

## **Certification Test Report**

**FCC ID: UIDDG860AP2**

**IC: 6670A-DG860AP2**

**FCC Rule Part: 15.247**

**IC Radio Standards Specification: RSS-210**

**ACS Report Number: 12-0013.W06.1A**

**Manufacturer: Arris International, Inc.**

**Model: DG860P2**

**Test Begin Date: March 28, 2012**

**Test End Date: May 1, 2012**

**Report Issue Date: June 11, 2012**



FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

**Reviewed by:**

A handwritten signature in black ink, appearing to read "Kirby Munroe", is written over a horizontal line.

**Kirby Munroe**  
**Director, Wireless Certifications**  
**ACS, Inc.**

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**This report contains 48 pages**

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## 1 GENERAL

### 1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210.

### 1.2 General

The DG860P2 is a Touchstone Data Gateway cable modem.

#### Technical Information:

Detail	Description
Frequency Range	802.11b/g/n HT20: 2412 – 2462 MHz 802.11n HT40: 2422 – 2452 MHz
Number of Channels	802.11b/g/n HT20: 11 802.11n HT40: 7
Modulation Format	802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rates	802.11b: 1 – 11 Mbps 802.11g: 6 – 54 Mbps 802.11n HT 20: 6.5 - 130 Mbps 802.11n HT40: 13.5 – 270 Mbps
Number of Inputs/Outputs	2T2R
Operating Voltage	120VAC / 60Hz
Antenna Type / Gain	Airgain Model M2450DLM embedded antenna; 4.6dBi

#### Manufacturer Information:

ARRIS International, Inc.  
3871 Lakefield Dr.  
Suwanee, GA 30024

**Test Sample Serial Number:** Radiated:C3EBUB222200186, RF Conducted:C3EBUB222200020

**Test Sample Condition:** The test samples were provided in good working order with no visible defects.

### 1.3 Test Methodology and Considerations

Testing was performed to determine worst-case mode of operation with respect to modulation and data rate. The following table details the parameters used for final testing.

**Table 1.3-1: Test Parameters**

Mode of Operation	Data Rate (Mbps)	Antenna Port(s) Evaluated	Channels Evaluated
802.11b	11	0	1, 6, 11
802.11g	6	0	1, 6, 11
802.11n HT20	13	0/1	1, 6, 11
802.11n HT40	27	0/1	3, 6, 9

Configuration software: Ralink RT3352 QA UI V1.0.1.8.

**Table 1.3-2: Power Settings**

Mode of Operation	Channel	TX Power Setting Chain 0	TX Power Setting Chain 1
802.11b	1	0C	-----
	6	0C	-----
	11	0B	-----
802.11g	1	0C	-----
	6	0C	-----
	11	0B	-----
802.11n HT20	1	0C	11
	6	0C	13
	11	0B	13
802.11n HT40	3	0C	11
	6	0C	13
	9	0B	13

## **2 TEST FACILITIES**

### **2.1 Location**

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions  
5015 B.U. Bowman Drive  
Buford, GA 30518  
Phone: (770) 831-8048  
Fax: (770) 831-8598

### **2.2 Laboratory Accreditations/Recognitions/Certifications**

ACS is accredited to ISO/IEC 17025 by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program (NVLAP), Lab Code 200612-0. Unless otherwise specified, all tests methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment.

FCC Registration Number: 511277

Industry Canada Lab Code: IC 4175A-1

VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

## 2.3 Radiated Emissions Test Site Description

### 2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

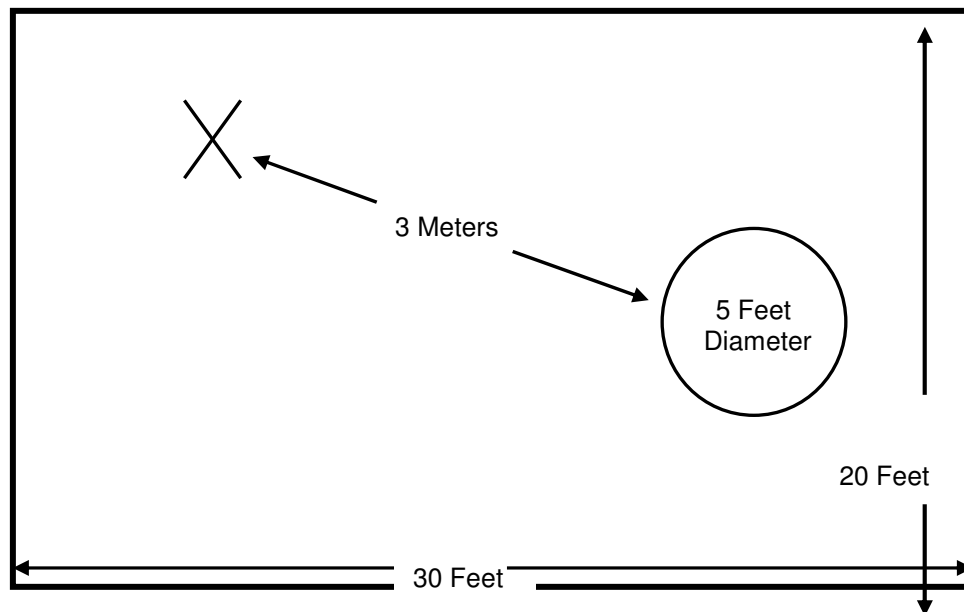


Figure 2.3-1: Semi-Anechoic Chamber Test Site

### 2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

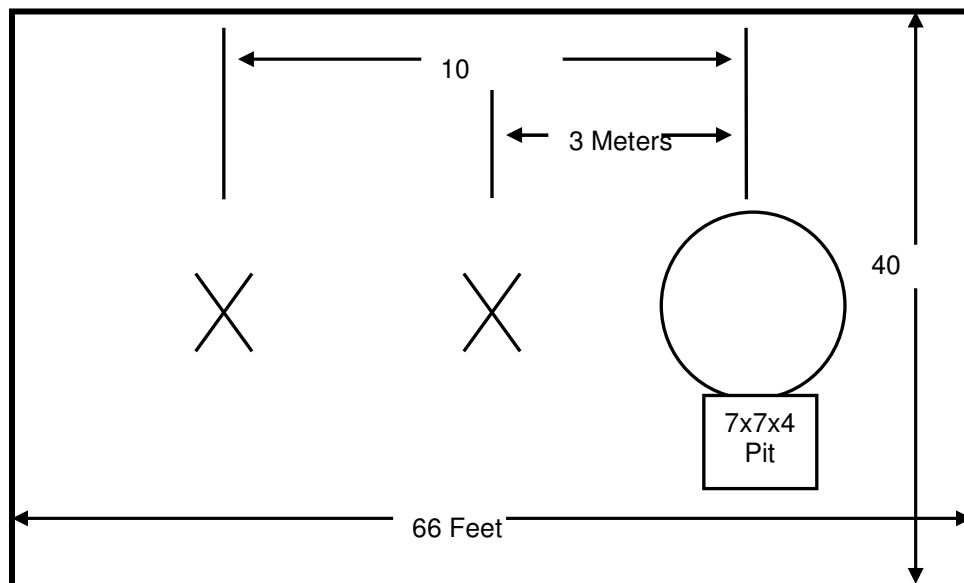


Figure 2.3-2: Open Area Test Site

## 2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal ground reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

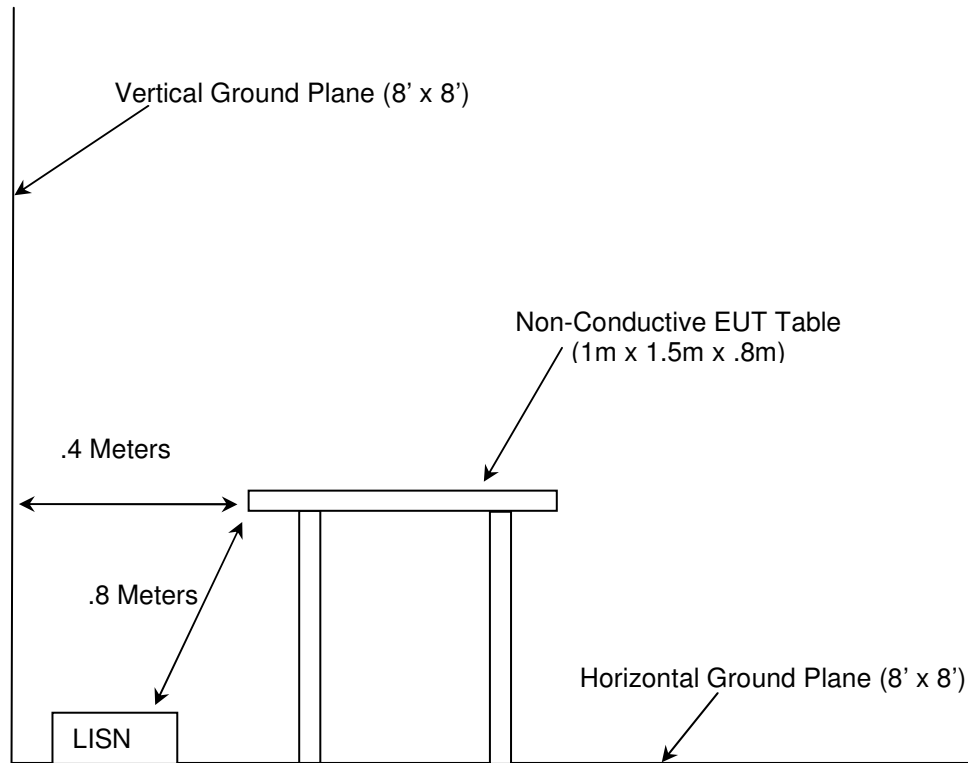


Figure 2.4-1: AC Mains Conducted EMI Site



### 3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ❖ ANSI C63.4-2009: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2012
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2012
- ❖ FCC KDB 558074 D01 DTS Meas Guidance v01 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247, January 18, 2012
- ❖ FCC KDB Publication No. 662911 D01 Multiple Transmitter Output v01r01 - Emissions Testing of Transmitters with Multiple Outputs in the Same Band, October 25, 2011
- ❖ Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8, Dec 2010
- ❖ Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue 3, Dec 2010.

### 4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

**Table 4-1: Test Equipment**

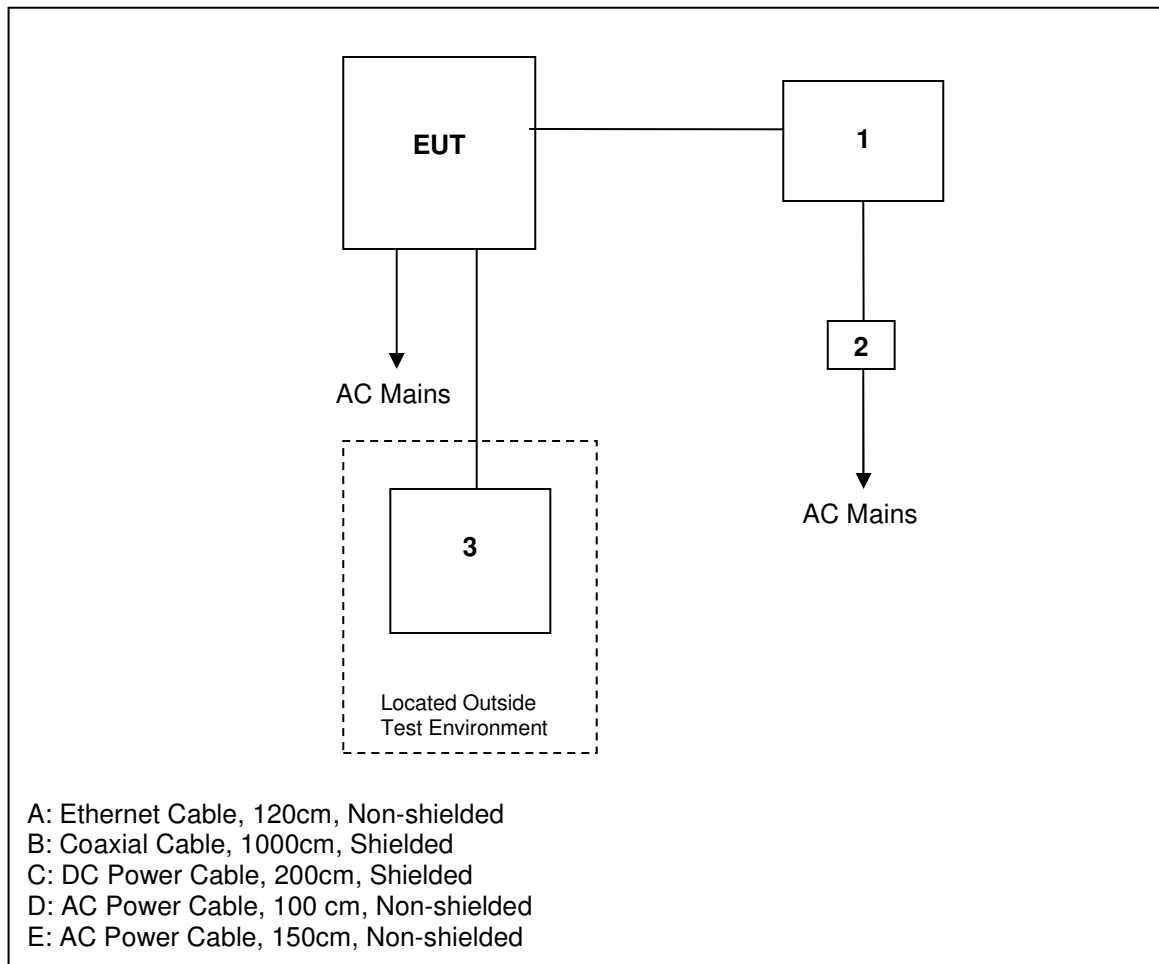
AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
1	Rohde & Schwarz	ESMI - Display	Spectrum Analyzers	833771/007	9/23/2011	9/23/2012
2	Rohde & Schwarz	ESMI-Receiver	Spectrum Analyzers	839587/003	9/23/2011	9/23/2012
30	Spectrum Technologies	DRH-0118	Antennas	970102	4/27/2011	4/27/2013
40	EMCO	3104	Antennas	3211	2/11/2011	2/11/2013
73	Agilent	8447D	Amplifiers	2727A05624	9/30/2011	9/30/2012
152	EMCO	3825/2	LISN	9111-1905	11/2/2010	11/2/2012
153	EMCO	3825/2	LISN	9411-2268	1/13/2011	1/13/2013
168	Hewlett Packard	11947A	Attenuators	44829	2/1/2012	2/1/2013
283	Rohde & Schwarz	FSP40	Spectrum Analyzers	1000033	8/26/2011	8/26/2012
291	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	None	12/2/2011	12/2/2012
292	Florida RF Cables	SMR-290AW-480.0-SMR	Cables	None	4/11/2011	4/11/2012
292	Florida RF Cables	SMR-290AW-480.0-SMR	Cables	None	4/2/2012	4/2/2013
324	ACS	Belden	Cables	8214	7/6/2011	7/6/2012
334	Rohde&Schwarz	3160-10	Antennas	45576	11/4/2010	NCR
335	Suhner	SF-102A	Cables	882/2A	8/29/2011	8/29/2012
338	Hewlett Packard	8449B	Amplifiers	3008A01111	3/1/2012	8/31/2012
340	Aeroflex/Weinschel	AS-20	Attenuators	7136	8/29/2011	8/29/2012
345	Suhner Sucoflex	102A	Cables	1077/2A	8/29/2011	8/29/2012
412	Electro Metrics	LPA-25	Antennas	1241	7/28/2010	7/28/2012
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	12/2/2011	12/2/2012
432	Microwave Circuits	H3G020G4	Filters	264066	7/11/2011	7/11/2012
562	United Microwave Products, Inc.	AA-190-00.48.0	Cables	562	8/11/2011	8/11/2012

## 5 SUPPORT EQUIPMENT

**Table 5-1: Support Equipment**

Item	Equipment Type	Manufacturer	Model Number	Serial Number
1	Laptop Computer	Dell	Vostro 3450	CN-0YW3P2-48643-18T-1329-A00
2	Laptop Power Supply	Dell	LA65NS2-01	CN-0928G4-72438-16S-24AD-A00
3	Data Gateway	Arris	D5 UEQ	NA

## 6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

**Figure 6-1: Setup Block Diagram**

## 7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

### 7.1 Antenna Requirement – FCC: Section 15.203

The EUT utilizes an Airgain Model M2450DLM embedded antenna. The antennas are integral to the device and cannot be removed or replaced by the end user. The peak gain antenna gain is stated as 4.6dBi.

### 7.2 Power Line Conducted Emissions – FCC: Section 15.207 IC: RSS-Gen 7.2.4

#### 7.2.1 Measurement Procedure

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

**Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss**  
**Margin = Applicable Limit - Corrected Reading**

#### 7.2.2 Measurement Results

Results of the test are shown below in and Tables 7.2.2-1 to 7.2.2-2.

