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Report No.: 1406RSU03301
Report Version: V02
Issue Date: 07-30-2014

MEASUREMENT REPORT
FCC PART 15.247 WLAN 802.11b/g/n

FCC ID:	O9C-BJNGAFB0004
APPLICANT:	Hewlett Packard Company

Application Type:	Certification
Product:	Wireless LAN Access Point
Model No.:	BJNGA-FB0004, JG993A
Brand Name:	HP
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15.247
Test Procedure(s):	KDB 558074 D01v03r02, KDB 662911 D01v02r01
Test Date:	June 25 ~ July 13, 2014

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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 D01v03r02. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date
1406RSU03301	Rev. 01	Initial report	07-14-2014
1406RSU03301	Rev. 02	Added some descriptions for EUT and the antenna	07-30-2014

CONTENTS

Description Page

§2.1033 General Information

Applicant:	Hewlett Packard Company
Applicant Address:	153 Taylor Street Littleton Massachusetts, United States 01460-1407
Manufacturer:	Hewlett Packard Company
Manufacturer Address:	153 Taylor Street Littleton Massachusetts, United States 01460-1407
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 No.:	BJNGA-FB0004, JG993A
FCC ID:	O9C-BJNGAFB0004
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Digital Transmission System (DTS)
Date(s) of Test:	June 25 ~ July 13, 2014
Test Report S/N:	1406RSU03301

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**
- **MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (11384A-1).**
- **MRT facility is an IC registered (11384A-1) test laboratory with the site description on file at Industry Canada.**

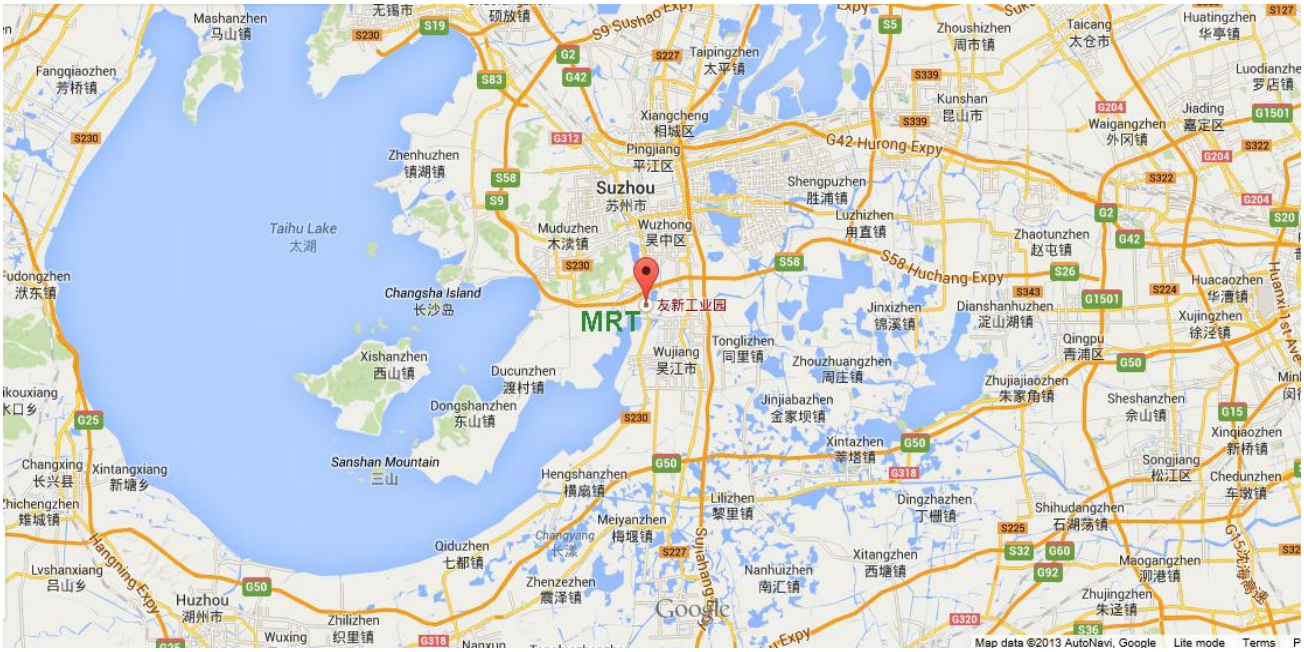
1. INTRODUCTION

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	Wireless LAN Access Point
Model No.	BJNGA-FB0004, JG993A
Power Type	48Vdc, 0.63A (or POE input)
Frequency Range	802.11b/g/n-HT20: 2412 ~ 2462 MHz 802.11n-HT40: 2422 ~ 2452 MHz
Maximum Output Power	802.11b: 26.64dBm 802.11g: 28.48dBm 802.11n-HT20: 28.48dBm 802.11n-HT40: 28.49dBm
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM
Adapter	Brand Name: DVE M/N: DSA-42D-48 2 480063 P/N: JD055B Input: 100-240V ~ 50/60Hz 1.2A Output: +48V ~ 0.63A

2.2. Frequency / Channel Operation

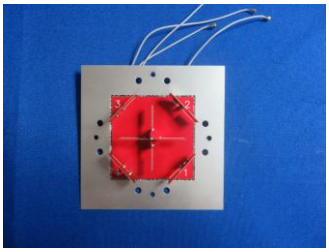
Channel List for 802.11b/g/n-HT20

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

2.3. Description of Available Antennas

Antenna Type	Frequency Band (GHz)	Manufacturer	Model	Tx Paths	Max Peak Gain (dBi)	Directional Gain (dBi)	
						For Power	For PSD
Internal Antenna							
	2.4	Airgain, Inc.	N2465D	2	4	4	7.01
	5.2			2	5	5	8.01
	5.5			2	4.6	4.6	7.61
	5.8			2	4.9	4.9	7.91
External Antenna							
	2.4	Laird Technologies (Beijing) Co., Ltd.	JG696A	2	L1: 4.12 L2: 3.78	6.96	6.96
	5.2			2	H1: 5.65 H2: 6.21	8.94	8.94
	5.5			2	H1: 5.47 H2: 5.86	8.68	8.68
	5.8			2	H1: 5.45 H2: 5.36	8.42	8.42

Note:

1. The four antennas of the internal antenna are all the same, and the four antennas of the external antenna are different.
2. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.
   For CDD transmissions, directional gain is calculated as follows, N_{ANT} = 2, N_{SS} = 1.
   1) If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.
   - For power spectral density (PSD) measurements on all devices,
     Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 3.01;
   - For power measurements on IEEE 802.11 devices,
     Array Gain = 0 dB for $N_{ANT} \leq 4$;

   2) If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream:

- Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

- $$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

  $g_{j,k} = 10^{G_k/20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

  G_k is the gain in dBi of the kth antenna.

2.4. Description of Antenna RF Port

External Antenna RF Port (Note 1)				
--	2.4GHz RF Port		5GHz RF Port	
RF Port Location	C1	C2	D1	D2
Software Control Port	Ant 0	Ant 1	Ant 1	Ant 0
Internal Antenna RF Port (Note 2)				
RF Port Location	A1	A3	A2	A4
--	2.4GHz TX			
Software Control Port	Ant 0	Ant 1	Ant 0	Ant 1
--	5GHz TX			
Software Control Port	Ant 1	Ant 0	Ant 1	Ant 0

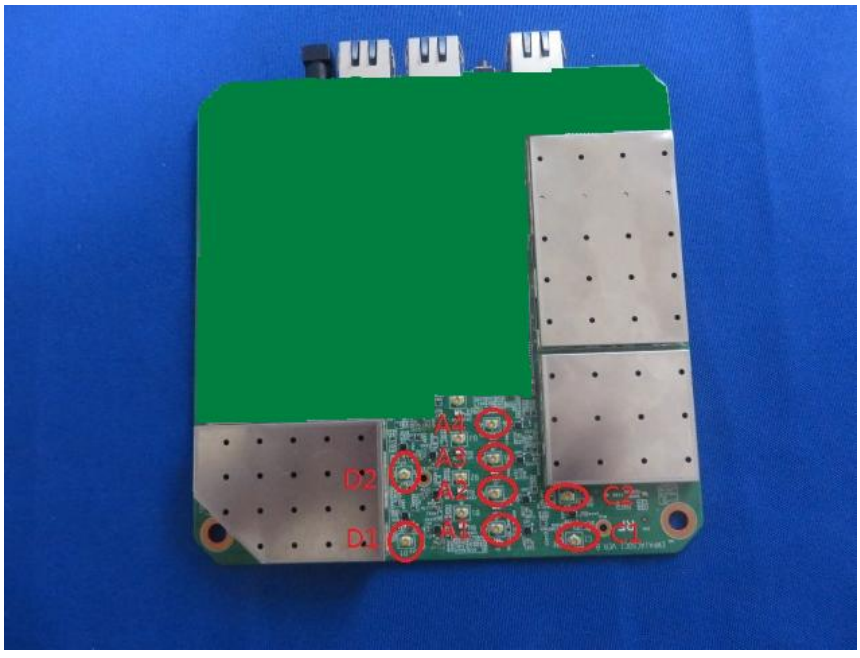
Note 1: The external antenna RF ports are divided into two groups. One group (C1 and C2) just transmit 2.4GHz, and another group (D1 and D2) just transmit 5GHz signal.

Note 2: The internal antenna RF ports are divided into two groups, one group includes A1 and A3, another group includes A2 and A4. Two groups can transmit 2.4GHz or 5GHz signal.

Note 3: When the EUT worked normally, it always used its default antenna (internal or external) and can't switch automatic unless modify the software setting through access controller (AC) or WEB page. When the product used its internal antenna, it can adjust antenna combiner (A1+A3 or A2+A4) automatic according to signal strength.

Note 4: After comparing as below table, we select the worst-case group (external antenna RF port) for all RF testing.

