FCC RADIO TEST REPORT

FCC ID: 2AI2O-OC32

Product：	Sharing bike smart lock
Trade Name：	Omni
Model Name：	OC32
Additional Model：	N/A
Report No.：	UNIA21032411ER-15

Prepared for

Shenzhen Omni Intelligent Technology Co., Ltd.

11th Floor Block 31, Lianchuang Technical Zone, Bulan Road, Longgang District, Shenzhen, P.R. China

Prepared by

Shenzhen United Testing Technology Co., Ltd.

2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

TEST RESULT CERTIFICATION

Applicant:	Shenzhen Omni Intelligent Technology Co., Ltd.
Address:	11th Floor Block 31, Lianchuang Technical Zone, Bulan Road, Longgang District, Shenzhen, P.R. China
Manufacturer:	Shenzhen Omni Intelligent Technology Co., Ltd.
Address:	11th Floor Block 31, Lianchuang Technical Zone, Bulan Road, Longgang District, Shenzhen, P.R. China

Product description

Product Name:	Sharing bike smart lock
Trade Mark:	Omni
Model Name:	OC32
Test Methods:	FCC Rules and Regulations Part 15 Subpart C Section 15.225, ANSI C63.10: 2013

This device described above has been tested by Shenzhen United Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test:	
Date (s) of performance of tests:	Mar. 21, 2021 ~ Jul. 11, 2021
Date of Issue:	Aug. 24, 2021
Test Result:	Pass

Prepared by: Bob liao

Bob liao/Editor

Reviewer: Kahn. Yang

Kahn yang/Supervisor

Approved & Authorized Signer: liuze

Liuze/Manager

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1 TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

ITEM	STANGARD	RESULT
CONDUCTED EMISSION	FCC Part 15.207	COMPLIANT
RADIATED EMISSION	FCC Part 15.209/15.225	COMPLIANT
FREQUENCY STABILITY	FCC Part 15.225	COMPLIANT
OCCUPIED BANDWIDTH	FCC Part 15.215	COMPLIANT
ANTENNA REQUIREMENT	FCC Part 15.203	COMPLIANT

1.2 TEST FACILITY

Test Firm : Shenzhen United Testing Technology Co., Ltd.

Address : 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.The testing quality system of our laboratory meets with ISO/IEC-17025 requirements. This approval result is accepted by MRA of APLAC.

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

A2LA Certificate Number: 4747.01
The EMC Laboratory has been accredited by A2LA, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

FCC Registration Number: 674885
The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission.

IC Registration Number: 21947
The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada.

1.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI	ANSI	9kHz ~ 150kHz	2.96	
		150kHz ~ 30MHz	2.44	

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI	ANSI	9kHz ~ 30MHz	2.50	
		30MHz ~ 1000MHz	4.80	
		Above 1000MHz	4.13	

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Sharing bike smart lock
Trade Mark:	Omni
Main Model:	OC32
Additional Model:	N/A
Model Difference:	N/A
FCC ID:	2AI2O-OC32
Operation Frequency:	13.56MHz
Number of Channels:	1CH
Modulation Type:	FSK
Antenna Type:	Coil Antenna
Antenna Gain:	0dBi
Battery:	DC 3.7V, 8000mAh
Adapter:	N/A
Power Source:	DC 3.7V from battery or DC 6.0V from adapter with AC 120(240)V/60Hz

2.2 CARRIER FREQUENCY OF CHANNELS

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	13.56						

2.3 TEST MODE

The EUT was programmed to be in transmitting mode.

Channel List	
Test Channel	Test Frequency (MHz)
01	13.56

2.4 TEST SETUP

Operation of EUT during Conducted testing:

Operation of EUT during Radiation testing:

2.5 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Note
E-1	Sharing bike smart lock	Omni	OC32	EUT
E-2	Adapter	N/A	KY-6V3A	AE

Item	Shielded Type	Ferrite Core	Length	Note

Note:

1. The support equipment was authorized by Declaration of Confirmation.
2. For detachable type I/O cable should be specified the length in cm in『Length』column.
3. “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.6 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
Conduction Emissions Measurement					
1	Conducted Emission Test Software	EZ-EMC	Ver.CCS-3A1-CE	N/A	N/A
2	AMN	Schwarzbeck	NNLK8121	8121370	2021.10.12
3	AAN	TESEQ	T8-Cat6	38888	2021.10.12
4	Pulse Limiter	CYBRTEK	EM5010	E115010056	2022.05.17
5	EMI Test Receiver	Rohde&Schwarz	ESCI	101210	2021.10.12
Radiated Emissions Measurement					
1	Radiated Emission Test Software	EZ-EMC	Ver.CCS-03A1	N/A	N/A
2	Horn Antenna	Sunol	DRH-118	A101415	2021.10.18
3	Broadband Hybrid Antenna	Sunol	JB1	A090215	2022.03.01
4	PREAMP	HP	8449B	3008A00160	2021.10.18
5	PREAMP	HP	8447D	2944A07999	2022.05.17
6	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2021.10.12
7	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2021.10.12
8	Signal Generator	Agilent	E4421B	MY4335105	2021.11.11
9	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2021.10.12
10	MXA Signal Analyzer	Keysight	N9020A	MY51110104	2021.10.12
11	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2022.05.17
12	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2022.05.17
13	RF power divider	Anritsu	K241B	992289	2021.10.12
14	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2021.10.12
15	Active Loop Antenna	Com-Power	AL-130R	10160009	2022.05.17
16	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2022.05.17
17	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2022.05.17
18	Horn Antenna	A-INFOMW	LB-180400-KF	J211060660	2021.11.04
19	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2022.05.17
20	Signal Generator	Agilent	N5183A	MY47420153	2022.05.17
21	Spctrum Analyzer	Rohde&Schwarz	FSP 40	100501	2022.05.17
22	Power Meter	KEYSIGHT	N1911A	MY50520168	2022.05.17
23	Frequency Meter	VICTOR	VC2000	997406086	2022.05.17
24	DC Power Source	HYELEC	HY5020E	055161818	2022.05.17

3 CONDUCTED EMISSION

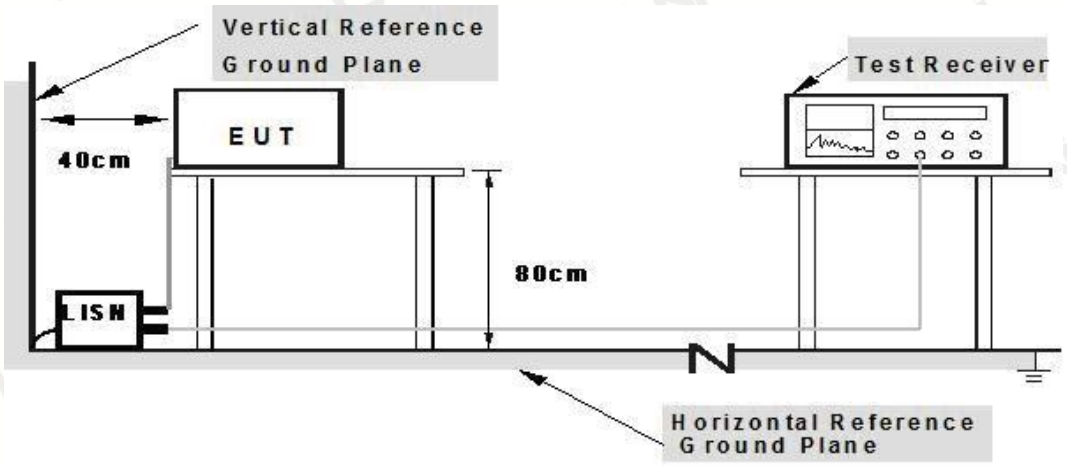
3.1 TEST LIMIT

For unintentional device, according to § 15.207(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15~0.50	79	66	66~56*	56~46*
0.50~5.00	73	60	56	46
5.00~30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency.
For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.3 TEST PROCEDURE

