FCC / IC RF Test Report

APPLICANT	:	**Fujitsu Limited**
EQUIPMENT	:	**802.11n 1x1 Wireless LAN USB module**
BRAND NAME	:	**Fujitsu Limited**
MODEL NAME	:	**WLU5110-D50(ROHS)**
FCC ID	:	**EJE-WL0025**
IC ID	:	**337J-WL0025**
STANDARD	:	**FCC Part 15 Subpart C §15.247** **IC RSS-210 Issue 8**
CLASSIFICATION	:	**Digital Transmission System (DTS)**

The product was received on Feb. 17, 2011 and completely tested on Feb. 21, 2011. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

Wayne Hsu / Vice Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR121820	Rev. 01	Initial issue of report	Mar. 01, 2011

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	A8.2(a)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	Gen 4.4.1	99% Bandwidth	-	Pass	-
0	15.247(b)	A8.4	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(d)	A8.5	Frequency Band Edges	≤ 20dBc	Pass	-
3.5	15.247(e)	A8.2(b)	Power Spectral Density	≤ 8dBm	Pass	-
3.6	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 13.40 dB at 1.771 MHz
3.7	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.03 dB at 7386.00 MHz
3.8	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Fujitsu Limited
1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-855, Japan

1.2 Manufacturer

1. ASKEY COMPUTER CORPORATION
10F, No. 119, Chienkang Rd., Chung-Ho, Taiwan, R.O.C.

2. ASKEY TECHNOLOGY (JIANG SU) LTD.
No. 1388, Jiao Tong Road, Wujiang Economic-Technological Development Area, Jiangsu Province, P.R. China

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	802.11n 1x1 Wireless LAN USB module
Brand Name	Fujitsu Limited
Model Name	WLU5110-D50(ROHS)
FCC ID	EJE-WL0025
Tx/Rx Frequency Range	802.11b/g/n : 2400 MHz ~ 2483.5 MHz 802.11a/n : 5725 MHz ~ 5850 MHz
Channel Spacing	802.11b/g/n : 5 MHz 802.11a/n : 20 MHz 802.11n : 40 MHz
Maximum Output Power to Antenna	**<2400 MHz ~ 2483.5 MHz>** 802.11b : 19.19 dBm (0.0830 W) 802.11g : 23.31 dBm (0.2143 W) 802.11n (BW 20MHz) : 23.01 dBm (0.2000 W) 802.11n (BW 40MHz) : 22.77 dBm (0.1892 W) **<5725 MHz ~ 5850 MHz>** 802.11a : 21.46 dBm (0.1400 W) 802.11n (BW 20MHz) : 22.28 dBm (0.1690 W) 802.11n (BW 40MHz) : 21.97 dBm (0.1574 W)
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11a/g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
EUT Stage	Production Unit

Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Transmission System (DTS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		Remark
					2.4G	5G	
A	NISSEI ELECTRIC CO., LTD.	CP492543	PIFA Antenna	U.FL	4.67	5.10	TX / RX
B	NISSEI ELECTRIC CO., LTD.	CP492542	PIFA Antenna	U.FL	-1.12	3.20	TX / RX

EUT may match the two antennas use. Performed the worst configuration for higher gain was test in final test report.

1.5 Testing Site

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-327-0973	
Test Site No.	**Sporton Site No.**	**FCC/IC Registration No.**
	CO01-LK	486905/137405
	03CH02-HY	643075/137211

1.6 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 (Measurement Guidelines of DTS)
- ANSI C63.4-2003
- IC RSS-210 Issue 8

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B (DoC), recorded in a separate test report.

1.7 Ancillary Equipment List

Support Unit	Brand	Model	FCC ID	Remark
Personal computer	DELL	T3500	DoC	Conducted
Monitor	COMPAQ	S510	DoC	
(PS/2) Keyboard	HP	KB-0133	DoC	
(PS/2) Mouse	COMPAQ	M-S69	DoC	
Printer	HP	DJ400	DoC	
Modem	ACEEX	DM1414	DoC	
AP Router (Remote Workstation)	BUFFALO	WD6400H1CS-00	N/A	
Notebook	DELL	PP19S	DoC	Radiated
Test Fixture	-	-	-	

Note：The test fixture provides is by customer.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel No.	Frequency (20MHz)	Channel No.	Frequency (40MHz)
5725~5850 MHz	149	5745 MHz	151	5755 MHz
	153	5765 MHz	159	5795 MHz
	157	5785 MHz	-	-
	161	5805 MHz	-	-
	165	5825 MHz	-	-

Frequency Band	Channel No.	Frequency (20MHz)	Channel No.	Frequency (20MHz)
2400~2483.5MHz	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	-	-

Frequency Band	Channel No.	Frequency (20MHz)
2400~2483.5MHz	3	2422 MHz
	4	2427 MHz
	5	2432 MHz
	6	2437 MHz
	7	2442 MHz
	8	2447 MHz
	9	2452 MHz

2.2 Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz), radiated emission (30 MHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Mode	Data Rate	Channel
6dB and 99% Bandwidth Measurement Output Power Measurement Power Spectral Density Measurement Radiated Emissions Above 1GHz	11b/CCK	11 Mbps	1/6/11
	11g/BPSK	6 Mbps	
	11n/BPSK (HT-20)	6.5 Mbps	
	11n/BPSK (HT-40)	13.5 Mbps	3/6/9
	11a/BPSK	6 Mbps	149/157/165
	11n/BPSK (HT-20)	6.5 Mbps	
	11n/BPSK (HT-40)	13.5 Mbps	151/159
AC Conducted Emission Measurement Radiated Emissions Below 1GHz	Normal Mode		
Band Edges Measurement	11b/CCK	11 Mbps	1/11
	11g/BPSK	6 Mbps	
	11n/BPSK (HT-20)	6.5 Mbps	
	11n/BPSK (HT-40)	13.5 Mbps	3/9
	11a/BPSK	6 Mbps	149/165
	11n/BPSK (HT-20)	6.5 Mbps	
	11n/BPSK (HT-40)	13.5 Mbps	151/159

Remark:

Radiated band edge measurements were chosen from the highest RF output power of each chain, the n (HT-20/HT-40) modes and SISO, MIMO (chain A) modes. The worst modes from the legacy modes and n modes were used for the full radiated test measurement.

For conducted test cases, the high, middle, low channels of legacy modes (802.11abg), and 802.11n mode (SISO, MIMO) were tested respectively by choosing the highest RF output power chain, and data rate from preliminary testing.

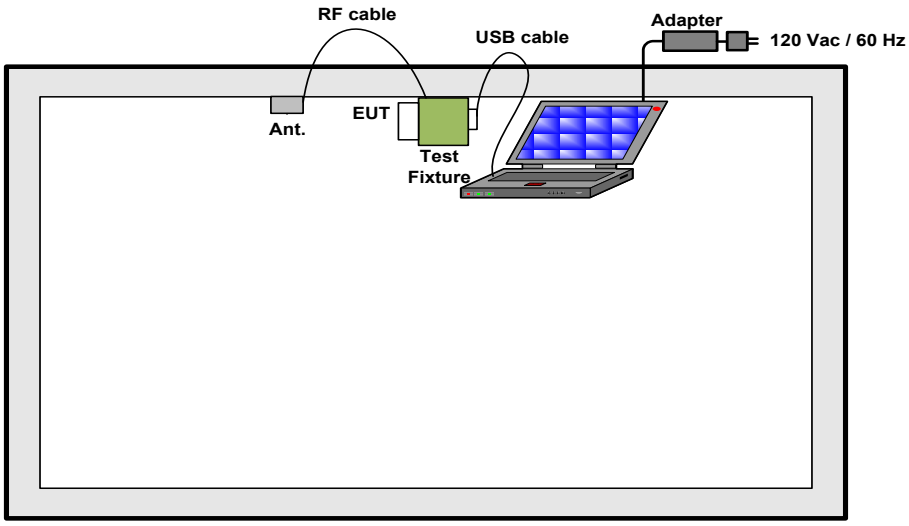
For the 6dB and 99% Bandwidth at MIMO mode were tested on chain A individually from preliminary testing.

For the power spectral density and conducted spurious emissions, the individual chain A was tested due to the maximum output power chosen from preliminary testing.

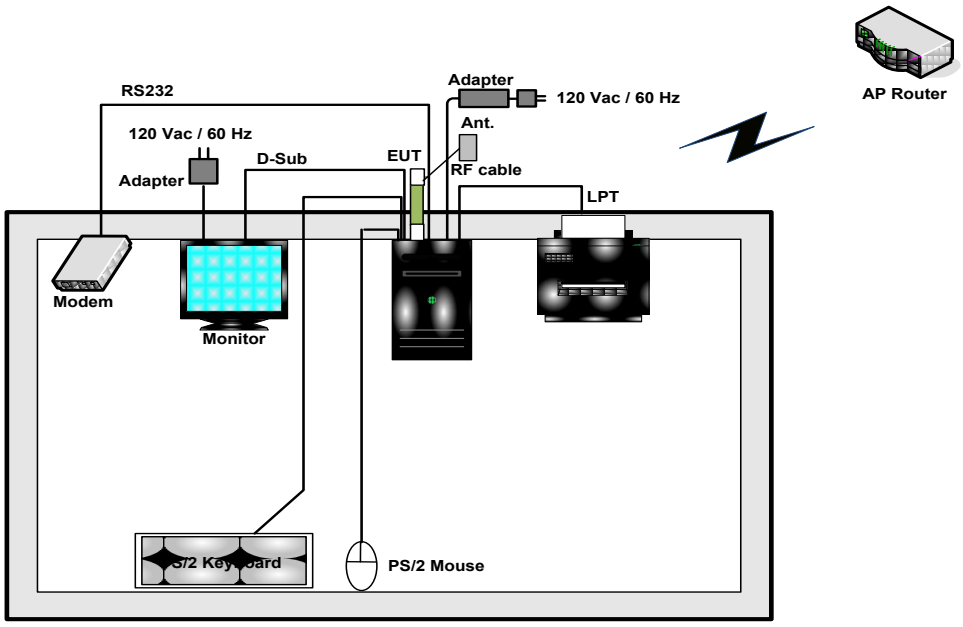
Note: SISO stands for single input and single output. It means that only one chain transmits signals at a time.

2.3 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.4 RF Utility

The programmed RF utility “RT 3x7x QA”, is installed in EUT to provide channel selection, power level, data rate and the application type. RF Utility can send transmitting signal for all testing. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

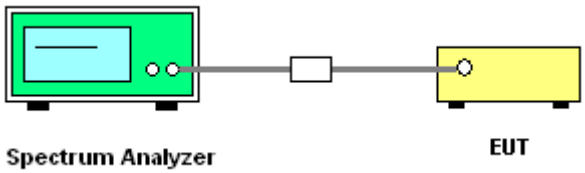
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Test Mode :	802.11b L/M/H channel	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
		Chain A		
01	2412	12.08	0.5	Pass
06	2437	11.76	0.5	Pass
11	2462	11.73	0.5	Pass

Test Mode :	802.11g L/M/H channel	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
		Chain A		
01	2412	16.54	0.5	Pass
06	2437	16.51	0.5	Pass
11	2462	16.51	0.5	Pass

Test Mode :	802.11n (HT-20) L/M/H channel at 2.4G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 20MHz) 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
		Chain A		
01	2412	17.60	0.5	Pass
06	2437	17.66	0.5	Pass
11	2462	17.60	0.5	Pass

Test Mode :	802.11n (HT-40) L/M/H channel at 2.4G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 40MHz) 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
		Chain A		
03	2422	36.47	0.5	Pass
06	2437	36.47	0.5	Pass
09	2452	36.47	0.5	Pass

Test Mode :	802.11a L/M/H channels	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11a 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
		Chain A		
149	5745	16.51	0.5	Pass
157	5785	16.51	0.5	Pass
165	5825	16.51	0.5	Pass

Test Mode :	802.11n (HT-20) L/M/H channels at 5.8G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 20MHz, 2Tx) 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
		Chain A		
149	5745	17.60	0.5	Pass
157	5785	17.60	0.5	Pass
165	5825	17.63	0.5	Pass

Test Mode :	802.11n (HT-40) L/M/H channels at 5.8G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 40MHz, SISO, 2Tx) 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
		SISO		
		Chain A		
151	5755	36.41	0.5	Pass
159	5795	36.47	0.5	Pass

3.1.6 Test Result of 99% Occupied Bandwidth

Test Mode :	802.11b L/M/H channel	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11b 99% Occupied Bandwidth (MHz)	Pass/Fail
		Chain A	
01	2412	14.55	Pass
06	2437	14.55	Pass
11	2462	14.55	Pass

Test Mode :	802.11g L/M/H channel	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11g 99% Occupied Bandwidth (MHz)	Pass/Fail
		Chain A	
01	2412	16.38	Pass
06	2437	16.38	Pass
11	2462	16.41	Pass

Test Mode :	802.11n (HT-20) L/M/H channel at 2.4G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 20MHz) 99% Occupied Bandwidth (MHz)	Pass/Fail
		Chain A	
01	2412	17.50	Pass
06	2437	17.50	Pass
11	2462	17.50	Pass

Test Mode :	802.11n (HT-40) L/M/H channel at 2.4G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 40MHz) 99% Occupied Bandwidth (MHz)	Pass/Fail
		Chain A	
03	2412	35.96	Pass
06	2437	35.96	Pass
09	2462	35.96	Pass

Test Mode :	802.11a L/M/H channels	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11a 99% Occupied Bandwidth (MHz)	Pass/Fail
		Chain A	
149	5745	16.38	Pass
157	5785	16.41	Pass
165	5825	16.41	Pass

Test Mode :	802.11n (HT-20) L/M/H channels at 5.8G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

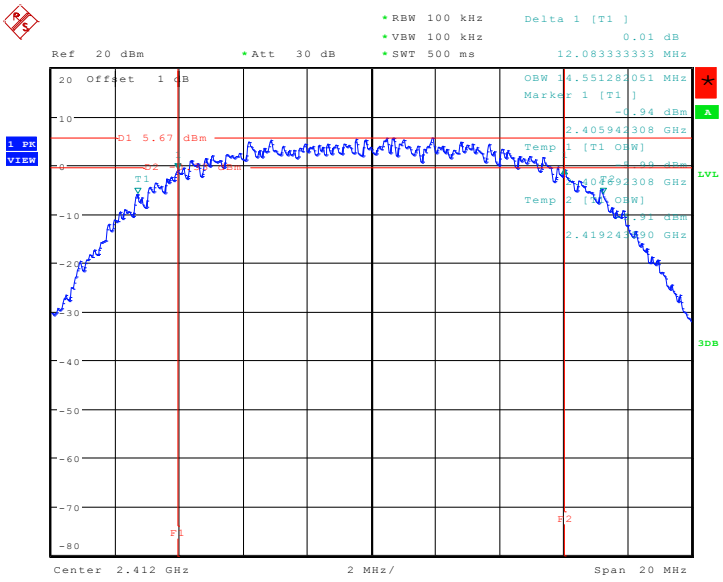
Channel	Frequency (MHz)	802.11n (BW 20MHz) 99% Occupied Bandwidth (MHz)	Pass/Fail
		Chain A	
149	5745	17.50	Pass
157	5785	17.50	Pass
165	5825	17.50	Pass

Test Mode :	802.11n (HT-40) L/M/H channels at 5.8G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 40MHz) 99% Occupied Bandwidth (MHz)	Pass/Fail
		SISO	
		Chain A	
151	5755	35.96	Pass
159	5795	35.96	Pass

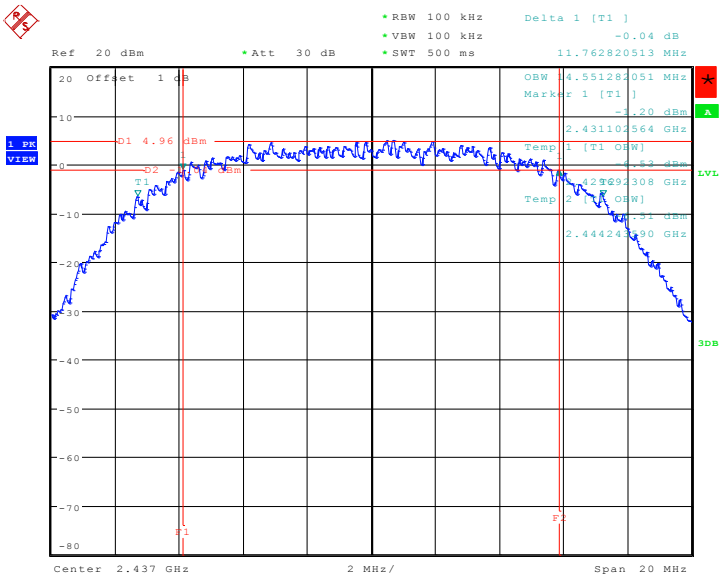
3.1.7 Test Result of 6dB and 99% Bandwidth Plots

