



TESTING LABORATORY  
CERTIFICATE#4323.01



## FCC PART 15.247

### TEST REPORT

For

**Shanghai Sunmi Technology Co.,Ltd.**

Room 605, Block 7, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai 200433 China

**FCC ID: 2AH25FW010**

<b>Report Type:</b> CIIPC Report	<b>Product Type:</b> Wireless Router
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<b>Report Number:</b> RKSA191107001-00A	
<b>Report Date:</b> 2019-12-03 Oscar Ye	
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## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>3</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	3
OBJECTIVE .....	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY .....	4
MEASUREMENT UNCERTAINTY .....	4
TEST FACILITY .....	4
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>5</b>
DESCRIPTION OF TEST CONFIGURATION .....	5
EQUIPMENT MODIFICATIONS .....	5
EUT EXERCISE SOFTWARE .....	5
SUPPORT EQUIPMENT LIST AND DETAILS .....	6
EXTERNAL I/O CABLE.....	6
BLOCK DIAGRAM OF TEST SETUP .....	6
<b>SUMMARY OF TEST RESULTS .....</b>	<b>8</b>
<b>TEST EQUIPMENT LIST .....</b>	<b>9</b>
<b>FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS.....</b>	<b>10</b>
APPLICABLE STANDARD .....	10
EUT SETUP .....	10
EMI TEST RECEIVER SETUP.....	10
TEST PROCEDURE .....	10
CORRECTED FACTOR & OVER LIMIT CALCULATION.....	11
TEST RESULTS SUMMARY .....	11
TEST DATA .....	11
<b>FCC §15.209, §15.205 &amp; §15.247(d) - SPURIOUS EMISSIONS.....</b>	<b>14</b>
APPLICABLE STANDARD .....	14
EUT SETUP .....	14
EMI TEST RECEIVER SETUP.....	14
TEST PROCEDURE .....	15
TEST RESULTS SUMMARY .....	15
TEST DATA .....	16

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

Applicant:	Shanghai Sunmi Technology Co.,Ltd.
Tested Model:	FW010
Product Type:	Wireless Router
Power Supply:	AC100~240V
RF Function:	2.4G Wi-Fi, 5G Wi-Fi,
Operating Band/Frequency:	2.4G Wi-Fi: 2412-2462MHz 5G Wi-Fi B1: 5150-5250MHz, B4: 5725-5850MHz
Channel Number:	2.4G Wi-Fi: 2412-2462MHz 11; 5G Wi-Fi B1:7, B4:8
Channel Separation:	2.4G Wi-Fi: 5MHz; 5G Wi-Fi B1/B4 a/ac20/n20 mode: 20MHz, n40/ac40 mode: 40MHz; ac80 mode: 80MHz
Modulation Type:	2.4GWi-Fi: DSSS,OFDM; 5GWi-Fi: DSSS, OFDM
Antenna Type:	2.4GWi-Fi, 5Wi-Fi: Monopole Antenna
Maximum Antenna Gain:	2.4G Wi-Fi: Antenna 0: 3.67dBi, Antenna 1: 3.35dBi, Antenna 2: 3.33dBi, Antenna 3: 2.65dBi; 5G Wi-Fi: Antenna 0: 4.58 dBi, Antenna 1: 5.13dBi

*\*All measurement and test data in this report was gathered from production sample serial number: 20191107001.  
(Assigned by the BACL. The EUT supplied by the applicant was received on 2019-11-07.*

### Objective

This report is prepared on behalf of *Shanghai Sunmi Technology Co.,Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions' rules.

The tests were performed in order to determine Compliant with FCC Part 15, Subpart C, and section 15.205, 15.207, 15.209 and 15.247 rules.

This is a CIIPC report based on the original report RKSA190613001-00C with FCC ID: 2AH25FW010 which was granted on 2019-08-22, the differences between the original device and the current one are as follows:

Update the board of the internal power supply, this change will affect AC Line Conducted Emissions and Spurious Emissions (below 1GHz) testing, so we retested these items and all the other data referred to the original report.

### Related Submittal(s)/Grant(s)

FCC Part 15.407 NII submissions with FCC ID: 2AH25FW010.

## Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliant Testing of Unlicensed Wireless Devices and FCC 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Bay Area Compliant Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
Radiated emission	30MHz~1GHz	6.11dB
Temperature		1.0°C
Humidity		6%

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 Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

Test channel list is as below:

For 802.11b, 802.11g and 802.11n-HT20 mode, EUT was tested with Channel 1, 6 and 11;

For 802.11n-HT40 mode, EUT was tested with Channel 3, 6 and 9.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/

### Equipment Modifications

No modification was made to the EUT tested.

### EUT Exercise Software

RF test tool: QRCT

Pre-scan with all the data rates, and the worst case was performed as below:

Mode	Data Rate	Power Level		
		Chain 0	Chain 1	Chain 2
802.11b	1Mbps	23.0	23.0	23.0
802.11g	6 Mbps	22.5	22.5	22.5
802.11n-HT20	MCS0	22.5	22.5	22.5
802.11n-HT40	MCS0	22.0	22.0	22.0

**Support Equipment List and Details**

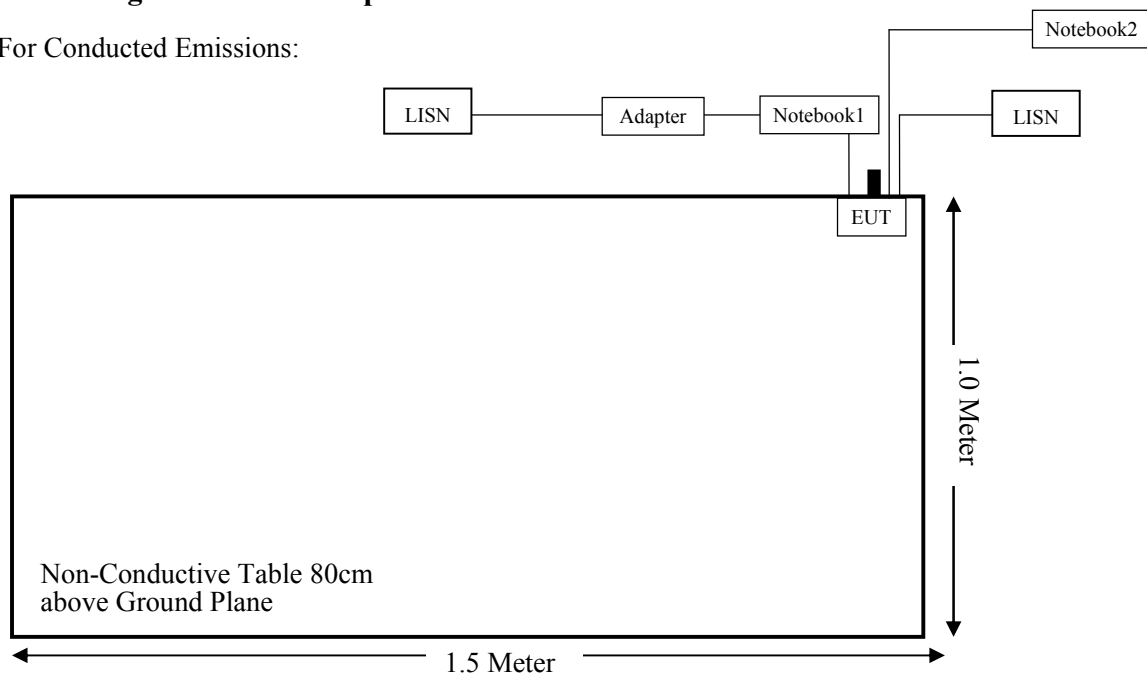
Manufacturer	Description	Model	Serial Number
DELL	Notebook1	GX620	D65874152
DELL	Notebook2	GX620	D65874152
DELL	Adapter	LA65NS0-00	DF263
Sandisk	USB flash disk	16G	/

