EMC
TEST REPORT

Report No. : TS11050011-EME
Model No. : WiFiHU-c-2-NE
Issued Date : Jun. 08, 2011

Applicant: **Radicom Research Inc.**
2148 Bering Dr., San Jose, CA. 95131, USA

Test Method/ Standard: **CFR 47 FCC Part 15.247 & ANSI C63.4 2003**

Test By: **Intertek Testing Services Taiwan Ltd.**
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
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These measurements were taken by: Sign on File
Terry Hsu / Engineer

The test report was reviewed by: Jimmy Yang

Name Jimmy Yang
Title Engineer

Table of Contents

1. Summary of Test Data

Test/Requirement Description	Applicable Rule	Result
Minimum 6 dB Bandwidth	15.247(a)(2)	Pass
Maximum Output Power	15.247(b)	Pass
Power Spectral Density	15.247(e)	Pass
RF Antenna Conducted Spurious	15.247(d)	Pass
Radiated Spurious Emission	15.247(d), 15.205, 15.209	Pass
Emission on the Band Edge	15.247(d)	Pass
AC Power Line Conducted Emission	15.207	Pass

2. General Information

Identification of the EUT

Product:	USB WiFi Module
Model No.:	WiFiHU-c-2-NE
FCC ID.:	K7T-WIFIHU-C-2-NE
Frequency Range:	1. 2412 MHz ~ 2462 MHz for 802.11b, 802.11g, 802.11n HT20 2. 2422 MHz ~ 2452 MHz for 802.11n HT40
Channel Number:	1. 11 channels for 2412 MHz ~ 2462 MHz 2. 7 channels for 2422 MHz ~ 2452 MHz
Rated Power:	DC 5 V
Power Cord:	N/A
Data Cable:	USB shielded cable 0.2 meter × 1
Sample Received:	May 02, 2011
Test Date(s):	May 04, 2011 ~ Jun 03, 2011
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

Description of EUT

The EUT is a USB WiFi Module, and was defined as information technology equipment.

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

Antenna description

Antenna

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 2 dBi
Antenna Type : Dipole antenna
Connector Type : IPX

Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Description of Data Cable
Notebook PC	DELL	Latitude D610	2YWZK1S	USB shielded cable 0.1 meter × 1
Modem	LEMEL	MD-56KVT-100	00V230A00078422	N/A
Printer	HP	DeskJet 400	TH86I1K30S	N/A
Mouse	IBM	MO09BO	23-021287	N/A

Operation mode

The EUT was supplied with 5 Vdc from Notebook PC (Test voltage: 120Vac, 60Hz) and it was run in TX / RX mode that was controlled by “MP819xVC” program.

Plug the EUT into Notebook PC via USB interface, then turn on the Notebook PC power and run the test program “MP819xVC” under windows OS, which provide by manufacturer.

With individual verifying, the maximum output power was found out 1 Mbps data rate for 802.11b mode and 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n HT 20 mode and 13 Mbps data rate for 802.11n HT 40 mode. The final tests were executed under these conditions recorded in this report individually. Please refer the details below:

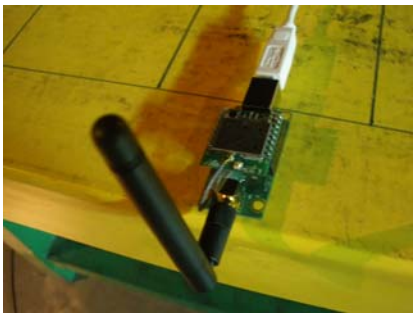
Chain 0: 802.11b channel 6	
Data rate (Mbps)	PK(dBm)
1	16.09
2	15.92
5.5	15.87
11	15.81

Chain 0: 802.11n HT20 channel 6	
Data rate (Mbps)	PK(dBm)
6.5	16.87
13	16.76
19.5	16.69
26	16.61
39	16.54
52	16.44
58.5	16.39
65	16.37

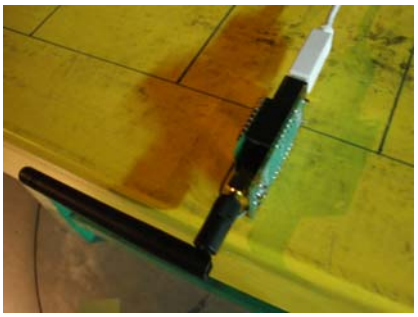
Chain 0: 802.11g channel 6	
Data rate (Mbps)	PK(dBm)
6	16.97
9	16.86
12	16.79
18	16.71
24	16.69
36	16.64
48	16.54
54	16.49

Chain 0: 802.11n HT40 channel 6	
Data rate (Mbps)	PK(dBm)
13.5	16.26
27	16.18
40.5	16.10
54	15.94
81	15.87
108	15.79
121.5	15.71
135	15.63

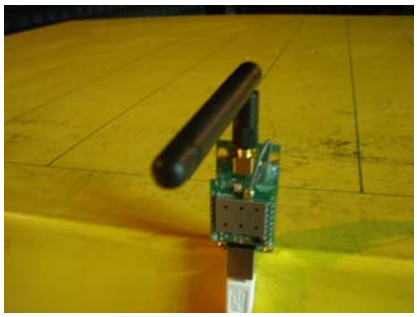
For the signal from USB WiFi Module is maximized through rotation and placement in the three orthogonal axes.



X-axis



Y-axis



Z-axis

After verifying three axes, we found the maximum electromagnetic field was occurred at Y-axis. The final test data was executed under this configuration.

The EUT configuration please refers to the “Spurious set-up photo.pdf”.

3. Maximum 6 dB Bandwidth

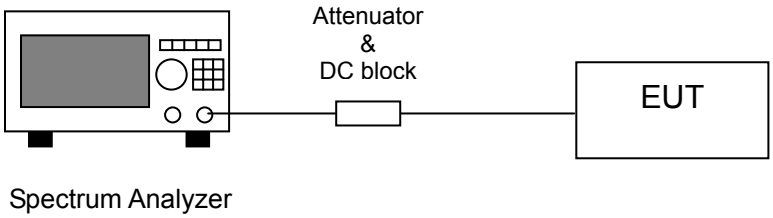
Name of Test	Maximum 6 dB Bandwidth
Base Standard	FCC 15.247 (a)(2)

Test Result: Complies
Measurement Data: See Table & plots below

Method of Measurement:

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.

Test Diagram:

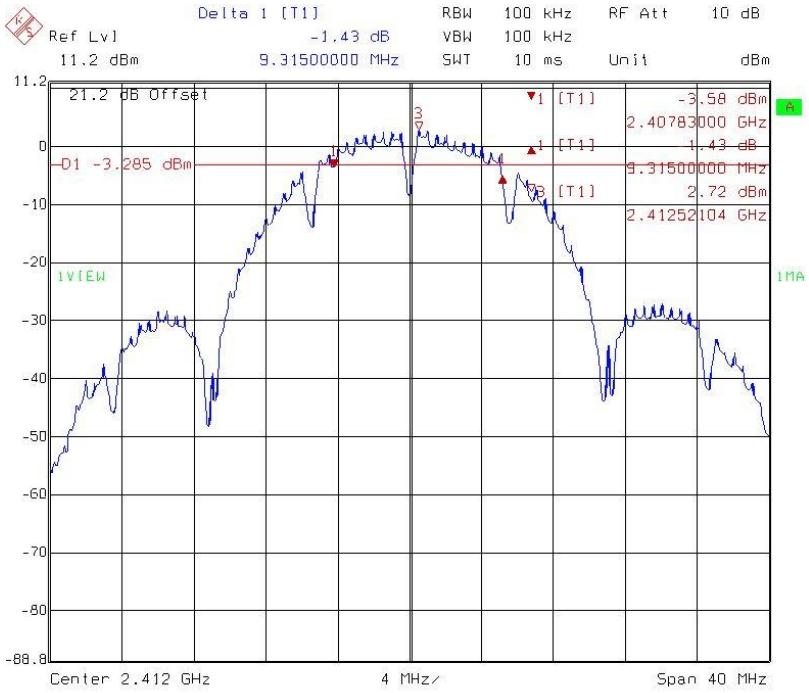


Note: The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n HT20 mode and 13 Mbps data rate for 802.11n HT40 mode. The EUT was tuned to a low, middle and high channel.

Table 1 Maximum 6 dB Bandwidth

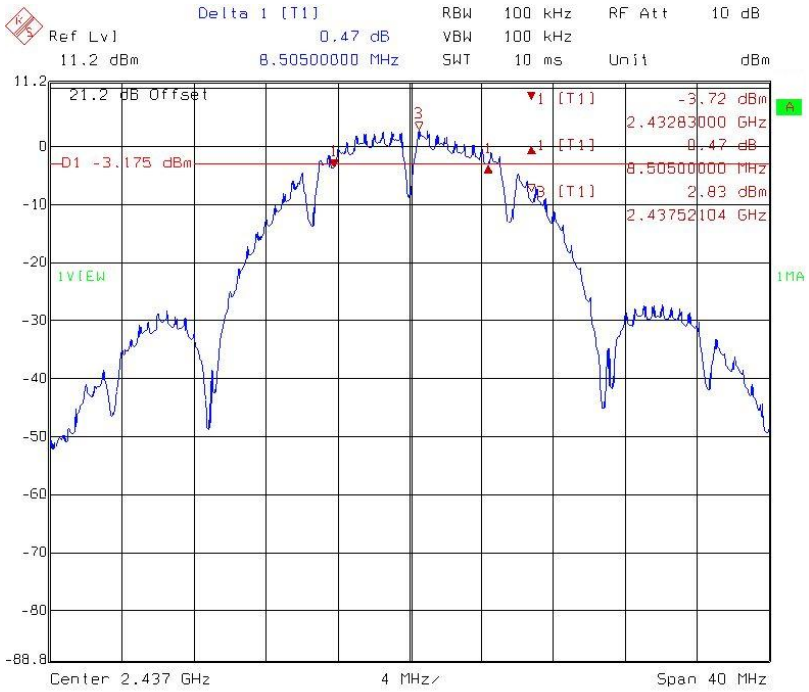
Mode	Channel	Frequency (MHz)	Bandwidth (MHz)	Min. Limit (MHz)	Pass/Fail
			DAC0		
802.11b	1	2412	9.315	0.5	Pass
	6	2437	8.505	0.5	Pass
	11	2462	9.315	0.5	Pass
802.11g	1	2412	16.605	0.5	Pass
	6	2437	16.680	0.5	Pass
	11	2462	16.605	0.5	Pass
802.11n HT20	1	2412	17.895	0.5	Pass
	6	2437	17.970	0.5	Pass
	11	2462	17.895	0.5	Pass
802.11n HT40	3	2422	36.570	0.5	Pass
	6	2437	36.570	0.5	Pass
	9	2452	36.735	0.5	Pass

