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TEST REPORT

FCC PART 15.247

Report Reference No.: CTL1611308201-WF

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Product Name.....: WLAN 802.11b/g/n module

Model/Type reference: WIFI-2-M06USA1

List Model(s).....: See next page

Trade Mark.....: **CHANGHONG 长虹**

FCC ID: 2AC49-M06USA1

Applicant's name: Sichuan Changhong Electronic Component Co., Ltd.

Address of applicant: Luosheng street, Huagai Zhen, Anxian, Mianyang, Sichuan, China

Prepared by: Shenzhen CTL Testing Technology Co., Ltd.

Address.....: Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

Test specification.....:

Standard.....: **FCC Part 15.247:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

TRF Originator: Shenzhen CTL Testing Technology Co., Ltd.

Master TRF: Dated 2011-01

Date of Receipt.....: Nov. 30, 2016

Date of Test Date.....: Nov. 30, 2016–Dec. 14, 2016

Data of Issue.....: Dec. 14, 2016

Result.....: Pass

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TEST REPORT

Test Report No. : CTL1611308201-WF	Dec. 14, 2016 Date of issue
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Equipment under Test : WLAN 802.11b/g/n module

Model /Type : WIFI-2-M06USA1

Listed Models : WIFI-2-M06, WIFI-2-M06USA2, WIFI-2-M06UWP4,
WIFI-2-M601, WIFI-2-M601UWP3

Applicant : Sichuan Changhong Electronic Component Co.,
Ltd.

Address : Luosheng street, Huagai Zhen, Anxian, Mianyang,
Sichuan, China

Manufacturer : Sichuan Changhong Electronic Component Co.,
Ltd.

Address : Luosheng street, Huagai Zhen, Anxian, Mianyang,
Sichuan, China

Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified page 5.

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

**** Modified History ****

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2016-12-14	CTL1611308201-WF	Tracy Qi



Table of Contents

Page

1. SUMMARY.....	5
1.1. TEST STANDARDS.....	5
1.2. TEST DESCRIPTION.....	5
1.3. TEST FIRM	6
1.4. STATEMENT OF THE MEASUREMENT UNCERTAINTY.....	6
2. GENERAL INFORMATION.....	7
2.1. ENVIRONMENTAL CONDITIONS	7
2.2. GENERAL DESCRIPTION OF EUT	7
2.3. DESCRIPTION OF TEST MODES AND TEST FREQUENCY.....	7
2.4. DESCRIPTION OF SUPPORT UNITS	7
2.5. EQUIPMENTS USED DURING THE TEST	8
2.6. RELATED SUBMITTAL(S) / GRANT (S).....	8
2.7. MODIFICATIONS.....	9
3. TEST CONDITIONS AND RESULTS	10
3.1. CONDUCTED EMISSIONS TEST	10
3.2. RADIATED EMISSIONS AND BAND EDGE	13
3.3. MAXIMUM CONDUCTED OUTPUT POWER.....	20
3.4. POWER SPECTRAL DENSITY	21
3.5. 6dB BANDWIDTH.....	24
3.6. OUT-OF-BAND EMISSIONS	27
3.7. ANTENNA REQUIREMENT.....	36
4. TEST SETUP PHOTOS OF THE EUT	37
5. PHOTOS OF THE EUT.....	39

1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

[ANSI C63.10: 2013](#): American National Standard for Testing Unlicensed Wireless Devices

[ANSI C63.4: 2014](#): –American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz
Range of 9 kHz to 40GHz

[KDB558074 D01 V03r05](#): Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.2. Test Description

FCC PART 15.247		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Conducted Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

1.3. Test Firm

1.3.1 Address of the test laboratory

Shenzhen BALUN Technology Co., Ltd.

Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.:832625

Shenzhen BALUN Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 832625

1.4. Statement of the measurement uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Occupied Channel Bandwidth	$\pm 4\%$
RF output power, conducted	$\pm 1.4\text{dB}$
Power Spectral Density, conducted	$\pm 2.5\text{dB}$
Unwanted Emissions, conducted	$\pm 2.8\text{dB}$
All emissions, radiated	$\pm 5.4\text{dB}$
Temperature	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 4\%$

2. GENERAL INFORMATION

2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	WLAN 802.11b/g/n module
Model/Type reference:	WIFI-2-M06USA1
Power supply:	DC 3.3V from host device
WIFI :	
Supported type:	802.11b/802.11g/802.11n(H20)/802.11n(H40)
Modulation:	802.11b: DSSS 802.11g/802.11n(H20)/802.11n(H40): OFDM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz 802.11n(H40): 2422MHz~2452MHz
Channel number:	802.11b/802.11g/802.11n(H20): 11 802.11n(H40): 7
Channel separation:	5MHz
Antenna type:	PIFA Antenna
Antenna gain:	1.0dBi

Note: For more details, please refer to the user's manual of the EUT.

2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing.

There are 11 channels provided to the EUT and Channel 01/06/11 were selected for WIFI test.

Operation Frequency WIFI :

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

Note: The line display in grey were the channel selected for testing

2.4. Description of Support Units

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

No.	Equipment	Manufacturer	Model No.	Notes
1	Notebook	Apple	MacBook Air	--
2	Adapter	Apple	A1436	--
3	Test jig	Sichuan Changhong	T1	--
4	Antenna	Walsin	810654071	Gani 1.0dBi

Data Rate Used:

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Maximum Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission Radiated Emission 9kHz~1GHz& Radiated Emission 1GHz~10th Harmonic	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	6.5Mbps	1/6/11
	11n(40MHz)/OFDM	13.5Mbps	3/6/9
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11
	11n(40MHz)/OFDM	13.5Mbps	3/9

2.5. Equipments Used during the Test

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	ZFSV-30	103118	2016.07.13	2017.07.12
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	1012	2016.07.13	2017.07.12
Spectrum Analyzer	AGILENT	E4440A4	MY4530443	2016.10.15	2017.10.14
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04
LISN	SCHWARZBECK	NSLK	81278127-687	2016.07.05	2017.07.04
Test Antenna-Loop(9kHz-30MHz)	SCHWARZBECK	FMZB	15191519-037	2016.07.22	2017.07.21
Test Antenna-Bi-Log(30MHz-3GHz)	SCHWARZBECK	VULB 9163	9163-624	2016.07.22	2017.07.21
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2016.07.22	2017.07.21
Test Antenna-Horn(15-26.5GHz)	SCHWARZBECK	BBHA 9170	9170-305	2016.07.22	2017.07.21
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2016.02.28	2017.02.27
Shielded Enclosure	ChangNing	CN-1307013	13070	--	--
Power Splitter	KMW	DCPD-LDC	1305003215	2016.07.13	2017.07.12
Spectrum Analyzer	Agilent	N9020	US46220290	2016/01/17	2017/01/16
Power Meter	Anritsu	ML2487B	110553	2016/06/02	2017/06/01
Power Sensor	Anritsu	MA2411B	100345	2016/05/21	2017/05/20
RF Cable	Megalon	RF-A303	N/A	2016/06/02	2017/06/01

The calibration interval was one year

2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.7. Modifications

No modifications were implemented to meet testing criteria.



3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION

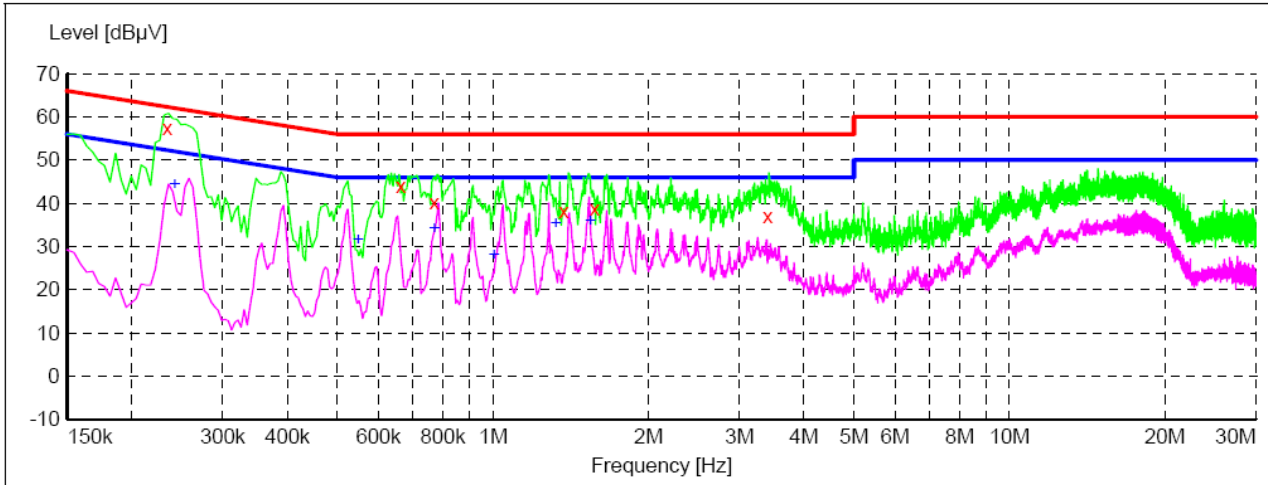


TEST PROCEDURE

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 C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The 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.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Remark: 802.11b/802.11g/802.11n(H20)/802.11n(H40) mode all have been tested ,only worse case of 802.11b High Channel was reported.

Test Mode	WIFI	Line:	L				
SCAN TABLE: "Voltage (9K-30M)FIN"							
Short Description:		150K-30M Voltage					
							
x x x MES CTL161209180_fin							
MEASUREMENT RESULT: "CTL161209180_fin"							
12/12/2016 2:56PM							
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.234000	57.30	10.2	62	5.0	QP	L1	GND
0.662000	43.90	10.2	56	12.1	QP	L1	GND
0.770000	40.10	10.2	56	15.9	QP	L1	GND
1.370000	38.10	10.3	56	17.9	QP	L1	GND
1.574000	38.60	10.3	56	17.4	QP	L1	GND
3.398000	37.00	10.4	56	19.0	QP	L1	GND
MEASUREMENT RESULT: "CTL161209180_fin2"							
12/12/2016 2:56PM							
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.242000	44.40	10.2	52	7.6	AV	L1	GND
0.548000	31.60	10.2	46	14.4	AV	L1	GND
0.770000	34.20	10.2	46	11.8	AV	L1	GND
1.004000	28.00	10.3	46	18.0	AV	L1	GND
1.322000	35.10	10.3	46	10.9	AV	L1	GND
1.544000	35.70	10.3	46	10.3	AV	L1	GND

Test Mode

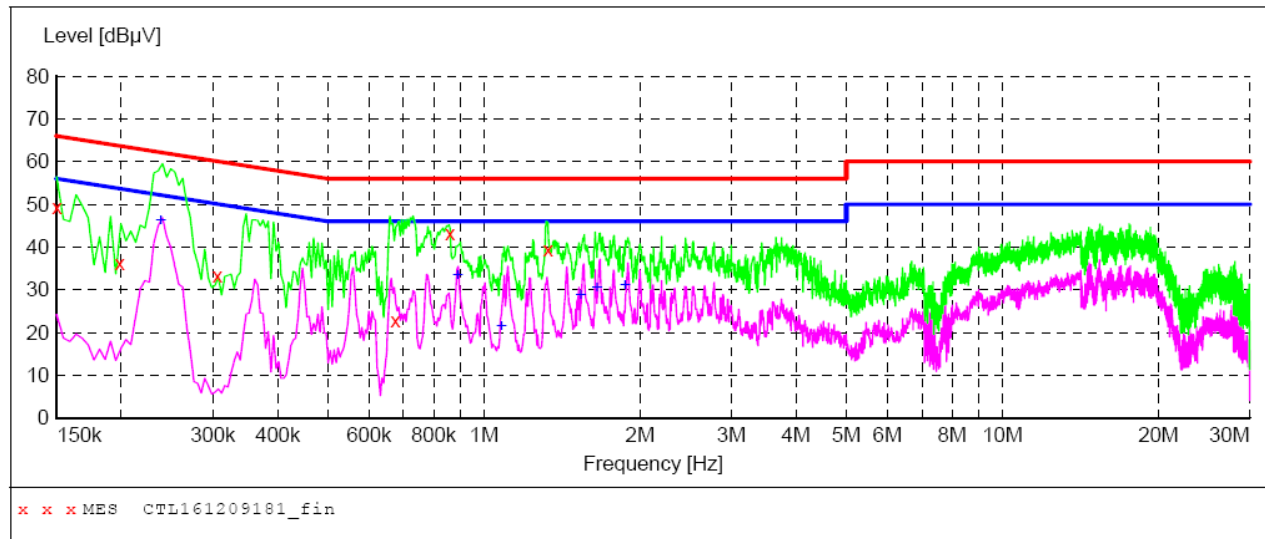
WIFI

Line:

N

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL161209181_fin"**

12/12/2016 3:00PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	49.40	10.2	66	16.6	QP	N	GND
0.198000	36.10	10.2	64	27.6	QP	N	GND
0.306000	33.30	10.2	60	26.8	QP	N	GND
0.674000	22.90	10.2	56	33.1	QP	N	GND
0.860000	43.10	10.2	56	12.9	QP	N	GND
1.328000	39.30	10.3	56	16.7	QP	N	GND