6dB and 99% Bandwidth Plot on 802.11b Channel 01 – Chain A



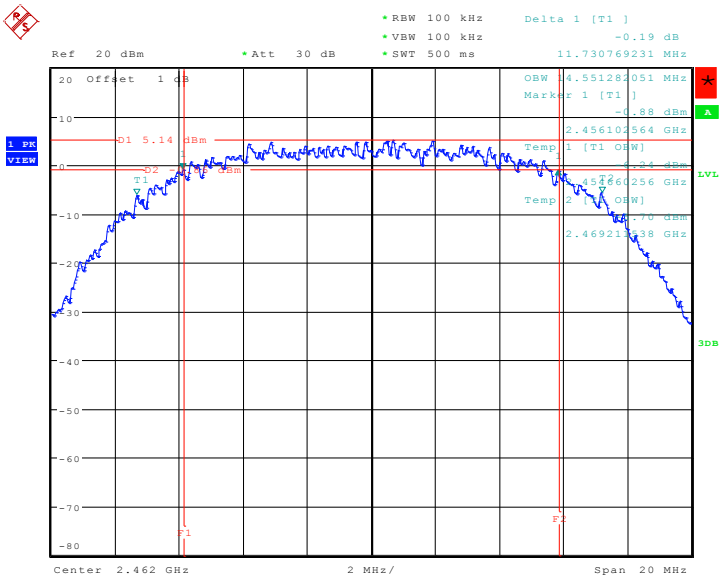
Date: 21.FEB.2011 11:32:00

6dB and 99% Bandwidth Plot on 802.11b Channel 06 – Chain A



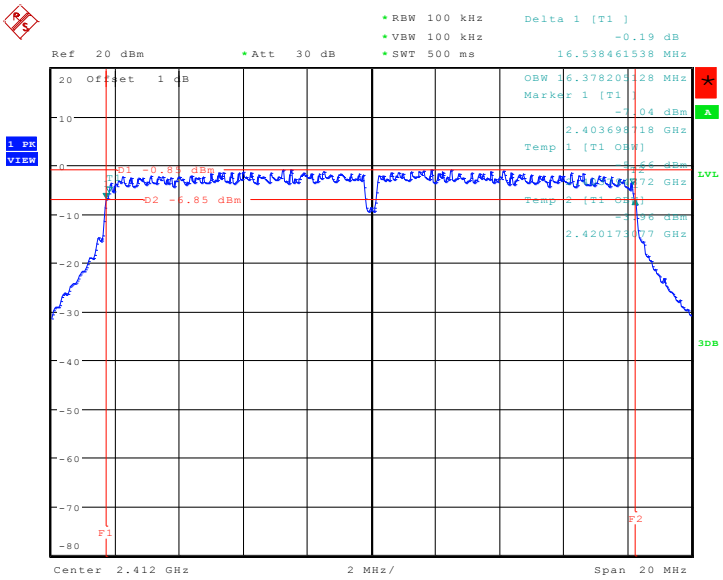
Date: 21.FEB.2011 11:27:57

6dB and 99% Bandwidth Plot on 802.11b Channel 11 – Chain A



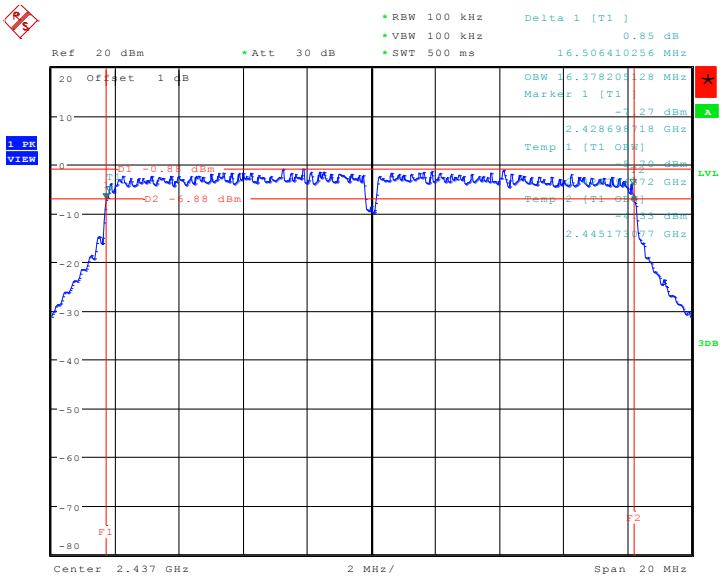
Date: 21.FEB.2011 11:34:57

6dB and 99% Bandwidth Plot on 802.11g Channel 01 – Chain A



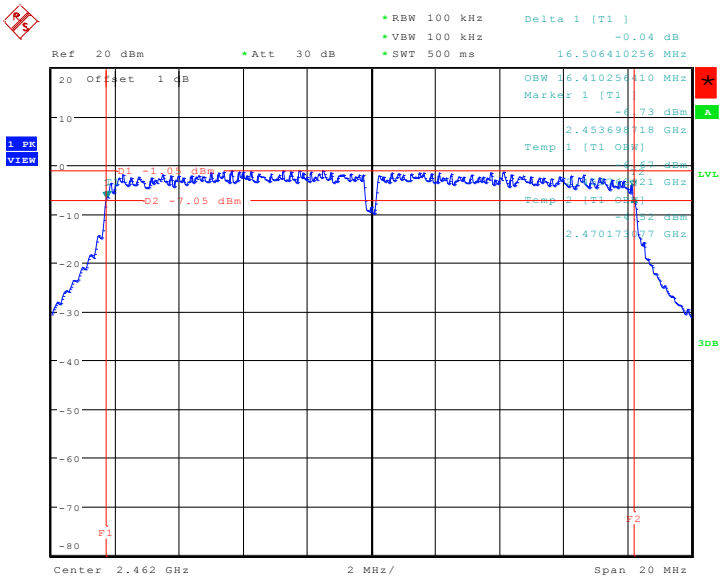
Date: 21.FEB.2011 14:02:05

6dB and 99% Bandwidth Plot on 802.11g Channel 06 – Chain A



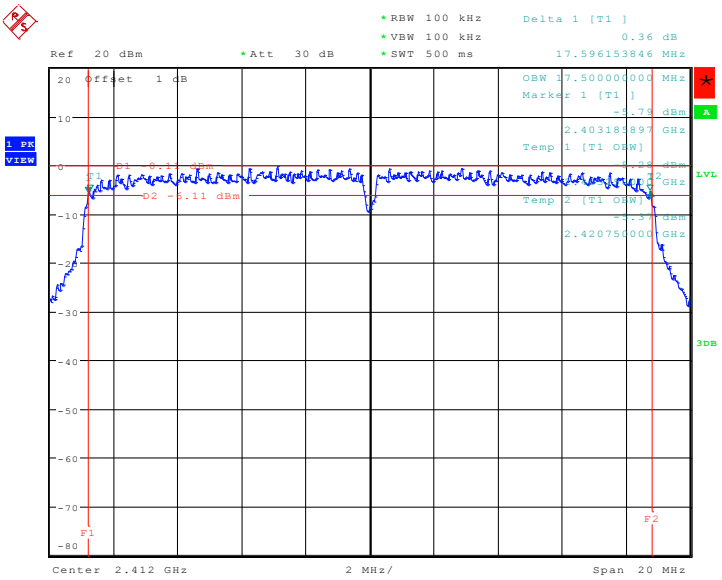
Date: 21.FEB.2011 14:07:19

6dB and 99% Bandwidth Plot on 802.11g Channel 11 – Chain A



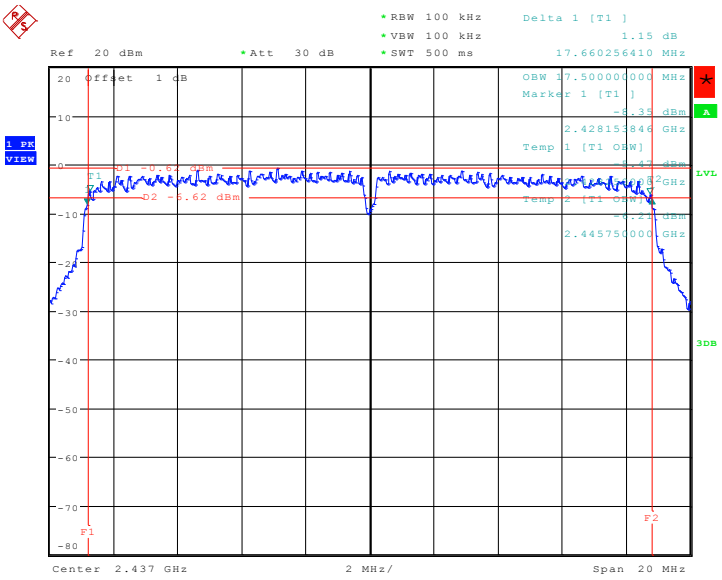
Date: 21.FEB.2011 14:31:02

6dB and 99% Bandwidth Plot on 802.11n Channel 01 – Chain A



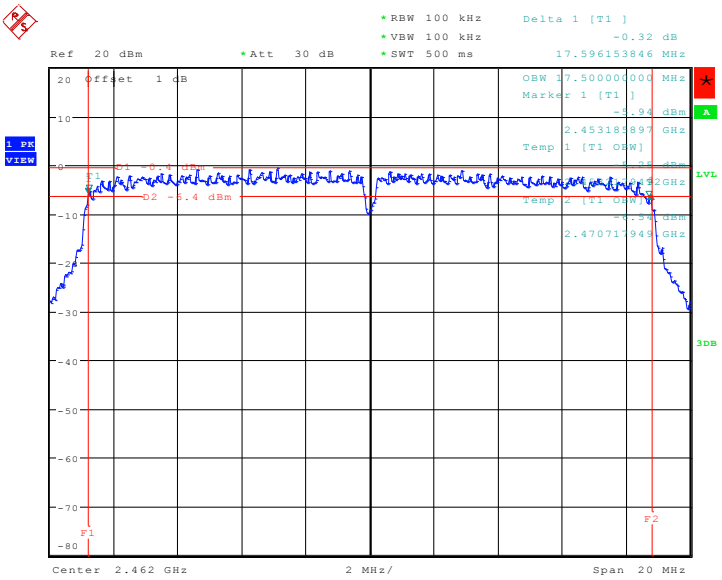
Date: 21.FEB.2011 15:24:59

6dB and 99% Bandwidth Plot on 802.11n Channel 06 – Chain A



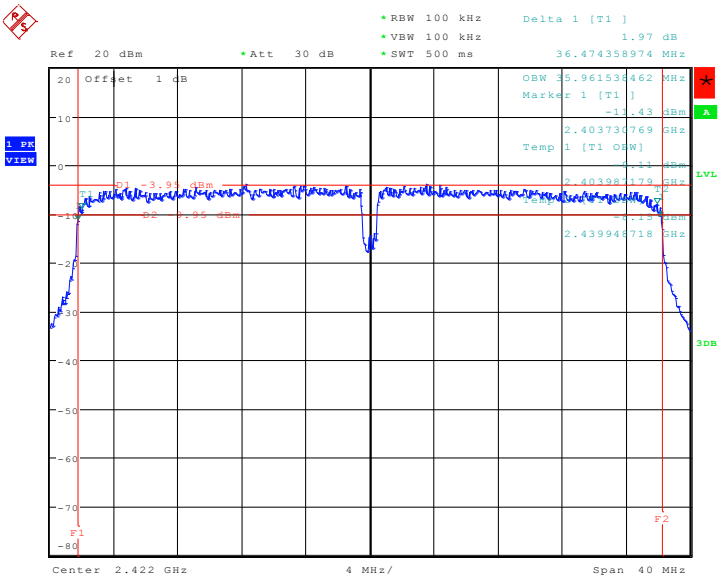
Date: 21.FEB.2011 15:35:13

6dB and 99% Bandwidth Plot on 802.11n Channel 11 – Chain A



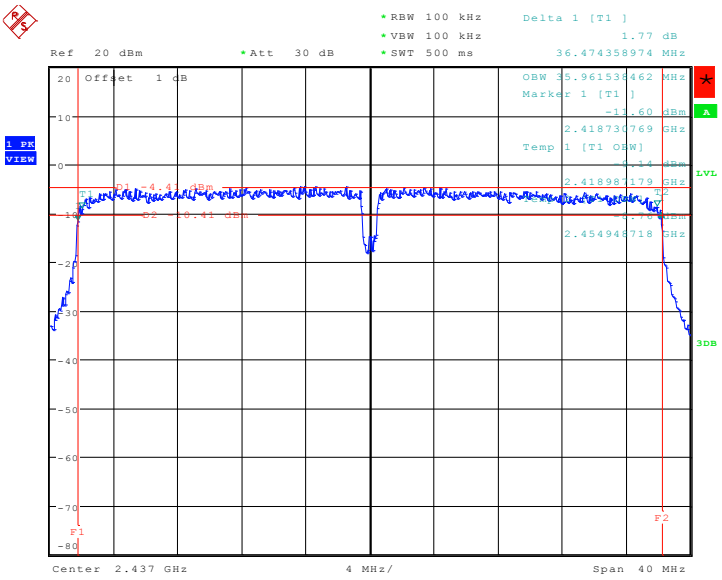
Date: 21.FEB.2011 15:40:45

6dB and 99% Bandwidth Plot on 802.11n Channel 03 – Chain A



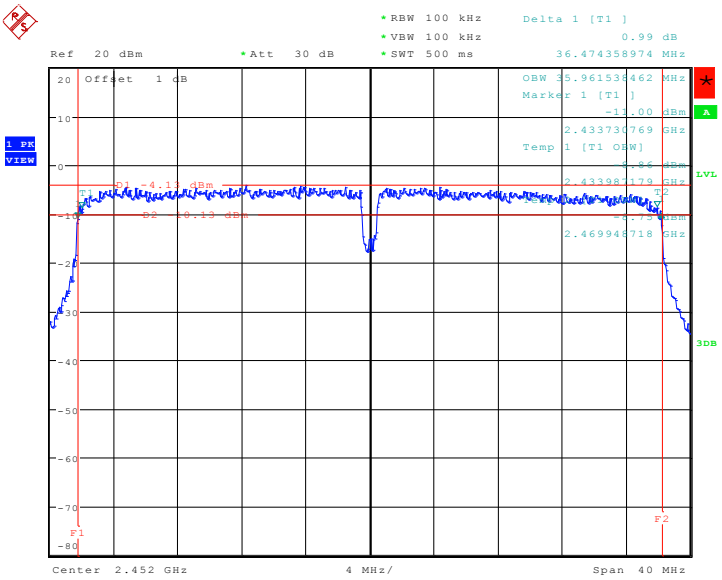
Date: 21.FEB.2011 15:48:31

6dB and 99% Bandwidth Plot on 802.11n Channel 06 – Chain A

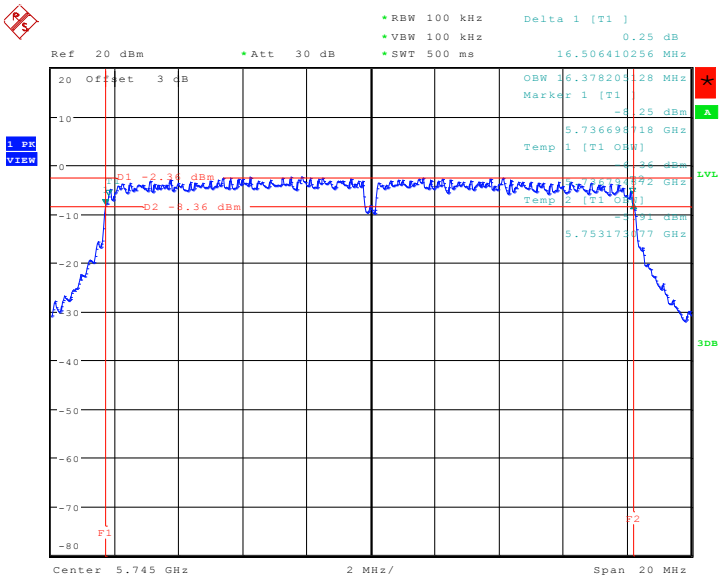


Date: 21.FEB.2011 15:59:52

6dB and 99% Bandwidth Plot on 802.11n Channel 11 – Chain A

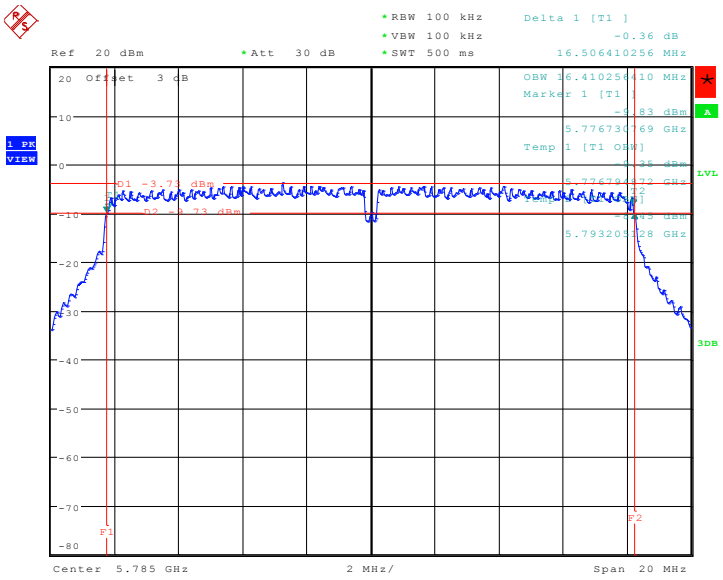


6dB and 99% Bandwidth Plot on 802.11a Channel 149 – Chain A



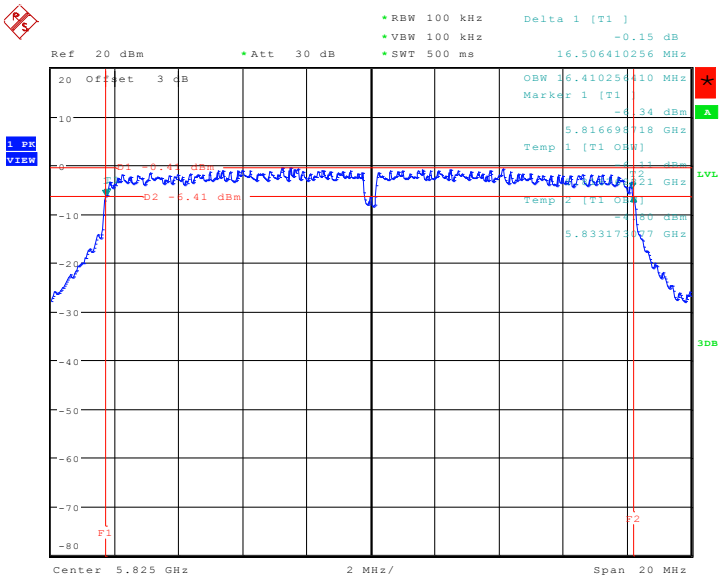
Date: 21.FEB.2011 16:48:39

6dB and 99% Bandwidth Plot on 802.11a Channel 157 – Chain A



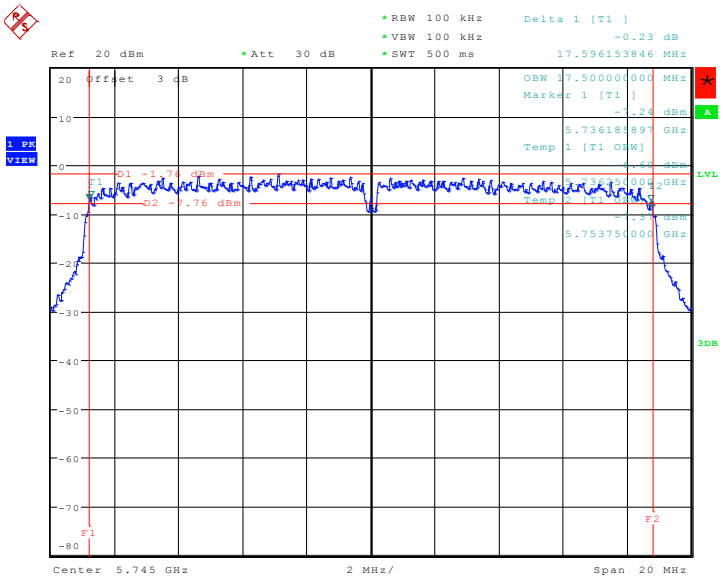
Date: 21.FEB.2011 16:59:04

6dB and 99% Bandwidth Plot on 802.11a Channel 165 – Chain A



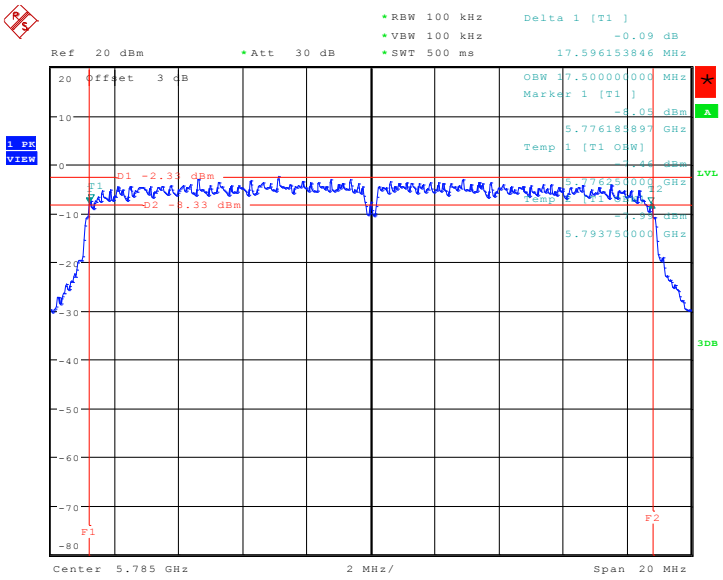
Date: 21.FEB.2011 17:22:59

6dB and 99% Bandwidth Plot on 802.11n Channel 149 – Chain A



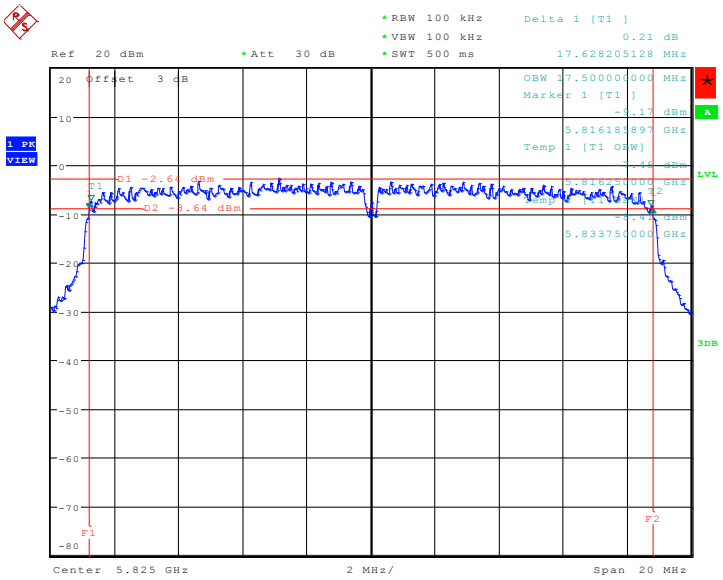
Date: 21.FEB.2011 17:39:50

6dB and 99% Bandwidth Plot on 802.11n Channel 157 – Chain A



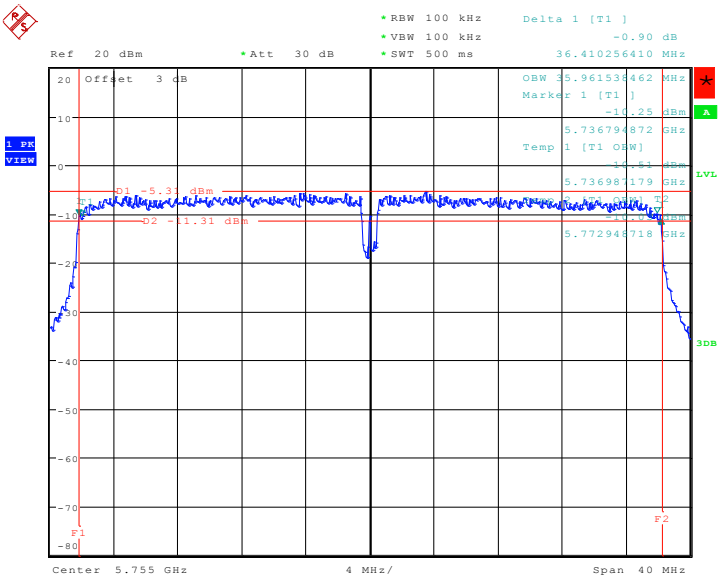
Date: 21.FEB.2011 17:46:13

6dB and 99% Bandwidth Plot on 802.11n Channel 165 – Chain A



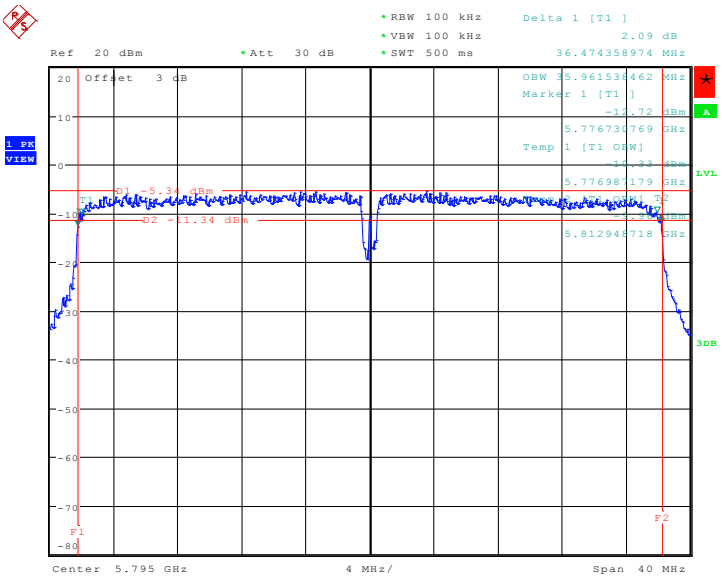
Date: 21.FEB.2011 17:49:48

6dB and 99% Bandwidth Plot on 802.11n Channel 151 – Chain A



Date: 21.FEB.2011 17:56:52

6dB and 99% Bandwidth Plot on 802.11n Channel 159 – Chain A



Date: 21.FEB.2011 18:11:07

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-multipoint antenna reduction operation, the limit has to be reduced by 1dB for every dB that the directional gain of the antenna exceeds 6dBi.

3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Turn on the EUT and power meter and then record the peak power value.
3. Repeat above procedures on all channels needed to be tested.

3.2.4 Test Setup

3.2.5 Test Result of Output Power

Test Mode :	802.11b L/M/H channel	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11b Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
01	2412	18.98	30	Pass
06	2437	19.10	30	Pass
11	2462	19.19	30	Pass

Test Mode :	802.11g L/M/H channel	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11g Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
01	2412	23.26	30	Pass
06	2437	23.31	30	Pass
11	2462	23.28	30	Pass

Test Mode :	802.11n (HT-20) L/M/H channel at 2.4G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 20MHz) Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
01	2412	22.85	30	Pass
06	2437	23.01	30	Pass
11	2462	22.57	30	Pass

Test Mode :	802.11n (HT-40) L/M/H channel at 2.4G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 40MHz) Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
CH 03	2422 MHz	22.77	30	Pass
CH 06	2437 MHz	22.39	30	Pass
CH 09	2452 MHz	22.75	30	Pass

Test Mode :	802.11 a L/M/H channel	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11a Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
149	5745	21.34	30	Pass
157	5785	20.89	30	Pass
165	5825	21.46	30	Pass

Test Mode :	802.11n (HT-20) L/M/H channel at 5.8G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 20MHz) Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
149	5745	22.28	30	Pass
157	5785	21.67	30	Pass
165	5825	20.85	30	Pass

Test Mode :	802.11n (HT-40) L/M/H channel at 5.8G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 40MHz) Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
151	5755	21.97	30	Pass
159	5795	21.88	30	Pass

3.3 Band Edges Measurement

3.3.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB.

3.3.2 Measuring Instruments

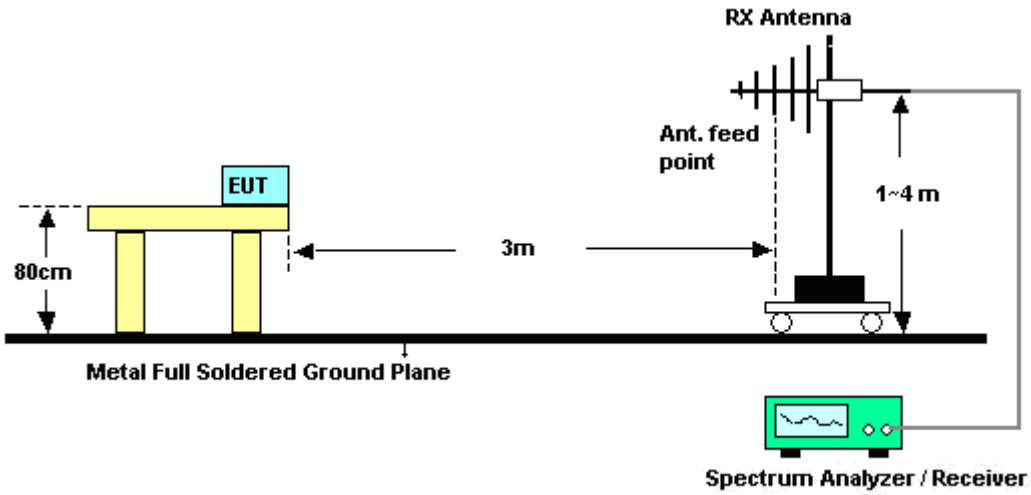
See list of measuring instruments of this test report.

3.3.3 Test Procedures

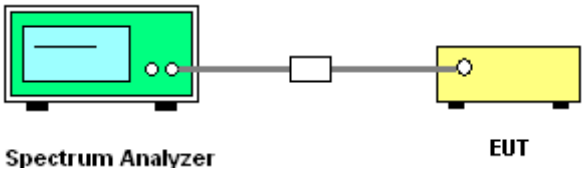
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Conducted emission test: Set RBW = 100 kHz, Video bandwidth (VBW) > RBW. Band edge emissions must be at least 20 dB below the highest emission level within the authorized band as measured with a 100 kHz RBW. Note: If the output power of this device was measured by power meter, the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Apply to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep=Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation as in FCC Section 15.35(b) and (c).

3.3.4 Test Setup

<Radiated Band Edges>



<Conducted Band Edges>



3.3.5 Test Result of Radiated Band Edges

Test Mode :	802.11 b L channel	Temperature :	23°C
Test Band :	802.11b	Relative Humidity :	51%
Test Channel :	01	Test Engineer :	Daniel
Remark	2411.460 MHz and 2412.980 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2390.000	48.57	-5.43	54.00	13.76	31.79	3.02	0.00	Average
2 @	2411.460	100.85			65.97	31.86	3.02	0.00	Average
1	2390.000	58.89	-15.11	74.00	24.08	31.79	3.02	0.00	Peak
2 X	2412.980	109.09			74.21	31.86	3.02	0.00	Peak

Test Mode :	802.11b H channel	Temperature :	23°C
Test Band :	802.11b	Relative Humidity :	51%
Test Channel :	11	Test Engineer :	Daniel
Remark	2459.530 MHz and 2461.050 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 X	2459.530	100.76			65.65	32.06	3.05	0.00	Average
2	2483.500	48.96	-5.04	54.00	13.75	32.13	3.08	0.00	Average
1 @	2461.050	108.94			73.83	32.06	3.05	0.00	Peak
2	2484.420	61.45	-12.55	74.00	26.24	32.13	3.08	0.00	Peak

Test Mode :	802.11g L channel	Temperature :	23°C
Test Band :	802.11g	Relative Humidity :	51%
Test Channel :	01	Test Engineer :	Daniel
Remark	2408.610 MHz and 2408.420 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2359.210	49.32	-4.68	54.00	14.68	31.65	2.99	0.00	Average
2 X	2408.610	94.33			59.45	31.86	3.02	0.00	Average
1	2359.780	61.54	-12.46	74.00	26.90	31.65	2.99	0.00	Peak
2 X	2408.420	104.99	-----	-----	70.11	31.86	3.02	0.00	Peak

Test Mode :	802.11g H channel	Temperature :	23°C
Test Band :	802.11g	Relative Humidity :	51%
Test Channel :	11	Test Engineer :	Daniel
Remark	2459.530 MHz and 2458.770 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 X	2459.530	97.94			62.83	32.06	3.05	0.00	Average
2	2483.500	52.42	-1.58	54.00	17.21	32.13	3.08	0.00	Average
1 X	2458.770	108.54			73.43	32.06	3.05	0.00	Peak
2	2483.500	70.38	-3.62	74.00	35.17	32.13	3.08	0.00	Peak

Test Mode :	802.11n (HT-20) L channel at 2.4G band	Temperature :	23°C
Test Band :	802.11n (HT20)	Relative Humidity :	51%
Test Channel :	01	Test Engineer :	Daniel
Remark	2408.610 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2359.970	49.39	-4.61	54.00	14.75	31.65	2.99	0.00	Average
2 X	2408.610	94.66			59.78	31.86	3.02	0.00	Average
1	2359.210	62.25	-11.75	74.00	27.61	31.65	2.99	0.00	Peak
2 X	2408.610	105.46			70.58	31.86	3.02	0.00	Peak

Test Mode :	802.11n (HT-20) H channel at 2.4G band	Temperature :	23°C
Test Band :	802.11n (HT20)	Relative Humidity :	51%
Test Channel :	11	Test Engineer :	Daniel
Remark	2467.130 MHz and 2464.420 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 X	2467.130	96.76			61.62	32.06	3.08	0.00	Average
2	2483.500	51.15	-2.85	54.00	15.94	32.13	3.08	0.00	Average
1 X	2465.420	107.60			72.46	32.06	3.08	0.00	Peak
2	2483.500	69.76	-4.24	74.00	34.55	32.13	3.08	0.00	Peak

Test Mode :	802.11n (HT-40) L channel at 2.4G band	Temperature :	23°C
Test Band :	802.11n (HT40)	Relative Humidity :	51%
Test Channel :	03	Test Engineer :	Daniel
Remark	2425.900 MHz and 2425.140 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2390.000	49.24	-4.76	54.00	14.43	31.79	3.02	0.00	Average
2 X	2425.900	92.43			57.46	31.92	3.05	0.00	Average
1	2390.000	65.46	-8.54	74.00	30.65	31.79	3.02	0.00	Peak
2 X	2425.140	103.12			68.15	31.92	3.05	0.00	Peak

Test Mode :	802.11n (HT-40) H channel at 2.4G band	Temperature :	23°C
Test Band :	802.11n (HT40)	Relative Humidity :	51%
Test Channel :	09	Test Engineer :	Daniel
Remark	2440.530 MHz and 2439.010 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 X	2440.530	92.41			57.37	31.99	3.05	0.00	Average
2	2483.500	51.57	-2.43	54.00	16.36	32.13	3.08	0.00	Average
1 @	2439.010	103.00			67.96	31.99	3.05	0.00	Peak
2	2488.220	66.45	-7.55	74.00	31.17	32.20	3.08	0.00	Peak

Test Mode :	802.11a L channel	Temperature :	23°C
Test Band :	802.11a	Relative Humidity :	51%
Test Channel :	149	Test Engineer :	Daniel
Remark	5743.730 MHz and 5742.610 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	5724.900	74.40	-9.14	83.54	32.39	36.97	5.04	0.00	Peak
2 X	5743.730	112.08			70.02	36.99	5.07	0.00	Peak
1	5725.000	60.76	-2.78	63.54	18.75	36.97	5.04	0.00	Average
2 X	5742.610	101.67			59.61	36.99	5.07	0.00	Average

Test Mode :	802.11a H channel	Temperature :	23°C
Test Band :	802.11a	Relative Humidity :	51%
Test Channel :	165	Test Engineer :	Daniel
Remark	5826.610 MHz and 5827.270 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 X	5826.610	114.07			71.87	37.09	5.11	0.00	Peak
2	5853.890	74.08	-9.46	83.54	31.84	37.13	5.11	0.00	Peak
1 X	5827.270	103.80			61.60	37.09	5.11	0.00	Average
2	5851.030	60.16	-3.38	63.54	17.94	37.11	5.11	0.00	Average

Test Mode :	802.11n (HT-20) L channel at 5.8G band	Temperature :	23°C
Test Band :	802.11n (HT20)	Relative Humidity :	51%
Test Channel :	149	Test Engineer :	Daniel
Remark	5742.050 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	5724.410	75.49	-8.05	83.54	33.48	36.97	5.04	0.00	Peak
2 X	5742.050	113.01			70.95	36.99	5.07	0.00	Peak
1	5724.970	60.95	-2.59	63.54	18.94	36.97	5.04	0.00	Average
2 X	5742.050	102.18			60.12	36.99	5.07	0.00	Average

Test Mode :	802.11n (HT-20) L channel at 5.8G band	Temperature :	23°C
Test Band :	802.11n (HT20)	Relative Humidity :	51%
Test Channel :	165	Test Engineer :	Daniel
Remark	5821.770 MHz and 5826.610 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 X	5821.770	111.99			69.79	37.09	5.11	0.00	Peak
2	5860.710	73.98	-9.56	83.54	31.72	37.13	5.13	0.00	Peak
1 X	5826.610	101.31			59.11	37.09	5.11	0.00	Average
2	5850.000	60.03	-3.51	63.54	17.81	37.11	5.11	0.00	Average

Test Mode :	802.11n (HT-40) L channel at 5.8G band	Temperature :	23°C
Test Band :	802.11n (HT40)	Relative Humidity :	51%
Test Channel :	151	Test Engineer :	Daniel
Remark	5752.700 MHz and 5753.100 MHz is Fundamental Signals which can be ignored.		

HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	5723.900	75.89	-7.65	83.54	33.88	36.97	5.04	0.00	Peak
2 X	5752.700	110.38			68.30	37.01	5.07	0.00	Peak
1	5725.000	61.69	-1.85	63.54	19.68	36.97	5.04	0.00	Average
2 X	5753.100	99.17			57.09	37.01	5.07	0.00	Average

Test Mode :	802.11n (HT-40) L channel at 5.8G band	Temperature :	23°C
Test Band :	802.11n (HT40)	Relative Humidity :	51%
Test Channel :	159	Test Engineer :	Daniel
Remark	5792.800 MHz and 5793.300 MHz is Fundamental Signals which can be ignored.		

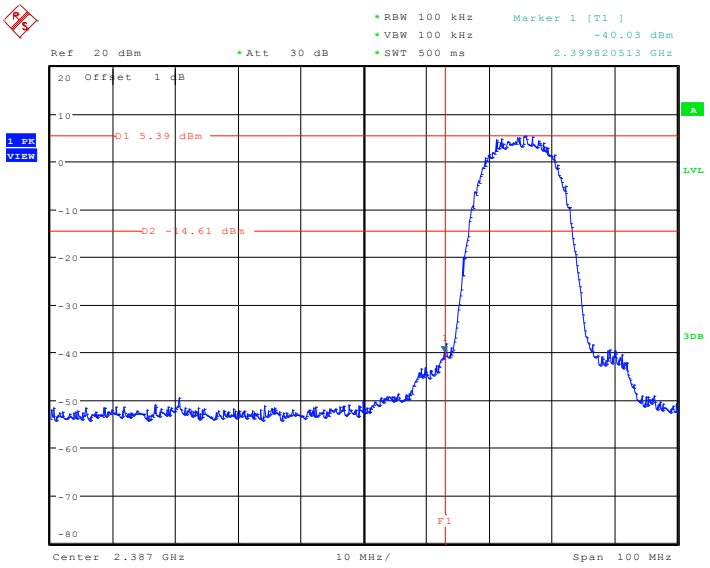
HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 X	5792.800	112.83			70.69	37.05	5.09	0.00	Peak
2	5859.200	73.84	-9.70	83.54	31.58	37.13	5.13	0.00	Peak
1 X	5793.300	102.01			59.87	37.05	5.09	0.00	Average
2	5850.800	59.98	-3.56	63.54	17.76	37.11	5.11	0.00	Average

3.4 Test Result of Conducted Band Edges

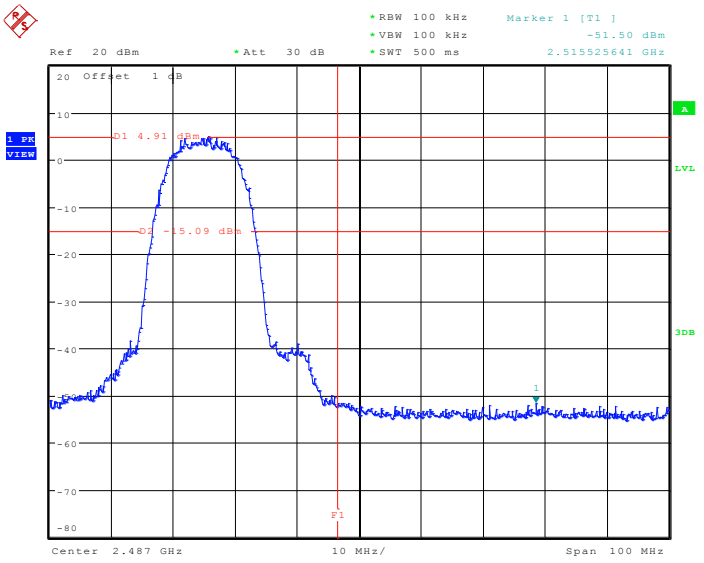
Test Mode :	802.11b L and H channel	**Temperature :**	21℃
Test Band :	802.11b	**Relative Humidity :**	62%
Test Channel :	01 and 11	**Test Engineer :**	Ian

Low Band Edge Plot on 802.11b Channel 01



Date: 21.FEB.2011 11:10:11

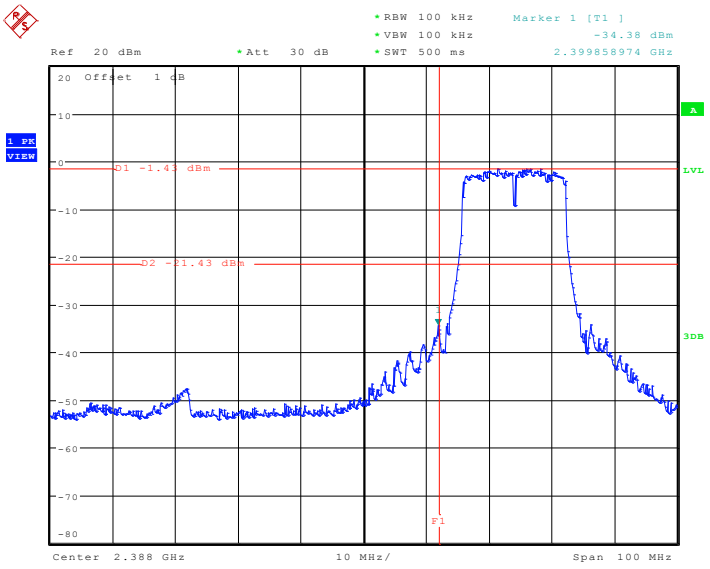
High Band Edge Plot on 802.11b Channel 11



Date: 21.FEB.2011 11:35:59

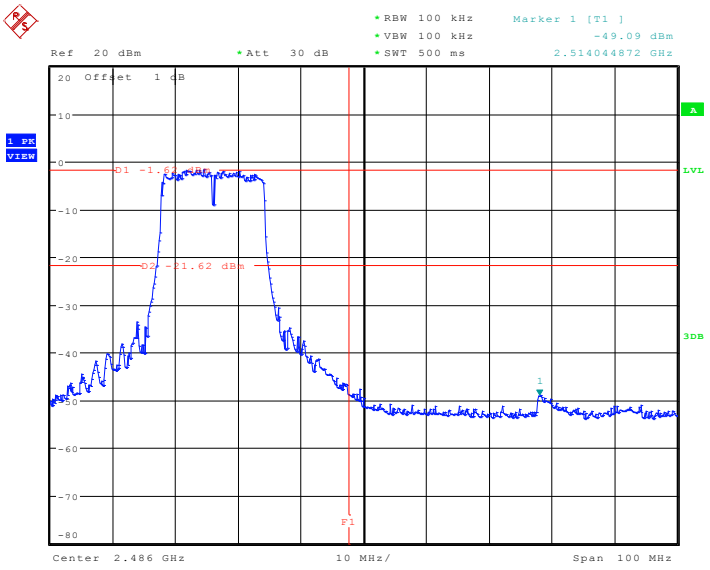
Test Mode :	802.11g L and H channel	Temperature :	21℃
Test Band :	802.11g	Relative Humidity :	62%
Test Channel :	01 and 11	Test Engineer :	Ian

Low Band Edge Plot on 802.11g Channel 01



Date: 21.FEB.2011 14:03:11

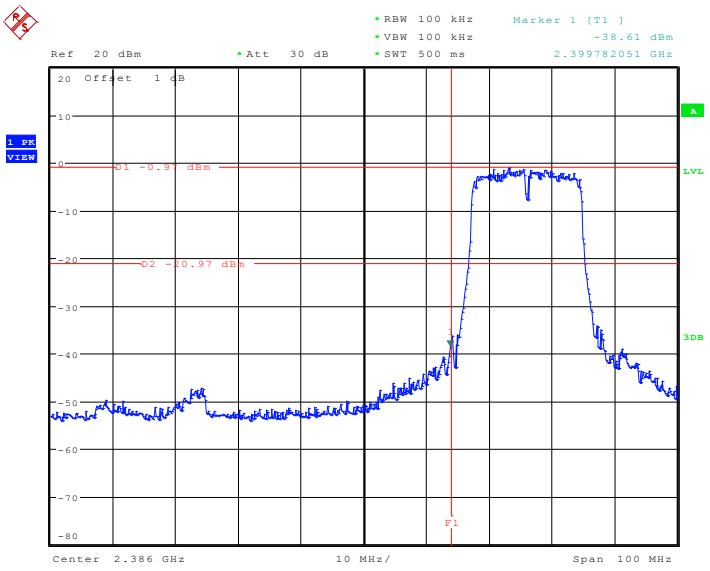
High Band Edge Plot on 802.11g Channel 11



Date: 21.FEB.2011 14:33:29

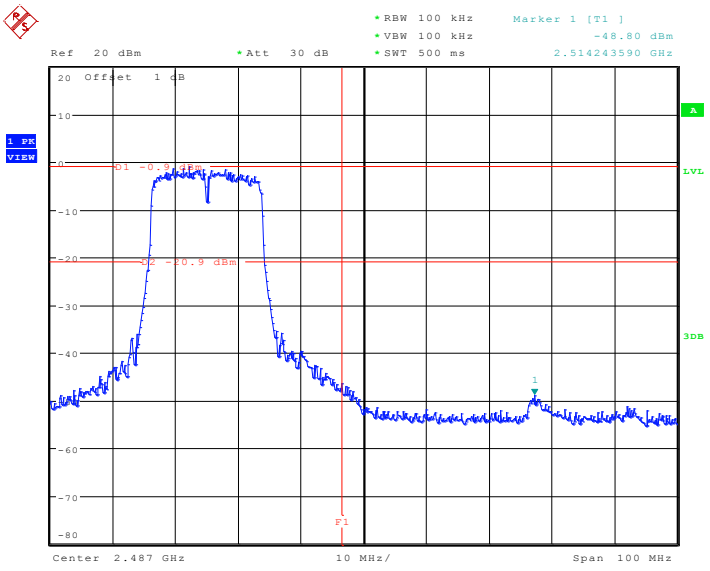
Test Mode :	802.11n (HT-20) L and H channel at 2.4G band	Temperature :	21℃
Test Band :	802.11n (HT 20MHz)	Relative Humidity :	62%
Test Channel :	01 and 11	Test Engineer :	Ian

Low Band Edge Plot on 802.11n Channel 01



Date: 21.FEB.2011 15:25:58

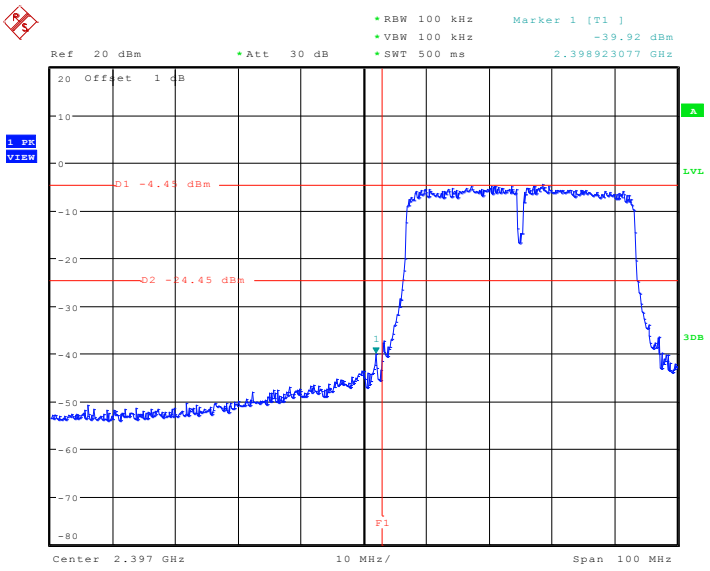
High Band Edge Plot on 802.11n Channel 11



Date: 21.FEB.2011 15:41:29

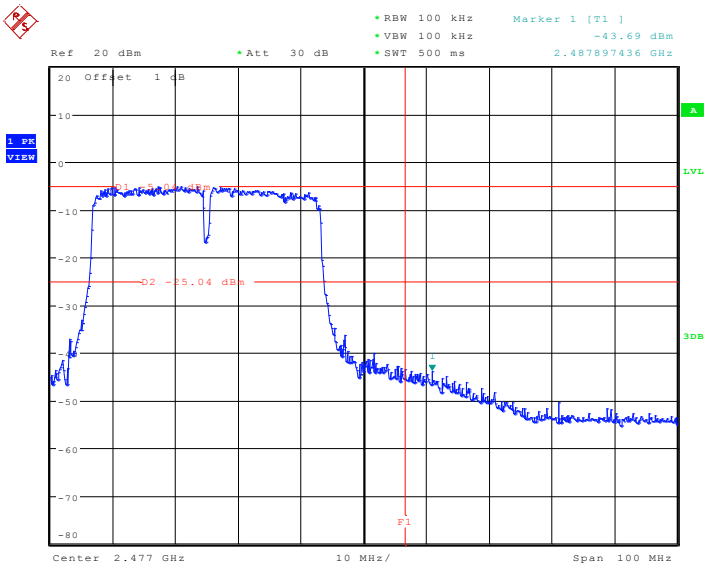
Test Mode :	802.11n (HT-40) L and H channel at 2.4G band	Temperature :	21℃
Test Band :	802.11n (HT 40MHz)	Relative Humidity :	62%
Test Channel :	03 and 09	Test Engineer :	Ian

Low Band Edge Plot on 802.11n Channel 03



Date: 21.FEB.2011 15:49:20

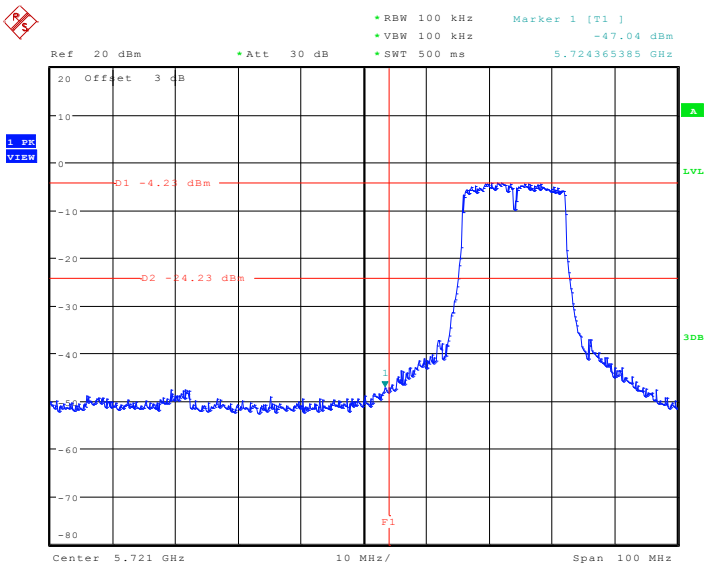
High Band Edge Plot on 802.11n Channel 09



Date: 21.FEB.2011 16:05:13

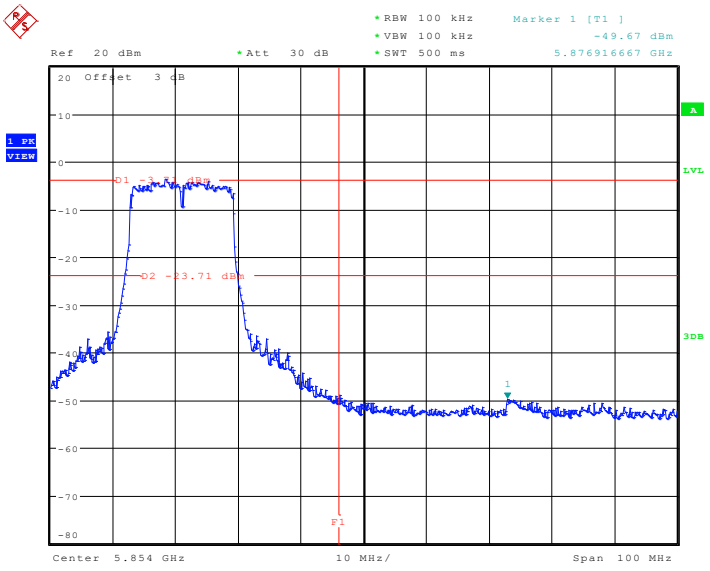
Test Mode :	802.11a L and H channel	Temperature :	21℃
Test Band :	802.11a	Relative Humidity :	62%
Test Channel :	149 and 165	Test Engineer :	Ian

Low Band Edge Plot on 802.11a Channel 149



Date: 21.FEB.2011 16:49:49

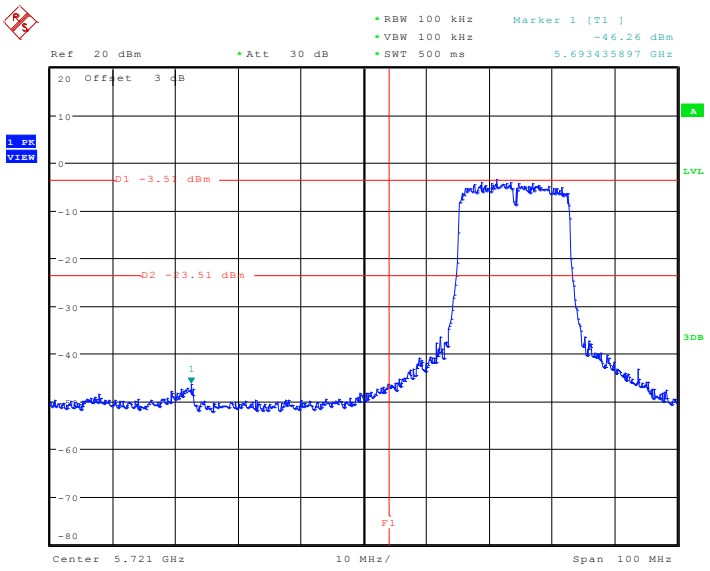
High Band Edge Plot on 802.11a Channel 165



Date: 21.FEB.2011 17:24:13

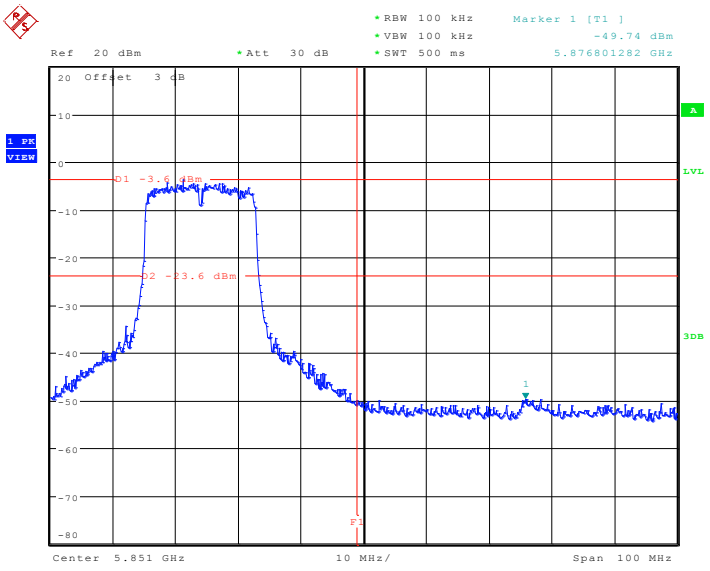
Test Mode :	802.11n (HT-20) L and H channel at 5.8G band	**Temperature :**	21℃
Test Band :	802.11n (HT 20MHz)	**Relative Humidity :**	62%
Test Channel :	149 and 165	**Test Engineer :**	Ian

Low Band Edge Plot on 802.11n Channel 149



Date: 21.FEB.2011 17:40:37

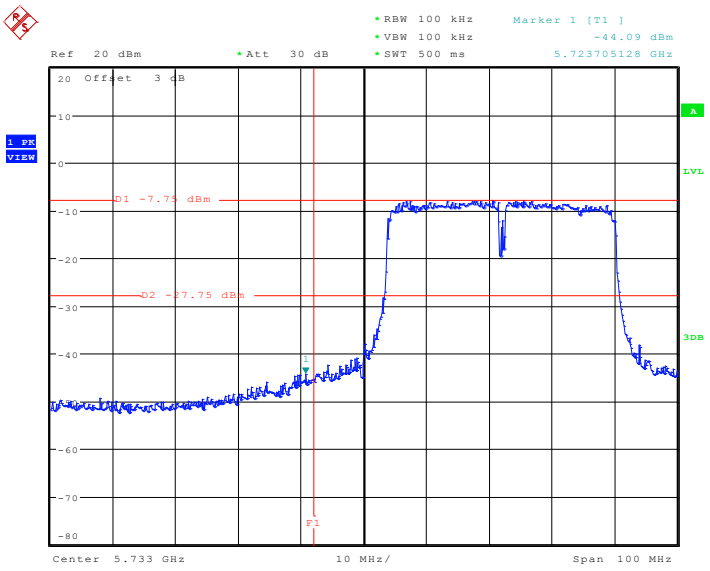
High Band Edge Plot on 802.11n Channel 165



Date: 21.FEB.2011 17:50:36

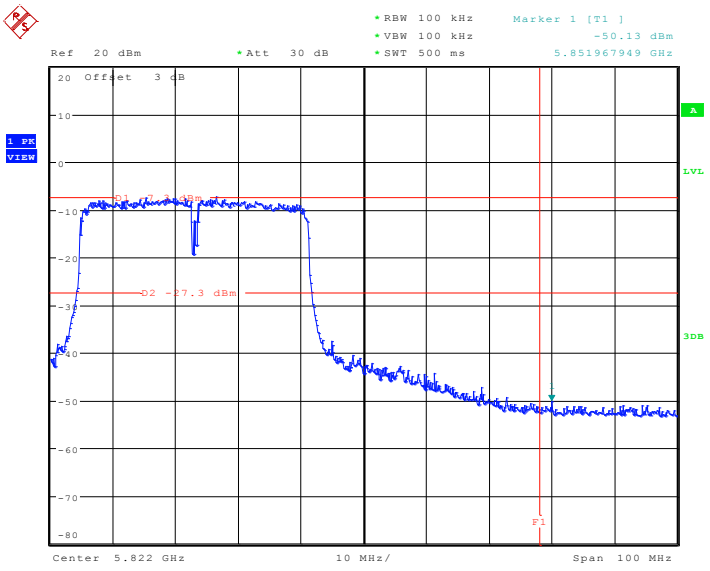
Test Mode :	802.11n (HT-40) L and H channel at 5.8G band	Temperature :	21℃
Test Band :	802.11n (HT 40MHz)	Relative Humidity :	62%
Test Channel :	151 and 159	Test Engineer :	Ian

Low Band Edge Plot on 802.11n Channel 151



Date: 21.FEB.2011 17:57:35

High Band Edge Plot on 802.11n Channel 159



Date: 21.FEB.2011 18:12:22

3.5 Power Spectral Density Measurement

3.5.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

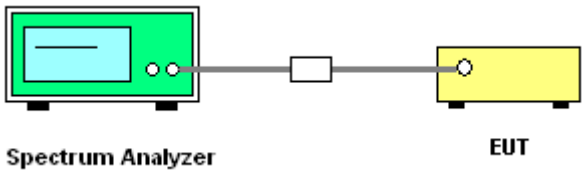
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The test follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Take the measured data from spectrum analyzer.

