ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name:	**Tablet Computer**
Brand Name:	acer
Marketing Name:	**A3-A30**
Model No.:	**A5003**
Model Difference:	**N/A**
FCC ID:	**HLZA5003**
Report No.:	**E2/2015/20018**
Issue Date:	**Apr. 08, 2015**
FCC Rule Part:	**§15.247, Cat: DTS**
Prepared for:	**Acer Incorporated** **8F., No.88, Sec. 1, Hsintai 5th Rd., Hsichih, New Taipei City 22181, Taiwan (R.O.C.)**
Prepared by:	**SGS Taiwan Ltd.** **Electronics & Communication Laboratory** **No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333**

ilac-MRA TAF Testing Laboratory 0513	***Note:*** *This report shall not be reproduced except in full, without the written approval of SGS Taiwan Ltd. This document may be altered or revised by SGS Taiwan Ltd. personnel only, and shall be noted in the revision section of the document.*

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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:	acer
Marketing Name:	A3-A30
Model No.:	A5003
Model Difference:	N/A
FCC ID:	HLZA5003
File Number:	E2/2015/20018
Date of test:	Feb. 25, 2015 ~ Apr. 08, 2015
Date of EUT Received:	Feb. 25, 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:	Marcus Tseng	***Date***	Apr. 08, 2015
	Marcus Tseng / Engineer		
Prepared By:	Allen Tsai	***Date***	Apr. 08, 2015
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Revision History

Report Number	Revision	Description	Issue Date
E2/2015/20018	Rev.00	Initial creation of document	Apr. 08, 2015

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1 GENERAL INFORMATION

1.1 Product description

General:

Product Name:	Tablet Computer	
Brand Name:	acer	
Marketing Name:	A3-A30	
Model No.:	A5003	
Model Difference:	N/A	
Product SW/HW version:	Acer_AV0L0_A3-A30_RV01RZ01_WW_CUS1 / E0	
Radio SW/HW version:	1.5.1.2 / WCN3620	
Test SW Version:	1.5.1.2	
USB Cable	Model No.: 3080199058, Supplier: 坤記	
Power Supply:	3.8Vdc from Rechargeable Li-polymer Battery or 5.35V from AC/DC Adapter	
	Battery:	Model No.:AP14A4M, Supplier: SONY
	Adapter :	1. Model No.: PA-1100-25, Supplier: LITEON. 2. Model No.: ADP-10HW A, Supplier: DELTA.

WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology
11b/g	2412-2462	11	b: 18.01dBm g: 20.65dBm	DSSS, OFDM
11n	HT20 2412-2462	11	n: 20.10dBm	OFDM
Antenna Designation:	PCB Wire Antenna, Gain: 1.9dBi Model No.: QTNKFWIPB01+A, Supplier: Wgt Gain: 1.9dBi			
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 65Mbps			

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1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is mobile phone supporting, ,Wi-Fi 802.11abgn & ac, Bluetooth with NFC features, and below is details of information.

Product Feature	
Product Name:	Tablet Computer
Brand Name:	acer
Type No.:	A3-A30
Model Difference:	A5003
FCC ID	HLZA5003
Wi-Fi Specification	802.11a/b/g/n/ac
Bluetooth Version	V4.0 dual mode + HS
NFC Specification	NFC

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 V03r02

FCC KDB 662311 D01 Multiple Transmitter Output V02r01

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 the certification 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.

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 a placed on as 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 §15.107. 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 a placed on as turn table which is 0.8 m above ground plane. 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 1.4 dB and 10 dB attenuator.

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Configuration of Tested System

Fig. 2-1 Radiated Emission

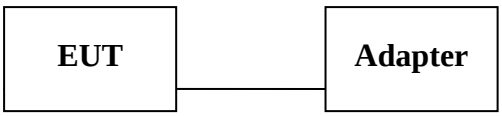

Fig. 2-2 Conducted (Antenna Port) Configuration

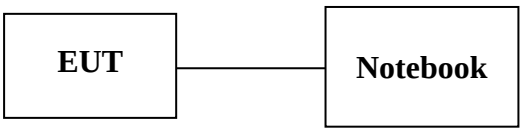

Table 2-1 Equipment Used in Tested System

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.	Notebook	Lenovo	L430	R9-YYG88	Shield	Un-shield

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Fig. 2-3 AC Power Line Conducted Emission

Table 2-2 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

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3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.247(d)	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.203 §15.247(b)	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		

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	MAIN
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	MAIN
802.11g	1 to 11	1, 6, 11	OFDM	6	MAIN
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 0	MAIN

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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 E2 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	MAIN
802.11g	1 to 11	1, 6, 11	OFDM	6	MAIN
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 0	MAIN

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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	+/- 1.55 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 3	101311	06/20/2014	06/19/2015
LISN	Schwarzbeck	NSLK 8127	8127-648	06/10/2014	06/09/2015
LISN	Rolf-Heine	NNB-2/16Z	99012	03/04/2015	03/03/2016
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	01/06/2015	01/07/2016

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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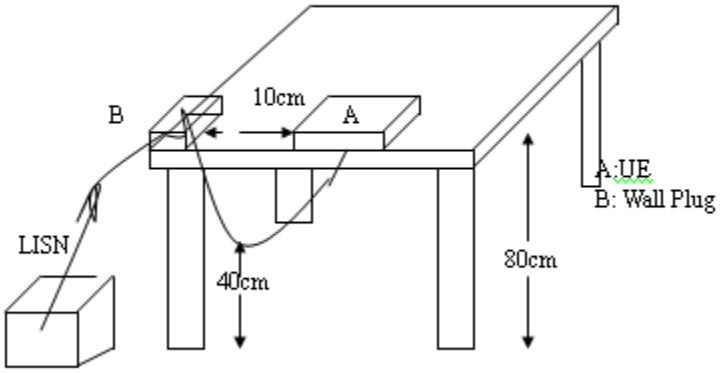
6.4 Test SET-UP (Block Diagram of Configuration)



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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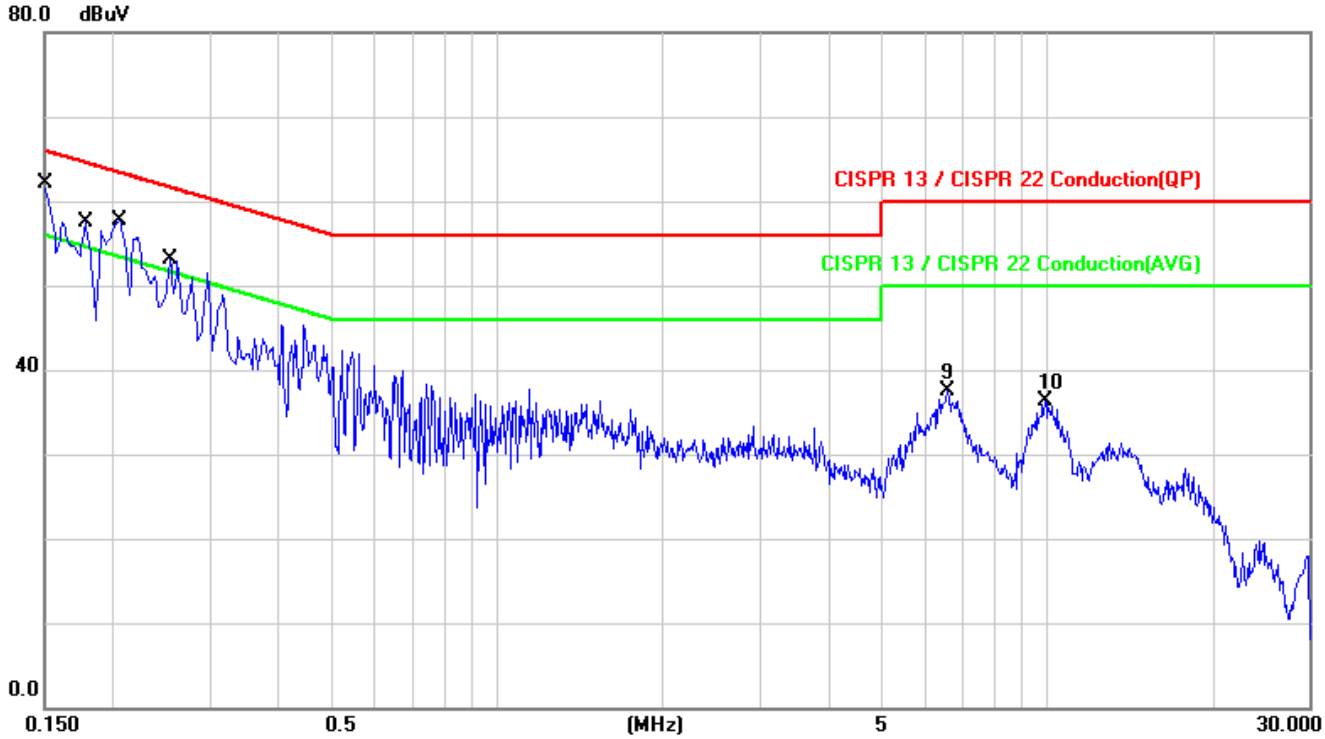
AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test Date:	Mar. 26, 2015
Temperature:	21 ℃	Humidity:	70 %	Test By:	Vito
Model No.:	PA-1100-25				
Phase:	L1				



No.	Mk.	Freq. (MHz)	Reading dBuV	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1	*	0.1516	54.40	0.12	54.52	65.91	-11.39	QP	
2		0.1516	38.70	0.12	38.82	55.91	-17.09	AVG	
3		0.1780	49.90	0.12	50.02	64.58	-14.56	QP	
4		0.1780	35.40	0.12	35.52	54.58	-19.06	AVG	
5		0.2060	50.80	0.12	50.92	63.37	-12.45	QP	
6		0.2060	37.30	0.12	37.42	53.37	-15.95	AVG	
7		0.2540	45.20	0.12	45.32	61.63	-16.31	QP	
8		0.2540	30.40	0.12	30.52	51.63	-21.11	AVG	
9		6.6020	37.11	0.32	37.43	60.00	-22.57	peak	
10		9.9580	35.91	0.40	36.31	60.00	-23.69	peak	

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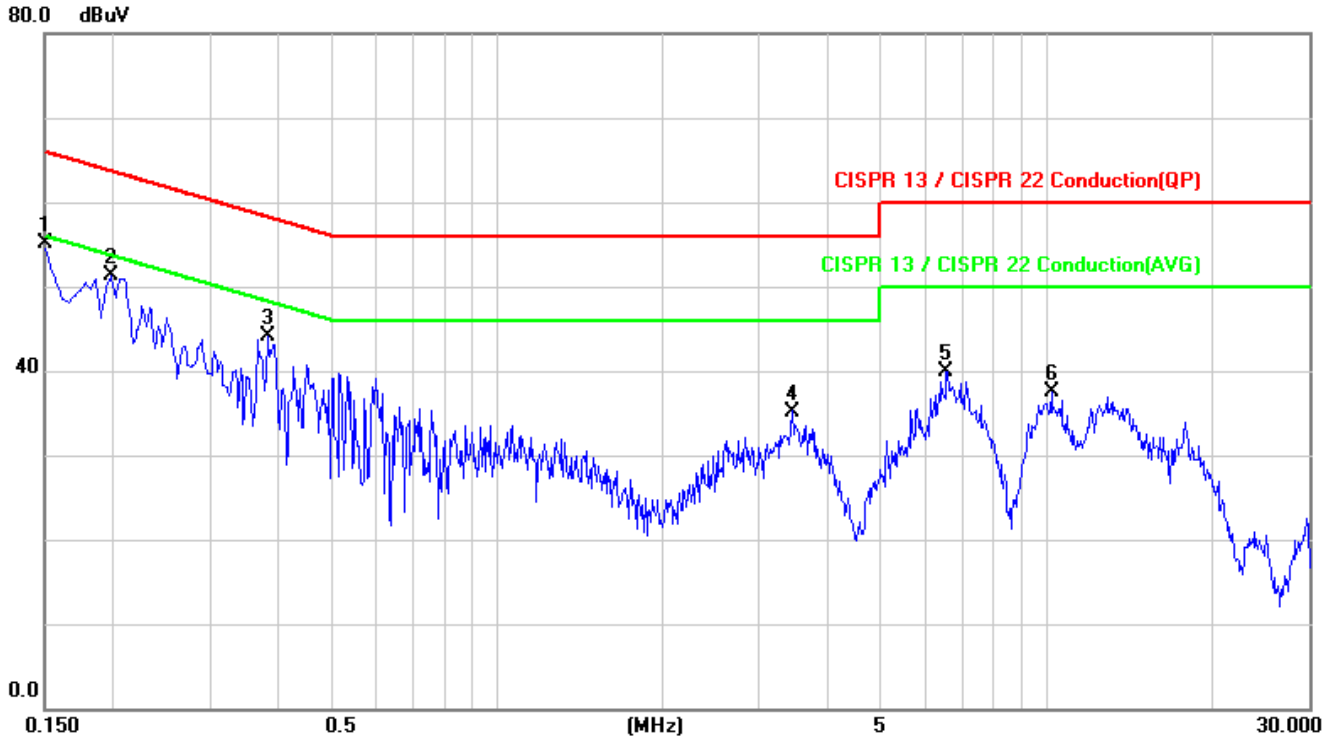
Operation Mode:	Operation mode			Test Date:	Mar. 26, 2015
Temperature:	21 ℃	Humidity:	70 %	Test By:	Vito
Model No.:	PA-1100-25				
Phase:	N				



No.	Mk.	Freq. (MHz)	Reading dBuV	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1	*	0.1500	54.98	0.12	55.10	66.00	-10.90	peak	
2		0.1980	51.17	0.12	51.29	63.69	-12.40	peak	
3		0.3820	44.01	0.12	44.13	58.24	-14.11	peak	
4		3.4420	34.97	0.23	35.20	56.00	-20.80	peak	
5		6.5700	39.54	0.32	39.86	60.00	-20.14	peak	
6		10.2220	37.06	0.40	37.46	60.00	-22.54	peak	

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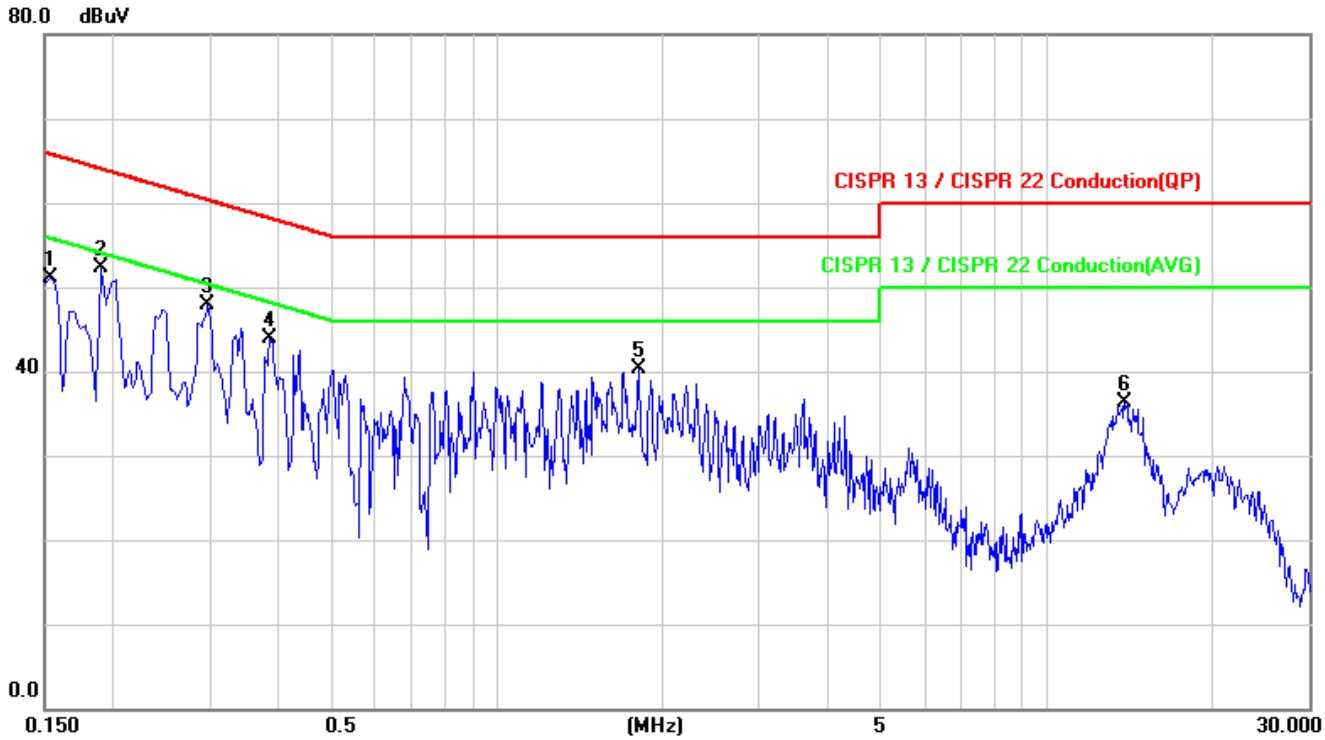
Operation Mode:	Operation mode			Test Date:	Mar. 26, 2015
Temperature:	21 ℃	Humidity:	70 %	Test By:	Vito
Model No.:	ADP-10HW				
Phase:	L1				



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		(MHz)	dBuV	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1540	51.09	0.05	51.14	65.78	-14.64	peak	
2	*	0.1900	52.36	0.04	52.40	64.04	-11.64	peak	
3		0.2980	47.91	0.08	47.99	60.30	-12.31	peak	
4		0.3860	43.70	0.12	43.82	58.15	-14.33	peak	
5		1.8100	39.79	0.49	40.28	56.00	-15.72	peak	
6		13.8420	35.89	0.37	36.26	60.00	-23.74	peak	

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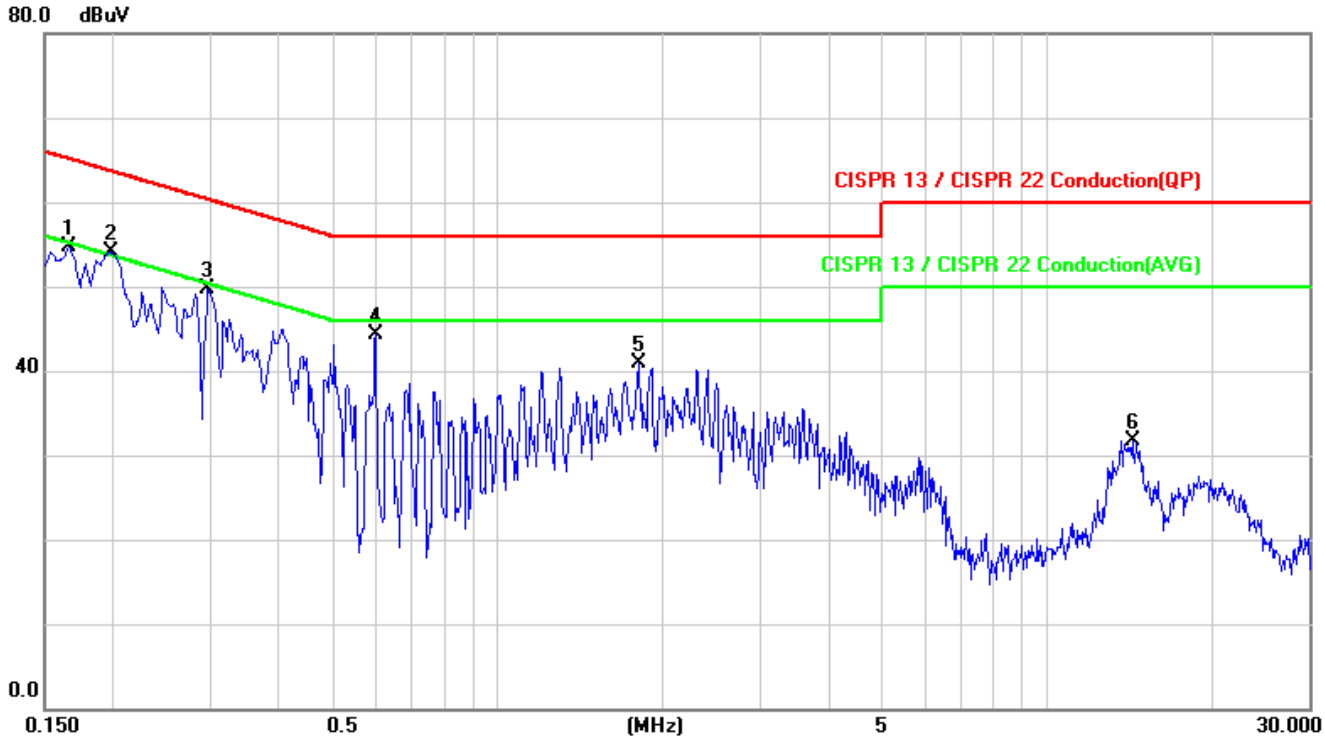
Operation Mode:	Operation mode			Test Date:	Mar. 26, 2015
Temperature:	21 ℃	Humidity:	70 %	Test By:	Vito
Model No.:	ADP-10HW				
Phase:	N				



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		(MHz)	dBuV	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1660	54.71	0.05	54.76	65.16	-10.40	peak	
2	*	0.1980	54.01	0.04	54.05	63.69	-9.64	peak	
3		0.2980	49.53	0.08	49.61	60.30	-10.69	peak	
4		0.6020	44.17	0.21	44.38	56.00	-11.62	peak	
5		1.8100	40.47	0.49	40.96	56.00	-15.04	peak	
6		14.3260	31.45	0.35	31.80	60.00	-28.20	peak	

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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:

Duty Cycle = Ton / (Ton+Toff)

Measurement Procedure:

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

Duty Cycle:

	Duty Cycle	Duty Fator (dB)
802.11b	94.10 %	0.26
802.11g	93.30 %	0.30
802.11n_20	92.90 %	0.32

Duty Cycle Factor: 10 * log (1/0.941) = 0.26
Duty Cycle Factor: 10 * log (1/0.933) = 0.30
Duty Cycle Factor: 10 * log (1/0.929) = 0.32

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7 DUTY CYCLE TEST SIGNAL Measurement Result

802.11 b

802.11 g

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802.11 n_20 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 form 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.

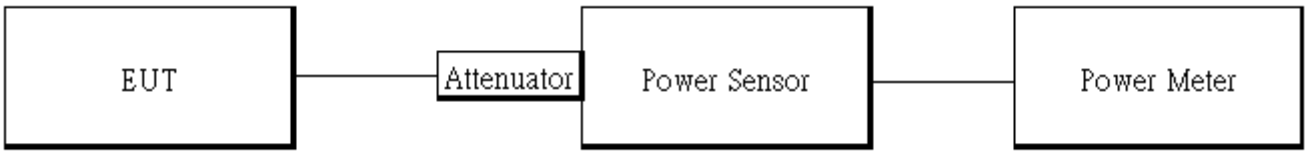
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

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	06/21/2014	06/20/2015
Power Sensor	Anritsu	MA2411B	1315048	06/21/2014	06/20/2015
DC Block	PASTERNACK	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:



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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 V03r02.
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. Repeat above procedures until all frequency of interest measured was complete.

8.5 Measurement Result

802.11b

CH	Frequency (MHz)	DATA RATE	Peak Output Power		REQUIRED LIMIT (dBm)	RESULT
			TOTAL POWER (dBm)	TOTAL POWER (mW)		
1	2412	1	17.24	52.966	1 W = 30 dBm	PASS
6	2437	1	17.66	58.345	1 W = 30 dBm	PASS
11	2462	1	**18.01**	**63.241**	1 W = 30 dBm	PASS

CH	Frequency (MHz)	DATA RATE	Avg. Output Power		REQUIRED LIMIT (dBm)	RESULT
			TOTAL POWER (dBm)	TOTAL POWER (mW)		
1	2412	1	14.01	25.177	1 W = 30 dBm	PASS
6	2437	1	14.22	26.424	1 W = 30 dBm	PASS
11	2462	1	14.42	27.669	1 W = 30 dBm	PASS

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802.11g

CH	Frequency (MHz)	DATA RATE	Peak Output Power		REQUIRED LIMIT (dBm)	RESULT
			TOTAL POWER (dBm)	TOTAL POWER (mW)		
1	2412	6	20.38	109.144	1 W = 30 dBm	PASS
6	2437	6	20.43	110.408	1 W = 30 dBm	PASS
11	2462	6	**20.65**	**116.145**	1 W = 30 dBm	PASS

CH	Frequency (MHz)	DATA RATE	Avg. Output Power		REQUIRED LIMIT (dBm)	RESULT
			TOTAL POWER (dBm)	TOTAL POWER (mW)		
1	2412	6	13.58	22.803	1 W = 30 dBm	PASS
6	2437	6	13.52	22.491	1 W = 30 dBm	PASS
11	2462	6	13.74	23.659	1 W = 30 dBm	PASS

802.11n_HT20

CH	Frequency (MHz)	DATA RATE	Peak Output Power		REQUIRED LIMIT (dBm)	RESULT
			TOTAL POWER (dBm)	TOTAL POWER (mW)		
1	2412	6	19.62	91.622	1 W = 30 dBm	PASS
6	2437	6	19.90	97.724	1 W = 30 dBm	PASS
11	2462	6	**20.10**	**102.329**	1 W = 30 dBm	PASS

CH	Frequency (MHz)	DATA RATE	Avg. Output Power		REQUIRED LIMIT (dBm)	RESULT
			TOTAL POWER (dBm)	TOTAL POWER (mW)		
1	2412	6	12.53	17.906	1 W = 30 dBm	PASS
6	2437	6	12.71	18.664	1 W = 30 dBm	PASS
11	2462	6	12.91	19.543	1 W = 30 dBm	PASS

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

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9 6dB BANDWIDTH

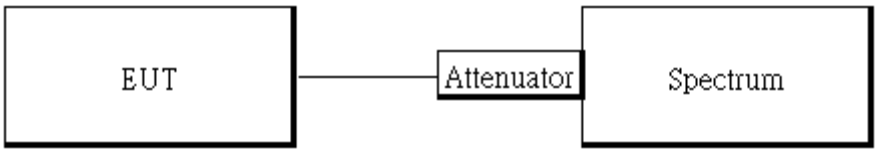
9.1 Standard Applicable

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	PASTERNACK	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 V03r02.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency of interest measured was complete.

