



# FCC Part 15C Test Report

## FCC ID: 2ABN7SWWHD

Product Name:	WiFi IP Camera
Trademark:	N/A
Model Name :	SWWHD-PTCAM
Prepared For :	<b>SHENZHEN BAICHUAN SECURITY TECHNOLOGY CO., LTD</b>
Address :	5th Floor, Building 7, Tangtou 3rd Industrial Area Shiyan Town, Baoan District, Shenzhen City,China
Prepared By :	<b>Shenzhen BCTC Technology Co., Ltd.</b>
Address :	No.101,Yousong Road,Longhua New District, Shenzhen,China
Test Date:	Jun. 20 - Jun. 30, 2017
Date of Report :	Jun. 30, 2017
Report No.:	BCTC-LH170602524E



## VERIFICATION OF COMPLIANCE

**Applicant's name** .....: SHENZHEN BAICHUAN SECURITY TECHNOLOGY CO., LTD

**Address**.....: 5th Floor, Building 7, Tangtou 3rd Industrial Area Shiyan Town,  
Baoan District, Shenzhen City, China

**Manufacture's Name** .....: SHENZHEN BAICHUAN SECURITY TECHNOLOGY CO.,LTD

**Address**.....: 5th Floor, Building 7, Tangtou 3rd Industrial Area, Shiyan Town,  
Bao'an District, Shenzhen City, China

### Product description

**Product Name:** WiFi IP Camera

**Trademark:** N/A

**Model Name :** SWWHD-PTCAM

**Standards:** FCC Part15.247  
ANSI C63.10-2013  
KDB 558074 D01 DTS Meas Guidance v04

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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**Test Result** ..... : **Pass**

**Prepared by(Engineer):** Snow Zeng

**Reviewer(Supervisor):** Jade Yang

**Approved(Manager):** Carson Zhang



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## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report



## 1.1 TEST FACILITY

Shenzhen BCTC Technology Co., Ltd.

Add. : No.101,Yousong Road,Longhua New District, Shenzhen,China

FCC Registered No.: 187086

IC Registered No.: 12655A

## 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately **95 %**.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	WiFi IP Camera	
Trade Name	N/A	
Model Name	SWWHD-PTCAM	
Model Difference	N/A	
Product Description	The EUT is a WiFi IP Camera	
	Operation Frequency:	802.11b/g/n20MHz:2412~2462MHz 802.11n40MHz: 2422~2452MHz
	Modulation Type:	WIFI: OFDM/DSSS
	Bit Rate of Transmitter	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n Up to 150Mbps
	Number Of Channel	802.11b/g/n20MHz:11 CH 802.11n40MHz:7 CH
	Antenna Designation:	Please see Note 3.
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	
Channel List	Please refer to the Note 2.	
Power Source	DC 5V from USB	
Adapter	---	
hardware version	---	
Software version	---	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

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

Channel List for 802.11n(40)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
03	2422	05	2432	07	2442	09	2452
04	2427	06	2437	08	2447		



## 3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Gain (dBi)	NOTE
1	N/A	N/A	external antenna	2.5dBi	
2	N/A	N/A	external antenna	2.5dBi	

The MIMO mode only support 802.11n mode, the Directional Gain=2.5dBi+10log(2)=5.51dBi

## 2.2 DESCRIPTION OF TEST MODES

Pretest Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n20 CH1/ CH6/ CH11
Mode 4	802.11n40 CH3/ CH6/ CH09
Mode 5	Link Mode

Conducted Emission	
Final Test Mode	Description
Mode 5	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n20 CH1/ CH6/ CH11
Mode 4	802.11n40 CH3/ CH6/ CH09

Note:

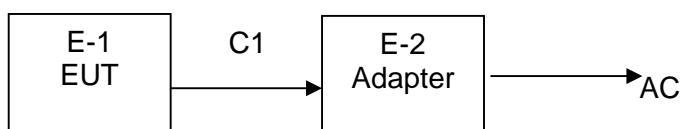
- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported
- (3) According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup” 11Mbps for 802.11b, 6Mbps for 802.11g, 13Mbps for 802.11n(H20), 54Mbps for 802.11n(H40).





## 2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted & Radiated Emission Test



## 2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	WiFi IP Camera	N/A	WiFi IP Camera	N/A	EUT
E-2	Adapter (provide by test lab)	N/A	FJ-SW1260502000 UU	N/A	I/P:AC 100-240V 50/60Hz O/P: DC 5V 2A

Item	Shielded Type	Ferrite Core	Length	Note
C1	NO	NO	0.8m	USB cable

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



### 3 EQUIPMENTS LIST FOR ALL TEST ITEMS

#### Radiation test, Band-edge test and bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45108040	2016.08.27	2017.08.26
2	Test Receiver (9kHz-7GHz)	R&S	ESPI	101318	2016.08.27	2017.08.26
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB 9168	VULB91 68-438	2016.08.27	2017.08.26
4	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1201	2016.09.03	2017.09.03
5	Horn Antenna (14GHz-40GHz)	SCHWARZBECK	BBHA 9170	9170-181	2016.09.03	2017.09.03
6	Amplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	9744-0037	2016.08.27	2017.08.26
7	Amplifier (1GHz-18GHz)	SCHWARZBECK	BBV9718	9718-309	2016.08.27	2017.08.26
8	Amplifier (18GHz-40GHz)	SCHWARZBECK	BBV 9721	9721-205	2016.08.27	2017.08.26
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	00014	2016.09.03	2017.09.03
10	RF cables1 (9kHz-1GHz)	R&S	R203	R20X	2016.08.27	2017.08.26
11	RF cables2 (1GHz-40GHz)	R&S	R204	R21X	2016.08.27	2017.08.26
12	Antenna connector	Florida RF Labs	N/A	RF 01#	2016.08.27	2017.08.26
13	Power Metter	ANRITSU	ML2487A	6K00001568	2016.08.27	2017.08.26
14	Power Sensor	ANRITSU	ML2491A	030989	2016.08.27	2017.08.26
15	Signal Analyzer 9kHz-26.5GHz	Agilent	N9010A	MY48030494	2016.08.27	2017.08.26
16	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	2016.08.27	2017.08.26
17	D.C. Power Supply	LongWei	PS-305D	010964729	2016.08.27	2017.08.26

#### Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESCI	1166.5950K03-1 01165-ha	2016.08.27	2017.08.26
2	LISN	SCHWARZBECK	NSLK8127	8127739	2016.08.27	2017.08.26
3	LISN	R&S	NSLK8126	8126487	2016.08.27	2017.08.26
4	RF cables	R&S	R204	R20X	2016.08.27	2017.08.26
5	Attenuator	R&S	ESH3-Z2	143206	2016.08.27	2017.08.26



## 4. EMC EMISSION TEST

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 POWER LINE CONDUCTED EMISSION LIMITS (FREQUENCY RANGE 150KHZ-30MHZ)

FREQUENCY (MHz)	Limit(dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

#### 4.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.1.3 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.4 TEST SETUP



**Note: 1. Support units were connected to second LISN.**

**2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes**

#### 4.1.5 EUT OPERATING CONDITIONS

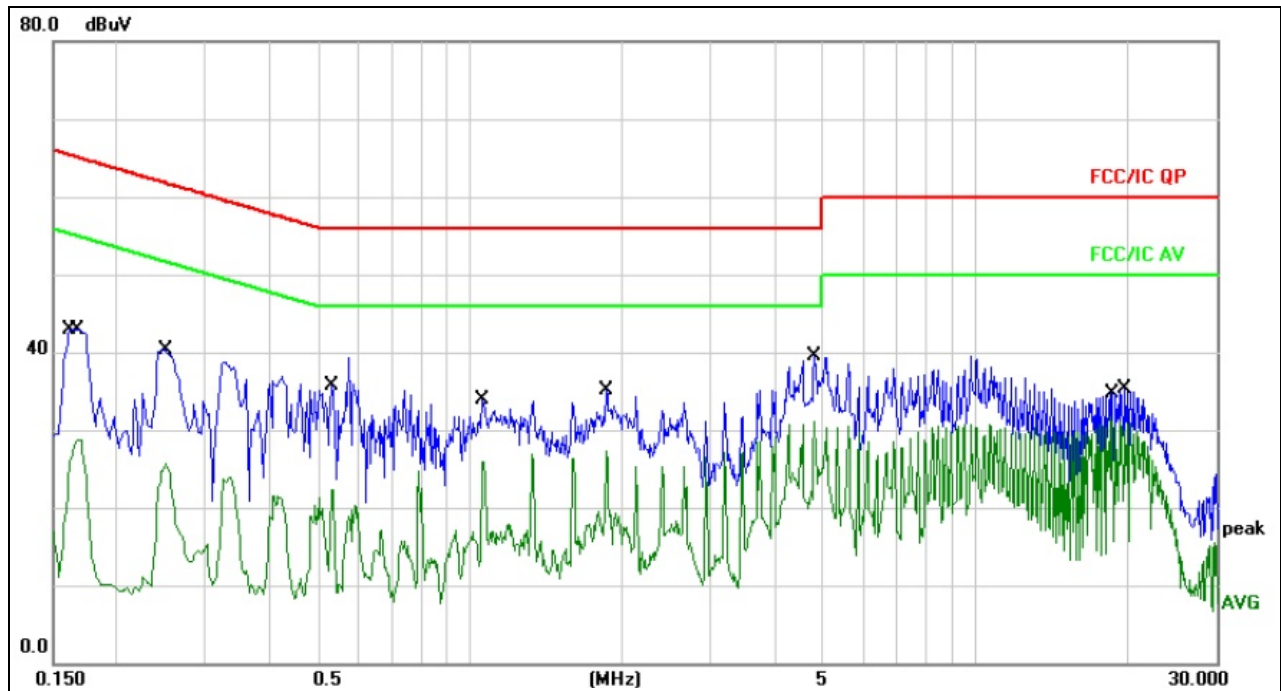
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in the report.

