Shenzhen Huaxia Testing Technology Co., Ltd

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Report Template Version: V03
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Test Report

Report No. :	CQASZ20210600844E-02
Applicant:	SHENZHEN TVT DIGITAL TECHNOLOGY CO.,LTD.
Address of Applicant:	23rd Floor Building B4 Block 9, Shenzhen Bay science and technology ecological garden, Nanshan District, Shenzhen, P.R. China
Equipment Under Test (EUT):	
Product:	Face Recognition Access Control Terminal
All Model No.:	TD-E2123-IC/PE/TP/WF, TD-E2123-PE/TP/WF, TD-E2123-IC/ID/PE/TP/WF
Test Model No.:	TD-E2123-IC/PE/TP/WF
Brand Name:	TVT
FCC ID:	2ATOW-TD-E2123
Standards:	47 CFR Part 15, Subpart C
Date of Test:	2021-06-08 to 2021-06-30
Date of Issue:	2021-06-30
Test Result :	**PASS***

Tested By: lewis zhou

(Lewis Zhou)

Reviewed By: Jun Li

(Jun Li)

Approved By:

(Jack Ai)

* In the configuration tested, the EUT complied with the standards specified above.

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210600844E-02	Rev.01	Initial report	2021-06-30

2 Contents

Page

3 Test Summary

Test Item	Test Requirement	Test Method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10 2013	Pass
Conducted Emission (150KHz to 30MHz)	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013 Section 6.2	Pass
Electric Field Strength of Fundamental and Outside the Allocated bands	47 CFR Part 15, Subpart C Section 15.225(a)/(b)/(c)	ANSI C63.10 2013 Section 6.9.2	Pass
Radiated Emission	47 CFR Part 15, Subpart C Section 15.225(d)/15.209	ANSI C63.10 2013 Section 6.4	Pass
Frequency Tolerance	47 CFR Part 15, Subpart C Section 15.225(e)	ANSI C63.10 2013 Section 6.4&6.5	Pass
Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215	ANSI C63.10 2013 Section 6.8	Pass

4 General Information

4.1 Client Information

Applicant:	SHENZHEN TVT DIGITAL TECHNOLOGY CO.,LTD.
Address of Applicant:	23rd Floor Building B4 Block 9, Shenzhen Bay science and technology ecological garden, Nanshan District, Shenzhen, P.R. China
Manufacturer:	SHENZHEN TVT DIGITAL TECHNOLOGY CO.,LTD.
Address of Manufacturer:	23rd Floor Building B4 Block 9, Shenzhen Bay science and technology ecological garden, Nanshan District, Shenzhen, P.R. China
Factory:	HUIZHOU TVT DIGITAL TECHNOLOGY CO., LTD.
Address of Factory:	TVT Industry Park, No.2 XingKe Rd.(E), Dongjiang Hi-Tech Industry Park, Zhongkai Hi-Tech District, Huizhou

4.2 General Description of E.U.T.

Product Name:	Face Recognition Access Control Terminal
Model No.:	TD-E2123-IC/PE/TP/WF, TD-E2123-PE/TP/WF, TD-E2123-IC/ID/PE/TP/WF
Test Model No.:	TD-E2123-IC/PE/TP/WF
Trade Mark:	TVT
Hardware Version:	1.4
Software Version:	5.0.1.0(20707)
Operation Frequency:	13.56MHz
Modulation Type:	ASK
Product Type:	☐ Mobile ☐ Portable ☒ Fix Location
Antenna Type:	Integral antenna
Antenna Gain:	2dBi
Power Supply:	DC12V/1A

Note:

All model:TD-E2123-IC/PE/TP/WF, TD-E2123-PE/TP/WF, TD-E2123-IC/ID/PE/TP/WF

Only the model TD-E2123-IC/PE/TP/WF was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

4.3 Test Environment

Temperature:	25.5 °C
Humidity:	53 % RH
Atmospheric Pressure:	1009mbar
Test mode:	Keep EUT working in continuous transmitting mode with 100% duty cycle.

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
/	/	/	/	/

4.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	±5.12dB	(1)
2	Radiated Emission (Above 1GHz)	±4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	±3.34dB	(1)
4	Radio Frequency	3×10^{-8}	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	time	0.6 %.	(1)
14	Frequency Error	5.5 Hz	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.6 Test Location

Shenzhen Huaxia Testing Technology Co., Ltd,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.7 Test Facility

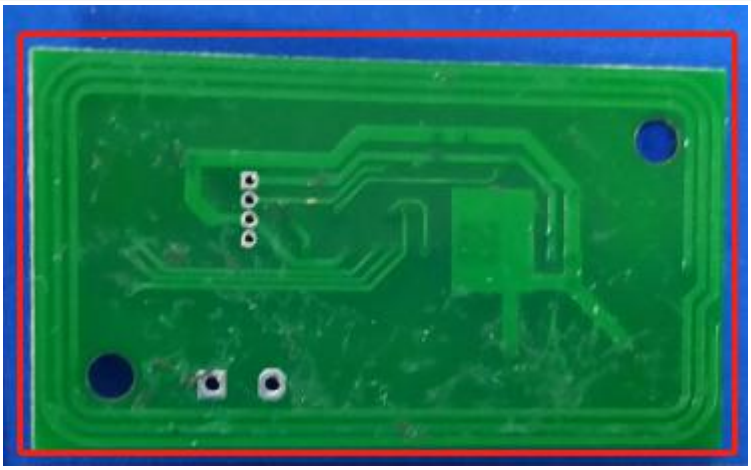
- **A2LA (Certificate No. 4742.01)**
  Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.
- **FCC Registration No.: 522263**
  Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.8 Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2020/9/26	2021/9/25
Spectrum analyzer	R&S	FSU26	CQA-038	2020/10/28	2021/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2020/9/26	2021/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2020/11/2	2021/11/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2020/10/28	2021/10/27
Bilog Antenna	R&S	HL562	CQA-011	2020/9/26	2021/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2020/9/26	2021/9/25
EMI Test Receiver	R&S	ESPI3	CQA-013	2020/9/26	2021/9/25
LISN	R&S	ENV216	CQA-003	2020/11/5	2021/11/4
Coaxial cable	CQA	N/A	CQA-C009	2020/9/26	2021/9/25
high-low temperature chamber	Auchno	OJN-9606	CQA-CB2	2020/9/26	2021/9/25
DC power	KEYSIGHT	E3631A	CQA-028	2020/9/26	2021/9/25

5 Test Result and Measurement Data

5.1 Antenna Requirment

Standard requirement:	47 CFR Part15 C Section 15.203
15.203 requirement:	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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
EUT Antenna:	
The antenna is integrated on the main PCB and no consideration of replacement.	