3.5.4 Test Setup



3.5.5 Test Result of Power Spectral Density

Test Mode :	802.11b L/M/H channel	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11b Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-7.12	8	Pass
06	2437	-7.50	8	Pass
11	2462	-7.41	8	Pass

Test Mode :	802.11g L/M/H channel	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11g Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-15.06	8	Pass
06	2437	-15.32	8	Pass
11	2462	-15.20	8	Pass

Test Mode :	802.11n (HT-20) L/M/H channel at 2.4G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 20MHz) Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
01	2412	-15.34	8	Pass
06	2437	-14.64	8	Pass
11	2462	-13.16	8	Pass

Test Mode :	802.11n (HT-40) L/M/H channel at 2.4G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 40MHz) Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
03	2422	-15.90	8	Pass
06	2437	-17.60	8	Pass
09	2452	-16.33	8	Pass

Test Mode :	802.11 a L/M/H channel	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11a Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
149	5745	-14.84	8	Pass
157	5785	-15.19	8	Pass
165	5825	-14.78	8	Pass

Test Mode :	802.11n (HT-20) L/M/H channel at 5.8G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

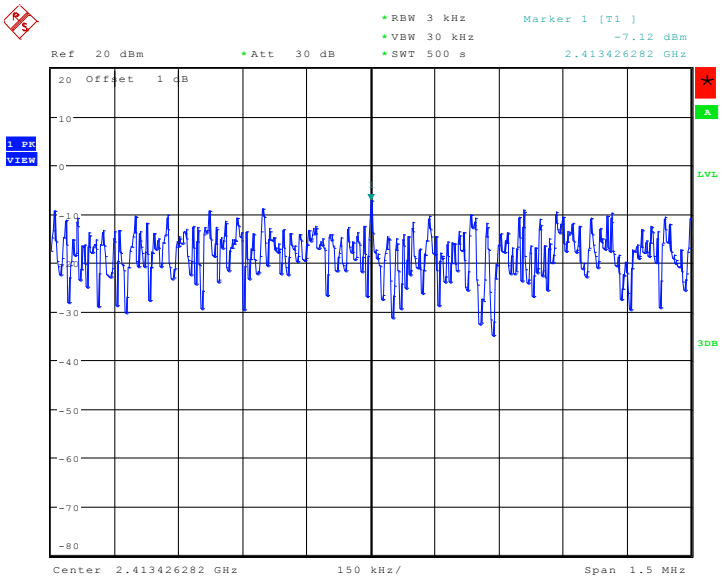
Channel	Frequency (MHz)	802.11n (BW 20MHz) Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
		Chain A		
149	5745	-14.51	8	Pass
157	5785	-14.74	8	Pass
165	5825	-14.59	8	Pass

Test Mode :	802.11n (HT-40) L/M/H channel at 5.8G band	Temperature :	21℃
Test Engineer :	Ian	Relative Humidity :	62%

Channel	Frequency (MHz)	802.11n (BW 40MHz) Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
		SISO		
		Chain A		
151	5755	-15.37	0.5	Pass
159	5795	-15.35		

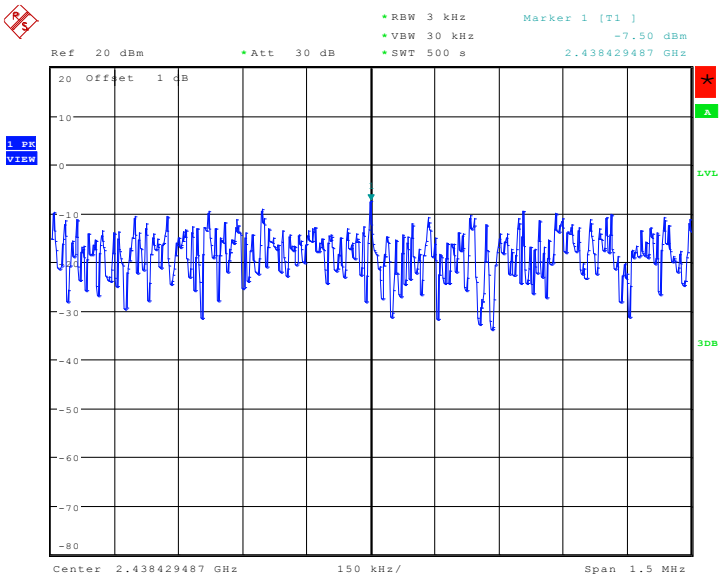
3.5.6 Test Result of Power Spectral Density Plots

PSD Plot on 802.11b Channel 01 – Chain A



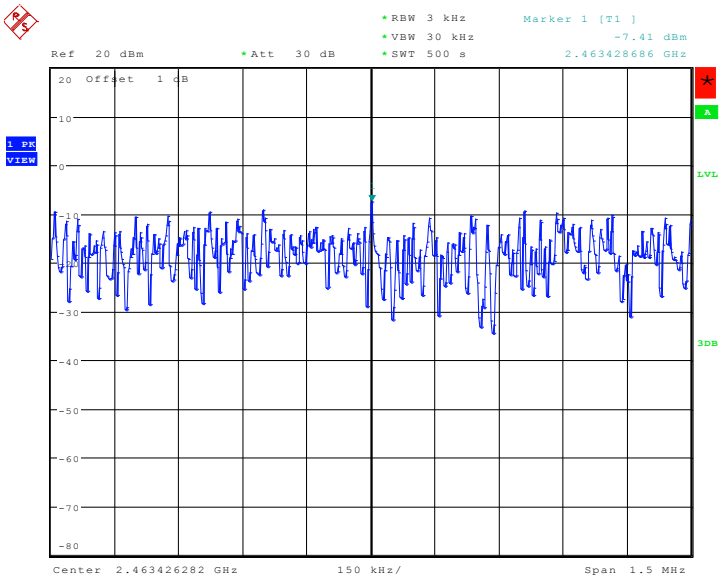
Date: 21.FEB.2011 11:12:59

PSD Plot on 802.11b Channel 06 – Chain A



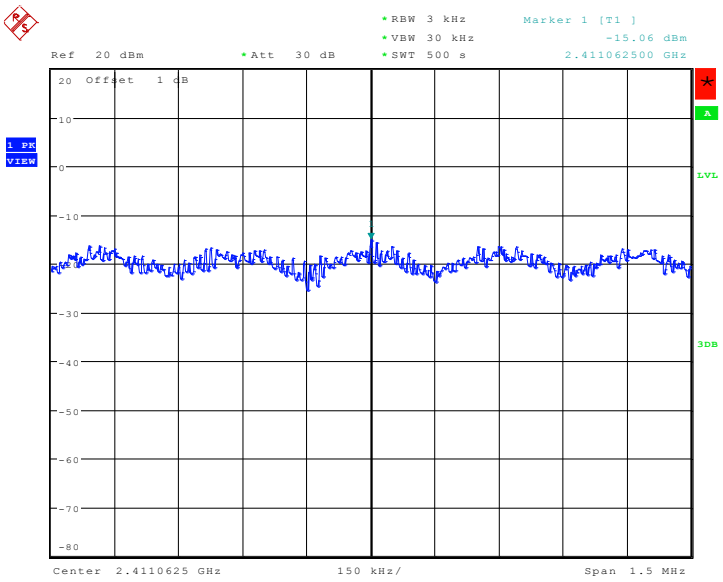
Date: 21.FEB.2011 11:29:40

PSD Plot on 802.11b Channel 11 – Chain A



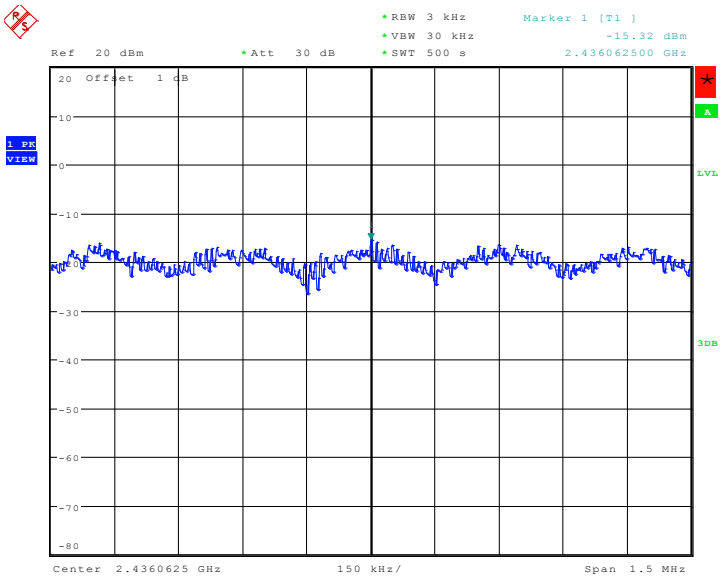
Date: 21.FEB.2011 11:36:51

PSD Plot on 802.11g Channel 01 – Chain A



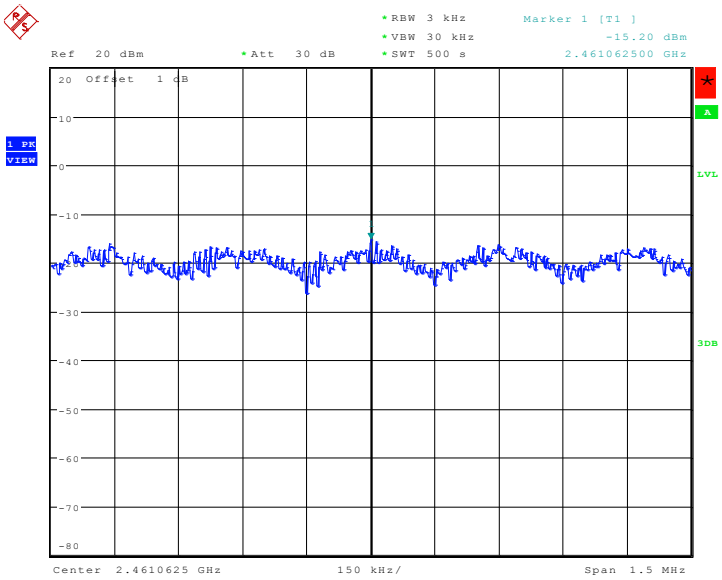
Date: 21.FEB.2011 14:04:02

PSD Plot on 802.11g Channel 06 – Chain A

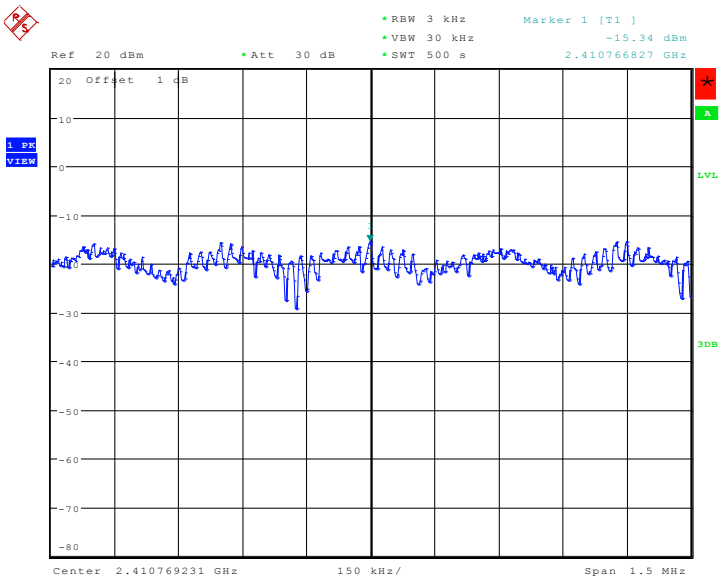


Date: 21.FEB.2011 14:08:40

PSD Plot on 802.11g Channel 11 – Chain A

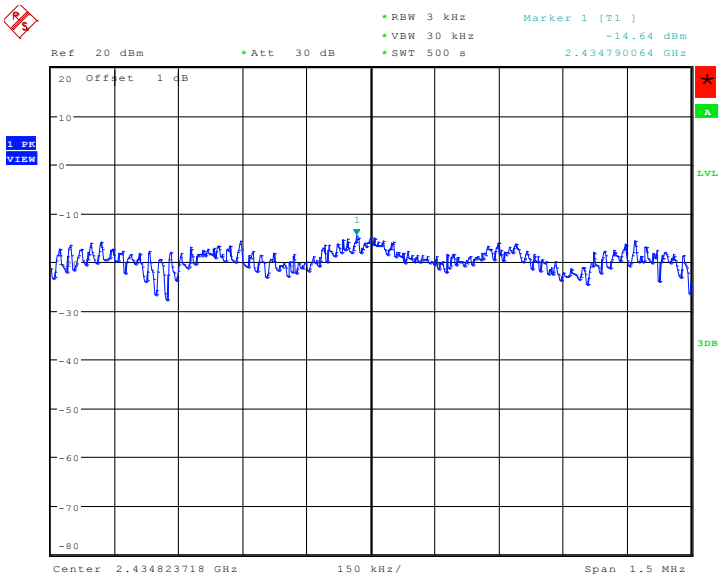


PSD Plot on 802.11n Channel 01 – Chain A



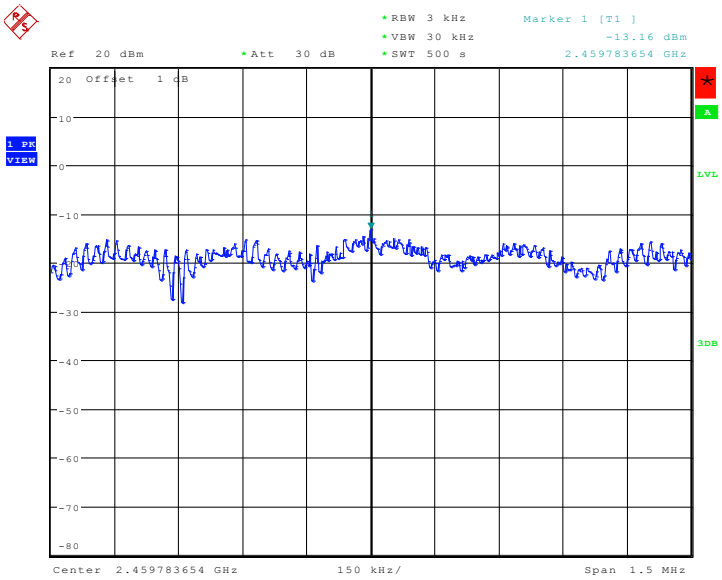
Date: 21.FEB.2011 15:26:45

PSD Plot on 802.11n Channel 06 – Chain A

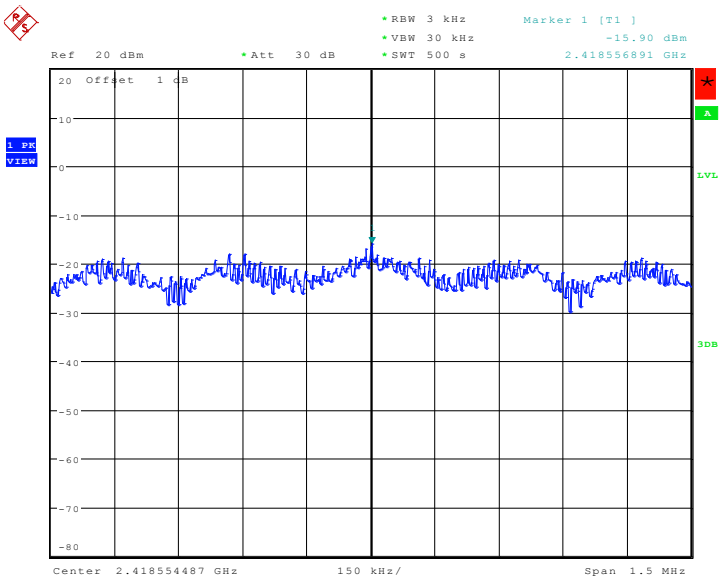


Date: 21.FEB.2011 15:35:55

PSD Plot on 802.11n Channel 11 – Chain A

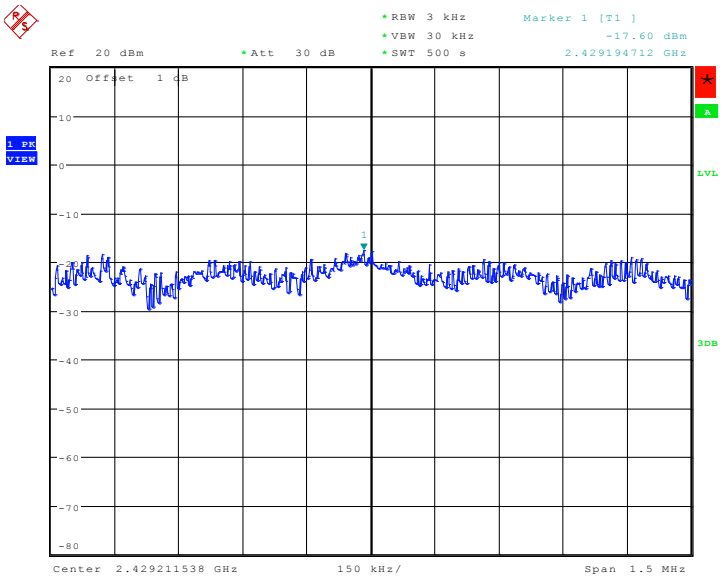


PSD Plot on 802.11n Channel 03 – Chain A



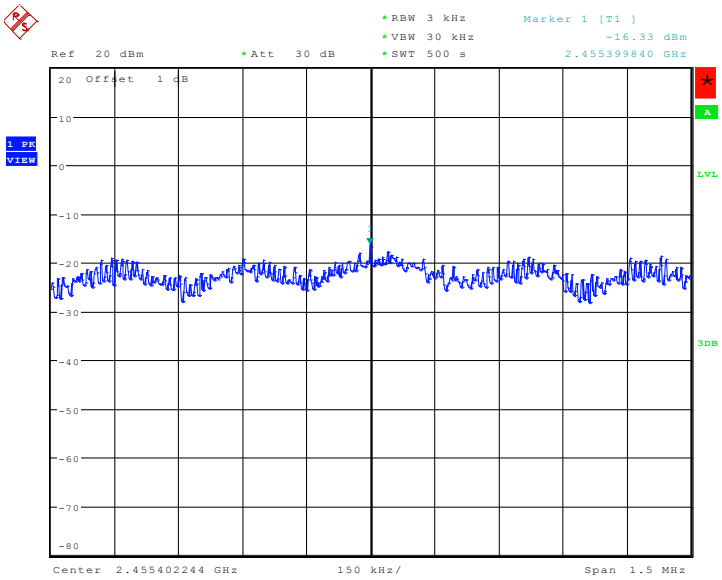
Date: 21.FEB.2011 15:50:20

PSD Plot on 802.11n Channel 06 – Chain A

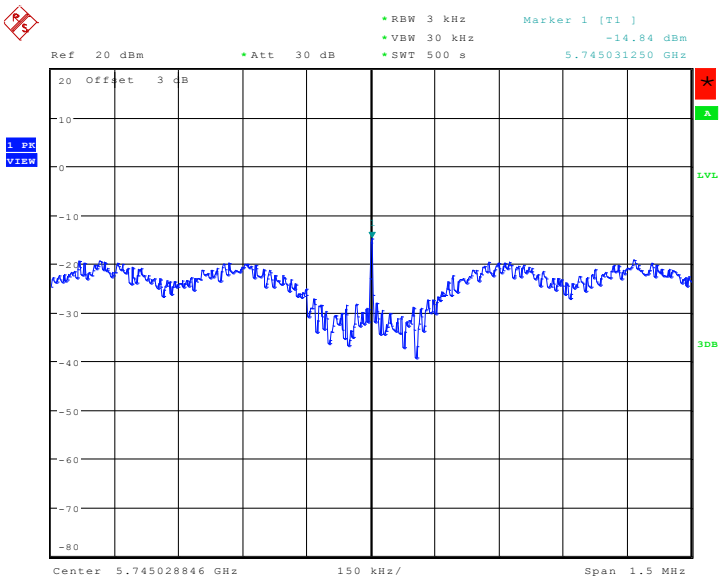


Date: 21.FEB.2011 16:00:51

PSD Plot on 802.11n Channel 09 – Chain A

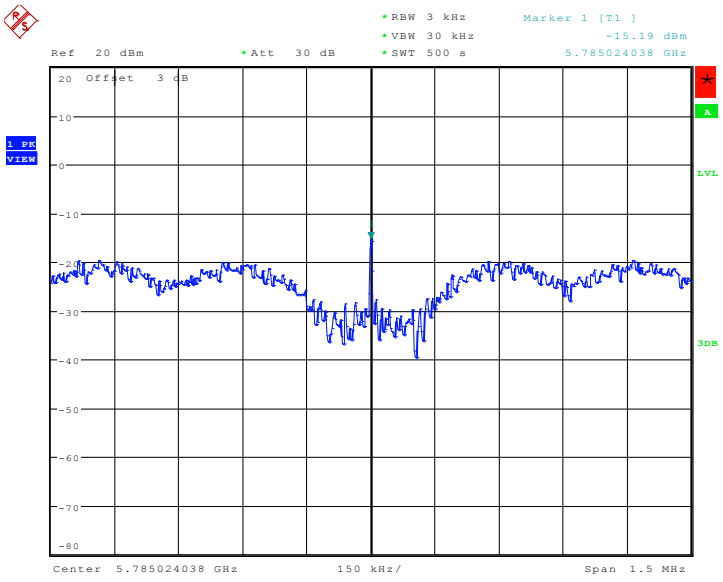


PSD Plot on 802.11a Channel 149 – Chain A



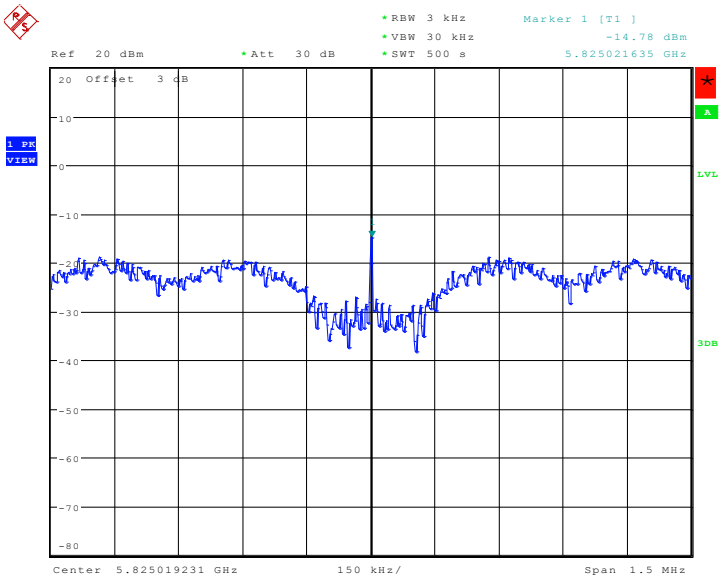
Date: 21.FEB.2011 16:50:31

PSD Plot on 802.11a Channel 157 – Chain A



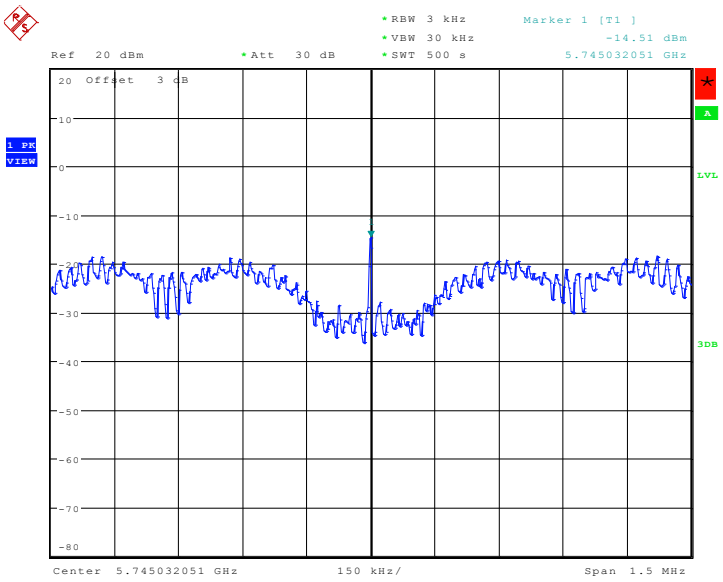
Date: 21.FEB.2011 16:59:53

PSD Plot on 802.11a Channel 165 – Chain A



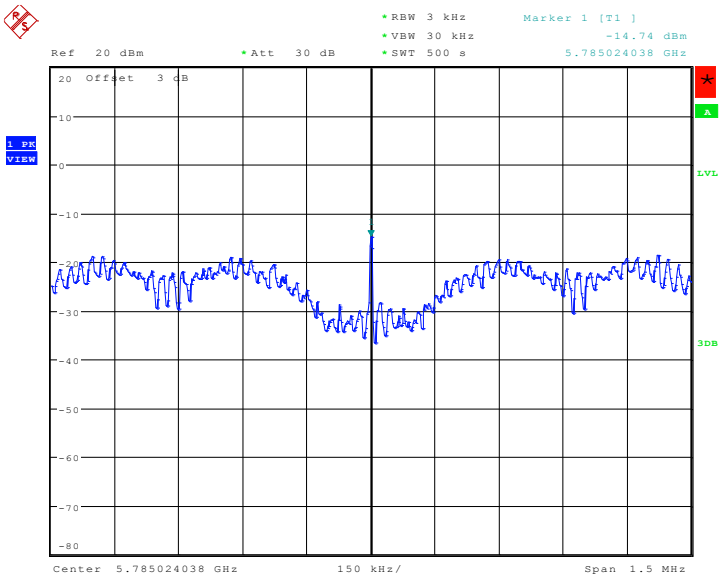
Date: 21.FEB.2011 17:25:07

PSD Plot on 802.11n Channel 149 – Chain A



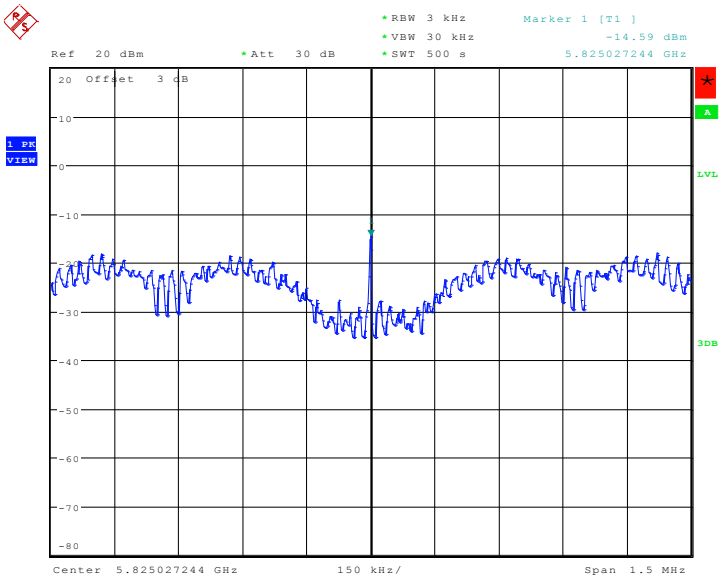
Date: 21.FEB.2011 17:41:27

PSD Plot on 802.11n Channel 157 – Chain A



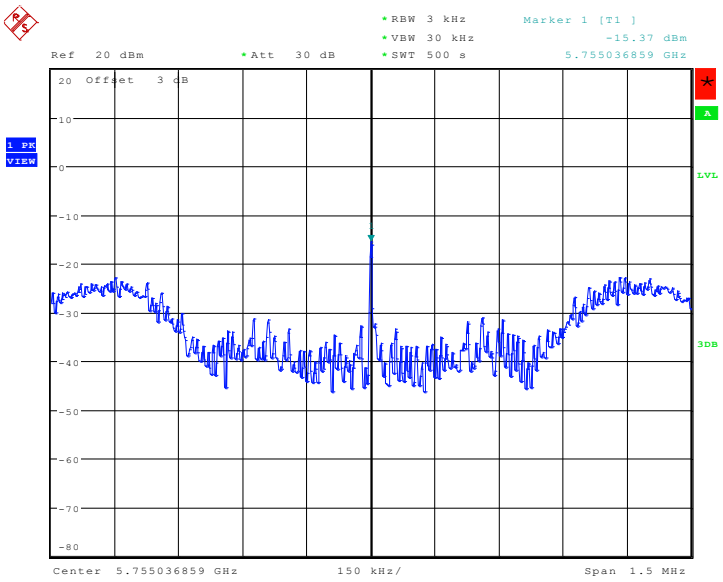
Date: 21.FEB.2011 17:46:55

PSD Plot on 802.11n Channel 165 – Chain A



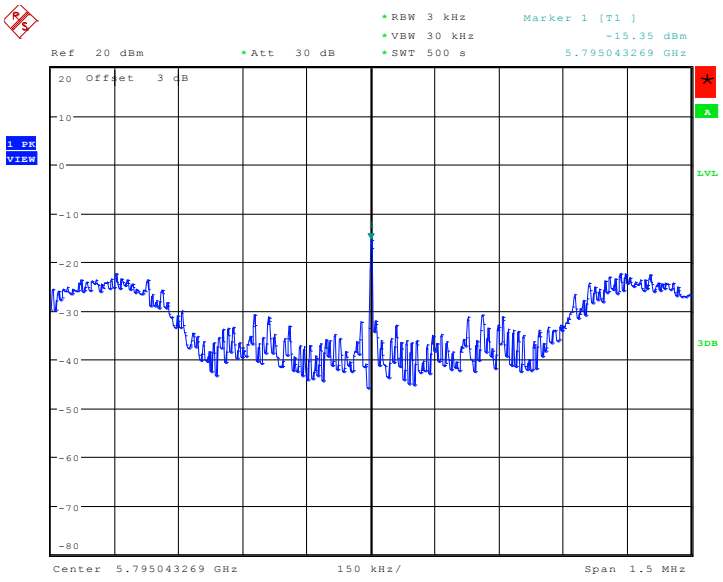
Date: 21.FEB.2011 17:51:15

PSD Plot on 802.11n Channel 151 – Chain A



Date: 21.FEB.2011 17:58:18

PSD Plot on 802.11n Channel 159 – Chain A



Date: 21.FEB.2011 18:13:06

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

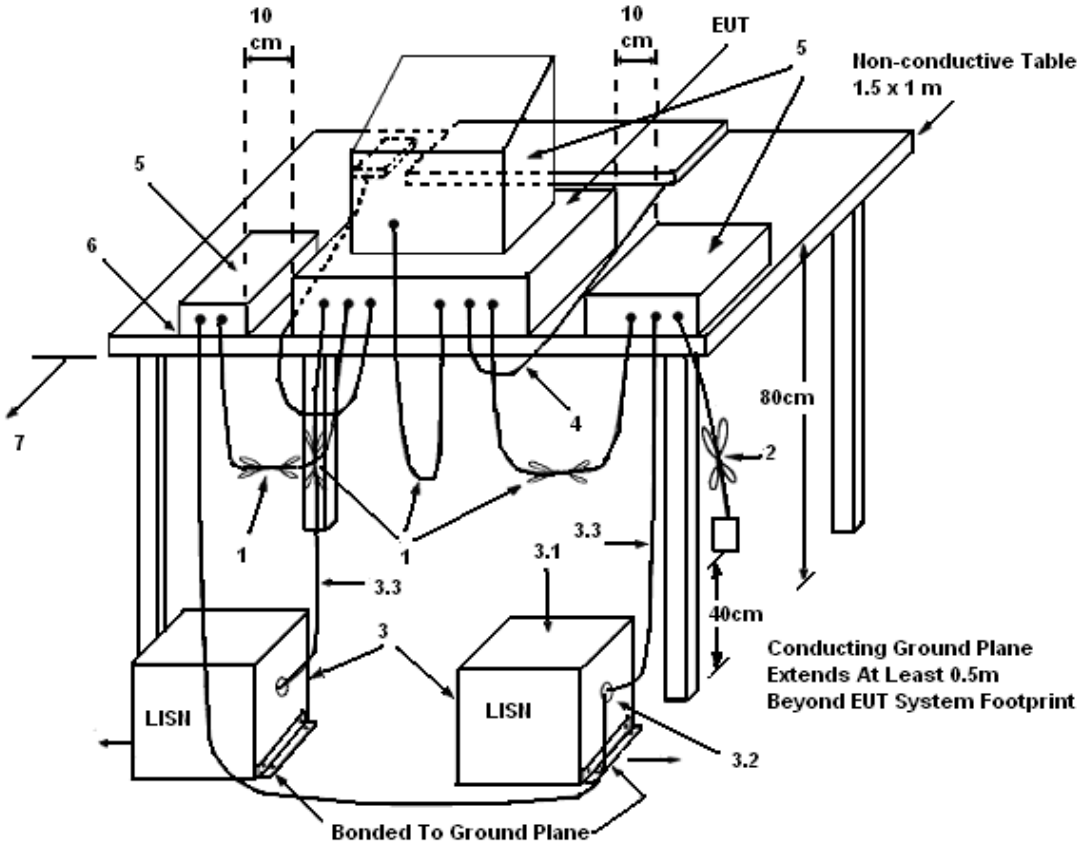
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

