



FCC TEST REPORT

**Test report
On Behalf of
MINIX TECHNOLOGY LIMITED
For
Android TV Box player
Model No.:NEO T5**

FCC ID: 2ADAC-NEOT5

Prepared for : MINIX TECHNOLOGY LIMITED
Unit 01, 15/F, Chevalier Commercial Center, No.8 Wang Hoi Road, Kowloon Bay,
Kowloon, Hong Kong.

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Date of Test: Sept. 02, 2019 ~ Sept. 09, 2019

Date of Report: Sept. 09, 2019

Report Number: HK1909032198-1E



TEST RESULT CERTIFICATION

Applicant's name MINIX TECHNOLOGY LIMITED

Address Unit 01, 15/F, Chevalier Commercial Center, No.8 Wang Hoi Road, Kowloon Bay, Kowloon, Hong Kong.

Manufacture's Name MINIX TECHNOLOGY LIMITED

Address Unit 01, 15/F, Chevalier Commercial Center, No.8 Wang Hoi Road, Kowloon Bay, Kowloon, Hong Kong.

Product description

Trade Mark: MINIX

Product name Android TV Box player

Model and/or type reference .. NEO T5

Standards FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013

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Date of Test

Date (s) of performance of tests Sept. 02, 2019 ~ Sept. 09, 2019

Date of Issue Sept. 09, 2019

Test Result **Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)



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1. Test Result Summary

1.1. TEST PROCEDURES AND RESULTS

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) §2.1046	PASS
6dB Emission Bandwidth	§15.247 (a)(2) §2.1049	PASS
Power Spectral Density	§15.247 (e)	PASS
Band Edge	1§5.247(d) §2.1051, §2.1057	PASS
Spurious Emission	§15.205/§15.209 §2.1053, §2.1057	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.*

1.2. TEST FACILITY

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

Address 1F, B2 Building, JunfengZhongchengZhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China



1.3. 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	$\pm 1.0\%$



2. EUT Description

2.1. GENERAL DESCRIPTION OF EUT

Equipment	Android TV Box player
Model Name	NEO T5
Serial No.	/
Model Difference	/
FCC ID	2ADAC-NEOT5
Antenna Type	Internal Antenna
Antenna Gain	1dBi
Operation frequency	802.11b/g/n 20:2412~2462 MHz 802.11n 40: 2422~2452MHz
Number of Channels	802.11b/g/n20: 11CH 802.11n 40: 7CH
Modulation Type	CCK/OFDM/DBPSK/DAPS
PowerSource	DC 5V 2A from Adapter with AC100-240V, 50/60Hz, 0.5A
Power Rating	DC 5V 2A from Adapter with AC100-240V, 50/60Hz, 0.5A



2.2. Carrier Frequency of Channels

Channel List for 802.11b/802.11g/802.11n (HT20)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

Channel List For 802.11n (HT40)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
--	--	04	2427	07	2442	--	--
--	--	05	2432	08	2447	--	--
03	2422	06	2437	09	2452		

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:

2.3. Operation of EUT during testing

Operating Mode

The mode is used: **Transmitting mode for 802.11b/802.11g/802.11n (HT20)**

Low Channel: 2412MHz
Middle Channel: 2437MHz
High Channel: 2462MHz

The mode is used: **Transmitting mode for 802.11n (HT40)**

Low Channel: 2422MHz
Middle Channel: 2437MHz
High Channel: 2452MHz

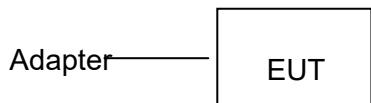


2.4. DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing and Radiation testing:



Operation of EUT Above 1GHz Radiation testing:



- Adapter information
Model: DSA-12CB-05 050200
Input: 100-240V, 50/60Hz, 0.5A
Output: 5V, 2A
- Display information
Model: 24PFF3661/T3
Input: AC 120V/60Hz



3. General Information

3.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 98.46%)
The sample was placed (0.8m below 1GHz, 1.5m 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 are shown in Test Results of the following pages. For the full battery state and The output power to the maximum state.	

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	1Mbps
802.11g	6Mbps
802.11n(H20)	6.5Mbps

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). Duty cycle setting during the transmission is 98.5% with maximum power setting for all modulations.



3.2. 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
/	/	/	/	/

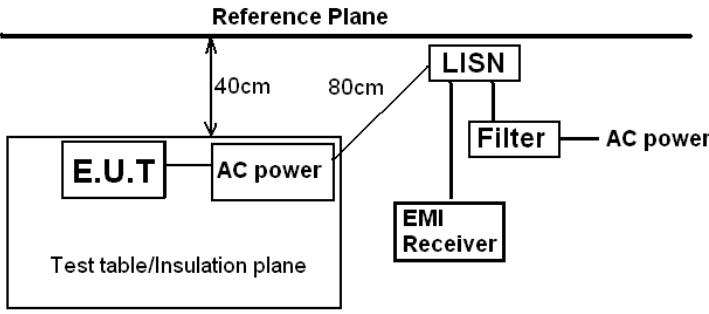
Note:

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.

4. Test Results and Measurement Data

4.1. Conducted Emission

Test Specification

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Frequency Range:	150 kHz to 30 MHz														
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
Limits:	<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													
Test Setup:	<p style="text-align: center;">Reference Plane</p>  <p><i>Remark:</i> <i>E.U.T: Equipment Under Test</i> <i>LISN: Line Impedance Stabilization Network</i> <i>Test table height=0.8m</i></p>														
Test Mode:	Charging + transmitting with modulation														
Test Procedure:	<ol style="list-style-type: none"> 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. 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). 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. 														
Test Result:	N/A														



Test Instruments

Conducted Emission Shielding Room Test Site (843)				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Receiver	R&S	ESCI 7	HKE-010	Dec. 26, 2019
L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 26, 2019
LISN	R&S	ENV216	HKE-059	Dec. 26, 2019
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A

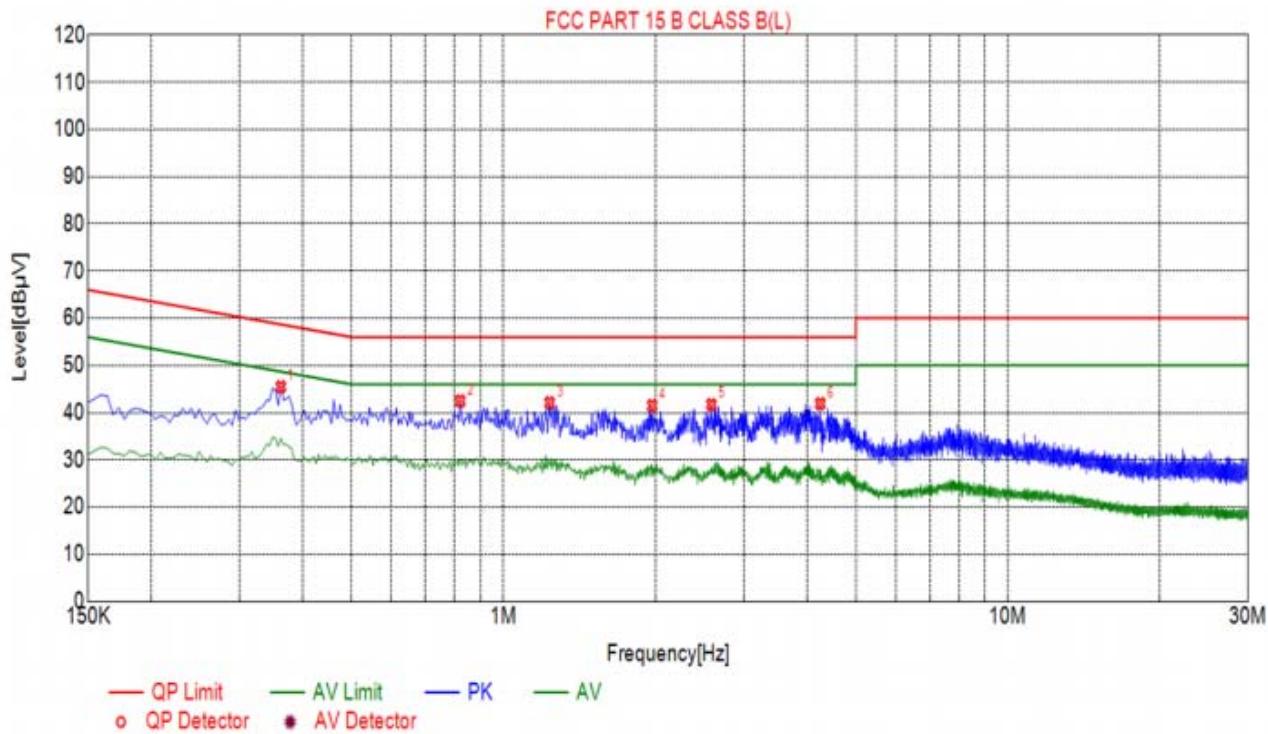
Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



4.2. Test Result

All the test modes completed for test. only the worst result of AC240V/60Hz(802.11b at 2412MHz) was reported

Test Specification: Line



Suspected List						
NO.	Freq. [MHz]	Level [dB μ V]	Factor [dB]	Limit [dB μ V]	Margin [dB]	Detector
1	0.3615	45.47	10.04	58.69	13.22	PK
2	0.8205	42.47	10.06	56.00	13.53	PK
3	1.2345	42.09	10.09	56.00	13.91	PK
4	1.9725	41.51	10.14	56.00	14.49	PK
5	2.5845	41.70	10.20	56.00	14.30	PK
6	4.2495	41.92	10.25	56.00	14.08	PK

