TEST REPORT

Applicant Name :	Shenzhen Youmi Intelligent Technology Co., Ltd.
Address :	406-407 Jinqi Zhigu Building, 4/F, 1 Tangling Road, Nanshan District, Shenzhen City, China
Report Number :	SZ1210909-53551E-RF-00E
FCC ID:	2ATZ4-RP01X

Test Standard (s)

FCC PART 15.225

Sample Description

Product Type:	RP01
Model No.:	RP01
Multiple Model(s) No.:	RP03, RP04
Trade Mark:	UMIDIGI
Date Received:	2021/09/09
Date of Test:	2021/10/25~2021/11/12
Report Date:	2021/11/12

Test Result:	Pass*

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

Prepared and Checked By:

Ting Lü
EMC Engineer

Approved By:

Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

Shenzhen Accurate Technology Co., Ltd. is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	RP01
Tested Model	RP01
Multiple Models	RP03, RP04
Model Differences	Refer to the DoS letter
Frequency Range	13.56 MHz
E-field Strength	73.88dBuV/m@3m
Modulation Technique	ASK
Voltage Range	DC 3.87V from battery or DC 5V from adapter
Date of Test	2021-10-25 to 2021-11-12
Sample serial number	SZ1210909-53551E-RF-S6 (Assigned by ATC)
Received date	2021-09-09
Sample/EUT Status	Good condition
Adapter information	Model: HJ-0502000W2-US Input: AC 100-240V, 50/60Hz, 0.3A Output: DC 5.0V, 2.0A

Objective

This Type approval report is in accordance with Part 2- Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The objective is to determine the compliance of the EUT with FCC rules, section 15.203, 15.205, 15.207, 15.209 and 15.225.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.082*10^{-7}$
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

EUT Exercise Software

No Exercise Software was used.

Equipment Modifications

No modification on the EUT.

Support Equipment List and Details

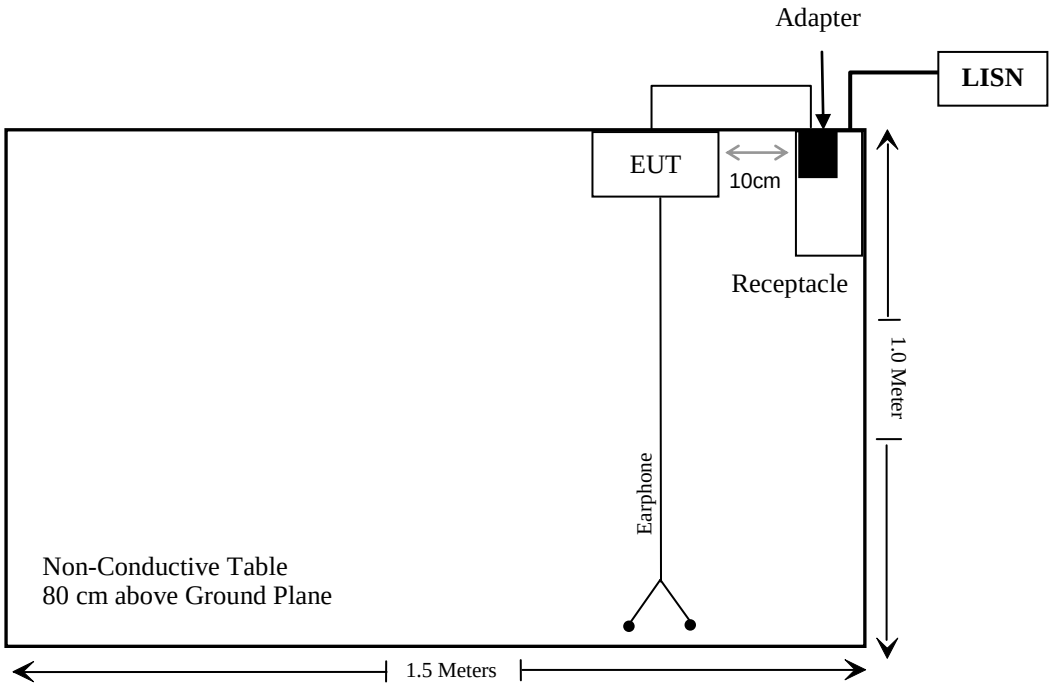
Manufacturer	Description	Model	Serial Number
Unknown	Earphone	Unknown	Unknown