1. The testing follows the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.6.4 Test Setup



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

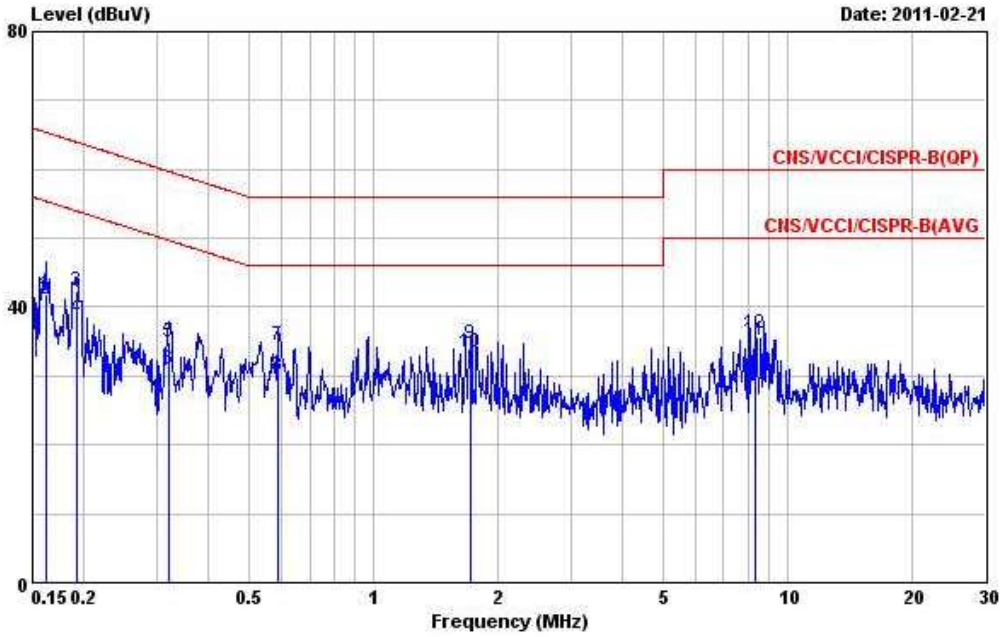
(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

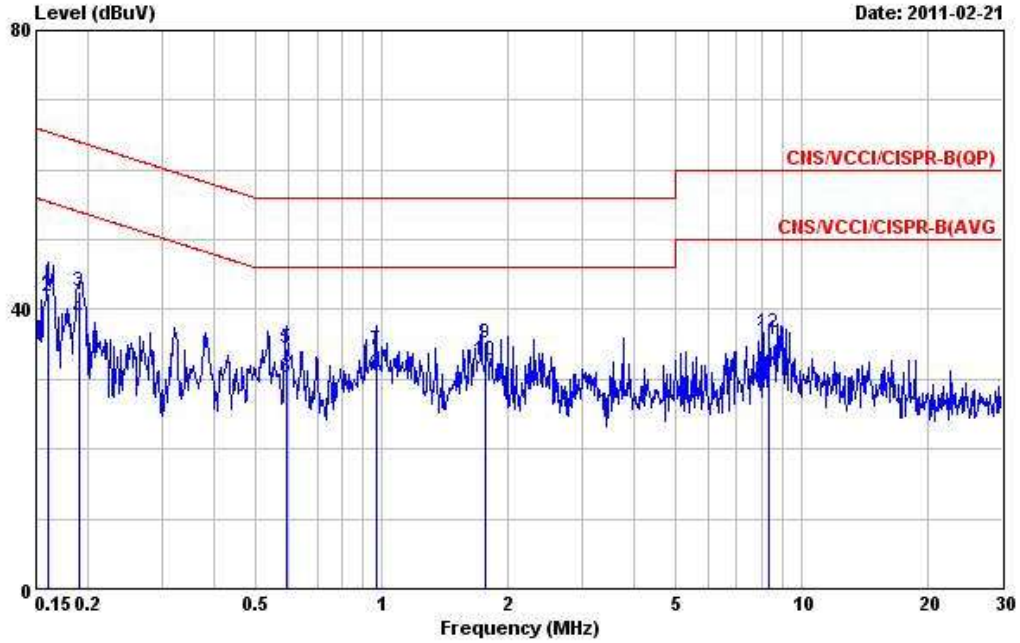
3.6.5 Test Result of AC Conducted Emission

Function Type :	Normal Mode	Temperature :	20℃
Test Engineer :	Wilson	Relative Humidity :	60%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.162	41.80	-23.56	65.36	31.74	10.01	0.05	QP
2	0.162	41.08	-14.28	55.36	31.02	10.01	0.05	Average
3	0.192	42.28	-21.67	63.95	32.22	10.00	0.06	QP
4	0.192	38.38	-15.57	53.95	28.32	10.00	0.06	Average
5	0.320	34.93	-24.78	59.71	24.83	10.01	0.09	QP
6	0.320	30.96	-18.75	49.71	20.86	10.01	0.09	Average
7	0.589	34.53	-21.47	56.00	24.44	10.01	0.08	QP
8	0.589	29.94	-16.06	46.00	19.85	10.01	0.08	Average
9	1.718	34.69	-21.31	56.00	24.57	10.03	0.09	QP
10 @	1.718	33.42	-12.58	46.00	23.30	10.03	0.09	Average
11	8.320	35.25	-14.75	50.00	24.92	10.11	0.22	Average
12	8.320	36.22	-23.78	60.00	25.89	10.11	0.22	QP

Function Type :	Normal Mode	Temperature :	20℃
Test Engineer :	Wilson	Relative Humidity :	60%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.160	42.30	-23.16	65.46	32.10	10.15	0.05	QP
2 @	0.160	41.76	-13.70	55.46	31.56	10.15	0.05	Average
3	0.191	42.52	-21.47	63.99	32.32	10.14	0.06	QP
4	0.191	38.69	-15.30	53.99	28.49	10.14	0.06	Average
5	0.592	34.43	-21.57	56.00	24.22	10.13	0.08	QP
6	0.592	30.11	-15.89	46.00	19.90	10.13	0.08	Average
7	0.968	34.29	-21.71	56.00	24.09	10.14	0.06	QP
8	0.968	30.68	-15.32	46.00	20.48	10.14	0.06	Average
9	1.771	35.05	-20.95	56.00	24.81	10.15	0.09	QP
10 @	1.771	32.60	-13.40	46.00	22.36	10.15	0.09	Average
11	8.320	35.65	-14.35	50.00	25.16	10.27	0.22	Average
12	8.320	36.72	-23.28	60.00	26.23	10.27	0.22	QP

3.7 Radiated Emission Measurement

3.7.1 Limit of Radiated Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.7.2 Measuring Instruments

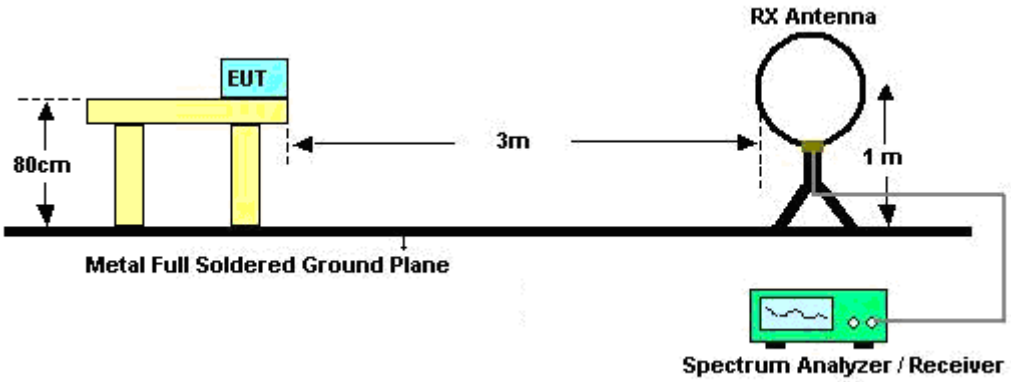
See list of measuring instruments of this test report.

3.7.3 Test Procedures

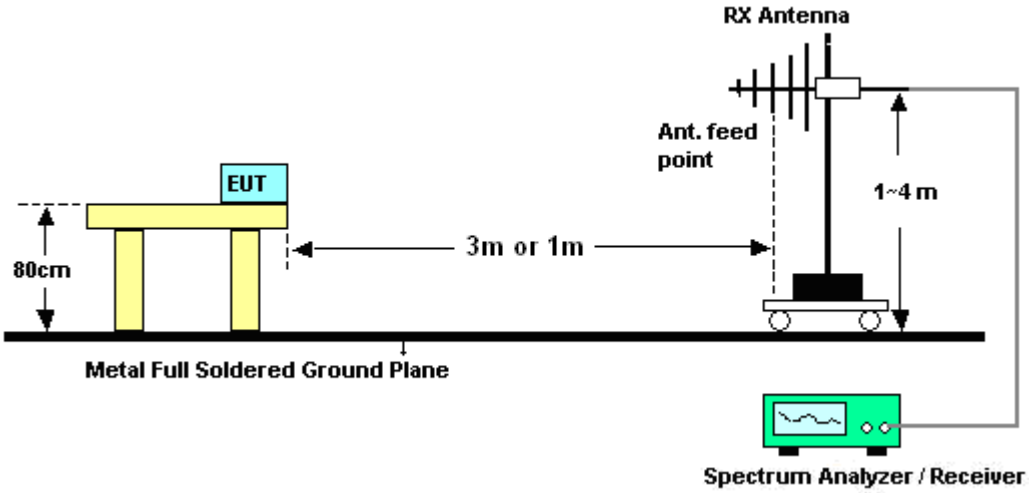
1. The testing follows the guidelines in FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Use the following spectrum analyzer settings:
   (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
   (2) Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
   Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB)
3. Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

3.7.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.7.5 Test Results of Radiated Emissions (9kHz ~ 30MHz)

Test Engineer :	Daniel	Temperature :	23°C
		Relative Humidity :	51%

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

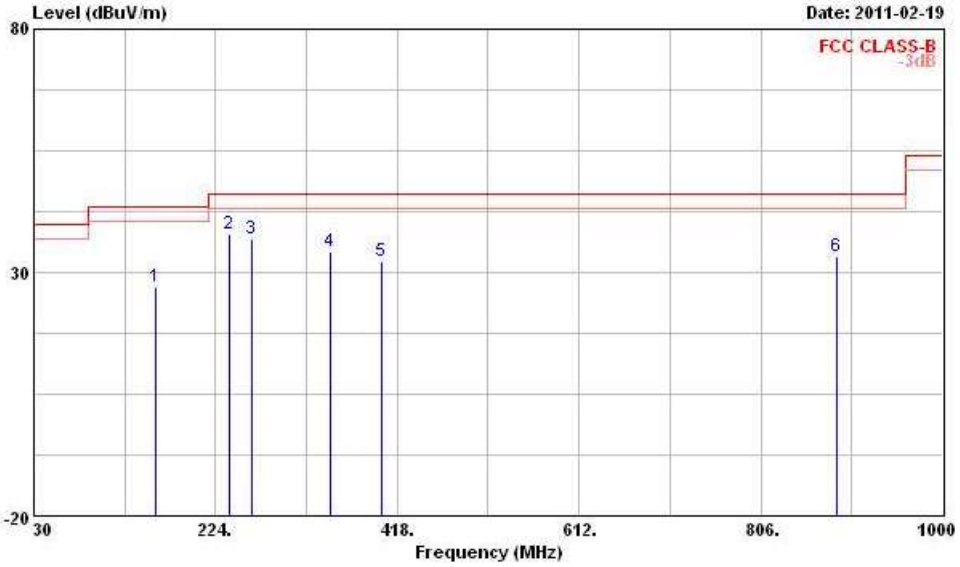
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

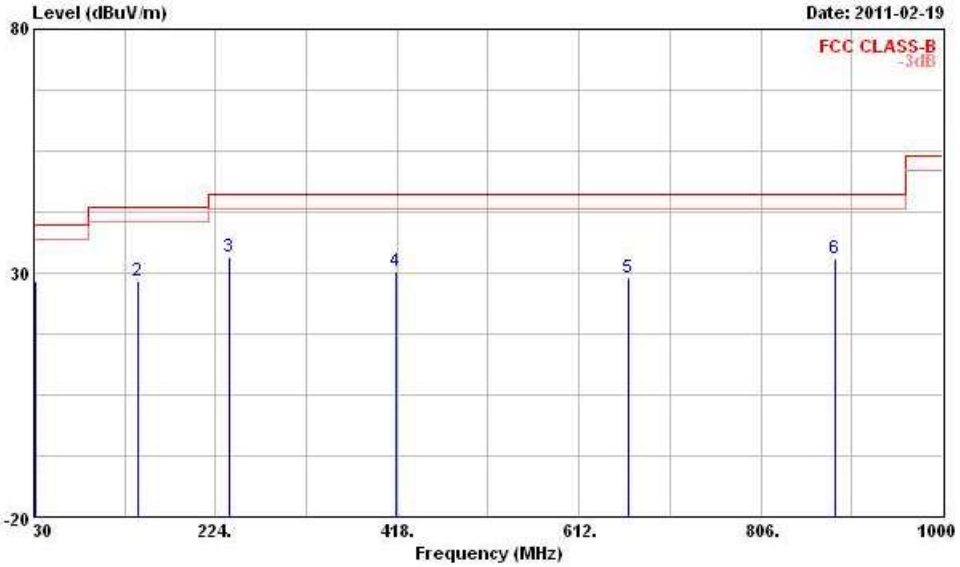
3.7.7 Test Result of Radiated Emission (30MHz ~ 1GHz)

Function Type :	Normal Mode	Temperature :	23°C
Test Engineer :	Daniel	Relative Humidity :	51%
		Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	159.980	27.15	-16.35	43.50	41.88	10.55	2.09	27.37	Peak
2	238.550	38.00	-8.00	46.00	49.65	12.62	2.60	26.87	Peak
3	261.830	36.87	-9.13	46.00	47.78	13.16	2.74	26.81	Peak
4	347.190	34.21	-11.79	46.00	43.93	14.43	3.00	27.15	Peak
5	400.540	32.21	-13.79	46.00	41.27	15.27	3.34	27.67	Peak
6	886.510	33.23	-12.77	46.00	35.61	20.06	4.96	27.40	Peak

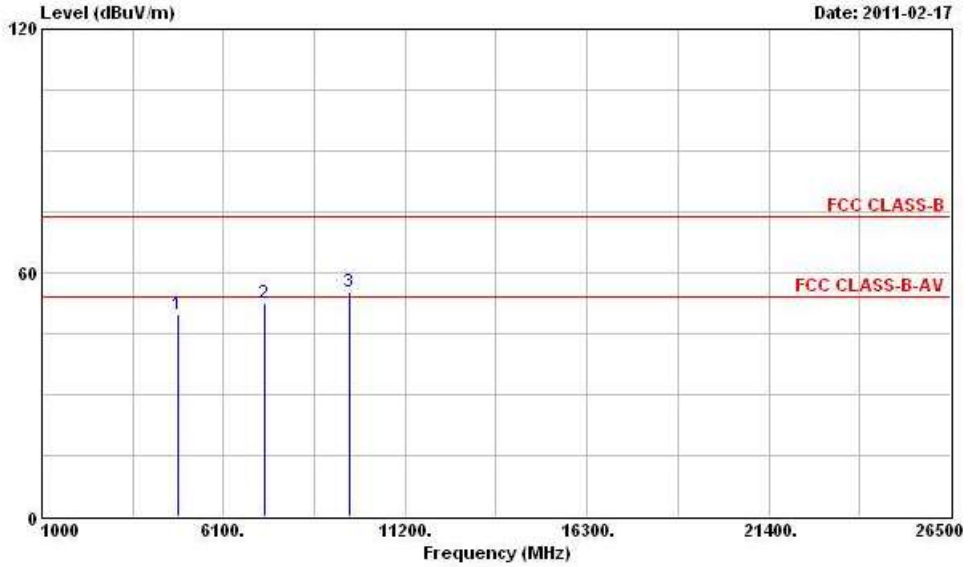
Function Type :	Normal Mode	Temperature :	23°C
Test Engineer :	Daniel	Relative Humidity :	51%
		Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	31.940	28.36	-11.64	40.00	39.96	15.48	0.78	27.86	Peak
2	141.550	28.28	-15.22	43.50	42.01	11.78	1.96	27.47	Peak
3	238.550	33.23	-12.77	46.00	44.88	12.62	2.60	26.87	Peak
4	417.030	30.29	-15.71	46.00	39.04	15.61	3.39	27.75	Peak
5	664.380	28.99	-17.01	46.00	33.45	19.32	4.29	28.07	Peak
6	885.540	33.03	-12.97	46.00	35.41	20.06	4.96	27.40	Peak

3.7.8 Test Result of Radiated Emission (1GHz ~ 10th Harmonic)

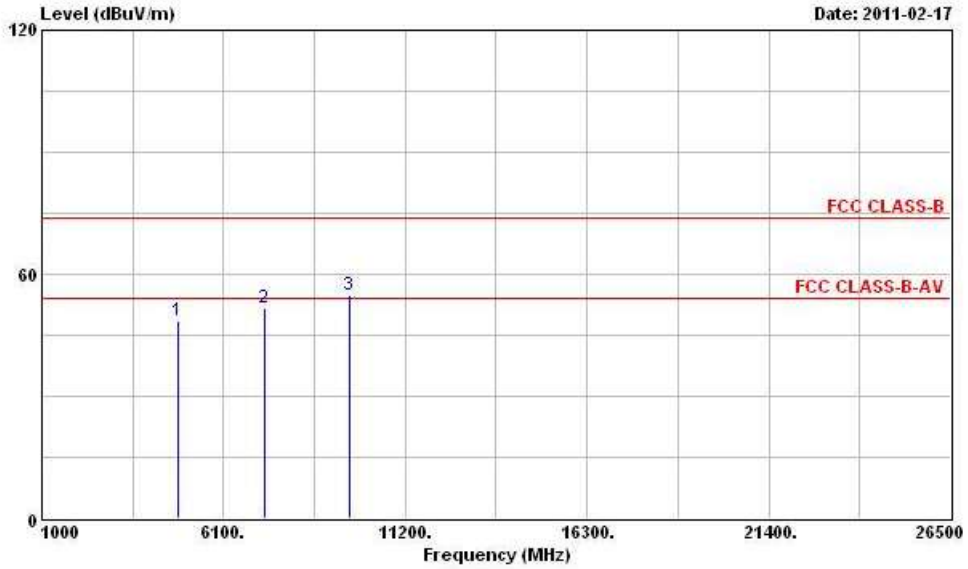
Test Mode :	802.11b L channel	Temperature :	23°C
Test Channel :	01	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.000	49.71	-4.29	54.00	43.88	35.76	4.58	34.51	PK
2	7236.000	52.47			43.28	37.85	5.63	34.29	Peak
3	9648.000	55.31			44.21	39.39	6.34	34.63	Peak

Note: The items 2 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

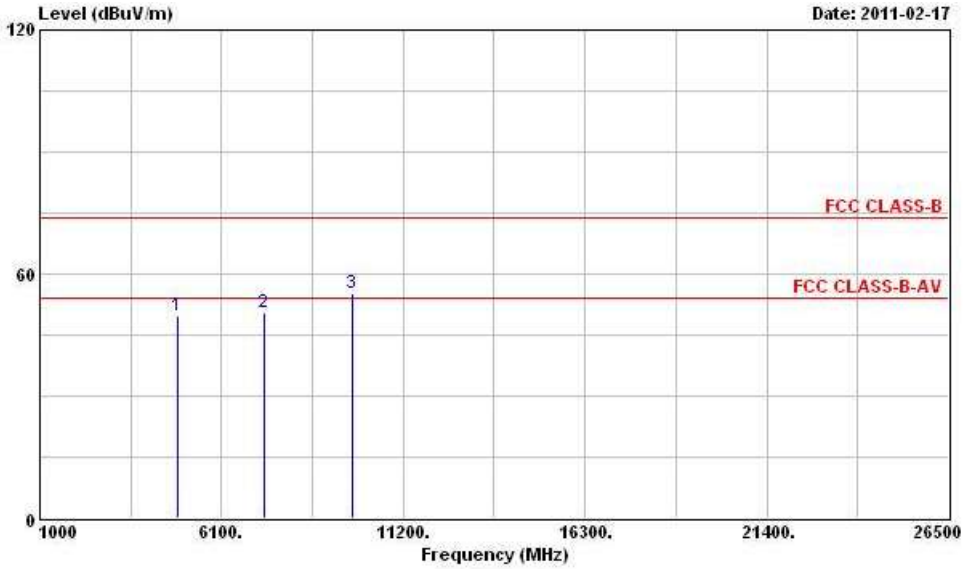
Test Mode :	802.11b L channel	Temperature :	23°C
Test Channel :	01	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.000	48.61	-5.39	54.00	43.41	35.13	4.58	34.51	PK
2	7236.000	51.60			43.36	36.90	5.63	34.29	Peak
3	9648.000	54.83			44.53	38.59	6.34	34.63	Peak

Note: The items 2 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

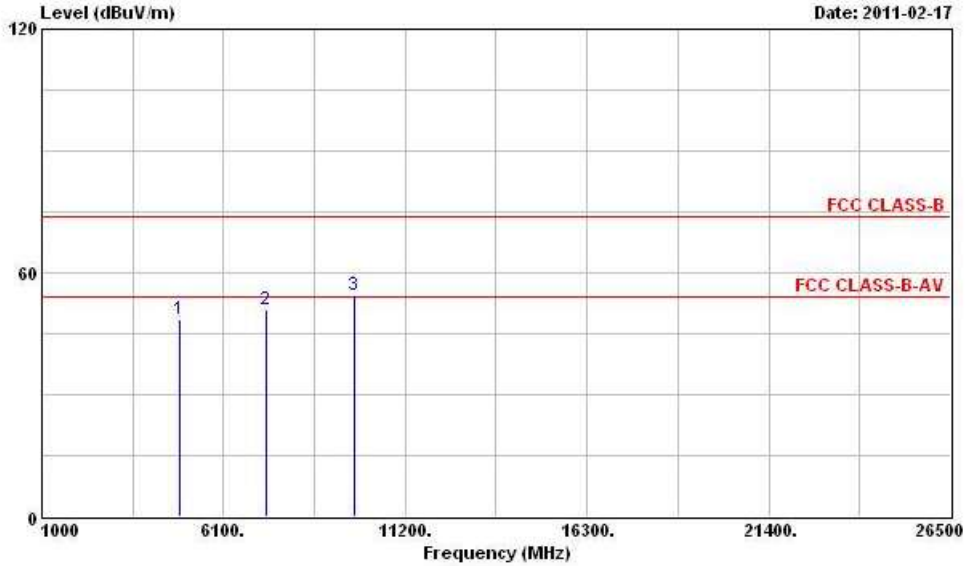
Test Mode :	802.11b M channel	Temperature :	23°C
Test Channel :	06	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	49.72	-4.28	54.00	43.73	35.83	4.61	34.45	PK
2	7311.000	50.36	-3.64	54.00	41.15	37.86	5.64	34.29	PK
3	9748.000	55.18			43.89	39.51	6.36	34.58	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

