

## FCCTest Report

**Report No.:** HP190708DC001-FWL

**FCC ID:** 2ACYT-MT7668U

**Product Name** wireless module

**Test Model:** MT7668U

**Series Model:** N/A

**Received Date:** 2019-7-11

**Test Date:** 2019-7-12~2019-7-25

**Issued Date:** 2019-8-26

**Applicant Name:** SHENZHEN Hitevision Technology Co., Ltd.

**Applicant Address:** No. 8, Qinglan 1st Road, Pingshan Shenzhen China

**Issued By:** Hwa-Hsing (Dongguan) Testing Co., Ltd.

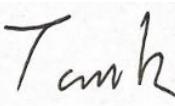
**Lab Address:** No.101, Bld N1,Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China

**Test Location:** No.101, Bld N1,Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China

**FCC Designation Number:** CN1255

**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:** Aug. 26, 2019  
Tank Tan//Engineer

**Approved by :**  , **Date:** Aug. 26, 2019  
Harry Li/ Supervisor

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**Release Control Record**

<b>Issue No.</b>	<b>Description</b>	<b>Date Issued</b>
HP190708DC001-FWL	Original Release	Aug. 26, 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 -23.80 dB at 0.4380MHz.
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -0.64 dB at 4924.00MHz.
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 EUTAs 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	wireless module
Brand Name	N/A
Test Model	MT7668U
FCC ID:	2ACYT-MT7668U
Identification No. of EUT	N/A
Series Model	N/A
Model Difference	N/A
Status of EUT	Engineering prototype
Power Supply Rating	DC5V from USB
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	22.27dBm
Antenna Type	Dipole antenna with 3.34dBi gain
Antenna Connector	SMA connector
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 CDD mode with dual antenna transmission and dual antenna reception

Support mode	Frequency band	Transmit and receive mode	Transmit and Receive Chain
802.11b	2412~2462MHz	MIMO	2TX,2RX
802.11g	2412~2462MHz	MIMO	2TX,2RX
802.11n HT20	2412~2462MHz	MIMO	2TX,2RX
802.11n HT40	2422~2452MHz	MIMO	2TX,2RX

## 2.2 Description of Test Channels

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≥1G	RE<1G	PLC	APCM	
802.11b	√	√	√	√	-
802.11g	√	√	√	√	-
802.11n (20MHz)	√	√	√	√	-
802.11n (40MHz)	√	√	√	√	-

Where      **RE≥1G:** Radiated Emission above 1GHz      **RE<1G:** Radiated Emission below 1GHz  
**PLC:** Power Line Conducted Emission      **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	Ant 1
802.11b	1	2412	1C	1C
	6	2437	1C	1C
	11	2462	1C	1C
802.11g	1	2412	1B	1B
	6	2437	1B	1B
	11	2462	1B	1B
802.11 n20	1	2412	19	19
	6	2437	19	19
	11	2462	19	19
802.11 n40	1	2412	16	16
	6	2437	16	16
	11	2462	16	16

## 2.4 DutyCycleof Test Signal

802.11b: Duty cycle of test signal is 99.584 %, Duty cycle of test signal is <98%

802.11g: Duty cycle of test signal is 97.887 %, Duty cycle of test signal is <98%

$$\text{Duty cycle} = 1.390/1.420 = 97.887 \%,$$

$$\text{Duty factor} = 10 * \log(1/0.978) = 0.09\text{dB}$$

802.11n HT20: Duty cycle of test signal is 97.153 %, Duty cycle of test signal is <98%

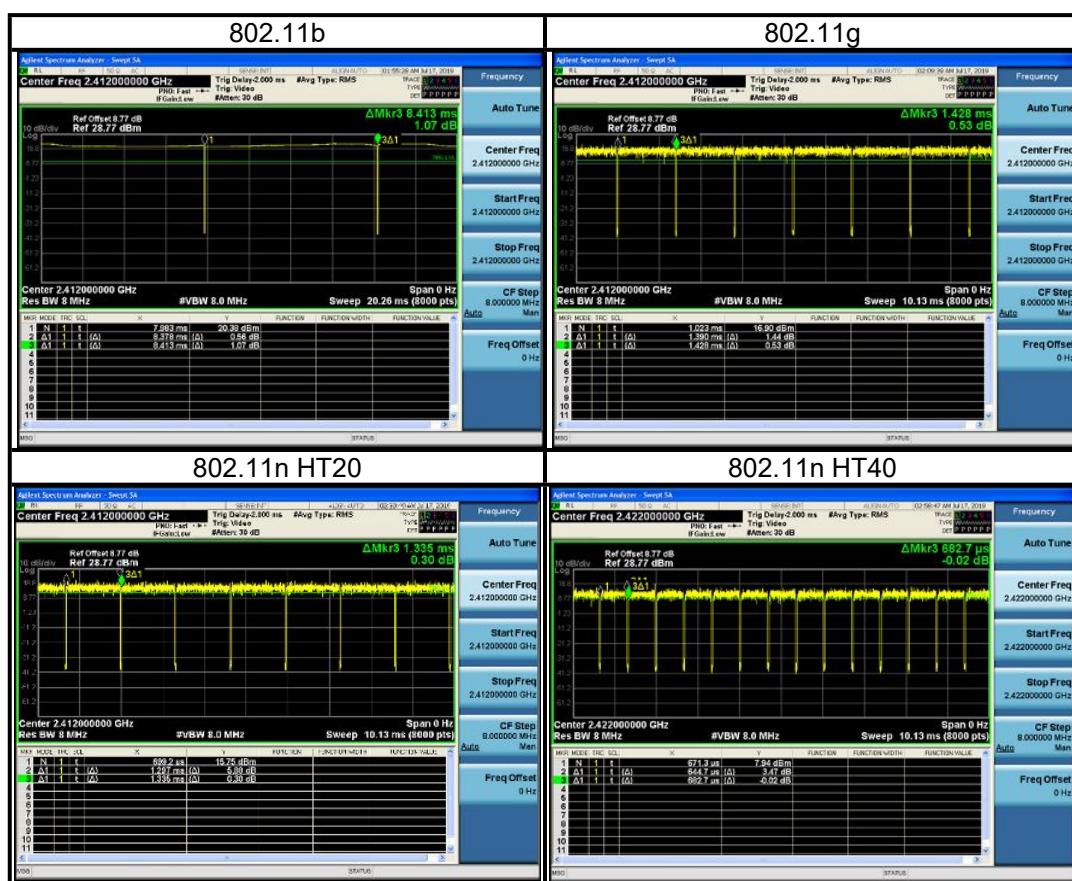
$$\text{Duty cycle} = 1.297/1.335 = 97.153 \%,$$

$$\text{Duty factor} = 10 * \log(1/0.971) = 0.12\text{dB}$$

802.11n HT40: Duty cycle of test signal is 94.433 %, Duty cycle of test signal is <98%

$$\text{Duty cycle} = 0.6447/0.6827 = 94.433 \%,$$

$$\text{Duty factor} = 10 * \log(1/0.944) = 0.24\text{dB}$$



## 2.5 Description of Support Units

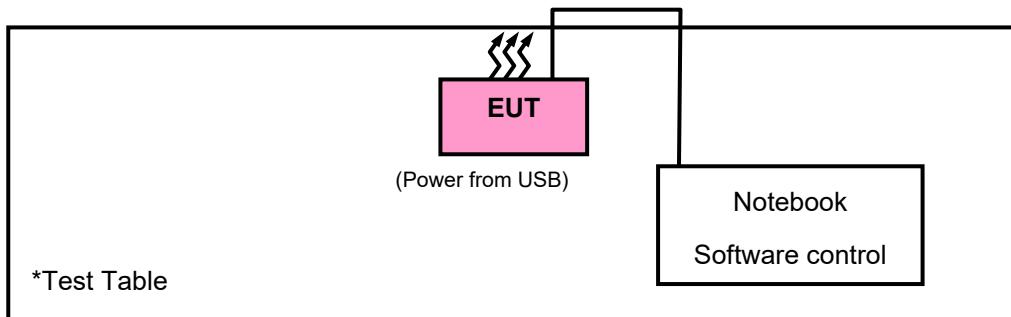
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

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

## 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 (dB<sub>UV</sub>/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:**

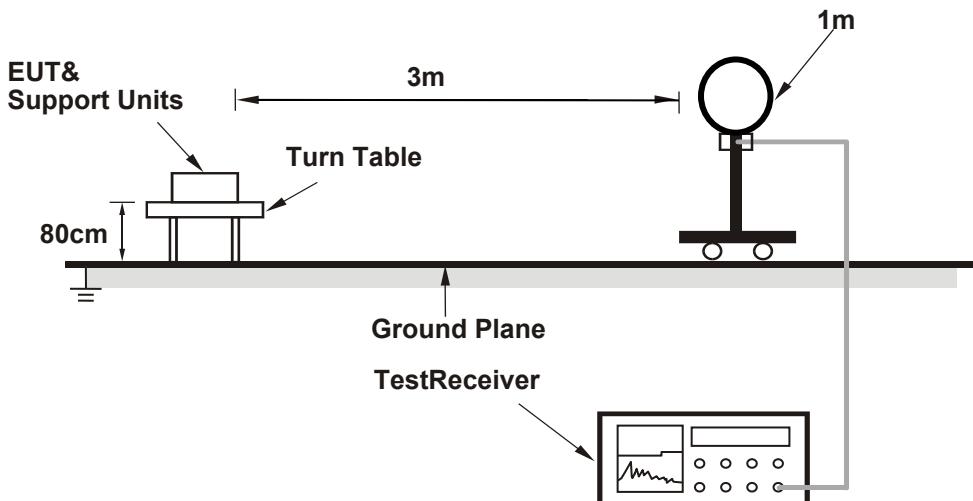
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency 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

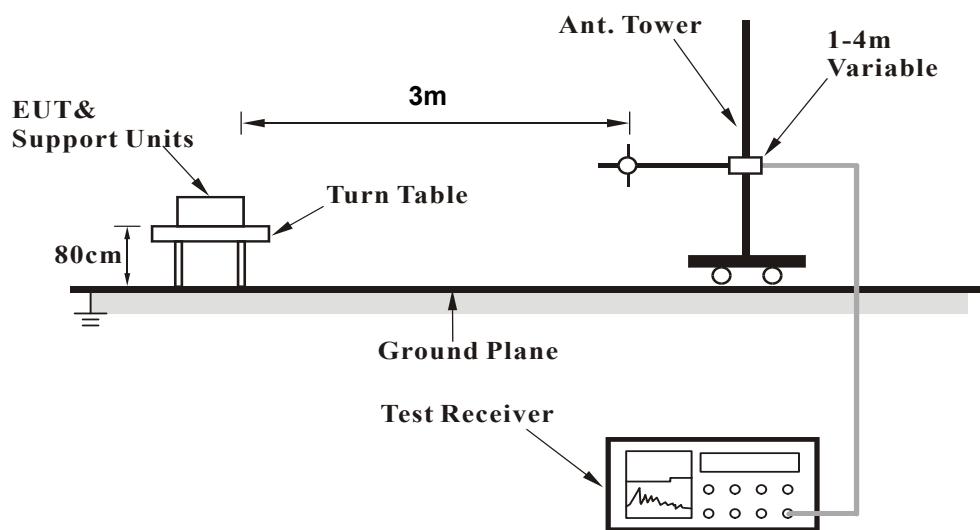
No deviation.

### 3.1.5 Test Set up

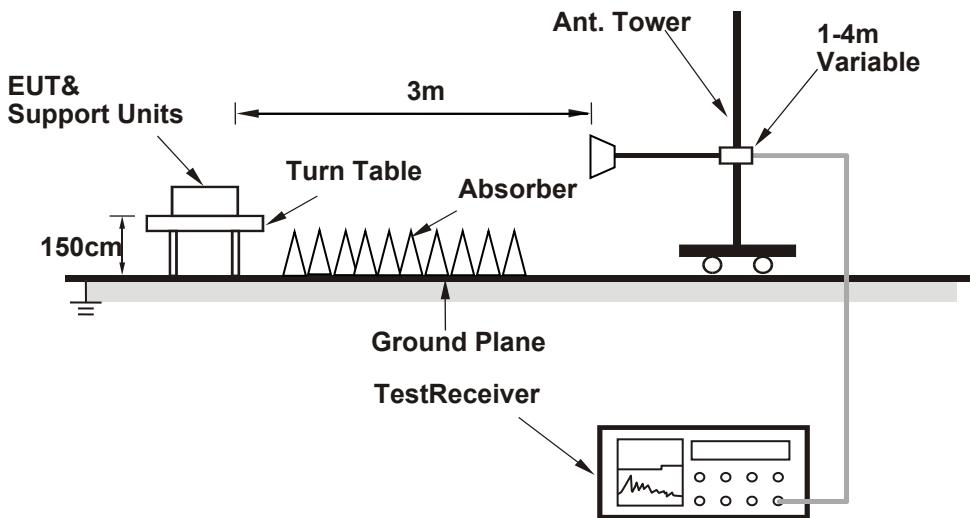
Radiated emission below 30MHz:



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

- Placed the EUT on the testing table.
- 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		25deg. C, 65%RH			Tested By		Tank tan		

Antennal Polarity&TestDistance: 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	53.39	-0.77	52.62	74.00	-21.38	peak	266	252	
2	2390.000	41.89	-0.77	41.12	54.00	-12.88	AVG	266	252	
3 *	2412.000	111.41	-0.71	110.70			peak	266	252	
4 *	2412.000	107.65	-0.71	106.94			AVG	266	252	
5	4824.000	52.92	5.59	58.51	74.00	-15.49	peak	100	185	
6	4824.000	38.16	5.59	43.75	54.00	-10.25	AVG	100	185	
7	7236.000	51.57	11.85	63.42	74.00	-10.58	peak	100	296	
8	7236.000	37.36	11.85	49.21	54.00	-4.79	AVG	100	296	
9	9648.00	45.04	14.57	59.61	74.00	-14.39	peak	100	264	
10	9648.00	30.82	14.57	45.39	54.00	-8.61	AVG	100	264	

#### Antennal Polarity&TestDistance: 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	48.97	-0.77	48.20	74.00	-25.80	peak	148	320	
2	2390.000	35.22	-0.77	34.45	54.00	-19.55	AVG	148	320	
3 *	2412.000	104.68	-0.71	103.97			peak	148	320	
4 *	2412.000	100.76	-0.71	100.05			AVG	148	320	
5	4824.000	52.47	5.59	58.06	74.00	-15.94	peak	100	122	
6	4824.000	37.18	5.59	42.77	54.00	-11.23	AVG	100	122	
7	7236.000	51.56	11.85	63.41	74.00	-10.59	peak	100	178	
8	7236.000	36.41	11.85	48.26	54.00	-5.74	AVG	100	78	
9	9648.00	47.19	14.57	61.76	74.00	-12.24	peak	100	163	
10	9648.00	30.58	14.57	45.15	54.00	-8.58	AVG	100	163	

#### Remarks:

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

<b>EUT Test Condition</b>		<b>802.11b: 2437MHz TX</b>							
<b>Test Channel</b>		Channel 6			<b>Frequency Range</b>		1GHz ~ 25GHz		
<b>Input Power</b>		DC 5V from USB			<b>Detector Function</b>		Peak (PK) Average (AV)		
<b>Environmental Conditions</b>		25deg. C, 65%RH			<b>Tested By</b>		Tank tan		

<b>Antennal Polarity&amp;TestDistance: Horizontal at 3 m</b>										
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	111.30	-0.65	110.65			peak	233	287	
2 *	2437.000	107.14	-0.65	106.49			Avg	233	287	
3	4874.000	52.27	6.16	58.43	74.00	-15.57	peak	100	326	
4	4874.000	37.03	6.16	43.19	54.00	-10.81	Avg	100	326	
5	7311.000	51.10	12.10	63.20	74.00	-10.80	peak	100	126	
6	7311.000	35.64	12.10	47.74	54.00	-6.26	Avg	100	126	
<b>Antennal Polarity&amp;TestDistance: Vertical at 3 m</b>										
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	104.77	-0.65	104.12			peak	153	315	
2 *	2437.000	100.81	-0.65	100.16			Avg	153	315	
3	4874.000	52.51	6.16	58.67	74.00	-15.33	peak	100	125	
4	4874.000	36.08	6.16	42.24	54.00	-11.76	Avg	100	125	
5	7311.000	51.61	12.10	63.71	74.00	-10.29	peak	100	269	
6	7311.000	36.72	12.10	48.82	54.00	-5.18	Avg	100	269	

**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		25deg. C, 65%RH			Tested By		Tank tan		

Antennal Polarity&TestDistance: 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	115.15	-0.58	114.57			peak	257	276	
2 *	2462.000	111.07	-0.58	110.49			AVG	257	276	
3	2483.500	60.76	-0.51	60.25	74.00	-13.75	peak	257	276	
4	2483.500	50.85	-0.51	50.34	54.00	-3.66	AVG	257	276	
5	4924.000	51.81	6.32	58.13	74.00	-15.87	peak	100	297	
6	4924.000	37.45	6.32	43.77	54.00	-10.23	AVG	100	297	
7	7386.000	51.13	12.35	63.48	74.00	-10.52	peak	100	178	
8	7386.000	36.50	12.35	48.85	54.00	-5.15	AVG	100	178	

Antennal Polarity&TestDistance: 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	105.49	-0.58	104.91			peak	100	284	
2 *	2462.000	101.63	-0.58	101.05			AVG	100	284	
3	2483.500	53.17	-0.51	52.66	74.00	-21.34	peak	100	284	
4	2483.500	41.31	-0.51	40.80	54.00	-13.20	AVG	100	284	
5	4924.000	52.49	6.32	58.81	74.00	-15.19	peak	100	0	
6	4924.000	37.24	6.32	43.56	54.00	-10.44	AVG	100	0	
7	7386.000	51.02	12.35	63.37	74.00	-10.63	peak	100	360	
8	7386.000	36.94	12.35	49.29	54.00	-4.71	AVG	100	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:		802.11g: 2412MHz TX							
Test Channel		Channel 1			Frequency Range		1GHz ~ 25GHz		
Input Power		DC 5V from USB			Detector Function		Peak (PK) Average (AV)		
Environmental Conditions		25deg. C, 65%RH			Tested By		Tank tan		

Antennal Polarity&TestDistance: 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	70.49	-0.77	69.72	74.00	-4.28	peak	265	277	
2	2390.000	50.81	-0.77	50.04	54.00	-3.96	AVG	265	277	
3 *	2412.000	114.16	-0.71	113.45			peak	265	277	
4 *	2412.000	101.83	-0.71	101.12			AVG	265	277	
5	4824.000	51.64	5.59	57.23	74.00	-16.77	peak	100	167	
6	4824.000	36.67	5.59	42.26	54.00	-11.74	AVG	100	167	
7	7236.000	51.19	11.85	63.04	74.00	-10.96	peak	100	360	
8	7236.000	36.49	11.85	48.34	54.00	-5.66	AVG	100	360	
Antennal Polarity&TestDistance: 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	60.00	-0.77	59.23	74.00	-14.77	peak	276	285	
2	2390.000	42.12	-0.77	41.35	54.00	-12.65	AVG	276	285	
3 *	2412.000	106.06	-0.71	105.35			peak	276	285	
4 *	2412.000	94.43	-0.71	93.72			AVG	276	285	
5	4824.000	53.08	5.59	58.67	74.00	-15.33	peak	100	246	
6	4824.000	37.75	5.59	43.34	54.00	-10.66	AVG	100	246	
7	7236.000	50.86	11.85	62.71	74.00	-11.29	peak	100	0	
8	7236.000	36.76	11.85	48.61	54.00	-5.39	AVG	100	0	

**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		25deg. C, 65%RH			Tested By		Tank tan		

Antennal Polarity&TestDistance: 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	115.04	-0.65	114.39			peak	216	287	
2 *	2437.000	102.13	-0.65	101.48			Avg	216	287	
3	4874.000	49.51	6.16	55.67	74.00	-18.33	peak	100	0	
4	4874.000	37.81	6.16	43.97	54.00	-10.03	Avg	100	0	
5	7311.000	51.16	12.10	63.26	74.00	-10.74	peak	100	360	
6	7311.000	37.07	12.10	49.17	54.00	-4.83	Avg	100	360	
Antennal Polarity&TestDistance: 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	105.58	-0.65	104.93			peak	178	315	
2 *	2437.000	93.86	-0.65	93.21			Avg	178	315	
3	4874.000	48.67	6.16	54.83	74.00	-19.17	peak	100	125	
4	4874.000	37.11	6.16	43.27	54.00	-10.73	Avg	100	125	
5	7311.000	51.23	12.10	63.33	74.00	-10.67	peak	100	269	
6	7311.000	37.17	12.10	49.27	54.00	-4.73	Avg	100	269	

