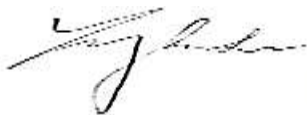


FCC RF Test Report

APPLICANT : Zebra Technologies Corporation
EQUIPMENT : Mobile Computer
BRAND NAME : Zebra
MODEL NAME : TC80NH
FCC ID : UZ7TC80NH
STANDARD : FCC Part 15 Subpart C §15.225
CLASSIFICATION : (DXX) Low Power Communication Device Transmitter

The testing was completed on Oct. 03, 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
FR573017D	Rev. 01	Initial issue of report	Nov. 05, 2015
FR573017D	Rev. 02	Remarking NFC RF fundamental signal and adding standard for terminal test result. at the result of conducted emission test section	Nov. 10, 2015



SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C					
Part	FCC Rule	IC Rule	Description of Test	Result	Under Limit
3.1	15.207	RSS-GEN 8.8	AC Power Line Conducted Emissions	Complies	12.00 dB at 13.558MHz
3.2	15.225(a)(b)(c)	A2.6	Field Strength of Fundamental Emissions	Complies	55.86 dB at 13.560 MHz
3.3	2.1049	-	20dB Spectrum Bandwidth	Complies	-
3.3	-	RSS-GEN 6.6	99% OBW Spectrum Bandwidth	Complies	-
3.4	15.225(d) 15.209	A2.6	Radiated Emissions	Complies	17.17 dB at 945.400 MHz
3.5	15.225(e)	A2.6	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)	±4.80dB	Confidence levels of 95%



1. GENERAL INFORMATION

1.1 Applicant

Zebra Technologies Corporation

1 Zebra Plaza, Holtsville, NY 11742

1.2 Manufacturer

Zebra Technologies Corporation

1 Zebra Plaza, Holtsville, NY 11742

1.3 Product Details

Items	Description
Tx/Rx Frequency Range	13.553 ~ 13.567MHz
Channel Number	1
Sample 1	SE965
Sample 2	SE4750SR
Sample 3	SE4750MR
20dBW	2.66KHz
99%OBW	2.24KHz
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.

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.		
	TH03-HY	CO05-HY	03CH07-HY
Test Engineer	Danny Chen	Eric Jeng	Wei Chen and James Chiu
Temperature (°C)	22~24	23~26	20~22
Relative Humidity (%)	53~55	52~56	50~55

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

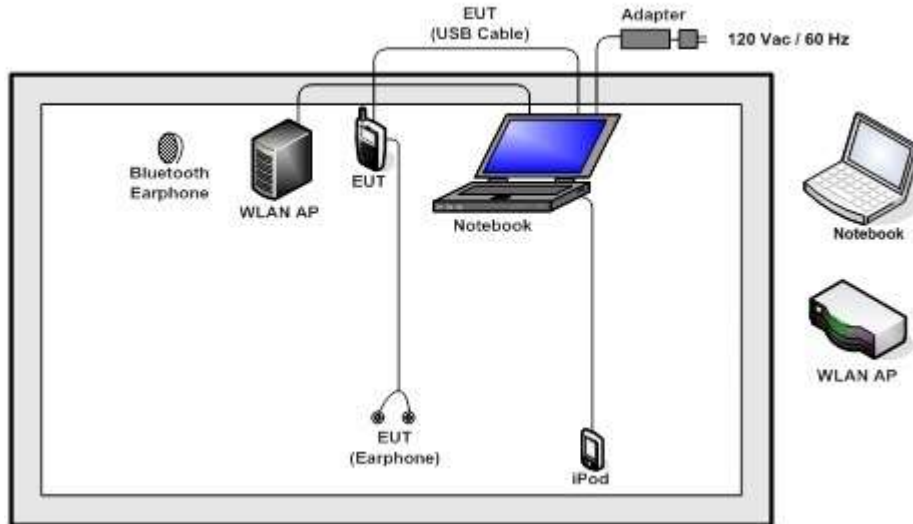
1.7 Test Modes

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
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz
Note: <ol style="list-style-type: none"> 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 Emission Mode>



< For Fundamental Emissions and Mask and Radiated Emissions Measurement >



**1.9 Table for Supporting Units**

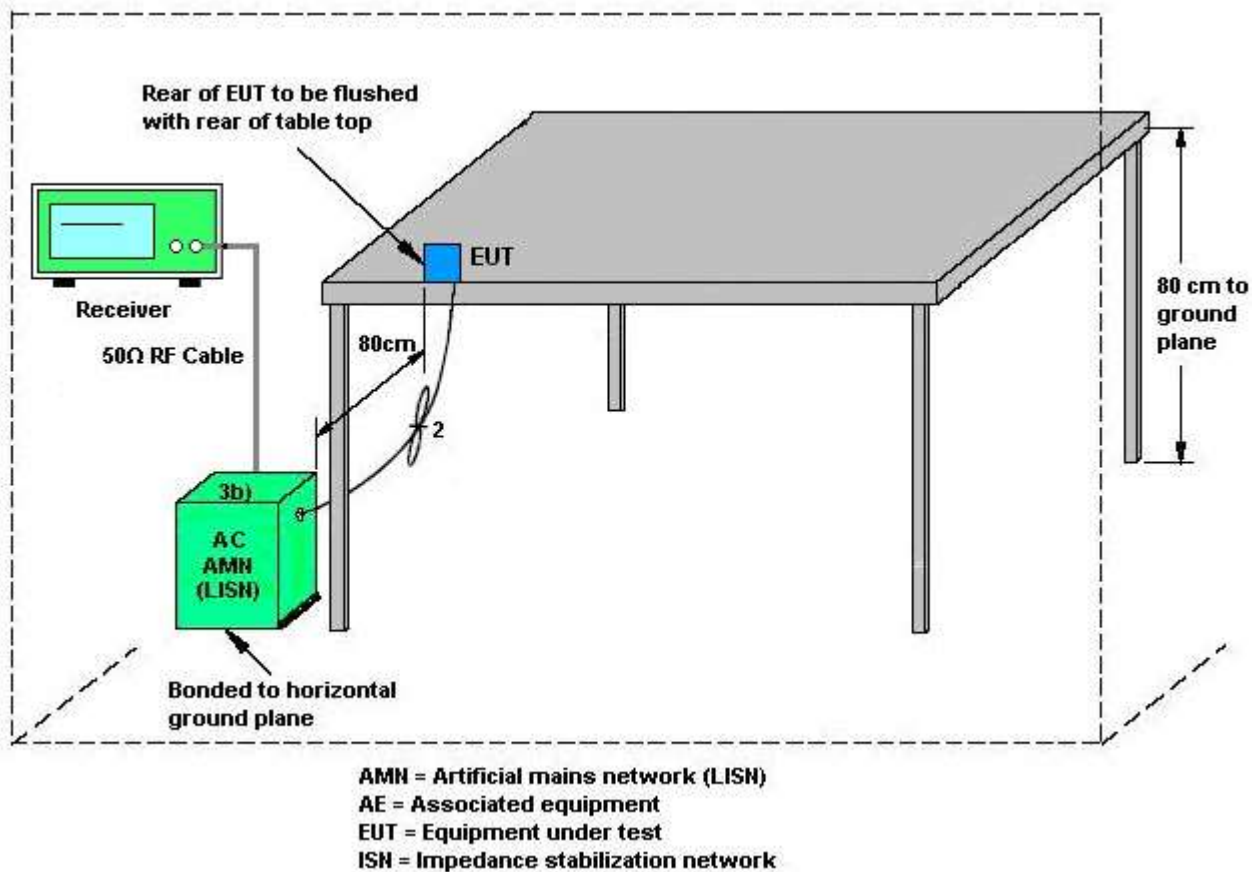
Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
2.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Notebook	DELL	P20G	FCC DoC/ Contains FCC ID:QDS-BRCM1051	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
7.	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.

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

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.

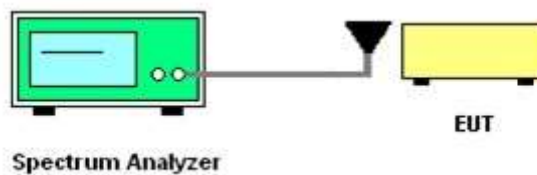
3. CONDUCTED TEST ITEMS

3.1 Measuring Instruments

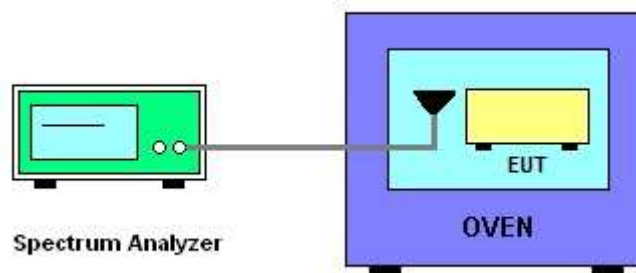
See list of measuring instruments of this test report.

