

FCC Part 15E

Measurement and Test Report

For

Compex Systems Pte Ltd

135 Joo Seng Road, #08-01 PM Industrial Building Singapore 368363

FCC ID: TK4-10-WLE200NX

Report Concerns: Original Report	Equipment Type: Wireless-A/B/G/N Network Mini PCIe Adapter
Model:	<u>WLE200NX</u>
Report No.:	<u>STR10098029I-2</u>
Test Date:	<u>2010-09-06 to 2010-10-12</u>
Issue Date:	<u>2010-10-14</u>
Tested By:	<u>Seven Song / Engineer</u> <i>Seven Song</i>
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Compex Systems Pte Ltd
Address of applicant: 135 Joo Seng Road, #08-01 PM Industrial Building
Singapore 368363

Manufacturer: Compex Systems Pte Ltd
Address of manufacturer: 135 Joo Seng Road, #08-01 PM Industrial Building
Singapore 368363

General Description of E.U.T

Items	Description
EUT Description:	Wireless-A/B/G/N Network Mini PCIe Adapter
Trade Name:	COMPEX
Model No.:	WLE200NX
Rated Voltage:	DC 3.3V
Max. RF Output Power	16.79dBm for 5.18-5.24GHz 23.21dBm for 5.26-5.32GHz 22.47dBm for 5.5-5.7GHz
Frequency range:	5180~5240MHz for 802.11a/n 5260~5320MHz for 802.11a/n 5500~5700MHz for 802.11a/n
Antenna Gain:	Max. 2.8dBi for 5.2GHz and 5.3GHz Max. 7.3dBi for 5.6GHz
Type of Antenna:	10.6cm
Type of Antenna:	Detachable Antenna
Size:	5.0X2.8X0.3cm

Note: The test data is gathered from a production sample, provided by the manufacture.

1.2 Test Standards

The following report is prepared on behalf of the Compex Systems Pte Ltd in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15E of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted with Low Channel, Middle Channel and High Channel, accordingly in reference to the Operating Instructions.

1.4 Test Facility

- **FCC – Registration No.: 994117**

SEM.Test Compliance Services Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 7673A**

The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components.

1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	ASUS	X50	/

1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/
/	/	/	/

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.203; § 15.405	Antenna Requirement	Compliant
§ 15.207; § 15.407(b)(6)	Conducted Emission	Compliant
§ 15.407(a)(1),(2)	Power Spectral Density	Compliant
§ 15.403(i)	26 dB Bandwidth	Compliant
§ 15.407(a)(1),(2)	Maximum Conducted Output Power	Compliant
§ 15.407(a)(6)	Peak Excursion	Compliant
§ 15.407(b)(1),(2),(3)	Conducted Spurious Emission	Compliant
§ 15.205; § 15.407(b)(1),(2),(3)	Radiated Emission	Compliant
§ 15.407(h)	Dynamic Frequency Selection (DFS)	Compliant

3. CONDUCTED EMISSIONS

3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

3.2 Test Equipment List and Details

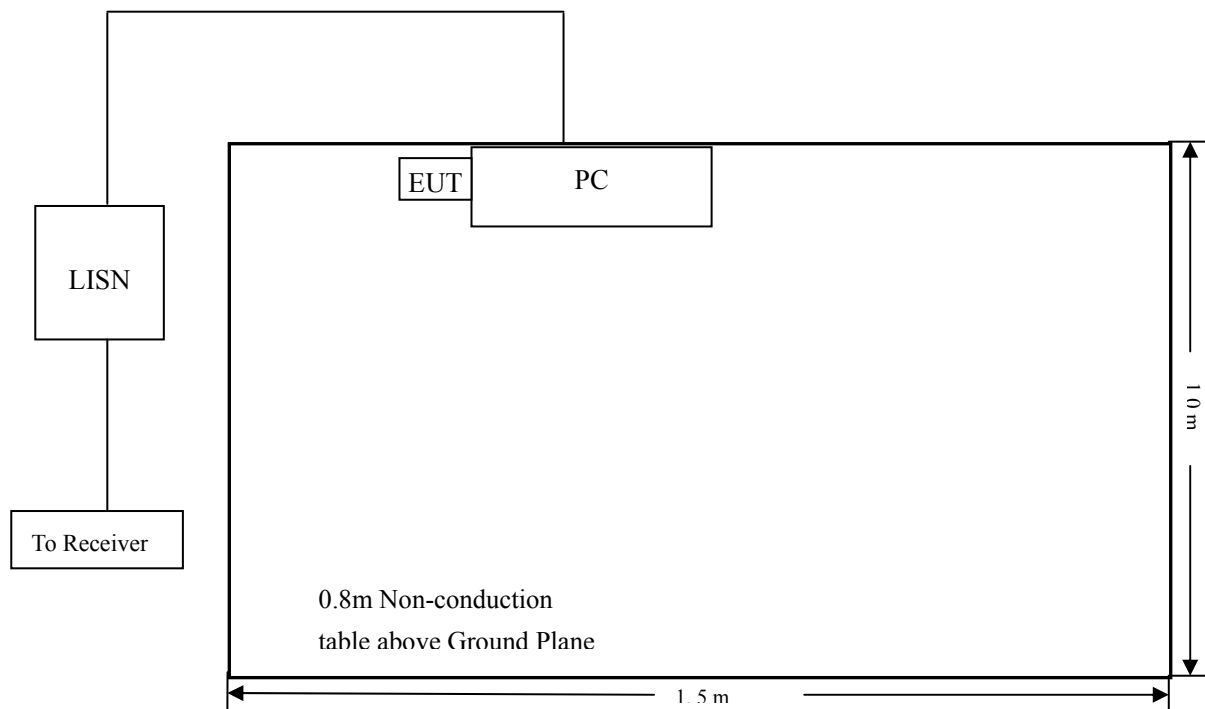
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2010-08-12	2011-08-11
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2010-08-12	2011-08-11
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2010-08-12	2011-08-11

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

3.3 Test Procedure

Test is conducting under the description of ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

3.4 Basic Test Setup Block Diagram



3.5 Environmental Conditions

Temperature:	20° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

3.6 Summary of Test Results/Plots

According to the data in section 3.7, the EUT complied with the FCC 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

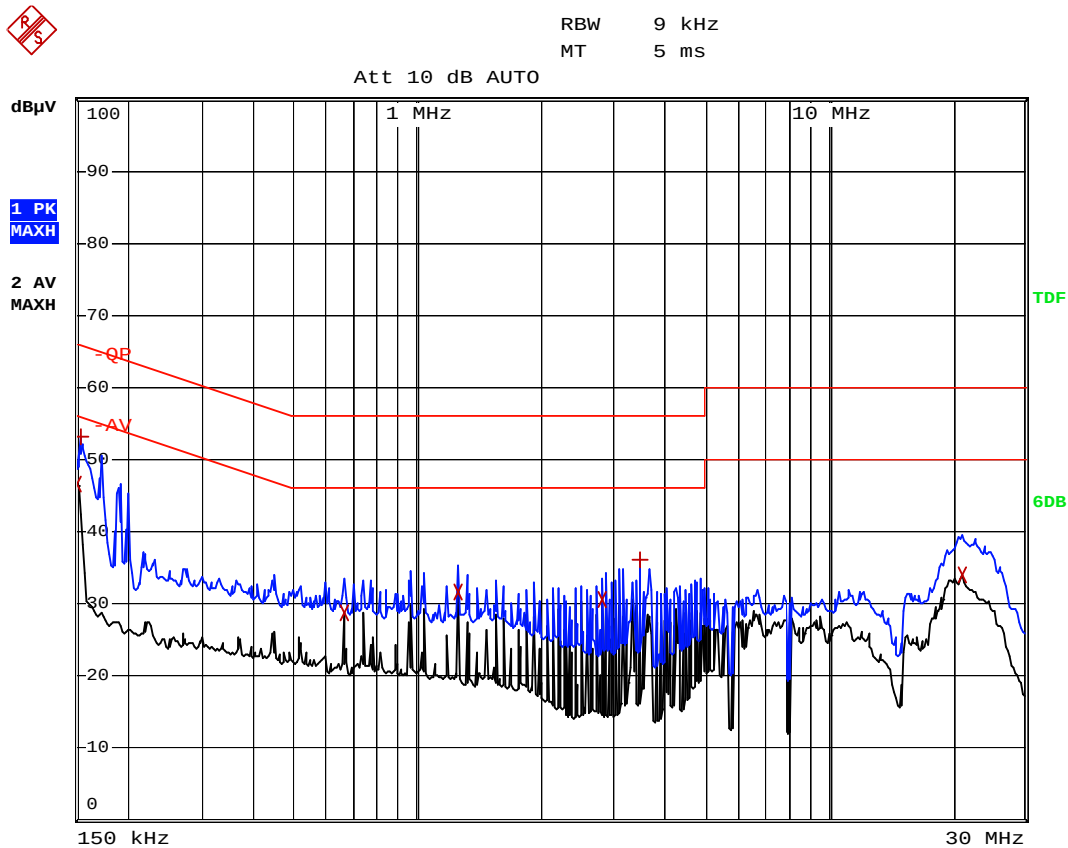
-4.4 dB μ V at 0.150 MHz in the Line Average Detector, 0.15-30MHz

3.7 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC 15.207	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dB μ V	QP/Ave/Pk	Line/Neutral	dB μ V	dB
0.150	51.57	Ave	Line	56	-4.4
0.154	57.98	QP	Line	65.78	-7.8
0.150	46.63	Ave	Neutral	56	-9.4
0.154	53.07	QP	Neutral	65.78	-12.7
1.258	31.67	Ave	Neutral	46	-14.3
2.81	30.60	Ave	Neutral	46	-15.4
21.142	33.91	Ave	Neutral	50	-16.1
0.666	28.86	Ave	Neutral	46	-17.1
3.114	28.29	Ave	Line	46	-17.7
3.474	36.03	QP	Neutral	56	-20.0

Plot of Conducted Emissions Test Data

Conducted Disturbance
EUT: Wireless-A/B/G/N Network Mini PCIe Adapter
M/N: WLE200NX
Operating Condition: Transmitting
Test Specification: L
Comment: AC 120V/60Hz



Plot of Conducted Emissions Test Data

Conducted Disturbance

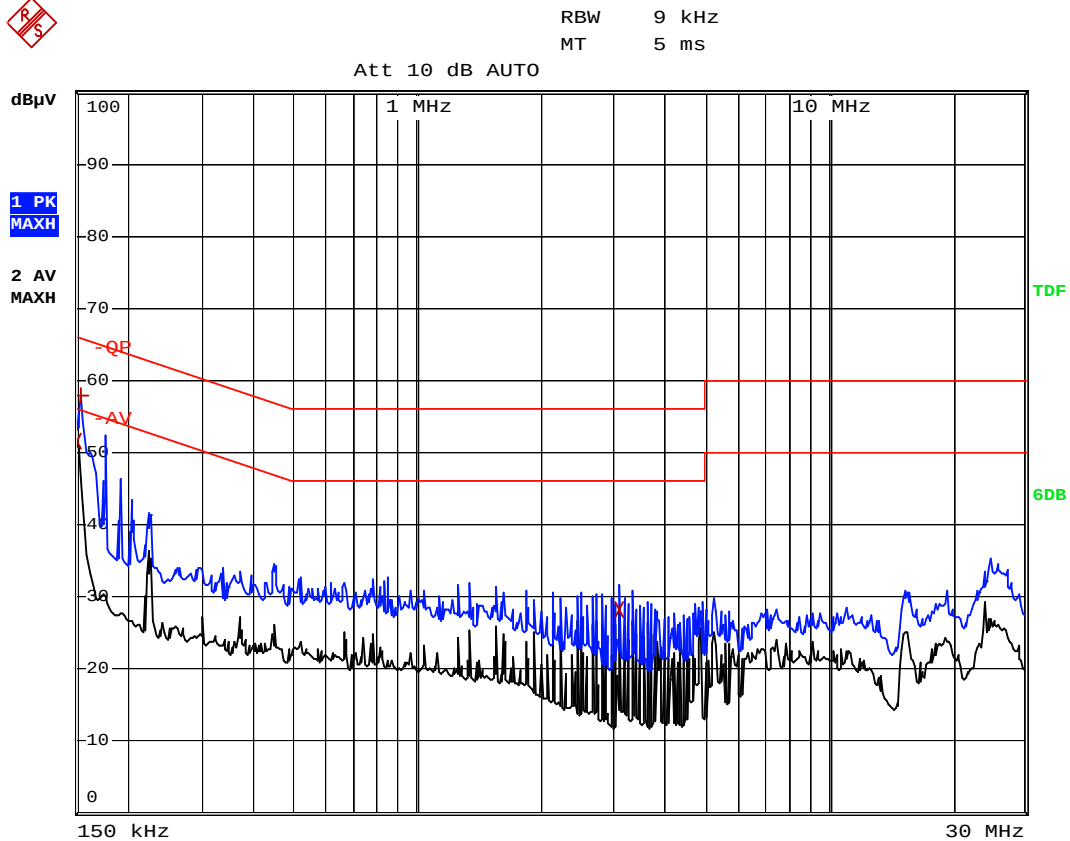
EUT: Wireless-A/B/G/N Network Mini PCIe Adapter

M/N: WLE200NX

Operating Condition: Transmitting

Test Specification: N

Comment: AC 120V/60Hz



4. §15.203 - ANTENNA REQUIREMENT

4.1 Standard Applicable

According to FCC 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 this section.

4.2 Test Result

This product has an unique and detachable antenna, fulfill the requirement of this section.

5. POWER SPECTRAL DENSITY

5.1 Standard Applicable

According to 15.407(a)(1), For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

5.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-04-16	2011-04-15
Attenuator	ATTEN	ATS010-6-10	DC-6GHz	2010-08-12	2011-08-11

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer via a RF combiner.
2. Set center frequency of spectrum analyzer = operating frequency.
3. Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span = 50MHz.
4. Repeat above procedures until all frequency measured was complete.

5.4 Environmental Conditions

Temperature:	20° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

For the frequency band 5.18-5.24GHz:

Test mode	Test channel	Reading dBm/MHz	Limit dBm/MHz
802.11a	Low channel (5180MHz)	1.07	4
	Middle channel (5210MHz)	1.52	4
	High channel(5240MHz)	2.68	4
802.11n HT20	Low channel (5180MHz)	0.81	4
	Middle channel (5210MHz)	2.38	4
	High channel(5240MHz)	2.62	4
802.11n HT40	Low channel (5190MHz)	-1.44	4
	Middle channel (5210MHz)	-0.24	4
	High channel(5230MHz)	-0.30	4

For the frequency band 5.26-5.32GHz

Test mode	Test channel	Reading dBm/MHz	Limit dBm/MHz
802.11a	Low channel (5260MHz)	7.58	11
	Middle channel (5290MHz)	7.80	11
	High channel(5320MHz)	7.71	11
802.11n HT20	Low channel (5260MHz)	8.20	11
	Middle channel (5290MHz)	7.98	11
	High channel(5320MHz)	7.82	11
802.11n HT40	Low channel (5270MHz)	5.25	11
	Middle channel (5290MHz)	4.63	11
	High channel(5310MHz)	4.59	11

For the frequency band 5.55-5.7GHz

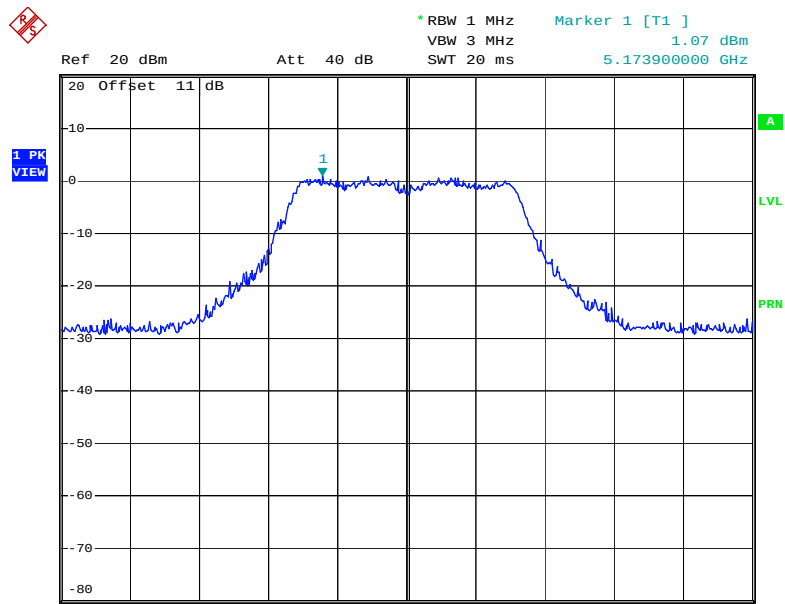
Test mode	Test channel	Reading dBm/MHz	Limit dBm/MHz
802.11a	Low channel (5500MHz)	7.92	9.7*
	Middle channel (5600MHz)	5.48	9.7*
	High channel(5700MHz)	7.28	9.7*
802.11n HT20	Low channel (5500MHz)	7.39	9.7*
	Middle channel (5600MHz)	6.55	9.7*
	High channel(5700MHz)	5.64	9.7*
802.11n HT40	Low channel (5510MHz)	4.75	9.7*
	Middle channel (5590MHz)	2.82	9.7*
	High channel(5670MHz)	2.60	9.7*

*: Limit = 11dBm – (Antenna Gain – 6dBi), Antenna Gain = 7.3dBi, so the Limit = 9.7dBm/MHz

For the frequency band 5.18-5.24GHz

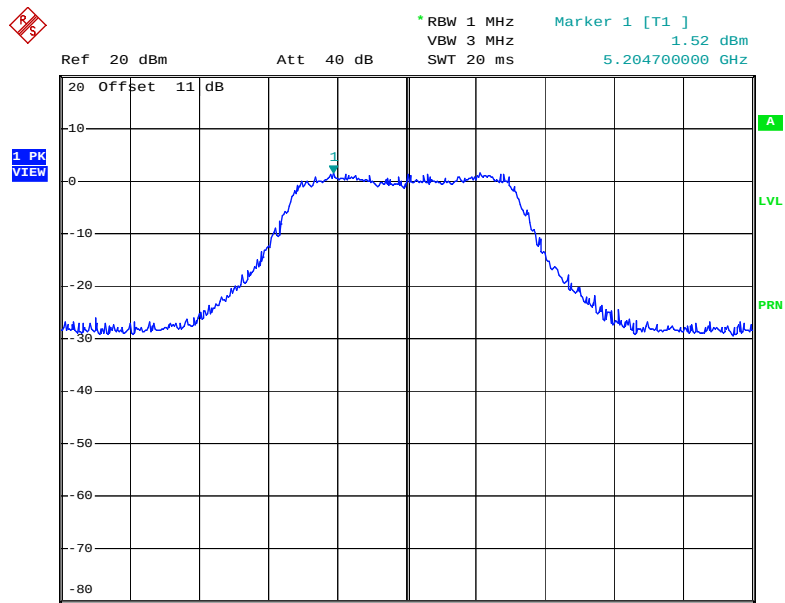
802.11a

Low Channel:



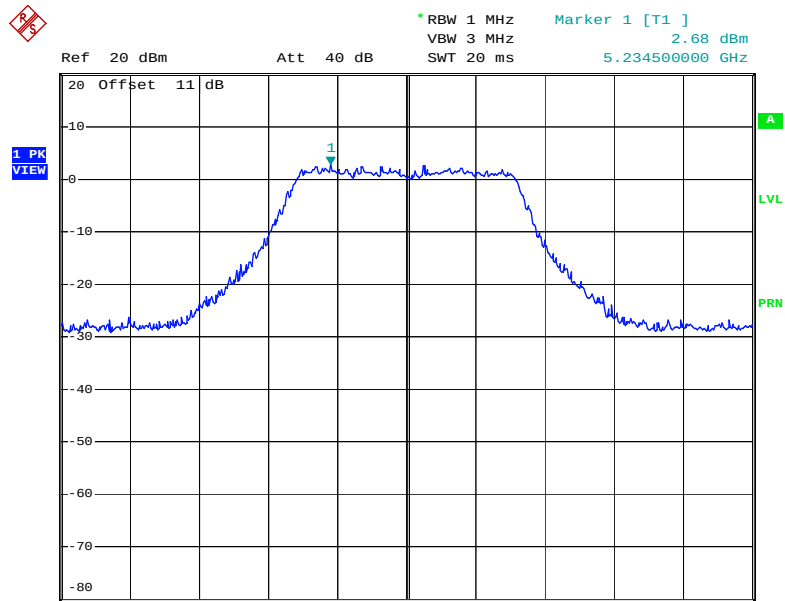
Date: 30.SEP.2010 15:31:09

Middle Channel:



Date: 30.SEP.2010 15:31:45

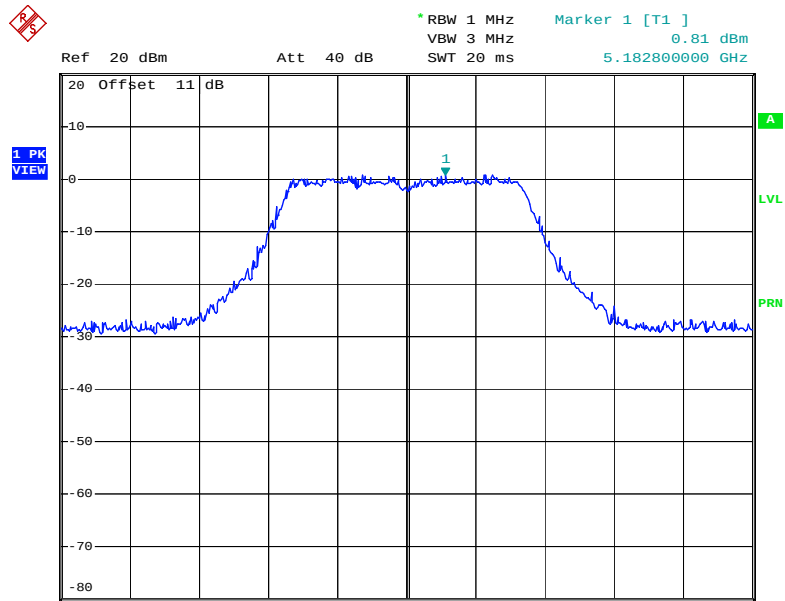
High Channel:



Date: 30.SEP.2010 15:32:07

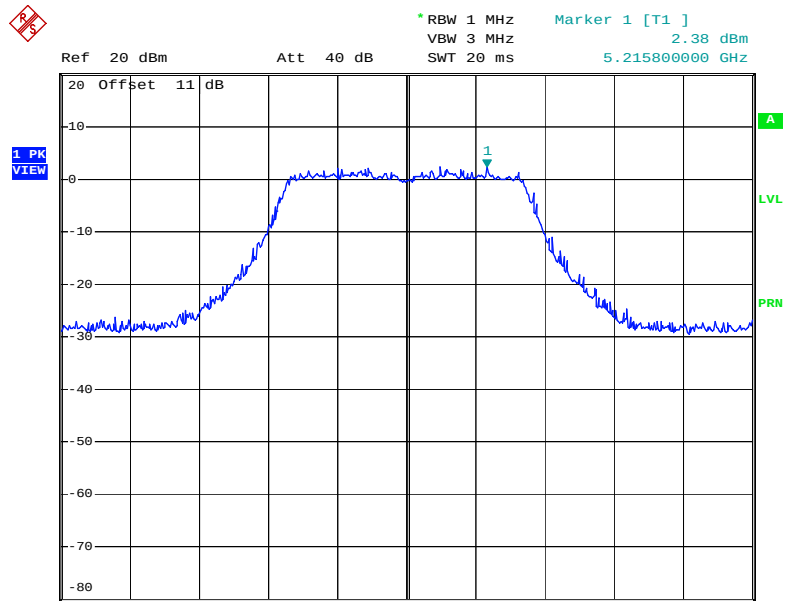
802.11n HT20

Low Channel:



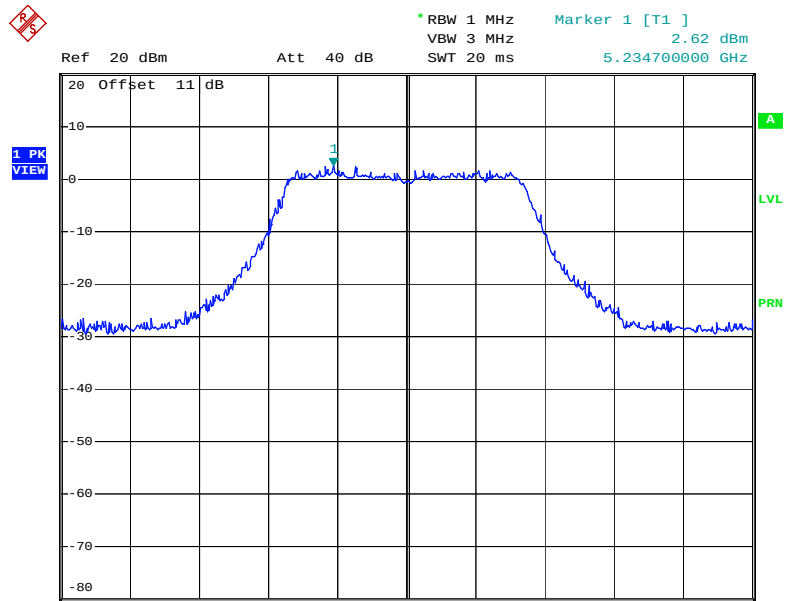
Date: 30.SEP.2010 15:33:42

Middle Channel:



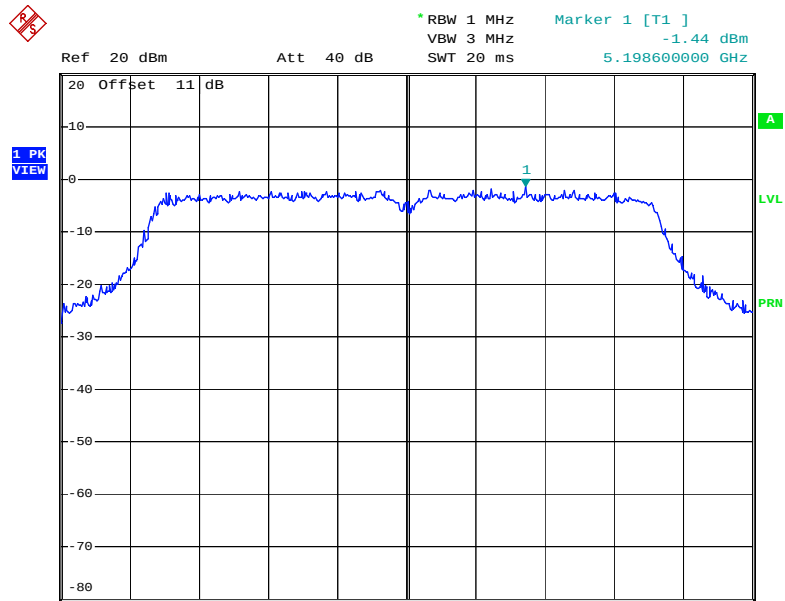
Date: 30.SEP.2010 15:33:20

High Channel:



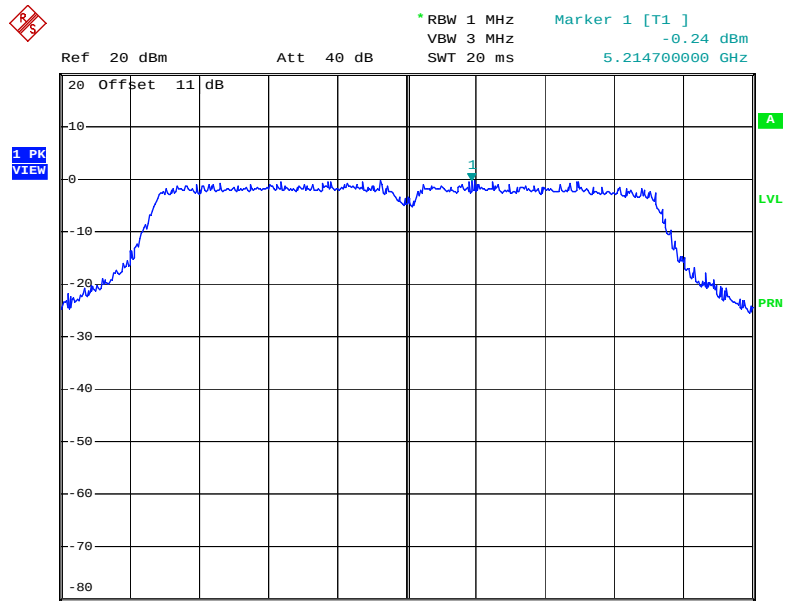
Date: 30.SEP.2010 15:32:36

802.11n HT40
Low Channel:



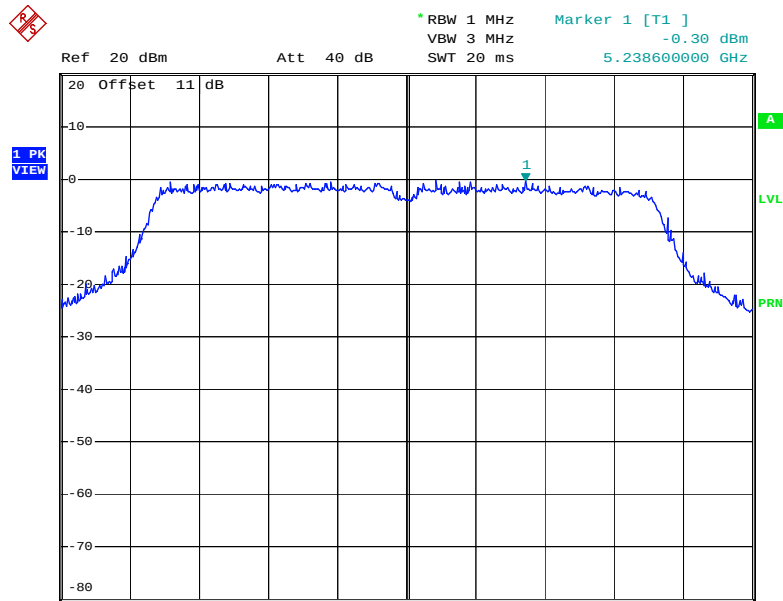
Date: 30.SEP.2010 15:34:39

Middle Channel:



Date: 30.SEP.2010 15:35:05

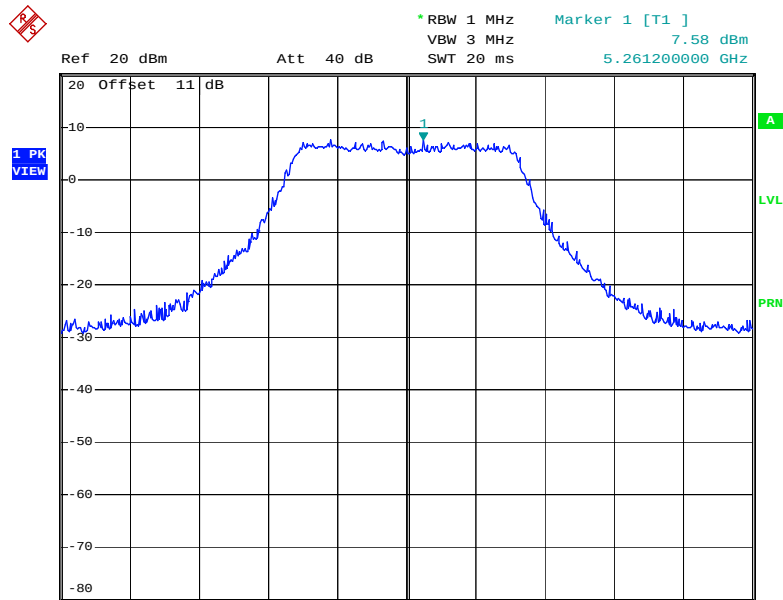
High Channel:



Date: 30.SEP.2010 15:35:36

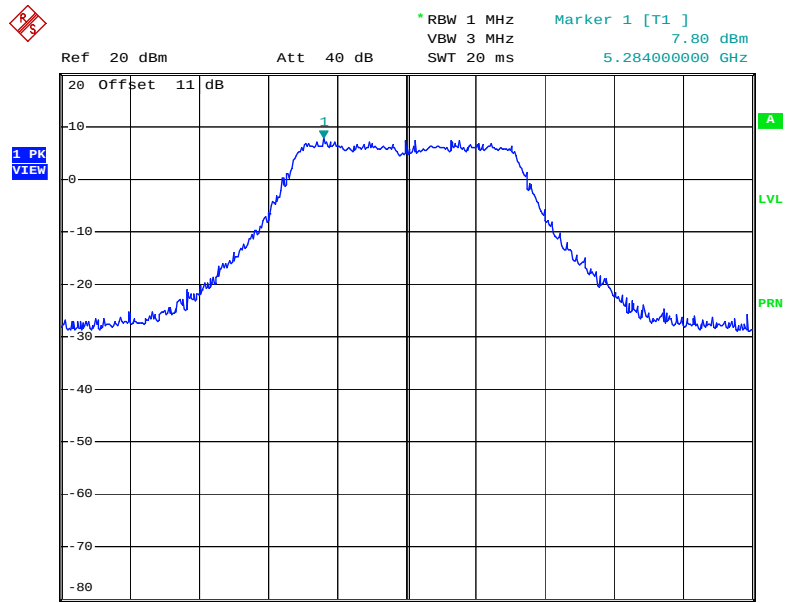
For the frequency band 5.26-5.32GHz
802.11a

Low Channel:



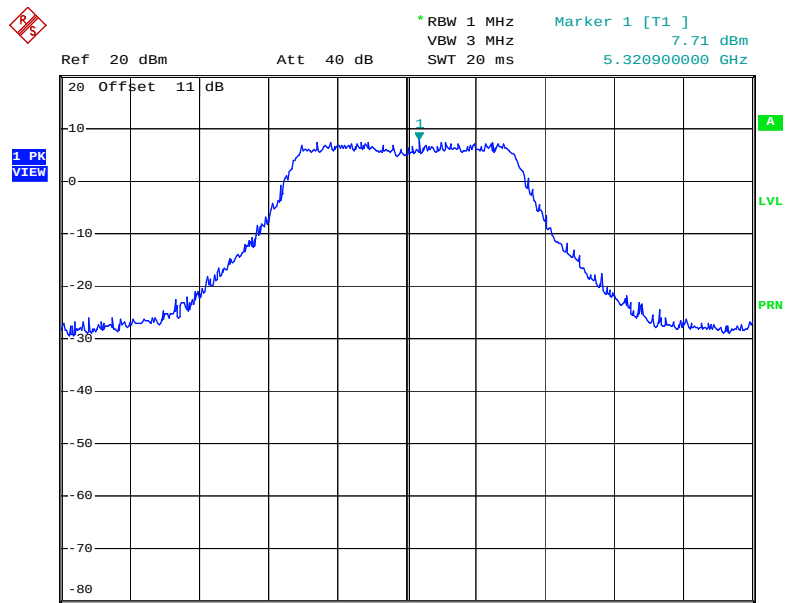
Date: 30.SEP.2010 16:27:32

Middle Channel:



Date: 30.SEP.2010 16:27:10

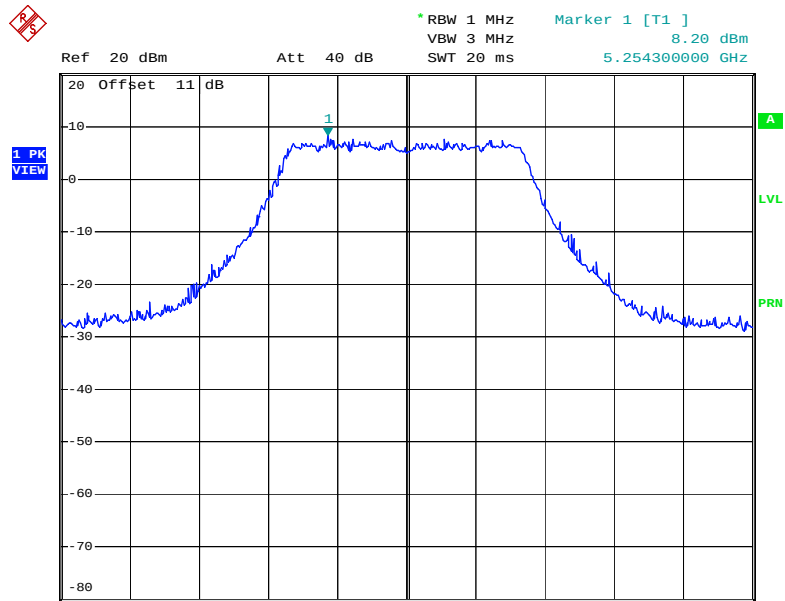
High Channel:



Date: 30.SEP.2010 16:26:38

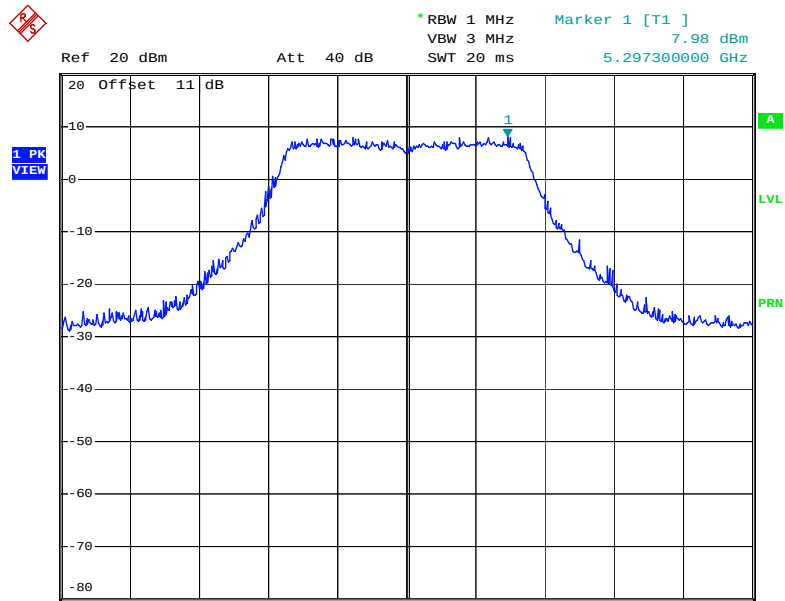
802.11n HT20

Low Channel:



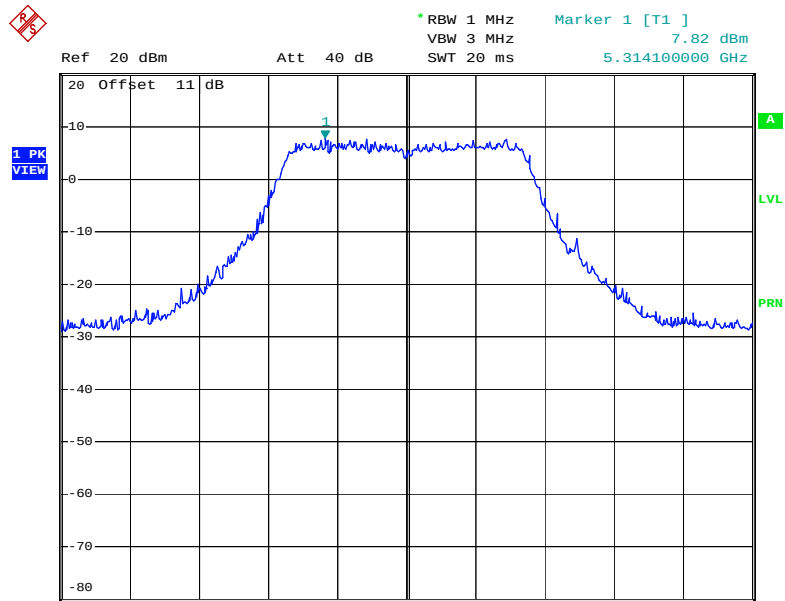
Date: 30.SEP.2010 16:25:02

Middle Channel:



Date: 30.SEP.2010 16:25:40

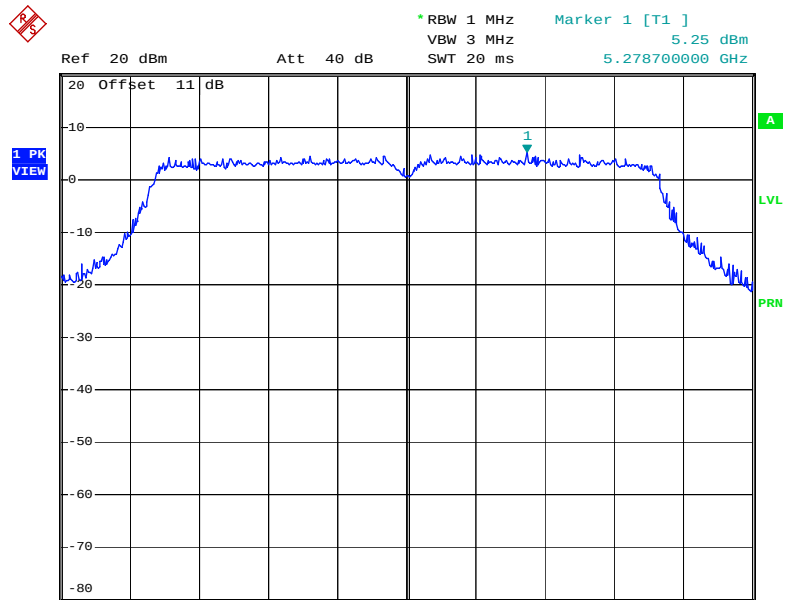
High Channel:



Date: 30.SEP.2010 16:26:10

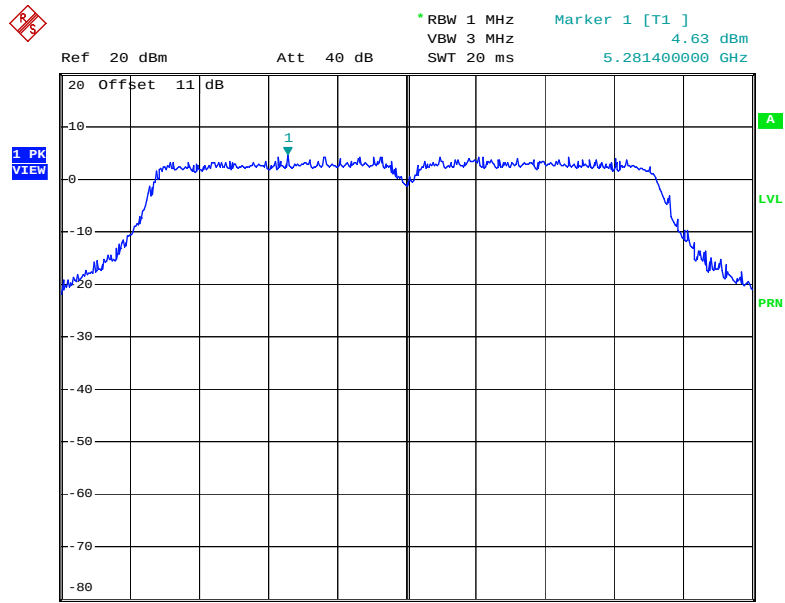
802.11n HT40

Low Channel:



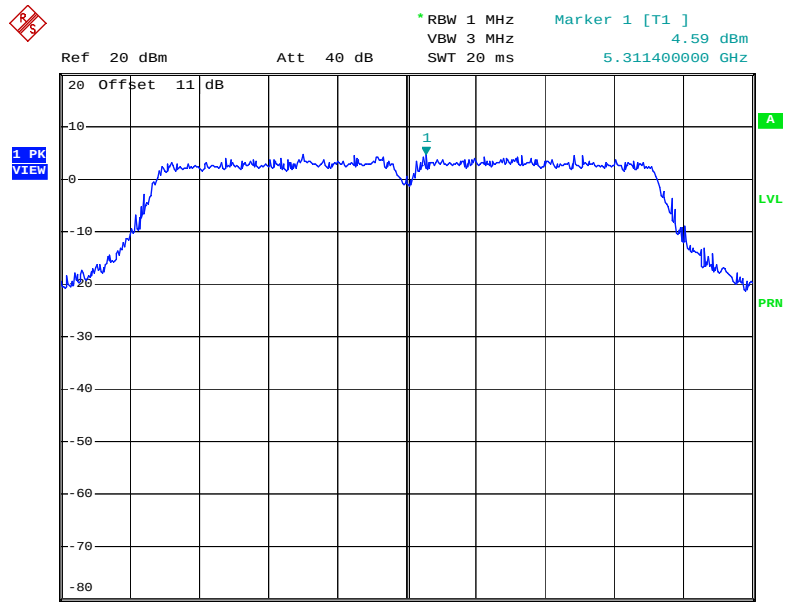
Date: 30.SEP.2010 16:11:56

Middle Channel:



Date: 30.SEP.2010 16:03:59

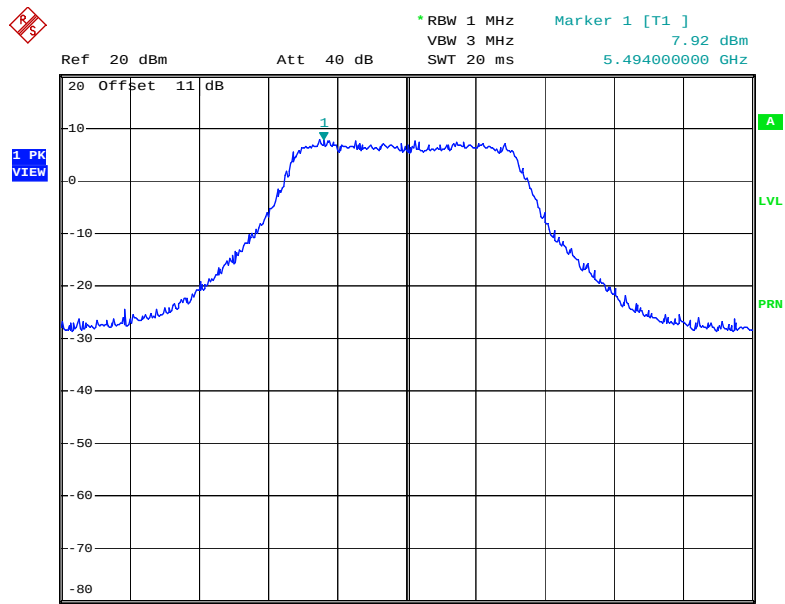
High Channel:



Date: 30.SEP.2010 16:03:31

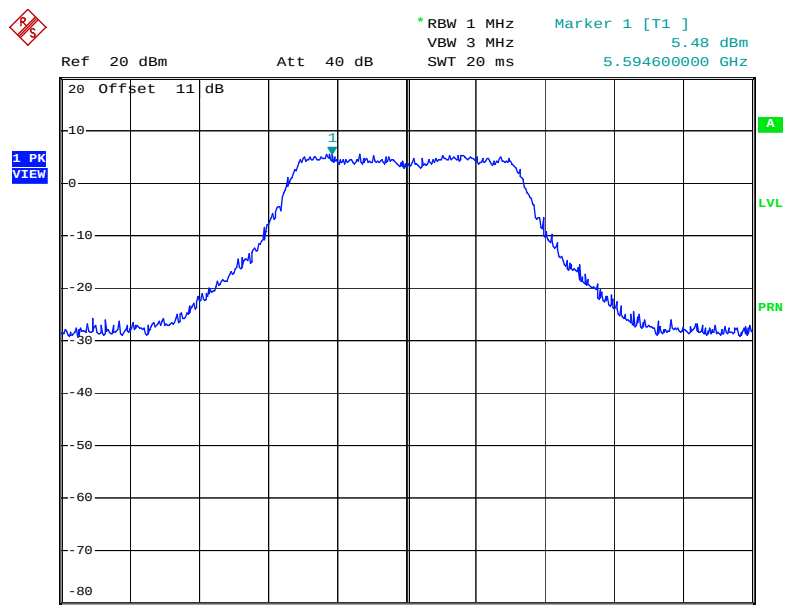
For the frequency band 5.5-5.7GHz
802.11a

Low Channel:



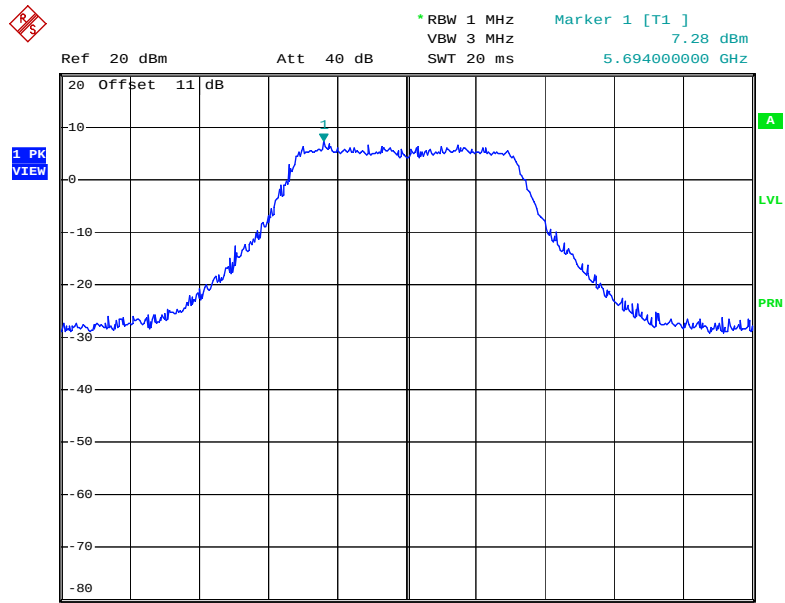
Date: 30.SEP.2010 16:28:42

Middle Channel:



Date: 30.SEP.2010 16:29:08

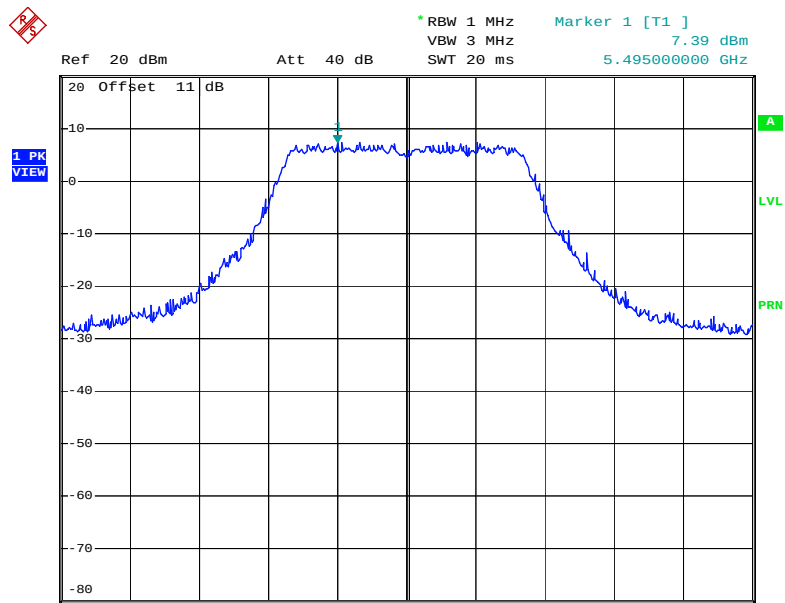
High Channel:



Date: 30.SEP.2010 16:29:38

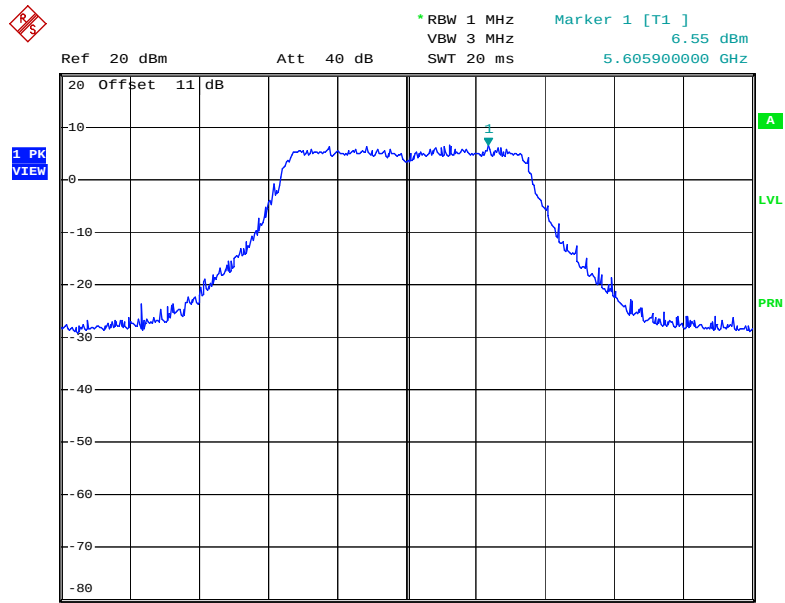
802.11n HT20

Low Channel:



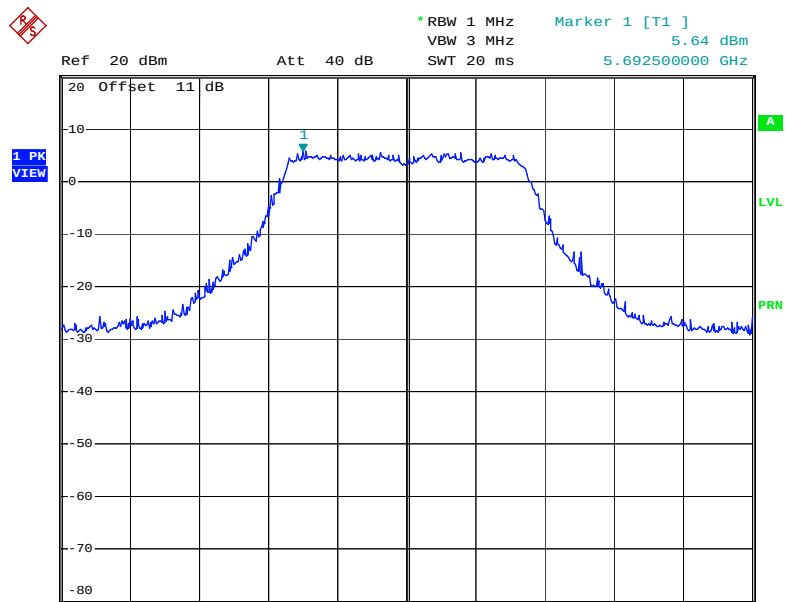
Date: 30.SEP.2010 16:31:08

Middle Channel:



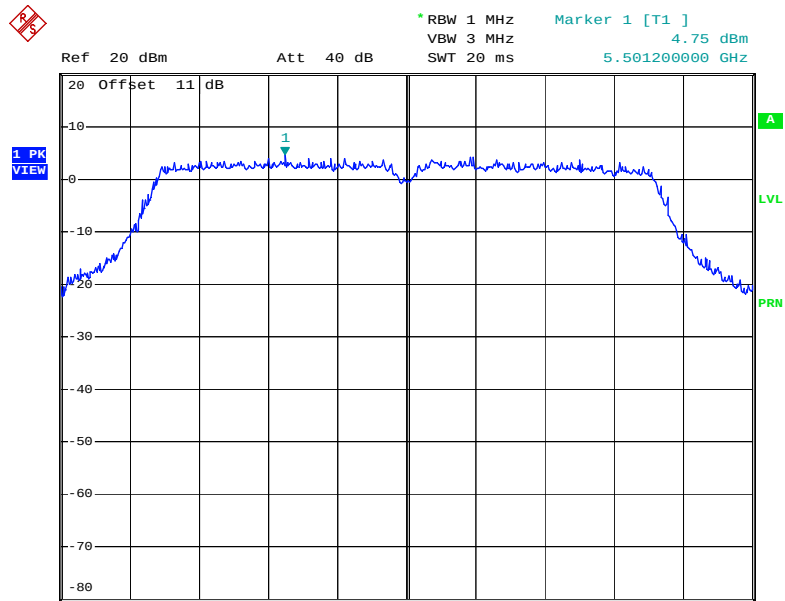
Date: 30.SEP.2010 16:30:27

High Channel:



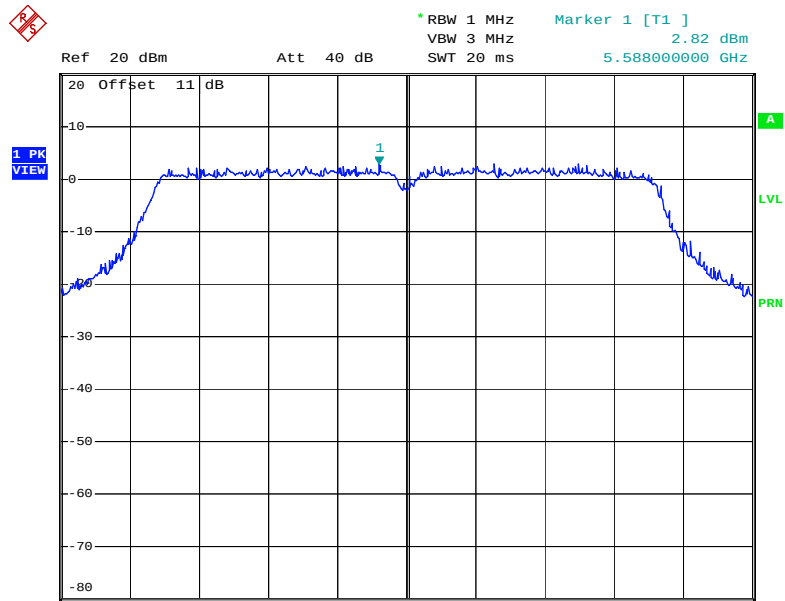
Date: 30.SEP.2010 16:30:01

802.11n HT40
Low Channel:



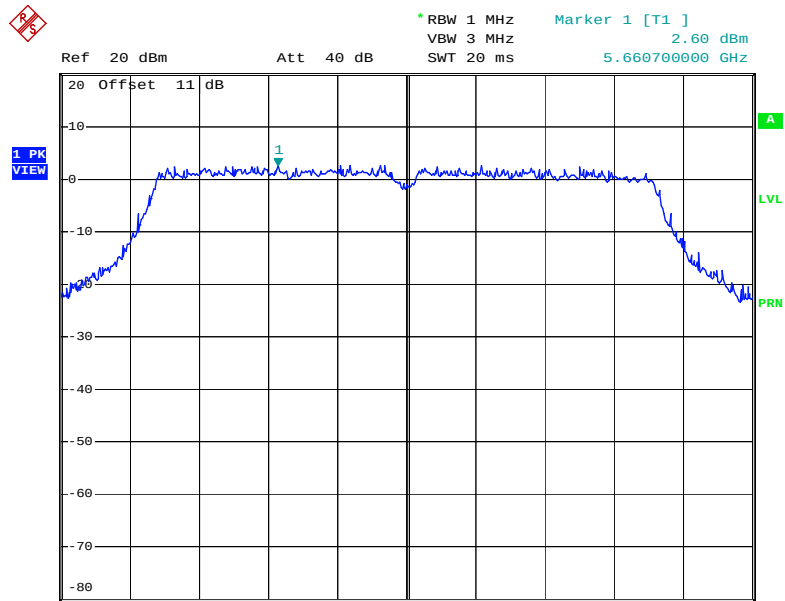
Date: 30.SEP.2010 16:31:57

Middle Channel:



Date: 30.SEP.2010 16:32:51

High Channel:



Date: 30.SEP.2010 16:33:17

6. 26-dB BANDWIDTH

6.1 Standard Applicable

According to 15.403(i). For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

6.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-04-16	2011-04-15
Attenuator	ATTEN	ATS010-6-10	DC-6GHz	2010-08-12	2011-08-11

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

6.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer = operating frequency.
3. The spectrum analyzer as RBW=300KHz (1 % of Bandwidth.), VBW = 1MHz, Sweep time = Auto.
4. Mark the peak frequency and -26dB (upper and lower) frequency.

6.4 Environmental Conditions

Temperature:	24° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.5 Summary of Test Results/Plots

For the frequency band 5.18-5.24GHz:

Test mode	Test channel	Reading MHz	Limit MHz
802.11a	Low channel (5180MHz)	23.84	/
	Middle channel (5210MHz)	24.64	/
	High channel(5240MHz)	23.92	/
802.11n HT20	Low channel (5180MHz)	23.44	/
	Middle channel (5210MHz)	24.48	/
	High channel(5240MHz)	24.40	/
802.11n HT40	Low channel (5190MHz)	44.38	/
	Middle channel (5210MHz)	43.82	/
	High channel(5230MHz)	44.10	/

For the frequency band 5.26-5.32GHz

Test mode	Test channel	Reading MHz	Limit MHz
802.11a	Low channel (5260MHz)	23.84	/
	Middle channel (5290MHz)	23.52	/
	High channel(5320MHz)	23.92	/
802.11n HT20	Low channel (5260MHz)	24.96	/
	Middle channel (5290MHz)	24.32	/
	High channel(5320MHz)	23.68	/
802.11n HT40	Low channel (5270MHz)	44.52	/
	Middle channel (5290MHz)	43.68	/
	High channel(5310MHz)	44.10	/

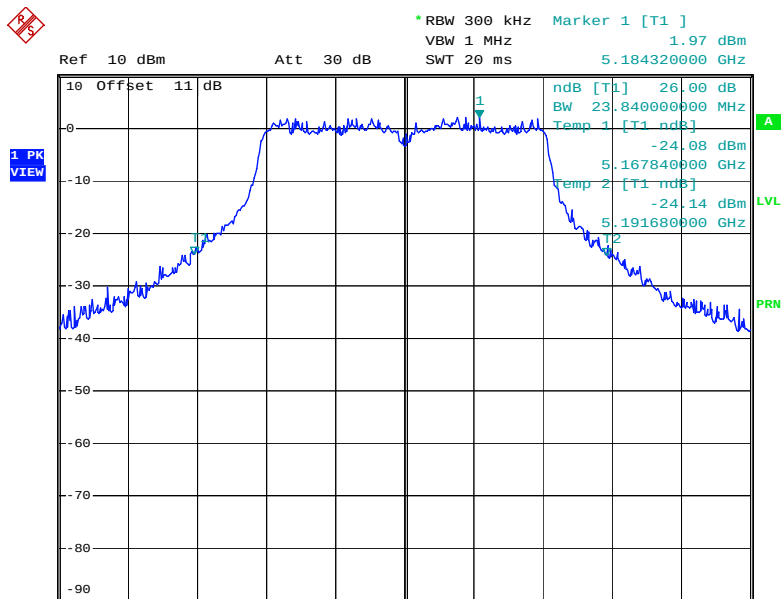
For the frequency band 5.5-5.7GHz

Test mode	Test channel	Reading MHz	Limit MHz
802.11a	Low channel (5500MHz)	24.08	/
	Middle channel (5600MHz)	23.36	/
	High channel(5700MHz)	23.68	/
802.11n HT20	Low channel (5500MHz)	24.40	/
	Middle channel (5600MHz)	23.44	/
	High channel(5700MHz)	23.76	/
802.11n HT40	Low channel (5510MHz)	44.24	/
	Middle channel (5590MHz)	43.96	/
	High channel(5670MHz)	43.40	/

For the frequency band 5.18-5.24GHz

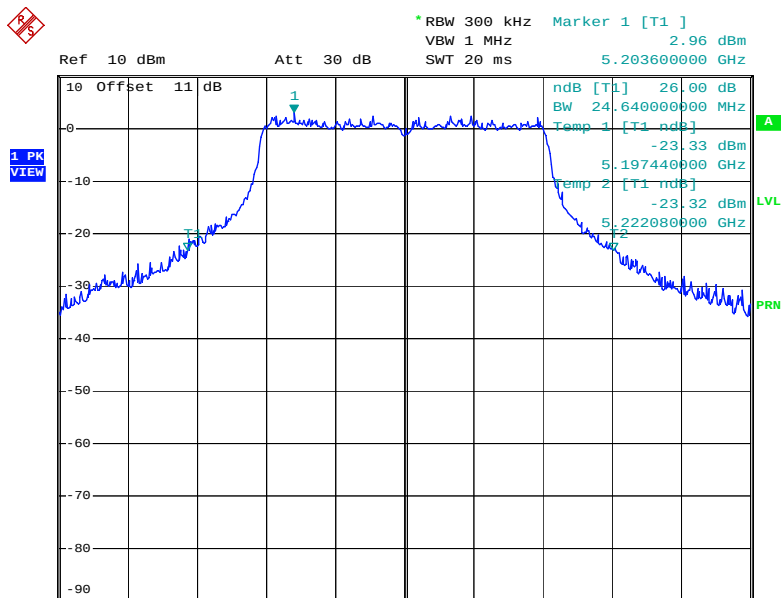
802.11a

Low Channel:



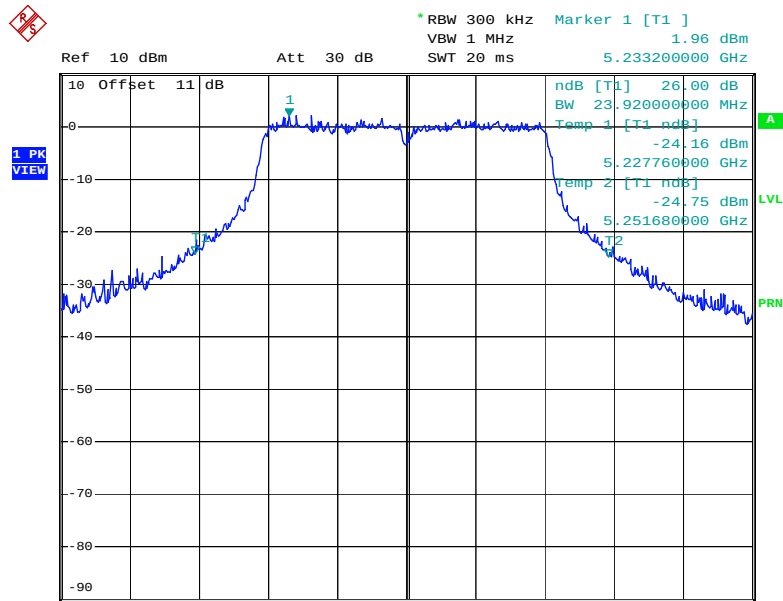
Date: 29.SEP.2010 20:27:37

Middle Channel:



Date: 29.SEP.2010 20:28:56

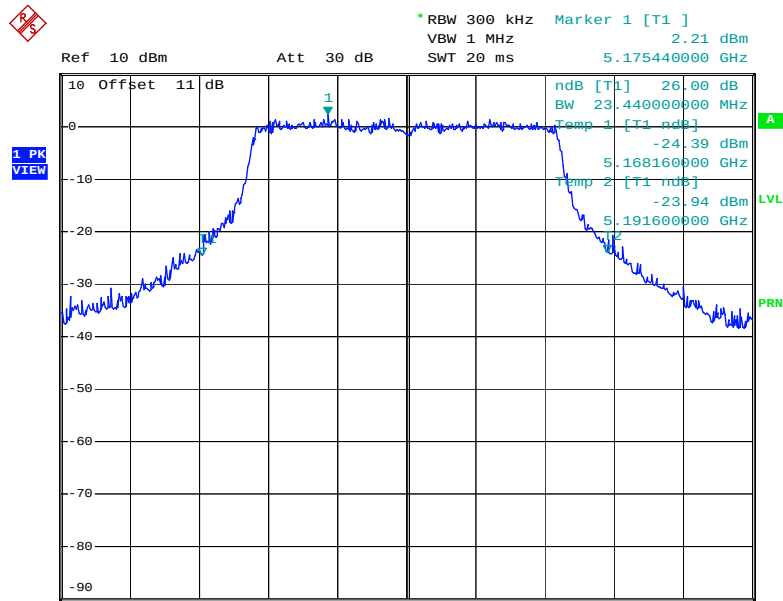
High Channel:



Date: 29.SEP.2010 20:29:30

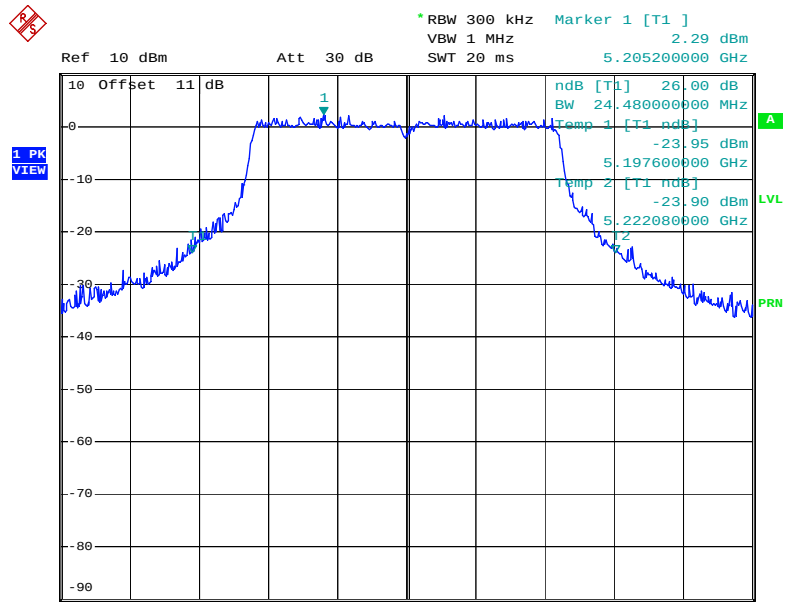
802.11n HT20

Low Channel:



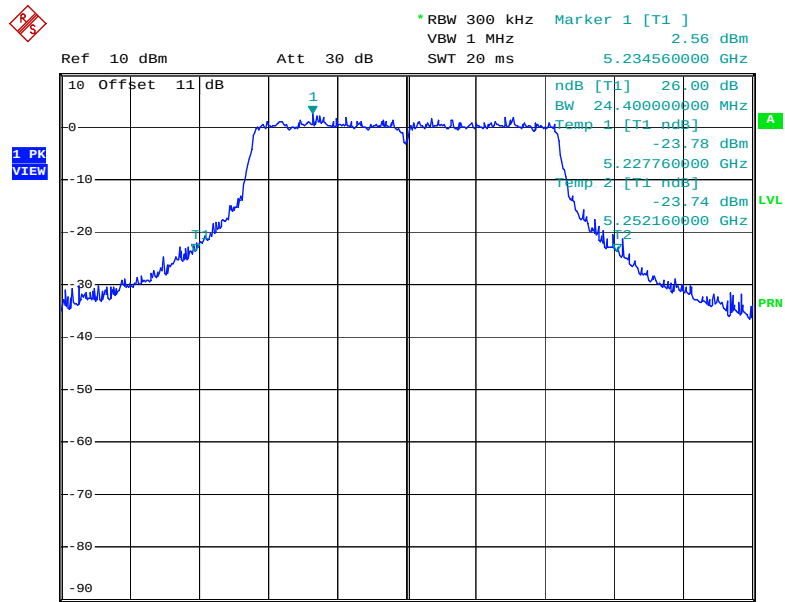
Date: 29.SEP.2010 20:26:40

Middle Channel:



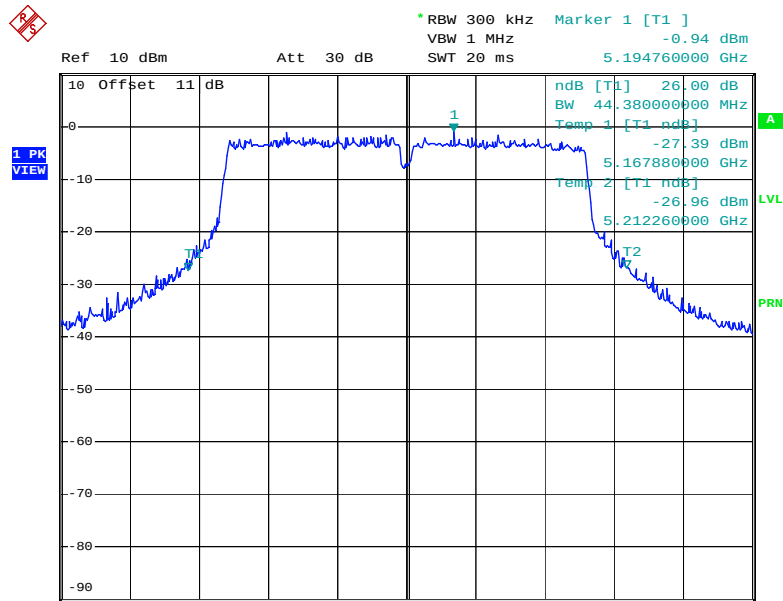
Date: 29.SEP.2010 20:26:13

High Channel:



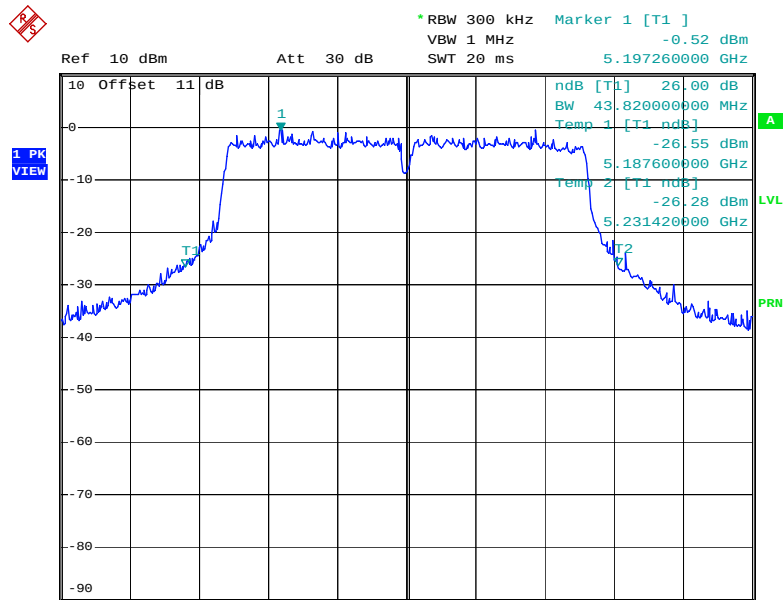
Date: 29.SEP.2010 20:25:32

802.11n HT40
Low Channel:



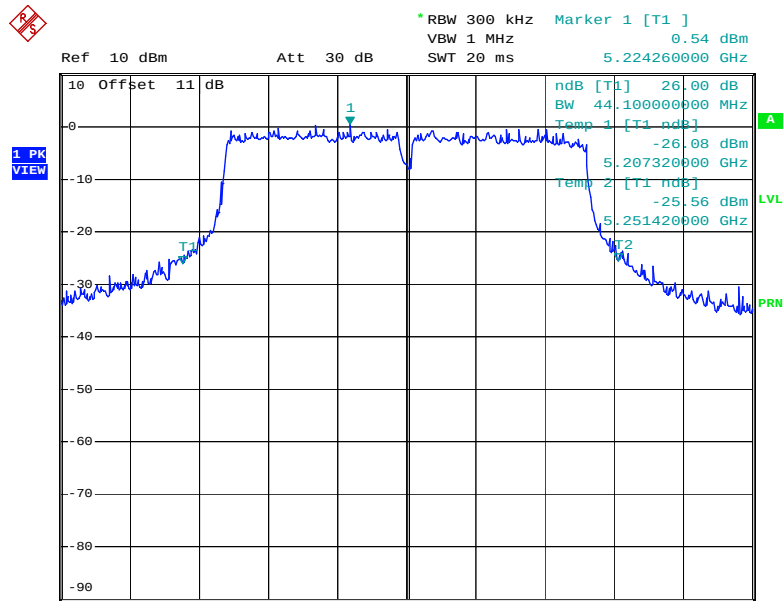
Date: 29.SEP.2010 20:22:28

Middle Channel:



Date: 29.SEP.2010 20:23:30

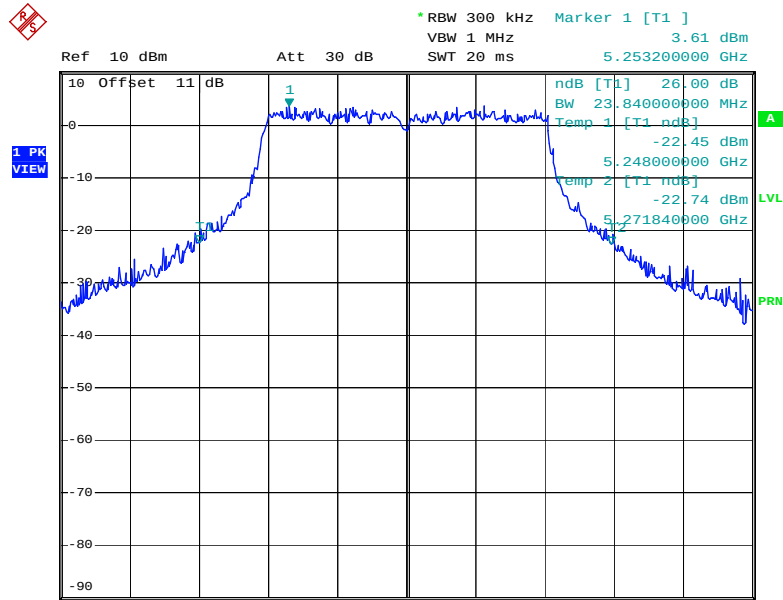
High Channel:



Date: 29.SEP.2010 20:23:58

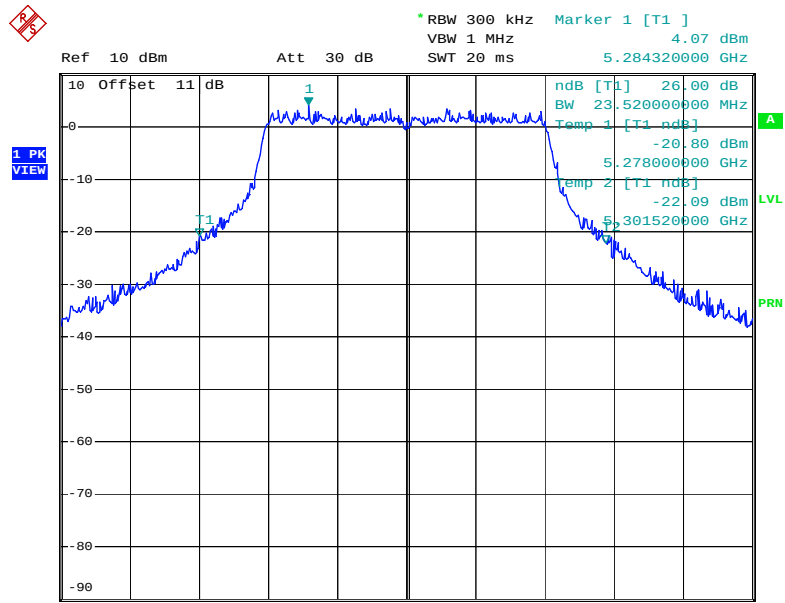
For the frequency band 5.26-5.32GHz
802.11a

Low Channel:



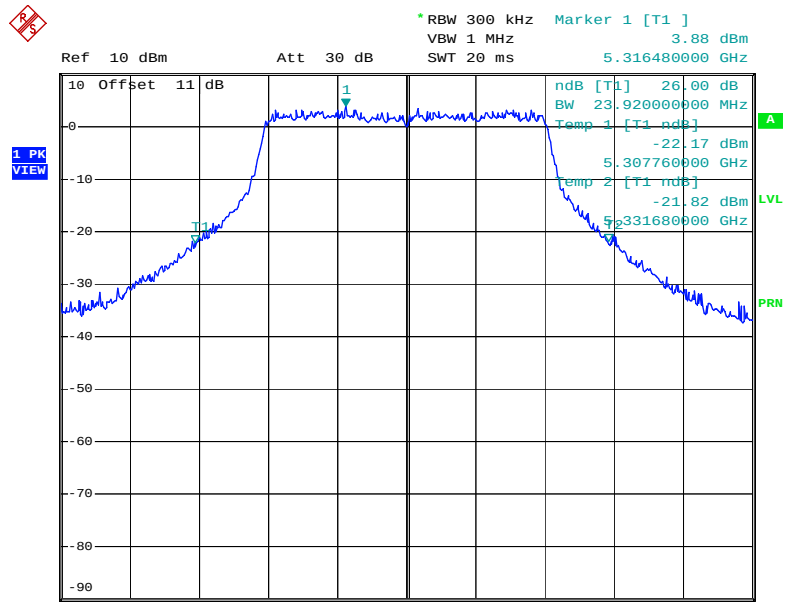
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Middle Channel:



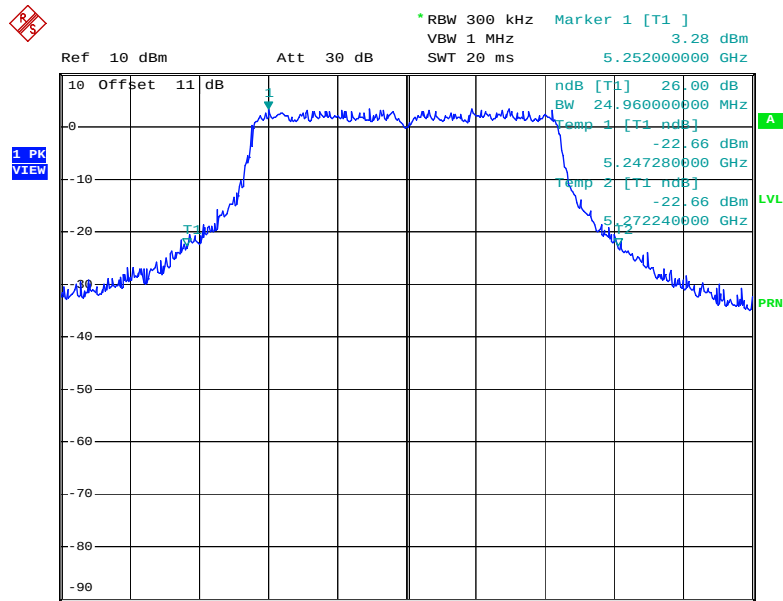
Date: 29.SEP.2010 21:01:32

High Channel:



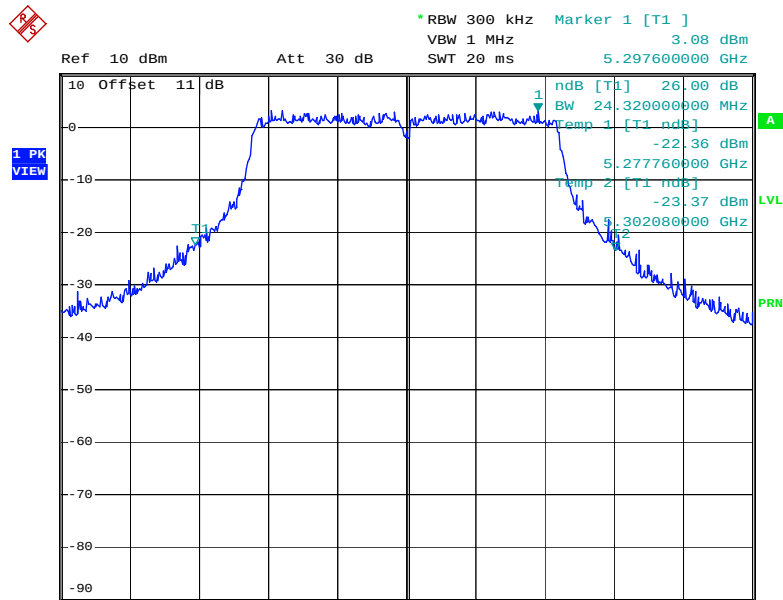
Date: 29.SEP.2010 20:59:26

802.11n HT20
Low Channel:



Date: 29.SEP.2010 21:02:14

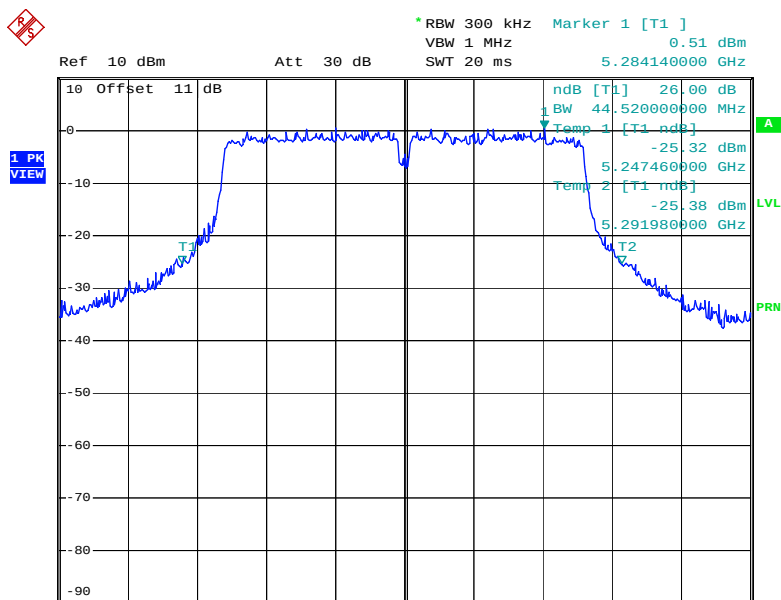
Middle Channel:



Date: 29.SEP.2010 21:02:44

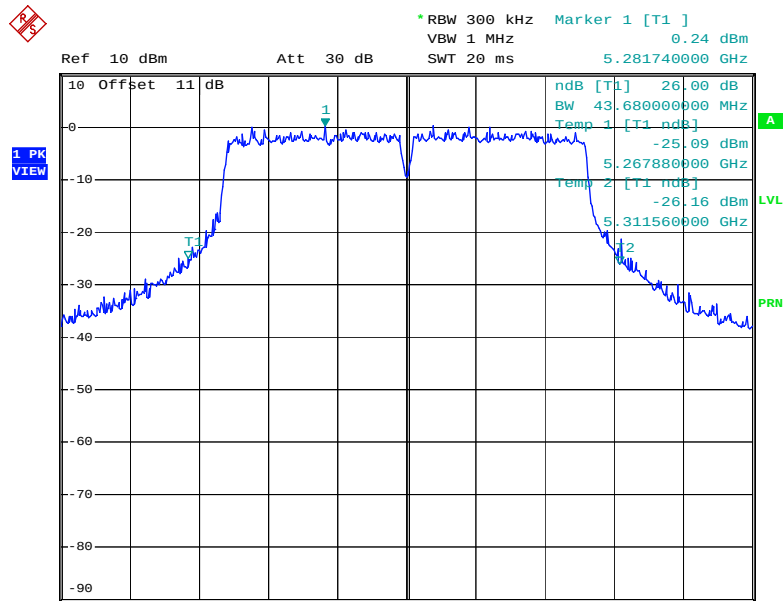
[illegible]

Low Channel:



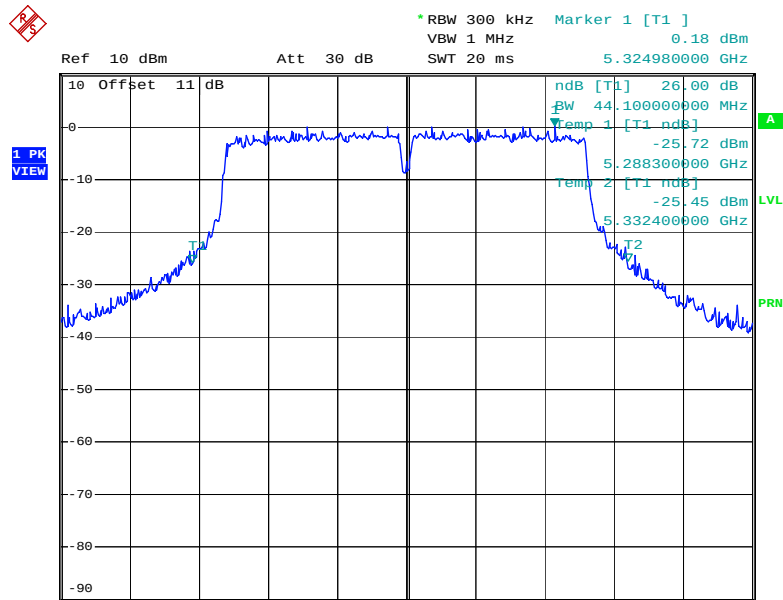
FCC PART 15E

Middle Channel:



Date: 29.SEP.2010 21:04:32

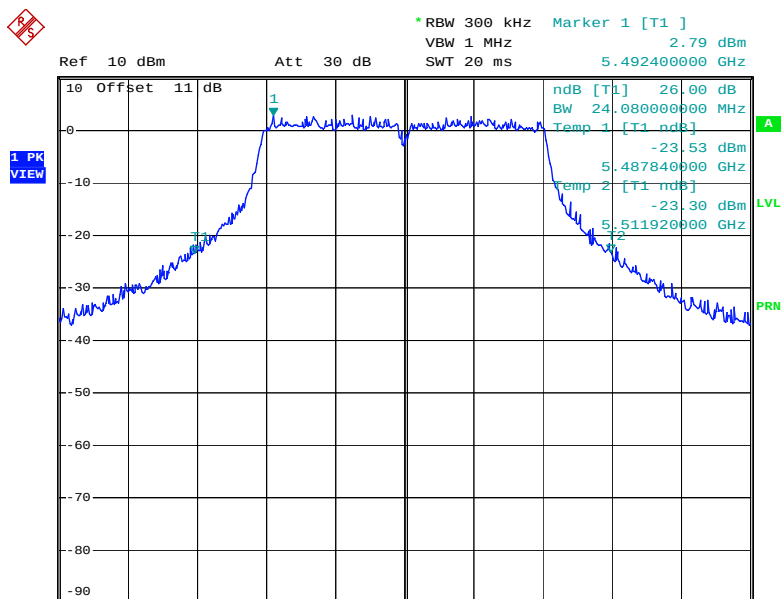
High Channel:



Date: 29.SEP.2010 21:04:04

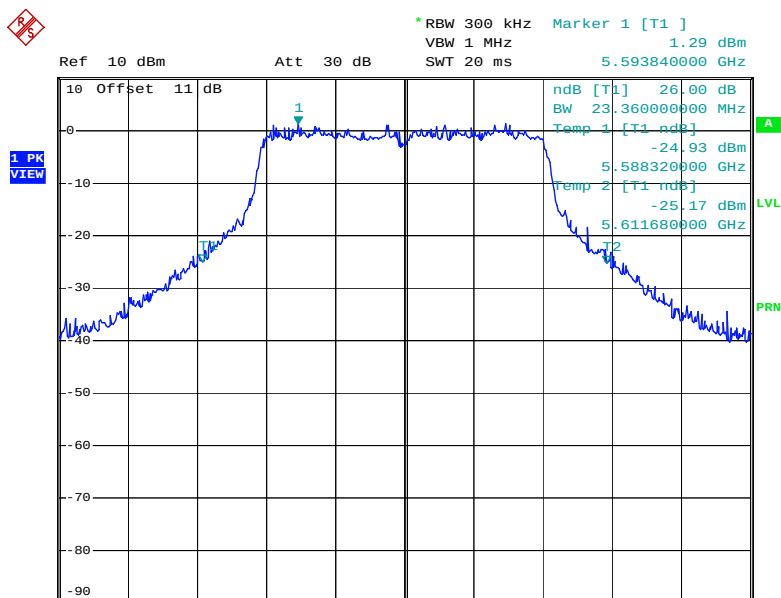
For the frequency band 5.5-5.7GHz**802.11a**

Low Channel:



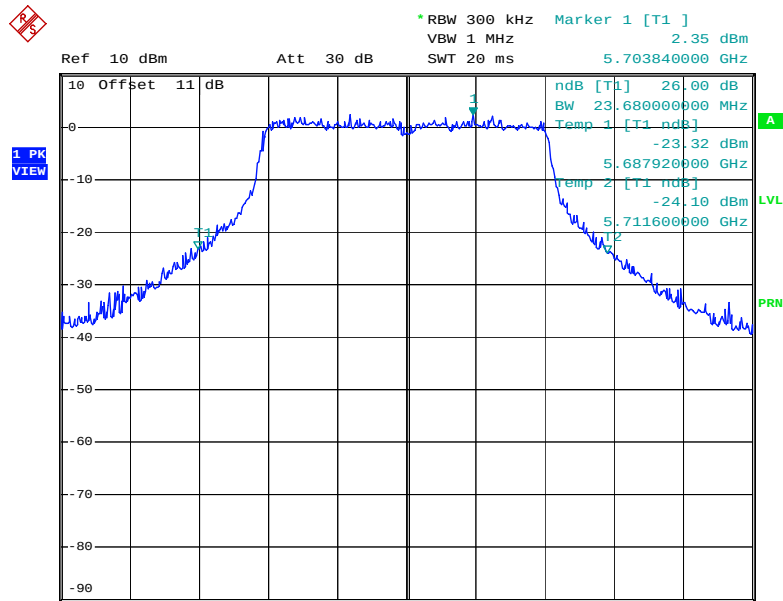
Date: 29.SEP.2010 20:56:55

Middle Channel:



Date: 29.SEP.2010 20:57:21

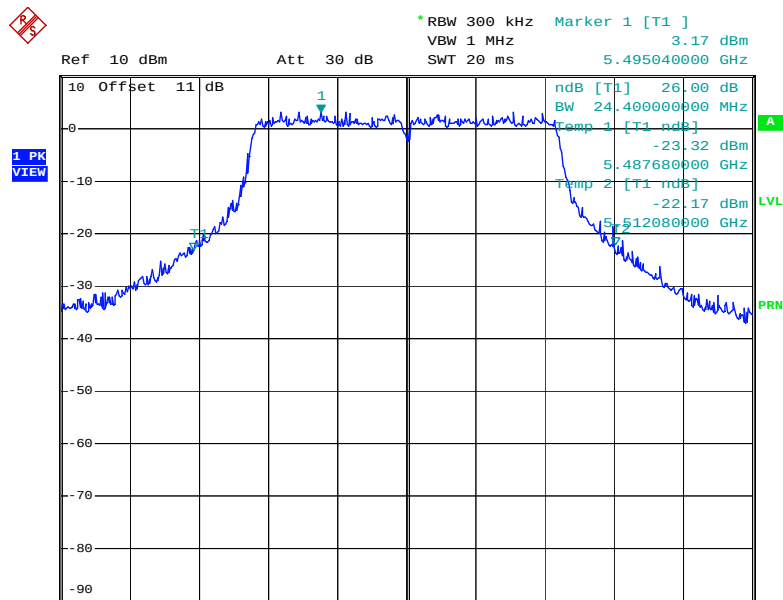
High Channel:



Date: 29.SEP.2010 20:57:57

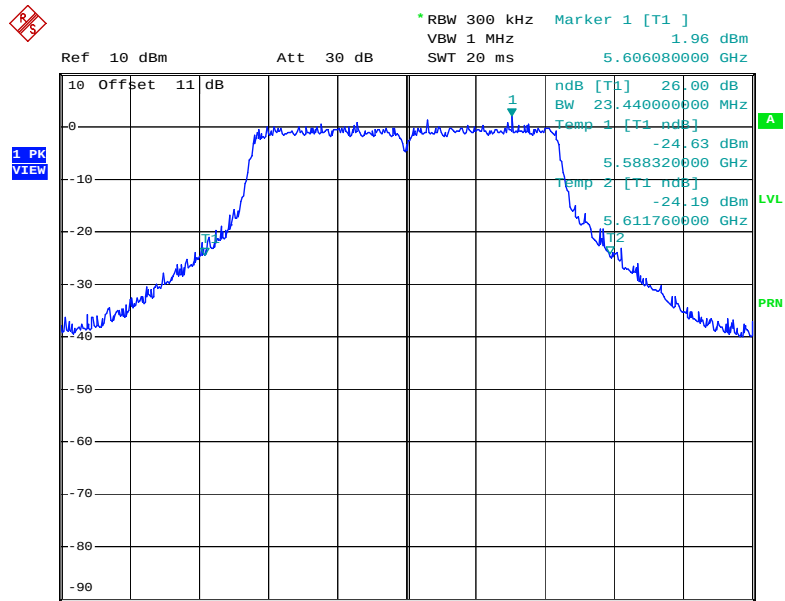
802.11n HT20

Low Channel:



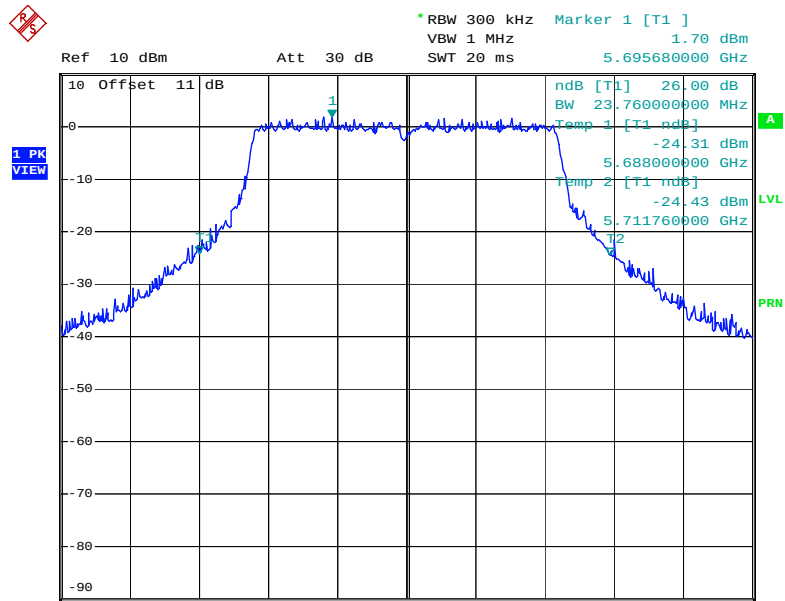
Date: 29.SEP.2010 20:56:30

Middle Channel:



Date: 29.SEP.2010 20:56:09

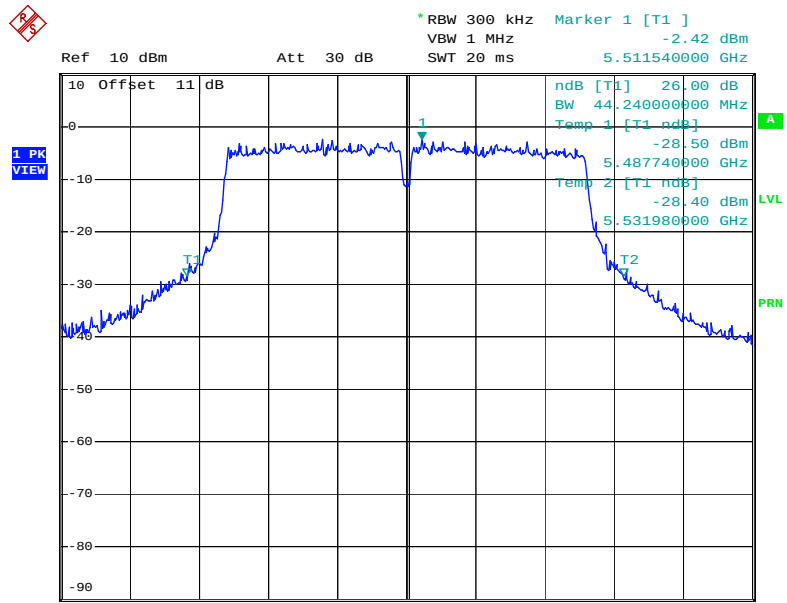
High Channel:



Date: 29.SEP.2010 20:55:41

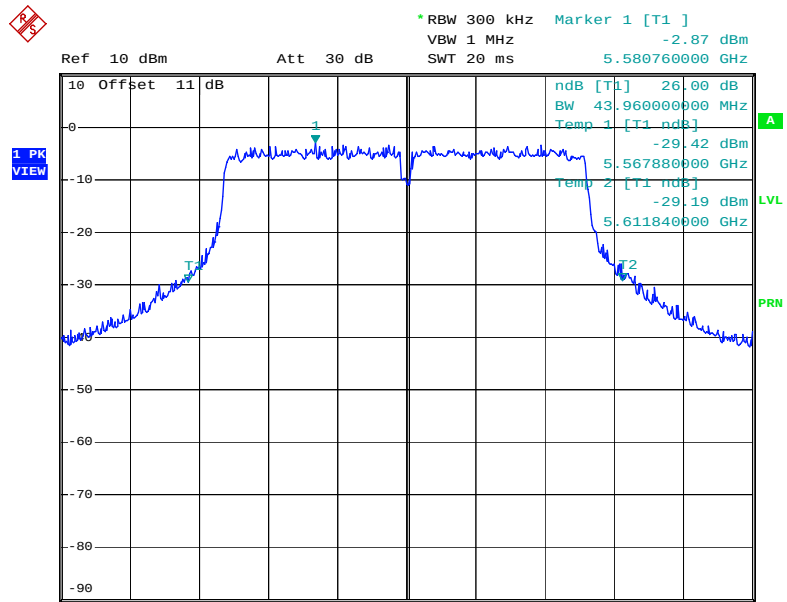
802.11n HT40

Low Channel:



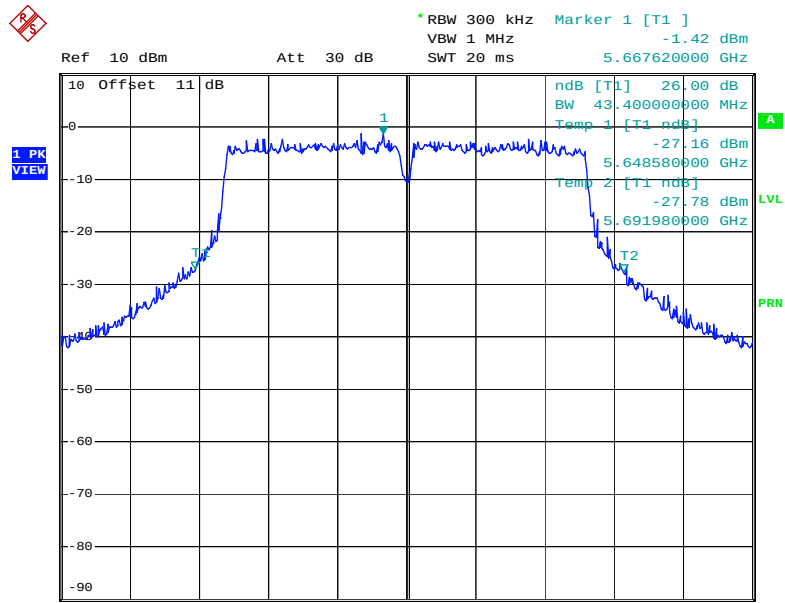
Date: 29.SEP.2010 20:53:43

Middle Channel:



Date: 29.SEP.2010 20:54:10

High Channel:



Date: 29.SEP.2010 20:54:40

7. MAXIMUM CONDUCTED OUTPUT POWER

7.1 Standard Applicable

According to 15.407(a). For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10\log B$, where B is the 26-dB emission bandwidth in MHz.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10\log B$, where B is the 26 dB emission bandwidth in megahertz.

7.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-04-16	2011-04-15
Attenuator	ATTEN	ATS010-6-10	DC-6GHz	2010-08-12	2011-08-11

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

7.3 Test Procedure

According to section U-NII Bands-power output of the DA 02-2138, the method #1 of the power output was used, the following is the measurement procedure.

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW $\geq$ 3 MHz.
3. Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode
4. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to "free run".
5. Trace average 100 traces in power averaging mode.
6. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

7.4 Environmental Conditions

Temperature:	21° C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

7.5 Summary of Test Results/Plots

For the frequency band 5.18-5.24GHz

Test mode	Frequency MHz	Chain 0 dBm	Chain 1 dBm	Total Power dBm	Total Power mW	Limit mW
802.11a	5180	13.07	12.98	16.04	40.14	50
	5210	13.52	12.90	16.23	41.99	50
	5240	13.68	13.39	16.55	45.16	50
802.11n HT20	5180	12.81	12.73	15.78	37.85	50
	5210	13.38	13.33	16.37	43.30	50
	5240	13.62	12.51	16.11	40.84	50
802.11n HT40	5190	13.56	13.26	16.42	43.88	50
	5210	13.76	13.33	16.56	45.30	50
	5230	13.70	13.86	16.79	47.76	50

For the frequency band 5.26-5.32GHz

Test mode	Frequency MHz	Chain 0 dBm	Chain 1 dBm	Total Power dBm	Total Power mW	Limit mW
802.11a	5260	19.58	19.20	22.40	173.96	250
	5290	19.80	18.71	22.30	169.80	250
	5320	19.71	20.08	22.91	195.40	250
802.11n HT20	5260	20.20	19.32	22.79	190.22	250
	5290	19.98	19.09	22.57	180.64	250
	5320	19.82	19.97	22.91	195.25	250
802.11n HT40	5270	20.25	19.74	23.01	200.11	250
	5290	19.63	19.79	22.72	187.11	250
	5310	19.59	20.73	23.21	209.30	250

For the frequency band 5.5-5.7GHz

Test mode	Frequency MHz	Chain 0 dBm	Chain 1 dBm	Total Power dBm	Total Power mW	Limit mW
802.11a	5500	18.72	19.12	21.93	156.13	186.2*
	5600	17.48	18.76	21.18	131.14	186.2*
	5700	19.28	18.73	22.02	159.37	186.2*
802.11n HT20	5500	19.39	19.53	22.47	176.64	186.2*
	5600	18.55	19.76	22.21	166.24	186.2*
	5700	17.64	19.04	21.41	138.24	186.2*
802.11n HT40	5510	17.75	18.37	21.08	128.27	186.2*
	5590	17.82	18.97	21.44	139.42	186.2*
	5670	17.60	17.90	20.76	119.20	186.2*

*: Limit = 24dBm – (Antenna Gain – 6dBi), Antenna Gain = 7.3dBi, so Limit = 22.7dBm = 186.2mW

8. PEAK EXCURSION

8.1 Standard Applicable

According to 15.407(a)(6). The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

8.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-04-16	2011-04-15
Attenuator	ATTEN	ATS010-6-10	DC-6GHz	2010-08-12	2011-08-11

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

8.3 Test Procedure

According to section U-NII-peak excursion of the DA 20-2138, the following is the measurement procedure.

Set the spectrum analyzer span to view the entire emission bandwidth. The largest difference between the following two traces must be ≤ 13 dB for all frequencies across the emission bandwidth. Submit a plot.

1st Trace:

- Set RBW = 1 MHz, VBW ≥ 3 MHz with peak detector and maxhold settings.

2nd Trace:

- If Method #1 was used for the peak conducted transmit output power test, then create the 2nd trace using the settings described in Method #1.
- If Methods #2 or #3 were used for the peak conducted transmit power test, then create the 2nd trace using the setting described in Method #3.

8.4 Environmental Conditions

Temperature:	21° C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

8.5 Summary of Test Results/Plots

For the frequency band 5.18-5.24GHz:

Test mode	Test channel	Reading dBc	Limit dBc
802.11a	Low channel (5180MHz)	-4.23	-13
	Middle channel (5210MHz)	-1.96	-13
	High channel(5240MHz)	-2.55	-13
802.11n HT20	Low channel (5180MHz)	-4.85	-13
	Middle channel (5210MHz)	-4.88	-13
	High channel(5240MHz)	-3.29	-13
802.11n HT40	Low channel (5190MHz)	-4.26	-13
	Middle channel (5210MHz)	-5.87	-13
	High channel(5230MHz)	-3.90	-13

For the frequency band 5.26-5.32GHz

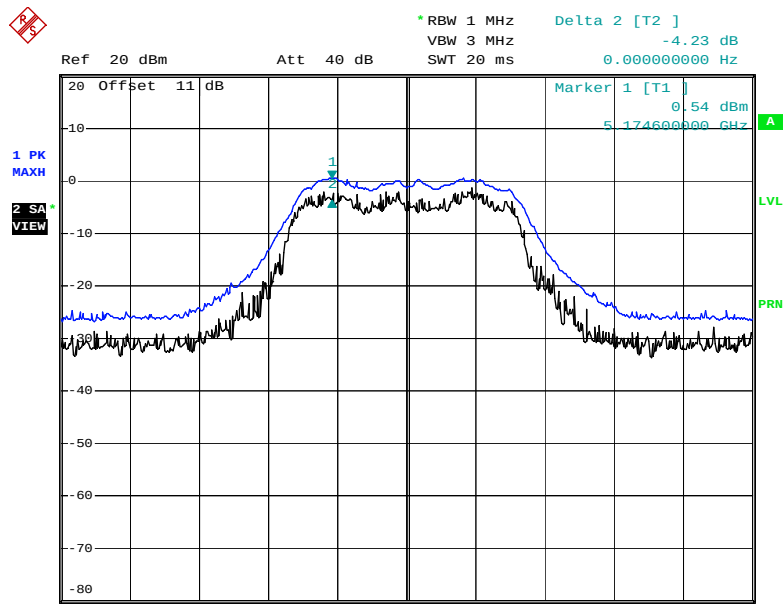
Test mode	Test channel	Reading dBc	Limit dBc
802.11a	Low channel (5260MHz)	-1.70	-13
	Middle channel (5290MHz)	-3.87	-13
	High channel(5320MHz)	-3.33	-13
802.11n HT20	Low channel (5260MHz)	-4.44	-13
	Middle channel (5290MHz)	-5.67	-13
	High channel(5320MHz)	-3.18	-13
802.11n HT40	Low channel (5270MHz)	-4.76	-13
	Middle channel (5290MHz)	-3.14	-13
	High channel(5310MHz)	-5.03	-13

For the frequency band 5.55-5.7GHz

Test mode	Test channel	Reading dBc	Limit dBc
802.11a	Low channel (5500MHz)	-2.85	-13
	Middle channel (5600MHz)	-3.53	-13
	High channel(5700MHz)	-2.22	-13
802.11n HT20	Low channel (5500MHz)	-5.20	-13
	Middle channel (5600MHz)	-3.93	-13
	High channel(5700MHz)	-4.07	-13
802.11n HT40	Low channel (5510MHz)	-4.54	-13
	Middle channel (5590MHz)	-3.37	-13
	High channel(5670MHz)	-2.93	-13

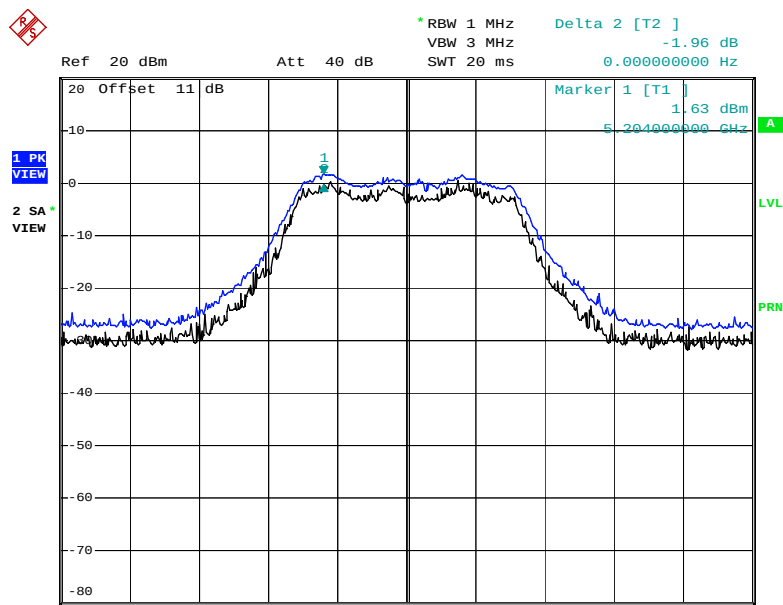
For the frequency band 5.18-5.24GHz
802.11a

Low Channel:



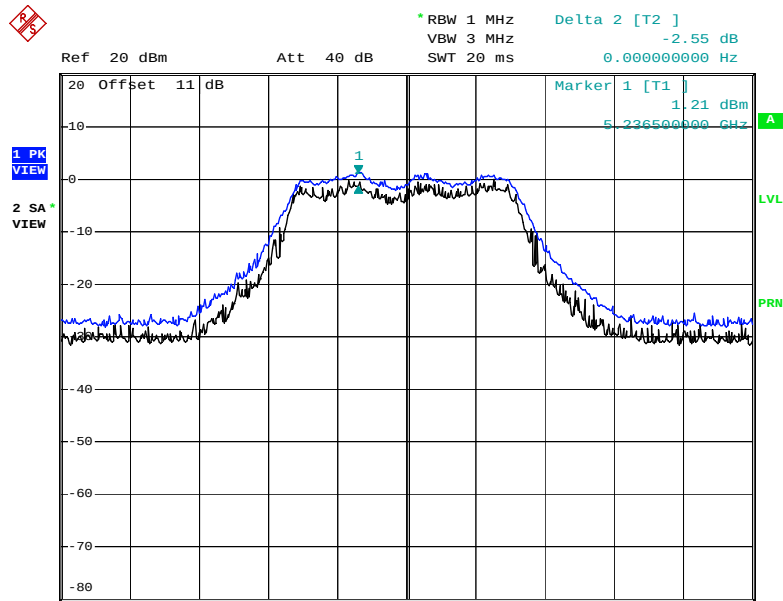
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Middle Channel:



Date: 30.SEP.2010 16:50:21

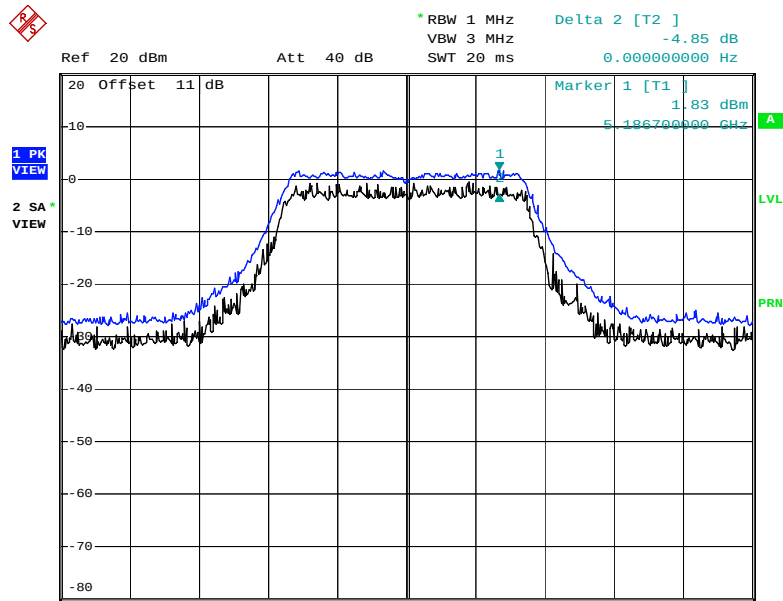
High Channel:



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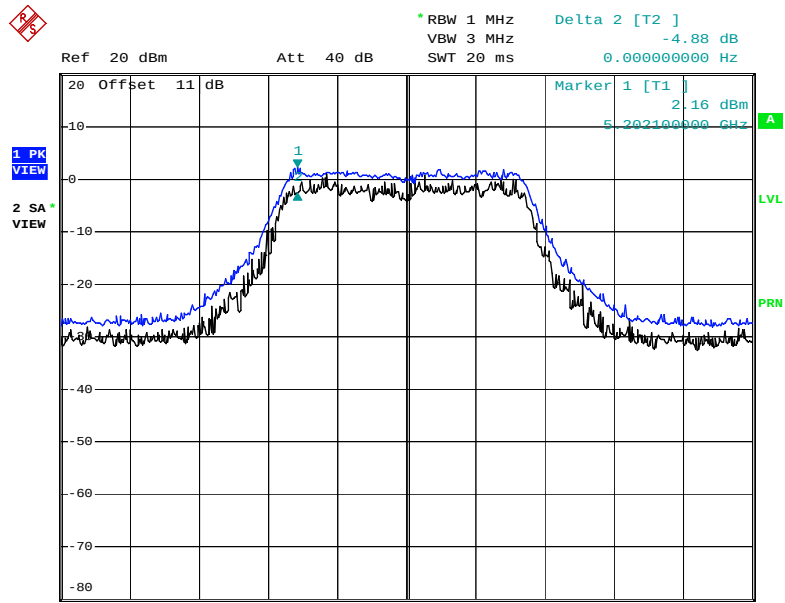
802.11n HT20

Low Channel:



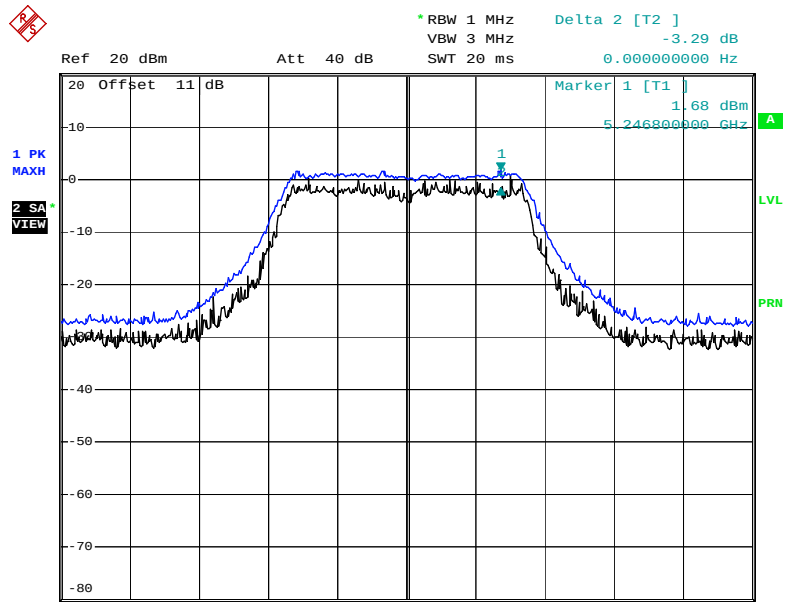
Date: 30.SEP.2010 16:59:43

Middle Channel:



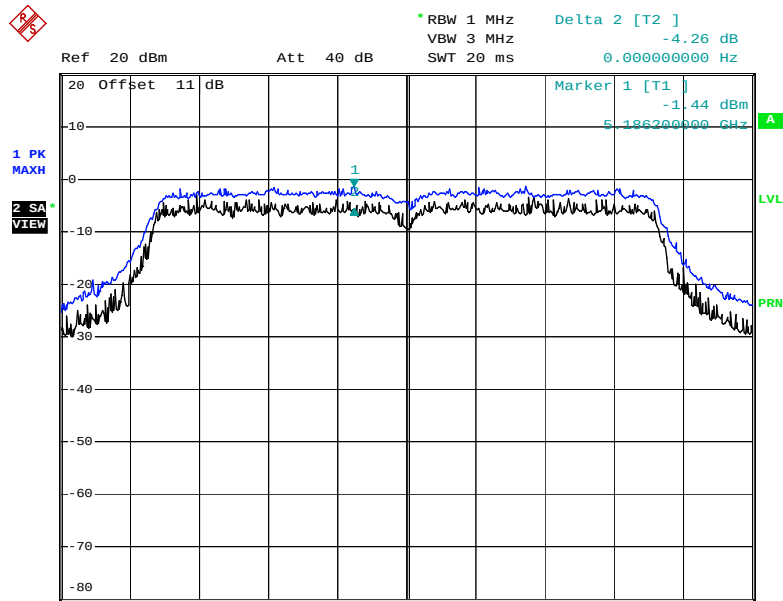
Date: 30.SEP.2010 16:58:36

High Channel:



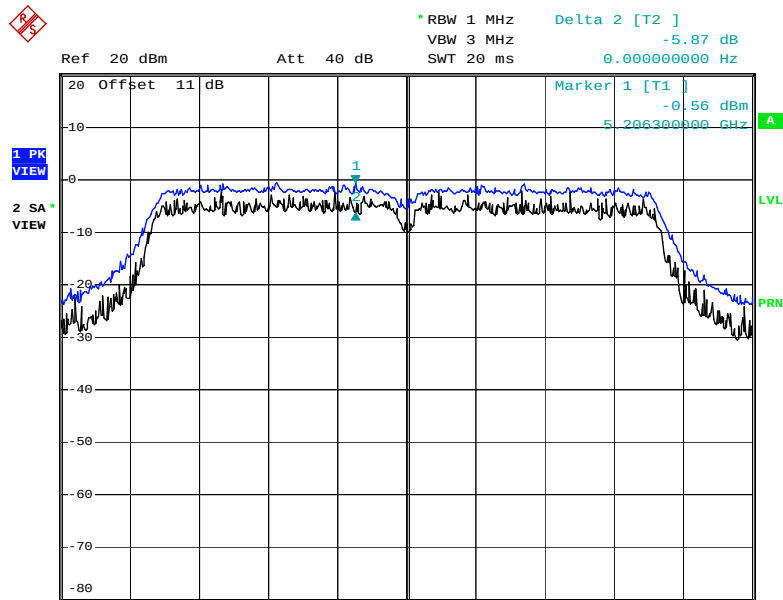
Date: 30.SEP.2010 16:57:23

802.11n HT40
Low Channel:



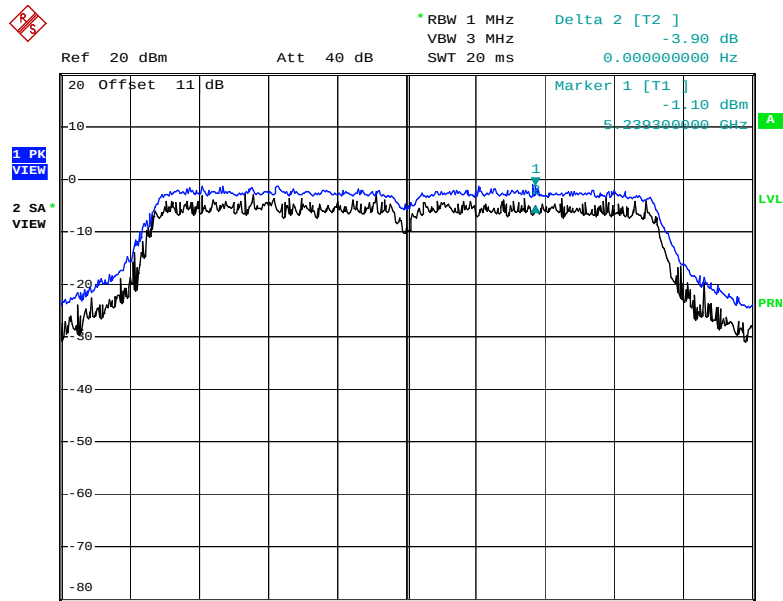
Date: 30.SEP.2010 17:01:29

Middle Channel:



Date: 30.SEP.2010 17:03:13

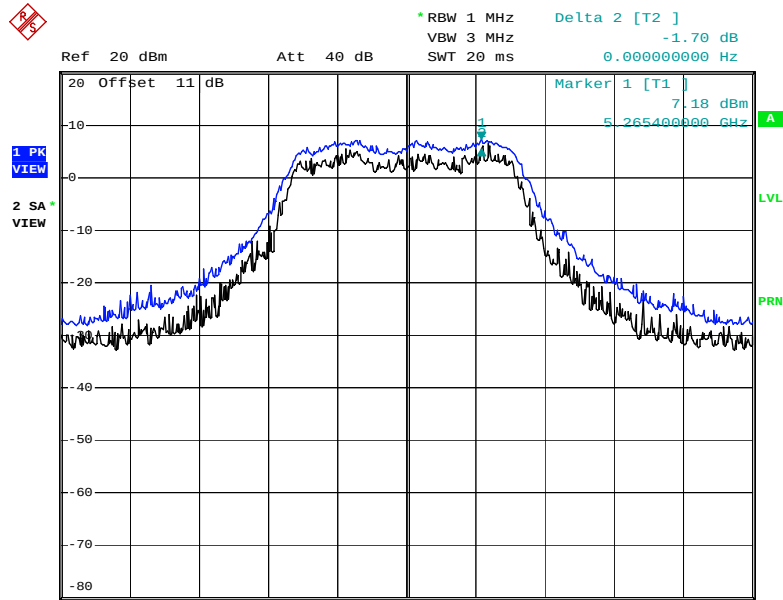
High Channel:



Date: 30.SEP.2010 17:04:09

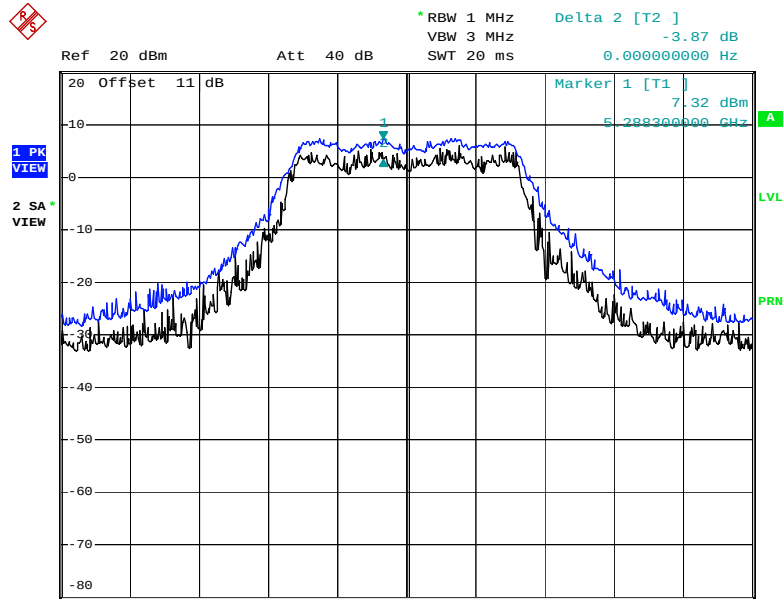
For the frequency band 5.26-5.32GHz
802.11a

Low Channel:



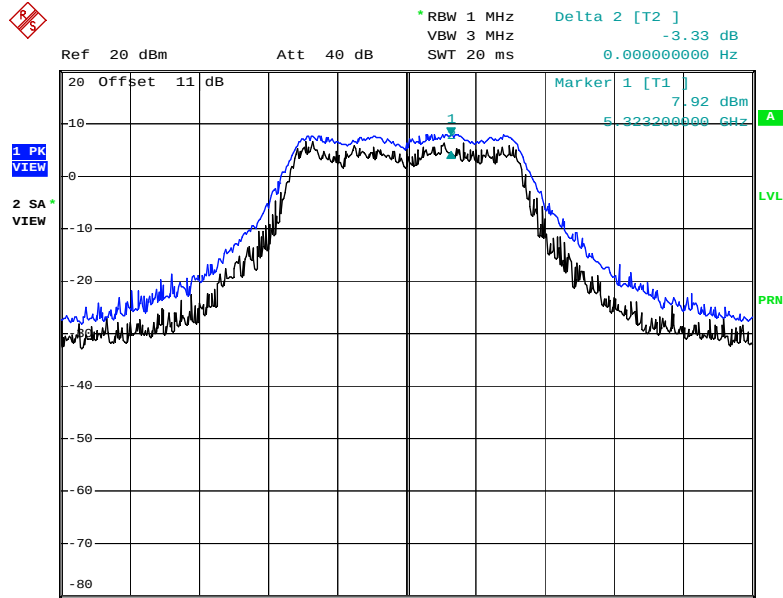
Date: 30.SEP.2010 17:14:21

Middle Channel:



Date: 30.SEP.2010 17:13:34

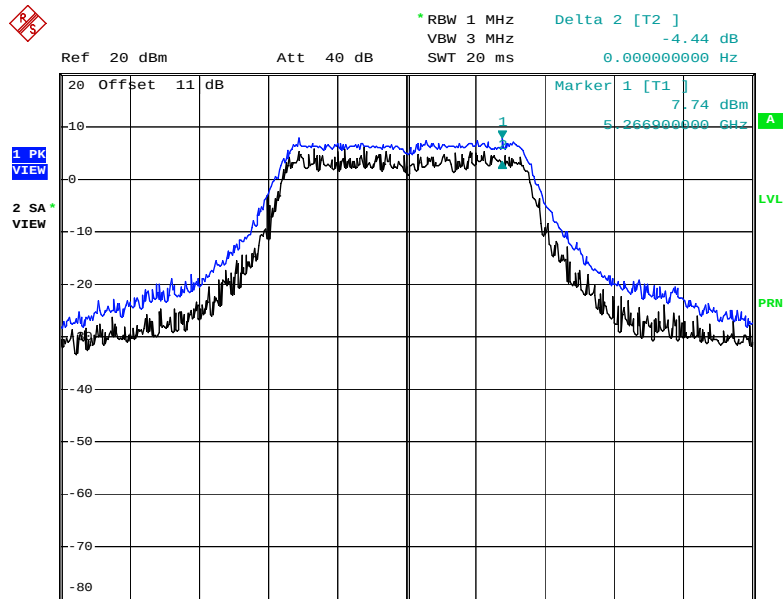
High Channel:



Date: 30.SEP.2010 17:12:40

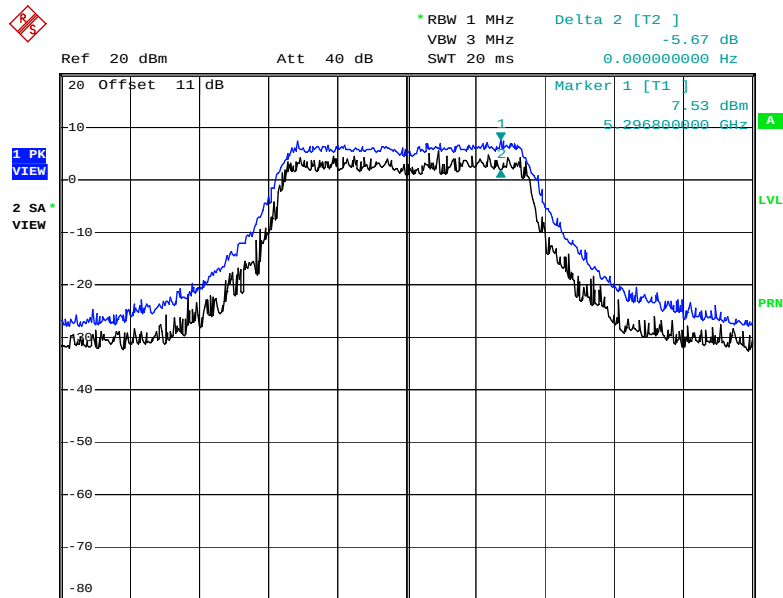
802.11n HT20

Low Channel:



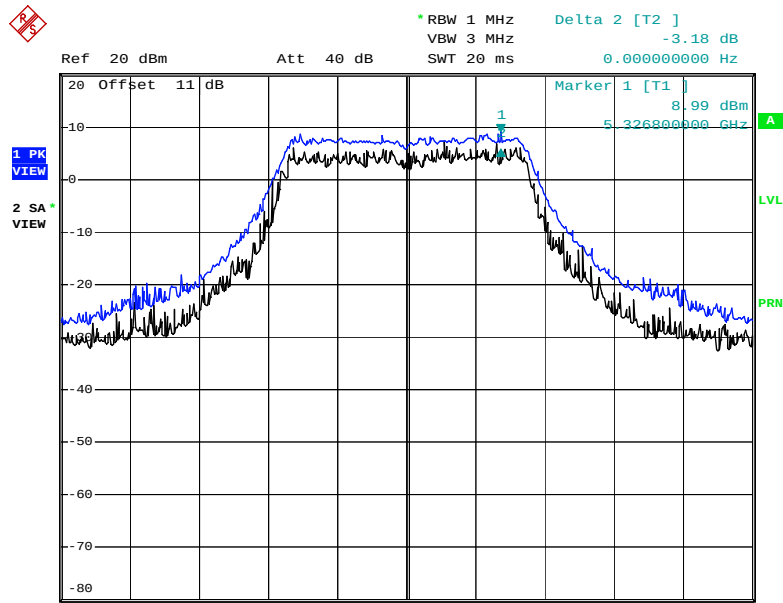
Date: 30.SEP.2010 17:09:46

Middle Channel:



Date: 30.SEP.2010 17:10:40

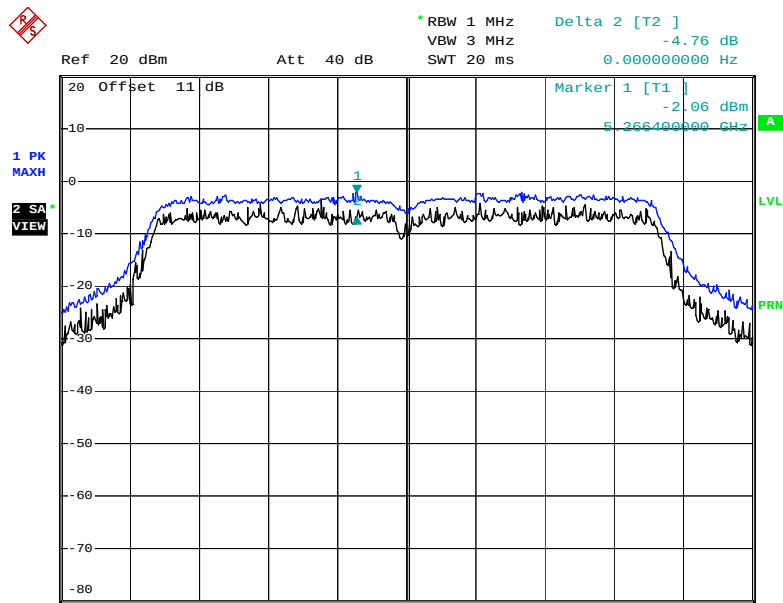
High Channel:



Date: 30.SEP.2010 17:11:28

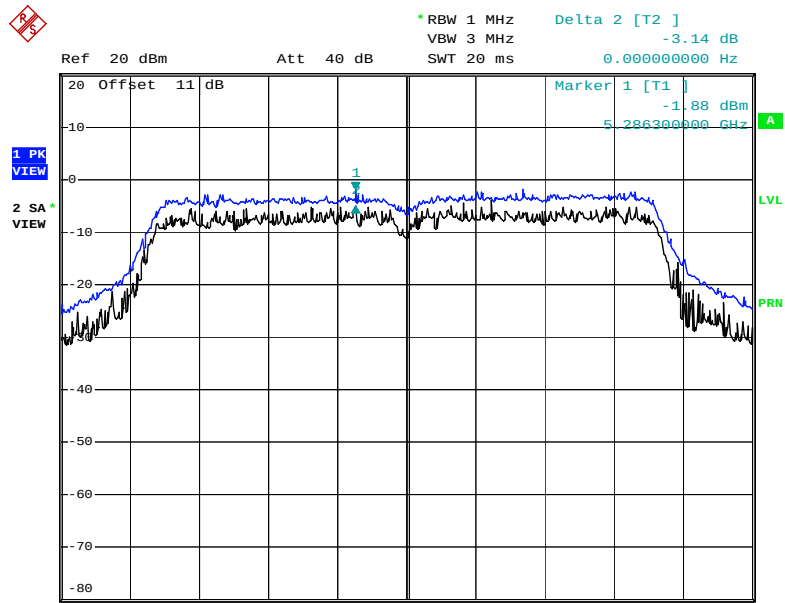
802.11n HT40

Low Channel:



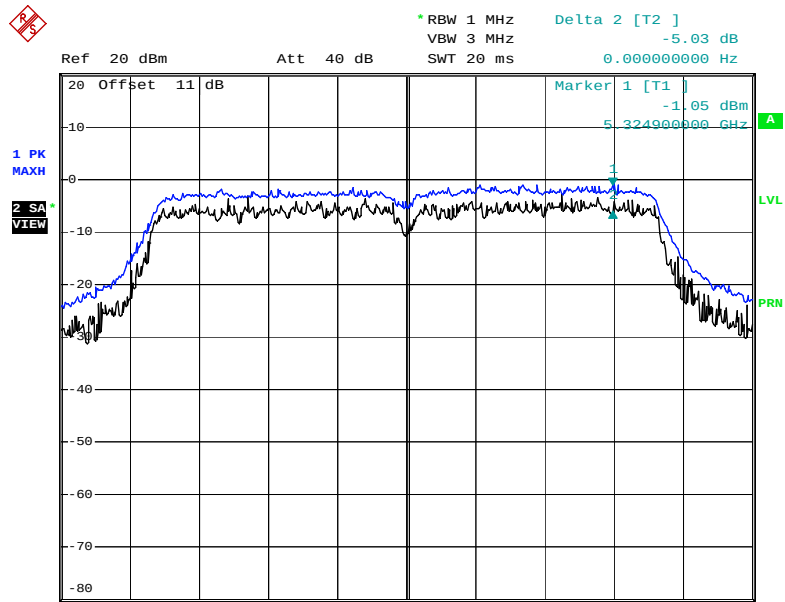
Date: 30.SEP.2010 17:07:38

Middle Channel:



Date: 30.SEP.2010 17:06:24

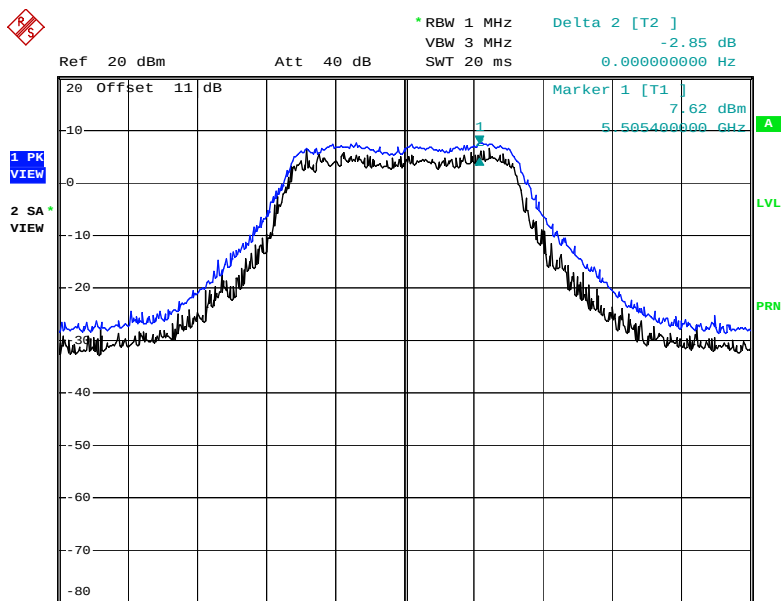
High Channel:



Date: 30.SEP.2010 17:05:24

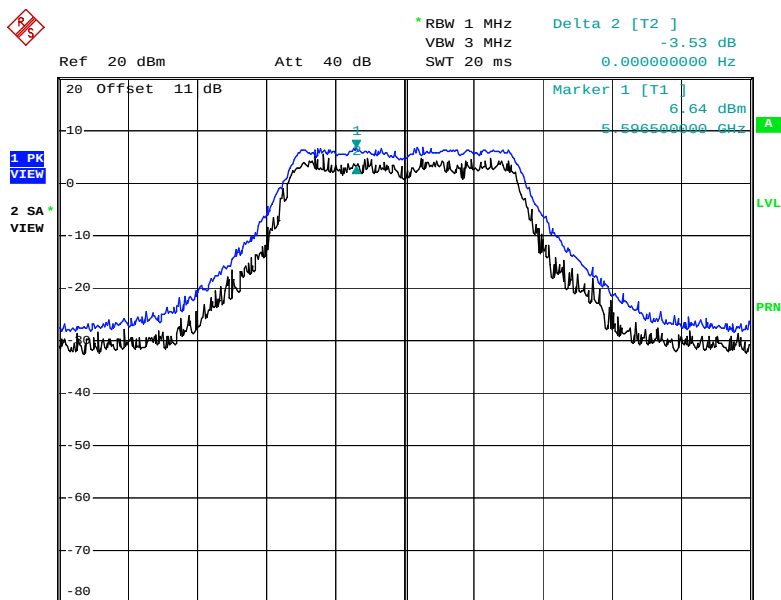
For the frequency band 5.5-5.7GHz**802.11a**

Low Channel:



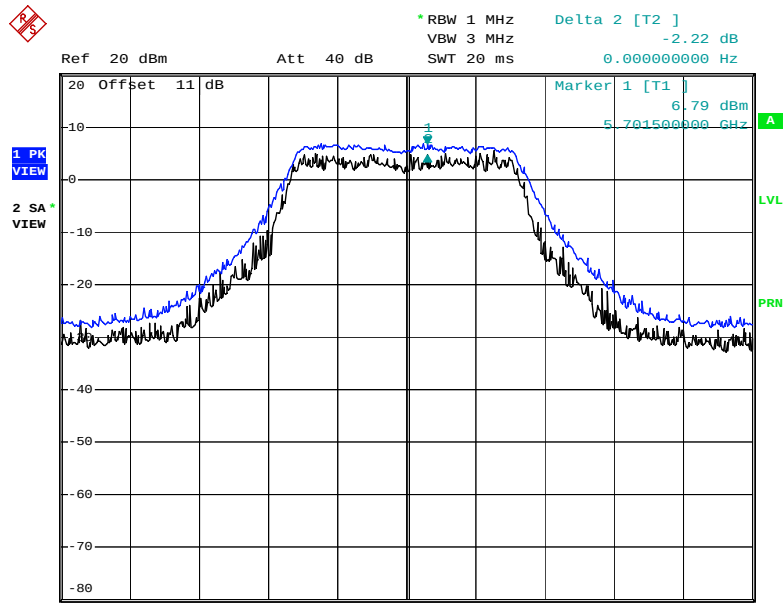
Date: 30.SEP.2010 17:15:33

Middle Channel:



Date: 30.SEP.2010 17:16:20

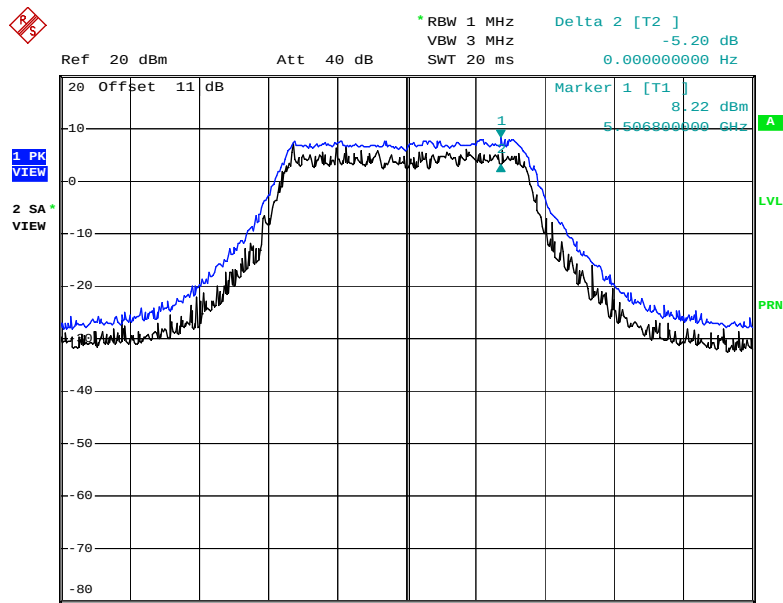
High Channel:



Date: 30.SEP.2010 17:17:04

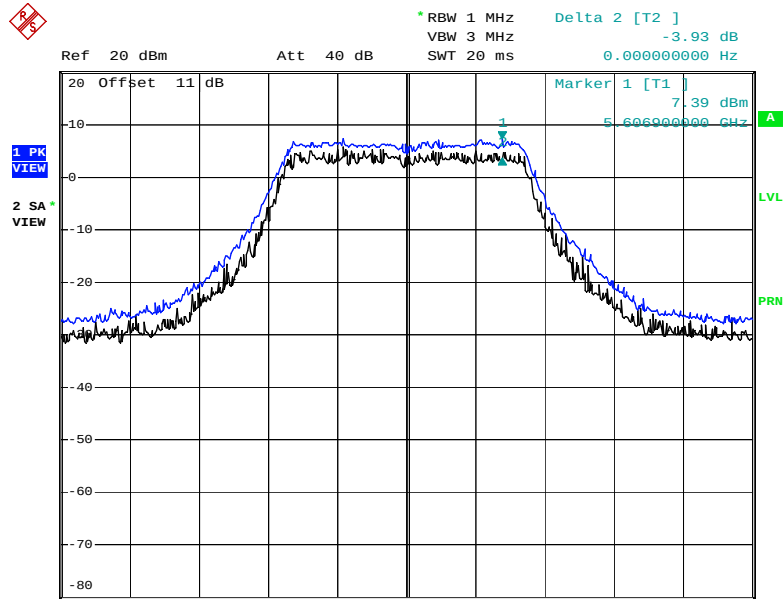
802.11n HT20

Low Channel:



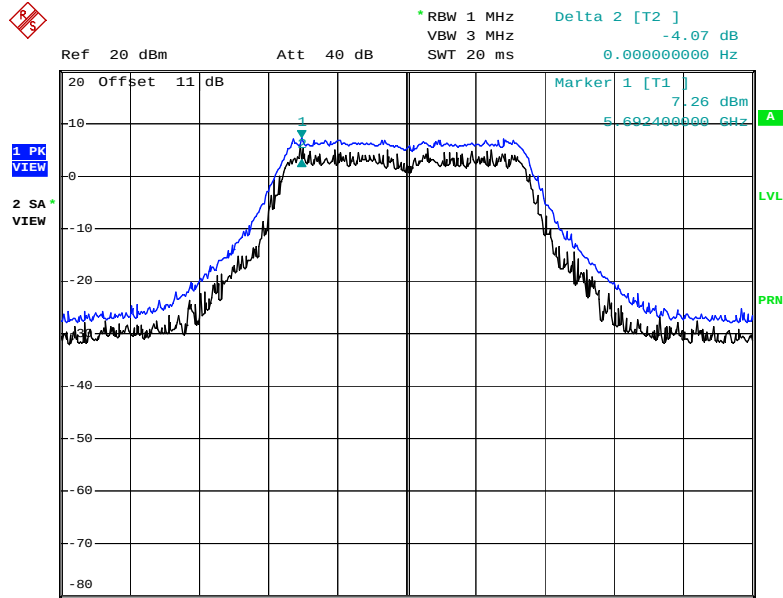
Date: 30.SEP.2010 17:22:18

Middle Channel:



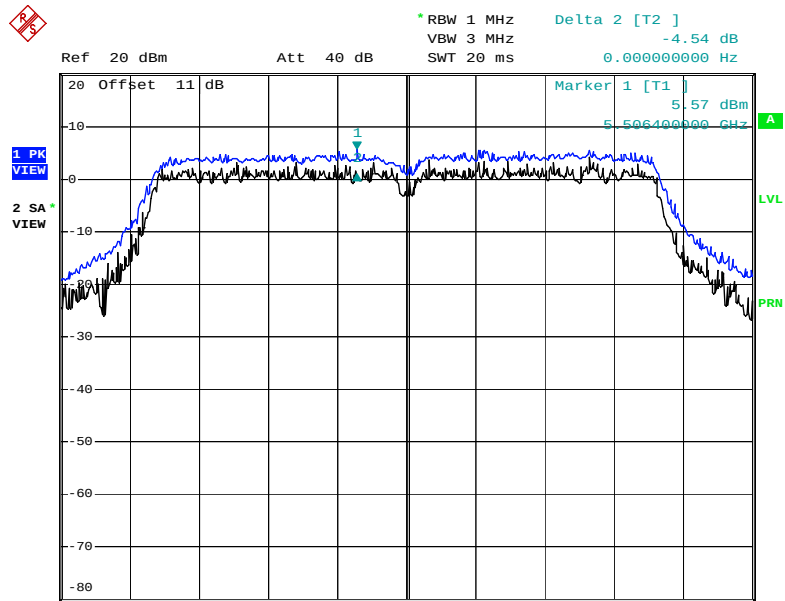
Date: 30.SEP.2010 17:18:48

High Channel:



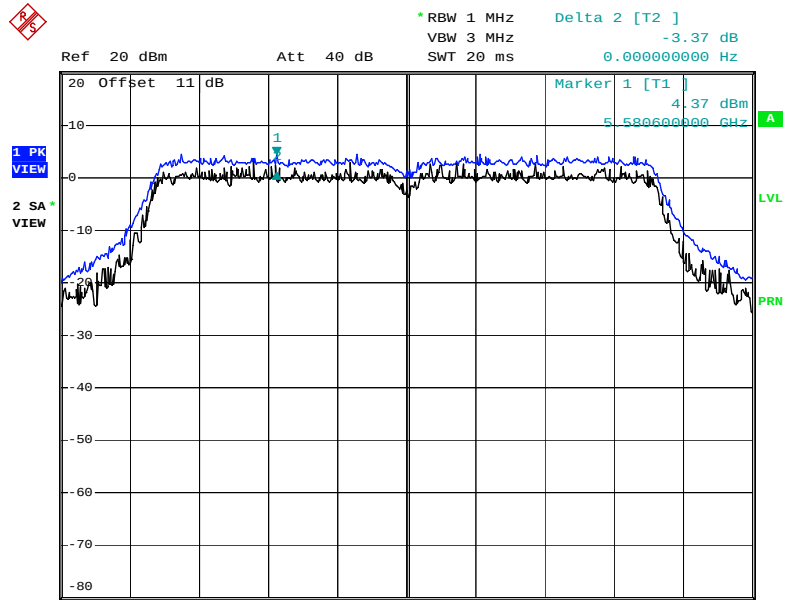
Date: 30.SEP.2010 17:17:59

802.11n HT40
Low Channel:



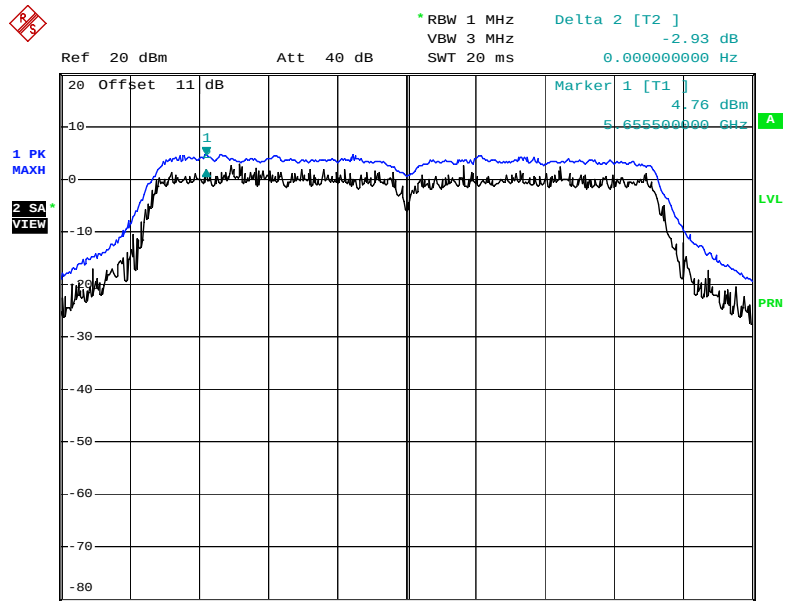
Date: 30.SEP.2010 17:23:15

Middle Channel:



Date: 30.SEP.2010 17:24:07

High Channel:



Date: 30.SEP.2010 17:26:57

9. CONDUCTED SPURIOUS EMISSIONS

9.1 Standard Applicable

According to §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

9.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-04-16	2011-04-15
Attenuator	ATTEN	ATS010-6-10	DC-6GHz	2010-08-12	2011-08-11

9.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer via a RF combiner.
2. Set the spectrum analyzer as RBW = 1MHz, VBW=1MHz, Sweep = auto
3. Set the Lowest, Middle and Highest Transmitting Channel, observed the outside band of 30MHz to 30GHz, then mark the higher-level emission for comparing with the FCC rules.

9.4 Environmental Conditions

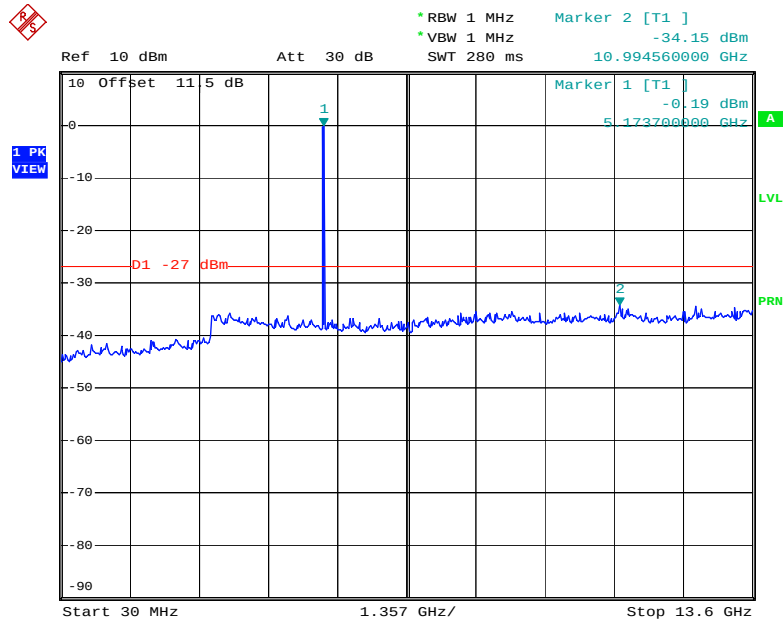
Temperature:	21° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

