APPLICATION FOR CERTIFICATION
On Behalf of
DIEBOLD NIXDORF SINGAPORE PTE. LTD.
POS Terminal

Model No. : BEETLE /iPOS plus Advanced
Brand : DIEBOLD NIXDORF
FCC ID : 2ACY3-IPOSPLUSADV

Prepared for

DIEBOLD NIXDORF SINGAPORE PTE. LTD.
151 Lorong Chuan New Tech Park #05-01A/B Singapore 556741

Prepared by

Audix Technology (Wujiang) Co., Ltd. EMC Dept.
No. 1289 Jiangxing East Road, the Part of Wujiang Economic Development Zone
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Report Number : ACWE-F1810001
Date of Test : Sep.28~Oct.10, 2018
Date of Report : Oct.17, 2018

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Description Page

TEST REPORT CERTIFICATION

Applicant	:	DIEBOLD NIXDORF SINGAPORE PTE. LTD.
Manufacturer	:	DIEBOLD NIXDORF SINGAPORE PTE. LTD.
EUT Description	:	POS Terminal
FCC ID	:	2ACY3-IPOSPLUSADV
(A) Model No.	:	BEETLE /iPOS plus Advanced
(B) Brand	:	DIEBOLD NIXDORF
(C) Power Supply	:	DC 24V, 5A
(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.28~Oct.10, 2018 Date of Report: Oct.17, 2018

Prepared by : Emma Hu

(Emma Hu/Assistant Administrator)

Approved & Authorized Signer : Ken Lu 10/16/18

(Ken Lu/ Assistant General Manager)

1. DESCRIPTION OF VERSION

Edition No.	Date of Rev.	Summary	Report No.
0	Oct.17, 2018	Original Report.	ACWE-F1810001

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 -0.54 dB at 0.15 MHz
FIELD STRENGTH OF FUNDAMNETAL EMISSION	Section 15.225	PASS	Minimum passing margin is 70.78 dB at 13.56 MHz
RADIATED EMISSION	Section 15.209 & 15.225	PASS	Minimum passing margin is 2.33 dB at 647.39 MHz
20 dB BANDWIDTH	Section 15.215	PASS	----
FEQUENCY STABILITY	Section 15.225	PASS	----

3. GENERAL INFORMATION

3.1. Description of Device (EUT)

Description	:	POS Terminal
Model No.	:	BEETLE /iPOS plus Advanced
FCC ID	:	2ACY3-IPOSPLUSADV
Brand	:	DIEBOLD NIXDORF
Applicant	:	DIEBOLD NIXDORF SINGAPORE PTE. LTD. 151 Lorong Chuan, New Tech Park #05-01A/B Singapore 556741
Manufacturer	:	DIEBOLD NIXDORF SINGAPORE PTE. LTD. 151 Lorong Chuan, New Tech Park #05-01A/B Singapore 556741
CPU	:	Intel, i5-6500TE
Radio	:	NFC, NXP PR533
Operation Frequency	:	13.56MHz
Date of Receipt of Sample	:	Jun.19, 2018
Date of Test	:	Sep.28~Oct.10, 2018

3.2. Description of Test Facility

Name of Firm	:	**Audix Technology (Wujiang) Co., Ltd. EMC Dept.**
Site Location	:	No. 1289 Jiangxing East Road, the Eastern Part of Wujiang Economic Development Zone Jiangsu China 215200
Test Facilities	:	**No.1 Conducted Shielding Enclosure** **No.1 3m Semi-anechoic Chamber** **RF Fully Chamber**
NVLAP Lab Code	:	200786-0 Valid until on Sep.30, 2019 (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.

3.3. Measurement Uncertainty

Test Item	Range Frequency	Uncertainty
No.2 Conducted Disturbance Measurement	0.15MHz ~ 30MHz	± 2.65dB
Radiated Disturbance Measurement (At 3m Chamber)	30MHz ~ 300MHz	± 3.18dB
	300MHz ~ 1GHz	± 3.12dB
Radiated Disturbance Measurement (At 3m Chamber)	1GHz ~ 6GHz	± 4.56dB
	6GHz ~ 18GHz	± 5.03dB

Remark: Uncertainty = $ku_c(y)$

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.

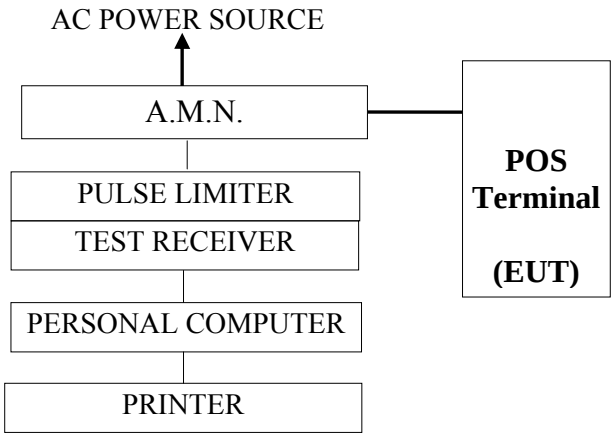
*The E.U.T Complies with the requirement of §15.203

5. CONDUCTED EMISSION MEASUREMET

5.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R & S	ESCI	100351	2018-09-05	2019-09-04
2.	A.M.N	R & S	ESH2-Z5	100153	2018-02-27	2019-02-26
3.	L.I.S.N.	Kyoritsu	KNW-407	8-1793-3	2018-05-10	2019-05-09
4.	Pulse Limiter	R&S	ESH3-Z2	100605	2018-01-05	2019-01-04
5.	RF Cable	Shengxuan	RG400	Cable 50/1+Switch	2018-01-05	2019-01-04
6.	Software	Audix/e3(6.7.0313)				

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 dBμV	56 ~ 46 dBμV
500kHz ~ 5MHz	56 dBμV	46 dBμV
5MHz ~ 30MHz	60 dBμV	50 dBμV

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 50Ω resistor. For the measurement, the A.M.N measuring port was terminated by a 50Ω measuring equipment and the second L.I.S.N measuring port was terminated by a 50Ω 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 (dBμV) = Reading (dBμV) + 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: Oct.10, 2018 Temperature: 16.9℃ Humidity: 47%

Mode	Test Condition	Reference Test Data No.	
		Neutral	Line
1	**TX 13.56MHz**	**# 7**	**※# 8**

NOTE 1- '※'means the worst test mode**.**

NOTE 2- The worst emission is detected at 0.15 MHz with emission level of 66.32 dB (μV) and with QP detector (Limit is 65.78 dB (μV)), when the Line of the EUT is connected to AMN.