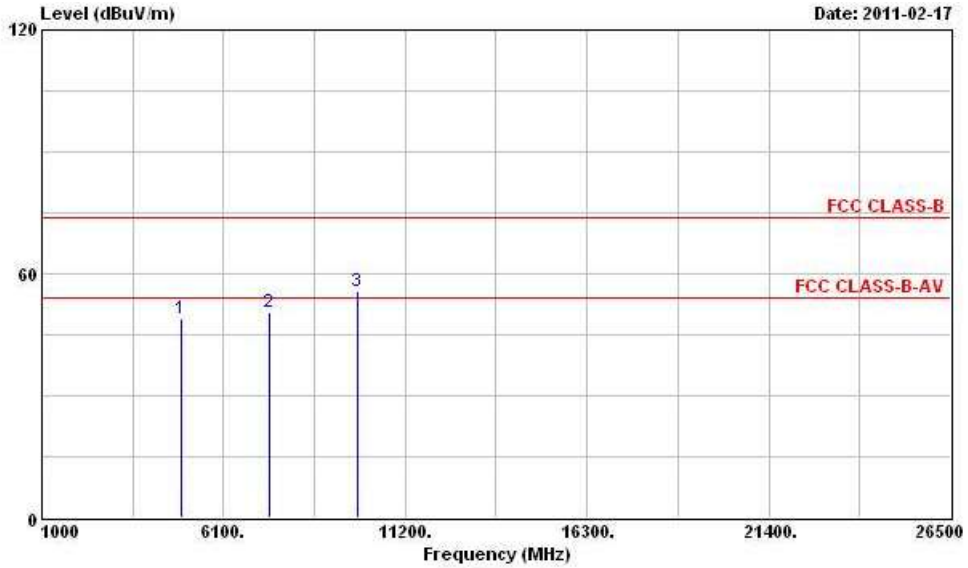
Test Mode :	802.11b M channel	Temperature :	23°C
Test Channel :	06	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	48.71	-5.29	54.00	43.37	35.18	4.61	34.45	PK
2	7311.000	50.82	-3.18	54.00	42.55	36.92	5.64	34.29	PK
3	9748.000	54.41			43.92	38.71	6.36	34.58	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

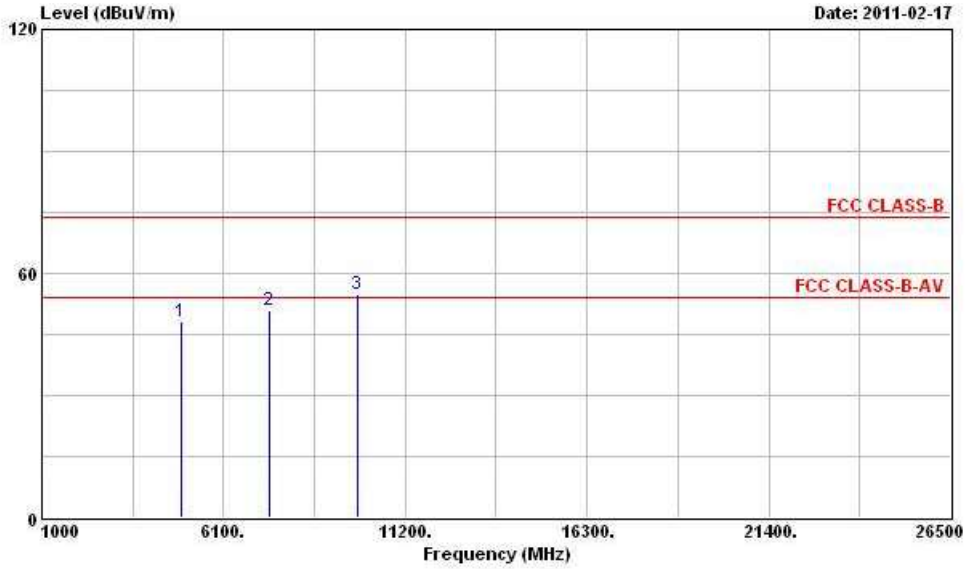
Test Mode :	802.11b H channel	Temperature :	23°C
Test Channel :	11	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.000	48.99	-5.01	54.00	42.79	35.90	4.68	34.38	PK
2	7386.000	50.39	-3.61	54.00	41.15	37.88	5.65	34.29	PK
3	9848.000	55.52			44.07	39.61	6.38	34.54	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

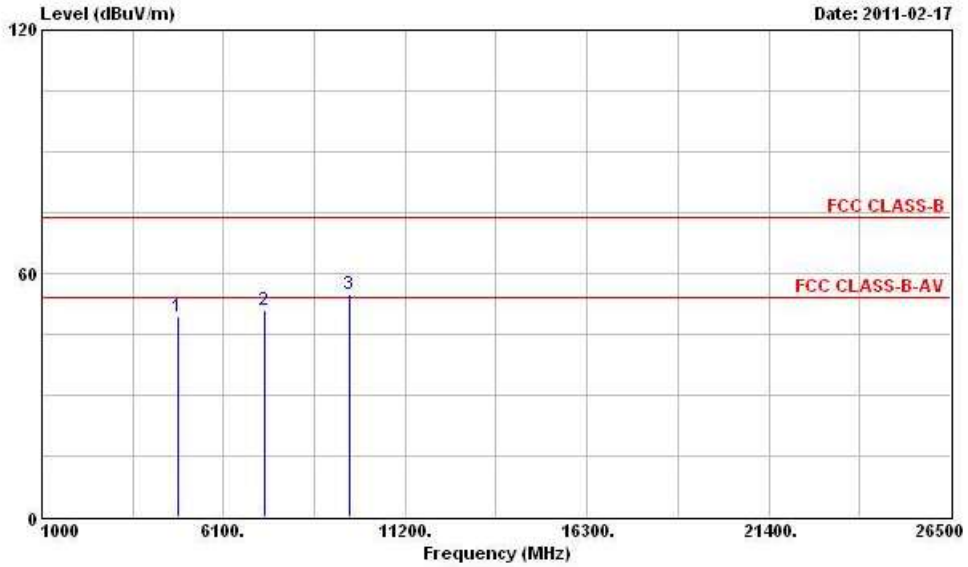
Test Mode :	802.11b H channel	Temperature :	23°C
Test Channel :	11	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.000	48.13	-5.87	54.00	42.60	35.23	4.68	34.38	PK
2	7386.000	50.97	-3.03	54.00	42.65	36.96	5.65	34.29	PK
3	9848.000	54.69			44.04	38.81	6.38	34.54	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

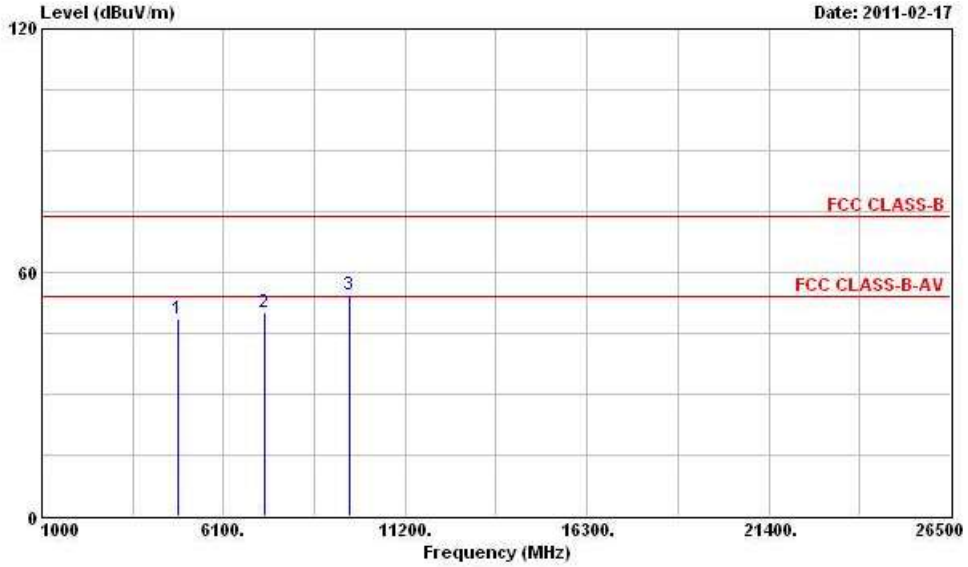
Test Mode :	802.11g L channel	Temperature :	23°C
Test Channel :	01	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.000	49.17	-4.83	54.00	43.34	35.76	4.58	34.51	PK
2	7236.000	50.97			41.78	37.85	5.63	34.29	Peak
3	9648.000	55.02			43.92	39.39	6.34	34.63	Peak

Note: The items 2 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

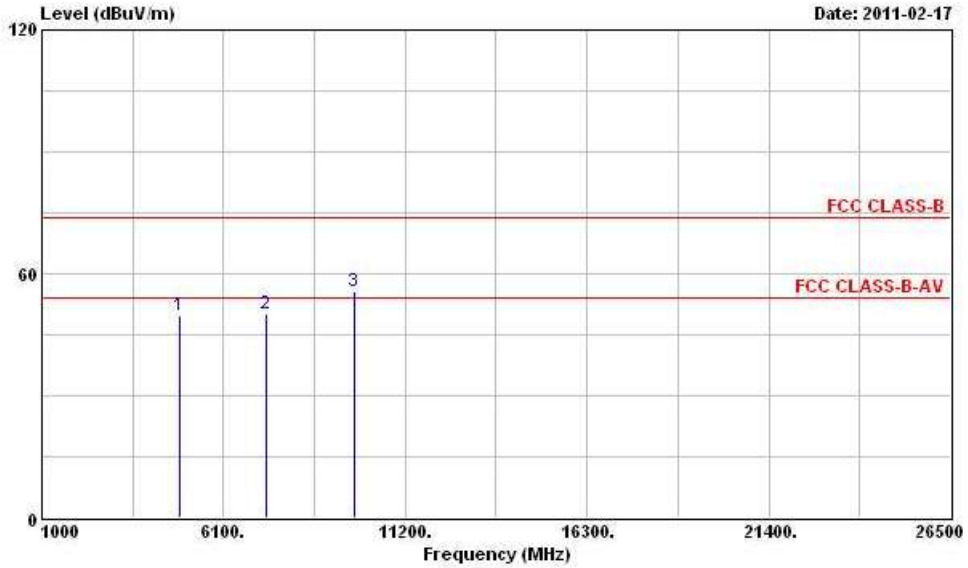
Test Mode :	802.11g L channel	Temperature :	23°C
Test Channel :	01	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.000	48.72	-5.28	54.00	43.52	35.13	4.58	34.51	PK
2	7236.000	50.21			41.97	36.90	5.63	34.29	Peak
3	9648.000	54.29			43.99	38.59	6.34	34.63	Peak

Note: The items 2 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

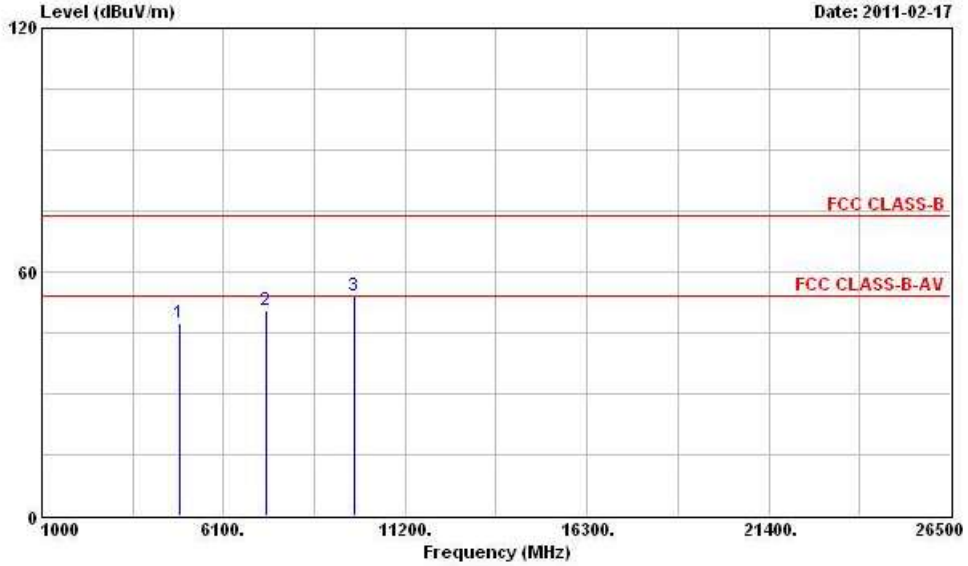
Test Mode :	802.11g M channel	Temperature :	23°C
Test Channel :	06	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	49.67	-4.33	54.00	43.68	35.83	4.61	34.45	PK
2	7311.000	50.05	-3.95	54.00	40.84	37.86	5.64	34.29	PK
3	9748.000	55.68			44.39	39.51	6.36	34.58	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

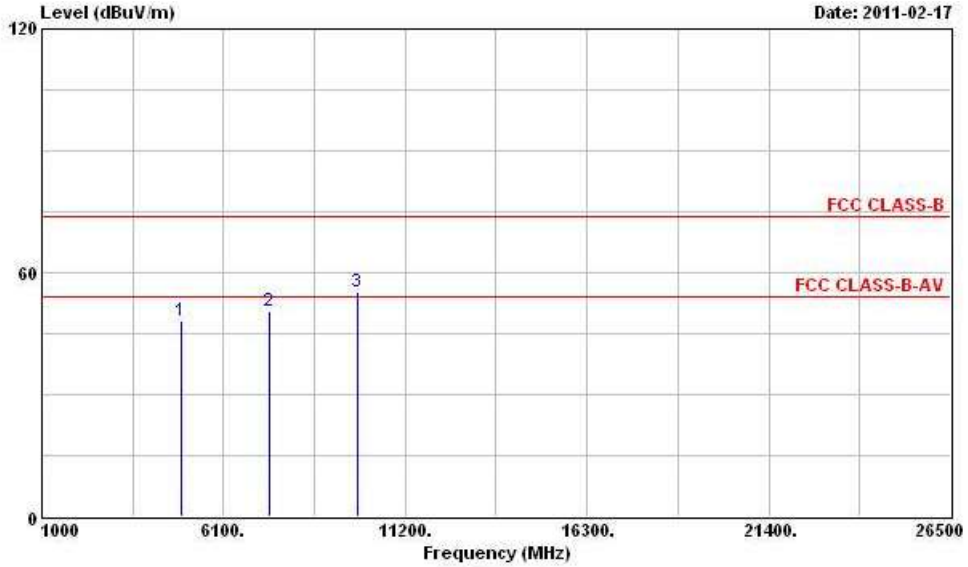
Test Mode :	802.11g M channel	Temperature :	23°C
Test Channel :	06	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	47.56	-6.44	54.00	42.22	35.18	4.61	34.45	PK
2 @	7311.000	50.35	-3.65	54.00	42.08	36.92	5.64	34.29	PK
3	9748.000	53.92			43.43	38.71	6.36	34.58	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

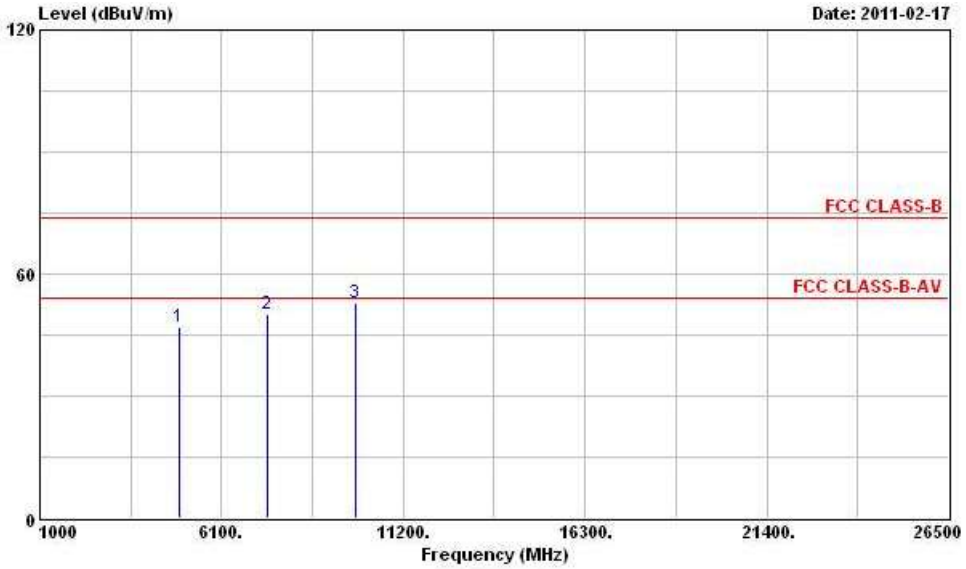
Test Mode :	802.11g H channel	Temperature :	23°C
Test Channel :	11	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.000	48.18	-5.82	54.00	42.65	35.23	4.68	34.38	PK
2	7386.000	50.50	-3.50	54.00	42.18	36.96	5.65	34.29	PK
3	9848.000	55.20			44.55	38.81	6.38	34.54	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

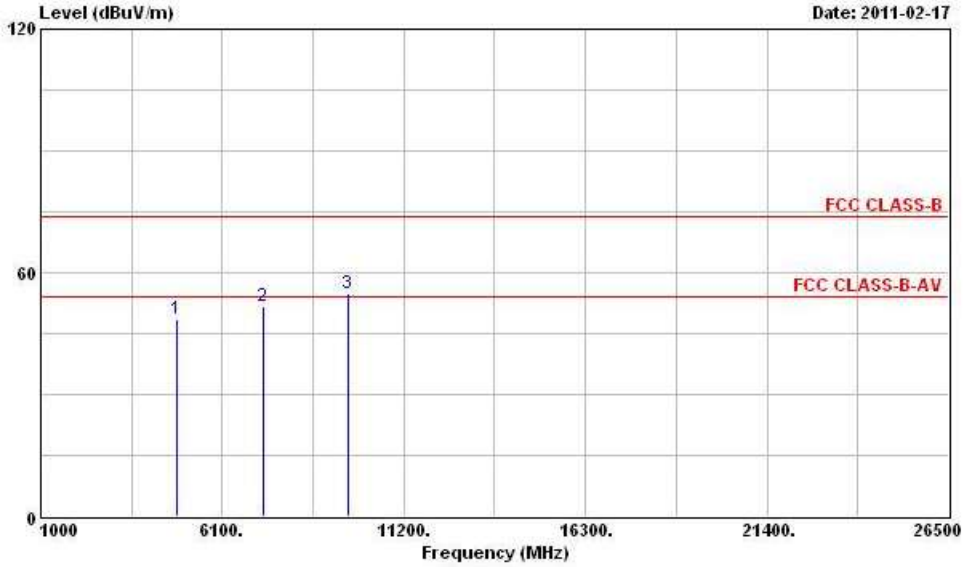
Test Mode :	802.11g H channel	Temperature :	23°C
Test Channel :	11	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.000	47.07	-6.93	54.00	40.87	35.90	4.68	34.38	PK
2	7386.000	50.01	-3.99	54.00	40.77	37.88	5.65	34.29	PK
3	9848.000	52.76			41.31	39.61	6.38	34.54	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

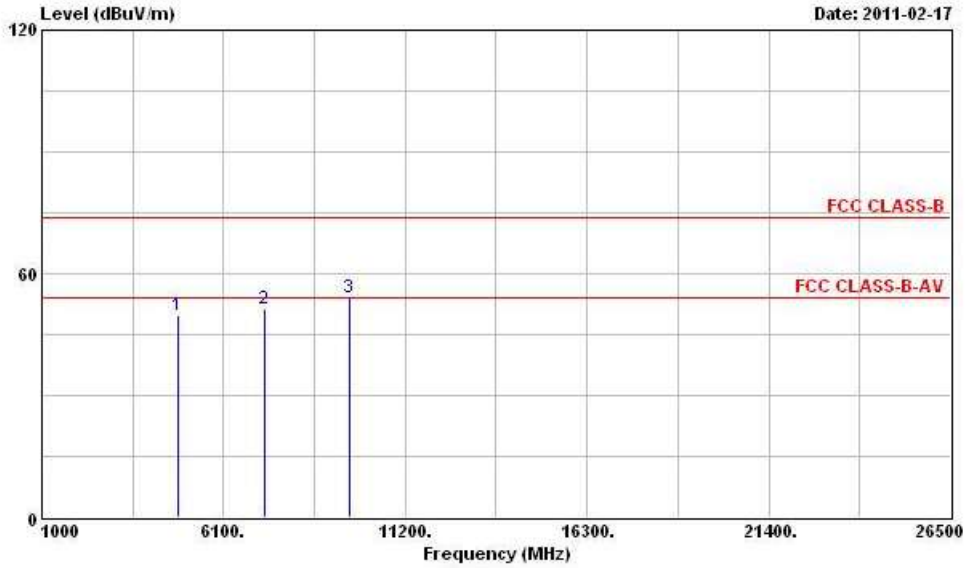
Test Mode :	802.11n (HT-20) L channel at 2.4G band	**Temperature :**	23°C
Test Channel :	01	**Relative Humidity :**	51%
Test Engineer :	Daniel	**Polarization :**	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.000	48.56	-5.44	54.00	42.73	35.76	4.58	34.51	PK
2	7236.000	51.90			42.71	37.85	5.63	34.29	Peak
3	9648.000	54.81			43.71	39.39	6.34	34.63	Peak

Note: The items 2 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

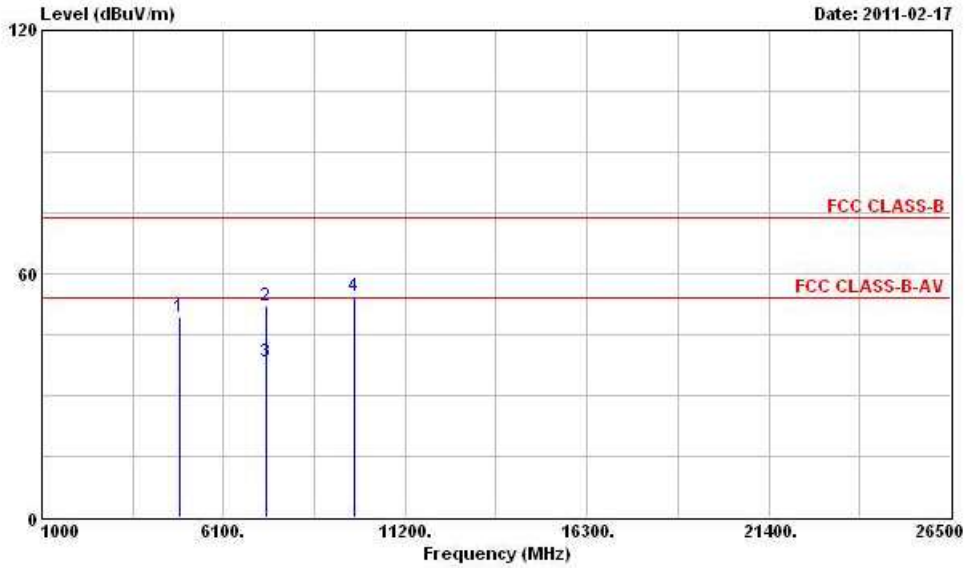
Test Mode :	802.11n (HT-20) L channel at 2.4G band	Temperature :	23°C
Test Channel :	01	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4813.000	49.84	-4.16	54.00	44.66	35.11	4.58	34.51	PK
2	7236.000	51.15			42.91	36.90	5.63	34.29	Peak
3	9648.000	54.10			43.80	38.59	6.34	34.63	Peak

Note: The items 2 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

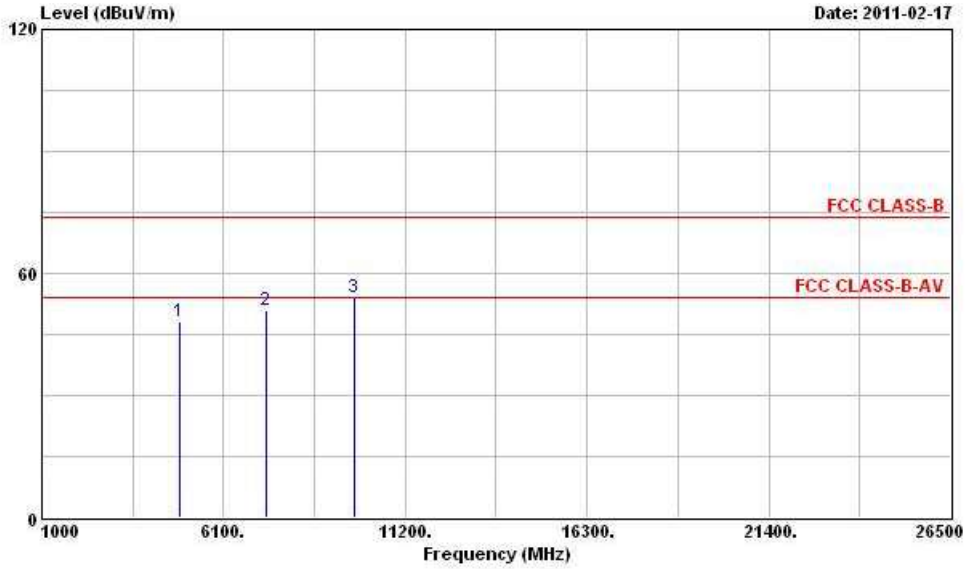
Test Mode :	802.11n (HT-20) M channel at 2.4G band	Temperature :	23°C
Test Channel :	06	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	49.31	-4.69	54.00	43.32	35.83	4.61	34.45	PK
2	7311.000	52.08	-21.92	74.00	42.87	37.86	5.64	34.29	Peak
3	7311.000	38.34	-15.66	54.00	29.13	37.86	5.64	34.29	Average
4	9748.000	54.45			43.16	39.51	6.36	34.58	Peak

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

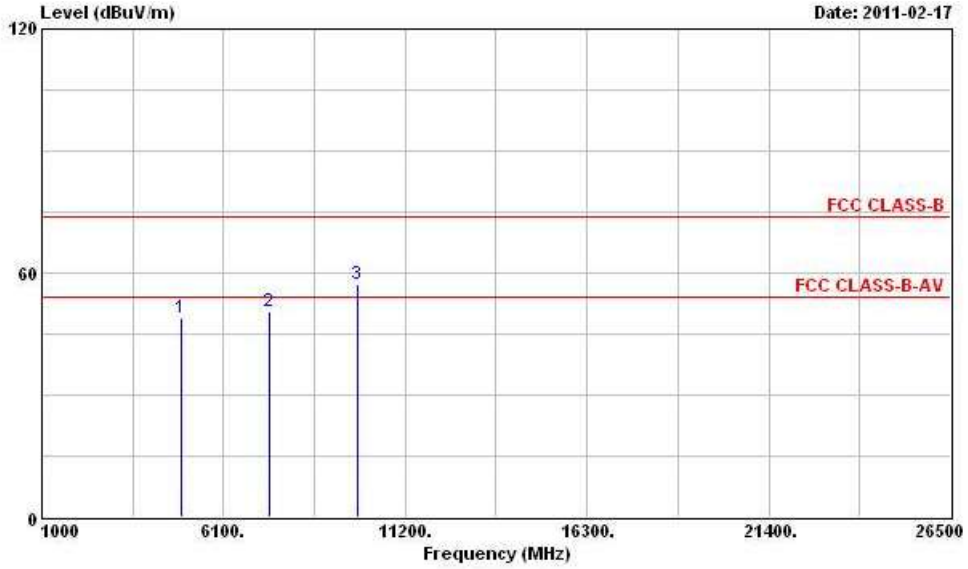
Test Mode :	802.11n (HT-20) M channel at 2.4G band	Temperature :	23°C
Test Channel :	06	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	48.13	-5.87	54.00	42.79	35.18	4.61	34.45	PK
2	7311.000	50.80	-3.20	54.00	42.53	36.92	5.64	34.29	PK
3	9748.000	54.03			43.54	38.71	6.36	34.58	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

