

## FCC Test Report

**Report No.:** HP190830DC001-FWL**FCC ID:** 2ARER-SA10**Product Name** Nooie Smart Power Strip**Test Model:** SA10**Series Model:** N/A**Received Date:** 2019-8-30**Test Date:** 2019-8-30~2019-9-18**Issued Date:** 2019-9-30**Applicant Name:** Shenzhen Apeman Innovations Technology Co.,Ltd**Applicant Address:** Building P11, Huanancheng, Longgang District, Shenzhen, China**Issued By:** Hwa-Hsing (Dongguan) Testing Co., Ltd.**Lab Address:** No.101, Bld N1,Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China**Test Location:** No.101, Bld N1,Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China**FCC Accredited Test Site Number:** 915896**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10:2013

The above equipment has been tested by **Hwa-Hsing (Dongguan) Testing Co., Ltd.**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :****Date:** Sep. 30, 2019

Tank Tan//Engineer

**Approved by :****Date:** Sep. 30, 2019

Harry Li/ Supervisor

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**Release Control Record**

<b>Issue No.</b>	<b>Description</b>	<b>Date Issued</b>
HP19830DC001-FWL	Original Release	Sep. 30, 2019

### 1. Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013; KDB 558074 D01 15.247 Meas Guidance v05r02			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -19.31 dB at 0.5631MHz.
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -14.59 dB at 7311.00MHz.
15.247(d)	Band Edge Measurement	Pass	Meet the requirement of limit.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB Bandwidth	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Reference only
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used. The device is professionally installed

### 1.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUTs specified in CISPR 16-4-2:

The listed uncertainties are the worst cases uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.66 dB
Radiated Emissions up to 1 GHz	9KHz ~ 30MHz	2.90dB
	30MHz ~ 1000MHz	3.47 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	4.84 dB
	18GHz ~ 40GHz	4.62 dB

### 1.3 Modification Record

There were no modifications required for compliance.

## 2. General Information

### 2.1 General Description of EUT

Product Name	Nooie Smart Power Strip
Brand Name	N/A
Test Model	SA10
FCC ID:	2ARER-SA10
Identification No. of EUT	N/A
Series Model	N/A
Model Difference	N/A
Status of EUT	Engineering prototype
Power Supply Rating	AC 120V
Modulation Type	CCK, DQPSK,DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation technology	DSSS, OFDM
Transfer Rate	802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300.0Mbps
Operating Frequency	2400 ~ 2483.5MHz
Number of Channel	11 channels for 802.11b, 802.11g, 802.11n (20MHz) 7channels for 802.11n (40MHz)
Maximum Output Power	9.66dBm
Antenna Type	PCB antenna with 2.0dBi gain
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. Please refer to the EUT photo document (Reference No.:HP190708DC001) for detailed product photo.
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.
3. The product's WLAN function supports SISO mode with one antenna transmission and one antenna reception

Support mode	Frequency band	Transmit and receive mode	Transmit and Receive Chain
802.11b	2412~2462MHz	SISO	1TX,1RX
802.11g	2412~2462MHz	SISO	1TX,1RX
802.11n HT20	2412~2462MHz	SISO	1TX,1RX
802.11n HT40	2422~2452MHz	SISO	1TX,1RX

## 2.2 Description of TestChannels

11 channels are provided for 802.11b, 802.11g and 802.11n (20MHz):

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

7 channels are provided for 802.11n (40MHz):

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

### 2.3 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable test items				Description
	RE $\geq$ 1G	RE $<$ 1G	PLC	APCM	
802.11b	√	√	√	√	-
802.11g	√	√	√	√	-
802.11n (20MHz)	√	√	√	√	-
802.11n (40MHz)	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz  
**PLC**: Power Line Conducted Emission

**RE $<$ 1G**: Radiated Emission below 1GHz  
**APCM**: Antenna Port Conducted Measurement

**Note:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

**Note:** "-" means no effect.

#### Radiated Emission Test (Above 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11b	1, 6, 11	DSSS	1.0
802.11g	1, 6, 11	OFDM	6.0
802.11n (20MHz)	1, 6, 11	OFDM	7.2
802.11n (40MHz)	3, 6, 9	OFDM	15.0

#### Radiated Emission Test (Below 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11b	1, 6, 11	DSSS	1

#### Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11b	1, 6, 11	DSSS	1



**Antenna Port Conducted Measurement:**

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	DSSS	1.0
-	802.11g	1 to 11	OFDM	6.0
-	802.11n (20MHz)	1 to 11	OFDM	7.2
-	802.11n (40MHz)	3 to 9	OFDM	15.0

**Test Condition:**

Applicable test items	Environmental Conditions	Input Power	Tested by
RE≥1G	25deg. C, 65%RH	DC5V from USB	Tank Tan
RE<1G	25deg. C, 65%RH	DC5V from USB	Tank Tan
PLC	25deg. C, 65 %RH	DC5V from USB	Tank Tan
APCM	25deg. C, 65 %RH	DC5V from USB	Harry Li

**Power setting value from test software:**

Mode	Channel Number	FREQ. (MHz)	Power Setting
			Ant 0
802.11b	1	2412	25
	6	2437	25
	11	2462	25
802.11g	1	2412	25
	6	2437	25
	11	2462	25
802.11 n20	1	2412	25
	6	2437	25
	11	2462	25
802.11 n40	1	2412	25
	6	2437	25
	11	2462	25

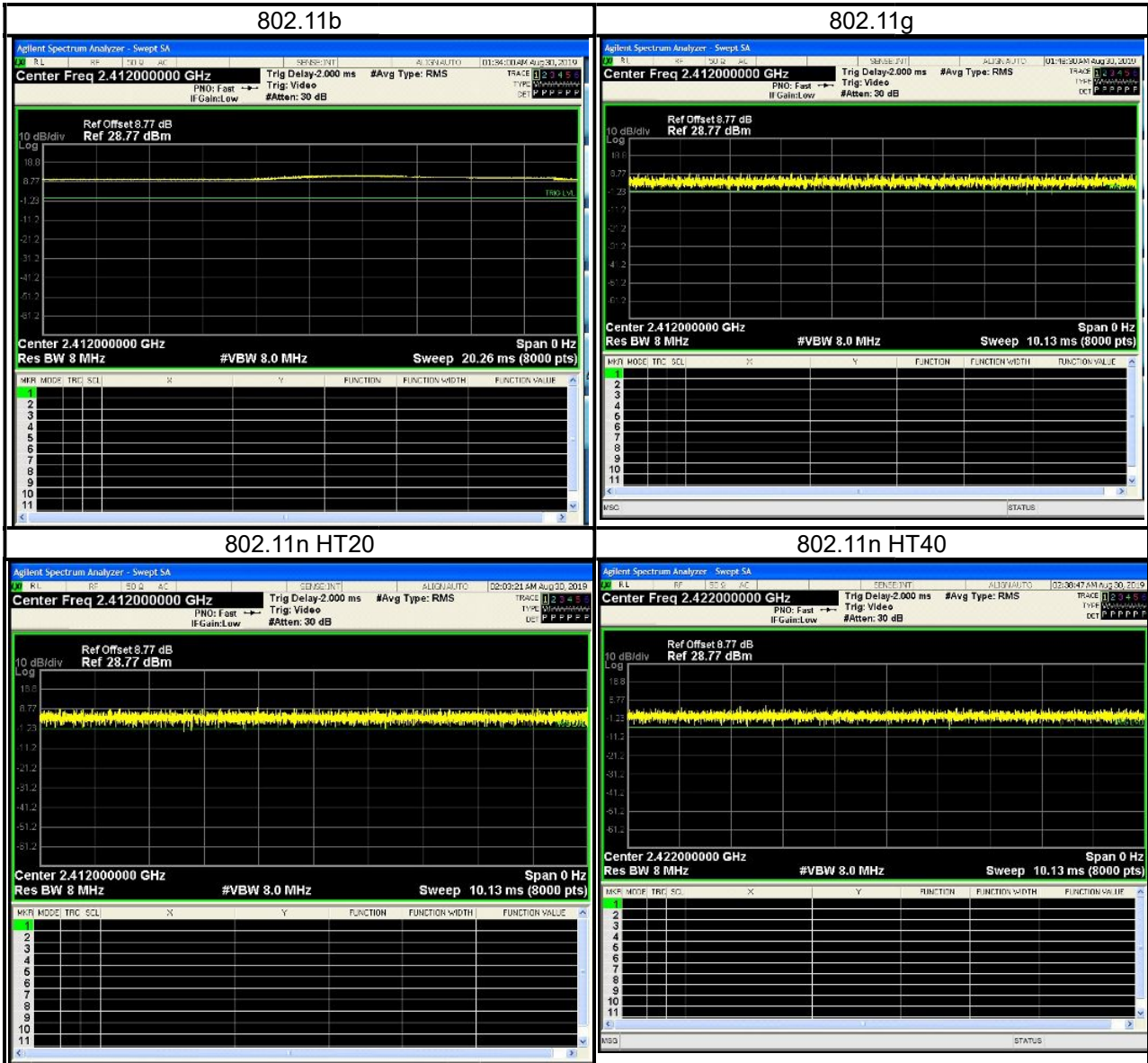
### 2.4 DutyCycle of Test Signal

802.11b: Duty cycle of test signal is 100 %, Duty cycle of test signal is >98%

802.11g: Duty cycle of test signal is 100 %, Duty cycle of test signal is >98%

802.11n HT20: Duty cycle of test signal is 100 %, Duty cycle of test signal is >98%

802.11n HT40: Duty cycle of test signal is 100 %, Duty cycle of test signal is >98%



## 2.5 Description of Support Units

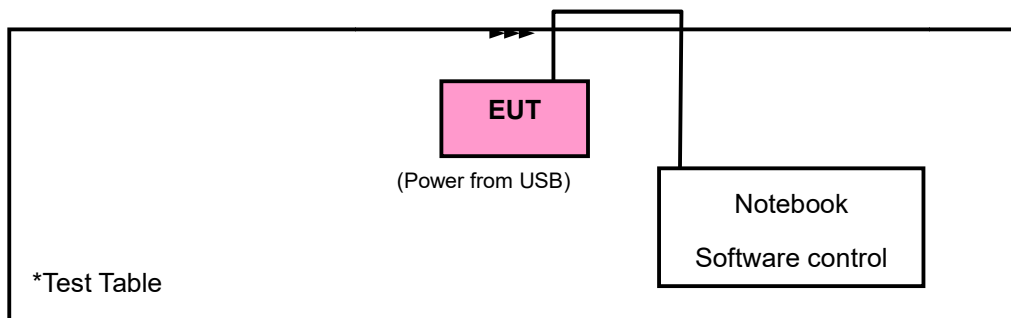
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Notebook	Lenovo	TP0093A	PF-12HMBU	N/A
2.	Mouse	DELL	MS111-L	CN-09RRC7-44751-0C6-04TR	N/A
3.	N/A	N/A	N/A	N/A	N/A

Insert Cable Connections to/from EUT provided by test team.

No.	Signal Cable Description Of The Above Support Units
1.	USB Line: Un-shieldin 1.0m
2.	N/A
3.	N/A

## 2.6 Configuration of System under Test



## 2.7 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.247)**

**KDB 558074 D01 15.247 Meas Guidance v05r02**

**KDB 662911 D01 v02r01**

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

**Note:**The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC).  
The test report has been issued separately.

### 3. Test types and results

#### 3.1 Radiated Emission and Bandedge Measurement

##### 3.1.1 Limits of radiated emission and bandedge measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	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 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**Note:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. 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.

### 3.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
EMI Test Receiver Rohde&Schwarz	ESCI 7	100962	2019-7-16	2020-7-15
Broadband antenna Schwarzbeck	VULB 9168	00937	2018-11-18	2019-11-17
3m Semi-anechoic Chamber MAORUI	9m*6m*6m	NSEMC003	2018-10-20	2019-10-19
Signal Amplifier Com-power	PAM-103	18020051	2018-11-29	2019-11-28
Attenuator Rohde&Schwarz	TS2GA-6dB	18101101	N/A	N/A
Test software FARAD	FARAD	EZ_EMCV1.1.4.2	N/A	N/A
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	2018-10-17	2019-10-16
Loop Antenna	HLA 6121	45745	2018-10-19	2019-10-18
Preamplifier EMCI	EMC001340	980201	2017-10-22	2019-10-21
Digital Multimeter FLUKE	15B+	43512617WS	2018-11-10	2019-11-09
Horn Antenna Schwarzbeck	BBHA 9170	01959	2018-11-18	2019-11-17
Spectrum Analyzer Rohde&Schwarz	FSV-40N	101783	2018-12-11	2019-12-10
Broadband Coaxial Preamplifier Schwarzbeck	BBV 9718	00025	2018-10-29	2019-10-28
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170242	2019-05-05	2020-05-04
Pre-Amplifier EMCI	EMC 184045	980102	2018-11-20	2019-11-19
Spectrum Keysight	N9020A	MY51240612	2018-10-29	2019-10-28
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower&Turn Table Controller MF	MF-7802	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.

2. The test was performed in Chamber 1.

### 3.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

#### Note:

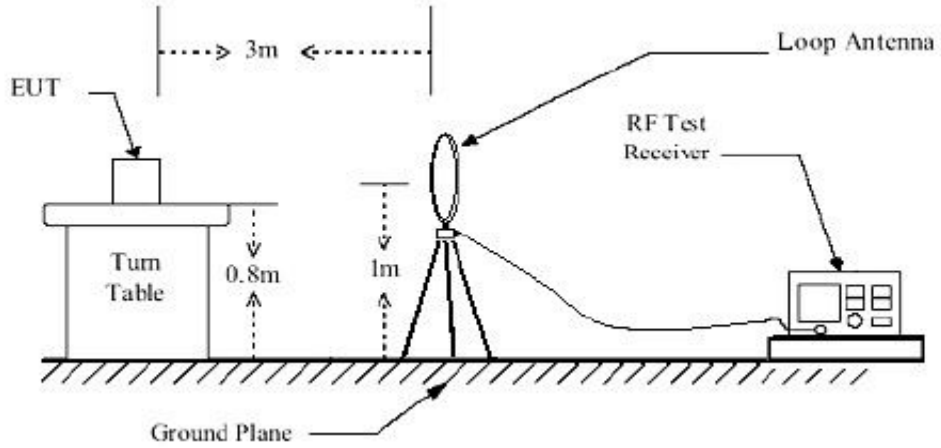
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for Average (Duty cycle < 98 %) detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

### 3.1.4 Deviation from Test Standard

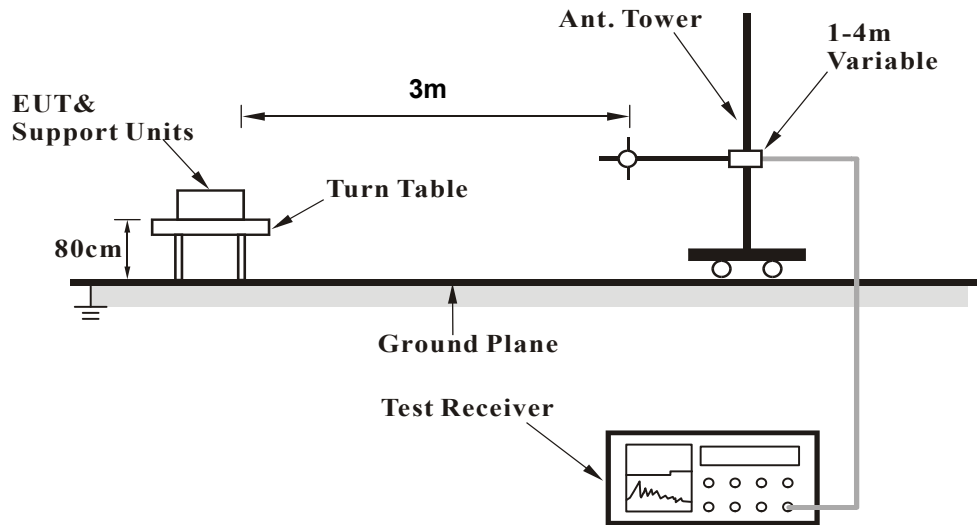
No deviation.

### 3.1.5 Test Set up

Radiated emission below 30MHz:

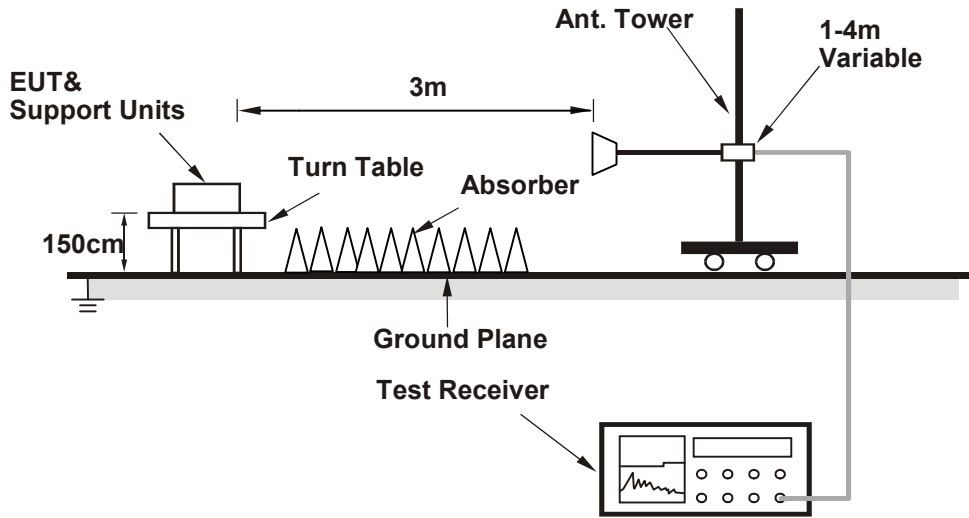


Frequency Range below 1GHz:





Frequency Range above 1GHz:



Directional antenna.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 3.1.6 EUT Operating Conditions

- a. Placed the EUT on the testing table.
- b. Set the EUT under transmission condition continuously at specific channel frequency.