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9.5 Measurement Result

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
802.11b			
2412	8238	> 500	PASS
2437	7843	> 500	PASS
2462	7557	> 500	PASS
802.11g			
2412	16370	> 500	PASS
2437	16360	> 500	PASS
2462	16360	> 500	PASS
802.11n_HT20			
2412	17610	> 500	PASS
2437	17610	> 500	PASS
2462	17610	> 500	PASS

** Note: The arrow "->" reveals X decibel level*

**Refer to next page for plots*

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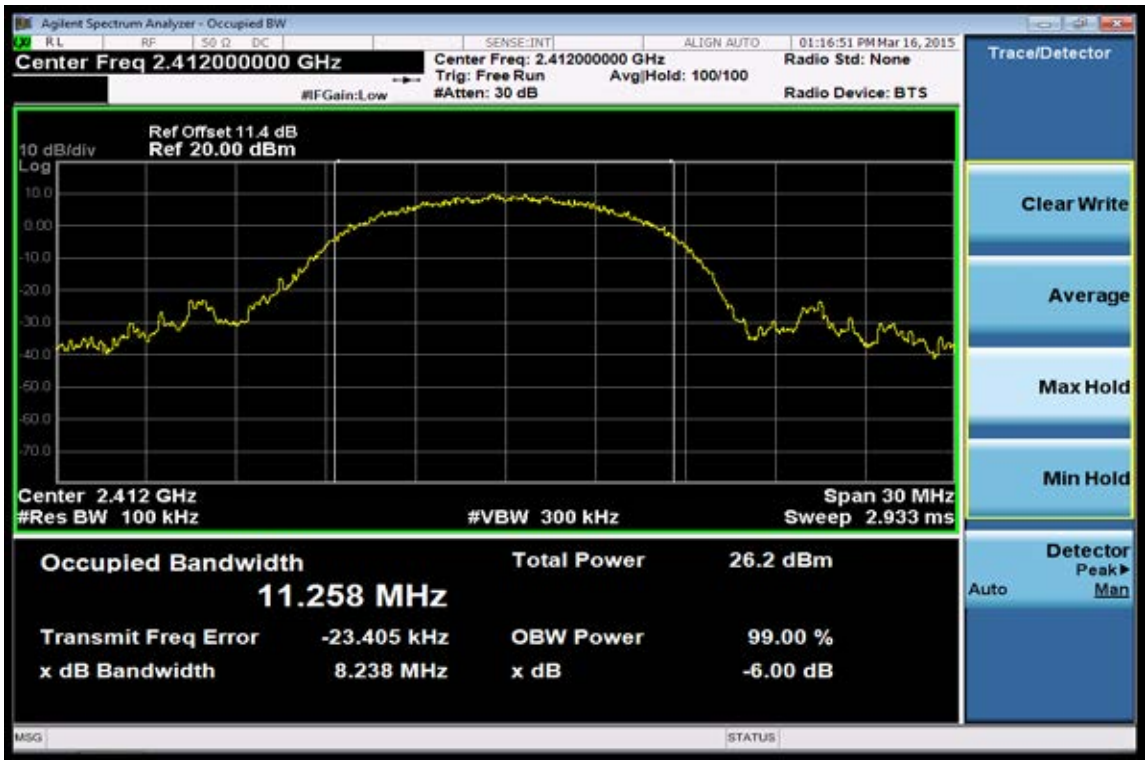
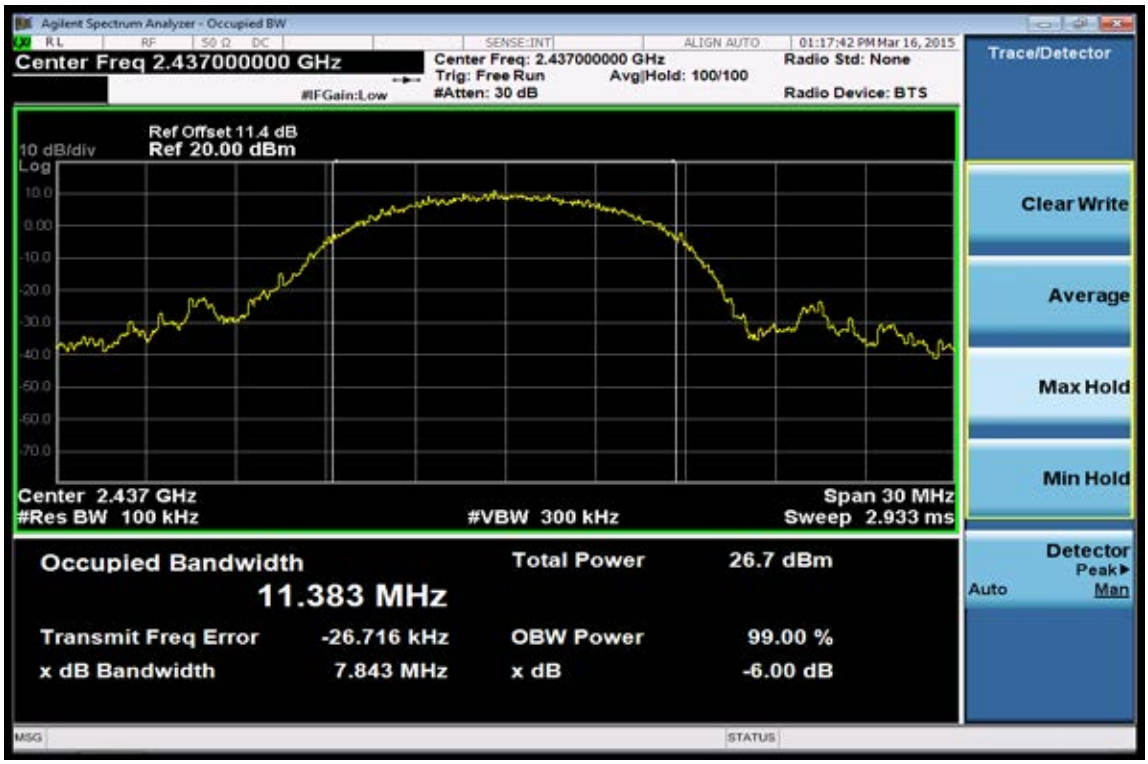
802.11b

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



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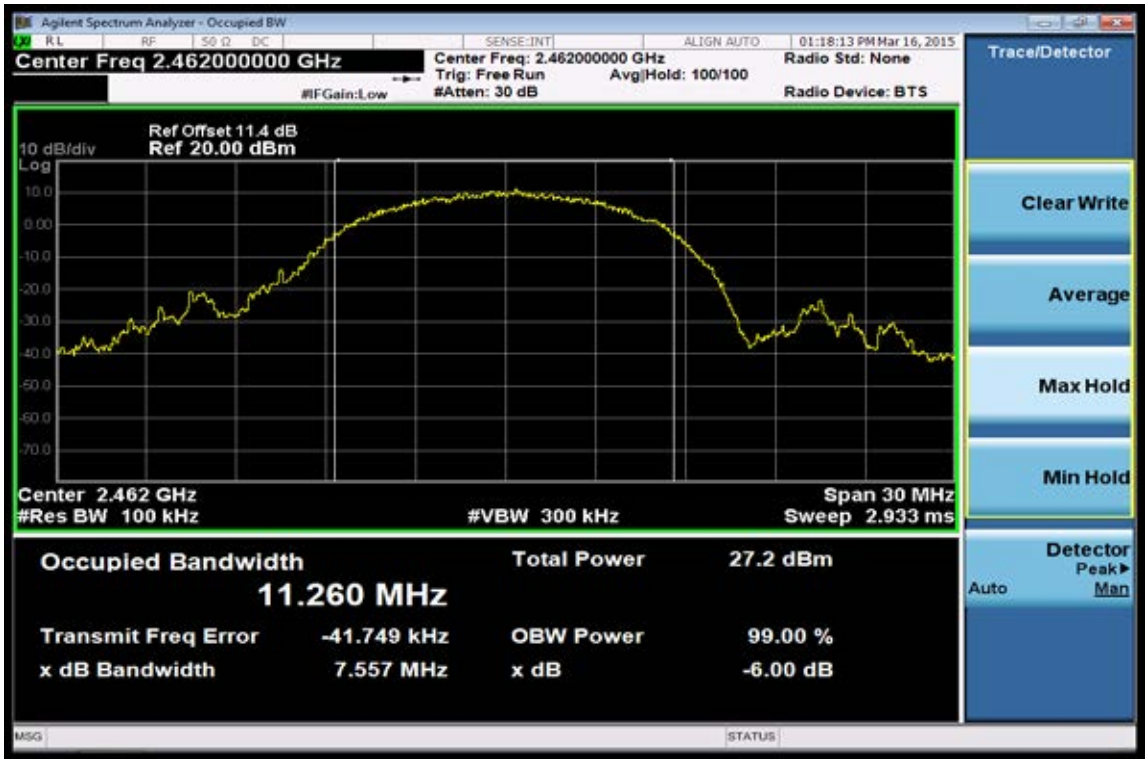
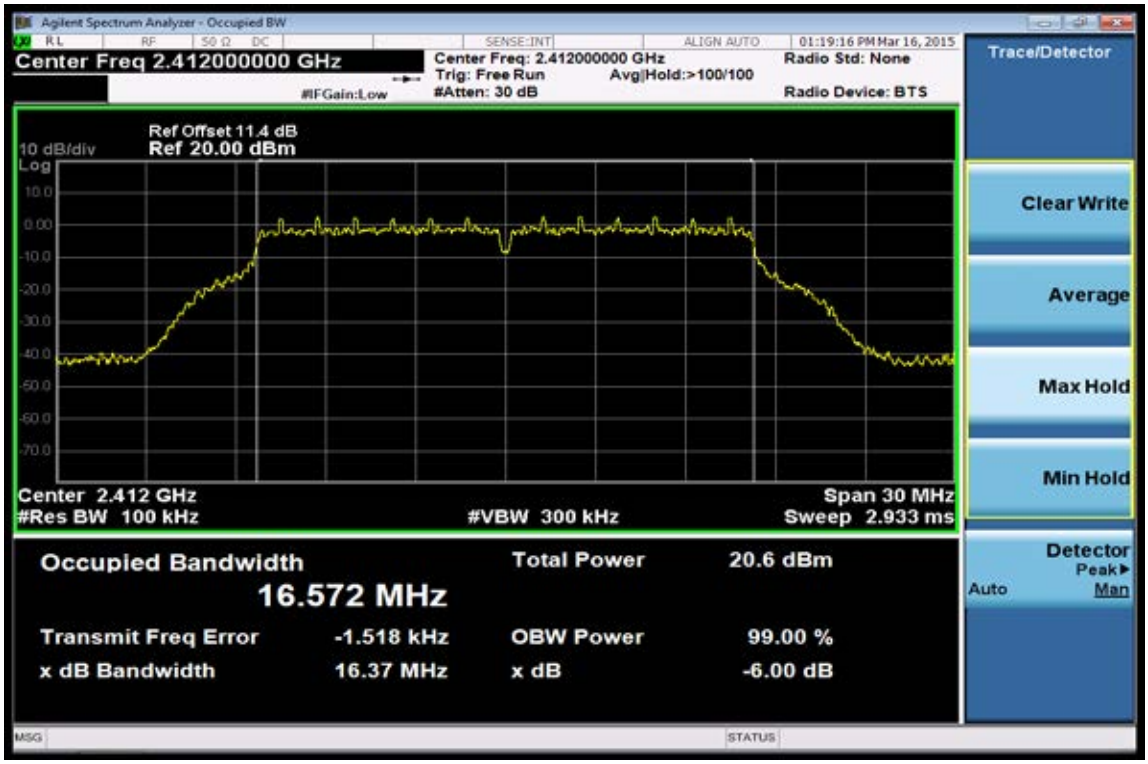
6dB Band Width Test Data CH-High



802.11g

6dB Band Width Test Data CH-Low



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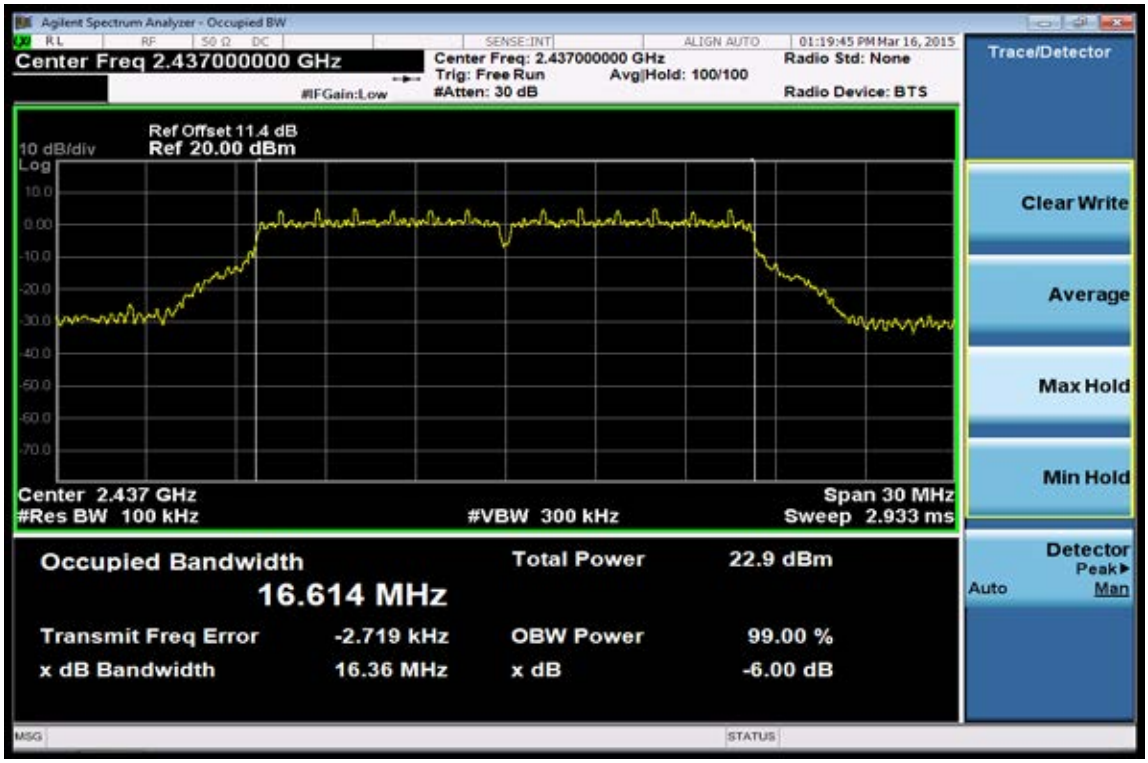
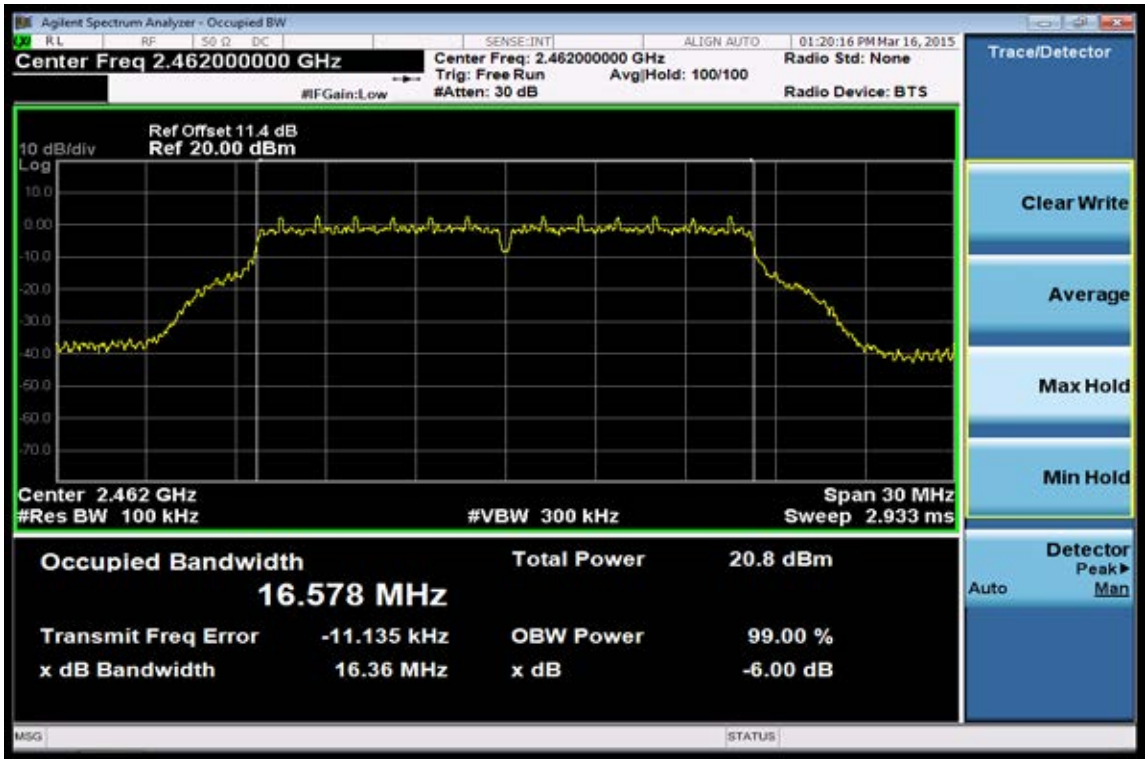
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



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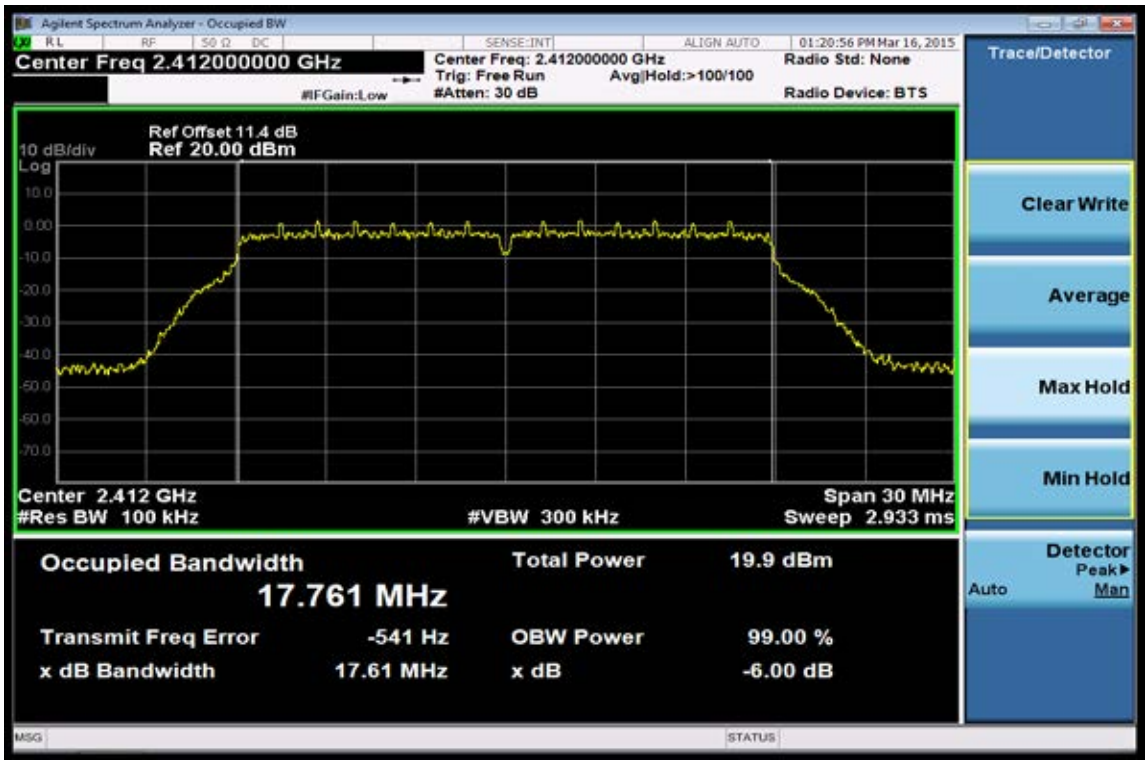
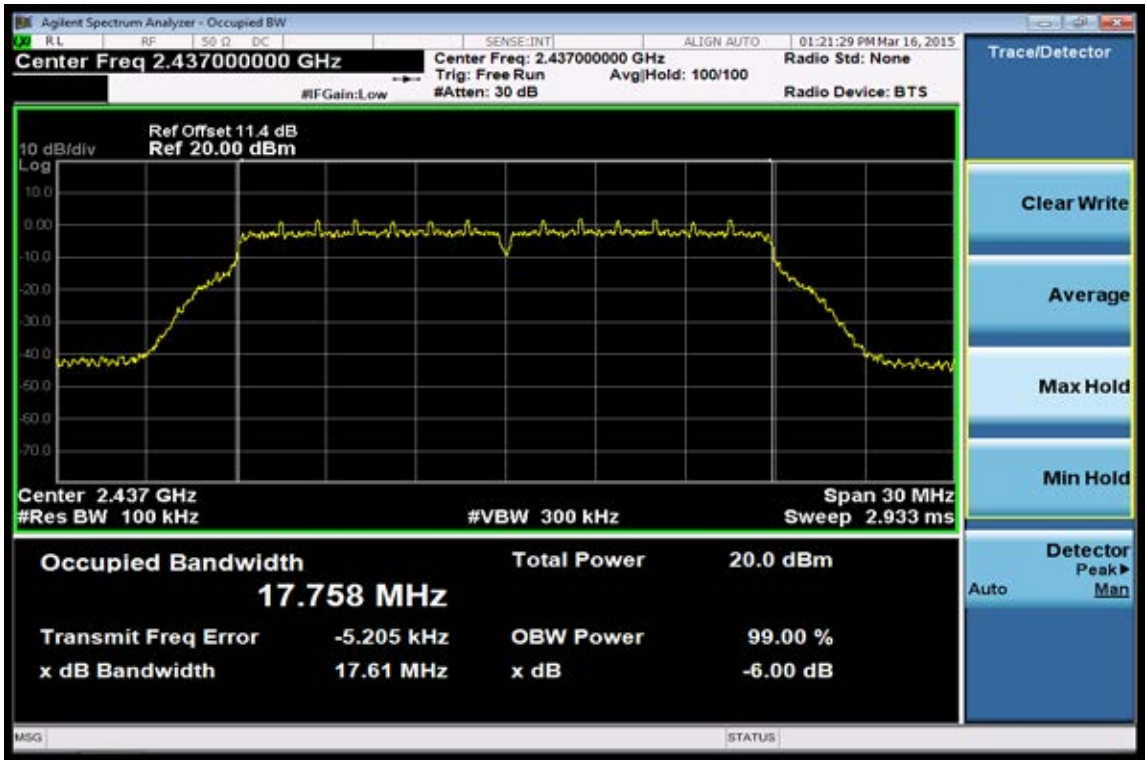
802.11n_20M

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



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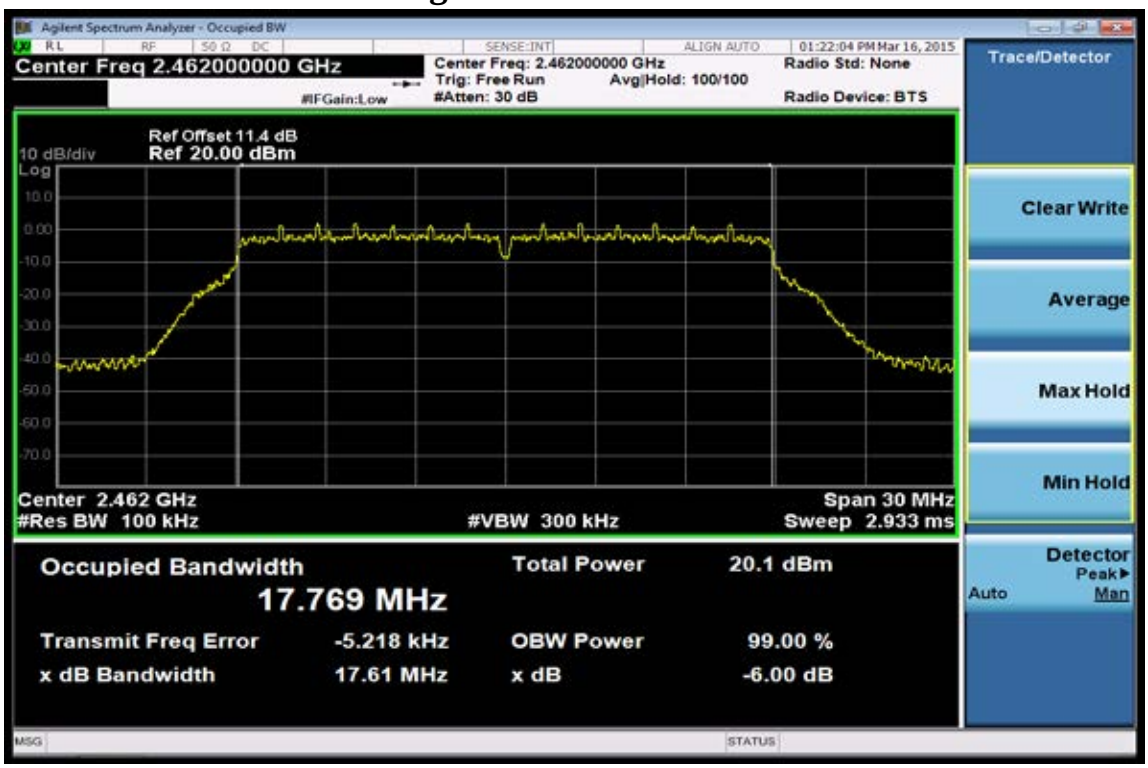
6dB Band Width Test Data CH-High



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10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

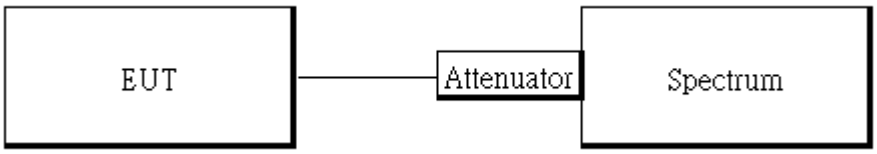
10.1 Standard Applicable

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).

