

# **FCC TEST REPORT**

**Test report  
On Behalf of  
Shenzhen Antswoods Smart Technology Co., Ltd.  
For  
CAR DVR  
Model No.: A1, A2, A3  
  
FCC ID: 2ALJF-A1A2A3**

**Prepared for :** Shenzhen Antswoods Smart Technology Co., Ltd.  
E-12/F, Quanzhi Science and Technology Innovation Park, Houting, Shajing,  
Bao'an, Shenzhen, China

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**Date of Test:** Mar.15, 2017 ~ Mar.20, 2017

**Date of Report:** Mar. 20, 2017

**Report Number:** UNI170315047-E

## TEST RESULT CERTIFICATION

**Applicant's name** ..... : Shenzhen Antswoods Smart Technology Co., Ltd.  
**Address** ..... : E-12/F, Quanzhi Science and Technology Innovation Park,  
Houting, Shajing, Bao'an, Shenzhen, China  
**Manufacture's Name** ..... : Shenzhen Antswoods Smart Technology Co., Ltd.  
**Address** ..... : E-12/F, Quanzhi Science and Technology Innovation Park,  
Houting, Shajing, Bao'an, Shenzhen, China

### Product description

**Trade Mark:** Antswoods  
**Product name** ..... : CAR DVR  
**Model and/or type reference** : A1, A2, A3  
**Standards** ..... : FCC Rules and Regulations Part 15 Subpart C Section 15.247  
ANSI C63.10: 2013

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**Date of Test** ..... :  
**Date (s) of performance of tests** ..... : **Mar.15, 2017 ~ Mar.20, 2017**  
**Date of Issue** ..... : **Mar. 20, 2017**  
**Test Result** ..... : **Pass**

Testing Engineer :



(Eric Xie)

Technical Manager :



(Dora Qin)

Authorized Signatory :



(Kait Chen)

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## 1. TEST SUMMARY

### 1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	COMPLIANT
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
POWER SPECTRAL DENSITY	COMPLIANT
PEAK OUTPUT POWER <sub>Peak</sub>	COMPLIANT
CONDUCTED EMISSION TEST	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

### 1.2 TEST FACILITY

Test Firm : Dongguan Dongdian Testing Service Co., Ltd  
Certificated by FCC, Registration No.: 270092  
Address No.17 Zongbu road 2, Songshan Lake Sci&Tech Park, DongGuan  
City, Guangdong province, 523808 China

### 1.3 MEASUREMENT UNCERTAINTY

Measurement Uncertainty	
Conducted Emission Expanded Uncertainty	= 2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	= 3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	= 4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	= 4.06dB, k=2

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	CAR DVR
Model Name	A1
Serial No	A2, A3
Model Difference	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: A1.
FCC ID	<b>2ALJF-A1A2A3</b>
Antenna Type	Integral Antenna
Antenna Gain	2dBi
Operation frequency	WIFI: 802.11b/g/n 20:2412~2462 MHz
Number of Channels	802.11b/g/n20: 11CH
Modulation Type	CCK/OFDM/DBPSK/DAPSK
Power Source	AC 120V/60Hz
Power Rating	AC 120V/60Hz

### 2.1.1 Carrier Frequency of Channels

Channel List for 802.11b/g/n(20MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

#### Operation of EUT during testing

##### Operating Mode

The mode is used: **Transmitting mode for 802.11b/g/n(20MHz)**

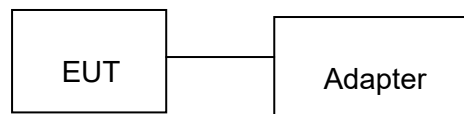
Low Channel: 2412MHz

Middle Channel: 2437MHz

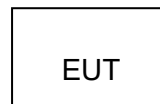
High Channel: 2462MHz

## 2.2 DESCRIPTION OF TEST SETUP

#### Operation of EUT during conducted testing:



#### Operation of EUT during Radiation testing:



## 2.3 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Receiver	Rohde & Schwarz	ESCI	100627	Feb. 19, 2016	1 Year
2.	LISN	SchwarzBeck	NSLK 8126	8126377	Feb. 19, 2016	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Feb. 19, 2016	1 Year
4.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A
5.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Feb. 19, 2016	1 Year
6.	Trilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Feb. 19, 2016	1 Year
7.	Pre-amplifier	Compliance Direction	PAP-0203	22008	Feb. 19, 2016	1 Year
8.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
9.	EMI Receiver	Rohde & Schwarz	ESCI	100627	Feb. 19, 2016	1 Year
10.	LISN	SchwarzBeck	NSLK 8126	8126377	Feb. 19, 2016	1 Year
11.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Feb. 19, 2016	1 Year
12.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A
13.	EMI Receiver	Rohde & Schwarz	ESCI	100627	Feb. 19, 2016	1 Year
14.	EMI Receiver	Rohde & Schwarz	ESCI	100627	Feb. 19, 2016	1 Year
15.	LISN	SchwarzBeck	NSLK 8126	8126377	Feb. 19, 2016	1 Year
16.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Feb. 19, 2016	1 Year
17.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A
18.	Power Meter	R&S	NRVD	SEL0069	Feb. 19, 2016	1 Year
19.	Power Sensor	R&S	URV5-Z2	SEL0071	Feb. 19, 2016	1 Year
20.	Power Sensor	R&S	URV5-Z2	SEL0072	Feb. 19, 2016	1 Year
21.	Software EMC32	R&S	EMC32-S	SEL0082	N/A	N/A
22.	Log-periodic Antenna	Amplifier Reasearch	APT1.580	SEL0073	N/A	N/A
23.	Antenna Tripod	Amplifier Reasearch	TP1000A	SEL0074	N/A	N/A
24.	High Gain Horn Antenna(0.8-5GHz)	Amplifier Reasearch	AT4002A	SEL0075	N/A	N/A
25.	Spectrum analyzer	Agilent	N9020A	MY499110 048	Feb. 19, 2016	1 Year
26.	Spectrum analyzer	Agilent	E4407B	MY461843 26	Feb. 19, 2016	1 Year



### 3. CONDUCTED EMISSIONS TEST

#### 3.1 Conducted Power Line Emission Limit

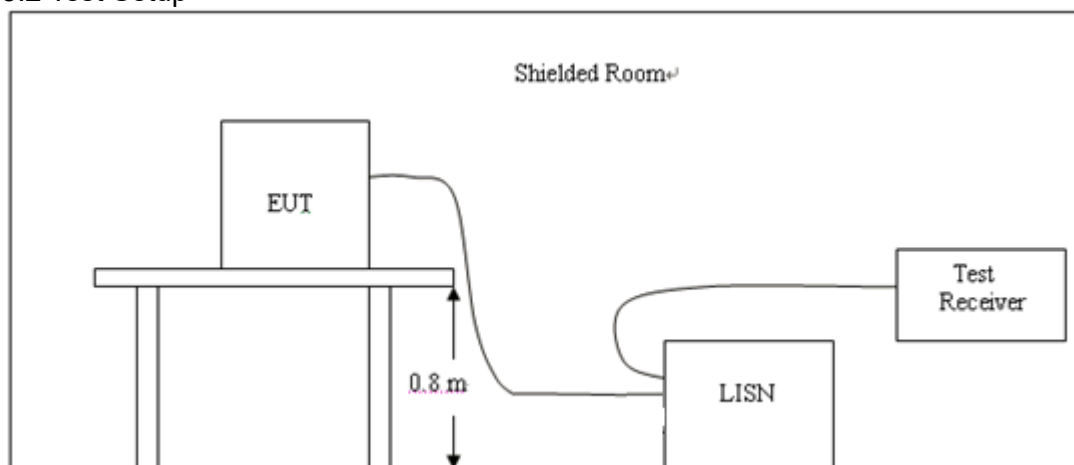
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage (dB $\mu$ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

\* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

#### 3.2 Test Setup



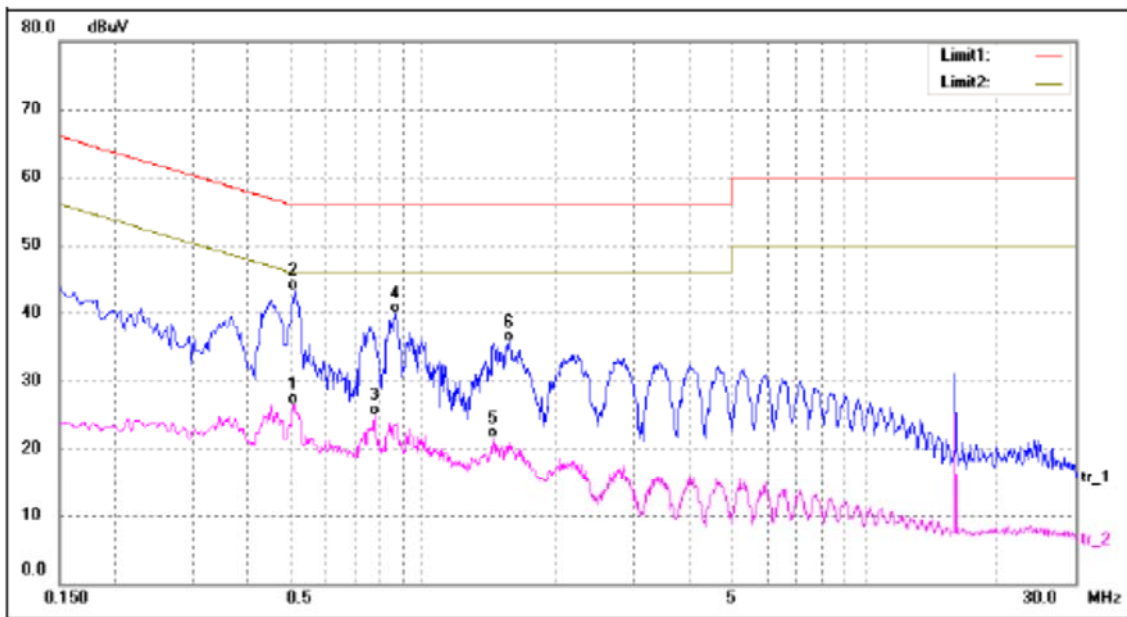
#### 3.3 Test Procedure

- 1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
- 2, Support equipment, if needed, was placed as per ANSI C63.10.
- 3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5, All support equipments received AC power from a second LISN, if any.
- 6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

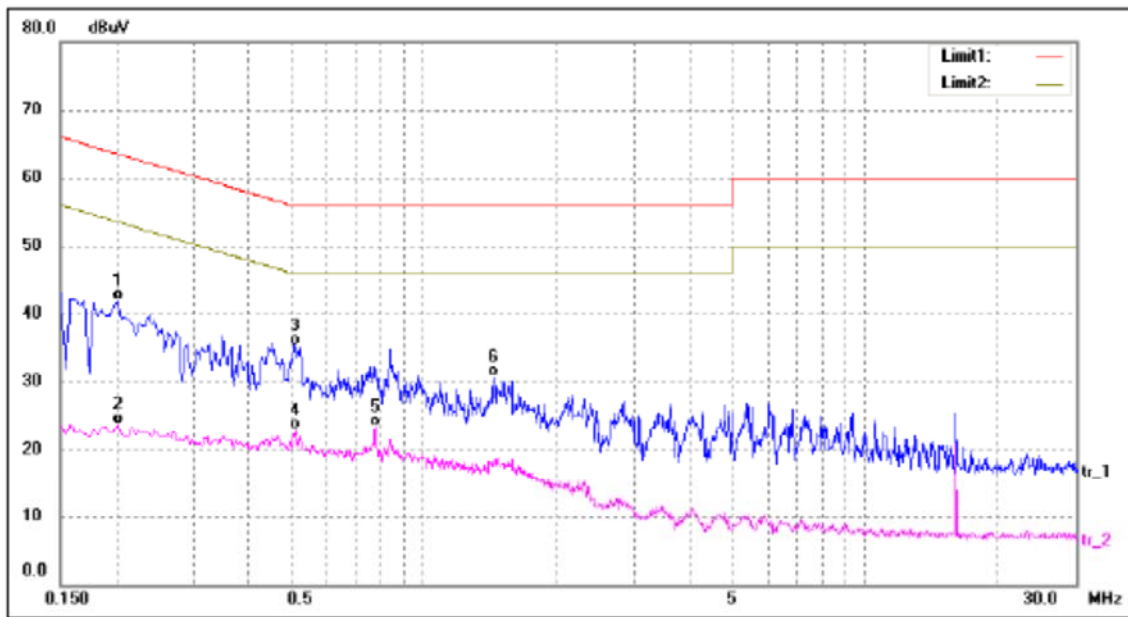
#### 3.4 Test Result

PASS

All the test modes completed for test, with the worst margin reading of:

**Test Specification: Line**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.5100	16.69	9.80	26.49	46.00	-19.51	AVG
2*	0.5140	33.42	9.80	43.22	56.00	-12.78	QP
3	0.7780	15.11	9.78	24.89	46.00	-21.11	AVG
4	0.8660	30.07	9.77	39.84	56.00	-16.16	QP
5	1.4420	11.70	9.75	21.45	46.00	-24.55	AVG
6	1.5620	26.05	9.75	35.80	56.00	-20.20	QP

**Test Specification: Neutral**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2020	32.07	9.80	41.87	63.53	-21.66	QP
2	0.2020	13.90	9.80	23.70	53.53	-29.83	AVG
3*	0.5100	25.60	9.80	35.40	56.00	-20.60	QP
4	0.5140	13.13	9.80	22.93	46.00	-23.07	AVG
5	0.7780	13.46	9.78	23.24	46.00	-22.76	AVG
6	1.4340	21.02	9.75	30.77	56.00	-25.23	QP