Antenna RF Port Plot



Antenna RF Port Comparison

Test Mode	Test Frequency (MHz)	Power Parameter Value	A1 + A3 Measured Level (dBm)	A2 + A4 Measured Level (dBm)	D1 + D2 Measured Level (dBm)	C1 + C2 Measured Level (dBm)
			Internal Antenna		External Antenna	
802.11b	2412	21.0	25.44	25.38	--	26.64
802.11g	2412	16.5	27.69	27.32	--	28.49
802.11n-HT20	2412	16.5	26.96	26.84	--	28.49
802.11n-HT40	2422	15.5	27.36	27.15	--	28.49

2.5. Test Mode

Test Mode	Mode 1: Transmit by 802.11b
	Mode 2: Transmit by 802.11g
	Mode 3: Transmit by 802.11n-HT20
	Mode 4: Transmit by 802.11n-HT40

2.6. Test Software

The test utility software used during testing were “ART2-GUI Version: 2.3” and “CART Version: 4.9”.

Final Power Parameter Value of the test software.

Test Mode	Test Frequency	Power Parameter Value
802.11b	2412	21.0
	2437	21.5
	2462	18.5
802.11g	2412	16.5
	2437	17.0
	2462	17.0
802.11n-HT20	2412	16.5
	2437	17.0
	2462	17.0
802.11n-HT40	2422	15.5
	2437	17.0
	2452	16.5

2.7. Device Capabilities

This device contains the following capabilities:
2.4GHz WLAN (DTS) and 5GHz WLAN (UNII)
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 D01v03r02. 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 - 100.0%
- 802.11g/n-HT20 - 100%
- 802.11n-HT40 - 100%

2.8. Test Configuration

The **Wireless LAN Access Point FCC ID: O9C-BJNGAFB0004** was tested per the guidance of KDB 558074 D01v03r02. ANSI C63.4-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.9. EMI Suppression Device(s)/Modifications

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

2.10. 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 D01v03r02 were used in the measurement of the **Wireless LAN Access Point FCC ID: O9C-BJNGAFB0004.**
Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. 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. 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 receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. 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 data exchange speed, 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 are 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.
An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2009 at Clause 4.3.
Line conducted emissions test results are shown in Section 7.8.

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. A 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 Beam-Width 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 Wireless LAN Access Point uses a unique connector.

Conclusion:

The **Wireless LAN Access Point FCC ID: O9C-BJNGAFB0004** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATA

Conducted Emissions

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2014/11/08
Two-Line V-Network	R&S	ENV216	101683	1 year	2014/11/08
Two-Line V-Network	R&S	ENV216	101684	1 year	2014/11/08
Temperature/ Meter Humidity	Anymetre	TH101B	SR2-01	1 year	2014/11/15

Radiated Emission

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	E4447A	MY45300136	1 year	2014/11/18
EMI Test Receiver	R&S	ESR7	101209	1 year	2014/11/08
Preamplifier	MRT	AP18G40	1310001	1 year	2014/10/07
Preamplifier	MRT	AP01G18	1310002	1 year	2014/10/07
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	1 year	2014/11/24
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2014/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2014/11/24
Broadband Horn Antenna	Schwarzbeck	BBHA9170	9170-549	1 year	2014/12/11
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2014/11/15

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
Wideband Peak Power Meter	Anritsu	ML2495A	0905006	1 year	2015/01/12
Power Sensor	Anritsu	MA2411B	0846014	1 year	2015/01/12
Temperature/Humidity Meter	Anymetre	TH101B	TR3-01	1 year	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: ± 3.46dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: ± 4.18dB 1GHz ~ 40GHz: ± 4.76dB

7. TEST RESULT

7.1. Summary

Company Name: **Hewlett Packard Company**
FCC ID: **O9C-BJNGAFB0004**
FCC Classification: **Digital Transmission System (DTS)**
Data Rate(s) Tested: **1Mbps ~ 11Mbps (b);**
6Mbps ~ 54Mbps (g);
13/14.4Mbps ~ 130/144.4Mbps (n-HT20);
27/30Mbps ~ 270/300Mbps (n-HT40)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	≥ 500kHz	Conducted	Pass	Section 7.2
15.247(b)(3)	Output Power	≤ 29.04dBm		Pass	Section 7.3
15.247(e)	Power Spectral Density	≤ 6.99dBm/3kHz		Pass	Section 7.4
15.247(d)	Band Edge / Out-of-Band Emissions	≥ 20dBc(Peak)		Pass	Section 7.5
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 7.6 & 7.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.8

Notes:

1) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. 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.

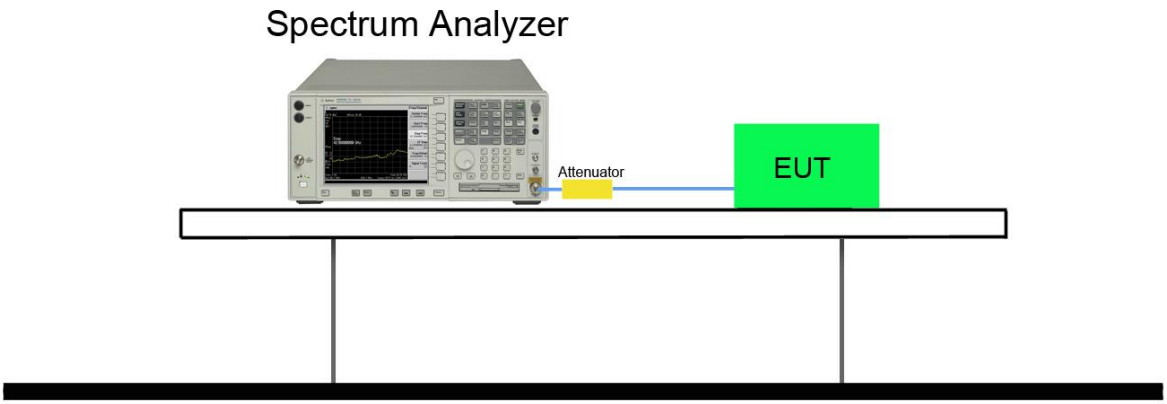
7.2.2. Test Procedure used

KDB 558074 D01v03r02 – 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 ≥ 3 × 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

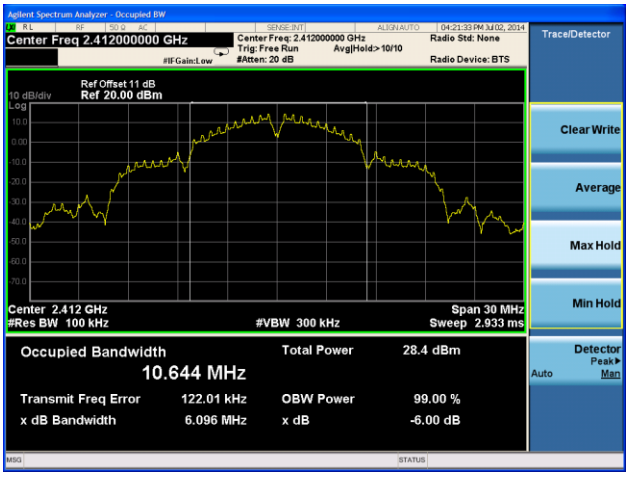


7.2.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Ant 0 / Ant 0 + 1						
802.11b	1	01	2412	6.10	≥0.5	Pass
802.11b	1	06	2437	6.09	≥0.5	Pass
802.11b	1	11	2462	6.09	≥0.5	Pass
802.11g	6	01	2412	16.59	≥0.5	Pass
802.11g	6	06	2437	16.59	≥0.5	Pass
802.11g	6	11	2462	16.59	≥0.5	Pass
802.11n-HT20	13	01	2412	17.82	≥0.5	Pass
802.11n-HT20	13	06	2437	17.81	≥0.5	Pass
802.11n-HT20	13	11	2462	17.83	≥0.5	Pass
802.11n-HT40	27	03	2422	36.53	≥0.5	Pass
802.11n-HT40	27	06	2437	36.51	≥0.5	Pass
802.11n-HT40	27	09	2452	36.55	≥0.5	Pass
Ant 1 / Ant 0 + 1						
802.11b	1	01	2412	6.09	≥0.5	Pass
802.11b	1	06	2437	6.09	≥0.5	Pass
802.11b	1	11	2462	6.09	≥0.5	Pass
802.11g	6	01	2412	16.57	≥0.5	Pass
802.11g	6	06	2437	16.54	≥0.5	Pass
802.11g	6	11	2462	16.56	≥0.5	Pass
802.11n-HT20	13	01	2412	17.71	≥0.5	Pass
802.11n-HT20	13	06	2437	17.73	≥0.5	Pass
802.11n-HT20	13	11	2462	17.77	≥0.5	Pass
802.11n-HT40	27	03	2422	36.44	≥0.5	Pass
802.11n-HT40	27	06	2437	36.48	≥0.5	Pass
802.11n-HT40	27	09	2452	36.50	≥0.5	Pass

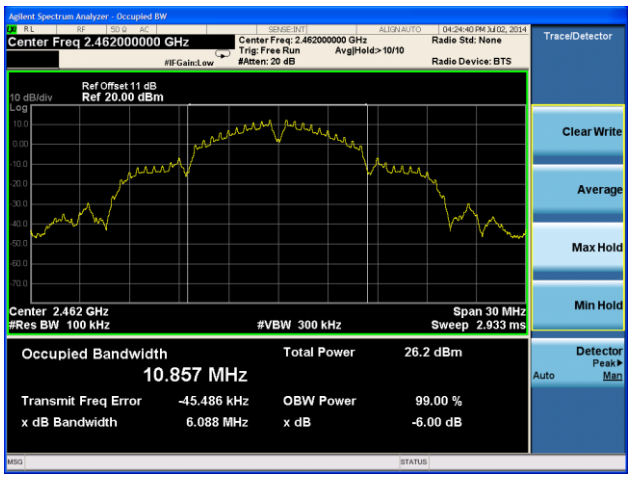
802.11b 6dB Bandwidth - Ant 0 / Ant 0 + 1

Channel 01 (2412MHz)



