

## FCC RADIO TEST REPORT

The device described below is tested by Dongguan Nore Testing Center Co., Ltd. to determine the maximum emission levels emanating from the device, the severe levels which the device can endure and E.U.T.'s performance criterion. The test results, data evaluation, test procedures, and equipment of configurations shown in this report were made in accordance with the procedures in ANSI C63.10(2013).

Applicant/ Manufacturer : BESTOM TECHNOLOGY(HK) CO., LIMITED

Address : R718 BuildingB1, Huayuan S&TP, No.168 BY Road Xixiang Street, Shenzhen City, China

Factory : Guangzhou Jinghua Precision Optics Co., Ltd.

Address : 12 Kangda Rd., Dongcheng Zone, Yunpu Industrial District, Huangpu, Guangzhou, China

E.U.T. : Bestable

Brand Name : N/A

Model No. : ET1030

FCC ID : 2ALBPET1030

Measurement Standard : FCC PART 15.247

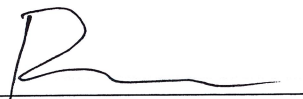
Date of Receiver : November 08, 2019

Date of Test : November 08, 2019 to December 09, 2019

Date of Report : December 09, 2019

This Test Report is Issued Under the Authority of :

Prepared by



Rose Hu / Engineer

Approved & Authorized Signer



Iori Fan / Authorized Signatory

This test report is for the customer shown above and their specific product only. This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan Nore Testing Center Co., Ltd.

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## Revision History of This Test Report

Report Number	Description	Issued Date
NTC1911073FV00	Initial Issue	2019-12-09

## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment under Test

E.U.T.	: Bestable
Main model number	: ET1030
Brand Name	: N/A
Rating	: DC 5V From Type-C USB Port
Test Voltage	: AC 120V 60Hz Adapter Input, AC 240V 60Hz Adapter Input Only the worst case was recorded in the test report.
Cable	: N/A
Adapter	: N/A
Hardware version	: V1.0
Software version	: V1.0
Note	: This report only applies to 2.4G WIFI function.

### Technical parameters (2.4G WIFI function)

Frequency Range	: 2412MHz~2462MHz(802.11b/802.11g/802.11n(HT20))
Modulation Type	: CCK, DQPSK, DBPSK for 802.11b OFDM for 802.11g/n(HT20)
Number of Channel	: 11 for 802.11b/g/n(HT20)
Channel space	: 5MHz
Date Rate	: 802.11b:1~11Mbps, 802.11g:6~54Mbps 802.11n(HT20): 6.5~72.2Mbps
Antenna Type	: Integral antenna
Antenna Gain	: 2 dBi

### WIFI Channel List

802.11 b/g/n(HT20)			
Channel	Frequency MHz	Channel	Frequency MHz
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	-	-
-	-	-	-

**Note:** According to section 15.31(m), regards to the operating frequency range over 10MHz, the Lowest, middle, and the Highest frequency of channel were selected to perform the test. The selected frequency see below:

802.11b/g/n(HT20)	
Channel	Frequency MHz
1	2412
6	2437
11	2462

Test SW version	EngineerMode.apk
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## 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **FCC ID: 2ALBPET1030** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rule.

## 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters.

## 1.4 Equipment Modifications

Not available for this EUT intended for grant.

## 1.5 Support Device

Adapter	: Manufacturer: HUWEI Model No.: HW-050200C01 Input: AC100-240V 50/60Hz, 0.5A Output: DC5V 2A
Notebook	: Manufacturer: Lenovo Model: TP00067A P/N: SL10G10768 S/N: PF-0DS3YC 15/12
Adapter (For Notebook)	: Manufacturer: Lenovo Model: ADLX65NLC3A I/P: AC 100-240V 50-60Hz, 1.8A O/P: DC 20V 3.25A

## 1.6 Test Facility and Location

### Site Description

EMC Lab	: Listed by CNAS, August 13, 2018 The certificate is valid until August 13, 2024 The Laboratory has been assessed and proved to be in compliance with CNAS/CL01 The Certificate Registration Number is L5795.
	Listed by A2LA, November 01, 2017 The certificate is valid until December 31, 2021 The Laboratory has been assessed and proved to be in compliance with ISO17025 The Certificate Registration Number is 4429.01
	Listed by FCC, November 06, 2017 The Designation Number is CN1214 Test Firm Registration Number: 907417
	Listed by Industry Canada, June 08, 2017 The Certificate Registration Number. Is 46405-9743
Name of Firm	: Dongguan Nore Testing Center Co., Ltd. (Dongguan NTC Co., Ltd.)
Site Location	: Building D, Gaosheng Science and Technology park, Hongtu road, Nancheng district, Dongguan city, Guangdong province, China

## 1.7 Deviations and Abnormalities from Standard Conditions

No additions, deviations and exclusions from the standard.

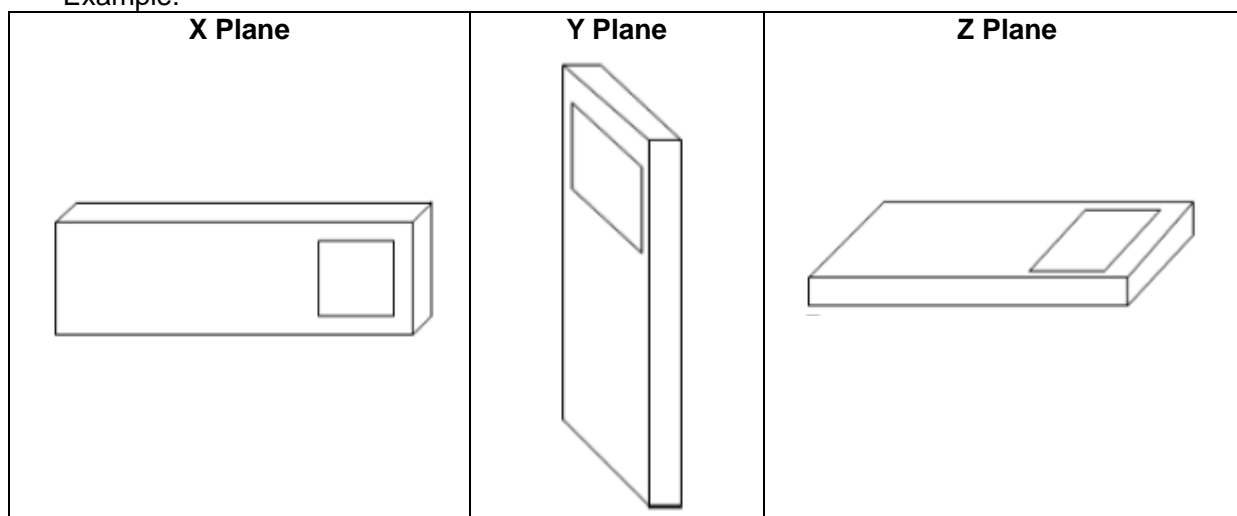


## 1.8 Summary of Test Results

FCC Rules	Description Of Test	Uncertainty	Result
§15.207 (a)	AC Power Conducted Emission	±1.06dB	PASS
§15.247(b)(3)	Max. Conducted Output Power	±1.06dB	PASS
§15.247(a)(2)	6dB Bandwidth	±1.42 x10 <sup>-4</sup> %	PASS
§15.247(e)	Power Spectral Density	±1.06dB	PASS
§15.247(d)	Band Edge and Conducted Spurious Emissions	±1.70dB	PASS
§15.247(d), §15.209,§15.205	Radiated Spurious Emissions and Restricted Bands	±3.70dB	PASS
§15.203	Antenna Requirement	N/A	PASS

Note: The EUT operating multiple positions, therefore the EUT shall be performed three orthogonal planes. The worst plane is X.

Example:



## **2. System Test Configuration**

### **2.1 EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### **2.2 Special Accessories**

Not available for this EUT intended for grant.

### **2.3 Description of test modes**

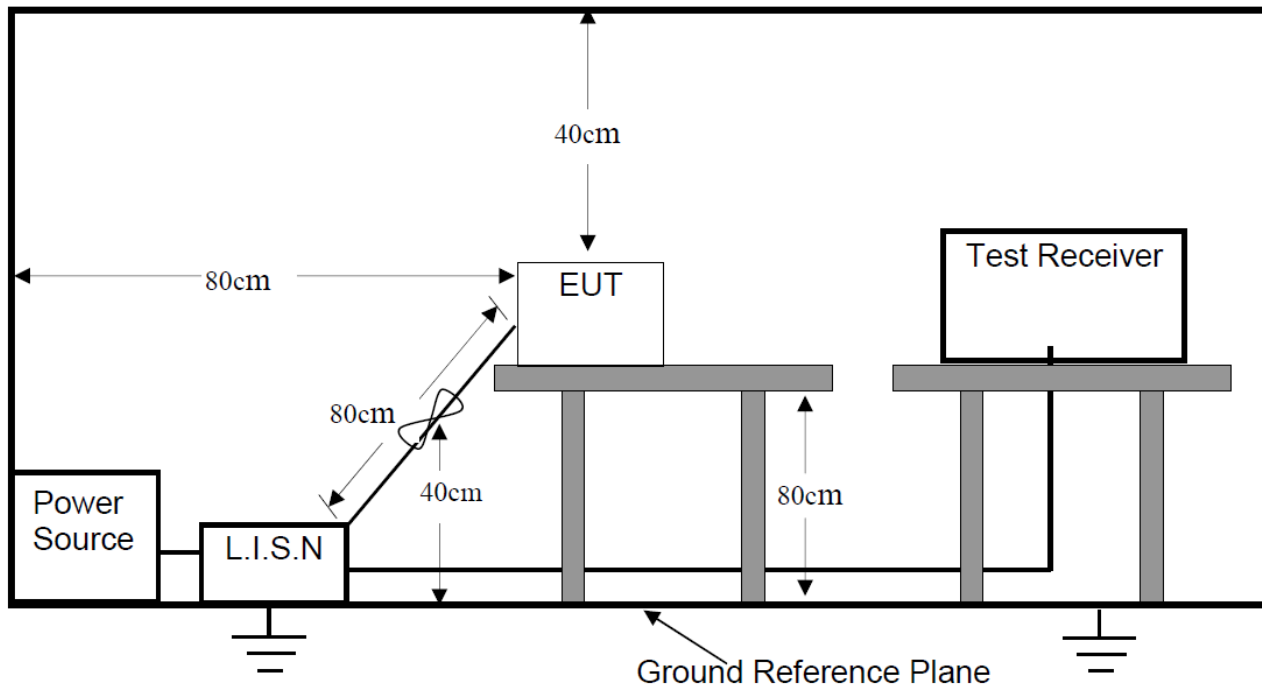
The EUT has been tested under continuous operating condition. Test program used to control the EUT staying in continuous transmitting mode. The Lowest, middle and highest channel were chosen for testing, and modulation type CCK, DQPSK, DBPSK, OFDM and all data rate were tested. But only the worst case data is shown in this report.

