

# TEST REPORT

**FCC ID: 2AQOO-N14I34128**

**Product: Notebook**

**Model No.: WWN14I3-4SL128**

**Additional Model No.: WWN14I3-4BK128, WWN14I3-4WH128,  
WWN14I3-4PK128, WWN14I3-4BL128, WWN14I3-4T128, WWN14I3-4GO128**

**Trade Mark: THOMSON**

**Report No.: TCT200928E026**

**Issued Date: Oct. 27, 2020**

**Issued for:**

**GROUPSFIT**

**80/84 route de la Liberation, PONTAULT COMBAULT 77340, France**

**Issued By:**

**Shenzhen Tongce Testing Lab.**

**1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District,  
Shenzhen, Guangdong, China**

**TEL: +86-755-27673339**

**FAX: +86-755-27673332**

**Note:** This report shall not be reproduced except in full, without the written approval of Shenzhen Tongce Testing Lab.

This document may be altered or revised by Shenzhen Tongce Testing Lab. personnel only, and shall be noted in the revision section of the document. The test results in the report only apply to the tested sample.

**TABLE OF CONTENTS**

1. Test Certification .....	3
2. Test Result Summary .....	4
3. EUT Description.....	5
4. General Information.....	7
4.1. Test environment and mode.....	7
4.2. Description of Support Units .....	8
5. Facilities and Accreditations .....	9
5.1. Facilities .....	9
5.2. Location .....	9
5.3. Measurement Uncertainty.....	9
6. Test Results and Measurement Data .....	10
6.1. Antenna requirement .....	10
6.2. Conducted Emission.....	11
6.3. Maximum Conducted (Average) Output Power .....	15
6.4. Emission Bandwidth .....	17
6.5. Power Spectral Density.....	18
6.6. Conducted Band Edge and Spurious Emission Measurement .....	20
6.7. Radiated Spurious Emission Measurement .....	22

**Appendix A: Test Result of Conducted Test****Appendix B: Photographs of Test Setup****Appendix C: Photographs of EUT**

## 1. Test Certification

<b>Product:</b>	Notebook
<b>Model No.:</b>	WWN14I3-4SL128
<b>Additional Model No.:</b>	WWN14I3-4BK128, WWN14I3-4WH128, WWN14I3-4PK128, WWN14I3-4BL128, WWN14I3-4T128, WWN14I3-4GO128
<b>Trade Mark:</b>	THOMSON
<b>Applicant:</b>	GROUPSFIT
<b>Address:</b>	80/84 route de la Liberation, PONTAULT COMBAULT 77340, France
<b>Manufacturer:</b>	GROUPSFIT
<b>Address:</b>	80/84 route de la Liberation, PONTAULT COMBAULT 77340, France
<b>Date of Test:</b>	Sep. 29, 2020 – Oct. 26, 2020
<b>Applicable Standards:</b>	FCC CFR Title 47 Part 15 Subpart C Section 15.247 FCC KDB 558074 D01 15.247 Meas Guidance v05r02 FCC KDB 662911 D01 Multiple Transmitter Output v02r01 ANSI C63.10:2013

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By: Kevin Huang

Date: Oct. 26, 2020

Kevin Huang

Reviewed By: Beryl Zhao

Date: Oct. 27, 2020

Beryl Zhao

Approved By: Tomsin

Date: Oct. 27, 2020

Tomsin

## 2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203/§15.247 (c)	PASS
AC Power Line Conducted Emission	§15.207	PASS
Conducted Peak Output Power	§15.247 (b)(3)	PASS
6dB Emission Bandwidth	§15.247 (a)(2)	PASS
Power Spectral Density	§15.247 (e)	PASS
Band Edge	§15.247(d)	PASS
Spurious Emission	§15.205/§15.209	PASS

**Note:**

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

### 3. EUT Description

<b>Product:</b>	Notebook
<b>Model No.:</b>	WWN14I3-4SL128
<b>Additional Model No.:</b>	WWN14I3-4BK128, WWN14I3-4WH128, WWN14I3-4PK128, WWN14I3-4BL128, WWN14I3-4T128, WWN14I3-4GO128
<b>Trade Mark:</b>	<b>THOMSON</b>
<b>Operation Frequency:</b>	2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20)) 2422MHz~2452MHz (802.11n(HT40))
<b>Channel Separation:</b>	5MHz
<b>Number of Channel:</b>	11 for 802.11b/802.11g/802.11n(HT20) 7 for 802.11n(HT40)
<b>Modulation Technology: (IEEE 802.11b)</b>	Direct Sequence Spread Spectrum (DSSS)
<b>Modulation Technology: (IEEE 802.11g/802.11n)</b>	Orthogonal Frequency Division Multiplexing(OFDM)
<b>Data speed (IEEE 802.11b):</b>	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
<b>Data speed (IEEE 802.11g):</b>	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps
<b>Data speed (IEEE 802.11n):</b>	Up to 300Mbps
<b>Antenna Type:</b>	Internal Antenna
<b>Antenna Gain:</b>	2.2dBi
<b>Power Supply:</b>	Rechargeable Li-polymer Battery DC 7.6V
<b>AC adapter:</b>	Adapter Information: Model: JHD-AD065B-190250BA-A Input: AC 100-240V, 50/60Hz, 1.5A Output: DC 19.0V, 2.5A, 47.5W
<b>Remark:</b>	All models above are identical in interior structure, electrical circuits and components, and just model names are different for the marketing requirement.

**Note:** The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

**Operation Frequency each of channel For 802.11b/g/n(HT20)**

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

**Operation Frequency each of channel For 802.11n (HT40)**

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
--	--	4	2427MHz	7	2442MHz	--	--
--	--	5	2432MHz	8	2447MHz	--	--
3	2422MHz	6	2437MHz	9	2452MHz		

**Note:**

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

**802.11b/802.11g/802.11n (HT20)**

Channel	Frequency
The lowest channel	2412MHz
The middle channel	2437MHz
The Highest channel	2462MHz

**802.11n (HT40)**

Channel	Frequency
The lowest channel	2422MHz
The middle channel	2437MHz
The Highest channel	2452MHz

## 4. General Information

### 4.1. Test environment and mode

Operating Environment:		
Condition	Conducted Emission	Radiated Emission
Temperature:	25.0 °C	25.0 °C
Humidity:	55 % RH	55 % RH
Atmospheric Pressure:	1010 mbar	1010 mbar
Test Mode:		
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations with Fully-charged battery	
The sample was placed 0.8m & 1.5m for the measurement below & above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case( Z axis) are shown in Test Results of the following pages.		

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.	
Mode	Data rate
802.11b (SISO)	1Mbps
802.11g (SISO)	6Mbps
802.11n(H20) (MIMO)	6.5Mbps
802.11n(H40) (MIMO)	13.5Mbps
Final Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation
1. For WIFI function, the engineering test program was provided and enabled to make EUT continuous transmit/receive. 2. According to ANSI C63.10 standards, the test results are both the "worst case" and "worst setup" 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n(H20), 13.5Mbps for 802.11(H40). Duty cycle setting during the transmission is 98.46% with maximum power setting for all modulations.	

## 4.2. Description of Support Units

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.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

**Note:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

## 5. Facilities and Accreditations

### 5.1. Facilities

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

- FCC - Registration No.: 645098

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

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

### 5.2. Location

Shenzhen Tongce Testing Lab.

Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

TEL: +86-755-27673339

### 5.3. Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , 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 %.

No.	Item	MU
1	Conducted Emission	$\pm 2.56\text{dB}$
2	RF power, conducted	$\pm 0.12\text{dB}$
3	Spurious emissions, conducted	$\pm 0.11\text{dB}$
4	All emissions, radiated(<1G)	$\pm 3.92\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^\circ\text{C}$
7	Humidity	$\pm 1.0\%$

## 6. Test Results and Measurement Data

### 6.1. Antenna requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
------------------------------	-------------------------------------

#### 15.203 requirement:

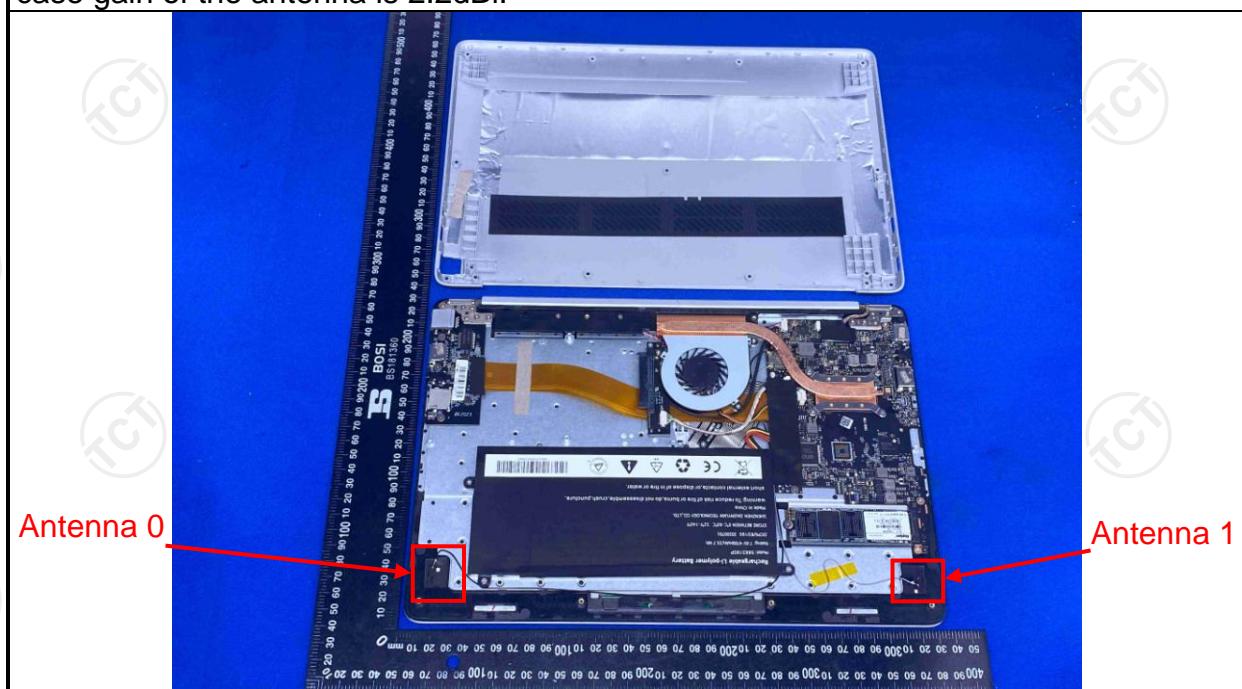
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit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

#### 15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

#### E.U.T Antenna:

The WIFI antennas are internal antennas which permanently attached, and the best case gain of the antenna is 2.2dBi.



## 6.2. Conducted Emission

### 6.2.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.207														
<b>Test Method:</b>	ANSI C63.10:2013														
<b>Frequency Range:</b>	150 kHz to 30 MHz														
<b>Receiver setup:</b>	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
<b>Limits:</b>	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	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
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													
<b>Test Setup:</b>	<p>Reference Plane</p> <p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>														
<b>Test Mode:</b>	Charging + transmitting with modulation														
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The E.U.T is connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol>														
<b>Test Result:</b>	PASS														

**6.2.2. Test Instruments**

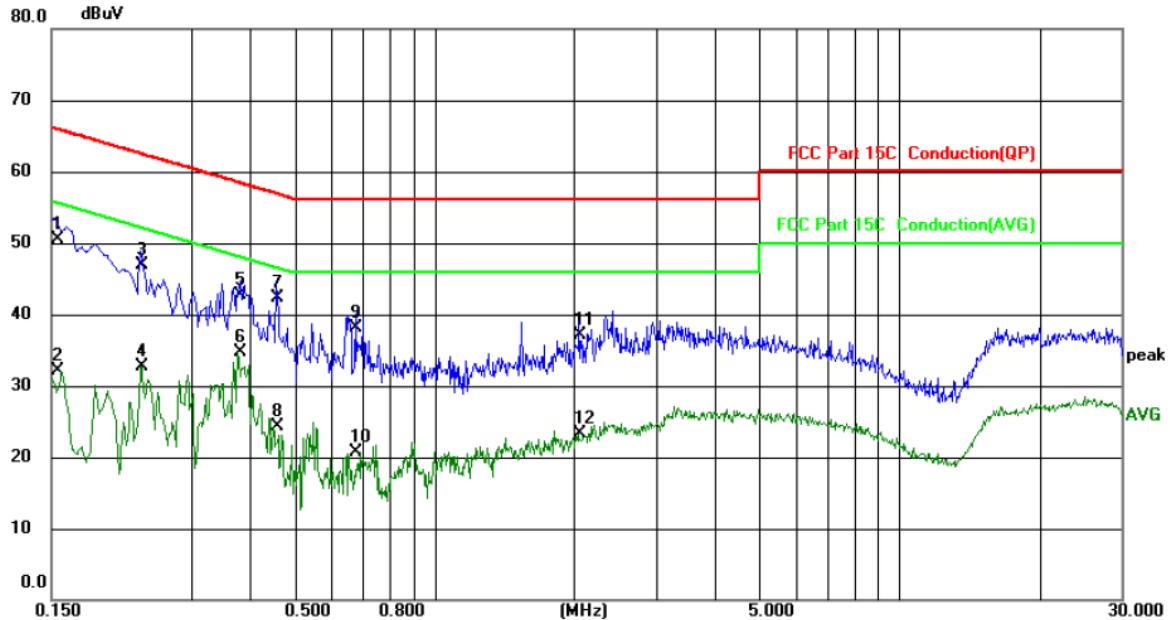
Conducted Emission Shielding Room Test Site (843)				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	R&S	ESCI3	100898	Jul. 27, 2021
LISN-2	Schwarzbeck	NSLK 8126	8126453	Sep. 11, 2021
Line-5	TCT	CE-05	N/A	Sep. 02, 2021
EMI Test Software	Shurples Technology	EZ-EMC	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 6.2.3. Test data

