




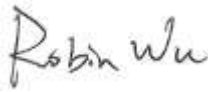
MEASUREMENT REPORT

FCC PART 15.247 WLAN 802.11b/g/n

FCC ID:	XHWMDB114
APPLICANT:	E-matic

Application Type: Certification
Product: MediaBeam
Brand Name: Ematic
Model No.: MDB114, MDB012
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15.247
Test Procedure(s): ANSI C63.10-2009, KDB 558074 D01v03r01
Test Date: January 04 ~ 07, 2014

Reviewed By : 
(Engineer: Sunny Sun)

Approved By : 
(Manager: Robin Wu)

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 D01v03r01. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

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Revision History

Report No.	Version	Description	Issue Date
1401RSU00401	Rev. 01	Initial report	01-21-2014

§2.1033 General Information

Applicant:	E-matic
Applicant Address:	3435 Ocean Park Blvd #107 PMB # 444 Santa Monica CA 90405
Manufacturer:	A-Unit Electronic Co., Ltd
Manufacturer Address:	Floor 2, Building 4, LangKou Industrial Park, Long Hua Town, Bao An District, Shenzhen City, China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT Registration No.:	809388
FCC Rule Part(s):	Part 15.247
Model Name:	MDB114, MDB012
FCC ID:	XHWMDB114
Test Device Serial No.:	N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering
FCC Classification:	Digital Transmission System (DTS)
Date(s) of Test:	January 04 ~ 07, 2014
Test Report S/N:	1401RSU00401

1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	MediaBeam
Brand Name	Ematic
Model No.	MDB114, MDB012
Frequency Range	2412 ~ 2462 MHz
Maximum Output Power	802.11b: 12.52dBm 802.11g: 11.02dBm 802.11n-HT20: 10.83dBm 802.11n-HT40: 11.42dBm
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM
Antenna Type	Internal
Peak Antenna Gain	2dBi

Note: They are only different marketing requirement.

Channel List for 802.11b/g/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	N/A	N/A

Channel List for 802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	N/A	N/A	N/A	N/A

2.2. Device Capabilities

This device contains the following capabilities:

802.11/b/g/n WLAN (DTS)

Note: 2.4GHz WLAN (DTS) operation is possible in 20MHz, and 40MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section 6.0 b) of KDB 558074 D01v03r01. The RBW and VBW were both greater than $50/T$, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

- 802.11b - 99.9%
- 802.11g/n 20MHz Bandwidth - 99.1%
- 802.11n 40MHz Bandwidth - 98.3%

2.3. Test Configuration

The MediaBeam FCC ID: XHWMDB114 was tested per the guidance of KDB 558074 D01v03r01. ANSI C63.10-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.4. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.5. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.

However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(a)(5).

Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009), and the guidance provided in KDB 558074 D01v03r01 were used in the measurement of the **MediaBeam FCC ID: XHWMDB114**.

Deviation from measurement procedure.....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.9.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB BeamWidth of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The antenna of the MediaBeam is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The **MediaBeam FCC ID: XHWMDB114** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATA

AC Conducted Emissions Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	2014/11/08
Two-Line V-Network	R&S	ENV216	101683	2014/11/08
Two-Line V-Network	R&S	ENV216	101684	2014/11/08
Temperature/ Meter Humidity	Anymetre	TH101B	SR2-01	2014/11/15

Radiated Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4447A	MY45300136	2014/11/08
Preamplifier	MRT	AP01G18	1310002	2014/12/14
Preamplifier	MRT	AP18G40	1310003	2014/10/07
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	2014/11/24
Bilog Period Antenna	Schwarzbeck	VULB9162	9162-047	2014/11/24
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	2014/11/24
Horn Antenna	Schwarzbeck	BBHA9170	9170-549	2014/12/11
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	2014/11/15

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
Spectrum Analyzer	Agilent	E4447A	MY45300136	2014/11/08
Power Meter	Agilent	U2021XA	MY52450003	2014/12/14
Temperature/Humidity Meter	Anymetre	TH101B	TR3-01	2014/11/15

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 150kHz~30MHz: $\pm 3.46\text{dB}$
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz ~ 1GHz: $\pm 4.2\text{dB}$ 1GHz ~ 40GHz: $\pm 4.8\text{dB}$

7. TEST RESULT

7.1. Summary

Company Name: E-matic
FCC ID: XHWMDB114
FCC Classification: Digital Transmission System (DTS)
Data Rate(s) Tested: 1Mbps ~ 11Mbps (b);
6Mbps ~ 54Mbps (g);
6.5/7.2Mbps ~ 65/72.2Mbps (n – HT20);
13.5/15Mbps ~ 135/150Mbps (n – HT40)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	$\geq 500\text{kHz}$	Conducted	Pass	Section 7.2
15.247(b)(3)	Output Power	$\leq 1\text{Watt}$		Pass	Section 7.3
15.247(e)	Power Spectral Density	$\leq 8\text{dBm} / 3\text{kHz Band}$		Pass	Section 7.4
15.247(d)	Band Edge / Out-of-Band Emissions	$\geq 20\text{dBc(Peak)}$		Pass	Section 7.5 & 7.6
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.7 & 7.8
15.207	AC Conducted Emissions 150kHz - 30MHz	$< \text{FCC 15.207 limits}$	Line Conducted	Pass	Section 7.9

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. 6dB Bandwidth Measurement

7.2.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

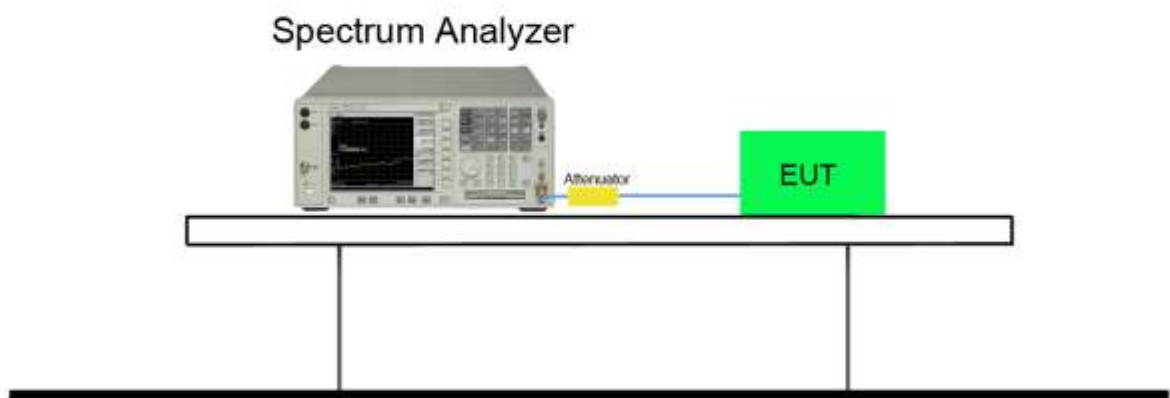
7.2.2. Test Procedure used

KDB 558074 D01v03r01 – Section 8.2 Option 2

7.2.3. Test Setting

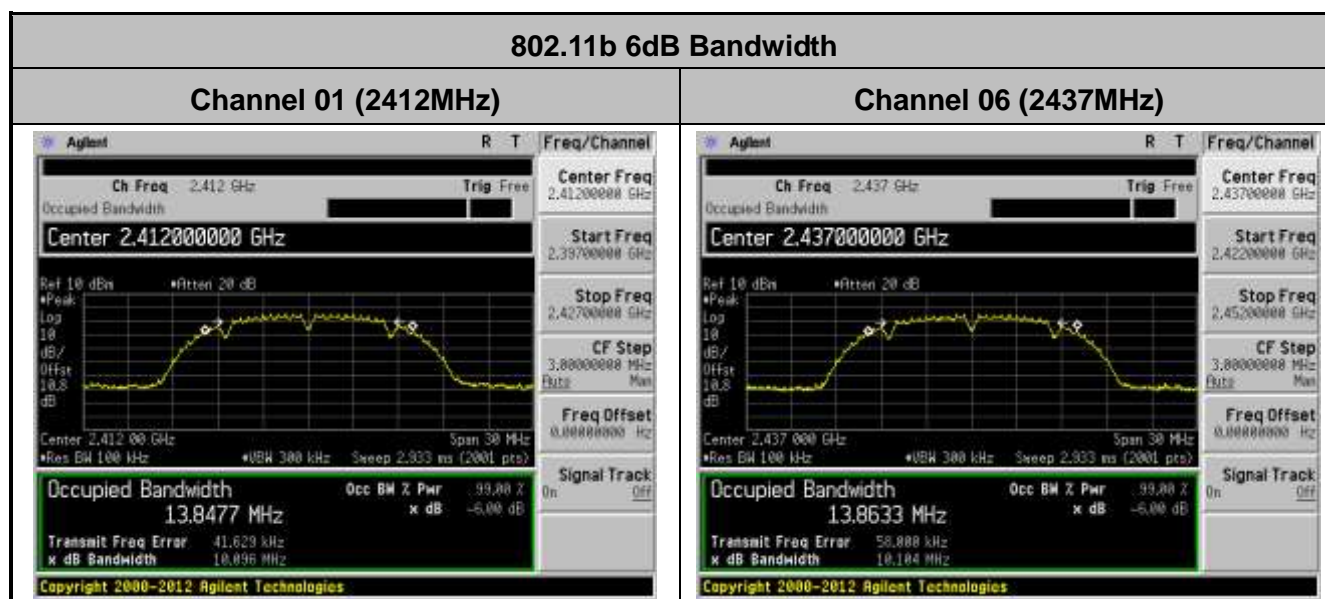
1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to $X = 6$. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize

7.2.4. Test Setup

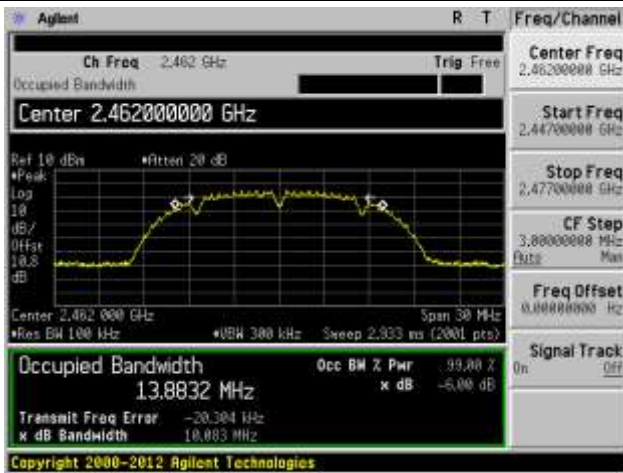


7.2.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11b	1	01	2412	10.10	≥0.5	Pass
802.11b	1	06	2437	10.10	≥0.5	Pass
802.11b	1	11	2462	10.08	≥0.5	Pass
802.11g	6	01	2412	16.35	≥0.5	Pass
802.11g	6	06	2437	16.35	≥0.5	Pass
802.11g	6	11	2462	16.40	≥0.5	Pass
802.11n-HT20	6.5/7.2	01	2412	17.56	≥0.5	Pass
802.11n-HT20	6.5/7.2	06	2437	17.34	≥0.5	Pass
802.11n-HT20	6.5/7.2	11	2462	17.59	≥0.5	Pass
802.11n-HT40	13.5/15	03	2422	36.11	≥0.5	Pass
802.11n-HT40	13.5/15	06	2437	36.14	≥0.5	Pass
802.11n-HT40	13.5/15	09	2452	36.37	≥0.5	Pass

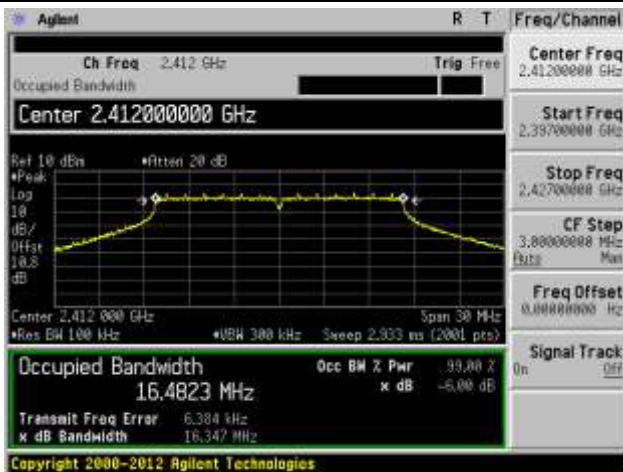


Channel 11 (2462MHz)



802.11g 6dB Bandwidth

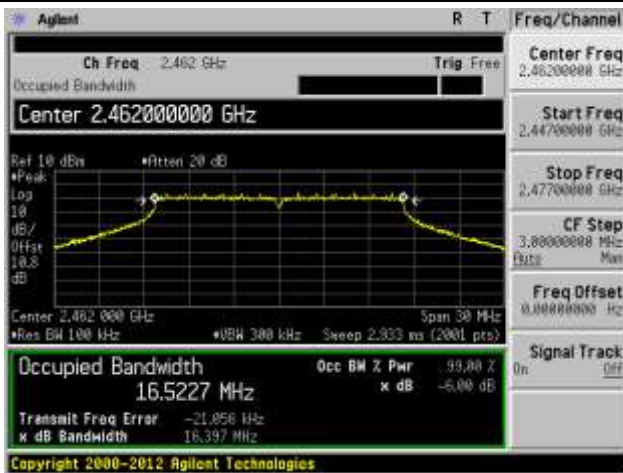
Channel 01 (2412MHz)

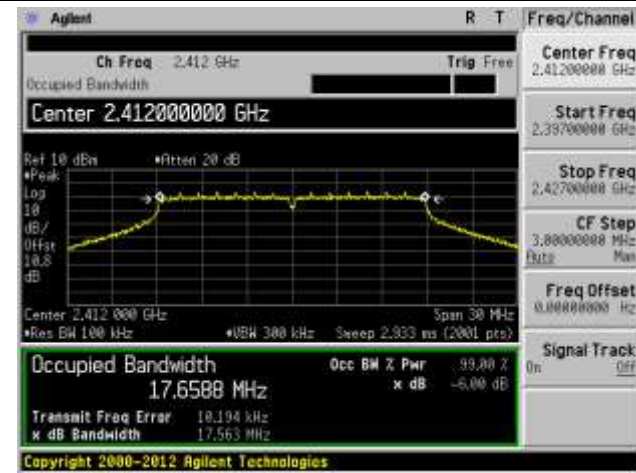
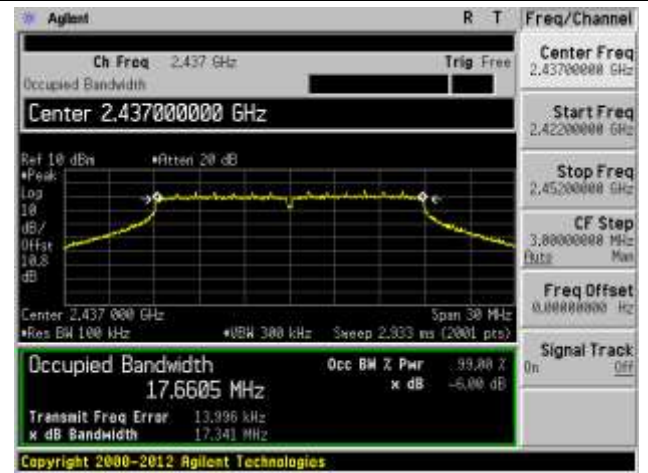
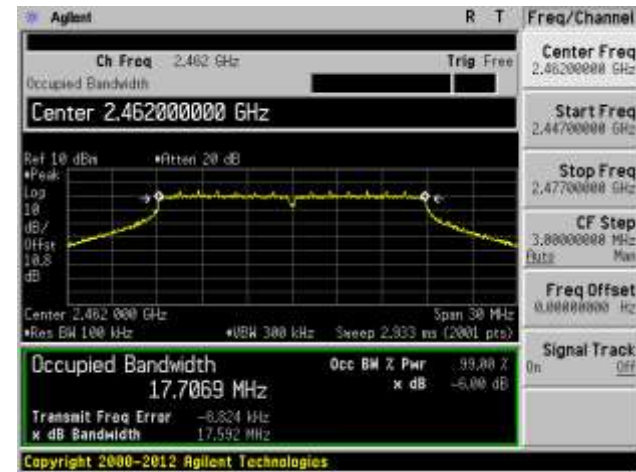
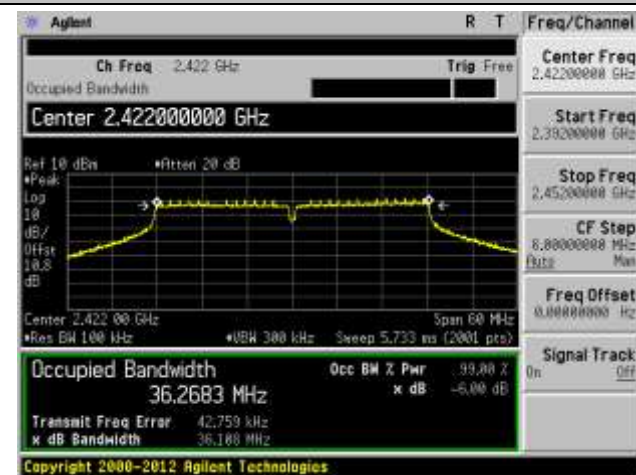
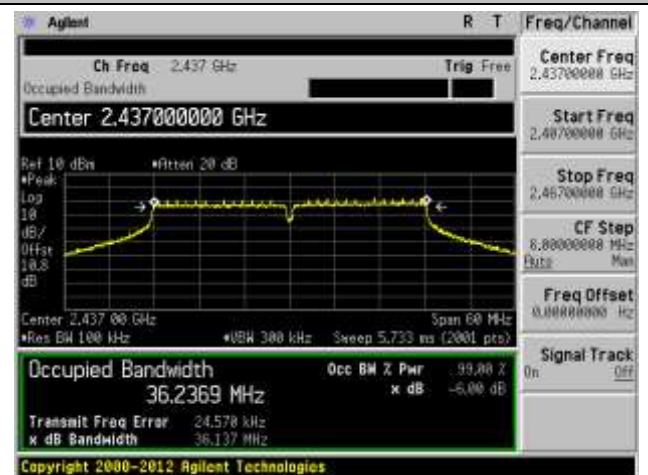