### **2.4 EUT Exercise**

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

### 3. Conducted Emissions Test

#### 3.1 Test SET-UP (Block Diagram of Configuration)



#### 3.2 Test Condition

Test Requirement: FCC Part 15.207

Frequency Range: 150 KHz ~ 30 MHz

Detector: RBW 9 KHz, VBW 30 KHz

Operation Mode: TX, TX+ Charging

#### 3.3 Measurement Results

Please refer to following plots of the worst case: 802.11n HT20 High channel  
The worst test voltage: AC 120V 60Hz



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Tel: +86-769-22022444 Fax: +86-769-22022799  
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### Conducted Emission Measurement

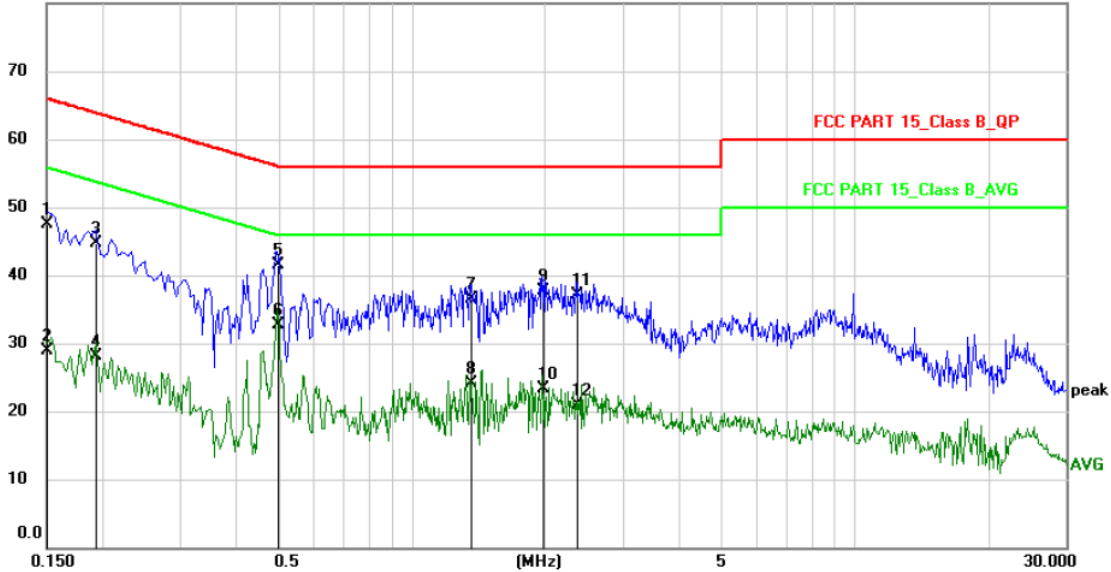
File :ET1030

Data :#5

Date: 2019/12/5

Time: 9:40:13

80.0 dBuV



Site

Phase: **L1**

Temperature: 26

Limit: FCC PART 15\_Class B\_QP

Power: AC120V/60Hz

Humidity: 50 %

EUT: Bestable

M/N: ET1030

Mode: TX-2.4G WIFI

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1500	36.90	10.60	47.50	66.00	-18.50	QP	
2		0.1500	18.30	10.60	28.90	56.00	-27.10	AVG	
3		0.1940	34.10	10.60	44.70	63.86	-19.16	QP	
4		0.1940	17.60	10.60	28.20	53.86	-25.66	AVG	
5		0.4980	30.97	10.63	41.60	56.03	-14.43	QP	
6	*	0.4980	22.17	10.63	32.80	46.03	-13.23	AVG	
7		1.3660	25.90	10.70	36.60	56.00	-19.40	QP	
8		1.3660	13.40	10.70	24.10	46.00	-21.90	AVG	
9		1.9740	27.10	10.70	37.80	56.00	-18.20	QP	
10		1.9740	12.70	10.70	23.40	46.00	-22.60	AVG	
11		2.3500	26.50	10.70	37.20	56.00	-18.80	QP	
12		2.3500	10.20	10.70	20.90	46.00	-25.10	AVG	



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Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

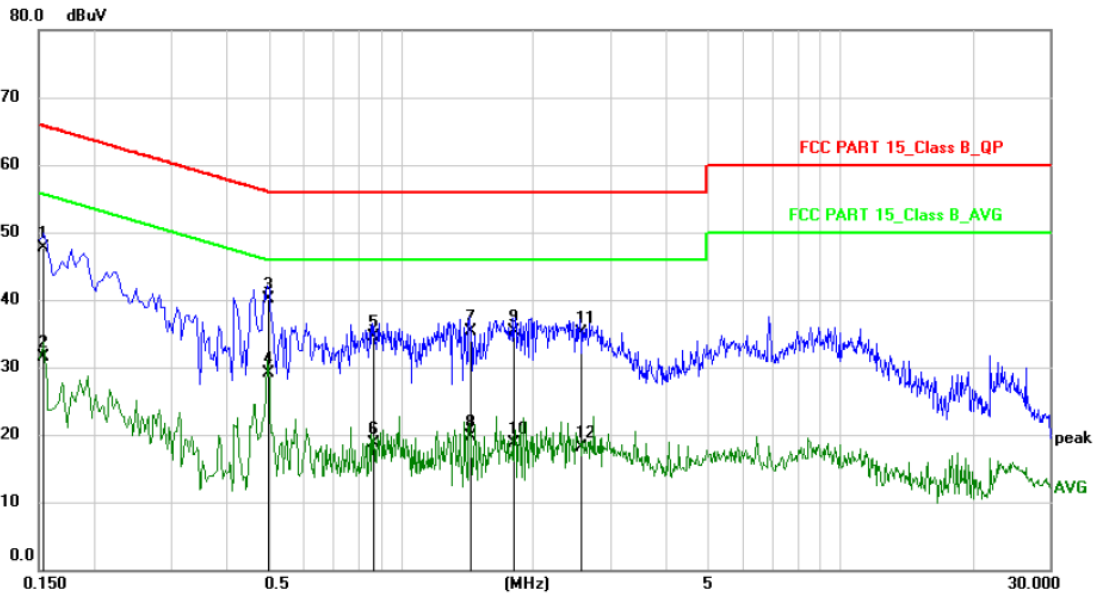
### Conducted Emission Measurement

File :ET1030

Data :#6

Date: 2019/12/5

Time: 9:48:15



Site

Phase: **N**

Temperature: 26

Limit: FCC PART 15\_Class B\_QP

Power: AC120V/60Hz

Humidity: 50 %

EUT: Bestable

M/N: ET1030

Mode: TX-2.4G WIFI

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1539	37.20	10.60	47.80	65.79	-17.99	QP	
2		0.1539	21.00	10.60	31.60	55.79	-24.19	AVG	
3	*	0.4980	29.47	10.63	40.10	56.03	-15.93	QP	
4		0.4980	18.57	10.63	29.20	46.03	-16.83	AVG	
5		0.8660	23.82	10.68	34.50	56.00	-21.50	QP	
6		0.8660	8.02	10.68	18.70	46.00	-27.30	AVG	
7		1.4340	24.70	10.70	35.40	56.00	-20.60	QP	
8		1.4340	9.10	10.70	19.80	46.00	-26.20	AVG	
9		1.8060	24.70	10.70	35.40	56.00	-20.60	QP	
10		1.8060	8.00	10.70	18.70	46.00	-27.30	AVG	
11		2.5660	24.40	10.70	35.10	56.00	-20.90	QP	
12		2.5660	7.50	10.70	18.20	46.00	-27.80	AVG	

## 4. Max. Peak Conducted Output Power

### 4.1 Measurement Procedure

Maximum Conducted Output power at Antenna Terminals, FCC Rules 15.247(b)(3):

One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

### 4.2 Test SET-UP (Block Diagram of Configuration)



### 4.3 Measurement Results

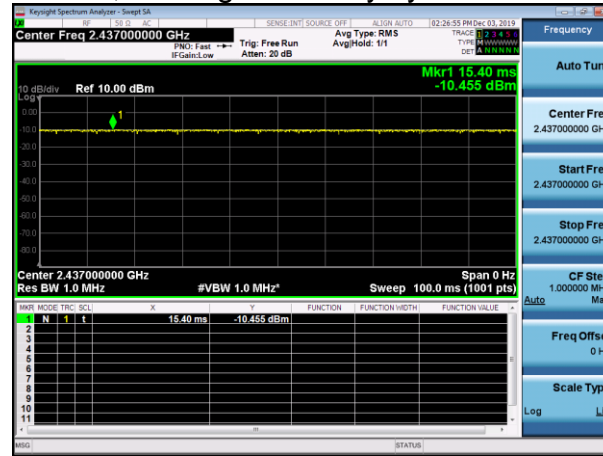
**Pass**

Please refer to following table.

Temperature :	22 °C	Humidity :	53%
Test By:	Sance	Test Date :	December 03, 2019
Test Result:	PASS		
Frequency MHz	Data Rate Mbps	Peak Output Power dBm	Limit dBm
IEEE 802.11b Mode (CCK, Antenna Gain=2 dBi)			
Low Channel: 2412	1	3.30	30
Middle Channel: 2437	1	3.38	30
High Channel: 2462	1	3.30	30
IEEE 802.11g Mode (OFDM, Antenna Gain=2 dBi)			
Low Channel: 2412	6	5.14	30
Middle Channel: 2437	6	5.02	30
High Channel: 2462	6	5.21	30
IEEE 802.11n(HT20) Mode (OFDM, Antenna Gain=2 dBi)			
Low Channel: 2412	6.5	4.90	30
Middle Channel: 2437	6.5	4.71	30
High Channel: 2462	6.5	5.35	30

Note: CCK was worst case of the 802.11b

802.11b, The signal of duty cycle =100%



802.11g: Duty cycle=1.4/1.44=0.972, Duty factor=10\*log(1/0.972)=0.12



802.11n HT20: Duty cycle=1.31/1.35=0.970, Duty factor=10\*log(1/0.970)=0.13





## 5. 6dB Bandwidth

### 5.1 Measurement Procedure

DTS 6dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074(v05):

1. Set resolution bandwidth (RBW) = 100kHz
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

### 5.2 Test SET-UP (Block Diagram of Configuration)



### 5.3 Measurement Results

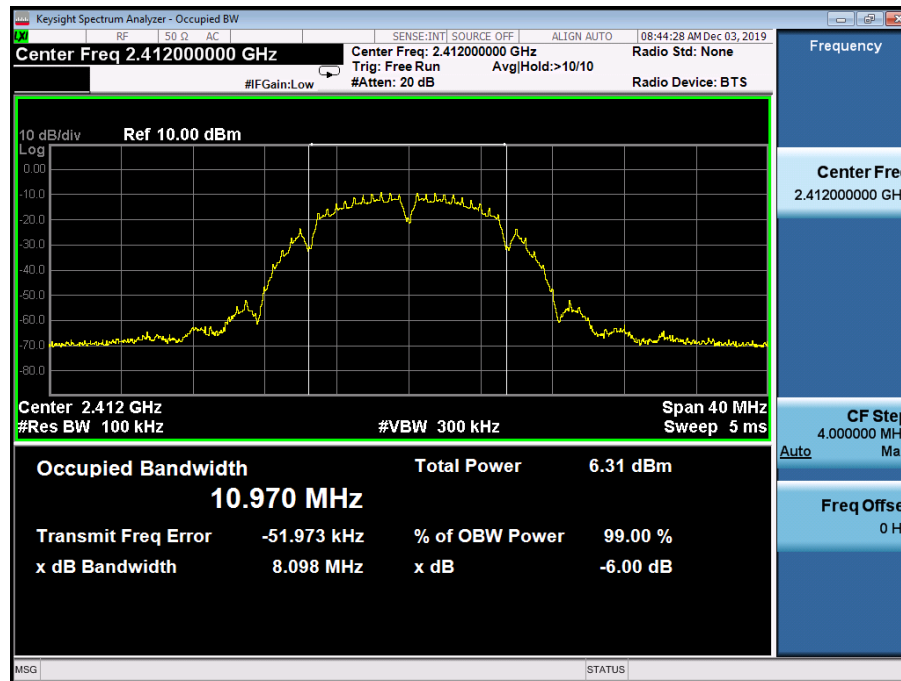
**Pass**

Please refer to following table and plots.