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 C.



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.
1. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
2. Measured the spectrum width with power higher than 20dB below carrier.
3. 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 $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 100 ppm.
6. Extreme temperature rule is -20°C~50°C.

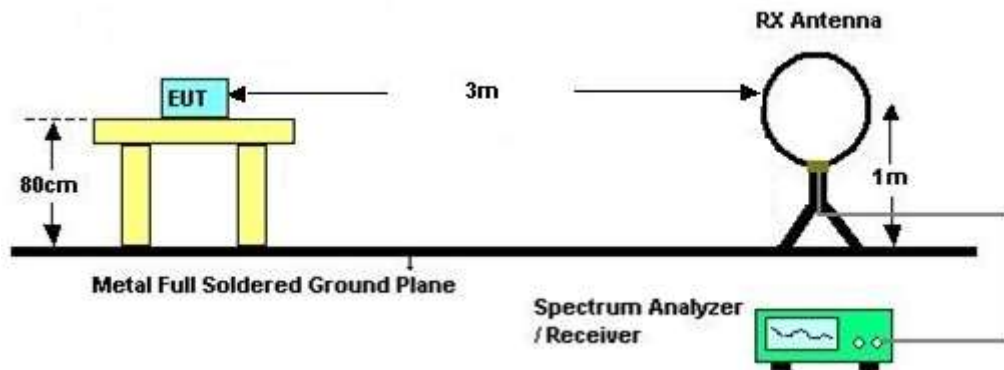
4. RADIATED TEST ITEMS

4.1 Measuring Instruments

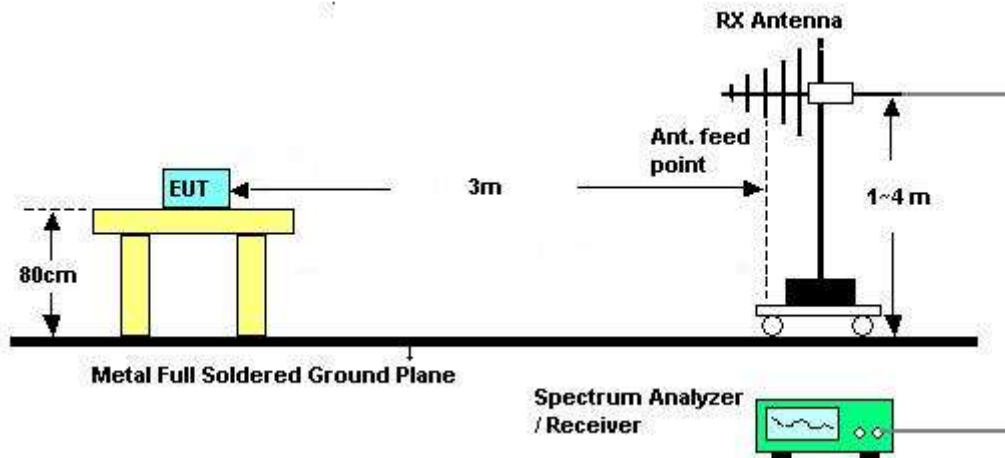
See list of measuring instruments of this test report.

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	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 (μ V/m) at 30m	Field Strength (dB μ V/m) at 30m	Field Strength (dB μ V/m) at 10m	Field Strength (dB μ V/m) at 3m
1.705~13.110	30	29.5	48.58	69.5
13.110~13.410	106	40.5	59.58	80.5
13.410~13.553	334	50.5	69.58	90.5
13.553~13.567	15848	84.0	103.08	124.0
13.567~13.710	334	50.5	69.58	90.5
13.710~14.010	106	40.5	59.58	80.5
14.010~30.000	30	29.5	48.58	69.5

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 (dB μ V/m) = 20 log Emission level (μ V/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 (μ V/m)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

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.
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

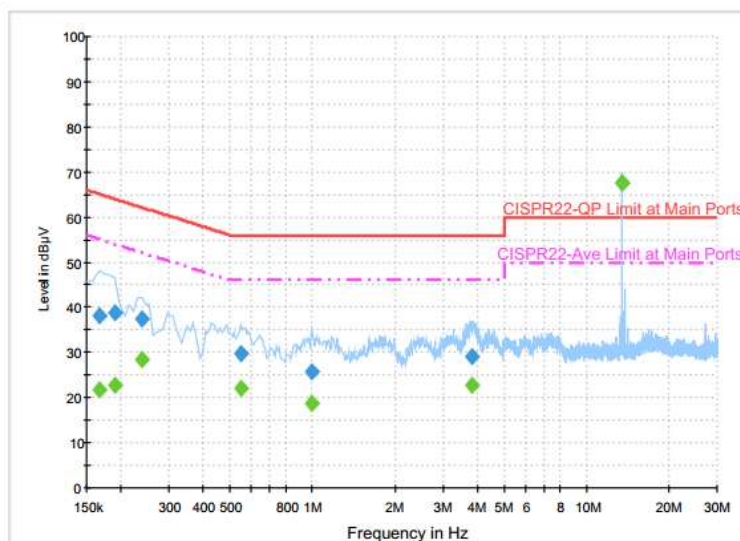
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Jun. 24, 2015	Aug. 18, 2015~ Aug. 19, 2015	Jun. 23, 2016	Conducted (TH03-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL883644	Voltage:0~20V;C urrent:0~5A	Dec. 01, 2014	Aug. 18, 2015~ Aug. 19, 2015	Nov. 30, 2015	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30°C ~70°C	Dec. 01, 2014	Aug. 18, 2015~ Aug. 19, 2015	Nov. 30, 2015	Conducted (TH03-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz – 2.75GHz	Dec. 01, 2014	Sep. 26, 2015~ Oct. 03, 2015	Nov. 30, 2015	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 02, 2014	Sep. 26, 2015~ Oct. 03, 2015	Dec. 01, 2015	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 08, 2014	Sep. 26, 2015~ Oct. 03, 2015	Dec. 07, 2015	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Sep. 26, 2015~ Oct. 03, 2015	N/A	Conduction (CO05-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Sep. 27, 2014	Aug. 24, 2015~ Sep. 08, 2015	Sep. 26, 2015	Radiation (03CH07-HY)
Loop Antenna	TESEQ	HLA6120	31244	9 kHz~30 MHz	Fed. 02 ,2015	Aug. 24, 2015~ Sep. 08, 2015	Fed. 01, 2016	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz-1000MH z	Mar. 12, 2015	Aug. 24, 2015~ Sep. 08, 2015	Mar. 11, 2016	Radiation (03CH07-HY)
Signal Analyzer	Rohde & Schwarz	FSV 30	101749	10Hz~30GHz	Mar. 10, 2015	Aug. 24, 2015~ Sep. 08, 2015	Mar. 09, 2016	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Aug. 24, 2015~ Sep. 08, 2015	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 degree	N/A	Aug. 24, 2015~ Sep. 08, 2015	N/A	Radiation (03CH07-HY)



Appendix B. Test Results of Conducted Emission Test

<Original Test Result>

Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	Bluetooth Link + WLAN Link + NFC Tx + USB Cable (USB File transfer) for Sample 2		
Remark :	13.558 MHz is fundamental signal of NFC		



Final Result : Quasi-Peak

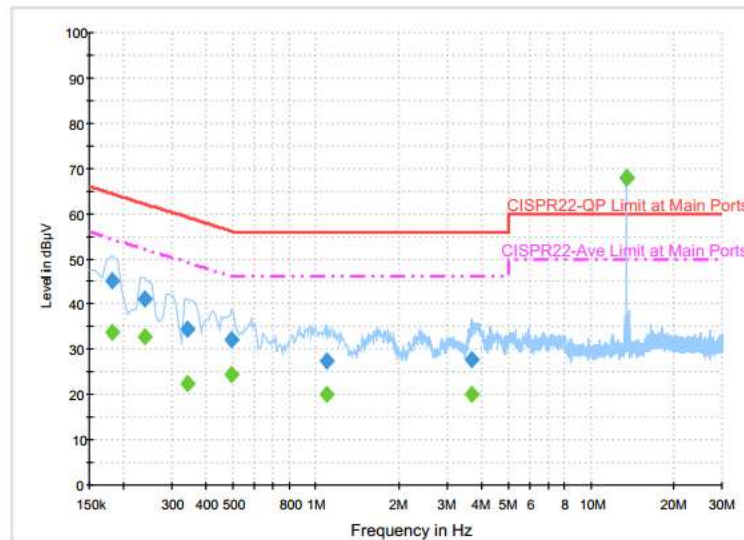
Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	38.1	Off	L1	19.5	27.1	65.2
0.190000	38.9	Off	L1	19.5	25.1	64.0
0.238000	37.3	Off	L1	19.5	24.9	62.2
0.550000	29.7	Off	L1	19.5	26.3	56.0
0.998000	25.7	Off	L1	19.6	30.3	56.0
3.830000	29.1	Off	L1	19.6	26.9	56.0
13.558000	67.7	Off	L1	19.9	-7.7	60.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	21.7	Off	L1	19.5	33.5	55.2
0.190000	22.7	Off	L1	19.5	31.3	54.0
0.238000	28.6	Off	L1	19.5	23.6	52.2
0.550000	22.2	Off	L1	19.5	23.8	46.0
0.998000	18.6	Off	L1	19.6	27.4	46.0
3.830000	22.7	Off	L1	19.6	23.3	46.0
13.558000	67.5	Off	L1	19.9	-17.5	50.0

