

FCC TEST REPORT
for
High-Flying Electronics Technology Co., Ltd

Embedded Wi-Fi Module
Model No.: HF-LPB200

Prepared for : High-Flying Electronics Technology Co., Ltd
Address : Room 511, #7Building, No.365 Chuanhong Road, Pudong,
Shanghai, China

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited
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Report Number : 201310784F
Date of Test : Oct. 22~ Nov. 06, 2013
Date of Report : Nov. 07, 2013

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Appendix I (2 Pages)

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TEST REPORT

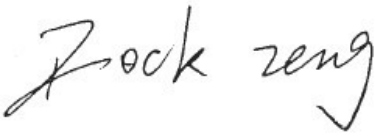
Applicant : High-Flying Electronics Technology Co., Ltd
Manufacturer : High-Flying Electronics Technology Co., Ltd
EUT : Embedded Wi-Fi Module
Model No. : HF-LPB200
Serial No. : N/A
Trade Mark : High-Flying
Rating : DC 3.1V-3.6V, 240mA


Measurement Procedure Used:
FCC Part15 Subpart C, Paragraph 15.247

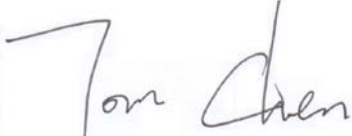
The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Oct. 22~ Nov. 06, 2013

Prepared by : 
(Tested Engineer / Rock Zeng)

Reviewer : 
(Project Manager / Amy Ding)

Approved & Authorized Signer : 
(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : Embedded Wi-Fi Module

Model Number : HF-LPB200

Test Power Supply : AC 120V/60Hz for adapter

RF Transmission : 2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20))
Frequency : 2422MHz~2452MHz (802.11n(HT40))

Channels : 11 For (802.11b/802.11g/802.11n(HT20))
7 For (802.11n(HT40))

Modulation : 802.11b CCK
802.11g OFDM
802.11n MCS

Antenna Type : Integral

Antenna Gain : 2 dBi

Applicant : High-Flying Electronics Technology Co., Ltd

Address : Room 511, #7Building, No.365 Chuanhong Road, Pudong,
Shanghai, China

Manufacturer : High-Flying Electronics Technology Co., Ltd

Address : Room 511, #7Building, No.365 Chuanhong Road, Pudong,
Shanghai, China

Factory : Shanghai Quick Turn Electronic Co., Ltd.

Address : 4F, Bldg. 1, No. 1069 Chuansha Road, Pudong New District,
Shanghai, China

Date of receiver : Oct. 22, 2013

Date of Test : Oct. 22~ Nov. 06, 2013

1.2. Auxiliary Equipment Used during Test

N/A

1.3. Description of Test Facility

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

CNAS - LAB Code: L3503

Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, 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 752021, July 10, 2013.

IC-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, February 22, 2013.

Test Location

All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

1.4. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.3dB
Conduction Uncertainty	:	Uc = 3.4dB

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC Part 15, Paragraph 15.247.

2.1. Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107, 15.207	Conducted Emission Test	PASS	Complies
FCC Part 15, Paragraph 15.247(b)(1)	Peak Output Power	PASS	Complies
FCC Part 15, Paragraph 15.247(a)(2)	6dB Bandwidth	PASS	Complies
FCC Part 15, Paragraph 15.247(c)	100kHz Bandwidth of Frequency Band Edges	PASS	Complies
FCC Part 15, Paragraph 15.209(a)(f)	Spurious Emission	PASS	Complies
FCC Part 15, Paragraph 15.247(a)(1)	Frequency Separation	-	N/A
FCC Part 15, Paragraph 15.247(a)(1)(iii)	Number of Hopping Frequency	-	N/A
FCC Part 15, Paragraph 15.247(a)(1)(iii)	Time of Occupancy	-	N/A
FCC Part 15, Paragraph 15.247(c)	Peak Power Density	PASS	Complies

2.2. Description of Test Modes

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 1 Mbps lowest data rate (worst case) are chosen for the final testing.

IEEE802.11g: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6 Mbps lowest data rate (the worst case) are chosen for the final testing.

IEEE802.11n (HT20): Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with MCS 0 Mbps lowest data rate (the worst case) are chosen for the final testing.

IEEE802.11n (HT40): Channel 3(2422MHz), Channel 6(2437MHz) and Channel 9(2452MHz) with MCS 0 Mbps lowest data rate (the worst case) are chosen for the final testing.

2.3. List of channels:

√ - available

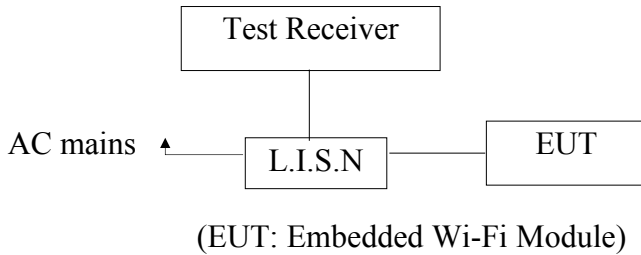
X - tested

Number	Frequency(MHz)		802.11 b/g/n (HT20)	802.11 b/g/n (HT40)
1	2412	√	X	
2	2417	√		
3	2422	√		X
4	2427	√		
5	2432	√		
6	2437	√	X	X
7	2442	√		
8	2447	√		
9	2452	√		X
10	2457	√		
11	2462	√	X	

3. Conducted Emission Test

3.1. Block Diagram of Test Setup

3.1.1. Block diagram of connection between the EUT and simulators



3.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

EUT : Embedded Wi-Fi Module
Model Number : HF-LPB200
Applicant : High-Flying Electronics Technology Co., Ltd

3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT and simulator as shown as Section 3.1.
- 3.4.2. Turn on the power of all equipment.
- 3.4.3. Let the EUT work in test mode (On) and measure it.

3.5. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.4-2003 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

The frequency range from 150KHz to 30MHz is checked.

The test results are reported on Section 3.6.

3.6. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Apr. 23, 2013	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 23, 2013	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 23, 2013	1 Year

3.7. Power Line Conducted Emission Measurement Results

PASS.

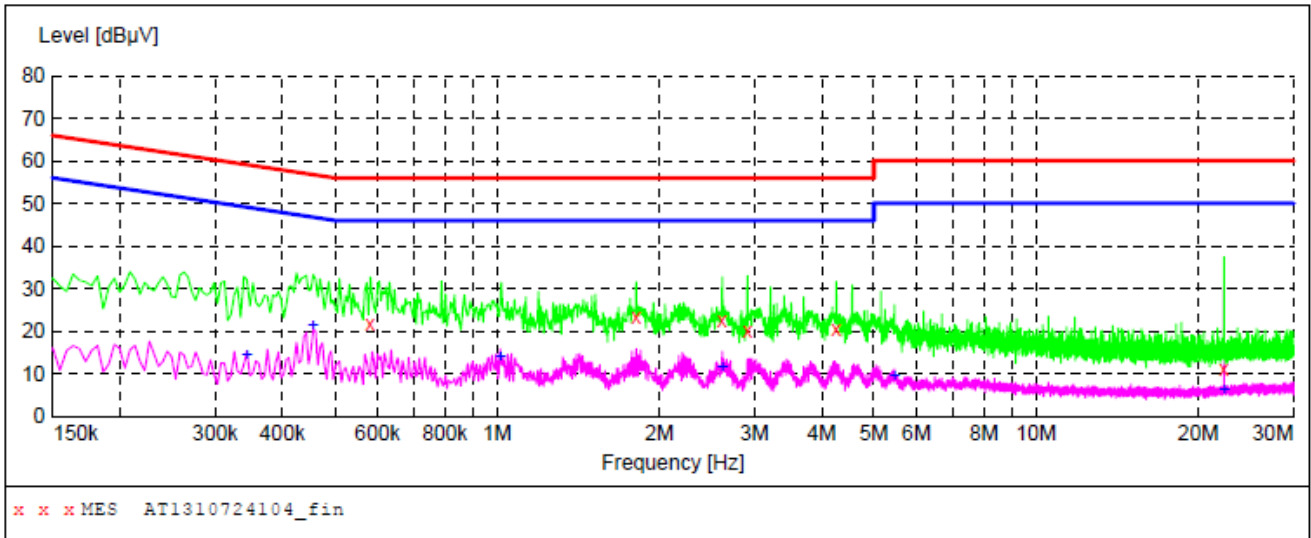
The frequency range from 150KHz to 30 MHz is investigated.

Please refer the following pages.

CONDUCTED EMISSION TEST DATA

EUT: Embedded Wi-Fi Module M/N:HF-LPB200
 Operating Condition: On
 Test Site: 1# Shielded Room
 Operator: Bevan Zhang
 Test Specification: AC 120V/60Hz for adapter
 Comment: L
 Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K~30M) FIN"
 Short Description: 150K-30M Disturbance Voltages



MEASUREMENT RESULT: "AT1310724104_fin"

10/24/2013 2:41PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.582000	21.80	20.1	56	34.2	QP	L1	GND
1.810000	23.20	20.3	56	32.8	QP	L1	GND
2.615500	22.40	20.4	56	33.6	QP	L1	GND
2.912500	20.20	20.4	56	35.8	QP	L1	GND
4.258000	20.40	20.5	56	35.6	QP	L1	GND
22.289500	11.20	20.8	60	48.8	QP	L1	GND

MEASUREMENT RESULT: "AT1310724104_fin2"

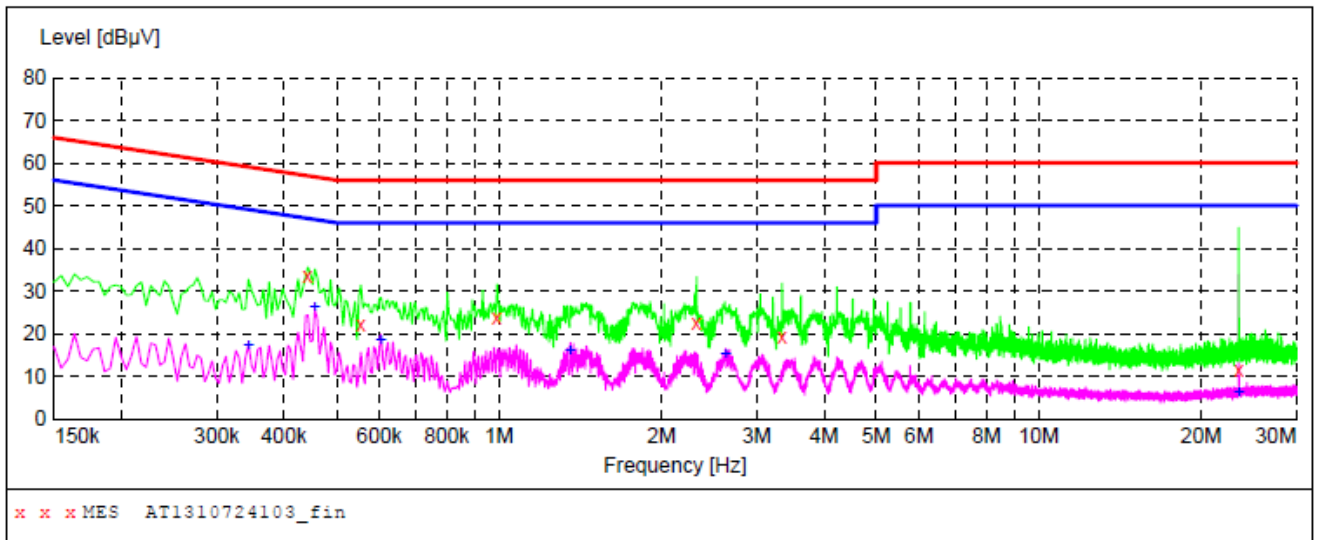
10/24/2013 2:41PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.343500	14.30	20.1	49	34.8	AV	L1	GND
0.456000	21.30	20.1	47	25.5	AV	L1	GND
1.013500	13.80	20.2	46	32.2	AV	L1	GND
2.615500	11.50	20.4	46	34.5	AV	L1	GND
5.455000	9.30	20.5	50	40.7	AV	L1	GND
22.289500	6.00	20.8	50	44.0	AV	L1	GND

CONDUCTED EMISSION TEST DATA

EUT: Embedded Wi-Fi Module M/N:HF-LPB200
 Operating Condition: On
 Test Site: 1# Shielded Room
 Operator: Bevan Zhang
 Test Specification: AC 120V/60Hz for adapter
 Comment: N
 Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K~30M) FIN"
 Short Description: 150K-30M Disturbance Voltages



MEASUREMENT RESULT: "AT1310724103_fin"

10/24/2013 2:38PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.442500	33.60	20.1	57	23.4	QP	N	GND
0.555000	22.10	20.1	56	33.9	QP	N	GND
0.991500	23.60	20.2	56	32.4	QP	N	GND
2.323000	22.50	20.3	56	33.5	QP	N	GND
3.344500	19.40	20.4	56	36.6	QP	N	GND
23.455000	11.60	20.8	60	48.4	QP	N	GND

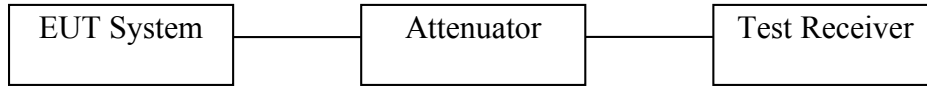
MEASUREMENT RESULT: "AT1310724103_fin2"

10/24/2013 2:38PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.343500	17.40	20.1	49	31.7	AV	N	GND
0.456000	26.10	20.1	47	20.7	AV	N	GND
0.604500	18.30	20.1	46	27.7	AV	N	GND
1.355500	15.80	20.2	46	30.2	AV	N	GND
2.629000	15.00	20.4	46	31.0	AV	N	GND
23.455000	6.20	20.8	50	43.8	AV	N	GND

4. FCC Part 15.247 Requirements for DSSS & OFDM Modulation

4.1 Test Setup



4.2 6dB Bandwidth

a. Limit

For the direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

b. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
 RBW = 100kHz, VBW ≥ 3*RBW = 300kHz,
 Detector= Peak
 Trace mode= Max hold.
 Sweep- auto couple.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

c. Test Setup See 4.1

d. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Aug. 09, 2013	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Aug. 09, 2013	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 23, 2013	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Aug. 09, 2013	3 Year
5.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

e. Test Results

Pass.

f. Test Data

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	10.08		Pass
Mid	2437	10.08	>500	Pass
High	2462	10.08		Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	16.40		Pass
Mid	2437	16.40	>500	Pass
High	2462	16.40		Pass

Test mode: IEEE 802.11n (HT20)

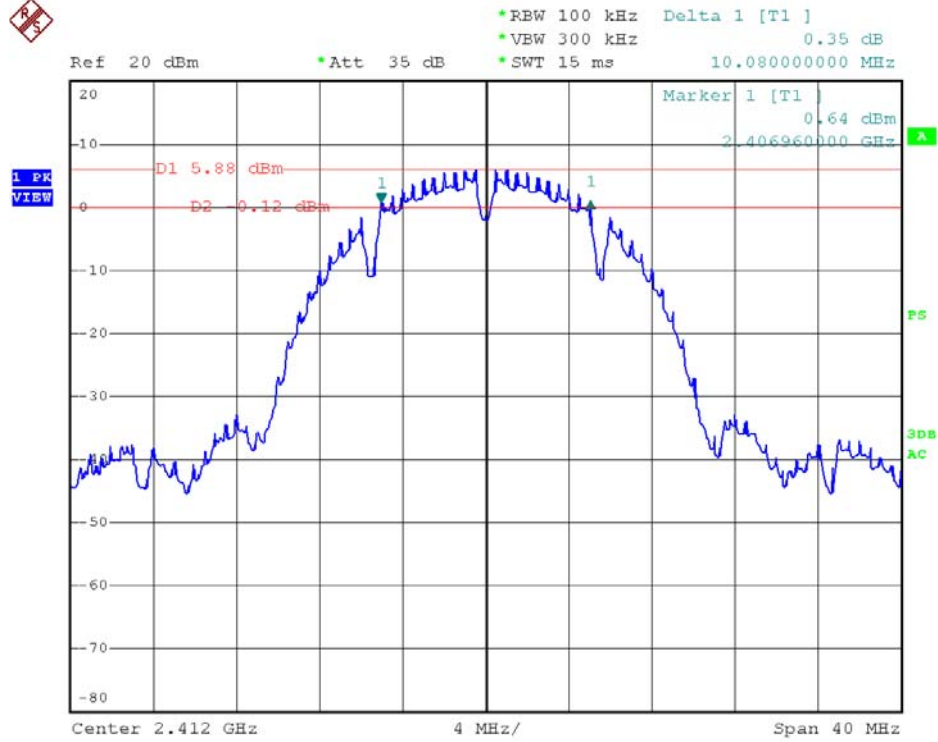
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	17.60		Pass
Mid	2437	17.60	>500	Pass
High	2462	17.60		Pass

Test mode: IEEE 802.11n (HT40)

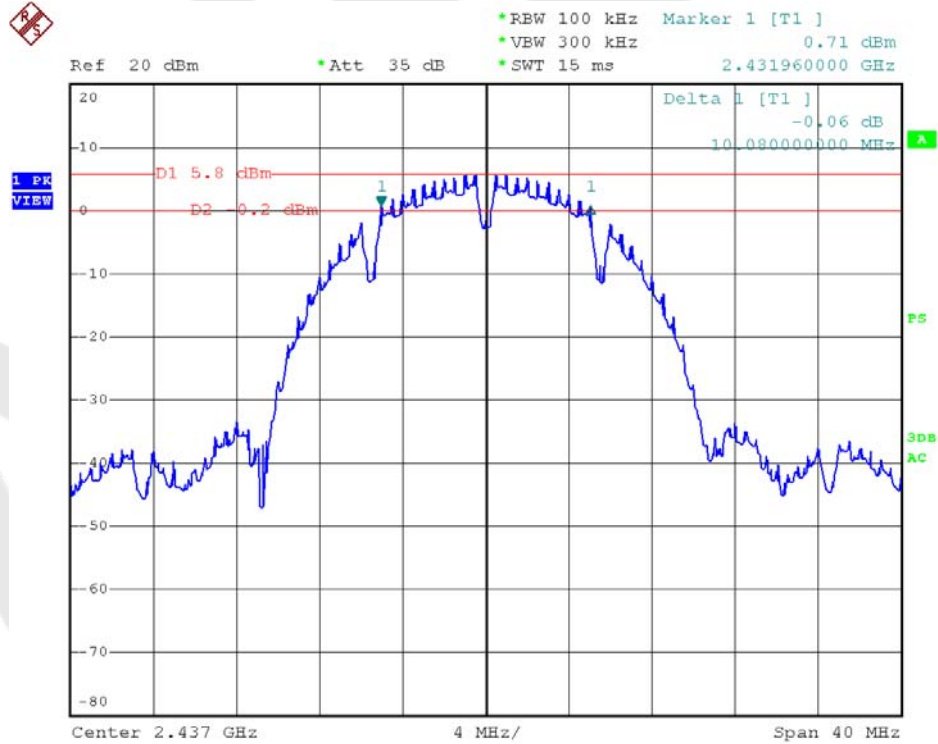
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2422	35.36		Pass
Mid	2437	35.36	>500	Pass
High	2452	35.36		Pass

Test Plots See the following page.