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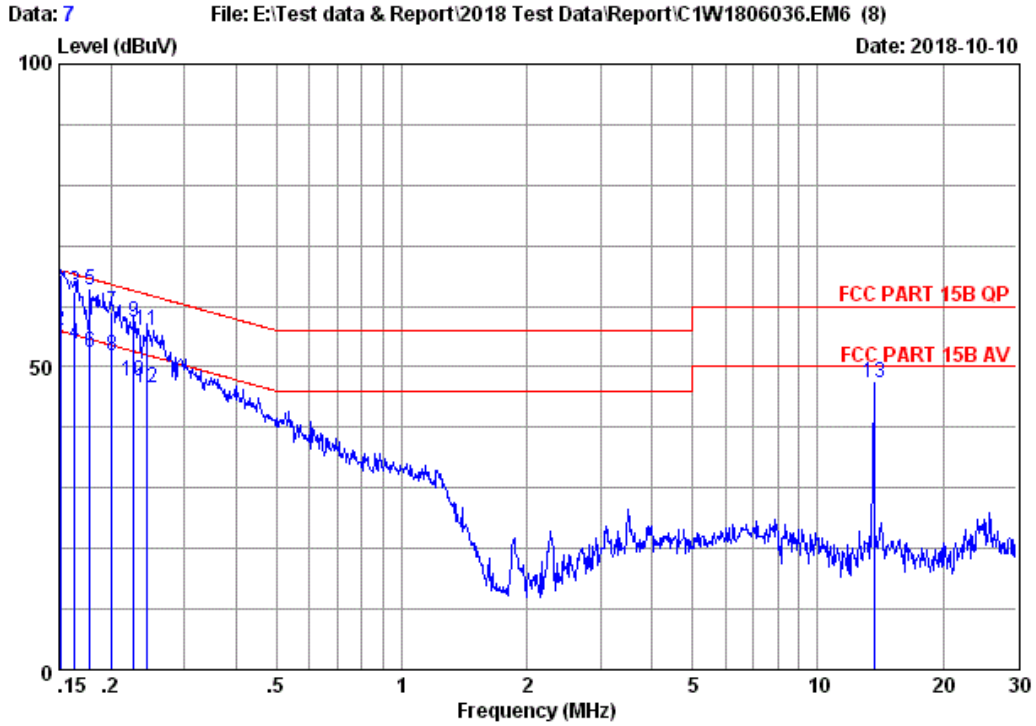

Site no. : No.2 Conducted shielding Enclosure
AMN/LISN : NNLK8129-1804-N Phase : NEUTRAL
Limit : FCC PART 15B QP
Env. / Ins. : 16.9C&47%/ESCI Engineer : Pan
EUT : POS Terminal
M/N : BEETLE/iPOS plus Advanced
Power Rating : 120Vac/60Hz
Test mode : TX 13.56MHz
Memo :

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.15	0.11	9.88	55.20	65.19	65.96	0.77	QP
* 2	0.15	0.11	9.88	45.90	55.89	55.96	0.07	Average
3	0.16	0.11	9.88	52.50	62.49	65.30	2.81	QP
4	0.16	0.11	9.88	43.90	53.89	55.30	1.41	Average
5	0.18	0.10	9.88	52.70	62.68	64.59	1.91	QP
6	0.18	0.10	9.88	42.40	52.38	54.59	2.21	Average
7	0.20	0.10	9.88	49.00	58.98	63.58	4.60	QP
8	0.20	0.10	9.88	41.80	51.78	53.58	1.80	Average
9	0.23	0.10	9.88	47.40	57.38	62.57	5.19	QP
10	0.23	0.10	9.88	37.70	47.68	52.57	4.89	Average
11	0.24	0.10	9.88	45.90	55.88	61.95	6.07	QP
12	0.24	0.10	9.88	36.60	46.58	51.95	5.37	Average
13	13.62	0.36	9.77	37.35	47.48	60.00	12.52	Peak

1.Emission Level= AMN factor + Cable loss(Pulse Att+Cable+Switch)+Reading .
2. The emission higher than limit were confirmed not emitted from RF transmitter are subject to FCC 15.107 and presented at report number: ACWE-F1401001C.

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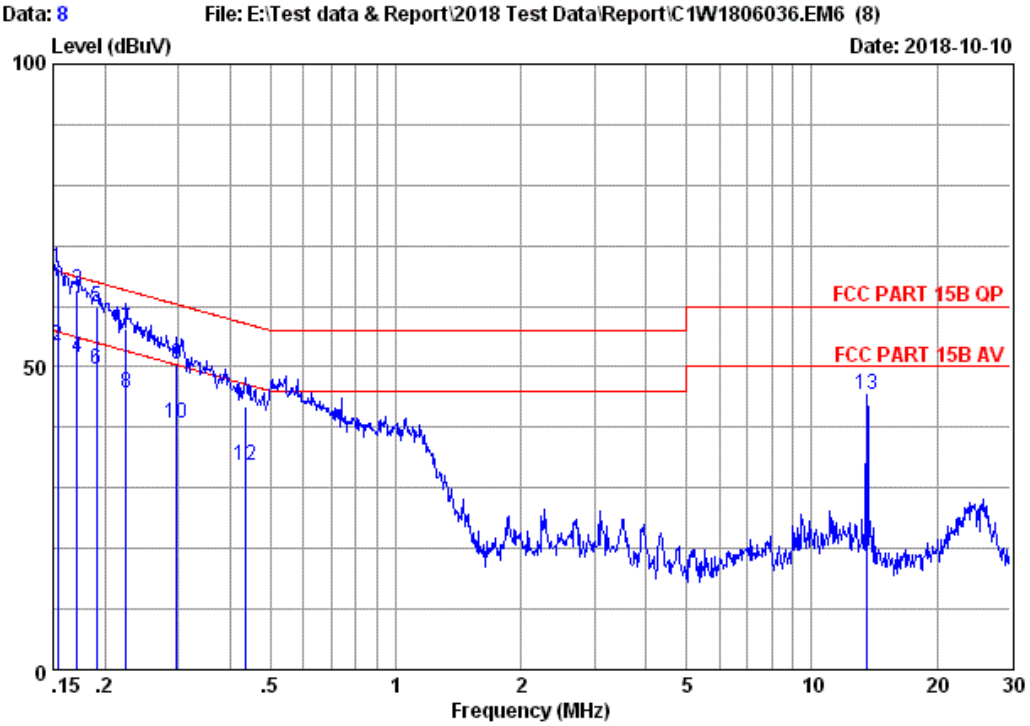


Site no. : No.2 Conducted shielding Enclosure
AMN/LISN : NNLK8129-1804-L1 Phase : LINE
Limit : FCC PART 15B QP
Env. / Ins. : 16.9C&47%/ESCI Engineer : Pan
EUT : POS Terminal
M/N : BEETLE/iPOS plus Advanced
Power Rating : 120Vac/60Hz
Test mode : TX 13.56MHz
Memo :

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
* 1	0.15	0.14	9.88	56.30	66.32	65.78	-0.54	QP
2	0.15	0.14	9.88	43.40	53.42	55.78	2.36	Average
3	0.17	0.13	9.88	52.60	62.61	64.90	2.29	QP
4	0.17	0.13	9.88	41.50	51.51	54.90	3.39	Average
5	0.19	0.12	9.88	49.90	59.90	64.02	4.12	QP
6	0.19	0.12	9.88	39.50	49.50	54.02	4.52	Average
7	0.22	0.11	9.88	46.40	56.39	62.66	6.27	QP
8	0.22	0.11	9.88	35.80	45.79	52.66	6.87	Average
9	0.30	0.10	9.88	40.50	50.48	60.32	9.84	QP
10	0.30	0.10	9.88	30.60	40.58	50.32	9.74	Average
11	0.44	0.09	9.88	33.50	43.47	57.15	13.68	QP
12	0.44	0.09	9.88	23.60	33.57	47.15	13.58	Average
13	13.55	0.38	9.77	35.33	45.48	60.00	14.52	Peak

1.Emission Level= AMN factor + Cable loss(Pulse Att+Cable+Switch)+Reading .
2. The emission higher than limit were confirmed not emitted from RF transmitter are subject to FCC 15.107 and presented at report number: ACWE-F1401001C.

