TEST REPORT

Applicant:	Lockstar Group Ltd
Address of Applicant:	71-75 Shelton Street, Covent Garden, London, Alabama WC2H 9JQ, United States
Manufacturer:	GUANGZHOU ONLENSE SCIENCE & TECHNOLOGY CO., LTD.
Address of Manufacturer:	No. 6 Zhongjiazhuang Xi Road, Dalong Street, Panyu, Guangzhou, China
Equipment Under Test (EUT)	
Product Name:	SMART DOOR LOCK
Model No.:	S110BBL-F
Trade Mark:	LOCKSTAR
FCC ID:	2A4S6-S110BBL-F
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.225
Date of sample receipt:	March 02, 2022
Date of Test:	March 03-08, 2022
Date of report issued:	March 09, 2022
Test Result :	PASS

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

Authorized Signature:

Robinson Luo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	*March 09, 2022*	*Original*

Prepared By: ***Date:*** *March 09, 2022*

Project Engineer

Check By: ***Date:*** *March 09, 2022*

Reviewer

3 Contents

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	N/A
Field Strength of Fundamental Emissions and Mask Measurement	15.225(a)(b)(c)	Pass
Radiated Emission	15.225(d)&15.209	Pass
20dB Emission Bandwidth	15.225&15.215	Pass
Frequency Stability Measurement	15.225(e)	Pass

Remark:

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *N/A: Not applicable.*

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz-30MHz	3.1dB	(1)
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	SMART DOOR LOCK
Model No.:	S110BBL-F
S/N:	X0035QJ1EX
Hardware Version:	1.0
Software Version:	1.0
Test sample(s) ID:	GTSL202203000017-1
Sample(s) Status	Engineered sample
Operation Frequency:	13.56MHz
Channel Number:	1
Modulation:	ASK
Antenna type:	Integral Antenna
Antenna gain:	0dBi
Power supply:	DC 6V (DC 1.5V*4) Battery

5.2 Test mode

<table>
<tr><td>Transmitter mode</td><td>Keep the EUT in continuously transmitting.</td></tr>
<tr><td colspan="2">Pre-test mode.</td></tr>
<tr><td colspan="2">GTS has verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:
ANT 1:
<table>
<tr><td>Axis</td><td>X</td><td>Y</td><td>Z</td></tr>
<tr><td>Field Strength(dBuV/m)</td><td>57.35</td><td>59.26</td><td>61.72</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Final Test Mode:</td></tr>
<tr><td colspan="2">According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup”: Y axis
(see the test setup photo)</td></tr>
</table>

5.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC—Registration No.: 381383**

Designation Number: CN5029

Global United Technology Services 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 files.

● **IC —Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

5.5 Description of Support Units

None.

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 24 2021	June. 23 2022
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 24 2021	June. 23 2022
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 24 2021	June. 23 2022
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 24 2021	June. 23 2022
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 24 2021	June. 23 2022
9	Coaxial Cable	GTS	N/A	GTS211	June. 24 2021	June. 23 2022
10	Coaxial cable	GTS	N/A	GTS210	June. 24 2021	June. 23 2022
11	Coaxial Cable	GTS	N/A	GTS212	June. 24 2021	June. 23 2022
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 24 2021	June. 23 2022
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 24 2021	June. 23 2022
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 24 2021	June. 23 2022
15	Band filter	Amindeon	82346	GTS219	June. 24 2021	June. 23 2022
16	Power Meter	Anritsu	ML2495A	GTS540	June. 24 2021	June. 23 2022
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 24 2021	June. 23 2022
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 24 2021	June. 23 2022
19	Splitter	Agilent	11636B	GTS237	June. 24 2021	June. 23 2022
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 24 2021	June. 23 2022
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 17 2021	Oct. 16 2022
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 17 2021	Oct. 16 2022
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 17 2021	Oct. 16 2022
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 24 2021	June. 23 2022