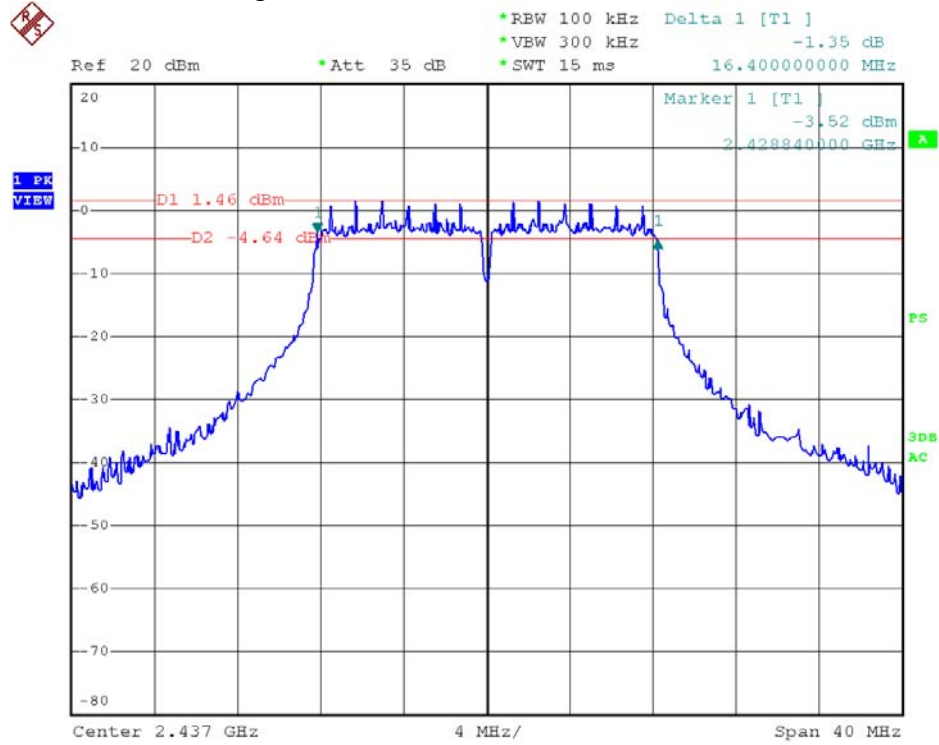
Test Mode: 802.11b---Low



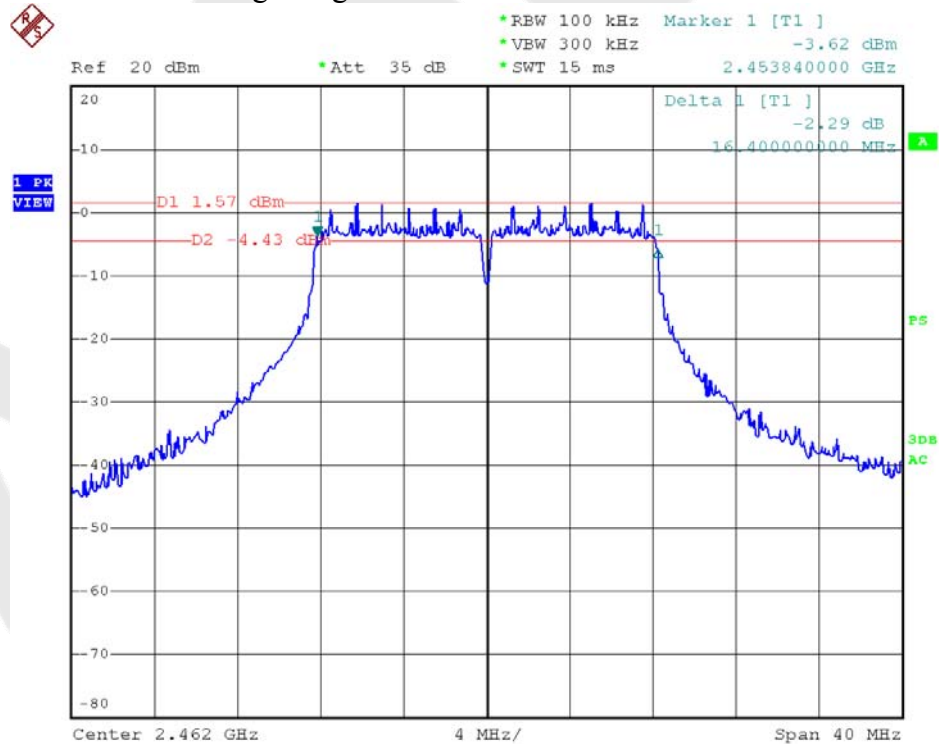
Test Mode: 802.11b---Mid



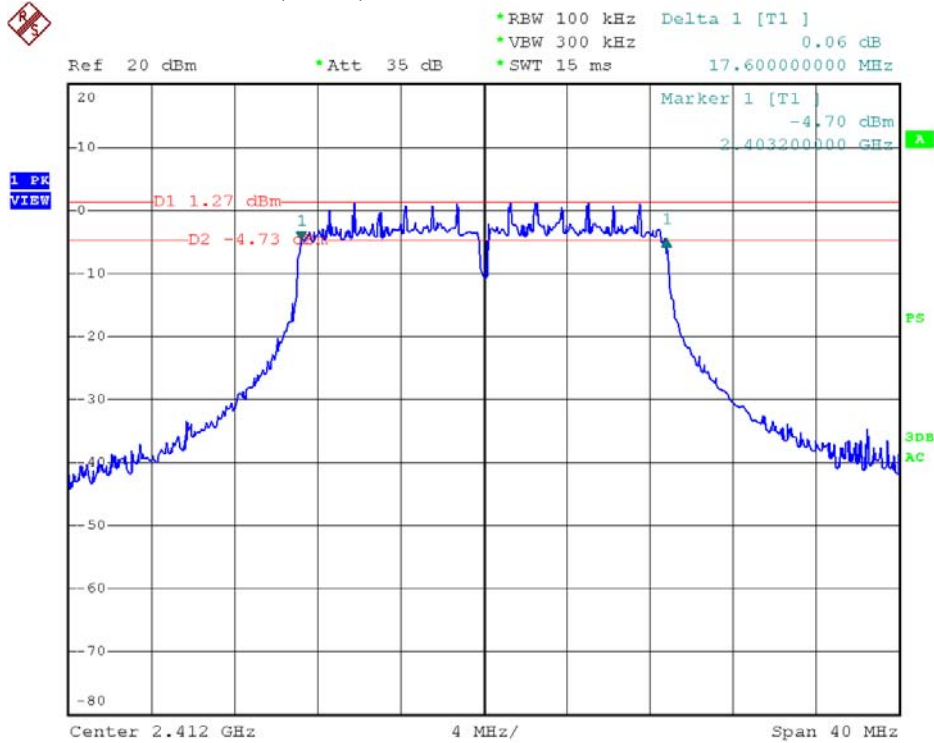
Test Mode: 802.11g---Mid



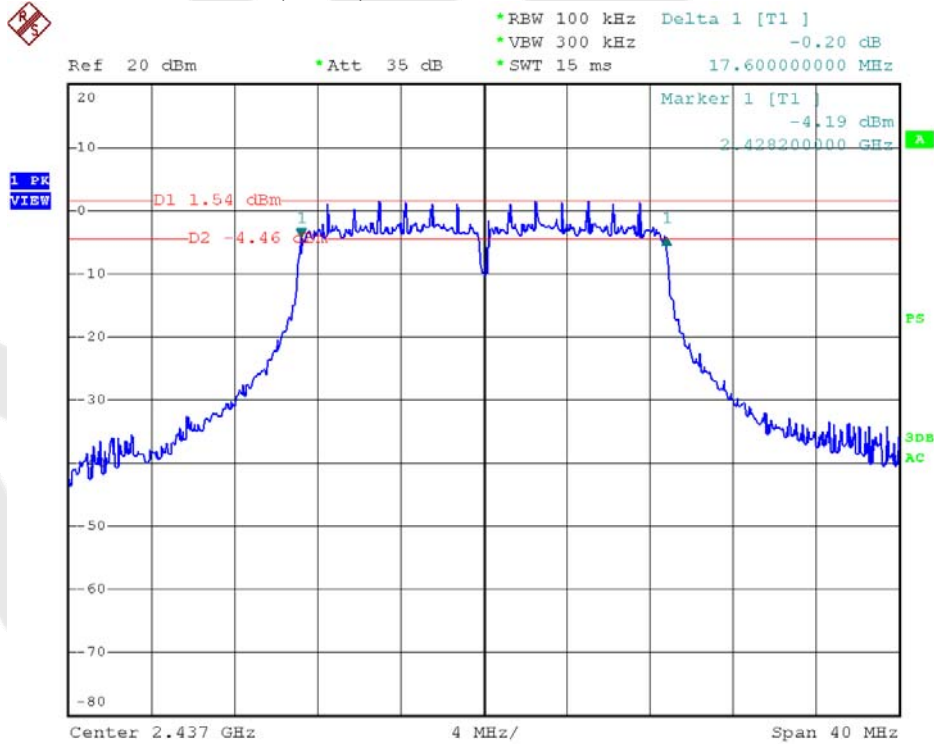
Test Mode: 802.11g---High



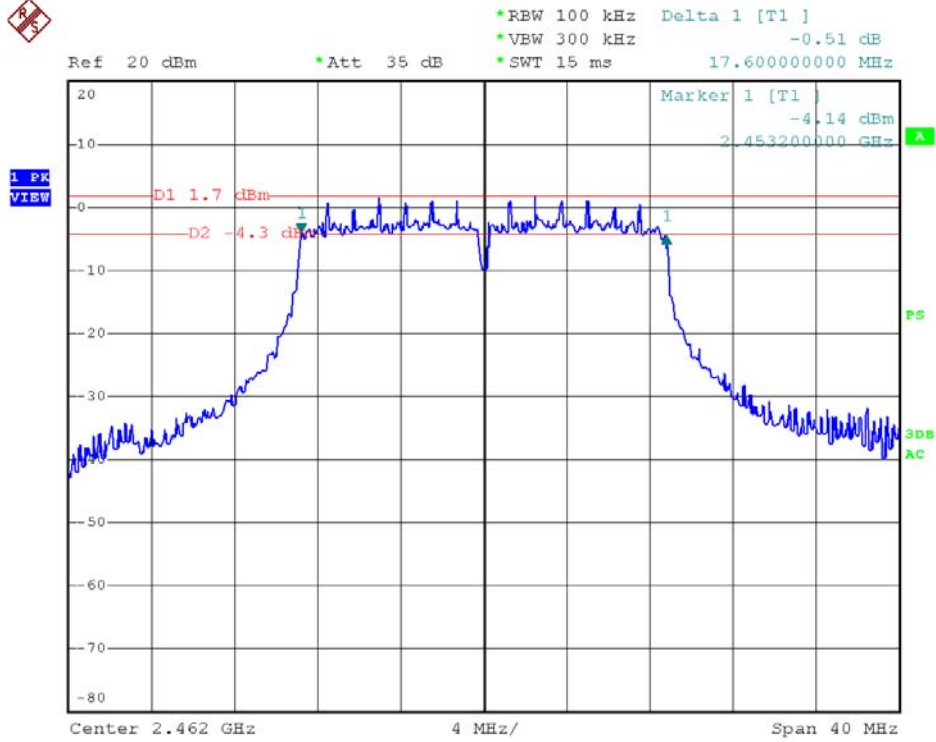
Test Mode: 802.11n (HT20)---Low



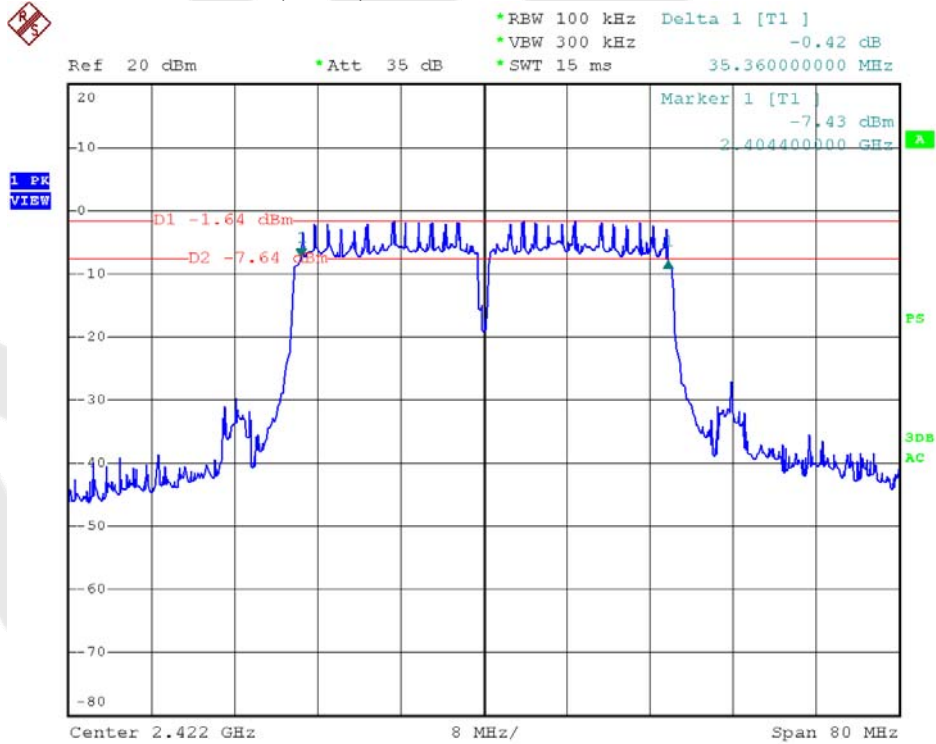
Test Mode: 802.11n (HT20)---Mid



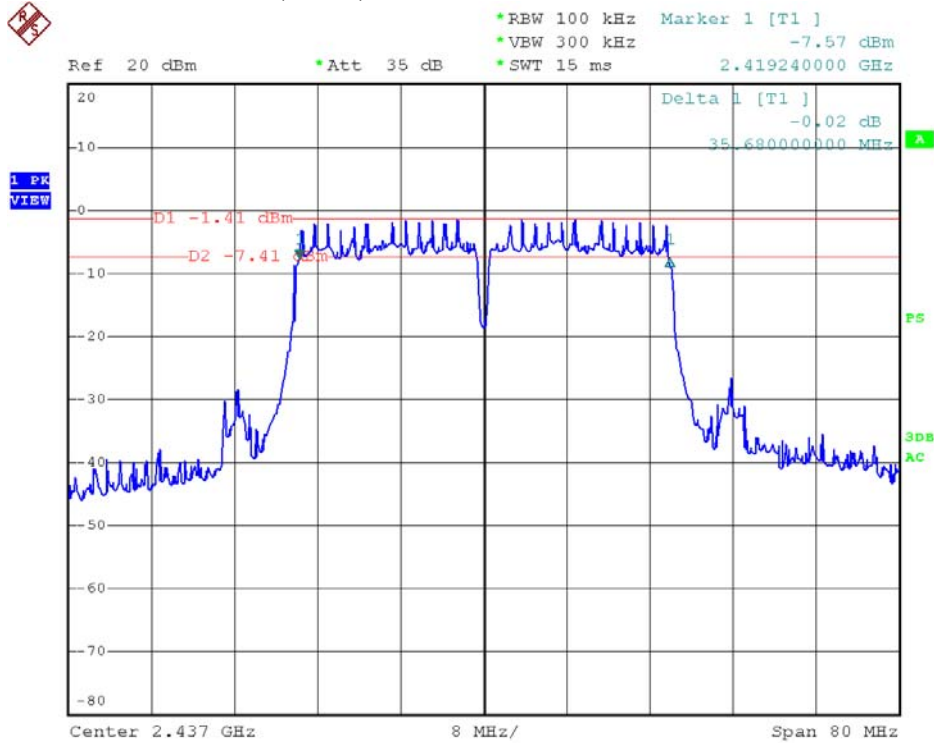
Test Mode: 802.11n (HT20)---High



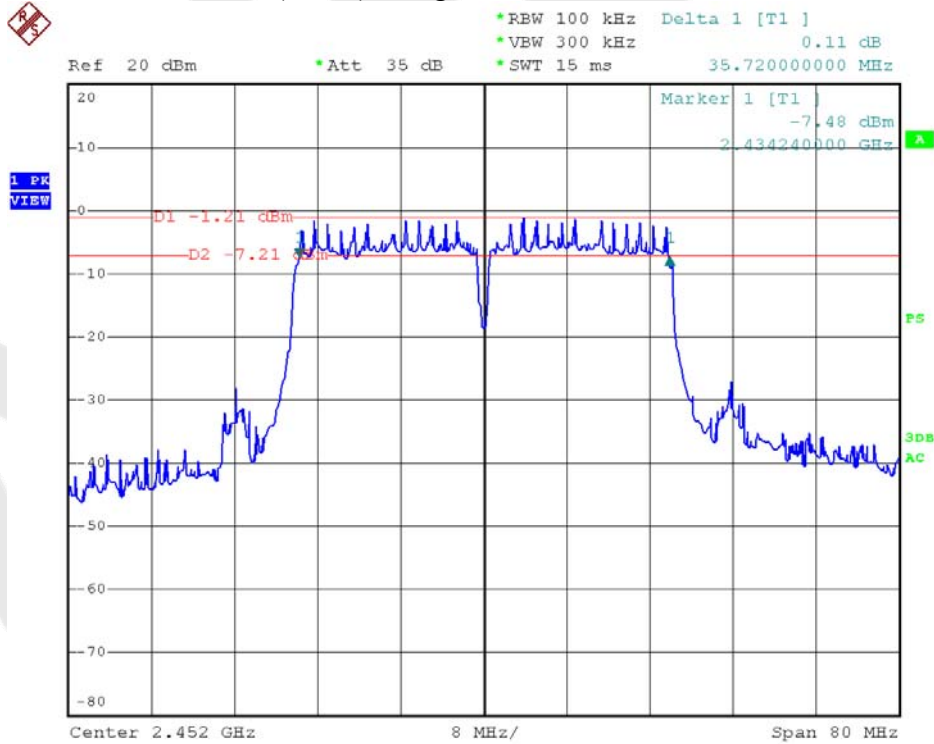
Test Mode: 802.11n (HT40)---Low



Test Mode: 802.11n (HT40)---Mid



Test Mode: 802.11n (HT40)---High



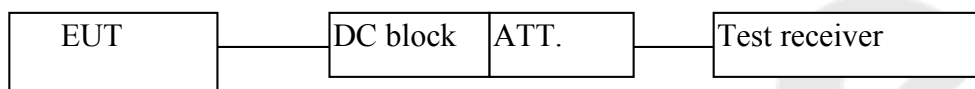
4.3. Maximum Peak output power test

a. Limit

The maximum peak output power of the intentional radiator shall not exceed the following:

1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt (30dBm).
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antenna of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

b. Configuration of Measurement



c. Data Rates

IEEE802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 1 Mbps data rate (worst case) are chosen for the final testing.

IEEE802.11g: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6 Mbps data rate (the worst case) are chosen for the final testing.

IEEE802.11n (HT20: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6.5Mbps data rate (the worst case) are chosen for the final testing.

IEEE802.11n (HT40: Channel 3(2422MHz), Channel 6(2437MHz) and Channel 9(2452MHz) with 13.5Mbps data rate (the worst case) are chosen for the final testing.

d. Test Procedure

This test was according the kDB 558074 9.1.2:

1. This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.
2. Set the RBW = 1 MHz.
3. Set the VBW $\geq 3 \times$ RBW = 3 MHz.
4. Set the span $\geq 1.5 \times$ DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

e. Test Equipment

Same as the equipment listed in 4.2.

f. Test Results

Pass.

g. Test Data

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Maximum transmit power (dBm)	Limit		Result
			(dBm)	(watts)	
Low	2412	18.74	30	1	Pass
Mid	2437	18.84			Pass
High	2462	19.22			Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Maximum transmit power (dBm)	Limit		Result
			(dBm)	(watts)	
Low	2412	19.84	30	1	Pass
Mid	2437	20.40			Pass
High	2462	20.50			Pass

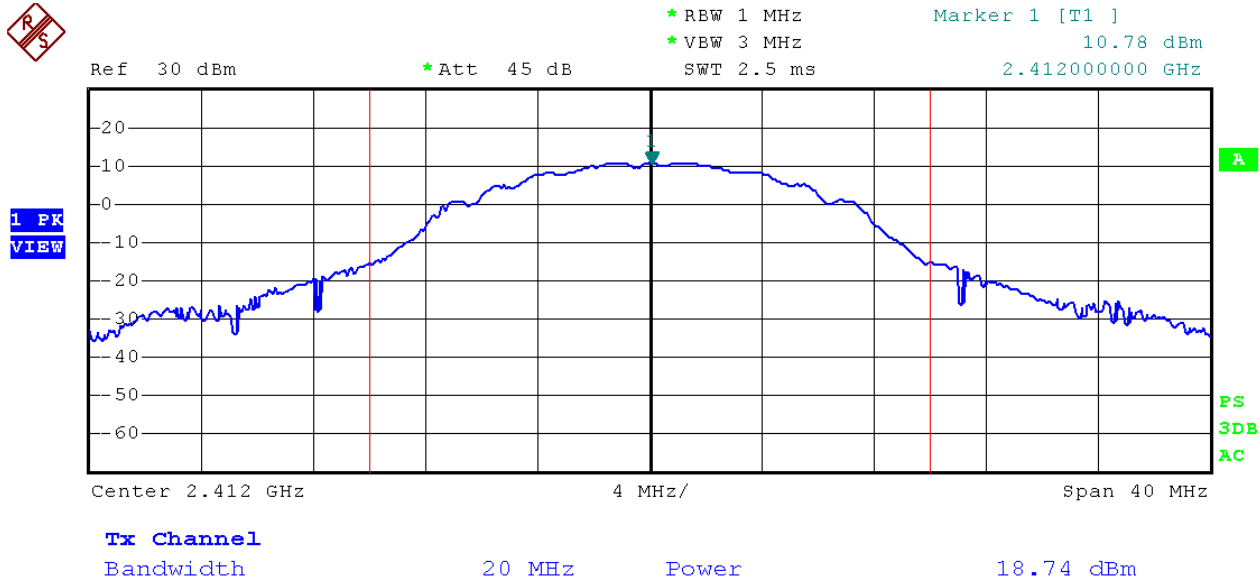
Test mode: IEEE 802.11n (HT20)

Channel	Frequency (MHz)	Maximum transmit power (dBm)	Limit		Result
			(dBm)	(watts)	
Low	2412	20.27	30	1	Pass
Mid	2437	20.63			Pass
High	2462	20.74			Pass

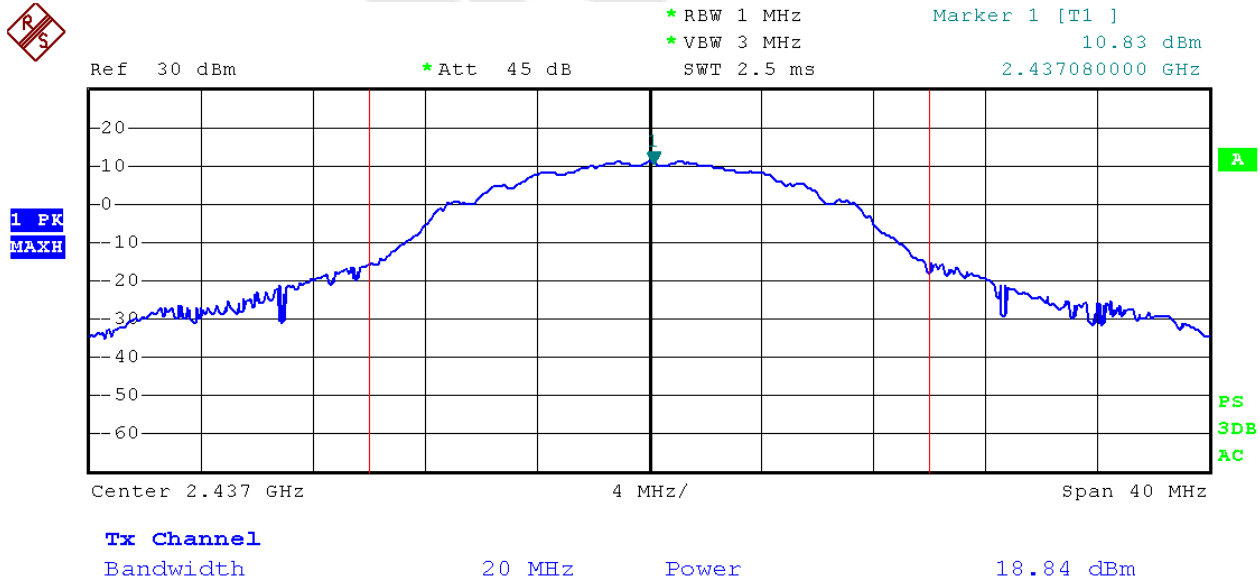
Test mode: IEEE 802.11n (HT40)

Channel	Frequency (MHz)	Maximum transmit power (dBm)	Limit		Result
			(dBm)	(watts)	
Low	2422	20.13	30	1	Pass
Mid	2437	20.34			Pass
High	2452	20.56			Pass