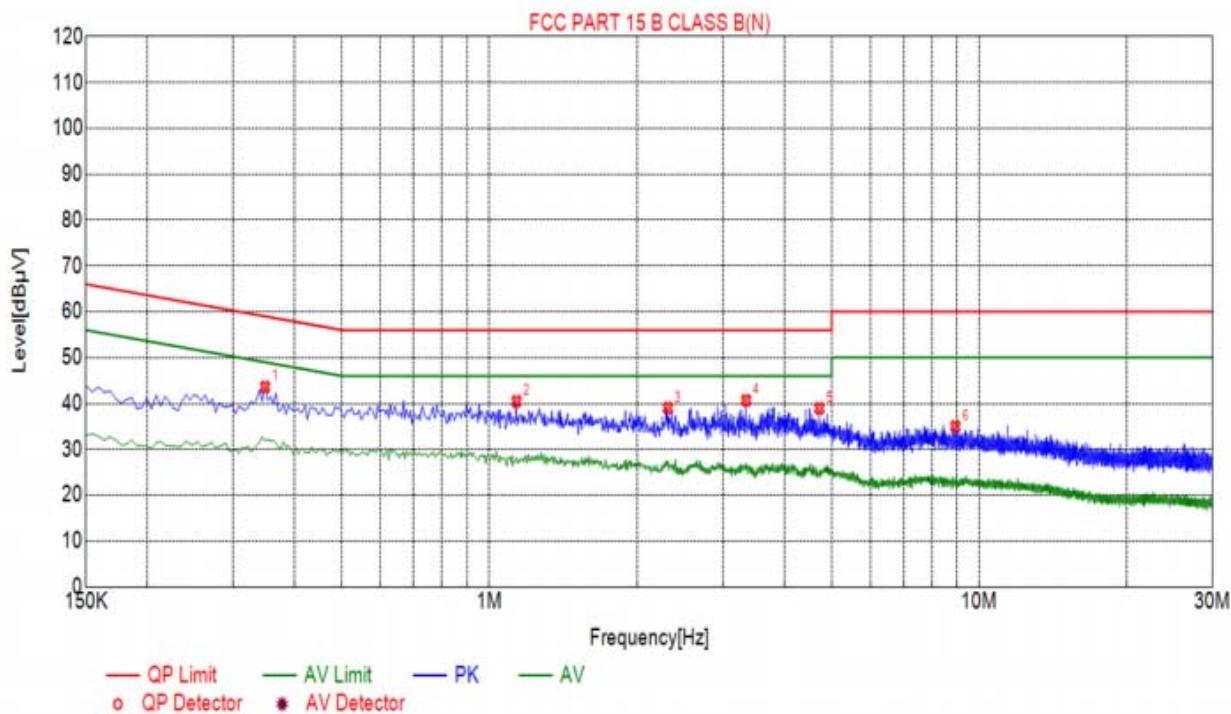
Remark: Margin = Limit – Level

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.



Test Specification: Neutral



Suspected List

NO.	Freq. [MHz]	Level [dB μ V]	Factor [dB]	Limit [dB μ V]	Margin [dB]	Detector
1	0.3480	43.61	10.03	59.01	15.40	PK
2	1.1355	40.48	10.09	56.00	15.52	PK
3	2.3145	39.01	10.18	56.00	16.99	PK
4	3.3450	40.69	10.24	56.00	15.31	PK
5	4.7175	38.94	10.26	56.00	17.06	PK
6	8.9475	34.99	10.11	60.00	25.01	PK

Remark: Margin = Limit – Level

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.

If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.



4.3. Maximum Conducted Output Power

Test Specification

Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Power meter	Agilent	E4419B	HKE-085	Dec. 26, 2019
Power Sensor	Agilent	9323A	HKE-142	Dec. 26, 2019
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 26, 2019
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 26, 2019
RF test software	Tonscend	JS1120-B Version 2.6	HKE-083	N/A

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

**Test Data**

TX 802.11b Mode			
Test Channel	Frequency	MaximumPeak Conducted Output Power	LIMIT
	(MHz)	(dBm)	dBm
CH01	2412	14.62	30
CH06	2437	14.50	30
CH11	2462	14.36	30

TX 802.11g Mode			
CH01	2412	14.24	30
CH06	2437	13.88	30
CH11	2462	13.74	30

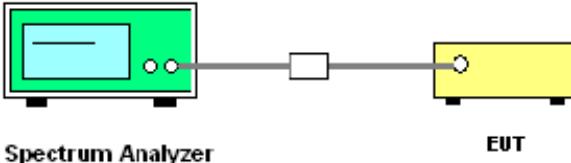
TX 802.11n20 Mode			
CH01	2412	13.46	30
CH06	2437	12.78	30
CH11	2462	12.59	30

TX 802.11n40 Mode			
CH03	2422	12.33	30
CH06	2437	11.85	30
CH09	2452	11.62	30



4.4. Emission Bandwidth

Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	KDB 558074
Limit:	>500kHz
Test Setup:	 <p>The diagram illustrates the test setup. A green 'Spectrum Analyzer' is connected to a yellow 'EUT' (Equipment Under Test) via a grey coaxial cable. A small white box representing a load is also connected in series with the cable.</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none">1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v05.2. Set to the maximum power setting and enable the EUT transmit continuously.3. 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.4. Measure and record the results in the test report.
Test Result:	PASS

Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 26, 2019
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 26, 2019
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 26, 2019
RF test software	Tonscend	JS1120-B Version 2.6	HKE-083	N/A

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

**Test data**

Test channel	6dB Emission Bandwidth (MHz)			
	802.11b	802.11g	802.11n(H20)	802.11n(H40)
Lowest	9.570	16.41	17.64	36.08
Middle	9.597	16.40	17.64	35.78
Highest	9.125	16.39	17.62	36.13
Limit:	>500k			
Test Result:	PASS			

Test plots as follows:



802.11b Modulation

Lowest channel



Middle channel

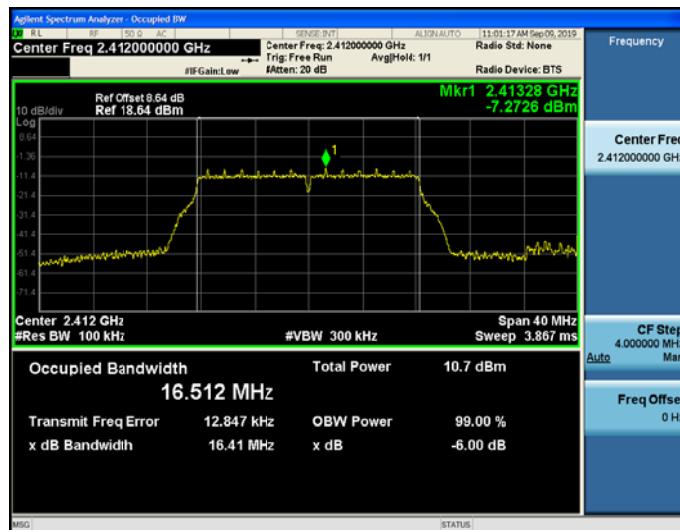


Highest channel

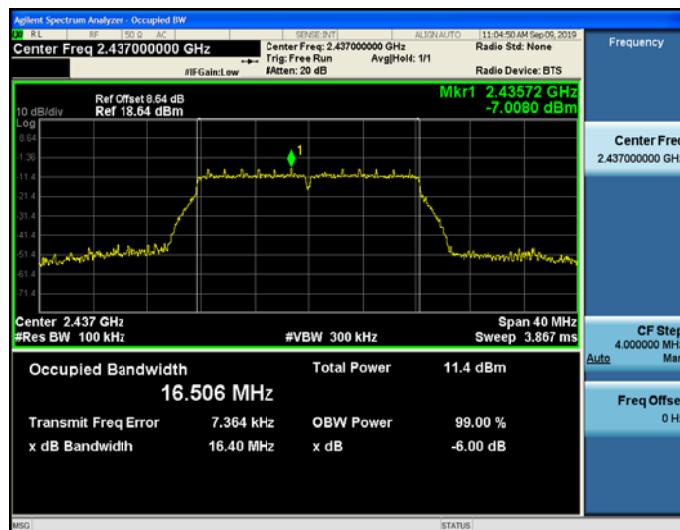


802.11g Modulation

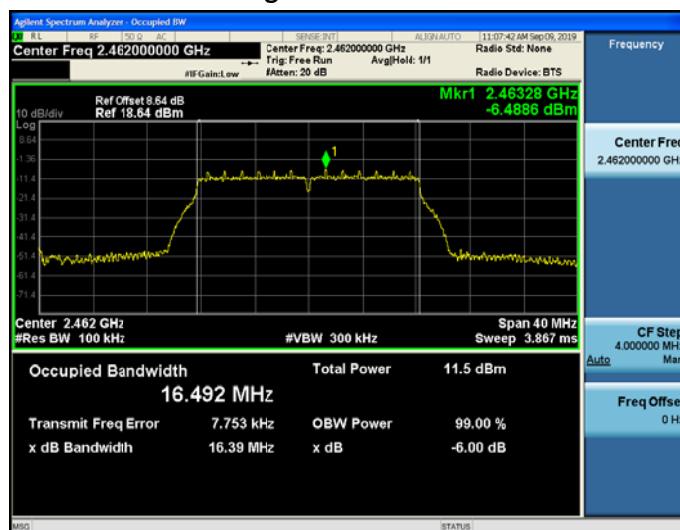
Lowest channel



Middle channel



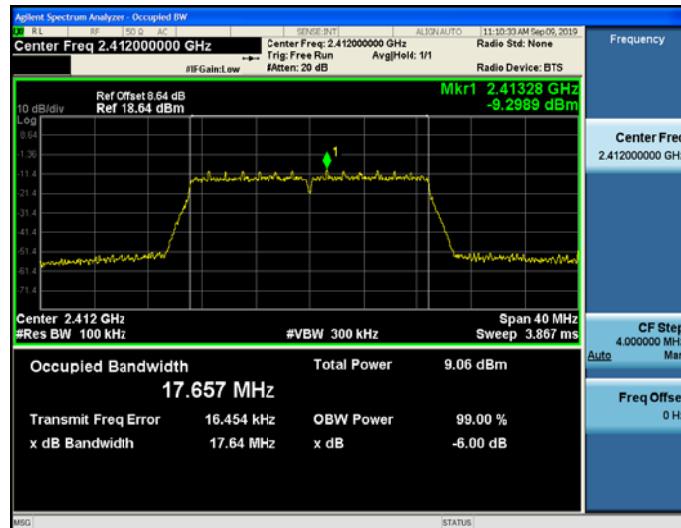
Highest channel



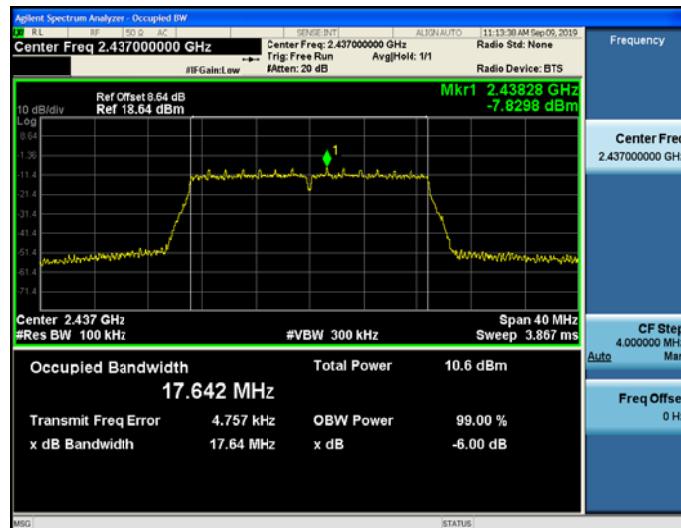


802.11n (HT20) Modulation

Lowest channel



Middle channel

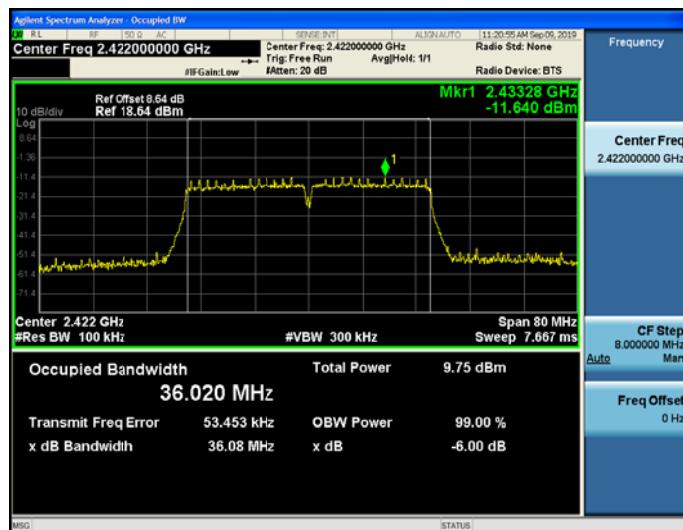


Highest channel

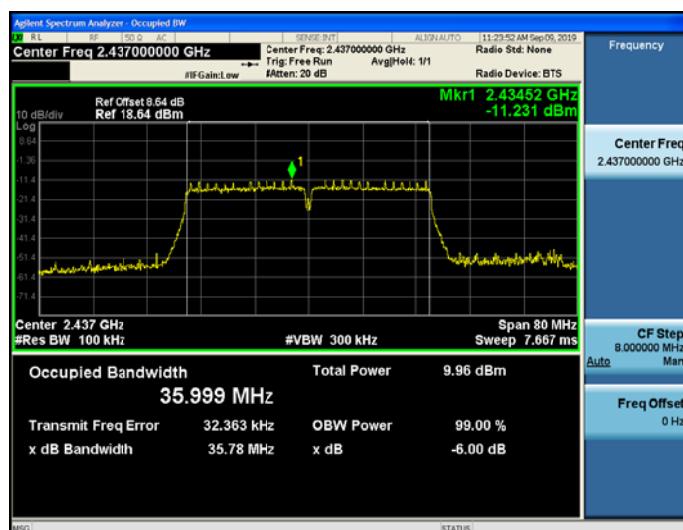


802.11n (HT40) Modulation

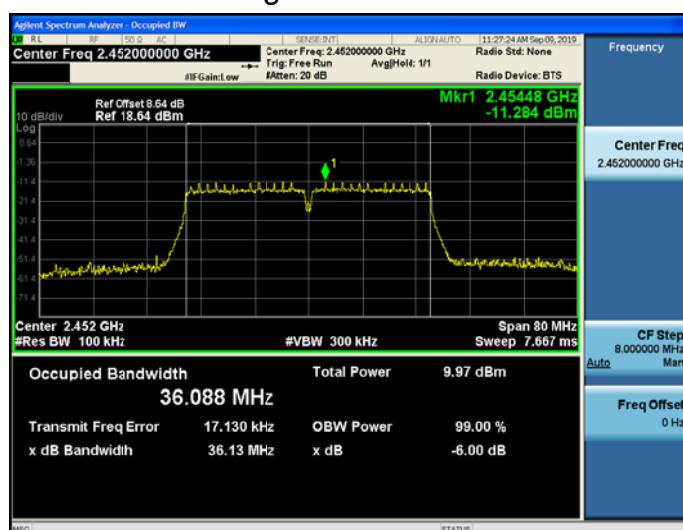
Lowest channel



Middle channel



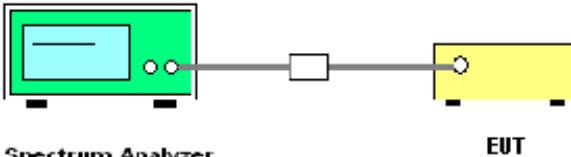
Highest channel





4.5. Power Spectral Density

Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	KDB 558074
Limit:	The average power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.
Test Setup:	 <p>Spectrum Analyzer EUT</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none">1. The testing follows Measurement procedure 10.2 method PKPSD of FCC KDB Publication No.558074 D01 DTS Meas. Guidance v052. 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.3. Set to the maximum power setting and enable the EUT transmit continuously.4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$. Video bandwidth VBW $\geq 3 \times \text{RBW}$. Set the span to at least 1.5 times the OBW.5. Detector = Peak, Sweep time = auto couple.6. Employ trace averaging (Peak) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level.7. Measure and record the results in the test report.
Test Result:	PASS

Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 26, 2019
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 26, 2019
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 26, 2019
RF test software	Tonscend	JS1120-B Version 2.6	HKE-083	N/A

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

**Test data**

EUT Set Mode	Channel	Result (dBm/30kHz)	Result (dBm/3kHz)
802.11b	Lowest	-6.19	-16.19
	Middle	-0.93	-10.93
	Highest	-4.38	-14.38
802.11g	Lowest	-12.46	-22.46
	Middle	-10.93	-20.93
	Highest	-11.02	-21.02
802.11n(H20)	Lowest	-13.05	-23.05
	Middle	-12.61	-22.61
	Highest	-10.94	-20.94
802.11n(H40)	Lowest	-16.84	-26.84
	Middle	-16.8	-26.8
	Highest	-16.4	-26.4
PSD test result (dBm/3kHz)= PSD test result (dBm/30kHz)-10			
Limit: 8dBm/3kHz			
Test Result:		PASS	

Test plots as follows:



802.11b Modulation

Lowest channel



Middle channel

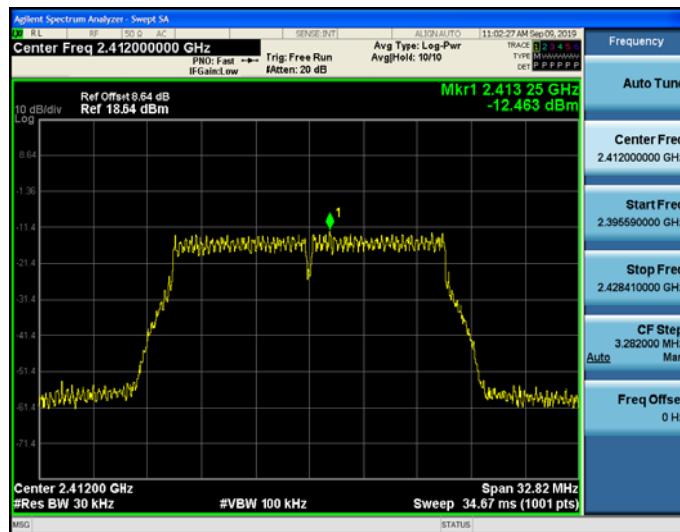


Highest channel

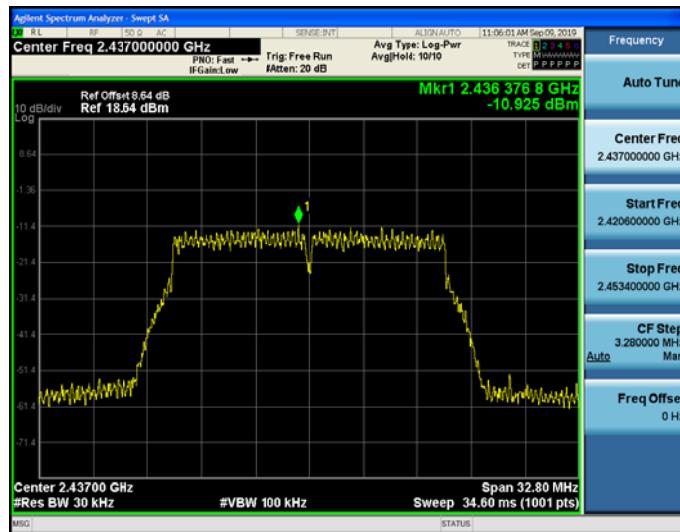


802.11g Modulation

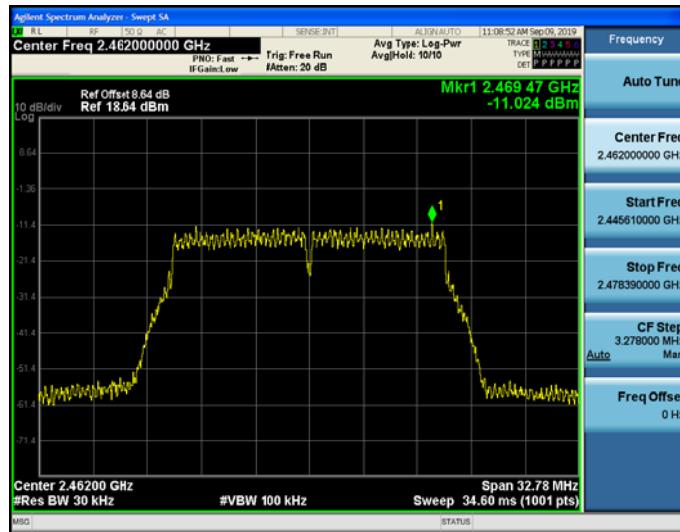
Lowest channel



Middle channel

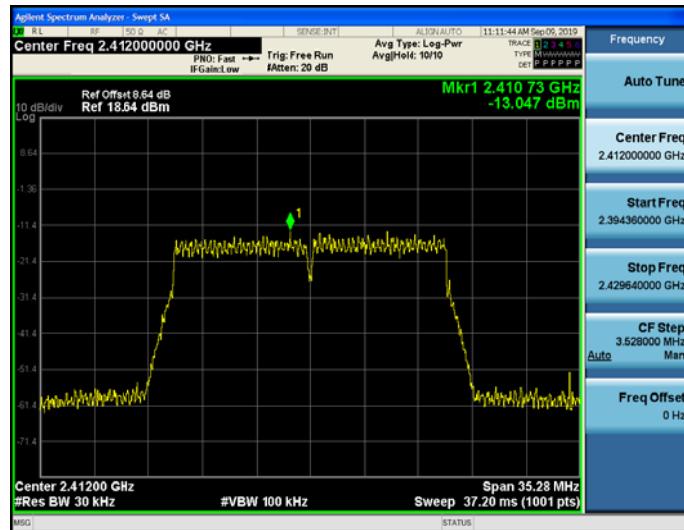


Highest channel



802.11n (HT20) Modulation

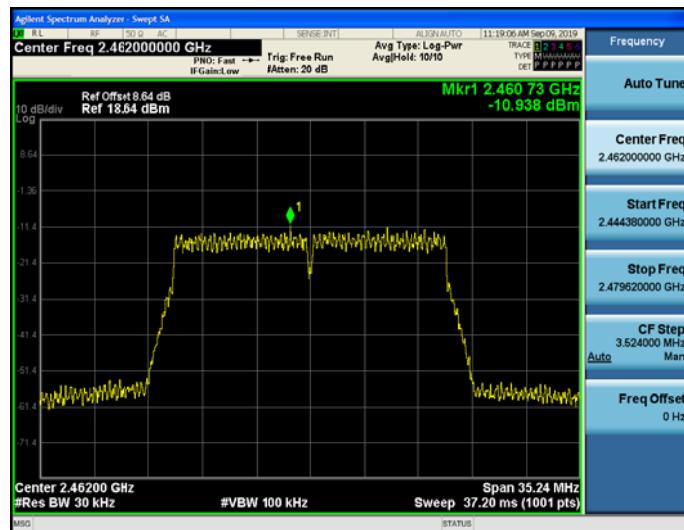
Lowest channel



Middle channel

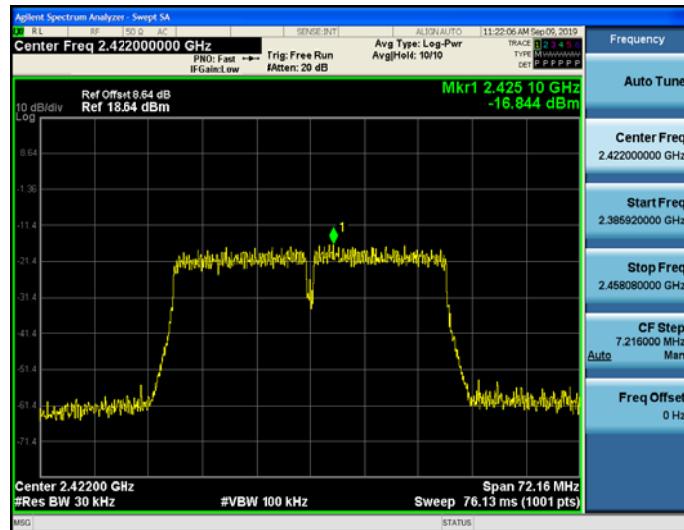


Highest channel

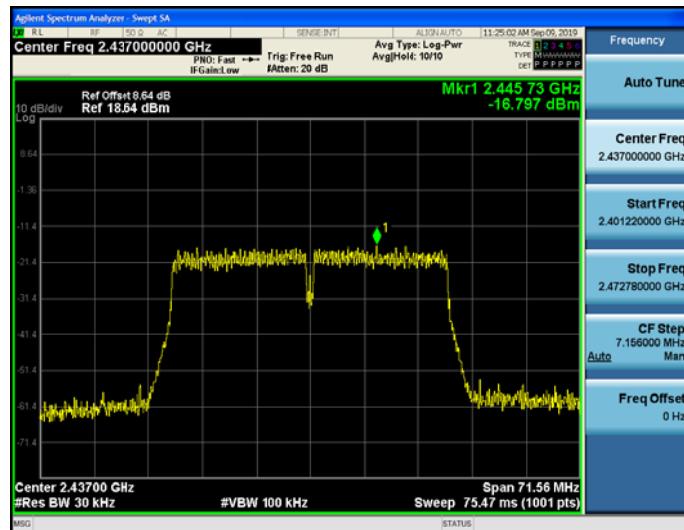


802.11n (HT40) Modulation

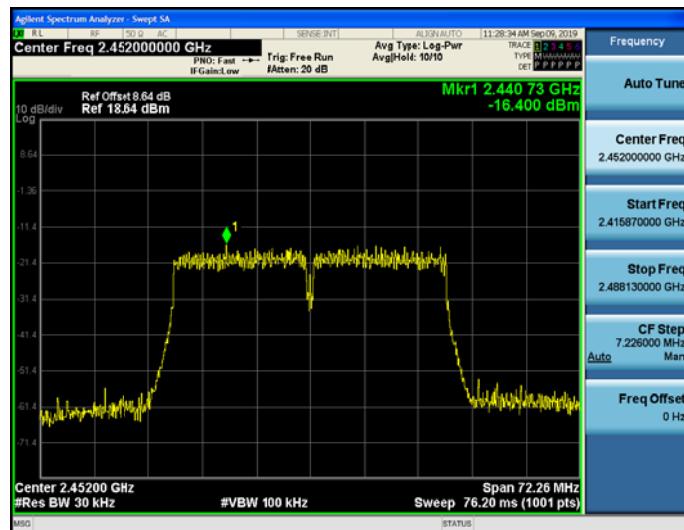
Lowest channel



Middle channel

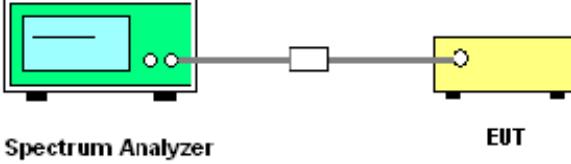


Highest channel



4.6. Conducted Band Edge and Spurious Emission Measurement

Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB558074
Limit:	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).
Test Setup:	 The diagram shows a green 'Spectrum Analyzer' on the left connected by a horizontal line to a yellow 'EUT' (Equipment Under Test) on the right. A small white square component is positioned between the two. Below the spectrum analyzer is the label 'Spectrum Analyzer' and below the EUT is the label 'EUT'.
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none">1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05.2. 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.3. Set to the maximum power setting and enable the EUT transmit continuously.4. 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).5. Measure and record the results in the test report.6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
Test Result:	PASS



Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 26, 2019
High pass filter unit	Tonscend	JS0806-F	HKE-055	Dec. 26, 2019
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 26, 2019
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 26, 2019
RF test software	Tonscend	JS1120-B Version 2.6	HKE-083	N/A

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



Test Data

802.11b Modulation

The figure consists of six screenshots of Agilent Spectrum Analyzer software arranged in a 3x2 grid. Each screenshot shows a spectrum plot with a yellow line highlighting a spurious emission peak. The left column shows 'Lowest Channel' and the right column shows 'Highest Channel'. The top row shows 'Band Edge' measurements, while the bottom row shows 'Spurious emission' measurements.

Lowest Channel Band Edge: Center Freq 2.400000000 GHz, Span 100.000 MHz, Sweep 9.600 ms (1001 pts). The plot shows a peak at Mkr4 2.389 0 GHz with -60.073 dBm. The table below lists the markers:

Marker	Center Freq	Function	Function Width	Function Value
1	2.4125 GHz	-1.158 dBm		
2	2.4000 GHz	-54.736 dBm		
3	2.3900 GHz	-60.737 dBm		
4	2.3890 GHz	-60.073 dBm		

Lowest Channel Spurious emission: Center Freq 5.015000000 GHz, Span 10.000 GHz, Sweep 953.1 ms (8001 pts). The plot shows a peak at Mkr2 3.305 1 GHz with -45.647 dBm. The table below lists the markers:

Marker	Center Freq	Function	Function Width	Function Value
1	5.0150 GHz	-1.158 dBm		
2	3.0000 GHz	-54.736 dBm		
3	10.0000 GHz	-60.737 dBm		
4	997.0000 MHz	-60.073 dBm		

Highest Channel Band Edge: Center Freq 2.483500000 GHz, Span 100.000 MHz, Sweep 9.600 ms (1001 pts). The plot shows a peak at Mkr4 2.484 0 GHz with -59.314 dBm. The table below lists the markers:

Marker	Center Freq	Function	Function Width	Function Value
1	2.4835 GHz	-0.753 dBm		
2	2.4835 GHz	-61.493 dBm		
3	2.5000 GHz	-61.788 dBm		
4	2.4840 GHz	-59.314 dBm		

Highest Channel Spurious emission: Center Freq 5.015000000 GHz, Span 10.000 GHz, Sweep 953.1 ms (8001 pts). The plot shows a peak at Mkr2 2.589 9 GHz with -46.280 dBm. The table below lists the markers:

Marker	Center Freq	Function	Function Width	Function Value
1	5.0150 GHz	-1.158 dBm		
2	3.0000 GHz	-54.736 dBm		
3	10.0000 GHz	-60.737 dBm		
4	997.0000 MHz	-60.073 dBm		

Lowest Channel Band Edge: Center Freq 18.000000000 GHz, Span 26.000 GHz, Sweep 1.530 s (8001 pts). The plot shows a peak at Mkr1 25.776 GHz with -50.400 dBm. The table below lists the markers:

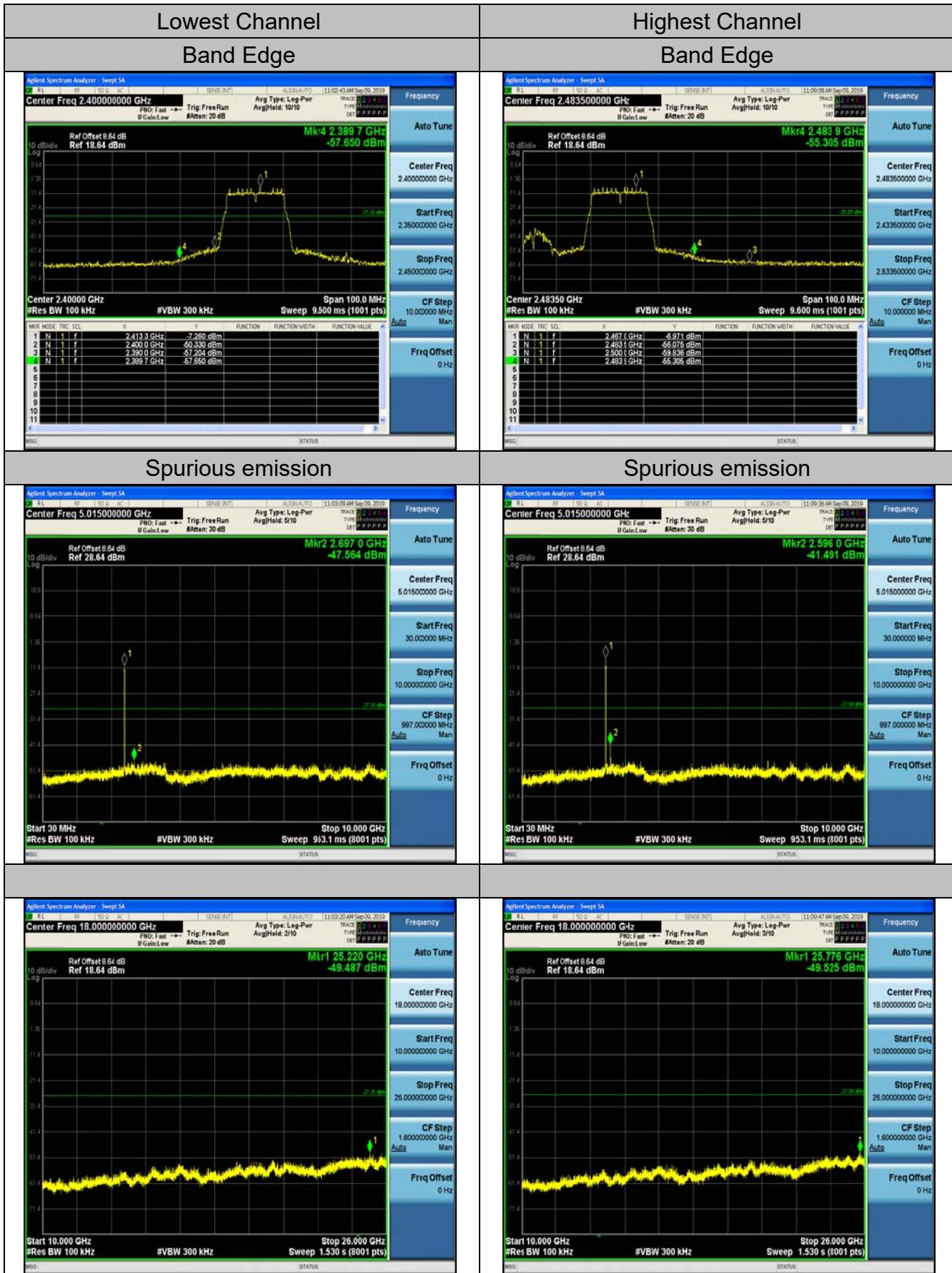
Marker	Center Freq	Function	Function Width	Function Value
1	18.0000 GHz	-1.158 dBm		
2	10.0000 GHz	-54.736 dBm		
3	25.0000 GHz	-60.737 dBm		
4	1.600000000 GHz	-60.073 dBm		

Highest Channel Spurious emission: Center Freq 18.000000000 GHz, Span 26.000 GHz, Sweep 1.530 s (8001 pts). The plot shows a peak at Mkr1 25.880 GHz with -49.811 dBm. The table below lists the markers:

Marker	Center Freq	Function	Function Width	Function Value
1	18.0000 GHz	-0.753 dBm		
2	10.0000 GHz	-61.493 dBm		
3	26.0000 GHz	-61.788 dBm		
4	1.600000000 GHz	-59.811 dBm		