Please refer to following diagram for individual

#### Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



Site				Phase:	<i>L1</i>	Temperature:	25 (C)
Limit: FCC Part 15C Conduction(QP)				Power:	AC 120V/60Hz	Humidity:	55 %RH
No.	Mk.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dB $\mu$ V	dB	dB $\mu$ V	dB	Detector
1	0.1548	40.48	10.12	50.60	65.74	-15.14	QP
2	0.1548	21.90	10.12	32.02	55.74	-23.72	AVG
3	0.2340	36.84	10.13	46.97	62.31	-15.34	QP
4	0.2340	22.65	10.13	32.78	52.31	-19.53	AVG
5	0.3820	32.64	10.13	42.77	58.24	-15.47	QP
6 *	0.3820	24.60	10.13	34.73	48.24	-13.51	AVG
7	0.4580	32.27	10.13	42.40	56.73	-14.33	QP
8	0.4580	14.21	10.13	24.34	46.73	-22.39	AVG
9	0.6780	27.90	10.12	38.02	56.00	-17.98	QP
10	0.6780	10.57	10.12	20.69	46.00	-25.31	AVG
11	2.0540	26.93	10.12	37.05	56.00	-18.95	QP
12	2.0540	13.21	10.12	23.33	46.00	-22.67	AVG

**Note:**

Freq. = Emission frequency in MHz

Reading level (dB $\mu$ V) = Receiver reading

Corr. Factor (dB) = LISN factor + Cable loss

Measurement (dB $\mu$ V) = Reading level (dB $\mu$ V) + Corr. Factor (dB)

Limit (dB $\mu$ V) = Limit stated in standard

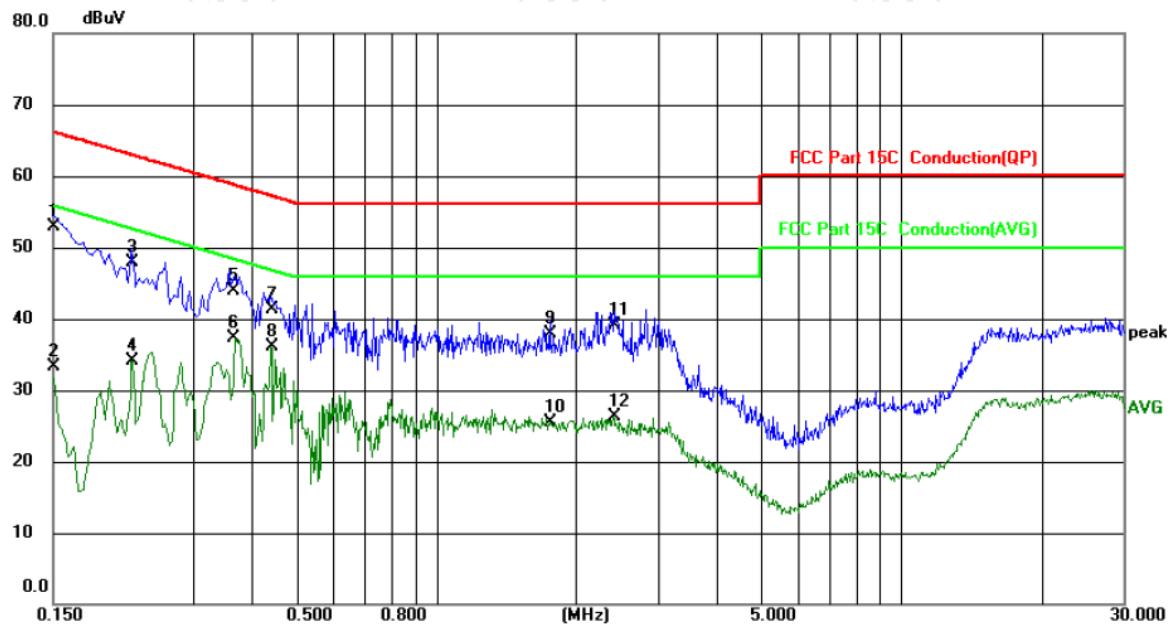
Margin (dB) = Measurement (dB $\mu$ V) - Limits (dB $\mu$ V)

QP. =Quasi-Peak

AVG =average

\* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Site				Phase: <i>N</i>	Temperature: 25 (C)			
Limit: FCC Part 15C Conduction(QP)				Power: AC 120V/60Hz	Humidity: 55 %RH			
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBμV	dB	dBμV	dB	Detector	Comment
1		0.1500	42.78	10.12	52.90	66.00	-13.10	QP
2		0.1500	23.12	10.12	33.24	56.00	-22.76	AVG
3		0.2220	37.83	10.13	47.96	62.74	-14.78	QP
4		0.2220	23.98	10.13	34.11	52.74	-18.63	AVG
5		0.3660	33.78	10.13	43.91	58.59	-14.68	QP
6		0.3660	27.25	10.13	37.38	48.59	-11.21	AVG
7		0.4420	31.15	10.13	41.28	57.02	-15.74	QP
8 *		0.4420	26.03	10.13	36.16	47.02	-10.86	AVG
9		1.7540	27.79	10.12	37.91	56.00	-18.09	QP
10		1.7540	15.46	10.12	25.58	46.00	-20.42	AVG
11		2.4180	28.94	10.12	39.06	56.00	-16.94	QP
12		2.4180	16.18	10.12	26.30	46.00	-19.70	AVG

**Note:**

Freq. = Emission frequency in MHz

Reading level (dB $\mu$ V) = Receiver reading

Corr. Factor (dB) = LISN factor + Cable loss

Measurement (dB $\mu$ V) = Reading level (dB $\mu$ V) + Corr. Factor (dB)

Limit (dB $\mu$ V) = Limit stated in standard

Margin (dB) = Measurement (dB $\mu$ V) - Limits (dB $\mu$ V)

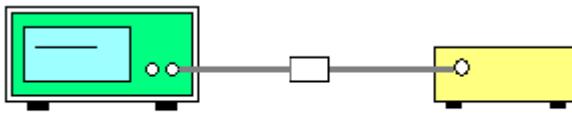
Q.P. =Quasi-Peak

AVG =average

\* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

### 6.3. Maximum Conducted (Average) Output Power

#### 6.3.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (b)(3)
<b>Test Method:</b>	KDB 558074 D01 v05r02, KDB662911 D01 v02r01
<b>Limit:</b>	30dBm
<b>Test Setup:</b>	
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>3. Measure the conducted output power and record the results in the test report.</li> </ol>
<b>Test Result:</b>	PASS

#### 6.3.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 11, 2021
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 11, 2021
Antenna Connector	TCT	RFC-01	N/A	Sep. 11, 2021

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 6.3.3. Test Data

Configuration IEEE 802.11b/ Antenna 0+Antenna 1				
Test channel	Maximum Conducted (Average) Output Power (dBm)		Limit (dBm)	Result
	Antenna 0	Antenna 1		
Lowest	13.60	12.78	30	PASS
Middle	14.20	13.36	30	PASS
Highest	13.75	12.73	30	PASS

Configuration IEEE 802.11g/ Antenna 0+Antenna 1				
Test channel	Maximum Conducted (Average) Output Power (dBm)		Limit (dBm)	Result
	Antenna 0	Antenna 1		
Lowest	13.78	12.70	30	PASS
Middle	14.68	13.06	30	PASS
Highest	13.82	12.53	30	PASS

Configuration IEEE 802.11n(H20)/ Antenna 0+Antenna 1					
Test channel	Maximum Conducted (Average) Output Power (dBm)			Limit (dBm)	Result
	Antenna 0	Antenna 1	Total		
Lowest	12.12	10.85	14.54	30	PASS
Middle	14.27	12.94	16.67	30	PASS
Highest	13.01	11.54	15.35	30	PASS

Configuration IEEE 802.11n(H40)/ Antenna 0+Antenna 1					
Test channel	Maximum Conducted (Average) Output Power (dBm)			Limit (dBm)	Result
	Antenna 0	Antenna 1	Total		
Lowest	11.92	11.03	14.51	30	PASS
Middle	14.64	13.12	16.96	30	PASS
Highest	12.80	11.10	15.04	30	PASS

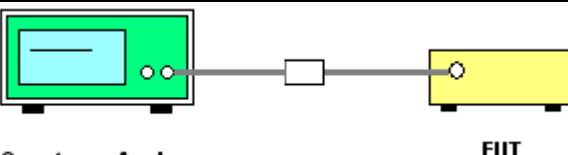
**Note:**  $G_{ANT} = 2.2\text{dBi}$ ,  $\text{Array Gain} = 10\log(N_{ANT}/NSS) = 3.01\text{dBi}$

**Directional Gain** =  $G_{ANT} + \text{Array Gain} = 5.21\text{dBi} < 6\text{dBi}$ , So limit=30dBm

Refer to Appendix A: Test Result of Conducted Test

## 6.4. Emission Bandwidth

### 6.4.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (a)(2)
<b>Test Method:</b>	KDB 558074 D01 v05r02
<b>Limit:</b>	>500kHz
<b>Test Setup:</b>	
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"><li>1. Set to the maximum power setting and enable the EUT transmit continuously.</li><li>2. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz.</li><li>3. Measure and record the results in the test report.</li></ol>
<b>Test Result:</b>	PASS

## 6.4.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 11, 2021
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 11, 2021
Antenna Connector	TCT	RFC-01	N/A	Sep. 11, 2021

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

## 6.5. Power Spectral Density

### 6.5.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (e)
<b>Test Method:</b>	KDB 558074
<b>Limit:</b>	The average power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.
<b>Test Setup:</b>	 <p style="text-align: center;"><b>Spectrum Analyzer</b>                                    <b>EUT</b></p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): <math>3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}</math>. Video bandwidth <math>\text{VBW} \geq 3 \times \text{RBW}</math>. Set the span to at least 1.5 times the OBW.</li> <li>4. Detector = RMS, Sweep time = auto couple.</li> <li>5. Employ trace averaging (RMS) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level.</li> <li>6. Measure and record the results in the test report.</li> </ol>
<b>Test Result:</b>	PASS

## 6.5.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 11, 2021
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 11, 2021
Antenna Connector	TCT	RFC-01	N/A	Sep. 11, 2021

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI)

6.5.3. Test data

Configuration IEEE 802.11b/ Antenna 0, Antenna 1

Test channel	AVG Power Spectral Density (dBm/3kHz)		Limit (dBm/3kHz)	Result
	Antenna 0	Antenna 1		
Lowest	-12.97	-14.82	8	PASS
Middle	-12.45	-14.08	8	PASS
Highest	-13.01	-13.96	8	PASS

Configuration IEEE 802.11g/ Antenna 0, Antenna 1

Test channel	AVG Power Spectral Density (dBm/3kHz)		Limit (dBm/3kHz)	Result
	Antenna 0	Antenna 1		
Lowest	-12.98	-15.52	8	PASS
Middle	-13.08	-15.11	8	PASS
Highest	-13.70	-15.25	8	PASS

Configuration IEEE 802.11n (HT20)/ Antenna 0, Antenna 1

Test channel	AVG Power Spectral Density (dBm/3kHz)			Limit (dBm/3kHz)	Result
	Antenna 0	Antenna 1	Total		
Lowest	-15.26	-17.20	-13.11	8	PASS
Middle	-12.85	-15.83	-11.08	8	PASS
Highest	-14.03	-17.16	-12.31	8	PASS

Configuration IEEE 802.11n (HT40)/ Antenna 0, Antenna 1

Test channel	AVG Power Spectral Density (dBm/3kHz)			Limit (dBm/3kHz)	Result
	Antenna 0	Antenna 1	Total		
Lowest	-15.92	-20.71	-14.68	8	PASS
Middle	-14.69	-18.48	-13.17	8	PASS
Highest	-16.03	-20.37	-14.67	8	PASS

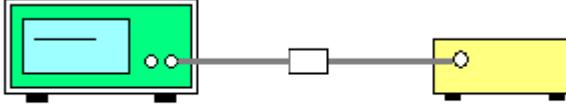
**Note:**  $G_{ANT} = 2.2\text{dBi}$ , Array Gain=  $10\log(NANT/NSS) = 3.01\text{dBi}$

Directional Gain=  $G_{ANT} + \text{Array Gain} = 5.21\text{dBi} < 6\text{dBi}$ , So limit=8dBm/3kHz

Refer to Appendix A: Test Result of Conducted Test

## 6.6. Conducted Band Edge and Spurious Emission Measurement

### 6.6.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (d)
<b>Test Method:</b>	KDB558074
<b>Limit:</b>	In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).
<b>Test Setup:</b>	 <p style="text-align: center;"><b>Spectrum Analyzer</b>    <b>EUT</b></p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>3. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).</li> <li>4. Measure and record the results in the test report.</li> <li>5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</li> </ol>
<b>Test Result:</b>	PASS