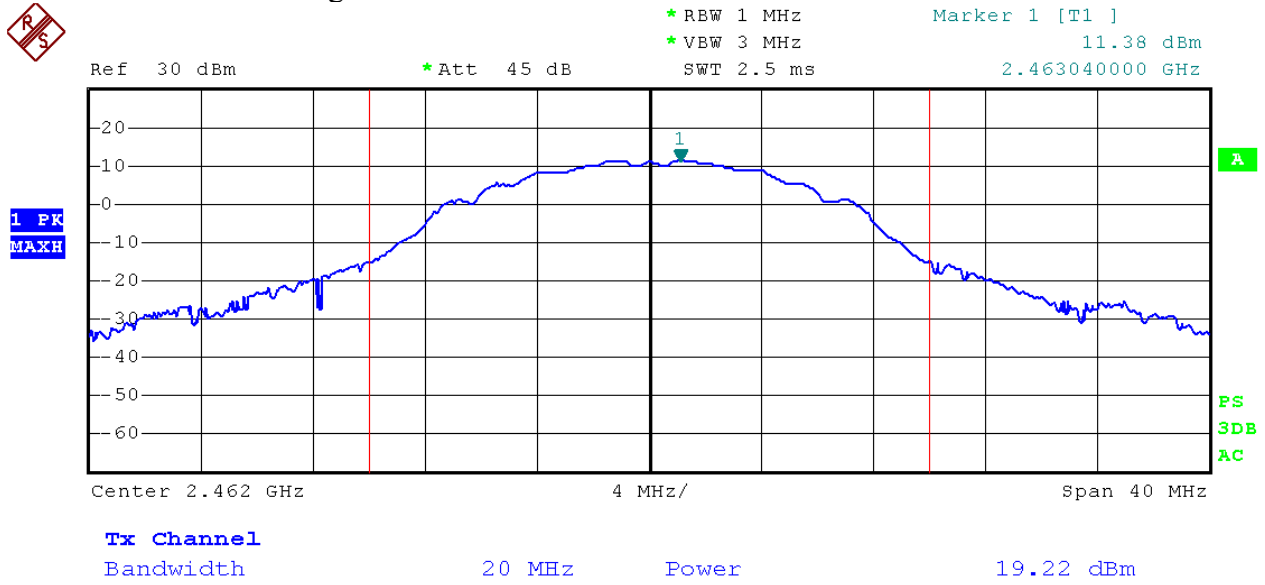
Test Mode: 802.11b---Low



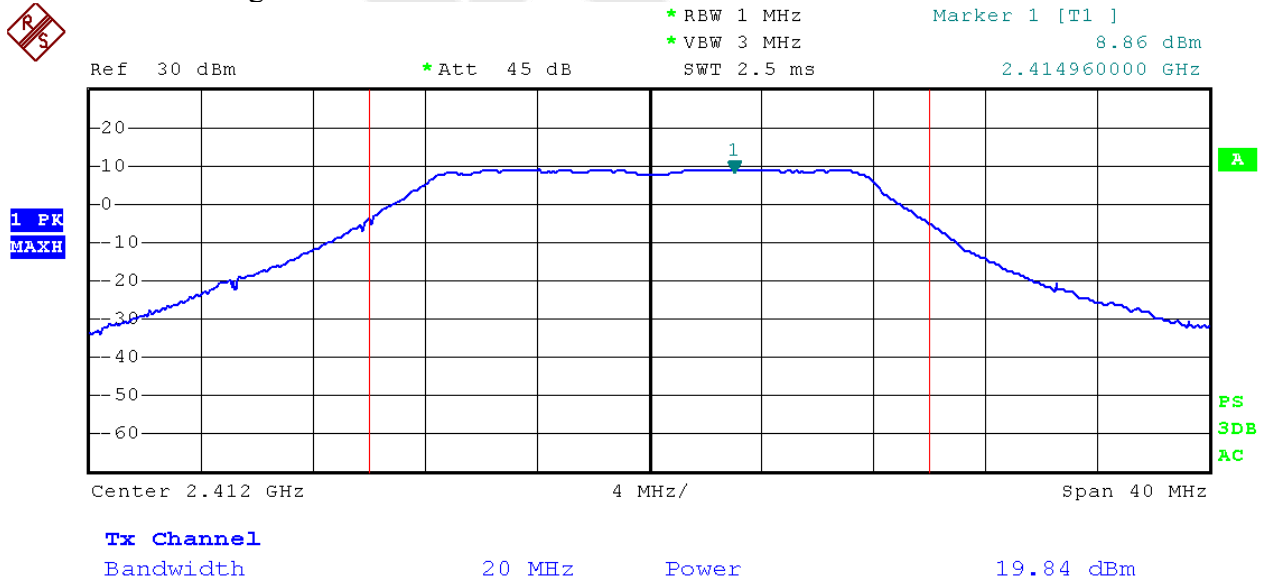
Test Mode: 802.11b---Mid



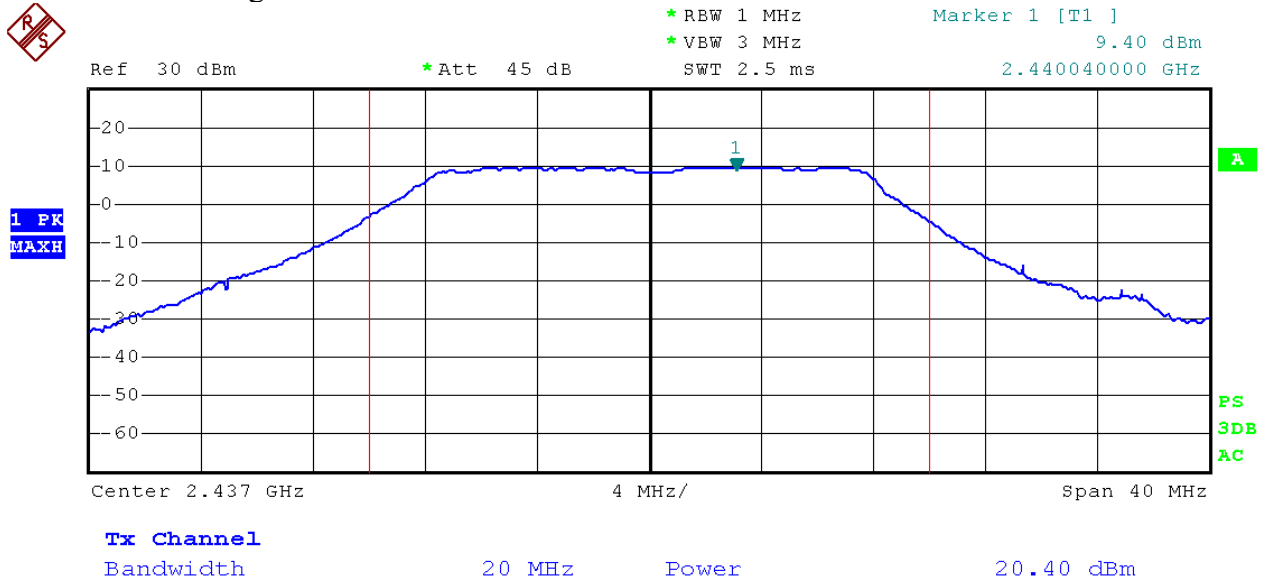
Test Mode: 802.11b---High



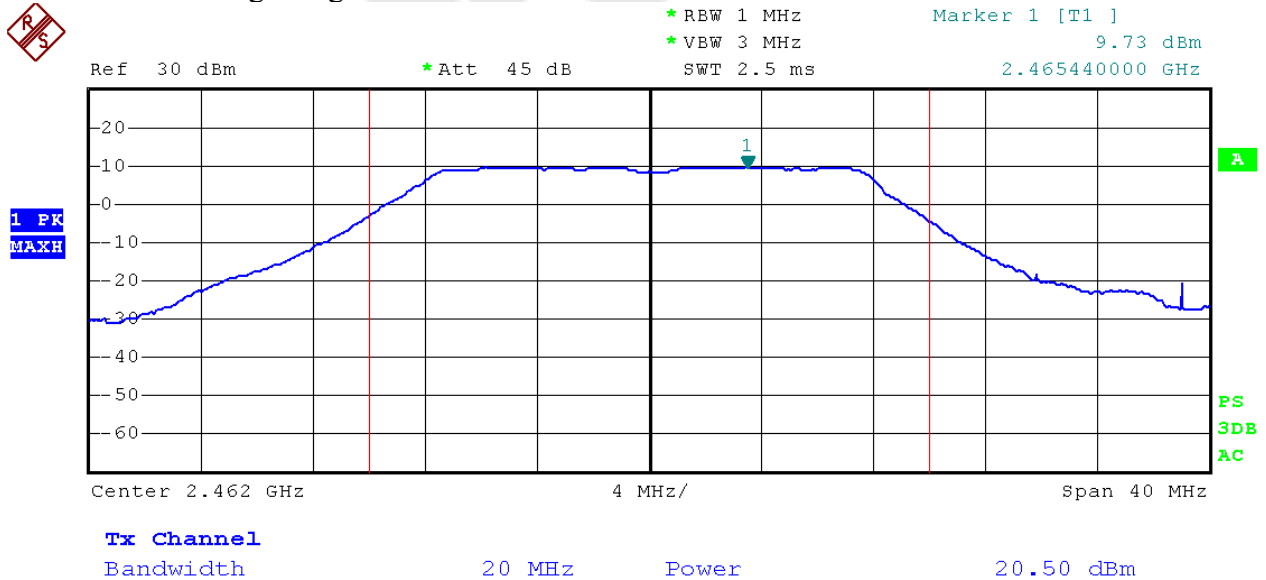
Test Mode: 802.11g---Low



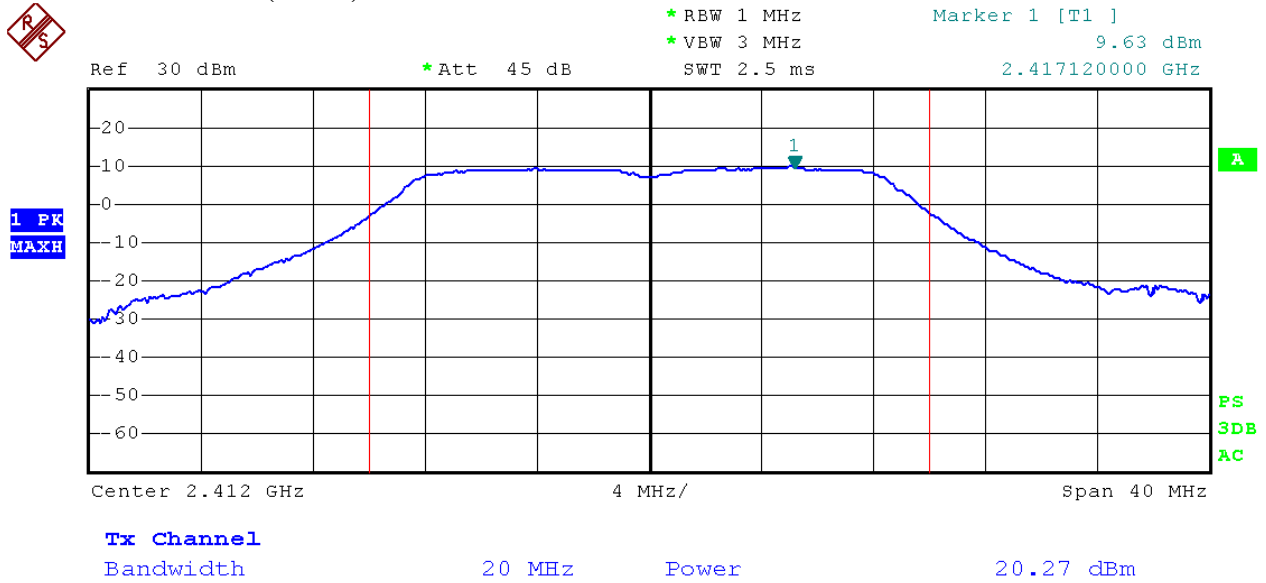
Test Mode: 802.11g---Mid



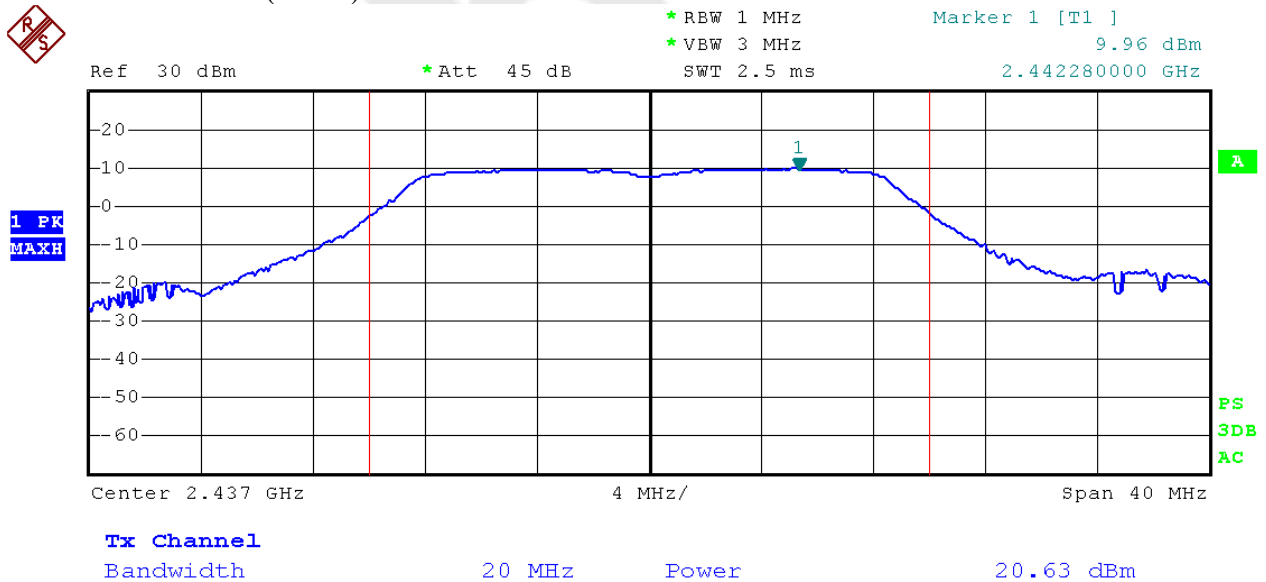
Test Mode: 802.11g---High



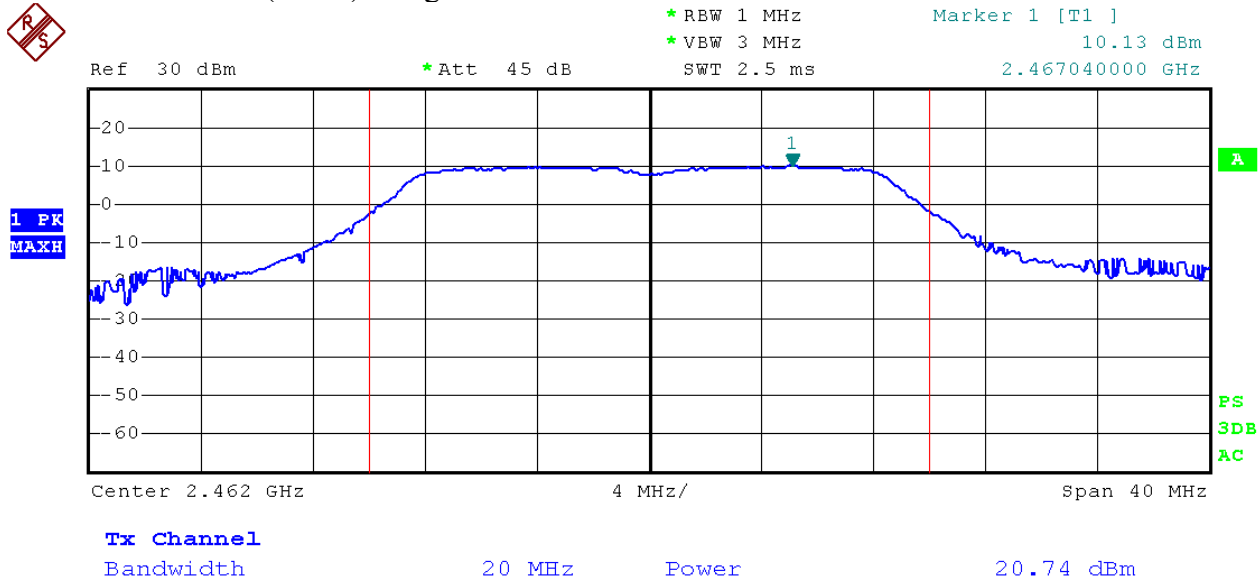
Test Mode: 802.11n(HT20)---Low



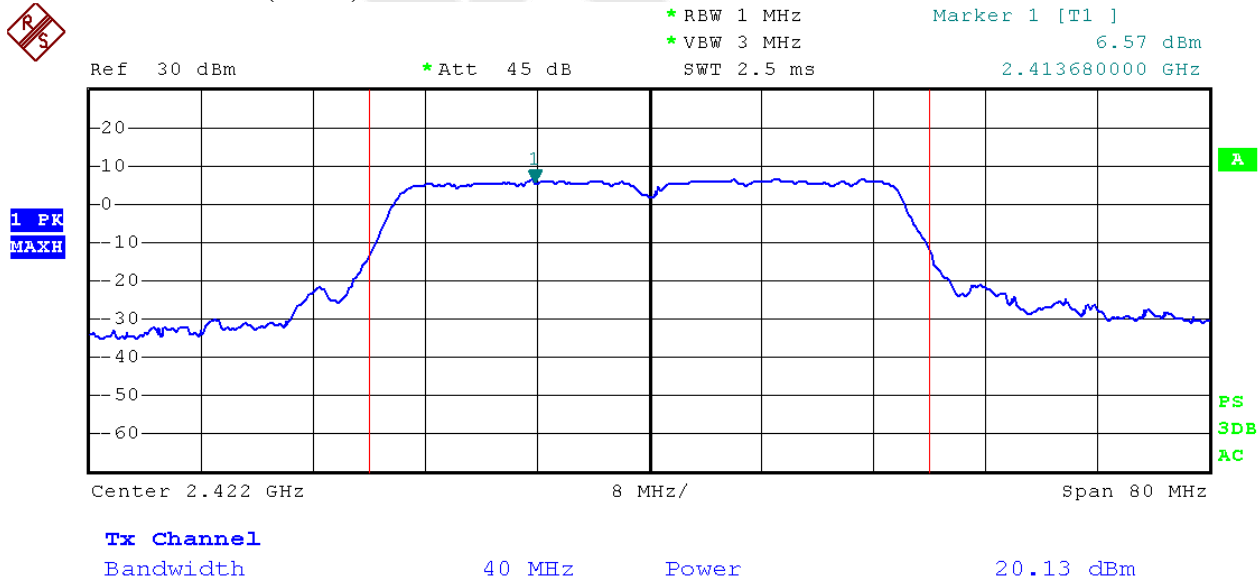
Test Mode: 802.11n(HT20)---Mid



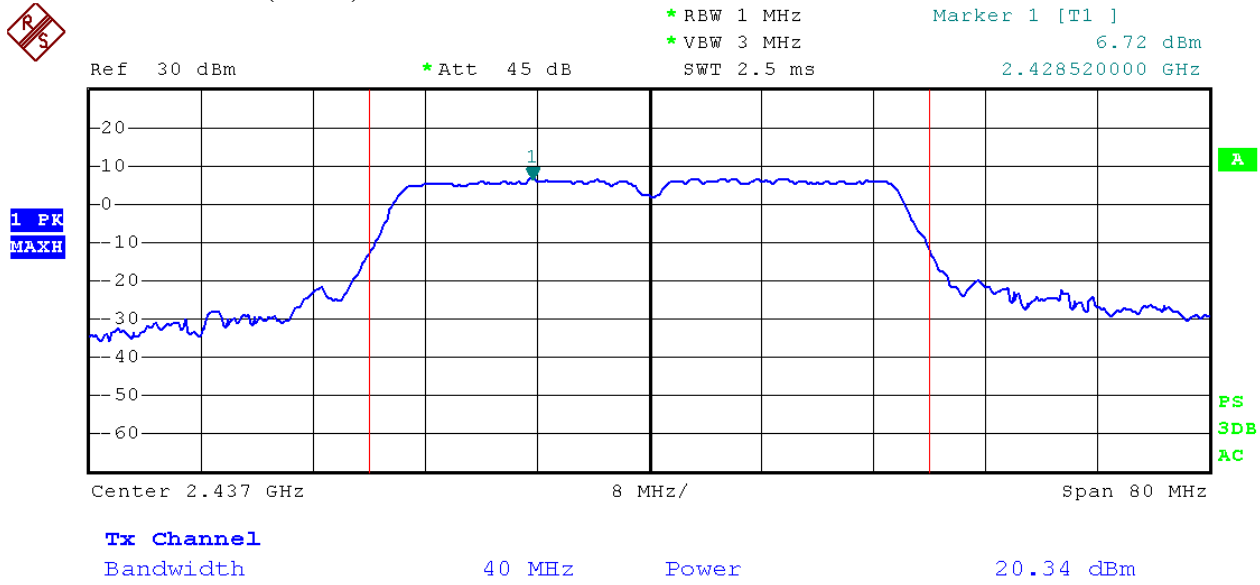
Test Mode: 802.11n(HT20)---High



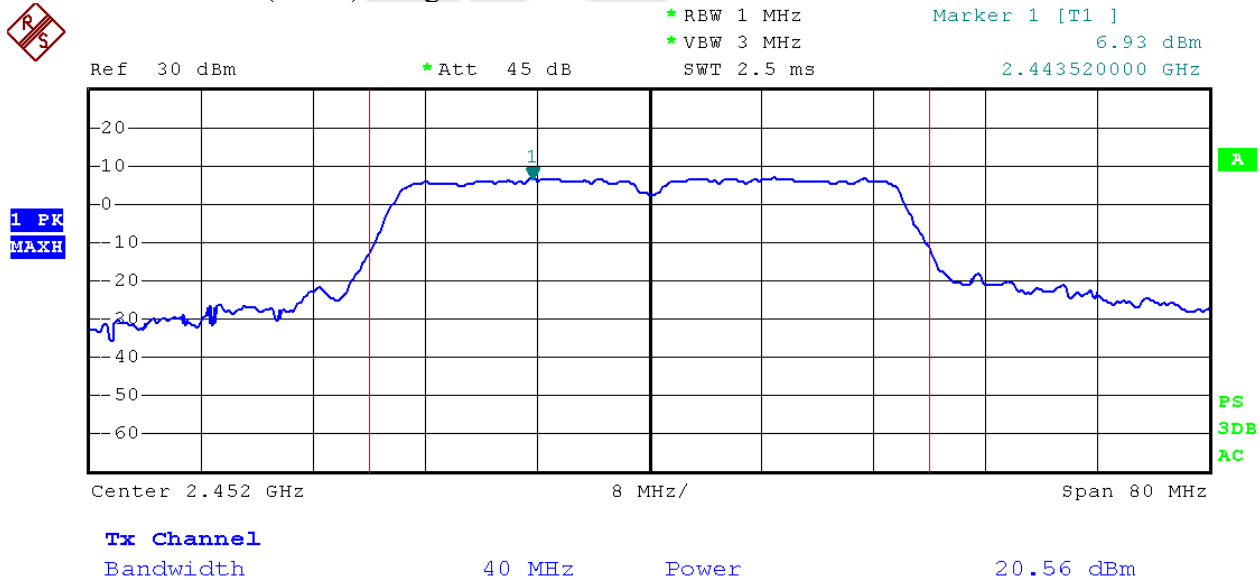
Test Mode: 802.11n(HT40)---Low



Test Mode: 802.11n(HT40)---Mid



Test Mode: 802.11n(HT40)---High



4.4. Band Edges Measurement

a. Limit

According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. 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).