External I/O Cable

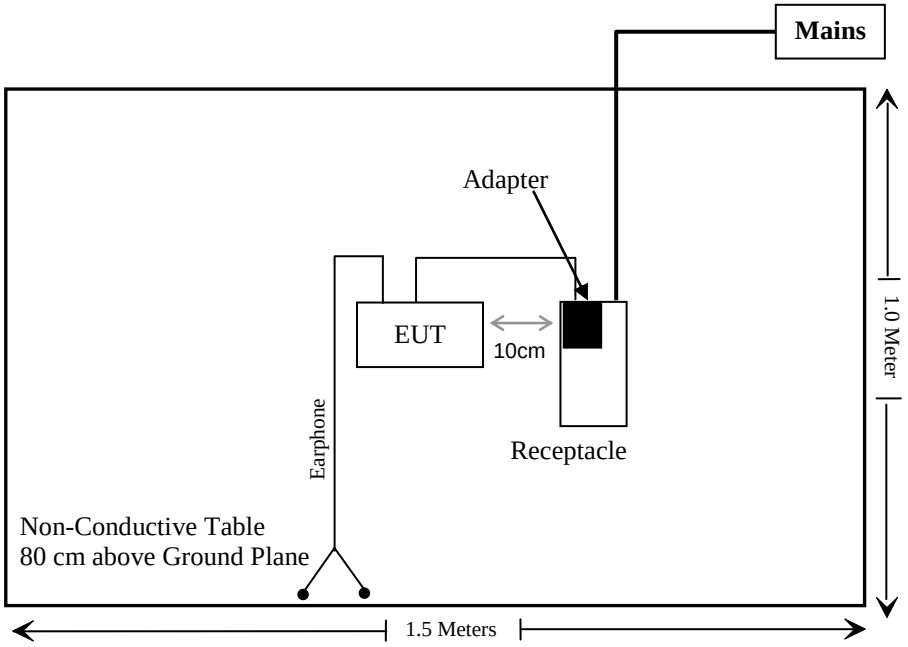
Cable Description	Length (m)	From Port	To
Un-shielding Detachable USB Cable	1.0	EUT	Adapter

Block Diagram of Test Setup

For conducted emission:



For radiated emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207	AC Line Conducted Emission	Compliant
§15.225 §15.209 §15.205	Radiated Emission Test	Compliant
§15.225(e)	Frequency Stability	Compliant
§15.215(c)	20dB Emission Bandwidth	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	Test Receiver	ESPI3	100396	2020/12/24	2021/12/23
R & S	L.I.S.N.	ENV216	101314	2020/12/25	2021/12/24
Anritsu Corp	50ΩCoaxial Switch	MP59B	6200506474	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-2m	No.2	2020/12/25	2021/12/24
Conducted Emission Test Software: e3 19821G (V9)					
Radiated Emission Test					
Rohde& Schwarz	Test Receiver	ESR	101817	2020/12/24	2021/12/23
SONOMA INSTRUMENT	Amplifier	310 N	186131	2020/12/25	2021/12/24
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2020/12/25	2021/12/24
SCHWARZBECK	LOOP ANTENNA	FMZB1516	1516131	2020/01/05	2023/01/04
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2020/01/05	2023/01/04
Gongwen	Temp. & Humid. Chamber	JB913R	GZ-WS004	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-5m	No.3	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-5m	No.4	2020/12/25	2021/12/24
Radiated Emission Test Software: EZ_EMC V 1.1.4.2					
Radiated Emission Test Software: e3 19821G (V9)					

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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 shall be considered sufficient to comply with the provisions of this section.

Antenna Connected Construction

The EUT has one internal antenna arrangement for NFC which was permanently attached; fulfill the requirement of this section. Please refer to the EUT photos.