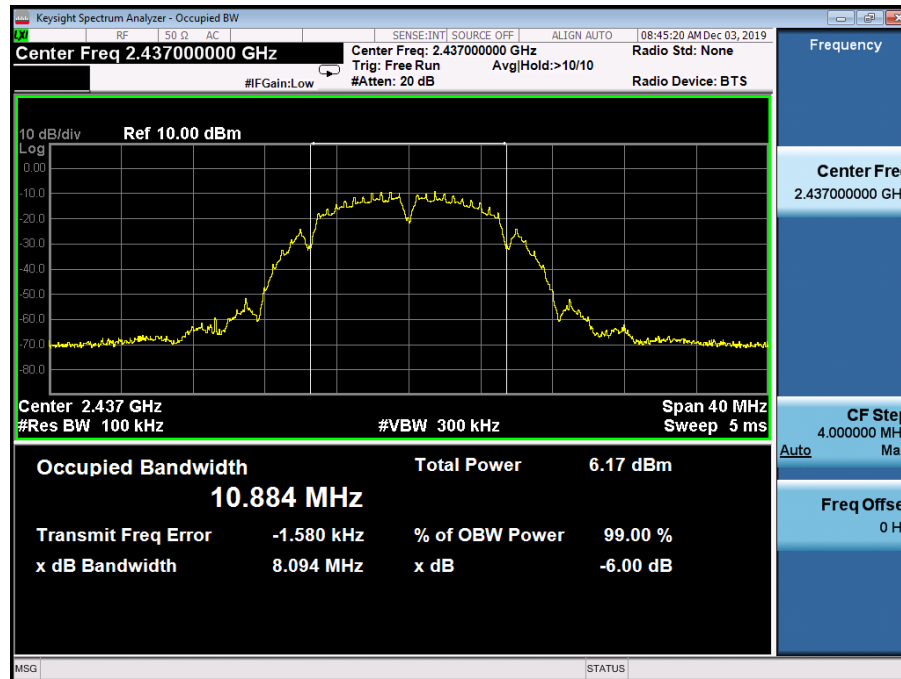
Temperature :	22 °C	Humidity : 53 %	
Test By:	Sance	Test Date : December 03, 2019	
Test Result:	PASS		
Frequency MHz	Data Rate Mbps	6dB Bandwidth MHz	Limit
IEEE 802.11b Mode (CCK)			
Low Channel: 2412	1	8.098	>500KHz
Middle Channel: 2437	1	8.094	>500KHz
High Channel: 2462	1	8.092	>500KHz
IEEE 802.11g Mode (OFDM)			
Low Channel: 2412	6	16.32	>500KHz
Middle Channel: 2437	6	16.31	>500KHz
High Channel: 2462	6	16.31	>500KHz
IEEE 802.11n(HT20) Mode (OFDM)			
Low Channel: 2412	6.5	17.28	>500KHz
Middle Channel: 2437	6.5	17.57	>500KHz
High Channel: 2462	6.5	17.52	>500KHz