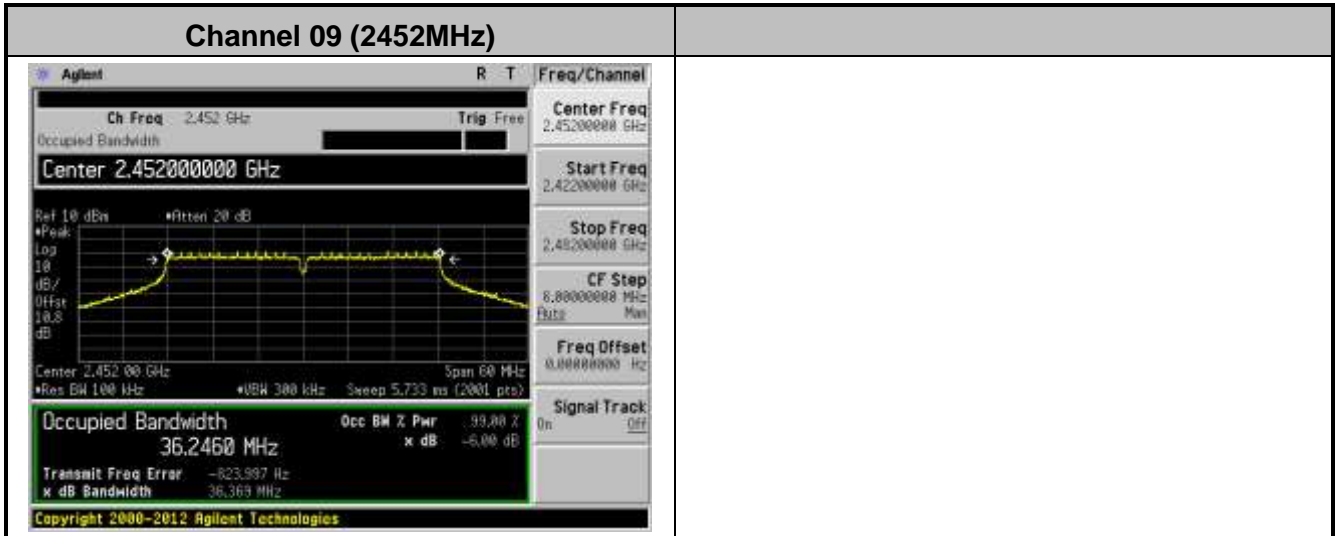
Channel 06 (2437MHz)



Channel 11 (2462MHz)



802.11n-HT20 6dB Bandwidth
Channel 01 (2412MHz)

Channel 06 (2437MHz)

Channel 11 (2462MHz)

802.11n-HT40 6dB Bandwidth
Channel 03 (2422MHz)

Channel 06 (2437MHz)




7.3. Output Power Measurement

7.3.1. Test Limit

The maximum out power shall be less 1 Watt (30dBm).

7.3.2. Test Procedure Used

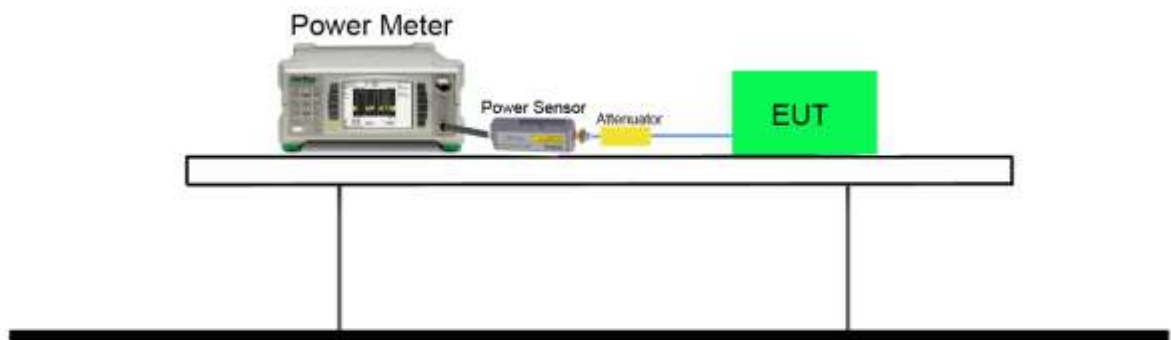
KDB 558074 D01v03r01 - Section 9.1.3 PKPM1 Peak Power Method (for signals with BW \leq 50MHz)

7.3.3. Test Setting

Method PKPM1 (Peak Power Measurement of Signals with DTS BW \leq 50MHz)

Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

7.3.4. Test Setup



7.3.5. Test Result of Output Power

Output power at various data rates:

Test Mode	Bandwidth	Frequency (MHz)	Channel	Data Rate (Mbps)	Peak Power (dBm)
802.11b	20	2437	6	1	12.52
				5.5	11.21
				11	10.78
802.11g	20	2437	6	6	11.02
				24	10.89
				54	10.04
802.11n	20	2437	6	6.5/7.2(MCS0)	10.83
				39/43.3(MCS4)	9.14
				65/72.2(MCS7)	8.67
802.11n	40	2437	6	13.5/15(MCS0)	11.42
				81/90(MCS4)	10.25
				135/150(MCS7)	9.92

Test Result of Peak Output Power

Test Mode	N _{Tx}	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
11b	1	1	1	2412	11.68	≤30	Pass
11b	1	1	6	2437	12.52	≤30	Pass
11b	1	1	11	2462	11.32	≤30	Pass
11g	1	6	1	2412	10.21	≤30	Pass
11g	1	6	6	2437	11.02	≤30	Pass
11g	1	6	11	2462	10.06	≤30	Pass
11n-HT20	1	6.5/7.2	1	2412	10.31	≤30	Pass
11n-HT20	1	6.5/7.2	6	2437	10.83	≤30	Pass
11n-HT20	1	6.5/7.2	11	2462	10.52	≤30	Pass
11n-HT40	1	13.5/15	3	2422	10.02	≤30	Pass
11n-HT40	1	13.5/15	6	2437	11.42	≤30	Pass
11n-HT40	1	13.5/15	9	2452	10.37	≤30	Pass

Test Result of Average Output Power (Reporting Only)

Test Mode	N _{Tx}	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
11b	1	1	1	2412	8.68	≤30	Pass
11b	1	1	6	2437	9.66	≤30	Pass
11b	1	1	11	2462	8.63	≤30	Pass
11g	1	6	1	2412	8.33	≤30	Pass
11g	1	6	6	2437	9.45	≤30	Pass
11g	1	6	11	2462	8.27	≤30	Pass
11n-HT20	1	6.5/7.2	1	2412	8.42	≤30	Pass
11n-HT20	1	6.5/7.2	6	2437	9.51	≤30	Pass
11n-HT20	1	6.5/7.2	11	2462	8.54	≤30	Pass
11n-HT40	1	13.5/15	3	2422	8.15	≤30	Pass
11n-HT40	1	13.5/15	6	2437	9.16	≤30	Pass
11n-HT40	1	13.5/15	9	2452	8.23	≤30	Pass

7.4. Power Spectral Density Measurement

7.4.1. Test Limit

The maximum permissible power spectral density is 8 dBm in any 3 kHz band.

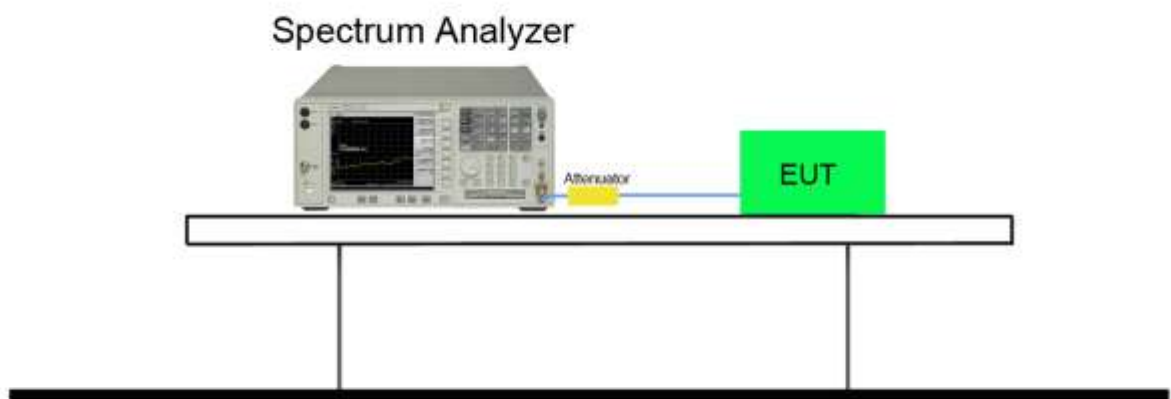
7.4.2. Test Procedure Used

KDB 558074 D01v03r01 - Section 10.2 Method PKPSD

7.4.3. Test Setting

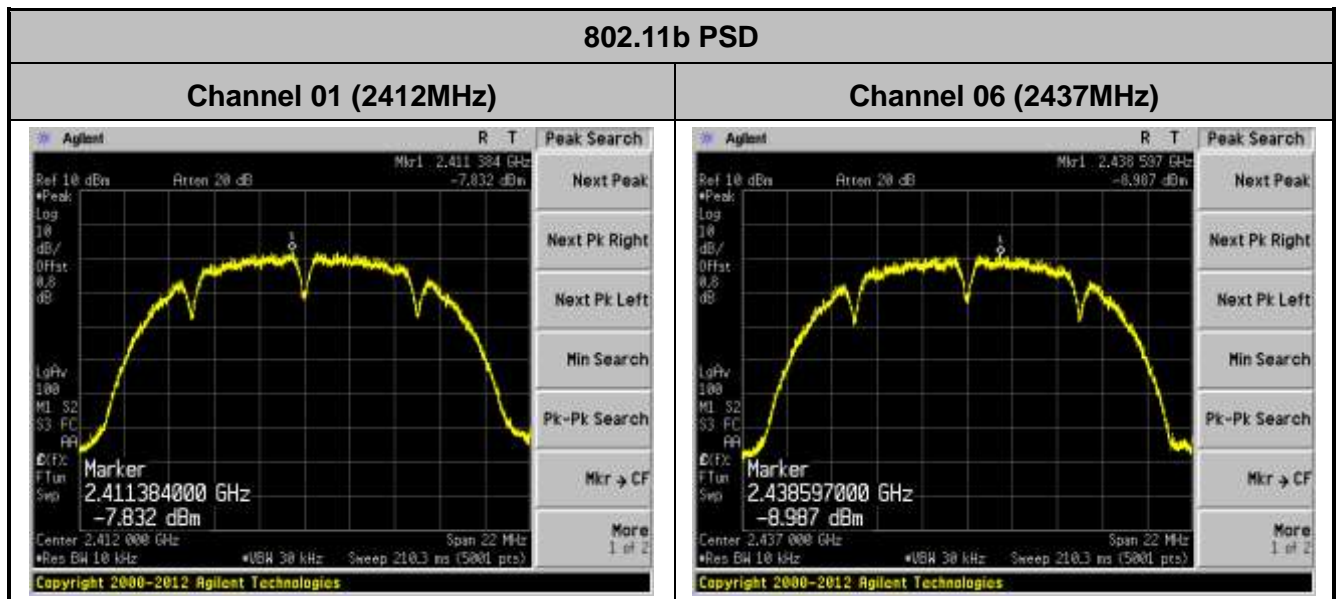
1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 10kHz
4. VBW = 30kHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

