

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS 247

OF

Product Name: Tablet Computer
Brand Name: 
Marketing Name: Predator 8 GT-810
Model No.: A5002
Model Difference: N/A
FCC ID: HLZA5002
IC: 1754F-A5002
Report No.: E2/2015/50077
Issue Date: Jul. 21, 2015
FCC Rule Part: §15.247, Cat: DTS
IC Rule Part: RSS-247 issue 1 :2015
Prepared for: Acer Incorporated
8F., No.88, Sec. 1, Hsintai 5th Rd., Hsichih,
New Taipei City 22181, Taiwan (R.O.C.)
SGS Taiwan Ltd.
Prepared by: Electronics & Communication Laboratory
No.2, Keji 1st Rd., Guishan District,
Taoyuan City, Taiwan 333



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VERIFICATION OF COMPLIANCE

Applicant: Acer Incorporated
8F., No.88, Sec. 1, Hsintai 5th Rd., Hsichih, New Taipei City
22181, Taiwan (R.O.C.)

Product Name: Tablet Computer

Brand Name: 

Marketing Name: Predator 8 GT-810

Model No.: A5002

Model Difference: N/A

FCC ID: HLZA5002

IC: 1754F-A5002

Report Number: E2/2015/50077

Date of test: May. 29, 2015 ~ Jul. 17, 2015

Date of EUT Received: May. 29, 2015

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Test By:

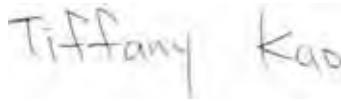


Date

Jul. 21, 2015

Jerry Lu / Engineer

Prepared By:

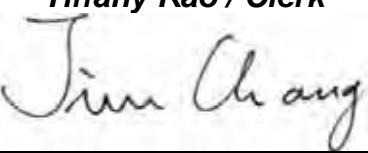


Date

Jul. 21, 2015

Tiffany Kao / Clerk

Approved By:



Date

Jul. 21, 2015

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
E2/2015/50077	Rev.00	Initial creation of document	Jul. 21, 2015

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1 GENERAL INFORMATION

1.1 Product description

General:

Product Name:	Tablet Computer	
Brand Name:		
Marketing Name:	Predator 8 GT-810	
Model No.:	A5002	
Model Difference:	N/A	
Product SW/HW version:	Acer_AV0L0_GT-810_RV1BRB03_TWN_GEN1 / E0	
Radio SW/HW version:	6.10.197.111.1 (r446629) FWID 01-dfa59dca / 0A	
Test SW Version:	N/A	
RF power setting in TEST SW:	N/A	
USB Cable:	Model No.: N/A, Supplier: Mingji	
Power Supply:	3.8V from Rechargeable Li-polymer battery or 5.35Vdc from AC/DC adapter	
	Battery:	Model No.:AP14F8K, Supplier: N/A
	Adapter :	1. Model No.: PA-1100-25, Supplier: LITEON. 2. Model No.: ADP-10HW A, Supplier: DELTA.

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WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power / (EIRP)	Type of Emission	Modulation Technology
11b/g	2412-2462	11	b: 18.04dBm b: 18.17dBm (EIRP) g: 22.93dBm g: 18.21dBm (EIRP)	b: 10M9G1D g:16M3D1D	DSSS, OFDM
11n	HT20 2412-2462	11	HT20: 24.33dBm (MIMO Chain 0+1) HT20: 20.29dBm (MIMO Chain 0+1) (EIRP)	HT20:17M5D1D	OFDM
11n	HT40 2422-2452	7	HT40: 21.87dBm (MIMO Chain 0+1) HT40: 18.25dBm (MIMO Chain 0+1) (EIRP)	HT40:36M3D1D	OFDM
Antenna Designation:		PIFA Antenna, Main: Gain: -0.18dBi Aux: Gain: 3.50dBi			
Modulation type:		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM			
Transition Rate:		802.11 b: up to 11 Mbps; 802.11 g: up to 54 Mbps 802.11 n_20MHz: up to 144Mbps 802.11 n_40MHz: up to 300Mbps			

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1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is Tablet Computer supporting, Wi-Fi 802.11abgn, Bluetooth features, and below is details of information.

Product Feature	
Product Name:	Tablet Computer
Brand Name:	
Marketing Name:	Predator 8 GT-810
Model Difference:	A5002
Model No.:	N/A
FCC ID:	HLZA5006
IC:	1754F-A5002
Wi-Fi Specification	802.11a/b/g/n
Bluetooth Version	V4.0 dual mode

Note: The above EUT information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance V03r03 FCC

KDB 662911 D01 Multiple Transmitter Output V02r01

Canada RSS-247 issue 1 May 2015

Canada RSS-Gen issue 4 Nov. 2014

ANSI C63.10:2013

Note:

1. All test items have been performed and record as per the above standards.
2. The composite system is compliance with FCC Subpart B is authorized under a DoC procedure.
3. The EUT was placed 1.5m height for frequency above 1GHz in accordance with ANSI C63.10 :2013

1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan. (TAF code 0513)

FCC Registration Numbers are: 628985

Canada Registration Number: 4620A-5.

1.5 Special Accessories

There are no special accessories used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example with cable loss 1.8dB and 10dB attenuator.

Single mode offset

= RF cable loss (dB)+ attenuation factor(dB)=11.8(dB)

N20/N40 MIMO mode offset

= RF cable loss (dB)+ attenuation factor(dB)+ 10 log(NANT) dB = 14.9(dB)

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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission

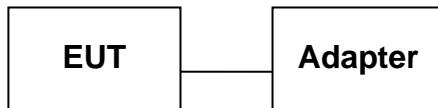


Fig. 2-2 Conducted (Antenna Port) Configuration

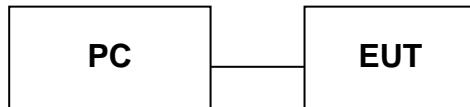


Fig. 2-3 AC Power Line Conducted Emission

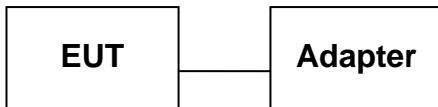


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	PC	N/A	N/A	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULTS

FCC Rules / IC Rules	Description Of Test	Result
§15.207(a) RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3) RSS-247 §5.4(4)	Peak Output Power	Compliant
§15.247(a)(2) RSS-247 §5.2 (1) RSS-Gen §6.6	6dB & 99% Emission Bandwidth	Compliant
§15.247(d) RSS-247 §5.5	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d) RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e) RSS-247 §5.2(2)	Power Spectral Density	Compliant
§15.203 §15.247(b) RSS- Gen §6.7 RSS- Gen §8.3	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

11 channels are provided for 802.11b, 802.11g and 802.11n_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

7 channels are provided for 802.11n_HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422 MHz	7	2442 MHz
4	2427 MHz	8	2447 MHz
5	2432 MHz	9	2452 MHz
6	2437 MHz		

4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11g	1 to 11	1,6,11	OFDM	6	AUX
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO

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RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1, 6, 11	DSSS	1	AUX
802.11g	1 to 11	1, 6, 11	OFDM	6	AUX
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO

Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1, 6, 11	DSSS	1	AUX
802.11g	1 to 11	1, 6, 11	OFDM	6	AUX
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO

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Directional gain (MIMO)

The Tx transmission to construct MIMO operation is cyclic delay diversity, and the following deduction to obtain the array gain of MIMO operation is based on the approach given by KDB 662911 D01.

Array gain = 3.01dBi (peak spectral density, conducted spurious emission)

Gain that is combined with different magnitude of two antennas:

(ii) 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; or,

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

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k/20}$ if the k th antenna is being fed by spatial stream j , or zero if it is not;
 G_k is the gain in dBi of the k th antenna.

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
6dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Peak Power Density	+/- 1.3 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : Horizontal)	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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6 CONDUCTED EMISSION TEST

6.1 Standard Applicable

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

1. The lower limit shall apply at the transition frequencies

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

6.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI 7	100950	12/12/2014	12/11/2015
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	01/06/2015	01/07/2016
LISN	Schwarzbeck	NSLK 8127	8127-648	06/09/2015	06/08/2016
LISN	Rolf-Heine	NNB-2/16Z	99012	03/04/2015	03/03/2016
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

6.3 EUT Setup

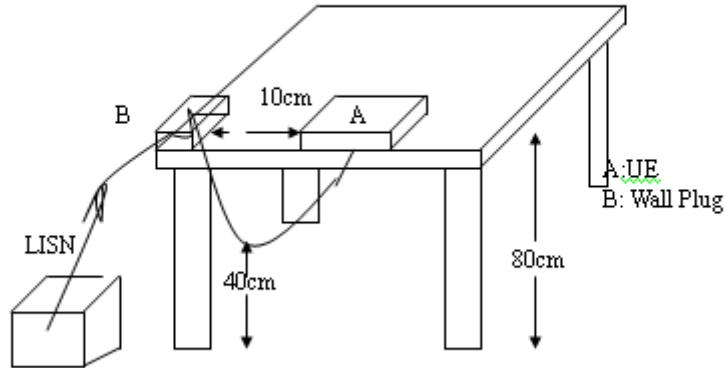
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

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6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

6.6 Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit

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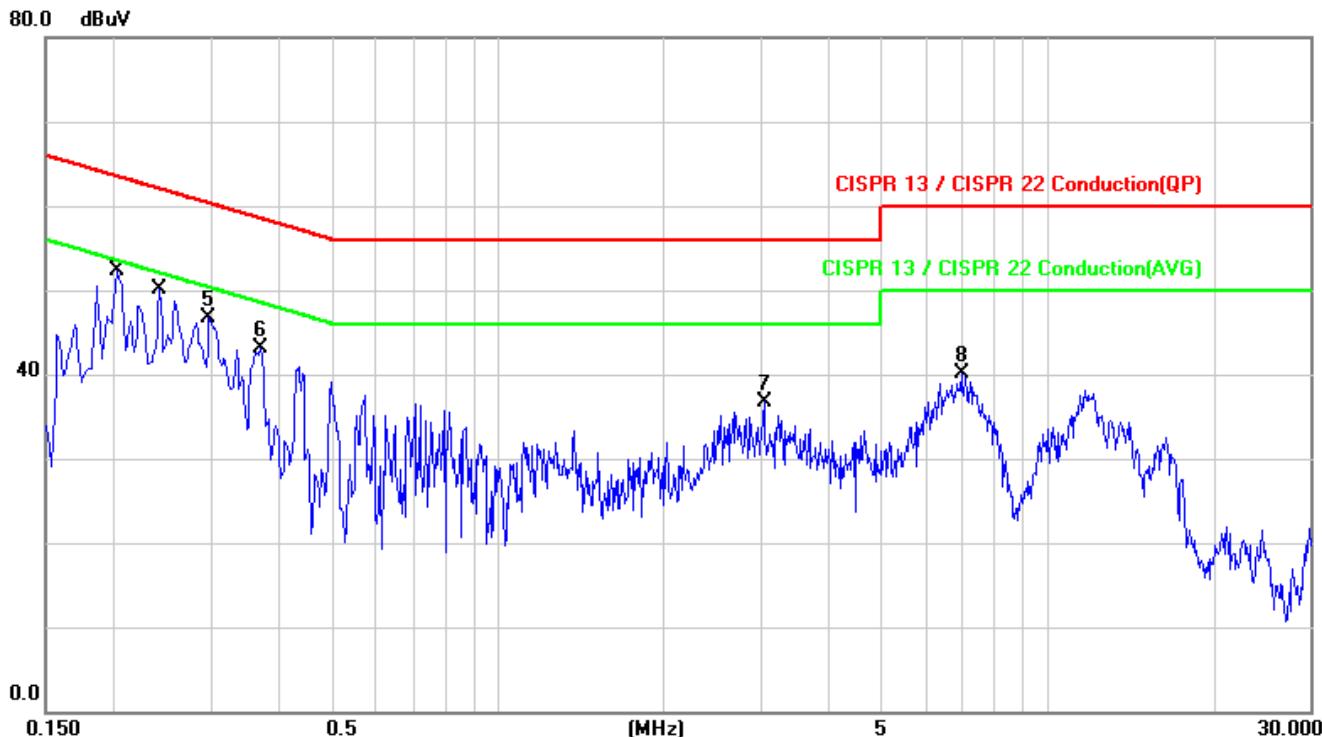
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test Date:	Jul. 10, 2015
Temperature:	26	Humidity:	54 %	Test By:	Ashton
Model No.:	Adapter: PA-1100-25, Supplier: LITEON			Phase:	L1



No.	Mk.	Freq. ^② (MHz) ^②	Reading ^② dBuV ^②	Factor ^②	Measurement ^② (dBuV) ^②	Limit ^② (dBuV) ^②	Over ^② (dB) ^②	Detector ^②	Comment ^②
1 ^②	^②	0.2020 ^②	46.30 ^②	0.12 ^②	46.42 ^②	63.53 ^②	-17.11 ^②	QP ^②	^②
2 ^②	^②	0.2020 ^②	34.20 ^②	0.12 ^②	34.32 ^②	53.53 ^②	-19.21 ^②	AVG ^②	^②
3 ^②	^②	0.2420 ^②	44.00 ^②	0.12 ^②	44.12 ^②	62.03 ^②	-17.91 ^②	QP ^②	^②
4 ^②	^②	0.2420 ^②	32.60 ^②	0.12 ^②	32.72 ^②	52.03 ^②	-19.31 ^②	AVG ^②	^②
5 ^②	* ^②	0.2980 ^②	46.57 ^②	0.12 ^②	46.69 ^②	60.30 ^②	-13.61 ^②	peak ^②	^②
6 ^②	^②	0.3700 ^②	42.91 ^②	0.12 ^②	43.03 ^②	58.50 ^②	-15.47 ^②	peak ^②	^②
7 ^②	^②	3.0500 ^②	36.42 ^②	0.22 ^②	36.64 ^②	56.00 ^②	-19.36 ^②	peak ^②	^②
8 ^②	^②	6.9660 ^②	39.81 ^②	0.33 ^②	40.14 ^②	60.00 ^②	-19.86 ^②	peak ^②	^②

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Operation Mode:	Operation mode		Test Date:	Jul. 10, 2015	
Temperature:	26	Humidity:	54 %	Test By:	Ashton
Model No.:	Adapter: PA-1100-25, Supplier: LITEON		Phase:	N	



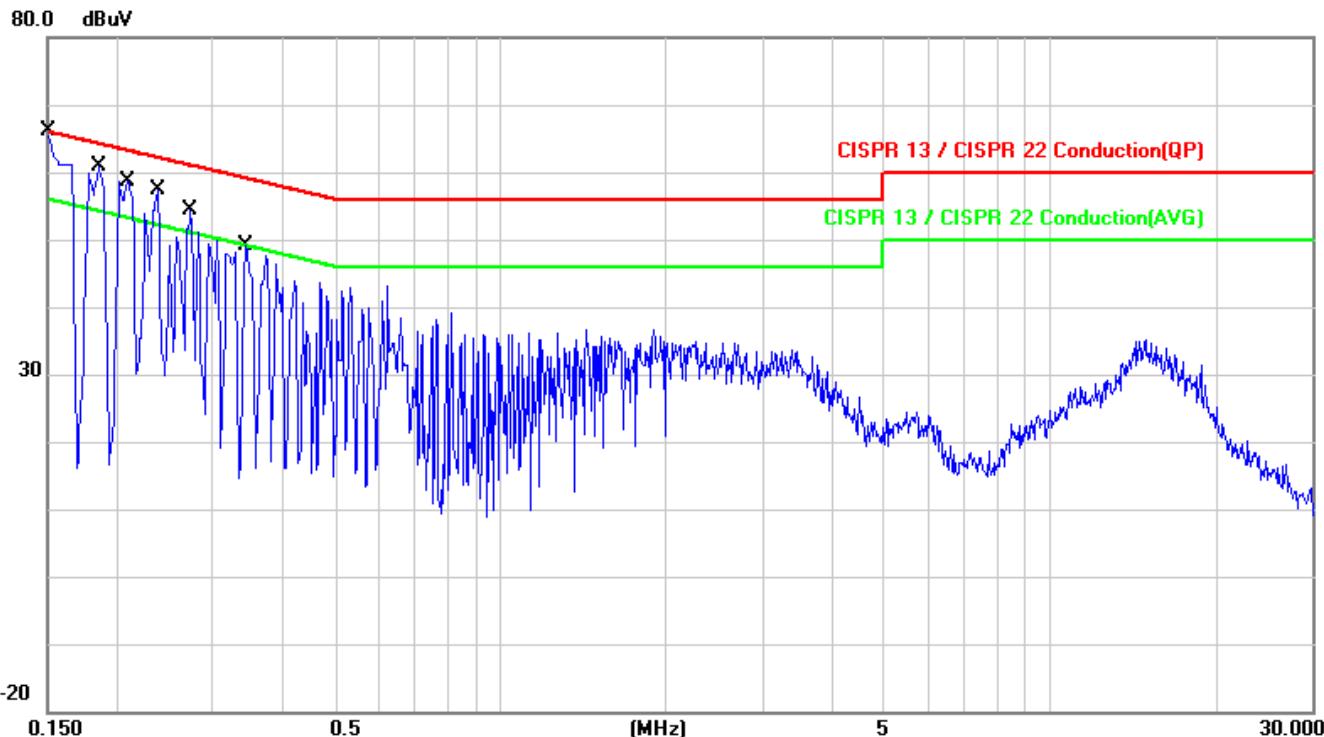
No.	Mk.	Freq. ² (MHz)	Reading ² dBuV ²	Factor ² (dB) ²	Measurement ² (dBuV) ²	Limit ² (dBuV) ²	Over ² (dB) ²	Detector ² QP ²	Comment ²
1 ²		0.1900 ²	49.30 ²	0.12 ²	49.42 ²	64.04 ²	-14.62 ²	QP ²	
2 ²		0.1900 ²	35.20 ²	0.12 ²	35.32 ²	54.04 ²	-18.72 ²	AVG ²	
3 ²		0.2180 ²	47.50 ²	0.12 ²	47.62 ²	62.89 ²	-15.27 ²	QP ²	
4 ²		0.2180 ²	32.60 ²	0.12 ²	32.72 ²	52.89 ²	-20.17 ²	AVG ²	
5 ²		0.2500 ²	46.50 ²	0.12 ²	46.62 ²	61.76 ²	-15.14 ²	QP ²	
6 ²		0.2500 ²	31.30 ²	0.12 ²	31.42 ²	51.76 ²	-20.34 ²	AVG ²	
7 ²		0.2940 ²	43.70 ²	0.12 ²	43.82 ²	60.41 ²	-16.59 ²	QP ²	
8 ²		0.2940 ²	33.00 ²	0.12 ²	33.12 ²	50.41 ²	-17.29 ²	AVG ²	
9 ²		0.4340 ²	43.10 ²	0.12 ²	43.22 ²	57.18 ²	-13.96 ²	QP ²	
10 ²	*	0.4340 ²	39.30 ²	0.12 ²	39.42 ²	47.18 ²	-7.76 ²	AVG ²	
11 ²		1.8660 ²	42.48 ²	0.18 ²	42.66 ²	56.00 ²	-13.34 ²	peak ²	

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Operation Mode:	Operation mode		Test Date:	Jul. 10, 2015	
Temperature:	26	Humidity:	54 %	Test By:	Ashton
Model No.:	Adapter: ADP-10HW A, Supplier: Delta		Phase:	L1	



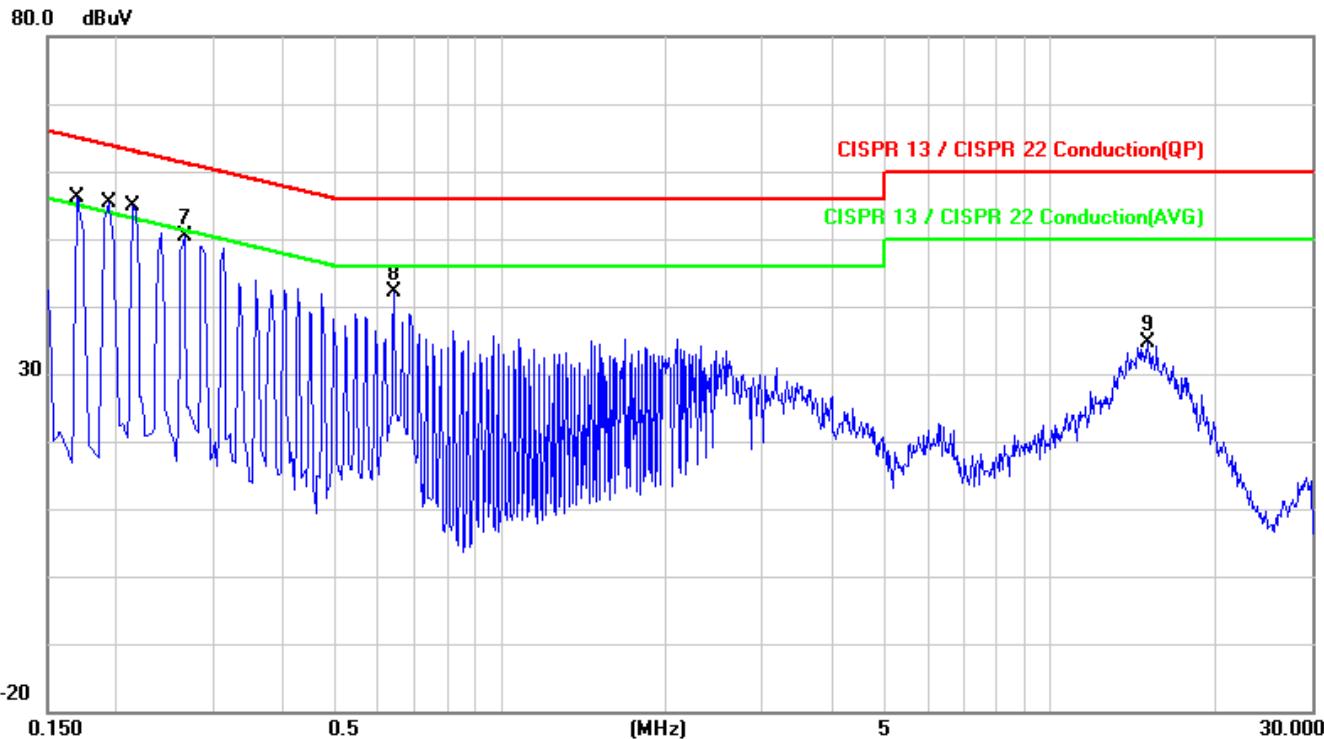
No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1	*	0.1500	58.61	0.08	58.69	66.00	-7.31	QP	
2		0.1500	41.91	0.08	41.99	56.00	-14.01	AVG	
3		0.1860	54.90	0.07	54.97	64.21	-9.24	QP	
4		0.1860	38.20	0.07	38.27	54.21	-15.94	AVG	
5		0.2100	52.60	0.07	52.67	63.21	-10.54	QP	
6		0.2100	36.70	0.07	36.77	53.21	-16.44	AVG	
7		0.2380	49.90	0.09	49.99	62.17	-12.18	QP	
8		0.2380	33.60	0.09	33.69	52.17	-18.48	AVG	
9		0.2740	48.70	0.10	48.80	61.00	-12.20	QP	
10		0.2740	33.00	0.10	33.10	51.00	-17.90	AVG	
11		0.3460	41.20	0.14	41.34	59.06	-17.72	QP	
12		0.3460	25.00	0.14	25.14	49.06	-23.92	AVG	

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Operation Mode:	Operation mode	Test Date:	Jul. 10, 2015
Temperature:	26	Humidity:	54 %
Model No.:	Adapter: ADP-10HW A, Supplier: Delta	Test By:	Ashton



No.	Mk.	Freq. (MHz)	Reading dBuV	Factor	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1		0.1700	52.30	0.14	52.44	64.96	-12.52	QP	
2		0.1700	35.00	0.14	35.14	54.96	-19.82	AVG	
3		0.1940	51.80	0.13	51.93	63.86	-11.93	QP	
4		0.1940	35.30	0.13	35.43	53.86	-18.43	AVG	
5		0.2140	50.20	0.14	50.34	63.05	-12.71	QP	
6		0.2140	33.80	0.14	33.94	53.05	-19.11	AVG	
7	*	0.2660	50.29	0.16	50.45	61.24	-10.79	peak	
8		0.6420	41.87	0.31	42.18	56.00	-13.82	peak	
9		15.1220	34.01	0.65	34.66	60.00	-25.34	peak	

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7 DUTY CYCLE OF TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

Formula:

$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

	Duty Cycle	Duty Factor (dB)
802.11b	99.2 %	0.04
802.11g	95.8 %	0.19
802.11n_20	90.7 %	0.42
802.11n_40	83.1 %	0.82

Duty Cycle Factor: $10 * \log (1/0.992) = 0.03$

Duty Cycle Factor: $10 * \log (1/0.958) = 0.19$

Duty Cycle Factor: $10 * \log (1/0.907) = 0.42$

Duty Cycle Factor: $10 * \log (1/0.831) = 0.80$

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7.1 DUTY CYCLE TEST SIGNAL Measurement Result

802.11 b



802.11 g

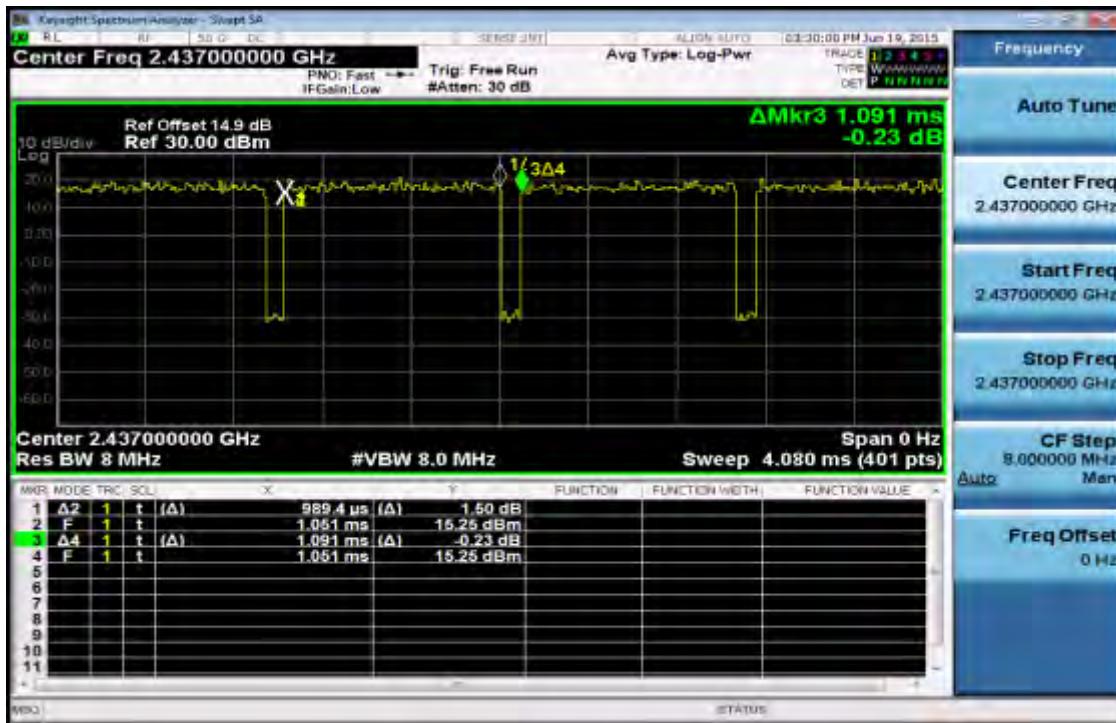


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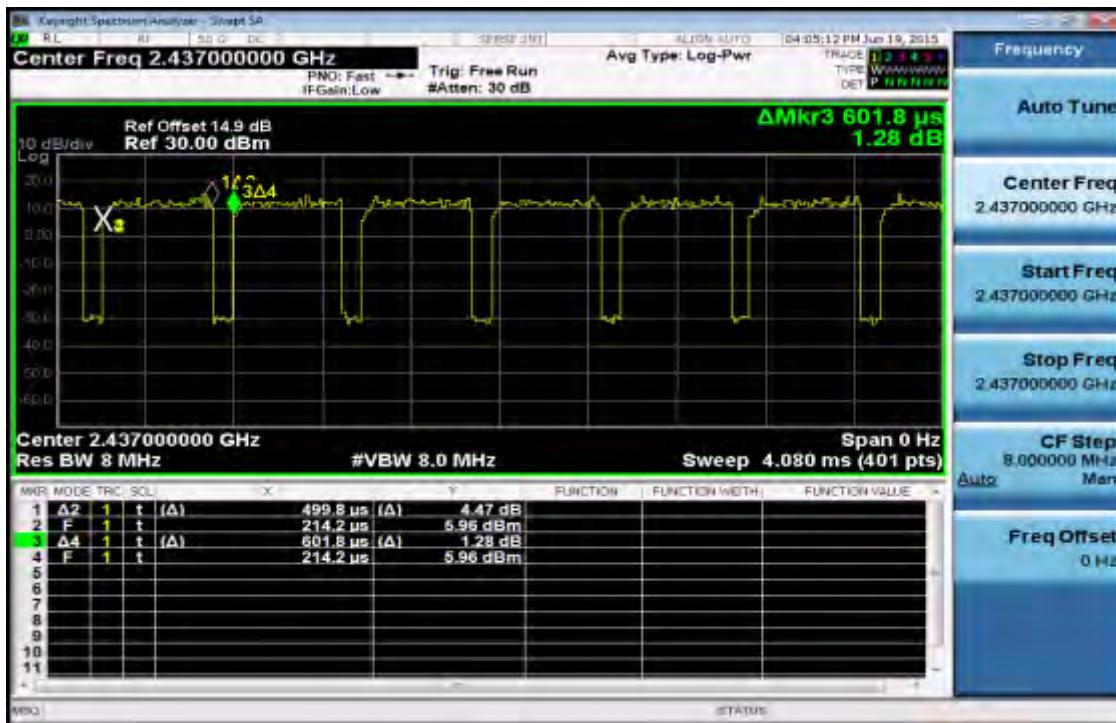
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802.11 n_20 MHz



802.11 n_40 MHz



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8 PEAK OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

Note: The antenna gain is greater than 6dBi in MIMO mode the limit reduce as below:

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain (dBi) = 3.50+3.01=6.51dBi

Limit: 30dBm – (6.51– 6dBi) = 29.49dBm

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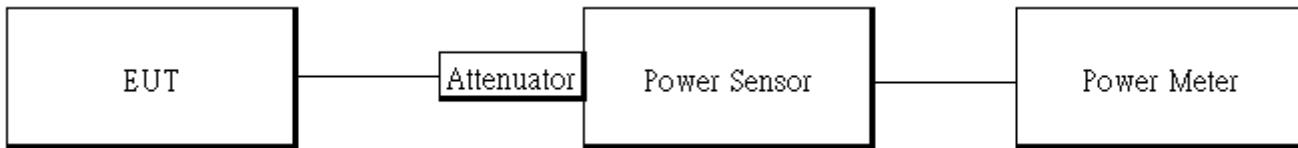
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8.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1326001	06/23/2015	06/22/2016
Power Sensor	Anritsu	MA2411B	1315048	06/23/2015	06/22/2016
DC Block	PASTERNAK	PE8210	RF29	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

8.3 Test Set-up

Power Meter:



8.4 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance V03r03.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

Power Meter:

It is used as the auxiliary test equipment to conduct the output power measurement.

4. Record the max. Reading as observed from Spectrum or Power Meter.
5. For MIMO operation, measurement is done per chain basis, and then sum the simultaneous transmitting output in linear.

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8.5 Measurement Result

802.11b

CH	Frequenc y (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit
1	2412	1	17.56	57.02	1 Watt = 30
6	2437	1	17.81	60.39	1 Watt = 30
11	2462	1	18.04	63.68	1 Watt = 30

CH	Frequenc y (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	14.21	26.36	1 Watt = 30
6	2437	1	14.67	29.31	1 Watt = 30
11	2462	1	14.49	28.12	1 Watt = 30

802.11g

CH	Frequenc y (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit
1	2412	6	20.07	101.62	1 Watt = 30
6	2437	6	22.93	196.34	1 Watt = 30
11	2462	6	20.54	113.24	1 Watt = 30

CH	Frequenc y (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	6	12.08	16.14	1 Watt = 30
6	2437	6	14.71	29.58	1 Watt = 30
11	2462	6	12.47	17.66	1 Watt = 30

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802.11n_HT20 (MIMO)

CH	Frequency (MHz)	DATA RATE	Peak Outout Power (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CHAIN 0	CHAIN 1				
1	2412	MCS8	20.81	20.68	23.76	237.454	29.49 dBm	PASS
6	2437	MCS8	21.27	21.19	24.24	265.490	29.49 dBm	PASS
11	2462	MCS8	21.36	21.28	24.33	271.049	29.49 dBm	PASS

CH	Frequency (MHz)	DATA RATE	Avg. Outout Power (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CHAIN 0	CHAIN 1				
1	2412	MCS8	10.59	10.51	13.56	22.701	29.49 dBm	PASS
6	2437	MCS8	10.78	10.39	13.60	22.907	29.49 dBm	PASS
11	2462	MCS8	10.85	10.68	13.78	23.857	29.49 dBm	PASS

802.11n_HT40 (MIMO)

CH	Frequency (MHz)	DATA RATE	Peak Outout Power (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CHAIN 0	CHAIN 1				
3	2422	MCS8	18.84	18.83	21.85	152.943	29.49 dBm	PASS
6	2437	MCS8	18.89	18.76	21.84	152.608	29.49 dBm	PASS
9	2452	MCS8	18.92	18.79	21.87	153.666	29.49 dBm	PASS

CH	Frequency (MHz)	DATA RATE	Avg. Outout Power (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CHAIN 0	CHAIN 1				
3	2422	MCS8	8.81	8.67	11.75	14.965	29.49 dBm	PASS
6	2437	MCS8	8.85	8.48	11.68	14.721	29.49 dBm	PASS
9	2452	MCS8	8.82	8.63	11.74	14.915	29.49 dBm	PASS

*** Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.**

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EIRP Measurement:
802.11b

CH	Frequency (MHz)	Avg. Output Power		GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
		TOTAL POWER (dBm)	TOTAL POWER (mW)				
1	2412	14.21	26.363	3.5	17.71	36	PASS
6	2437	14.67	29.309	3.5	18.17	36	PASS
11	2462	14.49	28.119	3.5	17.99	36	PASS

802.11g

CH	Frequency (MHz)	Avg. Output Power		GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
		TOTAL POWER (dBm)	TOTAL POWER (mW)				
1	2412	12.08	16.144	3.5	15.58	36	PASS
6	2437	14.71	29.580	3.5	18.21	36	PASS
11	2462	12.47	17.660	3.5	15.97	36	PASS

802.11n_HT20 (MIMO) Chain 0+Chain 1

CH	Frequency (MHz)	Avg. Output Power		GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
		TOTAL POWER (dBm)	TOTAL POWER (mW)				
1	2412	13.56	22.699	6.51	20.07	36	PASS
6	2437	13.60	22.909	6.51	20.11	36	PASS
11	2462	13.78	23.878	6.51	20.29	36	PASS

802.11n_HT40 (MIMO) Chain 0+Chain 1

CH	Frequency (MHz)	Avg. Output Power		GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
		TOTAL POWER (dBm)	TOTAL POWER (mW)				
3	2422	11.75	14.962	6.51	18.26	36	PASS
6	2437	11.68	14.723	6.51	18.19	36	PASS
9	2452	11.74	14.928	6.51	18.25	36	PASS

* Note: EIRP = Average Power + Gain

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9 6dB & 99% BANDWIDTH MEASUREMENT

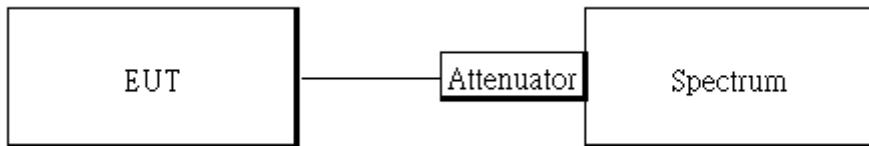
9.1 Standard Applicable

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

9.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNAK	PE8210	RF29	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

9.3 Test Set-up



9.4 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance V03r03.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. For 6dB Bandwidth:
Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=peak, Sweep=auto.
5. Mark the peak frequency and -6dB (upper and lower) frequency.
6. For 99% Bandwidth:
Set the spectrum analyzer as RBW=1%, VBW = 3*RBW, Span = 30M/50MHz, Detector=Sample, Sweep=auto.
7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

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9.5 Measurement Result

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)	Result
802.11b				
2412	8.089	10.456	> 500	PASS
2437	8.577	10.957	> 500	PASS
2462	8.092	10.882	> 500	PASS
802.11g				
2412	15.400	16.345	> 500	PASS
2437	15.500	16.286	> 500	PASS
2462	15.170	16.358	> 500	PASS
802.11n_HT20 (Main)				
2412	15.480	17.303	> 500	PASS
2437	15.160	17.506	> 500	PASS
2462	16.110	17.372	> 500	PASS
802.11n_HT20 (Aux)				
2412	15.920	17.379	> 500	PASS
2437	15.300	17.392	> 500	PASS
2462	16.030	17.450	> 500	PASS
802.11n_HT40 (Main)				
2422	36.330	36.342	> 500	PASS
2437	36.340	36.255	> 500	PASS
2452	36.370	36.257	> 500	PASS
802.11n_HT40 (Aux)				
2422	36.100	36.288	> 500	PASS
2437	36.330	36.172	> 500	PASS
2452	36.350	36.183	> 500	PASS

*Refer to next page for plots

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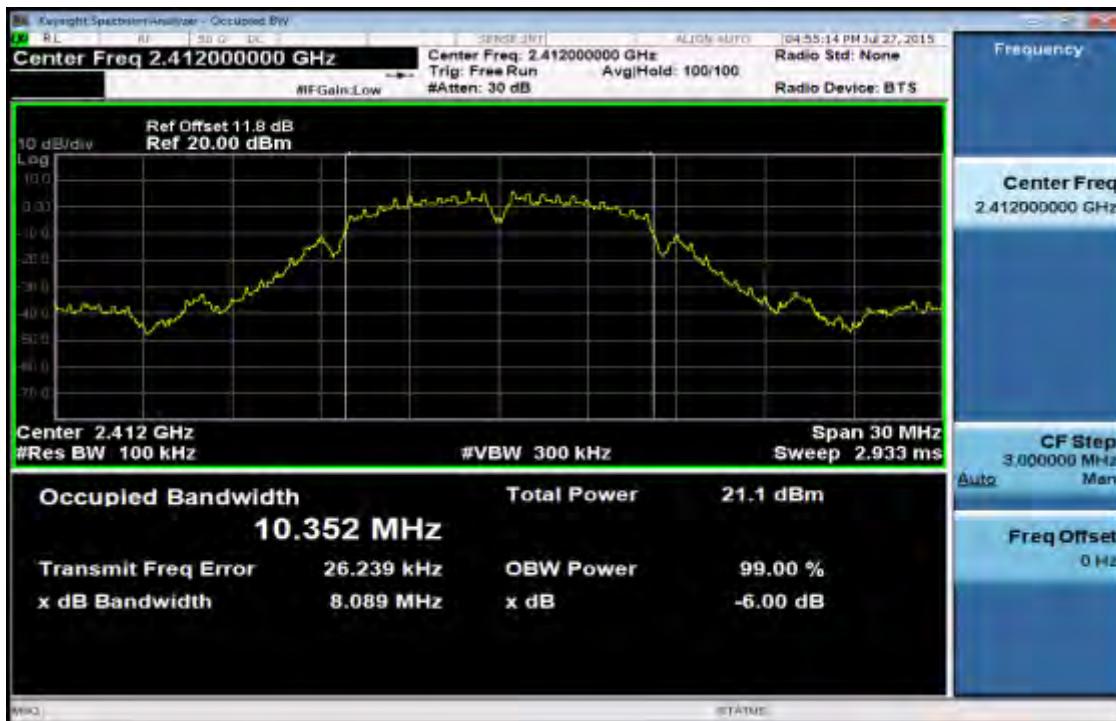
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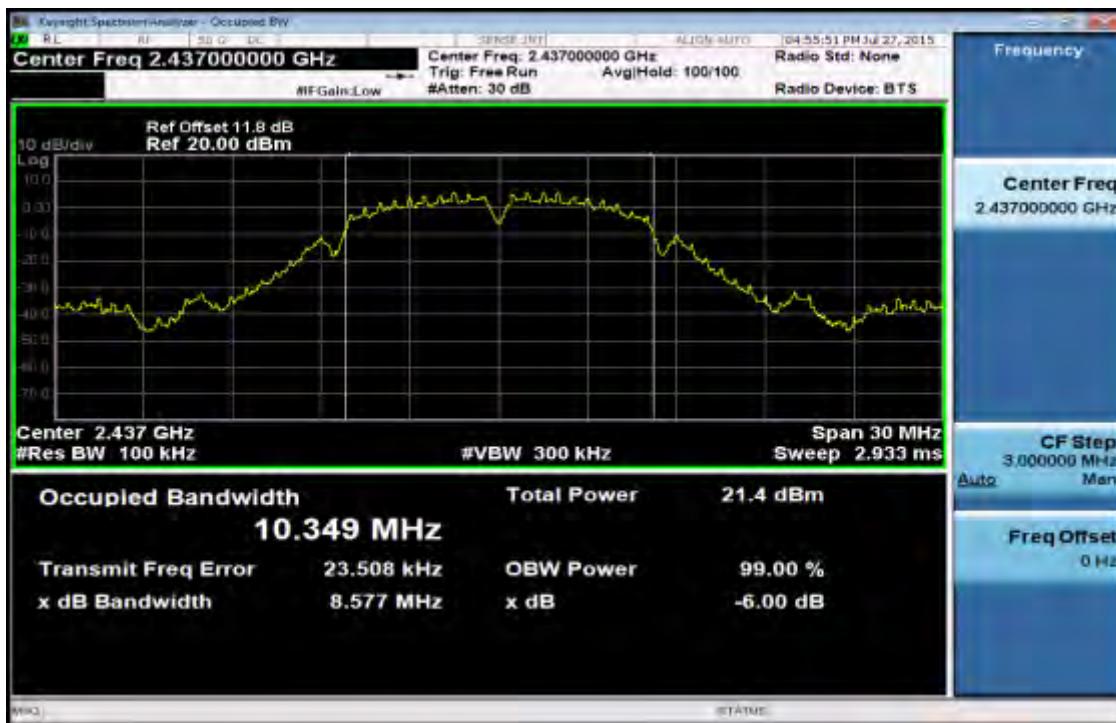
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802.11b