Note: CCK was worst case of the 802.11b

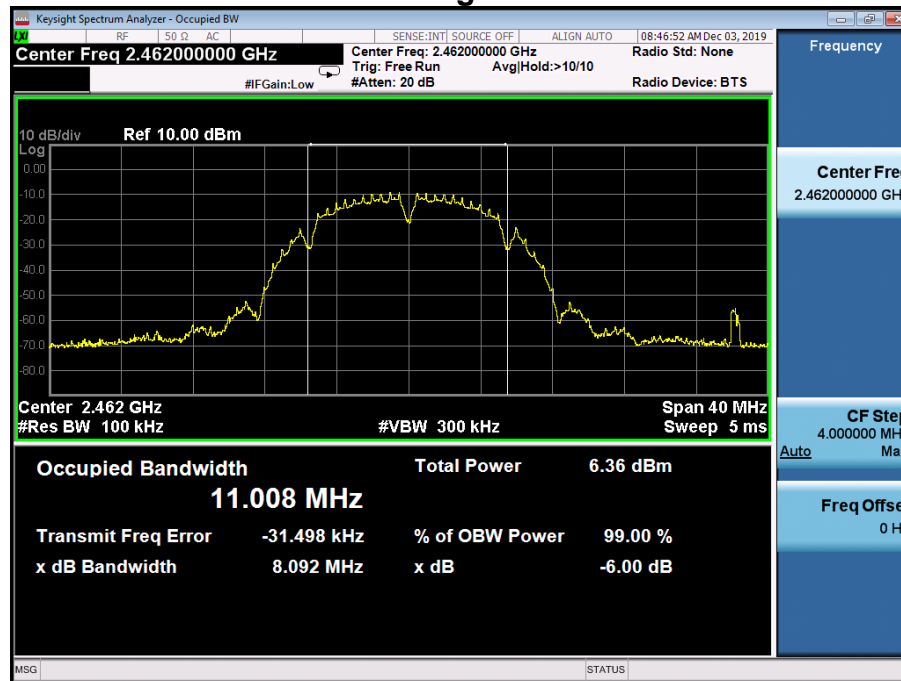
### 802.11b Low Channel



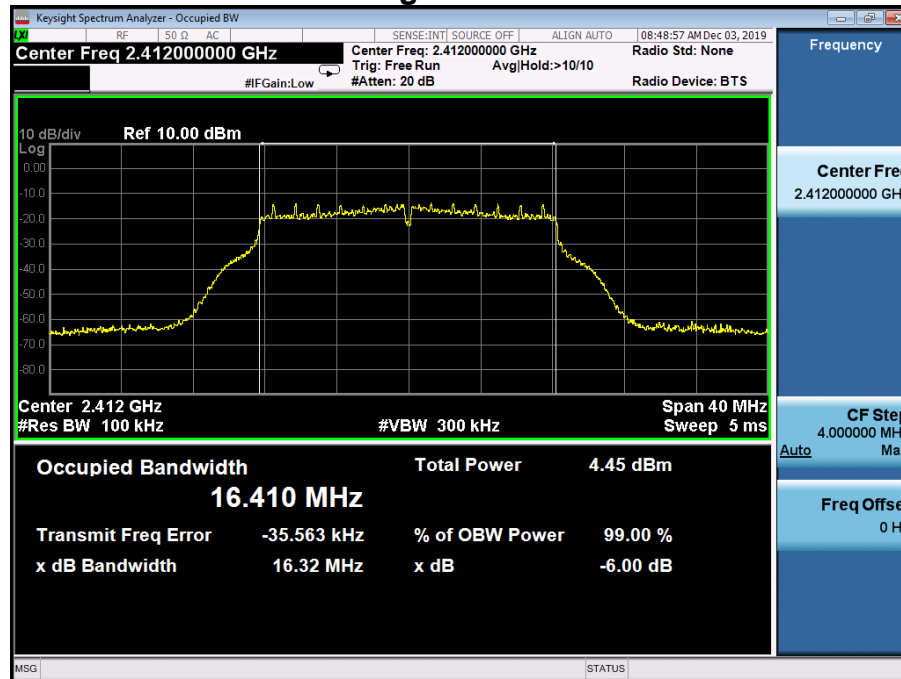
### 802.11b Middle Channel



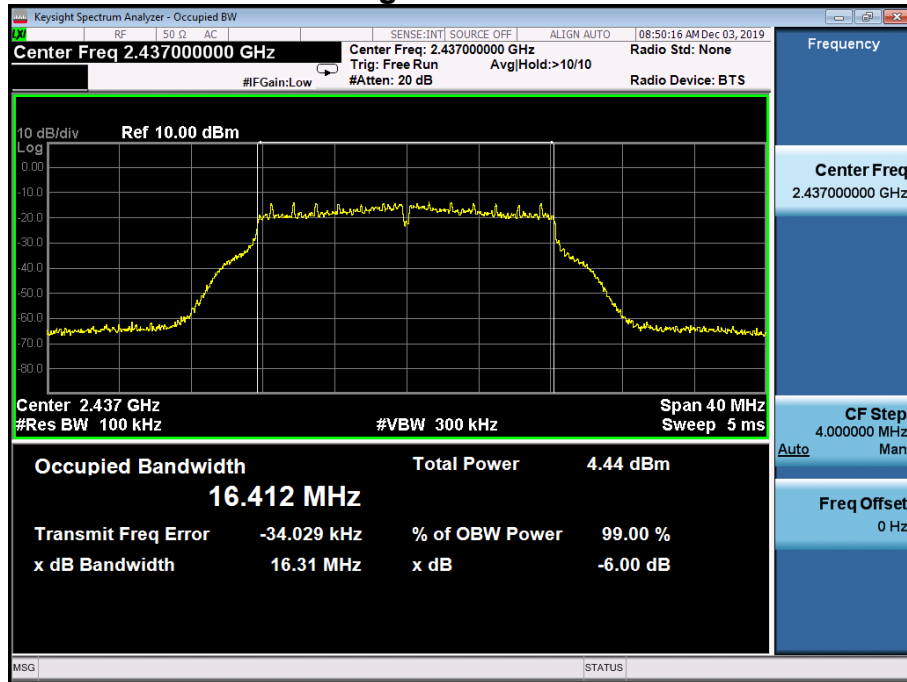
## 802.11b High Channel



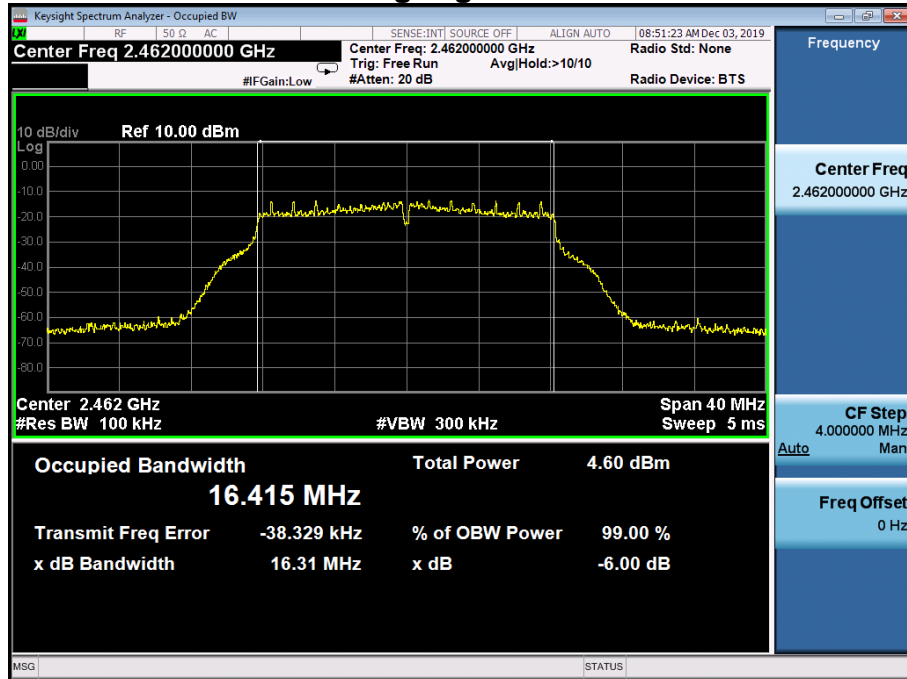
## 802.11g Low Channel



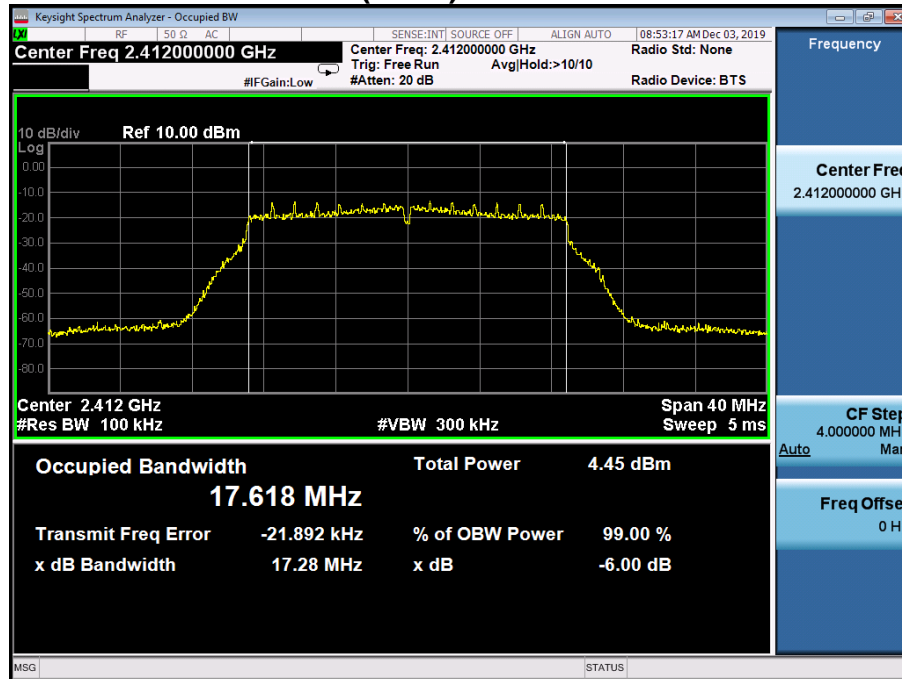
### 802.11g Middle Channel



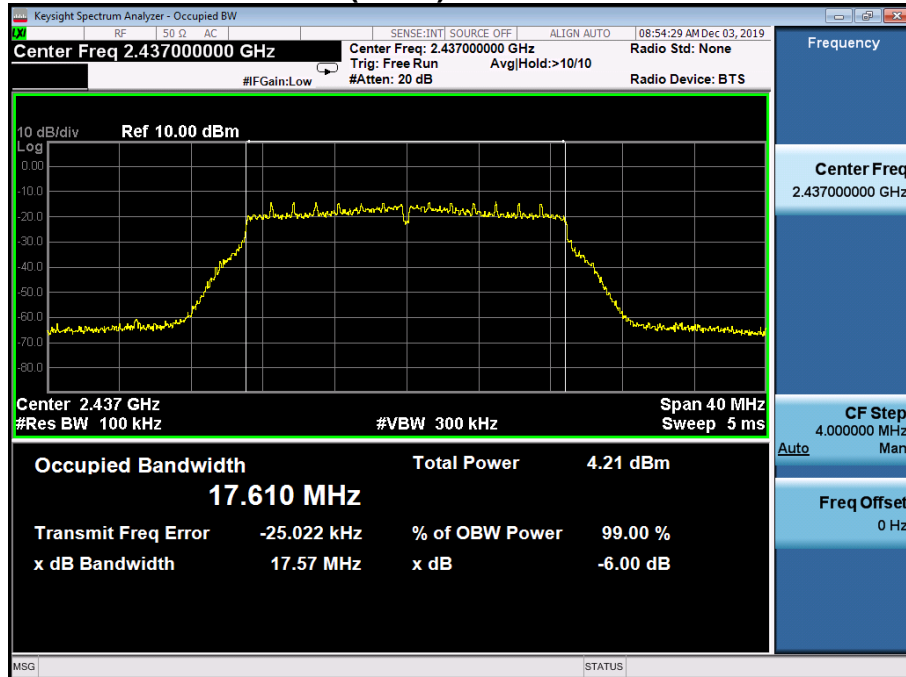
### 802.11g High Channel



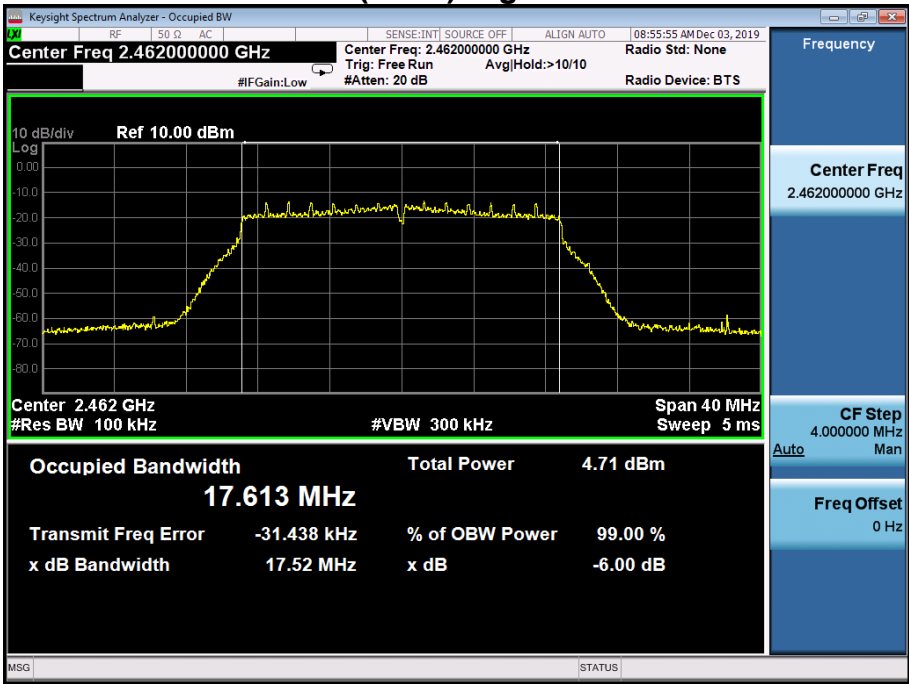
### 802.11n(HT20) Low Channel



### 802.11n(HT20) Middle Channel



802.11n(HT20) High Channel



## 6. Power Spectral Density

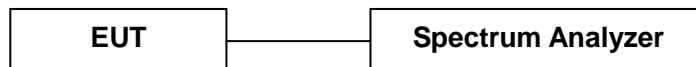
### 6.1 Measurement Procedure

Power Spectral Density, FCC Rule 15.247(e):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074 (v05):

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3\text{ kHz} \leq \text{RBW} \leq 100\text{ KHz}$
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 6.2 Test SET-UP (Block Diagram of Configuration)



### 6.3 Measurement Results

**Pass**

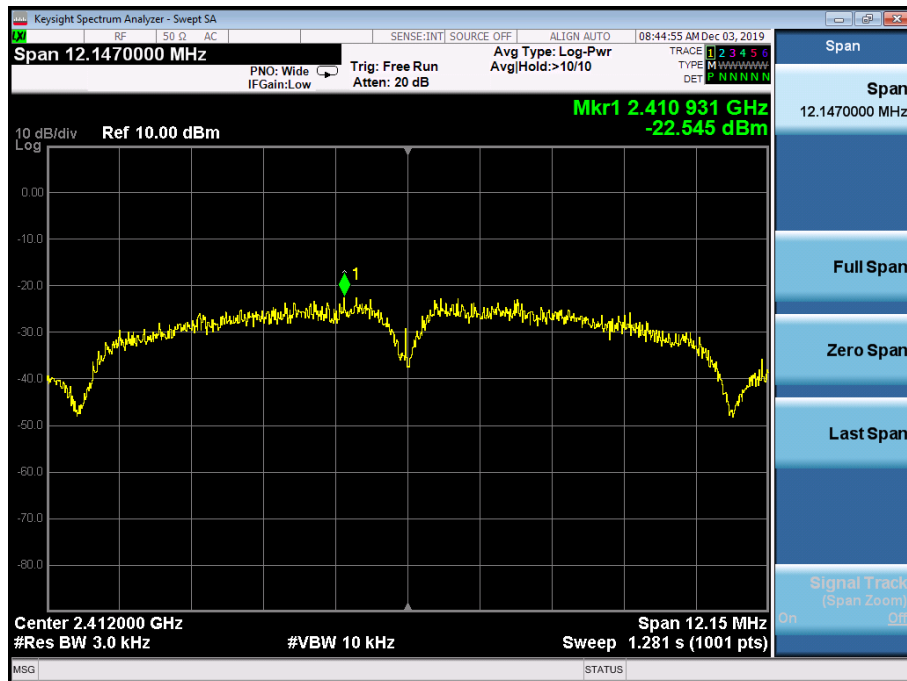
Please refer to following table and plots.



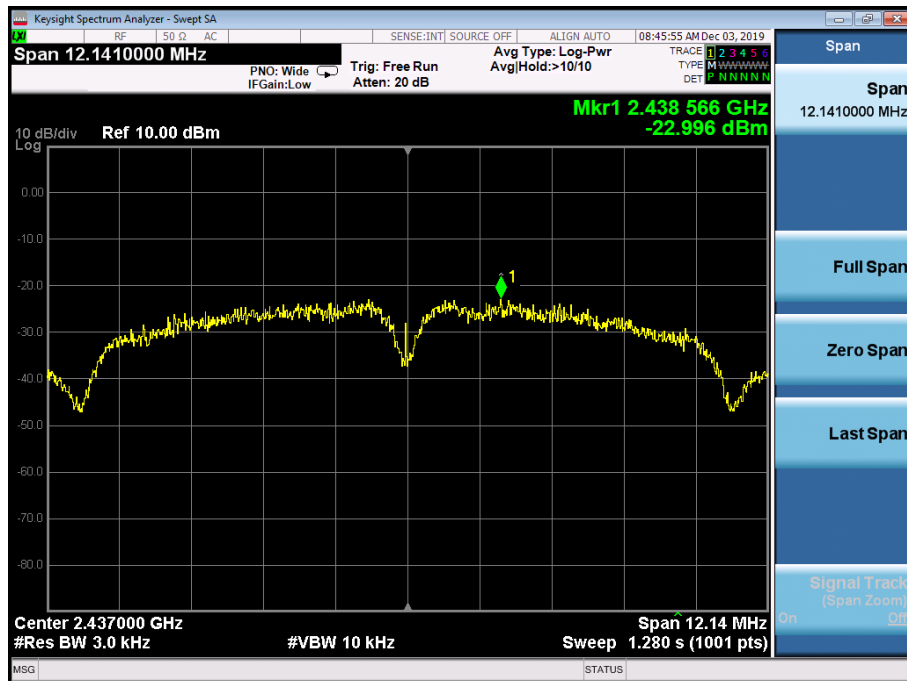
Temperature :	22 °C	Humidity :	53 %
Test By:	Sance	Test Date :	December 03, 2019
Test Result:	PASS		
Frequency MHz	Data Rate Mbps	PSD dBm/3kHz	Limit dBm/3kHz
IEEE 802.11b Mode (CCK)			
Low Channel: 2412	1	-22.55	8
Middle Channel: 2437	1	-23.00	8
High Channel: 2462	1	-21.09	8
IEEE 802.11g Mode (OFDM)			
Low Channel: 2412	6	-25.24	8
Middle Channel: 2437	6	-24.04	8
High Channel: 2462	6	-24.09	8
IEEE 802.11n(HT20) Mode (OFDM)			
Low Channel: 2412	6.5	-25.35	8
Middle Channel: 2437	6.5	-25.53	8
High Channel: 2462	6.5	-25.16	8

