

APPLICATION FOR CERTIFICATION  
On Behalf of  
**DIEBOLD NIXDORF SINGAPORE PTE. LTD.**  
NFC Reader

Model No. : NFC A Series  
Brand : DIEBOLD NIXDORF  
FCC ID : 2ACY3-NFC-A-SERIES

Prepared for

**DIEBOLD NIXDORF SINGAPORE PTE. LTD.**  
30A Kallang Place, #04-01 Singapore 339213

Prepared by

**Audix Technology (Wujiang) Co., Ltd. EMC Dept.**  
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Report Number : ACWE-F2009012  
Date of Test : Sep.24~28, 2020  
Date of Report : Sep.30, 2020

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## TEST REPORT CERTIFICATION

Applicant : DIEBOLD NIXDORF SINGAPORE PTE. LTD.  
 Manufacturer : DIEBOLD NIXDORF SINGAPORE PTE. LTD.  
 EUT Description : NFC Reader  
 FCC ID : 2ACY3-NFC-A-SERIES  
 (A) Model No. : NFC A Series  
 (B) Brand : DIEBOLD NIXDORF  
 (C) Power Supply : DC 5V, 0.3A  
 (D) Test Voltage : AC 120V, 60Hz

Applicable Standards:

### FCC RULES AND REGULATIONS PART 15 SUBPART C, Section 15.225

The device described above was tested by Audix Technology (Wujiang) Co., Ltd. EMC Dept. to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C section 15.207, 15.209&15.247 limits.

The measurement results are contained in this test report and Audix Technology (Wujiang) Co., Ltd. EMC Dept. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this test report shows that the EUT to be technically compliant with the FCC limits.

This test report applies to above tested sample only. This test report shall not be reproduced in part without written approval of Audix Technology (Wujiang) Co., Ltd. EMC Dept.

Date of Test: Sep.24~28, 2020

Date of Report: Sep.30, 2020

Prepared by :



(Emma Hu/Assistant Administrator)

Approved & Authorized Signer :



(Ken Lu/ Vice General Manager)



## 1. DESCRIPTION OF VERSION

Edition No.	Date of Rev.	Summary	Report No.
0	Sep.30, 2020	Original Report.	ACWE-F2009012

## 2. SUMMARY OF MEASUREMENTS AND RESULTS

The EUT has been tested according to the applicable standards and test results are referred as below.

Description of Test Item	Section in CFR 47	Results	Remark
CONDUCTED EMISSION	Section 15.207	PASS	Minimum passing margin is 11.67dB at 13.569MHz
FIELD STRENGTH OF FUNDAMNETAL EMISSION	Section 15.225	PASS	Minimum passing margin is 48.50dB at 13.772MHz
RADIATED EMISSION	Section 15.209 & 15.225	PASS	Minimum passing margin is 6.96dB at 13.551MHz
20 dB BANDWIDTH	Section 15.215	PASS	----
FEQUENCY STABILITY	Section 15.225	PASS	----

### 3. GENERAL INFORMATION

### 3.1. Description of Device (EUT)

Description	:	NFC Reader
Model No.	:	NFC A Series
FCC ID	:	2ACY3-NFC-A-SERIES
Brand	:	DIEBOLD NIXDORF
Applicant	:	DIEBOLD NIXDORF SINGAPORE PTE. LTD. 30A Kallang Place, #04-01 Singapore 339213
Manufacturer	:	DIEBOLD NIXDORF SINGAPORE PTE. LTD. 30A Kallang Place, #04-01 Singapore 339213
Radio	:	NFC
Operation Frequency	:	13.56MHz
Date of Receipt of Sample	:	Aug.25, 2020
Date of Test	:	Sep.24~28, 2020

### 3.2. Tested Supporting System Details (AE)

### 3.2.1. POS Terminal

Manufacturer : DIEBOLD NIXDORF  
Model Number : BEETLE A1050  
Serial Number : N/A

### 3.2.2.Adapter

Manufacturer : Acbel  
Model Number : ADC029  
Serial Number : N/A

### 3.3. Description of Test Facility

Name of Firm	:	<b>Audix Technology (Wujiang) Co., Ltd. EMC Dept.</b>
Site Location	:	No. 1289 Jiangxing East Road, the Eastern Part of Wujiang Economic Development Zone Jiangsu China 215200
Test Facilities	:	<b>No.1 Conducted Shielding Enclosure No.2 3m Semi-anechoic Chamber RF Fully Chamber</b>
NVLAP Lab Code	:	200786-0 Valid until on Sep.30, 2021 (NVLAP is a signatory member of ILAC MRA) Remark: This report shall not be imply endorsement, certification or approval by NVLAP, NIST, or any agency of the U.S. Federal Government.

### 3.4. Measurement Uncertainty

Test Item	Range Frequency	Uncertainty
No.1 Conducted Disturbance Measurement	0.15MHz ~ 30MHz	± 3.40dB
Radiated Disturbance Measurement (At 3m Chamber)	30MHz ~ 1GHz	± 5.92dB
Radiated Disturbance Measurement (At 3m Chamber)	1GHz ~ 6GHz	± 6.02dB
	6GHz ~ 18GHz	± 6.80dB

Remark: Uncertainty =  $ku_c(y)$

The standards listed in this report only require the uncertainty to be listed, and the measurement uncertainty is not required to be calculated in the measurement results. Therefore, the conformity judgment results are in accordance with the quality document TMC-205, and the test results in this report meet the requirements of the standards listed in this report.

## 4. ANTENNA REQUIREMENTS

### According to FCC 47 CFR §15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antennas of this E.U.T are permanently attached.

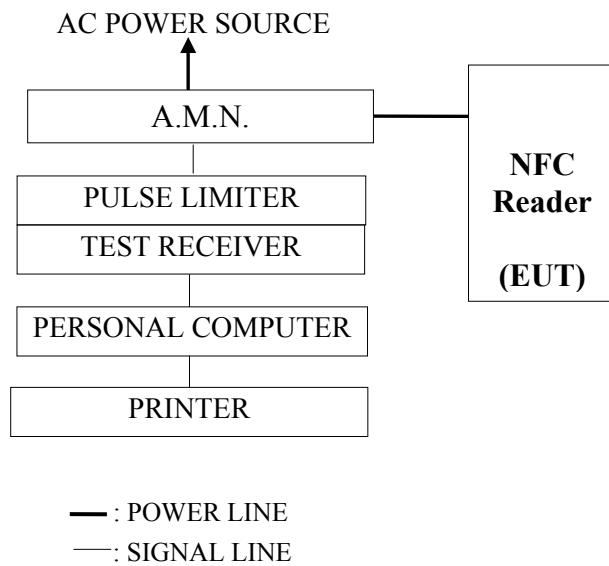
\*The E.U.T Complies with the requirement of §15.203

## 5. CONDUCTED EMISSION MEASUREMET

### 5.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Test Receiver	R & S	ESCI	100351	2020-08-25	1 Year
2.	A.M.N.	R & S	ESH2-Z5	100153	2019-12-20	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-1793-3	2020-04-03	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	101832	2019-12-20	1 Year
6.	RF Cable	Shengxuan	SX-ROS400	Cable 59/2+Switch	2019-12-20	1 Year
7.	Software			Audix /e3 (9.160323)		

### 5.2. Block Diagram of Test Setup



### 5.3. Power line Conducted Emission Limit

(FCC Part 15, Section 15.207, Class B)

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB $\mu$ V	56 ~ 46 dB $\mu$ V
500kHz ~ 5MHz	56 dB $\mu$ V	46 dB $\mu$ V
5MHz ~ 30MHz	60 dB $\mu$ V	50 dB $\mu$ V

Remark1: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2: The lower limit applies at the band edges.