#### 4.1.6 TEST RESULTS



Temperature :	25 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 5



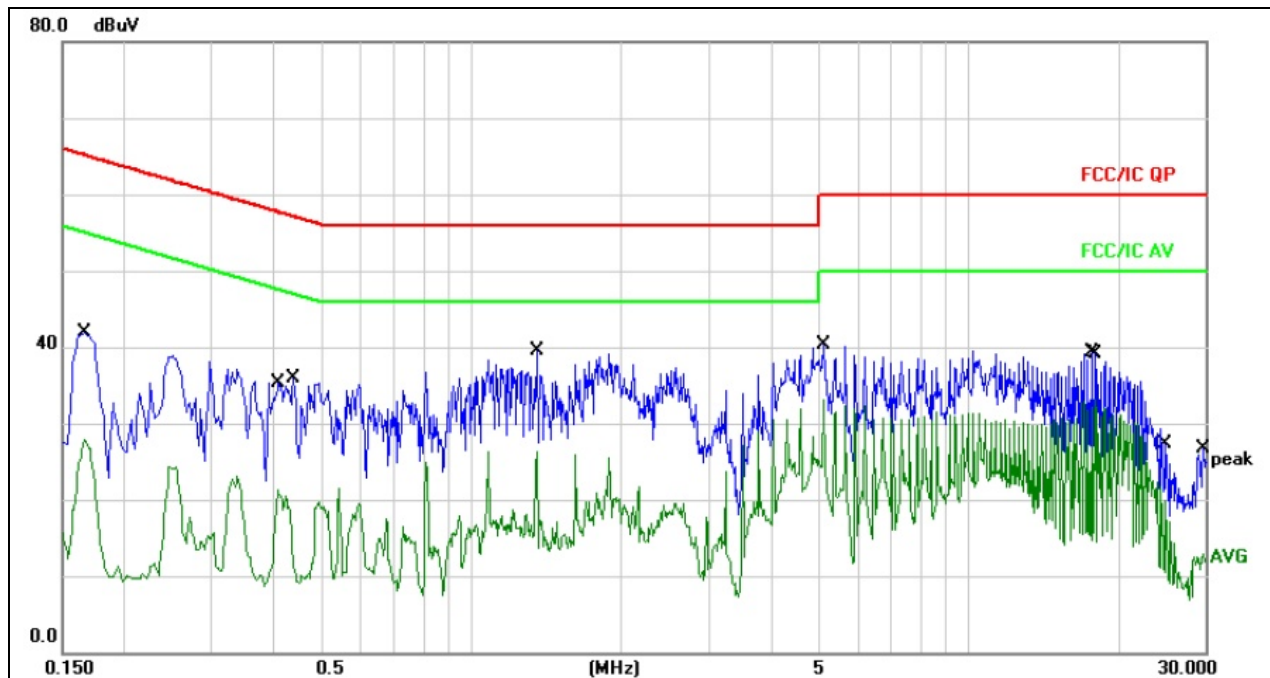
Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1621	32.92	10.05	42.97	65.35	-22.38	QP	
2		0.1701	18.74	10.06	28.80	54.95	-26.15	AVG	
3		0.2501	30.31	10.08	40.39	61.75	-21.36	QP	
4		0.5341	12.20	10.12	22.32	46.00	-23.68	AVG	
5		1.0580	23.76	10.17	33.93	56.00	-22.07	QP	
6		1.0580	15.74	10.17	25.91	46.00	-20.09	AVG	
7		1.8661	24.85	10.18	35.03	56.00	-20.97	QP	
8		1.8661	17.17	10.18	27.35	46.00	-18.65	AVG	
9		4.8181	29.26	10.15	39.41	56.00	-16.59	QP	
10	*	4.8181	21.02	10.15	31.17	46.00	-14.83	AVG	
11		18.4301	21.53	10.16	31.69	50.00	-18.31	AVG	
12		19.7701	25.14	10.17	35.31	60.00	-24.69	QP	



Temperature :	25 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 5



Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1661	31.77	10.06	41.83	65.15	-23.32	QP	
2		0.1661	17.91	10.06	27.97	55.15	-27.18	AVG	
3		0.4061	11.14	10.11	21.25	47.73	-26.48	AVG	
4		0.4381	25.76	10.11	35.87	57.10	-21.23	QP	
5	*	1.3541	29.27	10.17	39.44	56.00	-16.56	QP	
6		1.3541	16.19	10.17	26.36	46.00	-19.64	AVG	
7		5.1181	30.10	10.14	40.24	60.00	-19.76	QP	
8		5.1181	23.00	10.14	33.14	50.00	-16.86	AVG	
9		17.6861	29.22	10.16	39.38	60.00	-20.62	QP	
10		17.9581	22.91	10.16	33.07	50.00	-16.93	AVG	
11		25.1061	7.06	10.20	17.26	50.00	-32.74	AVG	
12		29.7461	16.49	10.22	26.71	60.00	-33.29	QP	



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 RADIATED EMISSION LIMITS (FREQUENCY RANGE 9KHZ-1000MHZ)

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

### 4.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:



- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. 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 antenna height 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter( Above 18GHz the distance is 1 meter and table is 1.5 meter).
- h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

Both horizontal and vertical antenna polarities were tested

and performed pretest to three orthogonal axis. The worst case emissions were reported

All the modulation modes have been tested, and the worst result was report as below:

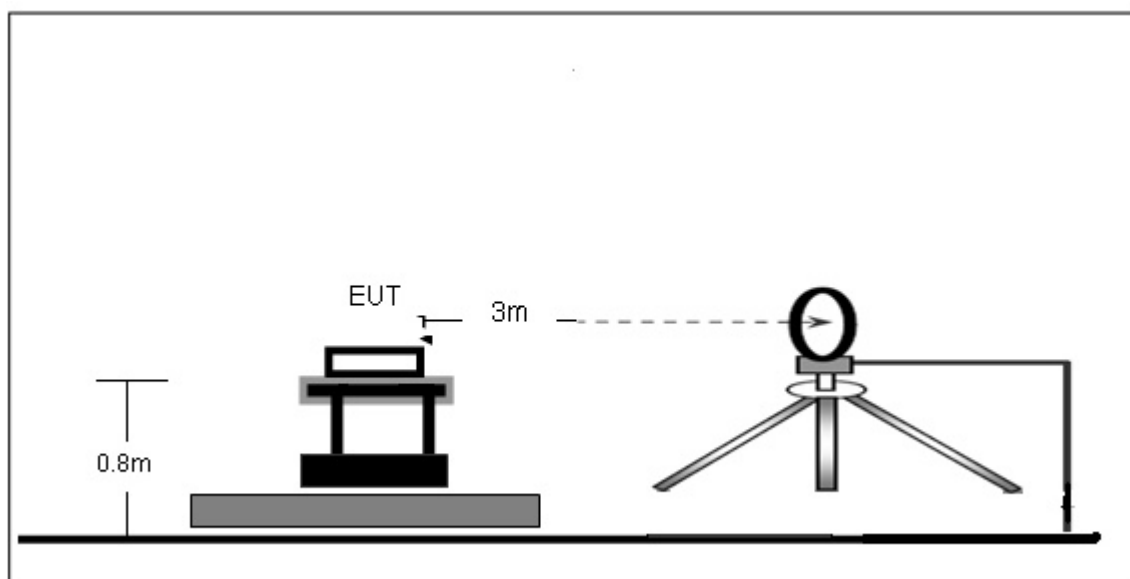
For conducted test, we test all antenna's data, the data only show the antenna1 worst mode.

#### 4.2.3 DEVIATION FROM TEST STANDARD

No deviation

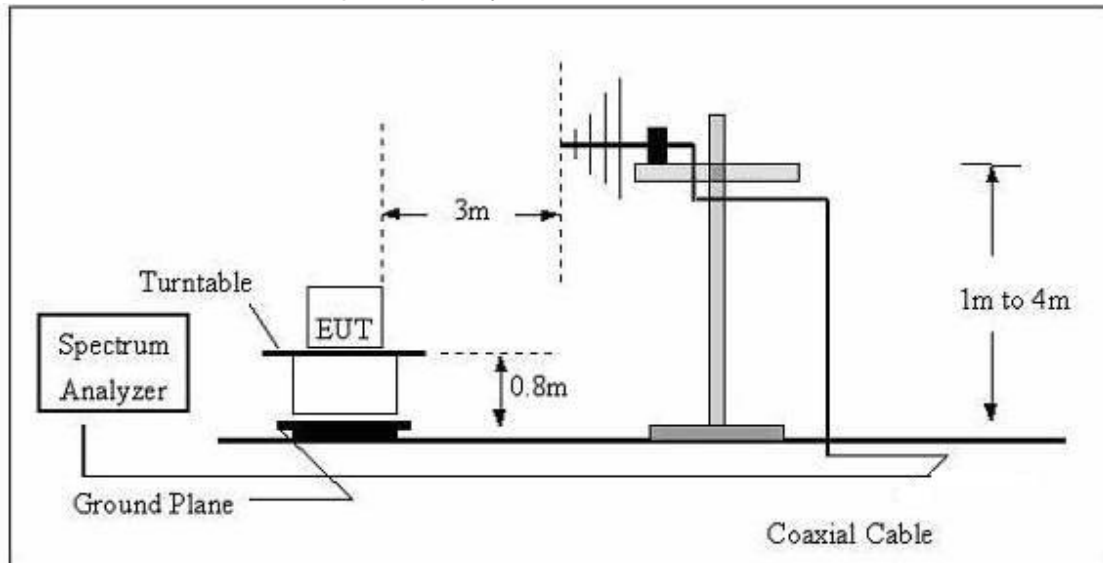
#### 4.2.4 TEST SETUP

(A) Radiated Emission Test-Up Frequency Below 30MHz

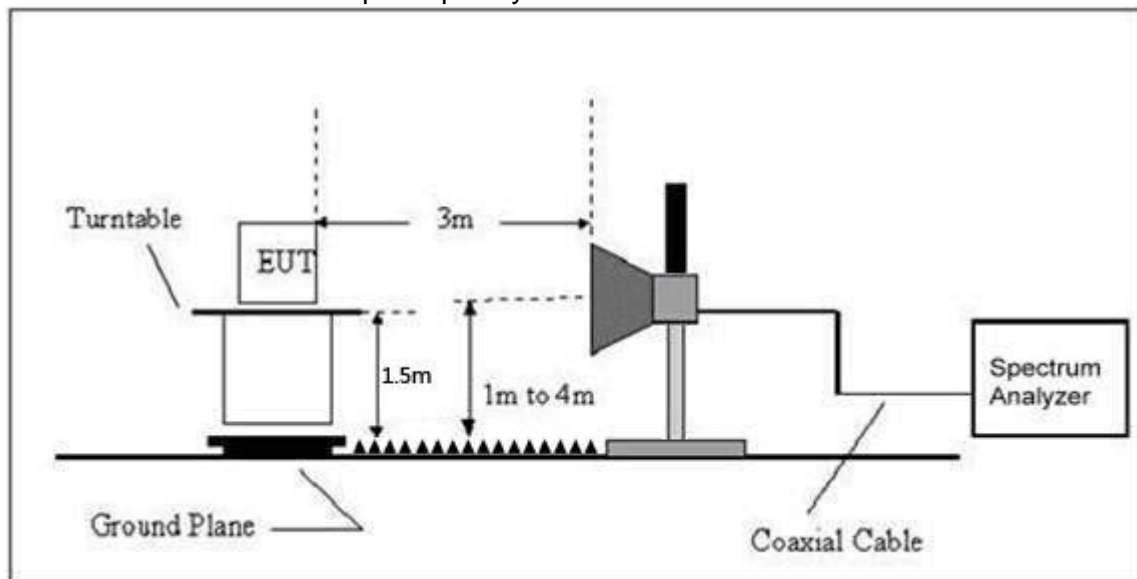




(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



#### 4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

For 802.11b/g, only the SISO mode was supported. And basing on the pre-scan, only the data for worst case configuration (ant 1 active) was listed below.

For 80211n, both SISO and MIMO were supported. And basing on the pre-scan, only the data for worst case configuration (MIMO mode) was listed below.