**3.1.7 Test Results**
**Above 1GHz Data:**

EUT Test Condition:	802.11b: 2412MHz TX		
Test Channel	Channel 1	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1	2390.000	43.15	-0.77	42.38	74.00	-31.62	peak	133	189	
2	2390.000	30.31	-0.77	29.54	54.00	-24.46	AVG	133	189	
3 #	2412.000	88.28	-0.71	87.57			peak	133	189	
4 #	2412.000	92.87	-0.71	92.16			peak	133	189	
5	4824.000	40.38	5.59	45.97	74.00	-28.03	peak	150	331	
6	4824.000	28.63	5.59	34.22	54.00	-19.78	AVG	150	331	
7	7236.000	39.15	11.85	51.00	74.00	-23.00	peak	150	360	
8	7236.000	26.62	11.85	38.47	54.00	-15.53	AVG	150	360	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1	2390.000	41.99	-0.77	41.22	74.00	-32.78	peak	242	121	
2	2390.000	31.49	-0.77	30.72	54.00	-23.28	AVG	242	121	
3 #	2412.000	95.98	-0.71	95.27			peak	242	121	
4 #	2412.000	91.93	-0.71	91.22			AVG	242	121	
5	4824.000	40.96	5.59	46.55	74.00	-27.45	peak	150	360	
6	4824.000	28.68	5.59	34.27	54.00	-19.73	AVG	150	360	
7	7236.000	38.06	11.85	49.91	74.00	-24.09	peak	150	207	
8	7236.000	26.66	11.85	38.51	54.00	-15.49	AVG	150	207	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

EUT Test Condition	802.11b: 2437MHz TX		
Test Channel	Channel 6	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2437.000	92.77	-0.65	92.12			peak	127	202	
2 #	2437.000	88.08	-0.65	87.43			AVG	127	202	
3	4874.000	40.12	6.16	46.28	74.00	-27.72	peak	150	295	
4	4874.000	29.01	6.16	35.17	54.00	-18.83	AVG	150	295	
5	7311.000	38.53	12.10	50.63	74.00	-23.37	peak	150	360	
6	7311.000	26.25	12.10	38.35	54.00	-15.65	AVG	150	360	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2437.000	95.81	-0.65	95.16			peak	208	120	
2 #	2437.000	91.68	-0.65	91.03			AVG	208	120	
3	4874.000	39.76	6.16	45.92	74.00	-28.08	peak	150	301	
4	4874.000	27.97	6.16	34.13	54.00	-19.87	AVG	150	301	
5	7311.000	39.32	12.10	51.42	74.00	-22.58	peak	150	59	
6	7311.000	26.96	12.10	39.06	54.00	-14.94	AVG	150	59	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

EUT Test Condition	802.11b: 2462MHz TX		
Test channel	Channel 11	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1#	2462.000	94.01	-0.58	93.43			peak	100	198	
2 #	2462.000	89.79	-0.58	89.21			AVG	100	198	
3	2483.500	45.41	-0.51	44.90	74.00	-29.10	peak	100	198	
4	2483.500	32.46	-0.51	31.95	54.00	-22.05	AVG	100	198	
5	4899.000	41.38	6.46	47.84	74.00	-26.16	peak	150	313	
6	4899.000	27.71	6.46	34.17	54.00	-19.83	AVG	150	313	
7	7336.000	41.32	12.18	53.50	74.00	-20.50	peak	150	350	
8	7336.000	27.20	12.18	39.38	54.00	-14.62	AVG	150	350	

Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2462.000	97.94	-0.58	97.36			peak	196	129	
2 #	2462.000	93.58	-0.58	93.00			AVG	196	129	
3	2483.500	47.38	-0.51	46.87	74.00	-27.13	peak	196	129	
4	2483.500	34.47	-0.51	33.96	54.00	-20.04	AVG	196	129	
5	4899.000	42.09	6.46	48.55	74.00	-25.45	peak	150	18	
6	4899.000	27.76	6.46	34.22	54.00	-19.78	AVG	150	18	
7	7336.000	40.97	12.18	53.15	74.00	-20.85	peak	150	226	
8	7336.000	27.23	12.18	39.41	54.00	-14.59	AVG	150	226	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

EUT Test Condition:	802.11g: 2412MHz TX		
Test Channel	Channel 1	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1	2390.000	42.38	-0.77	41.61	74.00	-32.39	peak	102	192	
2	2390.000	30.83	-0.77	30.06	54.00	-23.94	AVG	102	192	
3 #	2412.000	89.62	-0.71	88.91			peak	102	192	
4 #	2412.000	80.63	-0.71	79.92			AVG	102	192	
5	4824.000	42.40	5.59	47.99	74.00	-26.01	peak	150	251	
6	4824.000	28.13	5.59	33.72	54.00	-20.28	AVG	150	251	
7	7236.000	39.30	11.85	51.15	74.00	-22.85	peak	150	290	
8	7236.000	26.69	11.85	38.54	54.00	-15.46	AVG	150	290	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1	2390.000	43.86	-0.77	43.09	74.00	-30.91	peak	267	128	
2	2390.000	30.26	-0.77	29.49	54.00	-24.51	AVG	267	128	
3 #	2412.000	93.44	-0.71	92.73			peak	267	128	
4 #	2412.000	83.49	-0.71	82.78			AVG	267	128	
5	4824.000	40.08	5.59	45.67	74.00	-28.33	peak	150	244	
6	4824.000	28.15	5.59	33.74	54.00	-20.26	AVG	150	244	
7	7236.000	38.39	11.85	50.24	74.00	-23.76	peak	150	301	
8	7236.000	26.74	11.85	38.59	54.00	-15.41	AVG	150	301	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

EUT Test Condition	802.11g: 2437MHz TX		
Test Channel	Channel 6	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2437.000	90.41	-0.65	89.76			peak	100	204	
2 #	2437.000	80.41	-0.65	79.76			AVG	100	204	
3	4874.000	40.11	6.16	46.27	74.00	-27.73	peak	150	282	
4	4874.000	28.83	6.16	34.99	54.00	-19.01	AVG	150	282	
5	7311.000	41.61	12.10	53.71	74.00	-20.29	peak	150	197	
6	7311.000	27.27	12.10	39.37	54.00	-14.63	AVG	150	197	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2437.000	95.02	-0.65	94.37			peak	262	128	
2 #	2437.000	84.80	-0.65	84.15			AVG	262	128	
3	4874.000	46.78	6.16	52.94	74.00	-21.06	peak	150	256	
4	4874.000	27.57	6.16	33.73	54.00	-20.27	AVG	150	256	
5	7311.000	37.40	12.10	49.50	74.00	-24.50	peak	150	320	
6	7311.000	27.17	12.10	39.27	54.00	-14.73	AVG	150	320	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

EUT Test Condition	802.11g: 2462MHz TX		
Test channel	Channel 11	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2462.000	91.90	-0.58	91.32			peak	100	192	
2 #	2462.000	81.96	-0.58	81.38			AVG	100	192	
3	2483.500	44.37	-0.51	43.86	74.00	-30.14	peak	100	192	
4	2483.500	31.85	-0.51	31.34	54.00	-22.66	AVG	100	192	
5	4924.000	42.01	6.32	48.33	74.00	-25.67	peak	150	214	
6	4924.000	27.91	6.32	34.23	54.00	-19.77	AVG	150	214	
7	7386.000	40.31	12.35	52.66	74.00	-21.34	peak	150	330	
8	7386.000	26.39	12.35	38.74	54.00	-15.26	AVG	150	330	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2462.000	96.09	-0.58	95.51			peak	257	126	
2 #	2462.000	86.02	-0.58	85.44			AVG	257	126	
3	2483.500	47.03	-0.51	46.52	74.00	-27.48	peak	257	126	
4	2483.500	34.32	-0.51	33.81	54.00	-20.19	AVG	257	126	
5	4924.000	42.01	6.32	48.33	74.00	-25.67	peak	150	284	
6	4924.000	27.98	6.32	34.30	54.00	-19.70	AVG	150	284	
7	7386.000	40.12	12.35	52.47	74.00	-21.53	peak	150	172	
8	7386.000	26.62	12.35	38.97	54.00	-15.03	AVG	150	172	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

EUT Test Condition:	802.11n HT20: 2412MHz TX		
Test Channel	Channel 1	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1	2390.000	42.92	-0.77	42.15	74.00	-31.85	peak	100	201	
2	2390.000	31.03	-0.77	30.26	54.00	-23.74	AVG	100	201	
3 #	2412.000	90.92	-0.71	90.21			peak	100	201	
4 #	2412.000	80.74	-0.71	80.03			AVG	100	201	
5	4824.000	40.55	5.59	46.14	74.00	-27.86	peak	150	204	
6	4824.000	28.20	5.59	33.79	54.00	-20.21	AVG	150	204	
7	7236.000	39.77	11.85	51.62	74.00	-22.38	peak	150	171	
8	7236.000	26.56	11.85	38.41	54.00	-15.59	AVG	150	171	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1	2390.000	44.02	-0.77	43.25	74.00	-30.75	peak	261	127	
2	2390.000	31.24	-0.77	30.47	54.00	-23.53	AVG	261	127	
3 #	2412.000	93.97	-0.71	93.26			peak	261	127	
4 #	2412.000	83.86	-0.71	83.15			AVG	261	127	
5	4824.000	40.34	5.59	45.93	74.00	-28.07	peak	150	188	
6	4824.000	28.23	5.59	33.82	54.00	-20.18	AVG	150	188	
7	7236.000	38.93	11.85	50.78	74.00	-23.22	peak	150	280	
8	7236.000	26.81	11.85	38.66	54.00	-15.34	AVG	150	280	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.



EUT Test Condition	802.11n HT20: 2437MHz TX		
Test Channel	Channel 6	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2437.000	90.79	-0.65	90.14			peak	104	199	
2 #	2437.000	81.28	-0.65	80.63			AVG	104	199	
3	4874.000	40.66	6.16	46.82	74.00	-27.18	peak	150	244	
4	4874.000	28.91	6.16	35.07	54.00	-18.93	AVG	150	244	
5	7311.000	42.19	12.10	54.29	74.00	-19.71	peak	150	310	
6	7311.000	27.30	12.10	39.40	54.00	-14.60	AVG	150	310	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2437.000	95.88	-0.65	95.23			peak	257	126	
2 #	2437.000	85.48	-0.65	84.83			AVG	257	126	
3	4874.000	47.48	6.16	53.64	74.00	-20.36	peak	150	258	
4	4874.000	27.62	6.16	33.78	54.00	-20.22	AVG	150	258	
5	7311.000	39.52	12.10	51.62	74.00	-22.38	peak	150	360	
6	7311.000	27.31	12.10	39.41	54.00	-14.59	AVG	150	360	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

EUT Test Condition	802.11n HT20: 2462MHz TX		
Test channel	Channel 11	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2462.000	91.78	-0.58	91.20			peak	100	203	
2 #	2462.000	81.69	-0.58	81.11			AVG	100	203	
3	2483.500	44.54	-0.51	44.03	74.00	-29.97	peak	100	203	
4	2483.500	31.90	-0.51	31.39	54.00	-22.61	AVG	100	203	
5	4924.000	42.39	6.32	48.71	74.00	-25.29	peak	150	360	
6	4924.000	28.13	6.32	34.45	54.00	-19.55	AVG	150	360	
7	7386.000	41.29	12.35	53.64	74.00	-20.36	peak	150	153	
8	7386.000	26.47	12.35	38.82	54.00	-15.18	AVG	150	153	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2462.000	95.71	-0.58	95.13			peak	261	128	
2 #	2462.000	85.41	-0.58	84.83			AVG	261	128	
3	2483.500	47.49	-0.51	46.98	74.00	-27.02	peak	261	128	
4	2483.500	34.66	-0.51	34.15	54.00	-19.85	AVG	261	128	
5	4924.000	42.32	6.32	48.64	74.00	-25.36	peak	150	295	
6	4924.000	28.10	6.32	34.42	54.00	-19.58	AVG	150	295	
7	7386.000	40.54	12.35	52.89	74.00	-21.11	peak	150	164	
8	7386.000	26.77	12.35	39.12	54.00	-14.88	AVG	150	164	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

EUT Test Condition:	802.11n HT40: 2422MHz TX		
Test Channel	Channel 3	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1	2390.000	42.82	-0.77	42.05	74.00	-31.95	peak	100	207	
2	2390.000	28.69	-0.77	27.92	54.00	-26.08	AVG	100	207	
3 #	2422.000	88.82	-0.68	88.14			peak	100	207	
4 #	2422.000	78.09	-0.68	77.41			AVG	100	207	
5	4844.000	39.07	5.82	44.89	74.00	-29.11	peak	150	331	
6	4844.000	27.94	5.82	33.76	54.00	-20.24	AVG	150	331	
7	7266.000	37.74	11.94	49.68	74.00	-24.32	peak	150	254	
8	7266.000	27.20	11.94	39.14	54.00	-14.86	AVG	150	254	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1	2390.000	45.16	-0.77	44.39	74.00	-29.61	peak	249	129	
2	2390.000	32.39	-0.77	31.62	54.00	-22.38	AVG	249	129	
3 #	2422.000	93.56	-0.68	92.88			peak	249	129	
4 #	2422.000	82.97	-0.68	82.29			AVG	249	129	
5	4844.000	39.56	5.82	45.38	74.00	-28.62	peak	150	182	
6	4844.000	28.24	5.82	34.06	54.00	-19.94	AVG	150	182	
7	7266.000	38.89	11.94	50.83	74.00	-23.17	peak	150	226	
8	7266.000	27.31	11.94	39.25	54.00	-14.75	AVG	150	226	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

EUT Test Condition	802.11n HT40: 2437MHz TX		
Test Channel	Channel 6	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2437.000	90.28	-0.65	89.63			peak	100	214	
2 #	2437.000	79.12	-0.65	78.47			AVG	100	214	
3	4868.000	44.85	6.09	50.94	74.00	-23.06	peak	150	130	
4	4868.000	30.73	6.09	36.82	54.00	-17.18	AVG	150	130	
5	7302.000	38.76	12.07	50.83	74.00	-23.17	peak	150	272	
6	7302.000	27.18	12.07	39.25	54.00	-14.75	AVG	150	272	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2437.000	94.32	-0.65	93.67			peak	254	130	
2 #	2437.000	82.10	-0.65	81.45			AVG	254	130	
3	4868.000	39.72	6.09	45.81	74.00	-28.19	peak	150	158	
4	4868.000	27.17	6.09	33.26	54.00	-20.74	AVG	150	158	
5	7302.000	37.74	12.07	49.81	74.00	-24.19	peak	150	22	
6	7302.000	26.75	12.07	38.82	54.00	-15.18	AVG	150	22	

**Remarks:**

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

EUT Test Condition	802.11n HT40: 2452MHz TX		
Test Channel	Channel 9	Frequency Range	1GHz ~ 25GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2452.000	90.28	-0.61	89.67			peak	100	233	
2 #	2452.000	80.19	-0.61	79.58			AVG	100	233	
3	2483.500	46.14	-0.51	45.63	74.00	-28.37	peak	100	233	
4	2483.500	33.70	-0.51	33.19	54.00	-20.81	AVG	100	233	
5	4904.000	40.85	6.46	47.31	74.00	-26.69	peak	150	360	
6	4904.000	28.39	6.46	34.85	54.00	-19.15	AVG	150	360	
7	7356.000	38.96	12.25	51.21	74.00	-22.79	peak	150	255	
8	7356.000	27.11	12.25	39.36	54.00	-14.64	AVG	150	255	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 #	2452.000	94.75	-0.61	94.14			peak	259	127	
2 #	2452.000	83.71	-0.61	83.10			AVG	259	127	
3	2483.500	49.05	-0.51	48.54	74.00	-25.46	peak	259	127	
4	2483.500	36.35	-0.51	35.84	54.00	-18.16	AVG	259	127	
5	4904.000	40.11	6.46	46.57	74.00	-27.43	peak	150	193	
6	4904.000	28.26	6.46	34.72	54.00	-19.28	AVG	150	193	
7	7356.000	38.68	12.25	50.93	74.00	-23.07	peak	150	320	
8	7356.000	27.06	12.25	39.31	54.00	-14.69	AVG	150	320	

**Remarks:**

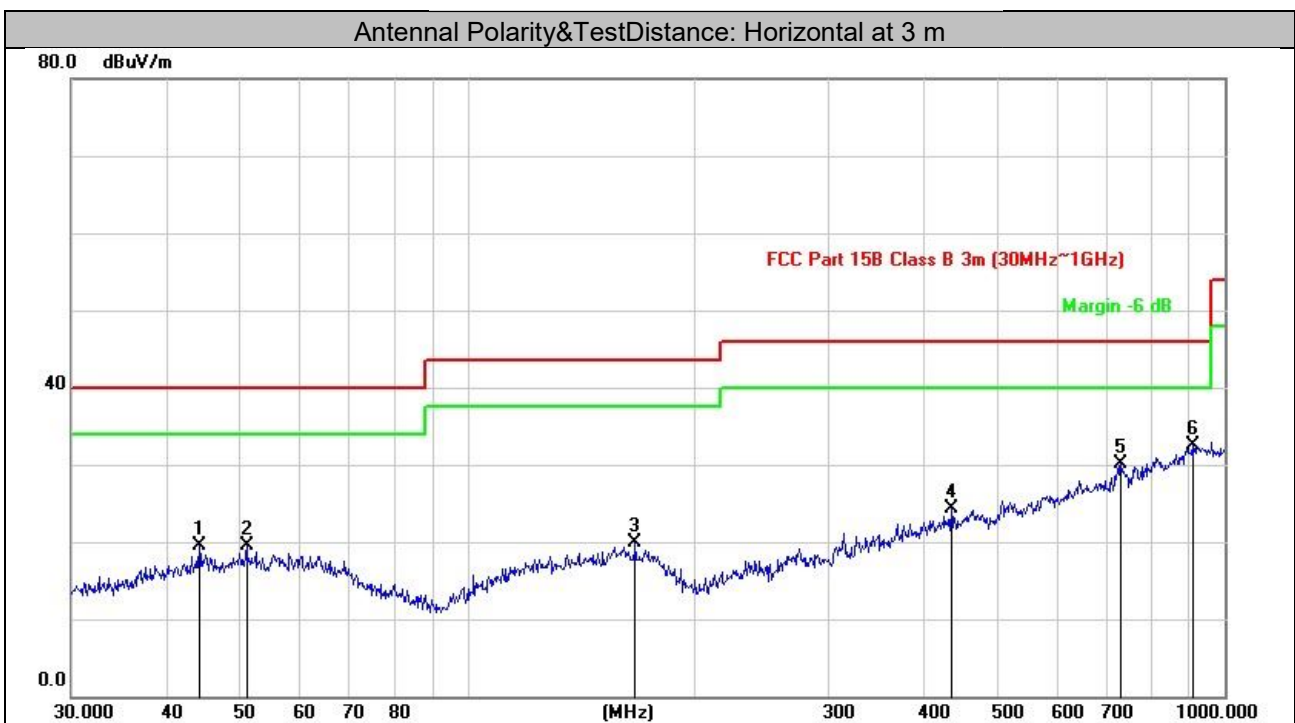
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

**9kHz ~ 30MHz Data:**

The amplitude of spurious emissions attenuated more than 20dB below the permissible value is not required to be report.

**30MHz ~ 1GHz Worst-Case Data:**

EUT Test Condition	802.11b 2412MHz TX		
Test Channel	Channel 1	Frequency Range	30MHz ~ 1GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank tan

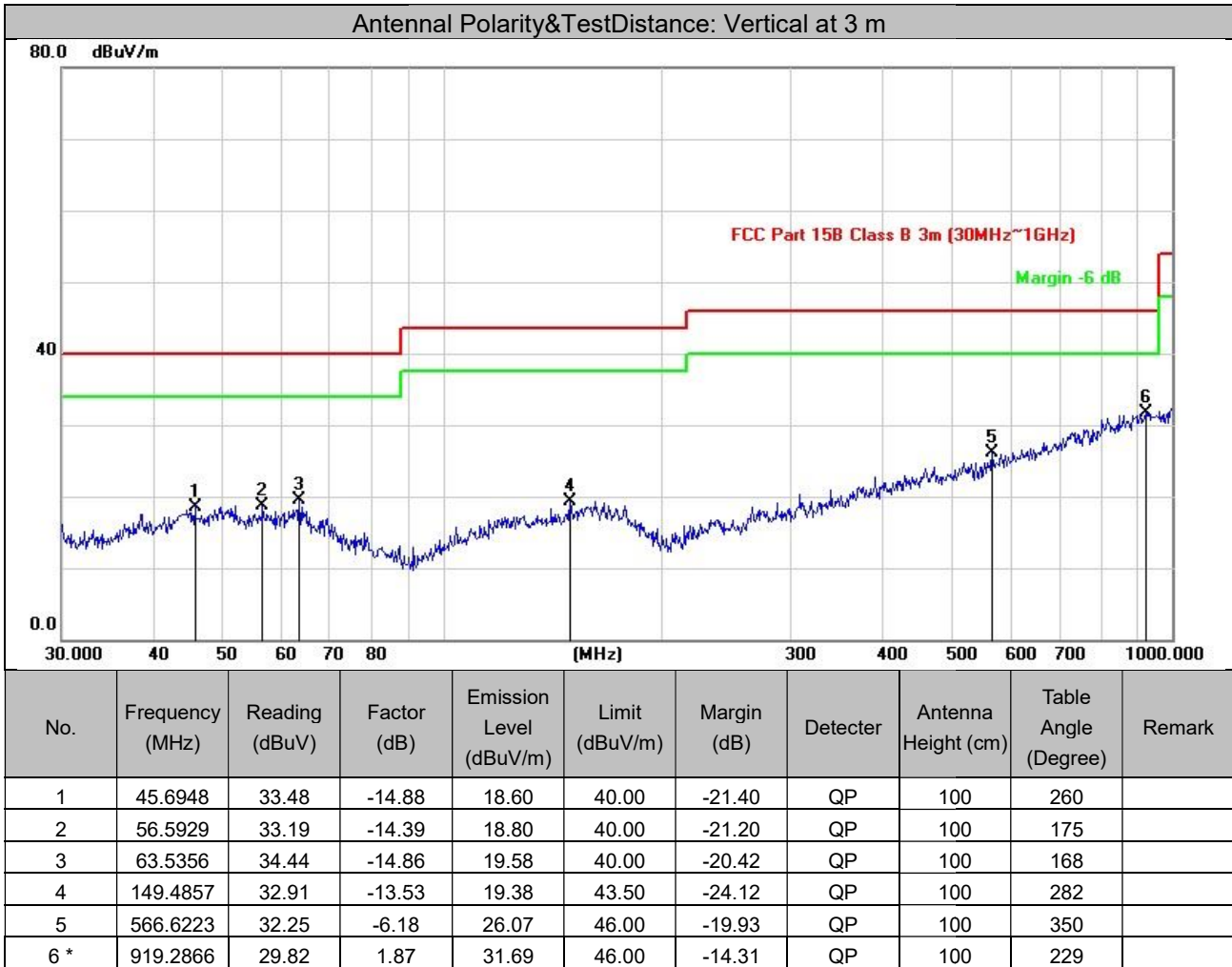


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1	44.2752	34.13	-14.54	19.59	40.00	-20.41	QP	200	320	
2	51.1209	33.80	-14.20	19.60	40.00	-20.40	QP	200	227	
3	166.6514	33.02	-13.11	19.91	43.50	-23.59	QP	200	254	
4	435.5898	33.07	-8.75	24.32	46.00	-21.68	QP	200	180	
5	729.3583	31.47	-1.44	30.03	46.00	-15.97	QP	200	223	
6 *	906.4824	30.93	1.51	32.44	46.00	-13.56	QP	200	290	

Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value

EUT Test Condition	802.11g:2412MHz TX		
Channel	Channel 1	Frequency Range	30MHz ~ 1GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	26deg. C, 59%RH	Tested By	Tank Tan


**Remarks:**

- 1.Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
- 2.Margin value = Emission level – Limit value

### 3.2 Conducted Emission Measurement

#### 3.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.  
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

#### 3.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
EMI Test Receiver Rohde&Schwarz	ESCI3	101418	2019-1-5	2020-1-4
Artificial Mains Network Rohde&Schwarz	ENV216	3560.6550.15	2018-11-12	2019-11-11
Test software FARAD	EZ_EMCC V1.1.4.2	N/A	N/A	N/A
Hygrothermograph Yuhuaze	HTC-1	NA	2018-10-30	2019-10-29
Digital Multimeter FLUKE	15B+	43512617WS	2018-11-10	2019-11-09

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.  
 2. The test was performed in Shielded Room 1.



