RF TEST REPORT

Report No.: 17070669-CE-R1

Supersede Report No.:N/A

Applicant	HUMAX Co., Ltd.
Product Name	Cable Set-top box
Main Model No.	1008R-HDD-XXX(XXX=A~Z)
Serial Model No.	1008C-STB-XXX(XXX=A~Z)
Test Standard	FCC Part 15.247: 2017, ANSI C63.10: 2013
Test Date	August 12, 2017 to January 09, 2018
Issue Date	January 10, 2018
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Aaron Liang	David Huang	
Aaron Liang Test Engineer	David Huang Checked By	

This test report may be reproduced in full only

Test result presented in this test report is applicable to the tested sample only

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: China@siemic.com.cn

Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

This page has been left blank intentionally.

CONTENTS

1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070669-CE-R1	NONE	Original	January 10, 2018

2. Customer information

Applicant Name	HUMAX Co., Ltd.
Applicant Add	HUMAX BLDG., 2, Yeongmun-ro, Cheoin-gu Yongin-si, Gyeonggi-do South Korea 17040
Manufacturer	HUMAX Co., Ltd.
Manufacturer Add	HUMAX BLDG., 2, Yeongmun-ro, Cheoin-gu Yongin-si, Gyeonggi-do South Korea 17040

3. Test site information

Test Lab A:

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

Test Lab B:

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	694825
IC Test Site No.	4842B-1
Test Software	EZ_EMC(ver.Icp-03A1)

Note: We just perform Radiated Spurious Emission above 18GHz in the test Lab. B.

4. Equipment under Test (EUT) Information

Description of EUT:	Cable Set-top box
Main Model:	1008R-HDD-XXX(XXX=A~Z)
Serial Model:	1008C-STB-XXX(XXX=A~Z)
Date EUT received:	August 11, 2017
Test Date(s):	August 12, 2017 to January 09, 2018
Equipment Category：	DTS
Antenna Gain:	WIFI(2.4G): Antenna (Green): 1.9 dBi Antenna (Gray): 2.8 dBi Antenna (Black): 1.7 dBi WIFI(5150-5250MHz): Antenna (Green): 3.9 dBi Antenna (Gray): 3.8 dBi Antenna (Black): 2.5 dBi WIFI(5250-5350MHz): Antenna (Green): 3.8 dBi Antenna (Gray): 3.9 dBi Antenna (Black): 3.8 dBi WIFI(5470-5725MHz): Antenna (Green): 3.6 dBi Antenna (Gray): 3.9 dBi Antenna (Black): 3.7 dBi WIFI(5725-5850MHz): Antenna (Green): 3.8 dBi Antenna (Gray): 3.8 dBi Antenna (Black): 2.7 dBi RF4CE: Antenna 0: 2.35 dBi Antenna 1: 2.28 dBi
Antenna Type:	WIFI: Dipole antenna RF4CE: PCB antenna
Type of Modulation:	802.11b: DSSS 802.11g/n20/n40/a/ac20/ac40/ac80: OFDM RF4CE: O-QPSK

RF Operating Frequency (ies):	WIFI: 802.11b/g: 2412-2462 MHz(TX/RX) WIFI: 802.11n(20M): 2412-2462 MHz; 5180-5240 MHz; 5260-5320 MHz; 5500-5700 MHz; 5745-5825 MHz; (TX/RX) WIFI: 802.11n(40M): 2422-2452 MHz; 5190-5230 MHz; 5270-5310 MHz; 5510-5710 MHz; 5755-5795 MHz; (TX/RX) 802.11a: 5180-5240 MHz; 5260-5320 MHz; 5500-5700 MHz; 5745-5825 MHz; (TX/RX) 802.11ac 20: 5180-5240 MHz; 5260-5320 MHz; 5500-5700 MHz; 5745-5825 MHz; (TX/RX) 802.11ac 40: 5190-5230 MHz; 5270-5310 MHz; 5510-5710 MHz; 5755-5795 MHz; (TX/RX) 802.11ac 80: 5210 MHz; 5290 MHz; 5530-5690 MHz; 5775 MHz; (TX/RX) RF4CE: 2405-2480 MHz
Max. Output Power:	802.11b: 18 dBm 802.11g: 18 dBm 802.11n(20M): 18.1dBm 802.11n(40M): 18.7 dBm
EIRP:	802.11b: 20.8 dBm 802.11g: 20.8 dBm 802.11n(20M): 20.9 dBm 802.11n(40M): 21.5 dBm
Number of Channels:	WIFI :802.11b/g: 11CH WIFI :802.11a: 25CH WIFI :802.11n20: 11CH(2.4GHz); 25CH(5GHz) WIFI :802.11n40: 7CH(2.4GHz); 12CH(5GHz) WIFI :802.11ac20: 25CH WIFI :802.11ac40: 12CH WIFI :802.11ac80: 6CH RF4CE:16CH
Port:	Please refer to the user manual

	Adapter
	Model: ADP-30LR A
Input Power:	Input: 100-240V~0.5A, 50/60Hz
	Output: 12V DC, 2.5A
Trade Name :	LGI
FCC ID:	O6ZEOS-1008C

5 Power level in software

Power level setup in software					
Test Mode	Antenna Path	Channel	Software setup		
			Antenna (Green) (dBm)	Antenna (Gray) (dBm)	Antenna (Black) (dBm)
B	SISO	1	58	56	58
		6	58	56	58
		11	58	56	58
G	SISO	1	66	62	66
		6	66	64	66
		10	66	64	66
		11	60	58	66
N20	MIMO	1	48	48	48
		6	48	48	48
		11	48	48	48
N40	MIMO	3	42	42	42
		4	42	42	42
		5	42	42	42
		6	42	42	42
		7	38	38	38
		8	38	38	38
		9	38	38	38

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.247 (a)(2)	DTS (6 dB&20 dB) CHANNEL BANDWIDTH	Compliance
§15.247(b)(3)	Conducted Maximum Output Power	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247(d)	Band-Edge & Unwanted Emissions into Non-Restricted Frequency Bands	Compliance
§15.207 (a),	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

Measurement Uncertainty

Emissions		
Test Item	**Description**	**Uncertainty**
Band Edge and Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

6. Measurements, Examination And Derived Results

6.1 Antenna Requirement

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.
The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.

b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has three attached Dipole antennas for 2.4GHz WIFI /5GHz WIFI and two attached PCB antennas for RF4CE.

MIMO mode:
FCC KDB 662911 D01 Mutiple Transmitter Output V02r01
For CDD transmissions, directional gain is calculateed as
Dirctional Gain= GANT+ Array Gain, where Array Gain is as follows.
For power spectral desity(PSD) measurements on all devices.
Array Gain=10 log(NANT/NSS=1)
For power measurements on IEEE802.11 devices,
Array Gain=0 dB (i.e, no array gain) for NANT<=4.
The EUT support CDD mode, for Power and PSD, the directional gain is following F)2)f)i)
The directional gain "DG" is calculated as following table.

Mode	Antenna (Green) (dBi)	Antenna (Gray) (dBi)	Antenna (Black) (dBi)	DG For Power (dBi)	DG For PSD (dBi)	Power Limit Reduction	PSD Limit Reduction
2.4GHz	1.9	2.8	1.7	2.8	6.92	0	0.92
5G(5150-5250)	3.9	3.8	2.5	3.9	8.19	0	2.19
5G(5250-5350)	3.8	3.9	3.8	3.8	8.6	0	2.6
5G (5470-5725)	3.6	3.9	3.7	3.9	8.51	0	2.51
5G (5725-5850)	3.8	3.8	2.7	3.8	8.22	0	2.22

Power Limit Reduction= DG(Power)-6dBi,(min=0)

PSD Limit Reduction= DG(Power)-6dBi,(min=0)

DG: Directional Gain

SISO:

WIFI:

Mode	Antenna (Green) (dBi)	Antenna (Gray) (dBi)	Antenna (Black) (dBi)	Power Limit Reduction	PSD Limit Reduction
2.4GHz (802.11b; 802.11g)	1.9	2.8	1.7	0	0
5G(5150-5250) (802.11a)	3.9	3.8	2.5	0	0
5G(5250-5350) (802.11a)	3.8	3.9	3.8	0	0
5G (5470-5725) (802.11a)	3.6	3.9	3.7	0	0
5G (5725-5850) (802.11a)	3.8	3.8	2.7	0	0

Zigbee:

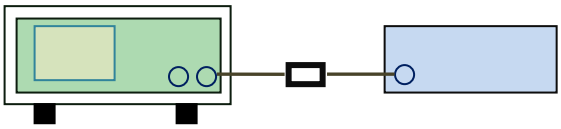
Mode	Antenna 0 (dBi)	Antenna 1 (dBi)	Power Limit Reduction	PSD Limit Reduction
2.4GHz (Zigbee)	1.9	2.8	0	0

The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 DTS (6 dB&20 dB) Channel Bandwidth

Temperature	23°C
Relative Humidity	55%
Atmospheric Pressure	1012mbar
Test date :	January 04, 2018
Tested By :	Aaron Liang

Spec	Item	Requirement	Applicable
§ 15.247(a)(2)	a)	6dB BW≥ 500kHz;	☑
RSS Gen(4.6.1)	b)	99% BW: For FCC reference only; required by IC.	☑
Test Setup			
Test Procedure	558074 D01 DTS MEAS Guidance v04, 8.1 DTS bandwidth 6dB bandwidth a) Set RBW = 100 kHz. b) Set the video bandwidth (VBW) ≥ 3 × RBW. c) Detector = Peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) Measure the maximum width of the emission that is constrained by the freq uencies associated with the two outermost amplitude points (upper and lower fr equencies) that are attenuated by 6 dB relative to the maximum level measure d in the fundamental emission. 20dB bandwidth C63.10 Occupied Bandwidth (OBW=20dB bandwidth) 1. Set RBW = 1%-5% OBW. 2. Set the video bandwidth (VBW) ≥ 3 x RBW. 3. Set the span range between 2 times and 5 times of the OBW. 4. Sweep time=Auto, Detector=PK, Trace=Max hold. 5. Once the reference level is established, the equipment is conditioned with t ypical modulating signals to produce the worst-		

	case (i.e., the widest) bandwidth. Unless otherwise specified for an unlicensed wireless device, measure the bandwidth at the 20 dB levels with respect to the reference level.
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

6dB Bandwidth measurement result

Type	Test mode	CH	Freq (MHz)	Result (MHz)			Limit (MHz)	Result
				Antenna (Green)	Antenna (Gray)	Antenna (Black)		
6dB BW	802.11b	Low	2412	8.781	8.542	8.585	≥ 0.5	Pass
		Mid	2437	8.851	8.141	8.473	≥ 0.5	Pass
		High	2462	8.733	8.496	8.582	≥ 0.5	Pass
	802.11g	1	2412	16.34	16.38	16.37	≥ 0.5	Pass
		6	2437	16.35	16.40	16.39	≥ 0.5	Pass
		10	2457	16.42	16.42	16.474	≥ 0.5	Pass
		11	2462	16.38	16.37	16.36	≥ 0.5	Pass
	802.11n (20M)	1	2412	17.59	17.57	17.58	≥ 0.5	Pass
		6	2437	17.59	17.59	17.61	≥ 0.5	Pass
		11	2462	17.57	17.58	17.58	≥ 0.5	Pass
	802.11n (40M)	3	2422	36.35	36.35	36.42	≥ 0.5	Pass
		6	2437	36.45	36.43	36.46	≥ 0.5	Pass
		7	2442	36.42	36.43	36.43	≥ 0.5	Pass
		8	2447	36.44	36.45	36.45	≥ 0.5	Pass
		9	2452	36.45	36.50	36.50	≥ 0.5	Pass

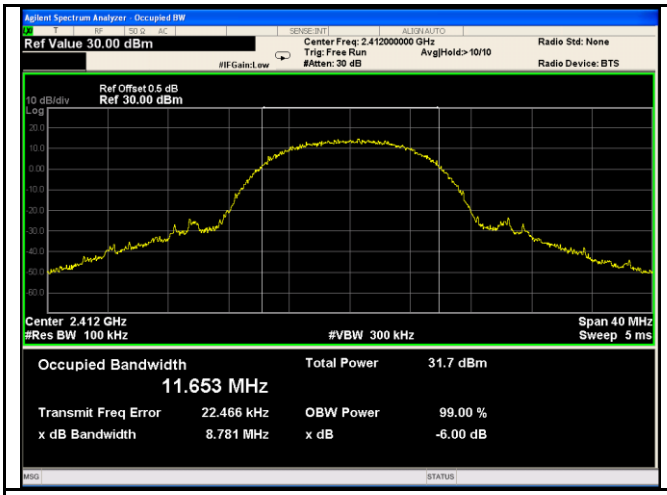
20 dB Bandwidth measurement result

Type	Test mode	CH	Freq (MHz)	Result (MHz)			Result
				Antenna (Green)	Antenna (Gray)	Antenna (Black)	
20dB BW	802.11b	Low	2412	13.43	13.46	13.46	Pass
		Mid	2437	13.43	13.42	13.08	Pass
		High	2462	13.52	13.41	13.33	Pass
	802.11g	1	2412	19.21	19.29	19.35	Pass
		6	2437	19.35	19.23	19.25	Pass
		10	2457	19.17	19.17	19.10	Pass
		11	2462	19.45	19.17	19.21	Pass
	802.11n (20M)	1	2412	19.75	19.84	19.61	Pass
		6	2437	19.82	19.83	19.79	Pass
		11	2462	19.47	19.70	19.77	Pass
	802.11n (40M)	3	2422	38.88	38.65	38.89	Pass
		6	2437	39.08	39.19	38.95	Pass
		7	2442	39.54	39.48	39.63	Pass
		8	2447	39.52	39.33	39.96	Pass
		9	2452	39.26	39.19	39.05	Pass

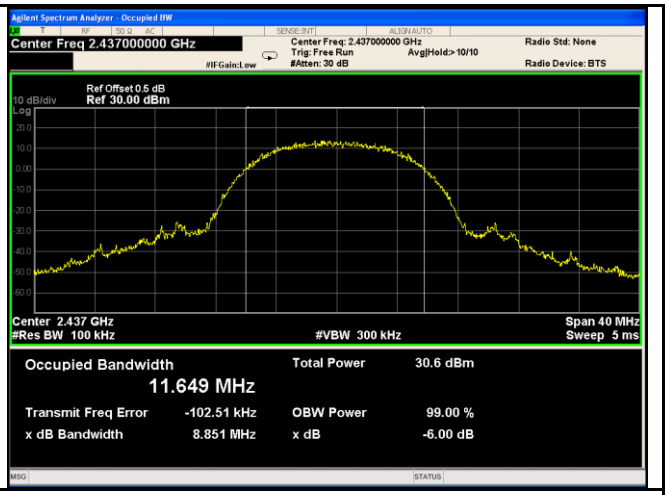
Test Plots

6dB Bandwidth measurement result

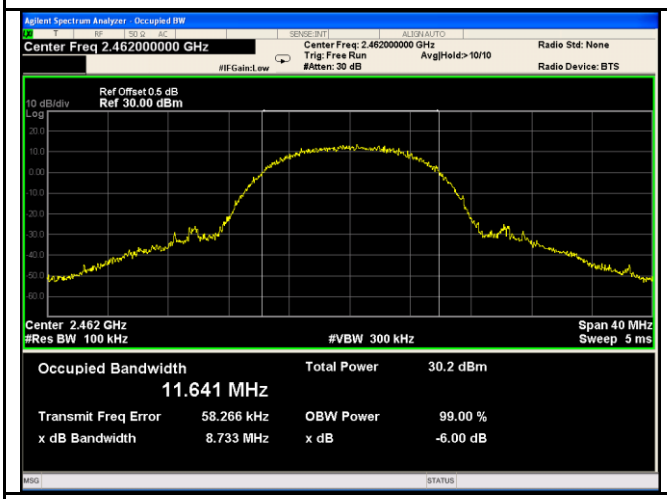
Antenna (Green):



