

# FCC TEST REPORT

FCC 15 Subpart C, Paragraph 15.247

Operating in 2400 ~ 2483.5 MHz Band

Prepared For :

**ZOOM TELEPHONICS INC**

207 SOUTH ST BOSTON, MA 02111 USA

EUT: ADSL Modem

Model: Series 1091

FCC ID: BDN SERIES1091

**Review By:** Apollo Liu / Manager

A handwritten signature in black ink, appearing to read 'Apollo Liu', is centered on the page.

December 21, 2010

Report #: KSZ2010122001J

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## 1. Information

Site on File with the Federal Communications Commission – United States

Registration Number: 963441

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: 7353A

### Client

Name : ZOOM TELEPHONICS INC  
Address : 207 SOUTH ST BOSTON, MA 02111 USA  
Contact : Frank Manning  
Tel : 617-423-1072  
Fax : N/A

Manufacturer : SHANGHAI CHONGZHENG ELECTRONICS TECHNOLOGY CO., LTD  
Address : NO.178 Renqing Road, Pudong, Shanghai  
Trade Name : Zoom  
Model No. : Series 1091  
Description : ADSL Modem

### EUT

Reception Frequencies : 2412~2462MHz  
Maximum Range : N/A  
Number of Channels : For 2.4GHz Band: 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth  
Transmitter Antenna : Dipole  
Power Supply : DC12V  
Modulation Type : IEEE 802.11b: DSSS (DQPSK, DBPSK, and CCK)  
IEEE 802.11g: OFDM (BPSK, QPSK, 16-QAM, 64-QAM)  
IEEE 802.11n: HT20/HT40: OFDM (64QAM,16QAM, QPSK, BPSK)

### Standard

#### Antenna & Band Width

Antenna	Single (TX)		Two (TX)	
	20 MHz	40 MHz	20 MHz	40 MHz
Band width Mode				
802.11a	X	X	X	X
802.11b	√	X	X	X
802.11g	√	X	X	X
802.11n	X	X	√	√

#### Test Standard

FCC 15 Subpart C, Paragraph 15.247

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## 2. Technical Test

### 2.1 Summary of Test Results

**The EUT has been tested according to the following specifications:**

<b>Standard</b>	<b>Test Type</b>	<b>Result</b>	<b>Notes</b>
FCC Part 15, Paragraph 15.203	Antenna Requirement	PASS	Complies
FCC Part 15, Paragraph 15.107, 15.207	Conducted Test	PASS	Complies
FCC Part 15.205	Radiated Emission (Restricted Band Requirements)	PASS	Complies.
FCC Part 15.109, 15.209	Radiated Emission (Spurious Emission)	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.247(a)(2)	Spectrum Bandwidth (6dB Bandwidth Measurement)	PASS	Complies.
FCC Part 15 Subpart C Paragraph 15.247(b)(3)	Maximum Peak Power	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.247(c)	100kHz Bandwidth of Frequency Band Edges	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.247(d)	Peak Power Spectral Density	PASS	Complies

### 2.2 Antenna Requirement

#### A. Regulation

FCC section 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

#### B. Result

The antenna type used in this product is Dipole Antenna and fixed in the EUT and without connector. That no antenna other than furnished by the responsible party shall be used with the device. The EUT as tested meets the criteria of this rule by being antenna being permanently attached and professionally installed. The EUT is compliant with this Section.

## 3. EUT Modifications

No modification by test lab.

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## 4. Conducted Power Line Test

### 4.1 Test Equipment

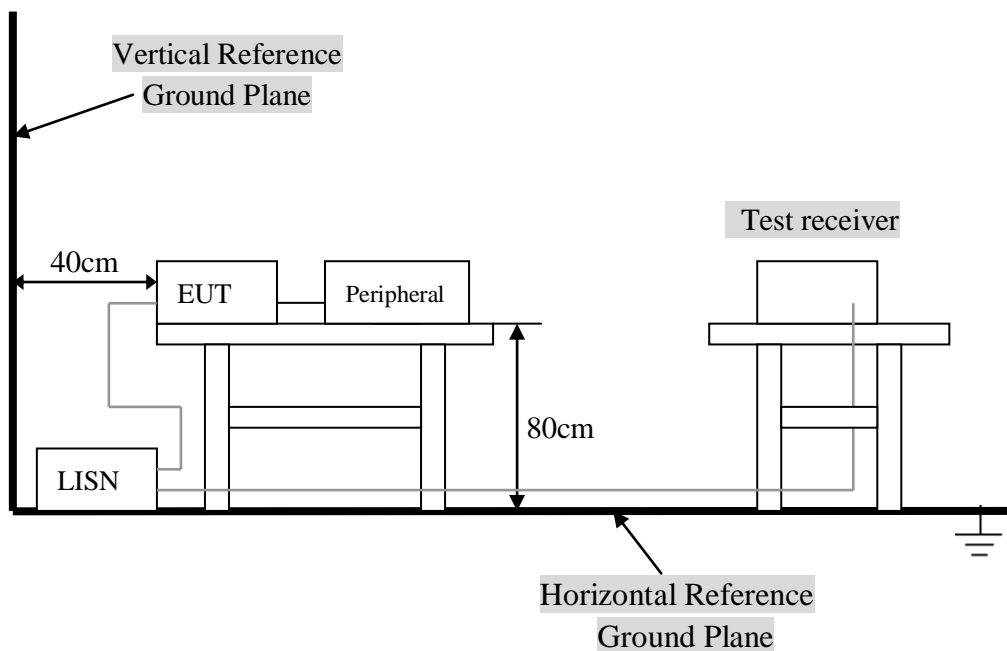
Please refer to Section 10 this report.

### 4.2 Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission., the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:2003 on conducted measurement. Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

### 4.3 Test Setup



For the actual test configuration, Please refer to the related items – Photos of Testing.

#### 4. 4 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2003. EUT was used DC12V. The operation frequency is from 2400MHz~2483.5MHz. Enable the signal transmitted from the EUT to Notebook PC. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

Note:

- 1) Operating Modes: Each of lowest, middle and highest channel frequencies transmits continuously for emissions measurements. The EUT operates in normal 802.11b/g for occupancy duration and frequency separation.
- 2) Special Test Software & Hardware: Special firmware and hardware provided by the Applicant are installed to allow the EUT to operate in 802.11b/g/n or at each channel frequency continuously. For example, the transmitter will be operated at each of lowest, middle and highest frequencies individually continuously during testing.
- 3) Transmitter Test Antenna: The EUT is tested with the antenna fitted in a manner typical of normal intended use as an integral / non-integral antenna equipment as describe with the test results.
- 4) Frequency(ies) Tested: low, mid, high were pre-tested, The worst case one, was chosen for conducted emission test.
- 5) Above 1GHz, the low, mid, high were tested individually.
- 6) Normal Test Modulation: 802.11b/g/n
- 7) Modulating Signal Source: Internal

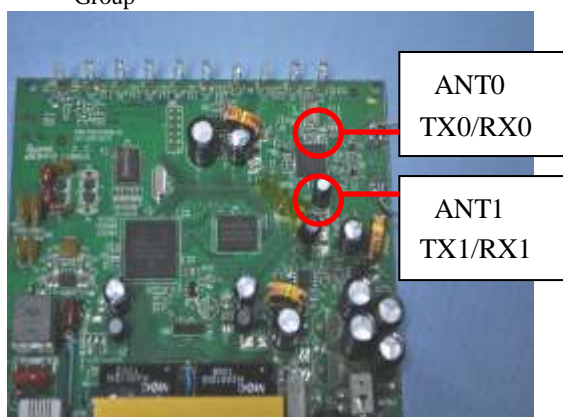
\* Associated Antenna Descriptions: The antenna used in this product is dipole antenna.

#### A. EUT

Device	Manufacturer	Model #	IC ID
Adsl Modem	SHANGHAI CHONGZHENG ELECTRONICS TECHNOLOGY CO., LTD	Series 1091	BDNSERIES1091

#### Field Antenna For 2.4GHz Band

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
0,1	Wha Yu Group	RF Antenna	Dipole	NA	2.00	TX/RX



Note:

The EUT incorporates a MIMO function with dfaft 802.11n. Physically, the EUT provides two completed transmit and two receivers. The device was tested in a MIMO type operation.

#### Carrier Frequencies For 2.4GHz Band

Frequency Band	Channel No.	Frquency	Channel No.	Frquency
2400~2483.5Mhz	1	2412MHz	7	2442MHz
	2	2417MHz	8	2447MHz
	3	2422MHz	9	2452MHz
	4	2427MHz	10	2457MHz
	5	2432MHz	11	2462MHz
	6	2437MHz		

**Test Modes For 2.4GHz Band**

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line	Normal Link	Auto	-	-
Conducted Emissions				
Maximum Peak	MCS8/20MHz	26 Mbps	1/6/11	0,1
Conducted Output Power	MCS8/40MHz	65 Mbps	3/6/9	0,1
Power Spectral Density	MCS8/20MHz	26 Mbps	1/6/11	0,1
6dB Spectrum Bandwidth	MCS8/40MHz	65 Mbps	3/6/9	0,1
Radiated Emissions				
9kHz~1GHz	Normal Link	Auto	-	-
Radiated Emissions	MCS8/20MHz	26 Mbps	1/6/11	0,1
1GHz~10 <sup>th</sup> Harmonic	MCS8/40MHz	65 Mbps	3/6/9	0,1
Band Edge Emissions	MCS8/20MHz	26 Mbps	1/11	0,1
Band Edge Emissions	MCS8/40MHz	65 Mbps	3/9	0,1

Note: During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level, 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.

**B. Internal Devices**

Device	Manufacturer	Model #	FCC ID
N/A			

**C. Peripherals**

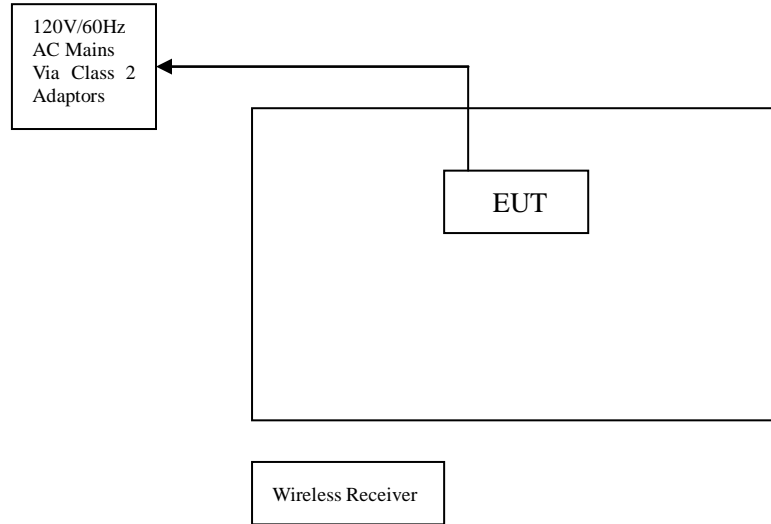
Device	Manufacturer	Model # Serial #	FCC ID/ DoC	Cable
Printer	HP	HP930C	DoC	1.5m unshielded power cord 1.2m unshielded data cable.
Modem	GVC	N/A	DoC	1.5m unshielded power cord 1.2m unshielded data cable.
Notebook	DELL	PP10L	DoC	1.5m unshielded power cord
PC	Dell	2400n	DoC	1.5m unshielded power cord

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## 4.5 EUT Operating Condition

Operating condition is according to ANSI C63.4 - 2003.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.



## 4.6 Conducted Power Line Emission Limits

RSS-Gen 7.2.2 (dBuV)		
Frequency Range (MHz)	Class A QP/AV	Class B QP/AV
0.15 – 0.5	79/66	66-56/56-46
0.5 – 5.0	73/60	56/46
5.0 - 30	73/60	60/50

**Note:** In the above table, the tighter limit applies at the band edges.



## 4.7 Conducted Power Line Test Result

Product	: Adsl Modem	Test Mode	: 802.11b - 2412MHz
Test Item	: Conducted Emission Data	Temperature	: 25 °C
Test Voltage	: DC 12V (by DC Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All readings are quasi -peak values with a resolution bandwidth of 9 KHz.

