TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**10039948 001**	**Seite 1 von 194** *Page 1 of 194*
Auftraggeber: *Client:*	CyberTAN technology Inc. No. 99, Park Ave. III, Science-based Industrial Park, Hsinchu 308, Taiwan, R.O.C.	
Gegenstand der Prüfung: *Test item:*	MiracastTM Video Receiver	
Bezeichnung: *Identification:*	RF-WFD301	**Serien-Nr.:** *Serial No.:* N/A
Wareneingangs-Nr.: *Receipt No.:*	TPE80960	**Eingangsdatum:** *Date of receipt:* 2012-12-18
Zustand des Prüfgegenstandes bei Anlieferung: **Condition of test item at delivery:**	The sample is ok for testing and not damaged	
Prüfort: *Testing location:*	**TÜV Rheinland Taiwan Ltd.** 11F., No.758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105 Taiwan **FCC Registration No.: 365730**	
Prüfgrundlage: *Test specification:*	**FCC CFR47 Part 15: Subpart C Section 15.247** **RSS-210 (Issue 8): Dec. 2010** **RSS-Gen (Issue 3): Dec. 2010**	
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Taiwan Ltd.** **11F., No.758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105, Taiwan, R.O.C.**	

geprüft/ *tested by:*

2013-01-17 Neil J. N. Tsai/Project Engineer

Datum *Date*	Name/Stellung *Name/Position*	Unterschrift *Signature*

kontrolliert/ *reviewed by:*

2013-01-17 Rene Charton/Senior Project Manager

Datum *Date*	Name/Stellung *Name/Position*	Unterschrift *Signature*

Sonstiges/ *Other Aspects:*

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

TEST SUMMARY

5.1.1 ANTENNA PORT 1 (TX0)

5.1.1.1 ANTENNA REQUIREMENT
RESULT: Passed

5.1.1.2 OUTPUT POWER
RESULT: Passed

5.1.1.3 6DB AND 99% BANDWIDTH
RESULT: Passed

5.1.1.4 POWER DENSITY
RESULT: Passed

5.1.1.5 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100KHZ BANDWIDTH
RESULT: Passed

5.1.2 ANTENNA PORT 2 (TX1)

5.1.2.1 ANTENNA REQUIREMENT
RESULT: Passed

5.1.2.2 OUTPUT POWER
RESULT: Passed

5.1.2.3 6DB AND 99% BANDWIDTH
RESULT: Passed

5.1.2.4 POWER DENSITY
RESULT: Passed

5.1.2.5 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100KHZ BANDWIDTH
RESULT: Passed

5.1.3 ANTENNA PORTS AGGREGATION (TX0+TX1)

5.1.3.1 POWER DENSITY
RESULT: Passed

5.1.3.2 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100KHZ BANDWIDTH
RESULT: Passed

5.1.4 SPURIOUS EMISSION
RESULT: Passed

5.2.1 ANTENNA PORT 1 (TX0)

5.2.1.1 ANTENNA REQUIREMENT
RESULT: Passed

5.2.1.2 OUTPUT POWER
RESULT: Passed

5.2.1.3 6DB AND 99% BANDWIDTH
RESULT: Passed

5.2.1.4 POWER DENSITY
RESULT: Passed

5.2.1.5 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100KHZ BANDWIDTH
RESULT: Passed

5.2.2 ANTENNA PORT 1 (TX1)

5.2.2.1 ANTENNA REQUIREMENT
RESULT: Passed

5.2.2.2 OUTPUT POWER
RESULT: Passed

5.2.2.3 6DB AND 99% BANDWIDTH
RESULT: Passed

5.2.2.4 POWER DENSITY
RESULT: Passed

5.2.2.5 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100KHZ BANDWIDTH
RESULT: Passed

5.2.3 ANTENNA PORTS AGGREGATION (TX0+TX1)

5.2.3.1 POWER DENSITY
RESULT: Passed

5.2.3.2 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100KHZ BANDWIDTH
RESULT: Passed

Contents

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Photo
(File: 10039948APPENDIX1)
Appendix 2: Test Result of Radiated Emissions
(File: 10039948APPENDIX2)

Test Specifications
The following standards were applied (in bold: product standards, otherwise: basic standards).

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 15.247 KDB 558074 D01 DTS Meas Guidance v02

2. Test Sites

2.1 Test Facilities

TUV Rheinland Taiwan Ltd.

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)
FCC Registration No.: 365730

2.2 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	R&S	ESCI 7	1166.5950K07-100797-Pt	20-Dec-13
Bilog Antenna	TESEQ	CBL6111D	29802	29-Jun-13
Pre-Amplifier	HP	8447F	2805A03335	14-Sep-13
Spectrum Analyzer	R&S	FSV 40	100921	13-Dec-13
Horn Antenna (1GHz~18GHz)	COM-POWER	AHA118	701251	28-Sep-13
Horn Antenna (18GHz~40GHz)	COM-POWER	AH840	101031	2-Nov-13
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	14-Sep-13
Preamplifier (18 GHz -40 GHz)	COMPOWER	PAM-840	461257	17-Sep-13
Power meter	R&S	NRVD	100439	27-Mar-13
Power sensor	R&S	NRV-Z1	100013	27-Mar-13
Temp. & Humid. Chamber	Giant Force	GCT-099-40-S	MAF0103-007	13-May-13
Signal Generator	R&S	SMU200	104260	13-Aug-13
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	28-Sep-13

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are ±3dB.

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-7}
RF power, conducted	± 1 dB
Adjacent channel power	± 3 dB
Radiated emission of transmitter, valid up to 26 GHz	± 6 dB
Radiated emission of receiver, valid up to 26 GHz	± 6 dB
Temperature	± 2 ºC
Humidity	± 10 %

3. General Product Information

3.1 Product Function and Intended Use

WiFi Display HDMI Reveiver Dongle, which is intended for use with compatible devices such as phone or tablet to deliver signals to LCD TV, projector or other audio/video devices. The tested sample must insert the micro USB port on LCD TV, which is intended for charge.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 Ratings and System Details

Table 4: Technical Specification of EUT

Technical Specification:	
Kind of Equipment	MiracastTM Video Receiver
Brand Name	CyberTAN technology Inc.
FCC ID	N89-RFWFD301
Type Designation	RF-WFD301
Operating Frequency Band	2400 MHz ~ 2483.5 MHz, 5725 MHz ~ 5850 MHz
Channel Spacing	5 MHz
Operation Voltage	5 V from USB power input
Modulation	OFDM, DSSS
Antenna gain	Peak individual gain:0.5 dBi, Peak aggregation gain:1 dBi
Antenna Type	One pair of chip Antennas (2*2 MIMO)

Table 5: Channel information

2.4GHz Band

802.11b/g, 802.11n (20MHz)
-Low Channel: 2412MHz
-Mid Channel: 2437MHz
-High Channel: 2462MHz

802.11n (40MHz)
-Low Channel: 2422MHz
-Mid Channel: 2437MHz
-High Channel: 2452MHz

5GHz (Band 4)

802.11a, 802.11n (20MHz)
-Low Channel: 5745MHz
-Mid Channel: 5785MHz
-High Channel: 5825MHz

802.11n (40MHz)
-Low Channel: 5755MHz
-High Channel: 5795MHz

3.3 Independent Operation Modes

The basic operation modes are:

A. Transmitting
    1. Low channel
    2. Middle channel
    3. High channel
B. Receiving
C. Standby
D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Technical Description
- Circuit Diagram
- Instruction Manual
- Rating Label

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 4. All testing were performed according to the procedures in ANSI C63.10: 2009 and
KDB 558074 D01 DTS Meas Guidance v02

Full pre-test was applied on all operation modes, but only worst case is shown.

TX0 stands for Antenna port one.

TX1 stands for Antenna port two.

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Kind of Equipment	Manufacturer	Model Name	S/N
Laptop	MSI	MSI4532 (CX420MX)	CX420 MX-233TWK 1008000096

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test

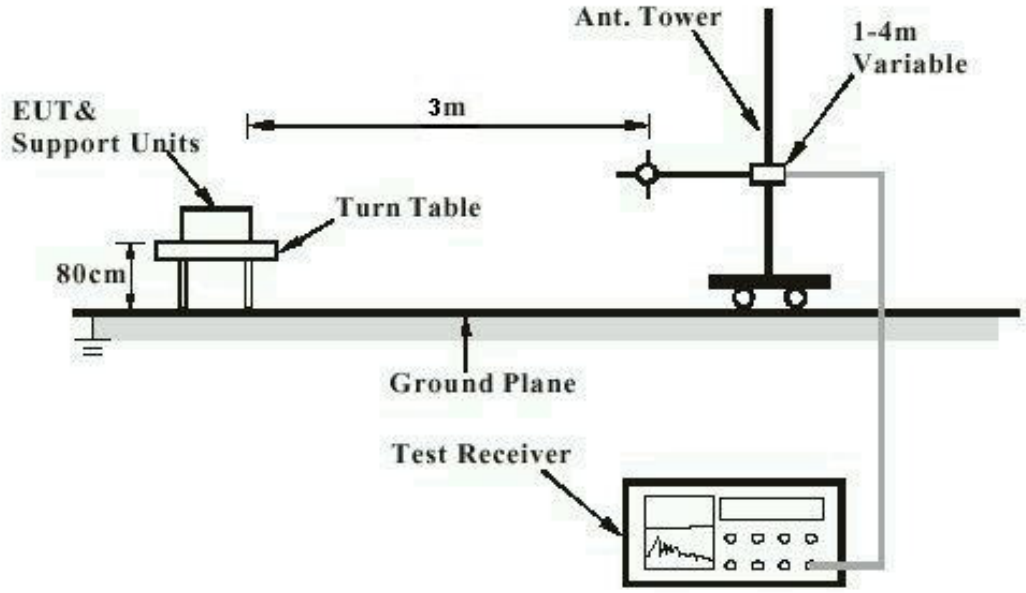


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement

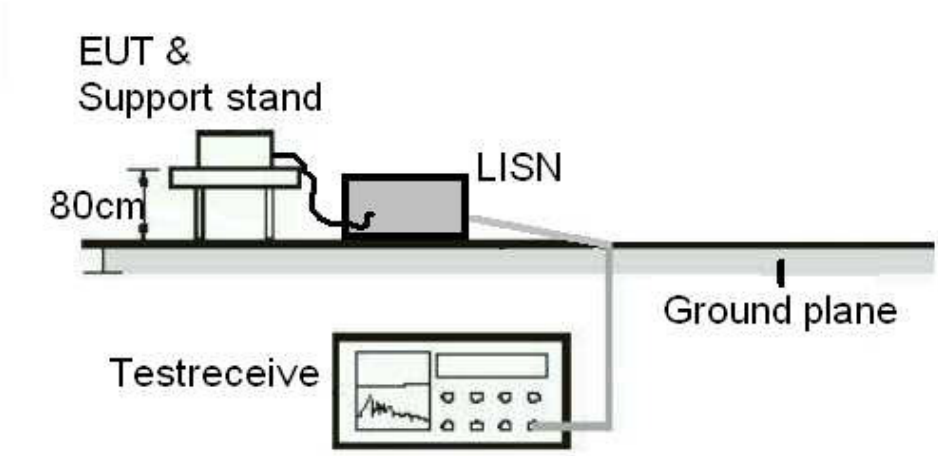
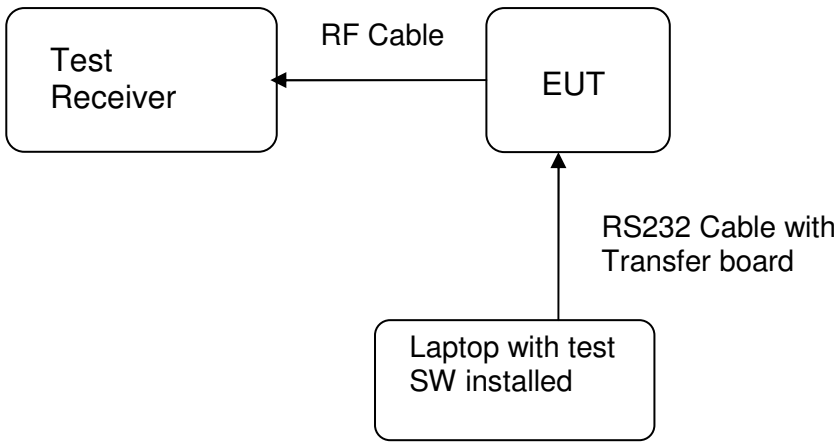


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 2.4GHz Band Transmitter Requirement & Test Suites

5.1.1 Antenna Port 1 (TX0)

5.1.1.1 Antenna Requirement

RESULT: **Passed**

Test date	:	2012-12-21
Test standard	:	FCC Part 15.247(b)(4), Part 15.203 and RSS-Gen 7.1.4
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an internal antenna with an directional gain of 0.5 dBi, and the antenna is a pair of chip antenna, so that the aggregation gain is 1 dBi. The EUT is considered to comply the provision.

Refer to EUT photo and Antenna datasheet for details.

5.1.1.2 Output Power

RESULT: **Passed**

Test date	:	2012-12-21
Test standard	:	FCC Part 15.247(b)(3), RSS-210 A8.4(4)
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

For the 802.11n modes, the EUT can be operated in 2x2 MIMO mode. Therefore, for those modes, in the tables below the limits are reduced by 3 dB.

Table 6: Test result of Output Power, 802.11b

Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	2412	22.54	0.1795	1	PASS
Middle Channel	2437	22.29	0.1694	1	PASS
High Channel	2462	21.91	0.1552	1	PASS

Table 7: Test result of Output Power, 802.11g

Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	2412	23.6	0.2291	1	PASS
Middle Channel	2437	22.8	0.1905	1	PASS
High Channel	2462	22.62	0.1828	1	PASS

Table 8: Test result of Output Power, 802.11n (20MHz)

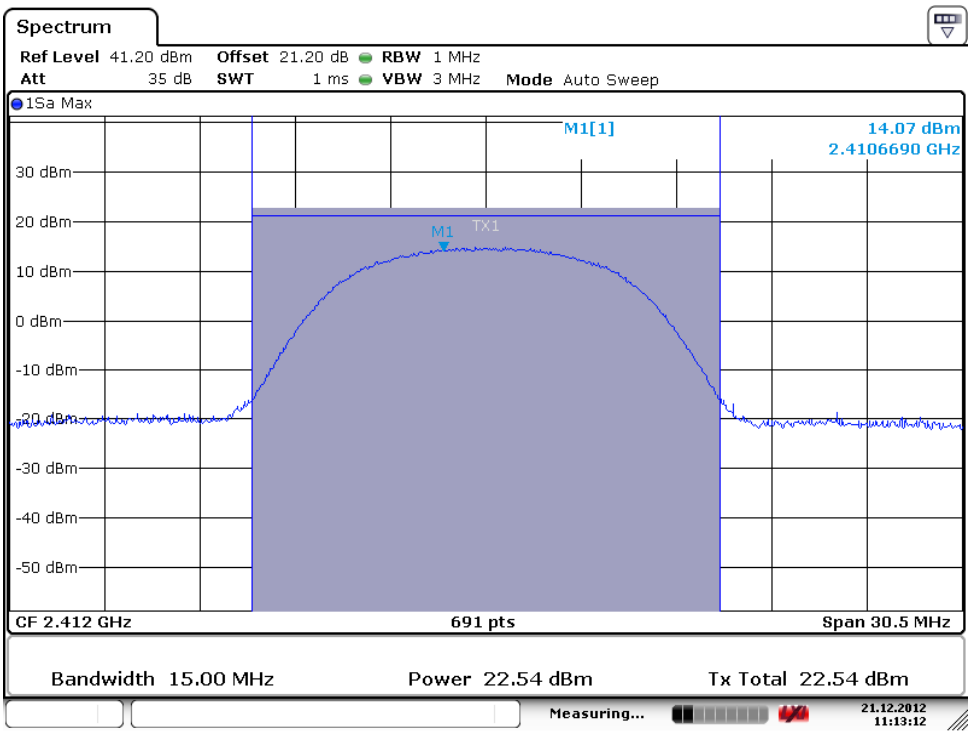
Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	2412	22.93	0.1963	0.5	PASS
Middle Channel	2437	22.17	0.1648	0.5	PASS
High Channel	2462	23.03	0.2009	0.5	PASS

Table 9: Test result of Output Power, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	2422	22.5	0.1778	0.5	PASS
Middle Channel	2437	22.16	0.1644	0.5	PASS
High Channel	2452	22.67	0.1849	0.5	PASS

Test Plot of Output Power, 802.11b

Low Channel



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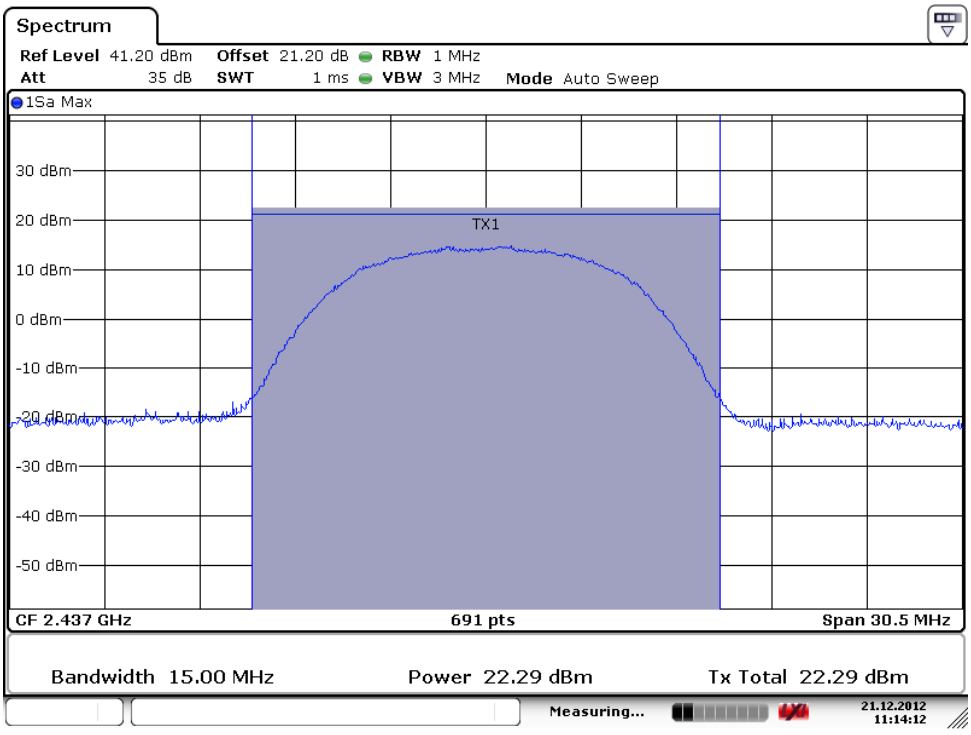
Middle Channel



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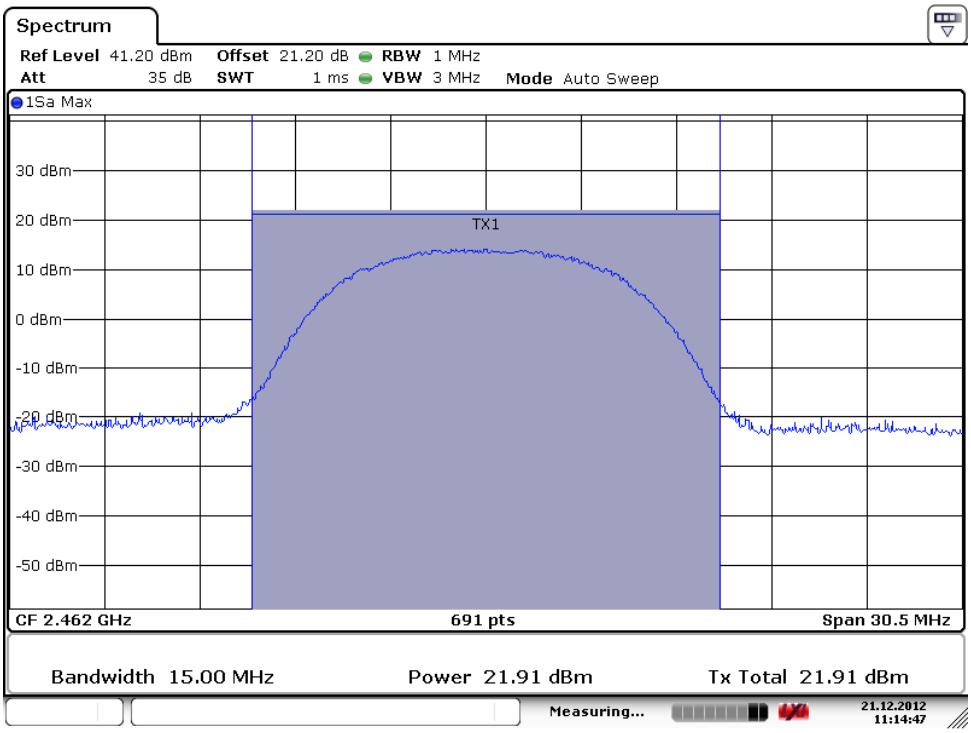
High Channel



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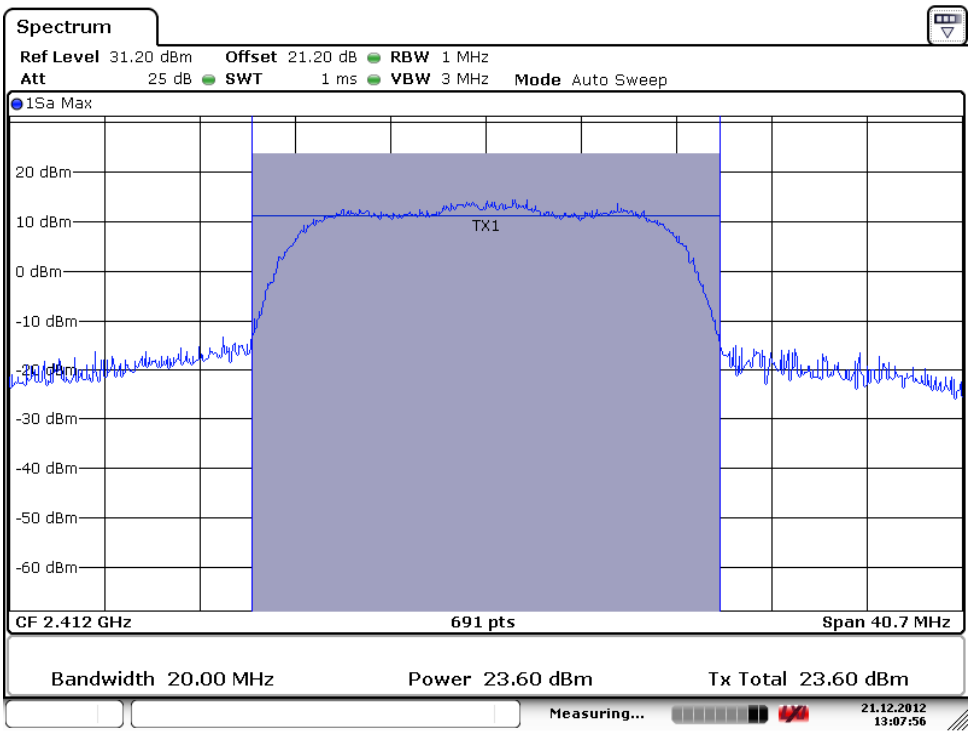
Test Plot of Output Power, 802.11g

Low Channel



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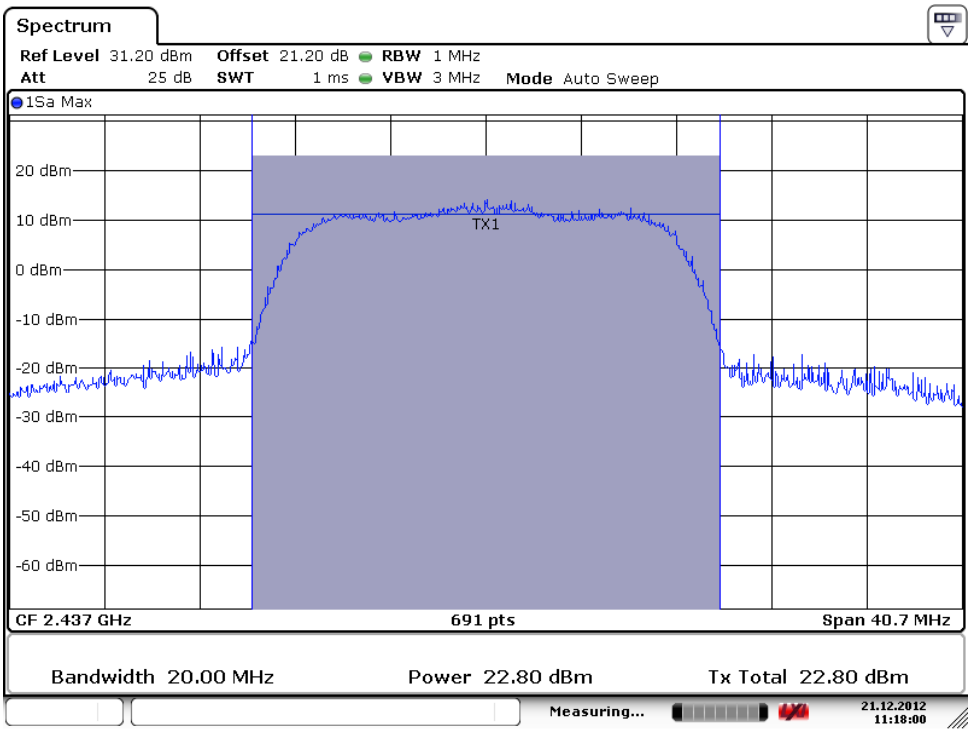
Middle Channel



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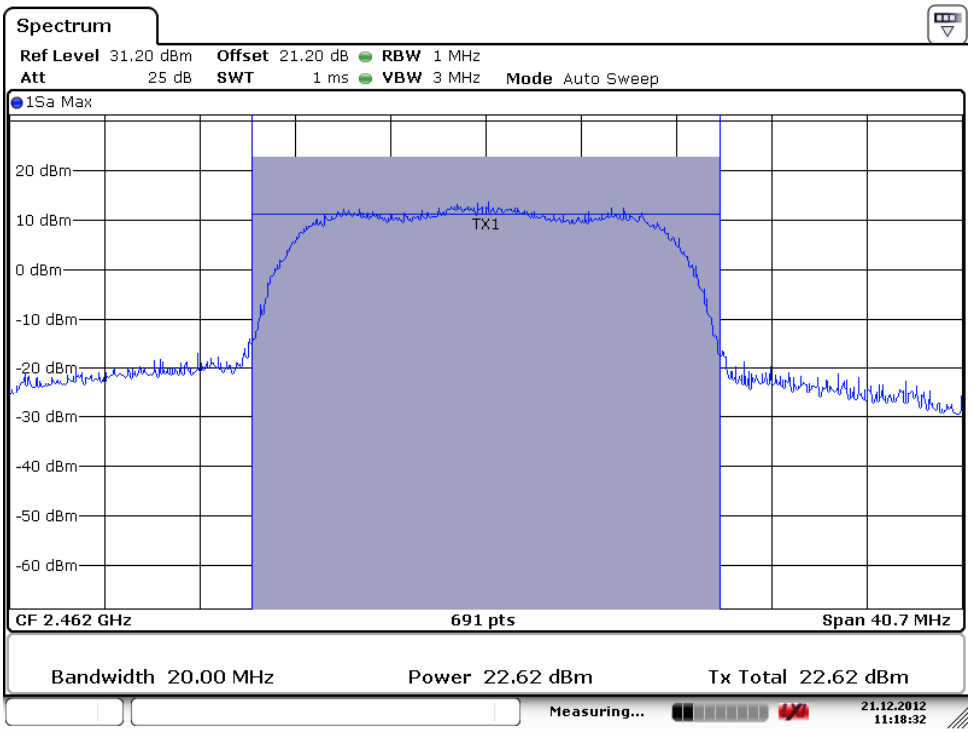
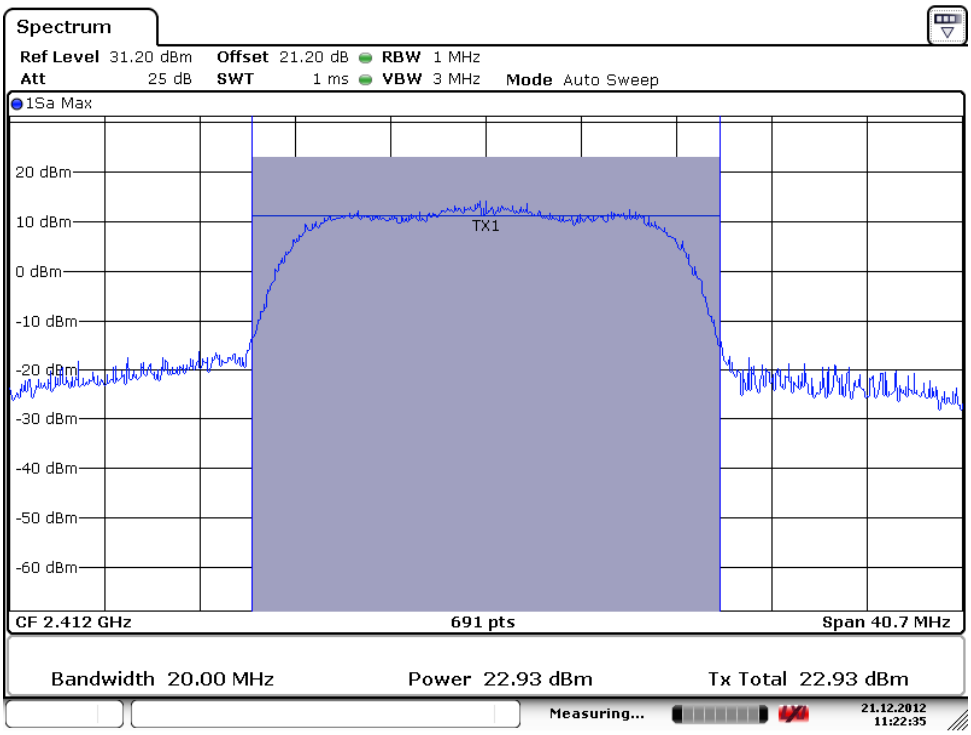
High Channel