#### 5.4. Test Procedure

The measuring process is according to ANSI C63.10-2013 and laboratory internal procedure TKC-301-004. (For FCC Part15 Subpart C)

In the conducted emission measurement, the EUT and all peripheral devices were set up on a non-metallic table which was 0.8 meter height above the ground plane, and 0.4 meter far away from the vertical plane. The mains cable of the EUT connected to one Artificial Main Network(AMN). All other unit of the EUT and AE connected to a second Line Impedance Stabilization Network(L.I.S.N.). The telecommunication cable connected to the AE through a Impedance Stabilization Network(ISN) which terminated a  $50\Omega$  resistor. For the measurement, the A.M.N measuring port was terminated by a  $50\Omega$  measuring equipment and the second L.I.S.N measuring port was terminated by a  $50\Omega$  terminator. All measurements were done between the phase lead and the reference ground, and between the neutral lead and the reference ground. All cables or wires placement were verified to find out the maximum emission.

The bandwidth of measuring receiver was set at 9 kHz.

The required frequency band (0.15 MHz ~ 30 MHz) was pre-scanned with peak detector; the final measurement was measured with quasi-peak detector and average detector. (If the average limit is met when using a quasi-peak detector, the average detector is unnecessary).

The emission level is calculated automatically by the test system which uses the following equation:

Emission level (dB $\mu$ V) = Reading (dB $\mu$ V) + A.M.N factor (dB) + Cable loss (dB).  
(Cable Loss includes pulse limiter loss+Switch+Cable)

## 5.5. Conducted Emission Measurement Results

For FCC Part15 Subpart C

**PASSED.**

EUT was performed during this section testing and all the test results are attached in next pages.

Test Date: Sep.24, 2020

Temperature: 24°C

Humidity: 54%

Mode	Test Condition	Reference Test Data No.	
		Neutral	Line
<b>1</b>	<b>TX 13.56MHz</b>	<b>※# 1</b>	<b># 2</b>

NOTE 1- '※'means the worst test mode.

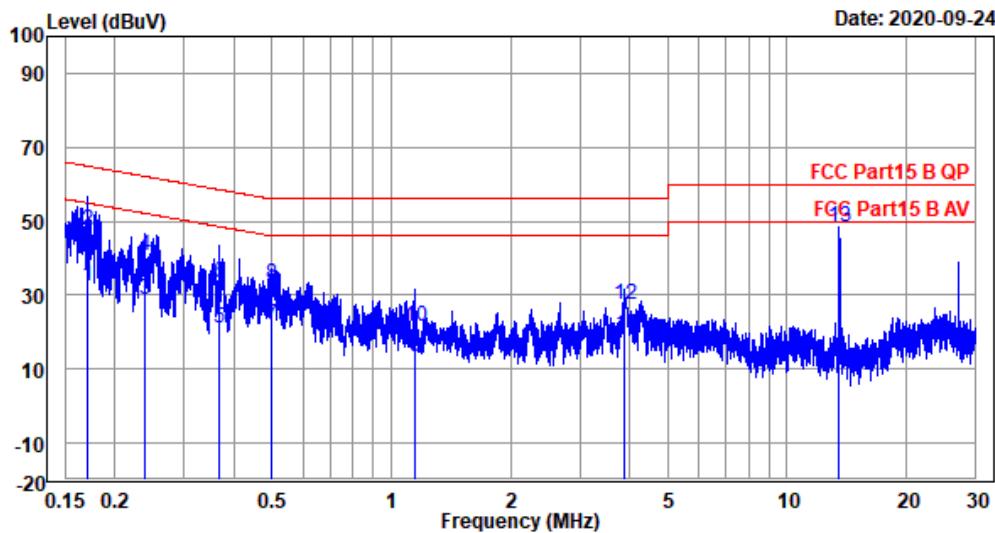
NOTE 2- The worst emission is detected at 13.569MHz with emission level of 48.33dB (μV) and with Peak detector (Limit is 60.00dB (μV)), when the Neutral of the EUT is connected to AMN.



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File: F:\TEST DATA\2020\Report07\C1W2007015\C1W20007015\_00001.EMI

Date: 2020-09-24



Site NO. : NO.1 Shielded Room phase.: Neutral Data NO.:1  
AMN/LISN . : ESH2-Z5-ADP-1912 Engineer : liuzhibo  
Limit : FCC Part15 B QP  
Env. / Ins. : 24°C&54%ESCI  
EUT : NFC Reader  
M/N : NFC A Series  
Power Rating : 120Vac/60Hz  
Test Mode : TX 13.56MHZ  
Memo :

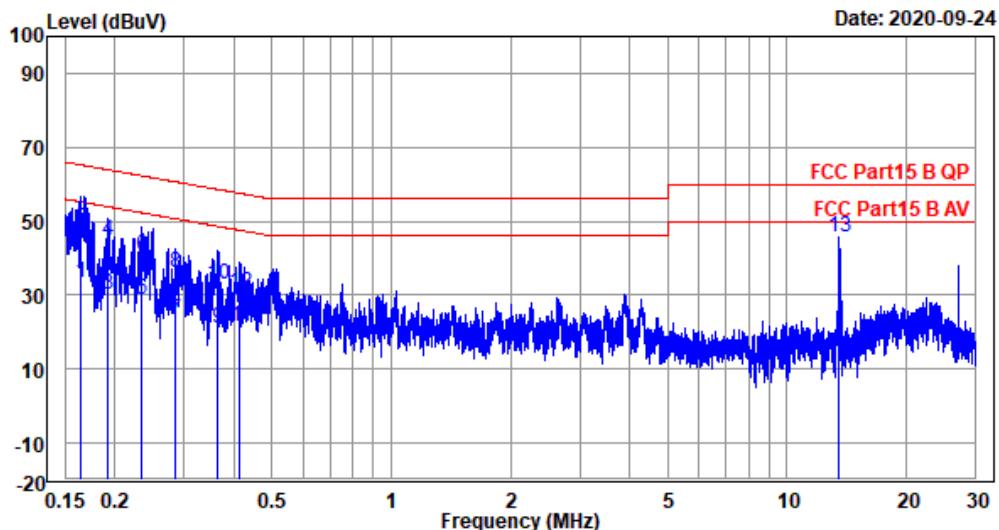
Freq. MHz	AMN. Factor dB	Cable		Emission				Remark
		Loss dB	Reading dBuV	Level dBuV	Limits dBuV	Margin dB		
0.170	0.17	9.90	22.55	32.62	54.94	22.32	Average	
0.170	0.17	9.90	37.61	47.68	64.94	17.26	QP	
0.239	0.18	9.90	18.78	28.86	52.14	23.28	Average	
0.239	0.18	9.90	30.44	40.52	62.14	21.62	QP	
0.368	0.19	9.90	11.05	21.14	48.54	27.40	Average	
0.368	0.19	9.90	23.30	33.39	58.54	25.15	QP	
0.500	0.19	9.90	11.72	21.81	46.00	24.19	Average	
0.500	0.19	9.90	22.70	32.79	56.00	23.21	QP	
1.151	0.22	9.92	3.00	13.14	46.00	32.86	Average	
1.151	0.22	9.92	11.18	21.32	56.00	34.68	QP	
3.889	0.31	9.97	9.09	19.37	46.00	26.63	Average	
3.889	0.31	9.97	17.02	27.30	56.00	28.70	QP	
13.569	0.67	10.08	37.58	48.33	60.00	11.67	Peak	

remarks:Emission Level = AMN factor+Cable loss(Pulse Att+Cable+Switch)+Reading



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File: F:\TEST DATA\2020\Report07\C1W2007015\C1W20007015\_00002.EMI