6. FIELD STRENGTH OF FUNDAMENTAL EMISSIONS MEASUREMENT

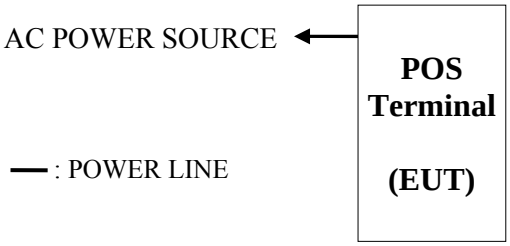
6.1. Test Equipment

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

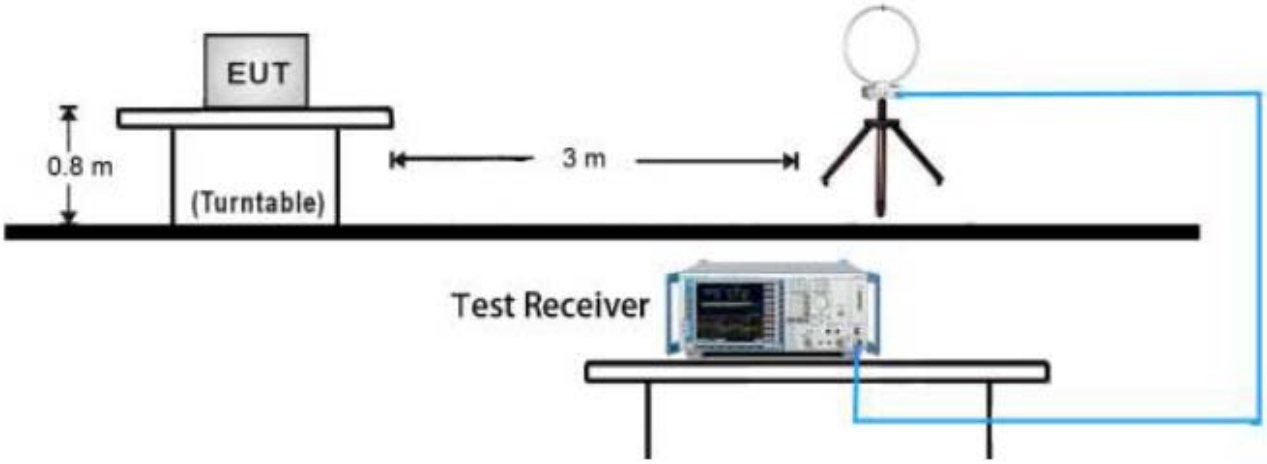
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Preamplifier	Agilent	8447D	2944A10922	2018-04-16	2019-04-15
2.	Microwave Preamplifier	Agilent	8449B	3008A02232	2018-04-16	2019-04-15
3.	EMI Test Receiver	R&S	ESR7	101956	2018-04-16	2019-04-15
4.	Rosnol RF	Shengxuan	CFD400NL-LW	N1C50-13000	2018-03-07	2019-03-06
5.	RF Cable	Huber+Shuner	SUCOFLEX 102	MY2862/2	2018-03-07	2019-03-06
6.	Loop Antenna	SCHAFFNER	HLA6120	N/A	2018-03-29	2019-03-28
7.	Software	Audix/e3(6.7.0313)				

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 (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	59.98	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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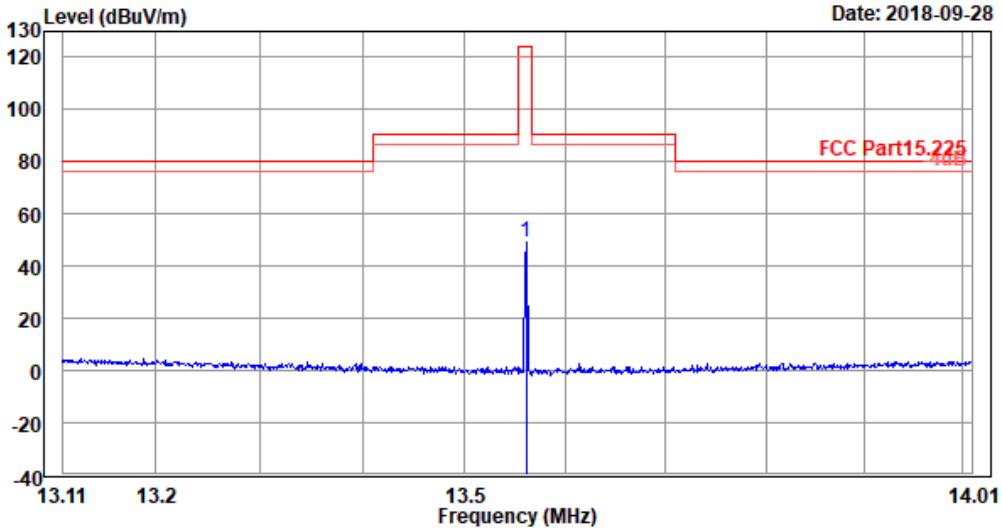

Site NO. : NO.2 3M chamber
Dis. / Ant. : HLA6120
Limit : FCC Part15.225
Env. / Ins. : 23.6°C & 45%/ESR
EUT : POS Terminal
M/N : BEETLE /iPOS plus Advanced
Power Rating : 120V/60Hz
Test Mode : TX 13.56MHz
Memo :

Ant. pol.: Horizontal
Engineer : Jin Xinxin

Freq.	Ant. Factor	Cable Loss	Reading	Preamp Factor	Emission Level	Limits	Margin	Remark
MHz	dB/m	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
13.56	20.23	0.33	66.18	37.57	49.17	124.00	74.83	Peak

marks:Emisson Level = Antenna factor+Cable loss+Reading-Preamp Factor

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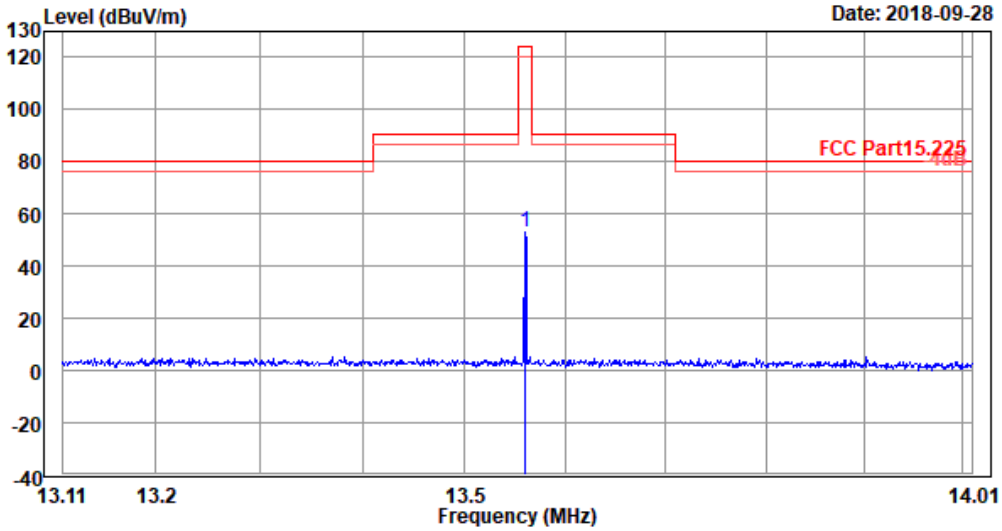