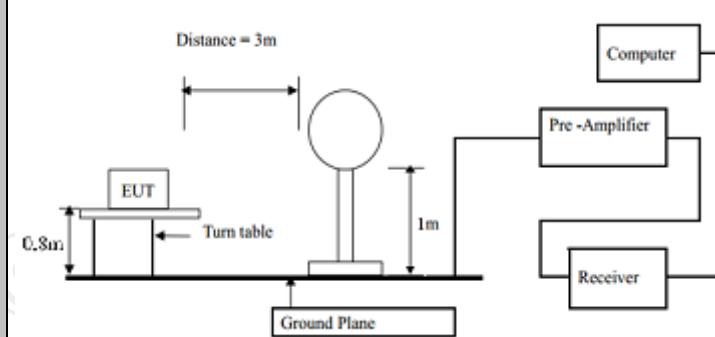
**6.6.2. Test Instruments**

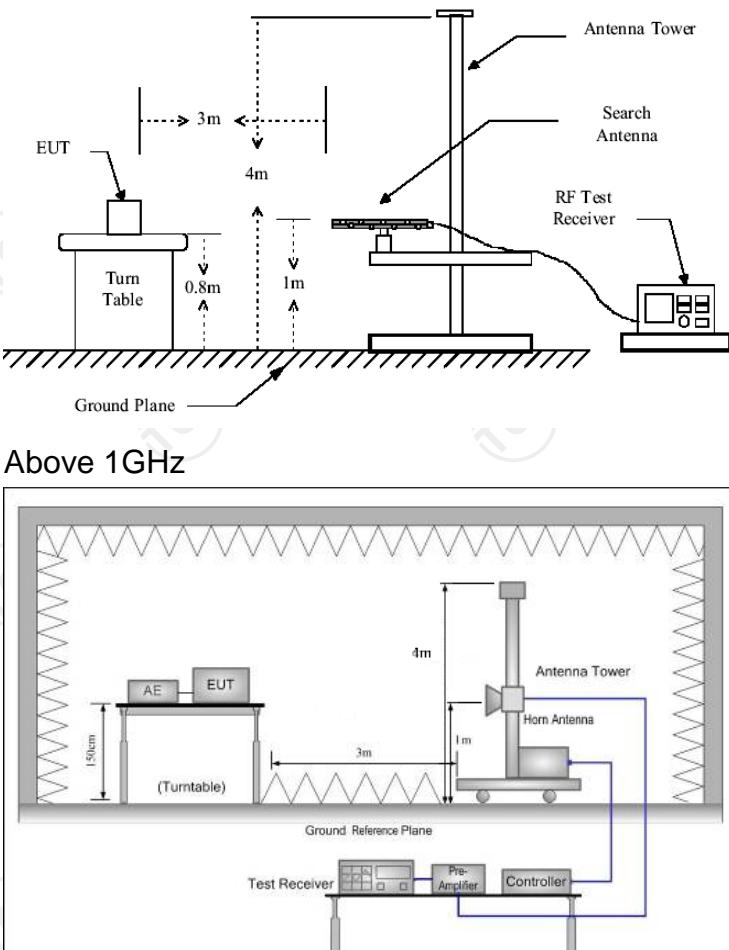
RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 11, 2021
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 11, 2021
Antenna Connector	TCT	RFC-01	N/A	Sep. 11, 2021

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

## 6.7. Radiated Spurious Emission Measurement

### 6.7.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.209						
<b>Test Method:</b>	ANSI C63.10: 2013						
<b>Frequency Range:</b>	9 kHz to 25 GHz						
<b>Measurement Distance:</b>	3 m						
<b>Antenna Polarization:</b>	Horizontal & Vertical						
<b>Operation mode:</b>	Transmitting mode with modulation						
<b>Receiver Setup:</b>	Frequency	Detector	RBW	VBW	Remark		
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value		
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value		
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value		
	Above 1GHz	Peak	1MHz	3MHz	Peak Value		
		Peak	1MHz	10Hz	Average Value		
<b>Limit:</b>	Frequency	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	30		30			
	30-88	100		3			
	88-216	150		3			
	216-960	200		3			
	Above 960	500		3			
	Frequency	Field Strength (microvolts/meter)		Measurement Distance (meters)	Detector		
	Above 1GHz	500		3	Average		
		5000		3	Peak		
<b>Test setup:</b>	For radiated emissions below 30MHz						
							
	30MHz to 1GHz						



### Test Procedure:

1. For the radiated emission test below 1GHz:  
 The EUT was placed on a turntable with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.  
 For the radiated emission test above 1GHz:  
 Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final

	<p>measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.</p> <p>3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level</p> <p>4. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.</p> <p>5. Use the following spectrum analyzer settings:</p> <ul style="list-style-type: none"><li>(1) Span shall wide enough to fully capture the emission being measured;</li><li>(2) Set RBW=120 kHz for <math>f &lt; 1</math> GHz; VBW <math>\geq</math> RBW; Sweep = auto; Detector function = peak; Trace = max hold;</li><li>(3) Set RBW = 1 MHz, VBW= 3MHz for <math>f &gt; 1</math> GHz for peak measurement.</li></ul> <p>For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW <math>\geq 1/T</math>, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.</p>
<b>Test results:</b>	PASS

### 6.7.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	ROHDE&SCHW ARZ	ESIB7	100197	Jul. 27, 2021
Spectrum Analyzer	ROHDE&SCHW ARZ	FSQ40	200061	Sep. 11, 2021
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 02, 2021
Pre-amplifier	HP	8447D	2727A05017	Sep. 02, 2021
Loop antenna	ZHINAN	ZN30900A	12024	Oct. 27, 2020
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 04, 2022
Horn Antenna	A-INFO	LB-180400-KF	J211020657	Sep. 04, 2022
Antenna Mast	Keleto	RE-AM	N/A	N/A
Line-4	RE-high-04	TCT	N/A	Sep. 02, 2021
Line-8	RE-01	TCT	N/A	Jul. 27, 2021
EMI Test Software	Shurples Technology	EZ-EMC	N/A	N/A

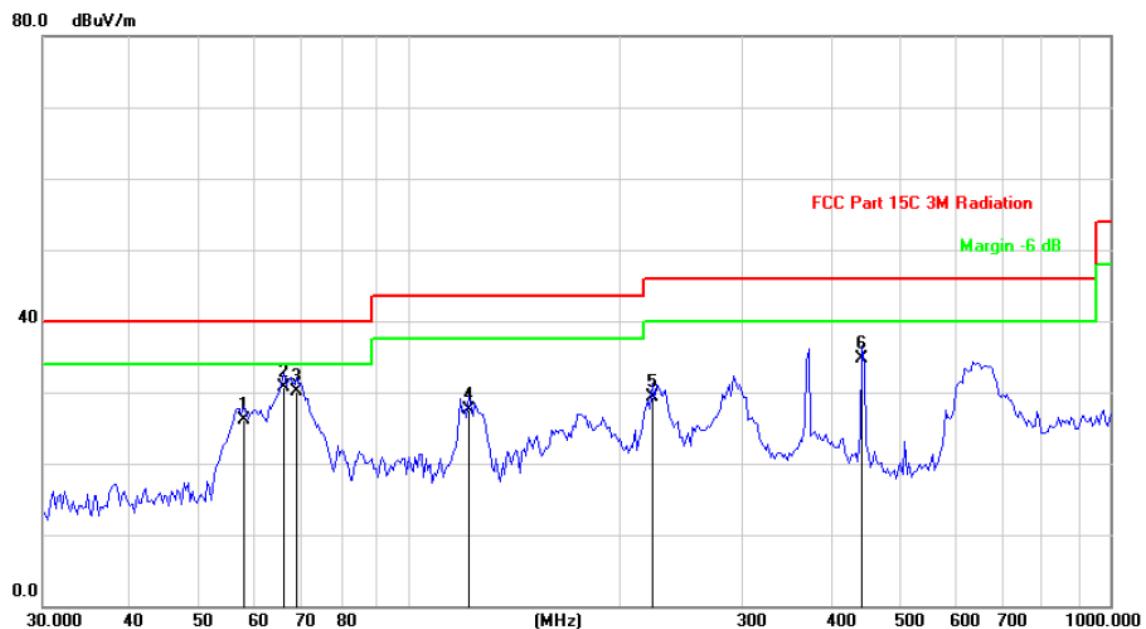
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 6.7.3. Test Data

Please refer to following diagram for individual

Below 1GHz

Horizontal:



Site

Polarization: *Horizontal*

Temperature: 25

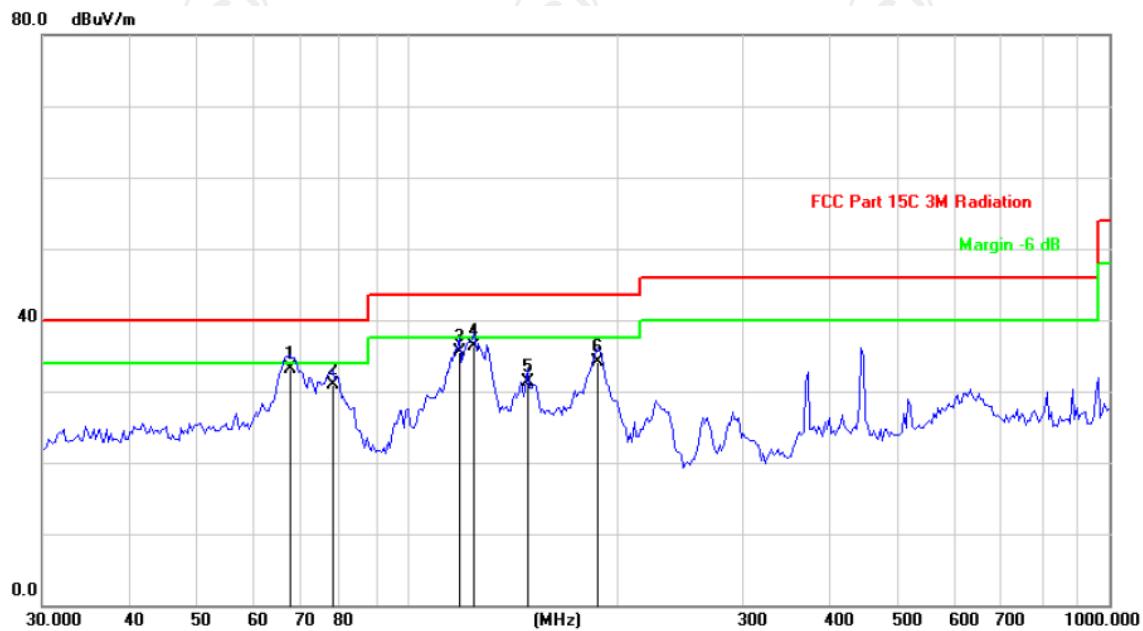
Limit: FCC Part 15C 3M Radiation

Power: AC 120V/60Hz

Humidity: 55 %

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		58.0758	38.03	-11.92	26.11	40.00	-13.89	QP
2	*	66.3713	45.08	-14.45	30.63	40.00	-9.37	QP
3		69.2296	45.55	-15.39	30.16	40.00	-9.84	QP
4		121.4621	39.56	-12.11	27.45	43.50	-16.05	QP
5		222.2803	42.67	-13.37	29.30	46.00	-16.70	QP
6		442.5722	43.07	-8.42	34.65	46.00	-11.35	QP

Vertical:



Site	Polarization: <b>Vertical</b>	Temperature: 25
Limit: FCC Part 15C 3M Radiation		Power: AC 120V/60Hz
		Humidity: 55 %

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	67.7856	48.04	-14.92	33.12	40.00	-6.88	QP
2		78.0143	47.44	-16.49	30.95	40.00	-9.05	QP
3		118.0956	46.52	-11.03	35.49	43.50	-8.01	QP
4		124.0501	49.37	-13.11	36.26	43.50	-7.24	QP
5		147.8745	47.49	-16.22	31.27	43.50	-12.23	QP
6		186.4684	48.68	-14.61	34.07	43.50	-9.43	QP

**Note:** 1. The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported

2. Measurements were conducted in all three channels (high, middle, low) and all modulation(802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40) ), and the worst case Mode (Middle channel and 802.11 n(HT40)) was submitted only.