Site NO. : NO.1 Shielded Room phase.: Line Data NO.:2  
AMN/LISN . : ESH2-Z5-ADP-1912 Engineer : liuzhibo  
Limit : FCC Part15 B QP  
Env. / Ins. : 24°C&54%ESCI  
EUT : NFC Reader  
M/N : NFC A Series  
Power Rating : 120Vac/60Hz  
Test Mode : TX 13.56MHZ  
Memo :

Freq. MHz	AMN. Factor dB	Cable		Emission				Remark
		Loss dB	Reading dBuV	Level dBuV	Limits dBuV	Margin dB		
0.164	0.24	9.90	23.36	33.50	55.24	21.74	Average	
0.164	0.24	9.90	37.92	48.06	65.24	17.18	QP	
0.192	0.24	9.90	20.17	30.31	53.93	23.62	Average	
0.192	0.24	9.90	34.51	44.65	63.93	19.28	QP	
0.234	0.24	9.90	18.77	28.91	52.30	23.39	Average	
0.234	0.24	9.90	30.37	40.51	62.30	21.79	QP	
0.285	0.25	9.90	13.37	23.52	50.67	27.15	Average	
0.285	0.25	9.90	26.09	36.24	60.67	24.43	QP	
0.366	0.25	9.90	10.96	21.11	48.60	27.49	Average	
0.366	0.25	9.90	22.89	33.04	58.60	25.56	QP	
0.415	0.25	9.90	11.28	21.43	47.56	26.13	Average	
0.415	0.25	9.90	20.56	30.71	57.56	26.85	QP	
13.569	0.66	10.08	35.11	45.85	60.00	14.15	Peak	

remarks:Emission Level = AMN factor+Cable loss(Pulse Att+Cable+Switch)+Reading

## 6. FIELD STRENGTH OF FUNDAMENTAL EMISSIONS

### MEASUREMENT

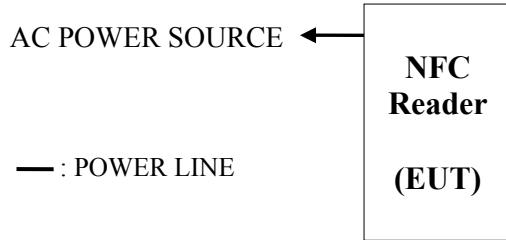
#### 6.1. Test Equipment

The following test equipment was used during the radiated emission measurement:  
At 3m Semi-Anechoic Chamber

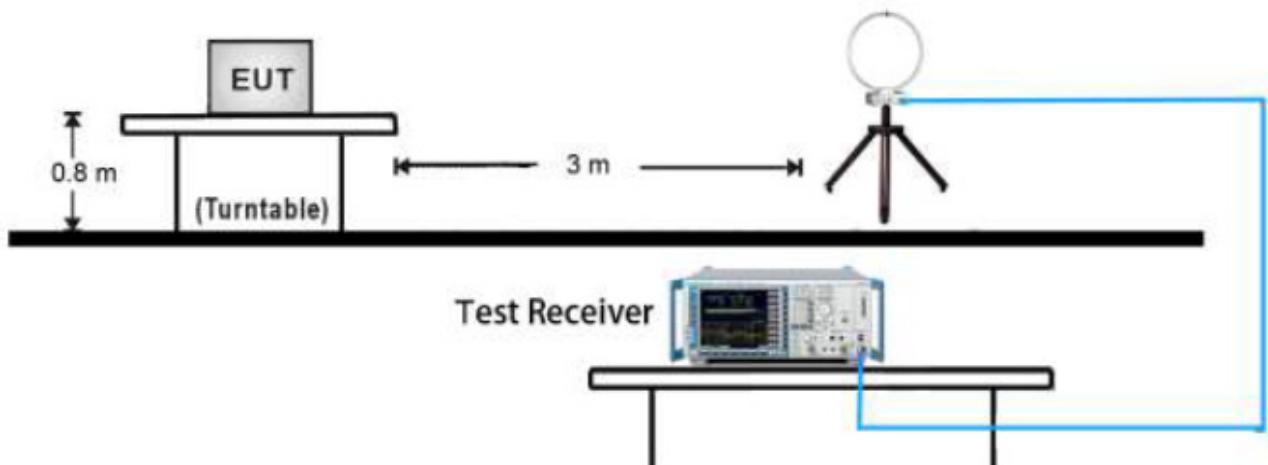
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Preamplifier	Agilent	8447D	2944A10922	2020-04-03	1 Year
2.	EMI Test Receiver	R&S	ESR7	101956	2020-04-07	1 Year
3.	RF Cable	Chengyi+ Shengxuan	NM500+ ROS400	190945+13000+ 3000	2020-03-18	1 Year
4.	Loop Antenna	TESEQ	HLA6120	1062	2020-06-02	1 Year
5.	Software			Audix /e3 (9.160323)		

#### 6.2. Block Diagram of Test Setup

##### 6.2.1. Block Diagram of Test Setup between EUT and simulators



##### 6.2.2. No. 1 3m Semi-Anechoic Chamber Setup Diagram (Test distance: 3m) for 9kHz-30MHz



### 6.3. Field Strength of Fundamental Emission Limits

FCC Part 15.225 Limits				
Frequency (MHz)	Field Strength ( $\mu$ V/m)at 30m	Field Strength (dB $\mu$ V/m)at 30m	Field Strength (dB $\mu$ V/m)at 10m	Field Strength (dB $\mu$ V/m)at 3m
1.705 ~ 13.110	30	29.5	48.58	69.5
13.110 ~ 13.410	106	40.5	59.98	80.5
13.410 ~13.553	334	50.5	69.58	90.5
13.553 ~13.567	15848	84	103.08	124
13.567 ~ 13.710	334	50.5	69.58	90.5
13.710 ~ 14.010	106	40.5	59.98	80.5
14.010 ~ 30.000	30	29.5	48.58	69.5

### 6.4. Measurement Results

**PASSED**

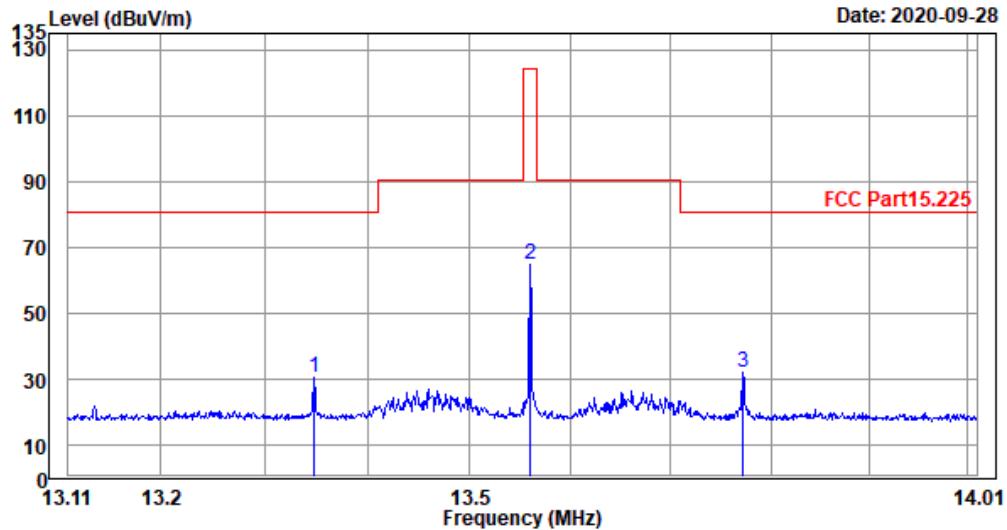
#### 6.4.1. For Restricted Bands:

The EUT was tested in restricted bands and all the test results are listed in next page.