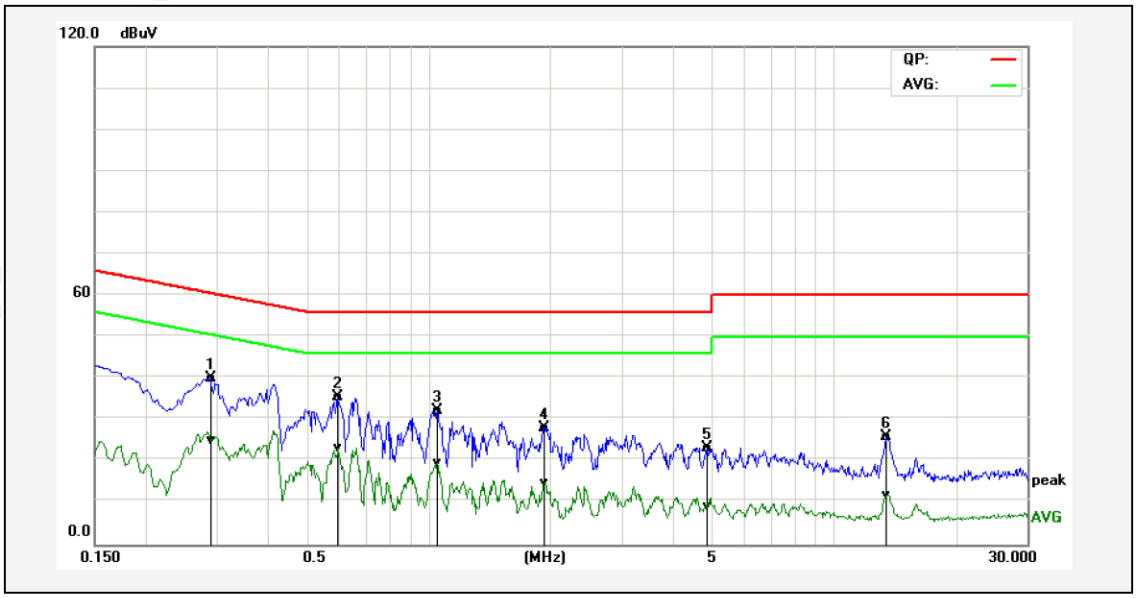
1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is placed on a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

3.4 TEST RESULT

PASS

Remark:
All modes were tested at AC 120V and 240V, only the worst result of AC 120V was reported.

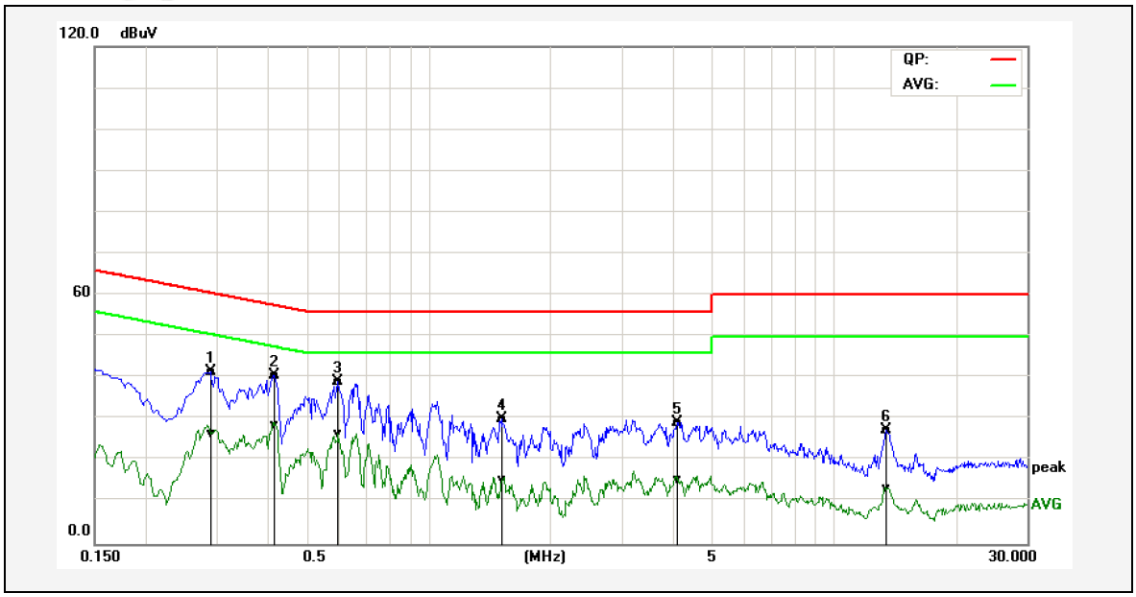
Temperature:	24℃	Relative Humidity:	48%
Test Date:	Jun. 09, 2021	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Line
Test Mode:	Transmitting mode		



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1P	0.2900	30.24	15.14	9.79	40.03	24.93	60.52	50.52	-20.49	-25.59	Pass
2*	0.5980	25.78	13.41	9.79	35.57	23.20	56.00	46.00	-20.43	-22.80	Pass
3P	1.0500	22.52	9.65	9.86	32.38	19.51	56.00	46.00	-23.62	-26.49	Pass
4P	1.9380	18.30	5.07	9.88	28.18	14.95	56.00	46.00	-27.82	-31.05	Pass
5P	4.8780	13.30	-0.68	9.97	23.27	9.29	56.00	46.00	-32.73	-36.71	Pass
6P	13.5460	25.67	11.70	0.25	25.92	11.95	60.00	50.00	-34.08	-38.05	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