- Temperature : 26 °C
- Humidity : 53 % RH

FCC Part 15 Paragraph 15.207							
Frequency (MHz)	Emission (dBuV)		LINE/NEUTRAL	Limit (dBuV)		Margin (dB)	
	QP	AV		QP	AV	QP	AV
0.158	41.72	28.92	LINE	65.57	55.57	-23.85	-26.65
0.154	43.67	35.78	NEUTRAL	65.78	55.78	-22.11	-20.00
0.182	39.34	27.65	LINE	64.39	54.39	-25.05	-26.74
0.194	39.25	27.81	NEUTRAL	63.86	53.86	-24.61	-26.05
0.270	33.65	22.64	LINE	61.12	51.12	-27.47	-28.48
0.278	37.89	29.15	NEUTRAL	60.88	50.88	-22.99	-21.73

**Note:**

- 1.Uncertainty in conducted emission measured is <+/- 2dB.
- 2.The emission levels of other frequencies were very low against the limit.
- 3.All Reading Levels are Quasi-Peak and Average value.
- 4.Emission = Meter Reading + Factor; Factor = Insertion Loss + Cable Loss.
- 5.Margin Value = Emission Level - Limit Value.

**Conducted Emission**  
**EN5022**

EUT: Adsl Modem

M/N: Series 1091

Manufacturer: SHANGHAI CHONGZHENG ELECTRONICS TECHNOLOGY CO., LTD

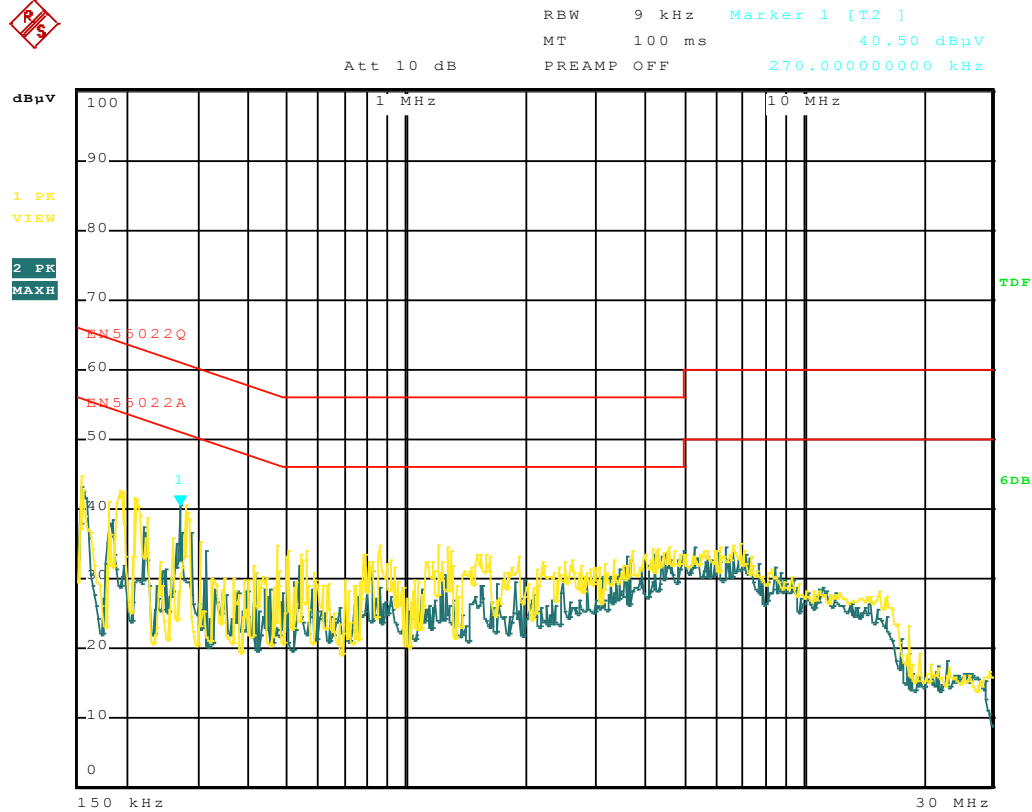
Operating Condition: Transmitting

Test Site: Normal

Operator: Jacky Huang

Test Specification: LINE&NEUTRAL

Comment:



Date: 20.DEC.2010 09:40:53

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## 5. FCC Part 15.247 Requirements for 802.11b/g/n Systems

### 5.1 Test Equipment

Please refer to Section 10 this report.

### 5.2 Test Procedure

Refer to FCC 15.247(a)(2), ANSI C63.4: 2003

#### 6 dB Bandwidth:

- Place the EUT on the table and set it in the transmitting mode.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- Set the spectrum analyzer as RBW = 100 kHz, VBW = RBW, Span = 50 MHz, Sweep = auto.
- Mark the peak frequency and -6dB (upper and lower) frequency.
- Repeat until all the rest channels are investigated.

#### Peak Power:

The transmitter output is connected to the test receiver. The test receiver is set to the peak power detection. The power is equal to the reading level on test receiver plus cable loss at the EUT RF output terminal.

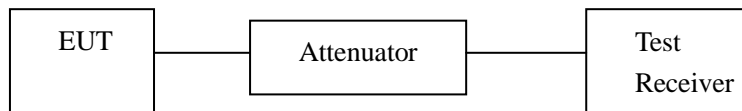
#### Band Edges Measurement:

- The transmitter output was connected to the spectrum analyzer via a low lose cable.
- Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.
- The band edges was measured and recorded.

#### Peak Power Spectral Density:

- The transmitter output is connected to a test receiver, The spectrum analyzer's resolution bandwidth was set at 3kHz RBW and 30kHz VBW as that of the fundamental frequency. Set the sweep time=span/3kHz.
- The power spectral density was measured and recorded.
- The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

### 5.3 Test Setup



### 5.4 Configuration of the EUT

Same as section 4.4 of this report

### 5.5 EUT Operating Condition

Same as section 4.5 of this report.

### 5.6 Limit

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 ~ 928 MHz, 2400 ~ 2483.5 MHz, and 5725 ~ 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.

According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

## 5.7 Test Result

### A. 6 dB Bandwidth

Product	: Adsl Modem	Test Mode	: IEEE 802.11b/g/n
Test Item	: 6 dB BW	Temperature	: 25 °C
Test Voltage	: DC 12V (Power by Adapter Supply)	Humidity	: 56%RH
Test Result	: PASS		

#### IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	FCC Limit (kHz)	Result
Low	2412	8.56	>500 kHz	PASS
Mid	2437	8.48		PASS
High	2462	8.48		PASS

#### IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (MHz)	FCC Limit (kHz)	Result
Low	2412	16.40	>500 kHz	PASS
Mid	2437	16.36		PASS
High	2462	16.40		PASS

#### IEEE 802.11n MCS8 20MHz Ant.0+ANT.1

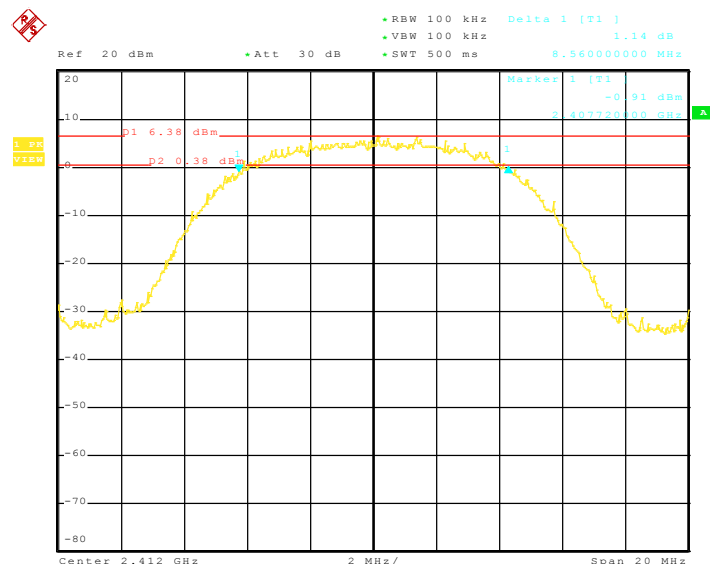
Channel	Frequency (MHz)	Bandwidth (MHz)	FCC Limit (kHz)	Result
Low	2412	17.40	>500 kHz	PASS
Mid	2437	17.60		PASS
High	2462	17.52		PASS

#### IEEE 802.11n MCS8 40MHz Ant.0+ANT.1

Channel	Frequency (MHz)	Bandwidth (MHz)	FCC Limit (kHz)	Result
Low	2422	36.48	>500 kHz	PASS
Mid	2437	36.48		PASS
High	2452	36.40		PASS