Site NO. : NO.2 3M chamber
Dis. / Ant. : HLA6120
Limit : FCC Part15.225
Env. / Ins. : 23.6°C & 45%/ESR
EUT : POS Terminal
M/N : BEETLE /iPOS plus Advanced
Power Rating : 120V/60Hz
Test Mode : TX 13.56MHz
Memo :

Ant. pol.: Vertical
Engineer : Jin Xinxin

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
13.56	20.23	0.33	70.23	37.57	53.22	124.00	70.78	Peak

marks:Emisson Level = Antenna factor+Cable loss+Reading-Preamp Factor

7. RADIATED SPURIOUS EMISSION MEASUREMENT

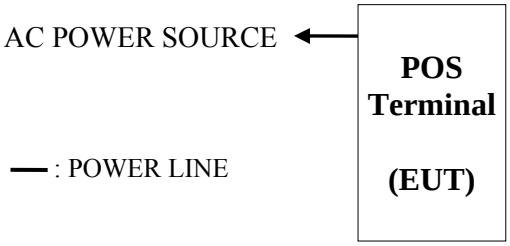
7.1. Test Equipment

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

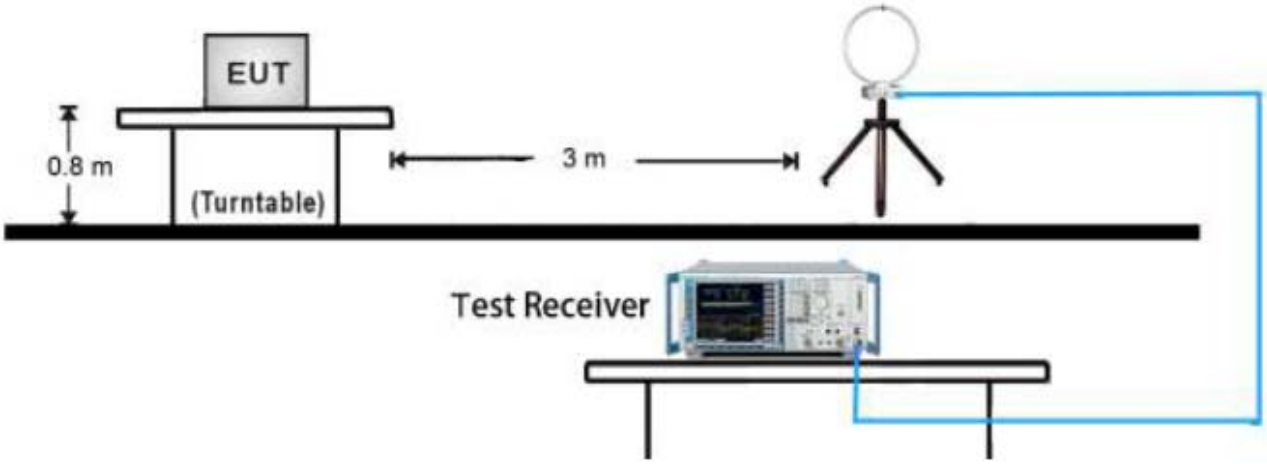
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Preamplifier	Agilent	8447D	2944A10922	2018-04-16	2019-04-15
2.	Bi-log Antenna	SCHWARZBECK	VULB 9168	706	2018-01-29	2019-01-28
3.	Microwave Preamplifier	Agilent	8449B	3008A02232	2018-04-16	2019-04-15
4.	EMI Test Receiver	R&S	ESR7	101956	2018-04-16	2019-04-15
5.	Rosnol RF	Shengxuan	CFD400NL-LW	N1C50-13000	2018-03-07	2019-03-06
6.	RF Cable	Huber+Shuner	SUCOFLEX 102	MY2862/2	2018-03-07	2019-03-06
7.	Loop Antenna	SCHAFFNER	HLA6120	N/A	2018-03-29	2019-03-28
8.	Software	Audix/e3(6.7.0313)				

7.2. Block Diagram of Test Setup

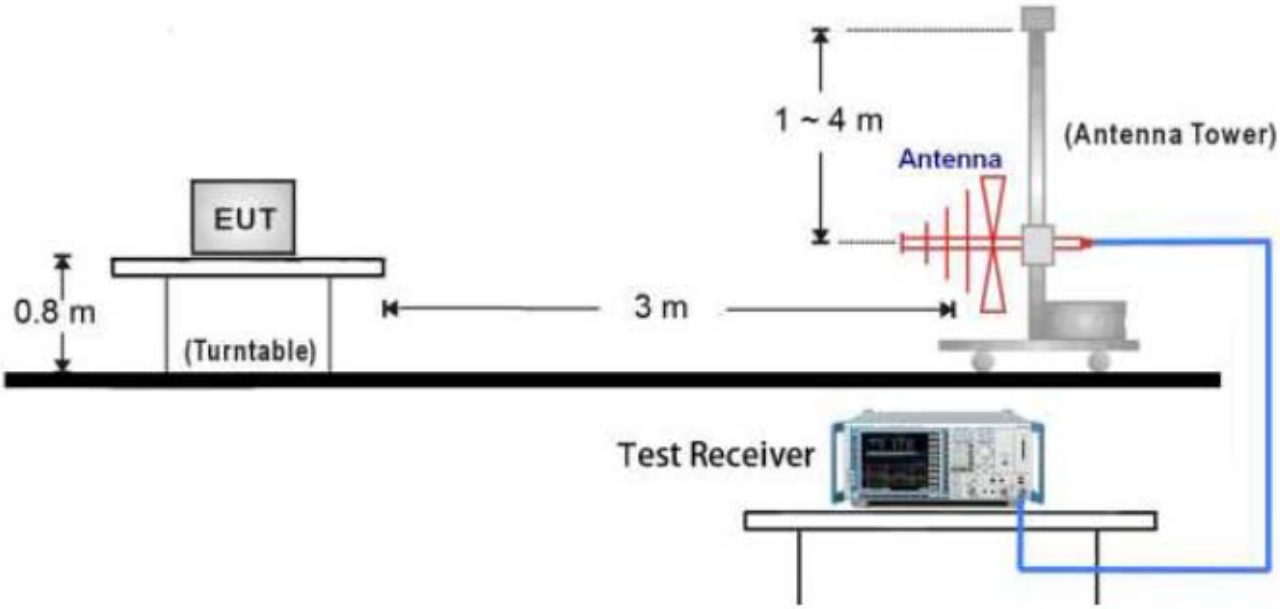
7.2.1. Block Diagram of Test Setup between EUT and simulators