3. Freq. = Emission frequency in MHz

Measurement (dB $\mu$ V/m) = Reading level (dB $\mu$ V) + Corr. Factor (dB)

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

Limit (dB $\mu$ V/m) = Limit stated in standard

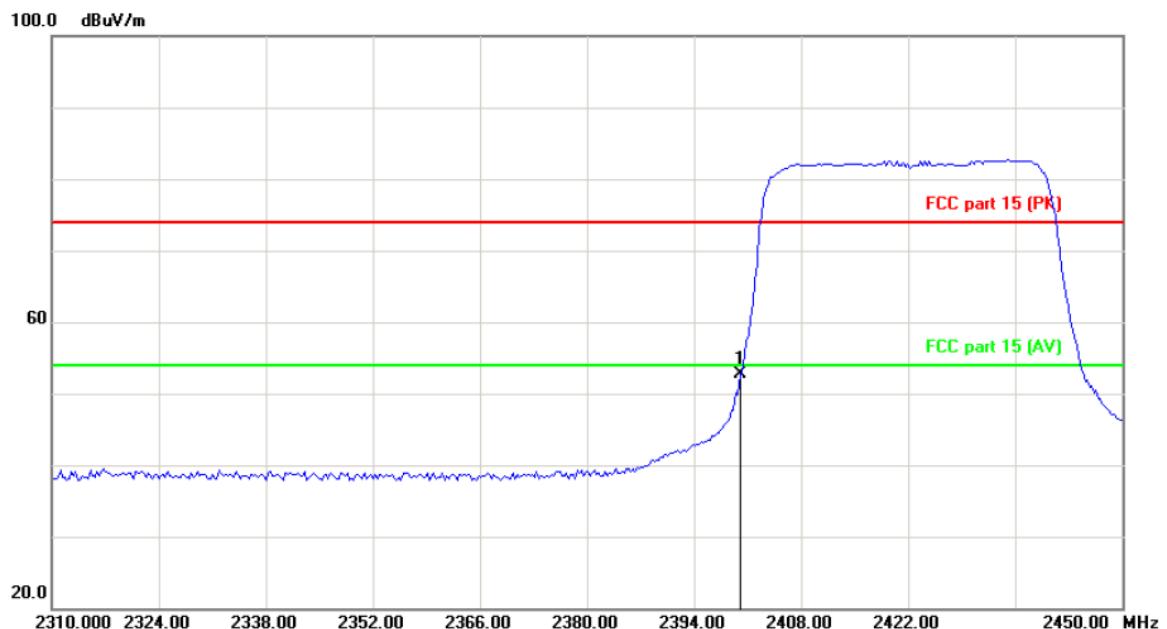
Margin (dB) = Measurement (dB $\mu$ V/m) – Limits (dB $\mu$ V/m)

\* is meaning the worst frequency has been tested in the test frequency range

Test Result of Radiated Spurious at Band edges

Lowest channel 2422:

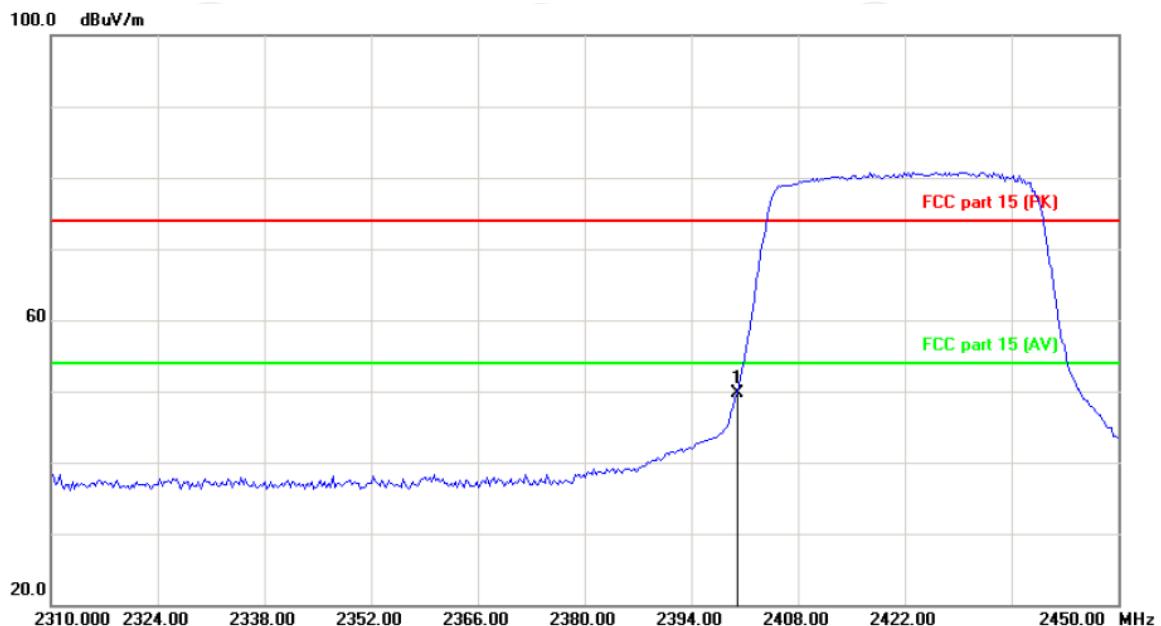
Horizontal:



Site Polarization: **Horizontal** Temperature: 25  
Limit: FCC part 15 (PK) Power: Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over
		MHz	dBuV	dB	dBuV/m	dB/m	dB
1	*	2400.000	65.89	-13.12	52.77	74.00	-21.23 peak

Vertical:

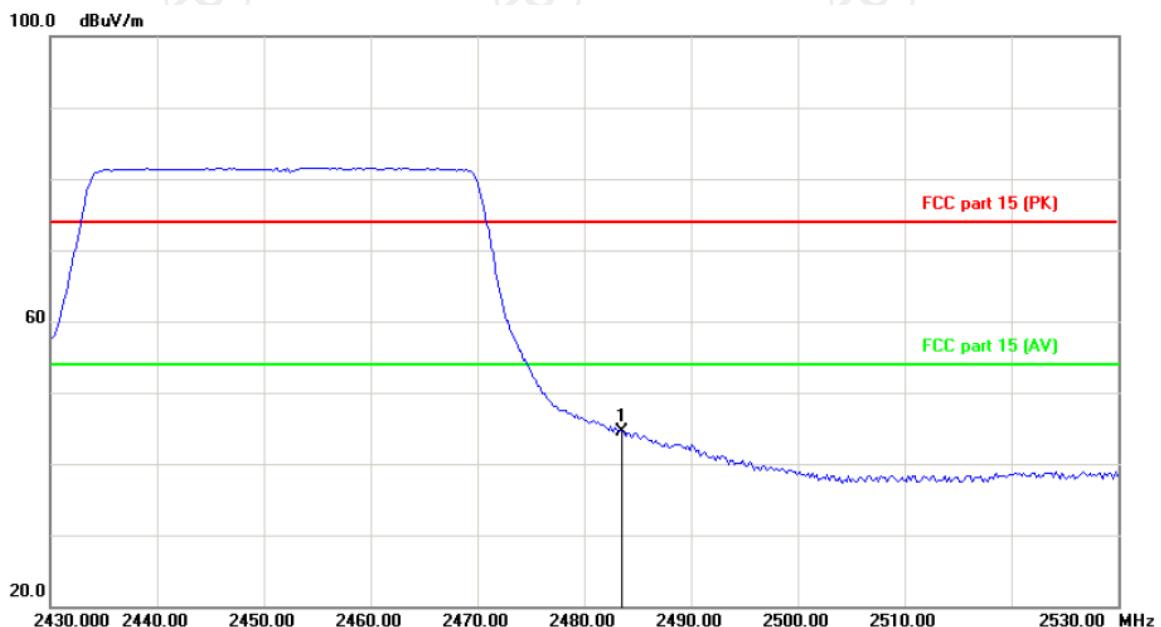


Site: Polarization: **Vertical** Temperature: 25  
 Limit: FCC part 15 (PK) Power: Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over
		MHz	dBuV	dB	dBuV/m	dB/m	dB
1	*	2400.000	62.74	-13.12	49.62	74.00	-24.38 peak

Highest channel 2452:

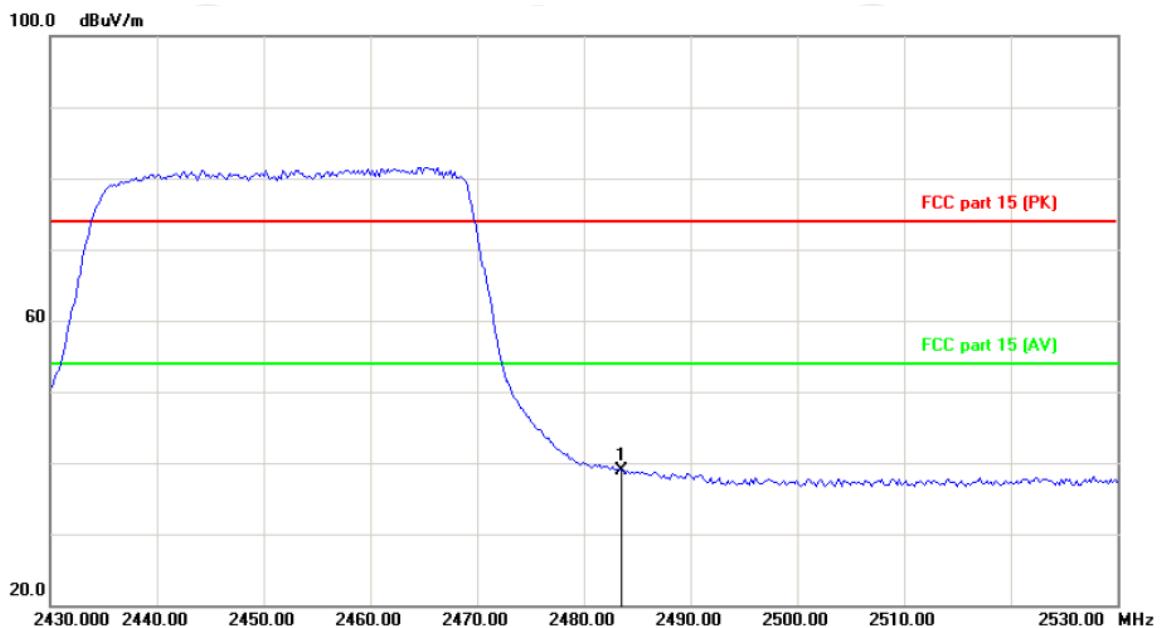
Horizontal:



Site: Polarization: *Horizontal* Temperature: 25  
Limit: FCC part 15 (PK) Power: Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	2483.500	57.27	-12.74	44.53	74.00	-29.47	peak

Vertical:



Site Polarization: **Vertical** Temperature: 25  
Limit: FCC part 15 (PK) Power: Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over
		MHz	dBuV	dB	dBuV/m	dB/m	dB
1	*	2483.500	51.67	-12.74	38.93	74.00	-35.07 peak

**Note:**

1. Peak Final Emission Level=Peak Reading + Correction Factor;
2. Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
3. Measurements were conducted in all modulation(802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40) ), and the worst case (802.11n(HT40) in MIMO mode was submitted only.

**Test Result of Radiated Spurious at harmonic frequencies**

Modulation Type: 802.11b

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4824	H	46.76	---	0.75	47.51	---	74	54	-6.49
7236	H	36.59	---	9.87	46.46	---	74	54	-7.54
---	H	---	---	---	---	---	---	---	---
4824	V	44.21	---	0.75	44.96	---	74	54	-9.04
7236	V	34.70	---	9.87	44.57	---	74	54	-9.43
---	V	---	---	---	---	---	---	---	---

Middle channel: 2437MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4874	H	45.94	---	0.97	46.91	---	74	54	-7.09
7311	H	34.20	---	9.83	44.03	---	74	54	-9.97
---	H	---	---	---	---	---	---	---	---
4874	V	48.36	---	0.97	49.33	---	74	54	-4.67
7311	V	36.54	---	9.83	46.37	---	74	54	-7.63
---	V	---	---	---	---	---	---	---	---

High channel: 2462 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4924	H	45.30	---	1.18	46.48	---	74	54	-7.52
7386	H	33.77	---	10.07	43.84	---	74	54	-10.16
---	H	---	---	---	---	---	---	---	---
4924	V	47.36	---	1.18	48.54	---	74	54	-5.46
7386	V	38.14	---	10.07	48.21	---	74	54	-5.79
---	V	---	---	---	---	---	---	---	---

**Note:**

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dB $\mu$ V/m)-Average limit (dB $\mu$ V/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
5. Data of measurement shown “---” in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
6. 802.11b is SISO mode and the worst case Antenna (ANT0) was submitted only.

Modulation Type: 802.11g

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4824	H	44.98	---	0.75	45.73	---	74	54	-8.27
7236	H	33.40	---	9.87	43.27	---	74	54	-10.73
---	H	---	---	---	---	---	---	---	---
4824	V	46.39	---	0.75	47.14	---	74	54	-6.86
7236	V	34.72	---	9.87	44.59	---	74	54	-9.41
---	V	---	---	---	---	---	---	---	---

Middle channel: 2437MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4874	H	44.05	---	0.97	45.02	---	74	54	-8.98
7311	H	34.82	---	9.83	44.65	---	74	54	-9.35
---	H	---	---	---	---	---	---	---	---
4874	V	46.51	---	0.97	47.48	---	74	54	-6.52
7311	V	37.89	---	9.83	47.72	---	74	54	-6.28
---	V	---	---	---	---	---	---	---	---

High channel: 2462 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4924	H	43.23	---	1.18	44.41	---	74	54	-9.59
7386	H	33.66	---	10.07	43.73	---	74	54	-10.27
---	H	---	---	---	---	---	---	---	---
4924	V	46.15	---	1.18	47.33	---	74	54	-6.67
7386	V	36.07	---	10.07	46.14	---	74	54	-7.86
---	V	---	---	---	---	---	---	---	---

**Note:**

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dB $\mu$ V/m)-Average limit (dB $\mu$ V/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
5. Data of measurement shown “---”in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
6. 802.11g is S/ISO mode and the worst case Antenna (ANT0) was submitted only.

Modulation Type: 802.11n (HT20)

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4824	H	43.86	---	0.75	44.61	---	74	54	-9.39
7236	H	34.90	---	9.87	44.77	---	74	54	-9.23
---	H	---	---	---	---	---	---	---	---
4824	V	44.44	---	0.75	45.19	---	74	54	-8.81
7236	V	33.57	---	9.87	43.44	---	74	54	-10.56
---	V	---	---	---	---	---	---	---	---

Middle channel: 2437MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4874	H	45.55	---	0.97	46.52	---	74	54	-7.48
7311	H	34.96	---	9.83	44.79	---	74	54	-9.21
---	H	---	---	---	---	---	---	---	---
4874	V	44.52	---	0.97	45.49	---	74	54	-8.51
7311	V	35.80	---	9.83	45.63	---	74	54	-8.37
---	V	---	---	---	---	---	---	---	---

High channel: 2462 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4924	H	43.30	---	1.18	44.48	---	74	54	-9.52
7386	H	33.66	---	10.07	43.73	---	74	54	-10.27
---	H	---	---	---	---	---	---	---	---
4924	V	45.16	---	1.18	46.34	---	74	54	-7.66
7386	V	35.94	---	10.07	46.01	---	74	54	-7.99
---	V	---	---	---	---	---	---	---	---

**Note:**

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dB $\mu$ V/m)-Average limit (dB $\mu$ V/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
5. Data of measurement shown “---” in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
6. 802.11n(HT20) is MIMO mode.