5.2 Electric Field Strength of Fundamental and Outside the Allocated bands

Test Requirement:	47 CFR Part 15, Subpart C Section 15.225(a)/(b)/(c)
Test Method:	ANSI C63.10: 2013
Test Site:	3m (Semi-Anechoic Chamber)
Receiver Setup:	

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak

Limit:

Frequency Range(MHz)	E-field Strength Limit @ 30 m (μV/m)	E-field Strength Limit @ 3 m (dBμV/m)
13.560 ± 0.007	15848	124
13.410 to 13.553 13.567 to 13.710	334	90
13.110 to 13.410 13.710 to 14.010	106	81

Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula:

Extrapolation(dB)=40log$_{10}$(Measurement Distance/Specification Distance)

Test Setup:

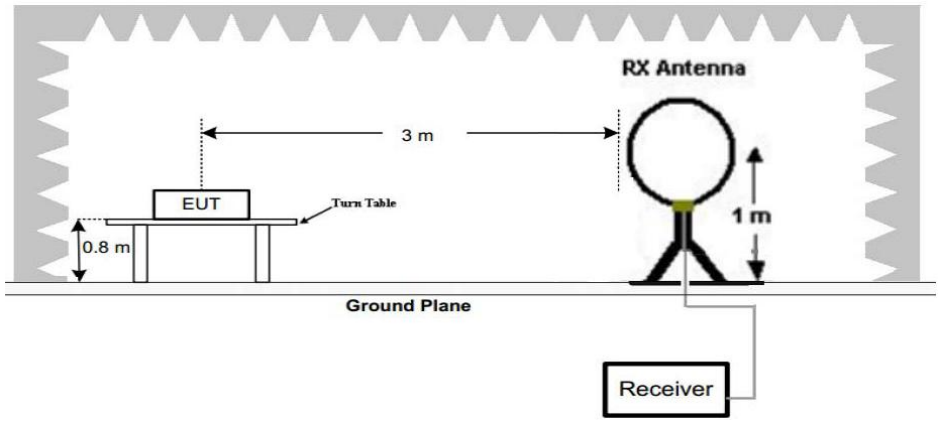


Figure 1. Below 30MHz

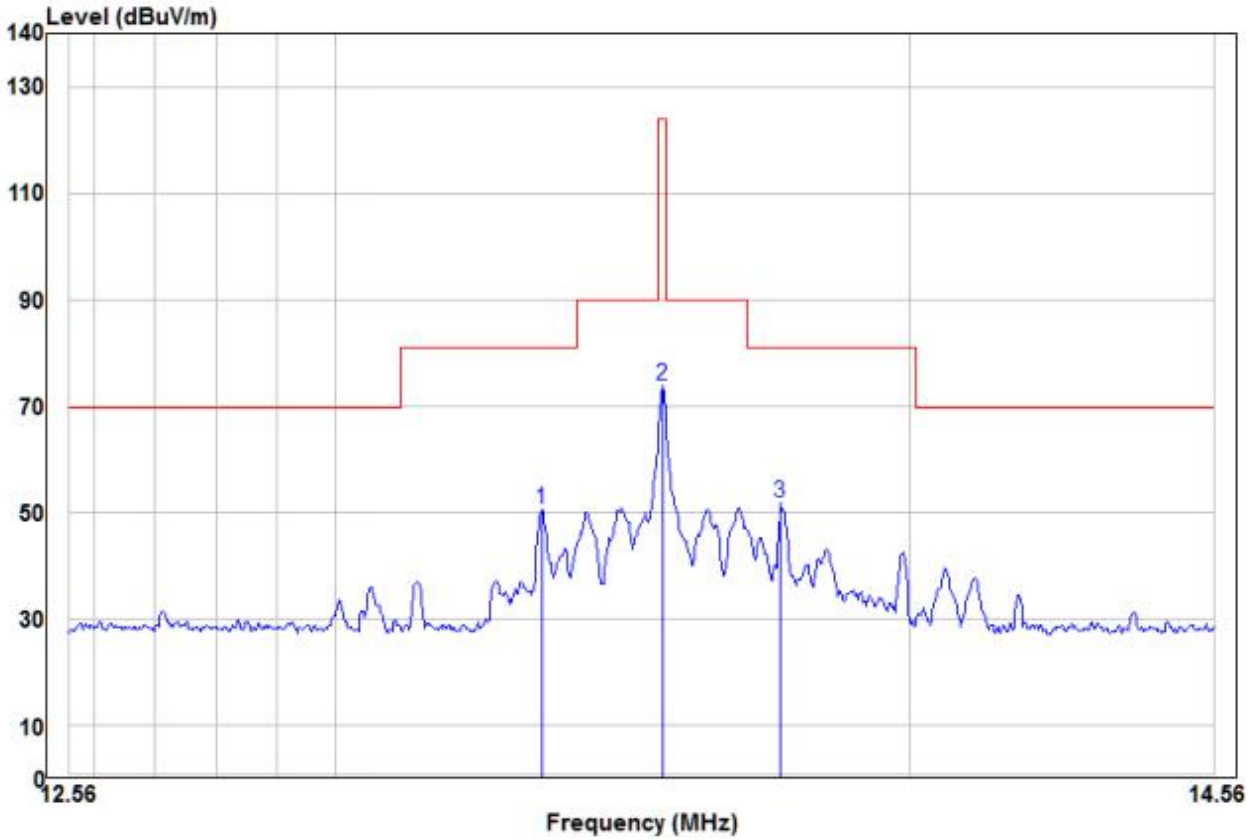
Test Procedure:

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the

	ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Test Mode:	Transmitting with ASK modulation.
Test Result:	Pass