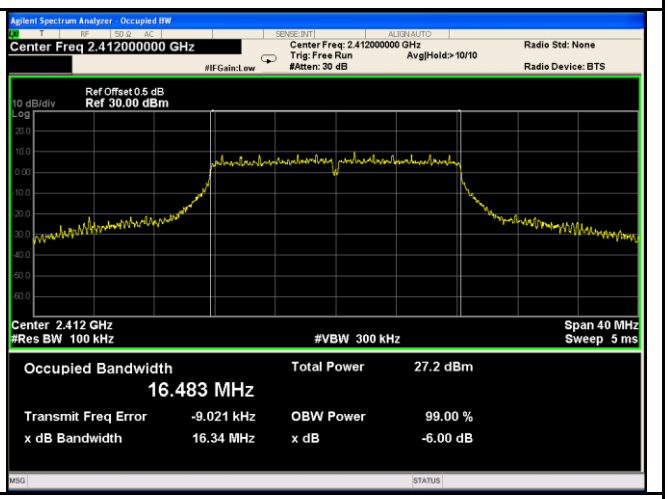
802.11b 6dB Bandwidth - Low CH 2412



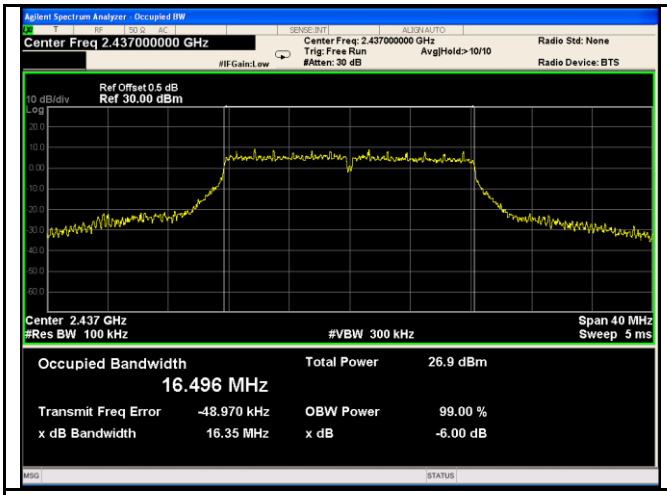
802.11b 6dB Bandwidth - Mid CH 2437



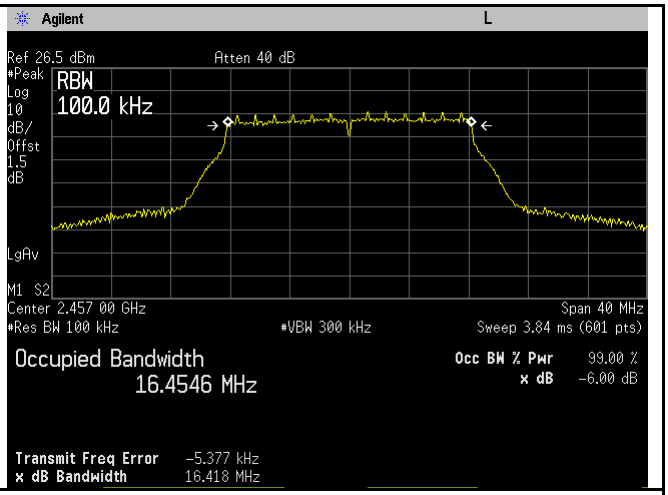
802.11b 6dB Bandwidth - High CH 2462



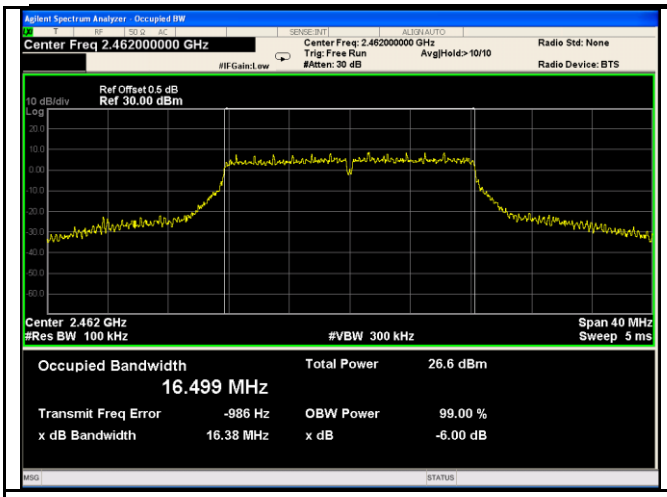
802.11g 6dB Bandwidth - 1 CH 2412



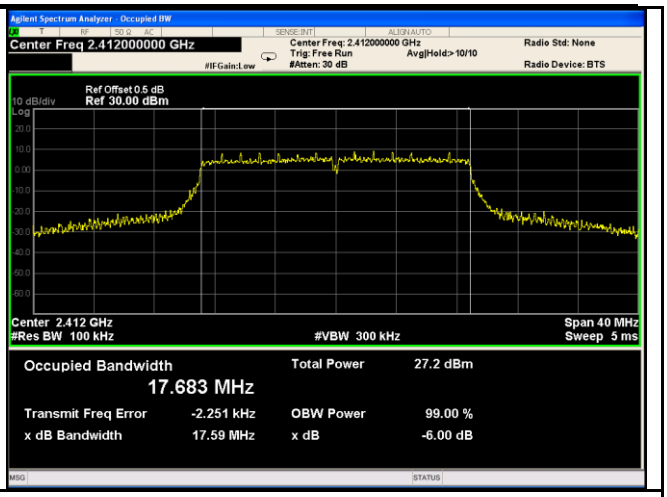
802.11g 6dB Bandwidth - 6 CH 2437



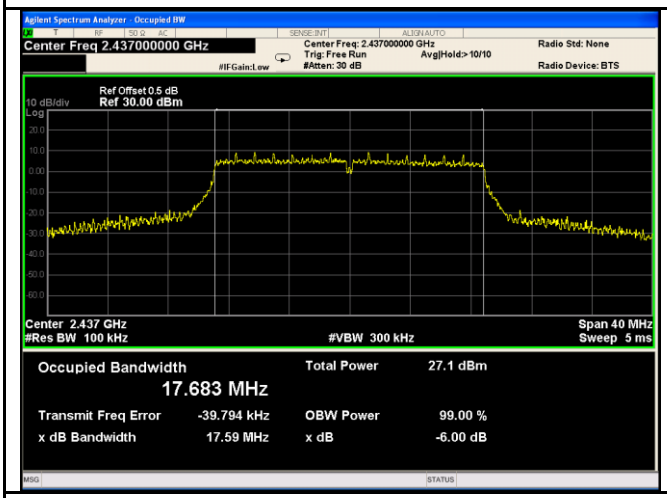
802.11g 6dB Bandwidth - 10 CH 2457



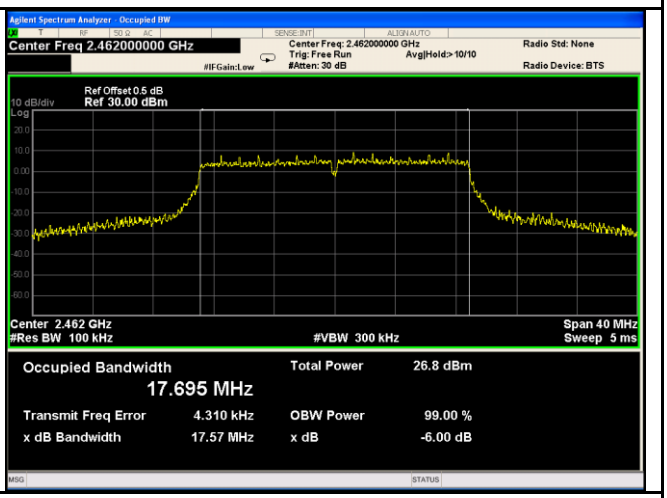
802.11g 6dB Bandwidth - 11 CH 2462



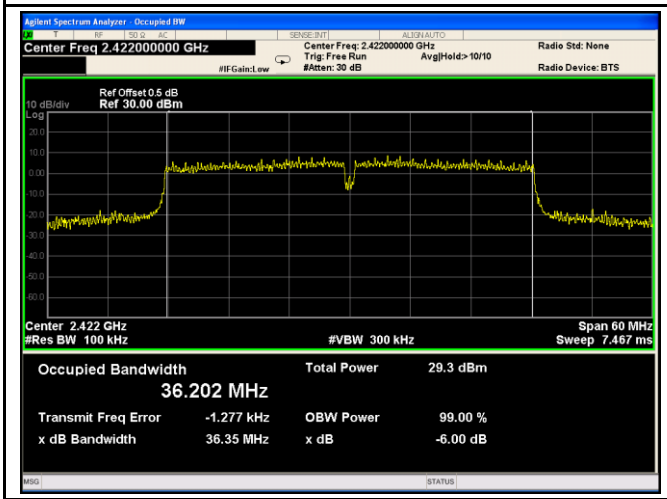
802.11n20 6dB Bandwidth - 1 CH 2412



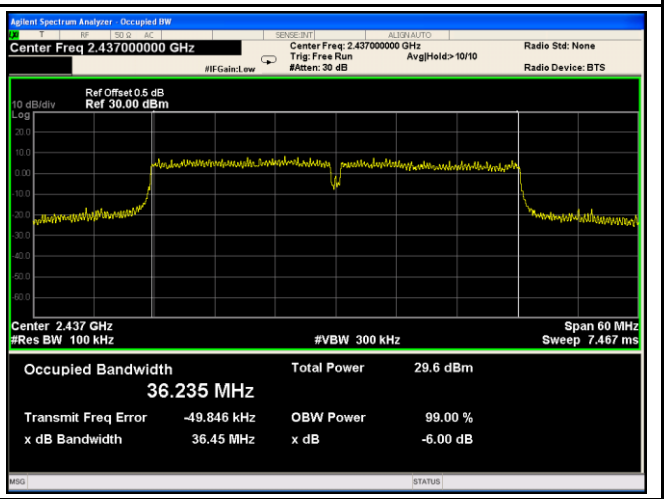
802.11n20 6dB Bandwidth - 6 CH 2437



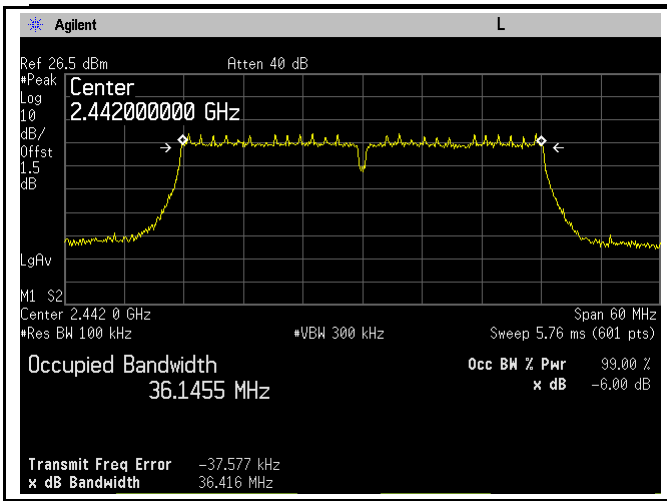
802.11n20 6dB Bandwidth - 11 CH 2462



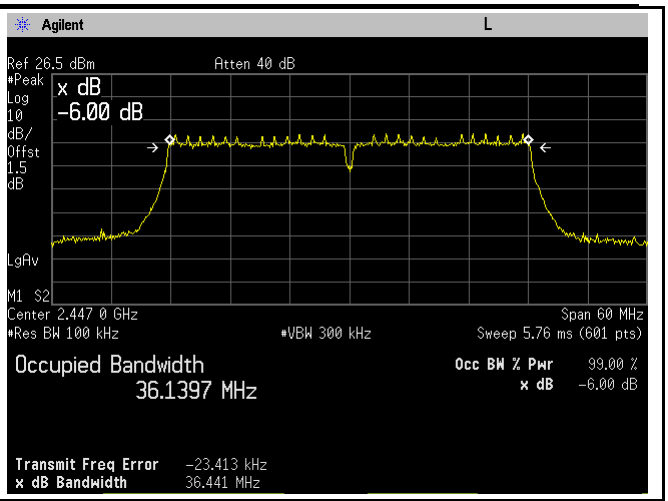
802.11n40 6dB Bandwidth - 3 CH 2422



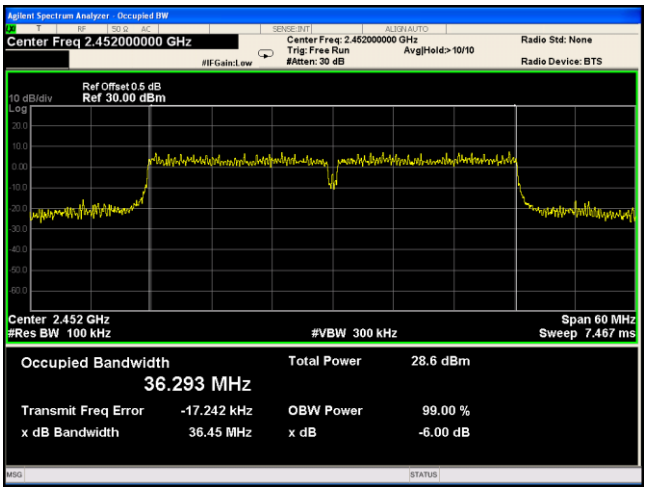
802.11n40 6dB Bandwidth – 6 CH 2437



802.11n40 6dB Bandwidth - 7 CH 2442

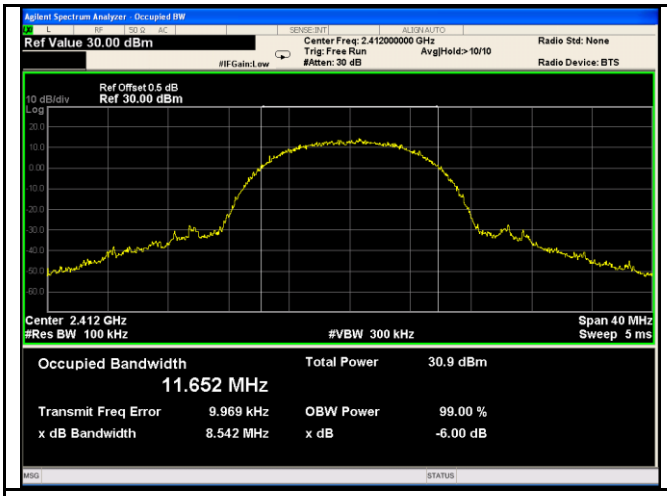


802.11n40 6dB Bandwidth - 8 CH 2447

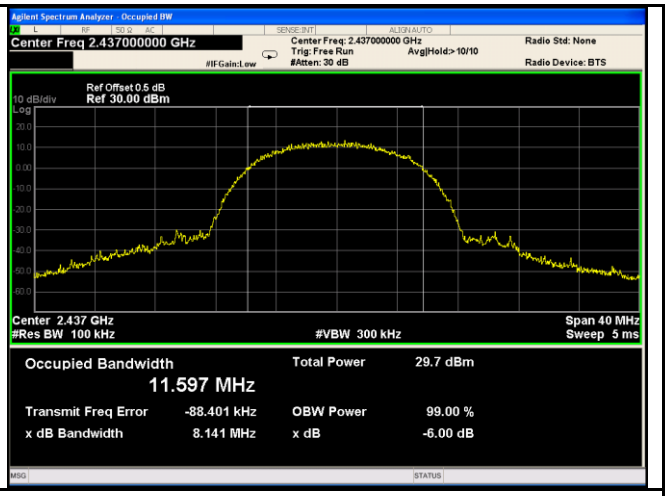


802.11n40 6dB Bandwidth - 9 CH 2452

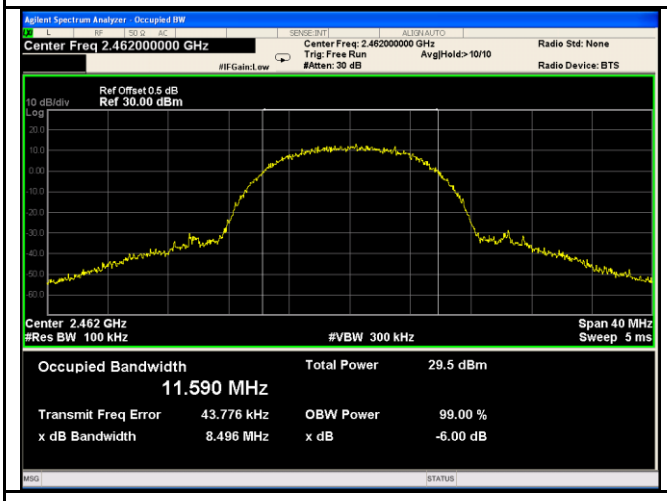
Antenna (Gray):