<Original Test Result>

Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	Bluetooth Link + WLAN Link + NFC Tx + USB Cable (USB File transfer) for Sample 2		
Remark :	13.558 MHz is fundamental signal of NFC		


Final Result : Quasi-Peak

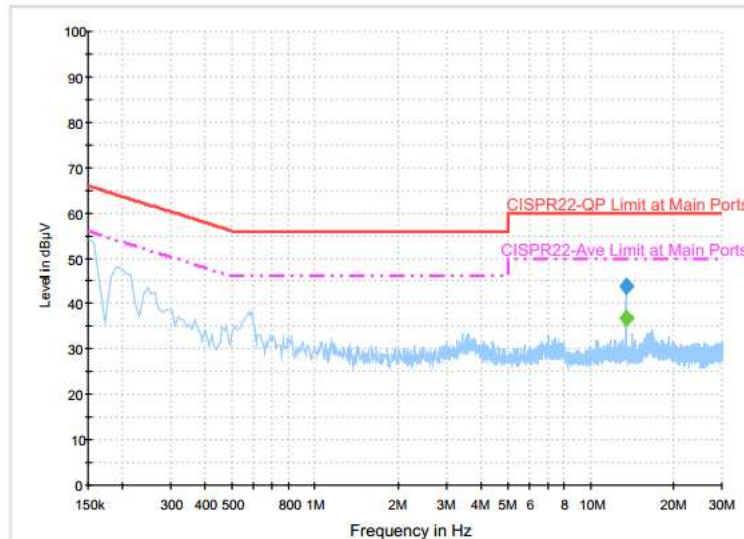
Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.182000	45.2	Off	N	19.5	19.2	64.4
0.238000	41.2	Off	N	19.5	21.0	62.2
0.342000	34.3	Off	N	19.5	24.9	59.2
0.494000	32.1	Off	N	19.5	24.0	56.1
1.094000	27.6	Off	N	19.6	28.4	56.0
3.686000	27.6	Off	N	19.7	28.4	56.0
13.558000	68.0	Off	N	19.9	-8.0	60.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.182000	33.7	Off	N	19.5	20.7	54.4
0.238000	32.6	Off	N	19.5	19.6	52.2
0.342000	22.3	Off	N	19.5	26.9	49.2
0.494000	24.6	Off	N	19.5	21.5	46.1
1.094000	20.1	Off	N	19.6	25.9	46.0
3.686000	20.1	Off	N	19.7	25.9	46.0
13.558000	67.9	Off	N	19.9	-17.9	50.0

<Terminal Test Result>

Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	Bluetooth Link + WLAN Link + NFC Tx + USB Cable (USB File transfer) for Sample 2		


Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
13.558000	43.9	Off	L1	19.9	16.1	60.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
13.558000	36.7	Off	L1	19.9	13.3	50.0

(1) with antenna

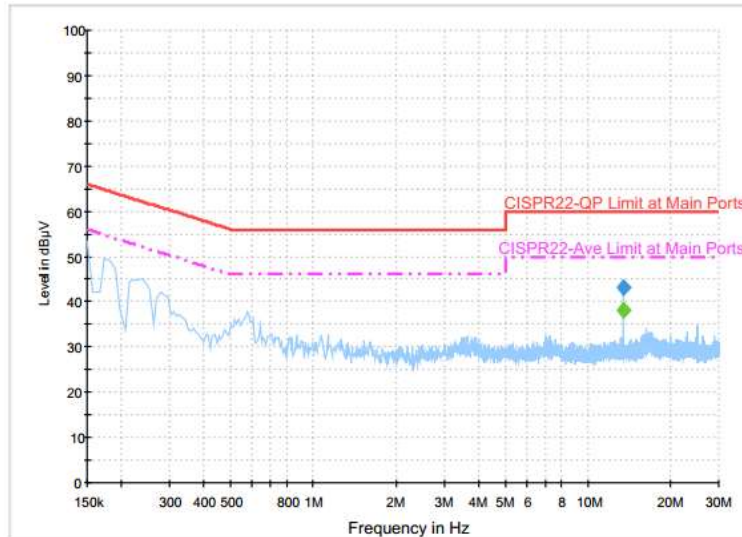
Remark: 13.558MHz is the NFC RF fundamental signal.

(2) with dummy load

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

**<Terminal Test Result>**

Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	Bluetooth Link + WLAN Link + NFC Tx + USB Cable (USB File transfer) for Sample 2		

**Final Result : Quasi-Peak**

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.550000	43.0	Off	N	19.9	17.0	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.550000	38.0	Off	N	19.9	12.0	50.0

(1) with antenna

Remark: 13.550MHz is the NFC RF fundamental signal.

(2) with dummy load

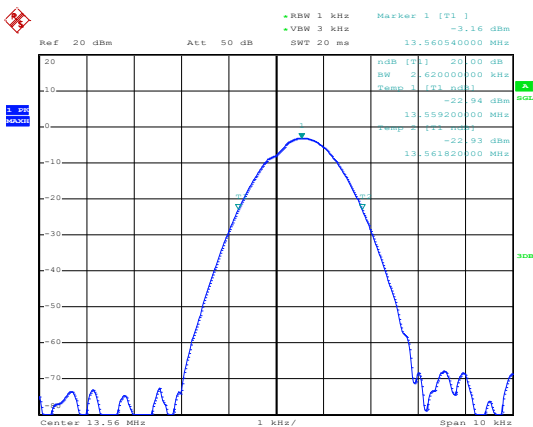
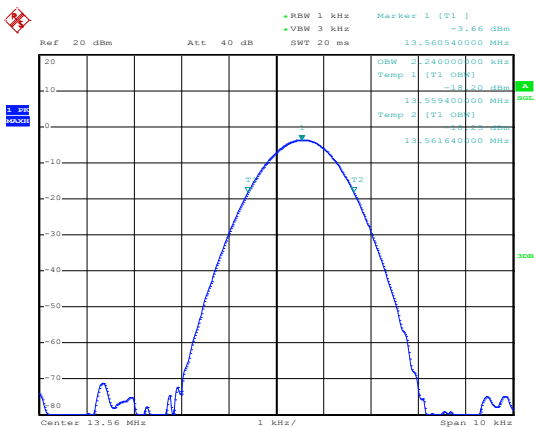
Remark: Only the fundamental NFC signal needs to be retested per C63.4.



Appendix C. Test Results of Conducted Test Items

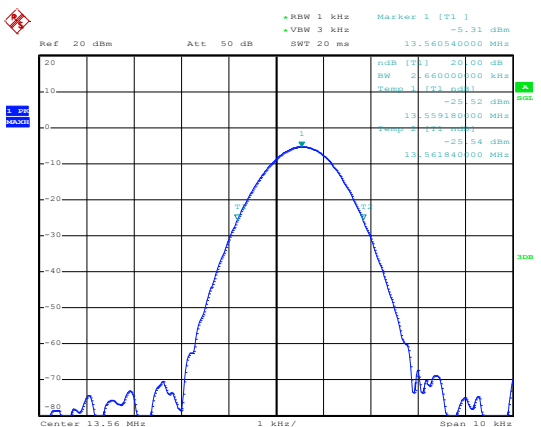
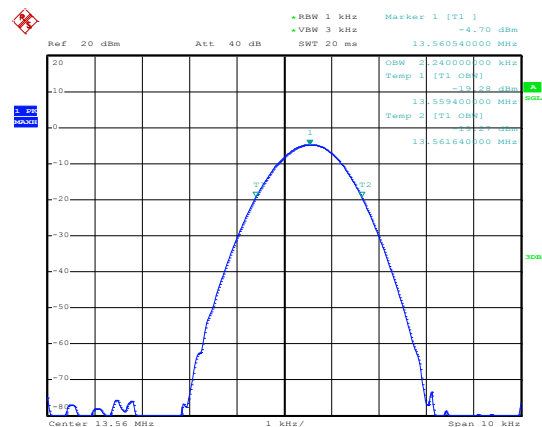
C.1 Test Result of 20dB Spectrum Bandwidth