**Table 7.2.2-1: Conducted EMI Results – Line 1**

Frequency (MHz)	Level (dBuV)	Transducer (dB)	Limit (dBuV)	Margin (dB)	Line	PE	Detector
0.198000	55.90	9.9	64	7.8	L1	FLO	QP
0.294000	44.60	10.0	60	15.8	L1	FLO	QP
0.594000	39.60	10.0	56	16.4	L1	FLO	QP
1.152000	37.70	10.0	56	18.3	L1	FLO	QP
1.392000	34.70	10.0	56	21.3	L1	FLO	QP
1.458000	40.10	10.0	56	15.9	L1	FLO	QP
1.860000	36.90	10.0	56	19.1	L1	FLO	QP
2.100000	37.40	10.0	56	18.6	L1	FLO	QP
3.540000	34.30	9.9	56	21.7	L1	FLO	QP
18.468000	36.60	9.8	73	23.4	L1	FLO	QP
0.204000	42.80	9.9	53	10.7	L1	FLO	AVG
0.312000	30.80	10.0	50	19.1	L1	FLO	AVG
0.588000	26.70	10.0	46	19.3	L1	FLO	AVG
1.152000	24.00	10.0	46	22.0	L1	FLO	AVG
1.344000	12.50	10.0	46	33.5	L1	FLO	AVG
1.458000	35.70	10.0	46	10.3	L1	FLO	AVG
1.878000	22.40	10.0	46	23.6	L1	FLO	AVG
2.052000	19.90	10.0	46	26.1	L1	FLO	AVG
3.522000	21.90	9.9	46	24.1	L1	FLO	AVG
18.402000	27.80	9.8	50	22.2	L1	FLO	AVG

Table 7.2.2-2: Conducted EMI Results – Line 2

Frequency (MHz)	Level (dBuV)	Transducer (dB)	Limit (dBuV)	Margin (dB)	Line	PE	Detector
0.198000	55.40	9.9	64	8.3	L2	FLO	QP
0.312000	42.30	10.0	60	17.6	L2	FLO	QP
0.588000	37.80	10.0	56	18.3	L2	FLO	QP
1.098000	34.40	10.0	56	21.6	L2	FLO	QP
1.458000	37.50	10.0	56	18.5	L2	FLO	QP
3.546000	32.90	9.9	56	23.1	L2	FLO	QP
4.494000	33.00	10.0	56	23.0	L2	FLO	QP
17.208000	33.90	9.8	60	26.1	L2	FLO	QP
18.090000	35.60	9.8	60	24.4	L2	FLO	QP
18.366000	36.60	9.8	73	23.4	L2	FLO	QP
0.204000	41.90	9.9	53	11.6	L2	FLO	AVG
0.312000	28.70	10.0	50	21.2	L2	FLO	AVG
0.624000	24.40	10.0	46	21.6	L2	FLO	AVG
1.188000	16.20	10.0	46	29.8	L2	FLO	AVG
1.458000	34.10	10.0	46	11.9	L2	FLO	AVG
3.606000	17.60	9.9	46	28.4	L2	FLO	AVG
4.494000	20.70	10.0	46	25.3	L2	FLO	AVG
17.340000	25.70	9.8	50	24.3	L2	FLO	AVG
17.976000	26.60	9.8	50	23.4	L2	FLO	AVG
18.048000	27.60	9.8	50	22.4	L2	FLO	AVG

### 7.3 6dB / 99% Bandwidth – FCC: Section 15.247(a)(2) IC: RSS-210 A8.2(a)

#### 7.3.1 Measurement Procedure

The 6dB bandwidth was measured in accordance with the FCC KDB 558074 D01 DTS Meas Guidance v01. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to approximately 1% to 5% of the Emission Bandwidth (EBW). The Video Bandwidth (VBW) was set to  $\geq 3$  times the RBW. The trace was set to max hold with a peak detector active. The Delta function of the analyzer was utilized to determine the 6 dB bandwidth of the emission.

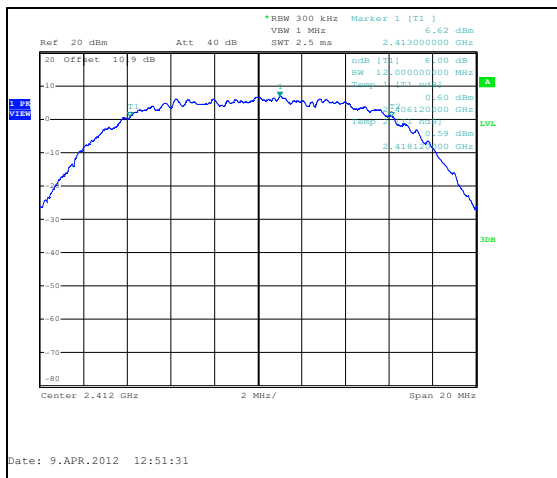
The occupied bandwidth measurement function of the analyzer was used for the 99% bandwidth. The span of the analyzer was set to capture all products of the modulation process, including the emission sidebands. The resolution bandwidth was set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth was set to 3 times the resolution bandwidth. A sampling detector was used.

#### 7.3.2 Measurement Results

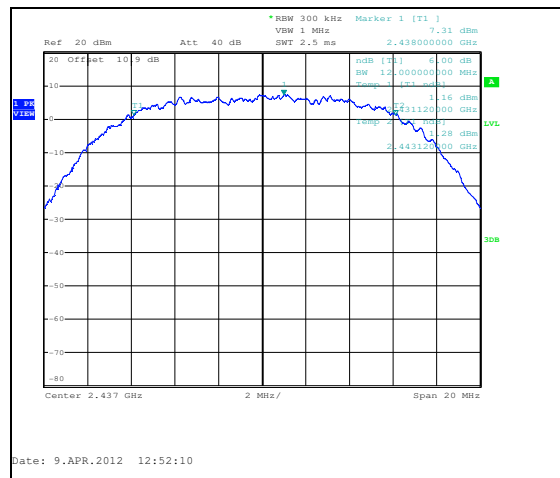
Results are shown below in tables 7.3.2-1 to 7.3.2-4 and figures 7.3.2-1 to 7.3.2-36:

**Table 7.3.2-1: 6dB / 99% Bandwidth – 802.11b**

Frequency (MHz)	6dB BW (MHz)		99% OBW (MHz)	
	Chain 0	Chain 1	Chain 0	Chain 1
2412	12.00	--	14.80	--
2437	12.00	--	14.80	--
2462	11.76	--	14.80	--



**Figure 7.3.2-1: 6dB BW – 2412MHz – Chain 0**



**Figure 7.3.2-2: 6dB BW – 2437MHz – Chain 0**

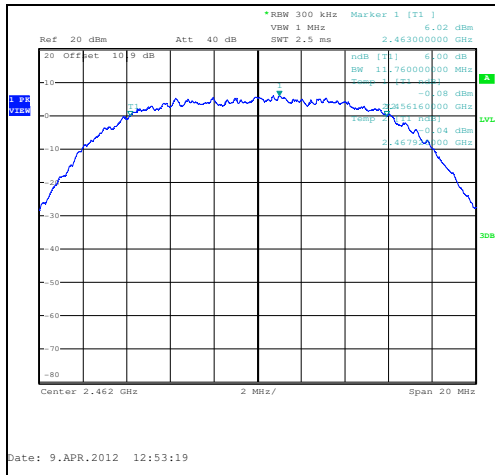


Figure 7.3.2-3: 6dB BW – 2462MHz – Chain 0

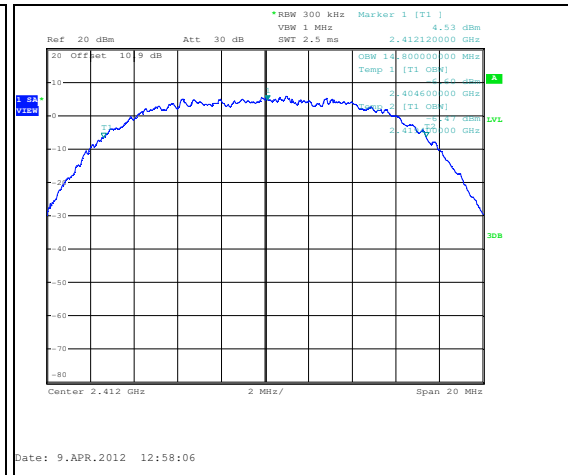


Figure 7.3.2-4: 99% OBW – 2412MHz – Chain 0

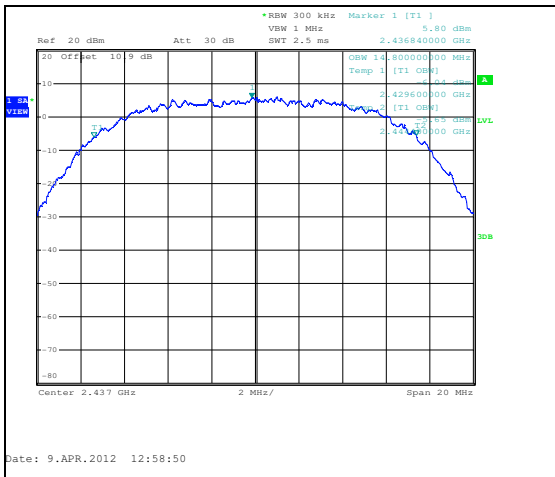


Figure 7.3.2-5: 99% OBW – 2437MHz – Chain 0

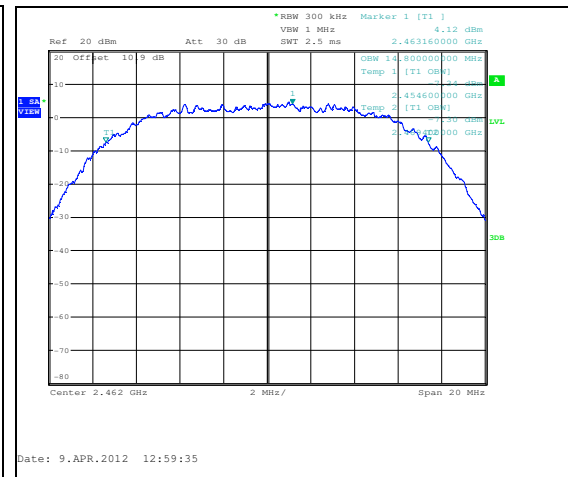


Figure 7.3.2-6: 99% OBW – 2462MHz – Chain 0

Table 7.3.2-2: 6dB / 99% Bandwidth – 802.11g

Frequency (MHz)	6dB BW (MHz)		99% OBW (MHz)	
	Chain 0	Chain 1	Chain 0	Chain 1
2412	15.96	--	16.24	--
2437	15.92	--	16.28	--
2462	16.08	--	16.24	--

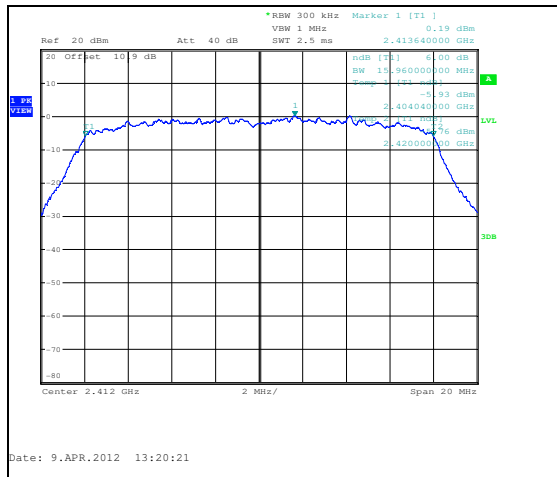


Figure 7.3.2-7: 6dB BW – 2412MHz – Chain 0

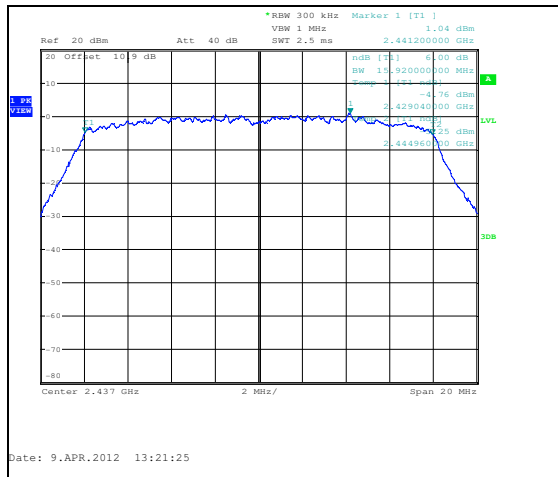


Figure 7.3.2-8: 6dB BW – 2437MHz – Chain 0

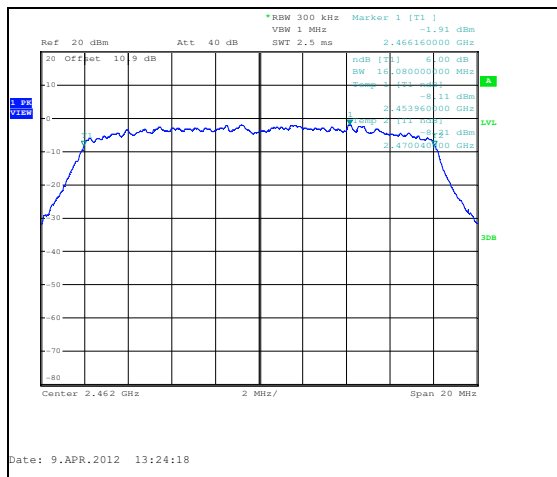


Figure 7.3.2-9: 6dB BW – 2462MHz – Chain 0

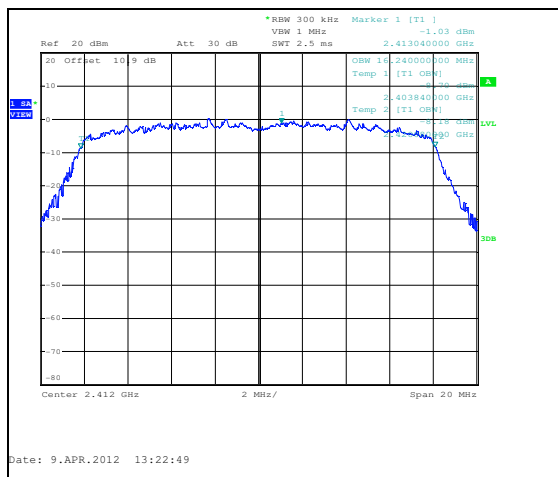
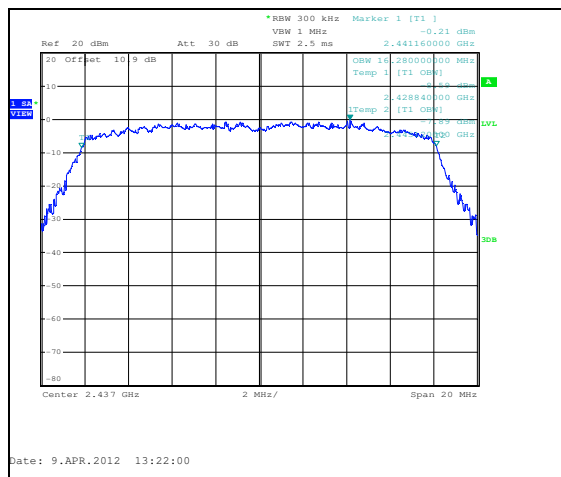
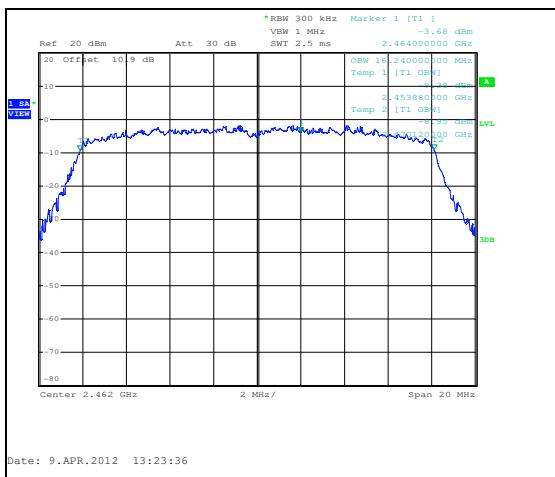