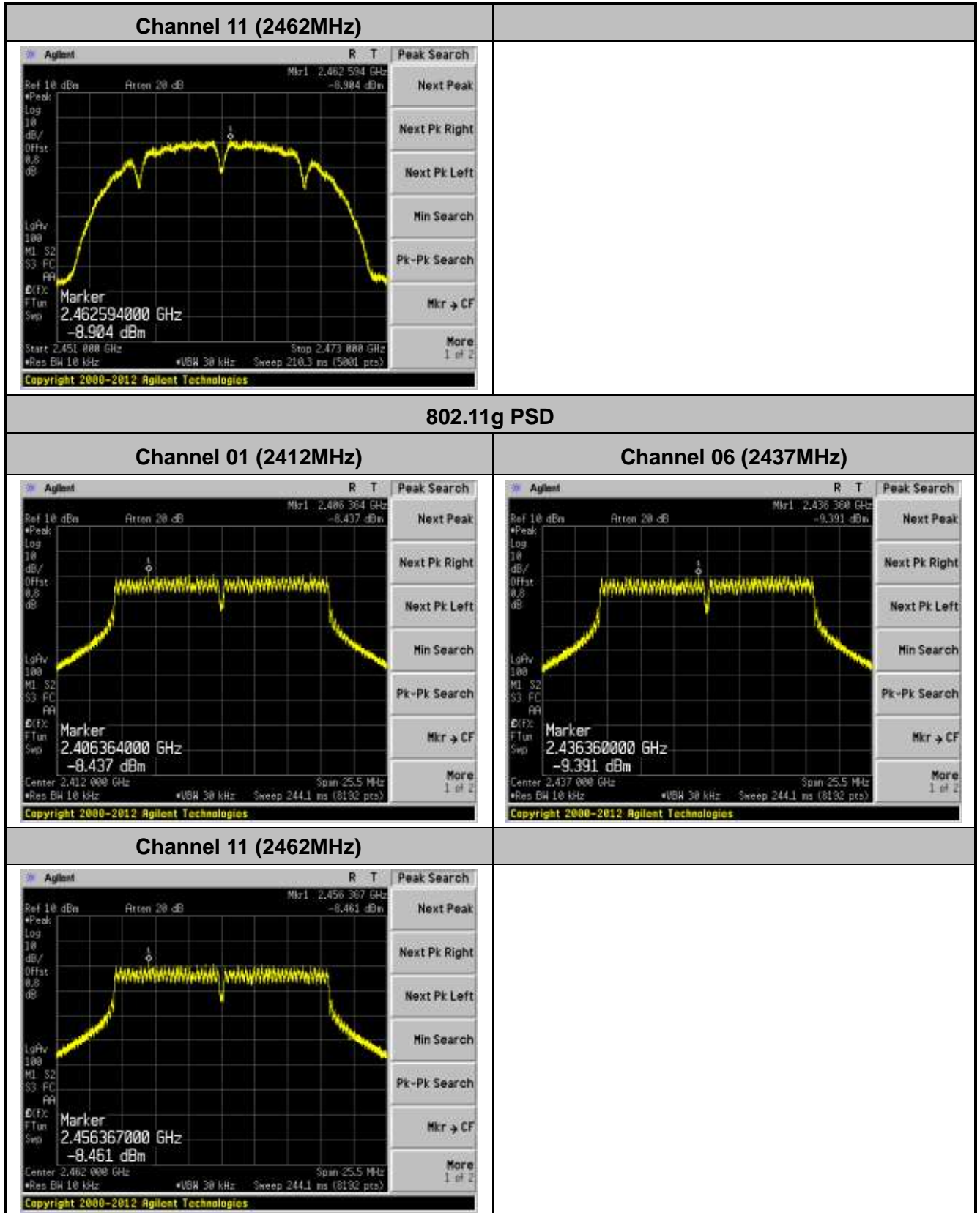
7.4.4. Test Setup

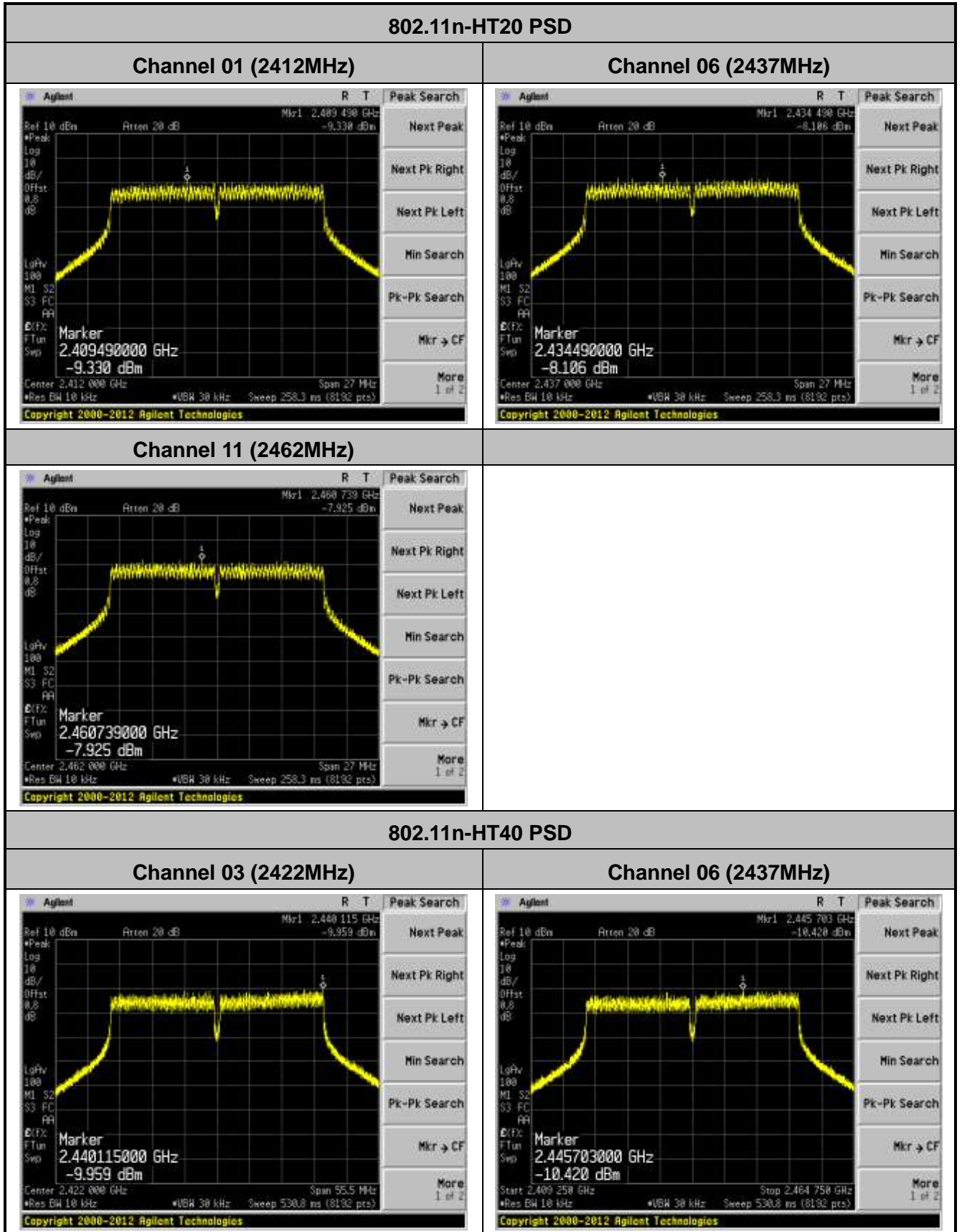


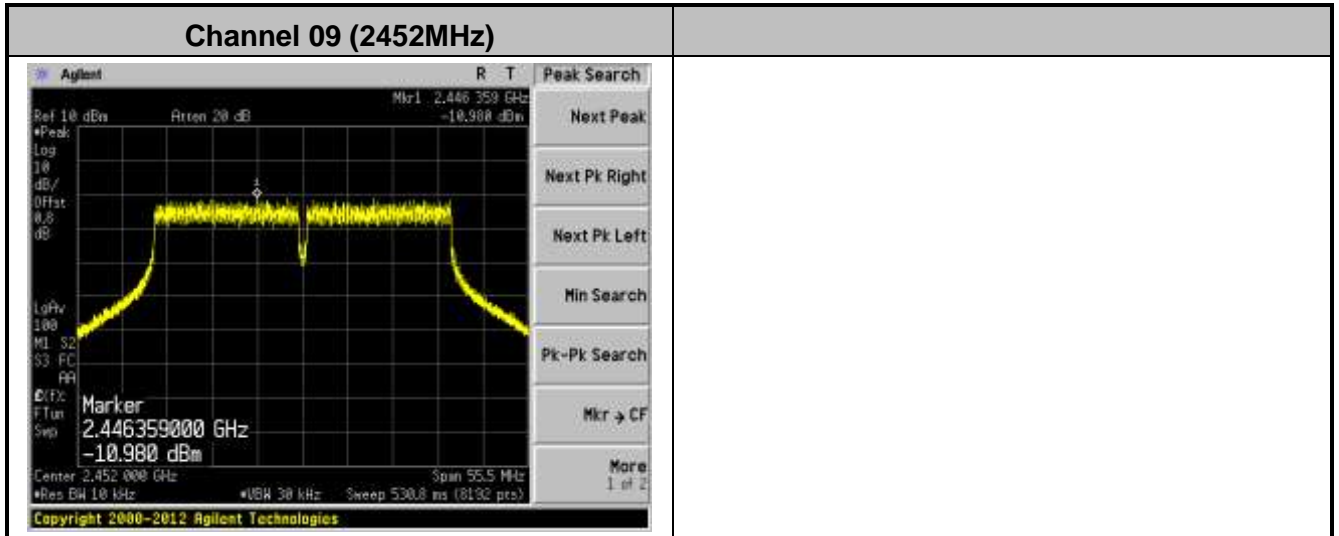
7.4.5. Test Result

Test Mode	N _{Tx}	Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD Result (dBm)	Limit (dBm / 3kHz)	Result
11b	1	1	1	2412	-7.832	≤8	Pass
11b	1	1	6	2437	-8.987	≤8	Pass
11b	1	1	11	2462	-8.904	≤8	Pass
11g	1	6	1	2412	-8.437	≤8	Pass
11g	1	6	6	2437	-9.391	≤8	Pass
11g	1	6	11	2462	-8.461	≤8	Pass
11n-HT20	1	6.5/7.2	1	2412	-9.330	≤8	Pass
11n-HT20	1	6.5/7.2	6	2437	-8.106	≤8	Pass
11n-HT20	1	6.5/7.2	11	2462	-7.925	≤8	Pass
11n-HT40	1	13.5/15	3	2422	-9.959	≤8	Pass
11n-HT40	1	13.5/15	6	2437	-10.420	≤8	Pass
11n-HT40	1	13.5/15	9	2452	-10.980	≤8	Pass









7.5. Conducted Band Edge and Out-of-Band Emissions

7.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure (Section 9.1).

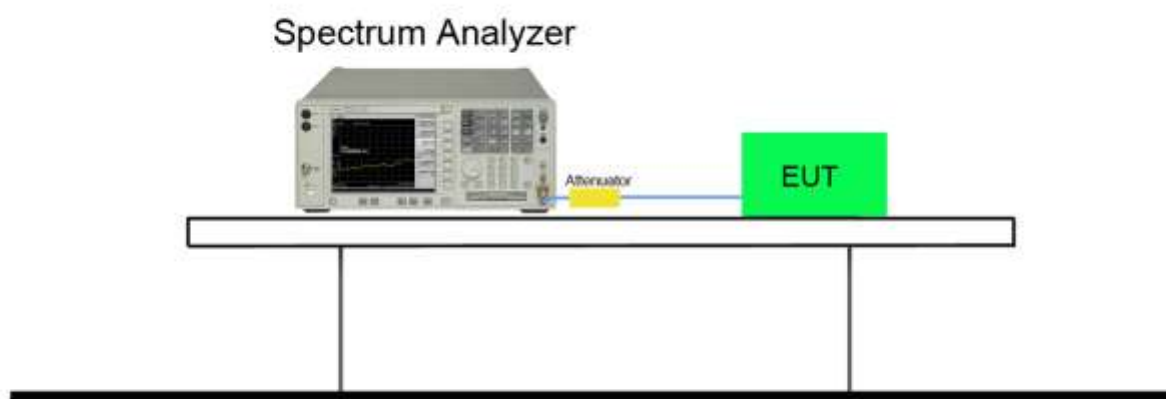
7.5.2. Test Procedure Used

KDB 558074 D01v03r01 – Section 11.3

7.5.3. Test Setting

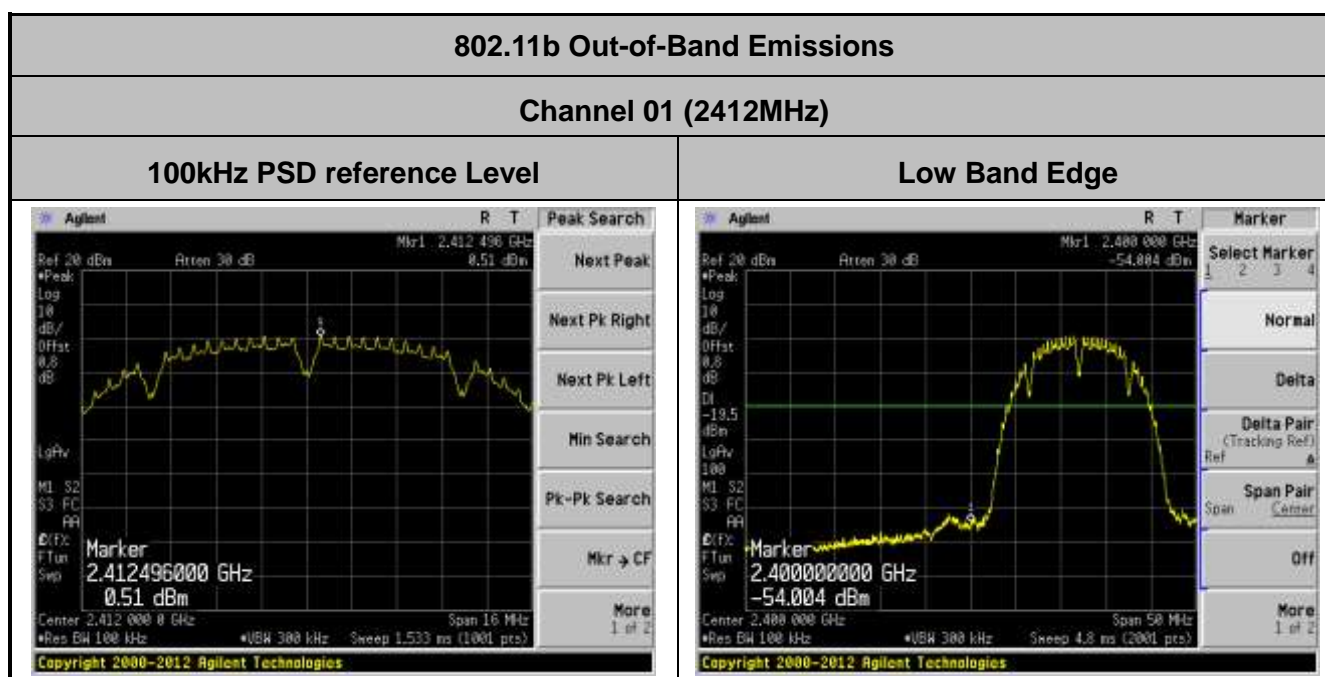
1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Number of sweep points $\geq 2 \times \text{Span/RBW}$
6. Trace mode = max hold
7. Sweep time = auto couple
8. The trace was allowed to stabilize

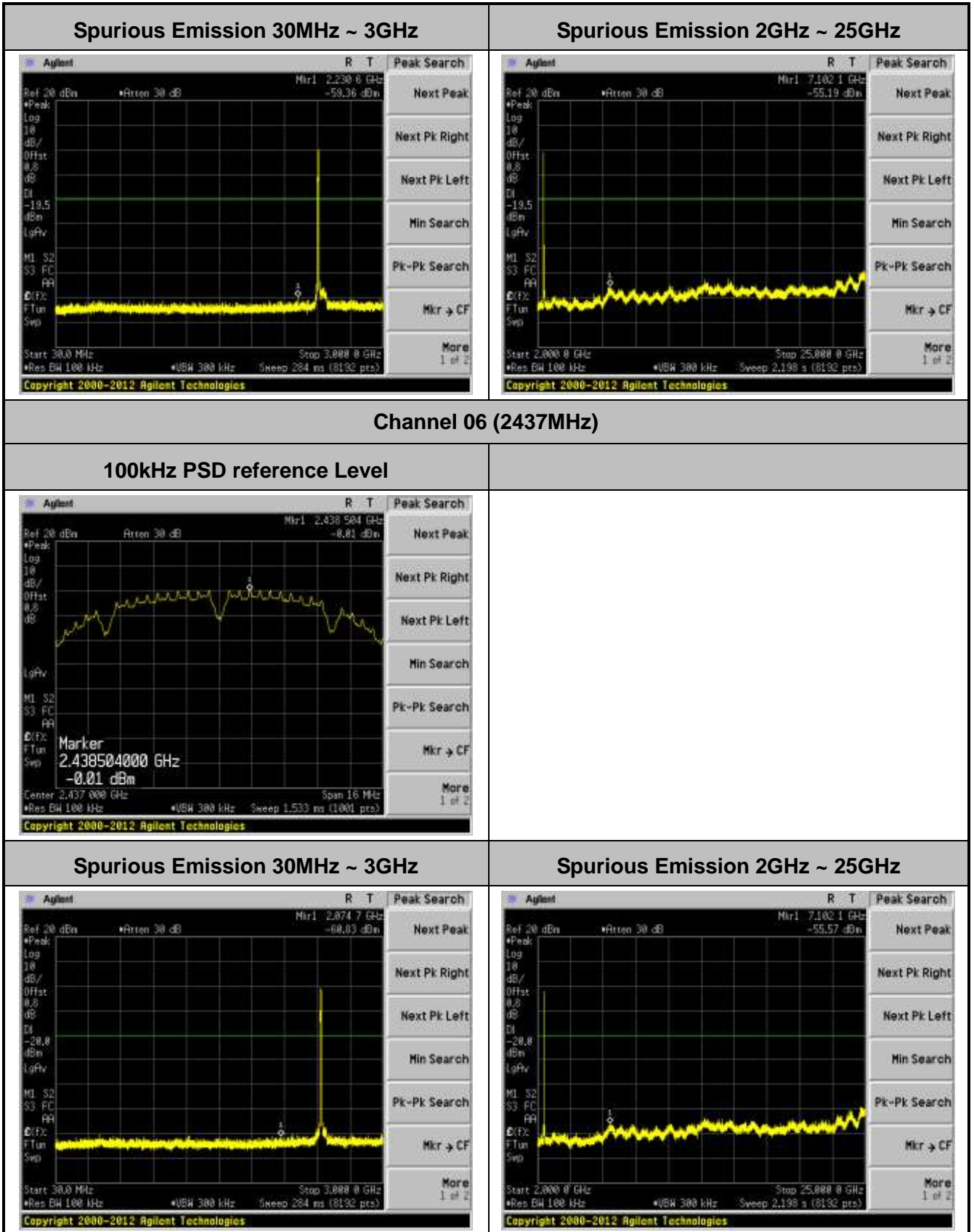
7.5.4. Test Setup

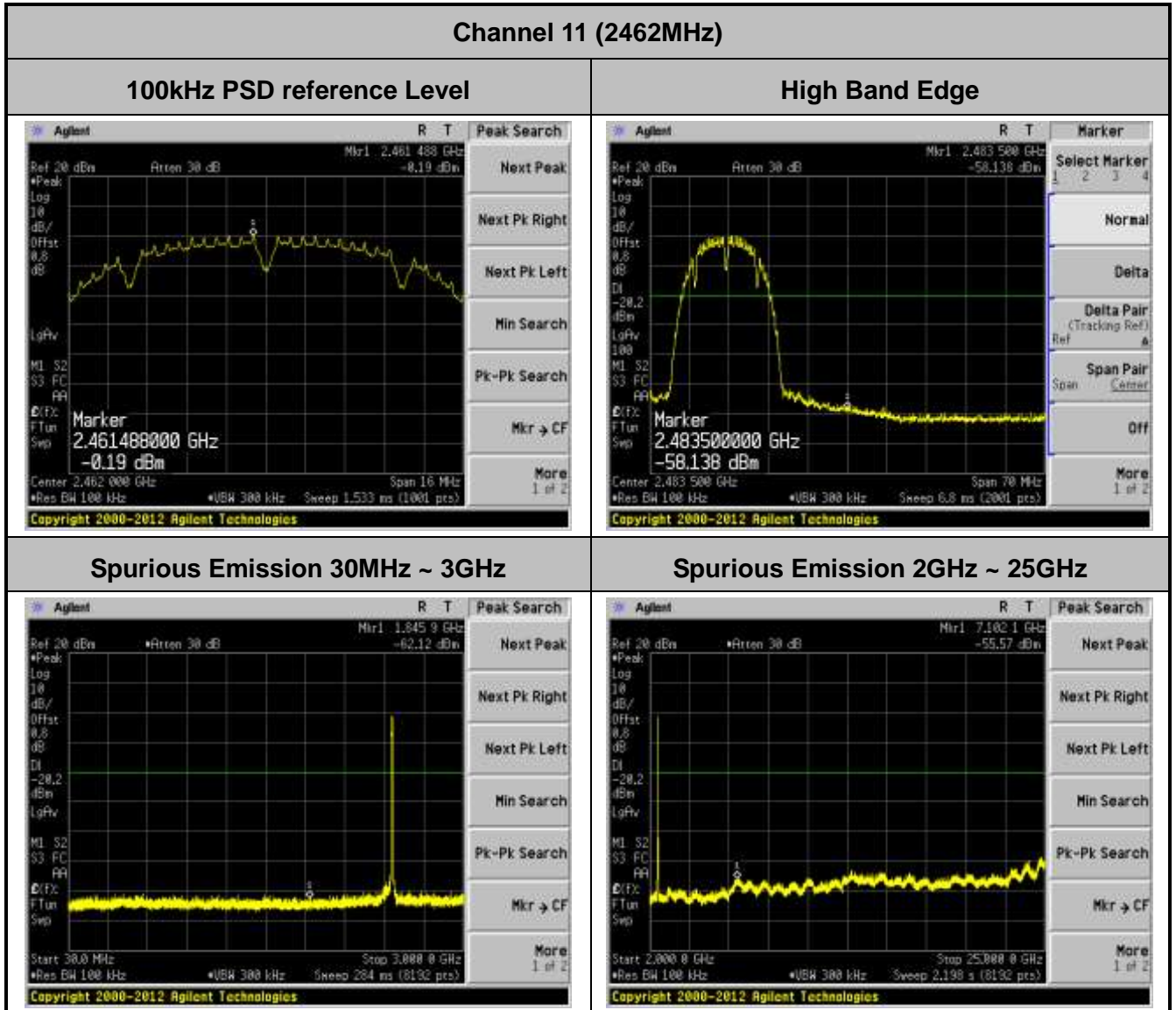


7.5.5. Test Result

Test Mode	N _{Tx}	Data Rate	Channel No.	Frequency (MHz)	Limit	Result
802.11b	1	1Mbps	01	2412	20dBc	Pass
802.11b	1	1Mbps	06	2437	20dBc	Pass
802.11b	1	1Mbps	11	2462	20dBc	Pass
802.11g	1	6Mbps	01	2412	20dBc	Pass
802.11g	1	6Mbps	06	2437	20dBc	Pass
802.11g	1	6Mbps	11	2462	20dBc	Pass
802.11n-HT20	1	6.5/7.2Mbps	01	2412	20dBc	Pass
802.11n-HT20	1	6.5/7.2Mbps	06	2437	20dBc	Pass
802.11n-HT20	1	6.5/7.2Mbps	11	2462	20dBc	Pass
802.11n-HT40	1	13.5/15Mbps	03	2422	20dBc	Pass
802.11n-HT40	1	13.5/15Mbps	06	2437	20dBc	Pass
802.11n-HT40	1	13.5/15Mbps	09	2452	20dBc	Pass