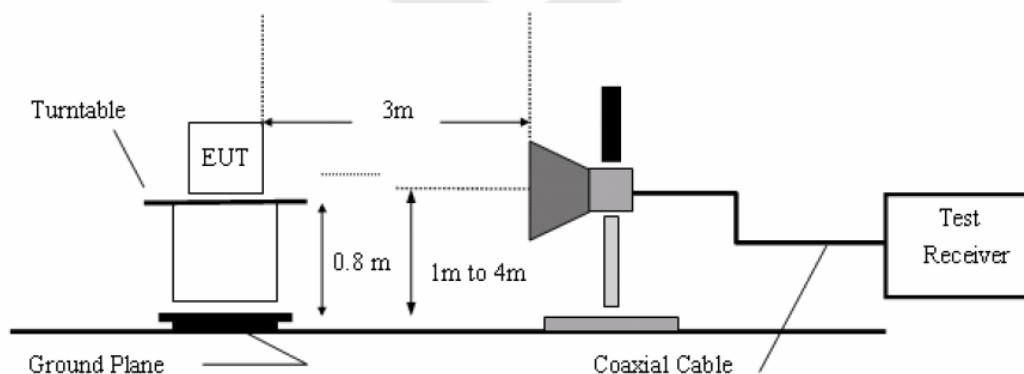
b. Test Procedure

1. Conducted Method:

- 1) Set RBW=100KHz, VBW=300KHz
- 2) Detector=peak
- 3) Sweep time= auto
- 4) Trace mode=max hold.

2. Radiated Method:

- 1) The EUT is placed on a turntable, which is 0.8m above the ground plane.
- 2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
- 4) Peak detector: RBW=1MHz, VBW=3MHz, SWT=AUTO
Average detector: RBW=1MHz, VBW=10Hz, SWT=AUTO
The EUT is tested in 9*6*6 Chamber.
- 5) Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.



c. Test Equipment

Same as the equipment listed in 4.2.

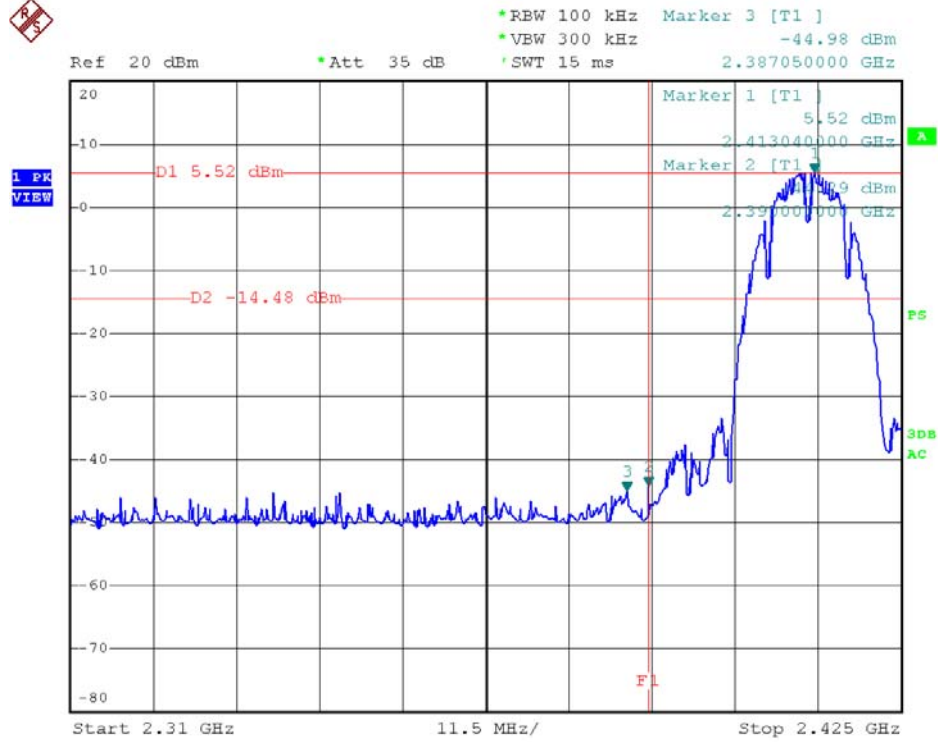
d. Test Results

Pass.

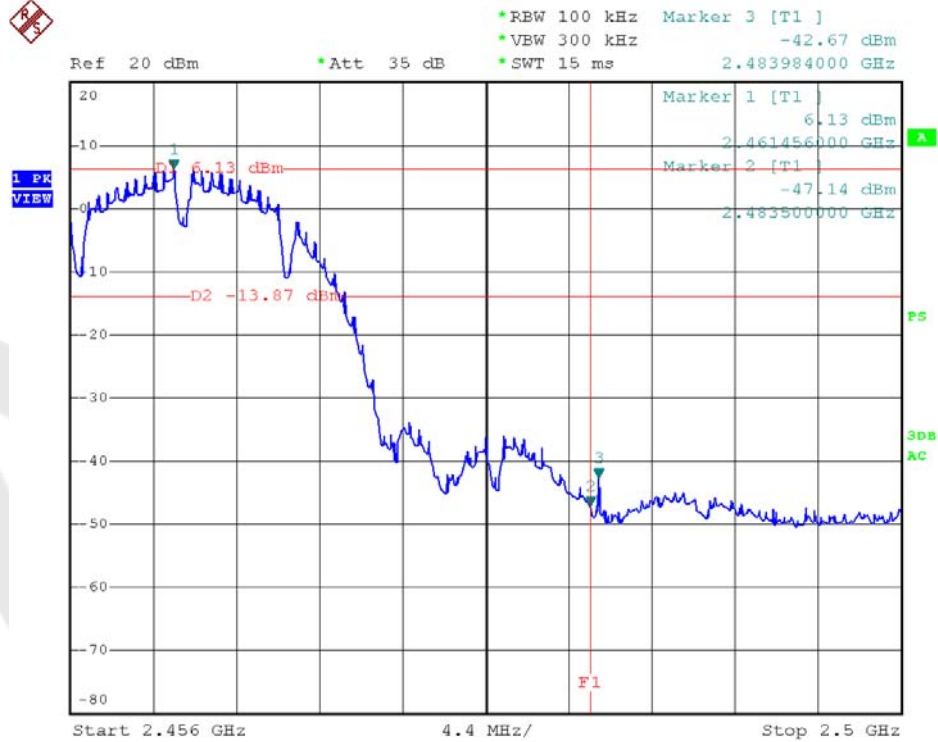
e. Test Plots

See the following page.

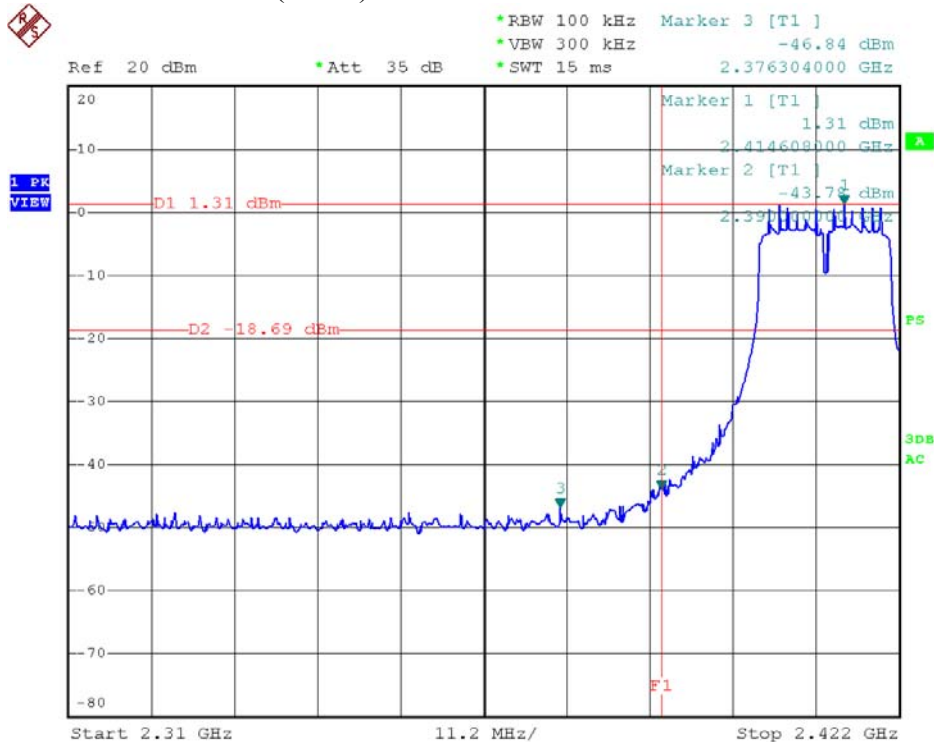
Test Mode: 802.11b ---Low



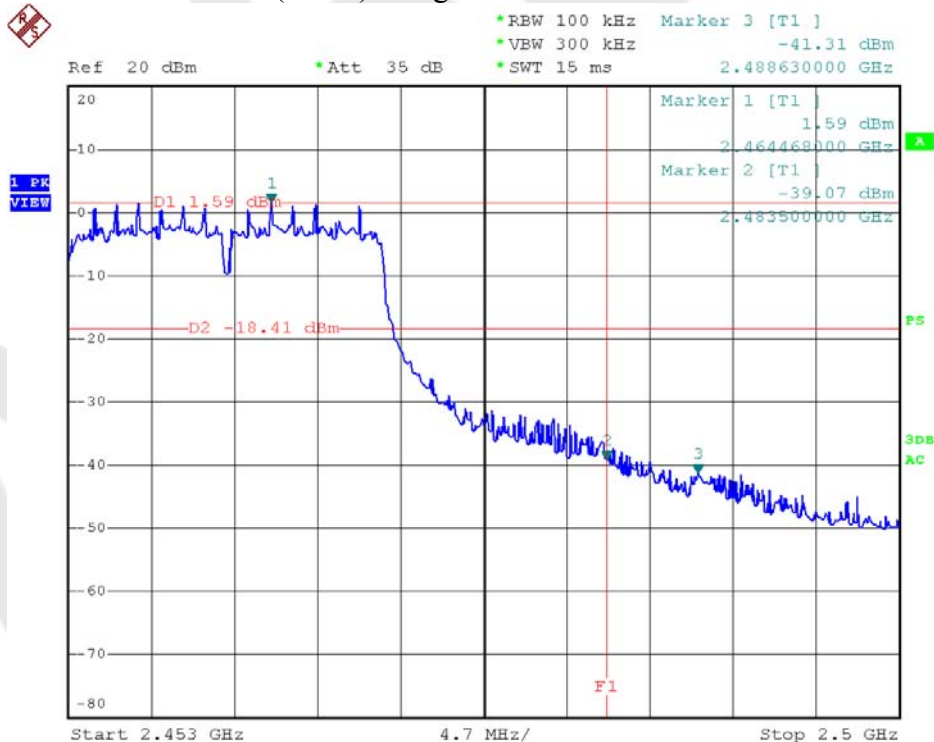
Test Mode: 802.11b ---High



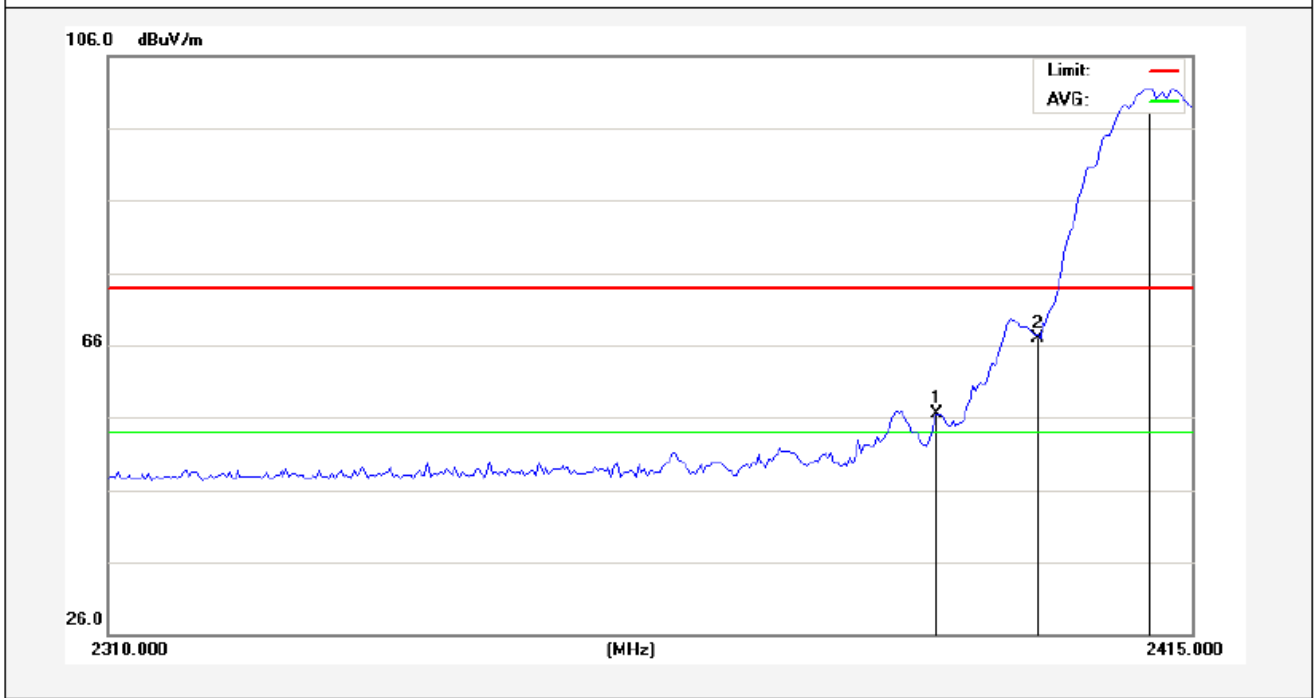
Test Mode: 802.11n (HT20) ---Low



Test Mode: 802.11n (HT20)---High



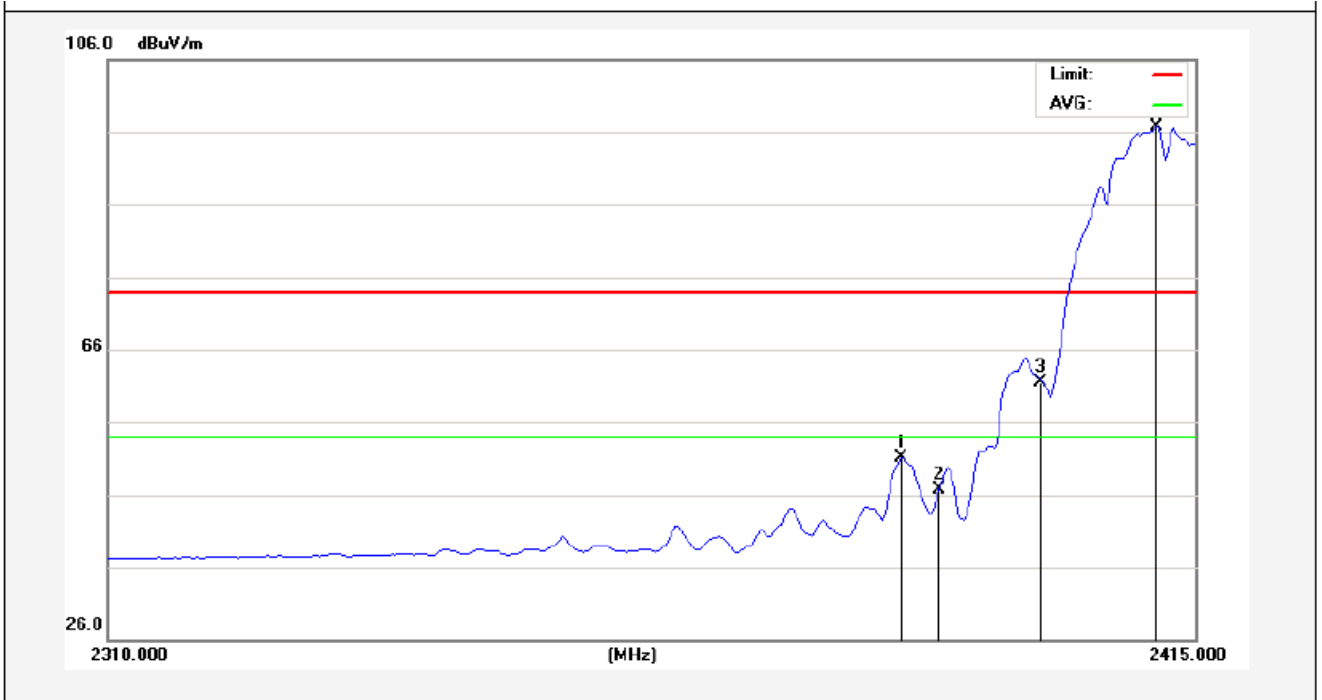
The Worst Mode: 802.11b
2412MHz
Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2390.000	59.07	-2.51	56.56	74.00	-17.44	peak			
2	2400.000	69.48	-2.49	66.99	74.00	-7.01	peak			
3	2410.800	103.97	-2.47	101.50	74.00	27.50	peak			

AMB

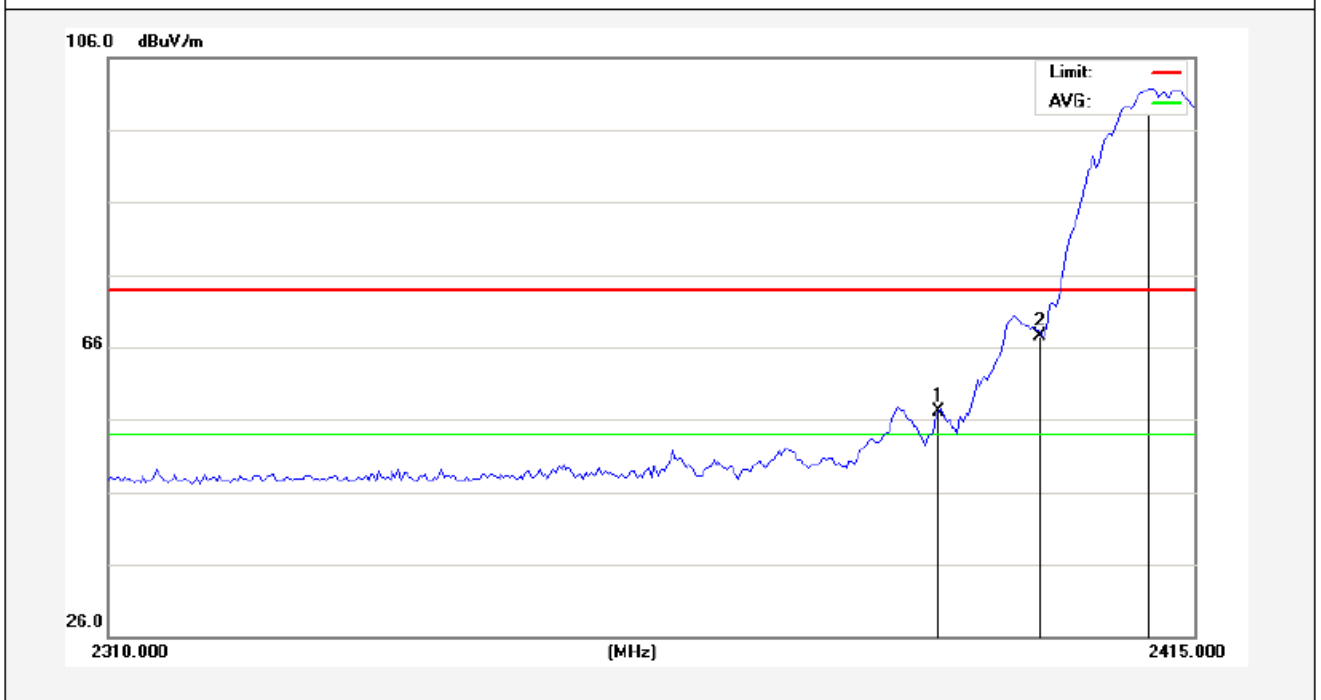
Horizontal-AV:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2386.387	53.61	-2.52	51.09	54.00	-2.91	AVG			
2	2390.000	49.12	-2.51	46.61	54.00	-7.39	AVG			
3	2400.000	64.09	-2.49	61.60	54.00	7.60	AVG			
4	2411.325	99.20	-2.47	96.73	54.00	42.73	AVG			

Anbotek

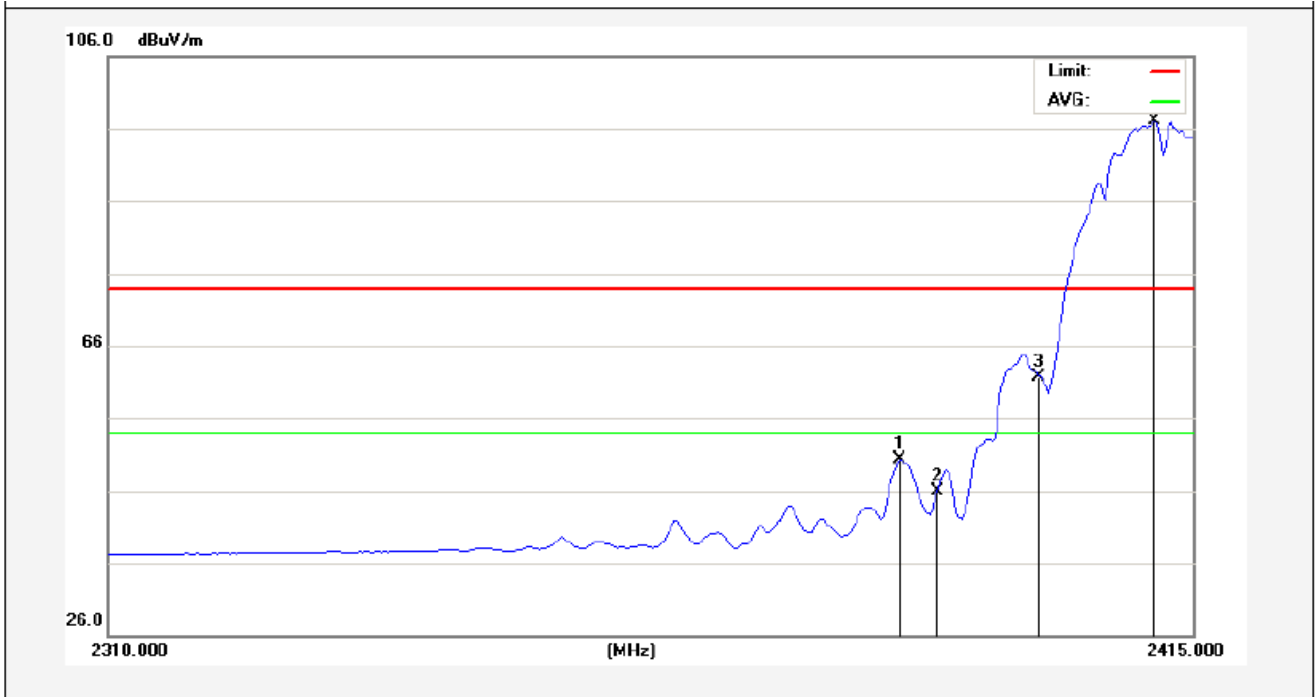
The Worst Mode: 802.11b
2412MHz
Vertical-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2390.000	59.59	-2.51	57.08	74.00	-16.92	peak			
2	2400.000	69.98	-2.49	67.49	74.00	-6.51	peak			
3	2410.537	104.24	-2.47	101.77	74.00	27.77	peak			