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 V03r02.
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=100KHz, VBW=300KHz, 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 V03r02.
3. Set RBW = 100K & VBW ≥300K, 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.

10.4 Measurement Result

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

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802.11b

Band Edges Test Data CH-Low

Band Edges Test Data CH-High

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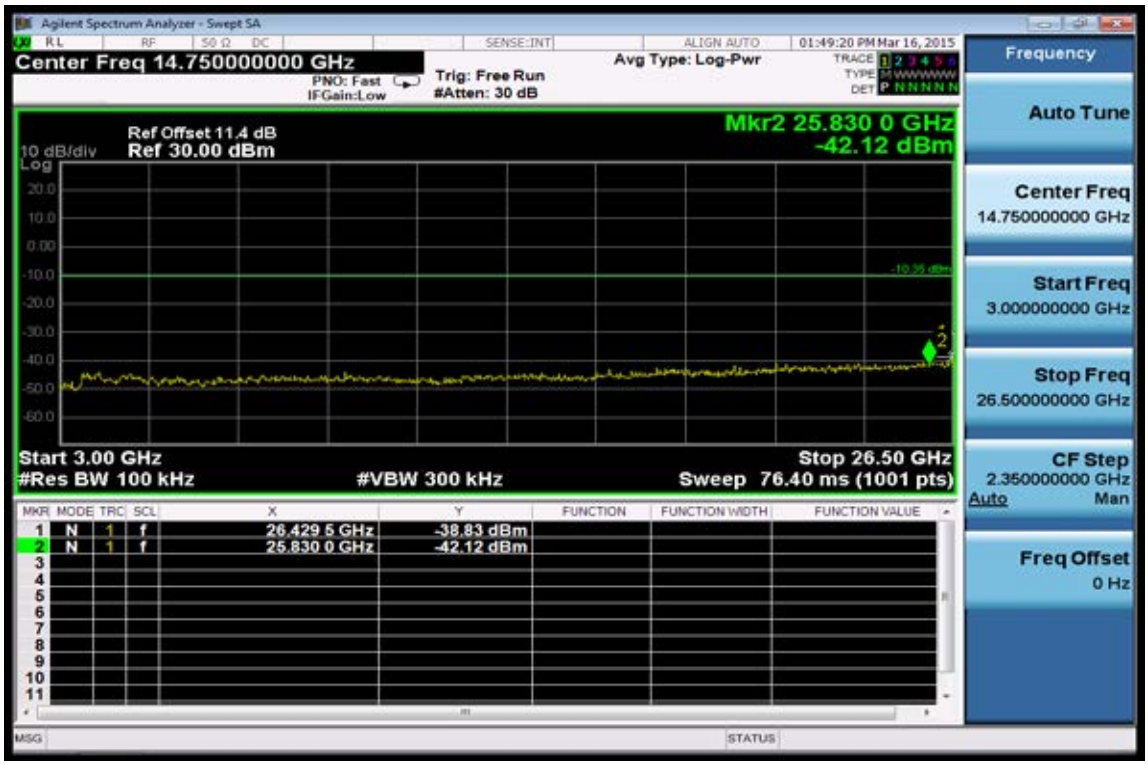
802.11b

Spurious Emission Test Data CH-Low



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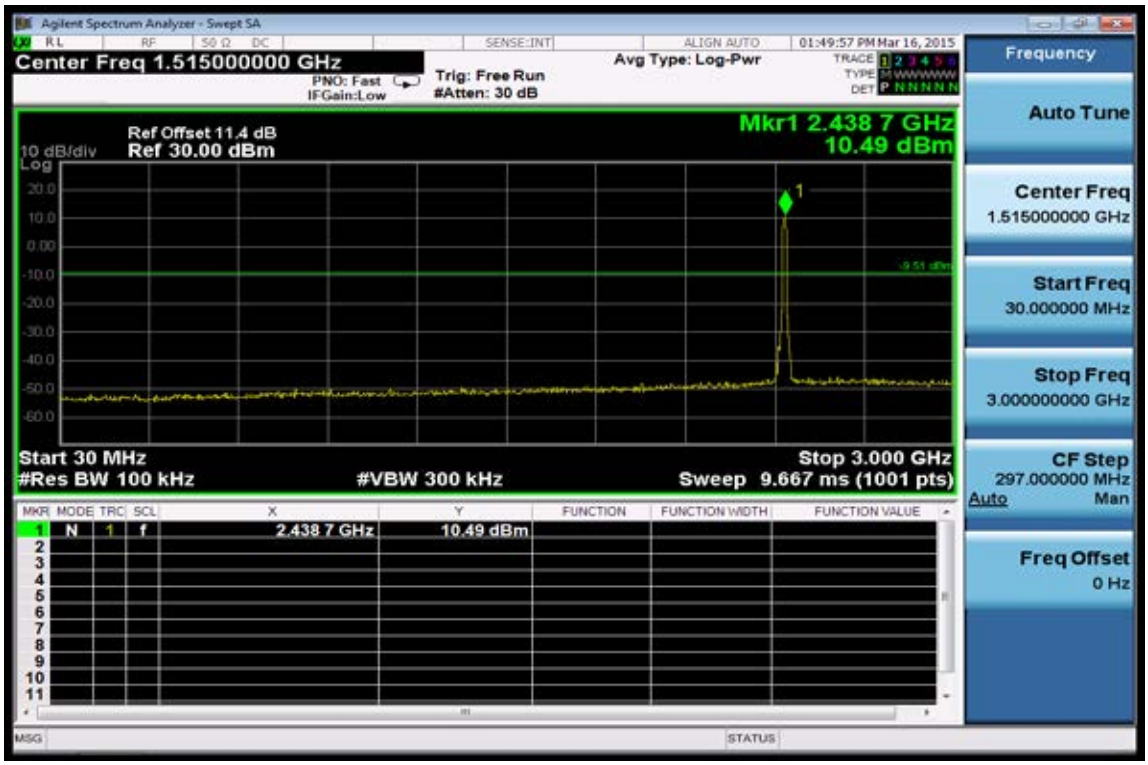
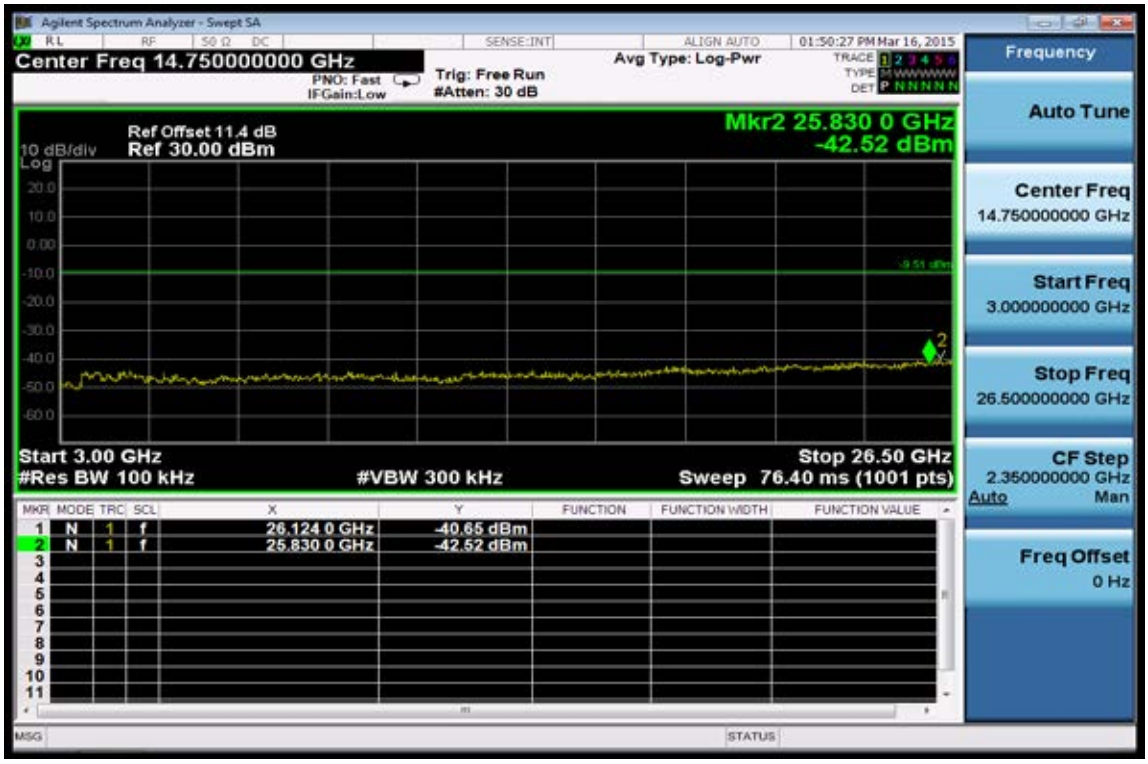
Spurious Emission Test Data CH-Mid





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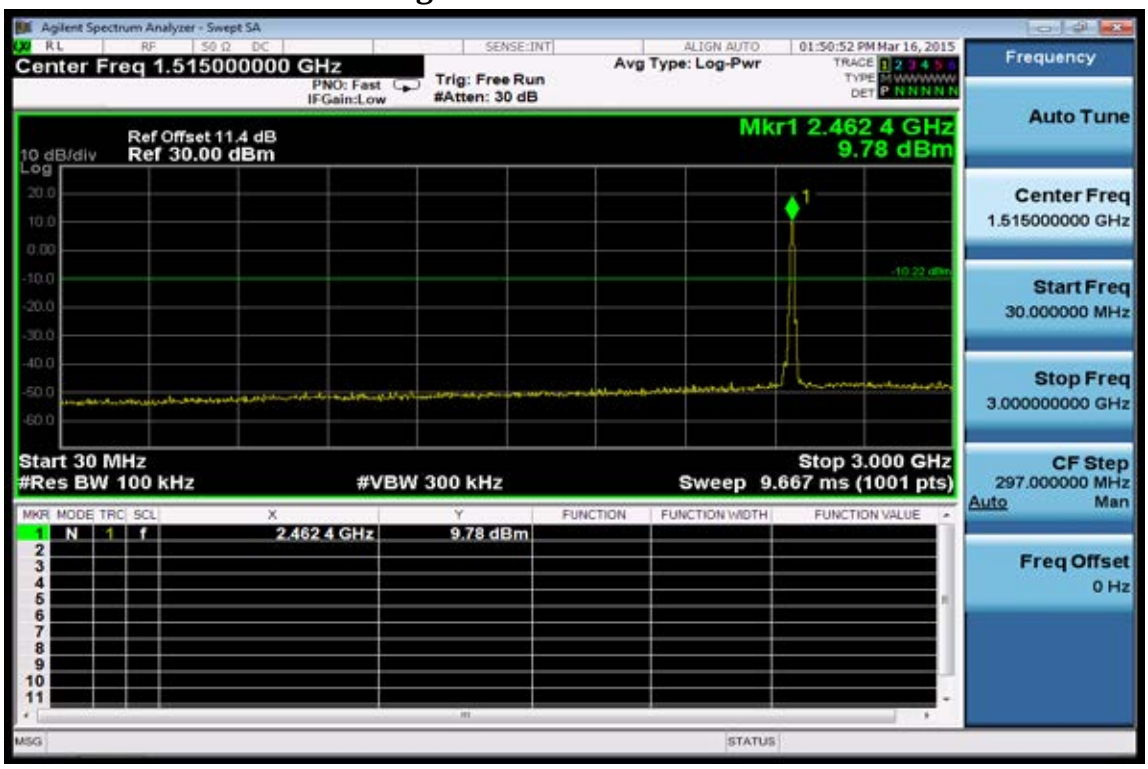
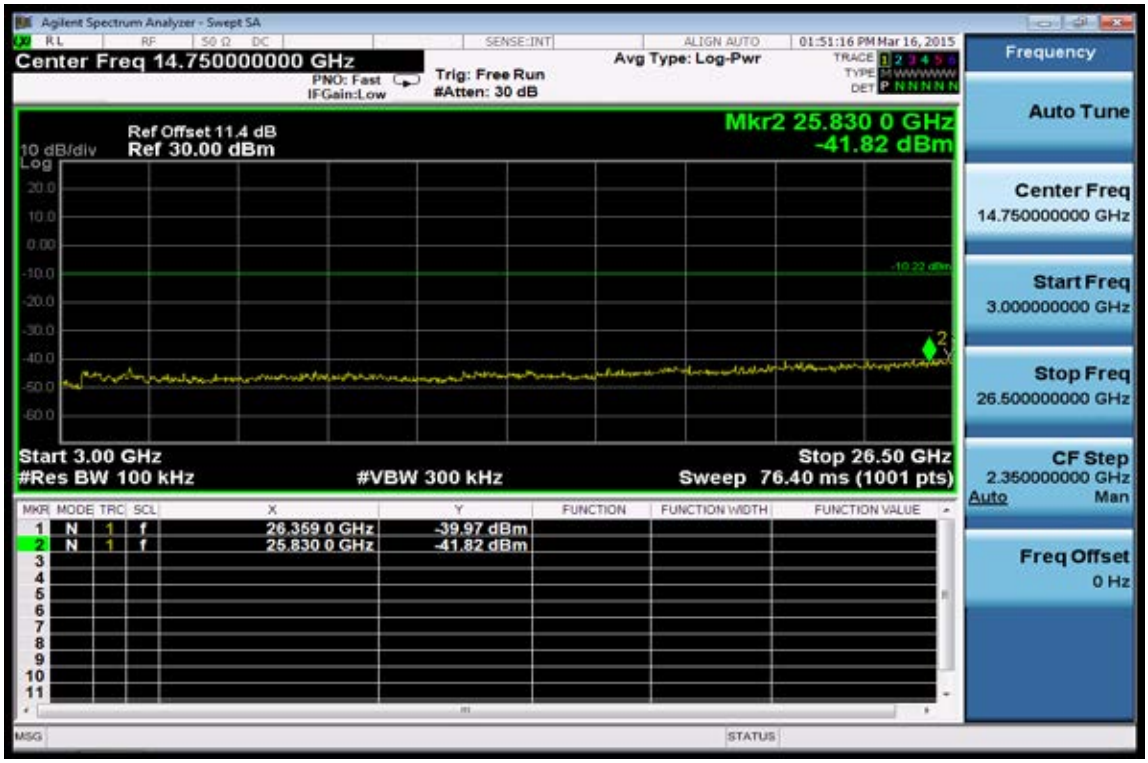
Spurious Emission Test Data CH-High





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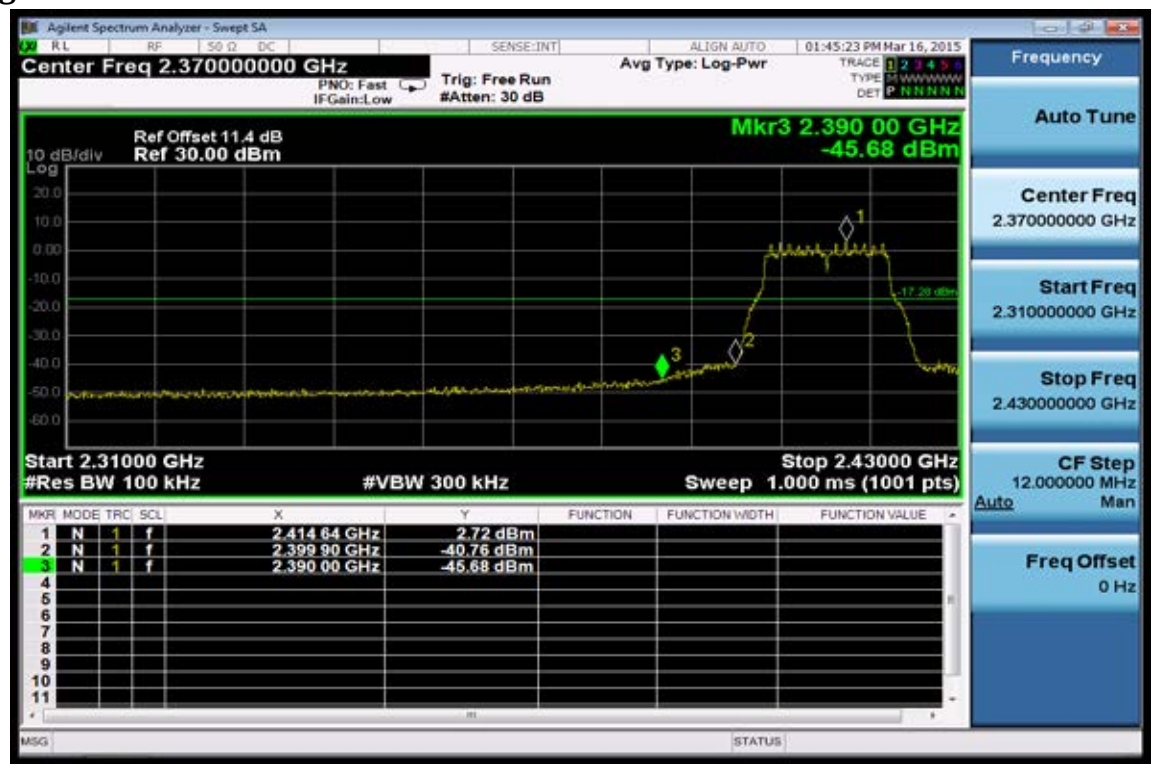
802.11g

Band Edges Test Data CH-Low



Band Edges Test Data CH-High

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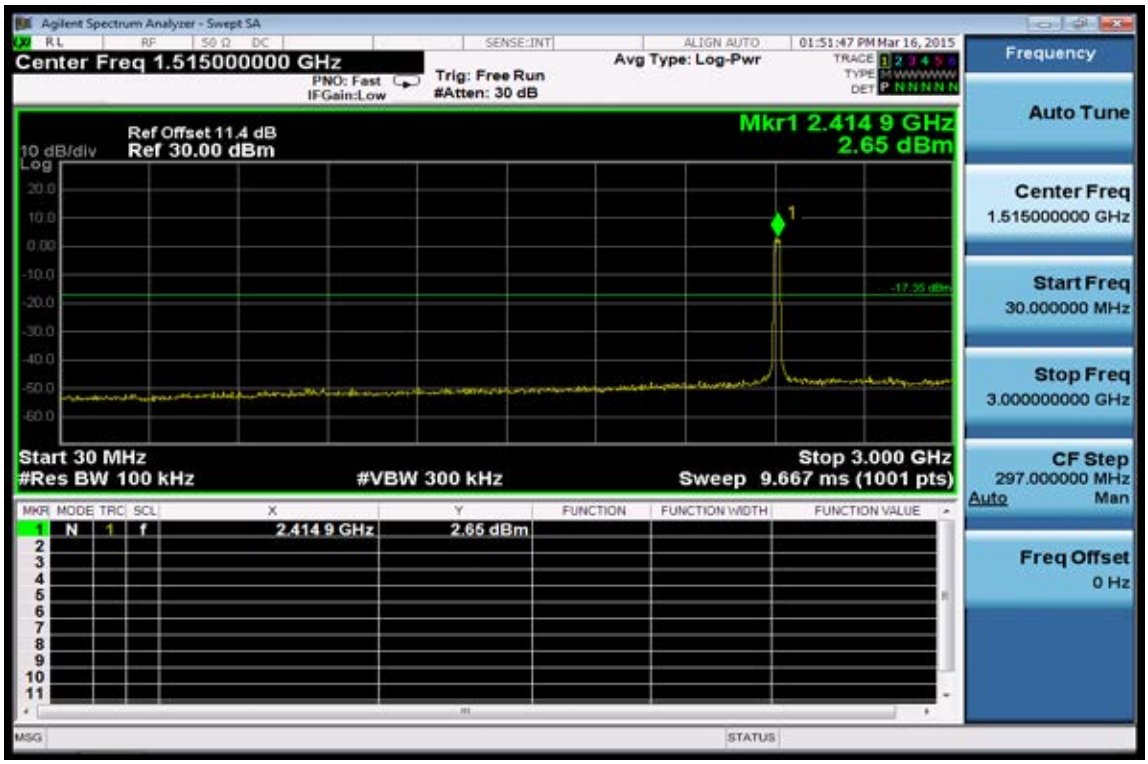
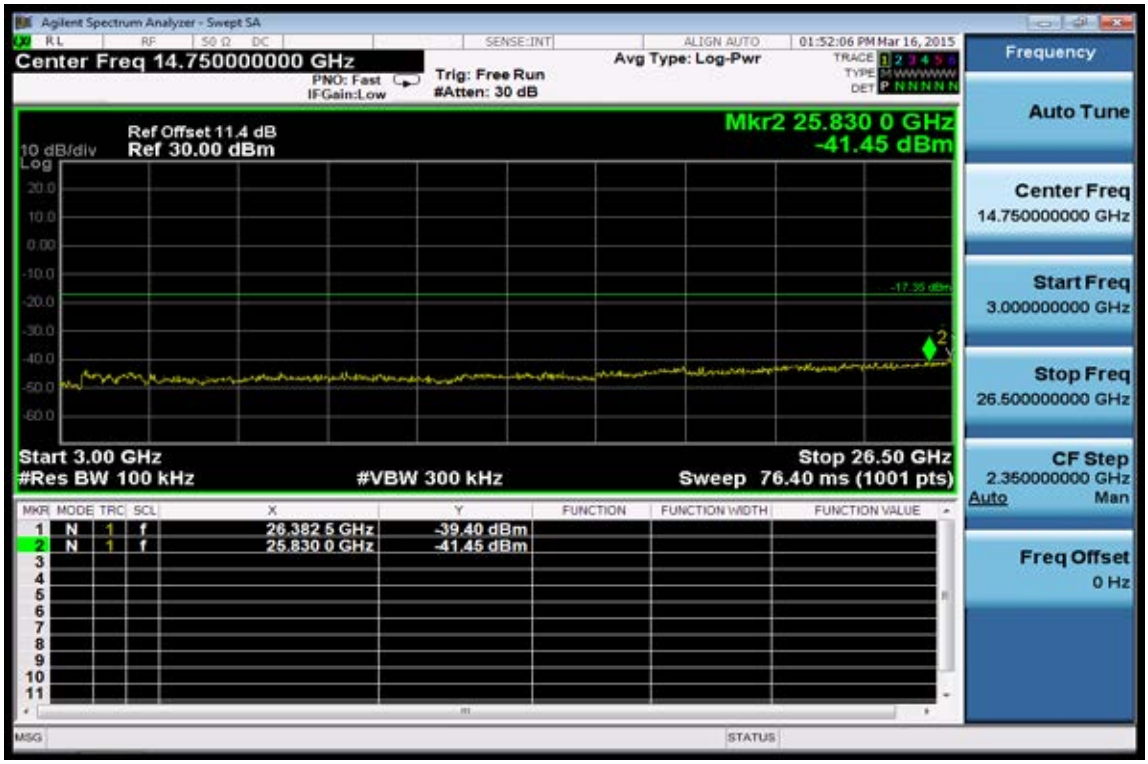
802.11g