<For Sample 1 - Type A>

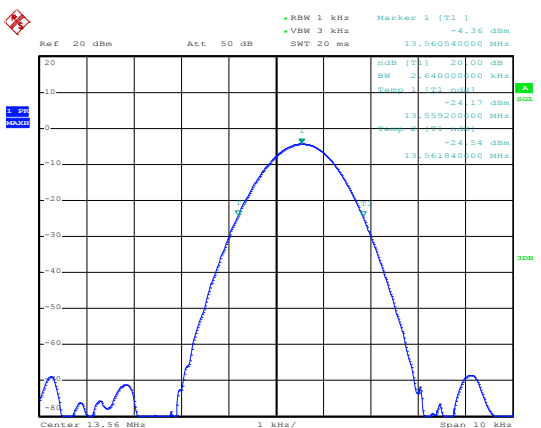
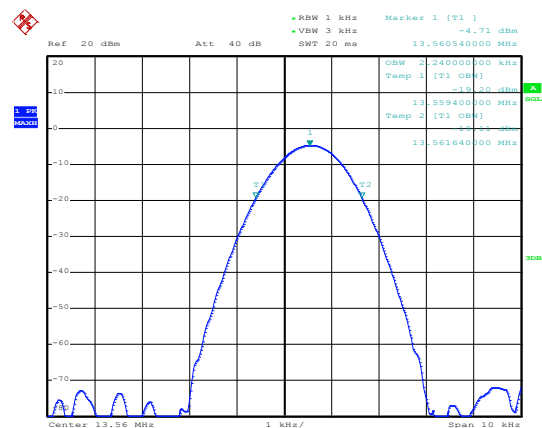
Test mode		NFC Tx		Test Frequency (MHz)	13.56
 Date: 18.AUG.2015 14:12:34		 Date: 18.AUG.2015 13:42:52			
20dB Bandwidth (kHz)		2.620		99% OccupiedBW(kHz)	2.240
Frequency range (MHz)	$f_L > 13.553$		13.55920		Test Result
	$f_H < 13.567$		13.56182		Complies



<For Sample 1 - Type B>

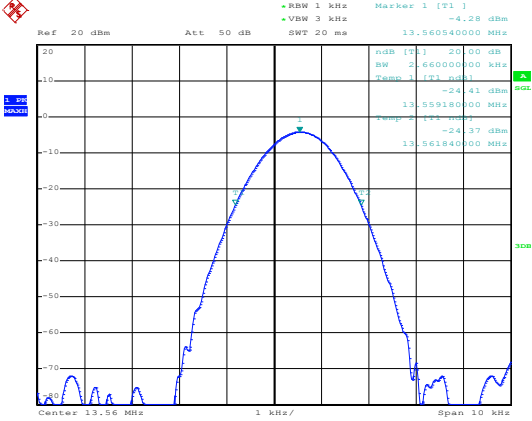
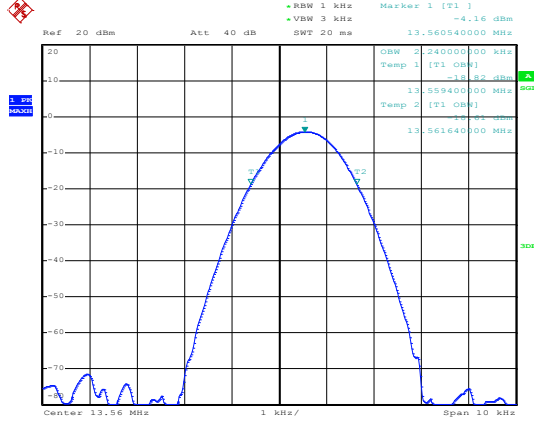
Test mode	NFC Tx	Test Frequency (MHz)	13.56
 <p>Date: 18.AUG.2015 14:13:51</p>		 <p>Date: 18.AUG.2015 13:44:19</p>	
20dB Bandwidth (kHz)	2.660	99% OccupiedBW(kHz)	2.240
Frequency range (MHz)	$f_L > 13.553$	13.55918	Test Result
	$f_H < 13.567$	13.56184	Complies

<For Sample 1 - Type F>

Test mode	NFC Tx	Test Frequency (MHz)	13.56
 <p>Date: 18.AUG.2015 14:15:42</p>		 <p>Date: 18.AUG.2015 13:46:45</p>	
20dB Bandwidth (kHz)	2.640	99% OccupiedBW(kHz)	2.240
Frequency range (MHz)	$f_L > 13.553$	13.55920	Test Result
	$f_H < 13.567$	13.56184	Complies

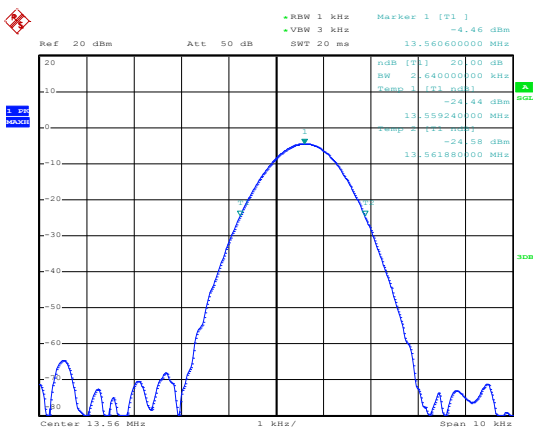
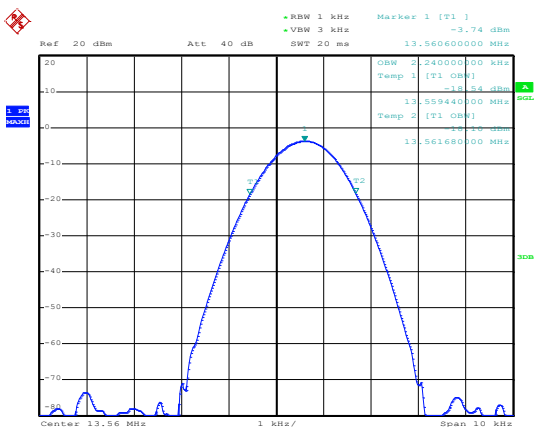


<For Sample 1 - Type V>

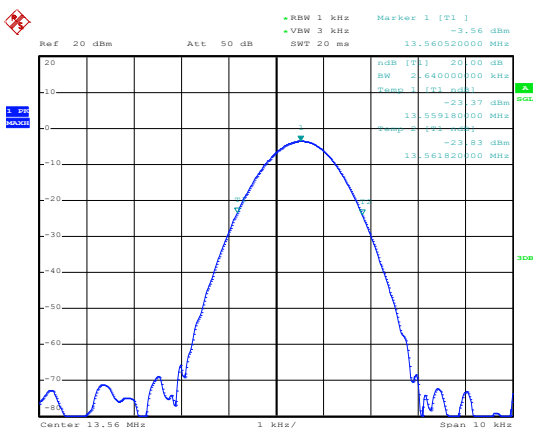
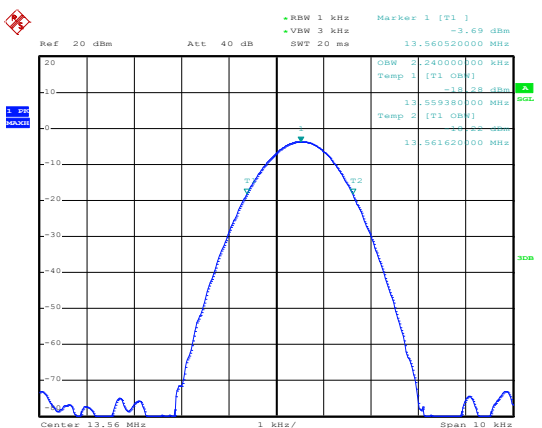
Test mode		Test Frequency (MHz)	
NFC Tx		13.56	
 <p>Ref 20 dBm Att 50 dB RBW 1 kHz VBW 3 kHz Marker 1 [T1] -4.28 dBm Temp 1 [T1] 13.560540000 MHz Temp 2 [T2] 13.559180000 MHz Temp 3 [T3] 13.561840000 MHz Date: 18.AUG.2015 14:17:06</p>		 <p>Ref 20 dBm Att 40 dB RBW 1 kHz VBW 3 kHz Marker 1 [T1] -4.16 dBm Temp 1 [T1] 13.560540000 MHz Temp 2 [T2] 13.559180000 MHz Temp 3 [T3] 13.561840000 MHz Date: 18.AUG.2015 13:48:04</p>	
20dB Bandwidth (kHz)	2.660	99% OccupiedBW(kHz)	2.240
Frequency range (MHz)	$f_L > 13.553$	13.55918	Test Result
	$f_H < 13.567$	13.56184	Complies



<For Sample 2 - Type B>

Test mode	NFC Tx	Test Frequency (MHz)	13.56
 <p>Date: 18.AUG.2015 09:34:38</p>		 <p>Date: 18.AUG.2015 09:29:46</p>	
20dB Bandwidth (kHz)	2.640	99% OccupiedBW(kHz)	2.240
Frequency range (MHz)	$f_L > 13.553$	13.55924	Test Result
	$f_H < 13.567$	13.56188	Complies