Chain 0: 6 dB Bandwidth @ 802.11b mode channel 1



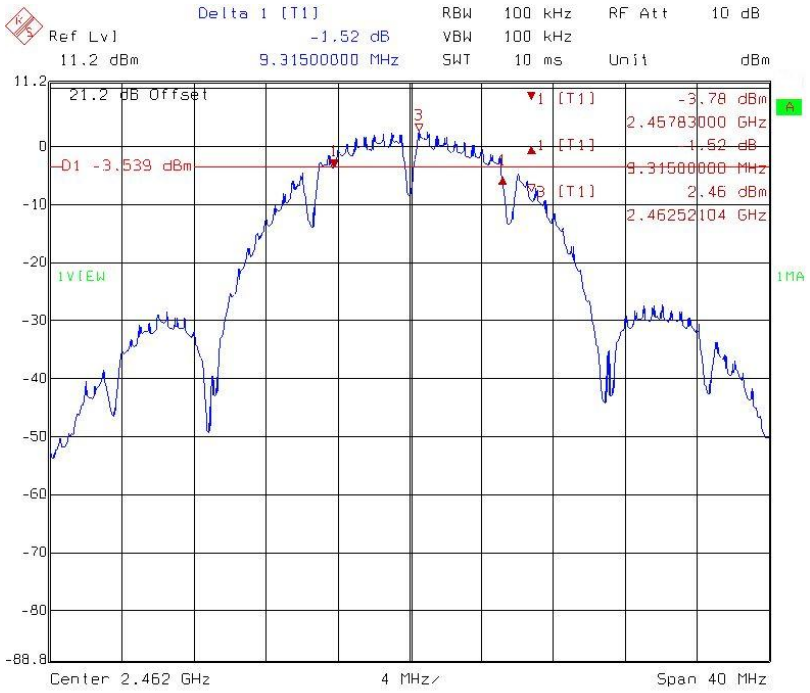
Title: 6dB Occupied Bandwidth,
Comment A: 11b 2412 ch1 Chain0
Date: 23.MAY 2011 15:22:29

Chain 0: 6 dB Bandwidth @ 802.11b mode channel 6



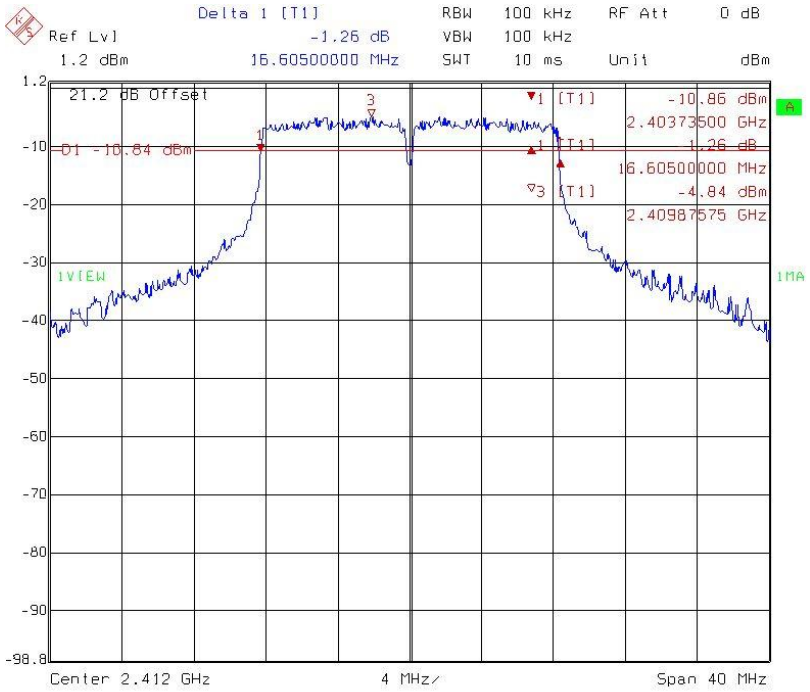
Title: 6dB Occupied Bandwidth,
Comment A: 11b 2437 ch6 Chain0
Date: 23.MAY 2011 15:26:32

Chain 0: 6 dB Bandwidth @ 802.11b mode channel 11



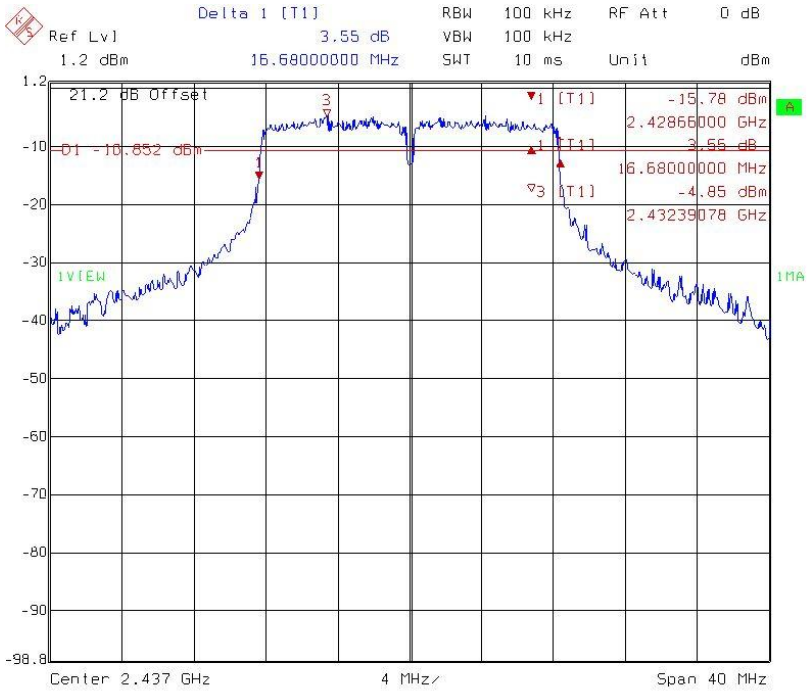
Title: 6dB Occupied Bandwidth,
Comment A: 11b 2462 ch11 Chain0
Date: 23.MAY 2011 15:29:43

Chain 0: 6 dB Bandwidth @ 802.11g mode channel 1



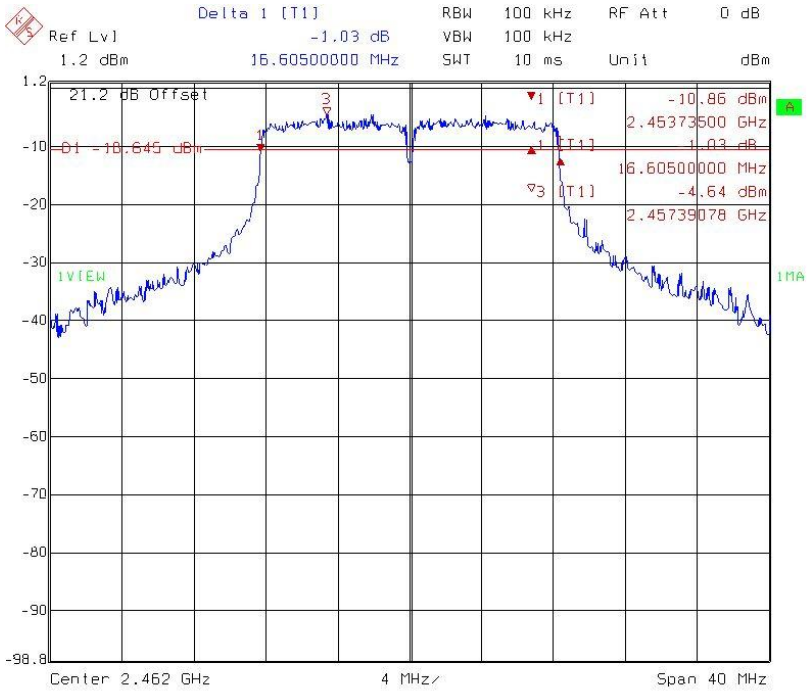
Title: 6dB Occupied Bandwidth,
Comment A: 11g 2412 ch1 Chain0
Date: 23.MAY 2011 15:34:00

Chain 0: 6 dB Bandwidth @ 802.11g mode channel 6



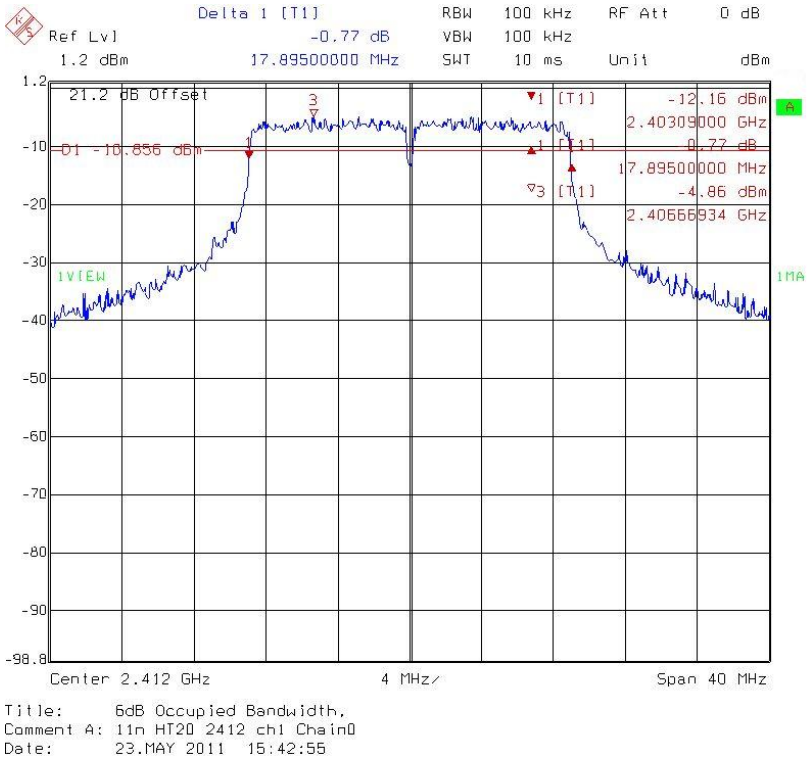
Title: 6dB Occupied Bandwidth,
Comment A: 11g 2437 ch6 Chain0
Date: 23.MAY 2011 15:36:49