Spurious Emission Test Data CH-Low





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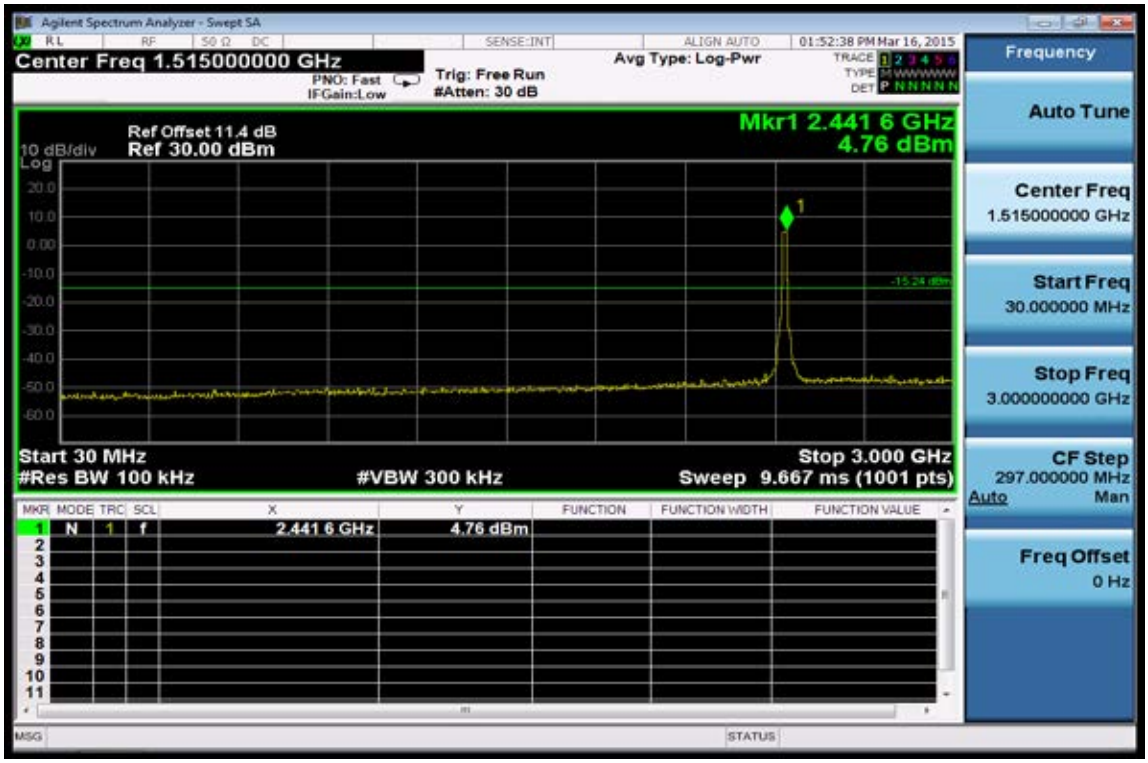
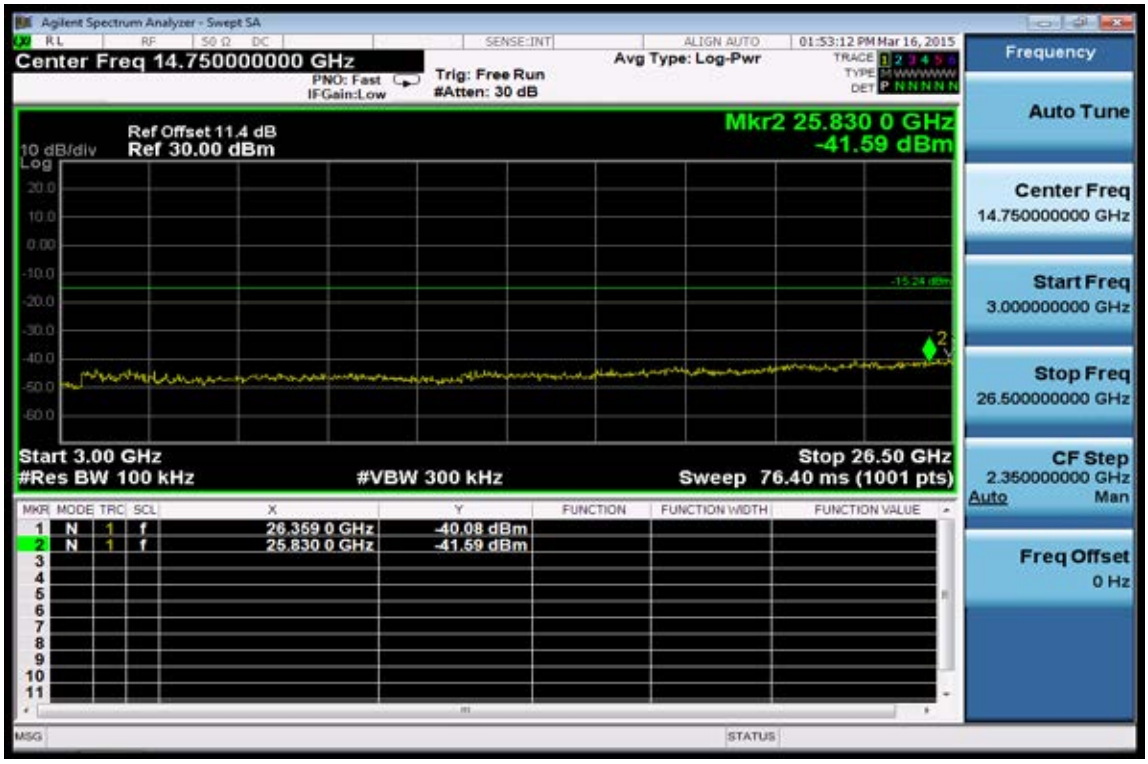
Spurious Emission Test Data CH-Mid





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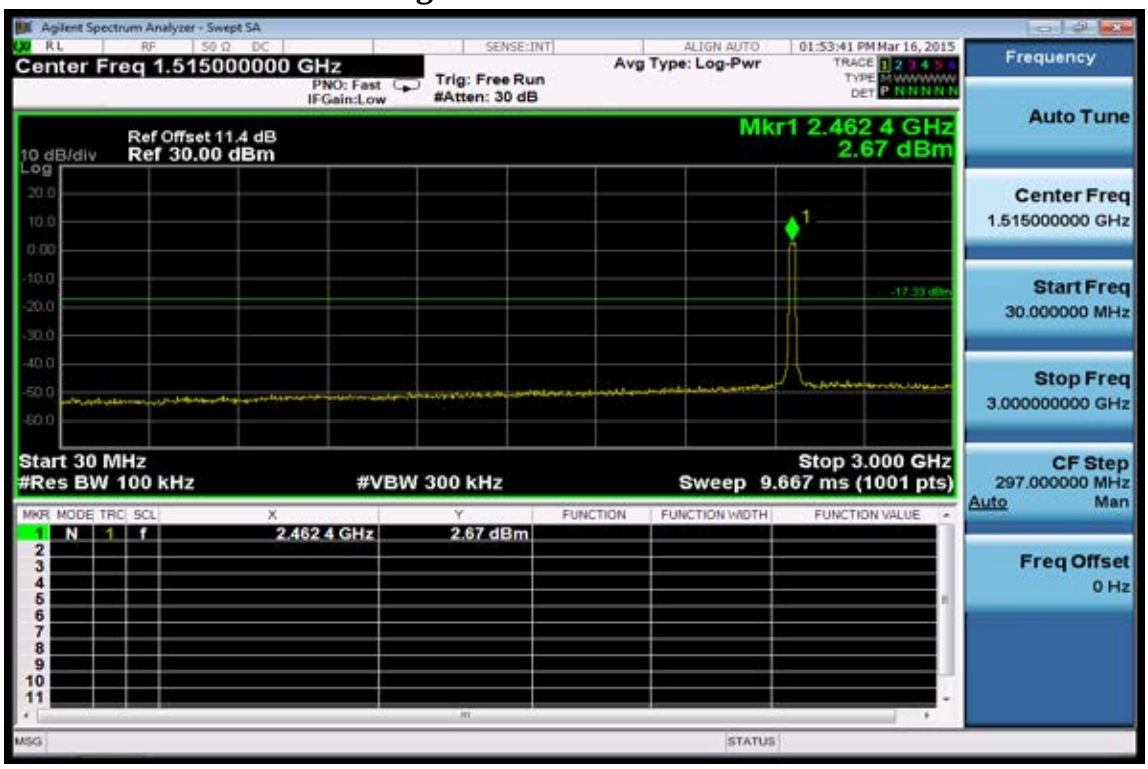
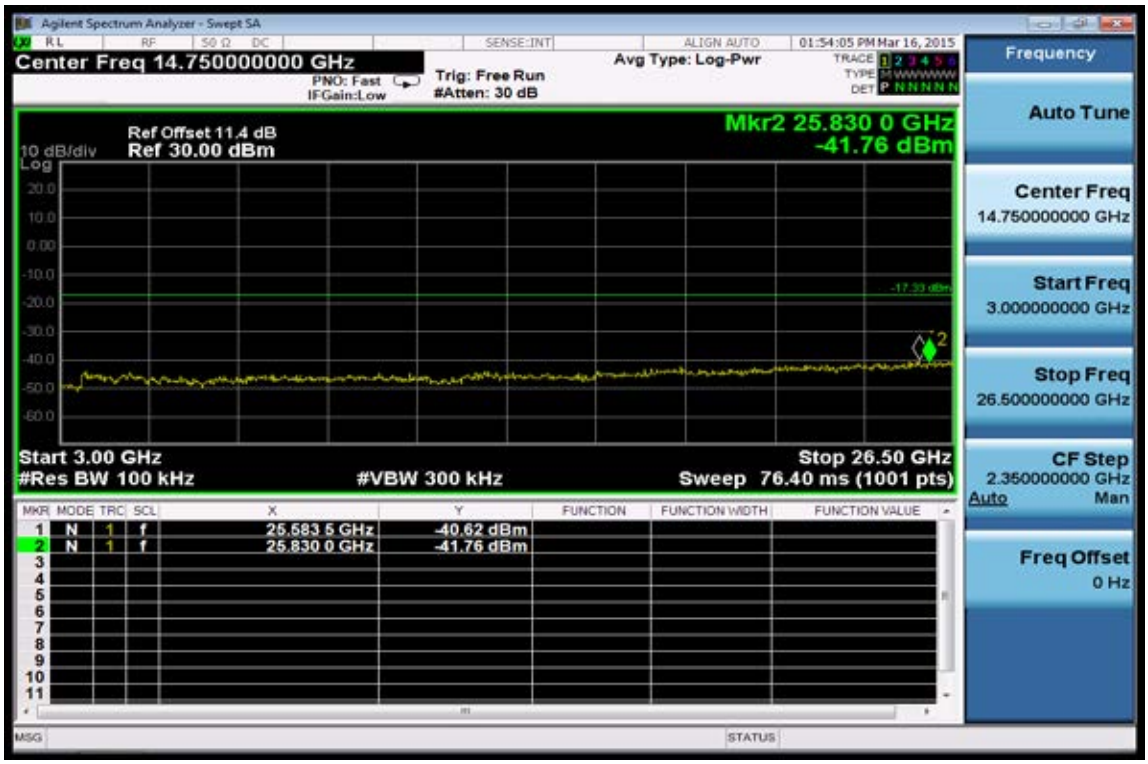
Spurious Emission Test Data CH-High





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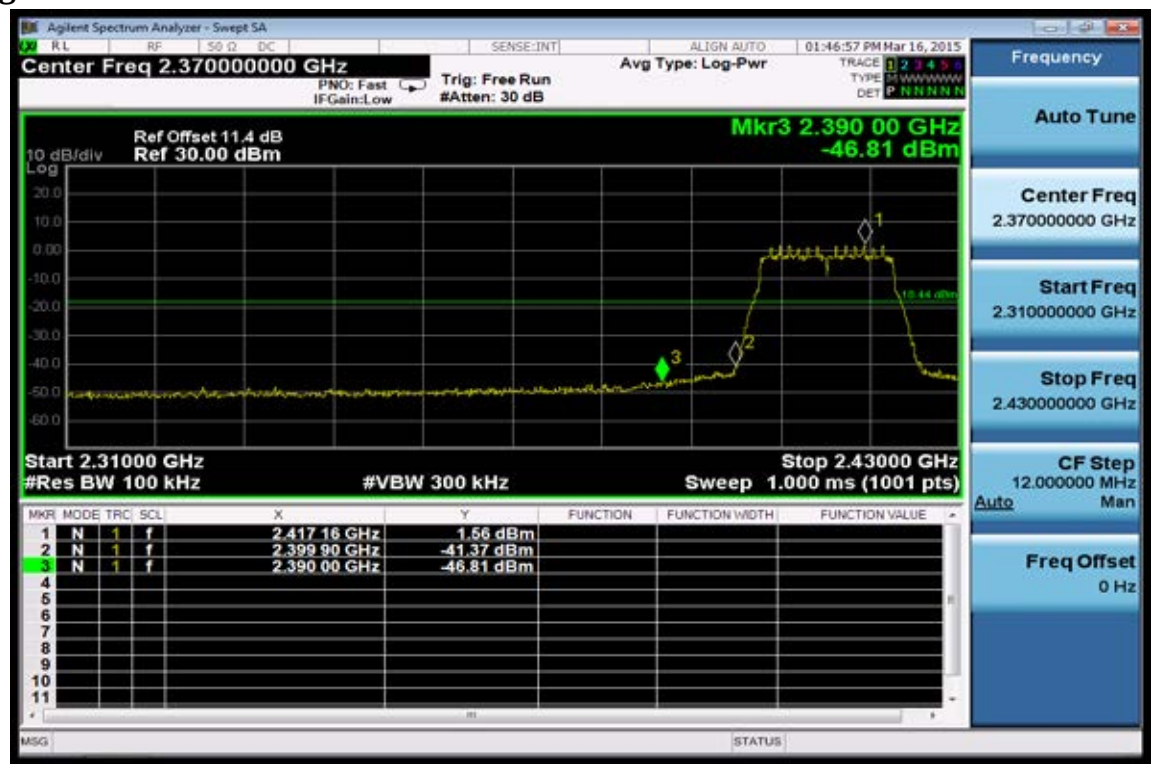
802.11n_HT20

Band Edges Test Data CH-Low



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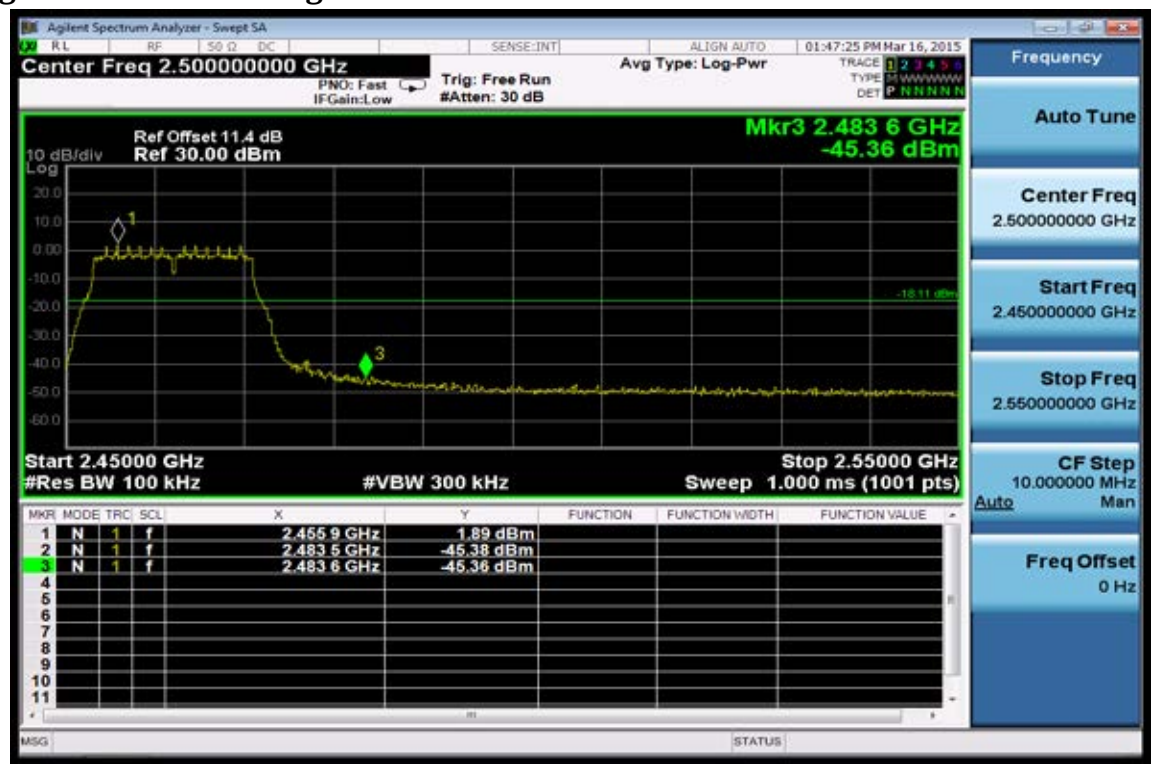

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802.11n_HT20

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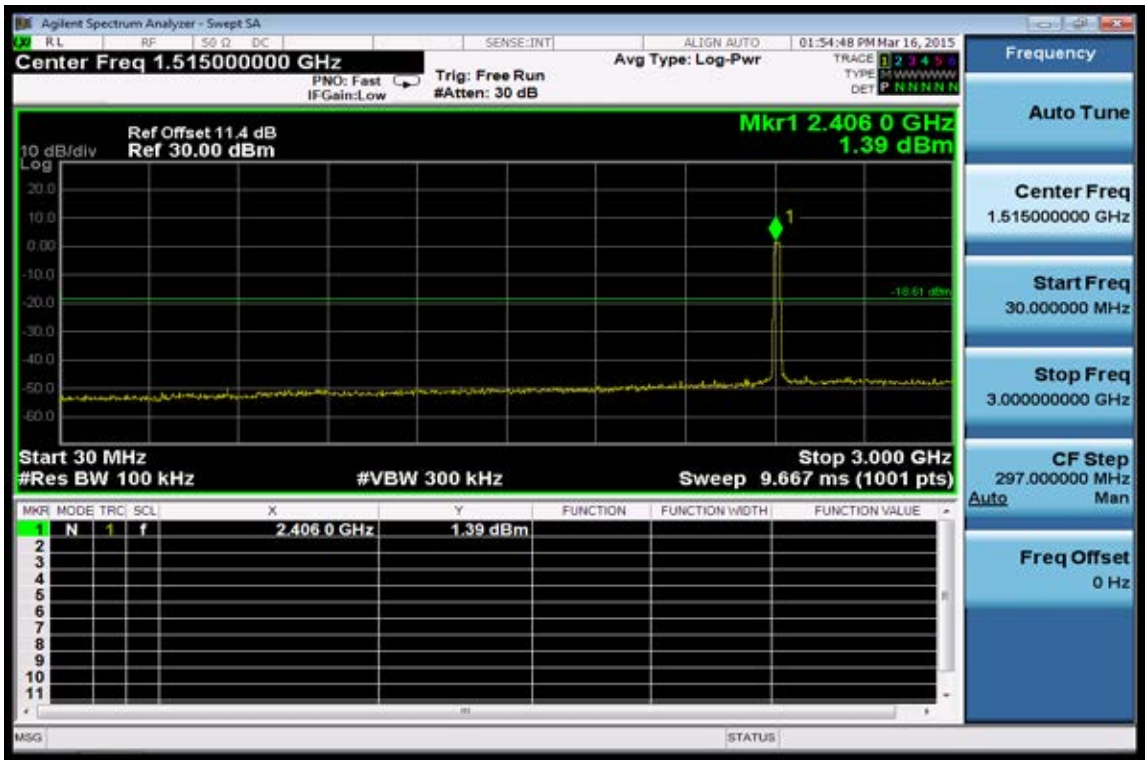

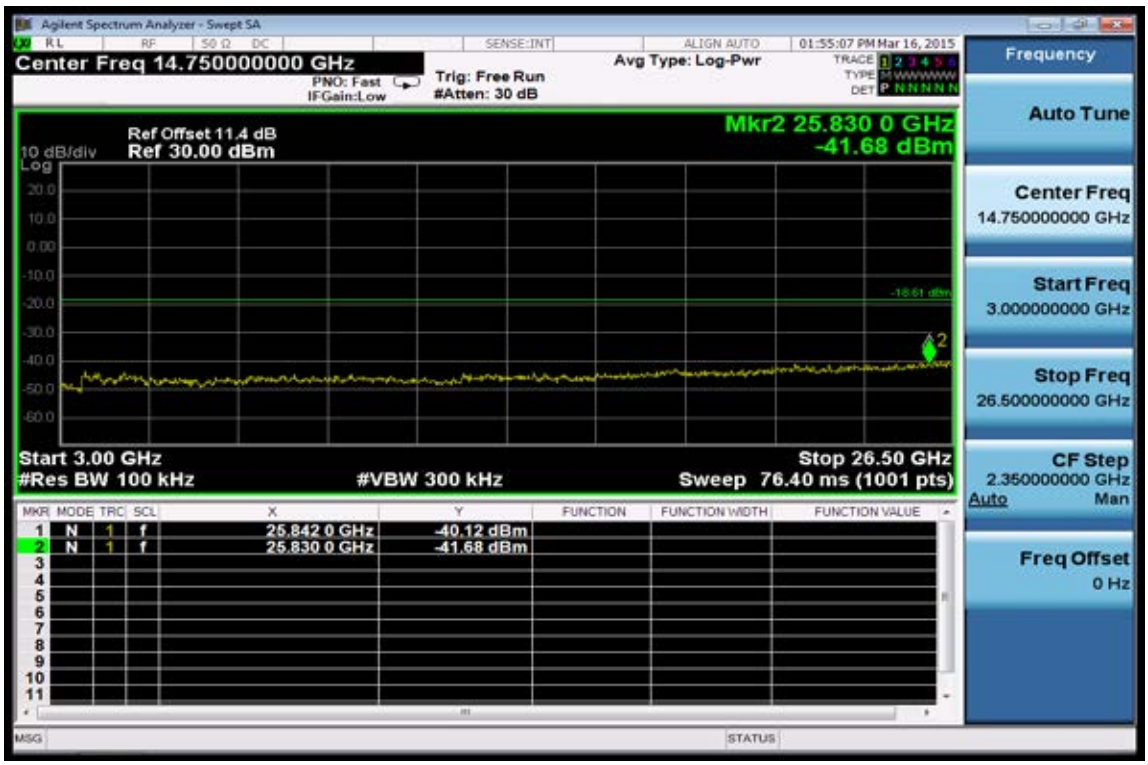

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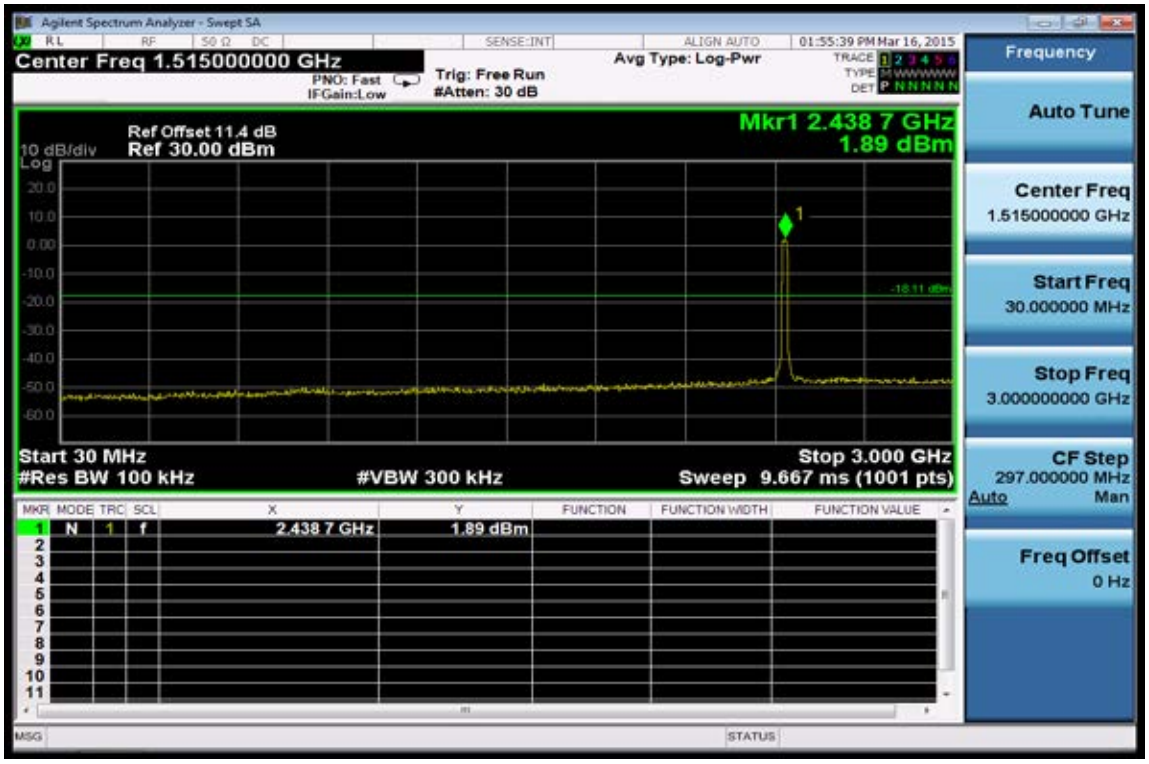
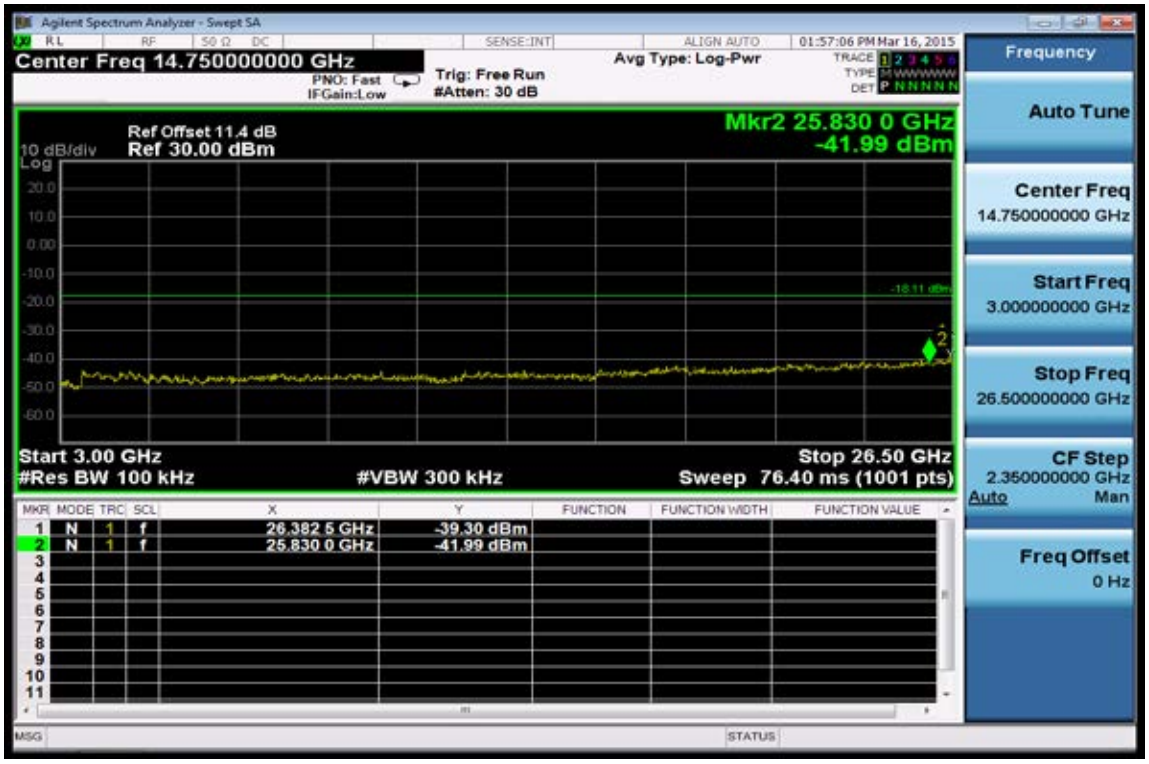
Spurious Emission Test Data CH-Mid