Temperature:	24℃	Relative Humidity:	48%
Test Date:	Jun. 09, 2021	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Neutral
Test Mode:	Transmitting mode		



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1P	0.2900	31.74	16.64	9.79	41.53	26.43	60.52	50.52	-18.99	-24.09	Pass
2*	0.4180	30.83	18.77	9.81	40.64	28.58	57.49	47.49	-16.85	-18.91	Pass
3P	0.5980	29.28	16.91	9.79	39.07	26.70	56.00	46.00	-16.93	-19.30	Pass
4P	1.5180	20.22	5.73	9.86	30.08	15.59	56.00	46.00	-25.92	-30.41	Pass
5P	4.1060	19.32	5.54	9.95	29.27	15.49	56.00	46.00	-26.73	-30.51	Pass
6P	13.5460	27.17	13.20	0.25	27.42	13.45	60.00	50.00	-32.58	-36.55	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

4 RADIATED EMISSION

4.1 TEST LIMIT

FCC Part15 C Section 15.225

Frequency (MHz)	Limit (uV/m @30m)	Limit (dBuV/m @3m)	Detector
13.110-13.410	106	80.5	QP
13.410-13.553	334	90.5	QP
13.553-13.567	15848	124.0	QP
13.567-13.7110	224	90.5	QP
13.710-14.010	106	80.5	QP

Note: RF Voltage (dBuV) = 20 log RF Voltage (uV)
Limit (dBuV/m @3m) = 20log(Limit (uV/m @30m)) + 40

For unintentional device, according to § 15.209(a), except for Class B digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F (kHz)	-	Quasi-peak	300
0.490MHz-1.705MHz	24000/F (kHz)	-	Quasi-peak	30
1.705MHz-30MHz	30	-	Quasi-peak	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3
		74.0	Peak	3

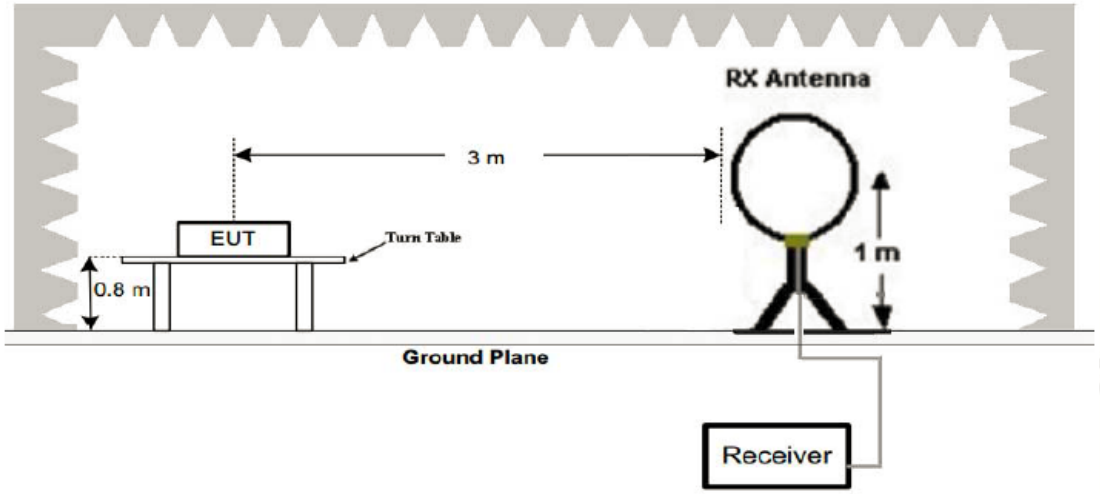
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

Limit: (Field strength of the fundamental signal)