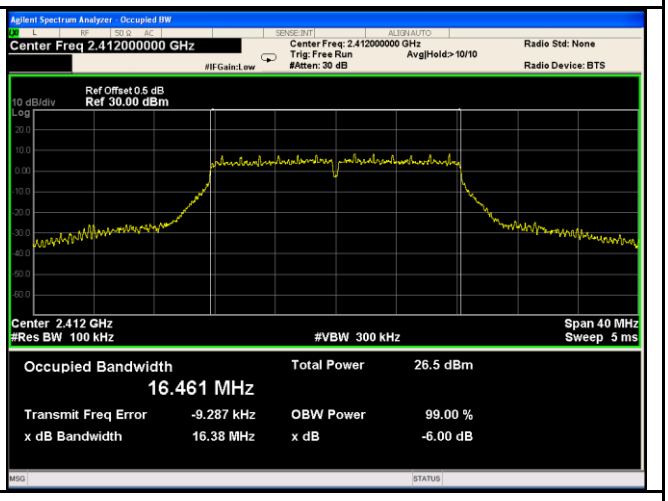
802.11b 6dB Bandwidth - Low CH 2412



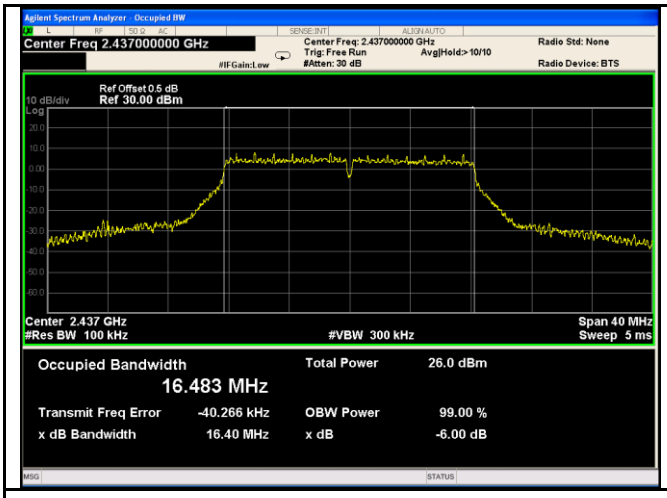
802.11b 6dB Bandwidth - Mid CH 2437



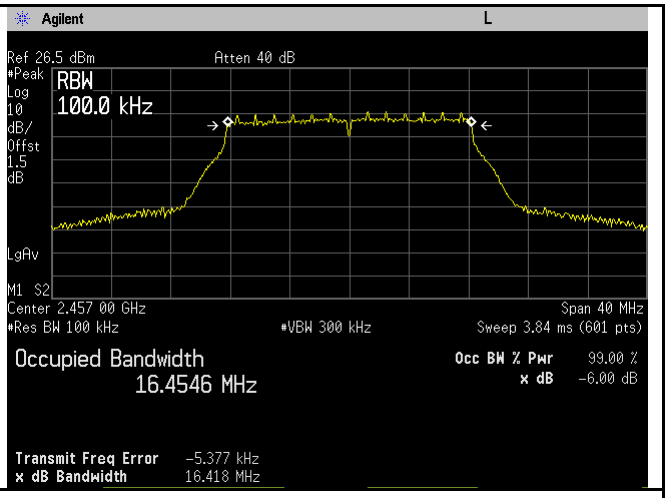
802.11b 6dB Bandwidth - High CH 2462



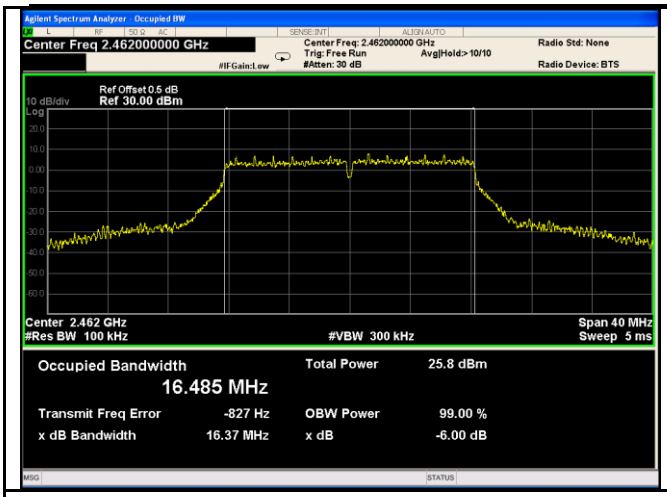
802.11g 6dB Bandwidth - 1 CH 2412



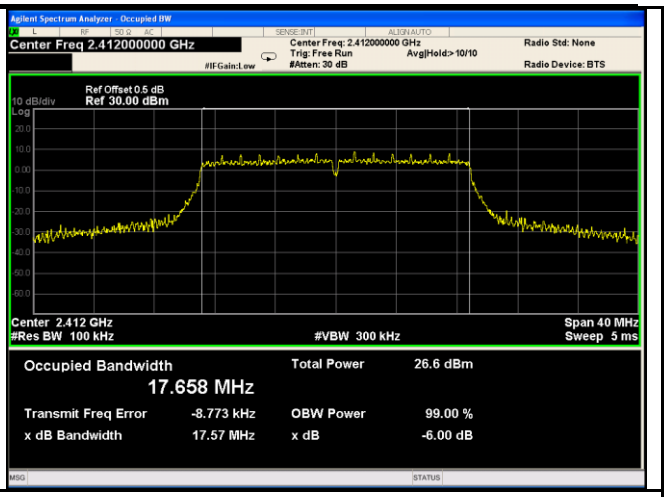
802.11g 6dB Bandwidth - 6 CH 2437



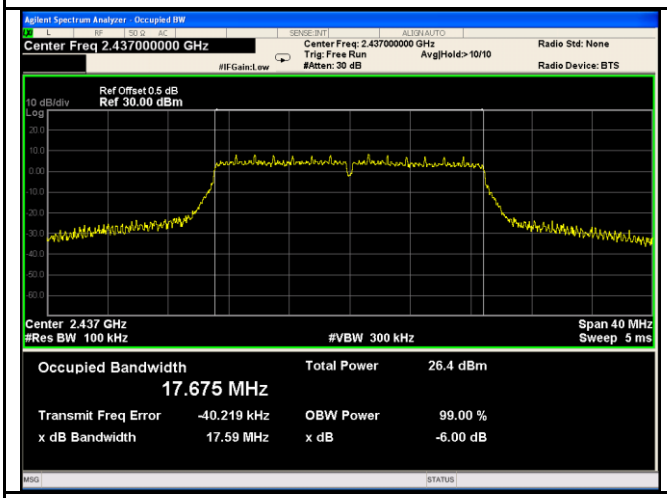
802.11g 6dB Bandwidth - 10 CH 2457



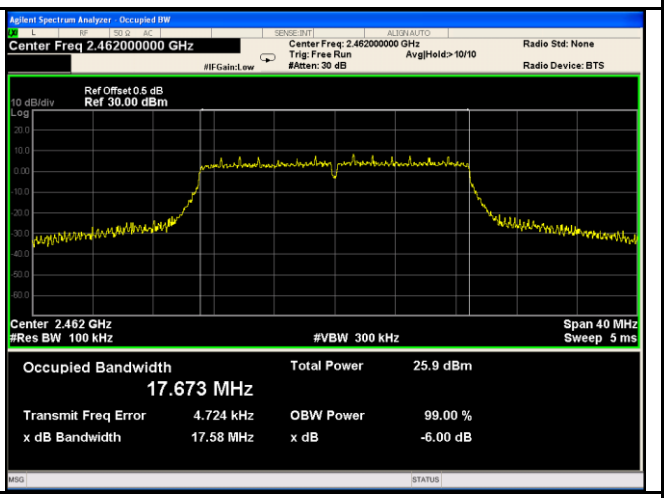
802.11g 6dB Bandwidth - 11 CH 2462



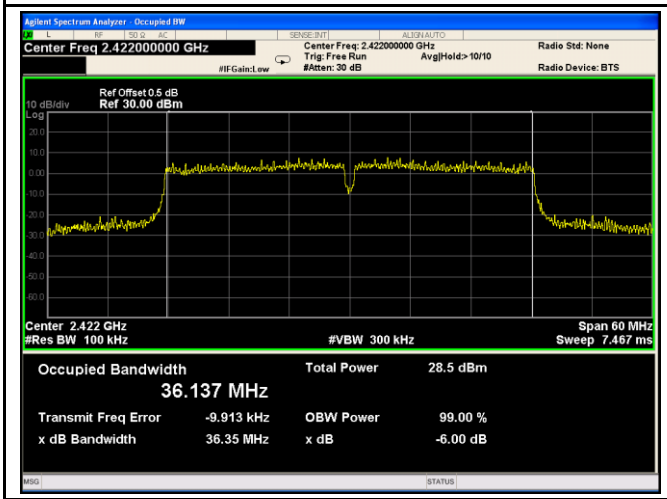
802.11n20 6dB Bandwidth - 1 CH 2412



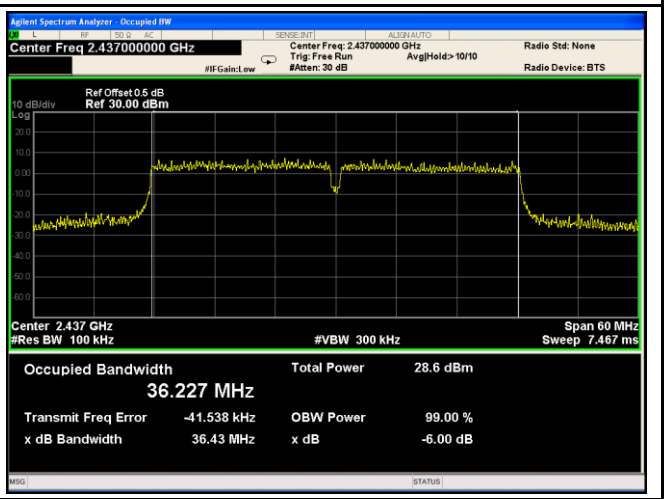
802.11n20 6dB Bandwidth - 6 CH 2437



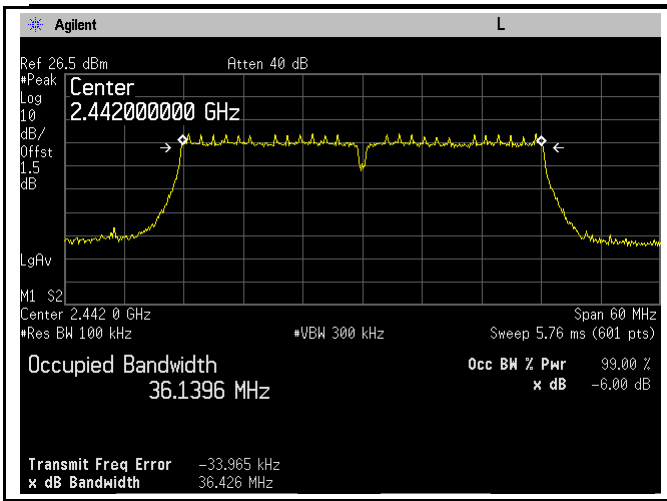
802.11n20 6dB Bandwidth - 11 CH 2462



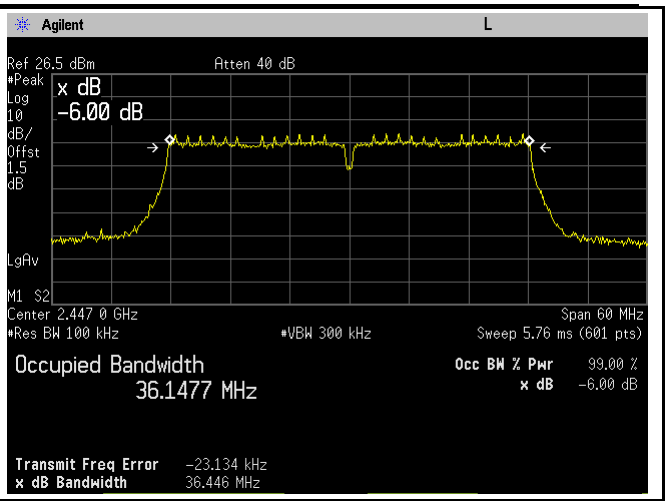
802.11n40 6dB Bandwidth - 3 CH 2422



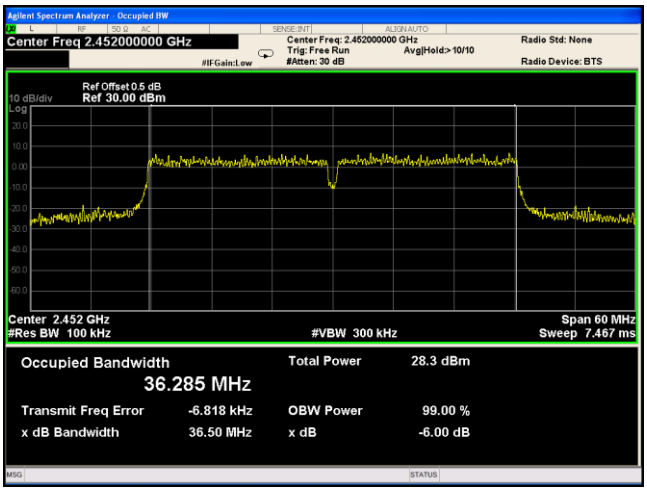
802.11n40 6dB Bandwidth – 6 CH 2437



802.11n40 6dB Bandwidth - 7 CH 2442

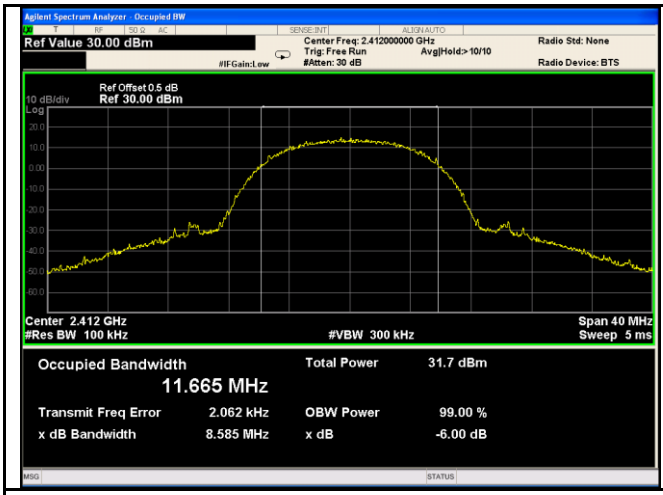


802.11n40 6dB Bandwidth - 8 CH 2447

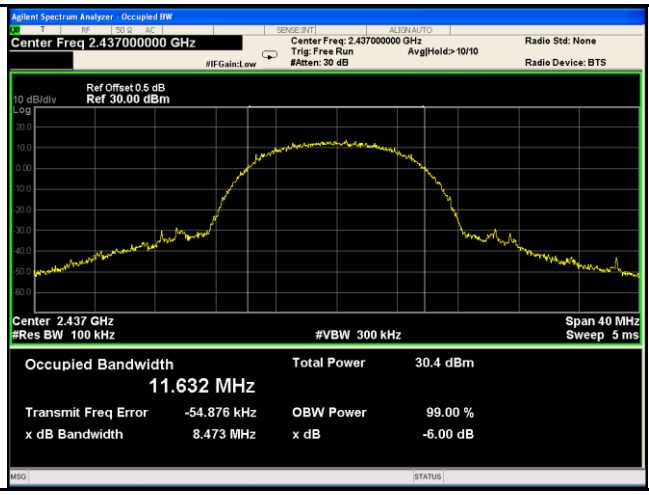


802.11n40 6dB Bandwidth - 9 CH 2452

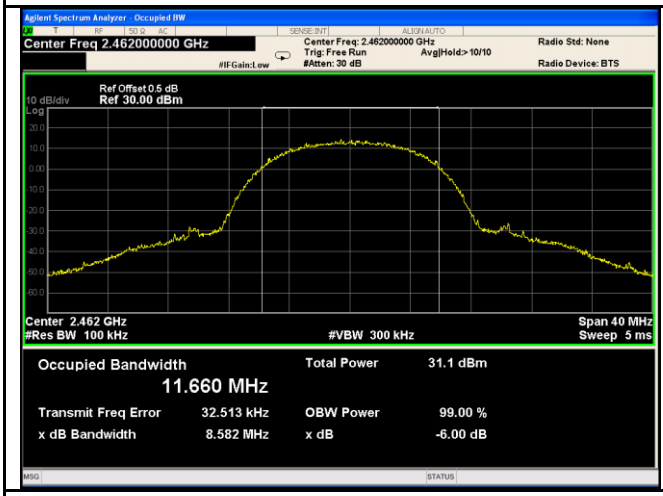
Antenna (Black):