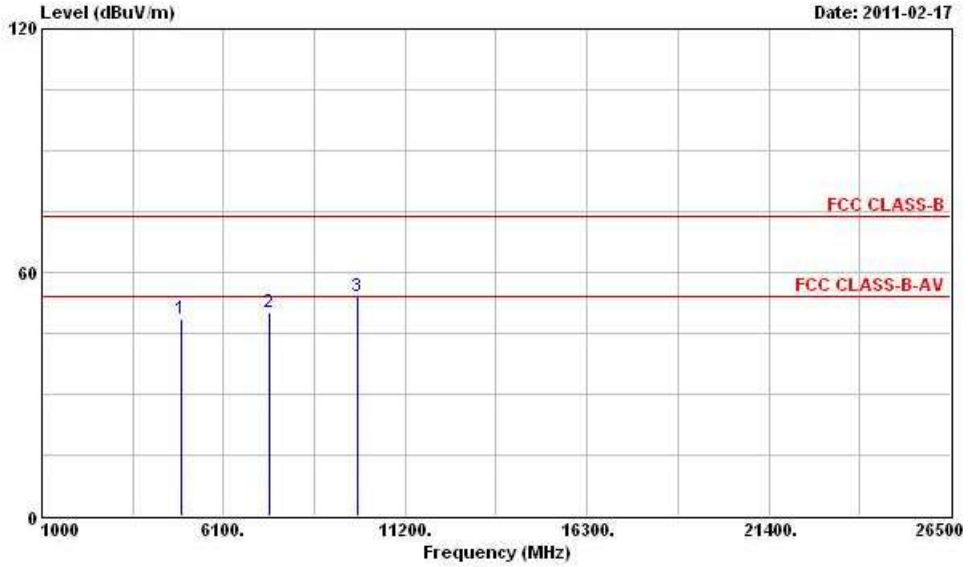
Test Mode :	802.11n (HT-20) H channel at 2.4G band	Temperature :	23°C
Test Channel :	11	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.000	48.79	-5.21	54.00	42.59	35.90	4.68	34.38	PK
2	7386.000	50.48	-3.52	54.00	41.24	37.88	5.65	34.29	PK
3	9848.000	57.22			45.77	39.61	6.38	34.54	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

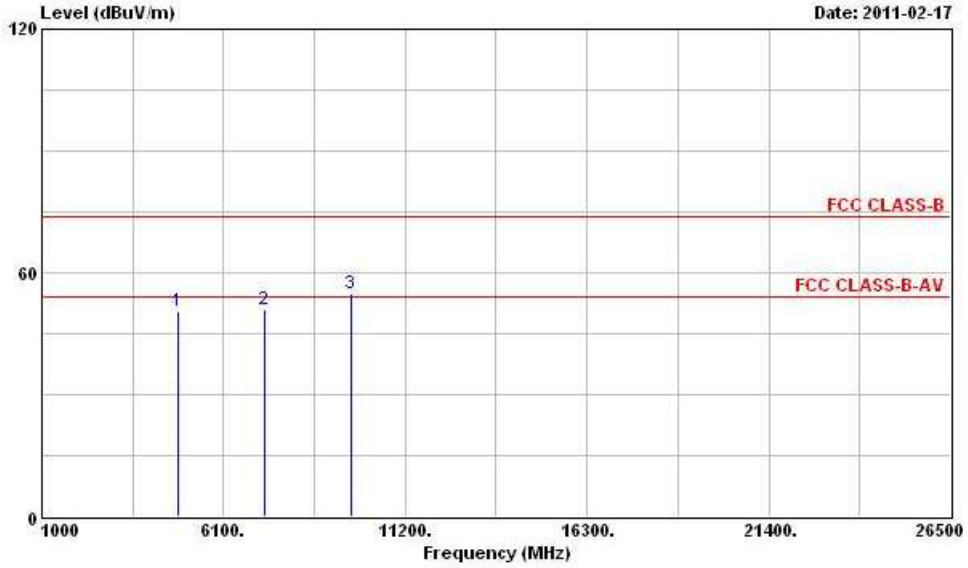
Test Mode :	802.11n (HT-20) H channel at 2.4G band	Temperature :	23°C
Test Channel :	11	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.000	48.45	-5.55	54.00	42.92	35.23	4.68	34.38	PK
2	7386.000	50.00	-4.00	54.00	41.68	36.96	5.65	34.29	PK
3	9848.000	54.05			43.40	38.81	6.38	34.54	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

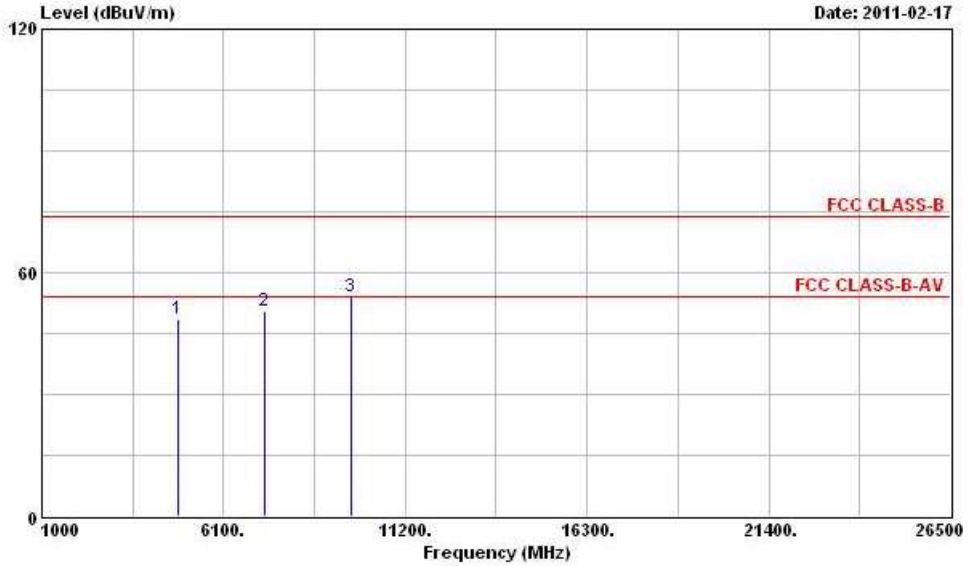
Test Mode :	802.11n (HT-40) H channel at 2.4G band	Temperature :	23°C
Test Channel :	03	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4844.000	50.46	-3.54	54.00	44.55	35.78	4.61	34.48	PK
2	7266.000	50.91	-3.09	54.00	41.71	37.86	5.63	34.29	PK
3	9688.000	54.87			43.69	39.43	6.35	34.60	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

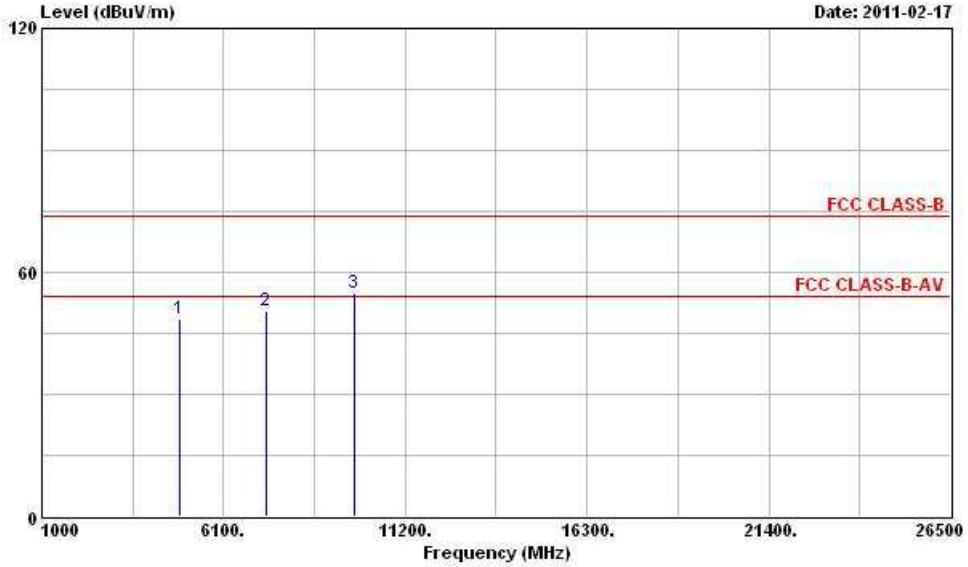
Test Mode :	802.11n (HT-40) H channel at 2.4G band	Temperature :	23°C
Test Channel :	03	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4844.000	48.74	-5.26	54.00	43.47	35.14	4.61	34.48	PK
2	7266.000	50.40	-3.60	54.00	42.15	36.91	5.63	34.29	PK
3	9688.000	54.06			43.68	38.63	6.35	34.60	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

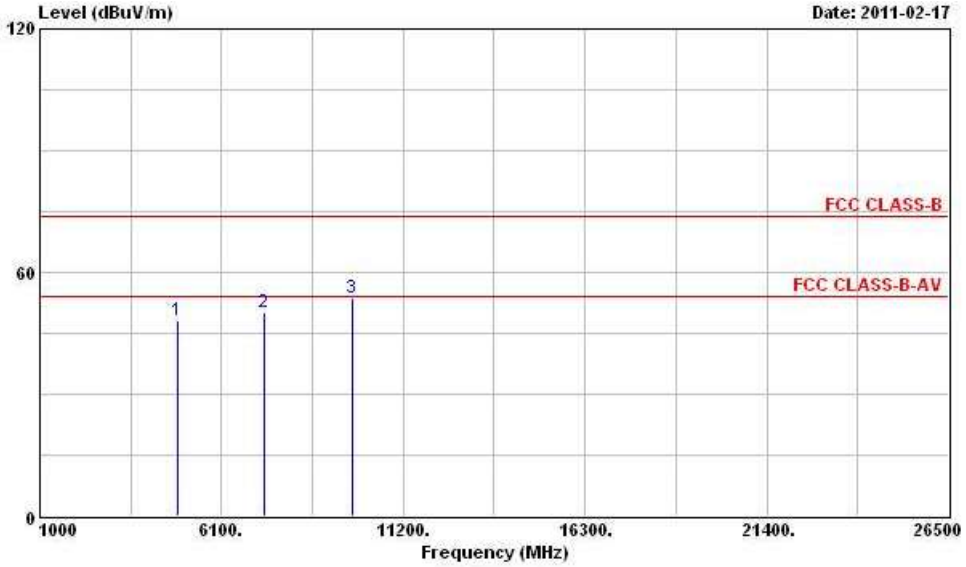
Test Mode :	802.11n (HT-40) M channel at 2.4G band	Temperature :	23°C
Test Channel :	06	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	48.61	-5.39	54.00	42.62	35.83	4.61	34.45	PK
2	7311.000	50.60	-3.40	54.00	41.39	37.86	5.64	34.29	PK
3	9748.000	54.97			43.68	39.51	6.36	34.58	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

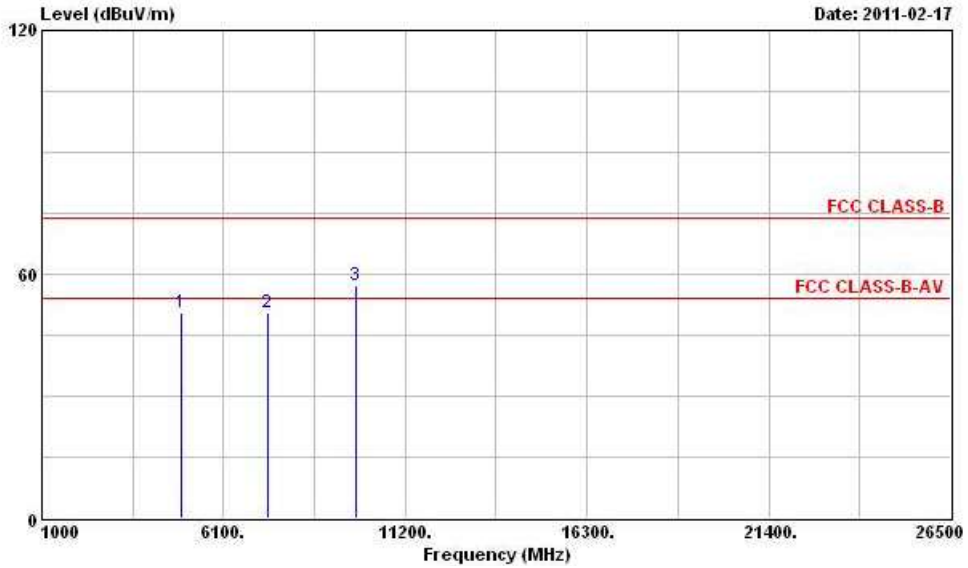
Test Mode :	802.11n (HT-40) M channel at 2.4G band	Temperature :	23°C
Test Channel :	06	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	48.31	-5.69	54.00	42.97	35.18	4.61	34.45	PK
2	7311.000	49.99	-4.01	54.00	41.72	36.92	5.64	34.29	PK
3	9748.000	53.51	-20.49	74.00	43.02	38.71	6.36	34.58	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

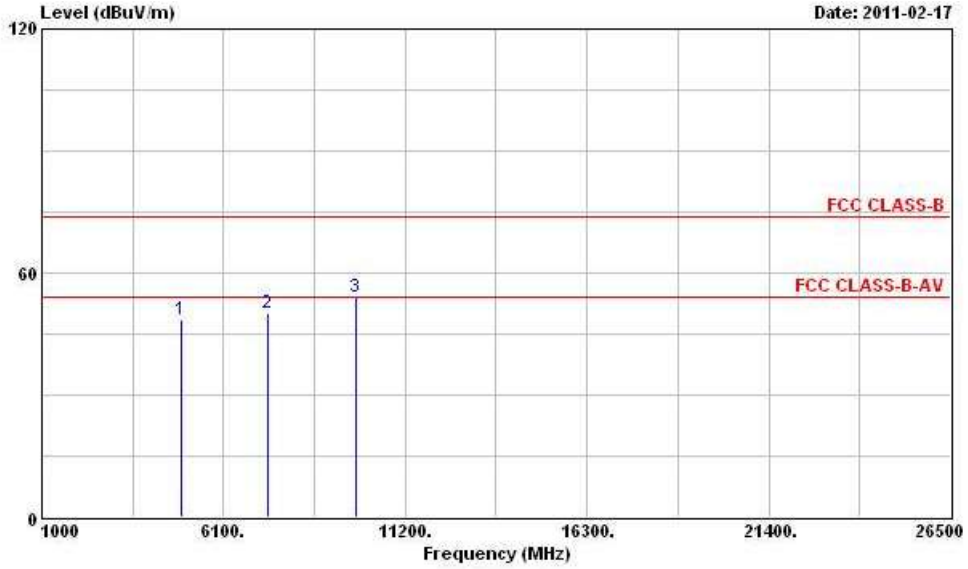
Test Mode :	802.11n (HT-40) H channel at 2.4G band	Temperature :	23°C
Test Channel :	09	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4904.000	50.69	-3.31	54.00	44.59	35.88	4.64	34.42	PK
2	7356.000	50.38	-3.62	54.00	41.16	37.87	5.64	34.29	PK
3	9808.000	57.17			45.79	39.57	6.37	34.56	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

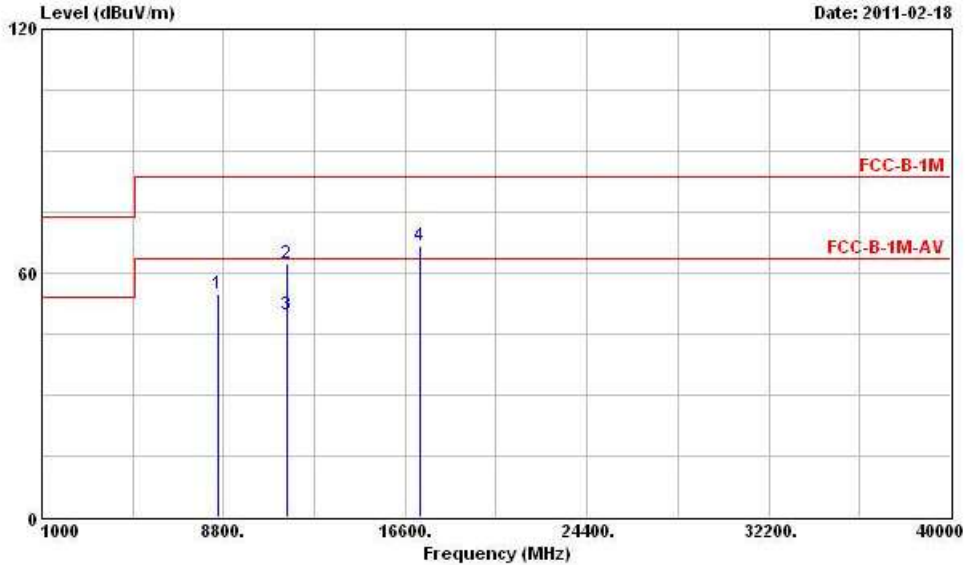
Test Mode :	802.11n (HT-40) H channel at 2.4G band	Temperature :	23°C
Test Channel :	09	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4904.000	48.73	-5.27	54.00	43.30	35.21	4.64	34.42	PK
2	7356.000	50.03	-3.97	54.00	41.74	36.94	5.64	34.29	PK
3	9808.000	54.12			43.54	38.77	6.37	34.56	Peak

Note: The items 2 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

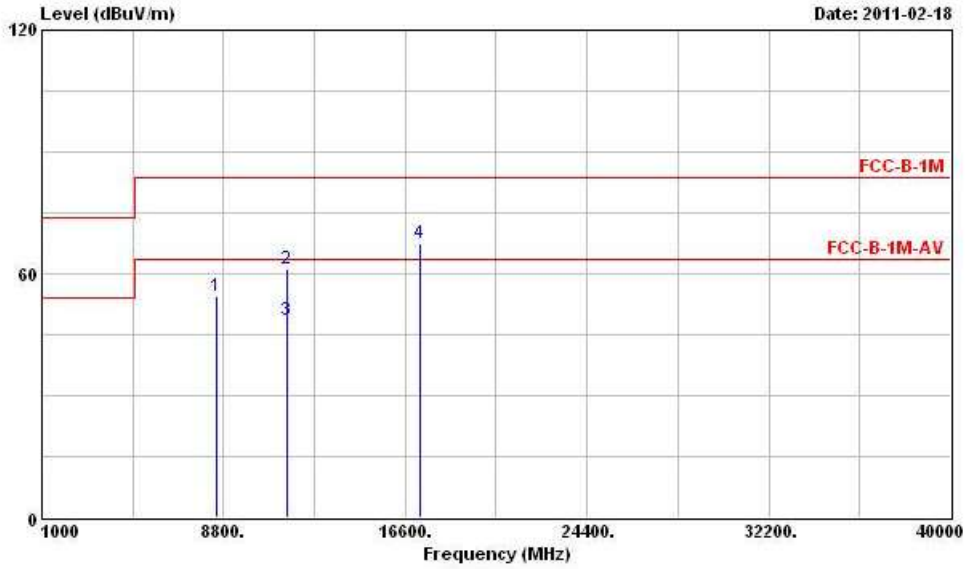
Test Mode :	802.11a L channel	Temperature :	23°C
Test Channel :	149	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8538.000	54.78	-----	-----	44.61	38.47	5.96	34.26	Peak
2	11490.000	62.48	-21.06	83.54	48.90	40.59	6.63	33.64	Peak
3	11490.000	49.80	-13.74	63.54	36.22	40.59	6.63	33.64	Average
4	17235.000	66.66	-----	-----	46.78	43.56	8.55	32.23	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

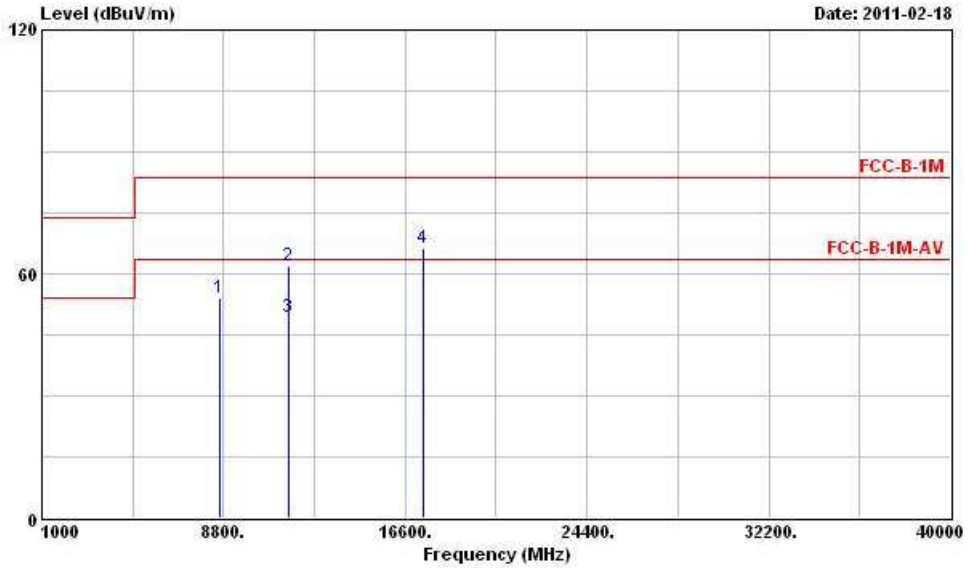
Test Mode :	802.11a L channel	Temperature :	23°C
Test Channel :	149	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8520.000	54.44			44.22	38.49	5.96	34.23	Peak
2	11490.000	61.21	-22.33	83.54	47.63	40.59	6.63	33.64	Peak
3	11490.000	48.51	-15.03	63.54	34.93	40.59	6.63	33.64	Average
4	17235.000	67.53			47.65	43.56	8.55	32.23	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

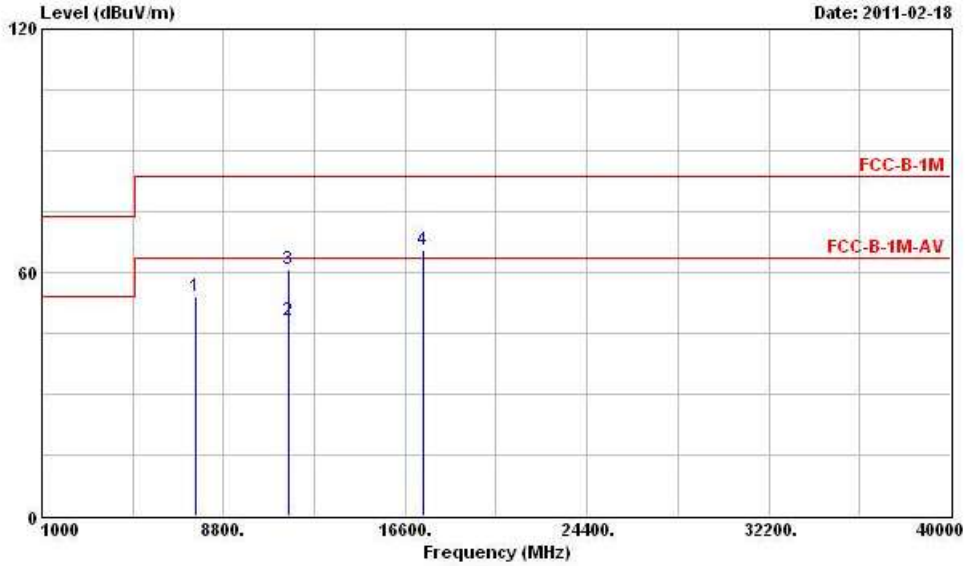
Test Mode :	802.11a M channel	Temperature :	23°C
Test Channel :	157	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8655.000	54.11	-----	-----	44.08	38.38	6.01	34.36	Peak
2	11570.000	62.10	-21.44	83.54	48.47	40.63	6.63	33.63	Peak
3	11570.000	49.38	-14.16	63.54	35.75	40.63	6.63	33.63	Average
4	17355.000	66.28	-----	-----	46.49	43.49	8.50	32.20	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

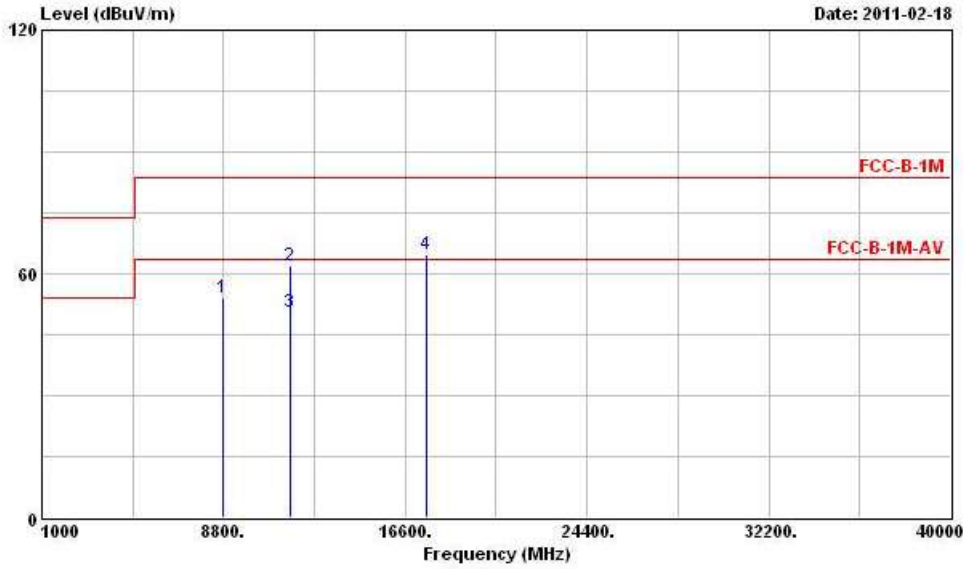
Test Mode :	802.11a M channel	Temperature :	23°C
Test Channel :	157	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	7609.000	53.89	-9.65	63.54	44.55	37.97	5.68	34.31	PK
2	11570.000	48.17	-15.37	63.54	34.54	40.63	6.63	33.63	Average
3	11570.000	60.84	-22.70	83.54	47.21	40.63	6.63	33.63	Peak
4	17355.000	65.45			45.66	43.49	8.50	32.20	Peak