Chain 0: 6 dB Bandwidth @ 802.11g mode channel 11

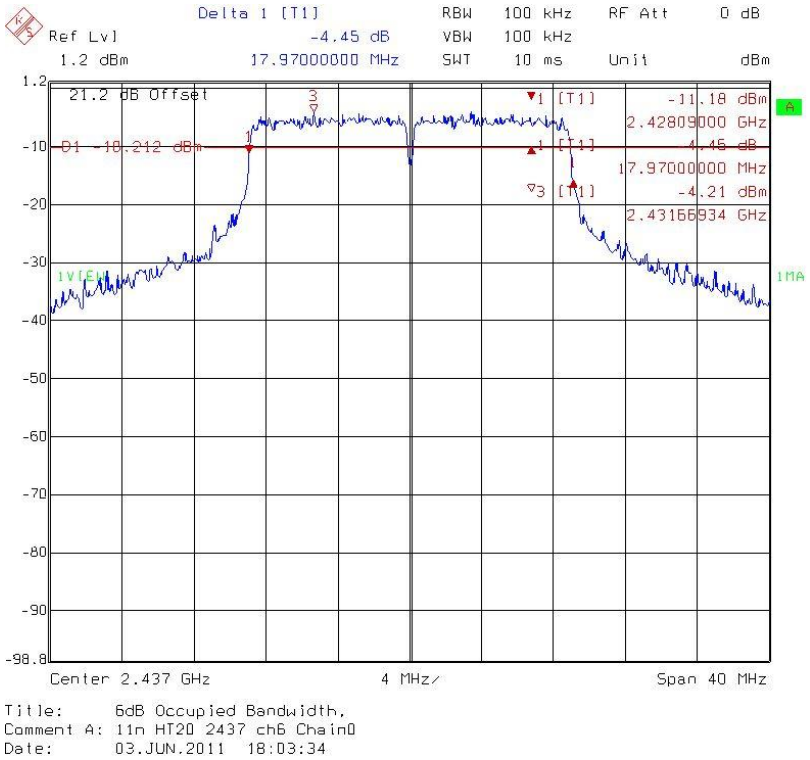


Title: 6dB Occupied Bandwidth,
Comment A: 11g 2462 ch11 Chain0
Date: 23.MAY 2011 15:39:31

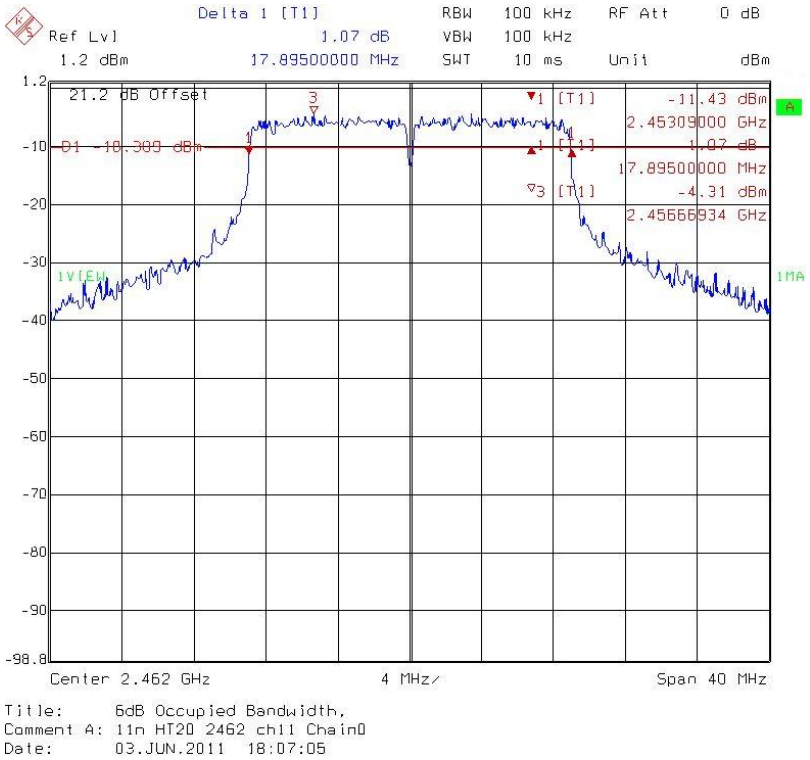
Chain 0: 6 dB Bandwidth @ 802.11n HT20 mode channel 1



Chain 0: 6 dB Bandwidth @ 802.11n HT20 mode channel 6

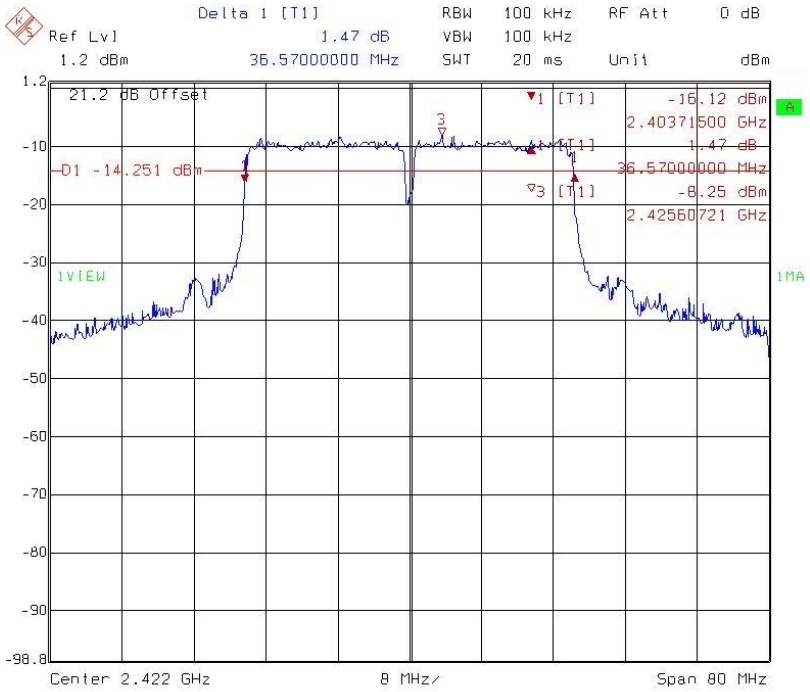


Chain 0: 6 dB Bandwidth @ 802.11n HT20 mode channel 11



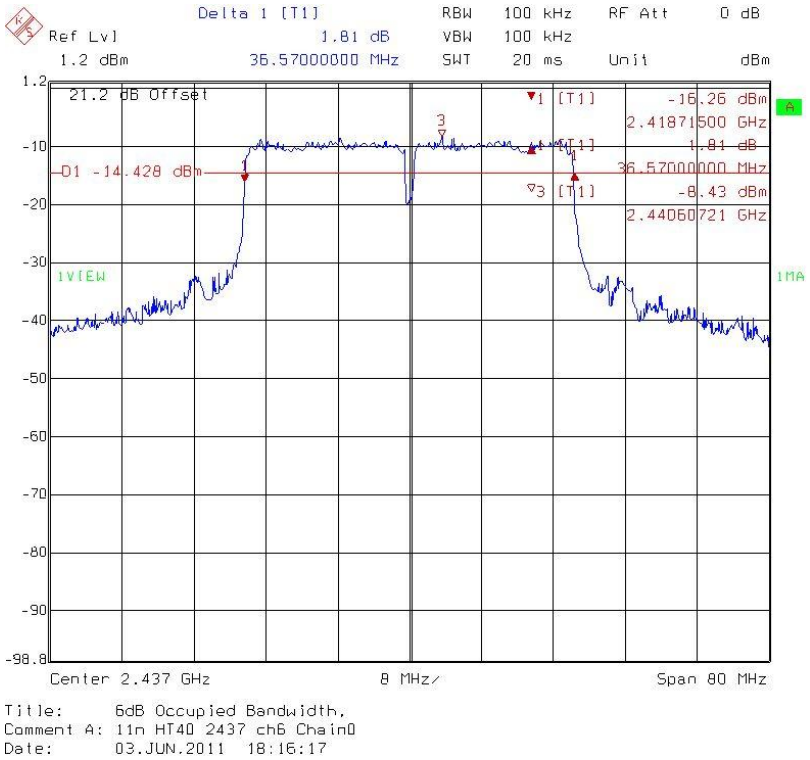
Title: 6dB Occupied Bandwidth,
Comment A: 11n HT20 2462 ch11 Chain0
Date: 03.JUN.2011 18:07:05

Chain 0: 6 dB Bandwidth @ 802.11n HT40 mode channel 3



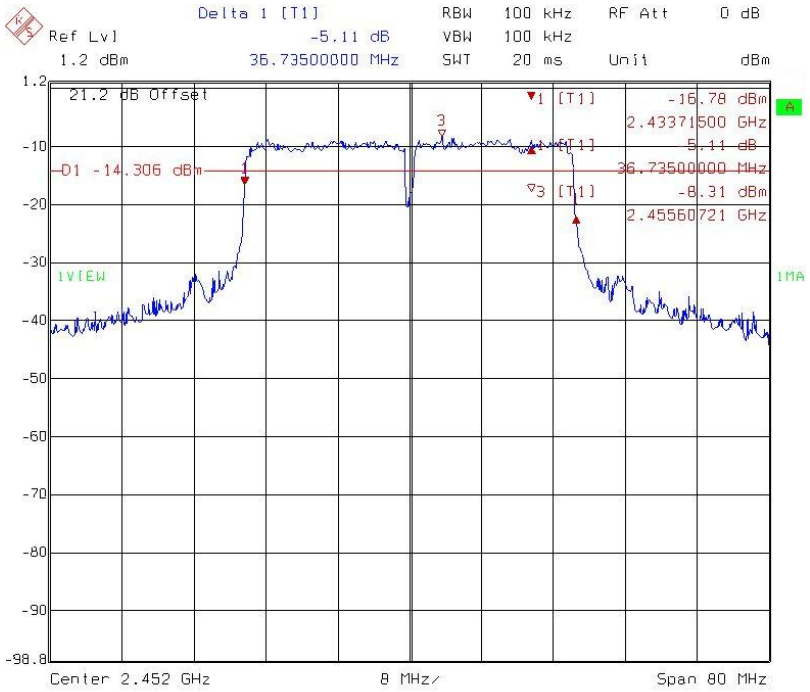
Title: 6dB Occupied Bandwidth,
Comment A: 11n HT40 2422 ch3 Chain0
Date: 03.JUN.2011 18:11:59

Chain 0: 6 dB Bandwidth @ 802.11n HT40 mode channel 6



Title: 6dB Occupied Bandwidth,
Comment A: 11n HT40 2437 ch6 Chain0
Date: 03.JUN.2011 18:16:17

Chain 0: 6 dB Bandwidth @ 802.11n HT40 mode channel 9



Title: 6dB Occupied Bandwidth,
Comment A: 11n HT40 2452 ch9 Chain0
Date: 03.JUN.2011 18:22:24

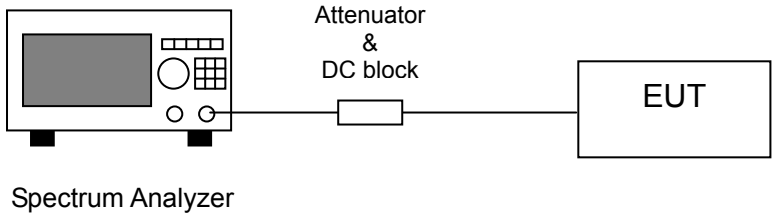
4. 99 % Occupied Bandwidth

Name of Test	99 % Occupied Bandwidth
Base Standard	None; for reporting purposes only

Test Result: Complies
Measurement Data: See Table & plots below

Method of Measurement:
Reference FCC document: KDB558074
A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1 % of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform. The appropriate bandwidth mask is applied to the output waveform to verify compliance.