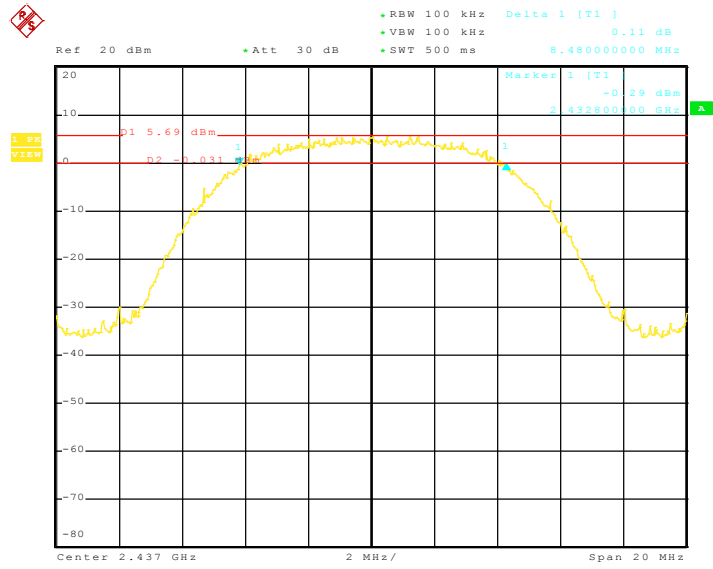
#### IEEE 802.11b

#### 6dB Bandwidth (CH Low)



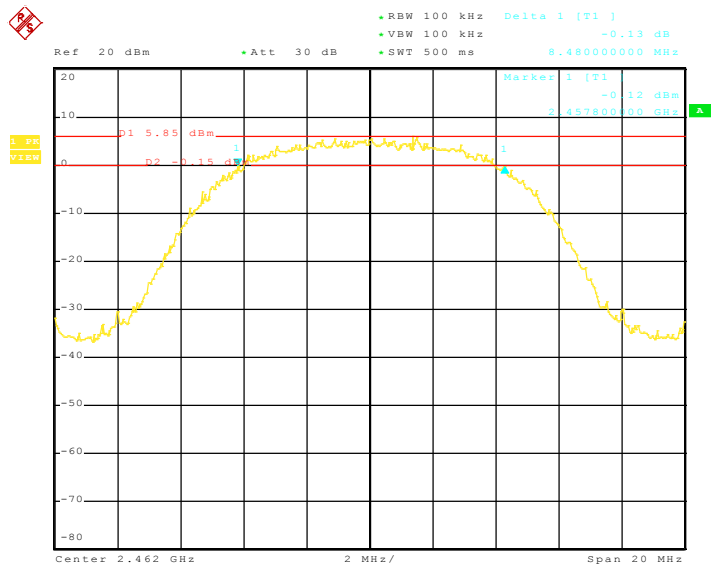
Date: 20.DEC.2010 11:19:50

### 6dB Bandwidth (CH Mid)



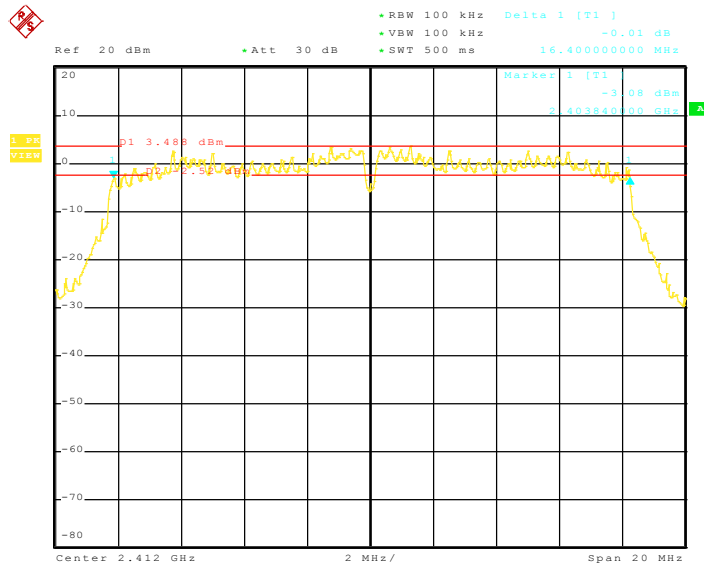
Date: 20.DEC.2010 11:26:08

### 6dB Bandwidth (CH High)



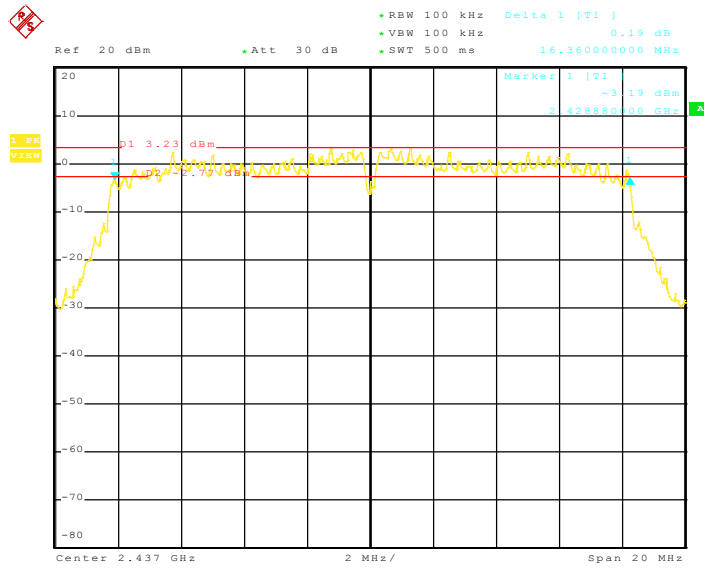
Date: 20.DEC.2010 11:28:36

### 6dB Bandwidth (CH Low)



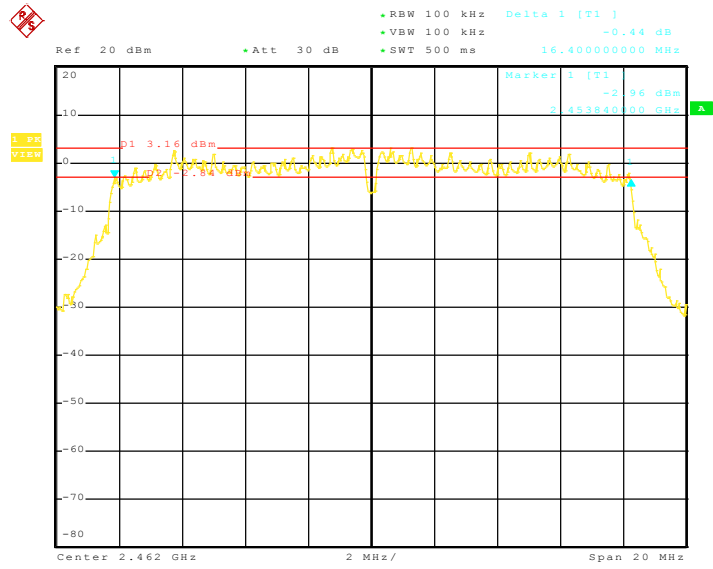
Date: 20.DEC.2010 11:31:34

### 6dB Bandwidth (CH Mid)



Date: 20.DEC.2010 11:34:50

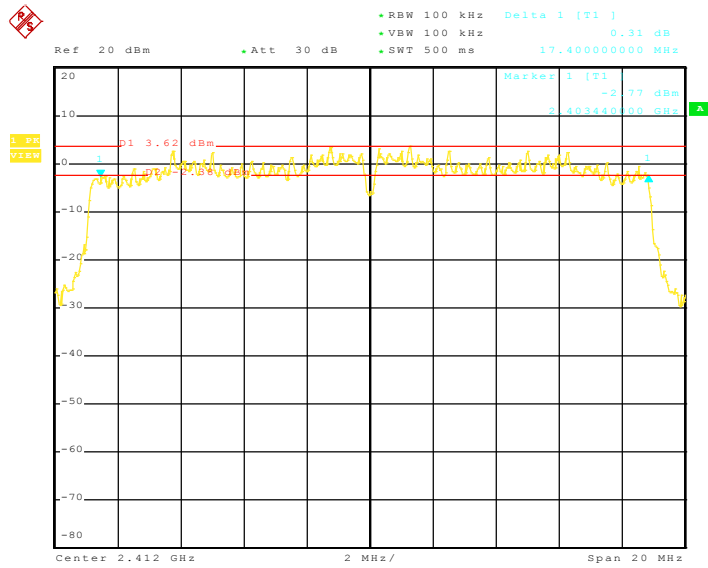
### 6dB Bandwidth (CH High)



Date: 20.DEC.2010 11:36:39

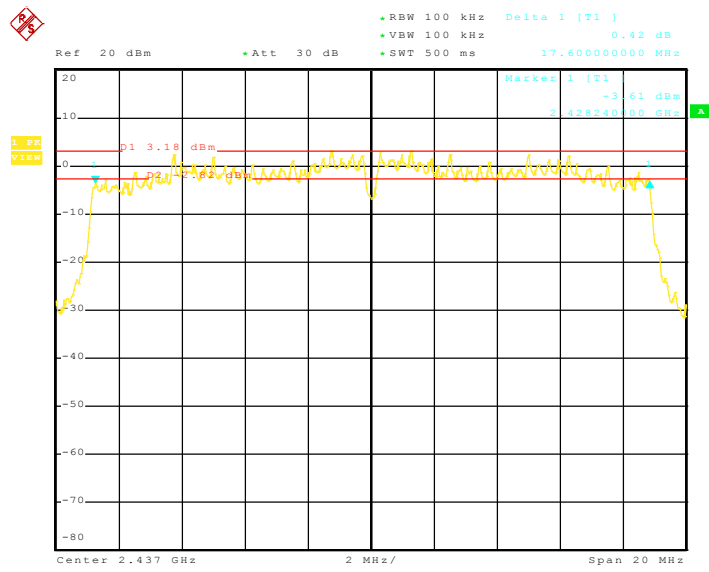
### IEEE 802.11n MCS8 20MHz Ant.0+ANT.1

### 6dB Bandwidth (CH Low)



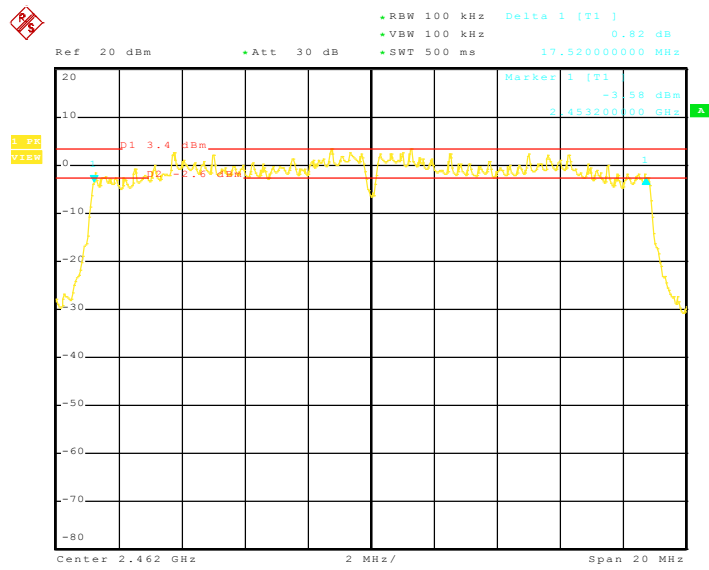
Date: 20.DEC.2010 11:39:07

### 6dB Bandwidth (CH Mid)



Date: 20.DEC.2010 11:40:40

### 6dB Bandwidth (CH High)

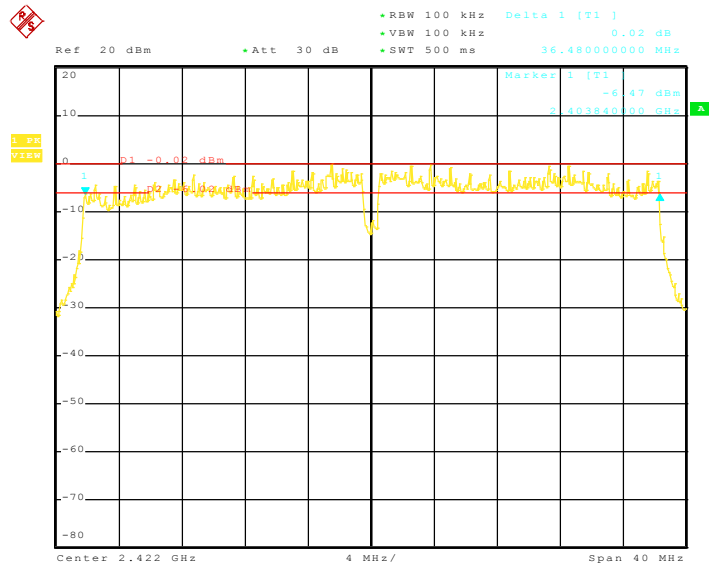


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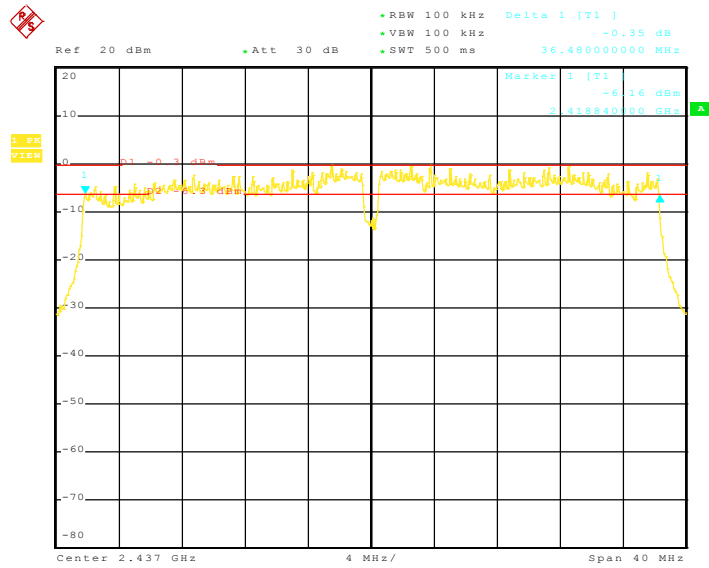
IEEE 802.11n MCS8 40MHz Ant.0+ANT.1

6dB Bandwidth (CH Low)



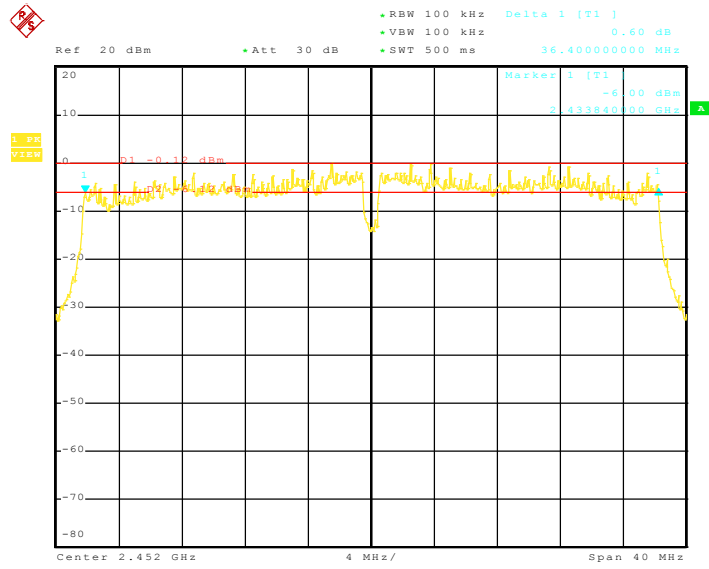
Date: 20.DEC.2010 14:05:31

6dB Bandwidth (CH Mid)



Date: 20.DEC.2010 14:11:11

# 6dB Bandwidth (CH High)



Date: 20.DEC.2010 14:13:12

## B. Peak Power

Product	: Adsl Modem	Test Mode	: IEEE 802.11b/g/n
Test Item	: Peak Power	Temperature	: 25 °C
Test Voltage	: DC 12V (Power by Adapter Supply)	Humidity	: 56%RH
Test Result	: PASS		

### IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	FCC Limit (W/dBm)	Result
Low	2412	20.14	1.00/30.00	PASS
Mid	2437	20.32		PASS
High	2462	20.09		PASS

### IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	FCC Limit (W/dBm)	Result
Low	2412	19.33	1.00/30.00	PASS
Mid	2437	19.45		PASS
High	2462	19.16		PASS

### Draft n MCS8 20MHz Ant.0

Channel	Frequency (MHz)	Output Power (dBm)	FCC Limit (W/dBm)	Result
Low	2412	20.03	1.00/30.00	PASS
Mid	2437	19.84		PASS
High	2462	20.26		PASS

### Draft n MCS8 20MHz Ant.1

Channel	Frequency (MHz)	Output Power (dBm)	FCC Limit (W/dBm)	Result
Low	2412	20.21	1.00/30.00	PASS
Mid	2437	20.11		PASS
High	2462	20.26		PASS

### Draft n MCS8 20MHz Ant.0+Ant.1

Channel	Frequency (MHz)	Output Power (dBm)	FCC Limit (W/dBm)	Result
Low	2412	23.13	1.00/30.00	PASS
Mid	2437	22.99		PASS
High	2462	23.27		PASS

### Draft n MCS8 40MHz Ant.0

Channel	Frequency (MHz)	Output Power (dBm)	FCC Limit (W/dBm)	Result
Low	2422	19.72	1.00/30.00	PASS
Mid	2437	19.31		PASS
High	2452	19.44		PASS

### Draft n MCS8 40MHz Ant.1

Channel	Frequency (MHz)	Output Power (dBm)	FCC Limit (W/dBm)	Result
Low	2422	19.59	1.00/30.00	PASS
Mid	2437	19.22		PASS
High	2452	19.34		PASS

### Draft n MCS8 40MHz Ant.0+Ant.1

Channel	Frequency (MHz)	Output Power (dBm)	FCC Limit (W/dBm)	Result
Low	2422	22.67	1.00/30.00	PASS
Mid	2437	22.28		PASS
High	2452	22.40		PASS

## C. Band Edges Measurement

Product : Adsl Modem Test Mode : IEEE 802.11b/g/n  
 Test Item : Band Edges Measurement Temperature : 25 °C  
 Test Voltage : DC 12V (Power by Adapter Supply) Humidity : 56%RH  
 Test Result : PASS

### IEEE 802.11b-low

Freq. (MHz)	Emission (dBuV/m)		HORIZ / VERT	Limits (dBuV/m)		Margin (dB)	
	Peak	Average		Peak	Average		
2350.040	57.15	40.64	HORZ	74	54	-16.85	-13.36
2384.280	57.74	41.38	VERT	74	54	-16.26	-12.62
2390.460	62.19	42.22	HORZ	74	54	-11.81	-11.78
2390.640	60.57	41.55	VERT	74	54	-13.43	-12.45

### IEEE 802.11b-High

Freq. (MHz)	Emission (dBuV/m)		HORIZ / VERT	Limits (dBuV/m)		Margin (dB)	
	Peak	Average		Peak	Average		
2483.540	60.18	44.27	HORZ	74	54	-13.82	-9.73
2484.460	57.64	42.49	VERT	74	54	-16.36	-11.51
2485.520	57.25	45.36	HORZ	74	54	-16.75	-8.64
2486.640	56.33	42.24	VERT	74	54	-17.67	-11.76

### IEEE 802.11g-Low

Freq. (MHz)	Emission (dBuV/m)		HORIZ / VERT	Limits (dBuV/m)		Margin (dB)	
	Peak	Average		Peak	Average		
2352.140	64.42	46.92	HORZ	74	54	-9.58	-7.08
2385.260	61.36	43.65	VERT	74	54	-12.64	-10.35
2390.780	62.58	43.46	HORZ	74	54	-11.42	-10.54
2390.840	62.11	42.37	VERT	74	54	-11.89	-11.63

### IEEE 802.11g-High

Freq. (MHz)	Emission (dBuV/m)		HORIZ / VERT	Limits (dBuV/m)		Margin (dB)	
	Peak	Average		Peak	Average		
2483.640	65.81	45.25	HORZ	74	54	-8.19	-8.75
2483.720	67.78	45.61	VERT	74	54	-6.22	-8.39
2485.420	68.35	48.74	HORZ	74	54	-5.65	-5.26
2486.560	67.54	47.15	VERT	74	54	-6.46	-6.85

### IEEE 802.11n MCS8 20MHz Ant.0+Ant.1-Low

Freq. (MHz)	Emission (dBuV/m)		HORIZ / VERT	Limits (dBuV/m)		Margin (dB)	
	Peak	Average		Peak	Average		
2351.040	67.16	48.96	HORZ	74	54	-6.84	-5.04
2385.260	68.84	47.34	VERT	74	54	-5.16	-6.66
2390.540	66.38	45.17	HORZ	74	54	-7.62	-8.83
2390.720	64.14	44.53	VERT	74	54	-9.86	-9.47

### IEEE 802.11n MCS8 20MHz Ant.0+Ant.1-High

Freq. (MHz)	Emission (dBuV/m)		HORIZ / VERT	Limits (dBuV/m)		Margin (dB)	
	Peak	Average		Peak	Average		
2484.840	65.26	44.15	HORZ	74	54	-8.74	-9.85
2485.144	66.79	45.62	VERT	74	54	-7.21	-8.38
2485.420	64.48	43.78	HORZ	74	54	-9.52	-10.22
2487.140	67.59	46.86	VERT	74	54	-6.41	-7.14

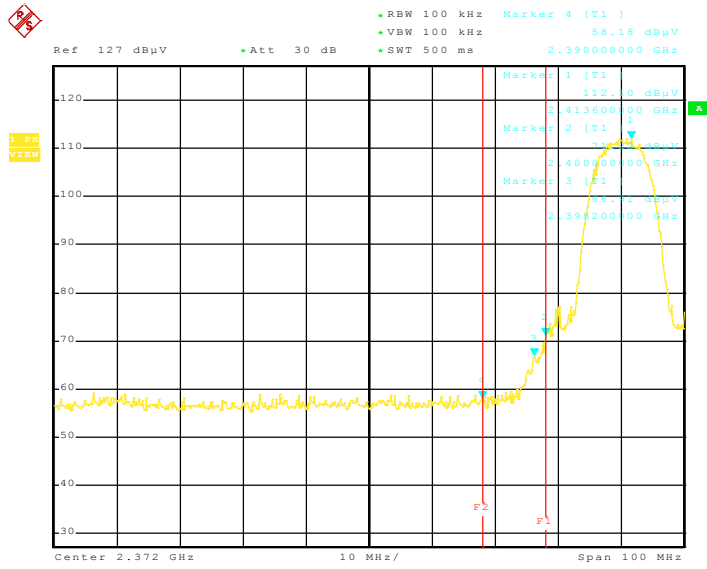
### IEEE 802.11n MCS8 40MHz Ant.0+Ant.1-Low

Freq. (MHz)	Emission (dBuV/m)		HORIZ / VERT	Limits (dBuV/m)		Margin (dB)	
	Peak	Average		Peak	Average		
2351.340	67.75	46.38	HORZ	74	54	-6.25	-7.62
2384.120	66.85	45.57	VERT	74	54	-7.15	-8.43
2390.440	64.17	43.33	HORZ	74	54	-9.83	-10.67
2390.540	65.55	44.69	VERT	74	54	-8.45	-9.31

### IEEE 802.11n MCS8 40MHz Ant.0+Ant.1-High

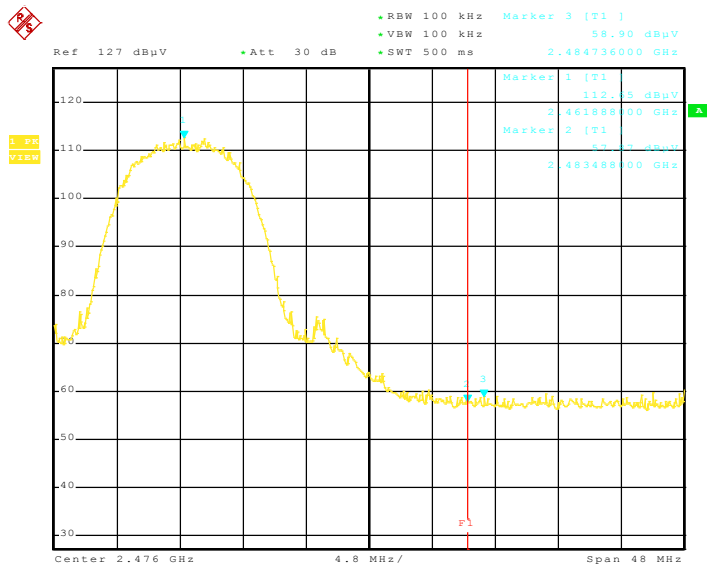
Freq. (MHz)	Emission (dBuV/m)		HORIZ / VERT	Limits (dBuV/m)		Margin (dB)	
	Peak	Average		Peak	Average		
2483.640	68.04	46.94	HORZ	74	54	-5.96	-7.06
2484.420	66.75	45.86	VERT	74	54	-7.25	-8.14
2485.260	65.27	44.39	HORZ	74	54	-8.73	-9.61
2485.640	68.31	47.16	VERT	74	54	-5.69	-6.84

### IEEE 802.11b Channel: Low



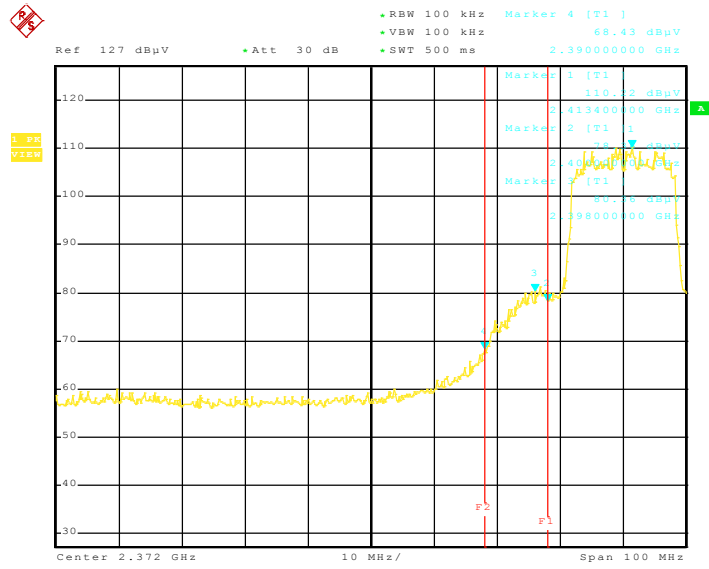
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### IEEE 802.11b Channel: High



