

FCC TEST REPORT
for
SHENZHEN YIRUI ELECTRONIC TECHNOLOGY CO., LTD
Wifi Controller
Model No.: L00-000001-00

Prepared for : SHENZHEN YIRUI ELECTRONIC TECHNOLOGY CO., LTD
Address : F4,Build B,SaiLian Industry Park,The 4th Industry
Zone,Shuitian,Shiyan Town,Baoan District,Shenzhen,China

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited
Address : 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road,
Nanshan District, Shenzhen, Guangdong, China
Tel: (86) 755-26066544
Fax: (86) 755-26014772

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Date of Test : Nov. 05~ Dec. 19, 2014
Date of Report : Jan. 22, 2015

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TEST REPORT

Applicant : SHENZHEN YIRUI ELECTRONIC TECHNOLOGY CO., LTD
Manufacturer : SHENZHEN YIRUI ELECTRONIC TECHNOLOGY CO., LTD
EUT : Wifi Controller
Model No. : L00-000001-00
Serial No. : N.A.
Trade Mark : TOUCH LIGHT
Rating : DC 5V, 1A

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 : Nov. 05~ Dec. 19, 2014

Prepared by :

Kebo Zhang

(Tested Engineer / Kebo Zhang)

Reviewer :

Amy Ding

(Project Manager / Amy Ding)

Approved & Authorized Signer :

Tom Chen

(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : Wifi Controller

Model Number : L00-000001-00

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

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

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

Modulation : 802.11b CCK
802.11g OFDM
802.11n MCS

Antenna Gain: : 0dBi

Applicant : SHENZHEN YIRUI ELECTRONIC TECHNOLOGY CO., LTD
Address : F4,Build B,SaiLian Industry Park,The 4th Industry
Zone,Shuitian,Shiyan Town,Baoan District,Shenzhen,China

Manufacturer : SHENZHEN YIRUI ELECTRONIC TECHNOLOGY CO., LTD
Address : F4,Build B,SaiLian Industry Park,The 4th Industry
Zone,Shuitian,Shiyan Town,Baoan District,Shenzhen,China

Factory : SHENZHEN YIRUI ELECTRONIC TECHNOLOGY CO., LTD
Address : F4,Build B,SaiLian Industry Park,The 4th Industry
Zone,Shuitian,Shiyan Town,Baoan District,Shenzhen,China

Date of receipt : Oct. 30, 2014

Date of Test : Nov. 05~ Dec. 19, 2014

1.2. Auxiliary Equipment Used during Test

Adapter : Power Supply
Model:MX12L3-0502000V
Input: AC 100-240V, 50-60Hz, 0.35A
Output: DC 5V, 2A
CE , FCC

BULB LIGHT : Model: 01U-BU016A-11

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.

2.3. List of channels:

√ - available

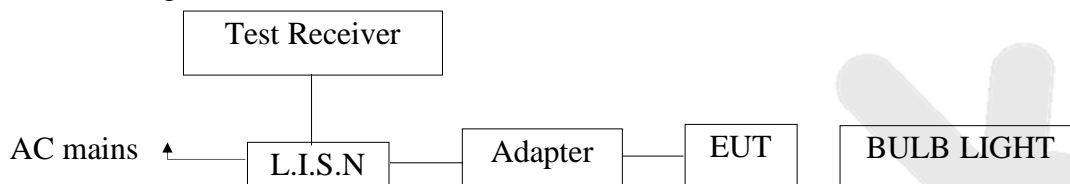
X - tested

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

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 (Static white light, Music) 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. 22, 2014	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 22, 2014	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 22, 2014	1 Year

3.7. Power Line Conducted Emission Measurement Results

PASS.

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

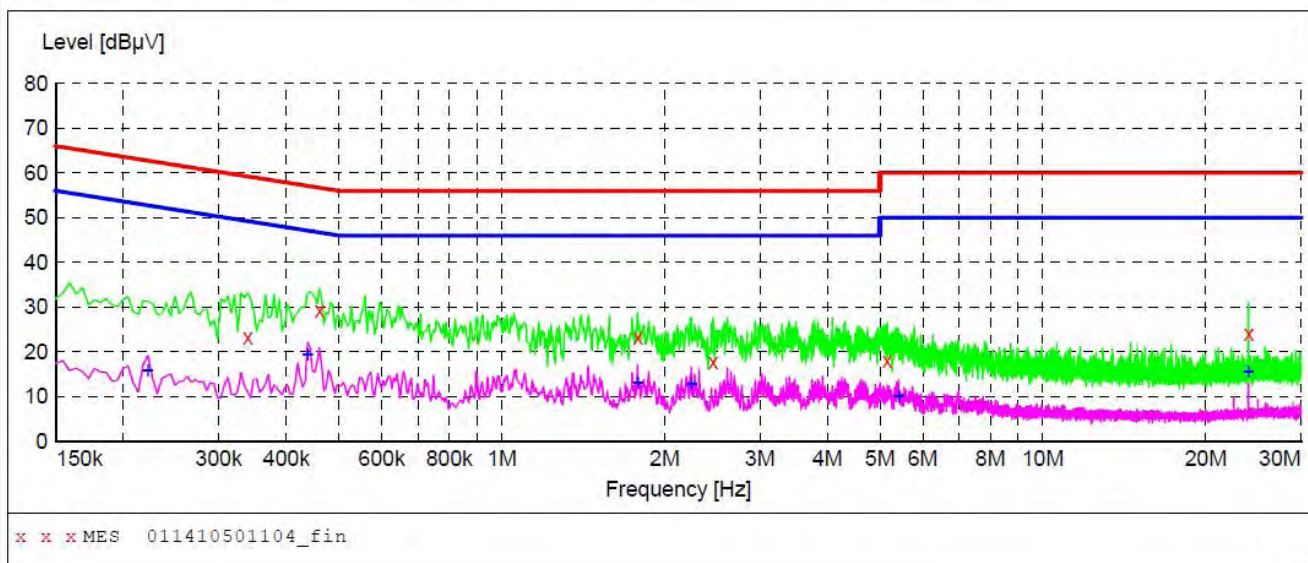
The EUT was tested on (Static white light, Music) modes, only the worst data of (Music) are attached in the following pages.

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
Operating Condition: Music
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Tem.:25°C Hum.:50%

SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



MEASUREMENT RESULT: "011410501104_fin"

11/10/2014 4:55PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.339000	23.10	20.1	59	36.1	QP	L1	GND
0.460500	29.20	20.1	57	27.5	QP	L1	GND
1.783000	23.10	20.3	56	32.9	QP	L1	GND
2.458000	17.80	20.3	56	38.2	QP	L1	GND
5.158000	18.00	20.5	60	42.0	QP	L1	GND
24.004000	24.10	20.8	60	35.9	QP	L1	GND

MEASUREMENT RESULT: "011410501104_fin2"

11/10/2014 4:55PM

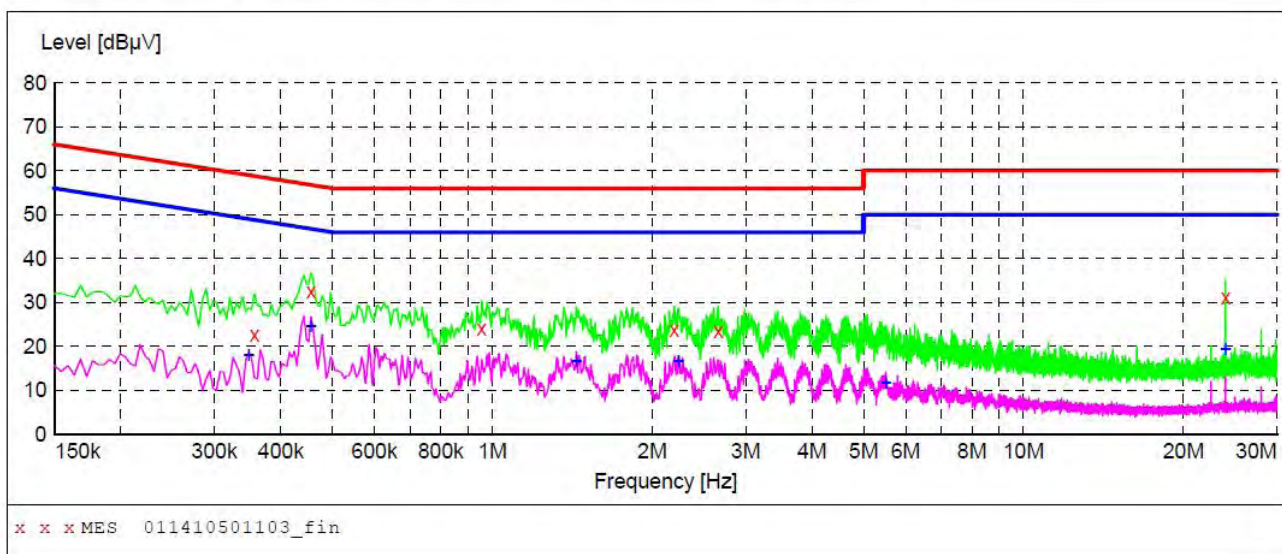
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.222000	15.80	20.1	53	36.9	AV	L1	GND
0.438000	19.30	20.1	47	27.8	AV	L1	GND
1.783000	13.10	20.3	46	32.9	AV	L1	GND
2.242000	12.80	20.3	46	33.2	AV	L1	GND
5.414500	10.00	20.5	50	40.0	AV	L1	GND
24.004000	15.60	20.8	50	34.4	AV	L1	GND

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
Operating Condition: Music
Test Specification: AC 120V, 60Hz for adapter
Comment: Neutral Line
Tem.:25°C Hum.:50%

SCAN TABLE: "Voltage(150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



MEASUREMENT RESULT: "011410501103_fin"

11/10/2014 4:52PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.357000	22.60	20.1	59	36.2	QP	N	GND
0.456000	32.50	20.1	57	24.3	QP	N	GND
0.955500	23.90	20.2	56	32.1	QP	N	GND
2.201500	23.80	20.3	56	32.2	QP	N	GND
2.665000	23.50	20.4	56	32.5	QP	N	GND
23.999500	31.20	20.8	60	28.8	QP	N	GND

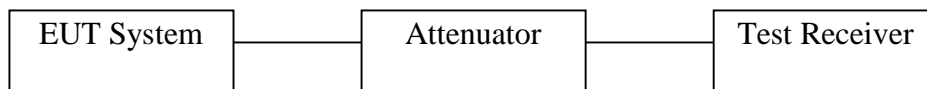
MEASUREMENT RESULT: "011410501103_fin2"

11/10/2014 4:52PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.348000	18.10	20.1	49	30.9	AV	N	GND
0.456000	24.70	20.1	47	22.1	AV	N	GND
1.441000	16.70	20.3	46	29.3	AV	N	GND
2.242000	16.60	20.3	46	29.4	AV	N	GND
5.504500	11.70	20.5	50	38.3	AV	N	GND
23.999500	19.40	20.8	50	30.6	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 $\geq 3 \times$ 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.

20dB Bandwidth:

C63.10

Occupied Bandwidth (OBW=20dB Bandwidth)

1. Set RBW=1%~5% OBW
2. Set the VBW $\geq 3 \times$ RBW
3. Set the span range between 2 times and 5 times of the OBW
4. Sweep Time= Auto
Detector= Peak
Trace= Max hold
5. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst case (i.e. the widest) bandwidth. Unless otherwise specified for an unlicensed wireless device, measure the bandwidth at the -20dB levels with respect to the reference level.

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. 08, 2014	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Aug. 08, 2014	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 22, 2014	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 04, 2014	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 24, 2014	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Aug. 08, 2014	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

e. Test Results

Pass.

f. Test Data
6dB Bandwidth

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	10.16	>500	Pass
Mid	2437	10.16		Pass
High	2462	10.16		Pass

Test mode: IEEE 802.11g

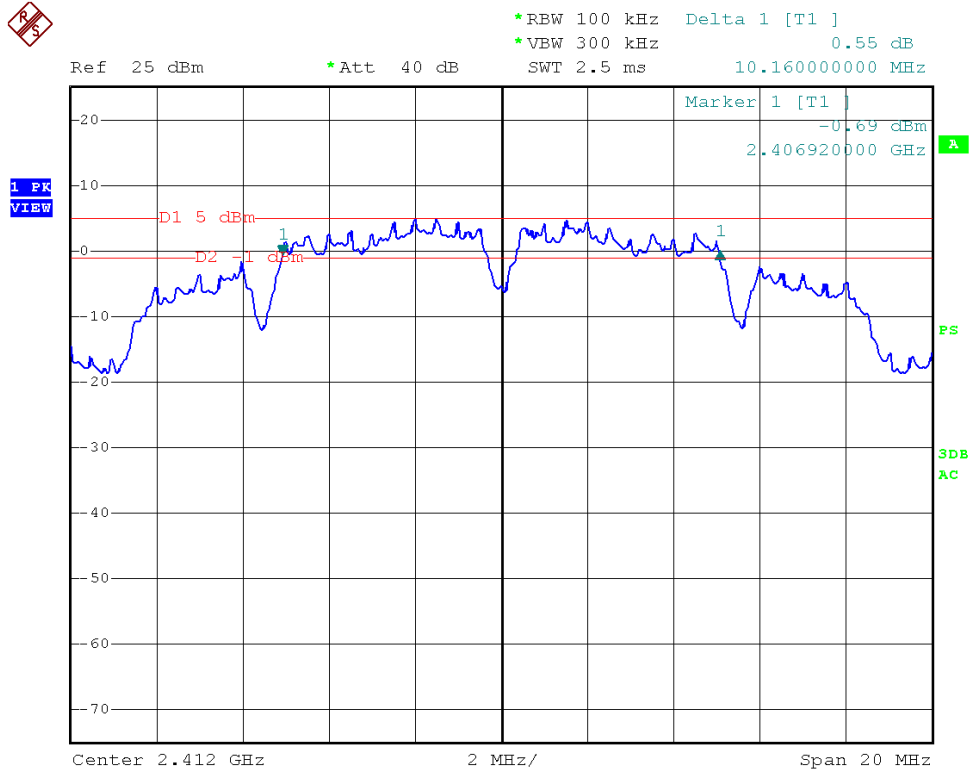
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	16.44	>500	Pass
Mid	2437	16.32		Pass
High	2462	16.32		Pass

Test mode: IEEE 802.11n (HT20)

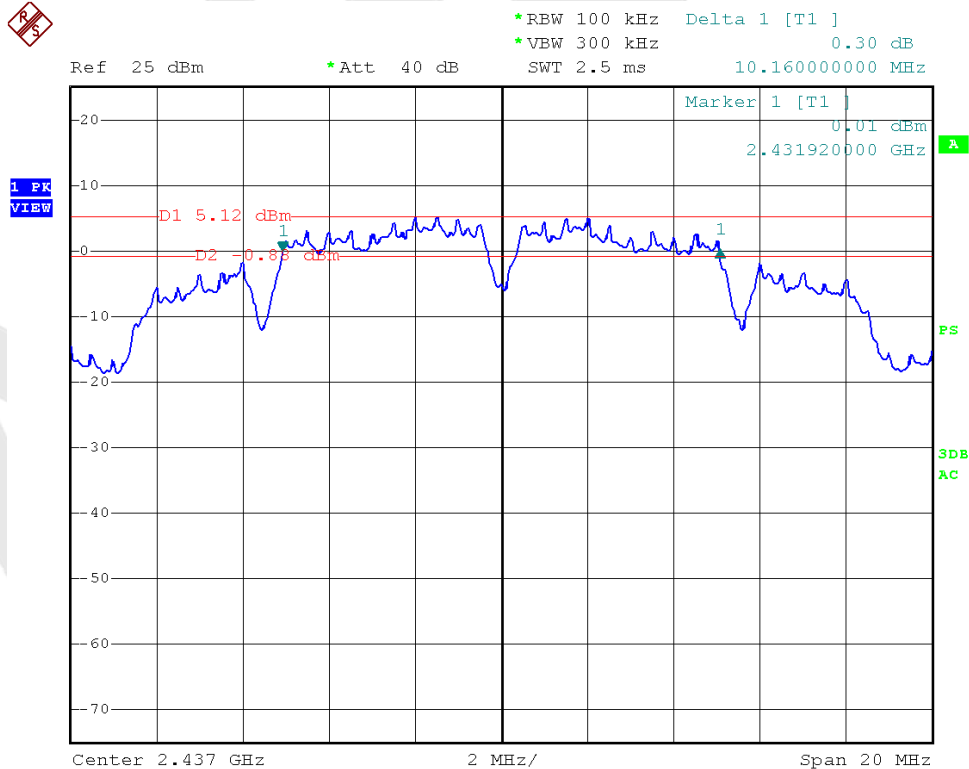
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	16.84	>500	Pass
Mid	2437	16.88		Pass
High	2462	16.92		Pass

Test Plots See the following page.

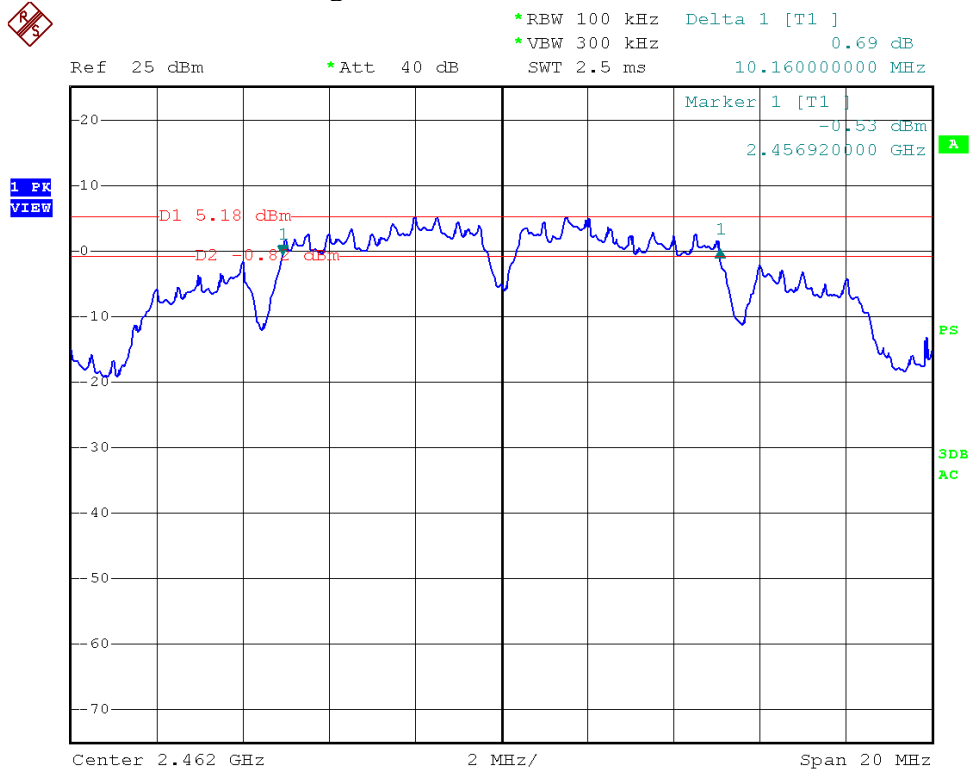
Test Mode: 802.11b---Low



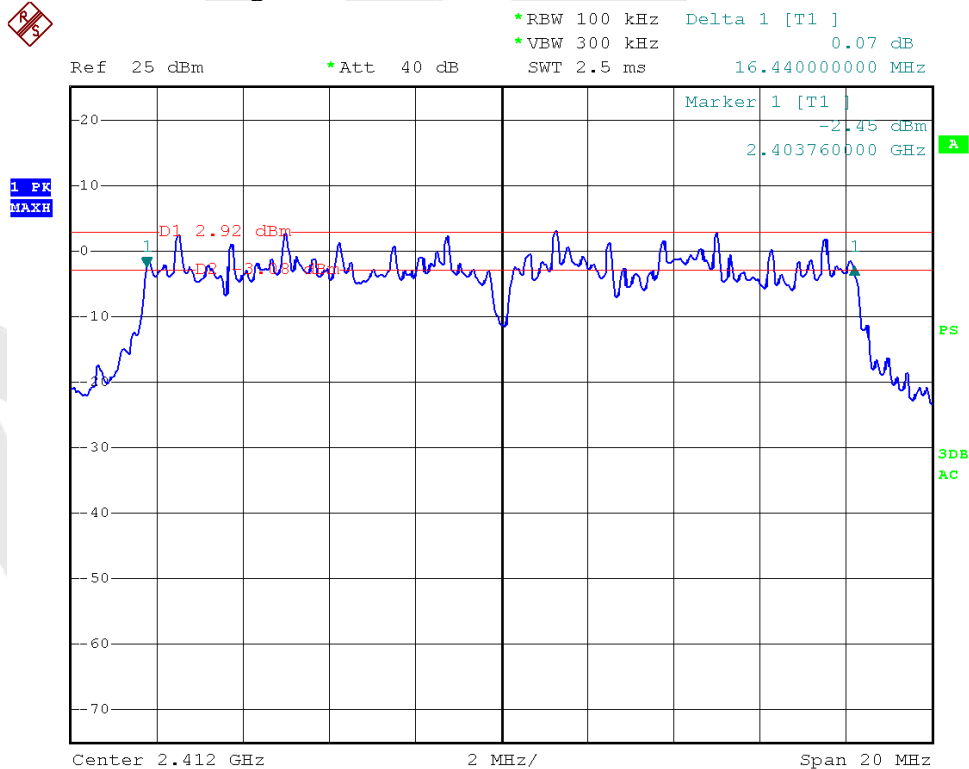
Test Mode: 802.11b---Mid



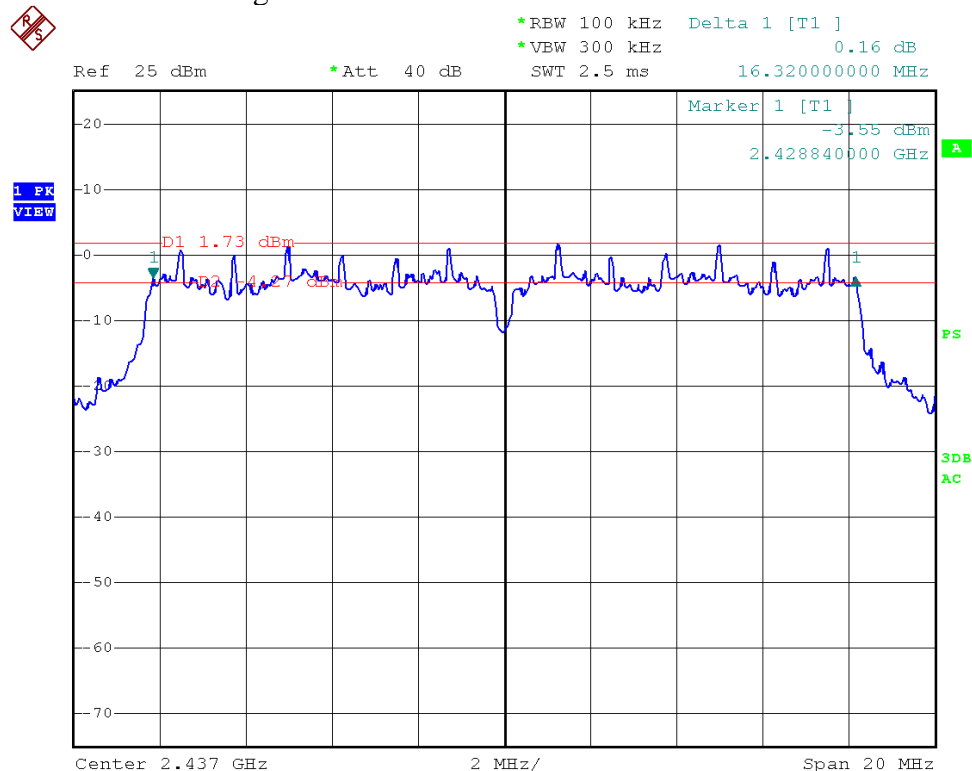
Test Mode: 802.11b---High



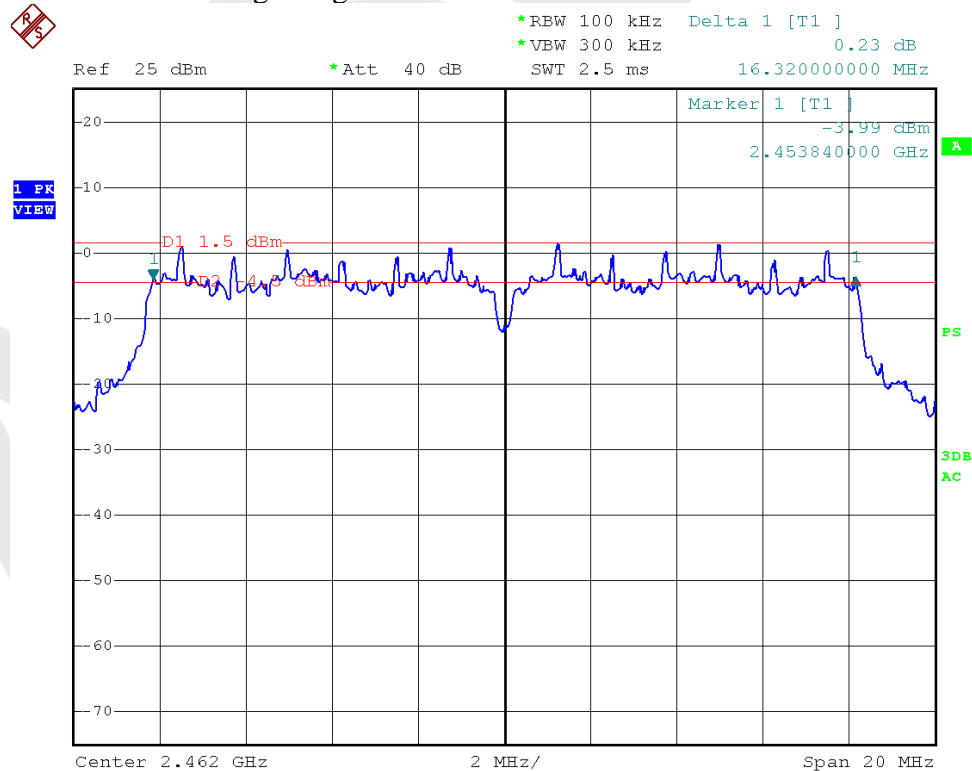
Test Mode: 802.11g---Low



Test Mode: 802.11g---Mid



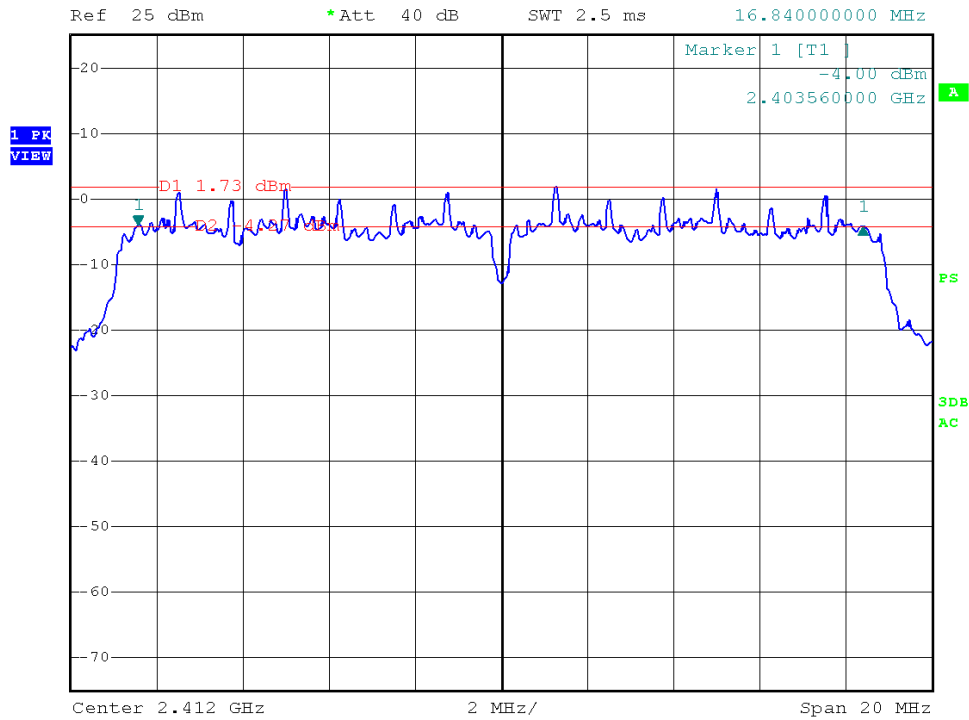
Test Mode: 802.11g---High



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



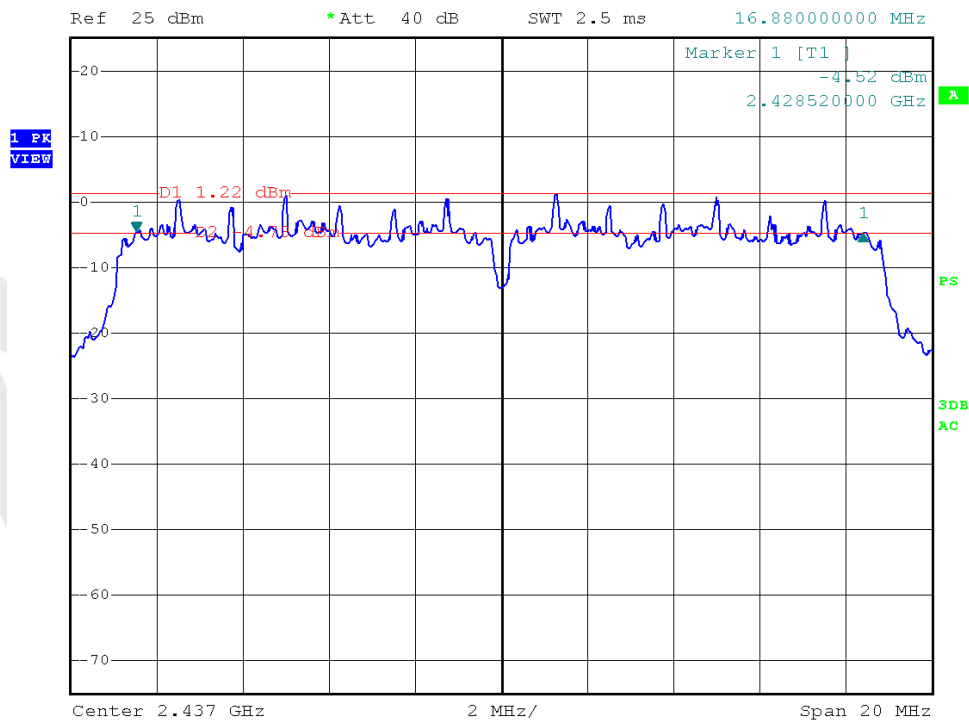
*RBW 100 kHz Delta 1 [T1]
*VBW 300 kHz -0.22 dB
SWT 2.5 ms 16.840000000 MHz