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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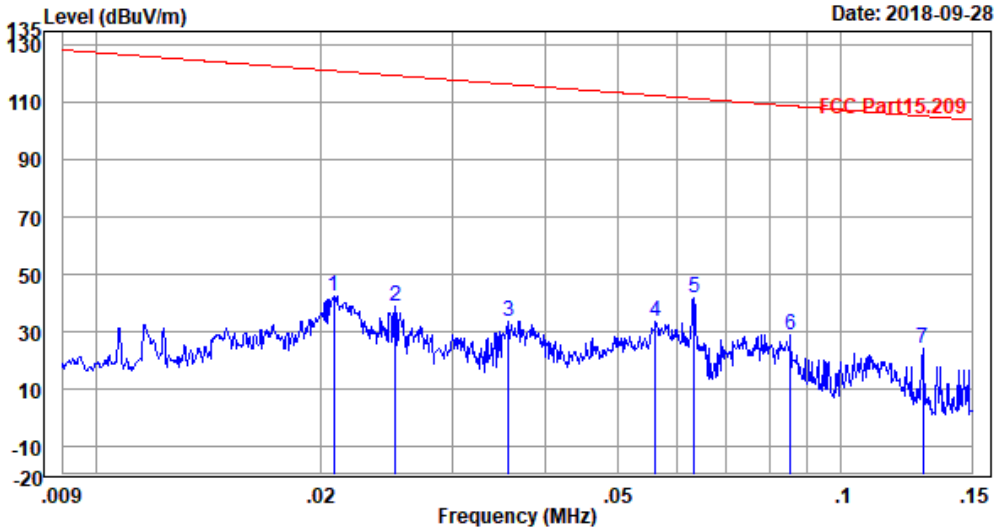

Site NO. : NO.2 3M chamber
Dis. / Ant. : HLA6120
Limit : FCC Part15.209
Env. / Ins. : 23.6°C & 45%/ESR
EUT : POS Terminal
M/N : BEETLE /iPOS plus Advanced
Power Rating : 120V/60Hz
Test Mode : TX 13.56MHz
Memo :

Ant. pol.: Vertical
Engineer : Jin Xinxin

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
0.02	20.30	0.03	59.88	37.51	42.70	121.24	78.54	Peak
0.03	20.30	0.03	56.33	37.49	39.17	119.60	80.43	Peak
0.04	20.23	0.04	51.09	37.45	33.91	116.57	82.66	Peak
0.06	20.33	0.04	50.88	37.40	33.85	112.59	78.74	Peak
0.06	20.37	0.04	58.88	37.40	41.89	111.58	69.69	Peak
0.09	20.25	0.04	46.13	37.39	29.03	108.97	79.94	Peak
0.13	20.16	0.04	41.25	37.40	24.05	105.43	81.38	Peak

marks:Emisson Level = Antenna factor+Cable loss+Reading-Preamp Factor

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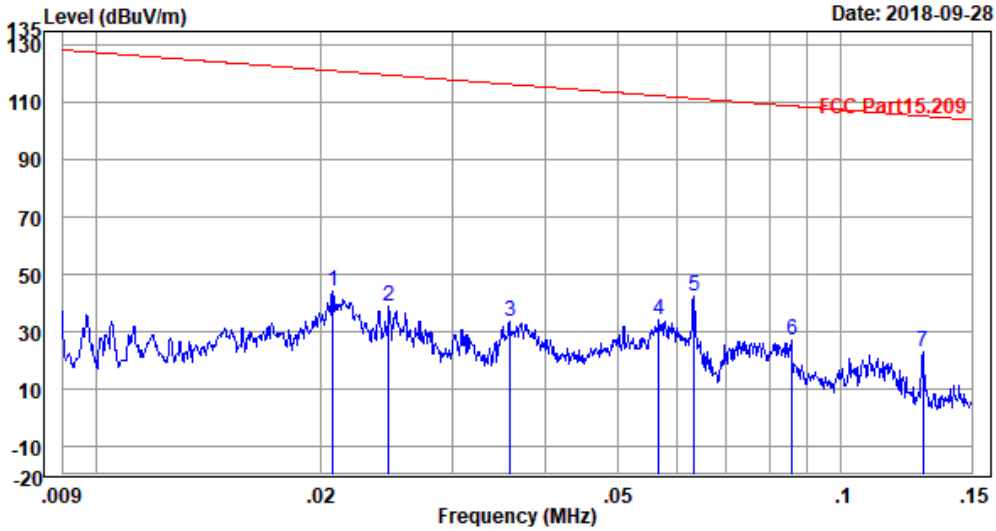

Site NO. : NO.2 3M chamber
Dis. / Ant. : HLA6120
Limit : FCC Part15.209
Env. / Ins. : 23.6°C & 45%/ESR
EUT : POS Terminal
M/N : BEETLE /iPOS plus Advanced
Power Rating : 120V/60Hz
Test Mode : TX 13.56MHz
Memo :

Ant. pol.: Horizontal
Engineer : Jin Xinxin

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
0.02	20.30	0.03	61.46	37.51	44.28	121.26	76.98	Peak
0.02	20.30	0.03	55.87	37.49	38.71	119.75	81.04	Peak
0.04	20.23	0.04	50.56	37.45	33.38	116.52	83.14	Peak
0.06	20.33	0.04	51.39	37.40	34.36	112.51	78.15	Peak
0.06	20.37	0.04	59.24	37.40	42.25	111.58	69.33	Peak
0.09	20.24	0.04	44.35	37.39	27.24	108.95	81.71	Peak
0.13	20.16	0.04	40.30	37.40	23.10	105.43	82.33	Peak

marks:Emisson Level = Antenna factor+Cable loss+Reading-Preamp Factor

Audix Technology (Wu Jiang) Co.,Ltd
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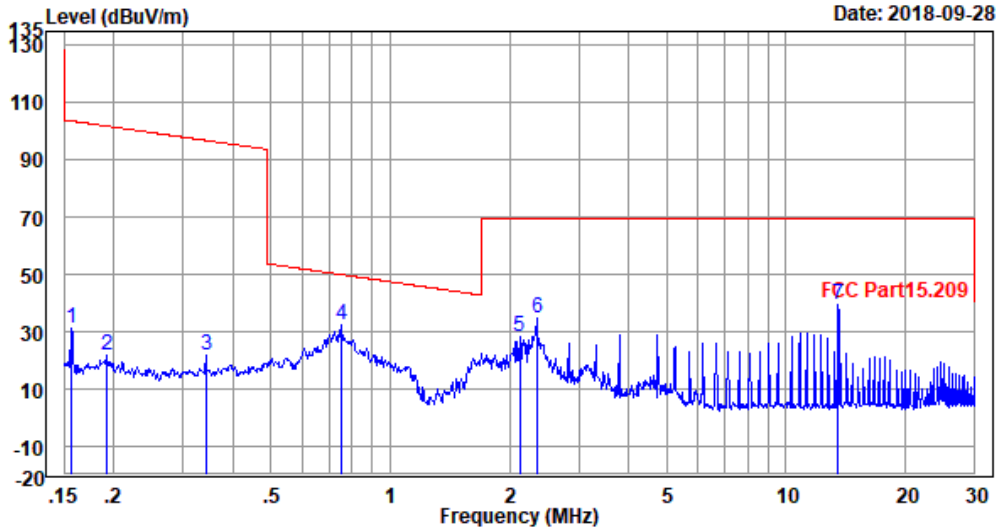