**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		25deg. C, 65%RH		Tested By			Tank tan		

Antennal Polarity&TestDistance: 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	113.32	-0.58	112.74			peak	258	286	
2 *	2462.000	101.42	-0.58	100.84			AVG	258	286	
3	2483.500	72.40	-0.51	71.89	74.00	-2.11	peak	258	286	
4	2483.500	52.03	-0.51	51.52	54.00	-2.48	AVG	258	286	
5	4924.000	49.88	6.32	56.20	74.00	-17.80	peak	100	146	
6	4924.000	46.05	6.32	52.37	54.00	-1.63	AVG	100	146	
7	7386.000	51.64	12.35	63.99	74.00	-10.01	peak	100	360	
8	7386.000	36.39	12.35	48.74	54.00	-5.26	AVG	100	360	
Antennal Polarity&TestDistance: 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	101.91	-0.58	101.33			peak	231	275	
2 *	2462.000	92.04	-0.58	91.46			AVG	231	275	
3	2483.500	65.65	-0.51	65.14	74.00	-8.86	peak	231	275	
4	2483.500	45.88	-0.51	45.37	54.00	-8.63	AVG	231	275	
5	4924.000	51.52	6.32	57.84	74.00	-16.16	peak	100	190	
<b>6</b>	<b>4924.000</b>	<b>47.04</b>	<b>6.32</b>	<b>53.36</b>	<b>54.00</b>	<b>-0.64</b>	<b>AVG</b>	<b>100</b>	<b>190</b>	Worst
7	7386.000	52.36	12.35	64.71	74.00	-9.29	peak	100	279	
8	7386.000	37.43	12.35	49.78	54.00	-4.22	AVG	100	279	

## 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		25deg. C, 65%RH			Tested By		Tank tan		

Antennal Polarity&TestDistance: 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	68.61	-0.77	67.84	74.00	-6.16	peak	267	276	
2	2390.000	51.66	-0.77	50.89	54.00	-3.11	AVG	267	276	
3 *	2412.000	109.35	-0.71	108.64			peak	267	276	
4 *	2412.000	98.59	-0.71	97.88			AVG	267	276	
5	4824.000	49.92	5.59	55.51	74.00	-18.49	peak	100	238	
6	4824.000	35.10	5.59	40.69	54.00	-13.31	AVG	100	238	
7	7236.000	51.82	11.85	63.67	74.00	-10.33	peak	100	360	
8	7236.000	36.71	11.85	48.56	54.00	-5.44	AVG	100	360	
Antennal Polarity&TestDistance: 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	62.96	-0.77	62.19	74.00	-11.81	peak	197	263	
2	2390.000	46.18	-0.77	45.41	54.00	-8.59	AVG	197	263	
3 *	2412.000	102.00	-0.71	101.29			peak	197	263	
4 *	2412.000	90.99	-0.71	90.28			AVG	197	263	
5	4824.000	49.80	5.59	55.39	74.00	-18.61	peak	100	173	
6	4824.000	34.95	5.59	40.54	54.00	-13.46	AVG	100	173	
7	7236.000	51.63	11.85	63.48	74.00	-10.52	peak	100	305	
8	7236.000	36.27	11.85	48.12	54.00	-5.88	AVG	100	305	

**Remarks:**

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

<b>EUT Test Condition</b>		<b>802.11n HT20: 2437MHz TX</b>							
<b>Test Channel</b>		Channel 6			<b>Frequency Range</b>		1GHz ~ 25GHz		
<b>Input Power</b>		DC 5V from USB			<b>Detector Function</b>		Peak (PK) Average (AV)		
<b>Environmental Conditions</b>		25deg. C, 65%RH			<b>Tested By</b>		Tank tan		

<b>Antennal Polarity&amp;TestDistance: Horizontal at 3 m</b>										
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	115.51	-0.65	114.86			peak	219	275	
2 *	2437.000	106.02	-0.65	105.37			Avg	219	275	
3	4874.000	51.56	6.16	57.72	74.00	-16.28	peak	100	0	
4	4874.000	37.48	6.16	43.64	54.00	-10.36	Avg	100	0	
5	7311.000	50.78	12.10	62.88	74.00	-11.12	peak	100	168	
6	7311.000	36.60	12.10	48.70	54.00	-5.30	Avg	100	168	
<b>Antennal Polarity&amp;TestDistance: Vertical at 3 m</b>										
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	104.44	-0.65	103.79			peak	231	284	
2 *	2437.000	95.04	-0.65	94.39			Avg	231	284	
3	4874.000	51.99	6.16	58.15	74.00	-15.85	peak	100	360	
4	4874.000	37.36	6.16	43.52	54.00	-10.48	Avg	100	360	
5	7311.000	49.53	12.10	61.63	74.00	-12.37	peak	100	214	
6	7311.000	35.83	12.10	47.93	54.00	-6.07	Avg	100	214	

**Remarks:**

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

<b>EUT Test Condition</b>		<b>802.11n HT20: 2462MHz TX</b>							
<b>Test channel</b>		Channel 11			<b>Frequency Range</b>		1GHz ~ 25GHz		
<b>Input Power</b>		DC 5V from USB			<b>Detector Function</b>		Peak (PK) Average (AV)		
<b>Environmental Conditions</b>		25deg. C, 65%RH			<b>Tested By</b>		Tank tan		

<b>Antennal Polarity&amp;TestDistance: Horizontal at 3 m</b>										
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	112.63	-0.58	112.05			peak	228	275	
2 *	2462.000	72.46	-0.58	71.88			Avg	228	275	
3	2483.500	72.40	-0.51	71.89	74.00	-2.11	peak	228	275	
4	2483.500	45.72	-0.51	45.21	54.00	-8.79	Avg	228	275	
5	4924.000	49.41	6.32	55.73	74.00	-18.27	peak	100	214	
6	4924.000	35.46	6.32	41.78	54.00	-12.22	Avg	100	214	
7	7386.000	49.16	12.35	61.51	74.00	-12.49	peak	100	327	
8	7386.000	35.34	12.35	47.69	54.00	-6.31	Avg	100	327	
<b>Antennal Polarity&amp;TestDistance: Vertical at 3 m</b>										
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	100.82	-0.58	100.24			peak	129	287	
2 *	2462.000	66.00	-0.58	65.42			Avg	129	287	
3	2483.500	59.99	-0.51	59.48	74.00	-14.52	peak	129	287	
4	2483.500	40.85	-0.51	40.34	54.00	-13.66	Avg	129	287	
5	4924.000	50.05	6.32	56.37	74.00	-17.63	peak	100	360	
6	4924.000	35.54	6.32	41.86	54.00	-12.14	Avg	100	360	
7	7386.000	50.02	12.35	62.37	74.00	-11.63	peak	100	310	
8	7386.000	35.75	12.35	48.10	54.00	-5.90	Avg	100	310	

**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		25deg. C, 65%RH			Tested By		Tank tan		

Antennal Polarity&TestDistance: 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	72.77	-0.77	72.00	74.00	-2.00	peak	266	272	
2	2390.000	43.86	-0.77	43.09	54.00	-10.91	AVG	266	272	
3 *	2422.000	107.71	-0.68	107.03			peak	266	272	
4 *	2422.000	62.41	-0.68	61.73			AVG	266	272	
5	4844.000	51.39	5.82	57.21	74.00	-16.79	peak	100	355	
6	4844.000	37.88	5.82	43.70	54.00	-10.30	AVG	100	355	
7	7266.000	51.22	11.94	63.16	74.00	-10.84	peak	100	143	
8	7266.000	36.36	11.94	48.30	54.00	-5.70	AVG	100	143	
Antennal Polarity&TestDistance: 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	62.89	-0.77	62.12	74.00	-11.88	peak	296	273	
2	2390.000	39.64	-0.77	38.87	54.00	-15.13	AVG	286	273	
3 *	2422.000	100.38	-0.68	99.70			peak	296	273	
4 *	2422.000	59.18	-0.68	58.50			AVG	296	273	
5	4844.000	51.15	5.82	56.97	74.00	-17.03	peak	100	360	
6	4844.000	38.86	5.82	44.68	54.00	-9.32	AVG	100	360	
7	7266.000	51.24	11.94	63.18	74.00	-10.82	peak	100	308	
8	7266.000	36.42	11.94	48.36	54.00	-5.64	AVG	100	308	

**Remarks:**

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

<b>EUT Test Condition</b>		<b>802.11n HT40: 2437MHz TX</b>							
<b>Test Channel</b>		Channel 6			<b>Frequency Range</b>		1GHz ~ 25GHz		
<b>Input Power</b>		DC 5V from USB			<b>Detector Function</b>		Peak (PK) Average (AV)		
<b>Environmental Conditions</b>		25deg. C, 65%RH			<b>Tested By</b>		Tank tan		

<b>Antennal Polarity&amp;TestDistance: Horizontal at 3 m</b>										
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	108.34	-0.65	107.69			peak	237	283	
2 *	2437.000	62.71	-0.65	62.06			Avg	237	283	
3	4874.000	50.59	6.16	56.75	74.00	-17.25	peak	100	360	
4	4874.000	37.13	6.16	43.29	54.00	-10.71	Avg	100	360	
5	7311.000	49.43	12.10	61.53	74.00	-12.47	peak	100	132	
6	7311.000	36.85	12.10	48.95	54.00	-5.05	Avg	100	132	
<b>Antennal Polarity&amp;TestDistance: Vertical at 3 m</b>										
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	101.03	-0.65	100.38			peak	274	281	
2 *	2437.000	60.38	-0.65	59.73			Avg	274	281	
3	4874.000	51.49	6.16	57.65	74.00	-16.35	peak	100	36	
4	4874.000	37.43	6.16	43.59	54.00	-10.41	Avg	100	36	
5	7311.000	51.95	12.10	64.05	74.00	-9.95	peak	100	347	
6	7311.000	36.96	12.10	49.06	54.00	-4.94	Avg	100	347	

**Remarks:**

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

<b>EUT Test Condition</b>		<b>802.11n HT40: 2452MHz TX</b>							
<b>Test Channel</b>		Channel 9			<b>Frequency Range</b>		1GHz ~ 25GHz		
<b>Input Power</b>		DC 5V from USB			<b>Detector Function</b>		Peak (PK) Average (AV)		
<b>Environmental Conditions</b>		25deg. C, 65%RH			<b>Tested By</b>		Tank tan		

<b>Antennal Polarity&amp;TestDistance: Horizontal at 3 m</b>										
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	106.85	-0.61	106.24			peak	227	274	
2 *	2452.000	61.71	-0.61	61.10			AVG	227	274	
3	2483.500	72.41	-0.51	71.90	74.00	-2.10	peak	227	274	
4	2483.500	44.89	-0.51	44.38	54.00	-9.62	AVG	227	274	
5	4904.000	51.34	6.46	57.80	74.00	-16.20	peak	100	295	
6	4904.000	36.89	6.46	43.35	54.00	-10.65	AVG	100	295	
7	7356.000	51.49	12.25	63.74	74.00	-10.26	peak	100	207	
8	7356.000	35.87	12.25	48.12	54.00	-5.88	AVG	100	207	
<b>Antennal Polarity&amp;TestDistance: Vertical at 3 m</b>										
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	100.36	-0.61	99.75			peak	219	285	
2 *	2452.000	57.29	-0.61	56.68			AVG	219	285	
3	2483.500	66.88	-0.51	66.37	74.00	-7.63	peak	219	285	
4	2483.500	40.69	-0.51	40.18	54.00	-13.82	AVG	219	285	
5	4904.000	51.71	6.46	58.17	74.00	-15.83	peak	100	100	
6	4904.000	36.50	6.46	42.96	54.00	-11.04	AVG	100	100	
7	7356.000	52.02	12.25	64.27	74.00	-9.73	peak	100	312	
8	7356.000	35.58	12.25	47.83	54.00	-6.17	AVG	100	312	

**Remarks:**

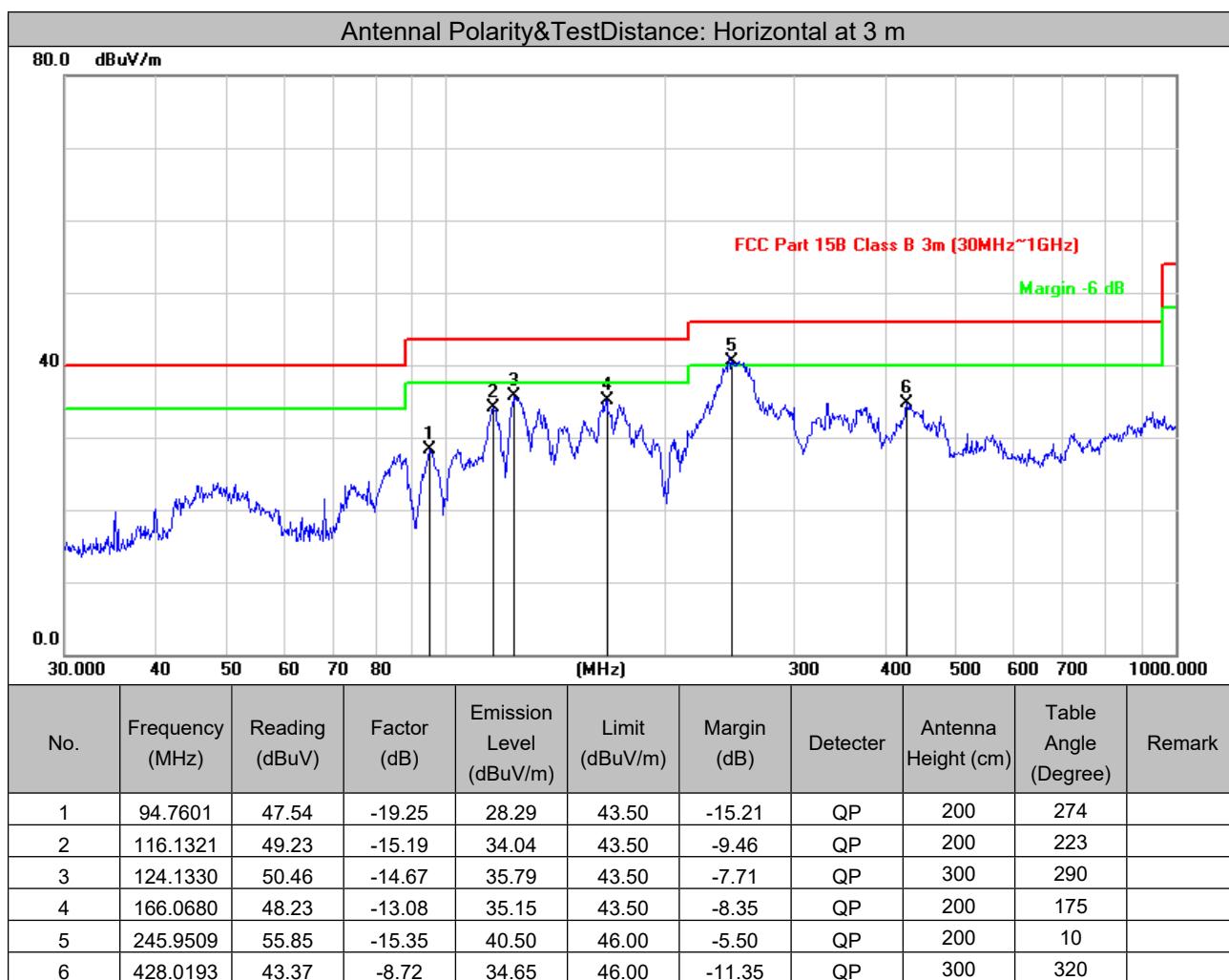
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

### 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:

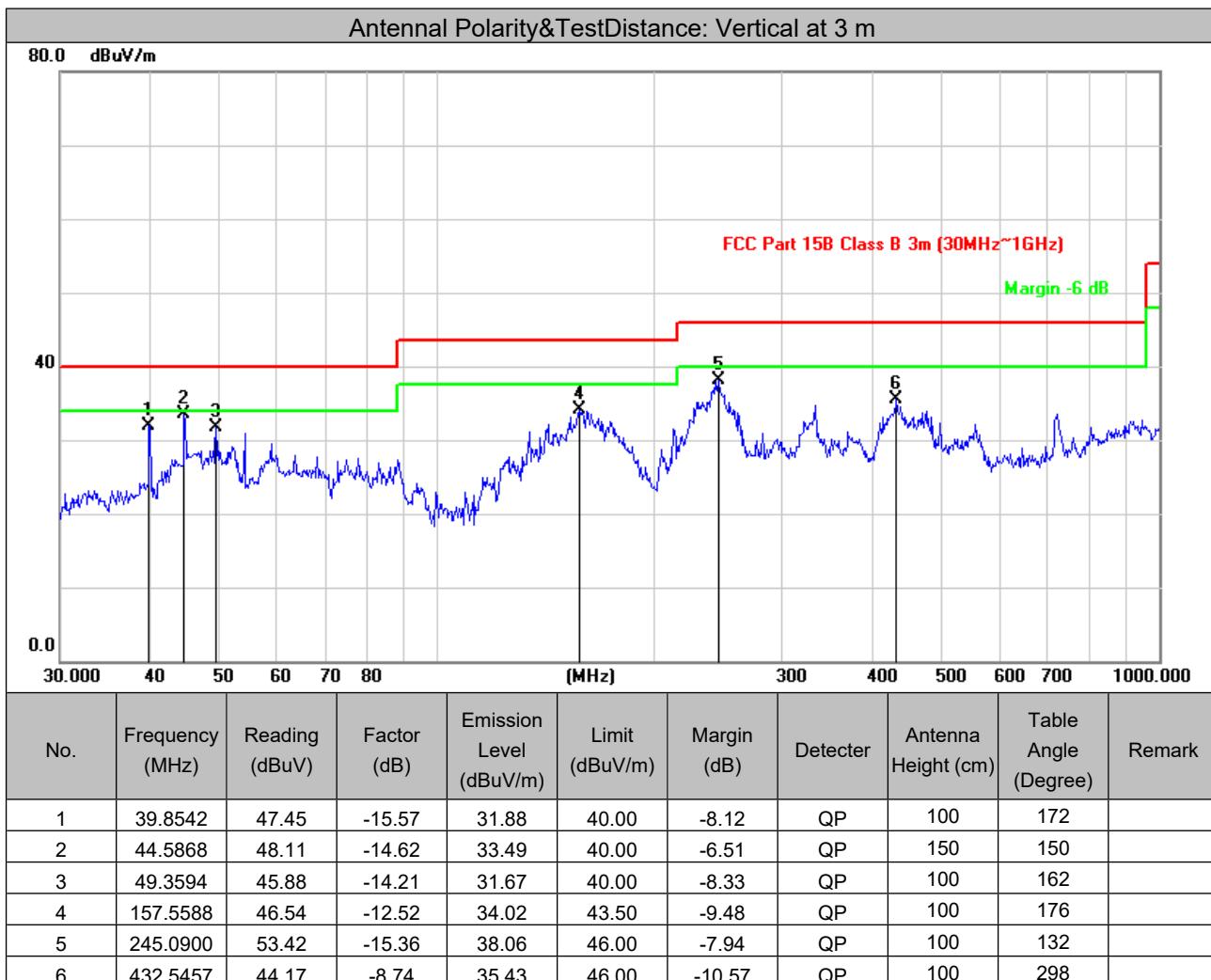
EUT Test Condition	802.11b 2462MHz TX		
Test Channel	Channel 11	Frequency Range	30MHz ~ 1GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25deg. C, 65%RH	Tested By	Tank tan



### Remarks:

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

EUT Test Condition	802.11g:2462MHz TX		
Channel	Channel 11	Frequency Range	30MHz ~ 1GHz
Input Power	DC 5V from USB	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25deg. C, 65%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_EMCA 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

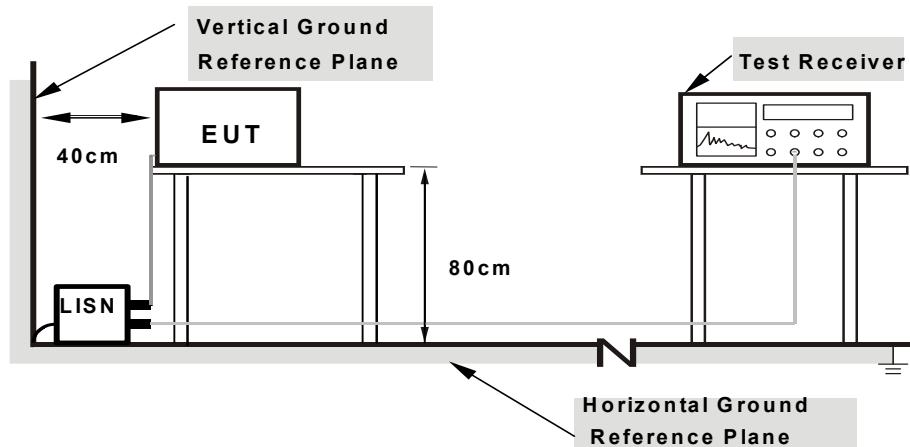
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50uH of coupling impedance 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:**