Measurement Data

Fundamental frequency	Detector	Result (dBμV/m)		Limit (dBμV/m)		Margin (dB)
		at 3 meter	at 30 meter	at 3 meter	at 30 meter	
13.56 MHz	Peak	73.76	33.76	124	84	-51.24



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	13.35	30.66	19.93	50.59	81.00	-30.41	Peak	HORIZONTAL
2	13.56	53.84	19.92	73.76	124.00	-50.24	Peak	HORIZONTAL
3 pp	13.77	31.74	19.92	51.66	81.00	-29.34	Peak	HORIZONTAL

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

5.3 Radiated Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.225(d)
Test Method:	ANSI C63.10: 2013
Test Site:	3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Peak	100 kHz	300kHz	Peak

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m) @ 3 m	Remark
0.009MHz-0.490MHz	2400/F(kHz) @300m	129-94	Quasi-peak
0.490MHz-1.705MHz	24000/F(kHz) @30m	74-63	Quasi-peak
1.705MHz-30MHz	30 @30m	70	Quasi-peak
30MHz-88MHz	100 @3m	40.0	Quasi-peak
88MHz-216MHz	150 @3m	43.5	Quasi-peak
216MHz-960MHz	200 @3m	46.0	Quasi-peak
960MHz-1GHz	500 @3m	54.0	Quasi-peak

Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula:

Extrapolation(dB)=40log$_{10}$(Measurement Distance/Specification Distance)

Test Setup:

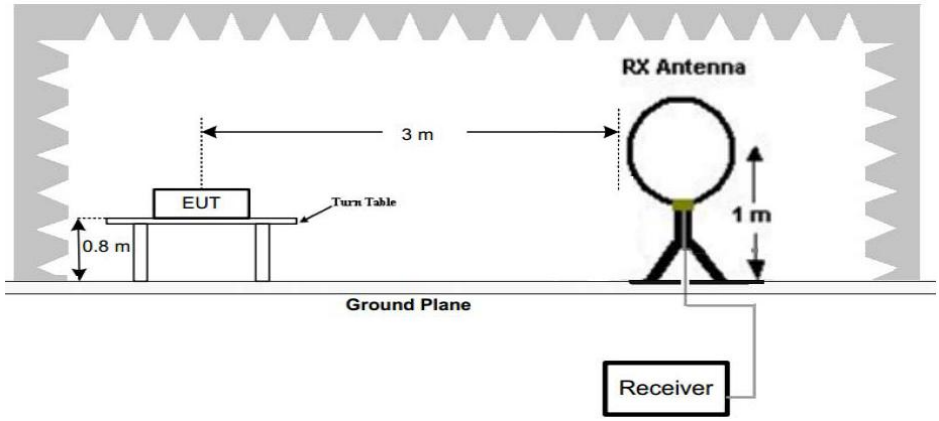
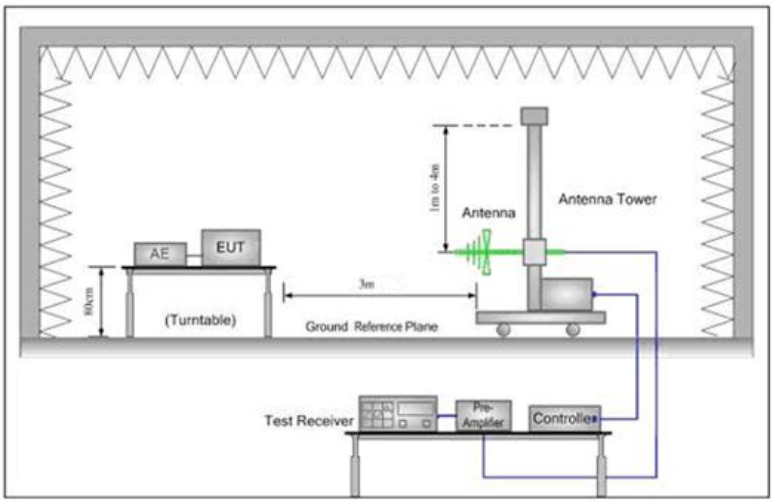
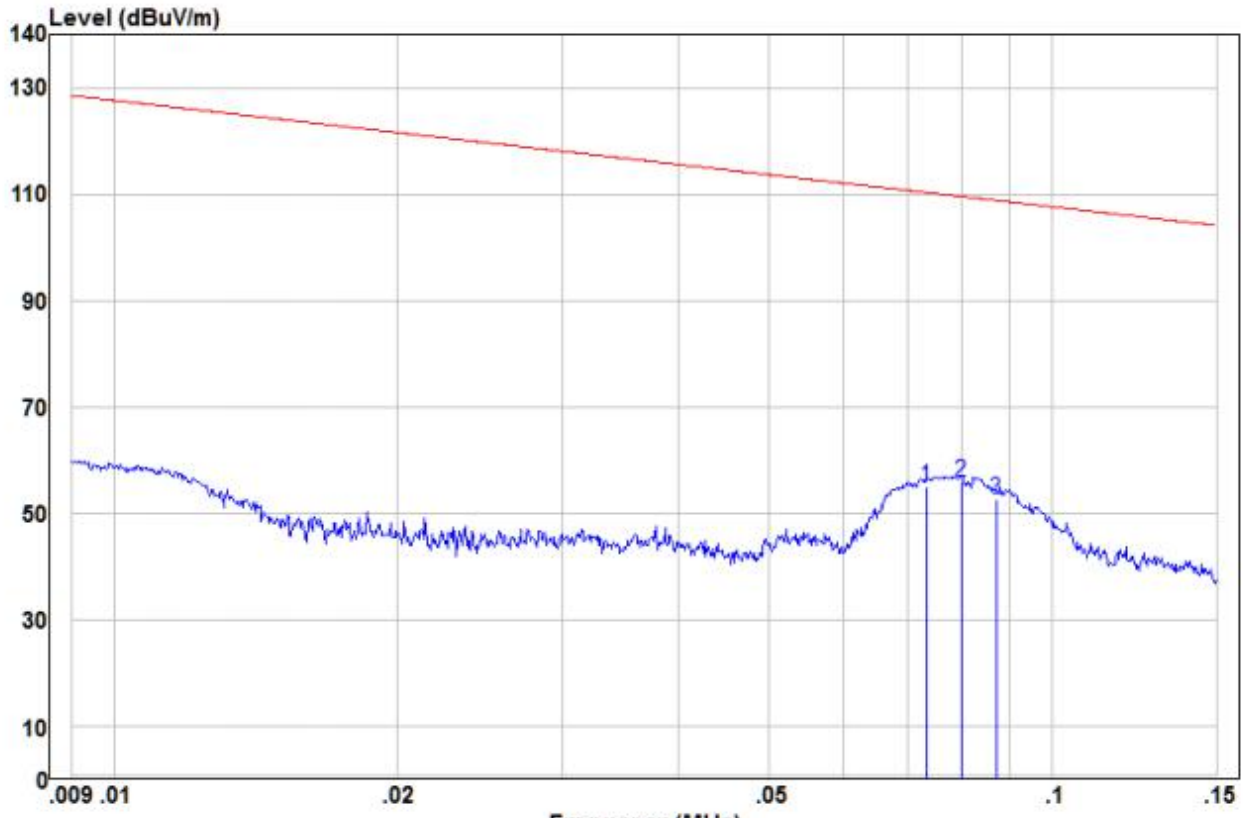