Test Diagram:

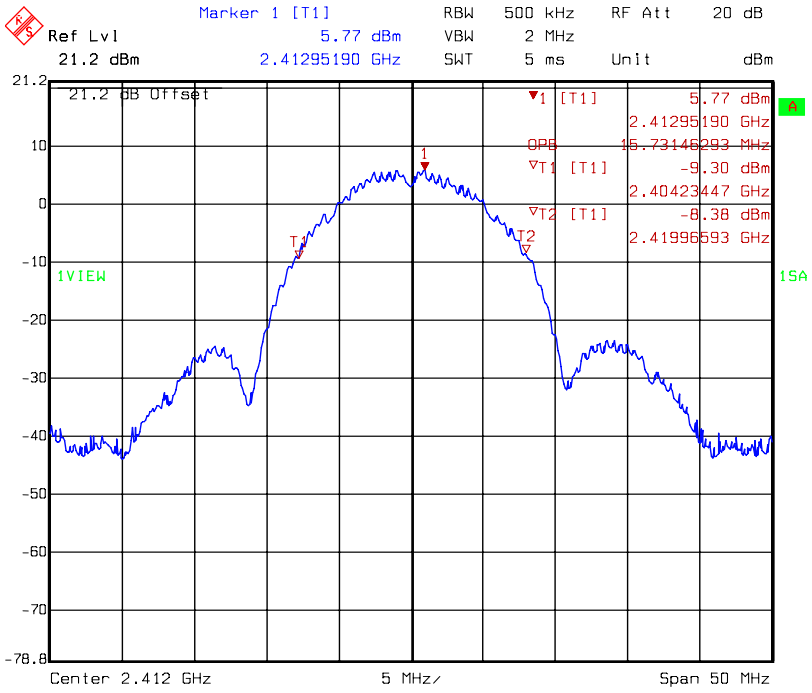


Note: The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n HT20 mode and 13 Mbps data rate for 802.11n HT40 mode. The EUT was tuned to a low, middle and high channel.

Table 2 99 % Occupied Bandwidth

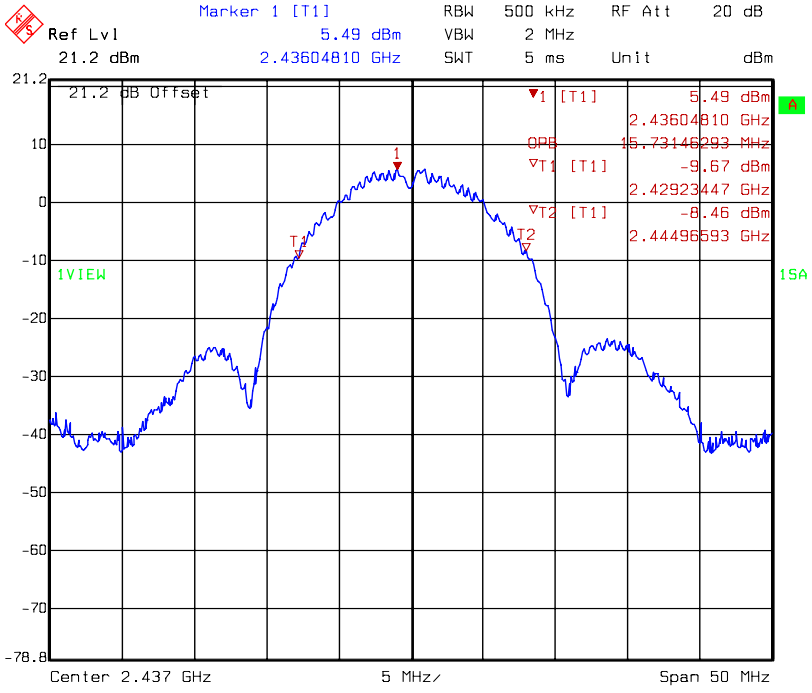
Mode	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
802.11b	1	2412	15.73
	6	2437	15.73
	11	2462	15.73
802.11g	1	2412	17.64
	6	2437	17.64
	11	2462	17.64
802.11n HT20	1	2412	18.64
	6	2437	18.94
	11	2462	18.64
802.11n HT40	3	2422	36.67
	6	2437	36.67
	9	2452	37.07

Chain 0: 99 % Occupied Bandwidth @ 802.11b mode channel 1



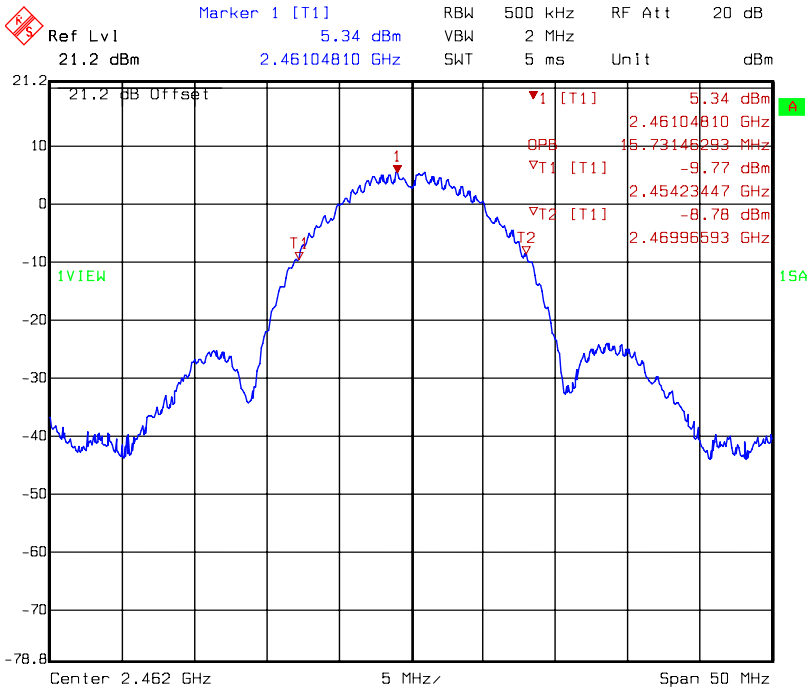
Title: Occupied Band-Width,
Comment A: 11b 2412 ch1 Chain0
Date: 23.MAY 2011 15:21:55

Chain 0: 99 % Occupied Bandwidth @ 802.11b mode channel 6



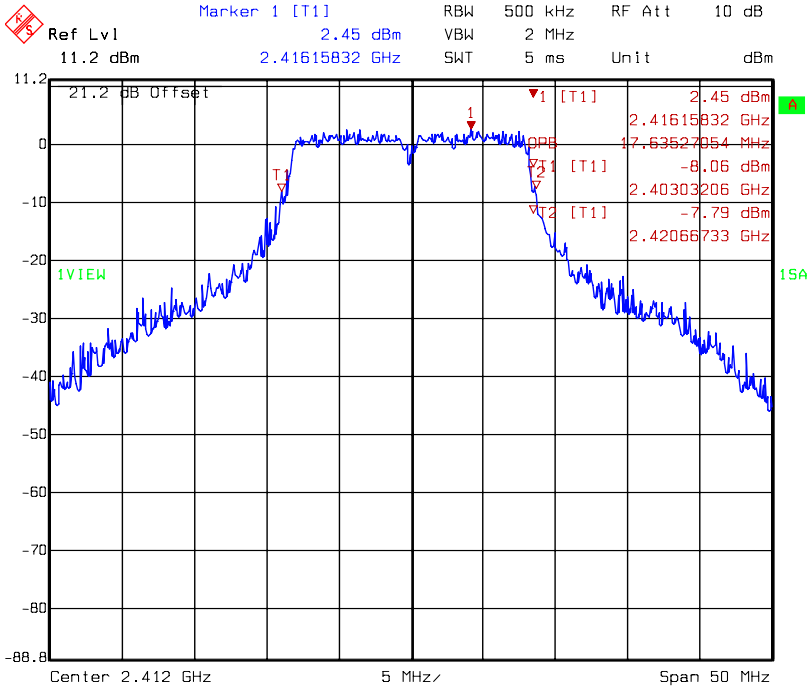
Title: Occupied Band-Width,
Comment A: 11b 2437 ch6 Chain0
Date: 23.MAY 2011 15:26:02

Chain 0: 99 % Occupied Bandwidth @ 802.11b mode channel 11



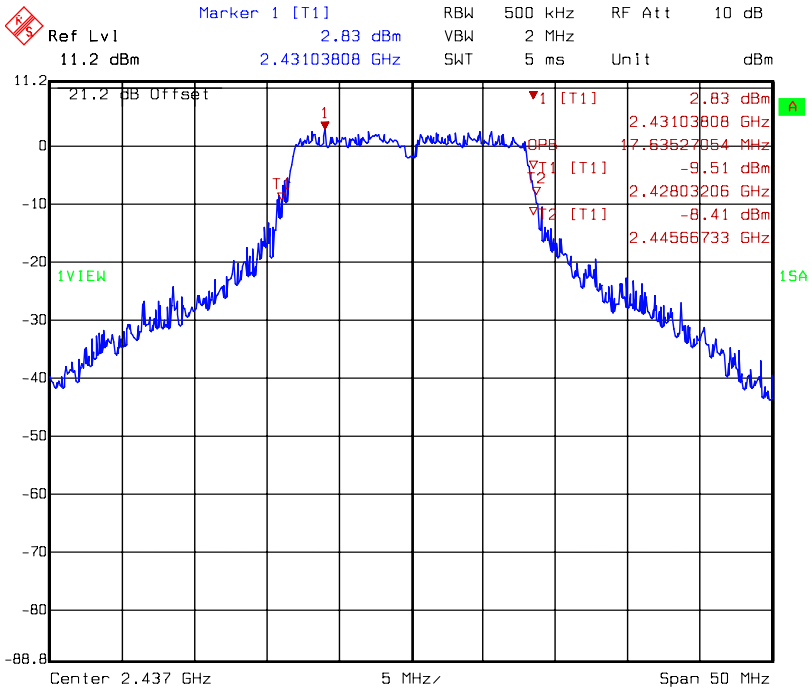
Title: Occupied Band-Width,
Comment A: 11b 2462 ch11 Chain0
Date: 23.MAY 2011 15:29:12