**4.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)**

Temperature:	20℃	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 5.0V from adapter(AC 120V/60Hz)
Test Mode :	Mode 5	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

**NOTE:**

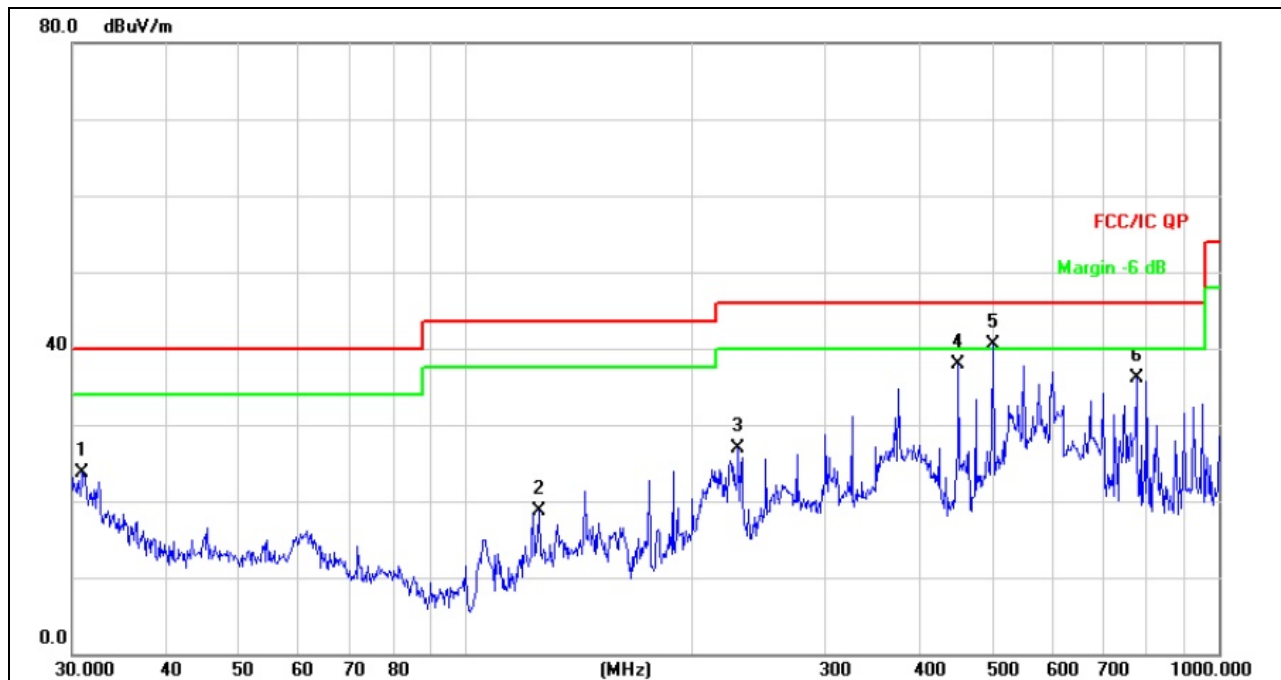
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

**4.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)**

Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 5.0V from adapter(AC 120V/60Hz)		
Test Mode :	Mode 5		

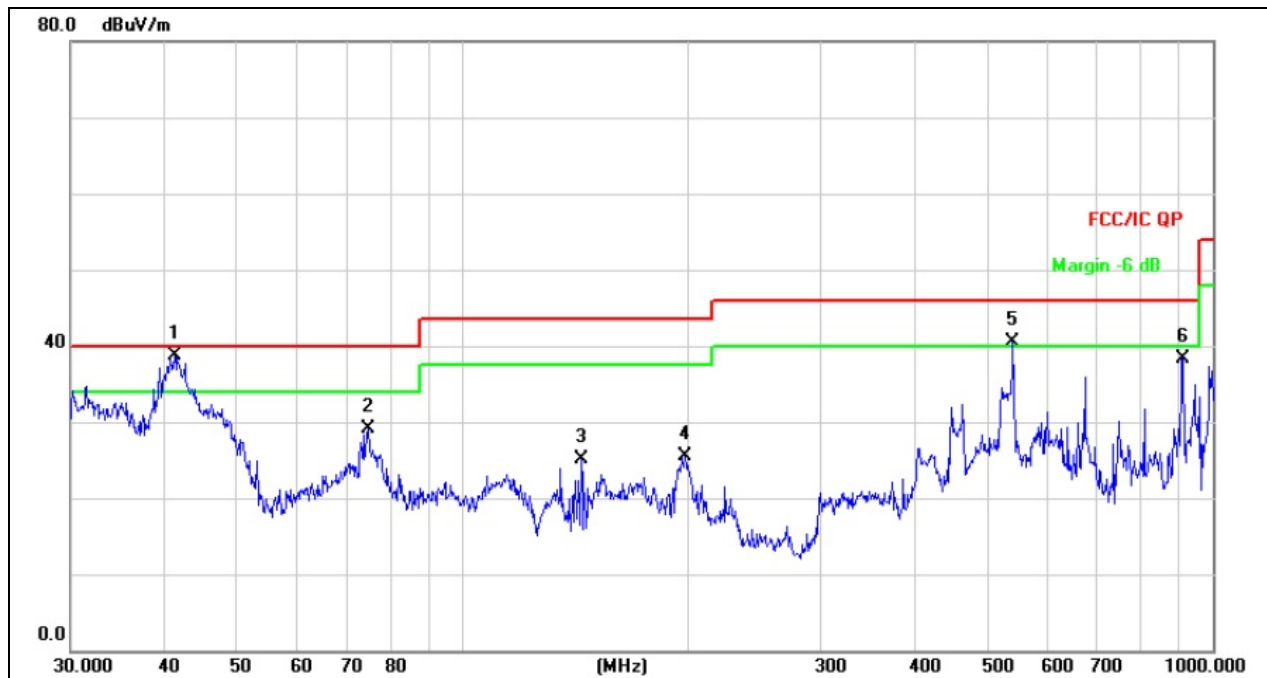
**Remark:**

Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		30.9619	31.80	-8.15	23.65	40.00	-16.35	QP
2		125.0066	33.15	-14.41	18.74	43.50	-24.76	QP
3		230.0985	41.96	-15.05	26.91	46.00	-19.09	QP
4		451.1350	46.99	-9.00	37.99	46.00	-8.01	QP
5	*	501.1790	48.71	-8.19	40.52	46.00	-5.48	QP
6		776.8778	38.90	-2.88	36.02	46.00	-9.98	QP



Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 5.0V from adapter(AC 120V/60Hz)		
Test Mode :	Mode 5		



**Remark:**

Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	41.2765	47.77	-9.01	38.76	40.00	-1.24	QP
2		74.9191	45.40	-16.29	29.11	40.00	-10.89	QP
3		143.8295	38.35	-13.18	25.17	43.50	-18.33	QP
4		197.8928	41.66	-16.07	25.59	43.50	-17.91	QP
5	!	541.3725	47.87	-7.35	40.52	46.00	-5.48	QP
6		912.8620	39.55	-1.21	38.34	46.00	-7.66	QP



## 4.2.8 TEST RESULTS (1GHZ~25GHZ)

### 802.11b

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2412									
V	4824.00	67.02	39.55	7.85	25.66	60.98	74.00	-13.02	PK
V	4824.00	48.81	39.55	7.85	25.66	42.77	54.00	-11.23	AV
V	7236.00	68.09	38.33	7.52	24.55	61.83	74.00	-12.17	PK
V	7236.00	48.30	38.33	7.52	24.55	42.04	54.00	-11.96	AV
V	15450.00	51.37	35.23	6.75	26.59	49.48	74.00	-24.52	PK
H	4824.00	68.54	39.55	7.85	25.66	62.50	74.00	-11.50	PK
H	4824.00	49.28	39.55	7.85	25.66	43.24	54.00	-10.76	AV
H	7236.00	69.28	38.33	7.52	23.55	62.02	74.00	-11.98	PK
H	7236.00	51.56	38.33	7.52	23.22	43.97	54.00	-10.03	AV
H	15450.00	46.71	35.45	6.75	27.88	45.89	74.00	-28.11	PK
operation frequency:2437									
V	4874.00	65.33	38.89	7.57	25.45	59.46	74.00	-14.54	PK
V	4874.00	48.48	38.89	7.57	25.45	42.61	54.00	-11.39	AV
V	7311.00	66.45	38.78	7.35	24.78	59.80	74.00	-14.20	PK
V	7311.00	48.08	38.78	7.35	24.78	41.43	54.00	-12.57	AV
V	15450.00	52.17	35.89	6.42	26.47	49.17	74.00	-24.83	PK
H	4874.00	64.66	38.89	7.57	25.45	58.79	74.00	-15.21	PK
H	4874.00	49.37	38.89	7.57	25.45	43.50	54.00	-10.50	AV
H	7311.00	70.10	38.78	7.35	24.78	63.45	74.00	-10.55	PK
H	7311.00	47.71	38.78	7.35	24.78	41.06	54.00	-12.94	AV
H	15450.00	47.59	36.68	6.45	26.65	44.01	74.00	-29.99	PK
operation frequency:2462									
V	4924.00	68.12	38.75	7.46	25.45	62.28	74.00	-11.72	PK
V	4924.00	50.60	38.75	7.46	25.45	44.76	54.00	-9.24	AV
V	7386.00	67.52	38.65	7.22	24.78	60.87	74.00	-13.13	PK
V	7386.00	49.18	38.65	7.22	24.78	42.53	54.00	-11.47	AV
V	15450.00	53.42	35.58	6.35	26.47	50.66	74.00	-23.34	PK
H	4924.00	65.99	38.75	7.46	25.45	60.15	74.00	-13.85	PK
H	4924.00	50.20	38.75	7.46	25.45	44.36	54.00	-9.64	AV
H	7386.00	69.44	38.65	7.22	24.78	62.79	74.00	-11.21	PK
H	7386.00	47.15	38.65	7.22	24.78	40.50	54.00	-13.50	AV
H	15450.00	49.36	36.42	6.32	26.65	45.91	74.00	-28.09	PK
Remark:									
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit									
2. If peak below the average limit, the average emission was no test.									
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



## 802.11g

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2412									
V	4824.00	65.85	39.55	7.85	25.66	59.81	74.00	-14.19	PK
V	4824.00	49.30	39.55	7.85	25.66	43.26	54.00	-10.74	AV
V	7236.00	66.02	38.33	7.52	24.55	59.76	74.00	-14.24	PK
V	7236.00	47.41	38.33	7.52	24.55	41.15	54.00	-12.85	AV
V	15450.00	50.66	35.23	6.75	26.59	48.77	74.00	-25.23	PK
H	4824.00	62.89	39.55	7.85	25.66	56.85	74.00	-17.15	PK
H	4824.00	49.21	39.55	7.85	25.66	43.17	54.00	-10.83	AV
H	7236.00	68.96	38.33	7.52	23.55	61.70	74.00	-12.30	PK
H	7236.00	49.25	38.33	7.52	23.22	41.66	54.00	-12.34	AV
H	15450.00	44.66	35.45	6.75	27.88	43.84	74.00	-30.16	PK
operation frequency:2437									
V	4874.00	66.30	38.89	7.57	25.45	60.43	74.00	-13.57	PK
V	4874.00	48.98	38.89	7.57	25.45	43.11	54.00	-10.89	AV
V	7311.00	67.16	38.78	7.35	24.78	60.51	74.00	-13.49	PK
V	7311.00	47.49	38.78	7.35	24.78	40.84	54.00	-13.16	AV
V	15450.00	52.54	35.89	6.42	26.47	49.54	74.00	-24.46	PK
H	4874.00	64.97	38.89	7.57	25.45	59.10	74.00	-14.90	PK
H	4874.00	49.21	38.89	7.57	25.45	43.34	54.00	-10.66	AV
H	7311.00	68.93	38.78	7.35	24.78	62.28	74.00	-11.72	PK
H	7311.00	47.09	38.78	7.35	24.78	40.44	54.00	-13.56	AV
H	15450.00	48.15	36.68	6.42	26.65	44.54	74.00	-29.46	PK
operation frequency:2462									
V	4924.00	67.52	38.75	7.46	25.45	61.68	74.00	-12.32	PK
V	4924.00	48.18	38.75	7.46	25.45	42.34	54.00	-11.66	AV
V	7386.00	68.18	38.65	7.22	24.78	61.53	74.00	-12.47	PK
V	7386.00	49.50	38.65	7.22	24.78	42.85	54.00	-11.15	AV
V	15450.00	53.35	35.58	6.35	26.47	50.59	74.00	-23.41	PK
H	4924.00	66.18	38.75	7.46	25.45	60.34	74.00	-13.66	PK
H	4924.00	50.16	38.75	7.46	25.45	44.32	54.00	-9.68	AV
H	7386.00	68.98	38.65	7.22	24.78	62.33	74.00	-11.67	PK
H	7386.00	47.68	38.65	7.22	24.78	41.03	54.00	-12.97	AV
H	15450.00	48.51	36.42	6.32	26.65	45.06	74.00	-28.94	PK
<b>Remark:</b> 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