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

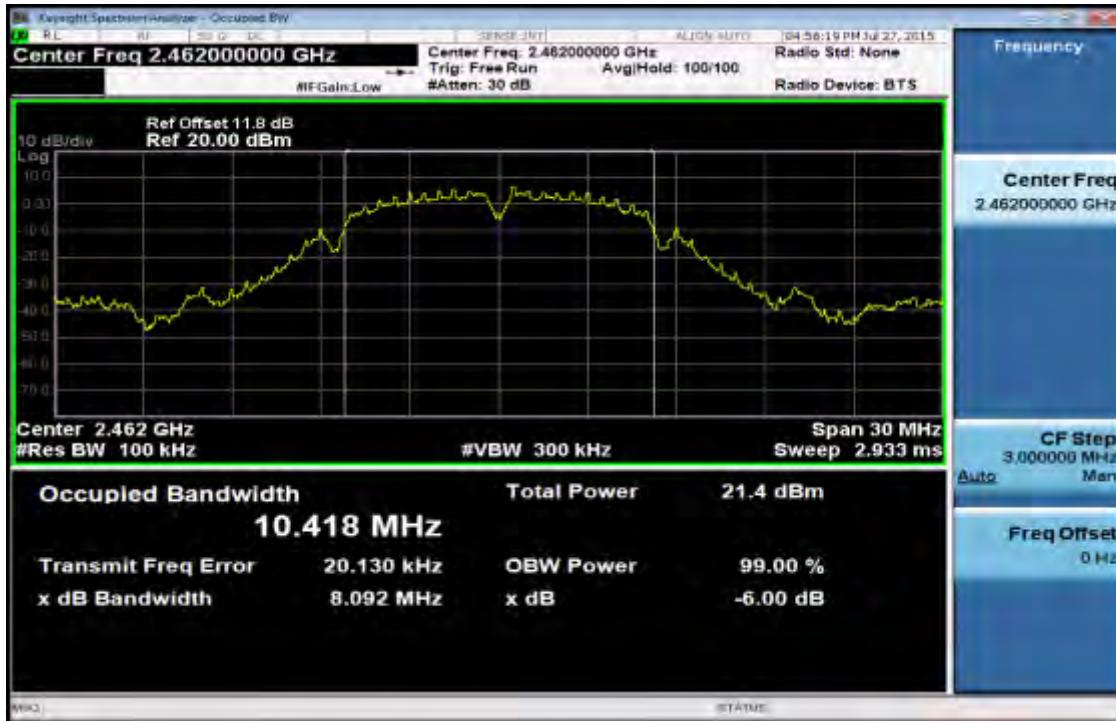


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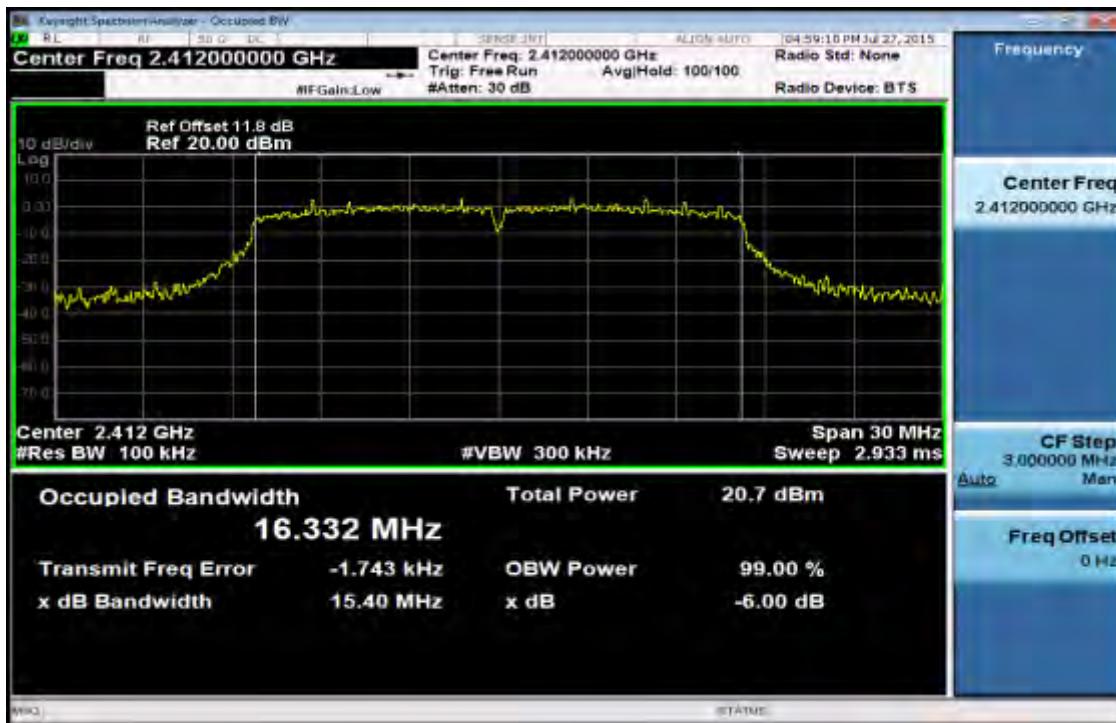
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6dB Band Width Test Data CH-High



802.11g

6dB Band Width Test Data CH-Low

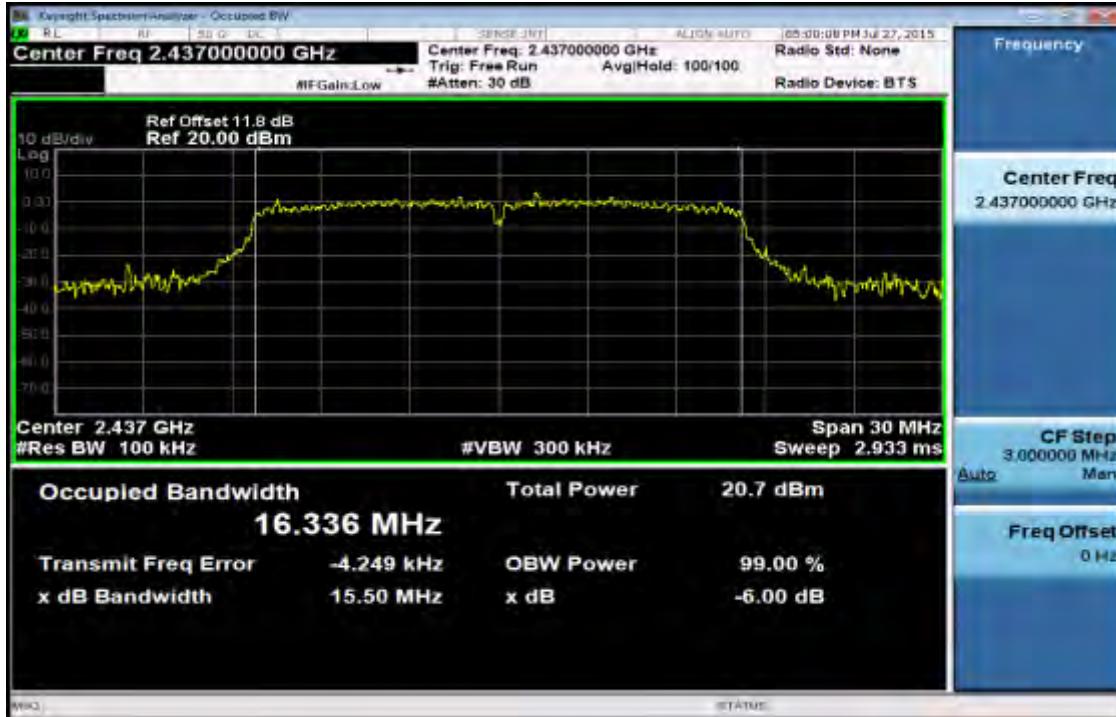


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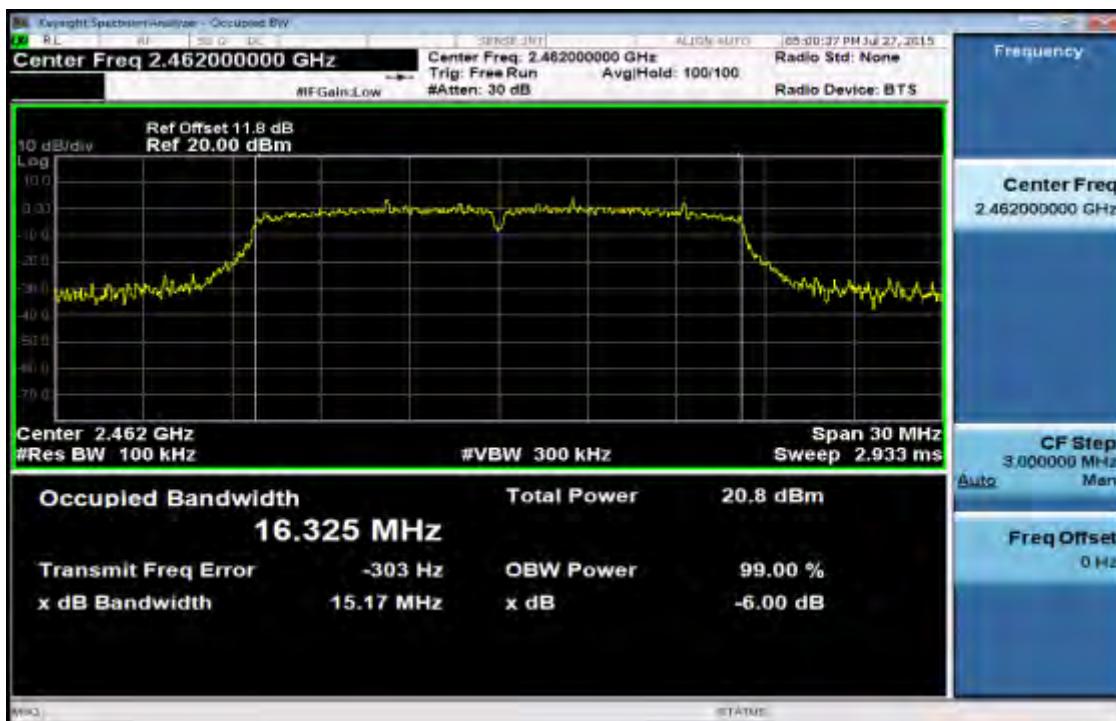
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6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



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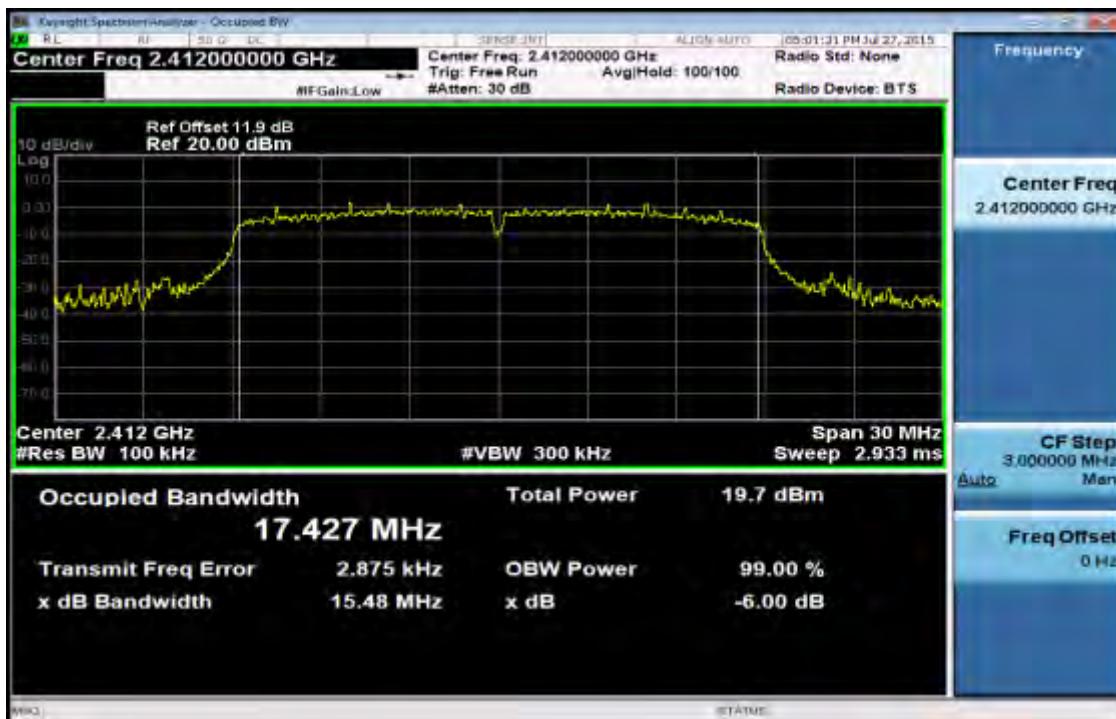
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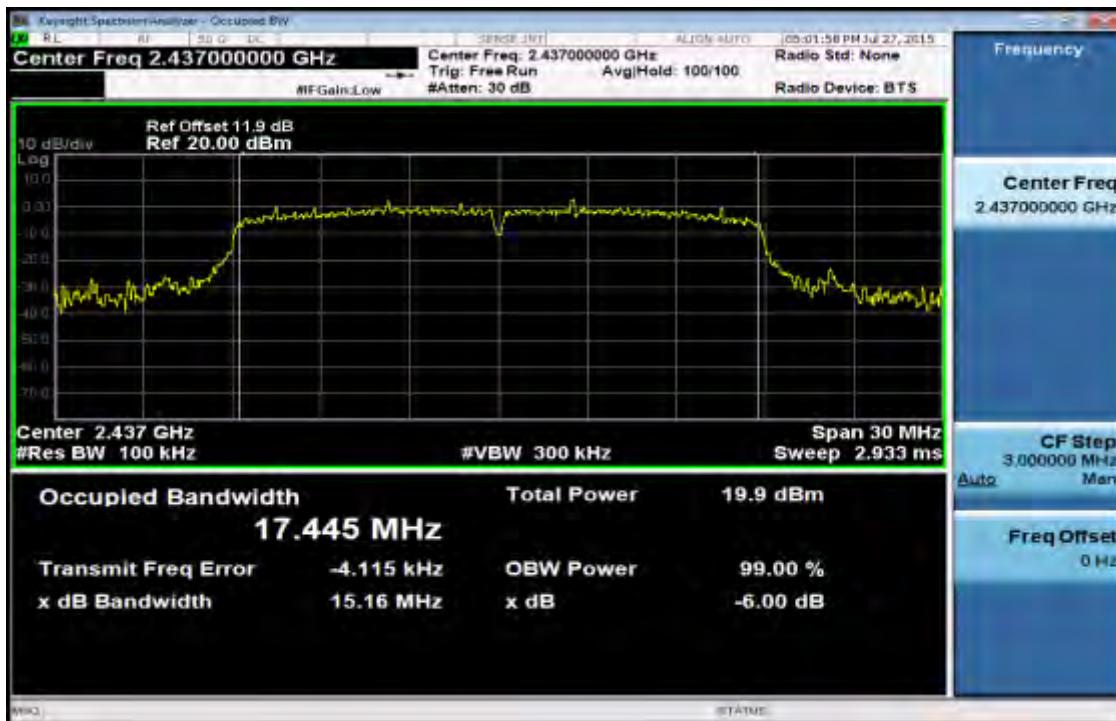
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802.11n_20M (Main)

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

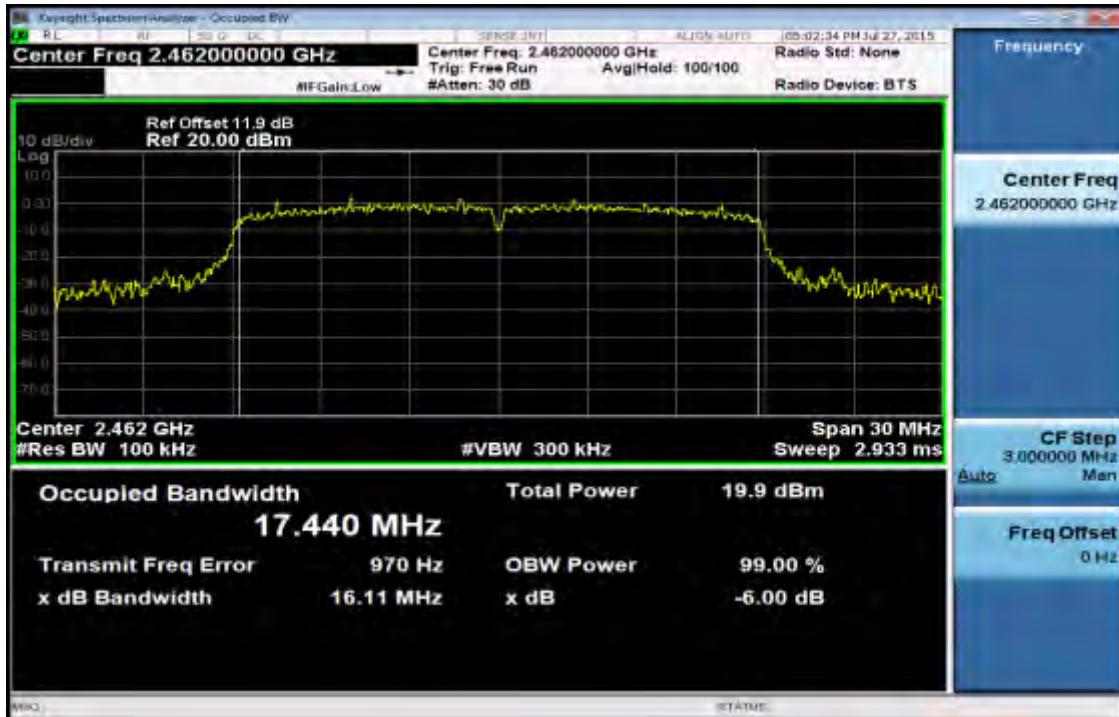


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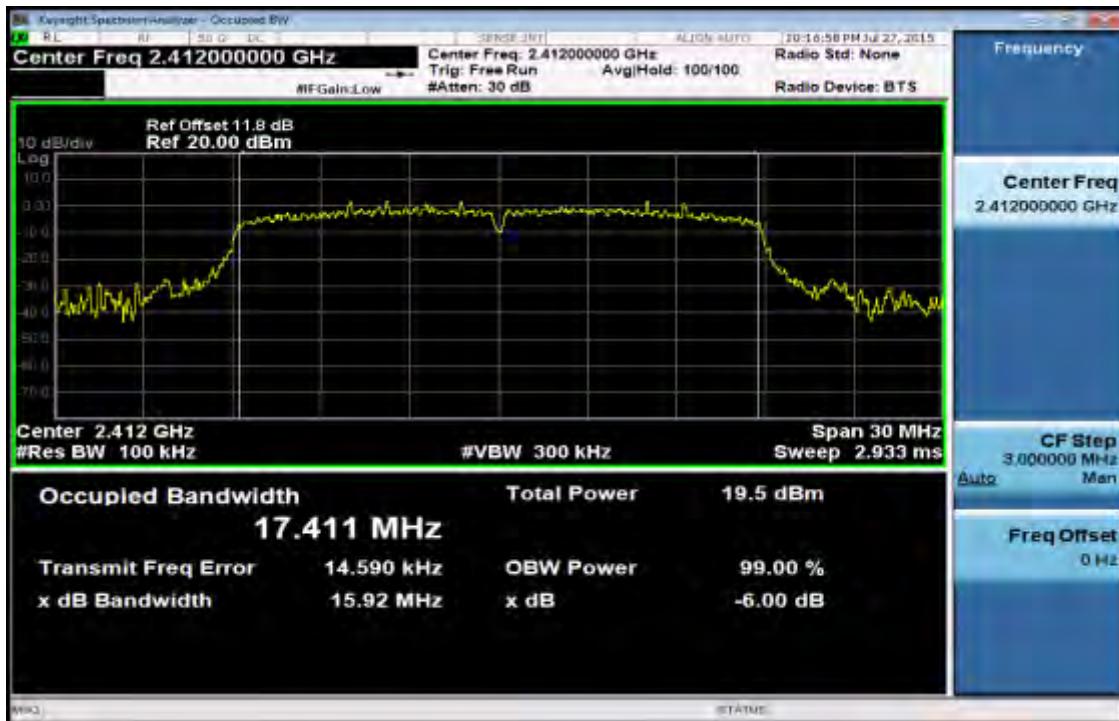
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6dB Band Width Test Data CH-High



802.11n_20M (Aux)

6dB Band Width Test Data CH-Low

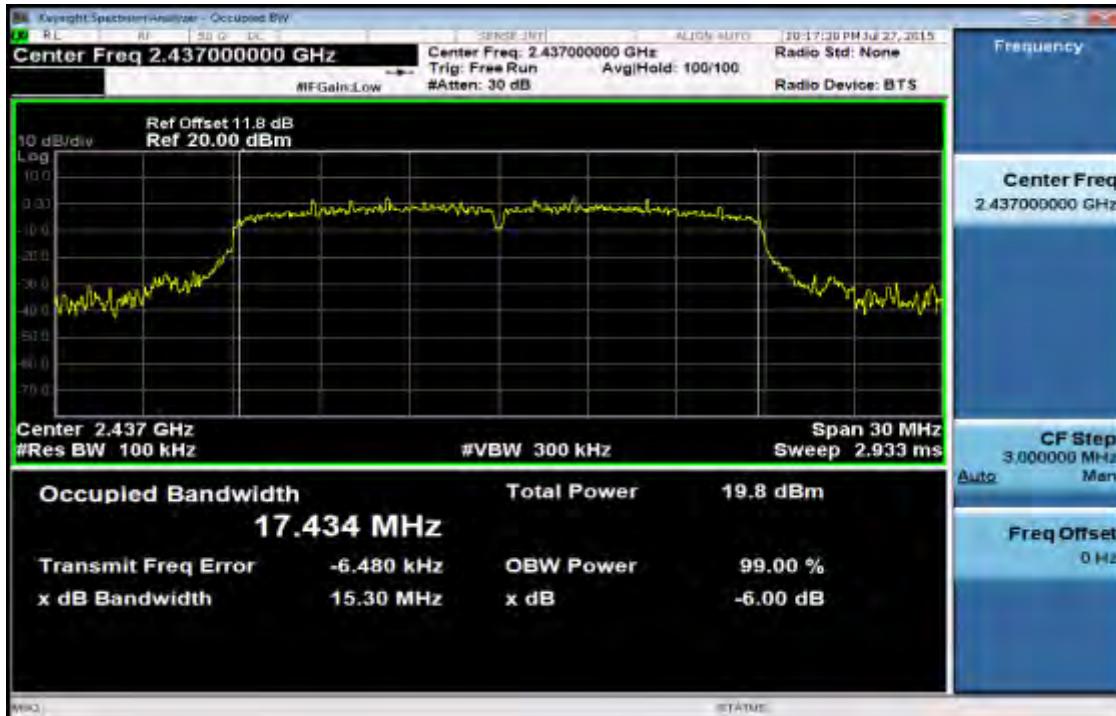


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6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



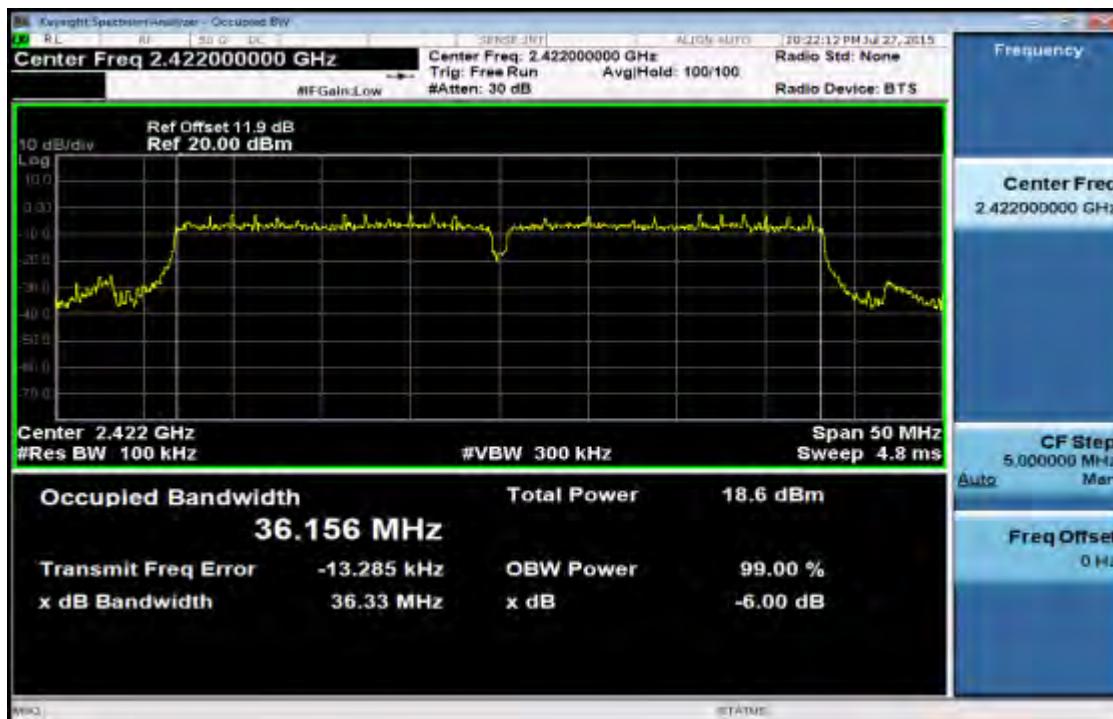
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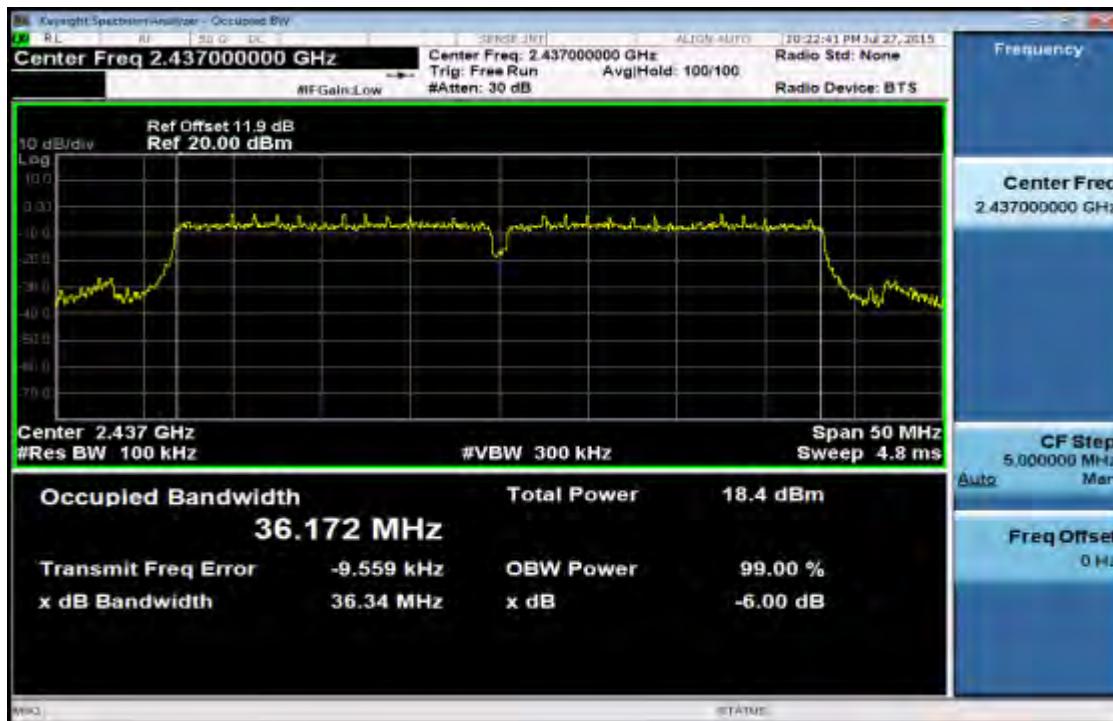
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802.11 n_40M (Main)

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

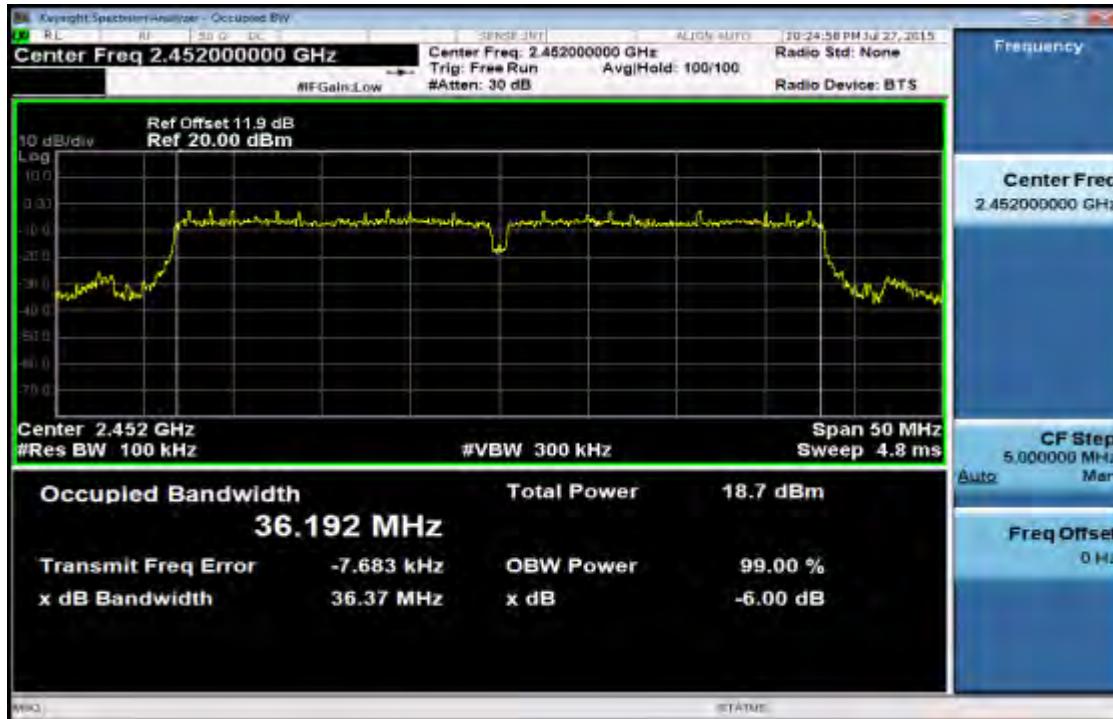


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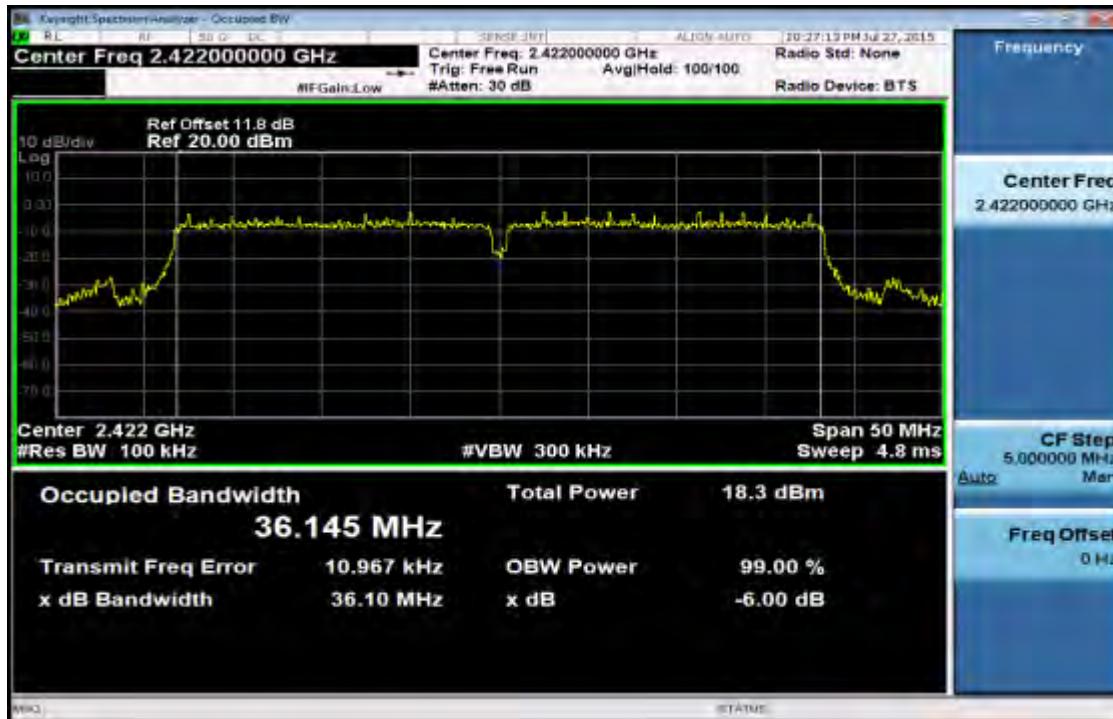
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6dB Band Width Test Data CH-High



802.11 n_40M (Aux)

6dB Band Width Test Data CH-Low

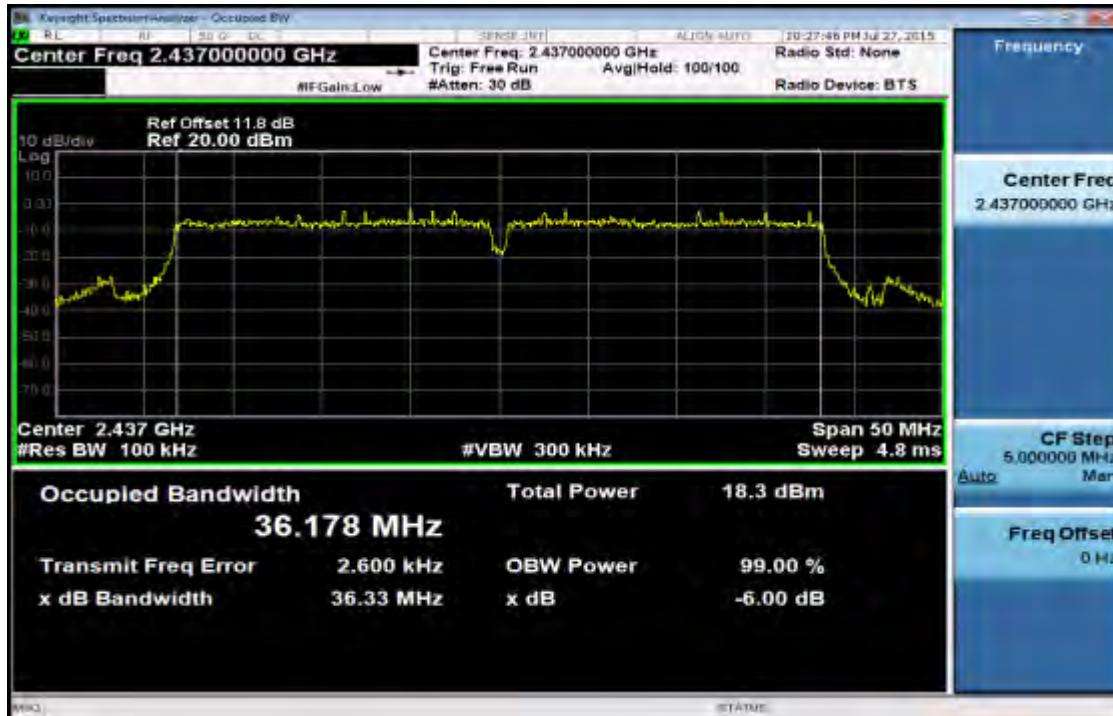


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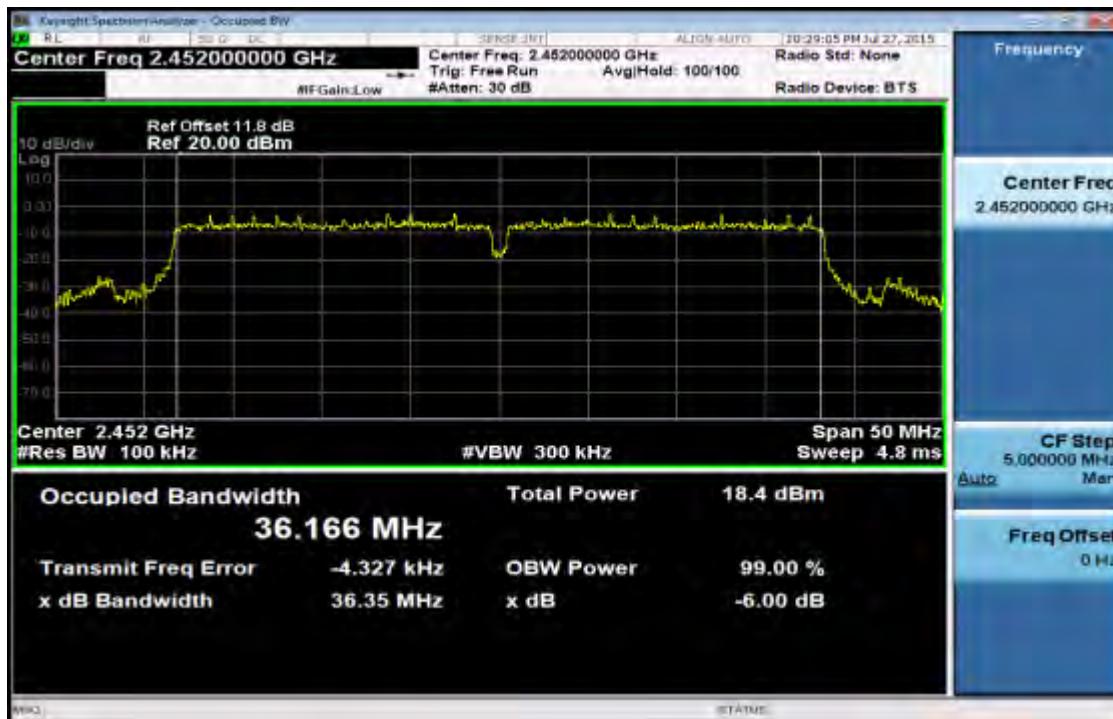
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6dB Band Width Test Data CH-Mid



