12.8	3.16	-	-	Peak
526.1	33.98	-12.02	46	42.58	18.22	3.89	-	-	Peak
757.1	32.17	-13.83	46	35.98	22.1	4.48	-	-	Peak
933.5	32.7	-13.3	46	33.97	24.3	4.8	-	-	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.