Modulation Type: 802.11n (HT40)

Low channel: 2422 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4844	H	46.74	---	0.75	47.49	---	74	54	-6.51
7266	H	34.50	---	9.87	44.37	---	74	54	-9.63
---	H	---	---	---	---	---	---	---	---
4824	V	43.38	---	0.75	44.13	---	74	54	-9.87
7236	V	33.61	---	9.87	43.48	---	74	54	-10.52
---	V	---	---	---	---	---	---	---	---

Middle channel: 2437MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4874	H	44.47	---	0.97	45.44	---	74	54	-8.56
7311	H	35.08	---	9.83	44.91	---	74	54	-9.09
---	H	---	---	---	---	---	---	---	---
4874	V	44.05	---	0.97	45.02	---	74	54	-8.98
7311	V	34.61	---	9.83	44.44	---	74	54	-9.56
---	V	---	---	---	---	---	---	---	---

High channel: 2452 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
4904	H	43.36	---	1.18	44.54	---	74	54	-9.46
7356	H	32.77	---	10.07	42.84	---	74	54	-11.16
---	H	---	---	---	---	---	---	---	---
4904	V	44.79	---	1.18	45.97	---	74	54	-8.03
7356	V	36.01	---	10.07	46.08	---	74	54	-7.92
---	V	---	---	---	---	---	---	---	---

**Note:**

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dB $\mu$ V/m)-Average limit (dB $\mu$ V/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
5. Data of measurement shown “---” in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
6. 802.11n(HT40) is MIMO mode.

## Appendix A: Test Result of Conducted Test

Antenna0:

### DTS Bandwidth

#### Test Result

Test Mode	Channel	DTS BW [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
11B	2412	10.160	2406.920	2417.080	0.5	PASS
	2437	10.120	2431.920	2442.040	0.5	PASS
	2462	9.240	2457.360	2466.600	0.5	PASS
11G	2412	16.120	2404.040	2420.160	0.5	PASS
	2437	16.400	2428.800	2445.200	0.5	PASS
	2462	16.400	2453.800	2470.200	0.5	PASS
11N20SISO	2412	17.120	2403.440	2420.560	0.5	PASS
	2437	16.960	2428.560	2445.520	0.5	PASS
	2462	16.760	2453.560	2470.320	0.5	PASS
11N40SISO	2422	35.200	2404.400	2439.600	0.5	PASS
	2437	34.640	2419.320	2453.960	0.5	PASS
	2452	34.880	2434.320	2469.200	0.5	PASS