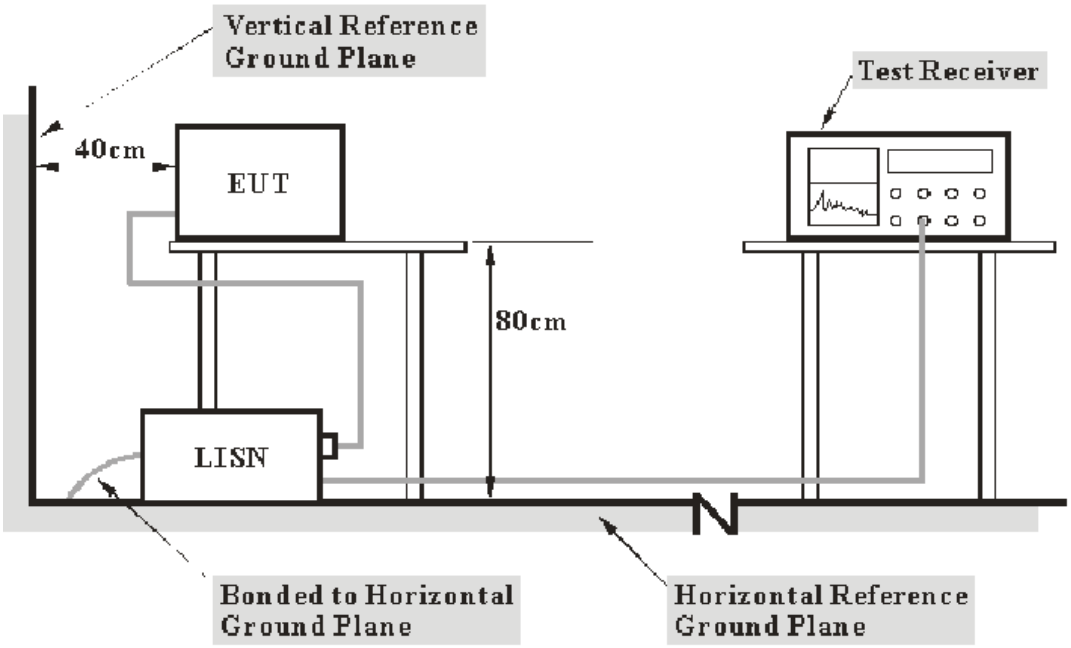
Result: Compliant.

FCC §15.207 – AC LINE CONDUCTED EMISSION

Applicable Standard

FCC §15.207

EUT Setup



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

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter of Host was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a over limit of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Over limit = Result – Limit
Result = Reading + Factor

Test Data

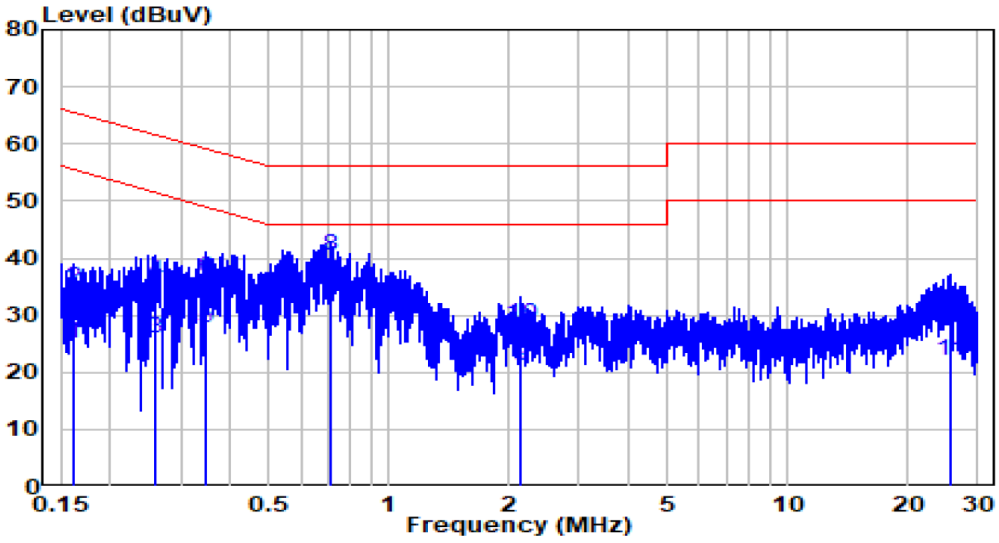
Environmental Conditions

Temperature:	23 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Bin Deng on 2021-10-25.