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File: E:\TEST DATA\2020\Report\07\C1W2007015\C1W2007015\_00001.EMI



Site NO. : NO.2 3M chamber  
 Dis. / Ant. : HLA6120-2003  
 Limit : FCC Part15.225  
 Env. / Ins. : 18.9°C/48%  
 EUT : NFC Reader  
 M/N : NFC A Series  
 Power Rating : 120V/60Hz  
 Test Mode : TX 13.56MHz  
 Memo :

Ant. pol.: Horizontal Data NO.:1  
 Engineer : Zhangming

Freq.	Ant.	Cable	Preamp	Emission				
MHz	Factor	Loss	Reading	Factor	Level	Limits	Margin	Remark
	dB/m	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
13.349	20.17	0.48	37.65	28.11	30.19	80.50	50.31	Peak
13.560	20.17	0.49	72.04	28.11	64.59	124.00	59.41	Peak
13.772	20.18	0.49	39.44	28.11	32.00	80.50	48.50	Peak

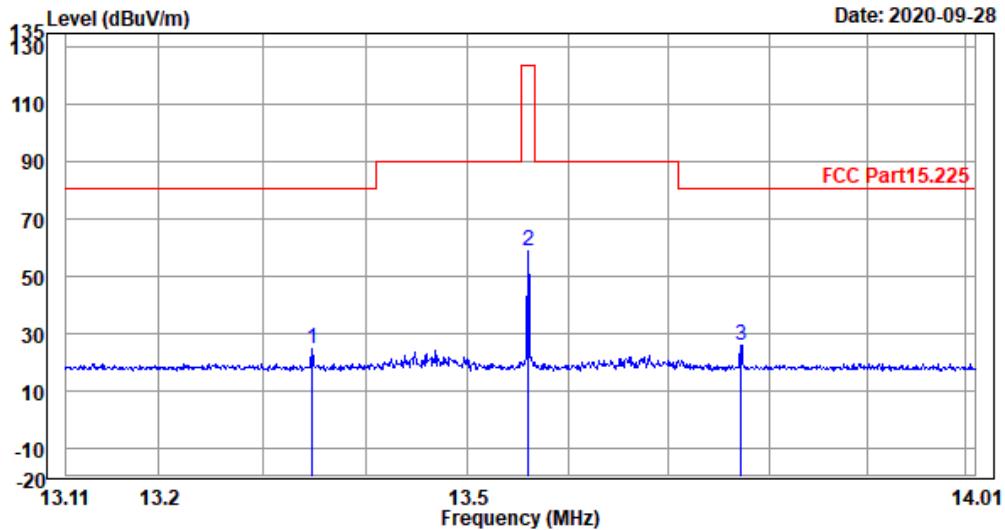
Remarks: Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor



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File: E:\TEST DATA\2020\Report\07\C1W2007015\C1W2007015\_00010.EMI

Date: 2020-09-28



Site NO. : NO.2 3M chamber  
 Dis. / Ant. : HLA6120-2003  
 Limit : FCC Part15.225  
 Env. / Ins. : 18.9°C/48%  
 EUT : NFC Reader  
 M/N : NFC A Series  
 Power Rating : 120V/60Hz  
 Test Mode : TX 13.56MHz  
 Memo :

Ant. pol.: Vertical Data NO.:10  
 Engineer : Zhangming

Freq.	Ant.	Cable	Preamp	Emission				
MHz	Factor	Loss	Reading	Factor	Level	Limits	Margin	Remark
	dB/m	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
13.348	20.17	0.48	32.54	28.11	25.08	80.50	55.42	Peak
13.560	20.17	0.49	66.22	28.11	58.77	124.00	65.23	Peak
13.772	20.18	0.49	33.53	28.11	26.09	80.50	54.41	Peak

Remarks:Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor

## 7. RADIATED SPURIOUS EMISSION MEASUREMENT

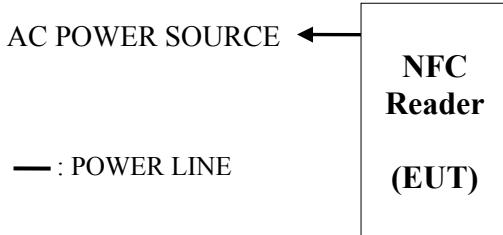
### 7.1. Test Equipment

The following test equipment was used during the radiated emission measurement:  
At 3m Semi-Anechoic Chamber

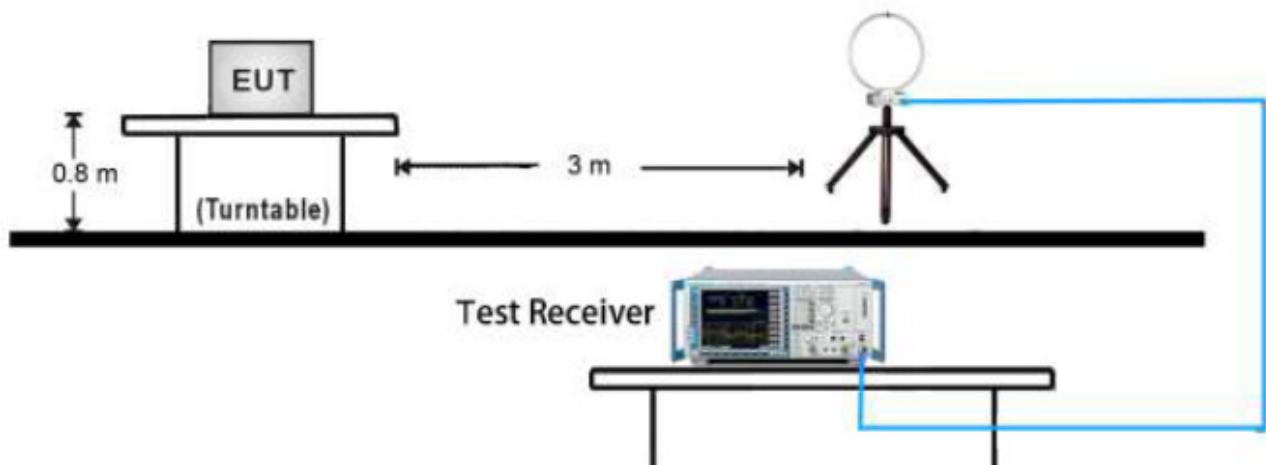
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Preamplifier	Agilent	8447D	2944A10922	2020-04-03	1 Year
2.	Bi-log Antenna	SCHWARZBECK	VULB 9168	706	2019-12-31	1 Year
3.	EMI Test Receiver	R&S	ESR7	101956	2020-04-07	1 Year
4.	RF Cable	Chengyi+ Shengxuan	NM500+ ROS400	190945+13000+ 3000	2020-03-18	1 Year
5.	Loop Antenna	TESEQ	HLA6120	1062	2020-06-02	1 Year
6.	Software			Audix /e3 (9.160323)		