MEASUREMENT RESULT: "CTL161209181_fin2"

12/12/2016 3:00PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.238000	46.10	10.2	52	6.1	AV	N	GND
0.890000	33.20	10.2	46	12.8	AV	N	GND
1.082000	21.40	10.3	46	24.6	AV	N	GND
1.538000	28.60	10.3	46	17.4	AV	N	GND
1.652000	30.30	10.3	46	15.7	AV	N	GND
1.874000	31.10	10.3	46	14.9	AV	N	GND

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

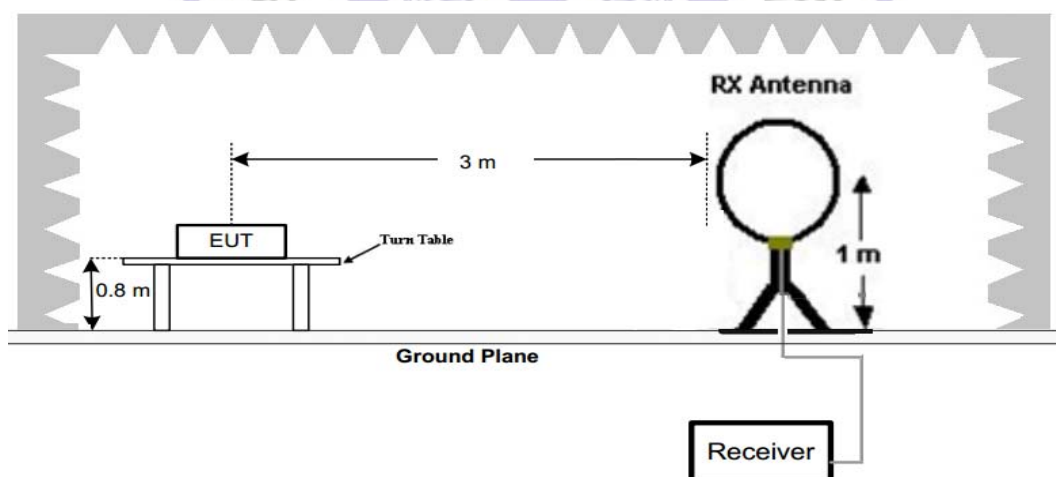
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

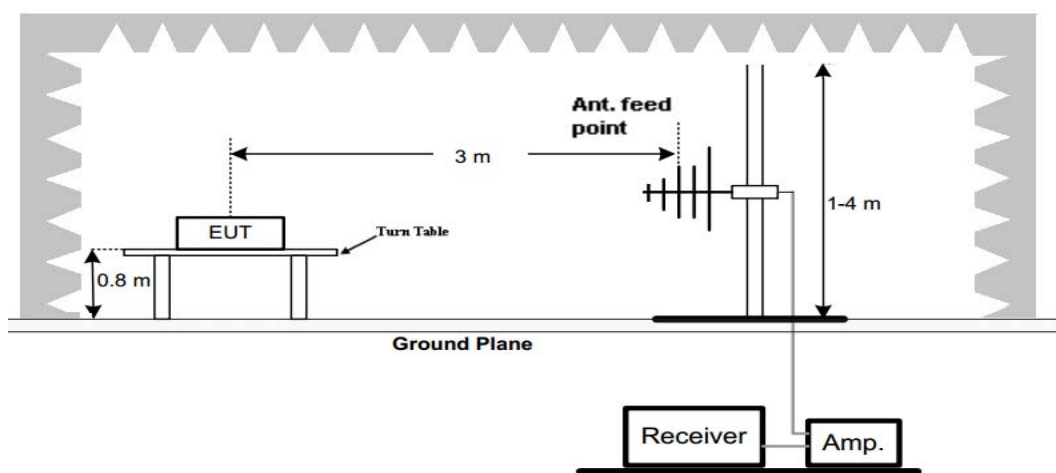
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

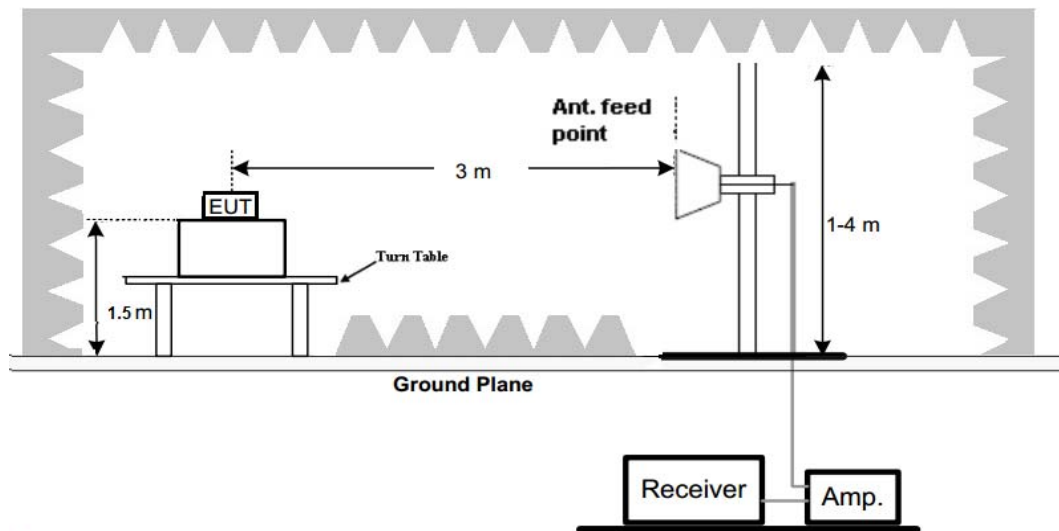
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

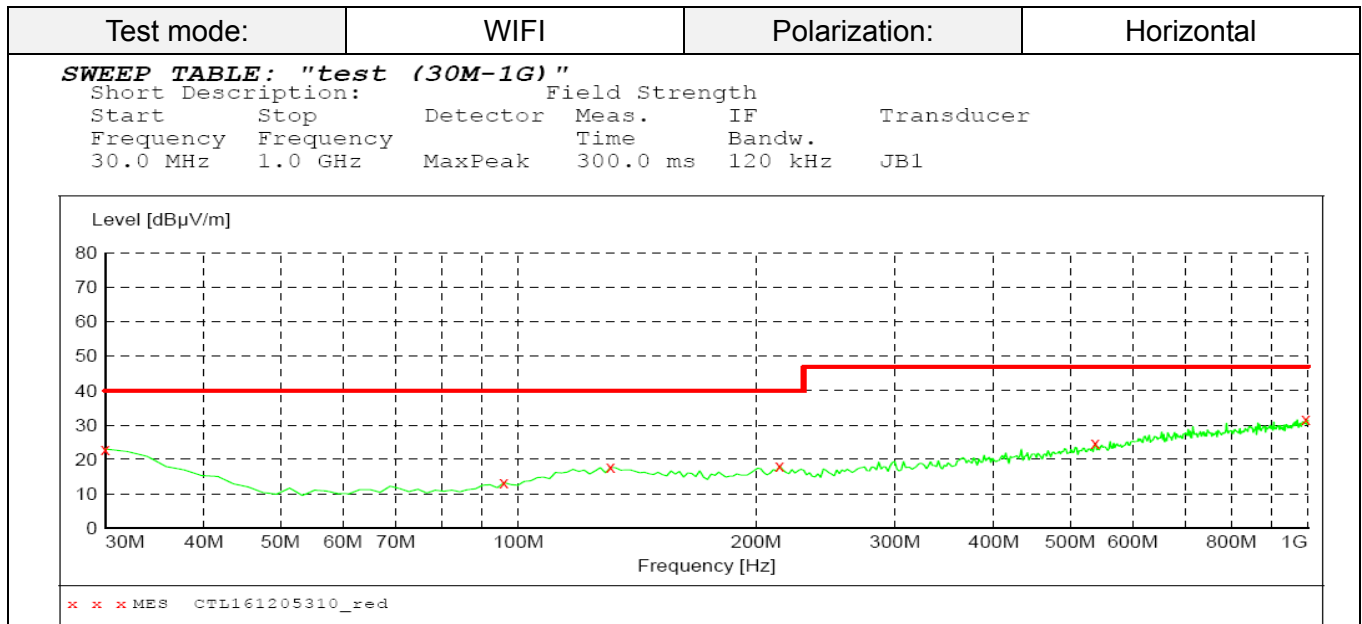
1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

TEST RESULTS

Remark:

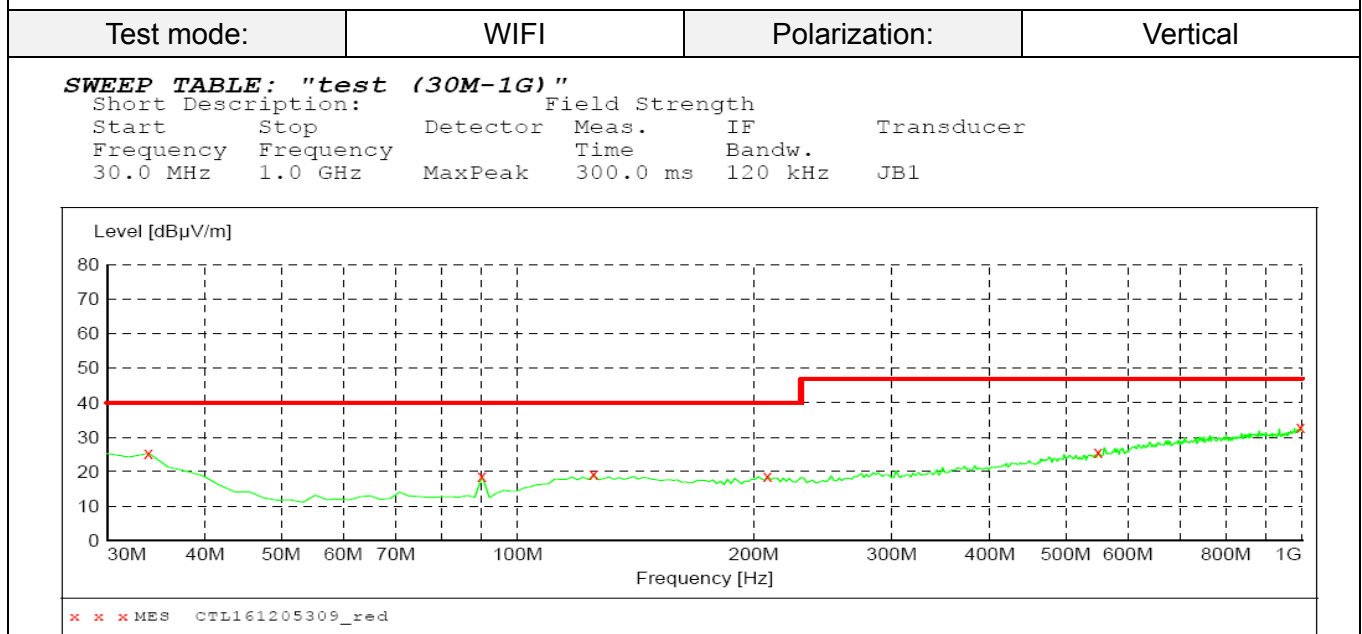
1. All three channels (lowest/middle/highest) of each mode were measured below 1GHz and recorded worst case at 802.11b low channel.
2. All three channels (lowest/middle/highest) of each mode were measured above 1GHz and recorded worst case at 802.11b mode.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

**MEASUREMENT RESULT: "CTL161205310_red"**

12/5/2016 9:47AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	23.00	20.8	40.0	17.0	---	0.0	0.00	HORIZONTAL
95.960000	13.20	10.2	40.0	26.8	---	0.0	0.00	HORIZONTAL
130.880000	17.70	14.5	40.0	22.3	---	0.0	0.00	HORIZONTAL
214.300000	18.10	14.0	40.0	21.9	---	0.0	0.00	HORIZONTAL
538.280000	24.60	20.6	47.0	22.4	---	0.0	0.00	HORIZONTAL
994.180000	31.80	27.1	47.0	15.2	---	0.0	0.00	HORIZONTAL

**MEASUREMENT RESULT: "CTL161205309_red"**

12/5/2016 9:46AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
33.880000	25.30	17.7	40.0	14.7	---	0.0	0.00	VERTICAL
90.140000	18.60	9.4	40.0	21.4	---	0.0	0.00	VERTICAL
125.060000	19.20	14.6	40.0	20.8	---	0.0	0.00	VERTICAL
208.480000	18.60	14.0	40.0	21.4	---	0.0	0.00	VERTICAL
549.920000	25.70	21.0	47.0	21.3	---	0.0	0.00	VERTICAL
996.120000	33.00	27.2	47.0	14.0	---	0.0	0.00	VERTICAL

For 1GHz to 25GHz**802.11b Mode (above 1GHz)**

Note: 802.11b/802.11g/802.11n (H20)/802.11n (H40) all have been tested, only worse case 802.11b is reported