Note: CCK was worst case of the 802.11b

### 802.11b Low Channel

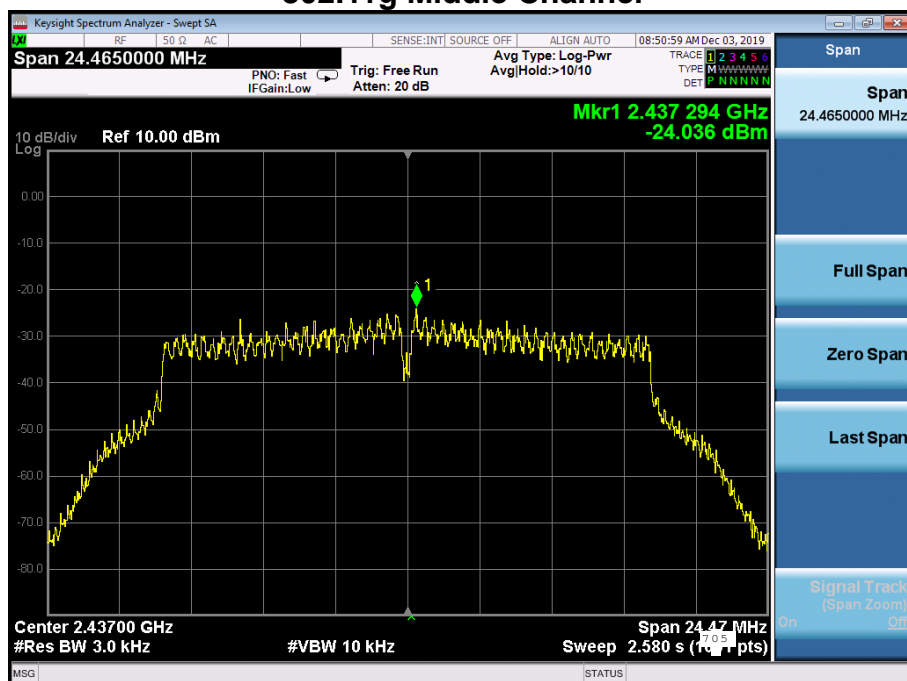


### 802.11b Middle Channel

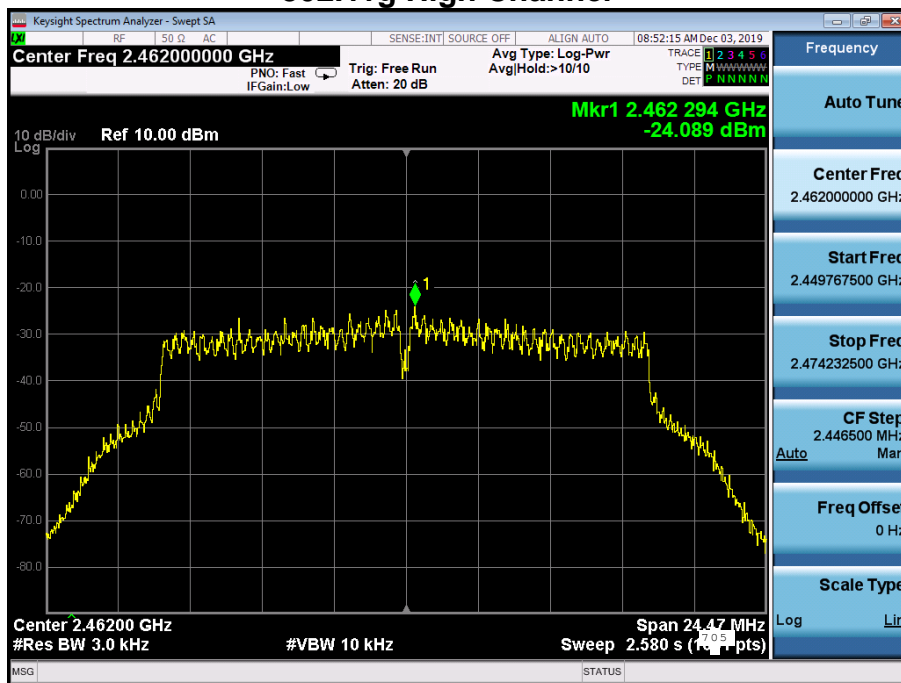




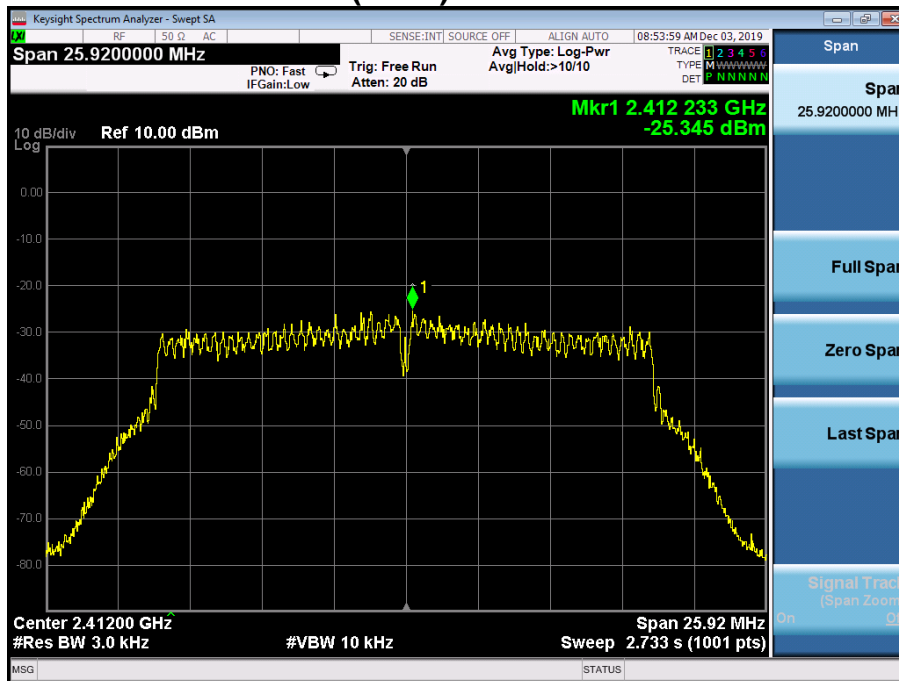
## 802.11g Middle Channel



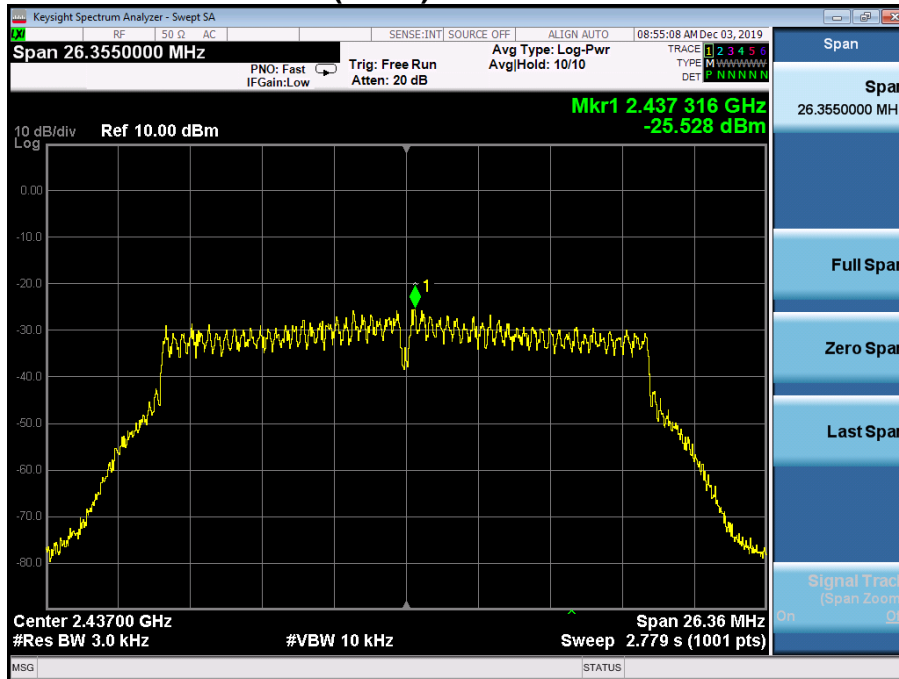
## 802.11g High Channel

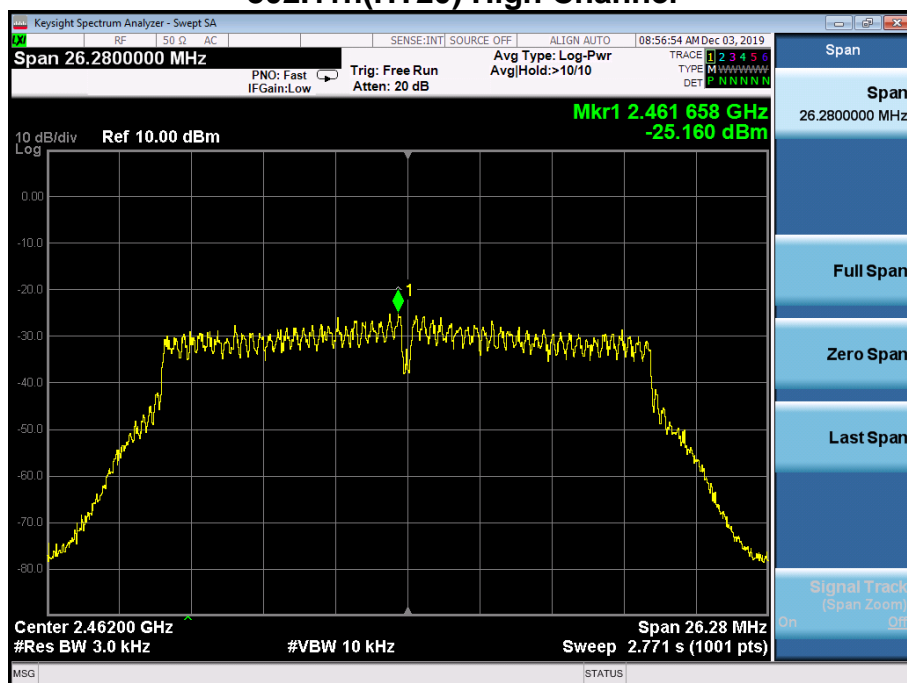


### 802.11n(HT20) Low Channel



### 802.11n(HT20) Middle Channel





## 7. Band Edge and Conducted Spurious Emissions

### 7.1 Requirement and Measurement Procedure

In any 100KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below.

#### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

#### MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

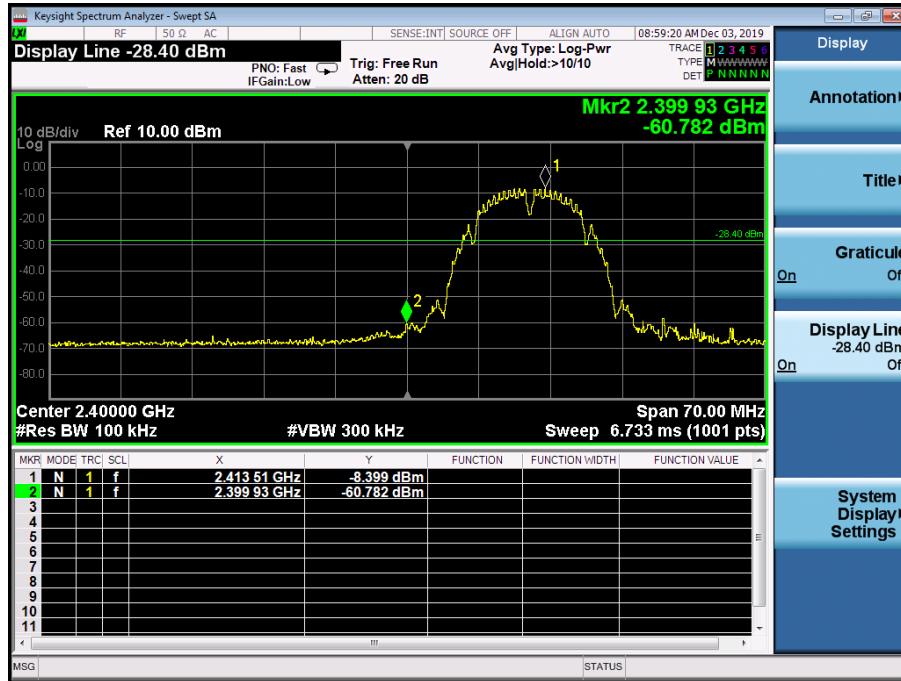
### 7.2 Test SET-UP (Block Diagram of Configuration)



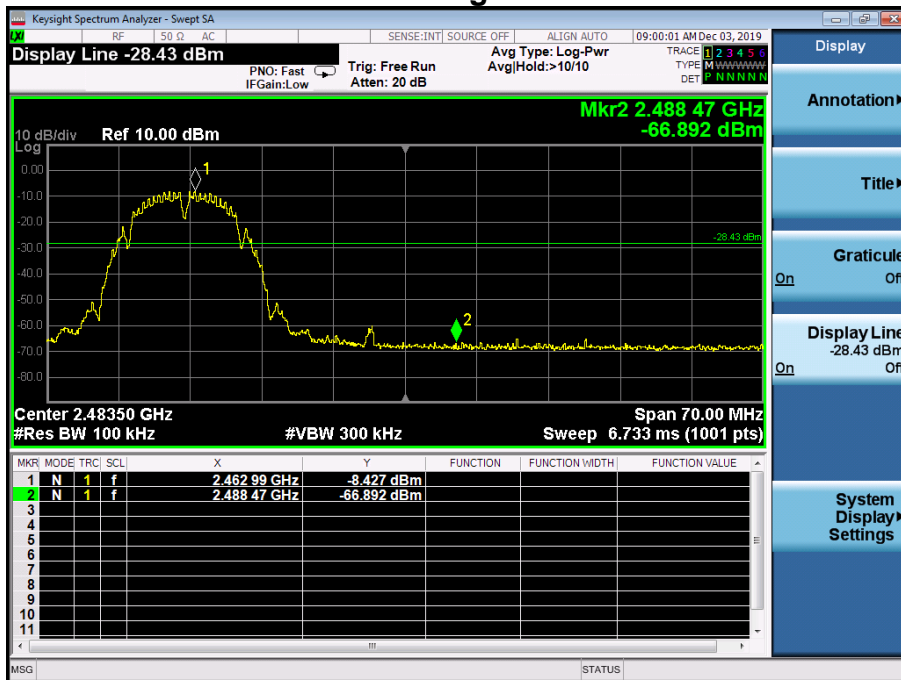
### 7.3 Measurement Results

The test plots and table showed all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the highest level of the desired power in the passband. Please refer to below plots.