#### Test Graphs

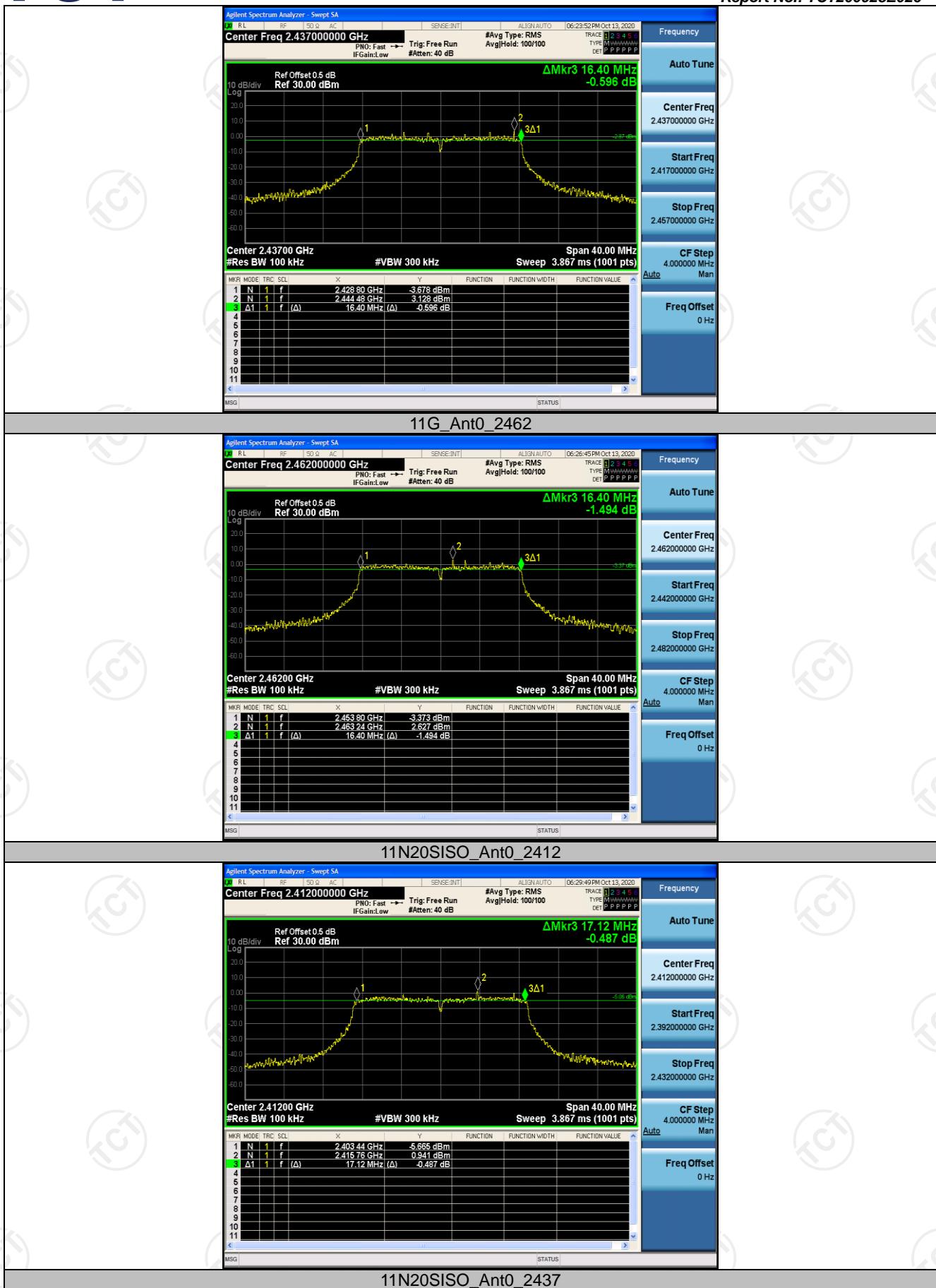


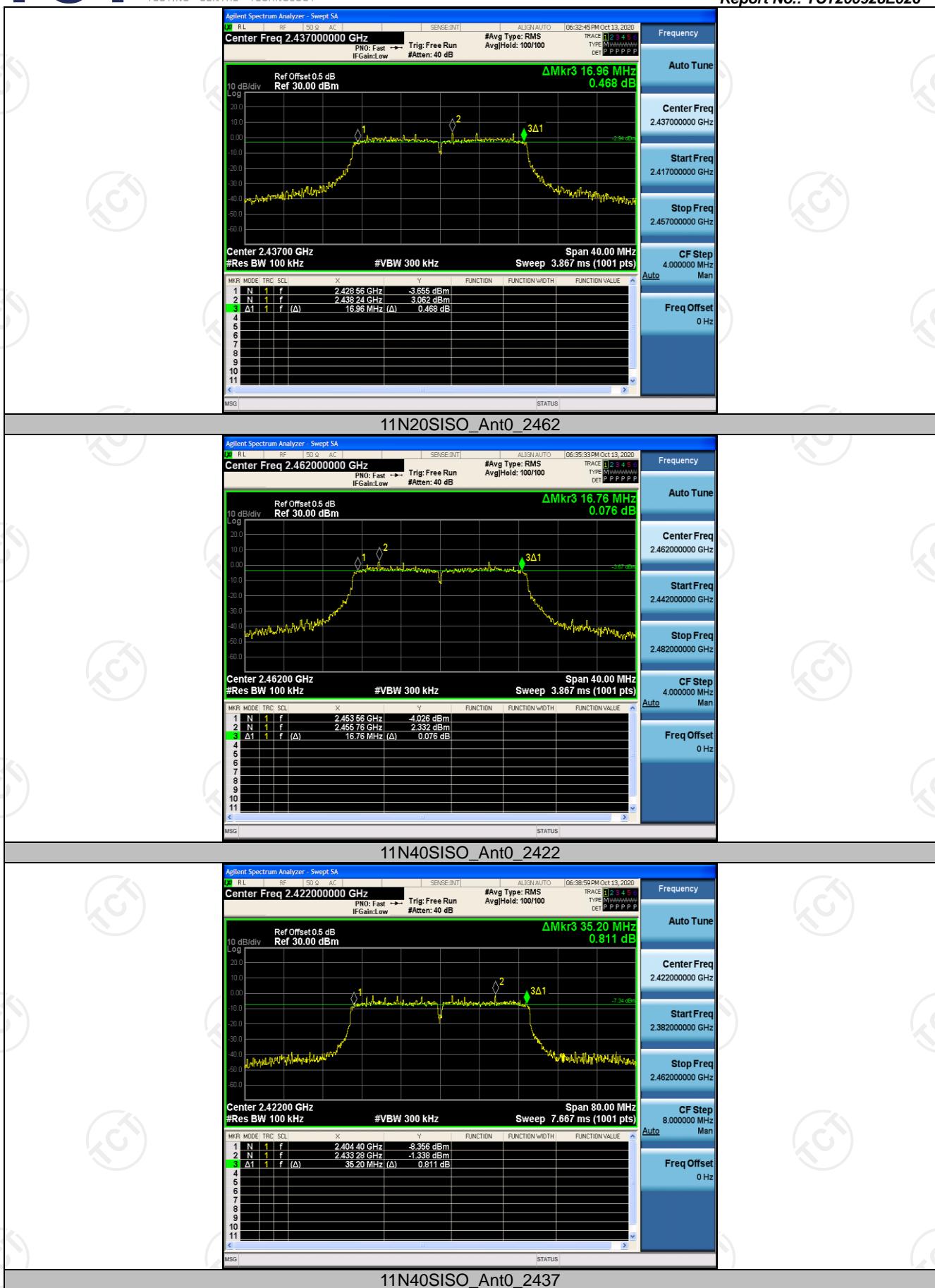


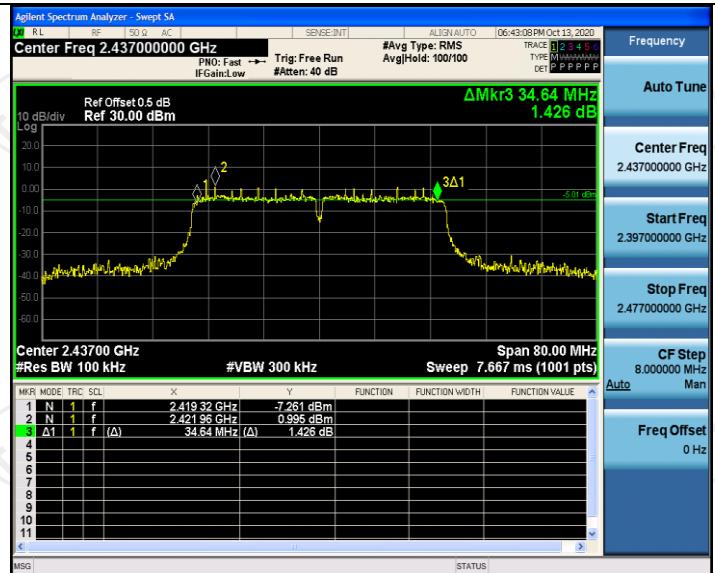
11G\_Ant0\_2412



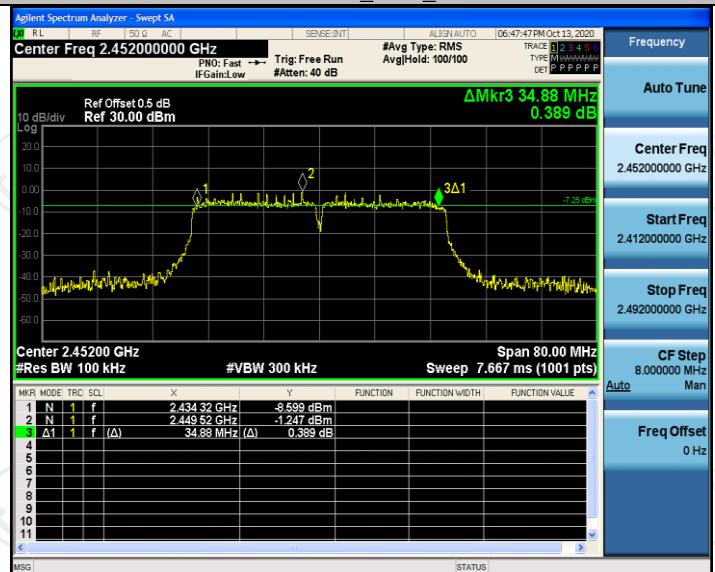
11G\_Ant0\_2437







11N40SISO\_Ant0\_2452



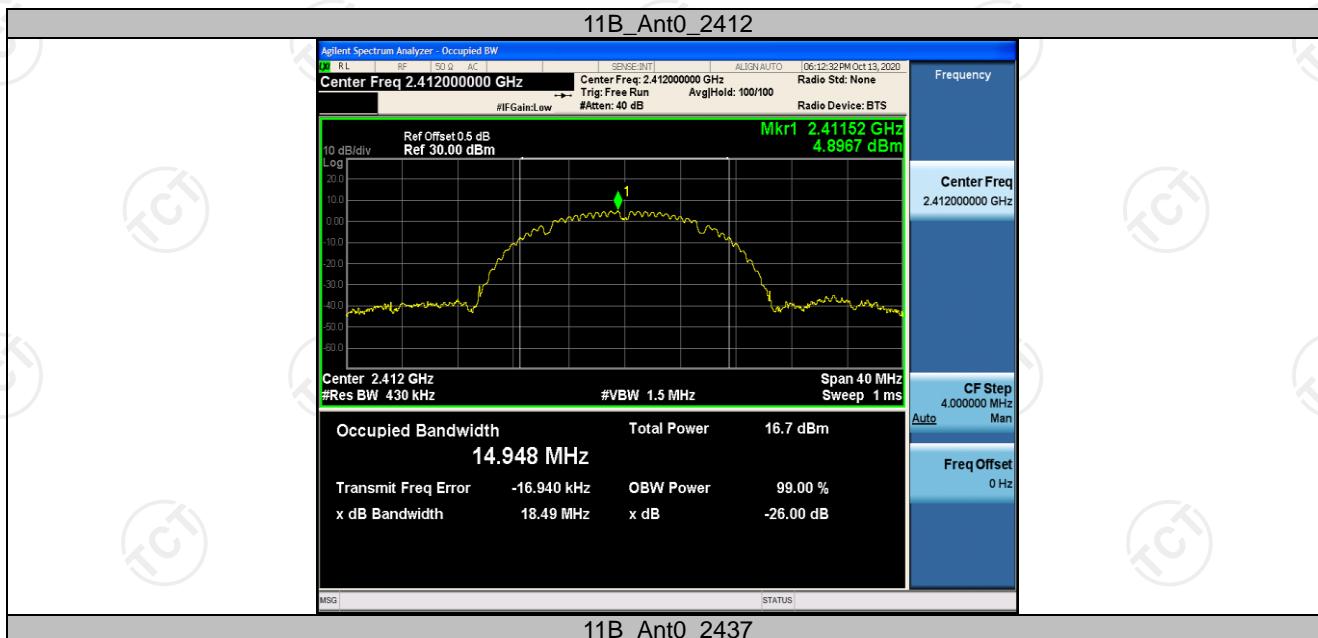
Digitized by srujanika@gmail.com

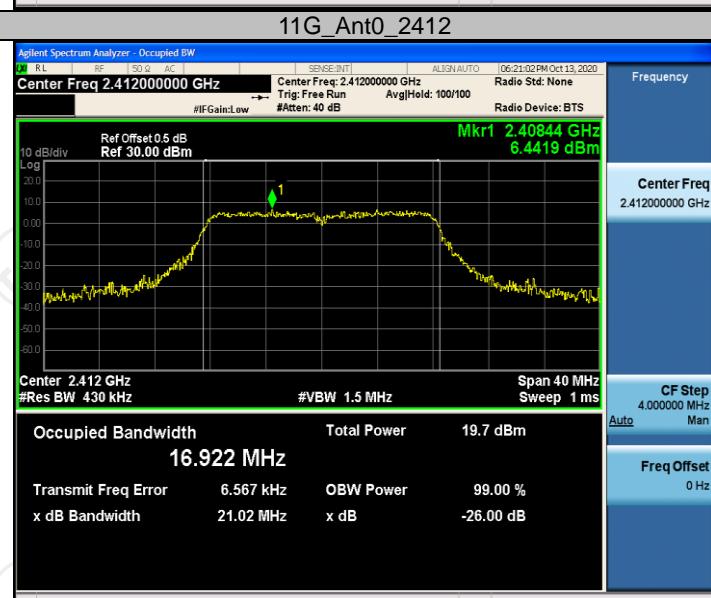
## Occupied Channel Bandwidth

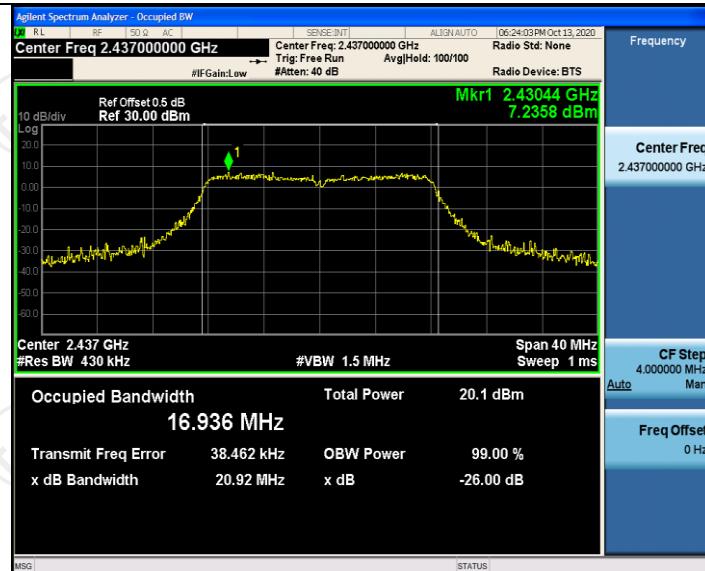
### Test Result

Test Mode	Channel	OCB [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
11B	2412	14.948	2404.509	2419.457	---	PASS
	2437	14.920	2429.501	2444.421	---	PASS
	2462	14.957	2454.463	2469.420	---	PASS
11G	2412	16.922	2403.546	2420.468	---	PASS
	2437	16.936	2428.570	2445.506	---	PASS
	2462	16.856	2453.572	2470.428	---	PASS
11N20SISO	2412	17.820	2403.075	2420.895	---	PASS
	2437	17.818	2428.094	2445.912	---	PASS
	2462	17.821	2453.068	2470.889	---	PASS
11N40SISO	2422	36.316	2403.891	2440.207	---	PASS
	2437	36.225	2418.807	2455.032	---	PASS
	2452	36.196	2433.834	2470.030	---	PASS

### Test Graphs



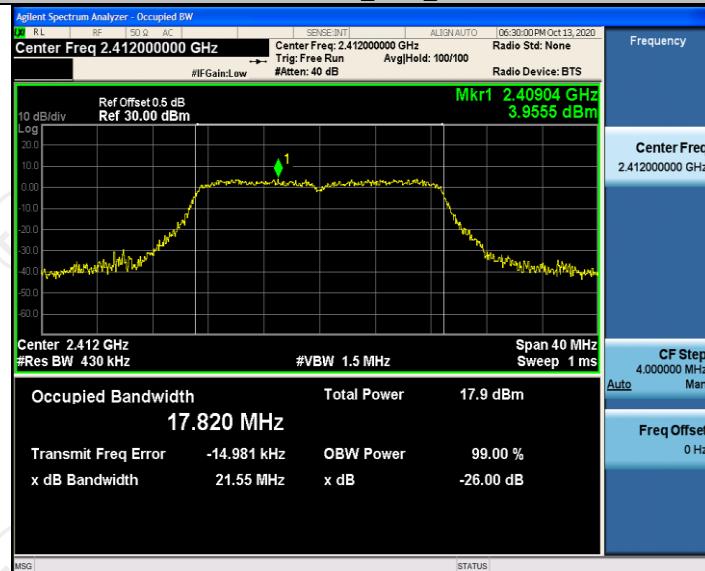




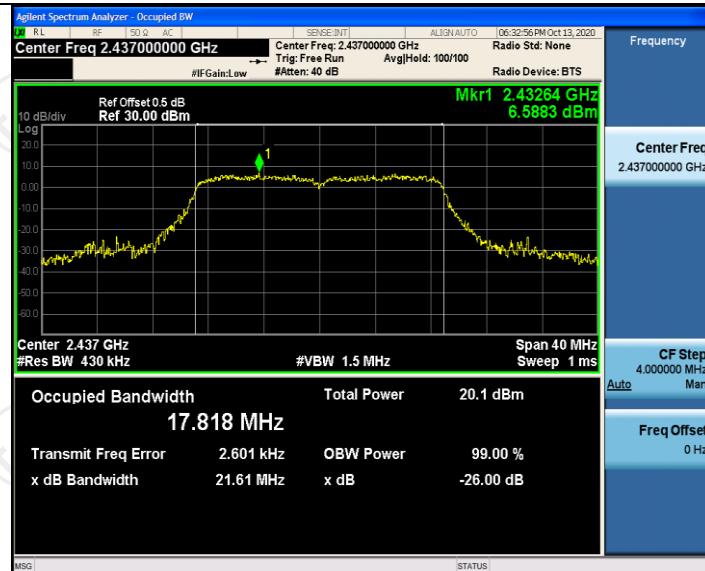
11G\_Ant0\_2462



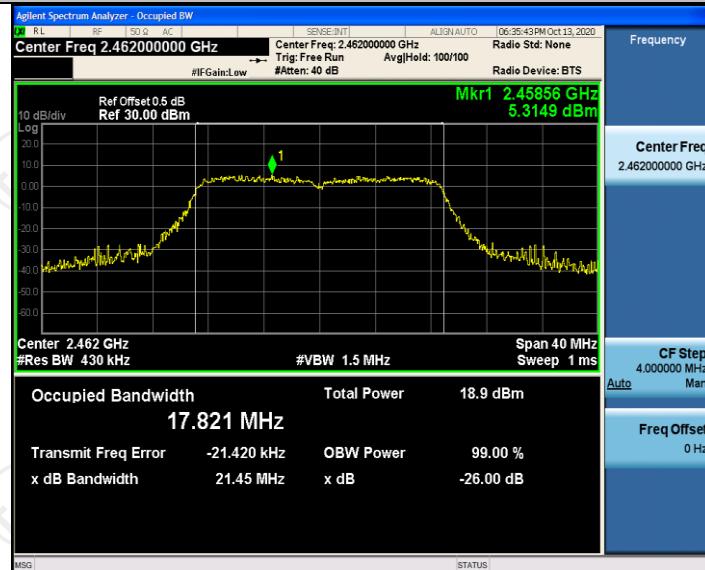
11N20SISO\_Ant0\_2412



11N20SISO\_Ant0\_2437



## 11N20SISO\_Ant0\_2462



## 11N40SISO\_Ant0\_2422



## 11N40SISO\_Ant0\_2437

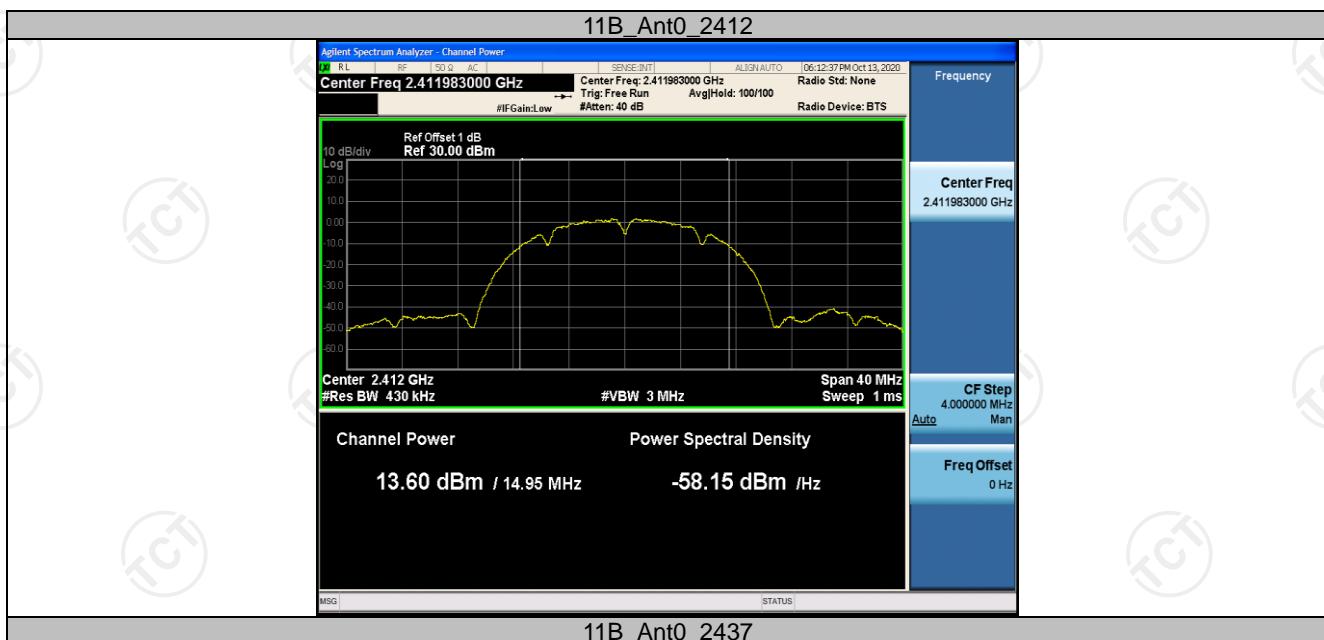


## Maximum conducted output power

### Test Result

Test Mode	Channel	Result [dBm]	Limit [dBm]	Verdict
11B	2412	13.60	<=30	PASS
	2437	14.20	<=30	PASS
	2462	13.75	<=30	PASS
11G	2412	13.78	<=30	PASS
	2437	14.68	<=30	PASS
	2462	13.82	<=30	PASS
11N20SISO	2412	12.12	<=30	PASS
	2437	14.27	<=30	PASS
	2462	13.01	<=30	PASS
11N40SISO	2422	11.92	<=30	PASS
	2437	14.64	<=30	PASS
	2452	12.80	<=30	PASS