### 7.2. Block Diagram of Test Setup

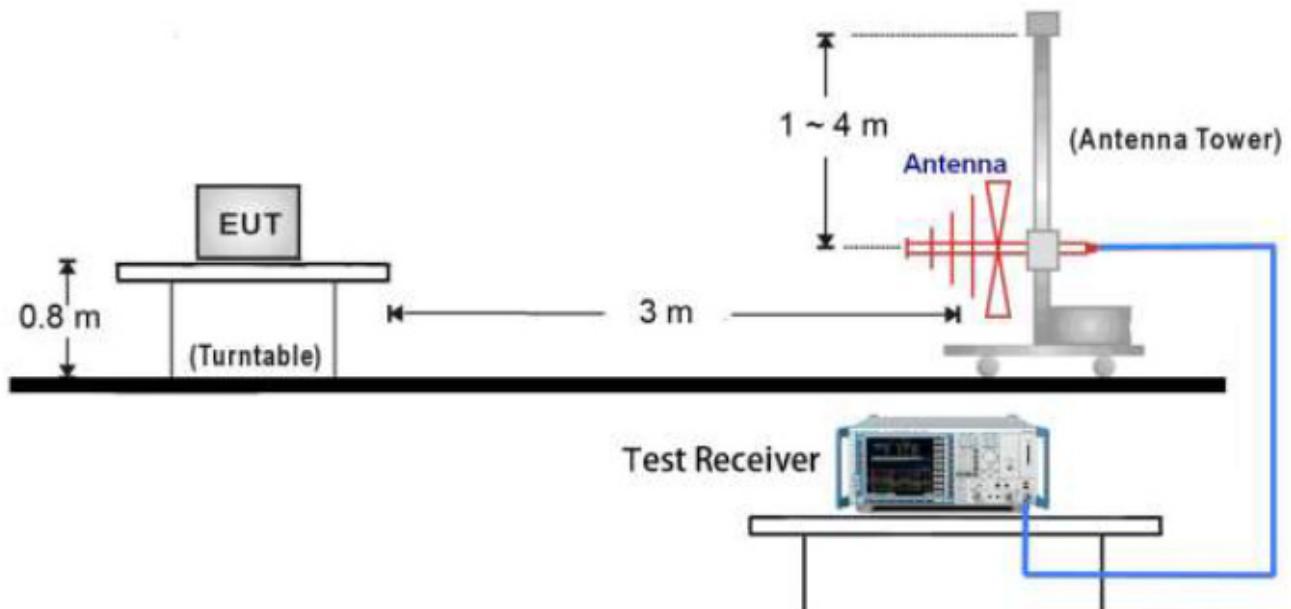
#### 7.2.1. Block Diagram of Test Setup between EUT and simulators



## 7.2.2. No. 1 3m Semi-Anechoic Chamber Setup Diagram (Test distance: 3m) for 9kHz-30MHz



## 7.2.3. No. 1 3m Semi-Anechoic Chamber Setup Diagram (Test distance: 3m) for 30MHz-1GHz



### 7.3. Radiated Spurious Emission Limits

All out of band emissions appearing in a restricted band as specified in Section 15.225 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Measured Distance (Meters)	Field Strength (V/m)
0.009 ~ 0.490	300	2400/F (kHz)
0.490 ~ 1.705	30	24000/F (kHz)
1.705 ~ 30	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960	3	500

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency 9-90kHz, 110-490kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

### 7.4. Measurement Results

#### **PASSED**

##### 7.4.1. For Restricted Bands:

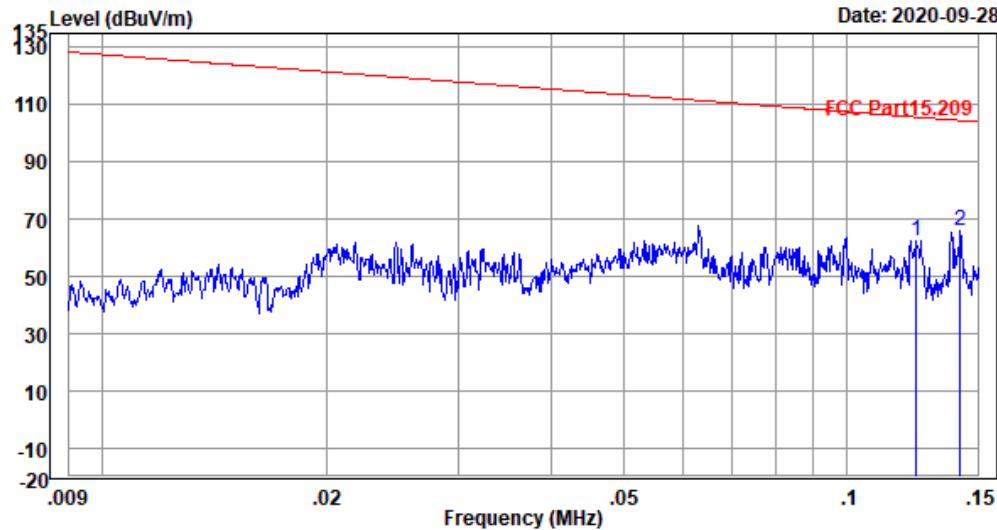
The EUT was tested in restricted bands and all the test results are listed in next page.



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File: E:\TEST DATA\2020\Report\07\C1W2007015\C1W2007015\_00008.EMI

Date: 2020-09-28



Site NO. : NO.2 3M chamber  
 Dis. / Ant. : HLA6120-2003  
 Limit : FCC Part15.209  
 Env. / Ins. : 18.9°C/48%  
 EUT : NFC Reader  
 M/N : NFC A Series  
 Power Rating : 120V/60Hz  
 Test Mode : TX 13.56MHz  
 Memo :

Ant. pol.: Horizontal Data NO.:8  
 Engineer : Zhangming

Freq.	Ant.	Cable	Preamp	Emission				
MHz	Factor	Loss	Reading	Factor	Level	Limits	Margin	Remark
	dB/m	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
0.124	20.10	0.06	68.62	26.40	62.38	105.77	43.39	Peak
0.142	20.10	0.06	72.45	26.66	65.95	104.57	38.62	Peak

