



Shenzhen CTL Testing Technology Co., Ltd.  
Tel: +86-755-89486194 E-mail: ctl@ctl-lab.com

# TEST REPORT

## FCC PART 15.247

Report Reference No. .... : CTL2407232066-WF02

Compiled by:  
( position+printed name+signature)

Happy Guo  
(File administrators)

Tested by:  
( position+printed name+signature)

Jack Wang  
(Test Engineer)

Approved by:  
( position+printed name+signature)

Ivan Xie  
(Manager)



Product Name ..... : Front center console entertainment system assembly

Model/Type reference ..... : G050-CENTER-CONSOLE-1

List Model(s)..... : N/A

Trade Mark..... : N/A

FCC ID..... : 2BLND-G050L

Applicant's name ..... : Indigo Technologies, Inc.

Address of applicant ..... : 73 Holton St. Woburn, MA 01801, USA

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

Address of Test Firm ..... : Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road,  
Nanshan District, Shenzhen, China 518055

Test specification..... :

Standard ..... : FCC Part 15.247: Operation within the bands 902-928 MHz,  
2400-2483.5 MHz and 5725-5850 MHz.

TRF Originator ..... : Shenzhen CTL Testing Technology Co., Ltd.

Master TRF..... : Dated 2011-01

Date of receipt of test item ..... : Aug. 26, 2024

Date of Test Date..... : Aug. 26, 2024-Oct. 22, 2024

Date of Issue ..... : Oct. 23, 2024

Result..... : Pass

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# TEST REPORT

<b>Test Report No. :</b>	<b>CTL2407232066-WF02</b>	Oct. 23, 2024
		Date of issue

Equipment under Test : Front center console entertainment system assembly

Sample No : CTL2407232066

Model /Type : G050-CENTER-CONSOLE-1

Listed Models : N/A

**Applicant** : **Indigo Technologies, Inc.**

Address : 73 Holton St. Woburn, MA 01801, USA

**Manufacturer** : **Indigo Technologies, Inc.**

Address : 73 Holton St. Woburn, MA 01801, USA

<b>Test result</b>	<b>Pass *</b>
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\* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

### **\*\* Modified History \*\***

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# 1. SUMMARY

## 1.1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

[ANSI C63.10: 2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB 558074 D01 v05r02](#): KDB558074 D01 15.247 Meas Guidance v05r02

## 1.2. Test Description

FCC PART 15.247		
FCC Part 15.207	AC Power Conducted Emission	N/A
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Conducted Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

### 1.3. Test Facility

#### 1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No.3011, Shaheji Road, Nanshan District, Shenzhen, China 518055

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.10 and CISPR 22/EN 55022 requirements.

#### 1.3.2 Laboratory accreditation

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

##### **CNAS-Lab Code: L7497**

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

##### **A2LA-Lab Cert. No. 4343.01**

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **IC Registration No.: 9618B**

##### **CAB identifier: CN0041**

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B.

##### **FCC-Registration No.: 399832**

##### **Designation No.: CN1216**

Shenzhen CTL Testing Technology Co., Ltd. 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 399832.

### 1.4. 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 CTL 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 CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	$\pm 0.57$ dB	(1)
Transmitter power Radiated	$\pm 2.20$ dB	(1)
Conducted spurious emission 9KHz-40 GHz	$\pm 2.20$ dB	(1)
Occupied Bandwidth	$\pm 0.01$ ppm	(1)
Radiated Emission 9KHz~30MHz	$\pm 3.66$ dB	(1)
Radiated Emission 30~1000MHz	$\pm 4.10$ dB	(1)
Radiated Emission Above 1GHz	$\pm 4.32$ dB	(1)
Conducted Disturbance 0.15~30MHz	$\pm 3.20$ dB	(1)

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

## 2. GENERAL INFORMATION

### 2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

### 2.2. General Description of EUT

Product Name:	Front center console entertainment system assembly
Model/Type reference:	G050-CENTER-CONSOLE-1
Power supply:	DC12V power supply
<b>2.4G WIFI</b>	
Supported type:	802.11b/802.11g/802.11n(H20)/802.11n(H40)
Modulation:	802.11b: DSSS 802.11g/802.11n(H20)/802.11n(H40): OFDM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz 802.11n(H40): 2422MHz~2452MHz
Channel number:	802.11b/802.11g/802.11n(H20): 11 802.11n(H40): 7
Channel separation:	5MHz
Antenna type:	PIFA Antenna
Antenna gain:	3.02dBi

Note1: For more details, please refer to the user's manual of the EUT.

Note2: Antenna gain provided by the applicant.



## 2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

There are 11 channels provided to the EUT and Channel 01/03/06/09/11 were selected for WIFI test.

### Operation Frequency WIFI :

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

Note: The line display in grey were the channel selected for testing

### Power Parameters:

Test Software Version	CMD Command		
Frequency	2412/2422MHz	2437MHz	2452/2462MHz
802.11b	0	0	0
802.11g	0	0	0
802.11n(HT20)	0	0	0
802.11n(HT40)	0	0	0

### Data Rate Used:

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Maximum Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission Radiated Emission 9kHz~1GHz& Radiated Emission 1GHz~10th Harmonic	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	6.5Mbps	1/6/11
	11n(40MHz)/OFDM	13.5 Mbps	3/6/9
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11
	11n(40MHz)/OFDM	13.5 Mbps	3/9

There was 2 test Modes. TM1 to TM2 were shown below:

TM1 : Operate in 2.4G WIFI mode;  
TM2 : Idle mode.

\*\*\*Note:

1. All test modes were tested, but we only recorded the worst case in this report.

## 2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ESH2-Z5	860014/010	2024/04/30	2025/04/29
Double cone logarithmic antenna	Schwarzbeck	VULB 9168	824	2023/02/13	2026/02/12
EMI Test Receiver	R&S	ESCI	1166.5950.03	2024/04/30	2025/04/29
Spectrum Analyzer	Agilent	N9020A	US46220290	2024/05/02	2025/05/01
Spectrum Analyzer	Keysight	N9020A	MY53420874	2024/05/02	2025/05/01
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2021/12/23	2024/12/22
Active Loop Antenna	Da Ze	ZN30900A	/	2024/04/30	2025/04/29
Amplifier	Agilent	8449B	3008A02306	2024/04/30	2025/04/29
Amplifier	Brief&Smart	LNA-4018	2104197	2024/05/03	2025/05/02
Temperature/Humidity Meter	Ji Yu	MC501	/	2024/05/04	2025/05/03
Power measurement module	TSTPASS	TSPS2023R	TSCB220016	2024/05/03	2025/05/02
Power Sensor	Agilent	U2021XA	MY53340004	2024/05/04	2025/05/03
Power Sensor	Agilent	U2021XA	MY54080012	2024/05/03	2025/05/02
Spectrum Analyzer	RS	FSP	1164.4391.38	2024/05/03	2025/05/02
Test Software					
Name of Software			Version		
TST-PASS			V2.0		
EZ_EMC(Below 1GHz)			V1.1.4.2		
EZ_EMC((Above 1GHz)			V1.1.4.2		

The calibration interval was one year

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

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 2.6. Modifications

No modifications were implemented to meet testing criteria.