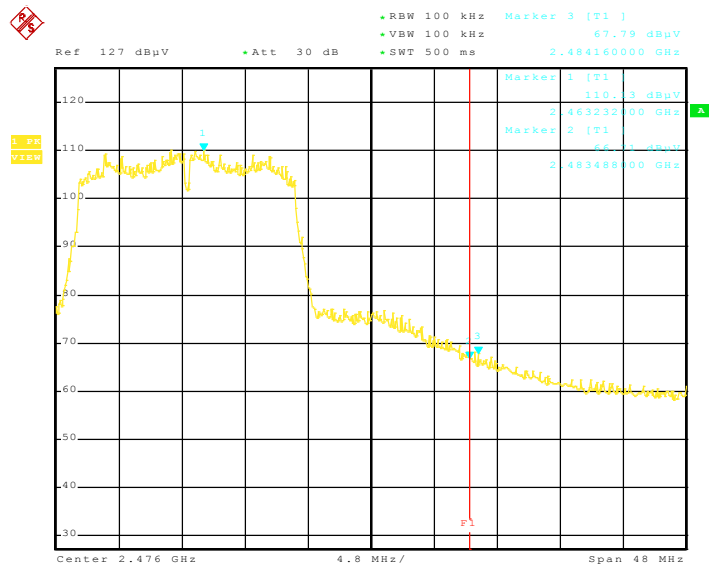
Date: 20.DEC.2010 15:19:59

### IEEE 802.11g Channel: Low



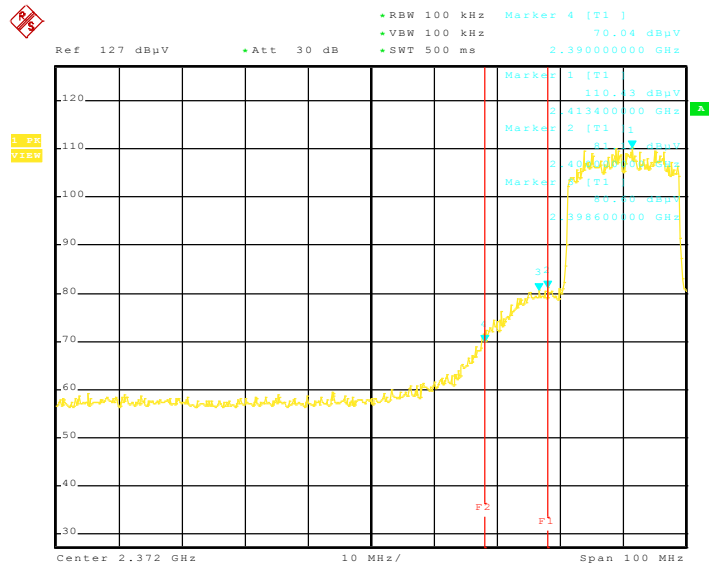
Date: 20.DEC.2010 15:22:17

### IEEE 802.11g Channel: High

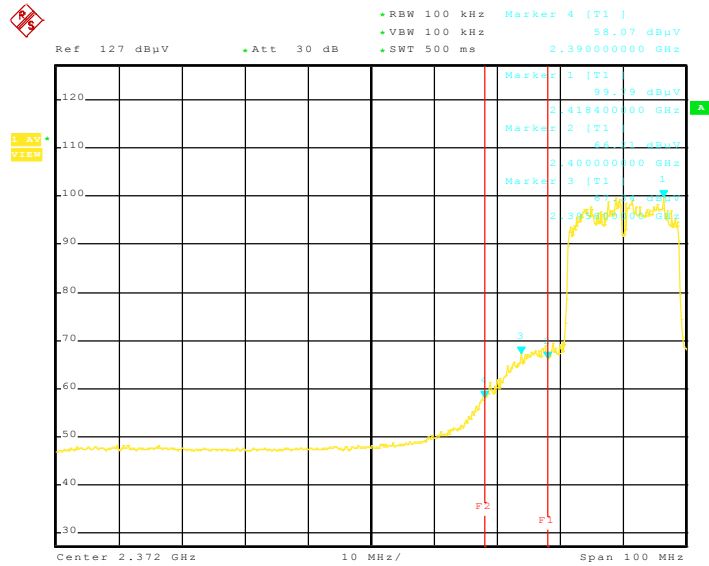


Date: 20.DEC.2010 15:13:11

**IEEE 802.11n MCS8 20MHz Ant.0+Ant.1**  
**Channel: Low**

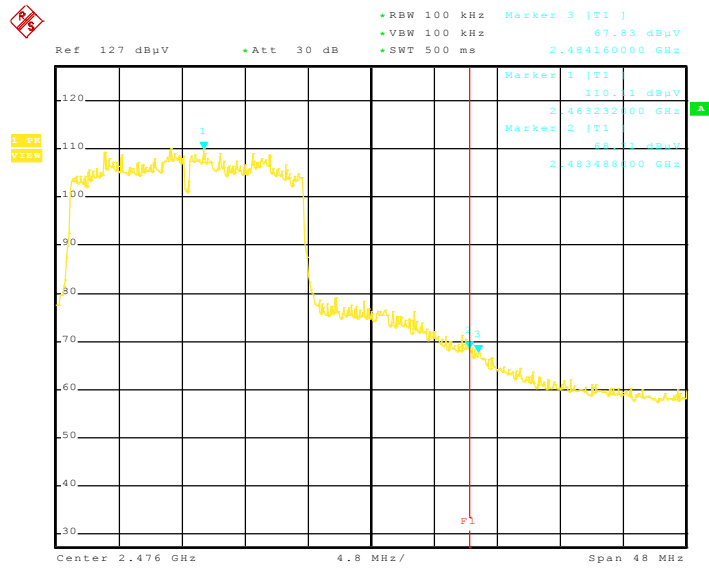


Date: 20.DEC.2010 15:30:29

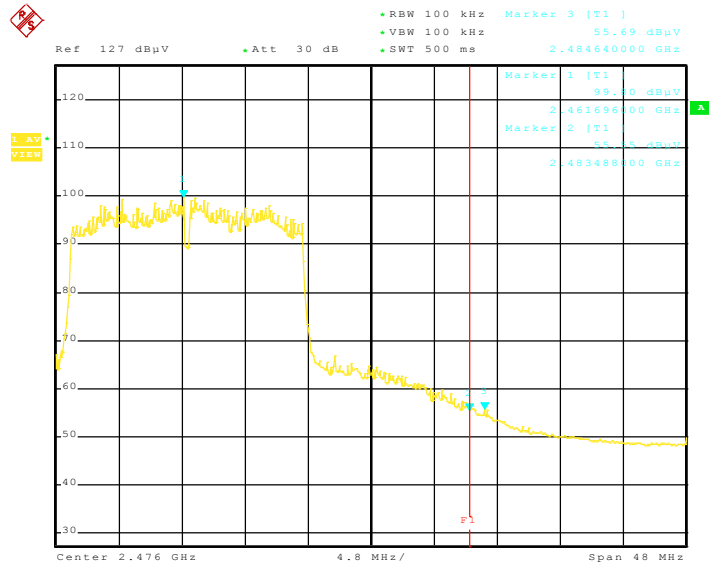


Date: 20.DEC.2010 15:35:10

**IEEE 802.11n MCS8 20MHz Ant.0+Ant.1**  
**Channel: High**



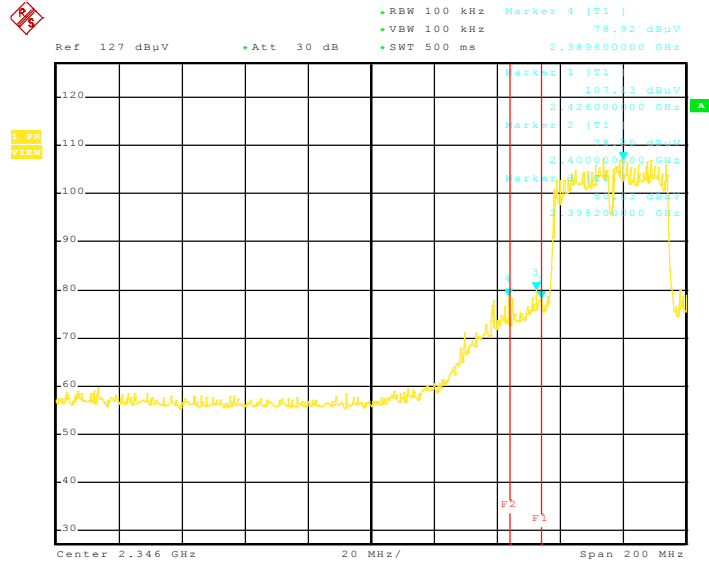
Date: 20.DEC.2010 15:37:18



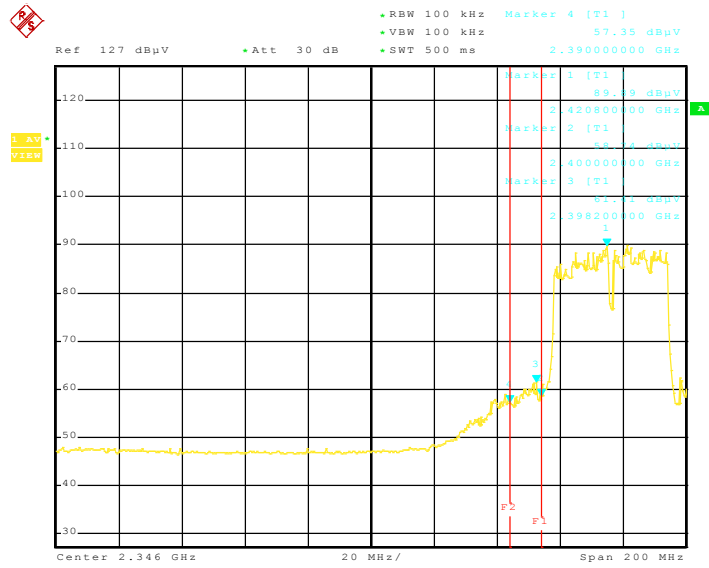
Date: 20.DEC.2010 15:37:59



**IEEE 802.11n MCS8 40MHz Ant.0+Ant.1**  
**Channel: Low**

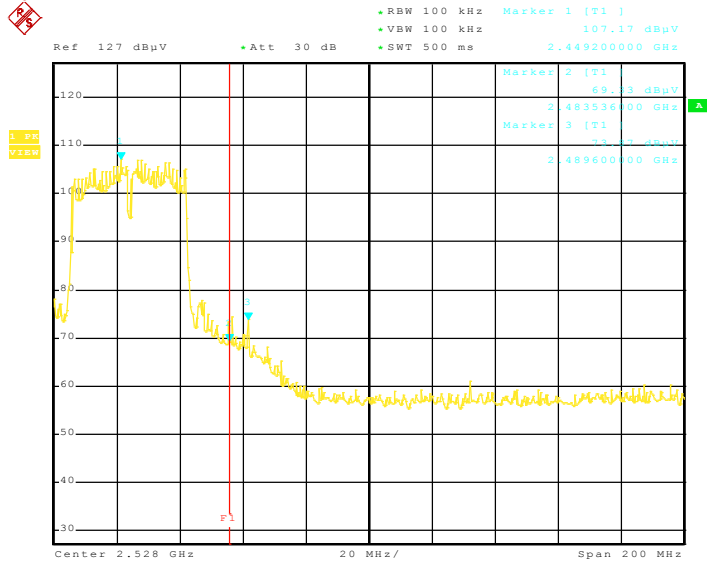


Date: 20.DEC.2010 15:46:43

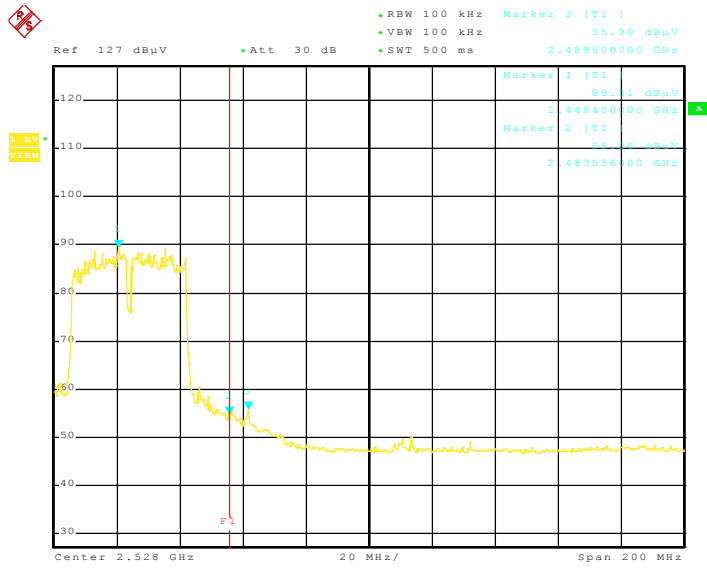


Date: 20.DEC.2010 15:48:17

**IEEE 802.11n MCS840MHz Ant.0+Ant.1**  
**Channel: High**



Date: 20.DEC.2010 15:59:01



Date: 20.DEC.2010 15:59:44

## D. Peak Power Spectral Density

Product	: Adsl Modem	Test Mode	: IEEE 802.11b/g/n
Test Item	: Peak Power Spectral Density	Temperature	: 25 °C
Test Voltage	: DC 12V (Power by Adapter Supply)	Humidity	: 56%RH
Test Result	: PASS		

### IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	FCC Limit (dBm)	Result
Low	2412	-5.42	8.00	PASS
Mid	2437	-6.04		PASS
High	2462	-6.19		PASS

### IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	FCC Limit (dBm)	Result
Low	2412	-8.80	8.00	PASS
Mid	2437	-10.26		PASS
High	2462	-9.90		PASS