AMB

Vertical-AV:



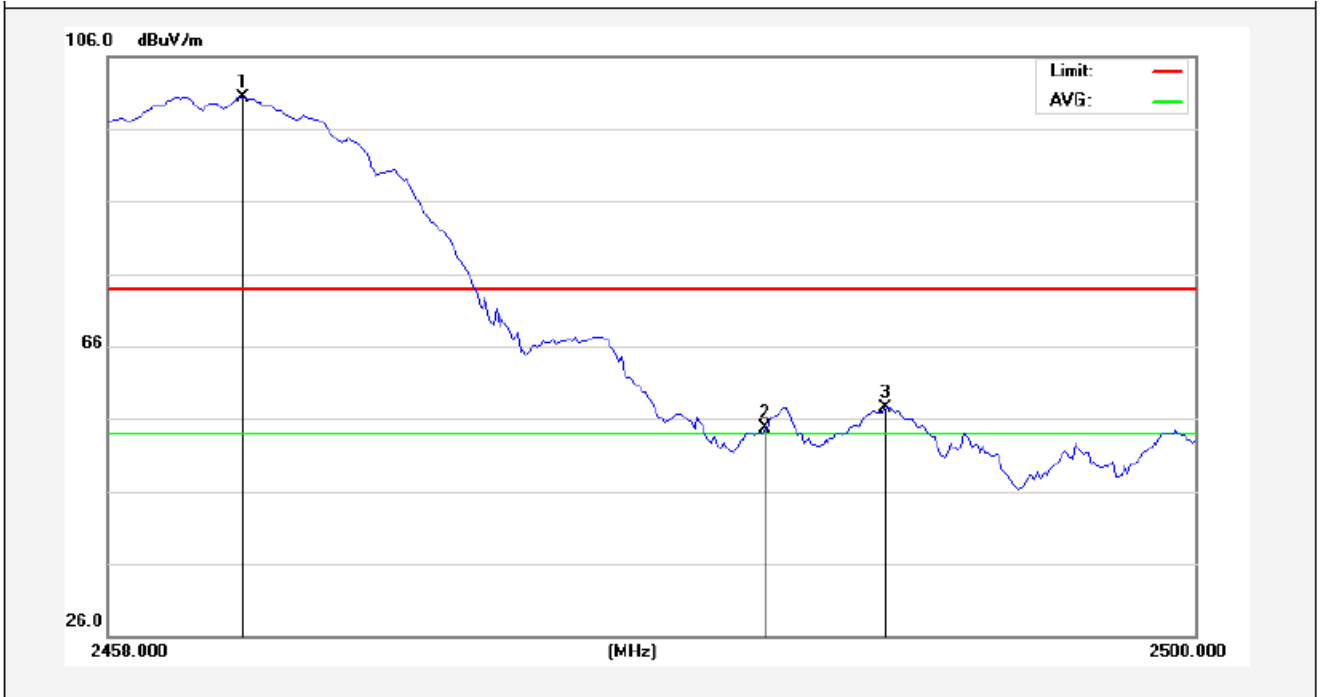
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2386.387	52.79	-2.52	50.27	54.00	-3.73	AVG			
2	2390.000	48.37	-2.51	45.86	54.00	-8.14	AVG			
3	2400.000	64.20	-2.49	61.71	54.00	7.71	AVG			
4	2411.325	99.49	-2.47	97.02	54.00	43.02	AVG			

Anbotek

The Worst Mode: 802.11b

2462MHz

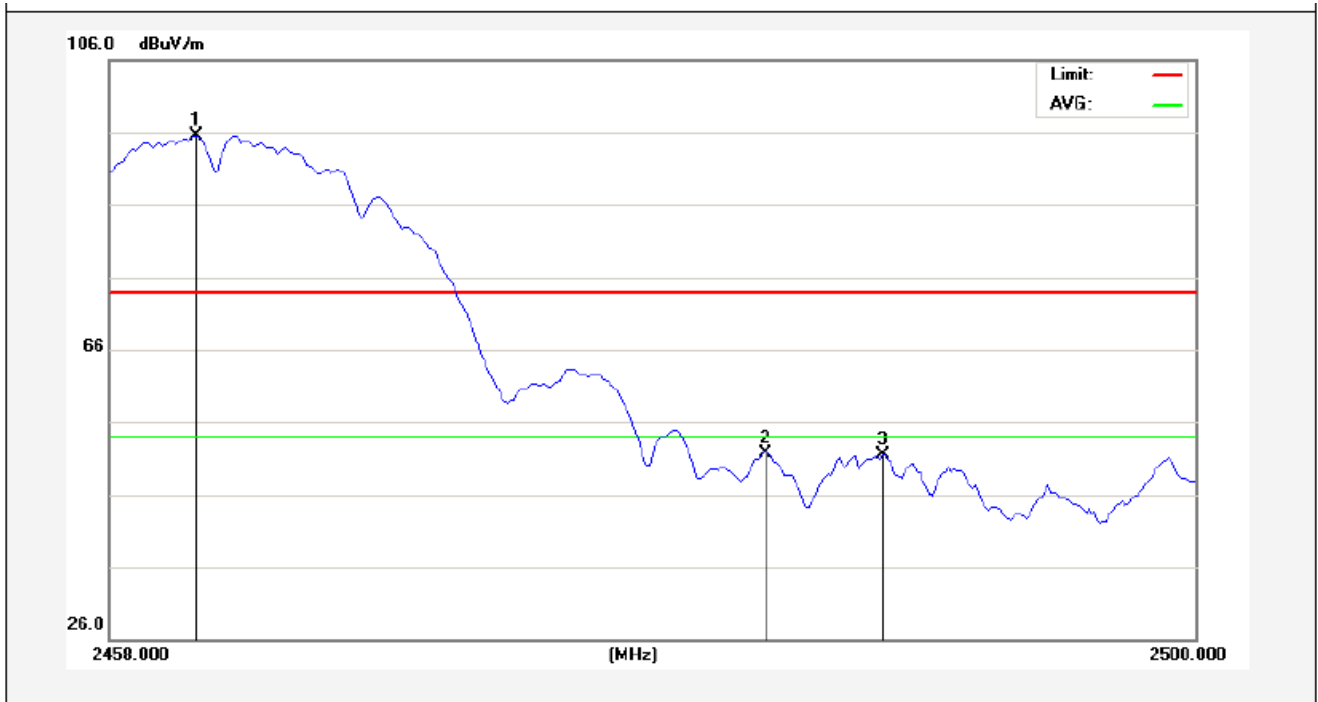
Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2463.250	102.62	-2.35	100.27	74.00	26.27	peak			
2	2483.500	57.11	-2.31	54.80	74.00	-19.20	peak			
3	2488.030	59.90	-2.30	57.60	74.00	-16.40	peak			

AMB

Horizontal-AV:



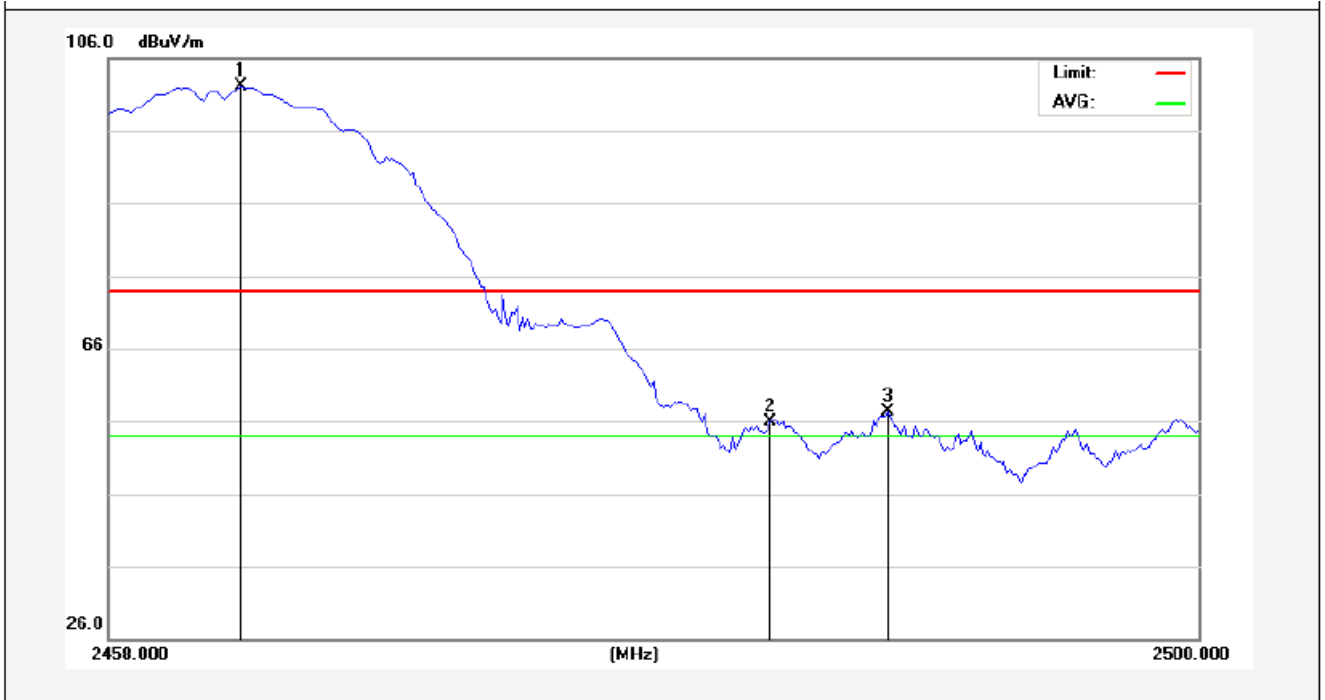
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2461.360	97.92	-2.36	95.56	54.00	41.56	AVG			
2	2483.500	54.00	-2.31	51.69	54.00	-2.31	AVG			
3	2487.925	53.82	-2.30	51.52	54.00	-2.48	AVG			

Anbotek

The Worst Mode: 802.11b

2462MHz

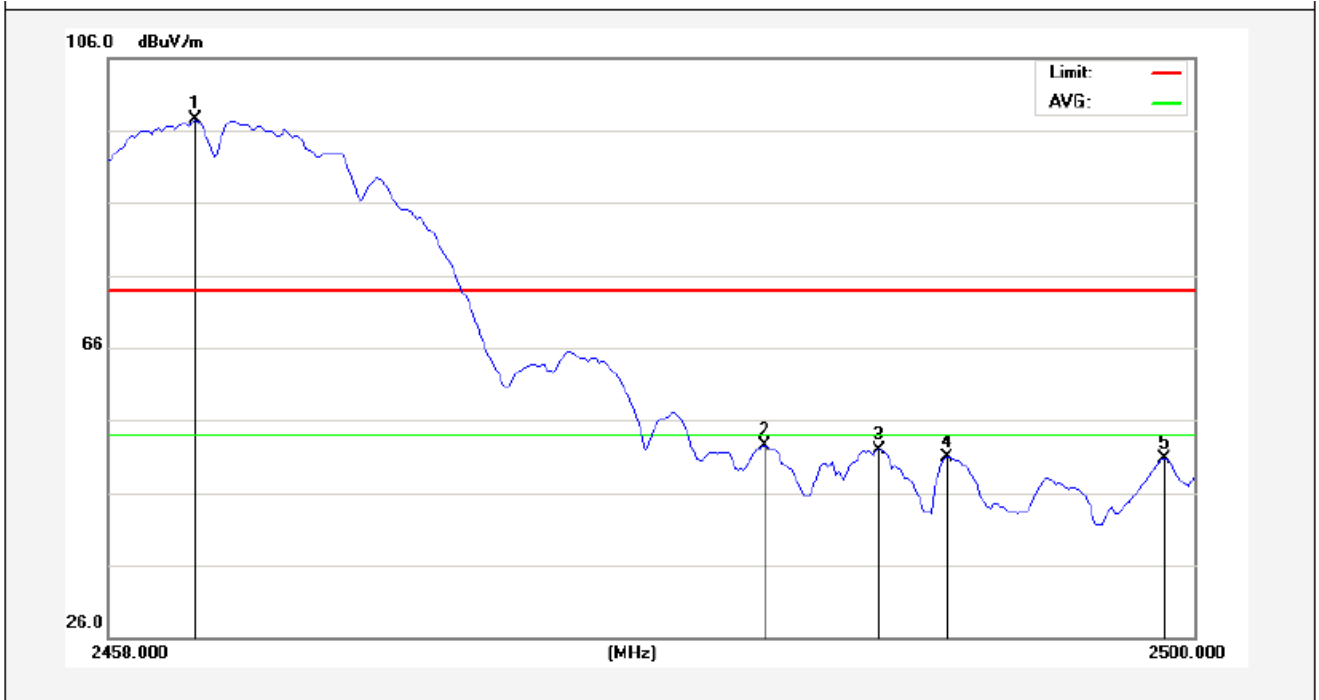
Vertical-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2463.145	104.36	-2.35	102.01	74.00	28.01	peak			
2	2483.500	58.17	-2.31	55.86	74.00	-18.14	peak			
3	2488.030	59.64	-2.30	57.34	74.00	-16.66	peak			

AMB

Vertical-AV:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2461.360	99.83	-2.36	97.47	54.00	43.47	AVG			
2	2483.500	54.73	-2.31	52.42	54.00	-1.58	AVG			
3	2487.820	54.15	-2.30	51.85	54.00	-2.15	AVG			
4	2490.445	53.17	-2.29	50.88	54.00	-3.12	AVG			
5	2498.845	53.01	-2.27	50.74	54.00	-3.26	AVG			

Anbotek

4.5. Peak Power Spectral Density

a. Limit

1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

b. Test Procedure

1. Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 1.5MHz, Sweep=500s
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

c. Test Equipment

Same as the equipment listed in 4.2.

d. Test Setup

See 4.1

e. Test Results

Pass

f. Test Data

Please refer to the following data.

g. Test Plot See the following pages

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm/3KHz)	ΣPPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2412	1.68	-	8.00	Pass
Mid	2437	-1.46	-		Pass
High	2462	-0.46	-		Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	ΣPPSD (dBm)	Limit (dBm)	Result
Low	2412	-14.87	-	8.00	Pass
Mid	2437	-15.00	-		Pass
High	2462	-14.41	-		Pass

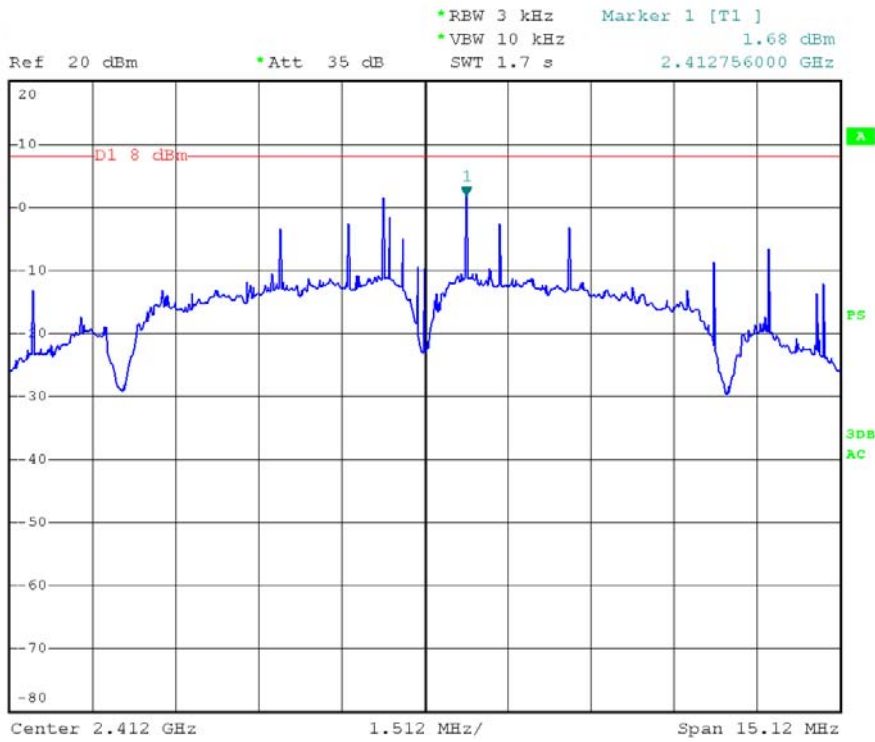
Test mode: IEEE 802.11n (HT20)

Channel	Frequency (MHz)	PPSD (dBm/3KHz)	ΣPPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2412	-13.37	-	8.00	Pass
Mid	2437	-13.54	-		Pass
High	2462	-13.11	-		Pass

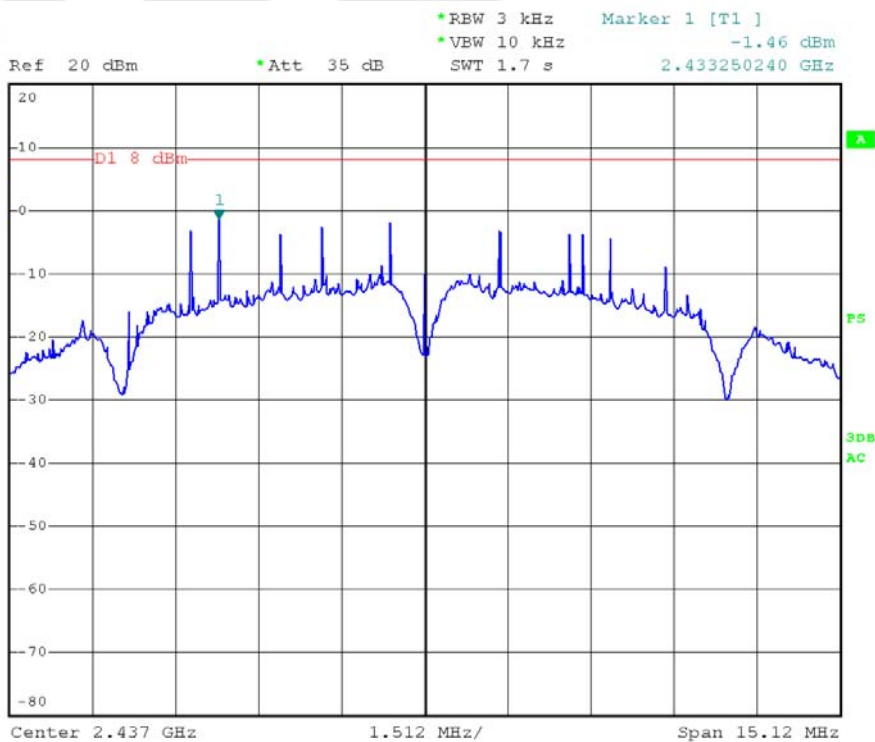
Test mode: IEEE 802.11n (HT40)

Channel	Frequency (MHz)	PPSD (dBm/3KHz)	ΣPPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2422	-17.88	-	8.00	Pass
Mid	2437	-17.93	-		Pass
High	2452	-16.70	-		Pass