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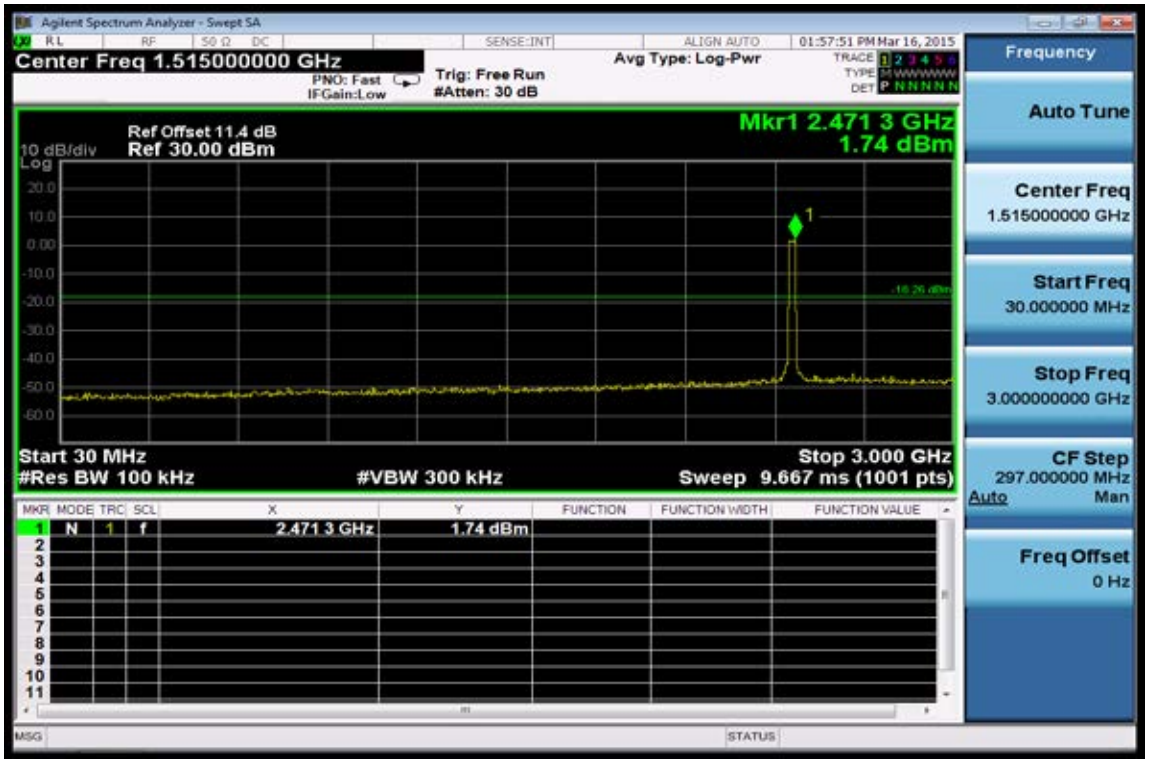
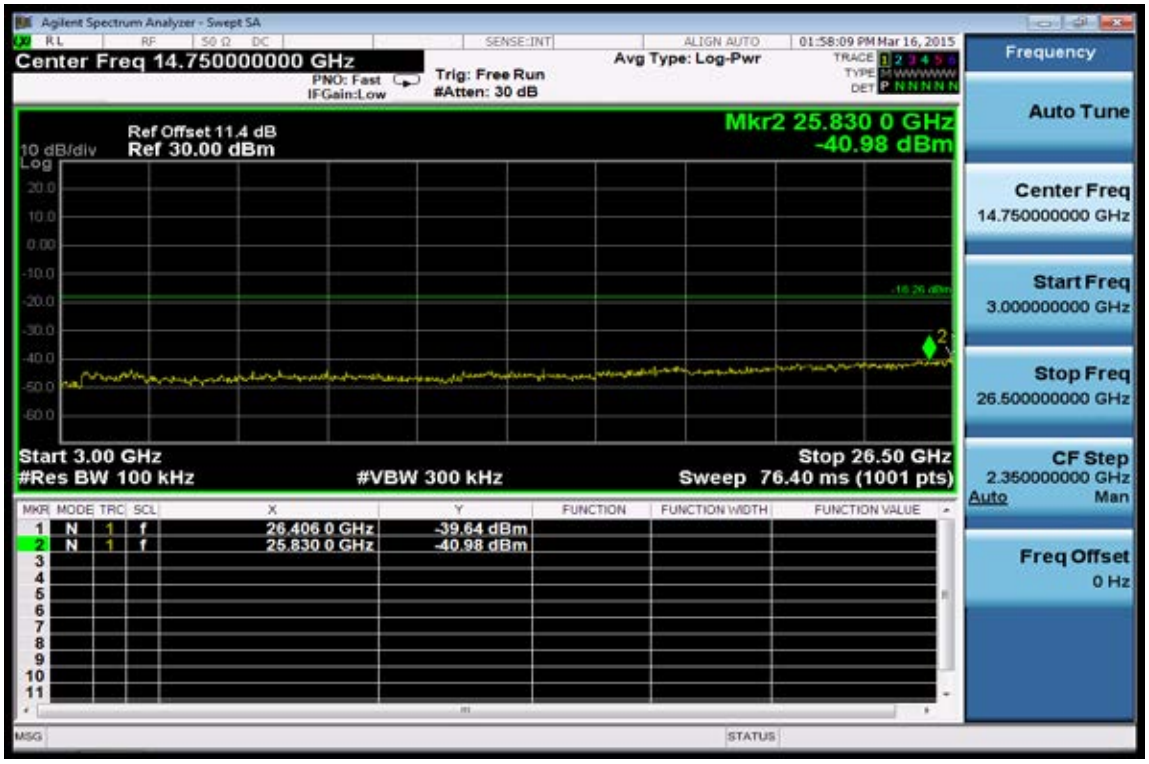
Spurious Emission Test Data CH-High





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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 (dBμV/m) = 20 log Emission level (μV/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	04/12/2014	04/11/2015
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
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
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.
Low Loss Cable	Huber Suhner	966_Rx	9	01/02/2015	01/01/2016
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

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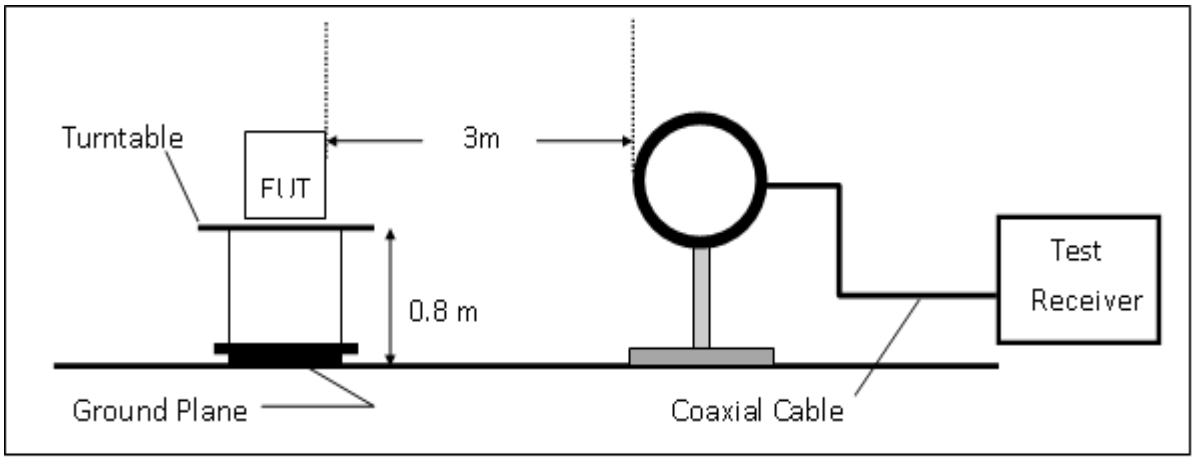
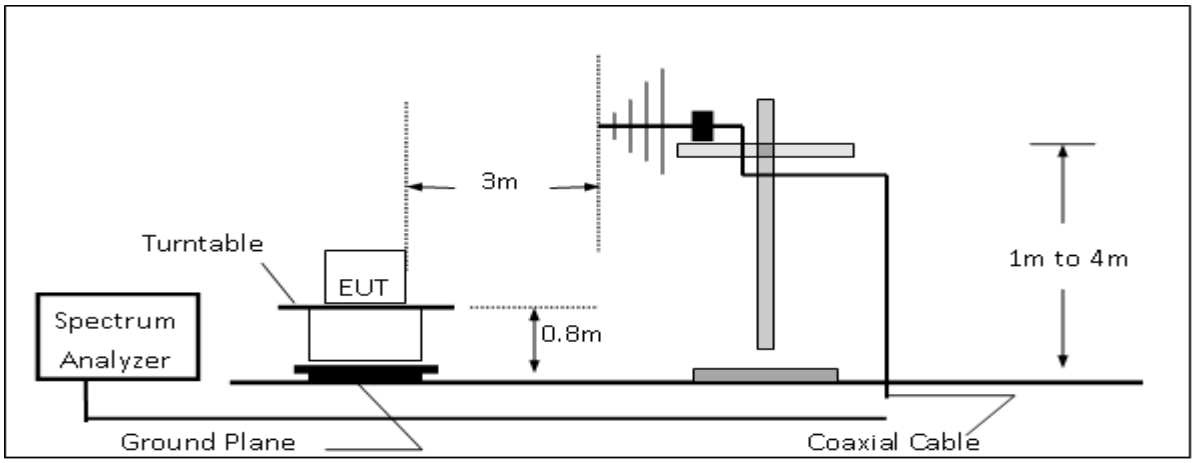
11.3 Test SET-UP

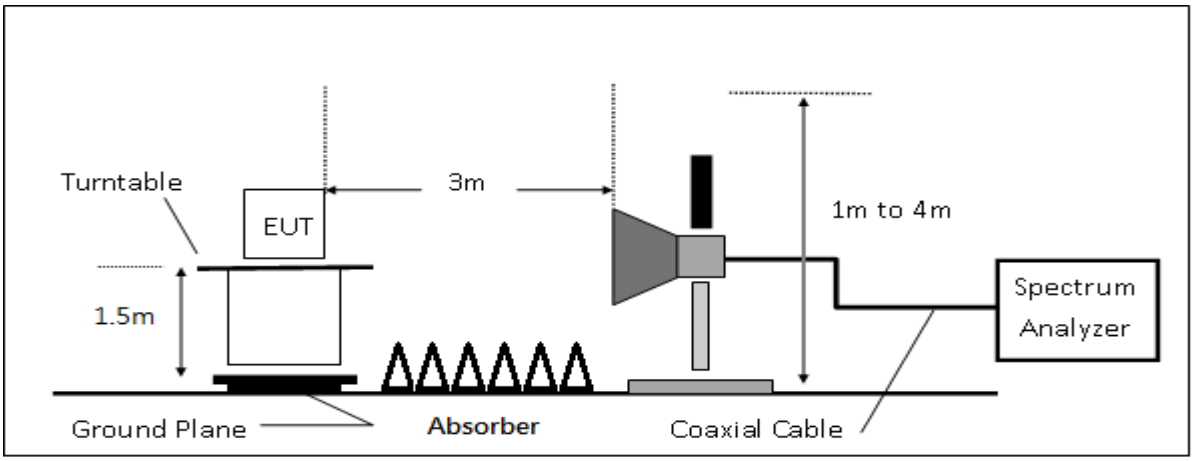
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency form 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 V03r02.
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 ≥ 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.

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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(dBµV/m) = SPA. Reading level(dBµV) + Factor(dB)

Factor(dB) = Antenna Factor(dBµV/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	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2390.00	Peak	E	50.41	6.36	56.77	74.00	-17.23
2390.00	Average	E	36.00	6.36	42.36	54.00	-11.64

Operation Band	:802.11 b	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2390.00	Peak	E	52.73	6.36	59.09	74.00	-14.91
2390.00	Average	E	37.32	6.36	43.68	54.00	-10.32

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Operation Band	:802.11 b	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2483.50	Peak	E	49.21	7.14	56.35	74.00	-17.65
2483.50	Average	E	36.67	7.14	43.81	54.00	-10.19

Operation Band	:802.11 b	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2483.50	Peak	E	52.40	7.14	59.53	74.00	-14.47
2483.50	Average	E	38.12	7.14	45.26	54.00	-8.74

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Radiated Band Edge Measurement Result (802.11g)

Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2390.00	Peak	E	57.69	6.36	64.05	74.00	-9.95
2390.00	Average	E	43.29	6.36	49.65	54.00	-4.35

Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2390.00	Peak	E	60.48	6.36	66.83	74.00	-7.17
2390.00	Average	E	45.15	6.36	51.51	54.00	-2.49

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Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2483.50	Peak	E	55.68	7.14	62.82	74.00	-11.18
2483.50	Average	E	41.54	7.14	48.68	54.00	-5.32

Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2483.50	Peak	E	60.15	7.14	67.29	74.00	-6.71
2483.50	Average	E	44.51	7.14	51.65	54.00	-2.35

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Radiated Band Edge Measurement Result (802.11_HT20)

Operation Band	:802.11 n20M	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2390.00	Peak	E	59.18	6.36	65.54	74.00	-8.46
2390.00	Average	E	42.03	6.36	48.39	54.00	-5.61

Operation Band	:802.11 n20M	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2390.00	Peak	E	60.68	6.36	67.04	74.00	-6.96
2390.00	Average	E	43.28	6.36	49.64	54.00	-4.36

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Operation Band	:802.11 n20M	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2483.50	Peak	E	58.96	7.14	66.10	74.00	-7.90
2483.50	Average	E	42.17	7.14	49.31	54.00	-4.69

Operation Band	:802.11 n20M	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2483.50	Peak	E	59.03	7.14	66.17	74.00	-7.83
2483.50	Average	E	42.34	7.14	49.48	54.00	-4.52

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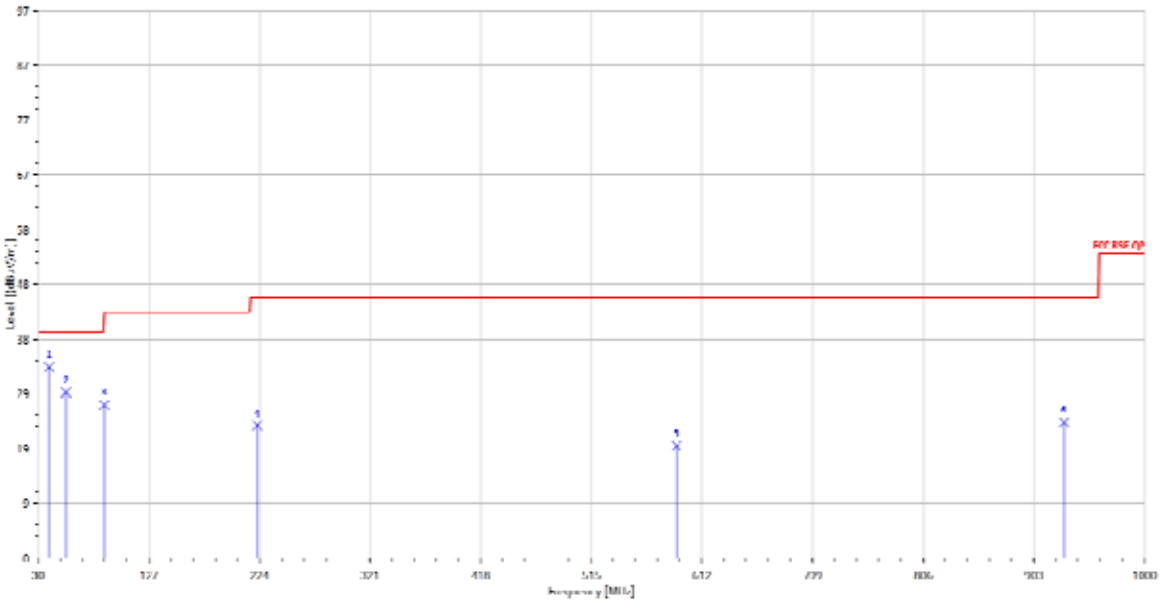
Radiated Spurious Emission Measurement Result (802.11 g)

Below 1GHz Worst-Case Data:

Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
39.70	Peak	S	52.55	-18.79	33.76	40.00	-6.24
54.25	Peak	S	56.09	-26.79	29.29	40.00	-10.71
88.20	Peak	S	52.92	-25.86	27.07	43.50	-16.43
222.06	Peak	S	46.32	-22.86	23.46	46.00	-22.54
589.69	Peak	S	31.94	-12.16	19.78	46.00	-26.22
929.19	Peak	S	31.62	-7.61	24.01	46.00	-21.99

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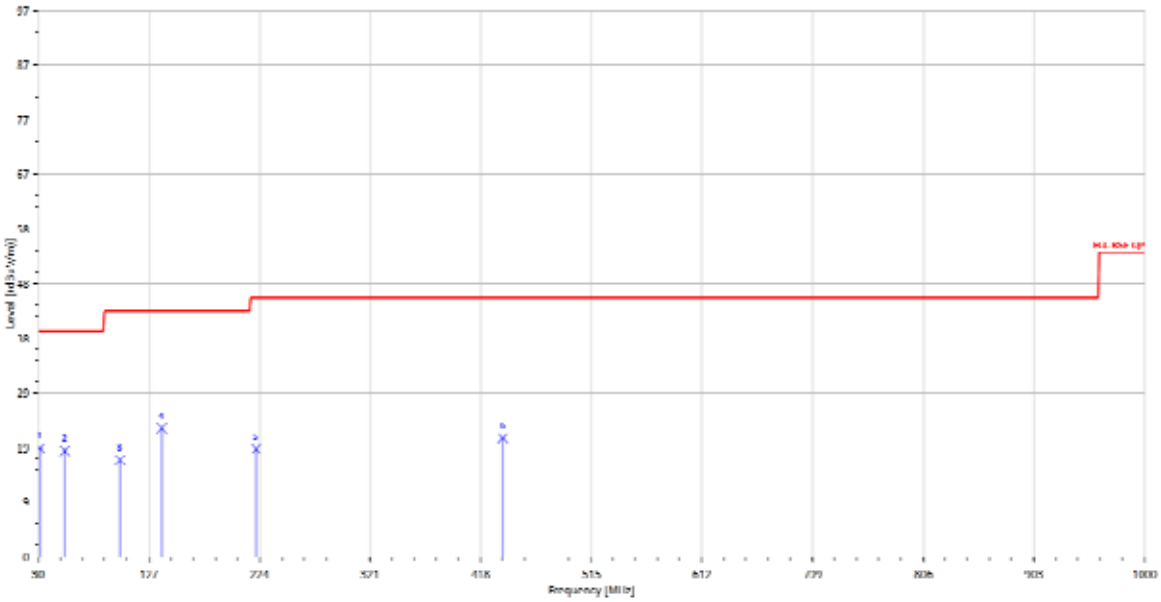
Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
31.94	Peak	S	33.40	-14.17	19.24	40.00	-20.77
53.28	Peak	S	45.27	-26.52	18.75	40.00	-21.25
101.78	Peak	S	40.69	-23.54	17.15	43.50	-26.35
138.64	Peak	S	44.44	-21.60	22.83	43.50	-20.67
221.09	Peak	S	42.04	-22.91	19.13	46.00	-26.87
437.40	Peak	S	36.33	-15.28	21.05	46.00	-24.95

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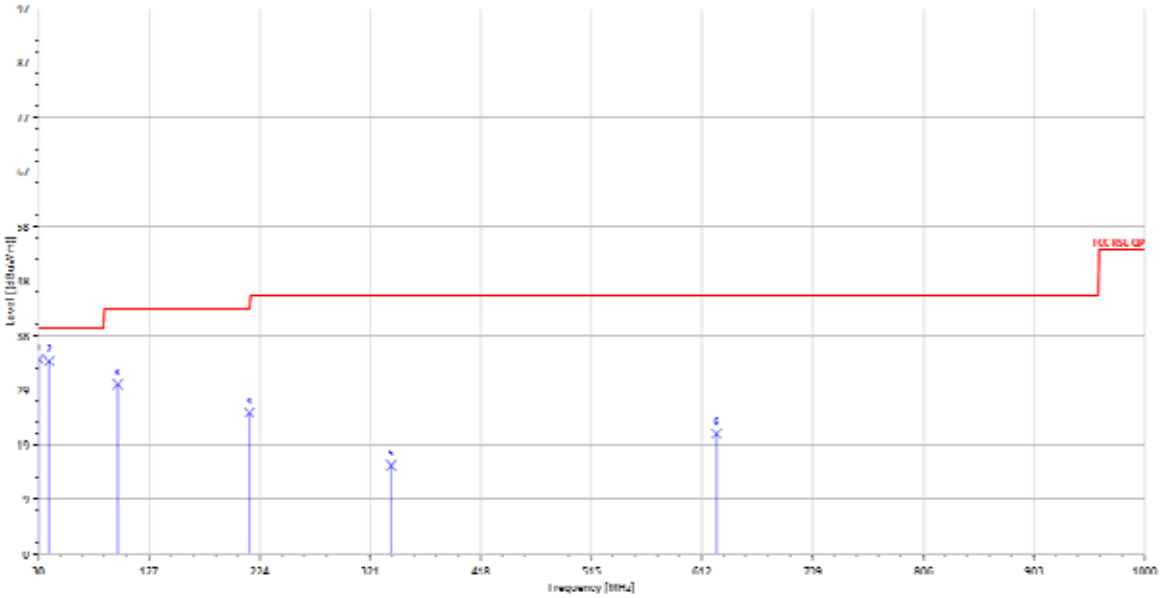
Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2437 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
30.70	Peak	S	48.05	-13.49	34.56	40.00	-5.44
39.70	Peak	S	53.00	-18.79	34.20	40.00	-5.80
99.84	Peak	S	53.95	-23.84	30.12	43.50	-13.38
215.27	Peak	S	48.05	-22.95	25.10	43.50	-18.40
339.43	Peak	S	33.56	-17.88	15.68	46.00	-30.32
624.61	Peak	S	33.49	-12.15	21.34	46.00	-24.66