## Band Edge 802.11b CCK Low Channel



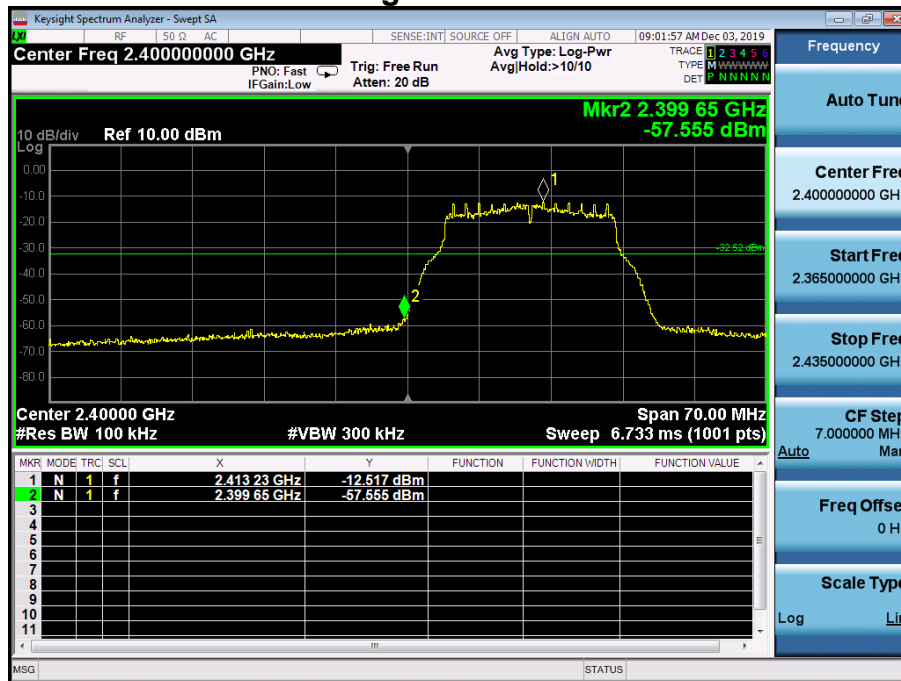
## 802.11b CCK High Channel



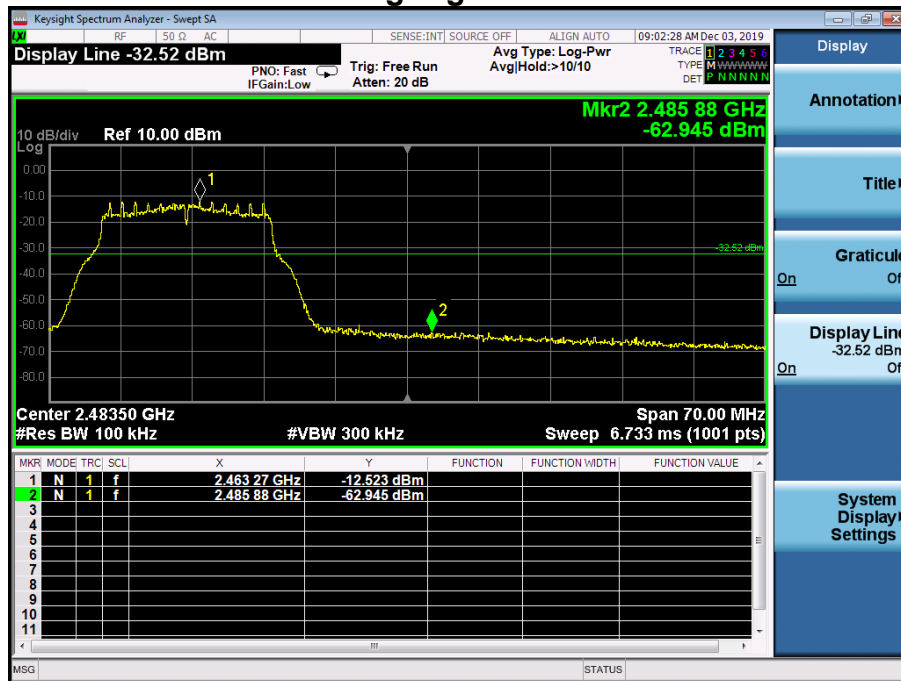
Note: CCK was worst case of the 802.11b



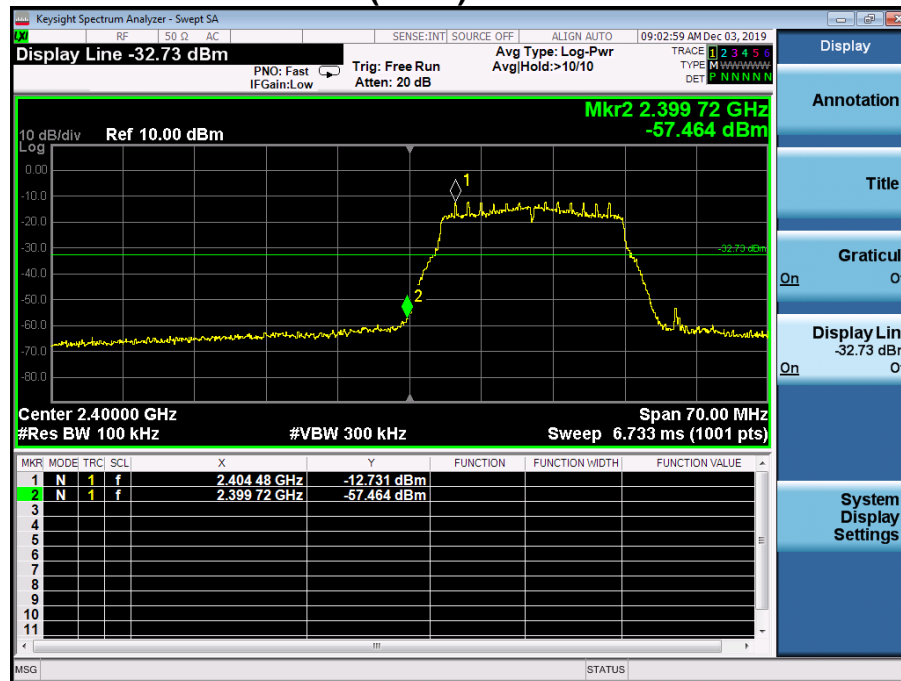
## 802.11g Low Channel



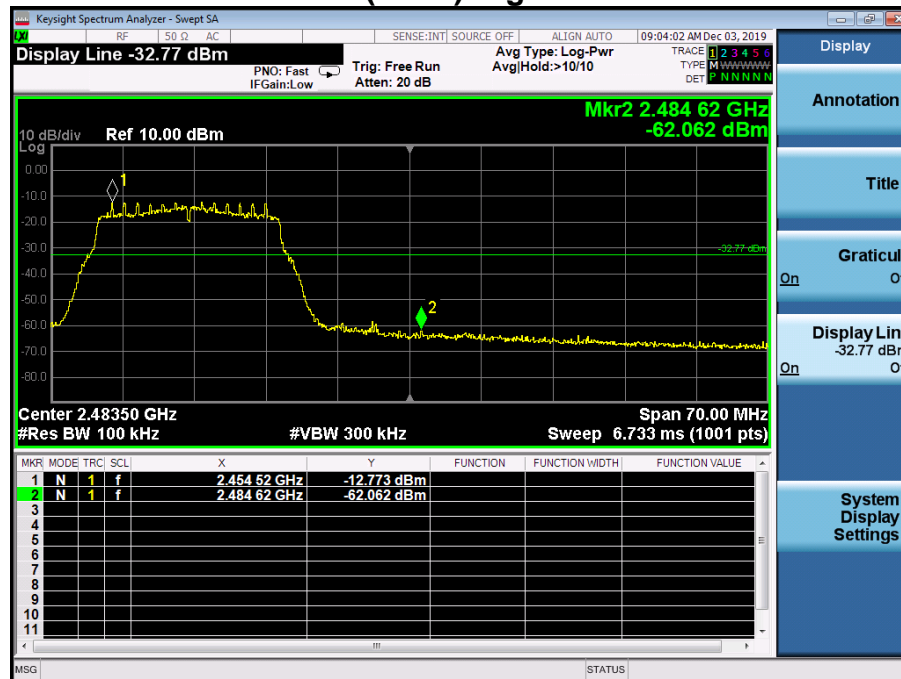
## 802.11g High Channel



### 802.11n(HT20) Low Channel



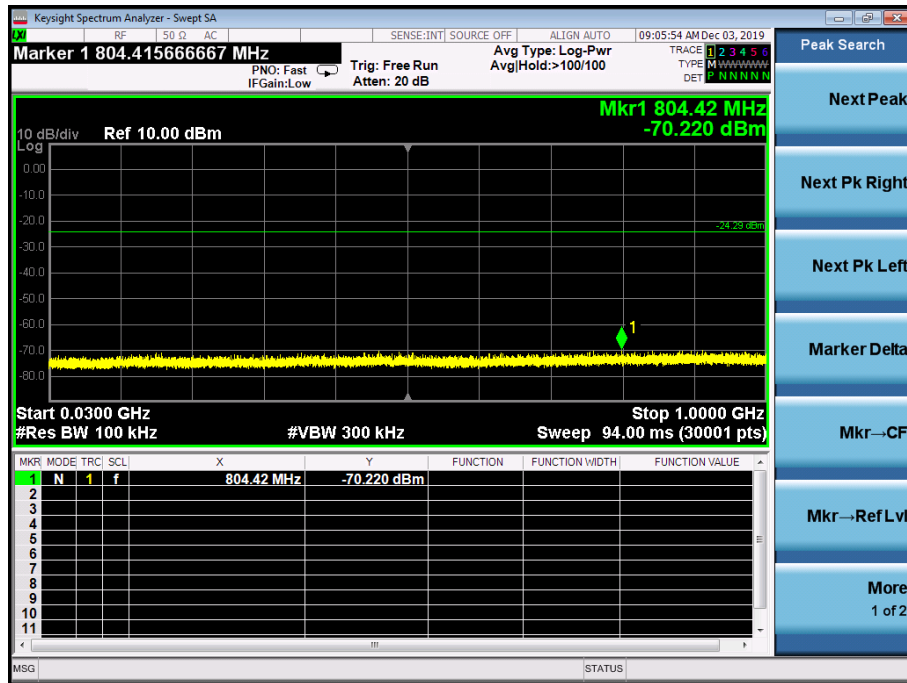
### 802.11n(HT20) High Channel



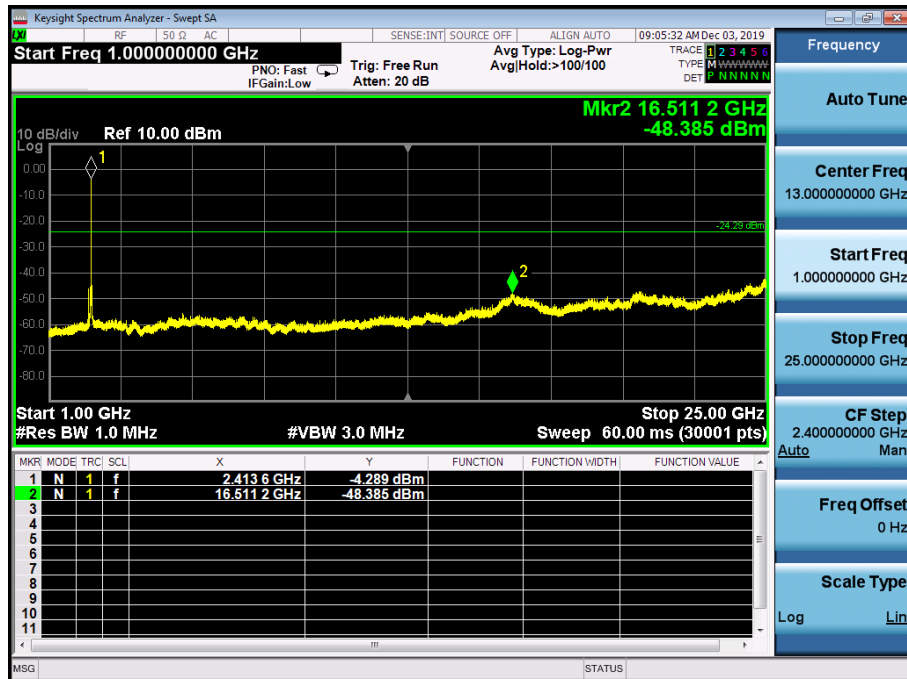