## 4 RADIATED EMISSION TEST

### 4.1 Radiation Limit

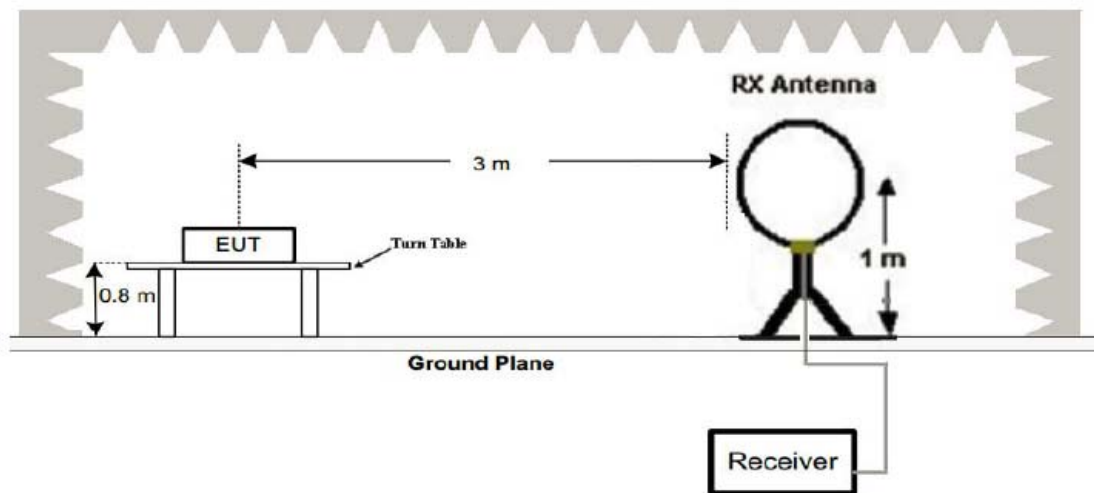
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB $\mu$ V/m)	Radiated ( $\mu$ V/m)
30-88	3	40	100
88-216	3	43.5	150
216-960	3	46	200
Above 960	3	54	500

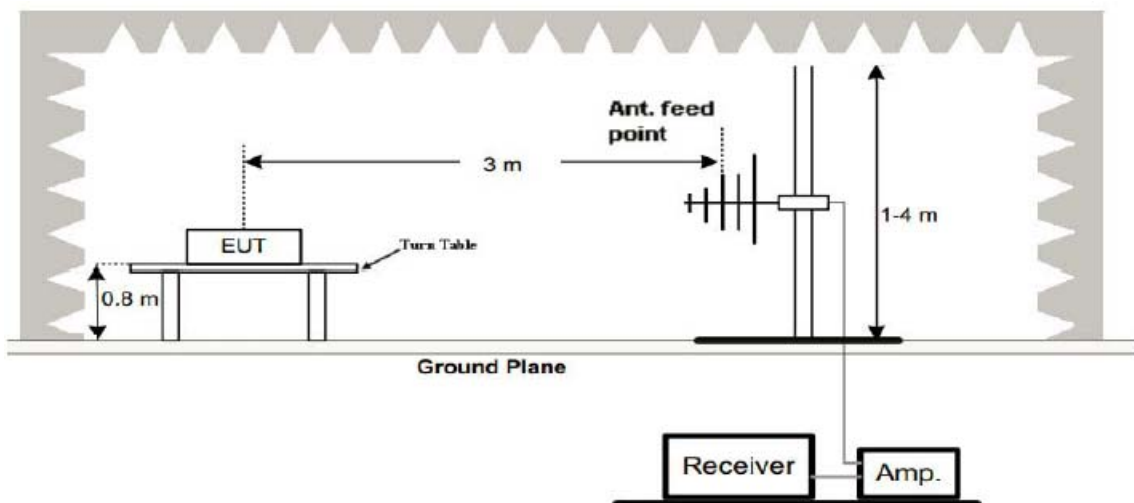
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

### 4.2 Test Setup

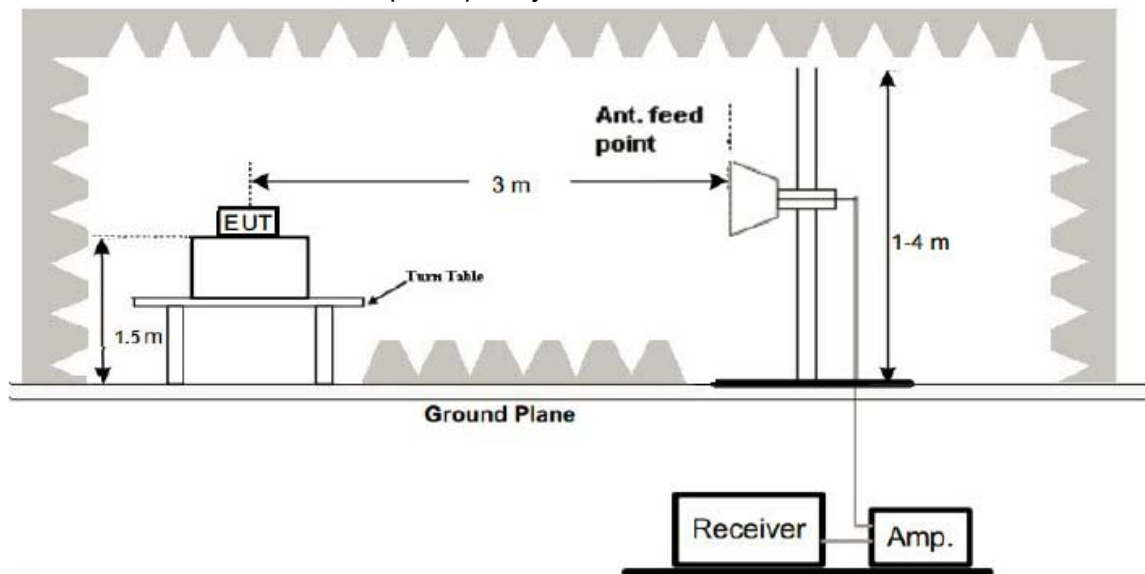
#### (1) Radiated Emission Test-Up Frequency Below 30MHz



#### (2) Radiated Emission Test-Up Frequency 30MHz~1GHz



## (3) Radiated Emission Test-Up Frequency Above 1GHz



## 4.3 Test Procedure

1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

## Note:

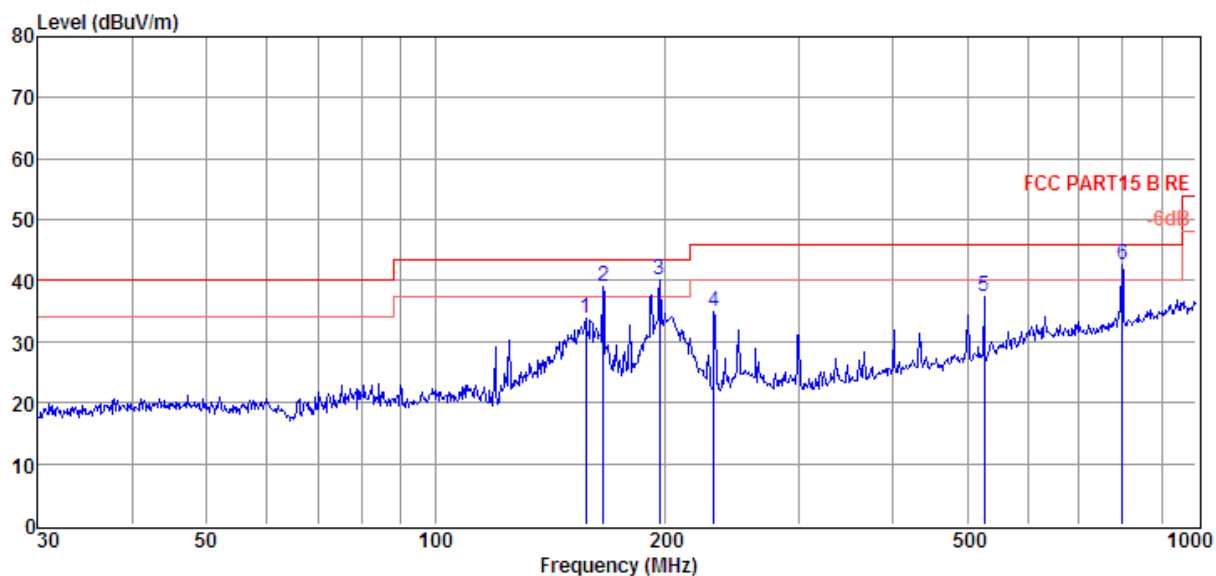
For battery operated equipment, the equipment tests shall be performed using a new battery.

## 4.4 Test Result

## PASS

All the test modes completed for test. The worst case of Radiated Emission; the test data of this mode was reported.

Below 1GHz Test Results:  
Antenna polarity: H



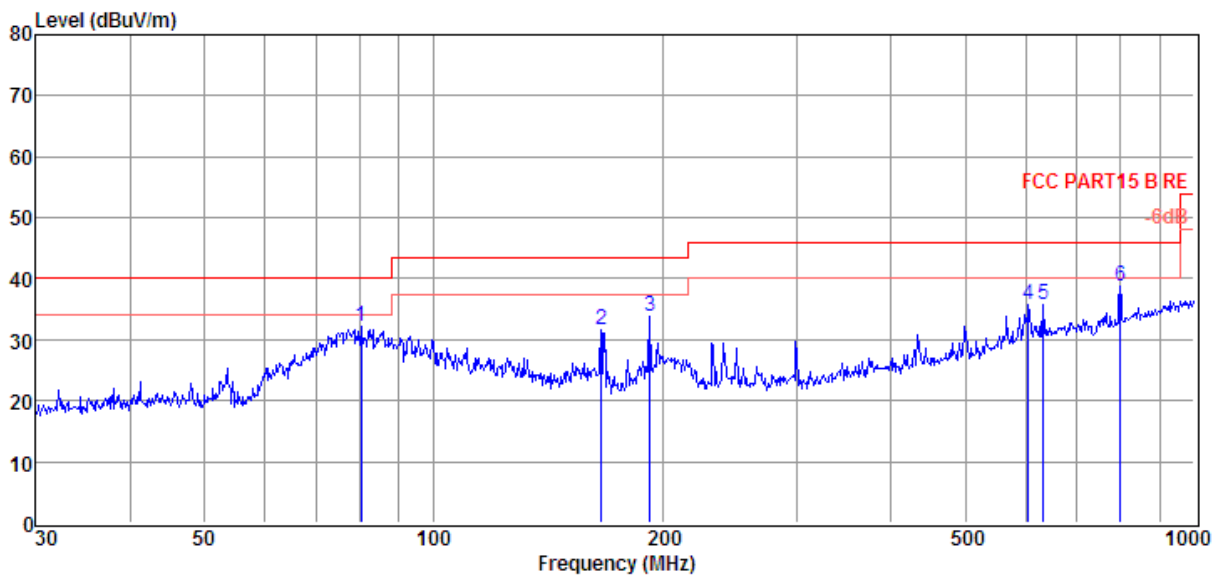
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	157.56	21.20	7.95	4.65	33.80	43.50	-9.70	Peak	HORIZONTAL
2	166.07	26.01	8.24	4.70	38.95	43.50	-4.55	Peak	HORIZONTAL
3	197.20	25.12	10.19	4.88	40.19	43.50	-3.31	Peak	HORIZONTAL
4	232.53	18.13	11.65	5.06	34.84	46.00	-11.16	Peak	HORIZONTAL
5	526.40	13.42	17.60	6.26	37.28	46.00	-8.72	Peak	HORIZONTAL
6	798.98	14.37	21.17	7.12	42.66	46.00	-3.34	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Antenna polarity: V



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	80.36	20.56	7.33	4.15	32.04	40.00	-7.96	Peak	VERTICAL
2	166.07	18.61	8.24	4.70	31.55	43.50	-11.95	Peak	VERTICAL
3	192.42	19.13	9.95	4.85	33.93	43.50	-9.57	Peak	VERTICAL
4	605.66	10.06	19.19	6.53	35.78	46.00	-10.22	Peak	VERTICAL
5	633.91	9.78	19.36	6.62	35.76	46.00	-10.24	Peak	VERTICAL
6	798.98	10.61	21.17	7.12	38.90	46.00	-7.10	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

#### Remark:

(1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.

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

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

LOW CH1 (802.11b Mode)/2412  
Horizontal:

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4824	61.06	-3.64	57.42	74	-16.58	peak
4824	45.85	-3.64	42.21	54	-11.79	AVG
7236	56.23	-0.95	55.28	74	-18.72	peak
7236	41.71	-0.95	40.76	54	-13.24	AVG
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



MID CH6 (802.11b Mode)/2437  
Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4874	61.98	-3.51	58.47	74	-15.53	peak
4874	46.75	-3.51	43.24	54	-10.76	AVG
7311	56.26	-0.82	55.44	74	-18.56	peak
7311	43.79	-0.82	42.97	54	-11.03	AVG
---	---	---	---	---	---	---
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4874	61.75	-3.51	58.24	74	-15.76	peak
4874	46.82	-3.51	43.31	54	-10.69	AVG
7311	56.34	-0.82	55.52	74	-18.48	peak
7311	43.81	-0.82	42.99	54	-11.01	AVG
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

HIGH CH11 (802.11b Mode)/2462  
Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4924	62.04	-3.43	58.61	74	-15.39	peak
4924	45.76	-3.43	42.33	54	-11.67	AVG
7386	56.43	-0.75	55.68	74	-18.32	peak
7386	42.29	-0.75	41.54	54	-12.46	AVG
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4924	60.88	-3.43	57.45	74	-16.55	peak
4924	44.37	-3.43	40.94	54	-13.06	AVG
7386	55.46	-0.75	54.71	74	-19.29	peak
7386	42.75	-0.75	42	54	-12	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

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

Remark:

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

LOW CH1 (802.11g Mode)/2412  
Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4824	62.52	-3.64	58.88	74	-15.12	peak
4824	45.93	-3.64	42.29	54	-11.71	AVG
7236	56.71	-0.95	55.76	74	-18.24	peak
7236	42.65	-0.95	41.7	54	-12.3	AVG
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---	---	---	---	---	---	---

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

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4824	62.43	-3.64	58.79	74	-15.21	peak
4824	46.21	-3.64	42.57	54	-11.43	AVG
7236	56.74	-0.95	55.79	74	-18.21	peak
7236	42.95	-0.95	42	54	-12	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

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

MID CH6 (802.11g Mode)/2437  
Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4874	61.05	-3.51	57.54	74	-16.46	peak
4874	45.62	-3.51	42.11	54	-11.89	AVG
7311	56.13	-0.82	55.31	74	-18.69	peak
7311	42.76	-0.82	41.94	54	-12.06	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