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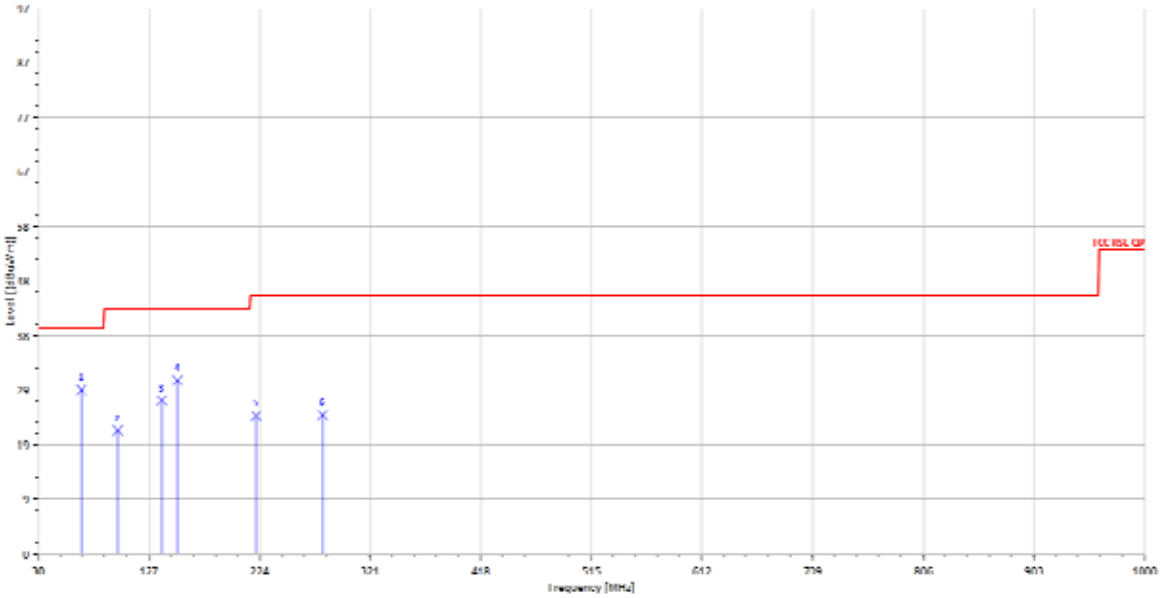
Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2437 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
67.83	Peak	S	57.07	-27.95	29.12	40.00	-10.88
99.84	Peak	S	45.80	-23.84	21.96	43.50	-21.54
138.64	Peak	S	48.88	-21.60	27.27	43.50	-16.23
152.22	Peak	S	53.61	-22.82	30.79	43.50	-12.71
221.09	Peak	S	47.44	-22.91	24.52	46.00	-21.48
279.29	Peak	S	44.37	-19.71	24.66	46.00	-21.34

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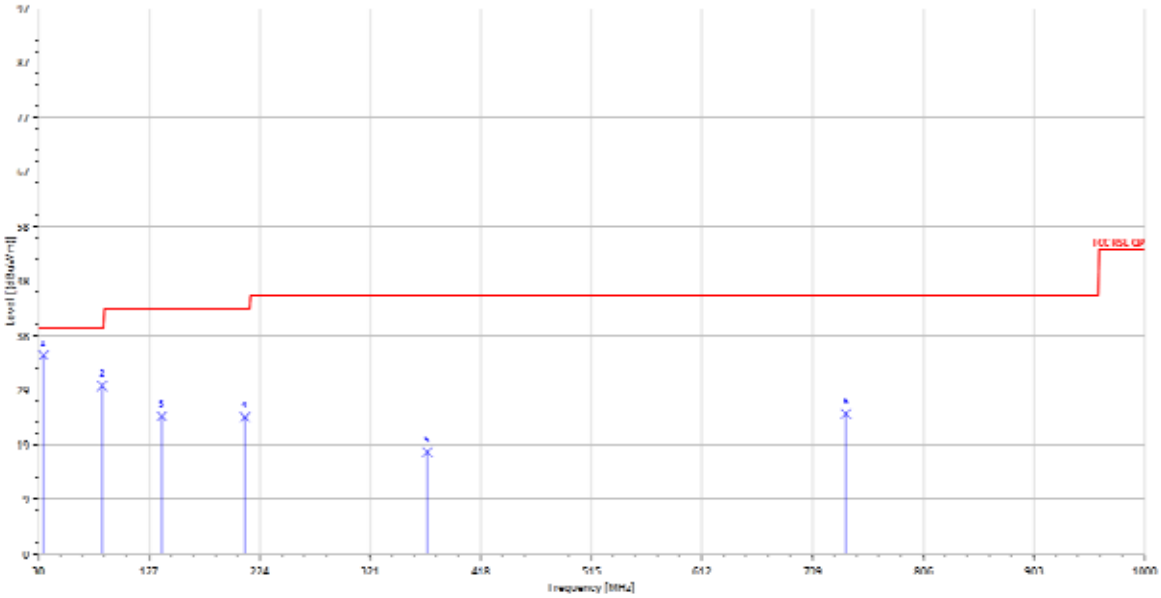
Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
34.85	Peak	S	51.05	-15.75	35.30	40.00	-4.70
86.26	Peak	S	55.94	-26.10	29.84	40.00	-10.16
138.64	Peak	S	46.05	-21.60	24.44	43.50	-19.06
211.39	Peak	S	47.17	-22.91	24.26	43.50	-19.24
371.44	Peak	S	34.84	-16.74	18.10	46.00	-27.90
738.10	Peak	S	35.22	-10.30	24.91	46.00	-21.09

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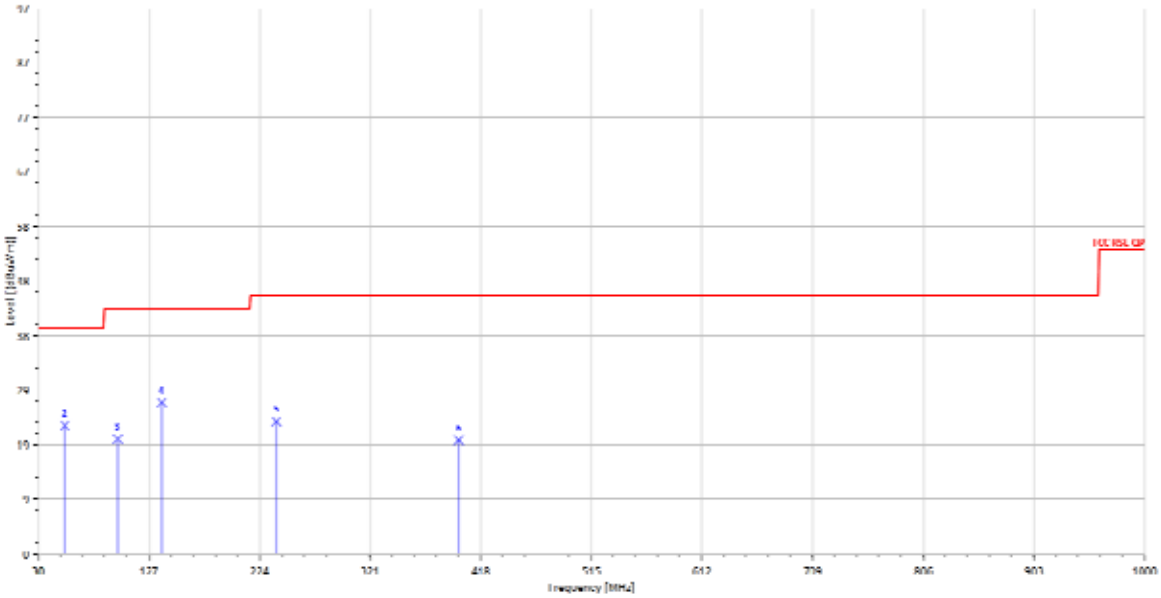
Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
30.00	Peak	S	40.14	-13.11	27.03	40.00	-12.98
53.28	Peak	S	49.30	-26.52	22.78	40.00	-17.22
99.84	Peak	S	44.23	-23.84	20.39	43.50	-23.11
138.64	Peak	S	48.48	-21.60	26.88	43.50	-16.62
238.55	Peak	S	44.77	-21.28	23.48	46.00	-22.52
398.60	Peak	S	36.12	-15.93	20.19	46.00	-25.81

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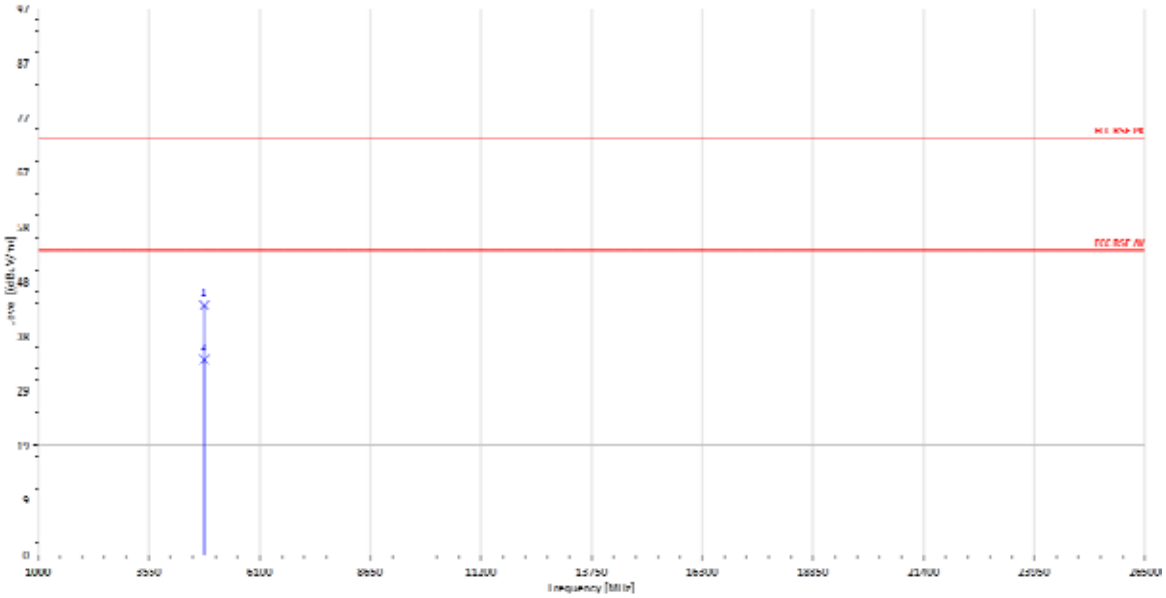
Radiated Spurious Emission Measurement Result (802.11 b)
Above 1GHz

Operation Band	:802.11 b	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4824.00	Peak	H	33.24	10.97	44.21	74.00	-29.79
4824.00	Average	H	23.64	10.97	34.61	54.00	-19.39

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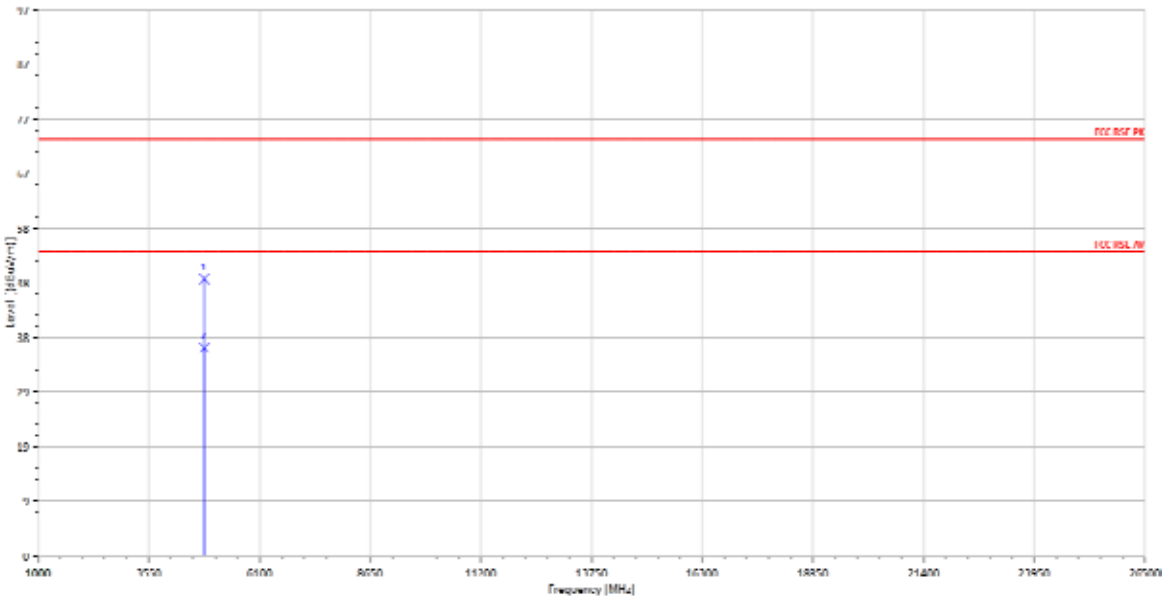
t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Operation Band	:802.11 b	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4824.00	Peak	H	38.22	10.97	49.19	74.00	-24.81
4824.00	Average	H	25.92	10.97	36.89	54.00	-17.11

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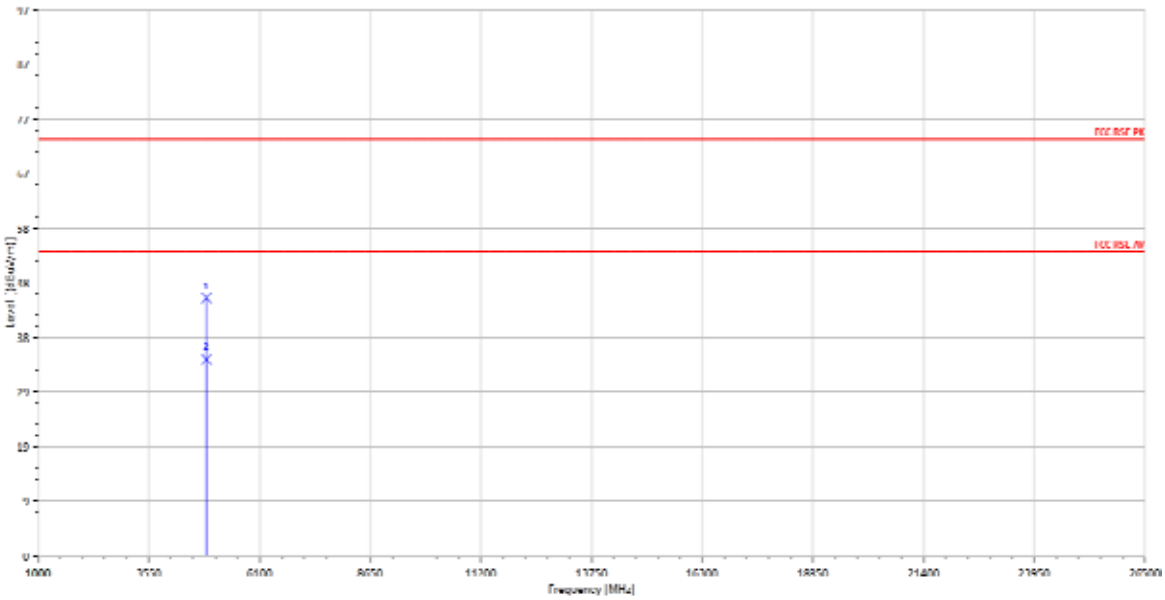
Operation Band	:802.11 b	Test Date	:2015-03-25
Fundamental Frequency	:2437 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4874.00	Peak	H	34.94	10.89	45.83	74.00	-28.17
4874.00	Average	H	23.99	10.89	34.88	54.00	-19.12

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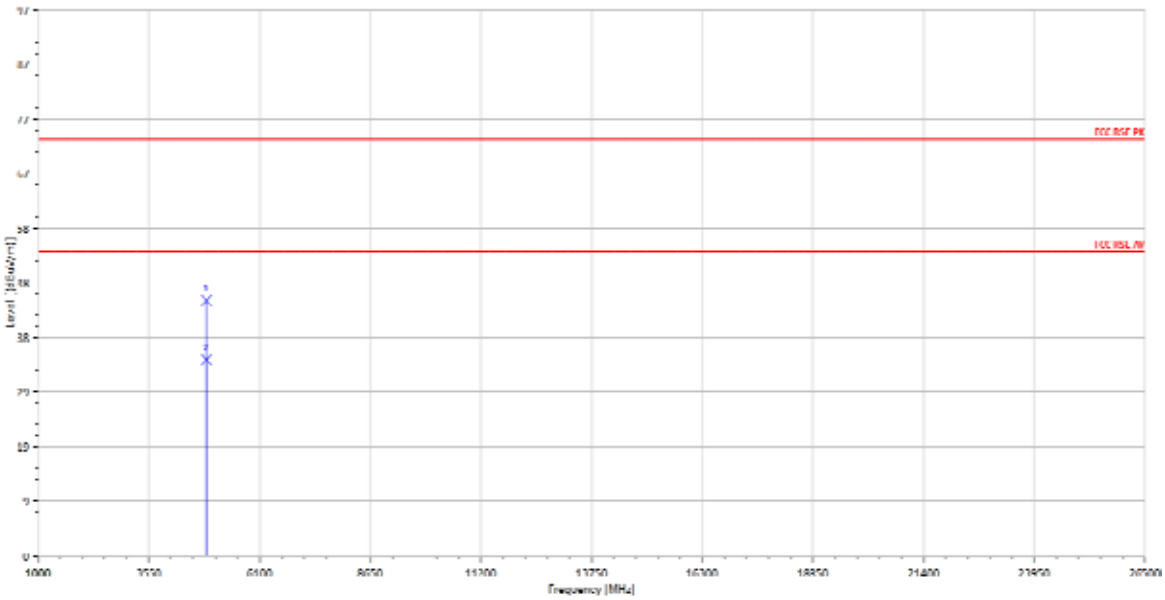
Operation Band	:802.11 b	Test Date	:2015-03-25
Fundamental Frequency	:2437 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4874.00	Peak	H	34.44	10.89	45.33	74.00	-28.67
4874.00	Average	H	23.94	10.89	34.83	54.00	-19.17

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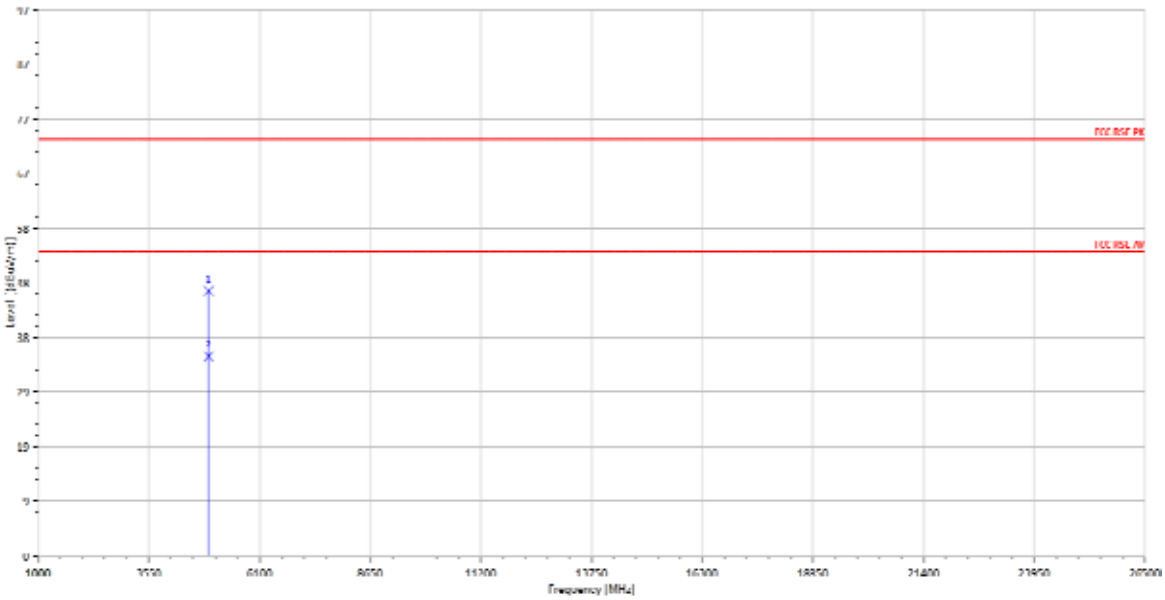
Operation Band	:802.11 b	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4924.00	Peak	H	36.04	10.98	47.02	74.00	-26.98
4924.00	Average	H	24.45	10.98	35.43	54.00	-18.57

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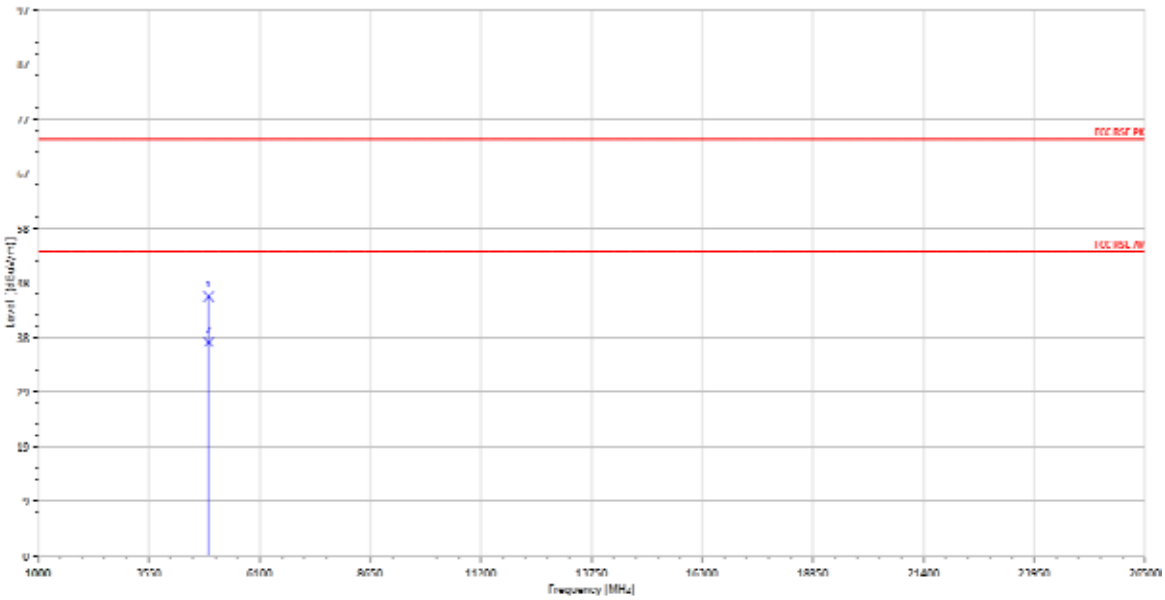
Operation Band	:802.11 b	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4924.00	Peak	H	35.06	10.98	46.04	74.00	-27.96
4924.00	Average	H	26.94	10.98	37.92	54.00	-16.08

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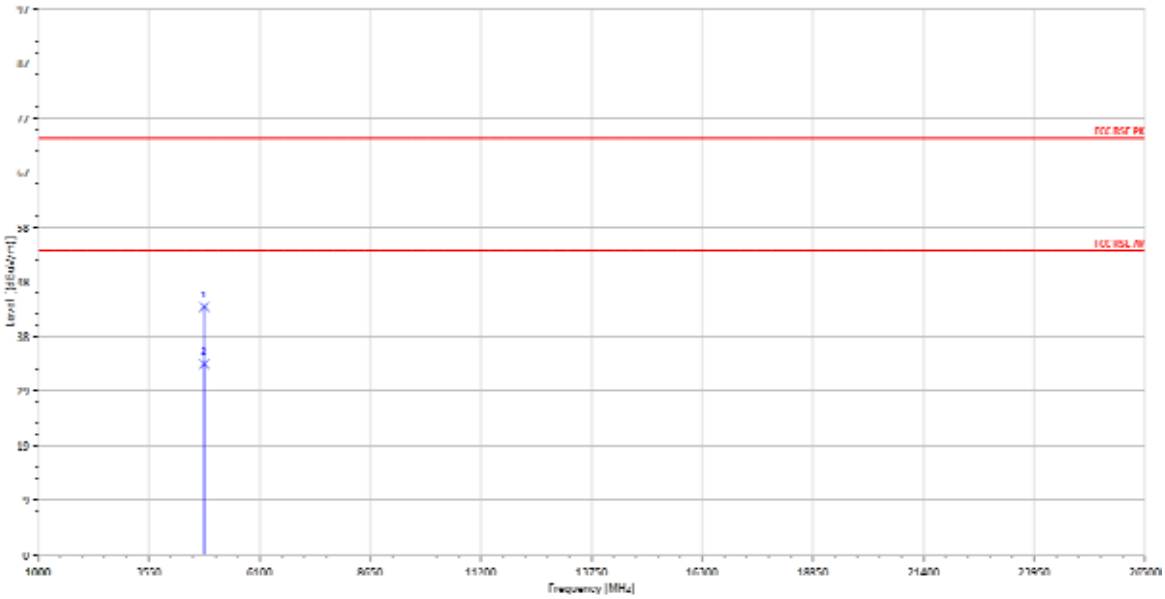
Radiated Spurious Emission Measurement Result (802.11 g)

Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4824.00	Peak	H	33.08	10.97	44.05	74.00	-29.95
4824.00	Average	H	22.90	10.97	33.87	54.00	-20.13