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



*RBW 100 kHz Delta 1 [T1]
*VBW 300 kHz -0.26 dB
SWT 2.5 ms 16.880000000 MHz



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

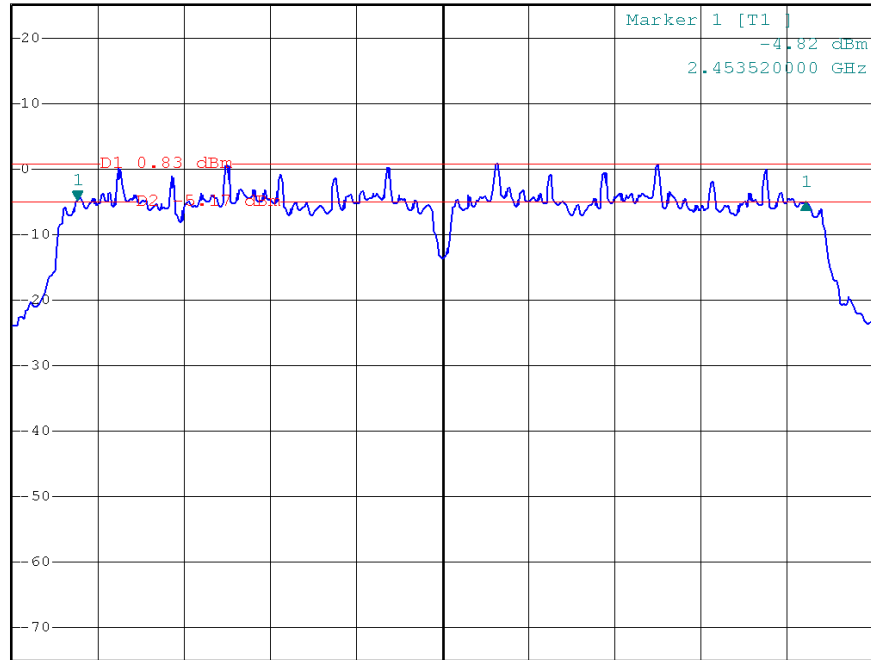


*RBW 100 kHz Delta 1 [T1]
*VBW 300 kHz -0.14 dB
SWT 2.5 ms 16.92000000 MHz

Ref 25 dBm

*Att 40 dB

1 PK
VIEW



Center 2.462 GHz

2 MHz/

Span 20 MHz

20dB Bandwidth

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	17.60	Pass
Mid	2437	17.60	Pass
High	2462	17.60	Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	19.44	Pass
Mid	2437	19.52	Pass
High	2462	19.52	Pass

Test mode: IEEE 802.11n (HT20)

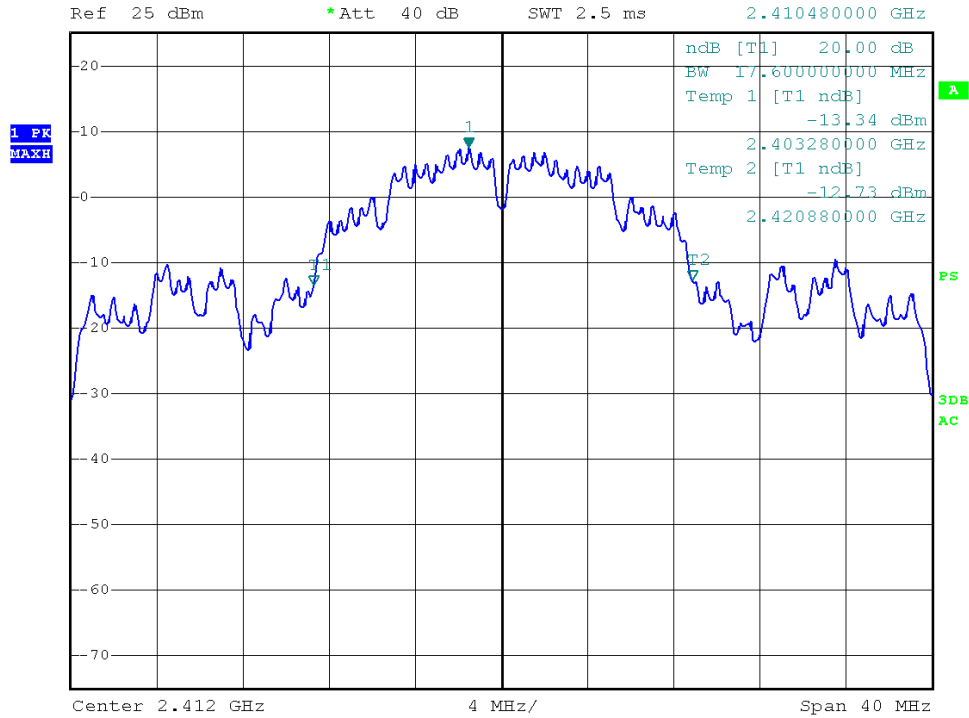
Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	20.80	Pass
Mid	2437	20.80	Pass
High	2462	20.80	Pass

Test Plots See the following page.

Test Mode: 802.11b---Low



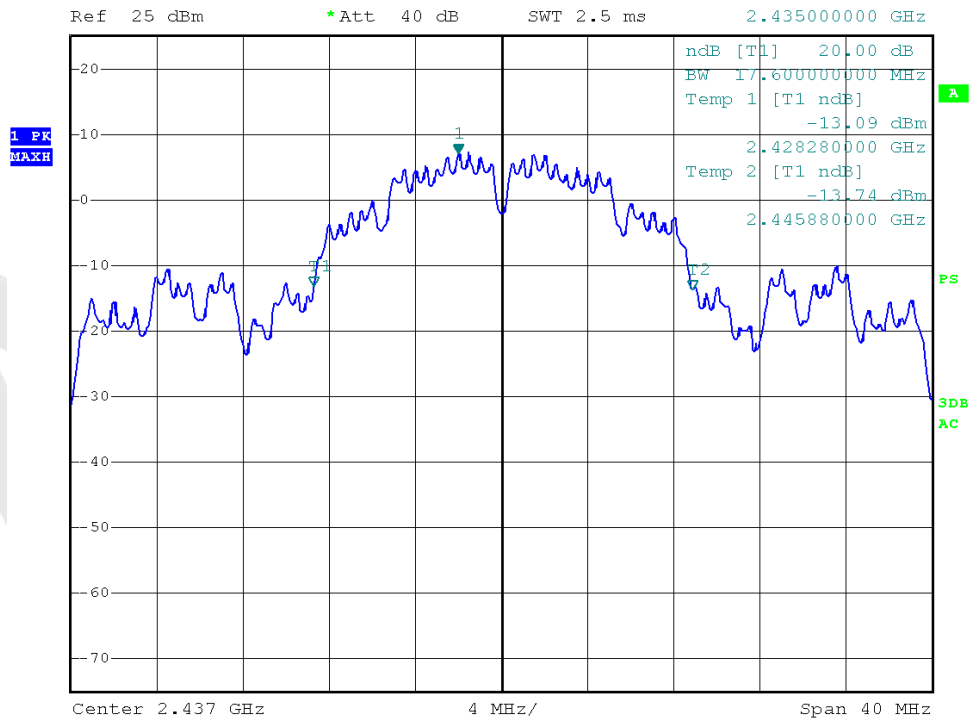
*RBW 300 kHz Marker 1 [T1]
*VBW 1 MHz 7.48 dBm
SWT 2.5 ms 2.410480000 GHz



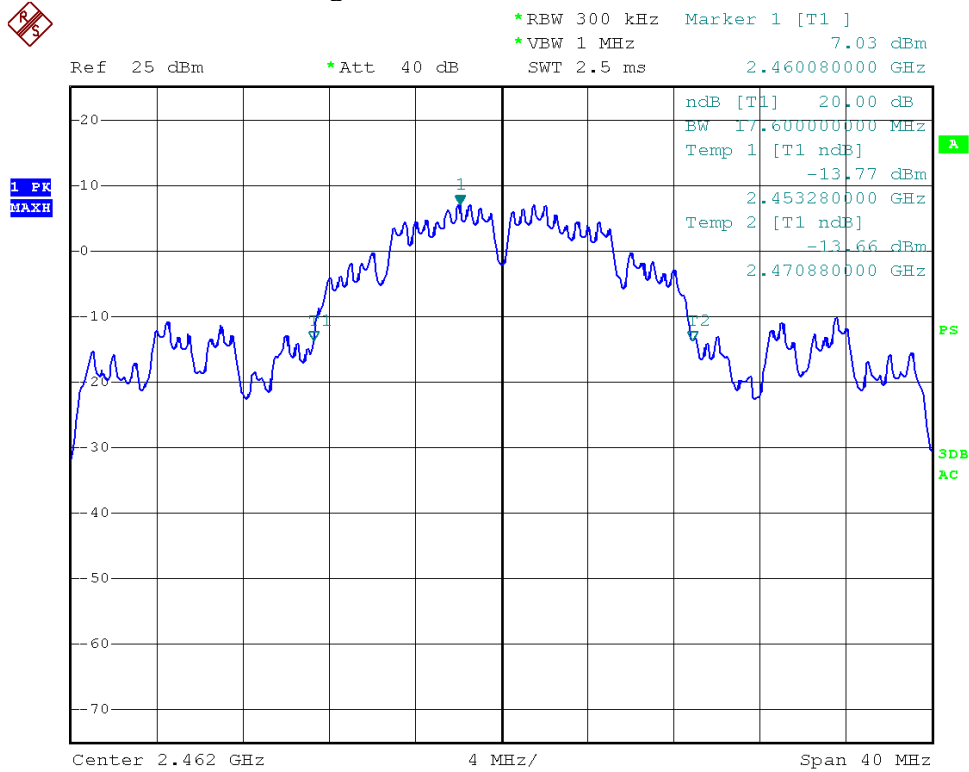
Test Mode: 802.11b---Mid



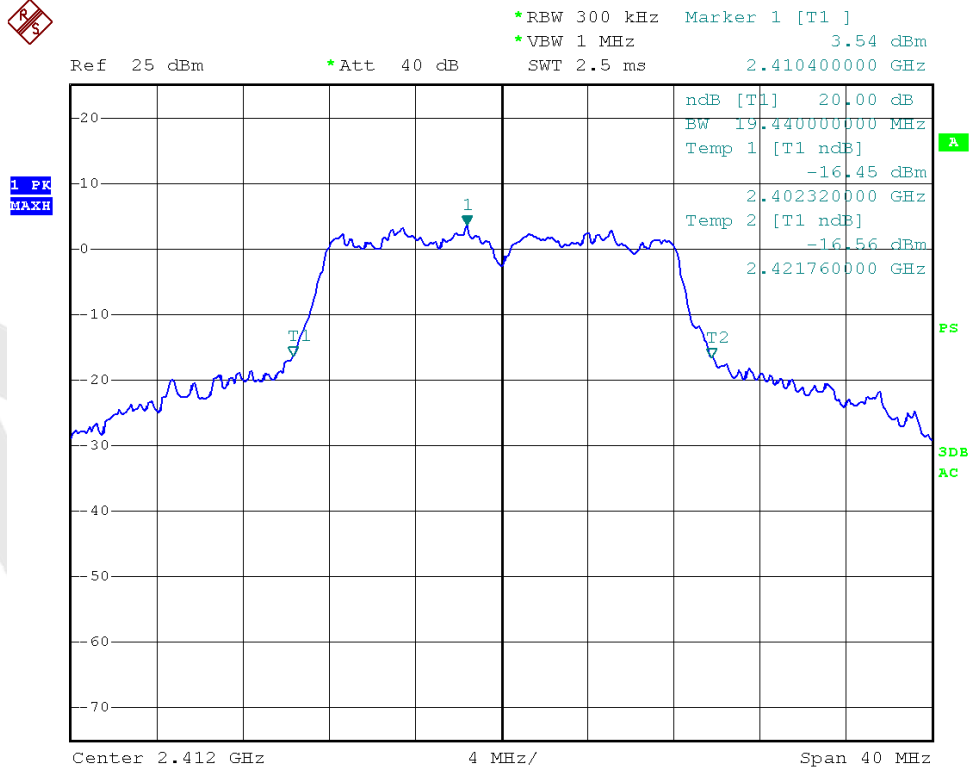
*RBW 300 kHz Marker 1 [T1]
*VBW 1 MHz 7.13 dBm
SWT 2.5 ms 2.435000000 GHz



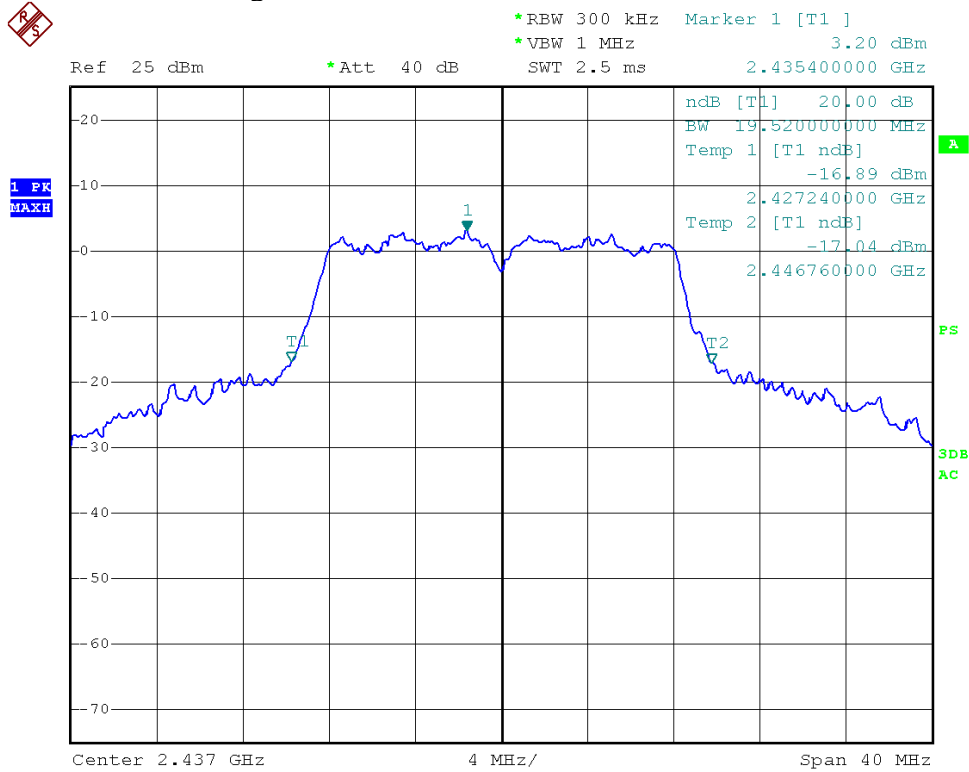
Test Mode: 802.11b---High



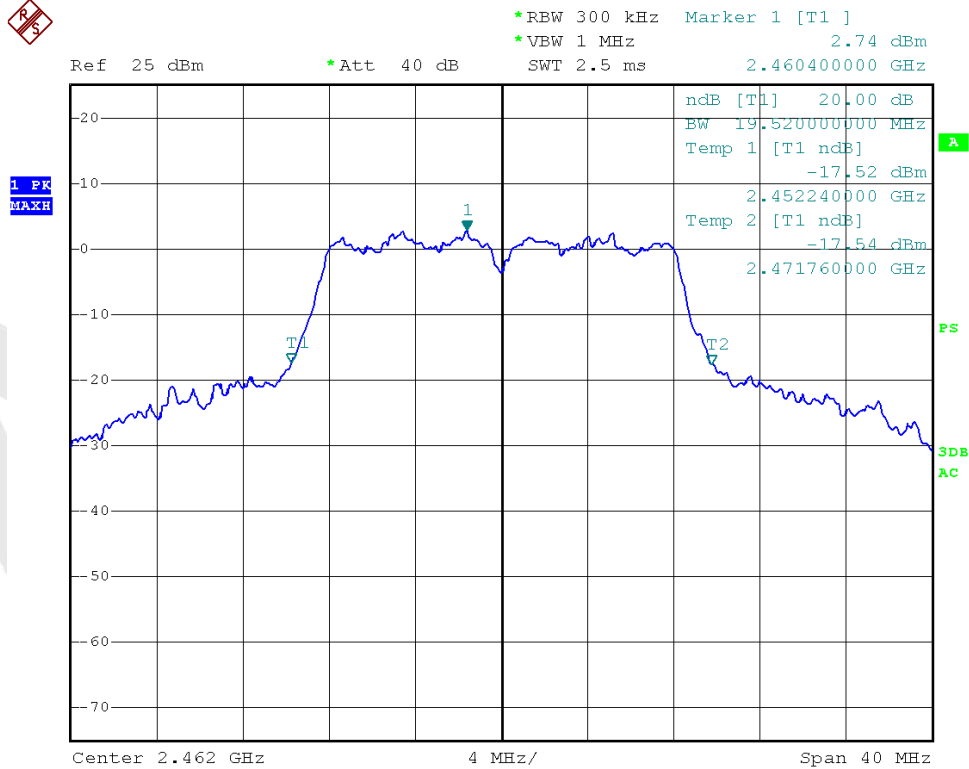
Test Mode: 802.11g---Low



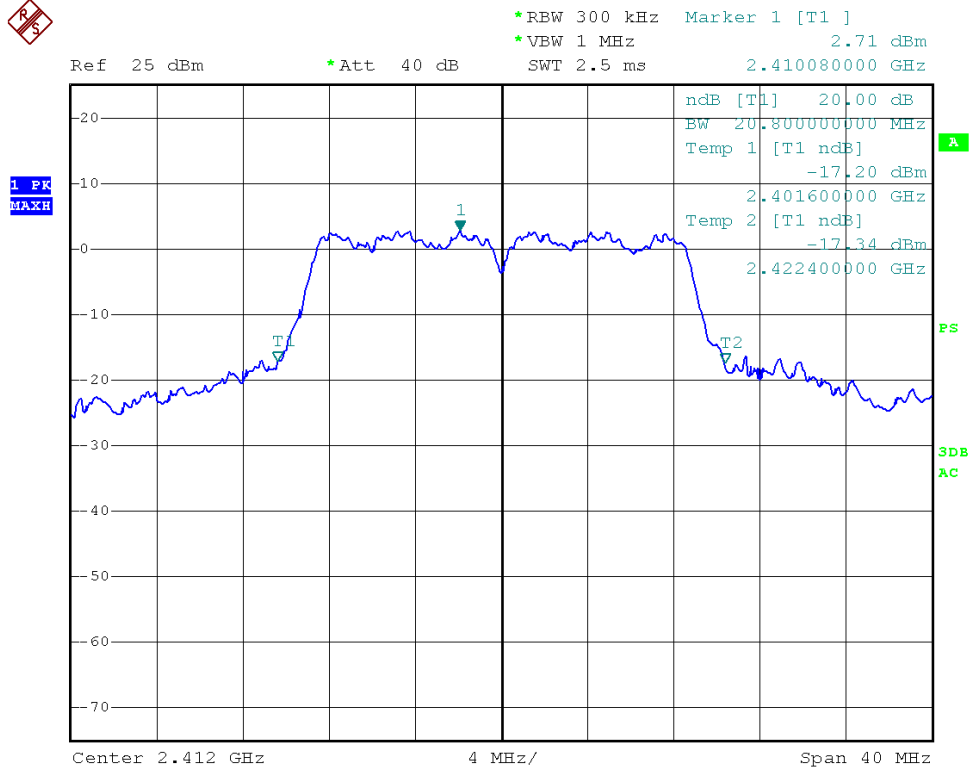
Test Mode: 802.11g---Mid



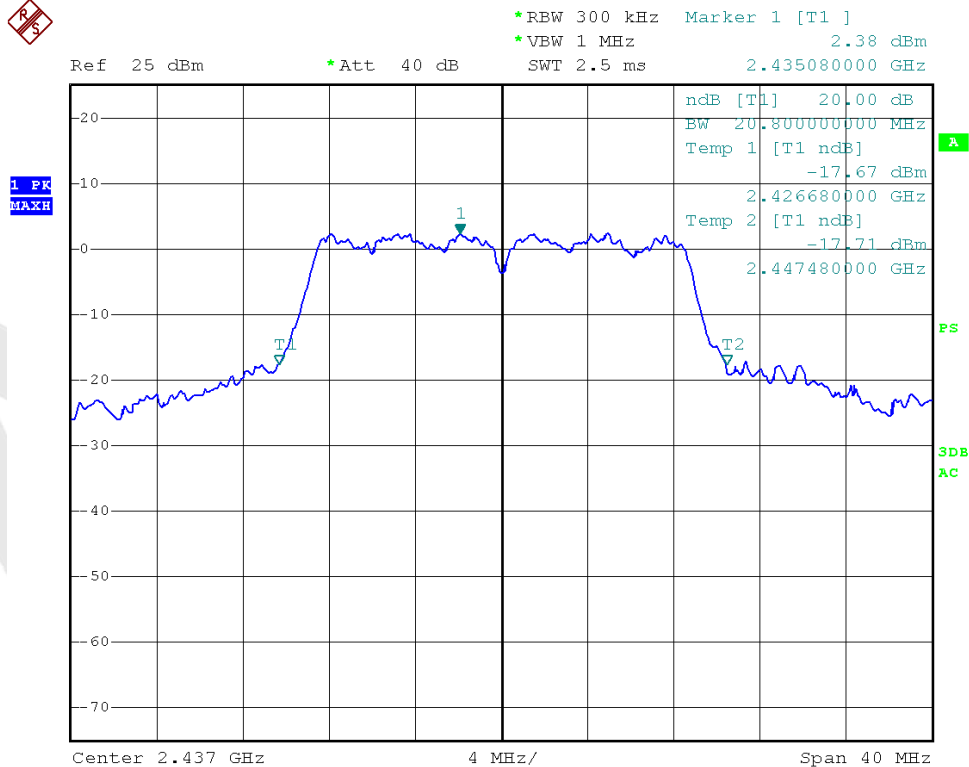
Test Mode: 802.11g---High



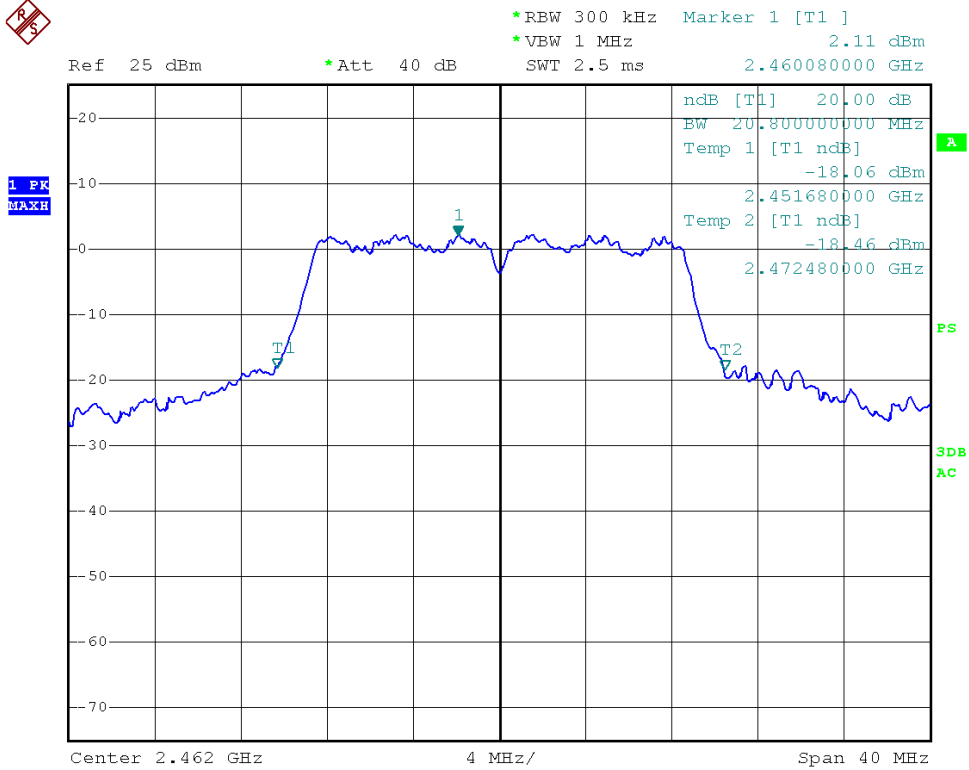
Test Mode: 802.11n (HT20)---Low



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



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



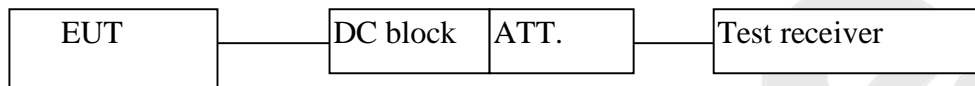
4.3. Maximum Output Power Test

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.

d. Test Procedure

This test was according the kDB 558074 9.2.2:

1. Set span to at least 1.5 times the OBW.
2. Set the RBW =1~5% of the OBW, not to exceed 1MHz.
3. Set VBW $\geq 3 \times$ RBW.
4. Detector = Average.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

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	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	5.79	30	1	Pass
Mid	2437	4.99			Pass
High	2462	4.33			Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	5.65	30	1	Pass
Mid	2437	4.78			Pass
High	2462	4.05			Pass

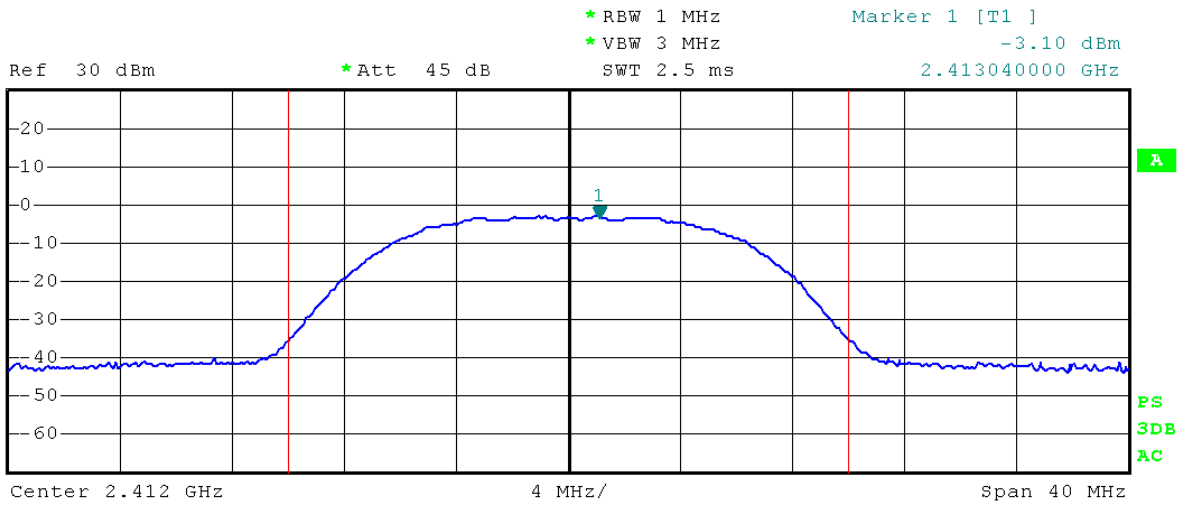
Test mode: IEEE 802.11n (HT20)

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	5.23	30	1	Pass
Mid	2437	4.51			Pass
High	2462	3.94			Pass