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

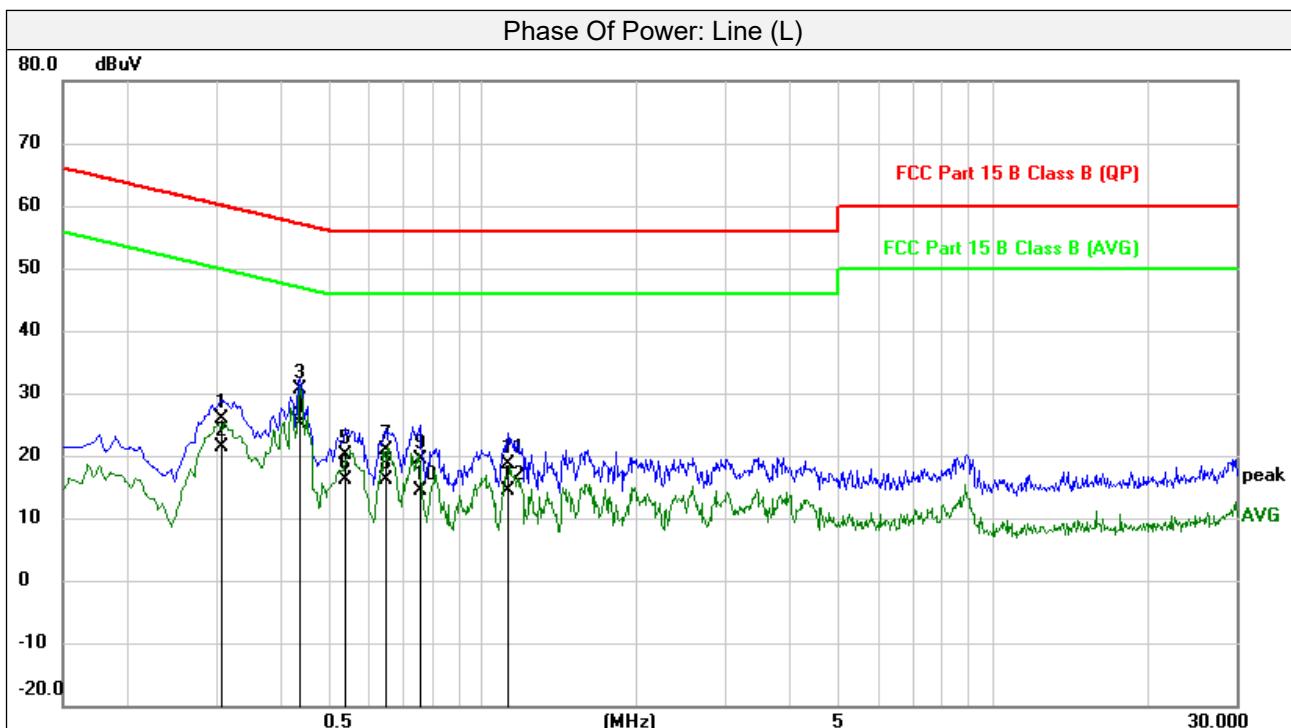
### 3.2.6 EUT Operating Conditions

- 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, 60%RH
Tested by	Tank Tan	Test Date	2019/7/15

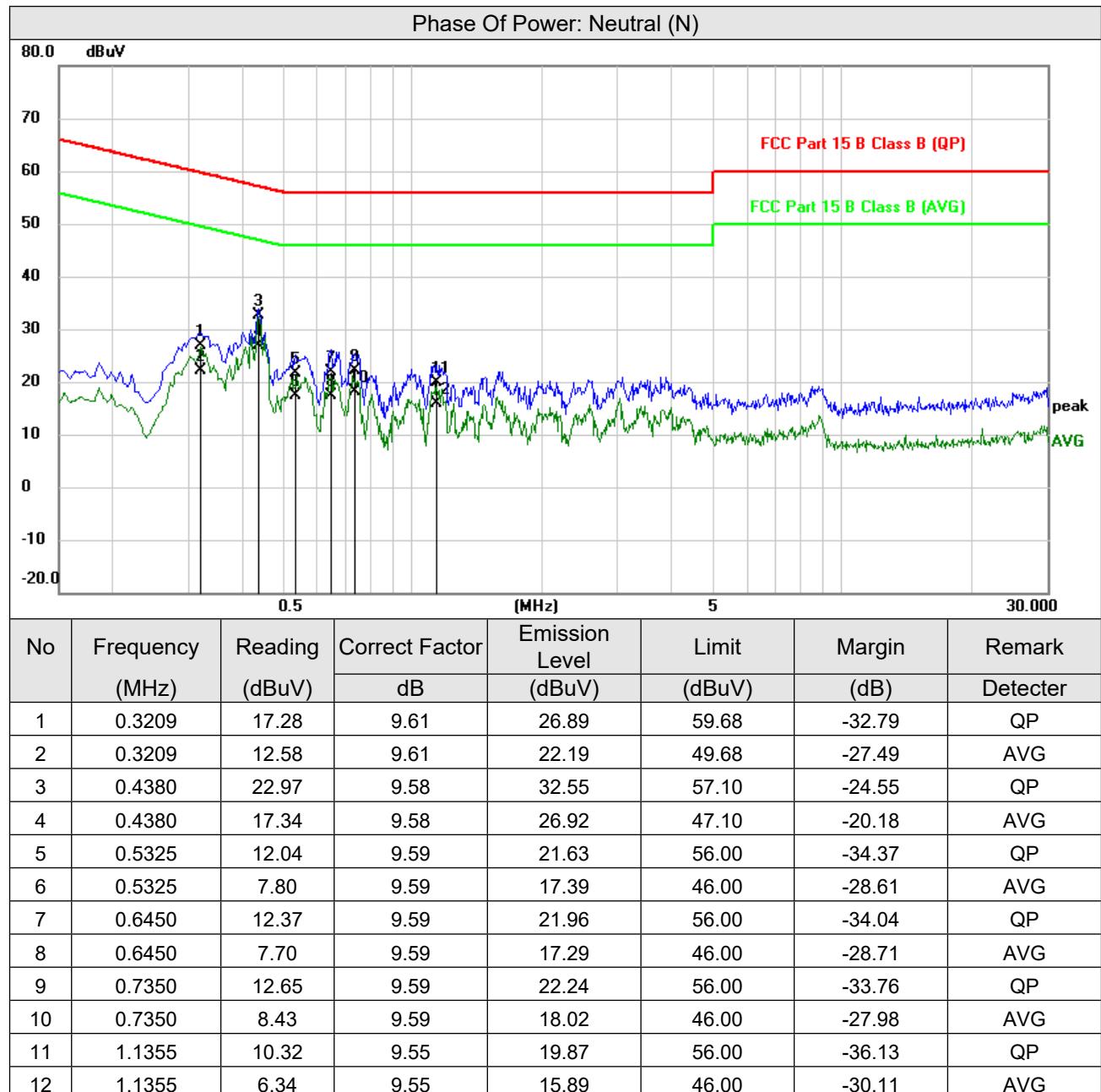


No	Frequency (MHz)	Reading (dBuV)	Correct Factor dB	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Remark
				Correct Factor Emission Level (dBuV)			
1	0.3075	16.20	9.61	25.81	60.04	-34.23	QP
2	0.3075	11.75	9.61	21.36	50.04	-28.68	AVG
3	0.4380	21.12	9.58	30.70	57.10	-26.40	QP
4	0.4380	15.49	9.58	25.07	47.10	-22.03	AVG
5	0.5370	10.49	9.59	20.08	56.00	-35.92	QP
6	0.5370	6.53	9.59	16.12	46.00	-29.88	AVG
7	0.6450	11.30	9.59	20.89	56.00	-35.11	QP
8	0.6450	6.50	9.59	16.09	46.00	-29.91	AVG
9	0.7530	9.69	9.59	19.28	56.00	-36.72	QP
10	0.7530	4.81	9.59	14.40	46.00	-31.60	AVG
11	1.1220	9.04	9.55	18.59	56.00	-37.41	QP
12	1.1220	4.93	9.55	14.48	46.00	-31.52	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.

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution andwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	DC 5V from USB	Environmental Conditions	25°C, 60%RH
Tested by	Tank Tan	Test Date	2019/7/15

**REMARKS:**

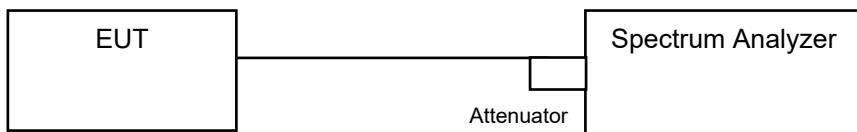
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

### 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

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

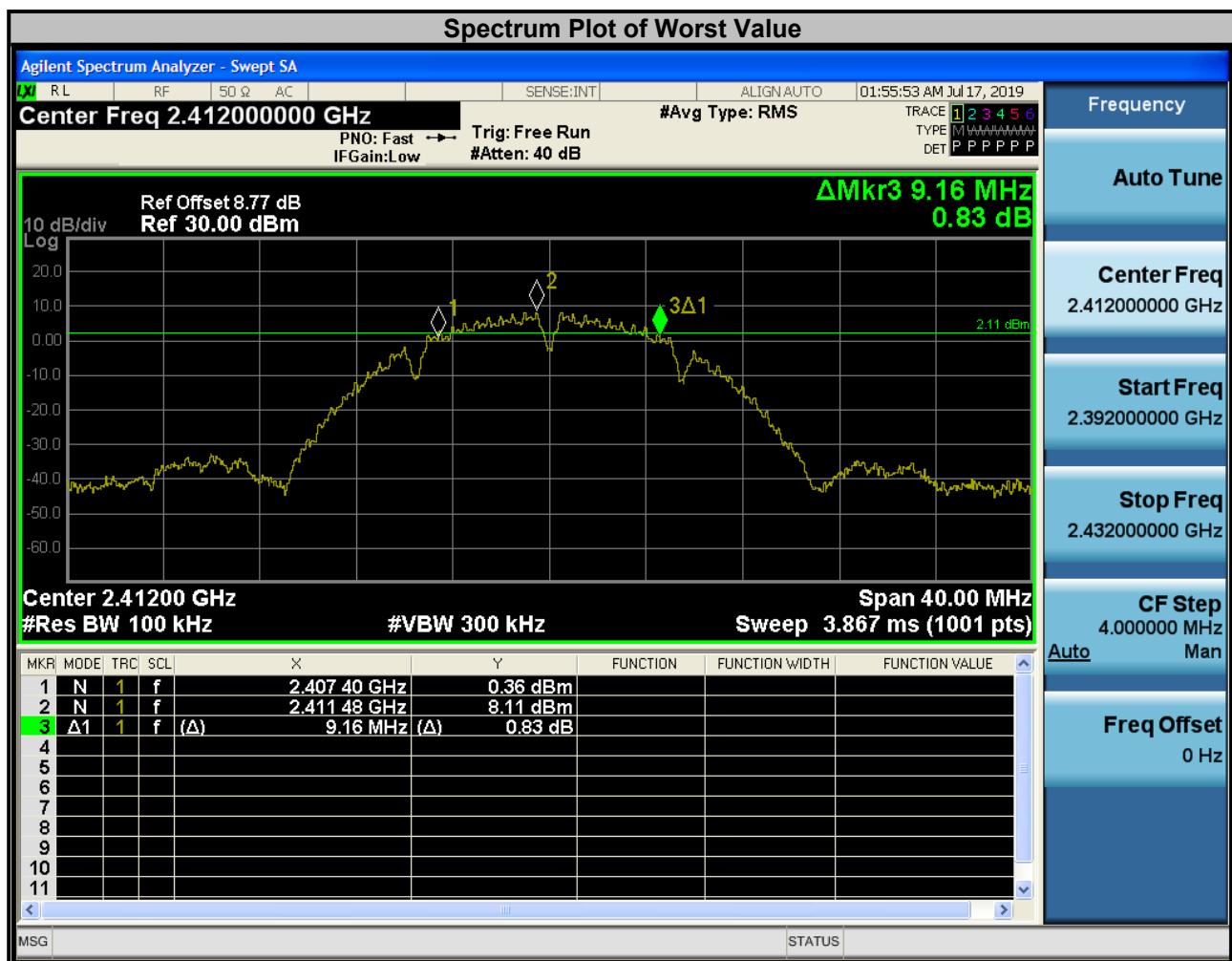
#### 3.3.6 EUT Operating Conditions

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	Ant 1		
1	2412	9.12	9.16	0.5	Pass
6	2437	9.12	9.16	0.5	Pass
11	2462	9.12	9.16	0.5	Pass



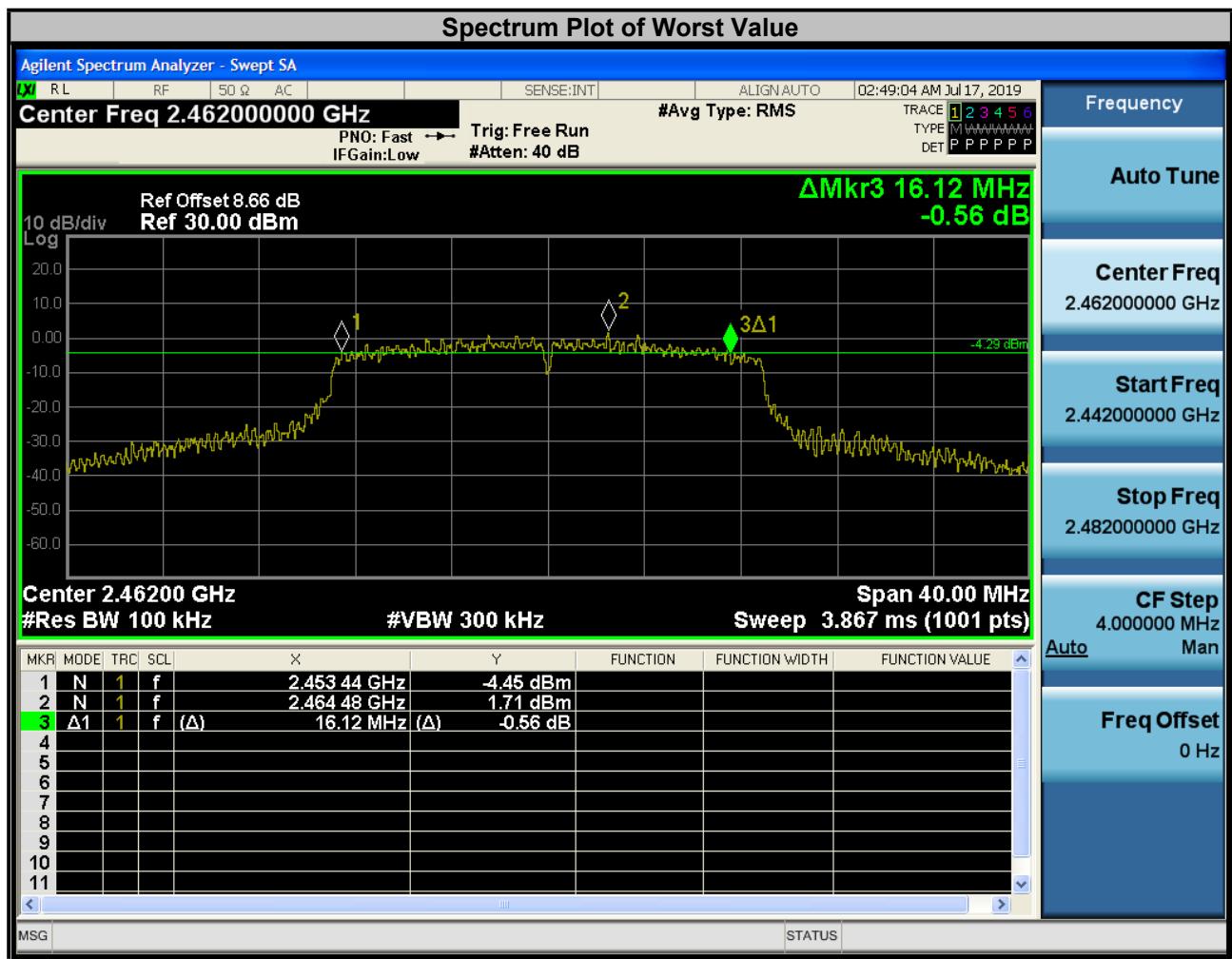
**802.11g**

Channel	Frequency (MHz)	6dB Bandwidth(MHz)		Minimum Limit (MHz)	Pass / Fail
		Ant 0	Ant 1		
1	2412	15.12	15.16	0.5	Pass
6	2437	15.44	15.16	0.5	Pass
11	2462	14.48	15.72	0.5	Pass



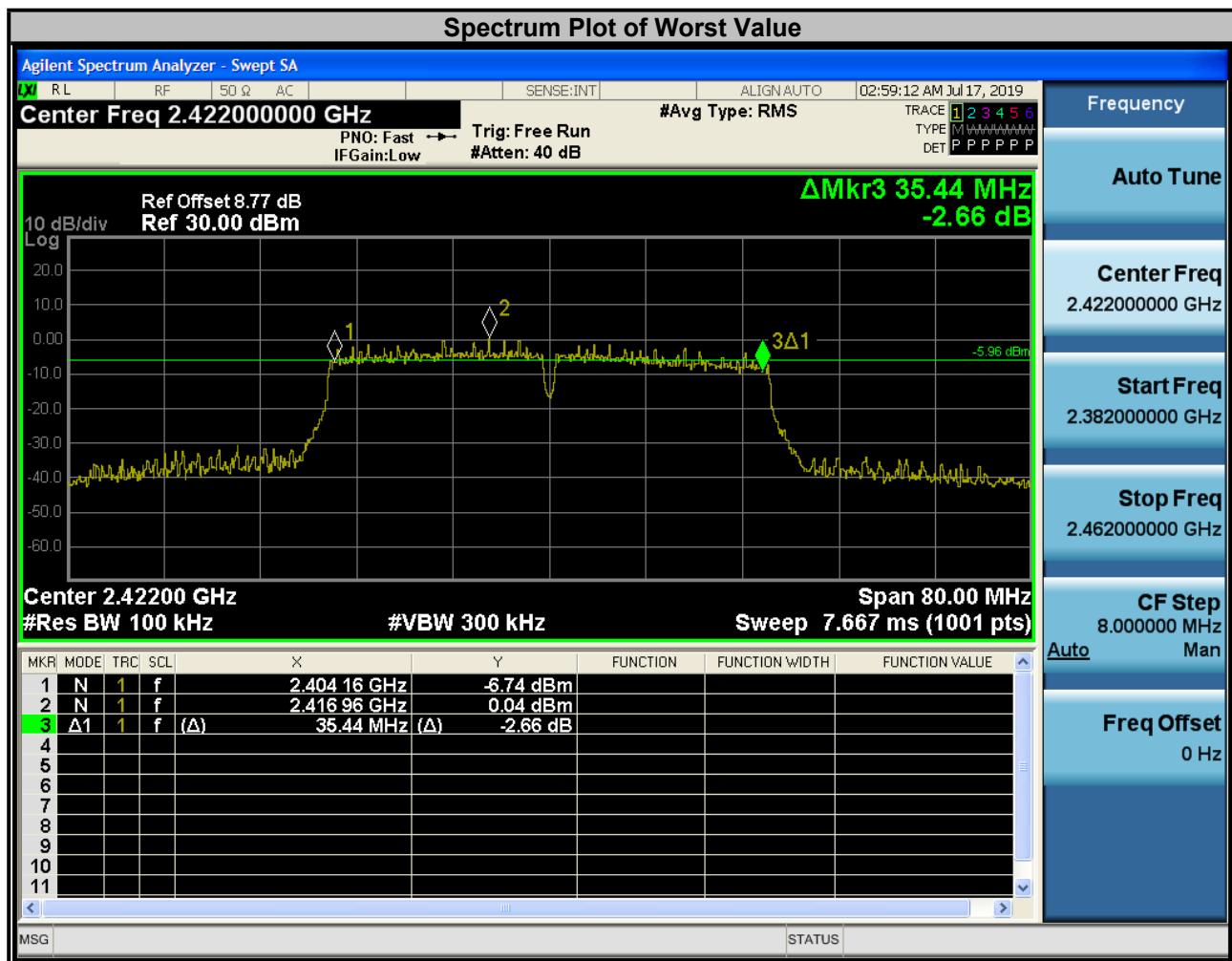
**802.11n HT20**

Channel	Frequency (MHz)	6dB Bandwidth(MHz)		Minimum Limit (MHz)	Pass / Fail
		Ant 0	Ant 1		
1	2412	15.72	15.52	0.5	Pass
6	2437	15.40	15.48	0.5	Pass
11	2462	16.12	16.04	0.5	Pass



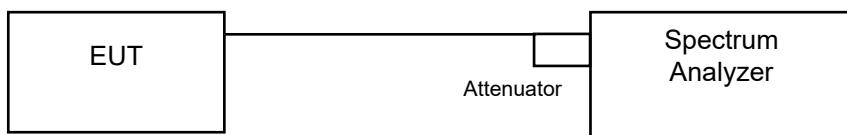
**802.11n HT40**

Channel	Frequency (MHz)	6dB Bandwidth(MHz)		Minimum Limit (MHz)	Pass / Fail
		Ant 0	Ant 1		
3	2422	35.44	35.04	0.5	Pass
6	2437	35.28	35.28	0.5	Pass
9	2452	35.20	35.20	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.