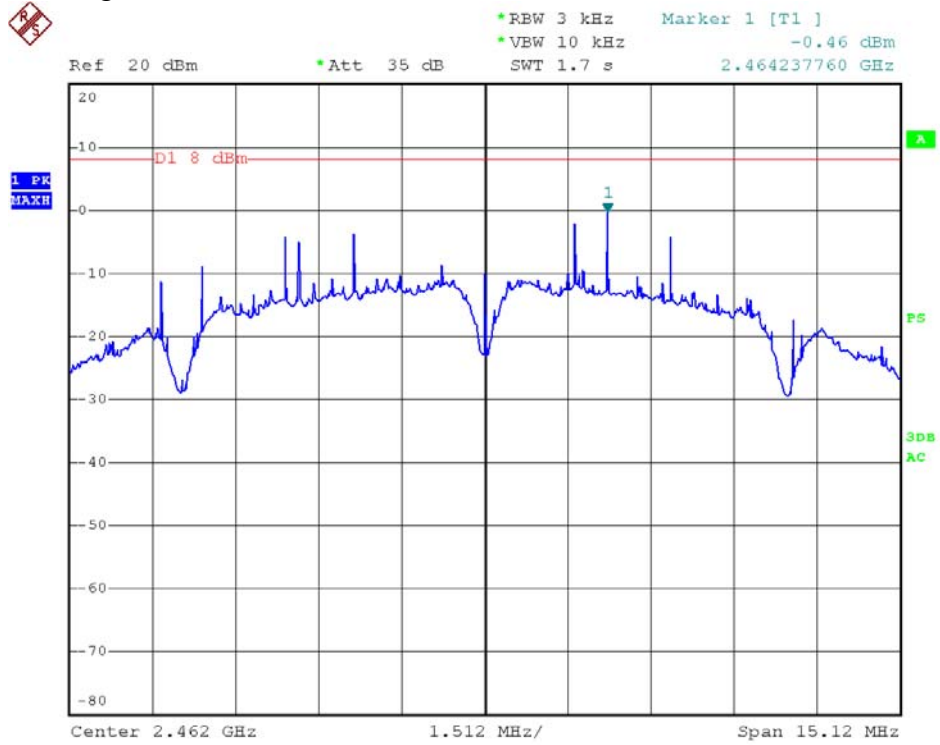
802.11 b CH--Low



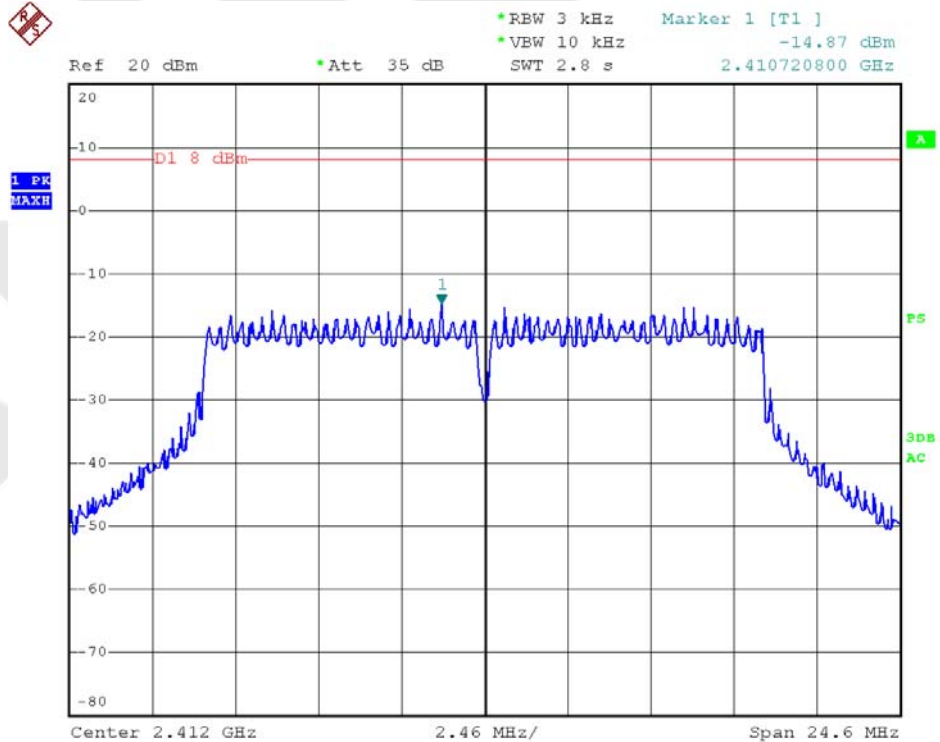
802.11 b CH--Mid



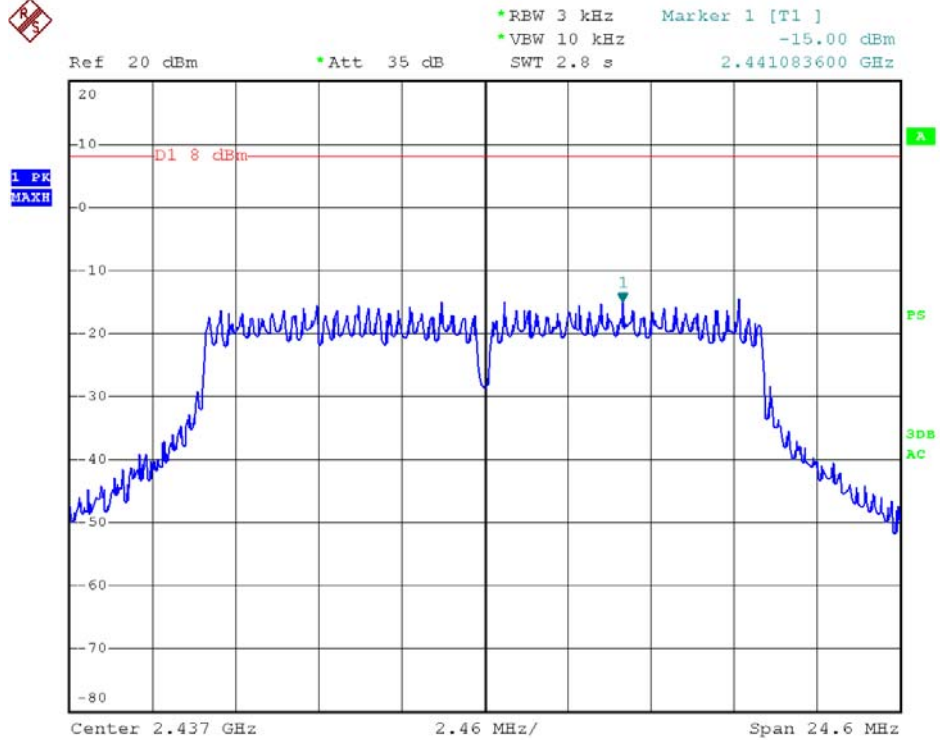
802.11 b CH--High



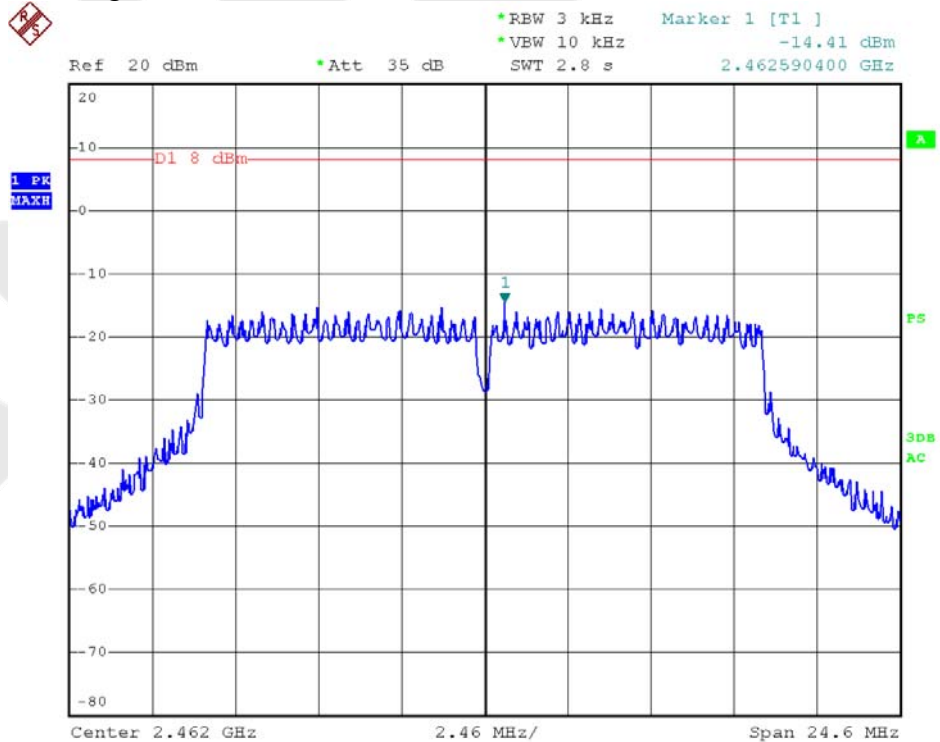
802.11g CH--Low



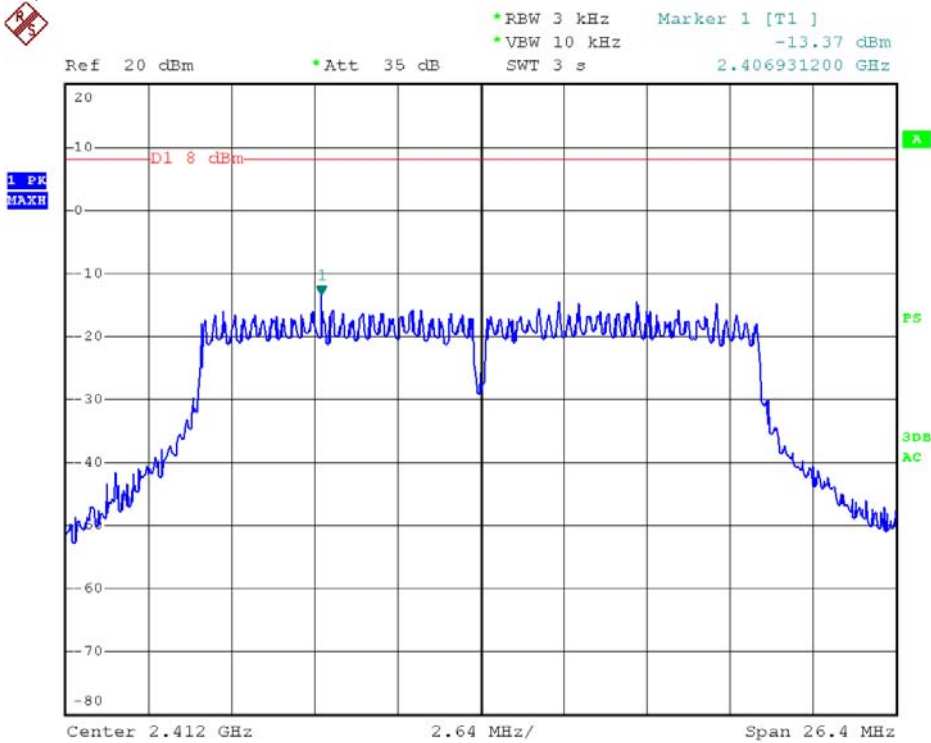
802.11g CH--Mid



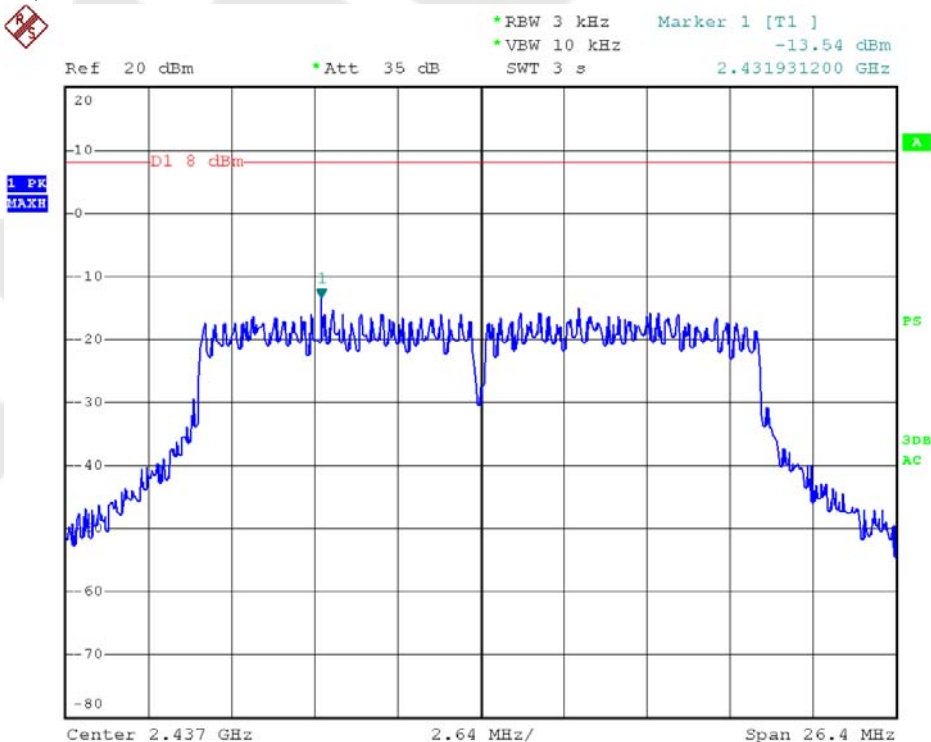
802.11g CH--High



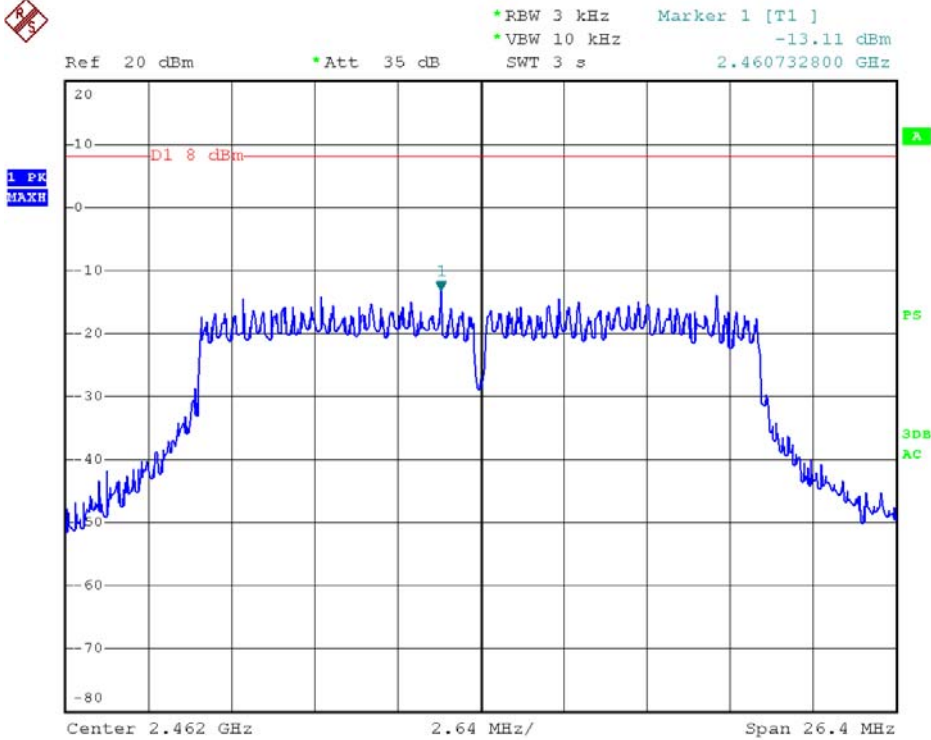
802.11n (HT20) CH—Low



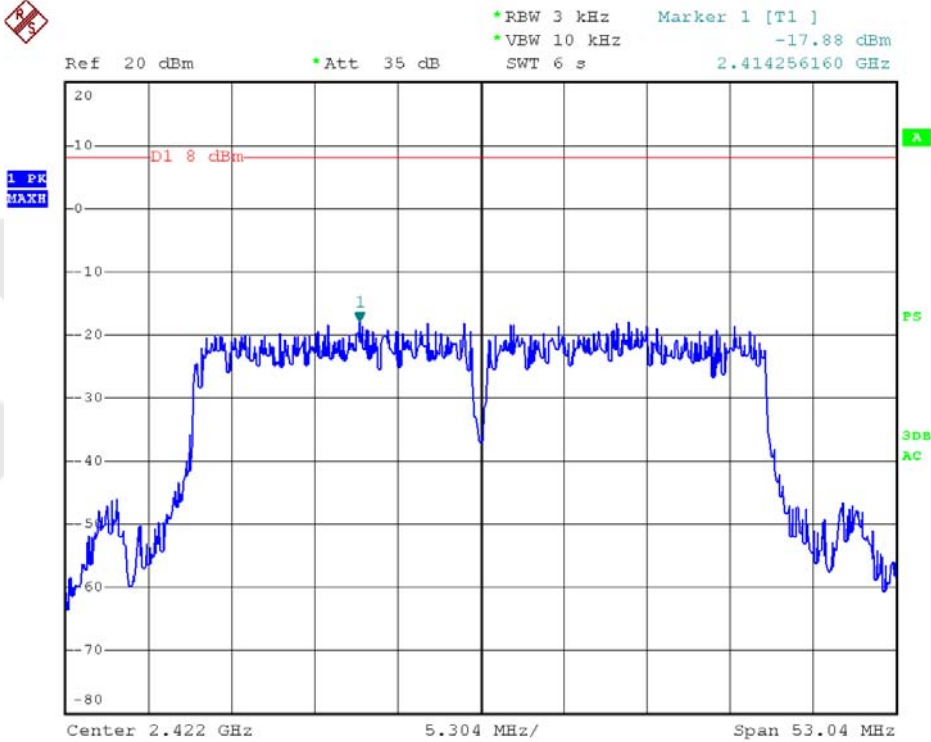
802.11n (HT20) CH—Mid



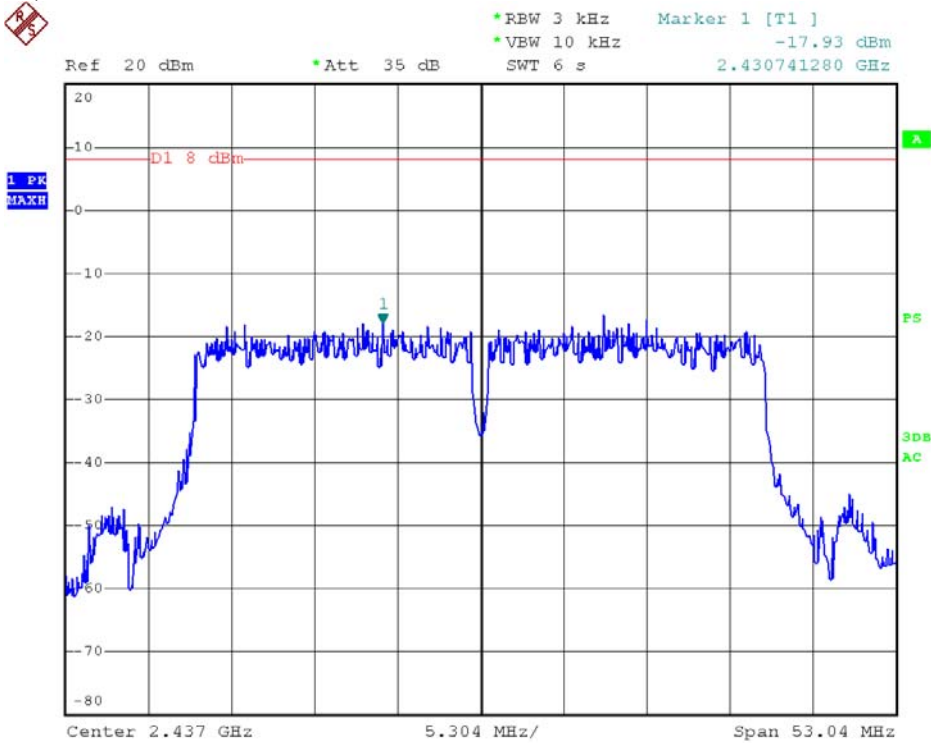
802.11n (HT20) CH—High



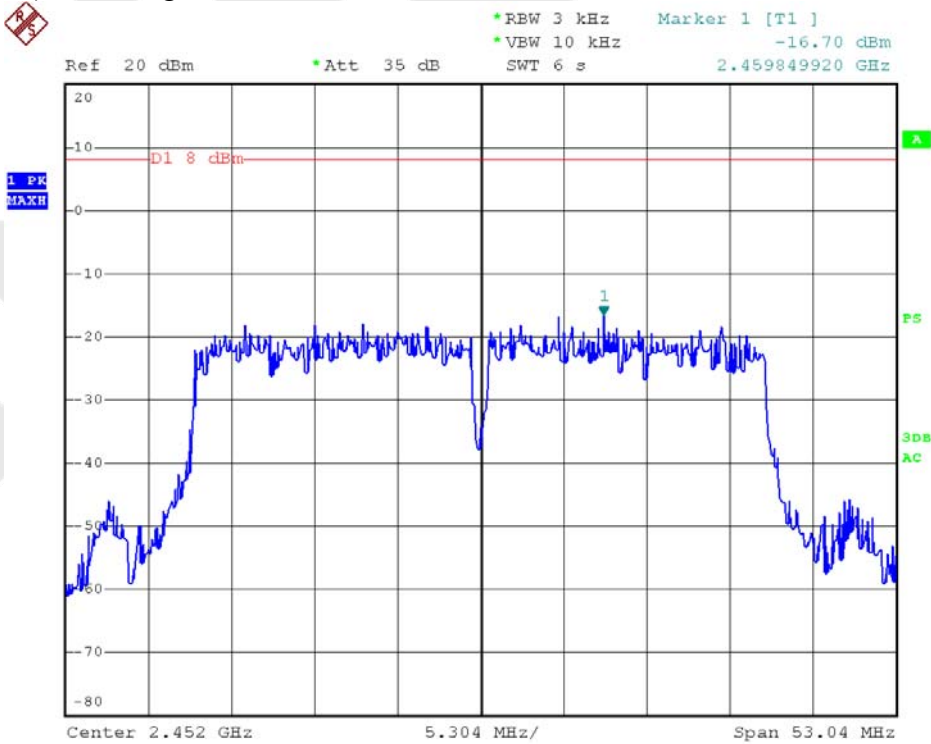
802.11n (HT40) CH—Low



802.11n (HT40) CH—Mid



802.11n (HT40) CH—High



4.6. Radiated Emissions

4.6.1.1. Test Limits (< 30 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

4.6.1.2. Test Limits (≥ 30 MHz)

FIELD STRENGTH of Fundamental: @3M	FIELD STRENGTH of Harmonics	S15.209	
902-928 MHz		30 - 88 MHz	40 dBuV/m
2.4-2.4835 GHz		88 - 216 MHz	43.5
94 dBμV/m @3m	54 dBμV/m @3m	216 - 960 MHz	46
		ABOVE 960 MHz	54dBuV/m

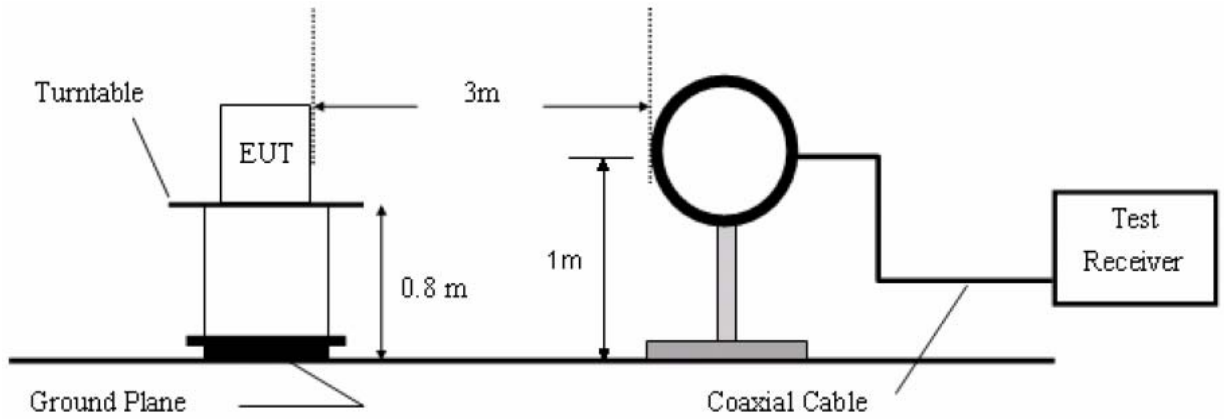
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Test Equipment