Figure 7.3.2-10: 99% OBW – 2412MHz – Chain 0



**Figure 7.3.2-11: 99% OBW – 2437MHz – Chain 0**

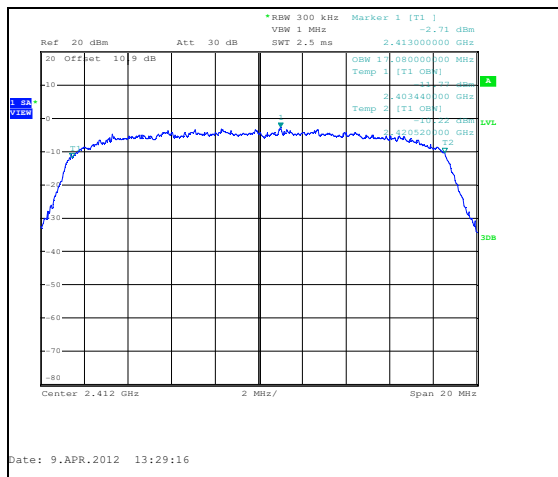
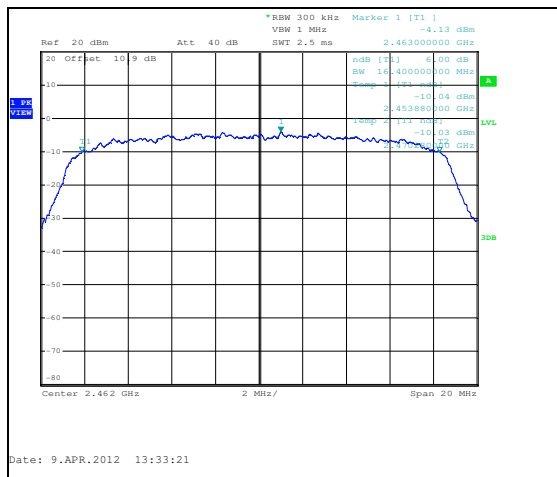
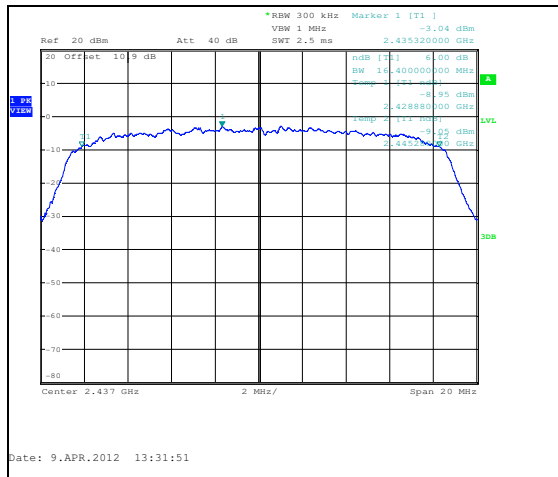
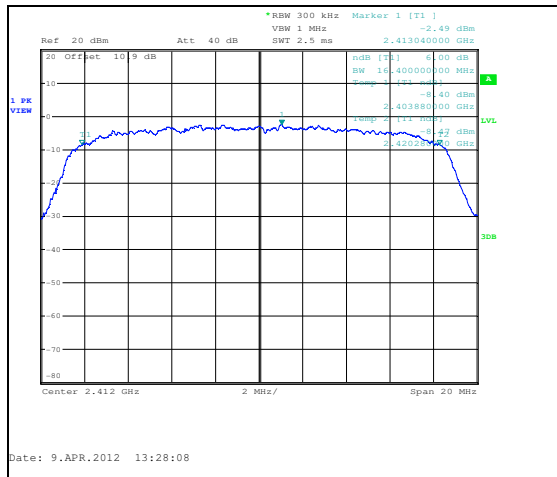


**Figure 7.3.2-12: 99% OBW – 2462MHz – Chain 0**



Table 7.3.2-3: 6dB / 99% Bandwidth – 802.11n HT20

Frequency (MHz)	6dB BW (MHz)		99% OBW (MHz)	
	Chain 0	Chain 1	Chain 0	Chain 1
2412	16.40	16.44	17.08	17.08
2437	16.40	16.52	17.12	17.12
2462	16.40	16.52	17.08	17.12



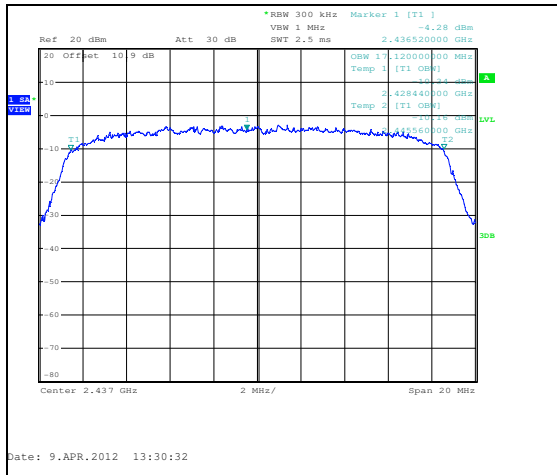


Figure 7.3.2-17: 99% OBW - 2437MHz - Chain 0

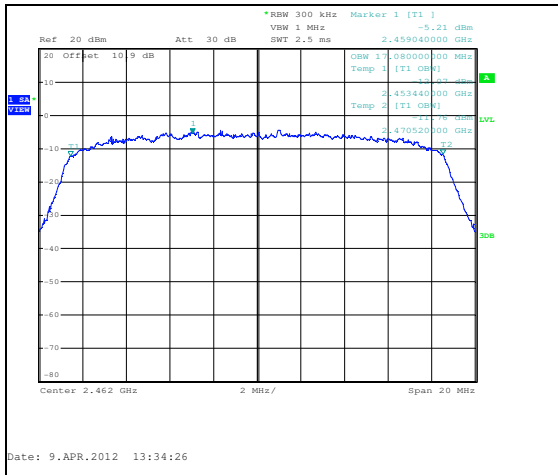


Figure 7.3.2-18: 99% OBW - 2462MHz - Chain 0

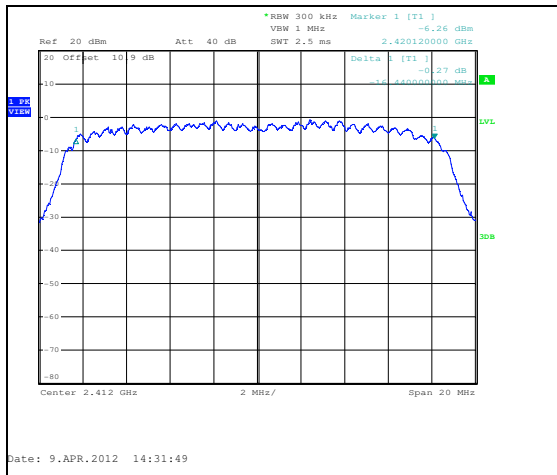


Figure 7.3.2-19: 6dB BW - 2412MHz - Chain 1

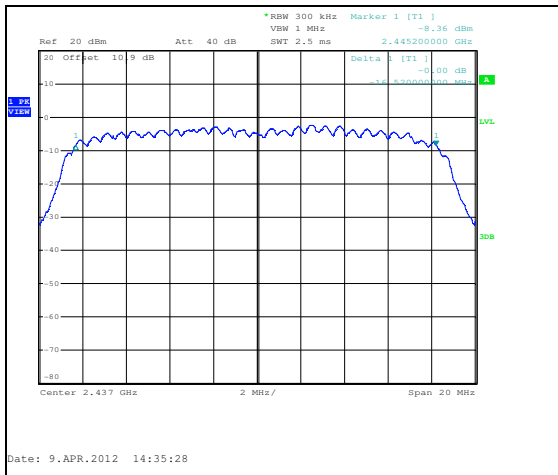


Figure 7.3.2-20: 6dB BW - 2437MHz - Chain 1

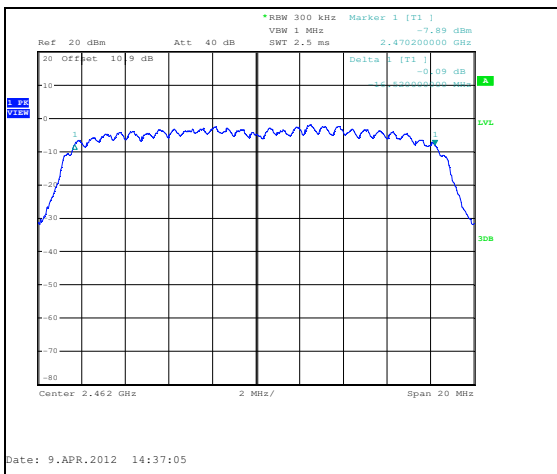


Figure 7.3.2-21: 6dB BW - 2462MHz - Chain 1

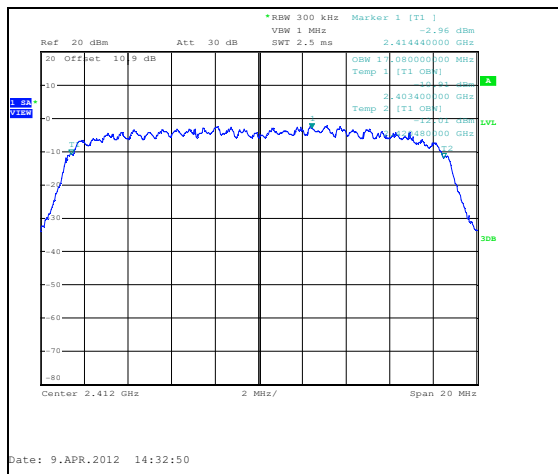


Figure 7.3.2-22: 99% OBW - 2412MHz - Chain 1

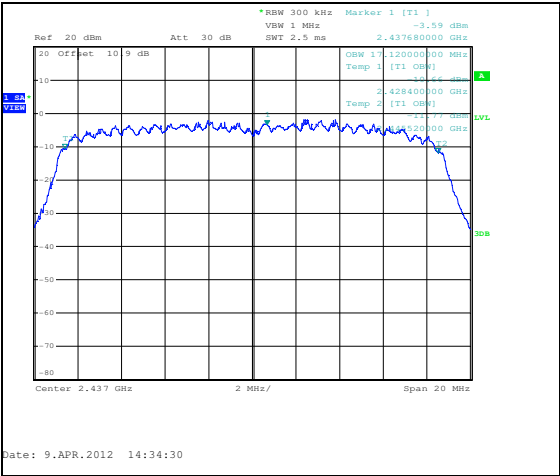


Figure 7.3.2-23: 99% OBW – 2437MHz – Chain 1

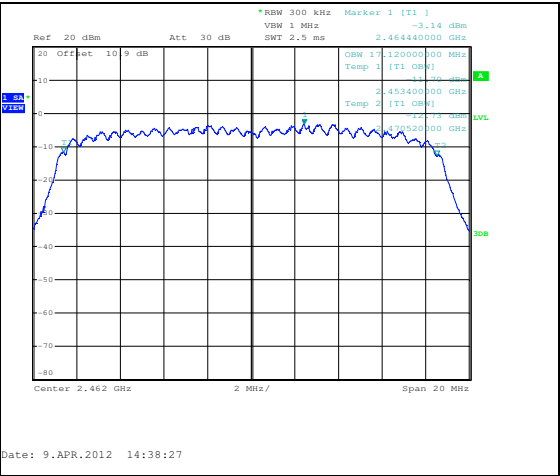
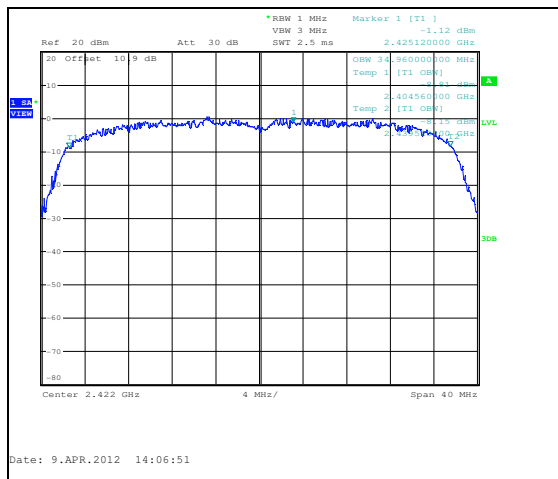
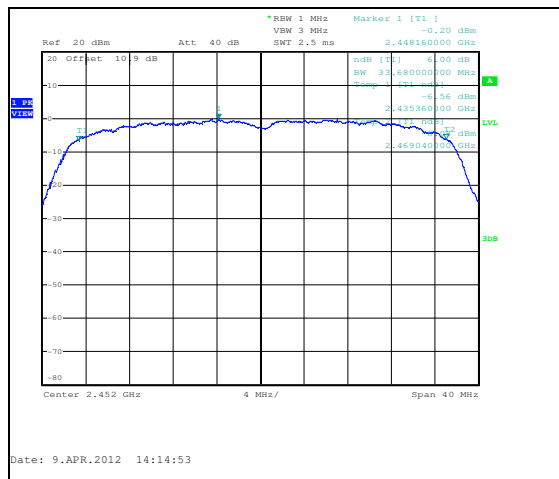
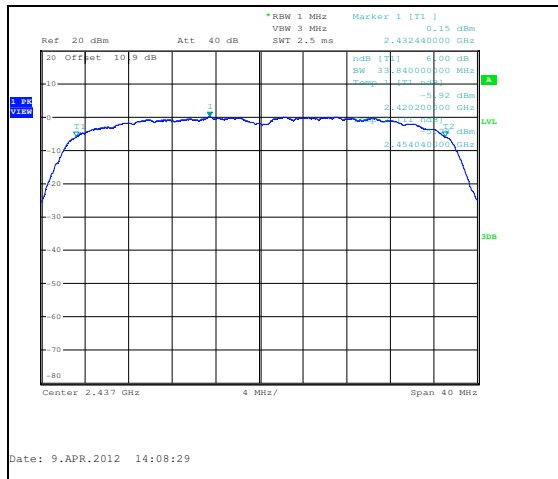
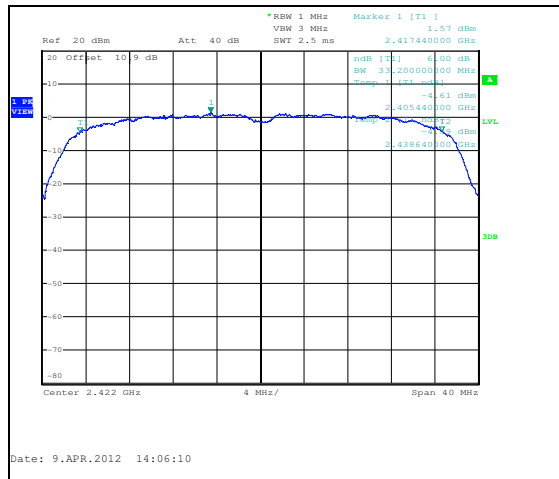


Figure 7.3.2-24: 99% OBW – 2462MHz – Chain 1

Table 7.3.2-4: 6dB / 99% Bandwidth – 802.11n HT40

Frequency (MHz)	6dB BW (MHz)		99% OBW (MHz)	
	Chain 0	Chain 1	Chain 0	Chain 1
2422	33.20	33.04	34.96	35.04
2437	33.84	33.52	35.04	35.04
2452	33.68	33.20	34.96	35.12