### 3. TEST CONDITIONS AND RESULTS

#### 3.1. Conducted Emissions Test

##### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

##### TEST CONFIGURATION



##### 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 a Speaker; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The 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.
8. During the above scans, the emissions were maximized by cable manipulation.

##### TEST RESULTS

Battery powered products do not require this test.

### 3.2. Radiated Emissions and Band Edge

#### Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

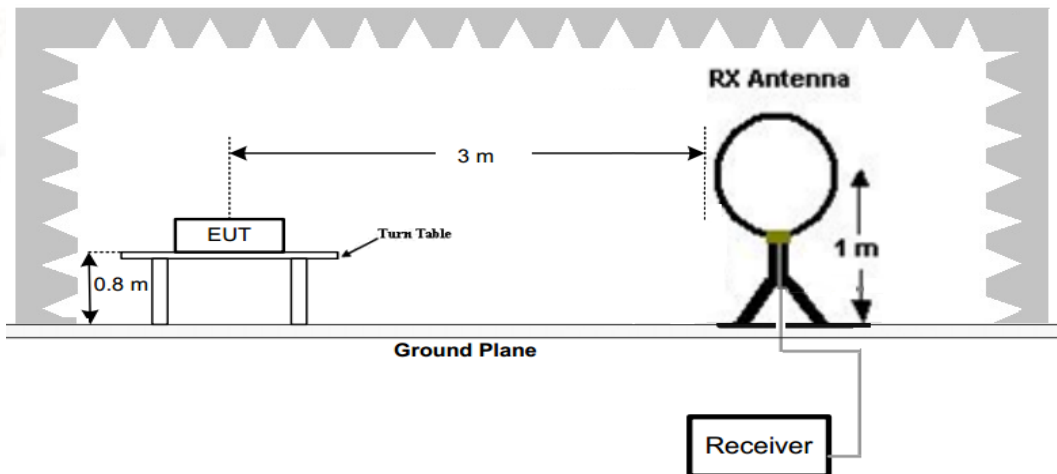
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

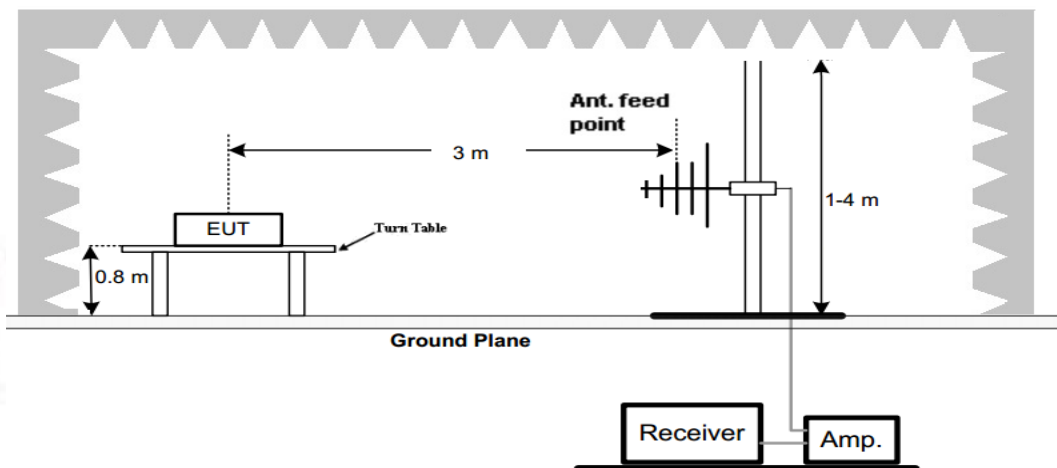
Frequency (MHz)	Distance (Meters)	Radiated (dB $\mu$ V/m)	Radiated ( $\mu$ V/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

#### TEST CONFIGURATION

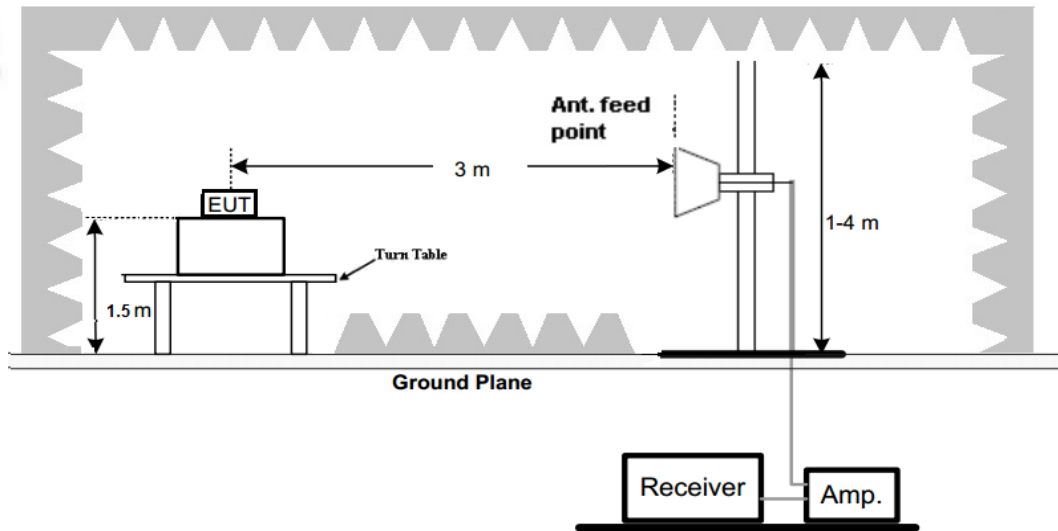
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