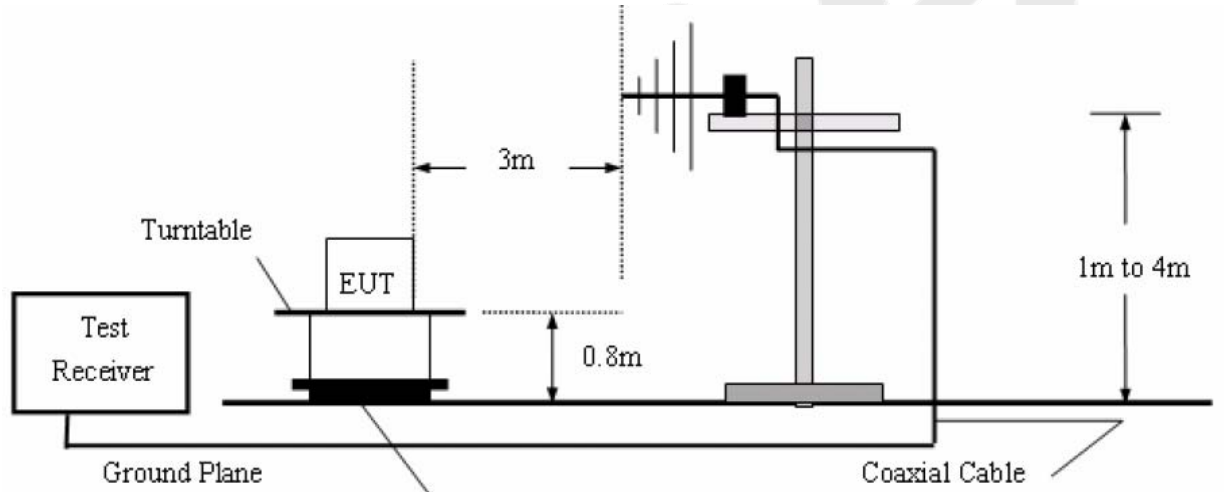
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Preamplifier	Instruments corporation	EMC011830	980100	Aug. 09, 2013	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 23, 2013	1 Year
3.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Aug. 09, 2013	3 Year
4.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	3 Year
5.	Pre-amplifier	SONOMA	310N	186860	Apr. 23, 2013	1 Year
6.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

4.6.2. Test Configuration:

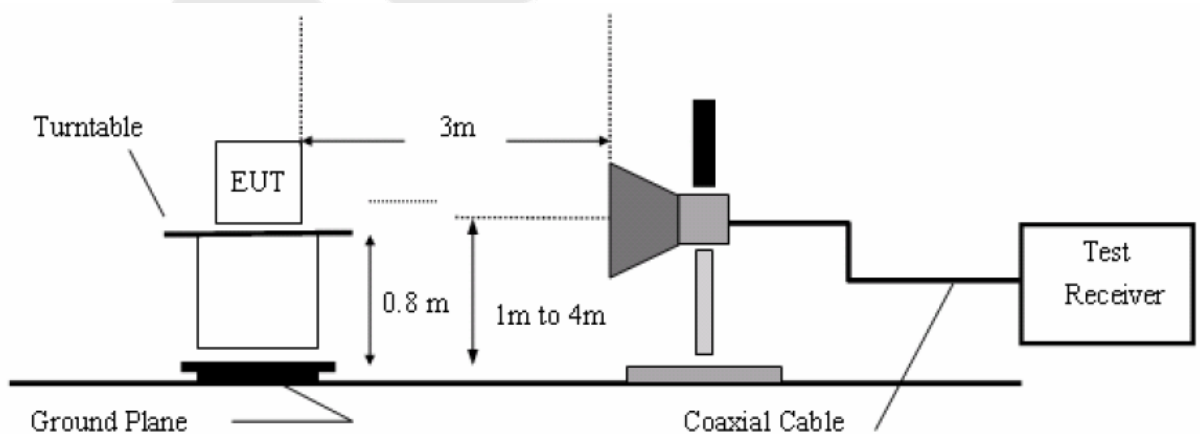
4.6.2.1. 9k to 30MHz emissions:



4.6.2.2. 30M to 1G emissions:



4.6.2.3. 1G to 40G emissions:



4.6.3. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

Measurements are made on 9KHz to 30MHz and 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz.

The EUT is tested in 9*6*6 Chamber.

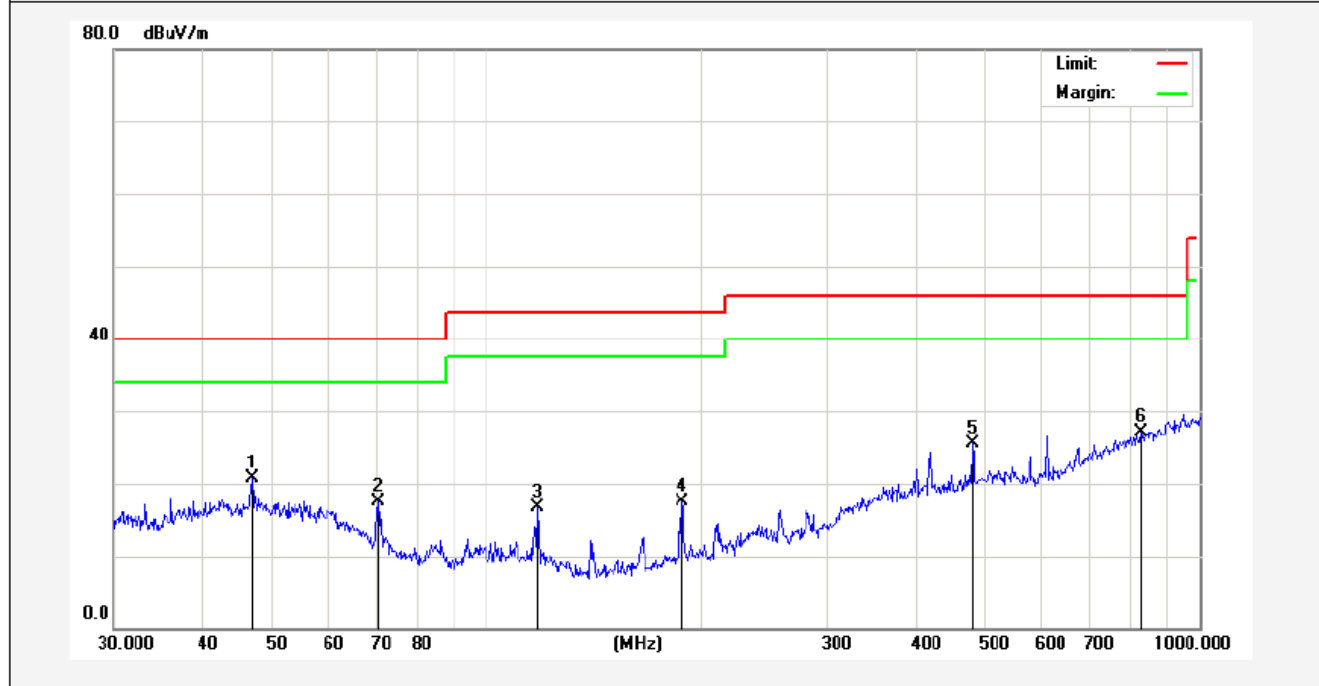
The test results are listed in Section 4.6.4.

4.6.4. Test Results

Please refer to the following pages.

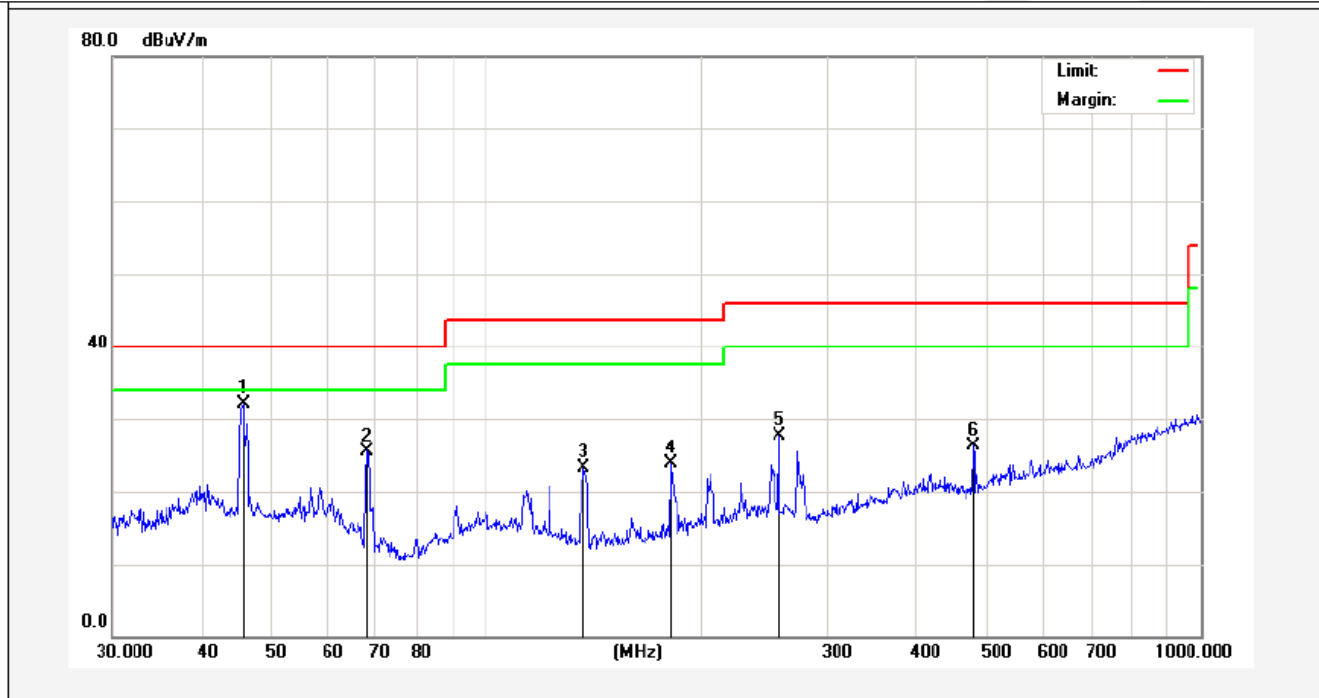
Job No.:	AT1310724F	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C_3m	Power Source:	AC 120V/60Hz for adapter
Test item:	Radiation Test	Date:	2013/10/28
Temp.(C)/Hum.(%RH):	24.3(C)/55%RH	Time:	11/47/59
EUT:	Embedded Wi-Fi Module	Test By:	Kebo Zhang
Model:	HF-LPB200	Distance:	3m

Note: On



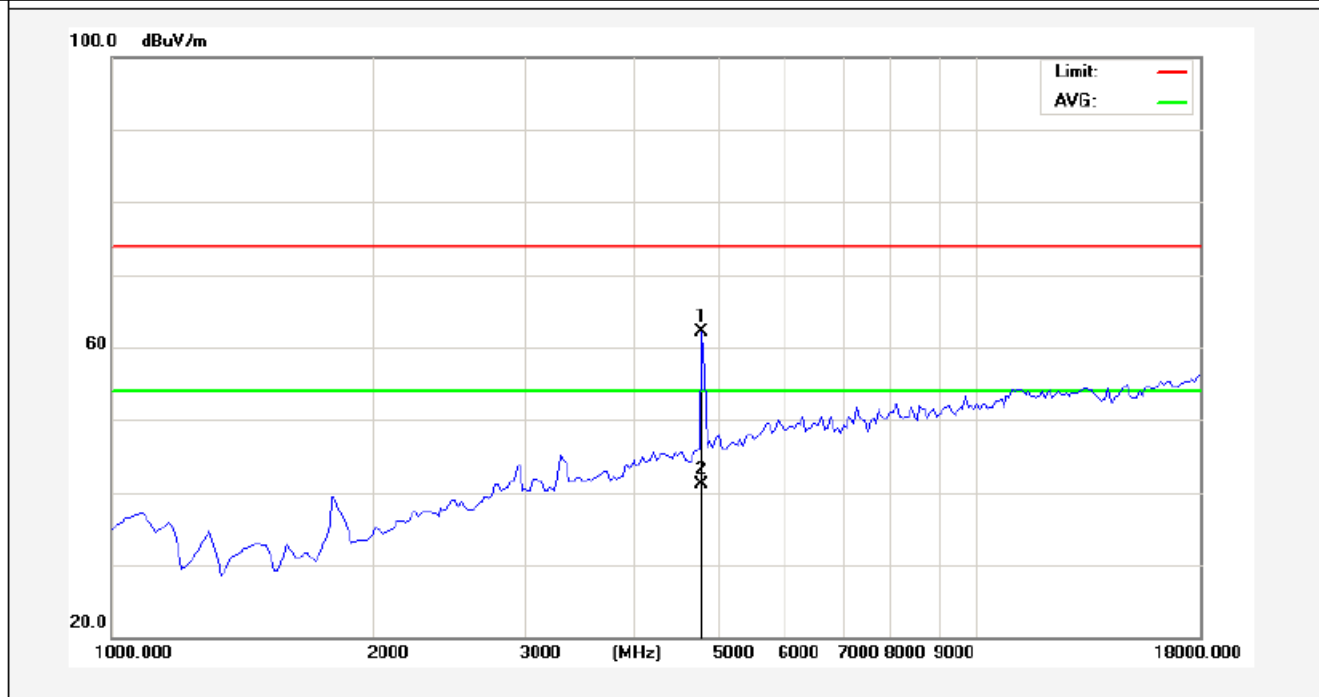
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	46.8303	35.14	-14.42	20.72	40.00	-19.28	peak			
2	70.3365	37.16	-19.69	17.47	40.00	-22.53	peak			
3	117.7725	37.93	-21.18	16.75	43.50	-26.75	peak			
4	187.7530	38.56	-21.14	17.42	43.50	-26.08	peak			
5	480.5276	36.98	-11.53	25.45	46.00	-20.55	peak			
6	827.4934	33.11	-6.01	27.10	46.00	-18.90	peak			

Job No.:	AT1310724F	Polarization:	Vertical
Standard:	(RE)FCC PART15 C_3m	Power Source:	AC 120V/60Hz for adapter
Test item:	Radiation Test	Date:	2013/10/28
Temp.(C)/Hum.(%RH):	24.3(C)/55%RH	Time:	11/51/58
EUT:	Embedded Wi-Fi Module	Test By:	Kebo Zhang
Model:	HF-LPB200	Distance:	3m
Note:	On		



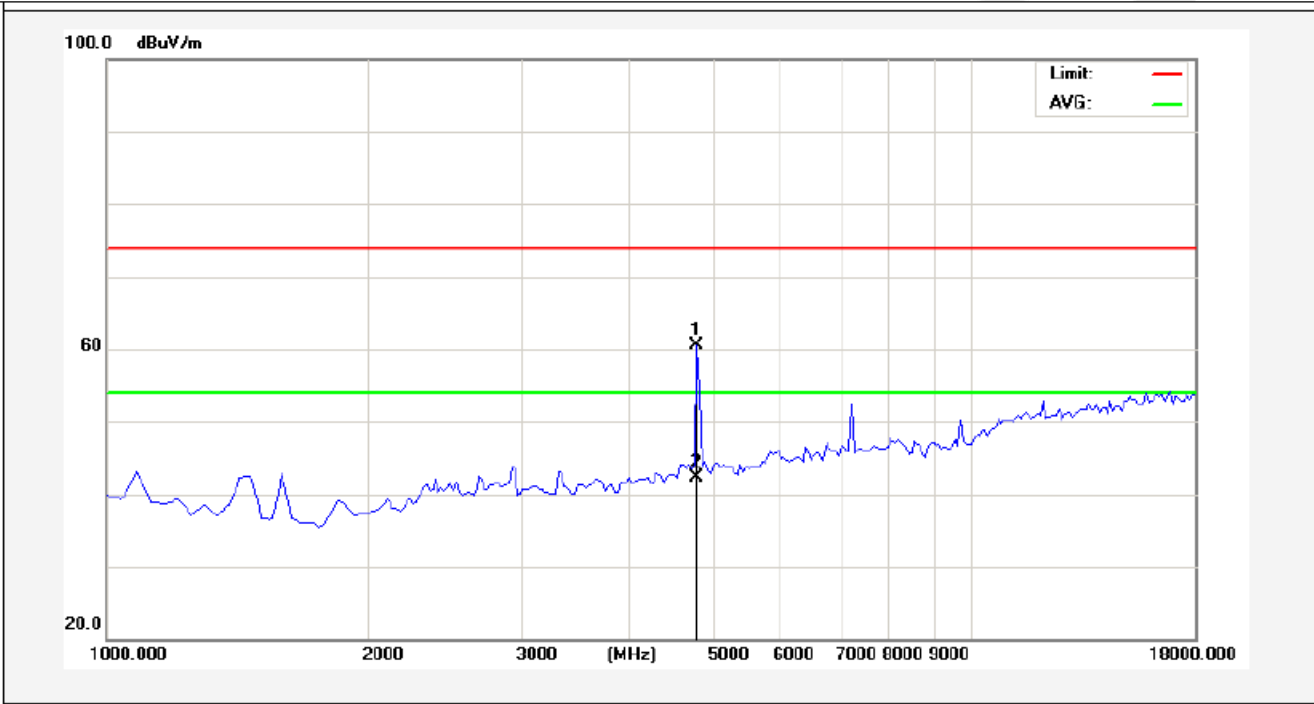
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	45.6948	46.46	-14.36	32.10	40.00	-7.90	peak			
2	68.1514	44.42	-18.82	25.60	40.00	-14.40	peak			
3	136.9391	41.59	-18.27	23.32	43.50	-20.18	peak			
4	180.6488	40.68	-16.79	23.89	43.50	-19.61	peak			
5	256.5211	41.64	-14.01	27.63	46.00	-18.37	peak			
6	480.5276	37.91	-11.53	26.38	46.00	-19.62	peak			

Job No.:	AT1310724F	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V/60Hz for adapter
Test item:	Radiation Test	Date:	2013/11/06
Temp.(C)/Hum.(%RH):	24.3(C)/55%RH	Time:	23/00/54
EUT:	Embedded Wi-Fi Module	Test By:	Rock Zeng
Model:	HF-LPB200	Distance:	3m
Note:	802.11b(2412Mhz)		



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4825.000	58.67	3.34	62.01	74.00	-11.99	peak			
2	4825.000	37.69	3.34	41.03	54.00	-12.97	AVG			

Job No.:	AT1310724F	Polarization:	Vertical
Standard:	(RE)FCC PART15 C_3m	Power Source:	AC 120V/60Hz for adapter
Test item:	Radiation Test	Date:	2013/11/06
Temp.(C)/Hum.(%RH):	24.3(C)/55%RH	Time:	22/57/51
EUT:	Embedded Wi-Fi Module	Test By:	Rock Zeng
Model:	HF-LPB200	Distance:	3m
Note:	802.11b(2412Mhz)		

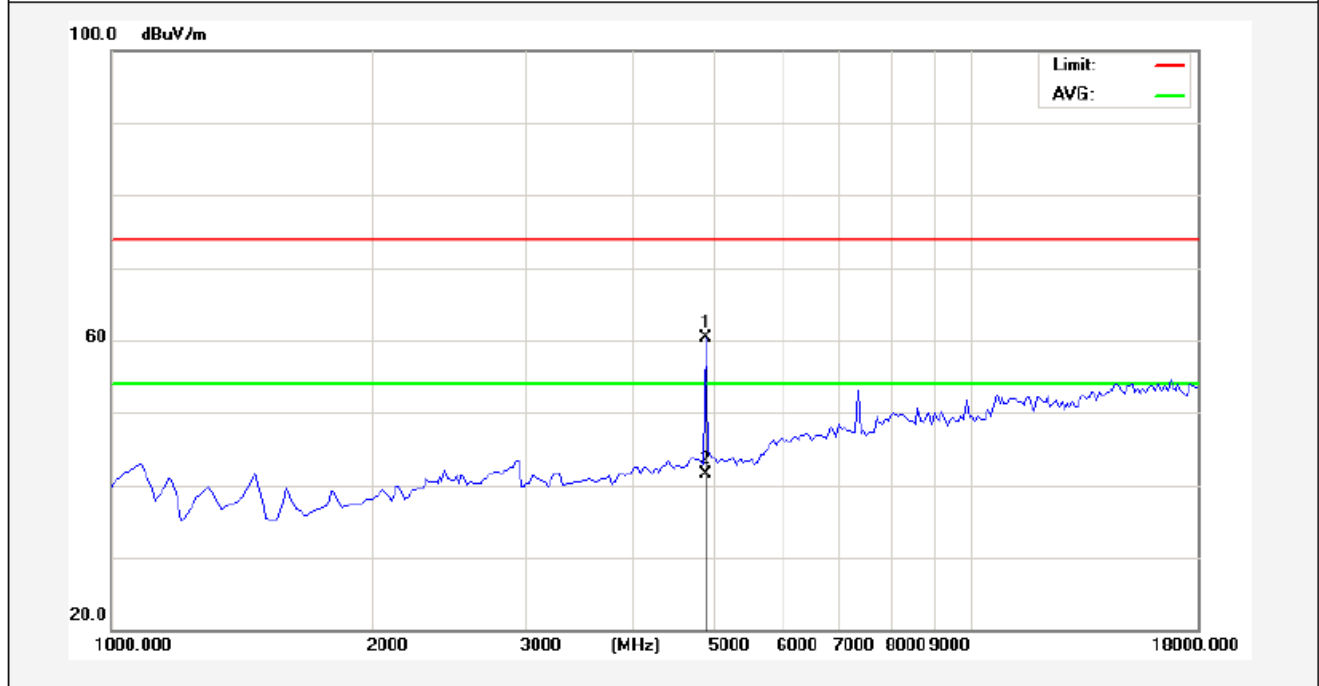


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4825.000	57.10	3.34	60.44	74.00	-13.56	peak			
2	4825.000	38.87	3.34	42.21	54.00	-11.79	AVG			

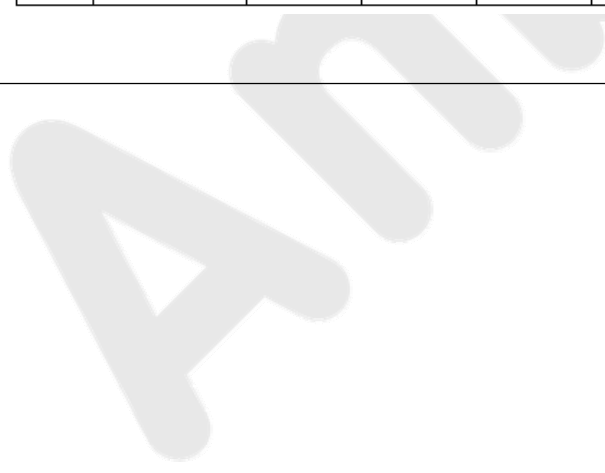


Job No.:	AT1310724F	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V/60Hz for adapter
Test item:	Radiation Test	Date:	2013/11/06
Temp.(C)/Hum.(%RH):	24.3(C)/55%RH	Time:	23/18/41
EUT:	Embedded Wi-Fi Module	Test By:	Rock Zeng
Model:	HF-LPB200	Distance:	3m