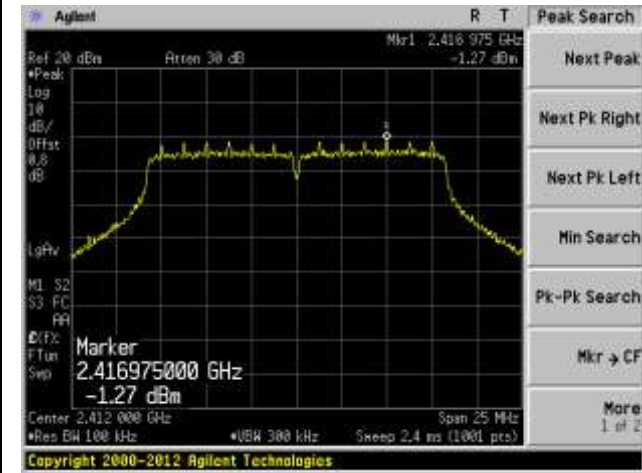




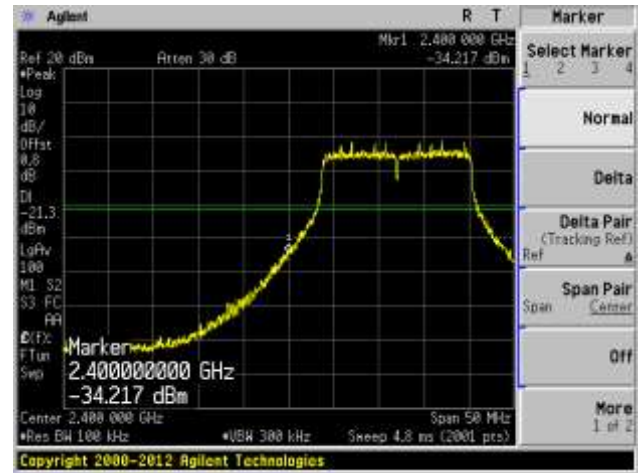
802.11g Out-of-Band Emissions

Channel 01 (2412MHz)

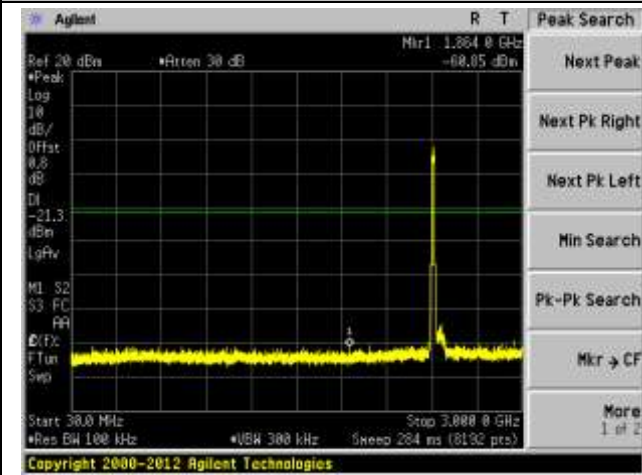
100kHz PSD reference Level



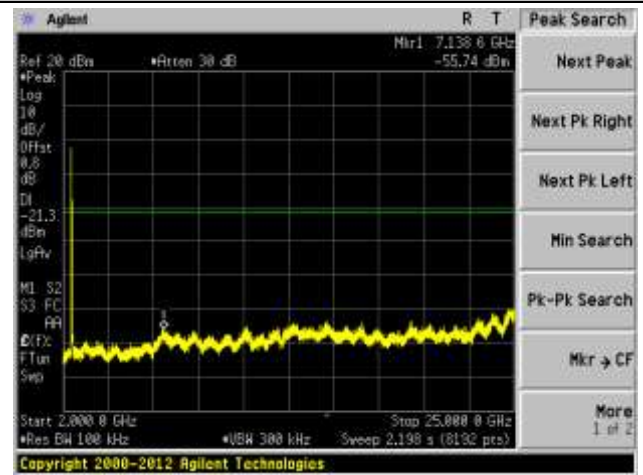
Low Band Edge



Spurious Emission 30MHz ~ 3GHz

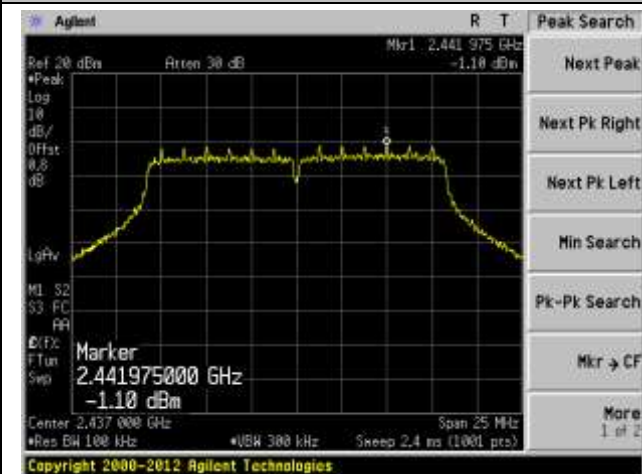


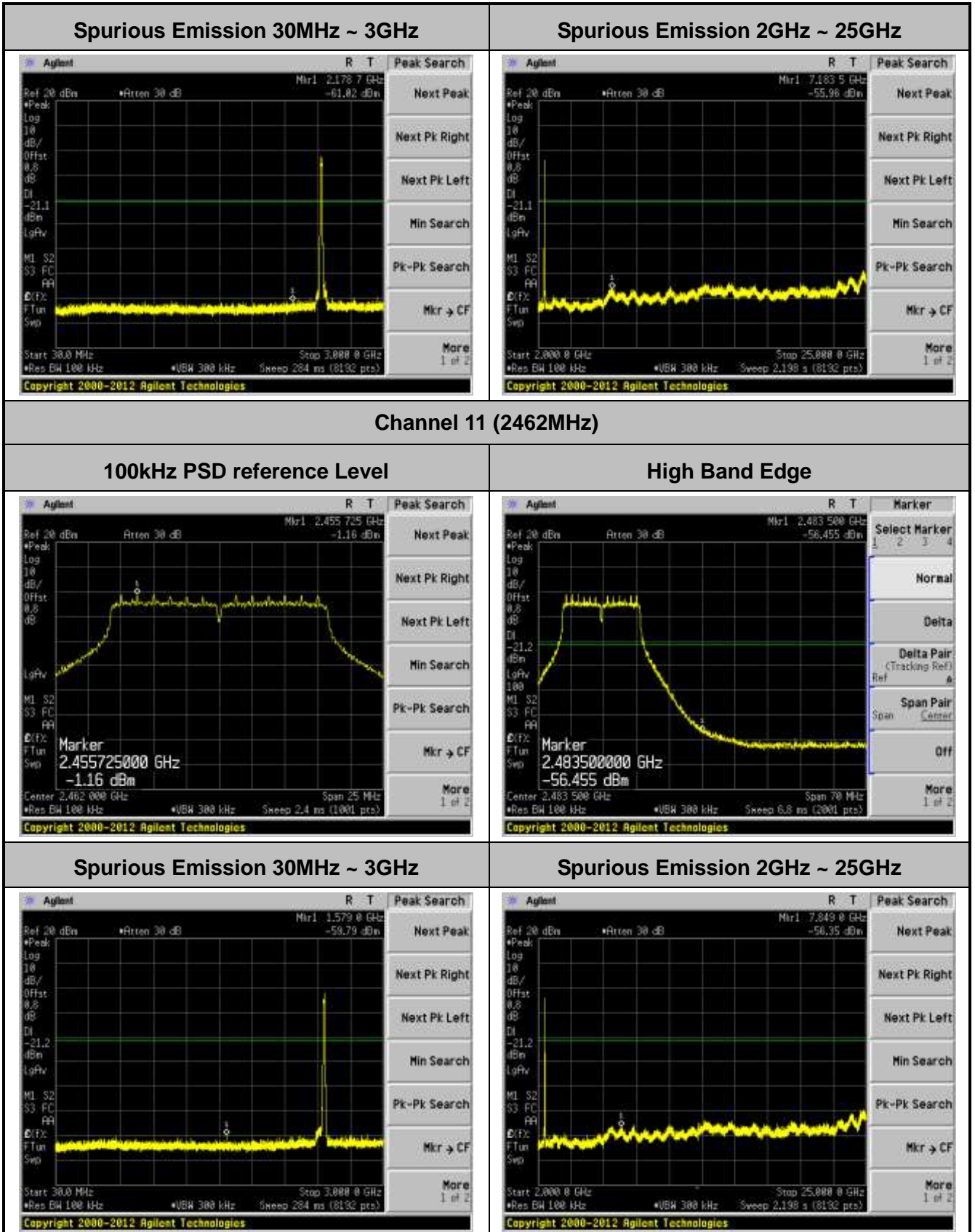
Spurious Emission 2GHz ~ 25GHz



Channel 06 (2437MHz)

100kHz PSD reference Level

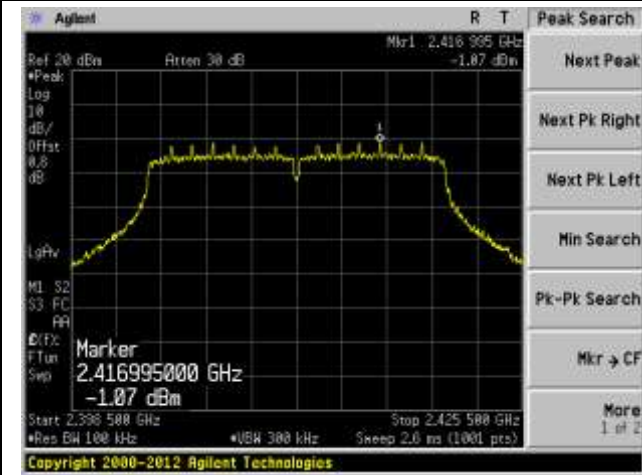




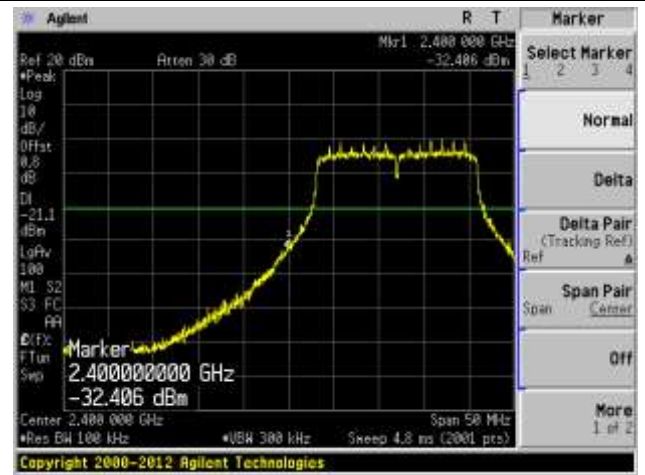
802.11n-HT20 Out-of-Band Emissions

Channel 01 (2412MHz)

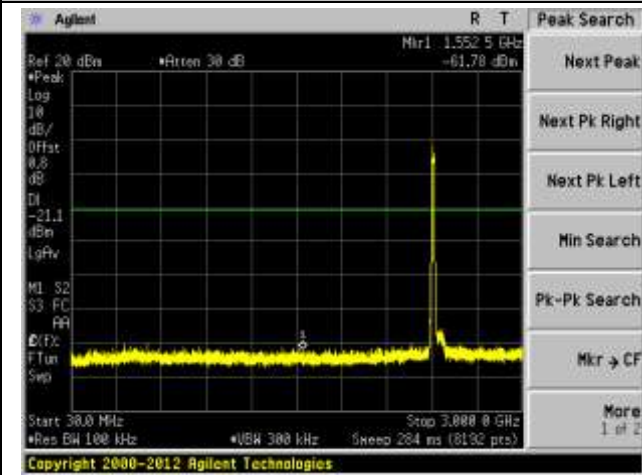
100kHz PSD reference Level



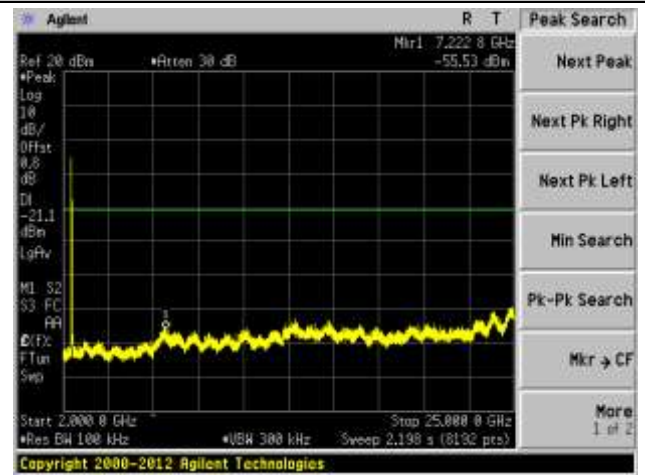
Low Band Edge



Spurious Emission 30MHz ~ 3GHz

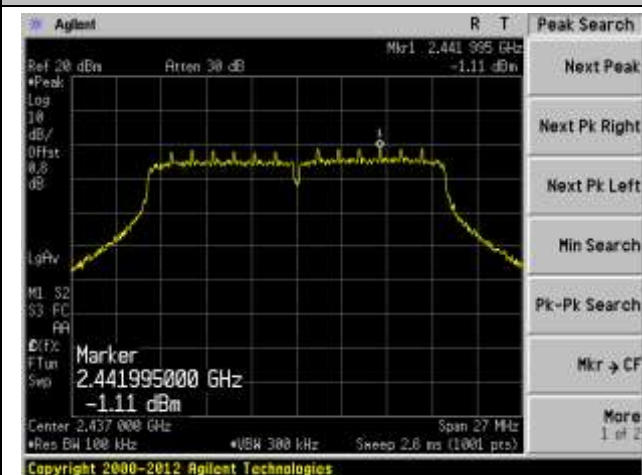


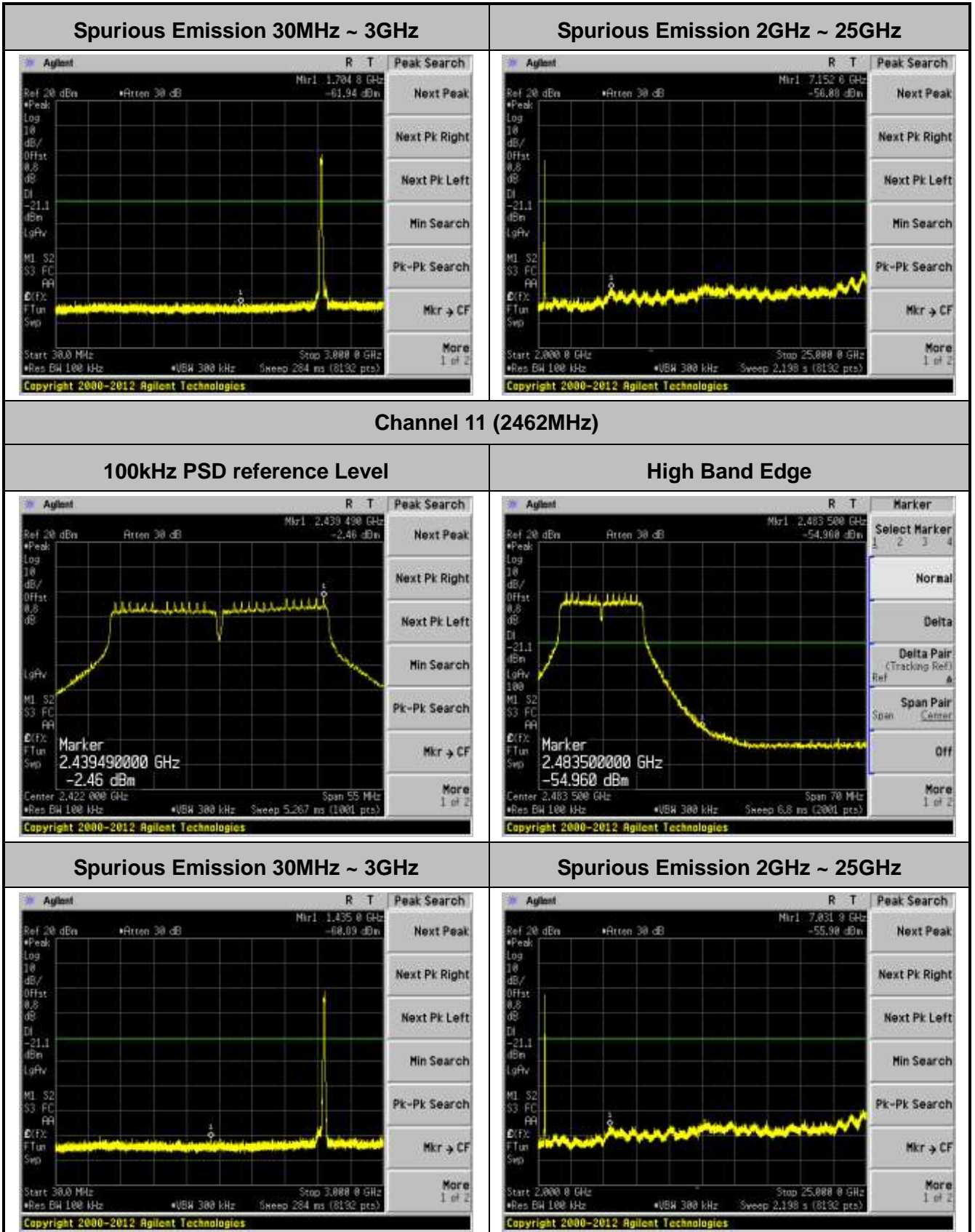
Spurious Emission 2GHz ~ 25GHz



Channel 06 (2437MHz)