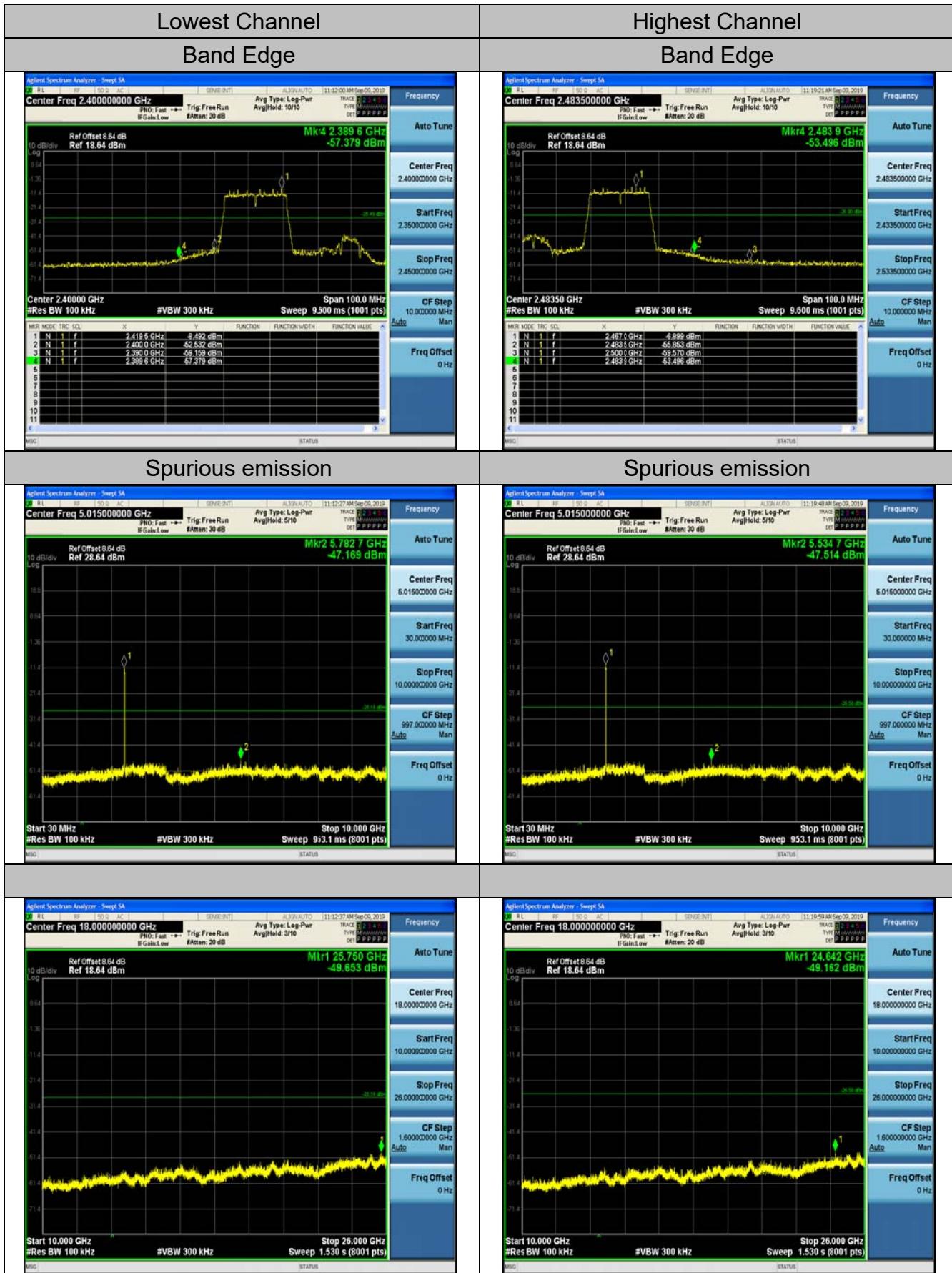


802.11g Modulation



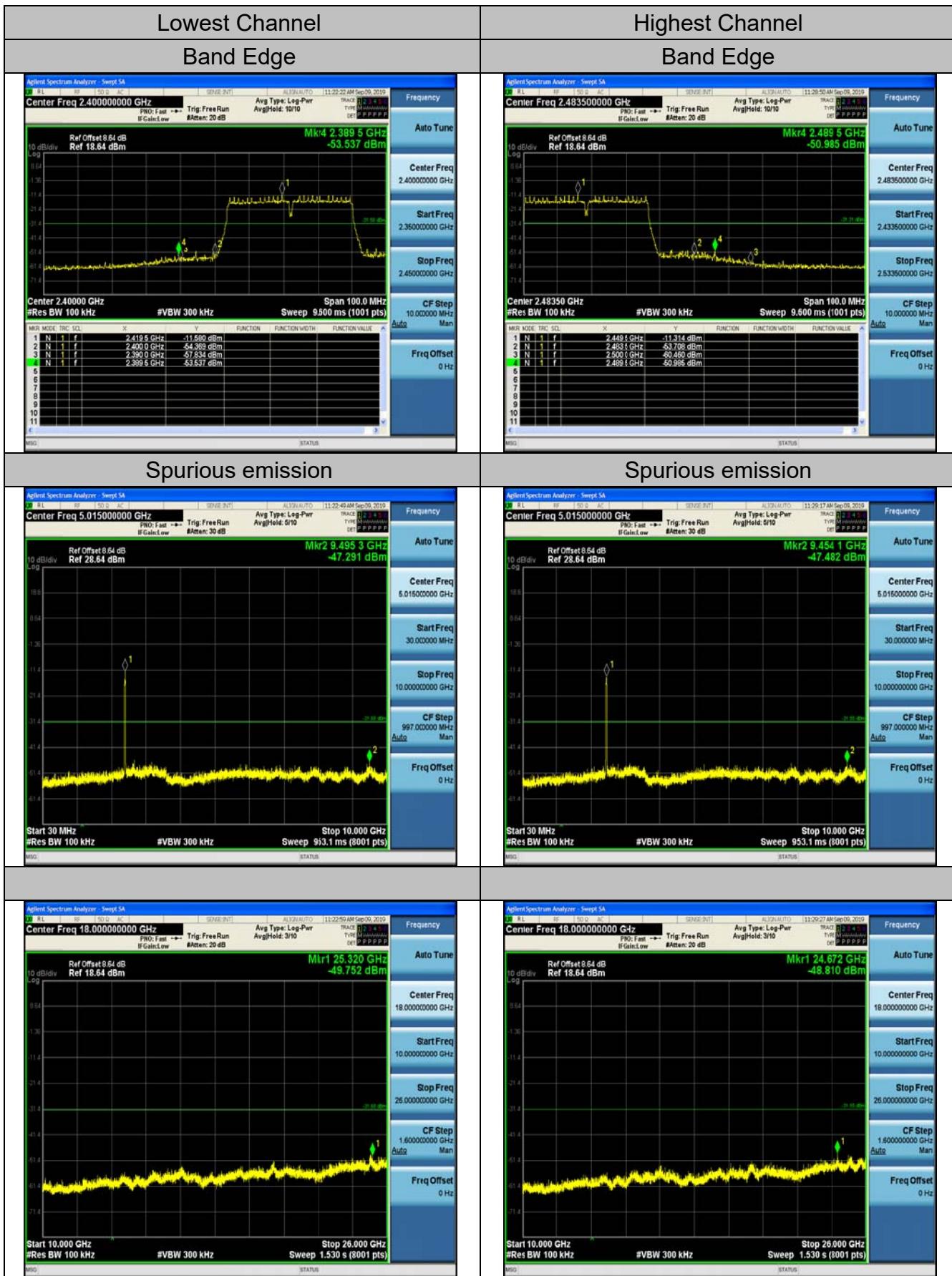


802.11n (HT20) Modulation





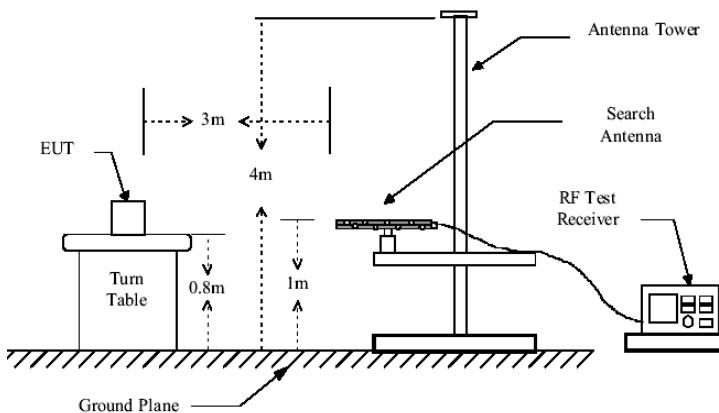
802.11n (HT40) Modulation



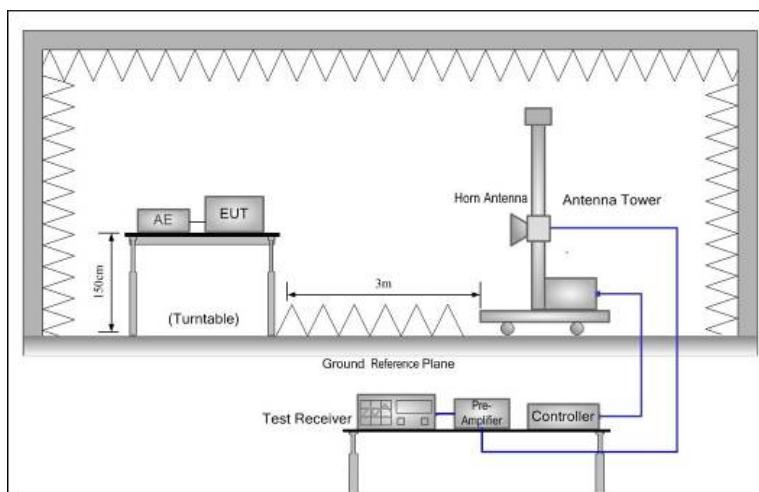
4.7. Radiated Spurious Emission Measurement

Test Specification

Test Requirement:	FCC Part15 C Section 15.209																																							
Test Method:	ANSI C63.10: 2013																																							
Frequency Range:	9 kHz to 25 GHz																																							
Measurement Distance:	3 m																																							
Antenna Polarization:	Horizontal & Vertical																																							
Operation mode:	Transmitting mode with modulation																																							
Receiver Setup:	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Detector</th> <th>RBW</th> <th>VBW</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>9kHz- 150kHz</td> <td>Quasi-peak</td> <td>200Hz</td> <td>1kHz</td> <td>Quasi-peak Value</td> </tr> <tr> <td>150kHz- 30MHz</td> <td>Quasi-peak</td> <td>9kHz</td> <td>30kHz</td> <td>Quasi-peak Value</td> </tr> <tr> <td>30MHz-1GHz</td> <td>Quasi-peak</td> <td>100KHz</td> <td>300KHz</td> <td>Quasi-peak Value</td> </tr> <tr> <td rowspan="2">Above 1GHz</td><td>Peak</td> <td>1MHz</td> <td>3MHz</td> <td>Peak Value</td> </tr> <tr> <td>Peak</td> <td>1MHz</td> <td>10Hz</td> <td>Average Value</td> </tr> </tbody> </table>					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	100KHz	300KHz	Quasi-peak Value	Above 1GHz	Peak	1MHz	3MHz	Peak Value	Peak	1MHz	10Hz	Average Value						
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	100KHz	300KHz	Quasi-peak Value																																				
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Limit:	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Field Strength (microvolts/meter)</th> <th>Measurement Distance (meters)</th> </tr> </thead> <tbody> <tr> <td>0.009-0.490</td> <td>2400/F(KHz)</td> <td>300</td> </tr> <tr> <td>0.490-1.705</td> <td>24000/F(KHz)</td> <td>30</td> </tr> <tr> <td>1.705-30</td> <td>30</td> <td>30</td> </tr> <tr> <td>30-88</td> <td>100</td> <td>3</td> </tr> <tr> <td>88-216</td> <td>150</td> <td>3</td> </tr> <tr> <td>216-960</td> <td>200</td> <td>3</td> </tr> <tr> <td>Above 960</td> <td>500</td> <td>3</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Frequency</th> <th>Field Strength (microvolts/meter)</th> <th>Measurement Distance (meters)</th> <th>Detector</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Above 1GHz</td><td>500</td> <td>3</td> <td>Average</td> </tr> <tr> <td>5000</td> <td>3</td> <td>Peak</td> </tr> </tbody> </table>					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
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																																					
Test setup:	<p>For radiated emissions below 30MHz</p> <p>Distance = 3m</p> <p>Turn table</p> <p>EUT</p> <p>Ground Plane</p> <p>Computer</p> <p>Pre -Amplifier</p> <p>Receiver</p> <p>30MHz to 1GHz</p>																																							



Above 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 highPASS 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 measurement antenna elevation shall be that which



	<p>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">(1) Span shall wide enough to fully capture the emission being measured;(2) Set RBW=100 kHz for $f < 1$ GHz; VBW \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold;(3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement. <p>For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW $\geq 1/T$, 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>
Test results:	PASS



Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Receiver	R&S	ESCI-7	HKE-010	Dec. 26, 2019
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 26, 2019
Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 26, 2019
High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	Dec. 26, 2019
Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 26, 2019
Preamplifier	EMCI	EMC051845S E	HKE-015	Dec. 26, 2019
Preamplifier	Agilent	83051A	HKE-016	Dec. 26, 2019
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 26, 2019
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 26, 2019
Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 26, 2019
High pass filter unit	Tonscend	JS0806-F	HKE-055	Dec. 26, 2019
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Dec. 26, 2019
Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A
RF cable	Times	9kHz-1GHz	HKE-117	Dec. 26, 2019
RF cable	Times	1-40G	HKE-034	Dec. 26, 2019

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

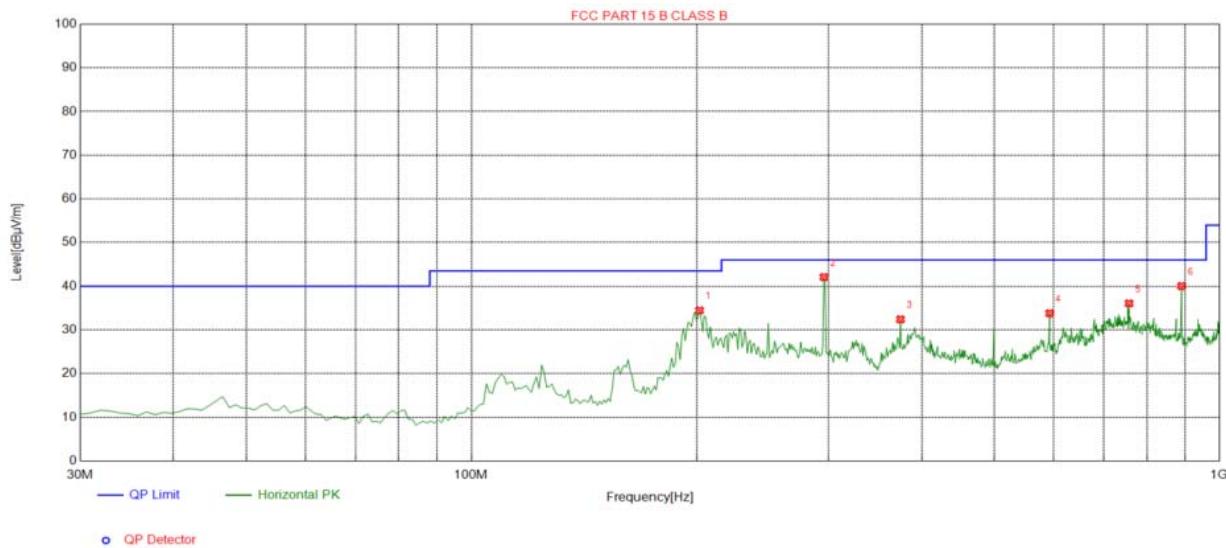


Test Data

All the test modes completed for test. only the worst result of AC240V/60Hz(802.11b at 2412MHz) was reported

Below 1GHz

Horizontal

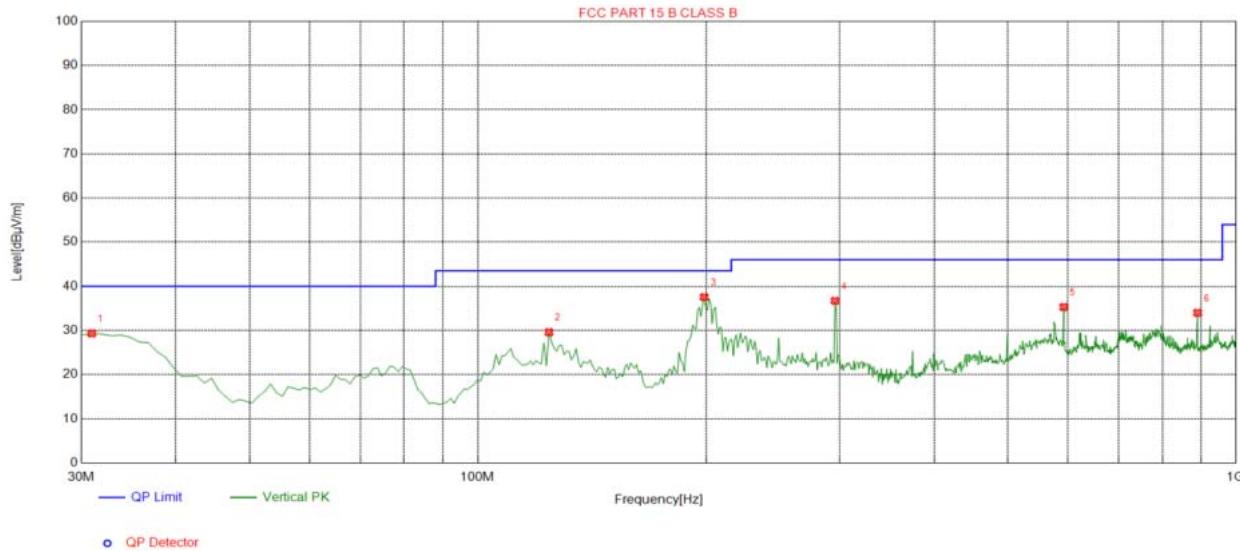


Suspected List								
NO.	Freq. [MHz]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	201.861	34.46	-15.01	43.50	9.04	100	38	Horizontal
2	296.046	42.07	-12.78	46.00	3.93	100	12	Horizontal
3	374.694	32.41	-10.92	46.00	13.59	100	88	Horizontal
4	593.163	33.79	-6.57	46.00	12.21	100	317	Horizontal
5	757.257	36.07	-3.55	46.00	9.93	100	38	Horizontal
6	890.280	40.02	-1.88	46.00	5.98	100	168	Horizontal