Chain 0: 99 % Occupied Bandwidth @ 802.11g mode channel 1



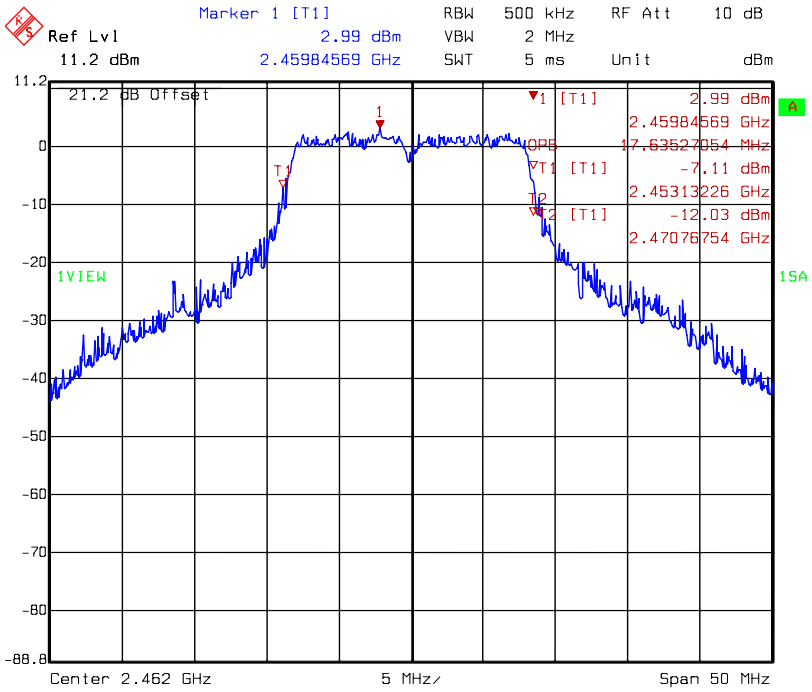
Title: Occupied Band-Width,
Comment A: 11g 2412 ch1 Chain0
Date: 23.MAY 2011 15:33:13

Chain 0: 99 % Occupied Bandwidth @ 802.11g mode channel 6



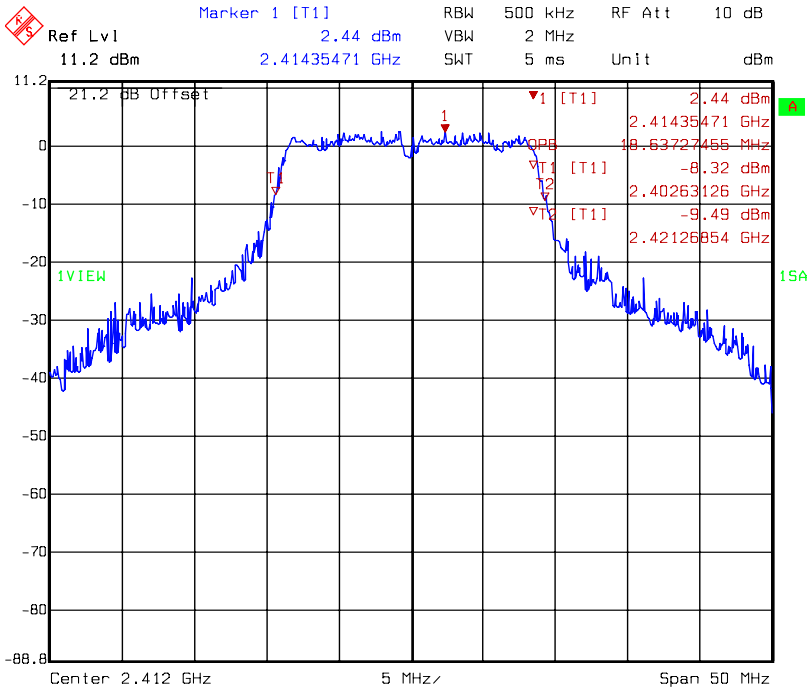
Title: Occupied Band-Width,
Comment A: 11g 2437 ch6 Chain0
Date: 23.MAY 2011 15:36:02

Chain 0: 99 % Occupied Bandwidth @ 802.11g mode channel 11



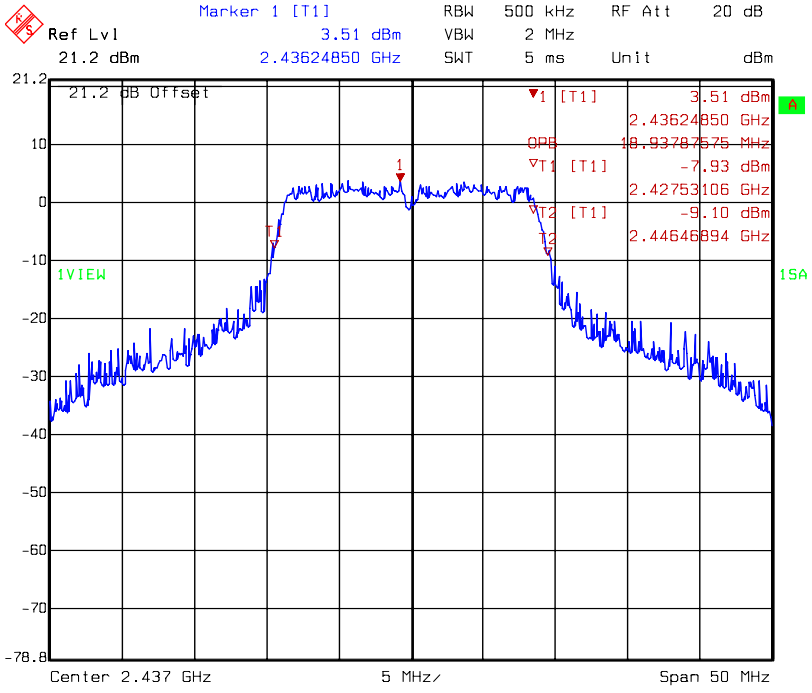
Title: Occupied Band-Width,
Comment A: 11g 2462 ch11 Chain0
Date: 23.MAY 2011 15:38:44

Chain 0: 99 % Occupied Bandwidth @ 802.11n HT20 mode channel 1



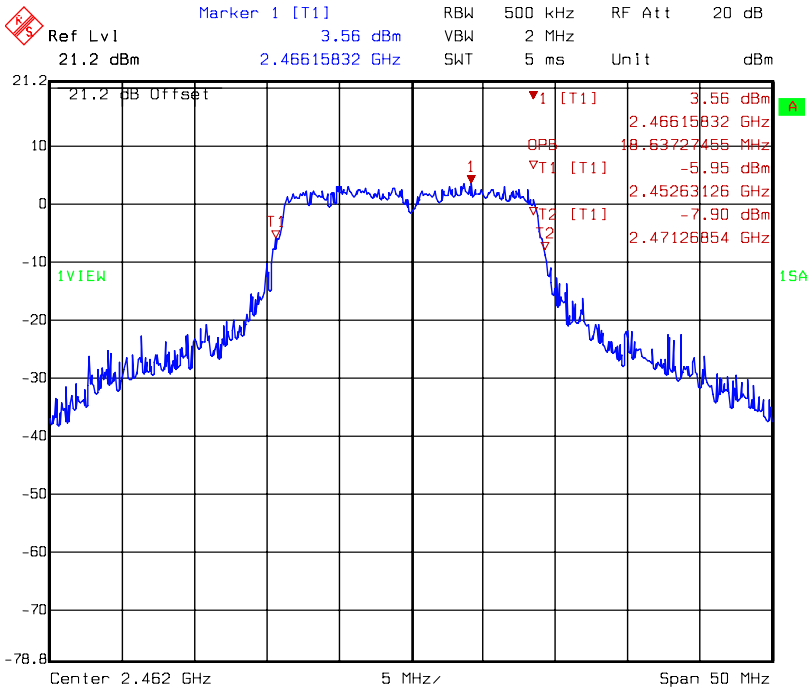
Title: Occupied Band-Width,
Comment A: 11n HT20 2412 ch1 Chain0
Date: 23.MAY 2011 15:42:06

Chain 0: 99 % Occupied Bandwidth @ 802.11n HT20 mode channel 6



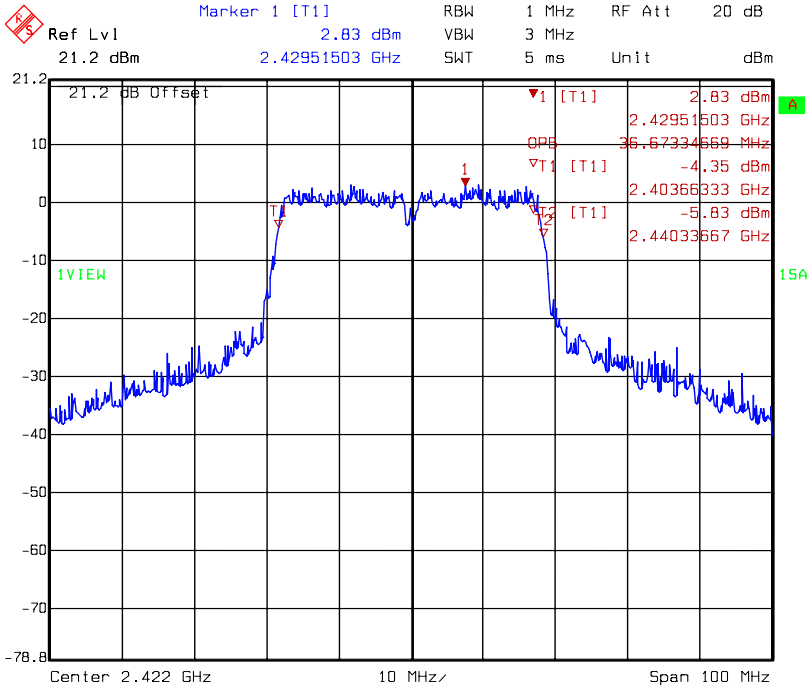
Title: Occupied Band-Width,
Comment A: 11n HT20 2437 ch6 Chain0
Date: 03.JUN.2011 18:02:43