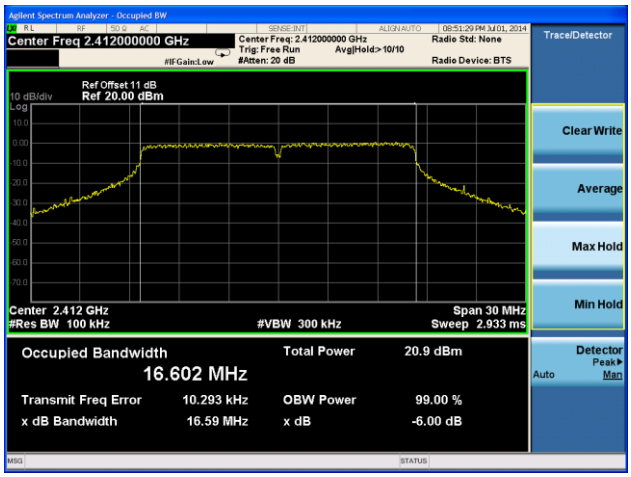
Channel 06 (2437MHz)

Channel 11 (2462MHz)

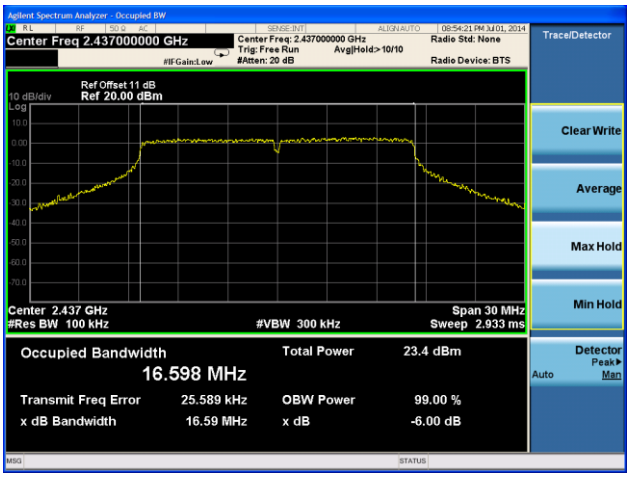


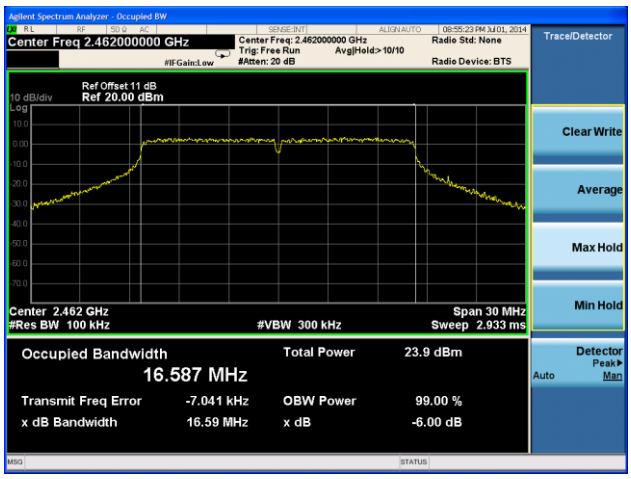
802.11g 6dB Bandwidth - Ant 0 / Ant 0 + 1

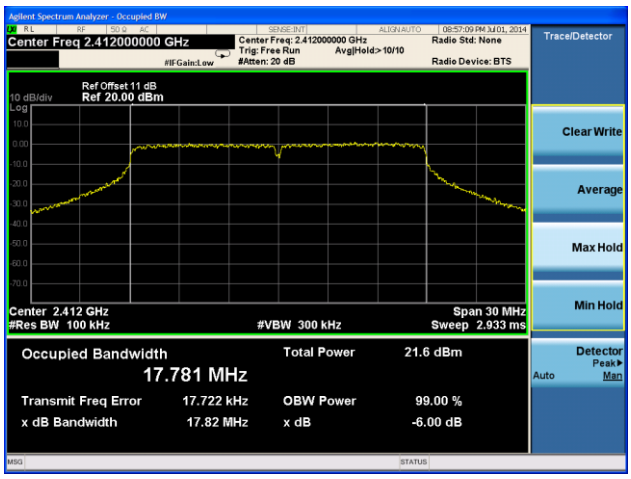
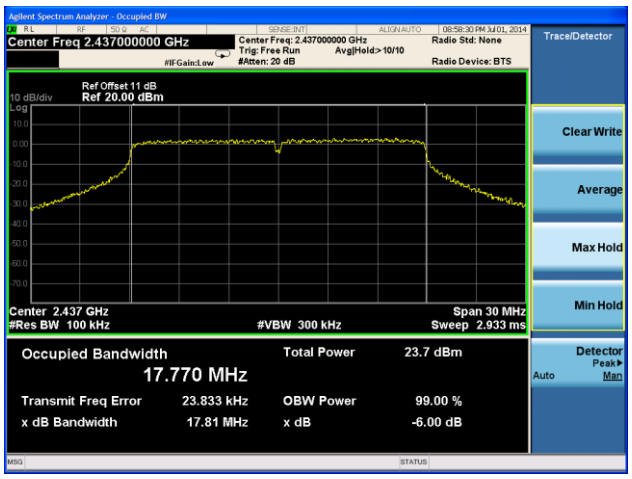
Channel 01 (2412MHz)

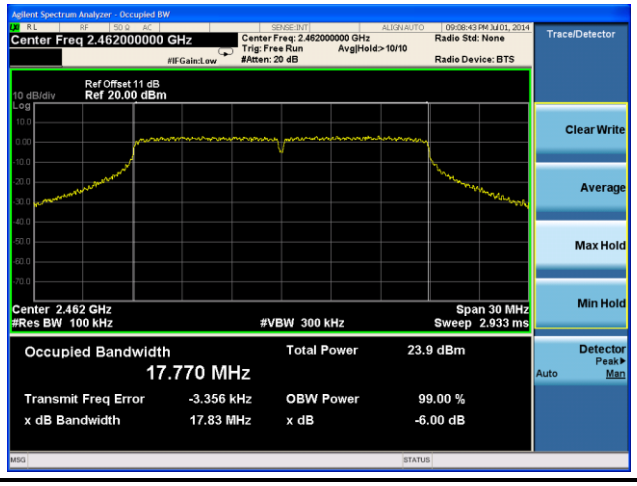


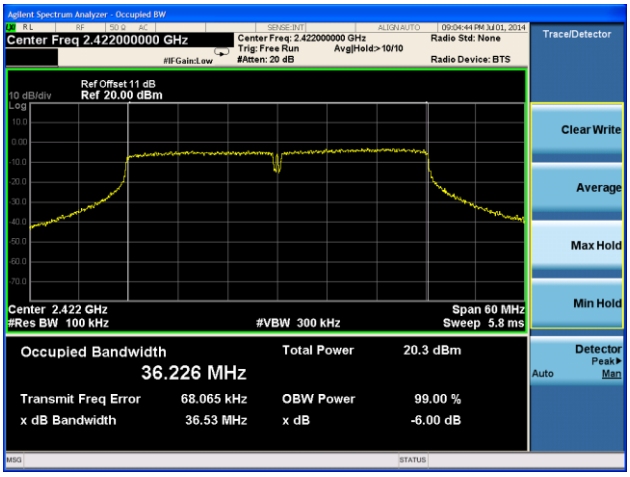
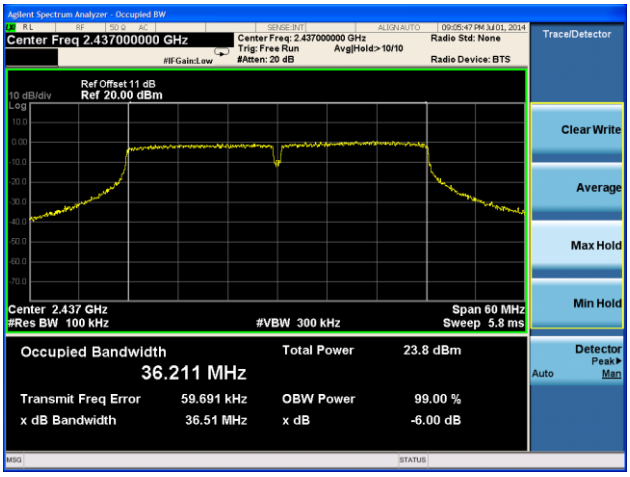
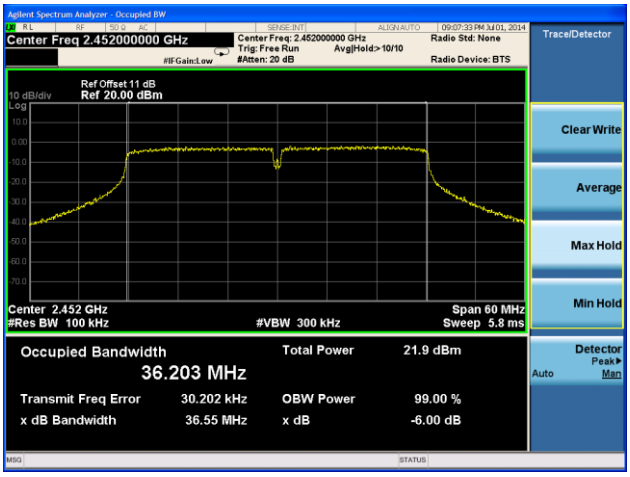
Channel 06 (2437MHz)



Channel 11 (2462MHz)	
	

802.11n-HT20 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	

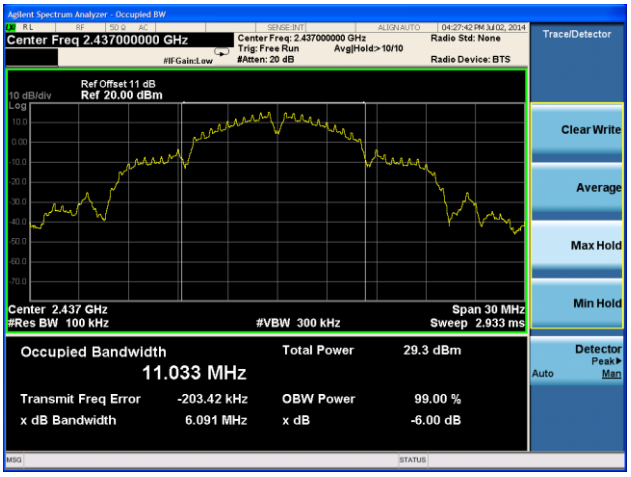
Channel 11 (2462MHz)	
	