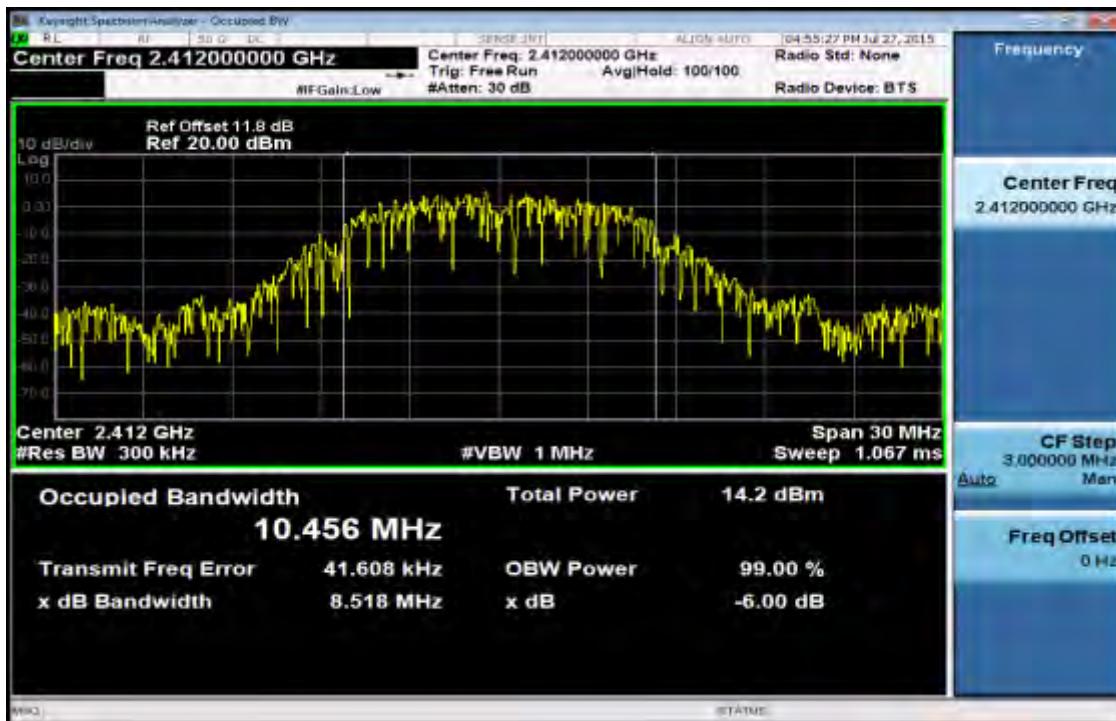
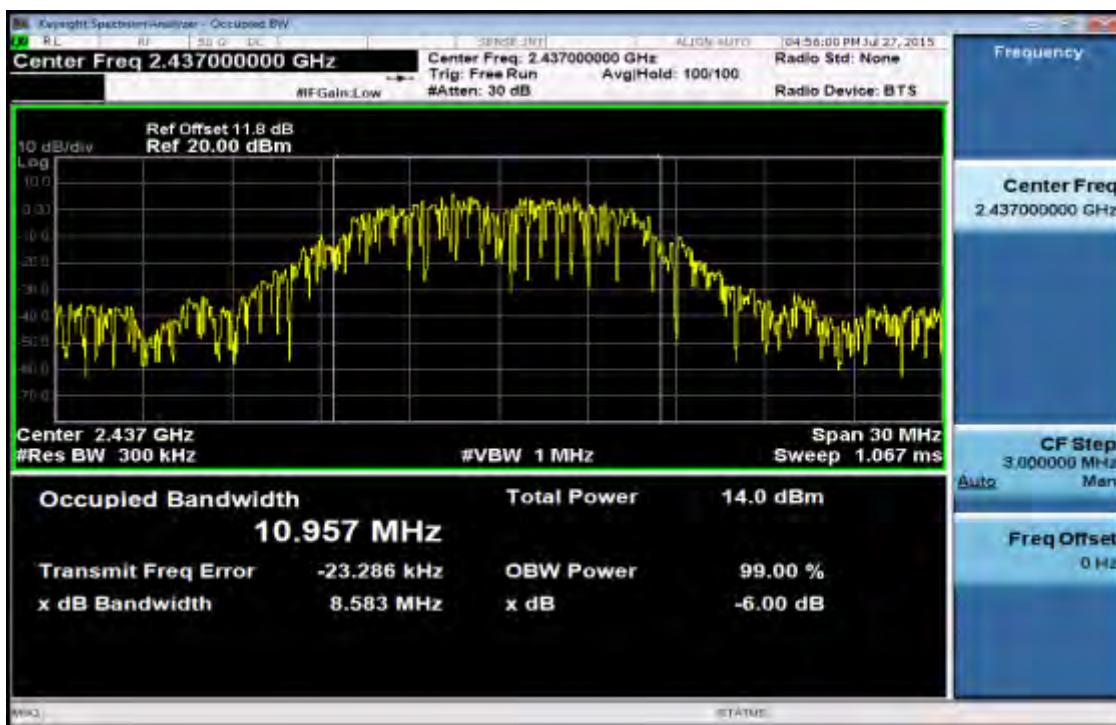
6dB Band Width Test Data CH-High



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802.11b**99% Band Width Test Data CH-Low****99% Band Width Test Data CH-Mid**

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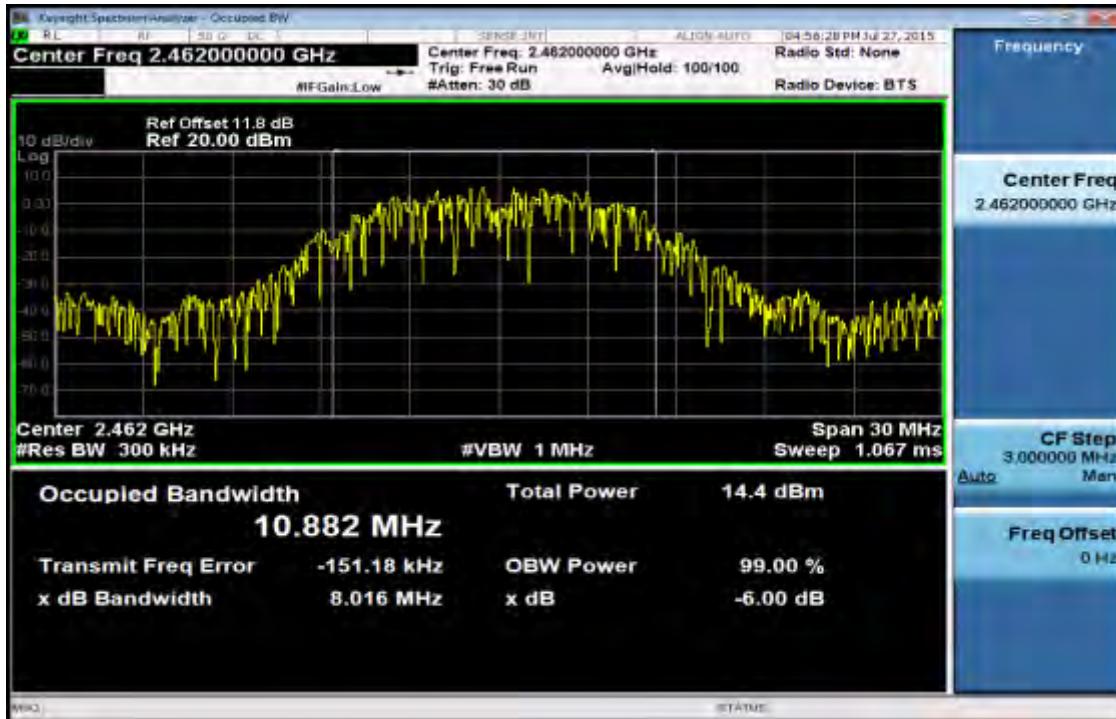
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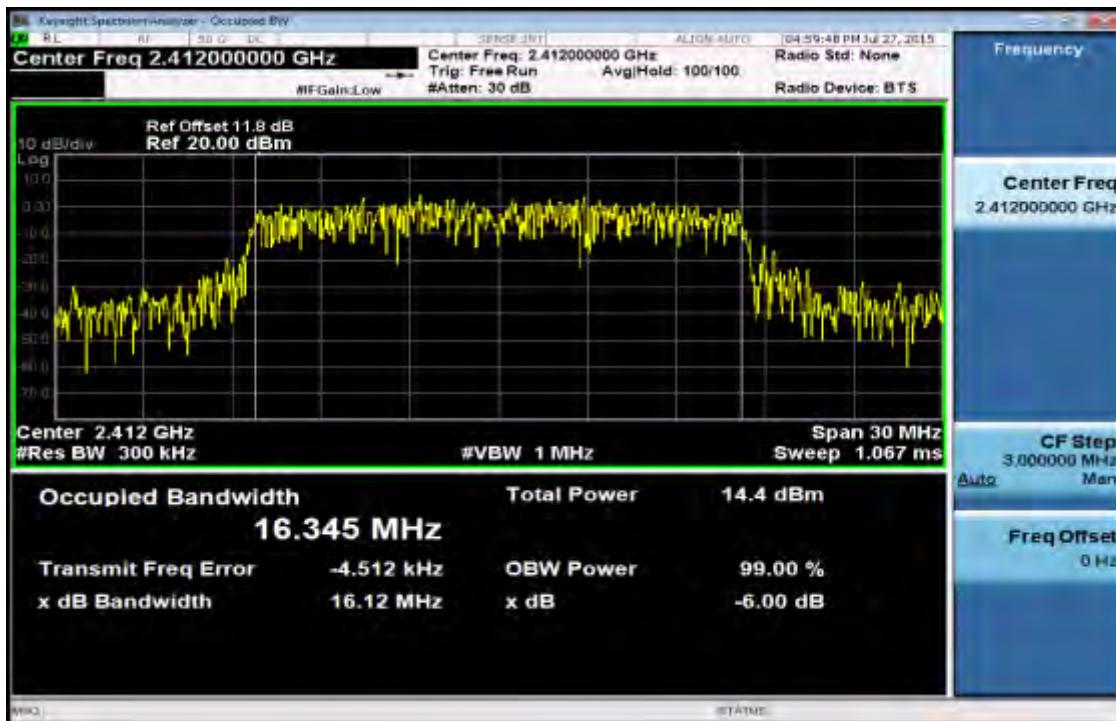
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99% Band Width Test Data CH-High



802.11g

99% Band Width Test Data CH-Low

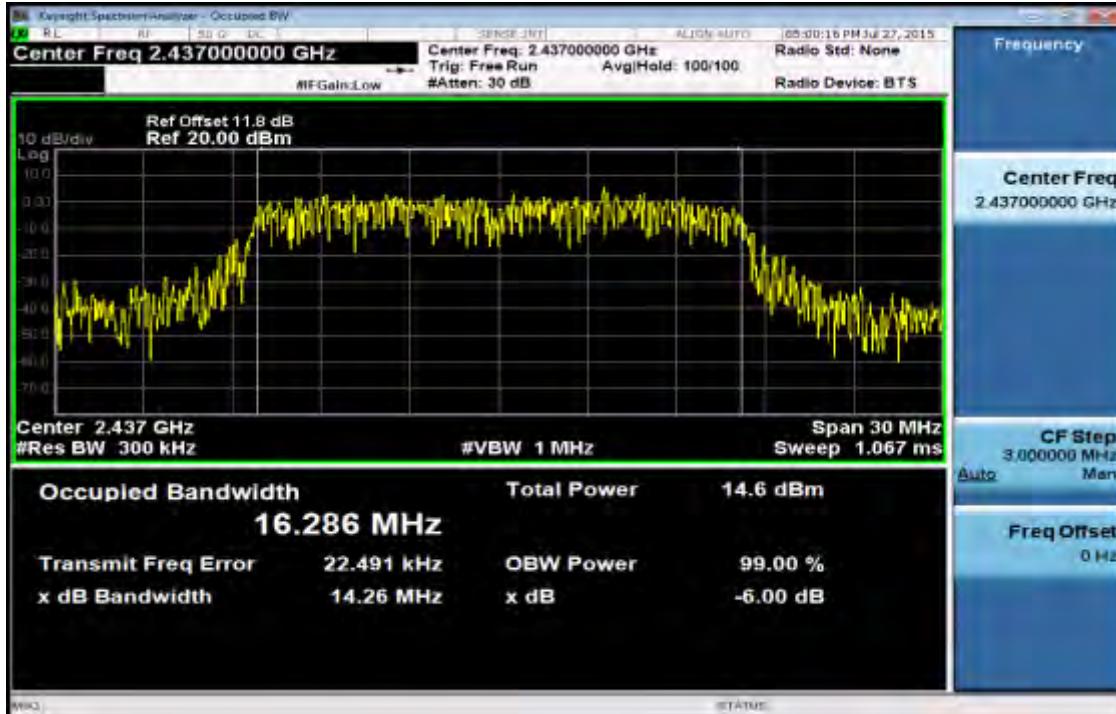


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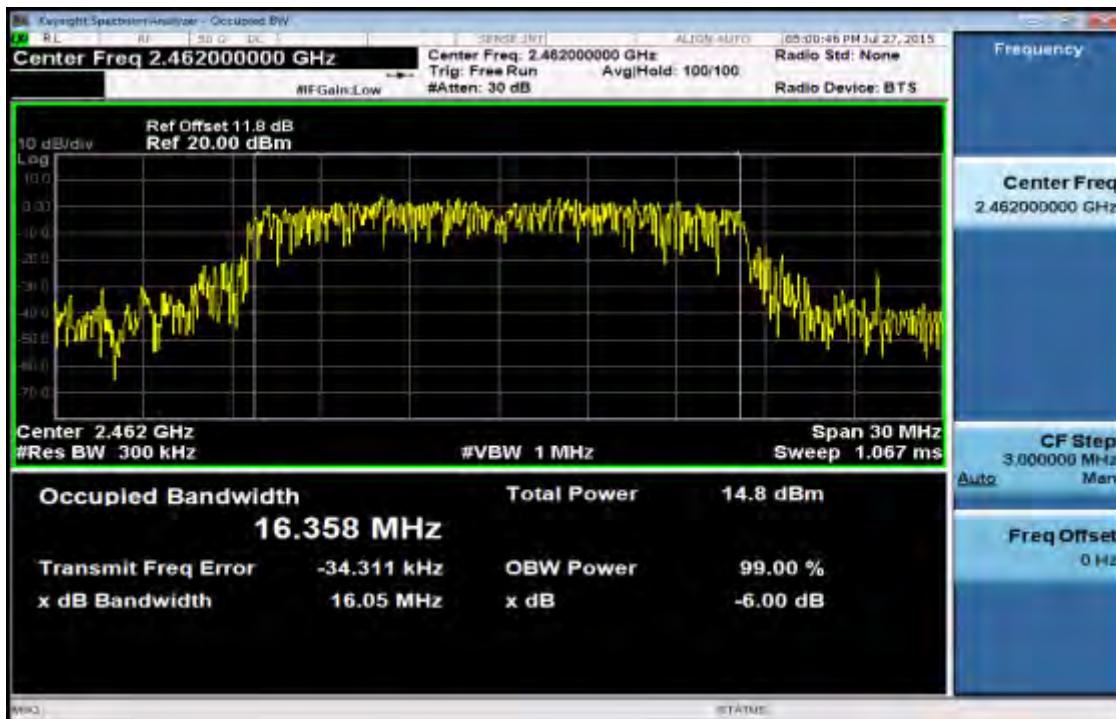
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99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High



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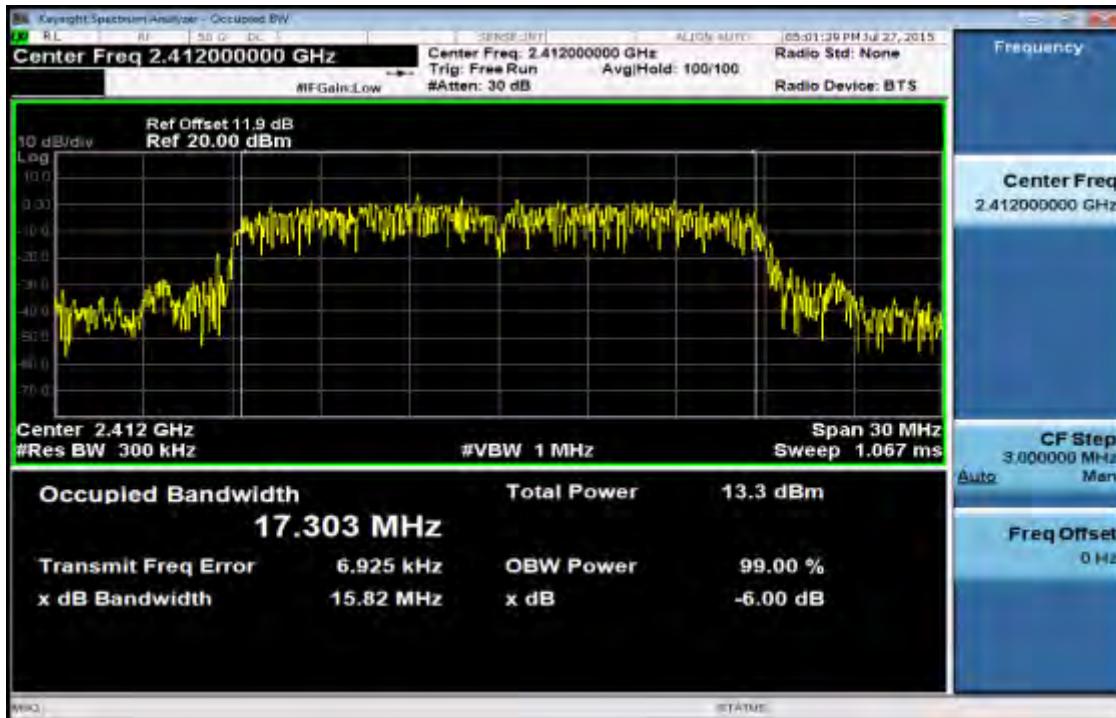
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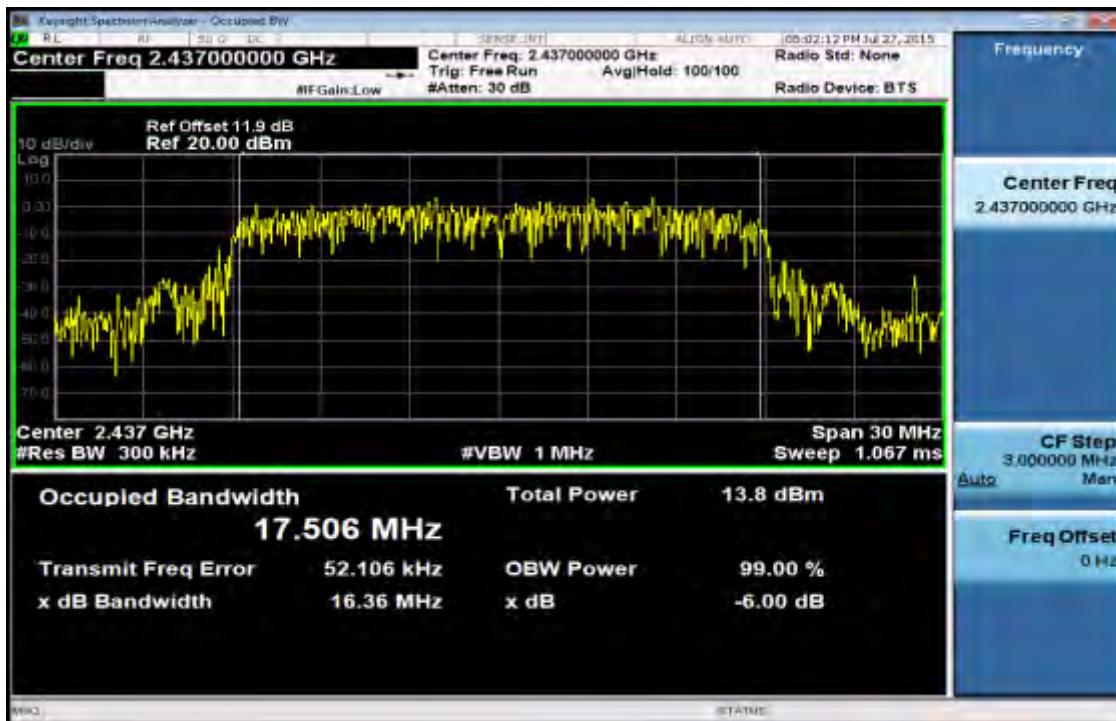
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802.11n_20M (Main)

99% Band Width Test Data CH-Low



99% Band Width Test Data CH-Mid



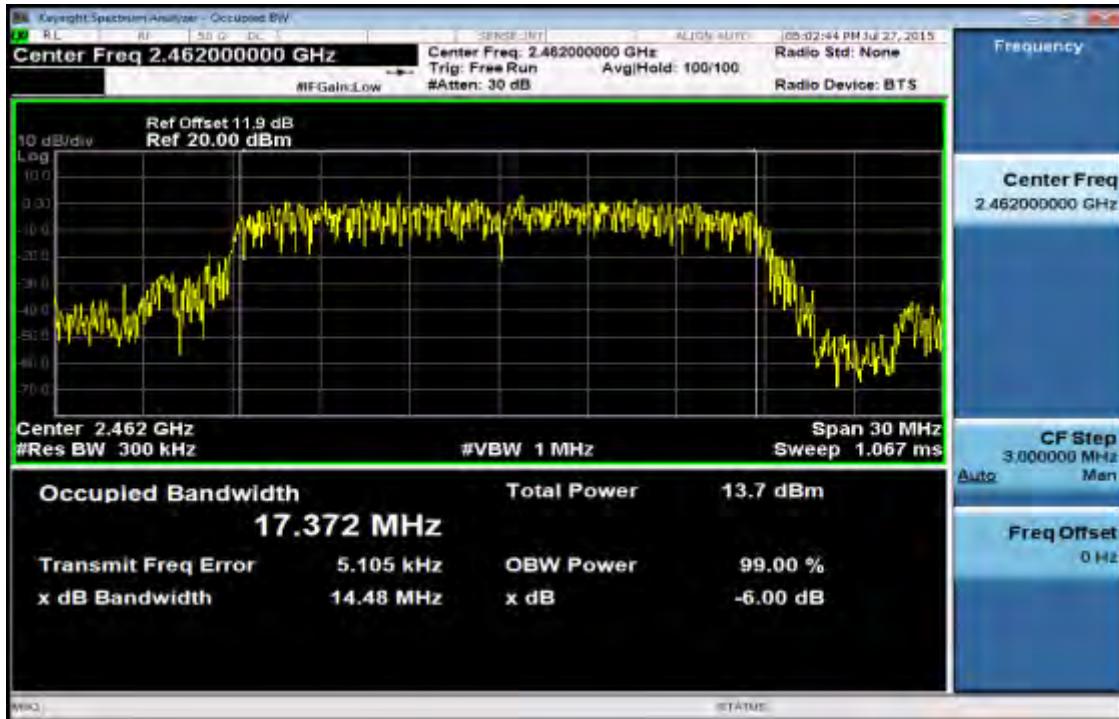
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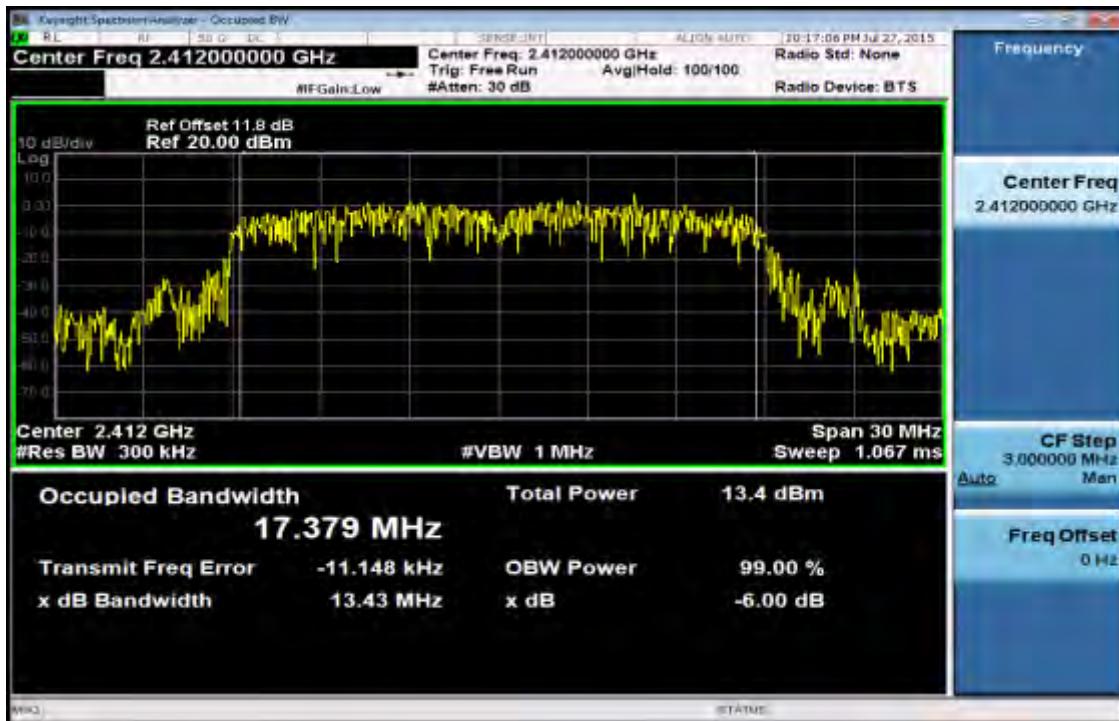
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99% Band Width Test Data CH-High



802.11n_20M (Aux)

99% Band Width Test Data CH-Low

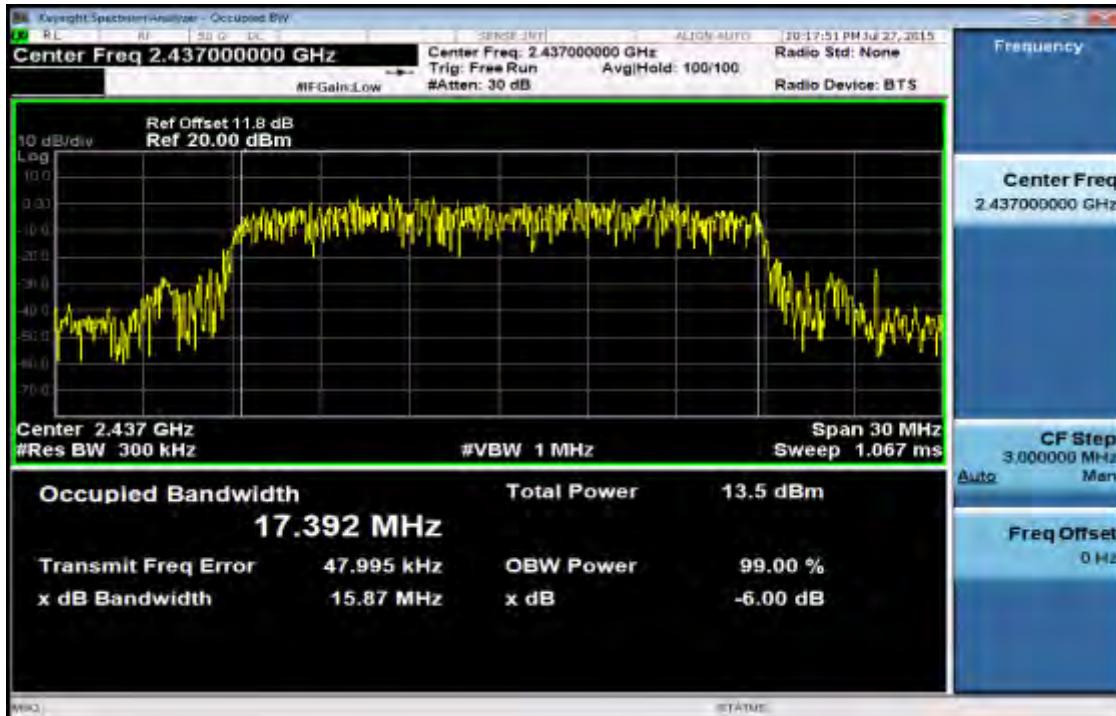


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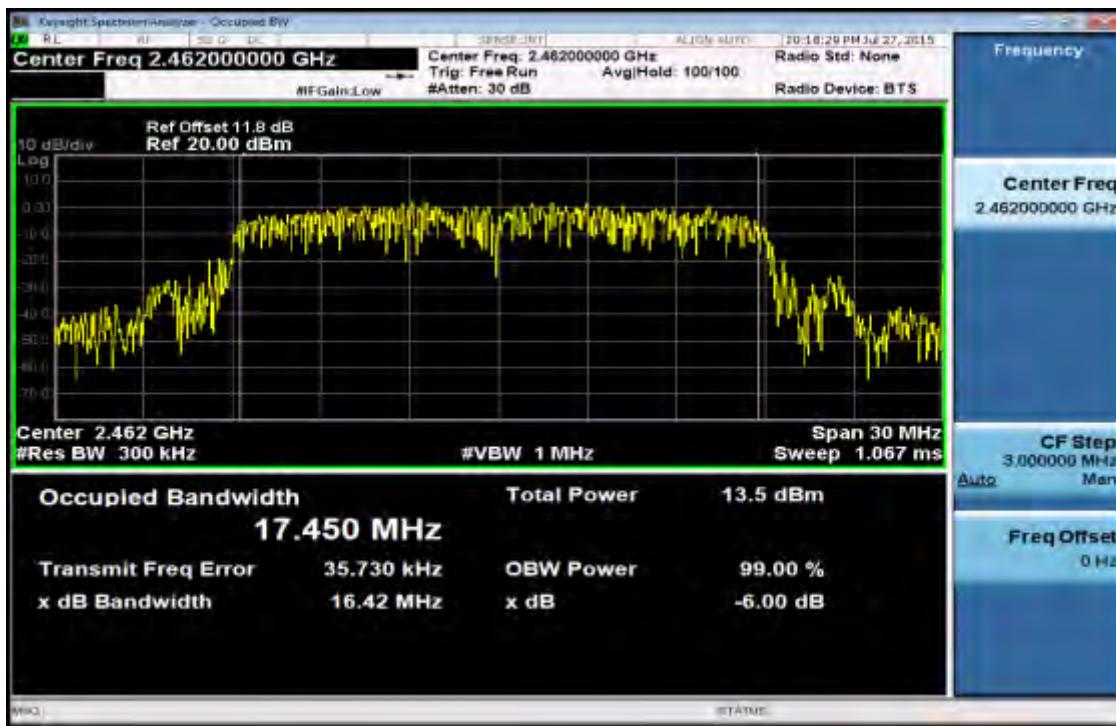
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99% Band Width Test Data CH-Mid



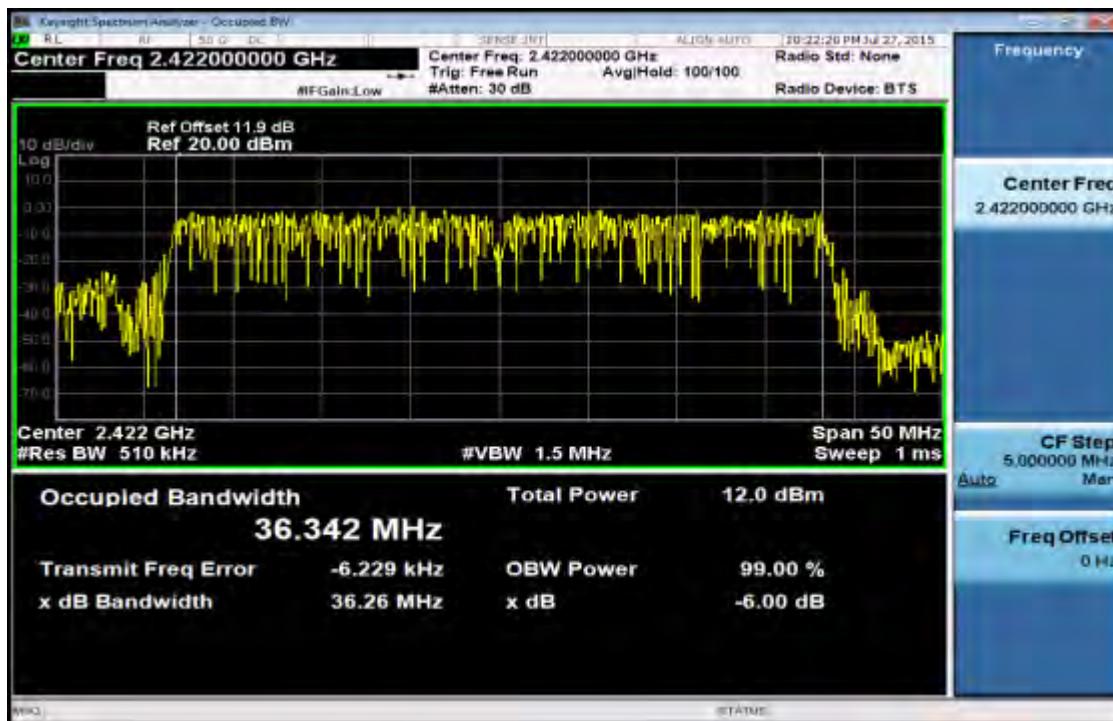
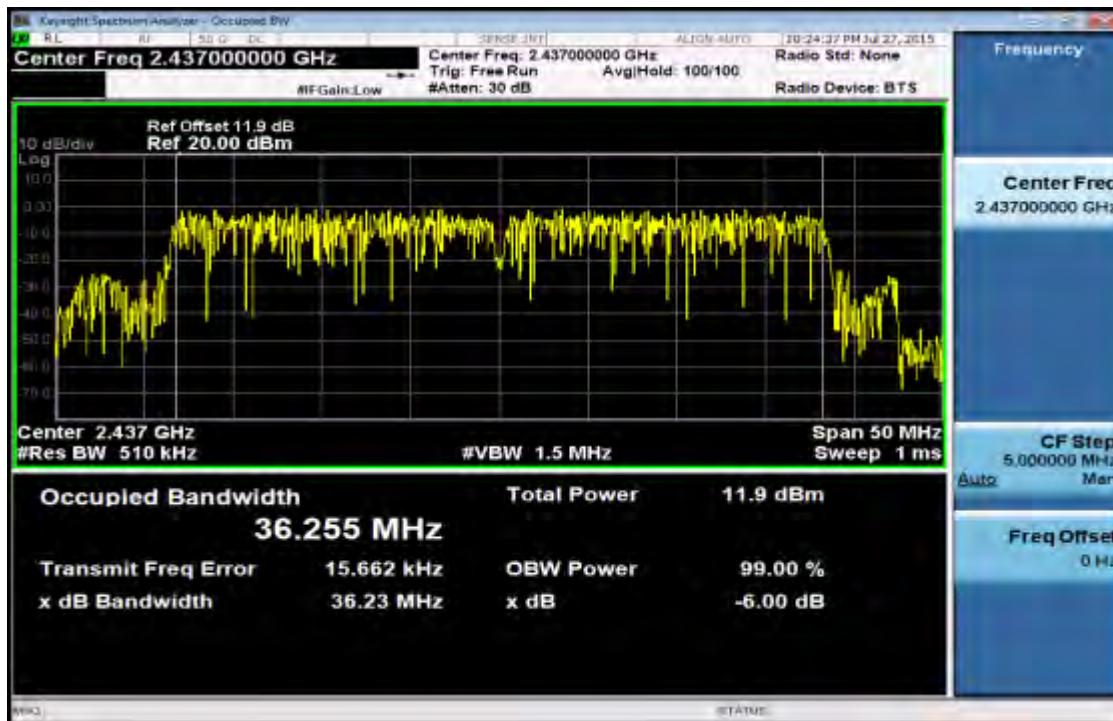
99% Band Width Test Data CH-High



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802.11 n_40M (Main)**99% Band Width Test Data CH-Low****99% Band Width Test Data CH-Mid**

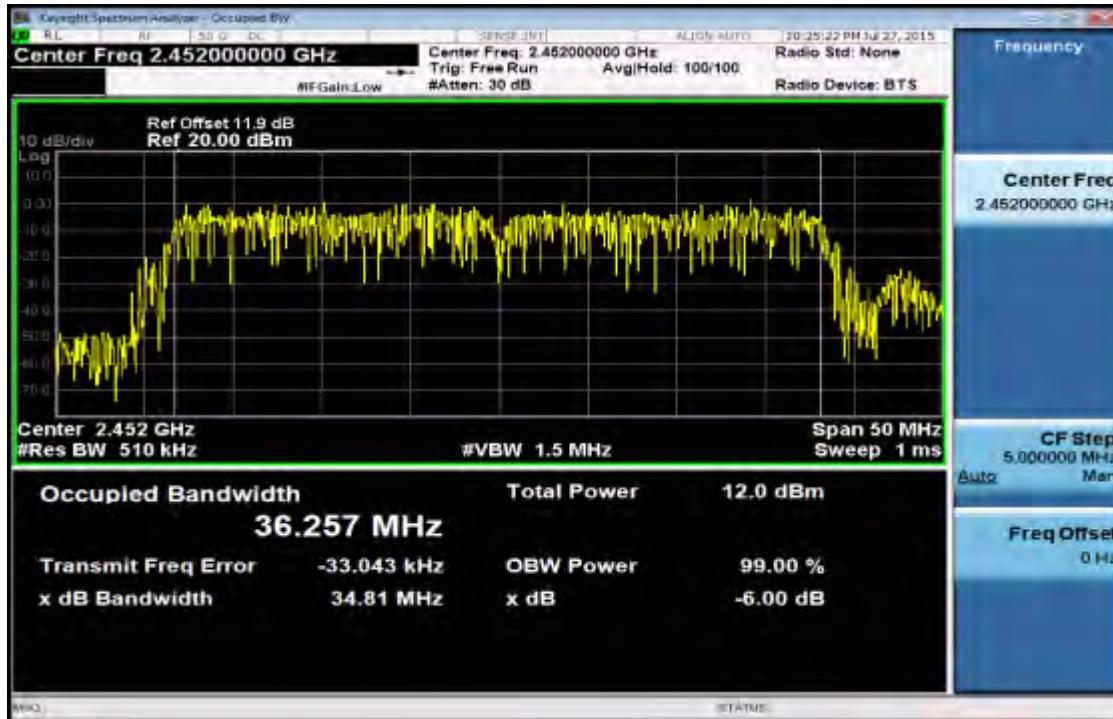
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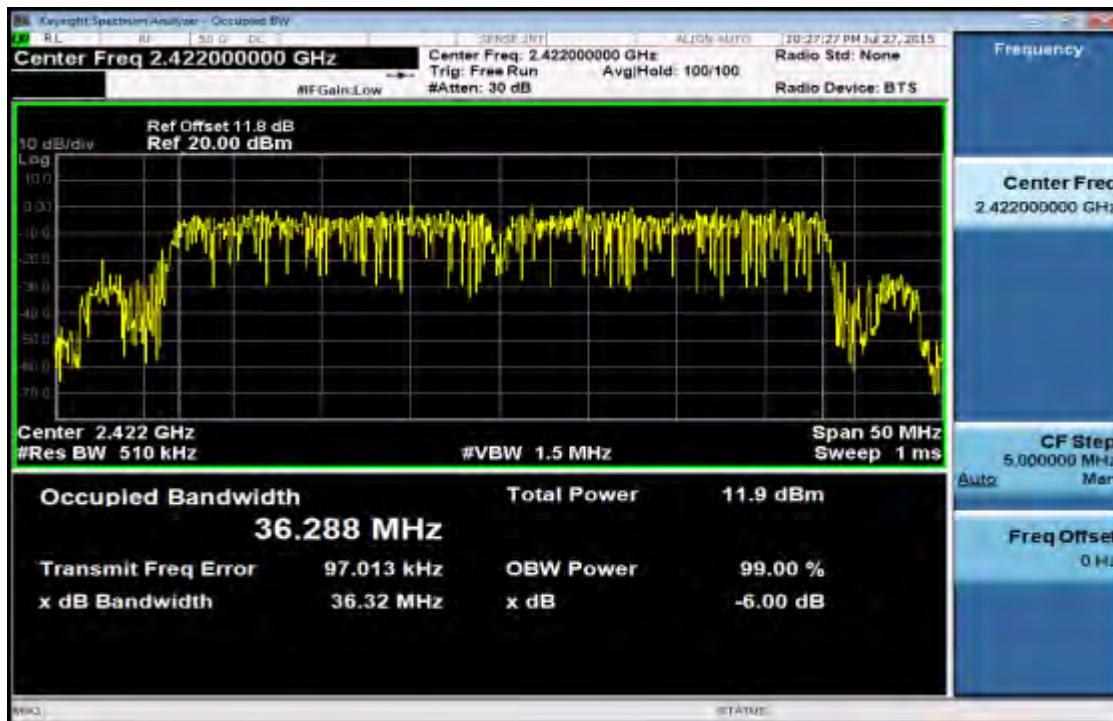
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99% Band Width Test Data CH-High