Frequency(MHz):			2412		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	57.79	PK	74	16.21	53.24	33.52	6.92	35.89	4.55
4824.00	49.42	AV	54	4.58	44.87	33.52	6.92	35.89	4.55
5125.75	48.81	PK	74	25.19	41.61	34.38	7.10	34.28	7.20
5125.75	--	AV	54	--	--	--	--	--	--
7236.00	48.44	PK	74	25.56	37.17	37.10	9.19	35.02	11.27
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2412		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	58.02	PK	74	15.98	53.47	33.52	6.92	35.89	4.55
4824.00	50.17	AV	54	3.83	45.62	33.52	6.92	35.89	4.55
5125.75	49.62	PK	74	24.38	42.42	34.38	7.10	34.28	7.20
5125.75	--	AV	54	--	--	--	--	--	--
7236.00	49.04	PK	74	24.96	37.77	37.10	9.19	35.02	11.27
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	56.91	PK	74	17.09	50.67	33.59	6.95	34.3	6.24
4874.00	49.83	AV	54	4.17	43.59	33.59	6.95	34.3	6.24
5215.50	50.14	PK	74	23.86	42.54	34.56	7.15	34.11	7.60
5215.50	--	AV	54	--	--	--	--	--	--
7311.00	49.77	PK	74	24.23	38.11	37.44	9.22	35	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	58.04	PK	74	15.96	51.80	33.59	6.95	34.3	6.24
4874.00	51.82	AV	54	2.18	45.58	33.59	6.95	34.3	6.24
5215.50	52.04	PK	74	21.96	44.44	34.56	7.15	34.11	7.60
5215.50	--	AV	54	--	--	--	--	--	--
7311.00	50.91	PK	74	23.09	39.25	37.44	9.22	35	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	57.74	PK	74	16.26	52.96	33.71	6.98	35.91	4.78
4924.00	50.25	AV	54	3.75	45.47	33.71	6.98	35.91	4.78
5105.50	51.05	PK	74	22.95	43.89	34.34	7.09	34.27	7.16
5105.50	--	AV	54	--	--	--	--	--	--
7386.00	49.49	PK	74	24.51	37.61	37.61	9.25	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	58.83	PK	74	15.17	54.05	33.71	6.98	35.91	4.78
4924.00	51.04	AV	54	2.96	46.26	33.71	6.98	35.91	4.78
5105.50	48.89	PK	74	25.11	41.73	34.34	7.09	34.27	7.16
5105.50	--	AV	54	--	--	--	--	--	--
7386.00	50.06	PK	74	23.94	38.18	37.61	9.25	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
3. Margin value = Limit value - Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

Results of Band Edges Test (Radiated)

Note: 802.11b/802.11g/802.11n (H20)/802.11n (H40) all have been tested, only worse case 802.11b is reported

Frequency(MHz):			2412		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2412.00	117.20	PK	--	--	83.78	28.80	4.62	0	33.42
2412.00	109.05	AV	--	--	75.63	28.80	4.62	0	33.42
2357.25	44.28	PK	74	29.72	11.21	28.51	4.56	0	33.07
2357.25	--	AV	54	--	--	--	--	--	--
2390.00	51.02	PK	74	22.98	17.7	28.72	4.60	0	33.32
2390.00	--	AV	54	--	--	--	--	--	--
2400.00	54.85	PK	74	19.15	21.46	28.78	4.61	0	33.39
2400.00	49.01	AV	54	4.99	15.62	28.78	4.61	0	33.39

Frequency(MHz):			2412		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2412.00	118.90	PK	--	--	85.48	28.80	4.62	0	33.42
2412.00	109.74	AV	--	--	76.32	28.80	4.62	0	33.42
2357.25	45.96	PK	74	28.04	12.89	28.51	4.56	0	33.07
2357.25	--	AV	54	--	--	--	--	--	--
2390.00	50.42	PK	74	23.58	17.1	28.72	4.60	0	33.32
2390.00	--	AV	54	--	--	--	--	--	--
2400.00	54.76	PK	74	19.24	21.37	28.78	4.61	0	33.39
2400.00	48.14	AV	54	5.86	14.75	28.78	4.61	0	33.39

Frequency(MHz):			2462		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2462.00	117.46	PK	--	--	83.89	28.89	4.68	0	33.57
2462.00	110.18	AV	--	--	76.61	28.89	4.68	0	33.57
2483.50	45.72	PK	74	28.28	12.09	28.93	4.70	0	33.63
2483.50	--	AV	54	--	--	28.93	4.70	0	--
2488.75	50.99	PK	74	23.01	17.34	28.94	4.71	0	33.65
2488.75	--	AV	54	--	--	--	--	--	--
2500.00	54.44	PK	74	19.56	20.76	28.96	4.72	0	33.68
2500.00	48.37	AV	54	5.63	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2462.00	117.72	PK	--	--	84.15	28.89	4.68	0	33.57
2462.00	108.09	AV	--	--	74.52	28.89	4.68	0	33.57
2483.50	43.18	PK	74	30.82	9.55	28.93	4.70	0	33.63
2483.50	--	AV	54	--	--	28.93	4.70	0	--
2488.75	50.42	PK	74	23.58	16.77	28.94	4.71	0	33.65
2488.75	--	AV	54	--	--	--	--	--	--
2500.00	53.94	PK	74	20.06	20.26	28.96	4.72	0	33.68
2500.00	49.01	AV	54	4.99	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
3. Margin value = Limit value - Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
7. For fundamental frequency, RBW 3MHz VBW 3MHz Peak detector is for PK Value; RMS detector is for AV value.



3.3. Maximum Conducted Output Power

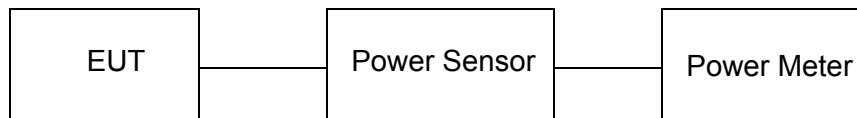
Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

WIFI				
Type	Channel	Output power PK (dBm)	Limit (dBm)	Result
802.11b	01	22.25	30.00	Pass
	06	21.66		
	11	22.54		
802.11g	01	22.88	30.00	Pass
	06	22.25		
	11	23.12		
802.11n(HT20)	01	21.65	30.00	Pass
	06	21.00		
	11	21.86		
802.11n(HT40)	03	20.20	30.00	Pass
	06	19.48		
	09	19.73		

Note: 1.The test results including the cable lose.

3.4. Power Spectral Density

Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
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 power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

Test Configuration

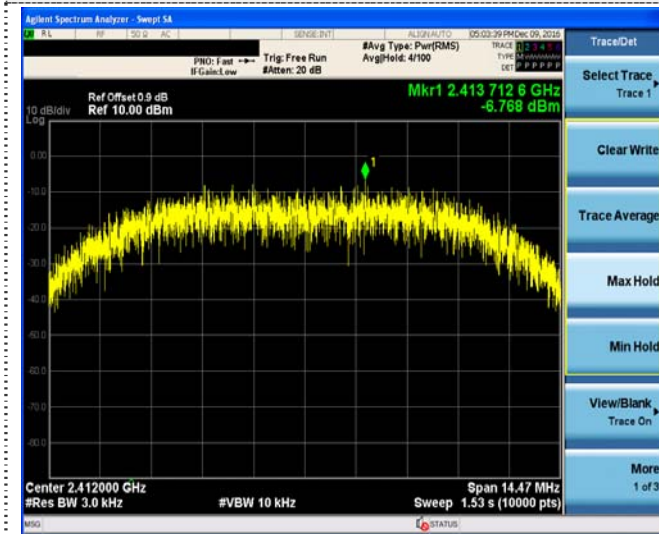


Test Results

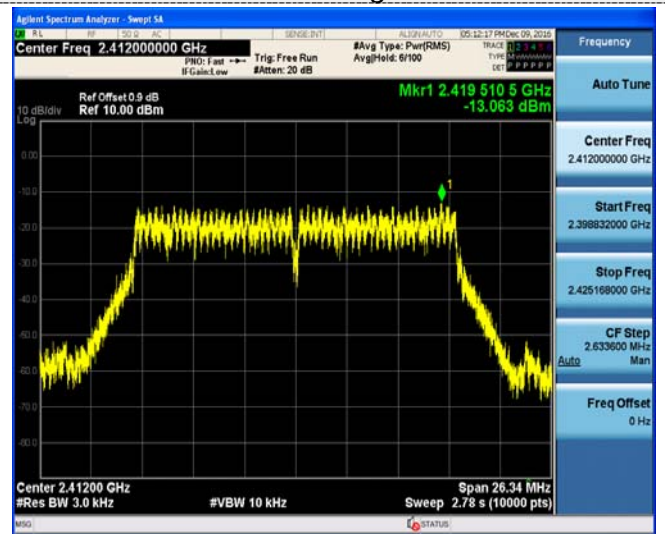
WIFI				
Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-6.768	8.00	Pass
	06	-7.309		
	11	-6.944		
802.11g	01	-13.063	8.00	Pass
	06	-12.583		
	11	-12.342		
802.11n(HT20)	01	-13.470	8.00	Pass
	06	-14.418		
	11	-13.440		
802.11n(HT40)	03	-18.622	8.00	Pass
	06	-18.982		
	09	-19.503		

Test plot as follows:

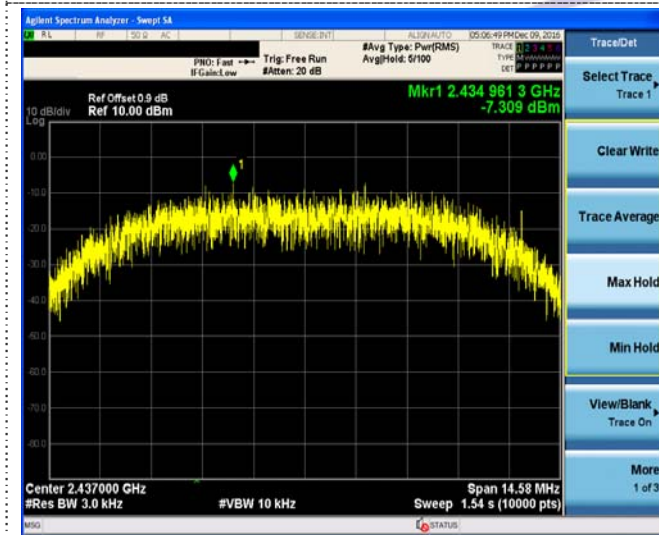
802.11b



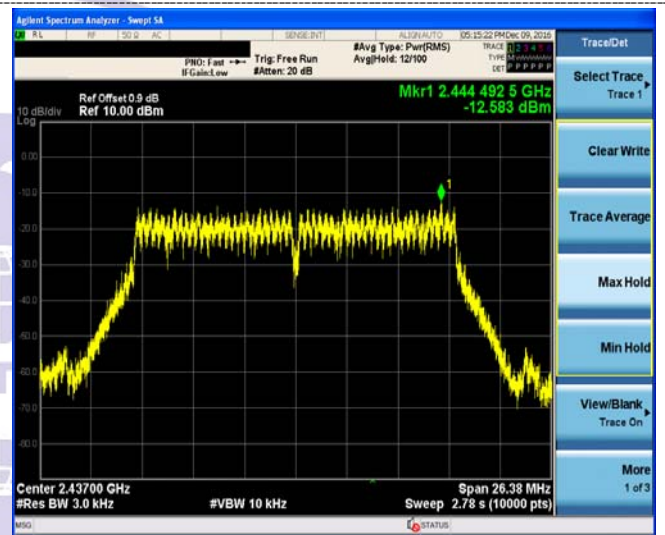
802.11g



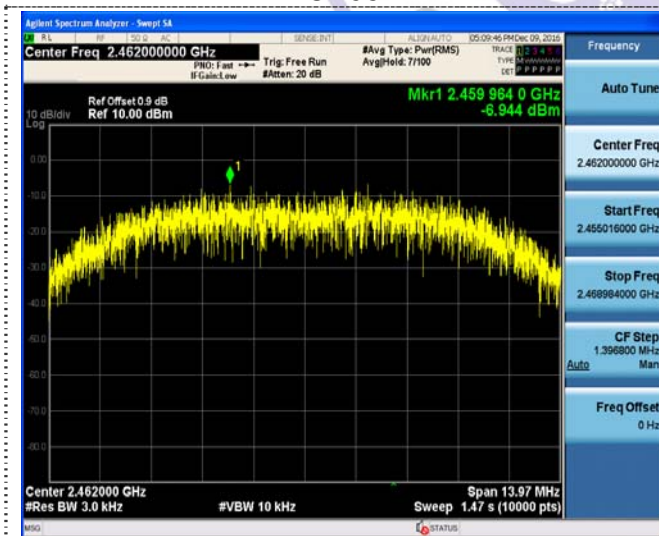
CH01



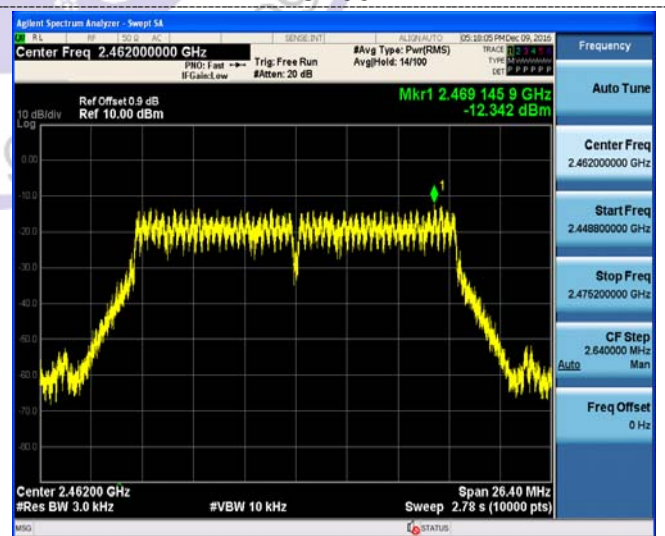
CH01



CH06



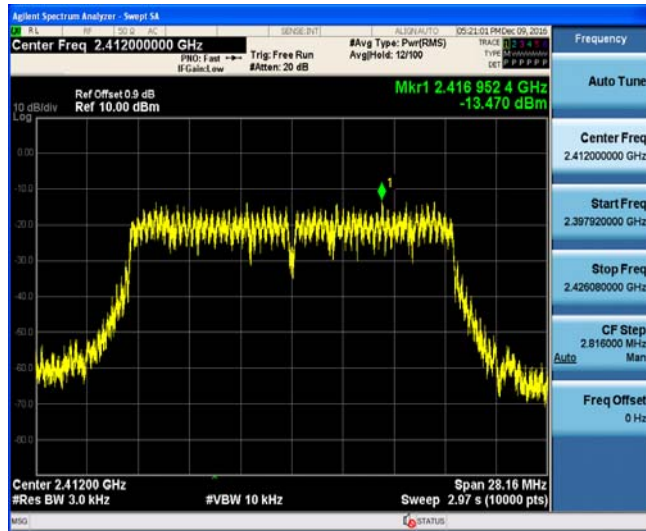
CH06



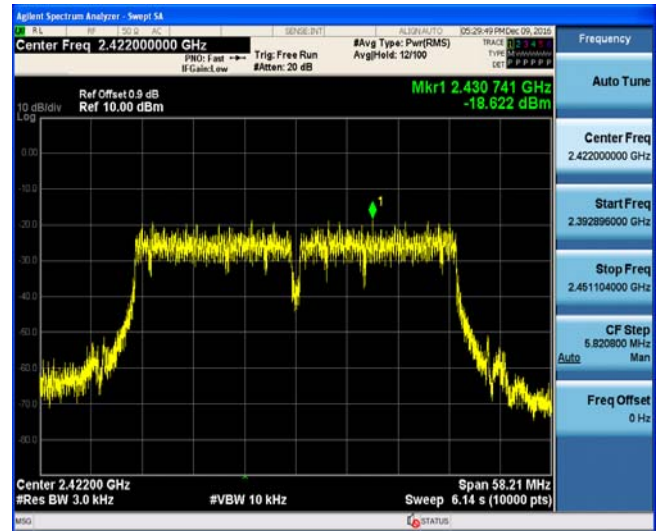
CH11

CH11

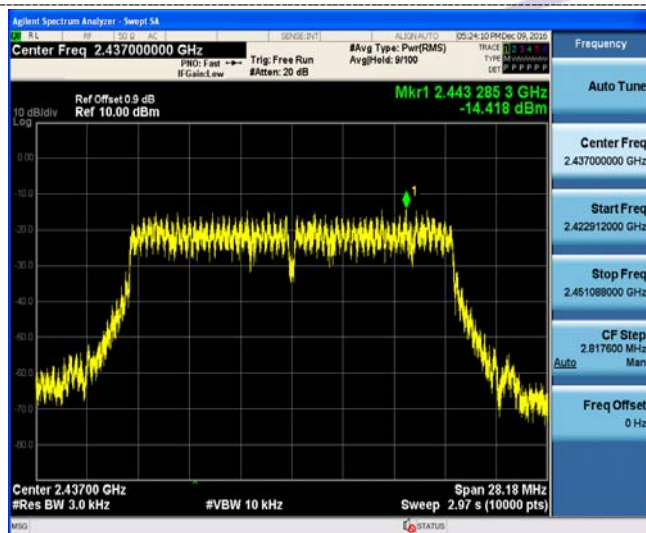
802.11n(HT20)



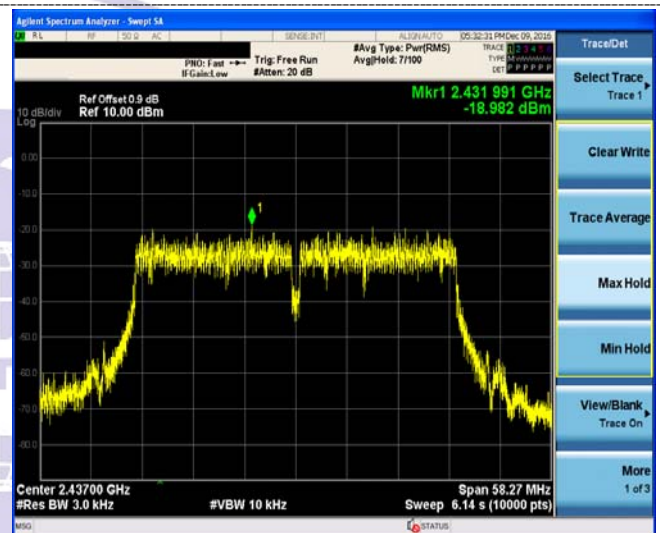
802.11n(HT40)



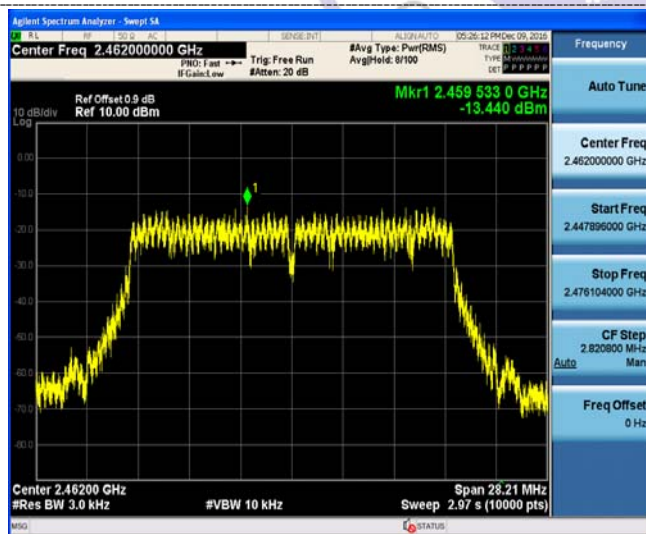
CH01



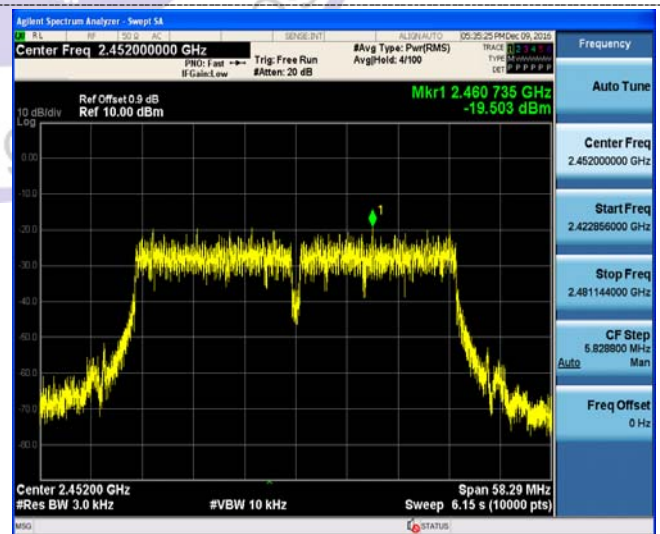
CH03



CH06



CH06



CH11

CH09

3.5. 6dB Bandwidth

Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

Test Configuration

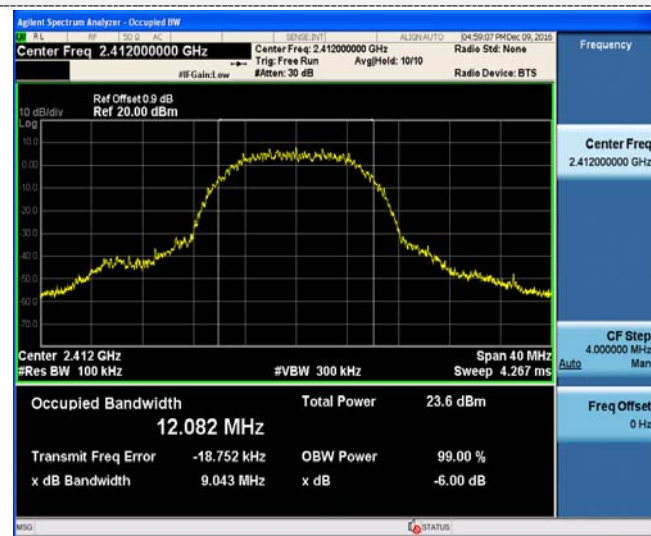


Test Results

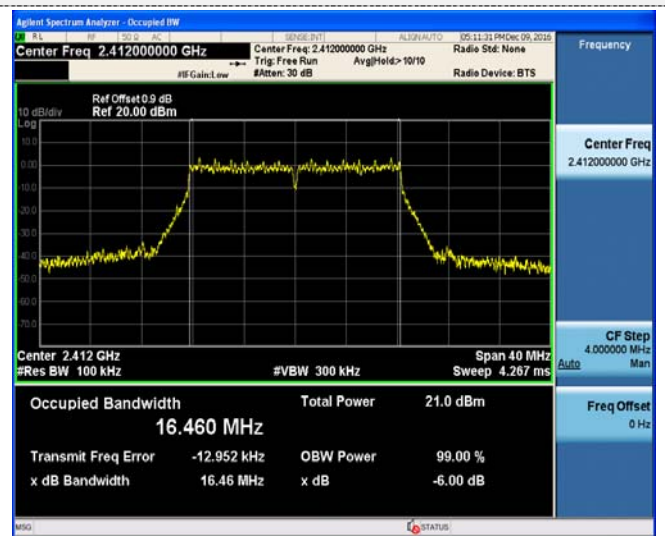
WIFI					
Type	Channel	6dB Bandwidth (MHz)	99% OBW (MHz)	Limit (KHz)	Result
802.11b	01	9.043	12.082	≥500	Pass
	06	9.110	12.106		
	11	8.730	12.077		
802.11g	01	16.46	16.460	≥500	Pass
	06	16.49	16.467		
	11	16.50	16.462		
802.11n(HT20)	01	17.60	17.560	≥500	Pass
	06	17.61	17.569		
	11	17.63	17.559		
802.11n(HT40)	03	36.38	36.191	≥500	Pass
	06	36.42	36.197		
	09	36.43	36.159		

Test plot as follows:

802.11b



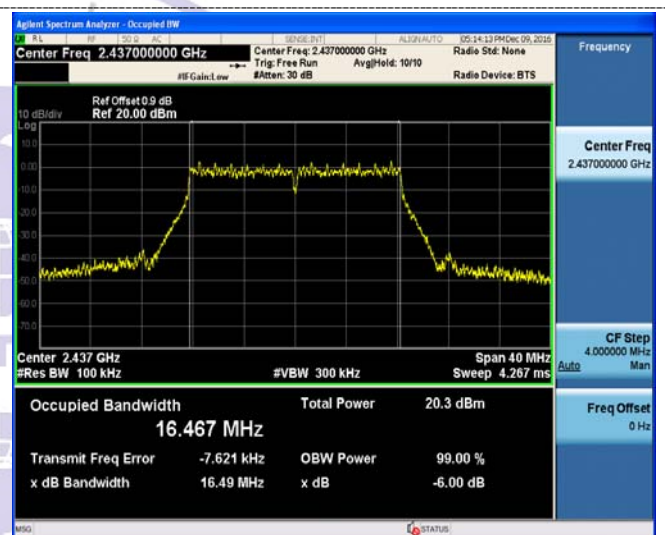
802.11g



CH01



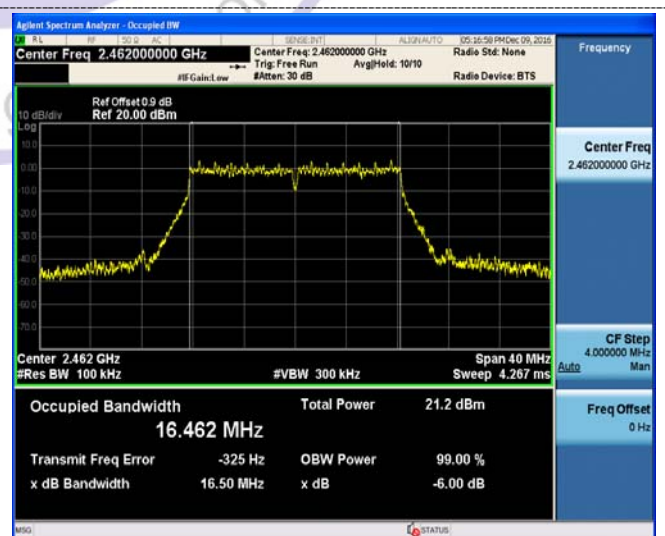
CH01



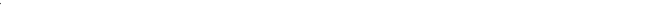
CH06



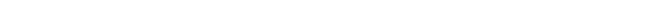
CH06



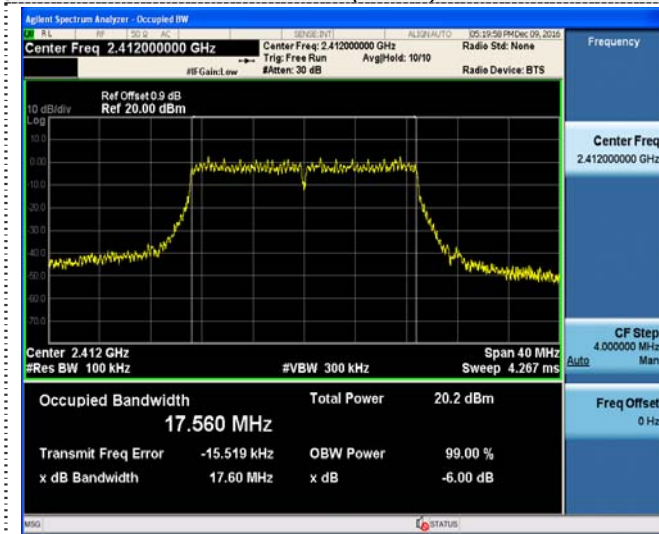
CH11



CH11

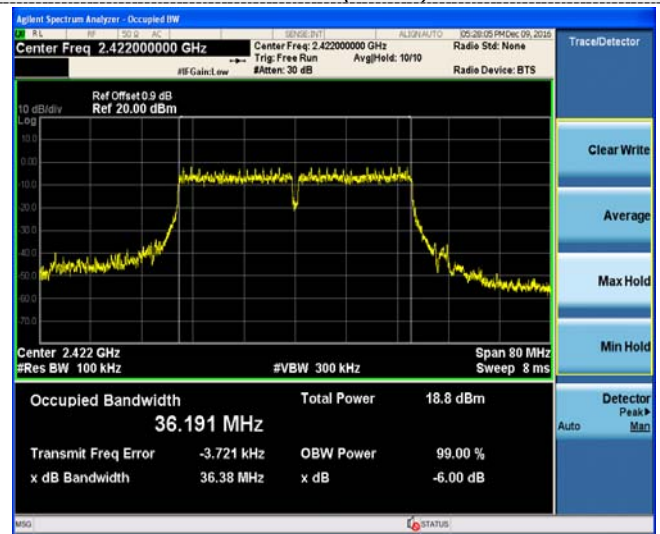


802.11n(HT20)

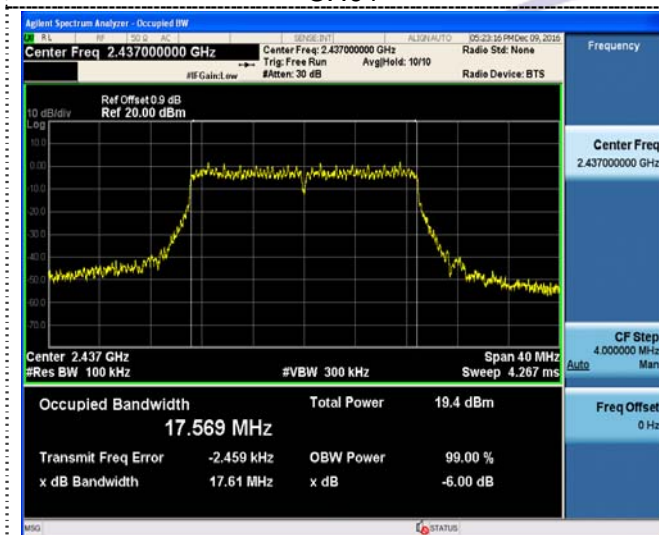


CH01

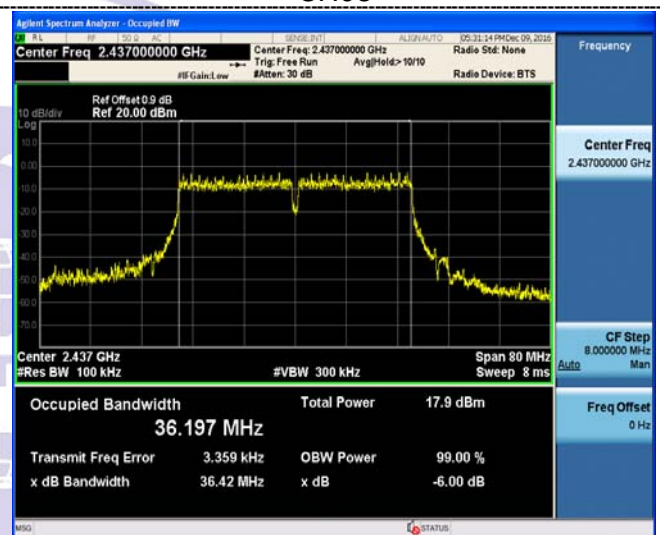
802.11n(HT40)



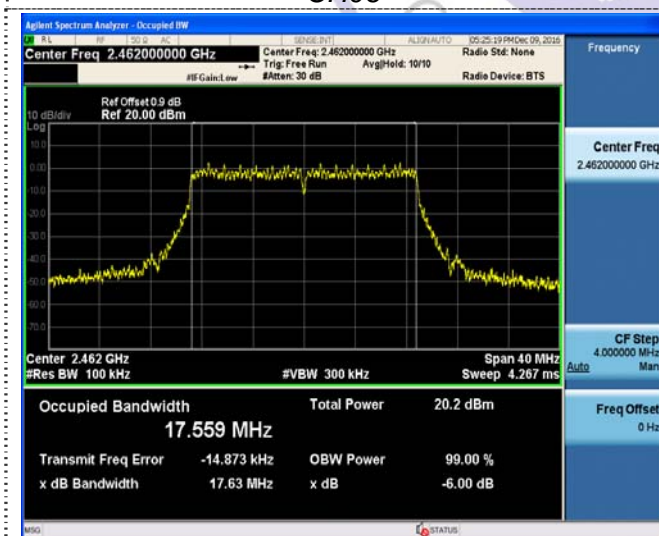
CH03



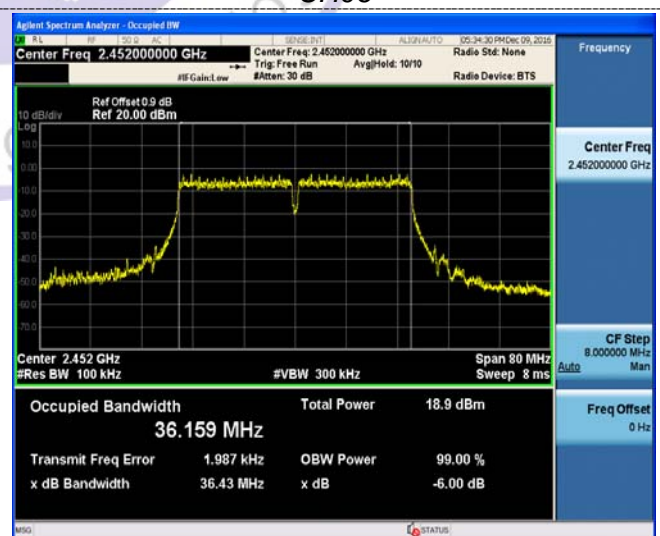
CH06



CH06



CH11



CH09

3.6. Out-of-band Emissions

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. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, band edge and out-of-band emissions.

Test Configuration



Test Results

Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

Test plot as follows:

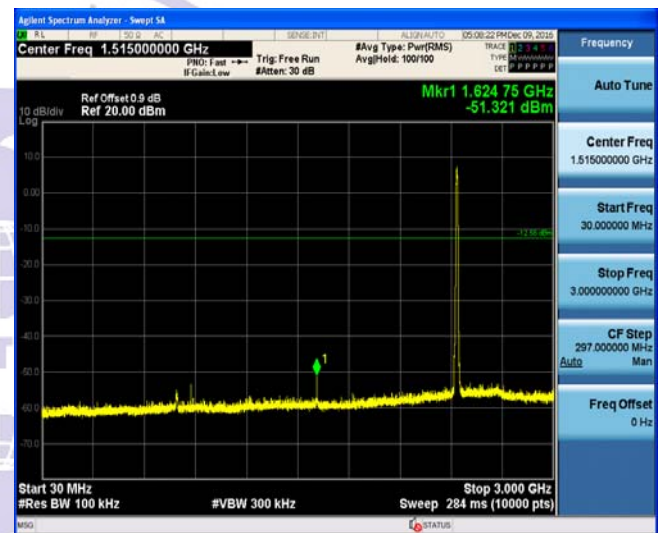
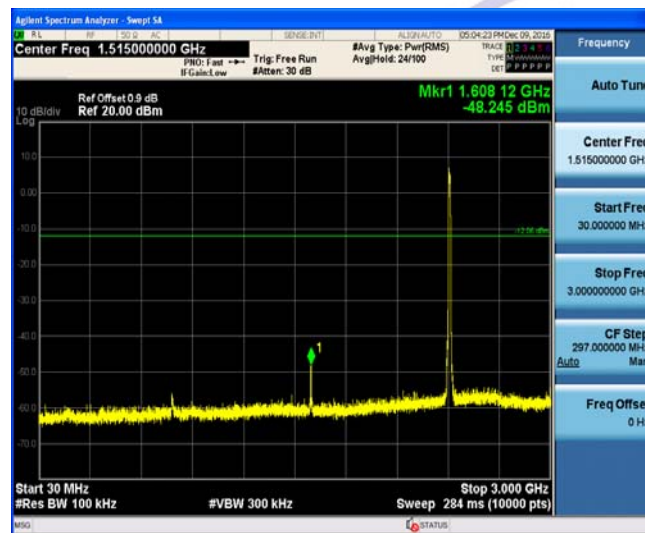
802.11b CH01