## (C) Radiated Emission Test Set-Up, Frequency above 1000MHz


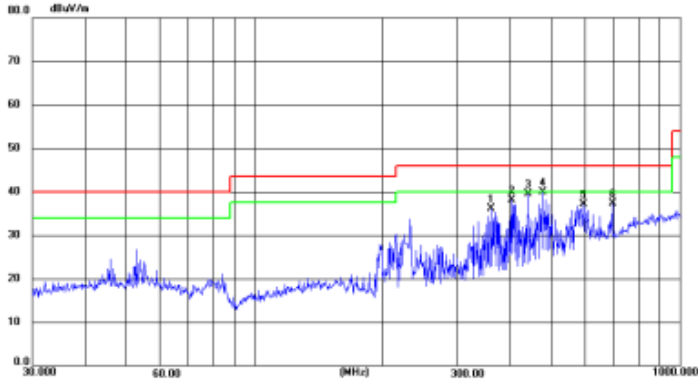

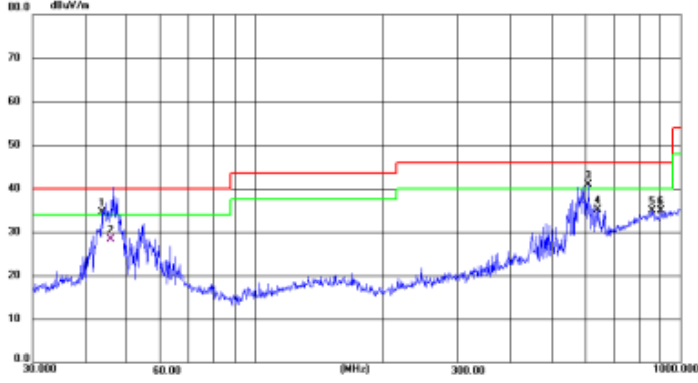
**Test Procedure**

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

**TEST RESULTS****Remark:**

1. All three channels (lowest/middle/highest) of each mode were measured below 1GHz and recorded worst case at 802.11b low channel.
2. All three channels (lowest/middle/highest) of each mode were measured above 1GHz and recorded worst case at 802.11b mode.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, Found the emission level are attenuated 20dB below the limits from 9 kHz to 30MHz, so it does not recorded in report.

## For 30MHz-1GHz

Test mode:	TM1	Polarization:	Horizontal																																																																																				
<div><div></div><div>Shenzhen CTL Testing Technology Co., Ltd Tel: +86-755-89486194</div></div> <div><div><b>Radiated Emission Measurement</b> File :RF_9 Data :#735 Date: 2024/09/14 Time: 19:36:29</div></div> <div><div>Site: LAB Chamber 2 Limit: FCC Part15 RE-Class C_30-1000MHz EUT: MN: G050L Mode: WIFI2.4G 2412MHz Note: Indigo Technologies, Inc.</div><div>Polarization: <b>Horizontal</b> Power: Distance: 3m</div><div>Temperature: 25(C) Humidity: 50 %</div></div> <table><tr><th>No.</th><th>Frequency (MHz)</th><th>Reading (dBuV)</th><th>Factor (dB/m)</th><th>Level (dBuV/m)</th><th>Limit (dBuV/m)</th><th>Margin (dB)</th><th>Detector</th><th>Height (cm)</th><th>Azimuth (deg.)</th><th>P/F</th><th>Remark</th></tr><tr><td>1</td><td>360.4476</td><td>19.61</td><td>16.56</td><td>36.17</td><td>46.00</td><td>9.83</td><td>peak</td><td>100</td><td>360</td><td>P</td><td></td></tr><tr><td>2</td><td>402.3672</td><td>19.38</td><td>18.63</td><td>38.01</td><td>46.00</td><td>7.99</td><td>peak</td><td>100</td><td>9</td><td>P</td><td></td></tr><tr><td>3</td><td>440.3892</td><td>20.56</td><td>18.92</td><td>39.48</td><td>46.00</td><td>6.52</td><td>peak</td><td>100</td><td>9</td><td>P</td><td></td></tr><tr><td>4</td><td>477.1693</td><td>20.28</td><td>19.53</td><td>39.81</td><td>46.00</td><td>6.19</td><td>peak</td><td>100</td><td>174</td><td>P</td><td></td></tr><tr><td>5</td><td>593.3096</td><td>14.93</td><td>22.20</td><td>37.13</td><td>46.00</td><td>8.87</td><td>peak</td><td>100</td><td>236</td><td>P</td><td></td></tr><tr><td>6</td><td>695.6360</td><td>13.84</td><td>23.49</td><td>37.33</td><td>46.00</td><td>8.67</td><td>peak</td><td>100</td><td>112</td><td>P</td><td></td></tr></table>				No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark	1	360.4476	19.61	16.56	36.17	46.00	9.83	peak	100	360	P		2	402.3672	19.38	18.63	38.01	46.00	7.99	peak	100	9	P		3	440.3892	20.56	18.92	39.48	46.00	6.52	peak	100	9	P		4	477.1693	20.28	19.53	39.81	46.00	6.19	peak	100	174	P		5	593.3096	14.93	22.20	37.13	46.00	8.87	peak	100	236	P		6	695.6360	13.84	23.49	37.33	46.00	8.67	peak	100	112	P	
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark																																																																												
1	360.4476	19.61	16.56	36.17	46.00	9.83	peak	100	360	P																																																																													
2	402.3672	19.38	18.63	38.01	46.00	7.99	peak	100	9	P																																																																													
3	440.3892	20.56	18.92	39.48	46.00	6.52	peak	100	9	P																																																																													
4	477.1693	20.28	19.53	39.81	46.00	6.19	peak	100	174	P																																																																													
5	593.3096	14.93	22.20	37.13	46.00	8.87	peak	100	236	P																																																																													
6	695.6360	13.84	23.49	37.33	46.00	8.67	peak	100	112	P																																																																													
Test mode:	TM1	Polarization:	Vertical																																																																																				
<div><div></div><div>Shenzhen CTL Testing Technology Co., Ltd Tel: +86-755-89486194</div></div> <div><div><b>Radiated Emission Measurement</b> File :RF_9 Data :#736 Date: 2024/09/14 Time: 19:37:32</div></div> <div><div>Site: LAB Chamber 2 Limit: FCC Part15 RE-Class C_30-1000MHz EUT: MN: G050L Mode: WIFI2.4G 2412MHz Note: Indigo Technologies, Inc.</div><div>Polarization: <b>Vertical</b> Power: Distance: 3m</div><div>Temperature: 25(C) Humidity: 50 %</div></div> <table><tr><th>No.</th><th>Frequency (MHz)</th><th>Reading (dBuV)</th><th>Factor (dB/m)</th><th>Level (dBuV/m)</th><th>Limit (dBuV/m)</th><th>Margin (dB)</th><th>Detector</th><th>Height (cm)</th><th>Azimuth (deg.)</th><th>P/F</th><th>Remark</th></tr><tr><td>1</td><td>43.7926</td><td>19.53</td><td>14.88</td><td>34.41</td><td>40.00</td><td>5.59</td><td>peak</td><td>100</td><td>176</td><td>P</td><td></td></tr><tr><td>2</td><td>45.7408</td><td>13.37</td><td>14.84</td><td>28.21</td><td>40.00</td><td>11.79</td><td>QP</td><td>100</td><td>360</td><td>P</td><td></td></tr><tr><td>3</td><td>609.3873</td><td>18.07</td><td>22.79</td><td>40.86</td><td>46.00</td><td>5.14</td><td>peak</td><td>100</td><td>299</td><td>P</td><td></td></tr><tr><td>4</td><td>642.2980</td><td>11.57</td><td>23.44</td><td>35.01</td><td>46.00</td><td>10.99</td><td>peak</td><td>100</td><td>74</td><td>P</td><td></td></tr><tr><td>5</td><td>857.4004</td><td>7.48</td><td>27.45</td><td>34.93</td><td>46.00</td><td>11.07</td><td>peak</td><td>100</td><td>330</td><td>P</td><td></td></tr><tr><td>6</td><td>901.7270</td><td>7.06</td><td>27.87</td><td>34.93</td><td>46.00</td><td>11.07</td><td>peak</td><td>100</td><td>330</td><td>P</td><td></td></tr></table>				No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark	1	43.7926	19.53	14.88	34.41	40.00	5.59	peak	100	176	P		2	45.7408	13.37	14.84	28.21	40.00	11.79	QP	100	360	P		3	609.3873	18.07	22.79	40.86	46.00	5.14	peak	100	299	P		4	642.2980	11.57	23.44	35.01	46.00	10.99	peak	100	74	P		5	857.4004	7.48	27.45	34.93	46.00	11.07	peak	100	330	P		6	901.7270	7.06	27.87	34.93	46.00	11.07	peak	100	330	P	
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark																																																																												
1	43.7926	19.53	14.88	34.41	40.00	5.59	peak	100	176	P																																																																													
2	45.7408	13.37	14.84	28.21	40.00	11.79	QP	100	360	P																																																																													
3	609.3873	18.07	22.79	40.86	46.00	5.14	peak	100	299	P																																																																													
4	642.2980	11.57	23.44	35.01	46.00	10.99	peak	100	74	P																																																																													
5	857.4004	7.48	27.45	34.93	46.00	11.07	peak	100	330	P																																																																													
6	901.7270	7.06	27.87	34.93	46.00	11.07	peak	100	330	P																																																																													