802.11 n_40M (Aux)

99% Band Width Test Data CH-Low



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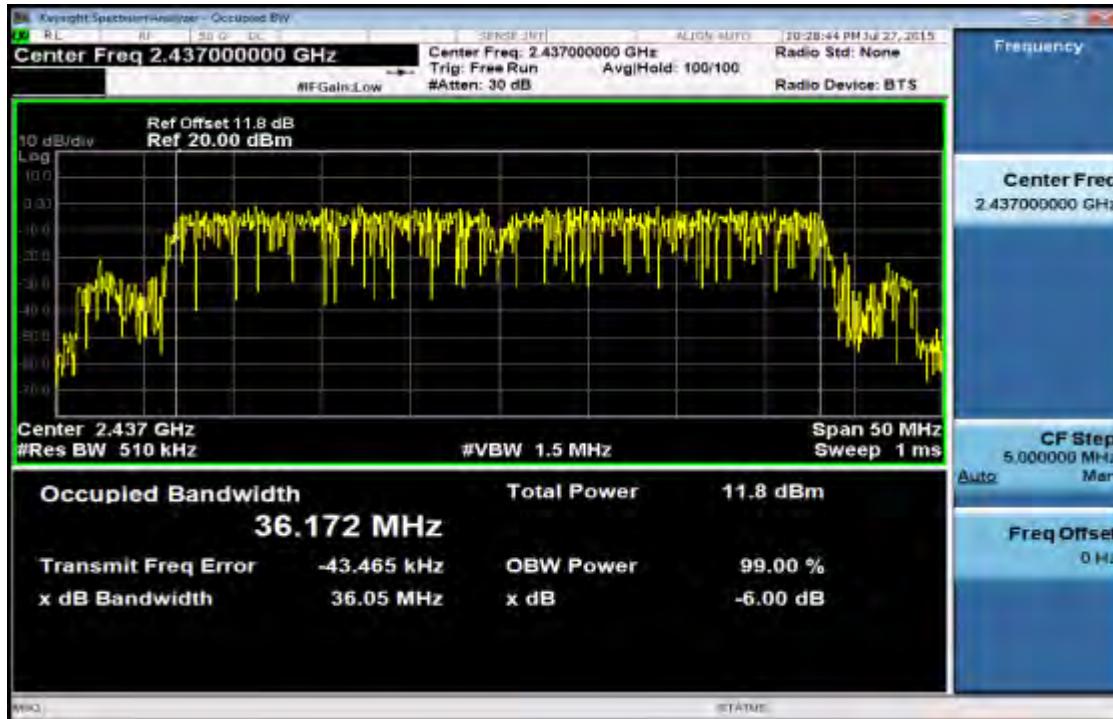
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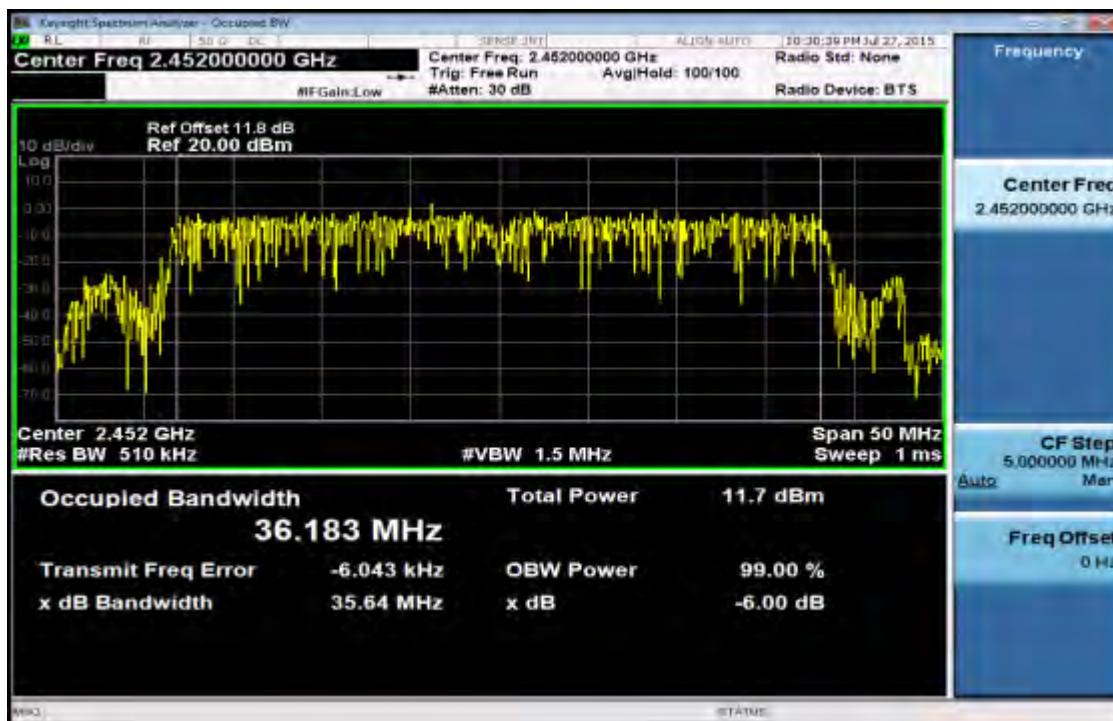
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99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High



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10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

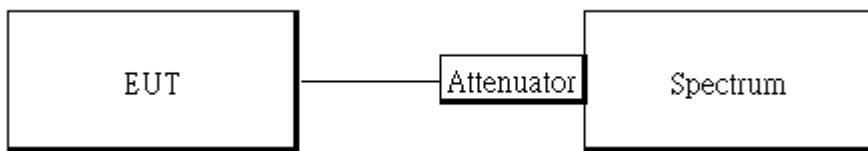
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

10.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

10.3 Test SET-UP



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10.3.1 Measurement Procedure

Conducted Band Edge:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance V03r03.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
6. Mark the highest reading of the emission as the reference level measurement.
7. Set DL as the limit = reading on marker 1 – 20dBm
8. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 kHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
9. Repeat above procedures until all default test channel (low, middle, and high) was complete.

Conducted Spurious Emission:

1. To connect Antenna Port of EUT to Spectrum
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance V03r03.
3. Set RBW = 100 kHz & VBW= 300 kHz, Detector =Peak, Sweep = Auto.
4. Allow trace to fully stabilize.
5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Repeat above procedures until all default test channel measured were complete.

Note:

1. 802.11n MIMO mode: offset is set following “measure and add 10 Log (N)” on spectrum to measure for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=2 for this given application.
2. For MIMO operation, directional gain is not subjected to offset back as prescribe in KDB 662911 D01 for relative out-of-band measurement, including conducted bandedge falling into non-restricted frequency band.

10.4 Measurement Result

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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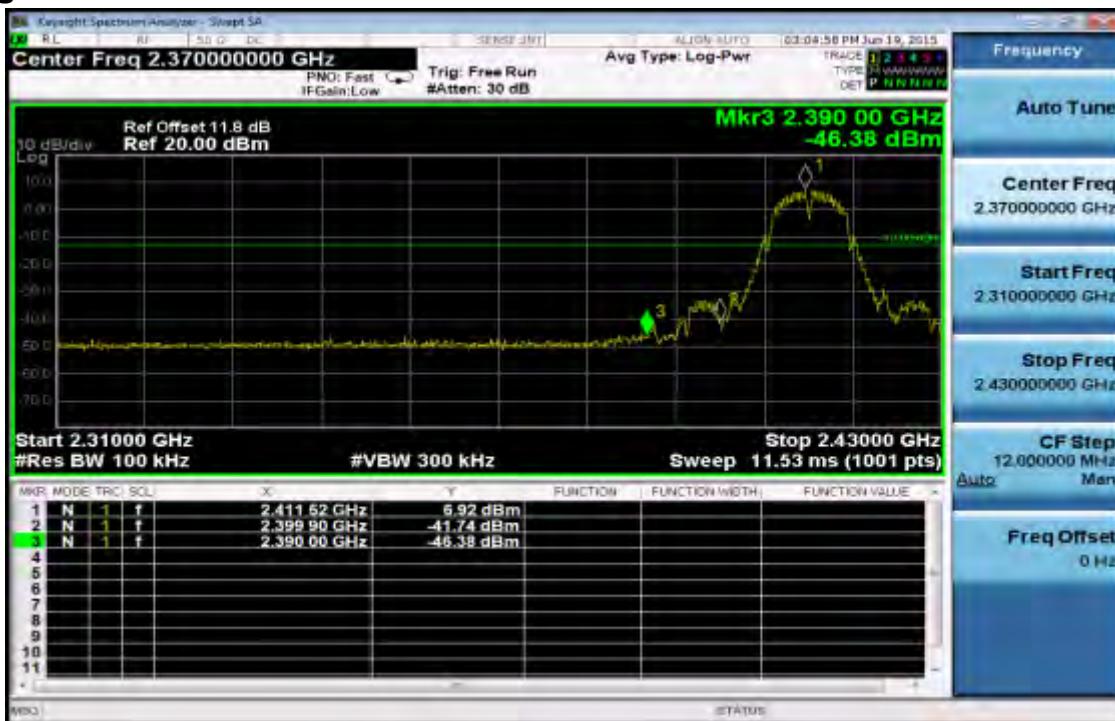
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802.11b

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



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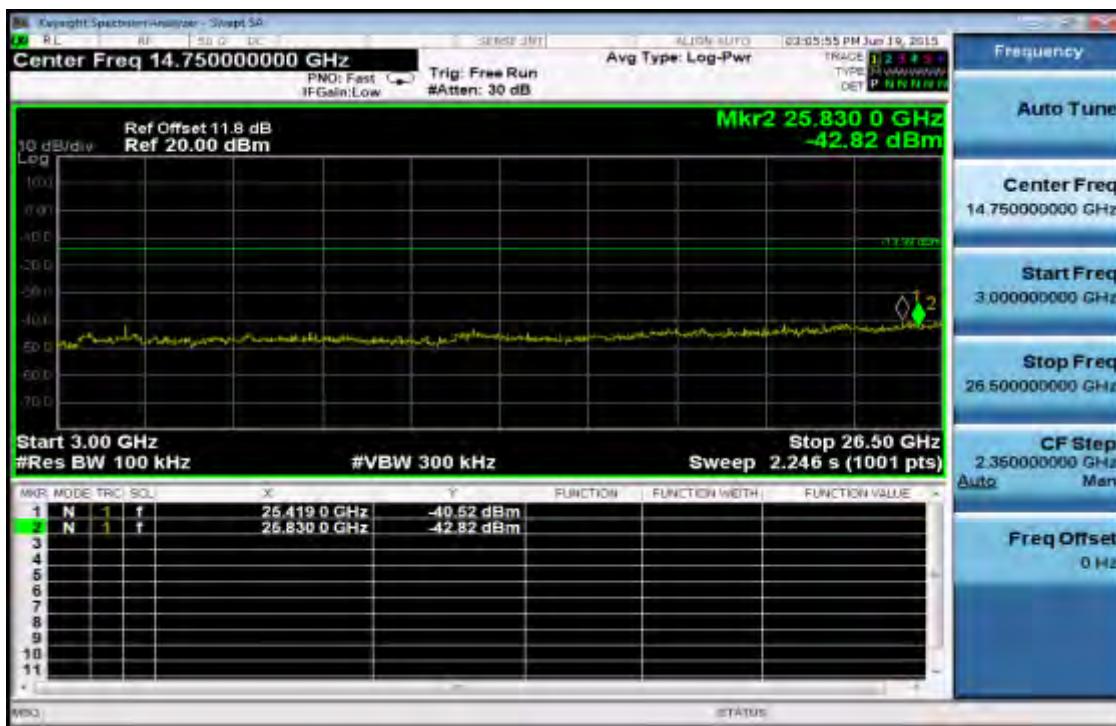
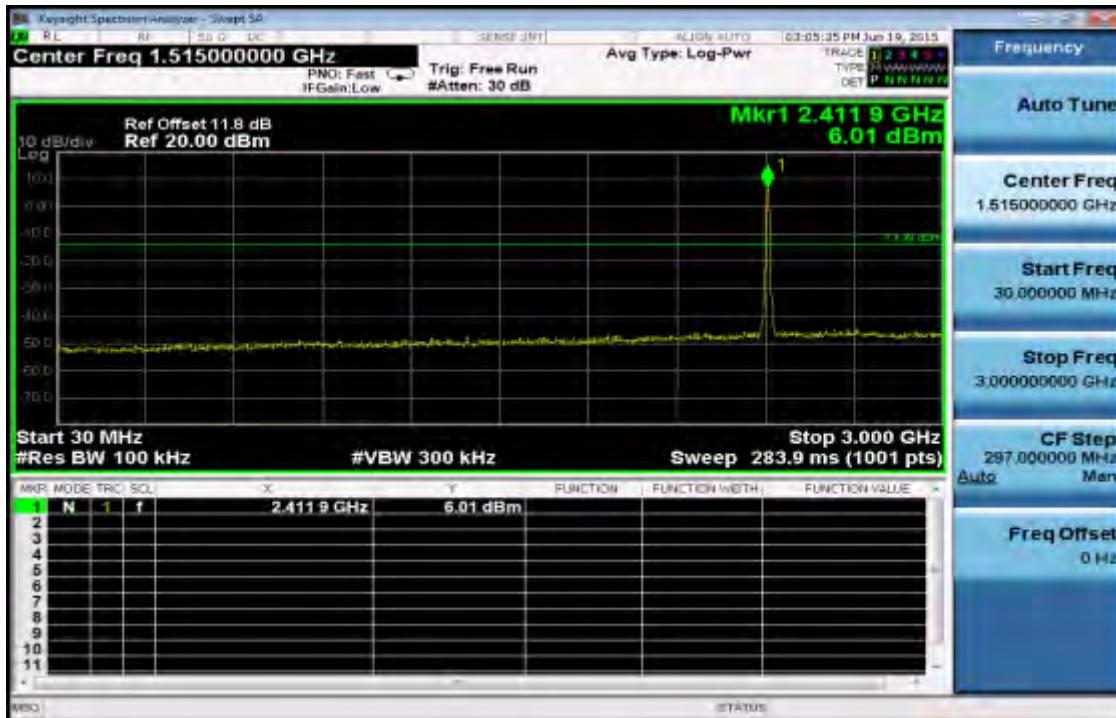
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802.11b

Spurious Emission Test Data CH-Low



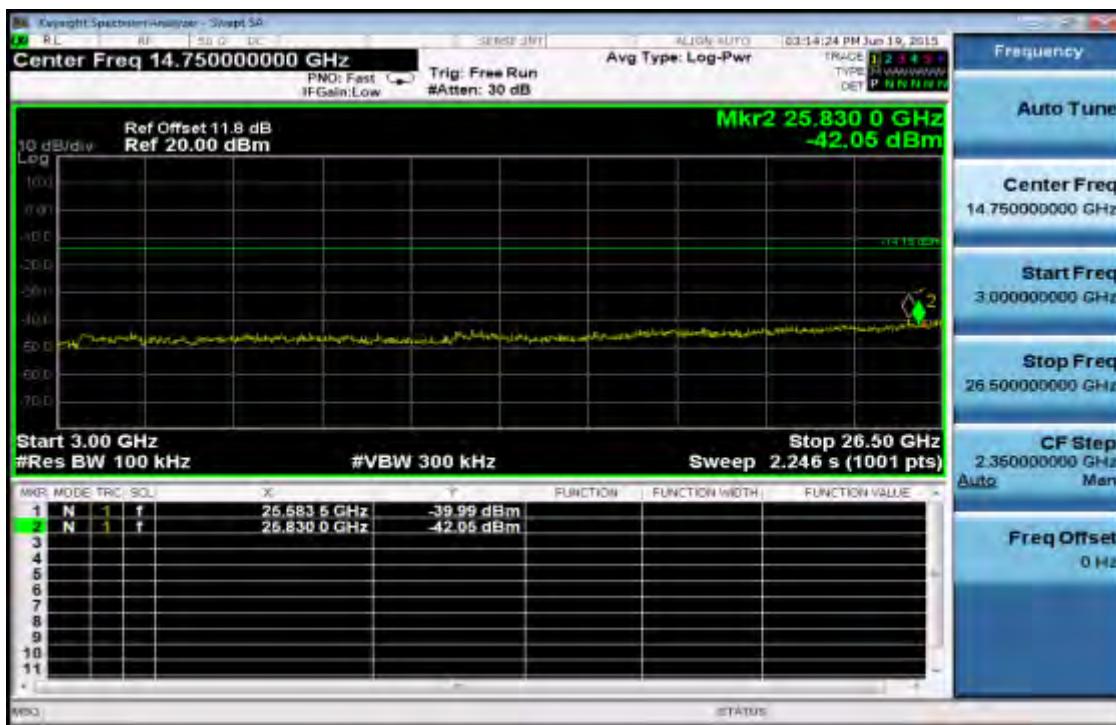
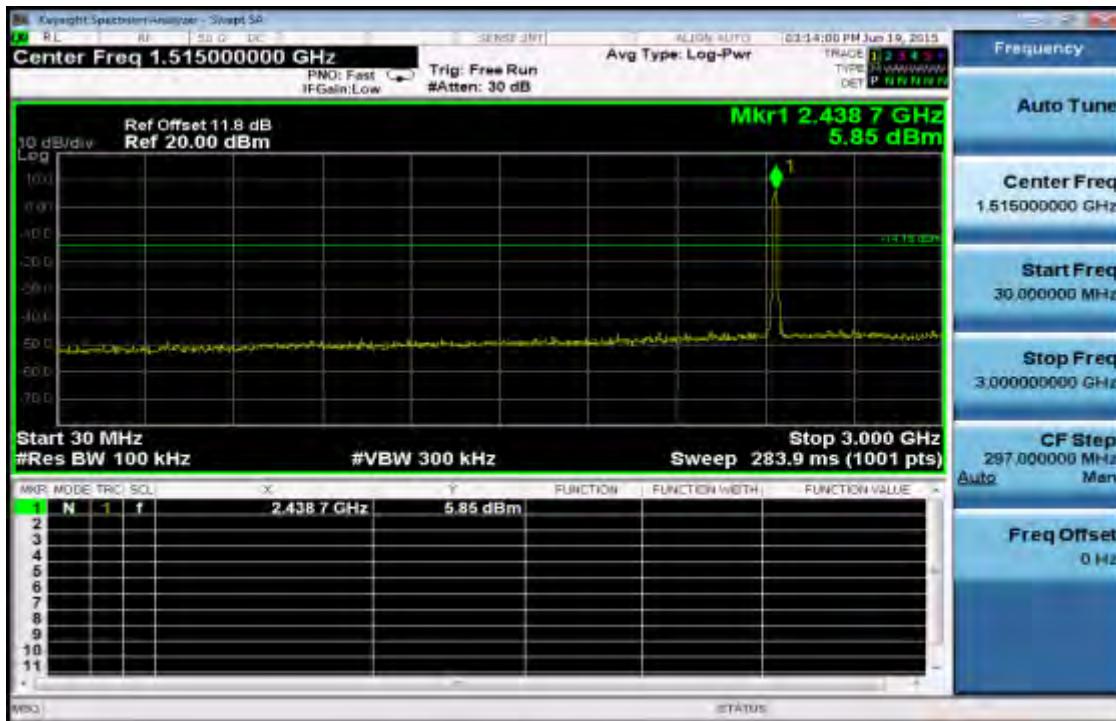
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Spurious Emission Test Data CH-Mid

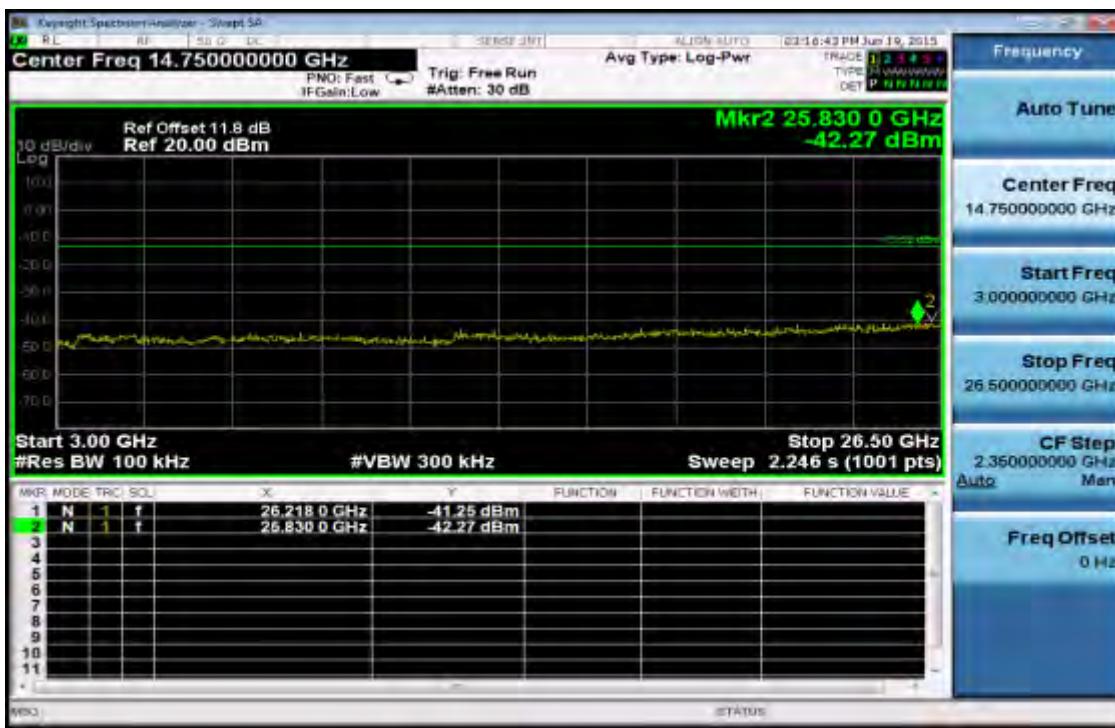
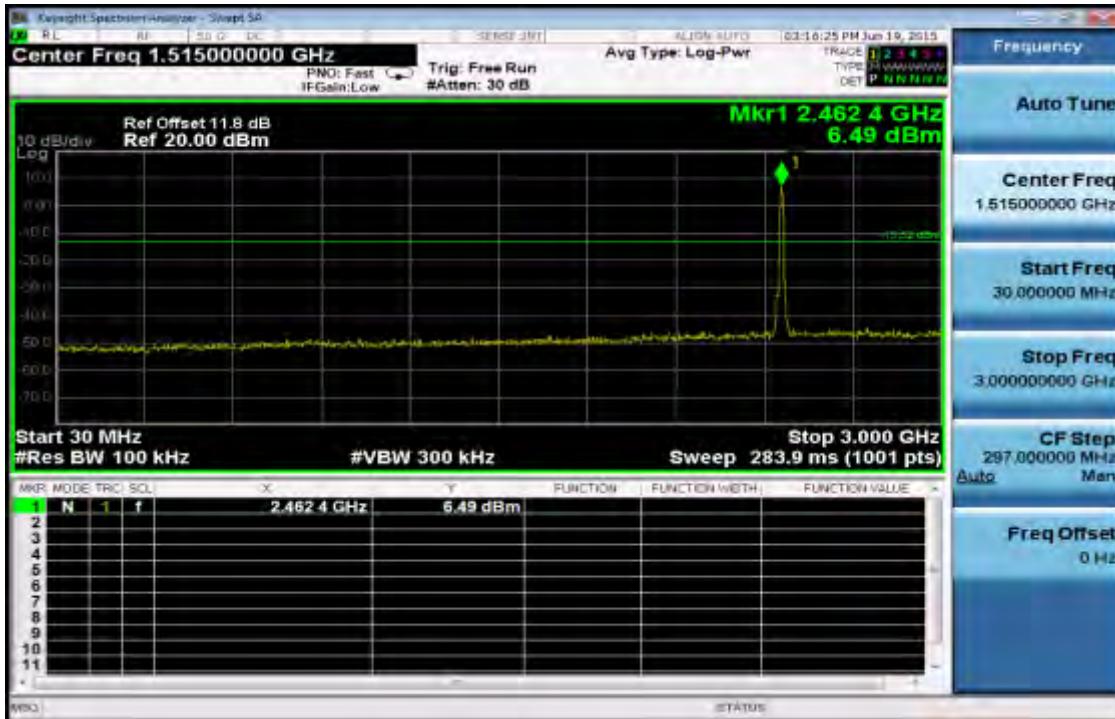


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Spurious Emission Test Data CH-High



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802.11g

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



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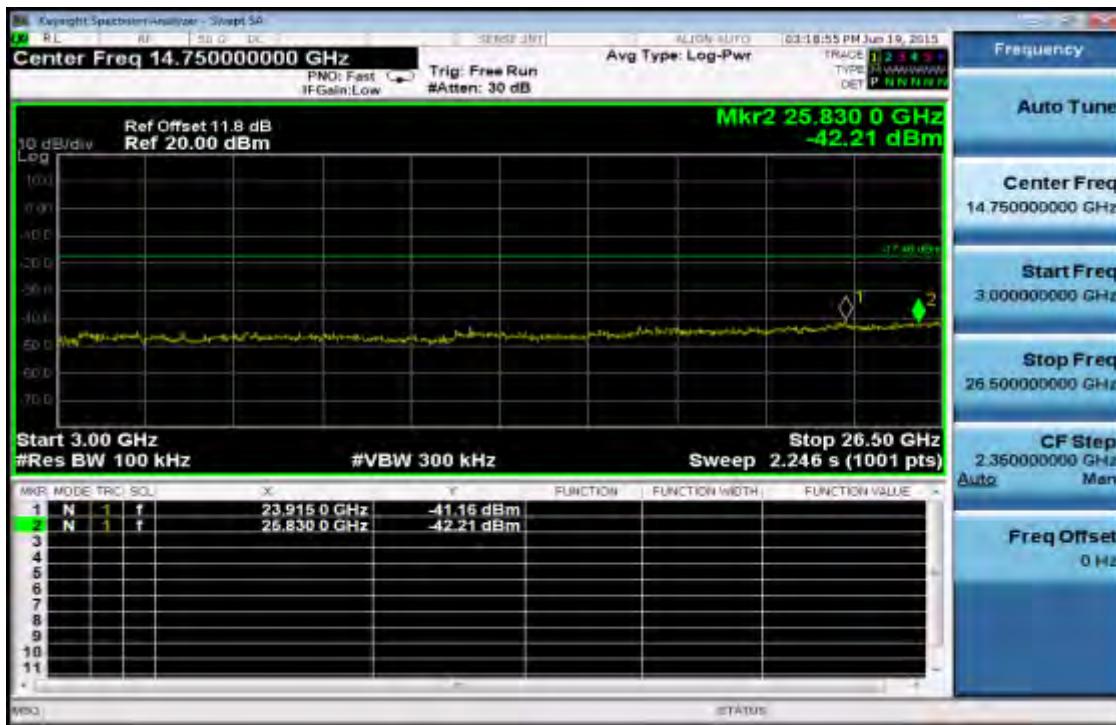
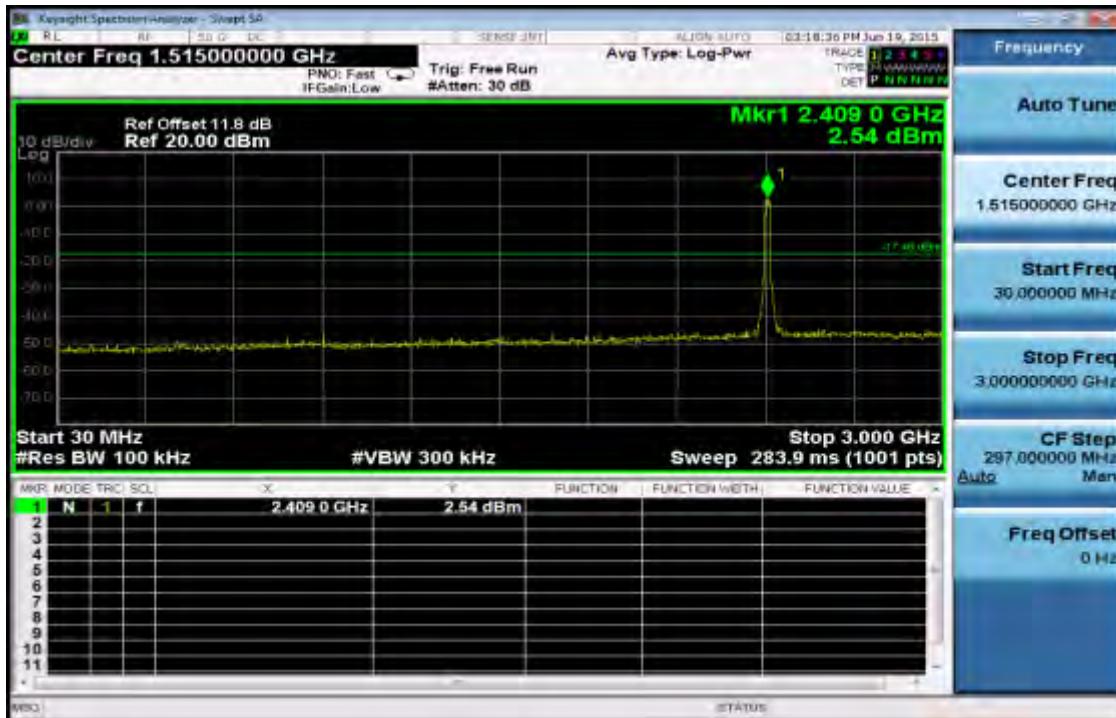
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802.11g

Spurious Emission Test Data CH-Low



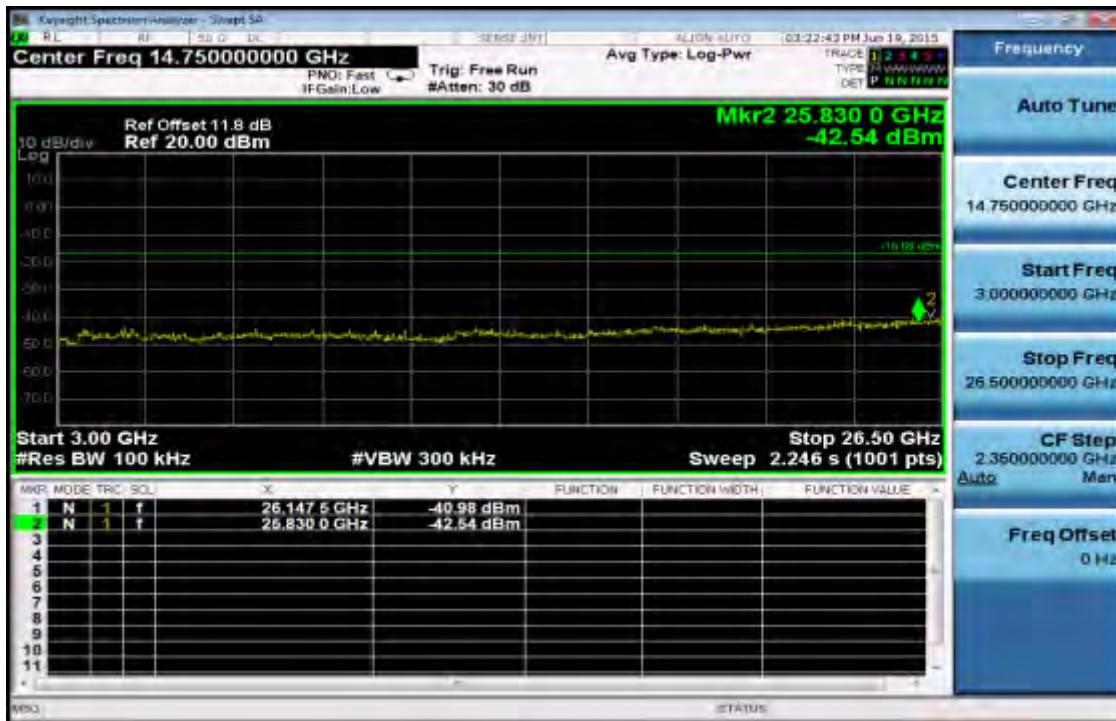
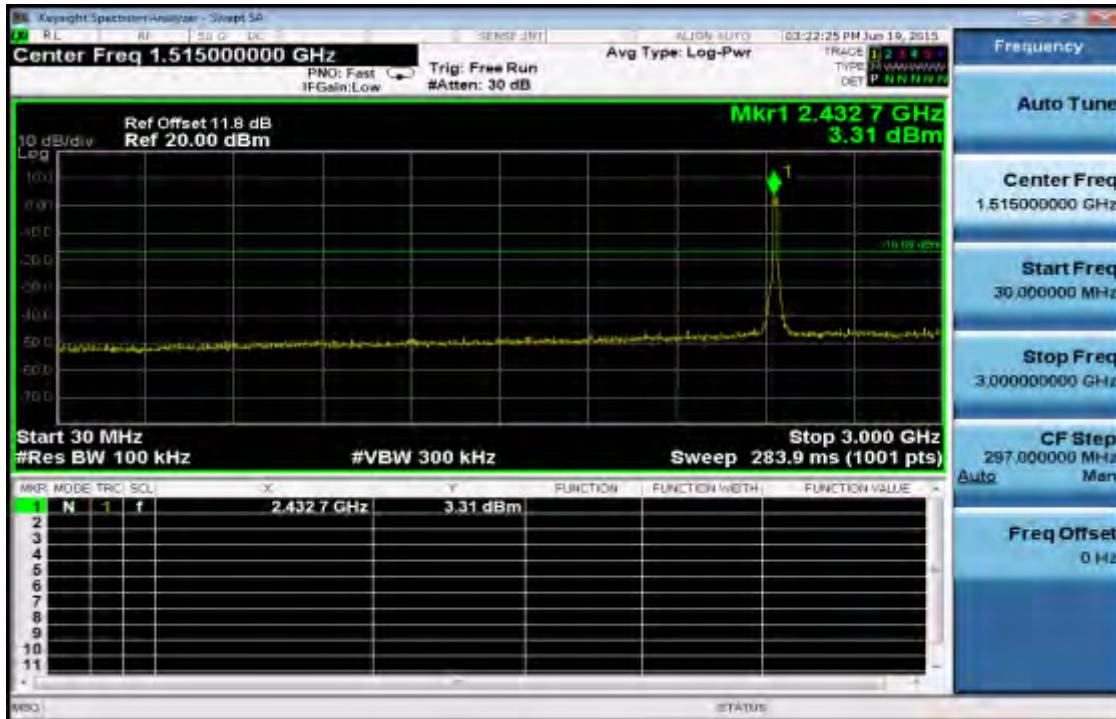
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Spurious Emission Test Data CH-Mid



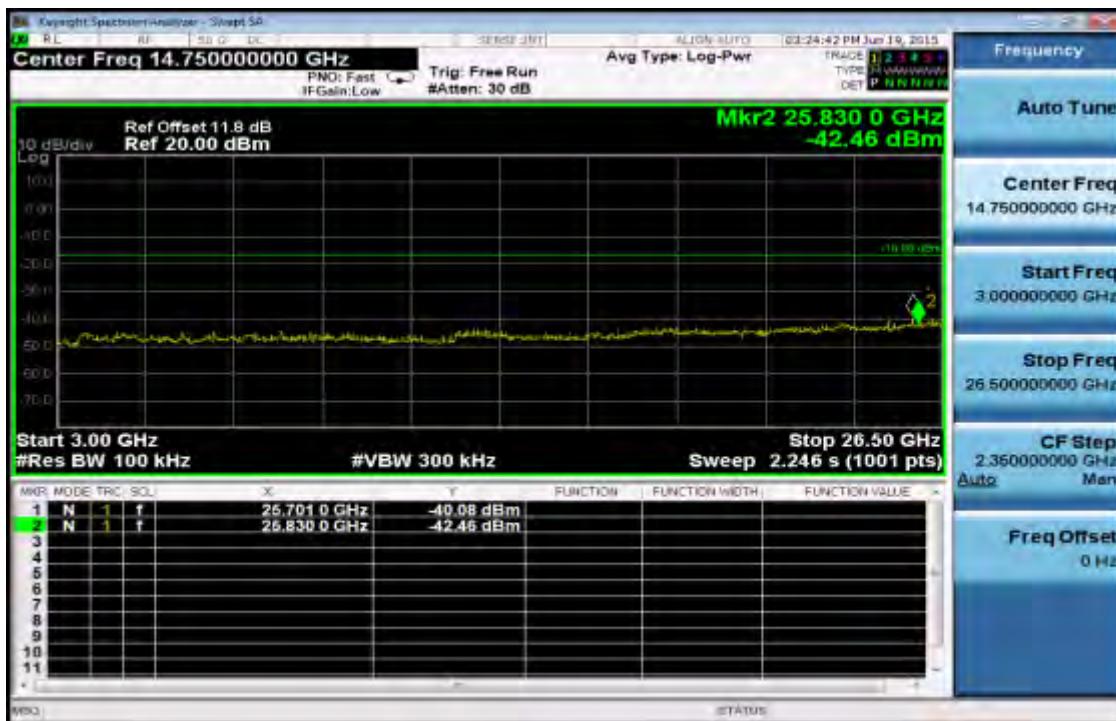
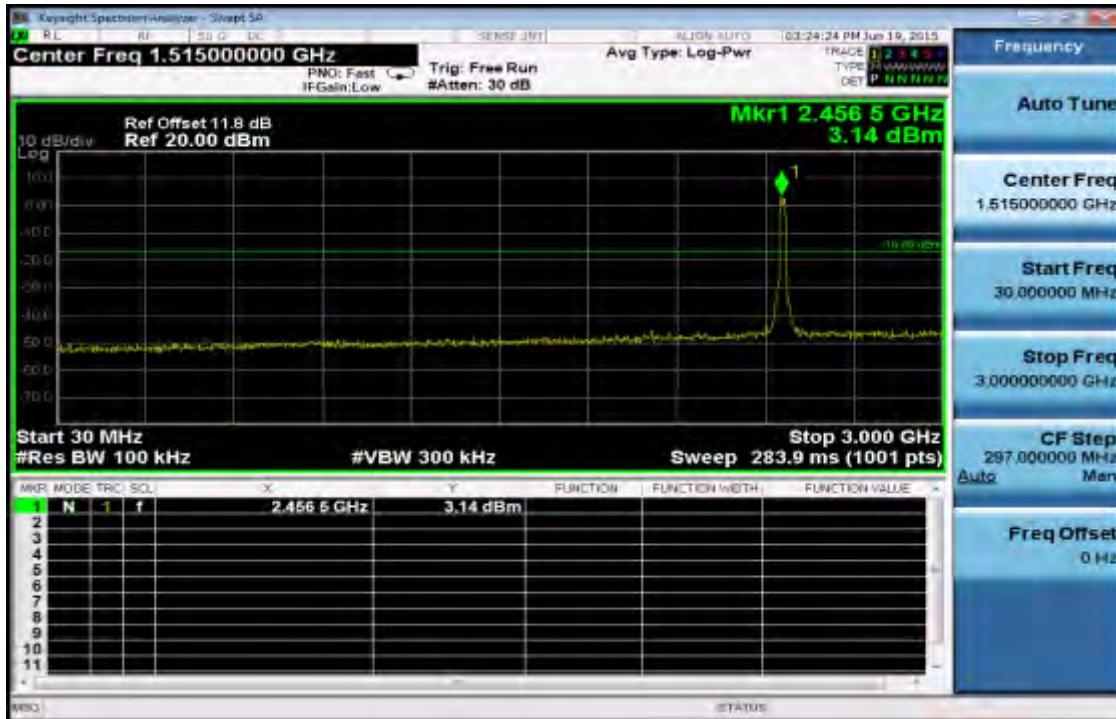
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台灣檢驗科技股份有限公司 t (886-2) 2299-3279

f (886-2) 2298-0488

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802.11n_HT20 (MIMO)