Chain 0: 99 % Occupied Bandwidth @ 802.11n HT20 mode channel 11



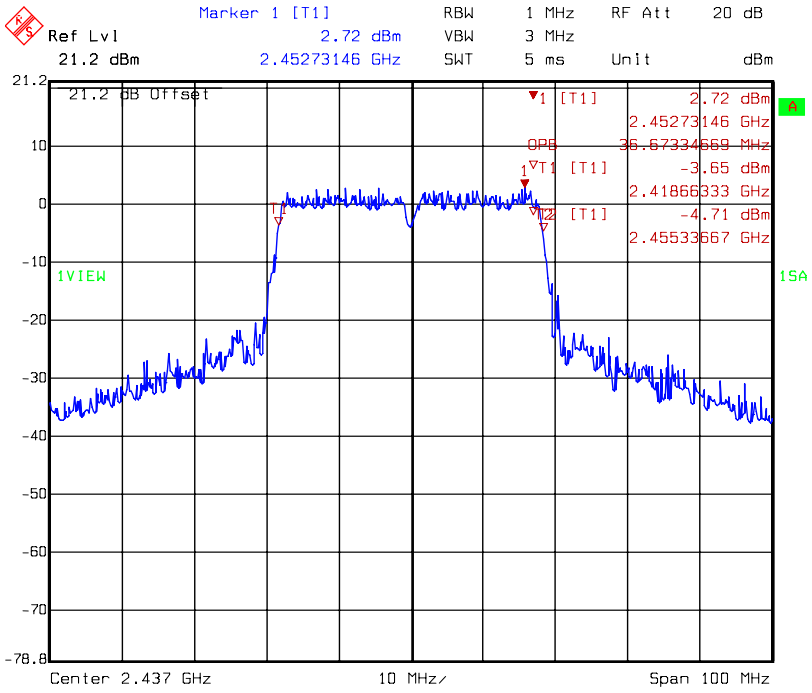
Title: Occupied Band-Width,
Comment A: 11n HT20 2462 ch11 Chain0
Date: 03.JUN.2011 18:06:14

Chain 0 : 99 % Occupied Bandwidth @ 802.11n HT40 mode channel 3



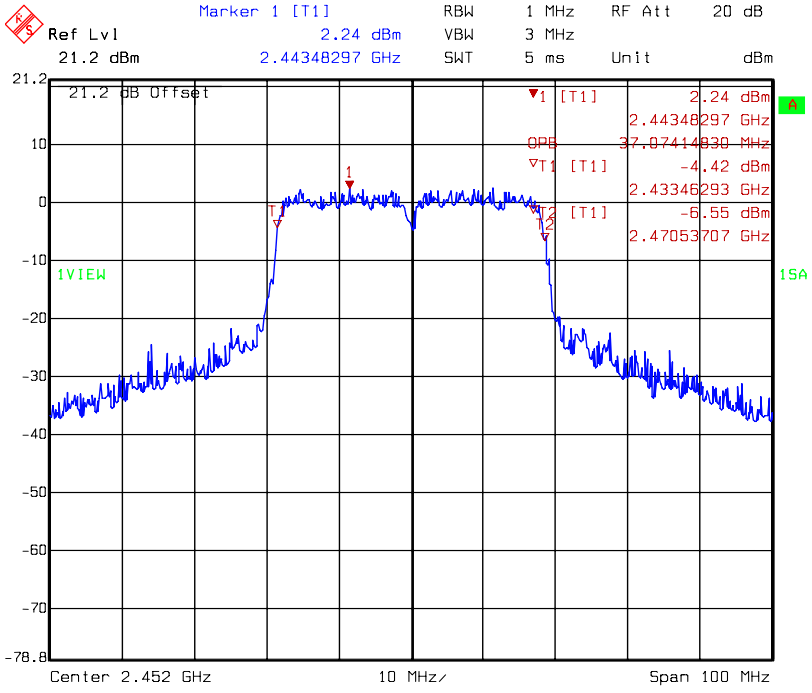
Title: Occupied Band-Width,
Comment A: 11n HT40 2422 ch3 Chain0
Date: 03.JUN.2011 18:10:24

Chain 0: 99 % Occupied Bandwidth @ 802.11n HT40 mode channel 6



Title: Occupied Band-Width,
Comment A: 11n HT40 2437 ch6 Chain0
Date: 03.JUN.2011 18:14:41

Chain 0: 99 % Occupied Bandwidth @ 802.11n HT40 mode channel 9



Title: Occupied Band-Width,
Comment A: 11n HT40 2452 ch9 Chain0
Date: 03.JUN.2011 18:20:50

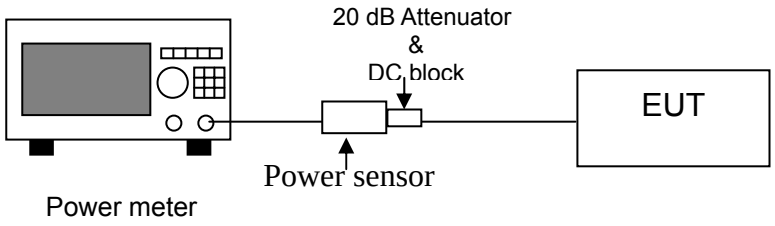
5. Maximum Output Power

Name of Test	Maximum output power
Base Standard	FCC 15.247(b)

Measurement Uncertainty: ±0.392 dB (k=2)
Test Result: Complies
Measurement Data: See Table below

Method of Measurement:
Reference FCC document: KDB558074
The power output was measured on the EUT using a 50 ohm SMA Cable connected to peak power meter via power sensor. Connect 20 dB attenuator and DC block at the input port of the power sensor. Measure conducted transmit power of at each antenna port ,besides another ports were terminated by 50 ohm and sum these power in linear power units,Power output was measured with the maximum rated input level.

Test Diagram:



Note 1: §15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note 2: §15.247 (b) (4) (ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Table 3. Maximum output power

Mode	Channel	Frequency (MHz)	Output Power (dBm)	Total Power (mw)	Limit (dBm)	Margin (dB)
			PK			
			DAC0	PK		
802.11b	1	2412	13.03	20.09	30	-16.97
	6	2437	12.94	19.68	30	-17.06
	11	2462	12.61	18.24	30	-17.39
802.11g	1	2412	16.94	49.43	30	-13.06
	6	2437	16.88	48.75	30	-13.12
	11	2462	16.79	47.75	30	-13.21
802.11n HT20	1	2412	17.01	50.23	30	-12.99
	6	2437	16.91	49.09	30	-13.09
	11	2462	16.84	48.31	30	-13.16
802.11n HT40	3	2422	16.56	45.29	30	-13.44
	6	2437	16.45	44.16	30	-13.55
	9	2452	16.35	43.15	30	-13.65

6. Power Spectral Density

Name of Test	Power Spectral Density
Base Standard	FCC 15.247(e)

Test Result: Complies
Measurement Data: See Table & plots below

Method of Measurement:
Reference FCC document: KDB558074
The power spectrum density was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer. Locate and zoom in on emission peak(s) within the passband. Set RBW = 3 kHz, VBW >RBW, sweep= 500s. The peak level measured must be no greater than + 8 dBm. Power spectrum density was read directly and cable loss (1 dB)/external attenuator (20 dB) correction was added to the reading to obtain power at the EUT antenna terminals.

Test Diagram:

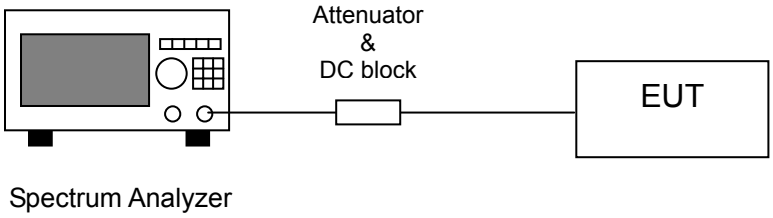
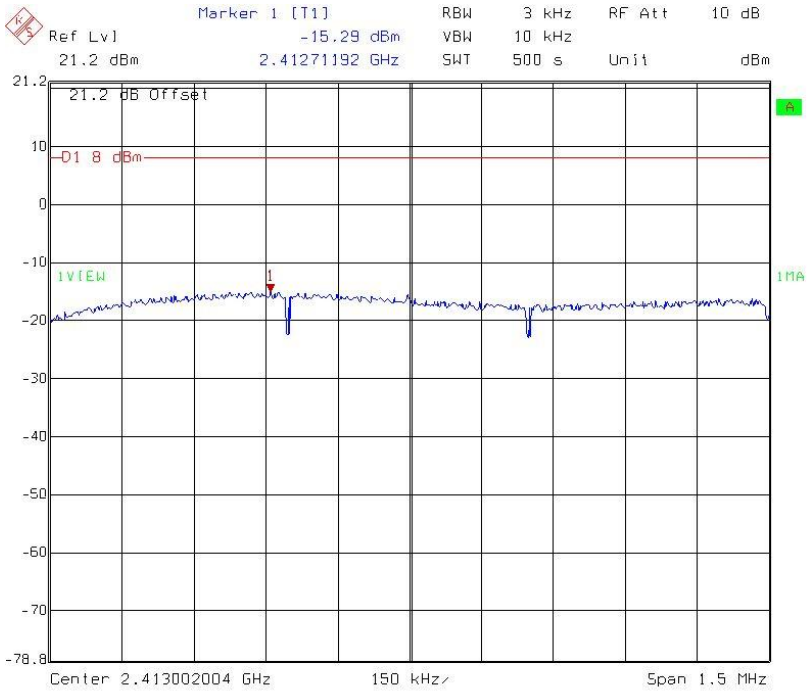


Table 4. Power Spectral Density

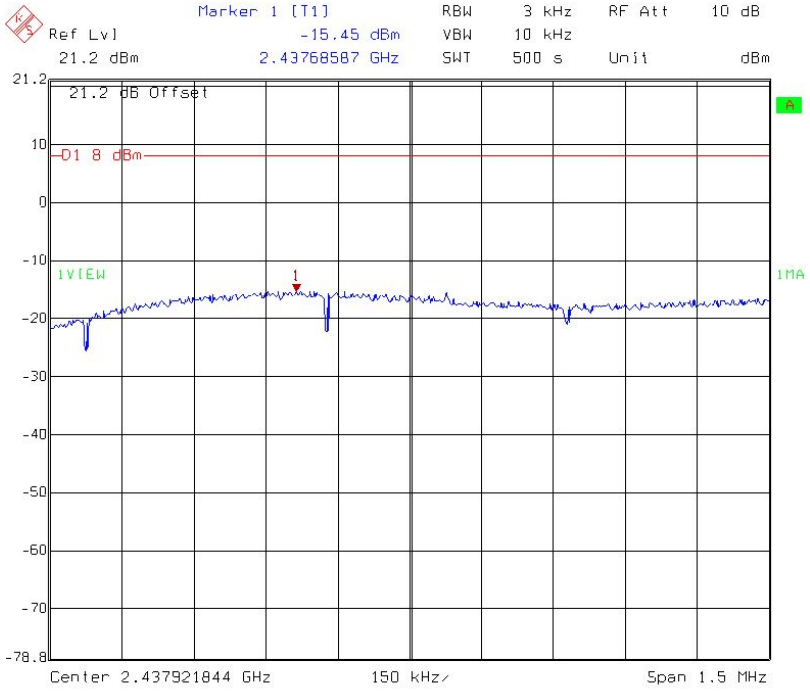
Mode	Channel	Frequency (MHz)	PSD(dBm)	Total PSD (mW)	Limit (dBm)	Margin (dB)
			DAC0			
802.11b	1	2412	-15.29	0.03	8	-23.29
	6	2437	-15.45	0.03	8	-23.45
	11	2462	-15.69	0.03	8	-23.69
802.11g	1	2412	-19.00	0.01	8	-27.00
	6	2437	-19.19	0.01	8	-27.19
	11	2462	-9.11	0.12	8	-17.11
802.11n HT20	1	2412	-17.87	0.02	8	-25.87
	6	2437	-16.30	0.02	8	-24.30
	11	2462	-17.11	0.02	8	-25.11
802.11n HT40	3	2422	-20.00	0.01	8	-28.00
	6	2437	-21.48	0.01	8	-29.48
	9	2452	-21.19	0.01	8	-29.19