802.11b CH06



Reference



30MHz-3GHz

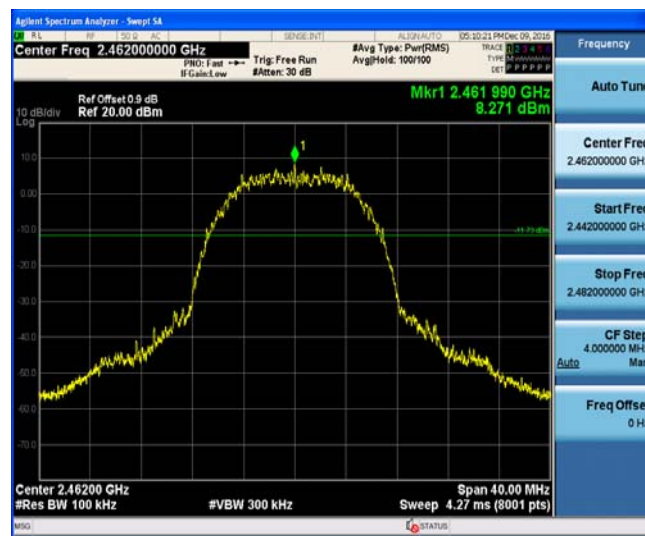
30MHz-3GHz



3GHz-25GHz

3GHz-25GHz

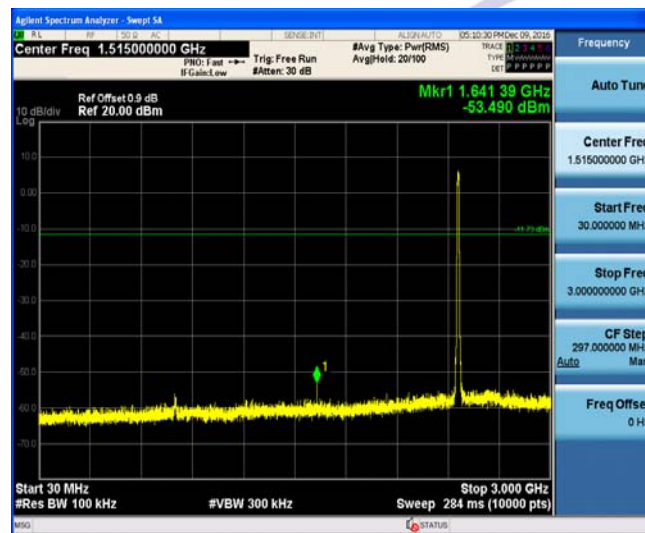
802.11b CH11



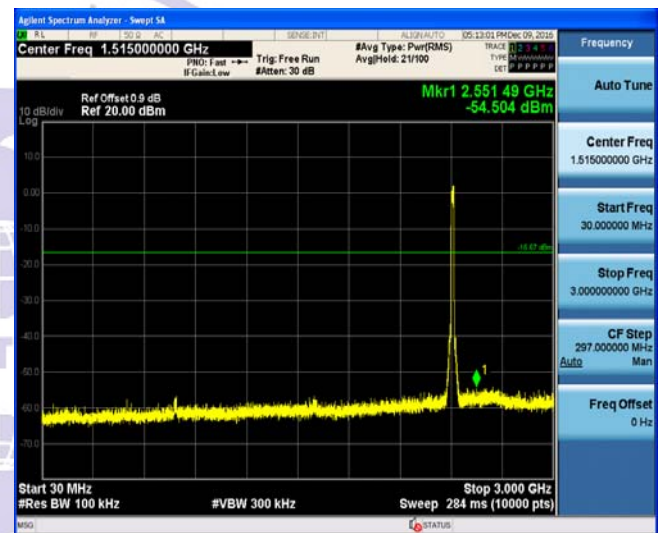
802.11g CH01



Reference



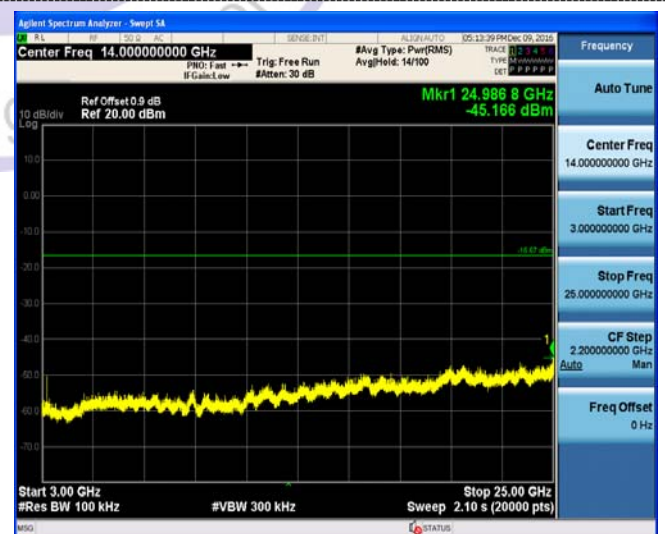
Reference



30MHz-3GHz



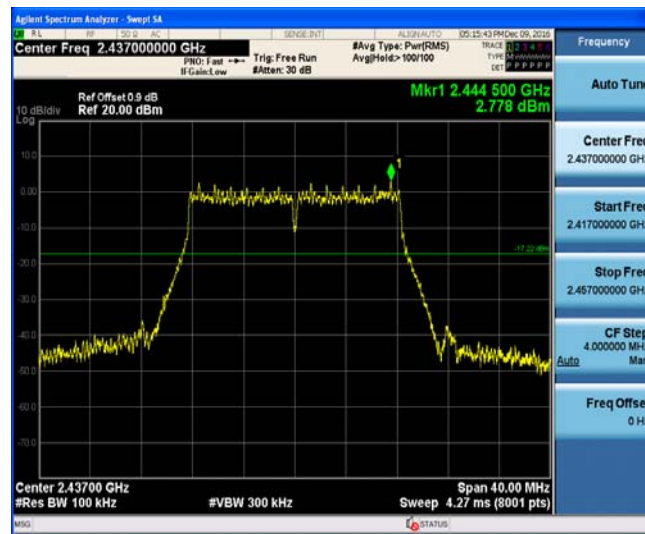
30MHz-3GHz



3GHz-25GHz

3GHz-25GHz

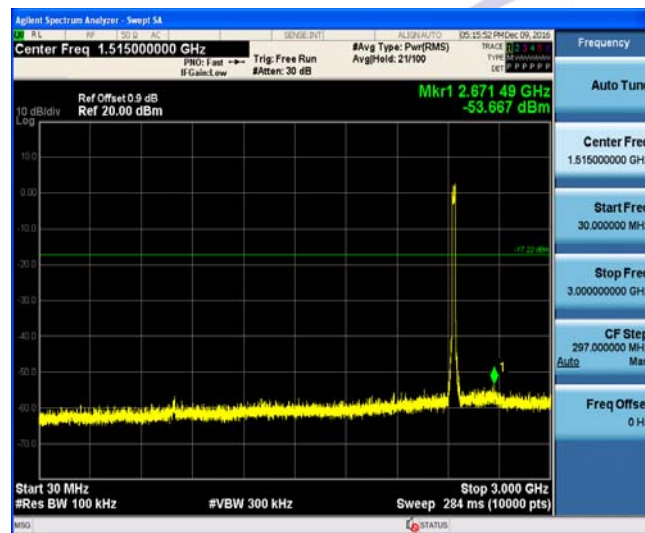
802.11g CH06



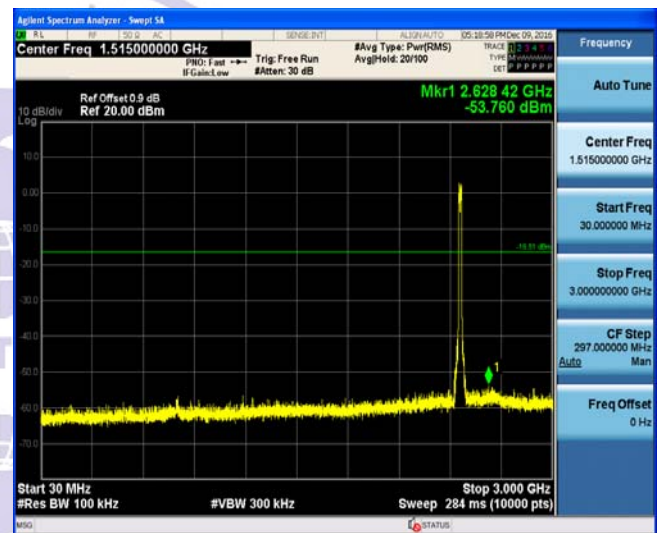
802.11g CH11



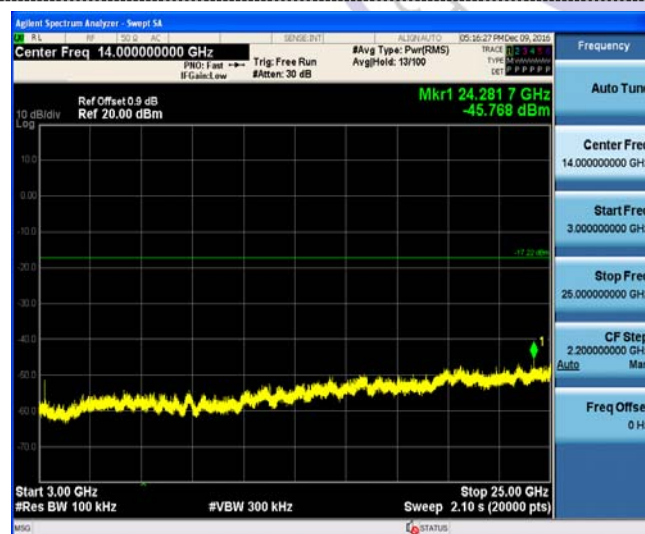
Reference



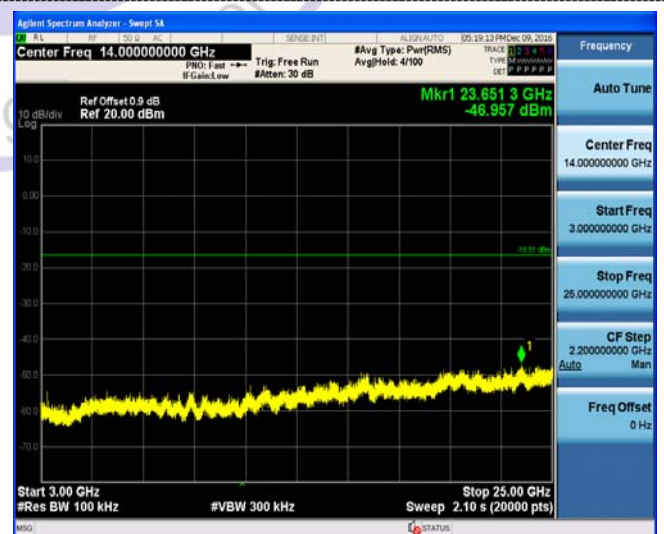
Reference



30MHz-3GHz



30MHz-3GHz



3GHz-25GHz

3GHz-25GHz

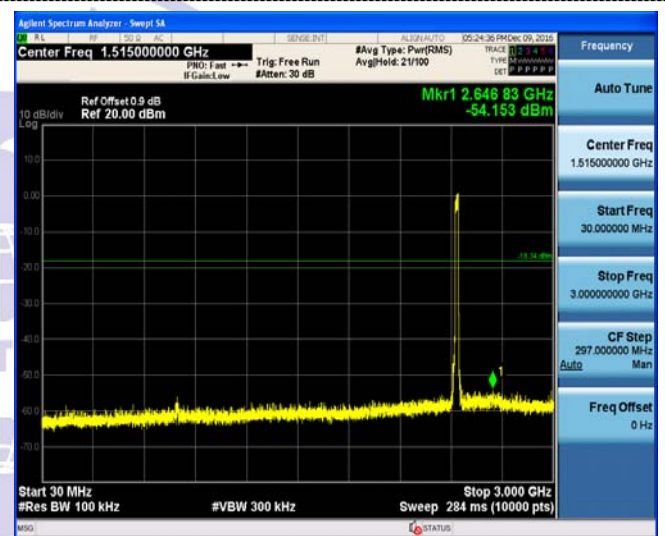
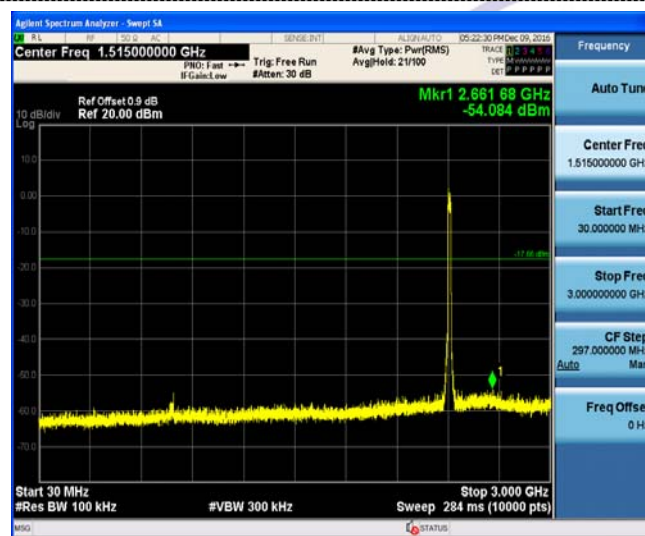
802.11n(HT20) CH01