Site NO. : NO.2 3M chamber
Dis. / Ant. : HLA6120
Limit : FCC Part15.209
Env. / Ins. : 23.6°C & 45%/ESR
EUT : POS Terminal
M/N : BEETLE /iPOS plus Advanced
Power Rating : 120V/60Hz
Test Mode : TX 13.56MHz
Memo :

Ant. pol.: Horizontal
Engineer : Jin Xinxin

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
0.16	20.19	0.05	48.16	37.41	30.99	103.71	72.72	Peak
0.19	20.12	0.05	39.21	37.42	21.96	101.97	80.01	Peak
0.34	19.76	0.05	39.52	37.37	21.96	96.90	74.94	Peak
0.75	20.28	0.08	49.27	37.36	32.27	50.03	17.76	Peak
2.12	19.82	0.14	46.19	37.55	28.60	69.54	40.94	Peak
2.35	19.87	0.15	52.49	37.56	34.95	69.54	34.59	Peak
13.55	20.23	0.33	56.67	37.57	39.66	69.54	29.88	Peak

marks:Emisson Level = Antenna factor+Cable loss+Reading-Preamp Factor

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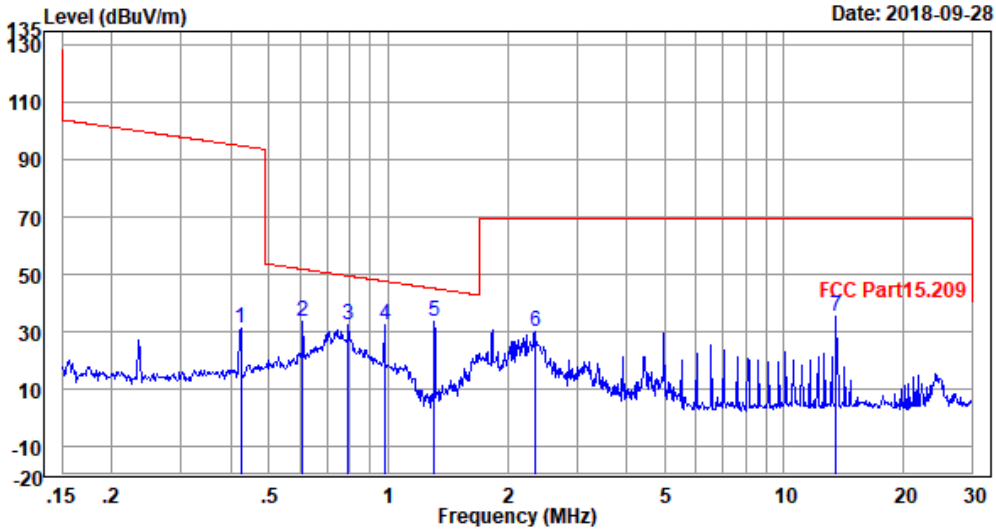

Site NO. : NO.2 3M chamber
Dis. / Ant. : HLA6120
Limit : FCC Part15.209
Env. / Ins. : 23.6°C & 45%/ESR
EUT : POS Terminal
M/N : BEETLE /iPOS plus Advanced
Power Rating : 120V/60Hz
Test Mode : TX 13.56MHz
Memo :

Ant. pol.: Vertical
Engineer : Jin Xinxin

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
0.42	19.70	0.06	48.73	37.35	31.14	95.06	63.92	Peak
0.61	20.02	0.07	50.94	37.34	33.69	51.90	18.21	Peak
0.79	20.27	0.08	49.21	37.36	32.20	49.57	17.37	Peak
0.98	20.21	0.10	49.27	37.39	32.19	47.70	15.51	Peak
1.31	20.14	0.11	51.11	37.44	33.92	45.13	11.21	Peak
2.35	19.87	0.15	47.60	37.56	30.06	69.54	39.48	Peak
13.55	20.23	0.33	52.17	37.57	35.16	69.54	34.38	Peak

marks:Emisson Level = Antenna factor+Cable loss+Reading-Preamp Factor

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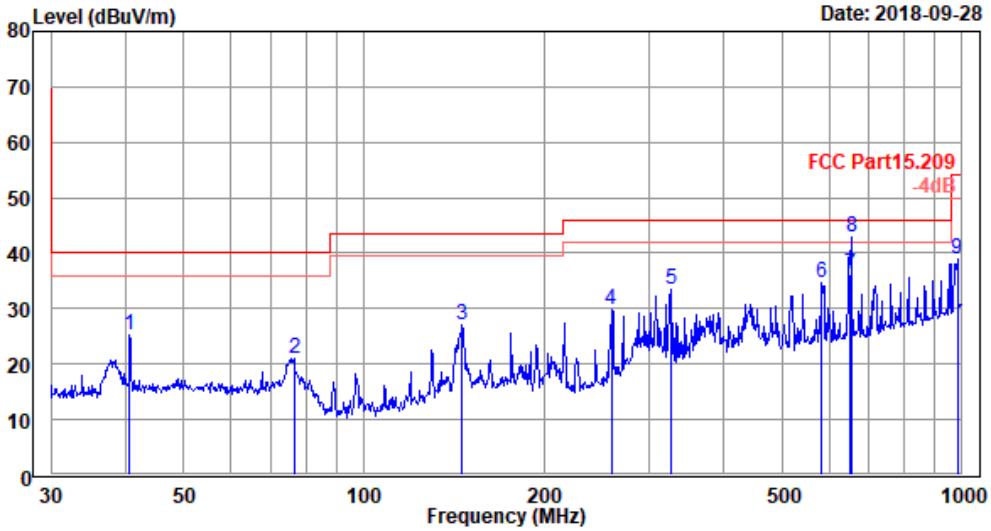

Site NO. : NO.2 3M chamber
Dis. / Ant. : VULB9168-706-1801
Limit : FCC Part15.209
Env. / Ins. : 23.6°C & 45%/ESR
EUT : POS Terminal
M/N : BEETLE /iPOS plus Advanced
Power Rating : 120V/60Hz
Test Mode : TX 13.56MHz
Memo :