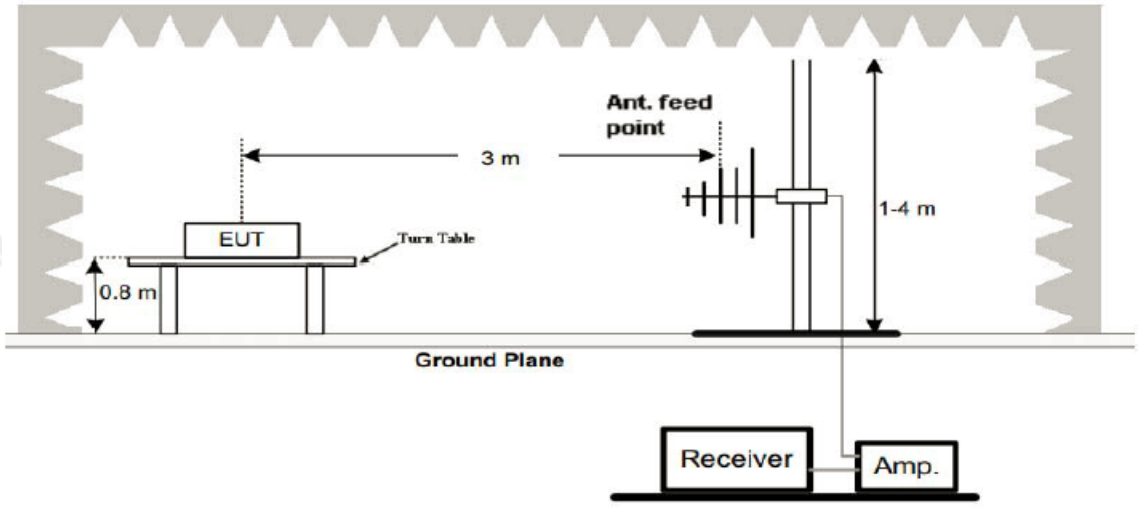
Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.0	Average Value
	114.0	Peak Value

4.2 TEST SETUP

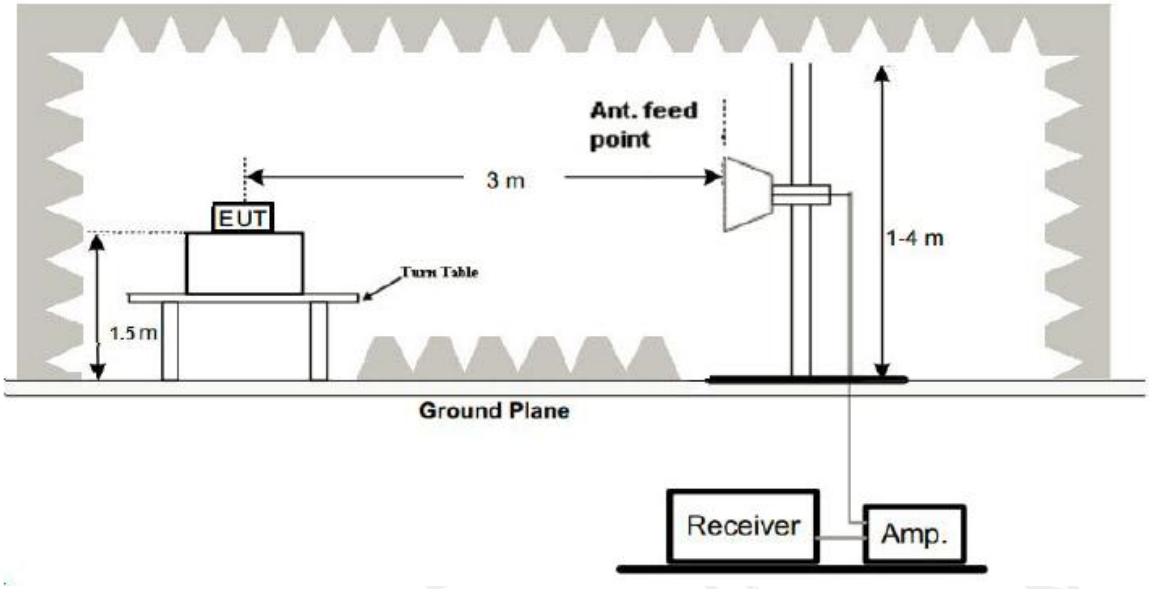
1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency 30MHz~1GHz



3. Radiated Emission Test-Up Frequency Above 1GHz



4.3 TEST PROCEDURE

1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9kHz to 25GHz per FCC PART 15.33(a).

Note:
For battery operated equipment, the equipment tests shall be performed using a new battery.

4.4 TEST RESULT

PASS

Remark:
1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, and test data recorded in this report.
2. Radiated emission test from 9kHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9kHz to 30MHz and not recorded in this report.