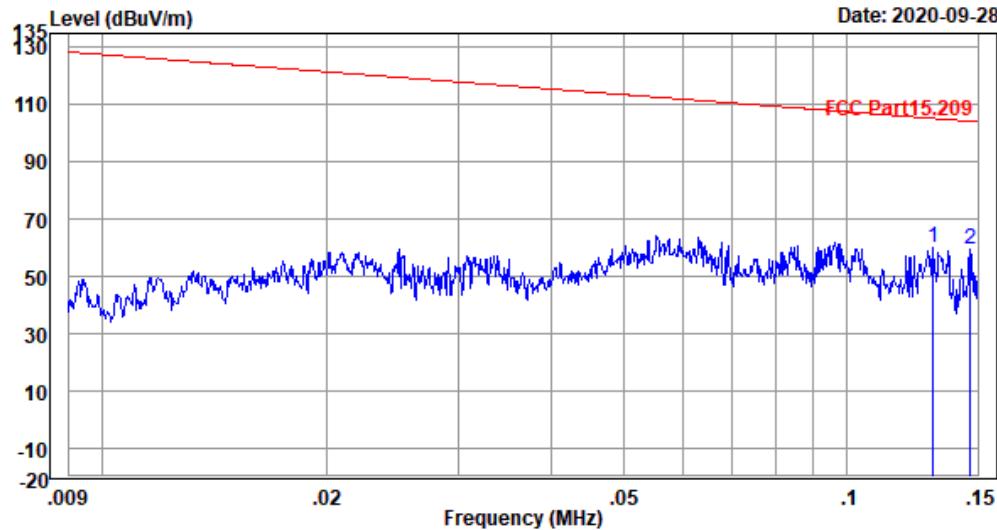
Remarks: Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor



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File: E:\TEST DATA\2020\Report\07\C1W2007015\C1W2007015\_00005.EMI

Date: 2020-09-28



Site NO. : NO.2 3M chamber  
 Dis. / Ant. : HLA6120-2003  
 Limit : FCC Part15.209  
 Env. / Ins. : 18.9°C/48%  
 EUT : NFC Reader  
 M/N : NFC A Series  
 Power Rating : 120V/60Hz  
 Test Mode : TX 13.56MHz  
 Memo :

Ant. pol.: Vertical Data NO.:5  
 Engineer : Zhangming

Freq.	Ant.	Cable	Preamp	Emission				
MHz	Factor	Loss	Reading	Factor	Level	Limits	Margin	Remark
0.130	20.10	0.06	66.05	25.85	60.36	105.33	44.97	Peak
0.146	20.10	0.06	65.65	26.02	59.79	104.33	44.54	Peak

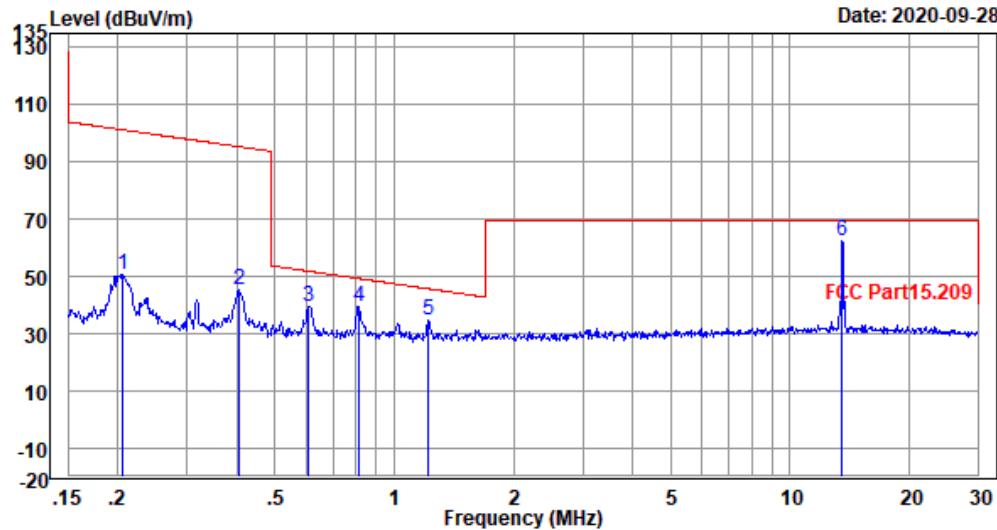
Remarks: Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor



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Date: 2020-09-28



Site NO. : NO.2 3M chamber Ant. pol.: Horizontal Data NO.:2  
 Dis. / Ant. : HLA6120-2003 Engineer : Zhangming  
 Limit : FCC Part15.209  
 Env. / Ins. : 18.9°C/48%  
 EUT : NFC Reader  
 M/N : NFC A Series  
 Power Rating : 120V/60Hz  
 Test Mode : TX 13.56MHz  
 Memo :

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Preamp Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
0.206	19.99	0.07	58.03	27.47	50.62	101.32	50.70	Peak
0.404	19.80	0.08	53.27	27.82	45.33	95.48	50.15	Peak
0.608	20.01	0.10	47.46	28.01	39.56	51.90	12.34	Peak
0.813	20.14	0.11	47.42	28.05	39.62	49.33	9.71	Peak
1.216	20.20	0.13	42.60	28.10	34.83	45.78	10.95	Peak
13.551	20.17	0.49	70.03	28.11	62.58	69.54	6.96	Peak

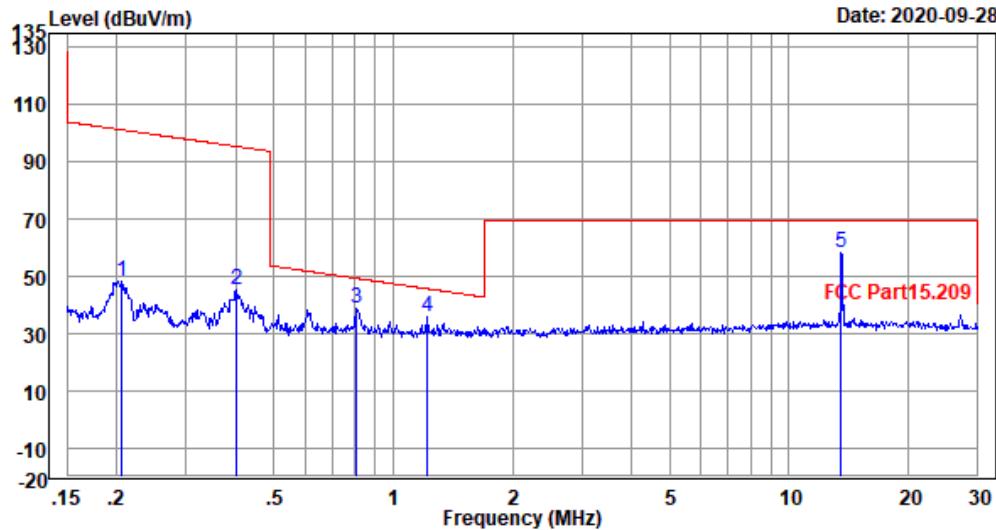
Remarks: Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor



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Date: 2020-09-28



Site NO. : NO.2 3M chamber  
 Dis. / Ant. : HLA6120-2003  
 Limit : FCC Part15.209  
 Env. / Ins. : 18.9°C/48%  
 EUT : NFC Reader  
 M/N : NFC A Series  
 Power Rating : 120V/60Hz  
 Test Mode : TX 13.56MHz  
 Memo :