**External I/O Cable**

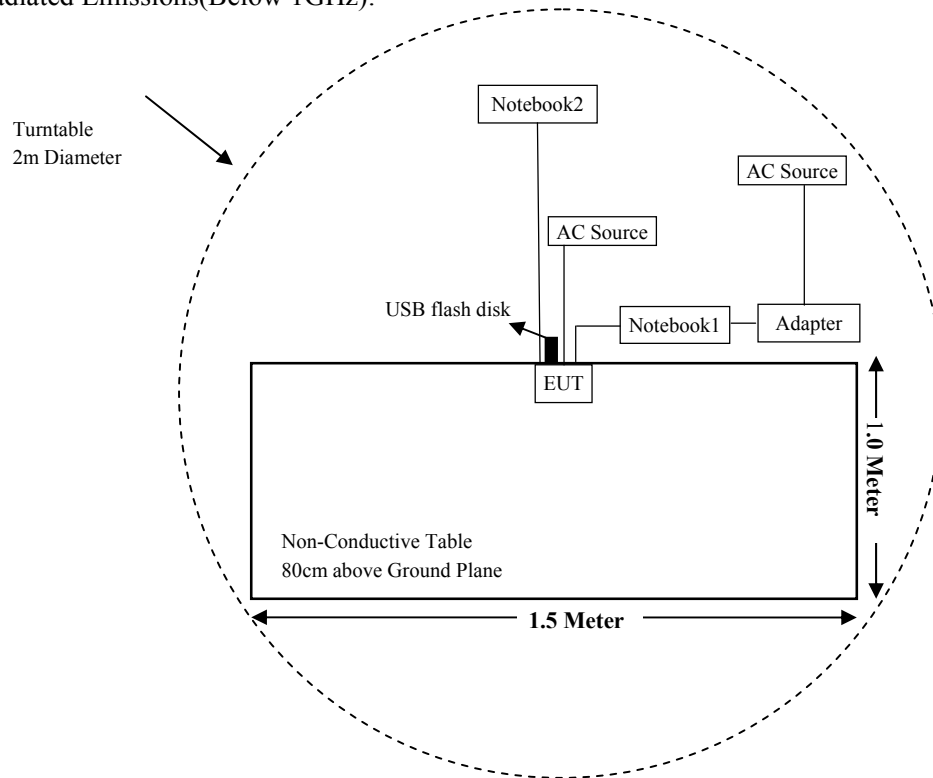
Cable Description	Length (m)	From Port	To
RJ45 Cable	10.0	EUT	Notebook1
RJ45 Cable	10.0	EUT	Notebook2
Power Cable	1.0	Notebook	Adapter
Power Cable	1.0	Adapter	AC Source
Power Cable	1.0	EUT	AC Source

**Block Diagram of Test Setup**

For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant



**TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated Emission Test (Chamber 1#)</b>					
Rohde & Schwarz	EMI Test receiver	ESR	1316.3003K03-102454-Qd	2019-06-25	2020-06-24
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
Sonoma Instrument	Pre-amplifier	310N	171205	2019-08-14	2020-08-13
Audix	Test Software	e3	V9	-	-
MICRO-COAX	Coaxial Cable	Cable-8	008	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2019-08-15	2020-08-14
<b>Conducted Emission Test</b>					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2019-07-11	2020-07-10
Rohde & Schwarz	LISN	ENV216	3560655016	2018-11-30	2019-11-29
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2018-11-30	2019-11-29
Audix	Test Software	e3	V9	---	---
Narda	Attenuator/10dB	10690812-2	26850-6	2019-01-10	2020-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2019-08-15	2020-08-14

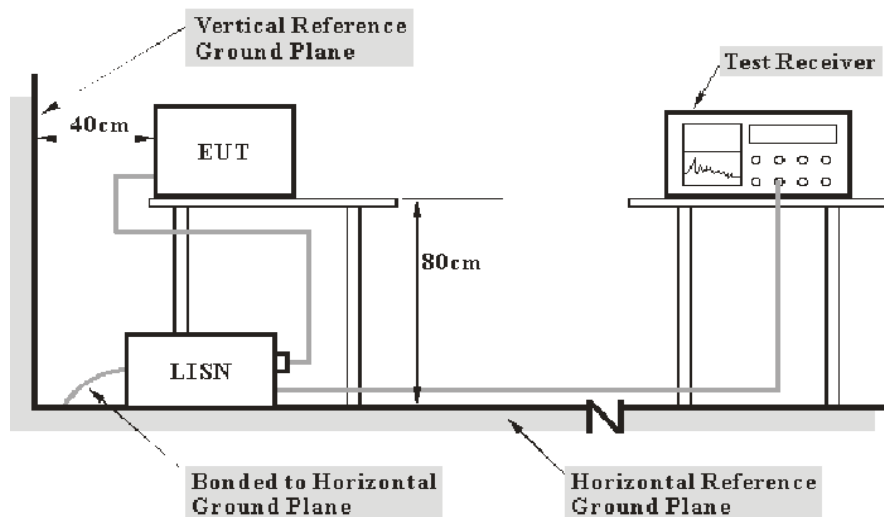
\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS

### Applicable Standard

FCC §15.207(a)

### 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 measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

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

ANSI C63.10-2013 clause 6.2

During the conducted emission test, the EUT 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 & Over Limit Calculation

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

$$\text{Corrected Factor (dB)} = \text{LISN VDF (dB)} + \text{Cable Loss (dB)} + \text{Attenuator (dB)}$$

The “**Over Limit**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit of 7 dB means the emission is 7 dB above the limit. The equation for Over Limit calculation is as follows:

$$\text{Over Limit (dB)} = \text{Read level (dB}\mu\text{V)} + \text{Factor (dB)} - \text{Limit (dB}\mu\text{V)}$$

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

### Test Data

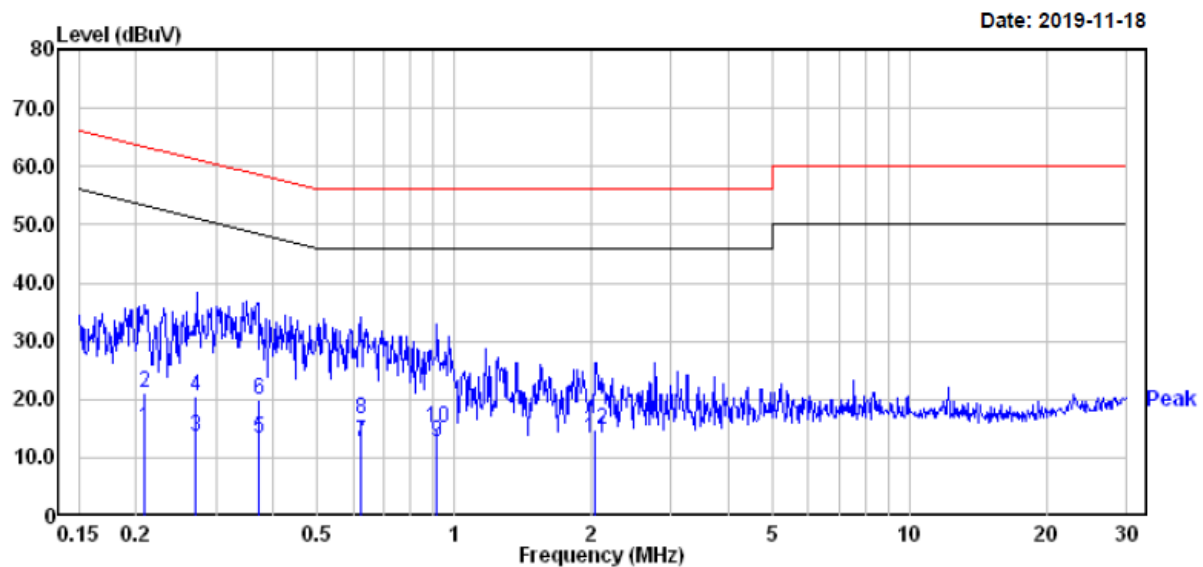
#### Environmental Conditions

<b>Temperature:</b>	20.2 °C
<b>Relative Humidity:</b>	51 %
<b>ATM Pressure:</b>	101.3 kPa