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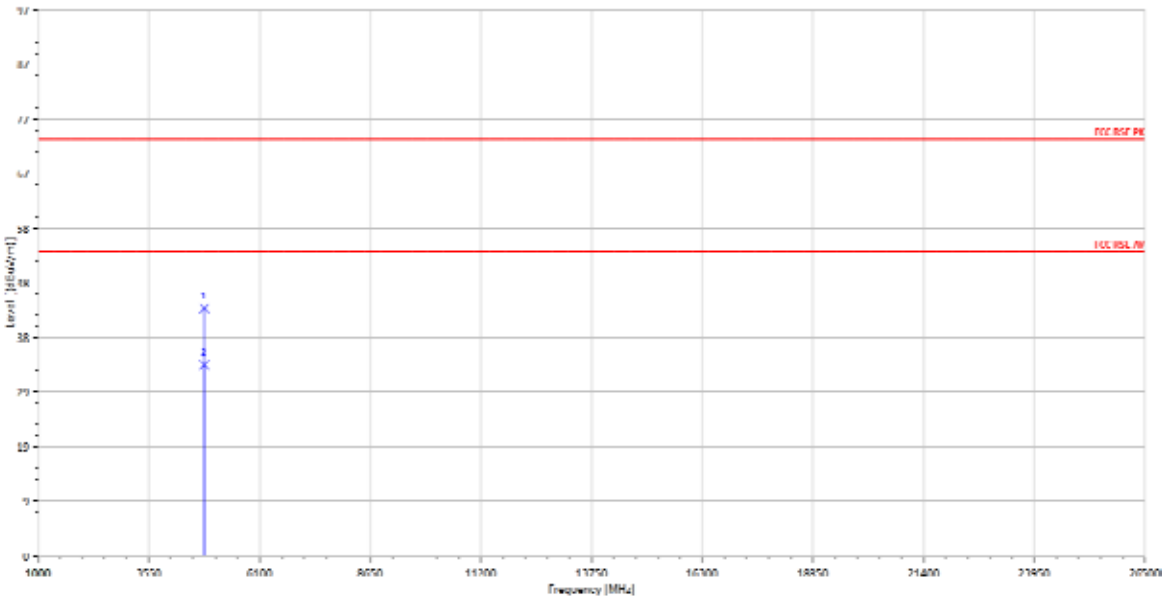
Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4824.00	Peak	H	33.01	10.97	43.98	74.00	-30.02
4824.00	Average	H	22.92	10.97	33.89	54.00	-20.11

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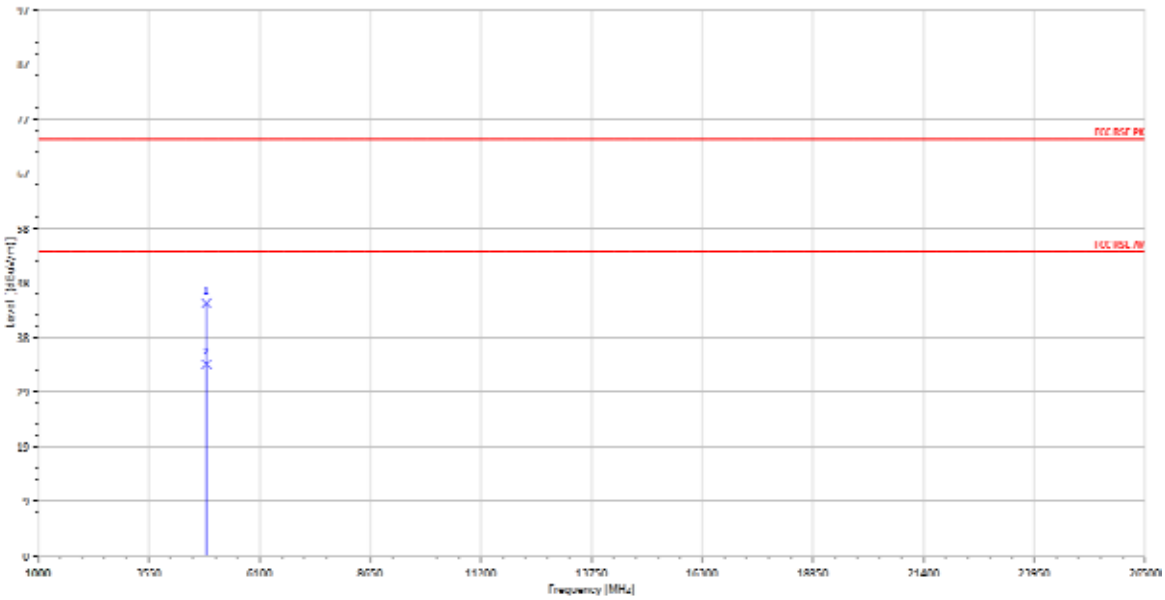
Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2437 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4874.00	Peak	H	33.98	10.89	44.87	74.00	-29.13
4874.00	Average	H	23.14	10.89	34.03	54.00	-19.97

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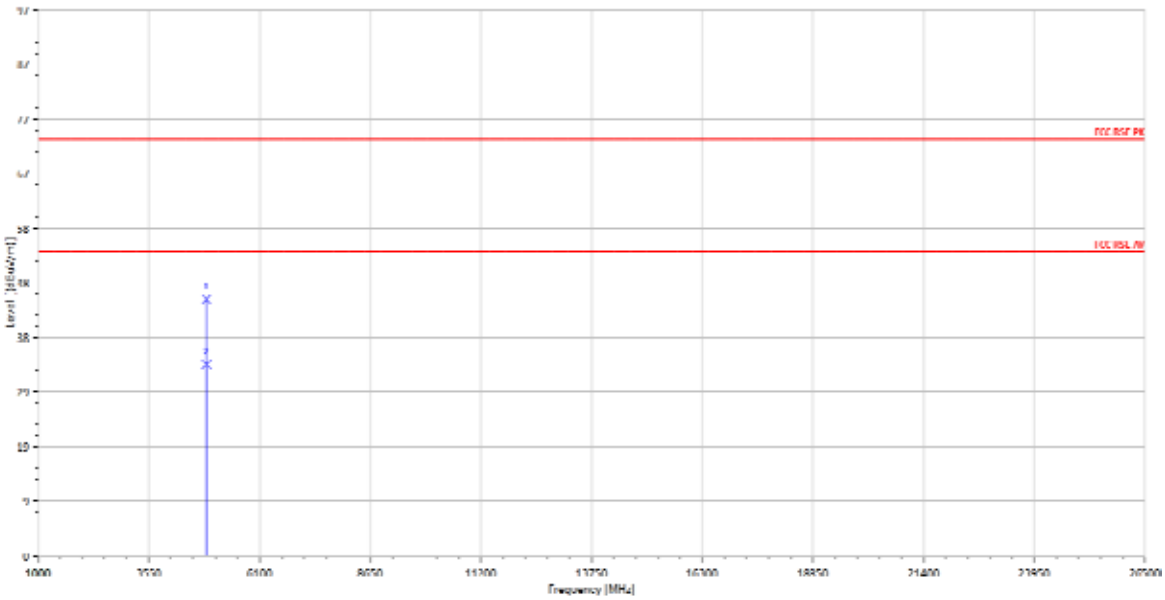
Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2437 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4874.00	Peak	H	34.68	10.89	45.57	74.00	-28.43
4874.00	Average	H	23.11	10.89	34.00	54.00	-20.00

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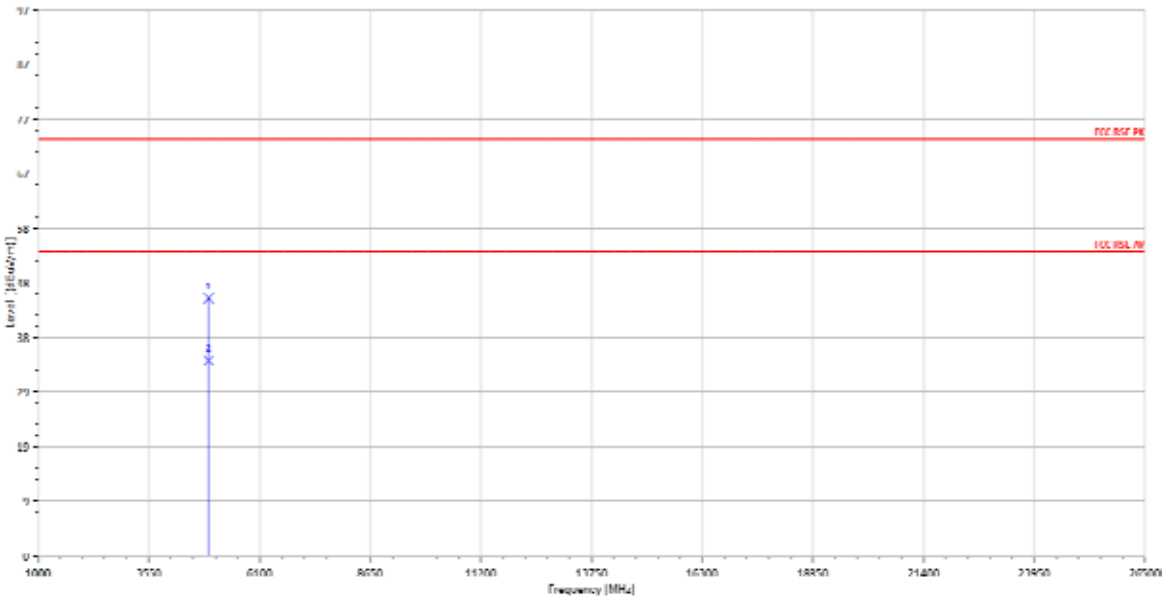
Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4924.00	Peak	H	34.78	10.98	45.76	74.00	-28.24
4924.00	Average	H	23.70	10.98	34.68	54.00	-19.32

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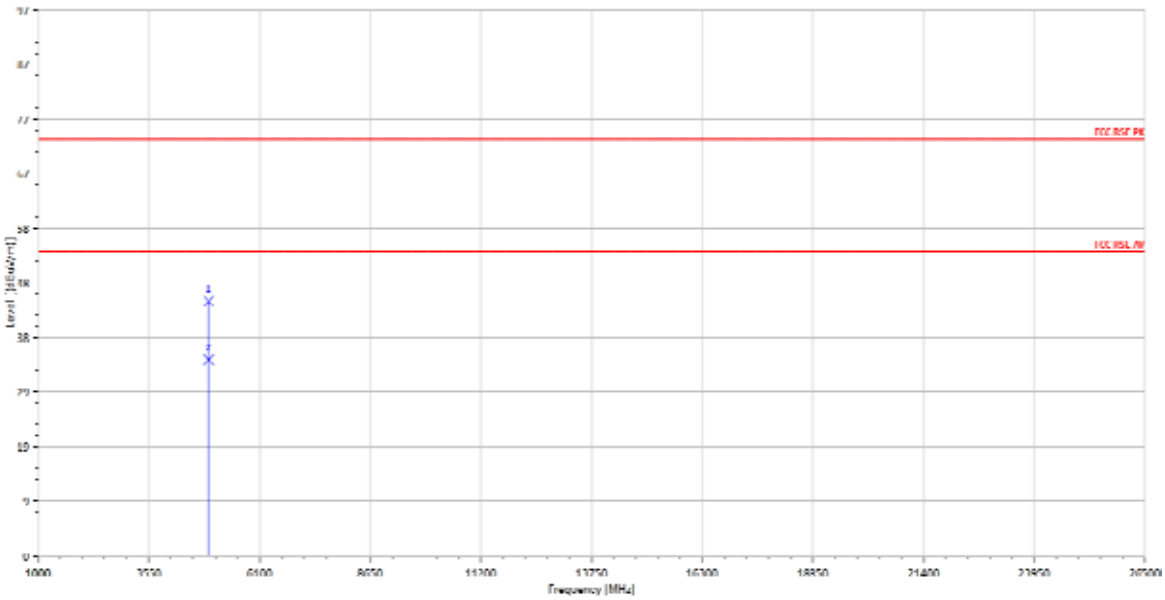
Operation Band	:802.11 g	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4924.00	Peak	H	34.24	10.98	45.22	74.00	-28.78
4924.00	Average	H	23.86	10.98	34.84	54.00	-19.16

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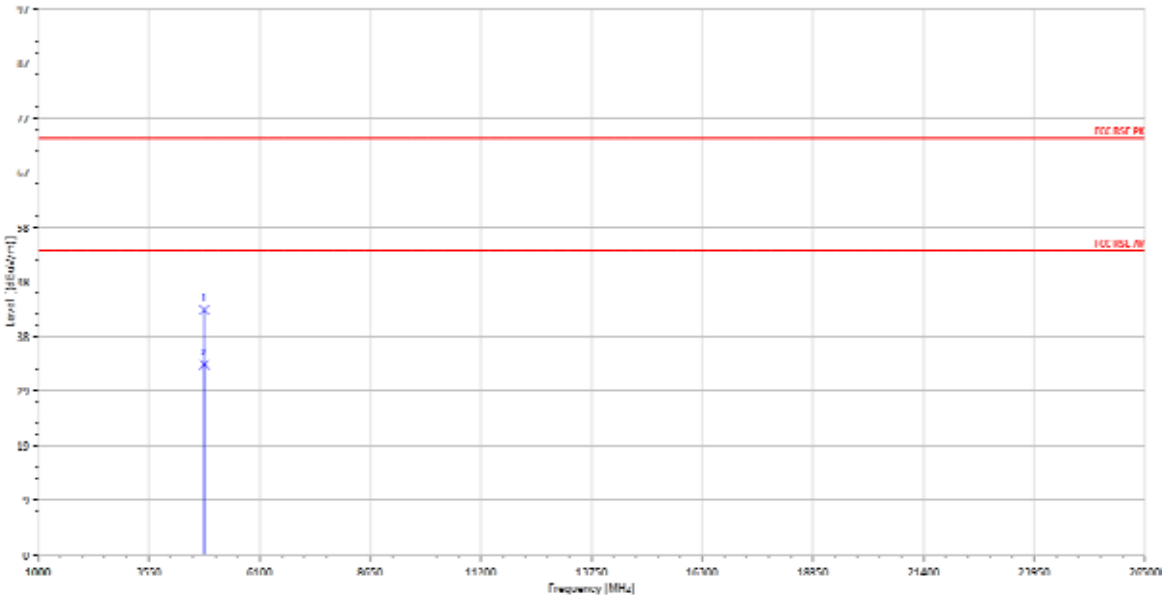
Radiated Spurious Emission Measurement Result (802.11_HT20)

Operation Band	:802.11 n20M	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4824.00	Peak	H	32.48	10.97	43.45	74.00	-30.55
4824.00	Average	H	22.83	10.97	33.80	54.00	-20.20

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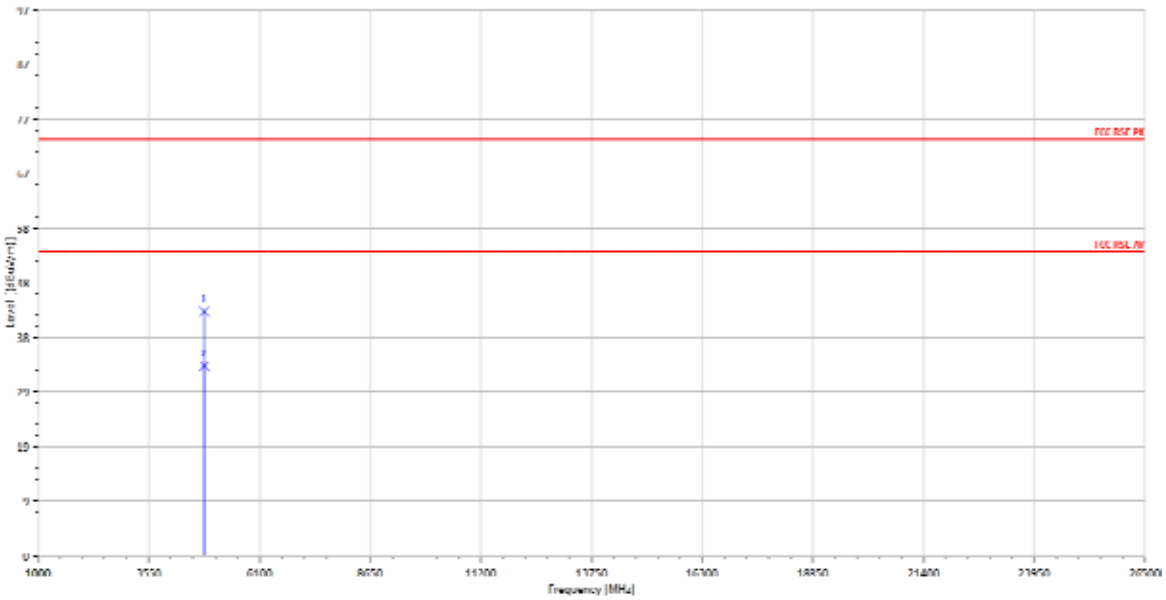
Operation Band	:802.11 n20M	Test Date	:2015-03-25
Fundamental Frequency	:2412 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4824.00	Peak	H	32.39	10.97	43.36	74.00	-30.64
4824.00	Average	H	22.77	10.97	33.74	54.00	-20.26

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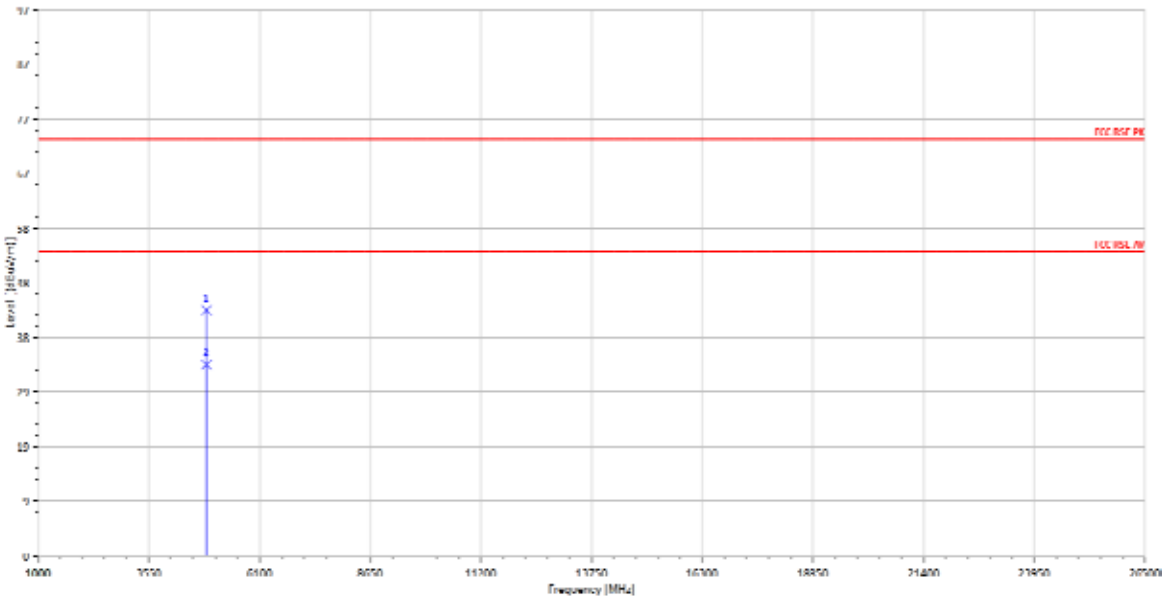
Operation Band	:802.11 n20M	Test Date	:2015-03-25
Fundamental Frequency	:2437 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4874.00	Peak	H	32.71	10.89	43.60	74.00	-30.40
4874.00	Average	H	23.04	10.89	33.93	54.00	-20.07

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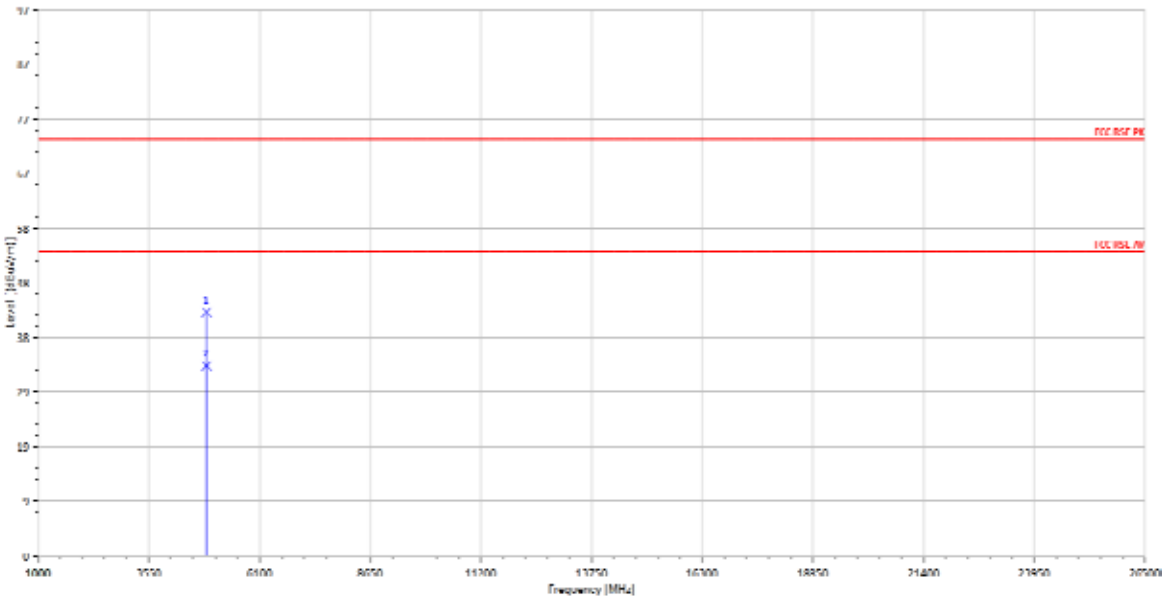
Operation Band	:802.11 n20M	Test Date	:2015-03-25
Fundamental Frequency	:2437 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4874.00	Peak	H	32.35	10.89	43.24	74.00	-30.76
4874.00	Average	H	22.87	10.89	33.76	54.00	-20.24

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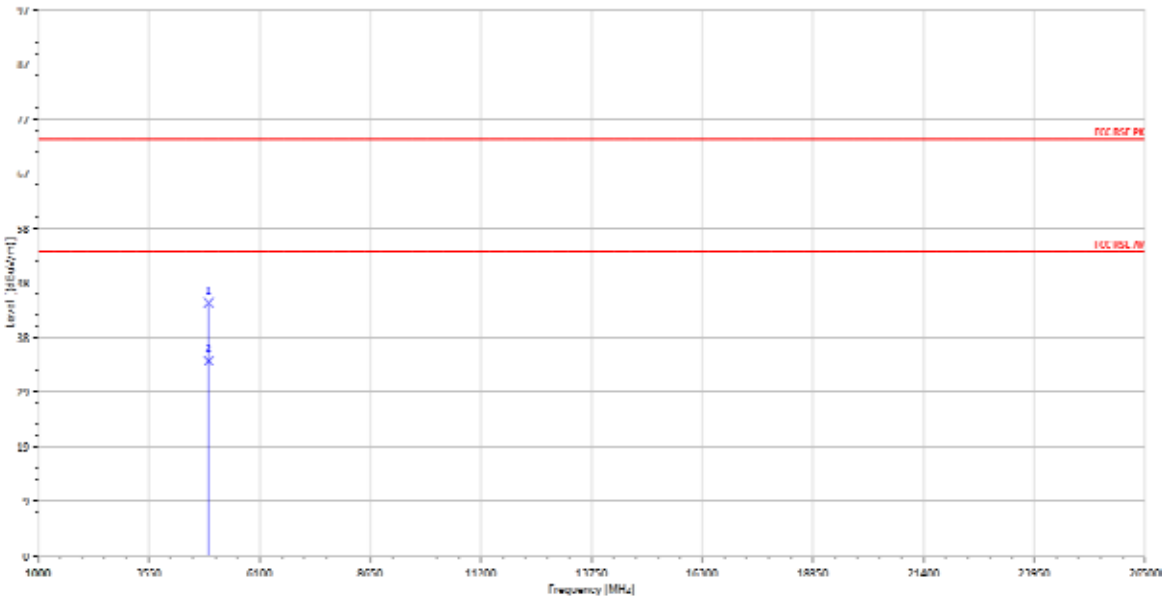
Operation Band	:802.11 n20M	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4924.00	Peak	H	33.96	10.98	44.94	74.00	-29.06
4924.00	Average	H	23.64	10.98	34.62	54.00	-19.38

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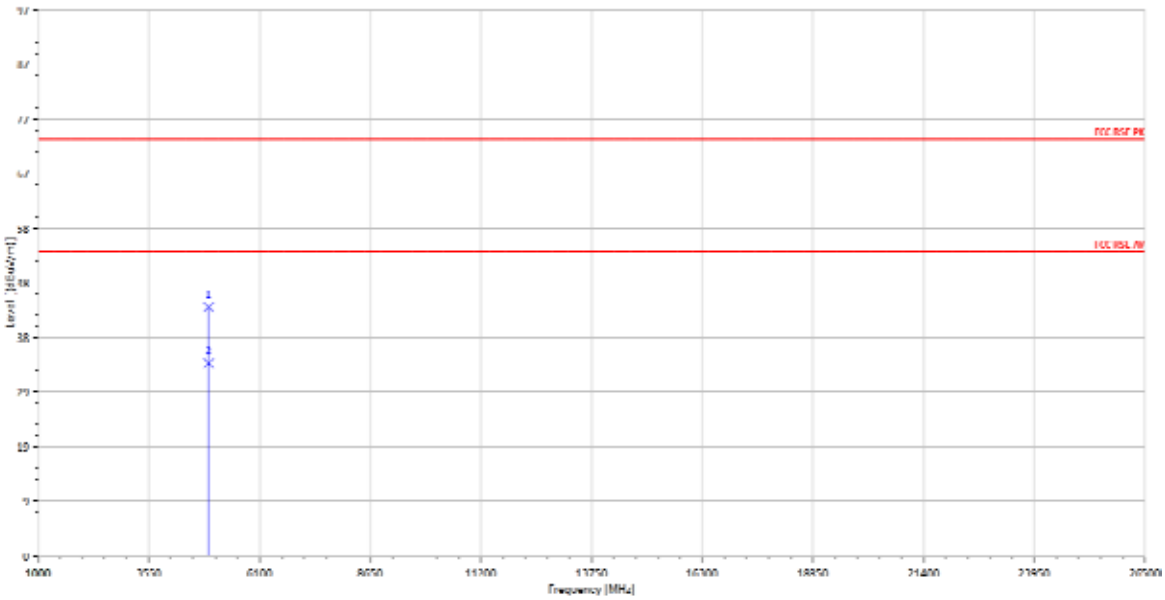
Operation Band	:802.11 n20M	Test Date	:2015-03-25
Fundamental Frequency	:2462 MHz	Temp./Humi.	:17.5deg_C/ 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Note F/H/E/S	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV / m	Limit @3m dBµV / m	Margin dB
4924.00	Peak	H	33.19	10.98	44.17	74.00	-29.83
4924.00	Average	H	23.22	10.98	34.20	54.00	-19.80