Test Mode: 802.11b---Low



1 PK
MAXH

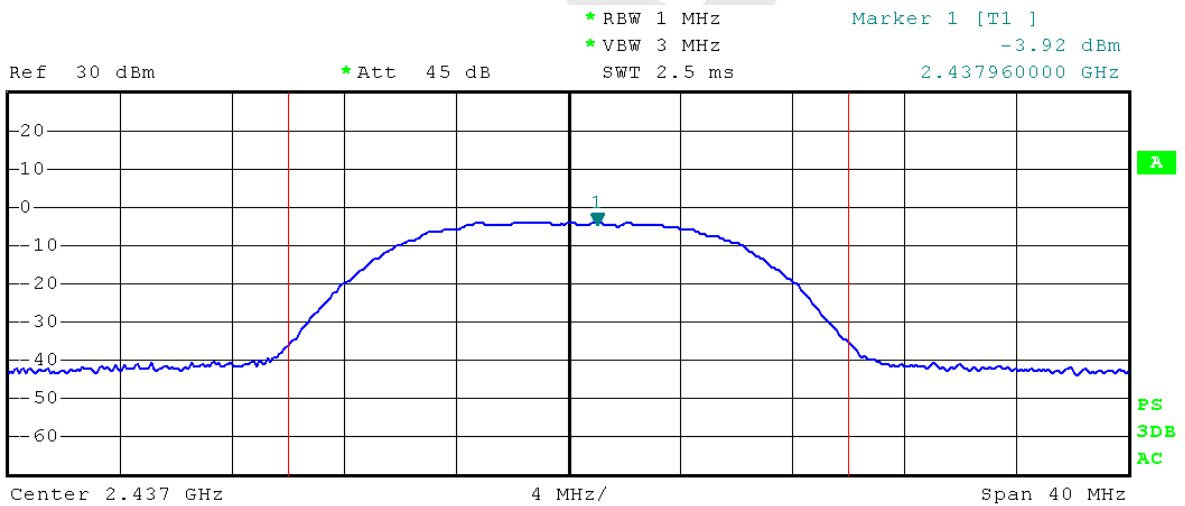


Tx Channel
Bandwidth 20 MHz Power 5.79 dBm

Test Mode: 802.11b---Mid



1 PK
MAXH

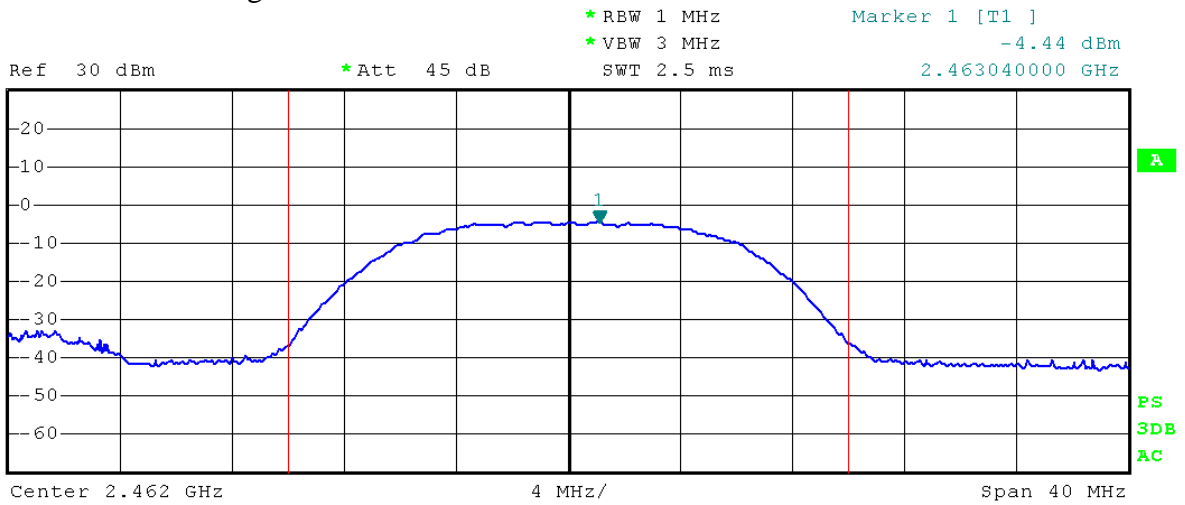


Tx Channel
Bandwidth 20 MHz Power 4.99 dBm

Test Mode: 802.11b---High



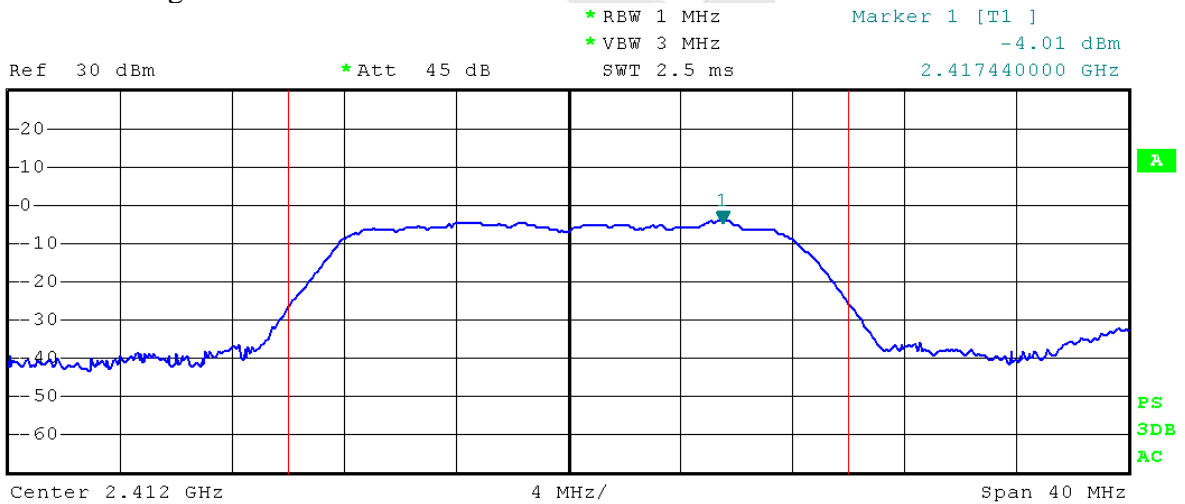
1 PK
MAXH



Test Mode: 802.11g---Low



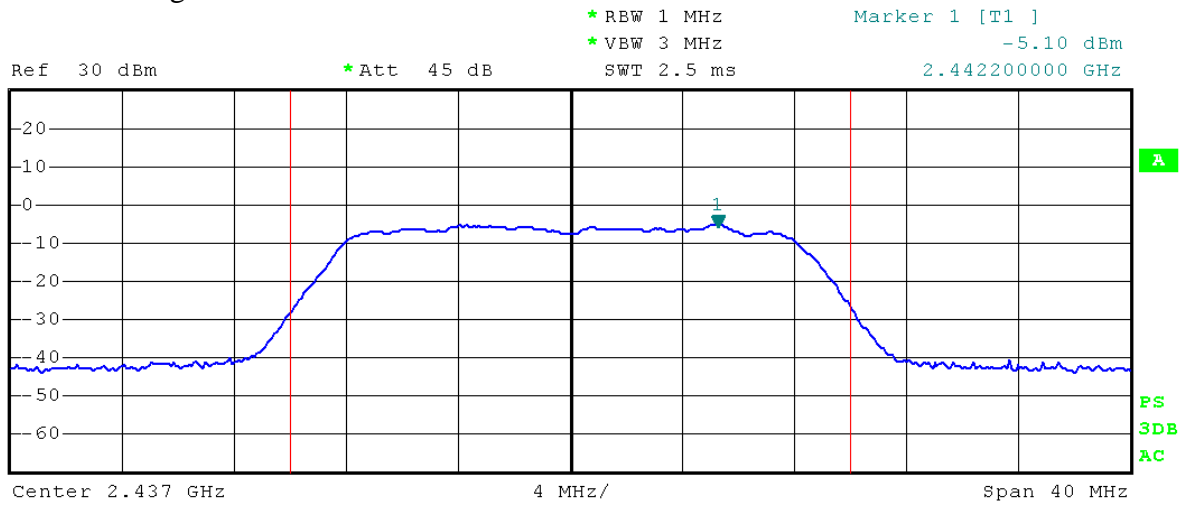
1 PK
MAXH



Test Mode: 802.11g---Mid



1 PK
MAXH



Tx Channel

Bandwidth

20 MHz

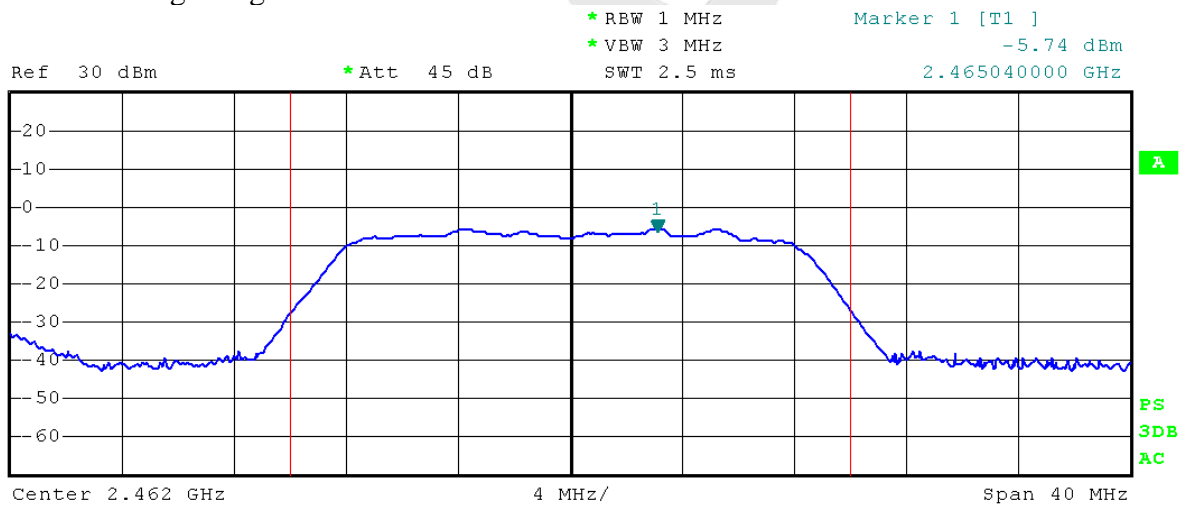
Power

4.78 dBm

Test Mode: 802.11g---High



1 PK
MAXH



Tx Channel

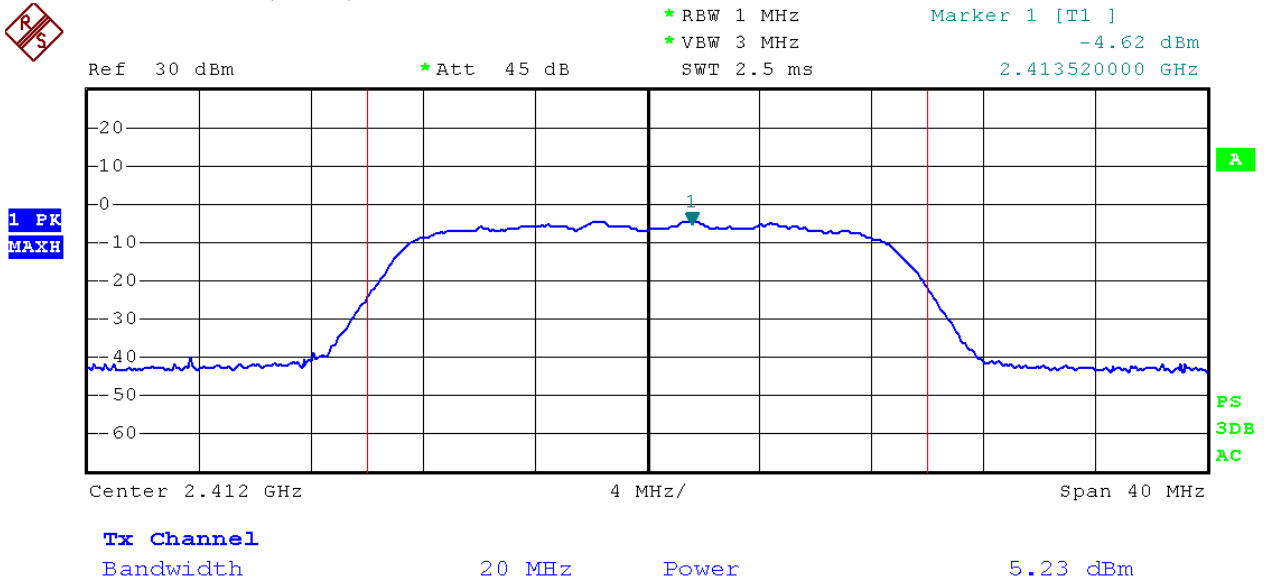
Bandwidth

20 MHz

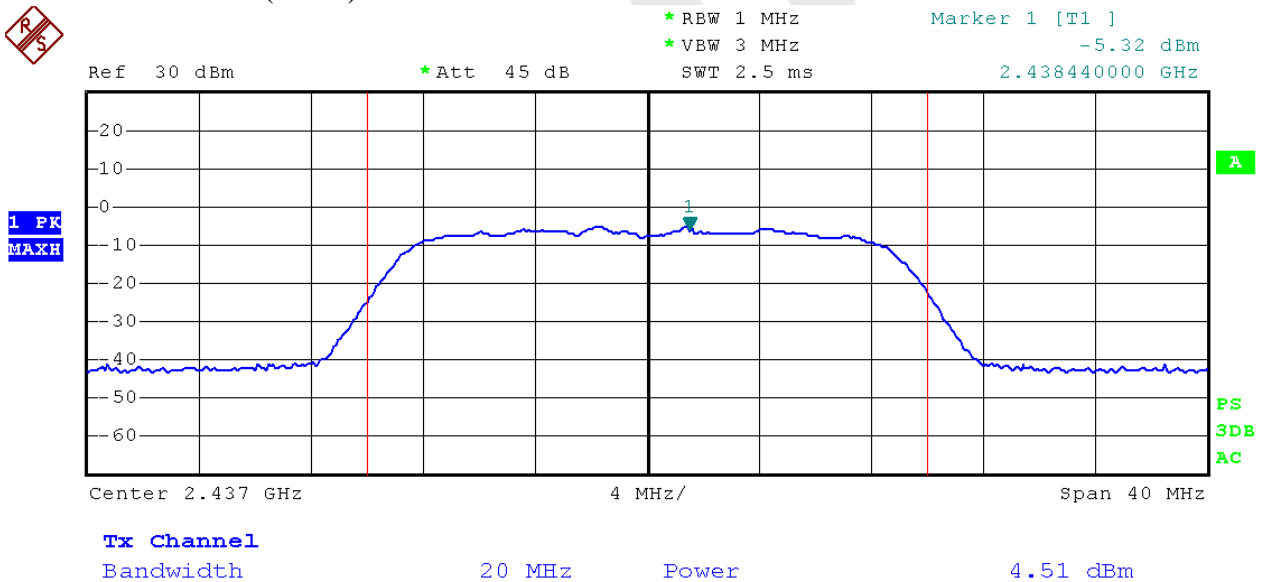
Power

4.05 dBm

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



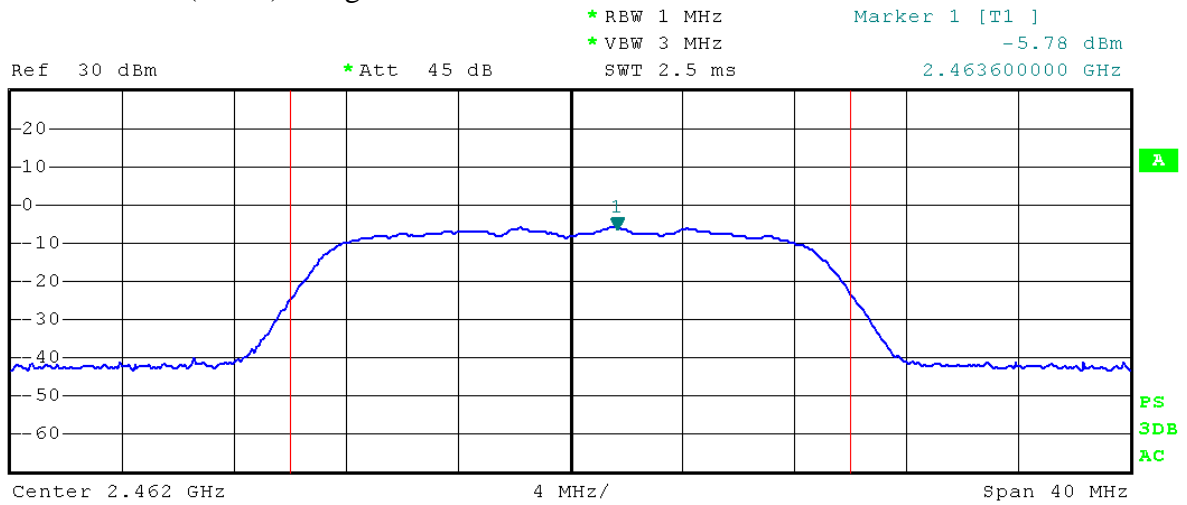
Test Mode: 802.11n(HT20)---Mid



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



1 PK
MAXH



Tx Channel

Bandwidth

20 MHz

Power

3.94 dBm

4.4. Band Edges Measurement

a. Limit

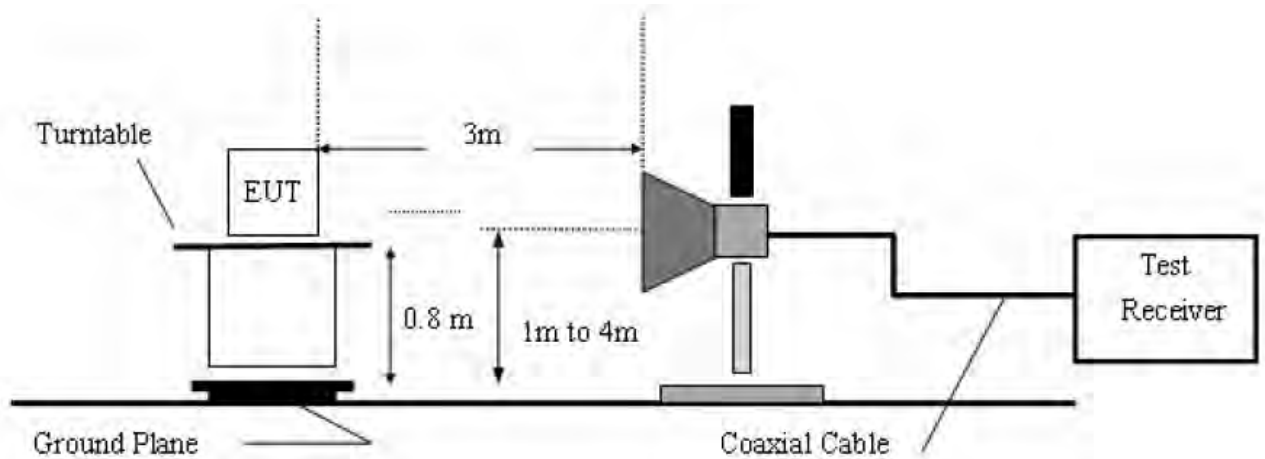
According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains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

- 1) The EUT is placed on a turntable, which is 0.8m above the ground plane. The EUT is tested in 9*6*6 Chamber.
- 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) Set both RBW and VBW of spectrum analyzer to 100kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT. If pass then set Spectrum Analyzer as below:
For below 1GHz:
The resolution bandwidth and video bandwidth of test receiver/ spectrum analyzer is 120kHz.
Detector: **Quasi-Peak**
For above 1GHz Peak measurement:
The resolution bandwidth of test receiver/ spectrum analyzer is 1MHz and video bandwidth is 3MHz.
Detector: **Peak**
For above 1GHz average measurement:
The resolution bandwidth of test receiver/ spectrum analyzer is 1MHz and the video bandwidth is 10Hz.
Detector: **Peak**
- 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.

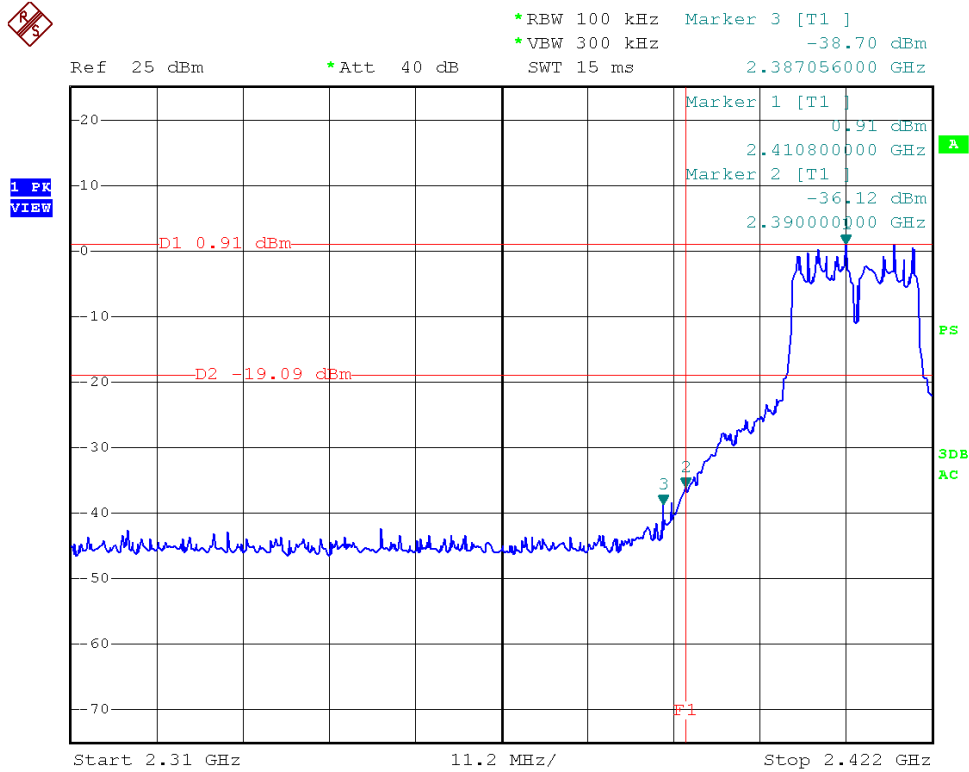
d. Test Results

Pass.

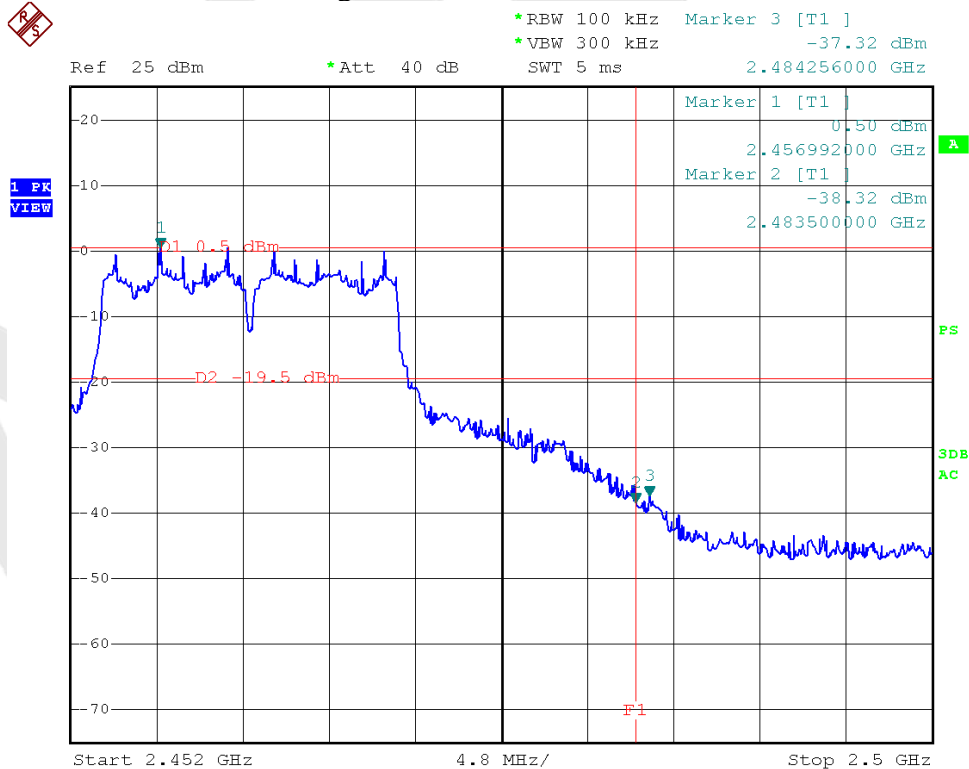
e. Test Plots

See the following page.