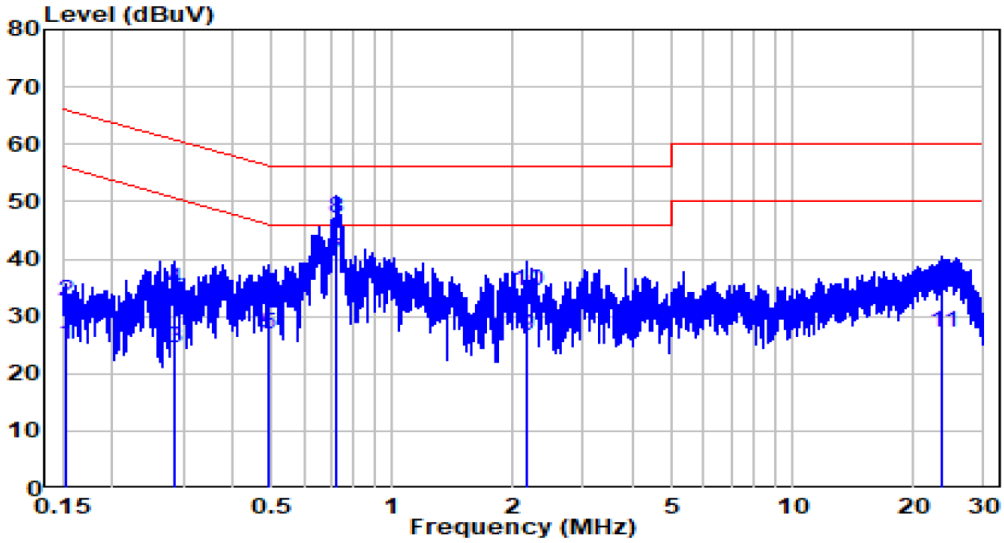
Test mode: Transmitting

AC 120 V/60 Hz, Line:



No.	Frequency	Reading	Correct	Result	Limit	Over Limit	Remark	Phase
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)		
1	0.161	15.22	9.88	25.09	55.43	-30.34	Average	Line
2	0.161	24.92	9.88	34.80	65.43	-30.64	QP	Line
3	0.258	16.17	9.80	25.98	51.51	-25.53	Average	Line
4	0.258	26.20	9.80	36.00	61.51	-25.51	QP	Line
5	0.349	17.98	9.80	27.78	48.99	-21.21	Average	Line
6	0.349	26.71	9.80	36.51	58.99	-22.48	QP	Line
7	0.713	23.83	9.81	33.64	46.00	-12.36	Average	Line
8	0.713	30.64	9.81	40.45	56.00	-15.55	QP	Line
9	2.142	11.25	9.92	21.17	46.00	-24.83	Average	Line
10	2.142	18.32	9.92	28.24	56.00	-27.76	QP	Line
11	25.456	11.59	10.37	21.96	50.00	-28.04	Average	Line
12	25.456	20.42	10.37	30.80	60.00	-29.20	QP	Line

AC 120V/ 60 Hz, Neutral:



No.	Frequency	Reading	Correct	Result	Limit	Over Limit	Remark	Phase
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)		
1	0.153	15.02	9.91	24.92	55.83	-30.91	Average	Neutral
2	0.153	22.58	9.91	32.49	65.83	-33.34	QP	Neutral
3	0.285	14.48	9.96	24.44	50.66	-26.22	Average	Neutral
4	0.285	24.84	9.96	34.80	60.66	-25.85	QP	Neutral
5	0.490	16.83	9.91	26.74	46.16	-19.43	Average	Neutral
6	0.490	23.95	9.91	33.86	56.16	-22.31	QP	Neutral
7	0.728	29.96	9.91	39.87	46.00	-6.13	Average	Neutral
8	0.728	37.25	9.91	47.16	56.00	-8.84	QP	Neutral
9	2.157	16.61	9.93	26.54	46.00	-19.46	Average	Neutral
10	2.157	24.40	9.93	34.33	56.00	-21.67	QP	Neutral
11	23.667	17.04	10.28	27.32	50.00	-22.68	Average	Neutral
12	23.667	24.71	10.28	34.99	60.00	-25.01	QP	Neutral