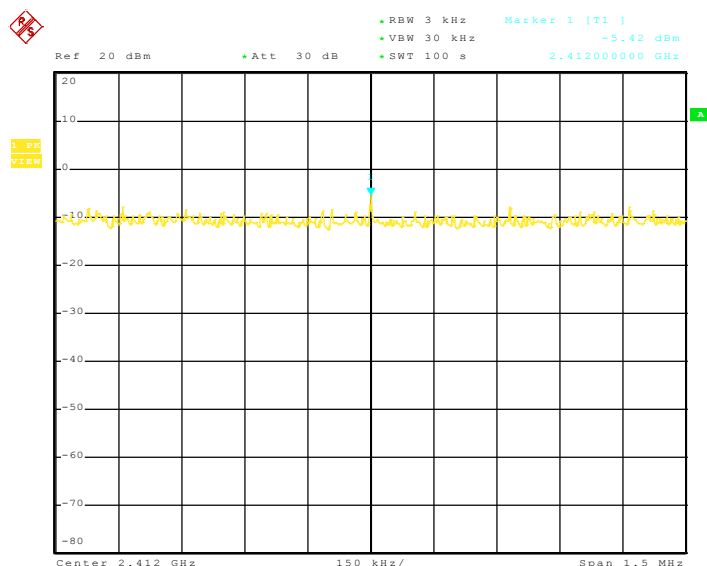
### IEEE 802.11n MCS8 20MHz Ant.0+Ant.1

Channel	Frequency (MHz)	PPSD (dBm)	FCC Limit (dBm)	Result
Low	2412	-9.50	8.00	PASS
Mid	2437	-9.26		PASS
High	2462	-9.90		PASS

### IEEE 802.11n MCS8 40MHz Ant.0+Ant.1

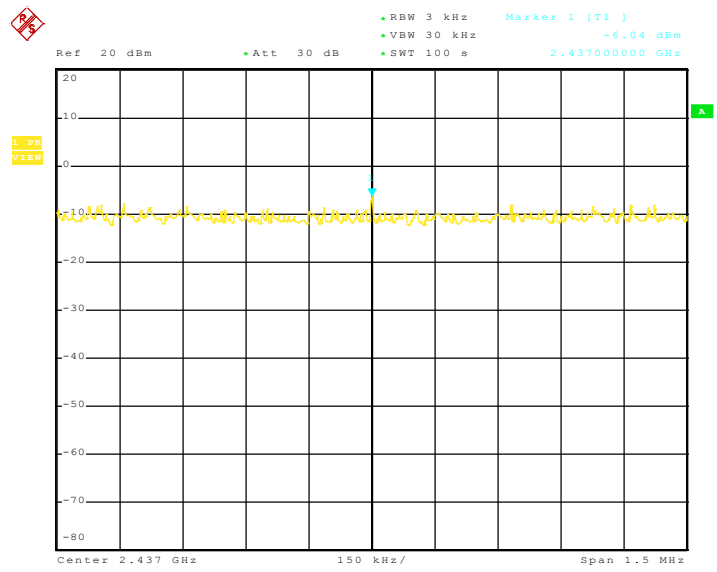
Channel	Frequency (MHz)	PPSD (dBm)	FCC Limit (dBm)	Result
Low	2422	-15.72	8.00	PASS
Mid	2437	-14.85		PASS
High	2452	-14.94		PASS

### IEEE 802.11b Channel: Low



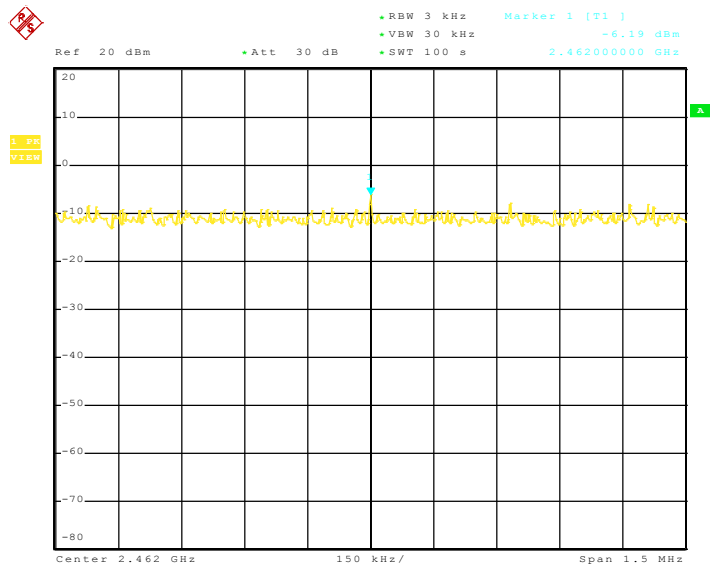
Date: 20.DEC.2010 14:34:22

### IEEE 802.11b Channel: Mid



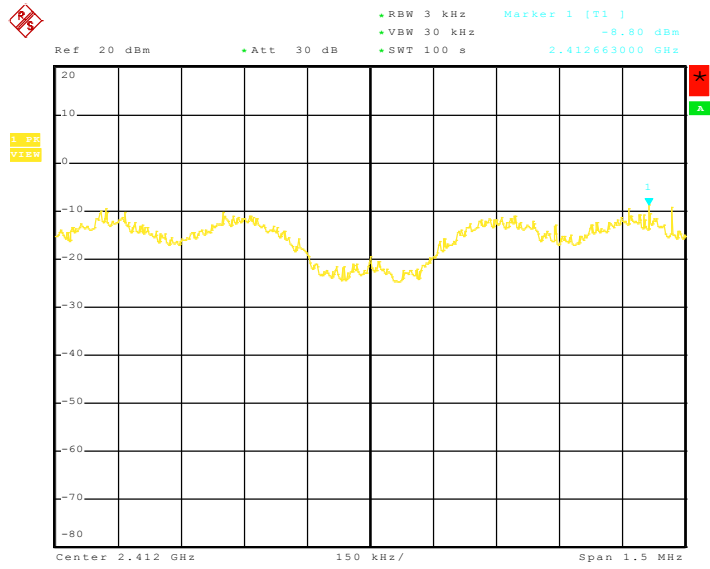
Date: 20.DEC.2010 14:44:37

### IEEE 802.11b Channel: High



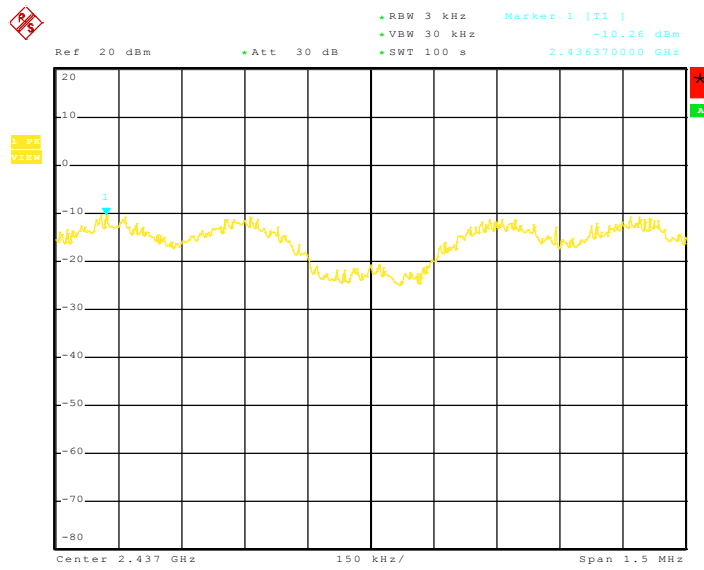
Date: 20.DEC.2010 14:57:24

### IEEE 802.11g Channel: Low



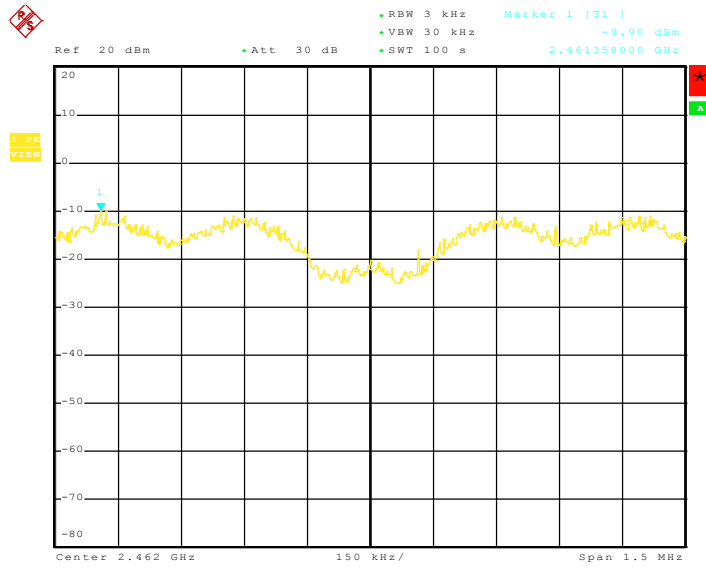
Date: 20.DEC.2010 15:02:20

### IEEE 802.11g Channel: Mid



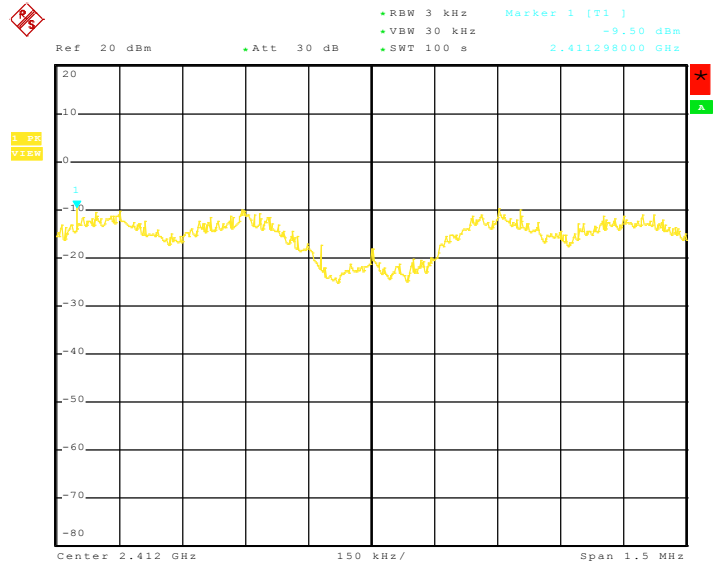
Date: 20.DEC.2010 15:05:36

### IEEE 802.11g Channel: High



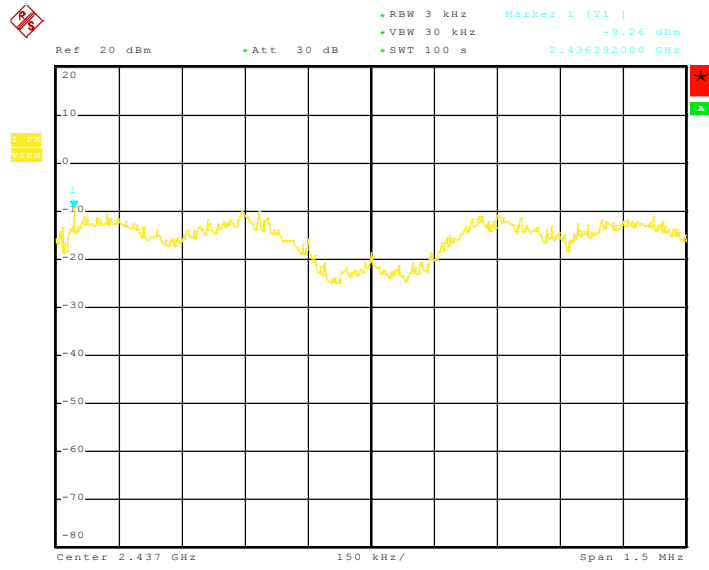
Date: 20.DEC.2010 15:09:15

### IEEE 802.11n MCS8 20MHz Ant.0+Ant.1/2412MHZ (Channel: Low)



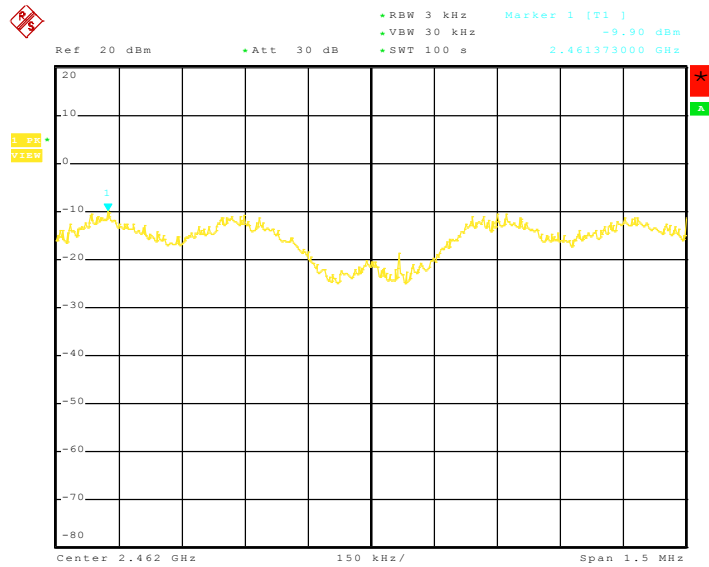
Date: 20.DEC.2010 16:21:00

IEEE 802.11n MCS8 20MHz Ant.0+Ant.1/2437MHZ  
(Channel: Mid)