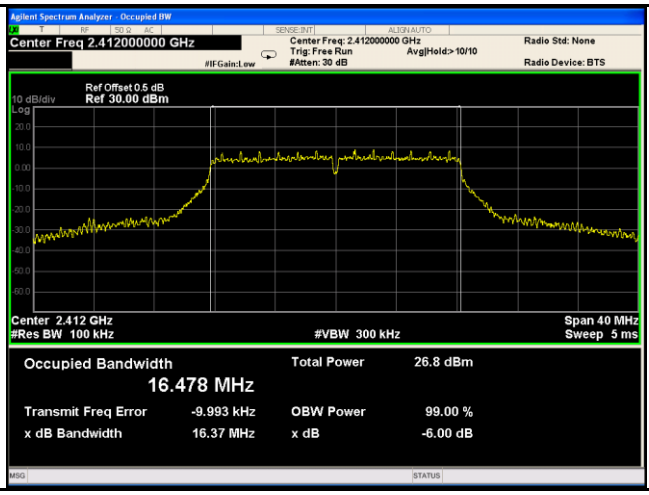
802.11b 6dB Bandwidth - Low CH 2412



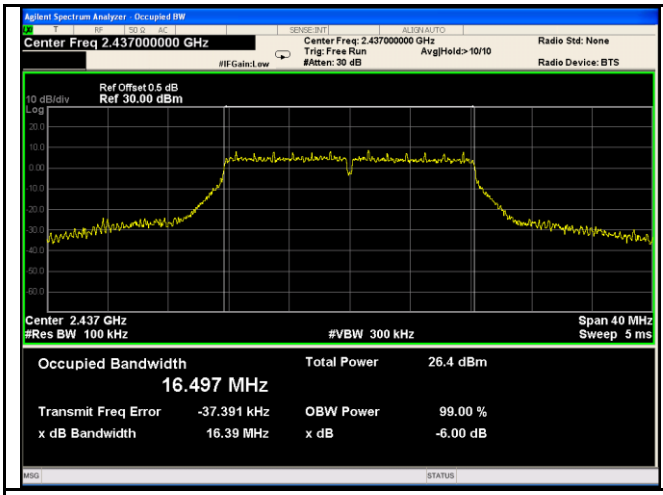
802.11b 6dB Bandwidth - Mid CH 2437



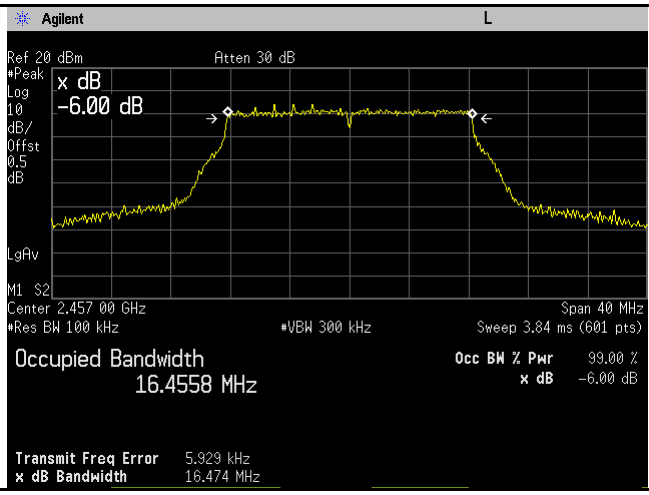
802.11b 6dB Bandwidth - High CH 2462



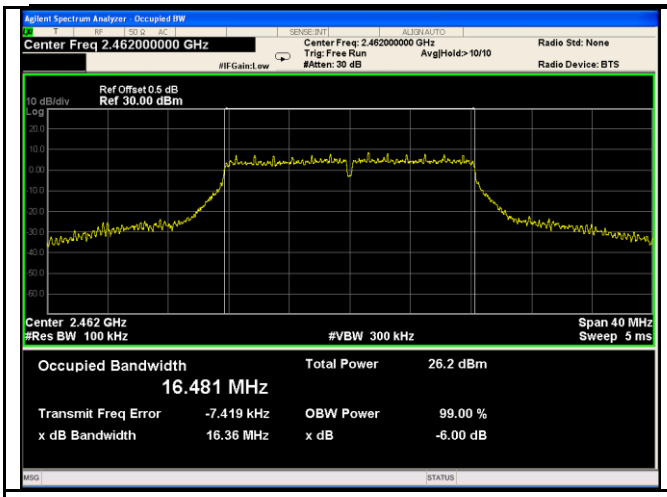
802.11g 6dB Bandwidth - 1 CH 2412



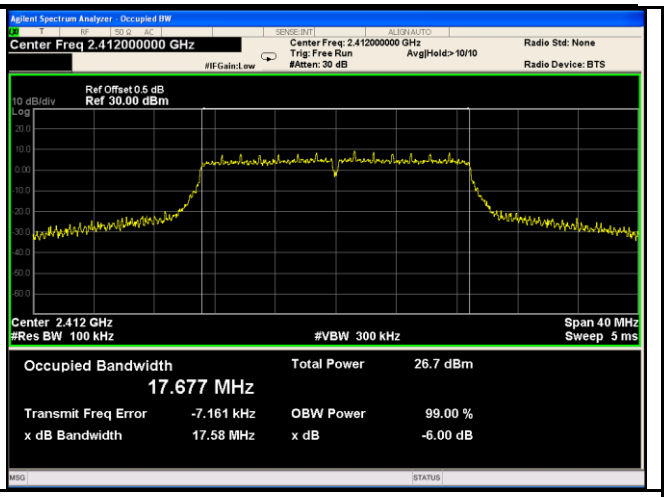
802.11g 6dB Bandwidth - 6 CH 2437



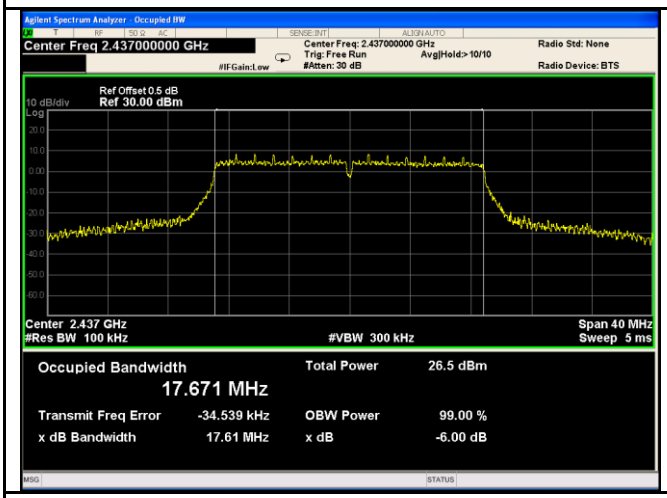
802.11g 6dB Bandwidth - 10 CH 2457



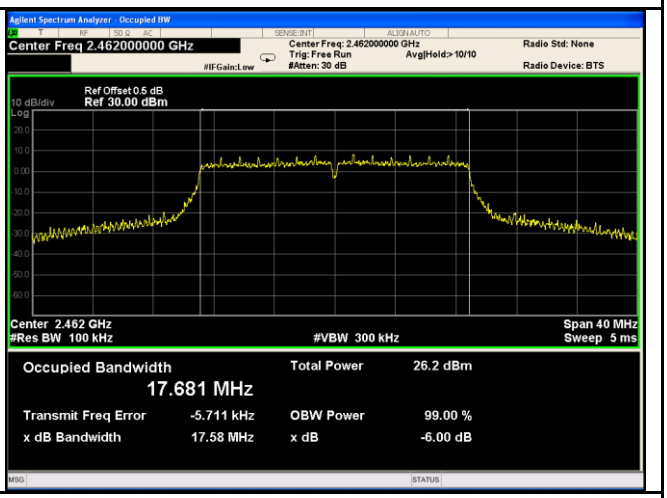
802.11g 6dB Bandwidth - 11 CH 2462



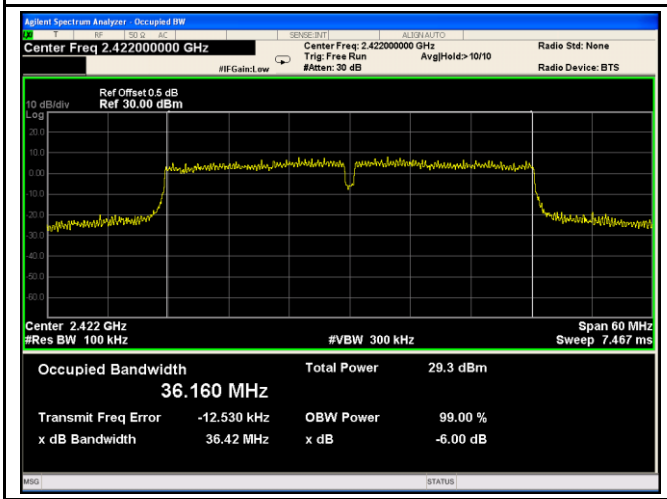
802.11n20 6dB Bandwidth - 1 CH 2412



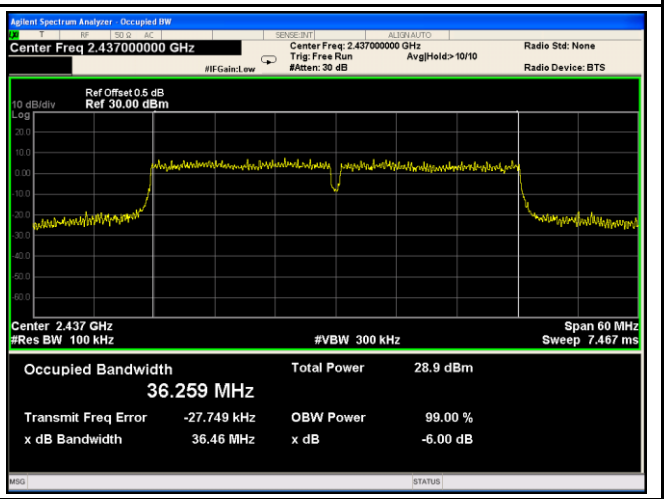
802.11n20 6dB Bandwidth - 6 CH 2437



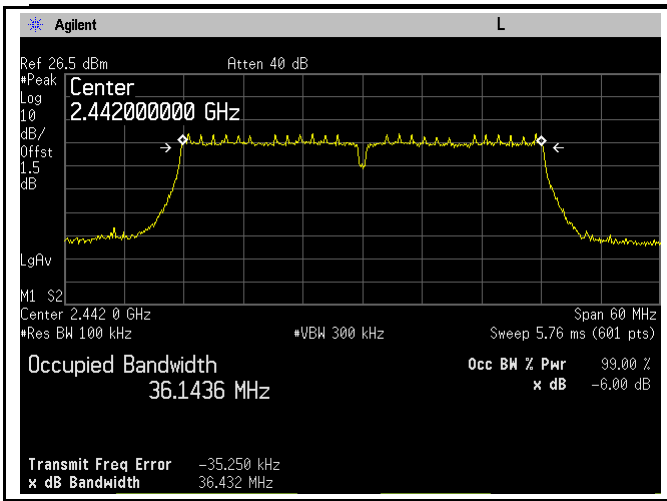
802.11n20 6dB Bandwidth - 11 CH 2462



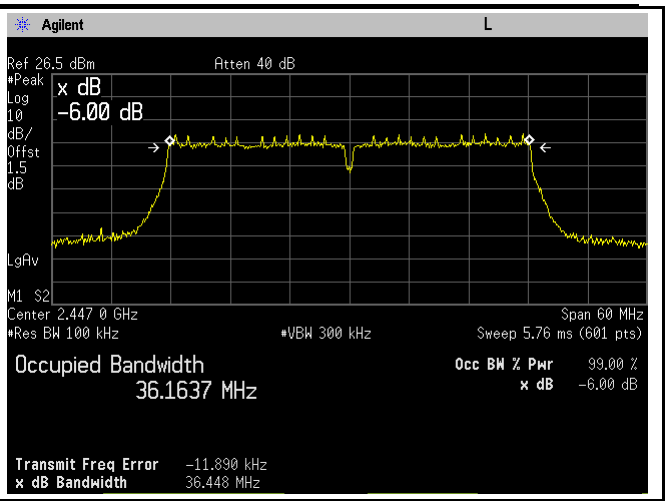
802.11n40 6dB Bandwidth - 3 CH 2422



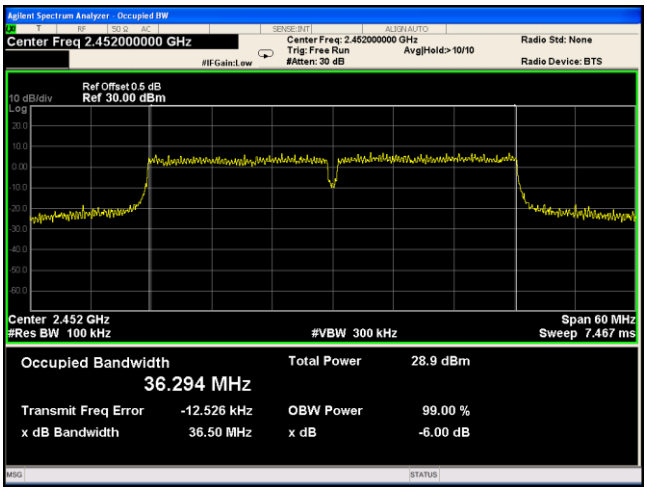
802.11n40 6dB Bandwidth – 6 CH 2437



802.11n40 6dB Bandwidth - 7 CH 2442



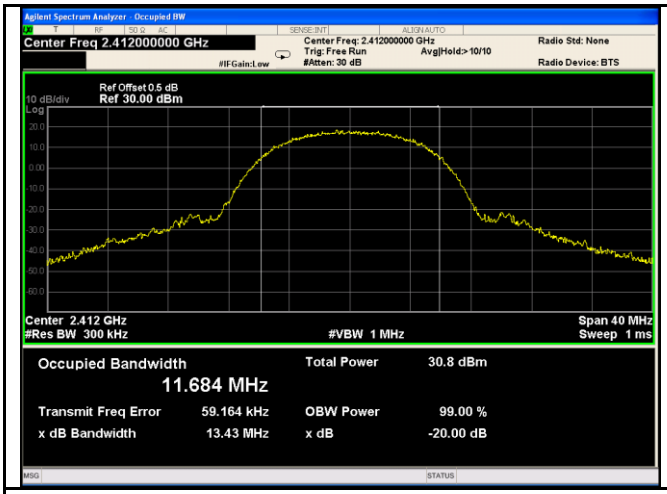
802.11n40 6dB Bandwidth - 8 CH 2447



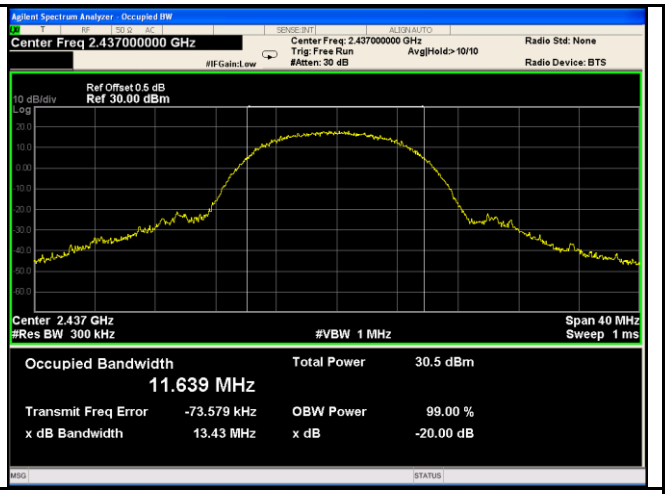
802.11n40 6dB Bandwidth - 9 CH 2452

20 dB Bandwidth measurement result:

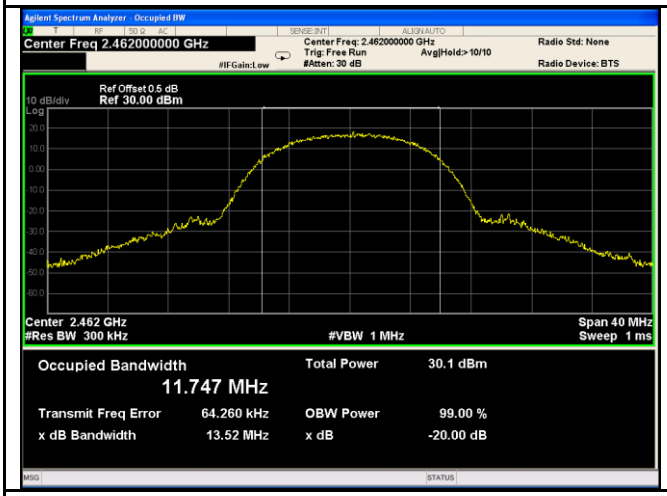
Antenna (Green):