802.11n-HT40 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 03 (2422MHz)	**Channel 06 (2437MHz)**
	
Channel 09 (2452MHz)	
	

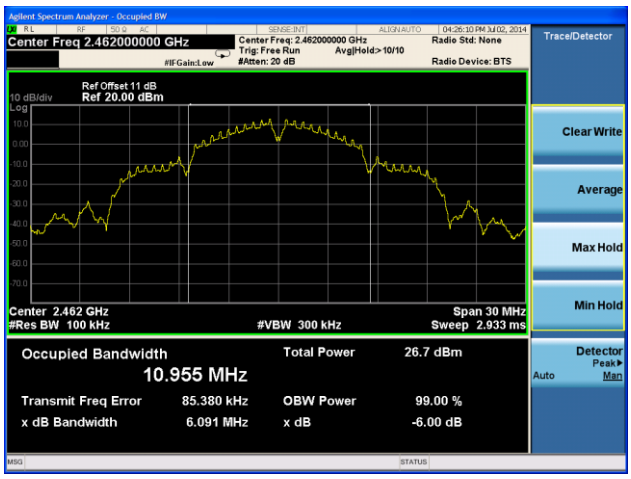
802.11b 6dB Bandwidth - Ant 1 / Ant 0 + 1

Channel 01 (2412MHz)

Channel 06 (2437MHz)

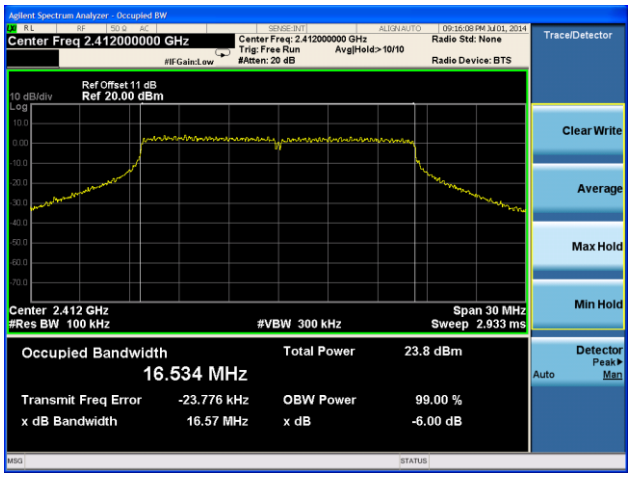


Channel 11 (2462MHz)

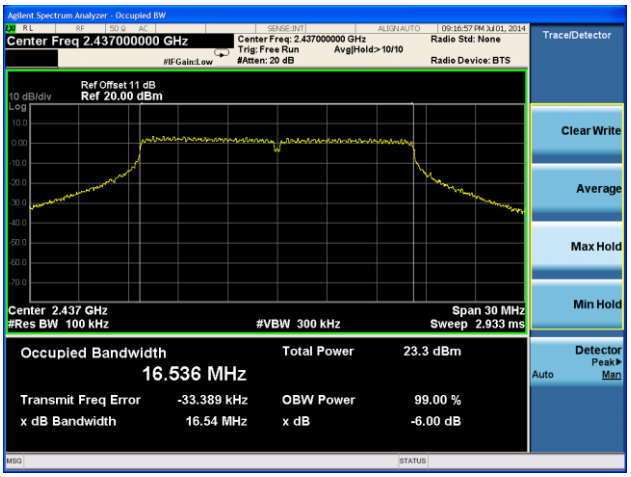


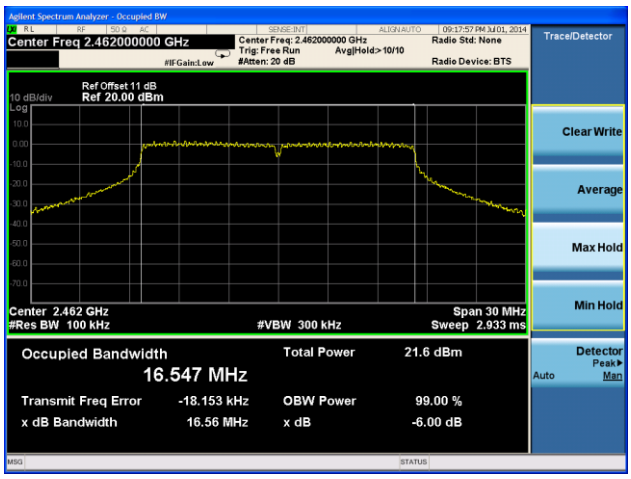
802.11g 6dB Bandwidth - Ant 1 / Ant 0 + 1

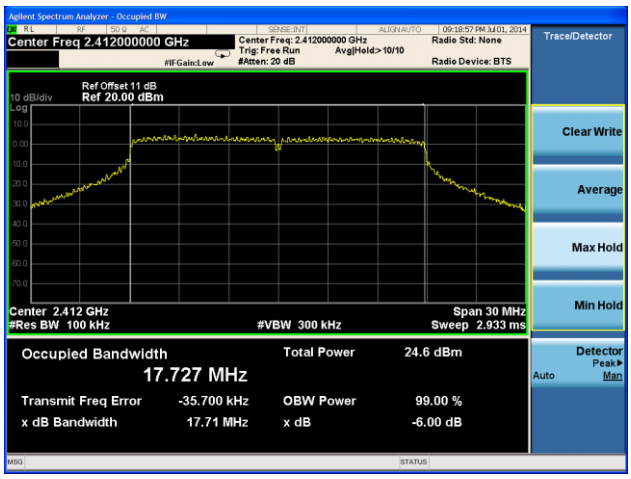
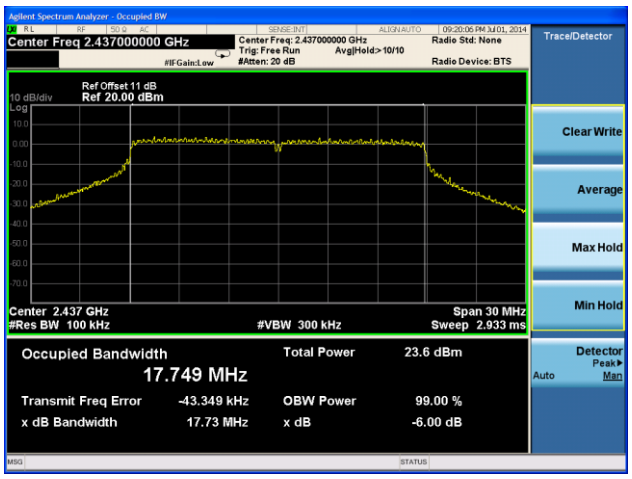
Channel 01 (2412MHz)

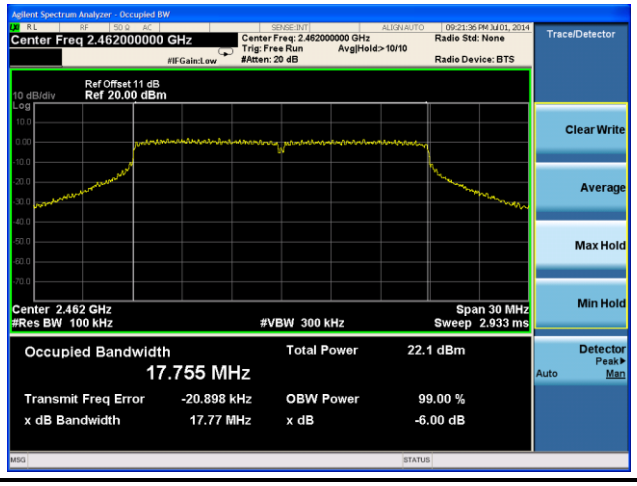


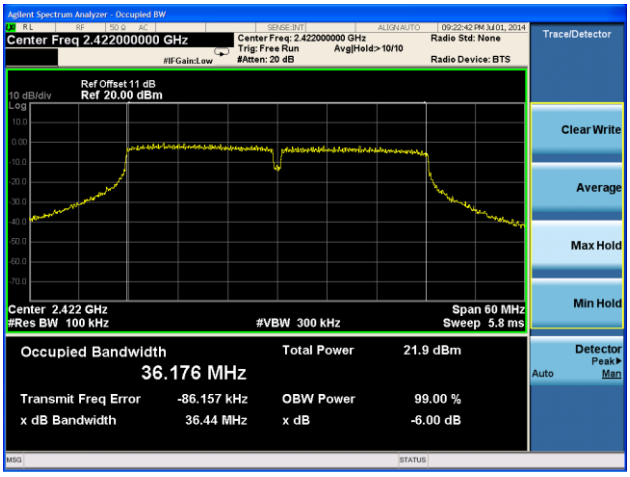
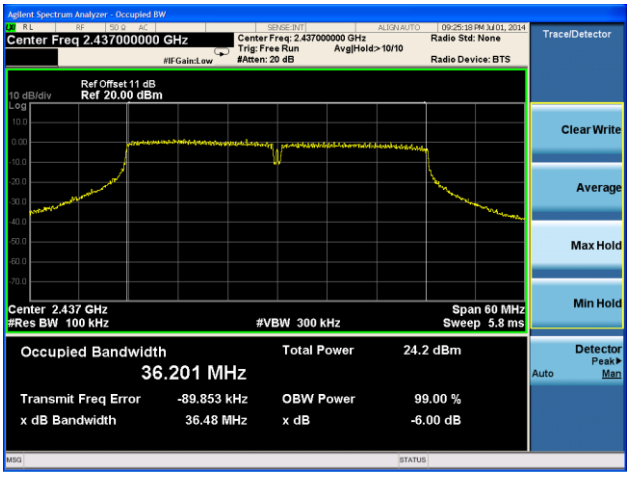
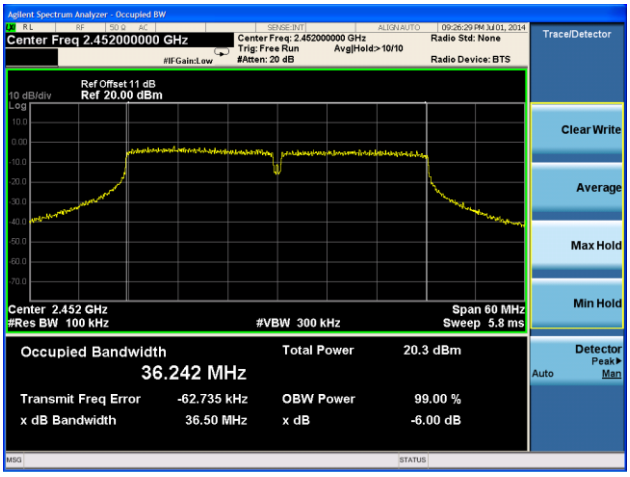
Channel 06 (2437MHz)