9.5 Summary of Test Results/Plots

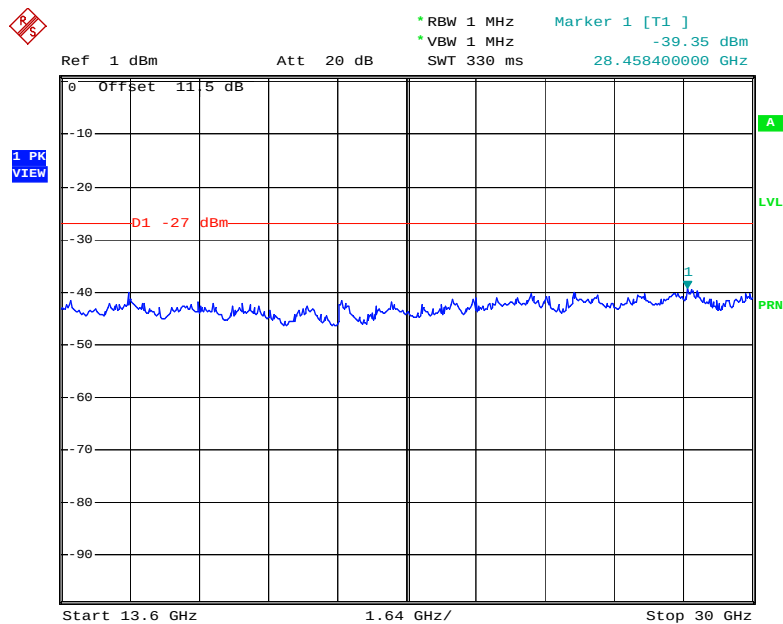
For the frequency band 5.18-5.24GHz

802.11a

Low Channel

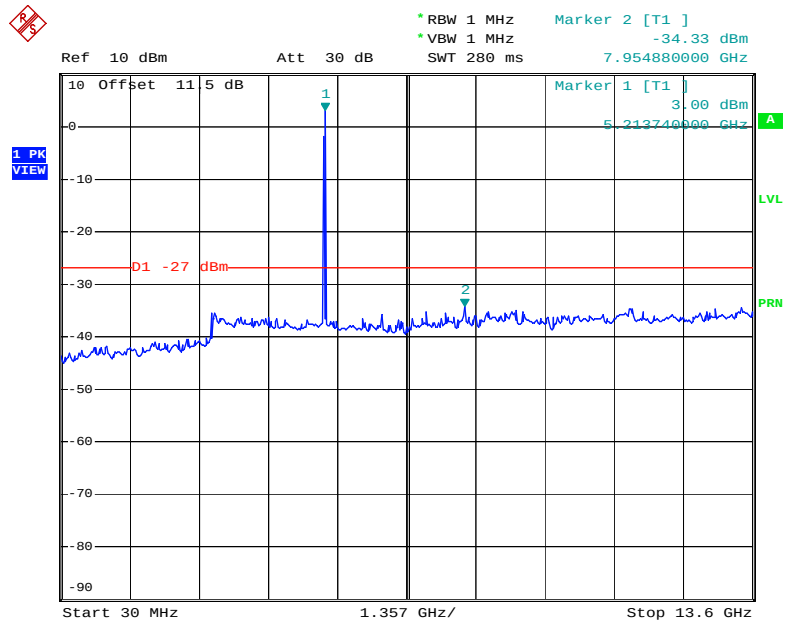


Date: 12.OCT.2010 11:18:25

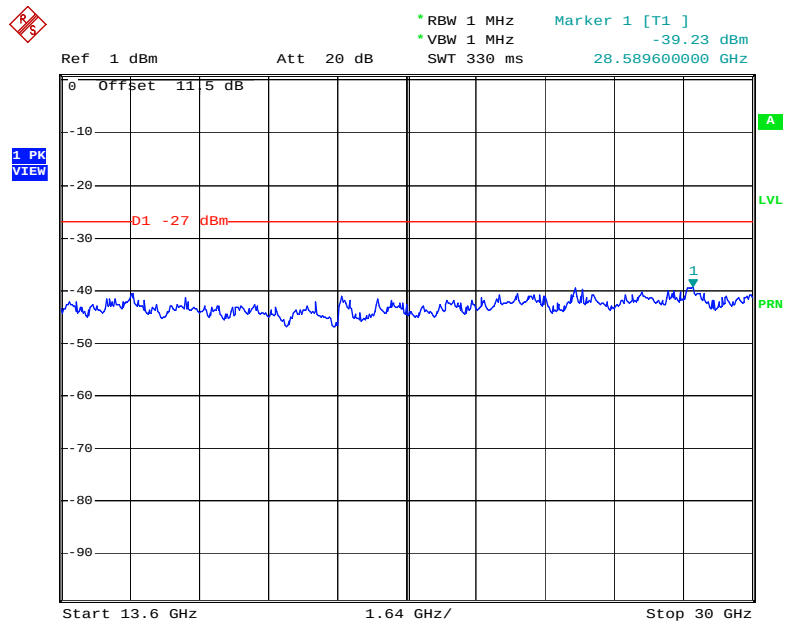


Date: 12.OCT.2010 11:37:23

802.11a
Middle Channel

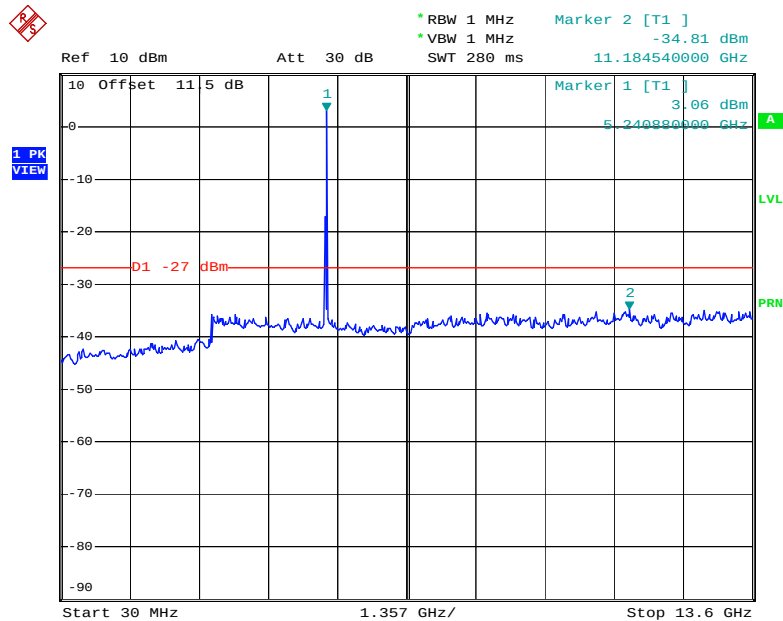


Date: 12.OCT.2010 11:22:31

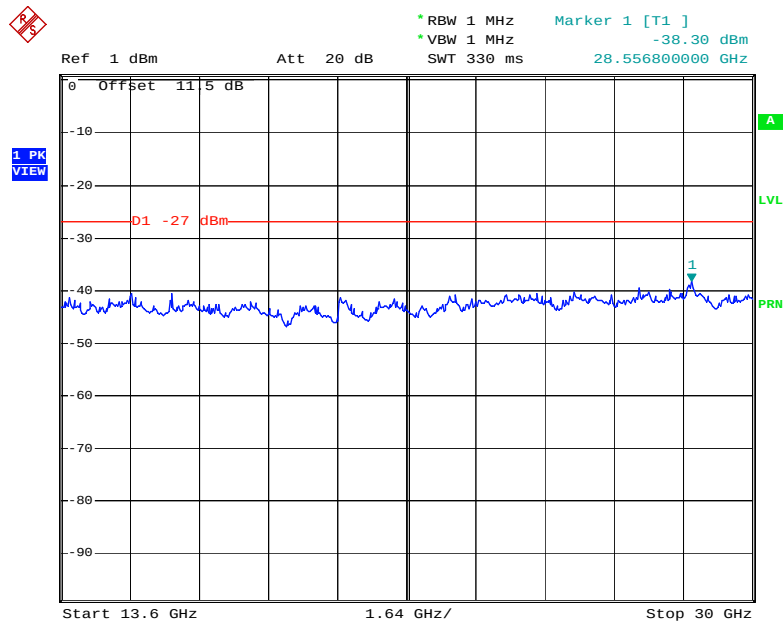


Date: 12.OCT.2010 11:37:53

802.11a
High Channel

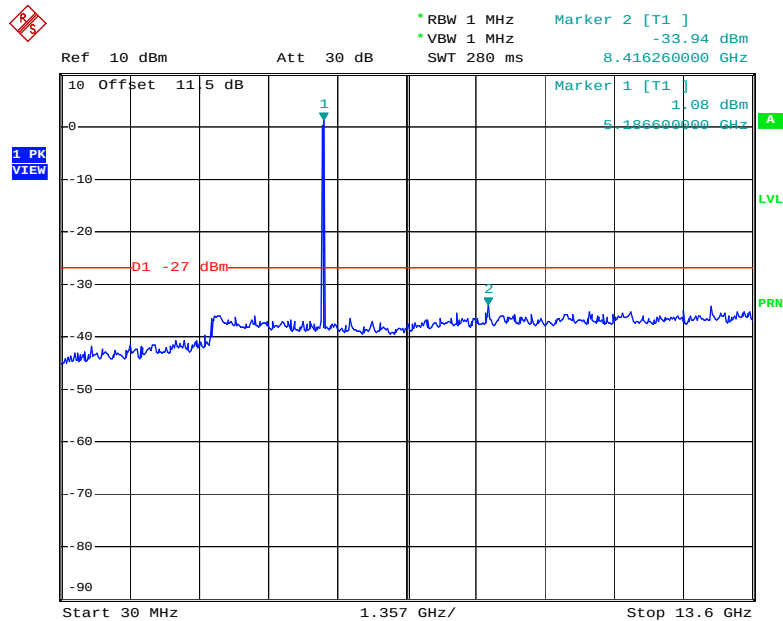


Date: 12.OCT.2010 11:23:24

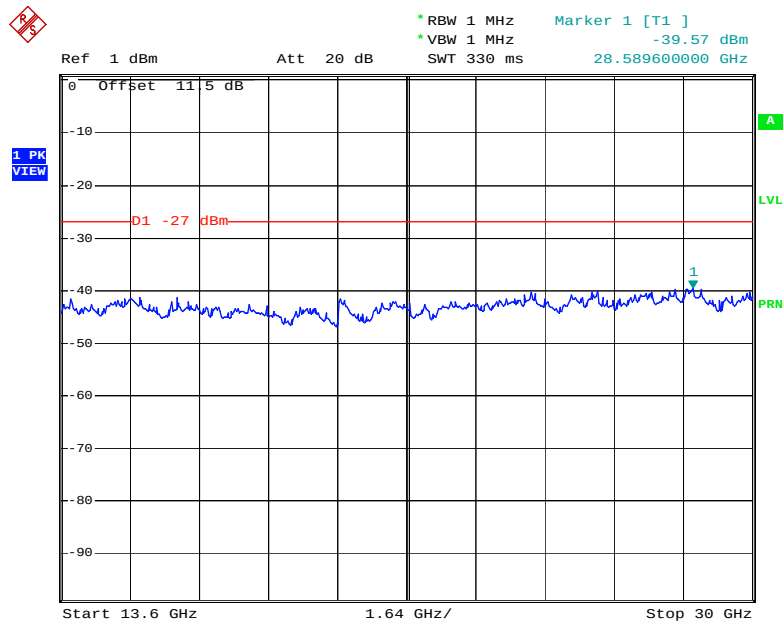


Date: 12.OCT.2010 11:38:25

802.11n HT20
Low Channel

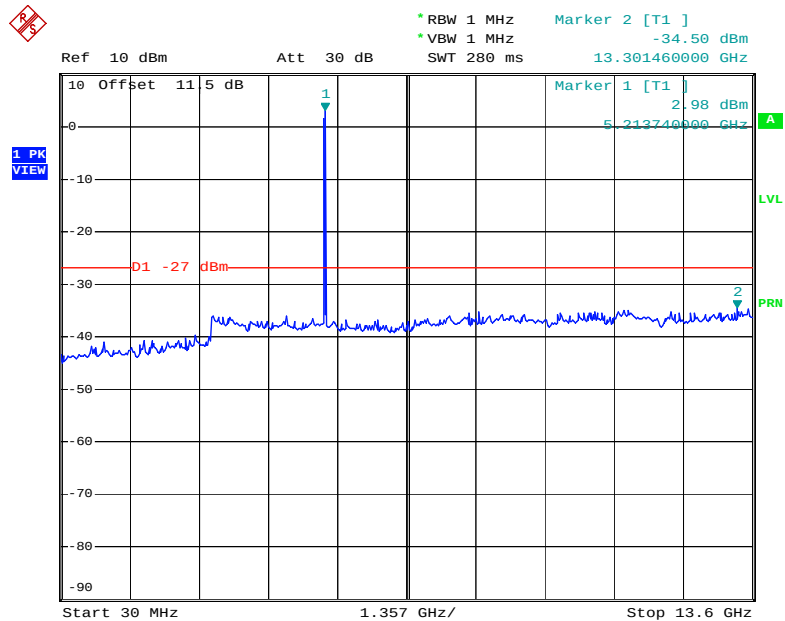


Date: 12.OCT.2010 11:19:11

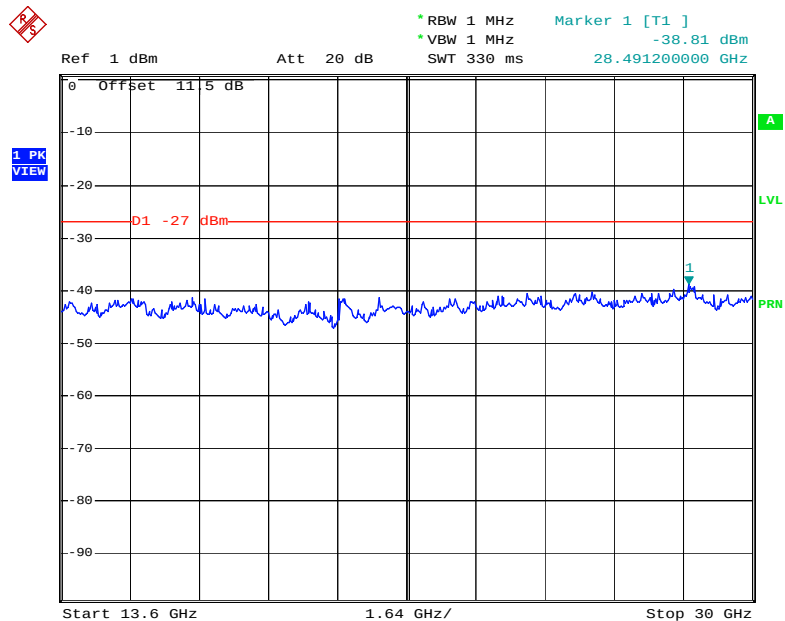


Date: 12.OCT.2010 11:36:40

802.11n HT20
Middle Channel

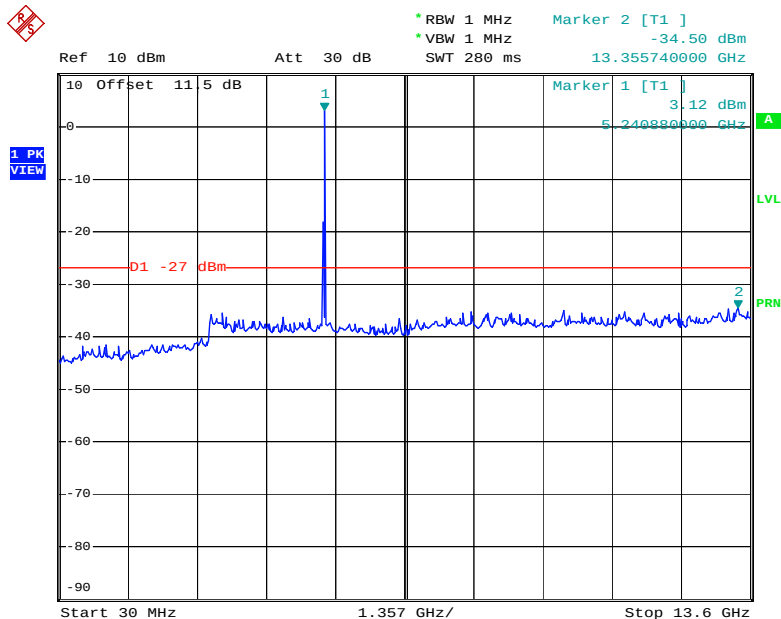


Date: 12.OCT.2010 11:21:49

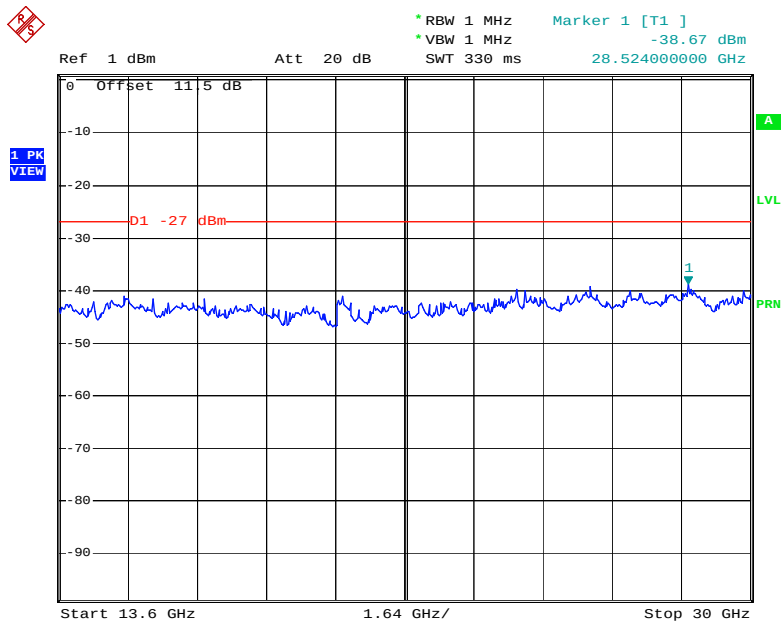


Date: 12.OCT.2010 11:36:10

802.11n HT20 High Channel



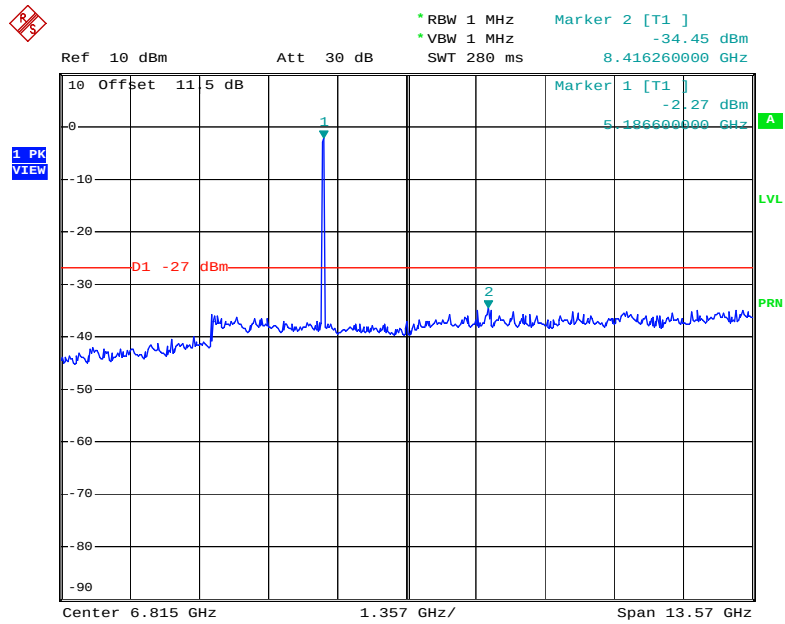
Date: 12.OCT.2010 11:24:06



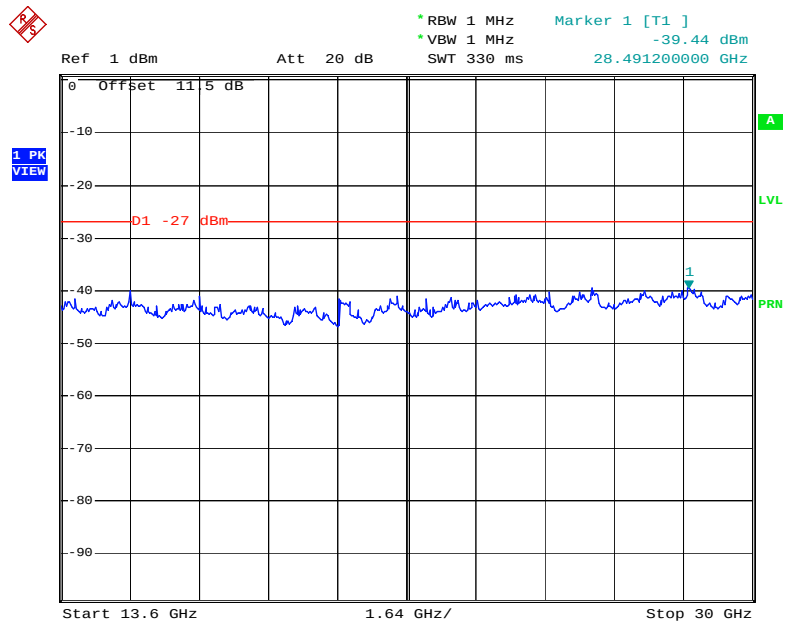
Date: 12.OCT.2010 11:35:22

802.11n HT40

Low Channel

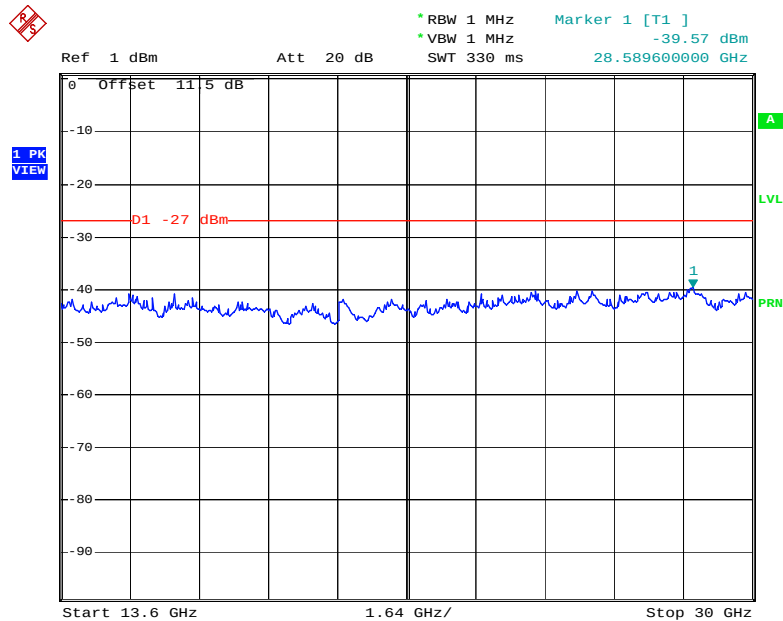


Date: 12.OCT.2010 11:26:54

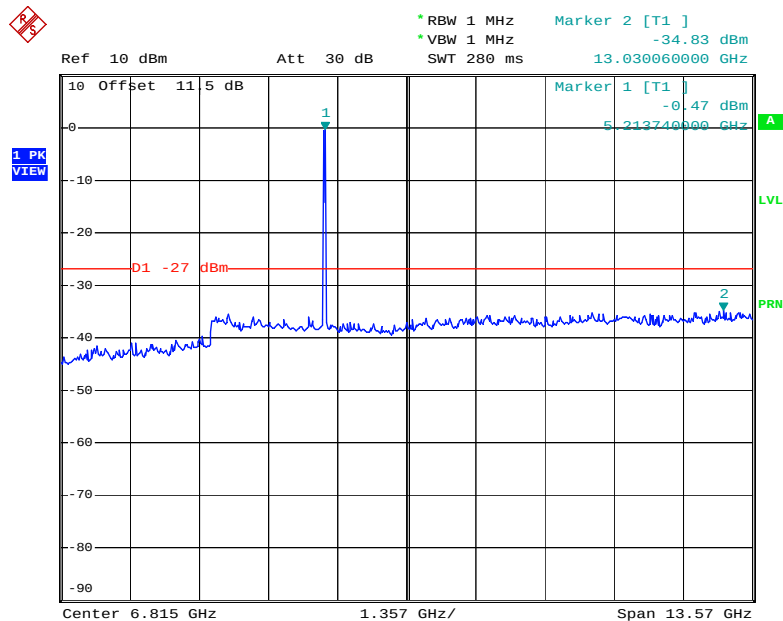


Date: 12.OCT.2010 11:33:07

802.11n HT40
Middle Channel

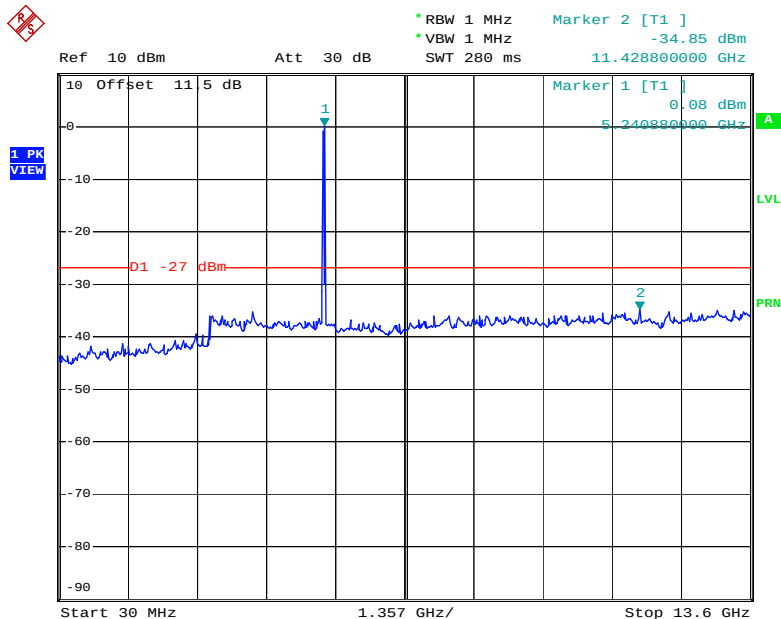


Date: 12.OCT.2010 11:34:19

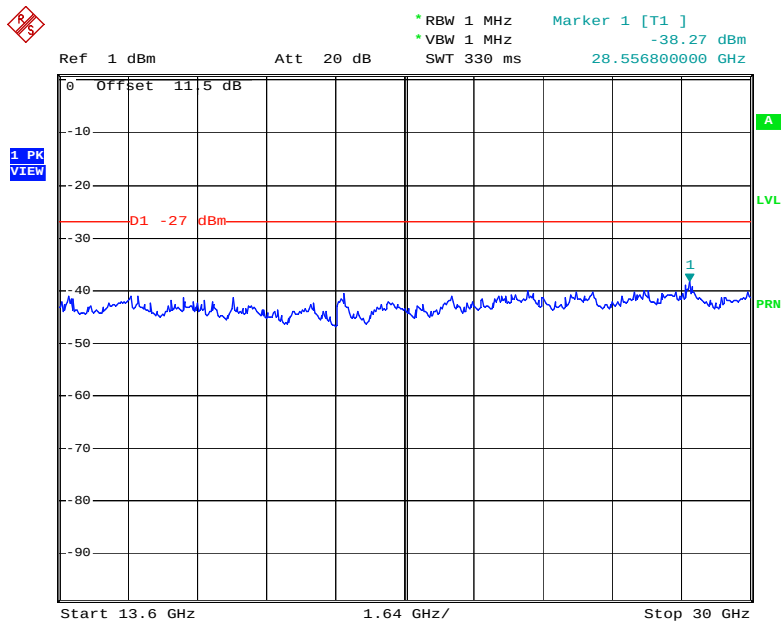


Date: 12.OCT.2010 11:26:22

802.11n HT40 High Channel



Date: 12.OCT.2010 11:25:37

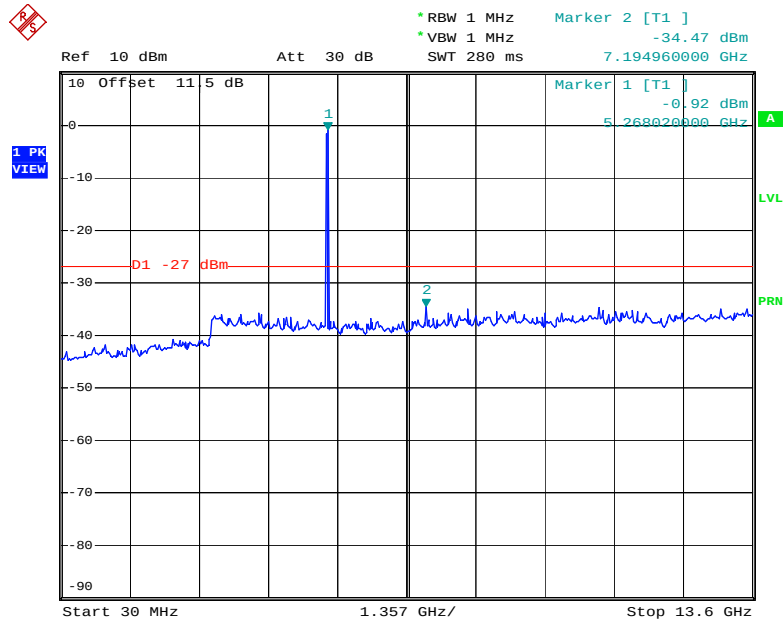


Date: 12.OCT.2010 11:34:44

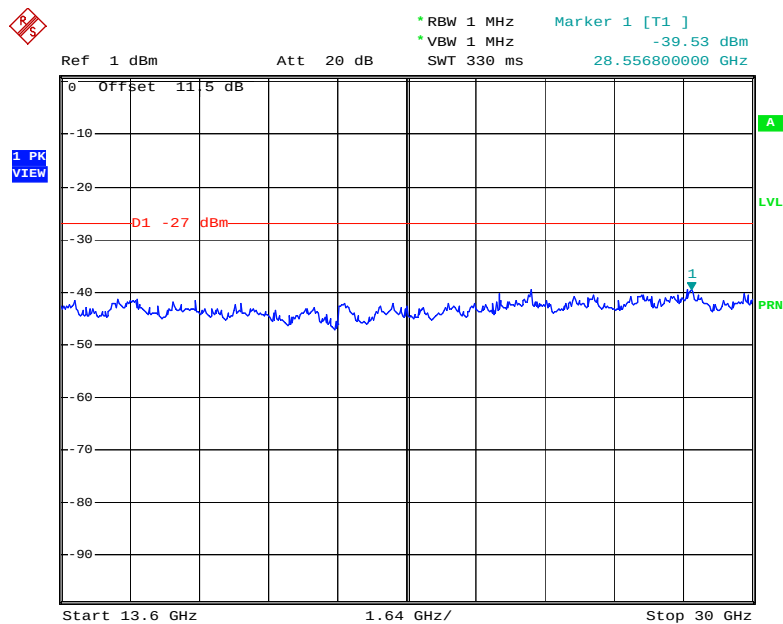
For the frequency band 5.26-5.32GHz

802.11a

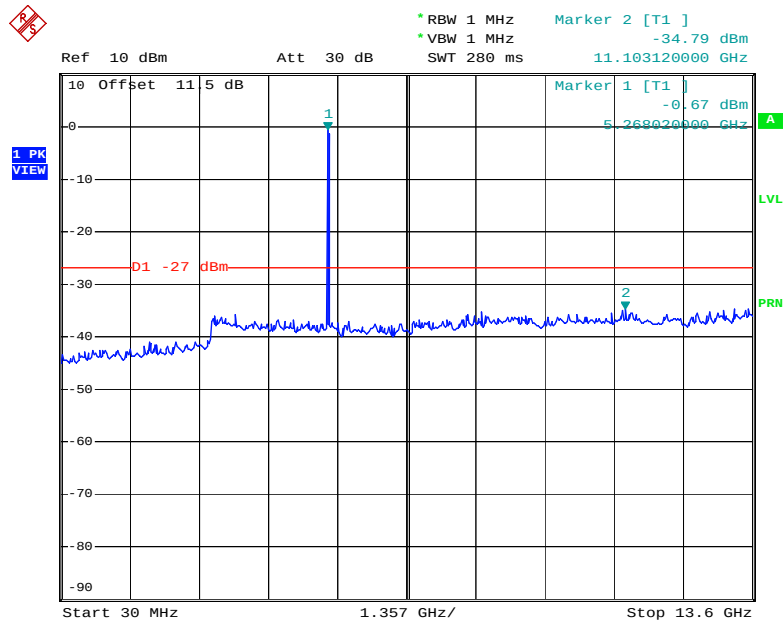
Low Channel



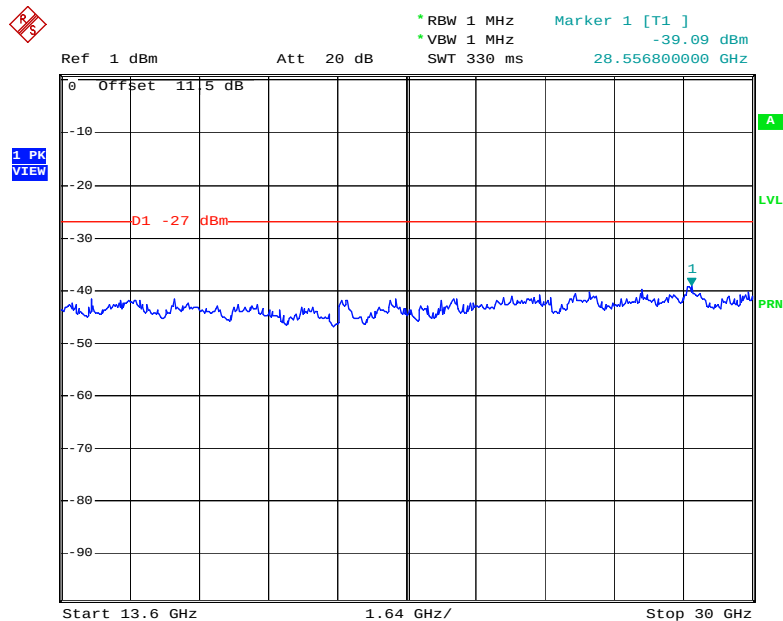
Date: 12.OCT.2010 12:06:40



Date: 12.OCT.2010 11:39:31

802.11a**Middle Channel**

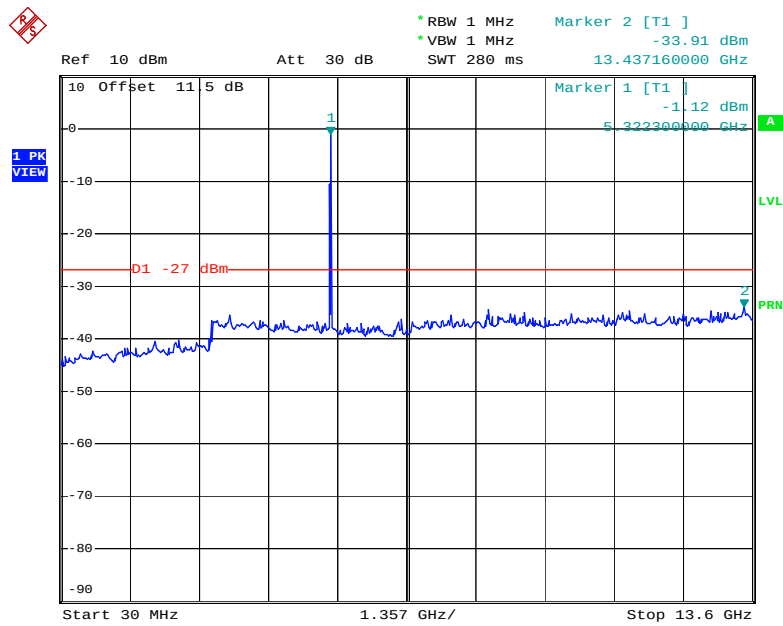
Date: 12.OCT.2010 12:07:21



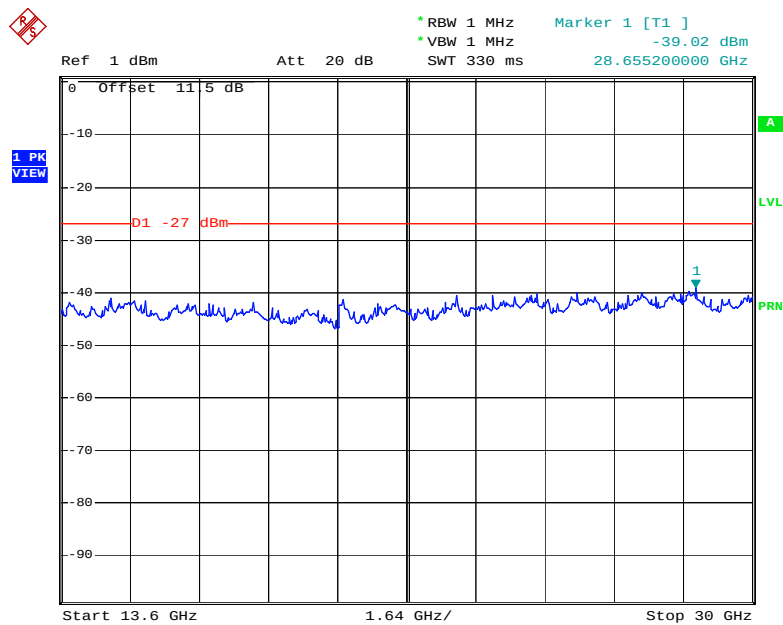
Date: 12.OCT.2010 11:40:14

802.11a

High Channel



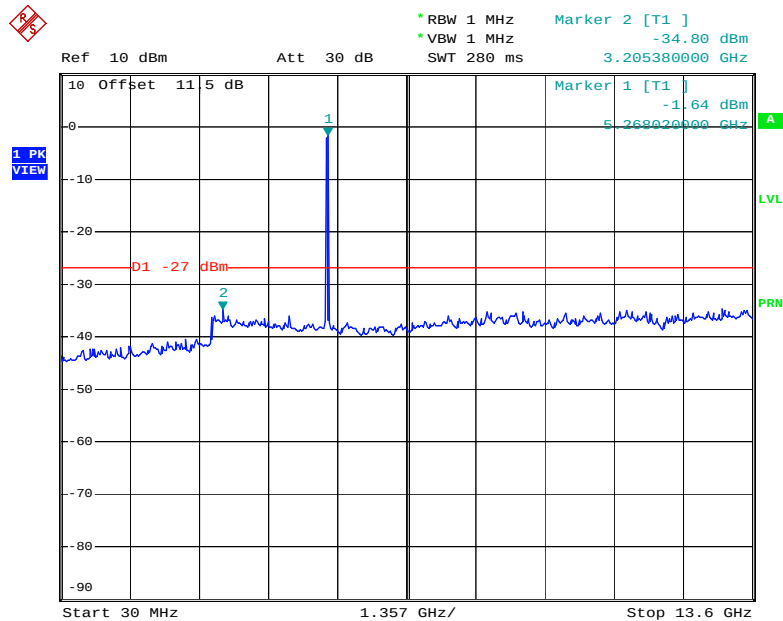
Date: 12.OCT.2010 12:08:33



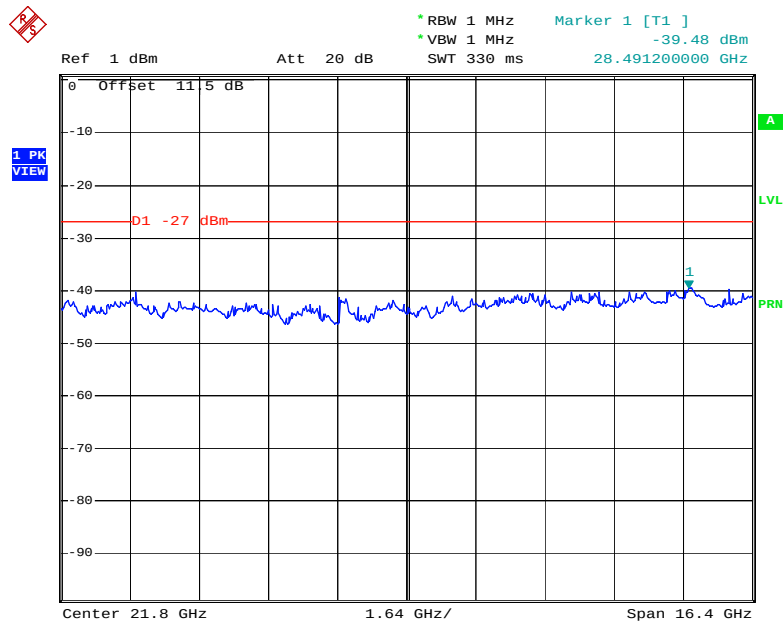
Date: 12.OCT.2010 11:41:40

802.11n HT20

Low Channel

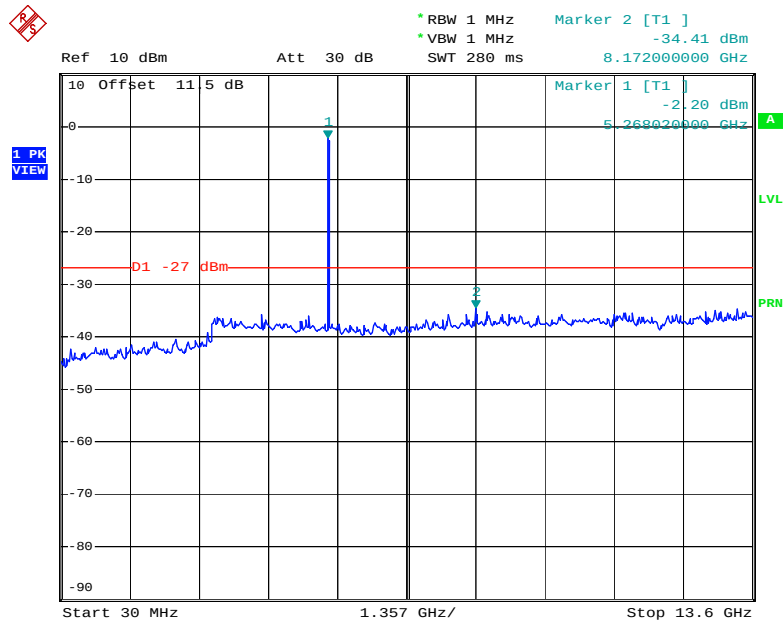


Date: 12.OCT.2010 12:05:14

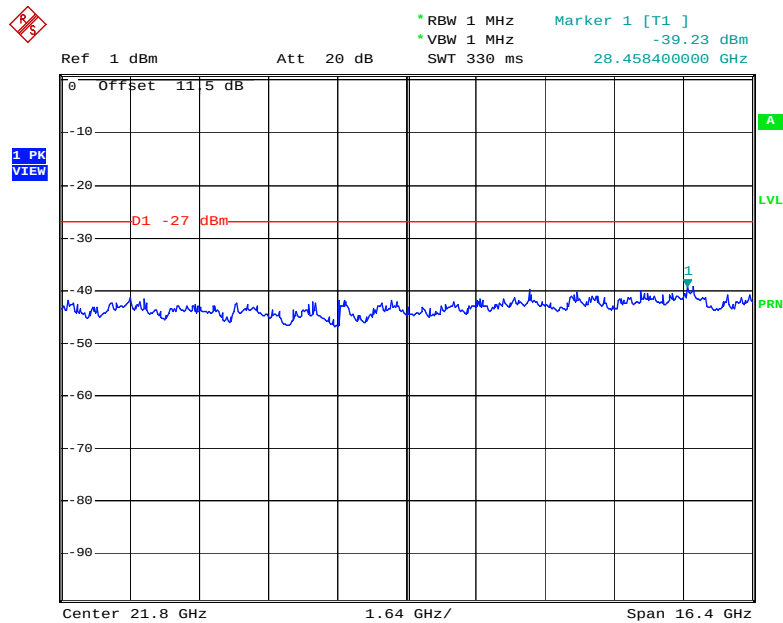


Date: 12.OCT.2010 11:45:34

802.11n HT20 Middle Channel

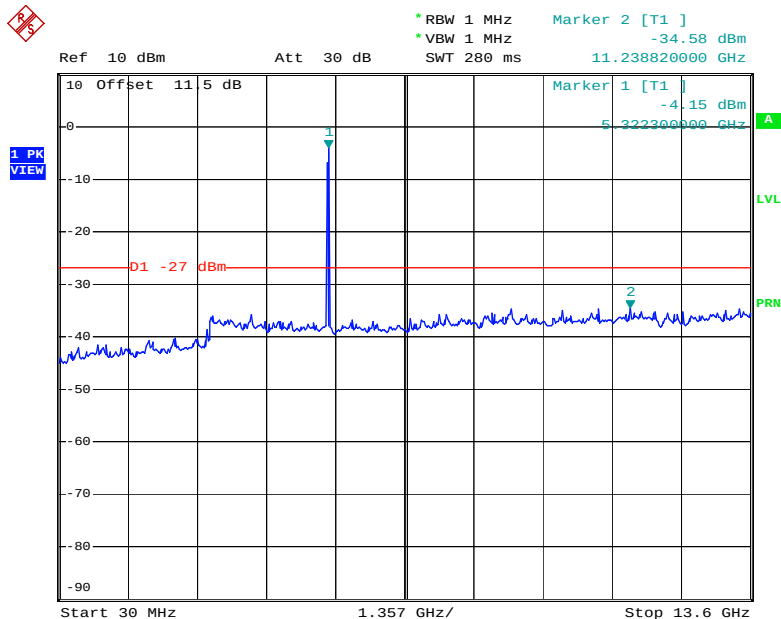


Date: 12.OCT.2010 12:04:30

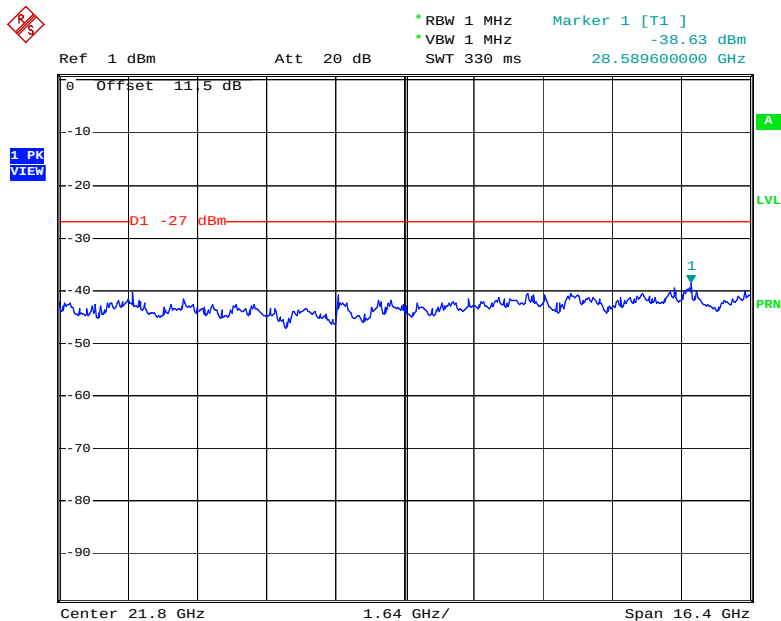


Date: 12.OCT.2010 11:43:38

802.11n HT20 High Channel

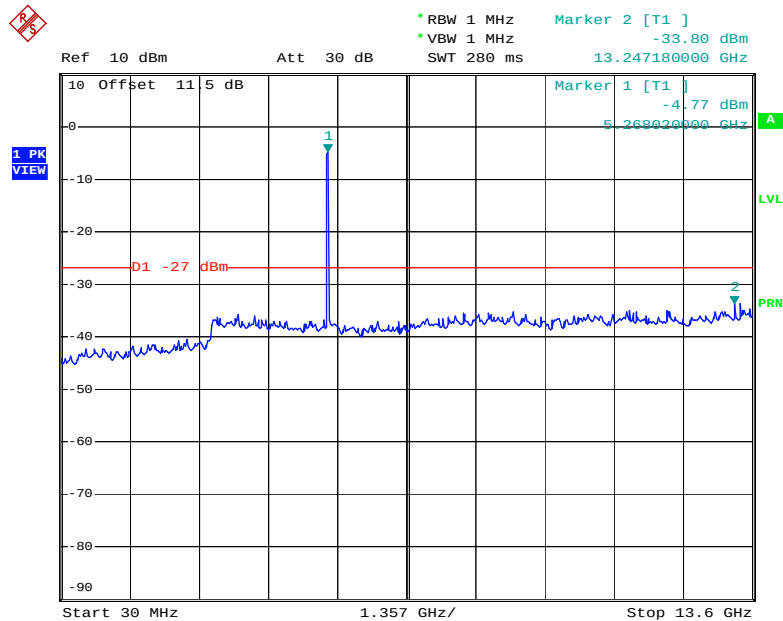


Date: 12.OCT.2010 12:03:41

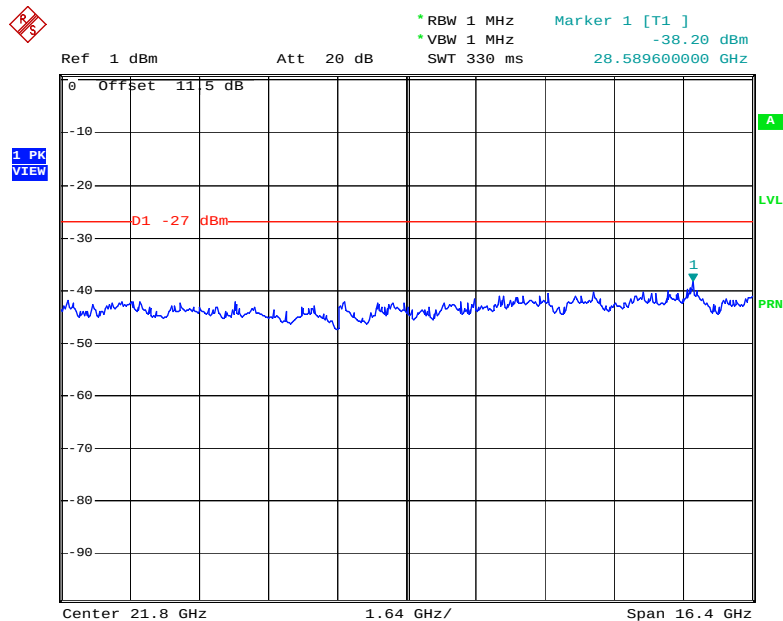


Date: 12.OCT.2010 11:43:10

802.11n HT40
Low Channel

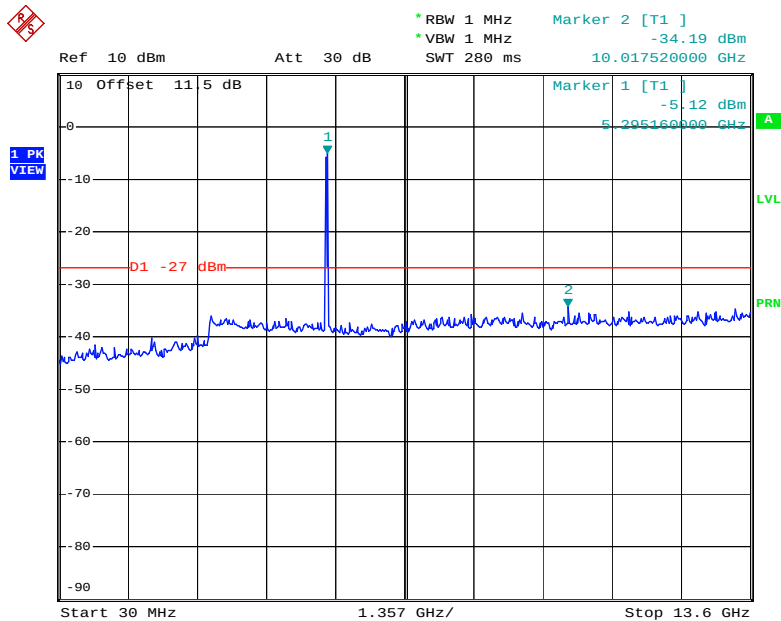


Date: 12.OCT.2010 12:00:31

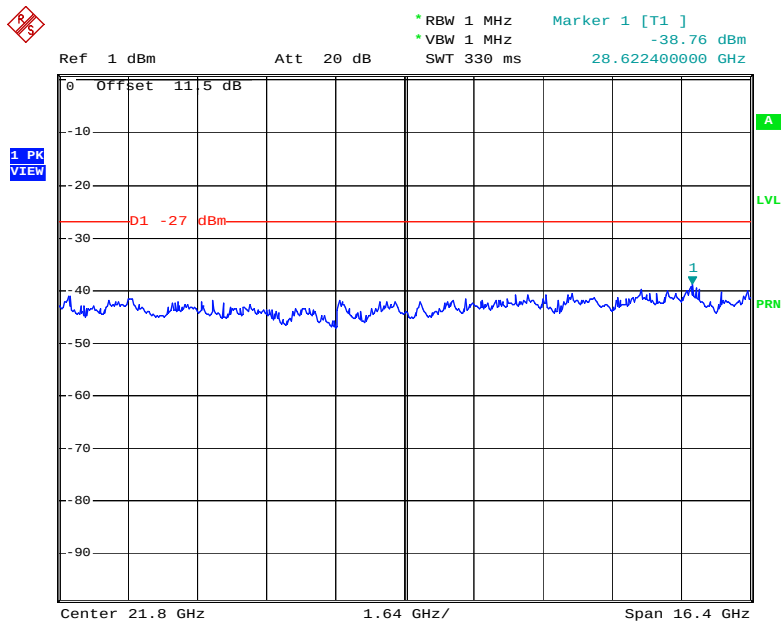


Date: 12.OCT.2010 11:46:25

802.11n HT40 Middle Channel

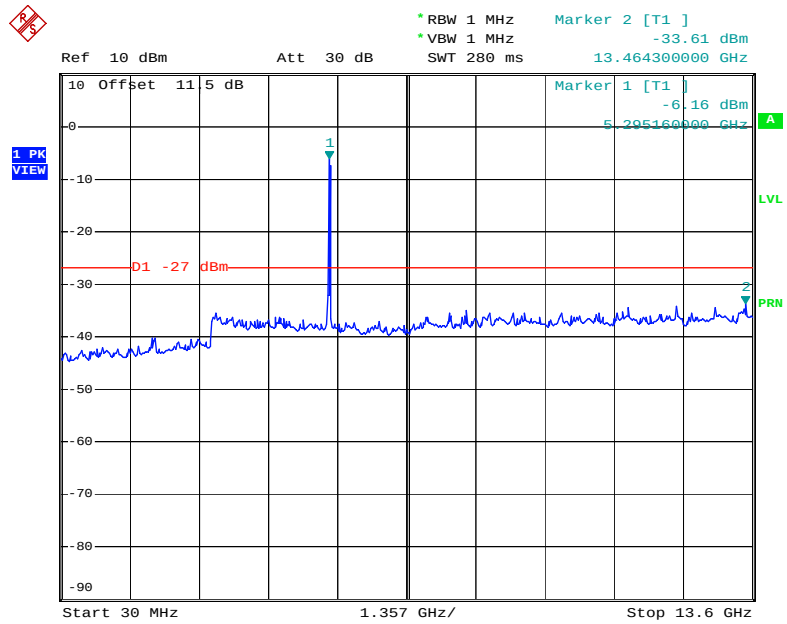


Date: 12.OCT.2010 12:01:17

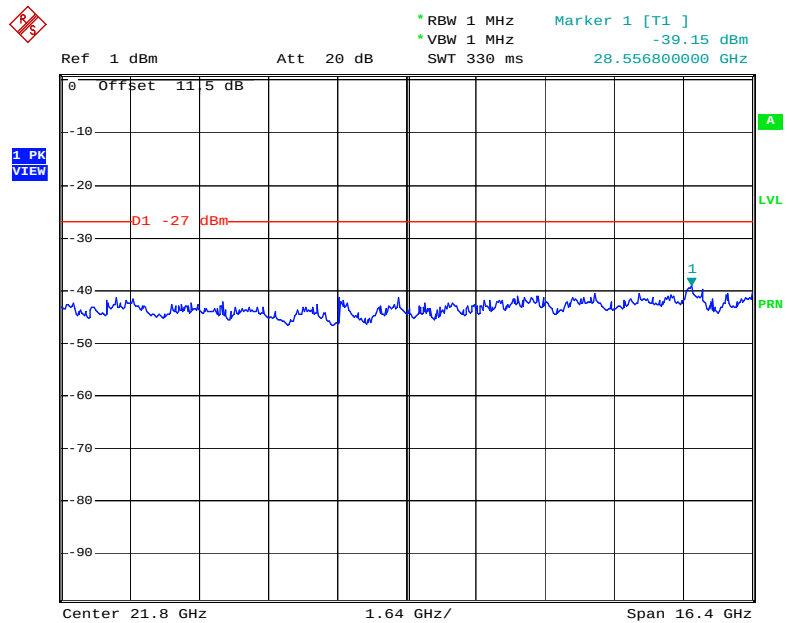


Date: 12.OCT.2010 11:47:01

802.11n HT40
High Channel



Date: 12.OCT.2010 12:02:48

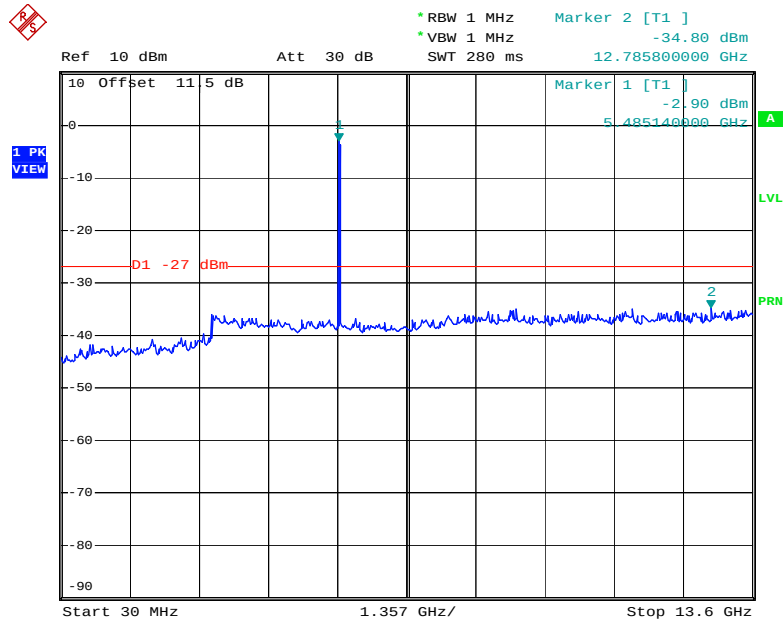


Date: 12.OCT.2010 11:47:19

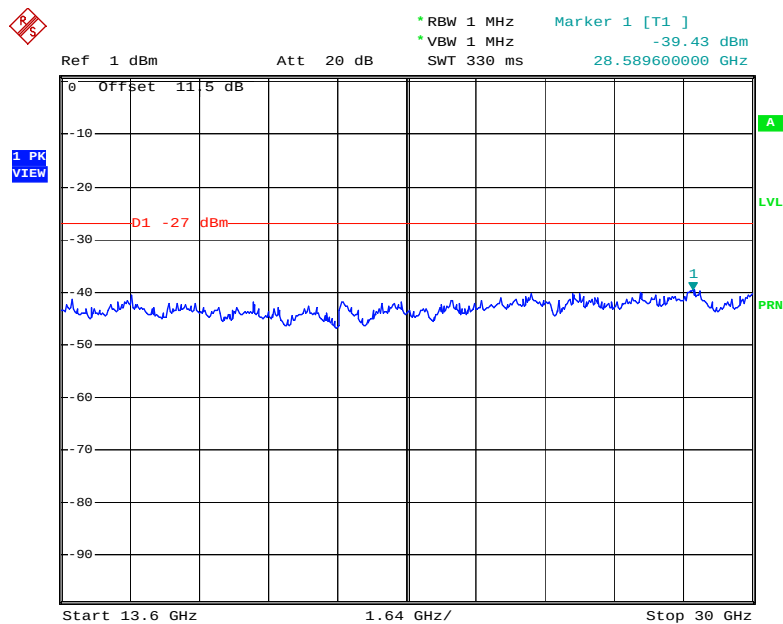
For the frequency band 5.5-5.7GHz

802.11a

Low Channel

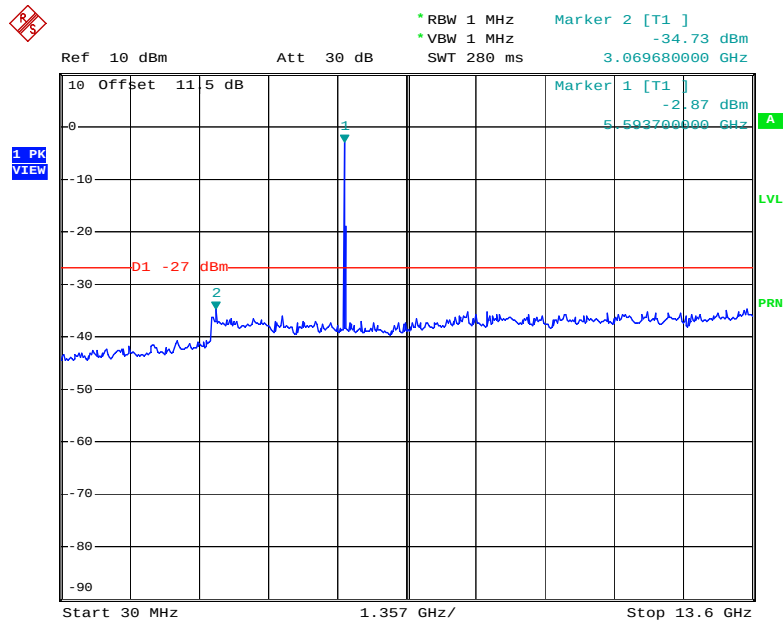


Date: 12.OCT.2010 11:54:02

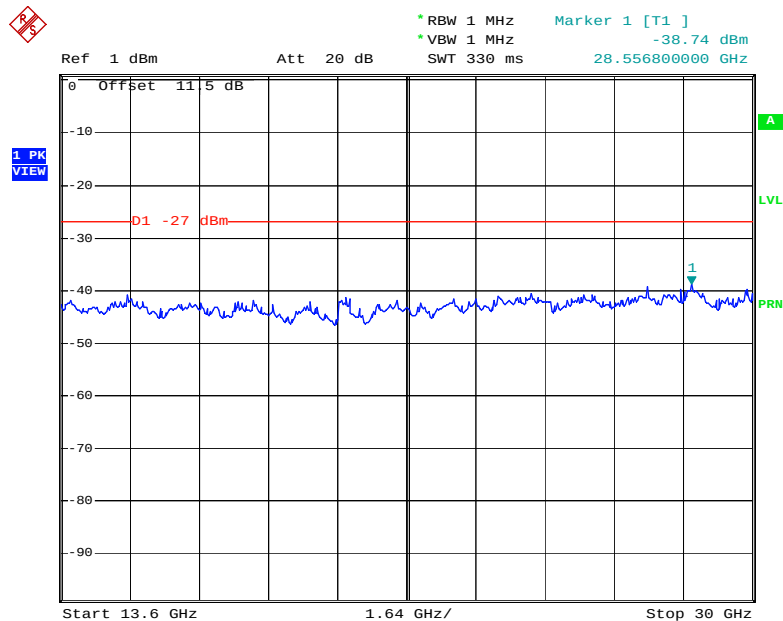


Date: 12.OCT.2010 11:52:43

802.11a
Middle Channel

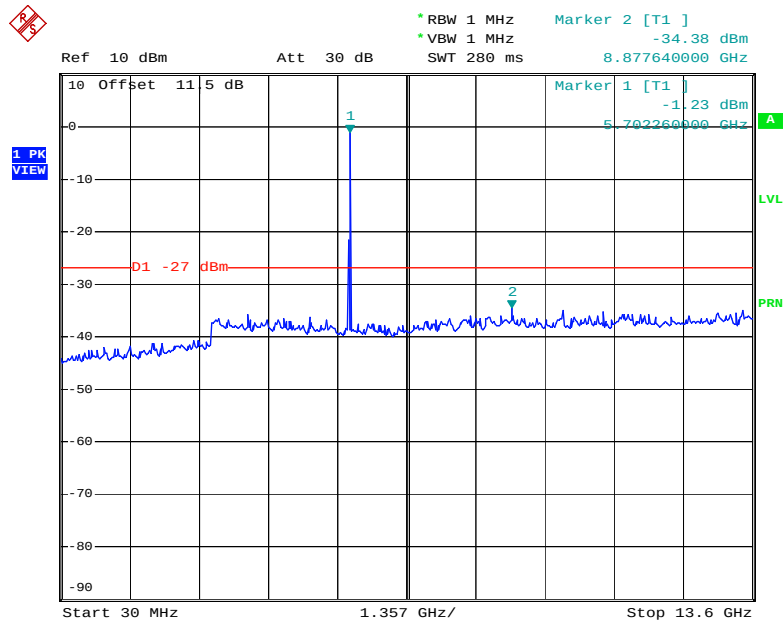


Date: 12.OCT.2010 11:54:53

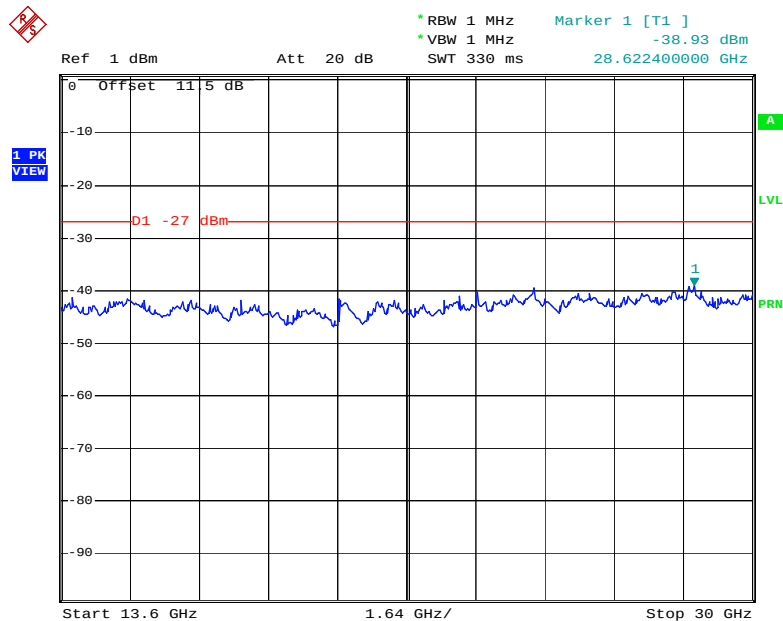


Date: 12.OCT.2010 11:52:18

802.11a
High Channel



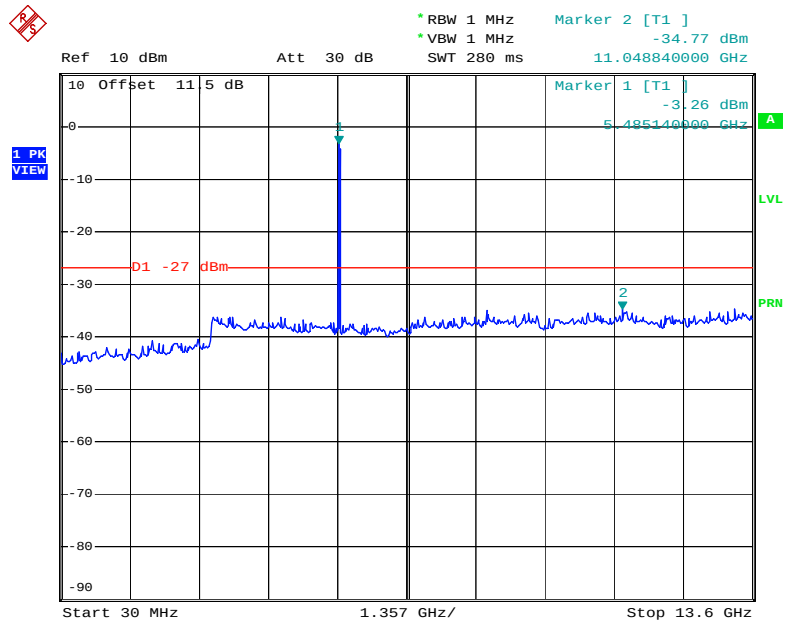
Date: 12.OCT.2010 11:55:22



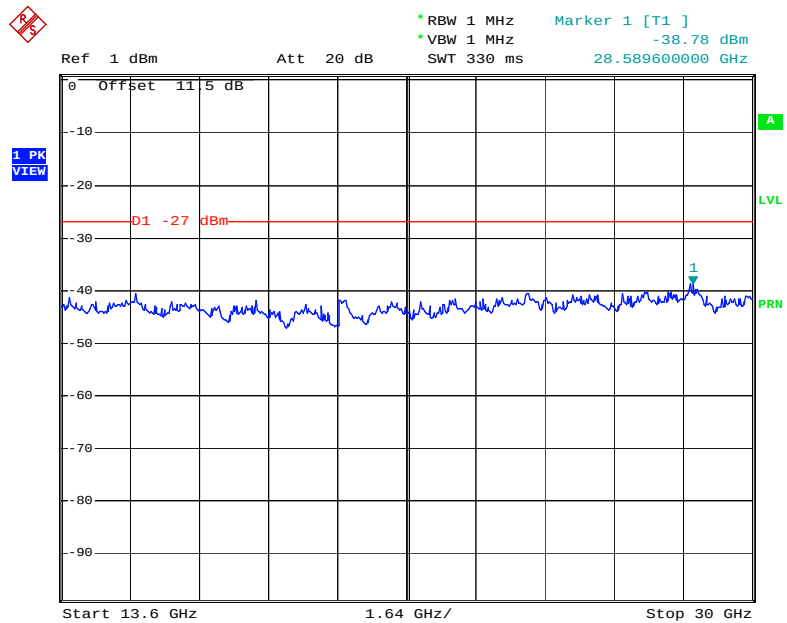
Date: 12.OCT.2010 11:51:53

802.11n HT20

Low Channel

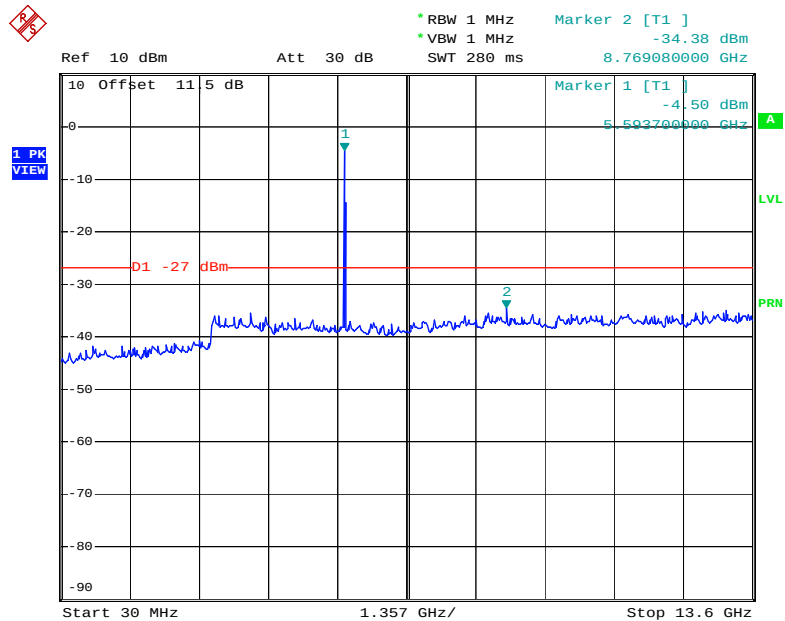


Date: 12.OCT.2010 11:57:00

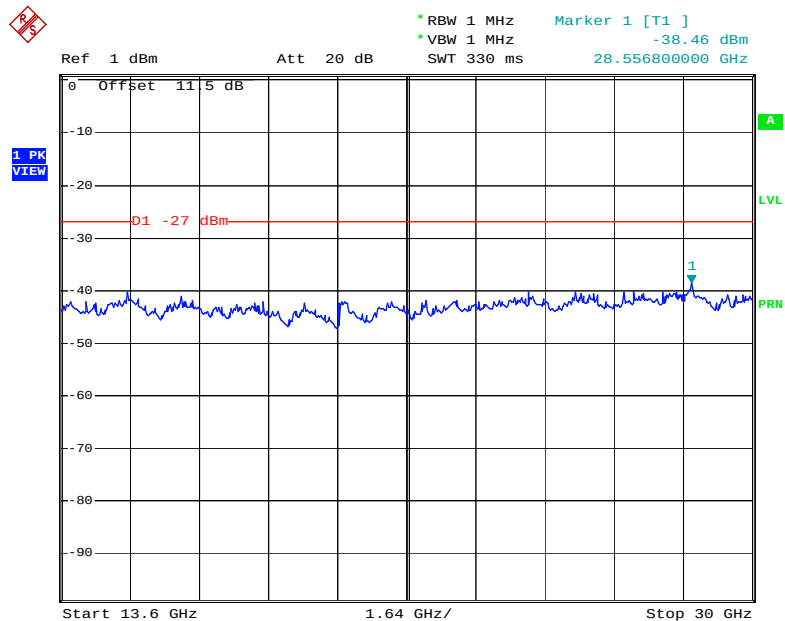


Date: 12.OCT.2010 11:50:15

802.11n HT20
Middle Channel

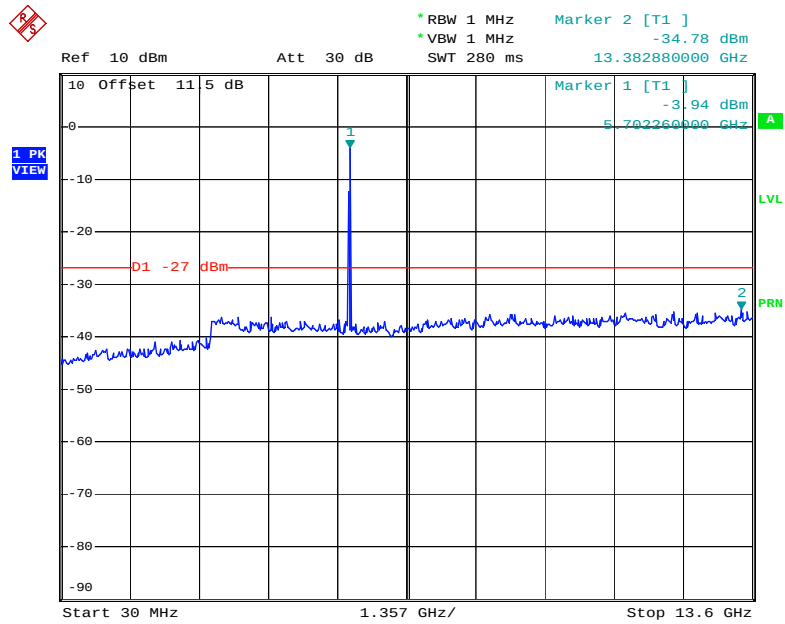


Date: 12.OCT.2010 11:56:27

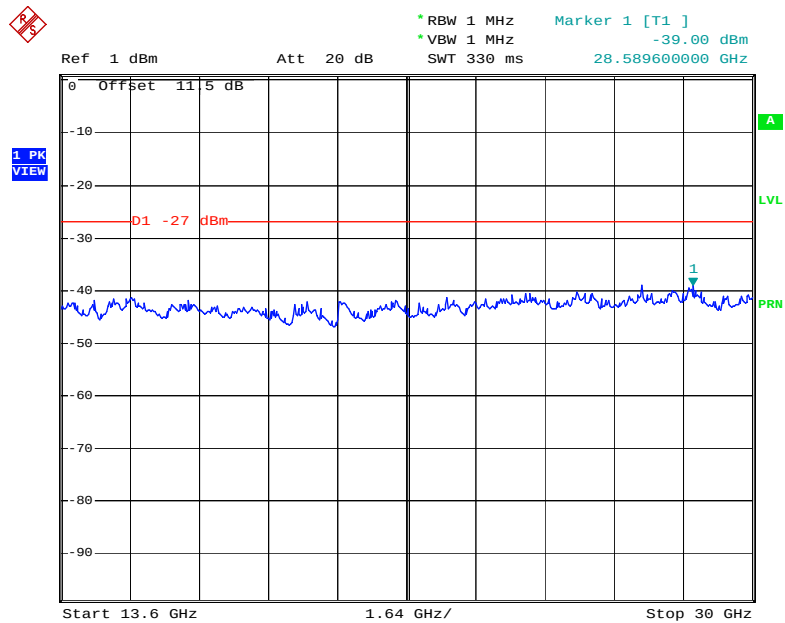


Date: 12.OCT.2010 11:50:34

802.11n HT20
High Channel

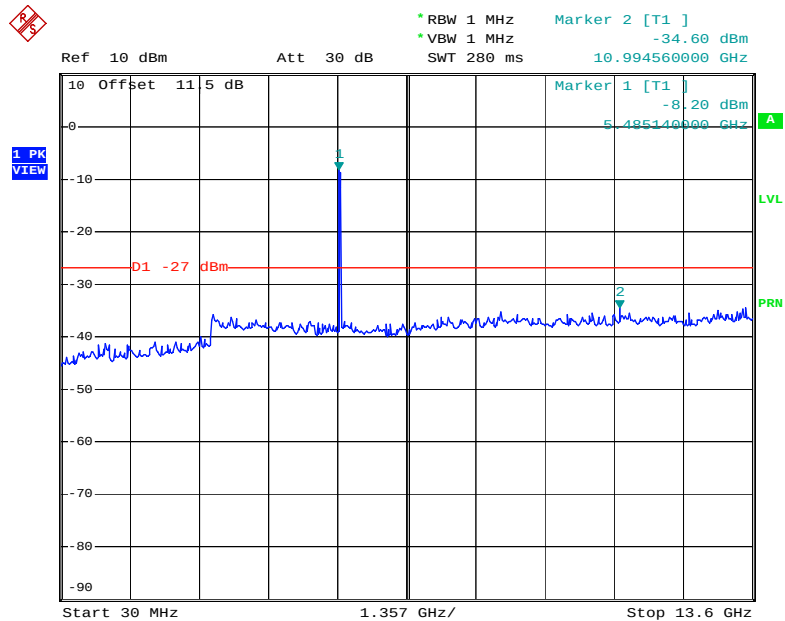


Date: 12.OCT.2010 11:55:57

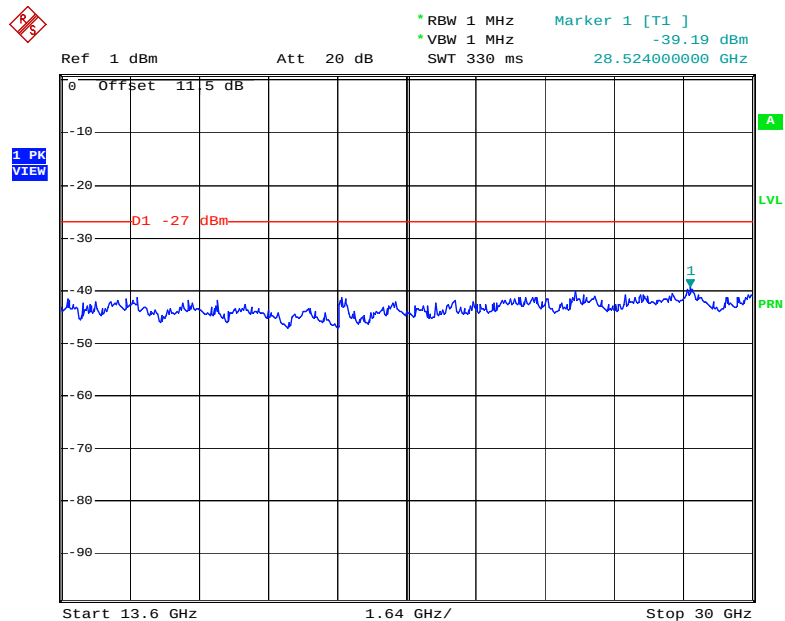


Date: 12.OCT.2010 11:51:25

802.11n HT40
Low Channel

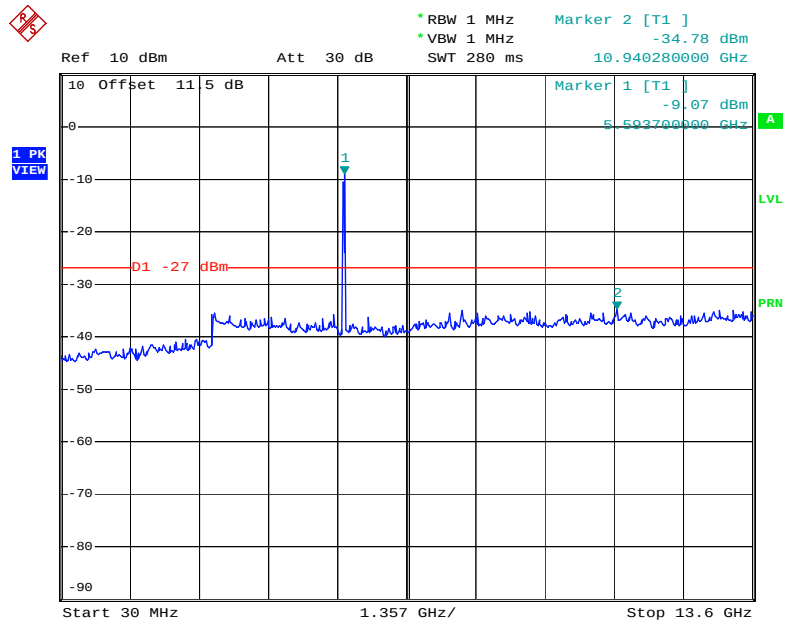


Date: 12.OCT.2010 11:58:19

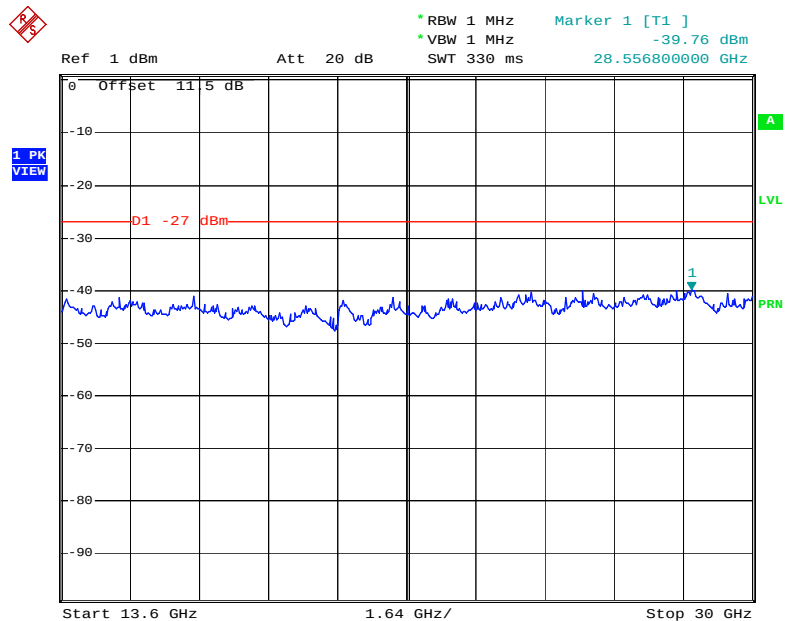


Date: 12.OCT.2010 11:49:41

802.11n HT40
Middle Channel

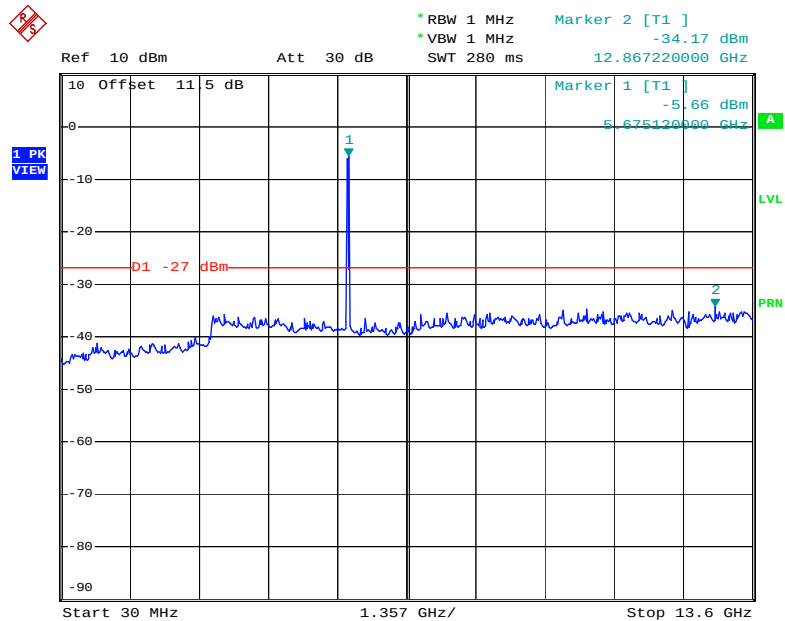


Date: 12.OCT.2010 11:58:51

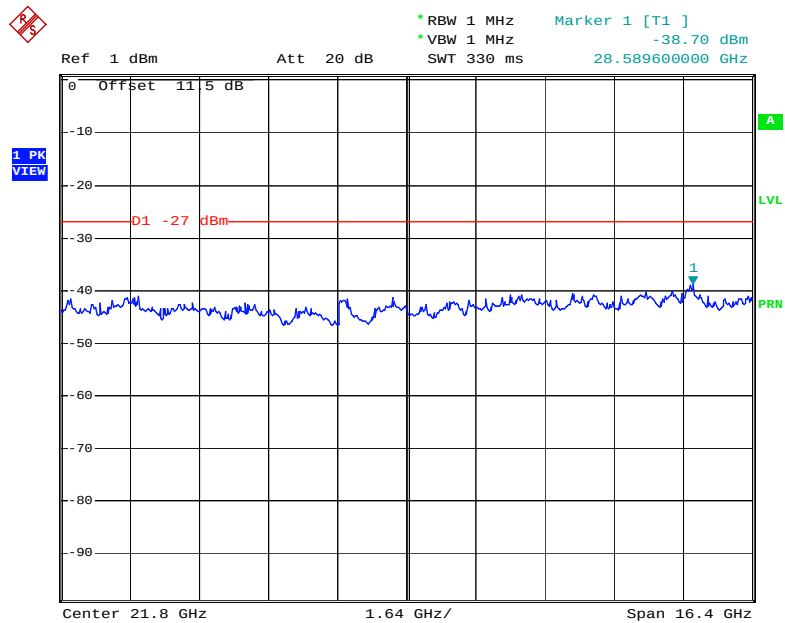


Date: 12.OCT.2010 11:49:17

802.11n HT40
High Channel



Date: 12.OCT.2010 11:59:24