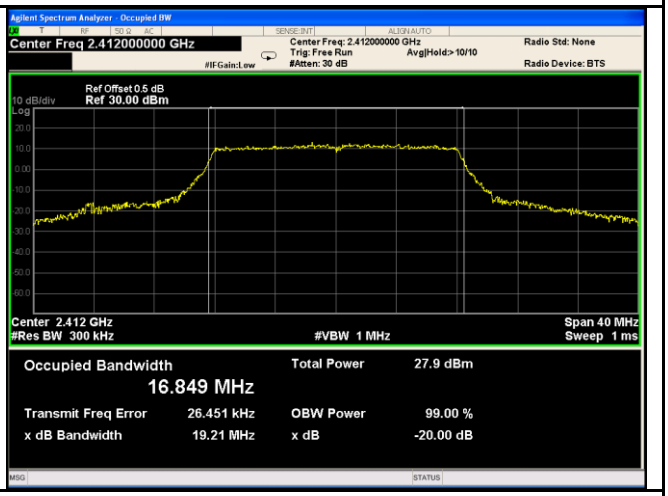
802.11b 20dB Bandwidth - Low CH 2412



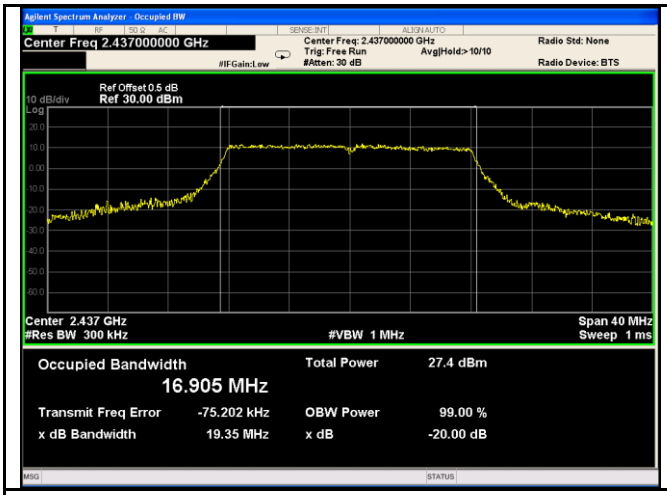
802.11b 20dB Bandwidth - Mid CH 2437



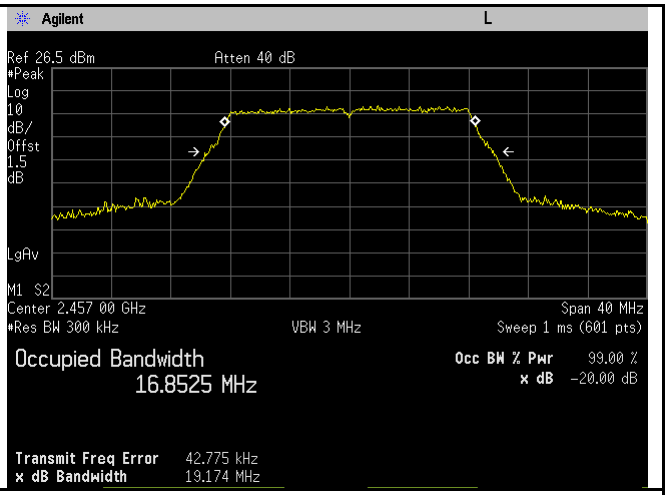
802.11b 20dB Bandwidth - High CH 2462



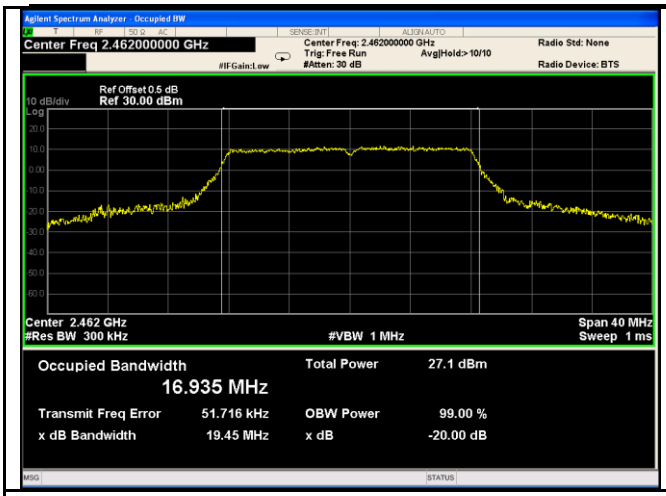
802.11g 20dB Bandwidth - 1 CH 2412



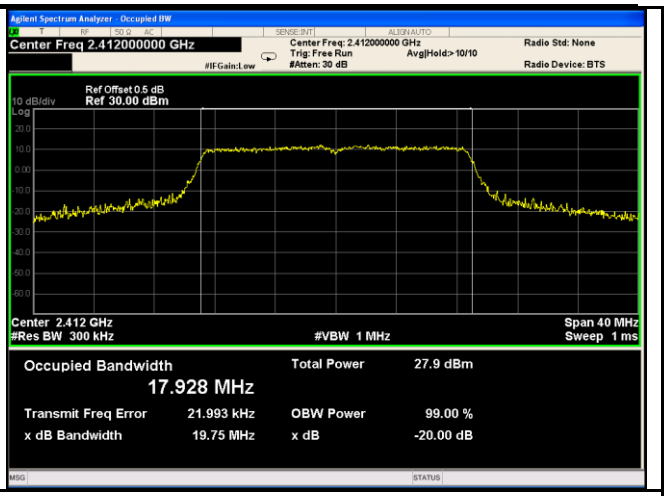
802.11g 20dB Bandwidth - 6 CH 2437



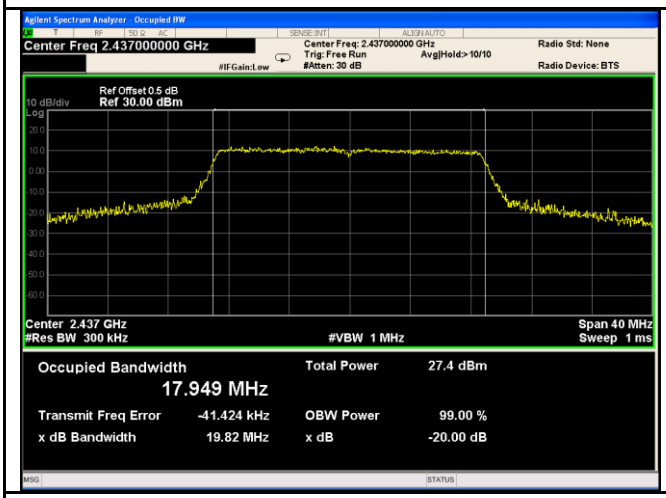
802.11g 20dB Bandwidth - 10 CH 2457



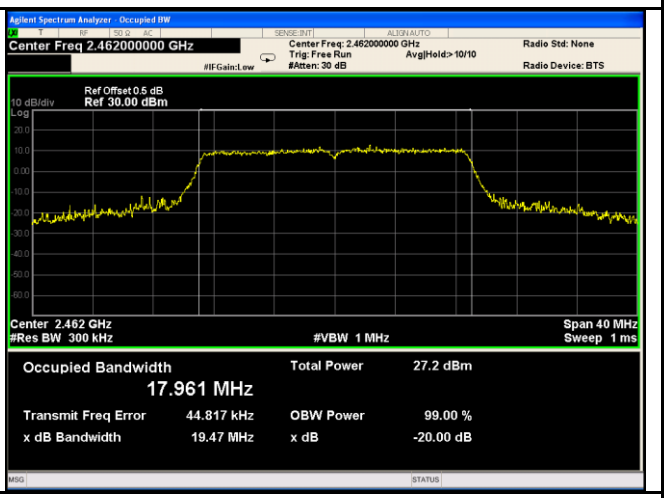
802.11g 20dB Bandwidth - 11 CH 2462



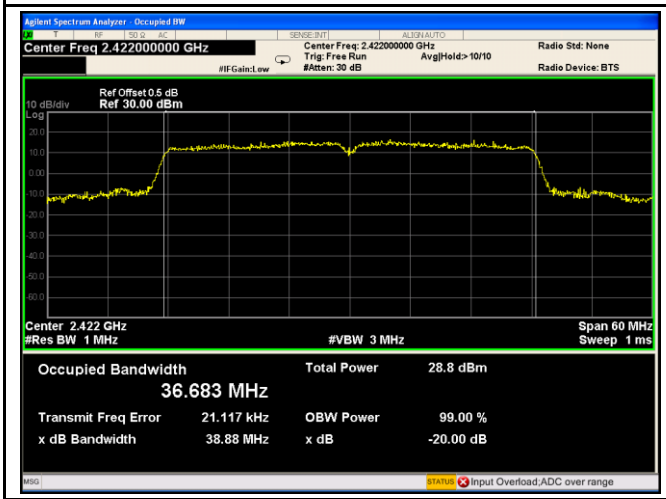
802.11n20 20dB Bandwidth - 1 CH 2412



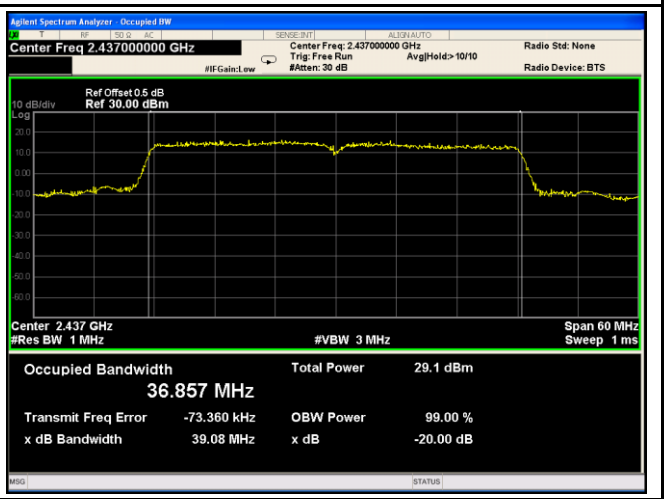
802.11n20 20dB Bandwidth - 6 CH 2437



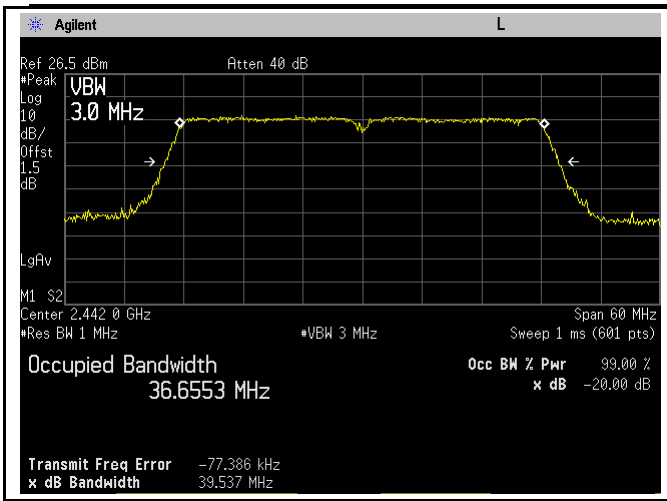
802.11n20 20dB Bandwidth - 11 CH 2462



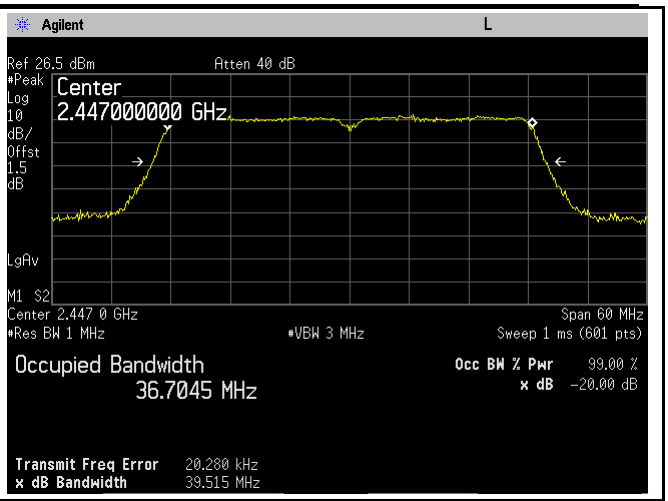
802.11n40 20dB Bandwidth - 3 CH 2422



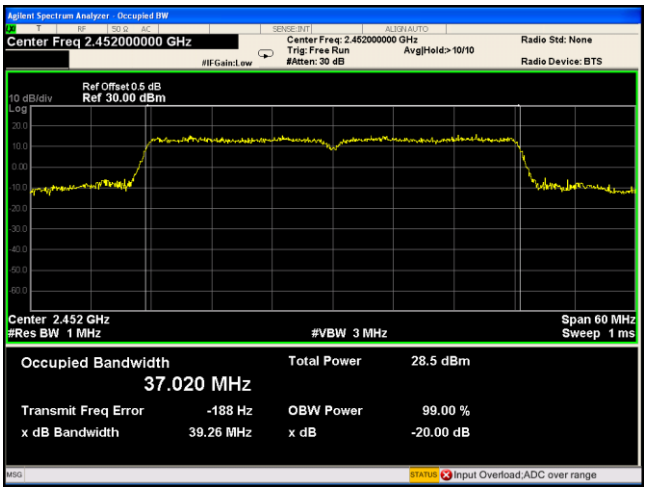
802.11n40 20dB Bandwidth – 6 CH 2437



802.11n40 20dB Bandwidth - 7 CH 2442

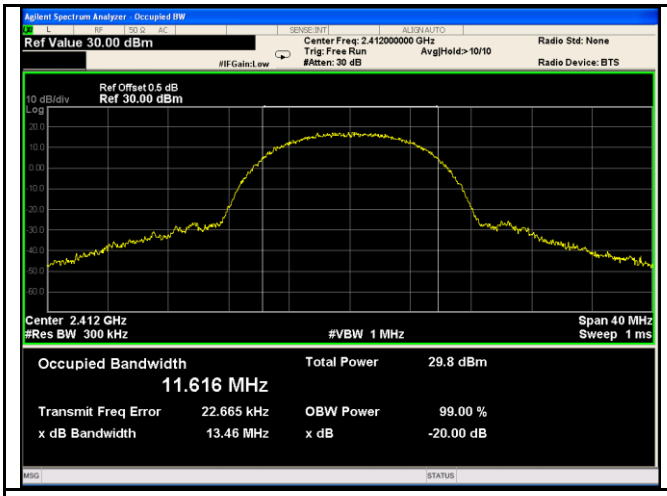


802.11n40 20dB Bandwidth - 8 CH 2447

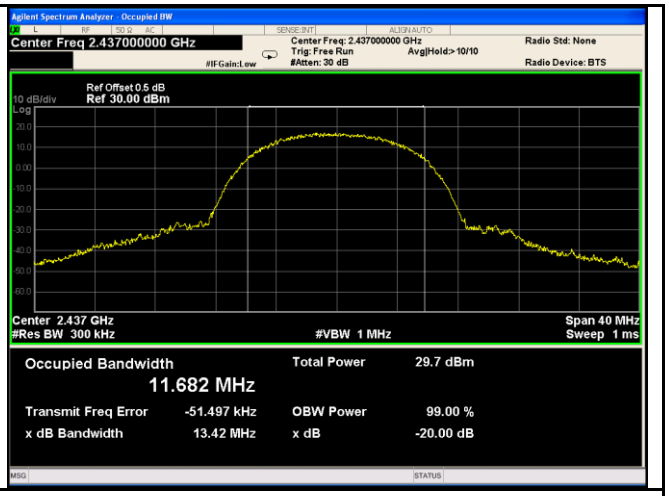


802.11n40 20dB Bandwidth - 9 CH 2452

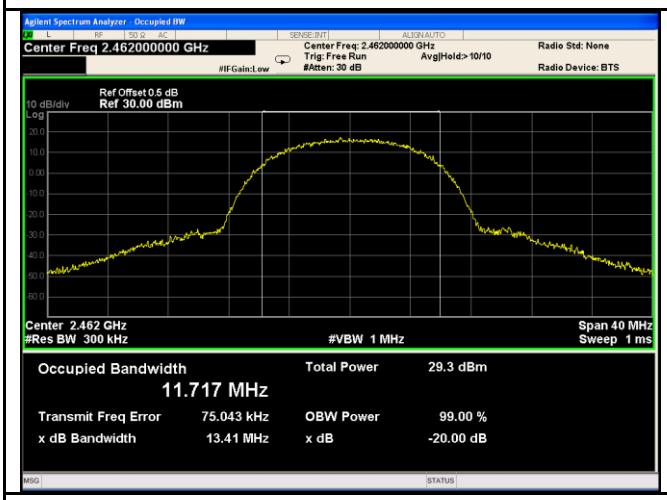
Antenna (Gray):