### Test Graphs





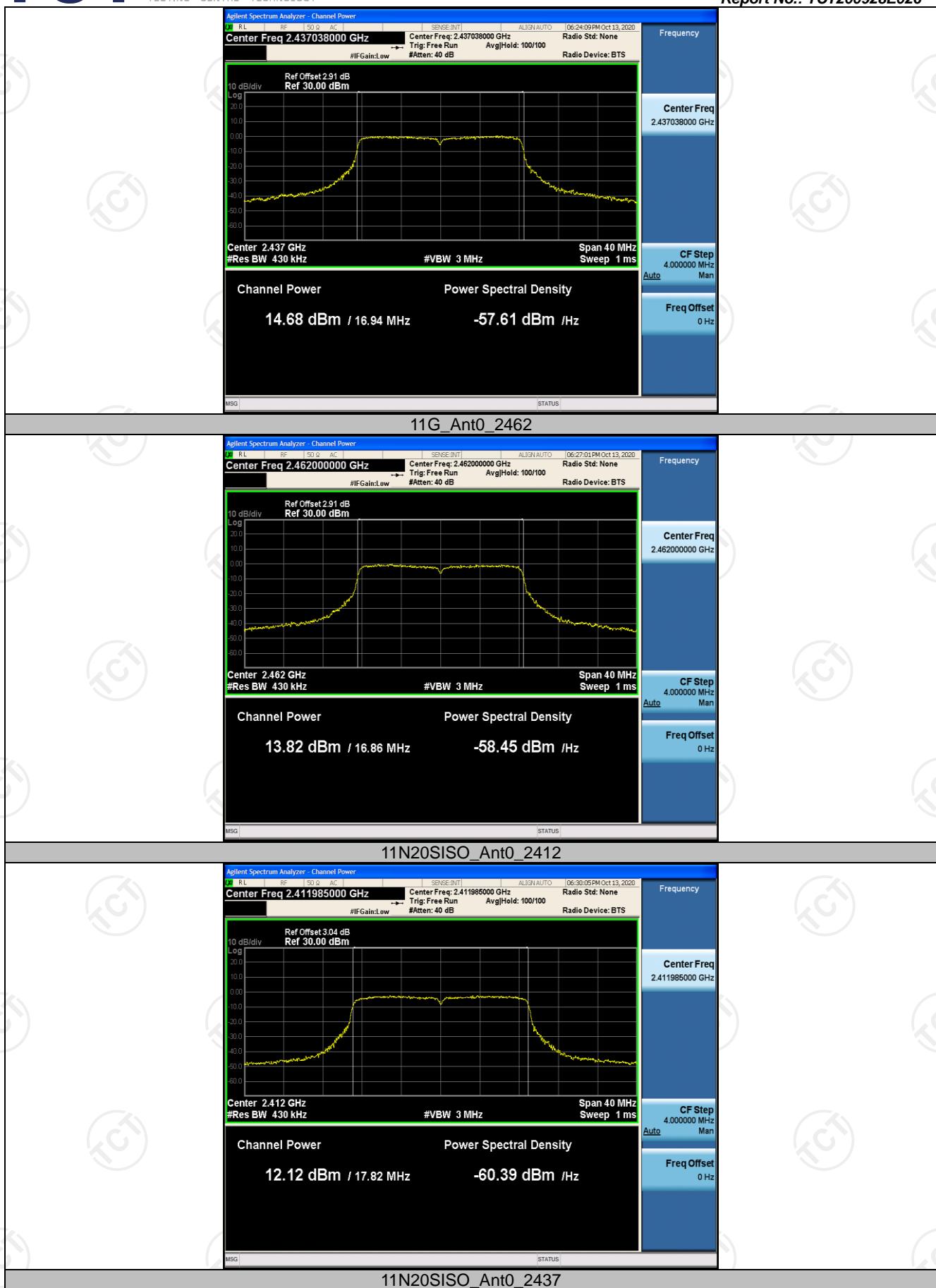
11B\_Ant0\_2462

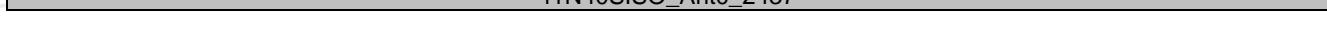
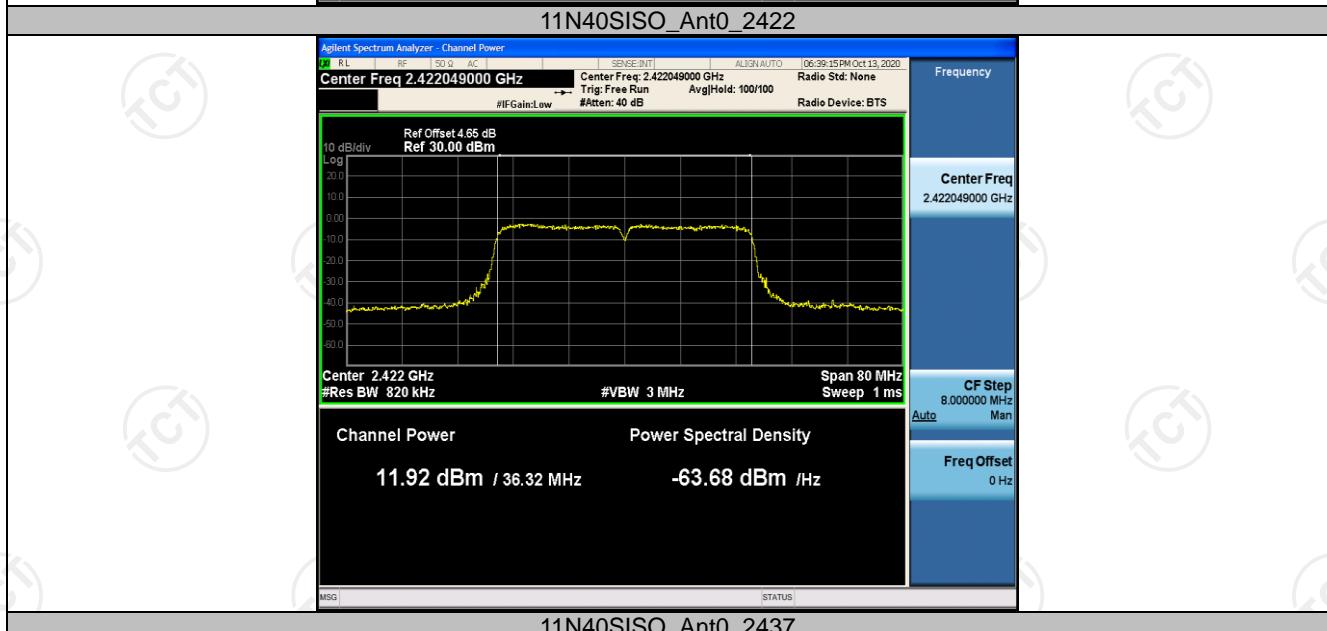
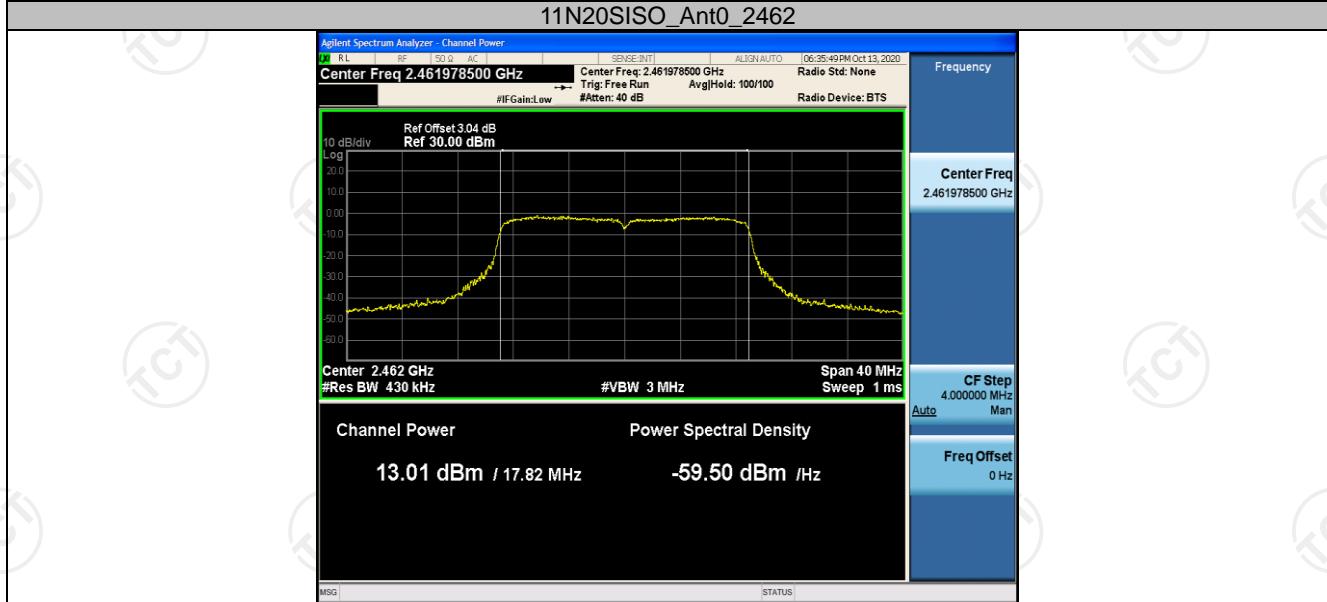
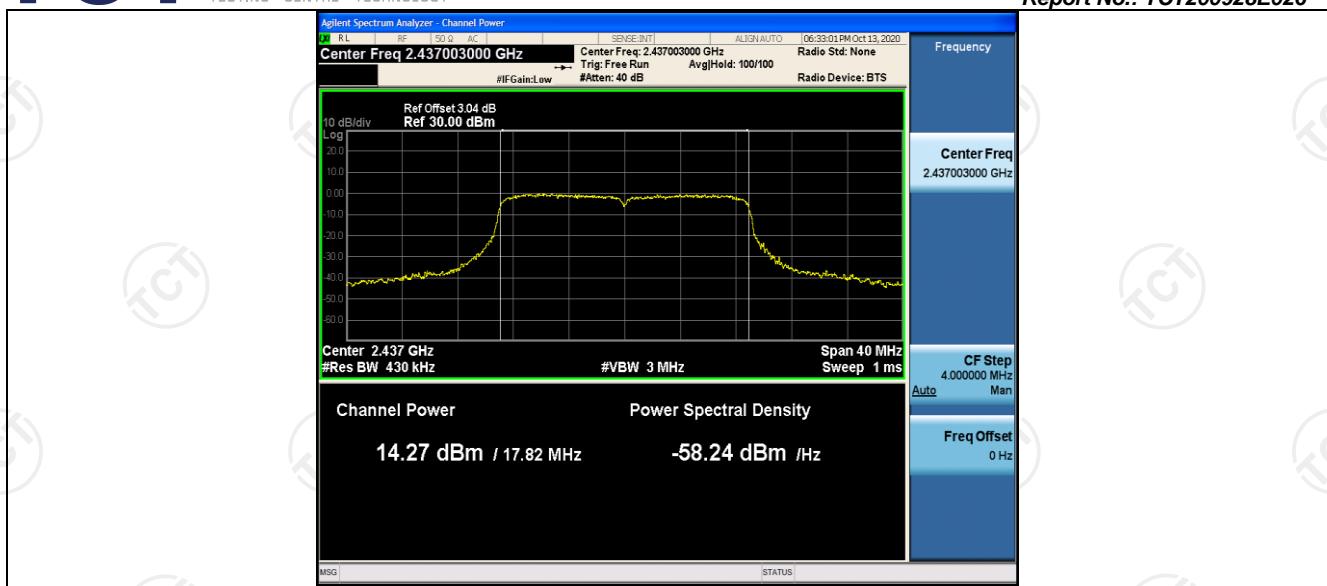