*The testing was performed by Jack Jiao on 2019-11-18.*

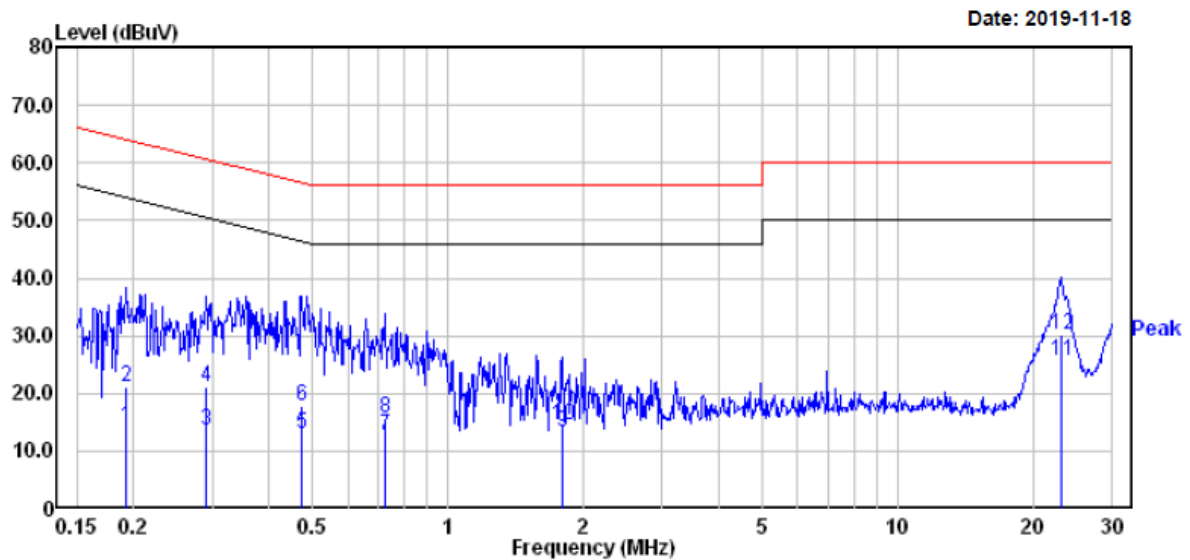
*EUT operation mode: MIMO Transmitting in 802.11n-HT20 mode low channel (worst case)*

## AC 120V/60 Hz, Line



	Freq	Read		Limit	Over	
	MHz	Level	Factor	Level	Line	Limit Remark
	MHz	dBuV	dB	dBuV	dBuV	dB
1	0.209	-4.70	19.82	15.12	53.23	-38.11 Average
2	0.209	1.40	19.82	21.22	63.23	-42.01 QP
3	0.271	-6.20	19.82	13.62	51.08	-37.46 Average
4	0.271	0.70	19.82	20.52	61.08	-40.56 QP
5	0.371	-6.60	19.78	13.18	48.47	-35.29 Average
6	0.371	0.00	19.78	19.78	58.47	-38.69 QP
7	0.624	-7.10	19.75	12.65	46.00	-33.35 Average
8	0.624	-3.00	19.75	16.75	56.00	-39.25 QP
9	0.918	-7.21	19.75	12.54	46.00	-33.46 Average
10	0.918	-4.71	19.75	15.04	56.00	-40.96 QP
11	2.044	-6.59	19.79	13.20	46.00	-32.80 Average
12	2.044	-5.09	19.79	14.70	56.00	-41.30 QP