### 3.2.3 Test Procedures

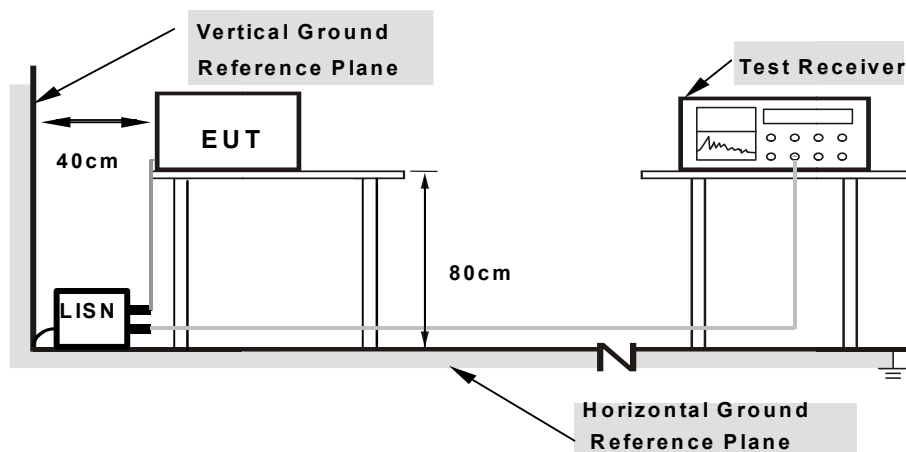
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit – 20dB) was not recorded.

**Note:** All modes of operation were investigated and the worst-case emissions are reported.

### 3.2.4 Deviation from Test Standard

No deviation.

### 3.2.5 Test setup



- Note:** 1. Support units were connected to second LISN.  
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

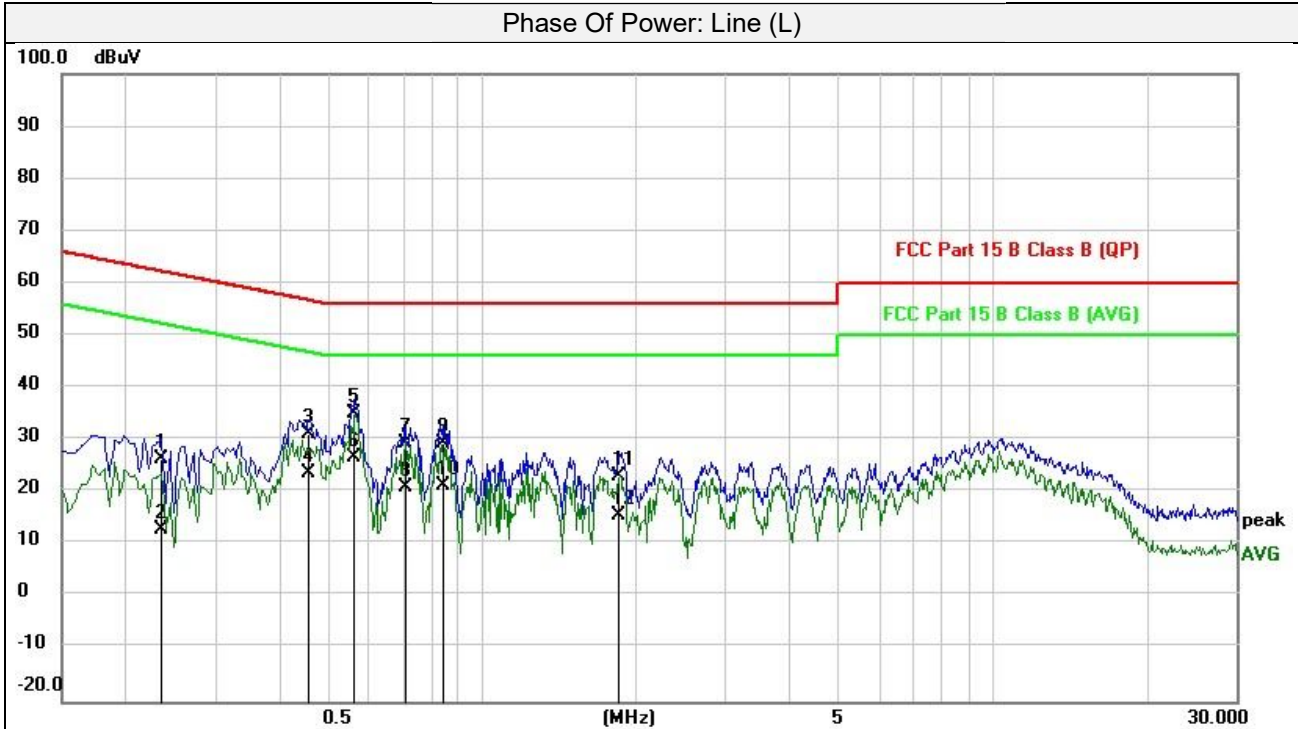
### 3.2.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Set the EUT under transmission condition continuously at specific channel frequency.

### 3.2.7 Test Results

#### Conducted worst-case data

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution andwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	DC 5V from USB	Environmental Conditions	25°C, 57%RH
Tested by	Tank Tan	Test Date	2019/9/5

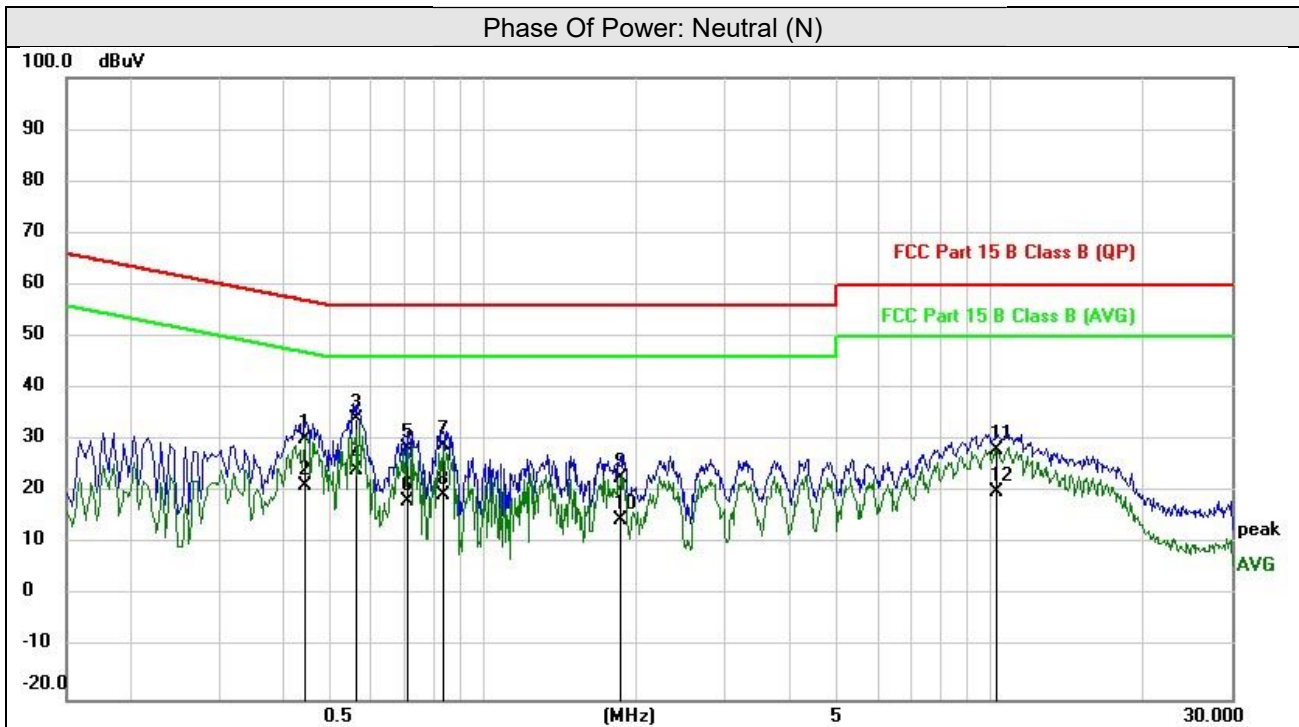


No	Frequency (MHz)	Reading (dBuV)	Correct Factor	Emission Level	Limit	Margin	Remark
			dB	(dBuV)	(dBuV)	(dB)	Detector
1	0.2348	16.41	9.98	26.39	62.28	-35.89	QP
2	0.2348	2.76	9.98	12.74	52.28	-39.54	AVG
3	0.4565	21.36	9.81	31.17	56.76	-25.59	QP
4	0.4565	13.90	9.81	23.71	46.76	-23.05	AVG
5	0.5631	25.25	9.78	35.03	56.00	-20.97	QP
6	0.5631	16.91	9.78	26.69	46.00	-19.31	AVG
7	0.7109	19.56	9.77	29.33	56.00	-26.67	QP
8	0.7109	11.12	9.77	20.89	46.00	-25.11	AVG
9	0.8455	19.75	9.71	29.46	56.00	-26.54	QP
10	0.8455	11.47	9.71	21.18	46.00	-24.82	AVG
11	1.8541	13.48	9.58	23.06	56.00	-32.94	QP
1	0.2348	16.41	9.98	26.39	62.28	-35.89	QP

#### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution andwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	DC 5V from USB	Environmental Conditions	25°C, 57%RH
Tested by	Tank Tan	Test Date	2019/9/5



No	Frequency (MHz)	Reading (dBuV)	Correct Factor	Emission Level	Limit	Margin	Remark
			dB	(dBuV)	(dBuV)	(dB)	
1	0.4400	20.57	9.81	30.38	57.06	-26.68	QP
2	0.4400	11.57	9.81	21.38	47.06	-25.68	AVG
3	0.5626	24.51	9.78	34.29	56.00	-21.71	QP
4	0.5626	14.53	9.78	24.31	46.00	-21.69	AVG
5	0.7123	18.75	9.77	28.52	56.00	-27.48	QP
6	0.7123	8.59	9.77	18.36	46.00	-27.64	AVG
7	0.8343	19.29	9.71	29.00	56.00	-27.00	QP
8	0.8343	9.84	9.71	19.55	46.00	-26.45	AVG
9	1.8561	13.17	9.58	22.75	56.00	-33.25	QP
10	1.8561	5.08	9.58	14.66	46.00	-31.34	AVG
11	10.3463	18.69	9.53	28.22	60.00	-31.78	QP
12	10.3463	10.47	9.53	20.00	50.00	-30.00	AVG

**REMARKS:**

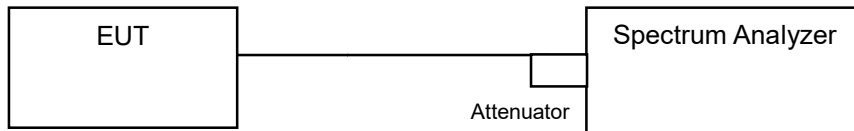
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

### 3.3 6dB Bandwidth Measurement

#### 3.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 3.3.2 Test Setup



#### 3.3.3 Test Instruments

Refer to section 10.1 to get information of above instrument.

#### 3.3.4 Test Procedure

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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

#### 3.3.5 Deviation from Test Standard

No deviation.

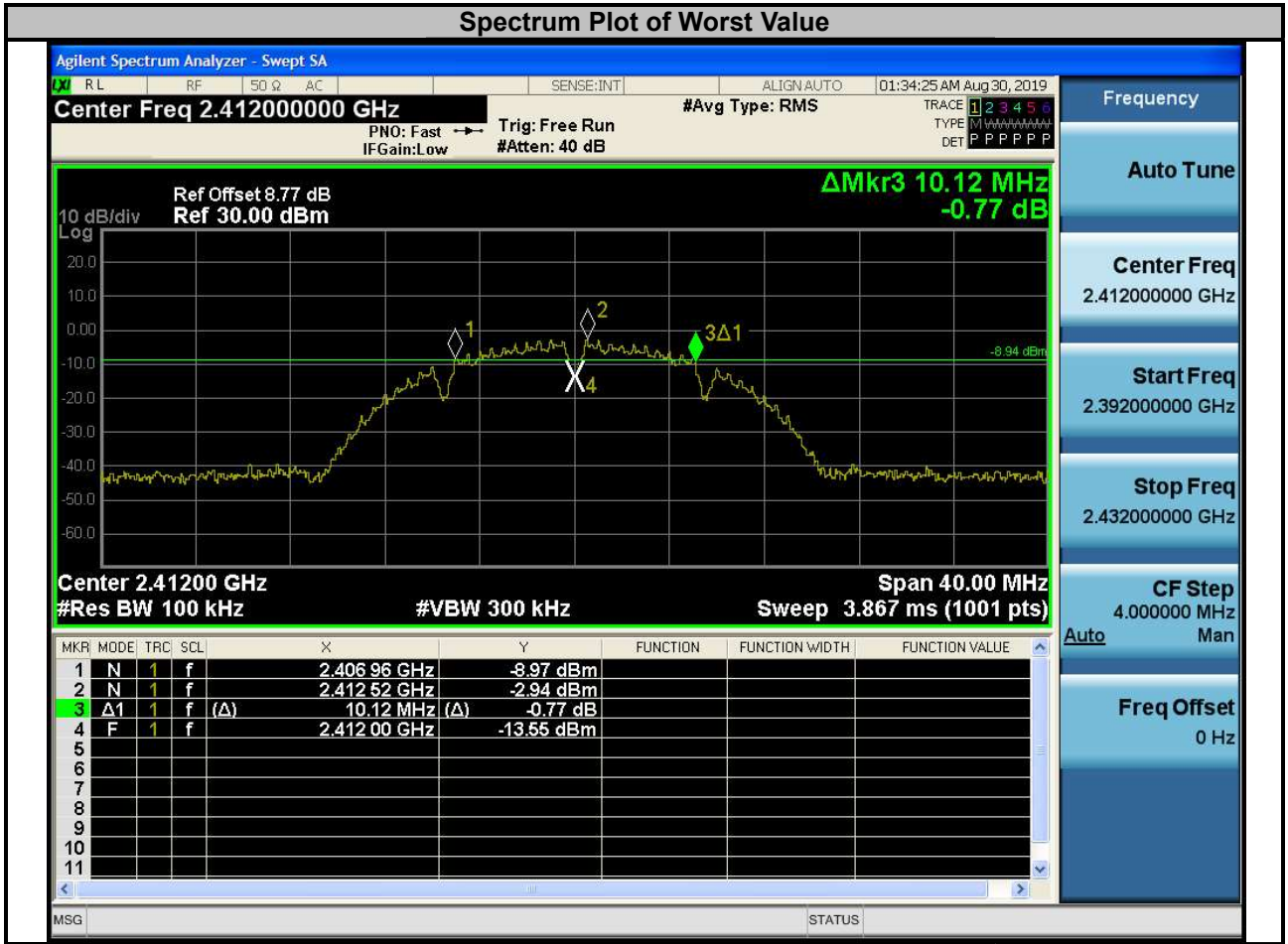
#### 3.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

**3.3.7 Test Result**

**802.11b**

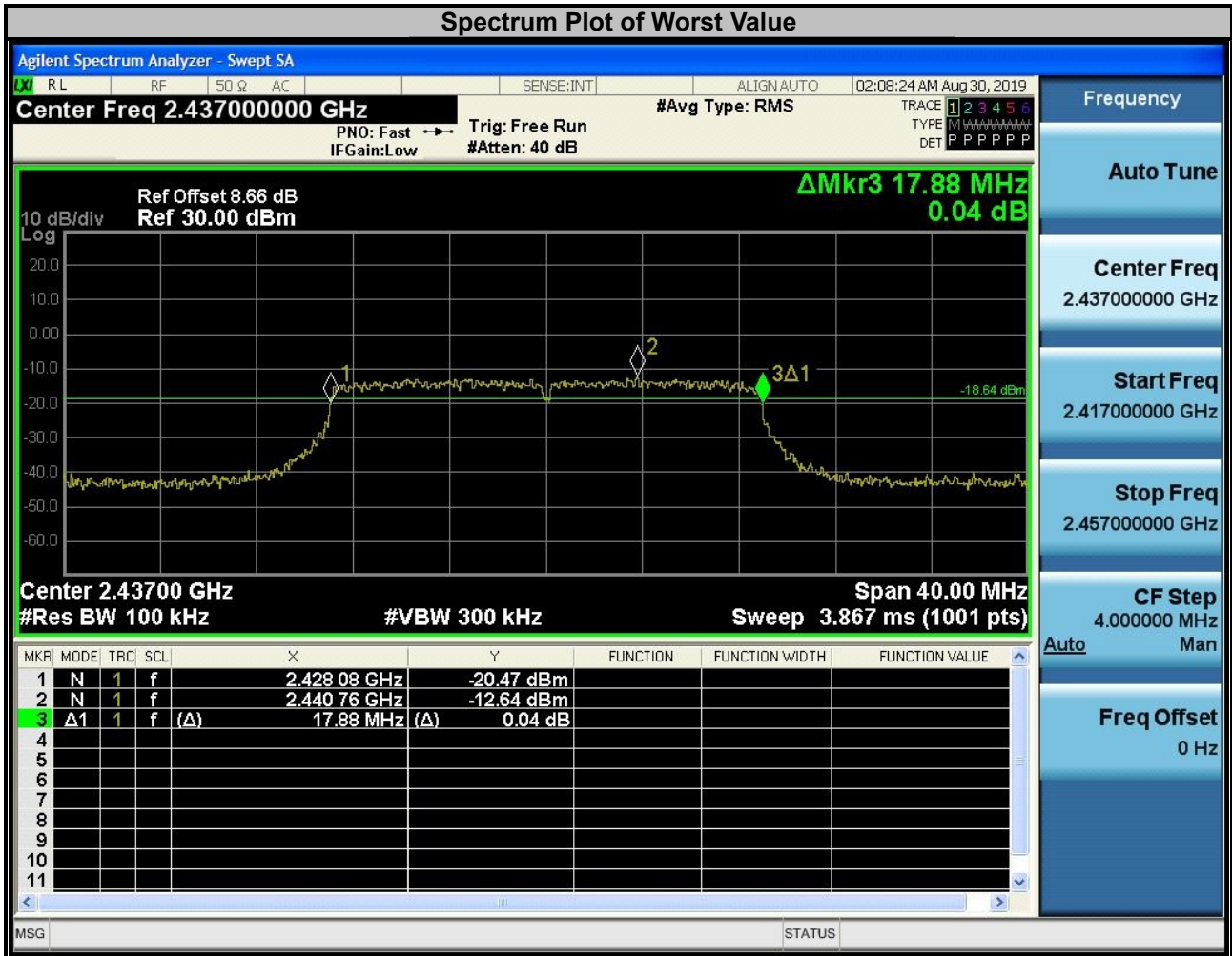
Channel	Frequency (MHz)	6dB Bandwidth(MHz)	Minimum Limit (MHz)	Pass / Fail
		Ant 0		
1	2412	10.12	0.5	Pass
6	2437	10.12	0.5	Pass
11	2462	10.12	0.5	Pass