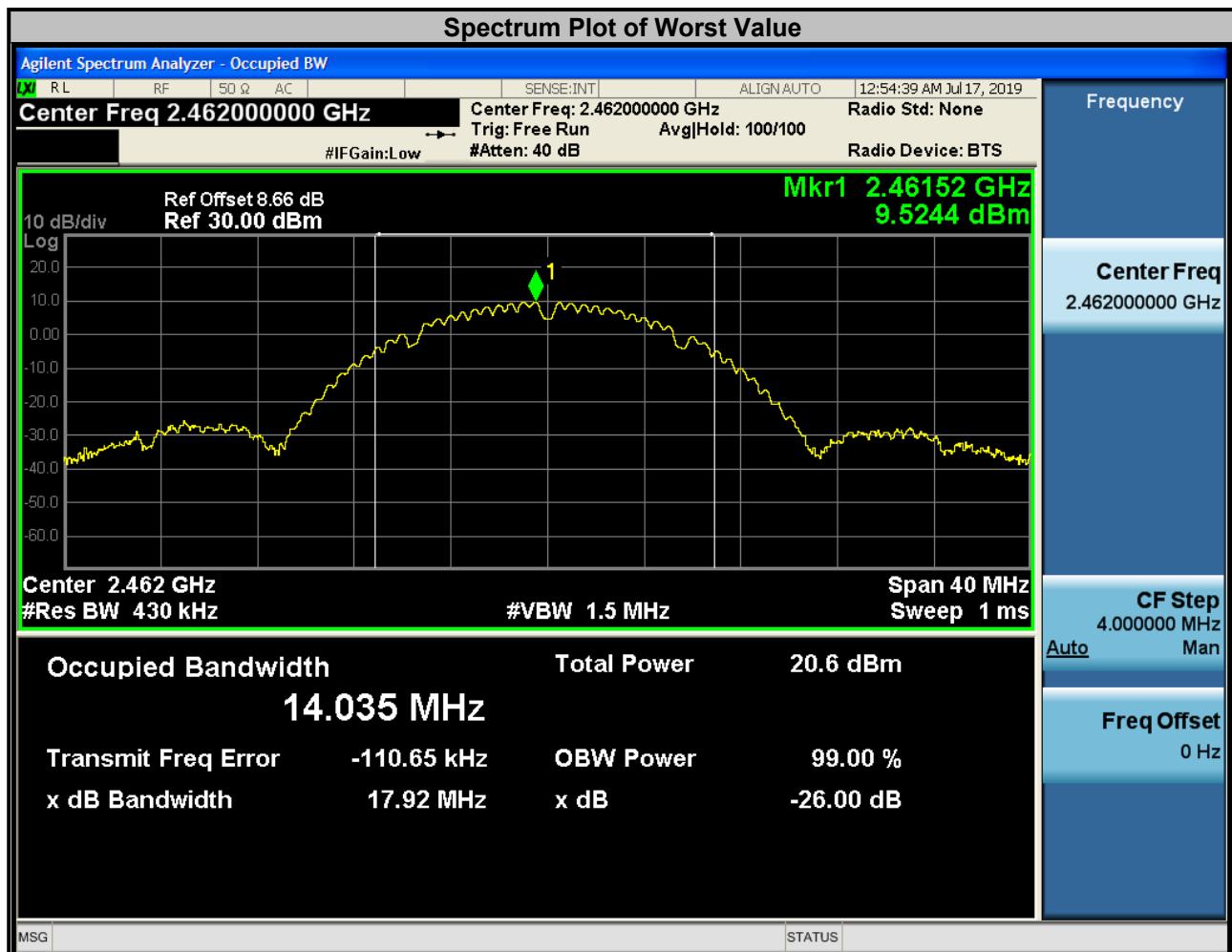
#### 3.4.5 EUT Operating Conditions

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

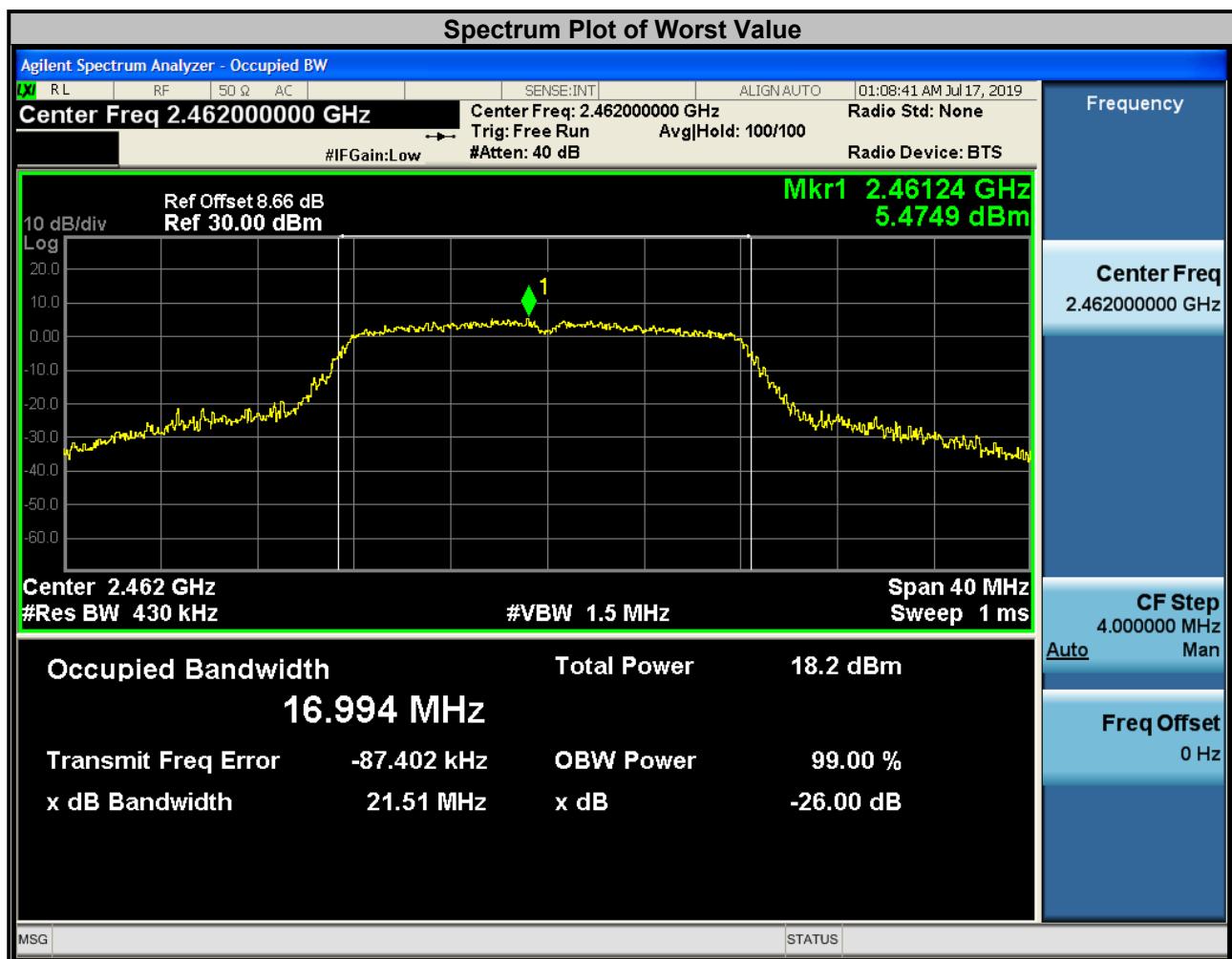
#### 802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Ant 0	Ant 1	
1	2412	13.564	13.731	Pass
6	2437	13.697	13.981	Pass
11	2462	13.805	14.035	Pass



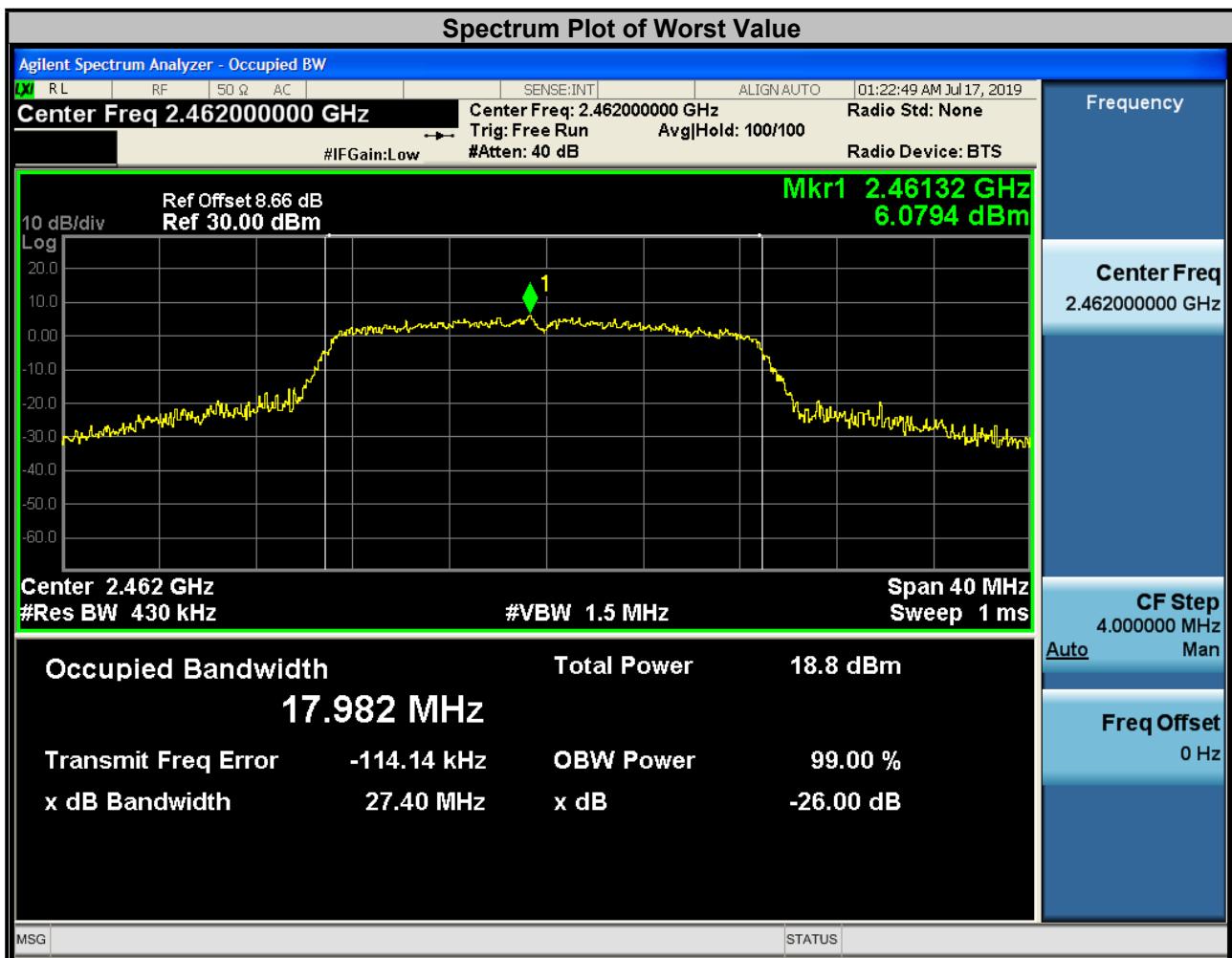
**802.11g**

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Ant 0	Ant 1	
1	2412	16.524	16.818	Pass
6	2437	16.627	16.970	Pass
11	2462	16.756	16.994	Pass



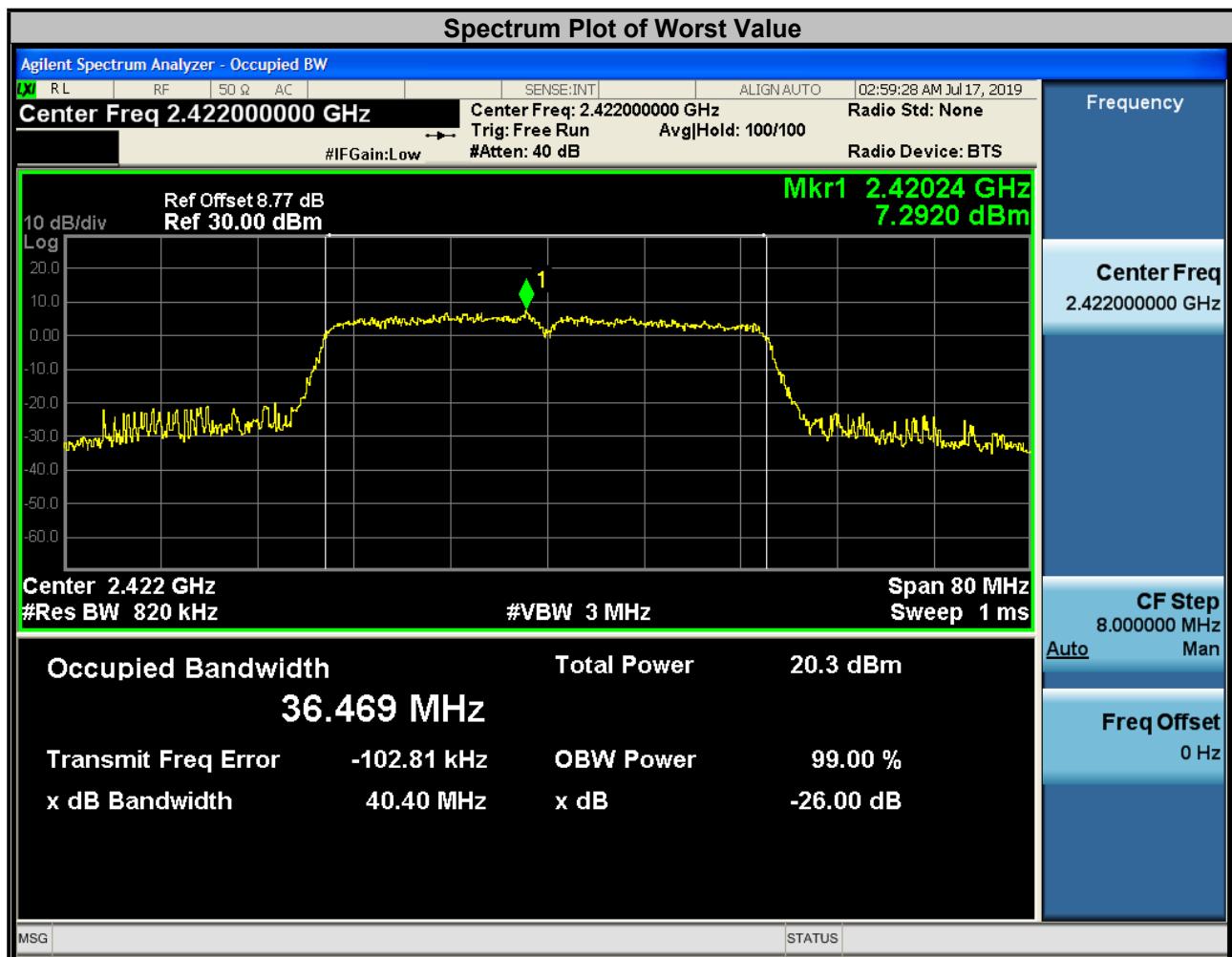
**802.11n HT20**

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Ant 0	Ant 1	
1	2412	17.569	17.708	Pass
6	2437	17.660	17.873	Pass
11	2462	17.738	17.982	Pass



**802.11n HT40**

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Ant 0	Ant 1	
3	2422	36.469	36.274	Pass
6	2437	36.430	36.321	Pass
9	2452	36.162	36.014	Pass

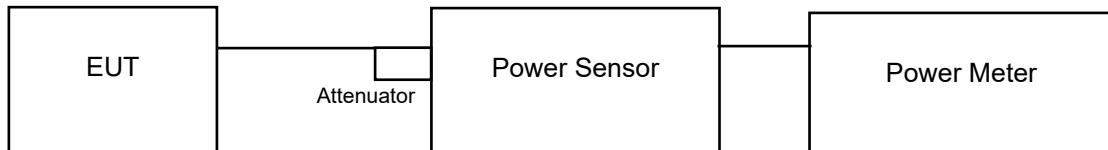


### 3.5 Conducted Output Power Measurement

#### 3.5.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 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)	AveragePower (mW)		Average Power (dBm)		Total power (mW)	Total power (dBm)	Limit (dBm)
		Ant 0	Ant1	Ant 0	Ant1			
1	2412	53.827	53.827	17.31	17.31	107.654	20.32	29.65
6	2437	52.602	54.200	17.21	17.34	106.802	20.29	29.65
11	2462	52.723	52.845	17.22	17.23	105.568	20.24	29.65

#### 802.11g

CH.	Fre. (MHz)	AveragePower (mW)		Average Power (dBm)		Total power (mW)	Total power (dBm)	Limit (dBm)
		Ant 0	Ant1	Ant 0	Ant1			
1	2412	67.920	72.111	18.32	18.58	140.031	21.46	29.65
6	2437	69.502	74.645	18.42	18.73	144.147	21.59	29.65
11	2462	68.865	61.802	18.38	17.91	130.667	21.16	29.65

#### 802.11n HT20

CH.	Fre. (MHz)	AveragePower (mW)		Average Power (dBm)		Total power (mW)	Total power (dBm)	Limit (dBm)
		Ant 0	Ant1	Ant 0	Ant1			
1	2412	92.257	76.208	19.65	18.82	168.465	22.27	29.65
6	2437	75.858	74.989	18.80	18.75	150.847	21.79	29.65
11	2462	96.828	66.527	19.86	18.23	163.355	22.13	29.65

#### 802.11n HT40

CH.	Fre. (MHz)	AveragePower (mW)		Average Power (dBm)		Total power (mW)	Total power (dBm)	Limit (dBm)
		Ant 0	Ant1	Ant 0	Ant1			
1	2412	43.853	43.551	16.42	16.39	87.404	19.42	29.65
6	2437	41.305	42.170	16.16	16.25	83.474	19.22	29.65
11	2462	38.194	43.853	15.82	16.42	82.047	19.14	29.65

Directional gain =  $3.34\text{dBi} + 10*\log(2) = 6.35\text{dBi} < 6\text{dBi}$ , so the power density limit need to reduce 0.35dB

### 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

- a. Set the RBW = 10 kHz, VBW =30 kHz, Detector = peak.
- b. Sweep time = auto couple, Trace mode = max hold,allow trace to fully stabilize.
- c. 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.

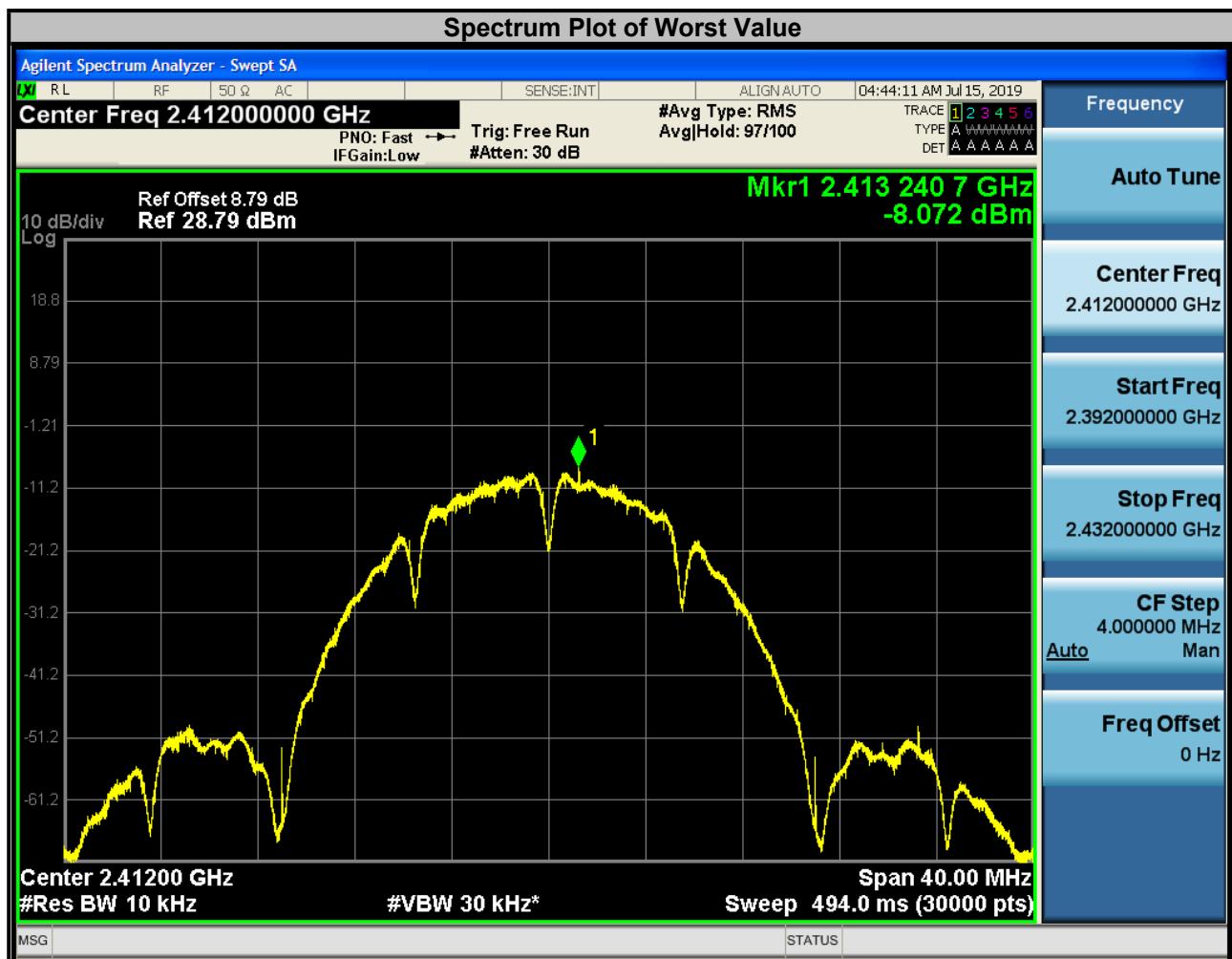
### 3.6.7 Test Results

#### 802.11b:

Channel	Frequency (MHz)	PSD (dBm/10kHz)		Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
		Ant 0	Ant 1			
1	2412	-8.646	-8.072	-5.339	7.65	Pass
6	2437	-9.460	-8.976	-6.201	7.65	Pass
11	2462	-8.932	-8.330	-5.610	7.65	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 =  $3.34\text{dBi} + 10*\log(2) = 6.35\text{dBi} < 6\text{dBi}$ , so the power density limit need to reduce 0.35dB.