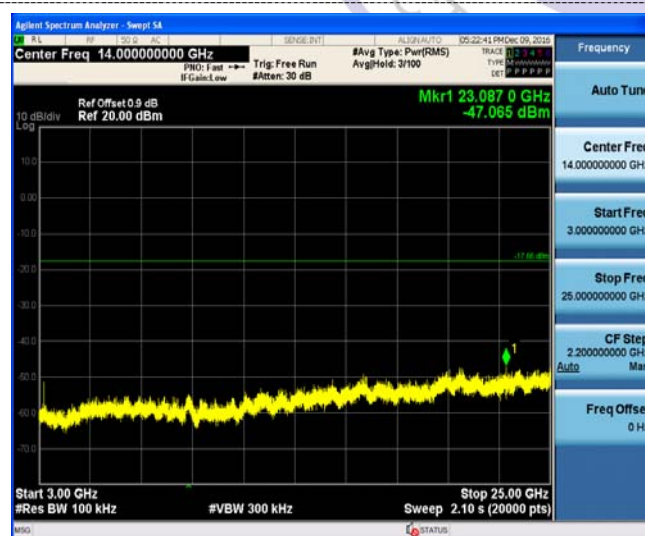
802.11n(HT20) CH06



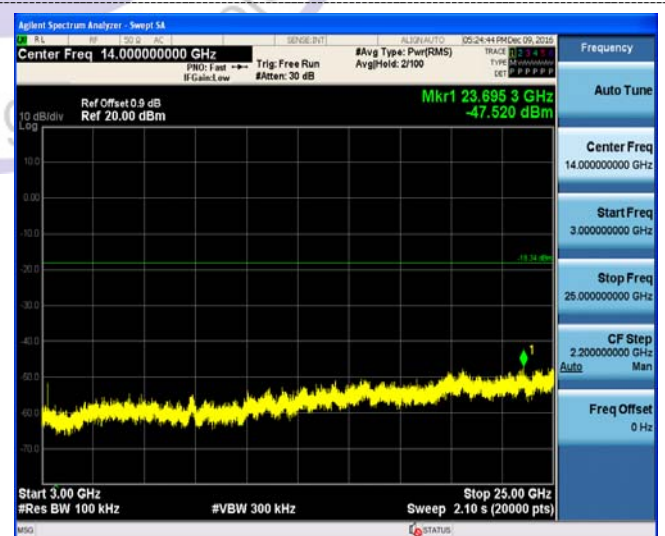
Reference



30MHz-3GHz



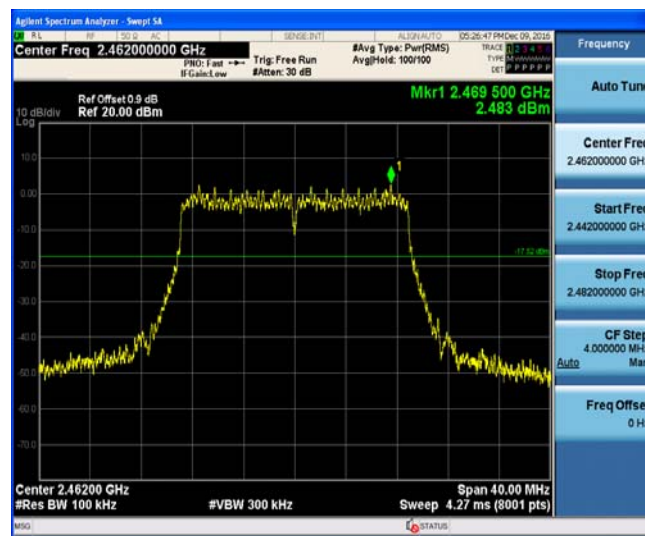
30MHz-3GHz



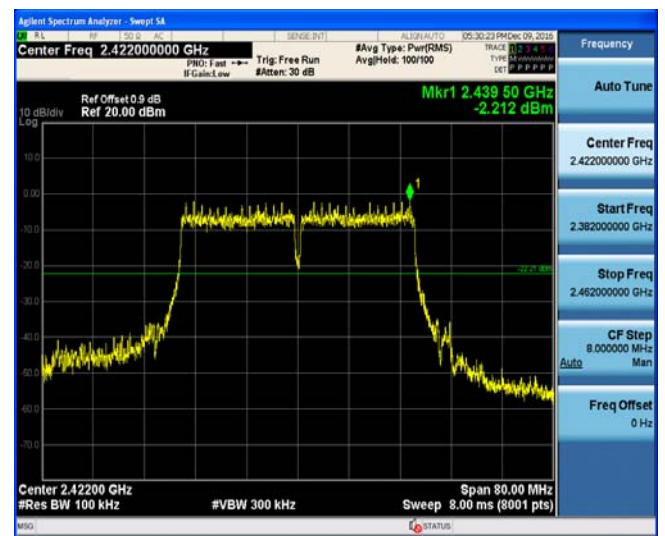
3GHz-25GHz

3GHz-25GHz

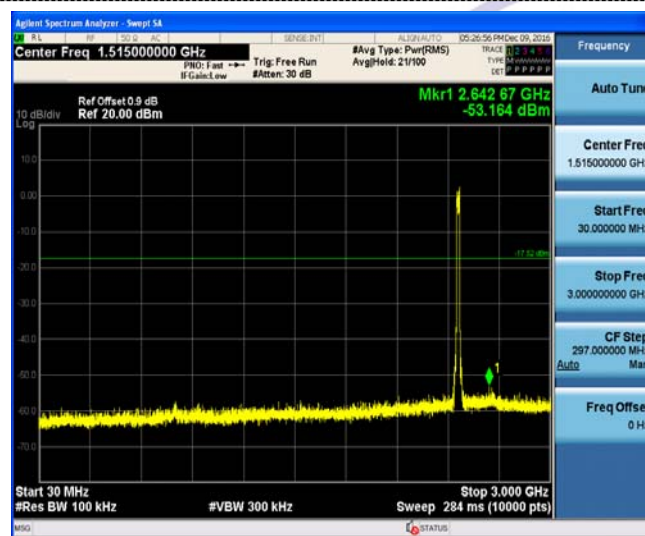
802.11n(HT20) CH11



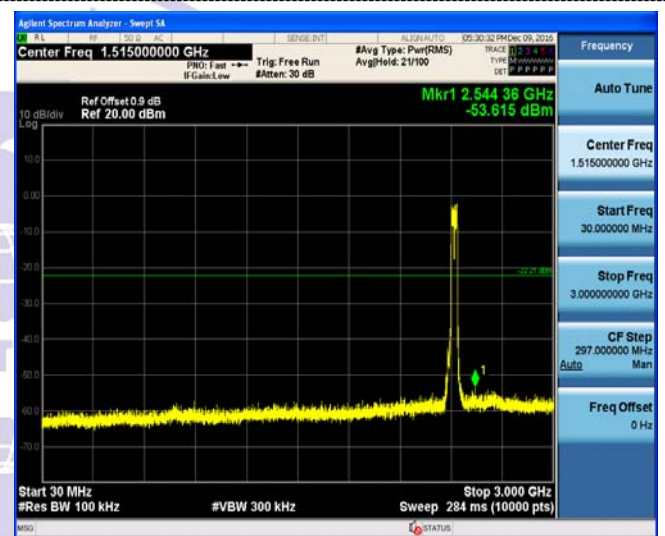
802.11n(HT40) CH03



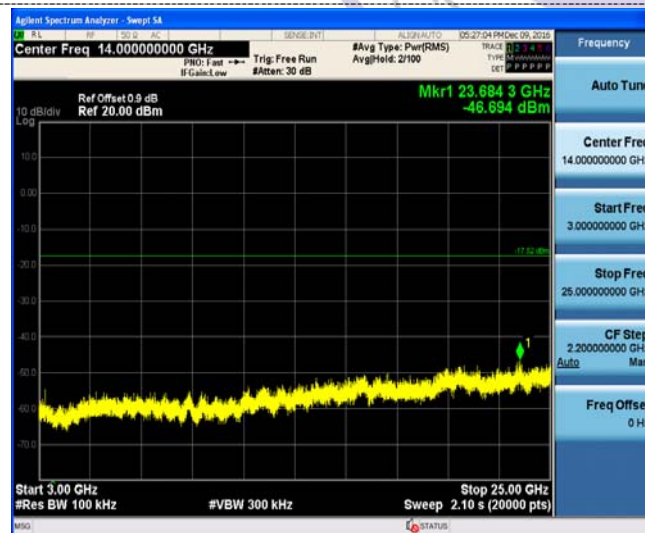
Reference



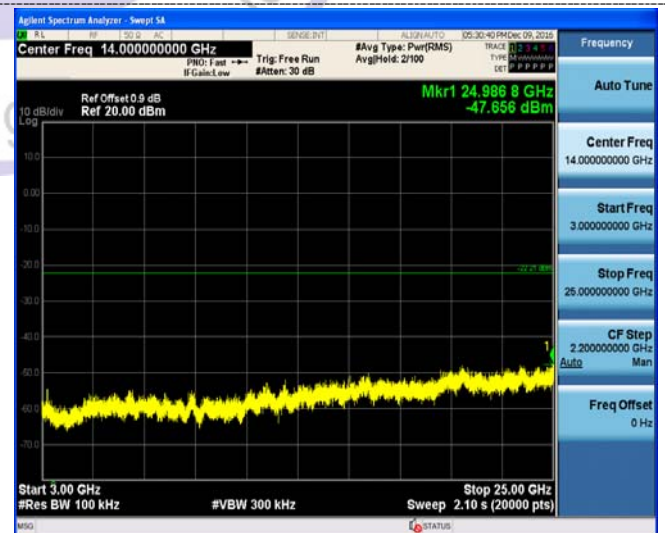
Reference



30MHz-3GHz



30MHz-3GHz



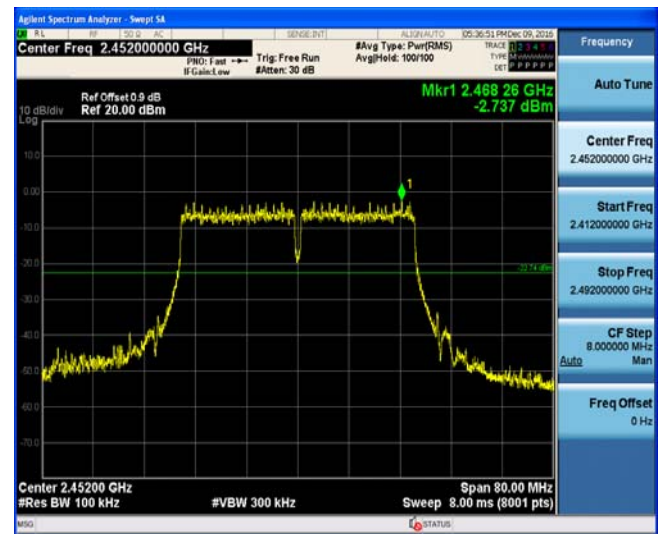
3GHz-25GHz

3GHz-25GHz

802.11n(HT40) CH06



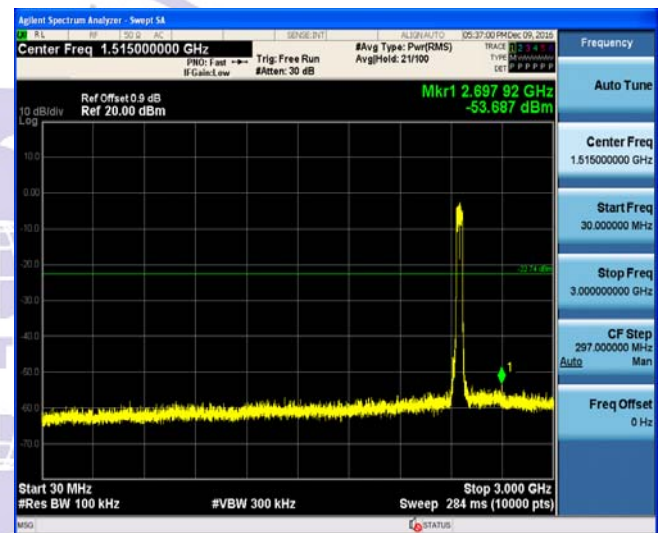
802.11n(HT40) CH09



Reference



Reference



30MHz-3GHz

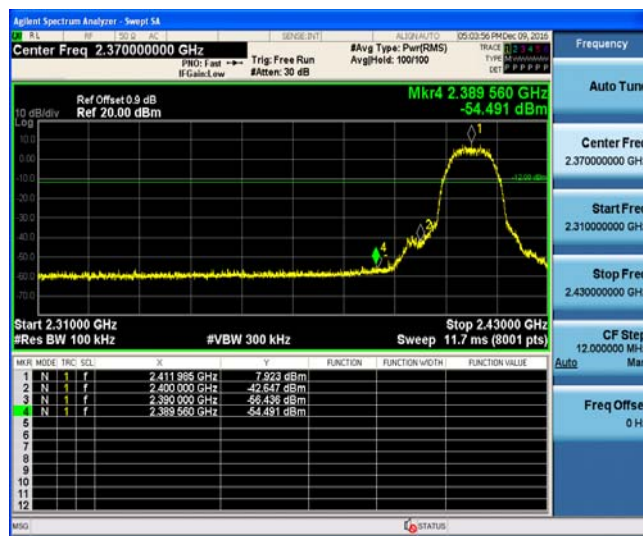


30MHz-3GHz

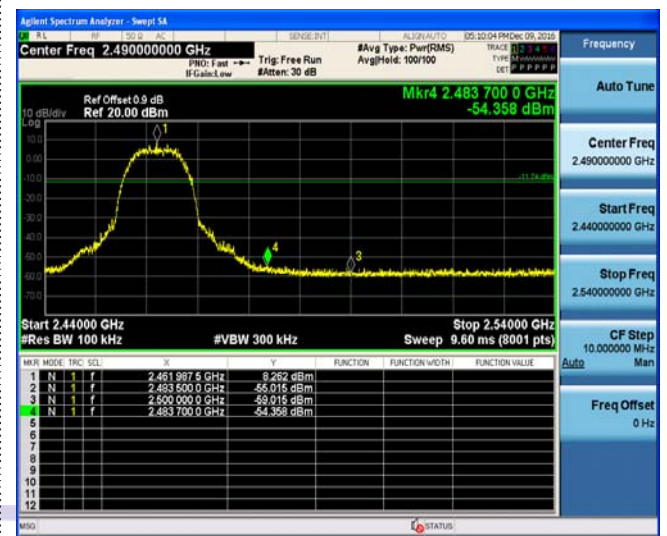


3GHz-25GHz

3GHz-25GHz

Band-edge Measurements for RF Conducted Emissions:**802.11b**