## AC 120V/60 Hz, Neutral



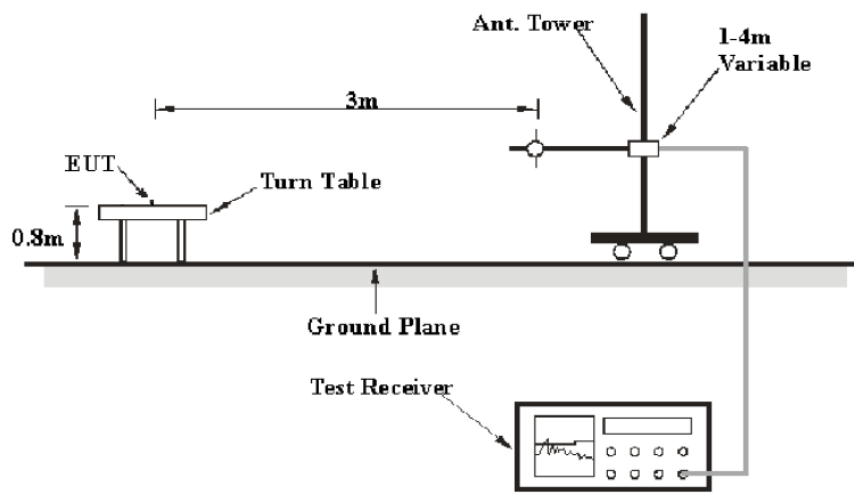
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.193	-5.50	19.82	14.32	53.89	-39.57	Average
2	0.193	1.40	19.82	21.22	63.89	-42.67	QP
3	0.291	-6.20	19.82	13.62	50.50	-36.88	Average
4	0.291	1.30	19.82	21.12	60.50	-39.38	QP
5	0.474	-6.90	19.76	12.86	46.45	-33.59	Average
6	0.474	-1.80	19.76	17.96	56.45	-38.49	QP
7	0.724	-7.00	19.74	12.74	46.00	-33.26	Average
8	0.724	-4.10	19.74	15.64	56.00	-40.36	QP
9	1.800	-6.70	19.84	13.14	46.00	-32.86	Average
10	1.800	-5.30	19.84	14.54	56.00	-41.46	QP
11	23.140	5.89	19.79	25.68	50.00	-24.32	Average
12	23.140	10.49	19.79	30.28	60.00	-29.72	QP

**FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS****Applicable Standard**

FCC §15.247 (d); §15.209; §15.205;

**EUT Setup**

**Below 1 GHz:**



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

**EMI Test Receiver Setup**

The system was investigated from 30 MHz to 1 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP

**Test Procedure**

According to ANSI C63.10-2013 clause 6.5, 6.6 and 6.7.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30MHz - 1GHz.

**Factor & Over Limit Calculation**

The Factor is calculated by adding Antenna Factor , Cable Loss, and Amplifier Gain. The basic equation is as follows:

$$\text{Factor (dB)} = \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Amplifier Gain (dB)}$$

The “**Over Limit**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit of 7dB means the emission is 7 dB above the limit. The equation for Over Limit calculation is as follows:

$$\text{Over Limit (dB)} = \text{Read level (dB}\mu\text{V)} + \text{Factor (dB/m)} - \text{Limit (dB}\mu\text{V/m)}$$

**Test Results Summary**

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

**Test Data****Environmental Conditions**

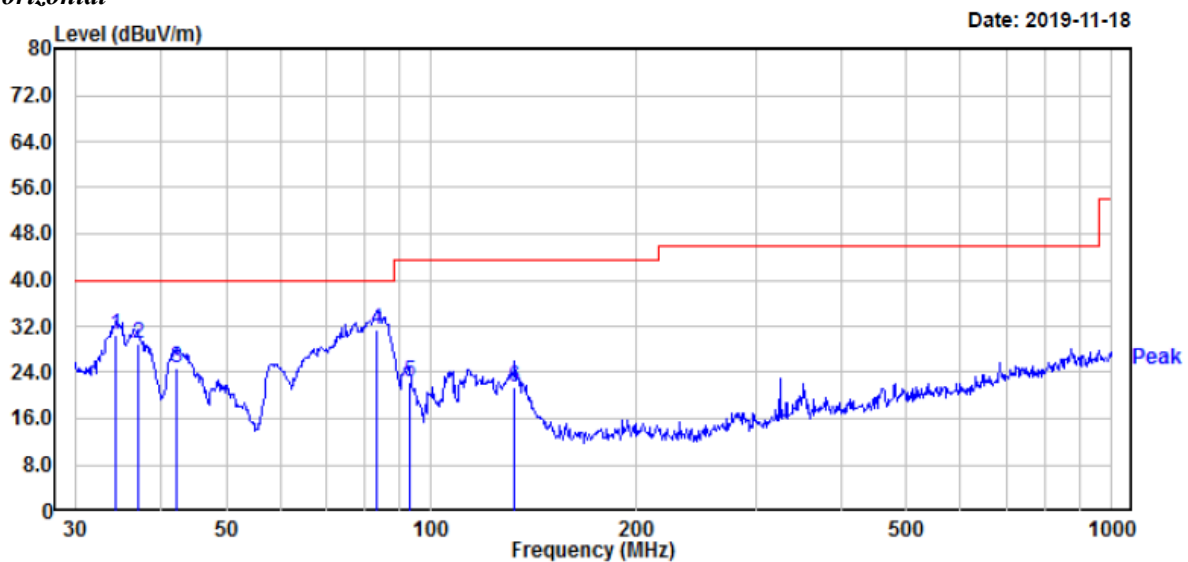
<b>Temperature:</b>	24.2 °C
<b>Relative Humidity:</b>	51 %
<b>ATM Pressure:</b>	101.2kPa