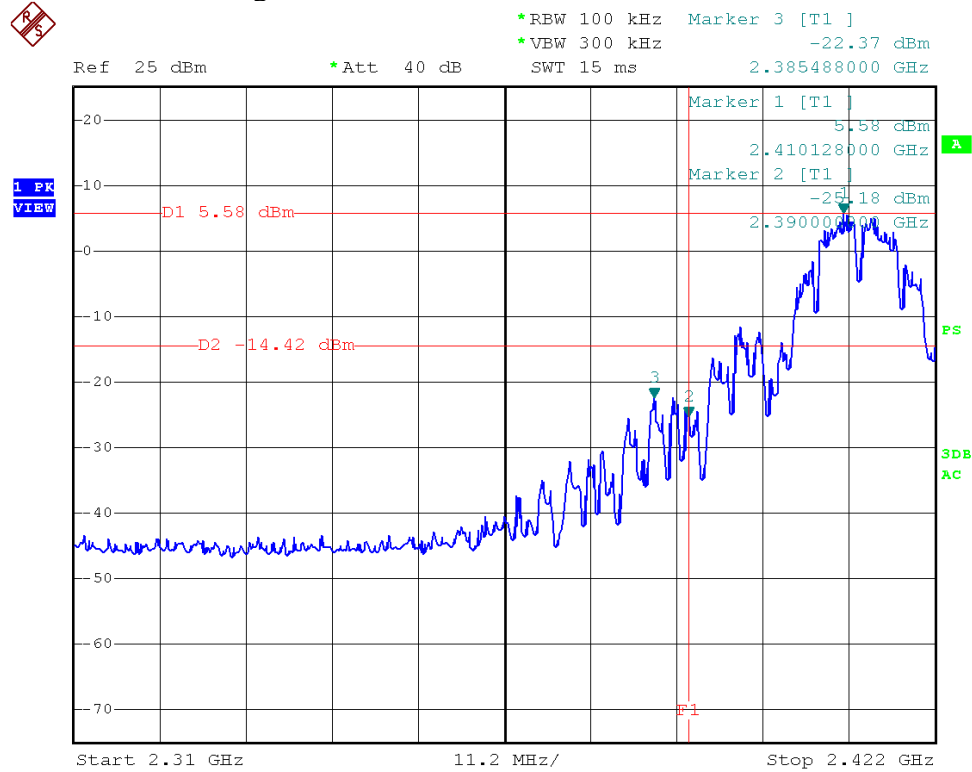
Test Mode: 802.11b ---Low



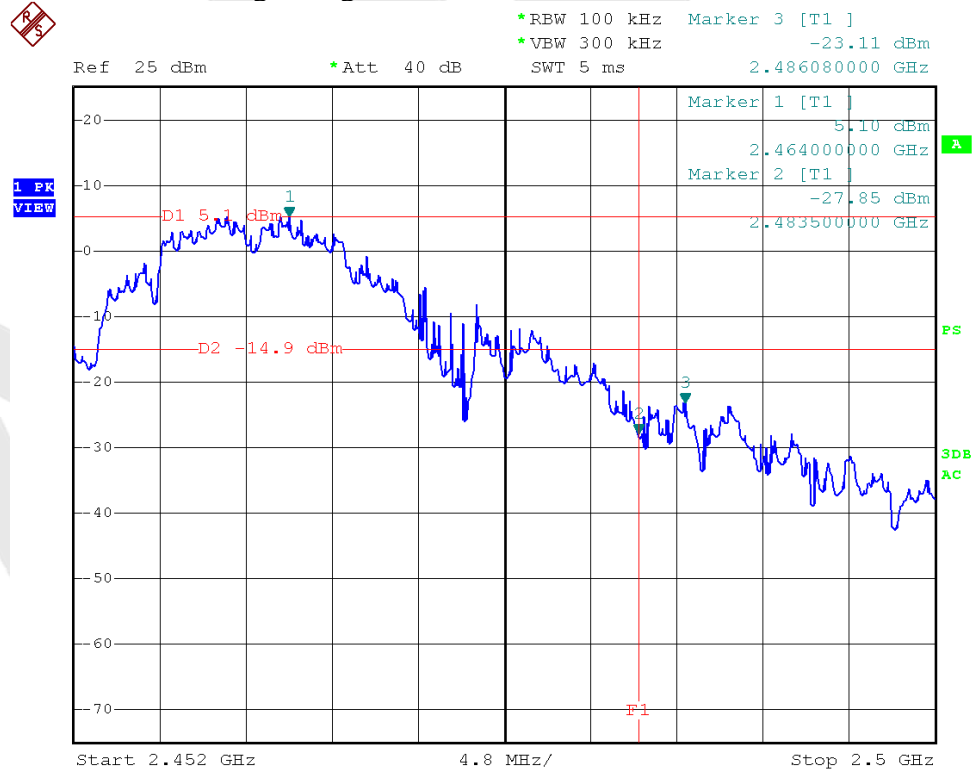
Test Mode: 802.11b ---High



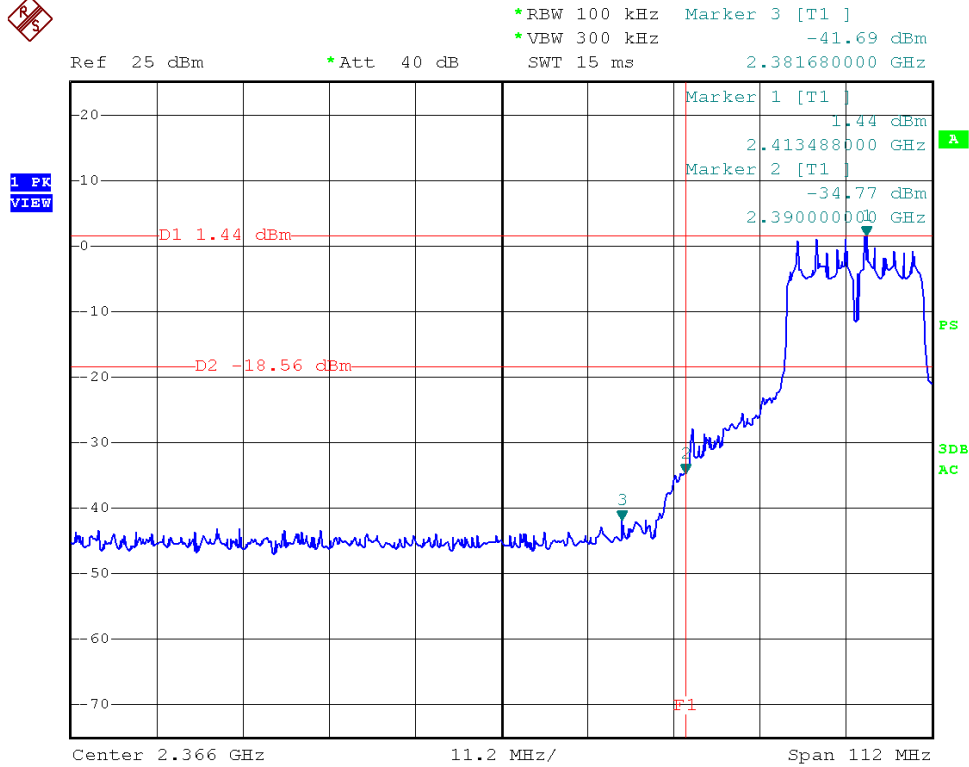
Test Mode: 802.11g ---Low



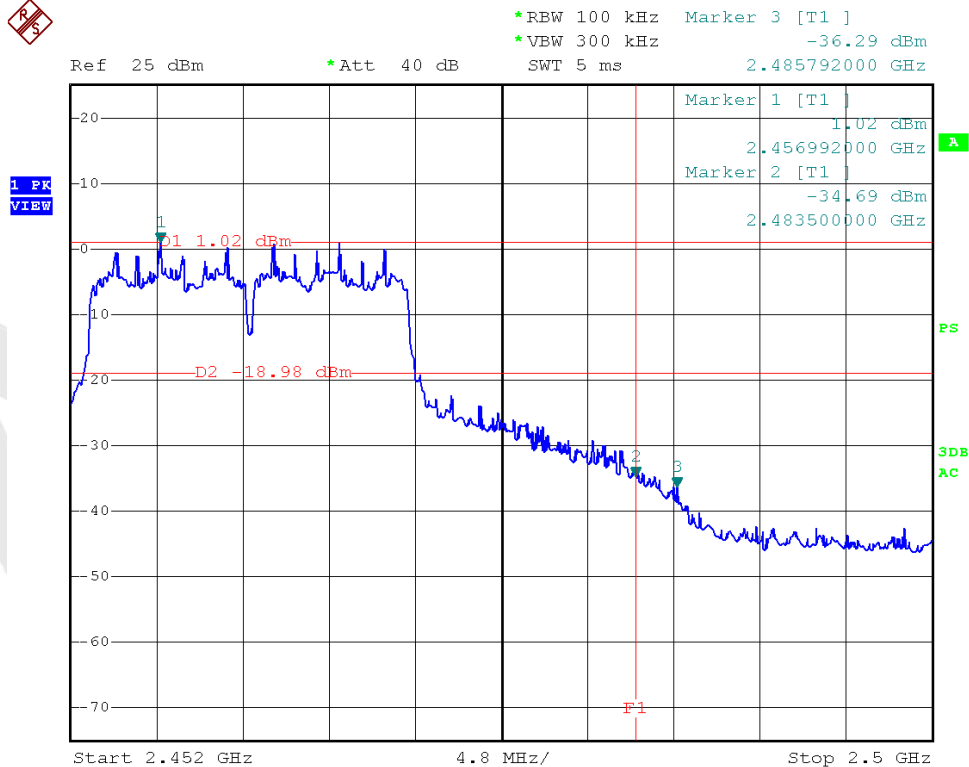
Test Mode: 802.11g ---High



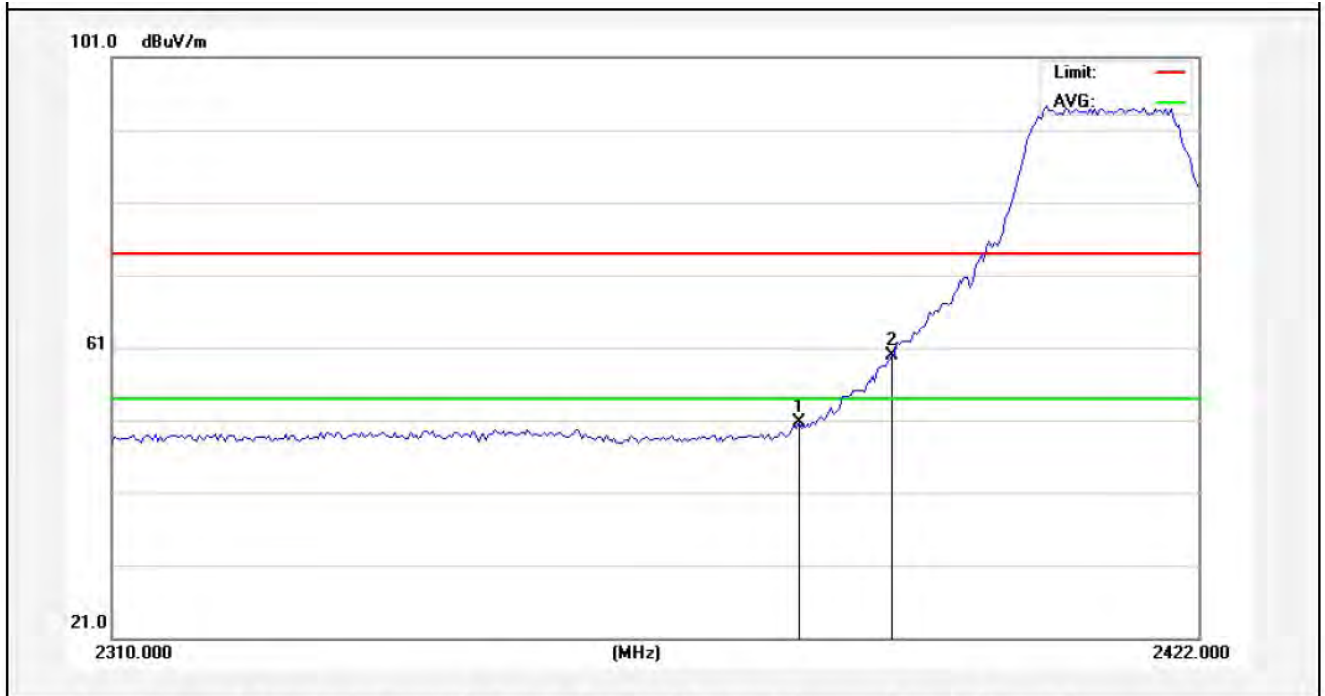
Test Mode: 802.11n (HT20) ---Low



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



Test 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	2380.280	53.34	-2.54	50.80	74.00	-23.20	peak			
2	2390.000	62.39	-2.51	59.88	74.00	-14.12	peak			

Horizontal-AV:



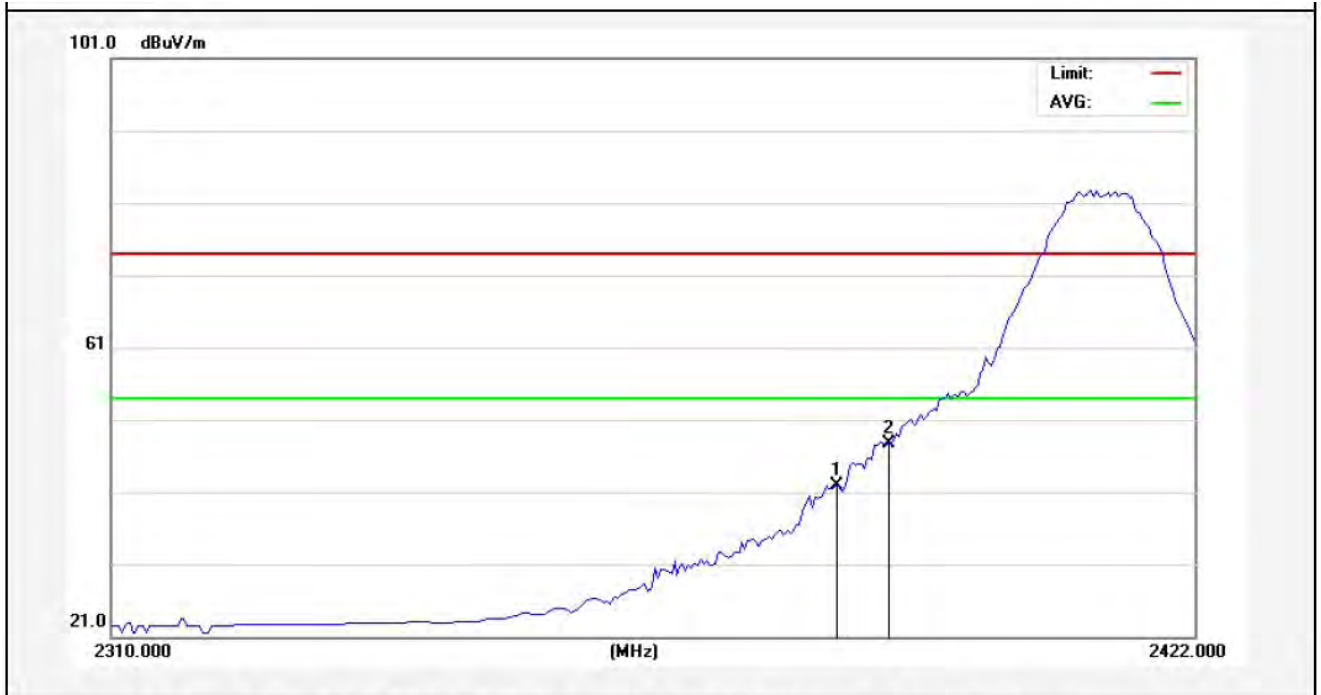
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2384.200	47.07	-2.53	44.54	54.00	-9.46	AVG			
2	2390.000	50.95	-2.51	48.44	54.00	-5.56	AVG			

Test Mode: 802.11b
2412MHz
Vertical-PEAK:



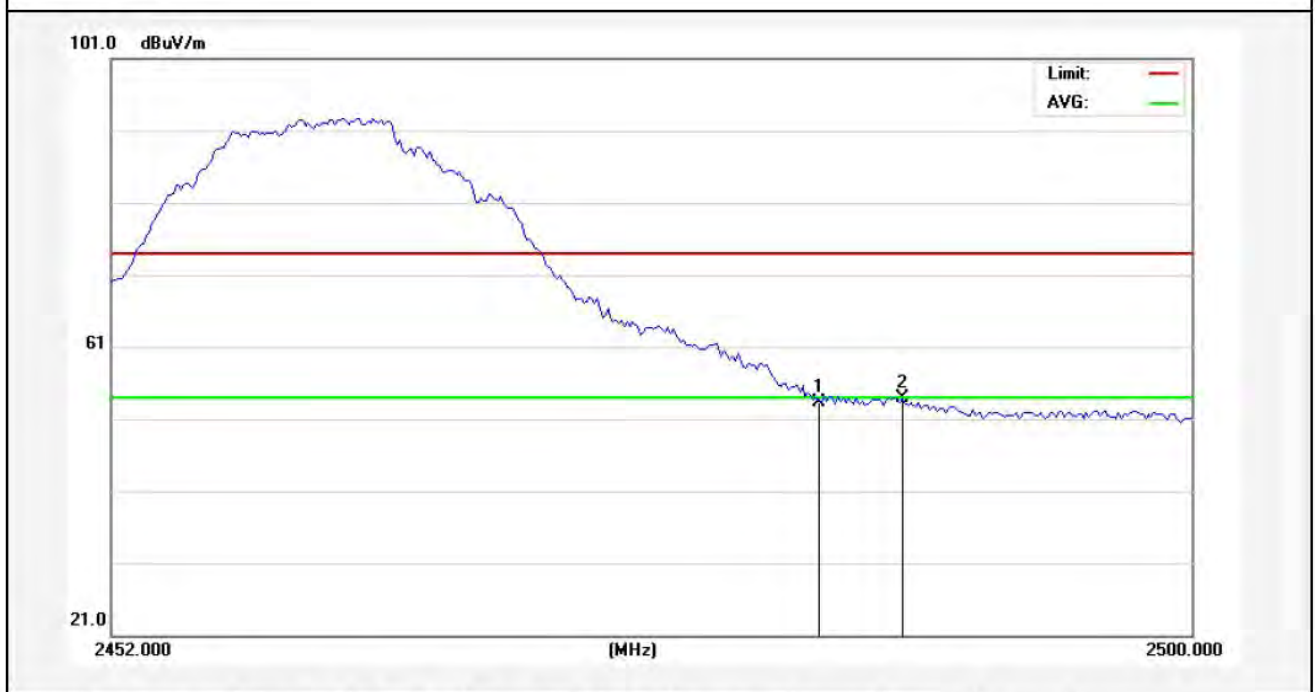
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2380.000	54.54	-2.54	52.00	74.00	-22.00	peak			
2	2390.000	61.10	-2.51	58.59	74.00	-15.41	peak			

Vertical-AV:



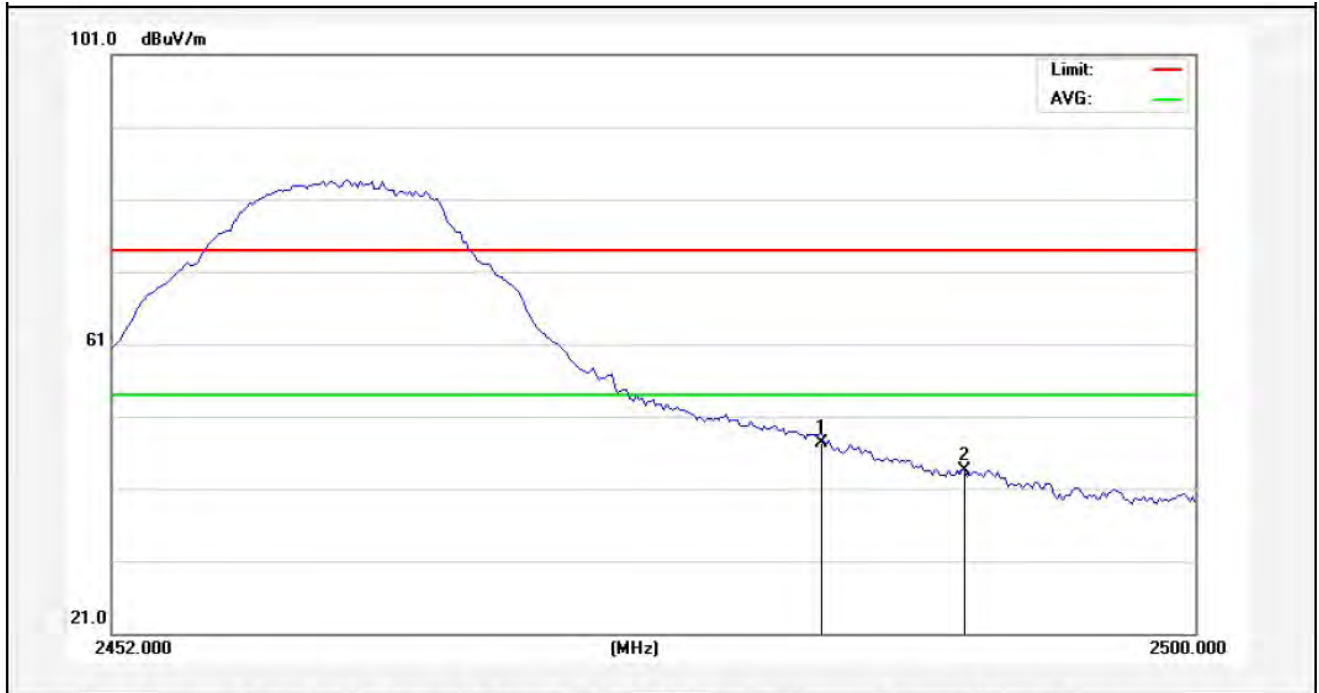
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2384.480	44.48	-2.53	41.95	54.00	-12.05	AVG			
2	2390.000	50.21	-2.51	47.70	54.00	-6.30	AVG			

Test Mode: 802.11b
2462MHz
Horizontal-PEAK:



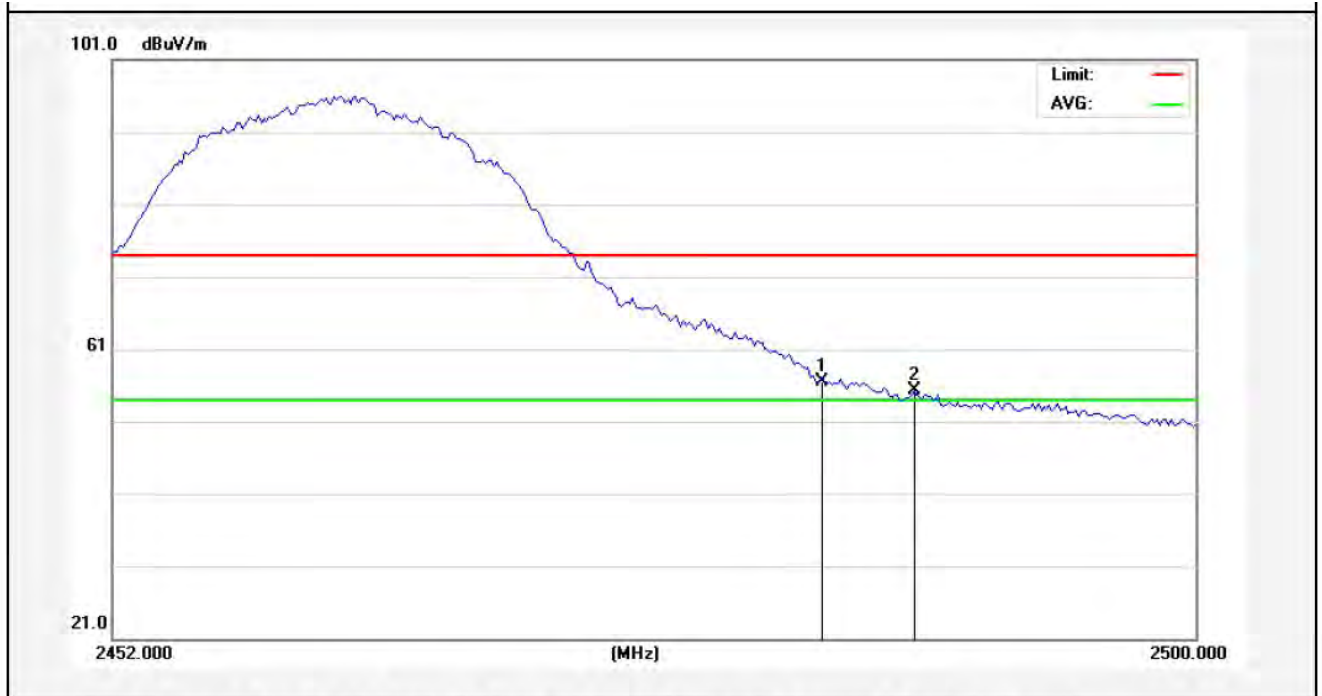
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	55.67	-2.31	53.36	74.00	-20.64	peak			
2	2487.160	56.18	-2.30	53.88	74.00	-20.12	peak			

Horizontal-AV:



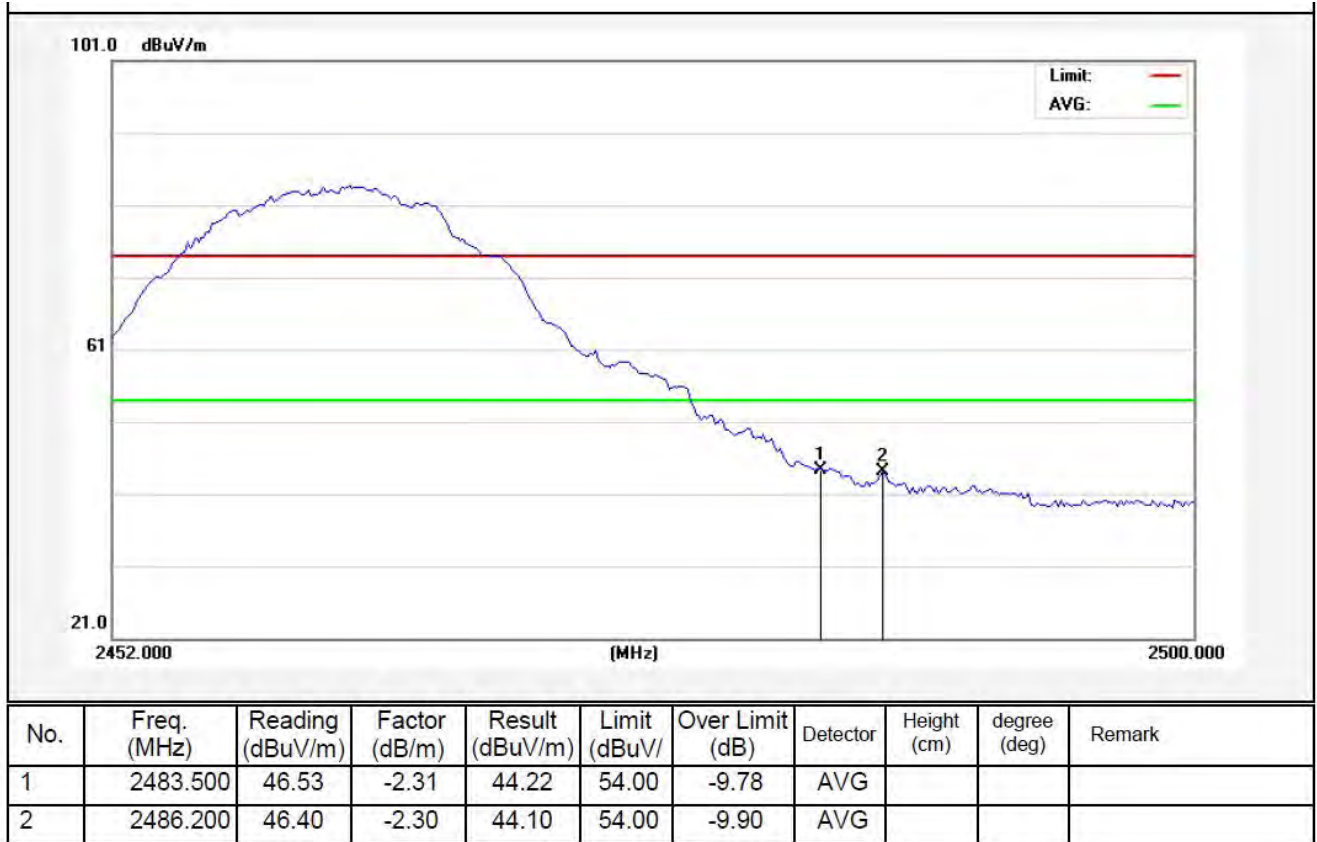
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	49.58	-2.31	47.27	54.00	-6.73	AVG			
2	2489.800	45.72	-2.29	43.43	54.00	-10.57	AVG			

Test Mode: 802.11b
2462MHz
Vertical-PEAK:

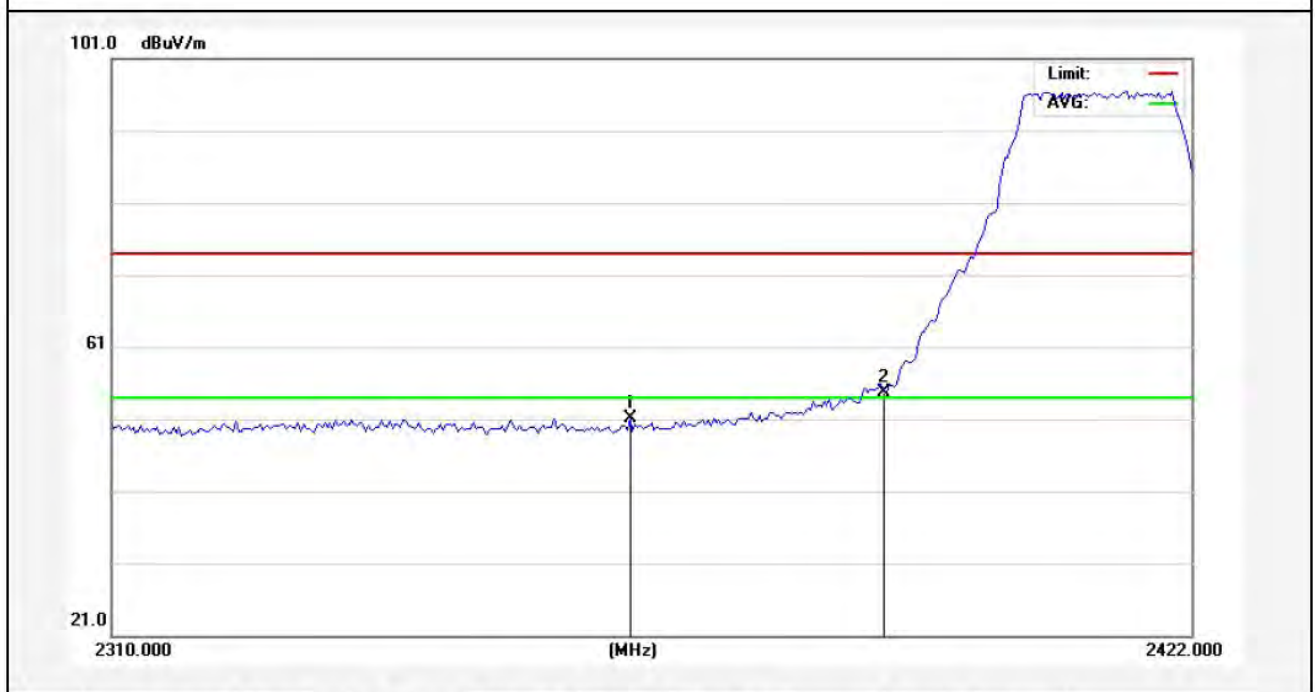


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	58.76	-2.31	56.45	74.00	-17.55	peak			
2	2487.520	57.59	-2.30	55.29	74.00	-18.71	peak			

Vertical-AV:



Test Mode: 802.11g
2412MHz
Horizontal-PEAK:



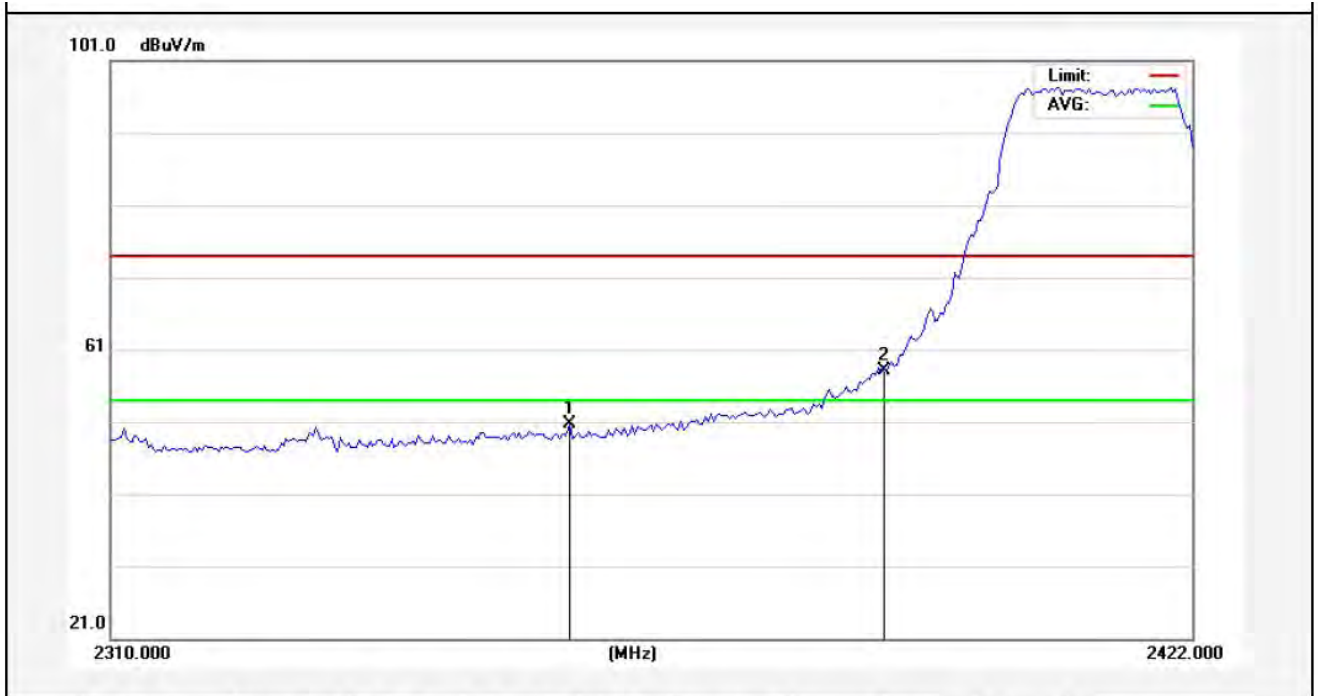
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2363.200	53.64	-2.57	51.07	74.00	-22.93	peak			
2	2390.000	57.16	-2.51	54.65	74.00	-19.35	peak			

Horizontal-AV:



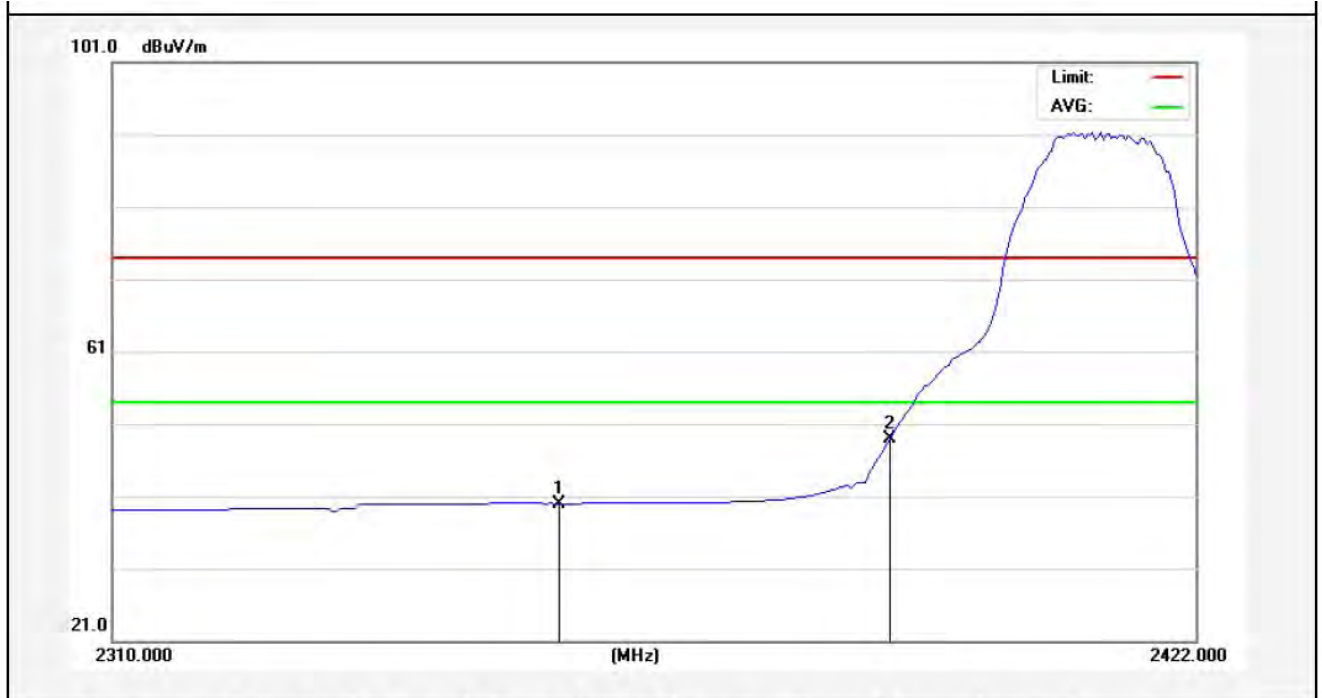
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2357.880	41.90	-2.59	39.31	54.00	-14.69	AVG			
2	2390.000	48.45	-2.51	45.94	54.00	-8.06	AVG			

Test Mode: 802.11g
2412MHz
Vertical-PEAK:



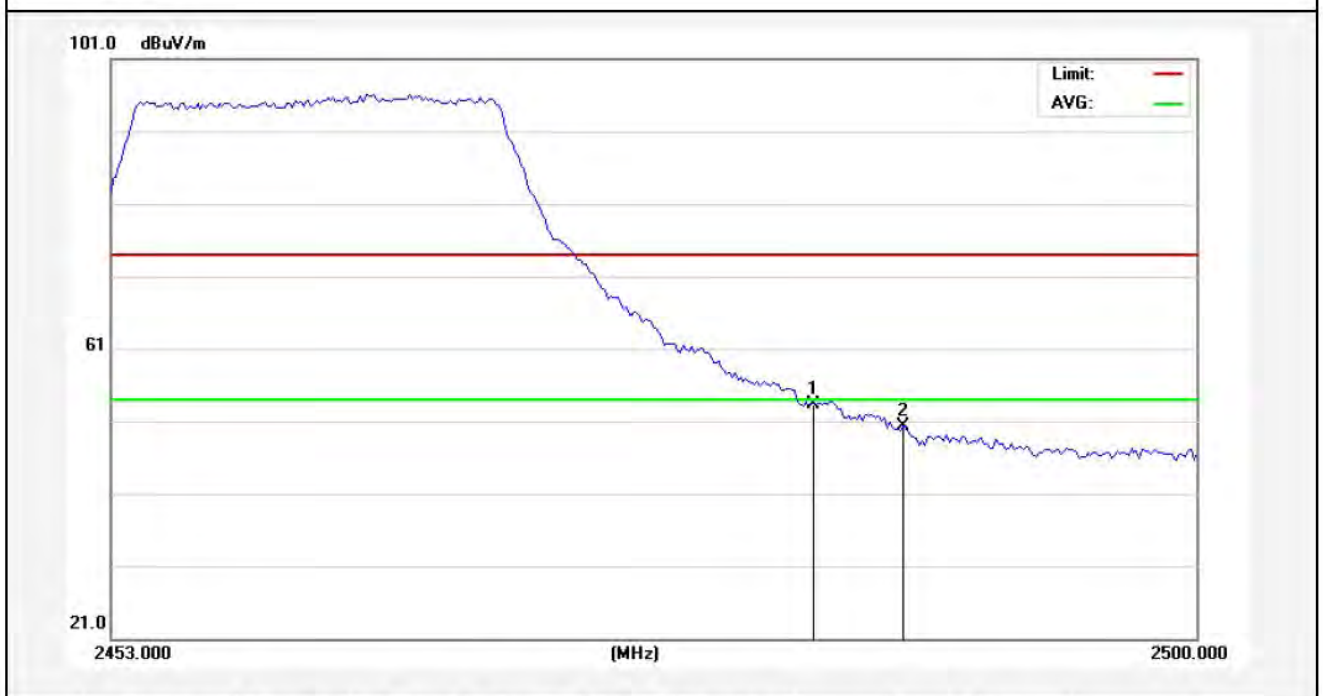
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2357.040	53.32	-2.59	50.73	74.00	-23.27	peak			
2	2390.000	60.54	-2.51	58.03	74.00	-15.97	peak			

Vertical-AV:



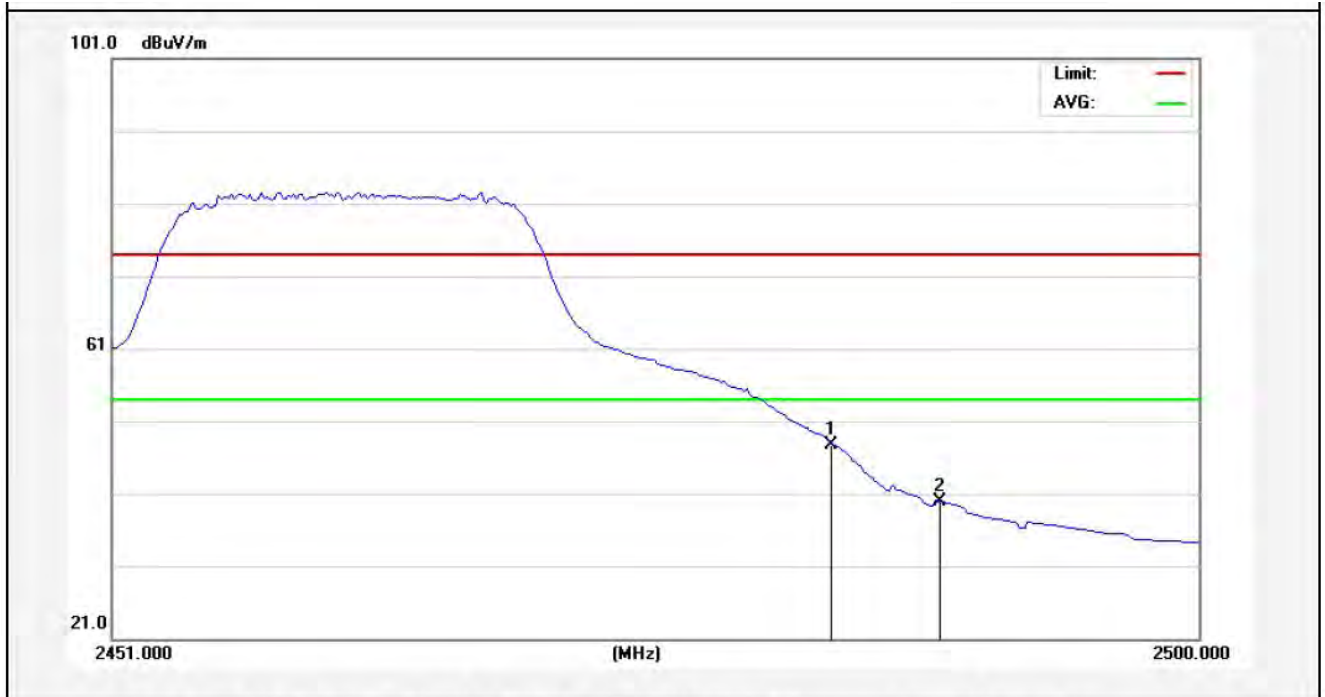
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2355.640	42.58	-2.59	39.99	54.00	-14.01	AVG			
2	2390.000	51.49	-2.51	48.98	54.00	-5.02	AVG			

Test Mode: 802.11g
2462MHz
Horizontal-PEAK:



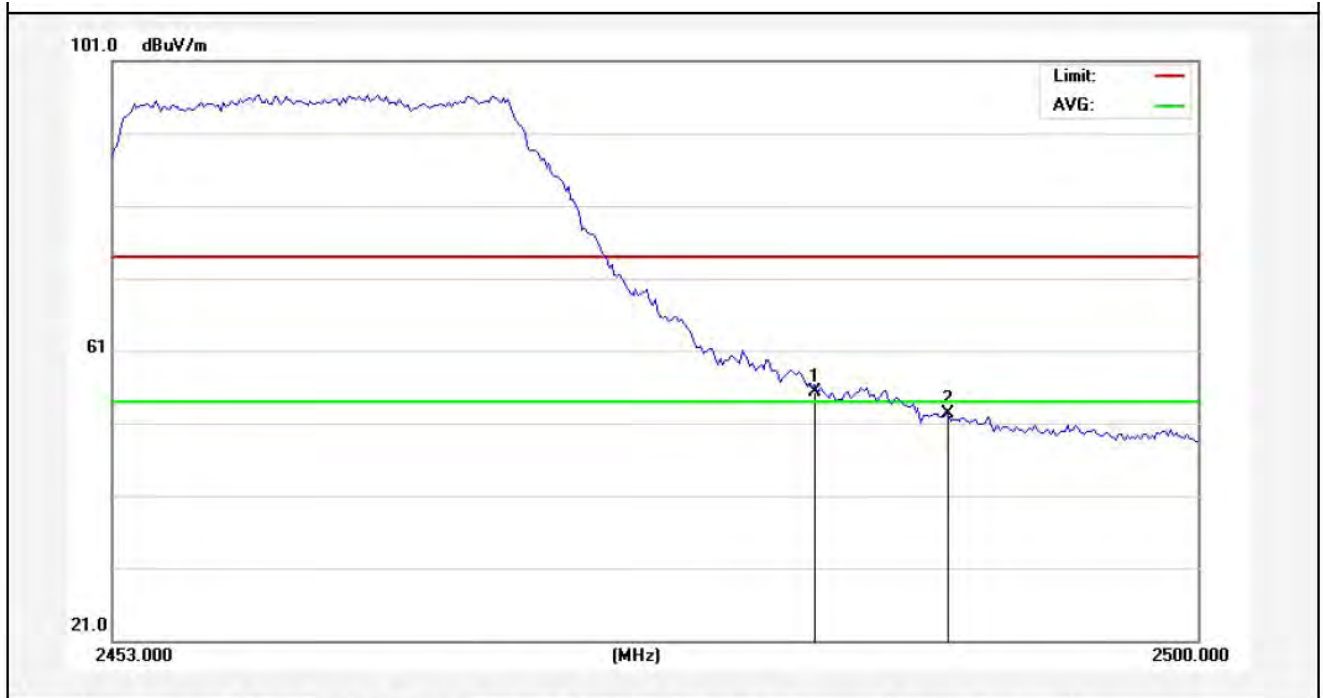
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	55.70	-2.31	53.39	74.00	-20.61	peak			
2	2487.310	52.70	-2.30	50.40	74.00	-23.60	peak			

Horizontal-AV:



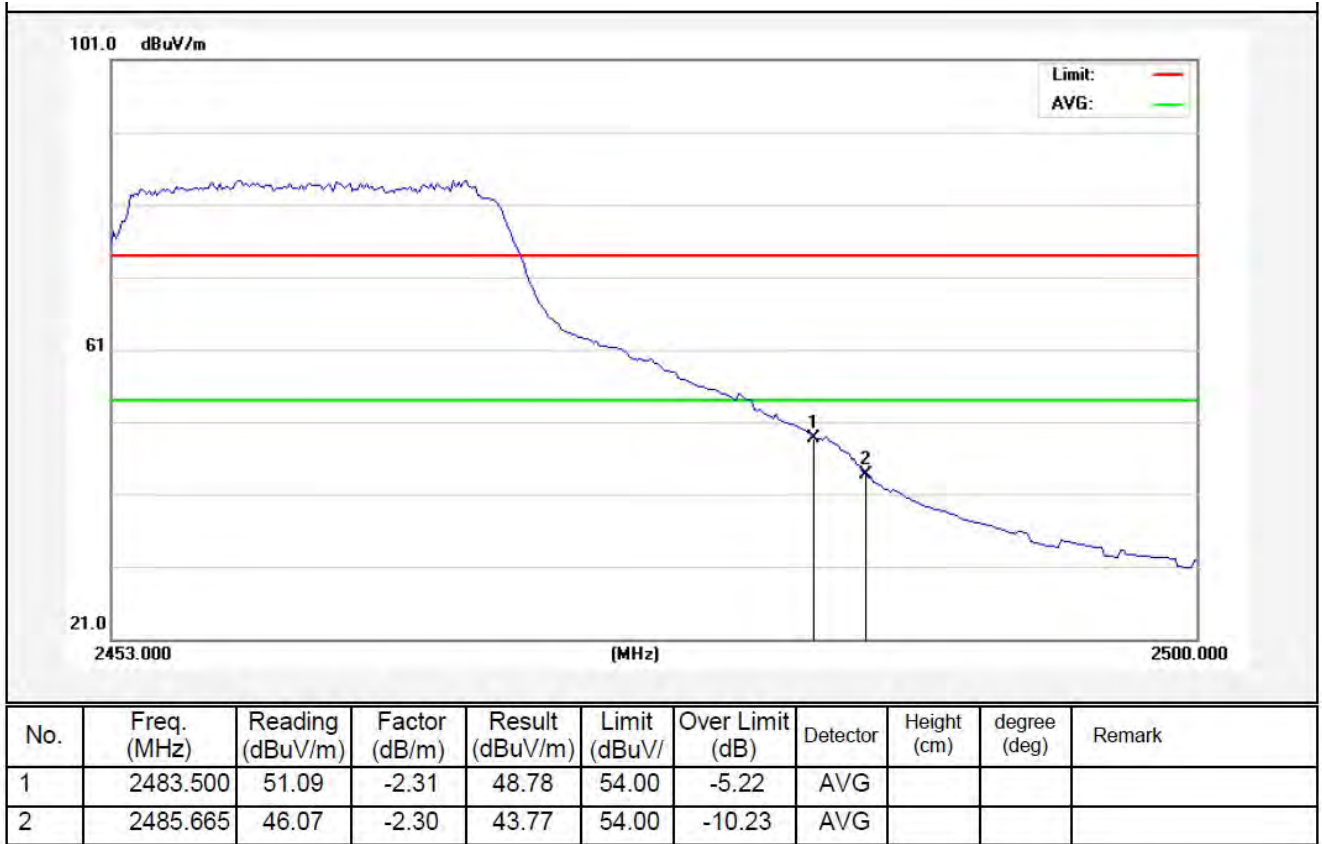
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	50.05	-2.31	47.74	54.00	-6.26	AVG			
2	2488.363	42.17	-2.30	39.87	54.00	-14.13	AVG			

Test Mode: 802.11g
2462MHz
Vertical-PEAK:

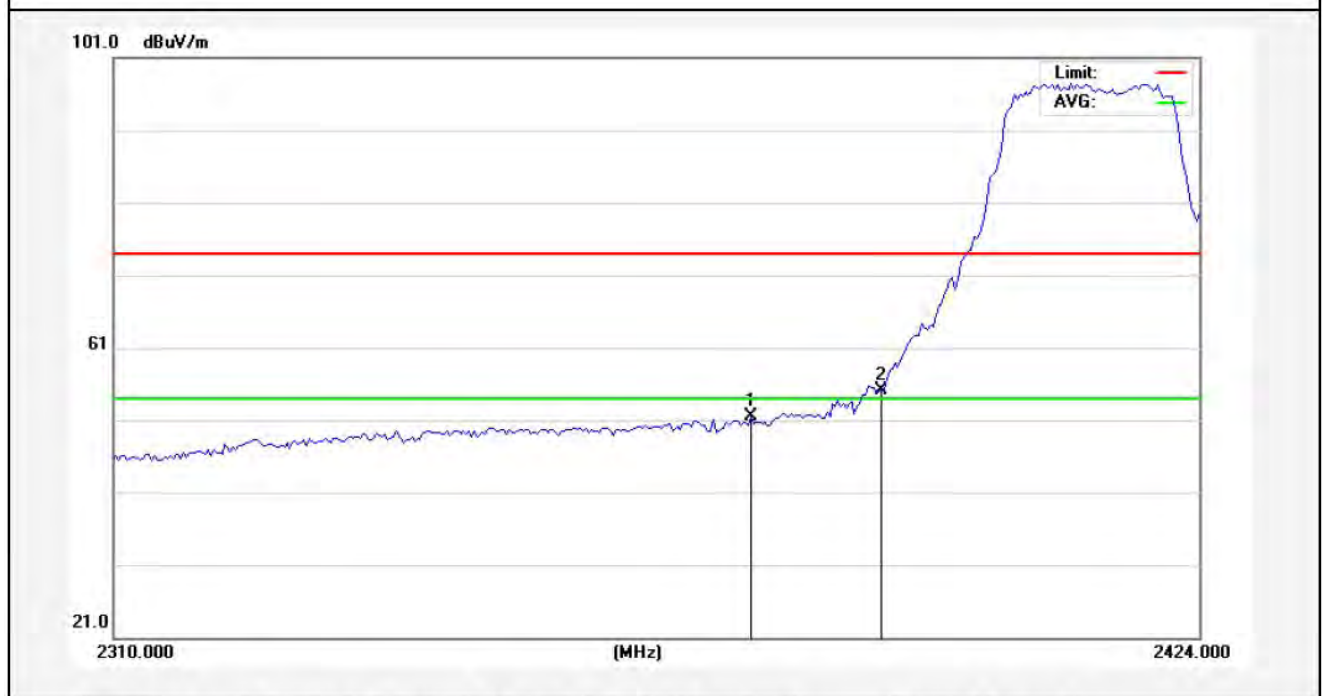


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	57.64	-2.31	55.33	74.00	-18.67	peak			
2	2489.190	54.59	-2.29	52.30	74.00	-21.70	peak			

Vertical-AV:

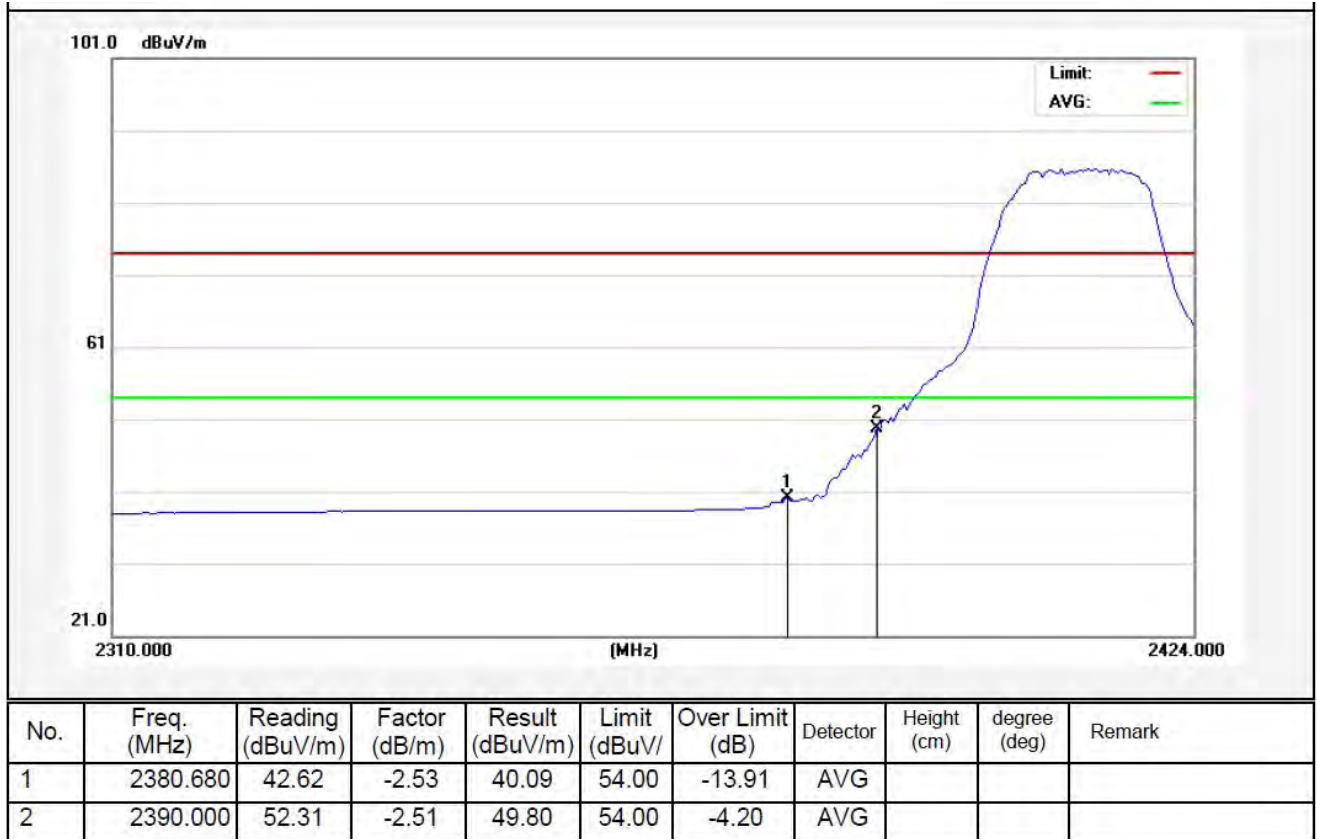


Test Mode: 802.11n (HT20)
2412MHz
Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2376.405	54.04	-2.54	51.50	74.00	-22.50	peak			
2	2390.000	57.69	-2.51	55.18	74.00	-18.82	peak			

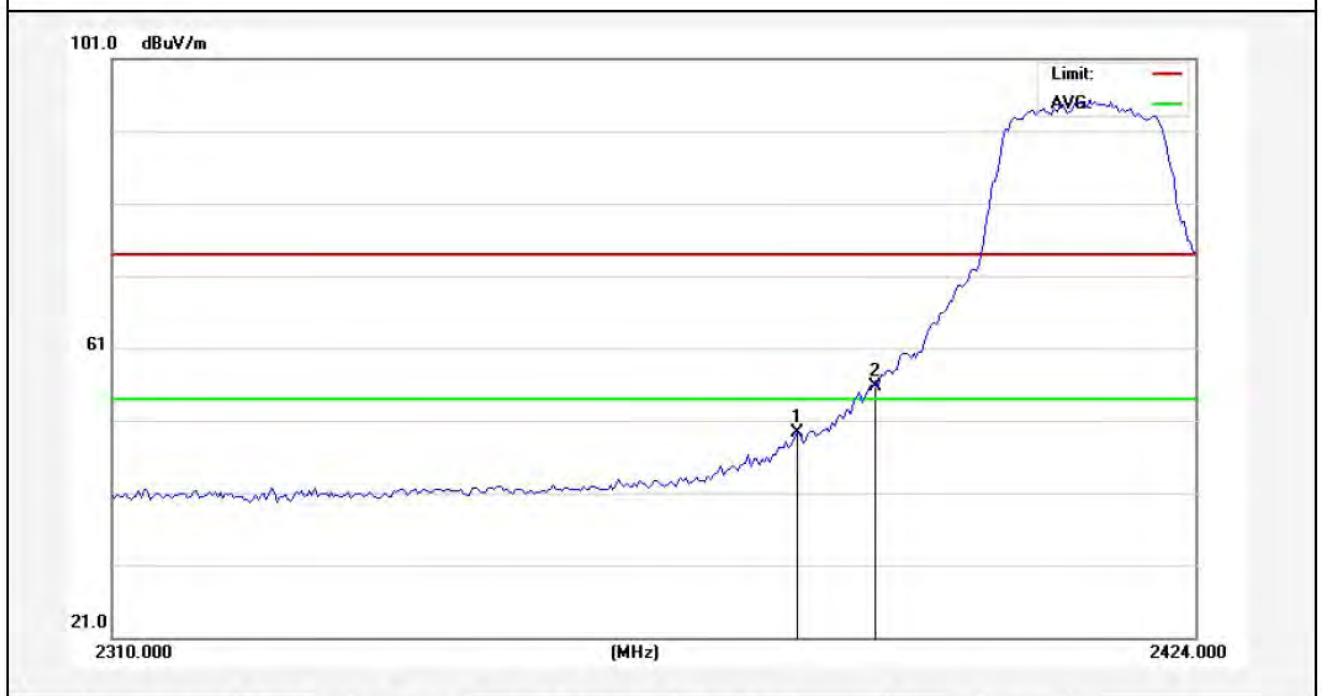
Horizontal-AV:



Test Mode: 802.11n (HT20)

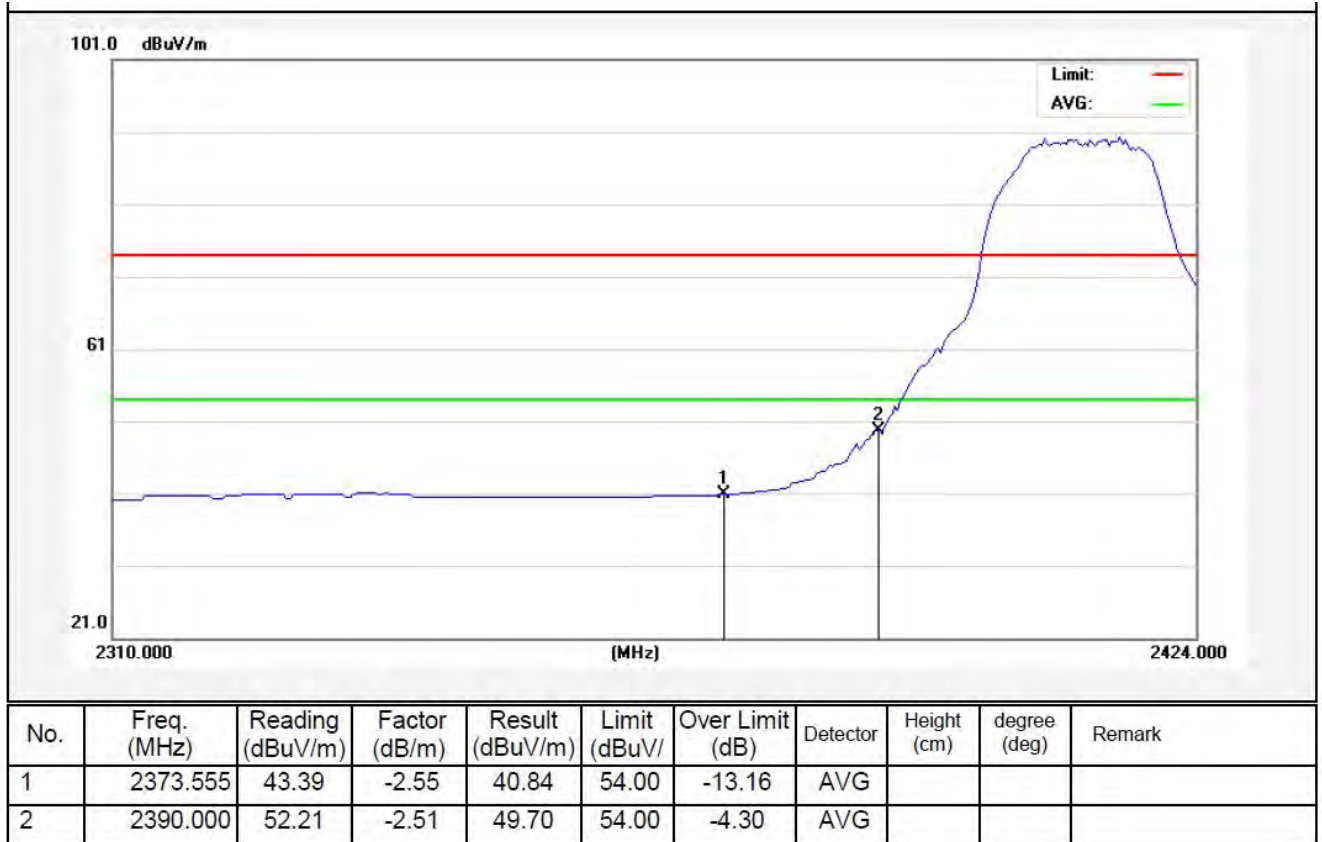
2412MHz

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	2381.535	51.78	-2.53	49.25	74.00	-24.75	peak			
2	2390.000	58.25	-2.51	55.74	74.00	-18.26	peak			