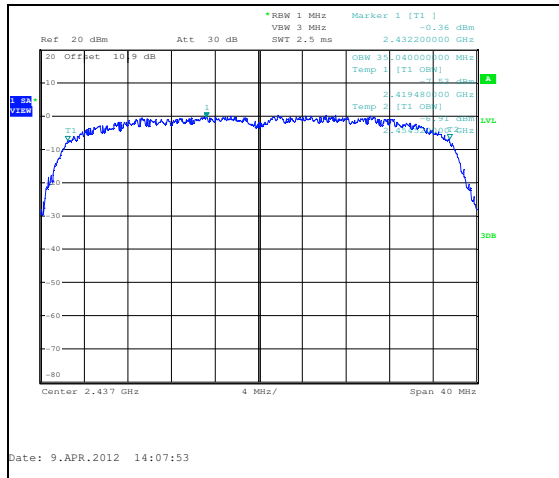


Figure 7.3.2-29: 99% OBW – 2437MHz – Chain 0

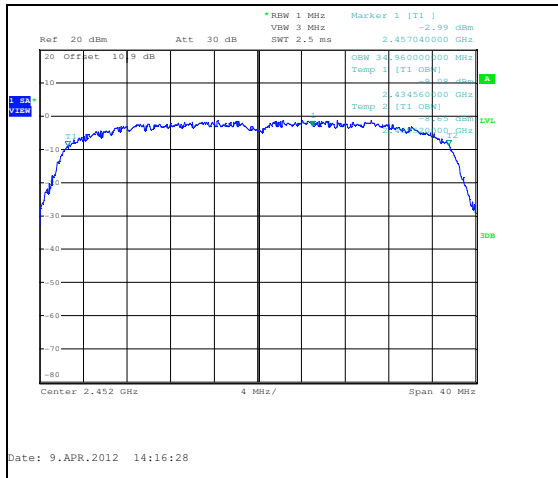


Figure 7.3.2-30: 99% OBW – 2452MHz – Chain 0

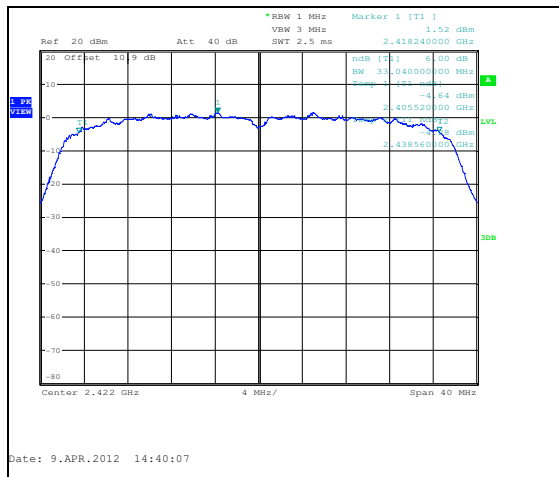


Figure 7.3.2-31: 6dB BW – 2422MHz – Chain 1

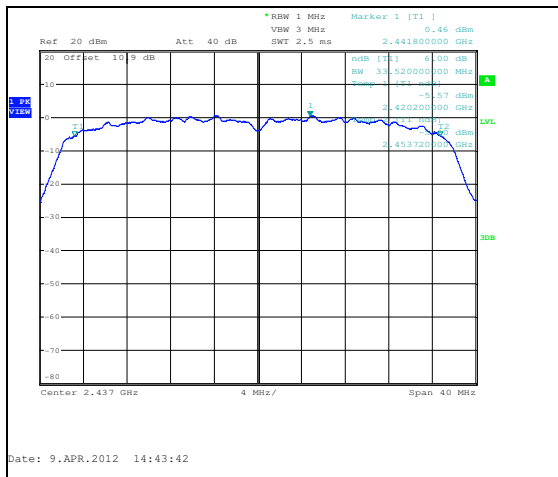


Figure 7.3.2-32: 6dB BW – 2437MHz – Chain 1

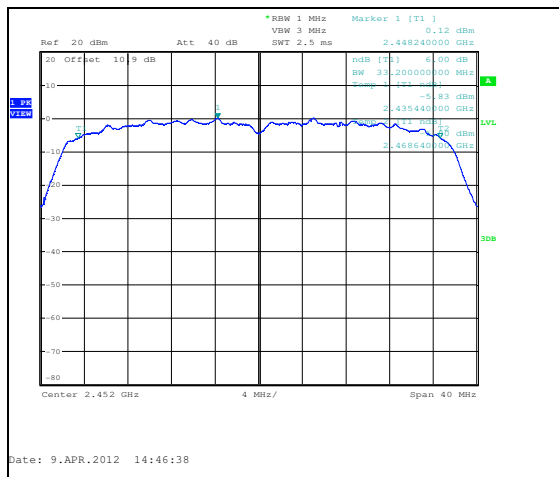


Figure 7.3.2-33: 6dB BW – 2452MHz – Chain 1

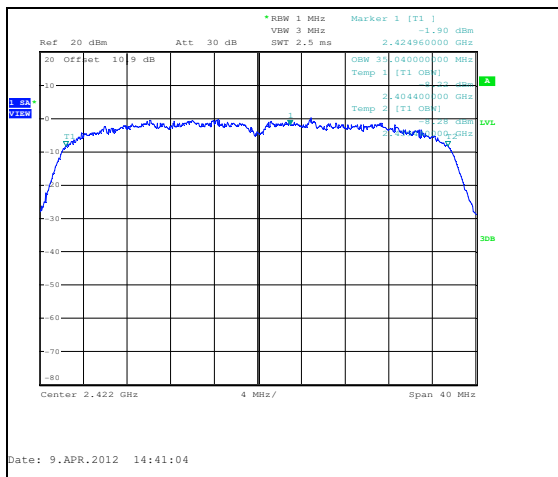


Figure 7.3.2-34: 99% OBW – 2422MHz – Chain 1

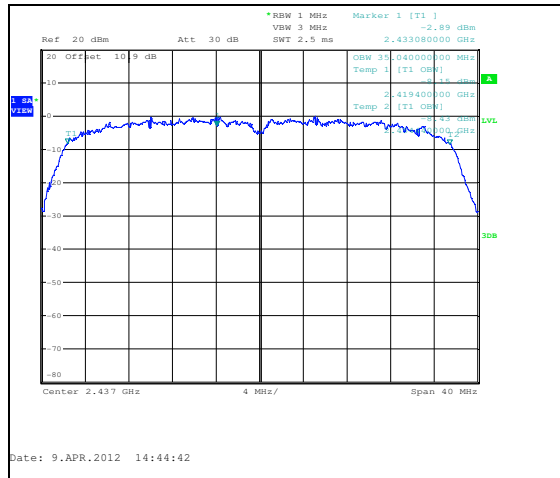


Figure 7.3.2-35: 99% OBW – 2437MHz – Chain 1

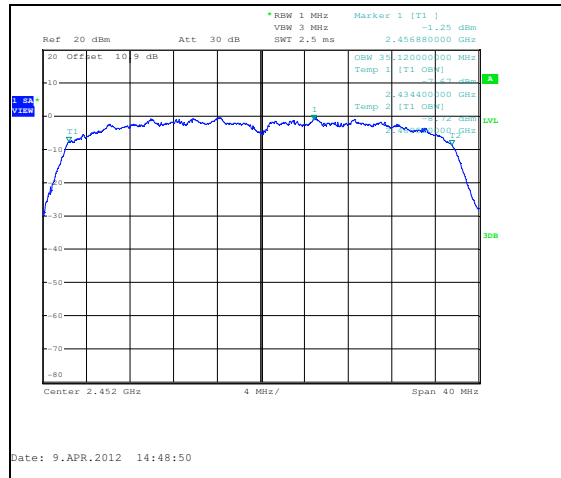


Figure 7.3.2-36: 99% OBW – 2452MHz – Chain 1

## 7.4 Fundamental Emission Output Power - FCC Section 15.247(b)(3) IC: RSS-210 A8.4(4)

### 7.4.1 Measurement Procedure

The maximum peak conducted output power was measured in accordance with FCC KDB 558074 D01 DTS Meas Guidance v01 Measurement Procedure PK2. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 1 MHz. The Video Bandwidth (VBW) was set to 3 MHz. Span was set to 5 – 30% greater the EBW. The trace was set to max hold with a peak detector active. The spectrum analyzer's integrated band power measurement function was utilized with band limits set equal to the EBW band edges.

### 7.4.2 Measurement Results

Results are shown below in Table 7.4.2-1 to 7.4.2-4 and figures 7.4.2-1 to 7.4.2-18.

**Table 7.4.2-1: Peak Output Power – 802.11b**

Frequency (MHz)	Measured Peak Power (dBm)		Total Peak Power (dBm)	Total Peak Power (mW)
	Chain 0	Chain 1		
2412	21.02	--	21.02	126.47
2437	21.09	--	21.09	128.53
2462	19.87	--	19.87	97.05

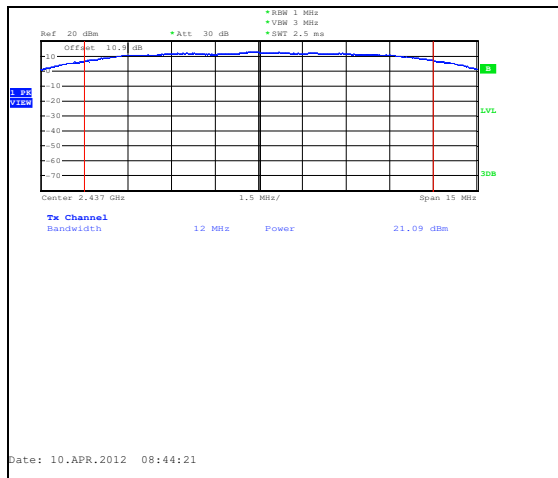
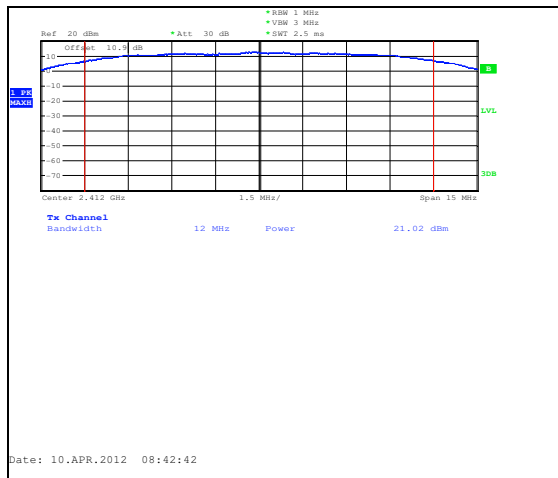






Table 7.4.2-2: Peak Output Power – 802.11g

Frequency (MHz)	Measured Peak Power (dBm)		Total Peak Power (dBm)	Total Peak Power (mW)
	Chain 0	Chain 1		
2412	19.68	--	19.68	92.90
2437	19.95	--	19.95	98.86
2462	18.63	--	18.63	72.95

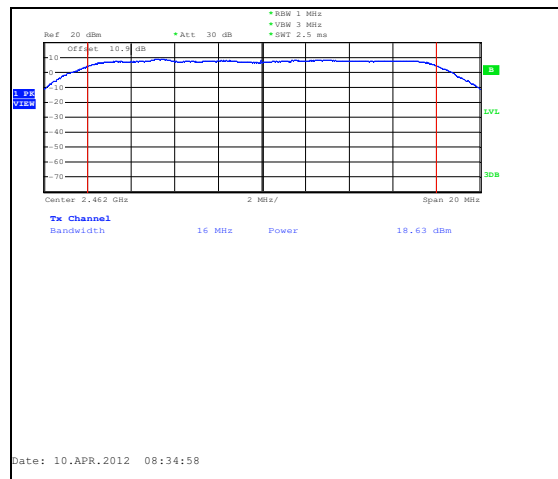
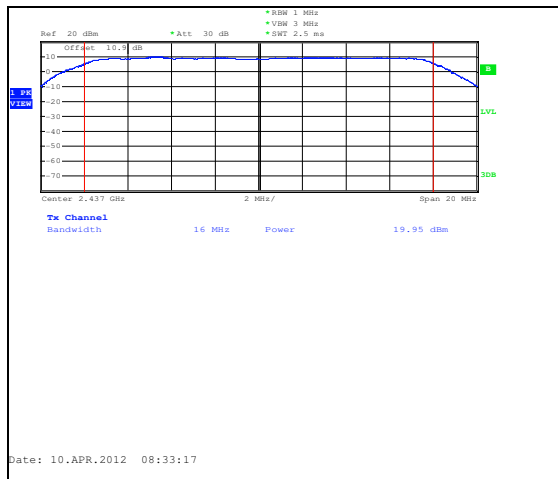
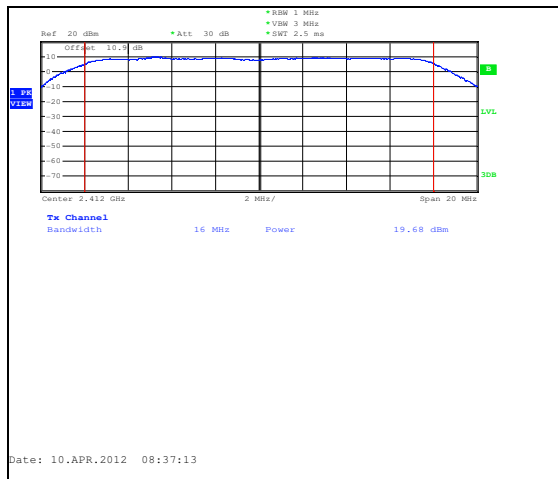
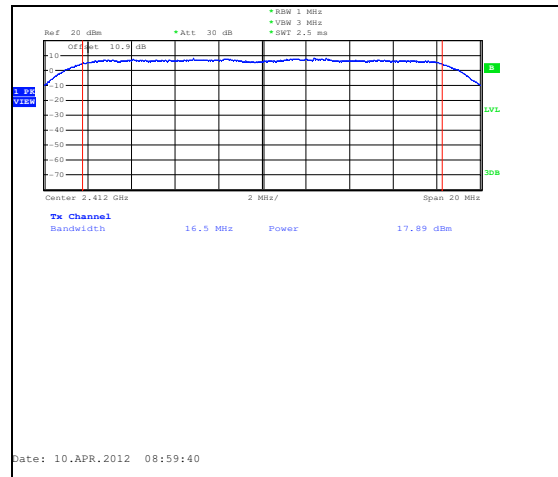
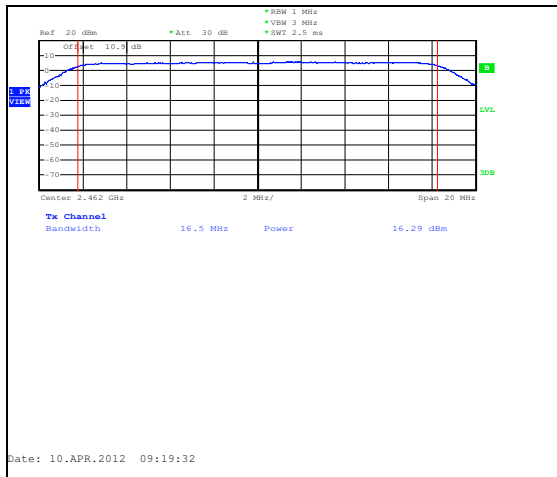
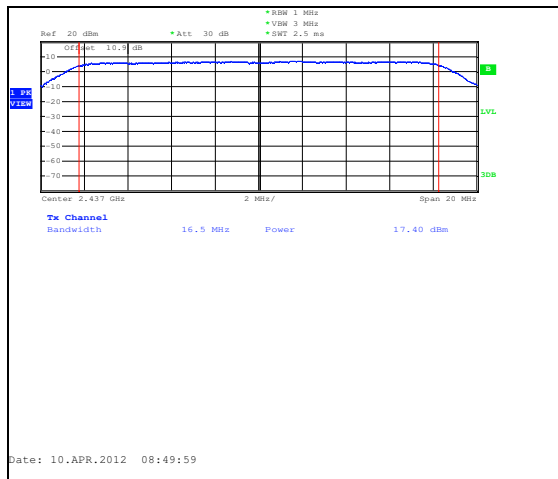
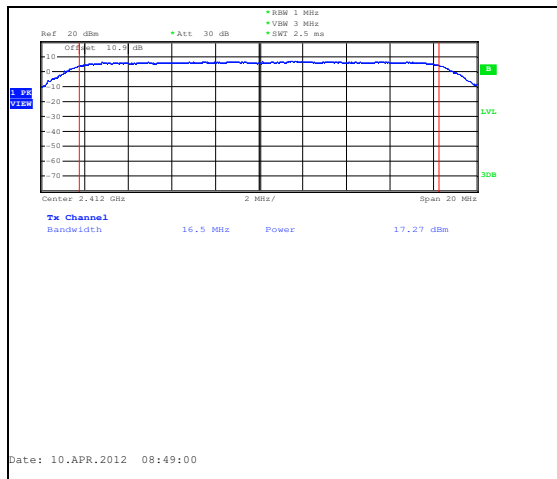


Table 7.4.2-3: Peak Output Power – 802.11n HT20

Frequency (MHz)	Measured Peak Power (dBm)		Total Peak Power (dBm)	Total Peak Power (mW)
	Chain 0	Chain 1		
2412	17.27	17.89	20.60	114.85
2437	17.40	17.64	20.53	113.03
2462	16.29	17.18	19.77	94.80



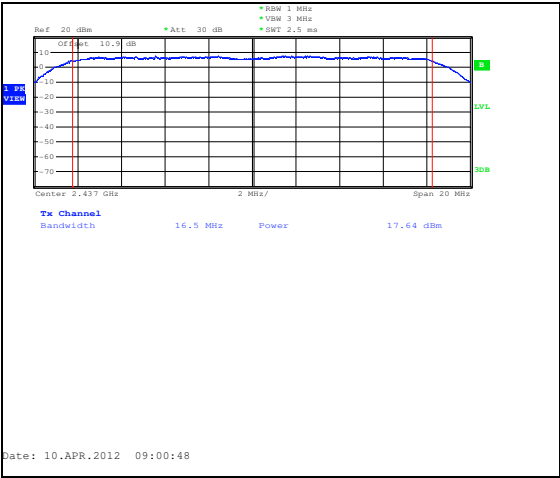


Figure 7.4.2-11: Output Power – 2437MHz – Chain 1

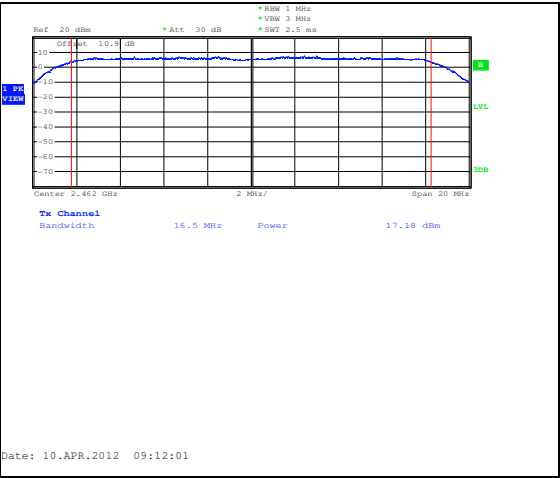


Figure 7.4.2-12: Output Power – 2462MHz – Chain 1

Table 7.4.2-4: Peak Output Power – 802.11n HT40

Frequency (MHz)	Measured Peak Power (dBm)		Total Peak Power (dBm)	Total Peak Power (mW)
	Chain 0	Chain 1		
2412	17.21	17.84	20.55	113.42
2437	17.42	17.87	20.66	116.44
2462	16.10	17.58	19.91	98.02