Ant. pol.: Horizontal
Engineer : Jin Xinxin

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
40.56	19.83	0.55	42.04	37.24	25.18	40.00	14.82	Peak
76.51	16.54	0.71	40.43	36.79	20.89	40.00	19.11	Peak
145.86	18.98	0.90	43.50	36.27	27.11	43.50	16.39	Peak
259.23	18.48	1.19	46.12	35.94	29.85	46.00	16.15	Peak
325.60	20.39	1.33	47.51	35.87	33.36	46.00	12.64	Peak
582.74	25.57	1.82	43.39	36.04	34.74	46.00	11.26	Peak
652.10	26.42	1.93	44.00	36.20	36.15	46.00	9.85	QP
654.23	26.44	1.93	50.75	36.21	42.91	46.00	3.09	Peak
982.62	30.01	2.44	42.53	36.00	38.98	54.00	15.02	Peak

marks:Emisson Level = Antenna factor+Cable loss+Reading-Preamp Factor

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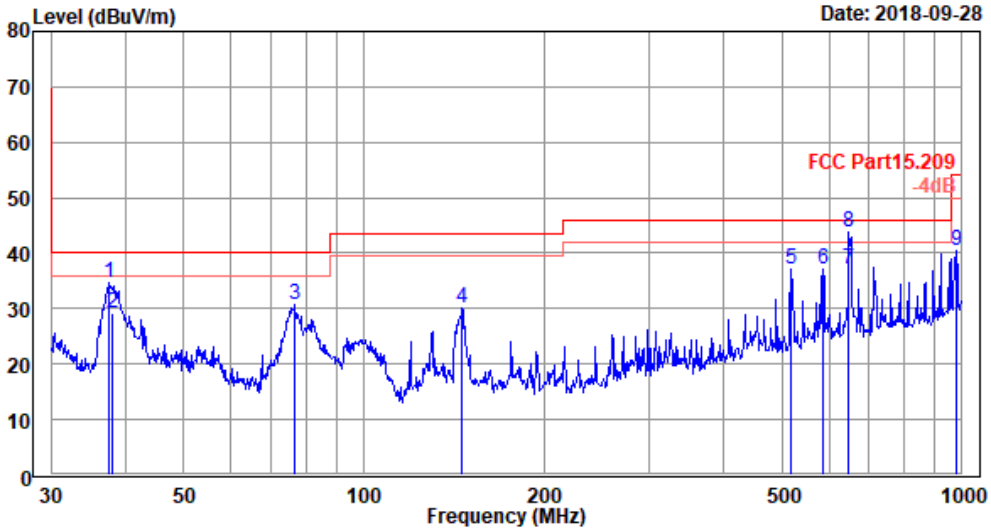


Site NO. : NO.2 3M chamber
Dis. / Ant. : VULB9168-706-1801
Limit : FCC Part15.209
Env. / Ins. : 23.6°C & 45%/ESR
EUT : POS Terminal
M/N : BEETLE /iPOS plus Advanced
Power Rating : 120V/60Hz
Test Mode : TX 13.56MHz
Memo :

Ant. pol.: Vertical
Engineer : Jin Xinxin

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
37.55	19.58	0.53	51.93	37.27	34.77	40.00	5.23	Peak
37.98	19.62	0.53	46.23	37.27	29.11	40.00	10.89	QP
76.78	16.47	0.71	50.21	36.78	30.61	40.00	9.39	Peak
145.86	18.98	0.90	46.39	36.27	30.00	43.50	13.50	Peak
519.06	24.36	1.71	46.98	36.09	36.96	46.00	9.04	Peak
586.84	25.65	1.83	45.76	36.03	37.21	46.00	8.79	Peak
647.14	26.37	1.92	45.10	36.18	37.21	46.00	8.79	QP
647.39	26.37	1.92	51.57	36.19	43.67	46.00	2.33	Peak
979.18	29.97	2.44	44.11	36.03	40.49	54.00	13.51	Peak

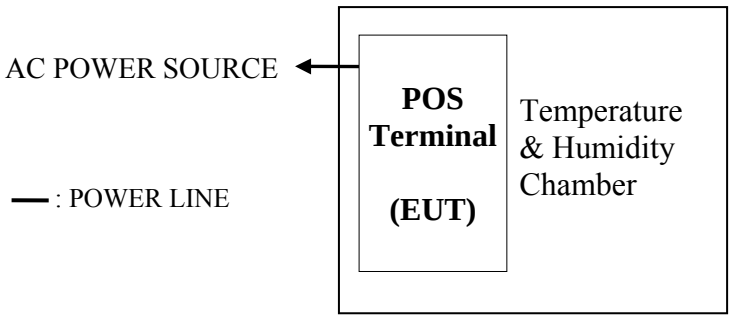
marks:Emisson Level = Antenna factor+Cable loss+Reading-Preamp Factor

8. 20DB BANDWIDTH MEASUREMENT

8.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	PXA signal analyzer	Agilent	N9030A	MY53120367	2018-07-26	2019-07-25

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

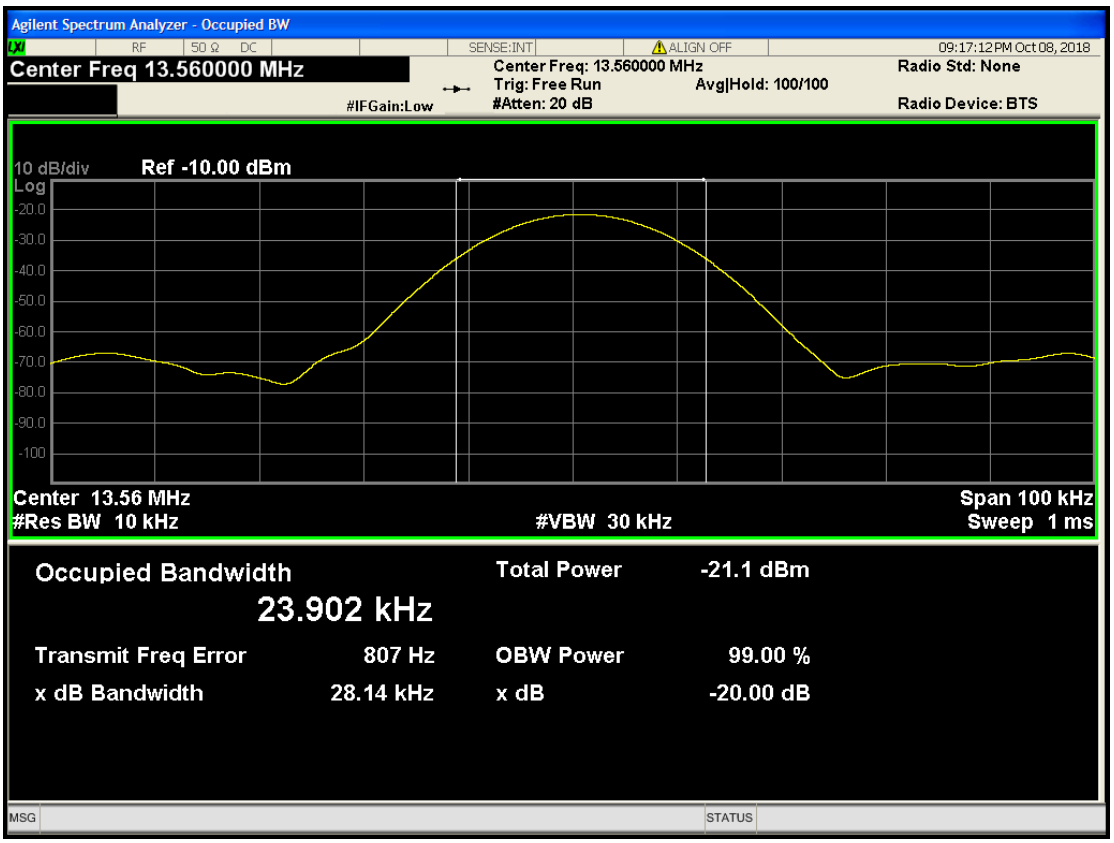
The 20dB bandwidth is measured with a spectrum analyzer connected via receiver antenna placed near the EUT while the EUT is operating in transmission mode.