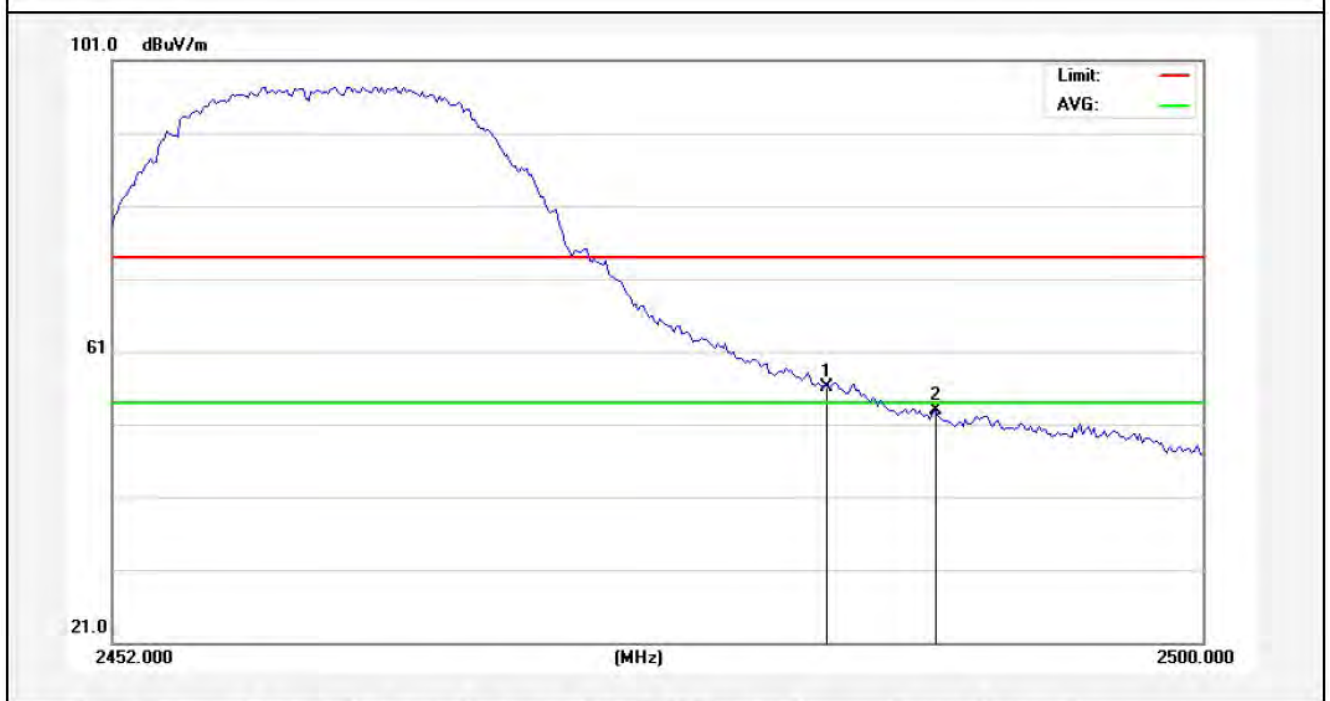
Vertical-AV:



Test Mode: 802.11n (HT20)

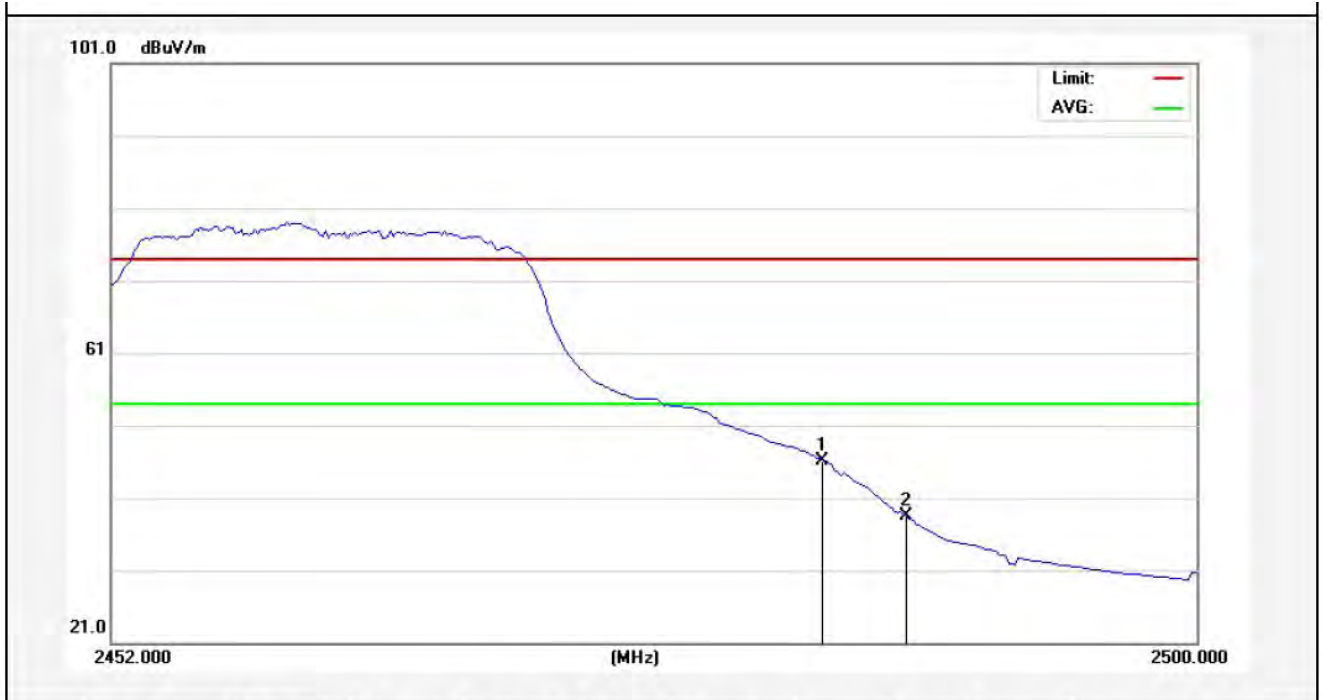
2462MHz

Horizontal-PEAK:



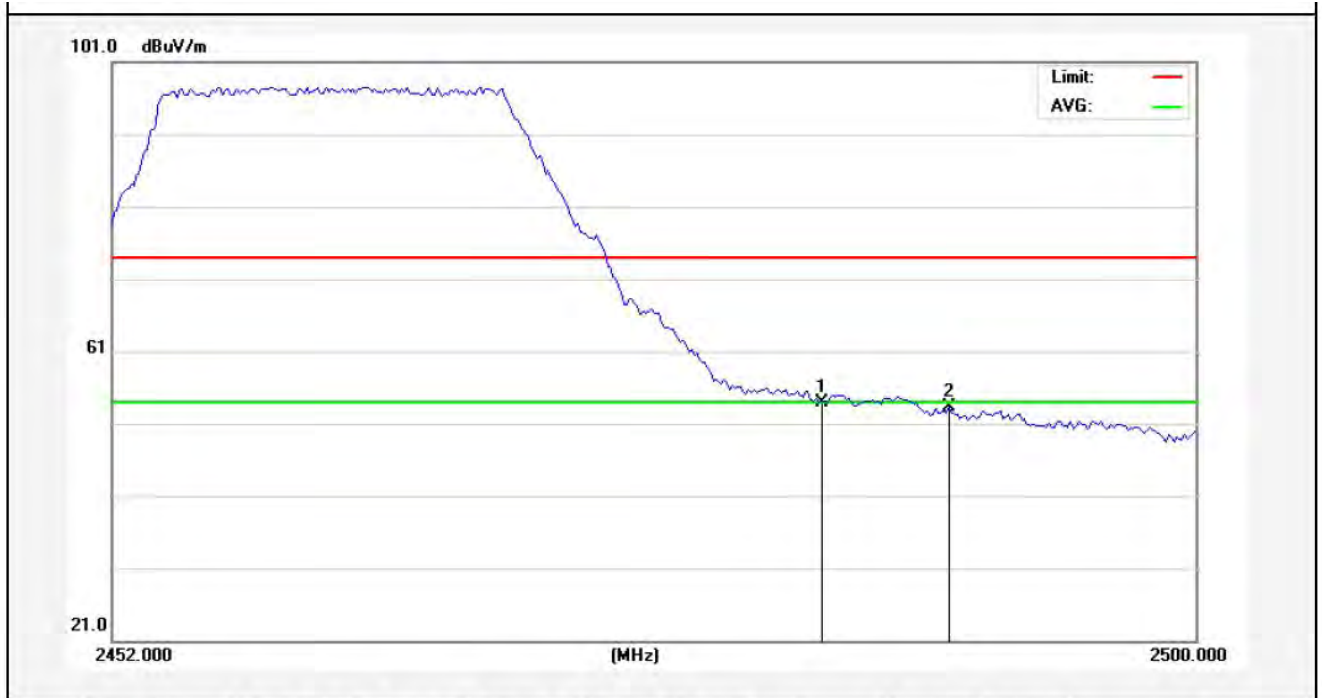
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	58.34	-2.31	56.03	74.00	-17.97	peak			
2	2488.240	55.22	-2.30	52.92	74.00	-21.08	peak			

Horizontal-AV:



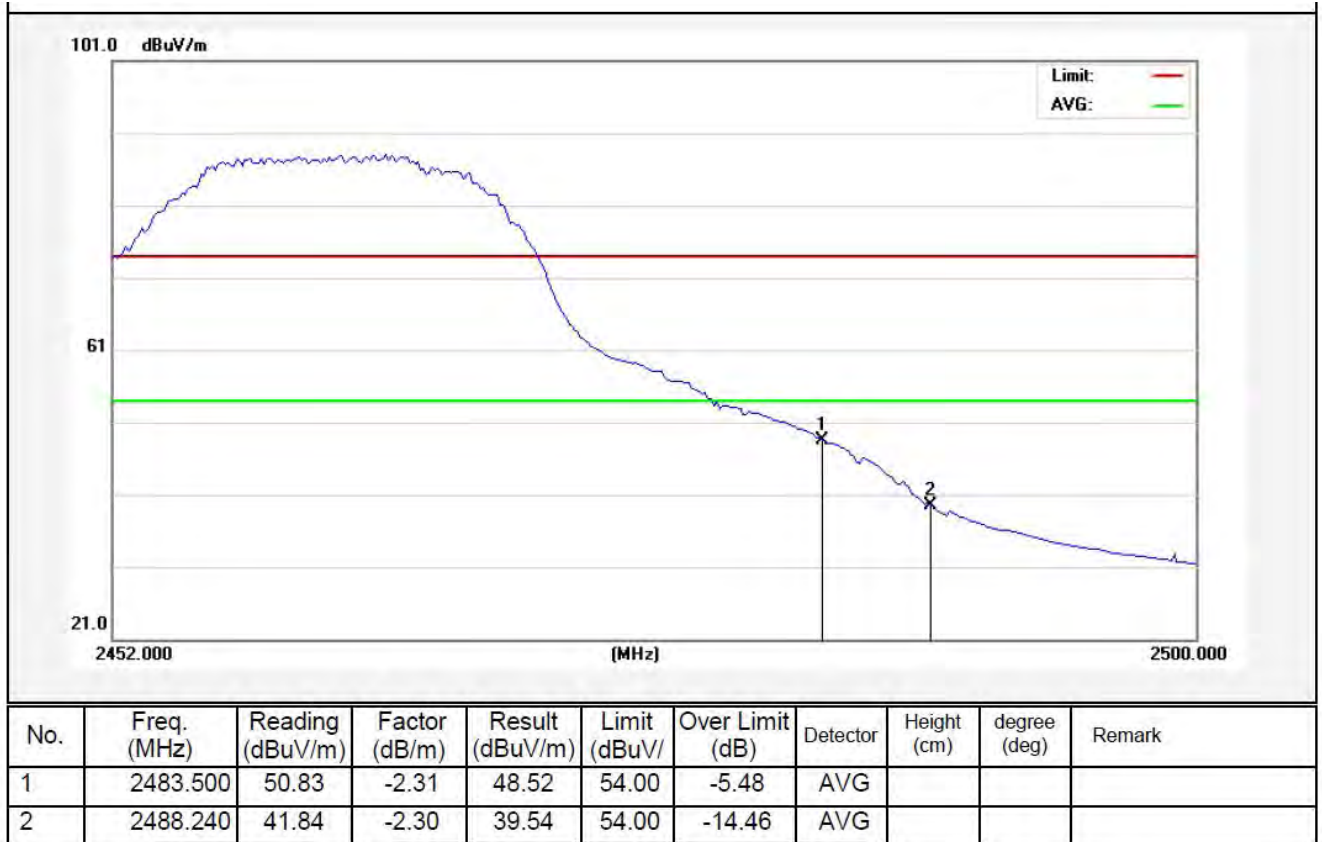
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	48.37	-2.31	46.06	54.00	-7.94	AVG			
2	2487.160	40.75	-2.30	38.45	54.00	-15.55	AVG			

Test Mode: 802.11n (HT20)
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	2483.500	56.31	-2.31	54.00	74.00	-20.00	peak			
2	2489.080	55.64	-2.29	53.35	74.00	-20.65	peak			

Vertical-AV:



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 = 1.5 times DTS BW, 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)	Σ PPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2412	-10.34	-	8.00	Pass
Mid	2437	-10.99	-		Pass
High	2462	-10.91	-		Pass

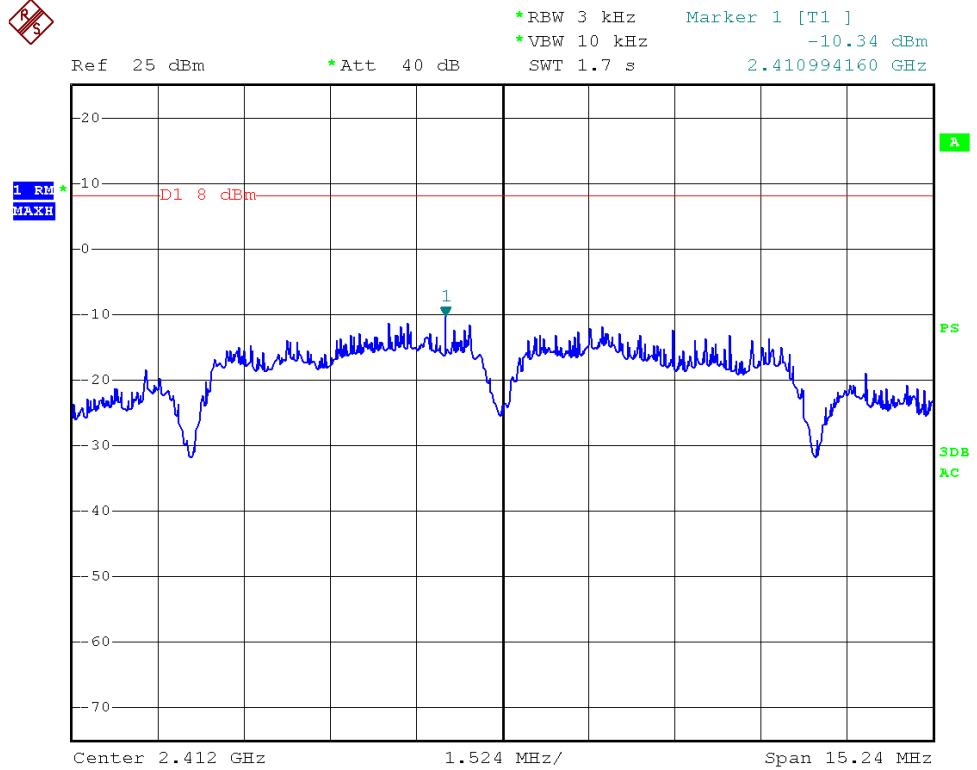
Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Σ PPSD (dBm)	Limit (dBm)	Result
Low	2412	-22.18	-	8.00	Pass
Mid	2437	-22.57	-		Pass
High	2462	-22.58	-		Pass

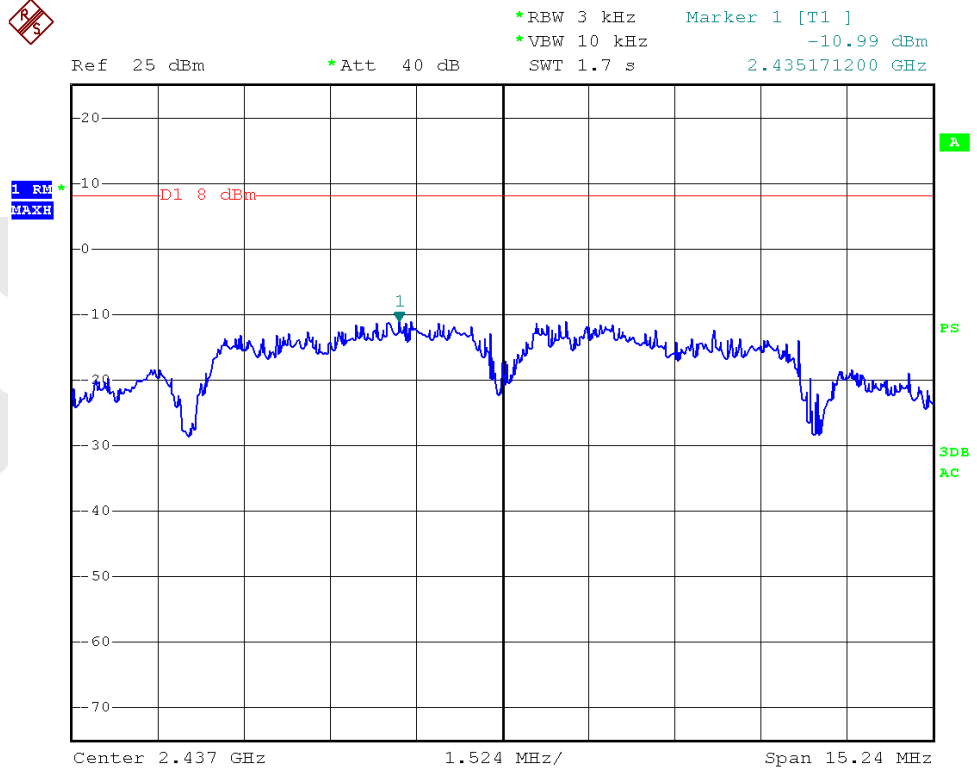
Test mode: IEEE 802.11n (HT20)

Channel	Frequency (MHz)	PPSD (dBm/3KHz)	Σ PPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2412	-15.38	-	8.00	Pass
Mid	2437	-15.55	-		Pass
High	2462	-16.87	-		Pass