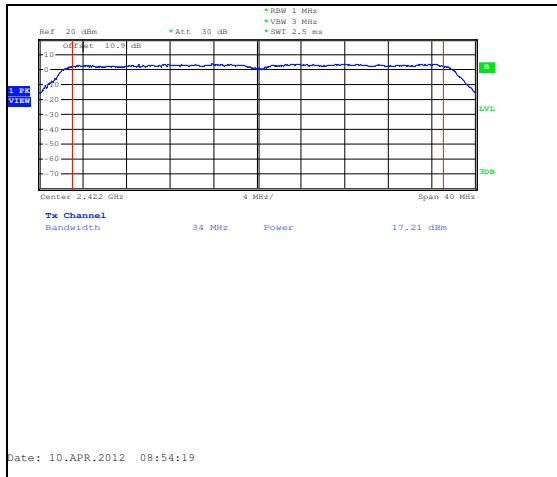


Figure 7.4.2-13: Output Power – 2422MHz – Chain 0

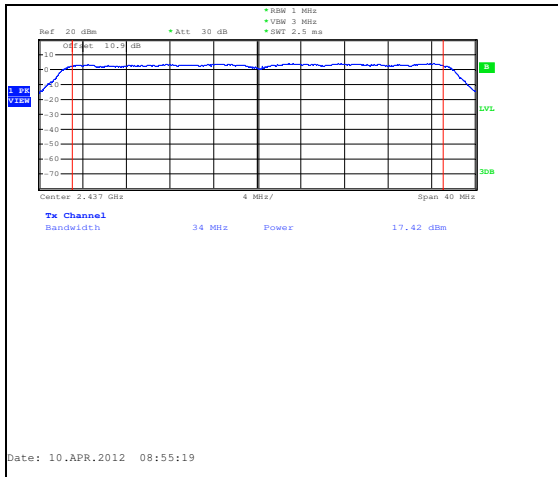


Figure 7.4.2-14: Output Power – 2437MHz – Chain 0

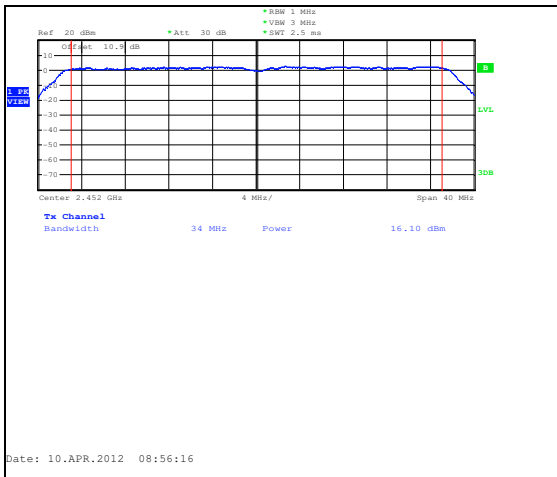


Figure 7.4.2-15: Output Power – 2452MHz – Chain 0

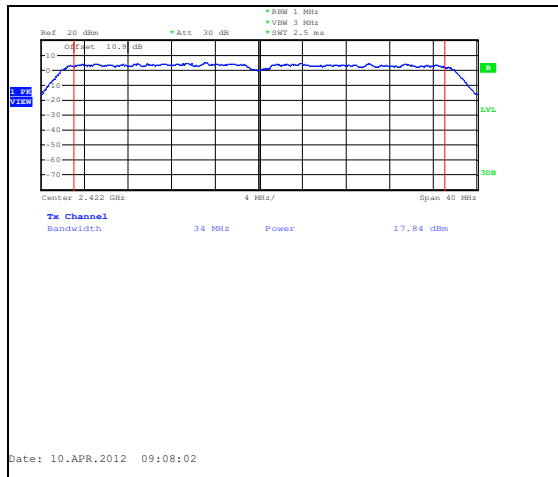


Figure 7.4.2-16: Output Power – 2422MHz – Chain 1

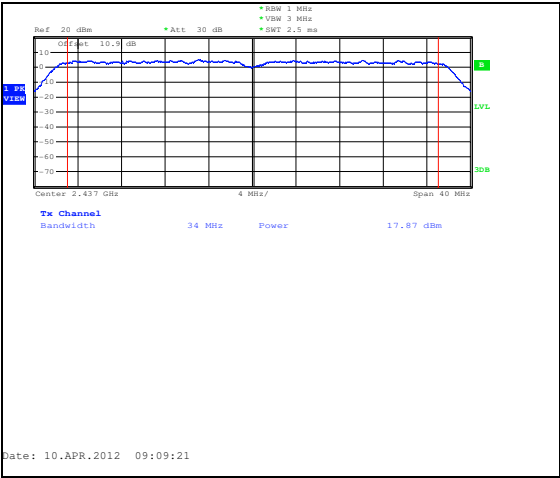


Figure 7.4.2-17: Output Power – 2437MHz – Chain 1

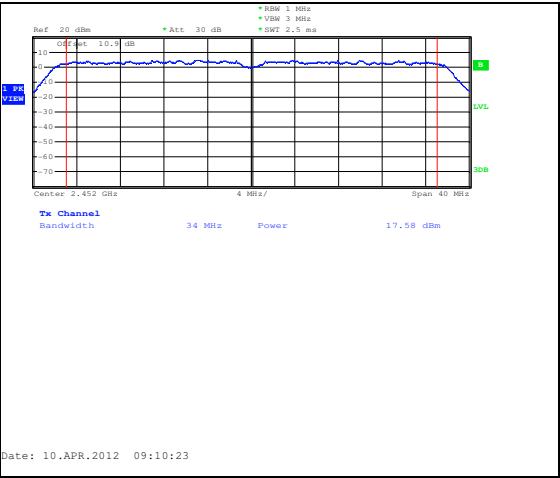


Figure 7.4.2-18: Output Power – 2452MHz – Chain 1

## 7.5 Band-Edge Compliance and Spurious Emissions-FCC 15.247(d) IC:RSS-210 2.2, A8.5

### 7.5.1 Band-Edge Compliance

#### 7.5.1.1 Measurement Procedure

The EUT was investigated at the low and high channels of operation to determine band-edge compliance at the restricted bands. Band-edge compliance at the restricted bands was determined based on the measurement of the absolute radiated field strength of the highest emission outside the frequency band of operation. Radiated band-edge compliance at the restricted bands is shown in section 7.5.3.

When the frequency band of operation does not coincide with a restricted band, band-edge compliance was determined using the conducted marker-delta method in which the radio frequency power that is produced by the EUT is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power.

Per KDB 662911, compliance was demonstrated by confirming that the maximum out-of-band emission on each individual output is at least 20 dB below the maximum in-band PSD on that output.

#### 7.5.1.2 Measurement Results

Conducted band-edge compliance is shown in Figures 7.5.1.2-1 to 7.5.1.2-12.