<For Sample 3- Type B>

Test mode	NFC Tx	Test Frequency (MHz)	13.56
 <p>Date: 19.AUG.2015 09:30:04</p>		 <p>Date: 19.AUG.2015 09:29:06</p>	
20dB Bandwidth (kHz)	2.640	99% OccupiedBW(kHz)	2.240
Frequency range (MHz)	$f_L > 13.553$	13.55918	Test Result
	$f_H < 13.567$	13.56182	Complies



C.2 Test Result of Frequency Stability

<For Sample 1 - Type A>

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Measurement Frequency (MHz)
120	13.560500	-20	13.560540
102	13.560500	-10	13.560540
138	13.560500	0	13.560550
		10	13.560540
		20	13.560530
		30	13.560520
		40	13.560500
		50	13.560480
Max.Deviation (MHz)	0.000500	Max.Deviation (MHz)	0.000550
Max.Deviation (ppm)	36.8732	Max.Deviation (ppm)	40.5605
Limit	FS < ±100 ppm	Limit	FS < ±100 ppm
Test Result	PASS	Test Result	PASS

<For Sample 1 - Type B>

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Measurement Frequency (MHz)
120	13.560500	-20	13.560540
102	13.560500	-10	13.560540
138	13.560500	0	13.560560
		10	13.560540
		20	13.560540
		30	13.560520
		40	13.560500
		50	13.560480
Max.Deviation (MHz)	0.000500	Max.Deviation (MHz)	0.000560
Max.Deviation (ppm)	36.8732	Max.Deviation (ppm)	41.2979
Limit	FS < ±100 ppm	Limit	FS < ±100 ppm
Test Result	PASS	Test Result	PASS



<For Sample 1 - Type F>

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Measurement Frequency (MHz)
120	13.560500	-20	13.560540
102	13.560500	-10	13.560540
138	13.560500	0	13.560540
		10	13.560540
		20	13.560520
		30	13.560520
		40	13.560500
		50	13.560480
Max.Deviation (MHz)	0.000500	Max.Deviation (MHz)	0.000540
Max.Deviation (ppm)	36.8732	Max.Deviation (ppm)	39.8230
Limit	FS < ±100 ppm	Limit	FS < ±100 ppm
Test Result	PASS	Test Result	PASS

<For Sample 1 - Type V>

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Measurement Frequency (MHz)
120	13.560500	-20	13.560540
102	13.560500	-10	13.560540
138	13.560500	0	13.560540
		10	13.560540
		20	13.560520
		30	13.560520
		40	13.560500
		50	13.560480
Max.Deviation (MHz)	0.000500	Max.Deviation (MHz)	0.000540
Max.Deviation (ppm)	36.8732	Max.Deviation (ppm)	39.8230
Limit	FS < ±100 ppm	Limit	FS < ±100 ppm
Test Result	PASS	Test Result	PASS



<For Sample 2 - Type B>

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Measurement Frequency (MHz)
120	13.560560	-20	13.560610
102	13.560560	-10	13.560600
138	13.560560	0	13.560600
		10	13.560590
		20	13.560580
		30	13.560560
		40	13.560540
		50	13.560510
Max.Deviation (MHz)	0.000560	Max.Deviation (MHz)	0.000610
Max.Deviation (ppm)	41.2979	Max.Deviation (ppm)	44.9853
Limit	FS < ±100 ppm	Limit	FS < ±100 ppm
Test Result	PASS	Test Result	PASS

<For Sample 3- Type B>

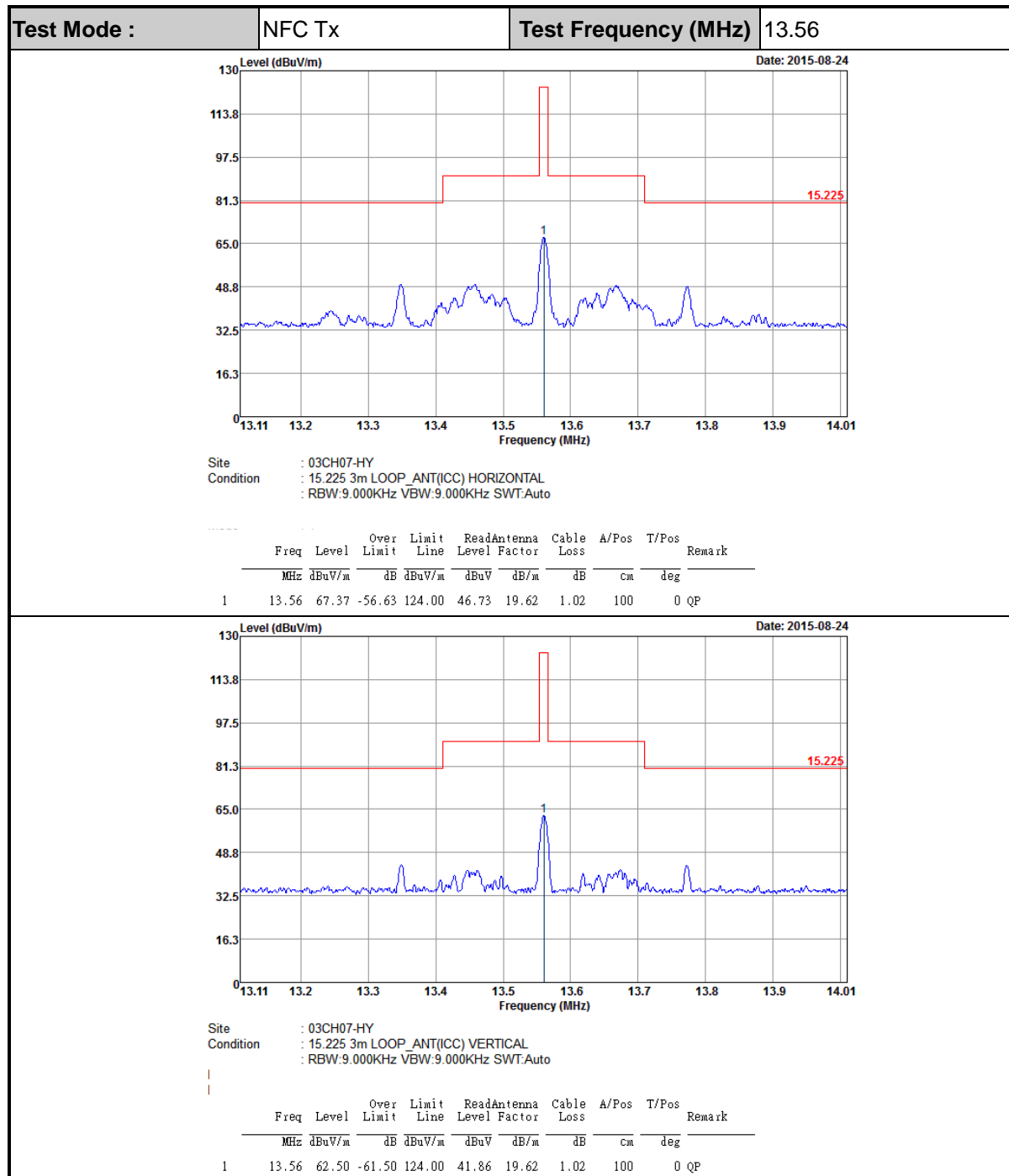
Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Measurement Frequency (MHz)
120	13.560490	-20	13.560520
102	13.560490	-10	13.560520
138	13.560490	0	13.560520
		10	13.560520
		20	13.560500
		30	13.560480
		40	13.560470
		50	13.560460
Max.Deviation (MHz)	0.000490	Max.Deviation (MHz)	0.000520
Max.Deviation (ppm)	36.1357	Max.Deviation (ppm)	38.3481
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