Date: 12.OCT.2010 11:48:17

10. RADIATED SPURIOUS EMISSIONS

10.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ± 5.10 dB.

10.2 Standard Applicable

According to §15.407(b)(6), Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209.

According to §15.407(b)(7), The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

10.3 Test Equipment List and Details

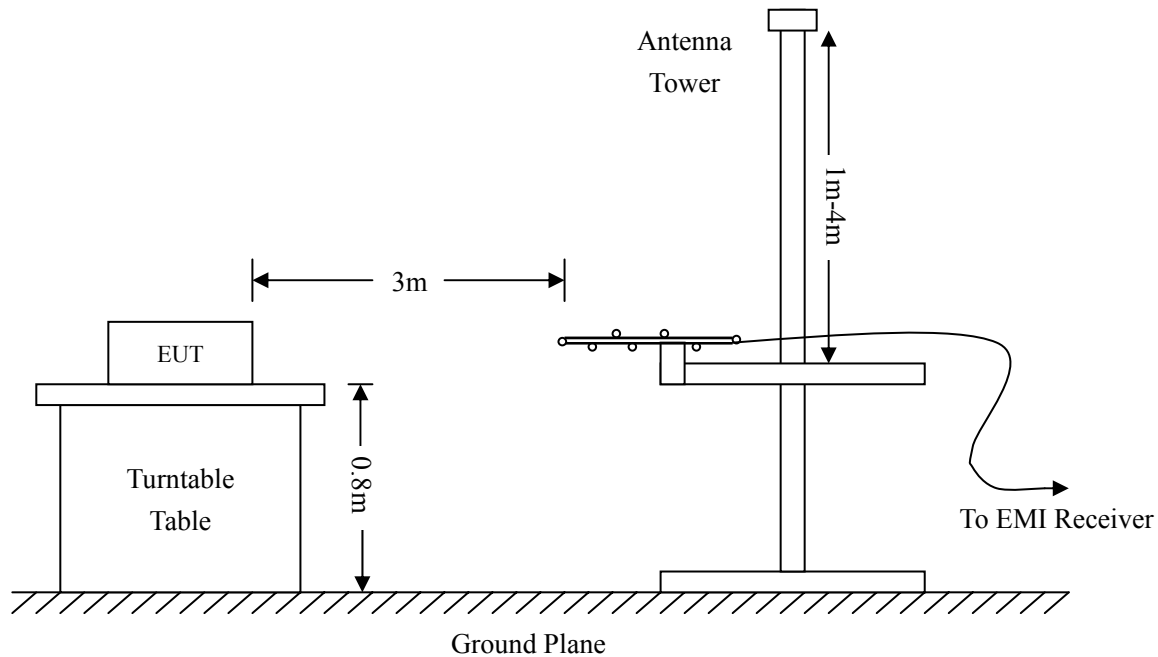
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-04-16	2011-04-15
EMI Test Receiver	R&S	ESVB	825471/005	2010-08-12	2011-08-11
Positioning Controller	C&C	CC-C-1F	N/A	2010-08-12	2011-08-11
RF Switch	EM	EMSW18	SW060023	2010-08-12	2011-08-11
Pre-amplifier	Agilent	8447F	3113A06717	2010-08-12	2011-08-11
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-08-12	2011-08-11
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2010-07-21	2011-07-20
Horn Antenna	ETS	3117	00086197	2010-07-21	2011-07-20

10.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.407(b)(6) and FCC Part 15.209 Limit..

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



10.5 Test Receiver Setup

During the radiated emission test for above 1GHz, the test receiver was set with the following configurations:

For peak detector:

RBW = 1000kHz, VBW = 3000kHz, Sweep Time = Auto

For average detector:

RBW = 1000kHz, VBW = 10Hz, Sweep Time = Auto

10.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

10.7 Environmental Conditions

Temperature:	22° C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

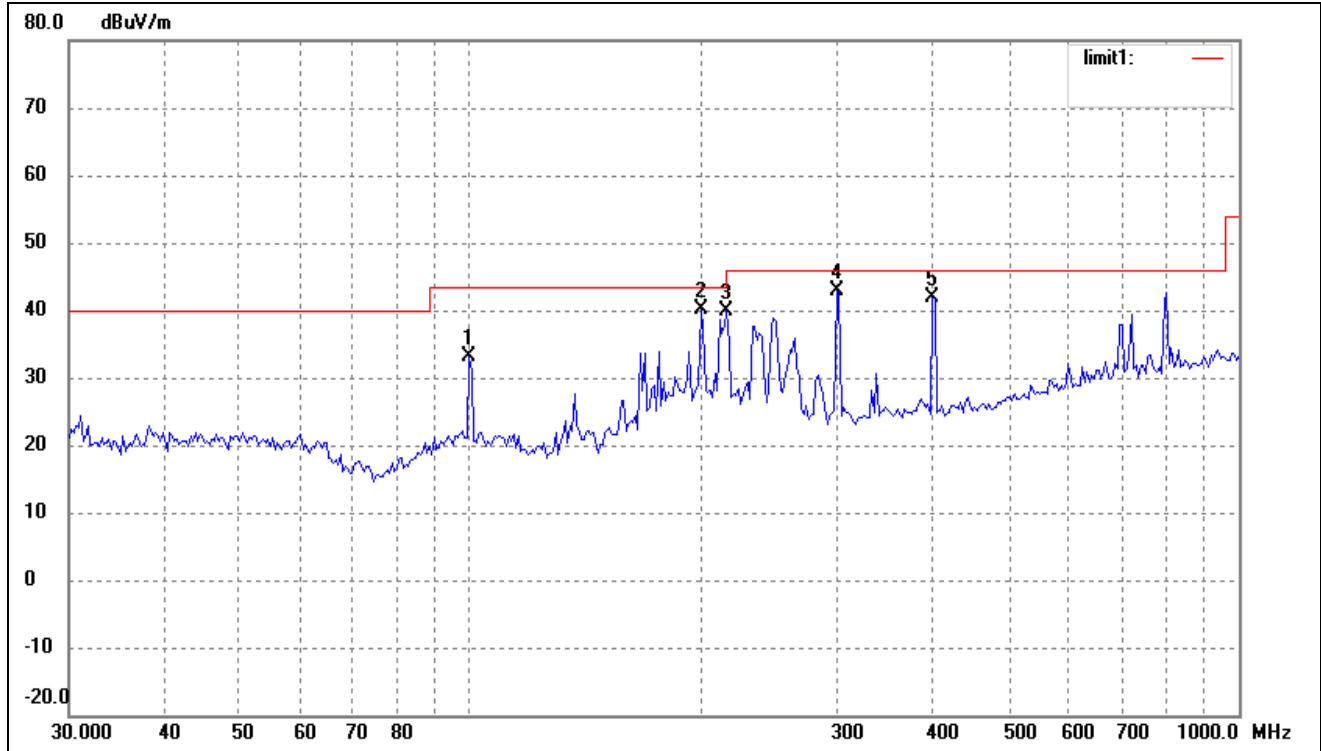
10.8 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.407(b)(6) standards, and had the worst margin of:

-3.03 dBμV at 299.3158 MHz in the Horizontal polarization, with worst test mode, 30 MHz to 1GHz, 3Meters

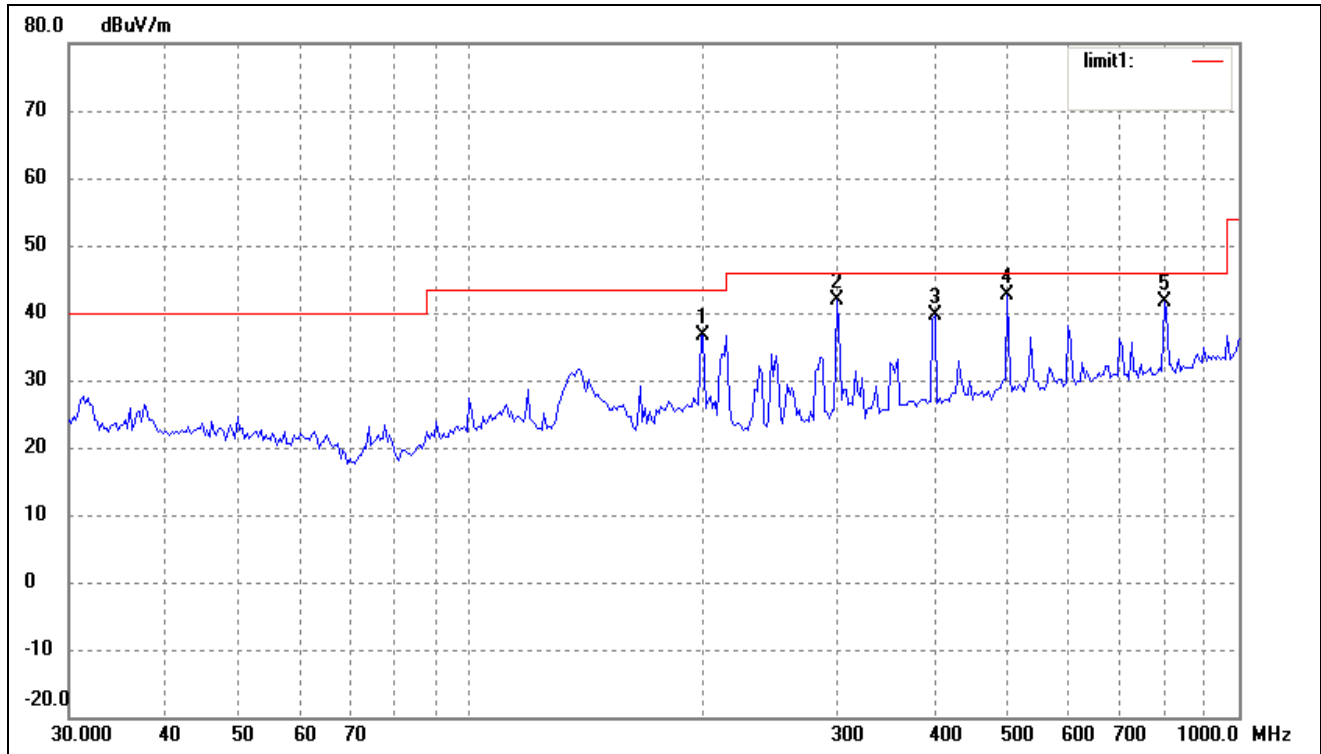
-5.4 dBμV at 15780 MHz in the Vertical polarization, Average detector, at low channel of the 802.11a of the frequency band 5.26-5.32GHz, 30 MHz to 1GHz, 3Meters

***Note:** this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

*Spurious Emission From 30 MHz to 1 GHz**Test mode: 5GHz Band, Transmitting with worst case**Comment:**Horizontal*

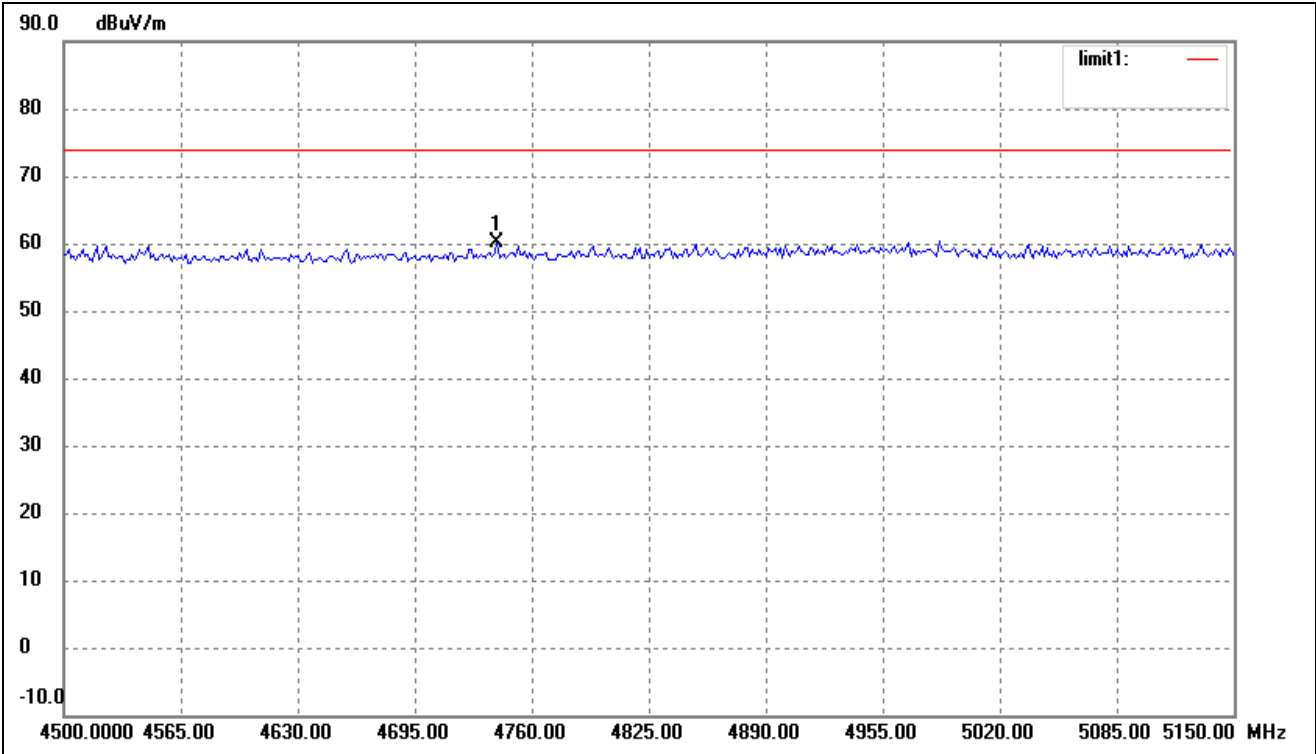
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	99.5281	25.28	7.78	33.06	43.50	-10.44	360	100	peak
2	199.2855	34.56	5.68	40.24	43.50	-3.26	360	100	peak
3	215.2678	33.60	6.18	39.78	43.50	-3.72	360	100	peak
4	299.3158	34.32	8.65	42.97	46.00	-3.03	360	100	peak
5	399.0302	31.74	10.08	41.82	46.00	-4.18	360	100	peak

Vertical



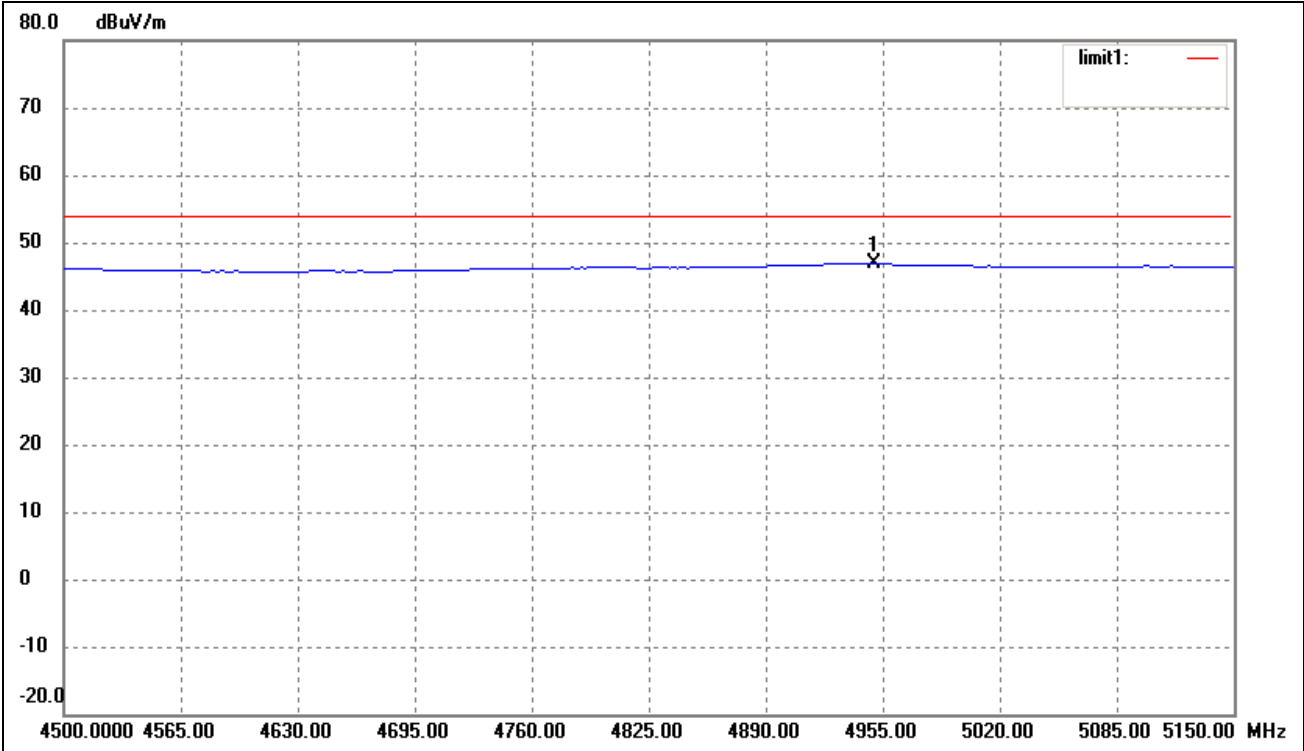
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	200.6881	30.98	5.70	36.68	43.50	-6.82	360	100	peak
2	299.3158	33.16	8.65	41.81	46.00	-4.19	360	100	peak
3	401.8385	29.45	10.08	39.53	46.00	-6.47	360	100	peak
4	499.4247	29.77	12.88	42.65	46.00	-3.35	360	100	peak
5	798.9797	26.15	15.50	41.65	46.00	-4.35	360	100	peak

Spurious Emission above 1GHz
For the frequency band 5.18-5.24GHz (802.11a)
Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	4740.500	29.65	30.41	60.06	74.00	-13.94	360	100	peak

Restricted Bandedge Average



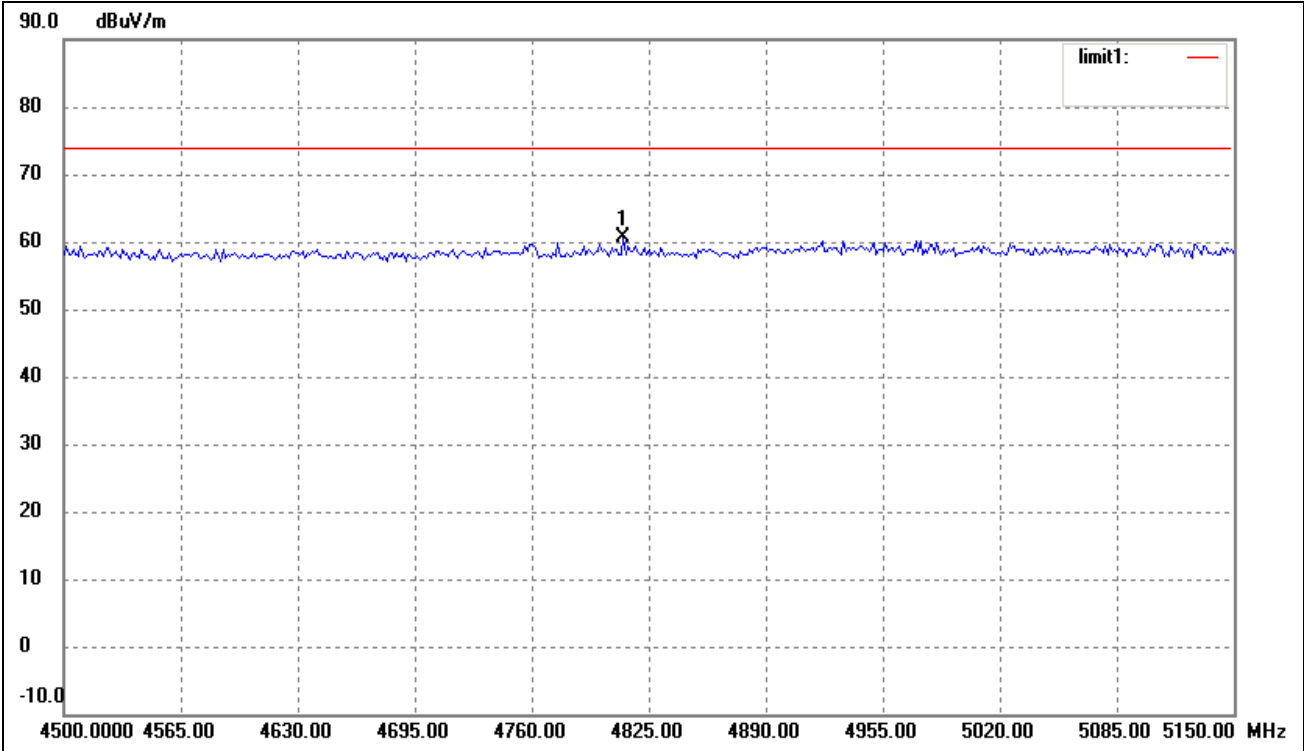
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	4949.800	16.13	30.71	46.84	54.00	-7.16	360	100	peak

Note: this EUT was tested in the low, middle, high channel and the worst case position data was reported.

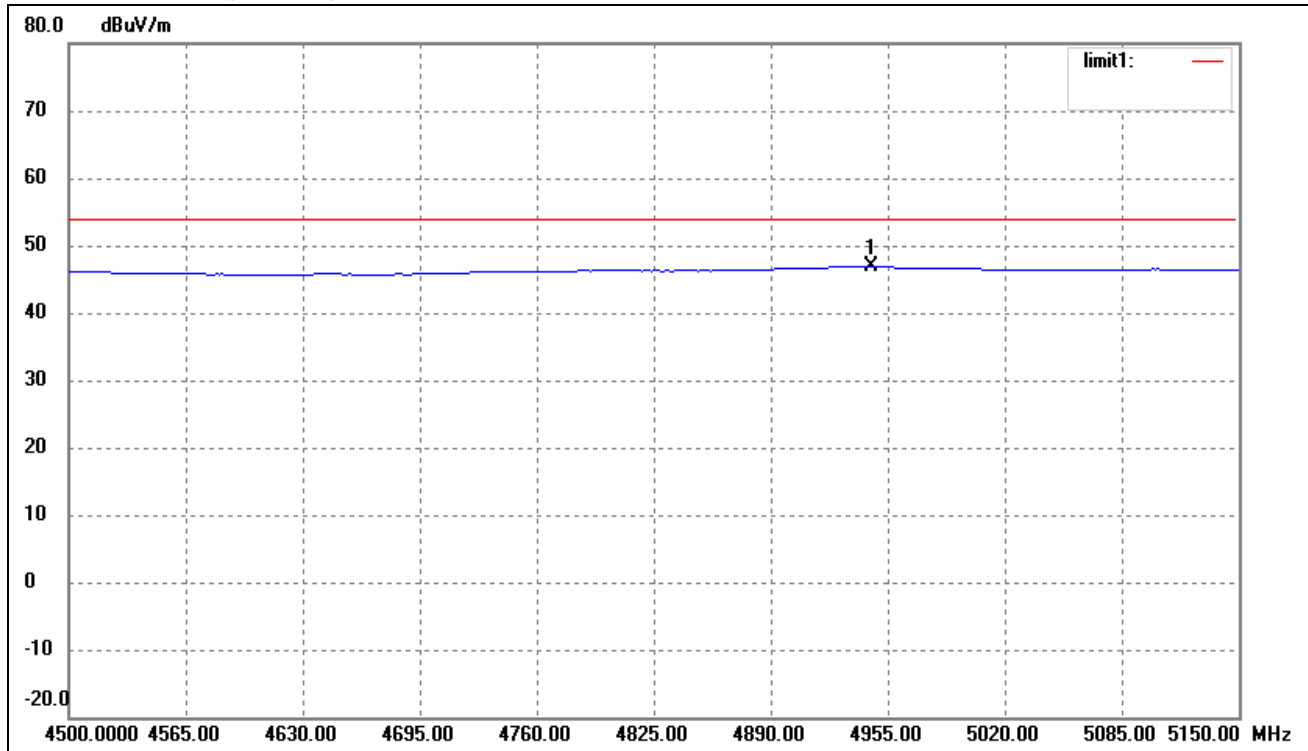
Restricted Band, Harmonics And Spurious Emissions

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5180MHz)										
15540	PK	50.8	360	V	40.7	10.9	39.6	62.8	74	-11.2
15540	PK	49.4	360	H	40.7	10.9	39.6	61.4	74	-12.6
15540	AV	35.6	360	V	40.7	10.9	39.6	47.6	54	-6.4
15540	AV	34.7	360	H	40.7	10.9	39.6	46.7	54	-7.3
Middle Channel (5210MHz)										
15630	PK	50.5	360	V	40.7	10.9	39.6	62.5	74	-11.5
15630	PK	49.7	360	H	40.7	10.9	39.6	61.7	74	-12.3
15630	AV	34.8	360	V	40.7	10.9	39.6	46.8	54	-7.2
15630	AV	34.6	360	H	40.7	10.9	39.6	46.6	54	-7.4
High Channel (5240MHz)										
15720	PK	51.1	360	V	40.7	10.9	39.6	63.1	74	-10.9
15720	PK	50.3	360	H	40.7	10.9	39.6	62.3	74	-11.7
15720	AV	35.4	360	V	40.7	10.9	39.6	47.4	54	-6.6
15720	AV	34.3	360	H	40.7	10.9	39.6	46.3	54	-7.7

For the frequency band 5.18-5.24GHz (802.11n HT20)
Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	4810.700	30.04	30.52	60.56	74.00	-13.44	360	100	peak

Restricted Bandedge Average

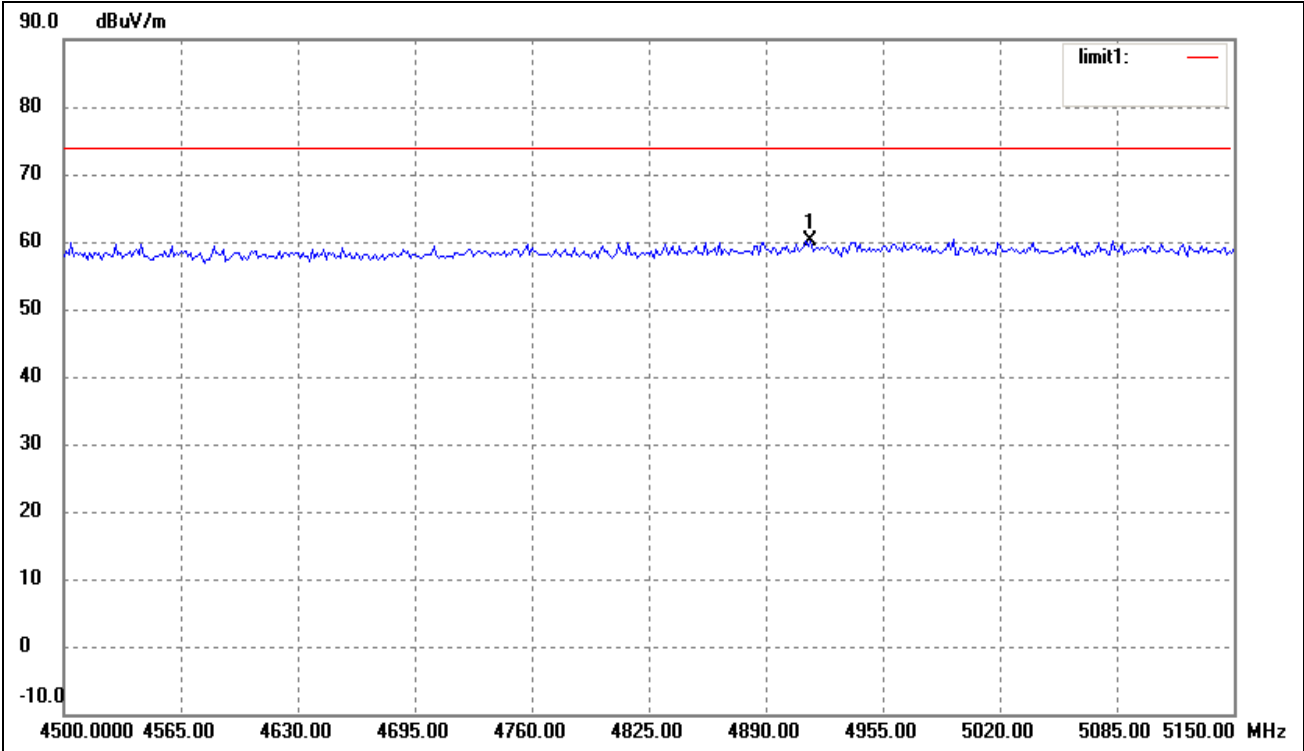
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	4945.900	16.13	30.71	46.84	54.00	-7.16	360	100	peak

Note: this EUT was tested in the low, middle, high channel and the worst case position data was reported.