100kHz PSD reference Level

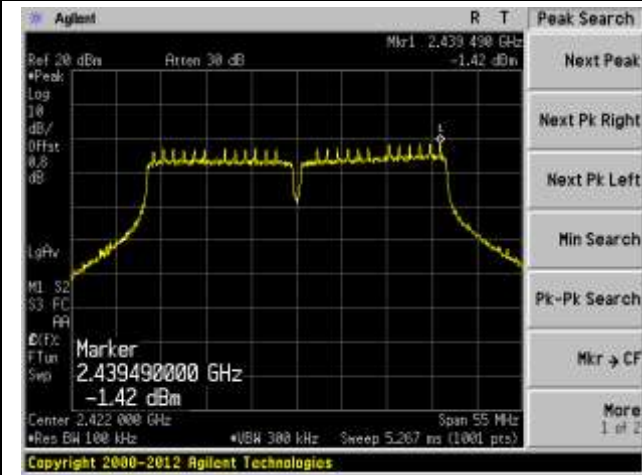




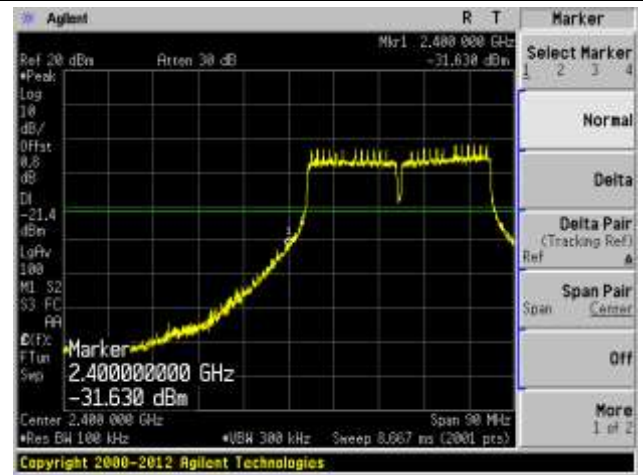
802.11n-HT40 Out-of-Band Emissions

Channel 03 (2422MHz)

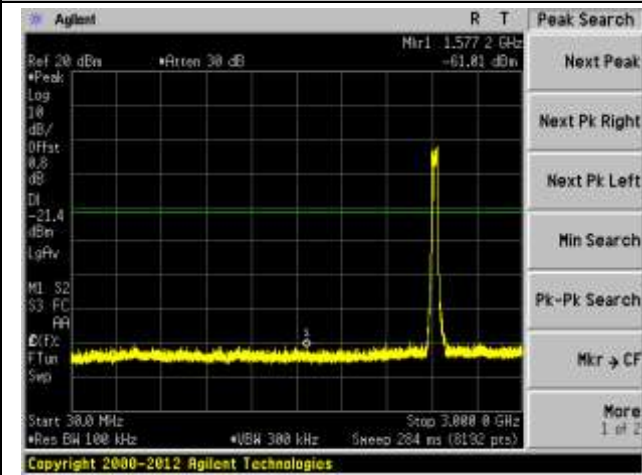
100kHz PSD reference Level



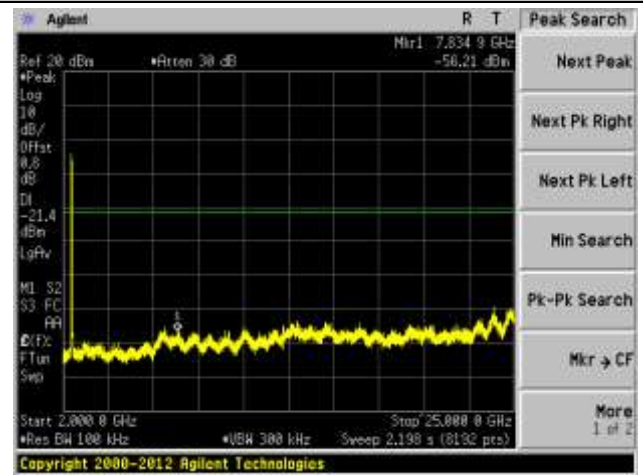
Low Band Edge



Spurious Emission 30MHz ~ 3GHz

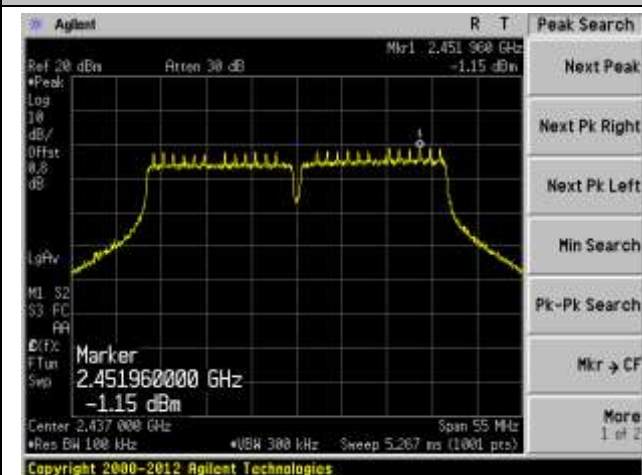


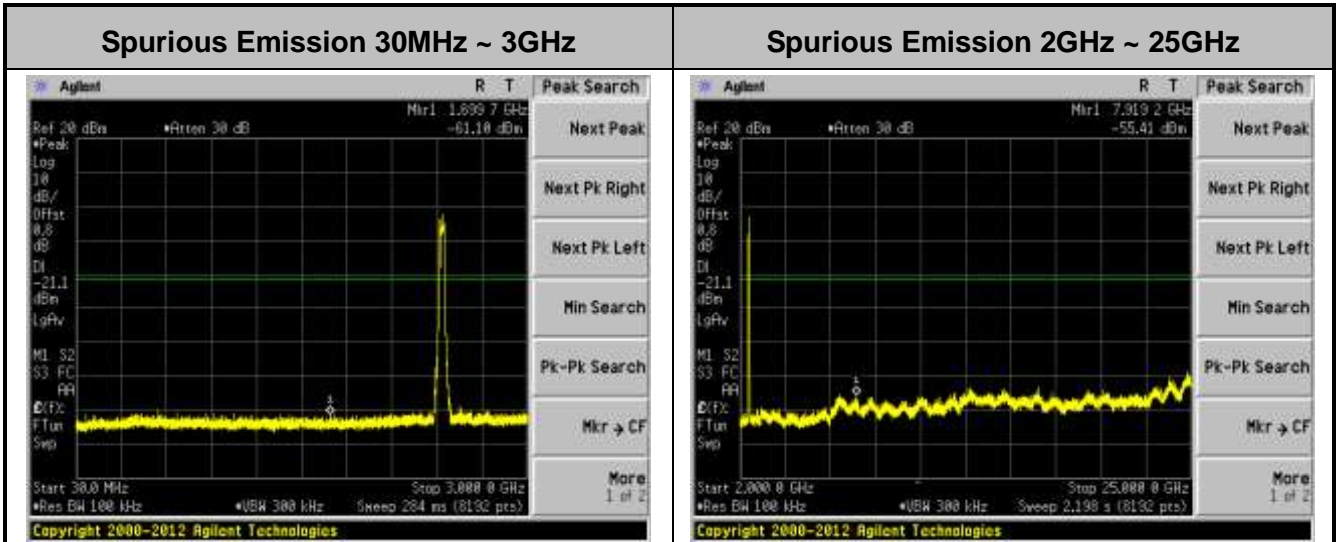
Spurious Emission 2GHz ~ 25GHz



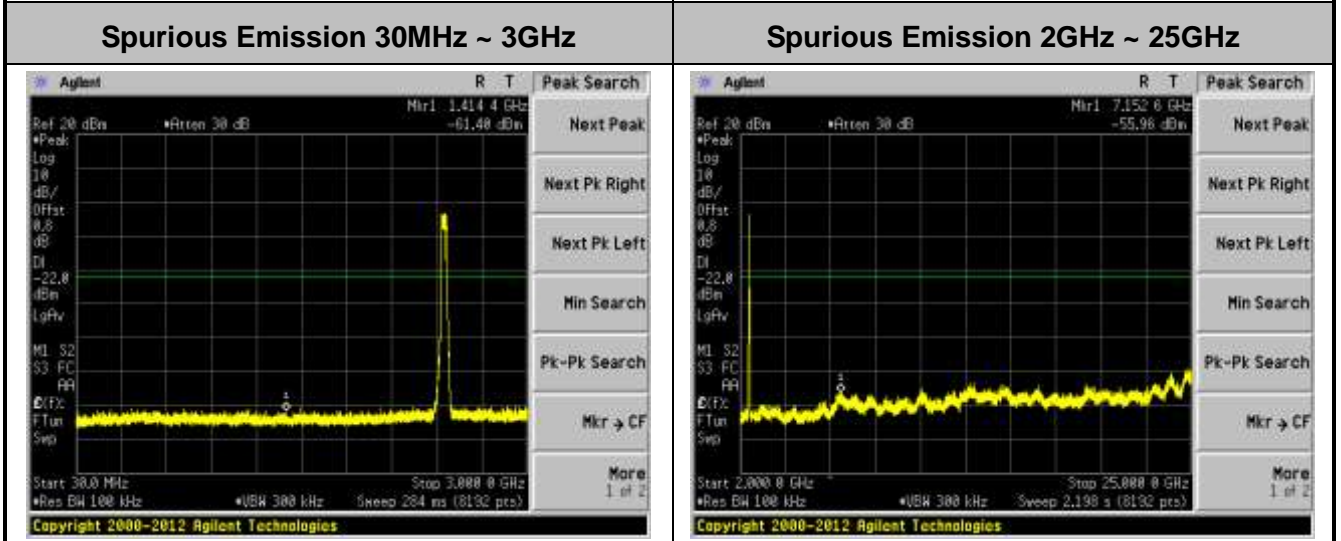
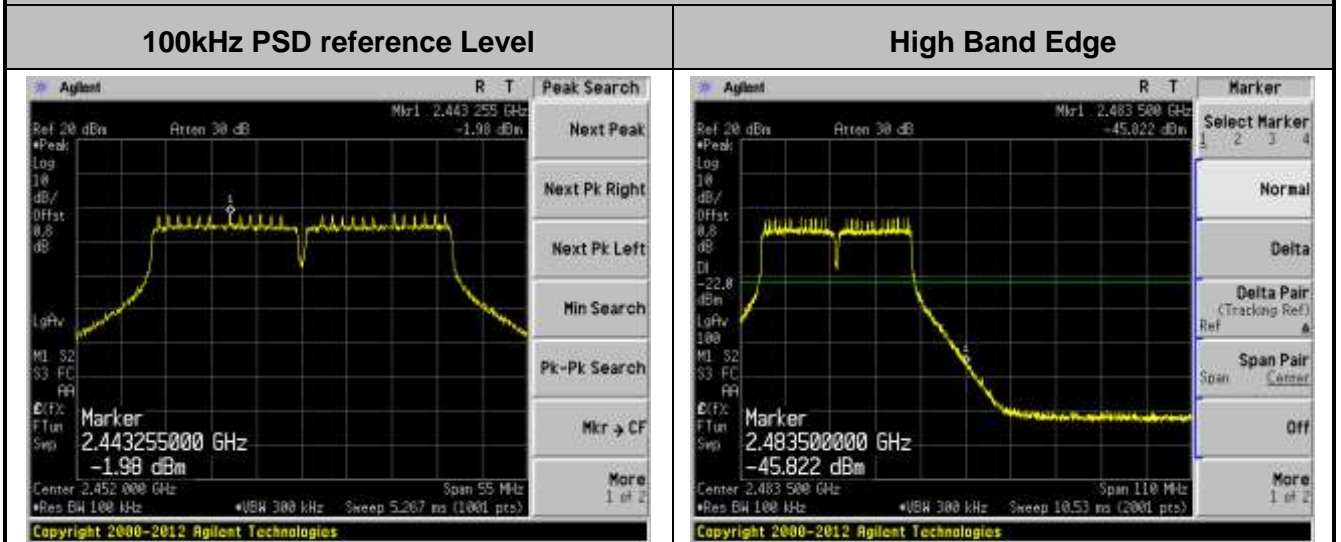
Channel 06 (2437MHz)

100kHz PSD reference Level





Channel 09 (2452MHz)



7.6. Radiated Spurious Emission Measurement

7.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.6.2. Test Procedure Used

KDB 558074 D01v03r01 – Section 12.2.3 (quasi-peak measurements)

KDB 558074 D01v03r01 – Section 12.2.4 (peak power measurements)

KDB 558074 D01v03r01 – Section 12.2.5 (average power measurements)

7.6.3. Test Setting

Peak Field Strength Measurements per Section 12.2.4 of KDB 558074 D01v03r01

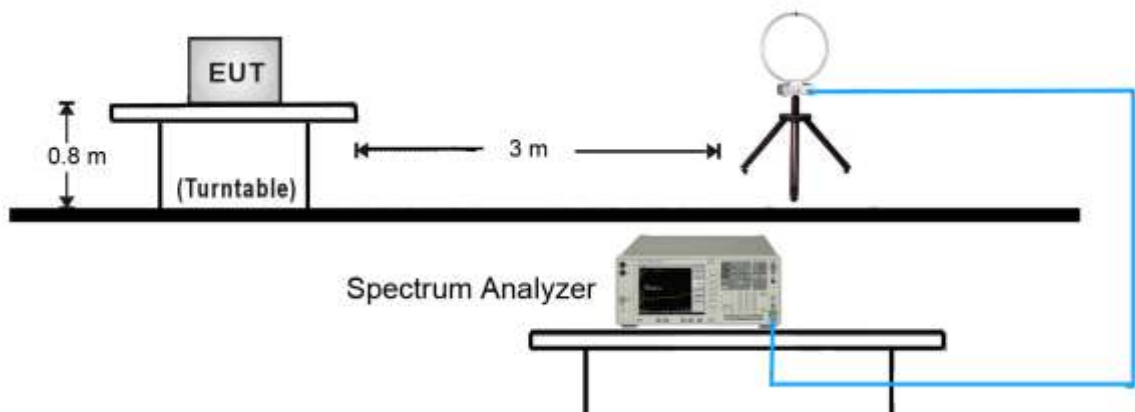
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Field Strength Measurements per Section 12.2.5.1 of KDB 558074 D01v03r01

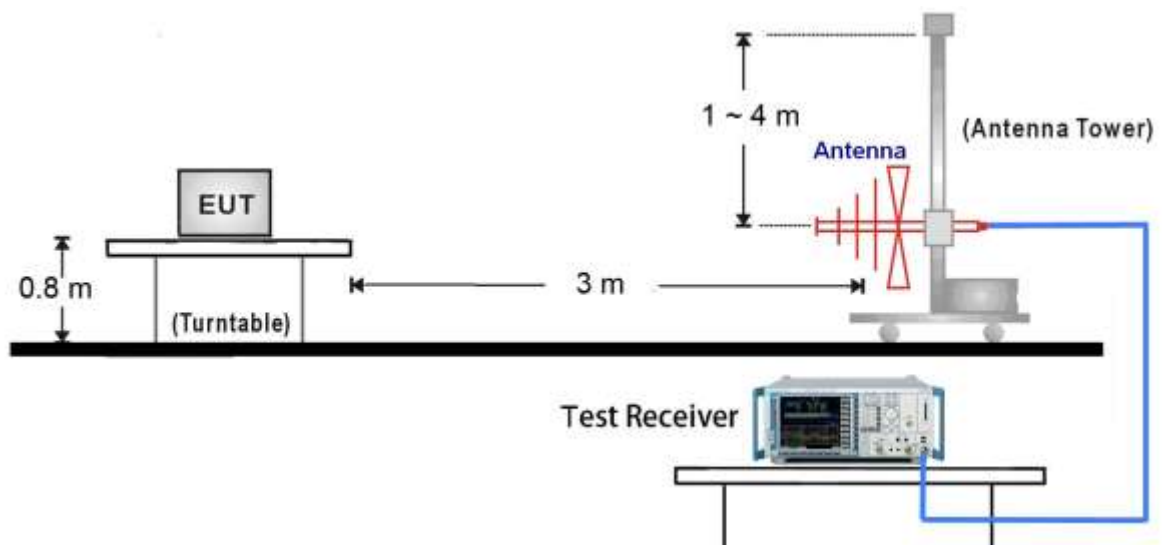
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be $> 2 \times \text{span}/\text{RBW}$)
6. Sweep time = auto
7. Trace (RMS) averaging was performed over at least 100 traces