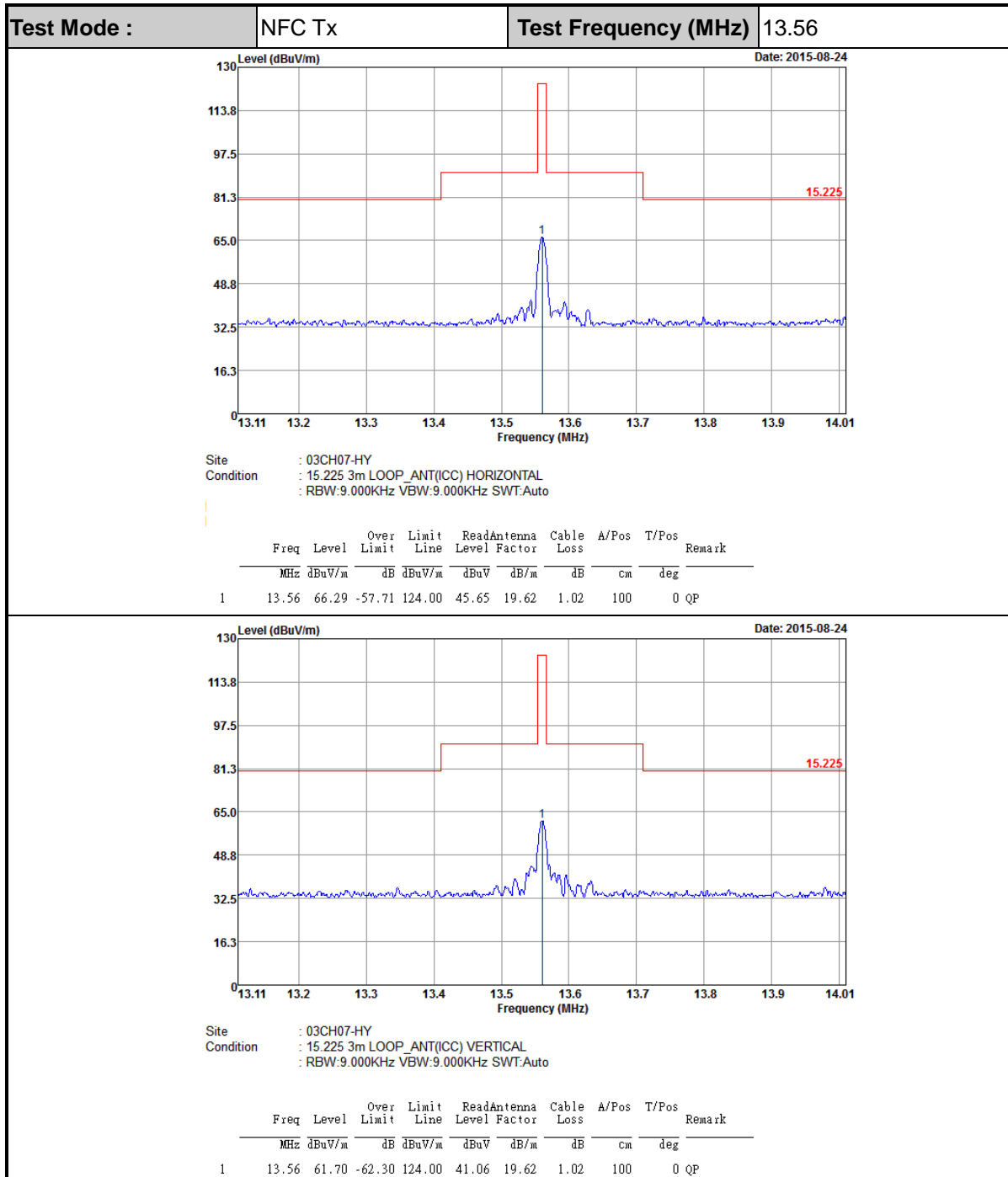
<For Sample 1 - Type A>



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



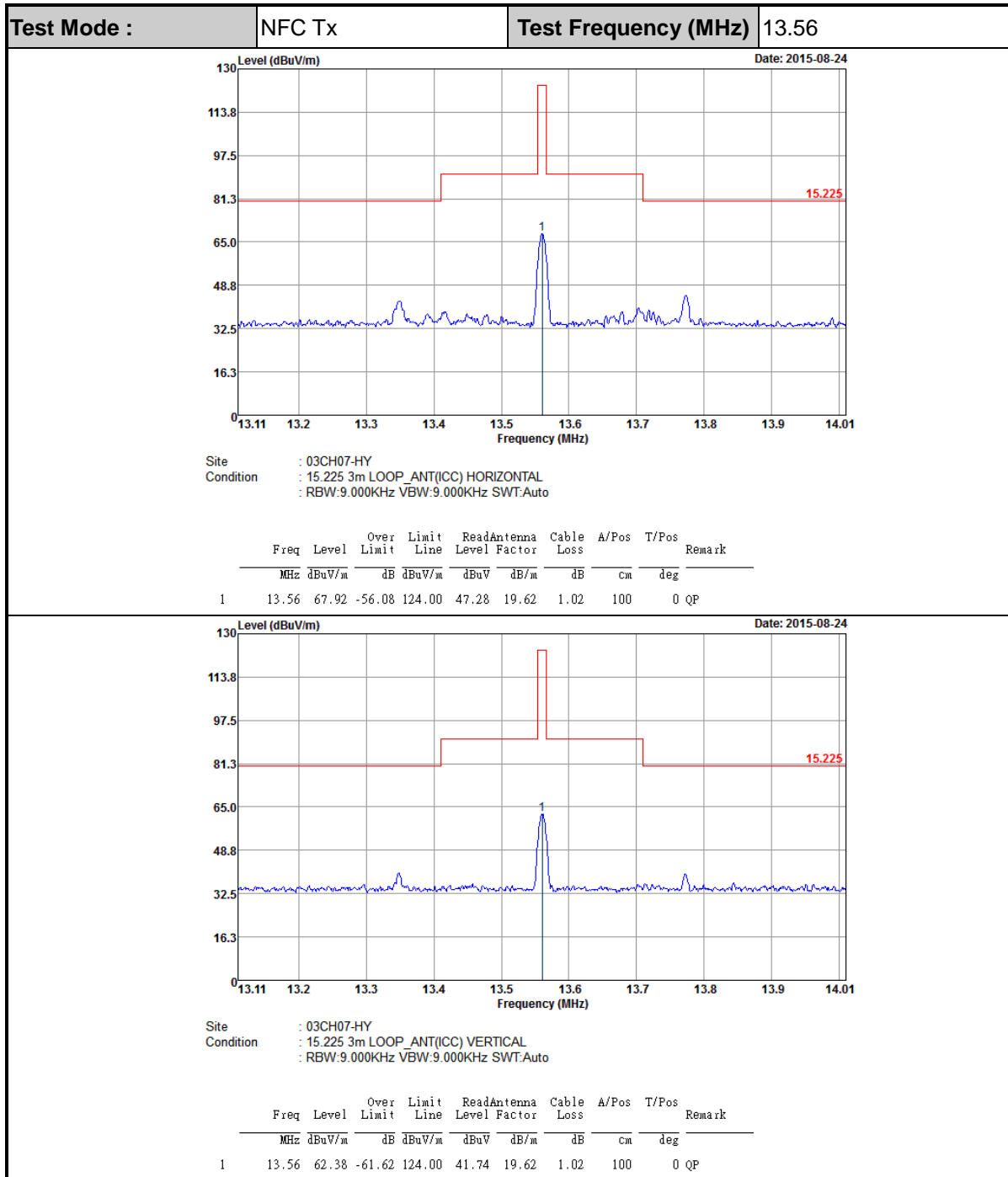
<For Sample 1 - Type B>



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



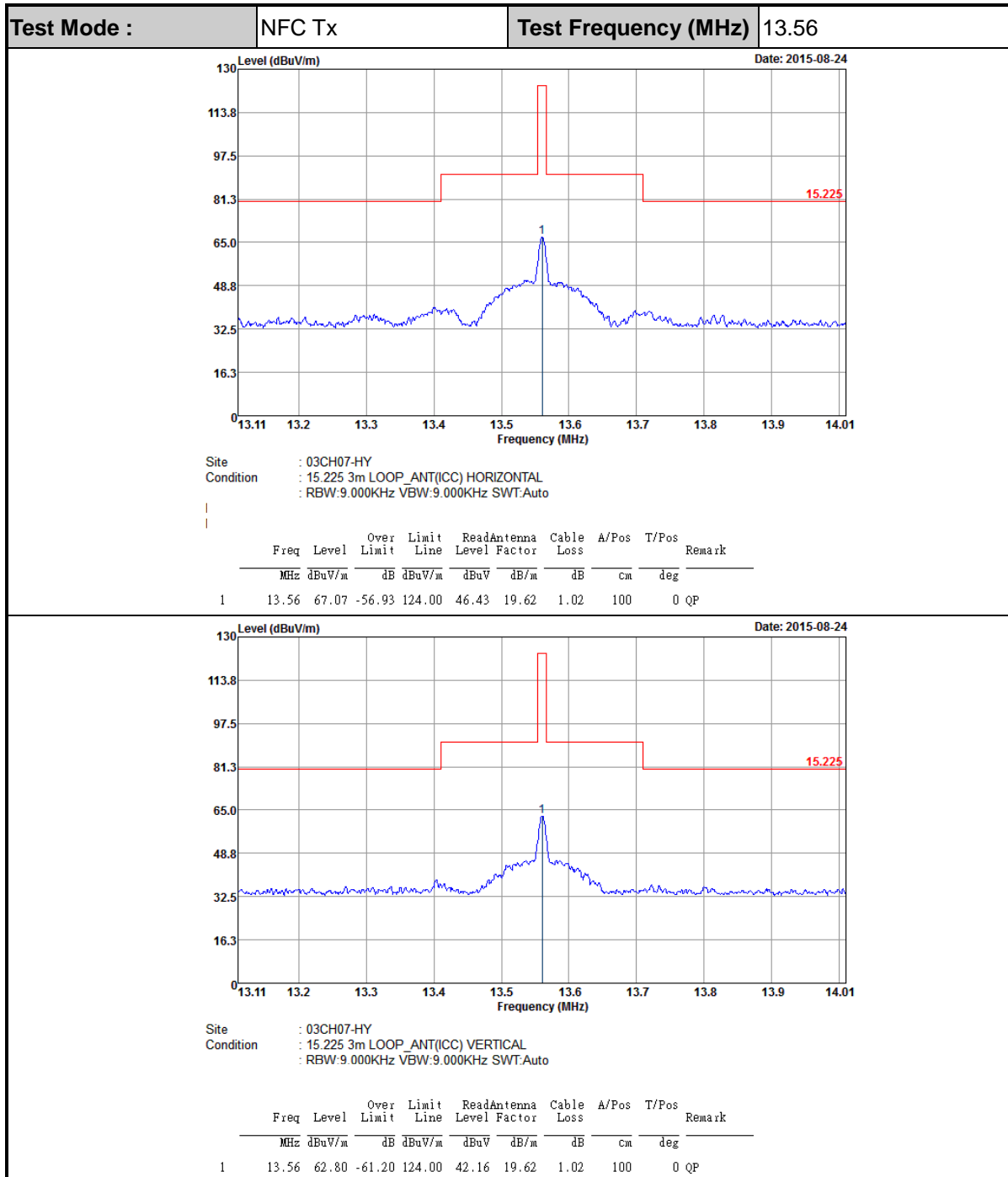
<For Sample 1 - Type F>



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

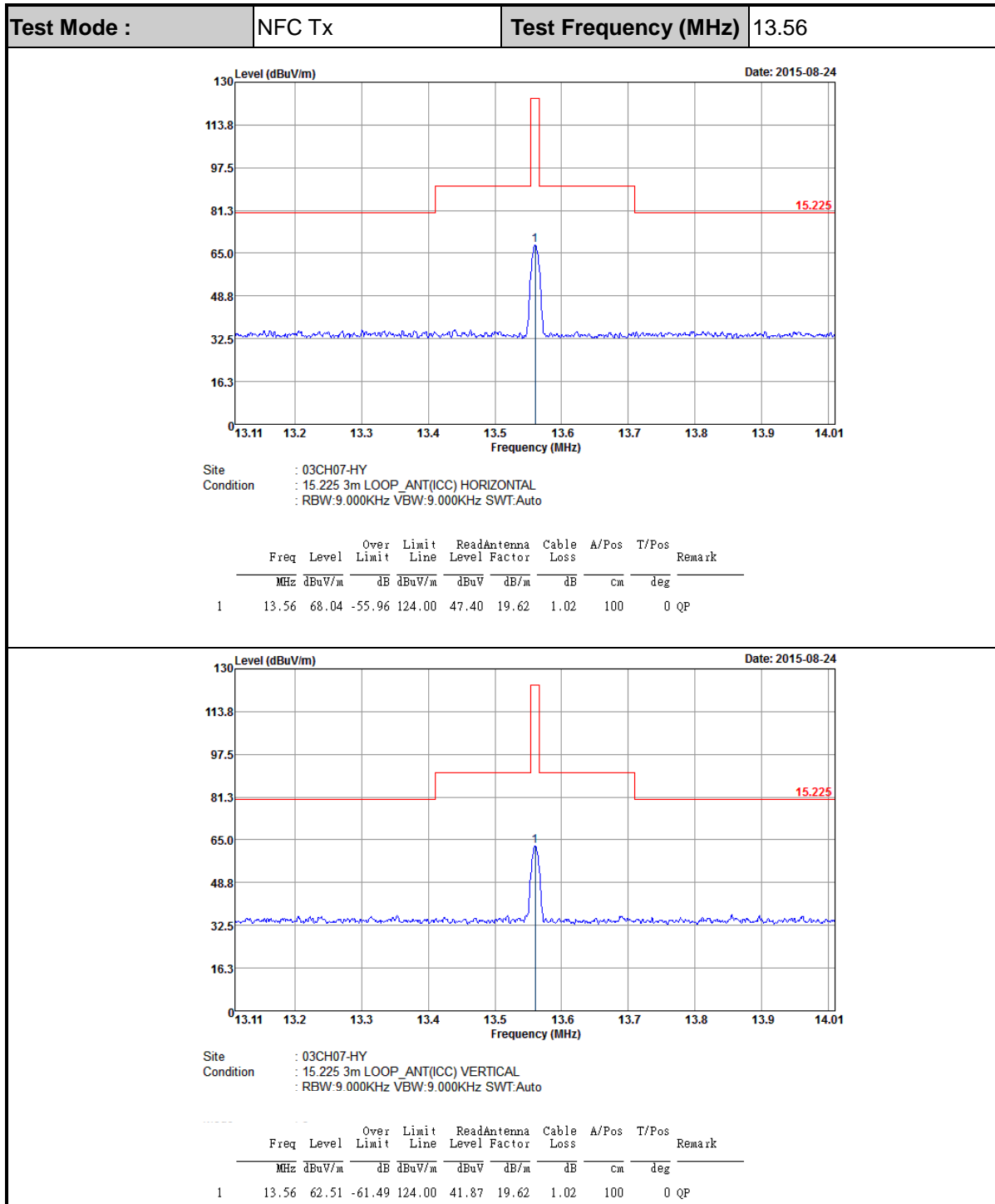


<For Sample 1 - Type V>

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



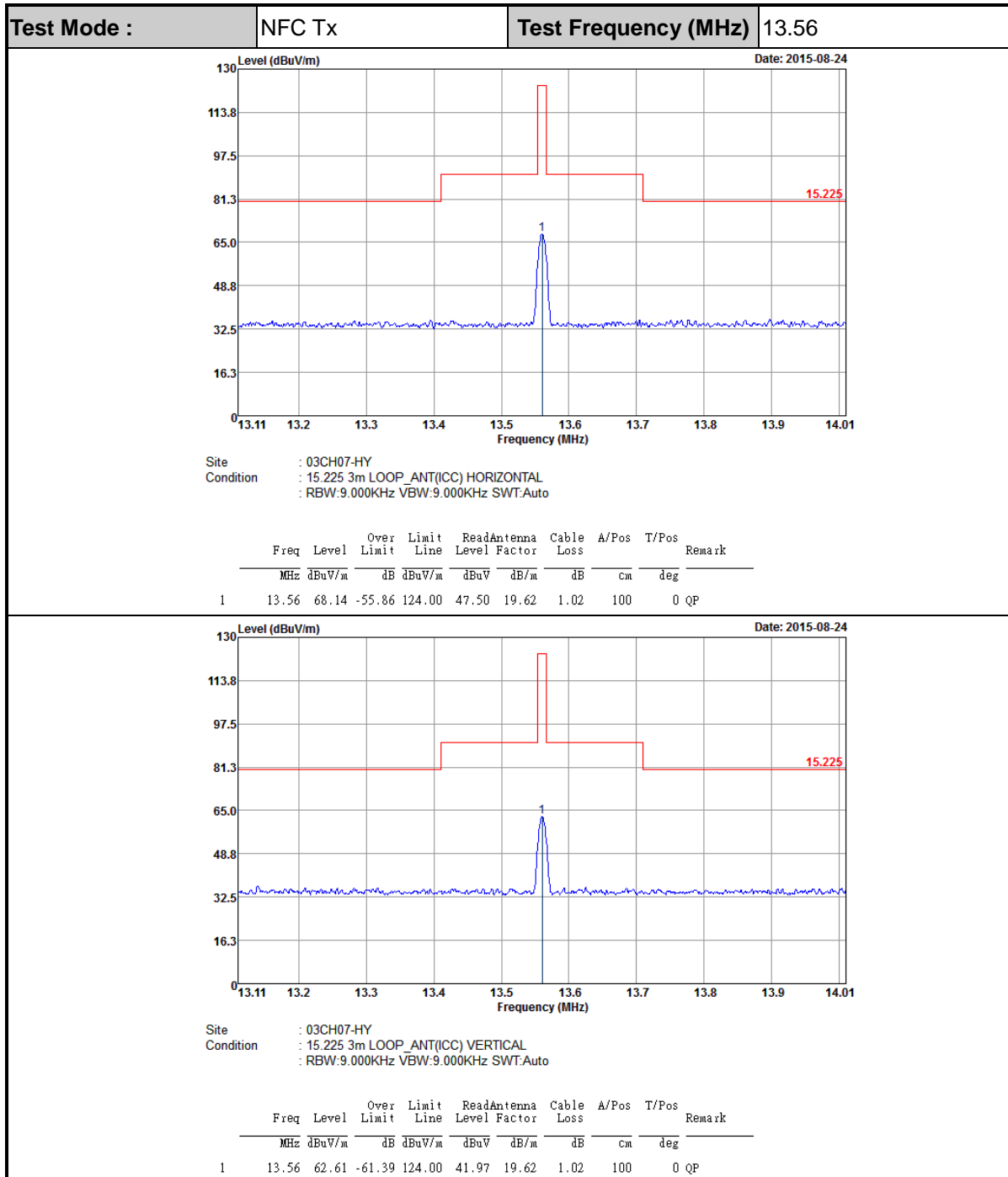
<For Sample 2 - Type F>



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



<For Sample 3 - Type F>

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



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

<For Sample 1 - Type F>

Test Mode :	NFC Tx	Polarization :	Horizontal
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Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.009	26.61	-101.91	128.52	6.04	20.28	0.29			Average
0.06468	34.4	-76.99	111.39	14.04	20.07	0.29			Average
0.0923	21.59	-86.71	108.3	1.25	20.05	0.29			QP
0.12936	32.02	-73.35	105.37	11.71	20.02	0.29			Average
0.41146	40.14	-55.18	95.32	19.94	19.91	0.29			Average
0.50502	39.89	-33.65	73.54	19.7	19.9	0.29			QP
9.928	35.88	-33.62	69.5	15.73	19.76	0.39			QP
13.56	68.1	-	-	48.08	19.62	0.4			QP
19.555	37.9	-31.6	69.5	17.48	19.99	0.43			QP
28.535	36.51	-32.99	69.5	15.68	20.32	0.51			QP

Test Mode :	NFC Tx	Polarization :	Vertical
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Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.01155	26.18	-100.17	126.35	5.61	20.28	0.29			Average
0.06465	31.08	-80.31	111.39	10.72	20.07	0.29			Average
0.09872	21.27	-86.45	107.72	0.93	20.05	0.29			QP
0.12936	28.85	-76.52	105.37	8.54	20.02	0.29			Average
0.44376	41.51	-53.15	94.66	21.31	19.91	0.29			Average
0.5651	39.72	-32.84	72.56	19.51	19.9	0.31			QP
11.264	35.78	-33.72	69.5	15.67	19.72	0.39			QP
13.56	62.76	-	-	42.74	19.62	0.4			QP
20.761	37.93	-31.57	69.5	17.42	20.08	0.43			QP
27.06	36.4	-33.1	69.5	15.58	20.34	0.48			QP

Note:

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



<For Sample 2 - Type F>

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
0.03409	30.6	-86.35	116.95	10.14	20.17	0.29			Average
0.06462	34.13	-77.27	111.4	13.77	20.07	0.29			Average
0.10466	21.37	-85.84	107.21	1.03	20.05	0.29			QP