## 802.11n(20MHz)

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2412									
V	4824.00	67.54	39.55	7.85	25.66	61.50	74.00	-12.50	PK
V	4824.00	48.51	39.55	7.85	25.66	42.47	54.00	-11.53	AV
V	7236.00	68.22	38.33	7.52	24.55	61.96	74.00	-12.04	PK
V	7236.00	48.38	38.33	7.52	24.55	42.12	54.00	-11.88	AV
V	15450.00	51.60	35.23	6.75	26.59	49.71	74.00	-24.29	PK
H	4824.00	68.11	39.55	7.85	25.66	62.07	74.00	-11.93	PK
H	4824.00	49.47	39.55	7.85	25.66	43.43	54.00	-10.57	AV
H	7236.00	69.12	38.33	7.52	23.55	61.86	74.00	-12.14	PK
H	7236.00	51.30	38.33	7.52	23.22	43.71	54.00	-10.29	AV
H	15450.00	46.78	35.45	6.75	27.88	45.96	74.00	-28.04	PK
operation frequency:2437									
V	4874.00	66.49	38.89	7.57	25.45	60.62	74.00	-13.38	PK
V	4874.00	49.47	38.89	7.57	25.45	43.60	54.00	-10.40	AV
V	7311.00	67.14	38.78	7.35	24.78	60.49	74.00	-13.51	PK
V	7311.00	47.29	38.78	7.35	24.78	40.64	54.00	-13.36	AV
V	15450.00	52.17	35.89	6.42	26.47	49.17	74.00	-24.83	PK
H	4874.00	65.36	38.89	7.57	25.45	59.49	74.00	-14.51	PK
H	4874.00	49.49	38.89	7.57	25.45	43.62	54.00	-10.38	AV
H	7311.00	69.51	38.78	7.35	24.78	62.86	74.00	-11.14	PK
H	7311.00	47.72	38.78	7.35	24.78	41.07	54.00	-12.93	AV
H	15450.00	48.51	36.68	6.42	26.65	44.90	74.00	-29.10	PK
operation frequency:2462									
V	4924.00	68.53	38.75	7.46	25.45	62.69	74.00	-11.31	PK
V	4924.00	50.20	38.75	7.46	25.45	44.36	54.00	-9.64	AV
V	7386.00	67.54	38.65	7.22	24.78	60.89	74.00	-13.11	PK
V	7386.00	49.40	38.65	7.22	24.78	42.75	54.00	-11.25	AV
V	15450.00	53.19	35.58	6.35	26.47	50.43	74.00	-23.57	PK
H	4924.00	66.55	38.75	7.46	25.45	60.71	74.00	-13.29	PK
H	4924.00	50.34	38.75	7.46	25.45	44.50	54.00	-9.50	AV
H	7386.00	69.04	38.65	7.22	24.78	62.39	74.00	-11.61	PK
H	7386.00	47.29	38.65	7.22	24.78	40.64	54.00	-13.36	AV
H	15450.00	49.03	36.42	6.32	26.65	45.58	74.00	-28.42	PK
<b>Remark:</b> 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									





## 802.11n(40MHz)

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2422									
V	4844.000	68.90	39.55	7.77	25.66	62.78	74.00	-11.22	PK
V	4844.000	48.90	39.55	7.77	25.66	42.78	54.00	-11.22	AV
V	7266.000	67.89	38.33	7.30	24.55	61.41	74.00	-12.59	PK
V	7266.000	48.61	38.33	7.30	24.55	42.13	54.00	-11.87	AV
V	15450.00	52.00	35.23	6.60	26.59	49.96	74.00	-24.04	PK
H	4844.000	69.11	39.55	7.77	25.66	62.99	74.00	-11.01	PK
H	4844.000	49.63	39.55	7.77	25.66	43.51	54.00	-10.49	AV
H	7266.000	70.09	38.33	7.30	23.55	62.61	74.00	-11.39	PK
H	7266.000	51.80	38.33	7.30	23.22	43.99	54.00	-10.01	AV
H	15450.00	47.75	35.45	6.60	27.88	46.78	74.00	-27.22	PK
operation frequency:2437									
V	4874.00	67.09	38.89	7.57	25.45	61.22	74.00	-12.78	PK
V	4874.00	49.91	38.89	7.57	25.45	44.04	54.00	-9.96	AV
V	7311.00	68.00	38.78	7.35	24.78	61.35	74.00	-12.65	PK
V	7311.00	47.99	38.78	7.35	24.78	41.34	54.00	-12.66	AV
V	15450.00	52.61	35.89	6.42	26.47	49.61	74.00	-24.39	PK
H	4874.00	65.54	38.89	7.57	25.45	59.67	74.00	-14.33	PK
H	4874.00	49.91	38.89	7.57	25.45	44.04	54.00	-9.96	AV
H	7311.00	70.30	38.78	7.35	24.78	63.65	74.00	-10.35	PK
H	7311.00	47.55	38.78	7.35	24.78	40.90	54.00	-13.10	AV
H	15450.00	48.76	36.68	6.42	26.65	45.15	74.00	-28.85	PK
operation frequency:2452									
V	4904.00	68.91	38.75	7.38	25.45	62.99	74.00	-11.01	PK
V	4904.00	50.60	38.75	7.38	25.45	44.68	54.00	-9.32	AV
V	7356.00	67.98	38.65	7.15	24.78	61.26	74.00	-12.74	PK
V	7356.00	50.19	38.65	7.15	24.78	43.47	54.00	-10.53	AV
V	15450.00	53.71	35.58	6.25	26.47	50.85	74.00	-23.15	PK
H	4904.00	67.05	38.75	7.38	25.45	61.13	74.00	-12.87	PK
H	4904.00	51.19	38.75	7.38	25.45	45.27	54.00	-8.73	AV
H	7356.00	70.10	38.65	7.15	24.78	63.38	74.00	-10.62	PK
H	7356.00	47.88	38.65	7.15	24.78	41.16	54.00	-12.84	AV
H	15450.00	49.67	36.42	6.25	26.65	46.15	74.00	-27.85	PK
<b>Remark:</b> 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									







### 3.3 RADIATED BAND EMISSION MEASUREMENT

#### 3.3.1 TEST REQUIREMENT:

In case the emission fall within the restricted band specified on 15.205

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

#### 3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. 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 antenna height 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the Highest channel

Note:

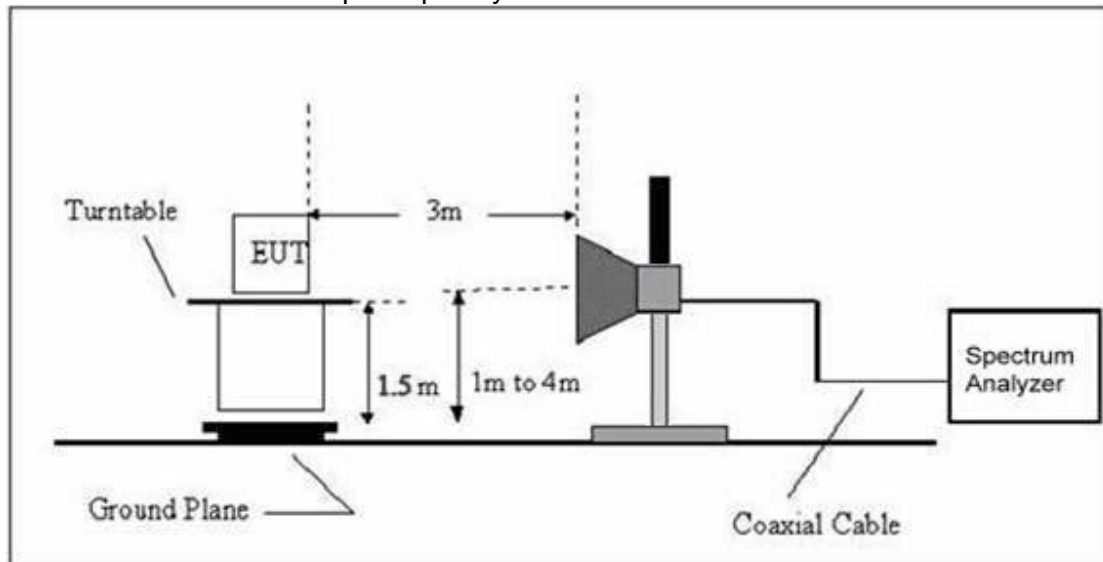
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

### 3.3.3 DEVIATION FROM TEST STANDARD

No deviation

### 3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



### 3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

For 802.11b/g, only the SISO mode was supported. And basing on the pre-scan, only the data for worst case configuration (ant 1 active) was listed below.

For 802.11n, both SISO and MIMO were supported. And basing on the pre-scan, only the data for worst case configuration (MIMO mode) was listed below.