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

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4874	61.11	-3.51	57.6	74	-16.4	peak
4874	45.76	-3.51	42.25	54	-11.75	AVG
7311	56.84	-0.82	56.02	74	-17.98	peak
7311	41.55	-0.82	40.73	54	-13.27	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

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

HIGH CH11 (802.11g Mode)/2462  
Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4924	61.62	-3.43	58.19	74	-15.81	peak
4924	45.93	-3.43	42.5	54	-11.5	AVG
7386	56.47	-0.75	55.72	74	-18.28	peak
7386	42.42	-0.75	41.67	54	-12.33	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

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

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4924	61.08	-3.43	57.65	74	-16.35	peak
4924	45.25	-3.43	41.82	54	-12.18	AVG
7386	55.19	-0.75	54.44	74	-19.56	peak
7386	41.99	-0.75	41.24	54	-12.76	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

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

Remark:

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

LOW CH1 (802.11n/H20 Mode)/2412  
Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4824	61.41	-3.64	57.77	74	-16.23	peak
4824	46.28	-3.64	42.64	54	-11.36	AVG
7236	55.72	-0.95	54.77	74	-19.23	peak
7236	42.49	-0.95	41.54	54	-12.46	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

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

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4824	61.02	-3.64	57.38	74	-16.62	peak
4824	45.18	-3.64	41.54	54	-12.46	AVG
7236	56.79	-0.95	55.84	74	-18.16	peak
7236	41.25	-0.95	40.3	54	-13.7	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

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



HIGH CH11 (802.11n/H20 Mode)/2462  
Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4924	61.82	-3.43	58.39	74	-15.61	peak
4924	46.28	-3.43	42.85	54	-11.15	AVG
7386	56.14	-0.75	55.39	74	-18.61	peak
7386	41.75	-0.75	41	54	-13	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4924	60.17	-3.43	56.74	74	-17.26	peak
4924	45.28	-3.43	41.85	54	-12.15	AVG
7386	55.56	-0.75	54.81	74	-19.19	peak
7386	41.75	-0.75	41	54	-13	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Remark:

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



## 5 BAND EDGE

### 5.1 Limits

Please refer section 15.247

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

### 5.2 Test Procedure

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength. The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBW to 300 KHz, to measure the conducted peak band edge.

### 5.3 Test Result

**PASS**

Detailed information please see the following page.



Operation Mode: TX CH High (2462MHz)  
Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	55.94	-5.65	50.29	74	-23.71	peak
2483.5	/	-5.65	/	54	/	AVG

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

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	53.13	-5.65	47.48	74	-26.52	peak
2483.5	/	-5.65	/	54	/	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						
Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.						

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

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2390	54.05	-5.81	48.24	74	-25.76	peak
2390	/	-5.81	/	54	/	AVG
2399	60.52	-5.84	54.68	74	-19.32	peak
2399	45.67	-5.84	39.83	54	-14.17	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2390	53.35	-5.81	47.54	74	-26.46	peak
2390	/	-5.81	/	54	/	AVG
2399	61.82	-5.84	55.98	74	-18.02	peak
2399	46.18	-5.84	40.34	54	-13.66	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						



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

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2390	54.33	-5.81	48.52	74	-25.48	peak
2390	/	-5.81	/	54	/	AVG
2399	60.89	-5.84	55.05	74	-18.95	peak
2399	45.25	-5.84	39.41	54	-14.59	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2390	54.93	-5.81	49.12	74	-24.88	peak
2390	/	-5.81	/	54	/	AVG
2399	60.08	-5.84	54.24	74	-19.76	peak
2399	44.76	-5.84	38.92	54	-15.08	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: TX CH High (2462MHz)  
Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	53.64	-5.65	47.99	74	-26.01	peak
2483.5	/	-5.65	/	54	/	AVG

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

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	54.45	-5.65	48.8	74	-25.2	peak
2483.5	/	-5.65	/	54	/	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						
Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.						

## 6 OCCUPIED BANDWIDTH MEASUREMENT

### 6.1 Test Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

### 6.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on FCC Part15 C Section 15.247: RBW= 100KHz. VBW= 300 KHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

### 6.3 Measurement Equipment Used

Same as Radiated Emission Measurement

### 6.4 Test Result

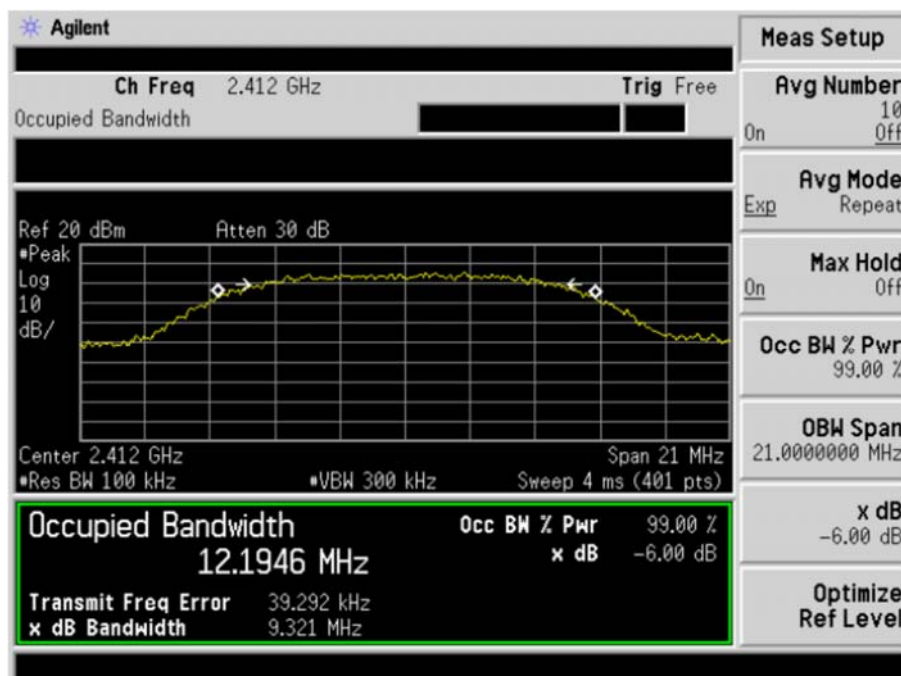
**PASS**

All the test modes completed for test.

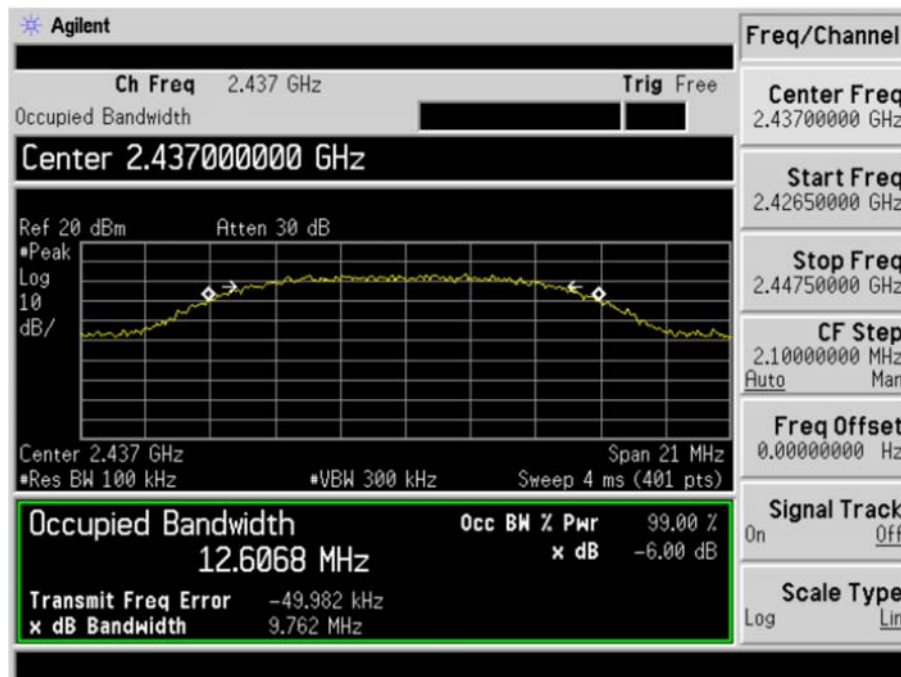


TX 802.11b Mode			
Frequency	6dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2412 MHz	9.321	$\geq 500\text{KHz}$	PASS
2437 MHz	9.762	$\geq 500\text{KHz}$	PASS
2462 MHz	9.507	$\geq 500\text{KHz}$	PASS

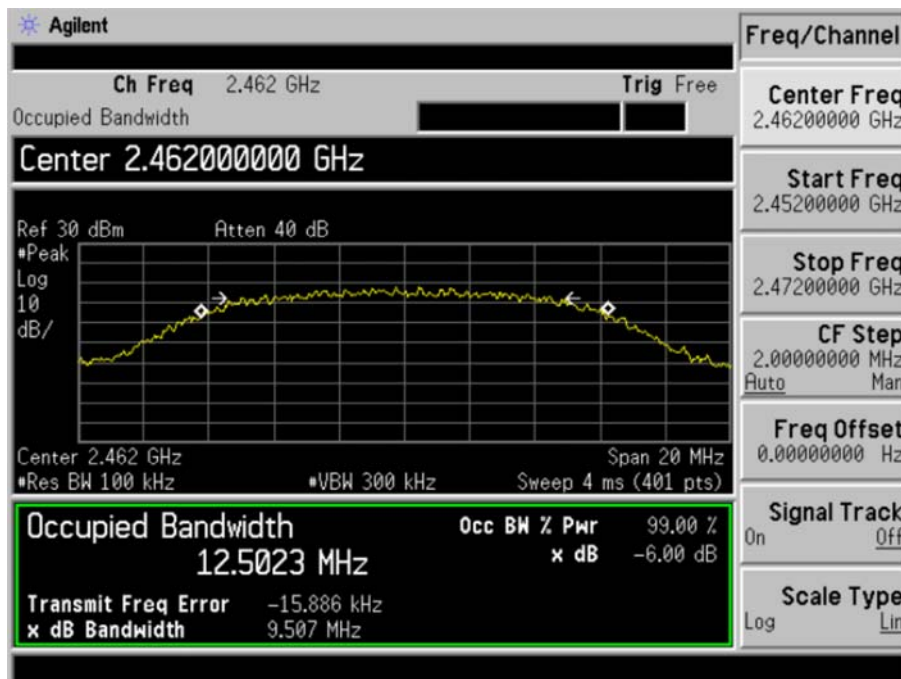
CH: 2412MHz



CH: 2437MHz

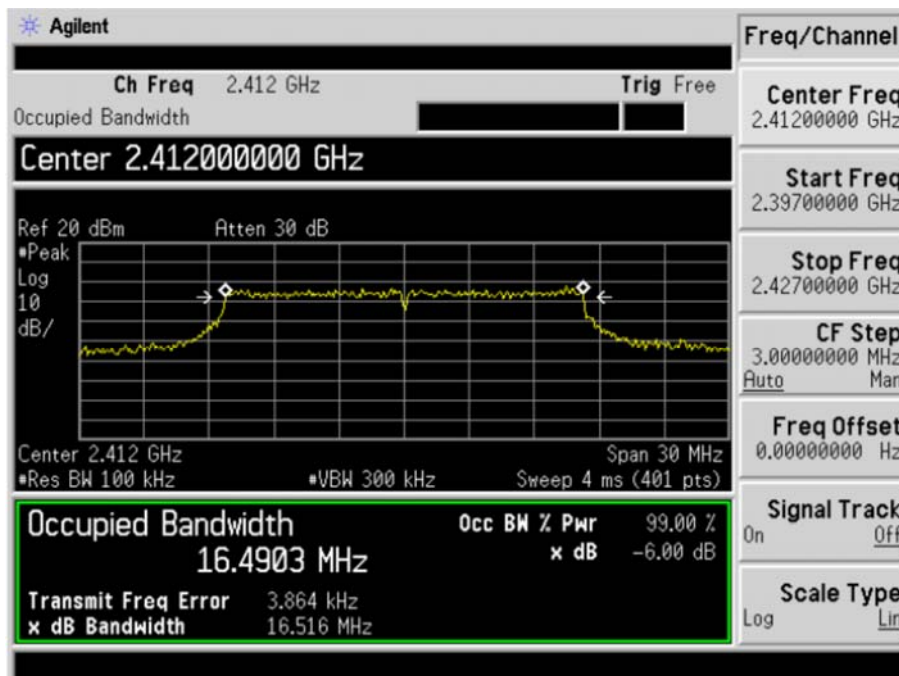


CH: 2462MHz

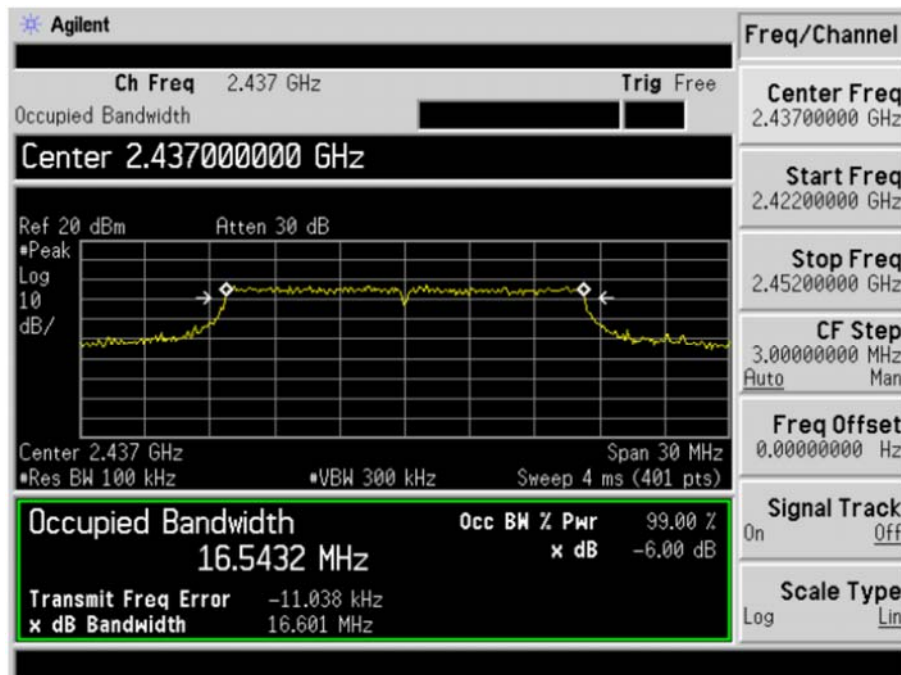


TX 802.11g Mode			
Frequency	6dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2412 MHz	16.516	$\geq 500\text{KHz}$	PASS
2437 MHz	16.601	$\geq 500\text{KHz}$	PASS
2462 MHz	16.536	$\geq 500\text{KHz}$	PASS