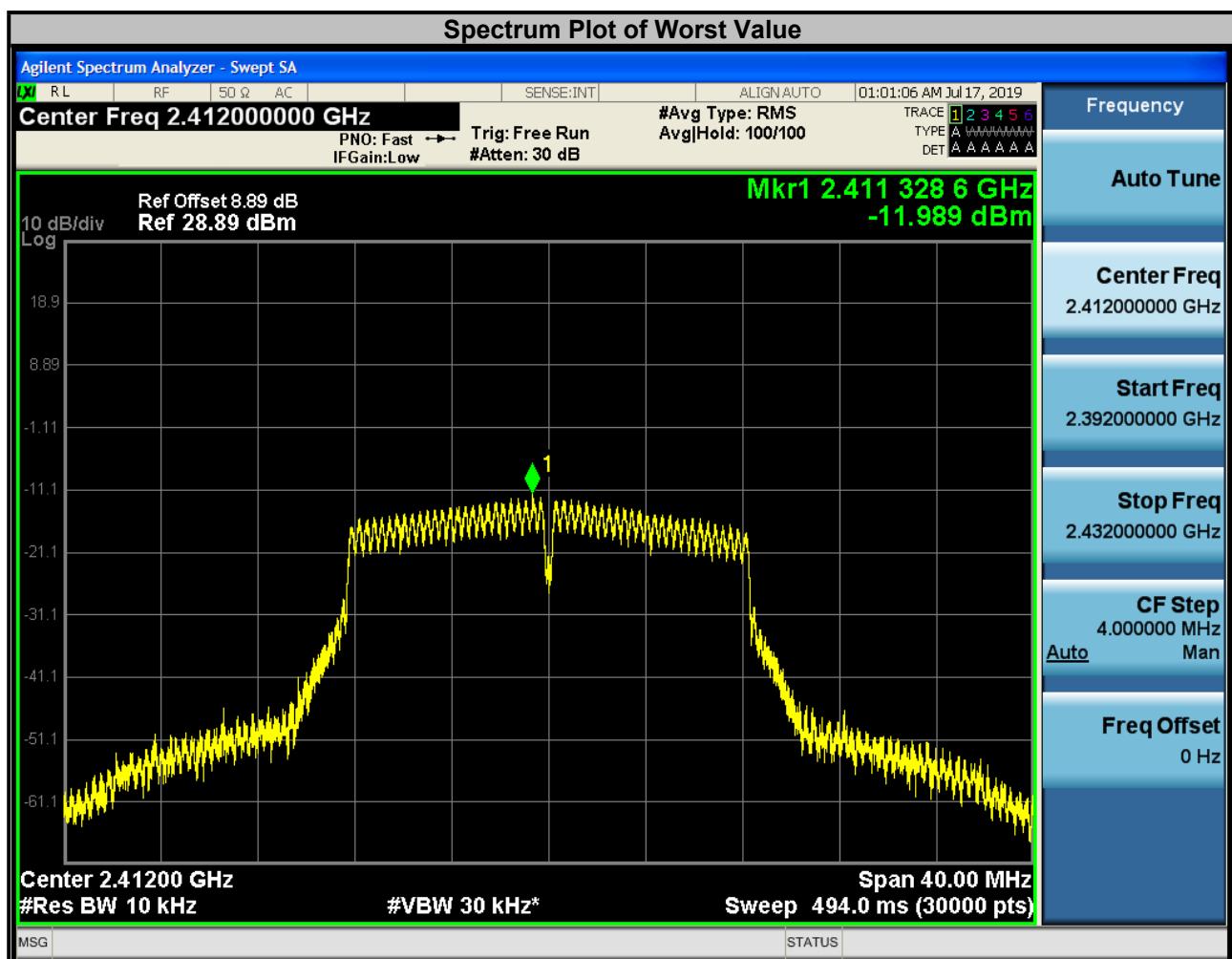


**802.11g:**

Channel	Frequency (MHz)	PSD (dBm/10kHz)		Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
		Ant 0	Ant 1			
1	2412	-12.691	-11.989	-9.316	7.65	Pass
6	2437	-13.087	-12.561	-9.806	7.65	Pass
11	2462	-13.757	-13.600	-10.667	7.65	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 =  $3.34\text{dBi} + 10*\log(2) = 6.35\text{dBi} < 6\text{dBi}$ , so the power density limit need to reduce 0.35dB.

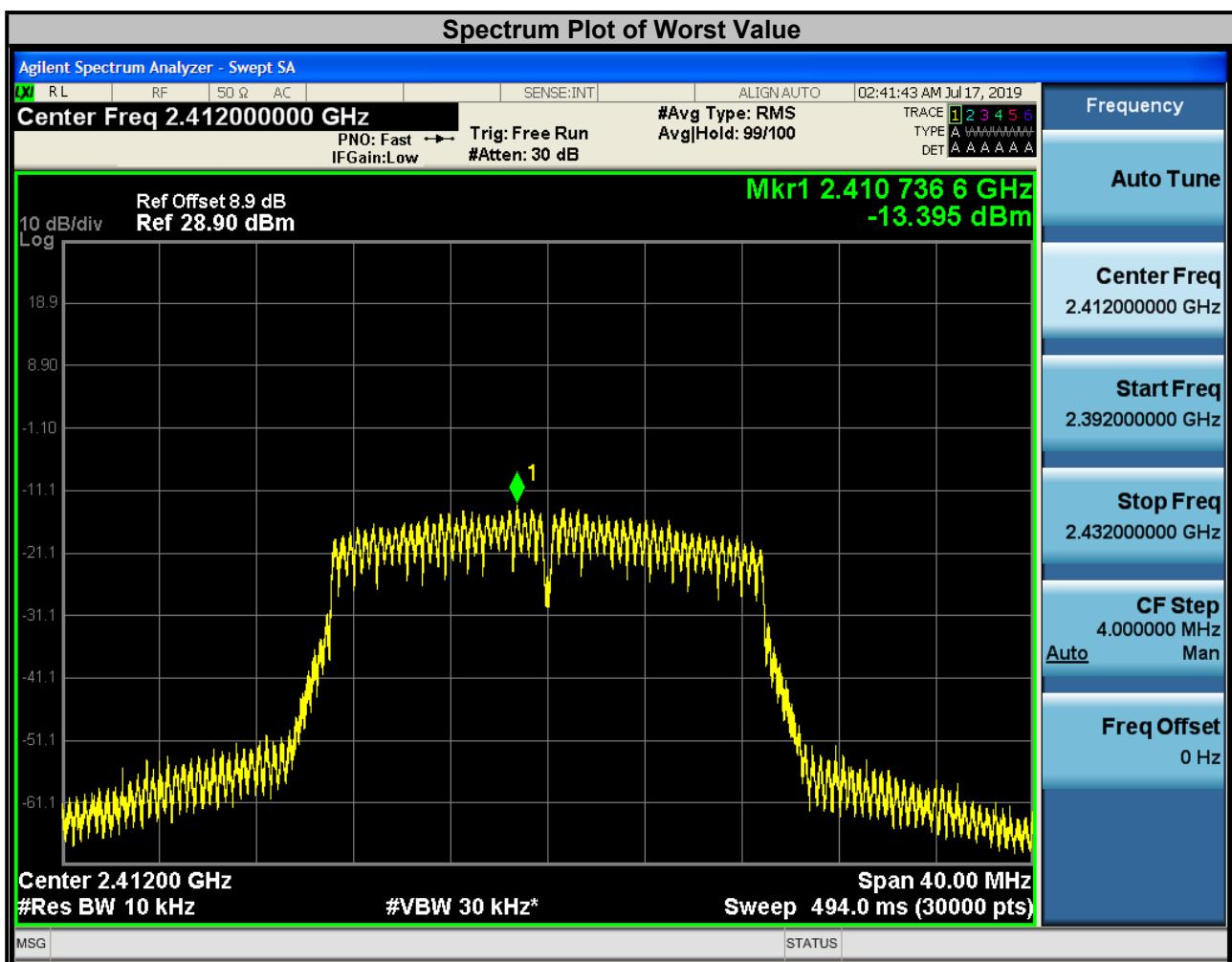


**802.11n HT20:**

Channel	Frequency (MHz)	PSD (dBm/10kHz)		Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
		Ant 0	Ant 1			
1	2412	<b>-13.395</b>	-13.492	-10.433	7.65	Pass
6	2437	-13.482	-13.531	-10.496	7.65	Pass
11	2462	-14.371	-14.083	-11.214	7.65	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 =  $3.34\text{dBi} + 10*\log(2) = 6.35\text{dBi} < 6\text{dBi}$ , so the power density limit need to reduce 0.35dB.

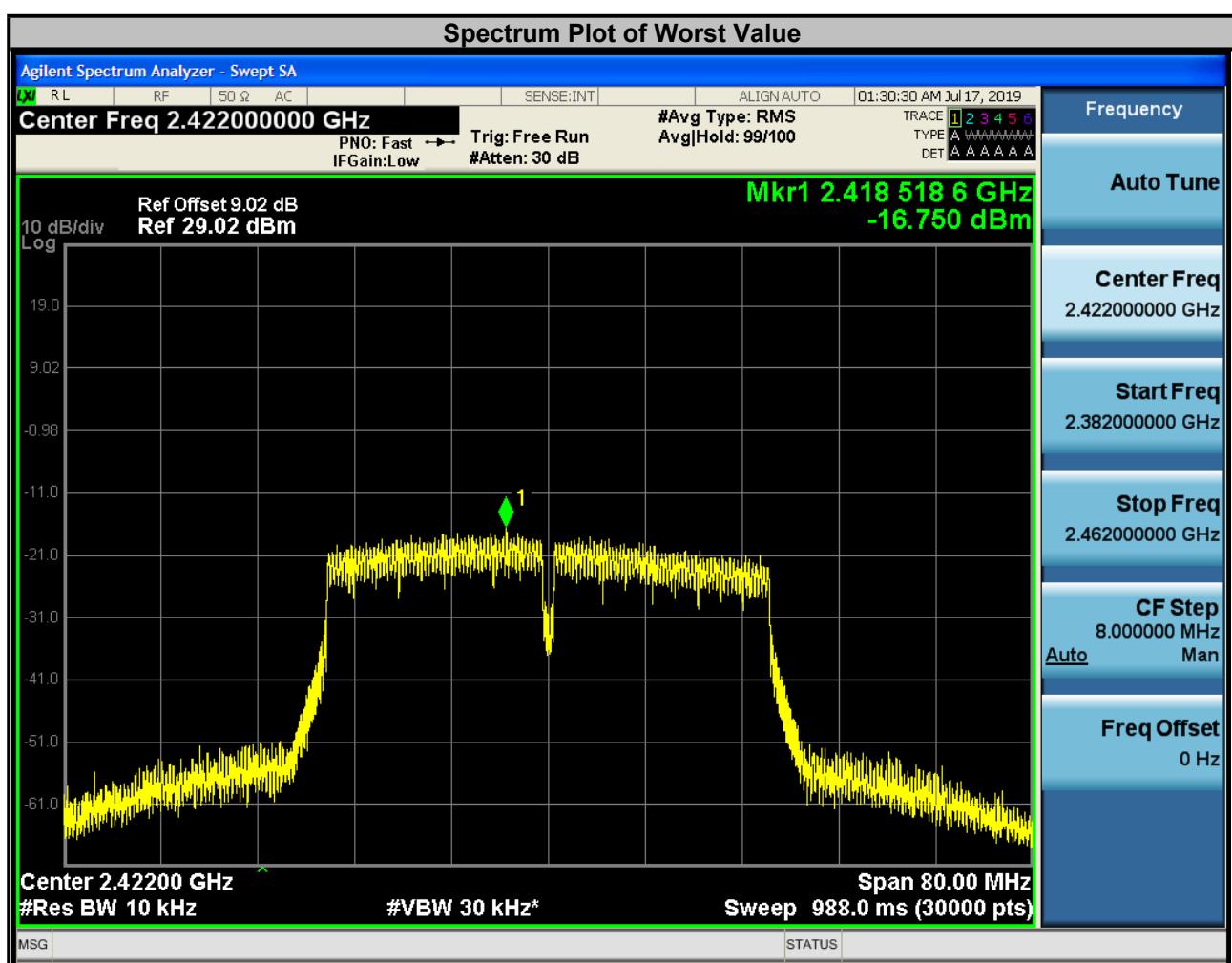


**802.11n HT40:**

Channel	Frequency (MHz)	PSD (dBm/10kHz)		Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
		Ant 0	Ant 1			
3	2422	-17.592	-16.750	-14.140	7.65	Pass
6	2437	-17.099	-17.308	-14.192	7.65	Pass
9	2452	-17.474	-17.042	-14.242	7.65	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 =  $3.34\text{dBi} + 10*\log(2) = 6.35\text{dBi} < 6\text{dBi}$ , so the power density limit need to reduce 0.35dB.



### 3.7 Conducted Out of Band Emission Measurement

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

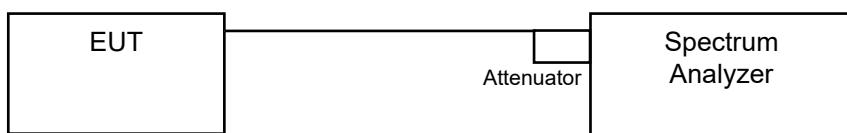
For average power:

Below -30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

For peak power:

Below -20dB 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 OOB

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

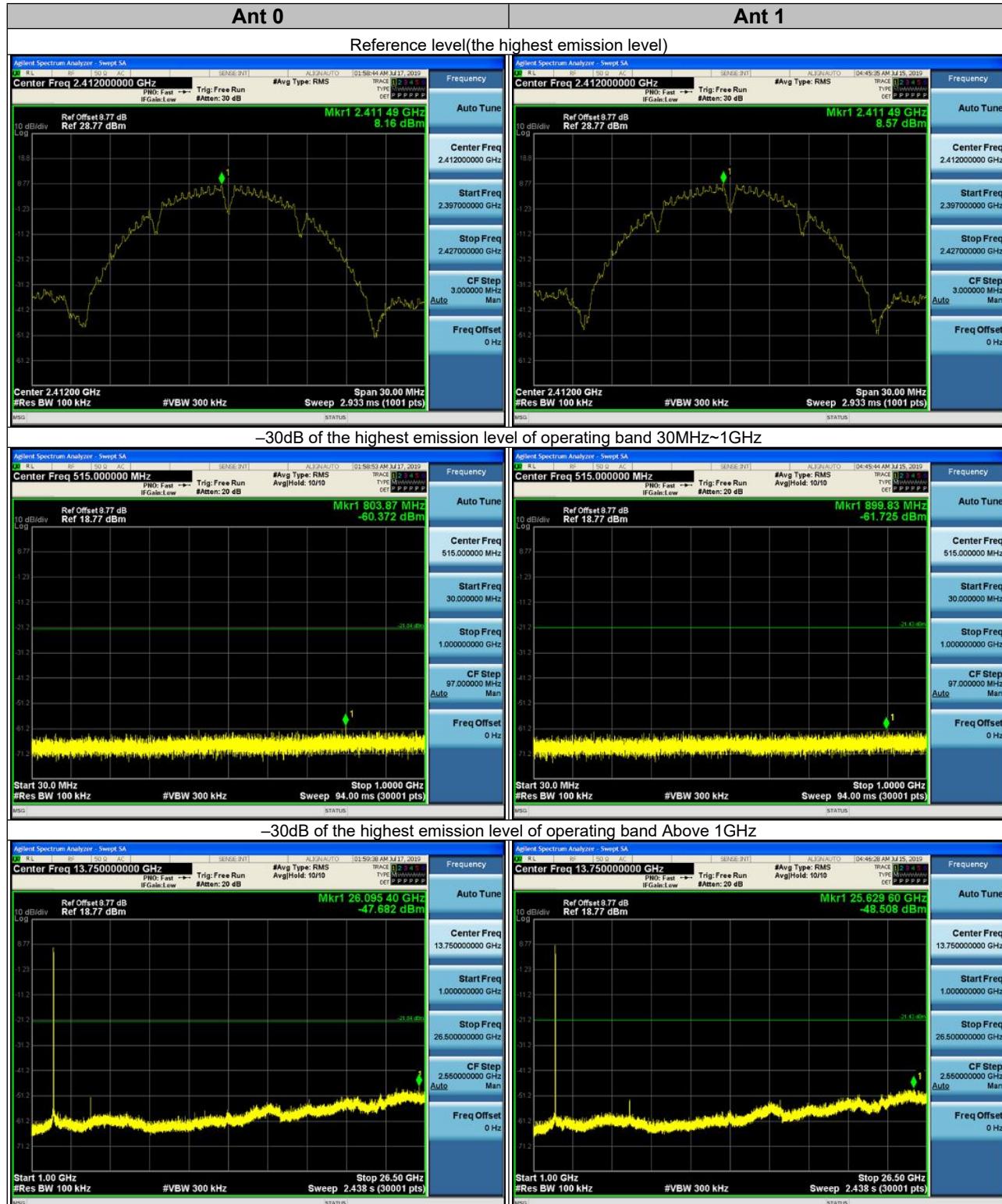
No deviation.

#### 3.7.7 EUT Operating Condition

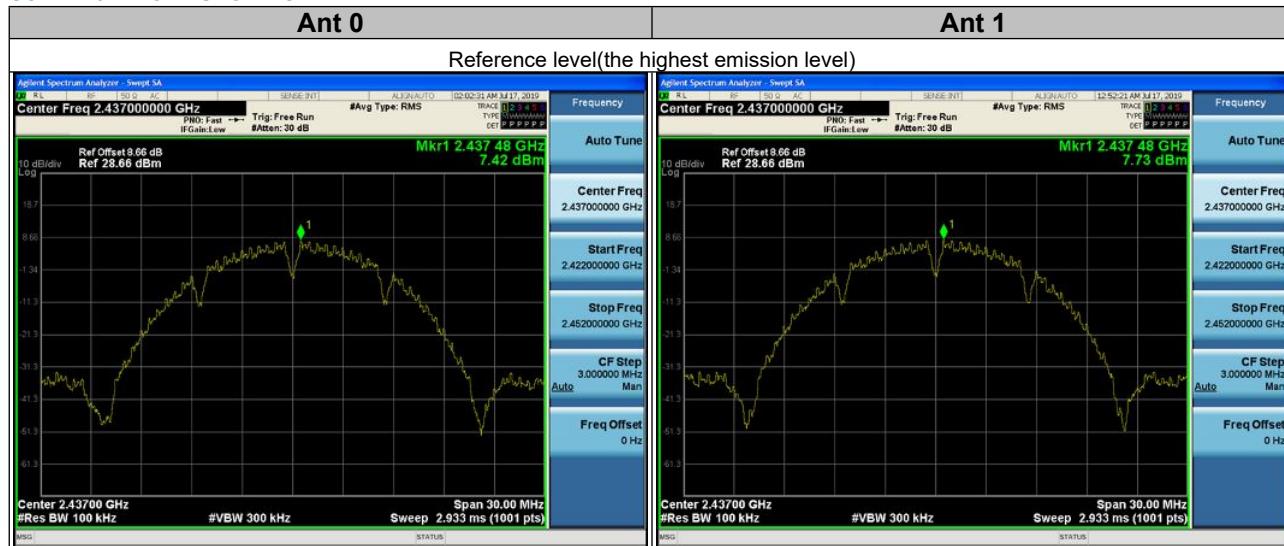
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 3.7.8 Test results