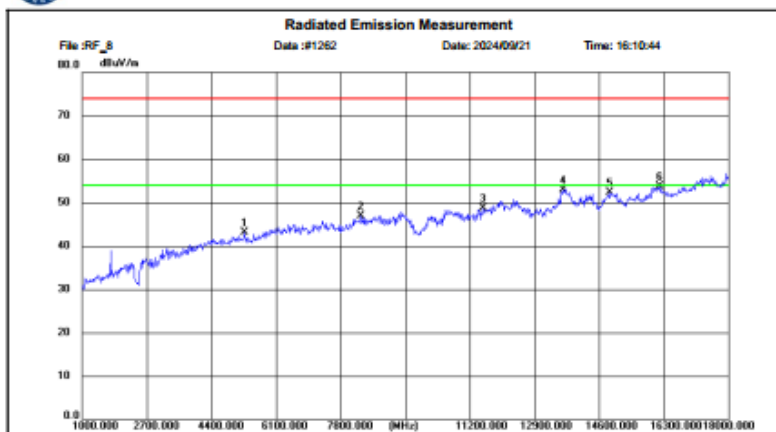


**For 1GHz to 25GHz****802.11b Mode (above 1GHz)**

Note: 802.11b/802.11g/802.11n (H20) /802.11n (H40) all have been tested, only worse case 802.11b is reported

**CH01****Horizontal**

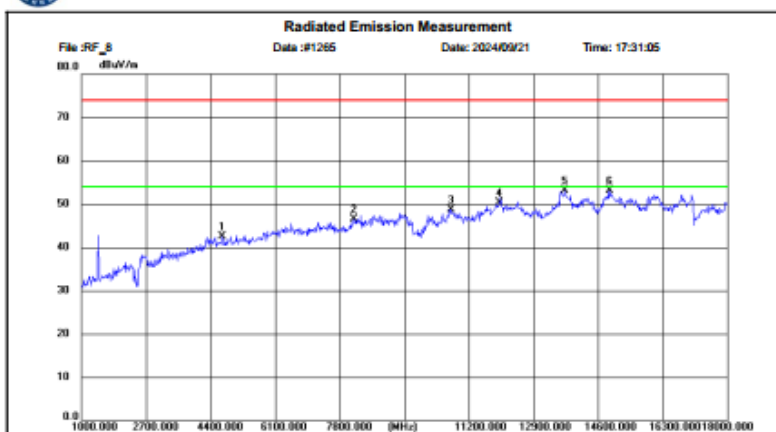
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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5281.875	50.92	-7.78	43.14	74.00	30.86	peak	150	32	P	
2	8327.000	49.09	-2.16	46.93	74.00	27.07	peak	150	2	P	
3	11559.125	47.78	0.97	48.75	74.00	25.25	peak	150	168	P	
4	13662.875	49.08	3.92	53.00	74.00	21.00	peak	150	262	P	
5	14903.875	49.13	3.16	52.29	74.00	21.71	peak	150	220	P	
6	16210.750	48.44	5.27	53.71	74.00	20.29	peak	150	32	P	

**CH01****Vertical**

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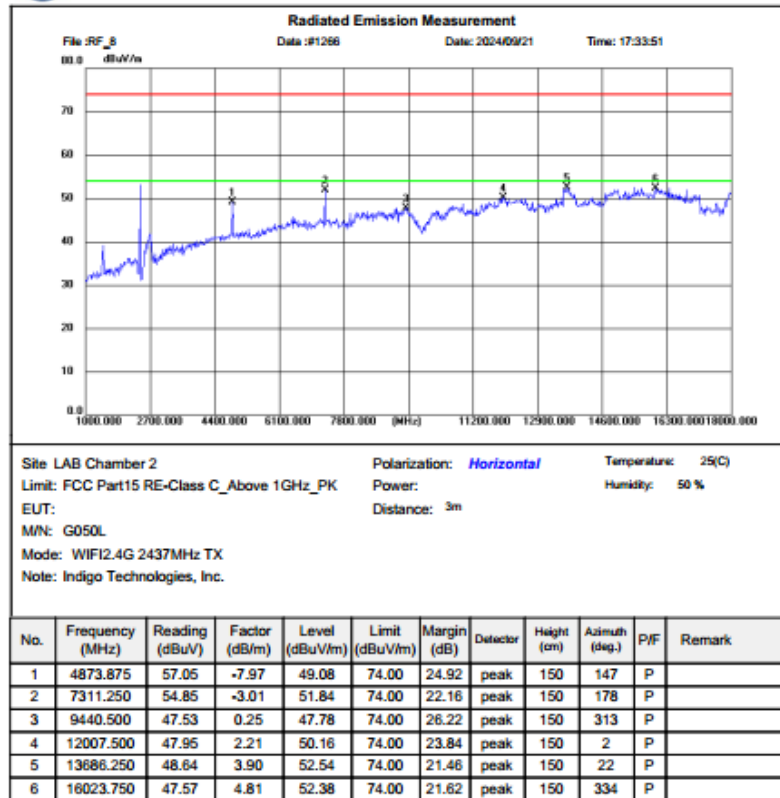
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4716.625	50.58	-8.17	42.41	74.00	31.59	peak	150	88	P	
2	8182.500	49.11	-2.52	46.59	74.00	27.41	peak	150	67	P	
3	10724.000	48.52	0.28	48.80	74.00	25.20	peak	150	151	P	
4	12003.250	48.06	2.20	50.26	74.00	23.74	peak	150	67	P	
5	13716.000	49.29	3.87	53.16	74.00	20.84	peak	150	78	P	
6	14916.625	49.95	3.17	53.12	74.00	20.88	peak	150	203	P	