Field Strength of Fundamental:

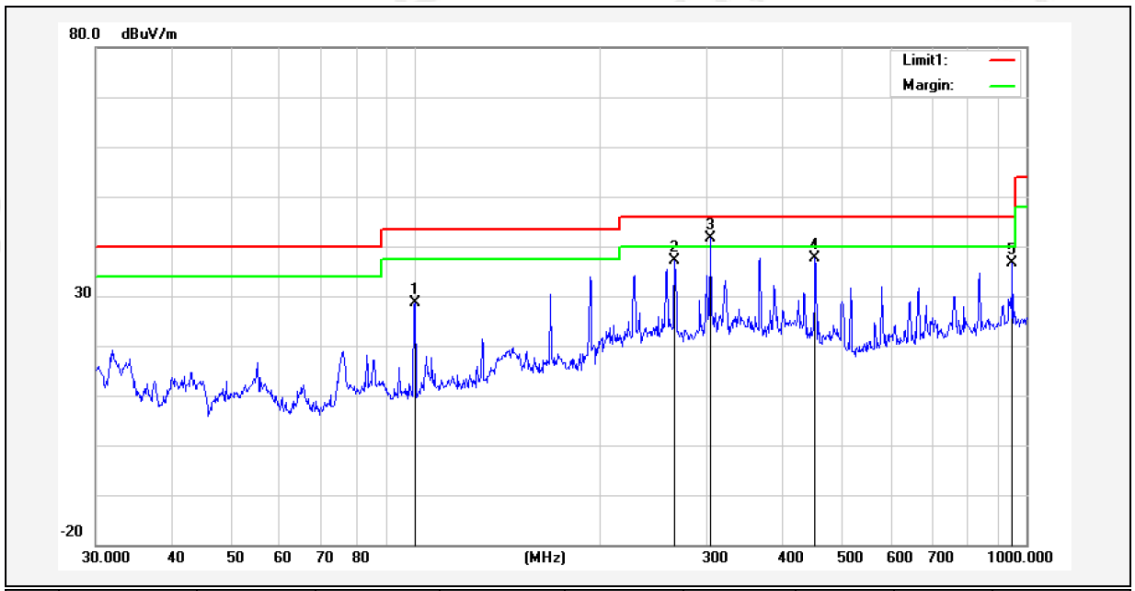
Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBuV/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
13.5600	75.28	-6.29	68.99	124	55.01	PK
13.2500	33.04	-6.28	26.76	80.51	53.75	QP
13.4800	47.20	-6.25	40.95	90.47	49.52	QP
13.6600	42.72	-6.23	36.49	90.47	53.98	QP
13.8200	37.11	-6.26	30.85	80.51	49.66	QP

Harmonics and Spurious Emissions:

Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor
2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

Below 1GHz Test Results:

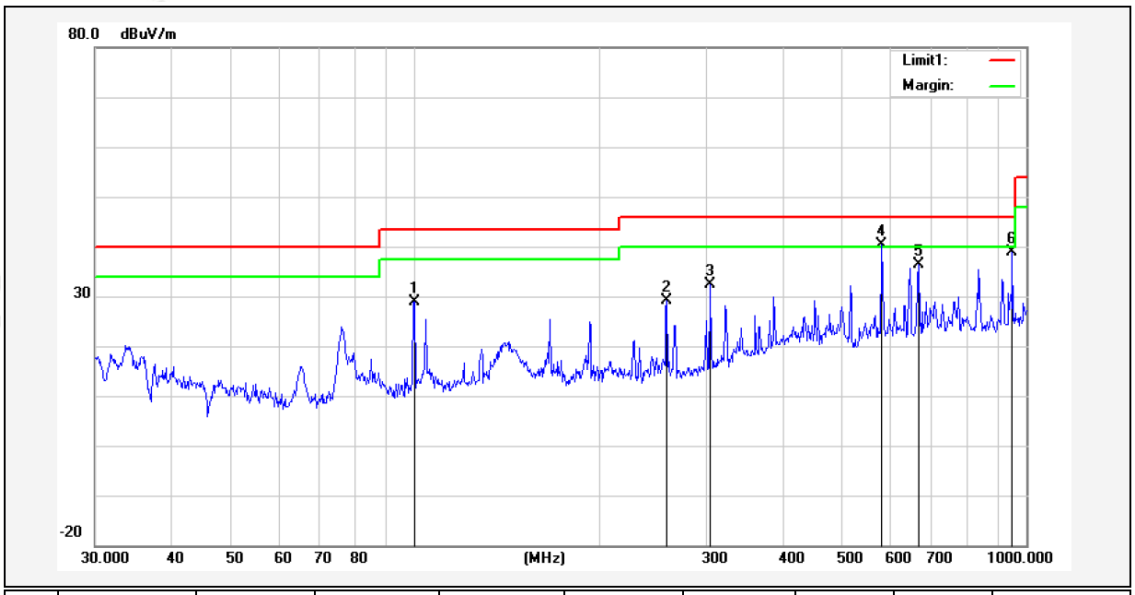
Temperature:	24℃	Relative Humidity:	48%
Test Date:	Jun. 09, 2021	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Horizontal
Test Mode:	Transmitting mode		