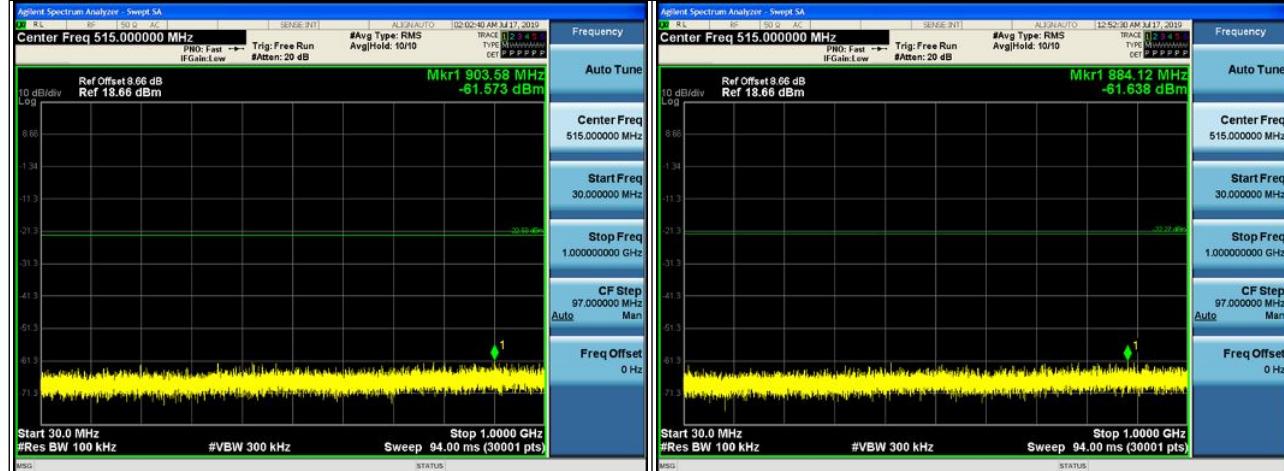
#### 802.11b-Channel 1-2412MHz



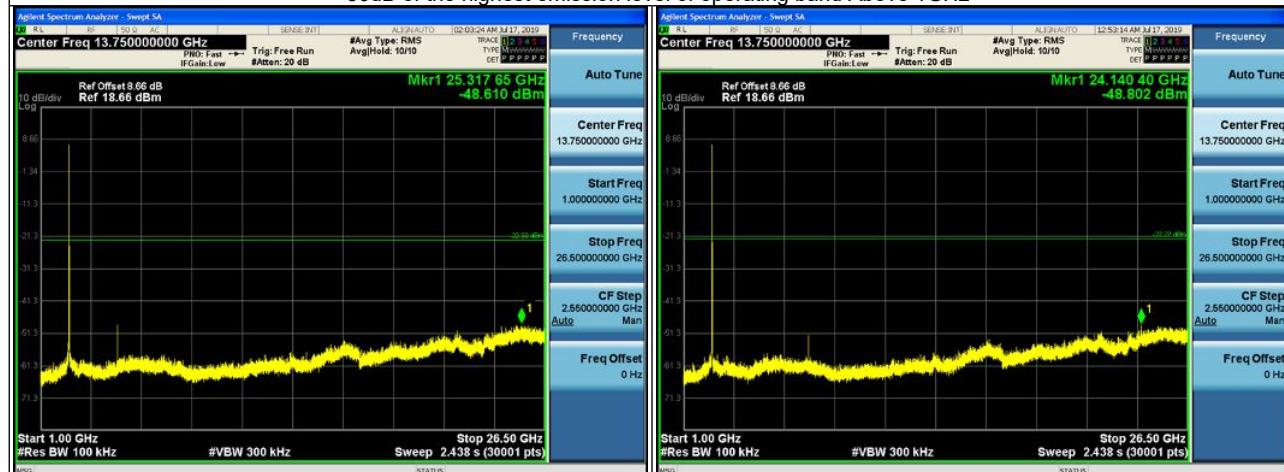
### 802.11b-Channel 6-2437MHz



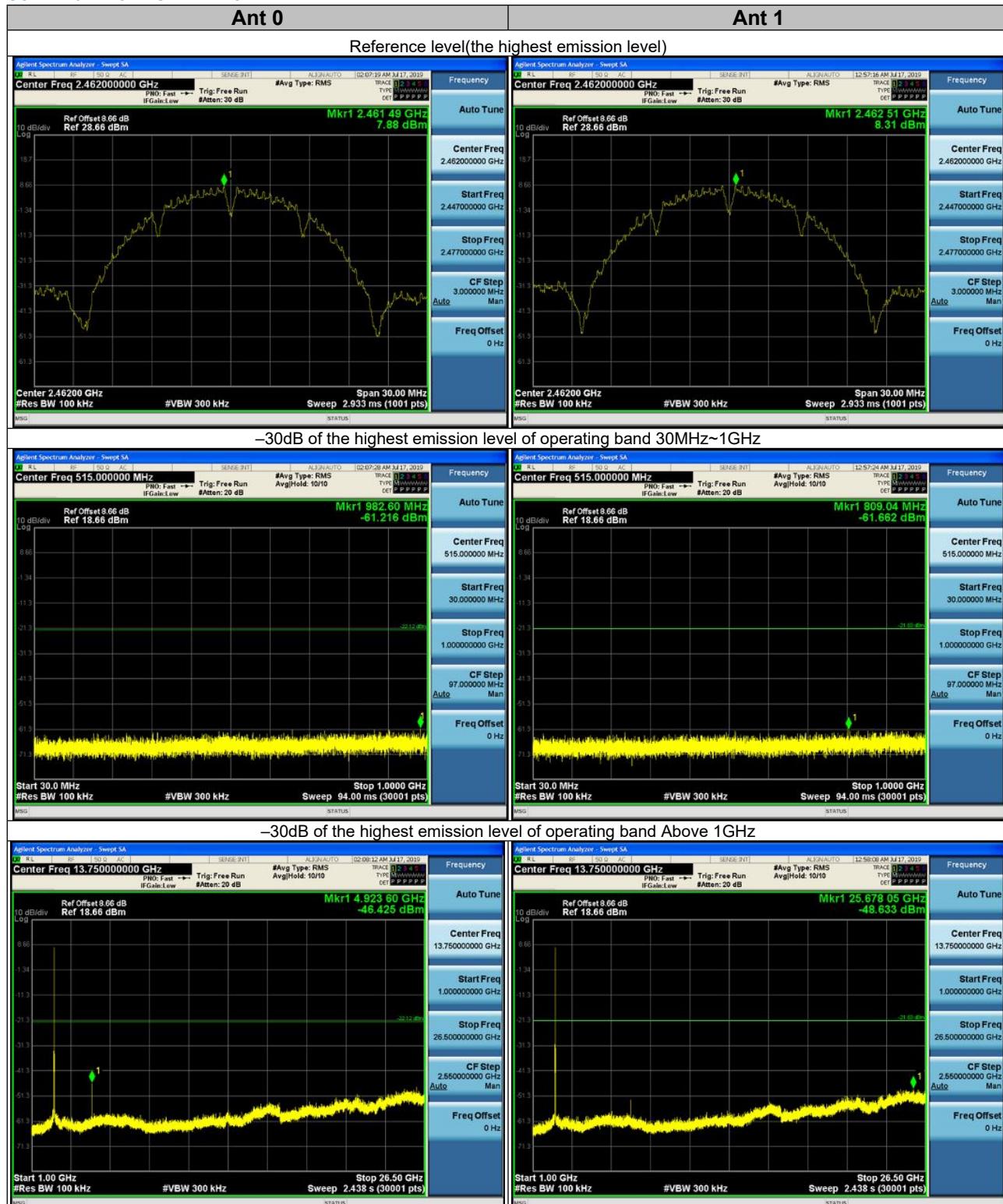
-30dB of the highest emission level of operating band 30MHz~1GHz



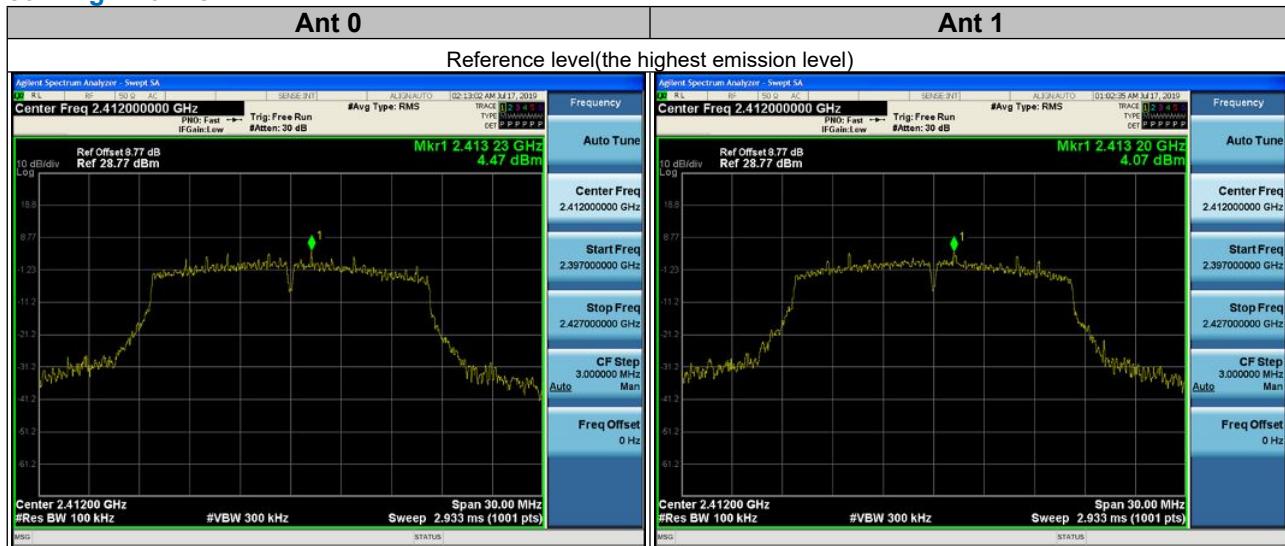
-30dB of the highest emission level of operating band Above 1GHz



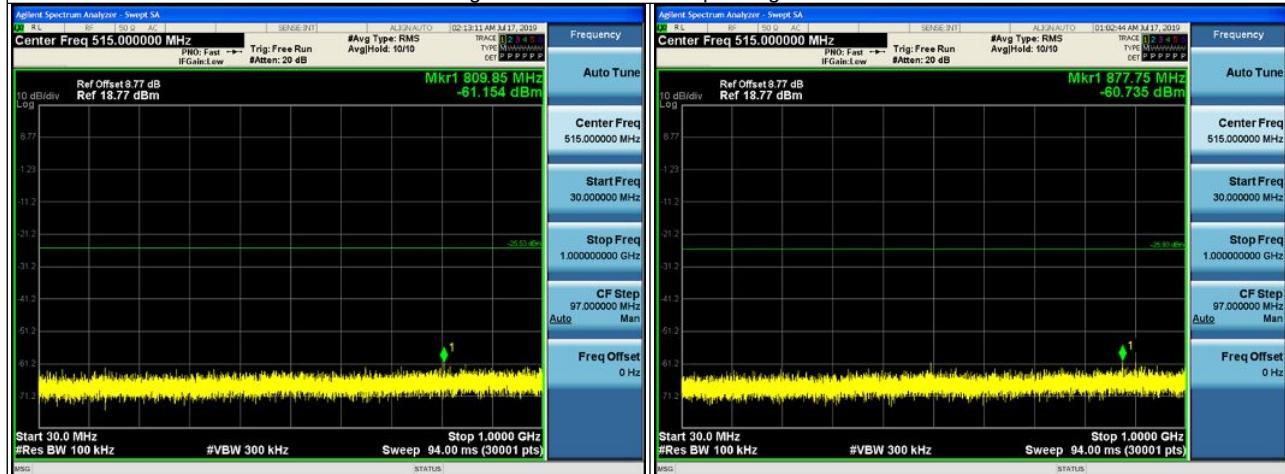
## 802.11b-Channel 11-2462MHz



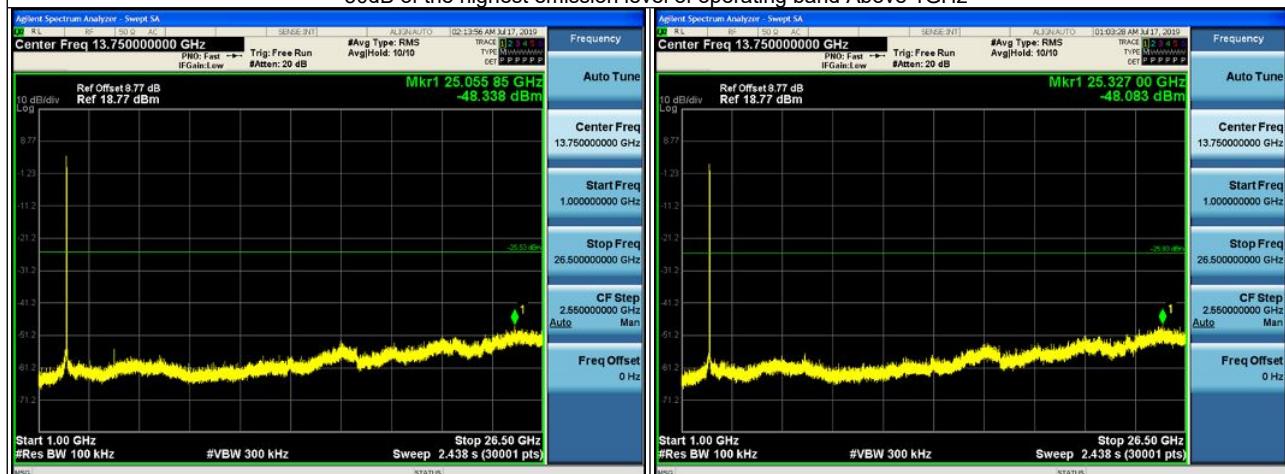
### 802.11g-Channel 1-2412MHz



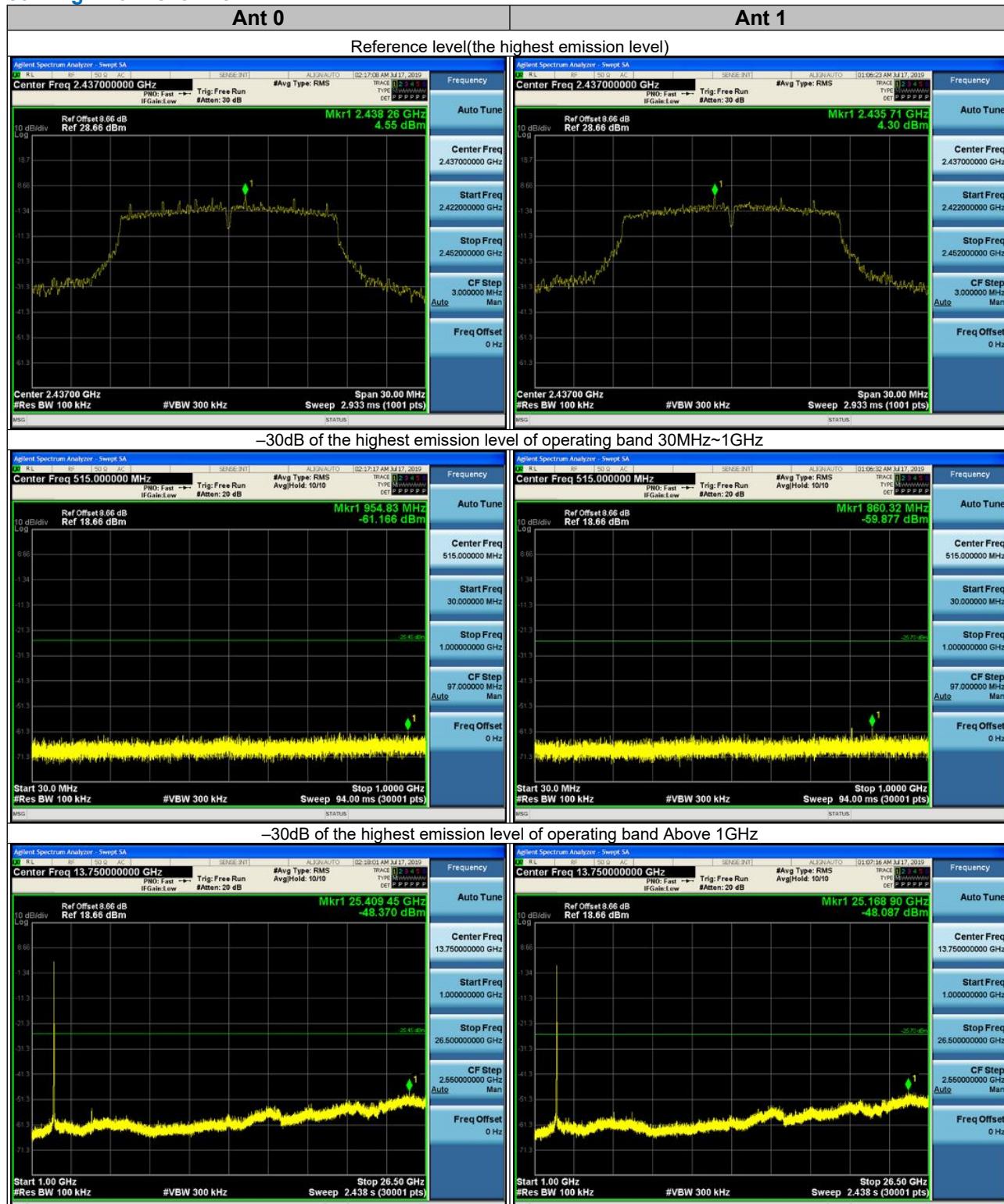
-30dB of the highest emission level of operating band 30MHz~1GHz



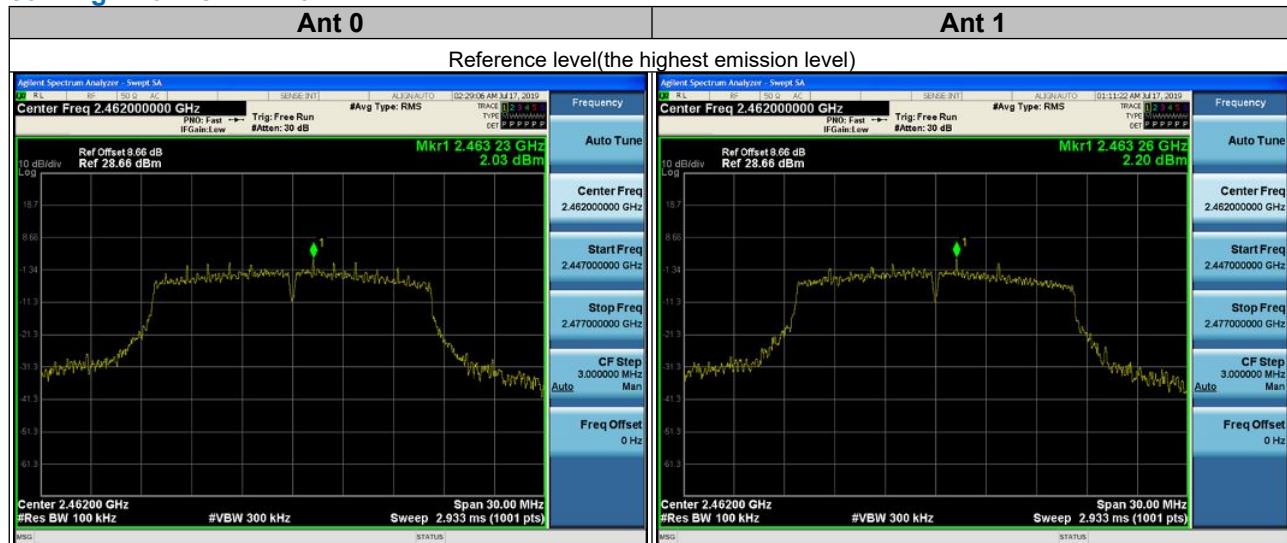
-30dB of the highest emission level of operating band Above 1GHz