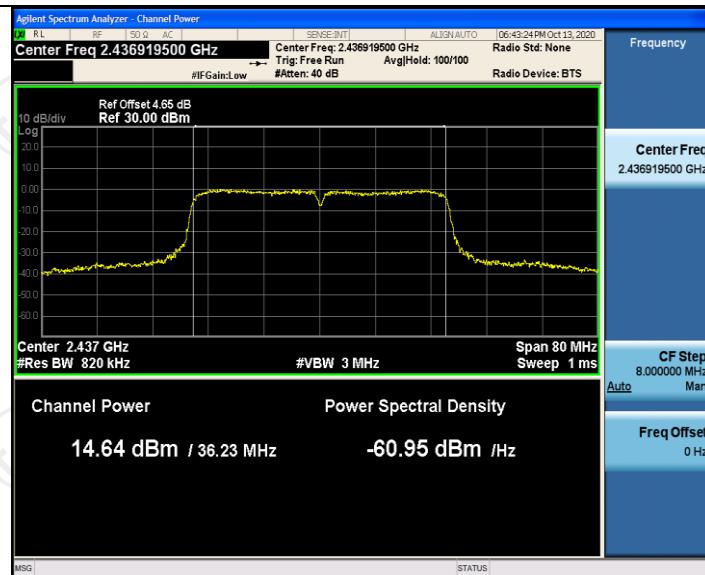
11B\_Ant0\_2462



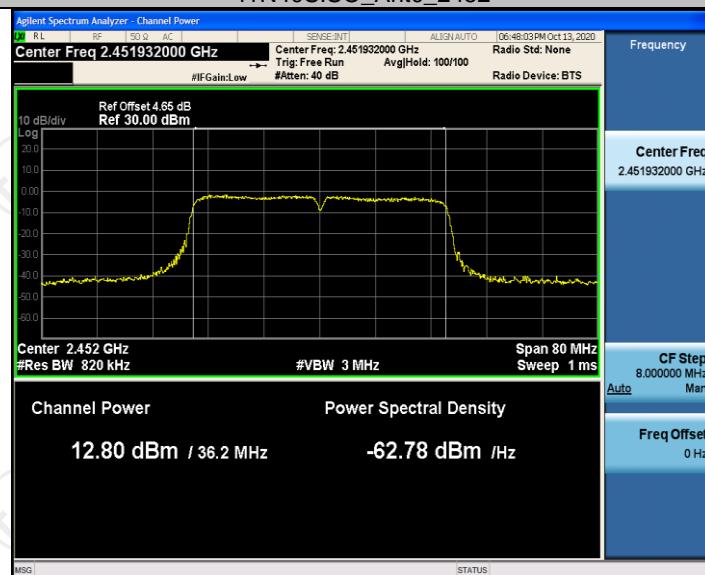
11G\_Ant0\_2412







11N40SISO\_Ant0\_2452



## Maximum power spectral density

### Test Result

Test Mode	Channel	Result[dBm/10kHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	2412	-12.97	-18.20	<=8	PASS
	2437	-12.45	-17.68	<=8	PASS
	2462	-13.01	-18.24	<=8	PASS
11G	2412	-12.98	-18.21	<=8	PASS
	2437	-13.08	-18.31	<=8	PASS
	2462	-13.70	-18.93	<=8	PASS
11N20SISO	2412	-15.26	-20.49	<=8	PASS
	2437	-12.85	-18.08	<=8	PASS
	2462	-14.03	-19.26	<=8	PASS
11N40SISO	2422	-15.92	-21.15	<=8	PASS
	2437	-14.69	-19.92	<=8	PASS
	2452	-16.03	-21.26	<=8	PASS

**Note:** Compensate 10dB is for Exchange rate of RBW

Exchange rate of RBW =  $10 * \log_{10}(3\text{KHz} / \text{RBW at measurement}) \approx -5.23[\text{dB}]$   
where Reference bandwidth = 10 KHz

### Test Graphs

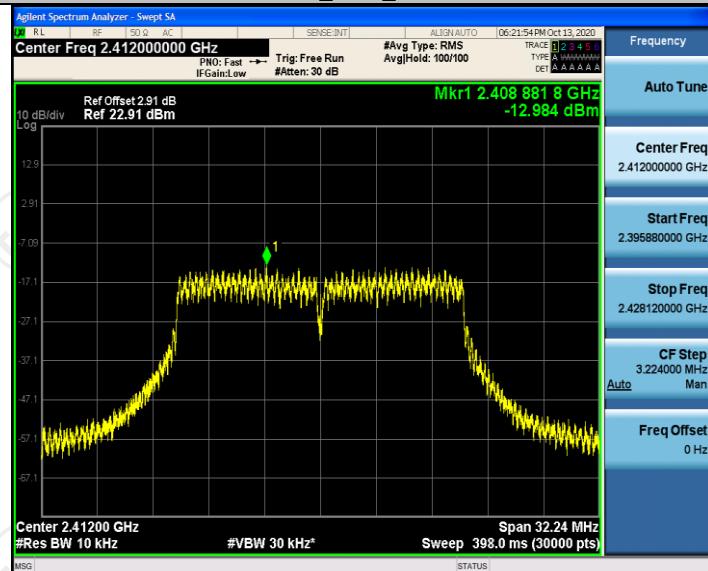




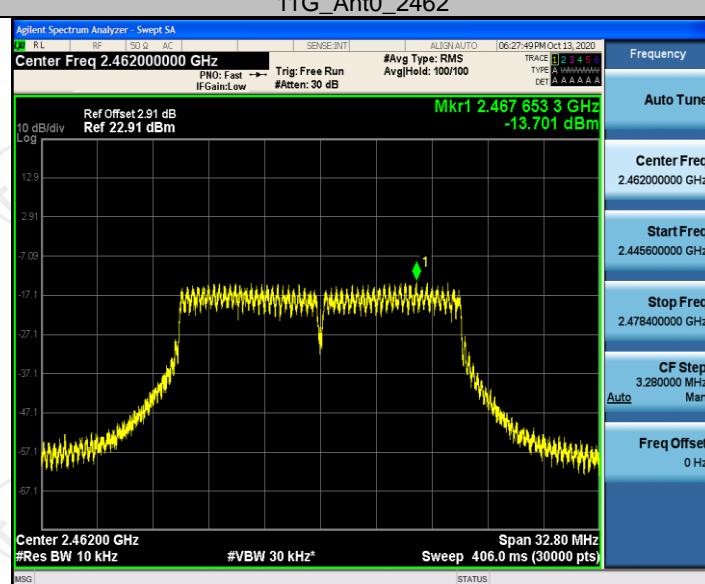
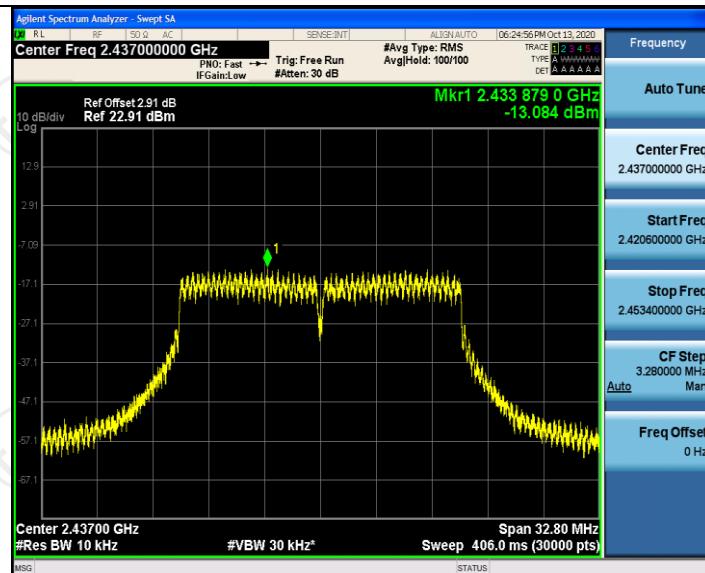
11B\_Ant0\_2462



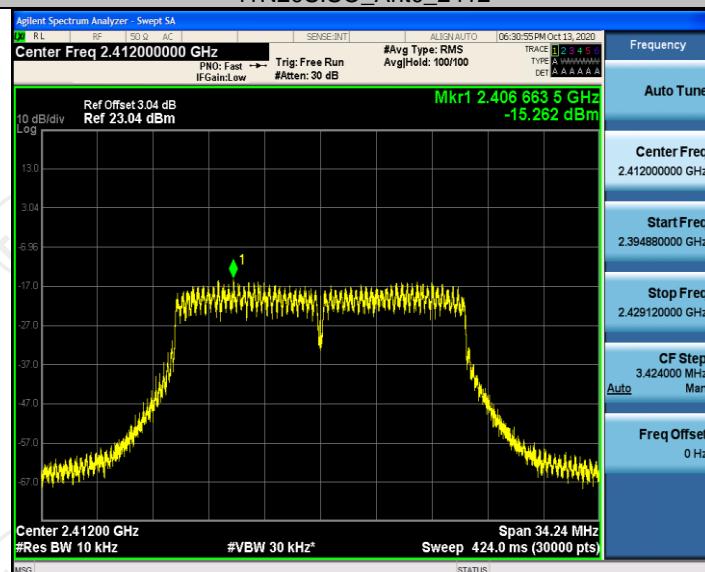
11B\_Ant0\_2462



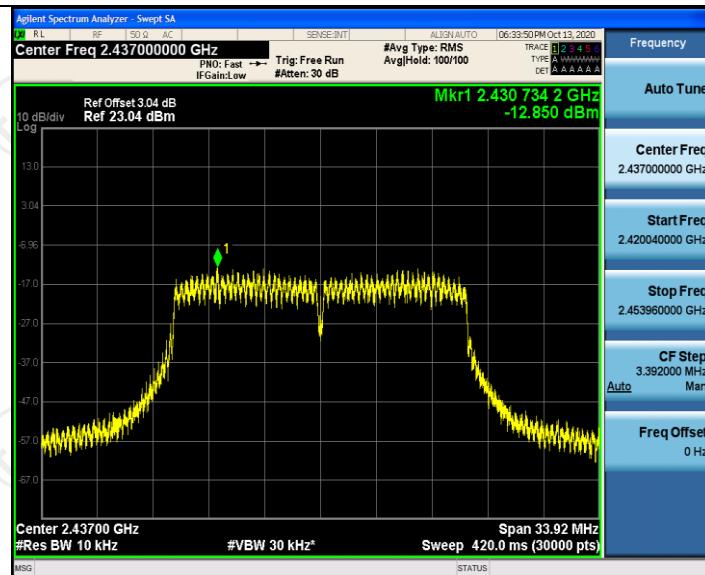
11G\_Ant0\_2412



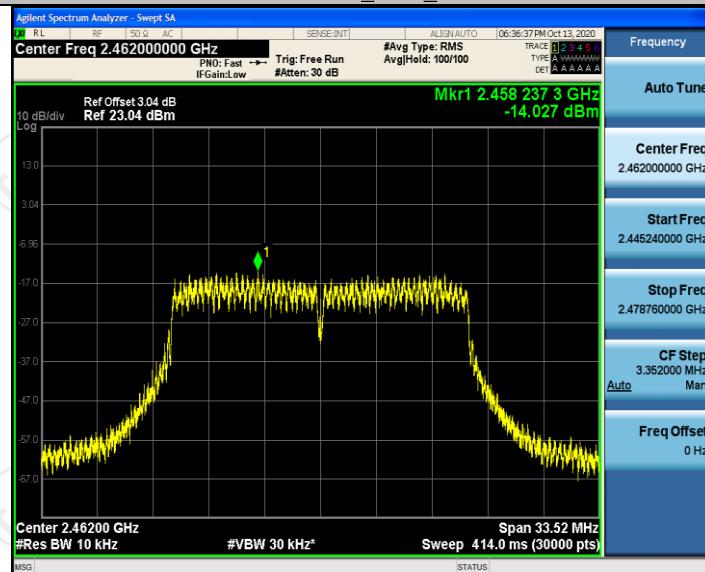
### 11N20SISO\_Ant0\_2412



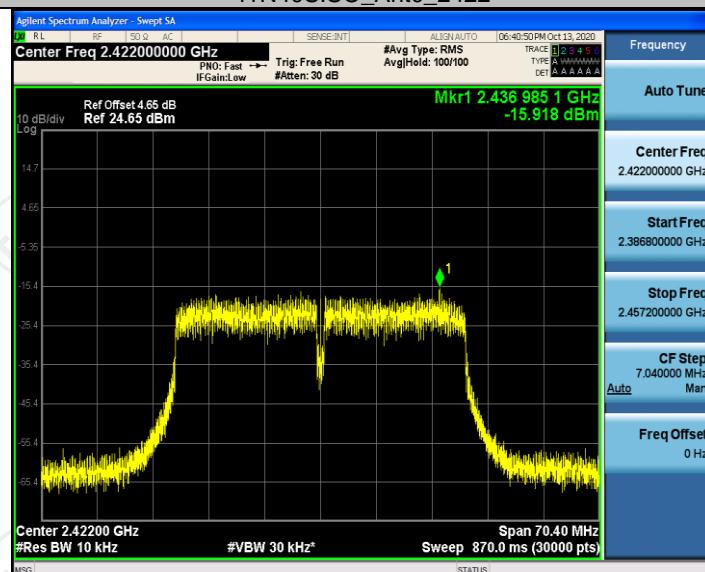
### 11N20SISO\_Ant0\_2437



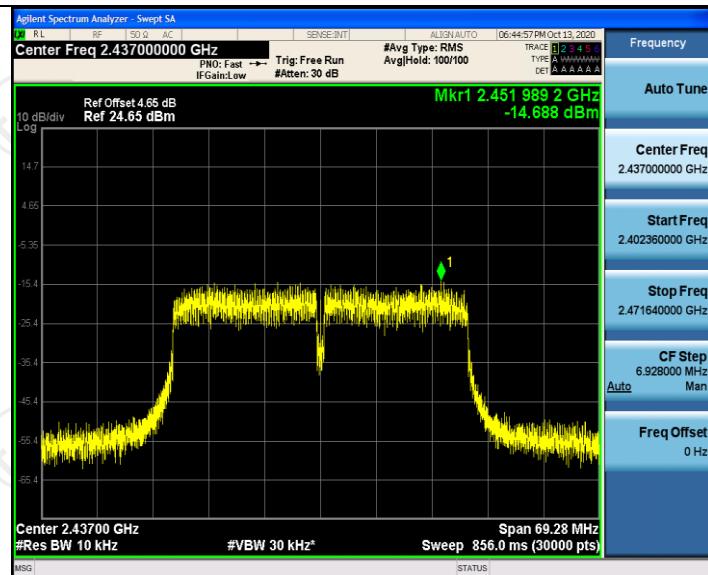
## 11N20SISO\_Ant0\_2462



## 11N40SISO\_Ant0\_2422



## 11N40SISO\_Ant0\_2437



11N40SISO\_Ant0\_2452