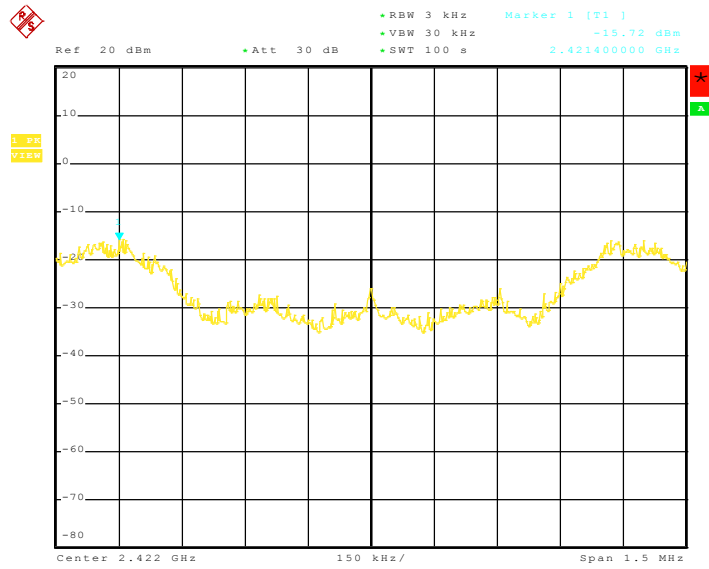
Date: 20.DEC.2010 16:24:00

IEEE 802.11n MCS8 20MHz Ant.0+Ant.1/2462MHZ  
(Channel: High)



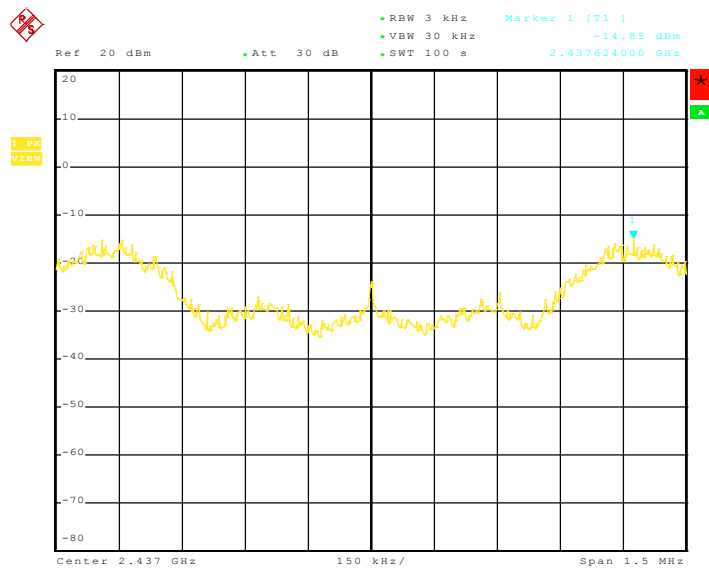
Date: 20.DEC.2010 16:30:34

IEEE 802.11n MCS8 40MHz Ant.0+Ant.1/2422MHZ  
(Channel: Low)



Date: 20.DEC.2010 16:34:26

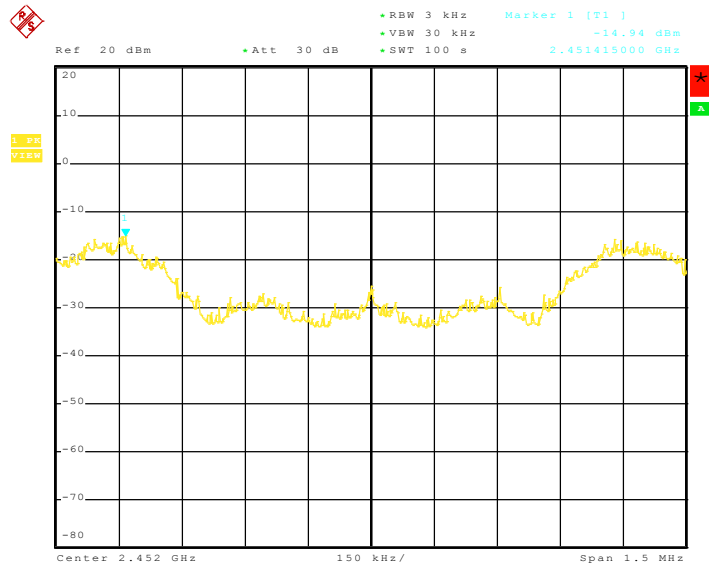
IEEE 802.11n MCS8 40MHz Ant.0+Ant.1/2437MHZ  
(Channel: Mid)



Date: 20.DEC.2010 16:38:08



IEEE 802.11n MCS8 40MHz Ant.0+Ant.1/2452MHZ  
(Channel: High)



Date: 20.DEC.2010 16:43:45

## 6. Transmitter Spurious Radiated Emission at 3 Meters

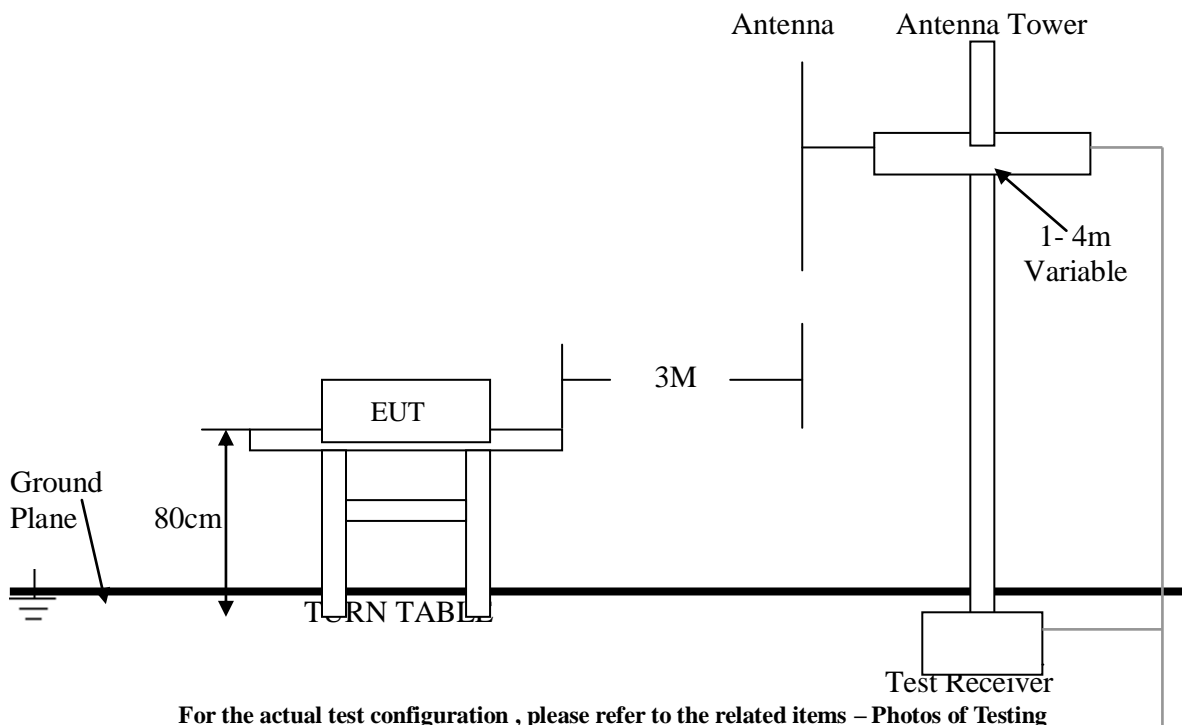
### 6.1 Test Equipment

Please refer to Section 10 this report.

### 6.2 Test Procedure

1. The EUT was tested according to ANSI C63.4 - 2003.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2003.
3. The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz , peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
4. The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
5. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
6. The antenna polarization: Vertical polarization and Horizontal polarization.

### 6.3 Test Setup



### 6.4 Configuration of The EUT

Same as section 4 . 4 of this report

### 6.5 EUT Operating Condition

Same as section 4 . 5 of this report.

### 6.6 Limit

IC RSS-210 Clause 2.6 (Transmitter) & IC RSS-GEN Clause 6 (Receiver)

Frequency (MHz)	Distance (m)	Field Strength (microvolts/m)
30 - 88	3	100
88 - 216	3	150
216 - 960	3	200
Above 960	3	500

## 6.7 Test Result

Product : Adsl Modem Test Mode : IEEE 802.11b/g/n  
 Test Item : Spurious Radiated Emissions Temperature : 25 °C  
 Test Voltage : DC 12V (Power by Adapter Supply) Humidity : 56%RH  
 Test Result : PASS

IEEE 802.11b Channel: Low

Freq. (MHz)	Emission (dBuV/m) Peak Detector	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4824.00	50.04	HORZ	74.0 / 54.0	-23.96
4824.00	49.15	VERT	74.0 / 54.0	-24.85
7236.00	49.63	HORZ	74.0 / 54.0	-24.37
7236.08	48.37	VERT	74.0 / 54.0	-25.63
9648.02	48.84	HORZ	74.0 / 54.0	-25.16
9648.10	47.95	VERT	74.0 / 54.0	-26.05
24120.04	-	HORZ	74.0 / 54.0	-
24120.20	-	VERT	74.0 / 54.0	-

IEEE 802.11b Channel: Mid

Freq. (MHz)	Emission (dBuV/m) Peak Detector	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4874.00	49.69	HORZ	74.0 / 54.0	-24.31
4874.00	48.51	VERT	74.0 / 54.0	-25.49
7311.00	49.86	HORZ	74.0 / 54.0	-24.14
7311.02	48.34	VERT	74.0 / 54.0	-25.66
9748.10	48.72	HORZ	74.0 / 54.0	-25.28
9748.00	47.55	VERT	74.0 / 54.0	-26.45
24370.10	-	HORZ	74.0 / 54.0	-
24370.00	-	VERT	74.0 / 54.0	-

IEEE 802.11b Channel: High

Freq. (MHz)	Emission (dBuV/m) Peak Detector	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4924.00	49.57	HORZ	74.0 / 54.0	-24.43
4924.00	48.16	VERT	74.0 / 54.0	-25.84
7386.12	48.68	HORZ	74.0 / 54.0	-25.32
7368.00	47.77	VERT	74.0 / 54.0	-26.23
9848.00	48.85	HORZ	74.0 / 54.0	-25.15
9848.00	47.23	VERT	74.0 / 54.0	-26.77
24620.11	-	HORZ	74.0 / 54.0	-
24620.00	-	VERT	74.0 / 54.0	-

- Note:**
- (1) All Reading Levels below 1GHz are Quasi-Peak, above are peak and average value.
  - (2) Emission Level = Reading Level + Probe Factor + Cable Loss.
  - (3) Receiver setting (Peak Detector) : RBW=1MHz; VBW=1MHz; Span=100MHz
  - (4) Receiver setting (AVG Detector): RBW=1MHz; VBW=30Hz; Span=20MHz
  - (5) The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.
  - (6) Where an emission level is indicated by a -, levels had a margin greater than 20 dB when compared to the limit.