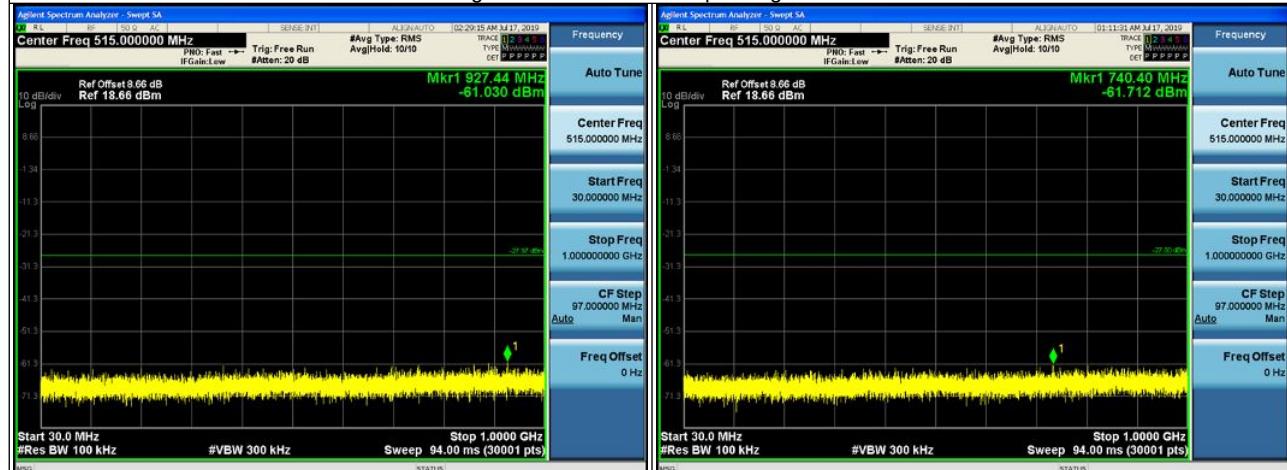
### 802.11g-Channel 6-2437MHz



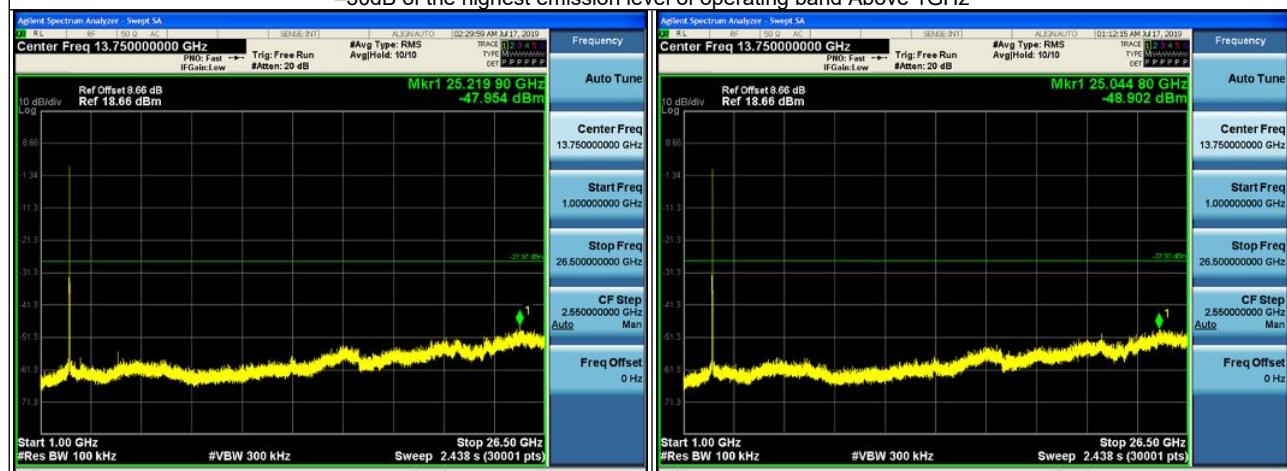
### 802.11g-Channel 11-2462MHz



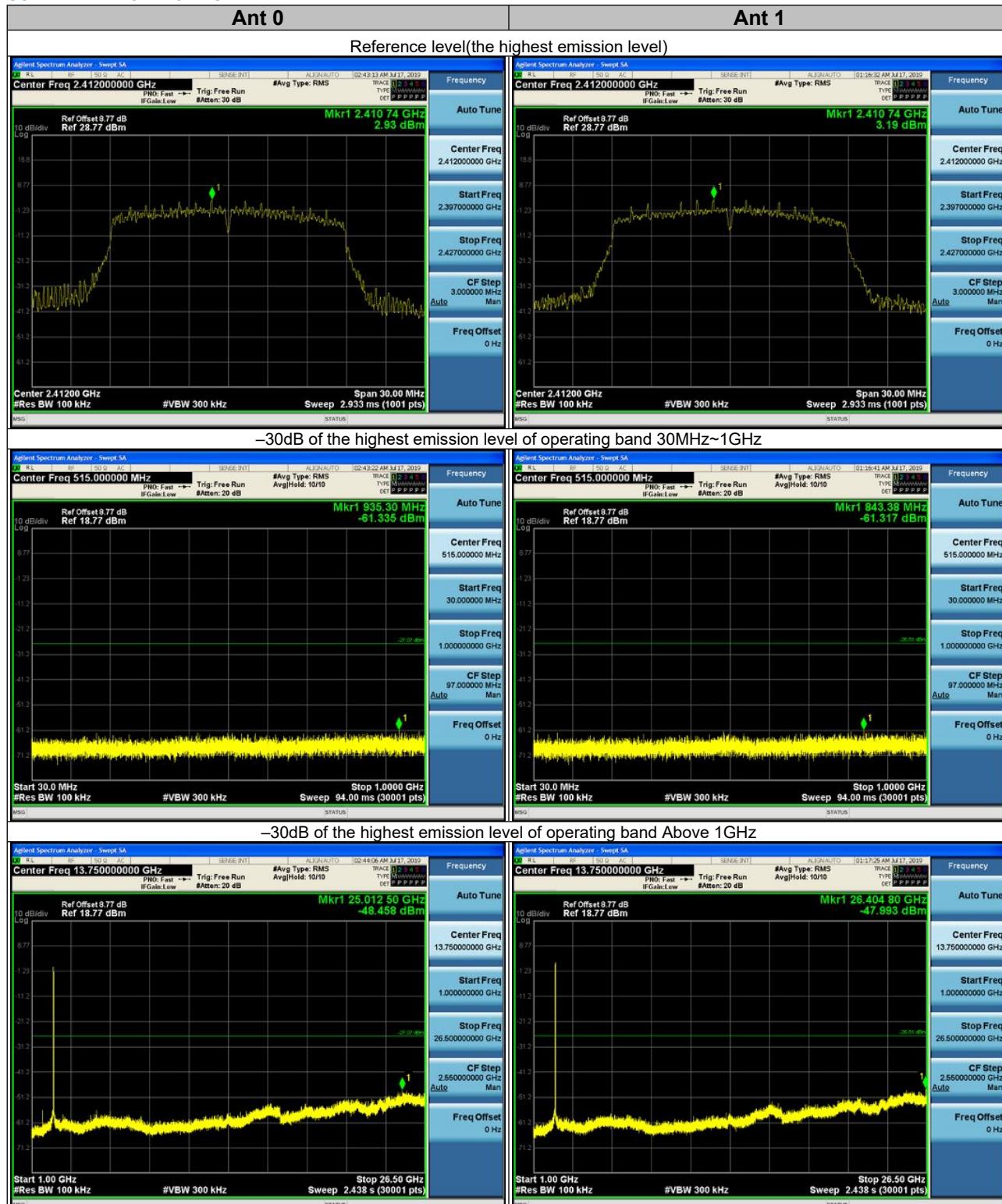
-30dB of the highest emission level of operating band 30MHz~1GHz



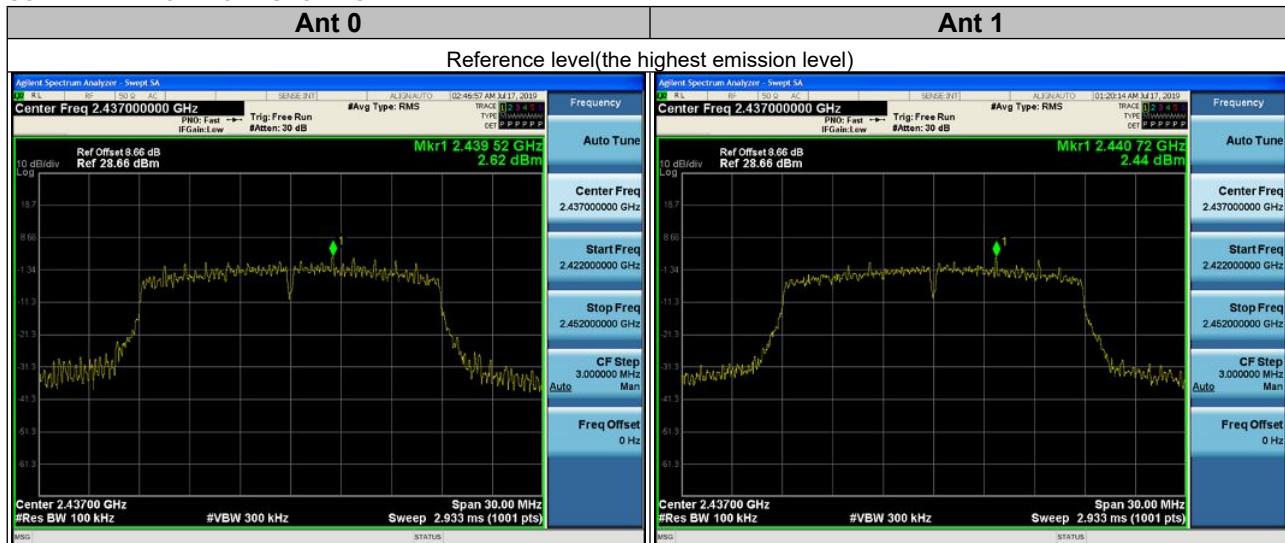
-30dB of the highest emission level of operating band Above 1GHz



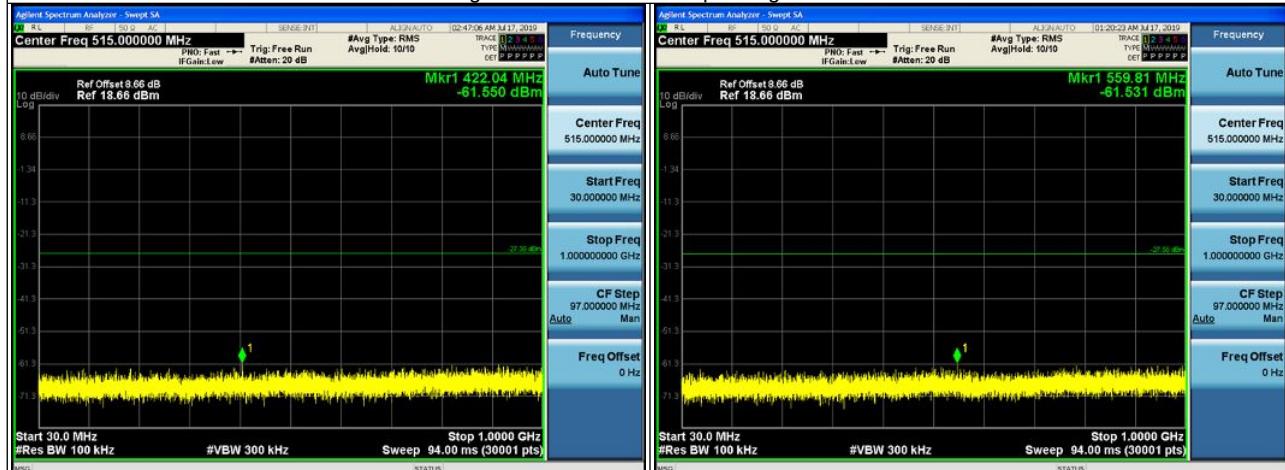
## 802.11n HT20-Channel 1-2412MHz



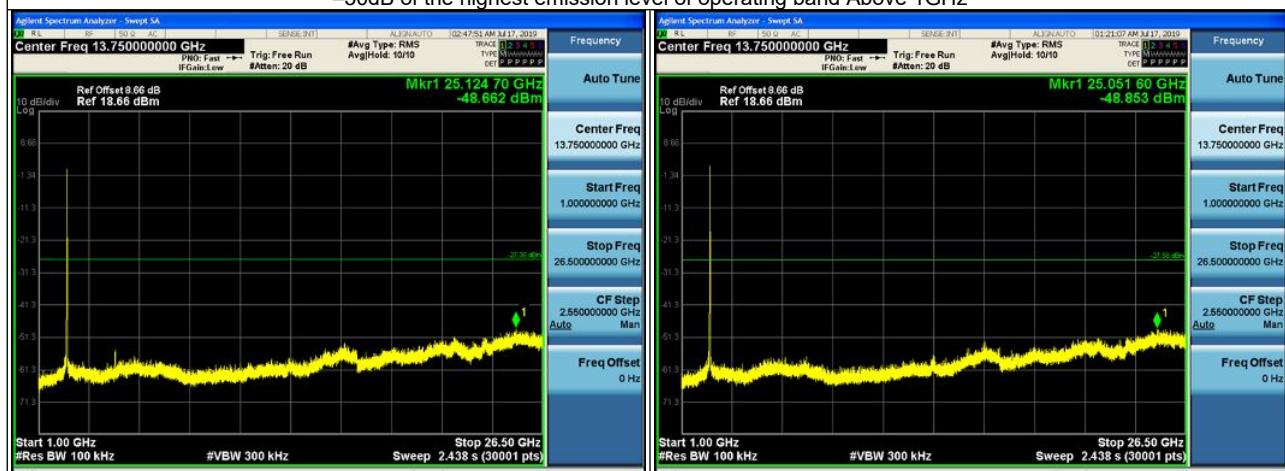
## 802.11n HT20-Channel 6-2437MHz



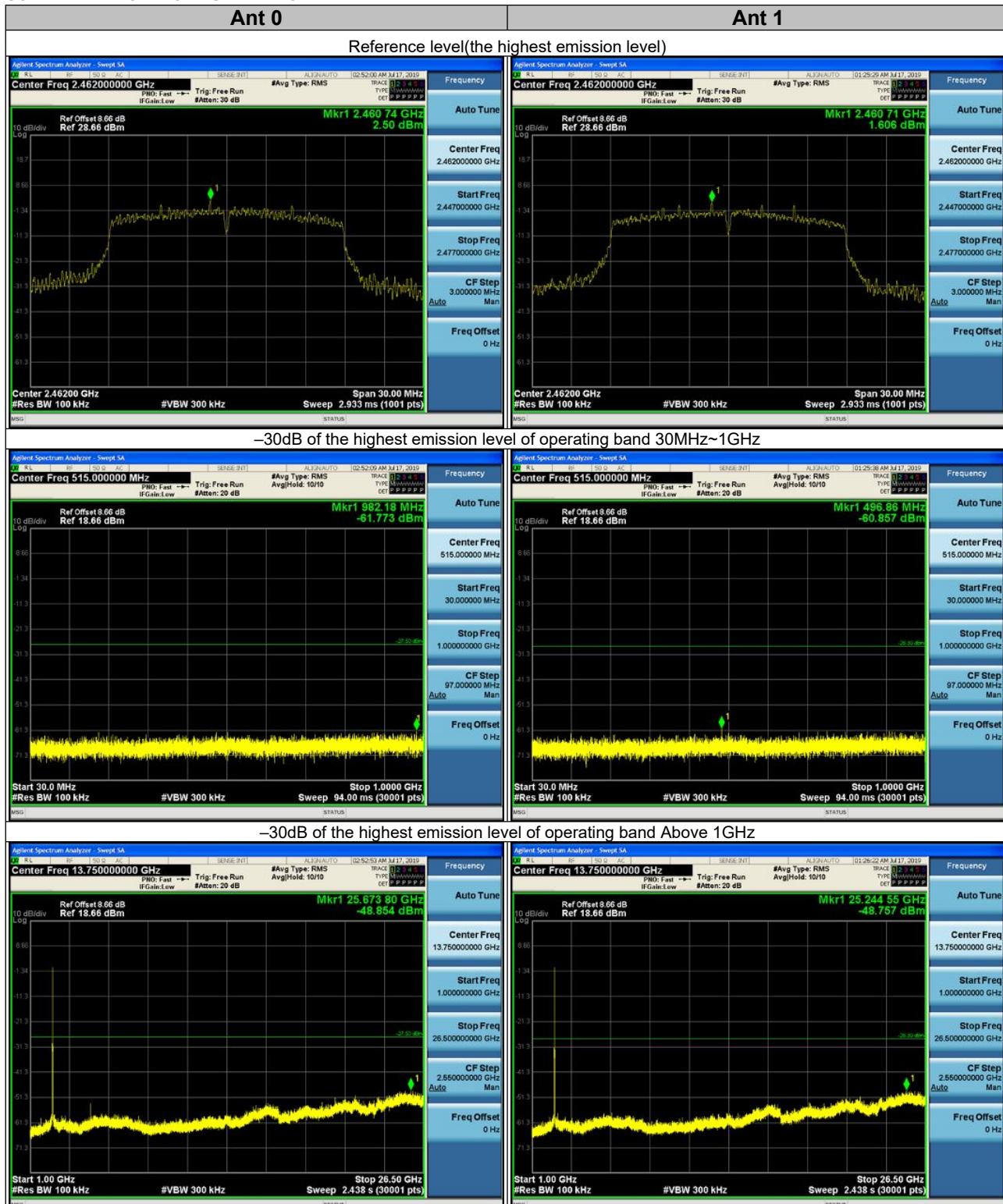
-30dB of the highest emission level of operating band 30MHz~1GHz



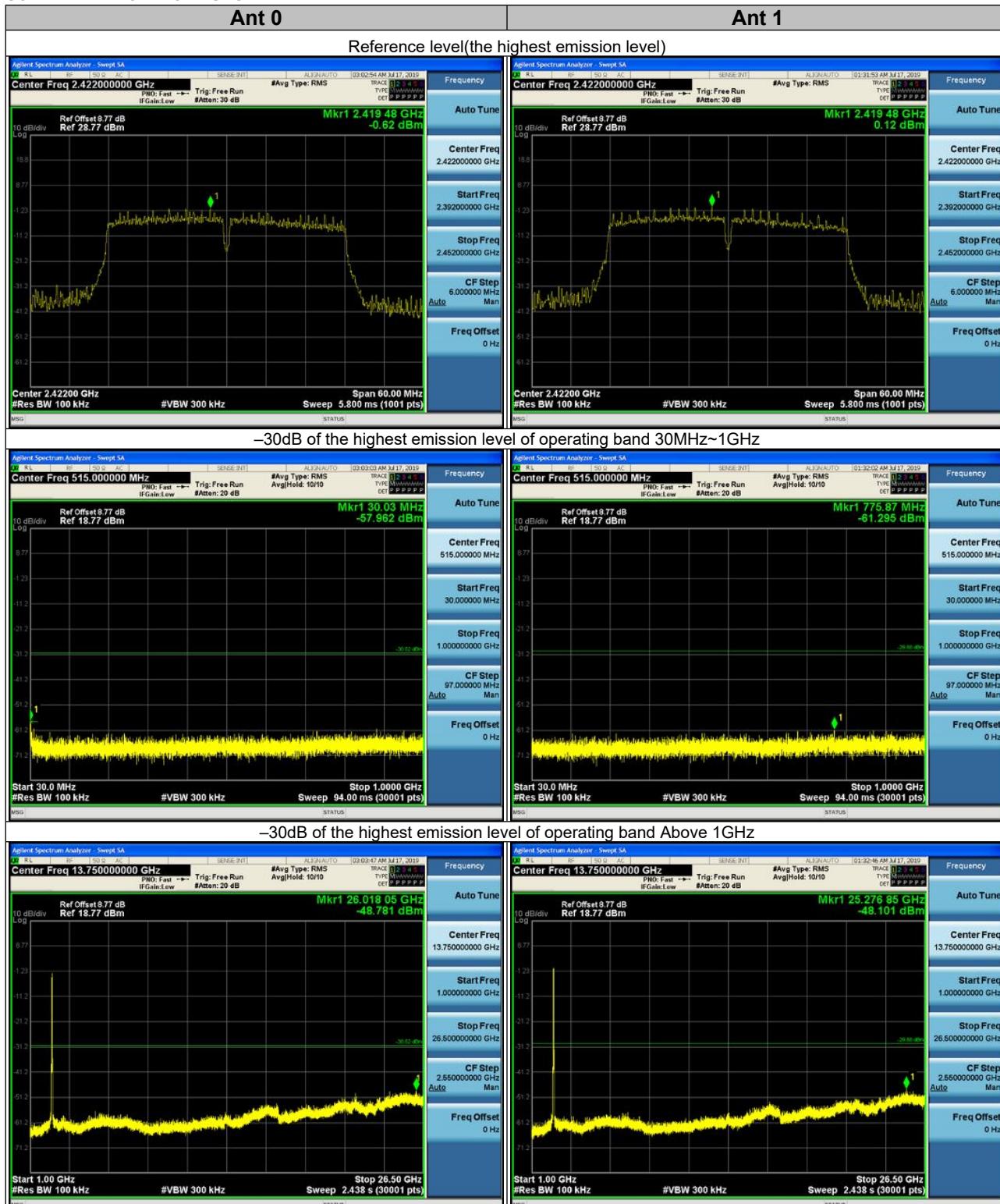
-30dB of the highest emission level of operating band Above 1GHz