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12 PEAK POWER SPECTRAL DENSITY

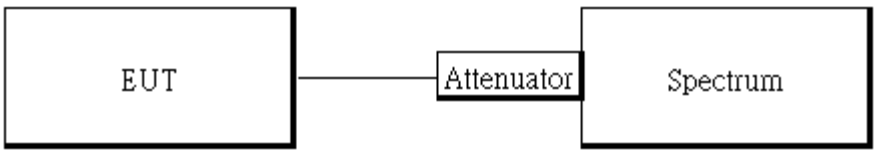
12.1 Standard Applicable

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 V03r02.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW ≥ 3 kHz.
5. Set the VBW ≥ 3 x RBW.
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. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

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12.5 Measurement Result

Frequency (MHz)	RF Power Density (dBm)	Maximum Limit (dBm)	Result
802.11b			
2412	-4.49	8	PASS
2437	-3.49	8	PASS
2462	-3.79	8	PASS
802.11g			
2412	-10.95	8	PASS
2437	-8.66	8	PASS
2462	-10.69	8	PASS
802.11n_HT20			
2412	-12.34	8	PASS
2437	-11.77	8	PASS
2462	-10.56	8	PASS

**Refer to next page for plots*

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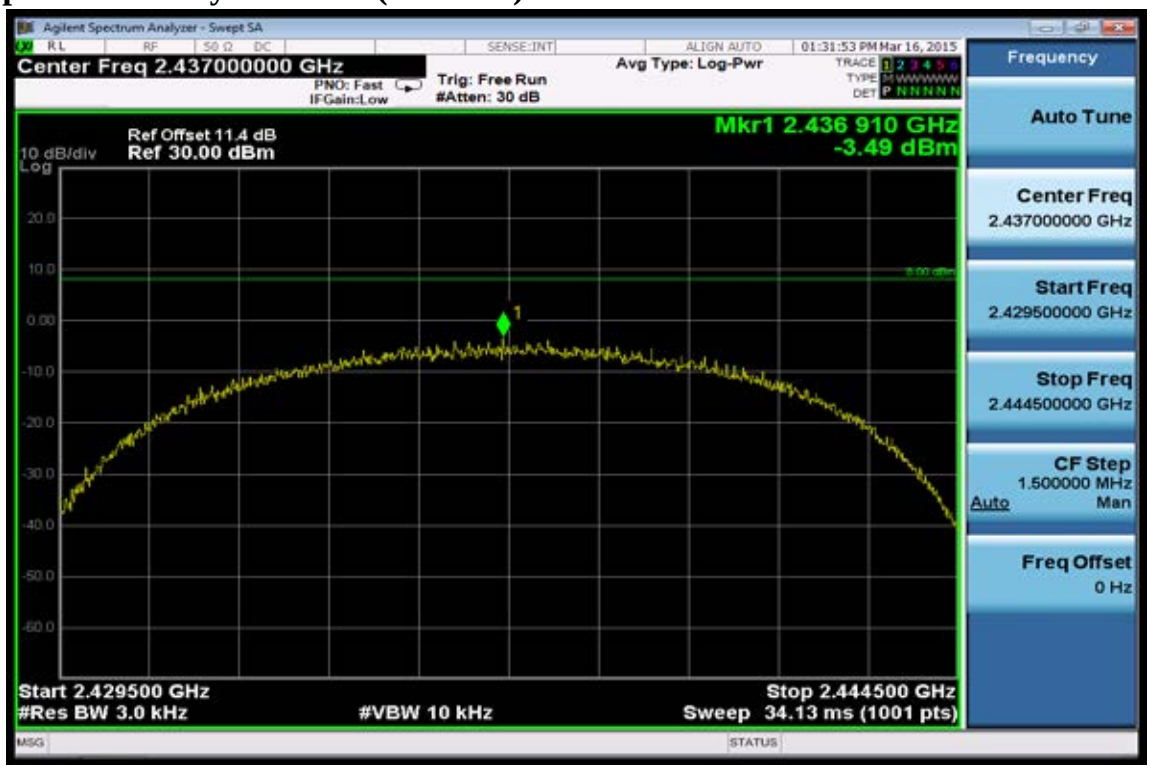
802.11b

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)



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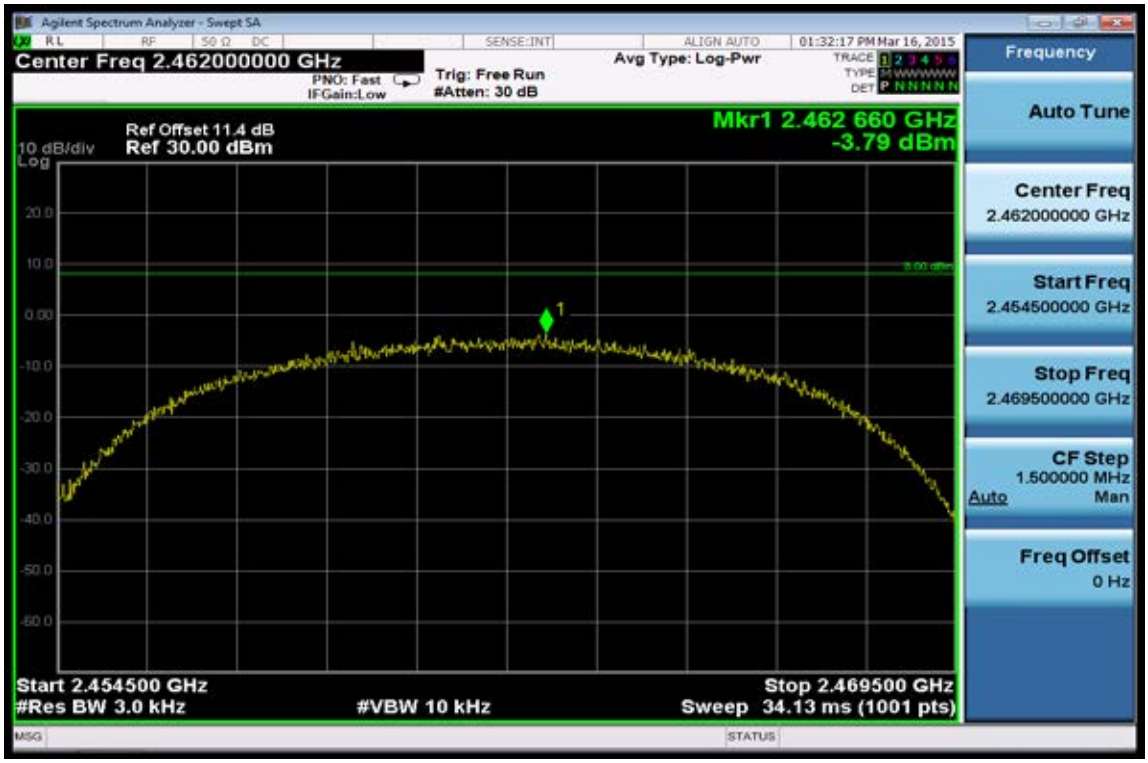
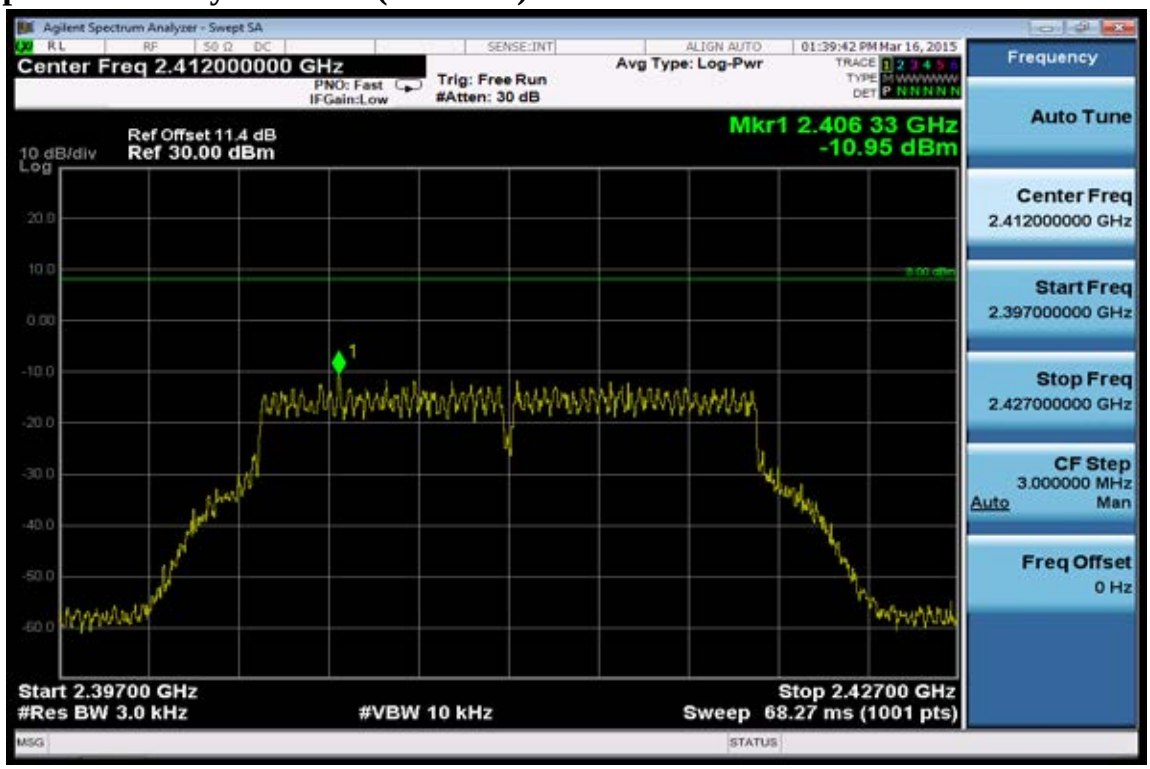
Power Spectral Density Test Plot (CH-High)



802.11g

Power Spectral Density Test Plot (CH-Low)



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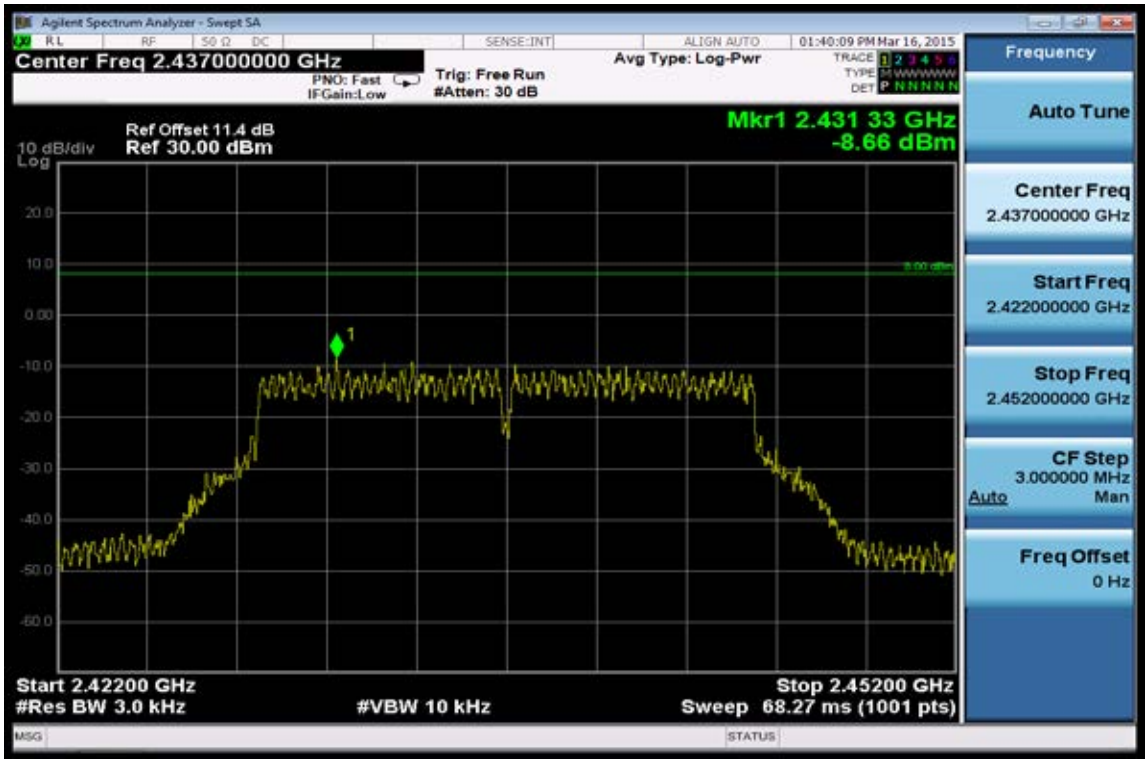
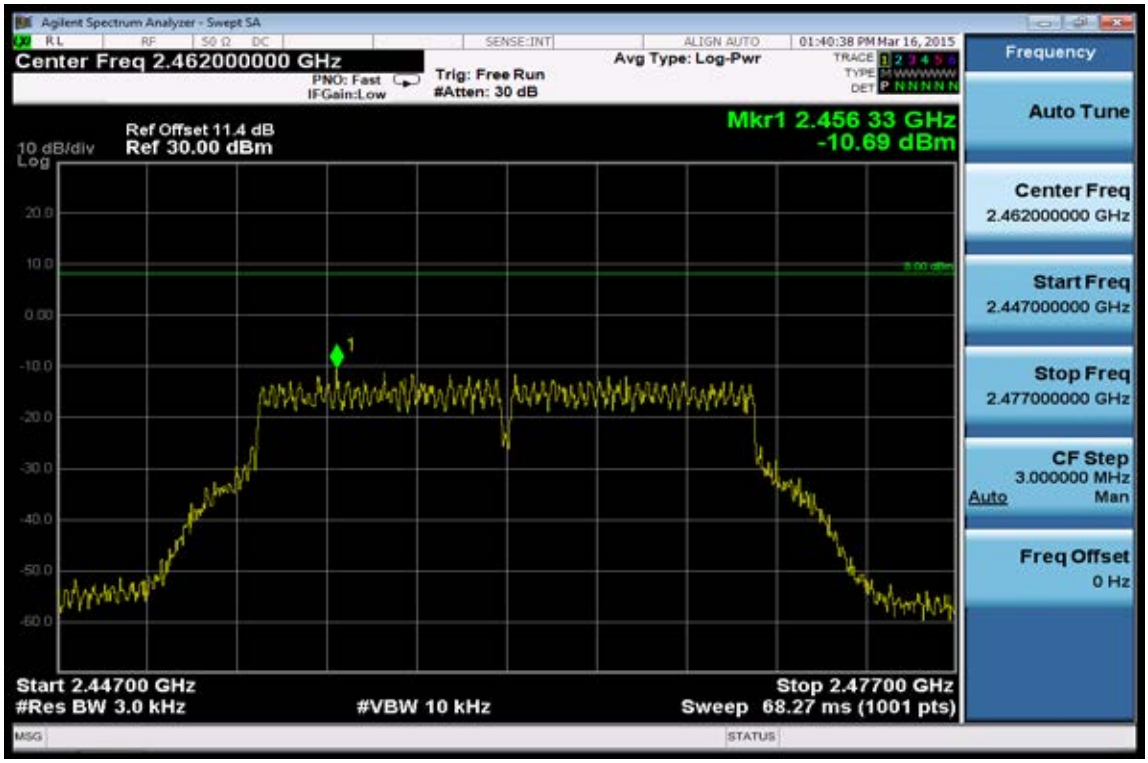
Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



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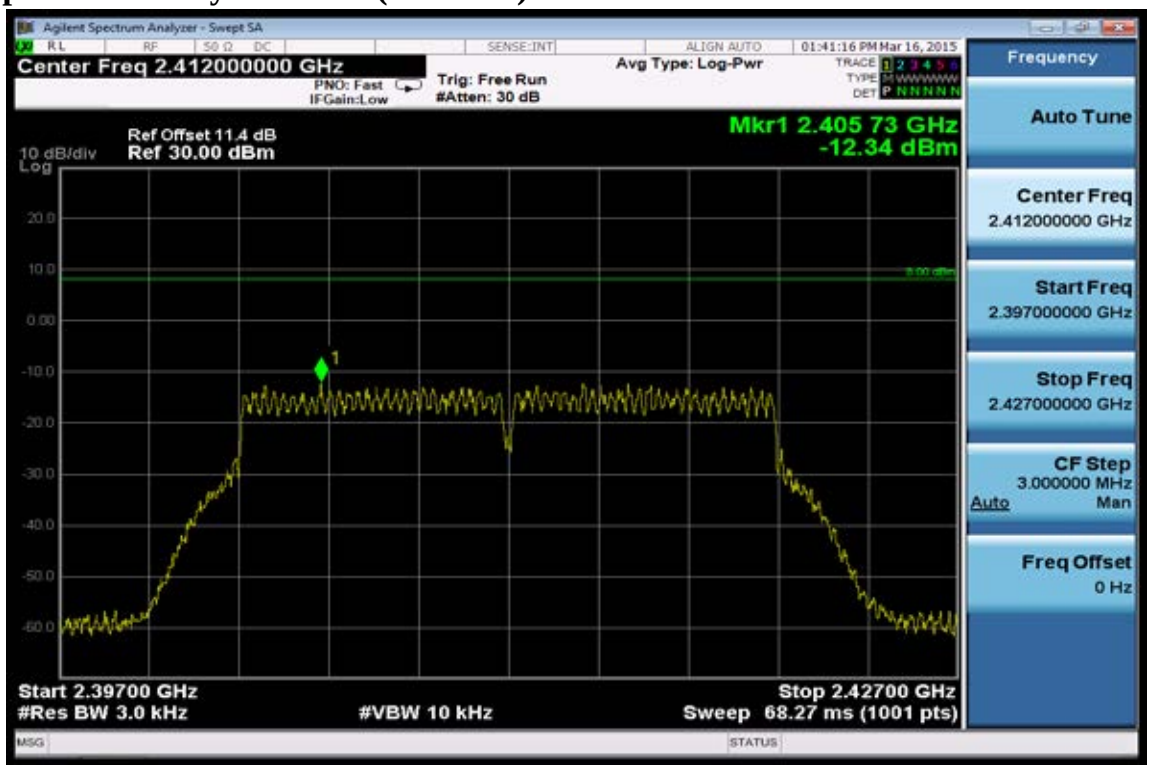
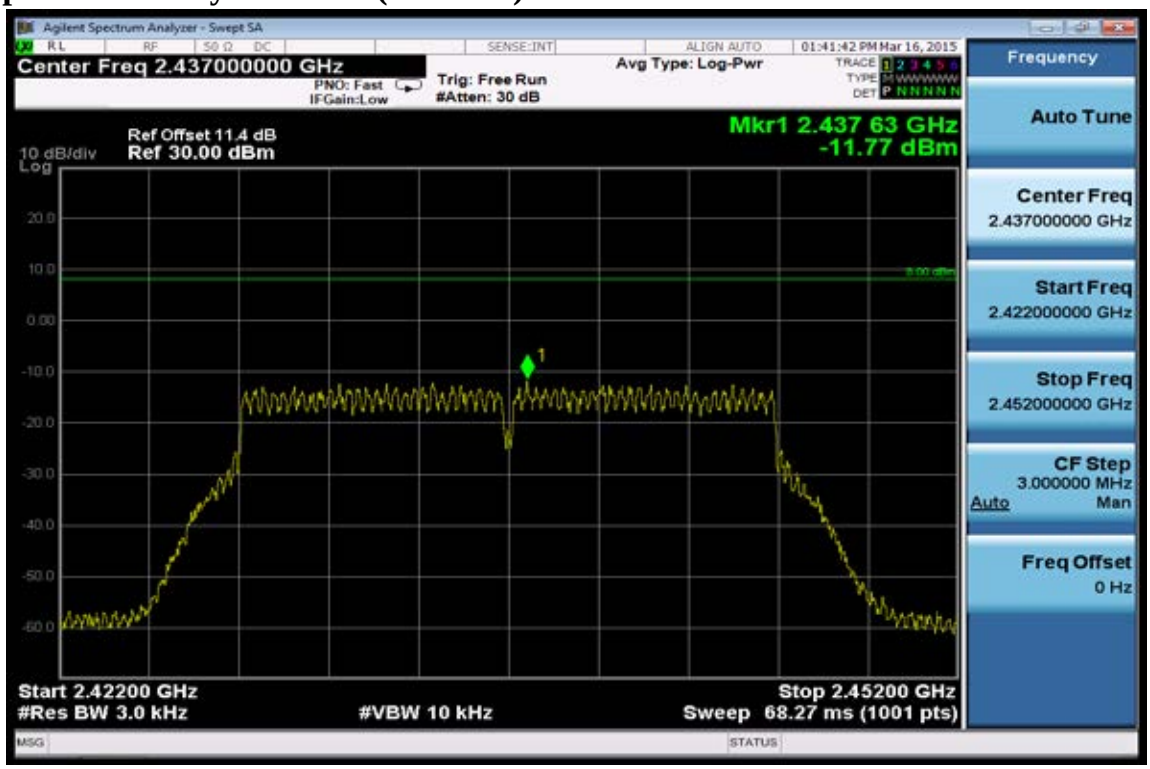
802.11n_HT20

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



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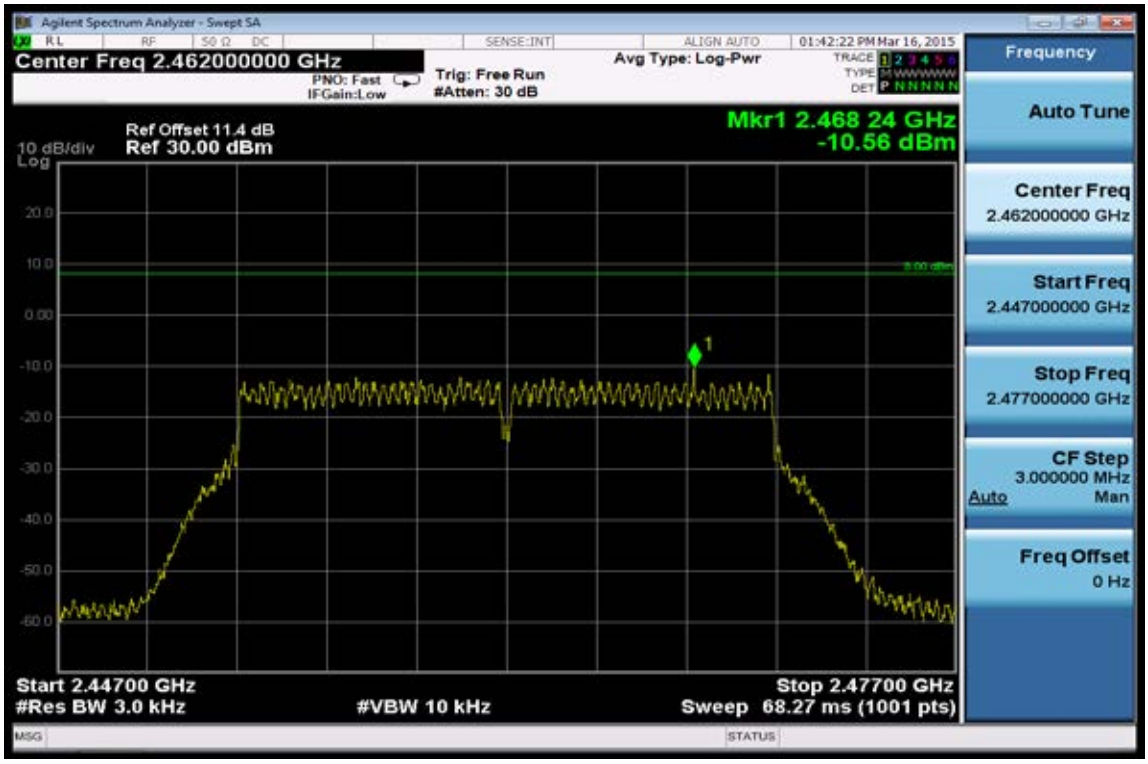
Power Spectral Density Test Plot (CH-High)



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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.

In case of point-to-point operation, the power shall be reduced by the one dB for every 3 dB that the directional gain of antenna exceeds 6dBi.

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.

~ End of Report ~

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