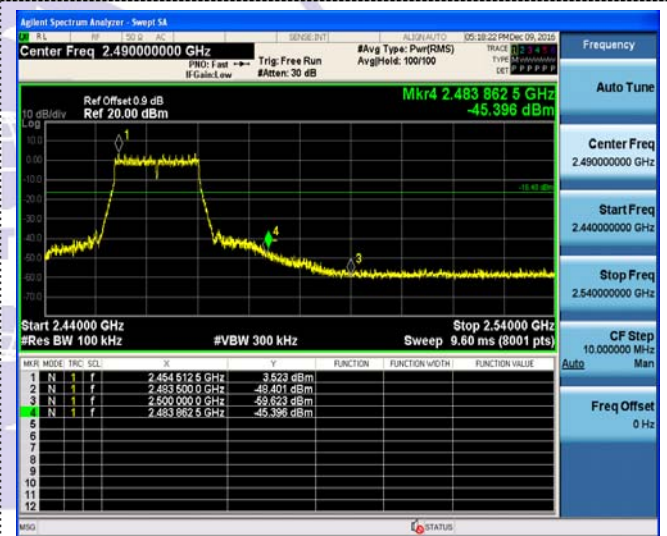
Left bandedge



Right bandedge

802.11g

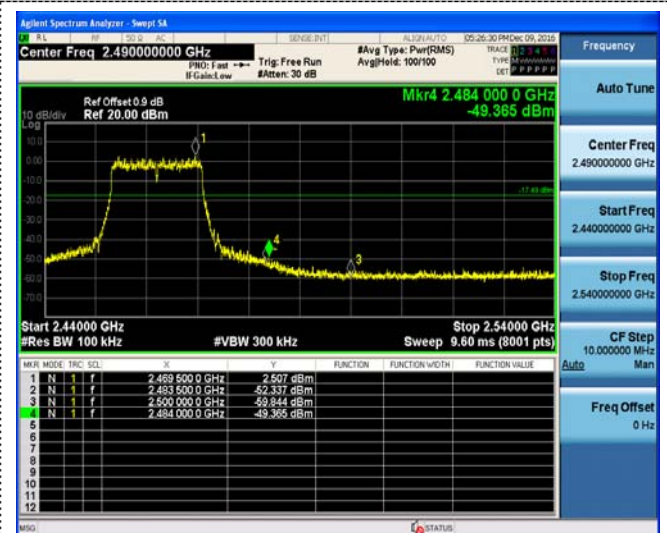
Left bandedge



Right bandedge

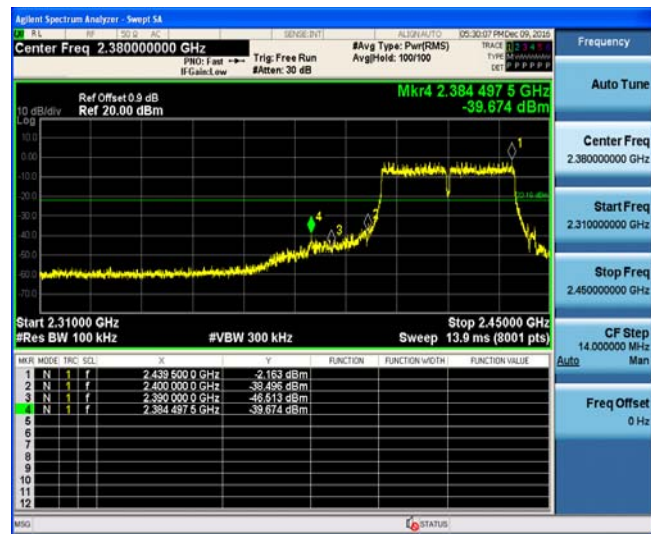
802.11n(HT20)

Left bandedge



Right bandedge

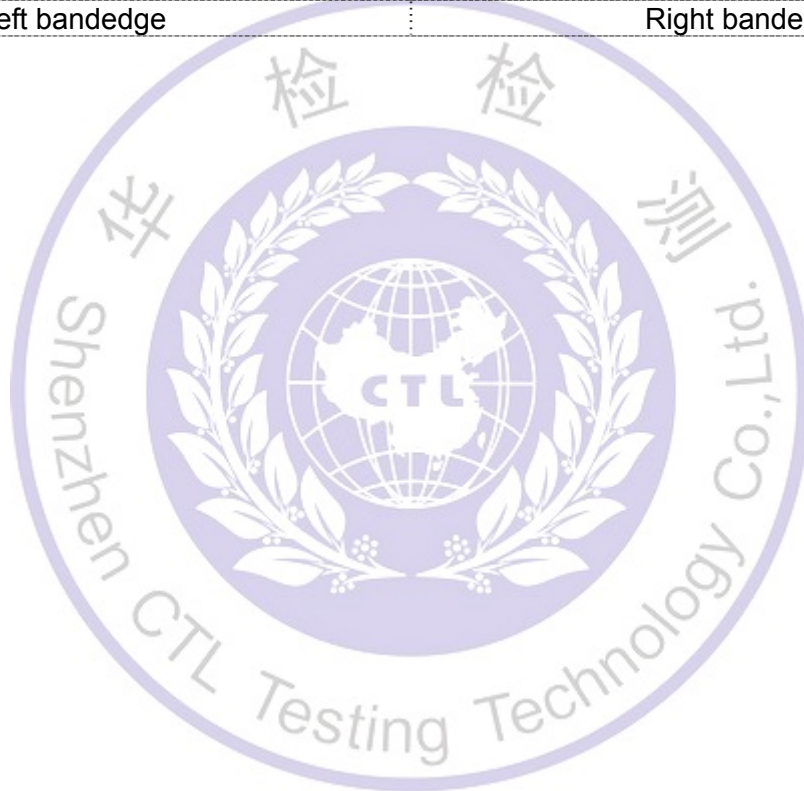
802.11n(HT40)



Left bandedge



Right bandedge



3.7. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

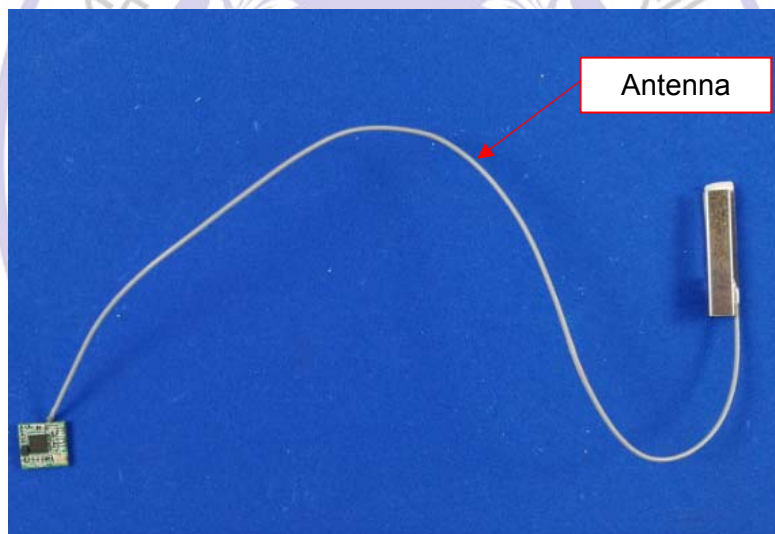
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):

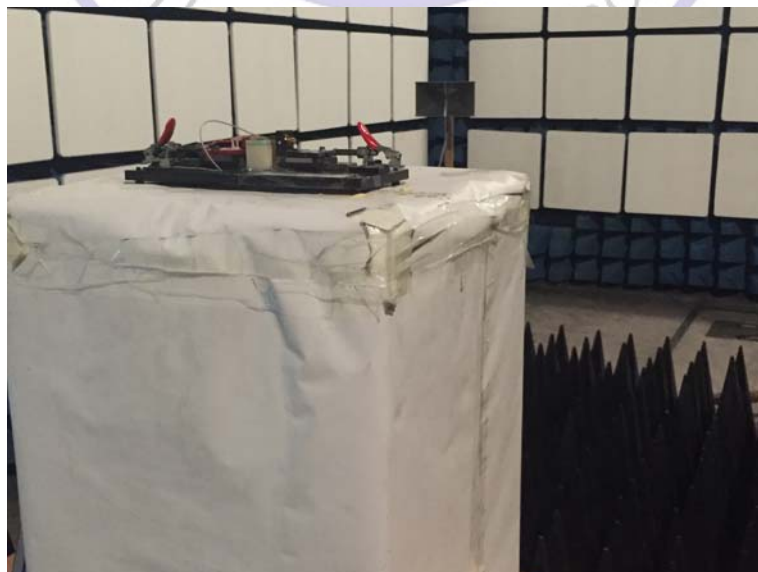
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional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

Test Result:

The maximum gain of antenna was 1dBi.

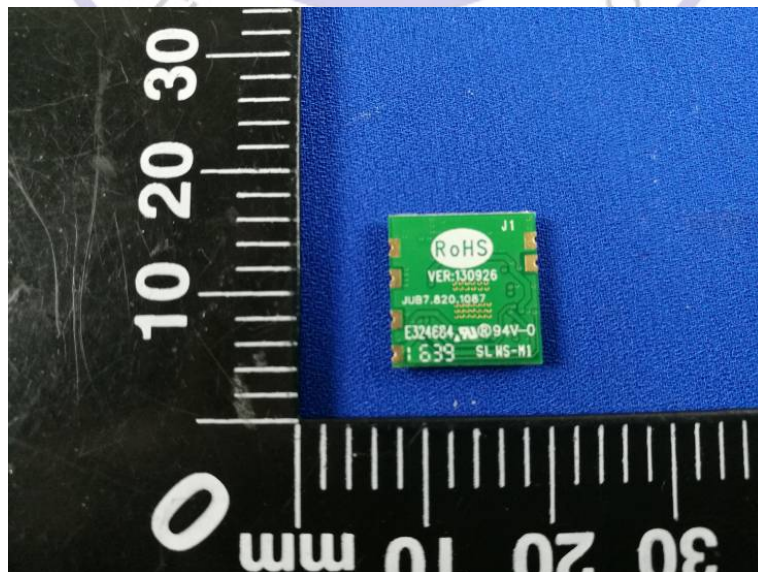
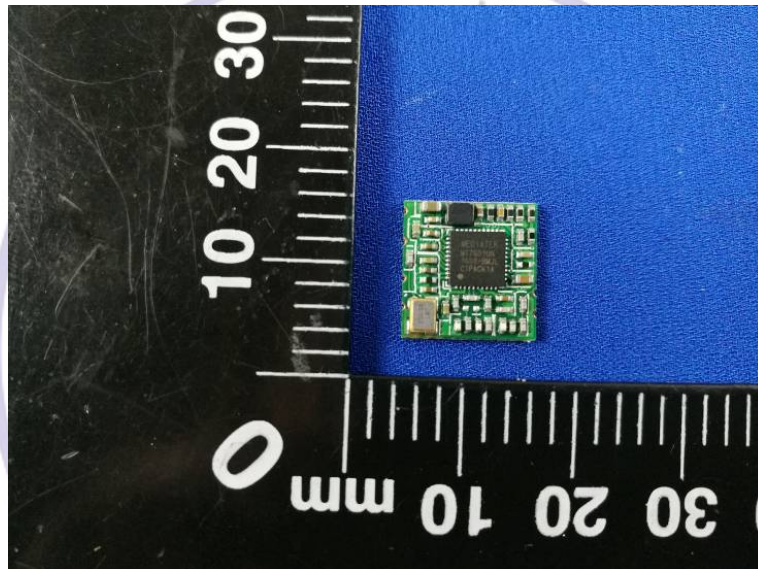
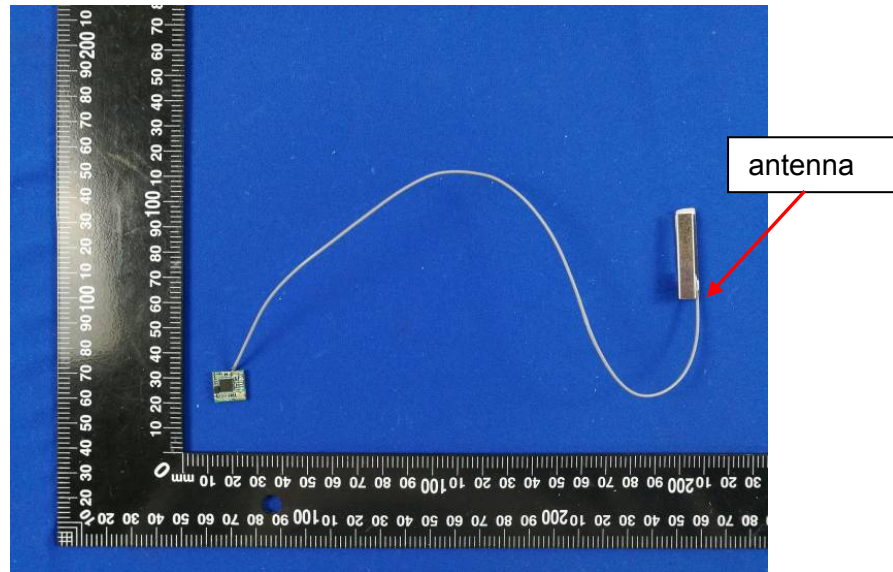


4. Test Setup Photos of the EUT





5. Photos of the EUT



***** End of Report *****