Restricted Band, Harmonics And Spurious Emissions

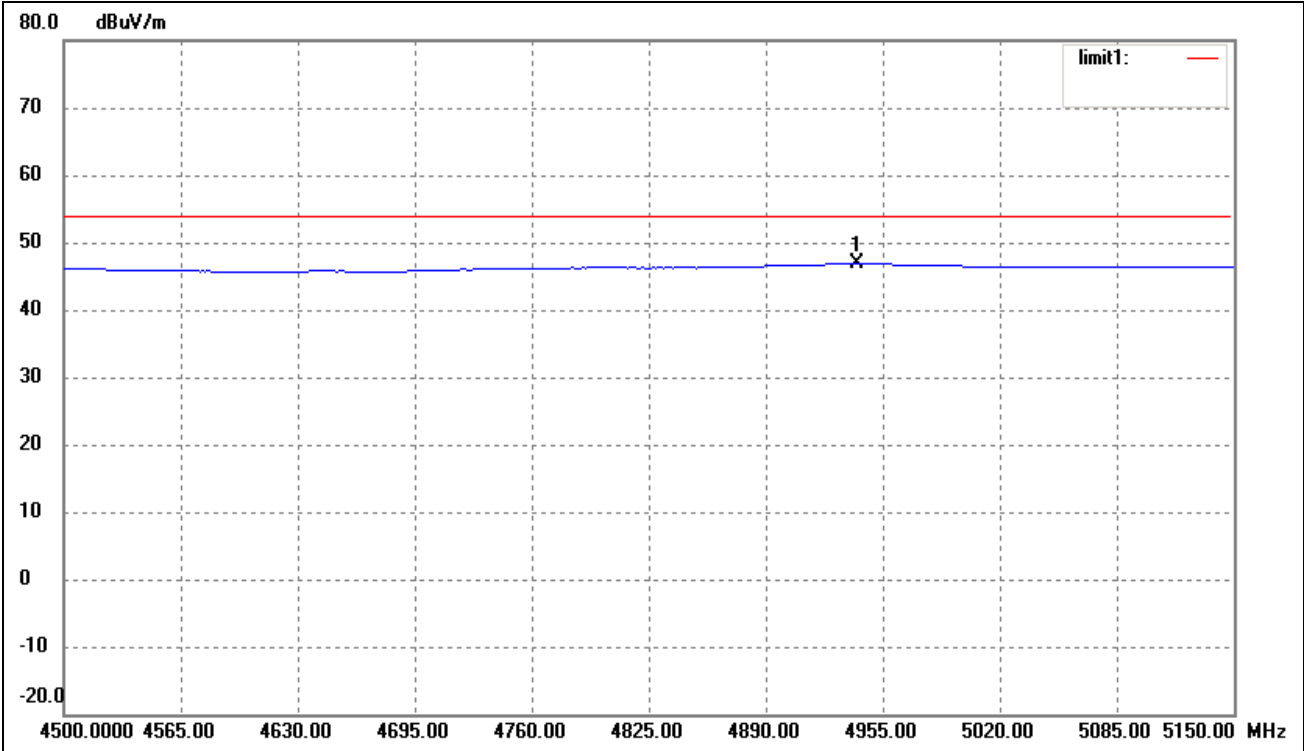
Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5180MHz)										
15540	PK	50.9	360	V	40.7	10.9	39.6	62.9	74	-11.1
15540	PK	50.4	360	H	40.7	10.9	39.6	62.4	74	-11.6
15540	AV	34.5	360	V	40.7	10.9	39.6	46.5	54	-7.5
15540	AV	34.6	360	H	40.7	10.9	39.6	46.6	54	-7.4
Middle Channel (5210MHz)										
15630	PK	51.3	360	V	40.7	10.9	39.6	63.3	74	-10.7
15630	PK	50.7	360	H	40.7	10.9	39.6	62.7	74	-11.3
15630	AV	35.1	360	V	40.7	10.9	39.6	47.1	54	-6.9
15630	AV	34.6	360	H	40.7	10.9	39.6	46.6	54	-7.4
High Channel (5240MHz)										
15720	PK	50.3	360	V	40.7	10.9	39.6	62.3	74	-11.7
15720	PK	49.5	360	H	40.7	10.9	39.6	61.5	74	-12.5
15720	AV	34.2	360	V	40.7	10.9	39.6	46.2	54	-7.8
15720	AV	33.8	360	H	40.7	10.9	39.6	45.8	54	-8.2

For the frequency band 5.19-5.23GHz (802.11n HT40)
Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	4914.700	29.57	30.66	60.23	74.00	-13.77	360	100	peak

Restricted Bandedge Average



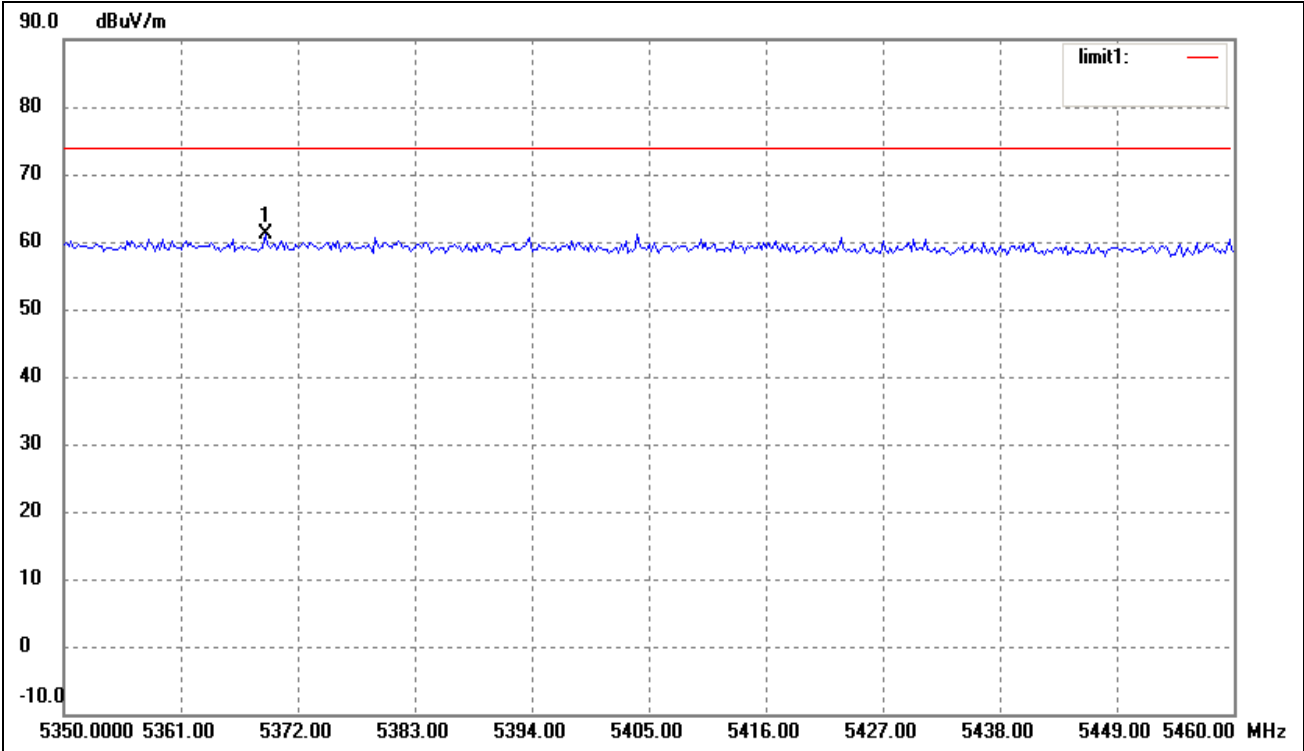
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	4940.700	16.14	30.70	46.84	54.00	-7.16	360	100	peak

Note: this EUT was tested in the low, middle, high channel and the worst case position data was reported.

Restricted Band, Harmonics And Spurious Emissions

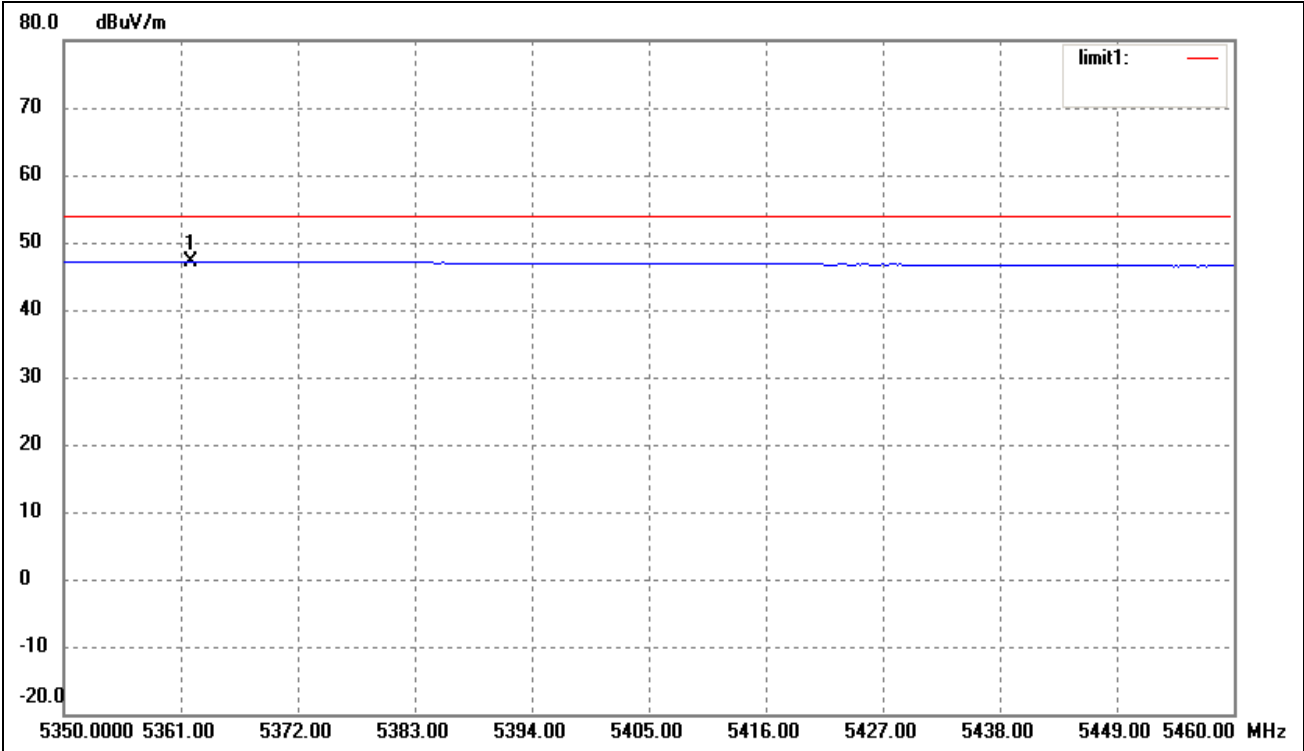
Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5190MHz)										
15570	PK	49.4	360	V	40.7	10.9	39.6	61.4	74	-12.6
15570	PK	48.2	360	H	40.7	10.9	39.6	60.2	74	-13.8
15570	AV	33.3	360	V	40.7	10.9	39.6	45.3	54	-8.7
15570	AV	31.2	360	H	40.7	10.9	39.6	43.2	54	-10.8
Middle Channel (5210MHz)										
15630	PK	48.8	360	V	40.7	10.9	39.6	60.8	74	-13.2
15630	PK	47.7	360	H	40.7	10.9	39.6	59.7	74	-14.3
15630	AV	32.9	360	V	40.7	10.9	39.6	44.9	54	-9.1
15630	AV	31.4	360	H	40.7	10.9	39.6	43.4	54	-10.6
High Channel (5230MHz)										
15690	PK	48.6	360	V	40.7	10.9	39.6	60.6	74	-13.4
15690	PK	47.4	360	H	40.7	10.9	39.6	59.4	74	-14.6
15690	AV	33.2	360	V	40.7	10.9	39.6	45.2	54	-8.8
15690	AV	31.7	360	H	40.7	10.9	39.6	43.7	54	-10.3

For the frequency band 5.26-5.32GHz (802.11a)
Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5368.920	29.86	31.23	61.09	74.00	-12.91	360	100	peak

Restricted Bandedge Average



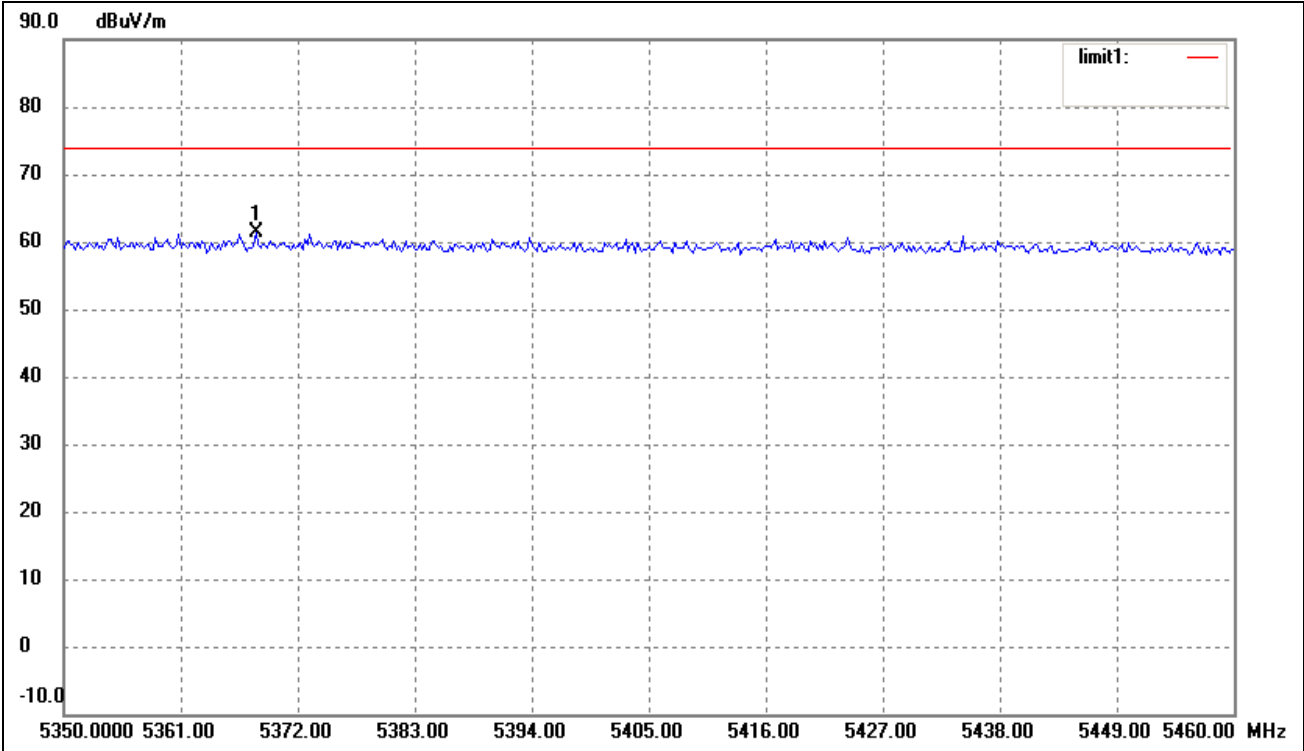
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5361.880	15.89	31.23	47.12	54.00	-6.88	360	100	peak

Note: this EUT was tested in the low, middle, high channel and the worst case position data was reported.

Restricted Band, Harmonics And Spurious Emissions

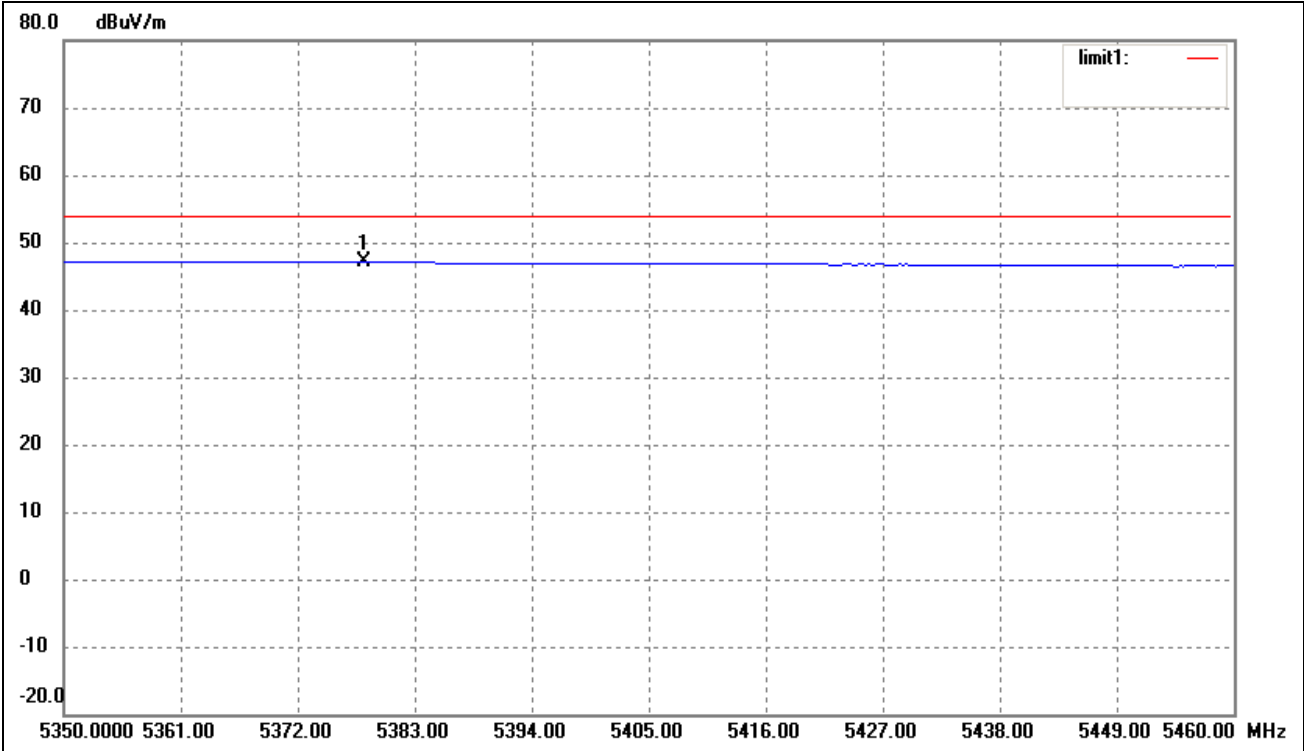
Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5260MHz)										
15780	PK	53.4	360	V	40.7	10.9	39.6	65.4	74	-8.6
15780	PK	51.8	360	H	40.7	10.9	39.6	63.8	74	-10.2
15780	AV	36.6	360	V	40.7	10.9	39.6	48.6	54	-5.4
15780	AV	34.2	360	H	40.7	10.9	39.6	46.2	54	-7.8
Middle Channel (5290MHz)										
15870	PK	52.7	360	V	40.7	10.9	39.6	64.7	74	-9.3
15870	PK	51.5	360	H	40.7	10.9	39.6	63.5	74	-10.5
15870	AV	36.1	360	V	40.7	10.9	39.6	48.1	54	-5.9
15870	AV	34.3	360	H	40.7	10.9	39.6	46.3	54	-7.7
High Channel (5320MHz)										
10640	PK	57.9	360	V	38.2	9.2	40.1	65.2	74	-8.8
10640	PK	56.5	360	H	38.2	9.2	40.1	63.8	74	-10.2
10640	AV	41.0	360	V	38.2	9.2	40.1	48.3	54	-5.7
10640	AV	39.8	360	H	38.2	9.2	40.1	47.1	54	-6.9
15960	PK	50.4	360	V	40.7	10.9	39.6	62.4	74	-11.6
15960	PK	49.4	360	H	40.7	10.9	39.6	61.4	74	-12.6
15960	AV	34.7	360	V	40.7	10.9	39.6	46.7	54	-7.3
15960	AV	33.3	360	H	40.7	10.9	39.6	45.3	54	-8.7

For the frequency band 5.26-5.32GHz (802.11n HT20)
Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5368.040	30.09	31.23	61.32	74.00	-12.68	360	100	peak

Restricted Bandedge Average



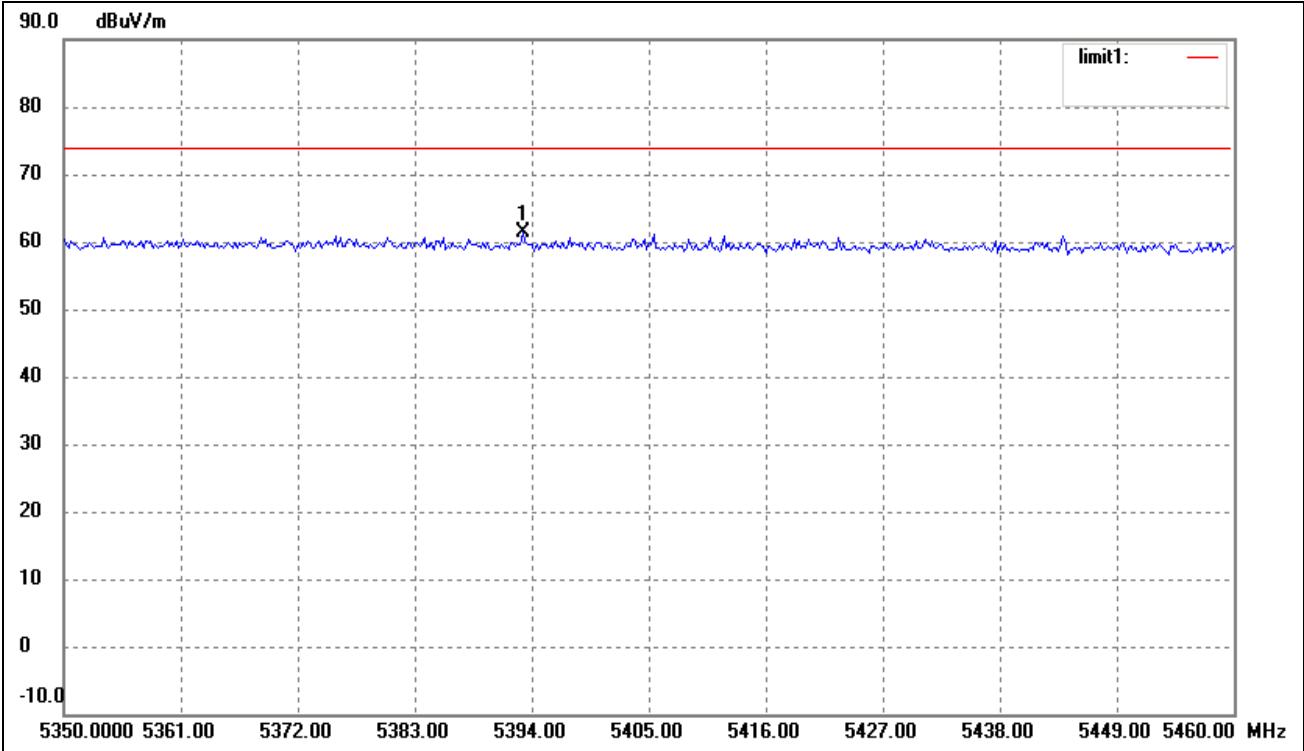
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5378.160	15.87	31.25	47.12	54.00	-6.88	360	100	peak

Note: this EUT was tested in the low, middle, high channel and the worst case position data was reported.

Restricted Band, Harmonics And Spurious Emissions

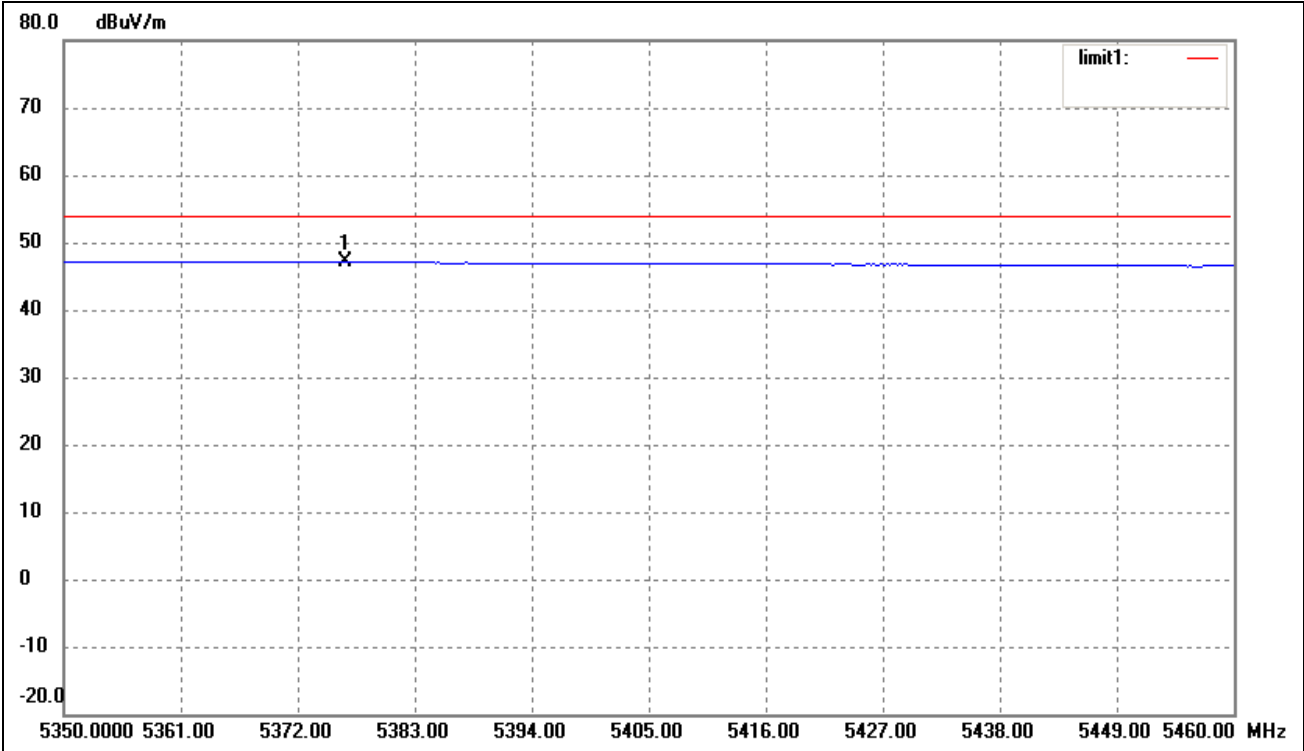
Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5260MHz)										
15780	PK	51.8	360	V	40.7	10.9	39.6	63.8	74	-10.2
15780	PK	50.3	360	H	40.7	10.9	39.6	62.3	74	-11.7
15780	AV	33.7	360	V	40.7	10.9	39.6	45.7	54	-8.3
15780	AV	32.8	360	H	40.7	10.9	39.6	44.8	54	-9.2
Middle Channel (5290MHz)										
15870	PK	50.9	360	V	40.7	10.9	39.6	62.9	74	-11.1
15870	PK	49.7	360	H	40.7	10.9	39.6	61.7	74	-12.3
15870	AV	34.1	360	V	40.7	10.9	39.6	46.1	54	-7.9
15870	AV	32.9	360	H	40.7	10.9	39.6	44.9	54	-9.1
High Channel (5320MHz)										
10640	PK	58.2	360	V	38.2	9.2	40.1	65.5	74	-8.5
10640	PK	56.9	360	H	38.2	9.2	40.1	64.2	74	-9.8
10640	AV	40.9	360	V	38.2	9.2	40.1	48.2	54	-5.8
10640	AV	40.3	360	H	38.2	9.2	40.1	47.6	54	-6.4
15960	PK	49.3	360	V	40.7	10.9	39.6	61.3	74	-12.7
15960	PK	48.2	360	H	40.7	10.9	39.6	60.2	74	-13.8
15960	AV	33.8	360	V	40.7	10.9	39.6	45.8	54	-8.2
15960	AV	32.5	360	H	40.7	10.9	39.6	44.5	54	-9.5

For the frequency band 5.27-5.31GHz (802.11n HT40)
Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5393.120	30.15	31.27	61.42	74.00	-12.58	360	100	peak

Restricted Bandedge Average



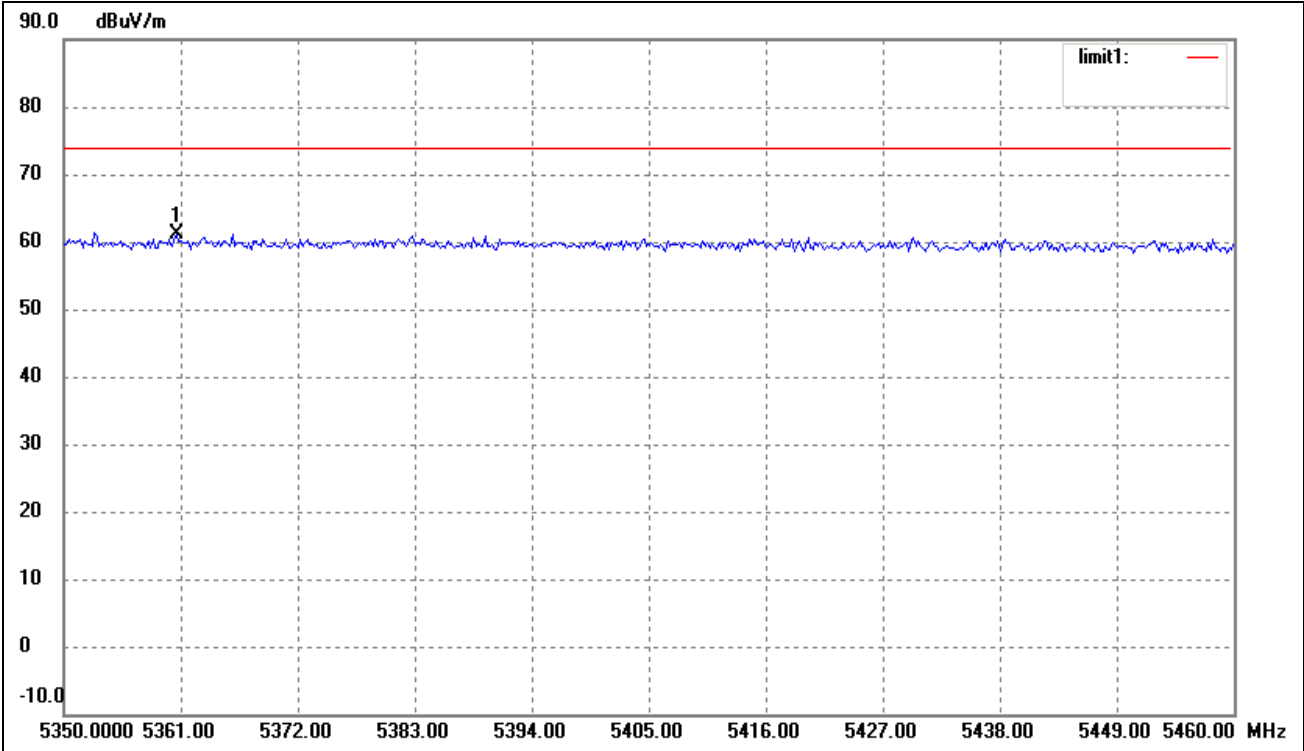
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5376.400	15.89	31.25	47.14	54.00	-6.86	360	100	peak

Note: this EUT was tested in the low, middle, high channel and the worst case position data was reported.

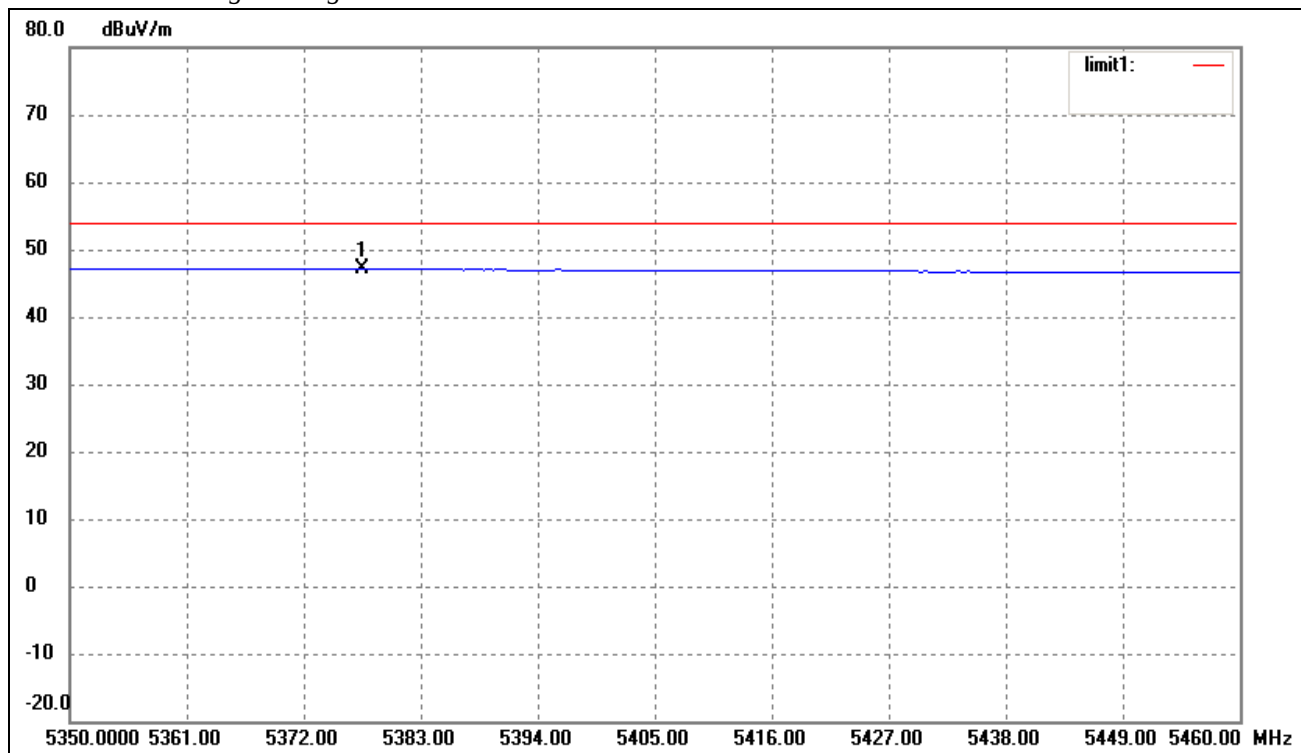
Restricted Band, Harmonics And Spurious Emissions

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5270MHz)										
15810	PK	49.9	360	V	40.7	10.9	39.6	61.9	74	-12.1
15810	PK	48.5	360	H	40.7	10.9	39.6	60.5	74	-13.5
15810	AV	33.4	360	V	40.7	10.9	39.6	45.4	54	-8.6
15810	AV	32.3	360	H	40.7	10.9	39.6	44.3	54	-9.7
Middle Channel (5290MHz)										
15870	PK	50.0	360	V	40.7	10.9	39.6	62.0	74	-12.0
15870	PK	48.7	360	H	40.7	10.9	39.6	60.7	74	-13.3
15870	AV	33.3	360	V	40.7	10.9	39.6	45.3	54	-8.7
15870	AV	31.8	360	H	40.7	10.9	39.6	43.8	54	-10.2
High Channel (5310MHz)										
10620	PK	57.7	360	V	38.2	9.2	40.1	65.0	74	-9.0
10620	PK	56.2	360	H	38.2	9.2	40.1	63.5	74	-10.5
10620	AV	40.4	360	V	38.2	9.2	40.1	47.7	54	-6.3
10620	AV	38.5	360	H	38.2	9.2	40.1	45.8	54	-8.2
15930	PK	49.7	360	V	40.7	10.9	39.6	61.7	74	-12.3
15930	PK	48.0	360	H	40.7	10.9	39.6	60.0	74	-14.0
15930	AV	33.6	360	V	40.7	10.9	39.6	45.6	54	-8.4
15930	AV	32.4	360	H	40.7	10.9	39.6	44.4	54	-9.6

For the frequency band 5.5-5.7GHz (802.11a)
Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5360.560	29.88	31.23	61.11	74.00	-12.89	360	100	peak

Restricted Bandedge Average

No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5377.500	15.92	31.25	47.17	54.00	-6.83	360	100	peak

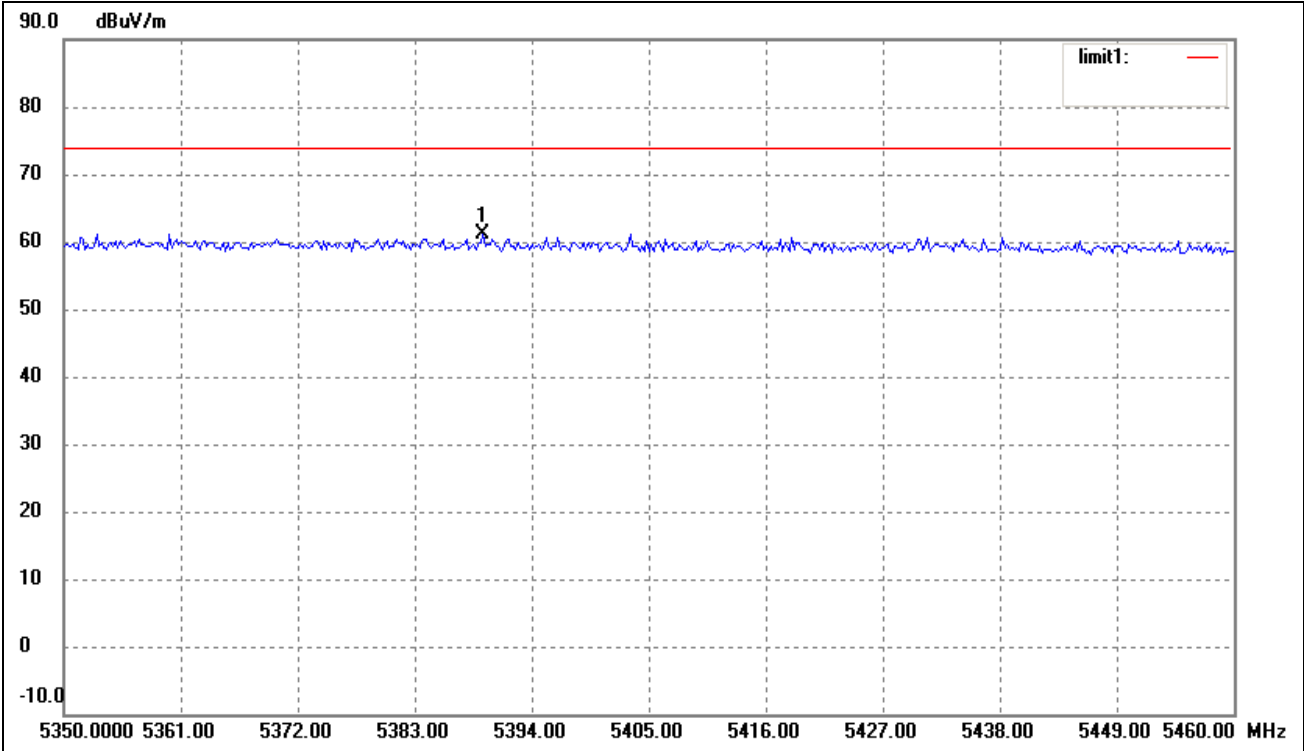
Note: this EUT was tested in the low, middle, high channel and the worst case position data was reported.

Restricted Band, Harmonics And Spurious Emissions

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5500MHz)										
11000	PK	55.9	360	V	38.9	9.8	40.1	64.5	74	-9.5
11000	PK	54.9	360	H	38.9	9.8	40.1	63.5	74	-10.5
11000	AV	36.4	360	V	38.9	9.8	40.1	45.0	54	-9.0
11000	AV	35.7	360	H	38.9	9.8	40.1	44.3	54	-9.7
Middle Channel (5600MHz)										
11200	PK	55.0	360	V	38.9	9.8	40.1	63.6	74	-10.4
11200	PK	54.4	360	H	38.9	9.8	40.1	63.0	74	-11.0
11200	AV	36.2	360	V	38.9	9.8	40.1	44.8	54	-9.2
11200	AV	34.6	360	H	38.9	9.8	40.1	43.2	54	-10.8
High Channel (5700MHz)										
11400	PK	54.3	360	V	38.9	9.8	40.1	62.9	74	-11.1
11400	PK	53.2	360	H	38.9	9.8	40.1	61.8	74	-12.2
11400	AV	37.5	360	V	38.9	9.8	40.1	46.1	54	-7.9
11400	AV	36.6	360	H	38.9	9.8	40.1	45.2	54	-8.8

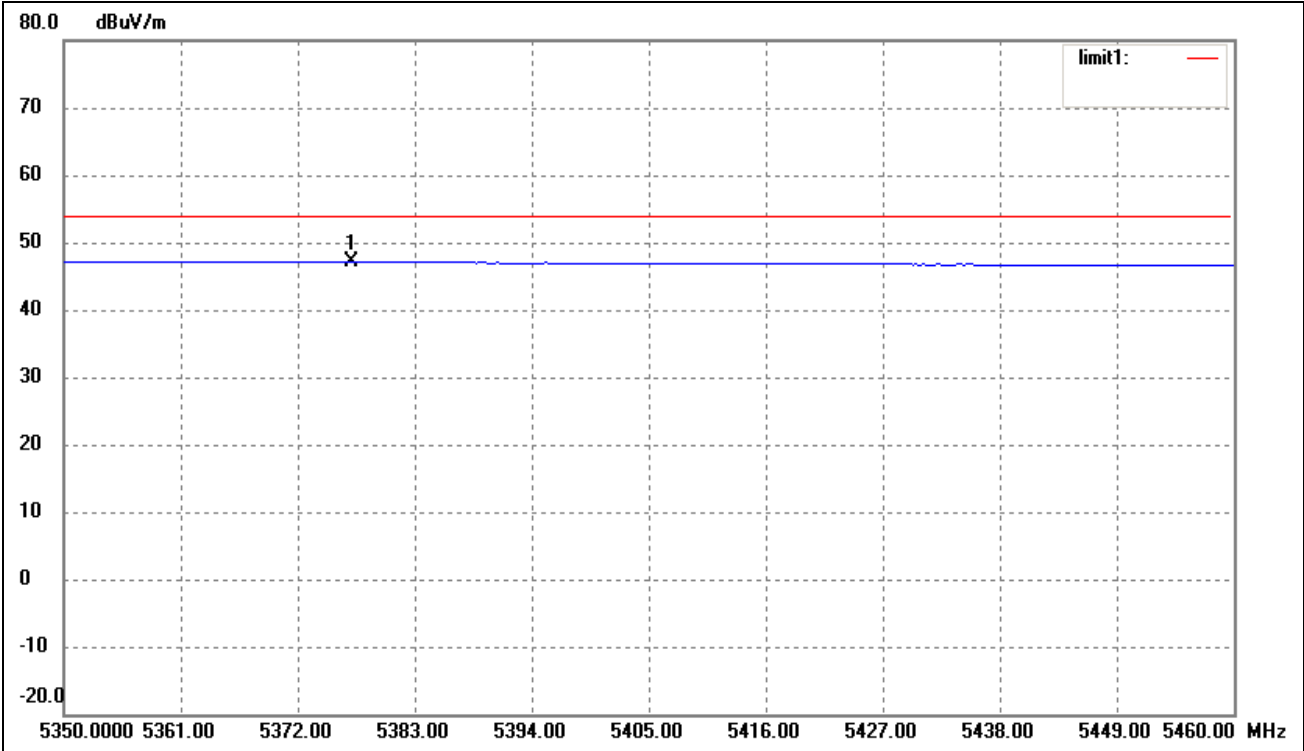
For the frequency band 5.5-5.7GHz (802.11n HT20)

Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5389.380	29.97	31.25	61.22	74.00	-12.78	360	100	peak

Restricted Bandedge Average



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5377.060	15.94	31.25	47.19	54.00	-6.81	360	100	peak

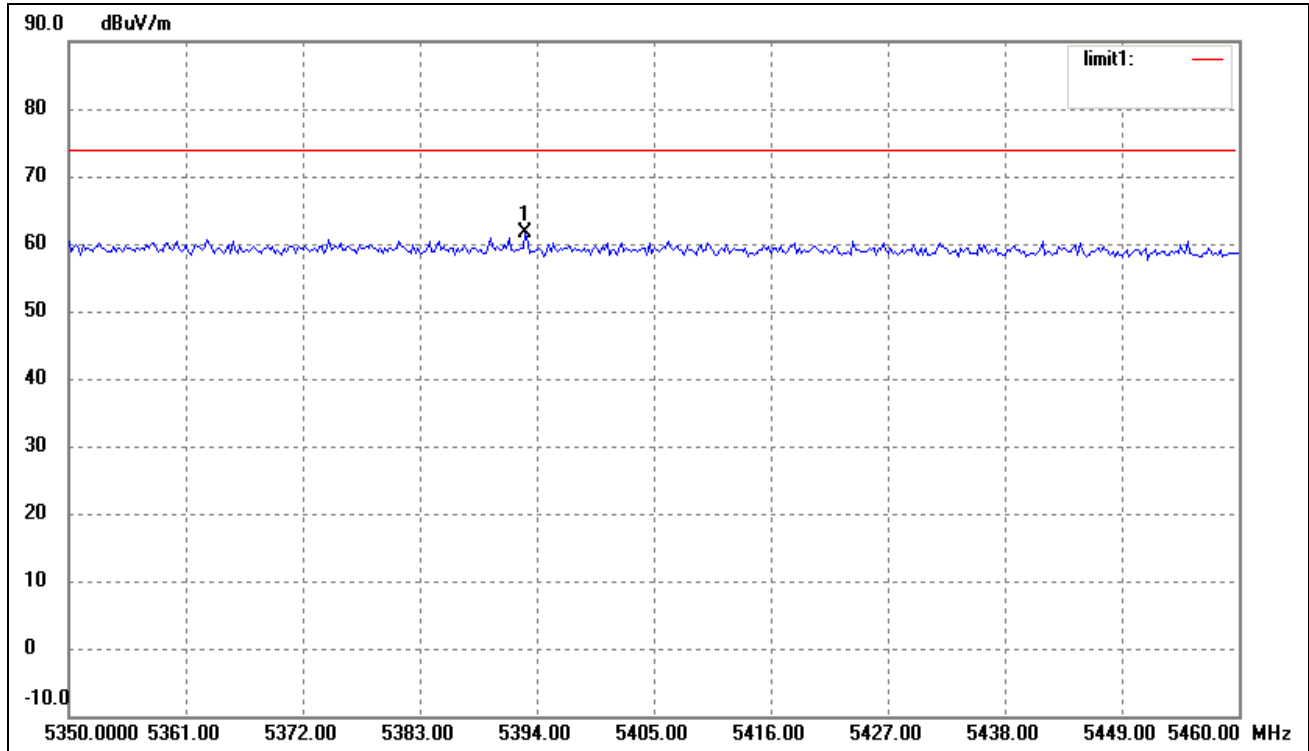
Note: this EUT was tested in the low, middle, high channel and the worst case position data was reported.