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 24 2021	June. 23 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 24 2021	June. 23 2022
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 24 2021	June. 23 2022
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 24 2021	June. 23 2022
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 24 2021	June. 23 2022
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 24 2021	June. 23 2022
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 24 2021	June. 23 2022
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 24 2021	June. 23 2022

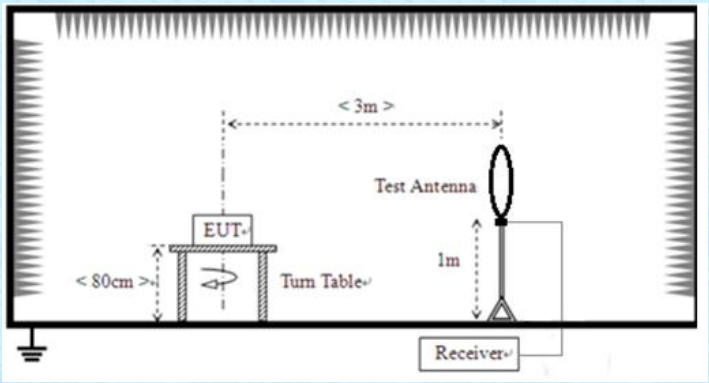
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 24 2021	June. 23 2022
2	Barometer	ChangChun	DYM3	GTS255	June. 24 2021	June. 23 2022

7 Test results and Measurement Data

7.1 Antenna requirement:

Standard requirement:	FCC 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 best case gain of the integral antenna is 0dBi. reference to the appendix II for details	

7.2 Field Strength of Fundamental Emissions and Mask Measurement

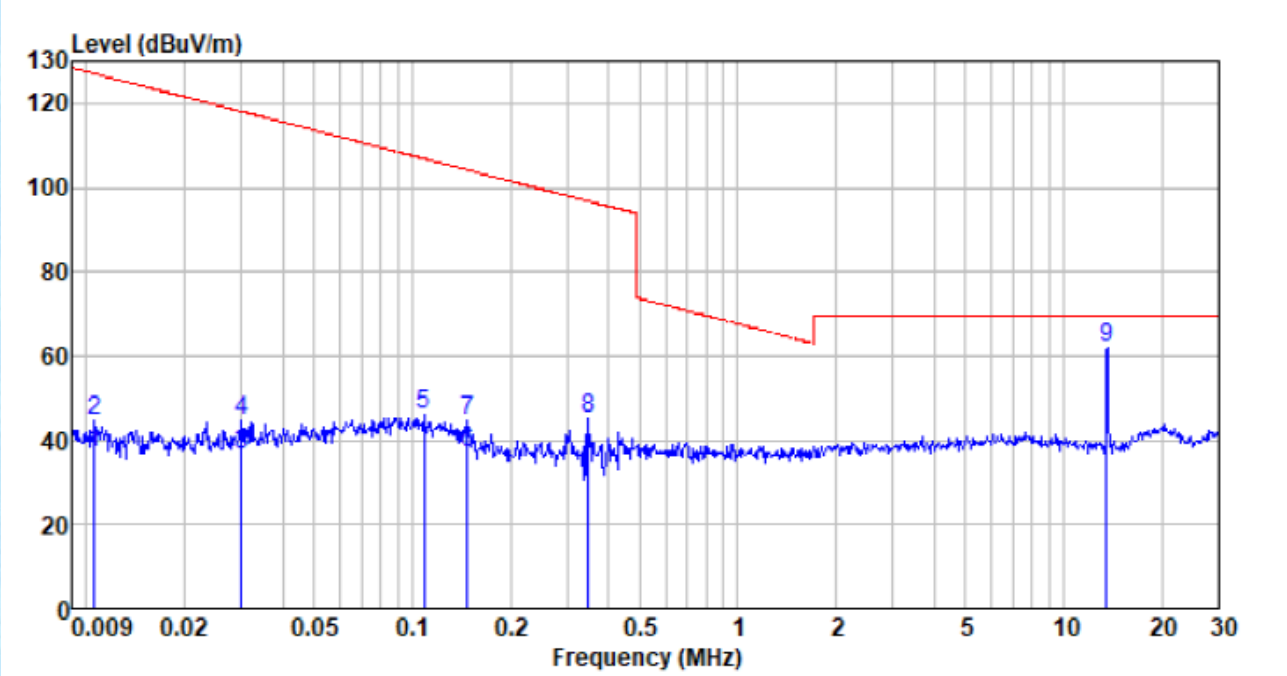
Test Requirement:	FCC Part15 C Section 15.225(a)(b)(c)
Test Method:	ANSI C63.10:2013 & ANSI C63.4: 2014
Test site:	Measurement Distance: 3m
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=Auto
limit:	FCC Part 15.225 & 15.209
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
13.56	38.35	22.86	0.51	61.72	124	-62.28	QP