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



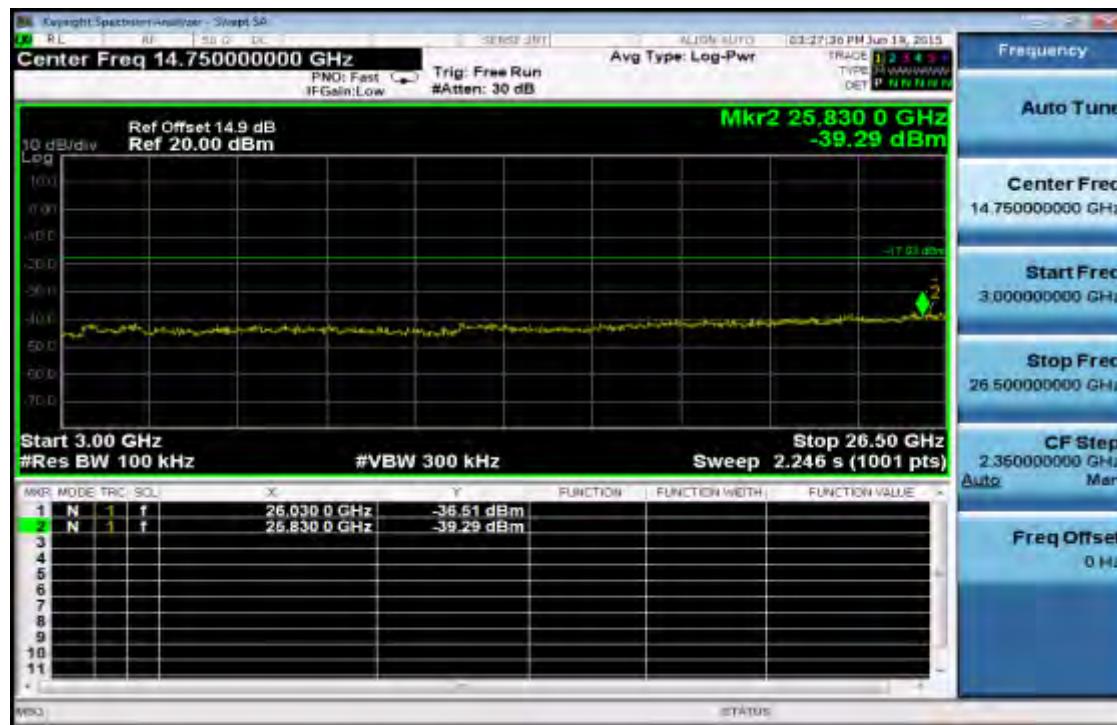
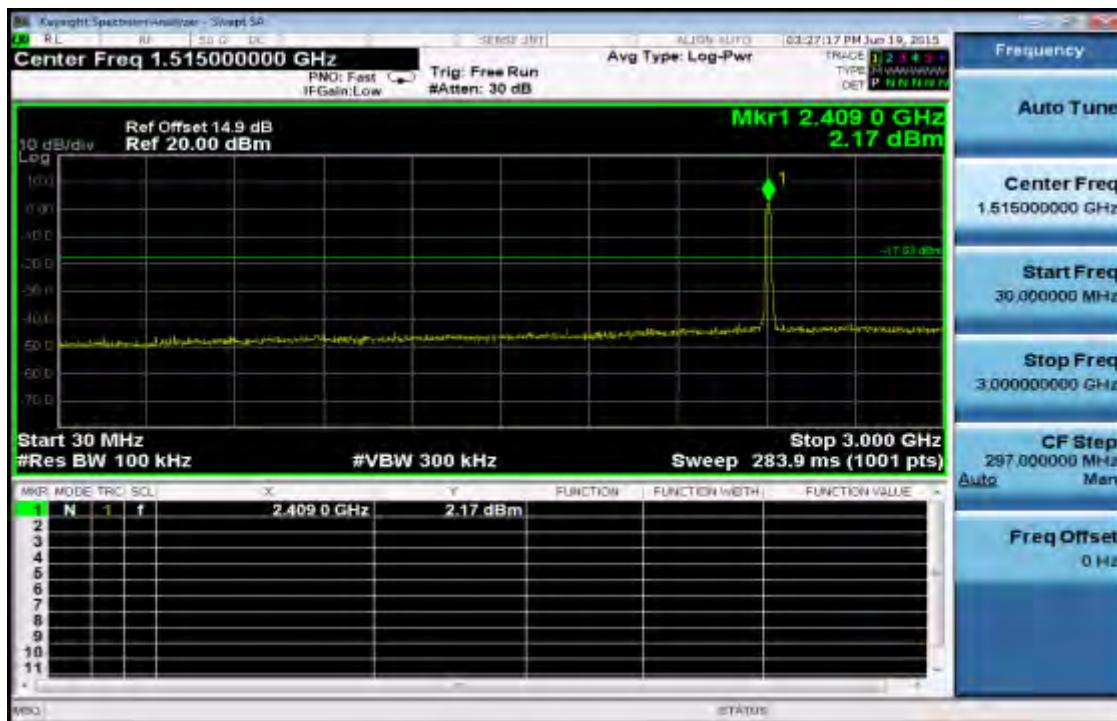
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802.11n_HT20 (MIMO)

Spurious Emission Test Data CH-Low

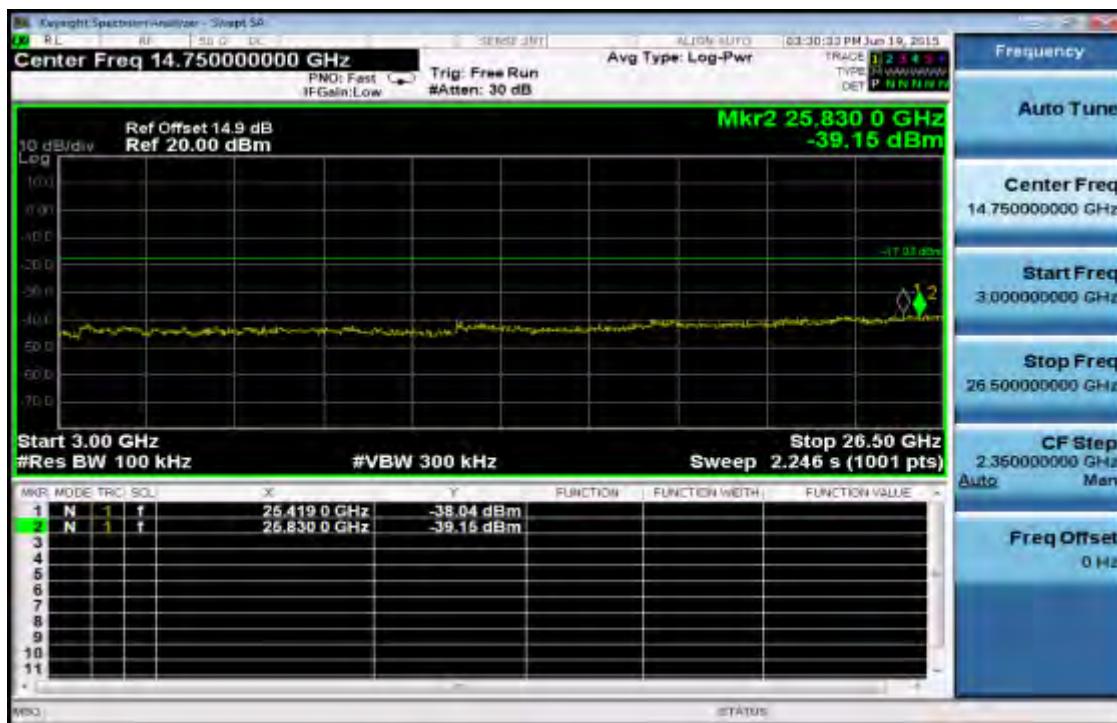
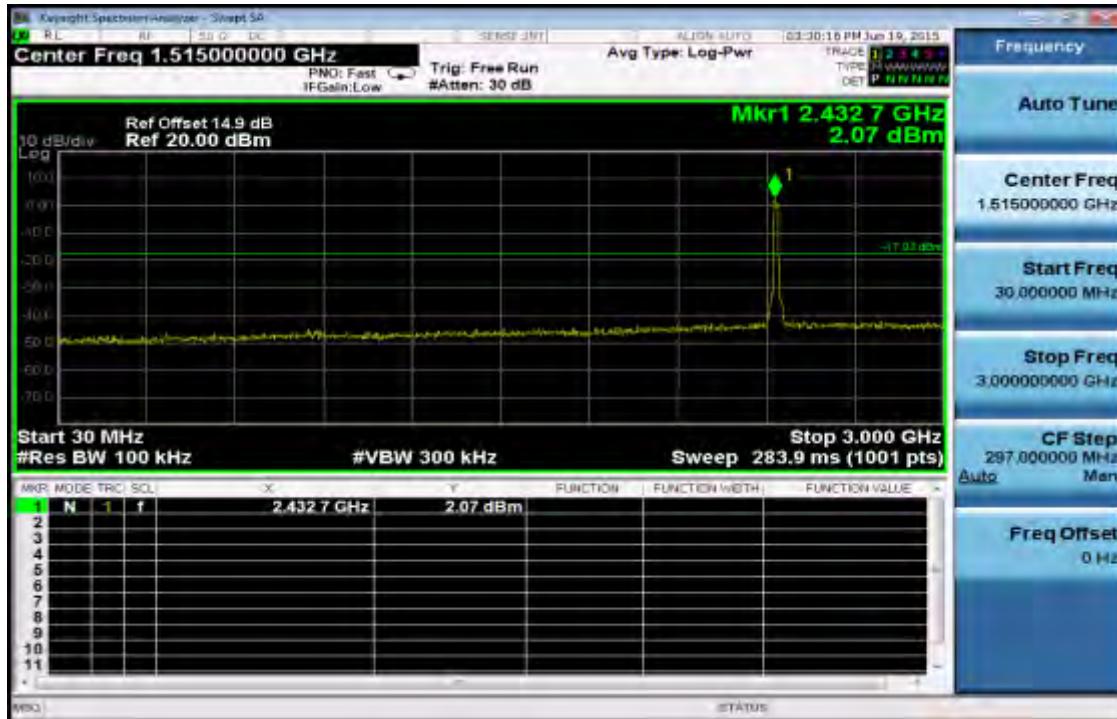


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Spurious Emission Test Data CH-Mid

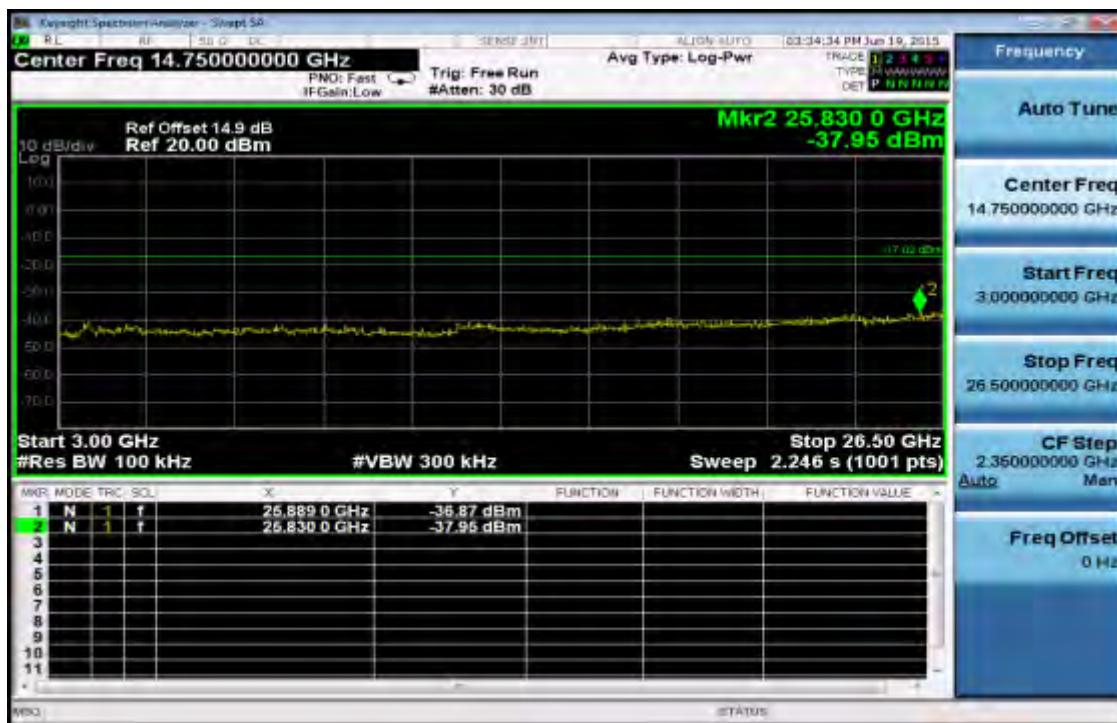
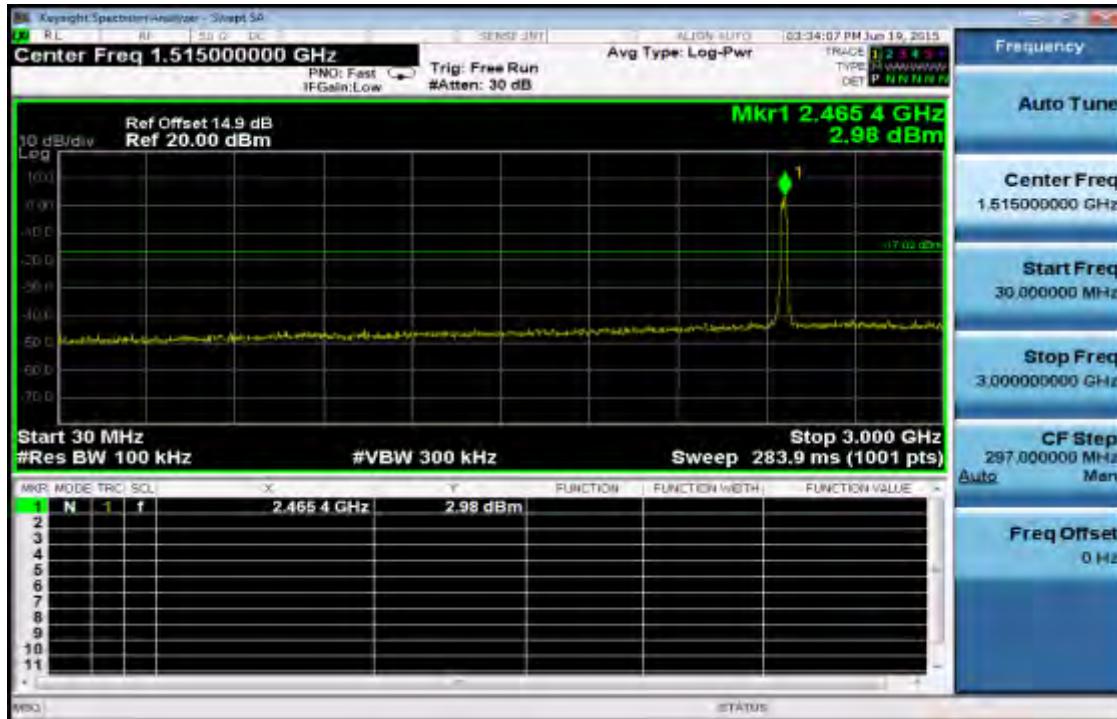


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Spurious Emission Test Data CH-High



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802.11n_HT40 (MIMO)

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



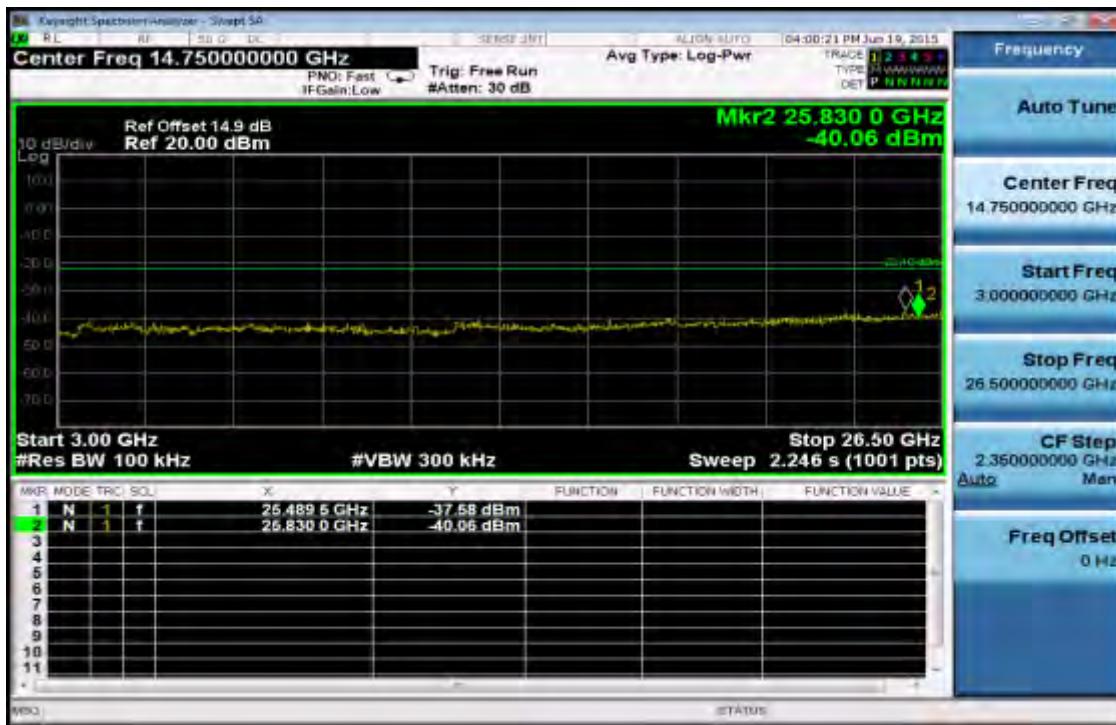
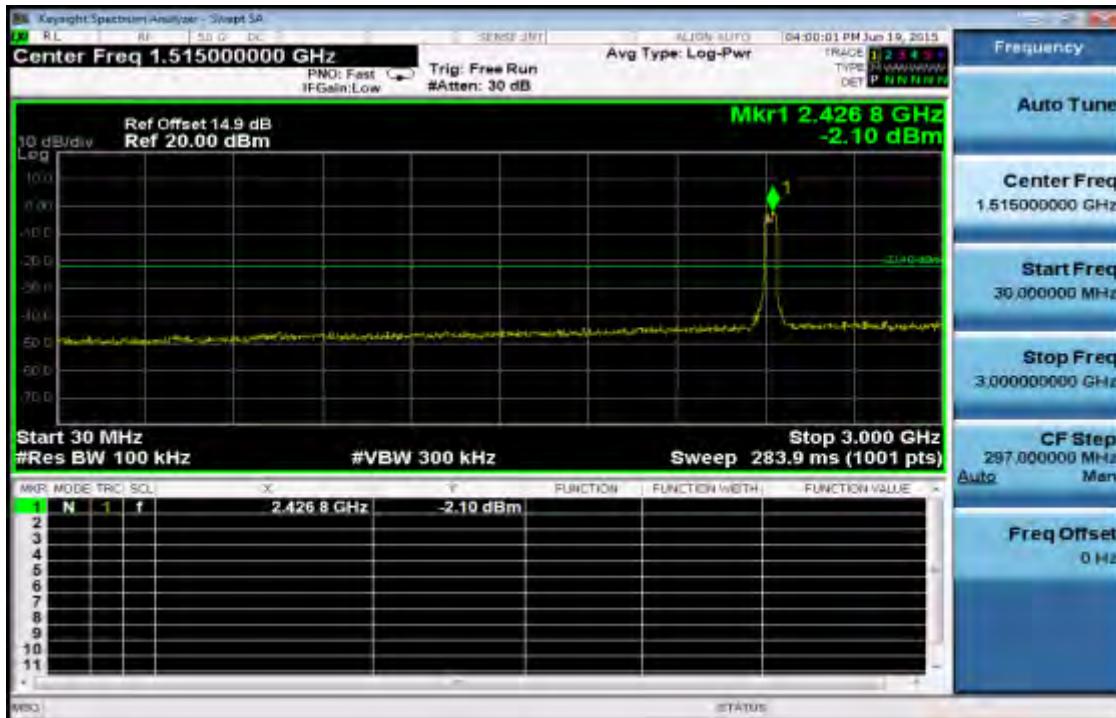
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802.11n_HT40 (MIMO)

Spurious Emission Test Data CH-Low

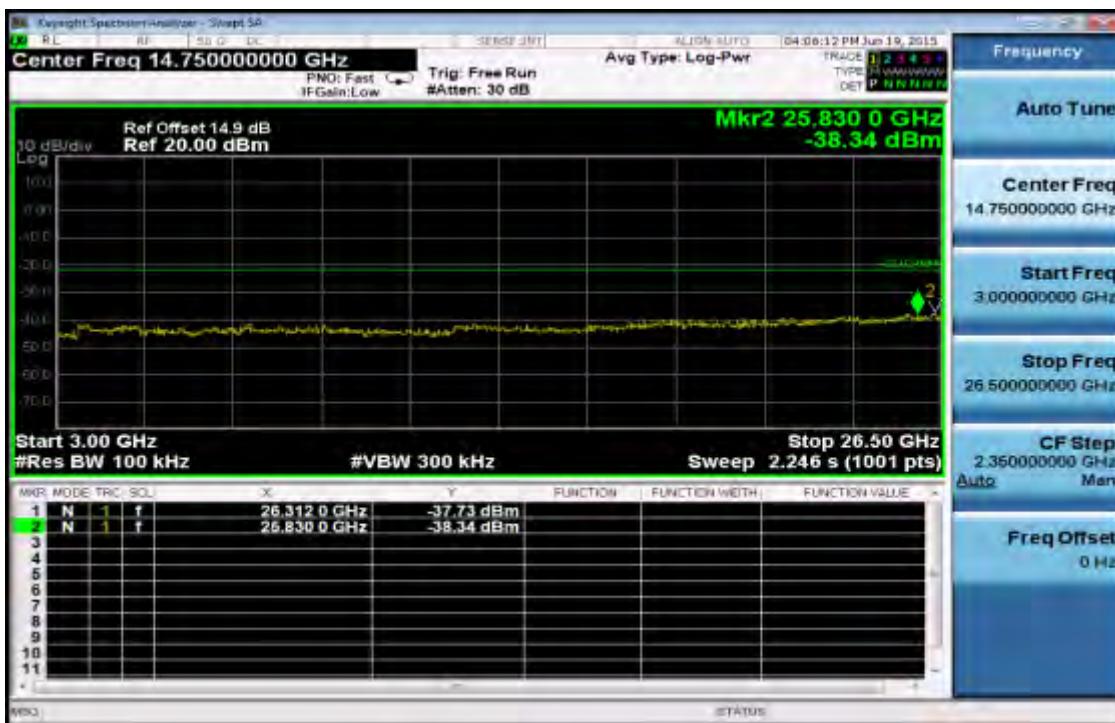
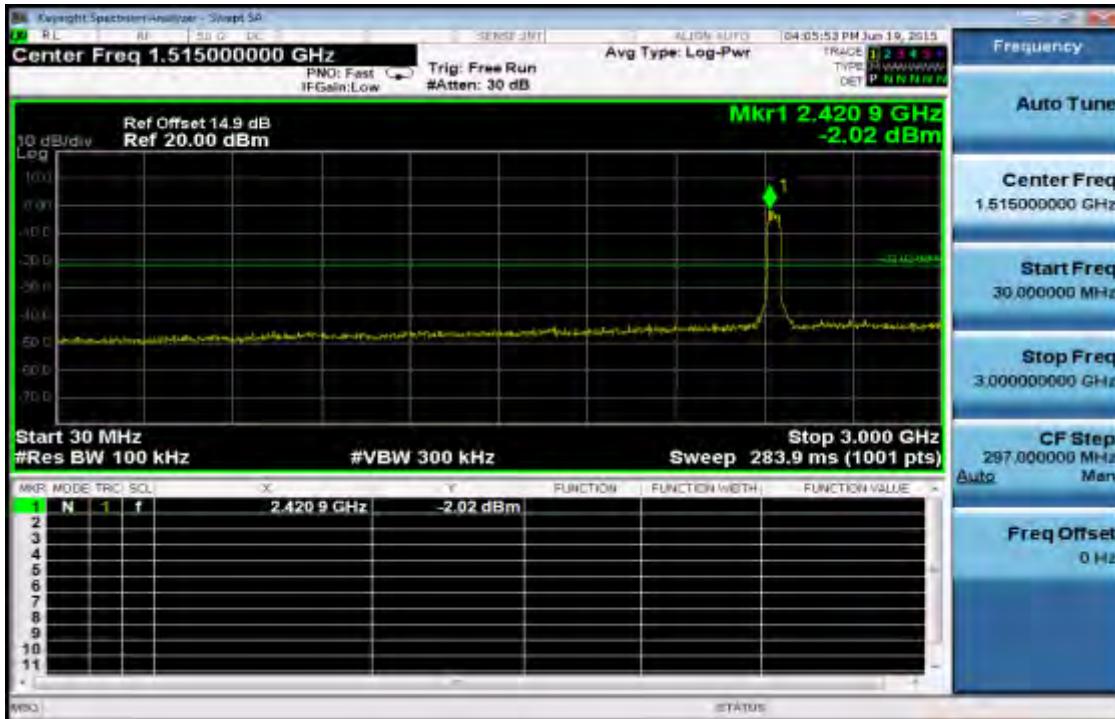


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Spurious Emission Test Data CH-Mid

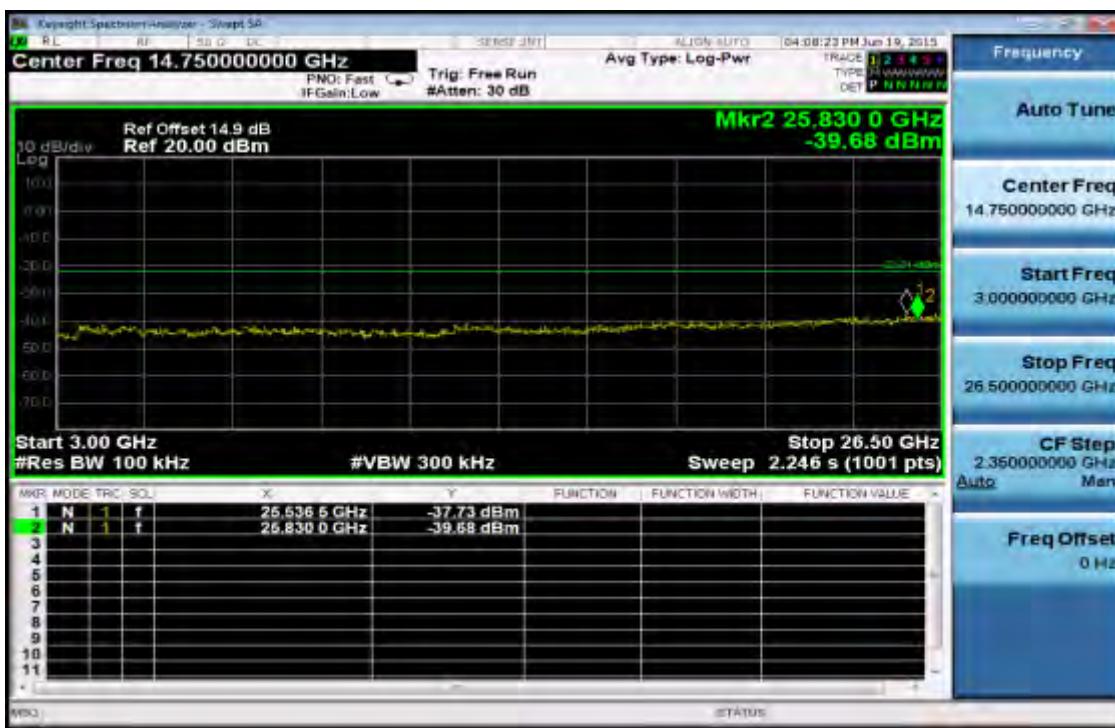
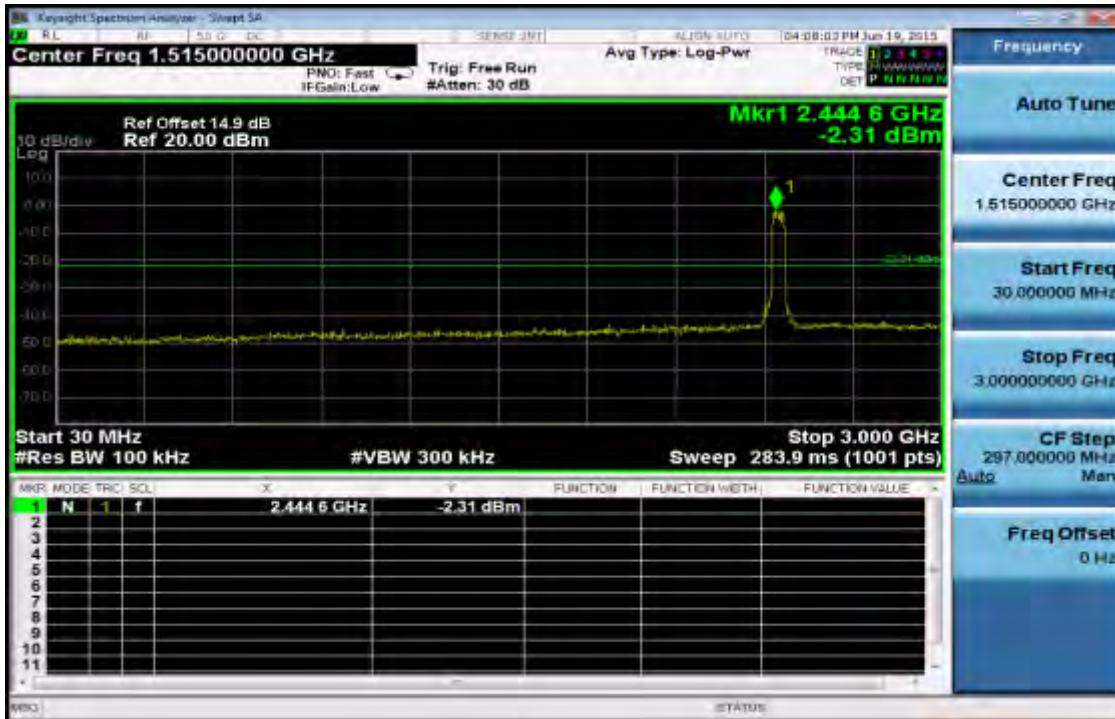


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Spurious Emission Test Data CH-High



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11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

11.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 limit as below.

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (dB μ V/m)

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11.2 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESU 40	100363	04/09/2015	04/08/2016
Loop Antenna	ETS-Lindgren	6502	00143303	12/09/2014	12/08/2015
Broadband Antenna	TESEQ	CBL 6112D	35240	12/05/2014	12/04/2015
Horn Antenna	ETS-Lindgren	3117	00143272	12/08/2014	12/07/2015
Horn Antenna	ETS-Lindgren	3160-09	00117911	11/13/2014	11/12/2015
Horn Antenna	ETS-Lindgren	3160-10	00117783	11/13/2014	11/12/2015
Pre Amplifier	EMC Instruments	EMC330	980096	12/19/2014	12/18/2015
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-18	10204	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-26	100780	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF27	12/19/2014	12/18/2015
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2015	05/03/2016
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

NOTE: N.C.R refers to Not Calibrated Required.

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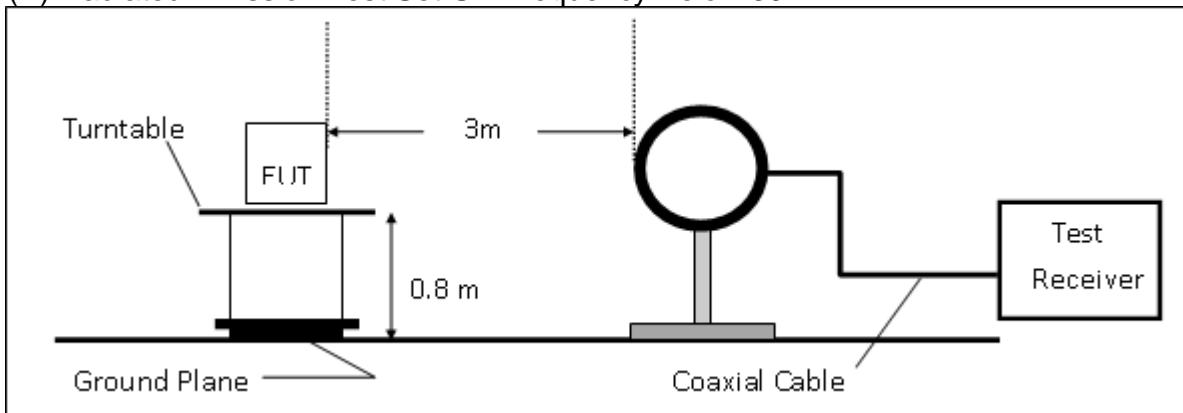
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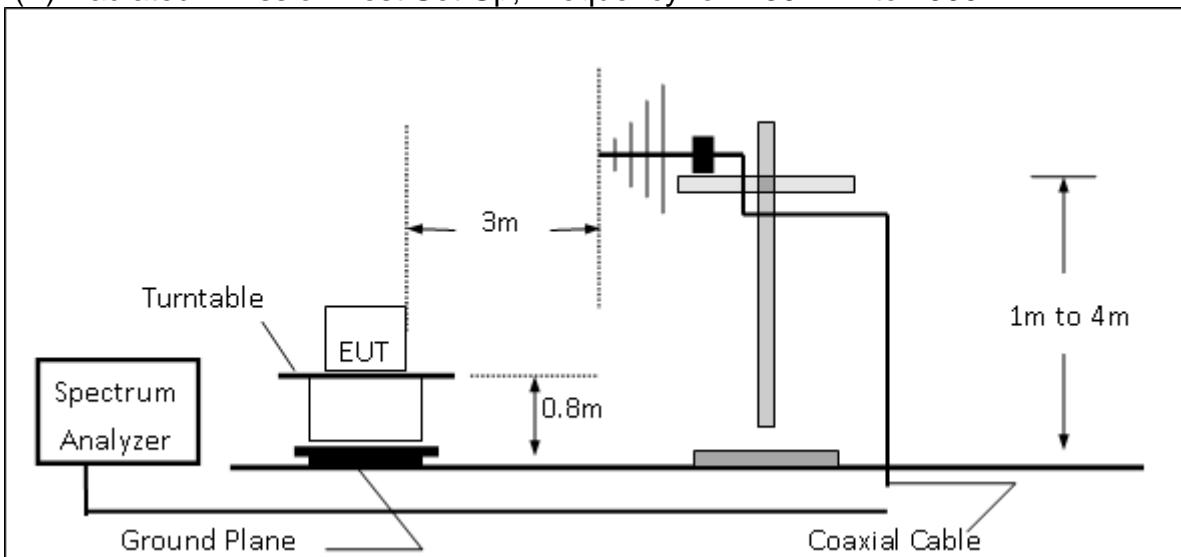
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11.3 Test SET-UP

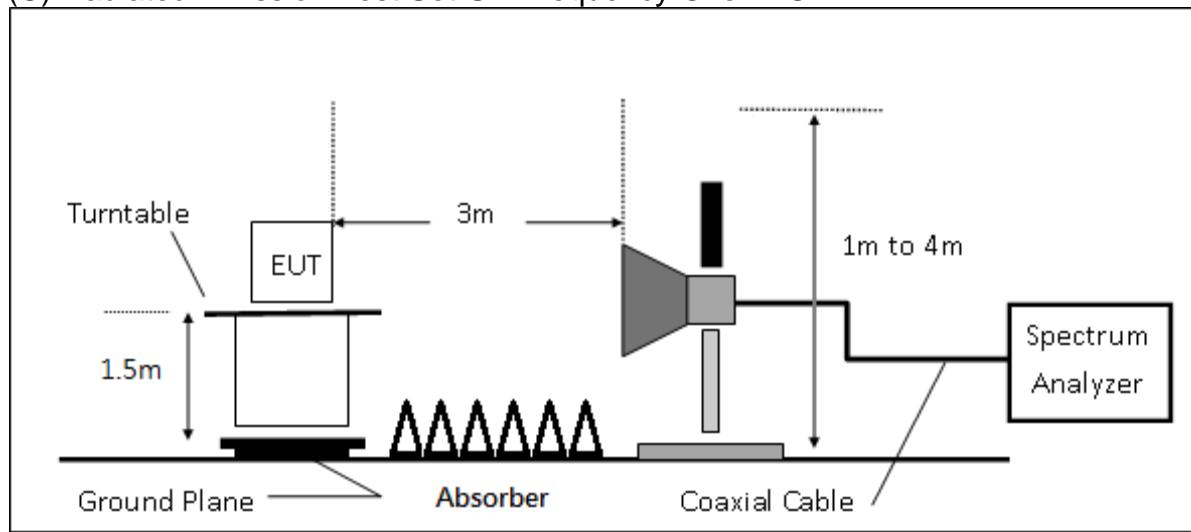
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-UP, Frequency from 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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11.3.1 Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance V03r03.
2. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW \geq 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
9. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
10. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
11. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
12. Repeat above procedures until all default test channel measured were complete.

Note:

1. For MIMO operation, directional gain is not subjected to offset back as prescribe in KDB 662911 D01 for relative out-of-band measurement, including conducted band edge falling into non-restricted frequency band.