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	99.8777	46.68	-18.16	28.52	43.50	-14.98	50	100	peak
2	265.6757	51.53	-14.36	37.17	46.00	-8.83	70	100	peak
3*	303.5437	54.81	-13.14	41.67	46.00	-4.33	110	100	peak
4	451.1350	47.56	-10.03	37.53	46.00	-8.47	150	100	peak
5	948.7610	39.36	-2.71	36.65	46.00	-9.35	200	100	peak

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Temperature:	24℃	Relative Humidity:	48%
Test Date:	Jun. 09, 2021	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Vertical
Test Mode:	Transmitting mode		



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	99.8777	47.10	-18.16	28.94	43.50	-14.56	80	100	peak
2	258.3264	44.09	-15.01	29.08	46.00	-16.92	120	100	peak
3	304.6100	45.61	-13.15	32.46	46.00	-13.54	140	100	peak
4*	580.7026	47.83	-7.47	40.36	46.00	-5.64	220	100	peak
5	665.8035	42.96	-6.54	36.42	46.00	-9.58	250	100	peak
6	948.7610	41.63	-2.71	38.92	46.00	-7.08	260	100	peak

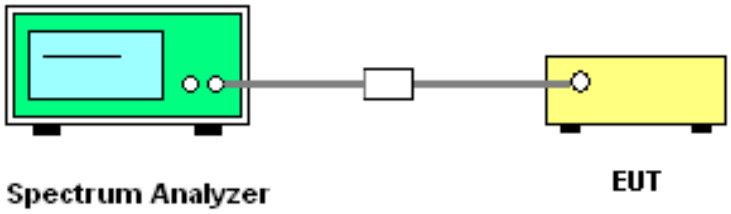
Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Remark:

1. Measuring frequencies from 9 kHz to the 1 GHz, Radiated emission test from 9kHz to 30MHzwas verified, and no any emission was found except system noise floor.
2. * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
3. The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120kHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10kHz.

5 OCCUPIED BANDWIDTH

5.1 TEST SETUP

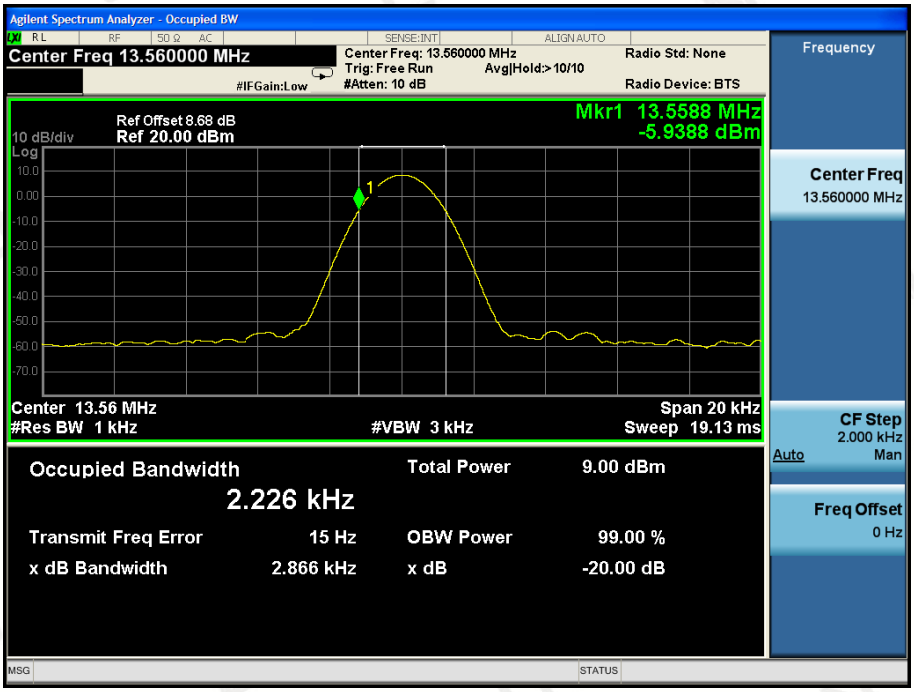


5.2 TEST PROCEDURE

1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW⩾1% of the 20 dB bandwidth; VBW⩾RBW; Sweep = auto; Detector function = peak; Trace = max hold.
4. Measure and record the results in the test report.