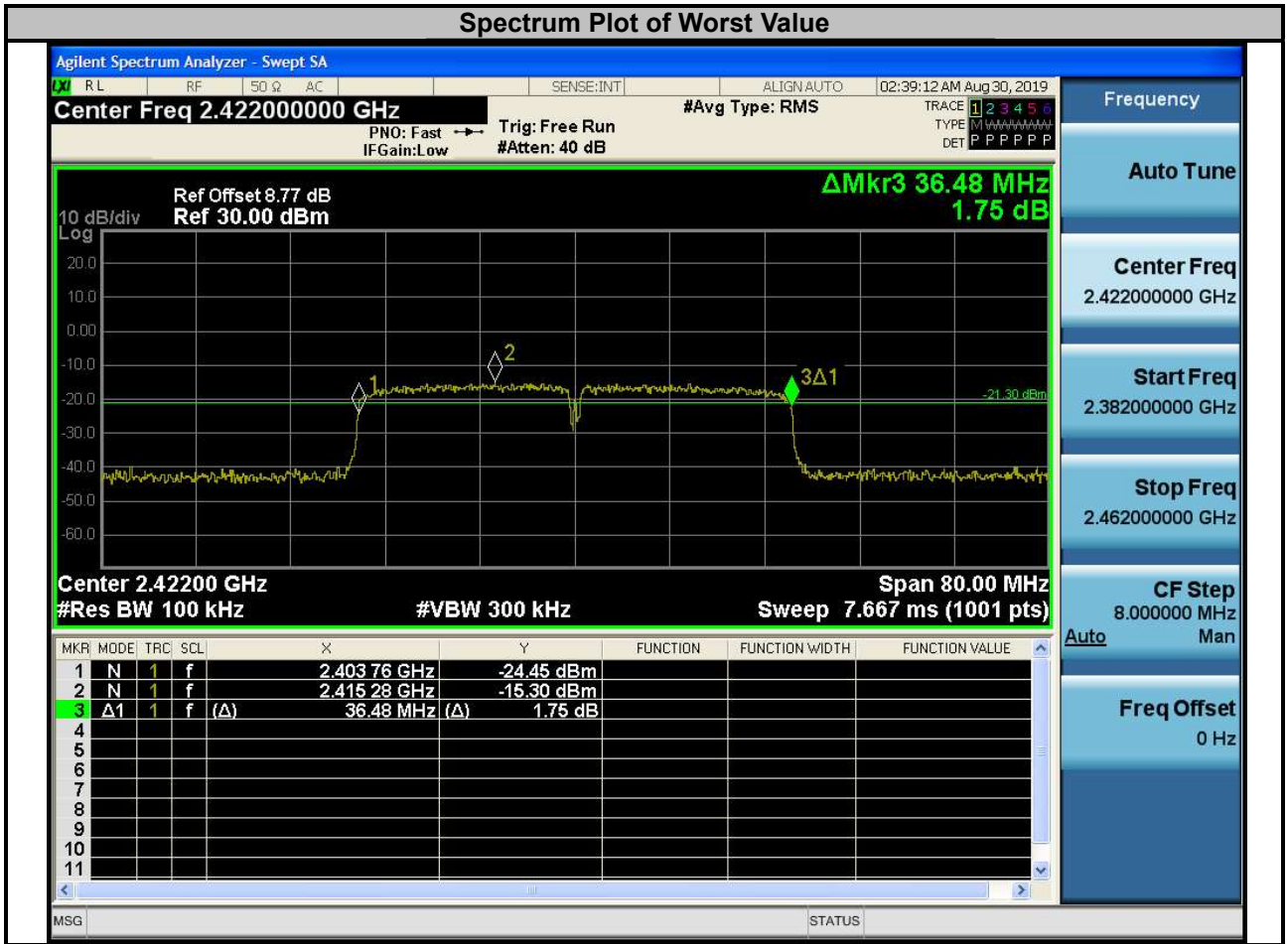
**802.11n HT20**

Channel	Frequency (MHz)	6dB Bandwidth(MHz)	Minimum Limit (MHz)	Pass / Fail
		Ant 0		
1	2412	17.72	0.5	Pass
6	2437	17.88	0.5	Pass
11	2462	17.76	0.5	Pass



802.11n HT40

Channel	Frequency (MHz)	6dB Bandwidth(MHz)	Minimum Limit (MHz)	Pass / Fail
		Ant 0		
3	2422	36.48	0.5	Pass
6	2437	36.48	0.5	Pass
9	2452	36.48	0.5	Pass





### 3.4 Occupied Bandwidth Measurement

#### 3.4.1 Test Setup



#### 3.4.2 Test Instruments

Refer to section 10.1 to get information of above instrument.

#### 3.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to peak. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

#### 3.4.4 Deviation from Test Standard

No deviation.

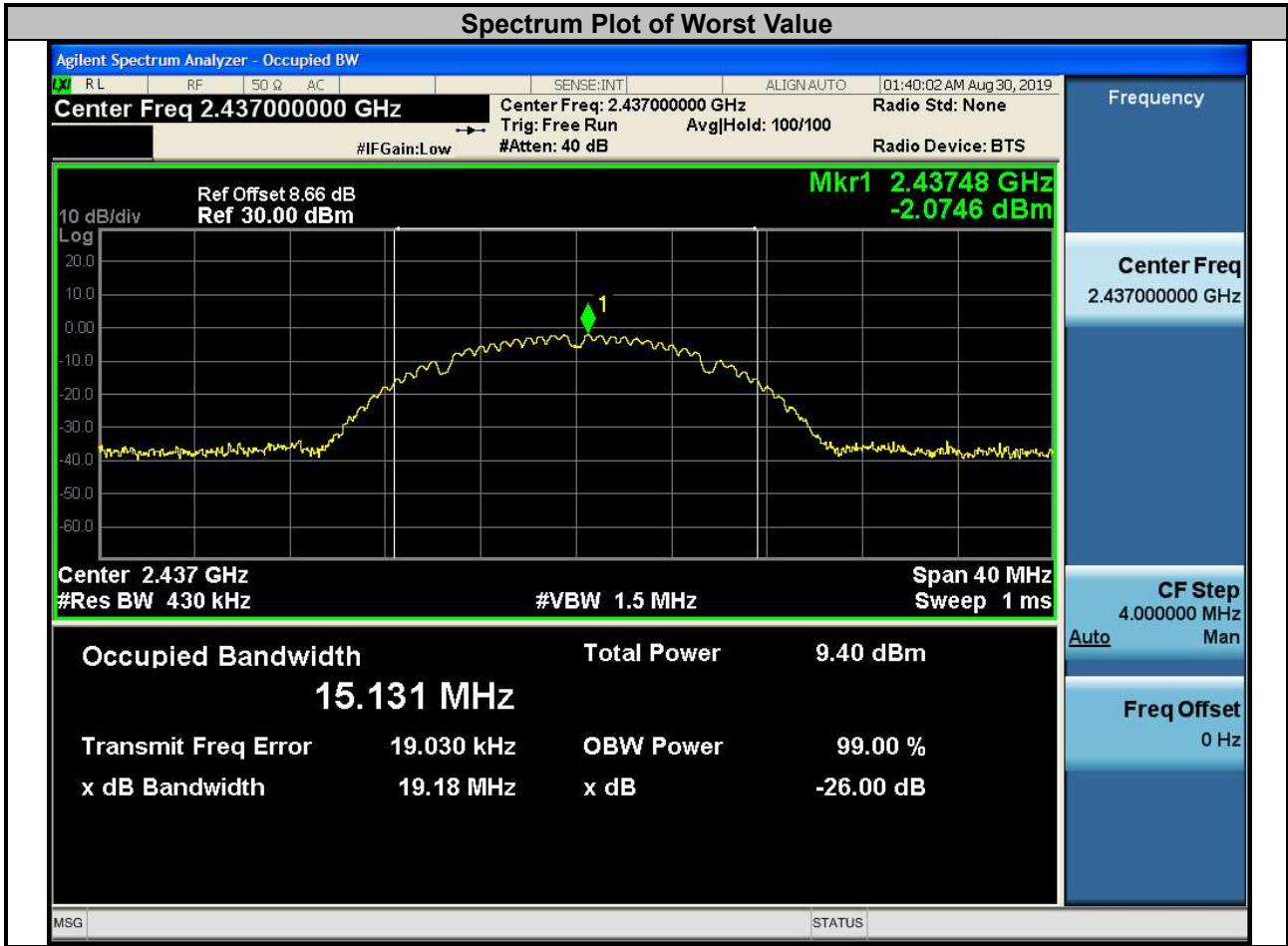
#### 3.4.5 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

**3.4.6 Test Results**

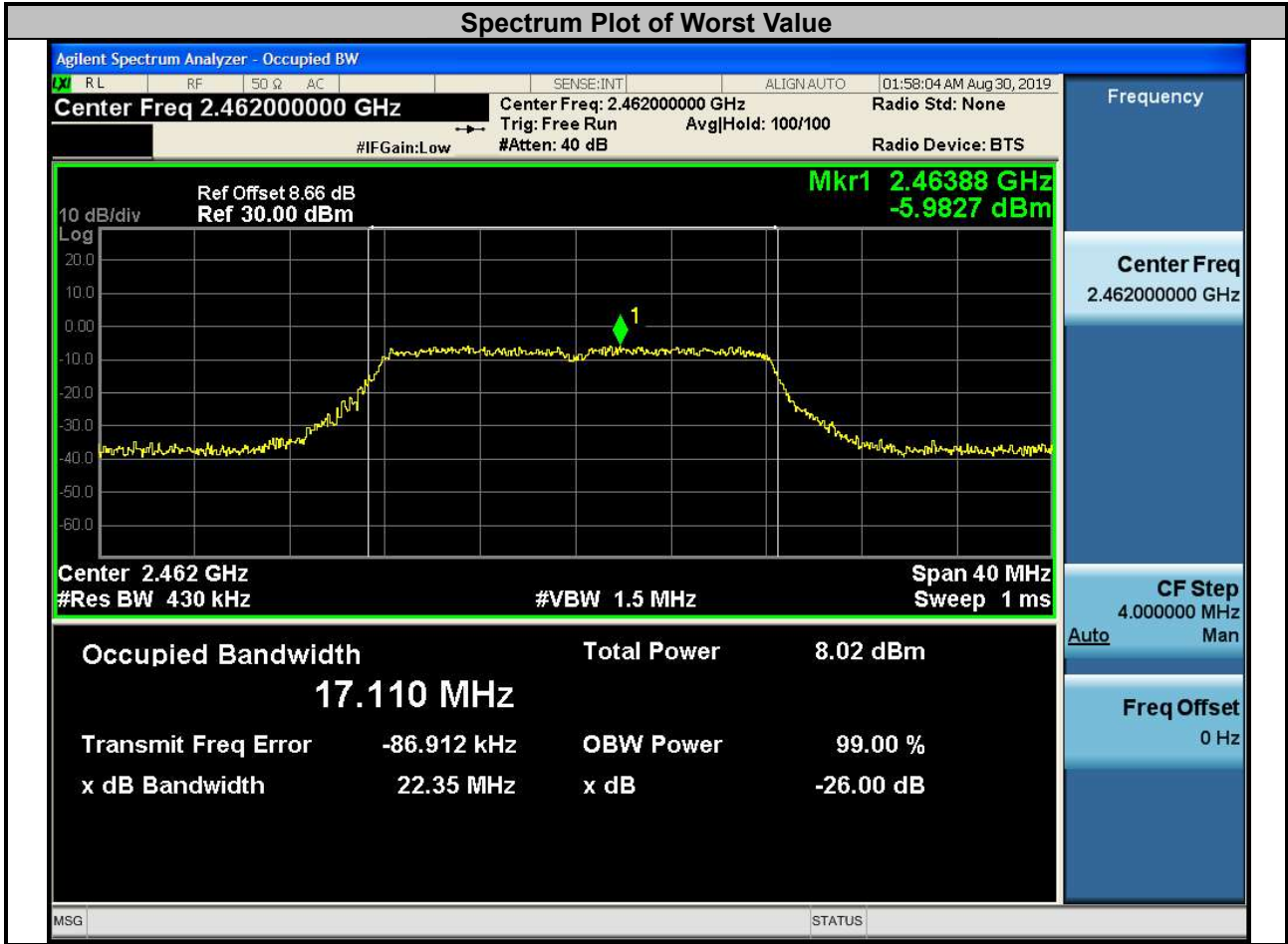
**802.11b**

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
		Ant 0	
1	2412	15.055	Pass
6	2437	15.131	Pass
11	2462	15.104	Pass



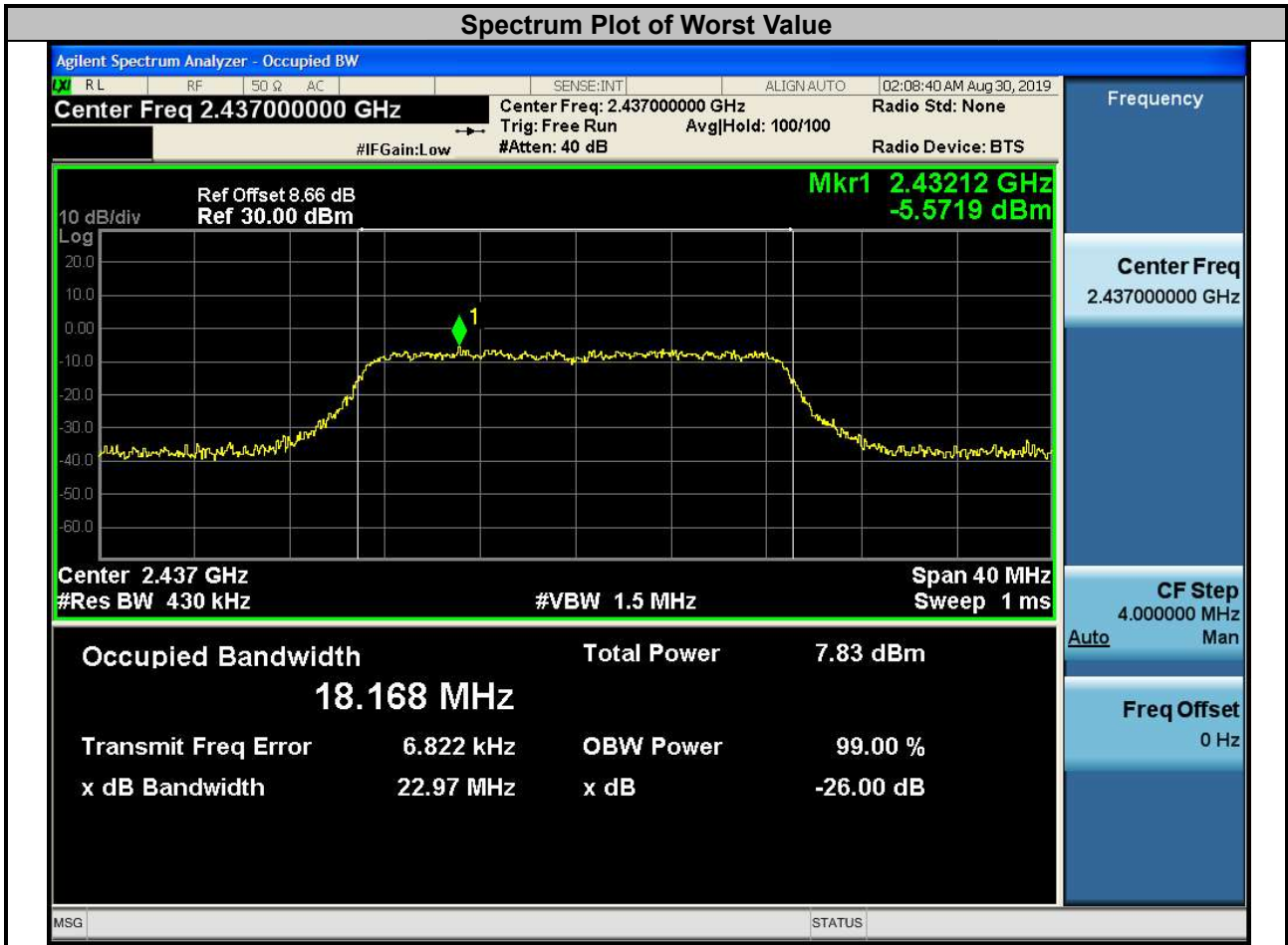
802.11g

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Ant 0		
1	2412	17.080		Pass
6	2437	17.066		Pass
11	2462	17.110		Pass



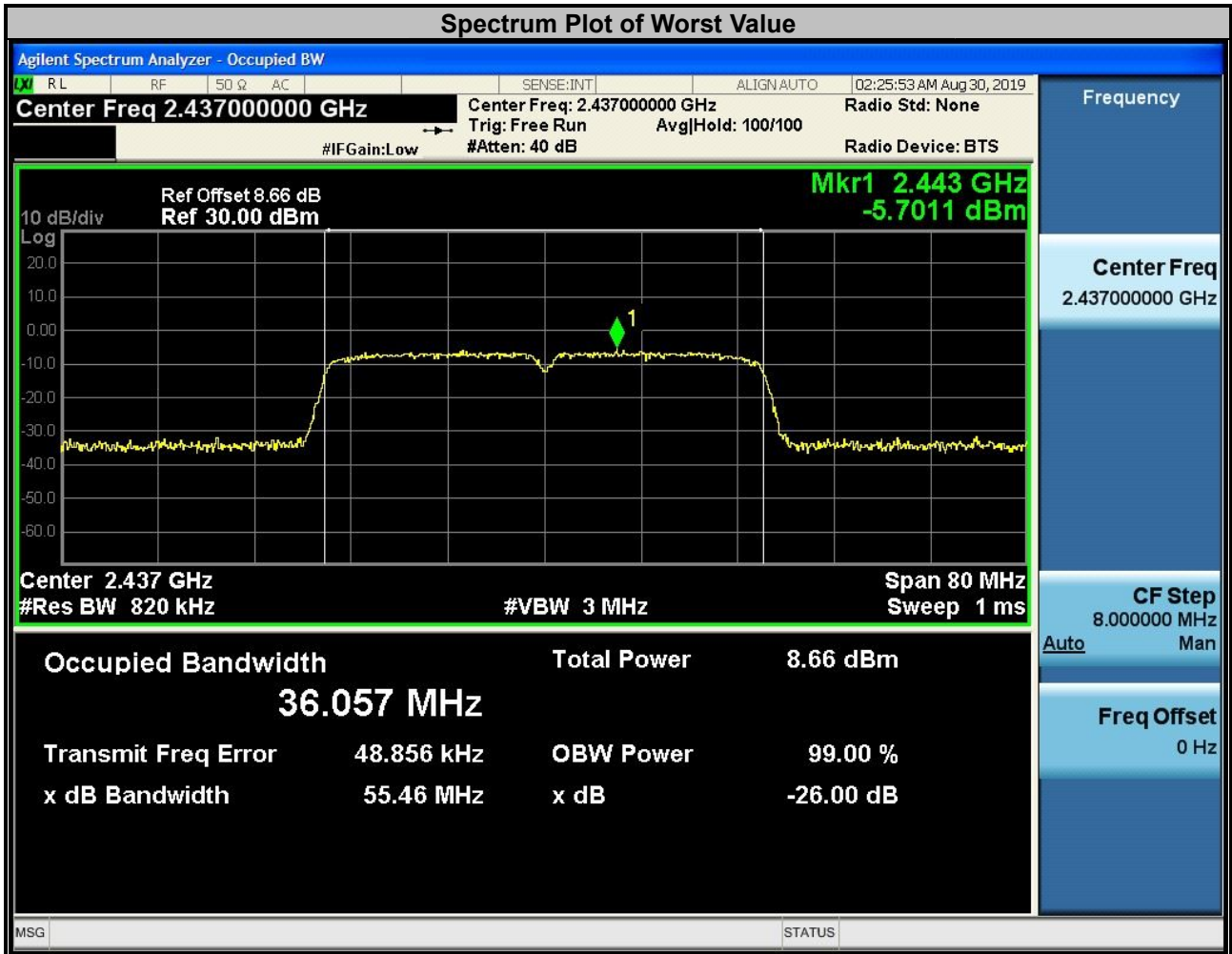
**802.11n HT20**

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Ant 0		
1	2412	18.094		Pass
6	2437	18.168		Pass
11	2462	18.130		Pass



**802.11n HT40**

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Ant 0		
3	2422	35.995		Pass
6	2437	36.057		Pass
9	2452	35.989		Pass

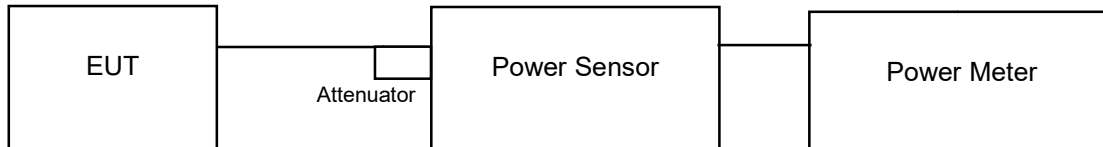


### 3.5 Conducted Output Power Measurement

#### 3.5.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHzbands: 1 Watt (30dBm)

#### 3.5.2 Test Setup



#### 3.5.3 Test Instruments

Refer to section 10.1 to get information of above instrument.