## IEEE 802.11g Channel: Low

Freq. (MHz)	Emission (dBuV/m) Peak / Av	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4824.00	49.14	HORZ	74.0 / 54.0	-24.86
4824.00	48.26	VERT	74.0 / 54.0	-25.74
7236.00	49.75	HORZ	74.0 / 54.0	-24.25
7236.08	48.39	VERT	74.0 / 54.0	-25.61
9648.02	48.81	HORZ	74.0 / 54.0	-25.19
9648.10	47.66	VERT	74.0 / 54.0	-26.34
24120.04	-	HORZ	74.0 / 54.0	-
24120.20	-	VERT	74.0 / 54.0	-

## IEEE 802.11g Channel: Mid

Freq. (MHz)	Emission (dBuV/m) Peak	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4874.00	49.35	HORZ	74.0 / 54.0	-24.65
4874.00	48.64	VERT	74.0 / 54.0	-25.36
7311.00	48.78	HORZ	74.0 / 54.0	-25.22
7311.02	47.81	VERT	74.0 / 54.0	-26.19
9748.10	48.69	HORZ	74.0 / 54.0	-25.31
9748.00	47.54	VERT	74.0 / 54.0	-26.46
24370.10	-	HORZ	74.0 / 54.0	-
24370.00	-	VERT	74.0 / 54.0	-

## IEEE 802.11g Channel: High

Freq. (MHz)	Emission (dBuV/m) Peak / Av	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4924.00	49.75	HORZ	74.0 / 54.0	-24.25
4924.00	48.92	VERT	74.0 / 54.0	-25.08
7386.12	48.86	HORZ	74.0 / 54.0	-25.14
7368.00	47.37	VERT	74.0 / 54.0	-26.63
9848.00	48.55	HORZ	74.0 / 54.0	-25.45
9848.00	47.62	VERT	74.0 / 54.0	-26.38
24620.11	-	HORZ	74.0 / 54.0	-
24620.00	-	VERT	74.0 / 54.0	-

- Note:**
- (1) All Reading Levels below 1GHz are Quasi-Peak, above are peak and average value.
  - (2) Emission Level = Reading Level + Probe Factor + Cable Loss.
  - (3) Receiver setting (Peak Detector) : RBW=1MHz; VBW=1MHz; Span=100MHz
  - (4) Receiver setting (AVG Detector): RBW=1MHz; VBW=30Hz; Span=20MHz
  - (5) The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.
  - (6) Where an emission level is indicated by a -, levels had a margin greater than 20 dB when compared to the limit.

## IEEE 802.11n MCS8 20MHz Ant.0+Ant.1 Channel: Low

Freq. (MHz)	Emission (dBuV/m) Peak /Av	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4824.00	49.57	HORZ	74.0 / 54.0	-24.43
4824.00	48.61	VERT	74.0 / 54.0	-25.39
7236.00	48.58	HORZ	74.0 / 54.0	-25.42
7236.08	47.72	VERT	74.0 / 54.0	-26.28
9648.02	48.84	HORZ	74.0 / 54.0	-25.16
9648.10	47.89	VERT	74.0 / 54.0	-26.11
24120.04	-	HORZ	74.0 / 54.0	-
24120.20	-	VERT	74.0 / 54.0	-

IEEE 802.11n MCS8 20MHz Ant.0+Ant.1 Channel: Mid

Freq. (MHz)	Emission (dBuV/m) Peak	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4874.00	49.17	HORZ	74.0 / 54.0	-24.83
4874.00	48.28	VERT	74.0 / 54.0	-25.72
7311.00	49.54	HORZ	74.0 / 54.0	-24.46
7311.02	48.65	VERT	74.0 / 54.0	-25.35
9748.10	48.33	HORZ	74.0 / 54.0	-25.67
9748.00	47.59	VERT	74.0 / 54.0	-26.41
24370.10	-	HORZ	74.0 / 54.0	-
24370.00	-	VERT	74.0 / 54.0	-

IEEE 802.11n MCS8 20MHz Ant.0+Ant.1 Channel: High

Freq. (MHz)	Emission (dBuV/m) Peak /Av	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4924.00	49.73	HORZ	74.0 / 54.0	-24.27
4924.00	48.84	VERT	74.0 / 54.0	-25.16
7386.12	48.67	HORZ	74.0 / 54.0	-25.33
7368.00	47.79	VERT	74.0 / 54.0	-26.21
9848.00	48.61	HORZ	74.0 / 54.0	-25.39
9848.00	47.75	VERT	74.0 / 54.0	-26.25
24620.11	-	HORZ	74.0 / 54.0	-
24620.00	-	VERT	74.0 / 54.0	-

- Note:**
- (1) All Reading Levels below 1GHz are Quasi-Peak, above are peak and average value.
  - (2) Emission Level = Reading Level + Probe Factor + Cable Loss.
  - (3) Receiver setting (Peak Detector) : RBW=1MHz; VBW=1MHz; Span=100MHz
  - (4) Receiver setting (AVG Detector): RBW=1MHz; VBW=30Hz; Span=20MHz
  - (5) The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.
  - (6) Where an emission level is indicated by a -, levels had a margin greater than 20 dB when compared to the limit.

## IEEE 802.11n MCS8 40MHz Ant.0+Ant.1 Channel: Low

Freq. (MHz)	Emission (dBuV/m) Peak /Av	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4844.00	50.23	HORZ	74.0 / 54.0	-23.77
4844.00	49.36	VERT	74.0 / 54.0	-24.64
7266.00	49.53	HORZ	74.0 / 54.0	-24.47
7266.08	48.64	VERT	74.0 / 54.0	-25.36
9688.02	48.77	HORZ	74.0 / 54.0	-25.23
9688.10	47.83	VERT	74.0 / 54.0	-26.17
24220.04	-	HORZ	74.0 / 54.0	-
24220.20	-	VERT	74.0 / 54.0	-

## IEEE 802.11n MCS8 40MHz Ant.0+Ant.1 Channel: Mid

Freq. (MHz)	Emission (dBuV/m) Peak	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4874.00	50.17	HORZ	74.0 / 54.0	-23.83
4874.00	49.25	VERT	74.0 / 54.0	-24.75
7311.00	48.75	HORZ	74.0 / 54.0	-25.25
7311.02	47.84	VERT	74.0 / 54.0	-26.16
9748.10	48.68	HORZ	74.0 / 54.0	-25.32
9748.00	47.51	VERT	74.0 / 54.0	-26.49
24370.10	-	HORZ	74.0 / 54.0	-
24370.00	-	VERT	74.0 / 54.0	-

## IEEE 802.11n MCS8 40MHz Ant.0+Ant.1 Channel: High

Freq. (MHz)	Emission (dBuV/m) Peak /Av	HORIZ / VERT	Limits (dBuV/m) Peak / Average	Margin (dB)
4904.00	49.65	HORZ	74.0 / 54.0	-24.35
4904.00	48.54	VERT	74.0 / 54.0	-25.46
7356.12	49.08	HORZ	74.0 / 54.0	-24.92
7356.00	48.37	VERT	74.0 / 54.0	-25.63
9808.00	48.61	HORZ	74.0 / 54.0	-25.39
9808.00	47.74	VERT	74.0 / 54.0	-26.26
24520.11	-	HORZ	74.0 / 54.0	-
24520.00	-	VERT	74.0 / 54.0	-

- Note:**
- (1) All Reading Levels below 1GHz are Quasi-Peak, above are peak and average value.
  - (2) Emission Level = Reading Level + Probe Factor + Cable Loss.
  - (3) Receiver setting (Peak Detector) : RBW=1MHz; VBW=1MHz; Span=100MHz
  - (4) Receiver setting (AVG Detector): RBW=1MHz; VBW=30Hz; Span=20MHz
  - (5) The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.
  - (6) Where an emission level is indicated by a -, levels had a margin greater than 20 dB when compared to the limit.

## 7. RF Exposure Requirements

### 7.1 Test Equipment

Please refer to Section 10 this report.

### 7.2 Limit

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceed the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, of if the power density exceeds the value give in Column 4 of Table 5, when averaged spatially and over time.

**Table 5 Exposure Limits for Persons Not Classed As RF and Microwave Ex-posed Workers (Including the General Public)**

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m <sup>2</sup> )	5 Averaging Time (min)
0.003-1	280	2.19		6
1-10	280/f	2.19/f		6
10 - 30	28	2.19/f		6
30-300	28	0.073	2*	6
300-1 500	1.585f <sup>0.5</sup>	0.0042f <sup>0.5</sup>	f/150	6
1 500- 15 000	61.4	0.163	10	6
15 000- 150 000	61.4	0.163	10	616 000 /f <sup>1.2</sup>
150 000- 300 000	0.158f <sup>0.5</sup>	4.21x 10 <sup>-4</sup> f <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> f	616 000 /f <sup>1.2</sup>

\* Power density limit is applicable at frequencies greater than 100 MHz.

Notes:

1. Frequency, f, is in MHz.
2. A power density of 10 W/m<sup>2</sup> is equivalent to 1 mW/cm<sup>2</sup>.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

### 7.3 Test Result

Product	: Adsl Modem	Test Mode	: IEEE 802.11b/g/n
Test Item	: RF Exposure	Temperature	: 25 °C
Test Voltage	: DC 12V (Power by DC Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

Evaluation of RF Exposure Compliance Requirements	
RF Exposure Requirements	Compliance with IC Safety Code 6
S=PG/4ΠR <sup>2</sup>  Where: S=Power density P=Power input to antenna G=Power gain of the antenna relative to an isotropic radiator R=Distance to the center of radiation of the antenna  The power density in units of mW/cm <sup>2</sup> is converted to units of W/m <sup>2</sup> by multiplying by a factor of 10.	Maximum output power at antenna input terminal: 20.32 dBm =107.65 mW (802.11b/g, 2437MHz) 23.27 dBm = 212.34 mW (Draft n, 2462MHz - 20MHz) 22.40 dBm = 173.80 mW (Draft n, 2462MHz - 40MHz) Prediction distance: 20 cm Antenna gain : 2.0 dBi MPE limit for uncontrolled exposure at prediction frequency: 1.0 mW/cm <sup>2</sup>  Power density at 20 cm: 802.11b/g: 0.0339 mW/cm <sup>2</sup> Draft n(20MHz) : 0.067 mW/cm <sup>2</sup> Draft n(40MHz) : 0.055 mW/cm <sup>2</sup>

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## 8. Photos of Testing

### 8.1 EUT Test Photographs

Conducted emission test view



Radiated emission test view





## 8. 2 EUT Detailed Photographs

EUT top view



EUT bottom view





EUT inside whole view



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Main & RF board component side



Main & RF board solder side



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## 9. IC Label

**FCC ID: BDN SERIES1091**

**This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

The Label must not be a stick-on paper label. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

### Proposed Label Location on EUT

EUT Bottom View/Proposed IC Label Location



## 10. Test Equipment

The following test equipments were used during the radiated & conducted emission test:

Equipment/ Facilities	Manufacturer	Model #	Serial No.	Due Date
Turntable	SinTek	N/A	N/A	NCR
Antenna Tower	SinTek	N/A	N/A	NCR
OATS	SinTek	N/A	N/A	Oct. 9, 2011
Bilog Antenna	SCHAFFNER	CBL6111C	2775	June 12, 2011
Pre-Amplifier	HP	8449B	3008B00965	June 12, 2011
Horn Antenna	EMCO	3115	9602-4659	June 12, 2011
Horn Antenna	Rohde & Schwarz	AT4560	SB3435/03	May 4, 2011
EMI Test Receiver	Rohde & Schwarz	ESPI7	100013	July 09, 2011
Spectrum Analyzer	Rohde & Schwarz	FSP40	100273	Sep.18, 2011
Signal Generator	FLUKE	PM5418+Y/C	LO747012	Feb.10, 2011
Loop Antenna	SCHWARZBECK	FMZB1516	113	Jan. 30, 2011
Loop Antenna	Rohde & Schwarz	HFH2-Z2	872096/16	Jan. 30, 2011
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4079	Sep.18, 2011
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4080	Sep.18, 2011
Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-564	Sep.18, 2011
Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-565	Sep.18, 2011
AMN	Rohde & Schwarz	ESH3-Z5	100196	Oct. 23, 2011
AMN	Rohde & Schwarz	ESH3-Z5	100197	Oct. 23, 2011
Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9604	Nov.29, 2011
KMO Shielded Room	KMO	KMO-001	N/A	N/A
Coaxial Cable with N-Connectors	SCHWARZBECK	AK9515H	95549	Sep.18, 2011
SOHO Telephone Switching System	IKE	2000-108C	N/A	Feb.10, 2011
Temperature Chamber	TABAI	PSL-4GTW	N/A	Feb.10, 2011