Restricted Band, Harmonics And Spurious Emissions

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5500MHz)										
11000	PK	54.5	360	V	38.9	9.8	40.1	63.1	74	-10.9
11000	PK	54.6	360	H	38.9	9.8	40.1	63.2	74	-10.8
11000	AV	35.8	360	V	38.9	9.8	40.1	44.4	54	-9.6
11000	AV	36.2	360	H	38.9	9.8	40.1	44.8	54	-9.2
Middle Channel (5600MHz)										
11200	PK	54.3	360	V	38.9	9.8	40.1	62.9	74	-11.1
11200	PK	54.9	360	H	38.9	9.8	40.1	63.5	74	-10.5
11200	AV	37.0	360	V	38.9	9.8	40.1	45.6	54	-8.4
11200	AV	35.7	360	H	38.9	9.8	40.1	44.3	54	-9.7
High Channel (5700MHz)										
11400	PK	54.1	360	V	38.9	9.8	40.1	62.7	74	-11.3
11400	PK	53.2	360	H	38.9	9.8	40.1	61.8	74	-12.2
11400	AV	36.3	360	V	38.9	9.8	40.1	44.9	54	-9.1
11400	AV	34.9	360	H	38.9	9.8	40.1	43.5	54	-10.5

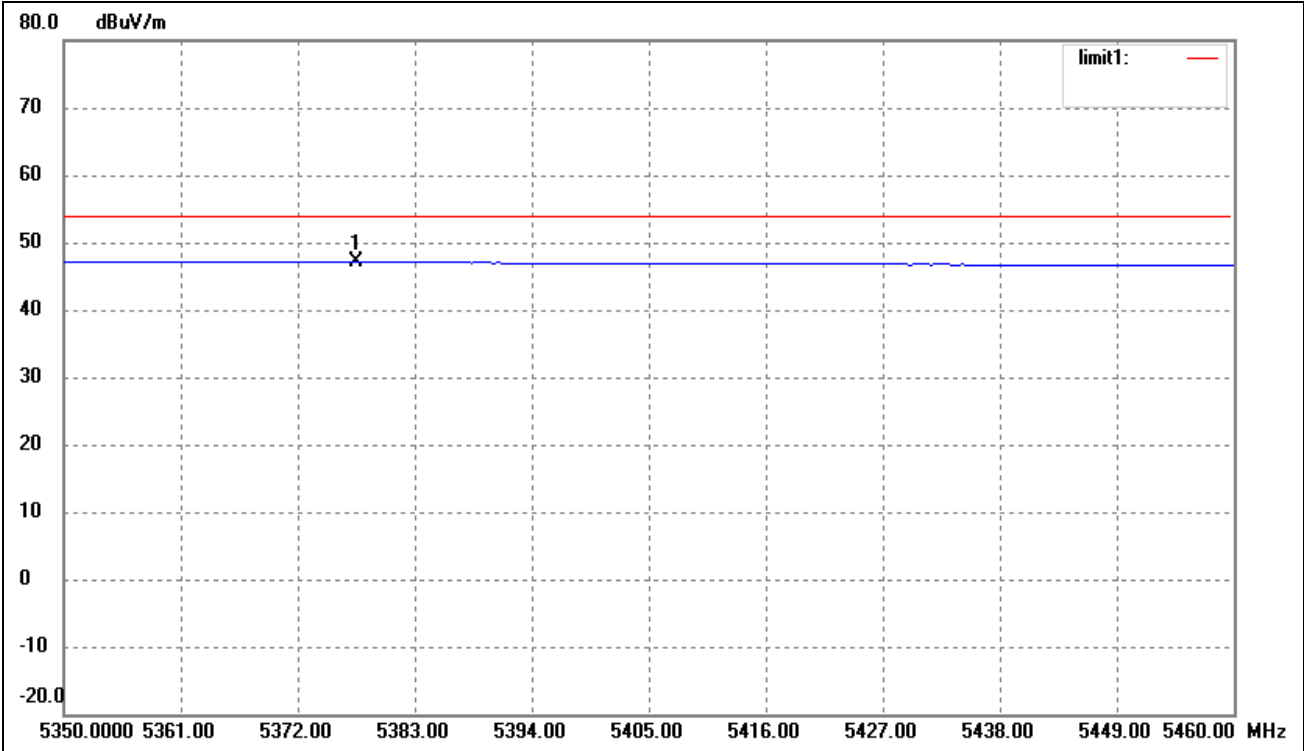
For the frequency band 5.51-5.67GHz (802.11n HT40)

Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5392.900	30.24	31.27	61.51	74.00	-12.49	360	100	peak

Restricted Bandedge Average



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5377.500	15.93	31.25	47.18	54.00	-6.82	360	100	peak

Note: this EUT was tested in the low, middle, high channel and the worst case position data was reported.

Restricted Band, Harmonics And Spurious Emissions

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5510MHz)										
11020	PK	54.7	360	V	38.9	9.8	40.1	63.3	74	-10.7
11020	PK	53.5	360	H	38.9	9.8	40.1	62.1	74	-11.9
11020	AV	37.2	360	V	38.9	9.8	40.1	45.8	54	-8.2
11020	AV	36.0	360	H	38.9	9.8	40.1	44.6	54	-9.4
Middle Channel (5590MHz)										
11180	PK	54.3	360	V	38.9	9.8	40.1	62.9	74	-11.1
11180	PK	54.1	360	H	38.9	9.8	40.1	62.7	74	-11.3
11180	AV	36.3	360	V	38.9	9.8	40.1	44.9	54	-9.1
11180	AV	36.6	360	H	38.9	9.8	40.1	45.2	54	-8.8
High Channel (5700MHz)										
11340	PK	53.2	360	V	38.9	9.8	40.1	61.8	74	-12.2
11340	PK	53.7	360	H	38.9	9.8	40.1	62.3	74	-11.7
11340	AV	37.0	360	V	38.9	9.8	40.1	45.6	54	-8.4
11340	AV	36.6	360	H	38.9	9.8	40.1	45.2	54	-8.8

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

11. DYNAMIC FREQUENCY SELECTION(DFS)

11.1 Standard Applicable

According to 15.407(h)(2), Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems. The minimum DFS detection threshold for devices with a maximum e.i.r.p. of 200 mW to 1 W is -64 dBm. For devices that operate with less than 200 mW e.i.r.p. the minimum detection threshold is -62 dBm. The detection threshold is the received power averaged over 1 microsecond referenced to a 0 dBi antenna. The DFS process shall be required to provide a uniform spreading of the loading over all the available channels.

(i) Operational Modes. The DFS requirement applies to the following operational modes:

(A) The requirement for channel availability check time applies in the master operational mode.

(B) The requirement for channel move time applies in both the master and slave operational modes.

(ii) Channel Availability Check Time. A U-NII device shall check if there is a radar system already operating on the channel before it can initiate a transmission on a channel and when it has to move to a new channel. The U-NII device may start using the channel if no radar signal with a power level greater than the interference threshold values listed above is detected within 60 seconds.

(iii) Channel Move Time. After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel.

(iv) Non-occupancy Period. A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The non-occupancy period starts at the time when the radar system is detected.

11.2 Test Equipment List and Details

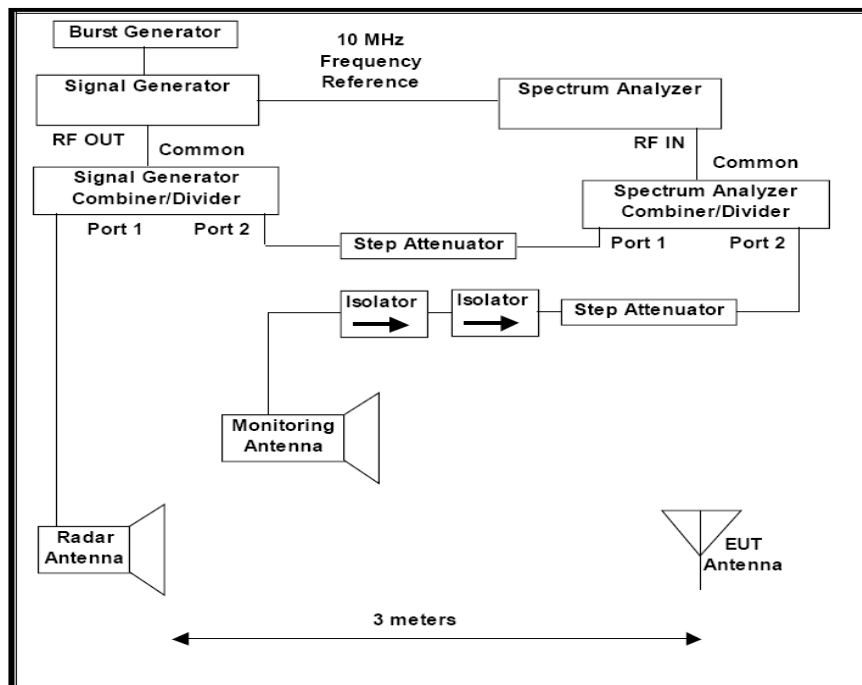
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Signal Generator, 20GHz	Agilent	83732B	US34490599	2010-08-12	2011-08-11
Arbitrary Waveform Generator	Agilent	33220A	MY44026694	2010-08-12	2011-08-11

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

11.3 Test Procedure

1. The test is conducting under the description of the FCC 06-96A1.

Test and measurement block diagram



2. The EUT is used over the 5250-5350 and 5470-5725MHz frequency ranges, and the EUT is a slave device without radar detection. The EUT utilizes the 802.11a/n architecture. Two nominal channel bandwidths are implemented: 20 MHz and 40 MHz.
3. The highest power level within these bands is 27.55 dBm EIRP in the 5250-5350 MHz band and 27.38 dBm EIRP in the 5470-5725 MHz band.
4. The EUT uses two transmitter/receiver chains, each connected to an antenna to perform radiated tests. WLAN traffic is generated by streaming the video file TestFile.mp2 “6 ½ Magic Hours” from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.
5. TPC is required since the maximum EIRP is greater than 500 mW (27 dBm), and The power is adjustable over a range of approximately 12 dB, therefore the EUT is capable of the required 6 dB TPC reduction.

11.4 Environmental Conditions

Temperature:	20° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

11.5 Summary of Test Results/Plots

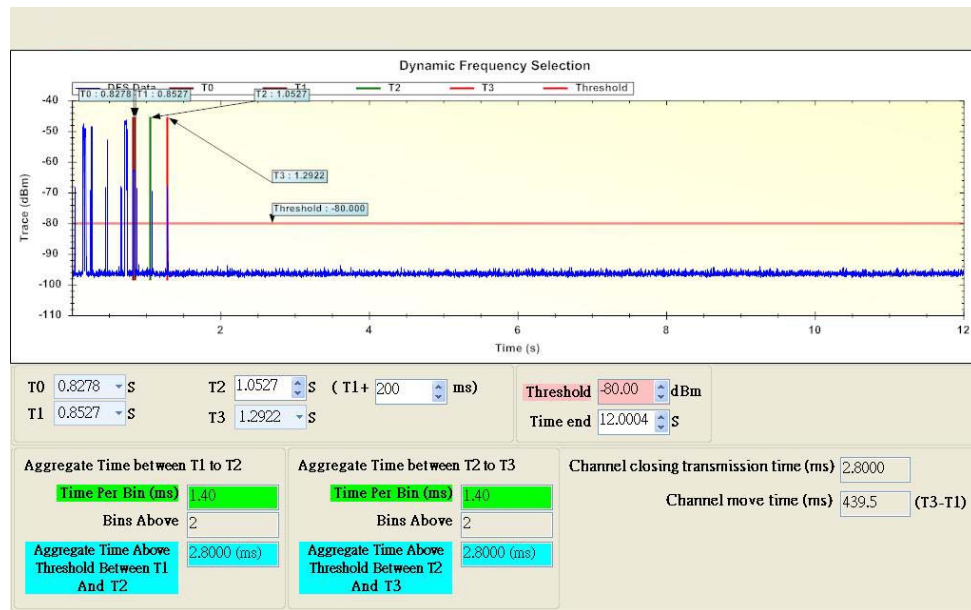
For the frequency band 5.26-5.32GHz**802.11a with 20MHz bandwidth**

All tests were performed at a channel center frequency of 5300 MHz. Measurements were performed using conducted test methods.

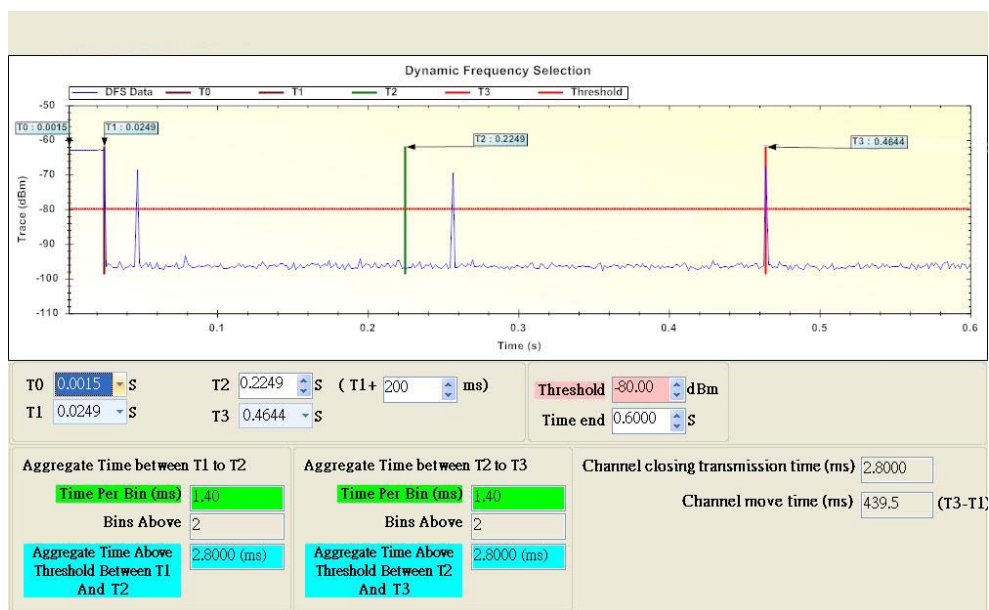
Test data

Test item	Measurement vale (msec)	Limit (msec)
Channel move time	439.5	10000

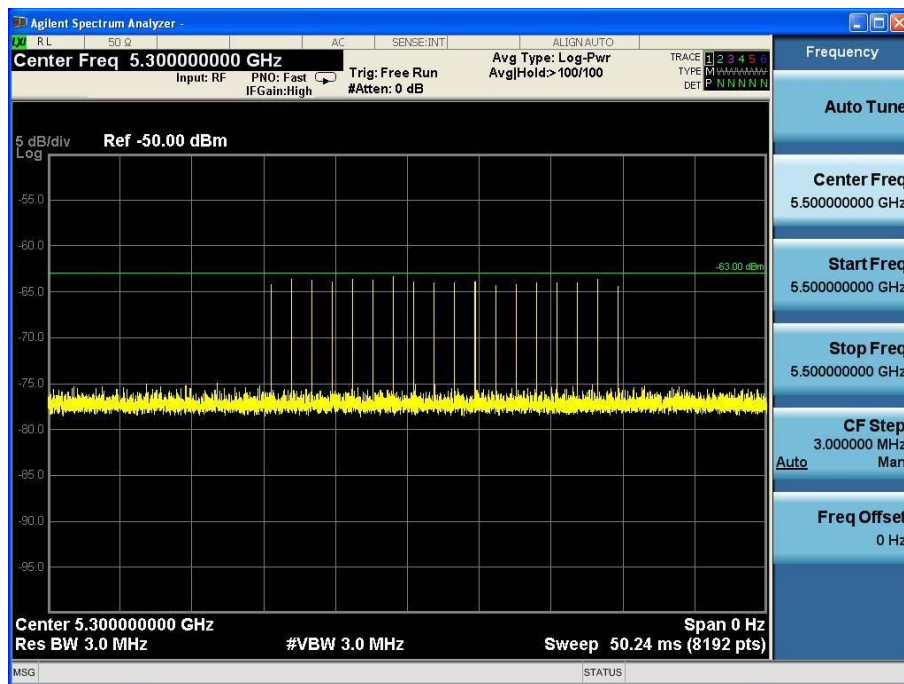
Test plots of the channel move time



Test plots of the channel closing time

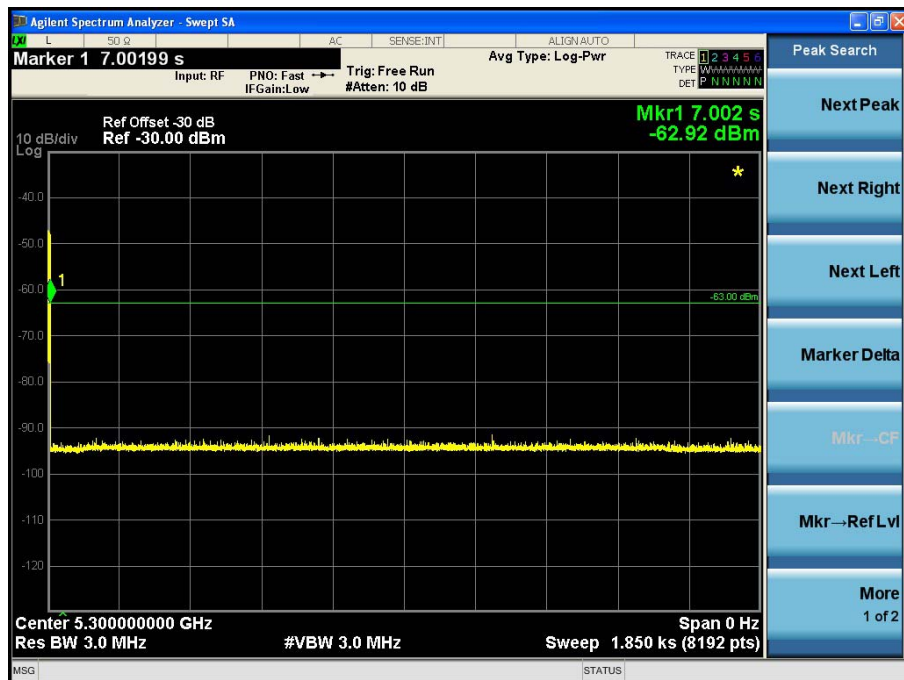


Test plots of the radar waveform



Test plots of the Non-occupancy period

No EUT transmissions were detected on the test channel during the 30-minute observation time.



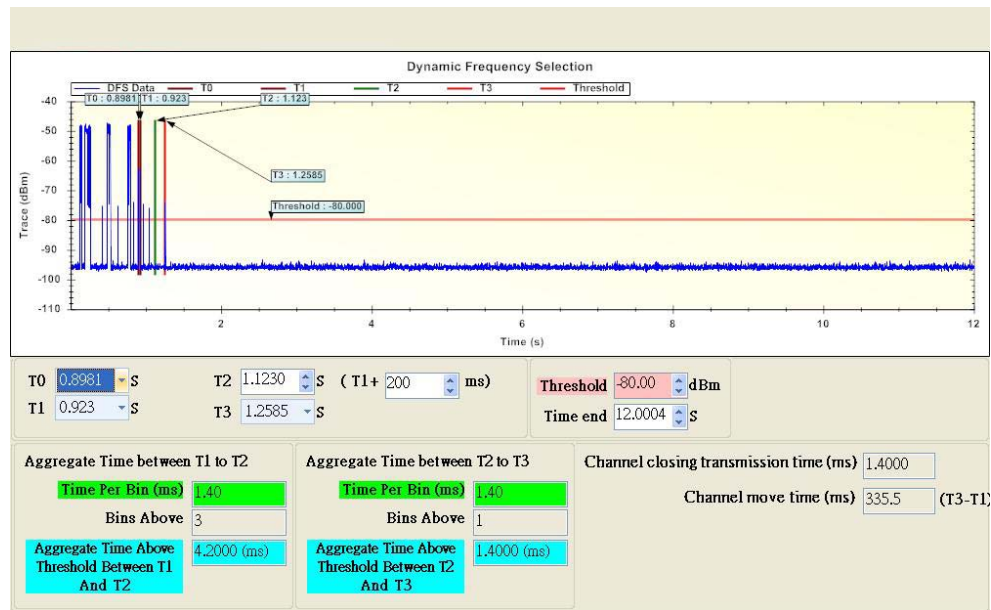
For the frequency band 5.27-5.31GHz**802.11n with 40MHz bandwidth**

All tests were performed at a channel center frequency of 5310 MHz. Measurements were performed using conducted test methods.

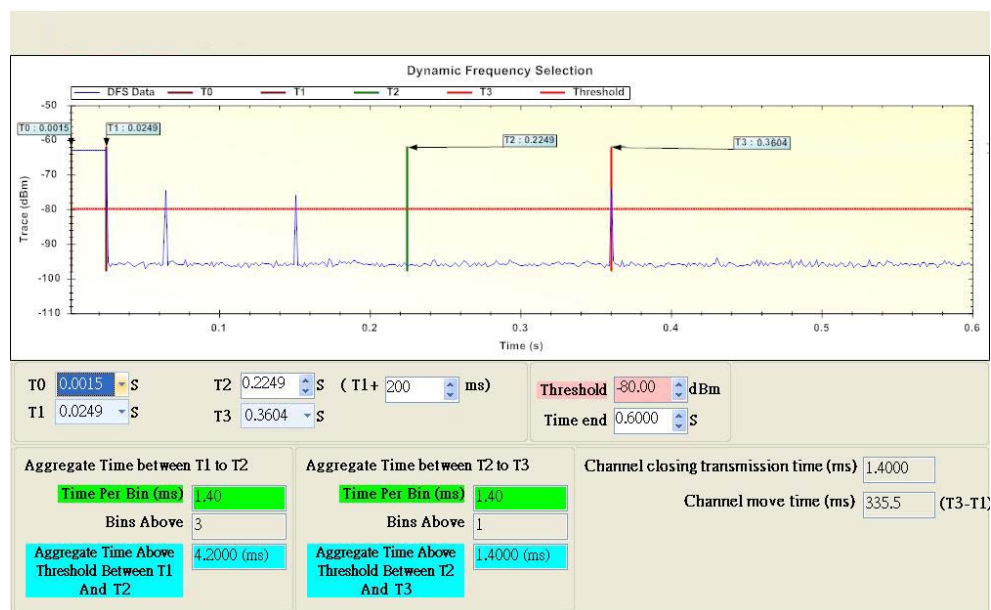
Test data

Test item	Measurement vale (msec)	Limit (msec)
Channel move time	335.5	10000

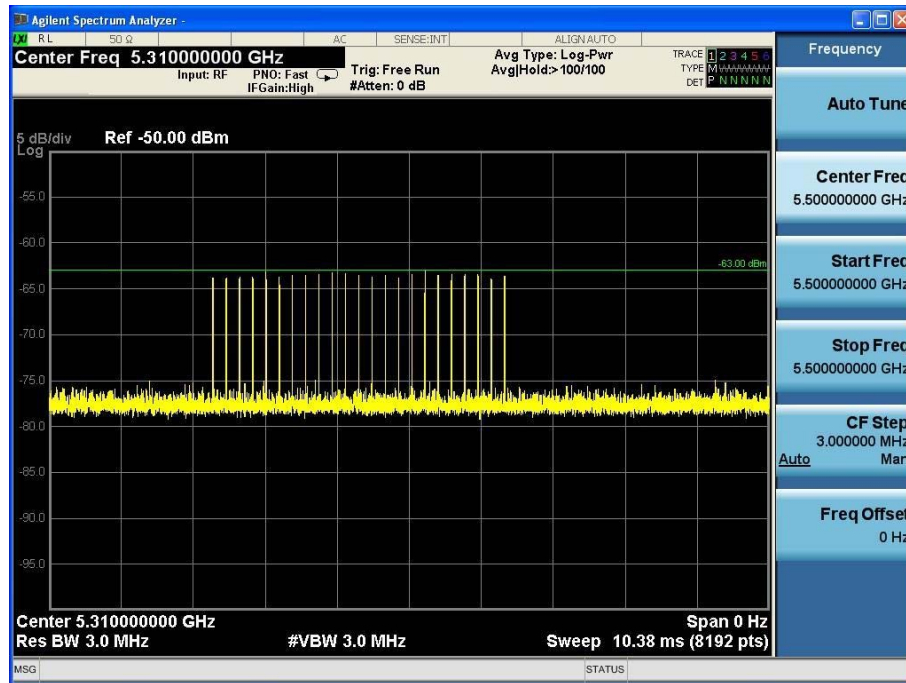
Test plots of the channel move time



Test plots of the channel closing time

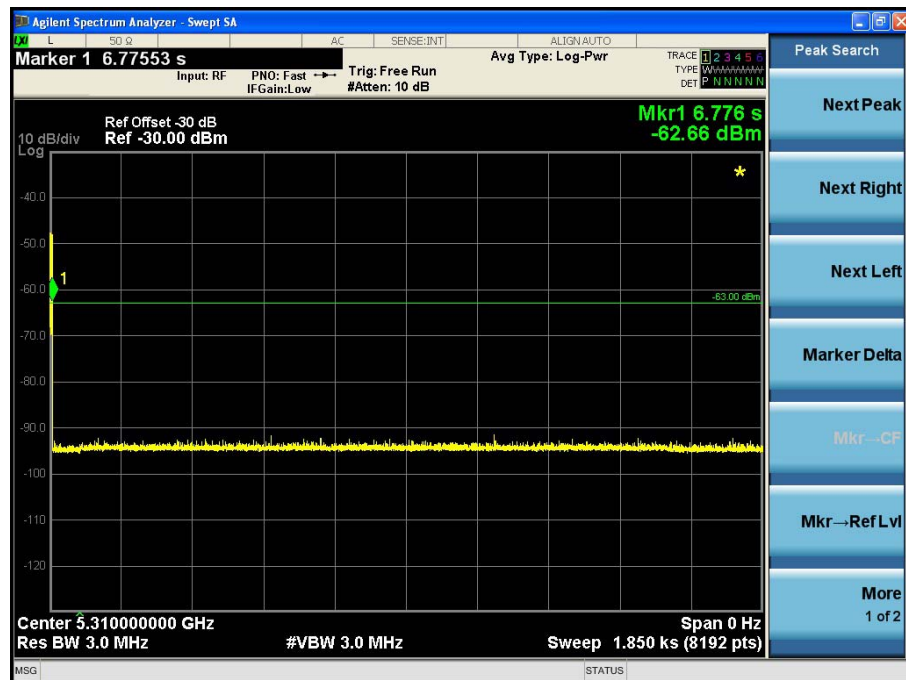


Test plots of the radar waveform



Test plots of the Non-occupancy period

No EUT transmissions were detected on the test channel during the 30-minute observation time.



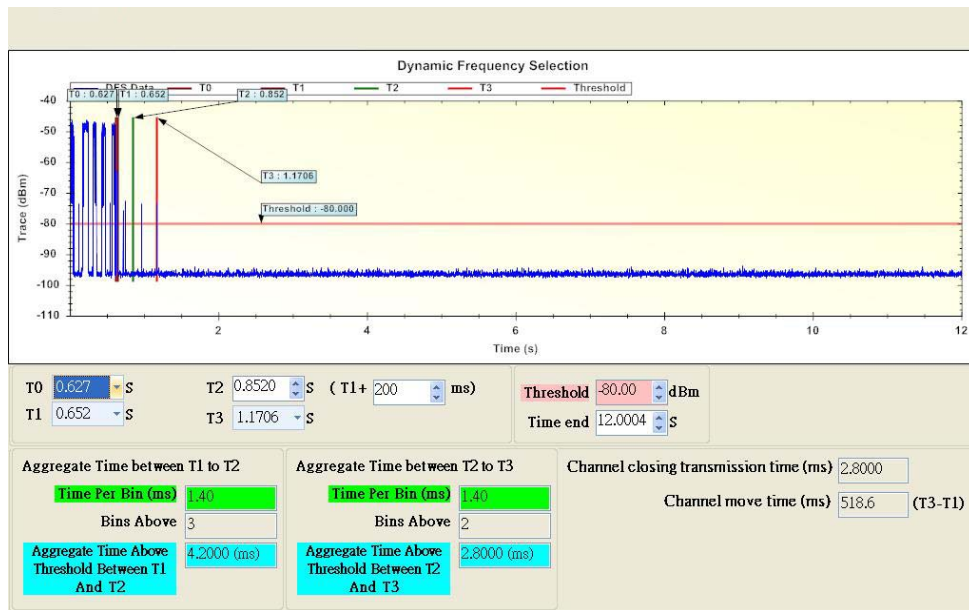
**For the frequency band 5.5-5.7GHz
802.11a with 20MHz bandwidth**

All tests were performed at a channel center frequency of 5500 MHz. Measurements were performed using conducted test methods.

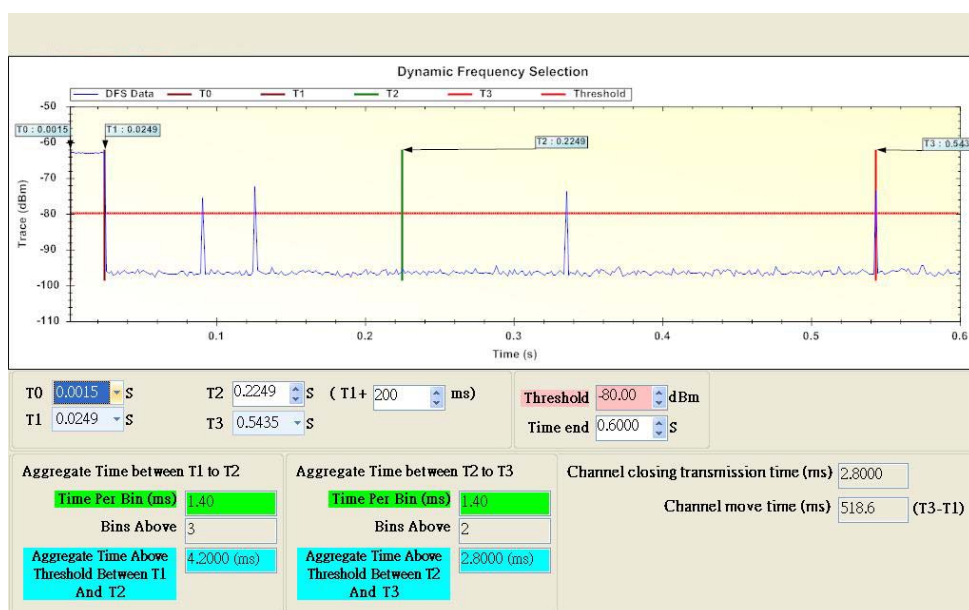
Test data

Test item	Measurement vale (msec)	Limit (msec)
Channel move time	518.6	10000

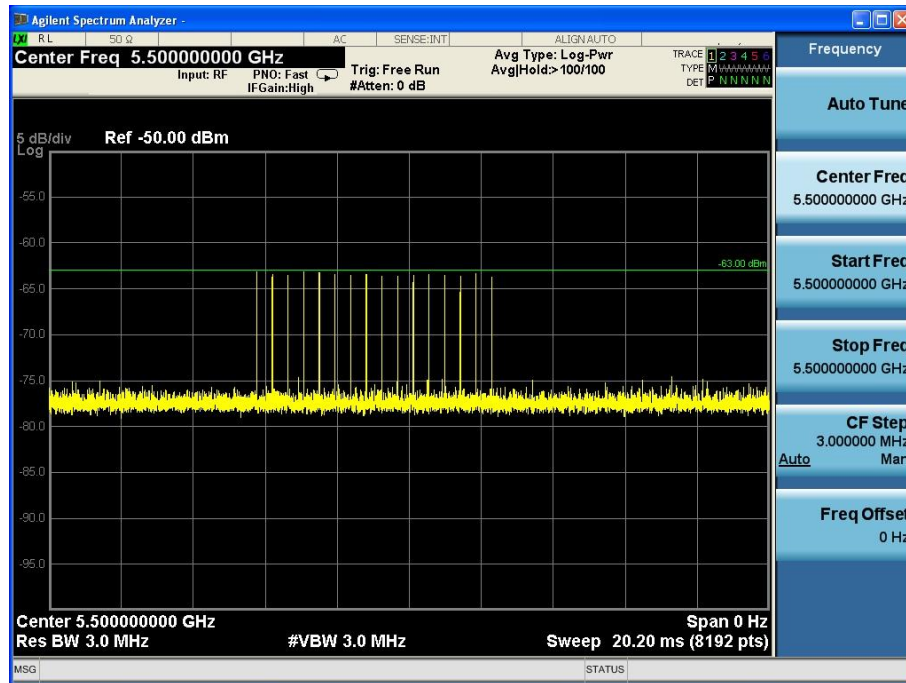
Test plots of the channel move time



Test plots of the channel closing time

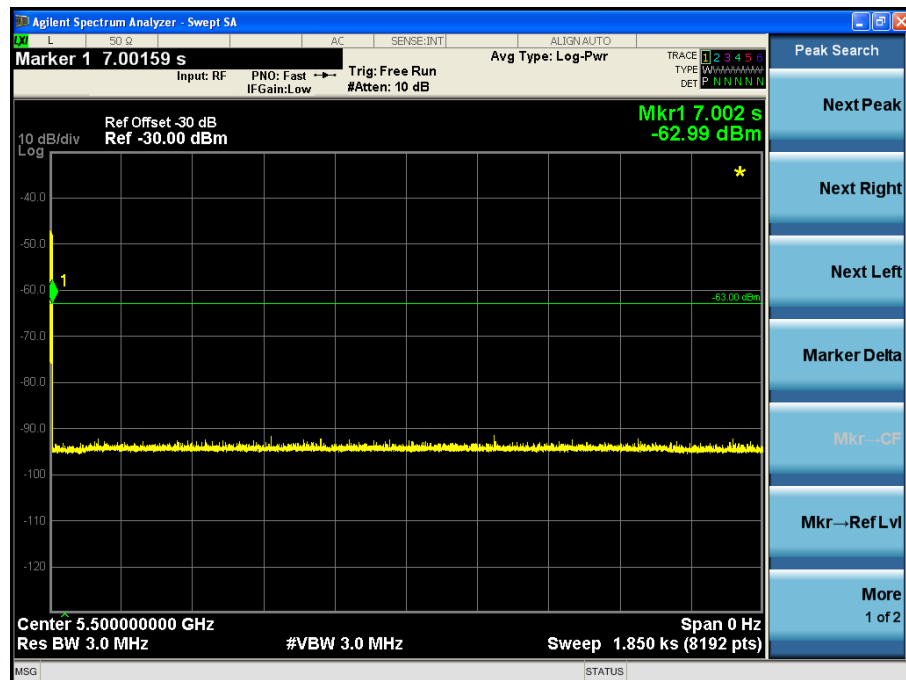


Test plots of the radar waveform



Test plots of the Non-occupancy period

No EUT transmissions were detected on the test channel during the 30-minute observation time.



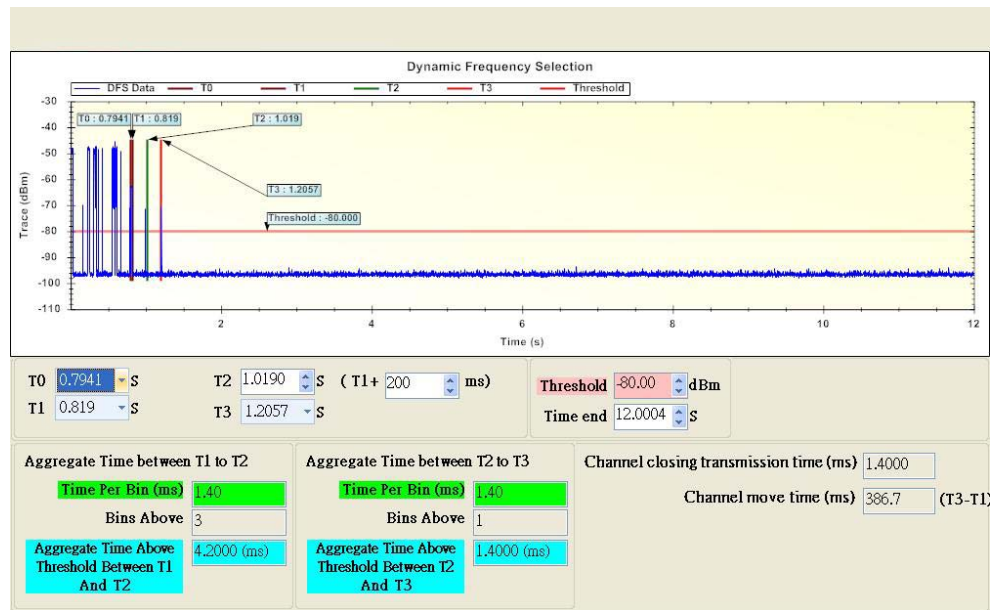
For the frequency band 5.51-5.67GHz**802.11n with 40MHz bandwidth**

All tests were performed at a channel center frequency of 5510 MHz. Measurements were performed using conducted test methods.

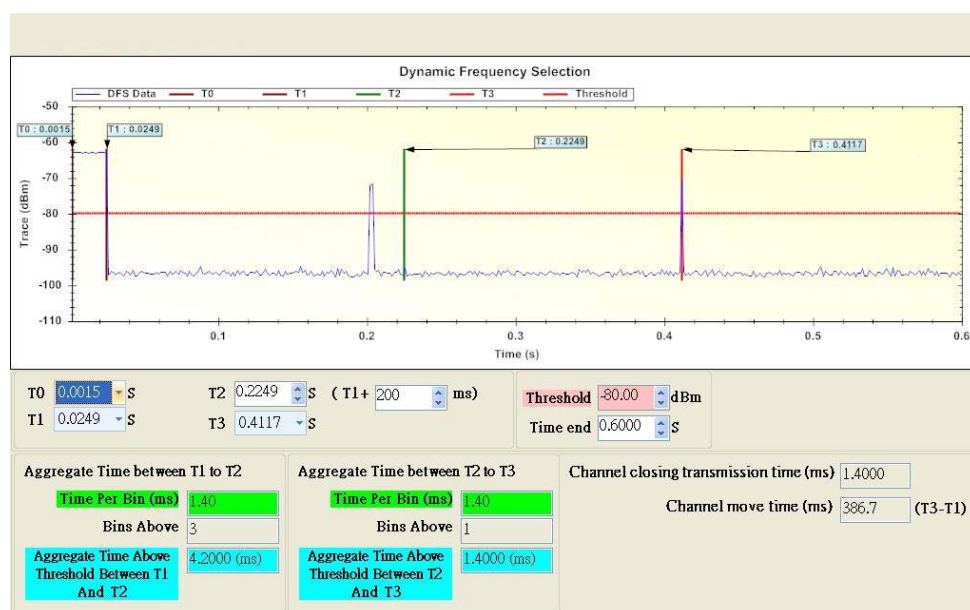
Test data

Test item	Measurement vale (msec)	Limit (msec)
Channel move time	386.7	10000

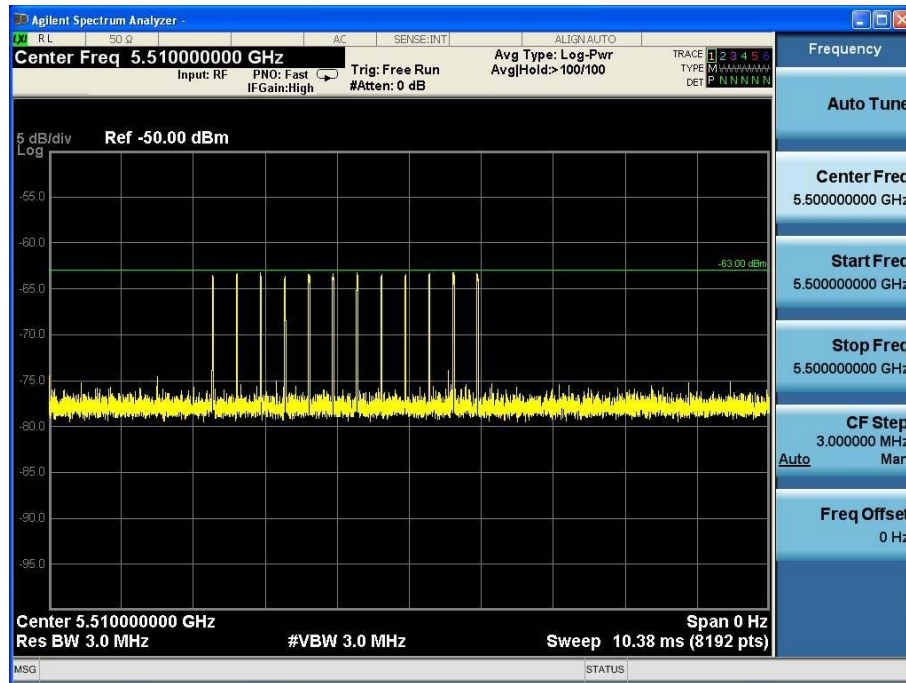
Test plots of the channel move time



Test plots of the channel closing time

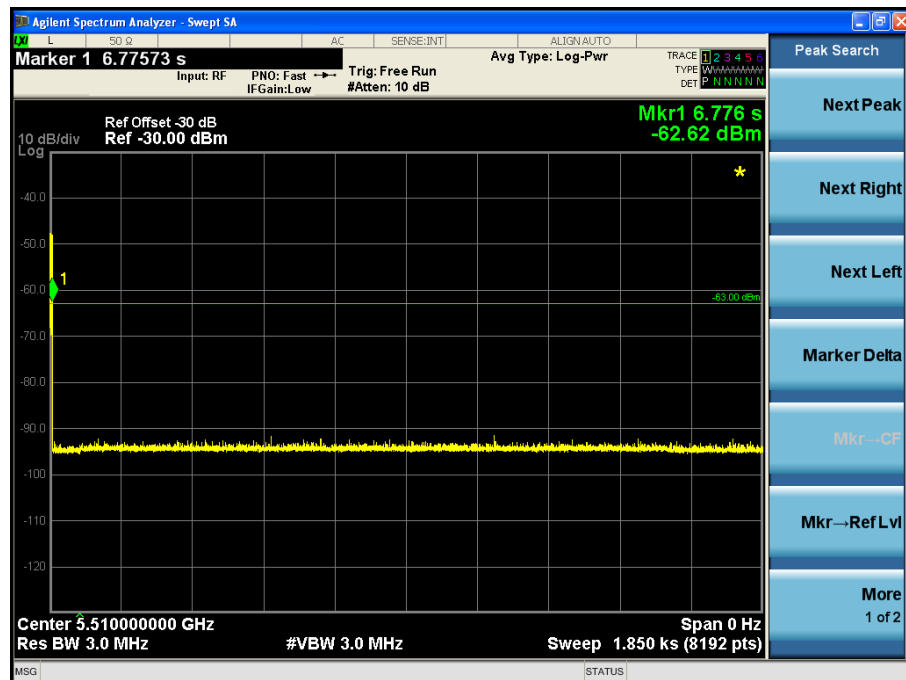


Test plots of the radar waveform



Test plots of the Non-occupancy period

No EUT transmissions were detected on the test channel during the 30-minute observation time.



***** END OF REPORT *****