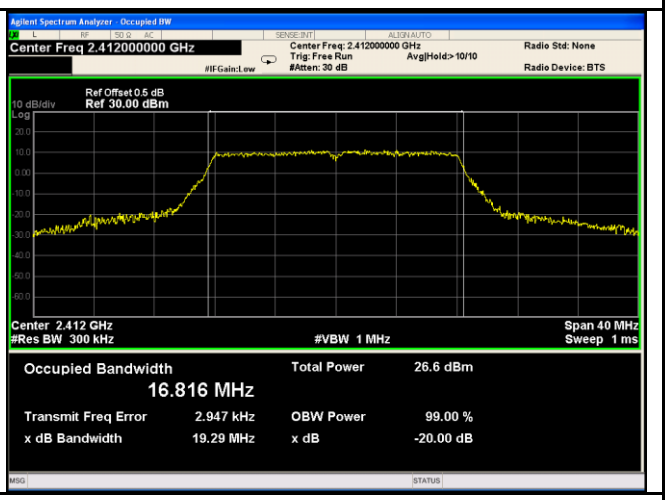
802.11b 20dB Bandwidth - Low CH 2412



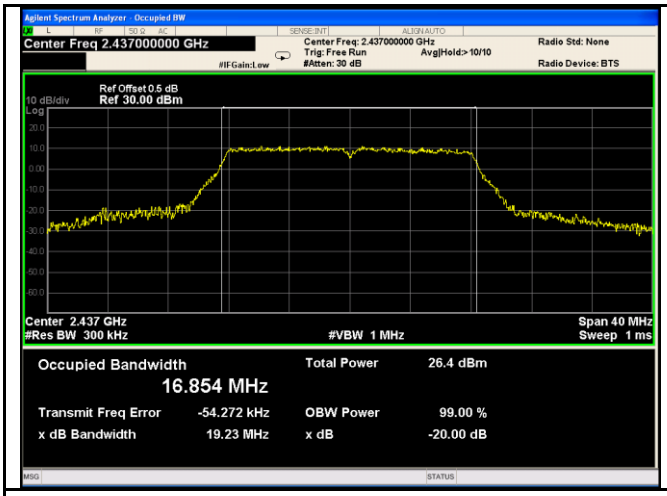
802.11b 20dB Bandwidth - Mid CH 2437



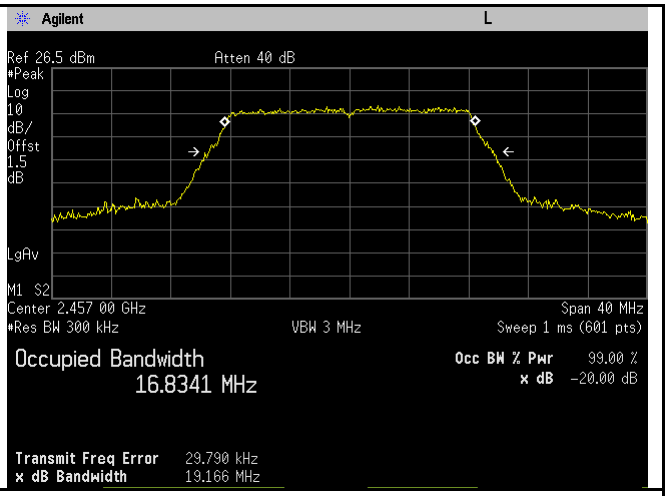
802.11b 20dB Bandwidth - High CH 2462



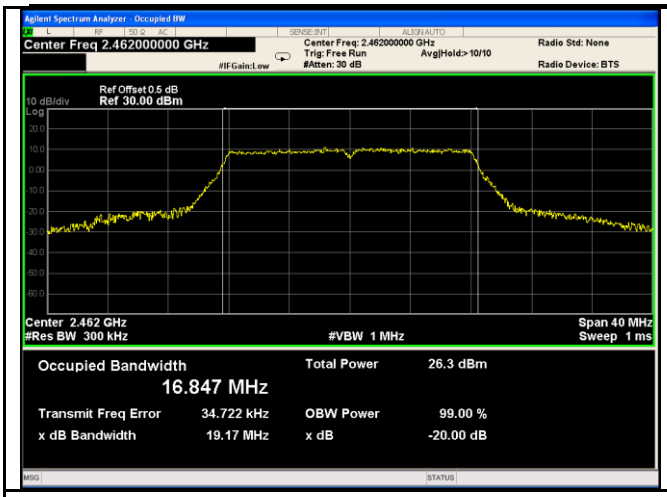
802.11g 20dB Bandwidth - 1 CH 2412



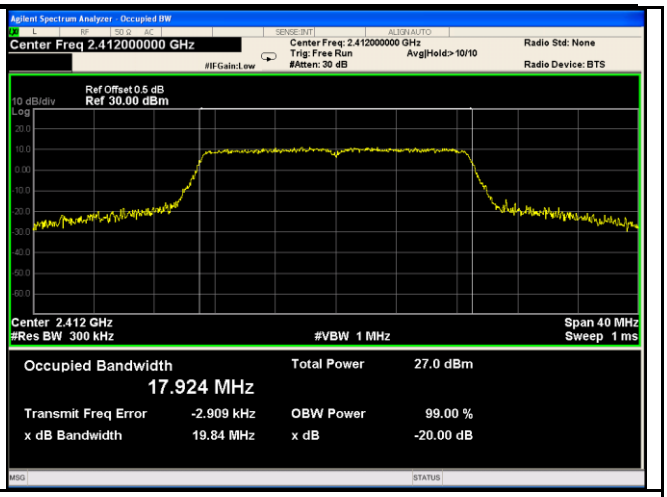
802.11g 20dB Bandwidth - 6 CH 2437



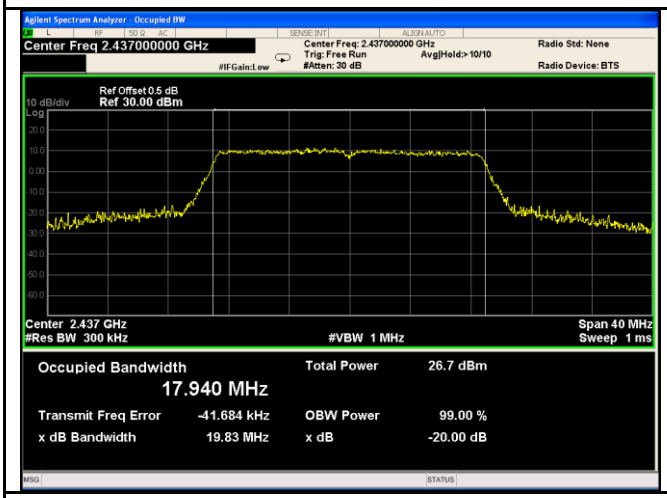
802.11g 20dB Bandwidth - 10 CH 2457



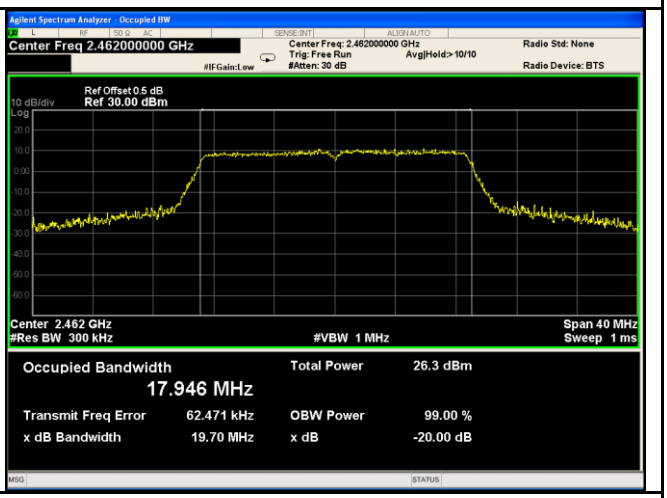
802.11g 20dB Bandwidth - 11 CH 2462



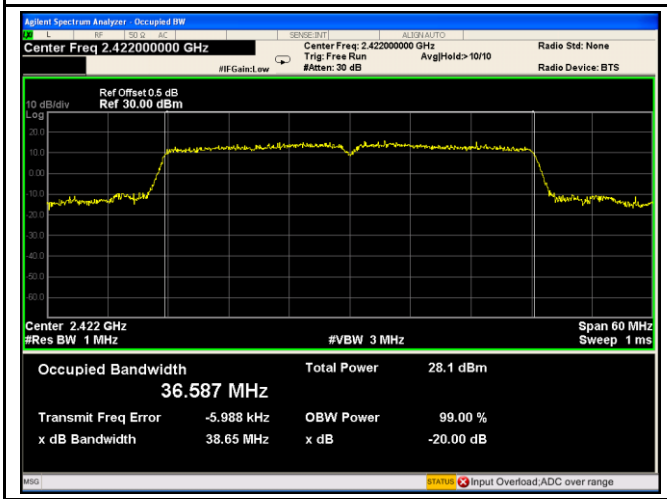
802.11n20 20dB Bandwidth - 1 CH 2412



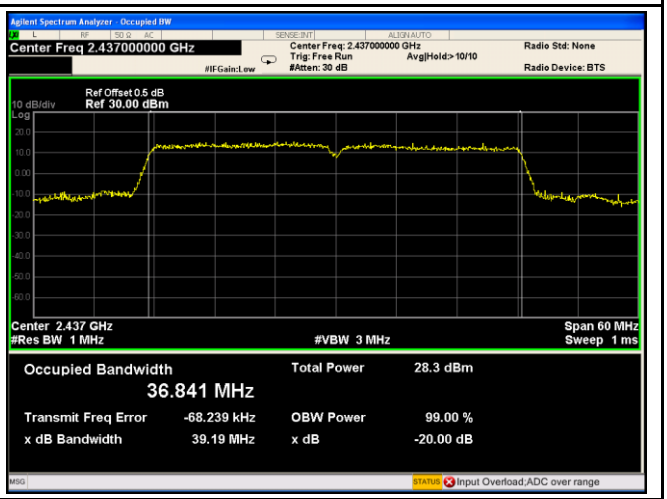
802.11n20 20dB Bandwidth - 6 CH 2437



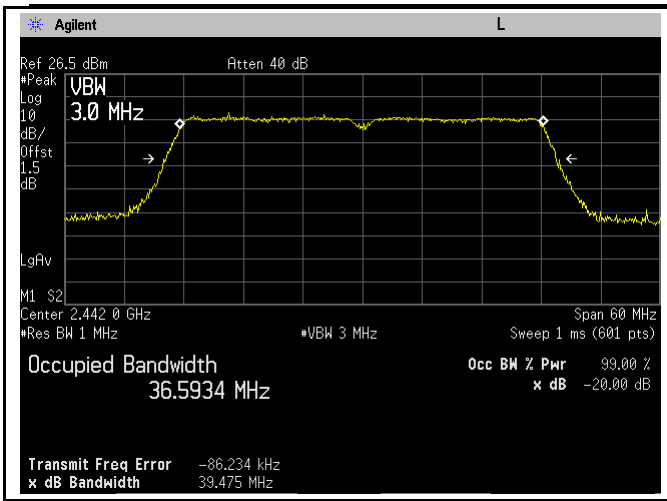
802.11n20 20dB Bandwidth - 11 CH 2462



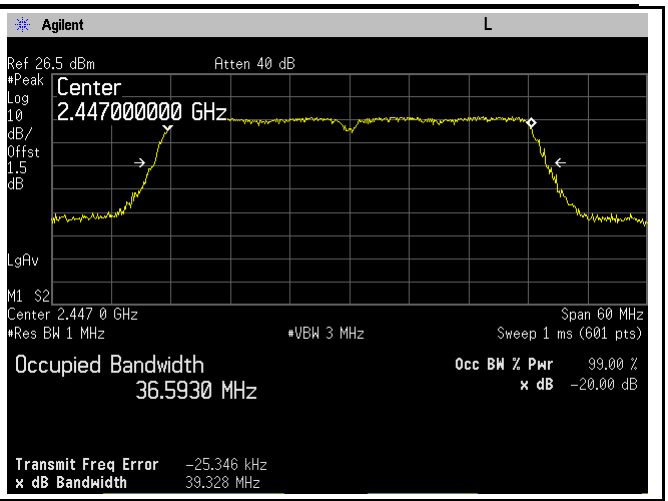
802.11n40 20dB Bandwidth - 3 CH 2422



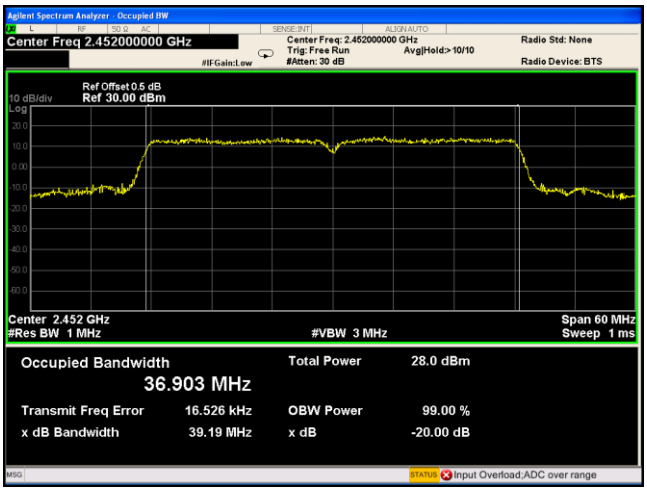
802.11n40 20dB Bandwidth – 6 CH 2437



802.11n40 20dB Bandwidth - 7 CH 2442

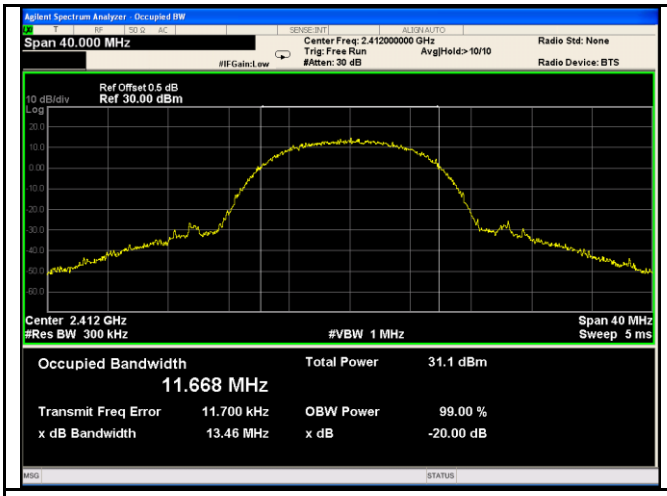


802.11n40 20dB Bandwidth - 8 CH 2447

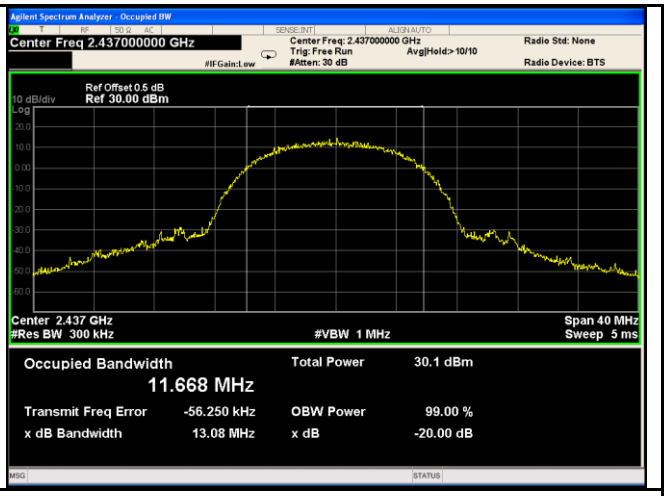


802.11n40 20dB Bandwidth - 9 CH 2452

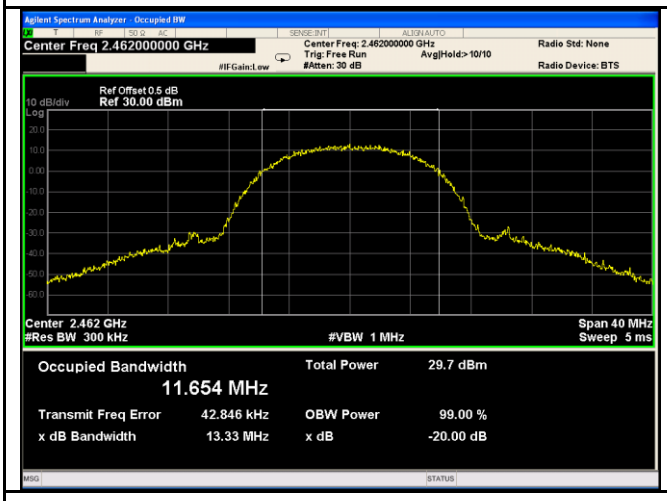
Antenna (Black):