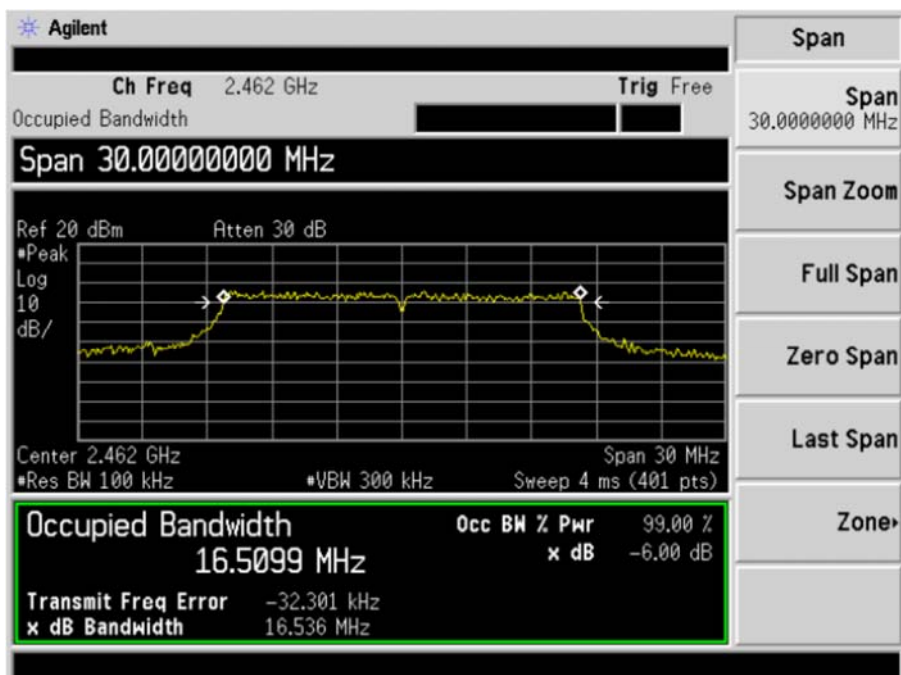
CH: 2412MHz



CH: 2437MHz

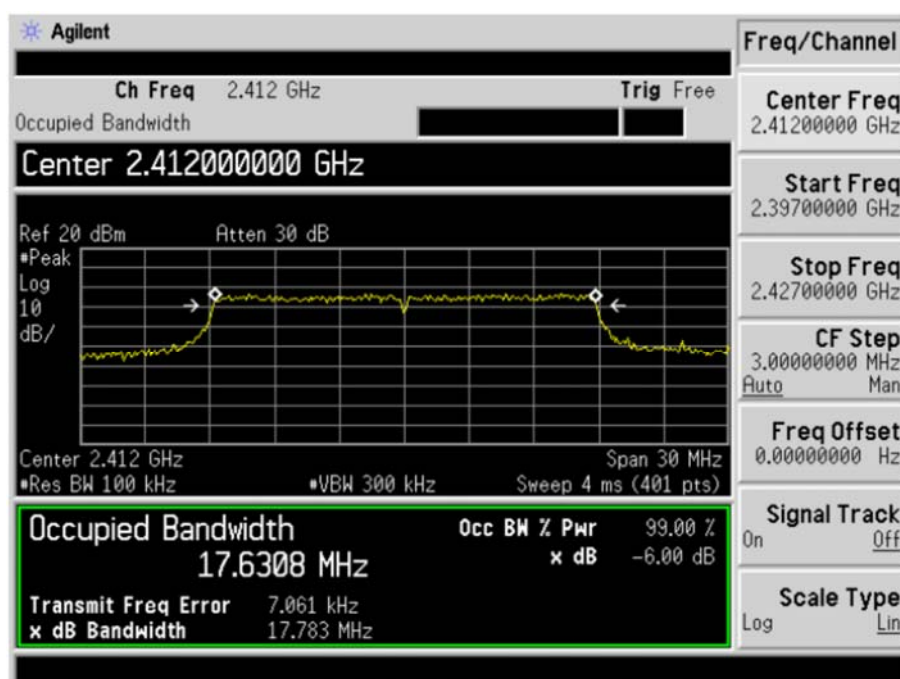


CH: 2462MHz

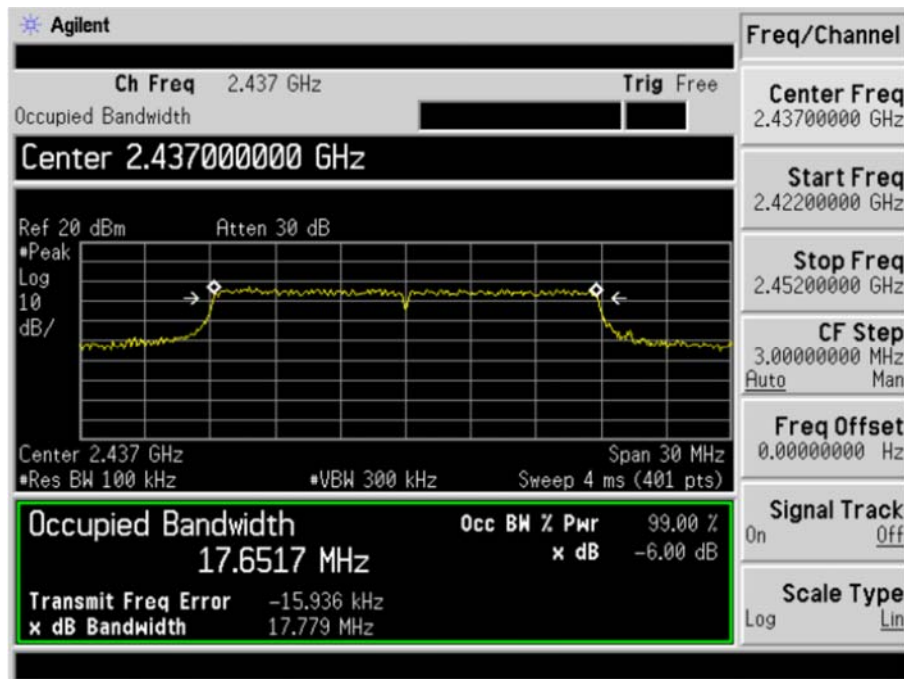


TX 802.11n/HT20 Mode			
Frequency	6dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2412 MHz	17.783	$\geq 500\text{KHz}$	PASS
2437 MHz	17.779	$\geq 500\text{KHz}$	PASS
2462 MHz	17.654	$\geq 500\text{KHz}$	PASS

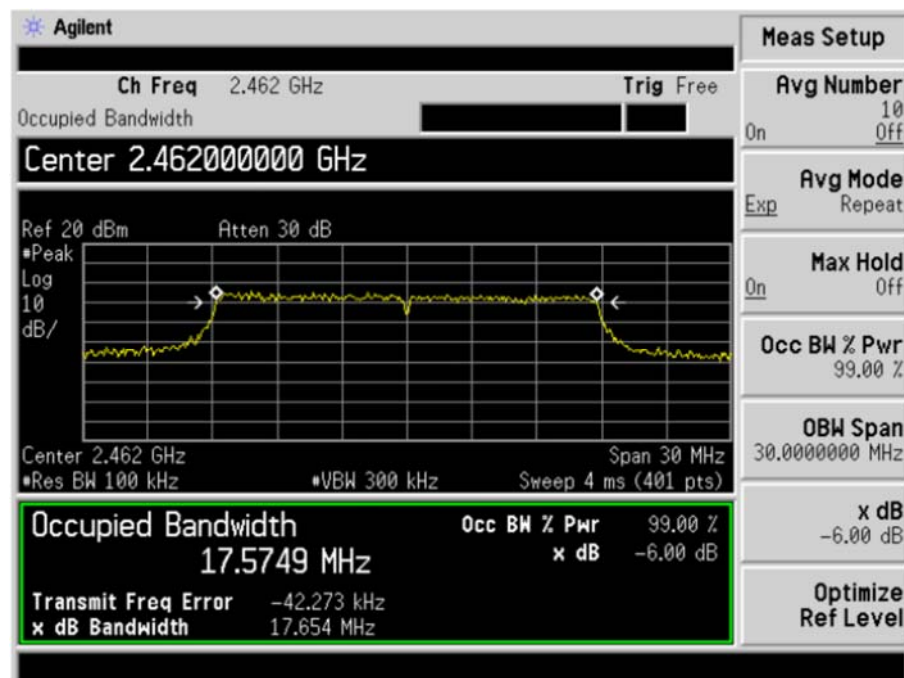
CH: 2412MHz



CH: 2437MHz



CH: 2462MHz



## 7 POWER SPECTRAL DENSITY TEST

### 7.1 Test Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

### 7.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on FCC Part15 C Section 15.247: RBW= 3KHz. VBW= 10 KHz, Span=3MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

### 7.3 Measurement Equipment Used

Same as Radiated Emission Measurement

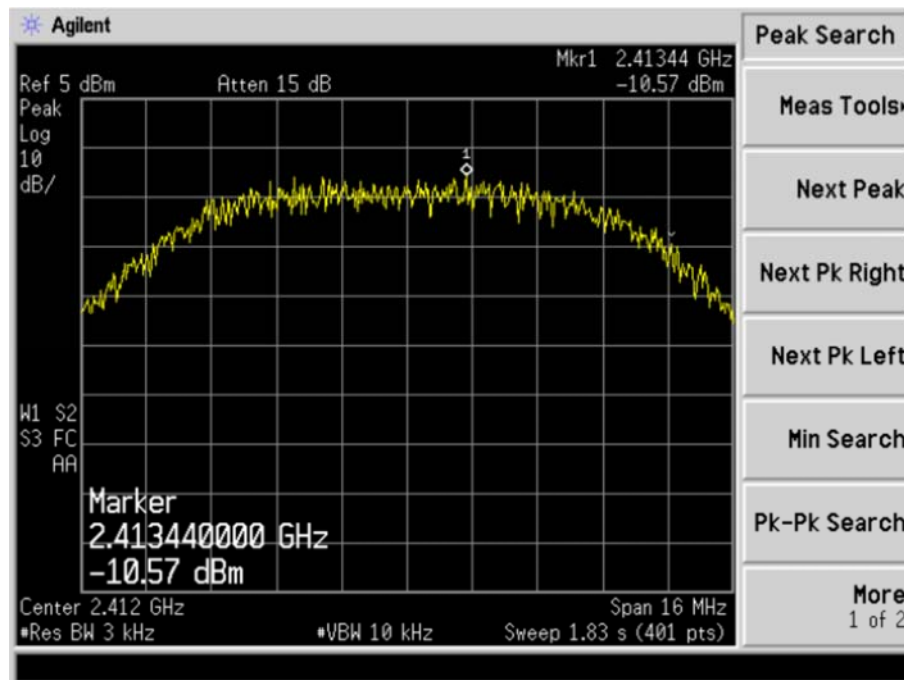
### 7.4 Test Result

**PASS**

All the test modes completed for test.

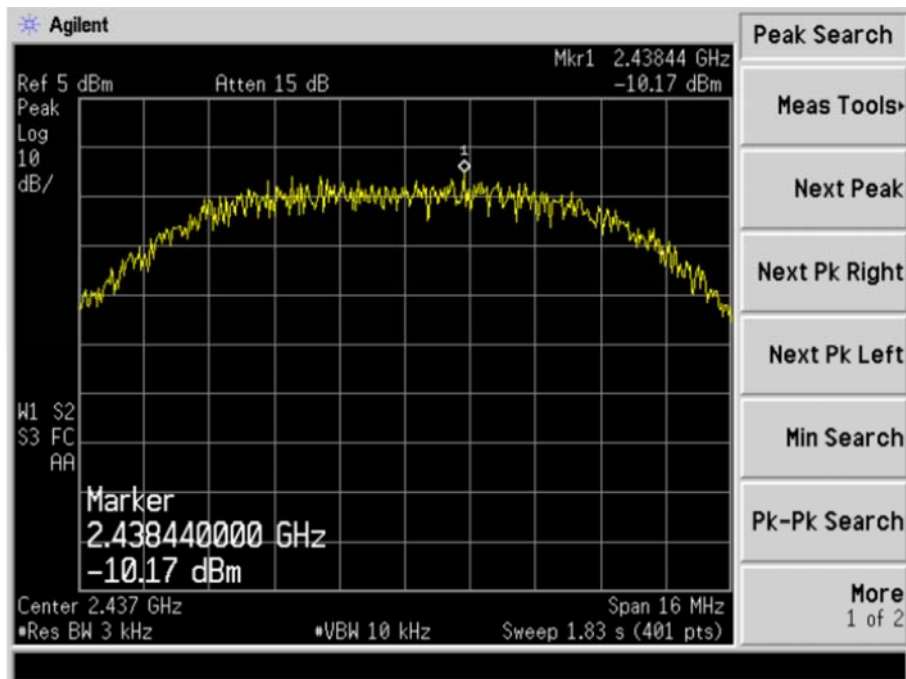
TX 802.11b Mode			
Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-10.57	8	PASS
2437 MHz	-10.17	8	PASS
2462 MHz	-11.06	8	PASS