#### 3.5.4 Test Procedures

A peak / average power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak / average power sensor. Record the power level.

#### 3.5.5 Deviation from Test Standard

No deviation.

#### 3.5.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 3.5.7 Test Results

#### 802.11b

CH.	Fre. (MHz)	Average Power (dBm)	Average Power (mW)	Limit (dBm)
1	2412	9.61	9.1411	30.00
6	2437	9.07	8.0724	30.00
11	2462	9.19	8.2985	30.00

#### 802.11g

CH.	Fre. (MHz)	Average Power (dBm)	Average Power (mW)	Limit (dBm)
1	2412	9.43	8.7700	30.00
6	2437	8.71	7.4302	30.00
11	2462	8.90	7.7625	30.00

#### 802.11n HT20

CH.	Fre. (MHz)	Average Power (dBm)	Average Power (mW)	Limit (dBm)
1	2412	<b>9.66</b>	<b>9.2470</b>	30.00
6	2437	9.01	7.9616	30.00
11	2462	9.33	8.5704	30.00

#### 802.11n HT40

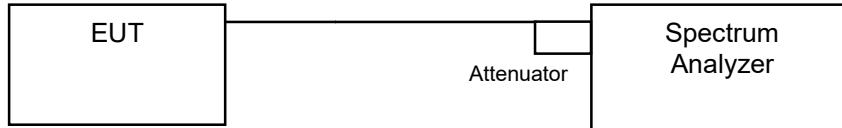
CH.	Fre. (MHz)	Average Power (dBm)	Average Power (mW)	Limit (dBm)
3	2422	9.03	7.9983	30.00
6	2437	8.94	7.8343	30.00
9	2452	8.86	7.6913	30.00

### 3.6 Power Spectral Density Measurement

#### 3.6.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

#### 3.6.2 Test Setup



#### 3.6.3 Test Instruments

Refer to section 10.1 to get information of above instrument.

#### 3.6.4 Test Procedure

- Set the RBW = 10 kHz, VBW =30 kHz, Detector = peak.
- Sweep time = auto couple, Trace mode = max hold,allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz bandsegment within the fundamental EBW.

#### 3.6.5 Deviation from Test Standard

No deviation.

#### 3.6.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



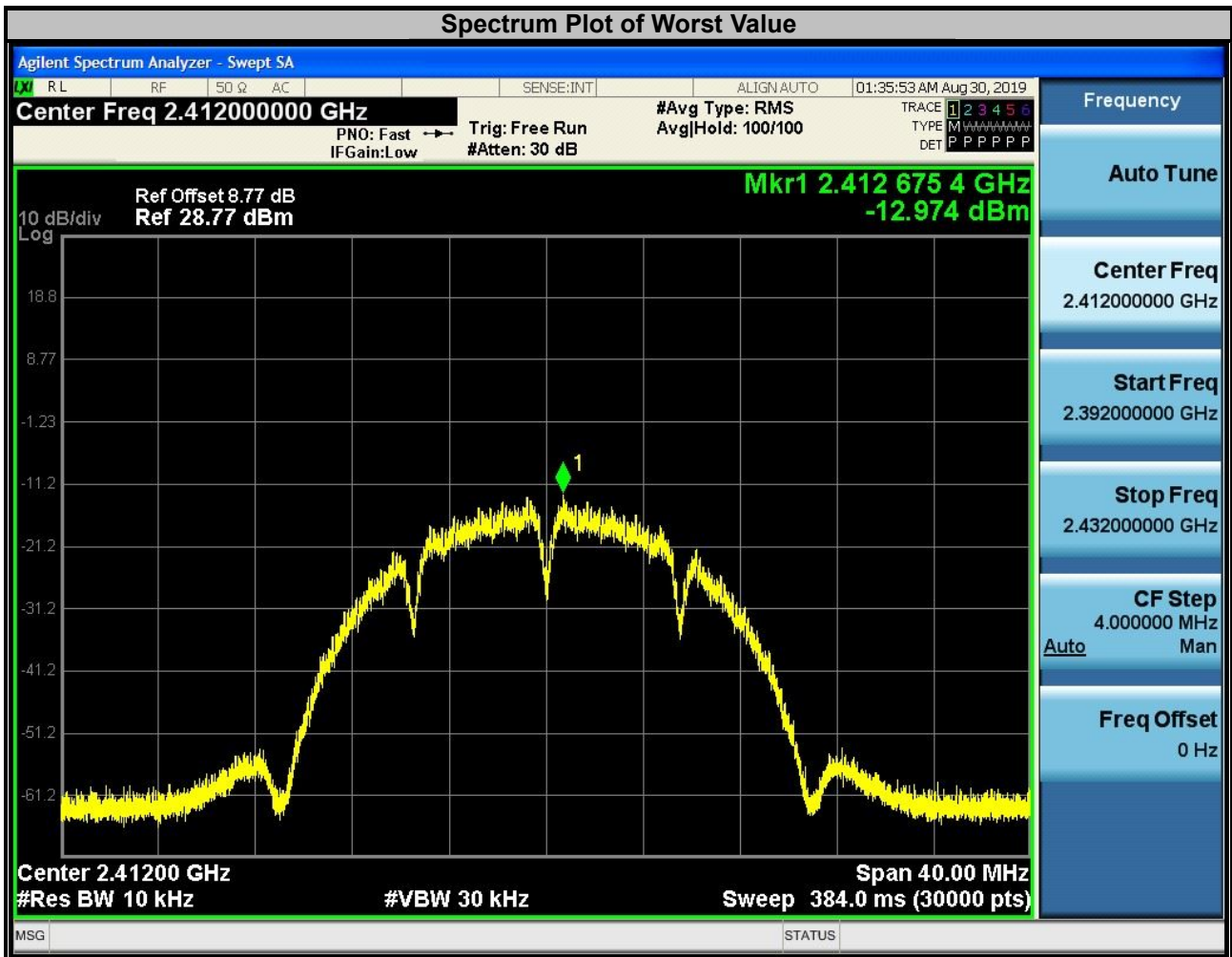
**3.6.7 Test Results**

**802.11b:**

Channel	Frequency (MHz)	PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	-12.974	8	Pass
6	2437	-13.743	8	Pass
11	2462	-13.442	8	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across ponding frequency bins on the various outputs by computer
2. Directional gain = 2dBi < 6dBi, so the power density limit no need to reduce.

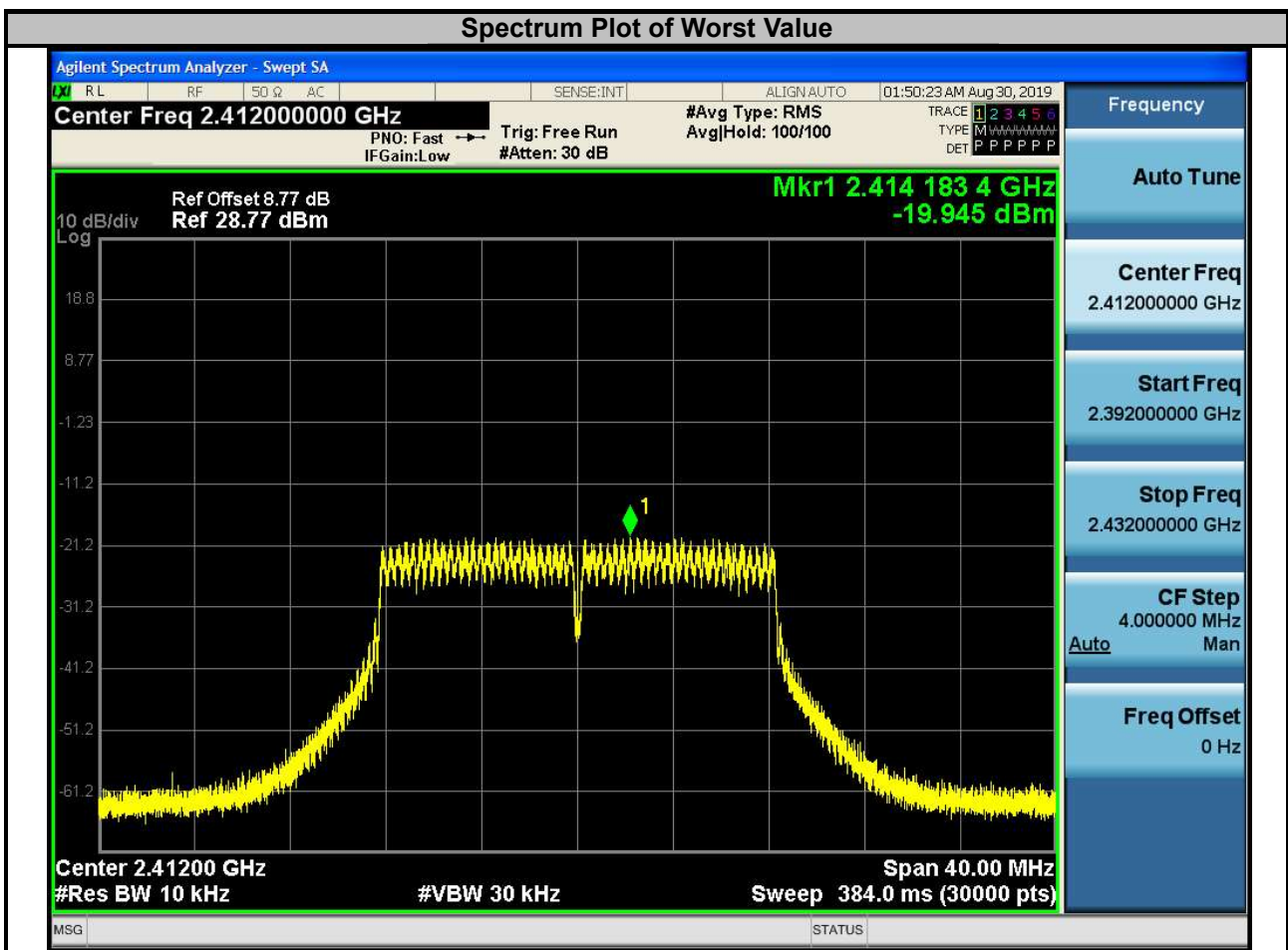


**802.11g:**

Channel	Frequency (MHz)	PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	-19.945	8	Pass
6	2437	-20.312	8	Pass
11	2462	-20.184	8	Pass

**Note:**

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across ponding frequency bins on the various outputs by computer
2. Directional gain = 2dBi < 6dBi, so the power density limit no need to reduce.

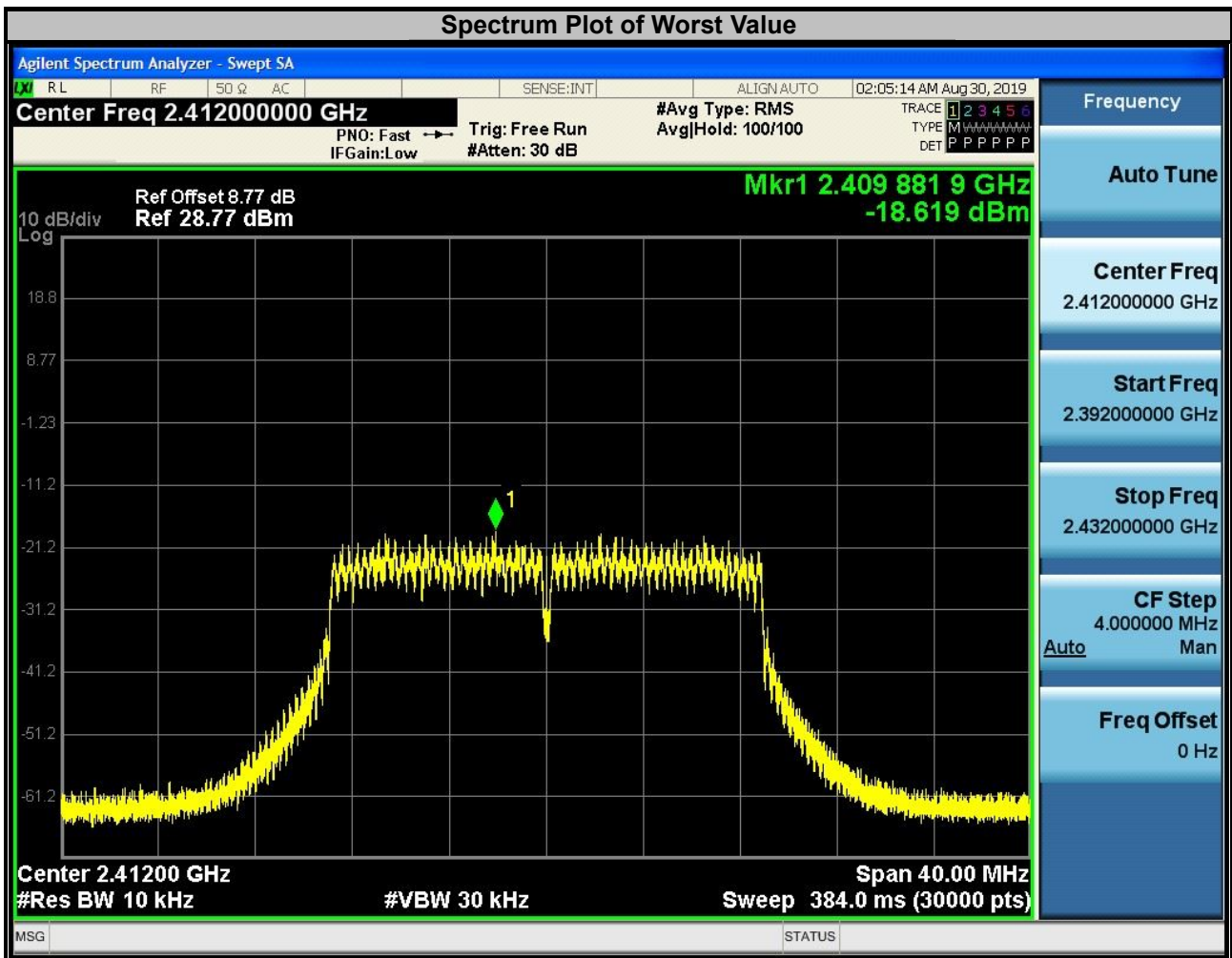


**802.11n HT20:**

Channel	Frequency (MHz)	PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	-18.619	8	Pass
6	2437	-19.616	8	Pass
11	2462	-19.101	8	Pass

Note:

- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across ponding frequency bins on the various outputs by computer
- Directional gain = 2dBi < 6dBi, so the power density limit no need to reduce..

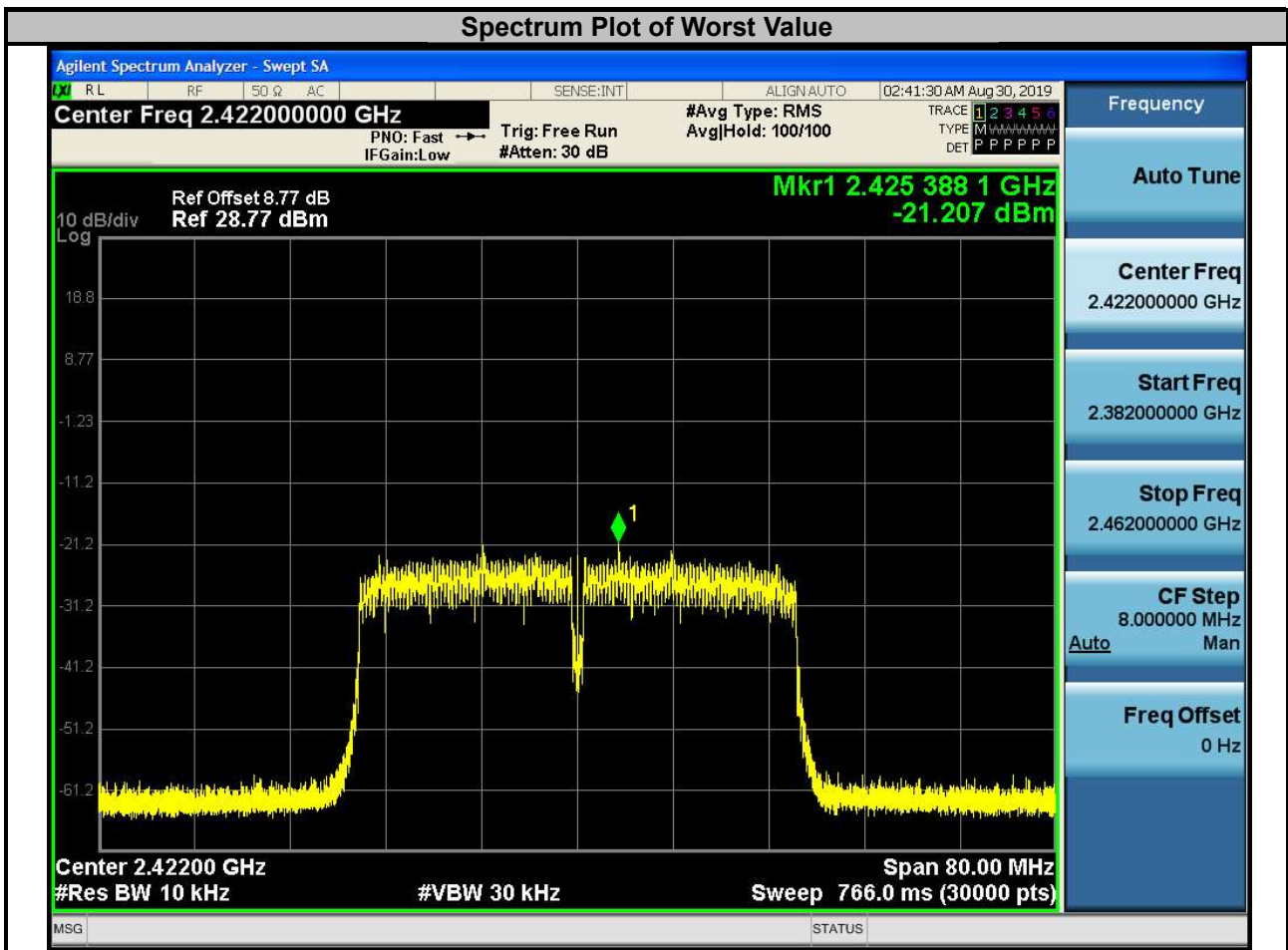


**802.11n HT40:**

Channel	Frequency (MHz)	PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
3	2422	-21.207	8	Pass
6	2437	-21.348	8	Pass
9	2452	-21.805	8	Pass

Note:

- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across ponding frequency bins on the various outputs by computer
- Directional gain = 2dBi < 6dBi, so the power density limit no need to reduce.