Test Plot of Output Power, 802.11n (20MHz)

Low Channel



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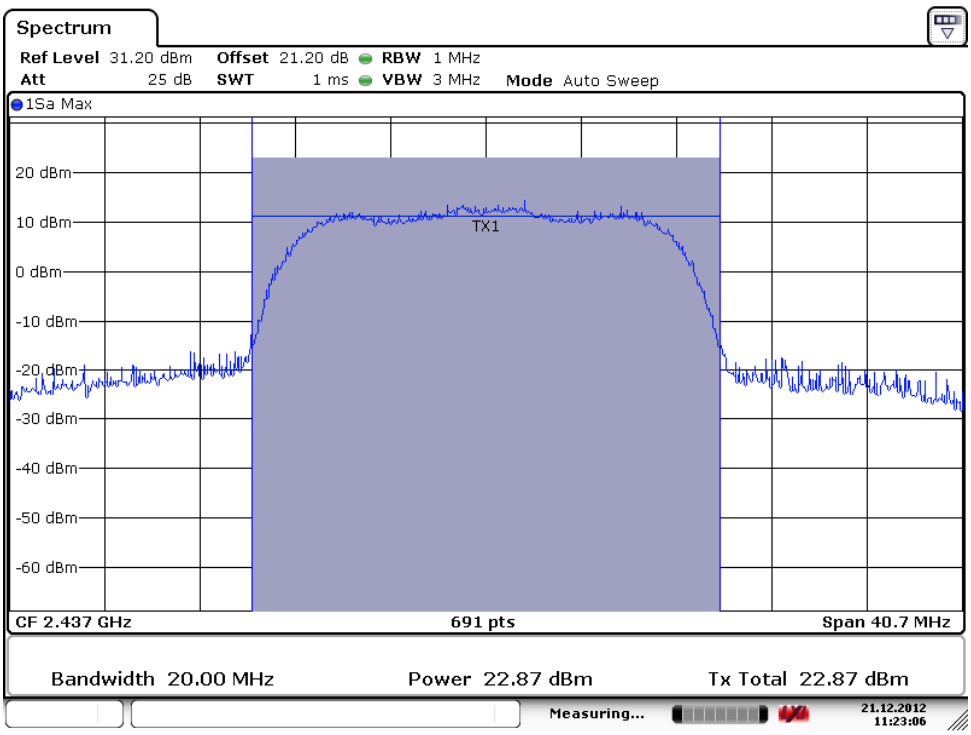
Middle Channel



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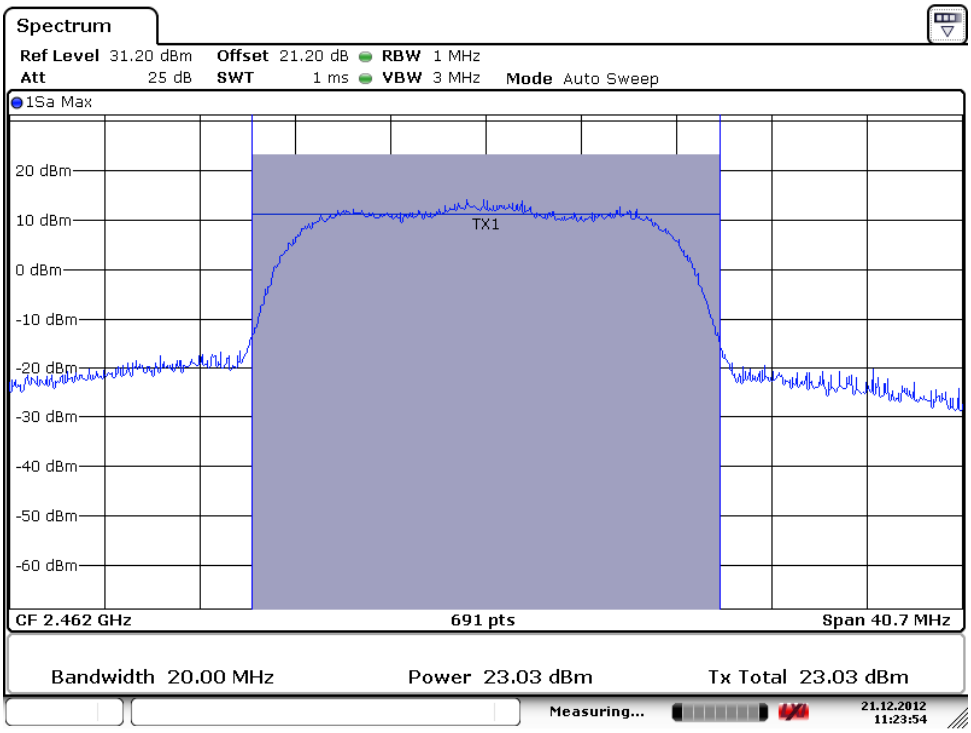
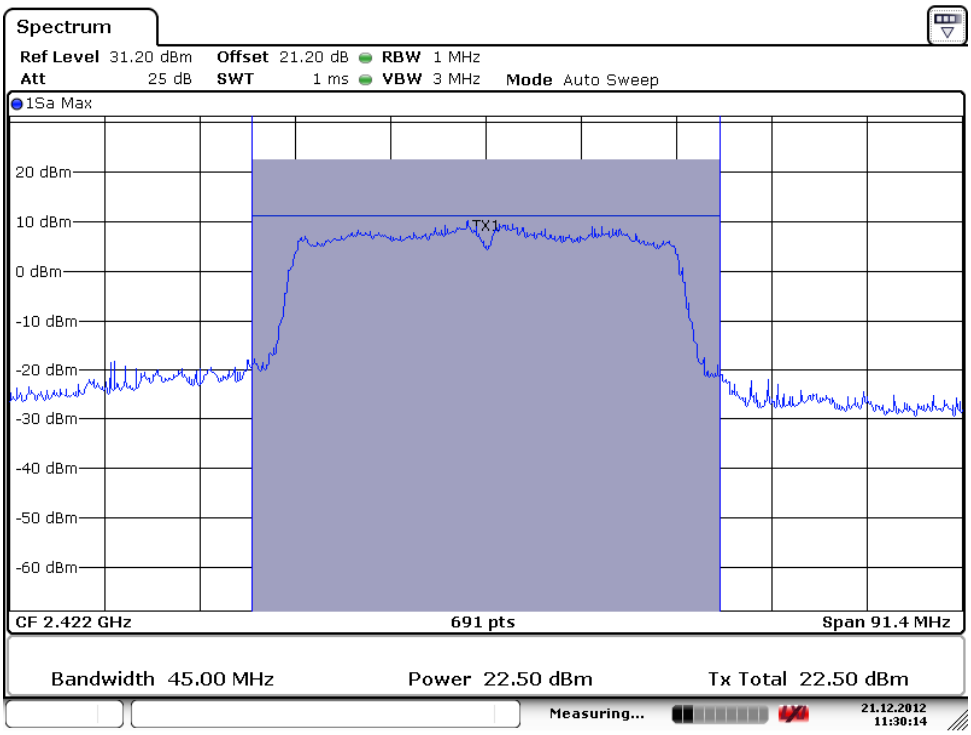
High Channel



Test Plot of Output Power, 802.11n (40MHz)

Low Channel



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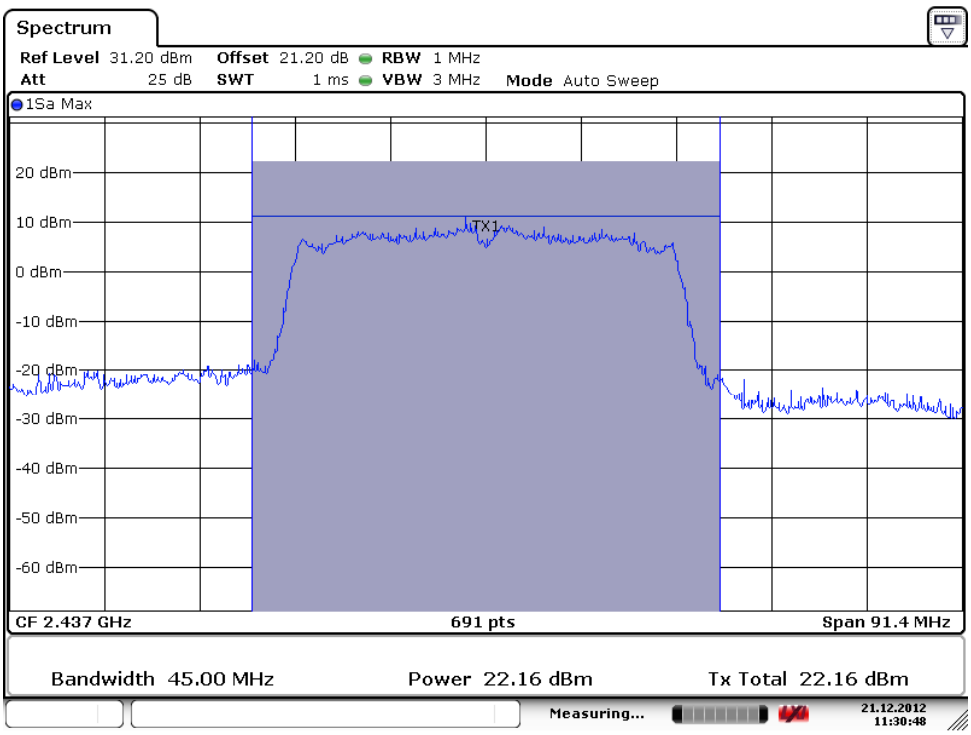
Middle Channel



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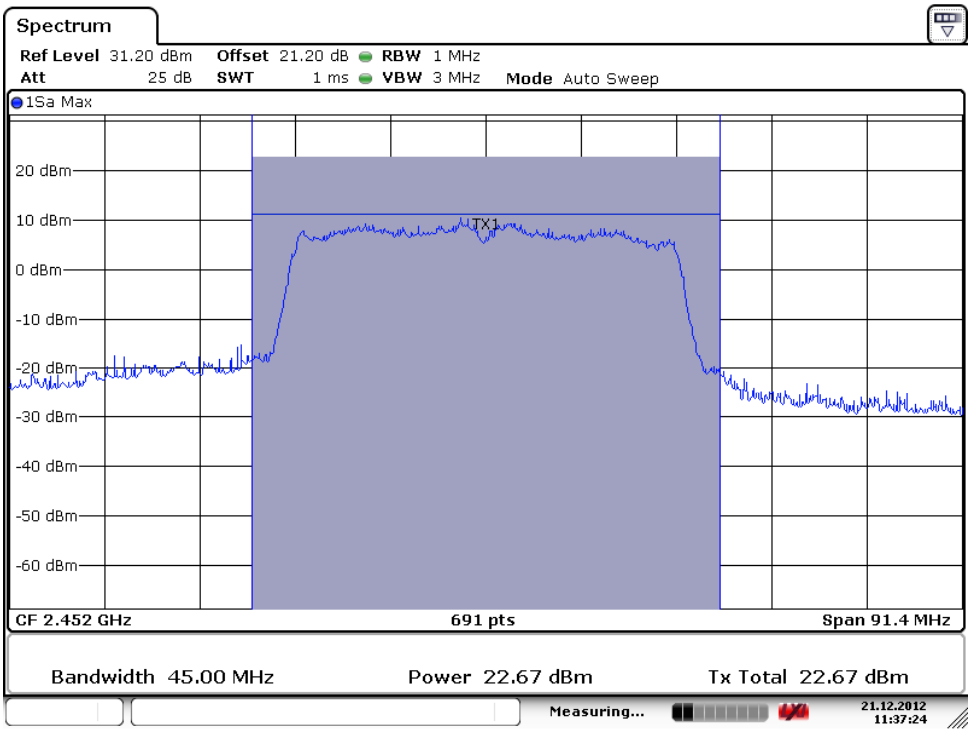
High Channel



5.1.1.3 6dB and 99% Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC Part 15.247(a)(2), RSS-210 A8.2(1)
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 10: Test result of 6dB Bandwidth, 802.11b

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	2412	7.67	≧0.5	Pass
Mid Channel	2437	8.278	≧0.5	Pass
High Channel	2462	8.799	≧0.5	Pass

Table 11: Test result of 6dB Bandwidth, 802.11g

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	2412	15.109	≧0.5	Pass
Mid Channel	2437	15.398	≧0.5	Pass
High Channel	2462	15.166	≧0.5	Pass

Table 12: Test result of 6dB Bandwidth, 802.11n (20MHz)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	2412	15.109	≧0.5	Pass
Mid Channel	2437	14.24	≧0.5	Pass
High Channel	2462	15.166	≧0.5	Pass

Table 13: Test result of 6dB Bandwidth, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	2422	36.469	≧0.5	Pass
Mid Channel	2437	36.433	≧0.5	Pass
High Channel	2452	36.454	≧0.5	Pass

Table 14: Test result of 99% Bandwidth, 802.11b

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	2412	10.651	/
Mid Channel	2437	10.680	/
High Channel	2462	10.651	/

Table 15: Test result of 99% Bandwidth, 802.11g

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	2412	16.454	/
Mid Channel	2437	16.498	/
High Channel	2462	16.411	/

Table 16: Test result of 99% Bandwidth, 802.11n (20MHz)

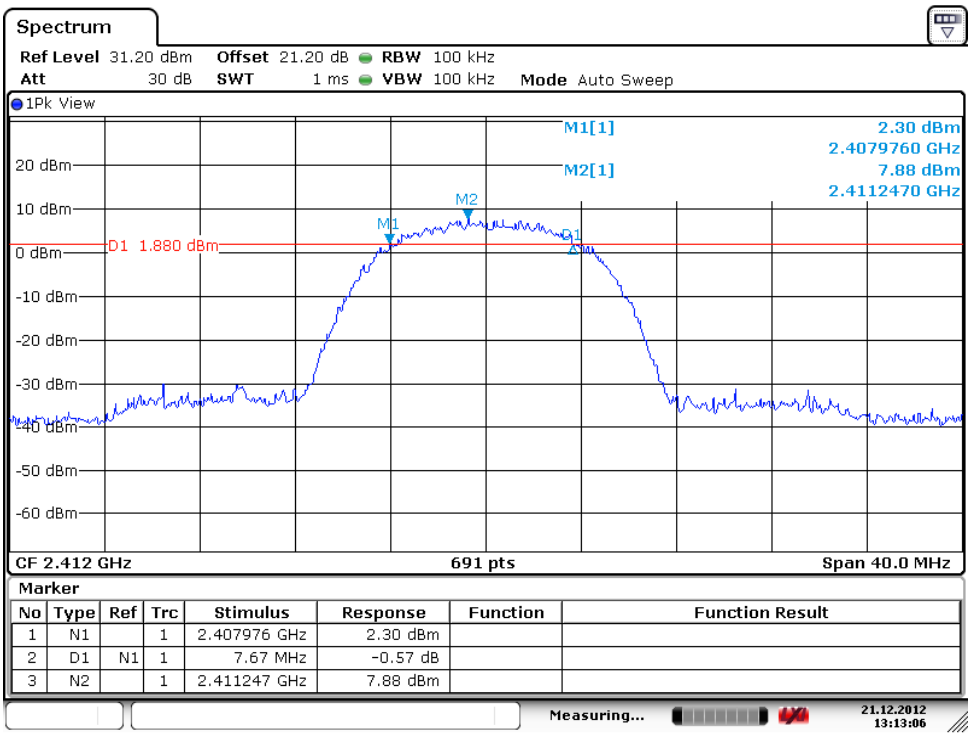
Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	2412	16.454	/
Mid Channel	2437	16.411	/
High Channel	2462	16.454	/

Table 17: Test result of 99% Bandwidth, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	2422	36.831	/
Mid Channel	2437	36.614	/
High Channel	2452	36.758	/

Test Plot of 6dB Bandwidth, 802.11b

Low Channel



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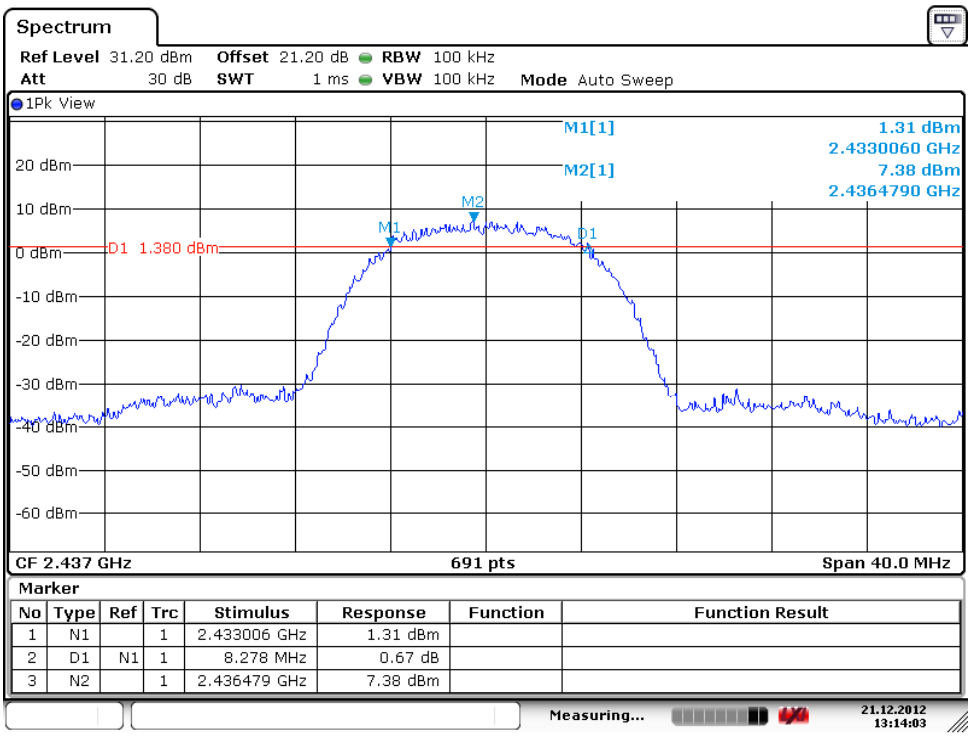
Middle Channel



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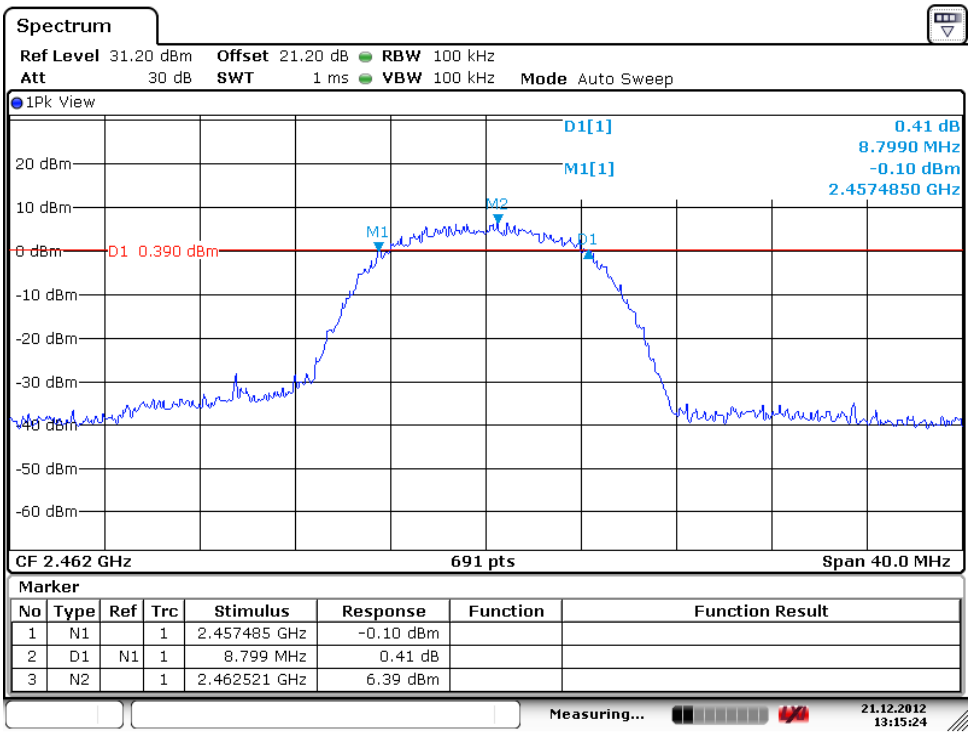
High Channel



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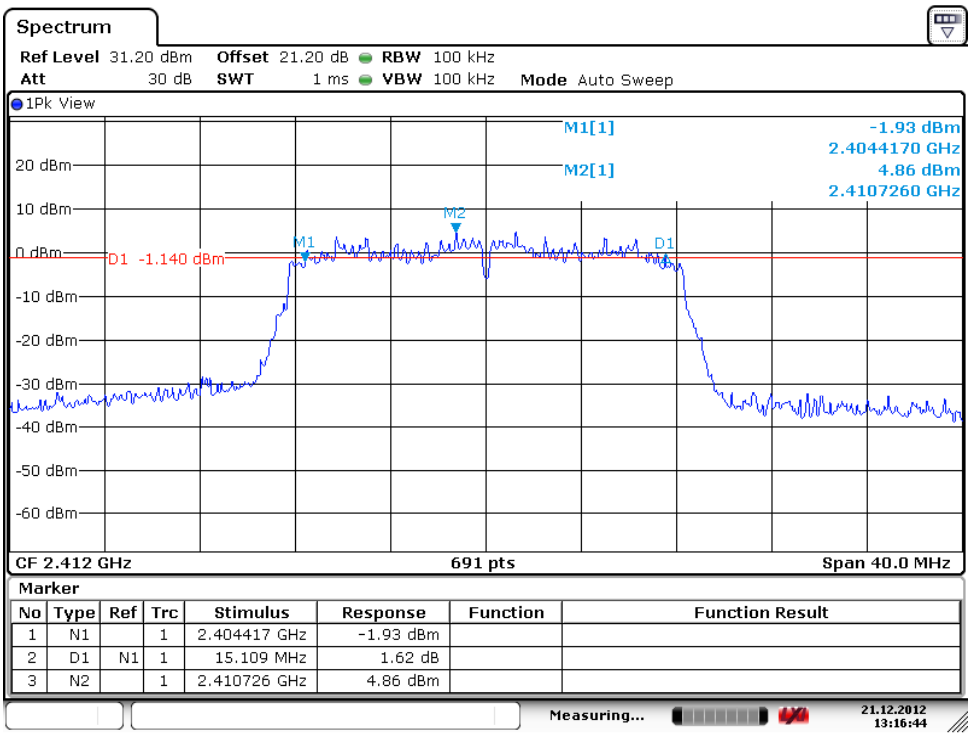
Test Plot of 6dB Bandwidth, 802.11g

Low Channel



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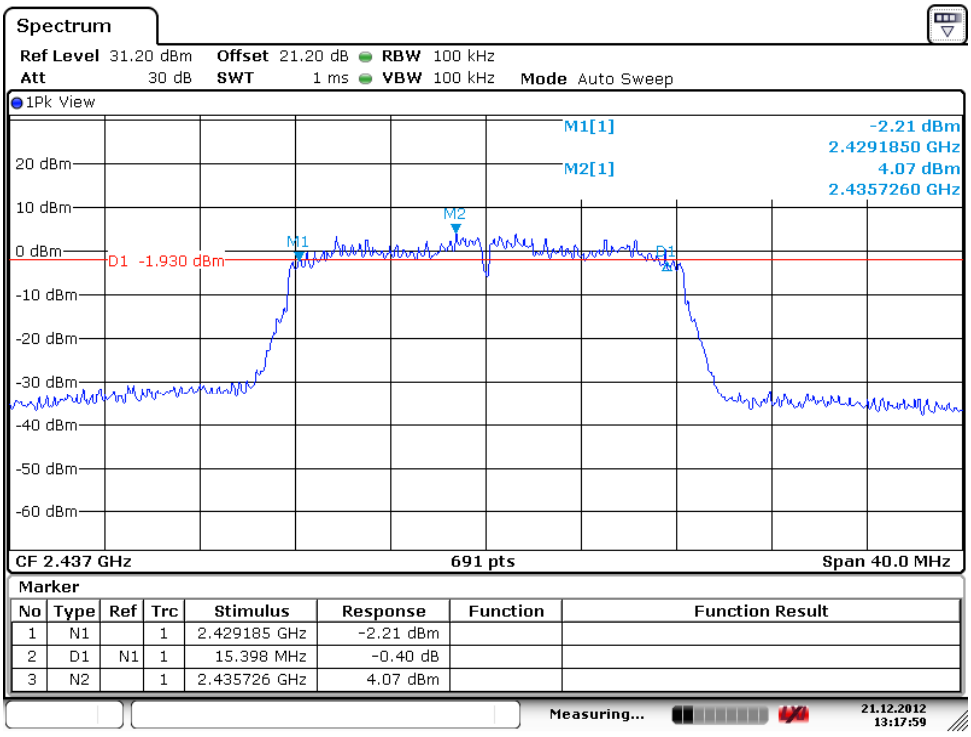
Middle Channel



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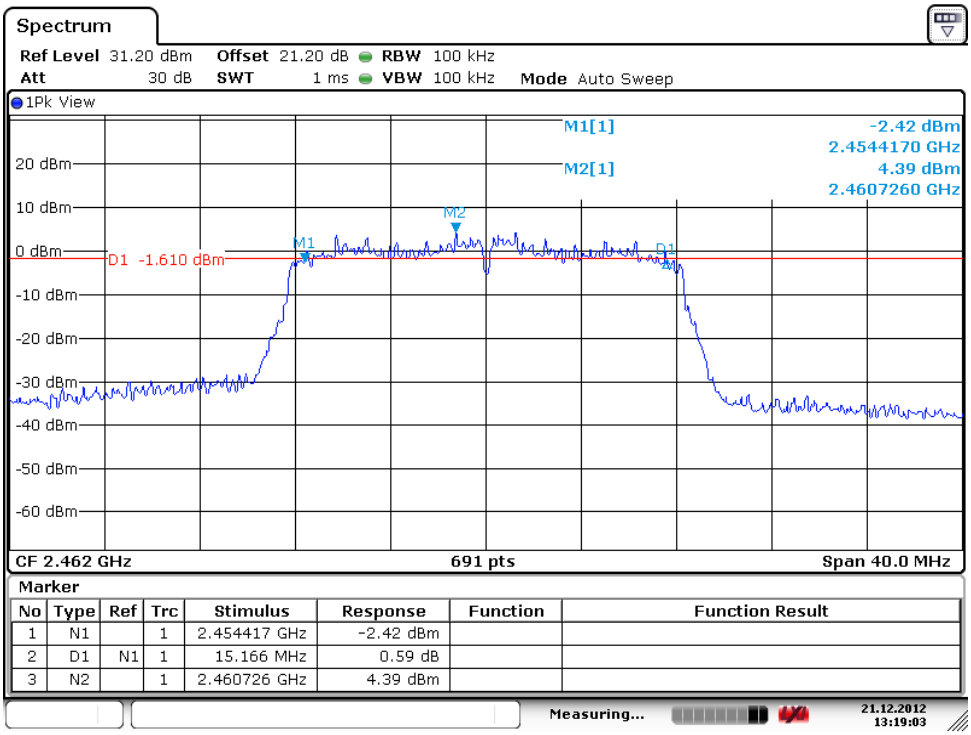
High Channel