Ant. pol.: Vertical Data NO.:9  
 Engineer : Zhangming

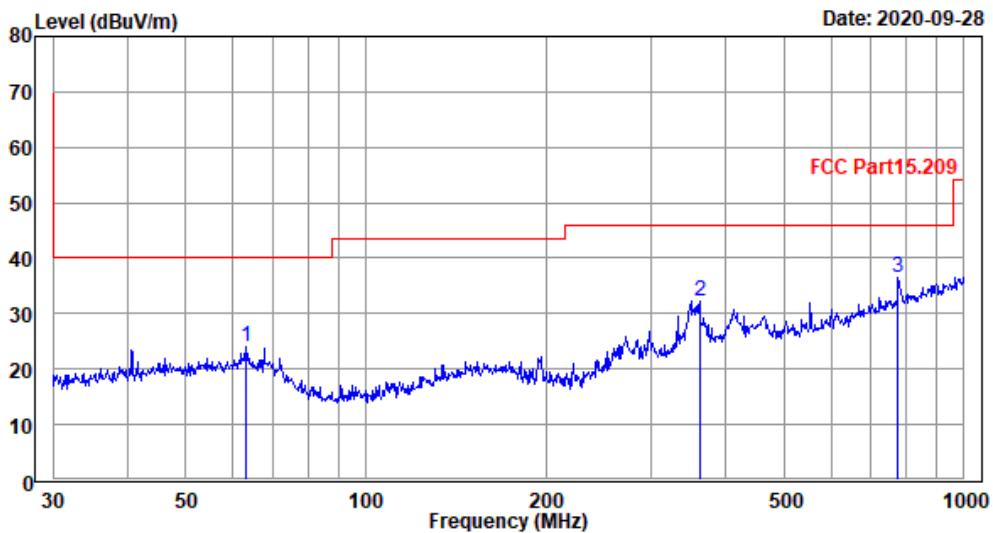
Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Preamp Factor dBuV	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
0.206	19.99	0.07	55.58	48.17	101.32	53.15	Peak
0.402	19.80	0.08	53.46	45.52	95.52	50.00	Peak
0.809	20.14	0.11	46.55	38.75	49.38	10.63	Peak
1.223	20.20	0.13	43.91	36.14	45.73	9.59	Peak
13.551	20.17	0.49	65.95	58.50	69.54	11.04	Peak

Remarks: Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor



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Site NO. : NO.2 3M chamber Ant. pol.: Horizontal Data NO.:11  
 Dis. / Ant. : 9168-705-1912 Engineer : Zhangming  
 Limit : FCC Part15.209  
 Env. / Ins. : 18.9°C/48%  
 EUT : NFC Reader  
 M/N : NFC A Series  
 Power Rating : 120V/60Hz  
 Test Mode : TX 13.56MHz  
 Memo :

Freq.	Ant.	Cable	Preamp	Emission				
MHz	Factor	Loss	Reading	Factor	Level	Limits	Margin	Remark
	dB/m	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
62.871	18.47	0.96	32.65	27.93	24.15	40.00	15.85	Peak
361.714	20.27	2.40	36.94	27.42	32.19	46.00	13.81	Peak
776.878	27.78	3.95	32.61	27.94	36.40	46.00	9.60	Peak

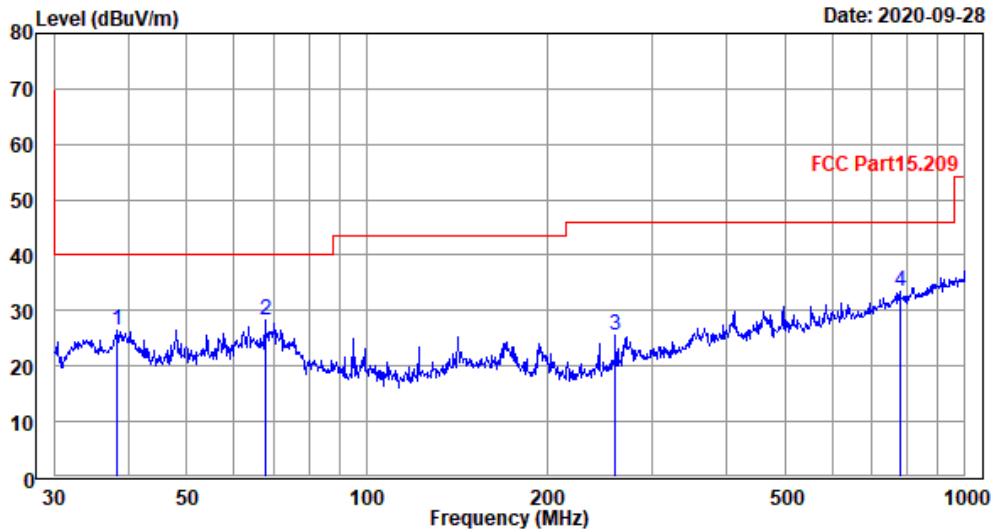
Remarks: Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor



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File: E:\TEST DATA\2020\Report\07\C1W2007015\C1W2007015\_00012.EMI

Date: 2020-09-28



Site NO. : NO.2 3M chamber  
 Dis. / Ant. : 9168-705-1912  
 Limit : FCC Part15.209  
 Env. / Ins. : 18.9°C/48%  
 EUT : NFC Reader  
 M/N : NFC A Series  
 Power Rating : 120V/60Hz  
 Test Mode : TX 13.56MHz  
 Memo :

Ant. pol.: Vertical Data NO.:12  
 Engineer : Zhangming

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Preamp Factor dBuV	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
38.212	18.82	0.81	34.73	26.33	40.00	13.67	Peak
67.675	17.85	0.98	37.48	28.40	40.00	11.60	Peak
260.144	17.71	1.89	32.98	25.53	46.00	20.47	Peak
779.607	27.80	3.96	29.73	33.56	46.00	12.44	Peak

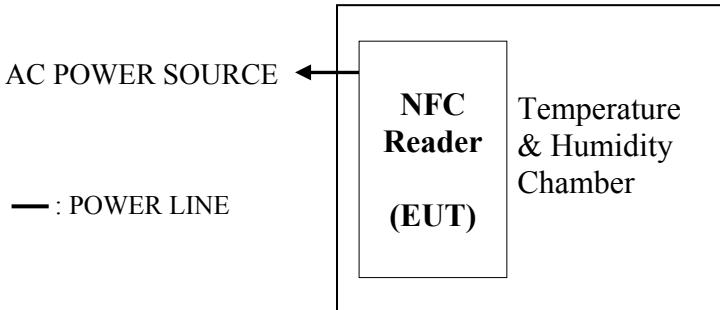
Remarks: Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor

## 8. 20DB BANDWIDTH MEASUREMENT

### 8.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	PXA signal analyzer	Agilent	N9030A	MY53120367	2020-07-17	1 Year

### 8.2. Block Diagram of Test Setup



### 8.3. Specification Limits (§15.215(c))

The 20dB bandwidth shall be specified in operating frequency band.