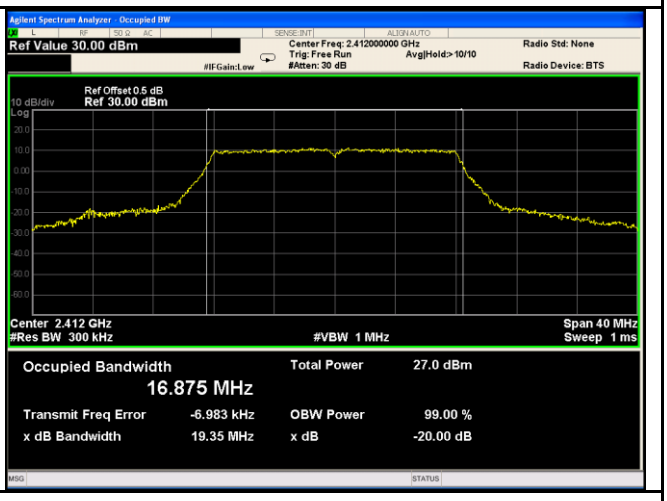
802.11b 20dB Bandwidth - Low CH 2412



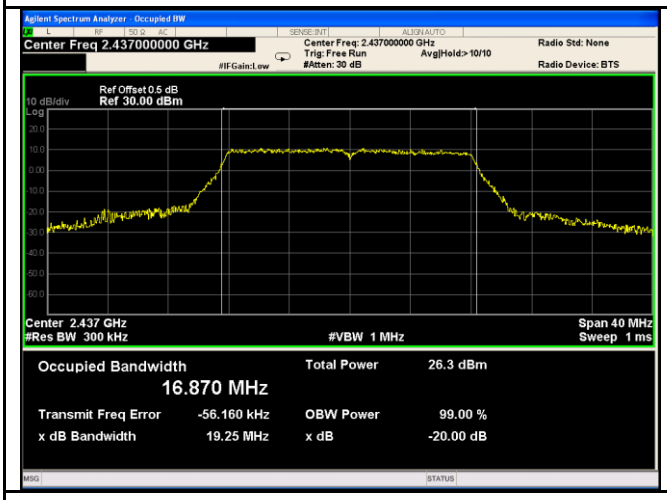
802.11b 20dB Bandwidth - Mid CH 2437



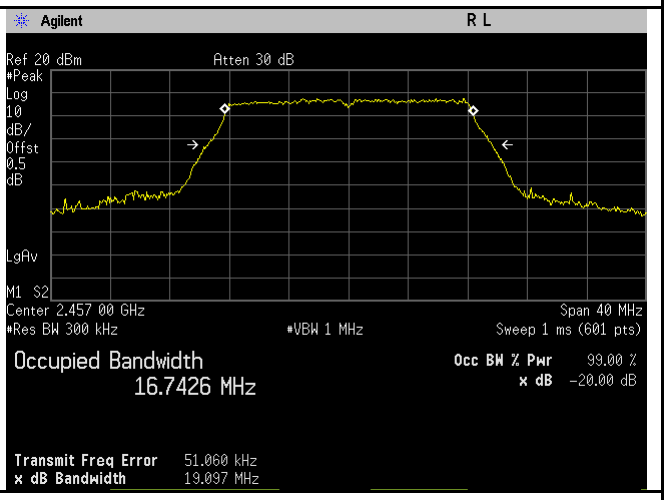
802.11b 20dB Bandwidth - High CH 2462



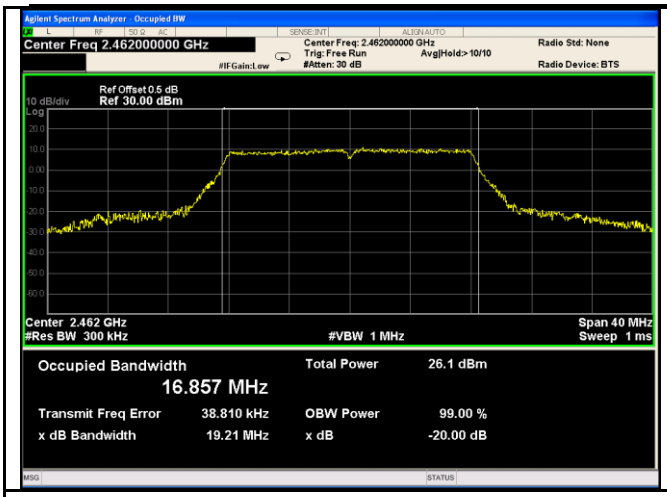
802.11g 20dB Bandwidth - 1 CH 2412



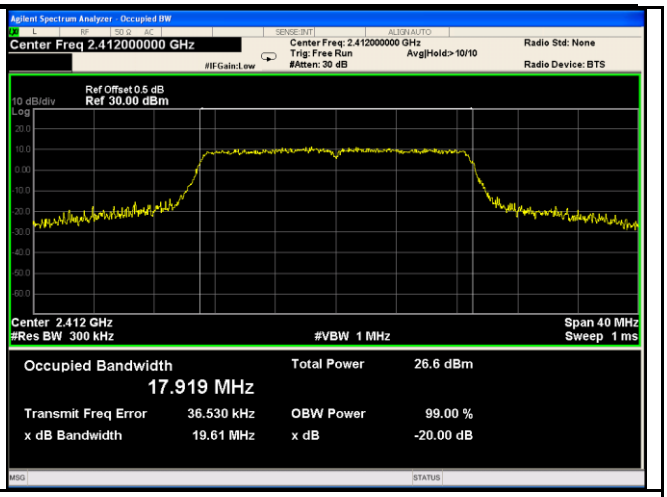
802.11g 20dB Bandwidth - 6 CH 2437



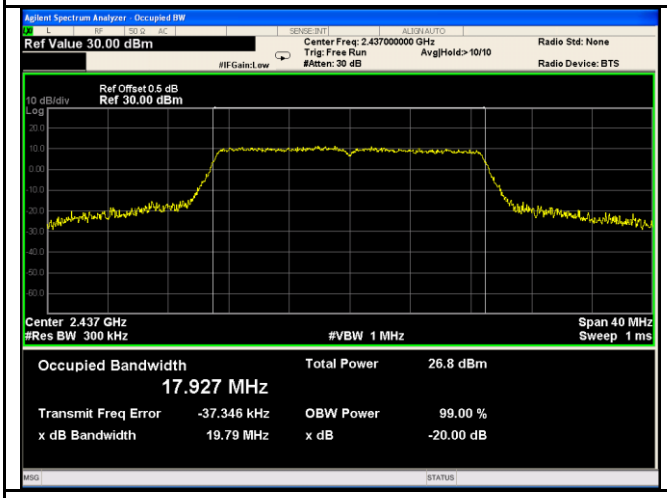
802.11g 20dB Bandwidth - 10 CH 2457



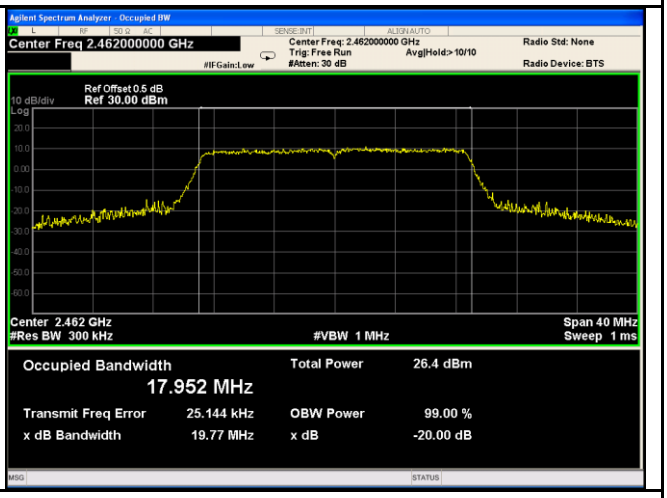
802.11g 20dB Bandwidth - 11 CH 2462



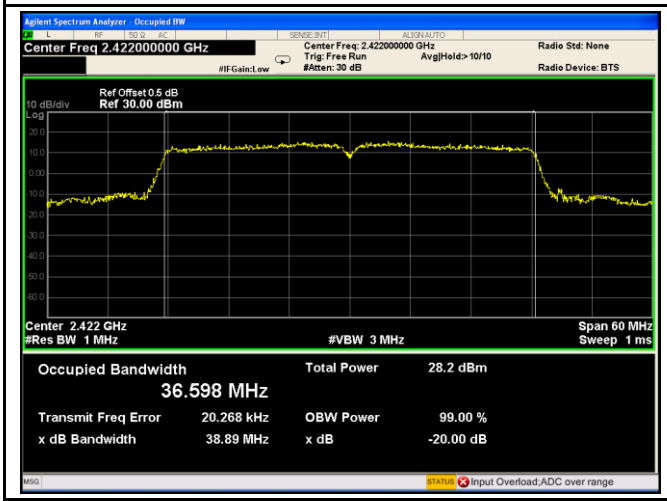
802.11n20 20dB Bandwidth - 1 CH 2412



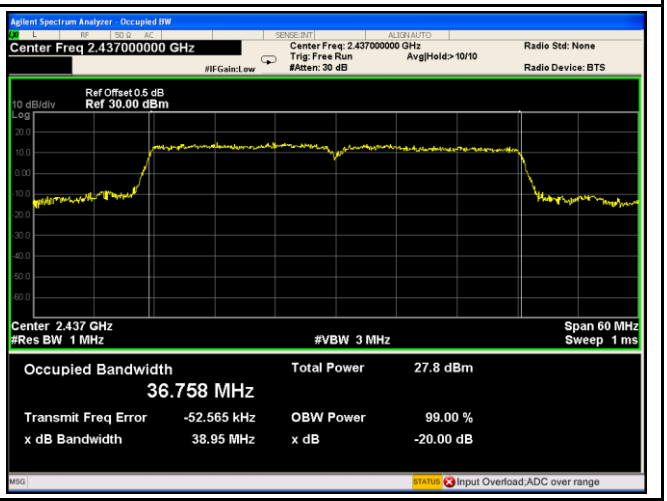
802.11n20 20dB Bandwidth - 6 CH 2437



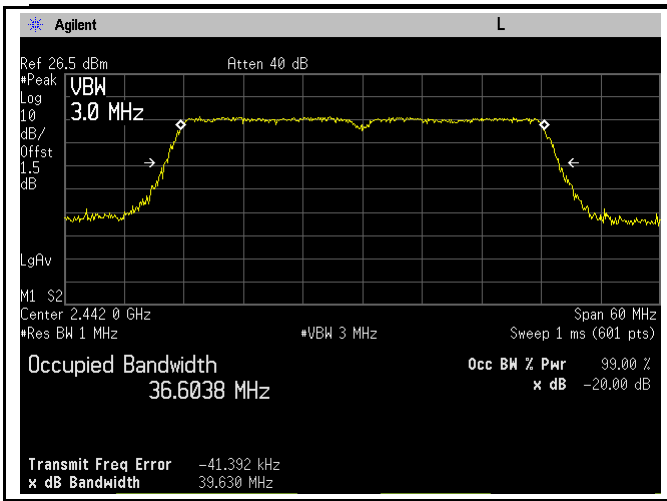
802.11n20 20dB Bandwidth - 11 CH 2462



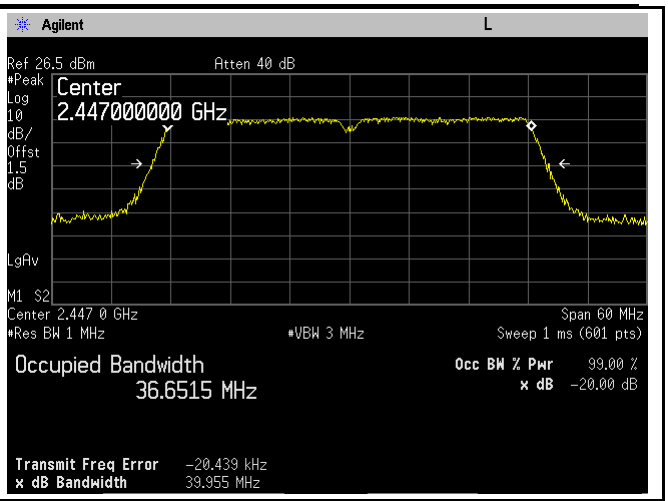
802.11n40 20dB Bandwidth - 3 CH 2422



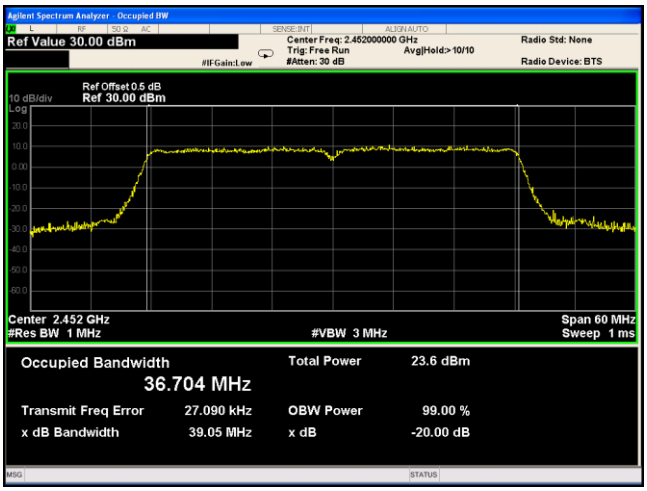
802.11n40 20dB Bandwidth – 6 CH 2437



802.11n40 20dB Bandwidth - 7 CH 2442



802.11n40 20dB Bandwidth - 8 CH 2447

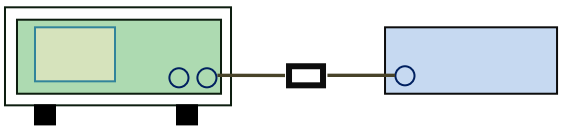


802.11n40 20dB Bandwidth - 9 CH 2452

6.3 Maximum Output Power

Temperature	23°C
Relative Humidity	55%
Atmospheric Pressure	1012mbar
Test date :	January 04, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b)(2),RSS210(A8.4)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤ 1 Watt	☐
	b)	FHSS in 5725-5850MHz: ≤ 1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤ 0.125 Watt.	☐
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤ 1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤ 0.25 Watt	☐
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤ 1 Watt	☑
Test Setup			
Test Procedure	558074 D01 DTS MEAS Guidance v04, 9.2.3.1 Method AVGPM. Maximum output power measurement procedure a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied. 1) The EUT is configured to transmit continuously, or to transmit with a constant duty factor. 2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level. 3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five. b) If the transmitter does not transmit continuously, measure the duty cycle (x) of the transmitter output signal as described in Section 6.0. c) Measure the average power of the transmitter. This measurement is an average over		

	both the on and off periods of the transmitter. d) Adjust the measurement in dBm by adding 10log (1/x), where x is the duty cycle to the measurement result.
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

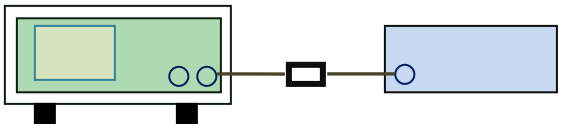
Test Plot ☐ Yes (See below) ☑ N/A

Output Power measurement result

Mode	duty factory	Antenna Path	Chan nel	Conducted Power						The Highst (SISO) or Total (MIMO) conduct ed power (dBm)	Puroto Rico/FC C Conduct ed power Limit (dBm)	Antenna Gain				E.I.R.P					
				Ant.Green		Ant .Gay		Ant.Black				Ant. Green	Ant. Gray	Ant. Black	Direct onal Gain (dBi)	Ant. Green	Ant. Gray	Ant. Black	The Highest (SISO) or Total (MIMO) E.I.R.P	E.I.R.P Power Limit (dBm)	Verdit
				Average Conducted Powe(dBm)	Average Conducted Powe with duty cycle factor （dBm）	Average Conducted Powe(dBm)	Average Conducted Powe with duty cycle factor （dBm）	Average Conduct ed Powe(dB m)	Average Conduct ed Powe with duty cycle factor （dBm ）												
b	0.3	SISO	1	17.7	18.0	17.6	17.9	17.4	17.7	18.0	30.0	1.9	2.8	1.7	/	19.9	20.7	19.4	20.7	21.8	Pass
			6	17.7	18.0	17.7	18.0	17.4	17.7	18.0	30.0	1.9	2.8	1.7	/	19.9	20.8	19.4	20.8	21.8	Pass
			11	17.6	17.9	17.6	17.9	17.4	17.7	17.9	30.0	1.9	2.8	1.7	/	19.8	20.7	19.4	20.7	21.8	Pass
g	0.2	SISO	1	17.7	17.9	17.5	17.7	17.7	17.9	17.9	30.0	1.9	2.8	1.7	/	19.8	20.5	19.6	20.5	21.8	Pass
			6	17.8	18.0	17.8	18.0	17.7	17.9	18.0	30.0	1.9	2.8	1.7	/	19.9	20.8	19.6	20.8	21.8	Pass
			10	17.8	18.0	17.7	17.9	17.4	17.6	18.0	30.0	1.9	2.8	1.7	/	19.9	20.7	19.3	20.7	21.8	Pass
			11	16.5	16.7	16.4	16.6	17.6	17.8	17.8	30.0	1.9	2.8	1.7	/	18.6	19.4	19.5	19.5	21.8	Pass
n(HT20)	0.5	MIMO(3TX Green-Gray-Black)	1	12.7	13.2	13.1	13.6	12.7	13.2	18.1	30.0	1.9	2.8	1.7	2.8	/	/	/	20.9	21.8	Pass
			6	12.9	13.4	12.9	13.4	12.7	13.2	18.1	30.0	1.9	2.8	1.7	2.8	/	/	/	20.9	21.8	Pass
			11	12.8	13.3	13.1	13.6	12.4	12.9	18.1	30.0	1.9	2.8	1.7	2.8	/	/	/	20.9	21.8	Pass
n(HT40)	0.9	MIMO(3TX Green-Gray-Black)	3	12.9	13.8	13.2	14.1	12.8	13.7	18.6	30.0	1.9	2.8	1.7	2.8	/	/	/	21.4	21.8	Pass
			6	12.8	13.7	13.4	14.3	12.8	13.7	18.7	30.0	1.9	2.8	1.7	2.8	/	/	/	21.5	21.8	Pass
			7	11.9	12.8	12.3	13.2	12.0	12.9	17.7	30.0	1.9	2.8	1.7	2.8	/	/	/	20.5	21.8	Pass
			8	11.9	12.8	12.4	13.3	12.1	13.0	17.8	30.0	1.9	2.8	1.7	2.8	/	/	/	20.6	21.8	Pass
			9	11.8	12.7	12.4	13.3	11.9	12.8	17.7	30.0	1.9	2.8	1.7	2.8	/	/	/	20.5	21.8	Pass

6.4 Power Spectral Density

Temperature	23°C
Relative Humidity	55%
Atmospheric Pressure	1012mbar
Test date :	January 04, 2018
Tested By :	Aaron Liang

Spec	Item	Requirement	Applicable
§15.247(e)	a)	The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	☑
Test Setup			
Test Procedure	558074 D01 DTS MEAS Guidance v04, 10.2 power spectral density method power spectral density measurement procedure - a) Set analyzer center frequency to DTS channel center frequency. - b) Set the span to 1.5 times the DTS bandwidth. - c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz. - d) Set the VBW ≥ 3 × RBW. - e) Detector = peak. - f) Sweep time = auto couple. - g) Trace mode = max hold. - h) Allow trace to fully stabilize. - i) Use the peak marker function to determine the maximum amplitude level within the RBW. - j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