Test plot as follows:

Test data combines x, y, z-axis



7.3 Radiated Emission

Test Requirement:	FCC Part15 C Section 15.225(d) and 15.209
Test Method:	ANSI C63.10: 2013 & ANSI C63.4: 2014
Test Frequency Range:	9KHz to 1000MHz
Test site:	Measurement Distance: 3m

Receiver setup:

Frequency	Detector	RBW	VBW	Remark
9kHz-150kHz	Quasi-peak	200Hz	300Hz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	10kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value

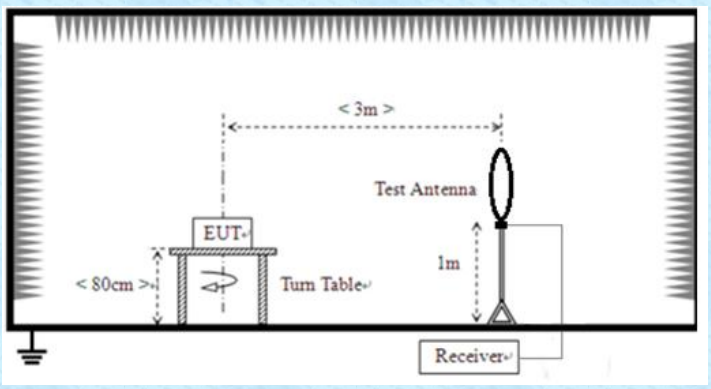
Limit:

Frequency (MHz)	Field strength (microvolts/meter)	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

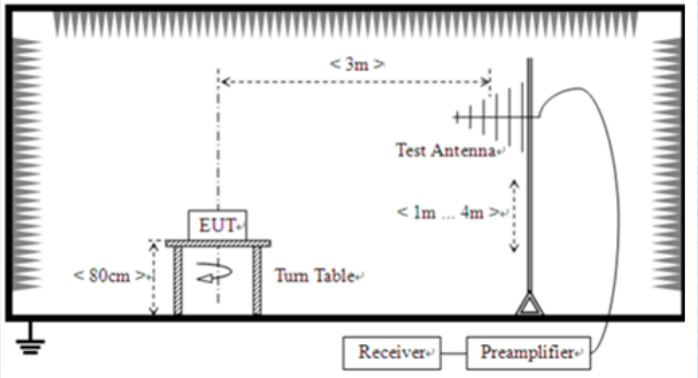
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test setup:

Below 30MHz



Above 30MHz

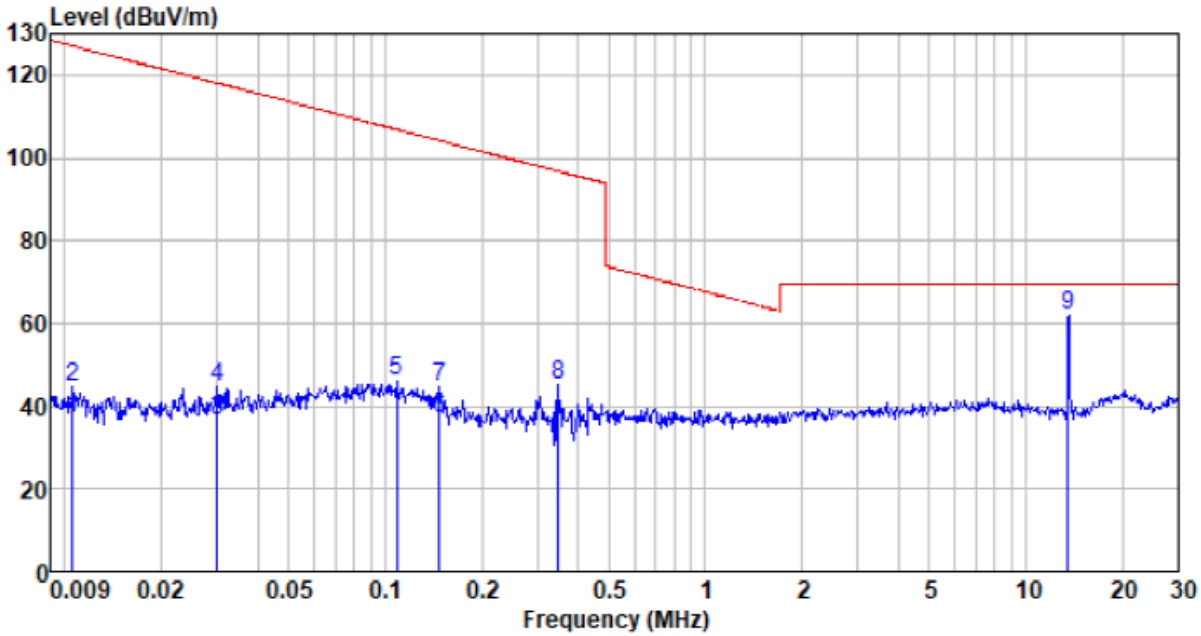
						
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test results:	Pass					

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

Measurement data:

■ **9kHz~30MHz**

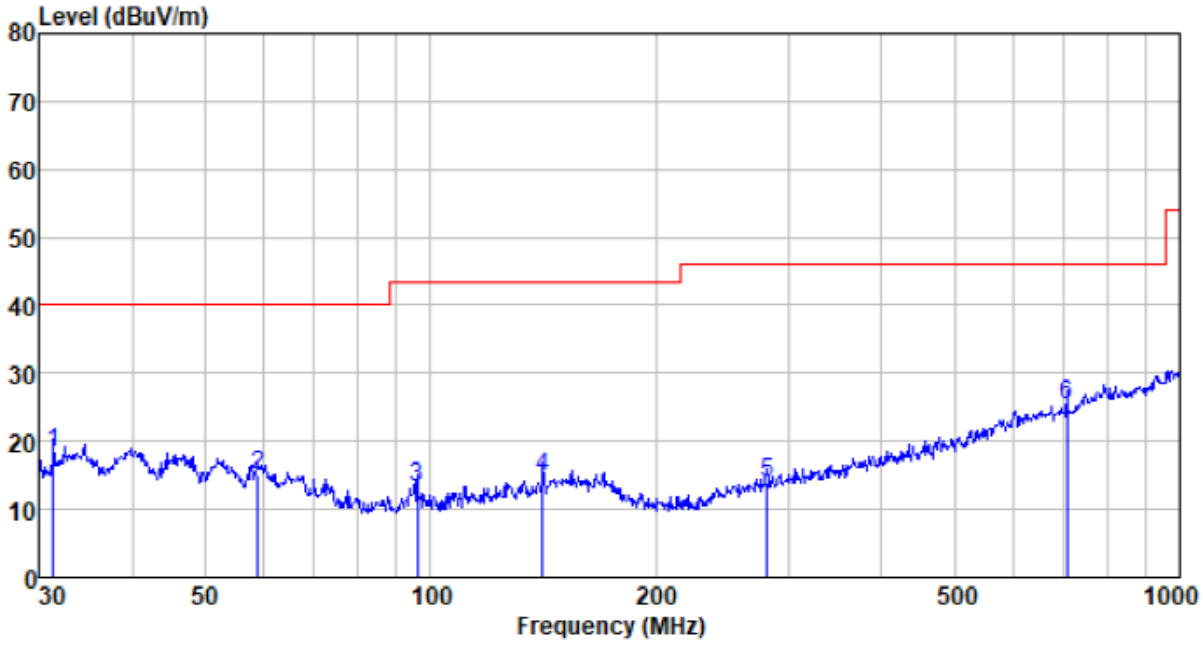
Test data combines x, y, z-axis; the radiation emission more than 20dB below the limit