Remark: Transd = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level



Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	30.9710	29.32	-16.30	40.00	10.68	100	67	Vertical
2	124.184	29.59	-17.72	43.50	13.91	100	41	Vertical
3	198.948	37.54	-15.16	43.50	5.96	100	143	Vertical
4	296.046	36.70	-12.78	46.00	9.30	100	325	Vertical
5	593.163	35.31	-6.57	46.00	10.69	100	242	Vertical
6	890.280	33.99	-1.88	46.00	12.01	100	348	Vertical

Remark: Transd = Cable loss + Antenna factor - Pre-amplifier; Margin = Limit – Level

Harmonics and Spurious Emissions

Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dB μ V/m)	Limit@3m (dB μ V/m)
--	--	--
--	--	--
--	--	--
--	--	--

Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

**Above 1GHz****RADIATED EMISSION TEST**

LOW CH1 (802.11b Mode)/2412

Horizontal:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4824	63.45	-3.64	59.81	74	-14.19	peak
4824	45.32	-3.64	41.68	54	-12.32	AVG
7236	58.62	-0.95	57.67	74	-16.33	peak
7236	45.02	-0.95	44.07	54	-9.93	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4824	63.99	-3.64	60.35	74	-13.65	peak
4824	47.32	-3.64	43.68	54	-10.32	AVG
7236	58.6	-0.95	57.65	74	-16.35	peak
7236	45.32	-0.95	44.37	54	-9.63	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



MID CH6 (802.11b Mode)/2437

Horizontal:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4874	62.34	-3.51	58.83	74	-15.17	peak
4874	47.32	-3.51	43.81	54	-10.19	AVG
7311	59.02	-0.82	58.2	74	-15.8	peak
7311	49.03	-0.82	48.21	54	-5.79	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4874	65.02	-3.51	61.51	74	-12.49	peak
4874	47.54	-3.51	44.03	54	-9.97	AVG
7311	58.32	-0.82	57.5	74	-16.5	peak
7311	46.87	-0.82	46.05	54	-7.95	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



HIGH CH11 (802.11b Mode)/2462

Horizontal:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4924	67.13	-3.43	63.7	74	-10.3	peak
4924	47.02	-3.43	43.59	54	-10.41	AVG
7386	56.89	-0.75	56.14	74	-17.86	peak
7386	43.62	-0.75	42.87	54	-11.13	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4924	64.32	-3.43	60.89	74	-13.11	peak
4924	46.48	-3.43	43.05	54	-10.95	AVG
7386	56.45	-0.75	55.7	74	-18.3	peak
7386	43.99	-0.75	43.24	54	-10.76	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes bandedge frequency.
- (3) * denotes emission frequency which appearing within the Restricted Bands specified inprovision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above meansthe reading of emissions are attenuated more than 20dB below the permissible limits orthe field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHzfor measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, theAverage Detected is not need completed. For example: Top Channel at Fundamental73.16dB μ V/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dB μ V/m(PK Value) <54dB μ V/m(AV Limit), the Average Detected not need to completed.



LOW CH1 (802.11g Mode)/2412

Horizontal:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4824	63.41	-3.64	59.77	74	-14.23	peak
4824	49.32	-3.64	45.68	54	-8.32	AVG
7236	56.13	-0.95	55.18	74	-18.82	peak
7236	43.67	-0.95	42.72	54	-11.28	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4824	59.78	-3.64	56.14	74	-17.86	peak
4824	48.62	-3.64	44.98	54	-9.02	AVG
7236	55.63	-0.95	54.68	74	-19.32	peak
7236	43.15	-0.95	42.2	54	-11.8	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



MID CH6 (802.11g Mode)/2437

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874	64.12	-3.51	60.61	74	-13.39	peak
4874	45.65	-3.51	42.14	54	-11.86	AVG
7311	58.66	-0.82	57.84	74	-16.16	peak
7311	47.03	-0.82	46.21	54	-7.79	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874	62.47	-3.51	58.96	74	-15.04	peak
4874	48.62	-3.51	45.11	54	-8.89	AVG
7311	58.32	-0.82	57.5	74	-16.5	peak
7311	47.11	-0.82	46.29	54	-7.71	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



HIGH CH11 (802.11g Mode)/2462

Horizontal:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4924	63.45	-3.43	60.02	74	-13.98	peak
4924	49.25	-3.43	45.82	54	-8.18	AVG
7386	57.32	-0.75	56.57	74	-17.43	peak
7386	42.16	-0.75	41.41	54	-12.59	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4924	59.64	-3.43	56.21	74	-17.79	peak
4924	49.32	-3.43	45.89	54	-8.11	AVG
7386	58.14	-0.75	57.39	74	-16.61	peak
7386	39.11	-0.75	38.36	54	-15.64	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes bandedge frequency.
- (3) * denotes emission frequency which appearing within the Restricted Bands specified inprovision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dB μ V/m(PK Value) < 93.98(AV Limit), at harmonic 53.20 dB μ V/m(PK Value) < 54dB μ V/m(AV Limit), the Average Detected not need to completed.



LOW CH1 (802.11n/H20 Mode)/2412

Horizontal:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4824	65.48	-3.64	61.84	74	-12.16	peak
4824	45.22	-3.64	41.58	54	-12.42	AVG
7236	55.15	-0.95	54.2	74	-19.8	peak
7236	43.71	-0.95	42.76	54	-11.24	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4824	64.23	-3.64	60.59	74	-13.41	peak
4824	47.25	-3.64	43.61	54	-10.39	AVG
7236	57.87	-0.95	56.92	74	-17.08	peak
7236	46.72	-0.95	45.77	54	-8.23	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



MID CH6 (802.11n/H20 Mode)/2437

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874	58.21	-3.51	54.70	74.00	-19.30	peak
4874	45.98	-3.51	42.47	54.00	-11.53	AVG
7311	56.30	-0.82	55.48	74.00	-18.52	peak
7311	45.03	-0.82	44.21	54.00	-9.79	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874	61.23	-3.51	57.72	74.00	-16.28	peak
4874	46.08	-3.51	42.57	54.00	-11.43	AVG
7311	55.61	-0.82	54.79	74.00	-19.21	peak
7311	40.33	-0.82	39.51	54.00	-14.49	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



HIGH CH11 (802.11n/H20 Mode)/2462

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4924	65.34	-3.43	61.91	74	-12.09	peak
4924	47.86	-3.43	44.43	54	-9.57	AVG
7386	57.49	-0.75	56.74	74	-17.26	peak
7386	43.65	-0.75	42.9	54	-11.1	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4924	63.45	-3.43	60.02	74	-13.98	peak
4924	47.66	-3.43	44.23	54	-9.77	AVG
7386	57.15	-0.75	56.4	74	-17.6	peak
7386	47.61	-0.75	46.86	54	-7.14	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



LOW CH3 (802.11n/H40 Mode)/2422

Horizontal:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4844	65.14	-3.63	61.51	74	-12.49	peak
4844	42.09	-3.63	38.46	54	-15.54	AVG
7266	56.45	-0.94	55.51	74	-18.49	peak
7266	40.67	-0.94	39.73	54	-14.27	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4844	61.25	-3.63	57.62	74	-16.38	peak
4844	41.73	-3.63	38.1	54	-15.9	AVG
7266	55.12	-0.94	54.18	74	-19.82	peak
7266	38.63	-0.94	37.69	54	-16.31	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



MID CH6 (802.11n/H40 Mode)/2437

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874	62.47	-3.51	58.96	74	-15.04	peak
4874	42.55	-3.51	39.04	54	-14.96	AVG
7311	55.74	-0.82	54.92	74	-19.08	peak
7311	37.23	-0.82	36.41	54	-17.59	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874	60.12	-3.51	56.61	74	-17.39	peak
4874	45.99	-3.51	42.48	54	-11.52	AVG
7311	53.62	-0.82	52.8	74	-21.2	peak
7311	43.26	-0.82	42.44	54	-11.56	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



HIGH CH9 (802.11n/H40 Mode)/2452

Horizontal:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits	Margin (dB)	Detector Type
4904	59.89	-3.43	56.46	74	-17.54	peak
4904	43.67	-3.43	40.24	54	-13.76	AVG
7356	52.62	-0.75	51.87	74	-22.13	peak
7356	40.15	-0.75	39.4	54	-14.6	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits	Margin (dB)	Detector Type
4904	62.12	-3.43	58.69	74	-15.31	peak
4904	41.57	-3.43	38.14	54	-15.86	AVG
7356	56.37	-0.75	55.62	74	-18.38	peak
7356	47.55	-0.75	46.8	54	-7.2	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark:

(1) Measuring frequencies from 1 GHz to the 25 GHz.

(2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.

(3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.

(4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

(5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

(6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dB μ V/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dB μ V/m(PK Value) <54 dB μ V/m(AV Limit), the Average Detected not need to completed.

**Test Result of Radiated Spurious at Band edges**

Operation Mode:
802.11b Mode TX CH Low (2412MHz)

Horizontal

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2310.00	57.33	-5.81	51.52	74	-22.48	peak
2310.00	48.62	-5.81	42.81	54	-11.19	AVG
2390.00	61.48	-5.84	55.64	74	-18.36	peak
2390.00	53.15	-5.84	47.31	54	-6.69	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2310.00	58.62	-5.81	52.81	74	-21.19	peak
2310.00	48.78	-5.81	42.97	54	-11.03	AVG
2390.00	64.12	-5.84	58.28	74	-15.72	peak
2390.00	48.02	-5.84	42.18	54	-11.82	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High (2462MHz)

Horizontal

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2483.50	60.07	-5.81	54.26	74	-19.74	peak
2483.50	50.12	-5.81	44.31	54	-9.69	AVG
2500.00	57.62	-6.06	51.56	74	-22.44	peak
2500.00	48.34	-6.06	42.28	54	-11.72	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2483.50	59.34	-5.81	53.53	74	-20.47	peak
2483.50	50.15	-5.81	44.34	54	-9.66	AVG
2500.00	57.62	-6.06	51.56	74	-22.44	peak
2500.00	50.23	-6.06	44.17	54	-9.83	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.