0.12924	31.45	-73.93	105.38	11.14	20.02	0.29			Average
0.4458	40.61	-54.01	94.62	20.42	19.9	0.29			Average
0.49751	40.32	-33.35	73.67	20.13	19.9	0.29			QP
11.6	35.46	-34.04	69.5	15.35	19.71	0.4			QP
13.56	67.93	-	-	47.91	19.62	0.4			QP
20.887	37.16	-32.34	69.5	16.64	20.09	0.43			QP
25.61	36.95	-32.55	69.5	16.15	20.33	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
0.00925	26.98	-101.3	128.28	6.41	20.28	0.29			Average
0.06462	30.06	-81.34	111.4	9.7	20.07	0.29			Average
0.09902	21.3	-86.39	107.69	0.96	20.05	0.29			QP
0.12924	28.09	-77.29	105.38	7.78	20.02	0.29			Average
0.26118	41.99	-57.28	99.27	21.75	19.95	0.29			Average
0.49	38.94	-34.86	73.8	18.75	19.9	0.29			QP
11.208	36.6	-32.9	69.5	16.49	19.72	0.39			QP
13.56	62.6	-	-	42.58	19.62	0.4			QP
20.887	36.87	-32.63	69.5	16.35	20.09	0.43			QP
25.22	36.37	-33.13	69.5	15.6	20.32	0.45			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.



<For Sample 3 - Type F>

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
0.03409	28.31	-88.64	116.95	7.85	20.17	0.29			Average
0.06462	33.94	-77.46	111.4	13.58	20.07	0.29			Average
0.09978	21.12	-86.5	107.62	0.78	20.05	0.29			QP
0.12924	31.89	-73.49	105.38	11.58	20.02	0.29			Average
0.4407	41.06	-53.66	94.72	20.86	19.91	0.29			Average
0.50502	39.09	-34.45	73.54	18.9	19.9	0.29			QP
12.696	35.55	-33.95	69.5	15.49	19.66	0.4			QP
13.56	67.69	-	-	47.67	19.62	0.4			QP
21.166	36.79	-32.71	69.5	16.25	20.11	0.43			QP
29.81	36.77	-32.73	69.5	16.03	20.21	0.53			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
0.0139	26.02	-98.73	124.75	5.45	20.28	0.29			Average
0.06459	30.71	-80.69	111.4	10.35	20.07	0.29			Average
0.10566	21.91	-85.22	107.13	1.57	20.05	0.29			QP
0.12924	28.36	-77.02	105.38	8.05	20.02	0.29			Average
0.45192	40.68	-53.82	94.5	20.49	19.9	0.29			Average
0.50502	38.95	-34.59	73.54	18.76	19.9	0.29			QP
11.8	35.78	-33.72	69.5	15.68	19.7	0.4			QP
13.56	62.62	-	-	42.6	19.62	0.4			QP
18.043	37.65	-31.85	69.5	17.37	19.86	0.42			QP
26.98	36.92	-32.58	69.5	16.1	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)

<For Sample 1 - Type F>

Test Mode :		NFC Tx				Polarization :		Horizontal		
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
127.47	22.1	-21.4	43.5	39.06	11.76	2.38	31.1			Peak
203.34	13.87	-29.63	43.5	33.14	9.14	2.69	31.1			Peak
271.38	22.35	-23.65	46	37.29	12.88	3.16	30.98			Peak