### 3.3.6 TEST RESULT

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
<b>802.11b operation frequency:2412</b>									
V	2390.00	67.93	38.06	7.42	20.15	57.44	74.00	-16.56	PK
V	2390.00	56.45	38.06	7.42	20.15	45.96	54.00	-8.04	AV
V	2400.00	68.15	38.06	7.42	20.15	57.66	74.00	-16.34	PK
V	2400.00	56.00	38.06	7.42	20.15	45.51	54.00	-8.49	AV
H	2390.00	68.23	38.06	7.42	20.15	57.74	74.00	-16.26	PK
H	2390.00	56.48	38.06	7.42	20.15	45.99	54.00	-8.01	AV
H	2400.00	68.09	38.06	7.42	20.15	57.60	74.00	-16.40	PK
H	2400.00	56.41	38.06	7.42	20.15	45.92	54.00	-8.08	AV
<b>802.11b operation frequency:2462</b>									
V	2483.50	68.15	38.17	7.42	20.51	57.91	74.00	-16.09	PK
V	2483.50	56.69	38.17	7.42	20.51	46.45	54.00	-7.55	AV
V	2500.00	68.08	38.20	7.45	20.54	57.87	74.00	-16.13	PK
V	2500.00	56.11	38.20	7.45	20.54	45.90	54.00	-8.10	AV
H	2483.50	68.27	38.17	7.42	20.51	58.03	74.00	-15.97	PK
H	2483.50	56.73	38.17	7.42	20.51	46.49	54.00	-7.51	AV
H	2500.00	67.88	38.20	7.45	20.54	57.67	74.00	-16.33	PK
H	2500.00	56.99	38.20	7.45	20.54	46.78	54.00	-7.22	AV
<b>802.11g operation frequency:2412</b>									
V	2390.00	67.93	38.06	7.42	20.15	57.44	74.00	-16.56	PK
V	2390.00	56.43	38.06	7.42	20.15	45.94	54.00	-8.06	AV
V	2400.00	68.13	38.06	7.42	20.15	57.64	74.00	-16.36	PK
V	2400.00	56.00	38.06	7.42	20.15	45.51	54.00	-8.49	AV
H	2390.00	68.21	38.06	7.42	20.15	57.72	74.00	-16.28	PK
H	2390.00	56.46	38.06	7.42	20.15	45.97	54.00	-8.03	AV
H	2400.00	68.09	38.06	7.42	20.15	57.60	74.00	-16.40	PK
H	2400.00	56.39	38.06	7.42	20.15	45.90	54.00	-8.10	AV
<b>802.11g operation frequency:2462</b>									
V	2483.50	68.13	38.17	7.42	20.51	57.89	74.00	-16.11	PK
V	2483.50	56.67	38.17	7.42	20.51	46.43	54.00	-7.57	AV
V	2500.00	68.08	38.20	7.45	20.54	57.87	74.00	-16.13	PK
V	2500.00	56.11	38.20	7.45	20.54	45.90	54.00	-8.10	AV
H	2483.50	68.25	38.17	7.42	20.51	58.01	74.00	-15.99	PK
H	2483.50	56.71	38.17	7.42	20.51	46.47	54.00	-7.53	AV
H	2500.00	67.88	38.20	7.45	20.54	57.67	74.00	-16.33	PK
H	2500.00	56.99	38.20	7.45	20.54	46.78	54.00	-7.22	AV
<b>Remark:</b> 1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
<b>802.11n(20MHz) operation frequency:2412</b>									
V	2390.00	67.80	38.06	7.42	20.15	57.31	74.00	-16.69	PK
V	2390.00	56.34	38.06	7.42	20.15	45.85	54.00	-8.15	AV
V	2400.00	68.03	38.06	7.42	20.15	57.54	74.00	-16.46	PK
V	2400.00	55.89	38.06	7.42	20.15	45.40	54.00	-8.60	AV
H	2390.00	68.11	38.06	7.42	20.15	57.62	74.00	-16.38	PK
H	2390.00	56.37	38.06	7.42	20.15	45.88	54.00	-8.12	AV
H	2400.00	67.96	38.06	7.42	20.15	57.47	74.00	-16.53	PK
H	2400.00	56.30	38.06	7.42	20.15	45.81	54.00	-8.19	AV
<b>802.11n(20MHz) operation frequency:2462</b>									
V	2483.50	68.03	38.17	7.42	20.51	57.79	74.00	-16.21	PK
V	2483.50	56.58	38.17	7.42	20.51	46.34	54.00	-7.66	AV
V	2500.00	67.95	38.20	7.45	20.54	57.74	74.00	-16.26	PK
V	2500.00	56.00	38.20	7.45	20.54	45.79	54.00	-8.21	AV
H	2483.50	68.14	38.17	7.42	20.51	57.90	74.00	-16.10	PK
H	2483.50	56.62	38.17	7.42	20.51	46.38	54.00	-7.62	AV
H	2500.00	67.75	38.20	7.45	20.54	57.54	74.00	-16.46	PK
H	2500.00	56.87	38.20	7.45	20.54	46.66	54.00	-7.34	AV
<b>802.11n(40MHz) operation frequency:2422</b>									
V	2390.00	67.67	38.06	7.42	20.15	57.18	74.00	-16.82	PK
V	2390.00	56.21	38.06	7.42	20.15	45.72	54.00	-8.28	AV
V	2400.00	67.88	38.06	7.42	20.15	57.39	74.00	-16.61	PK
V	2400.00	55.78	38.06	7.42	20.15	45.29	54.00	-8.71	AV
H	2390.00	67.96	38.06	7.42	20.15	57.47	74.00	-16.53	PK
H	2390.00	56.24	38.06	7.42	20.15	45.75	54.00	-8.25	AV
H	2400.00	67.83	38.06	7.42	20.15	57.34	74.00	-16.66	PK
H	2400.00	56.17	38.06	7.42	20.15	45.68	54.00	-8.32	AV
<b>802.11n(40MHz) operation frequency:2452</b>									
V	2483.50	67.88	38.17	7.42	20.51	57.64	74.00	-16.36	PK
V	2483.50	56.45	38.17	7.42	20.51	46.21	54.00	-7.79	AV
V	2500.00	67.82	38.20	7.45	20.54	57.61	74.00	-16.39	PK
V	2500.00	55.89	38.20	7.45	20.54	45.68	54.00	-8.32	AV
H	2483.50	68.00	38.17	7.42	20.51	57.76	74.00	-16.24	PK
H	2483.50	56.49	38.17	7.42	20.51	46.25	54.00	-7.75	AV
H	2500.00	67.62	38.20	7.45	20.54	57.41	74.00	-16.59	PK
H	2500.00	56.76	38.20	7.45	20.54	46.55	54.00	-7.45	AV
<b>Remark:</b> 1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



## 5. 6DB BANDWIDTH

### 5.1 APPLIED PROCEDURES / 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

#### 5.1.1 TEST PROCEDURE

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

#### 5.1.2 DEVIATION FROM STANDARD

No deviation.

#### 5.1.3 TEST SETUP



#### 5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.  
we test all antenna's data, the data only show the antenna1 worst mode

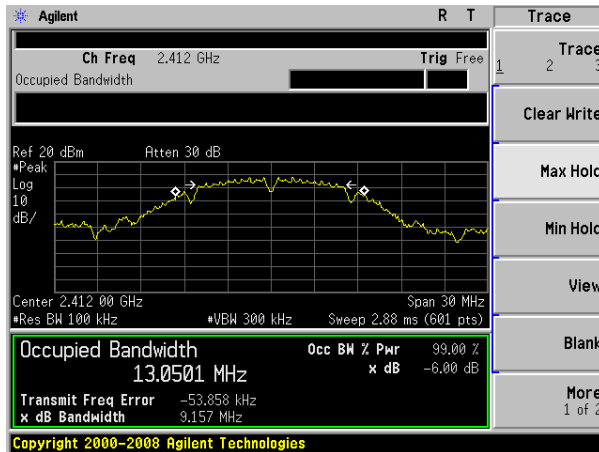


### 5.1.5 TEST RESULTS

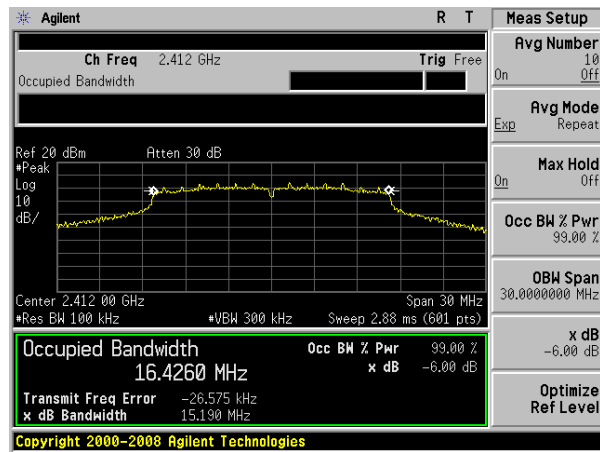
	Frequency (MHz)	6dB bandwidth (MHz)		Limit (kHz)	Result
		ANT1	ANT2		
802.11b	2412	9.16	9.12	>500	Pass
	2437	9.18	9.14	>500	Pass
	2462	9.12	9.14	>500	Pass
802.11g	2412	15.19	15.14	>500	Pass
	2437	15.10	15.14	>500	Pass
	2462	15.18	15.16	>500	Pass
802.11n20	2412	15.19	15.16	>500	Pass
	2437	15.18	15.18	>500	Pass
	2462	15.16	15.18	>500	Pass
802.11n40	2422	35.21	35.18	>500	Pass
	2437	35.18	35.14	>500	Pass
	2452	35.17	35.18	>500	Pass