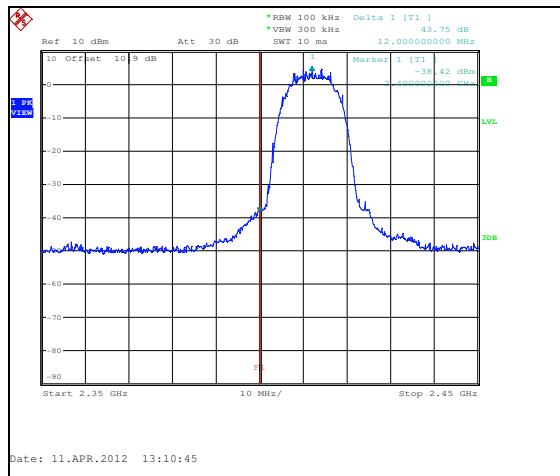


Figure 7.5.1.2-1: Lower Band-edge – 802.11b  
2412 MHz

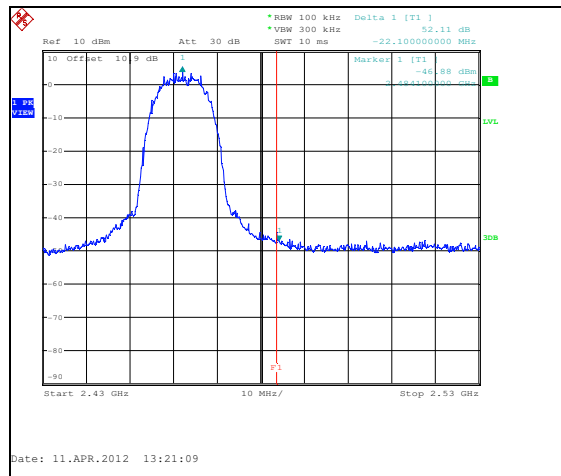


Figure 7.5.1.2-2: Upper Band-edge – 802.11b  
2462 MHz

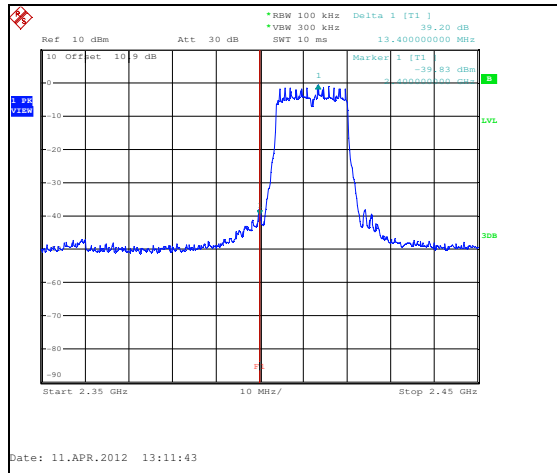


Figure 7.5.1.2-3: Lower Band-edge – 802.11g 2412 MHz

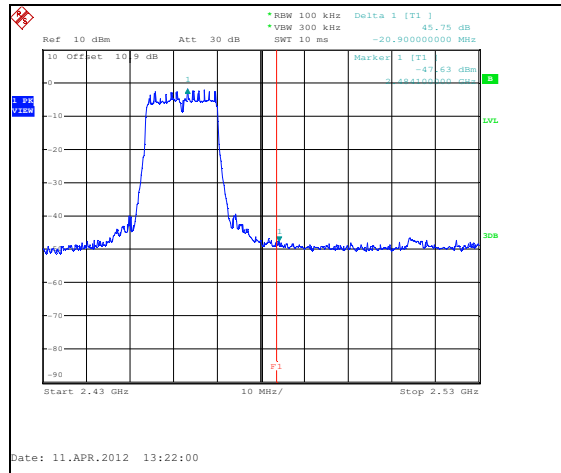


Figure 7.5.1.2-4: Upper Band-edge – 802.11g 2462 MHz

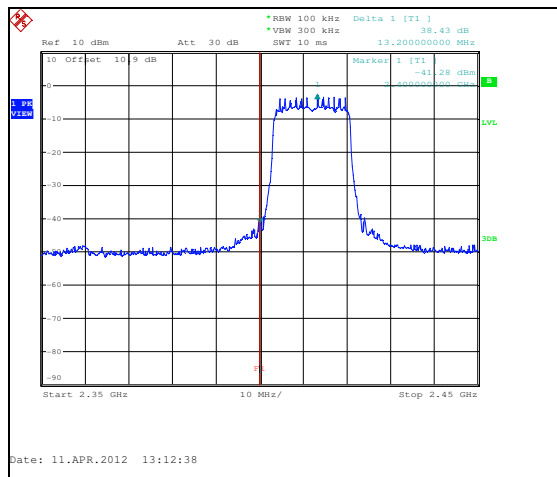


Figure 7.5.1.2-5: Lower Band-edge – 802.11n HT20 2412 MHz - Chain 0

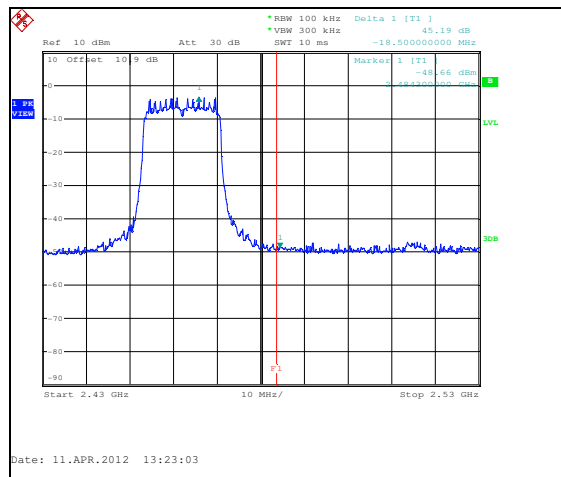


Figure 7.5.1.2-6: Upper Band-edge – 802.11n HT20 2462 MHz - Chain 0

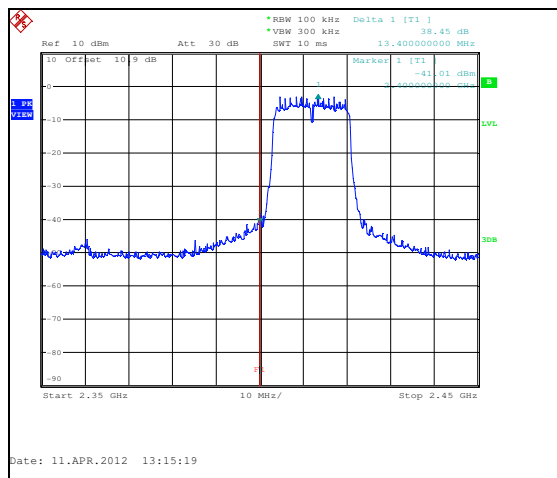


Figure 7.5.1.2-7: Lower Band-edge – 802.11n HT20 2412 MHz - Chain 1

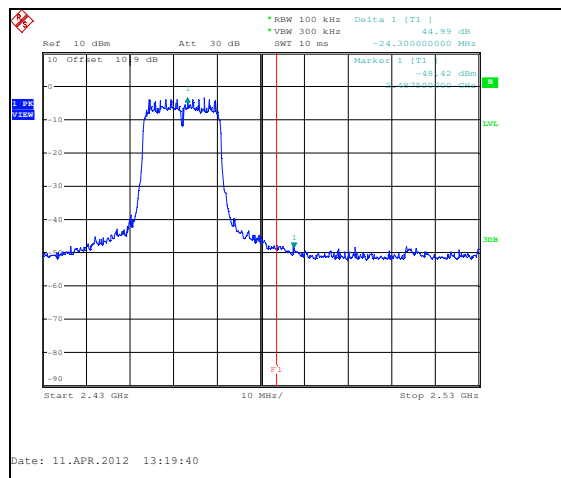


Figure 7.5.1.2-8: Upper Band-edge – 802.11n HT20 2462 MHz - Chain 1

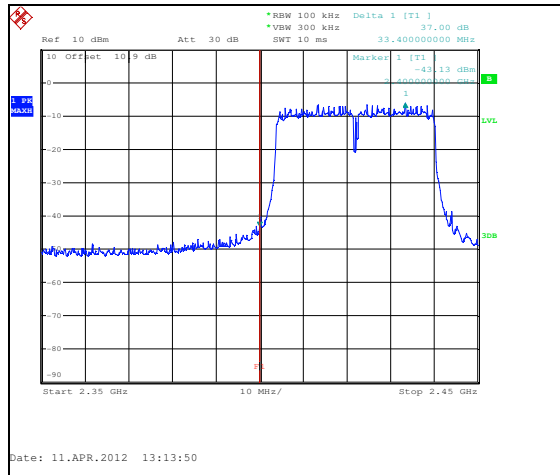


Figure 7.5.1.2-9: Lower Band-edge – 802.11n HT40 2422 MHz - Chain 0

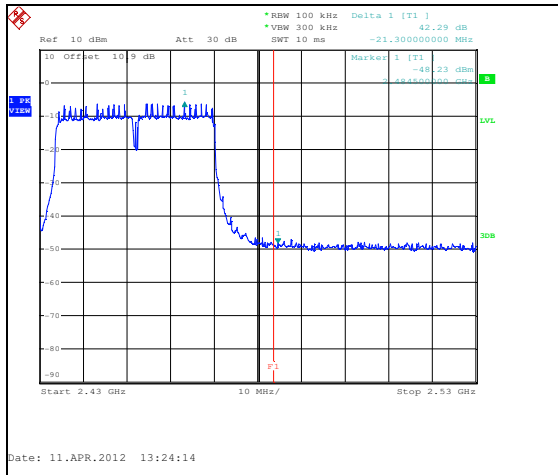


Figure 7.5.1.2-10: Upper Band-edge – 802.11n HT40 2452 MHz - Chain 0

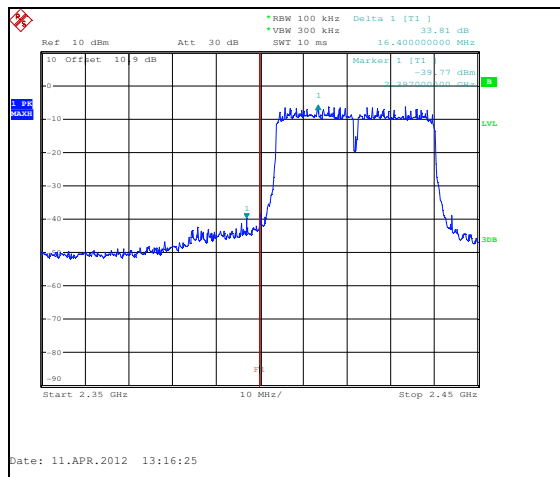


Figure 7.5.1.2-11: Lower Band-edge – 802.11n HT40 2422 MHz - Chain 1

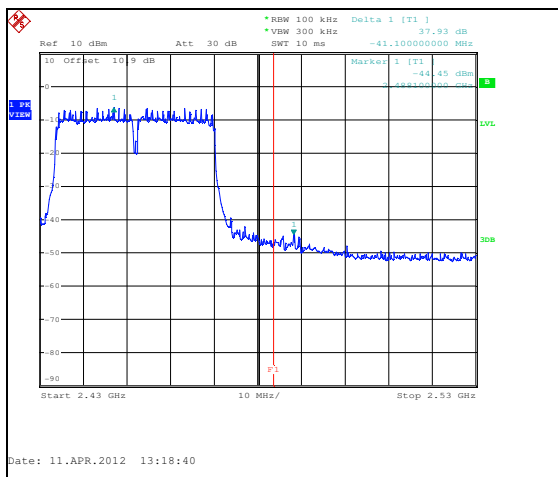


Figure 7.5.1.2-12: Upper Band-edge – 802.11n HT40 2452 MHz - Chain 1



## 7.5.2 RF Conducted Spurious Emissions (Unwanted Emissions into Non-Restricted Frequency Bands)

### 7.5.2.1 Measurement Procedure

The RF Conducted Spurious Emissions were measured in accordance with FCC KDB 558074 D01 DTS Meas Guidance v01. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to  $\geq 300$  kHz. Span was set to 5 – 30% greater the EBW. The trace was set to max hold with a peak detector active. The resulting spectrum analyzer peak level was used to determine the reference level with respect to the 20 dBc limit. The spectrum span was then adjusted for the measurement of spurious emissions from 30MHz to 25GHz, 10 times the highest fundamental frequency.

Per KDB 662911, compliance was demonstrated by confirming that the maximum out-of-band emission on each individual output is at least 20 dB below the maximum in-band PSD on that output.

### 7.5.2.2 Measurement Results

RF Conducted Emissions are displayed in Figures 7.5.2.2-1 through 7.5.2.2-18.