452.6	20.68	-25.32	46	30.48	17.33	3.63	30.76			Peak
727	25.25	-20.75	46	29.4	21.84	4.41	30.4			Peak
916.7	28.68	-17.32	46	30.39	23.82	4.8	30.33	100	0	Peak

Test Mode :		NFC Tx				Polarization :		Vertical		
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
66.18	15.58	-24.42	40	38.66	6.08	2.06	31.22			Peak
217.11	14.52	-31.48	46	33.59	9.27	2.69	31.03			Peak
278.13	16.01	-29.99	46	30.95	12.82	3.16	30.92			Peak
552.7	23.62	-22.38	46	30.54	19.86	4.01	30.79			Peak
745.2	25.92	-20.08	46	29.69	22.15	4.48	30.4	100	0	Peak
963.6	29.11	-24.89	54	29.79	24.73	4.94	30.35			Peak

Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.



<For Sample 2 - Type F>

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
126.66	23.06	-20.44	43.5	40.02	11.76	2.38	31.1			Peak
217.11	23.49	-22.51	46	42.56	9.27	2.69	31.03			Peak
271.38	23.48	-22.52	46	38.42	12.88	3.16	30.98			Peak
486.9	22.02	-23.98	46	31.17	17.81	3.77	30.73			Peak
735.4	26.39	-19.61	46	30.28	22.1	4.41	30.4	100	0	Peak
972	29.6	-24.4	54	30.13	24.84	4.94	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
64.56	17.28	-22.72	40	40.42	6	2.06	31.2			Peak
145.02	15.02	-28.48	43.5	32.01	11.5	2.61	31.1			Peak
259.23	16.78	-29.22	46	30.98	13.84	2.96	31			Peak
514.9	21.69	-24.31	46	30.36	18.1	3.89	30.66			Peak
831.3	28.09	-17.91	46	30.91	22.84	4.7	30.36	100	0	Peak
979.7	30.8	-23.2	54	31.14	25	4.94	30.28			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.



<For Sample 3 - Type F>

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)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
98.04	18.45	-25.05	43.5	37.57	9.92	2.06	31.1			Peak
173.1	12.33	-31.17	43.5	31.38	9.38	2.61	31.04			Peak
243.3	14.46	-31.54	46	30.8	11.7	2.96	31			Peak
565.3	23.1	-22.9	46	29.99	19.84	4.01	30.74			Peak
745.2	26.73	-19.27	46	30.5	22.15	4.48	30.4			Peak
945.4	28.83	-17.17	46	29.92	24.36	4.94	30.39	100	0	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)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
125.31	14.19	-29.31	43.5	31.31	11.6	2.38	31.1			Peak
236.82	13.98	-32.02	46	31.08	10.94	2.96	31			Peak
258.96	16.98	-29.02	46	31.18	13.84	2.96	31			Peak
394.5	19.21	-26.79	46	30.92	15.7	3.52	30.93			Peak
758.5	26.5	-19.5	46	30.3	22.1	4.48	30.38	100	0	Peak
985.3	29.44	-24.56	54	29.78	24.89	5.03	30.26			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.