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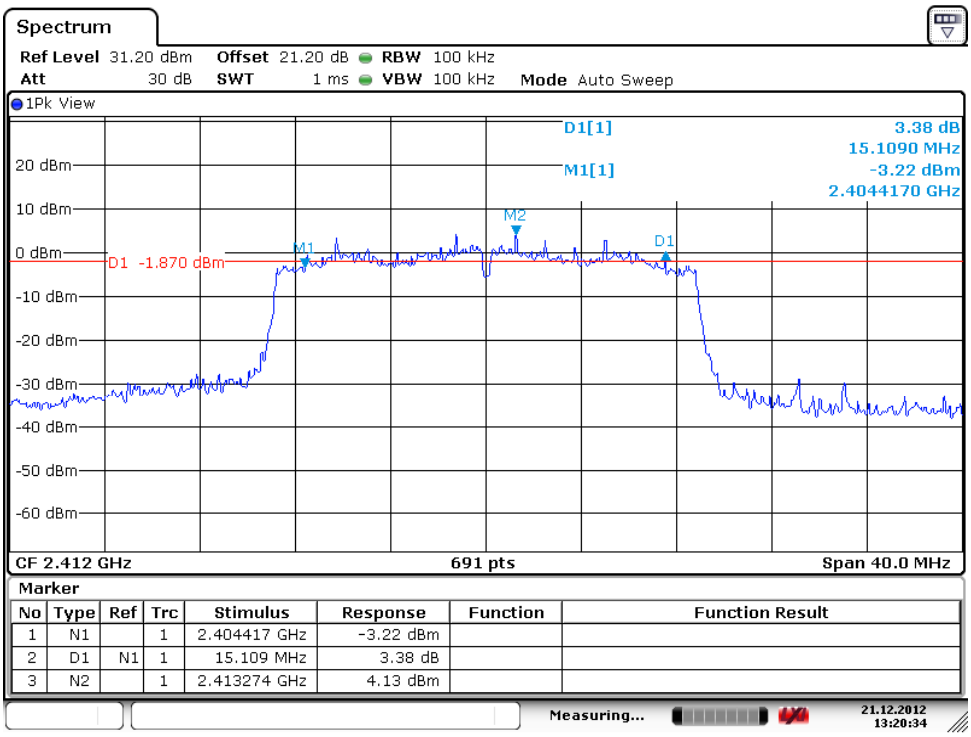
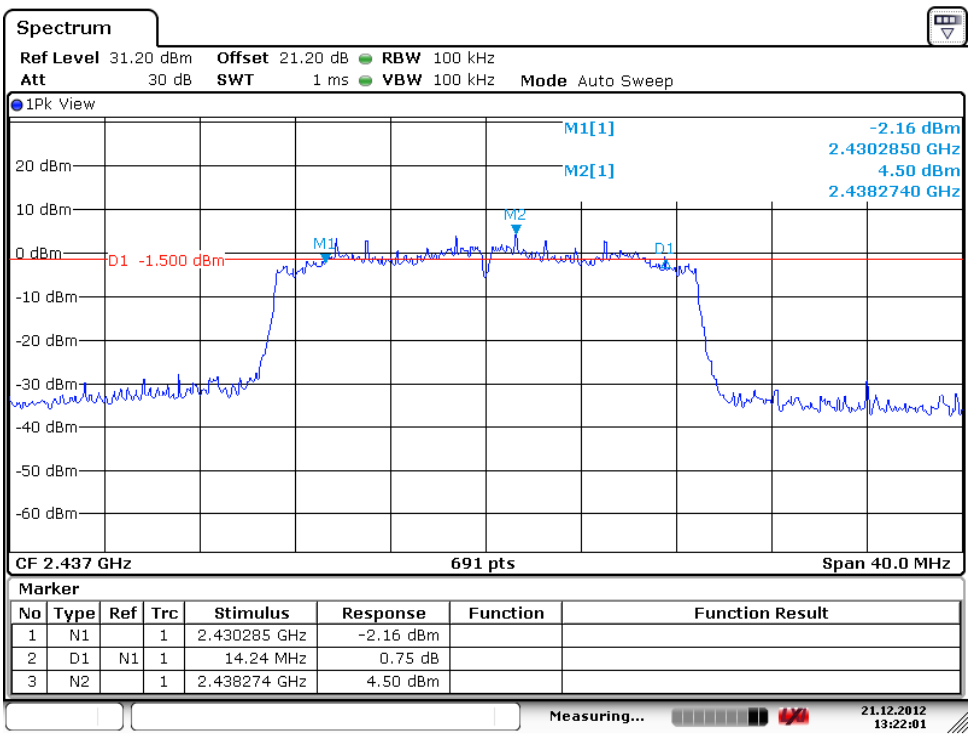
Test Plot of 6dB Bandwidth, 802.11n (20MHz)

Low Channel



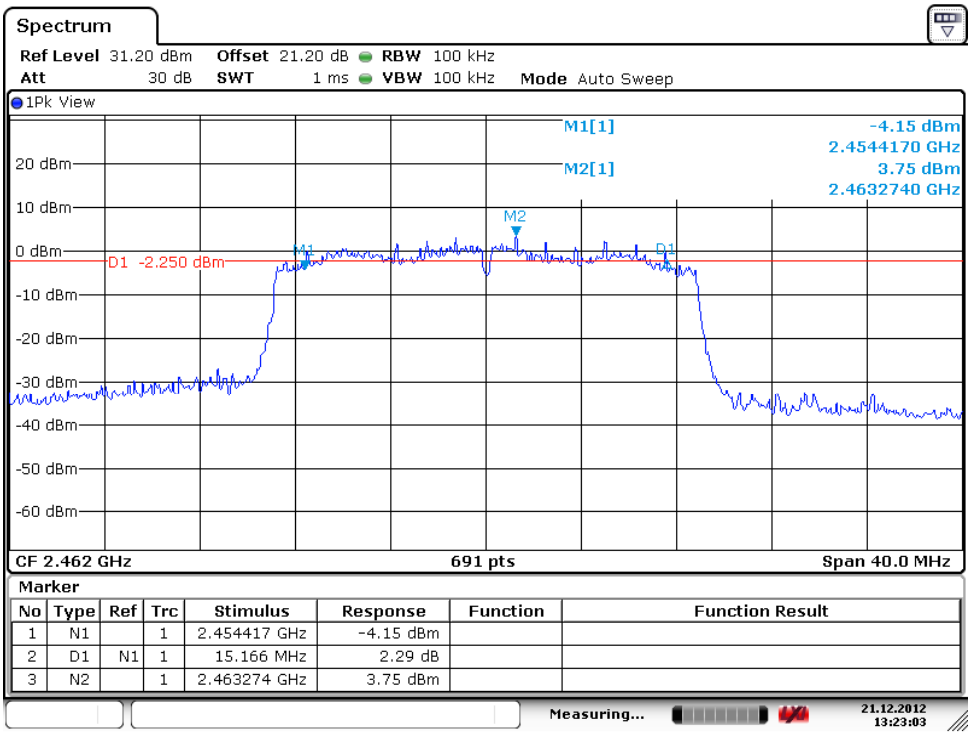
Date: 21.DEC.2012 13:20:35

Middle Channel



Date: 21.DEC.2012 13:22:01

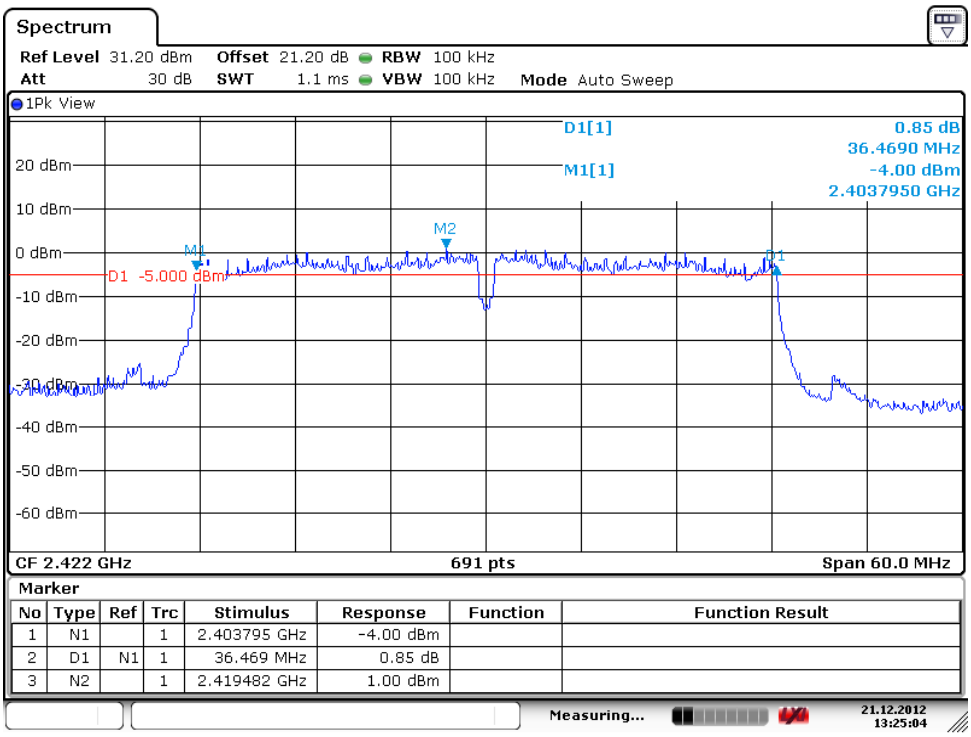
High Channel



Date: 21.DEC.2012 13:23:03

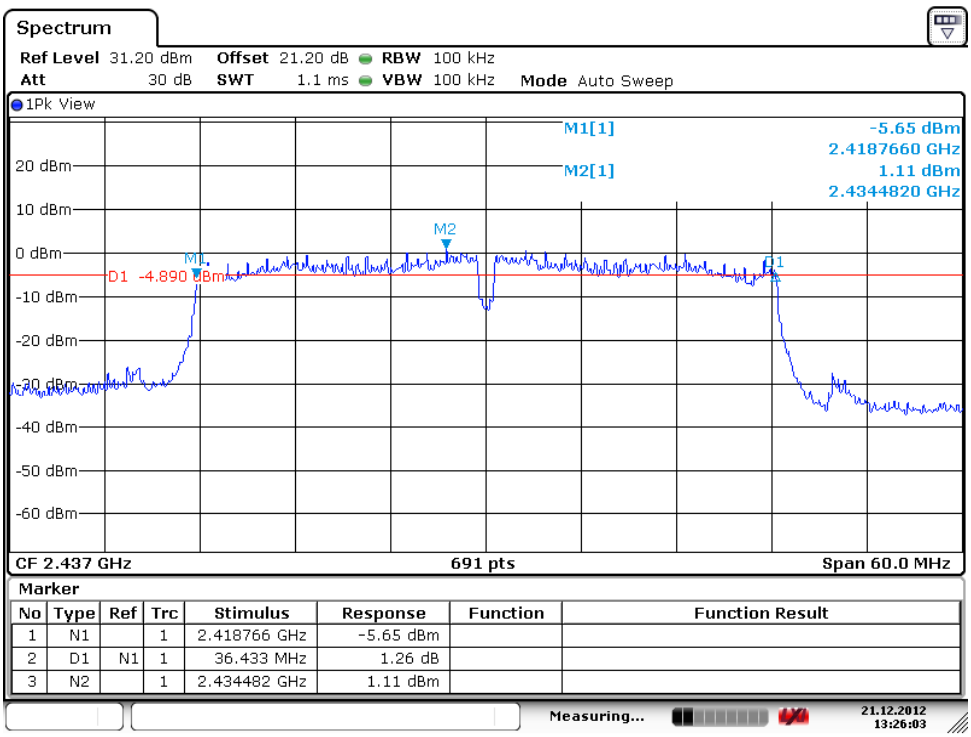
Test Plot of 6dB Bandwidth, 802.11n (40MHz)

Low Channel



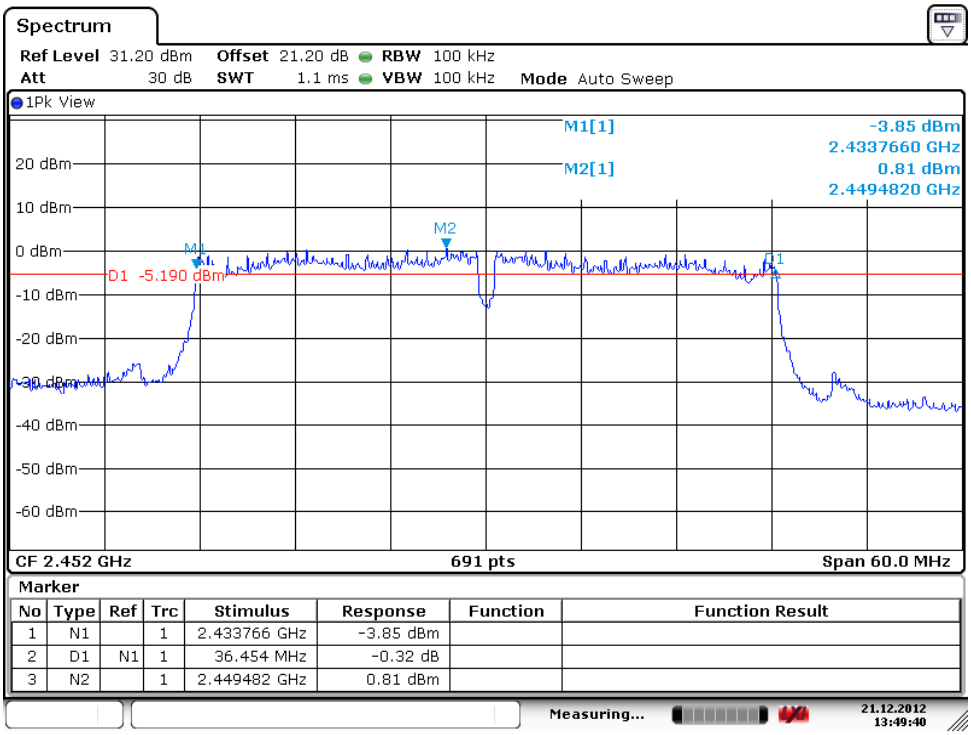
Date: 21.DEC.2012 13:25:04

Middle Channel



Date: 21.DEC.2012 13:26:03

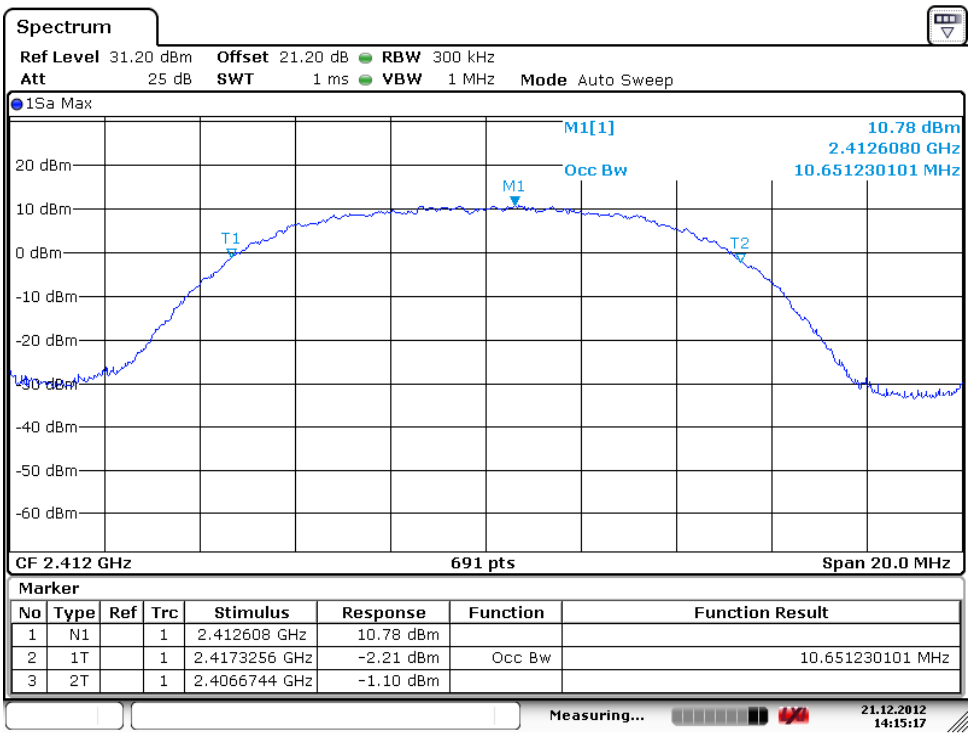
High Channel



Date: 21.DEC.2012 13:49:40

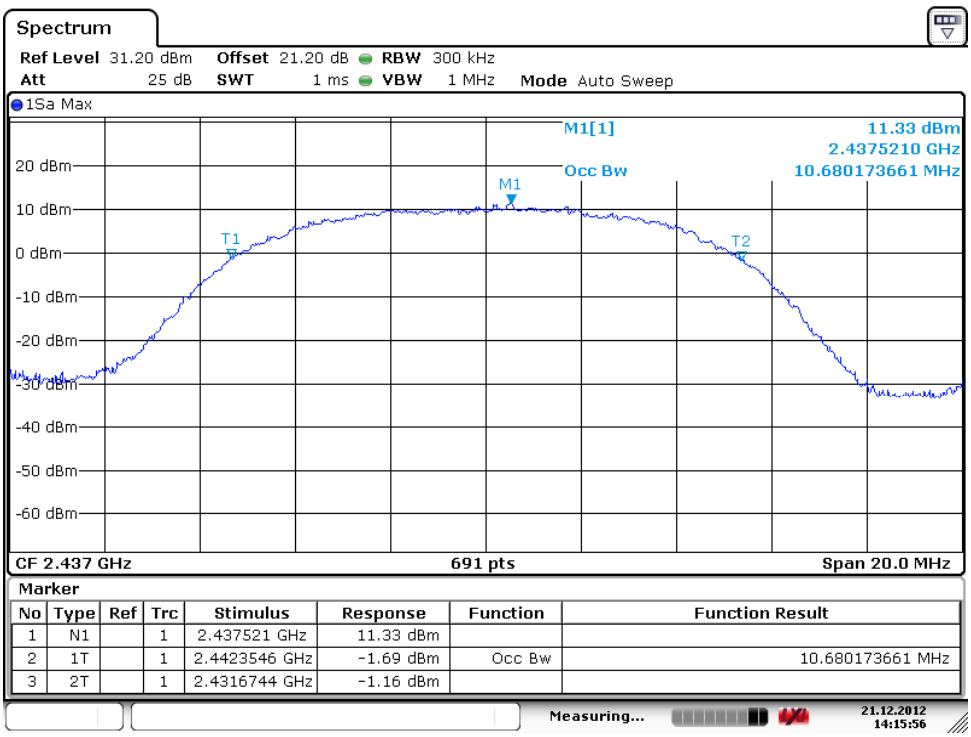
Test Plot of 99% Bandwidth, 802.11b

Low Channel



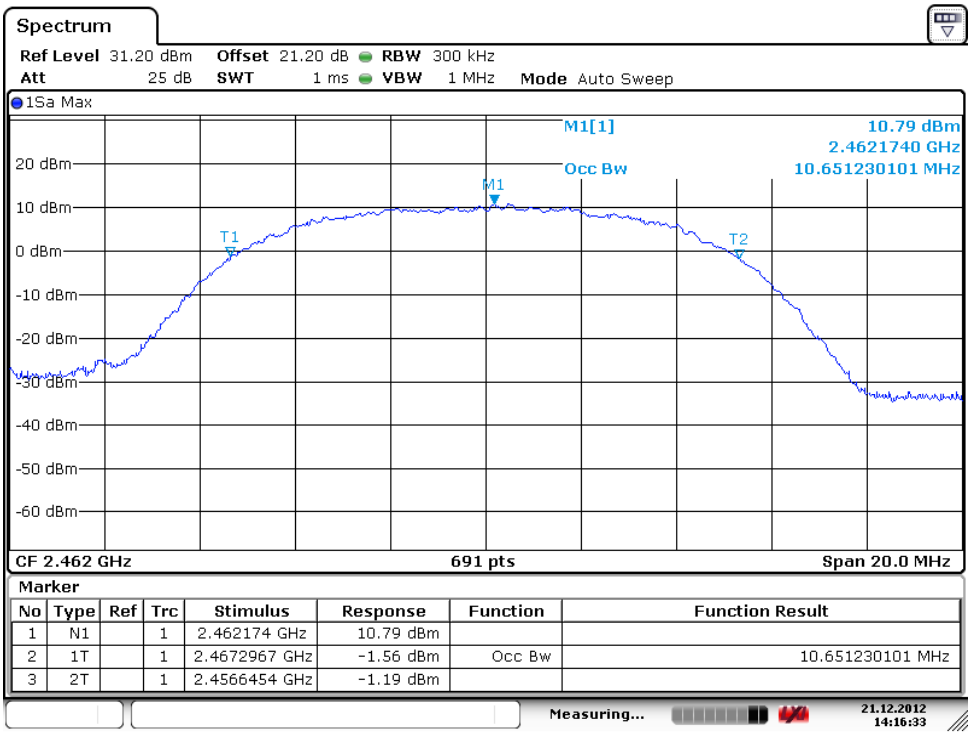
Date: 21.DEC.2012 14:15:17

Middle Channel



Date: 21.DEC.2012 14:15:56

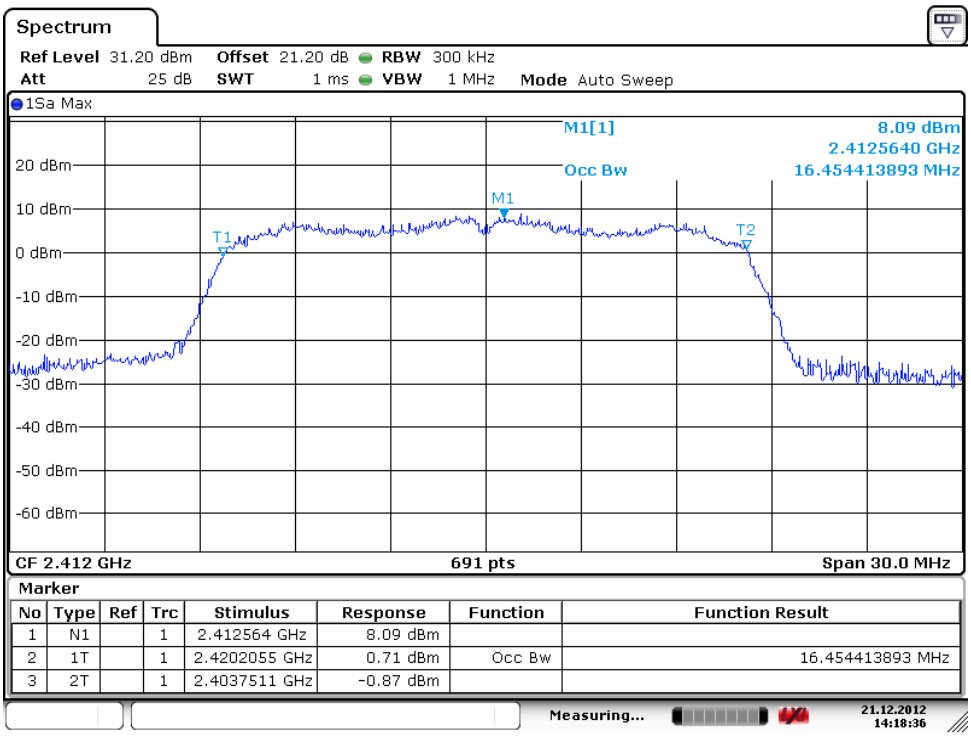
High Channel



Date: 21.DEC.2012 14:16:33

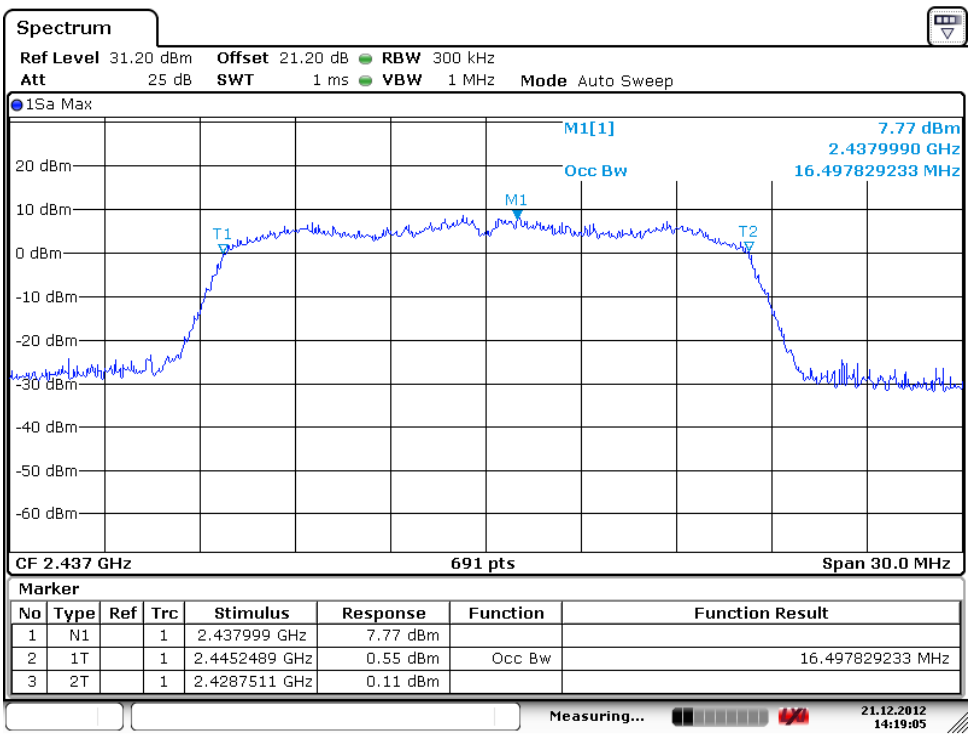
Test Plot of 99% Bandwidth, 802.11g

Low Channel



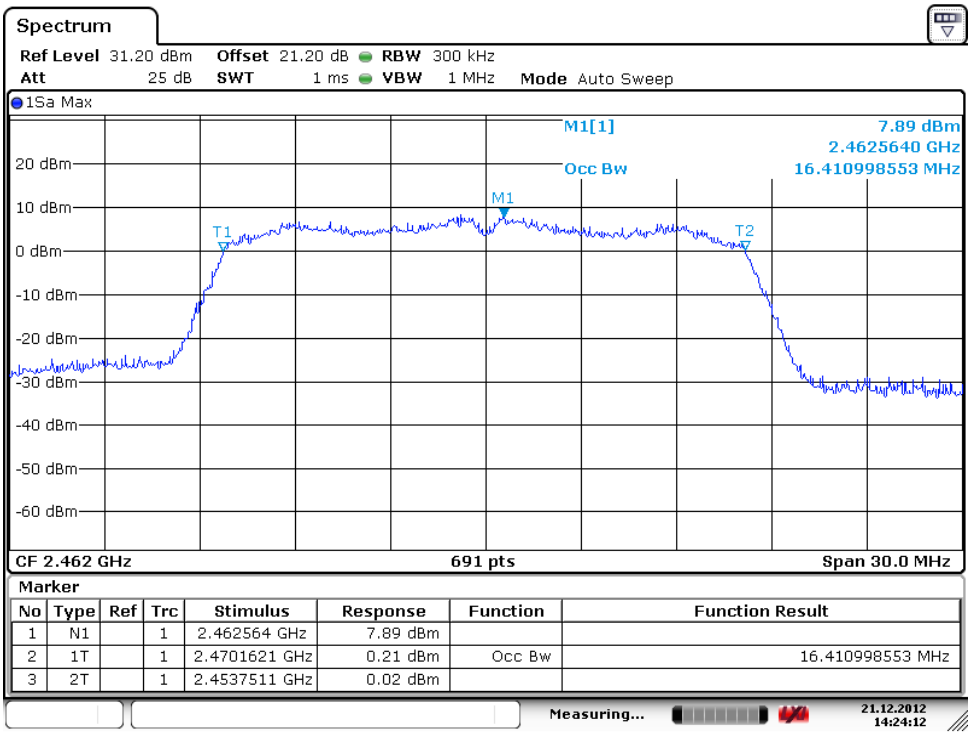
Date: 21.DEC.2012 14:18:36

Middle Channel



Date: 21.DEC.2012 14:19:05

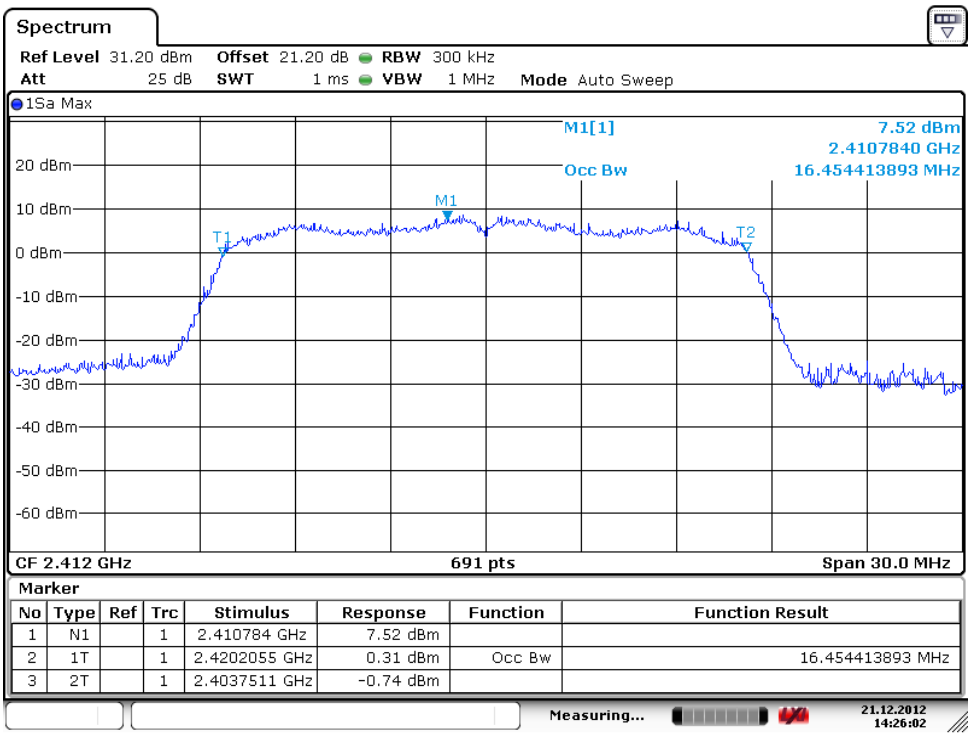
High Channel



Date: 21.DEC.2012 14:24:13

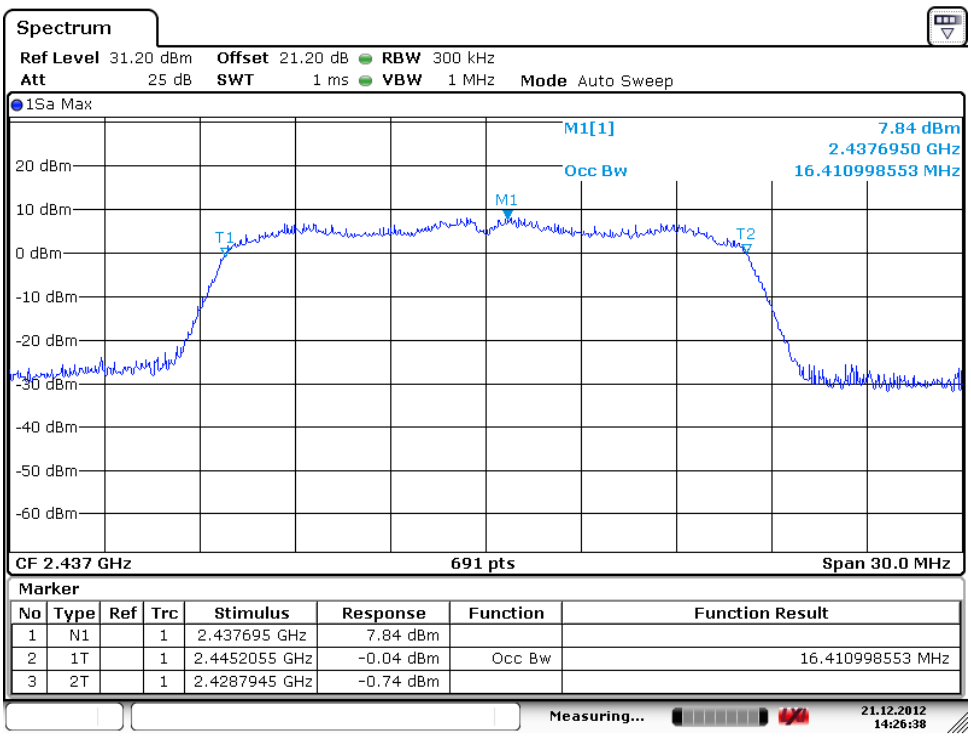
Test Plot of 99% Bandwidth, 802.11n (20MHz)