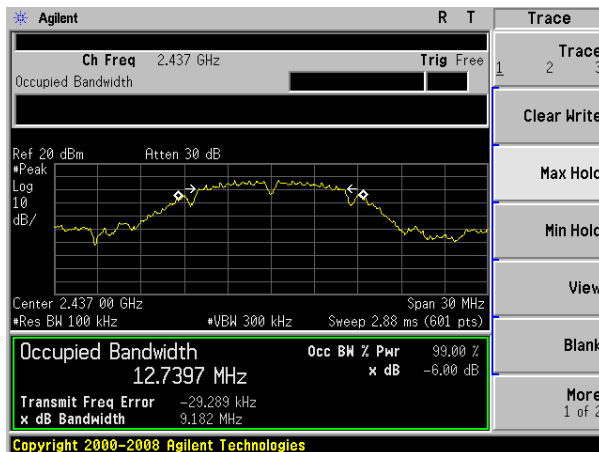
(802.11b) channel 1



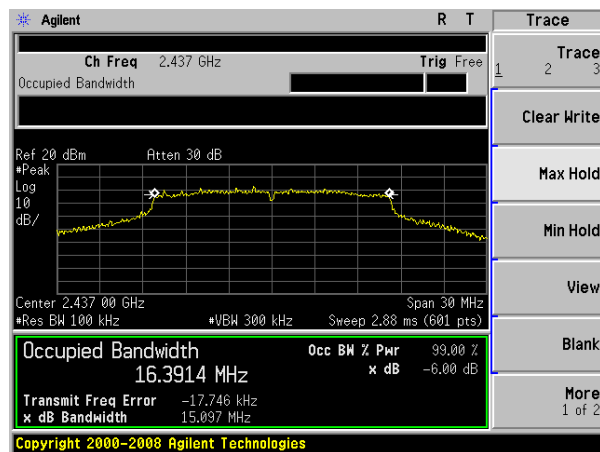
(802.11g) channel 1



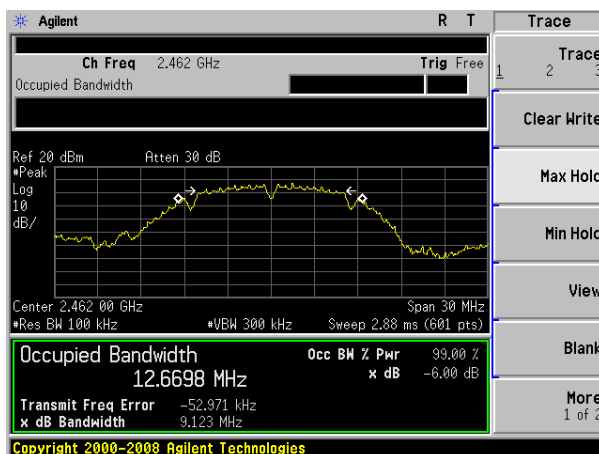
(802.11b) channel 6



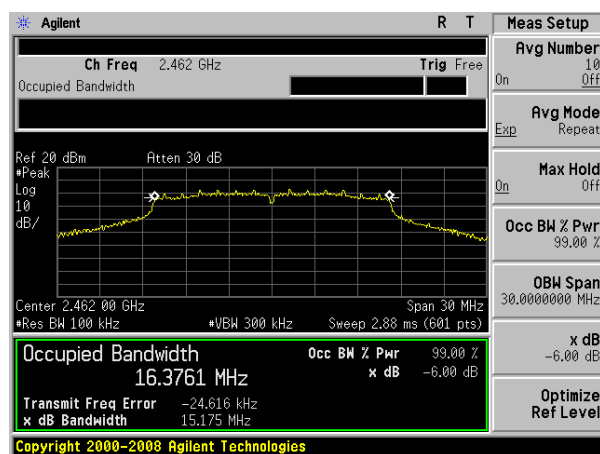
(802.11g) channel 6



(802.11b) channel 11



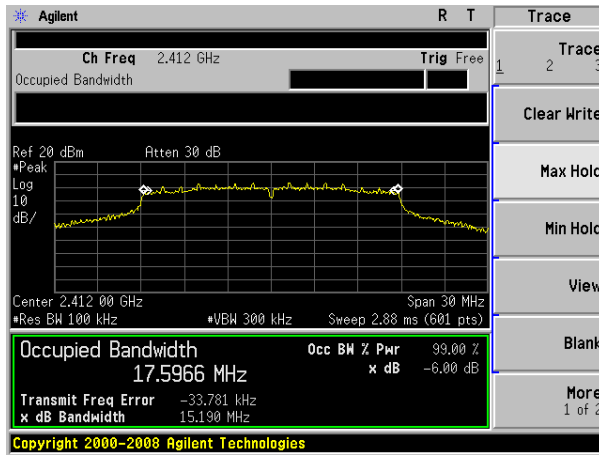
(802.11g) channel 11



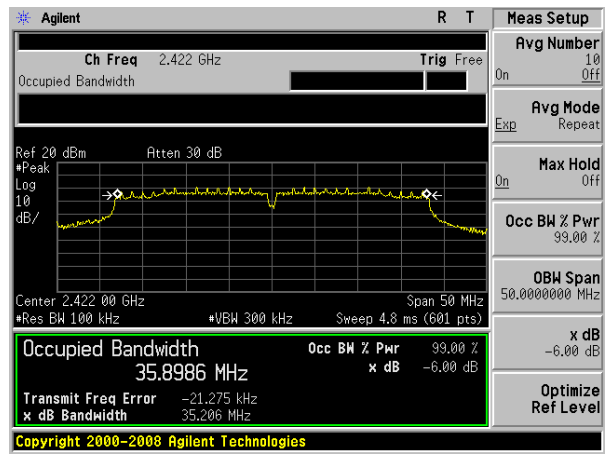




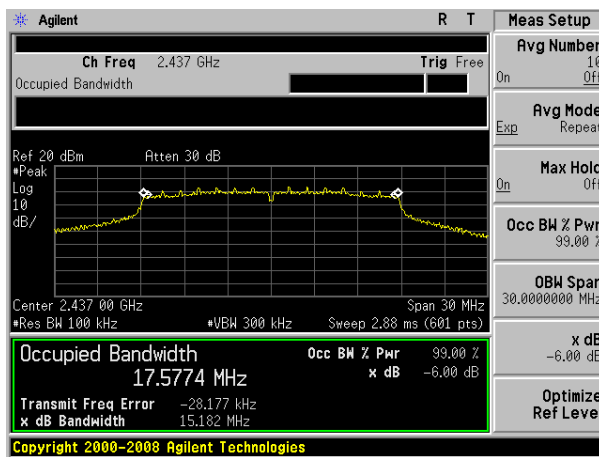
(802.11n20) channel 1



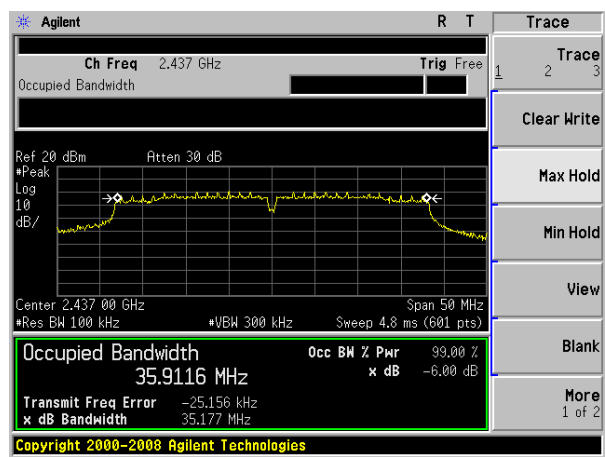
(802.11n40) channel 3



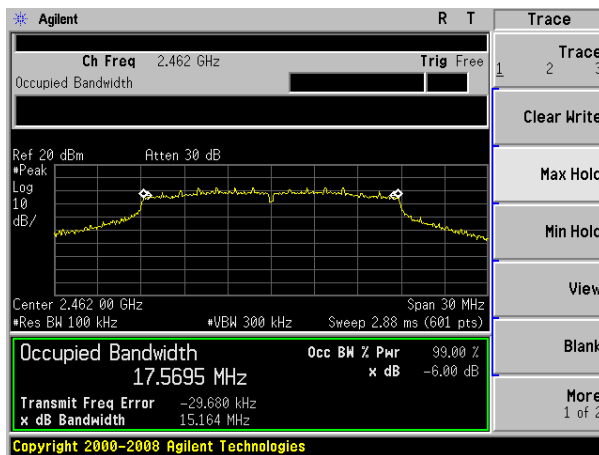
(802.11n20) channel 6



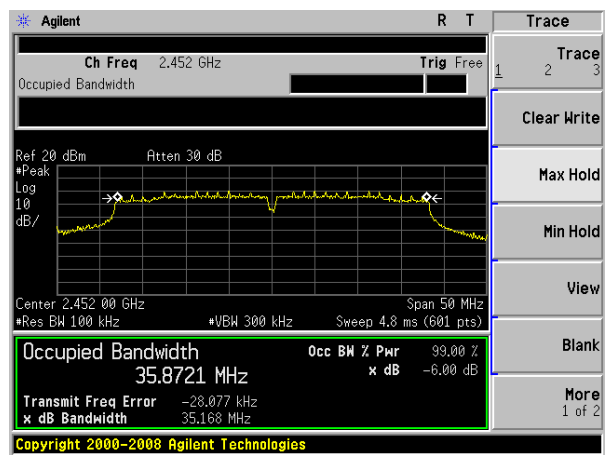
(802.11n40) channel 6



(802.11n20) channel 11



(802.11n40) channel 9





## 6. DUTY CYCLE

### 6.1 APPLICABLE STANDARD

According to KDB 558074)6)b), issued 04/05/2017

### 6.2 CONFORMANCE LIMIT

No limit requirement.

### 6.3 MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

### 6.4 TEST SETUP

Please refer to Section 6.1 of this test report.

### 6.5 TEST PROCEDURE

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set  $RBW \geq OBW$  if possible; otherwise, set RBW to the largest available value. Set  $VBW \geq RBW$ . Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are  $> 50/T$  and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if  $T \leq 16.7$  microseconds.)

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, 6.0)b) in KDB 558074(issued 04/05/2017)

The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if  $T \leq 6.25$  microseconds. ( $50/6.25 = 8$ )

The zero-span method was used because all measured T data are  $> 6.25$  microseconds and both RBW and VBW are  $> 50/T$ .

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = Zero Span

RBW = 8MHz(the largest available value)

VBW = 8MHz ( $\geq$  RBW)

Number of points in Sweep  $> 100$

Detector function = peak

Trace = Clear write

Measure  $T_{total}$  and  $T_{on}$

Calculate Duty Cycle =  $T_{on} / T_{total}$  and Duty Cycle Factor =  $10 \cdot \log(1/\text{Duty Cycle})$

### 6.6 TEST RESULTS

Mode	Data rate	Channel	$T_{on}$	$T_{total}$	Duty Cycle %	Duty Cycle Factor (dB)	1/T Minimum VBW (kHz)
802.11b	1Mbps	6	10	10	100	0.00	0.01
802.11g	6Mbps	6	10	10	100	0.00	0.01
802.11n HT20	MCS0	6	10	10	100	0.00	0.01
802.11n HT40	MCS0	6	10	10	100	0.00	0.01



## 7. POWER SPECTRAL DENSITY TEST

### 7.1 APPLIED PROCEDURES / 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

#### 7.1.1 TEST PROCEDURE

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

#### 7.1.2 DEVIATION FROM STANDARD

No deviation.

#### 7.1.3 TEST SETUP



#### 7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

Note: we test all antenna's data, the data only show the antenna1 worst mode

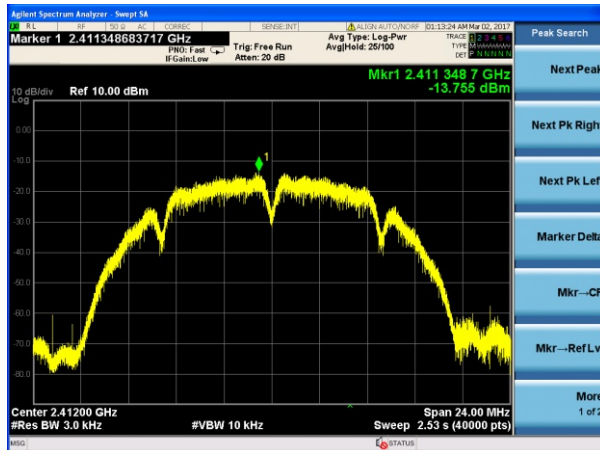


### 7.1.5 TEST RESULTS

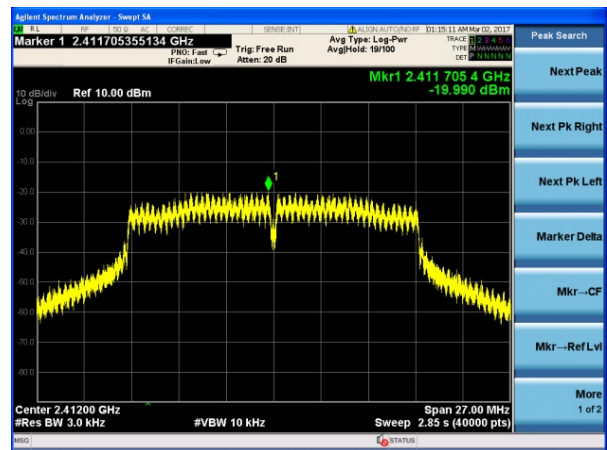
Temperature :	25℃	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 5.0V from adapter(AC 120V/60Hz)
Test Mode :	TX Mode		

	Frequency	Reading Level(dBm)		Cable Loss (dB)	Power Spectral Density (dBm)		Total Power Spectral Density (dBm)	Limit (dBm)	Result
		ANT1	ANT2		ANT1	ANT2			
802.11b	2412 MHz	-13.76	-13.84	0.5	-13.26	-13.34	/	<8	PASS
	2437 MHz	-13.76	-13.84	0.5	-13.26	-13.34	/	<8	PASS
	2462 MHz	-12.73	-13.80	0.5	-12.23	-13.30	/	<8	PASS
802.11g	2412 MHz	-19.99	-20.18	0.5	-19.49	-19.68	/	<8	PASS
	2437 MHz	-19.00	-19.87	0.5	-18.50	-19.37	/	<8	PASS
	2462 MHz	-17.85	-19.87	0.5	-17.35	-19.37	/	<8	PASS
802.11n (20MHz)	2412 MHz	-19.34	-19.67	0.5	/		-15.99	<8	PASS
	2437 MHz	-18.99	-19.52	0.5	/		-15.74	<8	PASS
	2462 MHz	-17.12	-19.52	0.5	/		-14.65	<8	PASS
802.11n (40MHz)	2422 MHz	-20.99	-20.87	0.5	/		-17.42	<8	PASS
	2437 MHz	-20.74	-20.95	0.5	/		-17.33	<8	PASS
	2452 MHz	-20.95	-20.95	0.5	/		-17.44	<8	PASS