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11.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF - CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dB μ V/m) = SPA. Reading level(dB μ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note :

“F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

11.5 Test Results of Radiated Spurious Emissions form 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

11.6 Measurement Result

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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Radiated Band Edge Measurement Result (802.11b)

Operation Band :802.11 b Test Date :2015-07-13
 Fundamental Frequency :2412 MHz Temp./Humi. :21 deg_C / 61 RH
 Operation Mode :Band Edge LOW Engineer :Vito
 EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Note	Detector	Spectrum		Factor	Actual	Limit	Margin
			Mode	Reading Level				
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB	
2390.00	E	Peak	48.94	6.62	55.56	74	-18.44	
2390.00	E	Average	36.63	6.62	43.25	54	-10.75	

Operation Band :802.11 b Test Date :2015-07-13
 Fundamental Frequency :2412 MHz Temp./Humi. :21 deg_C / 61 RH
 Operation Mode :Band Edge LOW Engineer :Vito
 EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Note	Detector	Spectrum		Factor	Actual	Limit	Margin
			Mode	Reading Level				
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB	
2390.00	E	Peak	49.98	6.62	56.60	74	-17.40	
2390.00	E	Average	37.32	6.62	43.94	54	-10.06	

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Operation Band :802.11 b
Fundamental Frequency :2462 MHz
Operation Mode :Band Edge HIGH
EUT Pol. :H Plan

Test Date :2015-07-13
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit @3m	Margin
					FS dB μ V/m	dB μ V/m	dB
2483.50	E	Peak	48.92	6.96	55.88	74	-18.12
2483.50	E	Average	35.06	6.96	42.02	54	-11.98

Operation Band :802.11 b
Fundamental Frequency :2462 MHz
Operation Mode :Band Edge HIGH
EUT Pol. :H Plan

Test Date :2015-07-13
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit @3m	Margin
					FS dB μ V/m	dB μ V/m	dB
2483.50	E	Peak	48.20	6.96	55.17	74	-18.84
2483.50	E	Average	35.34	6.96	42.30	54	-11.70

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Radiated Band Edge Measurement Result (802.11g)

Operation Band :802.11 g Test Date :2015-08-20
Fundamental Frequency :2412 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :Band Edge LOW Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Note	Detector	Spectrum		Factor	Actual	Limit	Margin
			Mode	Reading Level				
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB	
2390.00	E	Peak	61.83	6.62	68.44	74	-5.56	
2390.00	E	Average	34.74	6.62	41.36	54	-12.64	

Operation Band :802.11 g Test Date :2015-08-20
Fundamental Frequency :2412 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :Band Edge LOW Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Note	Detector	Spectrum		Factor	Actual	Limit	Margin
			Mode	Reading Level				
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB	
2390.00	E	Peak	65.43	6.62	72.04	74	-1.96	
2390.00	E	Average	36.70	6.62	43.32	54	-10.68	

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Operation Band :802.11 g
Fundamental Frequency :2462 MHz
Operation Mode :Band Edge HIGH
EUT Pol. :H Plan

Test Date :2015-08-20
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit @3m	Margin
					FS dB μ V/m	dB μ V/m	dB
2483.50	E	Peak	61.98	6.96	68.94	74	-5.06
2483.50	E	Average	35.18	6.96	42.14	54	-11.86

Operation Band :802.11 g
Fundamental Frequency :2462 MHz
Operation Mode :Band Edge HIGH
EUT Pol. :H Plan

Test Date :2015-08-20
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit @3m	Margin
					FS dB μ V/m	dB μ V/m	dB
2483.50	E	Peak	66.25	6.96	73.22	74	-0.78
2483.50	E	Average	36.73	6.96	43.69	54	-10.31

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Radiated Band Edge Measurement Result (802.11-HT20) (MIMO)

Operation Band :802.11 n20M Test Date :2015-07-13
 Fundamental Frequency :2412 MHz Temp./Humi. :21 deg_C / 61 RH
 Operation Mode :Band Edge LOW Engineer :Vito
 EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Note	Detector	Spectrum		Factor	Actual	Limit	Margin
			Mode	Reading Level				
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB	
2390.00	E	Peak	62.94	6.62	69.56	74	-4.44	
2390.00	E	Average	36.96	6.62	43.58	54	-10.42	

Operation Band :802.11 n20M Test Date :2015-07-13
 Fundamental Frequency :2412 MHz Temp./Humi. :21 deg_C / 61 RH
 Operation Mode :Band Edge LOW Engineer :Vito
 EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Note	Detector	Spectrum		Factor	Actual	Limit	Margin
			Mode	Reading Level				
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB	
2390.00	E	Peak	62.25	6.62	68.87	74	-5.13	
2390.00	E	Average	36.97	6.62	43.59	54	-10.41	

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Operation Band :802.11 n20M Test Date :2015-07-13
Fundamental Frequency :2462 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :Band Edge HIGH Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit @3m	Margin
					FS dB μ V/m	dB μ V/m	dB
2483.50	E	Peak	65.91	6.96	72.87	74	-1.13
2483.50	E	Average	36.11	6.96	43.07	54	-10.93

Operation Band :802.11 n20M Test Date :2015-07-13
Fundamental Frequency :2462 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :Band Edge HIGH Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual	Limit @3m	Margin
					FS dB μ V/m	dB μ V/m	dB
2483.50	E	Peak	61.41	6.96	68.38	74	-5.62
2483.50	E	Average	34.52	6.96	41.48	54	-12.52

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Radiated Band Edge Measurement Result (802.11-HT40) (MIMO)

Operation Band :802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2422 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :Band Edge LOW Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Note	Detector	Spectrum		Factor	Actual	Limit	Margin
			Mode	Reading Level				
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB	
2390.00	E	Peak	64.90	6.62	71.52	74	-2.48	
2390.00	E	Average	38.75	6.62	45.37	54	-8.63	

Operation Band :802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2422 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :Band Edge LOW Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Note	Detector	Spectrum		Factor	Actual	Limit	Margin
			Mode	Reading Level				
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB	
2390.00	E	Peak	62.35	6.62	68.97	74	-5.03	
2390.00	E	Average	39.90	6.62	46.52	54	-7.48	

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Operation Band :802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2452 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :Band Edge HIGH Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum		Factor	Actual FS	Limit @3m	Margin
			PK/QP/AV	Reading Level dB μ V				
2483.50	E	Peak		62.65	6.96	69.61	74	-4.39
2483.50	E	Average		38.54	6.96	45.50	54	-8.50
2486.80	S	Peak		63.72	6.98	70.70	74	-3.30
2486.80	S	Average		38.95	6.98	45.93	54	-8.07

Operation Band :802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2452 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :Band Edge HIGH Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum		Factor	Actual FS	Limit @3m	Margin
			PK/QP/AV	Reading Level dB μ V				
2483.50	E	Peak		61.18	6.96	68.15	74	-5.85
2483.50	E	Average		37.32	6.96	44.28	54	-9.72

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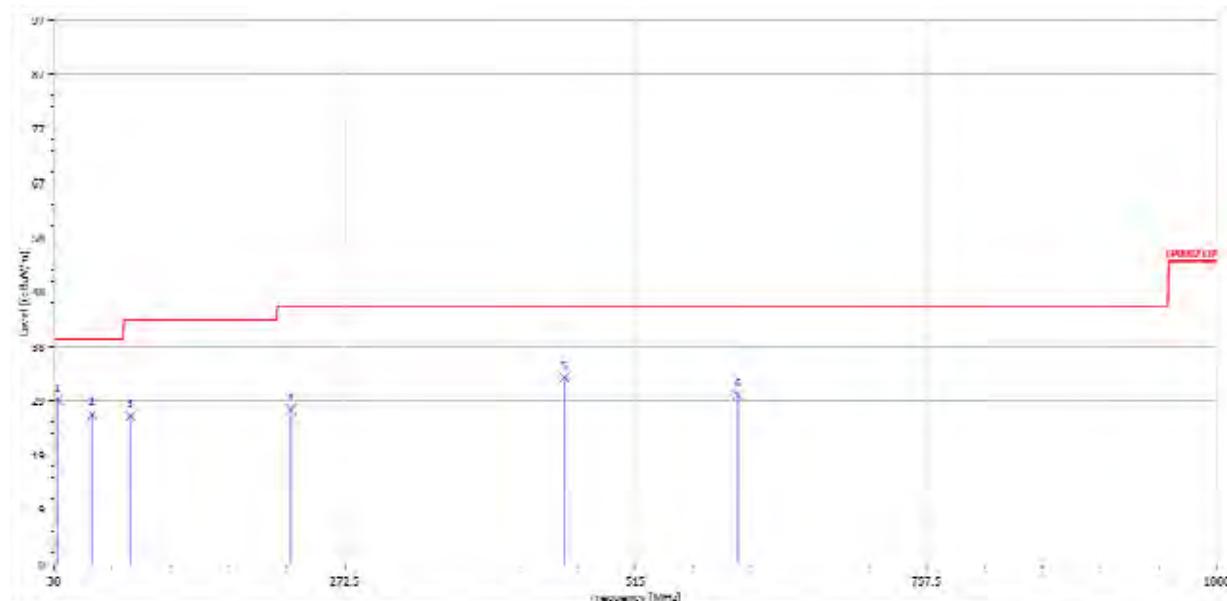
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Radiated Spurious Emission Measurement Result (802.11 g)

Below 1GHz Worst-Case Data:

Operation Band	:802.11 g	Test Date	:2015-07-13
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 61 RH
Operation Mode	:TX LOW	Engineer	:Vito
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Reading	Level				
32.91	S	Peak	43.91		-14.69	29.21	40	-10.79
62.01	S	Peak	54.92		-28.34	26.58	40	-13.42
94.02	S	Peak	51.21		-24.89	26.32	43.5	-17.18
227.88	S	Peak	50.03		-22.45	27.57	46	-18.43
455.83	S	Peak	47.94		-14.75	33.19	46	-12.81
600.36	S	Peak	42.51		-12.45	30.06	46	-15.94

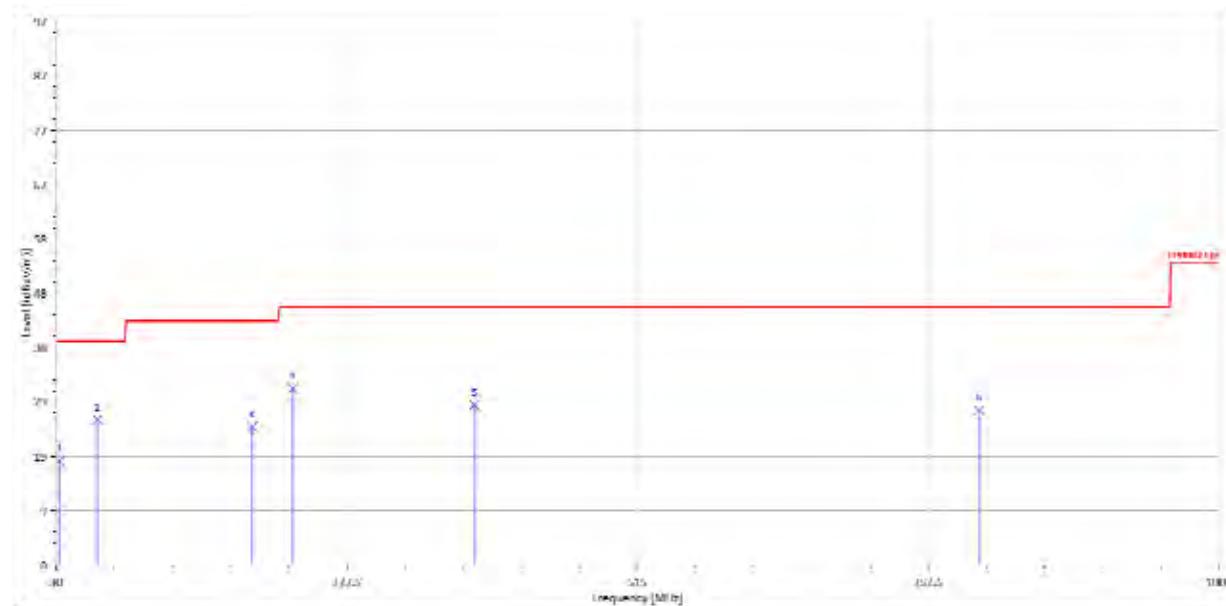
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Operation Band :802.11 g
 Fundamental Frequency :2412 MHz
 Operation Mode :TX LOW
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
32.91	S	Peak	33.20	-14.69	18.51	40	-21.49	
64.92	S	Peak	54.07	-28.16	25.91	40	-14.09	
193.93	S	Peak	48.48	-23.82	24.66	43.5	-18.84	
227.88	S	Peak	53.94	-22.45	31.48	46	-14.52	
379.20	S	Peak	45.04	-16.52	28.52	46	-17.48	
800.18	S	Peak	37.11	-9.49	27.62	46	-18.38	

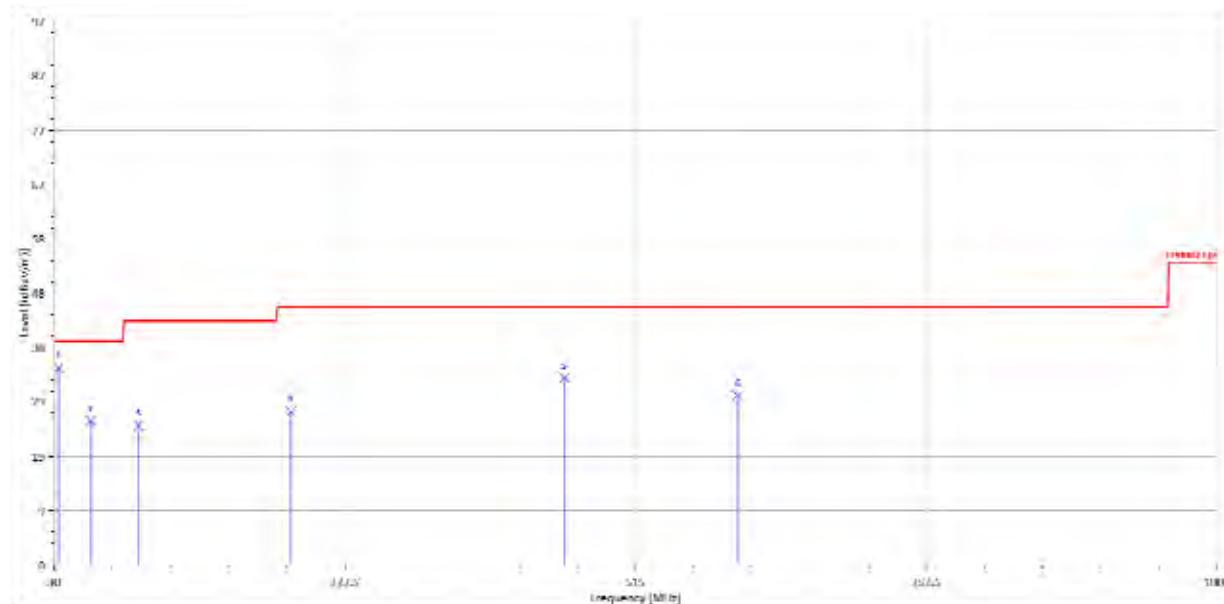
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Operation Band :802.11 g
 Fundamental Frequency :2437 MHz
 Operation Mode :TX MID
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
						Factor dB	Actual FS dBµV/m
33.88	S	Peak	50.36	-15.22	35.14	40	-4.86
61.04	S	Peak	54.10	-28.42	25.68	40	-14.32
100.81	S	Peak	48.60	-23.69	24.91	43.5	-18.59
227.88	S	Peak	49.84	-22.45	27.38	46	-18.62
455.83	S	Peak	48.11	-14.75	33.36	46	-12.64
600.36	S	Peak	42.66	-12.45	30.21	46	-15.79

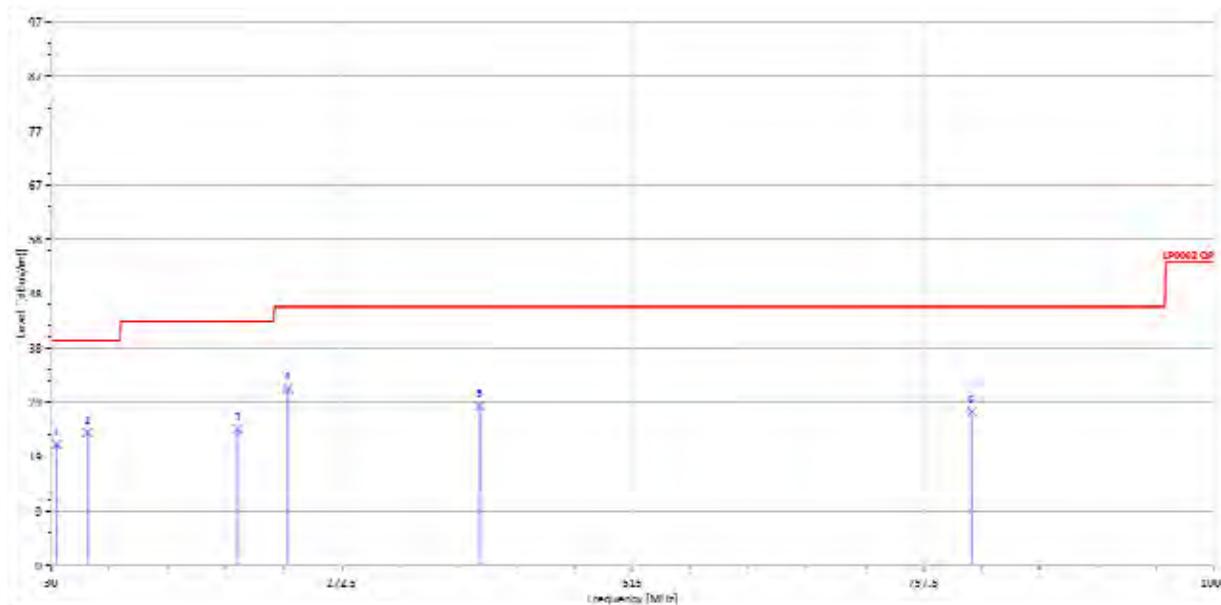
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Operation Band :802.11 g
 Fundamental Frequency :2437 MHz
 Operation Mode :TX MID
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :HORIZONTAL



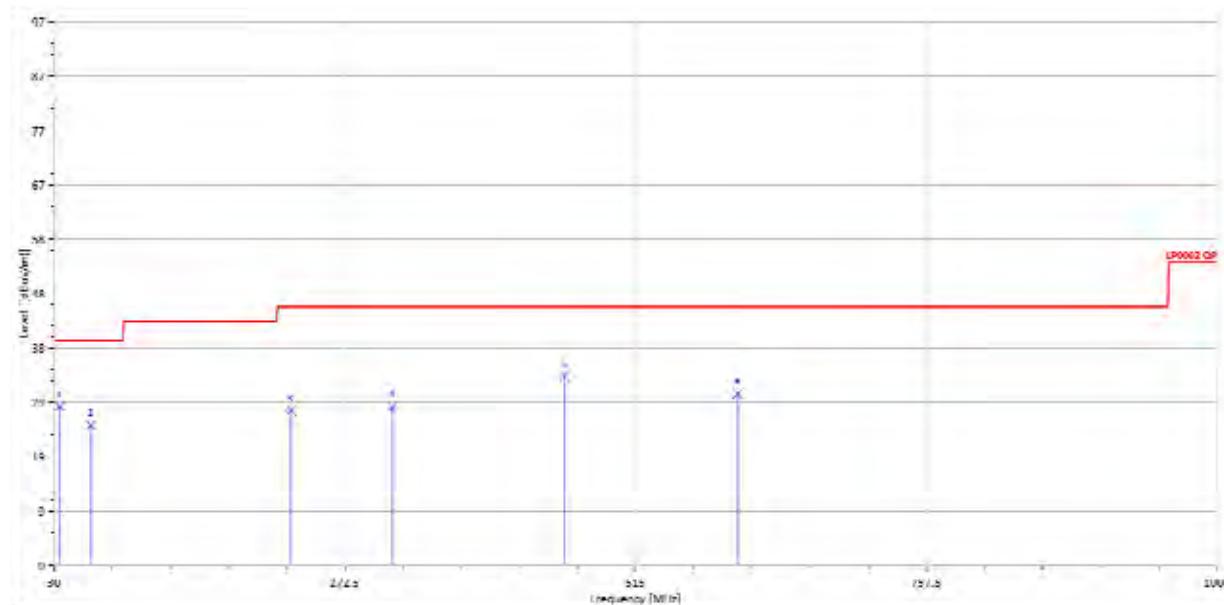
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
			Reading	Level				
34.85	S	Peak	37.27	-15.75	21.52	40	-18.48	
61.04	S	Peak	52.06	-28.42	23.64	40	-16.36	
186.17	S	Peak	48.57	-24.25	24.32	43.5	-19.18	
227.88	S	Peak	53.96	-22.45	31.51	46	-14.49	
387.93	S	Peak	44.75	-16.28	28.48	46	-17.52	
798.24	S	Peak	36.95	-9.55	27.40	46	-18.60	

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Operation Band :802.11 g
Fundamental Frequency :2462 MHz
Operation Mode :TX HIGH
EUT Pol. :H Plan
Test Date :2015-07-13
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual	Limit @3m	Margin
					FS	dBµV/m	dBµV/m
34.85	S	Peak	44.07	-15.75	28.32	40	-11.68
61.04	S	Peak	53.40	-28.42	24.98	40	-15.02
227.88	S	Peak	50.05	-22.45	27.60	46	-18.40
312.27	S	Peak	47.02	-18.66	28.36	46	-17.64
455.83	S	Peak	48.57	-14.75	33.83	46	-12.17
600.36	S	Peak	43.05	-12.45	30.60	46	-15.40

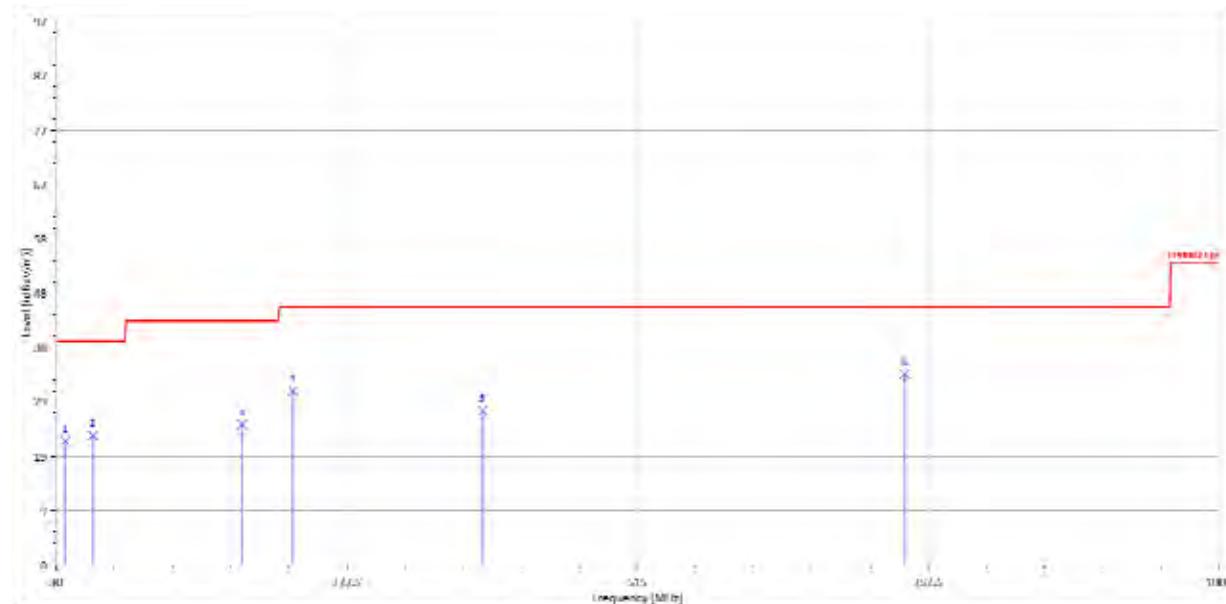
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Operation Band :802.11 g
 Fundamental Frequency :2462 MHz
 Operation Mode :TX HIGH
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
						Limit @3m dBµV/m	Margin dB
37.76	S	Peak	39.71	-17.57	22.14	40	-17.86
61.04	S	Peak	51.51	-28.42	23.09	40	-16.91
185.20	S	Peak	49.33	-24.26	25.07	43.5	-18.43
227.88	S	Peak	53.52	-22.45	31.07	46	-14.93
385.99	S	Peak	43.89	-16.35	27.54	46	-18.46
738.10	S	Peak	44.38	-10.30	34.08	46	-11.92

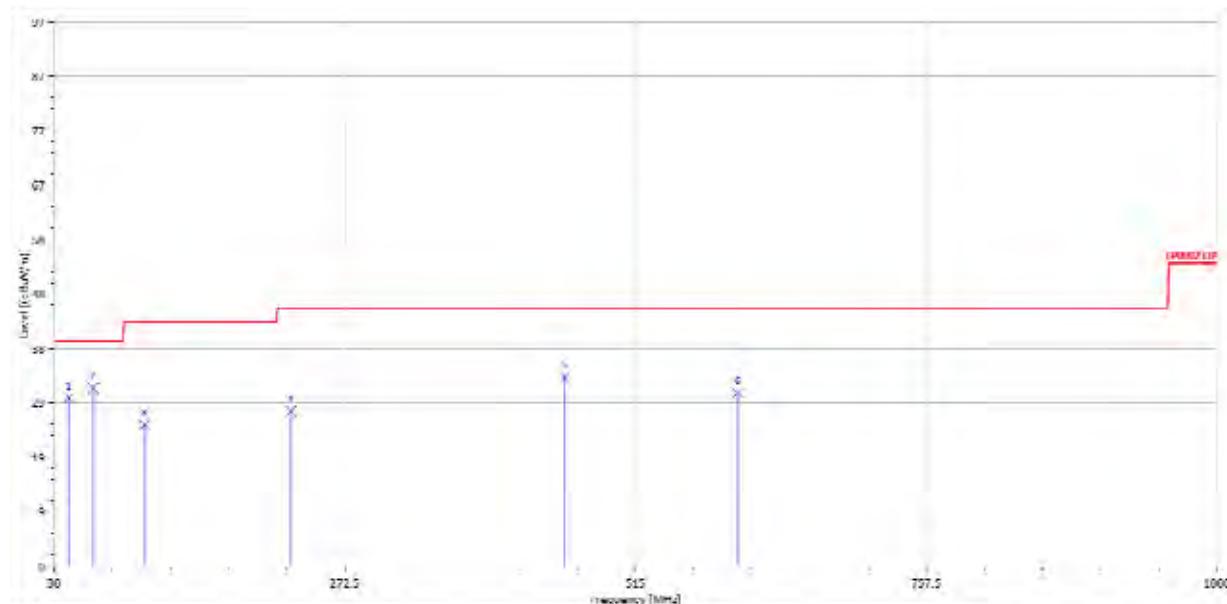
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Radiated Spurious Emission Measurement Result (802.11_HT40) (MIMO)

Operation Band : 802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2422 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :TX LOW Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



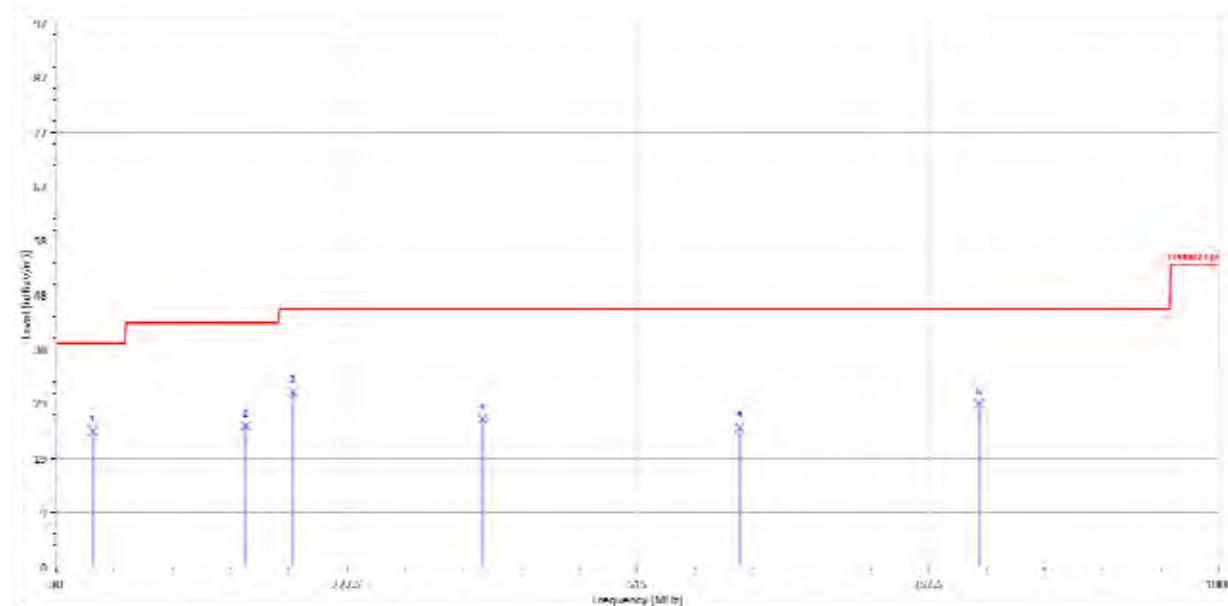
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual	Limit	Margin
					FS dBµV/m	@3m dBµV/m	dB
42.61	S	Peak	50.73	-20.76	29.97	40	-10.03
62.98	S	Peak	59.96	-28.27	31.69	40	-8.31
105.66	S	Peak	48.09	-22.96	25.13	43.5	-18.37
227.88	S	Peak	50.05	-22.45	27.59	46	-18.41
455.83	S	Peak	48.50	-14.75	33.75	46	-12.25
600.36	S	Peak	43.32	-12.45	30.87	46	-15.13

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Operation Band : 802.11 n40M Test Date : 2015-07-13
 Fundamental Frequency : 2422 MHz Temp./Humi. : 21 deg_C / 61 RH
 Operation Mode : TX LOW Engineer : Vito
 EUT Pol. : H Plan Measurement Antenna Pol. : HORIZONTAL



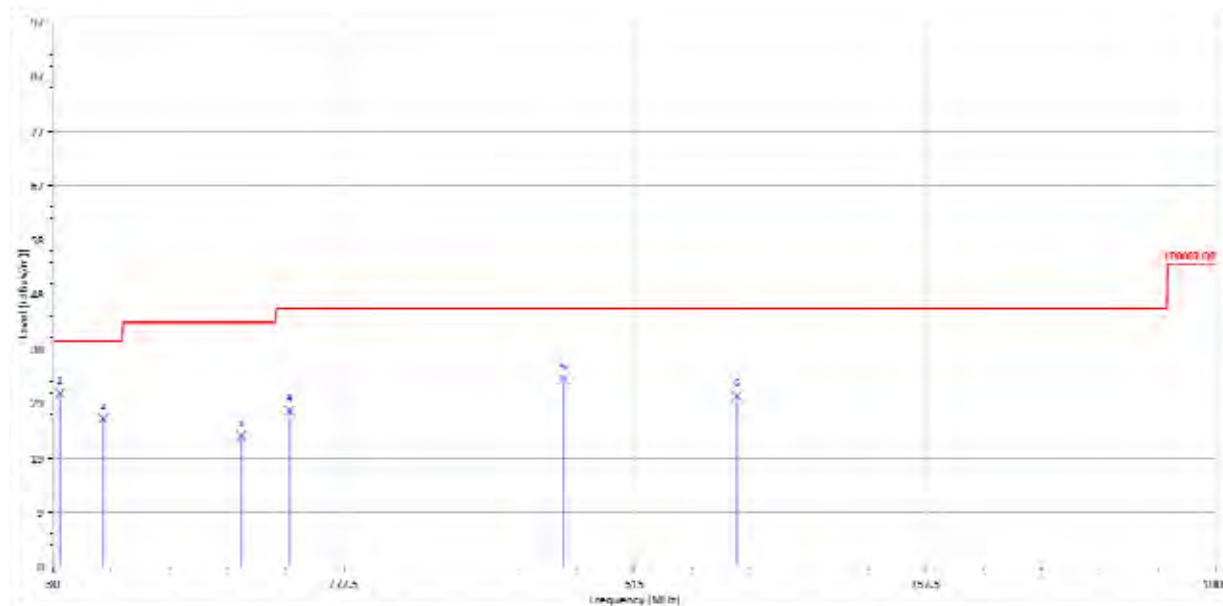
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Reading	Level				
61.04	S	Peak	52.73		-28.42	24.31	40	-15.69
188.11	S	Peak	49.40		-24.22	25.18	43.5	-18.32
227.88	S	Peak	53.69		-22.45	31.23	46	-14.77
385.99	S	Peak	42.70		-16.35	26.35	46	-19.65
600.36	S	Peak	37.31		-12.45	24.85	46	-21.15
800.18	S	Peak	38.63		-9.49	29.14	46	-16.86

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Operation Band : 802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2437 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :TX MID Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



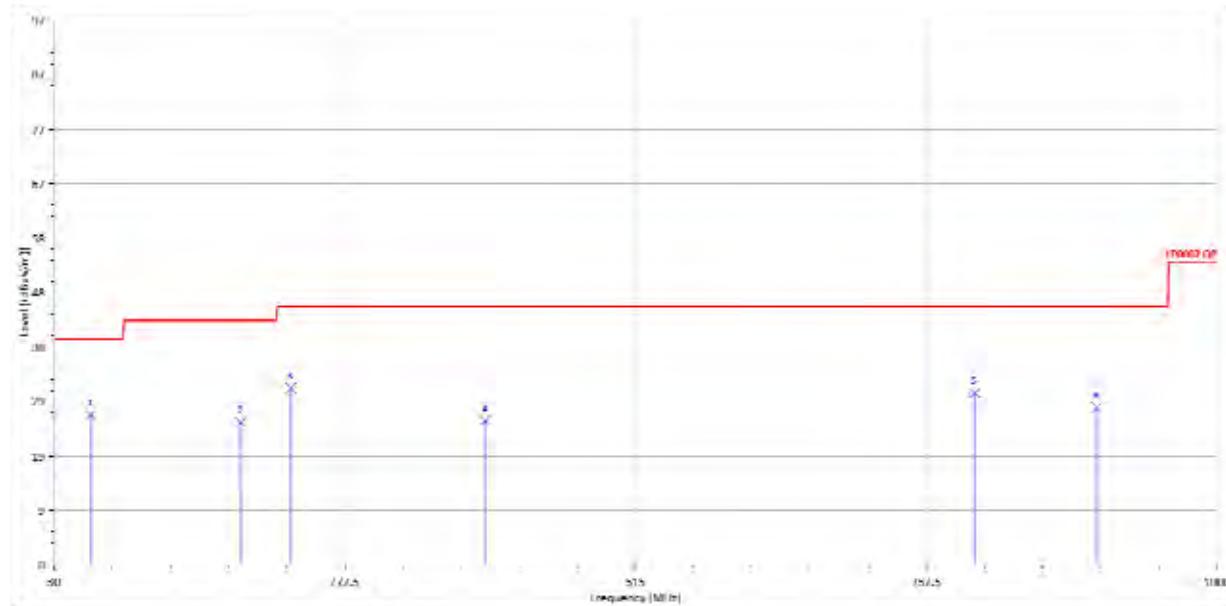
Freq.	Note	Detector	Spectrum		Factor	Actual	Limit	Margin
			Mode	Reading Level				
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB	
35.82	S	Peak	47.28	-16.34	30.94	40	-9.06	
71.71	S	Peak	54.01	-27.63	26.38	40	-13.62	
187.14	S	Peak	47.55	-24.24	23.31	43.5	-20.19	
227.88	S	Peak	50.23	-22.45	27.78	46	-18.22	
455.83	S	Peak	48.26	-14.75	33.51	46	-12.49	
600.36	S	Peak	42.89	-12.45	30.44	46	-15.56	

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Operation Band : 802.11 n40M Test Date : 2015-07-13
 Fundamental Frequency : 2437 MHz Temp./Humi. : 21 deg_C / 61 RH
 Operation Mode : TX MID Engineer : Vito
 EUT Pol. : H Plan Measurement Antenna Pol. : HORIZONTAL



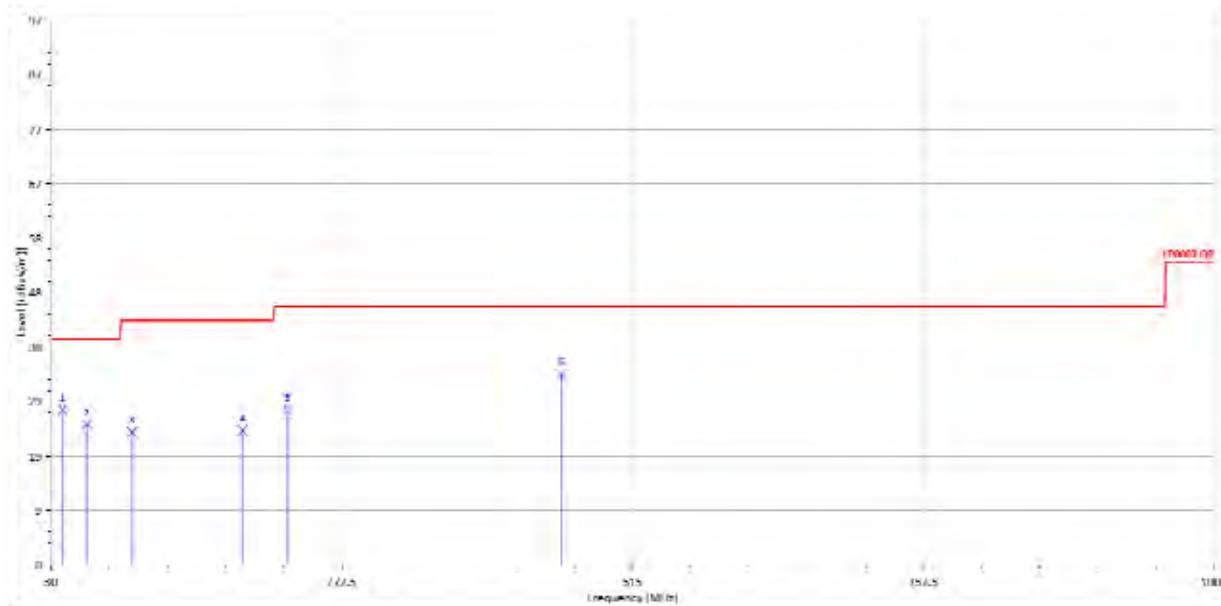
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Reading	Level dBµV				
61.04	S	Peak	55.13	-28.42	26.71	40	-13.29	
186.17	S	Peak	49.60	-24.25	25.35	43.5	-18.15	
227.88	S	Peak	53.88	-22.45	31.43	46	-14.57	
389.87	S	Peak	41.84	-16.21	25.62	46	-20.38	
798.24	S	Peak	40.12	-9.55	30.57	46	-15.43	
900.09	S	Peak	36.18	-8.17	28.01	46	-17.99	

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Operation Band :802.11 n40M Test Date :2015-07-13
 Fundamental Frequency :2452 MHz Temp./Humi. :21 deg_C / 61 RH
 Operation Mode :TX HIGH Engineer :Vito
 EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



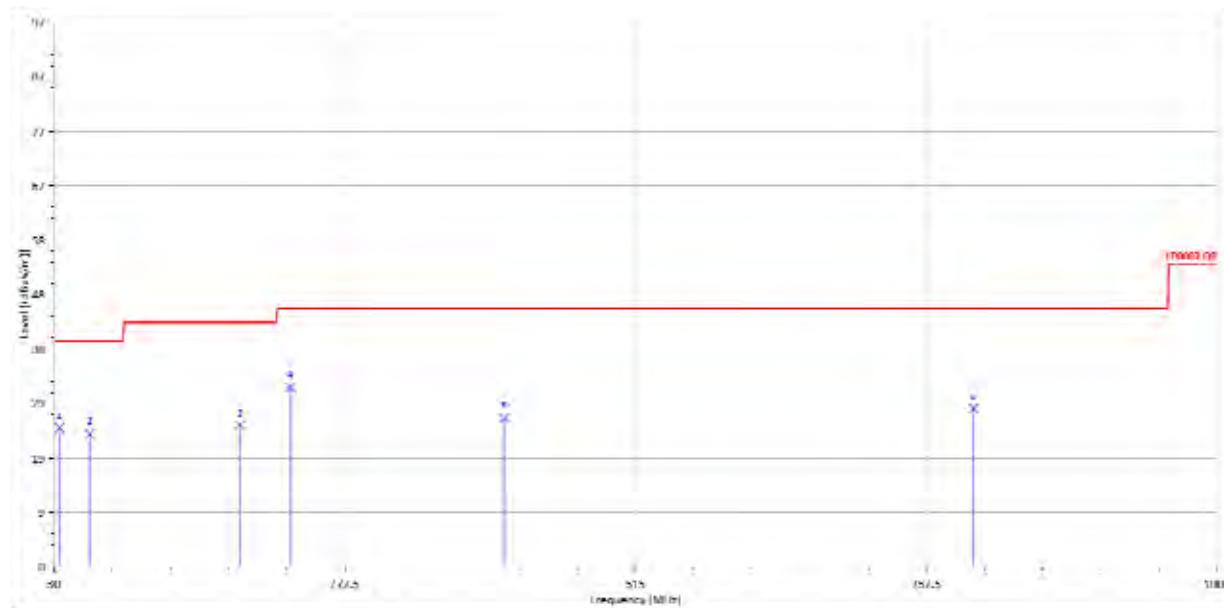
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Reading	Level dBµV				
39.70	S	Peak	46.41	-18.79	27.61	40	-12.39	
60.07	S	Peak	53.45	-28.50	24.95	40	-15.05	
97.90	S	Peak	47.80	-24.19	23.61	43.5	-19.89	
190.05	S	Peak	48.07	-24.16	23.90	43.5	-19.60	
227.88	S	Peak	50.06	-22.45	27.60	46	-18.40	
455.83	S	Peak	48.62	-14.75	33.88	46	-12.12	

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Operation Band :802.11 n40M Test Date :2015-07-13
 Fundamental Frequency :2452 MHz Temp./Humi. :21 deg_C / 61 RH
 Operation Mode :TX HIGH Engineer :Vito
 EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Reading	Level dBµV				
34.85	S	Peak	40.45	-15.75	24.70	40	-15.30	
60.07	S	Peak	52.12	-28.50	23.62	40	-16.38	
185.20	S	Peak	49.48	-24.26	25.21	43.5	-18.29	
227.88	S	Peak	54.41	-22.45	31.95	46	-14.05	
405.39	S	Peak	42.16	-15.70	26.46	46	-19.54	
797.27	S	Peak	37.79	-9.59	28.20	46	-17.80	