## Conducted Spurious Emissions

### The worst case: 802.11n(HT20)

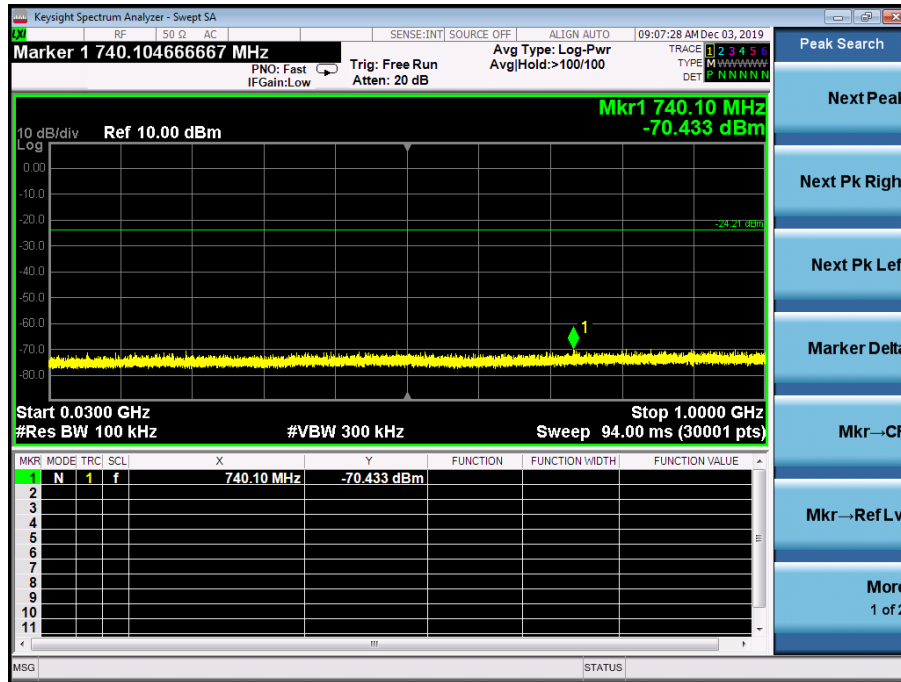
### Low Channel Below 1G



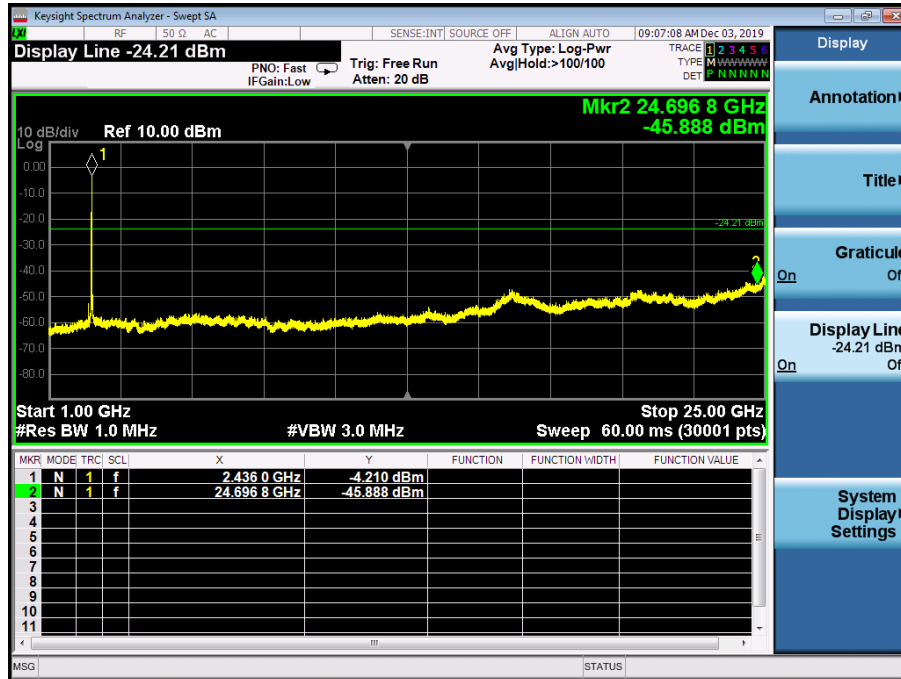
### Above 1G



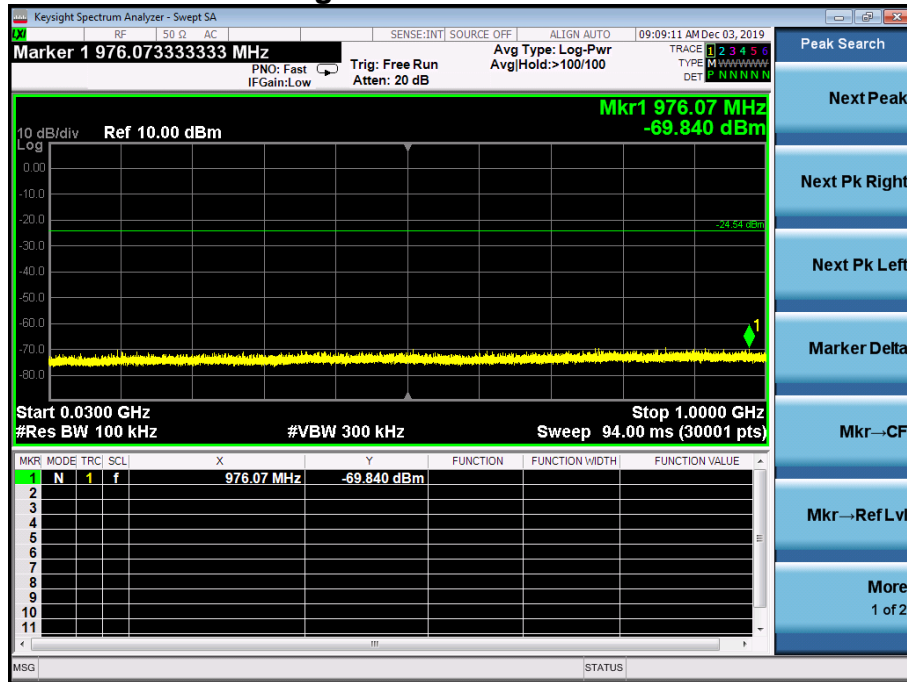
### Middle Channel Below 1G



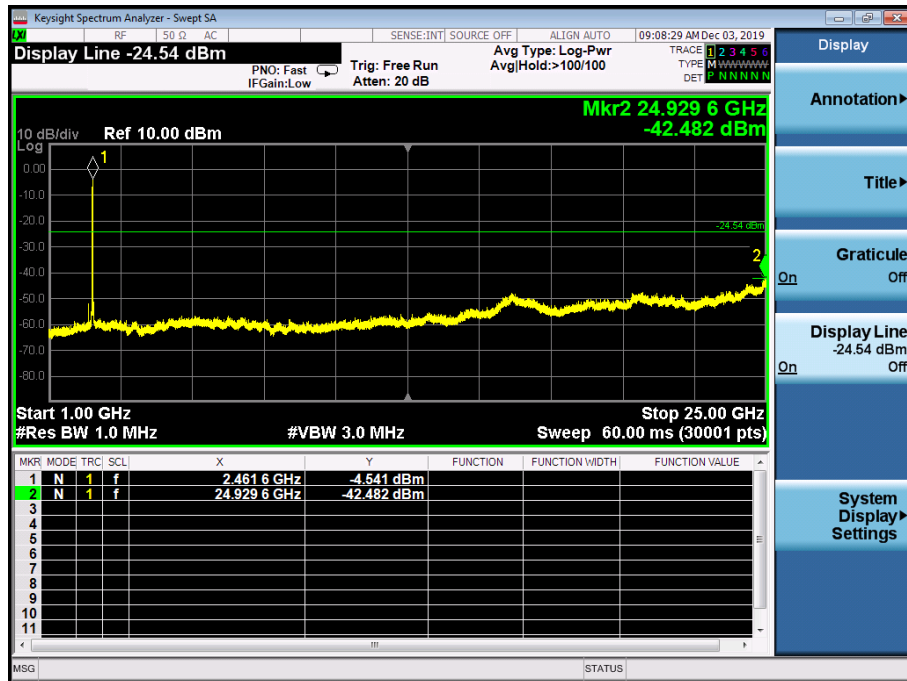
### Above 1G



## High Channel Below 1G



## Above 1G

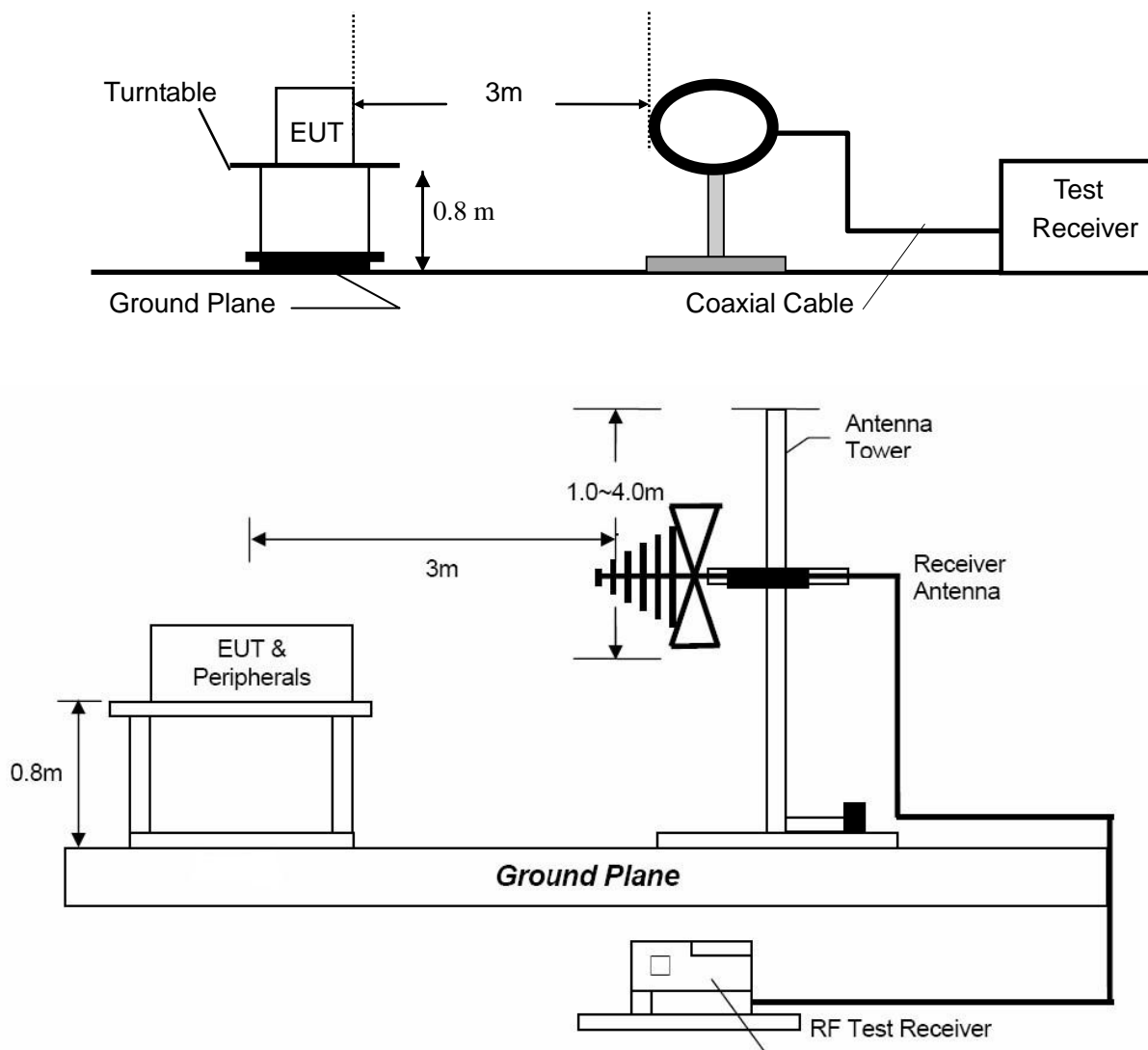


Note: Sweep points=30001pts

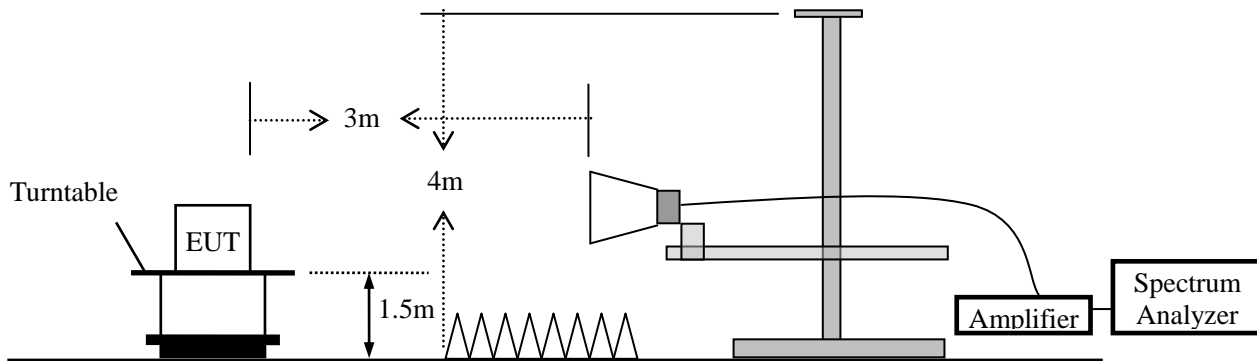
## 8. Radiated Spurious Emissions and Restricted Bands