Channel 11 (2462MHz)	
	

802.11n-HT20 6dB Bandwidth - Ant 1 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	

Channel 11 (2462MHz)	
	

802.11n-HT40 6dB Bandwidth - Ant 1 / Ant 0 + 1	
Channel 03 (2422MHz)	**Channel 06 (2437MHz)**
	
Channel 09 (2452MHz)	
	

7.3. Output Power Measurement

7.3.1. Test Limit

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

2.412~2.462GHz: Limit (dBm) = 30dBm – (6.96dBi – 6dBi) = 29.04dBm

7.3.2. Test Procedure Used

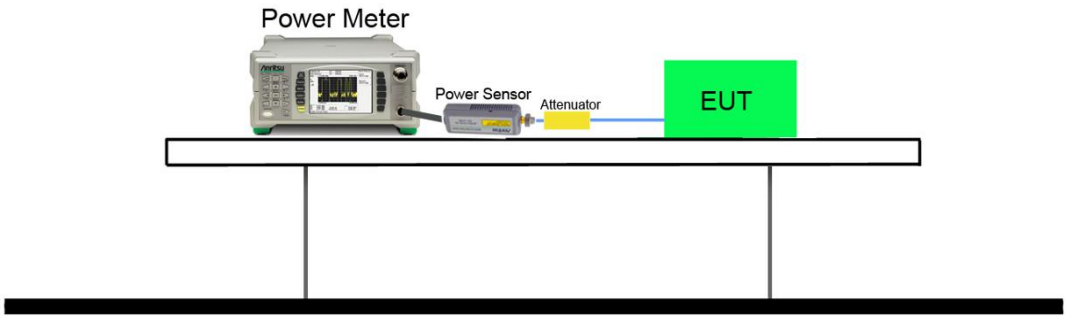
KDB 558074 D01v03r02 - Section 9.1.2 PKPM1 Peak Power Method (for signals with BW ≤ 50MHz)

7.3.3. Test Setting

Method PKPM1 (Peak Power Measurement of Signals with DTS BW ≤ 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 for Ant0:

Test Mode	Bandwidth (MHz)	Channel No.	Frequency (MHz)	Data Rate (Mbps)	Peak Power (dBm)
802.11b	20	6	2437	1	22.76
				5.5	22.74
				11	22.71
802.11g	20	6	2437	6	25.32
				24	25.24
				54	25.01
802.11n	20	6	2437	13	25.37
				52	25.20
				130	25.17
802.11n	40	6	2437	27	25.88
				108	25.79
				270	25.75

Test Result of Peak Output Power

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 Peak Power (dBm)	Ant 1 Peak Power (dBm)	Total Peak Power (dBm)	Limit (dBm)	Result
11b	2	1	1	2412	23.25	23.98	26.64	≤29.04	Pass
11b	2	1	6	2437	22.76	23.49	26.15	≤29.04	Pass
11b	2	1	11	2462	23.12	23.79	26.48	≤29.04	Pass
11g	2	6	1	2412	25.66	25.22	28.46	≤29.04	Pass
11g	2	6	6	2437	25.32	25.61	28.48	≤29.04	Pass
11g	2	6	11	2462	25.41	25.45	28.44	≤29.04	Pass
11n-HT20	2	13	1	2412	25.26	25.61	28.45	≤29.04	Pass
11n-HT20	2	13	6	2437	25.37	25.53	28.46	≤29.04	Pass
11n-HT20	2	13	11	2462	25.21	25.72	28.48	≤29.04	Pass
11n-HT40	2	27	3	2422	25.60	25.34	28.48	≤29.04	Pass
11n-HT40	2	27	6	2437	25.88	25.03	28.49	≤29.04	Pass
11n-HT40	2	27	9	2452	25.15	25.71	28.45	≤29.04	Pass

7.3.6. Test Result of Average Output Power (Reporting Only)

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Limit (dBm)	Result
11b	2	1	1	2412	19.46	19.97	22.73	≤29.04	Pass
11b	2	1	6	2437	19.08	19.74	22.43	≤29.04	Pass
11b	2	1	11	2462	19.24	19.99	22.64	≤29.04	Pass
11g	2	6	1	2412	15.31	15.81	18.58	≤29.04	Pass
11g	2	6	6	2437	15.76	15.96	18.87	≤29.04	Pass
11g	2	6	11	2462	15.42	16.10	18.78	≤29.04	Pass
11n-HT20	2	13	1	2412	15.31	15.76	18.55	≤29.04	Pass
11n-HT20	2	13	6	2437	15.95	15.77	18.87	≤29.04	Pass
11n-HT20	2	13	11	2462	15.24	16.14	18.72	≤29.04	Pass
11n-HT40	2	27	3	2422	14.65	14.70	17.69	≤29.04	Pass
11n-HT40	2	27	6	2437	15.35	15.62	18.50	≤29.04	Pass
11n-HT40	2	27	9	2452	14.66	15.32	18.01	≤29.04	Pass

7.4. Power Spectral Density Measurement

7.4.1. Test Limit

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

2.412~2.462GHz: Limit (dBm) = 8dBm – (7.01dBi – 6dBi) = 6.99dBm

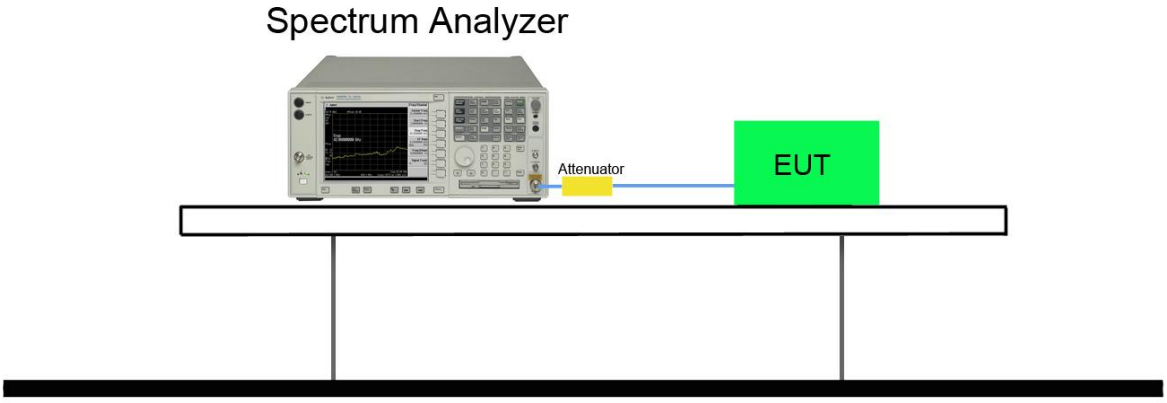
7.4.2. Test Procedure Used

KDB 558074 D01v03r02 - Section 10.2 Method PKPSD

7.4.3. Test Setting

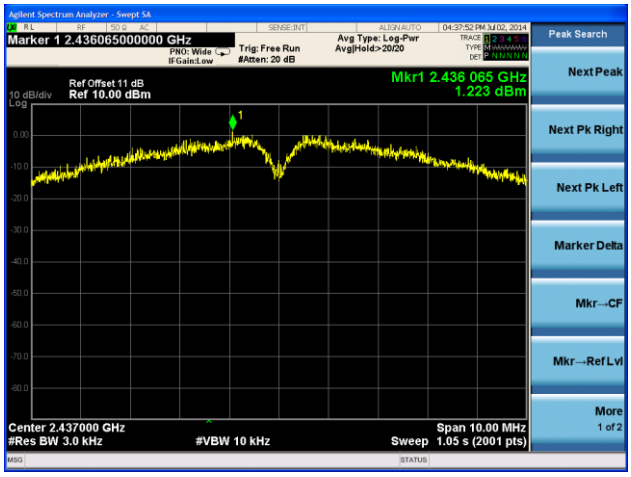
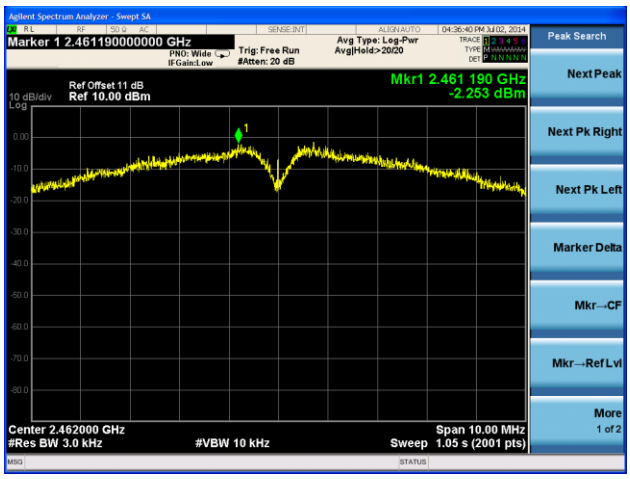
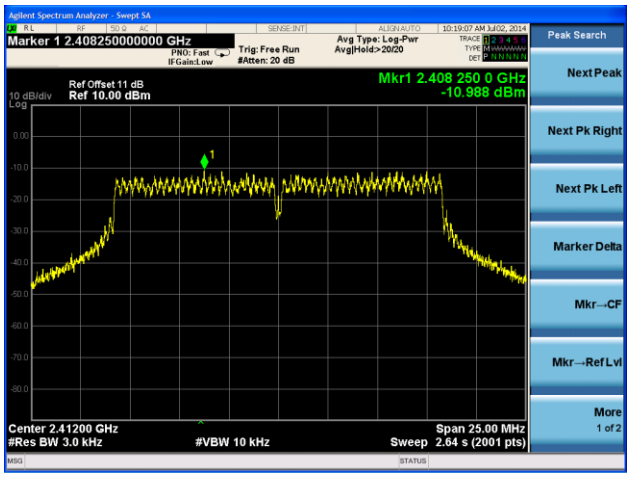
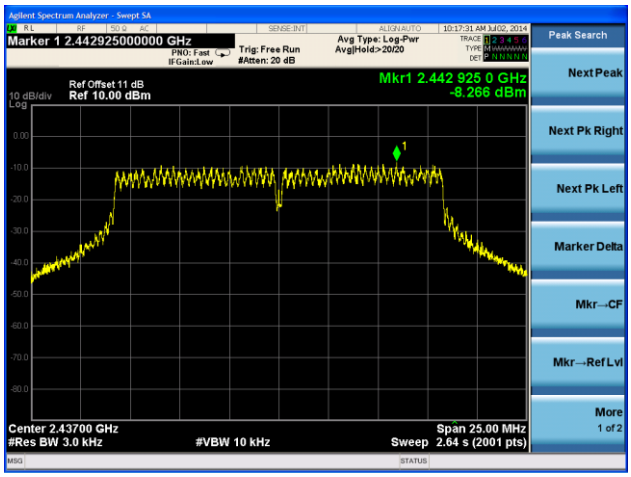
1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 3kHz
4. VBW = 10kHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