FCC §15.225, §15.205 & §15.209 - RADIATED EMISSIONS TEST

Applicable Standard

As per FCC Part 15.225

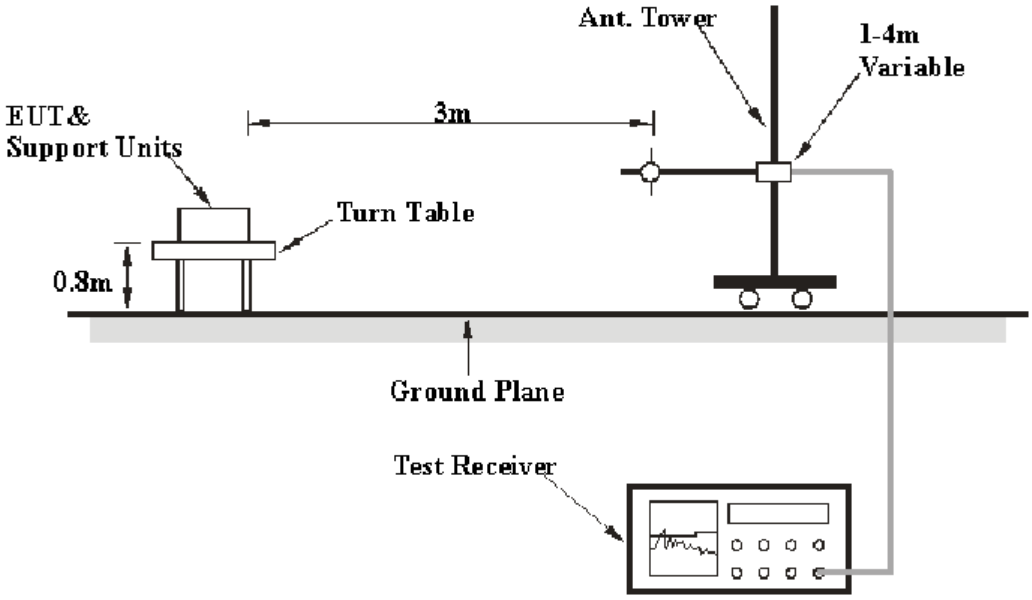
(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

EUT Setup



Note: Antenna is set up at 1m during test for below 30MHz.

The radiated emission tests were performed in the 3-meter chamber a test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part Subpart C limits.

EMI Test Receiver Setup

According to FCC Rules, 47 CFR 15.33, the EUT emissions were investigated up to 1000 MHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
9 kHz – 150 kHz	300 Hz	1 kHz	/	QP
150 kHz –30 MHz	10 kHz	30 kHz	/	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	/	QP

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Factor = Antenna Factor + Cable Loss- Amplifier Gain
Corrected Amplitude = Meter Reading + Corrected Factor

The "**Over Limit or Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin/over limit of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Over Limit / Margin = Level / Result – Limit
Level / Result = Reading level + Factor

Test Data

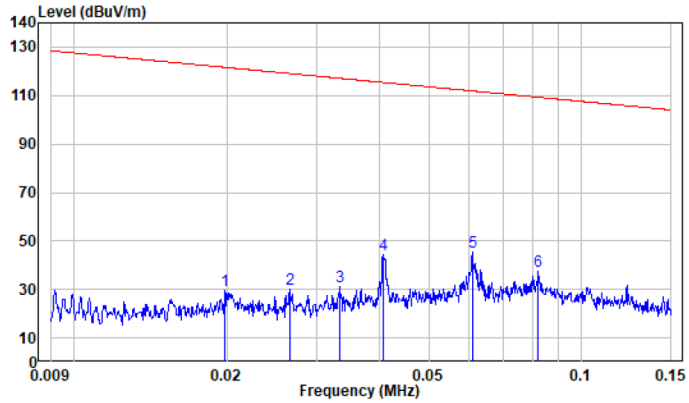
Environmental Conditions

Temperature:	23~25 °C
Relative Humidity:	48~64 %
ATM Pressure:	101.0 kPa

The testing was performed by Chao Mo from 2021-10-26 and 2021-11-06.