### 8.1 Test SET-UP (Block Diagram of Configuration)

#### 8.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz



### 8.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



### 8.2 Measurement Procedure

- Blow 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.
- For the radiated emission test above 1GHz:  
The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna 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 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.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Band (MHz)	Level	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	10 Hz

### 8.3 Limit

Frequency range MHz	Distance Meters	Field Strengths Limit (& 15.209)
		$\mu\text{V/m}$
0.009 ~ 0.490	300	$2400/F(\text{kHz})$
0.490 ~ 1.705	30	$24000/F(\text{kHz})$
1.705 ~ 30	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960	3	500

- Remark:
- (1) Emission level  $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$
  - (2) The smaller limit shall apply at the cross point between two frequency bands.
  - (3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
  - (4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.
  - (5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.



#### 8.4 Measurement Results

Please refer to following plots of the worst case: 802.11n HT20 High Channel.  
The worst test voltage: AC 120V 60Hz



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Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

### Radiated Emission Measurement

File : ET1030 Data : #55 Date : 2019/12/6 Time : 8:58:07



Site: Polarization: **Horizontal** Temperature: 26  
Limit: FCC Part 15\_ClassB\_3M Power: AC120V/60Hz Humidity: 47 %  
EUT: Bestable Distance: 3m  
M/N: ET1030  
Mode: TX-2.4G WIFI  
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		166.7700	36.52	-14.92	21.60	43.50	-21.90	QP		
2		234.6700	34.76	-12.26	22.50	46.00	-23.50	QP		
3	*	277.3500	48.83	-11.03	37.80	46.00	-8.20	QP		
4		314.2100	46.19	-10.09	36.10	46.00	-9.90	QP		
5		358.8299	39.34	-9.14	30.20	46.00	-15.80	QP		
6		399.5700	39.61	-9.11	30.50	46.00	-15.50	QP		

**Note:** Below 30MHz, the emissions are lower than 20dB below the allowable limit.



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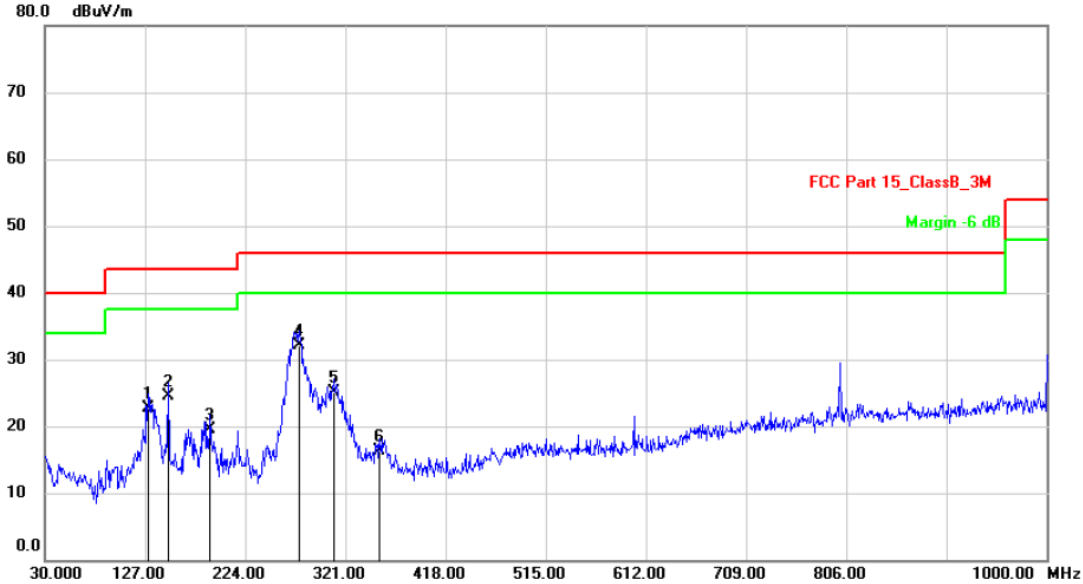
### Radiated Emission Measurement

File : ET1030

Data : #56

Date: 2019/12/6

Time: 9:03:36



Site

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part 15\_ClassB\_3M

Power: AC120V/60Hz

Humidity: 47 %

EUT: Bestable

Distance: 3m

M/N: ET1030

Mode: TX-2.4G WIFI

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		129.9100	40.95	-18.15	22.80	43.50	-20.70	QP			
2		149.3100	43.12	-18.52	24.60	43.50	-18.90	QP			
3		190.0500	36.17	-16.57	19.60	43.50	-23.90	QP			
4	*	276.3800	45.26	-13.06	32.20	46.00	-13.80	QP			
5		310.3299	37.30	-12.20	25.10	46.00	-20.90	QP			
6		353.9800	27.52	-11.12	16.40	46.00	-29.60	QP			

**Note:** Below 30MHz, the emissions are lower than 20dB below the allowable limit.

Test Mode: The worst case: Test Date : December 07, 2019  
802.11n HT20  
Frequency Range: Above 1GHz Temperature : 24°C  
Test Result: PASS Humidity : 47 %  
Measured Distance: 3m Test By: Sance

Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)										
4824	V	46.71	31.58	6.38	53.09	37.96	74.00	54.00	-20.91	-16.04
7236	V	46.66	31.21	10.48	57.14	41.69	74.00	54.00	-16.86	-12.31
---										
4824	H	46.92	32.14	6.38	53.30	38.52	74.00	54.00	-20.7	-15.48
7236	H	46.59	31.23	10.48	57.07	41.71	74.00	54.00	-16.93	-12.29
---										
Operation Mode: TX Mode (Mid)										
4874	V	47.11	31.65	6.56	53.67	38.21	74.00	54.00	-20.33	-15.79
7311	V	46.11	31.06	10.53	56.64	41.59	74.00	54.00	-17.36	-12.41
---										
4874	H	46.86	31.45	6.56	53.42	38.01	74.00	54.00	-20.58	-15.99
7311	H	46.25	31.36	10.53	56.78	41.89	74.00	54.00	-17.22	-12.11
---										
Operation Mode: TX Mode (High)										
4924	V	46.12	31.31	6.83	52.95	38.14	74.00	54.00	-21.05	-15.86
7386	V	46.19	30.66	10.59	56.78	41.25	74.00	54.00	-17.22	-12.75
---										
4924	H	46.02	31.63	6.83	52.85	38.46	74.00	54.00	-21.15	-15.54
7386	H	46.37	30.69	10.59	56.96	41.28	74.00	54.00	-17.04	-12.72
---										

- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level + Factor
  - (3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
  - (4) Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
  - (5) Measurement uncertainty :  $\pm 3.7$ dB.
  - (6) Horn antenna used for the emission over 1000MHz.

Spurious Emission in restricted band:

Operation Mode:	TX	Test Date :	December 07, 2019
Frequency Range:	Above 1GHz	Temperature :	24 °C
Test Result:	PASS	Humidity :	47 %
Measured Distance:	3m	Test By:	Sance

Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
The worst case:										
Test Mode: 802.11n HT20										
2390.000	H	57.47	37.04	0.09	57.56	37.13	74.00	54.00	-16.44	-16.87
2390.000	V	49.75	33.28	0.09	49.84	33.37	74.00	54.00	-24.16	-20.63
2483.500	H	51.24	33.65	0.35	51.59	34.00	74.00	54.00	-22.41	-20.00
2483.500	V	46.88	32.39	0.35	47.23	32.74	74.00	54.00	-26.77	-21.26

**Note:** (1) All Readings are Peak Value and AV.  
(2) Emission Level= Reading Level+Probe Factor +Cable Loss  
(3) Measurement uncertainty :  $\pm 3.7$ dB

## 9. Antenna Application

### 9.1 Antenna requirement

According to of FCC part 15C section 15.203 and 15.240:

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.

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

### 9.2 Measurement Results

The antenna is integral antenna that no antenna other than furnished by the responsible party shall be used with the device, and the best case gain of the antenna is 2 dBi, So, the antenna is consider meet the requirement.

## 10. Test Equipment List

Description	Manufacturer	Model Number	Serial Number	Characteristics	Calibration Date	Calibration Due Date
Test Receiver	Rohde & Schwarz	ESCI7	100837	9KHz~7GHz	Mar. 13, 2019	1 Year
Antenna	Schwarzbeck	VULB9162	9162-010	30MHz~7GHz	Mar. 22, 2019	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	20Hz~26.5GHz	Mar. 13, 2019	1 Year
Spectrum Analyzer	Keysight	N9020A	MY54200831	20Hz~26.5GHz	Apr. 23, 2019	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSV40	101003	10Hz~40GHz	Apr. 23, 2019	1 Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-372	15GHz~40GHz	Mar. 22, 2019	1 Year
Pre-Amplifier	EMCI	EMC 184045	980102	18GHz~40GHz	Apr. 23, 2019	1 Year
Power Sensor	DARE	RPR3006W	15I00041SN O64	100MHz~6GHz	Mar. 13, 2019	1 Year
Communication Tester	Rohde & Schwarz	CMW500	149004	70MHz~6GHz	Mar. 13, 2019	1 Year
Horn Antenna	COM-Power	AH-118	071078	500MHz~18GHz	Mar. 22, 2019	1 Year
Pre-Amplifier	HP	HP 8449B	3008A00964	1GHz~26.5GHz	Mar. 13, 2019	1 Year
Pre-Amplifier	HP	HP 8447D	1145A00203	100KHz~1.3GHz	Mar. 13, 2019	1 Year
Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	9KHz~30MHz	Apr. 23, 2019	1 Year
Temperature & Humidity Chamber	REMAFEE	SYHR225L	N/A	-40~150℃	Apr. 23, 2019	1 Year
DC Source	MY	MY8811	N/A	0~30V	N/A	N/A
Temporary antenna connector	TESCOM	SS402	N/A	9KHz~25GHz	N/A	N/A
Power Meter	Anritsu	ML2495A	1139001	100k-65GHz	Apr. 23, 2019	1 Year
Power Sensor	Anritsu	MA2411B	100345	300M-40GHz	Apr. 23, 2019	1 Year
Test Software	EZ	EZ_EMC	N/A	N/A	N/A	N/A
Test Receiver	Rohde & Schwarz	ESCI	101152	9KHz-3GHz	Mar. 14, 2019	1 Year
L.I.S.N	Rohde & Schwarz	ENV 216	101317	9KHz-30MHz	Mar. 14, 2019	1 Year
RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	9KHz-3GHz	Mar.14, 2019	1 Year

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

---End---