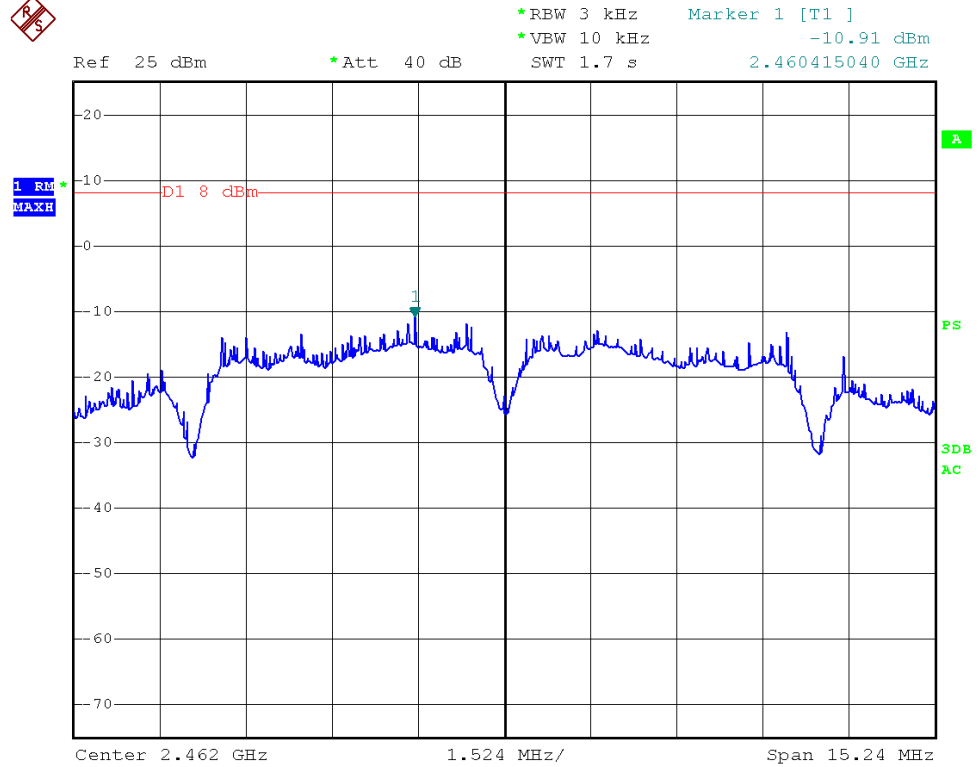
802.11 b CH--Low



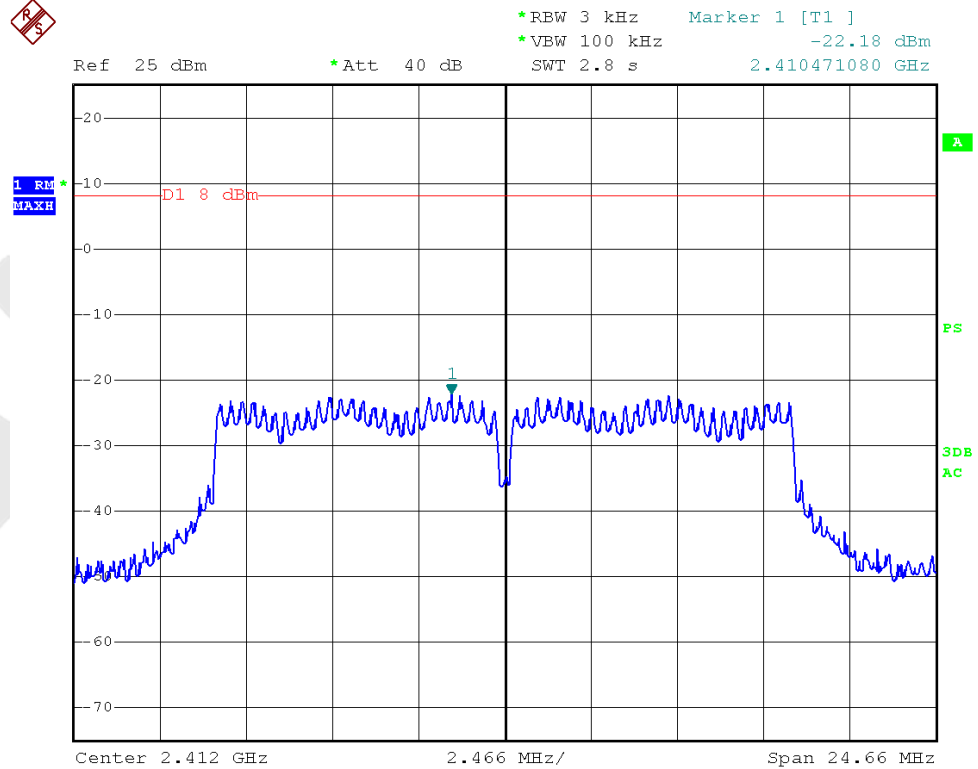
802.11 b CH--Mid



802.11 b CH--High

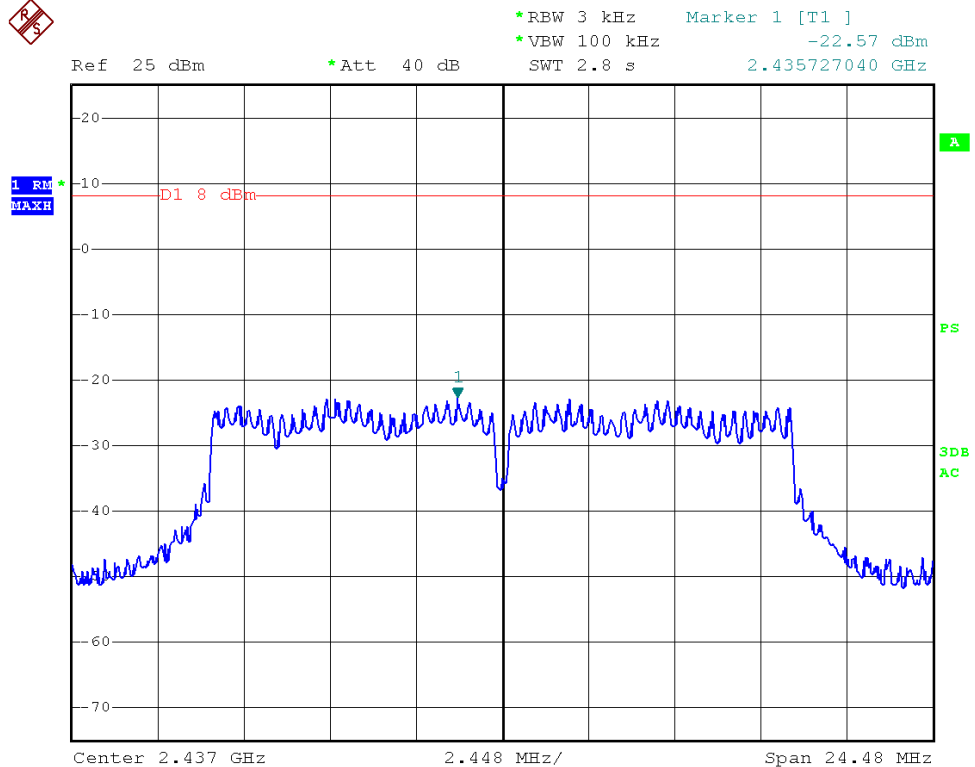


802.11g CH--Low



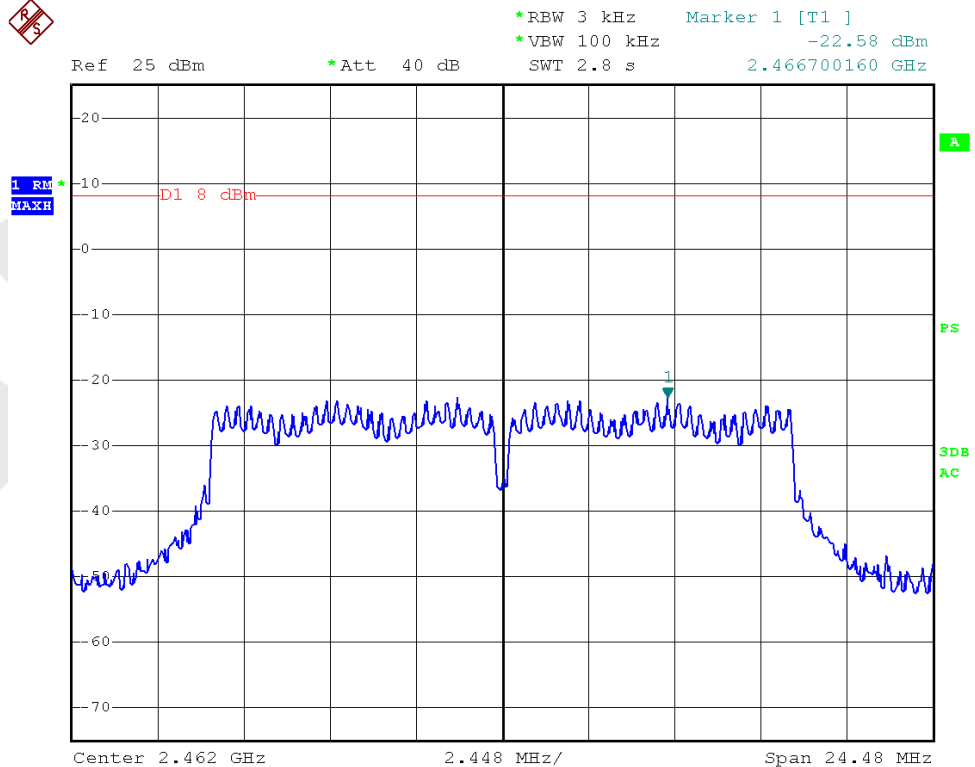
802.11g

CH--Mid

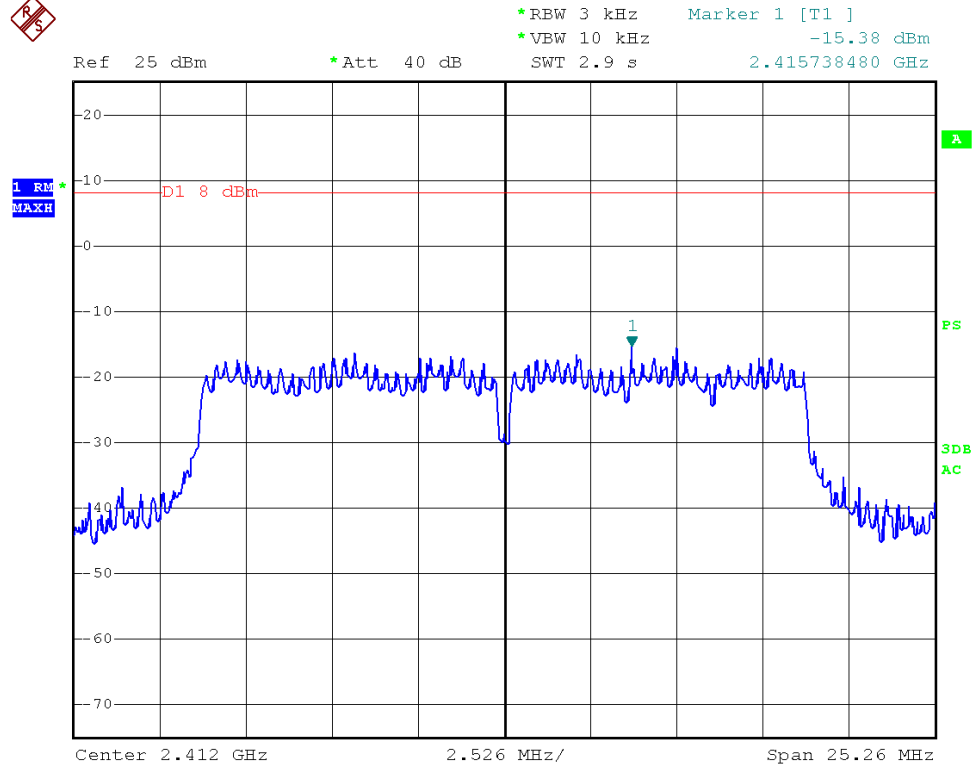


802.11g

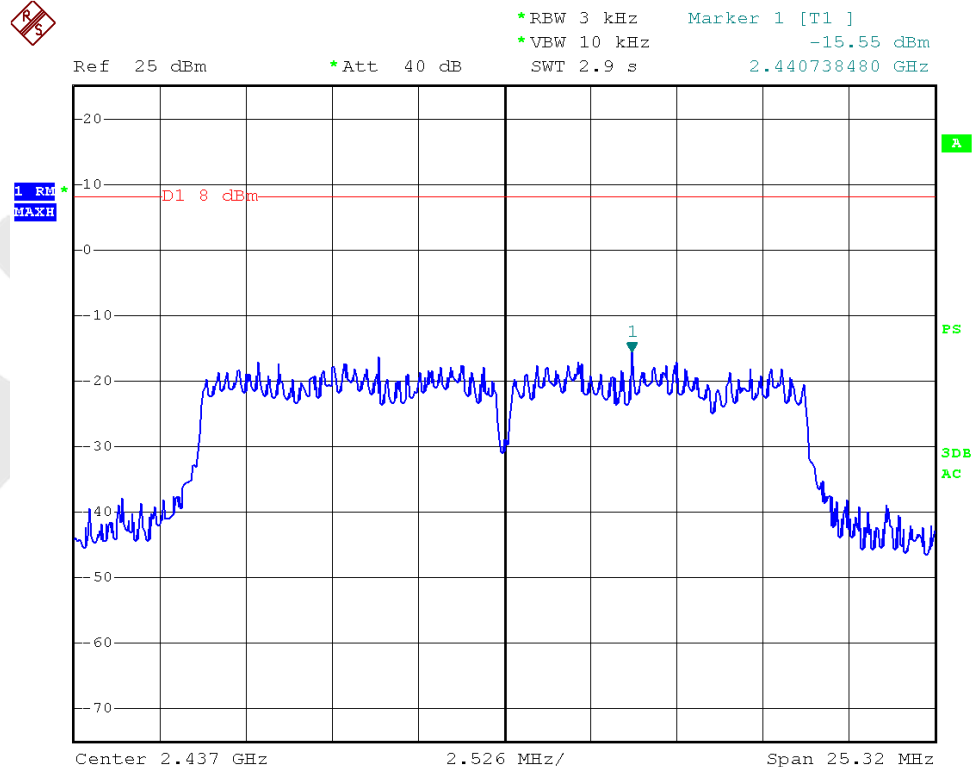
CH--High



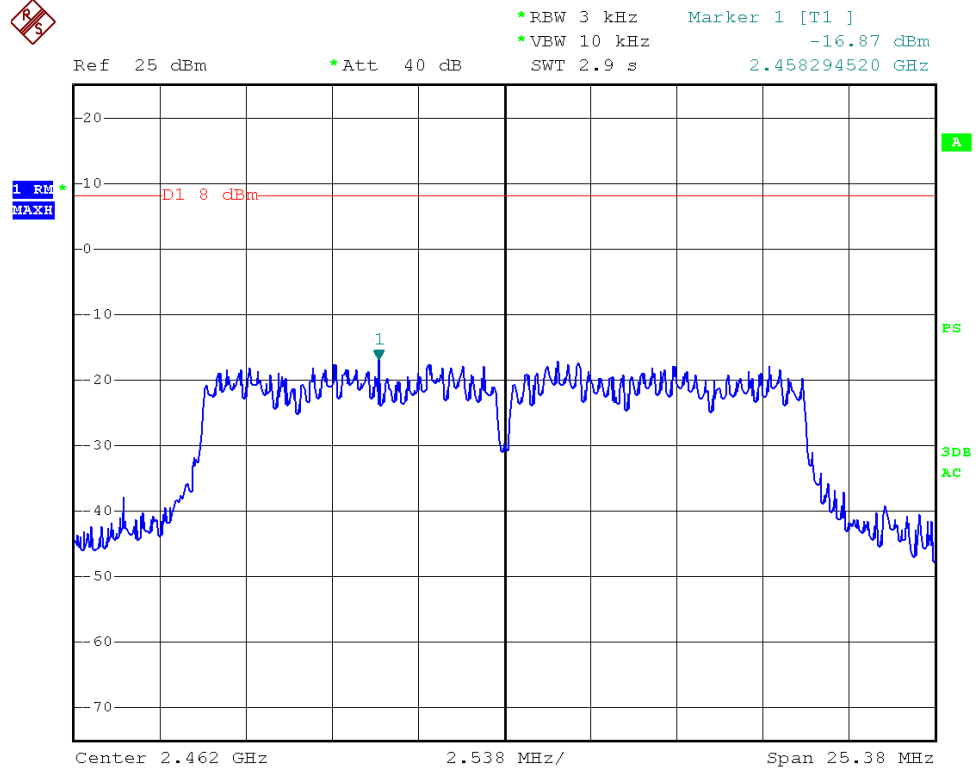
802.11n (HT20) CH—Low



802.11n (HT20) CH—Mid



802.11n (HT20) CH—High



Anbotek

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 (\geq 30 MHZ)

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

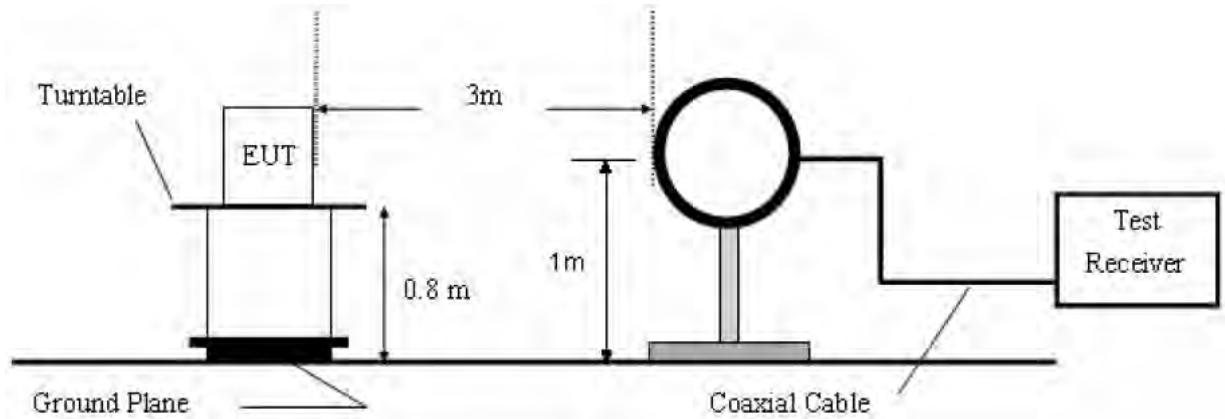
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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

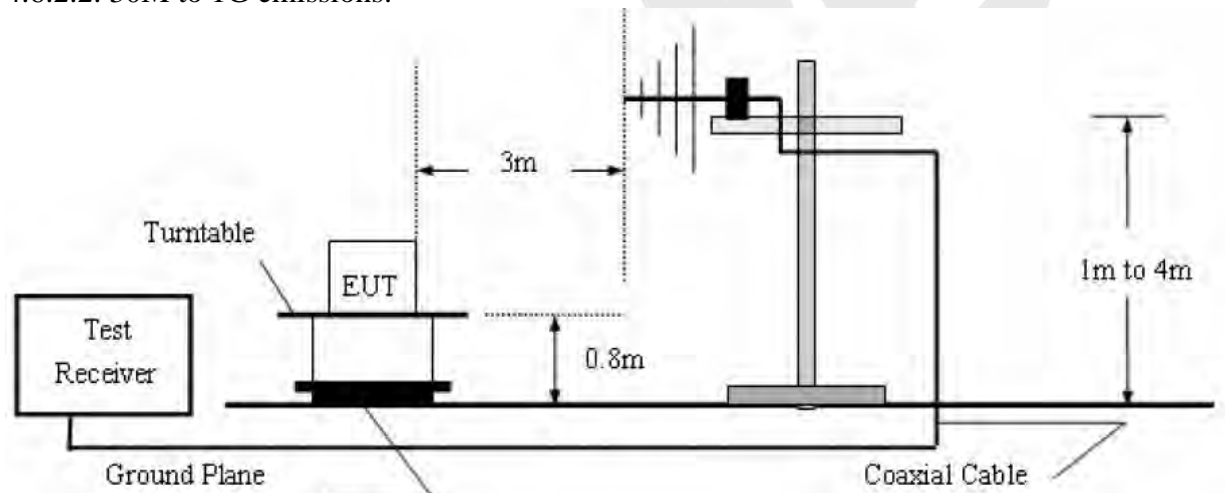
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Aug. 08, 2014	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Aug. 08, 2014	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 22, 2014	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 04, 2014	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 24, 2014	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Aug. 08, 2014	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

4.6.2. Test Configuration:

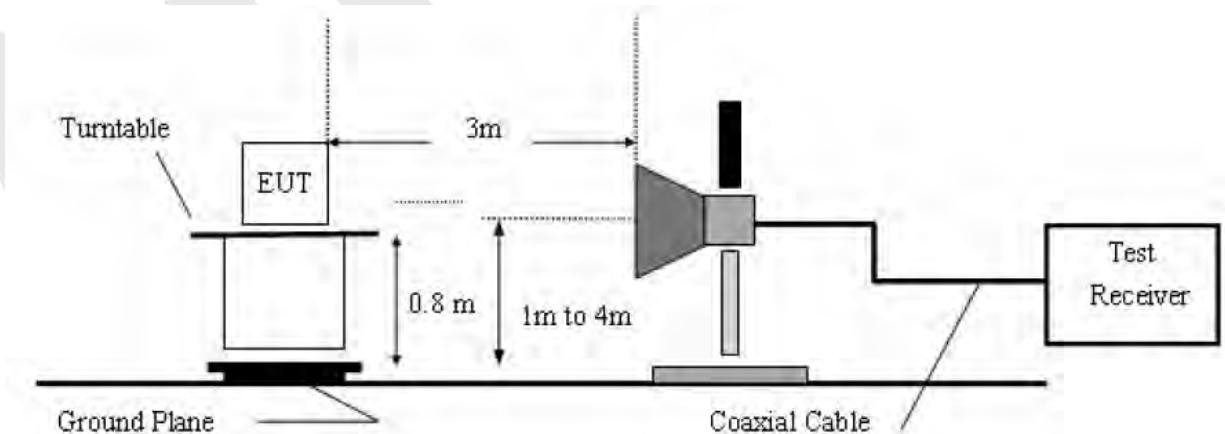
4.6.2.1. 9k to 30MHz emissions:



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.

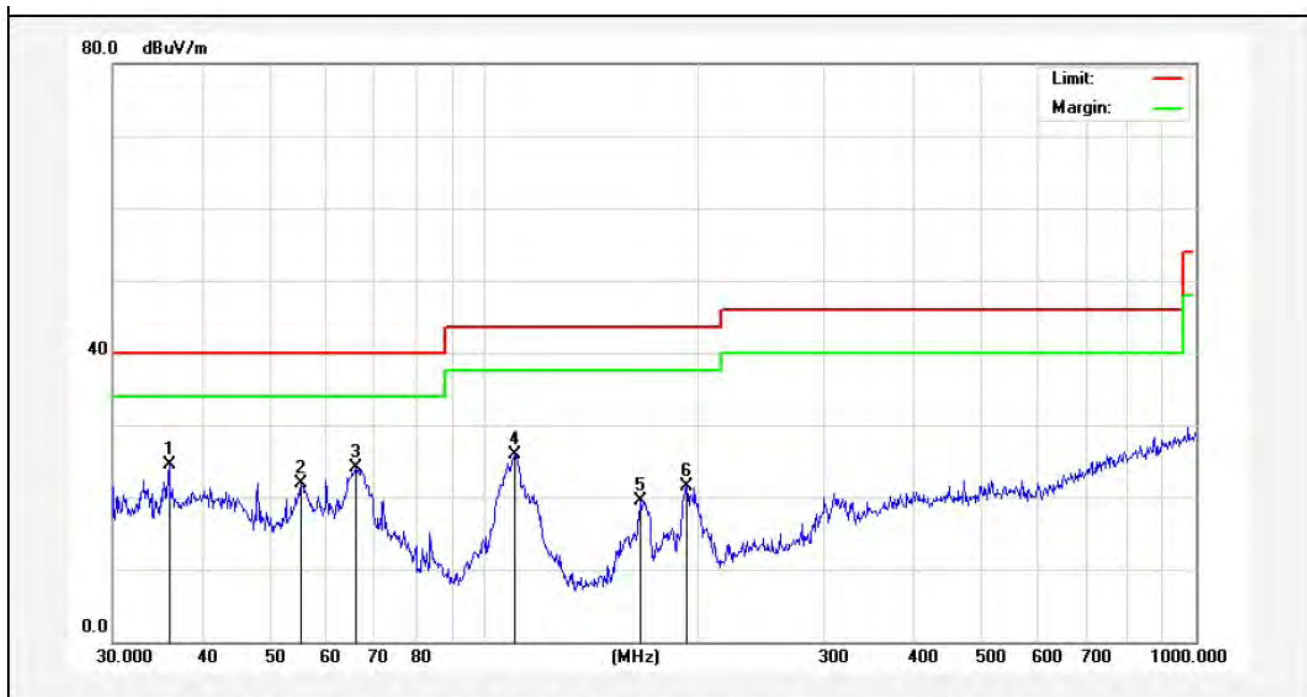
The EUT is tested in 9*6*6 Chamber.

The test results are listed in Section 4.6.4.

4.6.4. Test Results

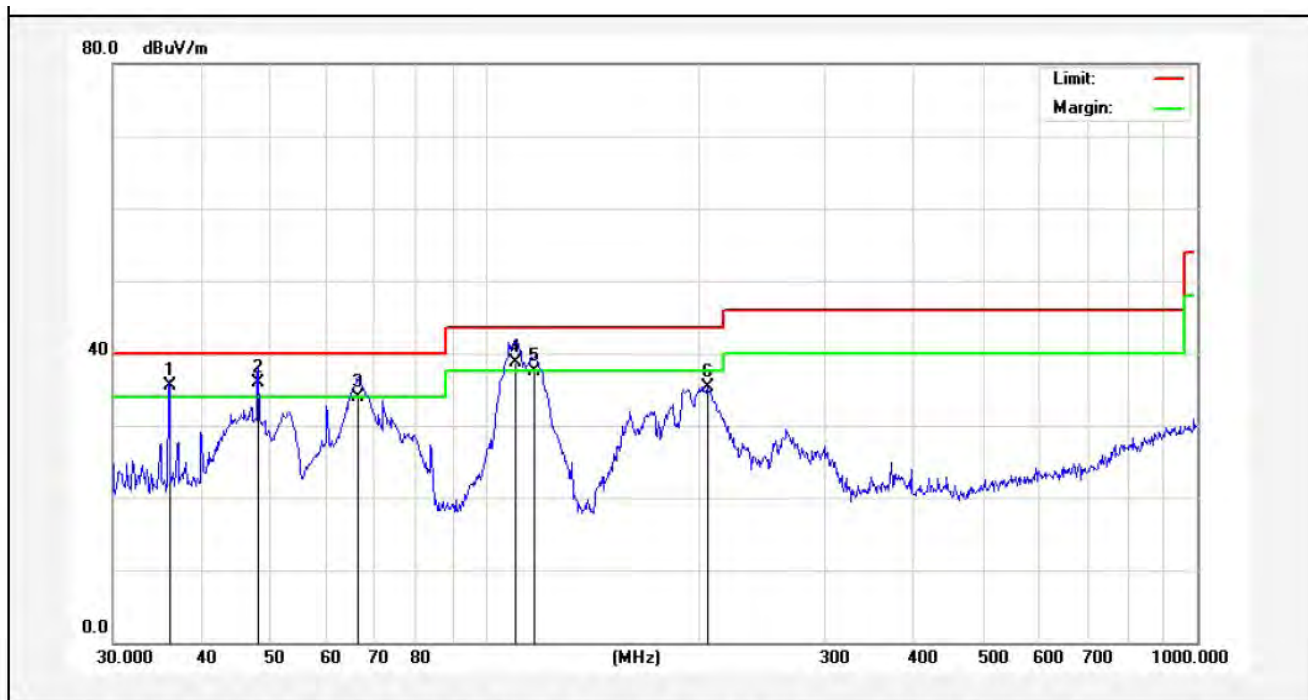
The EUT was tested on (Static white light, Music) modes, only the worst data of (Music) are attached in the following pages.

Job No.:	011410501E	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz for adapter
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Test Mode:	Music	Distance:	3m



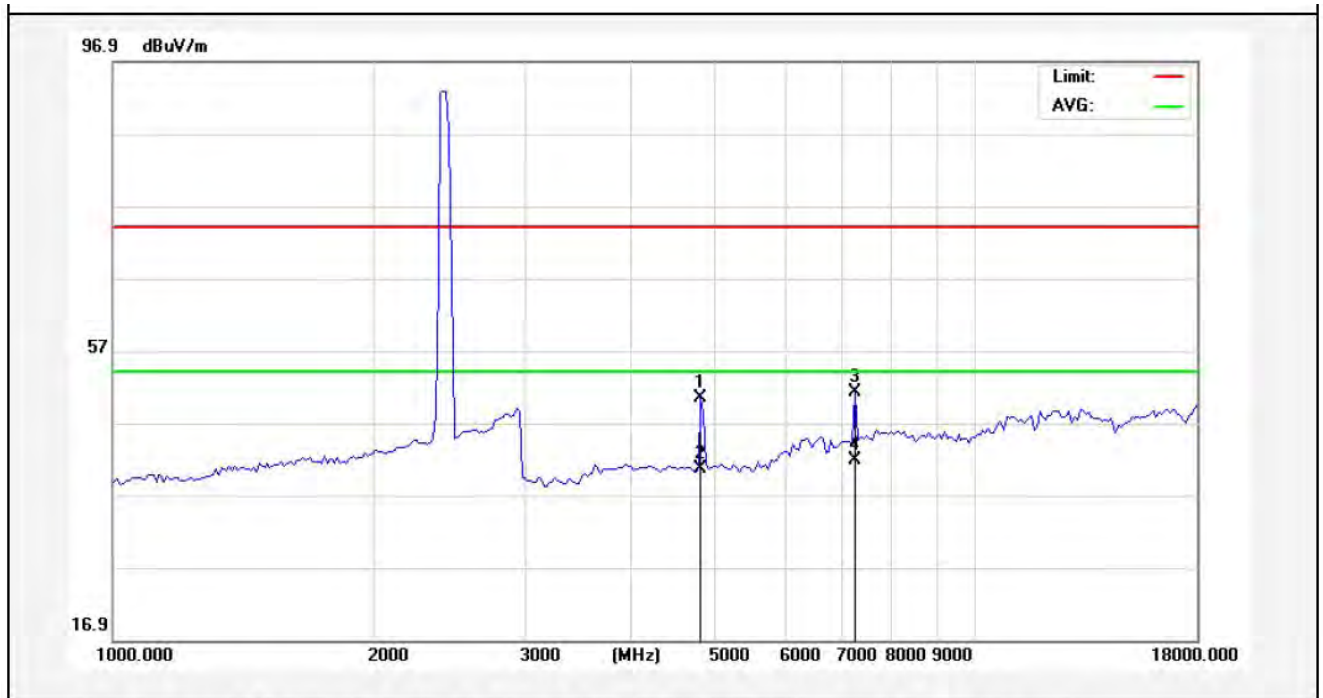
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	36.0007	38.00	-13.50	24.50	40.00	-15.50	peak			
2	55.2207	36.88	-14.94	21.94	40.00	-18.06	peak			
3	66.0342	41.94	-17.92	24.02	40.00	-15.98	peak			
4	110.1816	46.58	-20.63	25.95	43.50	-17.55	peak			
5	165.4866	42.27	-22.70	19.57	43.50	-23.93	peak			
6	192.4186	42.42	-20.91	21.51	43.50	-21.99	peak			

Job No.:	011410501E	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz for adapter
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Test Mode:	Music	Distance:	3m



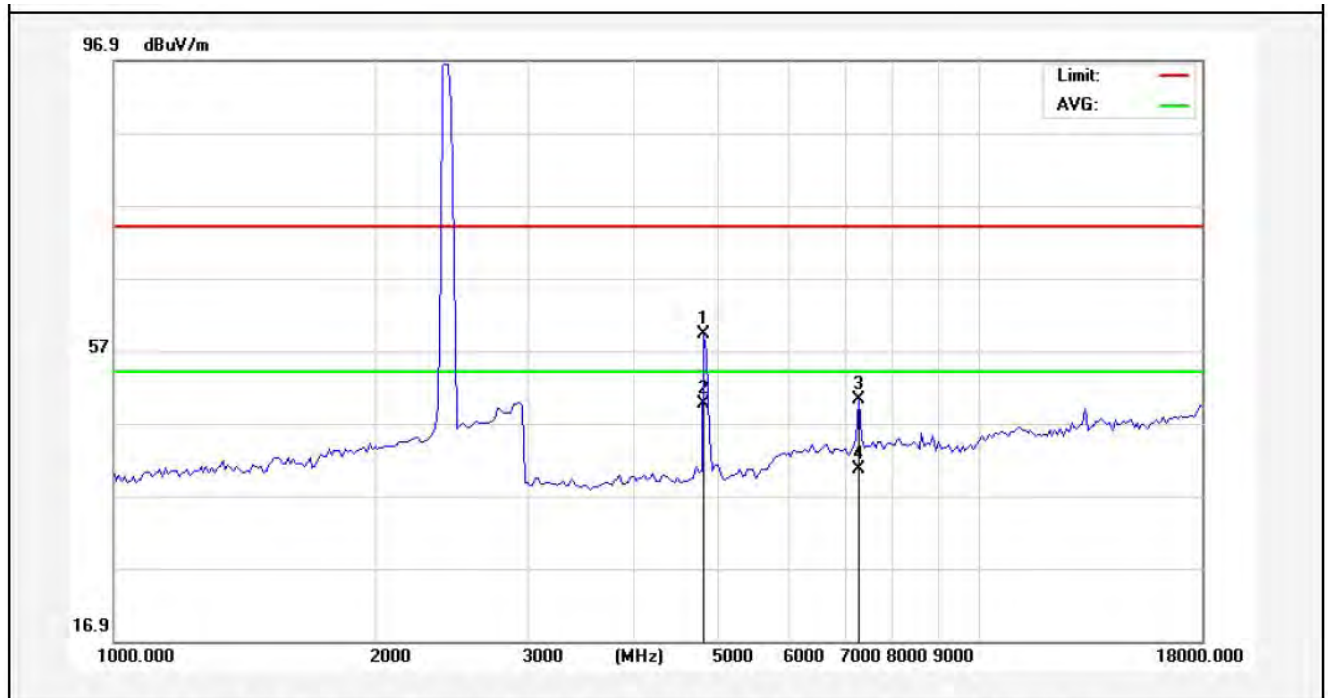
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	36.0107	49.00	-13.49	35.51	40.00	-4.49	QP	100	0	
2	48.0040	49.59	-13.67	35.92	40.00	-4.08	QP	100	360	
3	66.2662	51.86	-18.01	33.85	40.00	-6.15	QP	100	360	
4	110.1816	54.41	-15.63	38.78	43.50	-4.72	QP	100	0	
5	117.3603	53.63	-16.14	37.49	43.50	-6.01	QP	100	360	
6	204.9551	51.03	-15.68	35.35	43.50	-8.15	peak			

Job No.:	011410501E	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz for adapter
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2412MHz)	Distance:	3m



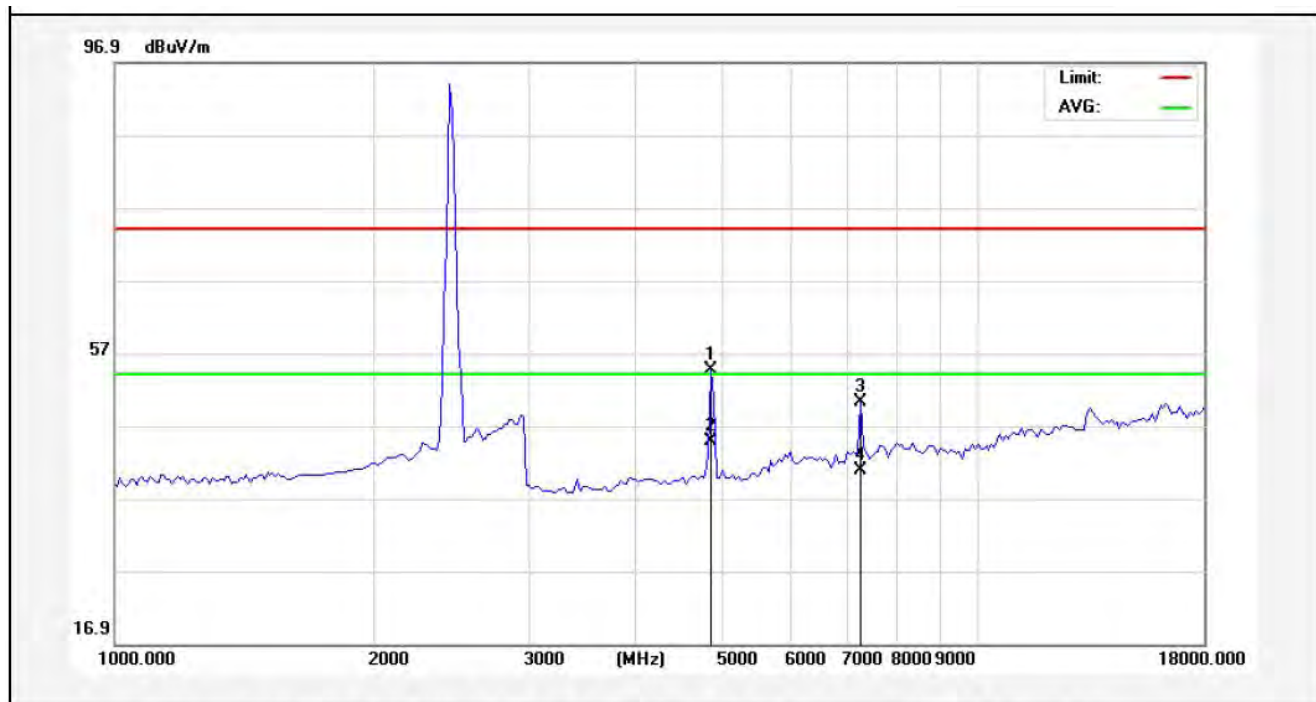
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4825.000	47.07	3.34	50.41	74.00	-23.59	peak			
2	4825.000	37.23	3.34	40.57	54.00	-13.43	AVG			
3	7247.500	42.79	8.48	51.27	74.00	-22.73	peak			
4	7247.500	33.39	8.48	41.87	54.00	-12.13	AVG			

Job No.:	011410501E	Polarization:	Vertical
Standard:	(RE)FCC PART15 C_3m	Power Source:	AC 120V, 60Hz for adapter
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2412MHz)	Distance:	3m



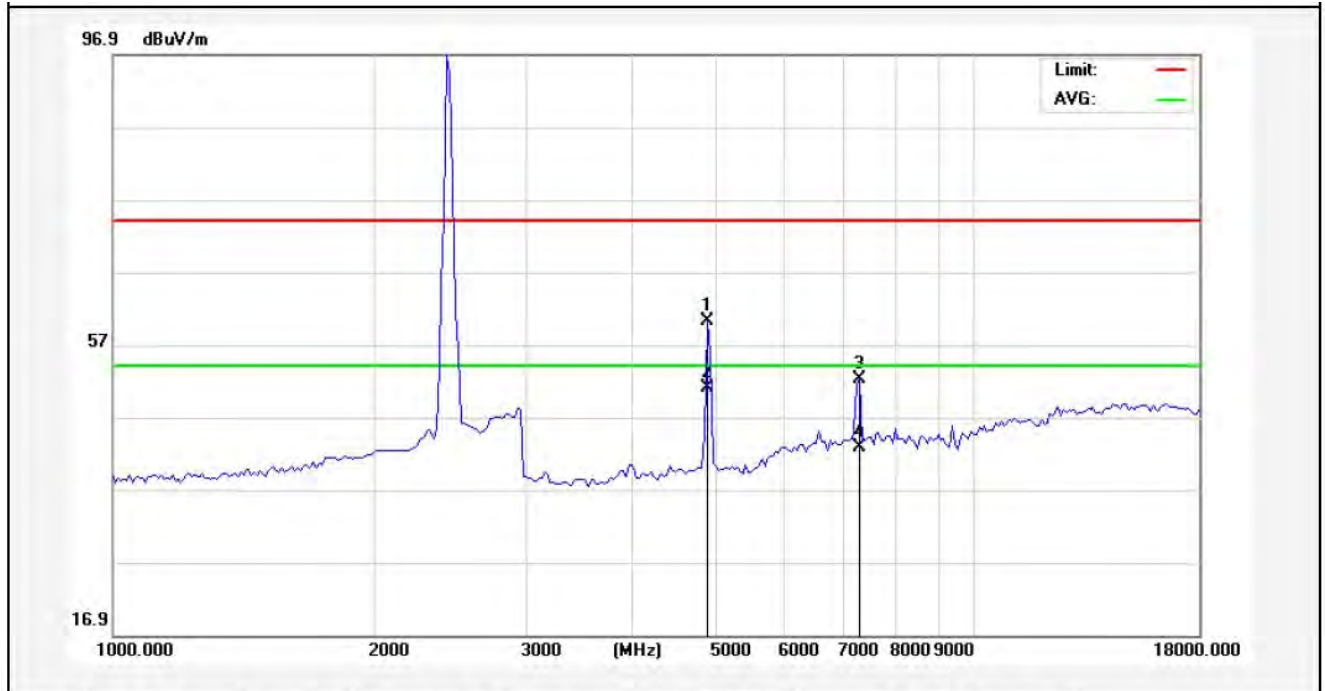
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4825.000	55.90	3.34	59.24	74.00	-14.76	peak			
2	4825.000	46.31	3.34	49.65	54.00	-4.35	AVG			
3	7247.500	41.65	8.48	50.13	74.00	-23.87	peak			
4	7247.500	32.09	8.48	40.57	54.00	-13.43	AVG			