Figure 1. Below 30MHz

	 Figure 2. 30MHz to 1GHz
Test Procedure:	5. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 6. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 7. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 8. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Test Mode:	Transmitting with ASK modulation.
Test Result:	Pass

Measurement Data

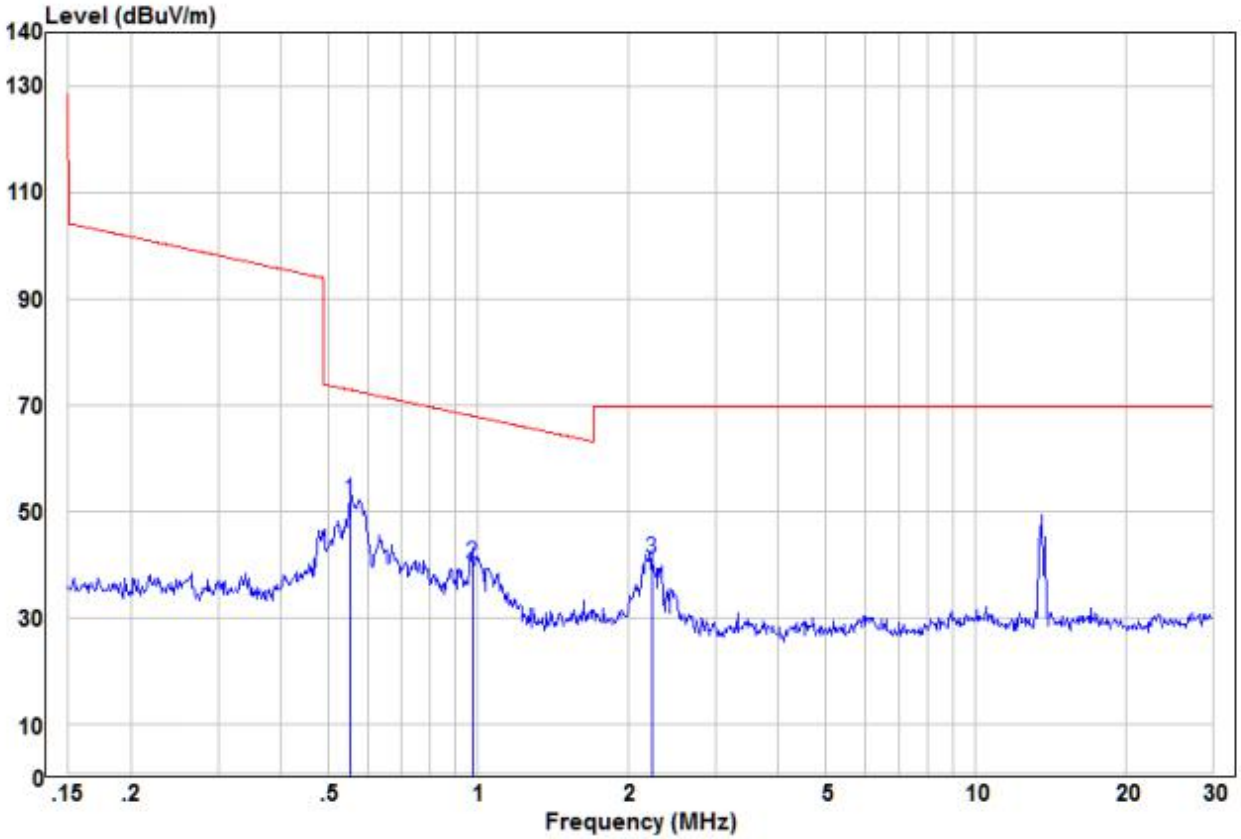
9kHz - 150kHz:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	0.07	35.14	19.69	54.83	110.28	-55.45	QP	HORIZONTAL
2 pp	0.08	36.21	19.68	55.89	109.52	-53.63	QP	HORIZONTAL
3	0.09	33.01	19.65	52.66	108.77	-56.11	QP	HORIZONTAL

Measurement Data

150kHz - 30MHz:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	0.56	32.11	19.73	51.84	72.72	-20.88	QP	HORIZONTAL
2	0.97	20.16	19.89	40.05	67.85	-27.80	QP	HORIZONTAL
3	2.24	20.79	19.97	40.76	69.50	-28.74	QP	HORIZONTAL