Chain 0: Power Spectral Density @ 802.11b mode channel 1



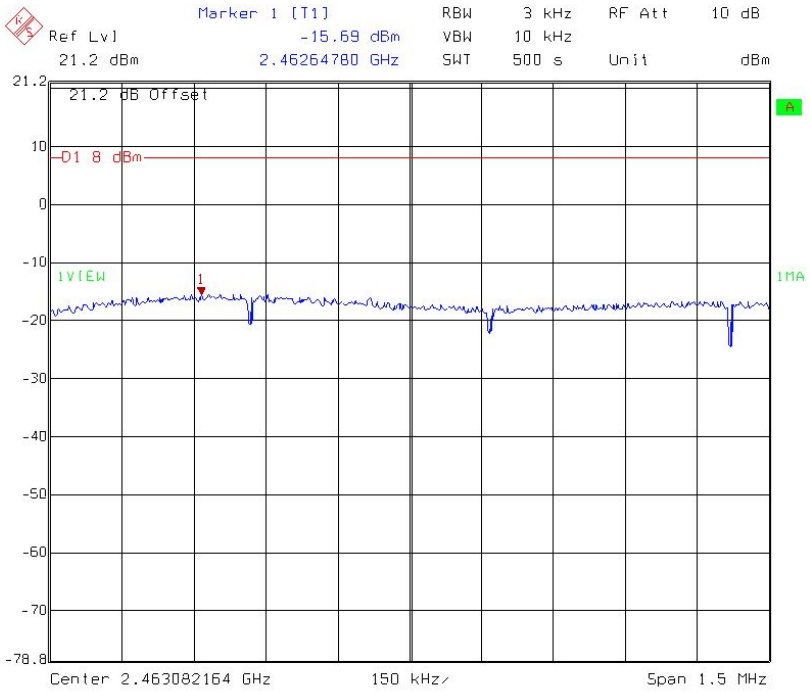
Title: Power Density,
Comment A: 11b 2412 ch1 Chain0
Date: 23.MAY 2011 15:21:29

Chain 0: Power Spectral Density @ 802.11b mode channel 6

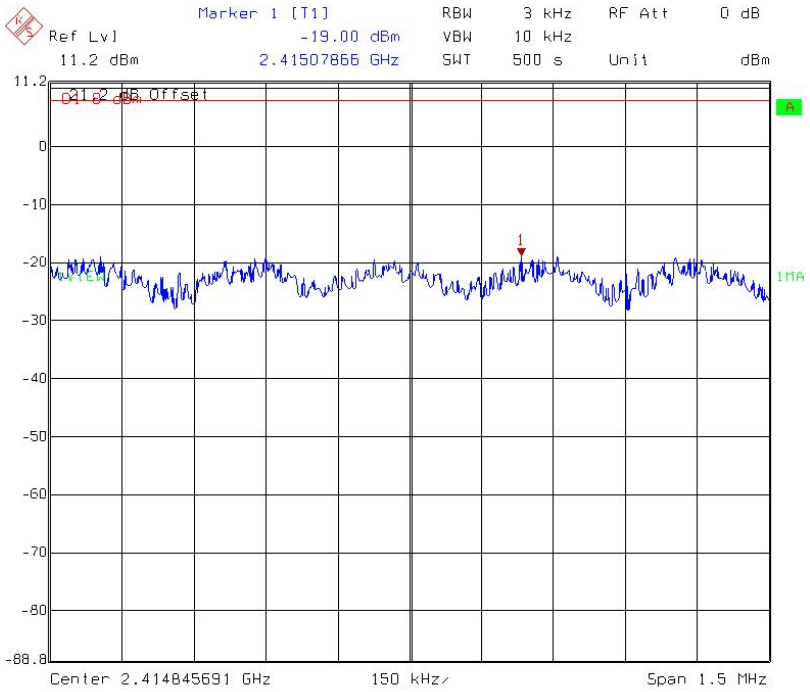


Title: Power Density,
Comment A: 11b 2437 ch6 Chain0
Date: 23.MAY 2011 15:25:41

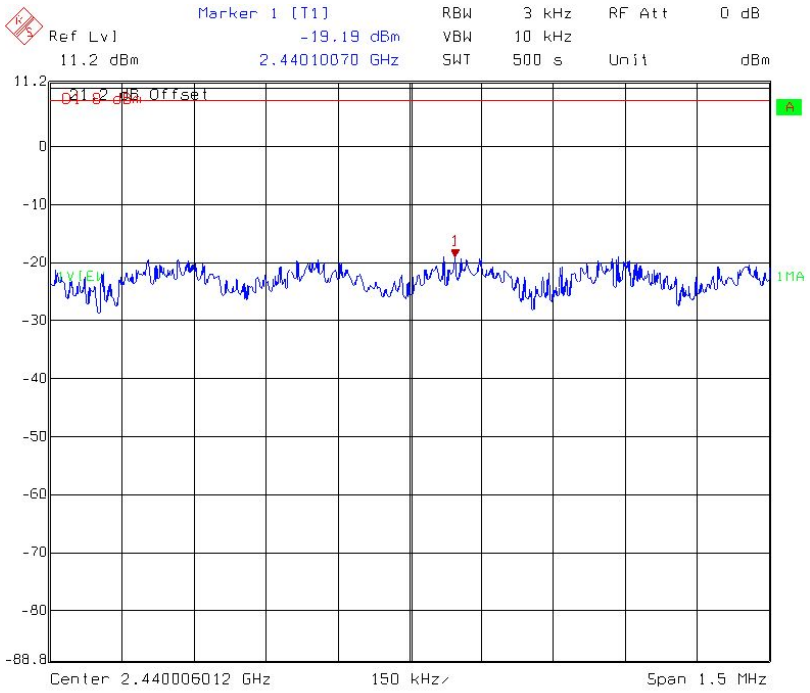
Chain 0: Power Spectral Density @ 802.11b mode channel 11



Chain 0: Power Spectral Density @ 802.11g mode channel 1

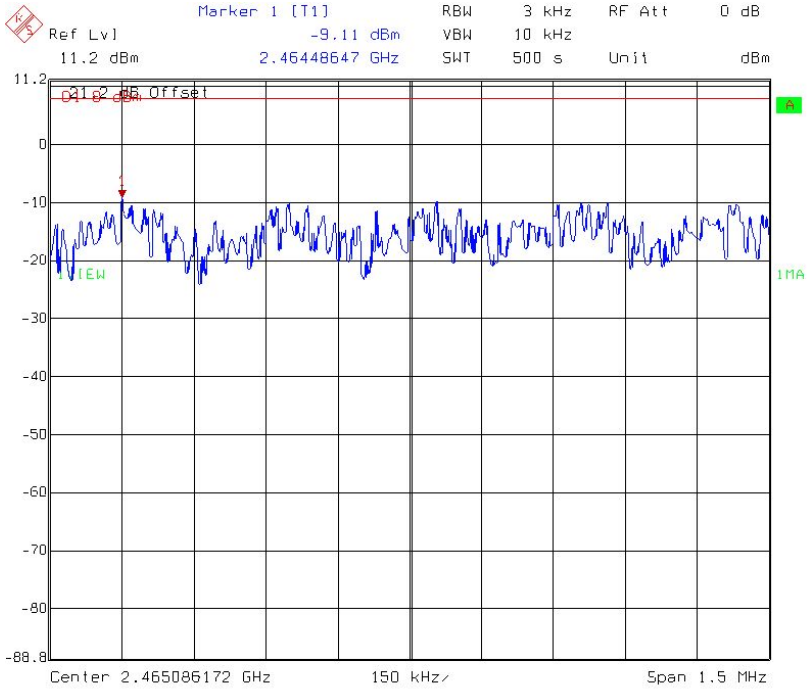


Chain 0: Power Spectral Density @ 802.11g mode channel 6



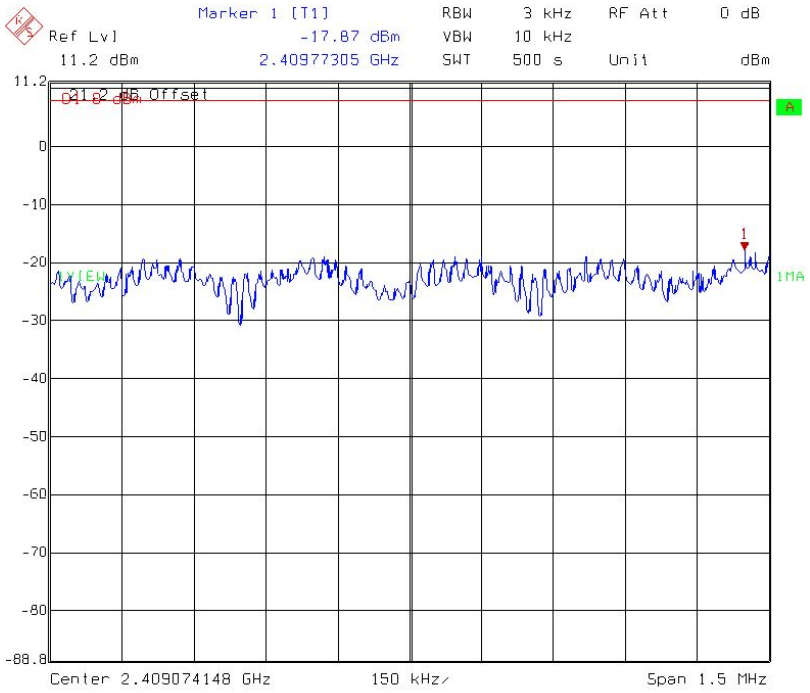
Title: Power Density,
Comment A: 11g 2437 ch6 Chain0
Date: 23.MAY 2011 15:35:42