### 3.7 Conducted Out of Band Emission Measurement

#### 3.7.1 Limits of Conducted Out of Band Emission Measurement

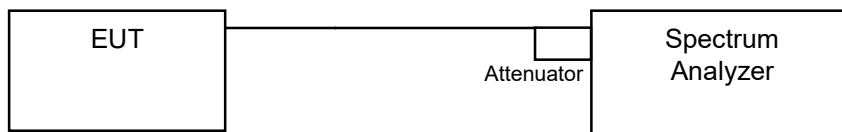
For average power:

Below  $-30\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

For peak power:

Below  $-20\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth)

#### 3.7.2 Test Setup



#### 3.7.3 Test Instruments

Refer to section 10.1 to get information of above instrument.

#### 3.7.4 Test Procedure

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 kHzband segment within the fundamental EBW.

#### 3.7.5 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.

#### 3.7.6 Deviation from Test Standard

No deviation.

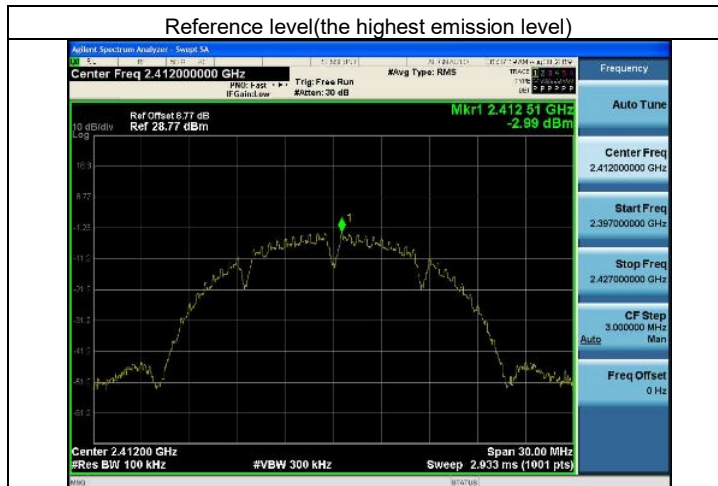
### 3.7.7 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

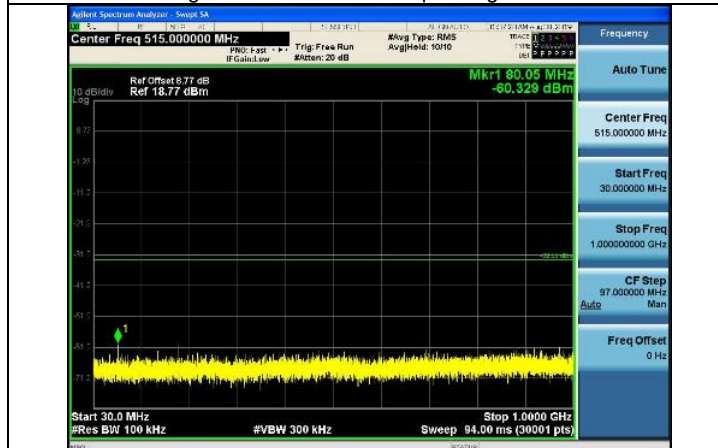
### 3.7.8 Test results

#### 802.11b-Channel 1-2412MHz

Reference level(the highest emission level)



-30dB of the highest emission level of operating band 30MHz~1GHz

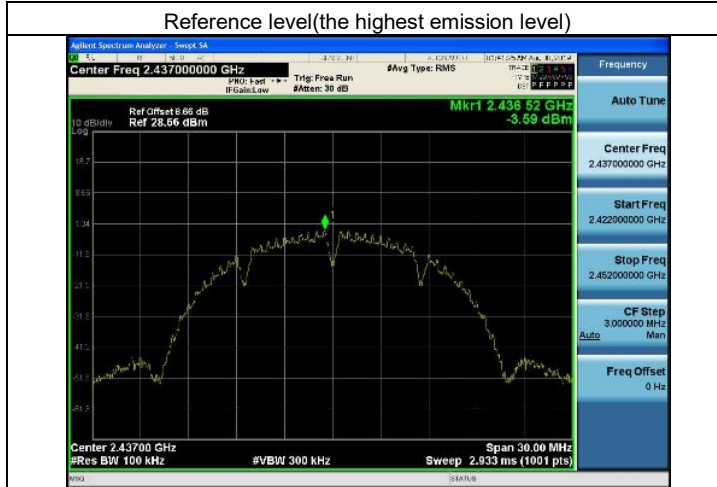


-30dB of the highest emission level of operating band Above 1GHz

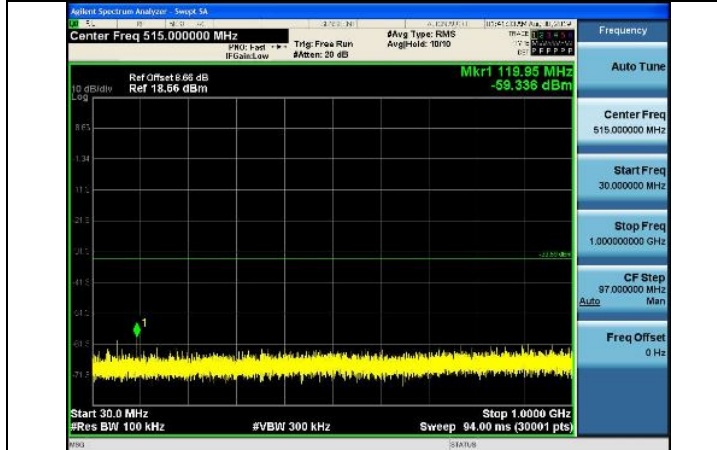


### 802.11b-Channel 6-2437MHz

Reference level(the highest emission level)



-30dB of the highest emission level of operating band 30MHz~1GHz

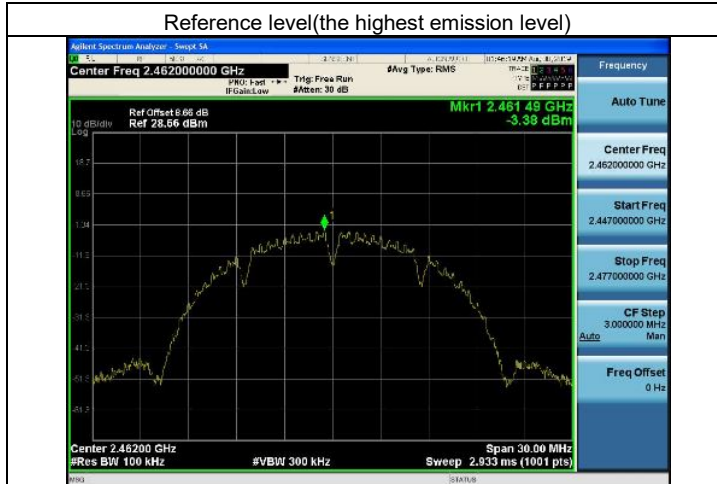


-30dB of the highest emission level of operating band Above 1GHz

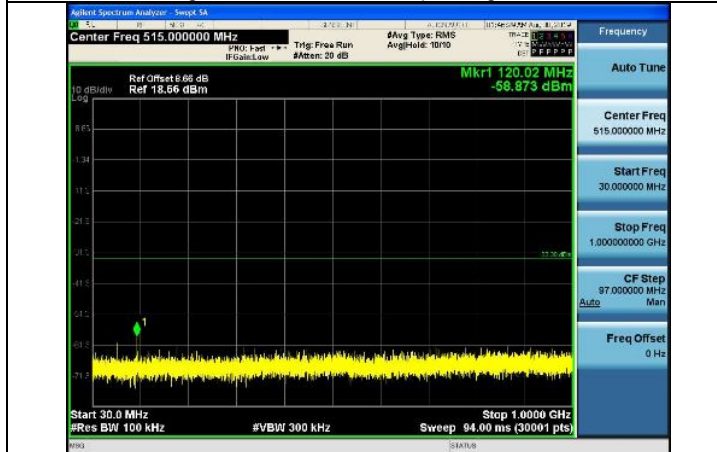


**802.11b-Channel 11-2462MHz**

Reference level(the highest emission level)



-30dB of the highest emission level of operating band 30MHz~1GHz



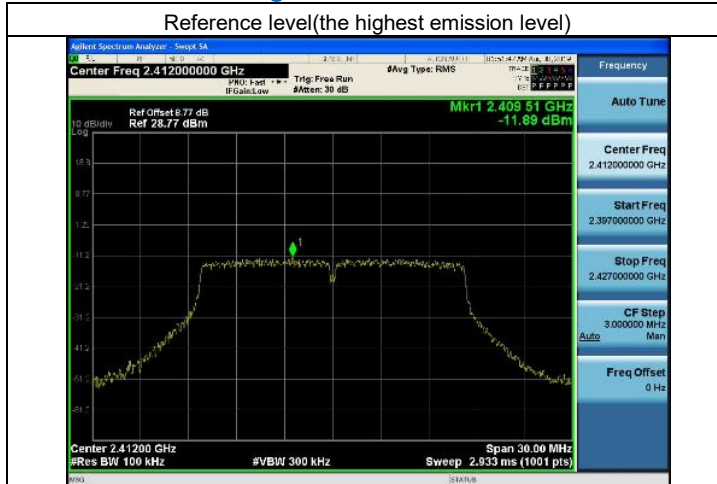
-30dB of the highest emission level of operating band Above 1GHz



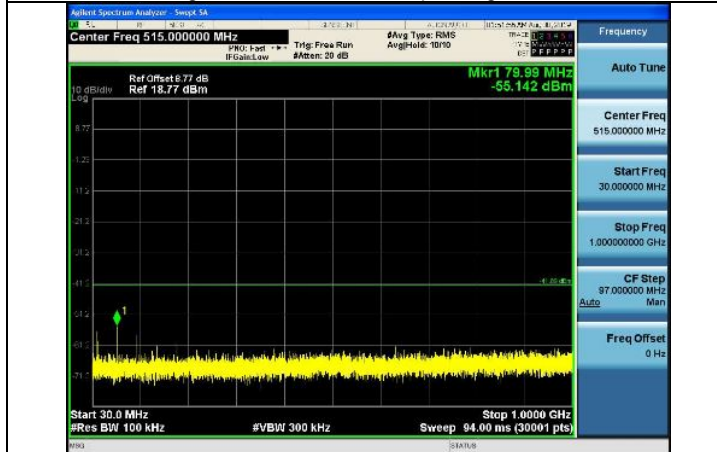


802.11g-Channel 1-2412MHz

Reference level(the highest emission level)



-30dB of the highest emission level of operating band 30MHz~1GHz

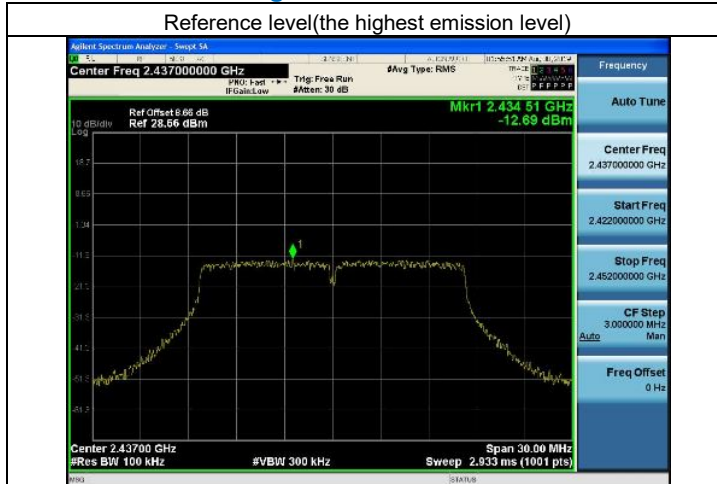


-30dB of the highest emission level of operating band Above 1GHz

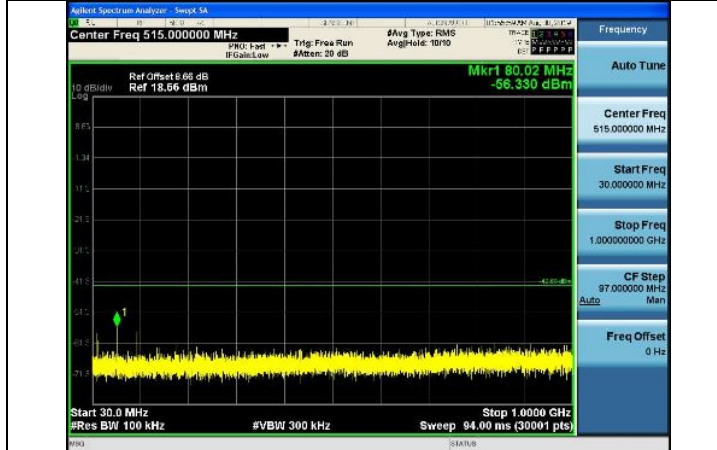


**802.11g-Channel 6-2437MHz**

Reference level(the highest emission level)



-30dB of the highest emission level of operating band 30MHz~1GHz

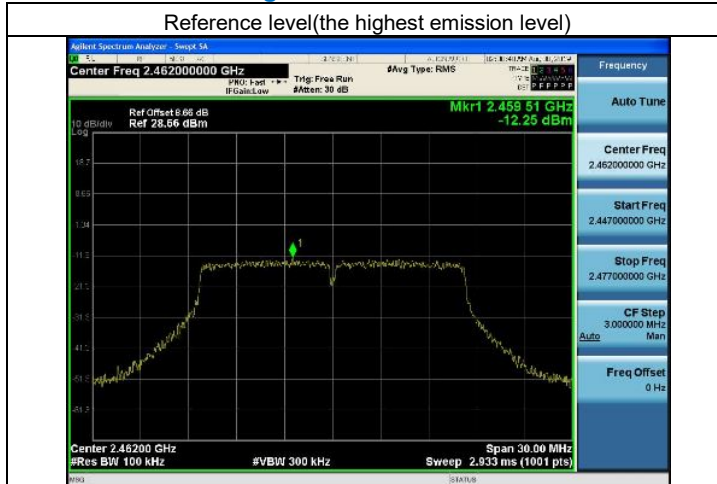


-30dB of the highest emission level of operating band Above 1GHz

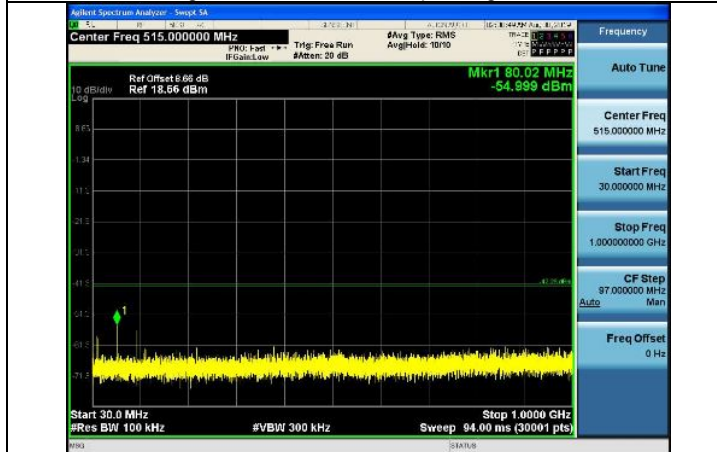


### 802.11g-Channel 11-2462MHz

Reference level(the highest emission level)



-30dB of the highest emission level of operating band 30MHz~1GHz

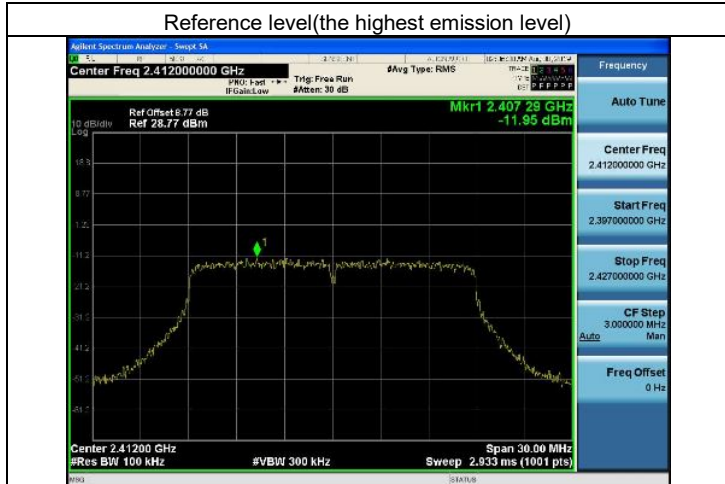


-30dB of the highest emission level of operating band Above 1GHz

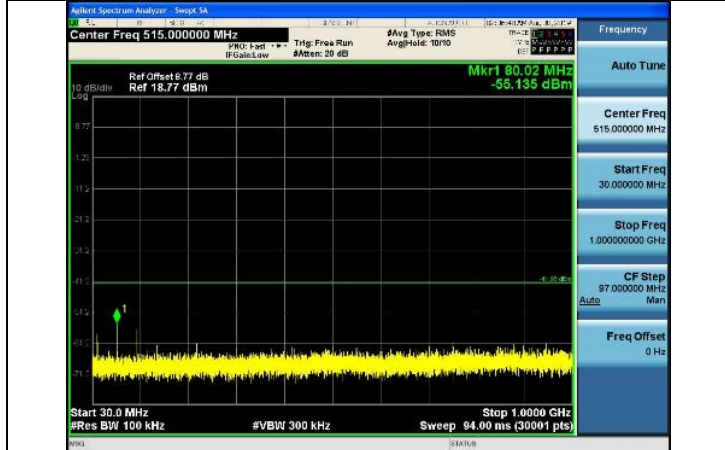


802.11n HT20-Channel 1-2412MHz

Reference level(the highest emission level)



-30dB of the highest emission level of operating band 30MHz~1GHz

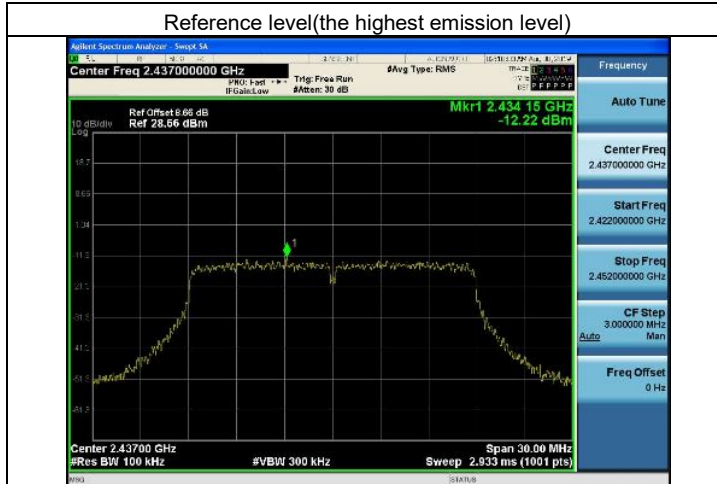


-30dB of the highest emission level of operating band Above 1GHz

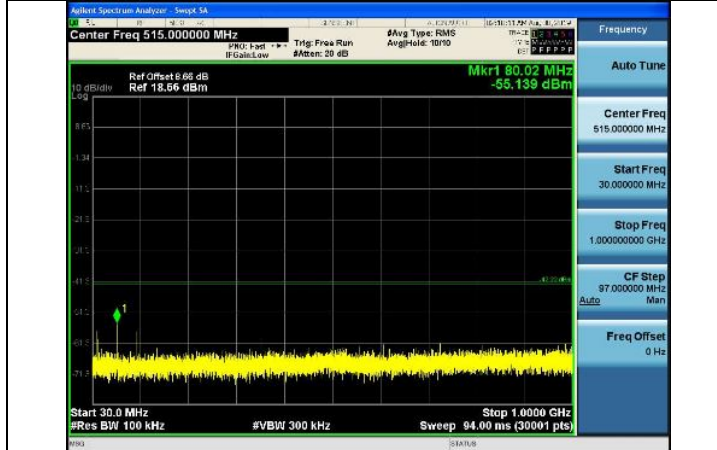


802.11n HT20-Channel 6-2437MHz

Reference level(the highest emission level)