CH: 2412MHz

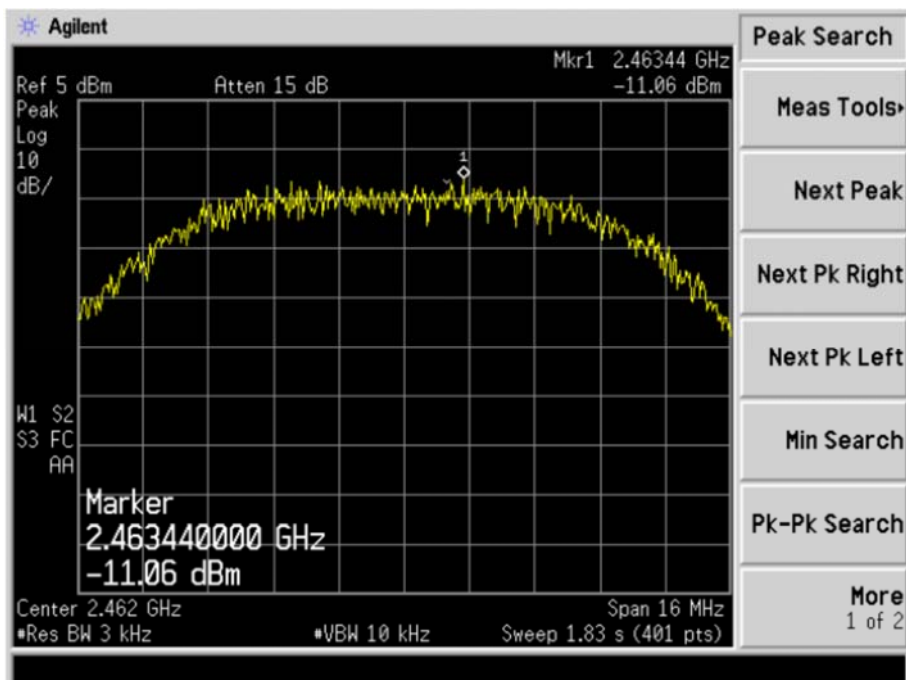




CH: 2437MHz

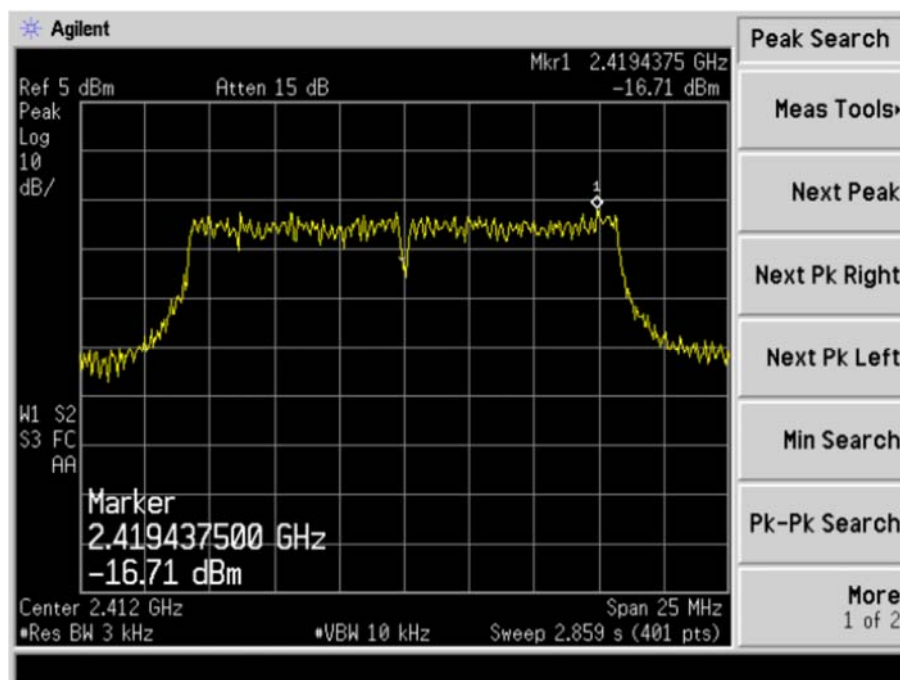


CH: 2462MHz

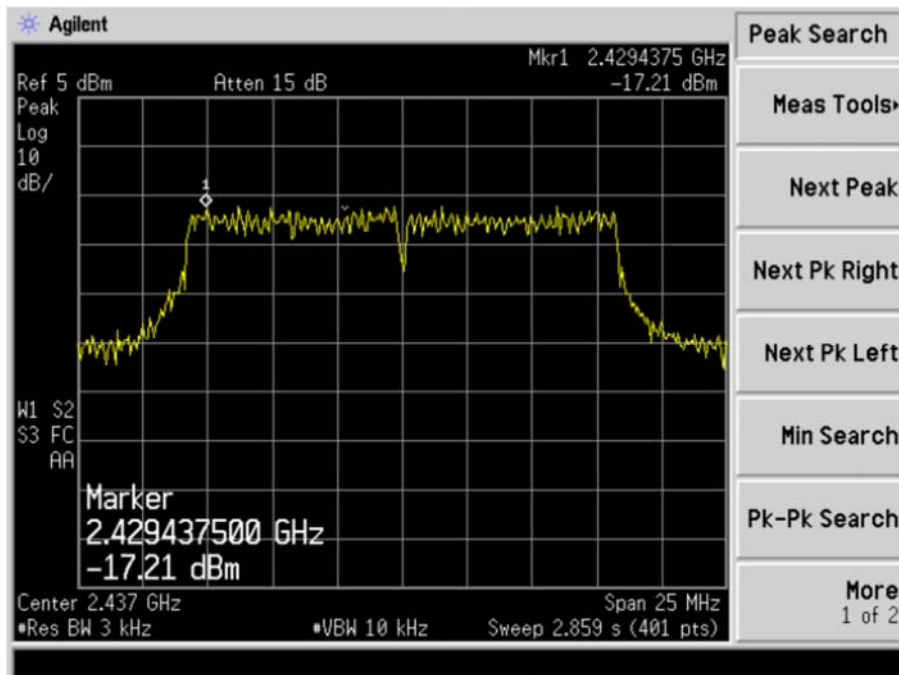


TX 802.11g Mode			
Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-16.71	8	PASS
2437 MHz	-17.21	8	PASS
2462 MHz	-17.81	8	PASS

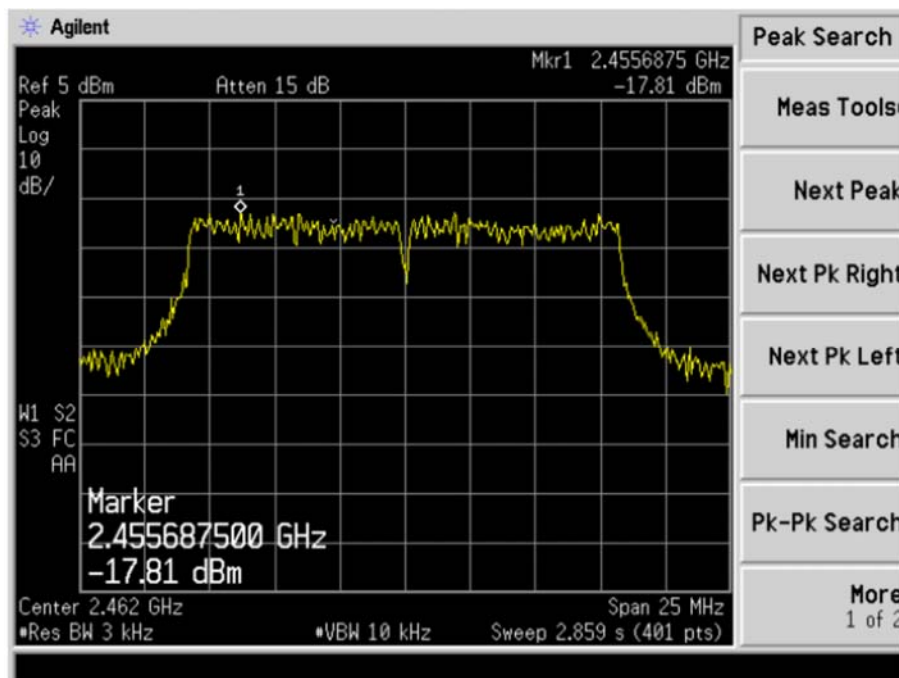
CH: 2412MHz



CH: 2437MHz

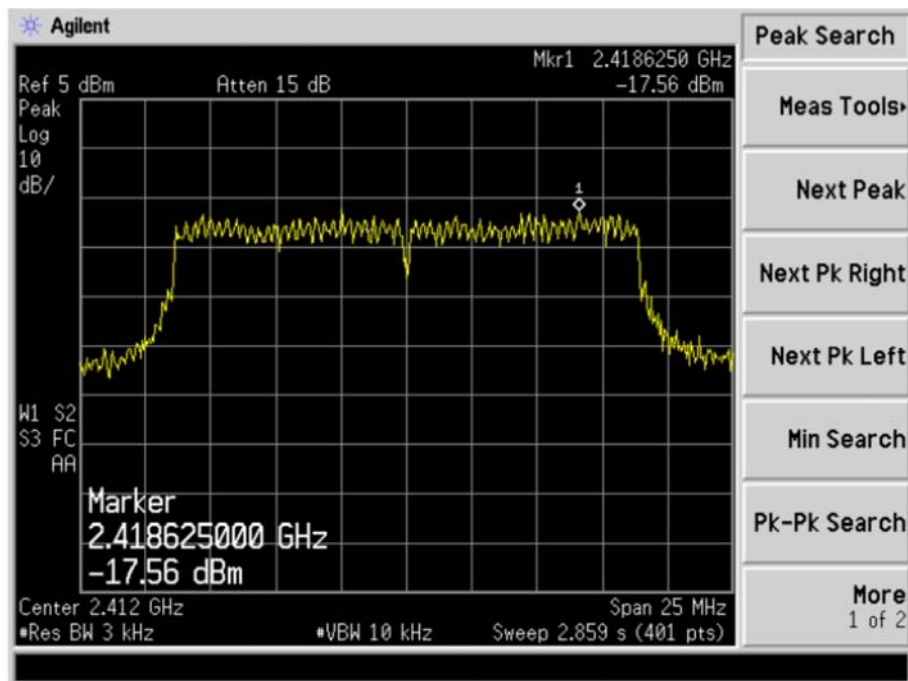


CH: 2462MHz

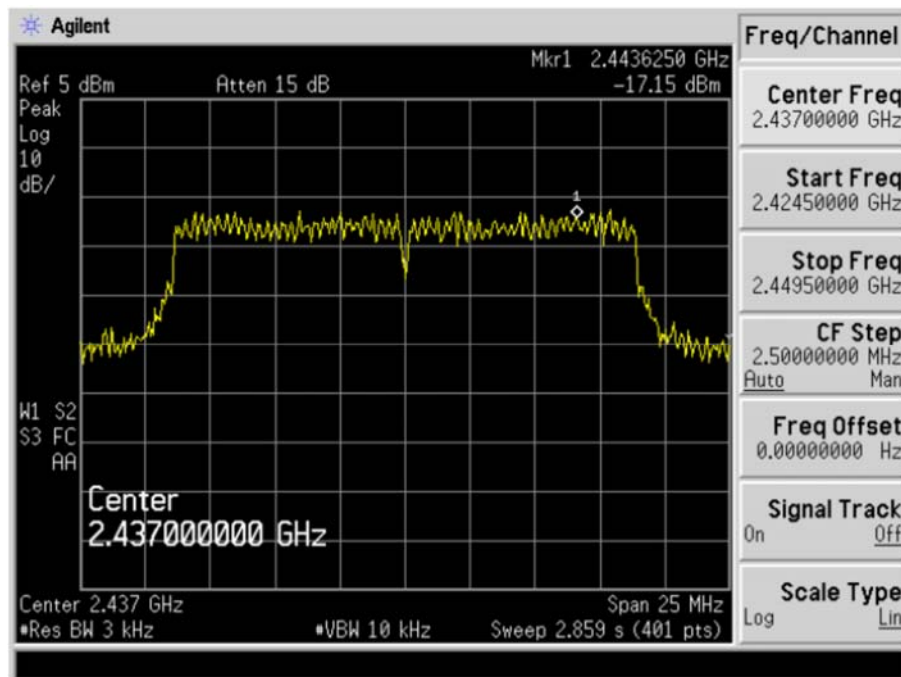


TX 802.11n/HT20 Mode			
Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-17.56	8	PASS
2437 MHz	-17.15	8	PASS
2462 MHz	-17.85	8	PASS

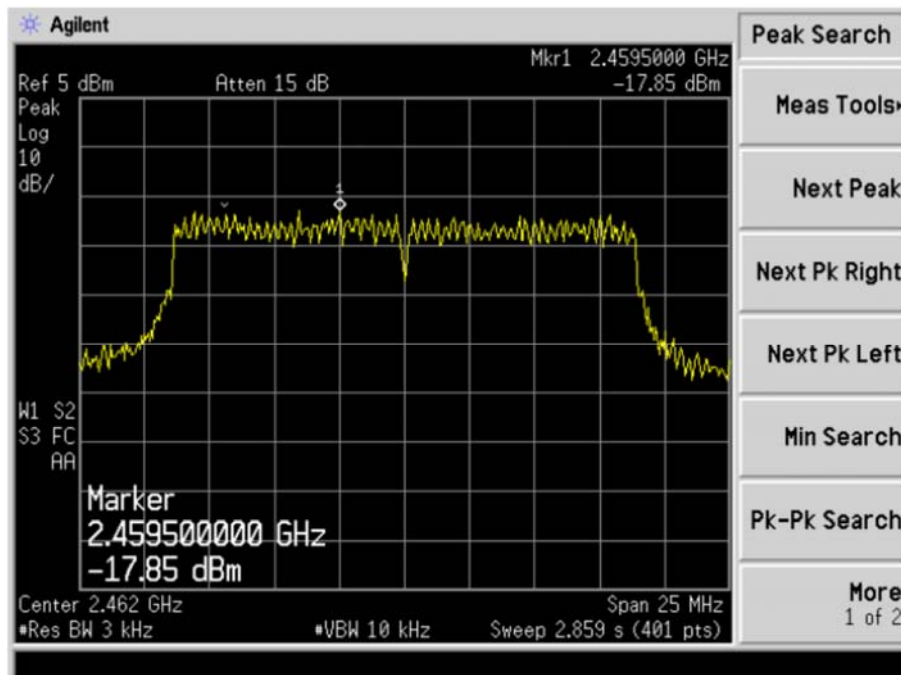
CH: 2412MHz



CH: 2437MHz



CH: 2462MHz



## 8 PEAK OUTPUT POWER TEST

### 8.1 Test Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

### 8.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The EUT was directly connected to the Power meter.

### 8.3 Measurement Equipment Used

Same as Radiated Emission Measurement

### 8.4 Test Result

**PASS**

All the test modes completed for test.