(802.11b) channel 1



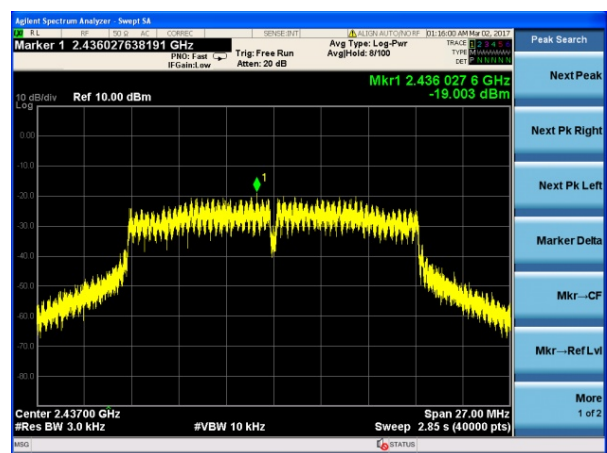
(802.11g) channel 1



(802.11b) channel 6



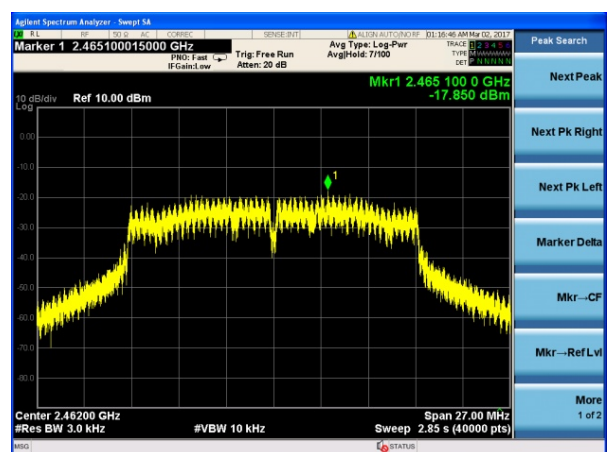
(802.11g) channel 6



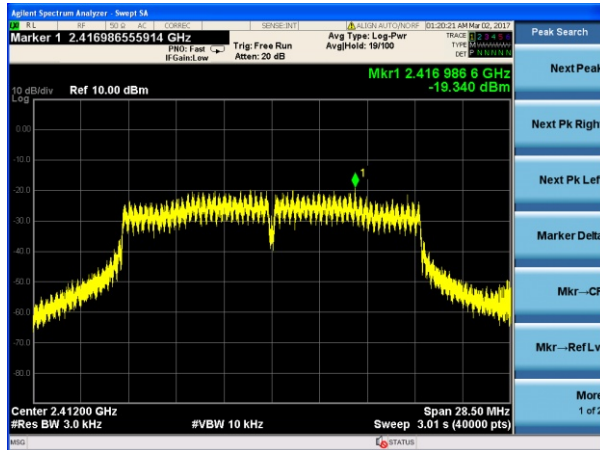
(802.11b) channel 11



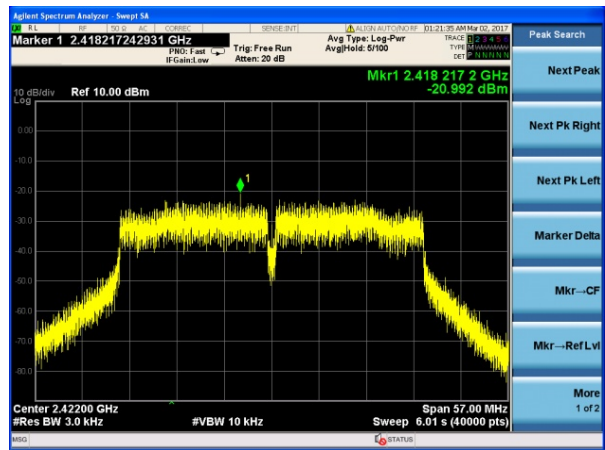
(802.11g) channel 11



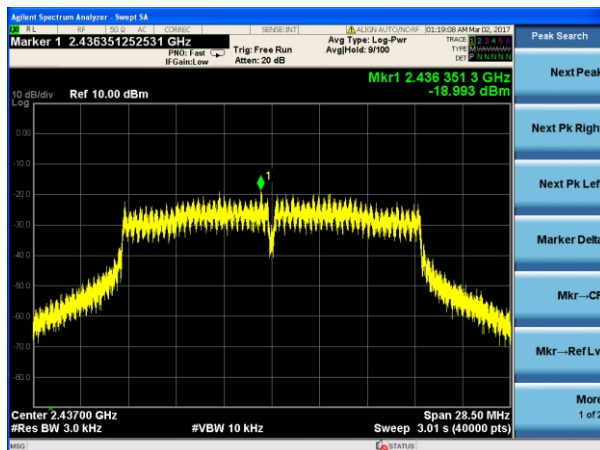
(802.11n20) channel 1



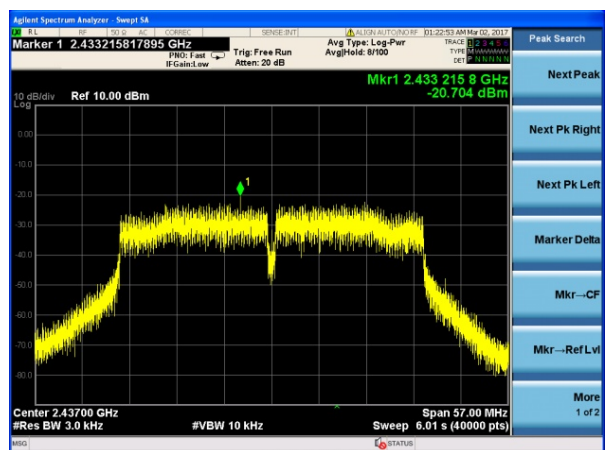
(802.11n40) channel 3



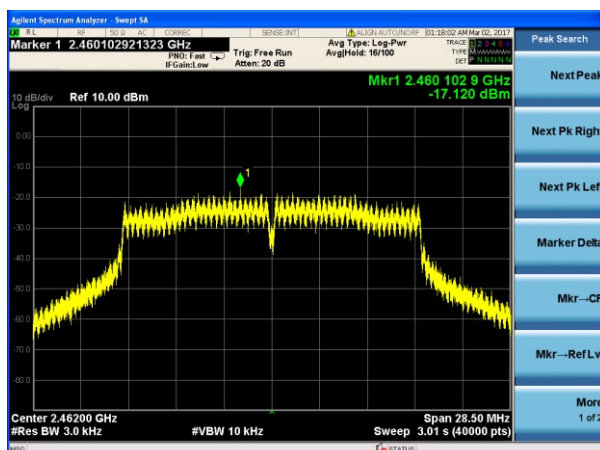
(802.11n20) channel 6



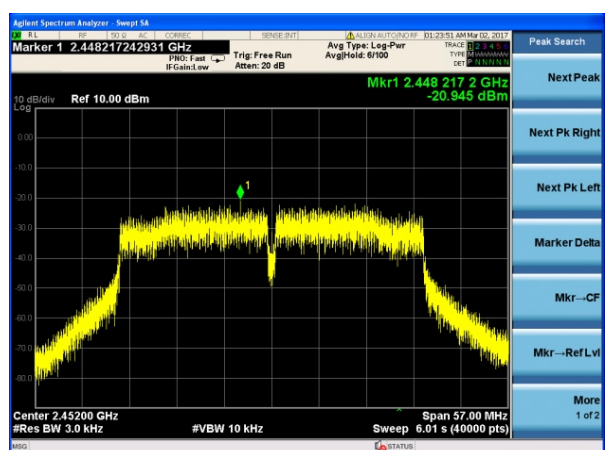
(802.11n40) channel 6



(802.11n20) channel 11



(802.11n40) channel 9







## 8. PEAK OUTPUT POWER TEST

### 8.1 APPLIED PROCEDURES / 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

#### 8.1.1 TEST PROCEDURE

- The EUT was directly connected to the Power meter
- Test procedures refer KDB 558074 D01 v03r05 section 9.2.3.2 Measurement using a power meter (PM).
- Alternatively, measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.
- Multiple antenna system was performed in accordance with KDB 662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.

#### 8.1.2 DEVIATION FROM STANDARD

No deviation.

#### 8.1.3 TEST SETUP



#### 8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

Note: we test all antenna's data, the data only show the antenna1 worst mode

**8.1.5 TEST RESULTS**

	Frequency (MHz)	Maximum Conducted Output Power(PK)(dBm)		Total Output Power (dBm)	LIMIT dBm
		ANT1	ANT2		
802.11b	2412	17.83	17.65	/	30
	2437	17.78	17.72	/	30
	2462	17.76	17.69	/	30
802.11g	2412	15.67	15.57	/	30
	2437	15.75	15.62	/	30
	2462	15.73	15.64	/	30
802.11n20	2412	11.58	11.66	14.63	30
	2437	11.73	11.68	14.72	30
	2462	11.62	11.74	14.69	30
802.11n40	2422	10.36	10.28	13.33	30
	2437	10.30	10.22	13.27	30
	2452	10.31	10.27	13.30	30





## 9. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

### 7.1 APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 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.

### 7.2 TEST PROCEDURE

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- Set RBW to 100 kHz and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- Repeat above procedures until all measured frequencies were complete.

### 7.3 DEVIATION FROM STANDARD

No deviation.

### 7.4 TEST SETUP



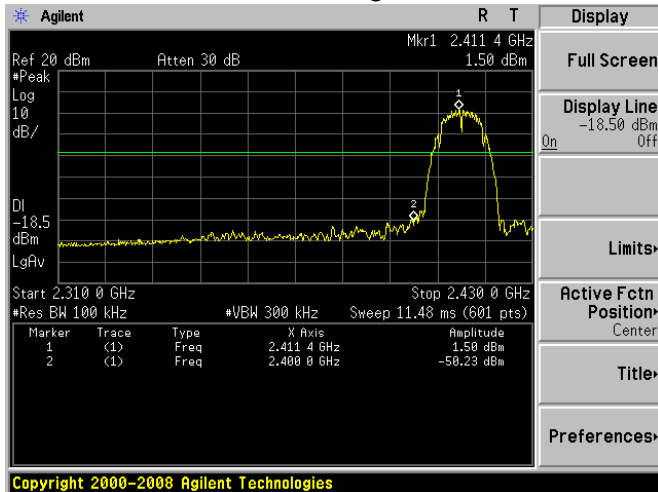
### 7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.  
we test all antenna's data, the data only show the antenna1 worst mode