Test mode: Transmitting (Scan with X-AXIS, Y-AXIS, Z-AXIS, the worst case was recorded)

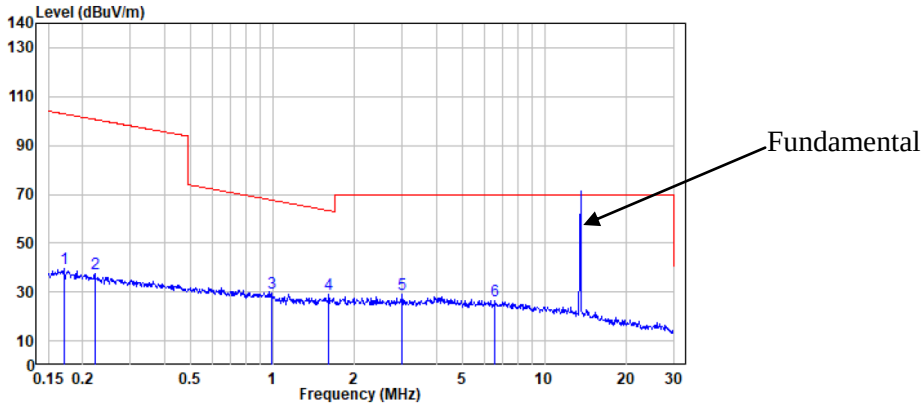
Spurious Emissions (9 kHz~150 kHz):



Site : chamber
Condition: 3m Vertical
Job NO : SZ1210909-53351E-RF
Mode : NFC

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Result
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.02	-14.75	44.21	29.46	121.65	-92.19	
2	0.03	-14.85	44.87	30.02	119.11	-89.09	
3	0.03	-14.88	46.16	31.28	117.13	-85.85	
4	0.04	-14.85	59.25	44.40	115.40	-71.00	
5	0.06	-14.85	60.07	45.22	111.90	-66.68	
6	0.08	-14.90	52.53	37.63	109.31	-71.68	

150 kHz~30 MHz

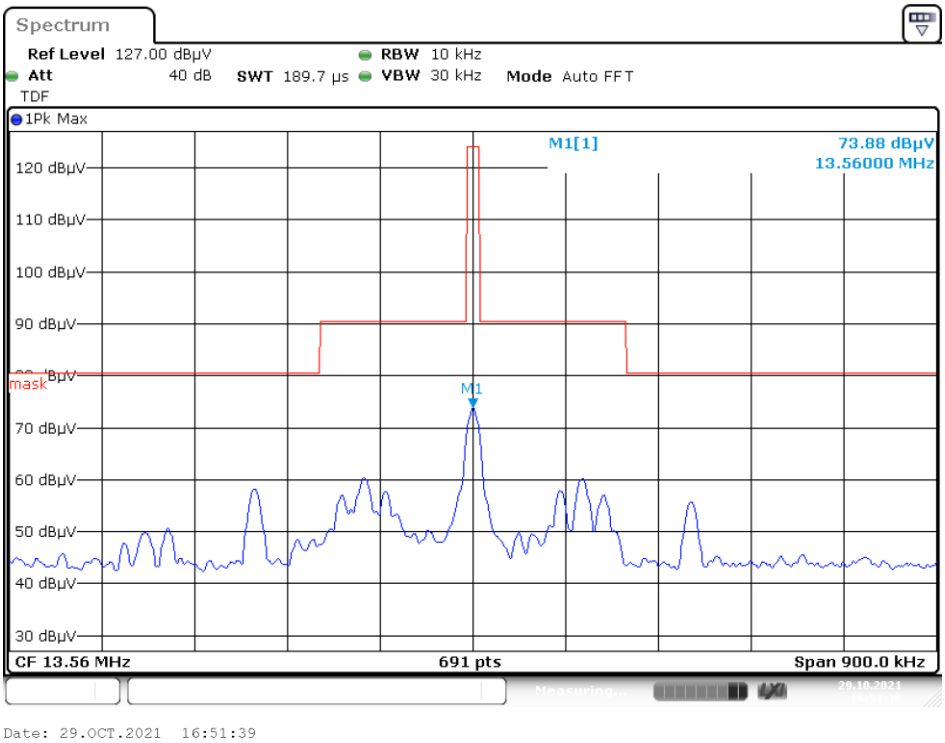


Site : chamber
Condition: 3m Vertical
Job NO : SZ1210909-53351E-RF
Mode : NFC

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Result
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.17	-14.97	54.76	39.79	102.89	-63.10	
2	0.22	-14.92	52.32	37.40	100.68	-63.28	
3	0.99	-14.97	44.45	29.48	67.57	-38.09	
4	1.61	-14.93	43.96	29.03	63.25	-34.22	
5	2.99	-14.84	43.89	29.05	69.54	-40.49	
6	6.59	-15.24	41.89	26.65	69.54	-42.89	