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

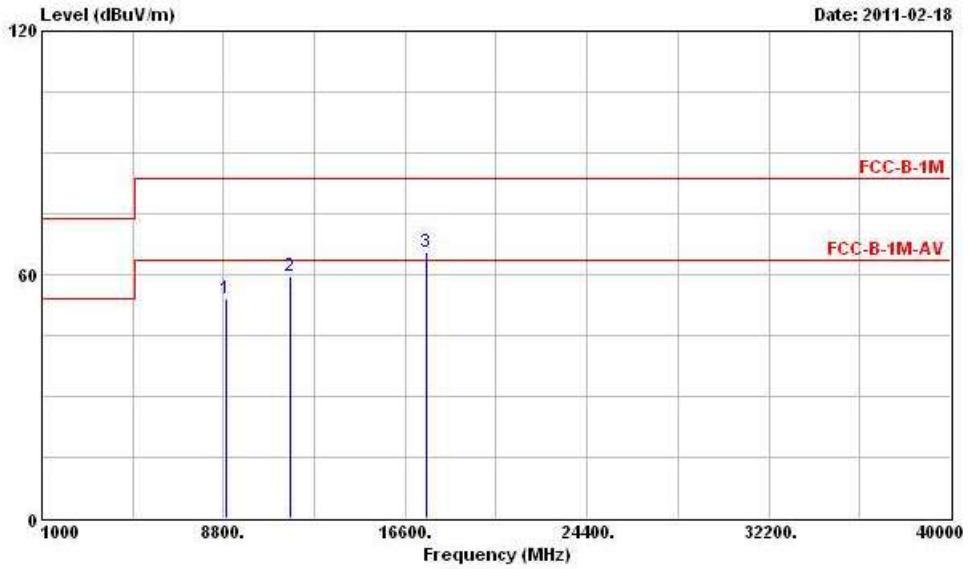
Test Mode :	802.11a H channel	Temperature :	23°C
Test Channel :	165	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8739.000	53.93			44.02	38.31	6.04	34.44	Peak
2	11650.000	62.06	-21.48	83.54	48.36	40.66	6.64	33.60	Peak
3	11650.000	50.54	-13.00	63.54	36.84	40.66	6.64	33.60	Average
4	17475.000	64.90			45.20	43.42	8.44	32.16	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

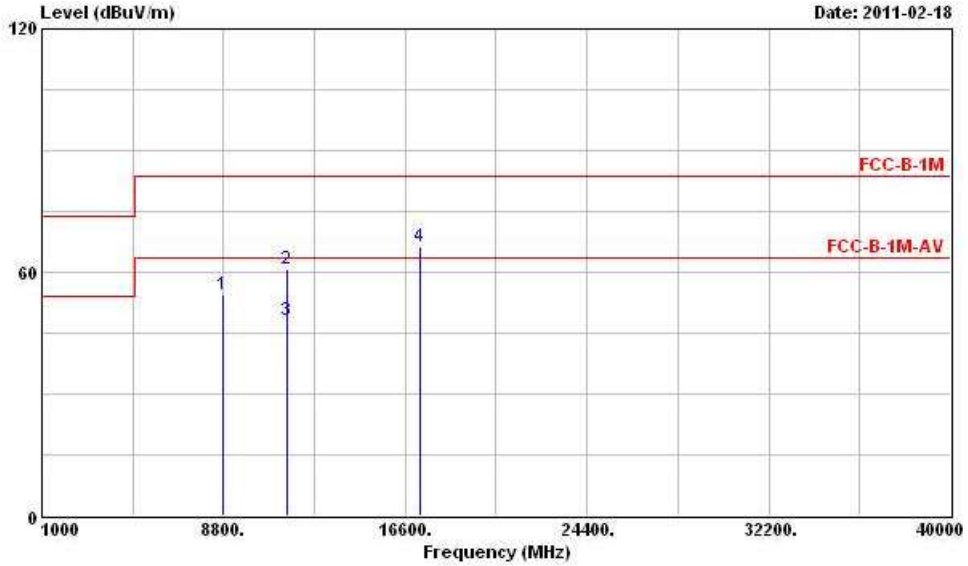
Test Mode :	802.11a H channel	Temperature :	23°C
Test Channel :	165	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8900.000	54.20			44.52	38.18	6.13	34.63	Peak
2	11650.000	59.68	-3.86	63.54	45.98	40.66	6.64	33.60	PK
3	17475.000	65.35			45.65	43.42	8.44	32.16	Peak

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

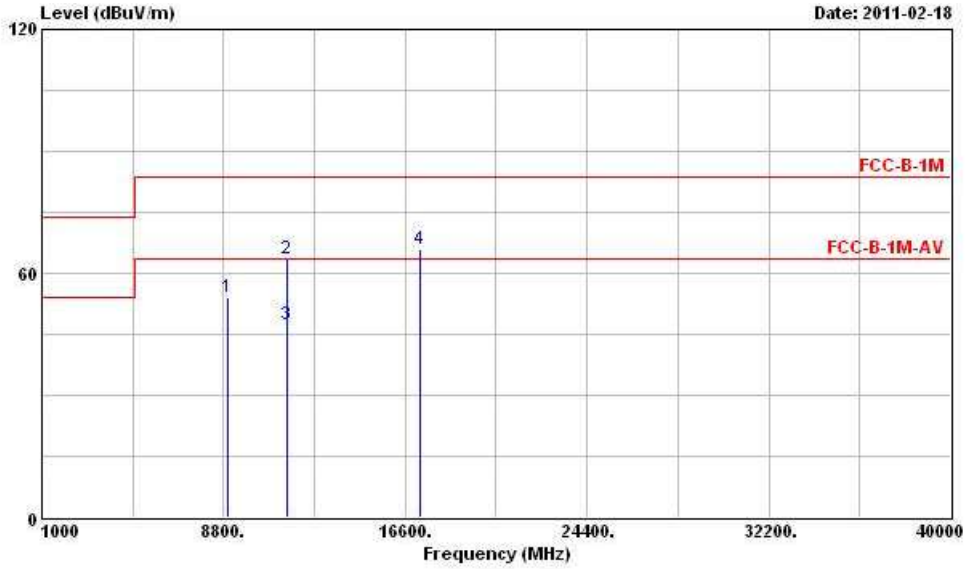
Test Mode :	802.11n (HT-20) L channel at 5.8G band	Temperature :	23°C
Test Channel :	149	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8802.000	54.62			44.80	38.26	6.08	34.52	Peak
2	11490.000	60.76	-22.78	83.54	47.18	40.59	6.63	33.64	Peak
3	11490.000	48.07	-15.47	63.54	34.49	40.59	6.63	33.64	Average
4	17235.000	66.48			46.60	43.56	8.55	32.23	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

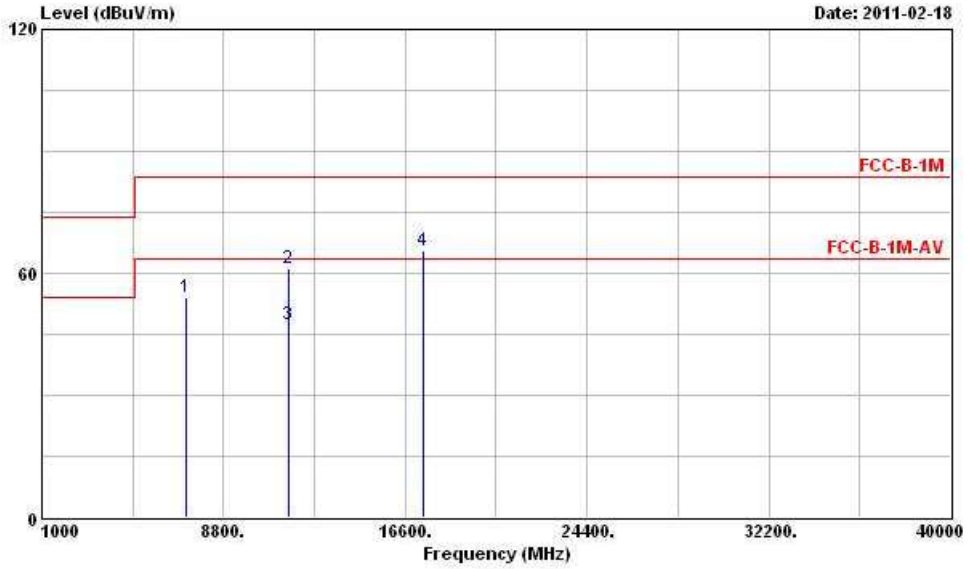
Test Mode :	802.11n (HT-20) L channel at 5.8G band	Temperature :	23°C
Test Channel :	149	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8983.000	54.03			44.47	38.11	6.16	34.71	Peak
2	11490.000	63.55	-19.99	83.54	49.97	40.59	6.63	33.64	Peak
3	11490.000	47.24	-16.30	63.54	33.66	40.59	6.63	33.64	Average
4	17235.000	66.03			46.15	43.56	8.55	32.23	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

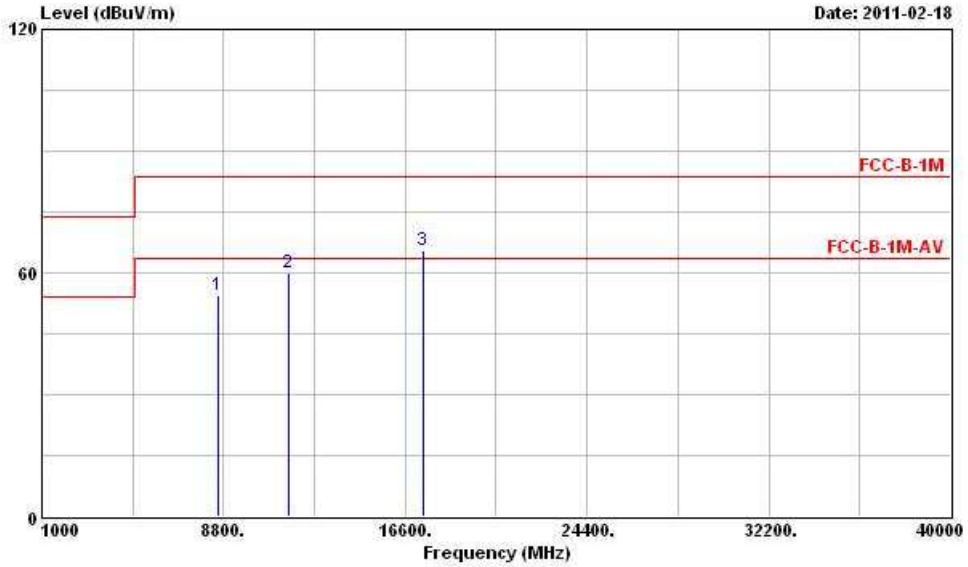
Test Mode :	802.11n (HT-20) M channel at 5.8G band	Temperature :	23°C
Test Channel :	157	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	7217.000	53.94			44.77	37.84	5.62	34.29	Peak
2	11570.000	61.06	-22.48	83.54	47.43	40.63	6.63	33.63	Peak
3	11570.000	47.56	-15.98	63.54	33.93	40.63	6.63	33.63	Average
4	17355.000	65.64			45.85	43.49	8.50	32.20	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

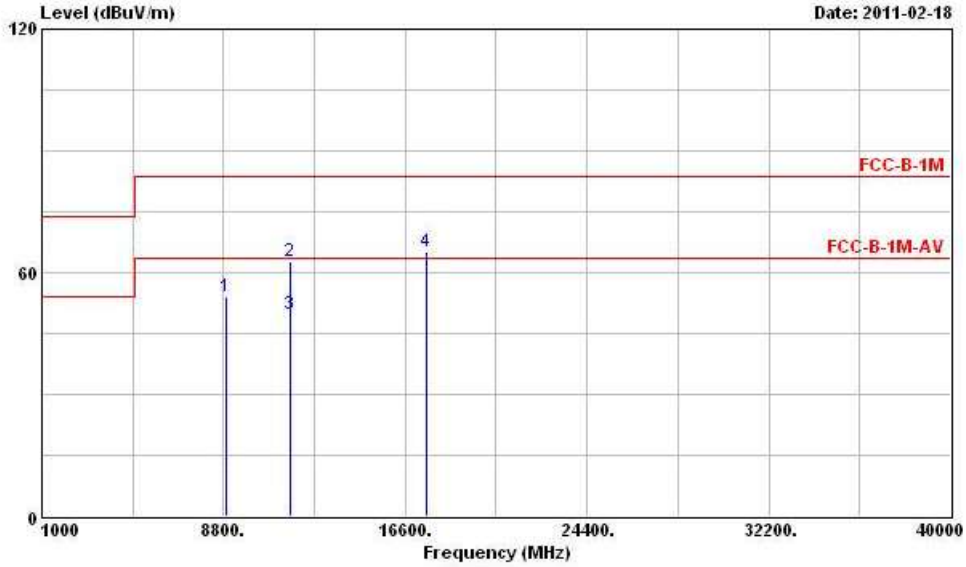
Test Mode :	802.11n (HT-20) M channel at 5.8G band	Temperature :	23°C
Test Channel :	157	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8549.000	54.44			44.27	38.46	5.97	34.26	Peak
2	11570.000	59.87	-3.67	63.54	46.24	40.63	6.63	33.63	PK
3	17355.000	65.38			45.59	43.49	8.50	32.20	Peak

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

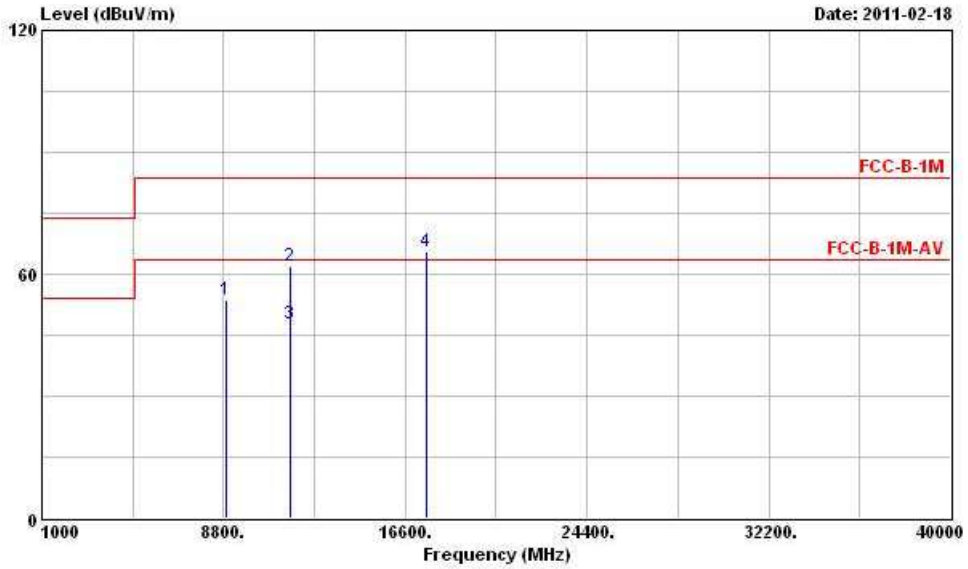
Test Mode :	802.11n (HT-20) H channel at 5.8G band	Temperature :	23°C
Test Channel :	165	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8928.000	54.02			44.38	38.17	6.13	34.66	Peak
2	11650.000	62.69	-20.85	83.54	48.99	40.66	6.64	33.60	Peak
3	11650.000	49.76	-13.78	63.54	36.06	40.66	6.64	33.60	Average
4	17475.000	65.06			45.36	43.42	8.44	32.16	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

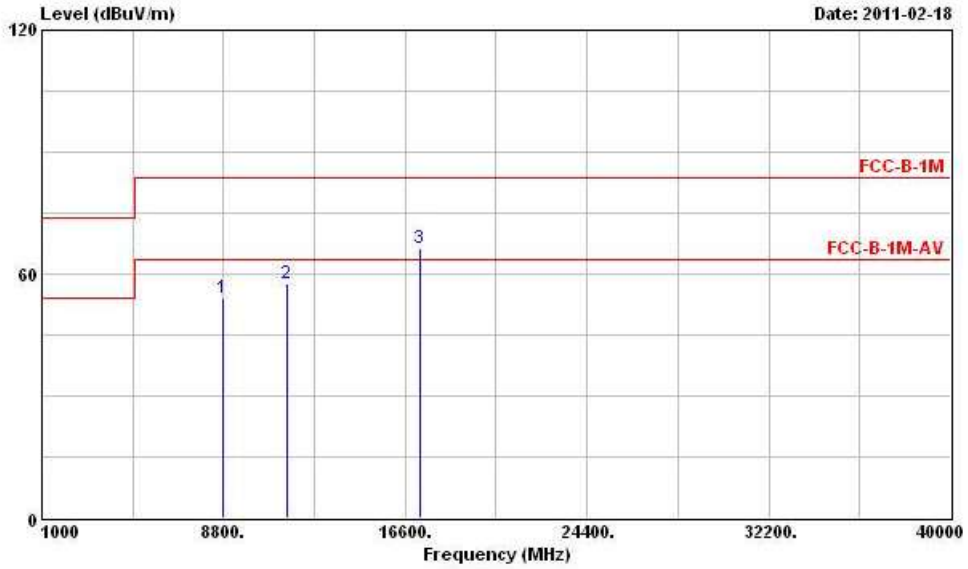
Test Mode :	802.11n (HT-20) H channel at 5.8G band	Temperature :	23°C
Test Channel :	165	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8886.000	53.70			44.00	38.19	6.11	34.60	Peak
2	11650.000	61.84	-21.70	83.54	48.14	40.66	6.64	33.60	Peak
3	11650.000	47.90	-15.64	63.54	34.20	40.66	6.64	33.60	Average
4	17475.000	65.63			45.93	43.42	8.44	32.16	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

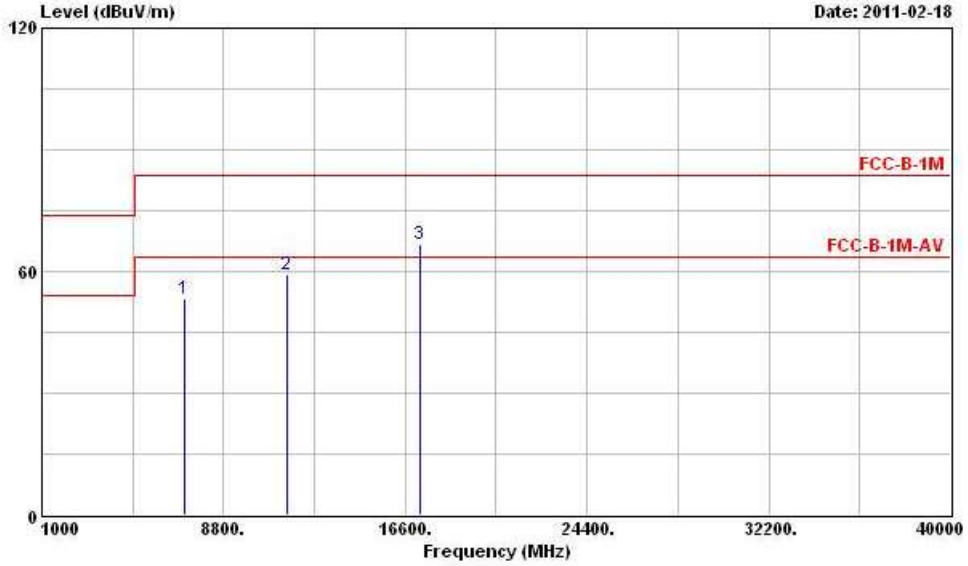
Test Mode :	802.11n (HT-40) L channel at 5.8G band	Temperature :	23°C
Test Channel :	151	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8781.000	53.90			44.05	38.27	6.08	34.50	Peak
2	11510.000	57.56	-5.98	63.54	43.99	40.60	6.63	33.66	PK
3	17265.000	66.47			46.62	43.54	8.54	32.23	Peak

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

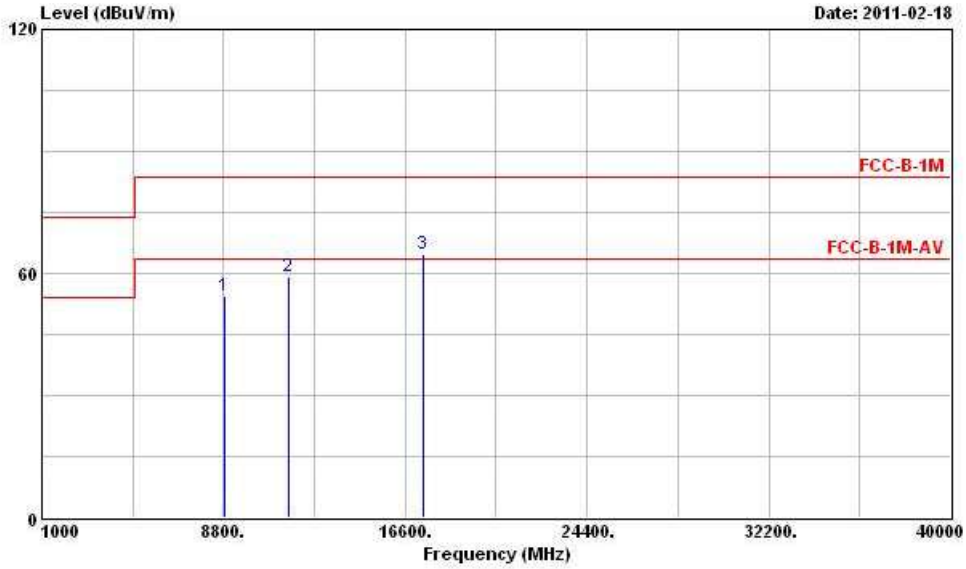
Test Mode :	802.11n (HT-40) L channel at 5.8G band	Temperature :	23°C
Test Channel :	151	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	7143.000	53.17			44.00	37.83	5.62	34.28	Peak
2	11510.000	59.12	-4.42	63.54	45.55	40.60	6.63	33.66	PK
3	17265.000	66.89			47.04	43.54	8.54	32.23	Peak

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

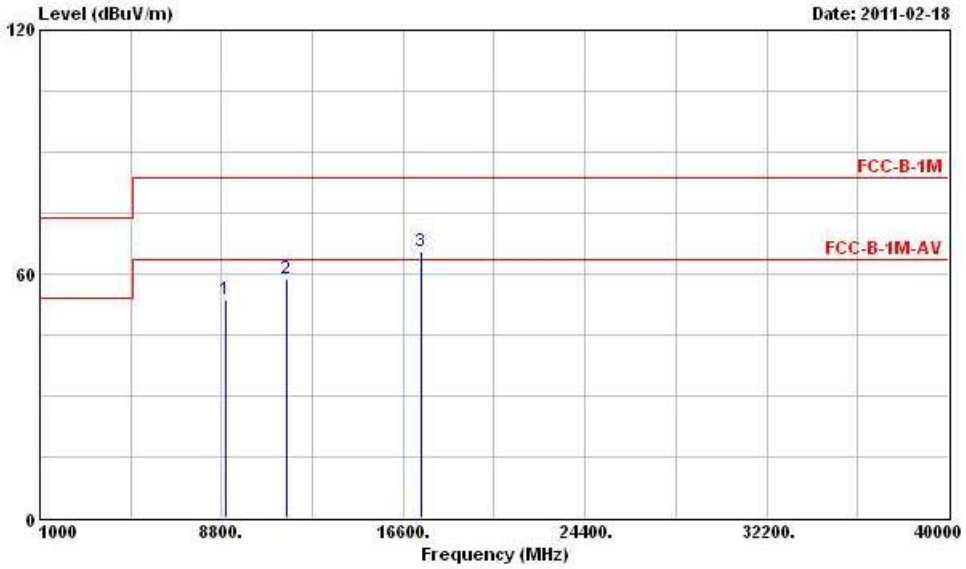
Test Mode :	802.11n (HT-40) H channel at 5.8G band	Temperature :	23°C
Test Channel :	159	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8860.000	54.49			44.74	38.22	6.11	34.58	Peak
2	11590.000	59.07	-4.47	63.54	45.44	40.63	6.63	33.63	PK
3	17385.000	64.64			44.87	43.47	8.48	32.18	Peak

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

Test Mode :	802.11n (HT-40) H channel at 5.8G band	Temperature :	23°C
Test Channel :	159	Relative Humidity :	51%
Test Engineer :	Daniel	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8997.000	53.56			44.03	38.11	6.16	34.74	Peak
2	11590.000	58.64	-4.90	63.54	45.01	40.63	6.63	33.63	PK
3	17385.000	65.46			45.69	43.47	8.48	32.18	Peak

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.3).

3.8 Antenna Requirements

3.8.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.8.2 Antenna Connected Construction

The antennas type used in this product is PIFA Antenna with U.FL connector and it is considered to meet antenna requirement.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Receiver	R&S	ESCS 30	838251/003	9 kHz - 2.75 GHz	Apr. 16, 2010	Conduction (CO01-LK)
LISN	SCHAFFNER	NNB 41	06/10024	9 kHz - 30 MHz	Jan. 12, 2011	Conduction (CO01-LK)
RF Cable-CON	Suhner Switzerland	RG223/U	CB017	9 kHz - 30 MHz	Nov. 04, 2010	Conduction (CO01-LK)
PULSE LIMTER	R&S	ESH3-Z2	20-6120	9 kHz - 30 MHz	May. 18. 2010	Conduction (CO01-LK)
Spectrum Analyzer	R&S	FSP40	100004	9 kHz - 40 GHz	Nov. 17, 2010	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30 MHz - 1 GHz 3m	May 01, 2010	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100 kHz – 1.3 GHz	Jul. 23, 2010	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1GHz – 26.5 GHz	Jul. 23, 2010	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz~18GHz	Nov. 11, 2010	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz ~ 1GHz	Feb. 26, 2010	Radiation (03CH02-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX106	03CH02-HY	1GHz~40GHz	Feb. 26, 2010	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30 MHz - 2 GHz	Oct. 16, 2010	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0 - 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 m - 4 m	N/A	Radiation (03CH02-HY)
Spectrum Analyzer	R&S	FSU26.5	100015	20Hz ~ 26.5GHz	Nov. 19, 2010	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Apr. 16, 2010	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Oct. 22, 2010	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 02, 2010	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 02, 2010	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 30, 2010	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	0917017	300MHz~40GHz	Jan. 06, 2011	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	0949003	300MHz~40GHz	Jan. 06, 2011	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Jul. 26, 2010*	Conducted (TH01-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 29, 2010*	Radiation (03CH02-HY)

Note: Calibration Interval of instruments listed above is two year.

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
Combined Standard Uncertainty Uc(y)	**1.13**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**		

Uncertainty of Radiated Emission Measurement (30MHz ~ 1000MHz)

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
Combined Standard Uncertainty Uc(y)	**1.27**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**		

Uncertainty of Radiated Emission Measurement (1GHz ~ 40GHz)

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	±0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	±1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	±0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site Imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR Γ1 = 0.197 Antenna VSWR Γ2 = 0.194 Uncertainty = 20Log(1-Γ1*Γ2)	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty Uc(y)	**2.36**				
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**				