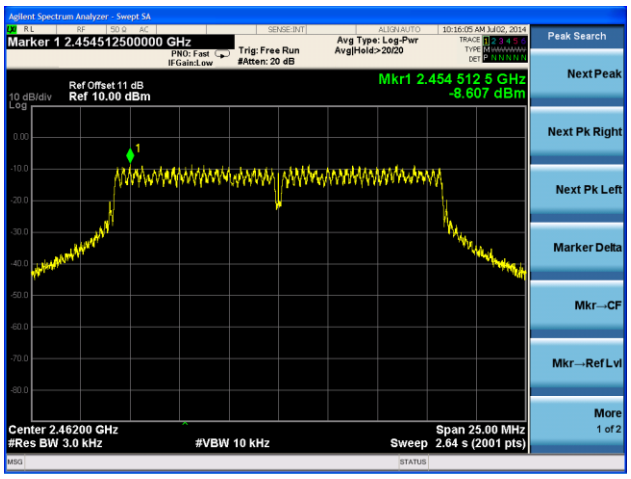
7.4.4. Test Setup

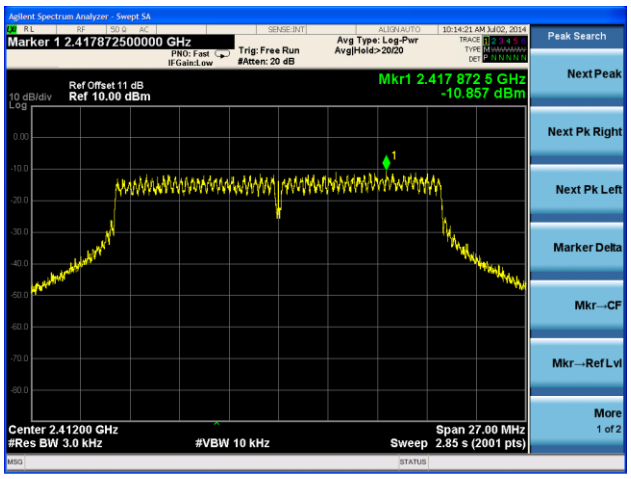
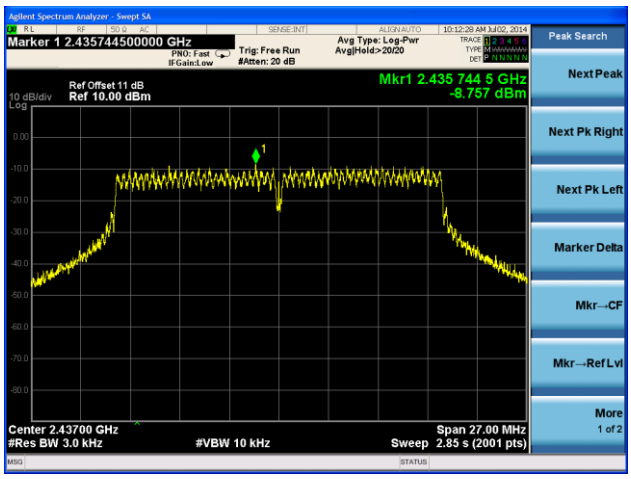
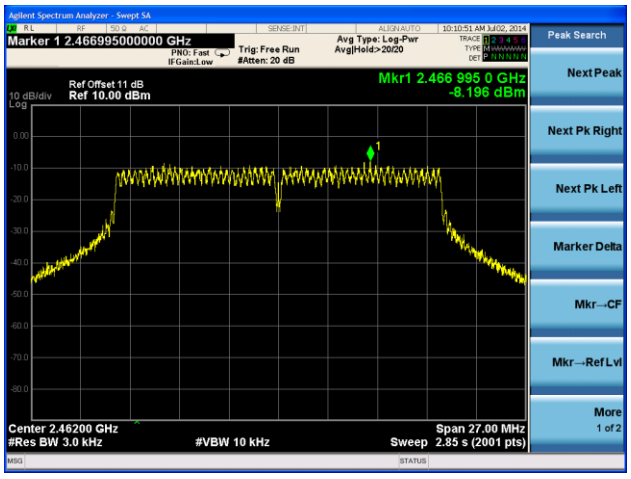


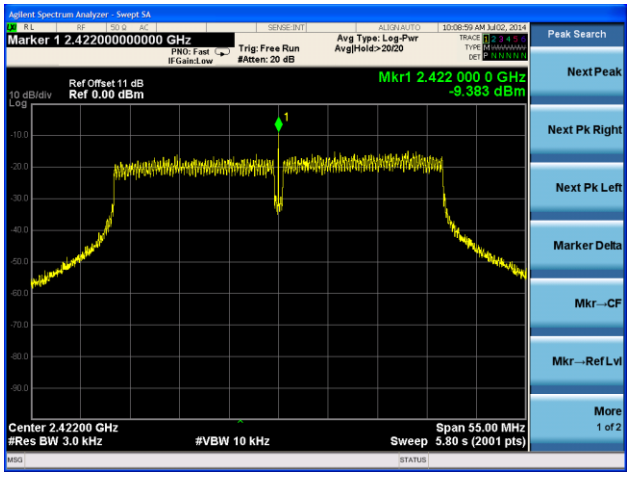
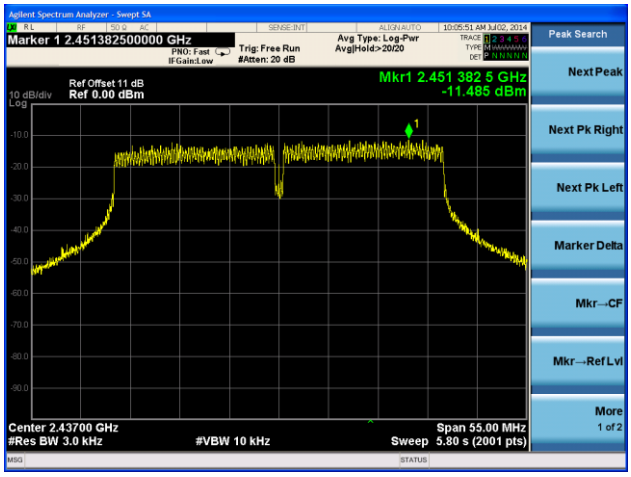
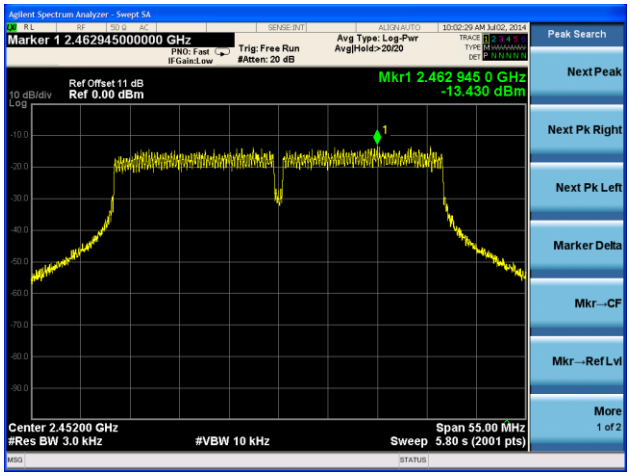
7.4.5. Test Result