Low Channel



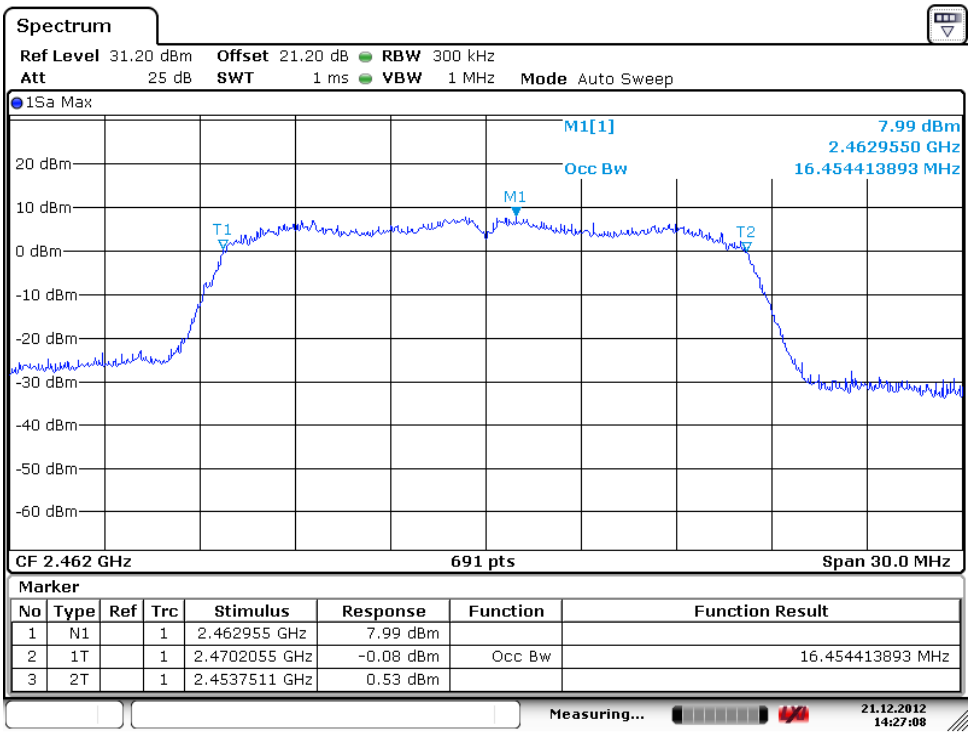
Date: 21.DEC.2012 14:26:02

Middle Channel



Date: 21.DEC.2012 14:26:39

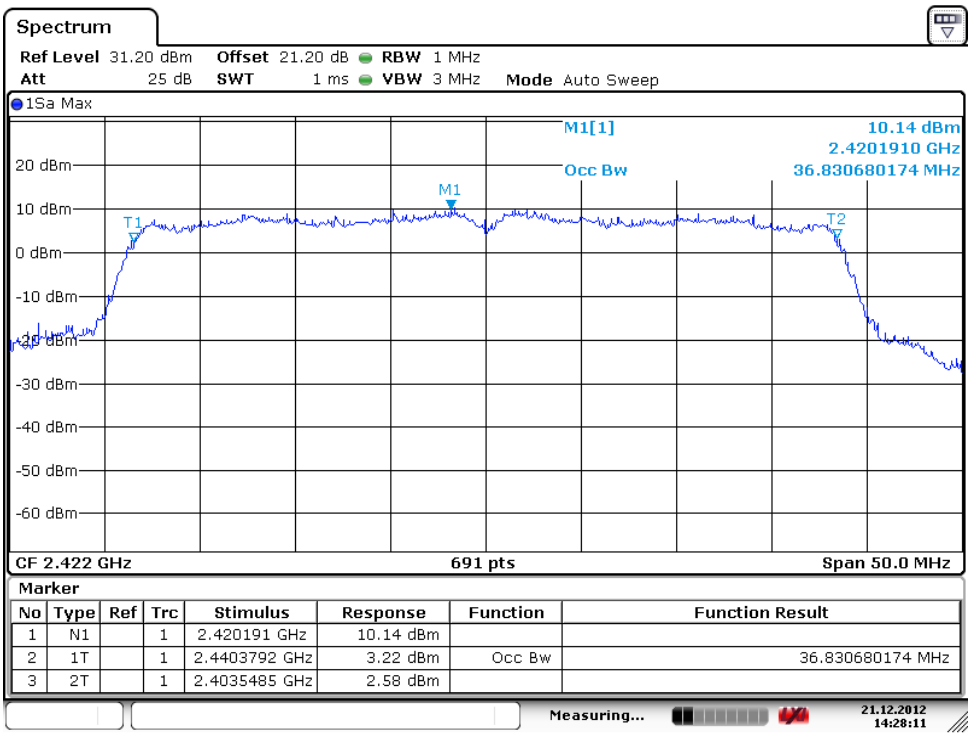
High Channel



Date: 21.DEC.2012 14:27:09

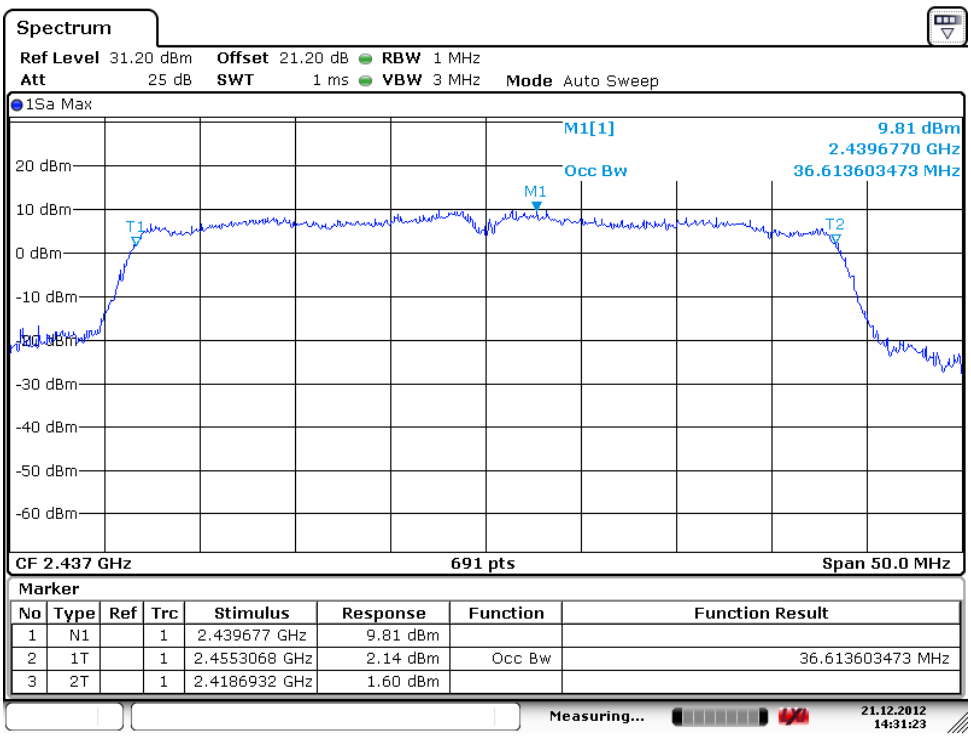
Test Plot of 99% Bandwidth, 802.11n (40MHz)

Low Channel



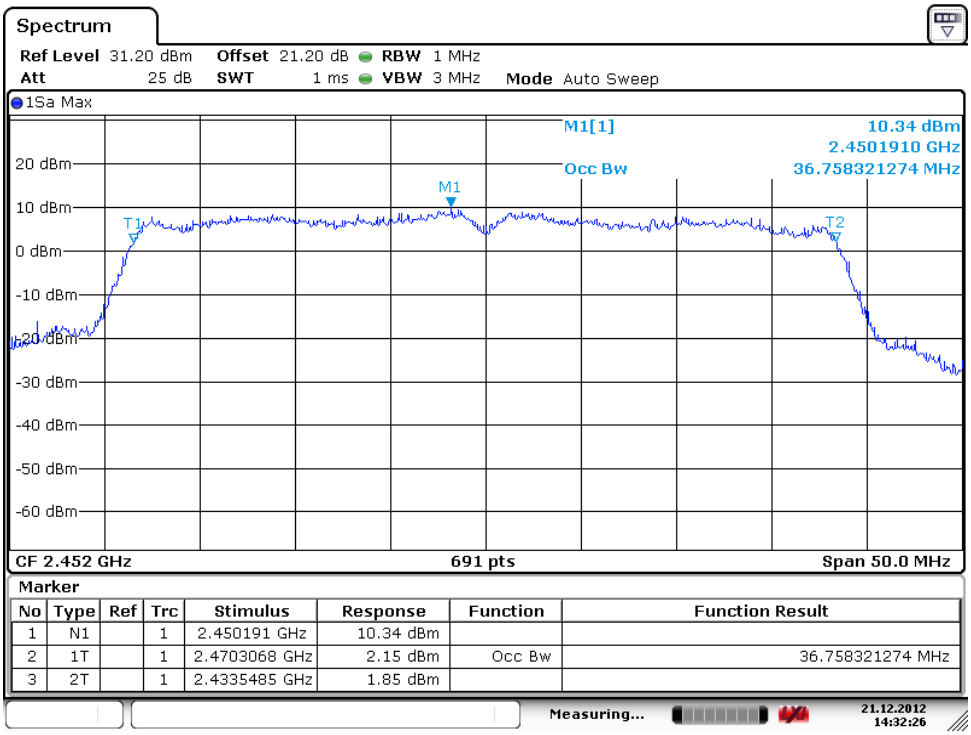
Date: 21.DEC.2012 14:28:12

Middle Channel



Date: 21.DEC.2012 14:31:24

High Channel



Date: 21.DEC.2012 14:32:26

5.1.1.4 Power Density

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC Part 15.247(e), A8.2(2)
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

For the 802.11n modes, the EUT can be operated in 2x2 MIMO mode. Therefore, for those modes, in the tables below the limits are reduced by 3 dB.

Table 18: Test result of Power Density, 802.11b

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2412	-8.42	8	Pass
Mid Channel	2437	-9.22	8	Pass
High Channel	2462	-8.79	8	Pass

Table 19: Test result of Power Density, 802.11g

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2412	-9.26	8	Pass
Mid Channel	2437	-9.81	8	Pass
High Channel	2462	-8.75	8	Pass

Table 20: Test result of Power Density, 802.11n (20MHz)

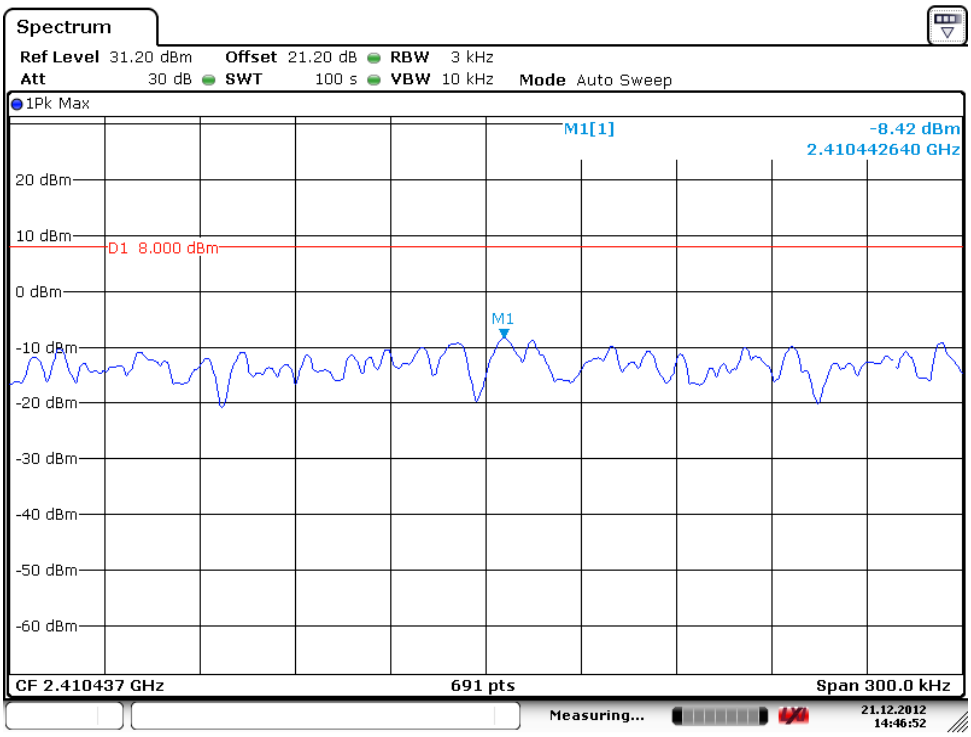
Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2412	-10.01	8-3	Pass
Mid Channel	2437	-10.52	8-3	Pass
High Channel	2462	-9.35	8-3	Pass

Table 21: Test result of Power Density, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2412	-14.02	8-3	Pass
Mid Channel	2437	-13.62	8-3	Pass
High Channel	2462	-16.3	8-3	Pass

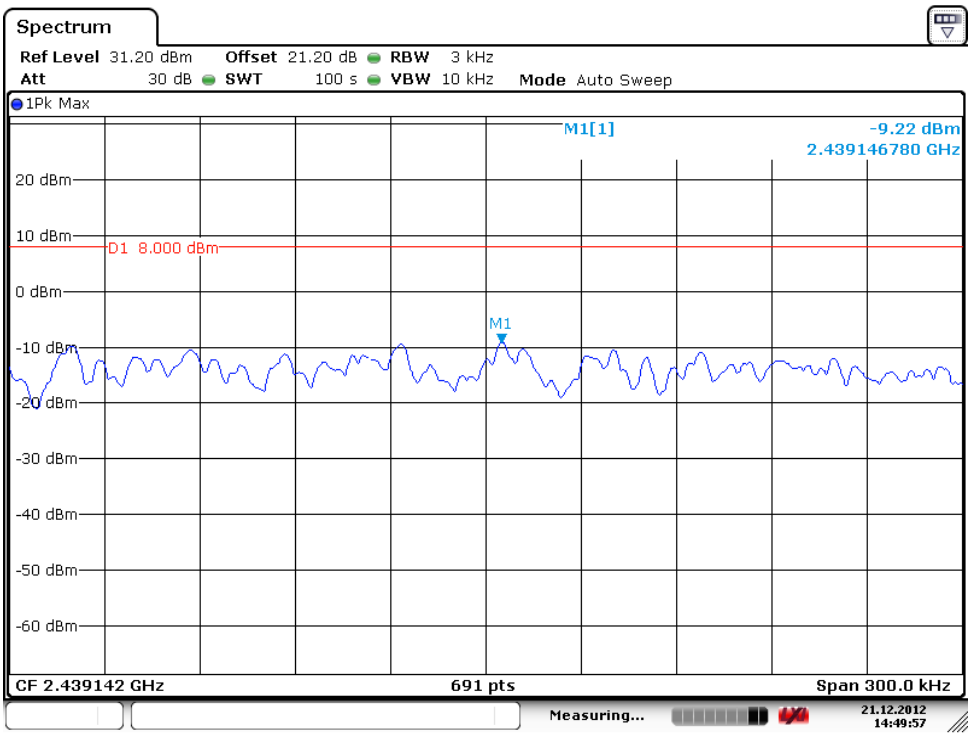
Test Plot of Power Density, 802.11b

Low Channel



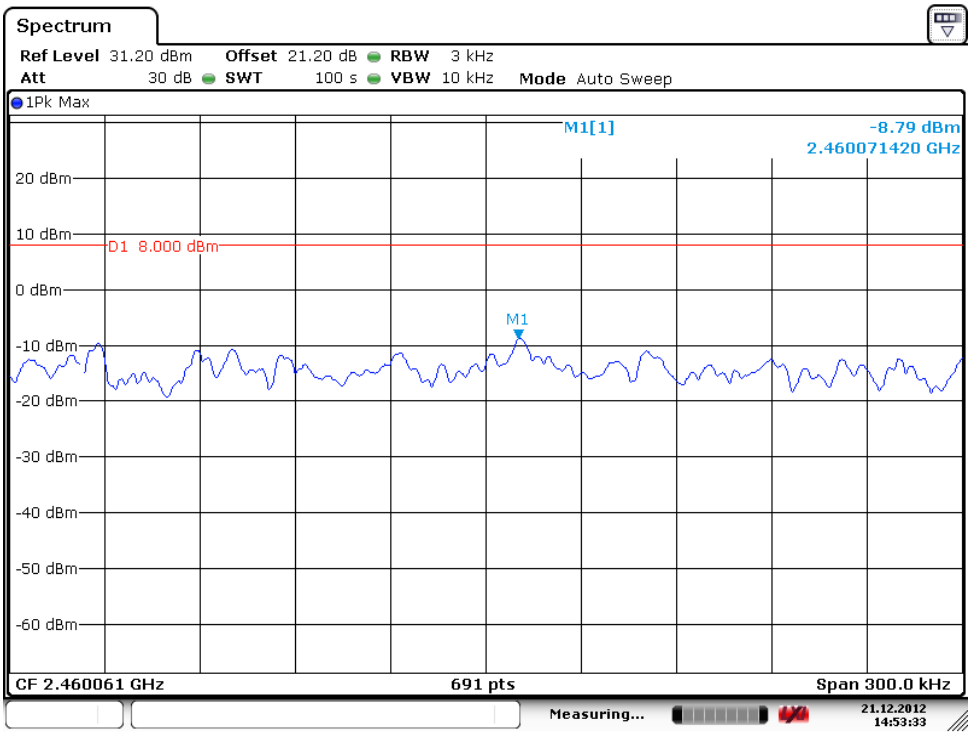
Date: 21.DEC.2012 14:46:53

Middle Channel



Date: 21.DEC.2012 14:49:58

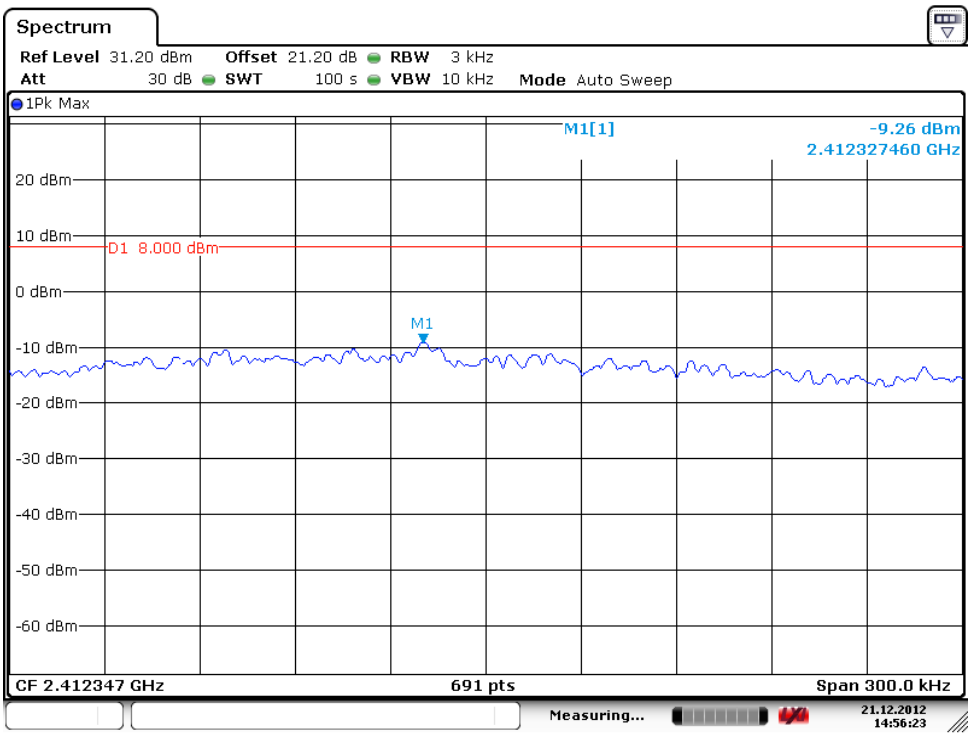
High Channel



Date: 21.DEC.2012 14:53:34

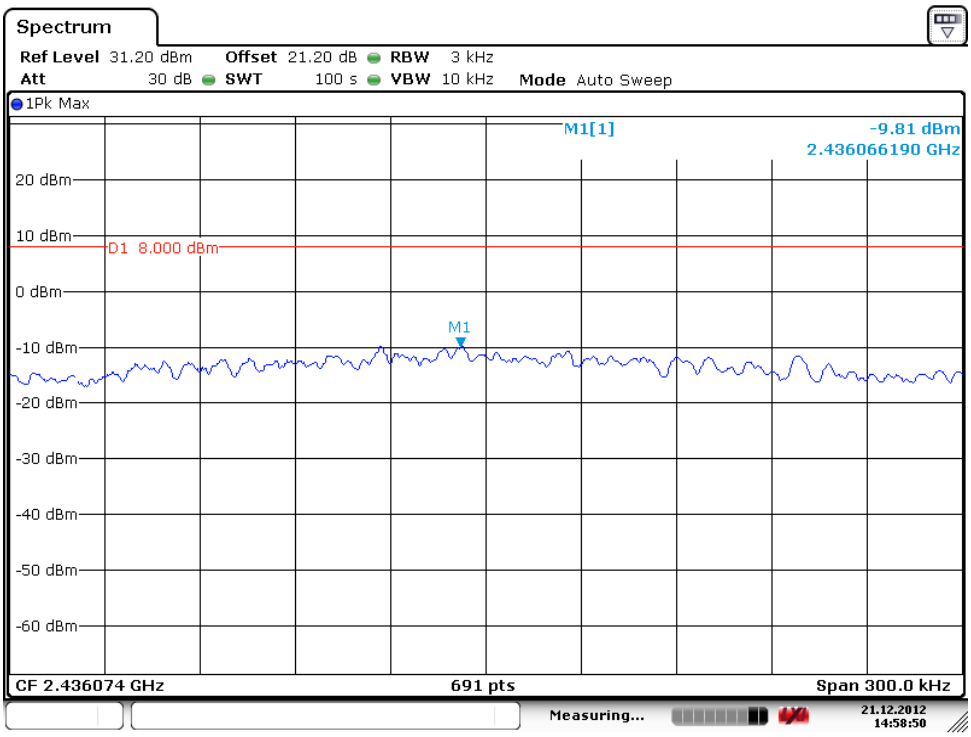
Test Plot of Power Density, 802.11g

Low Channel



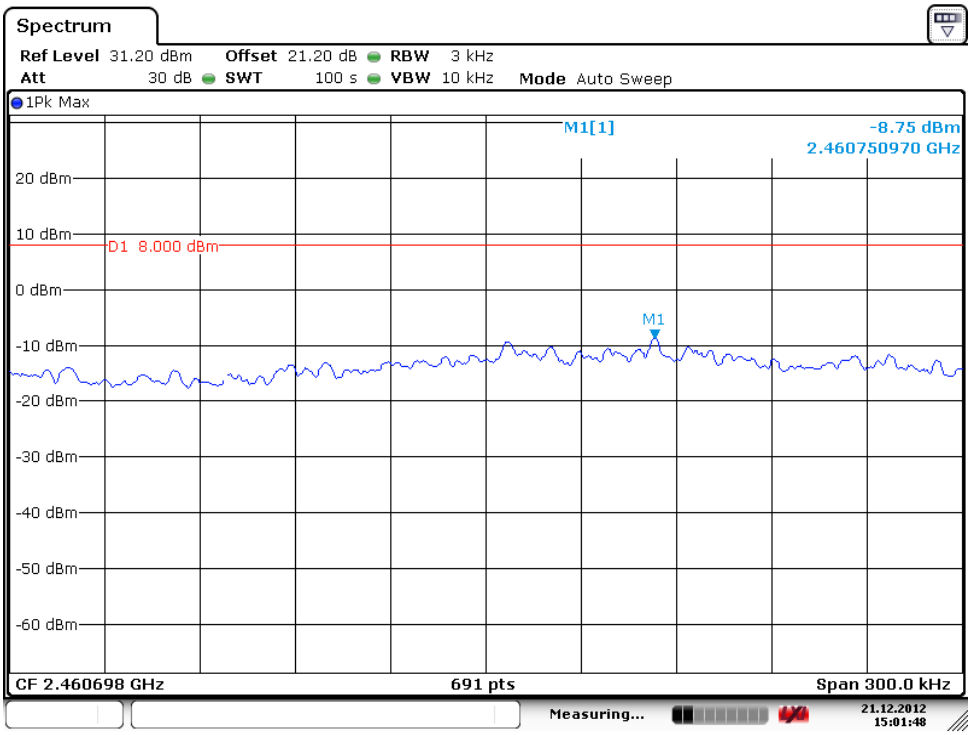
Date: 21.DEC.2012 14:56:24

Middle Channel



Date: 21.DEC.2012 14:58:50

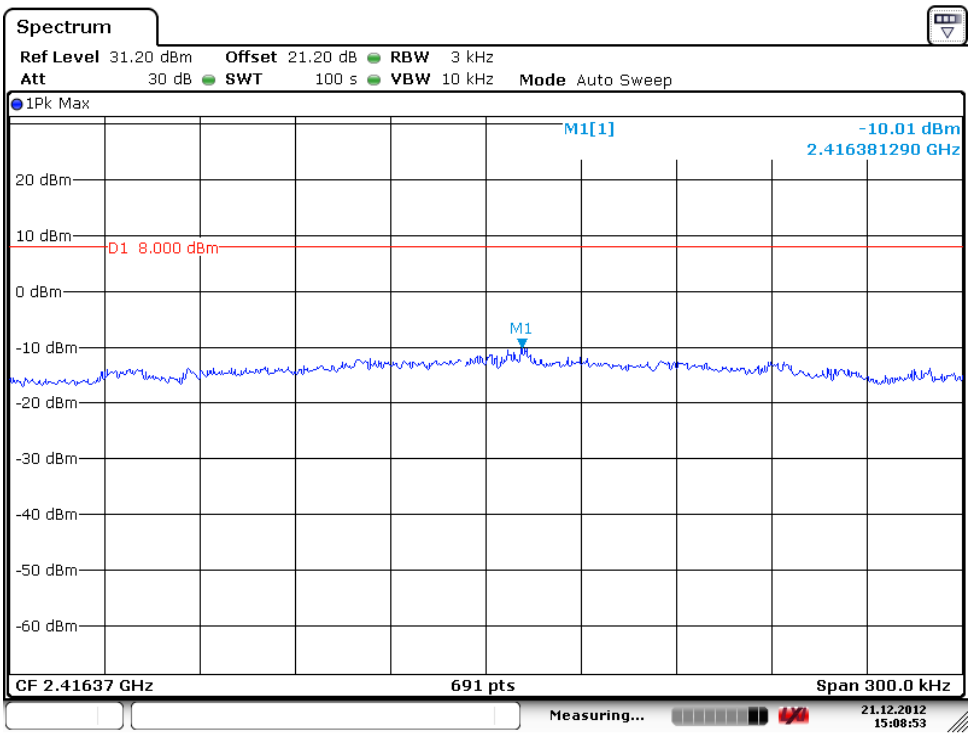
High Channel



Date: 21.DEC.2012 15:01:49

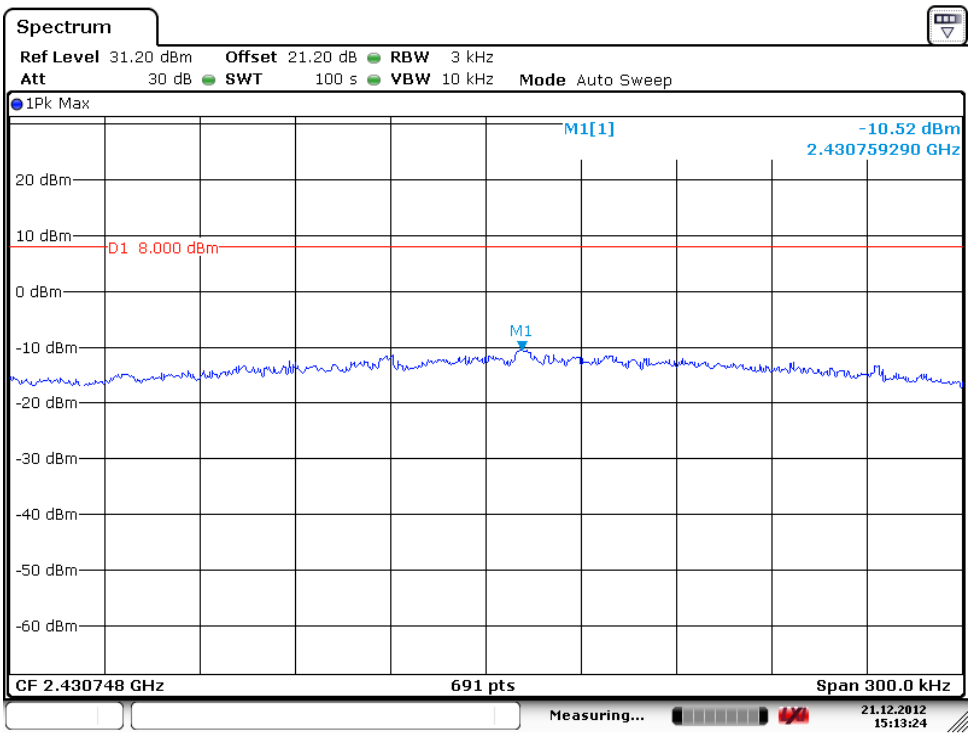
Test Plot of Power Density, 802.11n (20MHz)