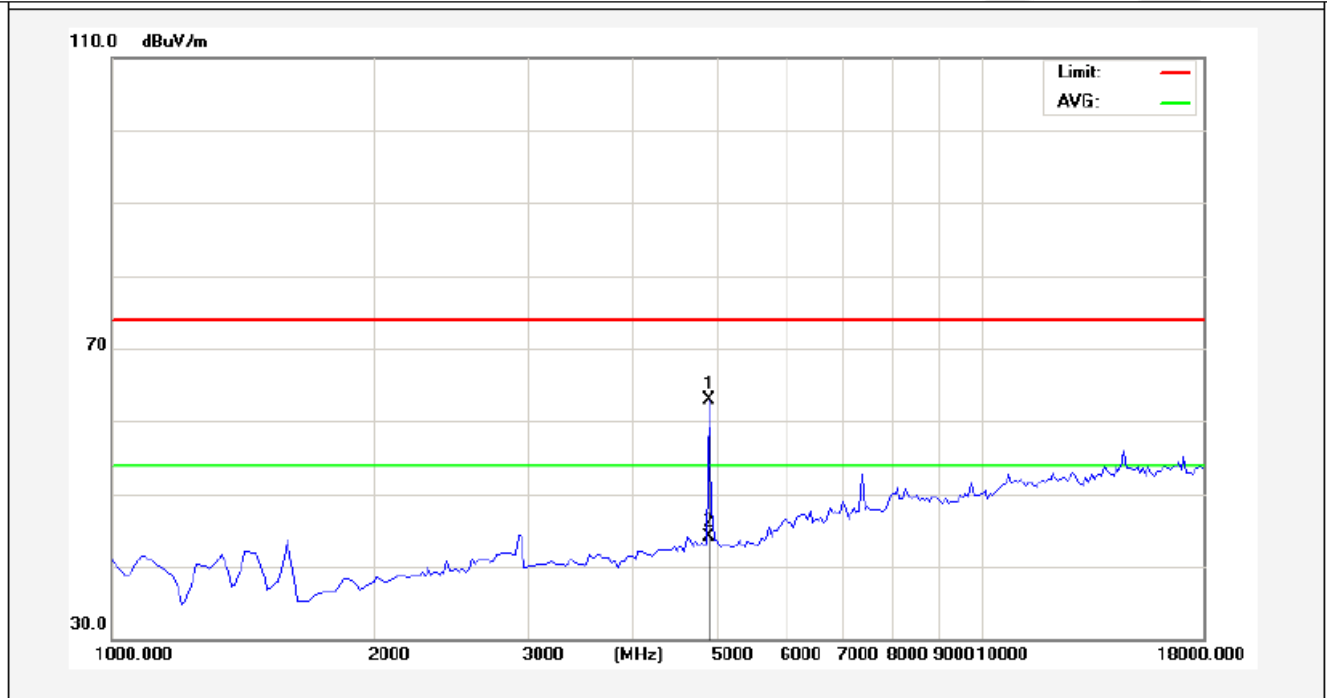
Note: 802.11b(2437Mhz)



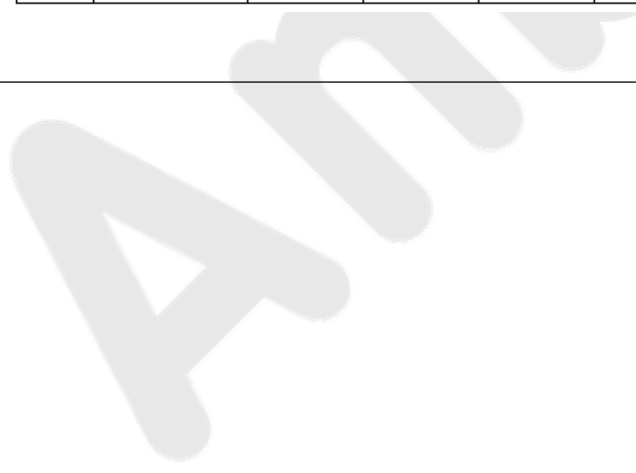
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4867.500	56.90	3.41	60.31	74.00	-13.69	peak			
2	4867.500	38.12	3.41	41.53	54.00	-12.47	AVG			



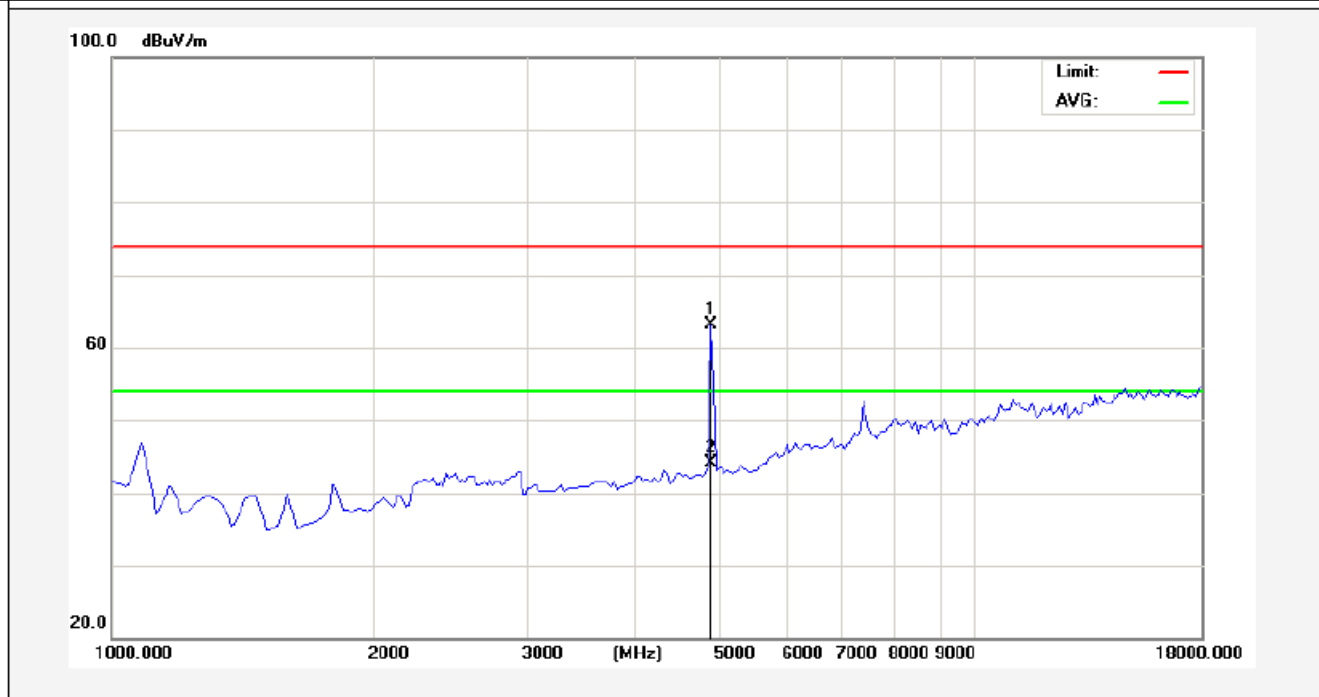
Job No.:	AT1310724F	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V/60Hz for adapter
Test item:	Radiation Test	Date:	2013/11/06
Temp.(C)/Hum.(%RH):	24.3(C)/55%RH	Time:	23/22/07
EUT:	Embedded Wi-Fi Module	Test By:	Rock Zeng
Model:	HF-LPB200	Distance:	3m
Note:	802.11b(2437Mhz)		



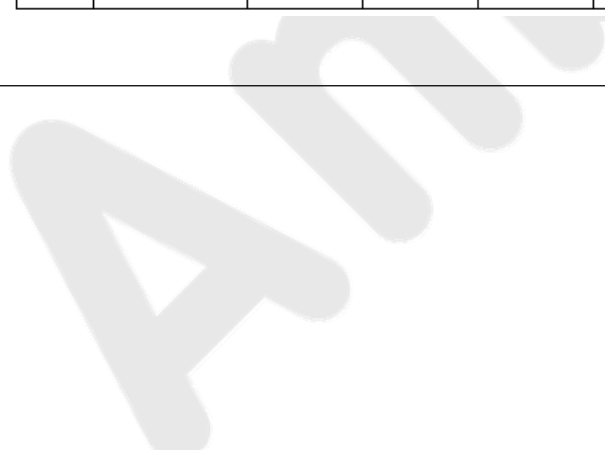
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4867.500	59.59	3.41	63.00	74.00	-11.00	peak			
2	4867.500	40.75	3.41	44.16	54.00	-9.84	AVG			



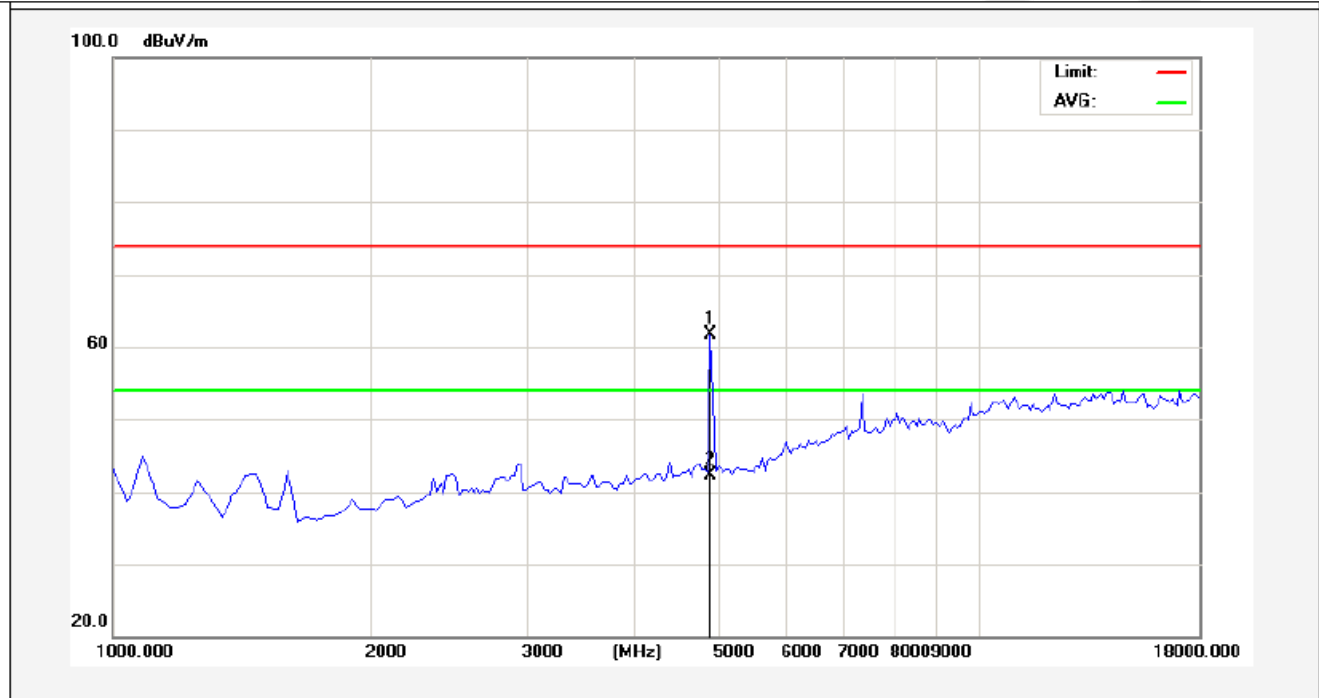
Job No.:	AT1310724F	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V/60Hz for adapter
Test item:	Radiation Test	Date:	2013/11/06
Temp.(C)/Hum.(%RH):	24.3(C)/55%RH	Time:	23/29/55
EUT:	Embedded Wi-Fi Module	Test By:	Rock Zeng
Model:	HF-LPB200	Distance:	3m
Note:	802.11b(2462Mhz)		



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4910.000	59.54	3.49	63.03	74.00	-10.97	peak			
2	4910.000	40.69	3.49	44.18	54.00	-9.82	AVG			



Job No.:	AT1310724F	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V/60Hz for adapter
Test item:	Radiation Test	Date:	2013/11/06
Temp.(C)/Hum.(%RH):	24.3(C)/55%RH	Time:	23/25/33
EUT:	Embedded Wi-Fi Module	Test By:	Rock Zeng
Model:	HF-LPB200	Distance:	3m
Note:	802.11b(2462Mhz)		



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4910.000	58.31	3.49	61.80	74.00	-12.20	peak			
2	4910.000	38.89	3.49	42.38	54.00	-11.62	AVG			



5. PHOTOGRAPH

5.1. Photo of Conducted Emission Measurement



5.2. Photo of Radiation Emission Test



Appendix I (External Photos)

Figure 1
The EUT-Front View

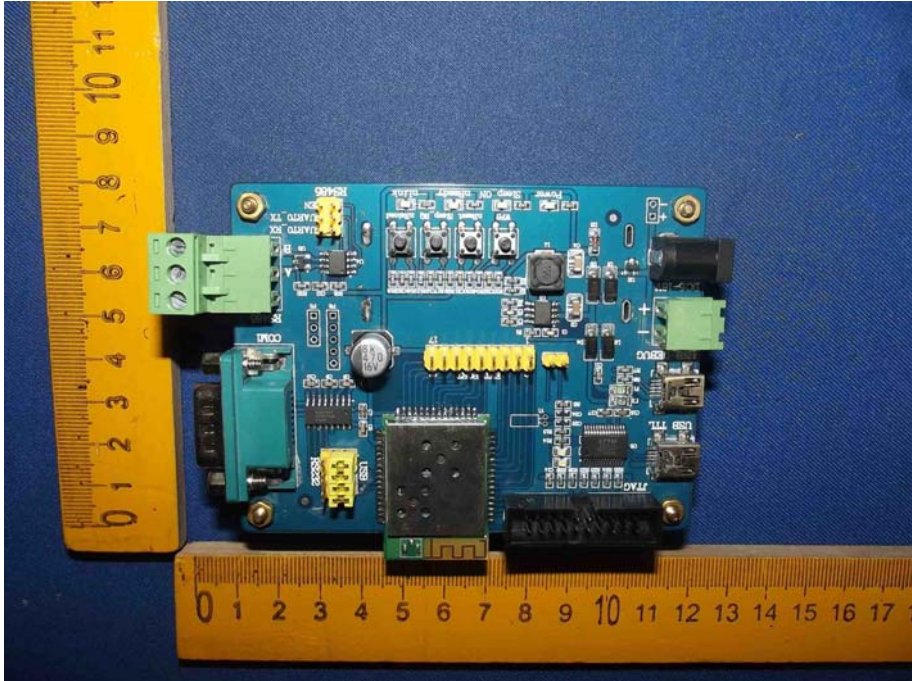


Figure 2
The EUT-Back View

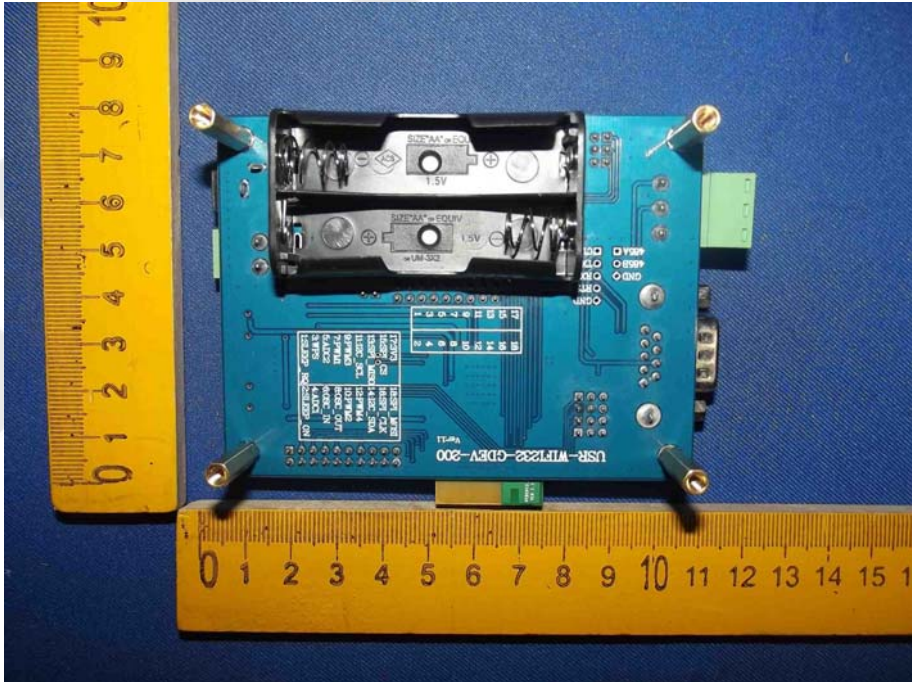


Figure 3
The EUT-Front View

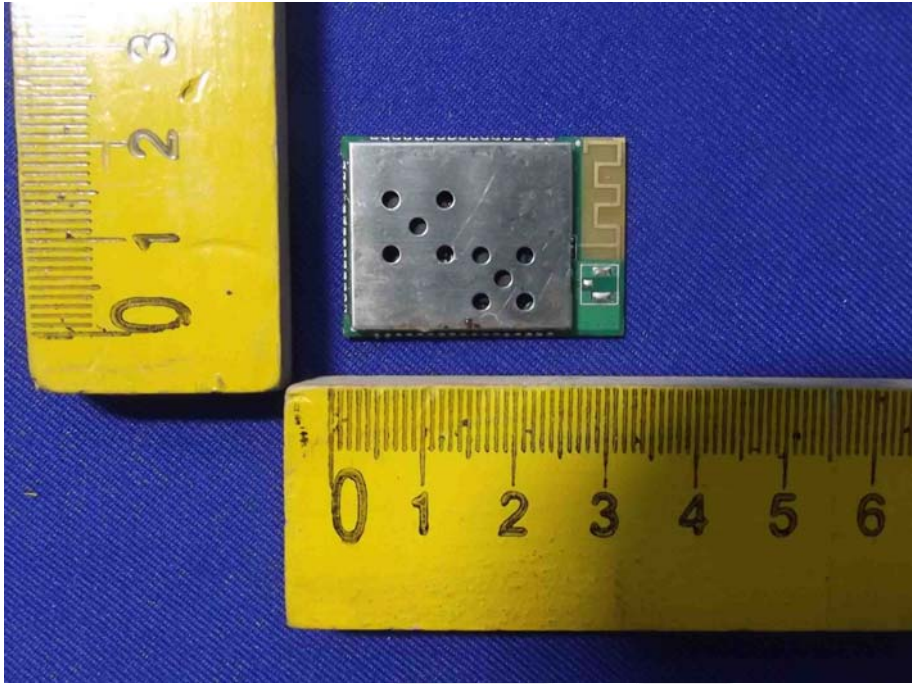
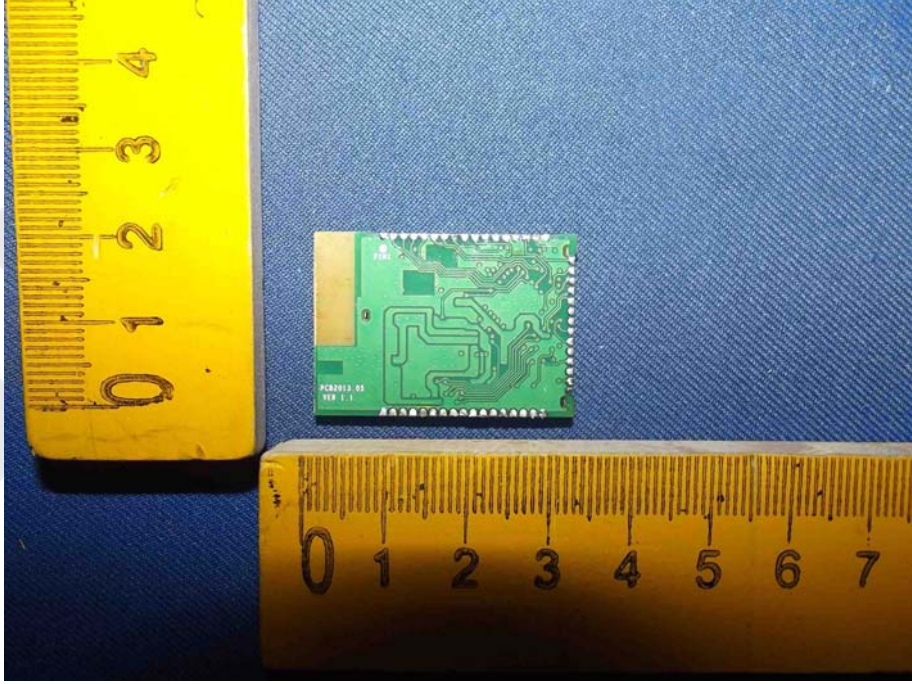


Figure 4
The EUT-Back View



Appendix II (Internal Photos)

Figure 5
The EUT-Inside View

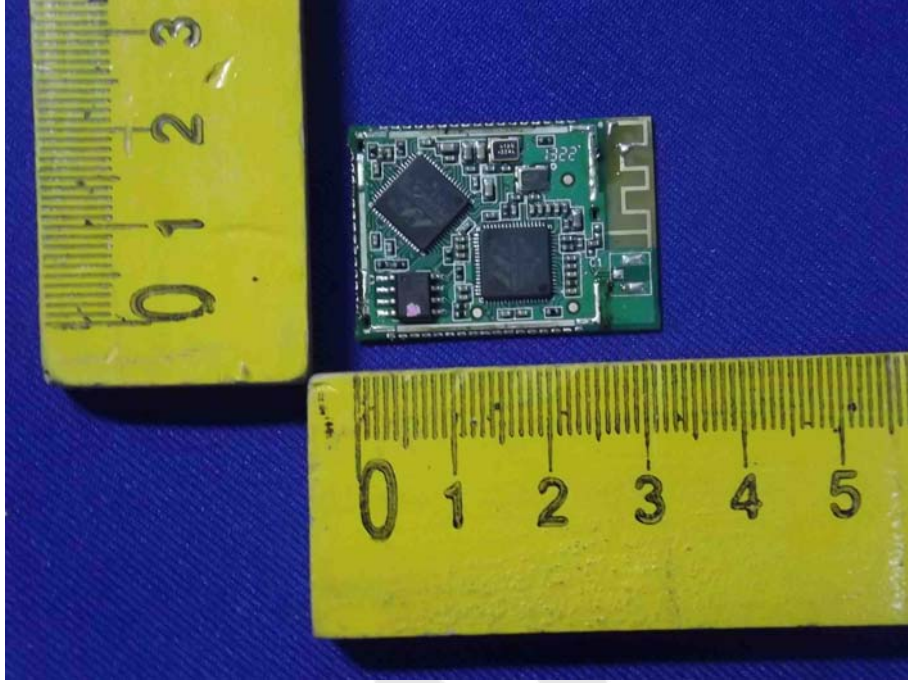


Figure 6
The EUT-Inside View