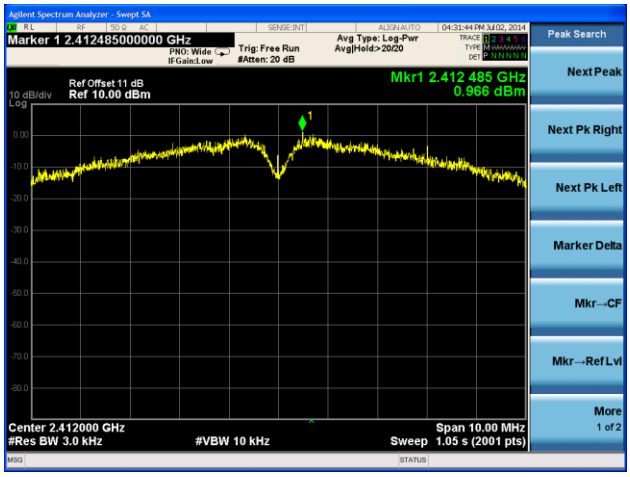
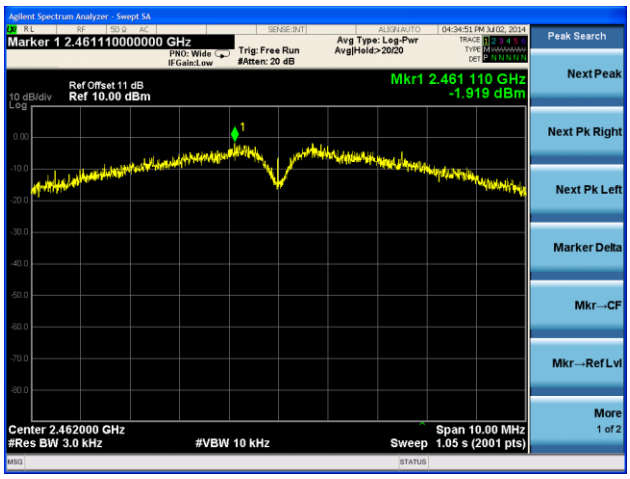
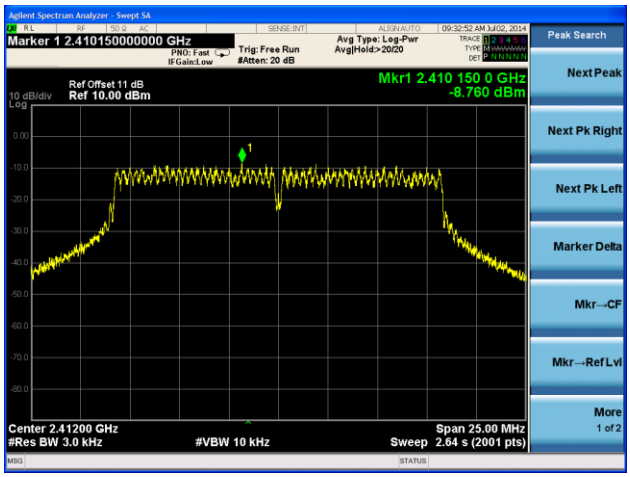
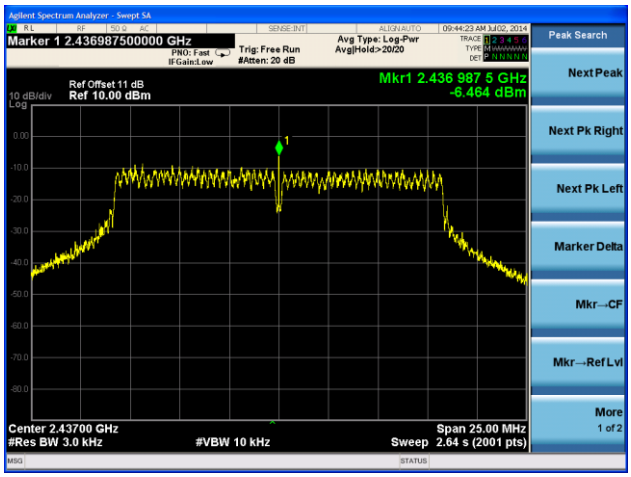
Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm)	Ant 1 PSD (dBm)	Total PSD (dBm)	Limit (dBm / 3kHz)	Result
11b	2	1	1	2412	-0.42	0.97	3.34	≤6.99	Pass
11b	2	1	6	2437	1.22	0.15	3.73	≤6.99	Pass
11b	2	1	11	2462	-2.25	-1.92	0.93	≤6.99	Pass
11g	2	6	1	2412	-10.99	-8.76	-6.72	≤6.99	Pass
11g	2	6	6	2437	-8.27	-6.46	-4.26	≤6.99	Pass
11g	2	6	11	2462	-8.61	-8.70	-5.64	≤6.99	Pass
11n-HT20	2	13	1	2412	-10.86	-6.64	-5.25	≤6.99	Pass
11n-HT20	2	13	6	2437	-8.76	-8.67	-5.70	≤6.99	Pass
11n-HT20	2	13	11	2462	-8.20	-9.49	-5.79	≤6.99	Pass
11n-HT40	2	27	3	2422	-9.38	-11.53	-7.31	≤6.99	Pass
11n-HT40	2	27	6	2437	-11.49	-11.03	-8.24	≤6.99	Pass
11n-HT40	2	27	9	2452	-13.43	-14.83	-11.06	≤6.99	Pass

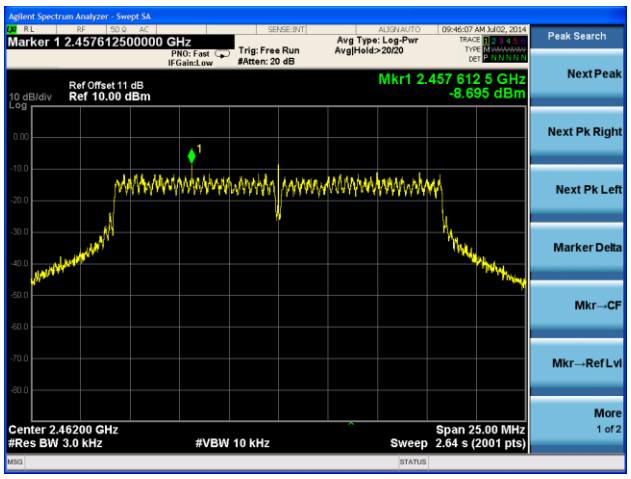
802.11b PSD - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	
Channel 11 (2462MHz)	
	
802.11g PSD - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	

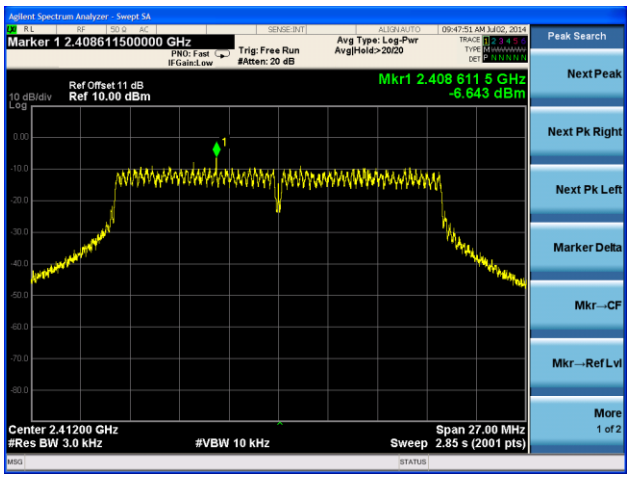
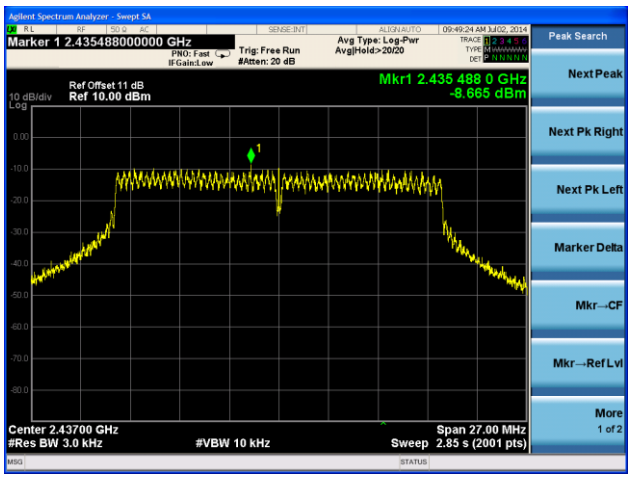
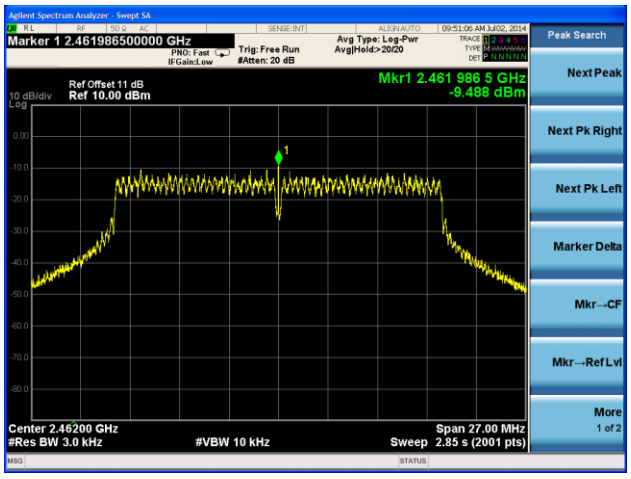
Channel 11 (2462MHz)	
	

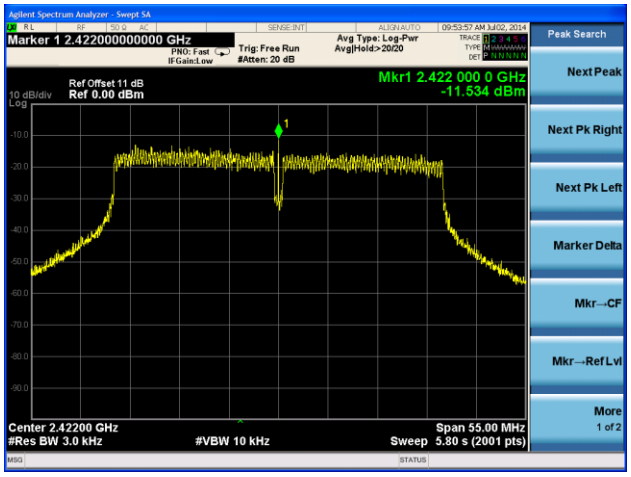
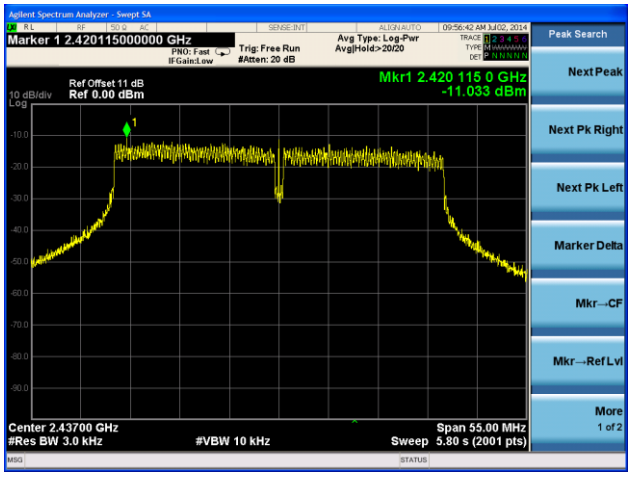
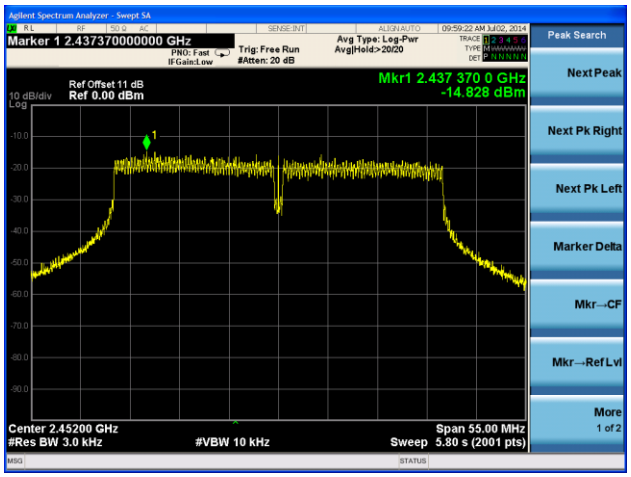
802.11n-HT20 PSD - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	
Channel 11 (2462MHz)	
	