TX 802.11b Mode			
Test	Frequency	Maximum Peak Conducted Output Power	LIMIT
Channe	(MHz)	(dBm)	dBm
CH01	2412	8.87	30
CH06	2437	8.54	30
CH11	2462	8.31	30
TX 802.11g Mode			
CH01	2412	8.63	30
CH06	2437	8.25	30
CH11	2462	8.13	30
TX 802.11n20 Mode			
CH01	2412	8.34	30
CH06	2437	8.12	30
CH11	2462	8.01	30

## 9 CONDUCTED EMISSION TEST

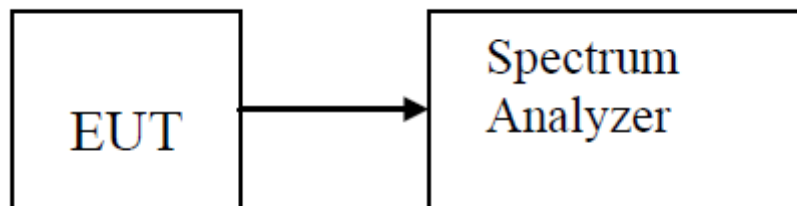
### 9.1 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

### 9.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as TX operation and connect directly to the spectrum analyzer.
3. Set spectrum analyzer RBW= 1MHz. VBW= 3MHz
4. Set detected by the spectrum analyser with peak detector.

### 9.3 Test Setup

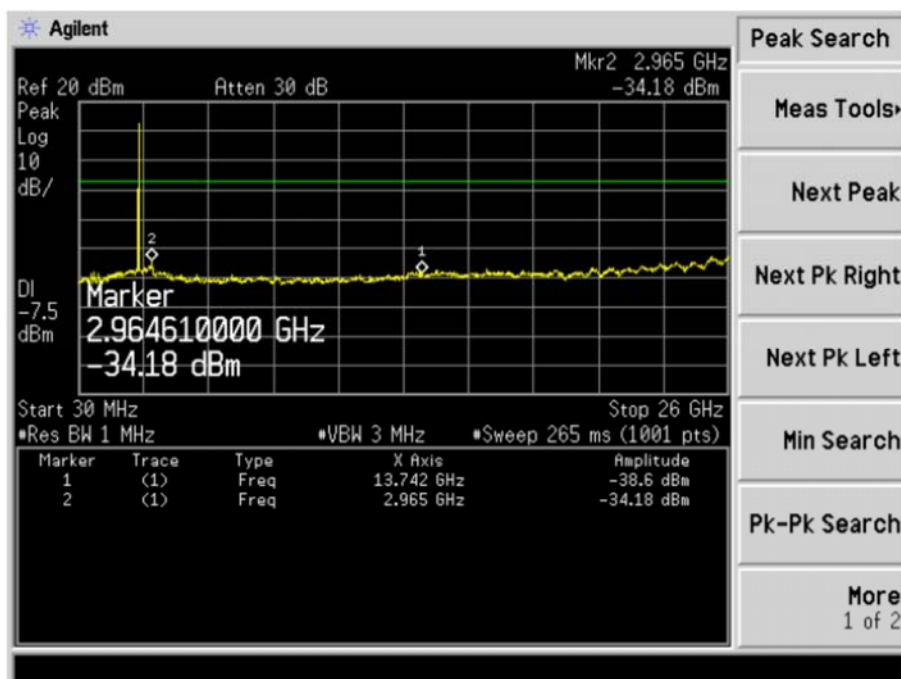
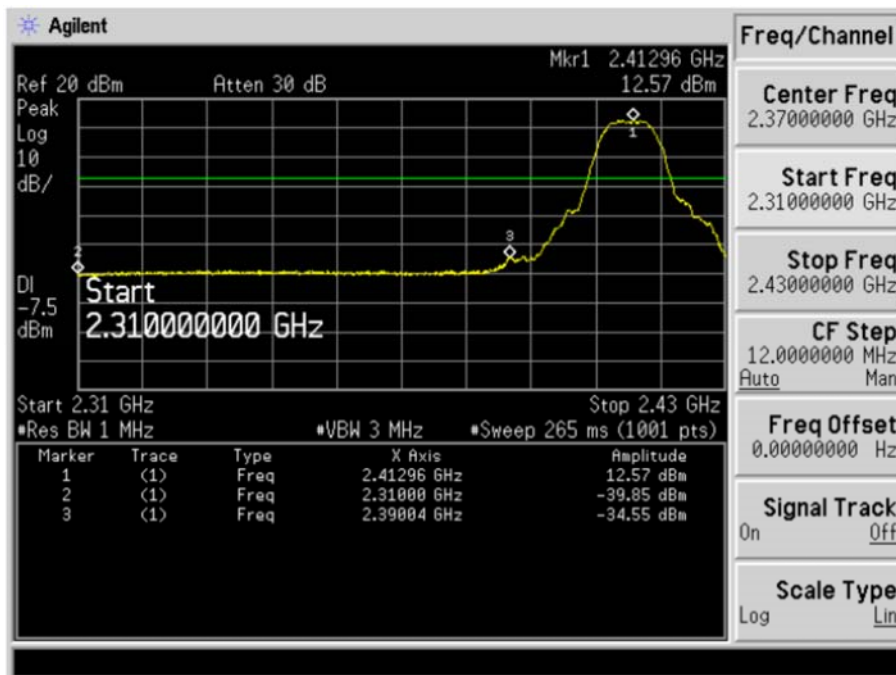


### 9.4 Test Result

#### **PASS**

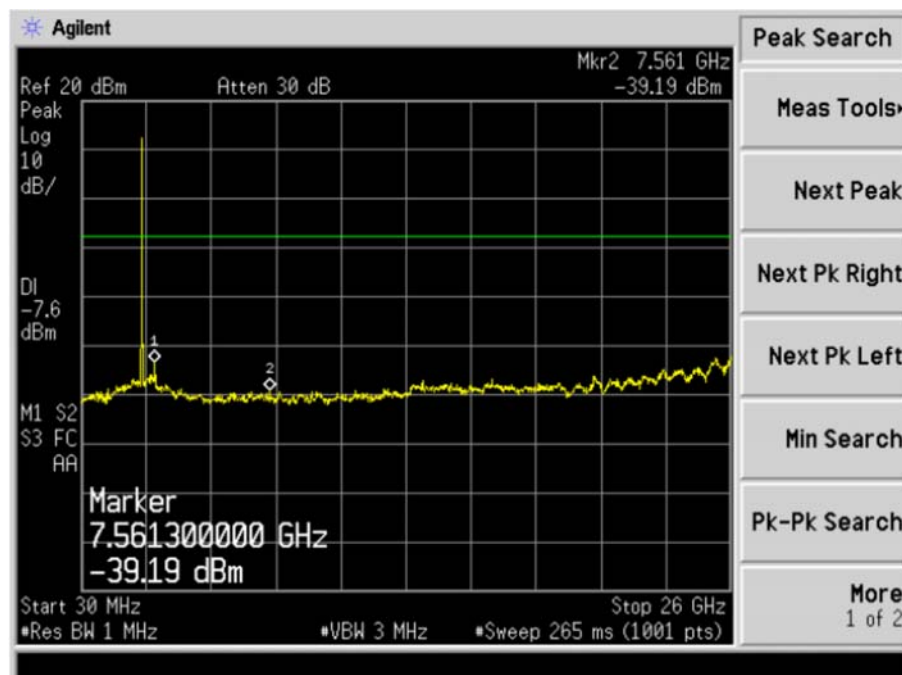
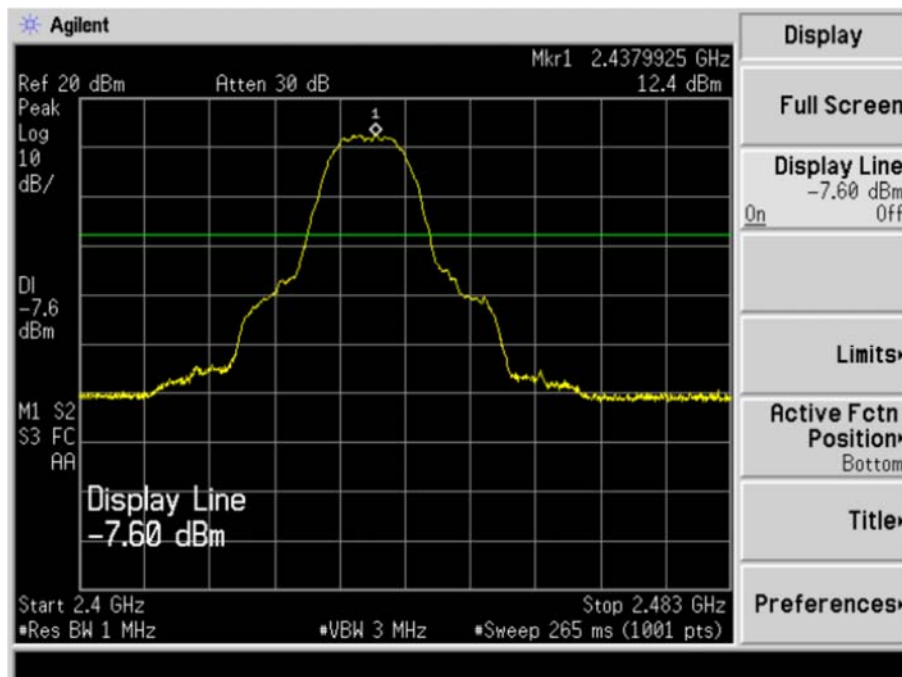
All the test modes completed for test.

TX 802.11b Mode CH01

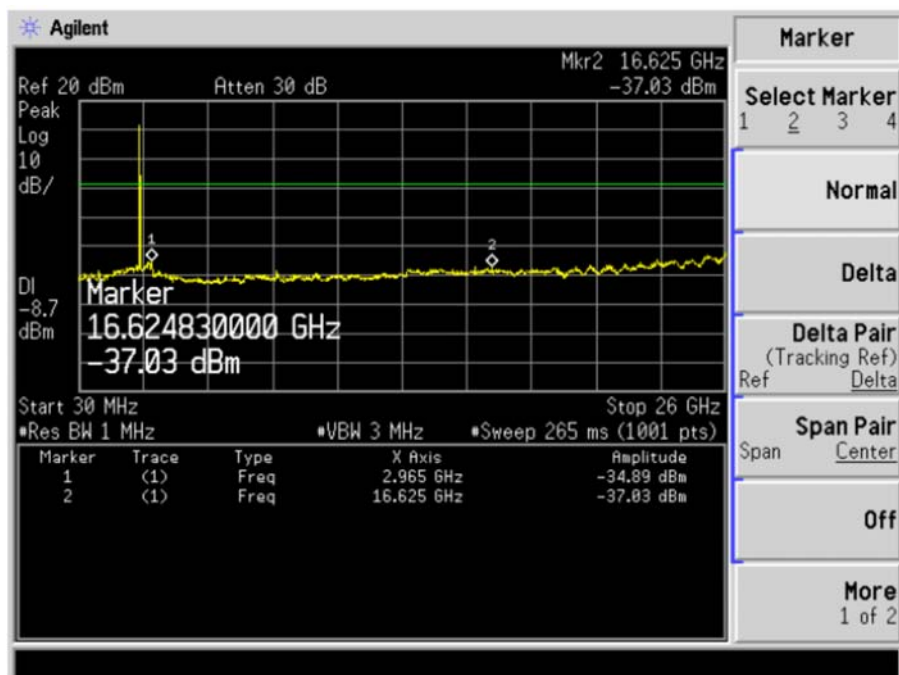
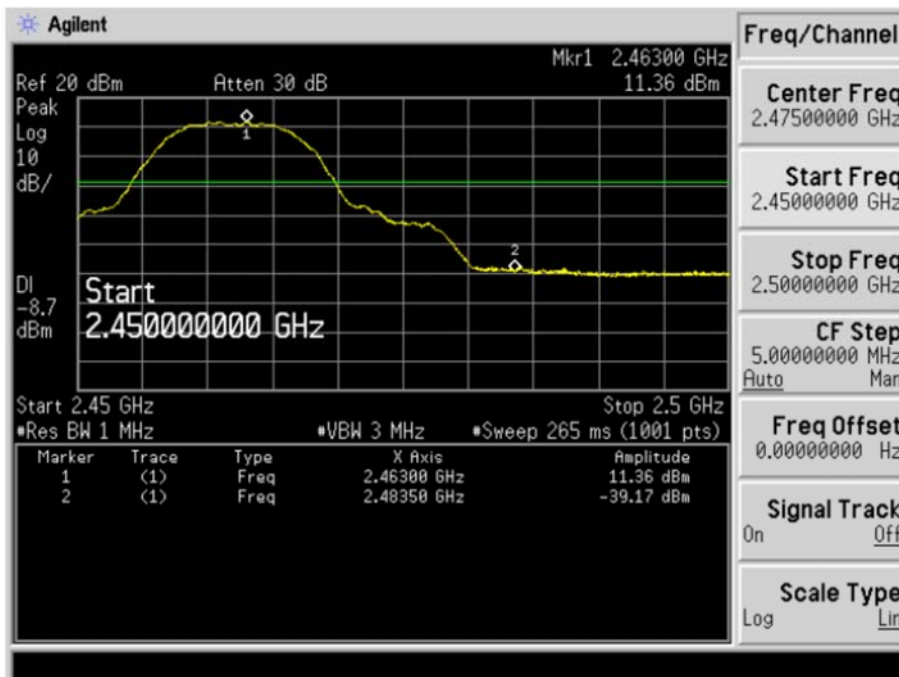