Low Channel



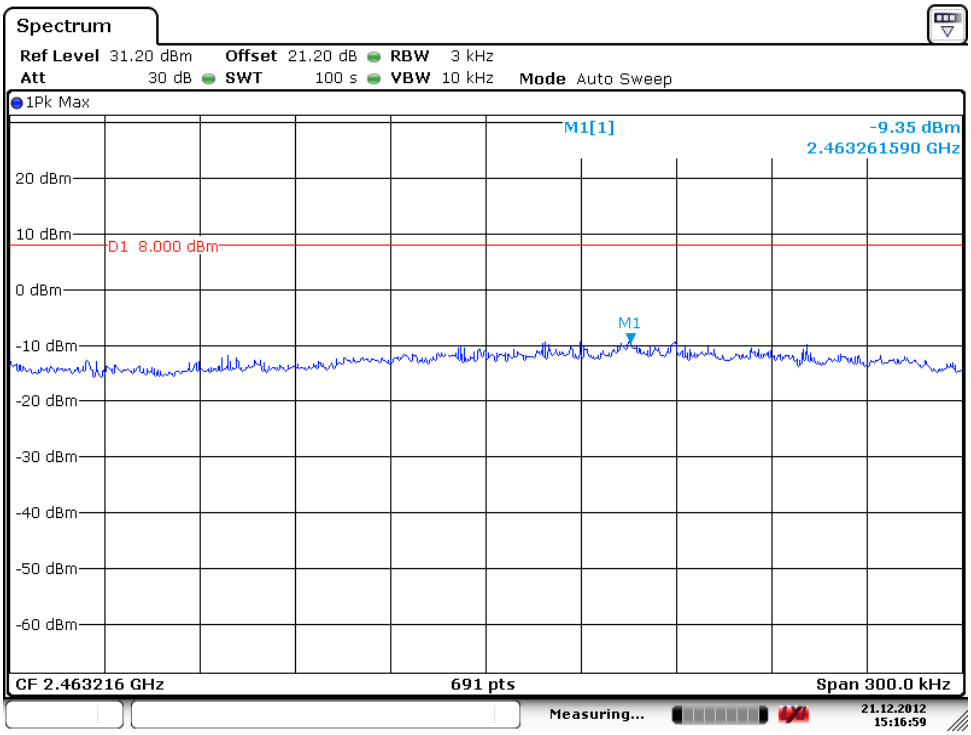
Date: 21.DEC.2012 15:08:54

Middle Channel



Date: 21.DEC.2012 15:13:24

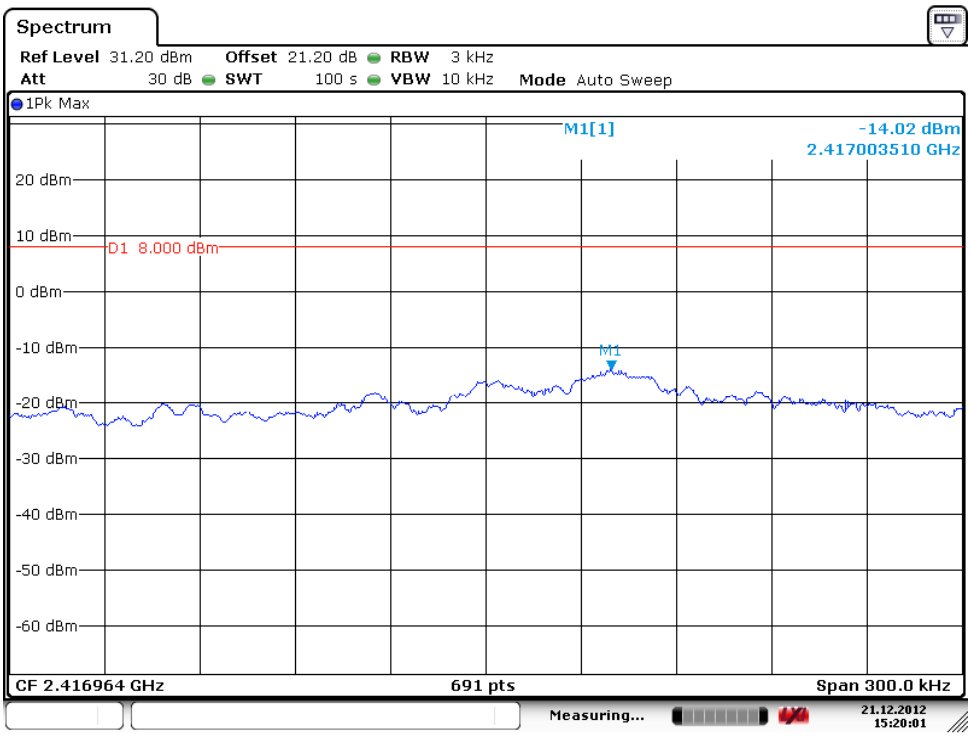
High Channel



Date: 21.DEC.2012 15:16:59

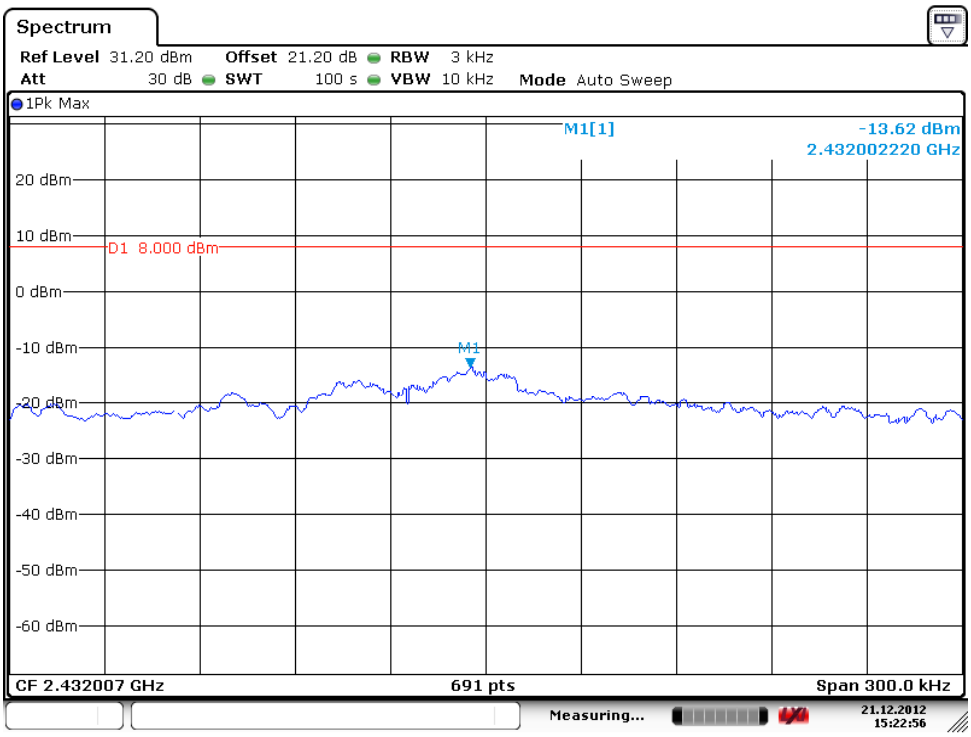
Test Plot of Power Density, 802.11n (40MHz)

Low Channel



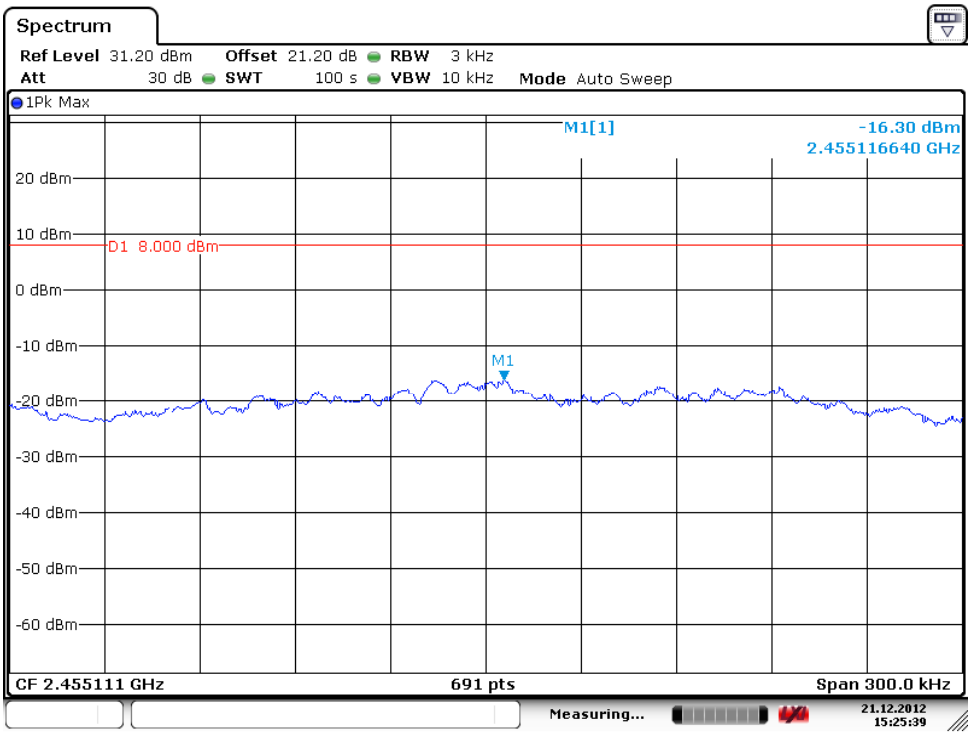
Date: 21.DEC.2012 15:20:01

Middle Channel



Date: 21.DEC.2012 15:22:56

High Channel



Date: 21.DEC.2012 15:25:40

5.1.1.5 Conducted spurious emissions measured in 100kHz Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC part 15.247(d), RSS-210 A8.5
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded room

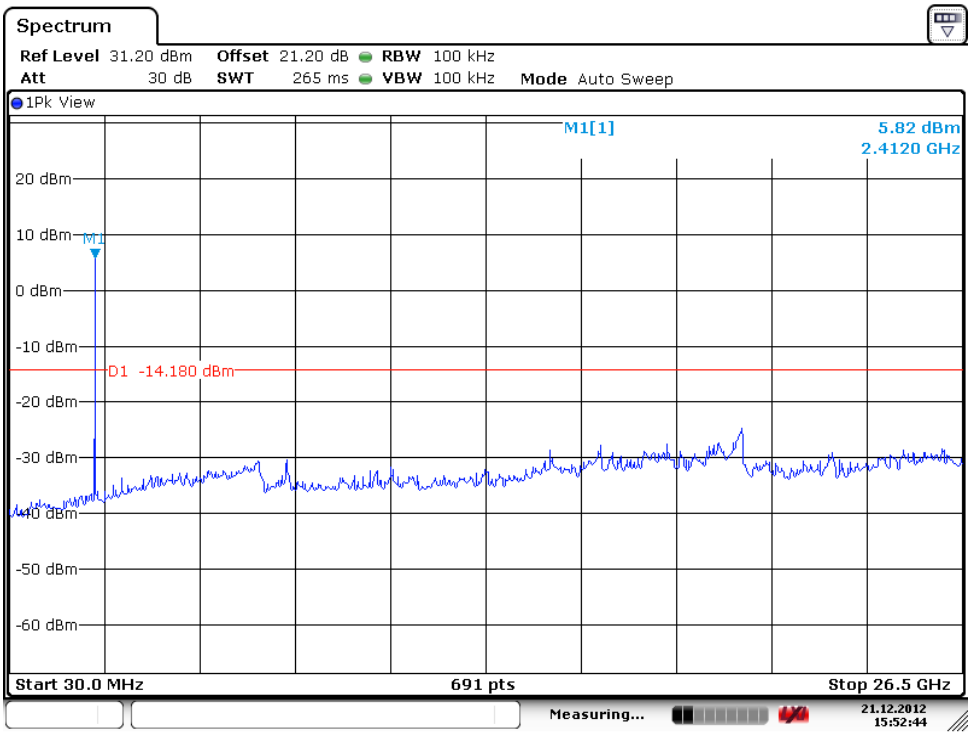
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

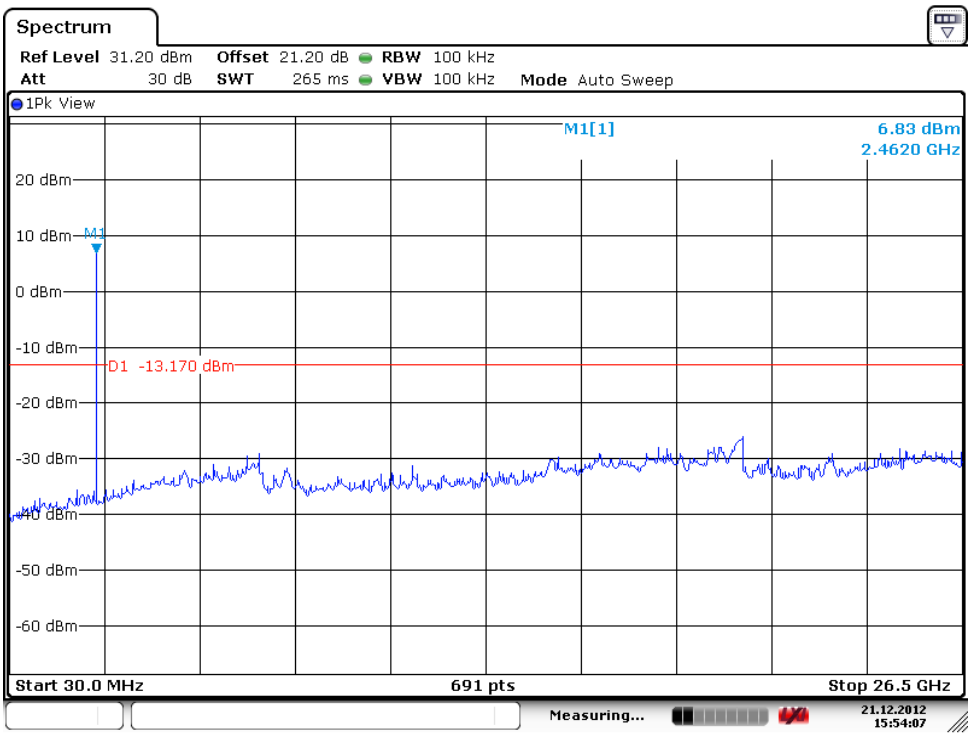
Test Plot of 100kHz Conducted Emissions, 802.11b

Low Channel



Date: 21.DEC.2012 15:52:45

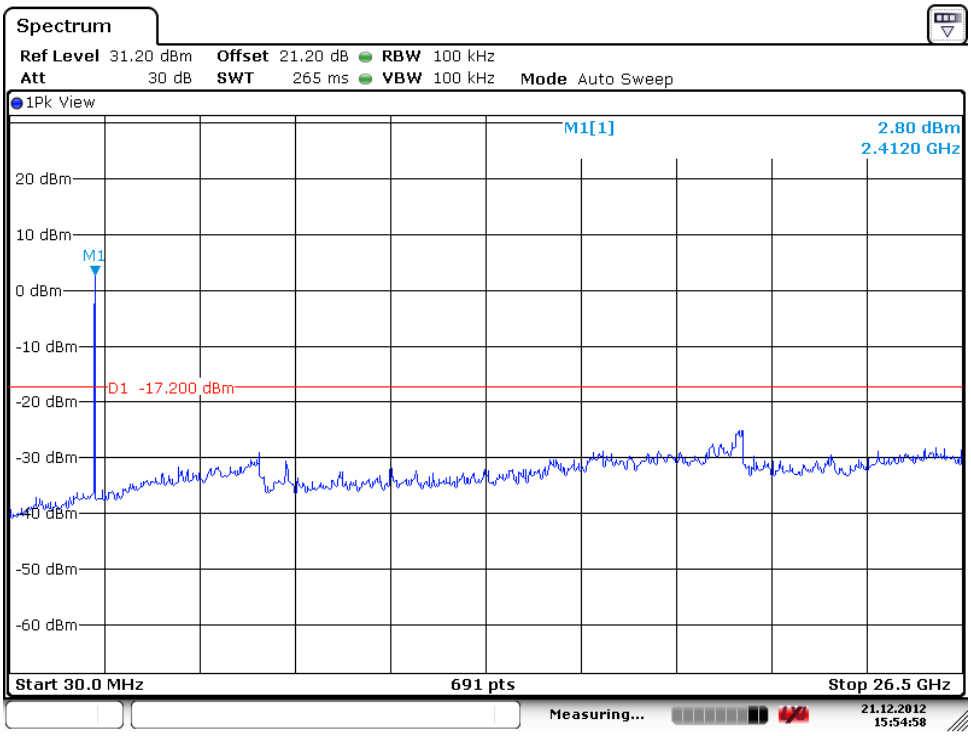
High Channel



Date: 21.DEC.2012 15:54:07

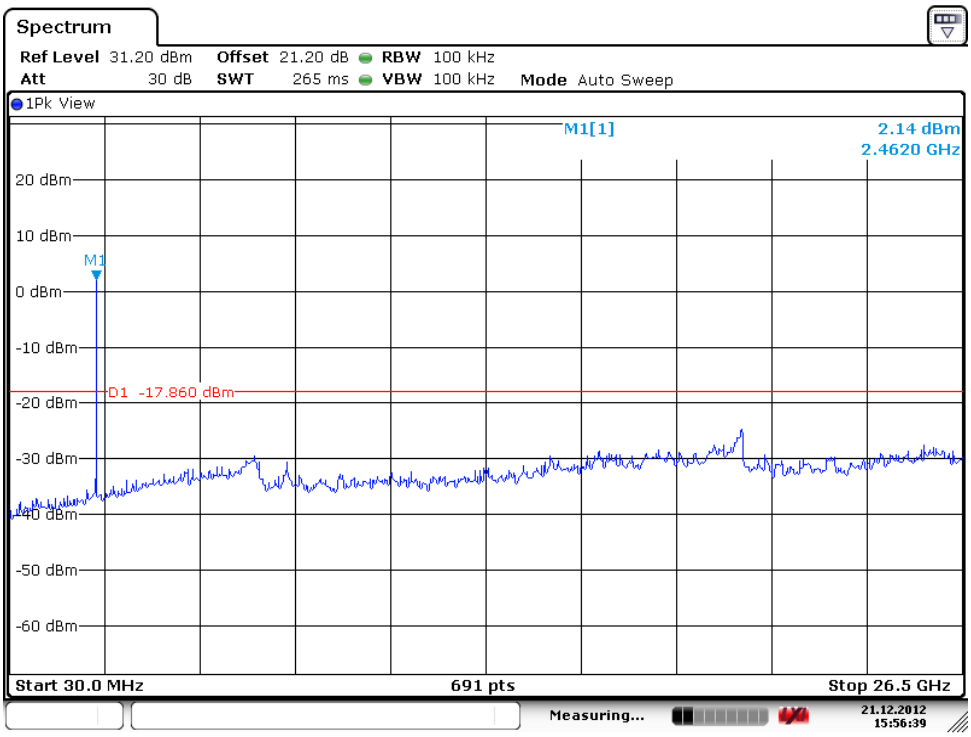
Test Plot of 100kHz Conducted Emissions, 802.11g

Low Channel



Date: 21.DEC.2012 15:54:59

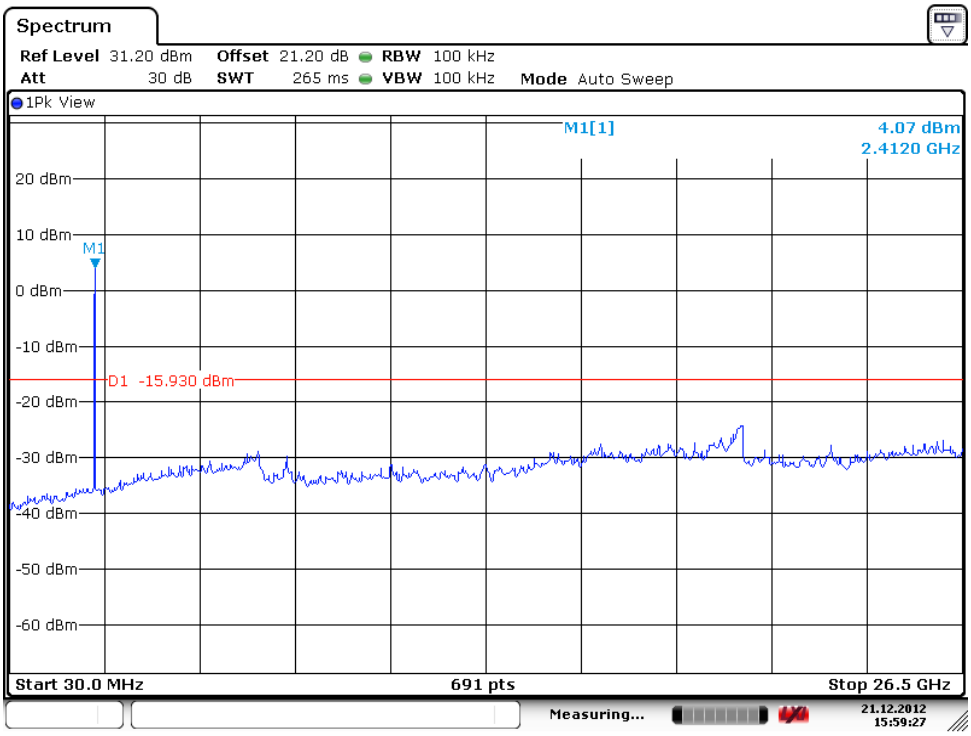
High Channel



Date: 21.DEC.2012 15:56:40

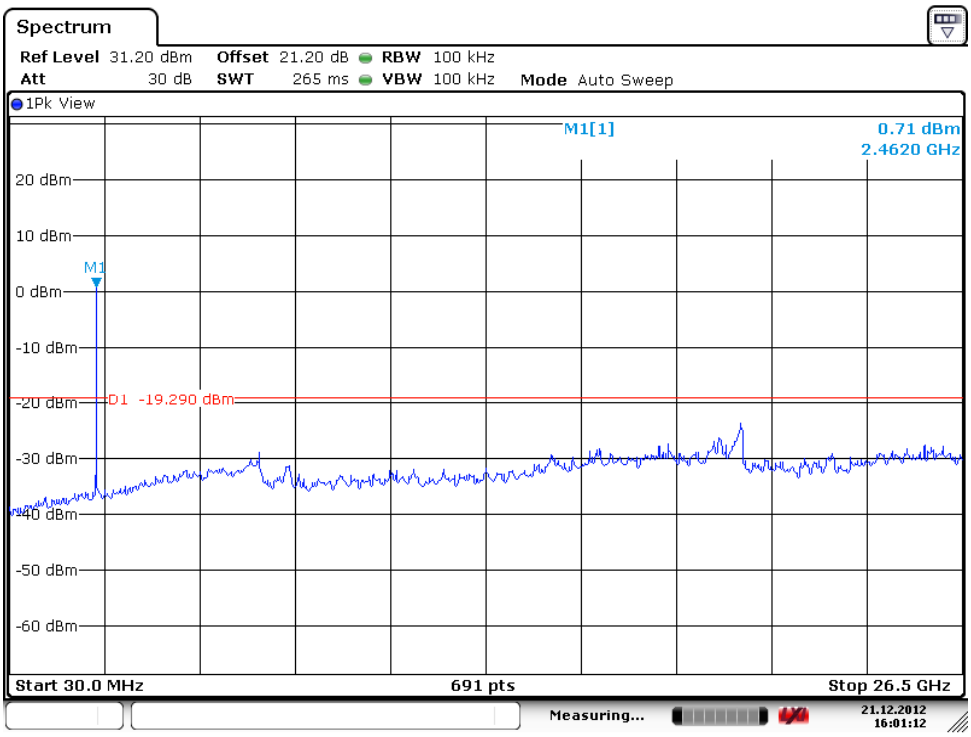
Test Plot of 100kHz Conducted Emissions, 802.11n (20MHz)

Low Channel



Date: 21.DEC.2012 15:59:27

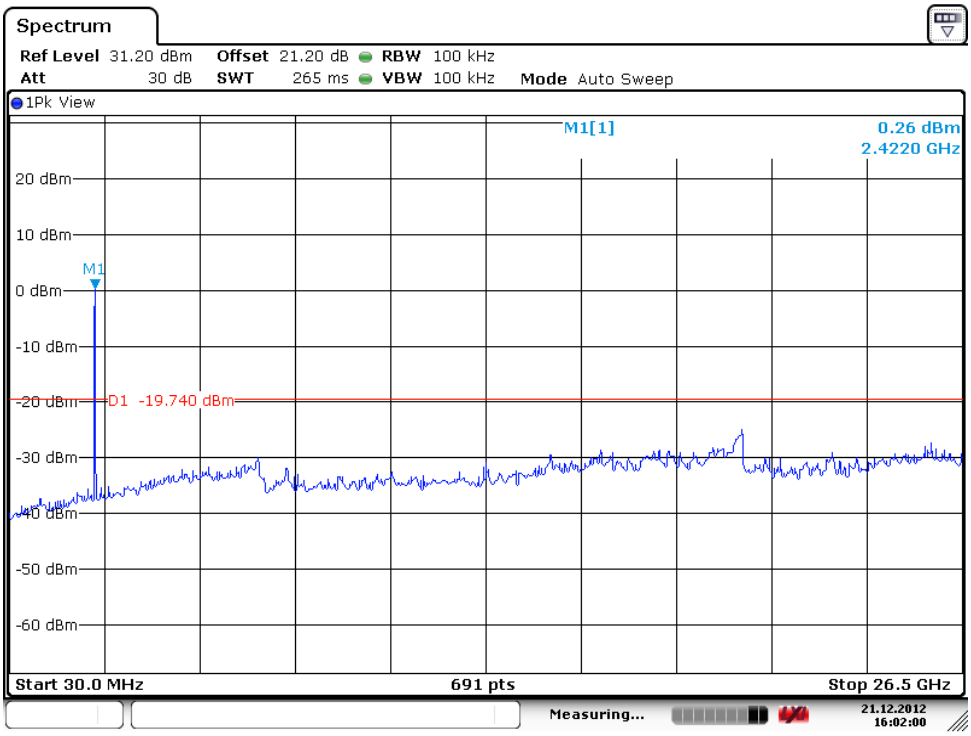
High Channel



Date: 21.DEC.2012 16:01:13

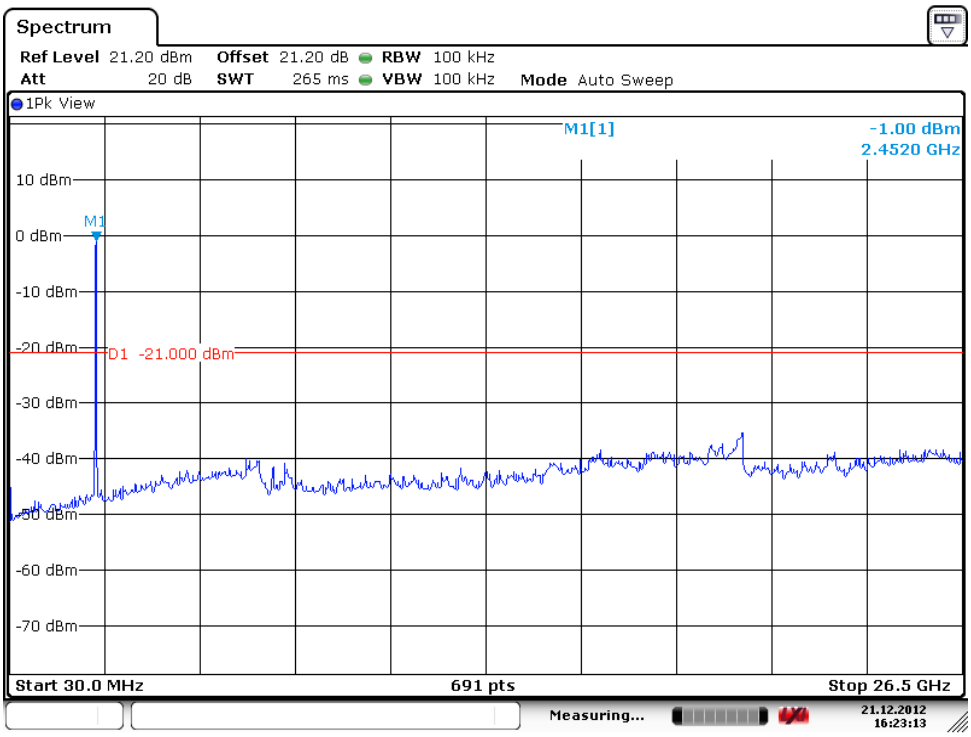
Test Plot of 100kHz Conducted Emissions, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 16:02:00

High Channel



Date: 21.DEC.2012 16:23:14

5.1.2 Antenna Port 2 (TX1)

5.1.2.1 Antenna Requirement

RESULT: **Passed**

Test date	:	2012-12-21
Test standard	:	FCC Part 15.247(b)(4), Part 15.203 and RSS-Gen 7.1.4
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an internal antenna with an directional gain of 0.5 dBi, and the antenna is a pair of chip antenna, so that the aggregation gain is 1 dBi. The EUT is considered to comply the provision.