CH06

Horizontal



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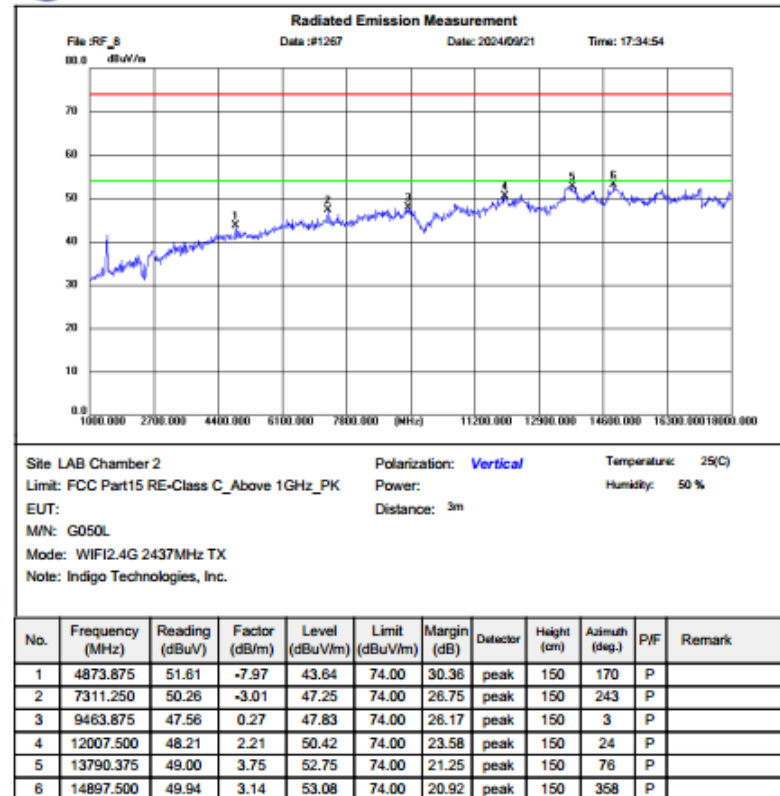


CH06

Vertical



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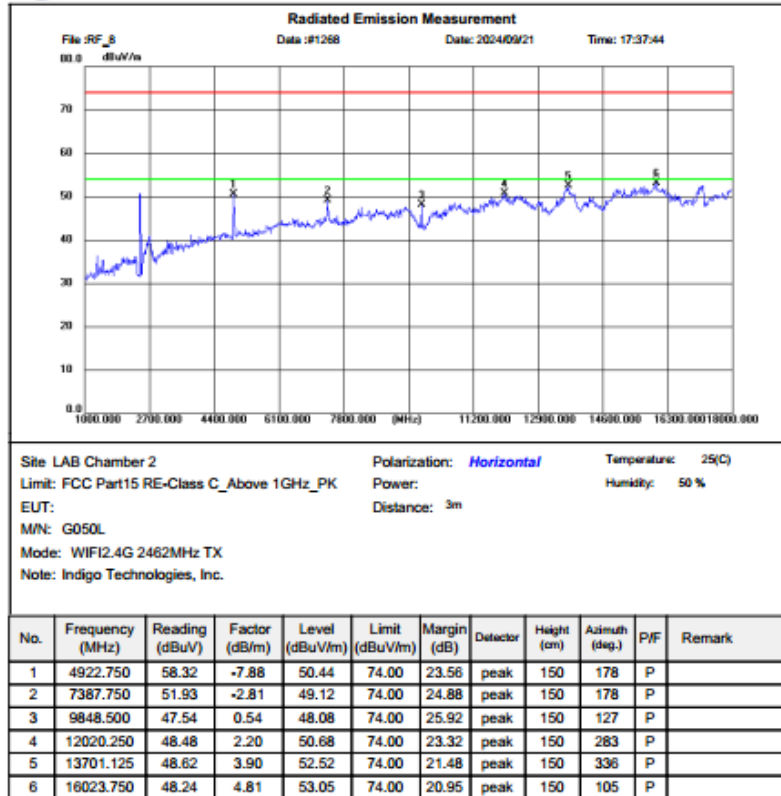


CH11

Horizontal



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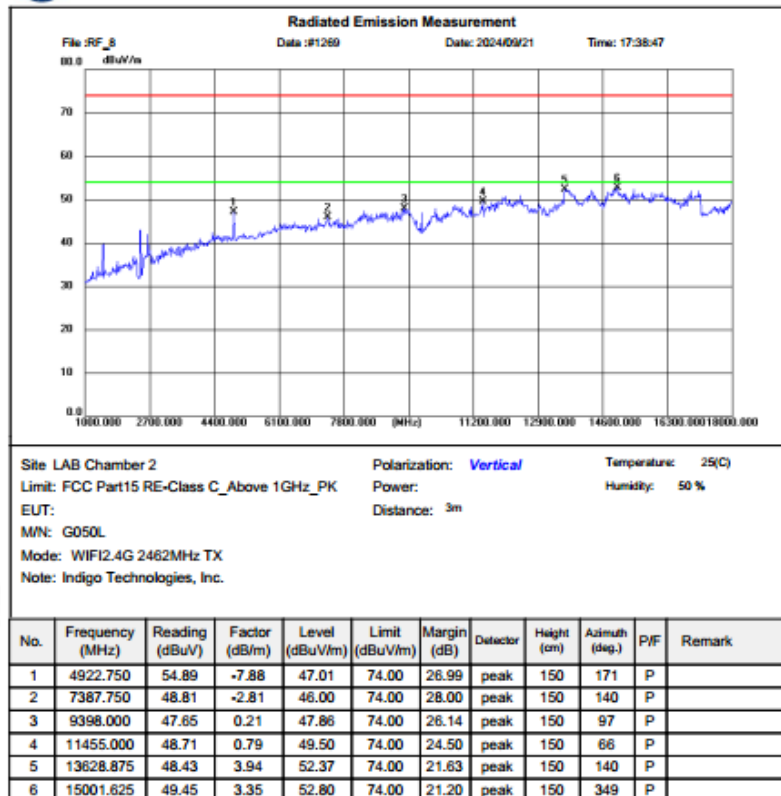