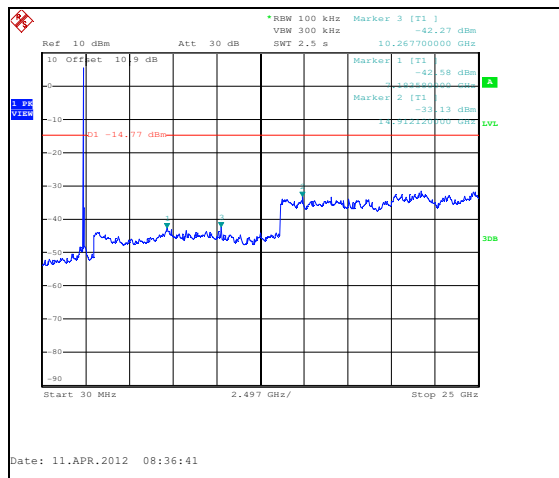


Figure 7.5.2.2-1: Conducted Emissions – 802.11b  
2412 MHz

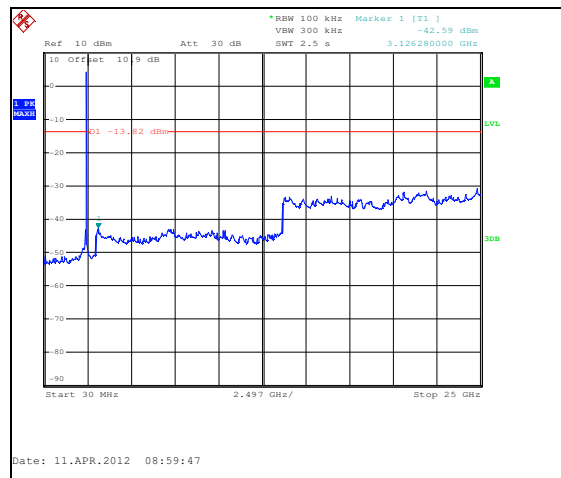


Figure 7.5.2.2-2: Conducted Emissions – 802.11b  
2437 MHz

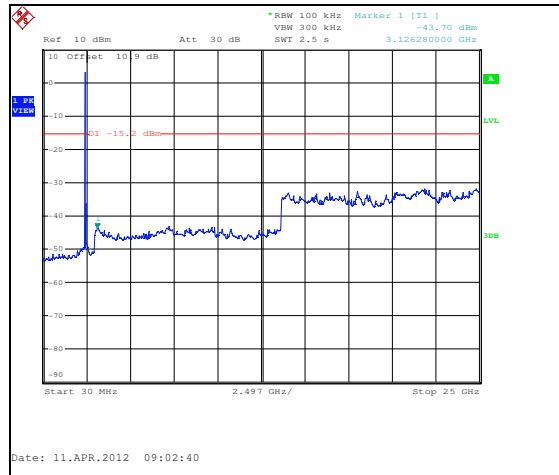


Figure 7.5.2.2-3: Conducted Emissions – 802.11b  
2462 MHz

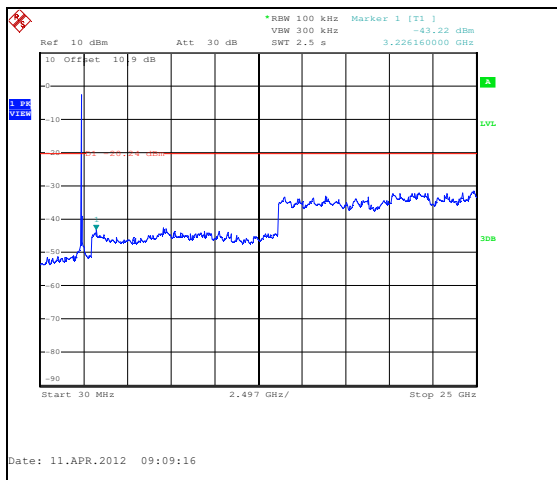


Figure 7.5.2.2-4: Conducted Emissions – 802.11g  
2412 MHz

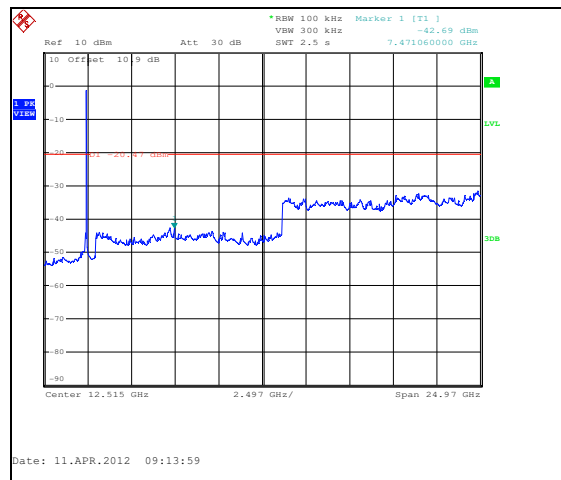


Figure 7.5.2.2-5: Conducted Emissions – 802.11g  
2437 MHz

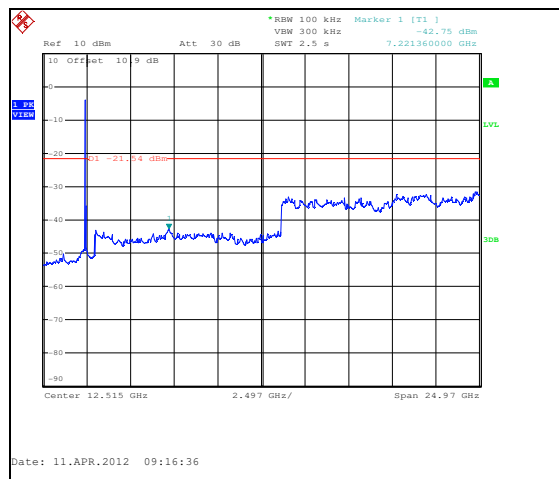


Figure 7.5.2.2-6: Conducted Emissions – 802.11g  
2462 MHz

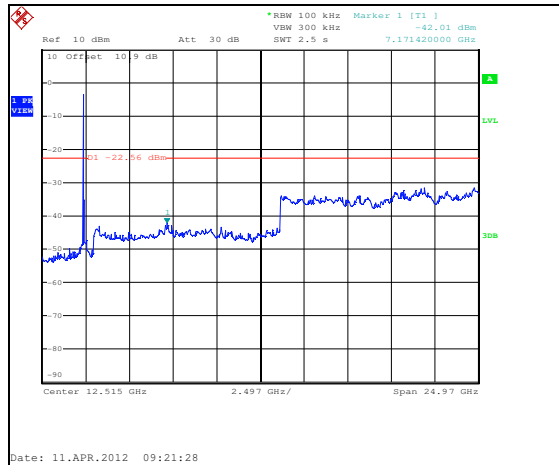


Figure 7.5.2.2-7: Conducted Emissions – 802.11nHT20 2412 MHz – Chain 0

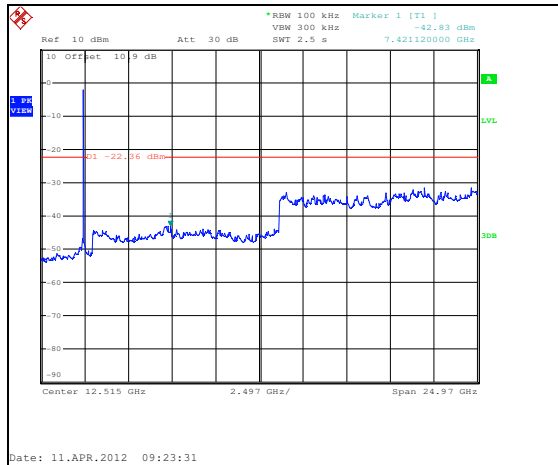


Figure 7.5.2.2-8: Conducted Emissions – 802.11nHT20 2437 MHz – Chain 0

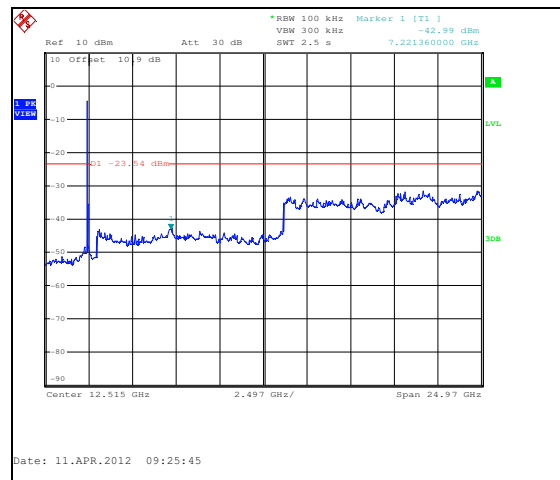


Figure 7.5.2.2-9: Conducted Emissions – 802.11nHT20 2462 MHz – Chain 0

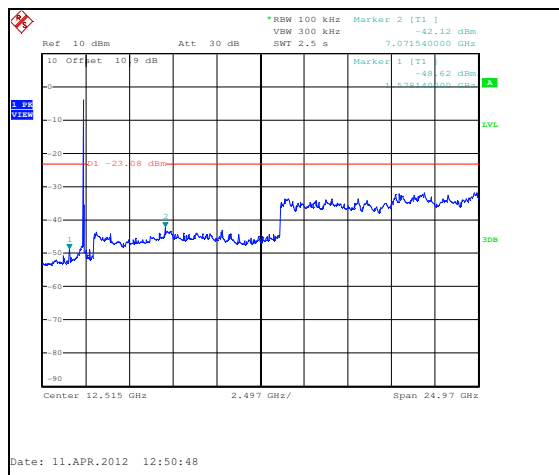


Figure 7.5.2.2-10: Conducted Emissions – 802.11nHT20 2412 MHz – Chain 1

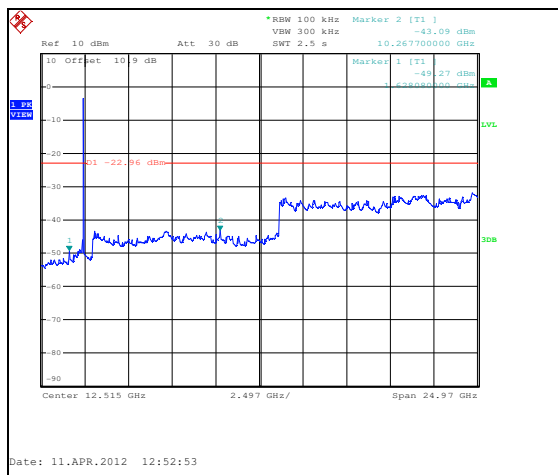


Figure 7.5.2.2-11: Conducted Emissions – 802.11nHT20 2437 MHz – Chain 1

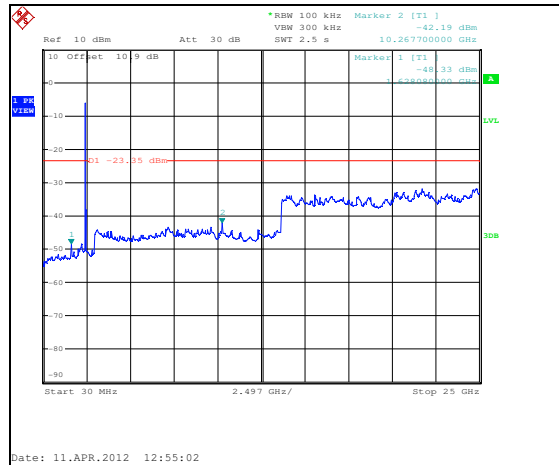


Figure 7.5.2.2-12: Conducted Emissions – 802.11nHT20  
2462 MHz – Chain 1

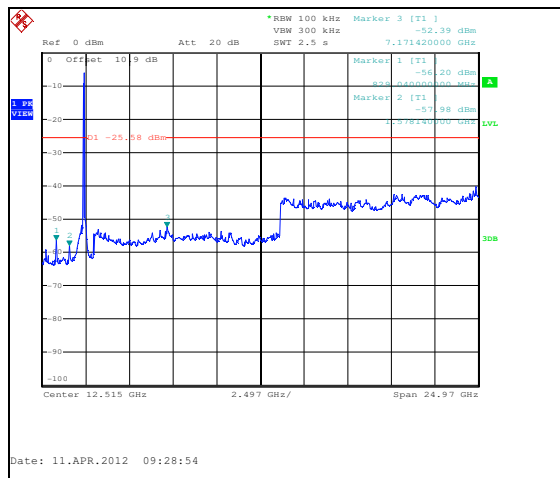


Figure 7.5.2.2-13: Conducted Emissions – 802.11nHT40  
2422 MHz – Chain 0

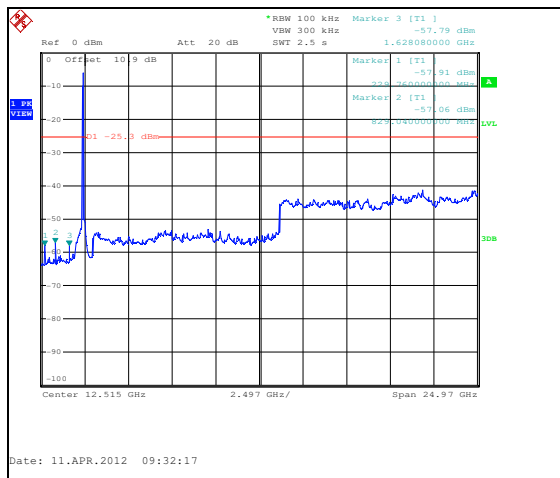


Figure 7.5.2.2-14: Conducted Emissions – 802.11nHT40  
2437 MHz – Chain 0

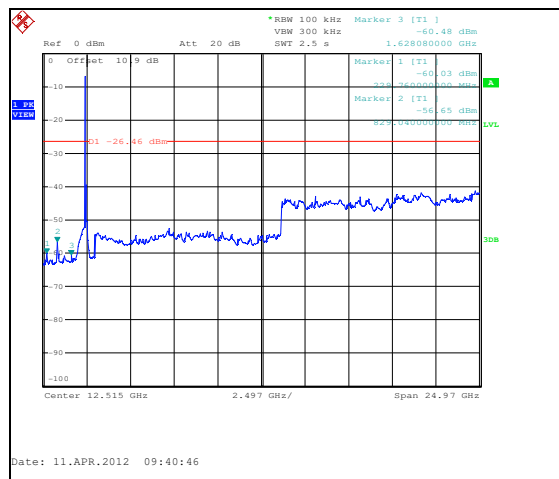


Figure 7.5.2.2-15: Conducted Emissions – 802.11nHT40  
2452 MHz – Chain 0

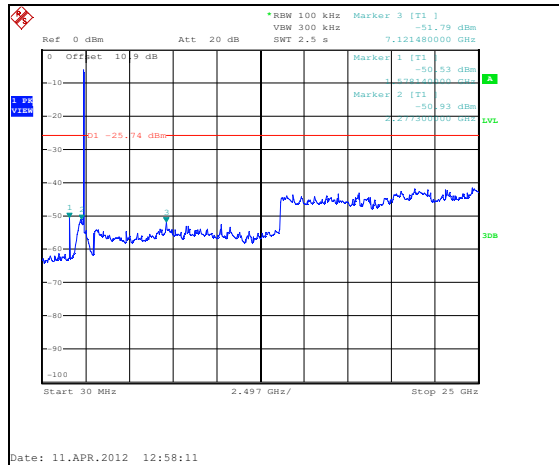


Figure 7.5.2.2-16: Conducted Emissions – 802.11nHT40  
2422 MHz – Chain 1

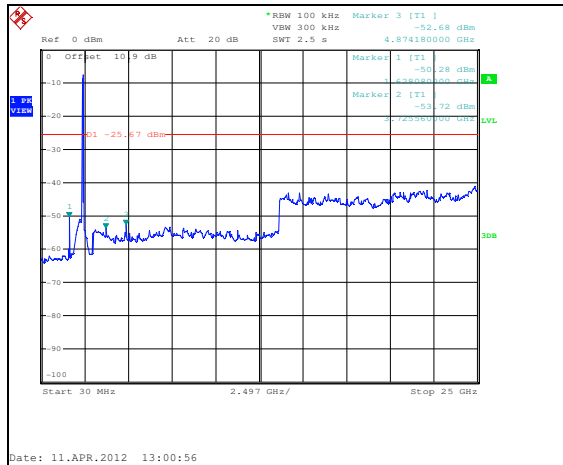


Figure 7.5.2.2-27: Conducted Emissions – 802.11nHT40  
2437 MHz – Chain 1

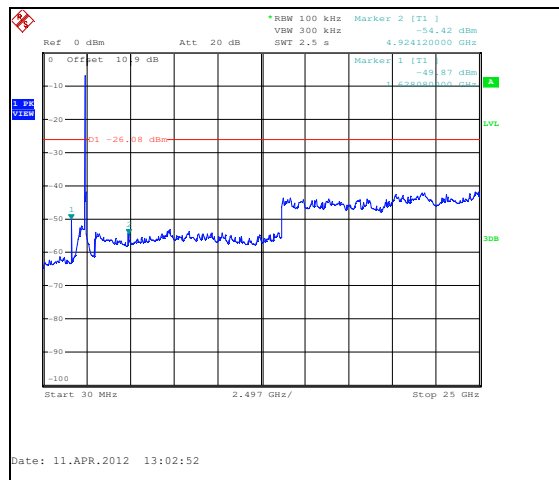


Figure 7.5.2.2-18: Conducted Emissions – 802.11nHT40  
2452 MHz – Chain 1

### 7.5.3 Radiated Spurious Emissions (Restricted Frequency Bands)

#### 7.5.3.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30MHz to 25 GHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000MHz, peak and average measurements were made with RBW and VBW of 1 MHz and 3 MHz respectively.

Each emission found to be in a restricted band and all emissions at the restricted band-edges were evaluated and compared to the applicable radiated emission limits.

#### 7.5.3.2 Measurement Results

Radiated spurious emissions are reported in tables 7.5.3.2-1 to 7.5.3.2-7 below.

**Table 7.5.3.2-1: Radiated Spurious Emissions Tabulated Data – 802.11b**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
2412 MHz										
2246.8	60.16	47.73	H	-6.13	54.03	41.60	74.0	54.0	20.0	12.4
2246.8	55.88	43.69	V	-6.13	49.75	37.56	74.0	54.0	24.3	16.4
2390	55.12	43.89	H	-5.52	49.60	38.37	74.0	54.0	24.4	15.6
2390	53.31	41.48	V	-5.52	47.79	35.96	74.0	54.0	26.2	18.0
2485.3	60.12	47.27	H	-5.11	55.01	42.16	74.0	54.0	19.0	11.8
2485.3	56.16	44.35	V	-5.11	51.05	39.24	74.0	54.0	23.0	14.8
4824	47.61	35.49	H	2.03	49.64	37.52	74.0	54.0	24.4	16.5
4824	46.21	34.47	V	2.03	48.24	36.50	74.0	54.0	25.8	17.5
2437 MHz										
2249.6	59.76	47.42	H	-6.12	53.64	41.30	74.0	54.0	20.4	12.7
2249.6	58.21	45.59	V	-6.12	52.09	39.47	74.0	54.0	21.9	14.5
2491.12	60.14	48.06	H	-5.09	55.05	42.97	74.0	54.0	18.9	11.0
2491.12	60.26	48.72	V	-5.09	55.17	43.63	74.0	54.0	18.8	10.4
4874	46.29	34.13	H	2.15	48.44	36.28	74.0	54.0	25.6	17.7
4874	46.36	34.57	V	2.15	48.51	36.72	74.0	54.0	25.5	17.3
2462 MHz										
2244	51.73	39.78	H	-6.14	45.59	33.64	74.0	54.0	28.4	20.4
2244	54.42	42.24	V	-6.14	48.28	36.10	74.0	54.0	25.7	17.9
2483.5	60.07	48.44	H	-5.12	54.95	43.32	74.0	54.0	19.10	10.70
2483.5	61.45	49.76	V	-5.12	56.33	44.64	74.0	54.0	17.70	9.40
4924	47.05	34.40	V	2.27	49.32	36.67	74.0	54.0	24.70	17.30

Table 7.5.3.2-2: Radiated Spurious Emissions Tabulated Data – 802.11g

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
2412 MHz										
2260	59.16	47.50	H	-6.08	53.08	41.42	74.0	54.0	20.9	12.6
2260	56.77	44.83	V	-6.08	50.69	38.75	74.0	54.0	23.3	15.2
2390	56.71	41.79	H	-5.52	51.19	36.27	74.0	54.0	22.8	17.7
2390	56.41	41.33	V	-5.52	50.89	35.81	74.0	54.0	23.1	18.2
2437 MHz										
2241	58.12	45.78	H	-6.16	51.96	39.62	74.0	54.0	22.0	14.4
2241	56.91	44.86	V	-6.16	50.75	38.70	74.0	54.0	23.2	15.3
2489.1	60.21	47.91	H	-5.10	55.11	42.81	74.0	54.0	18.9	11.2
2489.1	60.17	47.88	V	-5.10	55.07	42.78	74.0	54.0	18.9	11.2
2462 MHz										
2235	52.06	39.73	H	-6.18	45.88	33.55	74.0	54.0	28.1	20.5
2235	54.20	42.47	V	-6.18	48.02	36.29	74.0	54.0	26.0	17.7
2483.5	67.25	50.45	H	-5.12	62.13	45.33	74.0	54.0	11.90	8.70
2483.5	62.77	45.67	V	-5.12	57.65	40.55	74.0	54.0	16.40	13.50

Table 7.5.3.2-3: Radiated Spurious Emissions Tabulated Data – 802.11nHT20

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
2412 MHz										
1609.7	54.28	48.97	H	-9.71	44.57	39.26	74.0	54.0	29.4	14.7
1609.7	54.05	48.64	V	-9.71	44.34	38.93	74.0	54.0	29.7	15.1
2390	65.27	51.39	H	-5.52	59.75	45.87	74.0	54.0	14.3	8.1
2390	60.02	46.23	V	-5.52	54.50	40.71	74.0	54.0	19.5	13.3
2499.7	60.12	48.44	H	-5.05	55.07	43.39	74.0	54.0	18.9	10.6
2499.7	56.74	44.81	V	-5.05	51.69	39.76	74.0	54.0	22.3	14.2
4824	57.11	44.71	H	2.03	59.14	46.74	74.0	54.0	14.9	7.3
4824	51.03	38.44	V	2.03	53.06	40.47	74.0	54.0	20.9	13.5
2437 MHz										
1624.6	54.04	48.11	H	-9.62	44.42	38.49	74.0	54.0	29.6	15.5
1624.6	52.05	44.33	V	-9.62	42.43	34.71	74.0	54.0	31.6	19.3
2384.9	62.18	50.90	H	-5.54	56.64	45.36	74.0	54.0	17.4	8.6
2384.9	57.96	46.54	V	-5.54	52.42	41.00	74.0	54.0	21.6	13.0
2488.8	64.16	52.91		-5.10	59.06	47.81	74.0	54.0	14.9	6.2
2488.8	60.17	49.07		-5.10	55.07	43.97	74.0	54.0	18.9	10.0
4874	56.31	44.12	H	2.15	58.46	46.27	74.0	54.0	15.5	7.7
4874	51.54	39.12	V	2.15	53.69	41.27	74.0	54.0	20.3	12.7
2462 MHz										
2389.77	57.02	45.19	H	-5.52	51.50	39.67	74.0	54.0	22.5	14.3
2389.77	54.10	42.09	V	-5.52	48.58	36.57	74.0	54.0	25.4	17.4
2483.5	66.01	52.55	H	-5.12	60.89	47.43	74.0	54.0	13.10	6.60
2483.5	60.17	47.45	V	-5.12	55.05	42.33	74.0	54.0	19.00	11.70
4924	55.07	42.68	H	2.27	57.34	44.95	74.0	54.0	16.70	9.10
4924	50.42	38.41	V	2.27	52.69	40.68	74.0	54.0	21.30	13.30

Table 7.5.3.2-4: Radiated Spurious Emissions Tabulated Data – 802.11nHT40

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
2422 MHz										
2244	57.62	45.37	H	-6.09	51.53	39.28	74.0	54.0	22.5	14.7
2244	56.19	44.05	V	-6.09	50.10	37.96	74.0	54.0	23.9	16.0
2386.1	70.25	53.75	H	-5.48	64.77	48.27	74.0	54.0	9.2	5.7
2386.1	62.38	46.33	V	-5.48	56.90	40.85	74.0	54.0	17.1	13.2
2493	62.28	50.22	H	-5.03	57.25	45.19	74.0	54.0	16.7	8.8
2493	56.11	44.05	V	-5.03	51.08	39.02	74.0	54.0	22.9	15.0
4844	55.12	40.01	H	2.19	57.31	42.20	74.0	54.0	16.7	11.8
4844	47.36	34.47	V	2.19	49.55	36.66	74.0	54.0	24.5	17.3
2437 MHz										
2390	61.43	47.35	H	-5.47	55.96	41.88	74.0	54.0	18.0	12.1
2334	56.22	43.84	V	-5.70	50.52	38.14	74.0	54.0	23.5	15.9
2485.1	66.37	50.90	H	-5.06	61.31	45.84	74.0	54.0	12.7	8.2
2485.1	58.94	44.93	V	-5.06	53.88	39.87	74.0	54.0	20.1	14.1
4874	53.40	40.14	H	2.26	55.66	42.40	74.0	54.0	18.3	11.6
4874	48.15	35.26	V	2.26	50.41	37.52	74.0	54.0	23.6	16.5
2452 MHz										
2347.7	51.97	40.39	H	-0.09	51.88	40.30	74.0	54.0	22.1	13.7
2347.7	48.57	37.06	V	-0.09	48.48	36.97	74.0	54.0	25.5	17.0
2483.7	60.65	48.01	H	0.49	61.14	48.50	74.0	54.0	12.90	5.50
2483.7	56.01	43.67	V	0.49	56.50	44.16	74.0	54.0	17.50	9.80
4904	47.27	34.88	H	7.92	55.19	42.80	74.0	54.0	18.80	11.20

**7.5.3.3 Sample Calculation:**

$$R_C = R_U + CF_T$$

Where:

- $CF_T$  = Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)  
 $R_U$  = Uncorrected Reading  
 $R_C$  = Corrected Level  
AF = Antenna Factor  
CA = Cable Attenuation  
AG = Amplifier Gain  
DC = Duty Cycle Correction Factor

**Example Calculation: Peak**

Corrected Level: 60.16 - 6.13 = 54.03dBuV/m

Margin: 74dBuV/m – 54.03dBuV/m = 20.0dB

**Example Calculation: Average**

Corrected Level: 47.73 - 6.13 - 0 = 41.60dBuV

Margin: 54dBuV – 41.60dBuV = 12.4dB



## 7.6 Maximum Power Spectral Density Level in the Fundamental Emission - FCC Section 15.247(e) IC: RSS-210 A8.2(b)

### 7.6.1 Measurement Procedure

The power spectral density was measured in accordance with FCC KDB 558074 D01 DTS Meas Guidance v01 Measurement Procedure PKPSD. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to  $\geq 300$  kHz. Span was set to 5 – 30% greater the EBW. The trace was set to max hold with a peak detector active. An internal spectrum analyzer offset of -15.2 dB was applied to adjust the power to an equivalent value in a 3 kHz bandwidth. The bandwidth correction factor (BWCF) offset was determined as  $BWCF = 10\log(3 \text{ kHz}/100 \text{ kHz}) = -15.2 \text{ dB}$ . The resulting spectrum analyzer peak level is the power spectral density in a 3 kHz band.

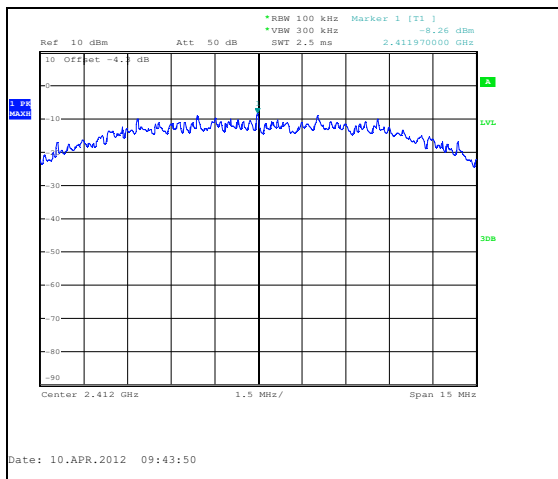
Where multiple outputs are available, the measure and add technique per KDB 662911 D01 was utilized.  $10 \log(N) \text{ dB}$ , where N is the number of outputs, was added to the measured peak spectral density for each transmitter output for comparison to the limit.