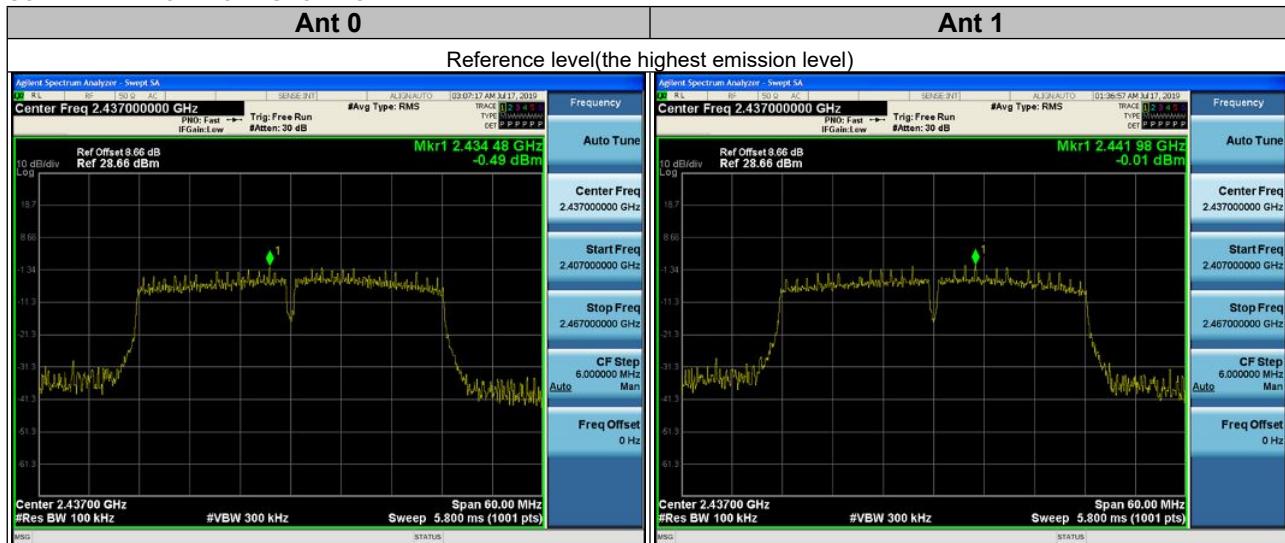
## 802.11n HT20-Channel 11-2462MHz



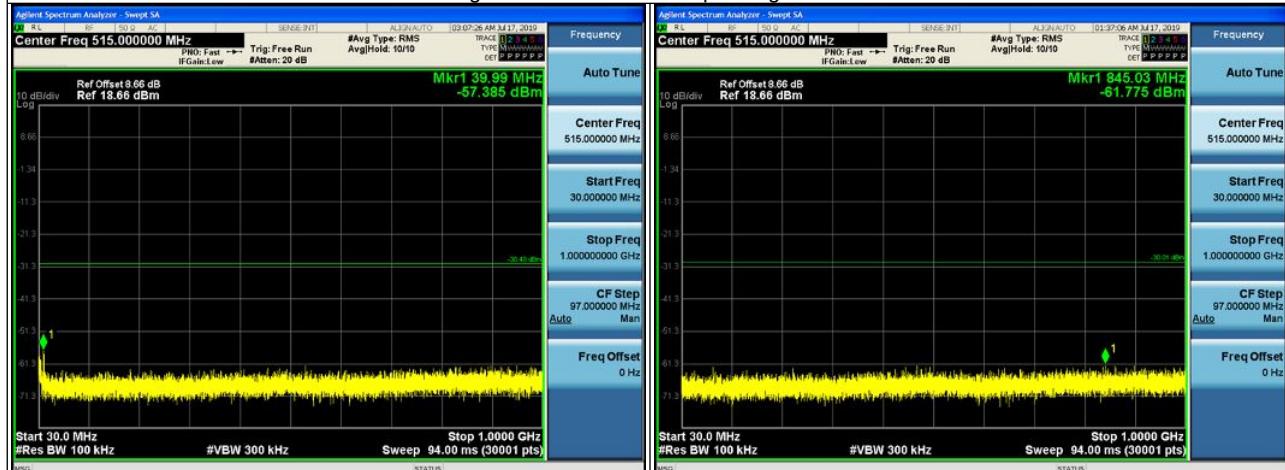
## 802.11n HT40-Channel 3-2422MHz



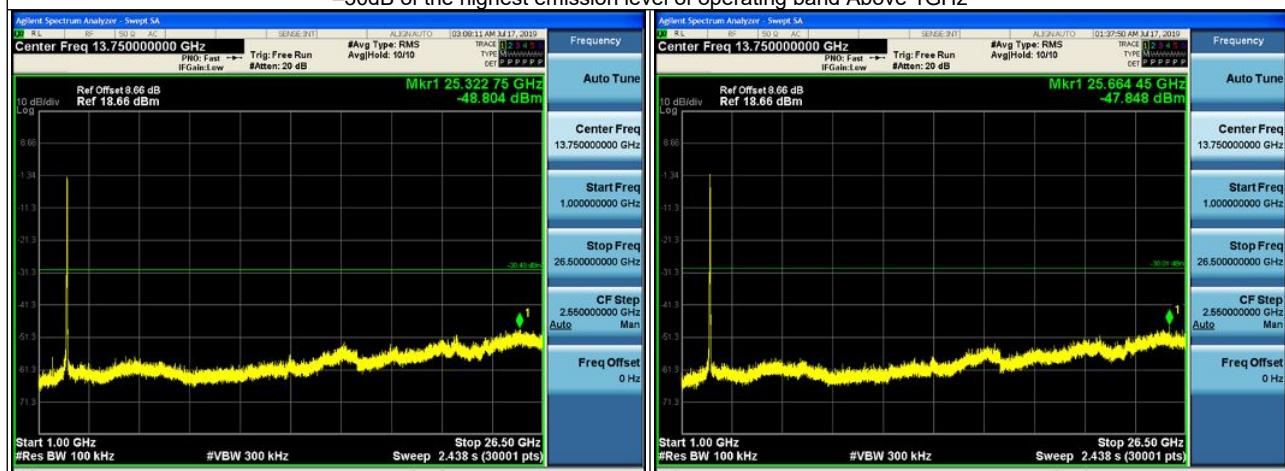
## 802.11n HT40-Channel 6-2437MHz



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



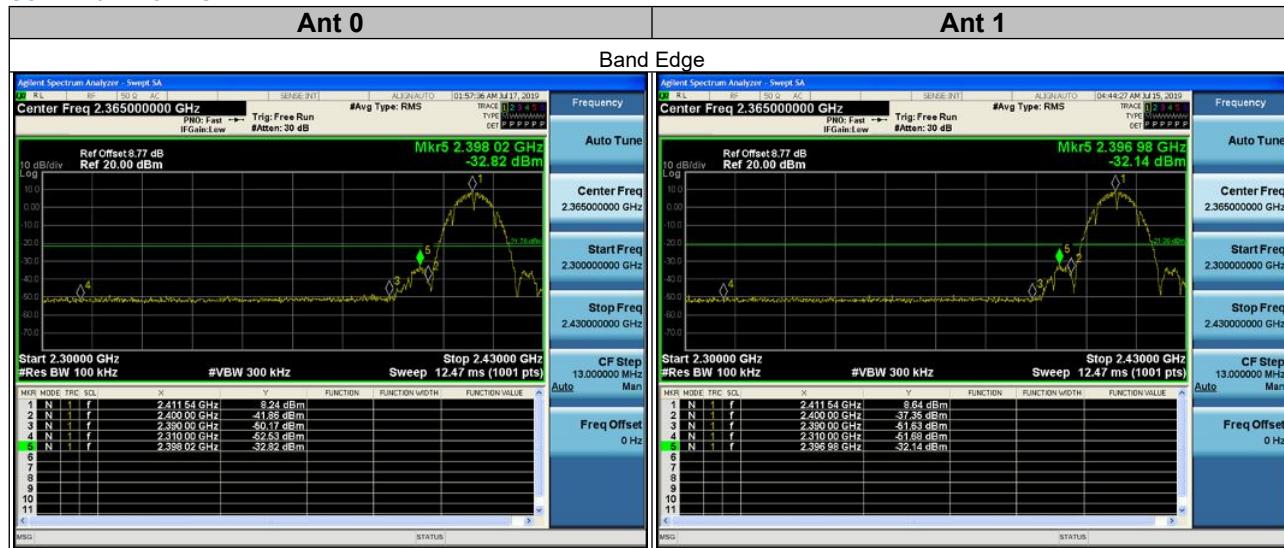
-30dB of the highest emission level of operating band Above 1GHz



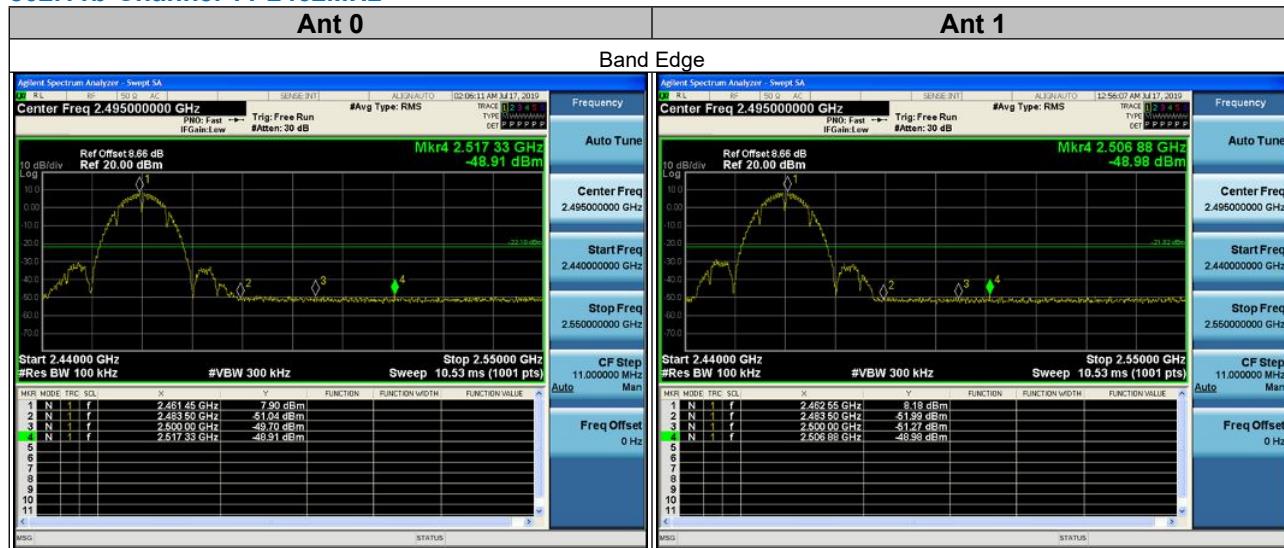
## 802.11n HT40-Channel 9-2452MHz



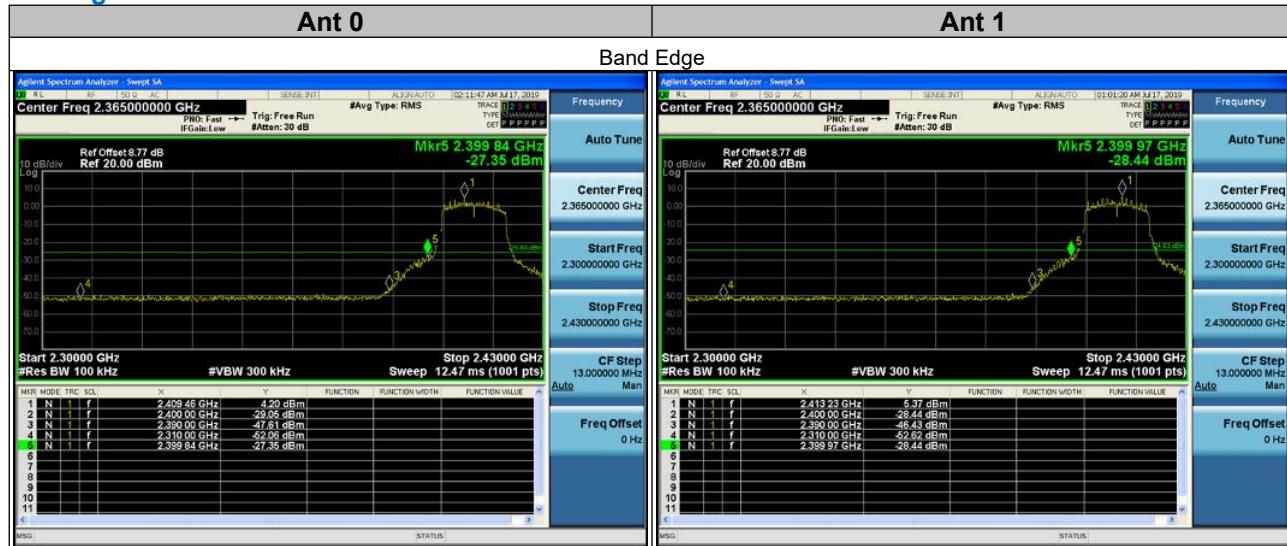
### 802.11b-Channel 1-2412MHz



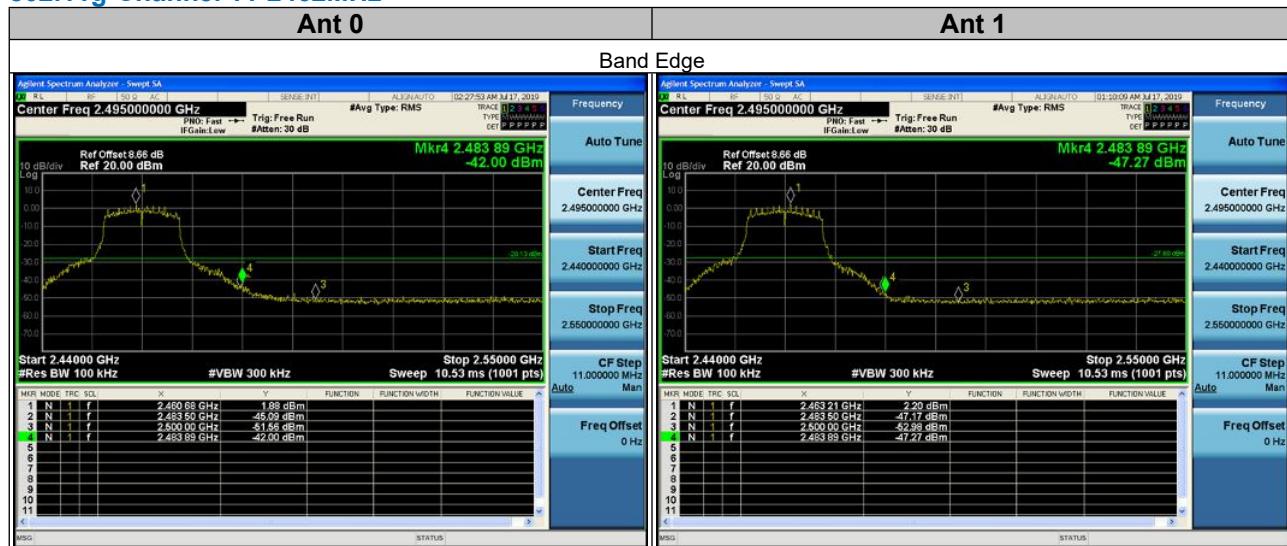
### 802.11b-Channel 11-2462MHz



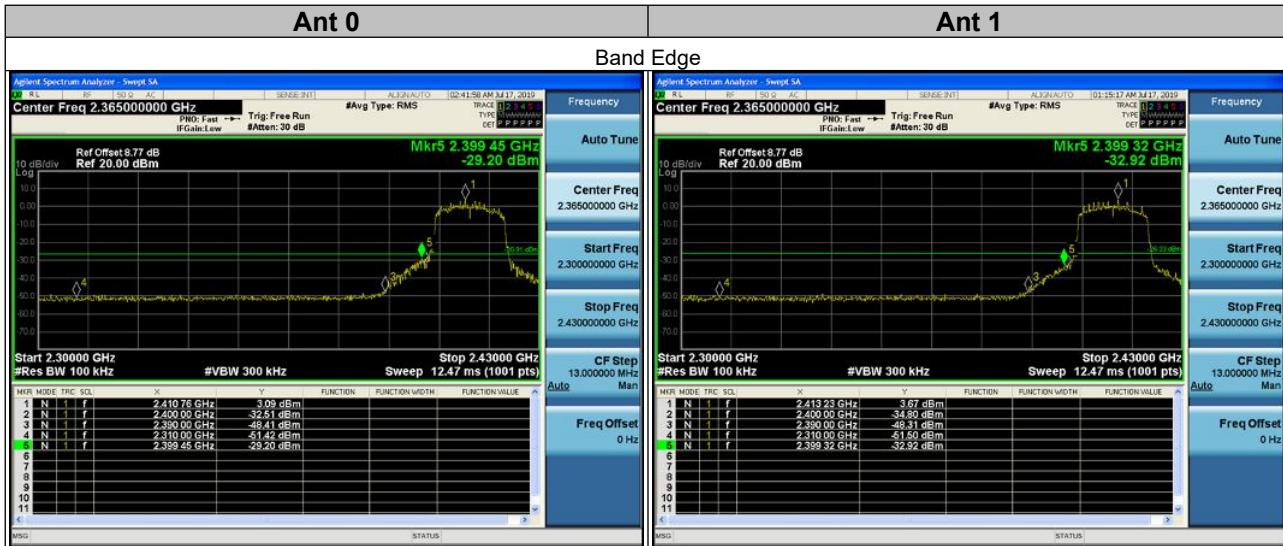
### 802.11g-Channel 1-2412MHz



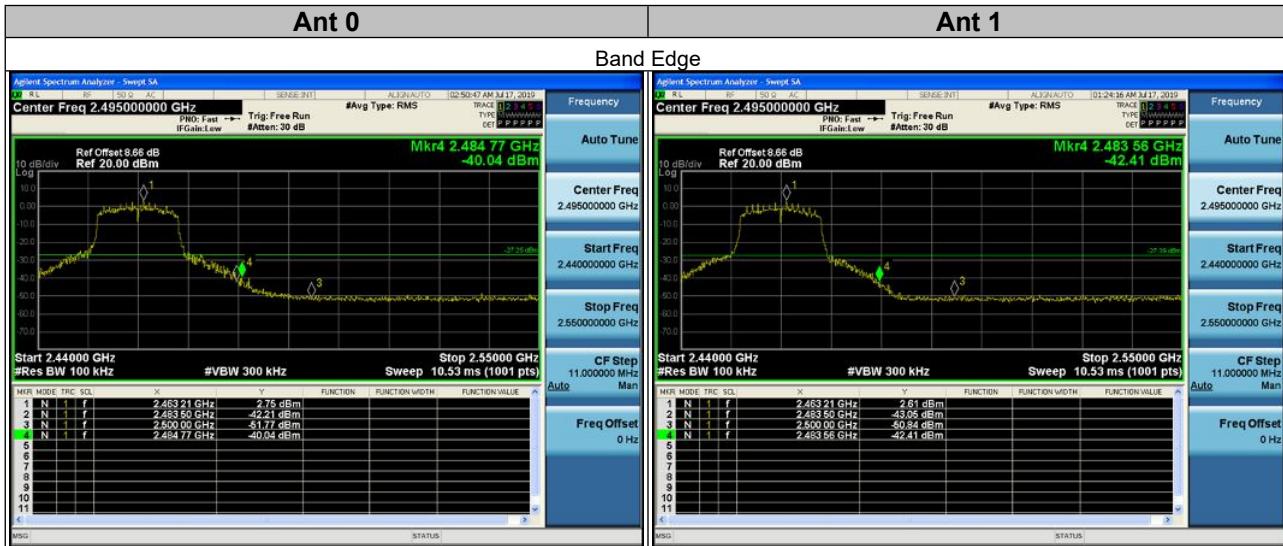
### 802.11g-Channel 11-2462MHz



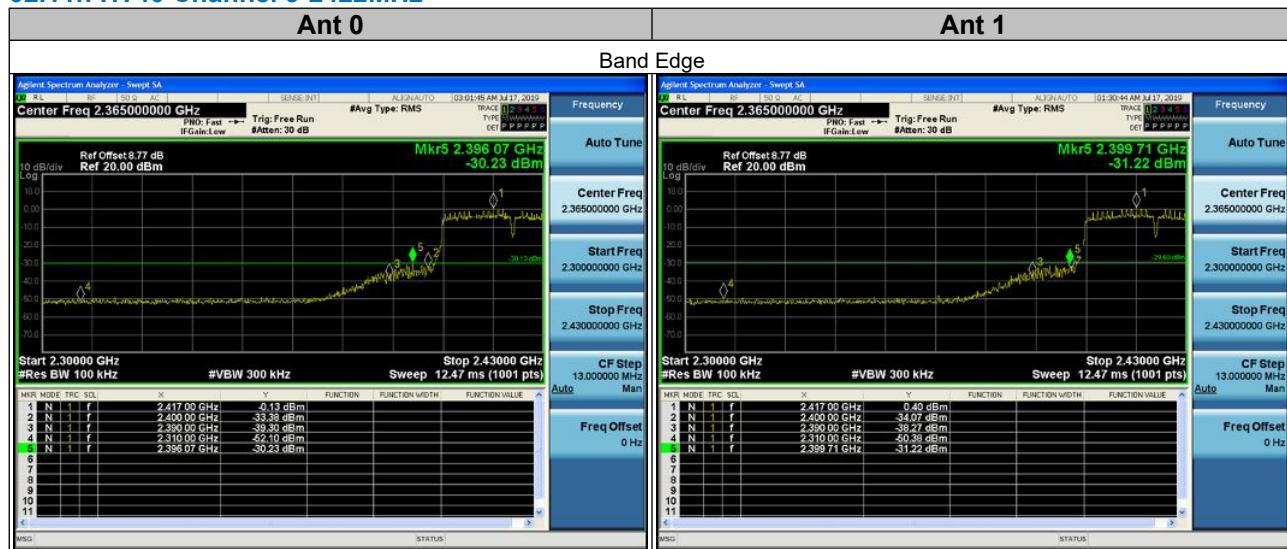
### 802.11n HT20-Channel 1-2412MHz



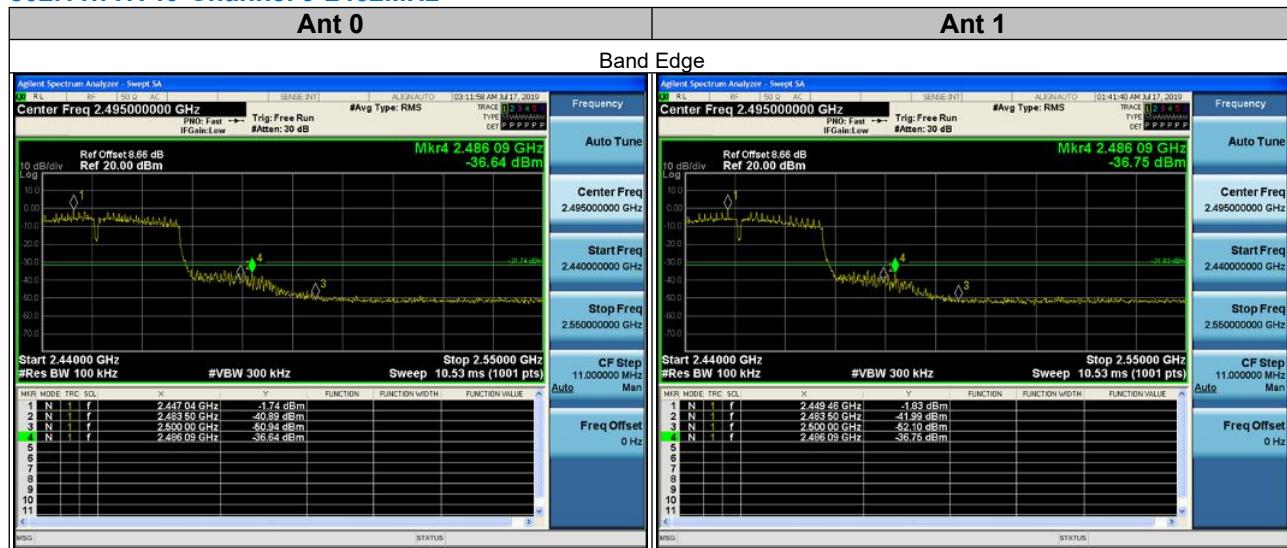
### 802.11n HT20-Channel 11-2462MHz



## 02.11n HT40 Channel 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:

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Contact 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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