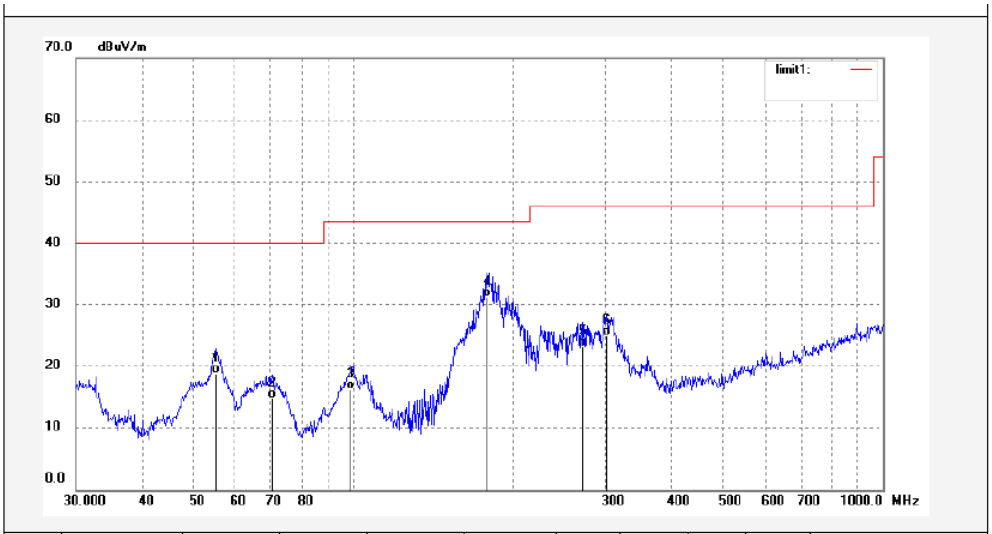
2) Emission Mask & Fundamental:

Indicated Frequency (MHz)	Corrected Amplitude (dBμV/m) @3m	Table Angle Degree	Antenna Height (m)	Detector	Correction Factor	FCC part 15.225 Limit (dBμV/m) @3m	FCC part 15.225 Result
13.56	73.88	0	1.0	QP	31.84	124	Pass



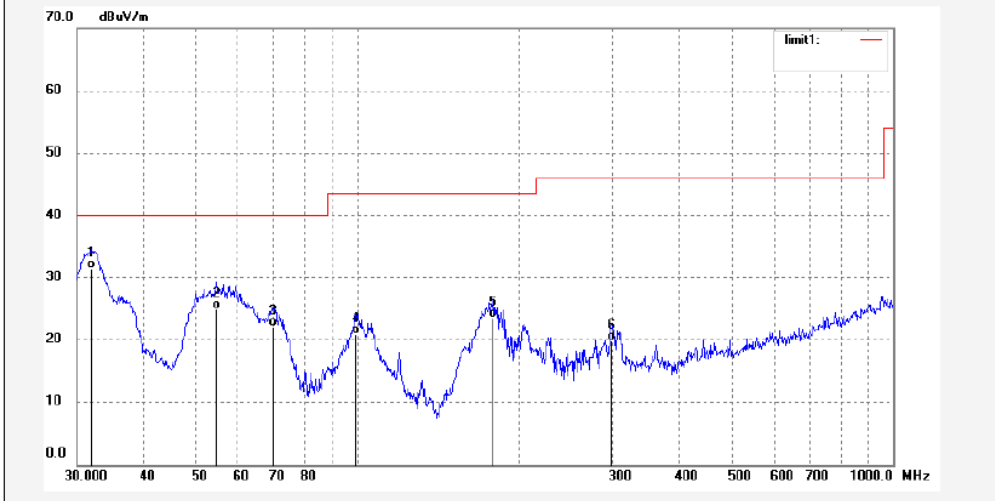
3) Spurious Emissions (30 MHz~1GHz):

Horizontal:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	55.2207	36.23	-17.45	18.78	40.00	-21.22	QP			
2	70.3365	36.12	-21.25	14.87	40.00	-25.13	QP			
3	99.1797	34.62	-18.38	16.24	43.50	-27.26	QP			
4	179.3863	49.88	-18.56	31.32	43.50	-12.18	QP			
5	272.2776	38.69	-15.56	23.13	46.00	-22.87	QP			
6	301.4224	39.46	-14.51	24.95	46.00	-21.05	QP			