Job No.:	011410501E	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz for adapter
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2437MHz)	Distance:	3m



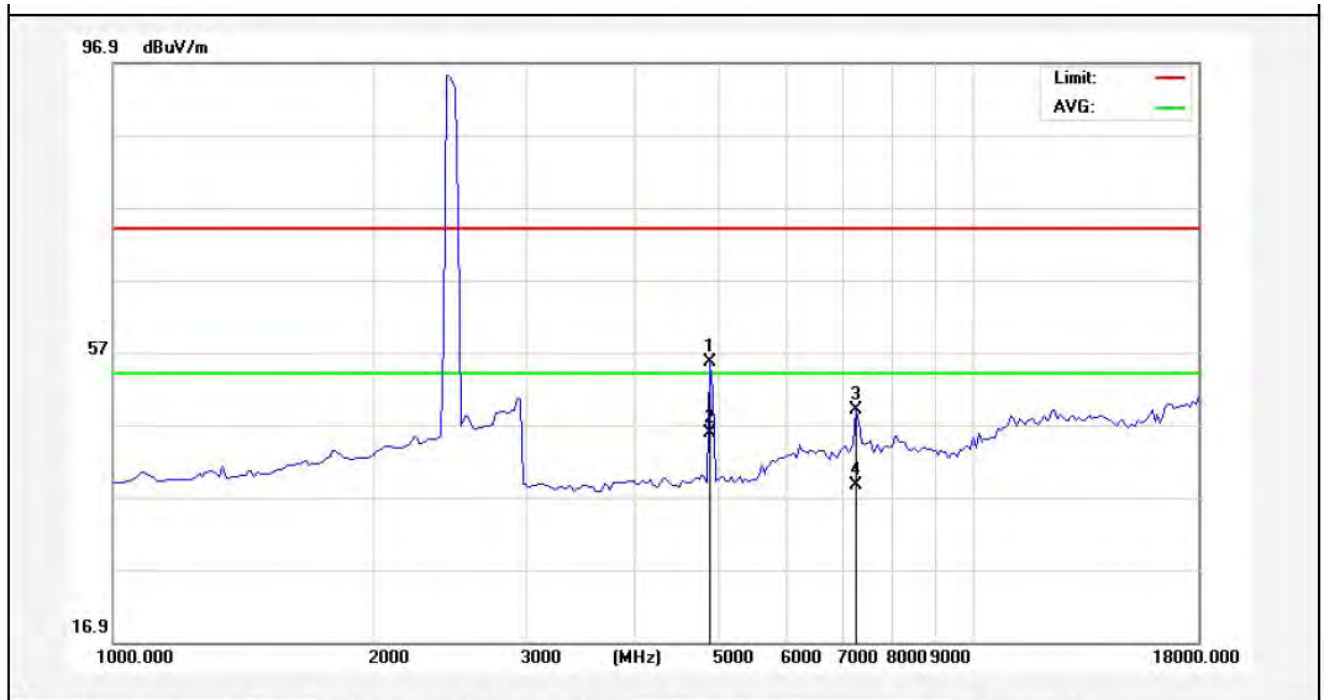
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4867.500	51.24	3.41	54.65	74.00	-19.35	peak			
2	4867.500	41.44	3.41	44.85	54.00	-9.15	AVG			
3	7290.000	41.67	8.53	50.20	74.00	-23.80	peak			
4	7290.000	32.34	8.53	40.87	54.00	-13.13	AVG			

Job No.:	011410501E	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz for adapter
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2437MHz)	Distance:	3m



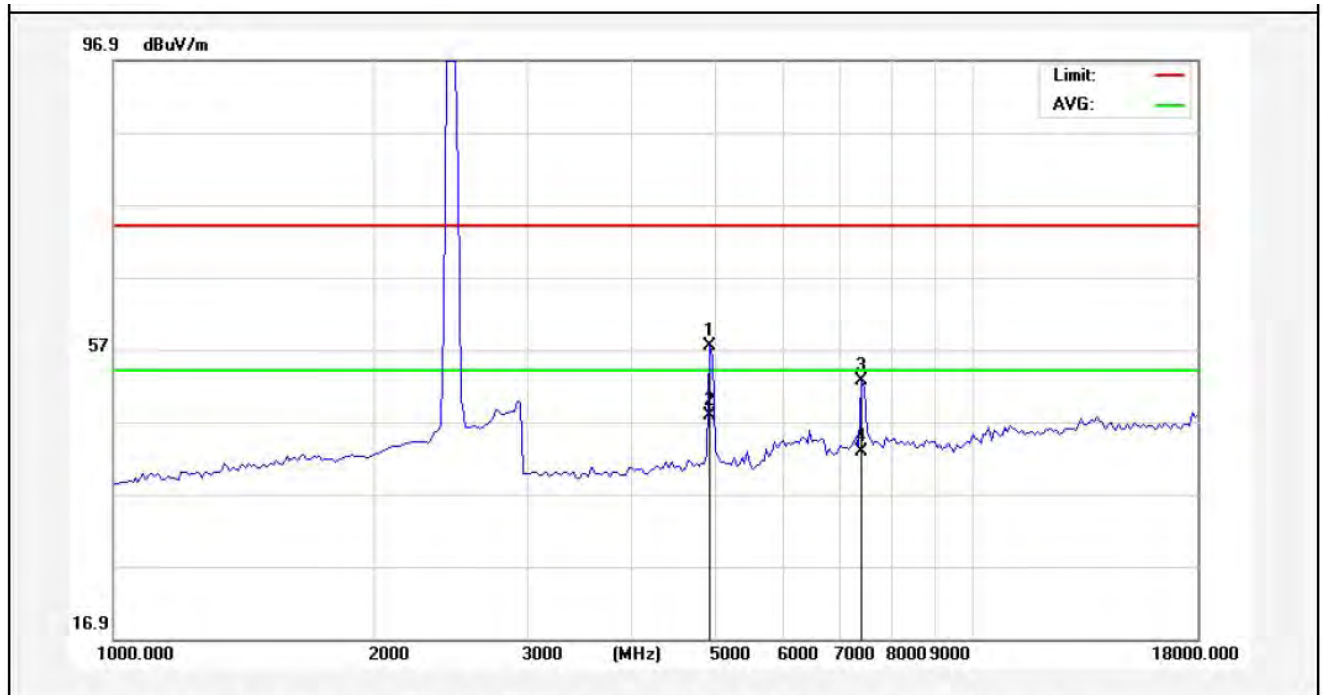
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4867.500	56.86	3.41	60.27	74.00	-13.73	peak			
2	4867.500	47.57	3.41	50.98	54.00	-3.02	AVG			
3	7332.500	43.58	8.58	52.16	74.00	-21.84	peak			
4	7332.500	34.26	8.58	42.84	54.00	-11.16	AVG			

Job No.:	011410501E	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C_3m	Power Source:	AC 120V, 60Hz for adapter
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2462MHz)	Distance:	3m



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	52.09	3.49	55.58	74.00	-18.42	peak			
2	4910.000	42.38	3.49	45.87	54.00	-8.13	AVG			
3	7290.000	40.40	8.53	48.93	74.00	-25.07	peak			
4	7290.000	30.04	8.53	38.57	54.00	-15.43	AVG			

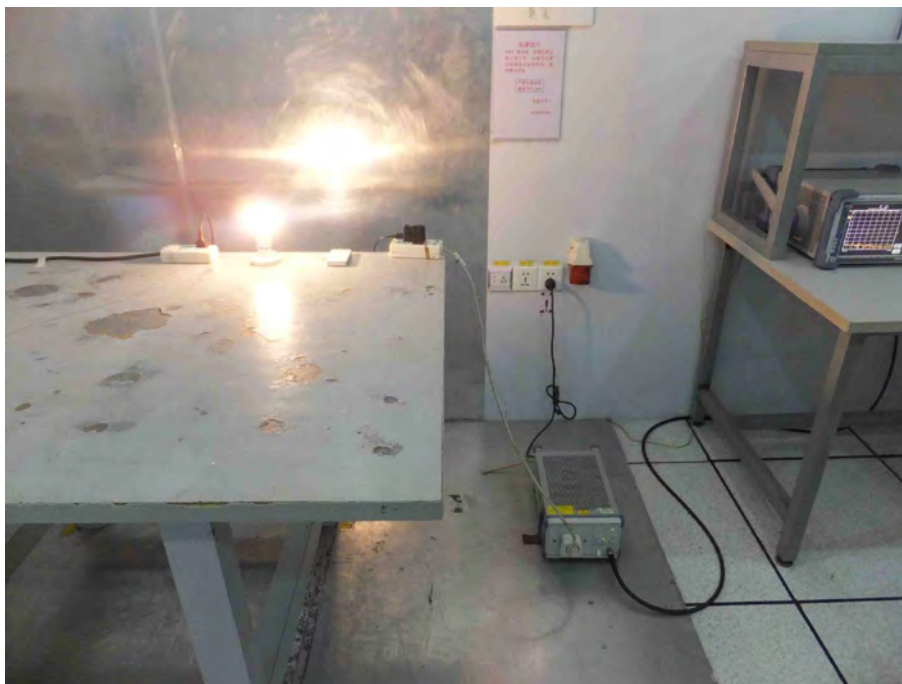
Job No.:	011410501E	Polarization:	Vertical
Standard:	(RE)FCC PART15 C_3m	Power Source:	AC 120V, 60Hz for adapter
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2462MHz)	Distance:	3m



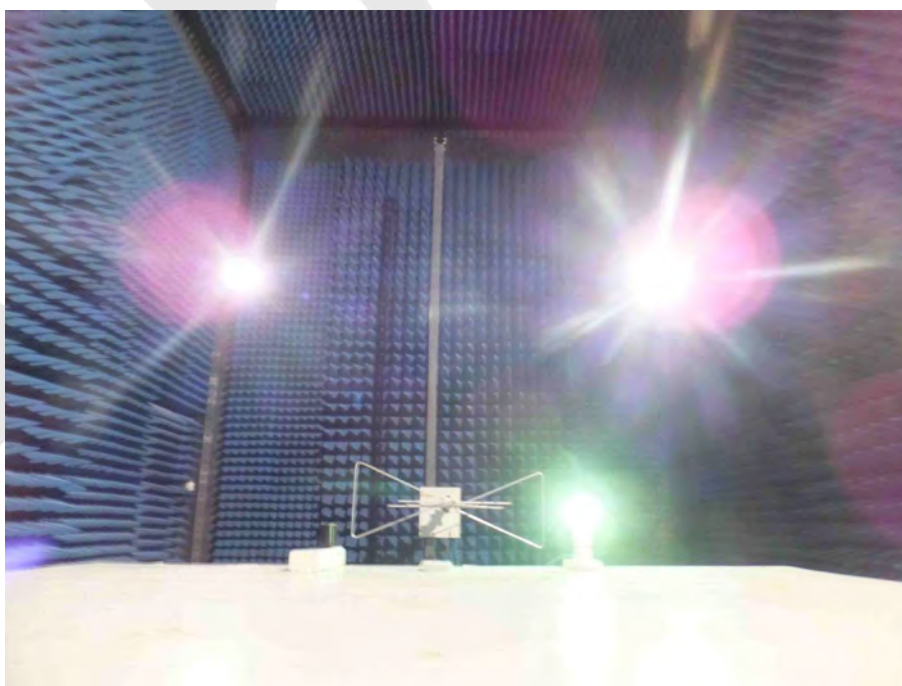
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4910.000	53.88	3.49	57.37	74.00	-16.63	peak			
2	4910.000	44.36	3.49	47.85	54.00	-6.15	AVG			
3	7375.000	43.89	8.63	52.52	74.00	-21.48	peak			
4	7375.000	34.25	8.63	42.88	54.00	-11.12	AVG			

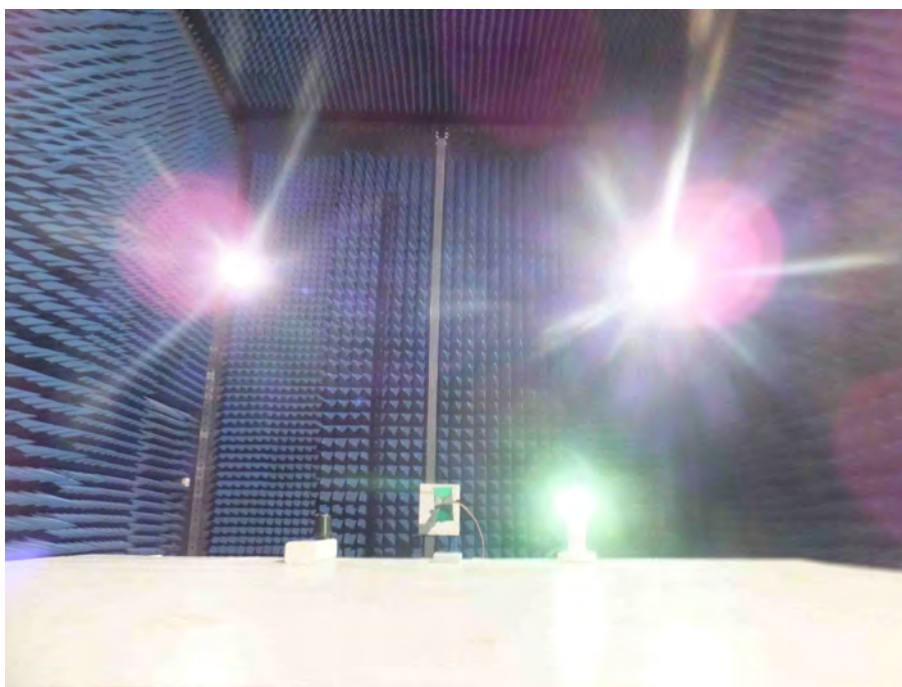
5. PHOTOGRAPH

5.1. Photo of Conducted Emission Measurement



5.2. Photo of Radiation Emission Test





APPENDIX I (EXTERNAL PHOTOS)

Figure 1
The EUT-Top View



Figure 2
The EUT- Bottom View



Figure 3
The EUT- Front View

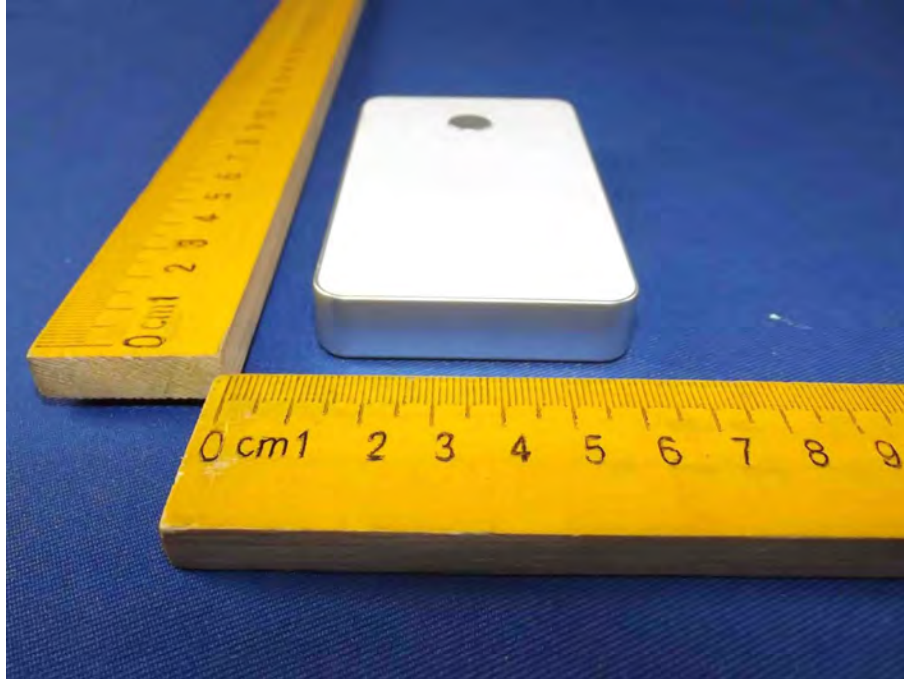


Figure 4
The EUT- Back View

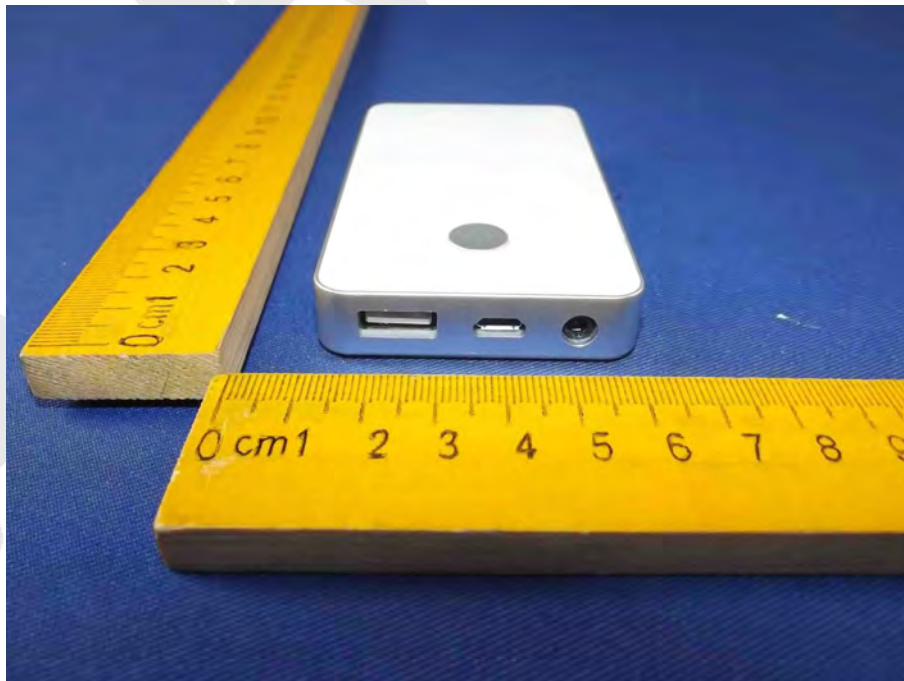


Figure 5
The EUT- Right View

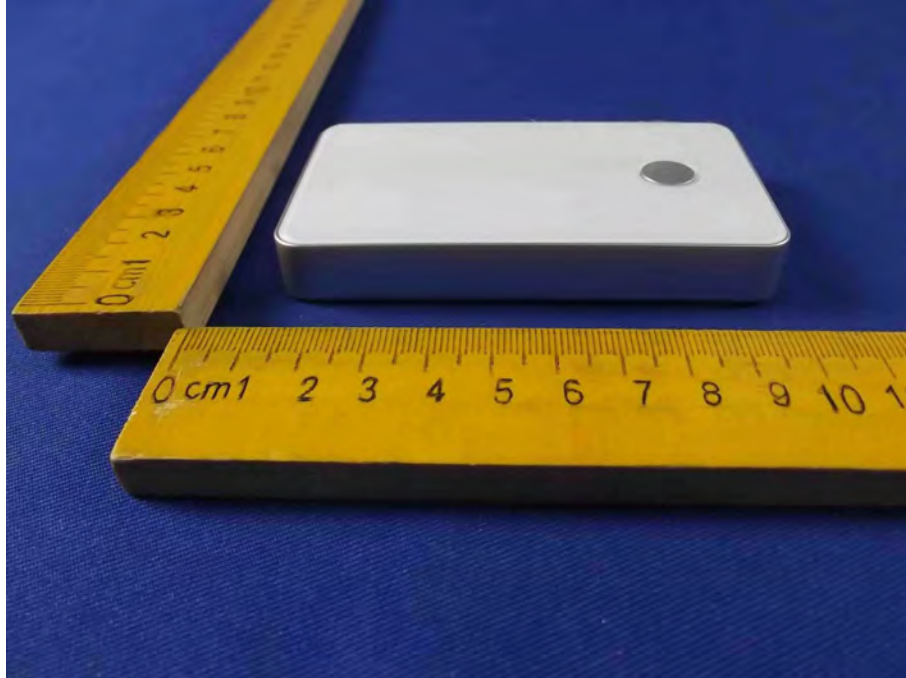


Figure 6
The EUT- Left View



APPENDIX II (INTERNAL PHOTOS)

Figure 7
The EUT-Inside View

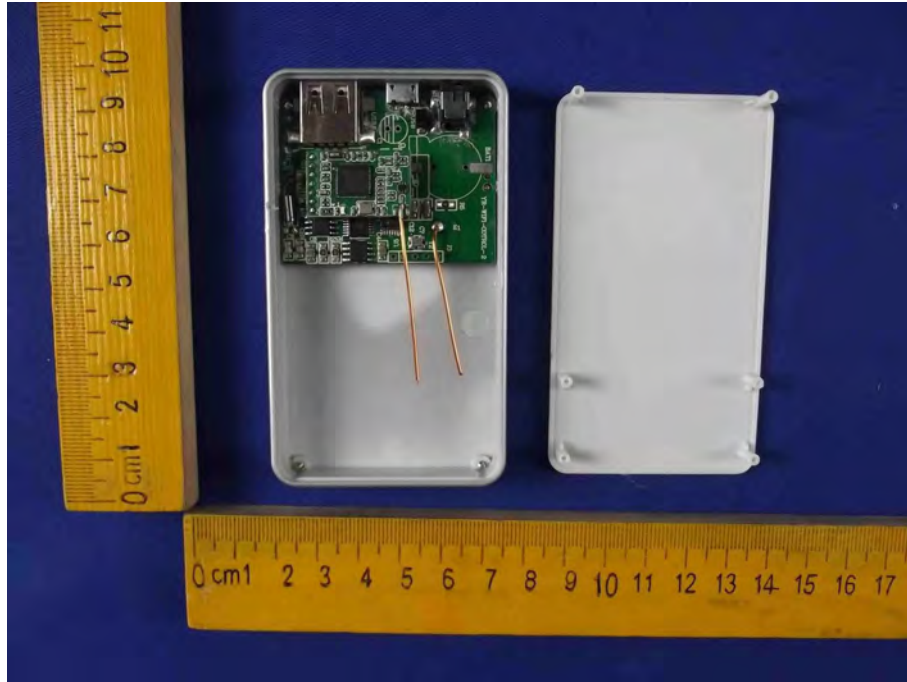


Figure 8
PCB of the EUT-Front View

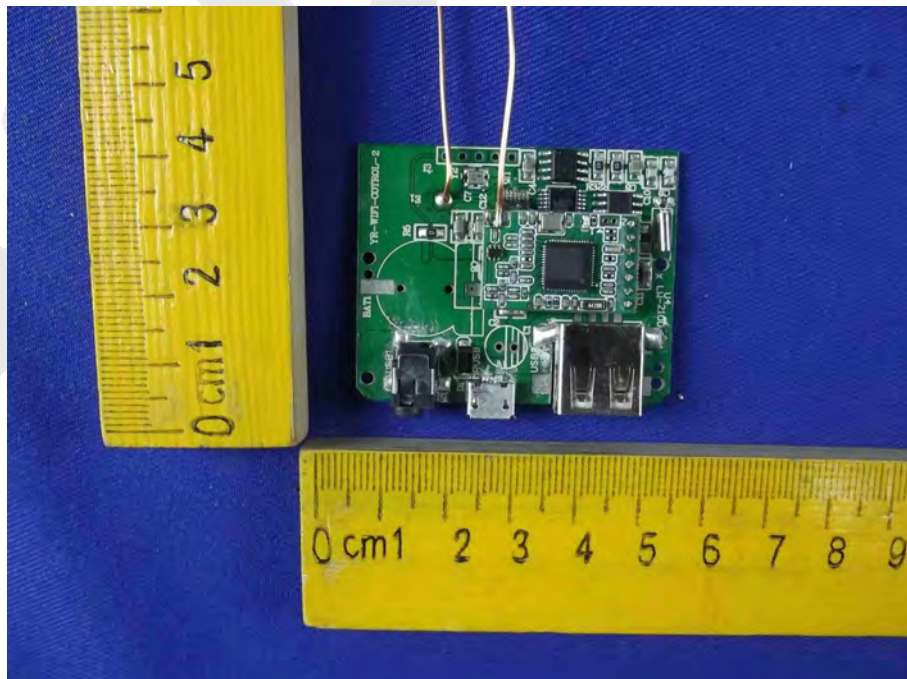


Figure 9
PCB of the EUT-Back View

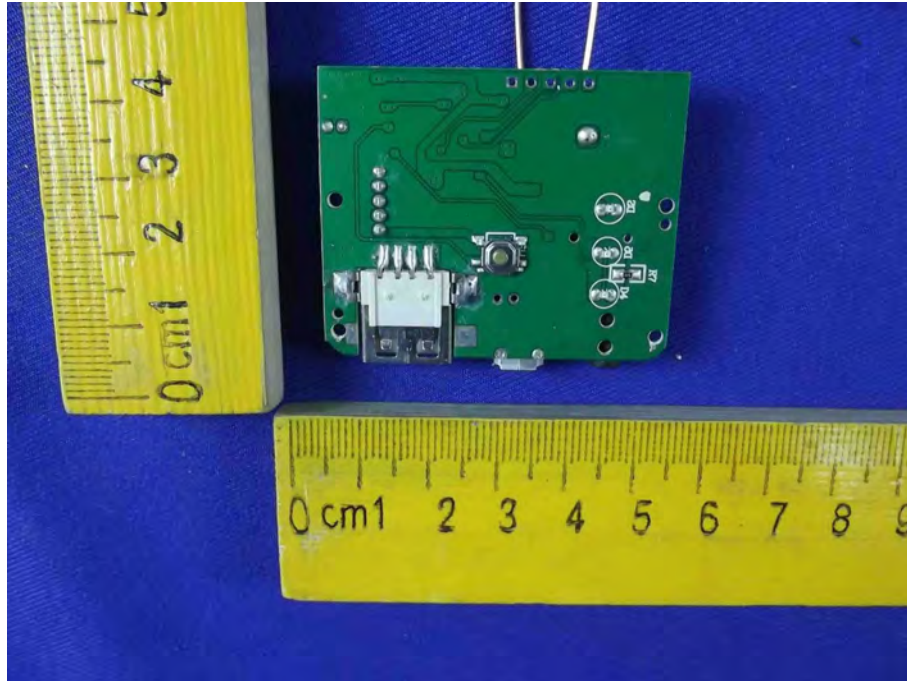


Figure 10
PCB of the EUT-Front View

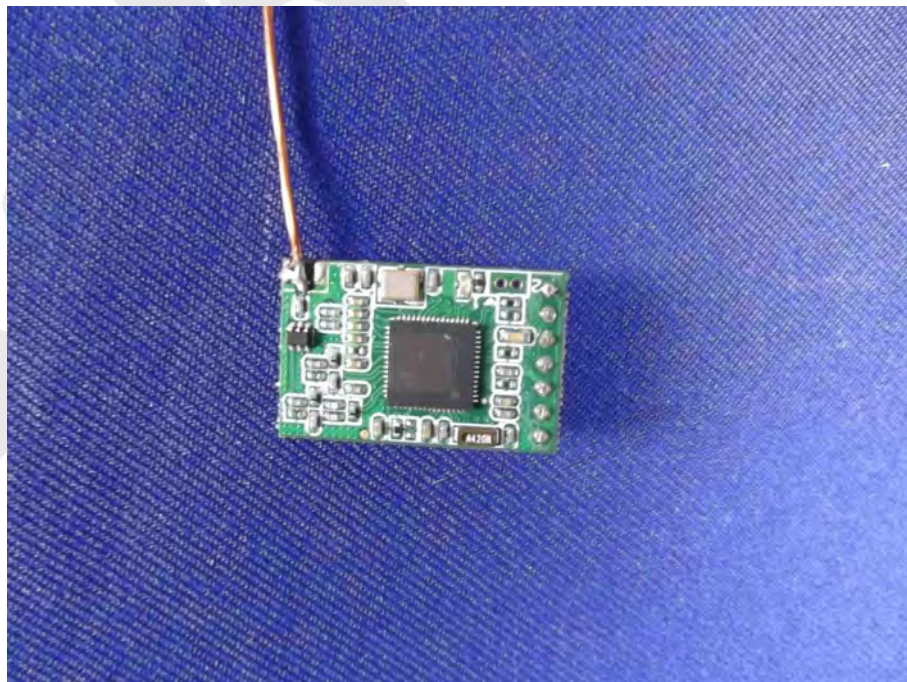


Figure 11
PCB of the EUT-Back View