CH11

Vertical



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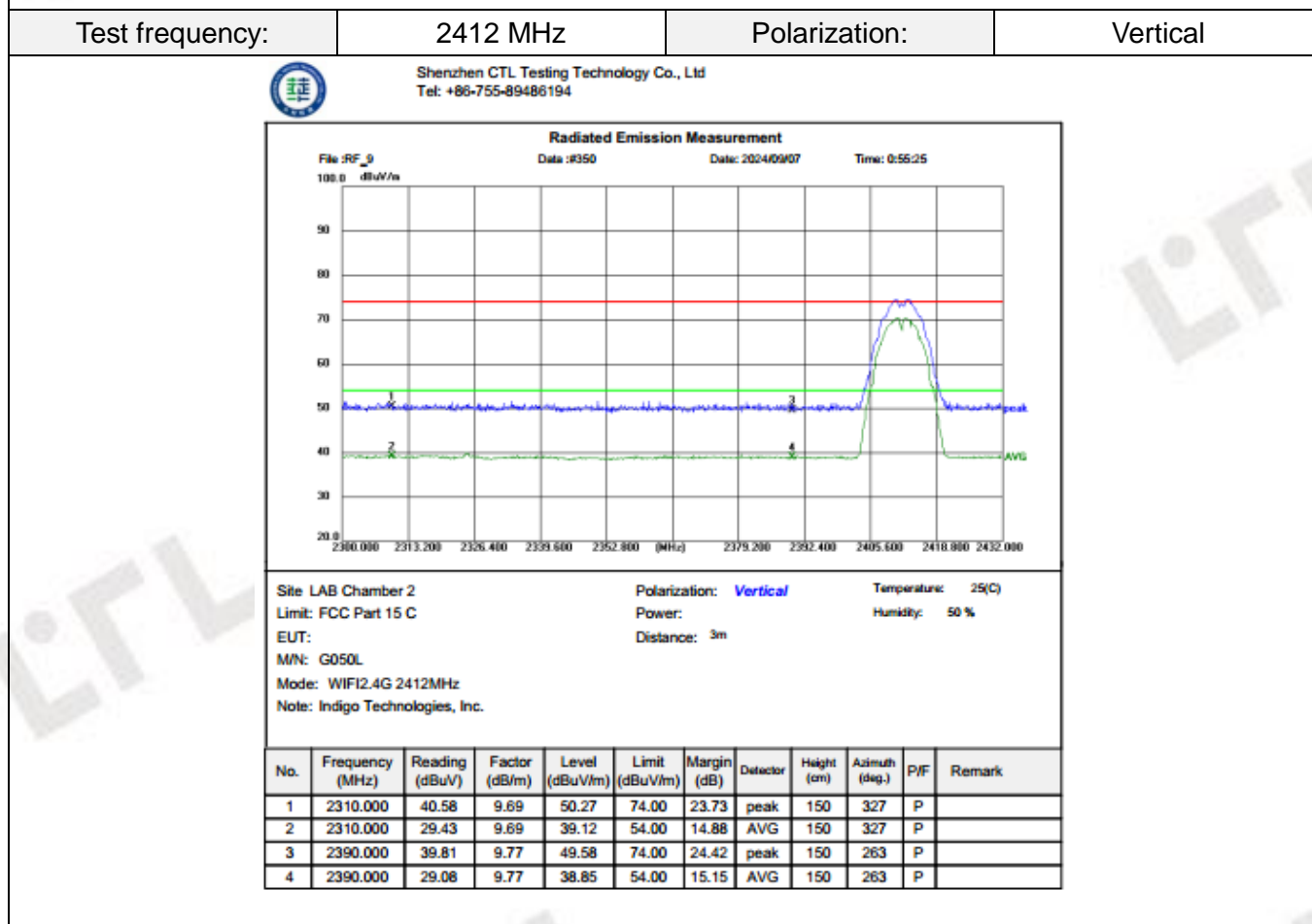
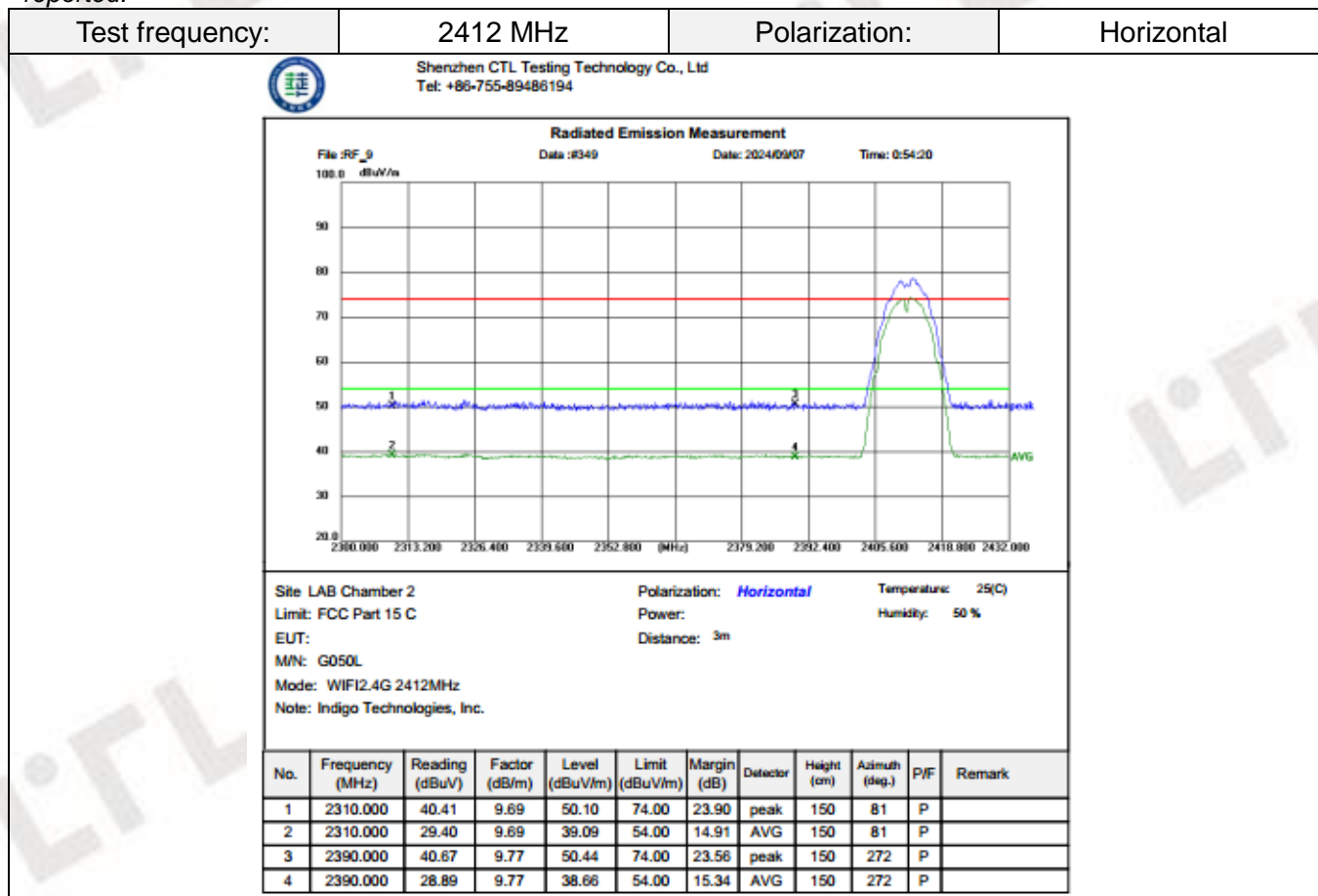


## REMARKS:

1.  $\text{Level (dBuV/m)} = \text{Reading (dBuV)} + \text{Factor (dB/m)}$ .
2.  $\text{Factor (dB/m)} = \text{Antenna Factor (dB/m)} + \text{Cable Factor (dB)} - \text{Pre-amplifier Factor}$ .
3.  $\text{Margin value} = \text{Limit (dBuV/m)} - \text{Level (dBuV/m)}$ .
4. PK detector measurement value is lower than the average limit. Therefore, there is no need to test AV detector measurements.
5. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
6. Other emissions are attenuated 20dB below the limits from 9kHz to 30MHz, so it does not record in report.
7. 18GHz-26GHz not recorded for no spurious point have a margin of less than 6 dB with respect to the limits.