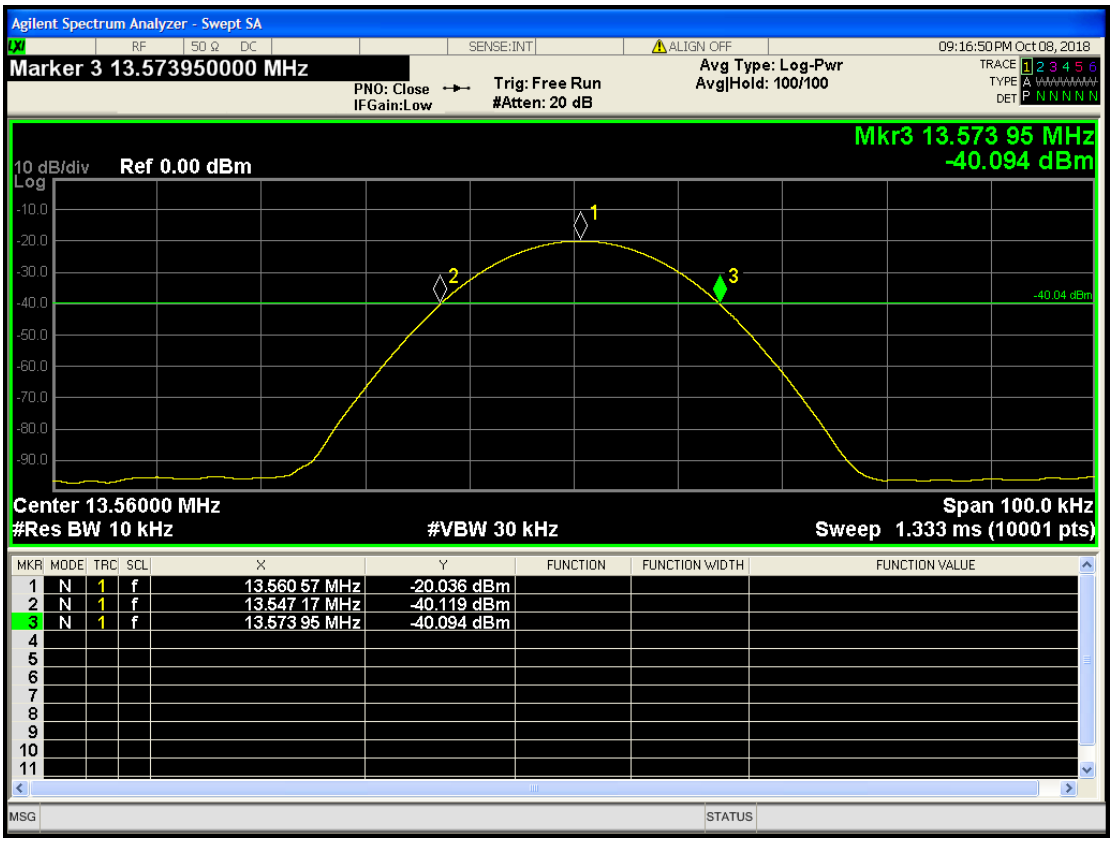
8.5. Test Results

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

Test Frequency	20dB Bandwidth
13.56MHz	28.14 kHz

Lower & Upper Frequency (MHz)	Test Frequency (MHz)	Result
Lower	13.54717	PASS
Upper	13.57395	PASS


Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω DC
SENSE:INT
ALIGN OFF
09:17:12 PM Oct 08, 2018
Center Freq 13.560000 MHz
Center Freq: 13.560000 MHz
Trig: Free Run
Avg|Hold: 100/100
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref -10.00 dBm
Log
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100
Center 13.56 MHz
#Res BW 10 kHz
#VBW 30 kHz
Span 100 kHz
Sweep 1 ms
Occupied Bandwidth
23.902 kHz
Total Power
-21.1 dBm
Transmit Freq Error
807 Hz
OBW Power
99.00 %
x dB Bandwidth
28.14 kHz
x dB
-20.00 dB
MSG
STATUS


Agilent Spectrum Analyzer - Swept SA
RF 50 Ω DC
SENSE:INT
ALIGN OFF
09:16:50 PM Oct 08, 2018
Marker 3 13.573950000 MHz
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 100/100
TRACE 1 2 3 4 5 6
TYPE A WWWWW
DET P N N N N N
Mkr3 13.573 95 MHz
-40.094 dBm
10 dB/div
Ref 0.00 dBm
Log
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-40.04 dBm
Center 13.56000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Span 100.0 kHz
Sweep 1.333 ms (10001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 13.560 57 MHz -20.036 dBm
2 N 1 f 13.547 17 MHz -40.119 dBm
3 N 1 f 13.573 95 MHz -40.094 dBm
MSG
STATUS

9. FREQUENCY STABILITY MEASUREMENT

9.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	PXA signal analyzer	Agilent	N9030A	MY53120367	2018-07-26	2019-07-25
2.	HP Series	Titech	MHQ-120 CLUB	A60614	2018-05-10	2019-05-09

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 ±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 frquency 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 10 minutes.
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 (±15%) and endpoint, record the ma ximum frequency change.

9.5. Test Results

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

Test Mode: 2 Minute

Temperature (℃)	-20	-10	0	10	20	30	40	50
Voltage	102Vac							
Measured Frequency (MHz)	13.56	13.56001	13.56003	13.56	13.56	13.56002	13.56003	13.55996
Error(%)	0	0.00007	0.00022	0	0	0.00015	0.00022	-0.00029

Test Mode: 5 Minute

Temperature (℃)	-20	-10	0	10	20	30	40	50
Voltage	120Vac							
Measured Frequency (MHz)	13.56002	13.56005	13.56003	13.56001	13.56	13.56002	13.56003	13.56003
Error(%)	0.00015	0.00037	0.00022	0.00007	0	0.00015	0.00022	0.00022

Test Mode: 10 Minute

Temperature (℃)	-20	-10	0	10	20	30	40	50
Voltage	138Vac							
Measured Frequency (MHz)	13.56003	13.56002	13.56001	13.56	13.56	13.56003	13.56002	13.55996
Error(%)	0.00022	0.00015	0.00007	0	0	0.00022	0.00015	-0.00029

10. DEVIATION TO TEST SPECIFICATIONS

【NONE】