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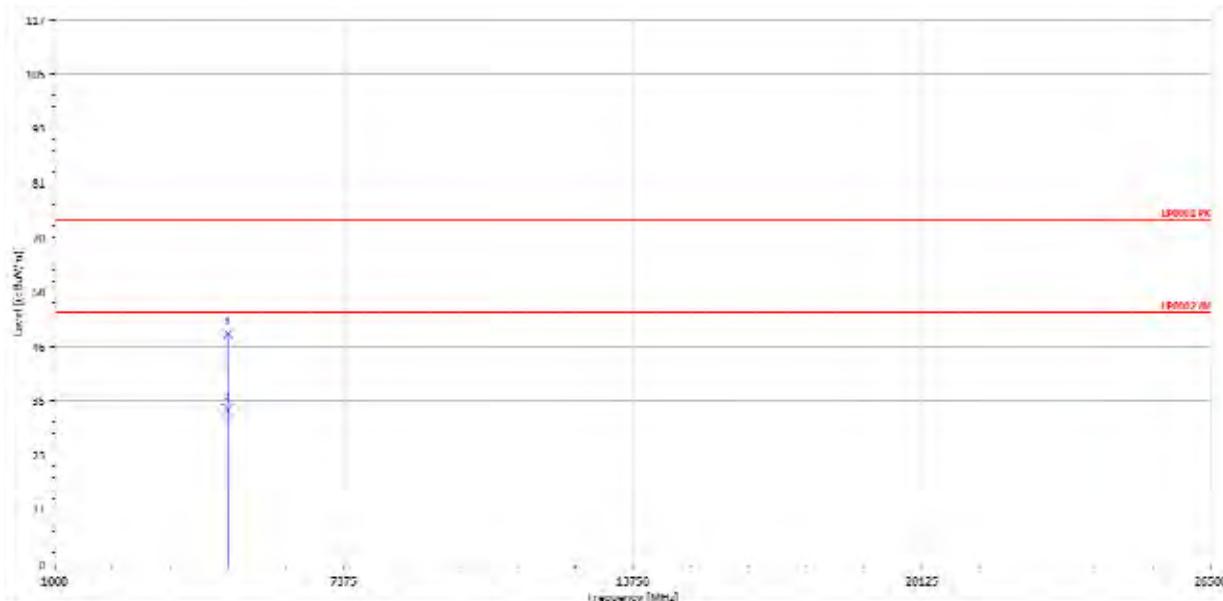
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Radiated Spurious Emission Measurement Result (802.11 b)

Above 1GHz Worst-Case Data:

Operation Band	:802.11 b	Test Date	:2015-07-13
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 61 RH
Operation Mode	:TX LOW	Engineer	:Vito
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
			Peak	dB μ V				
4822.00	H	Peak	38.43		10.97	49.40	74	-24.60
4822.00	H	Average	22.30		10.97	33.27	54	-20.73

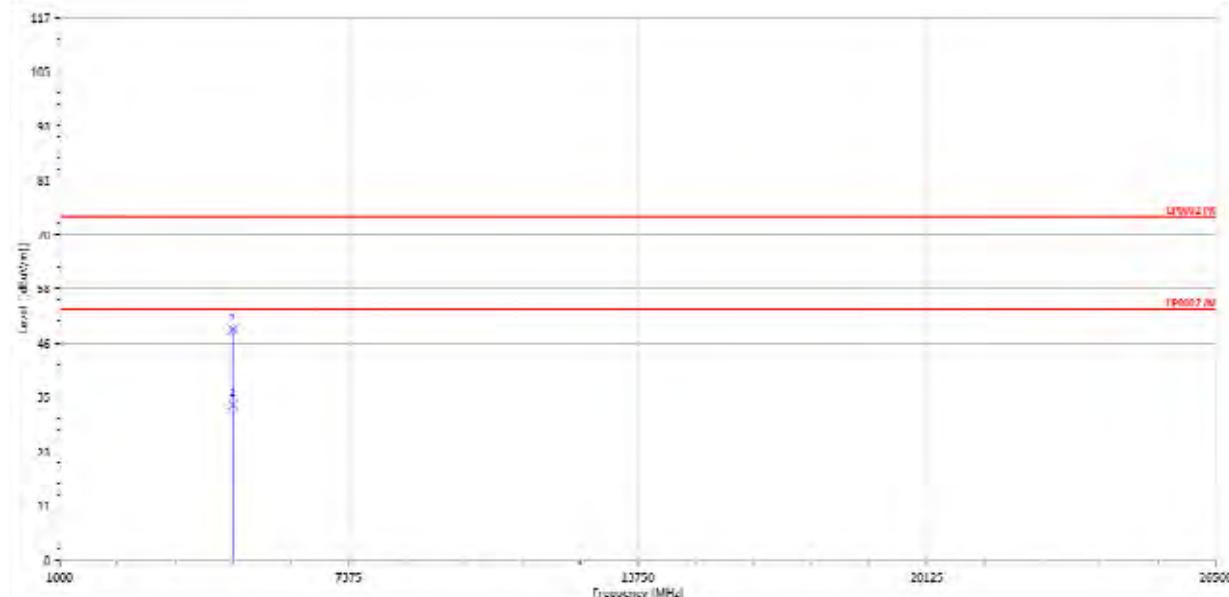
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Operation Band :802.11 b
 Fundamental Frequency :2412 MHz
 Operation Mode :TX LOW
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Peak	22.50				
4822.00	H	Peak	38.76	10.97	49.74	74	-24.26	
4822.00	H	Average	22.50	10.97	33.47	54	-20.53	

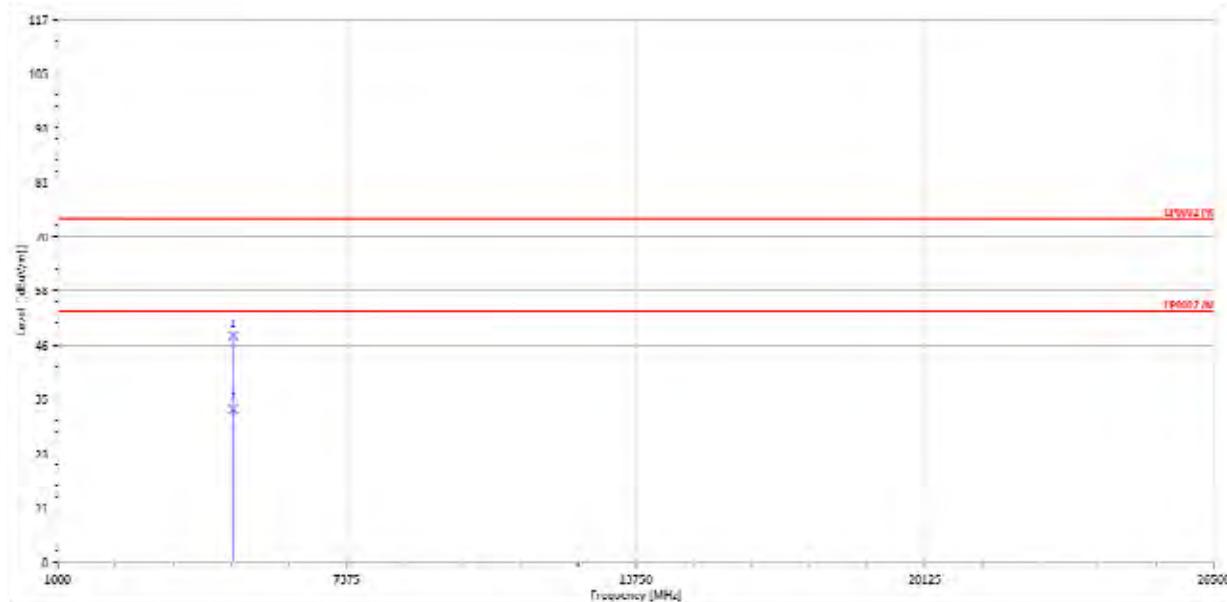
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Operation Band :802.11 b
 Fundamental Frequency :2437 MHz
 Operation Mode :TX MID
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum		Factor	Actual FS	Limit @3m	Margin
			PK/QP/AV	Reading Level dBµV				
4871.00	H	Peak	37.87	10.90	48.77	74	-25.23	
4871.00	H	Average	22.06	10.90	32.96	54	-21.04	

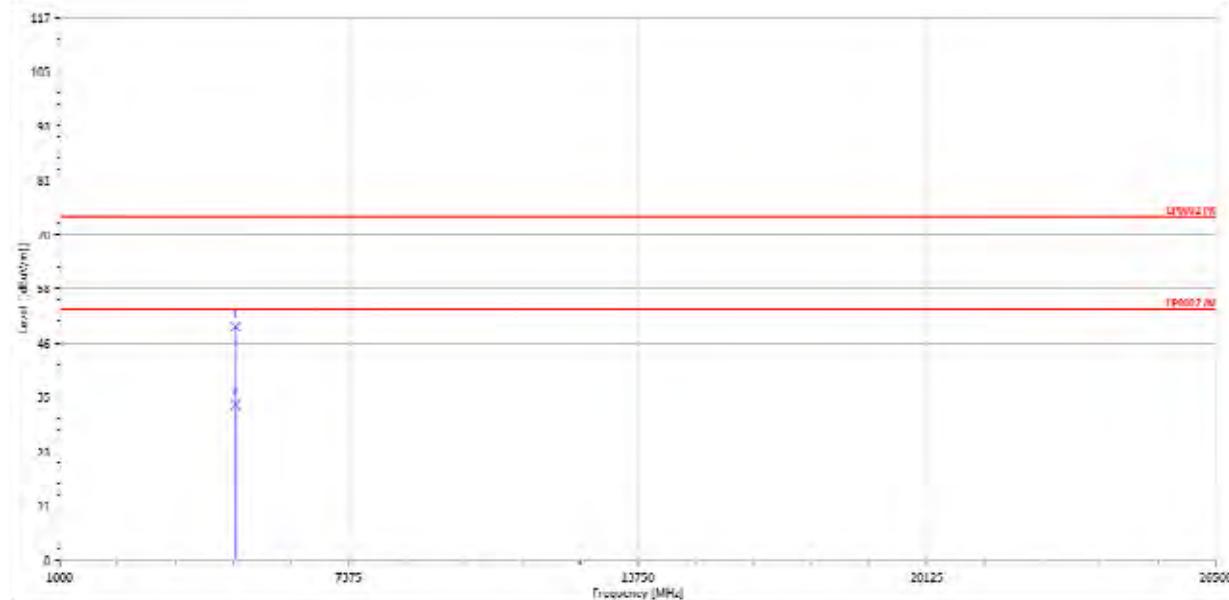
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Operation Band :802.11 b
Fundamental Frequency :2437 MHz
Operation Mode :TX MID
EUT Pol. :H Plan

Test Date :2015-07-13
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Peak	22.63				
4878.00	H	Peak	39.36	10.89	50.25	74	-23.75	
4878.00	H	Average	22.63	10.89	33.52	54	-20.48	

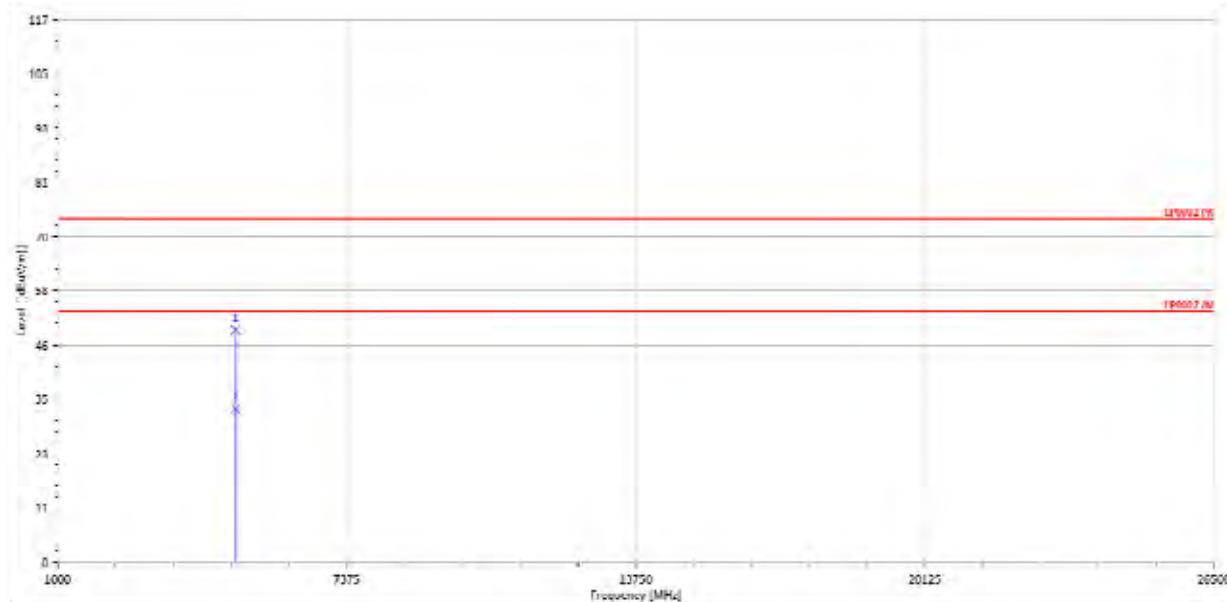
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Operation Band :802.11 b
 Fundamental Frequency :2462 MHz
 Operation Mode :TX HIGH
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum Reading		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			PK/QP/AV	Level dBµV				
4927.00	H	Peak		39.01	10.98	49.98	74	-24.02
4927.00	H	Average		22.06	10.98	33.04	54	-20.96

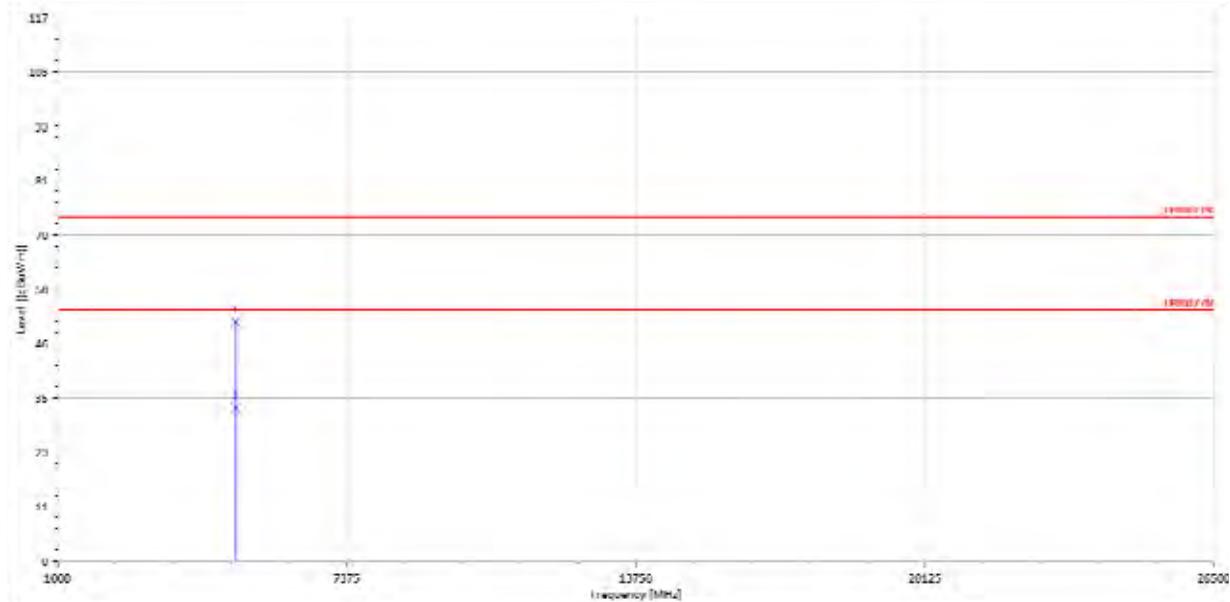
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Operation Band :802.11 b
 Fundamental Frequency :2462 MHz
 Operation Mode :TX HIGH
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum Reading Level		Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
			PK/QP/AV	dB μ V				
4927.00	H	Peak	40.39	40.39	10.98	51.36	74	-22.64
4927.00	H	Average	23.23	23.23	10.98	32.84	54	-21.16

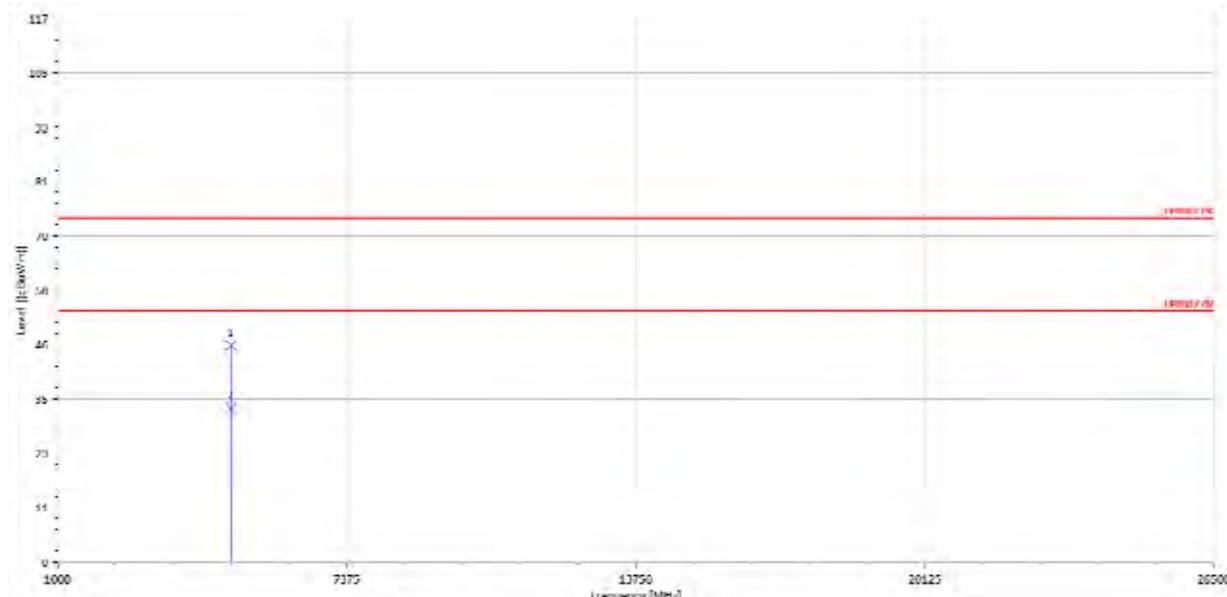
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Radiated Spurious Emission Measurement Result (802.11 g)

Operation Band :802.11 g Test Date :2015-07-13
Fundamental Frequency :2412 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :TX LOW Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			PK/QP/AV	dBµV				
4822.00	H	Peak		35.61	10.97	46.58	74	-27.42
4822.00	H	Average		22.18	10.97	33.15	54	-20.85

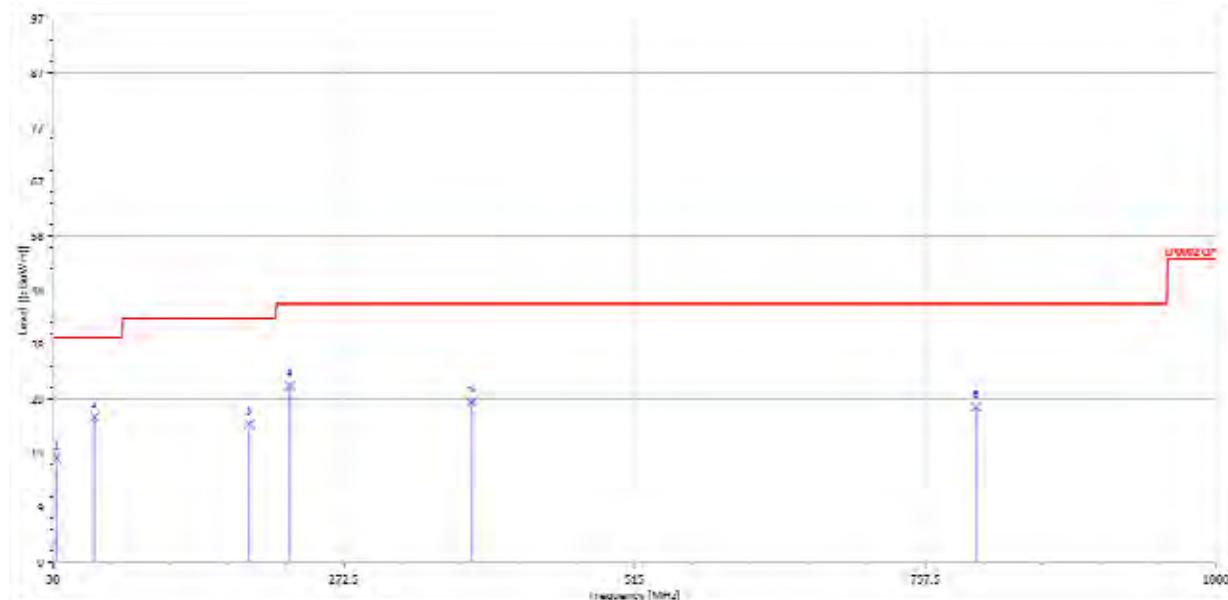
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Operation Band :802.11 g
Fundamental Frequency :2412 MHz
Operation Mode :TX LOW
EUT Pol. :H Plan

Test Date :2015-07-13
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			PK/QP/AV	dBµV				
4829.00	H	Peak		35.07	10.96	46.03	74	-27.97
4829.00	H	Average		22.70	10.96	33.66	54	-20.34

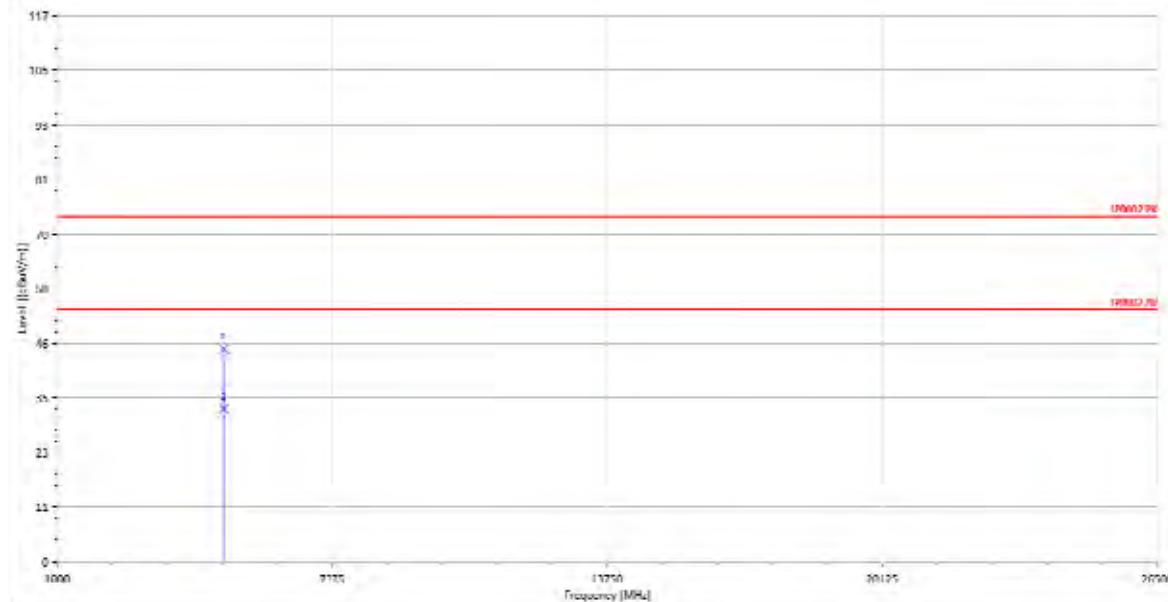
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Operation Band :802.11 g
 Fundamental Frequency :2437 MHz
 Operation Mode :TX MID
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum Reading Level		Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
			PK/QP/AV	dB μ V				
4874.00	Peak	H		34.71	10.89	45.60	74.00	-28.40
4874.00	Average	H		21.80	10.89	32.69	54.00	-21.31

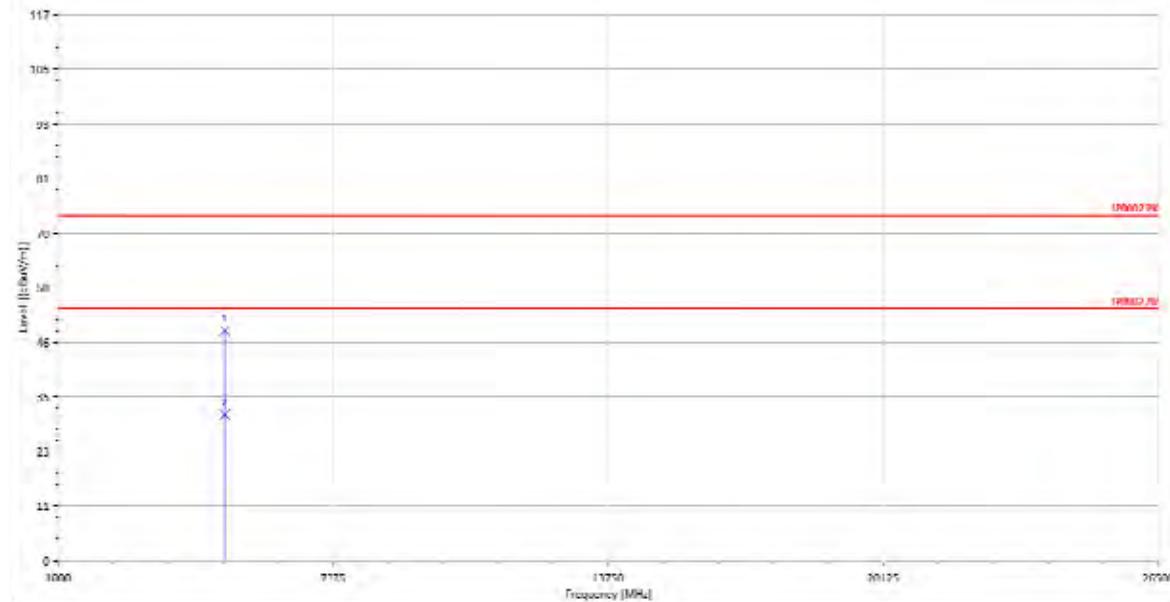
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Operation Band :802.11 g
 Fundamental Frequency :2437 MHz
 Operation Mode :TX MID
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Hum. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Reading	Level				
4874.00	Peak	H	38.46		10.89	49.35	74.00	-24.65
4874.00	Average	H	20.37		10.89	31.26	54.00	-22.74

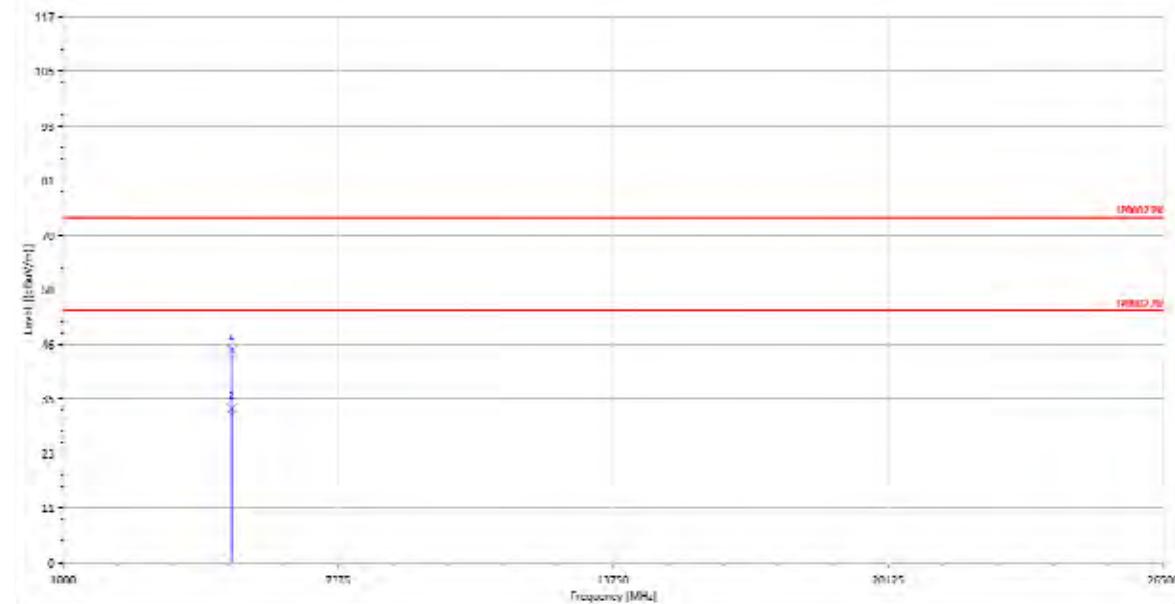
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Operation Band :802.11 g
 Fundamental Frequency :2462 MHz
 Operation Mode :TX HIGH
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Hum. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Reading	Level				
4920.00	Peak	H	34.66		10.98	45.64	74.00	-28.36
4920.00	Average	H	22.04		10.98	33.02	54.00	-20.98

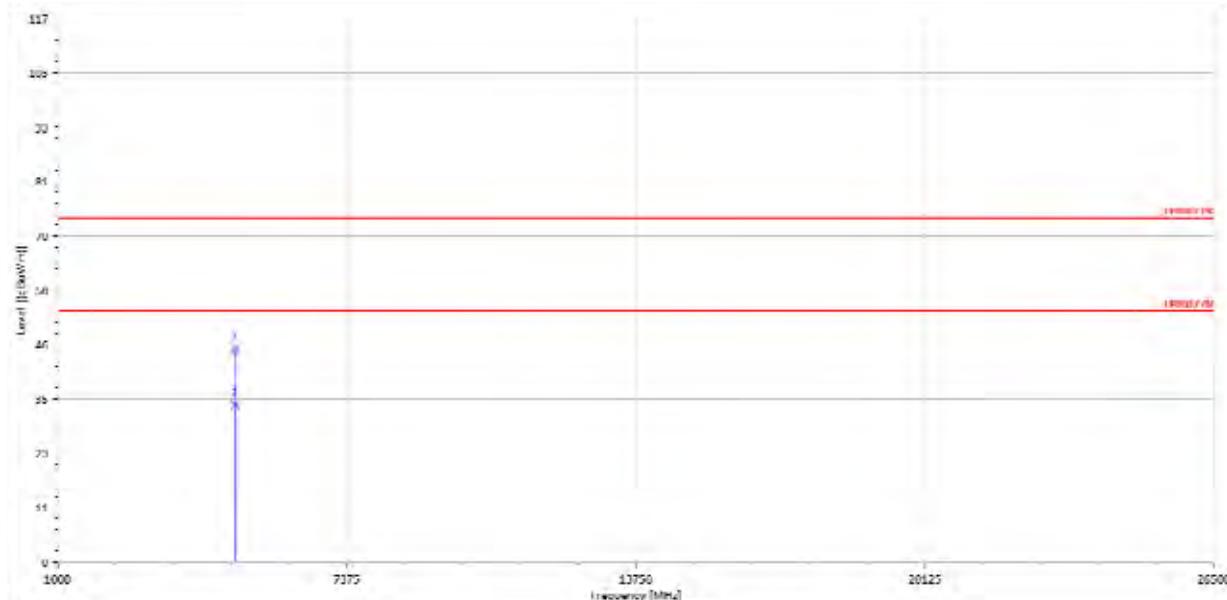
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Operation Band :802.11 g
 Fundamental Frequency :2462 MHz
 Operation Mode :TX HIGH
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Peak	22.74				
4920.00	H	Peak	34.99	10.98	45.97	74	-28.03	
4920.00	H	Average	22.74	10.98	33.72	54	-20.28	

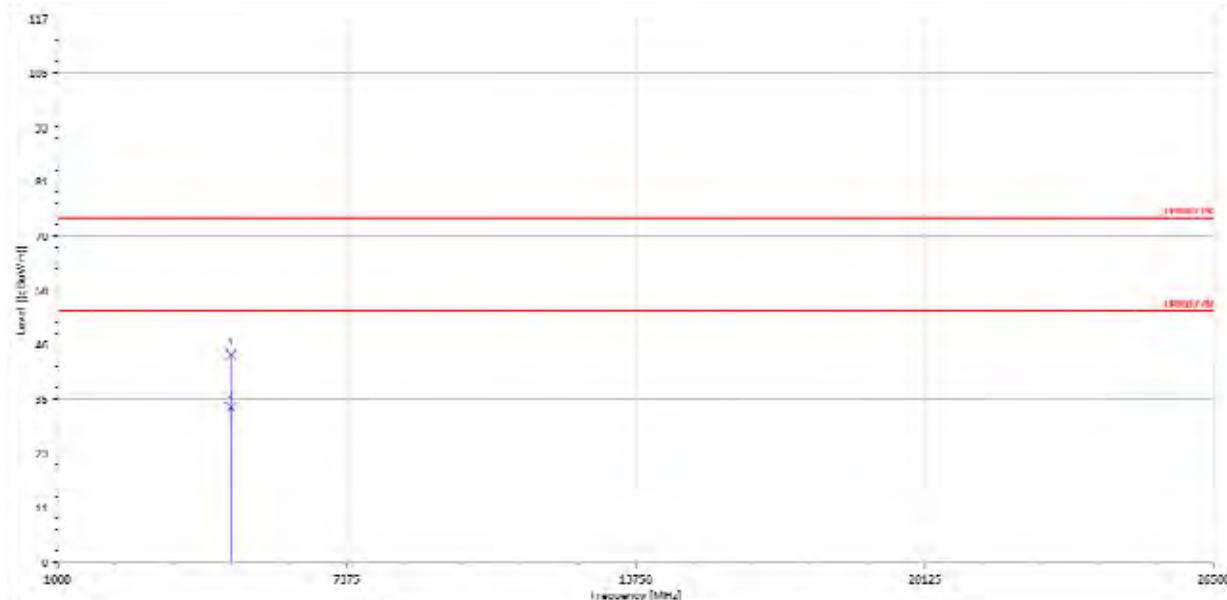
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Radiated Spurious Emission Measurement Result (802.11_HT20) (MIMO)

Operation Band :802.11 n20M Test Date :2015-07-13
Fundamental Frequency :2412 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :TX LOW Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum	Factor	Actual FS	Limit @3m	Margin
			Reading				
4824.00	H	Peak	33.70	10.97	44.67	74	-29.33
4824.00	H	Average	22.29	10.97	33.26	54	-20.74

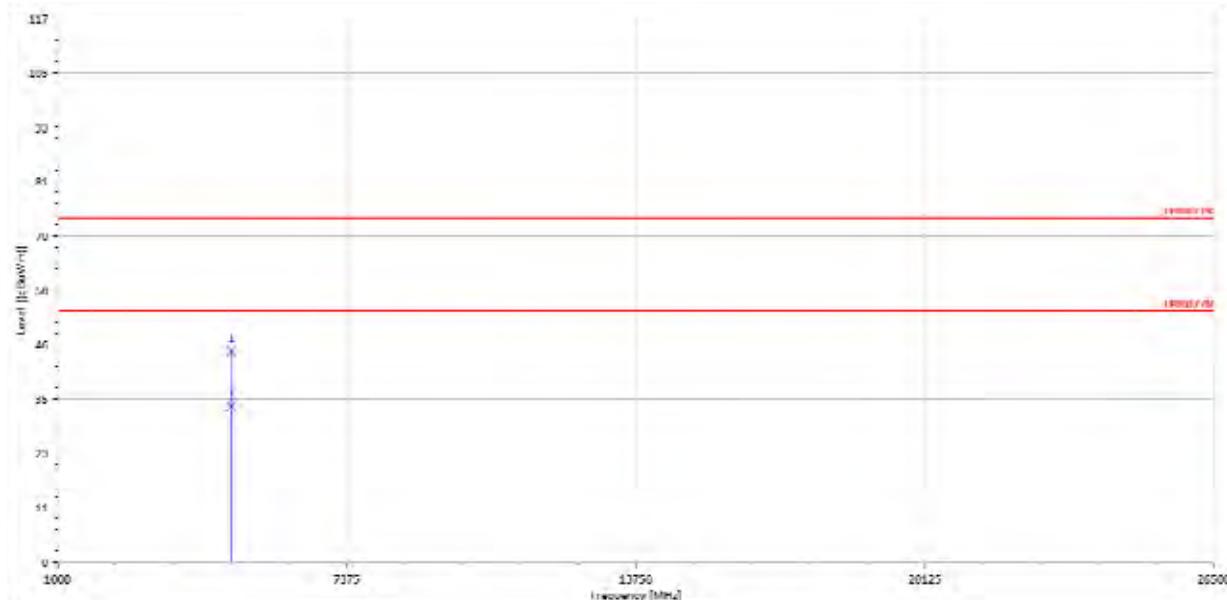
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Operation Band :802.11 n20M
Fundamental Frequency :2412 MHz
Operation Mode :TX LOW
EUT Pol. :H Plan

Test Date :2015-07-13
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Peak	22.56				
4829.00	H	Peak	34.38	10.96	45.34	74	-28.66	
4829.00	H	Average	22.56	10.96	33.52	54	-20.48	

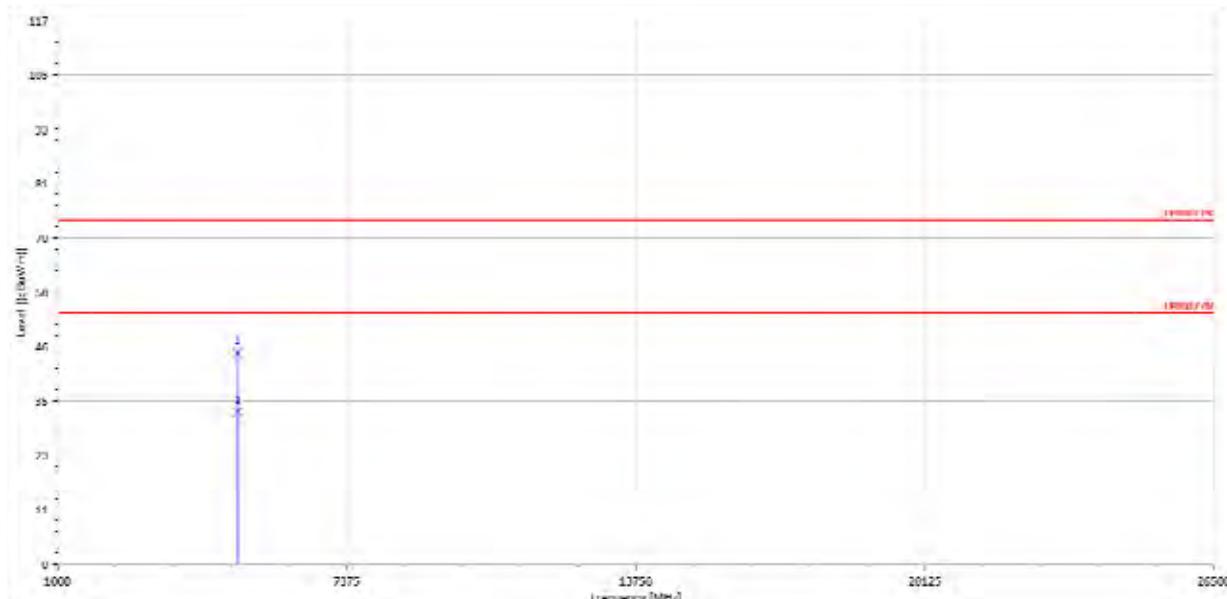
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Operation Band :802.11 n20M
 Fundamental Frequency :2437 MHz
 Operation Mode :TX MID
 EUT Pol. :H Plan

Test Date :2015-07-13
 Temp./Humi. :21 deg_C / 61 RH
 Engineer :Vito
 Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			PK/QP/AV	dBµV				
4976.00	H	Peak		34.40	10.94	45.34	74	-28.66
4976.00	H	Average		21.74	10.94	32.68	54	-21.32

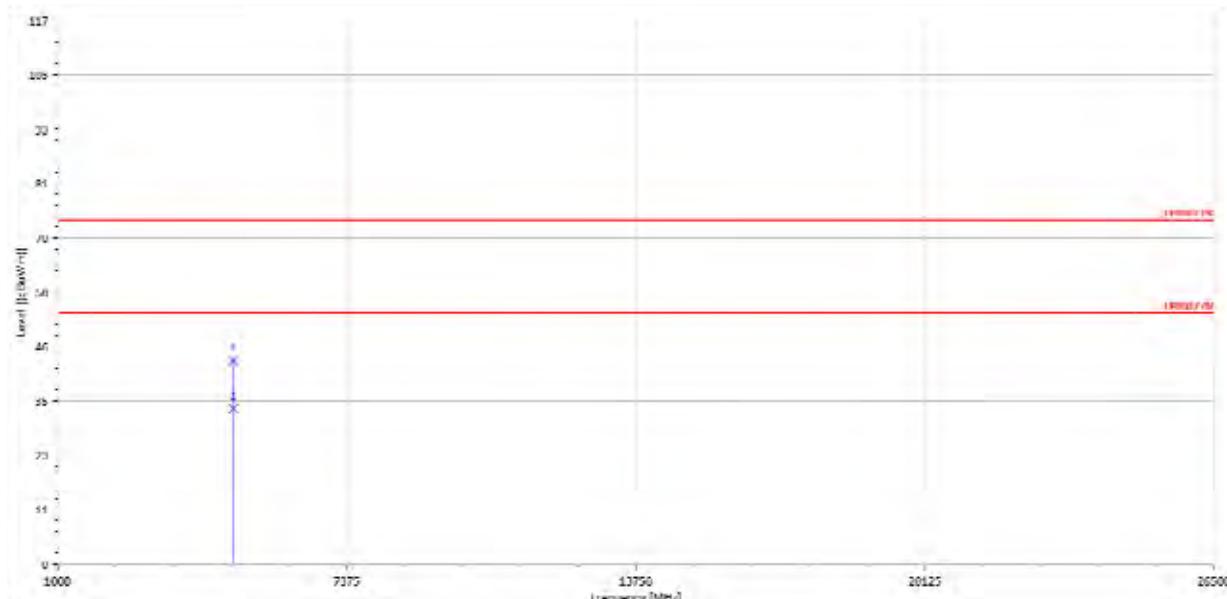
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Operation Band :802.11 n20M
Fundamental Frequency :2437 MHz
Operation Mode :TX MID
EUT Pol. :H Plan