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

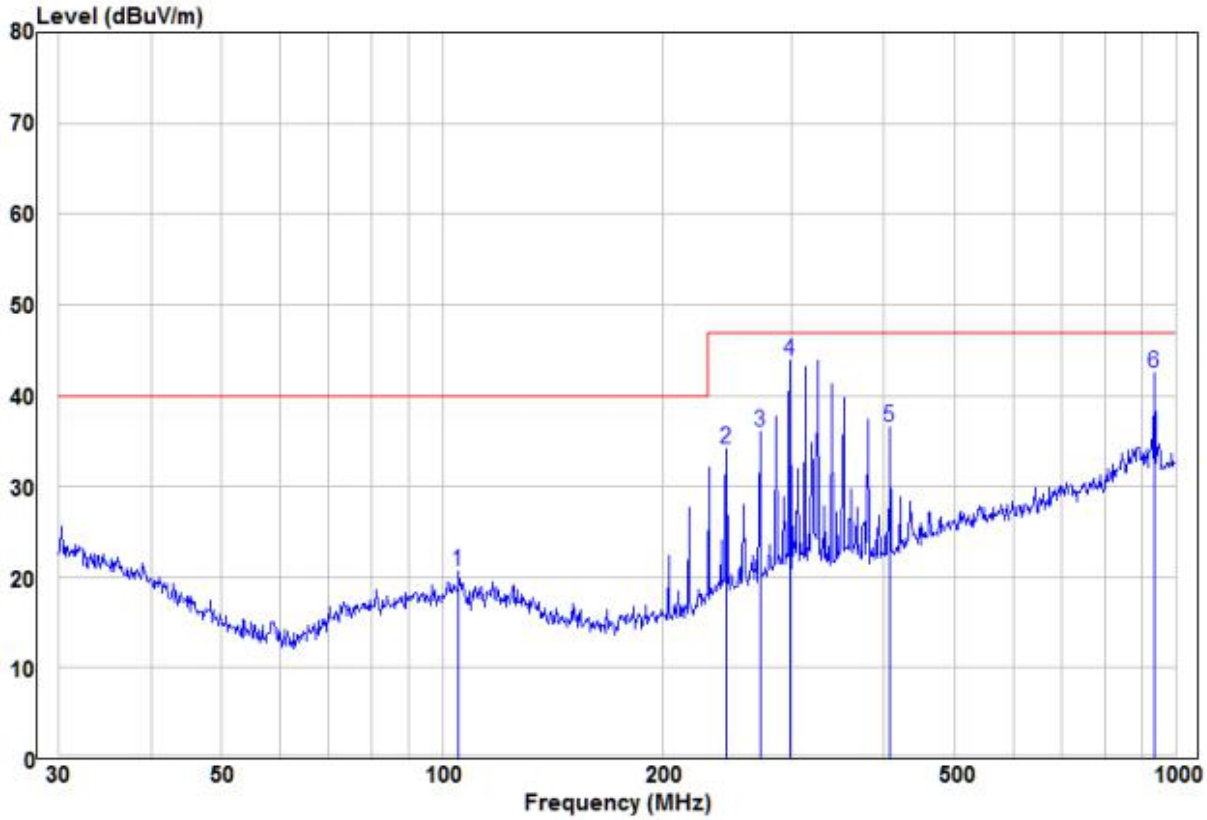
Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

30MHz-1GHz

Horizontal



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	105.27	10.27	10.40	20.67	40.00	-19.33	Peak	HORIZONTAL
2	244.23	22.29	11.87	34.16	47.00	-12.84	Peak	HORIZONTAL
3	271.32	23.21	12.78	35.99	47.00	-11.01	Peak	HORIZONTAL
4 pp	298.27	30.20	13.68	43.88	47.00	-3.12	Peak	HORIZONTAL
5	407.51	21.15	15.39	36.54	47.00	-10.46	Peak	HORIZONTAL
6	935.55	19.09	23.34	42.43	47.00	-4.57	Peak	HORIZONTAL

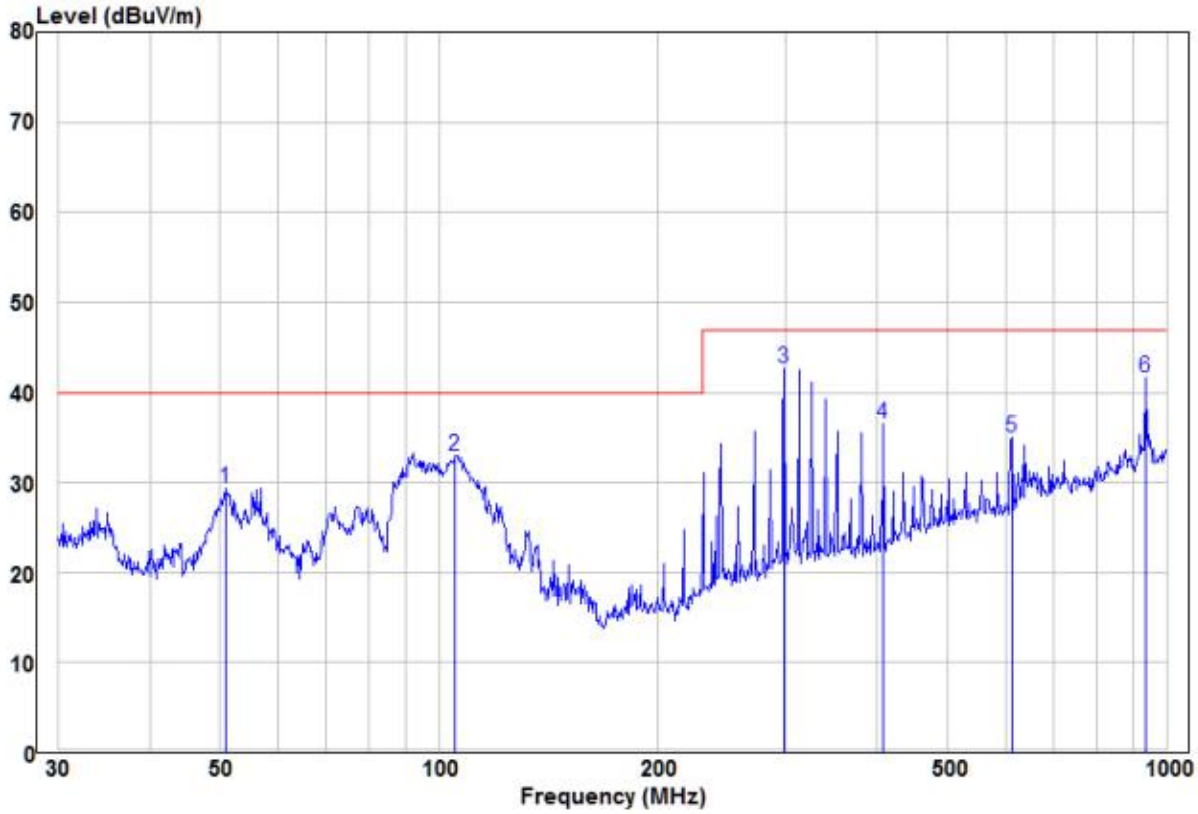
Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,
Over Limit=Level-Limit Line.

Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	50.94	21.45	7.89	29.34	40.00	-10.66	Peak	VERTICAL
2	105.27	22.54	10.40	32.94	40.00	-7.06	Peak	VERTICAL
3 pp	298.27	29.02	13.68	42.70	47.00	-4.30	Peak	VERTICAL
4	407.51	21.04	15.39	36.43	47.00	-10.57	Peak	VERTICAL
5	612.06	15.91	19.02	34.93	47.00	-12.07	Peak	VERTICAL
6	935.55	18.29	23.34	41.63	47.00	-5.37	Peak	VERTICAL

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

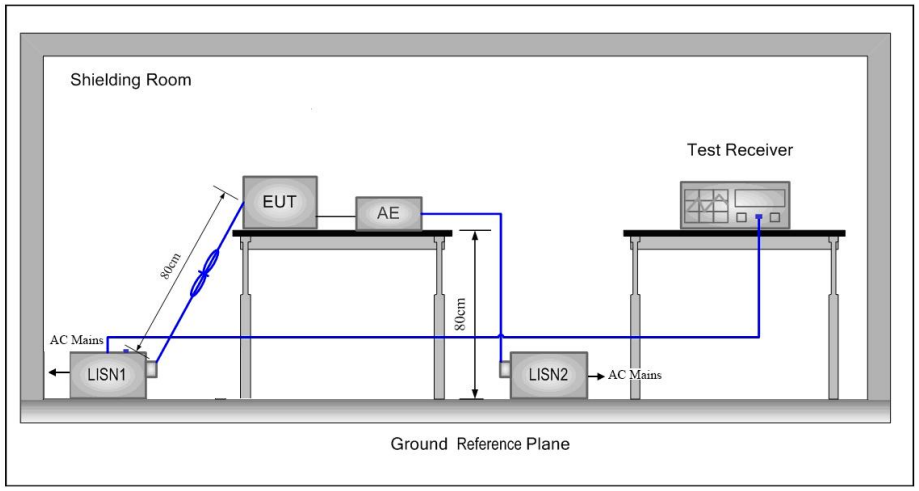
Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

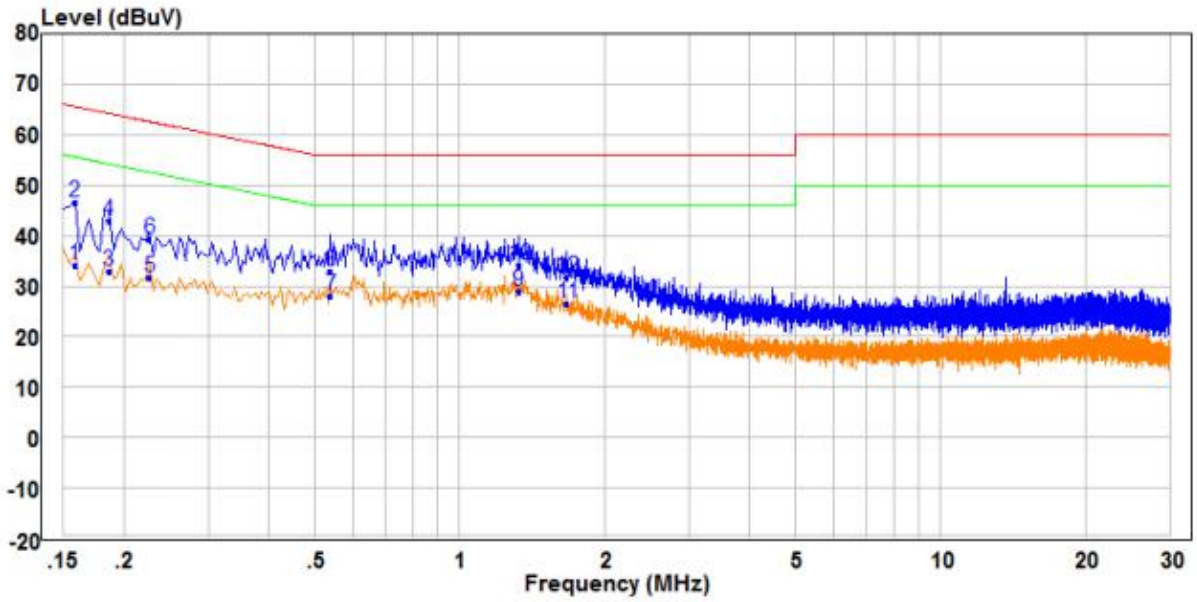
5.4 Conducted Emissions

<table>
<tr><td>Test Requirement:</td><td>47 CFR Part 15C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10: 2013</td></tr>
<tr><td>Test Frequency Range:</td><td>150kHz to 30MHz</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test Procedure:</td><td>1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference
plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a
single LISN provided the rating of the LISN was not exceeded.
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</td></tr>
</table>

Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate of 802.11b at lowest channel is the worst case. Only the worst case is recorded in the report.
Test Voltage:	DC 12V by adapter input AC120V/60Hz
Test Results:	Pass

Measurement Data

Live Line:

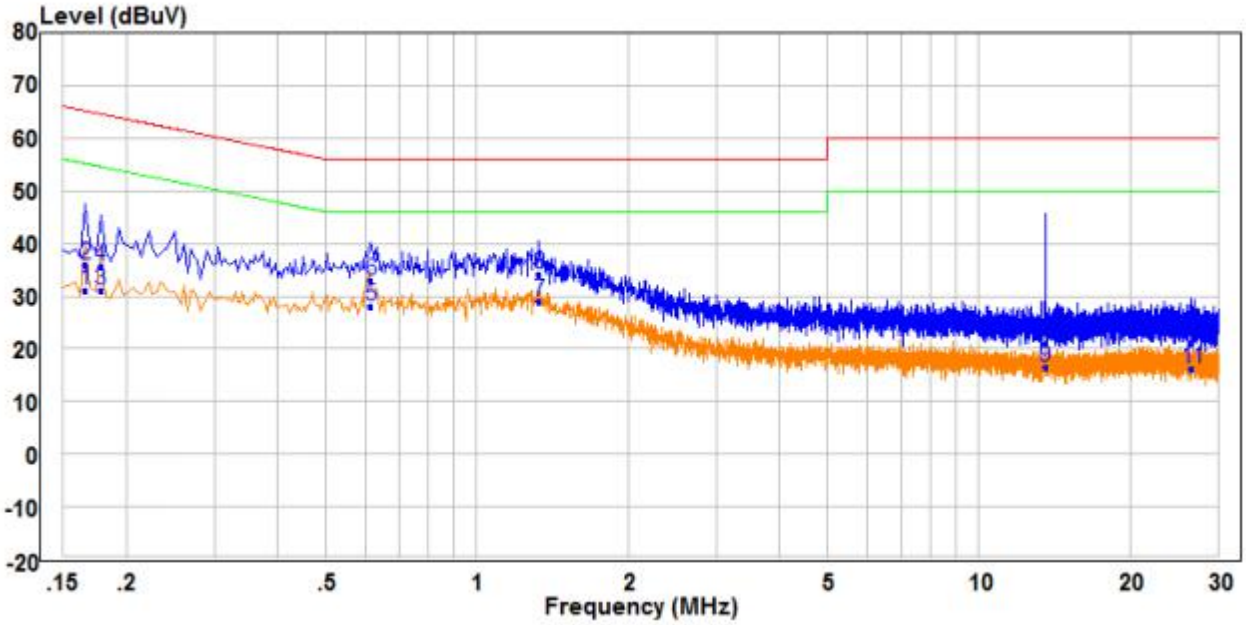


		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.158	24.65	9.49	34.14	55.57	-21.43	Average	Line
2	QP	0.158	37.03	9.49	46.52	65.57	-19.05	QP	Line
3		0.186	23.53	9.49	33.02	54.21	-21.19	Average	Line
4		0.186	33.31	9.49	42.80	64.21	-21.41	QP	Line
5		0.226	22.33	9.49	31.82	52.60	-20.78	Average	Line
6		0.226	29.66	9.49	39.15	62.60	-23.45	QP	Line
7		0.538	18.49	9.59	28.08	46.00	-17.92	Average	Line
8		0.538	23.45	9.59	33.04	56.00	-22.96	QP	Line
9	PP	1.326	19.56	9.53	29.09	46.00	-16.91	Average	Line
10		1.326	24.70	9.53	34.23	56.00	-21.77	QP	Line
11		1.674	17.00	9.52	26.52	46.00	-19.48	Average	Line
12		1.674	22.24	9.52	31.76	56.00	-24.24	QP	Line

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral Line:



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.166	21.51	9.48	30.99	55.16	-24.17	Average	Neutral
2		0.166	26.42	9.48	35.90	65.16	-29.26	QP	Neutral
3		0.178	21.55	9.48	31.03	54.58	-23.55	Average	Neutral
4		0.178	26.30	9.48	35.78	64.58	-28.80	QP	Neutral
5		0.614	18.39	9.72	28.11	46.00	-17.89	Average	Neutral
6		0.614	23.05	9.72	32.77	56.00	-23.23	QP	Neutral
7	PP	1.330	19.37	9.72	29.09	46.00	-16.91	Average	Neutral
8	QP	1.330	24.46	9.72	34.18	56.00	-21.82	QP	Neutral
9		13.553	6.41	9.93	16.34	50.00	-33.66	Average	Neutral
10		13.553	11.06	9.93	20.99	60.00	-39.01	QP	Neutral
11		26.612	6.15	10.09	16.24	50.00	-33.76	Average	Neutral
12		26.612	10.81	10.09	20.90	60.00	-39.10	QP	Neutral

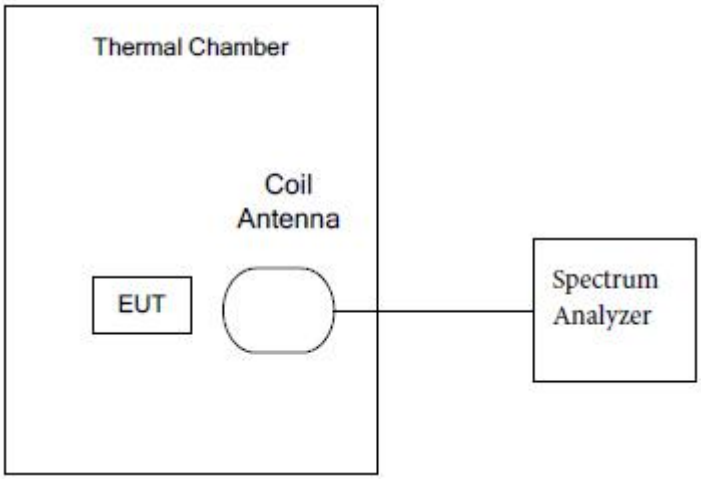
Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

3. If the Peak value under Average limit, the Average value is not recorded in the report.

5.5 Frequency Tolerance

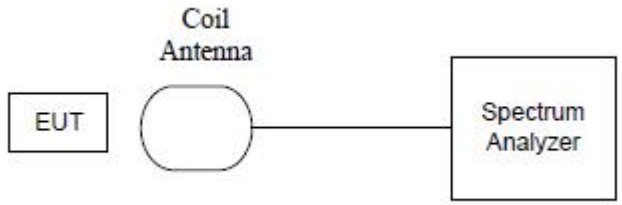
Test Requirement:	47 CFR Part 15 C Section 15.225(e)
Test Method:	ANSI C63.10: 2013
Test Setup:	
Frequency Range:	Operation within the band 13.110-14.010 MHz
Requirements:	The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature 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.
Method of Measurement:	The EUT was placed in an environmental test chamber and powered such that control element received normal voltage and the transmitter provided maximum RF output.
Test Result:	The unit does meet the FCC Part 15 C Section 15.225(e) requirements.