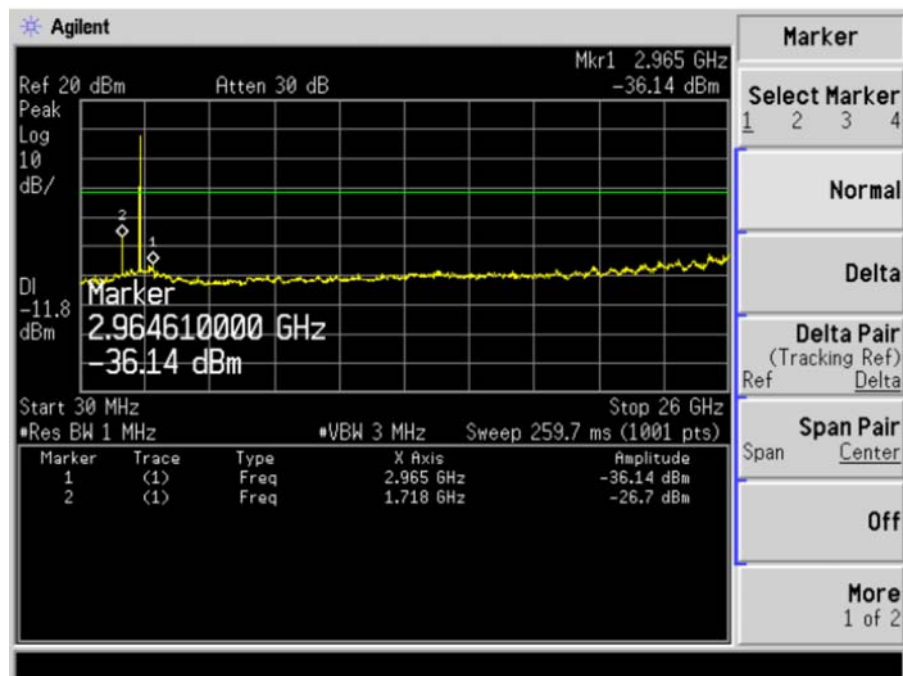
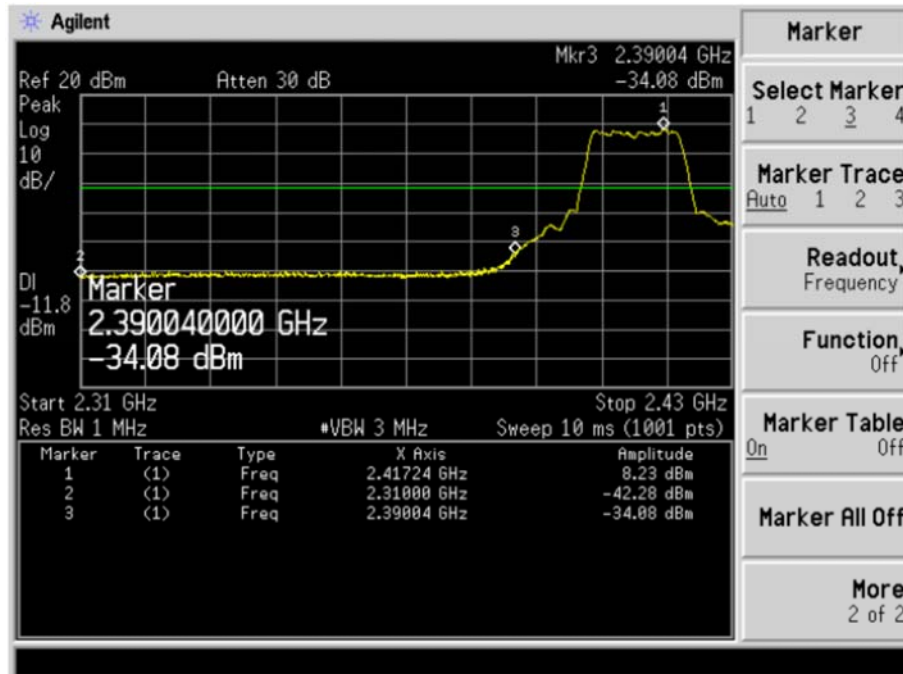
## TX 802.11b Mode CH06



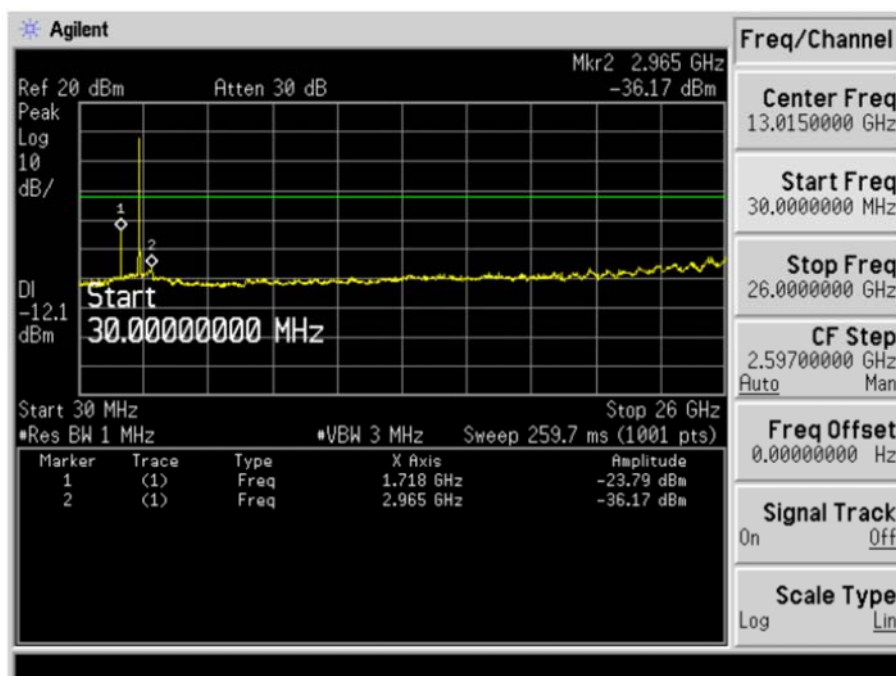
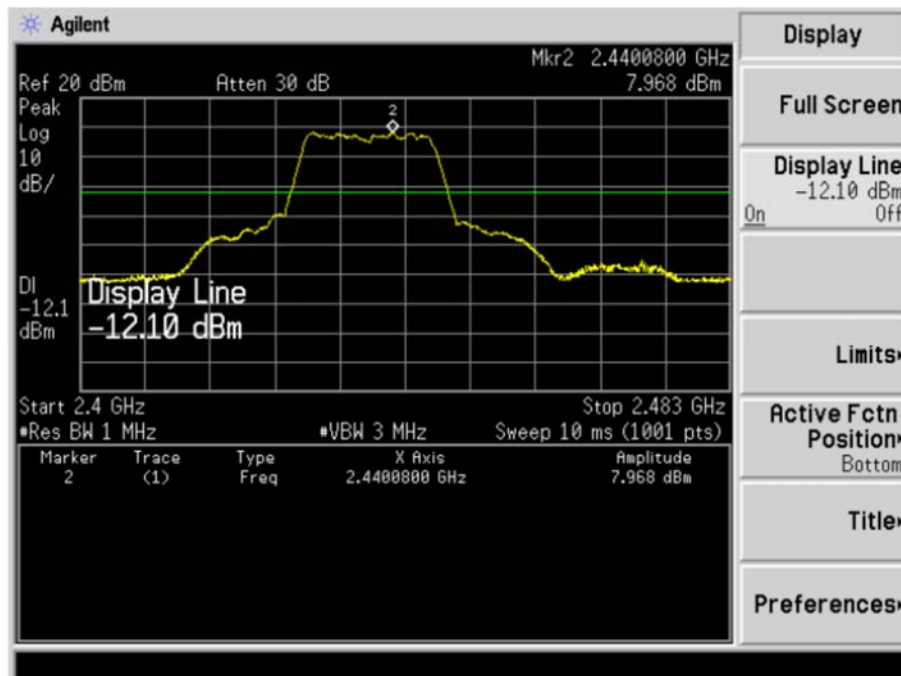
## TX 802.11b Mode CH11



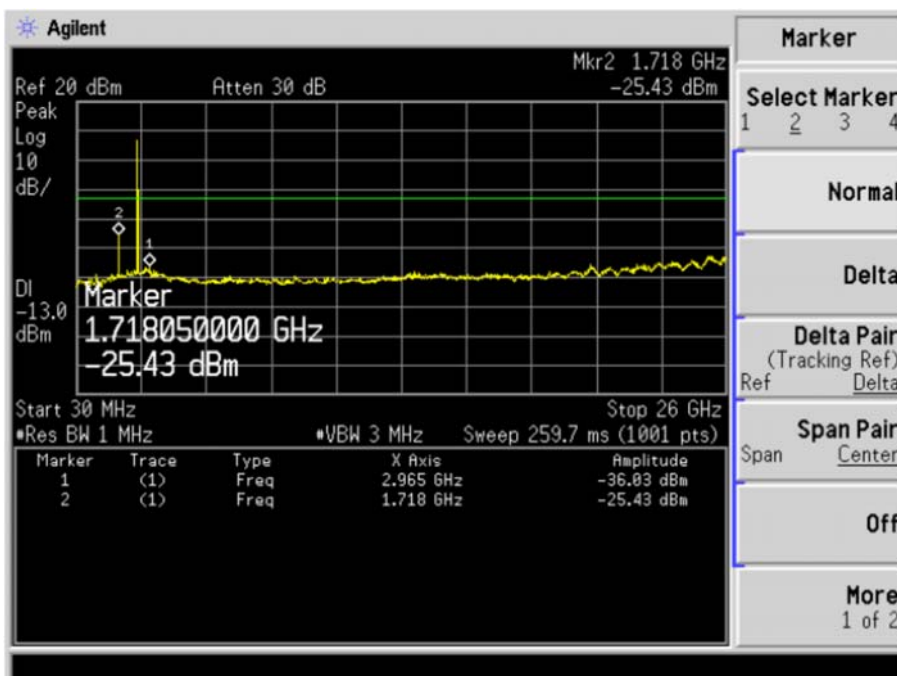
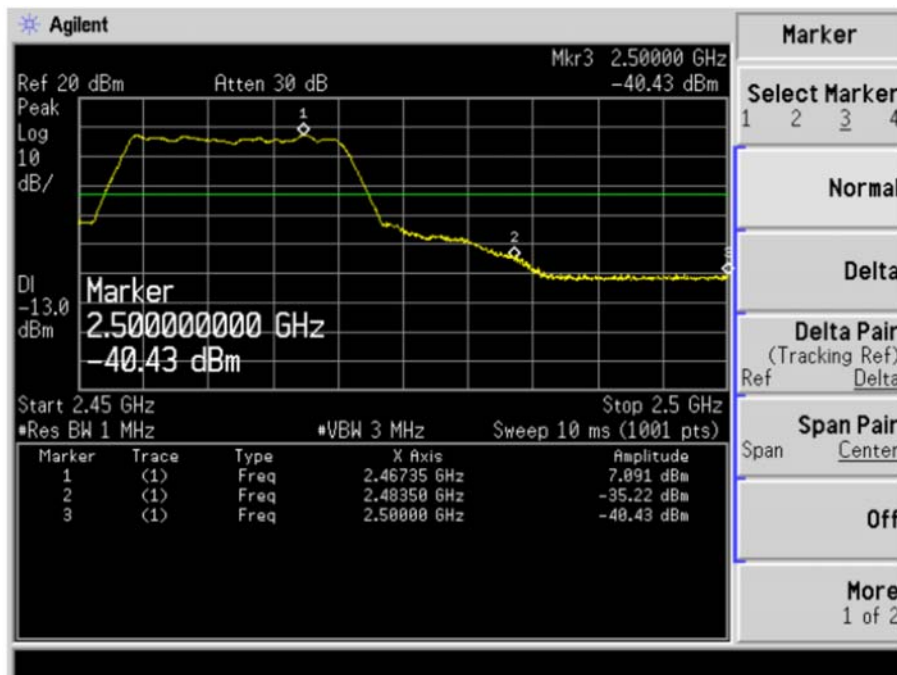
## TX 802.11g Mode CH01



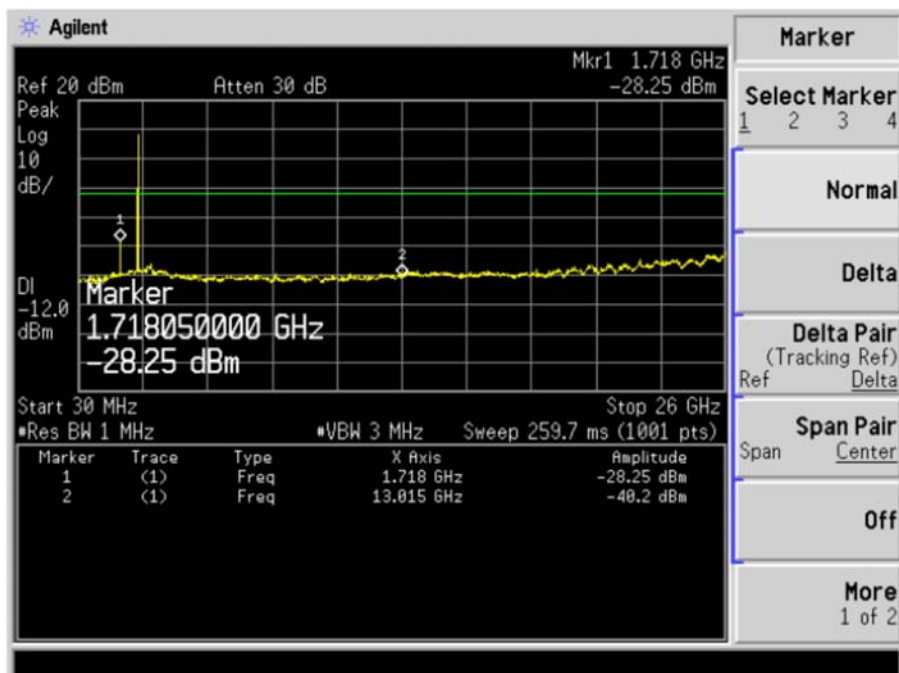
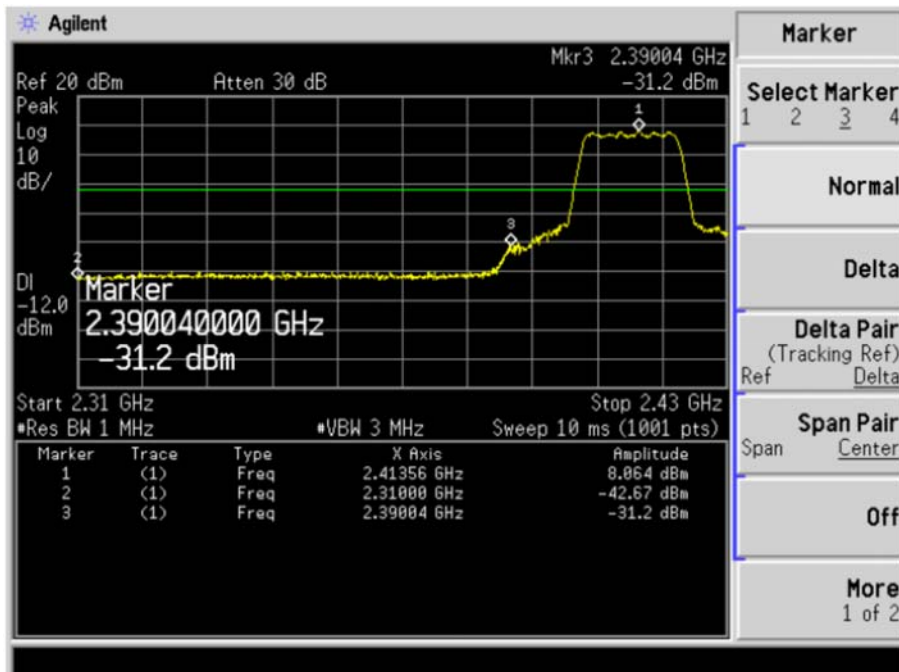
## TX 802.11g Mode CH06