Operation Mode: 802.11g Mode TX CH Low (2412MHz)

Horizontal

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2310.00	59.88	-5.81	54.07	74	-19.93	peak
2310.00	46.32	-5.81	40.51	54	-13.49	AVG
2390.00	48.01	-5.84	42.17	74	-31.83	peak
2390.00	47.63	-5.84	41.79	54	-12.21	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2310.00	58.22	-5.81	52.41	74	-21.59	peak
2310.00	48.31	-5.81	42.5	54	-11.5	AVG
2390.00	64.48	-5.84	58.64	74	-15.36	peak
2390.00	49.62	-5.84	43.78	54	-10.22	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High (2462MHz)

Horizontal

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2483.50	58.26	-5.65	52.61	74	-21.39	peak
2483.50	47.99	-5.65	42.34	54	-11.66	AVG
2500.00	56.62	-5.65	50.97	74	-23.03	peak
2500.00	45.28	-5.65	39.63	54	-14.37	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2483.50	58.32	-5.65	52.67	74	-21.33	peak
2483.50	47.88	-5.65	42.23	54	-11.77	AVG
2500.00	55.32	-5.65	49.67	74	-24.33	peak
2500.00	46.21	-5.65	40.56	54	-13.44	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.



Operation Mode: 802.11n/H20 Mode TX CH Low (2412MHz)

Horizontal

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2310.00	59.03	-5.81	53.22	74	-20.78	peak
2310.00	48.62	-5.81	42.81	54	-11.19	AVG
2390.00	61.32	-5.84	55.48	74	-18.52	peak
2390.00	49.67	-5.84	43.83	54	-10.17	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2310.00	58.12	-5.81	52.31	74	-21.69	peak
2310.00	46.62	-5.81	40.81	54	-13.19	AVG
2390.00	62.75	-5.84	56.91	74	-17.09	peak
2390.00	49.11	-5.84	43.27	54	-10.73	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High (2462MHz)

Horizontal

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2483.50	60.12	-5.65	54.47	74	-19.53	peak
2483.50	48.62	-5.65	42.97	54	-11.03	AVG
2500.00	51.32	-5.65	45.67	74	-28.33	peak
2500.00	46.45	-5.65	40.8	54	-13.2	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2483.50	56.21	-5.65	50.56	74	-23.44	peak
2483.50	49.62	-5.65	43.97	54	-10.03	AVG
2500.00	52.62	-5.65	46.97	74	-27.03	peak
2500.00	44.67	-5.65	39.02	54	-14.98	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.



Operation Mode: 802.11n/H40 Mode TX CH Low (2422MHz)

Horizontal

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
2310.00	59.02	-5.81	53.21	74	-20.79	peak
2310.00	/	-5.81	/	54	/	AVG
2390.00	65.26	-5.84	59.42	74	-14.58	peak
2390.00	51.48	-5.84	45.64	54	-8.36	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
2310.00	58.12	-5.81	52.31	74	-21.69	peak
2310.00	/	-5.81	/	54	/	AVG
2390.00	66.43	-5.84	60.59	74	-13.41	peak
2390.00	52.16	-5.84	46.32	54	-7.68	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High (2452MHz)

Horizontal

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2483.50	59.62	-5.65	53.97	74	-20.03	peak
2483.50	/	-5.65	/	54	/	AVG
2500.00	60.33	-5.65	54.68	74	-19.32	peak
2500.00	/	-5.65	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2483.50	59.34	-5.65	53.69	74	-20.31	peak
2483.50	/	-5.65	/	54	/	AVG
2500.00	58.46	-5.65	52.81	74	-21.19	peak
2500.00	/	-5.65	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.



4.8. 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. And according to FCC 47 CFR Section 15.247, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

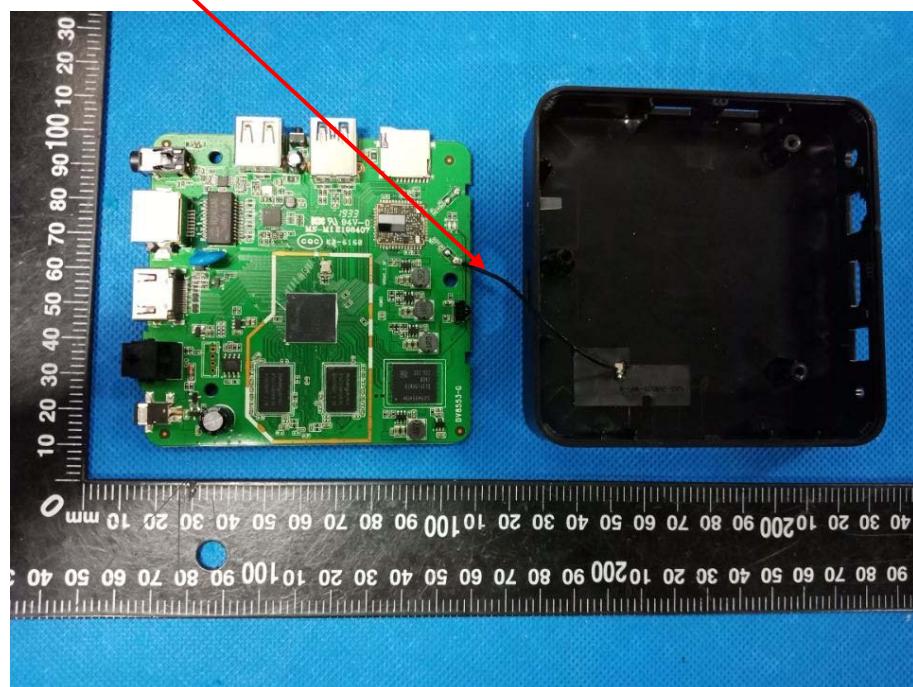
Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

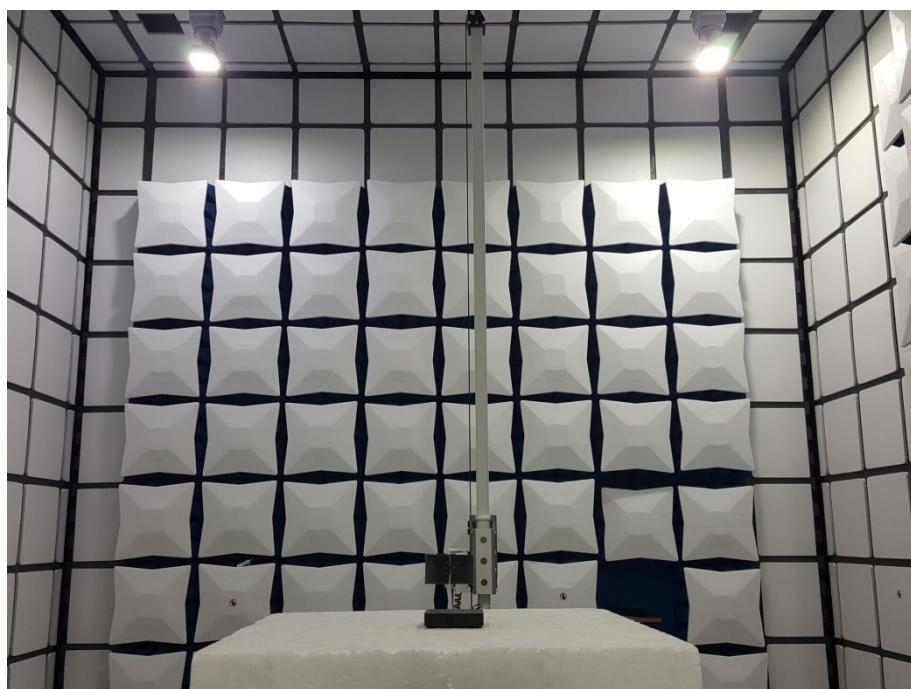
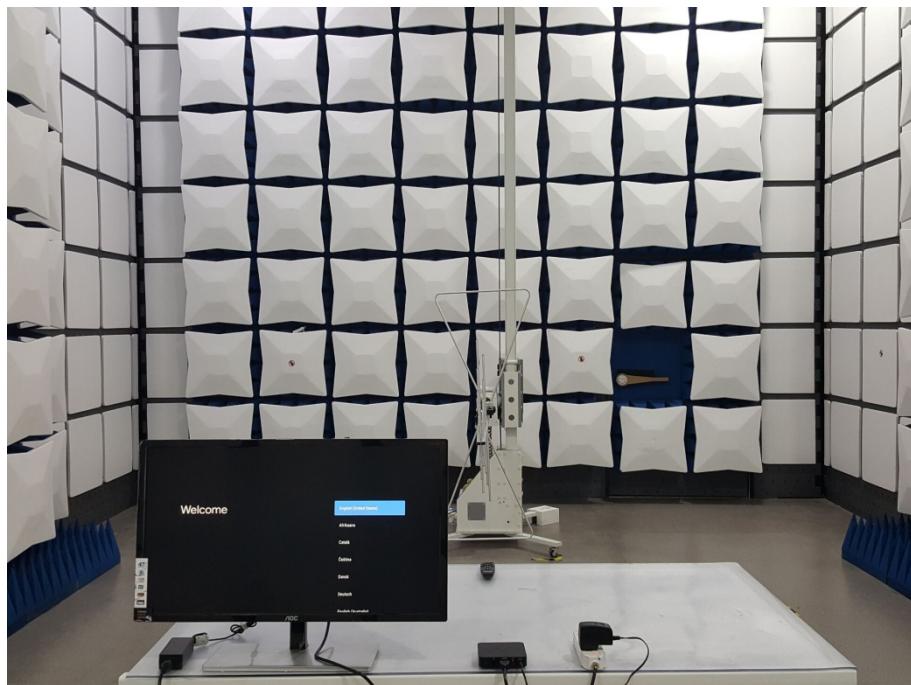
Antenna Connected Construction

The antenna used in this product is a Internal Antenna, The directional gains of antenna used for transmitting is 1dBi.

WIFI ANTENNA



4.9. PHOTOGRAPH OF TEST







4.10. PHOTOS OF THE EUT

Reference to the reporter : ANNEX A of external photos and ANNEX B of internal photos

-----End of test report-----