The testing was performed by Jack Jiao on 2019-11-18.

EUT operation mode: Transmitting

**Spurious Emission Test:****30MHz ~ 1GHz:**

Pre-scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case **low channel of 802.11 n-HT20 MIMO mode in Z-axis of orientation** was recorded  
**Horizontal**

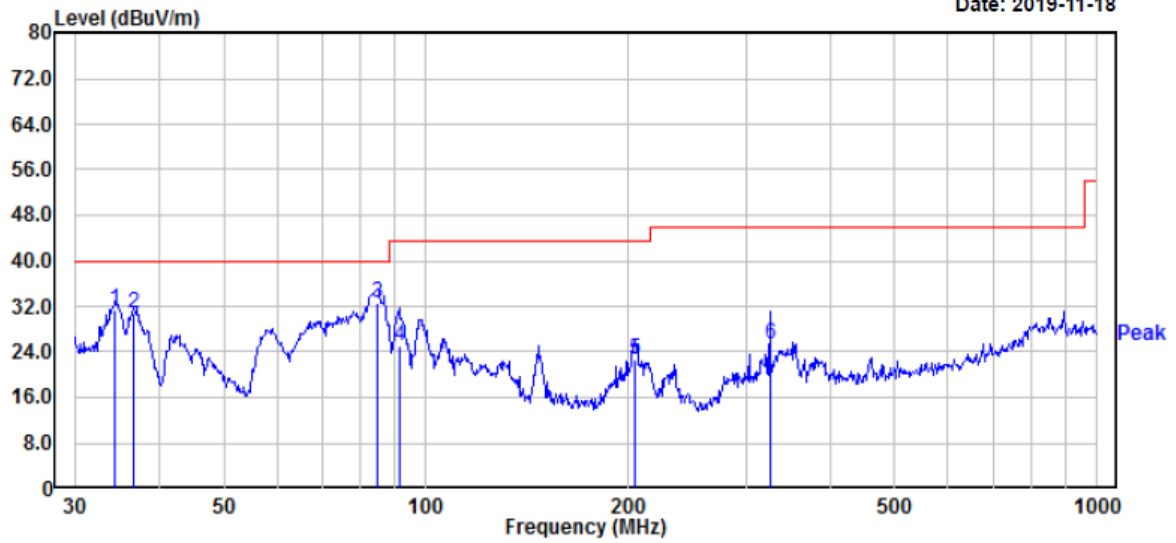


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	34.40	37.20	-6.79	30.41	40.00	-9.59	100	122	QP
2	37.02	38.10	-8.97	29.13	40.00	-10.87	100	276	QP
3	42.15	37.49	-12.62	24.87	40.00	-15.13	100	343	QP
4	83.23	48.69	-17.19	31.50	40.00	-8.50	100	42	QP
5	92.79	38.80	-16.52	22.28	43.50	-21.22	100	343	QP
6	132.69	32.80	-11.37	21.43	43.50	-22.07	100	-1	QP



**Vertical**

Date: 2019-11-18



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	34.40	38.10	-6.79	31.31	40.00	-8.69	100	96	QP
2	36.77	39.40	-8.76	30.64	40.00	-9.36	100	14	QP
3	84.70	49.70	-17.21	32.49	40.00	-7.51	100	52	QP
4	91.18	41.90	-16.94	24.96	43.50	-18.54	100	353	QP
5	204.96	34.70	-12.08	22.62	43.50	-20.88	100	0	QP
6	325.60	35.00	-9.72	25.28	46.00	-20.72	100	197	QP

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