Vertical:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.9546	45.61	-14.14	31.47	40.00	-8.53	QP			
2	54.6429	42.53	-17.65	24.88	40.00	-15.12	QP			
3	69.8450	43.11	-20.90	22.21	40.00	-17.79	QP			
4	99.5281	39.19	-18.26	20.93	43.50	-22.57	QP			
5	179.3863	42.08	-18.56	23.52	43.50	-19.98	QP			
6	298.2681	34.38	-14.57	19.81	46.00	-26.19	QP			

FCC §15.225(e) - FREQUENCY STABILITY

Applicable Standard

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.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and inductive antenna was connected to a Spectrum Analyzer. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external DC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	64 %
ATM Pressure:	101.0 kPa

The testing was performed by Chao Mo from 2021-10-29.

Test Mode: Transmitting

Test Result: Pass

Voltage Supply (V_{DC})	Temperature (℃)	Measured Frequency (MHz)	Frequency Error (%)	Part 15.225 Limit (%)
3.87	-20	13.561283	0.00946	±0.01
	-10	13.561220	0.00900	±0.01
	0	13.561144	0.00844	±0.01
	10	13.561239	0.00914	±0.01
	20	13.561264	0.00932	±0.01
	30	13.561338	0.00987	±0.01
	40	13.561279	0.00943	±0.01
	50	13.561200	0.00885	±0.01
3.5	20	13.561166	0.00860	±0.01
4.45	20	13.561083	0.00799	±0.01

Note: the extreme voltage was declared by the applicant.

FCC §15.215(c) - 20dB EMISSION BANDWIDTH

Requirement

Per 15.215 (c) 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, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated 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 a 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.

Test Procedure

Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

Test Data

Environmental Conditions

Temperature:	28 °C
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

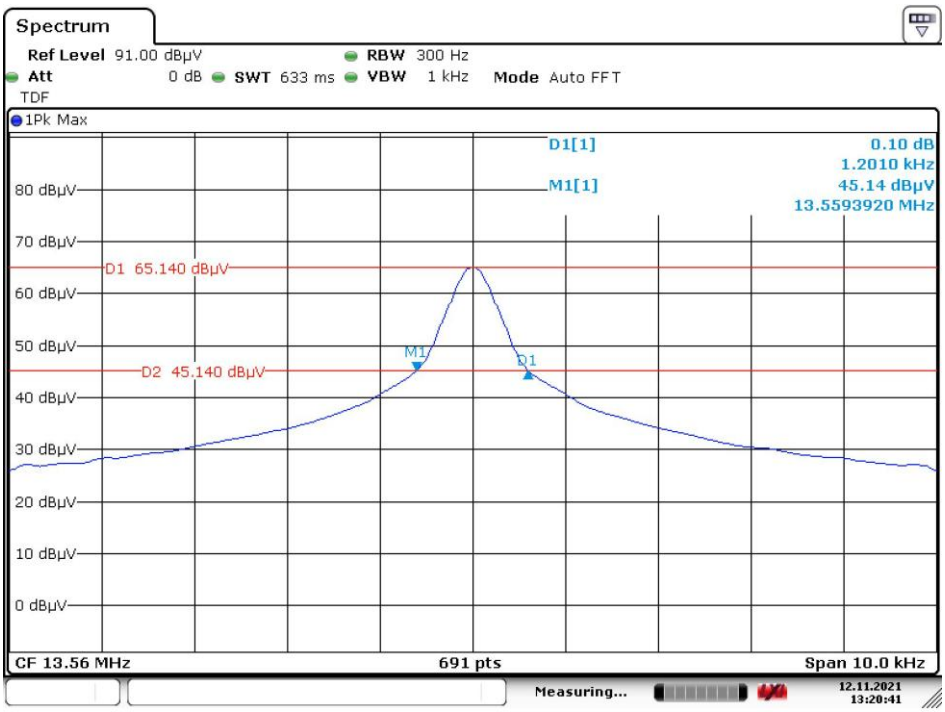
The testing was performed by Chao Mo from 2021-11-12.

Test Mode: Transmitting

Test Result: Pass

Test Frequency (MHz)	20dB Bandwidth (kHz)
13.56	1.201

20 dB Emission Bandwidth



******* END OF REPORT *******