Test Date :2015-07-13
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			PK/QP/AV	dBµV				
4874.00	H	Peak		33.04	10.89	43.92	74	-30.08
4874.00	H	Average		22.55	10.89	33.44	54	-20.56

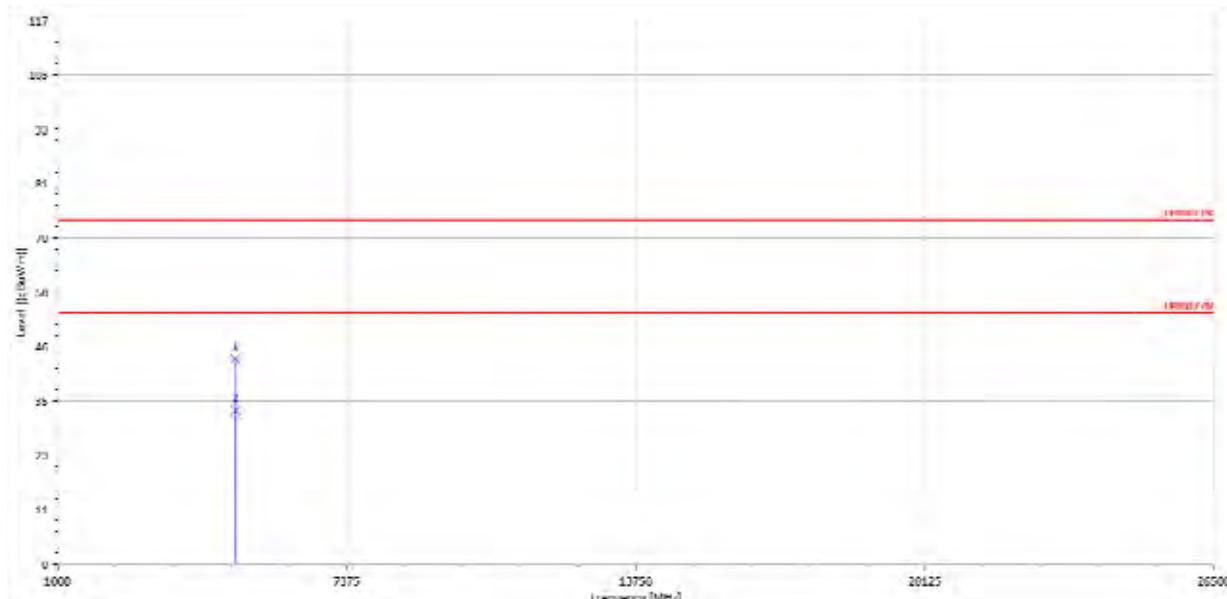
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Operation Band :802.11 n20M
Fundamental Frequency :2462 MHz
Operation Mode :TX HIGH
EUT Pol. :H Plan

Test Date :2015-07-13
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Peak	22.02				
4924.00	H	Peak	33.20	10.98	44.18	74	-29.82	
4924.00	H	Average	22.02	10.98	33.00	54	-21.00	

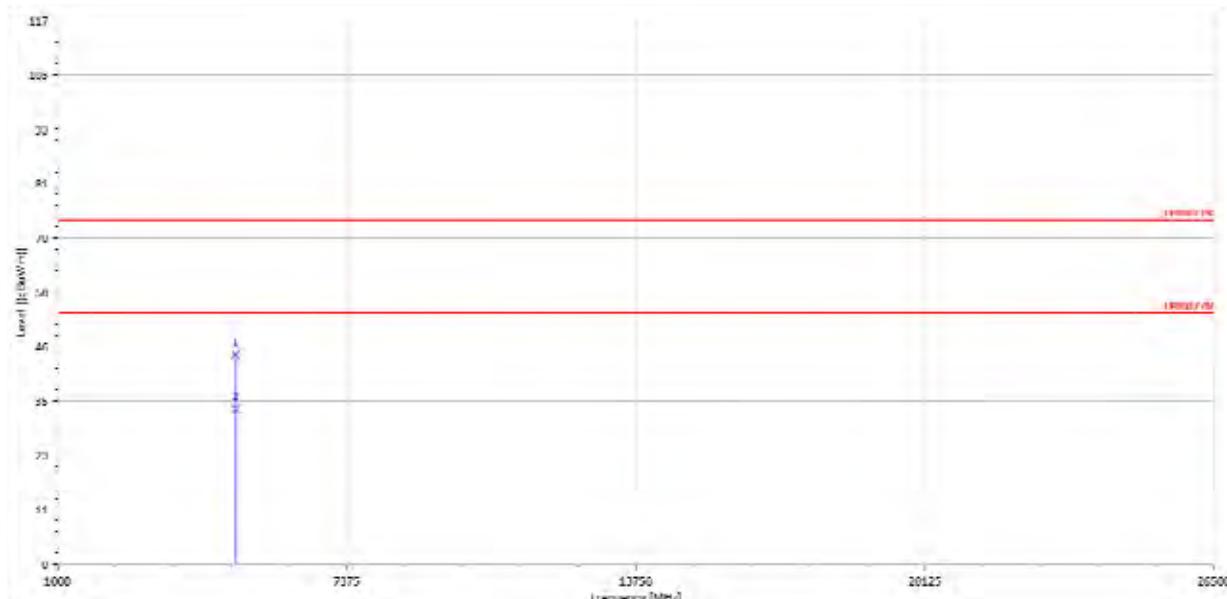
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Operation Band :802.11 n20M
Fundamental Frequency :2462 MHz
Operation Mode :TX HIGH
EUT Pol. :H Plan

Test Date :2015-07-13
Temp./Humi. :21 deg_C / 61 RH
Engineer :Vito
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Peak	22.37				
4927.00	H	Peak	34.07	10.98	45.05	74	-28.95	
4927.00	H	Average	22.37	10.98	33.35	54	-20.65	

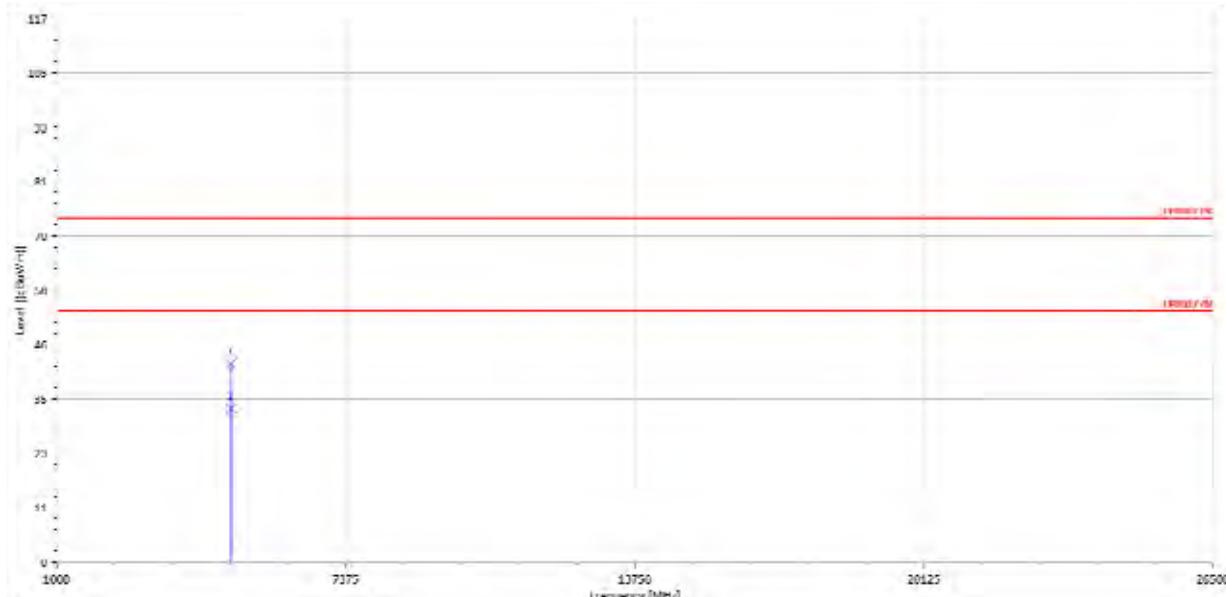
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Radiated Spurious Emission Measurement Result (802.11_HT40) (MIMO)

Operation Band :802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2422 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :TX LOW Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



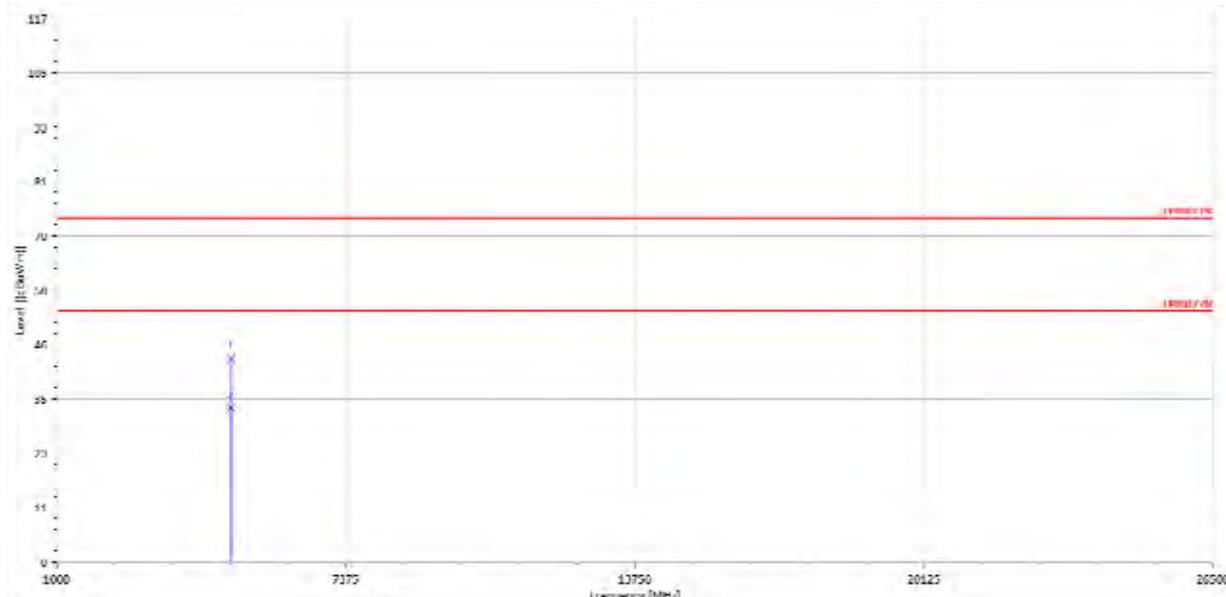
Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Reading				
		PK/QP/AV	Level dBµV				
4844.00	H	Peak	31.74	10.93	42.68	74	-31.32
4844.00	H	Average	22.09	10.93	33.02	54	-20.98

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Operation Band :802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2422 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :TX LOW Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL



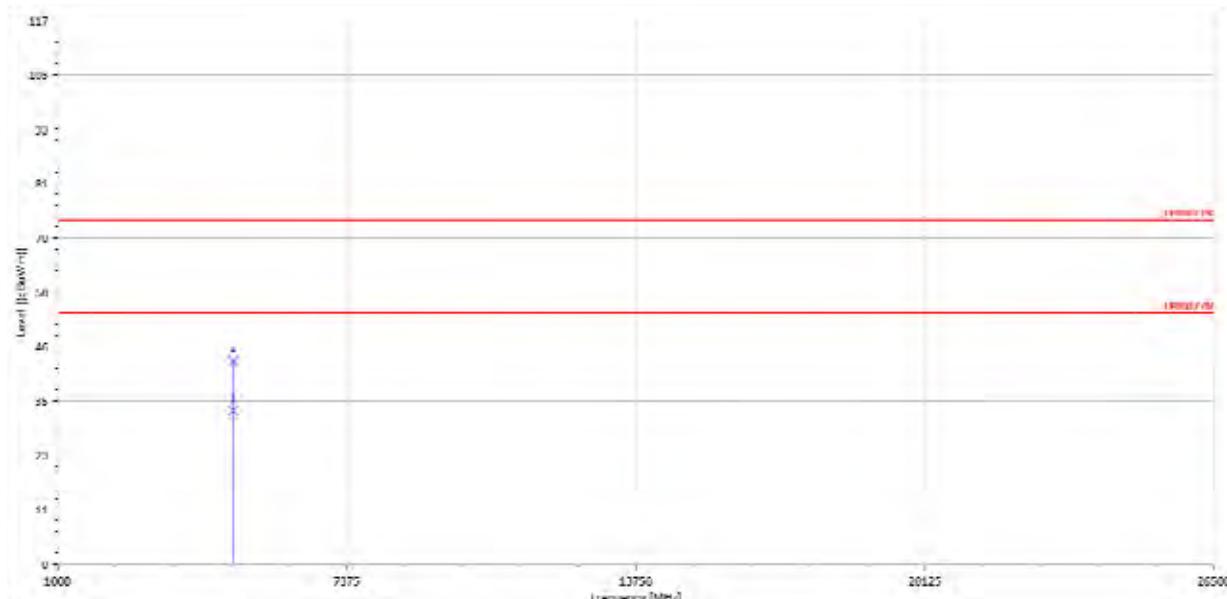
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Peak	22.23				
4844.00	H	Peak	32.82	10.93	43.75	74	-30.25	
4844.00	H	Average	22.23	10.93	33.16	54	-20.84	

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Operation Band :802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2437 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :TX MID Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



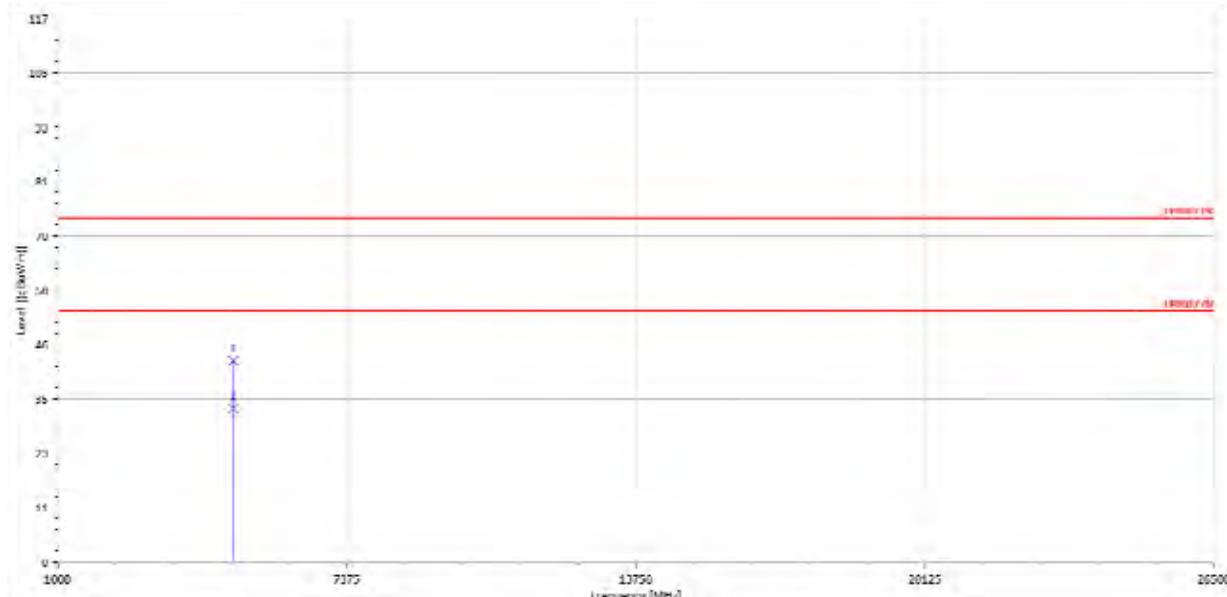
Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			PK/QP/AV	dBµV				
4874.00	H	Peak		32.72	10.89	43.60	74	-30.40
4874.00	H	Average		22.04	10.89	32.93	54	-21.07

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Operation Band :802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2437 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :TX MID Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL



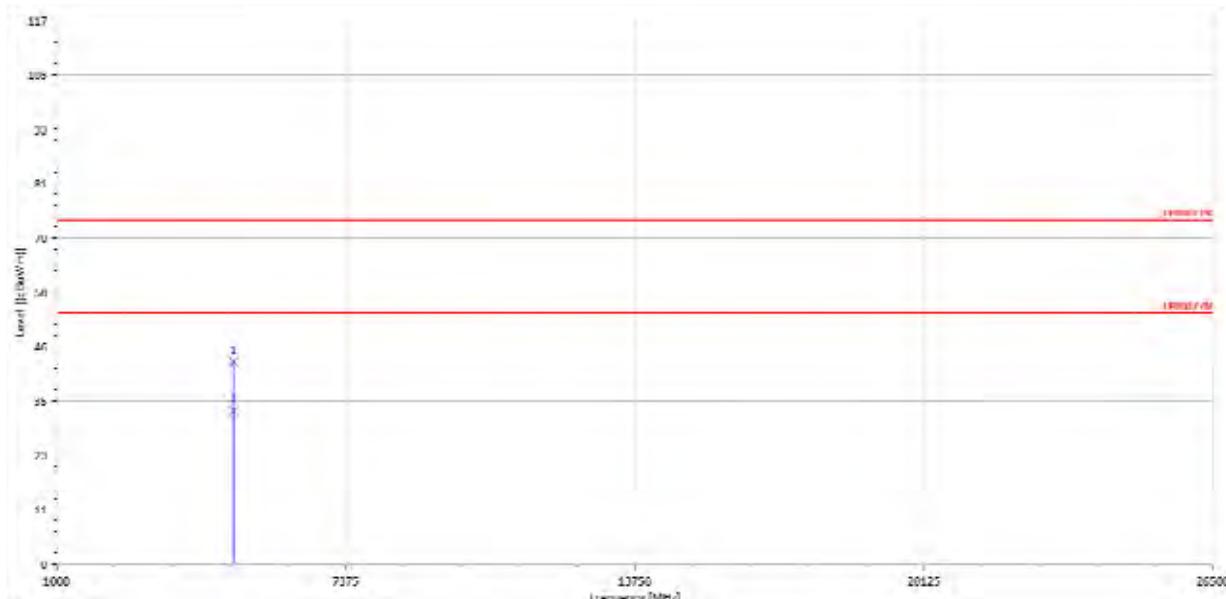
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Peak	22.14				
4874.00	H	Peak	32.38	10.89	43.27	74	-30.73	
4874.00	H	Average	22.14	10.89	33.03	54	-20.97	

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Operation Band :802.11 n40M Test Date :2015-07-13
 Fundamental Frequency :2452 MHz Temp./Humi. :21 deg_C / 61 RH
 Operation Mode :TX HIGH Engineer :Vito
 EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



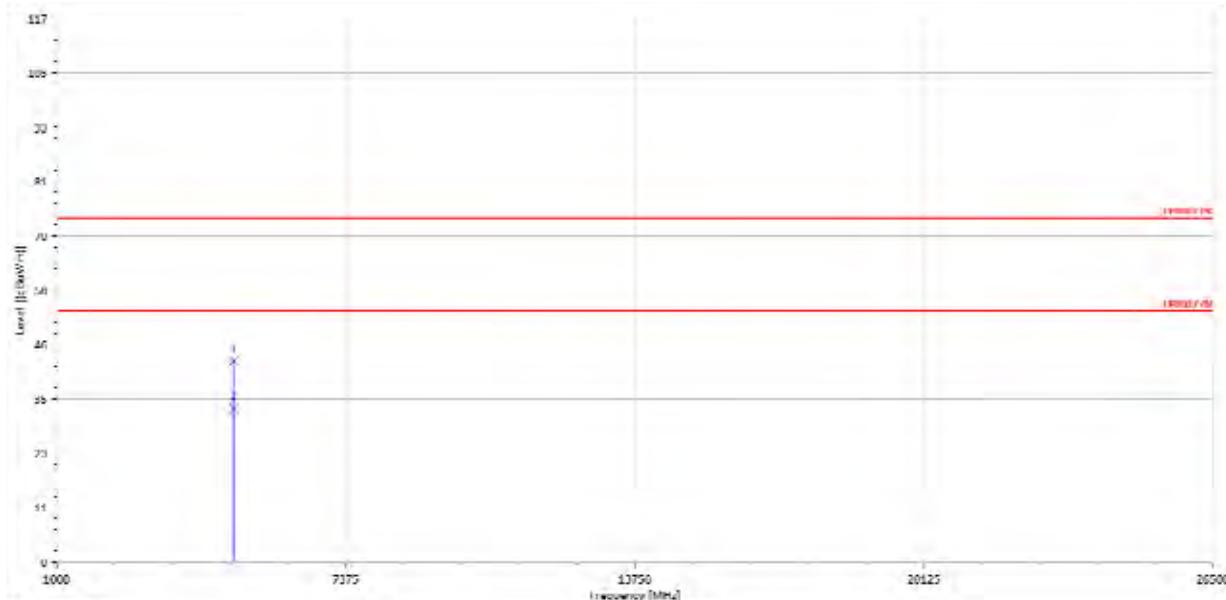
Freq. MHz	Note F/H/E/S	Detector Mode	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			PK/QP/AV	dBµV				
4904.00	H	Peak		32.50	10.98	43.48	74	-30.52
4904.00	H	Average		21.97	10.98	32.95	54	-21.05

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Operation Band :802.11 n40M Test Date :2015-07-13
Fundamental Frequency :2452 MHz Temp./Humi. :21 deg_C / 61 RH
Operation Mode :TX HIGH Engineer :Vito
EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level		Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
			Peak	22.13				
4904.00	H	Peak	32.27	10.98	43.24	74	-30.76	
4904.00	H	Average	22.13	10.98	33.11	54	-20.89	

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12 PEAK POWER SPECTRAL DENSITY

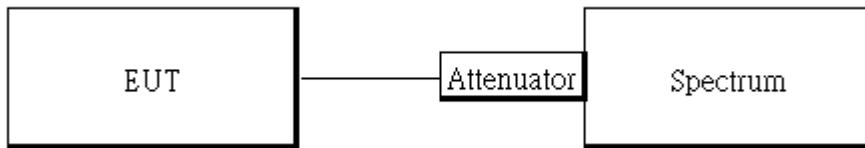
12.1 Standard Applicable

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

12.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

12.3 Test Set-up



12.4 Measurement Procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance V03r03.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 3 kHz.
5. Set the VBW = 10 kHz.
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level.

11. 802.11n MIMO mode: offset is set following “measure and add 10 Log (N)” on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=2 for this given application.

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Note: For the test of PSD at MIMO mode, the highest emission of worst case employing Measure and add 10 log (N) technical is reported on this report after the comparison between Main Antenna at single transmitting mode and Aux that yields the higher value. . The single transmitting mode is only reported measurement that produces higher value of outcome.

Note: The antenna gain is greater than 6 dBi in MIMO mode the limit reduce as below:

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain (dBi) = 3.50+3.01=6.51dBi

Limit: 8dBm – (6.51 – 6dBi) = 7.49dBm

12.5 Measurement Result

Frequency (MHz)	RF Power Density (dBm)	Maximum Limit (dBm)	Result
802.11b			
2412	-7.28	8	PASS
2437	-6.75	8	PASS
2462	-7.49	8	PASS
802.11g			
2412	-12.79	8	PASS
2437	-10.24	8	PASS
2462	-12.78	8	PASS
802.11n_HT20 (MIMO)			
2412	-12.23	7.49	PASS
2437	-11.53	7.49	PASS
2462	-11.54	7.49	PASS
802.11n_HT40 (MIMO)			
2422	-16.31	7.49	PASS
2437	-17.21	7.49	PASS
2452	-17.00	7.49	PASS

*Refer to next page for plots

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802.11b

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



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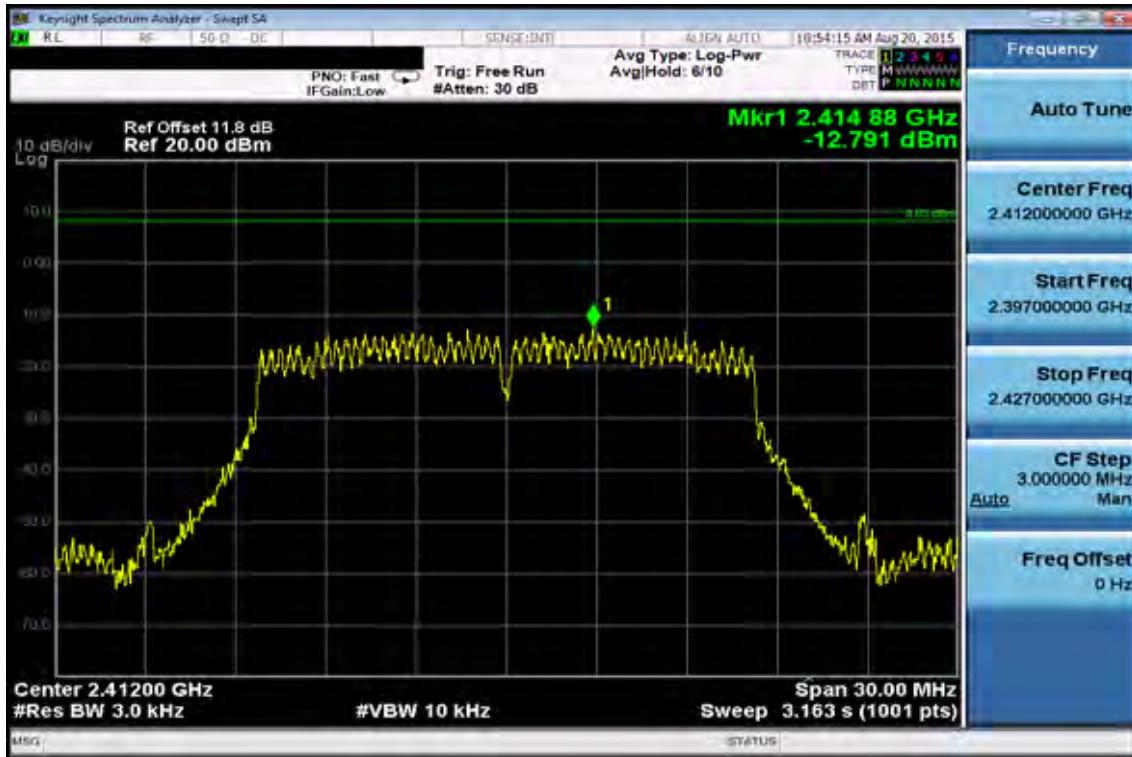
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Power Spectral Density Test Plot (CH-High)



802.11g

Power Spectral Density Test Plot (CH-Low)

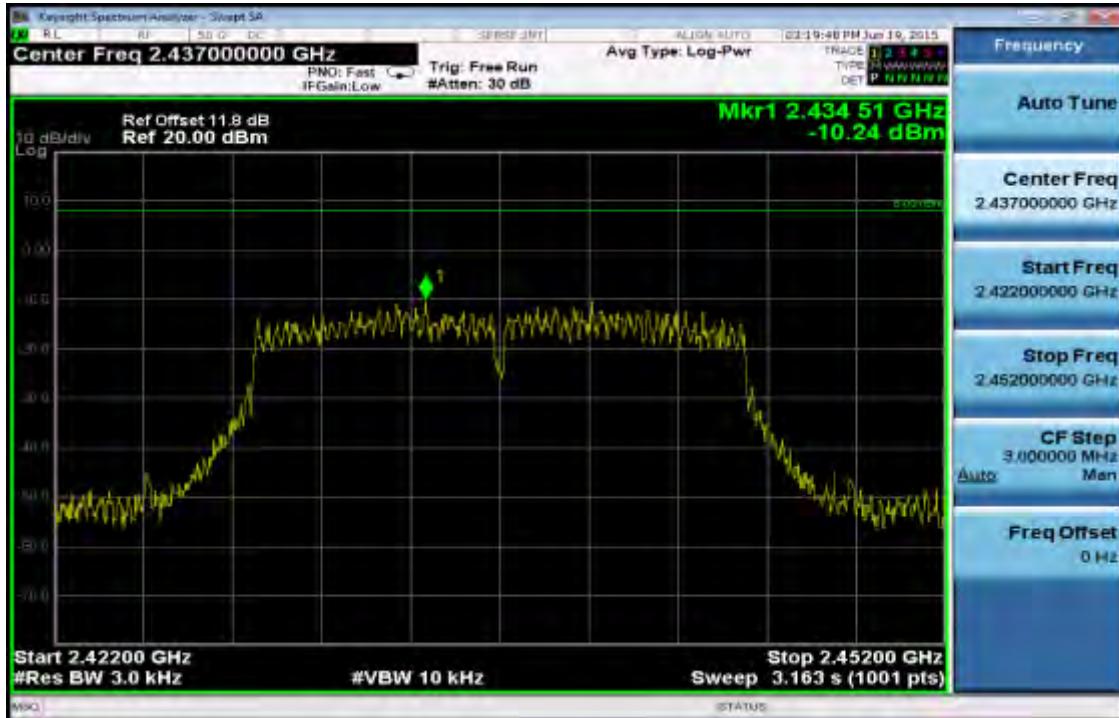


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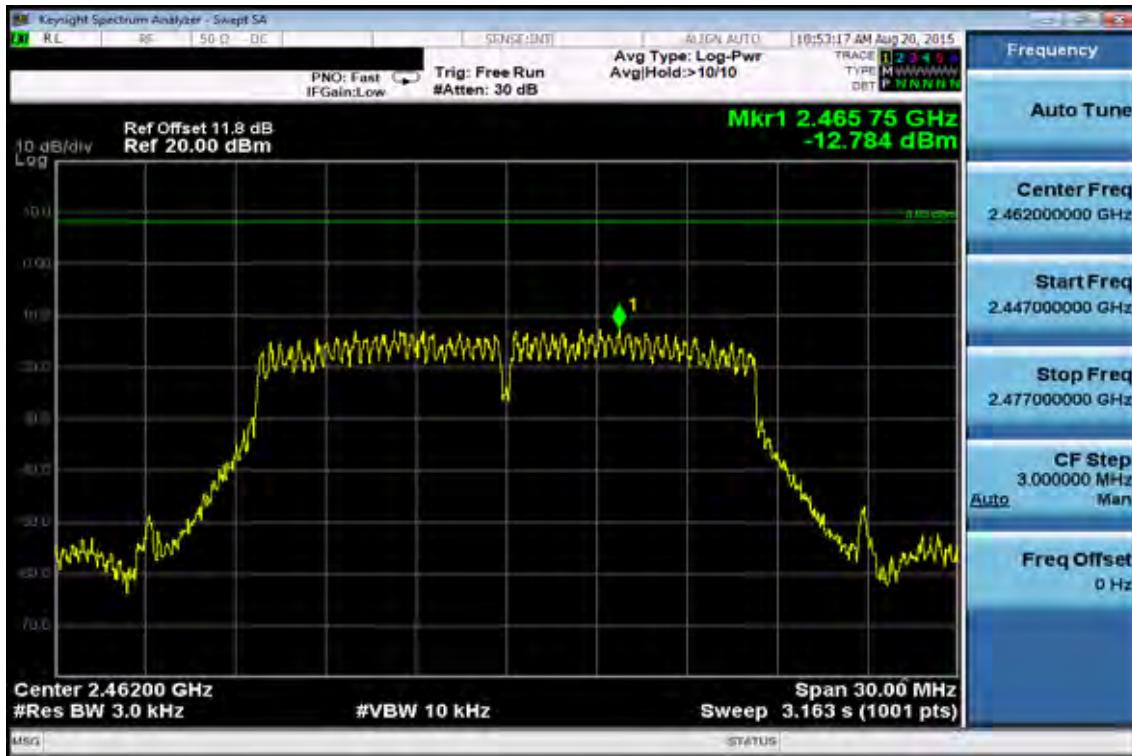
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Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



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802.11n_HT20 (MIMO)

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



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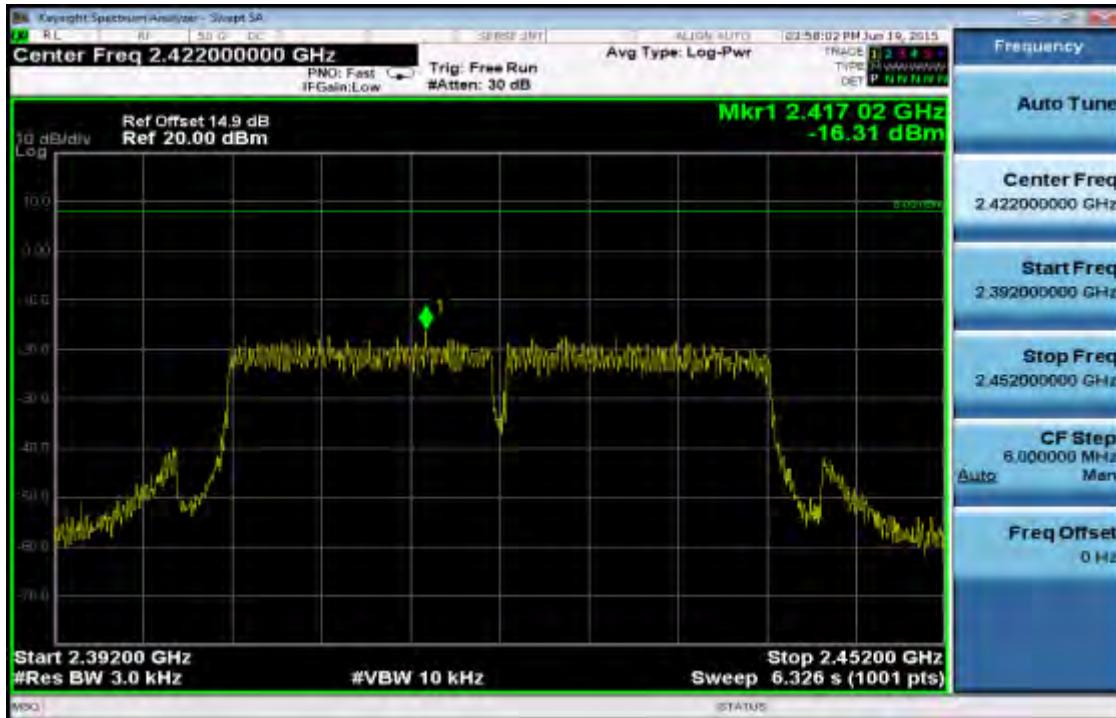
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Power Spectral Density Test Plot (CH-High)



802.11n_HT40 (MIMO)

Power Spectral Density Test Plot (CH-Low)



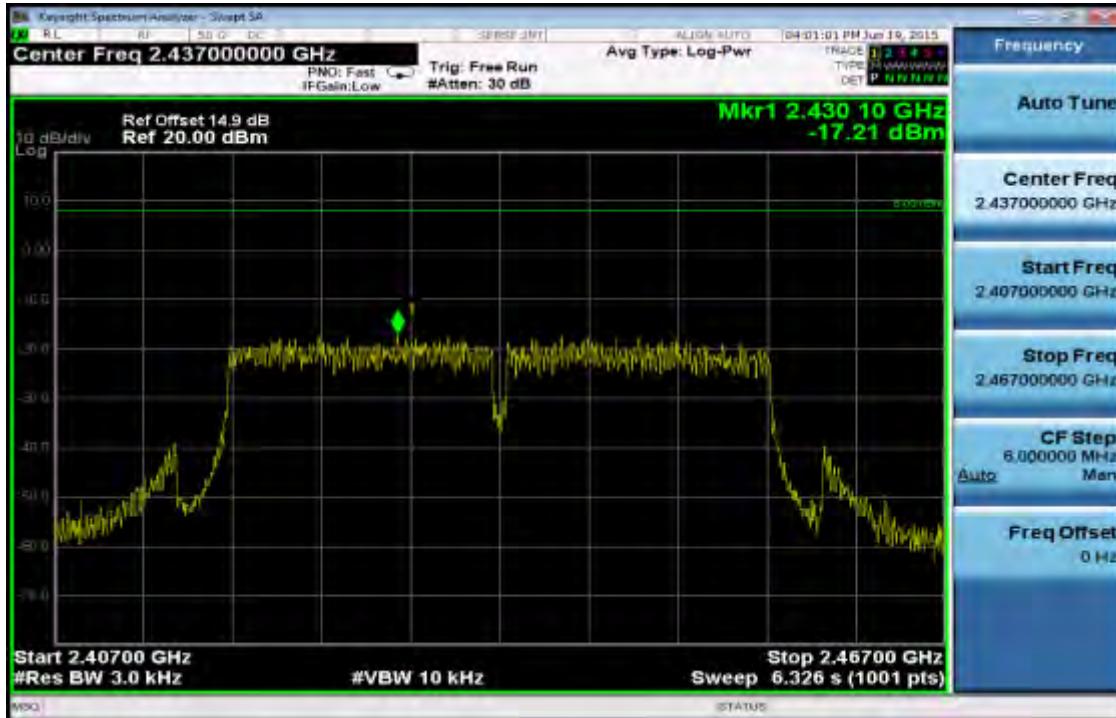
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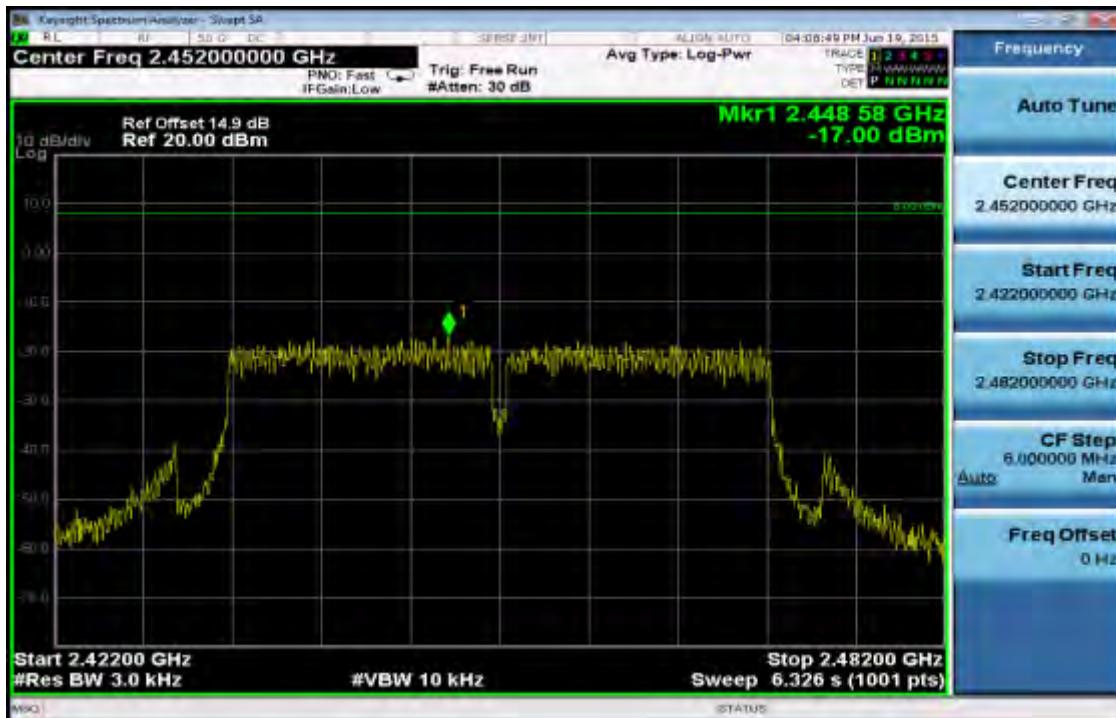
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Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



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13 ANTENNA REQUIREMENT

13.1 Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

According to RSS-GEN 8.3

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.⁹ When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

13.2 Antenna Connected Construction

An embedded-in antenna design is used.

The antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

The antenna gain is less than 6dBi. Therefore, it is not necessary to reduce maximum output power limit.

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