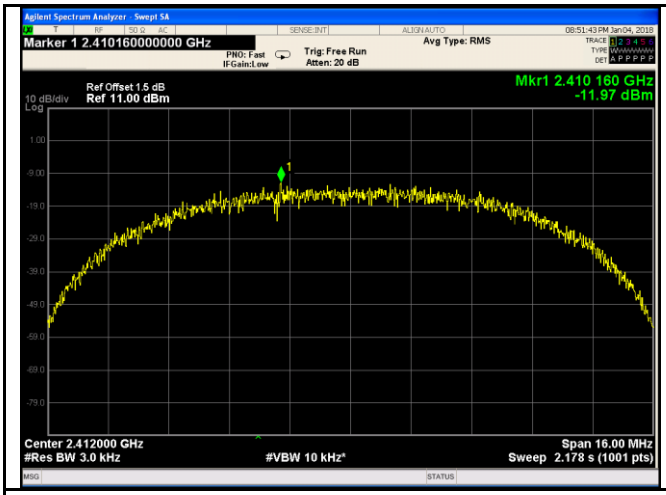
Test Plot ☑ Yes (See below) ☐ N/A

Mode	Antenna Path	Channel	Antenna (Green)	Antenna (Gray)	Antenna (Black)	The Highest (SISO) or Total (MIMO) PSD	PSD Limit (dBm)	Verdit
b	SISO	1	-11.97	-12.1	-13.695	-11.97	8	Pass
		6	-11.7	-13.75	-14.974	-11.70	8	Pass
		11	-12.09	-12.07	-14.051	-12.07	8	Pass
g	SISO	1	-14.72	-16.68	-15.516	-14.72	8	Pass
		6	-14.79	-14.52	-15.336	-14.52	8	Pass
		10	-16	-16.26	-15.256	-15.26	8	Pass
		11	-17.5	-19.92	-15.935	-15.94	8	Pass
n(HT20)	MIMO(3TX 0-1-2)	1	-18.4	-22.01	-20.926	-15.40	7.08	Pass
		6	-19.97	-19.64	-21.199	-15.45	7.08	Pass
		11	-19.91	-19.33	-22.361	-15.58	7.08	Pass
N(HT40)	MIMO(3TX 0-1-2)	3	-23.38	-23.67	-24.813	-19.14	7.08	Pass
		6	-25.18	-23.4	-23.745	-19.27	7.08	Pass
		7	-25.17	-26.42	-25.14	-20.77	7.08	Pass
		8	-24.89	-27.25	-25.41	-20.97	7.08	Pass
		9	-24.83	-26.8	-26.09	-21.06	7.08	Pass

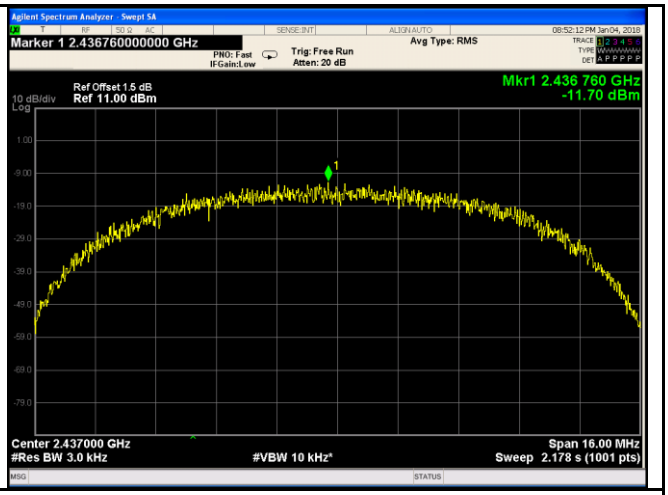
Test Plots

Power Spectral Density measurement result

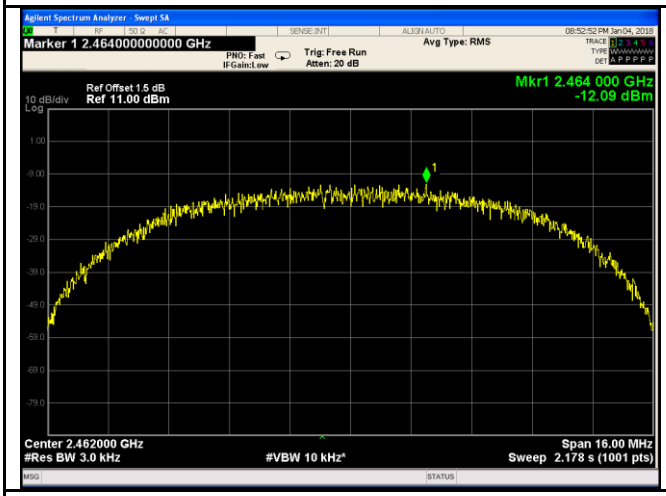
Antenna (Green):



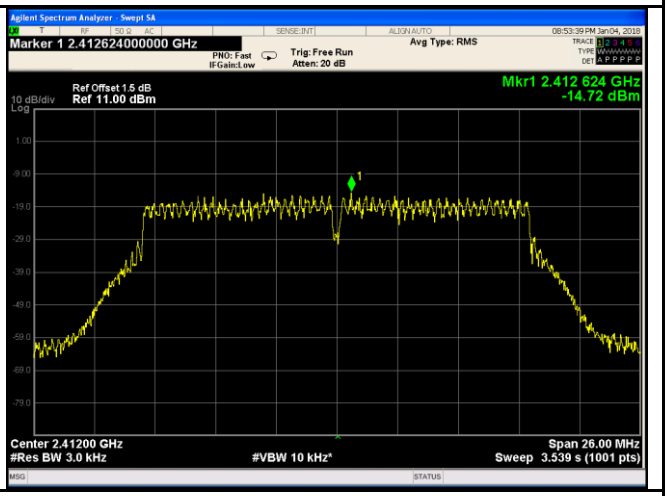
802.11b - Low CH 2412



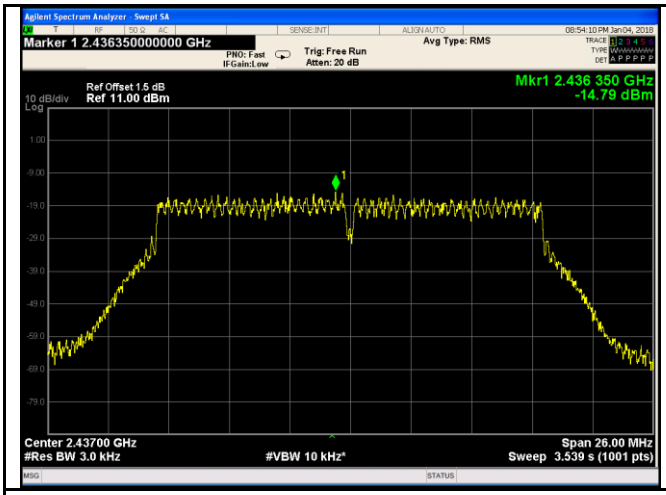
802.11b - Mid CH 2437



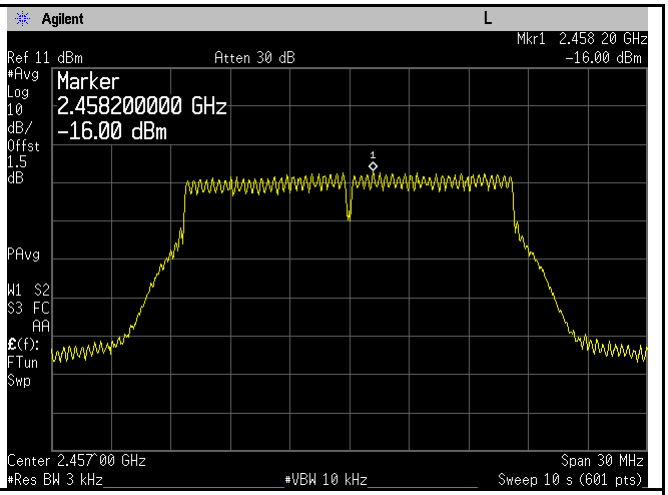
802.11b - High CH 2462



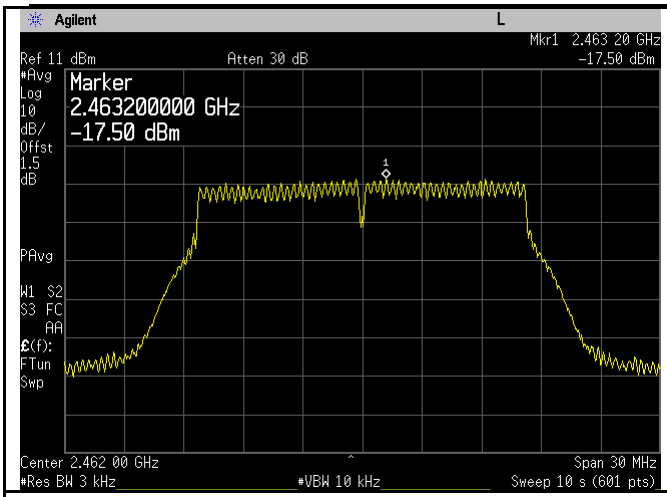
802.11g - 1 CH 2412



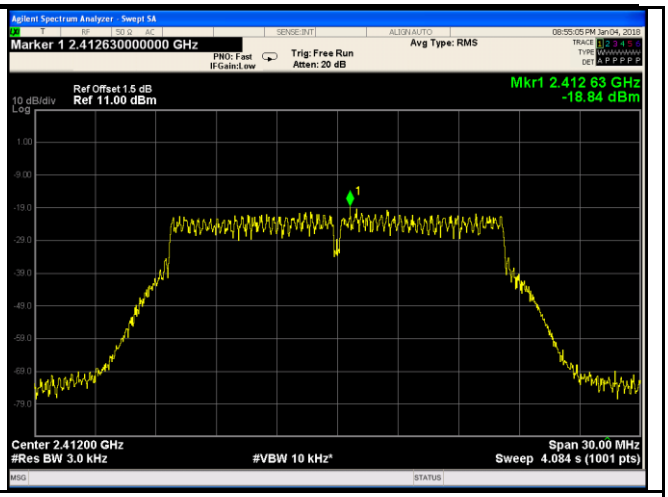
802.11g - 6 CH 2437



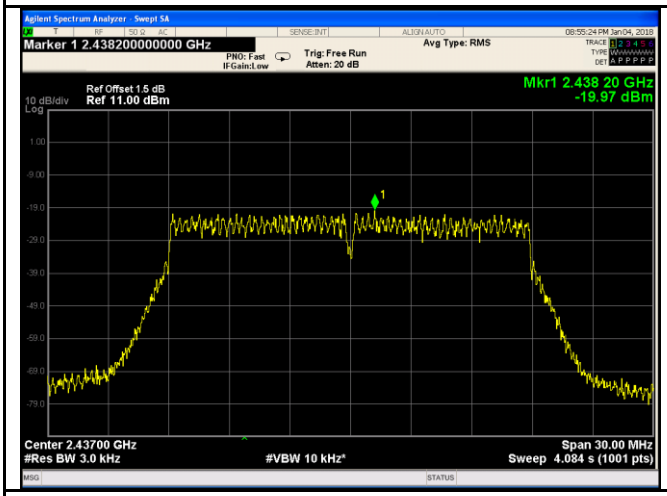
802.11g - 10 CH 2457



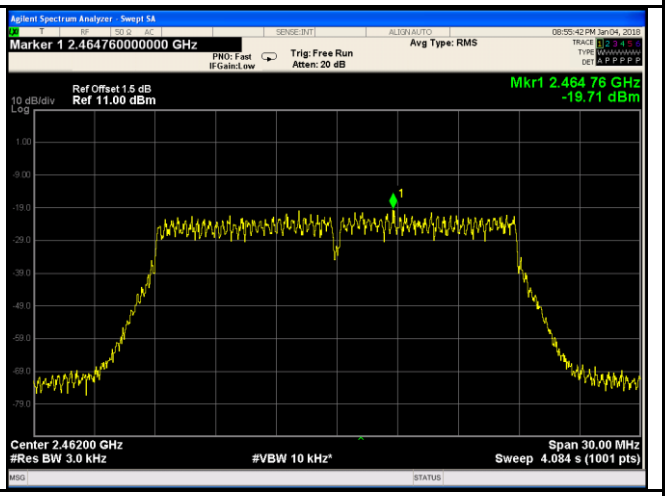
802.11g - 11 CH 2462



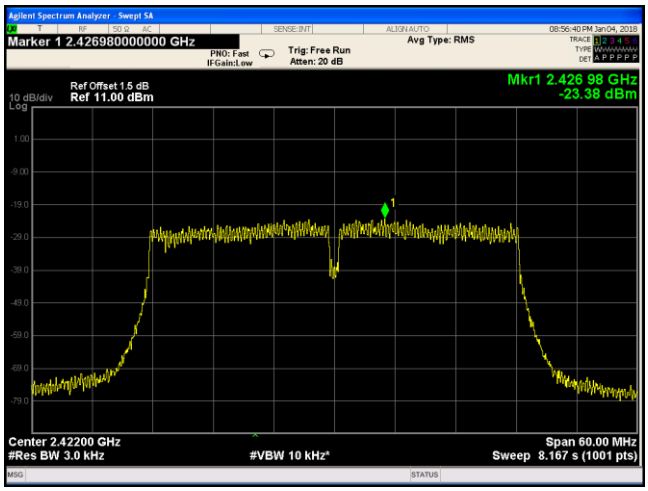
802.11n20 - 1 CH 2412



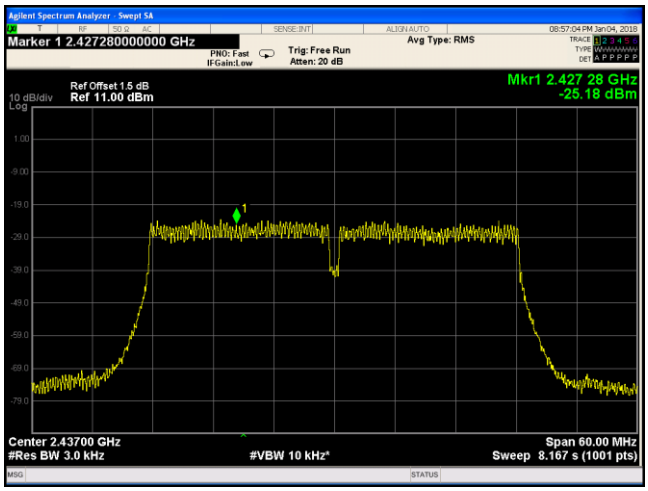
802.11n20 - 6 CH 2437



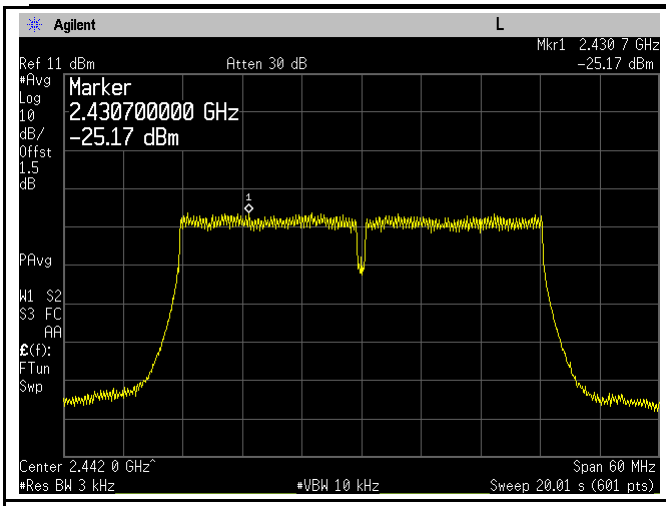
802.11n20 - 11 CH 2462



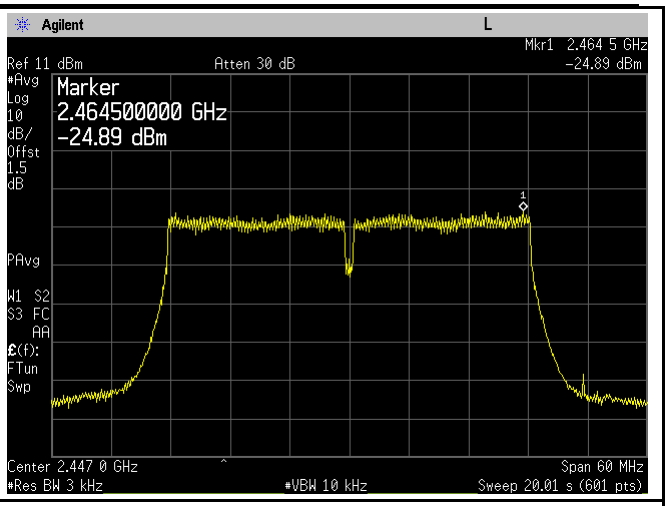
802.11n40 - 3 CH 2422



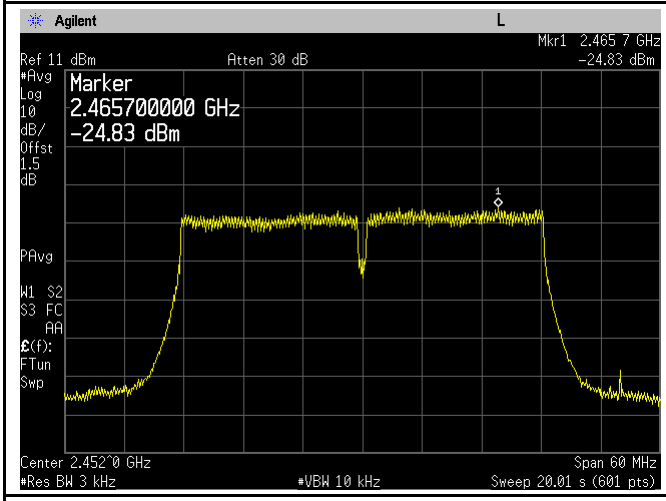
802.11n40 – 6 CH 2437



802.11n40 - 7 CH 2442



802.11n40 - 8 CH 2447



802.11n40 - 9 CH 2452