-30dB of the highest emission level of operating band 30MHz~1GHz

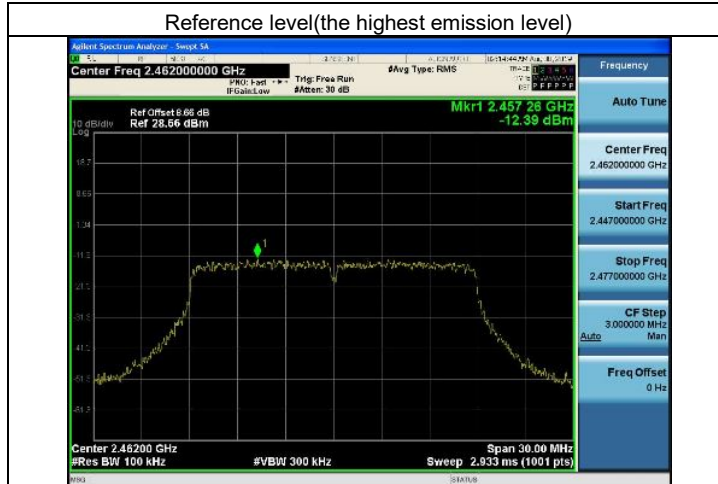


-30dB of the highest emission level of operating band Above 1GHz

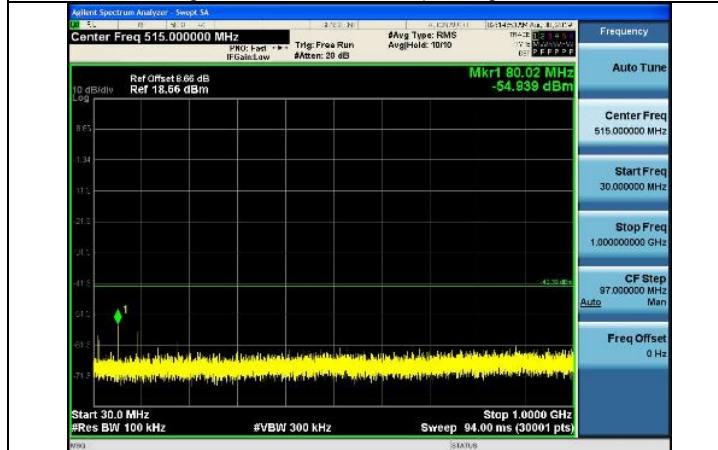


802.11n HT20-Channel 11-2462MHz

Reference level(the highest emission level)



-30dB of the highest emission level of operating band 30MHz~1GHz

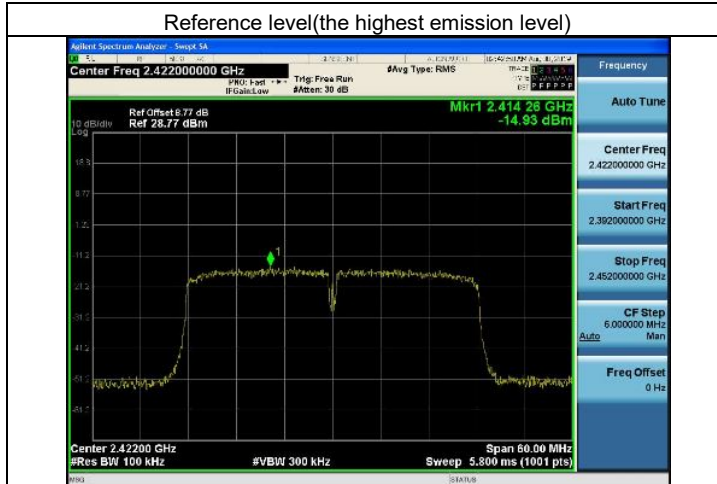


-30dB of the highest emission level of operating band Above 1GHz

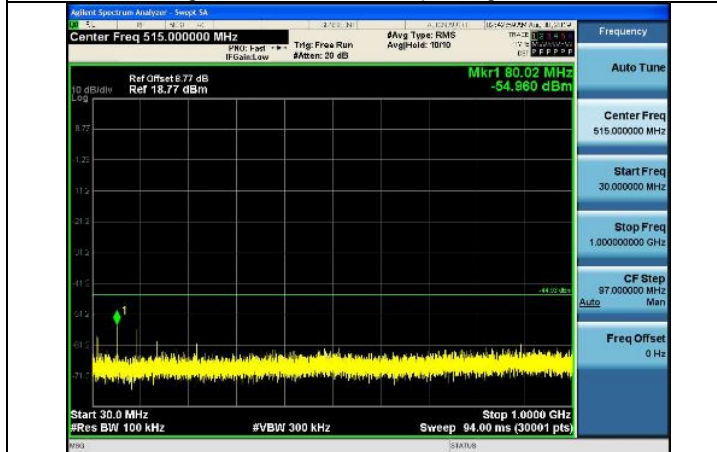


802.11n HT40-Channel 3-2422MHz

Reference level(the highest emission level)



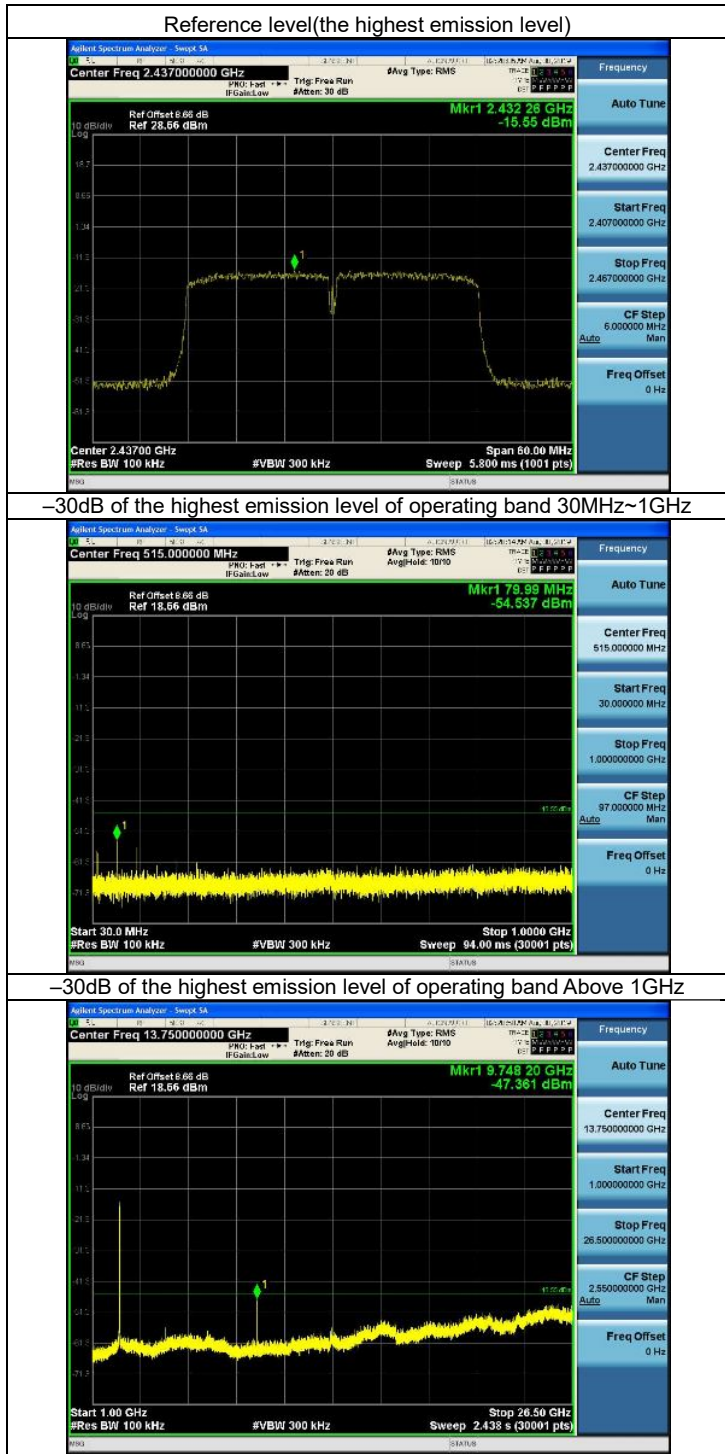
-30dB of the highest emission level of operating band 30MHz~1GHz



-30dB of the highest emission level of operating band Above 1GHz



802.11n HT40-Channel 6-2437MHz



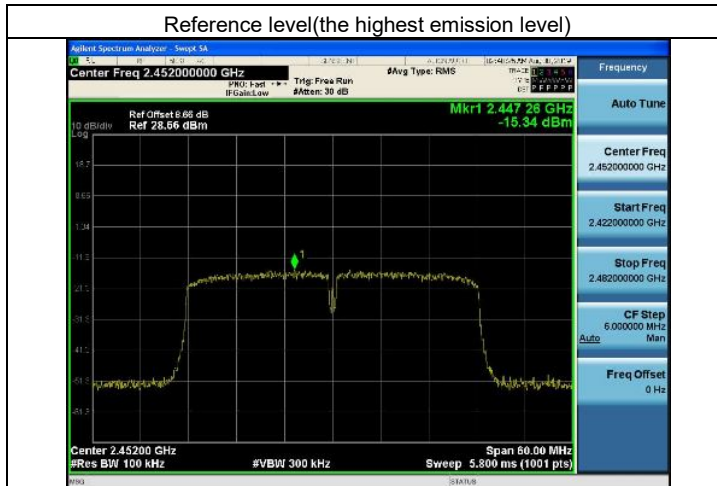
-30dB of the highest emission level of operating band 30MHz~1GHz

-30dB of the highest emission level of operating band Above 1GHz

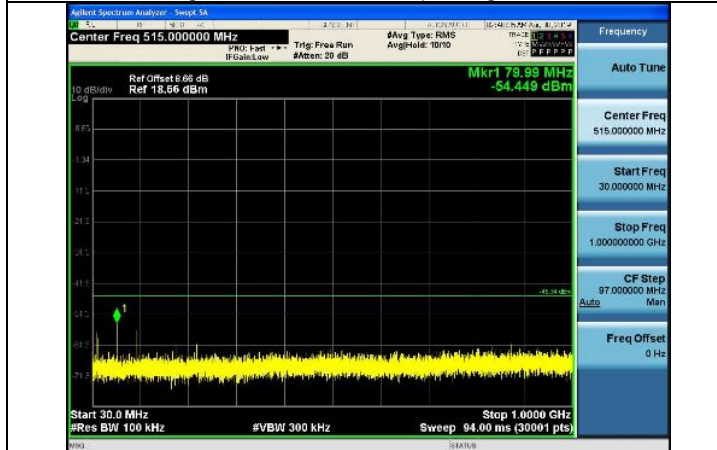


**802.11n HT40-Channel 9-2452MHz**

Reference level(the highest emission level)



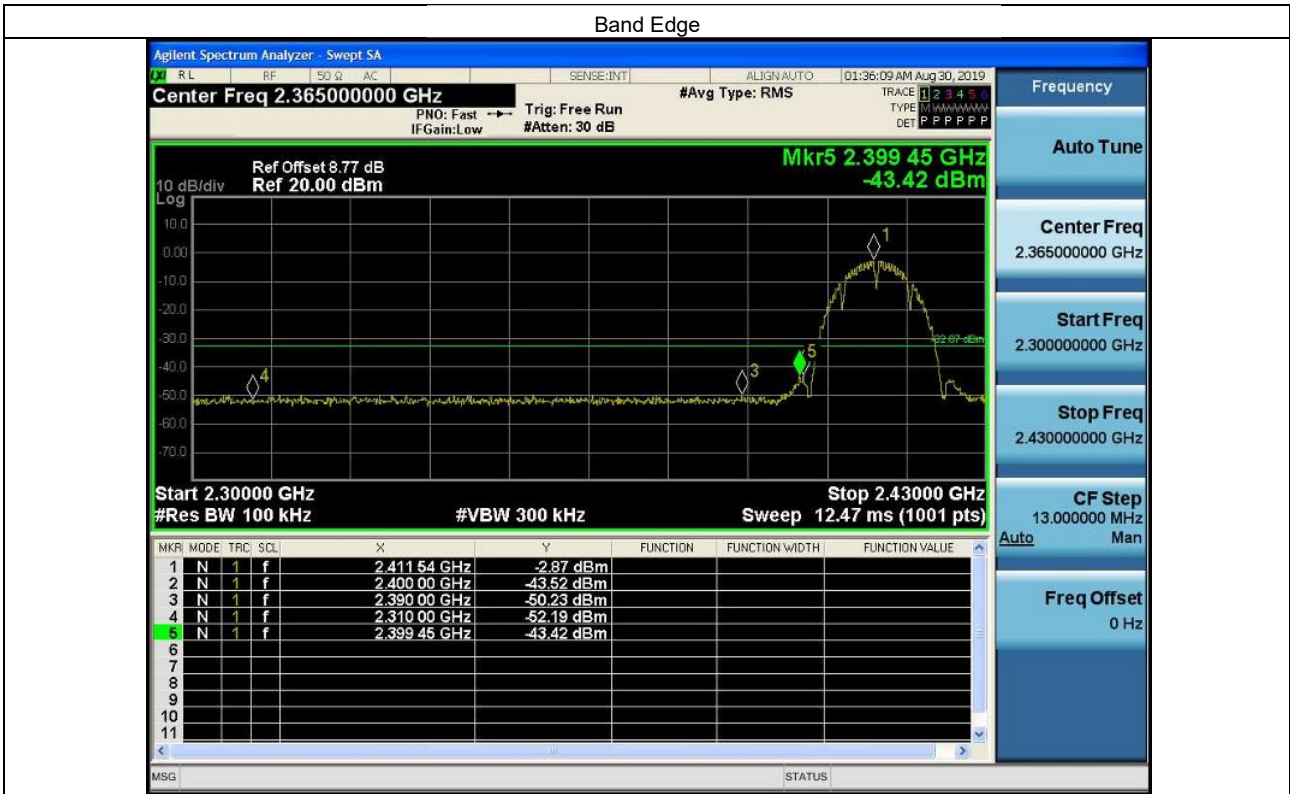
-30dB of the highest emission level of operating band 30MHz~1GHz



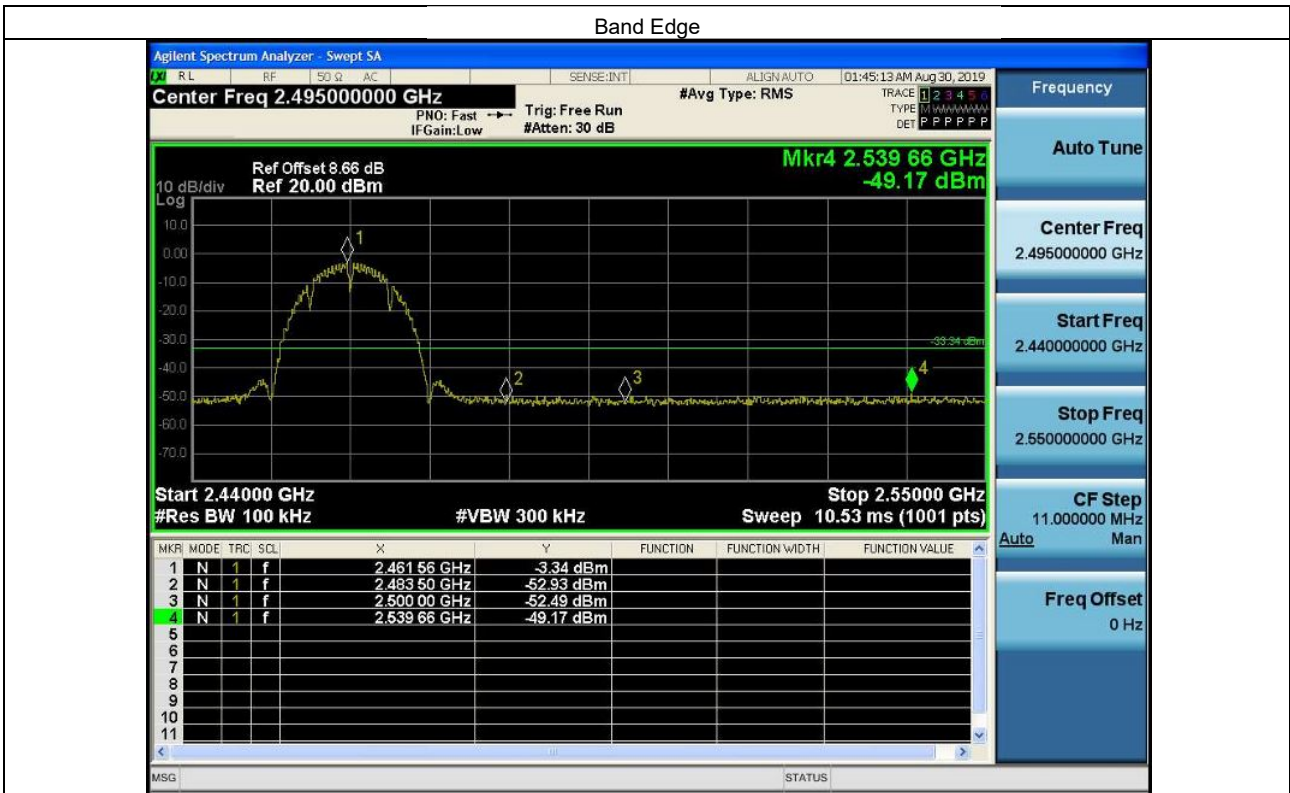
-30dB of the highest emission level of operating band Above 1GHz