7.6.4. Test Setup

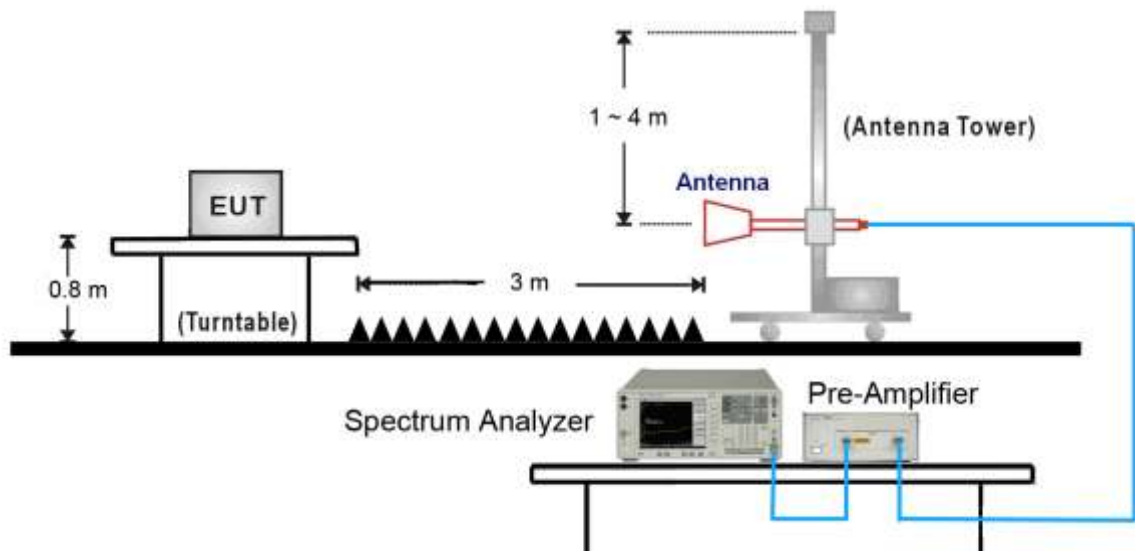
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



7.6.5. Test Result

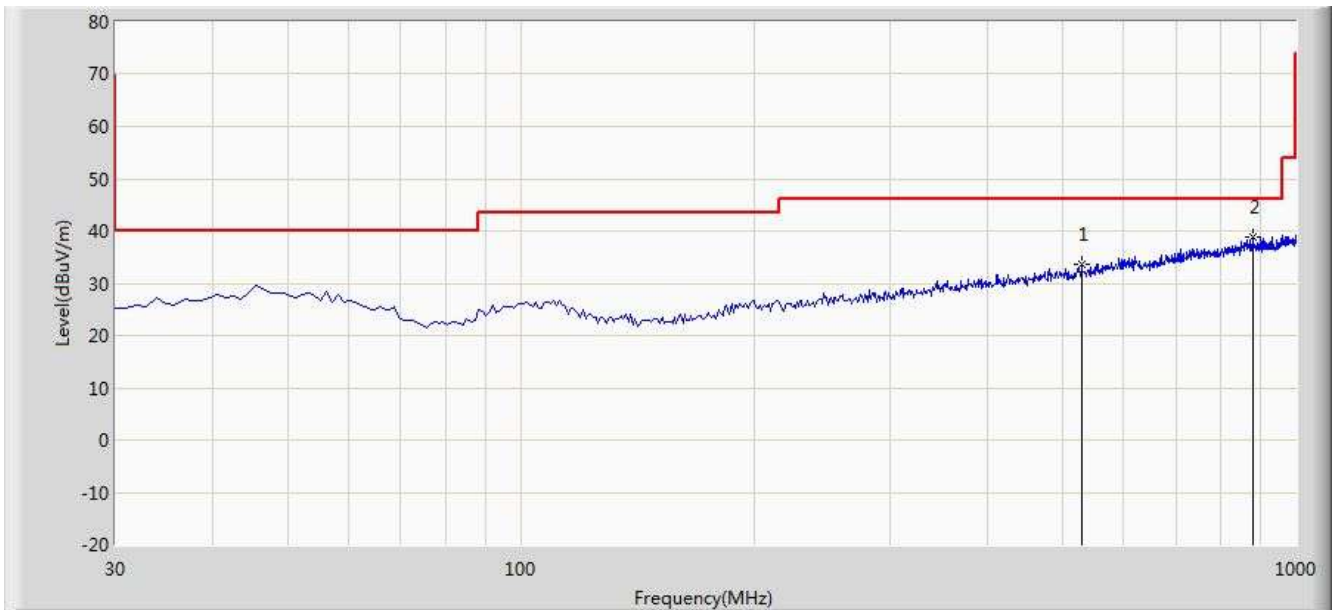
Test Mode:	802.11g	Test Site:	AC1
Test Channel:	06	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. The worst case of Radiated Spurious Emission		

Mark	Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
*	3500.0	36.0	3.9	39.9	83.4	-43.5	Peak	Horizontal
*	4420.0	35.3	5.5	40.8	83.4	-42.6	Peak	Horizontal
	4874.0	35.2	6.6	41.8	74.0	-32.2	Peak	Horizontal
	7311.0	35.4	14.0	49.4	74.0	-24.6	Peak	Horizontal
*	3502.0	35.2	3.9	39.1	83.4	-44.3	Peak	Vertical
*	4430.0	35.0	5.5	40.5	83.4	-42.9	Peak	Vertical
	4874.0	35.1	6.6	41.7	74.0	-32.3	Peak	Vertical
	7311.0	35.7	14.0	49.7	74.0	-24.3	Peak	Vertical

Note: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (103.4dB μ V/m).

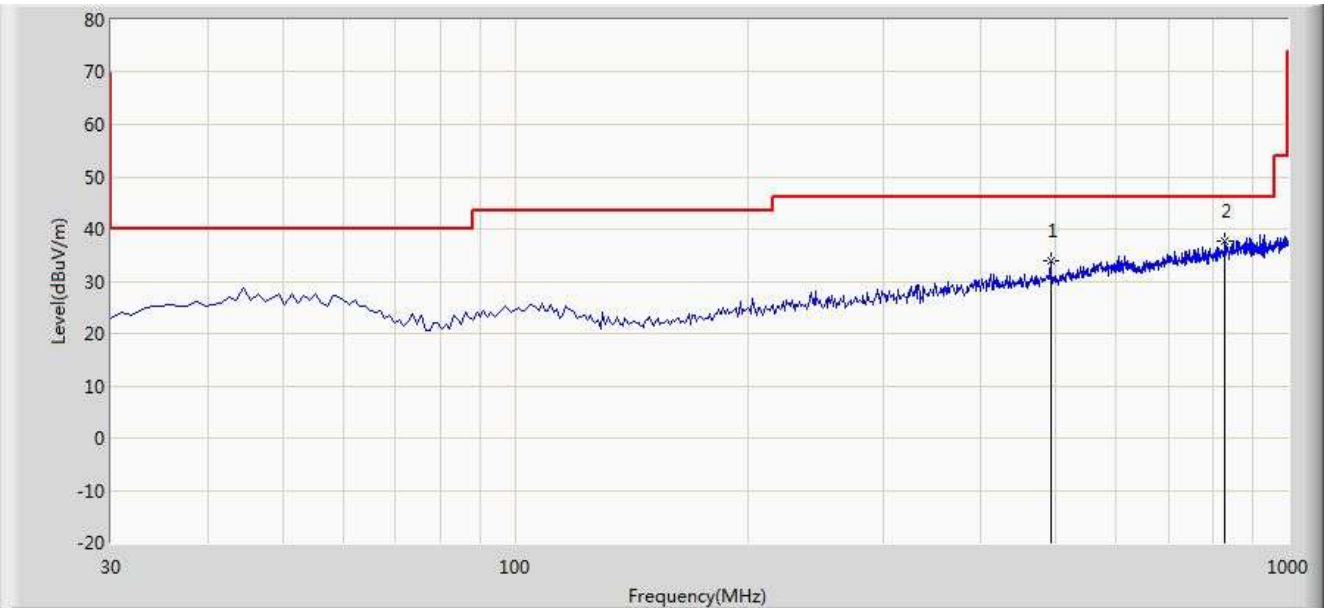
The worst case of Radiated Emission below 1GHz:

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/05 - 17:18
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: MediaBeam	Power: DC 5V
Worst Case Mode: 802.11b Channel 2437MHz	



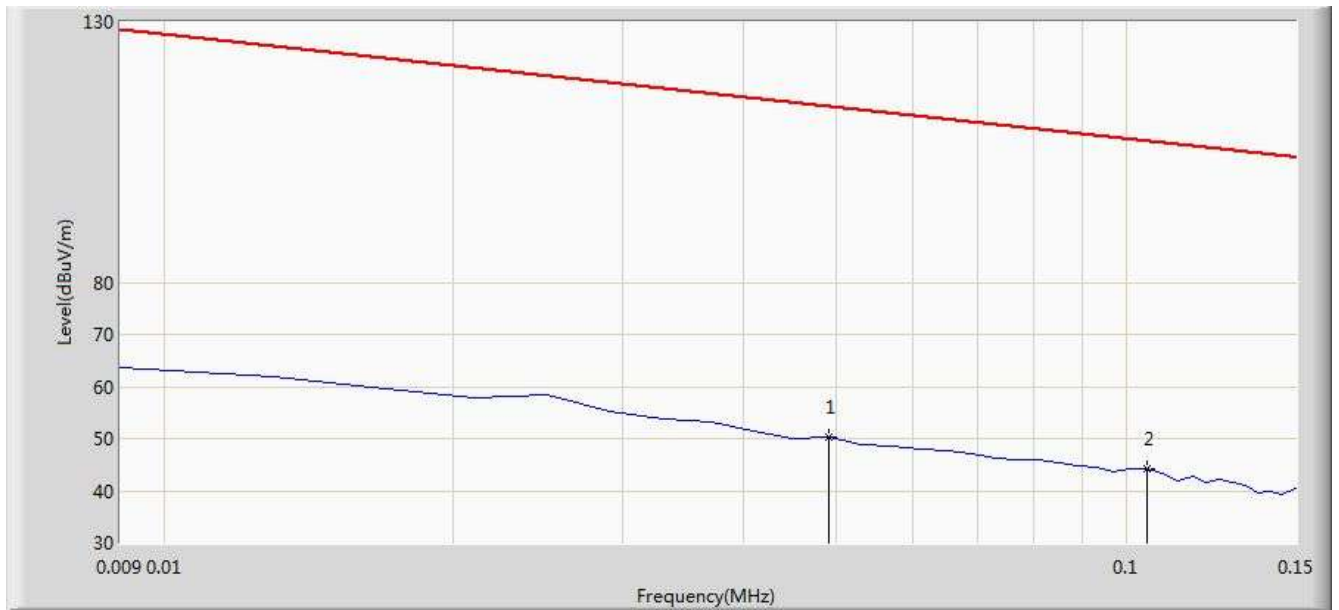
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			529.550	33.745	15.591	-12.255	46.000	18.154	PK
2		*	880.690	38.844	15.676	-7.156	46.000	23.168	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/05 - 17:19
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: MediaBeam	Power: DC 5V
Worst Case Mode: 802.11b Channel 2437MHz	



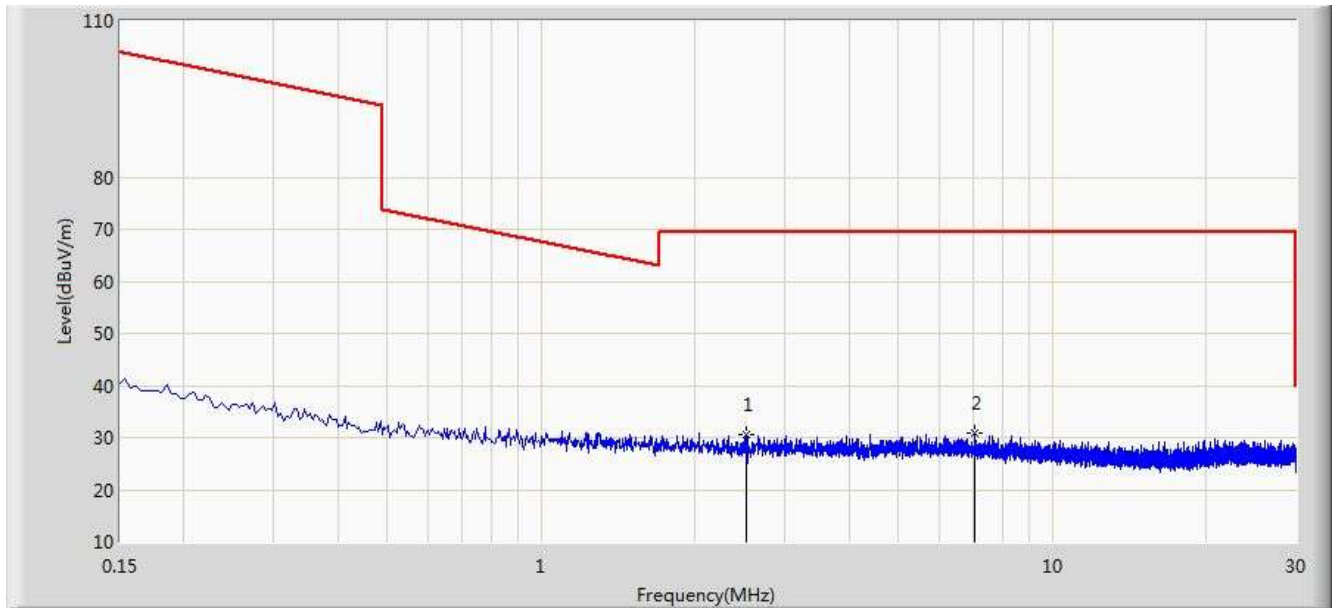
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			492.690	33.883	16.269	-12.117	46.000	17.614	PK
2		*	829.280	37.596	15.042	-8.404	46.000	22.554	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/05 - 16:39
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: FMZB1519_0.009-30MHz	Polarity: Face On
EUT: MediaBeam	Power: DC 5V
Note: There is the ambient noise within frequency range 9kHz~30MHz.	



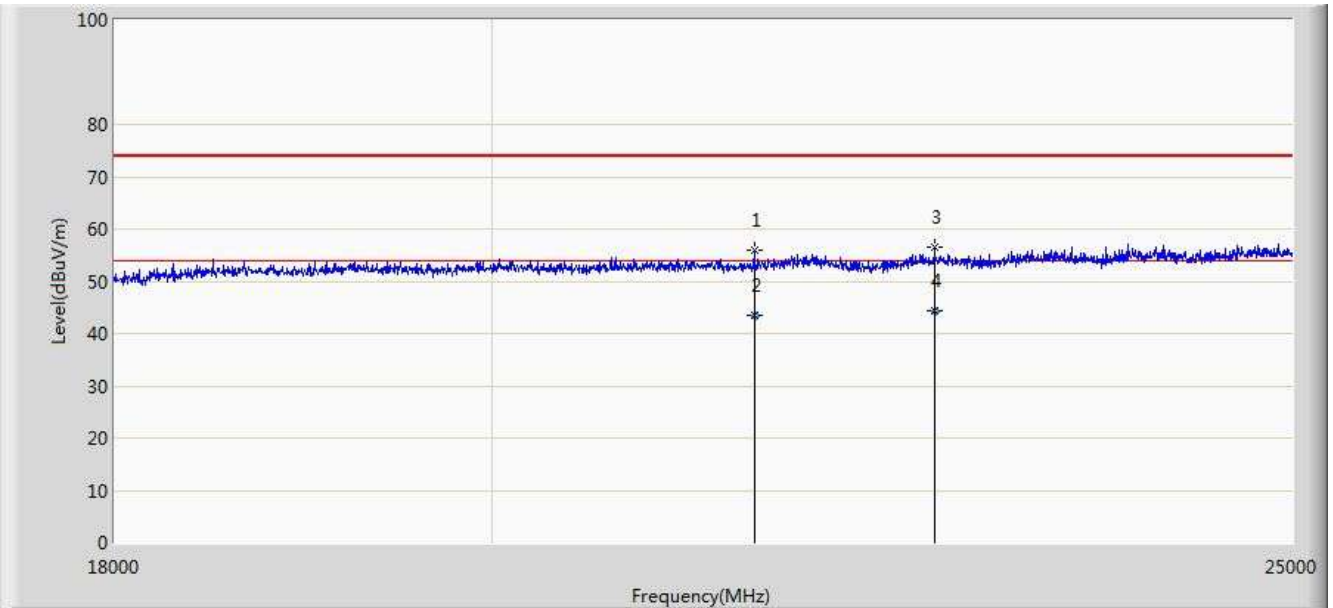
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			0.049	50.367	29.861	-63.422	113.789	20.505	PK
2		*	0.105	44.143	23.996	-63.029	107.173	20.147	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/05 - 16:41
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: FMZB1519_0.009-30MHz	Polarity: Face On
EUT: MediaBeam	Power: DC 5V
Note: There is the ambient noise within frequency range 9kHz~30MHz.	