Test Frequency: 13.56MHz			Temperature:20℃	
Supply Voltage （V）DC	Test Result (MHz)	Deviation (kHz)	Limit ±0.01% (kHz)	Result
12.0	13.5612859	1.2859	1.3560	Pass
13.2	13.5612861	1.2861	1.3560	Pass
10.8	13.5612864	1.2864	1.3560	Pass

Test Frequency: 13.56MHz			Normal Voltage:DC12V	
Temperature （℃）	Test Result (MHz)	Deviation (kHz)	Limit ±0.01% (kHz)	Result
-20	13.5612800	1.2800	1.3560	Pass
-10	13.5612861	1.2861	1.3560	
0	13.5612857	1.2857	1.3560	
10	13.5612842	1.2842	1.3560	
20	13.5612856	1.2856	1.3560	
30	13.5612853	1.2853	1.3560	
40	13.5612852	1.2852	1.3560	
50	13.5612840	1.2840	1.3560	

Note: Deviation (KHz) = (Test Result-13.56MHz)*1000

5.6 Occupied Bandwidth

Test Requirement:	47 CFR Part 15 C Section 15.215 (C)
Test Method:	ANSI C63.10: 2013
Test Setup:	
Frequency Range:	Operation within the band 13.110 – 14.010 MHz
Requirements:	Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through §15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.
Limit:	For 13.56 MHz the permitted frequency band is 14kHz, so the limit is 11.2 kHz.

Test Data:

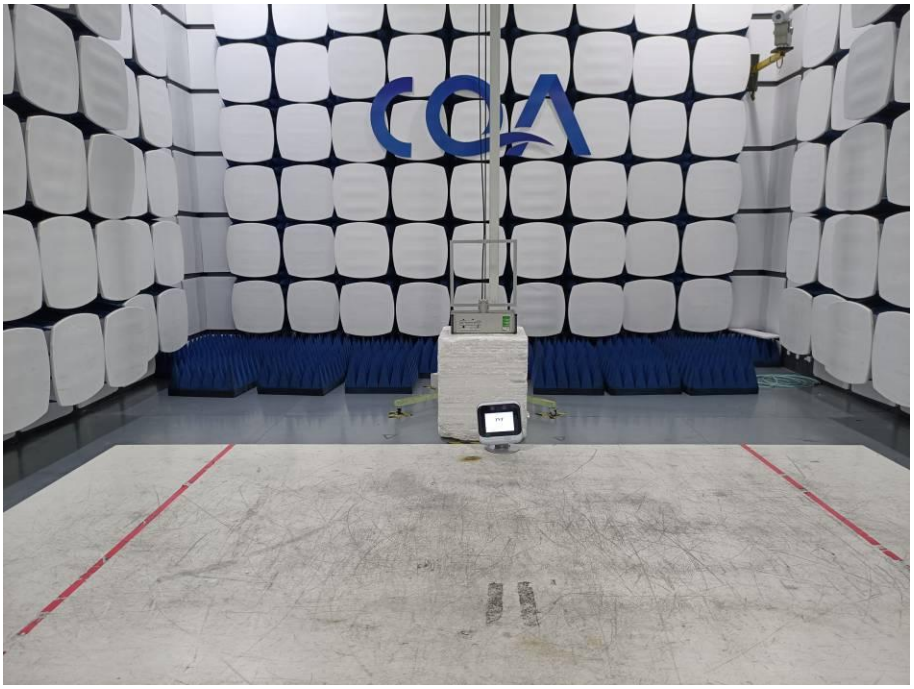
20dB bandwidth (kHz)	FL (MHz)	FH (MHz)	Limit(MHz)	Result
31.258	**13.54263**	**13.57809**	**13.110 – 14.010**	**Pass**

Test plot as follows:

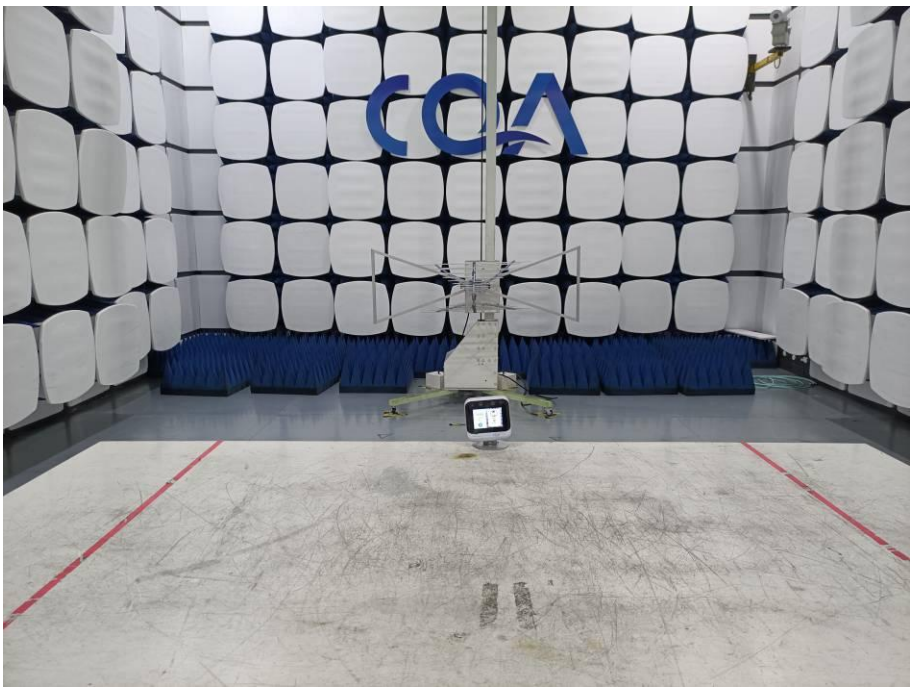
6 Photographs - EUT Test Setup

6.1 Radiated Emission

9KHz~30MHz:



30MHz~1GHz:



6.2 Conducted Emission

7 Photographs - EUT Construction Details

Refer to Photographs of EUT Constructional Details for CQASZ20210600844E-01

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The End