### 7.6.2 Measurement Results

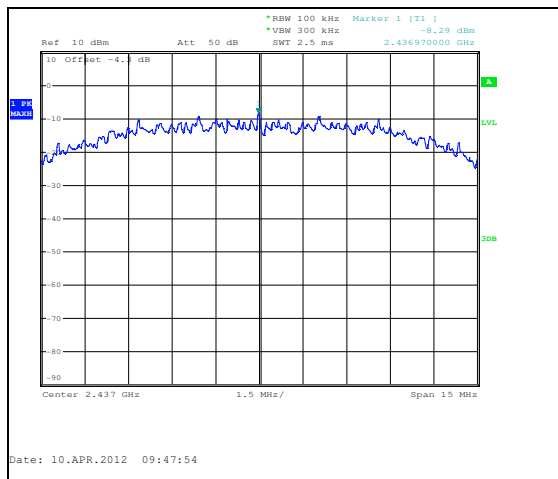
Results are shown below in table 7.6.2-1 to 7.6.2-4 and figures 7.6.2-1 – 7.6.2-18:

**Table 7.6.2-1: Maximum Power Spectral Density – 802.11b**

Frequency (MHz)	Measured Power Spectral Density (dBm)		Correction Factor $10 \log(N)$ , N=2 (dB)	Max Power Spectral Density (dBm)
	Chain 0	Chain 1		
2412	-8.26	--	--	-8.26
2437	-8.29	--	--	-8.29
2462	-9.80	--	--	-9.80



**Figure 7.6.2-1: Power Spectral Density – 802.11b  
2412 MHz**



**Figure 7.6.2-2: Power Spectral Density – 802.11b  
2437 MHz**

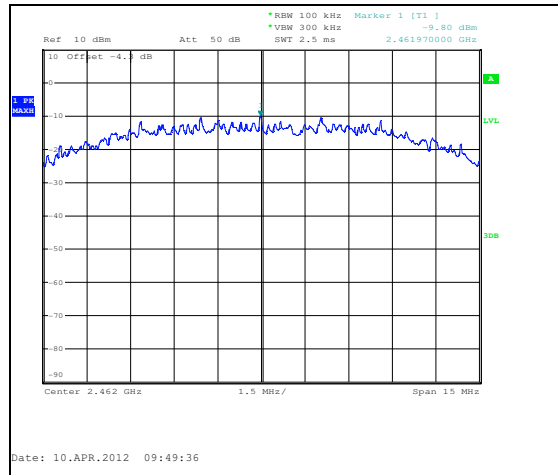


Figure 7.6.2-3: Power Spectral Density – 802.11b  
2462 MHz

Table 7.6.2-2: Maximum Power Spectral Density – 802.11g

Frequency (MHz)	Measured Power Spectral Density (dBm)		Correction Factor 10 log(N), N=2 (dB)	Max Power Spectral Density (dBm)
	Chain 0	Chain 1		
2412	-15.56	--	--	-15.56
2437	-15.35	--	--	-15.35
2462	-16.71	--	--	-16.71

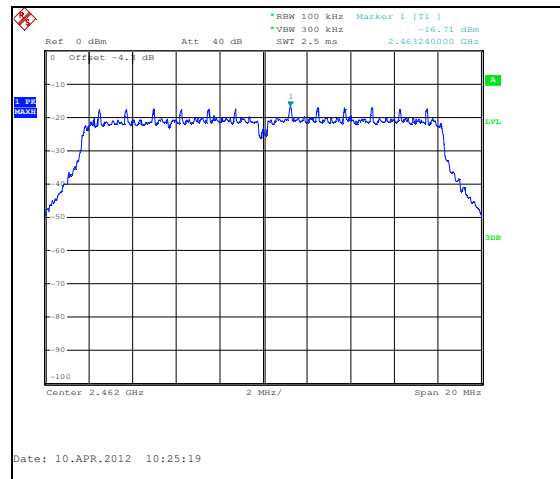
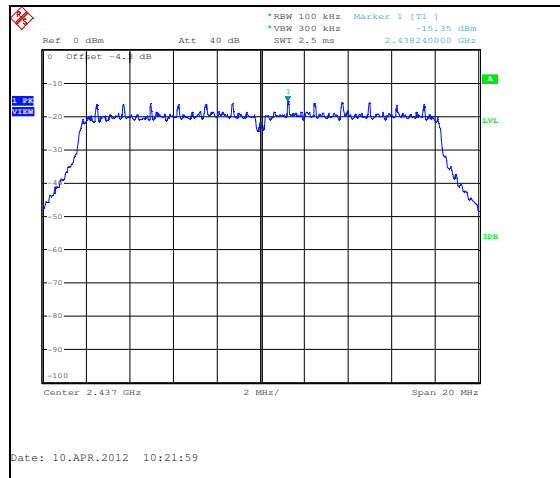
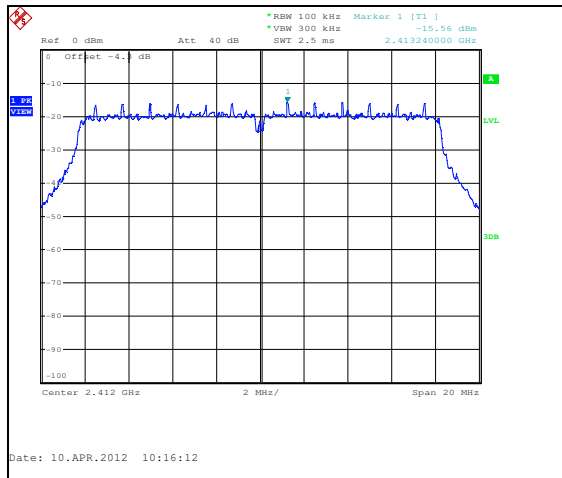
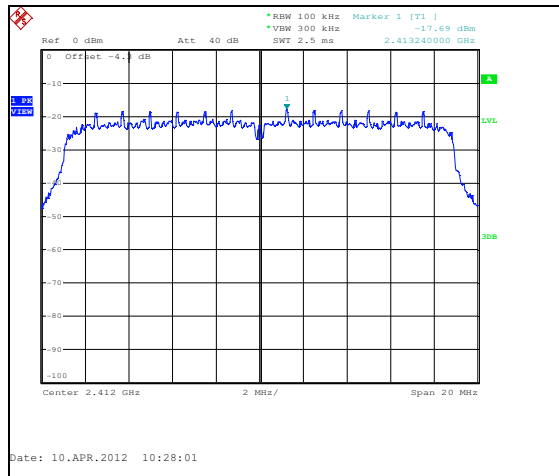
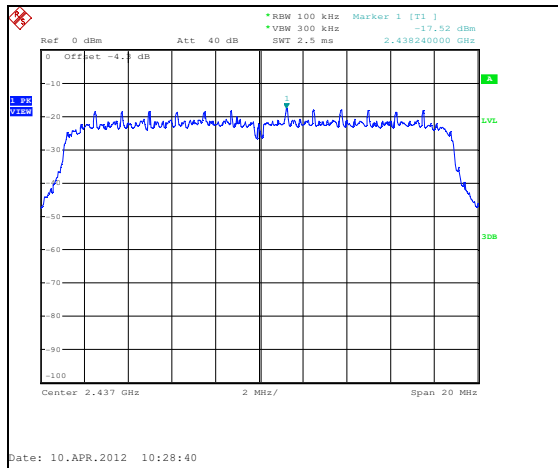
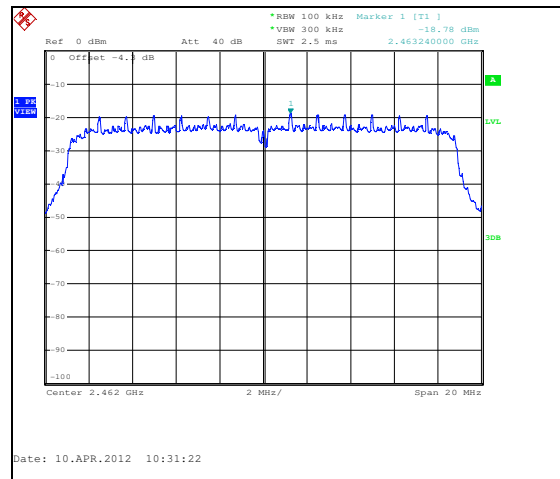


Table 7.6.2-3: Maximum Power Spectral Density – 802.11nHT20

Frequency (MHz)	Measured Power Spectral Density (dBm)		Correction Factor 10 log(N), N=2 (dB)	Max Power Spectral Density (dBm)
	Chain 0	Chain 1		
2412	-17.69	-17.95	3.01	-14.68
2437	-17.52	-18.55	3.01	-14.51
2462	-18.78	-18.79	3.01	-15.77

Figure 7.6.2-7: Power Spectral Density – 802.11nHT20  
2412 MHz – Chain 0Figure 7.6.2-8: Power Spectral Density – 802.11nHT20  
2437 MHz – Chain 0Figure 7.6.2-9: Power Spectral Density – 802.11nHT20  
2462 MHz – Chain 0

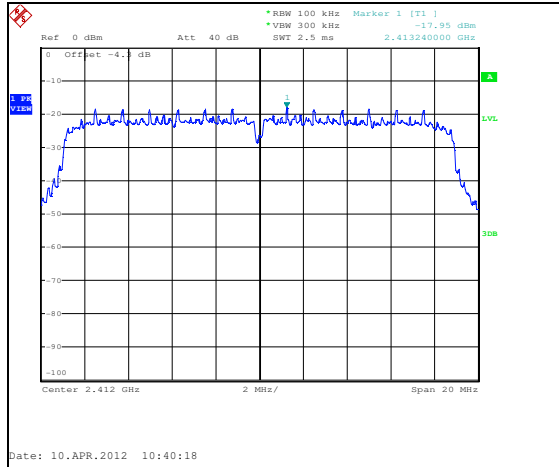


Figure 7.6.2-10: Power Spectral Density – 802.11nHT20  
2412 MHz – Chain 1

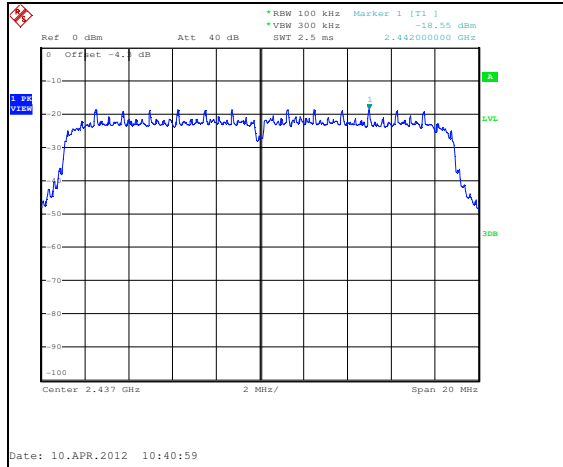


Figure 7.6.2-11: Power Spectral Density – 802.11nHT20  
2437 MHz – Chain 1

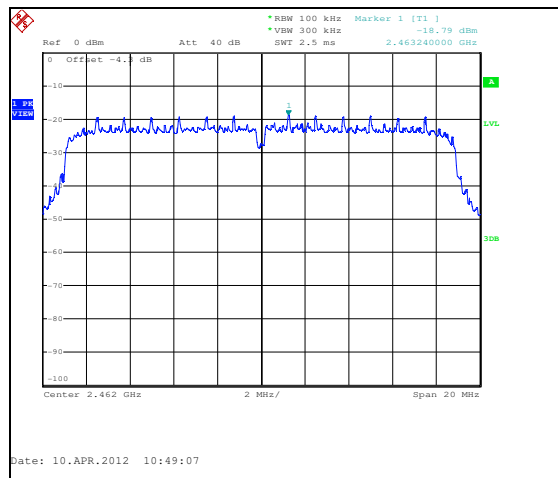
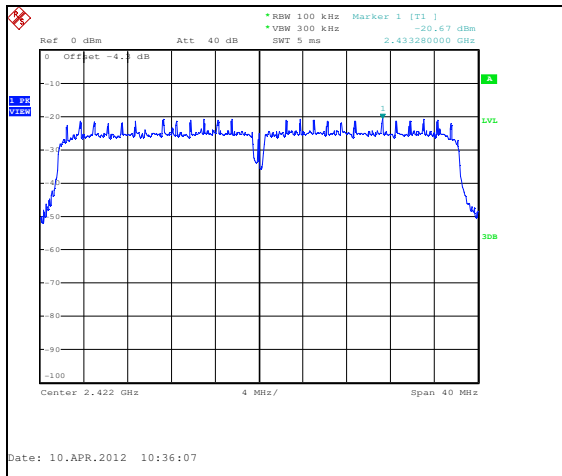
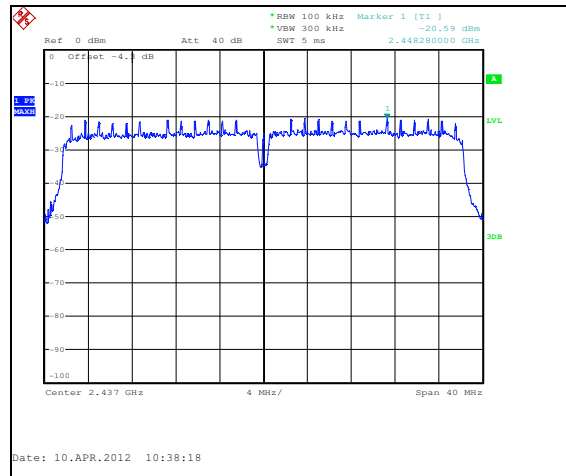
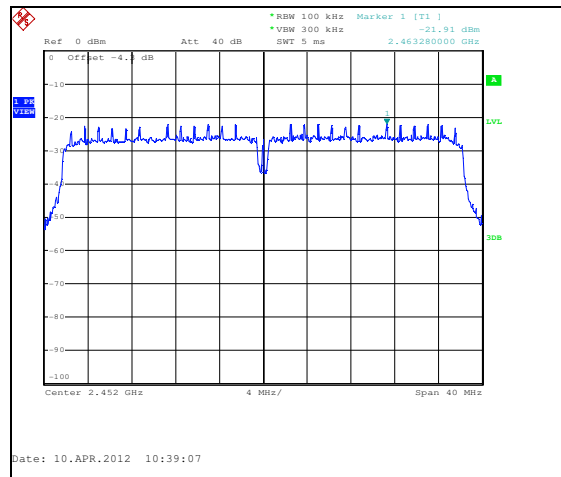


Figure 7.6.2-12: Power Spectral Density – 802.11nHT20  
2462 MHz – Chain 1

Table 7.6.2-4: Maximum Power Spectral Density – 802.11nHT40

Frequency (MHz)	Measured Power Spectral Density (dBm)		Correction Factor 10 log(N), N=2 (dB)	Max Power Spectral Density (dBm)
	Chain 0	Chain 1		
2422	-20.67	-20.95	3.01	-17.66
2437	-20.59	-21.08	3.01	-17.58
2452	-21.91	-21.60	3.01	-18.59

Figure 7.6.2-13: Power Spectral Density – 802.11nHT40  
2422 MHz – Chain 0Figure 7.6.2-14: Power Spectral Density – 802.11nHT40  
2437 MHz – Chain 0Figure 7.6.2-15: Power Spectral Density – 802.11nHT40  
2452 MHz – Chain 0

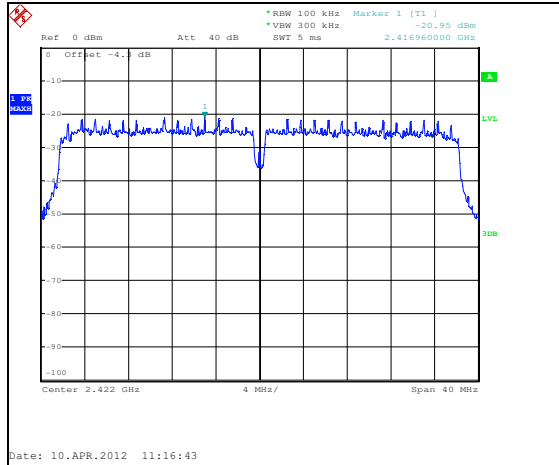


Figure 7.6.2-16: Power Spectral Density – 802.11nHT40  
2422 MHz – Chain 1

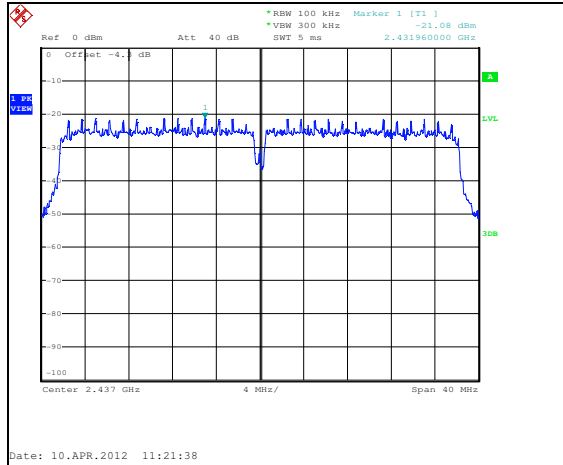


Figure 7.6.2-17: Power Spectral Density – 802.11nHT40  
2437 MHz – Chain 1

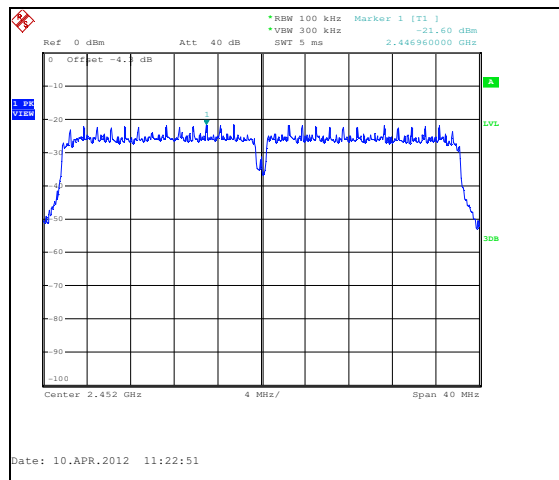


Figure 7.6.2-18: Power Spectral Density – 802.11nHT40  
2452 MHz – Chain 1

**8 CONCLUSION**

In the opinion of ACS, Inc. the DG860P2, manufactured by Arris International, Inc. meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

**END REPORT**