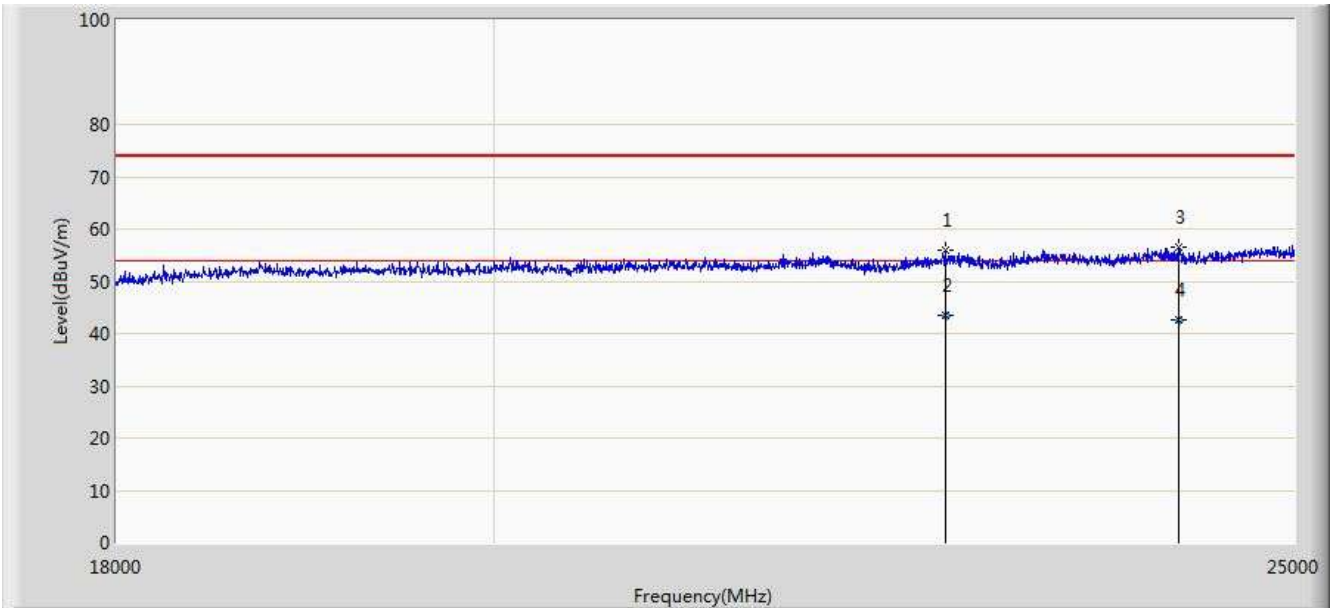
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2.513	30.495	10.336	-39.005	69.500	20.159	PK
2		*	7.041	30.974	10.579	-38.526	69.500	20.395	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/05 - 17:39
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9170_18-40GHz	Polarity: Horizontal
EUT: MediaBeam	Power: DC 5V
Note: There is the ambient noise within frequency range 18 ~ 25GHz.	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			21517.500	55.869	17.883	-18.131	74.000	37.986	PK
2			21517.650	43.351	5.365	-10.649	54.000	37.986	AV
3			22630.500	56.509	18.223	-17.491	74.000	38.286	PK
4		*	22630.540	44.310	6.024	-9.690	54.000	38.286	AV

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/05 - 17:43
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9170_18-40GHz	Polarity: Vertical
EUT: MediaBeam	Power: DC 5V
Note: There is the ambient noise within frequency range 18 ~ 25GHz.	

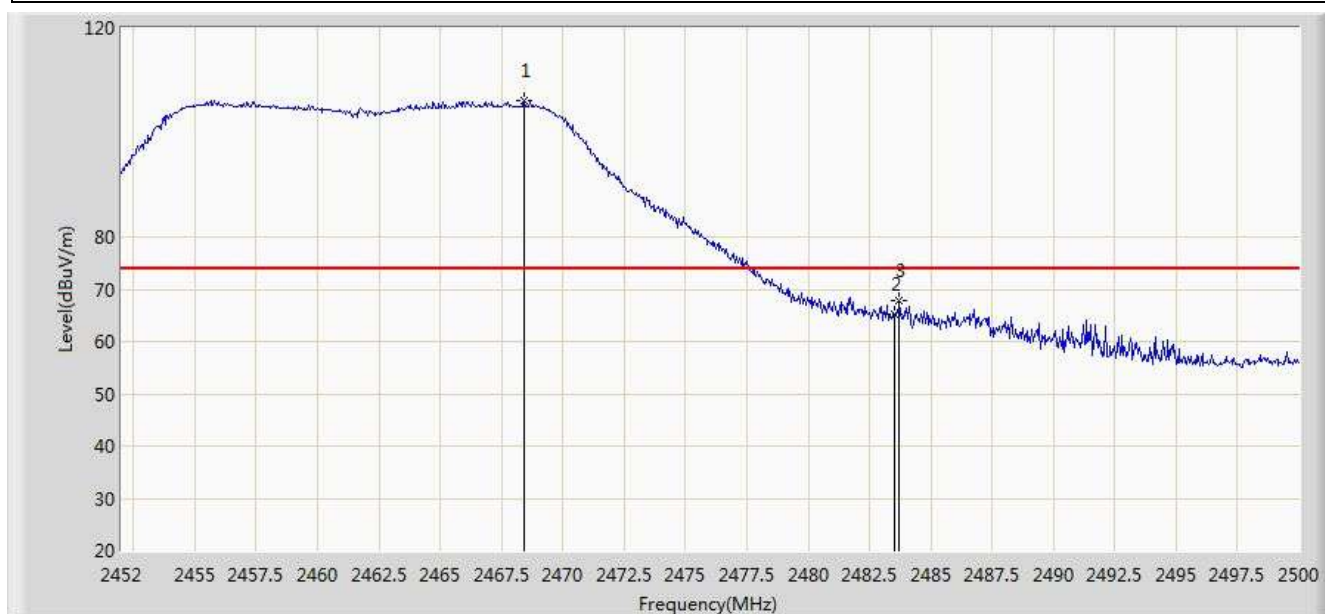


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			22686.500	55.811	17.457	-18.189	74.000	38.354	PK
2		*	22686.540	43.598	5.244	-10.402	54.000	38.354	AV
3			24205.500	56.430	17.607	-17.570	74.000	38.823	PK
4			24205.658	42.518	3.695	-11.482	54.000	38.823	AV

7.7. Radiated Restricted Band Edge Measurement

7.7.1. Test Result

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/04 - 14:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: MediaBeam	Power: DC 5V
Worst Case Mode: 802.11g Channel 2462MHz	



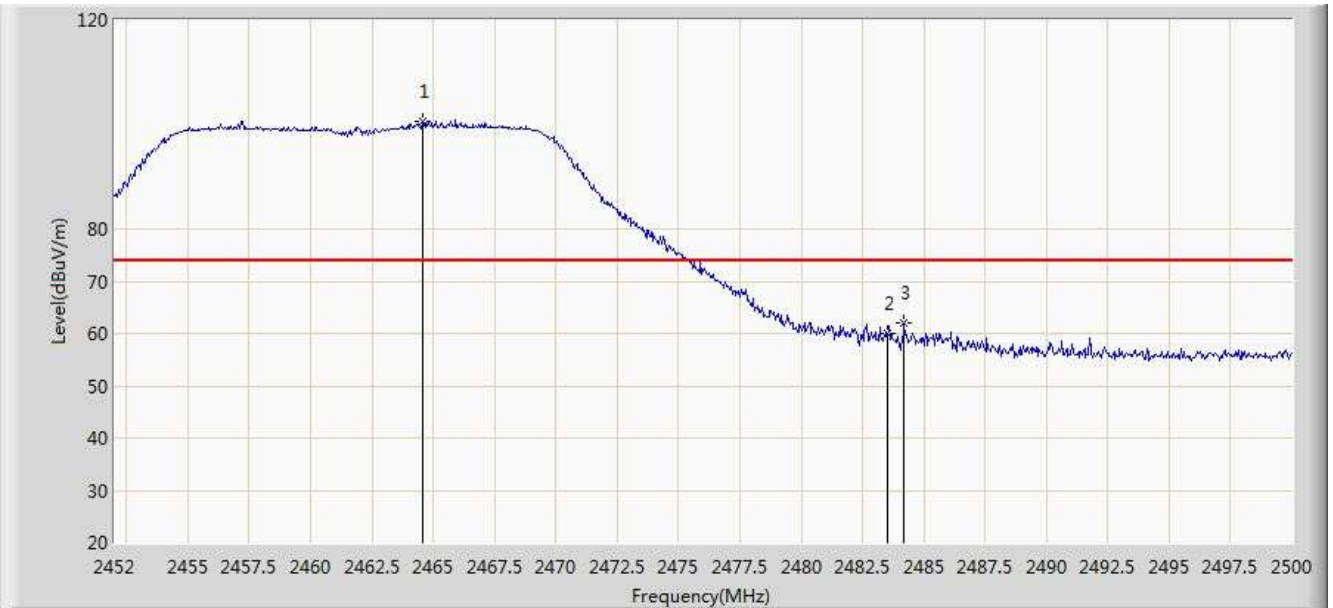
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2468.416	106.011	75.382	N/A	N/A	30.628	PK
2			2483.500	65.300	34.627	-8.700	74.000	30.673	PK
3			2483.728	67.969	37.296	-6.031	74.000	30.673	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/04 - 14:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: MediaBeam	Power: Power: DC 5V
Worst Case Mode: 802.11g Channel 2462MHz	



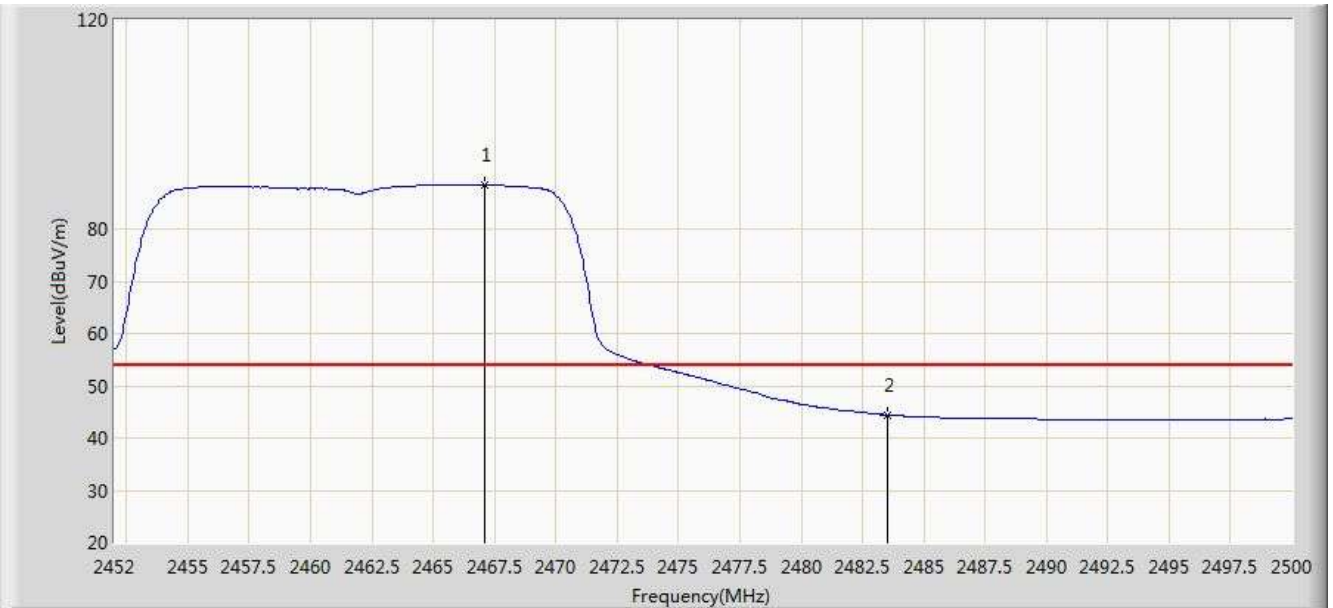
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2455.360	93.763	63.162	N/A	N/A	30.601	AV
2			2483.500	46.832	16.159	-7.168	54.000	30.673	AV

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/04 - 14:28
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: MediaBeam	Power: Power: DC 5V
Worst Case Mode: 802.11g Channel 2462MHz	



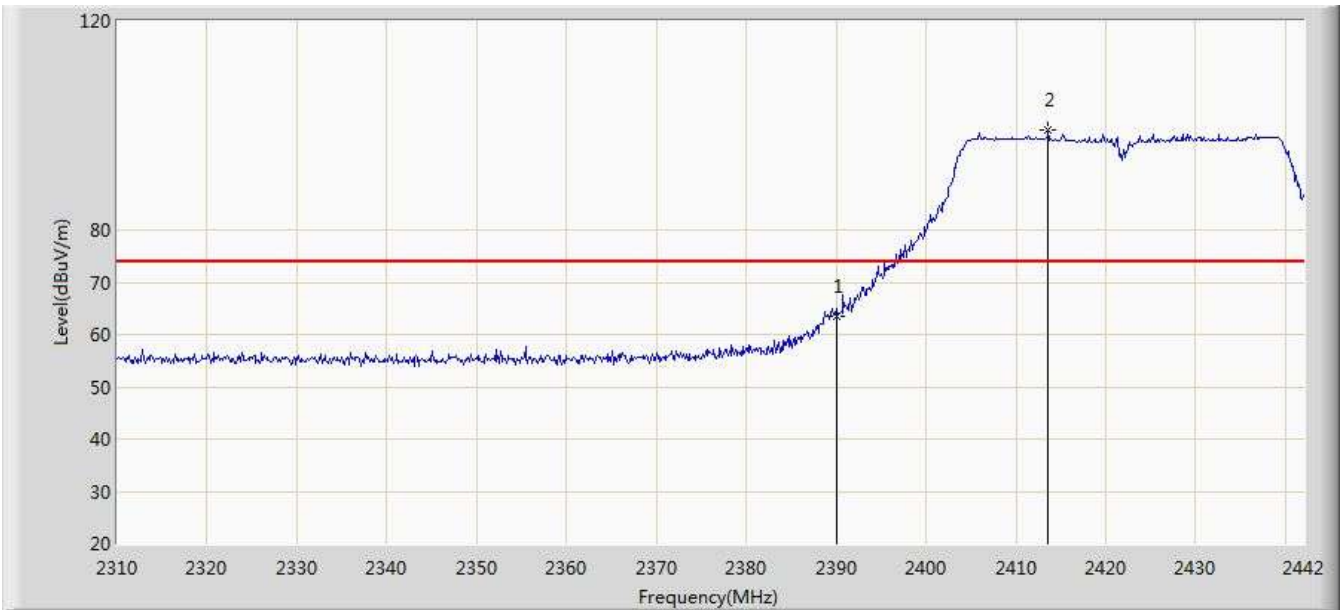
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2464.576	100.659	70.042	N/A	N/A	30.617	PK
2			2483.500	59.900	29.227	-14.100	74.000	30.673	PK
3			2484.208	61.964	31.289	-12.036	74.000	30.675	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/04 - 14:28
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: MediaBeam	Power: Power: DC 5V
Worst Case Mode: 802.11g Channel 2462MHz	



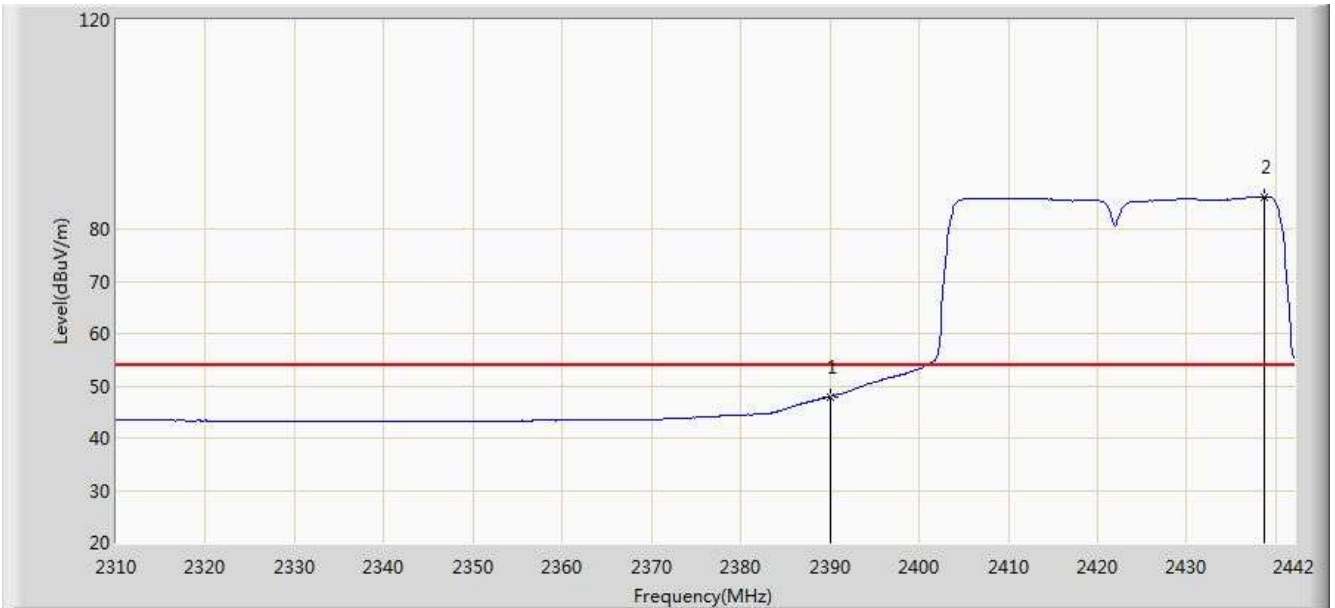
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2467.120	88.385	57.760	N/A	N/A	30.625	AV
2			2483.500	44.454	13.781	-9.546	54.000	30.673	AV