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
0.011	14.88	22.01	0.01	0.00	36.90	127.11	-90.21	Average
0.011	22.47	22.01	0.01	0.00	44.49	127.11	-82.62	Peak
0.030	16.58	19.95	0.08	0.00	36.61	118.09	-81.48	Average
0.030	24.47	19.95	0.08	0.00	44.50	118.09	-73.59	Peak
0.109	21.78	24.18	0.17	0.00	46.13	106.89	-60.76	QP
0.148	13.67	22.96	0.19	0.00	36.82	104.21	-67.39	Average
0.148	21.56	22.96	0.19	0.00	44.71	104.21	-59.50	Peak
0.346	23.65	21.23	0.25	0.00	45.13	96.81	-51.68	QP

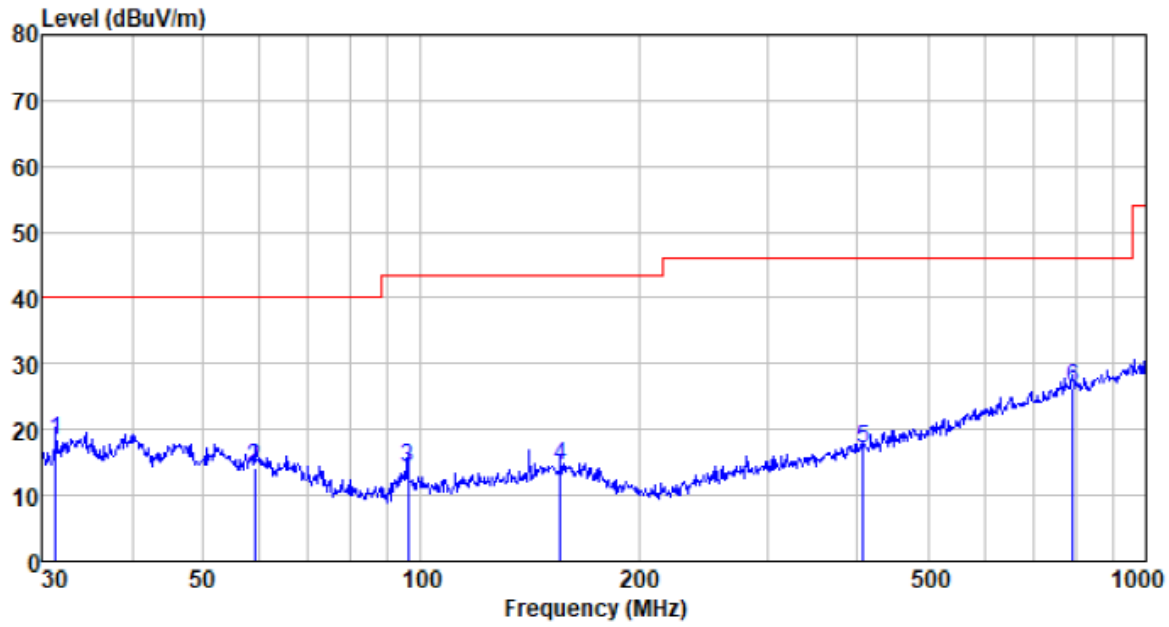
■ **30MHz~1GHz**

Horizontal:



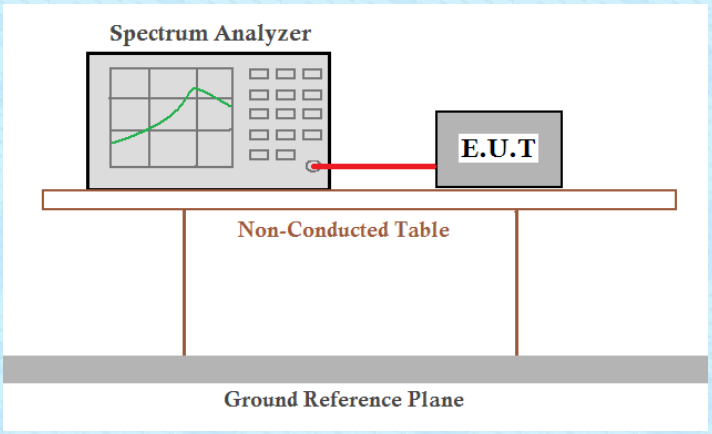
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
31.399	40.69	12.26	0.57	35.11	18.41	40.00	-21.59	QP
58.819	38.01	12.37	0.85	36.31	14.92	40.00	-25.08	QP
96.099	39.85	8.85	1.16	36.69	13.17	43.50	-30.33	QP
141.330	38.29	12.12	1.51	37.02	14.90	43.50	-28.60	QP
281.008	37.07	11.86	2.27	37.41	13.79	46.00	-32.21	QP
706.700	38.33	20.55	4.12	37.63	25.37	46.00	-20.63	QP

Vertical:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
31.399	40.69	12.26	0.57	35.11	18.41	40.00	-21.59	QP
59.025	37.38	12.36	0.85	36.31	14.28	40.00	-25.72	QP
96.099	40.94	8.85	1.16	36.69	14.26	43.50	-29.24	QP
155.910	37.11	12.78	1.60	37.11	14.38	43.50	-29.12	QP
407.515	36.83	14.89	2.89	37.52	17.09	46.00	-28.91	QP
793.396	37.27	22.15	4.43	37.62	26.23	46.00	-19.77	QP

7.4 Channel Bandwidth

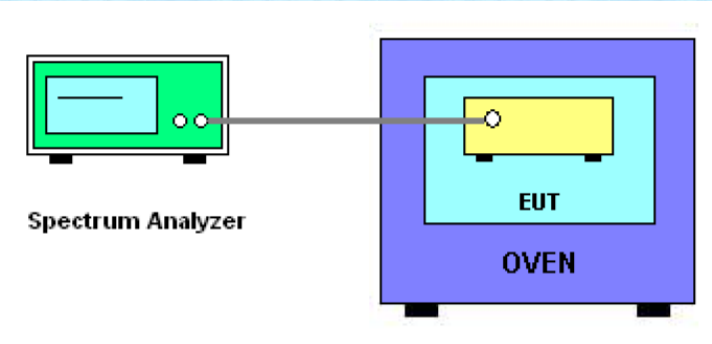
Test Requirement:	FCC Part15 C Section 15.225 and 15.215
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth & 99%bandwidth.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Test frequency (MHz)	20dB bandwidth(KHz)	Result
13.56	17.91	Pass

Test plot as follows:

7.5 Frequency Stability Measurement

Test Requirement:	FCC Part15 C Section 15.225 (e)
Test Method:	ANSI C63.10: 2013
Receiver setup:	RBW=1KHz, VBW=1KHz, Sweep time=Auto
Limit:	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, 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.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Reference Frequency: 13.56MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit	Result
		Hz	%		
6	-20	19	0.00014	+/- 0.01%	Pass
	-10	16	0.00012		
	0	18	0.00013		
	10	19	0.00014		
	20	19	0.00014		
	30	15	0.00011		
	40	14	0.00010		
	50	21	0.00015		

Reference Frequency: 13.56MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit	Result
		Hz	ppm		
20	6	18	0.00013	+/- 0.01%	Pass
	4	15	0.00011		

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

------ End ------