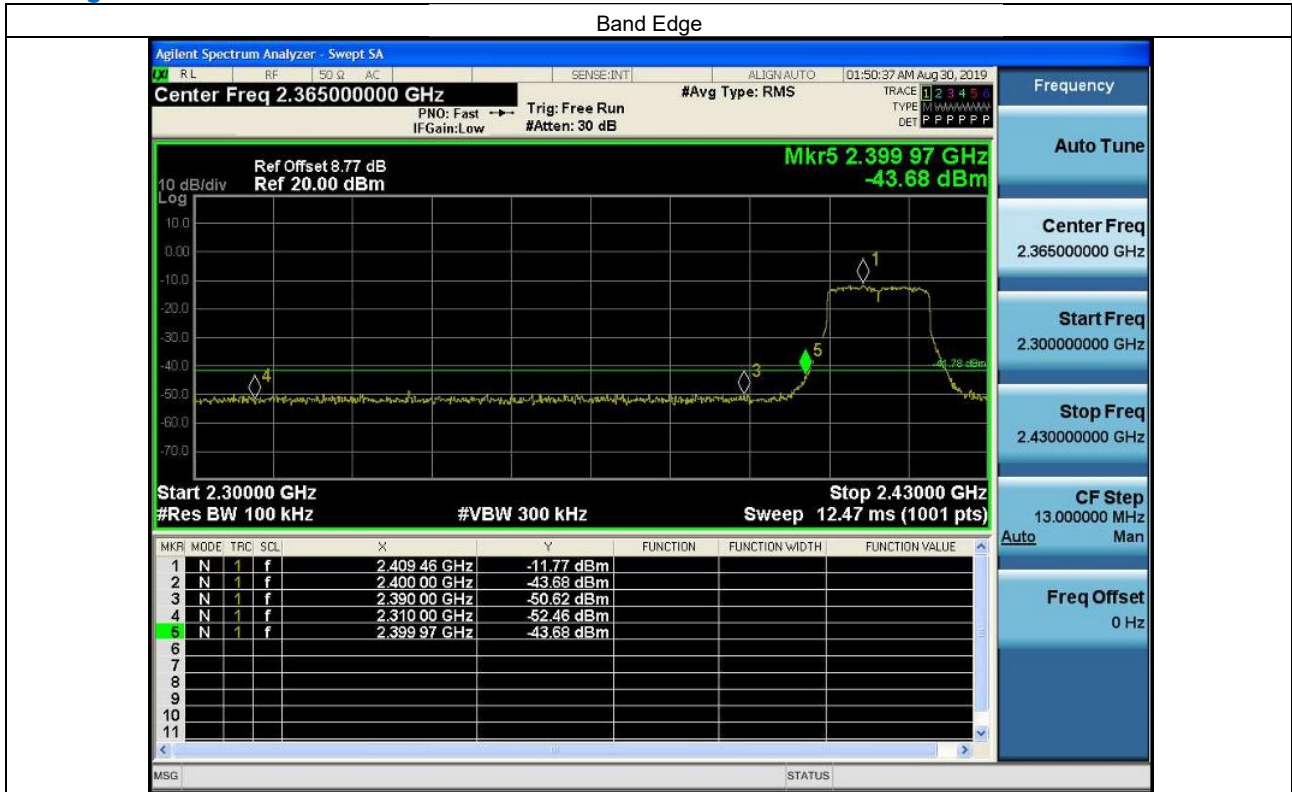
802.11b-Channel 1-2412MHz



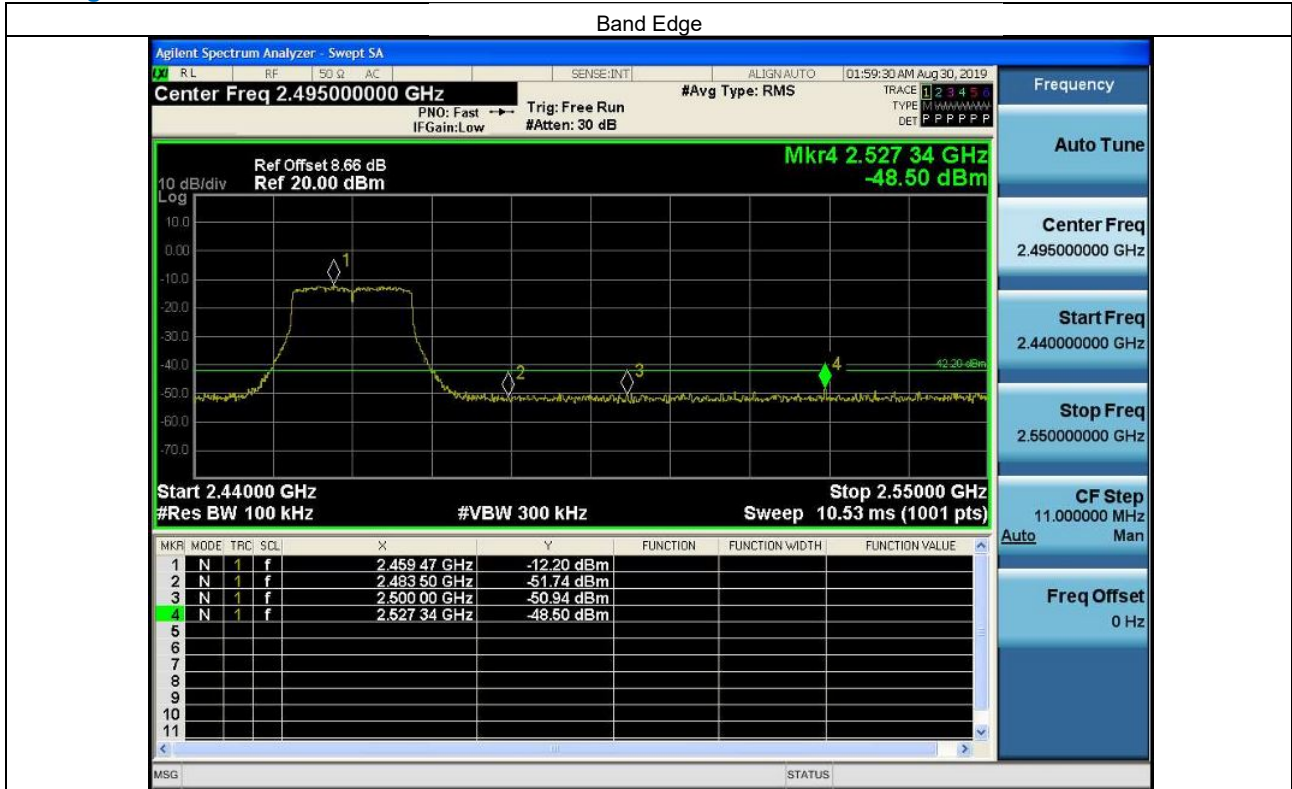
802.11b-Channel 11-2462MHz



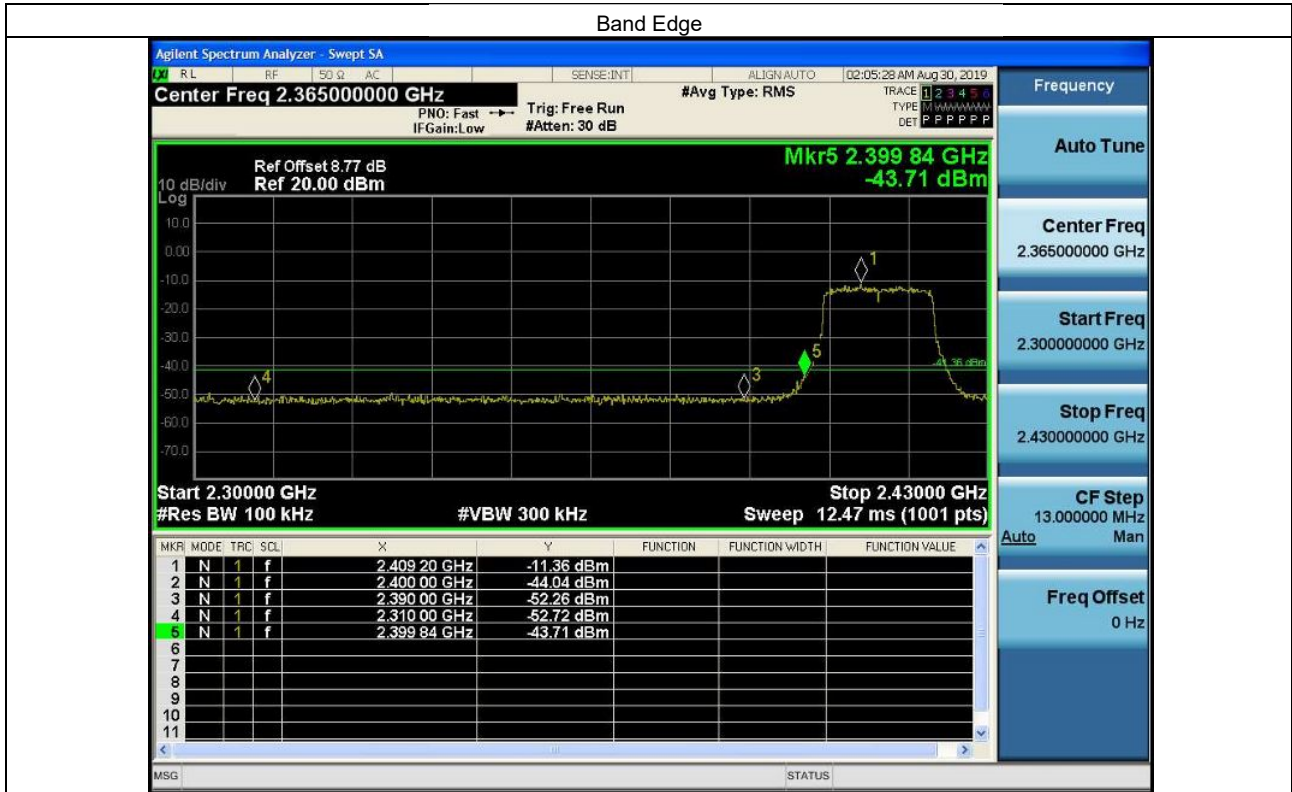
802.11g-Channel 1-2412MHz



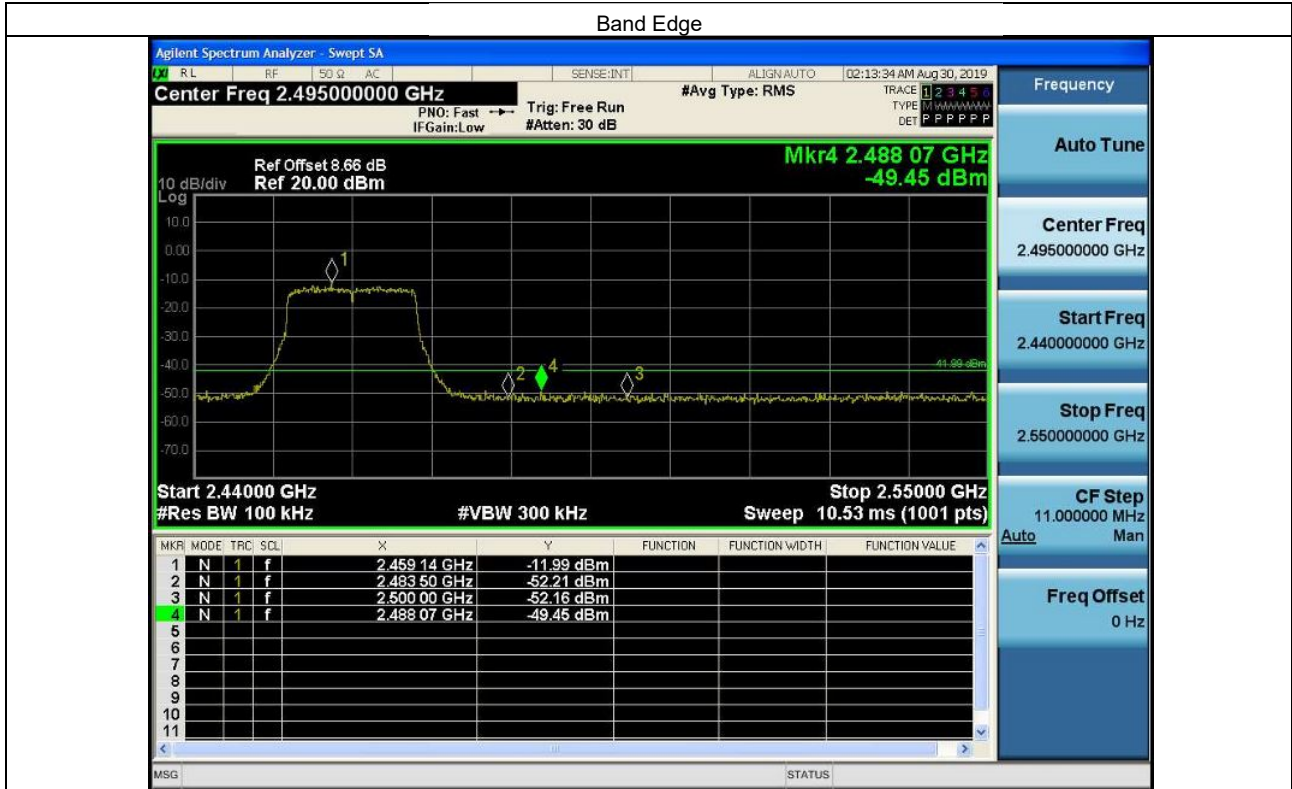
802.11g-Channel 11-2462MHz



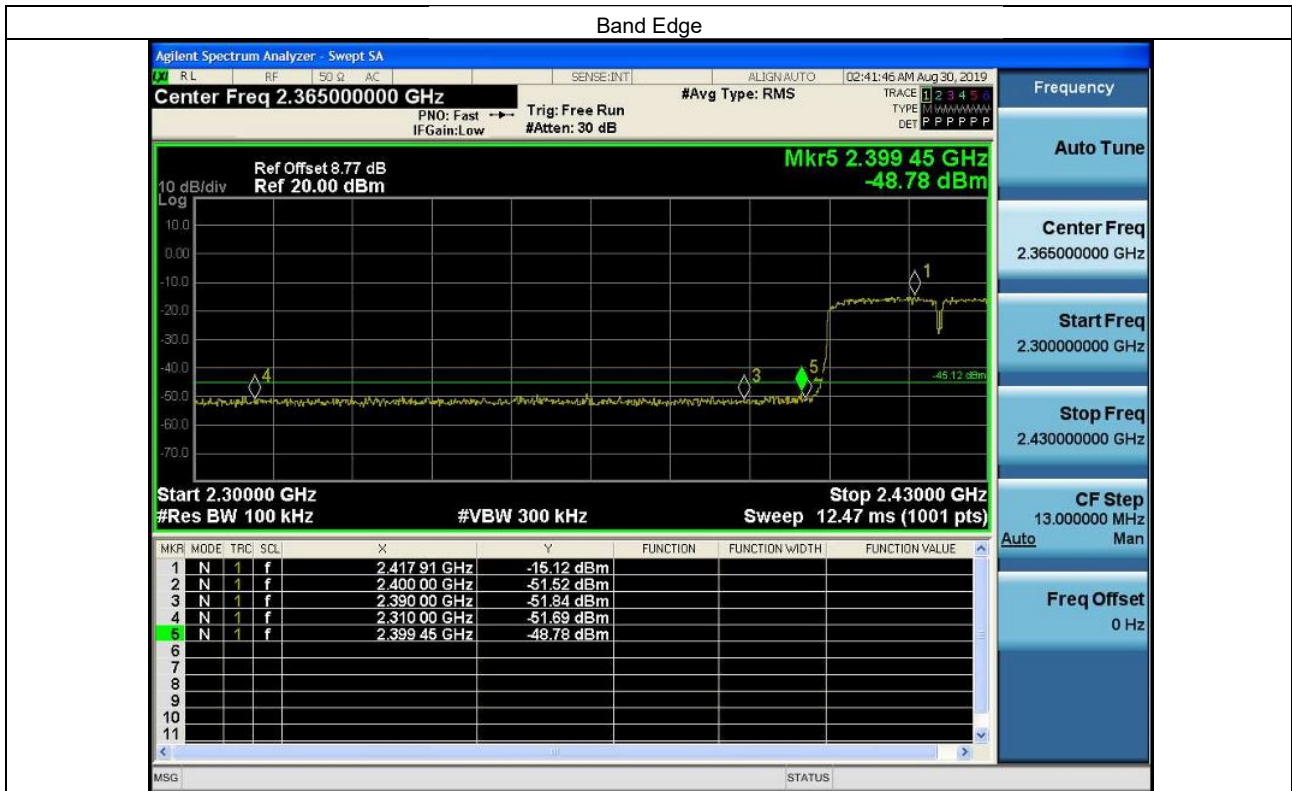
802.11n HT20-Channel 1-2412MHz



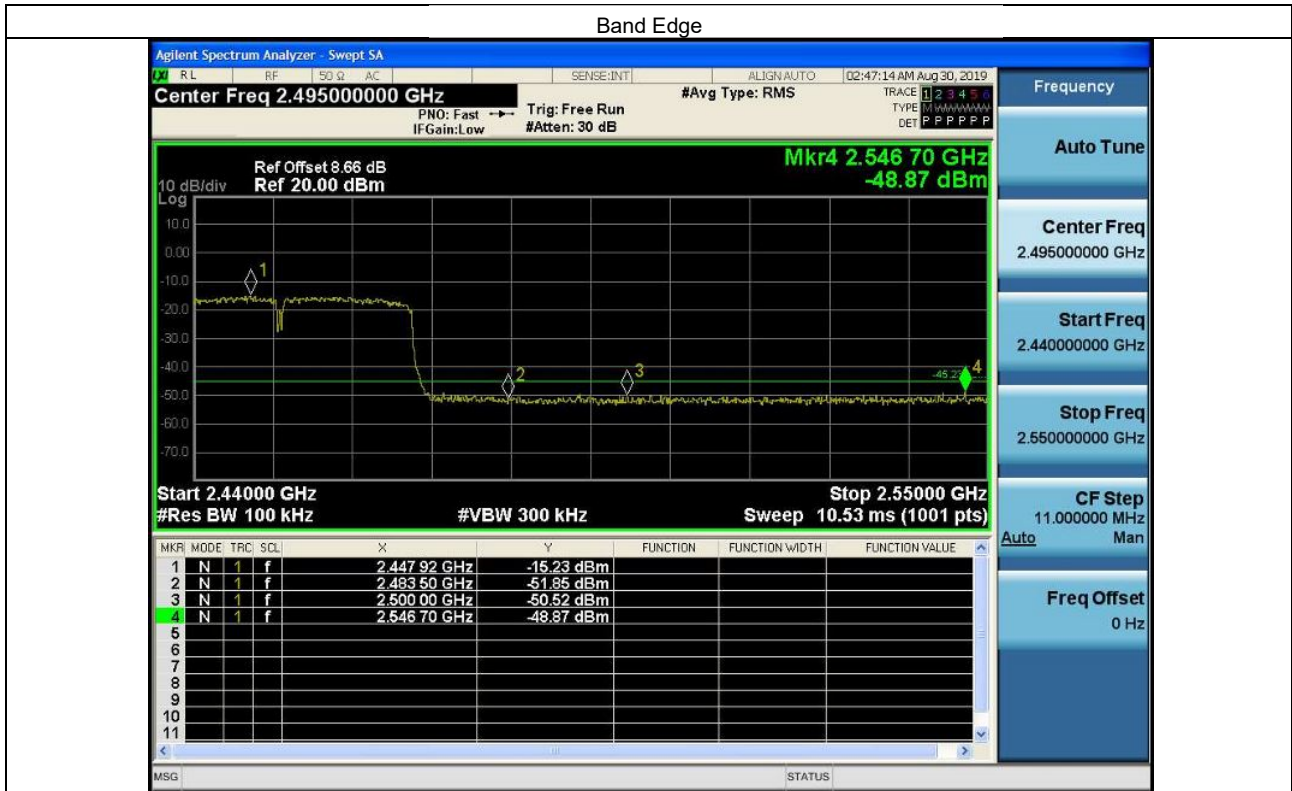
802.11n HT20-Channel 11-2462MHz



02.11n HT40Channel 3-2422MHz



802.11n HT40-Channel 9-2452MHz



#### 4. Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

#### 5. Test instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Spectrum Keysight	N9020A	MY51240612	2018/10/29	2019/10/28
Spectrum Analyzer Rohde&Schwarz	FSV-40N	101783	2018/12/11	2019/12/10
Power Meter10Hz~18GHz Tonscend	JS0806-2	188060126	2018-11-10	2019-11-09
Signal generator Keysight	N5182A	GB40051020	2018/10/29	2019/10/28
Signal generator Keysight	N5182A	MY47420944	2018/10/29	2019/10/28
Test Software Tonscend	JS0806-2	NA	NA	NA
Hygrothermograph Yuhuaze	HTC-1	NA	2018/10/30	2019/10/29

Note: 3. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.

4. The test was performed in Chamber 1.

**Appendix – Information on the Testing Laboratories**

We, [Hwa-Hsing \(Dongguan\) Co., Ltd.](#), A global provider of TESTING and CERTIFICATION services for consumer products, electronic products and wireless information technology products. Adhering to the core values “HONEST and TRUSTWORTHY, OBJECTIVE and IMPARTIALITY, RIGOROUS and AFFICIENT”, commitment to provide professional, perfect and efficient comprehensive ONE-STOP solution of TESTING and CERTIFICATION services for Manufacturers, Buyers, Traders, Brands, Retailers. Assist client to better manage risk, protect their brands, reduce costs and cut time to over 150 markets in global. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lab Address: [No.101, Bld N1, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China](#)

Contact Tel: [0769-83078199](tel:0769-83078199)

Email: [customerservice.dg@hwa-hsing.com](mailto:customerservice.dg@hwa-hsing.com)

Web Site: [www.hwa-hsing.com](http://www.hwa-hsing.com)

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