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/04 - 14:36
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: MediaBeam	Power: Power: DC 5V
Worst Case Mode: 802.11n-HT40 Channel 2422MHz	



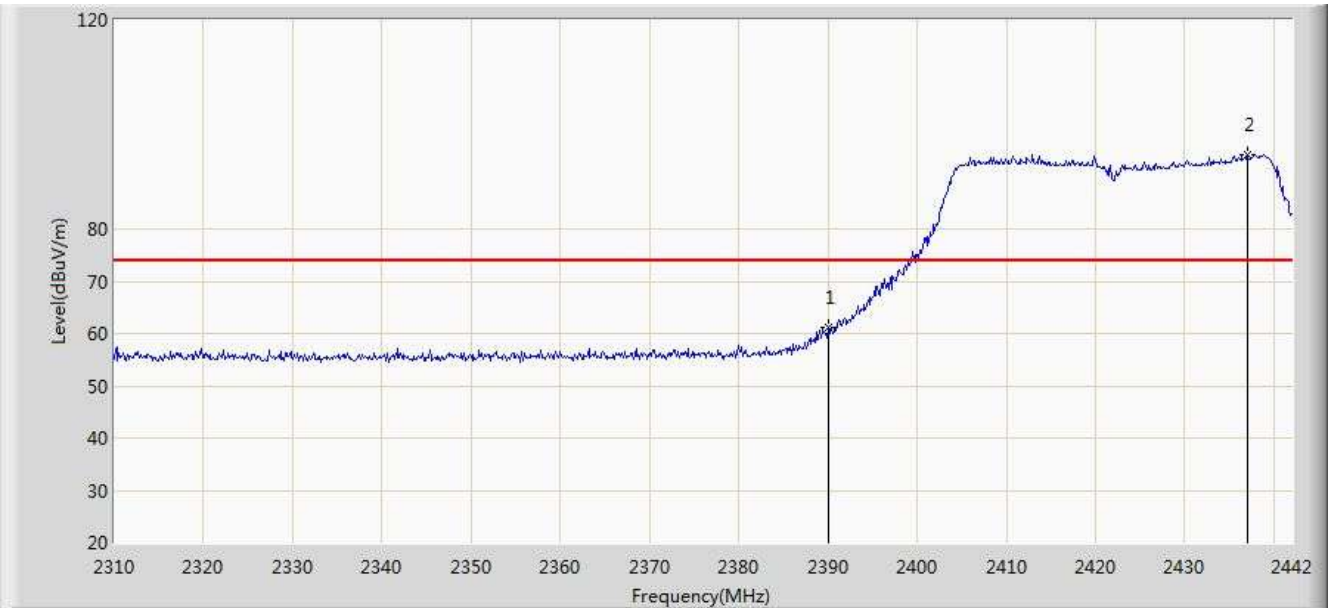
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	63.503	32.819	-10.497	74.000	30.684	PK
2		*	2413.620	99.004	68.362	N/A	N/A	30.642	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/04 - 14:38
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: MediaBeam	Power: Power: DC 5V
Worst Case Mode: 802.11n-HT40 Channel 2422MHz	



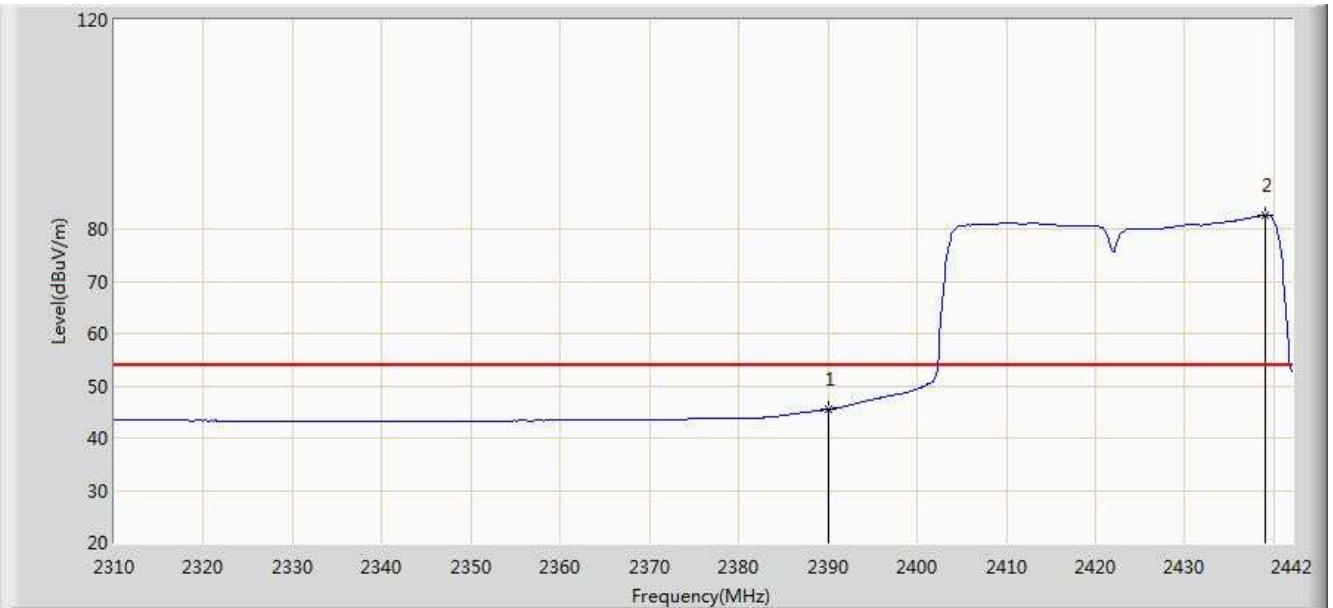
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	47.935	17.251	-6.065	54.000	30.684	AV
2		*	2438.700	86.164	55.563	N/A	N/A	30.601	AV

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/04 - 14:38
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: MediaBeam	Power: Power: DC 5V
Worst Case Mode: 802.11n-HT40 Channel 2422MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	61.058	30.374	-12.942	74.000	30.684	PK
2		*	2436.984	94.138	63.534	N/A	N/A	30.604	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/01/04 - 14:39
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: MediaBeam	Power: Power: DC 5V
Worst Case Mode: 802.11n-HT40 Channel 2422MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	45.515	14.831	-8.485	54.000	30.684	AV
2		*	2439.096	82.599	51.999	N/A	N/A	30.600	AV

7.8. AC Conducted Emissions Measurement

7.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

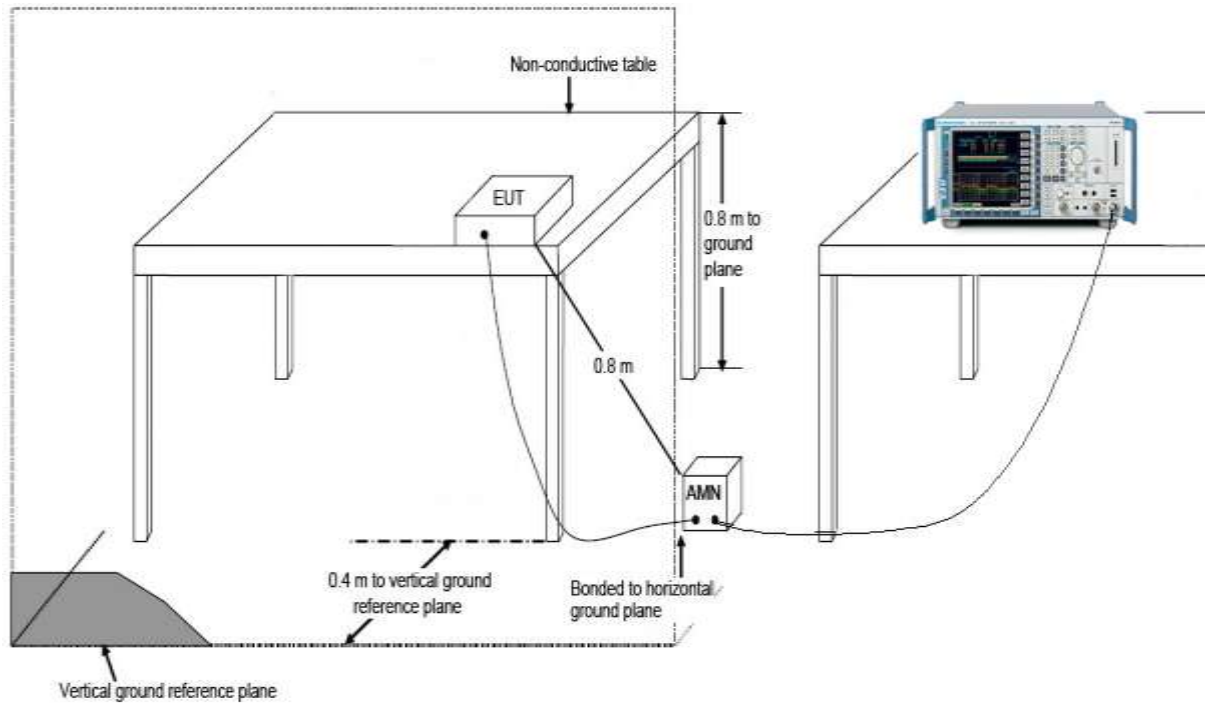
7.8.2. Test Procedure

The EUT was setup according to ANSI C63.4, 2009 and tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

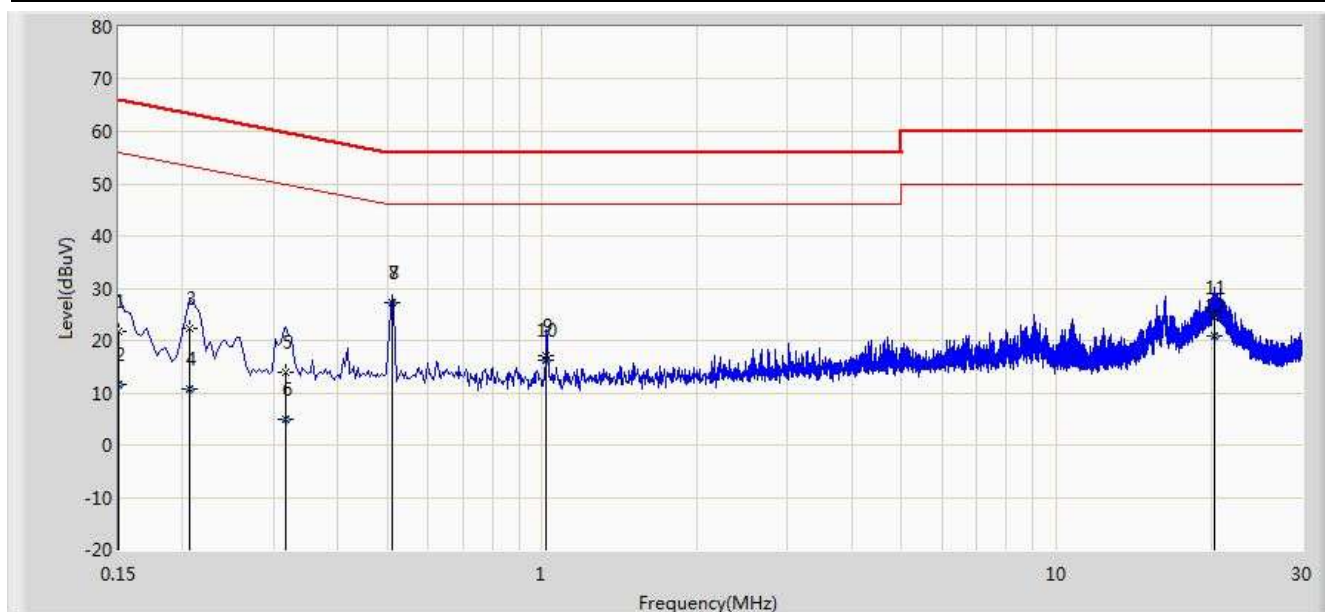
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

7.8.3. Test Setup



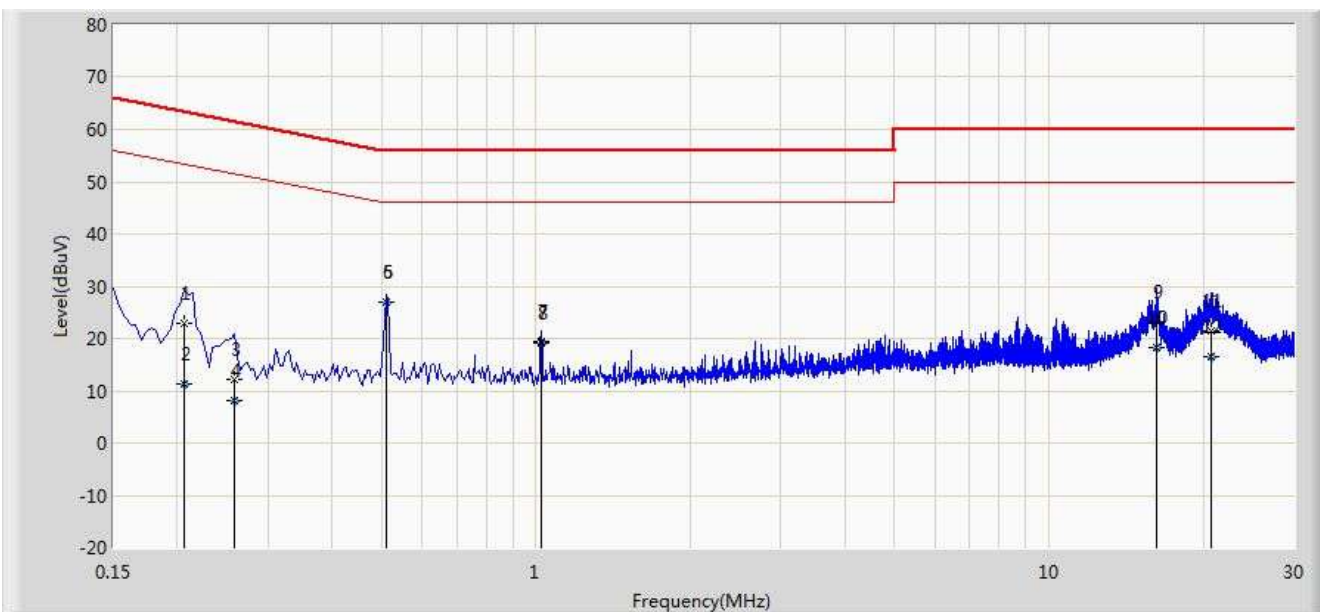
7.8.4. Test Result

Engineer: Roy Cheng	
Site: SR2	Time: 2014/01/05 - 17:05
Limit: FCC 15.207_CE_Class B	Margin: 0
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: MediaBeam	Power: AC 120V/60Hz
Note: Normal Operation	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor	Type
1			0.150	21.777	10.609	-44.223	66.000	11.168	QP
2			0.150	11.573	0.405	-44.427	56.000	11.168	AV
3			0.206	22.307	12.327	-41.058	63.365	9.981	QP
4			0.206	10.847	0.866	-42.518	53.365	9.981	AV
5			0.318	13.942	3.923	-45.817	59.759	10.018	QP
6			0.318	5.072	-4.947	-44.687	49.759	10.018	AV
7			0.510	27.376	17.219	-28.624	56.000	10.157	QP
8		*	0.510	27.211	17.055	-18.789	46.000	10.157	AV
9			1.018	17.198	7.289	-38.802	56.000	9.908	QP
10			1.018	16.192	6.283	-29.808	46.000	9.908	AV
11			20.294	24.431	14.288	-35.569	60.000	10.143	QP
12			20.294	20.887	10.744	-29.113	50.000	10.143	AV

Engineer: Roy Cheng	
Site: SR2	Time: 2014/01/05 - 17:15
Limit: FCC 15.207_CE_Class B	Margin: 0
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: MediaBeam	Power: AC 120V/60Hz
Note: Normal Operation	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor	Type
1			0.206	23.006	13.005	-40.359	63.365	10.001	QP
2			0.206	11.176	1.175	-42.189	53.365	10.001	AV
3			0.258	12.086	2.079	-49.409	61.496	10.007	QP
4			0.258	8.013	-1.994	-43.483	51.496	10.007	AV
5			0.510	27.026	16.850	-28.974	56.000	10.176	QP
6		*	0.510	26.927	16.750	-19.073	46.000	10.176	AV
7			1.022	19.320	9.411	-36.680	56.000	9.908	QP
8			1.022	19.014	9.105	-26.986	46.000	9.908	AV
9			16.182	23.295	13.174	-36.705	60.000	10.121	QP
10			16.182	18.180	8.059	-31.820	50.000	10.121	AV
11			20.706	21.388	11.197	-38.612	60.000	10.191	QP
12			20.706	16.633	6.443	-33.367	50.000	10.191	AV

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **MediaBeam FCC ID:**

XHWMDB114 is in compliance with Part 15C of the FCC Rules.

The End