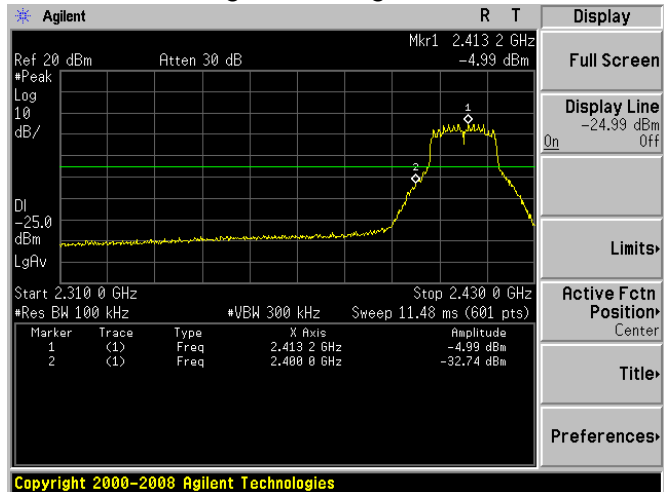
## 9.1 TEST RESULTS



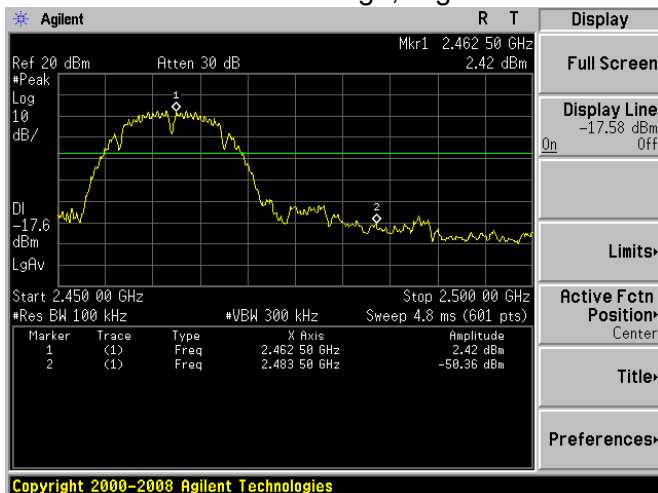
802.11b: Band Edge, Left Side



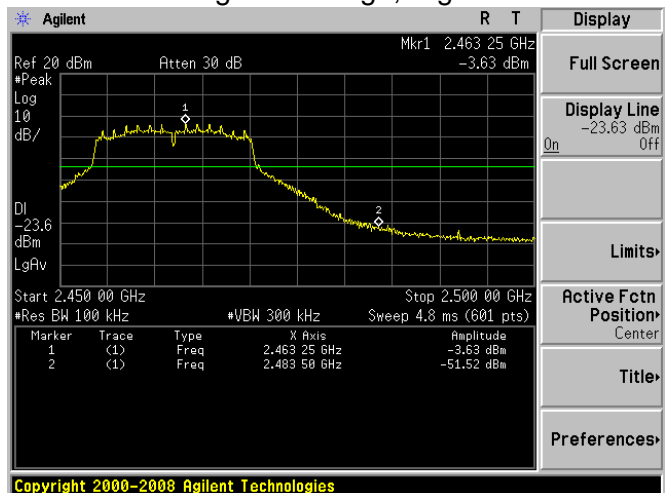
802.11g: Band Edge, Left Side



802.11b: Band Edge, Right Side

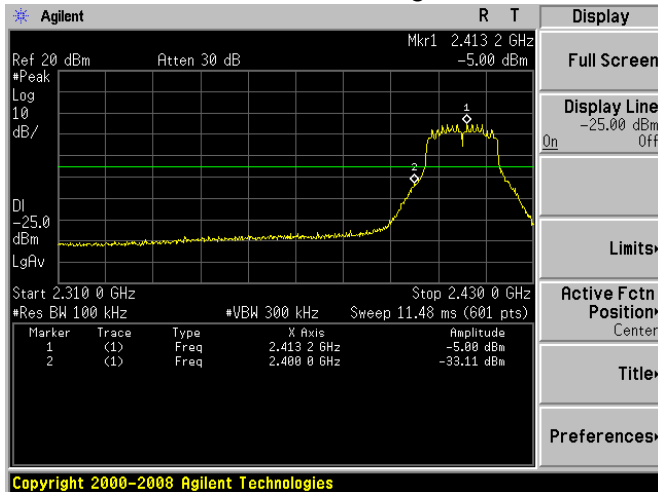


802.11g: Band Edge, Right Side

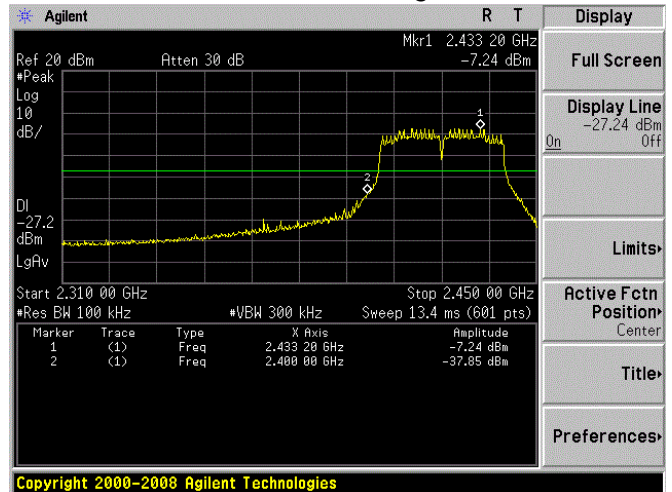




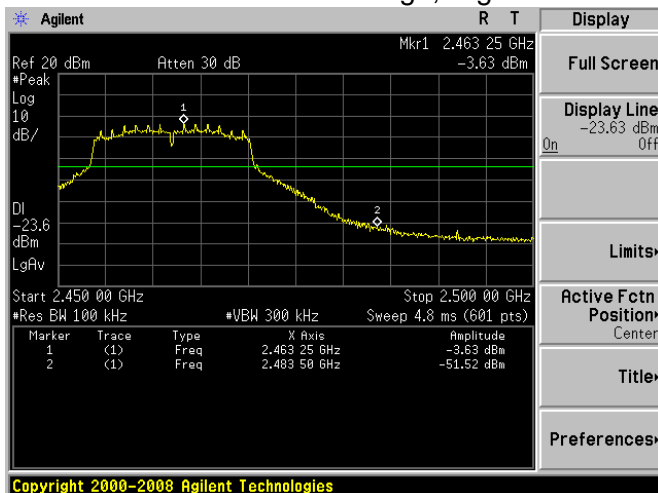
802.11n-HT20: Band Edge, Left Side



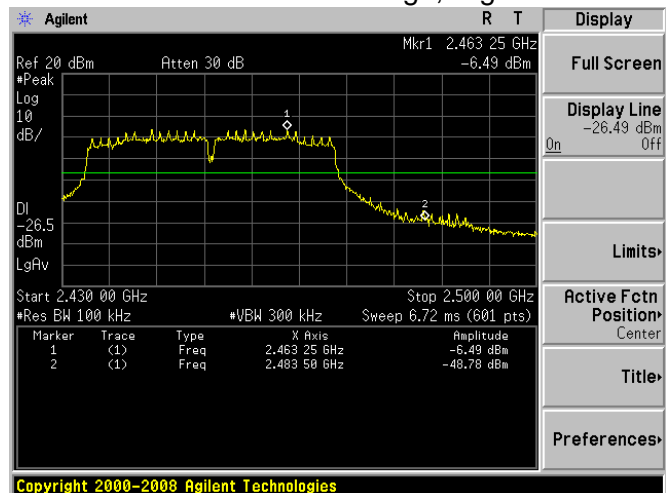
802.11n-HT40: Band Edge, Left Side



802.11n-HT20: Band Edge, Right Side



802.11n-HT40: Band Edge, Right Side





## **10. ANTENNA REQUIREMENT**

### **10.1 STANDARD REQUIREMENT**

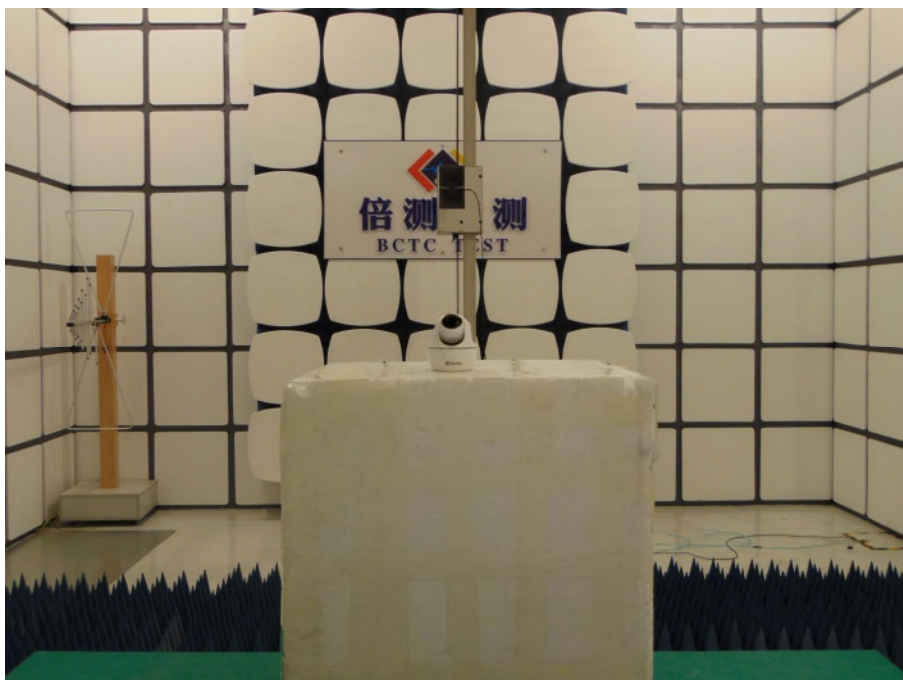
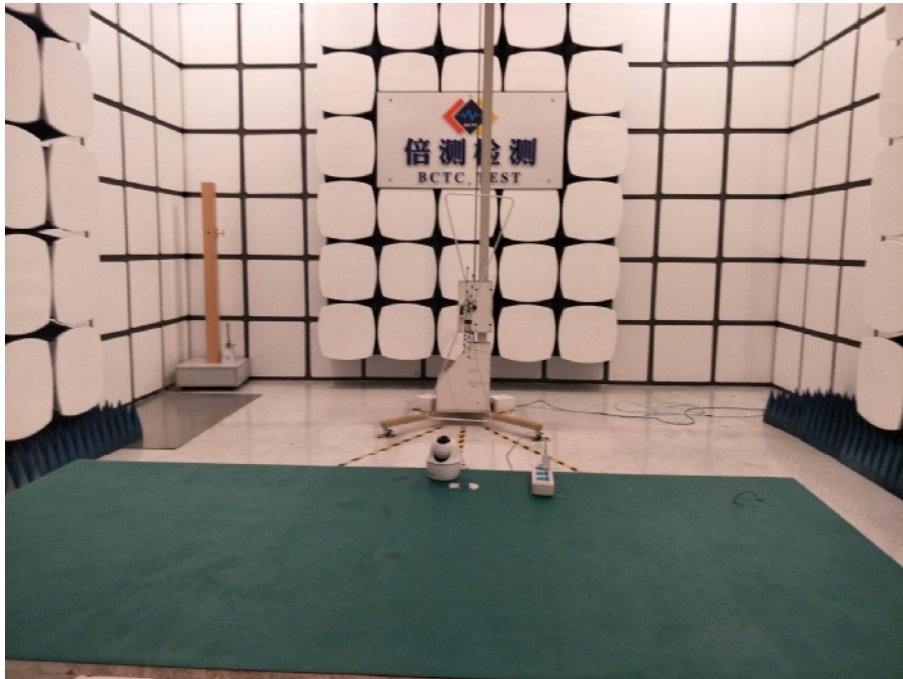
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

### **10.2 EUT ANTENNA**

The EUT antenna is external antenna, and used permanently connected antenna, It comply with the standard requirement.

## 11. EUT TEST PHOTO

### Radiated Measurement Photos



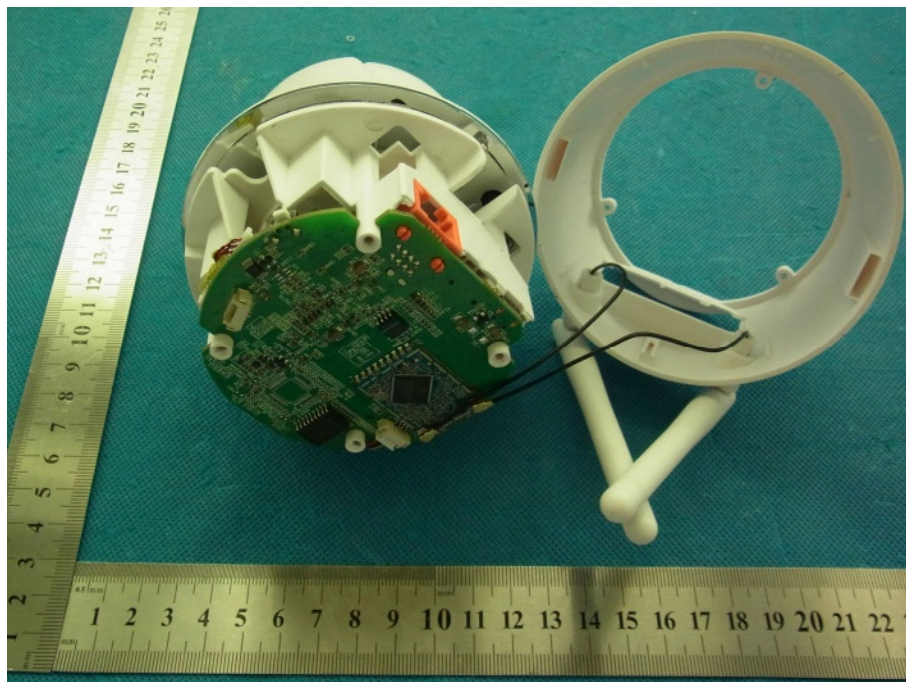
## Conducted Emission





## 12. EUT PHOTO





\*\*\*\*\* END OF REPORT \*\*\*\*\*