Chain 0: Power Spectral Density @ 802.11g mode channel 11



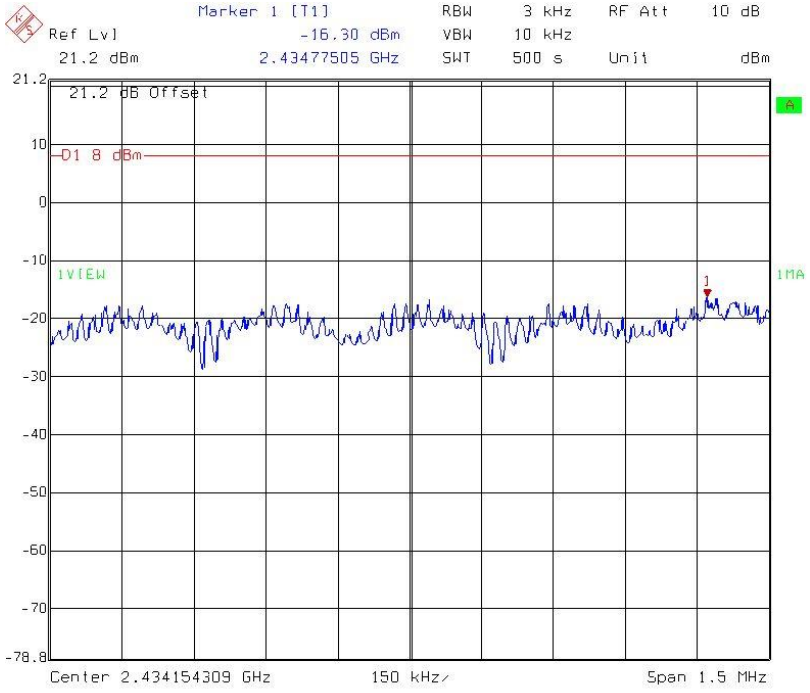
Title: Power Density,
Comment A: 11g 2462 ch11 Chain0
Date: 23.MAY 2011 15:38:24

Chain 0: Power Spectral Density @ 802.11n HT20 mode channel 1



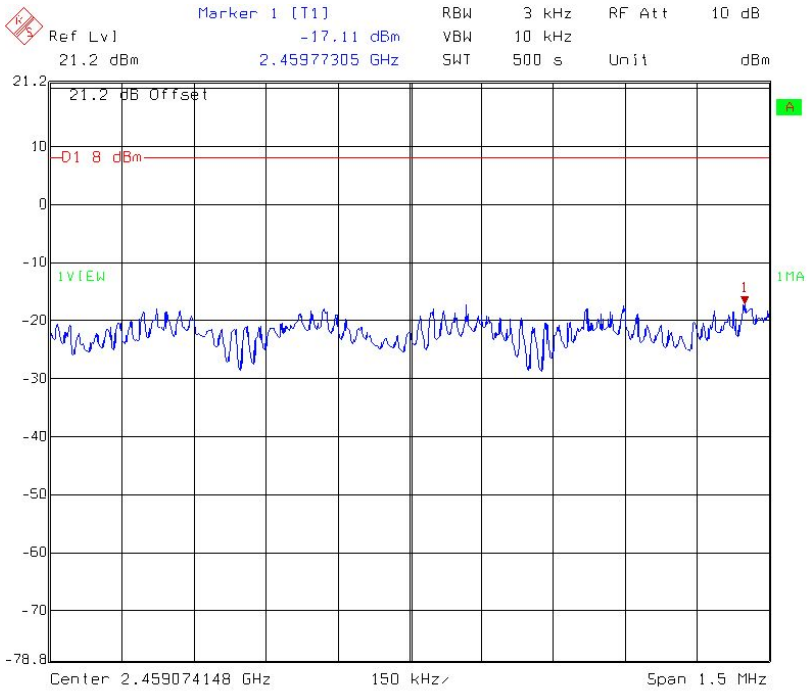
Title: Power Density,
Comment A: 11n HT20 2412 ch1 Chain0
Date: 23.MAY 2011 15:41:45

Chain 0: Power Spectral Density @ 802.11n HT20 mode channel 6



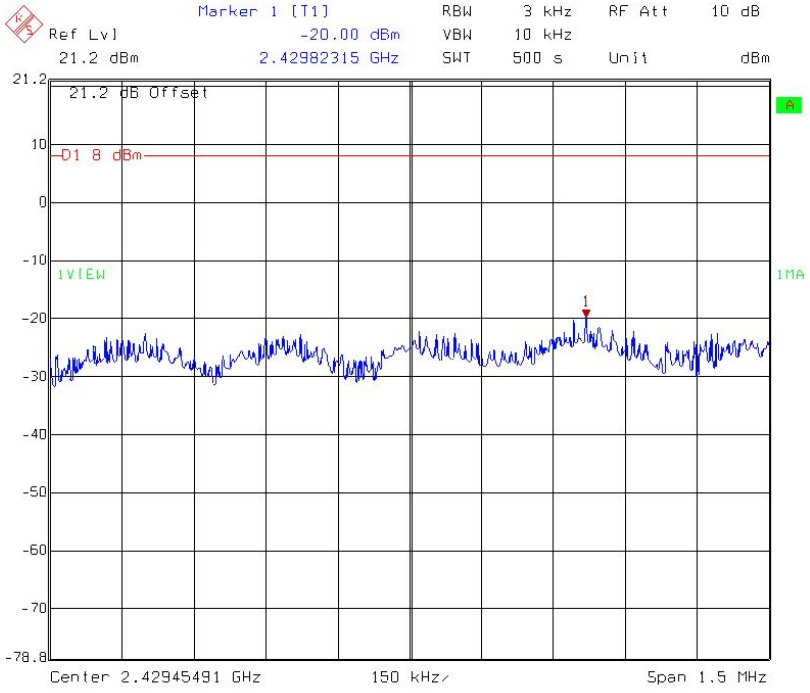
Title: Power Density,
Comment A: 11n HT20 2437 ch6 Chain0
Date: 03.JUN.2011 18:02:18

Chain 0: Power Spectral Density @ 802.11n HT20 mode channel 11



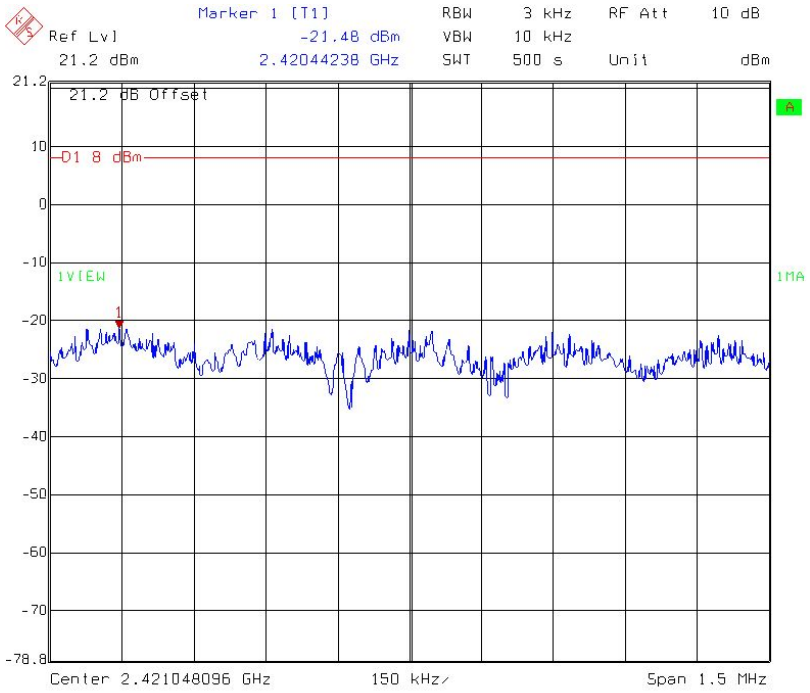
Title: Power Density,
Comment A: 11n HT20 2462 ch11 Chain0
Date: 03.JUN.2011 18:05:51

Chain 0: Power Spectral Density @ 802.11n HT40 mode channel 3



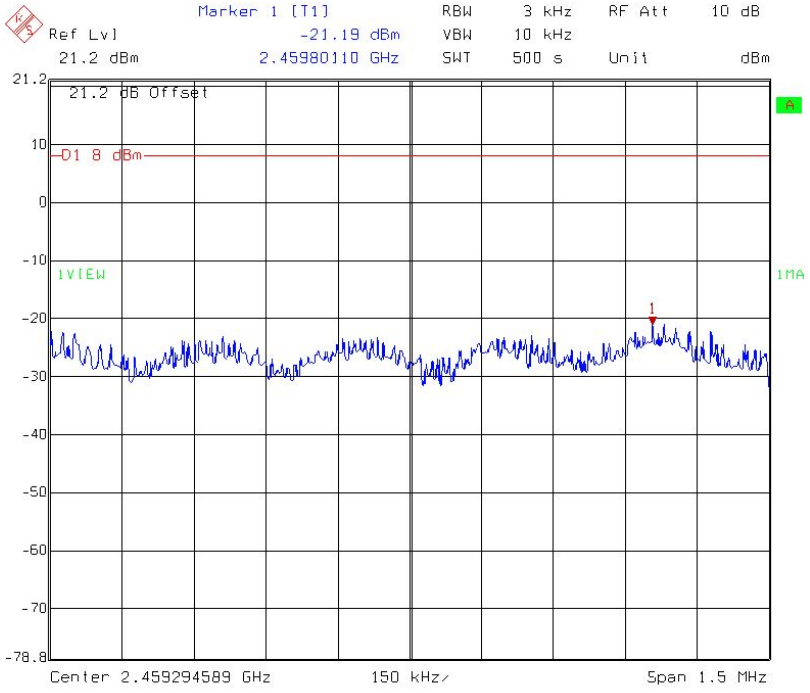
Title: Power Density,
Comment A: 11n HT40 2422 ch3 Chain0
Date: 03.JUN.2011 18:10:00

Chain 0: Power Spectral Density @ 802.11n HT40 mode channel 6



Title: Power Density,
Comment A: 11n HT40 2437 ch6 Chain0
Date: 03.JUN.2011 18:14:18

Chain 0: Power Spectral Density @ 802.11n HT40 mode channel 9



Title: Power Density,
Comment A: 11n HT40 2452 ch9 Chain0
Date: 03.JUN.2011 18:20:28