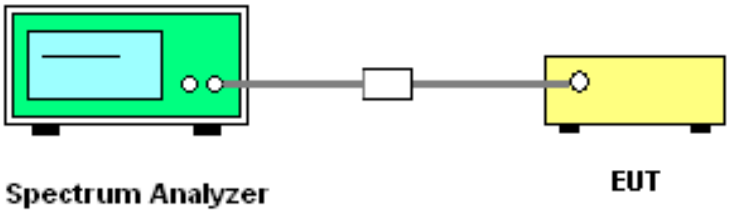
5.3 TEST RESULT

Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
13.56	2.861	N/A	PASS



6 FREQUENCY STABILITY

6.1 TEST SETUP



6.2 TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a spectrum analyzer.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to –20℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

6.3 TEST RESULT

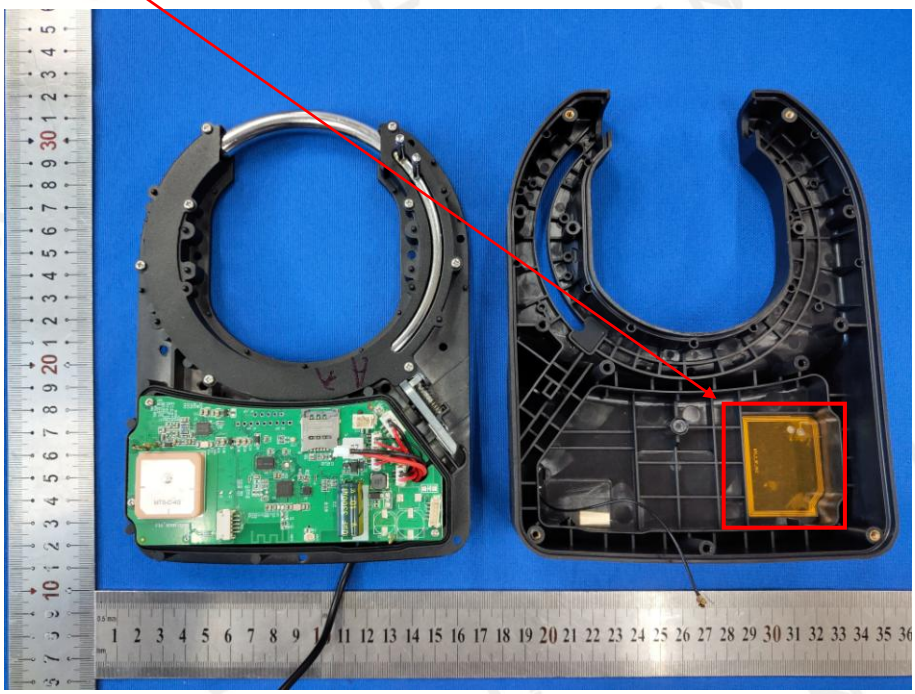
Voltage (Vdc)	Temperature (℃)	Frequency (MHz)	Deviation (%)	Limit (%)	Result
6	0	13.560238	0.001755	+/-0.01%	PASS
6	10	13.560122	0.000900		PASS
6	20	13.560206	0.001519		PASS
6	30	13.560161	0.001187		PASS
6	40	13.560250	0.001844		PASS
6	45	13.560244	0.001799		PASS
6.4	20	13.560168	0.001239		PASS
5.7	20	13.560207	0.001527		PASS

7 ANTENNA REQUIREMENT

Standard Applicable:
For intentional device, according to FCC 47 CFR Section 15.203, 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.

Antenna Connected Construction
The antenna used in this product is a Coil Antenna, The directional gains of antenna used for transmitting is 0dBi.

ANTENNA:



8 PHOTO OF TEST

8.1 RADIATED EMISSION

8.2 CONDUCTED EMISSION

End of Report