### 8.4. Test Procedure

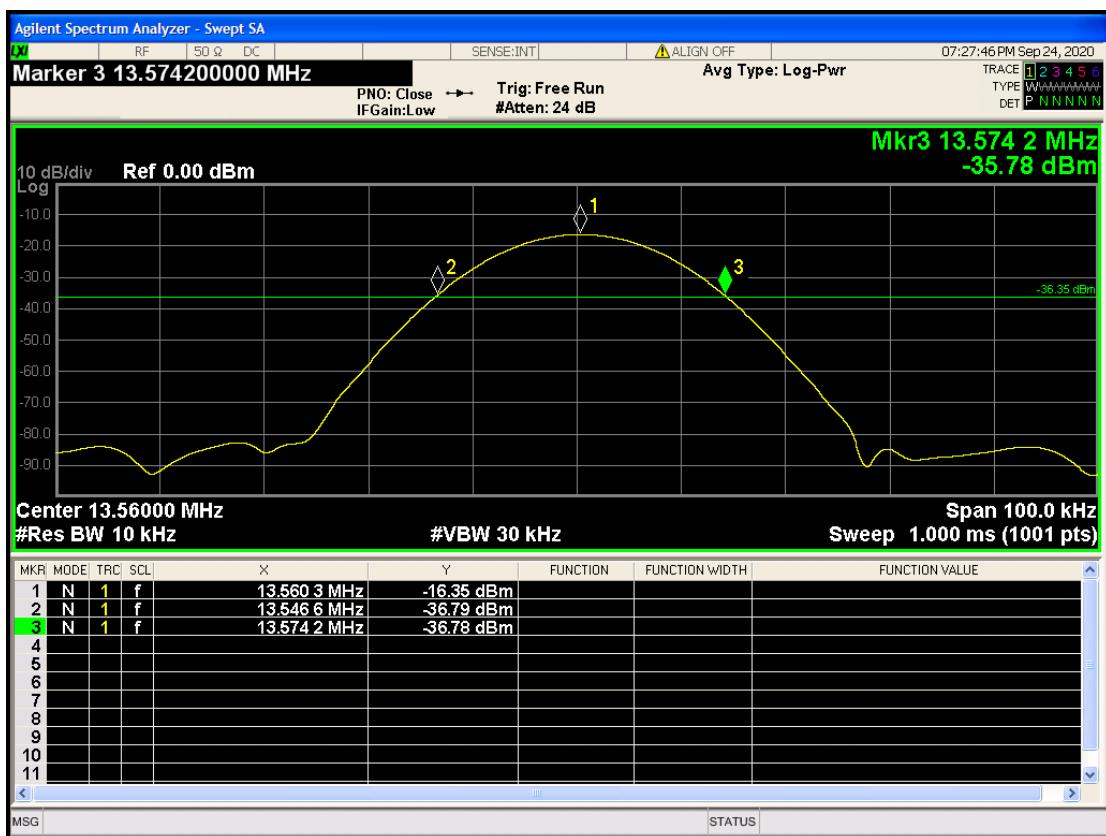
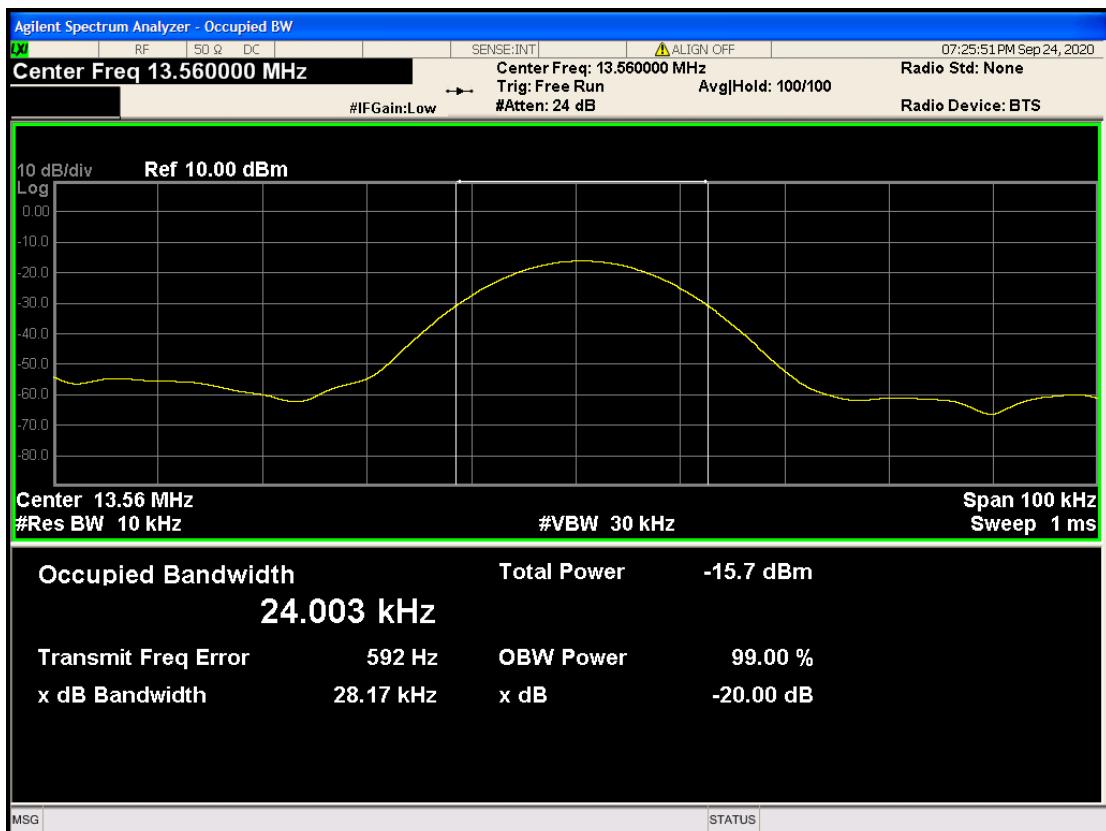
The 20dB bandwidth is measured with a spectrum analyzer connected via receiver antenna placed near the EUT while the EUT is operating in transmission mode.

### 8.5. Test Results

**PASSED.** All the test results are attached in next pages.

Test Frequency	20dB Bandwidth
13.56MHz	28.17 kHz

Lower & Upper Frequency (MHz)	Test Frequency (MHz)	Result
Lower	13.5466	PASS
Upper	13.5742	PASS



## 9. FREQUENCY STABILITY MEASUREMENT

### 9.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	PXA signal analyzer	Agilent	N9030A	MY53120367	2020-07-17	1 Year
2.	HP Series	Titech	MHQ-120 CLUB	A60614	2020-04-03	1 Year

### 9.2. Block Diagram of Test Setup

Same as section 8.2.

### 9.3. Specification Limits (§15.225(c))

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of -20degrees 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.

### 9.4. Test Procedure

The equipment under test was connected to an external AC or DC power supply and input rated voltage. The carrier frequency was measured with a loop antenna connected to a spectrum analyzer. The EUT was placed inside the temperature chamber.

Measurements were performed from 50°C down to -20°C for every 10°C. For each temperature step, the measurements started after the temperature was sufficiently stabilized and were performed at start-up of the EUT, and then after 2, 5 and 10minutes.

Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

## 9.5. Test Results

**PASSED.** All the test results are attached in next pages.

Test Mode: 2 Minute

Temperature (°C)	-20	-10	0	10	20	30	40	50
Voltage	102Vac							
Measured Frequency (MHz)	13.5601	13.5603	13.5600	13.5601	13.5603	13.5603	13.5602	13.5601
Error(%)	0.000007	0.000022	0	0.000007	0.000022	0.000022	0.000015	0.000007

Test Mode: 5 Minute

Temperature (°C)	-20	-10	0	10	20	30	40	50
Voltage	120Vac							
Measured Frequency (MHz)	13.5602	13.5603	13.5601	13.5600	13.5602	13.5602	13.5602	13.5600
Error(%)	0.000015	0.000022	0.000007	0	0.000015	0.000015	0.000015	0

Test Mode: 10 Minute

Temperature (°C)	-20	-10	0	10	20	30	40	50
Voltage	138Vac							
Measured Frequency (MHz)	13.5603	13.5602	13.5601	13.5602	13.5603	13.5603	13.5602	13.5602
Error(%)	0.000022	0.000015	0.000007	0.000015	0.000022	0.000022	0.000015	0.000015

## 10. DEVIATION TO TEST SPECIFICATIONS

【NONE】