Refer to EUT photo and Antenna datasheet for details.

5.1.2.2 Output Power

RESULT: **Passed**

Test date	:	2012-12-21
Test standard	:	FCC Part 15.247(b)(3), RSS-210 A8.4(4)
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

For the 802.11n modes, the EUT can be operated in 2x2 MIMO mode. Therefore, for those modes, in the tables below the limits are reduced by 3 dB.
.

Table 22: Test result of Output Power, 802.11b

Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	2412	22.77	0.1892	1	PASS
Middle Channel	2437	22.3	0.1698	1	PASS
High Channel	2462	22.21	0.1663	1	PASS

Table 23: Test result of Output Power, 802.11g

Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	2412	23.2	0.2089	1	PASS
Middle Channel	2437	22.83	0.1919	1	PASS
High Channel	2462	22.53	0.1791	1	PASS

Table 24: Test result of Output Power, 802.11n (20MHz)

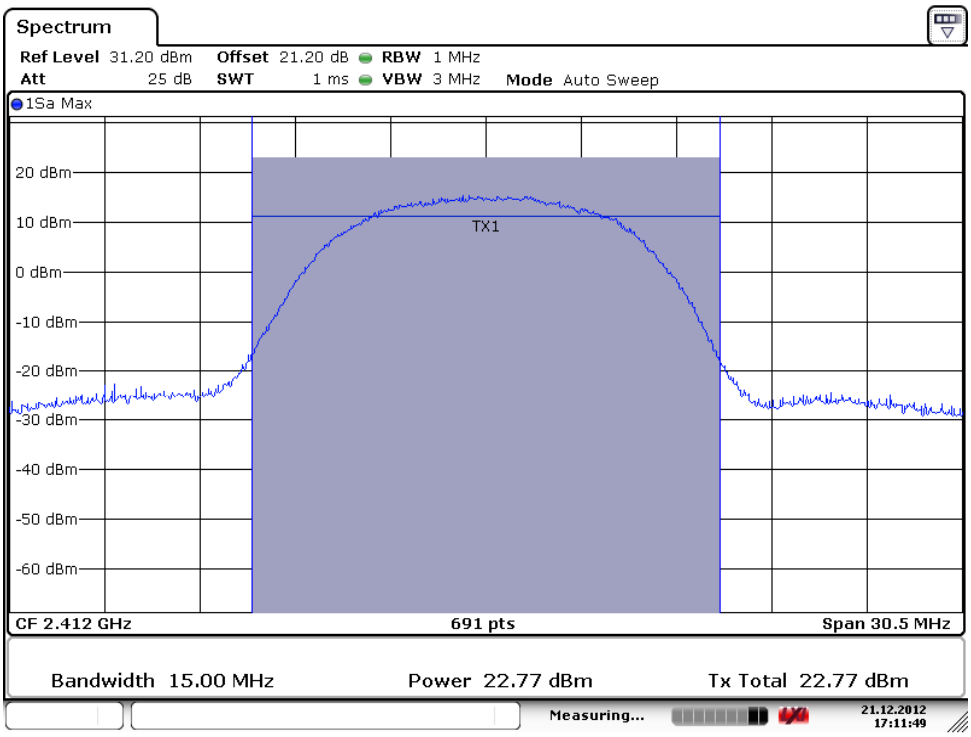
Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	2412	23.53	0.2254	0.5	PASS
Middle Channel	2437	23.19	0.2084	0.5	PASS
High Channel	2462	23.07	0.2028	0.5	PASS

Table 25: Test result of Output Power, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	2422	23.08	0.2032	0.5	PASS
Middle Channel	2437	23.06	0.2023	0.5	PASS
High Channel	2452	23.05	0.2018	0.5	PASS

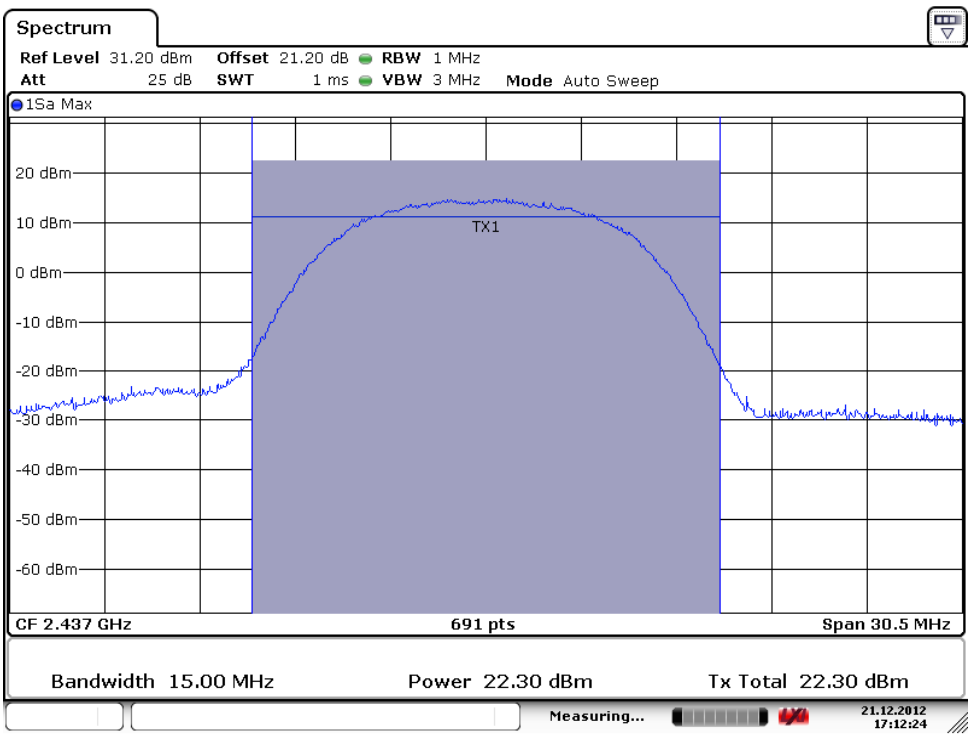
Test Plot of Output Power, 802.11b

Low Channel



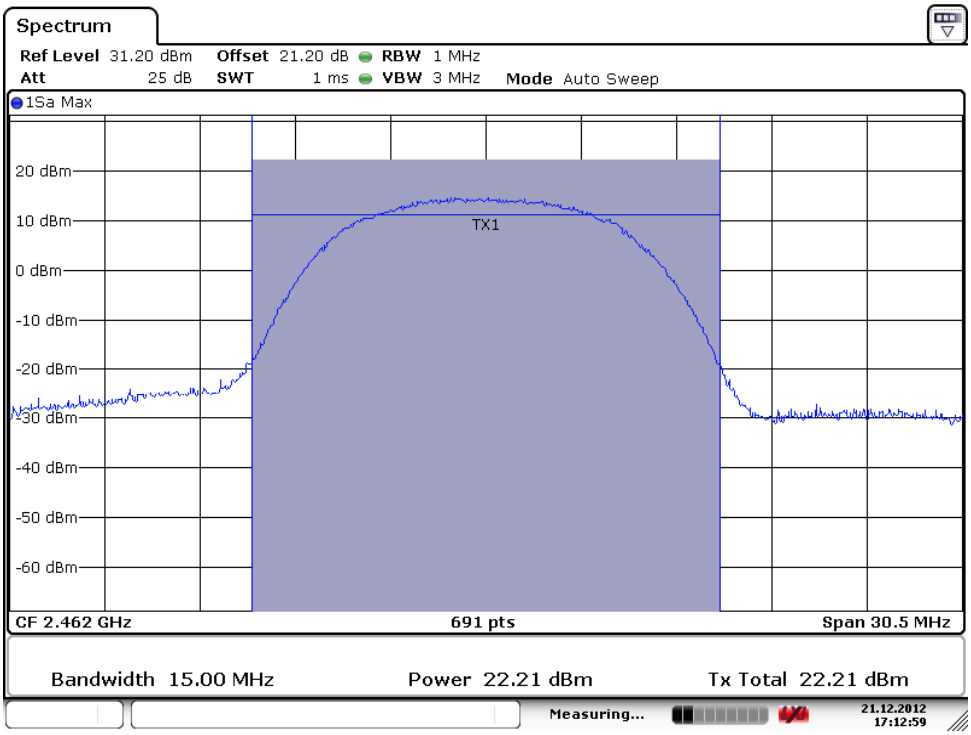
Date: 21.DEC.2012 17:11:49

Middle Channel



Date: 21.DEC.2012 17:12:25

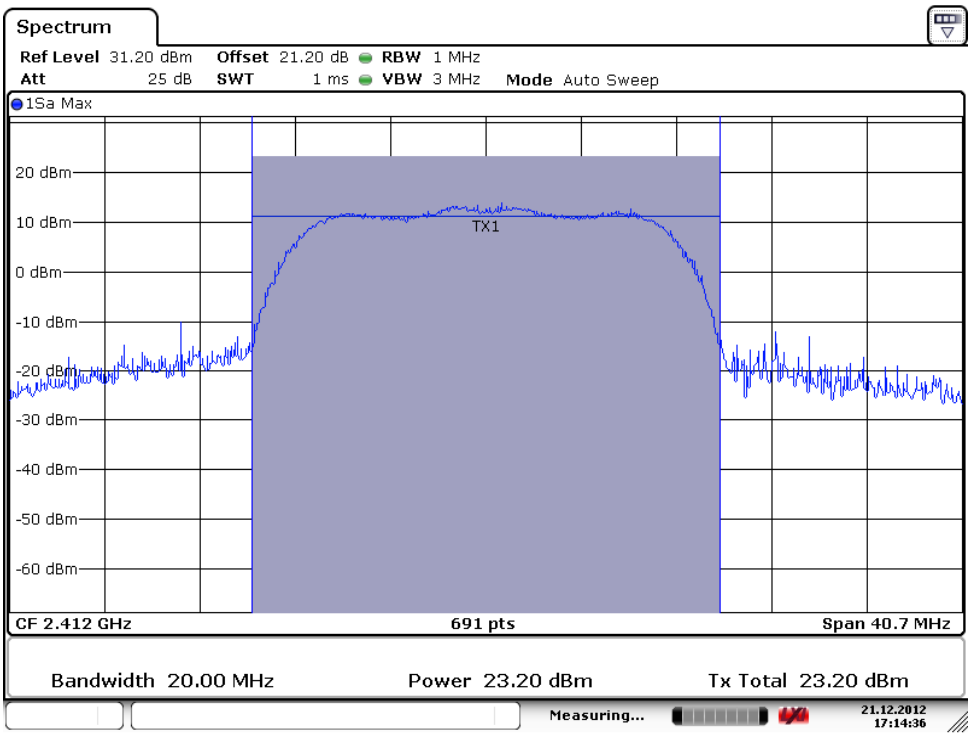
High Channel



Date: 21.DEC.2012 17:13:00

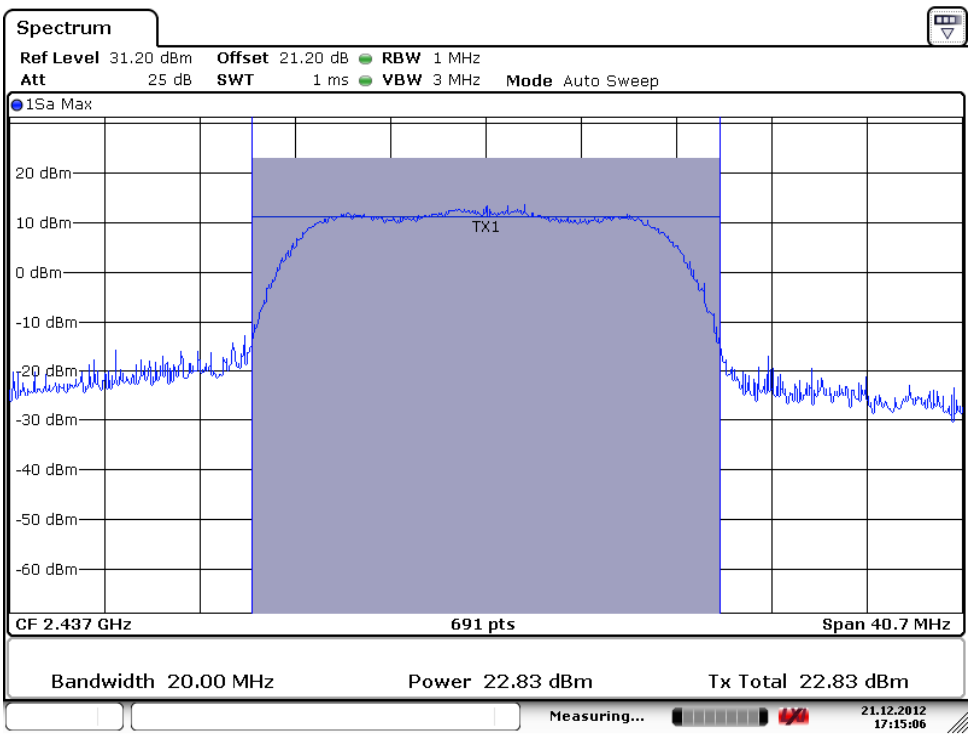
Test Plot of Output Power, 802.11g

Low Channel



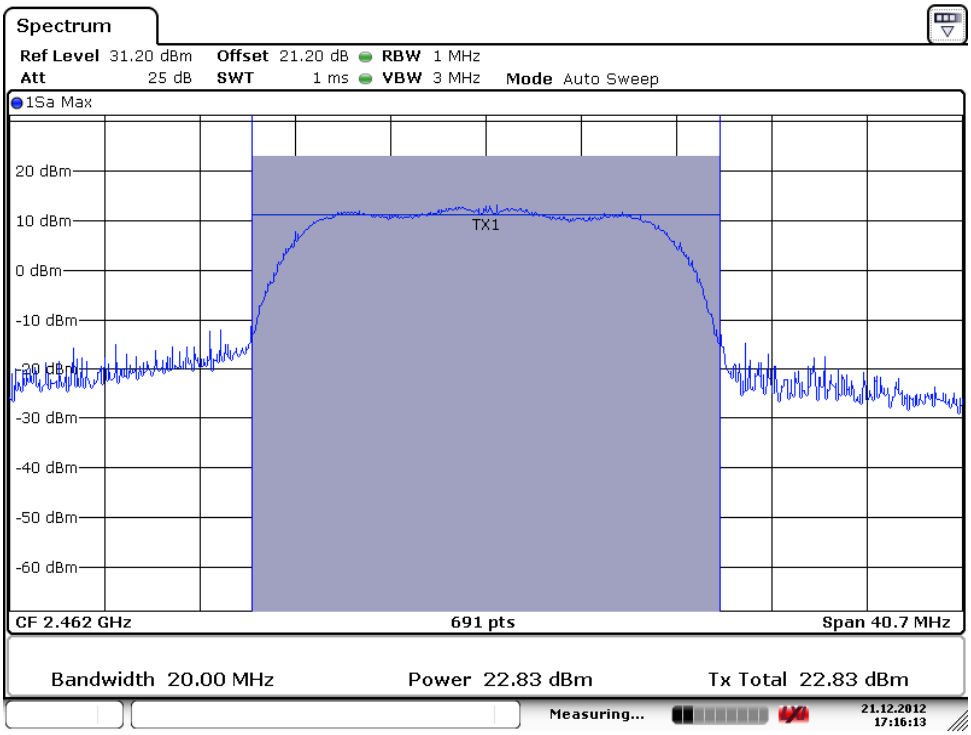
Date: 21.DEC.2012 17:14:35

Middle Channel



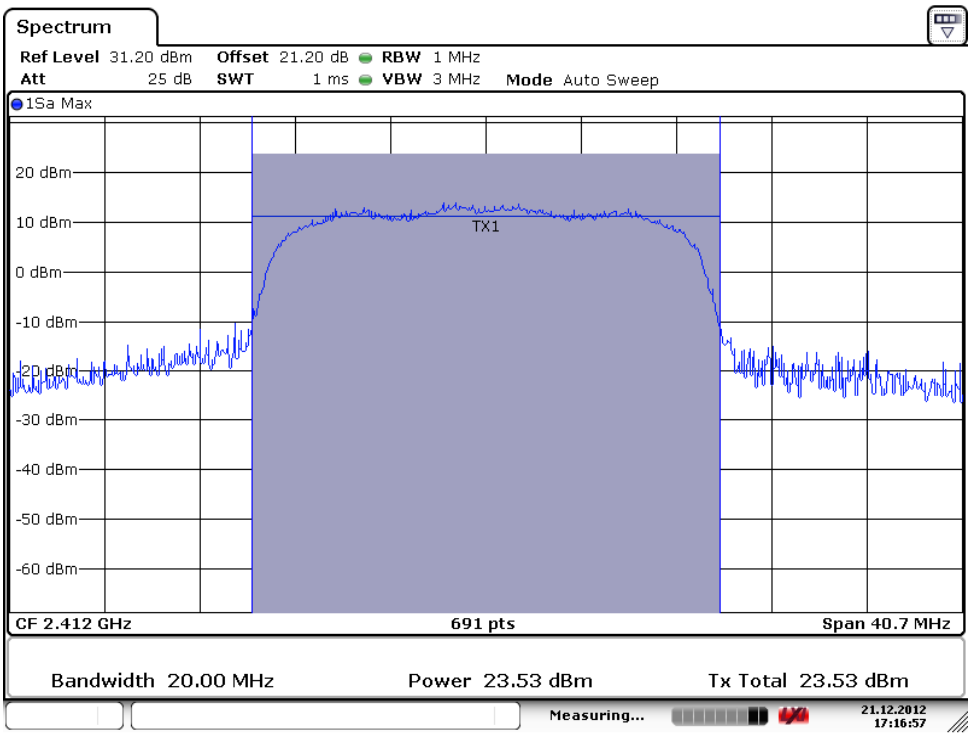
Date: 21.DEC.2012 17:15:07

High Channel



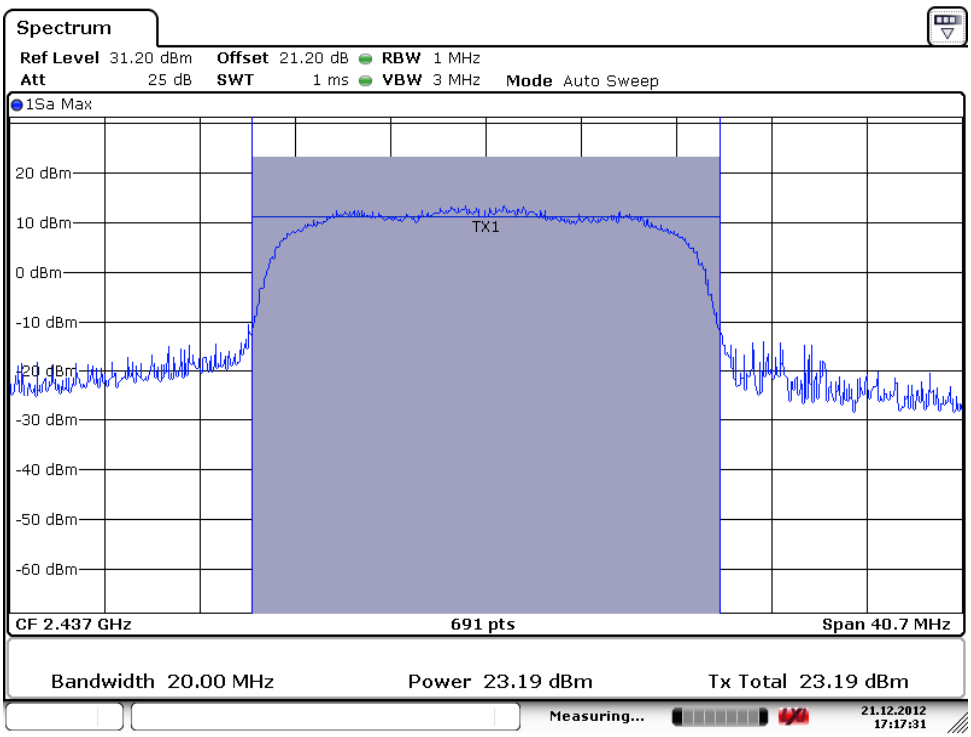
Test Plot of Output Power, 802.11n (20MHz)

Low Channel



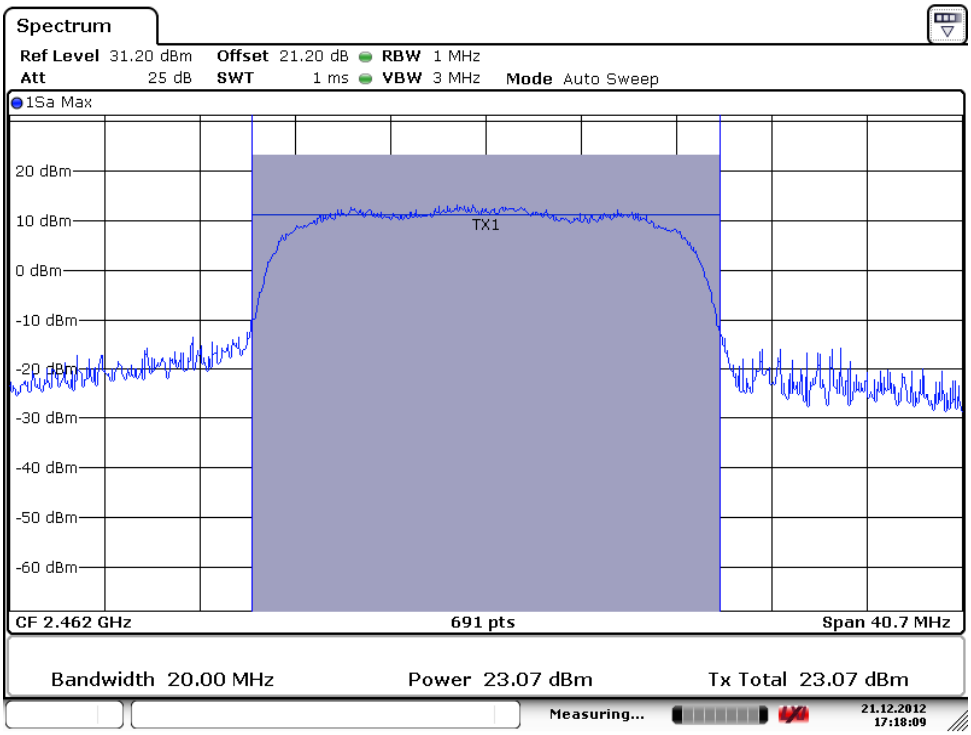
Date: 21.DEC.2012 17:16:58

Middle Channel



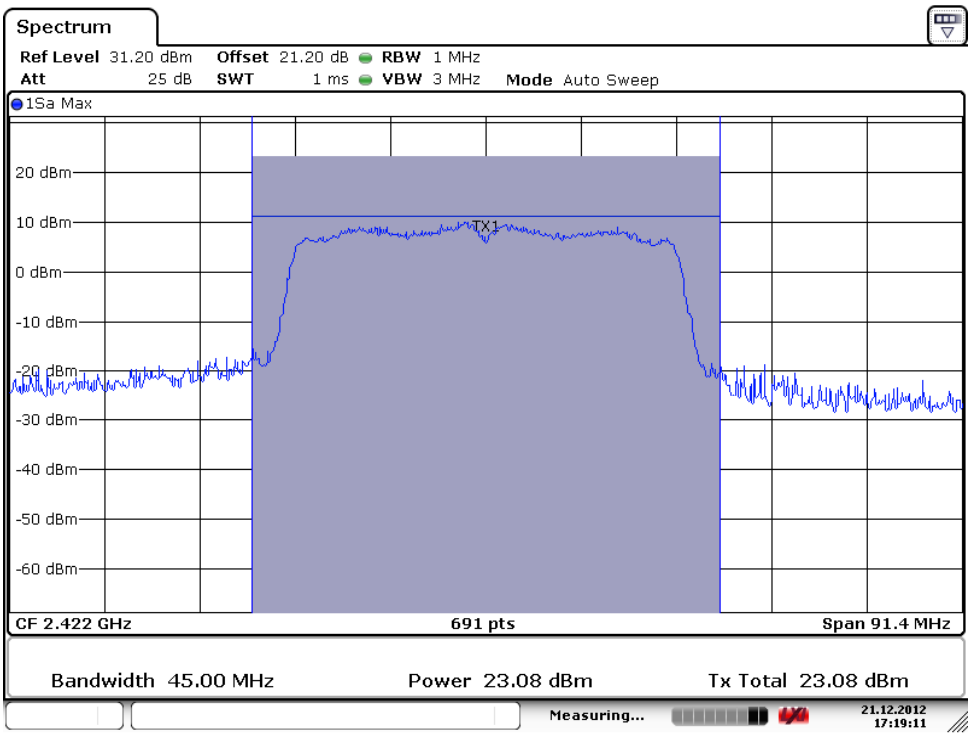
Date: 21.DEC.2012 17:17:32

High Channel



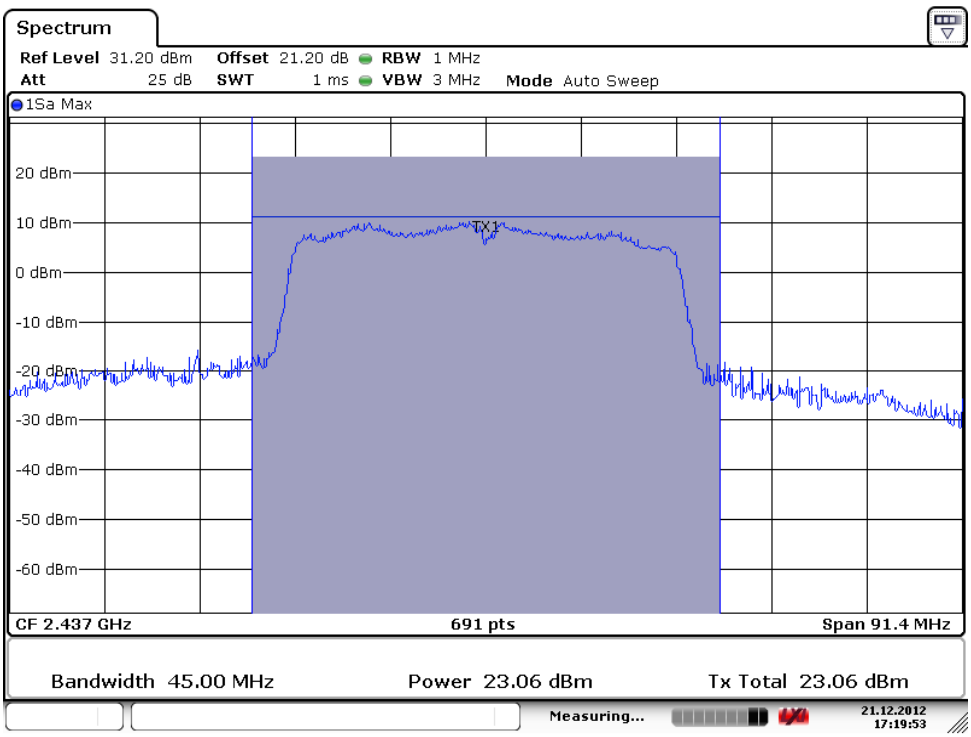
Test Plot of Output Power, 802.11n (40MHz)