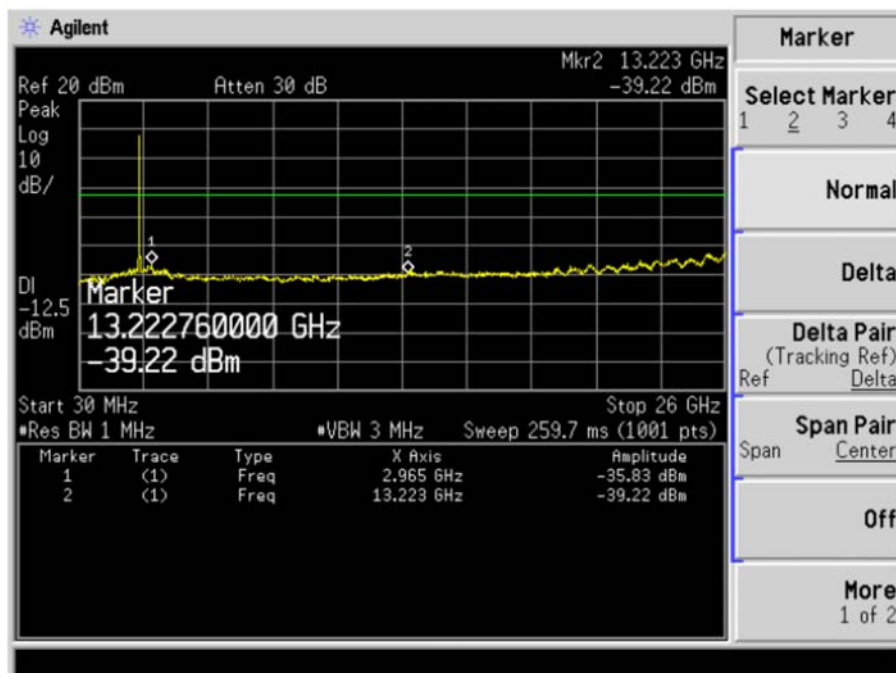
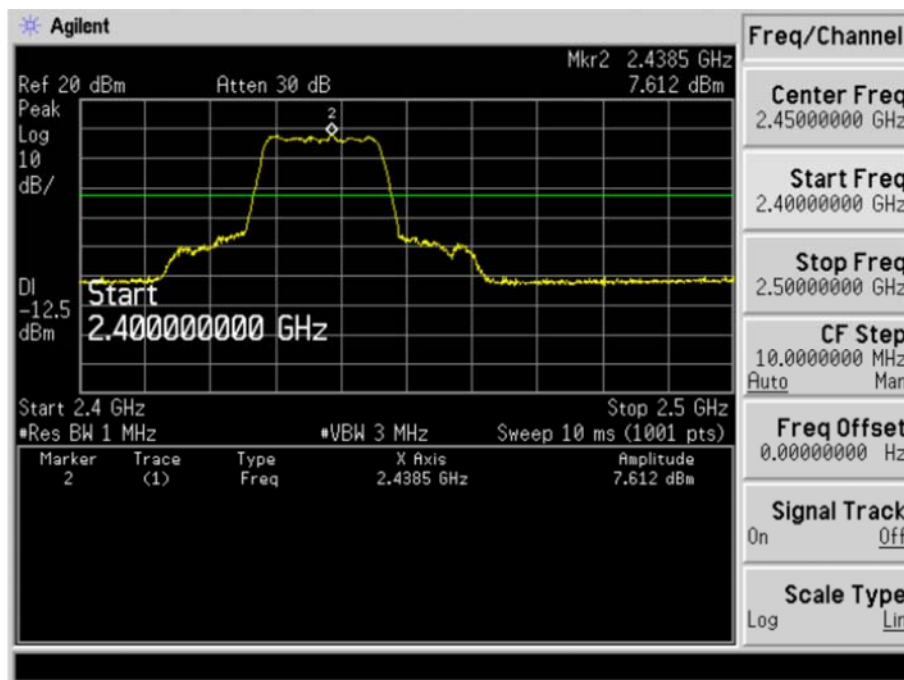
## TX 802.11g Mode CH11



## TX 802.11n(H20) Mode CH01

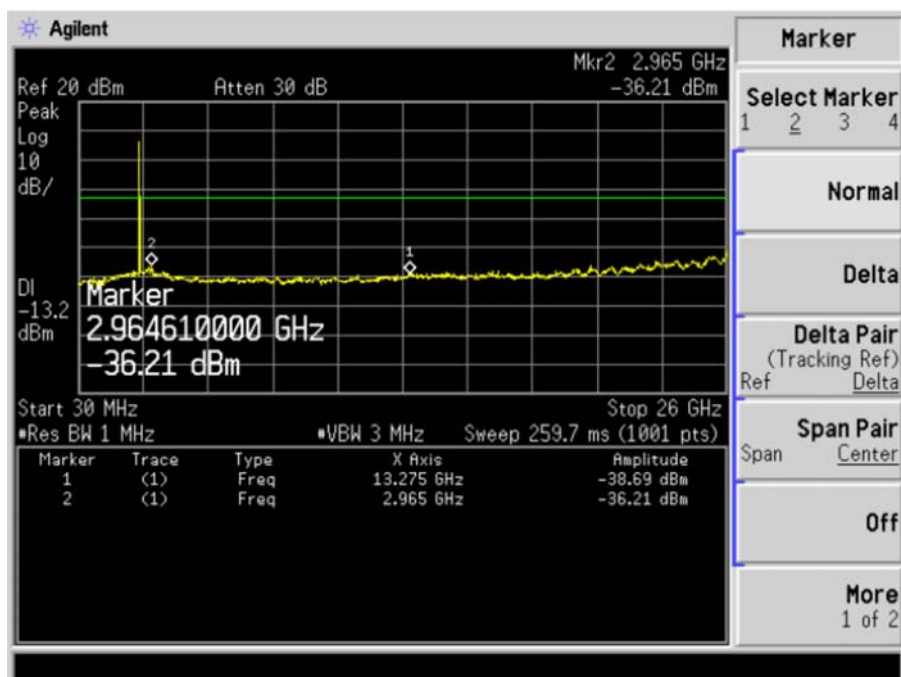
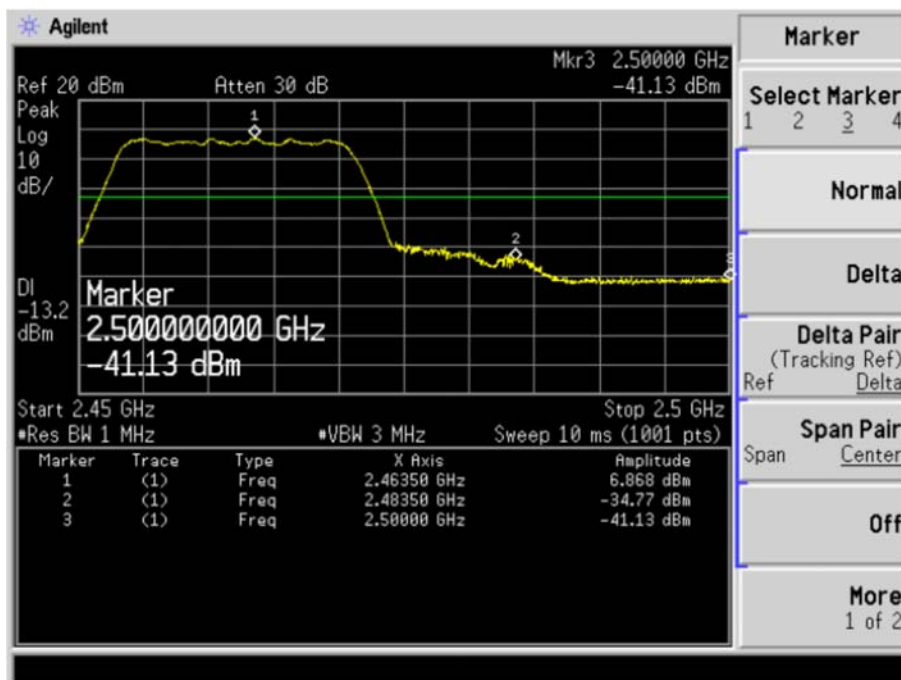


## TX 802.11n(H20) Mode CH06





## TX 802.11n(H20) Mode CH11





## 10 ANTENNA REQUIREMENT

### Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.249, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

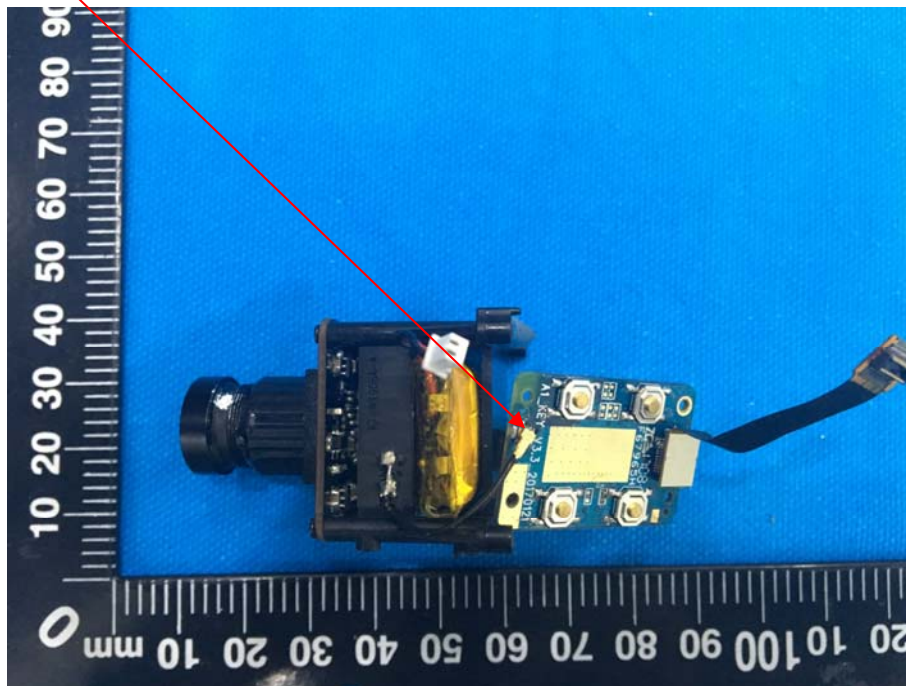
### Refer to statement below for compliance.

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

### Antenna Connected Construction

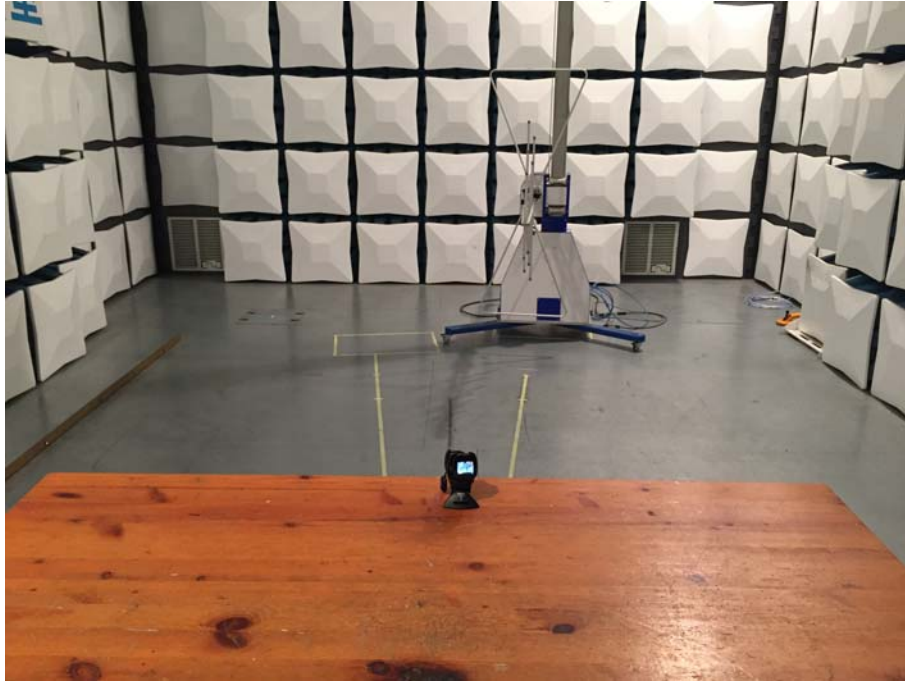
The antenna used in this product is a Integral Antenna, The directional gains of antenna used for transmitting is 2dBi.

### ANTENNA



## 11 PHOTOGRAPH OF TEST

### 11.1 Radiated Emission



## 11.2 Conducted Emission