### Results of Band Edges Test (Radiated)

Note: 802.11b/802.11g/802.11n (H20) /802.11n (H40) all have been tested, only worse case 802.11/802.11b is reported.

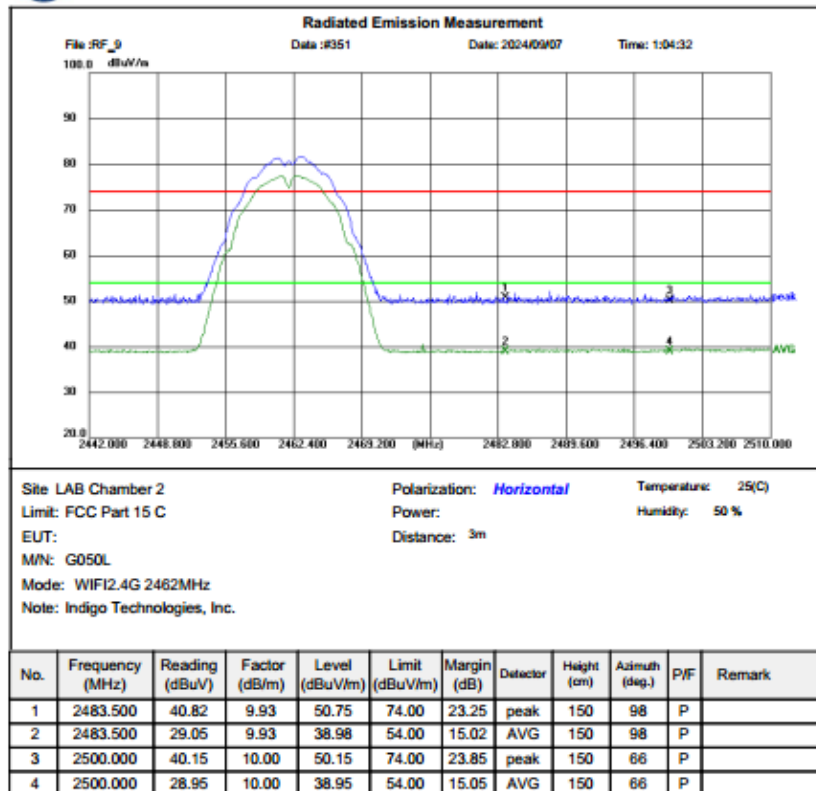


Test frequency:

2462 MHz

Polarization:

Horizontal

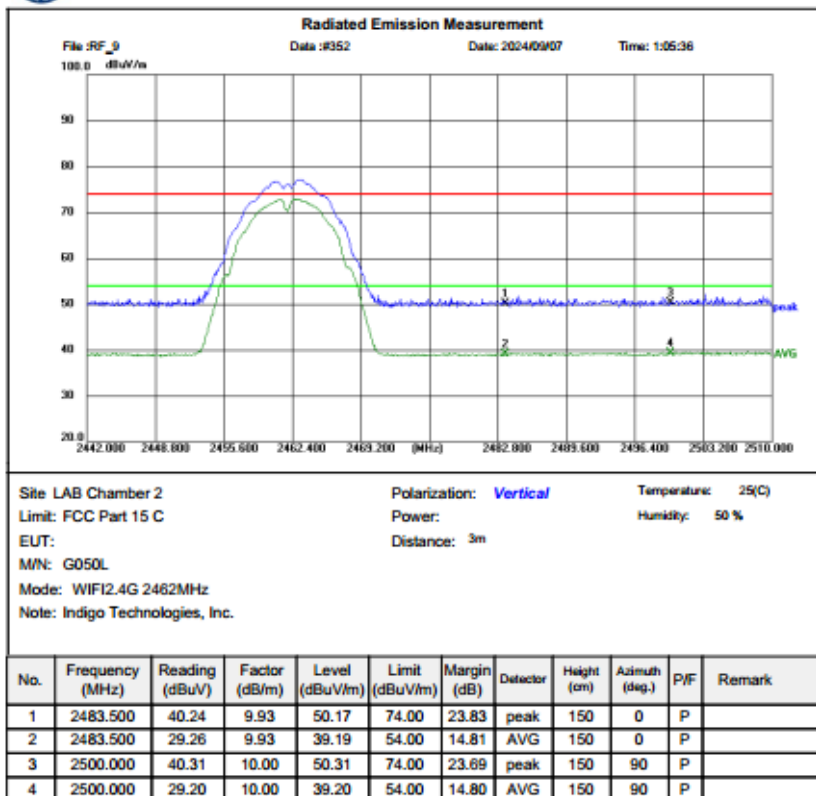
Shenzhen CTL Testing Technology Co., Ltd  
Tel: +86-755-89486194

Test frequency:

2462 MHz

Polarization:

Vertical

Shenzhen CTL Testing Technology Co., Ltd  
Tel: +86-755-89486194

## REMARKS:

1.  $\text{Level (dBuV/m)} = \text{Reading (dBuV)} + \text{Factor (dB/m)}$ .
2.  $\text{Factor (dB/m)} = \text{Antenna Factor (dB/m)} + \text{Cable Factor (dB)} - \text{Pre-amplifier Factor}$ .
3.  $\text{Margin value} = \text{Limit (dBuV/m)} - \text{Level (dBuV/m)}$ .
4. Other emission levels are attenuated 20dB below the limit and not recorded in report.
5. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

### 3.3. Maximum Conducted Output Power

#### Limit

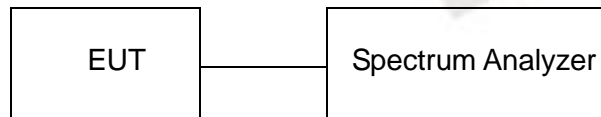
The Maximum Peak Output Power Measurement is 30dBm.

#### Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.

- a) Set the RBW=1MHz..
- b) Set VBW=3MHz.
- c) Set span $\geq$ [3 $\times$ RBW].
- d) Sweep time = auto couple.
- e) Detector=RMS.
- f) Trace mode=max hold.
- g) Allow trace to fully stabilize.
- h) Use Average marker function to determine the Average amplitude level.

#### Test Configuration



#### Test Results

Raw data reference to Section 2 from CTL2407232066-WF02\_2.4G\_WIFI\_Appendix. .