Low Channel



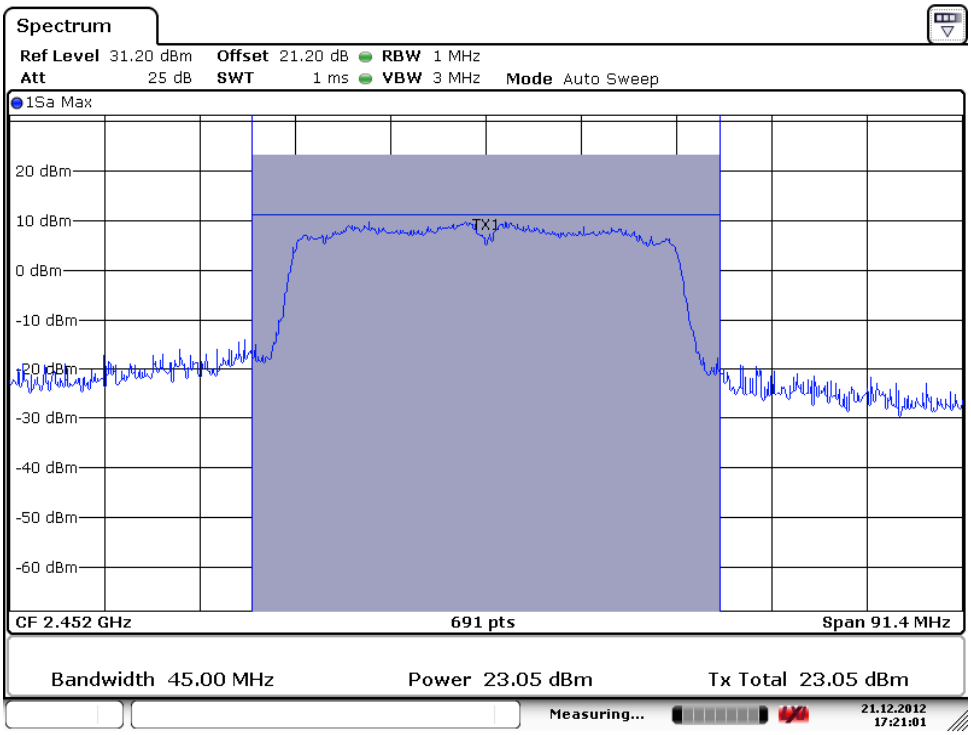
Date: 21.DEC.2012 17:19:10

Middle Channel



Date: 21.DEC.2012 17:19:53

High Channel



5.1.2.3 6dB and 99% Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC Part 15.247(a)(2), RSS-210 A8.2(1)
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 26: Test result of 6dB Bandwidth, 802.11b

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	2412	8.394	≧0.5	Pass
Mid Channel	2437	7.988	≧0.5	Pass
High Channel	2462	7.873	≧0.5	Pass

Table 27: Test result of 6dB Bandwidth, 802.11g

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	2412	15.109	≧0.5	Pass
Mid Channel	2437	14.884	≧0.5	Pass
High Channel	2462	15.412	≧0.5	Pass

Table 28: Test result of 6dB Bandwidth, 802.11n (20MHz)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	2412	15.051	≧0.5	Pass
Mid Channel	2437	14.711	≧0.5	Pass
High Channel	2462	15.181	≧0.5	Pass

Table 29: Test result of 6dB Bandwidth, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	2422	36.295	≧0.5	Pass
Mid Channel	2437	36.259	≧0.5	Pass
High Channel	2452	36.295	≧0.5	Pass

Table 30: Test result of 99% Bandwidth, 802.11b

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	2412	10.680	/
Mid Channel	2437	10.650	/
High Channel	2462	10.651	/

Table 31: Test result of 99% Bandwidth, 802.11g

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	2412	16.498	/
Mid Channel	2437	16.498	/
High Channel	2462	16.498	/

Table 32: Test result of 99% Bandwidth, 802.11n (20MHz)

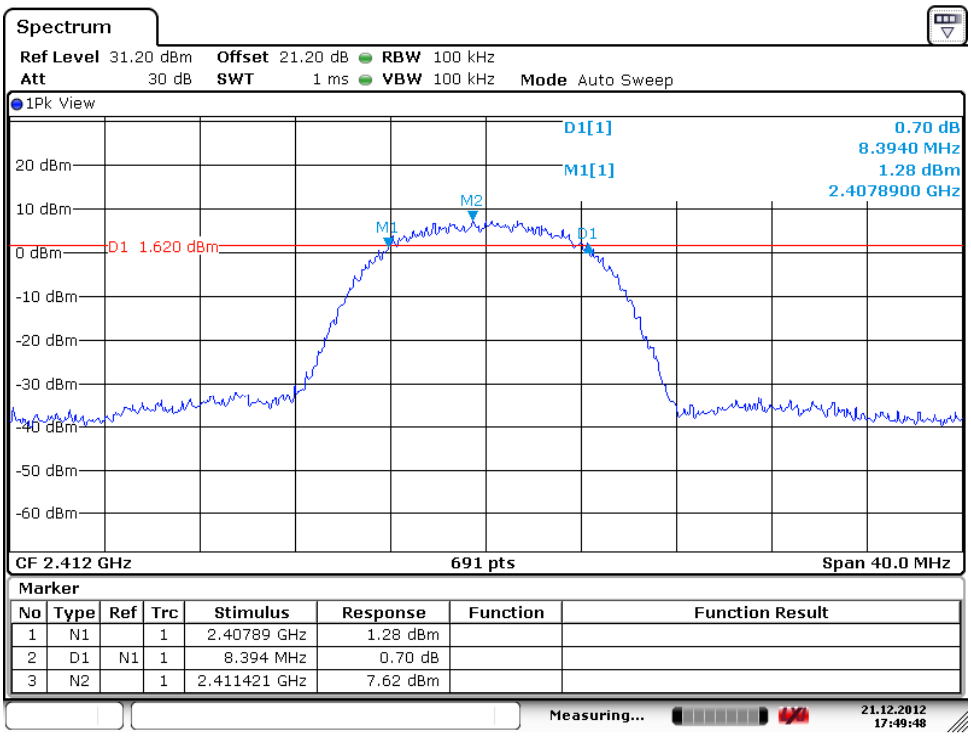
Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	2412	17.453	/
Mid Channel	2437	17.453	/
High Channel	2462	17.410	/

Table 33: Test result of 99% Bandwidth, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	2422	36.903	/
Mid Channel	2437	36.556	/
High Channel	2452	36.729	/

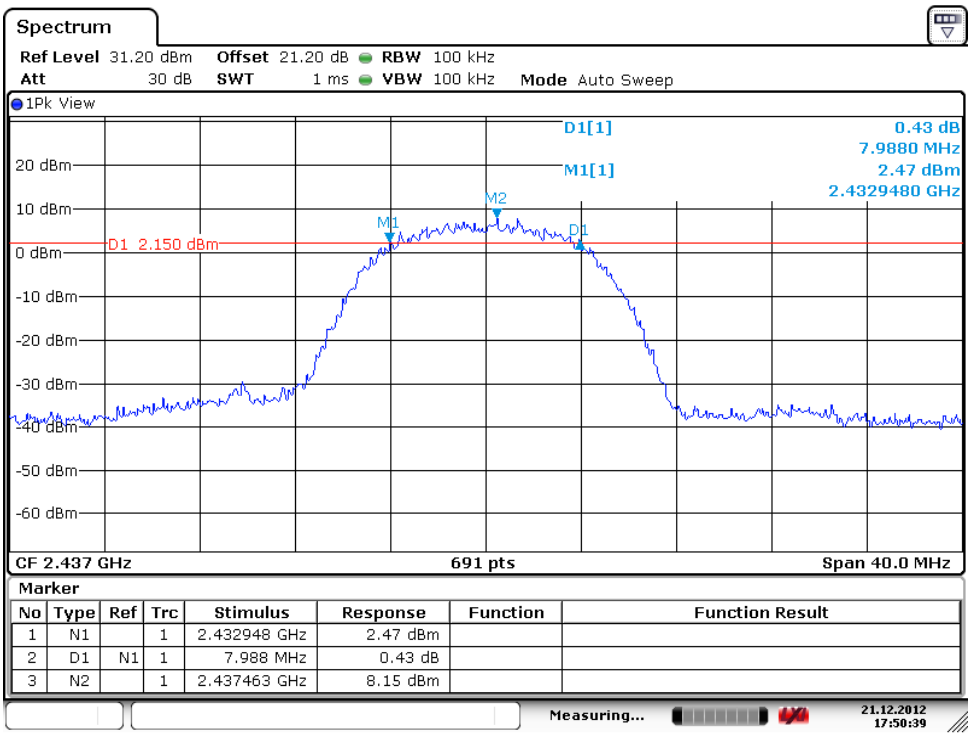
Test Plot of 6dB Bandwidth, 802.11b

Low Channel



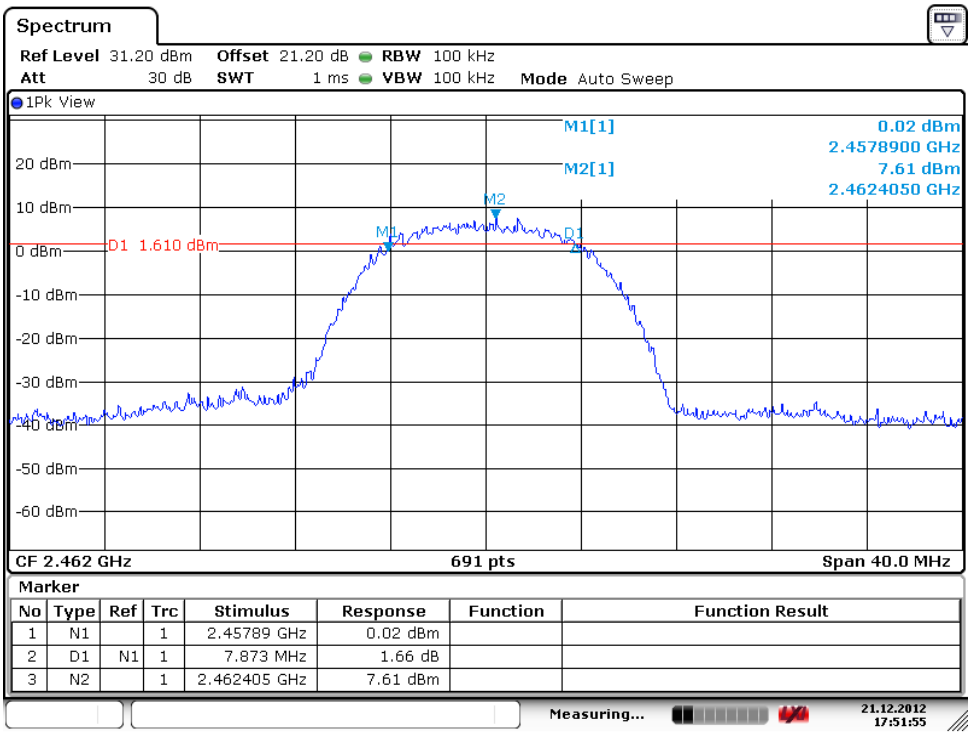
Date: 21.DEC.2012 17:49:48

Middle Channel



Date: 21.DEC.2012 17:50:40

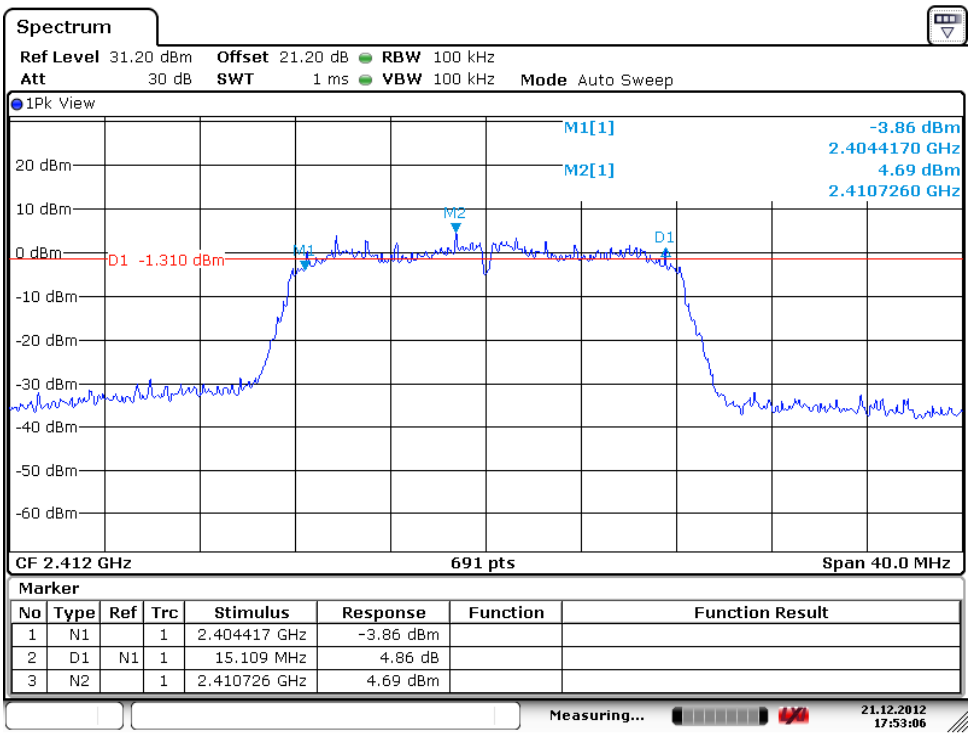
High Channel



Date: 21.DEC.2012 17:51:56

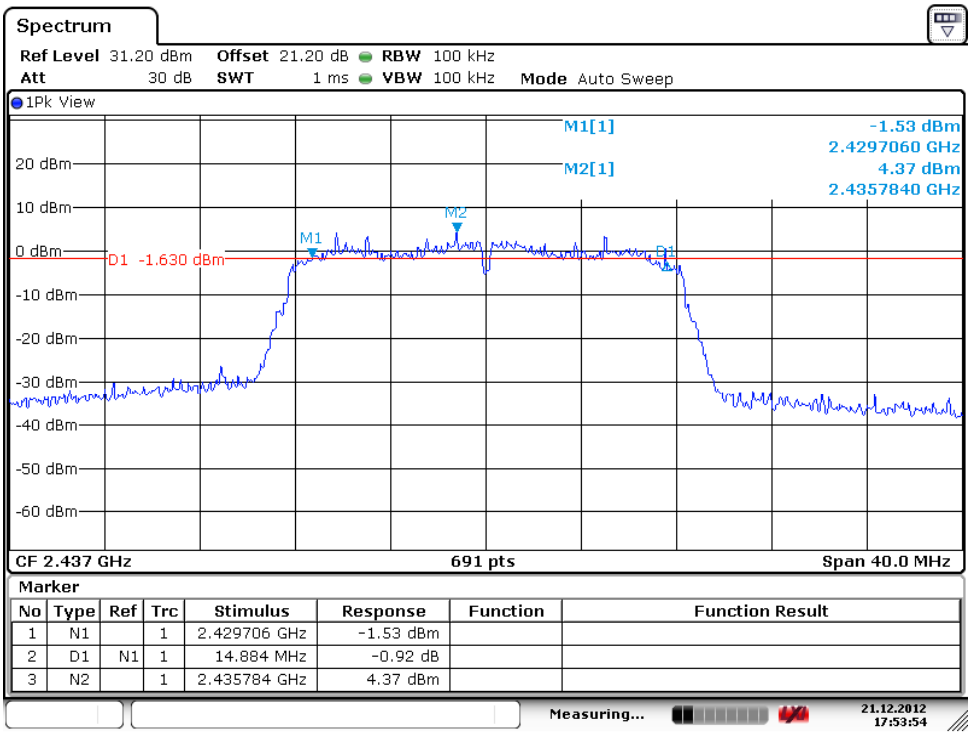
Test Plot of 6dB Bandwidth, 802.11g

Low Channel



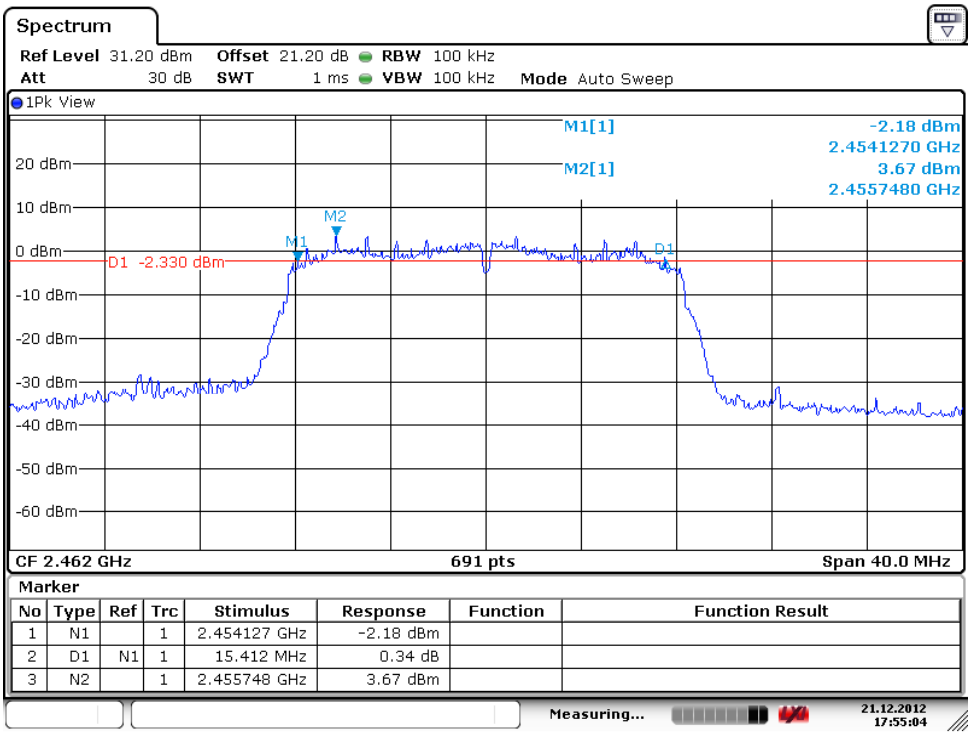
Date: 21.DEC.2012 17:53:05

Middle Channel



Date: 21.DEC.2012 17:53:54

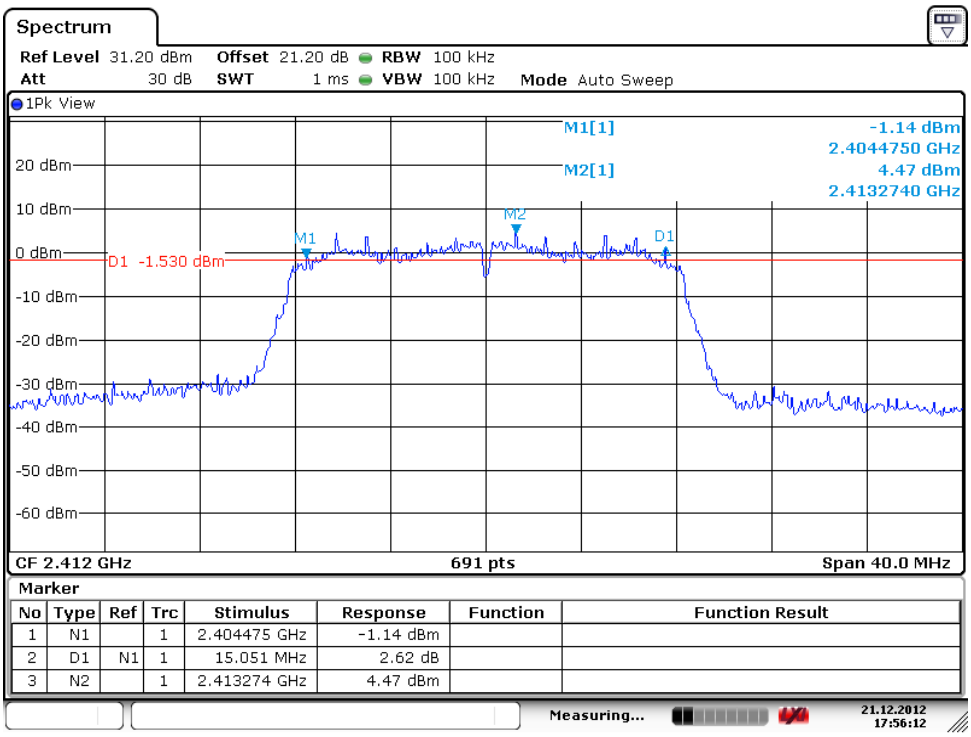
High Channel



Date: 21.DEC.2012 17:55:05

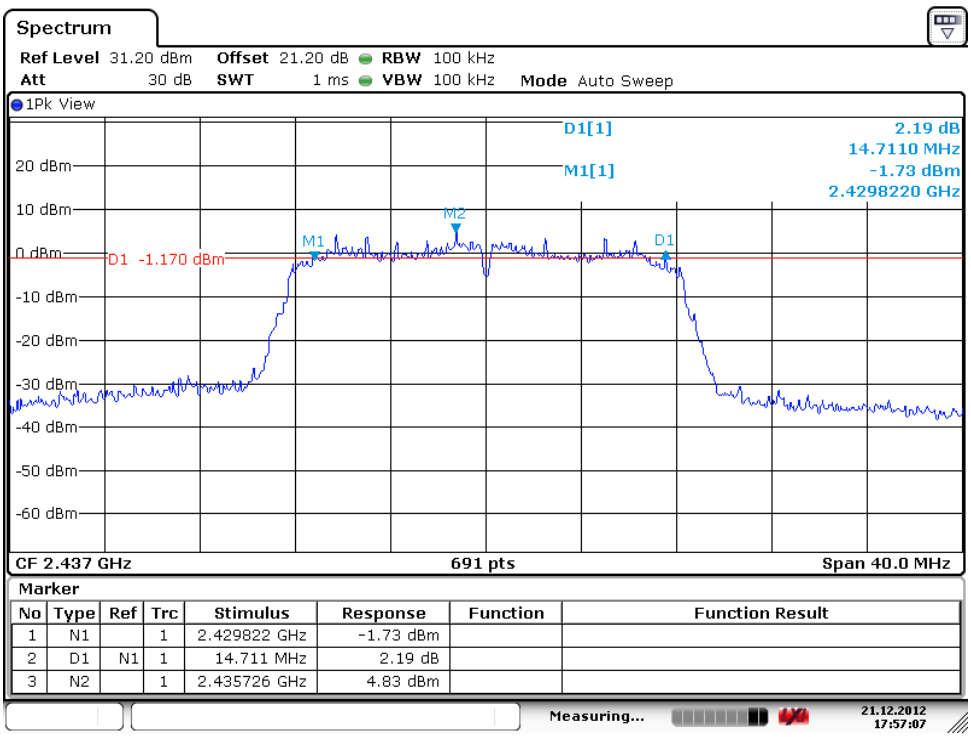
Test Plot of 6dB Bandwidth, 802.11n (20MHz)

Low Channel



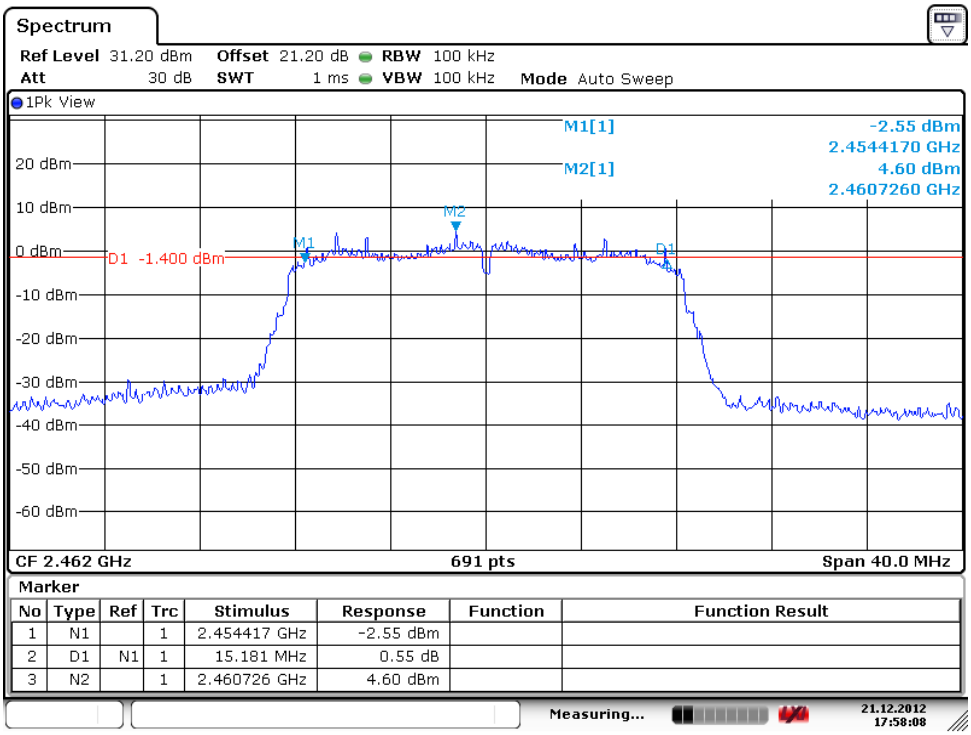
Date: 21.DEC.2012 17:56:12

Middle Channel



Date: 21.DEC.2012 17:57:07

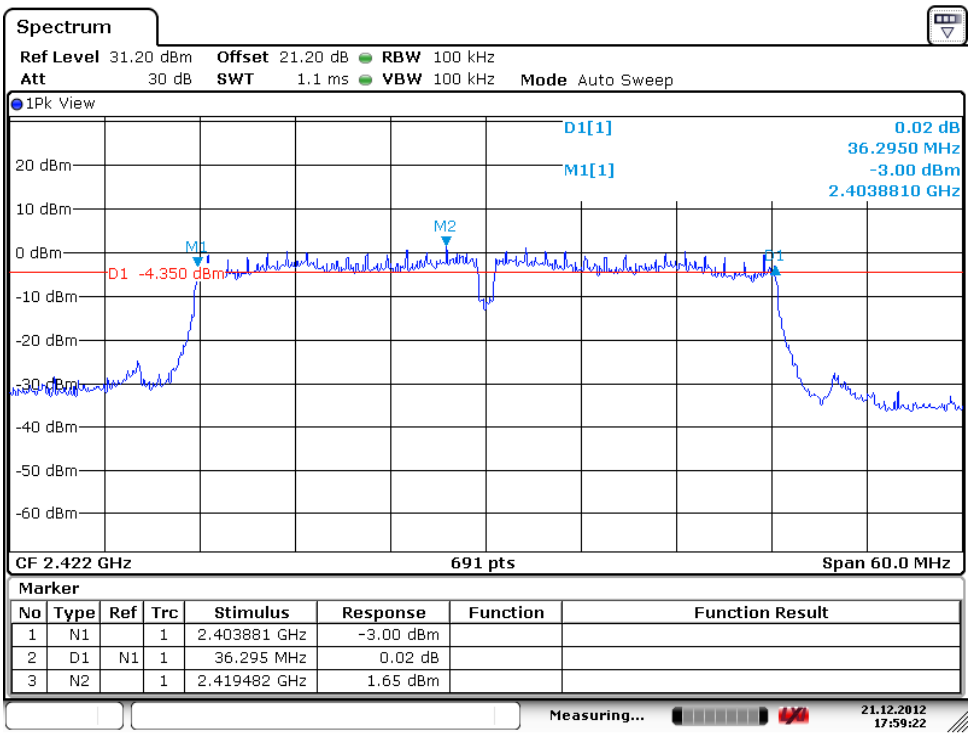
High Channel



Date: 21.DEC.2012 17:58:08

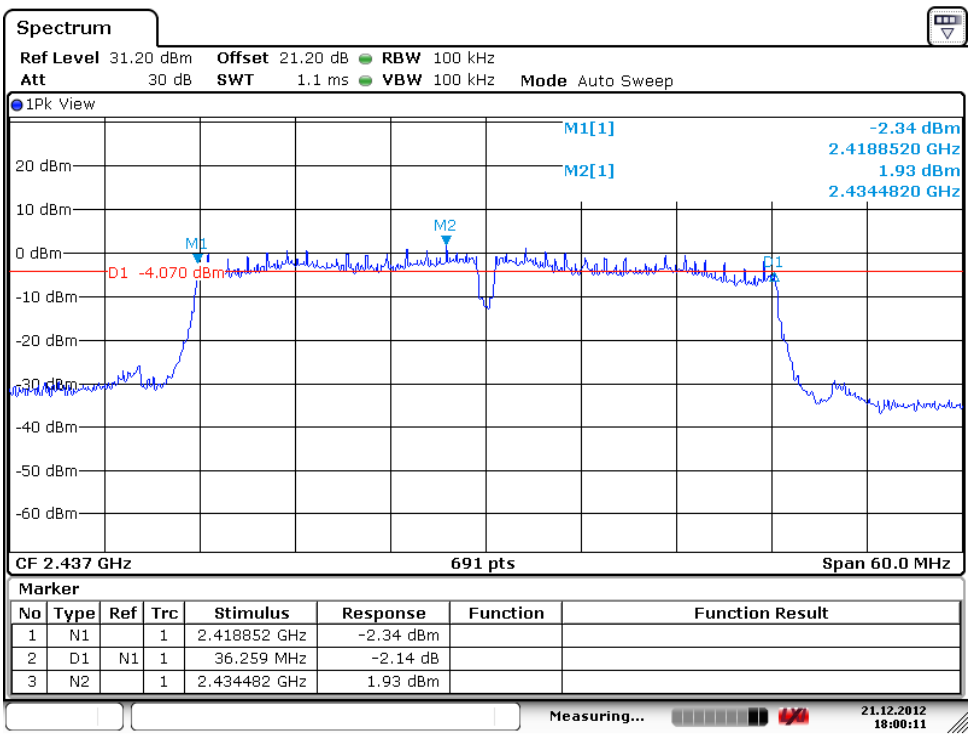
Test Plot of 6dB Bandwidth, 802.11n (40MHz)