802.11n-HT40 PSD - Ant 0 / Ant 0 + 1	
Channel 03 (2422MHz)	**Channel 06 (2437MHz)**
	
Channel 09 (2452MHz)	
	

802.11b PSD - Ant 1 / Ant 0 + 1	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	
Channel 11 (2462MHz)	
	
802.11g PSD - Ant 1 / Ant 0 + 1	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	

Channel 11 (2462MHz)	
	

802.11n-HT20 PSD - Ant 1 / Ant 0 + 1	
Channel 01 (2412MHz)	**Channel 06 (2437MHz)**
	
Channel 11 (2462MHz)	
	

802.11n-HT40 PSD - Ant 1 / Ant 0 + 1	
Channel 03 (2422MHz)	**Channel 06 (2437MHz)**
	
Channel 09 (2452MHz)	
	

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.

7.5.2. Test Procedure Used

KDB 558074 D01v03r02 – Section 11.2 & Section 11.3

7.5.3. Test Settitng

1. Reference level measurement

(a) Set instrument center frequency to DTS channel center frequency

(b) Set the span to ≥ 1.5 times the DTS bandwidth

(c) Set the RBW = 100 kHz

(d) Set the VBW ≥ 3 x RBW

(e) Detector = peak

(f) Sweep time = auto couple

(g) Trace mode = max hold

(h) Allow trace to fully stabilize

2. Emission level measurement

(a) Set the center frequency and span to encompass frequency range to be measured

(b) RBW = 100kHz

(c) VBW = 300kHz

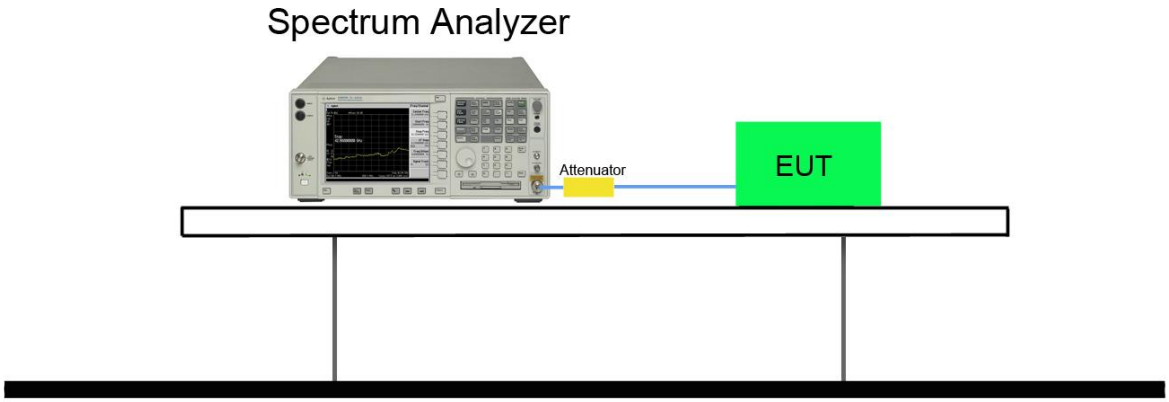
(d) Detector = Peak

(e) Trace mode = max hold

(f) Sweep time = auto couple

(g) The trace was allowed to stabilize

7.5.4. Test Setup



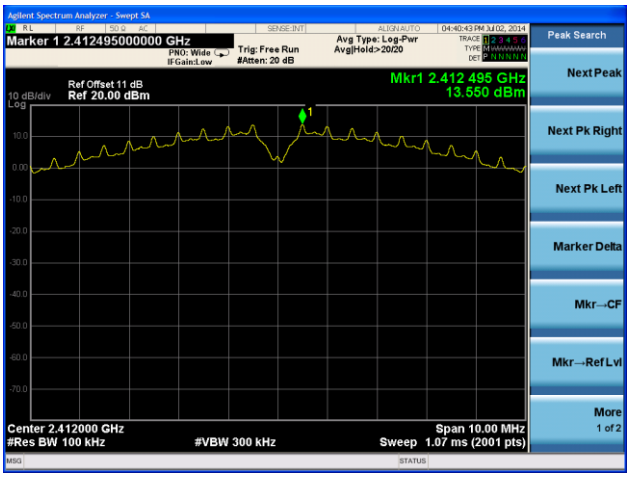
7.5.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Limit	Result
Ant 0 / Ant 0 + 1					
802.11b	1	01	2412	20dBc	Pass
802.11b	1	06	2437	20dBc	Pass
802.11b	1	11	2462	20dBc	Pass
802.11g	6	01	2412	20dBc	Pass
802.11g	6	06	2437	20dBc	Pass
802.11g	6	11	2462	20dBc	Pass
802.11n-HT20	13	01	2412	20dBc	Pass
802.11n-HT20	13	06	2437	20dBc	Pass
802.11n-HT20	13	11	2462	20dBc	Pass
802.11n-HT40	27	03	2422	20dBc	Pass
802.11n-HT40	27	06	2437	20dBc	Pass
802.11n-HT40	27	09	2452	20dBc	Pass
Ant 1 / Ant 0 + 1					
802.11b	1	01	2412	20dBc	Pass
802.11b	1	06	2437	20dBc	Pass
802.11b	1	11	2462	20dBc	Pass
802.11g	6	01	2412	20dBc	Pass
802.11g	6	06	2437	20dBc	Pass
802.11g	6	11	2462	20dBc	Pass
802.11n-HT20	13	01	2412	20dBc	Pass
802.11n-HT20	13	06	2437	20dBc	Pass
802.11n-HT20	13	11	2462	20dBc	Pass
802.11n-HT40	27	03	2422	20dBc	Pass
802.11n-HT40	27	06	2437	20dBc	Pass
802.11n-HT40	27	09	2452	20dBc	Pass

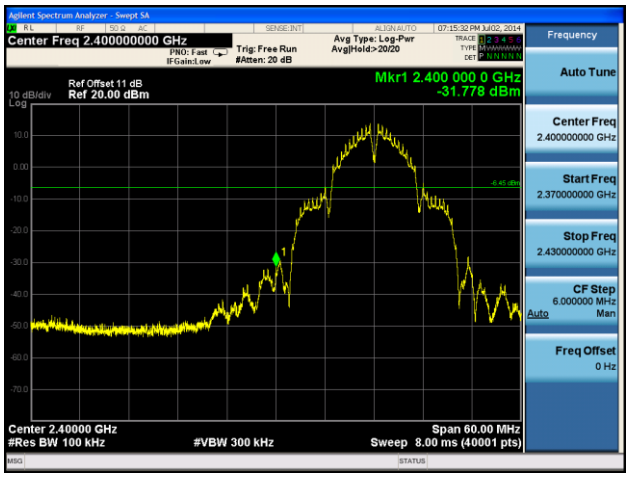
802.11b Out-of-Band Emissions - Ant 0 / Ant 0 + 1

Channel 01 (2412MHz)

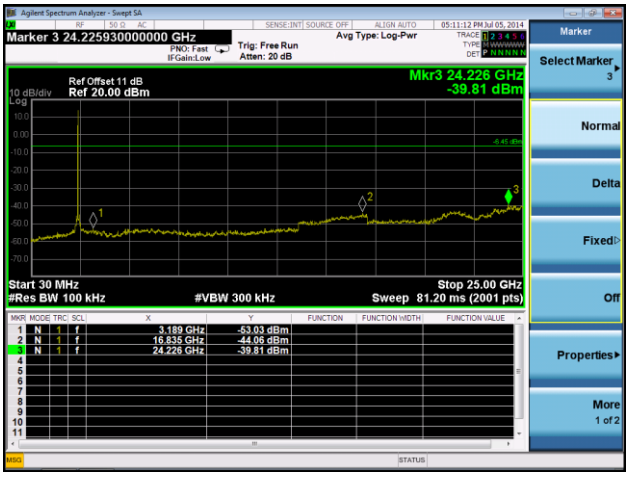
100kHz PSD Reference Level



Low Band Edge

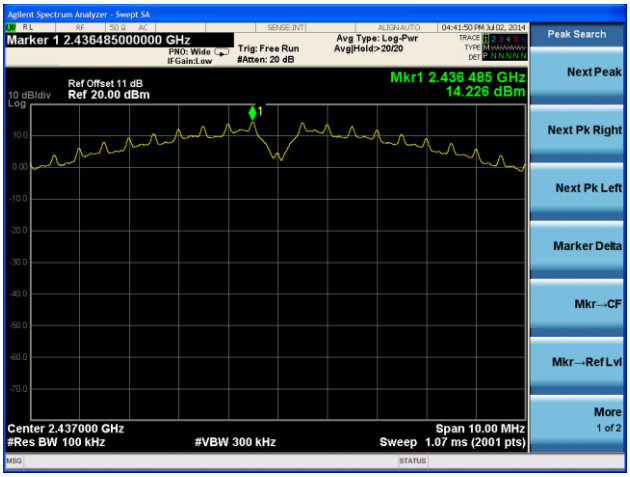


Spurious Emission



Channel 06 (2437MHz)

100kHz PSD Reference Level



Spurious Emission