### 3.4. Power Spectral Density

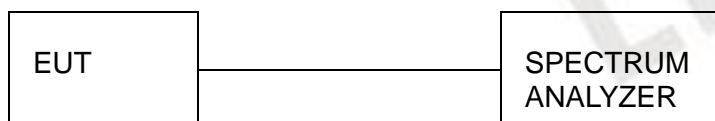
#### Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

#### Test Procedure

1. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW  $\geq 3$  kHz.
3. Set the VBW  $\geq 3 \times$  RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = Average.
6. Sweep points = 40001
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting PSD level must be 8dBm.

#### Test Configuration



#### Test Results

Raw data reference to Section 3 from CTL2407232066-WF02\_2.4G\_WIFI\_Appendix. .

### 3.5. 6dB Bandwidth

#### Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

#### Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

#### Test Configuration



#### Test Results

Raw data reference to Section 1 from CTL2407232066-WF02\_2.4G\_WIFI\_Appendix. .



### 3.6. Out-of-band Emissions

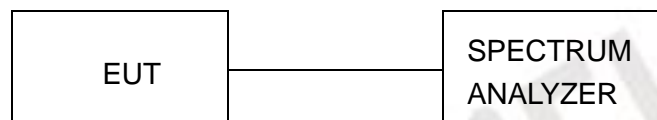
#### Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

#### Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

#### Test Configuration



#### Test Results

Raw data reference to Section 4 from CTL2407232066-WF02\_2.4G\_WIFI\_Appendix. .

### 3.7. Antenna Requirement

#### Standard Applicable

**For intentional device, according to FCC 47 CFR Section 15.203:**

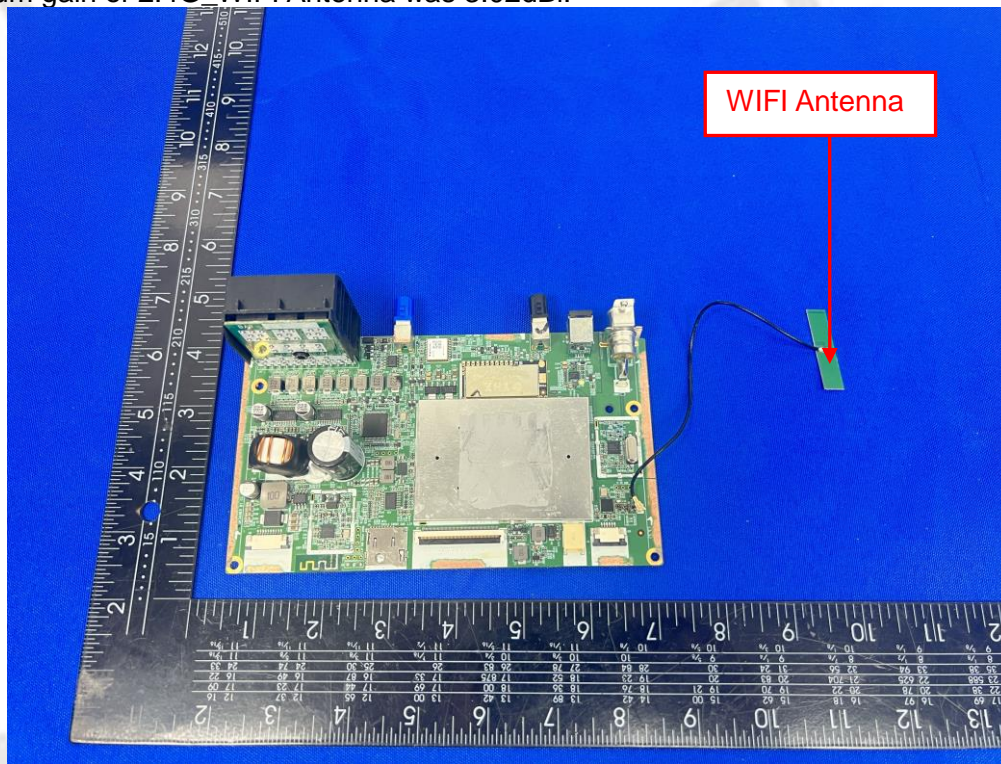
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

#### **FCC CFR Title 47 Part 15 Subpart C Section 15.247(b) (4):**

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.

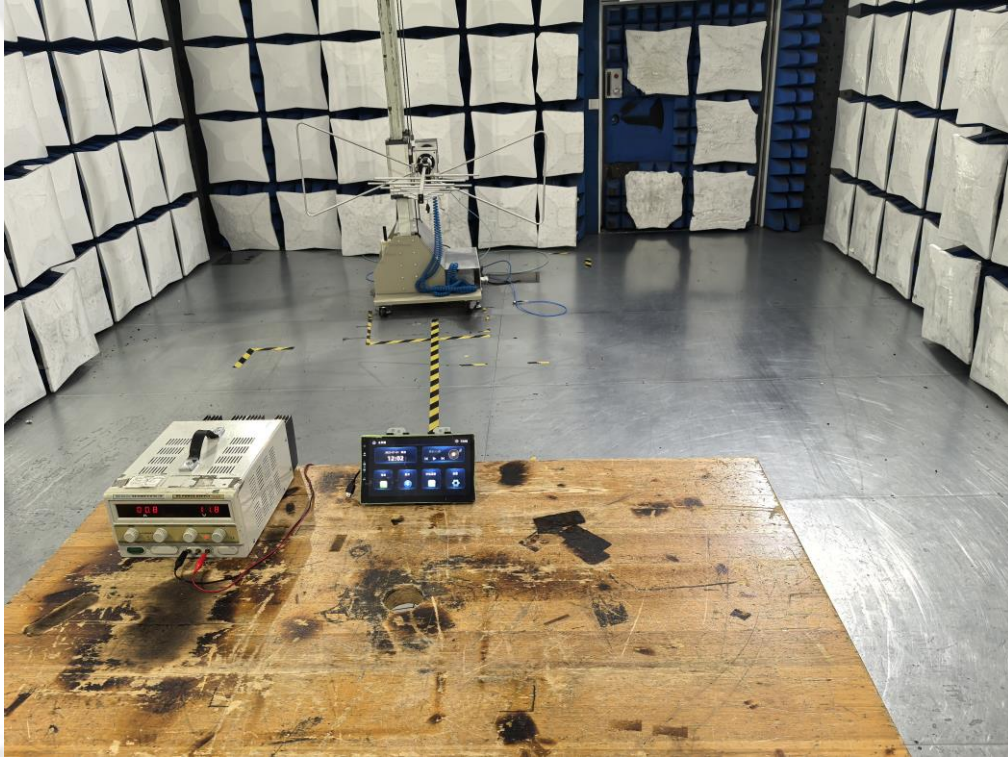
#### **Test Result:**

The maximum gain of 2.4G WIFI Antenna was 3.02dBi.





#### 4. Test Setup Photos of the EUT



## 5. External and Internal Photos of the EUT

Reference to the test report No.CTL2407232066-WF01

\*\*\*\*\* End of Report \*\*\*\*\*