Low Channel



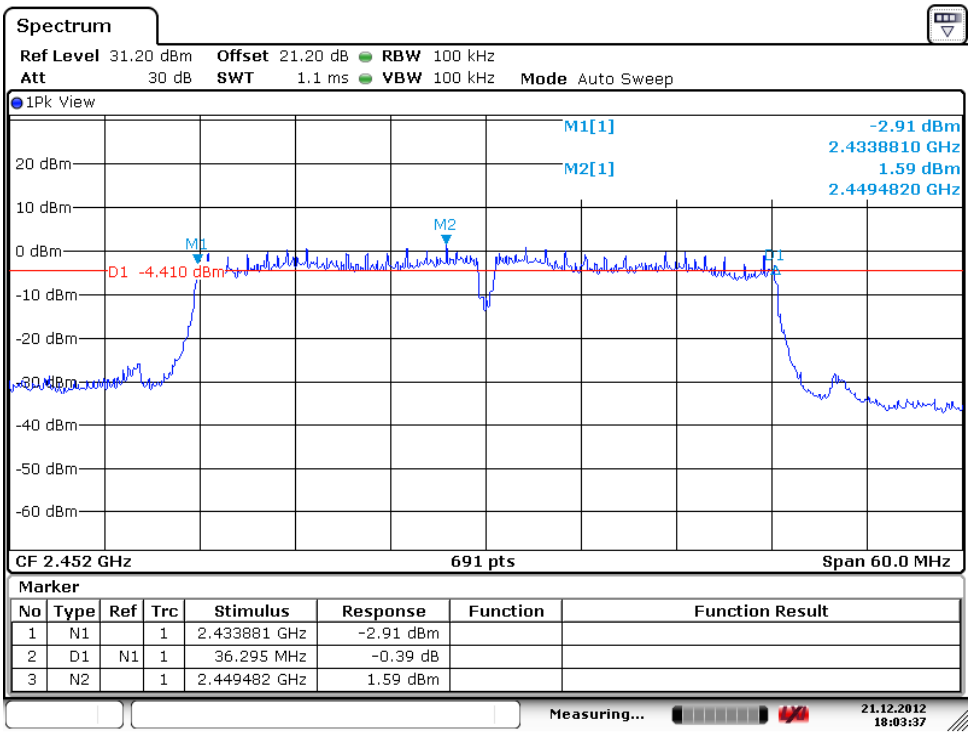
Date: 21.DEC.2012 17:59:23

Middle Channel



Date: 21.DEC.2012 18:00:12

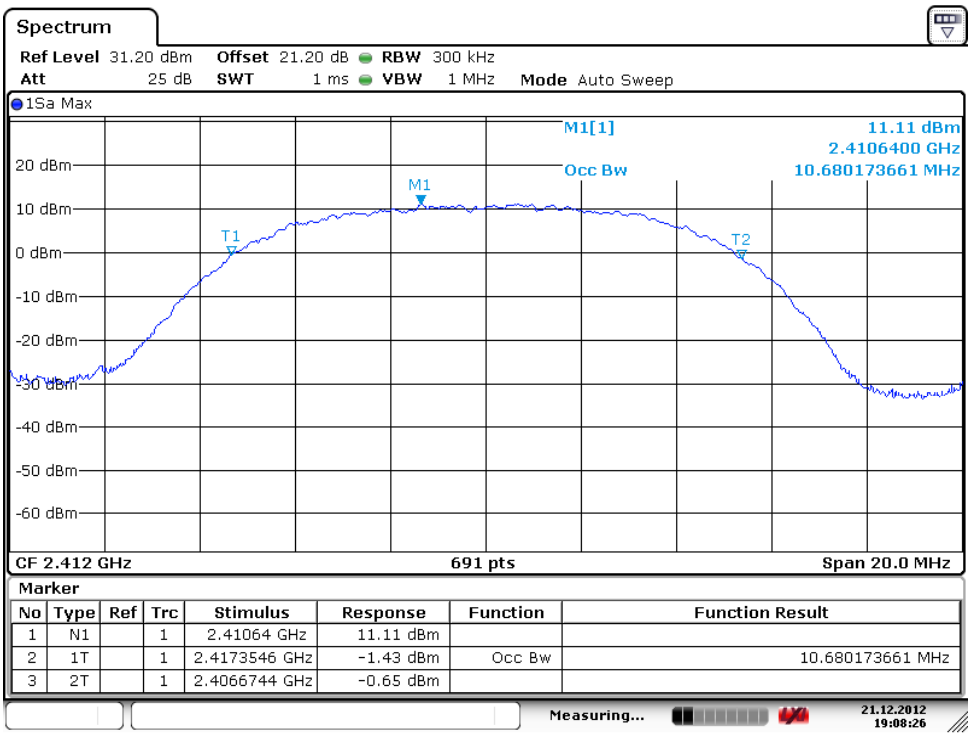
High Channel



Date: 21.DEC.2012 18:03:38

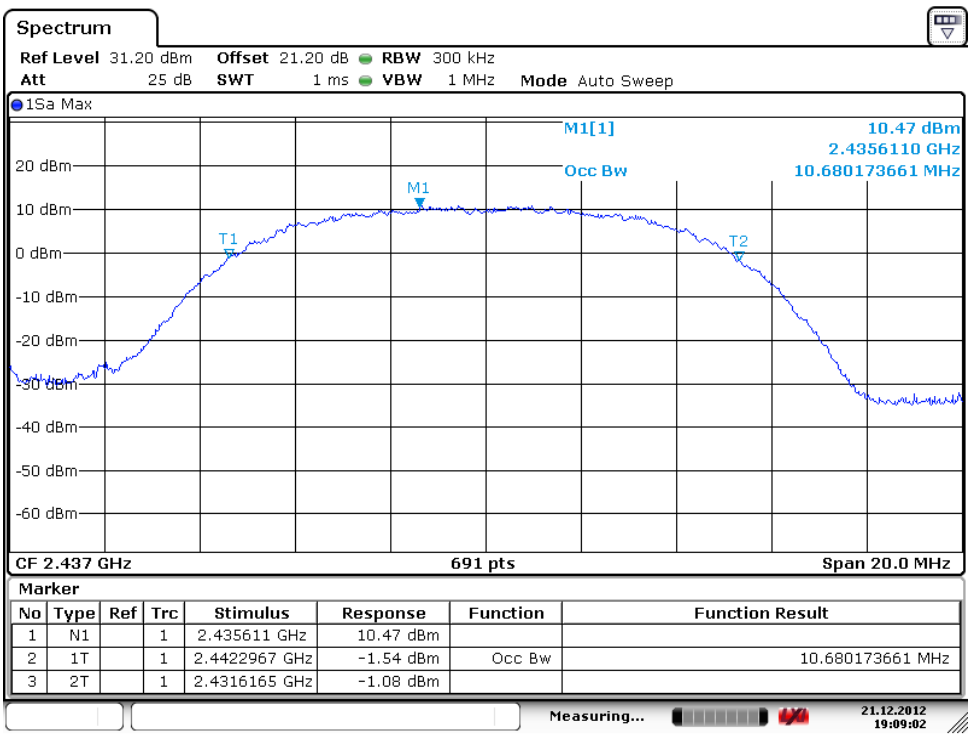
Test Plot of 99% Bandwidth, 802.11b

Low Channel



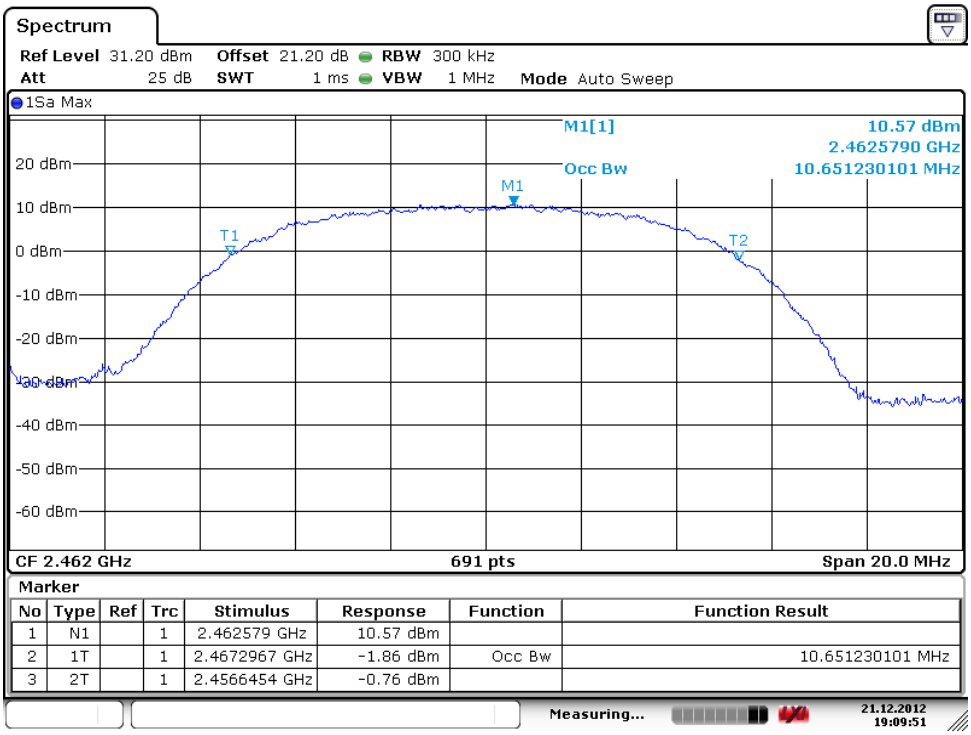
Date: 21.DEC.2012 19:08:27

Middle Channel



Date: 21.DEC.2012 19:09:03

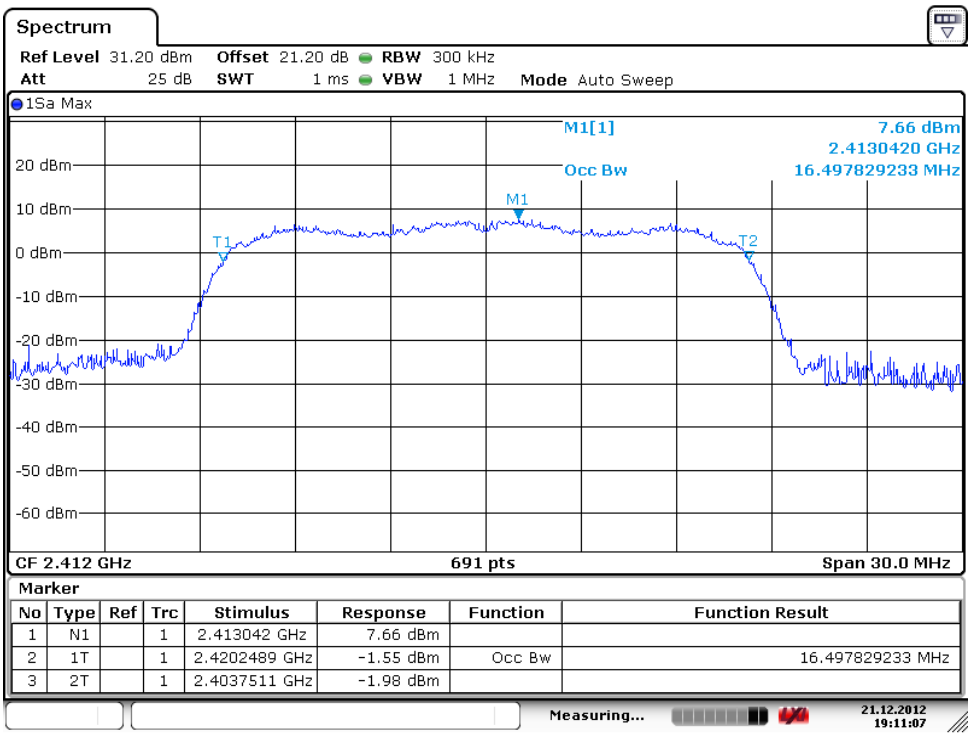
High Channel



Date: 21.DEC.2012 19:09:52

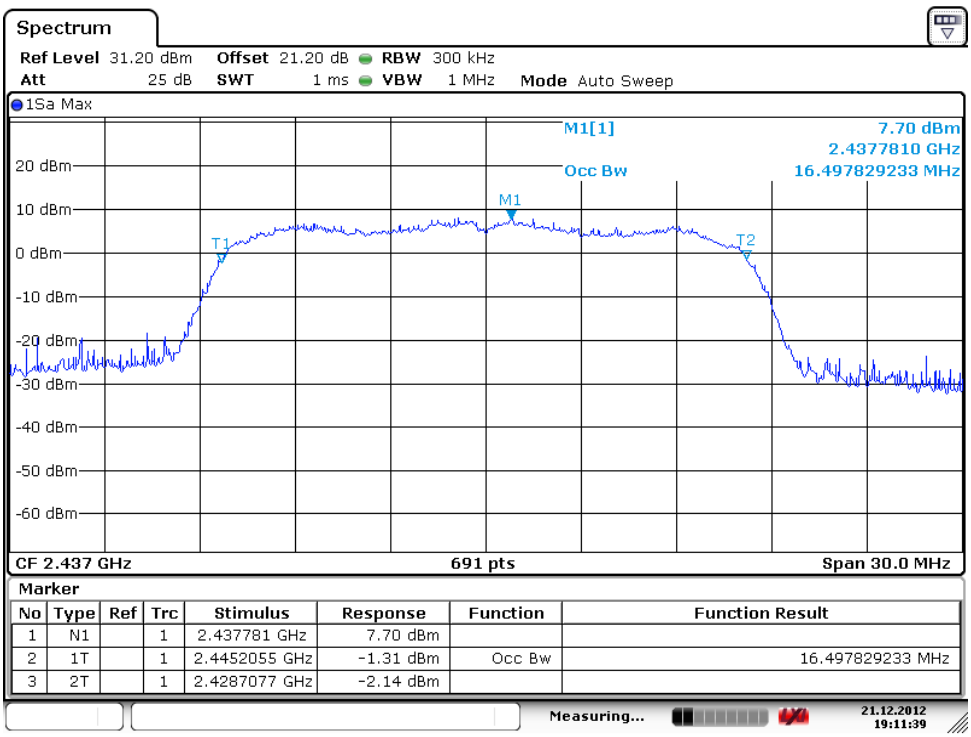
Test Plot of 99% Bandwidth, 802.11g

Low Channel



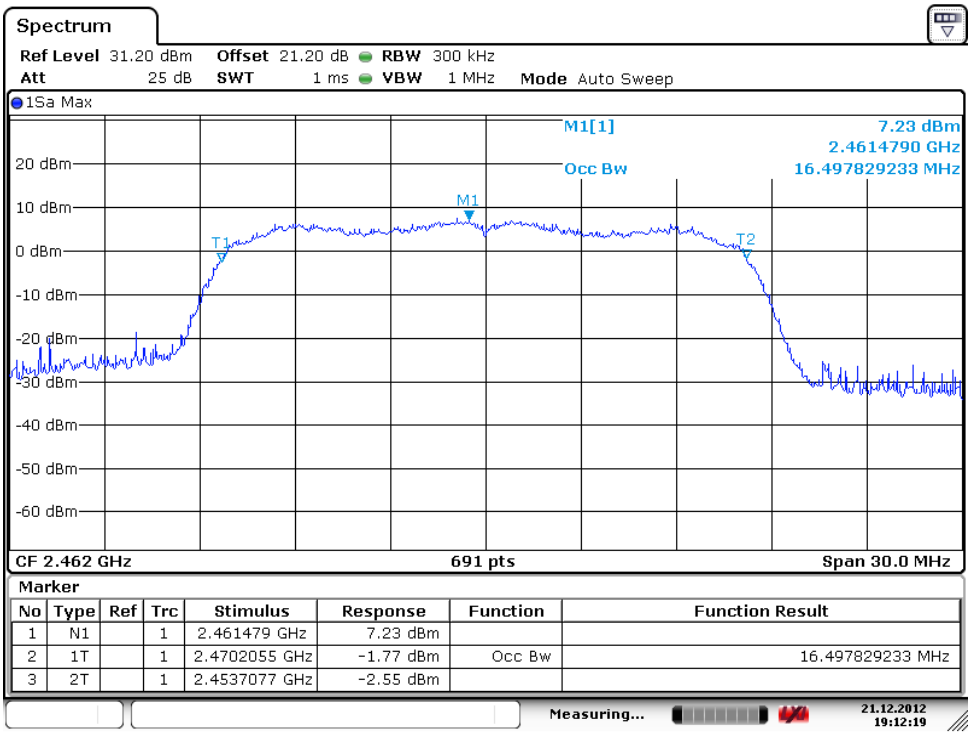
Date: 21.DEC.2012 19:11:08

Middle Channel



Date: 21.DEC.2012 19:11:40

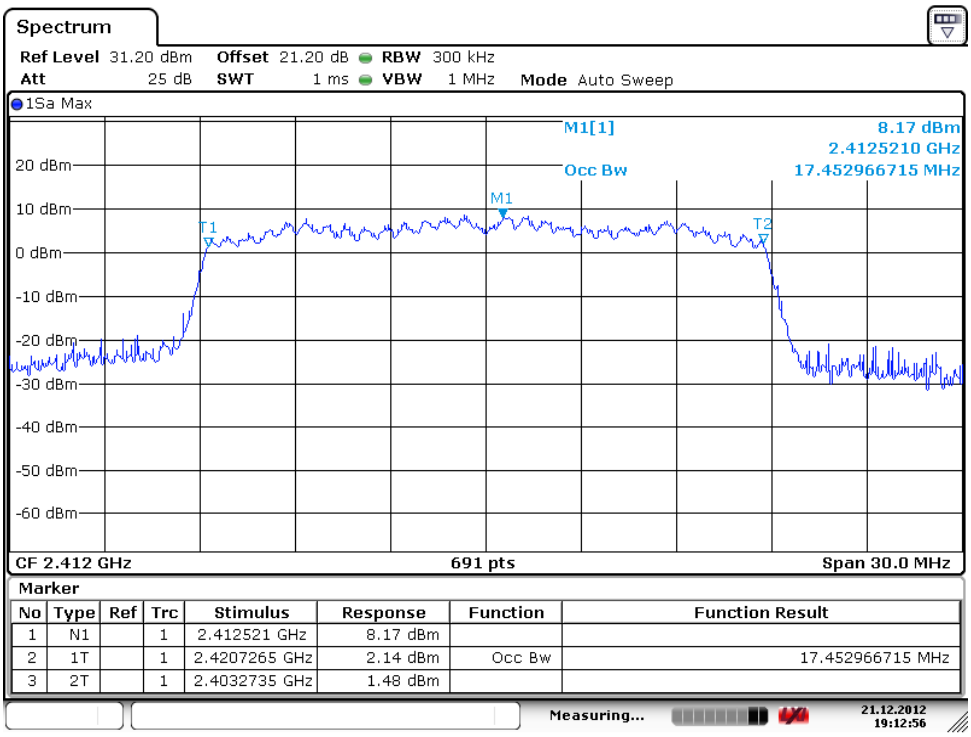
High Channel



Date: 21.DEC.2012 19:12:20

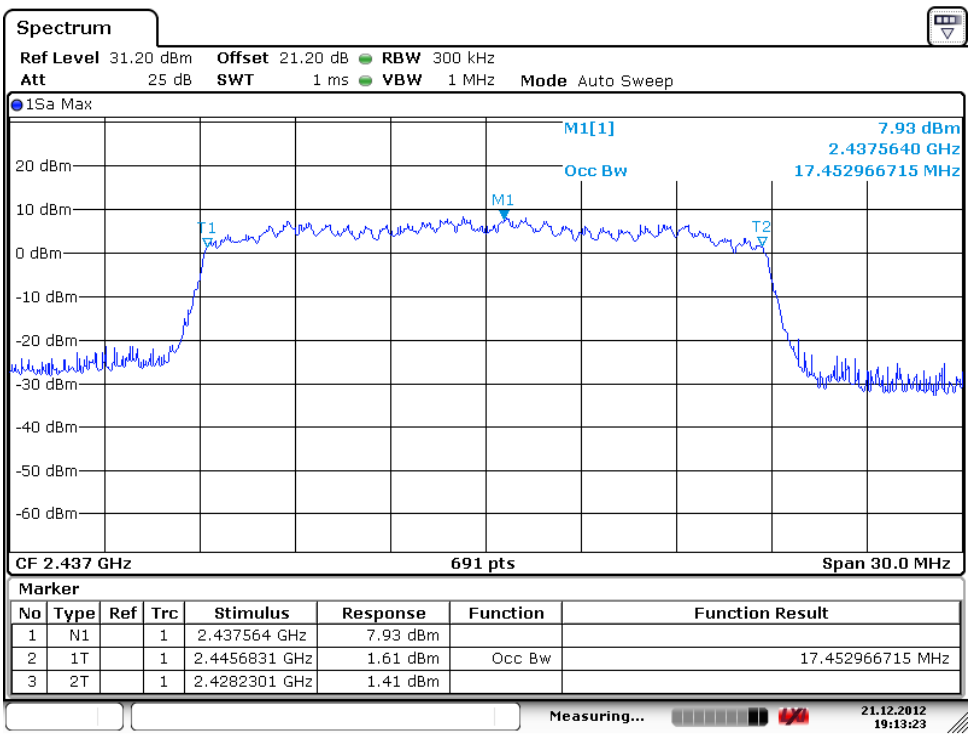
Test Plot of 99% Bandwidth, 802.11n (20MHz)

Low Channel



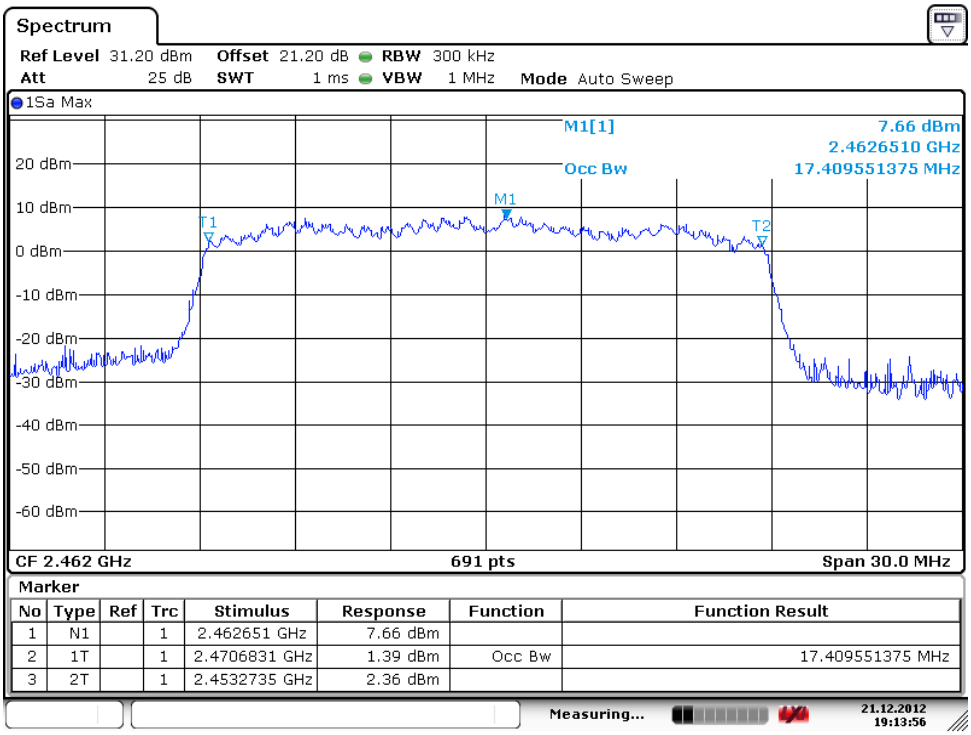
Date: 21.DEC.2012 19:12:57

Middle Channel



Date: 21.DEC.2012 19:13:24

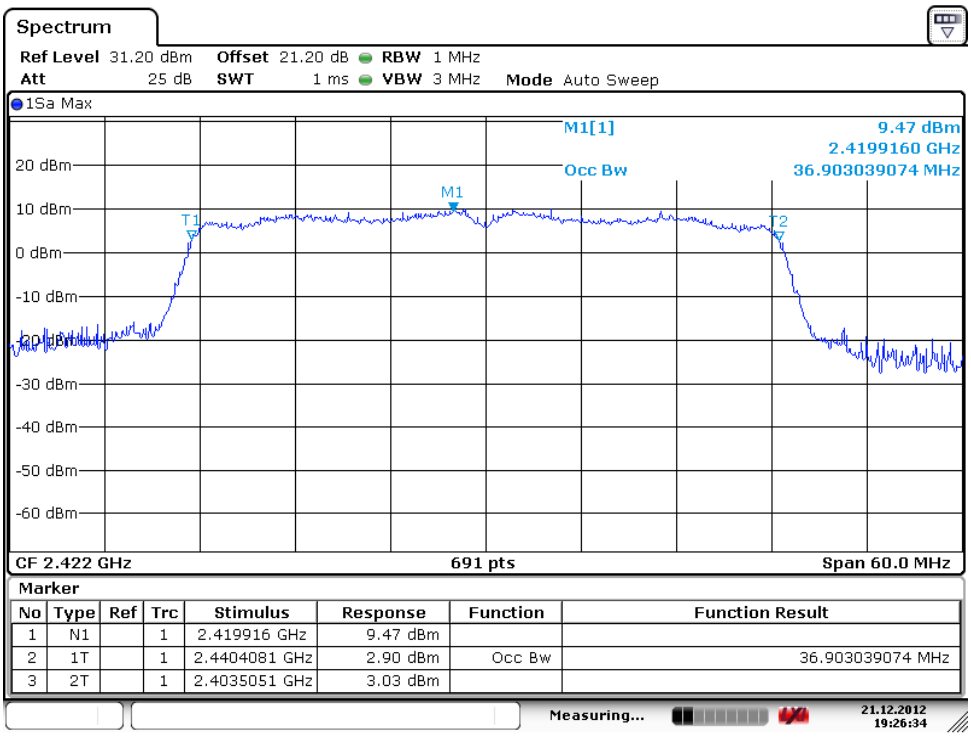
High Channel



Date: 21.DEC.2012 19:13:55

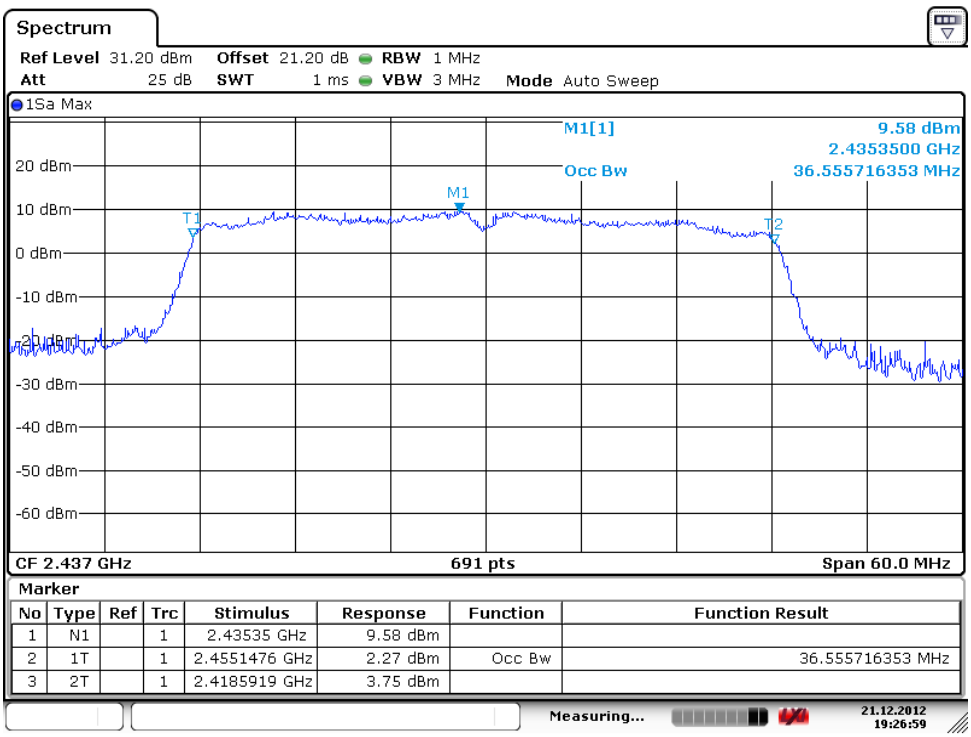
Test Plot of 99% Bandwidth, 802.11n (40MHz)

Low Channel



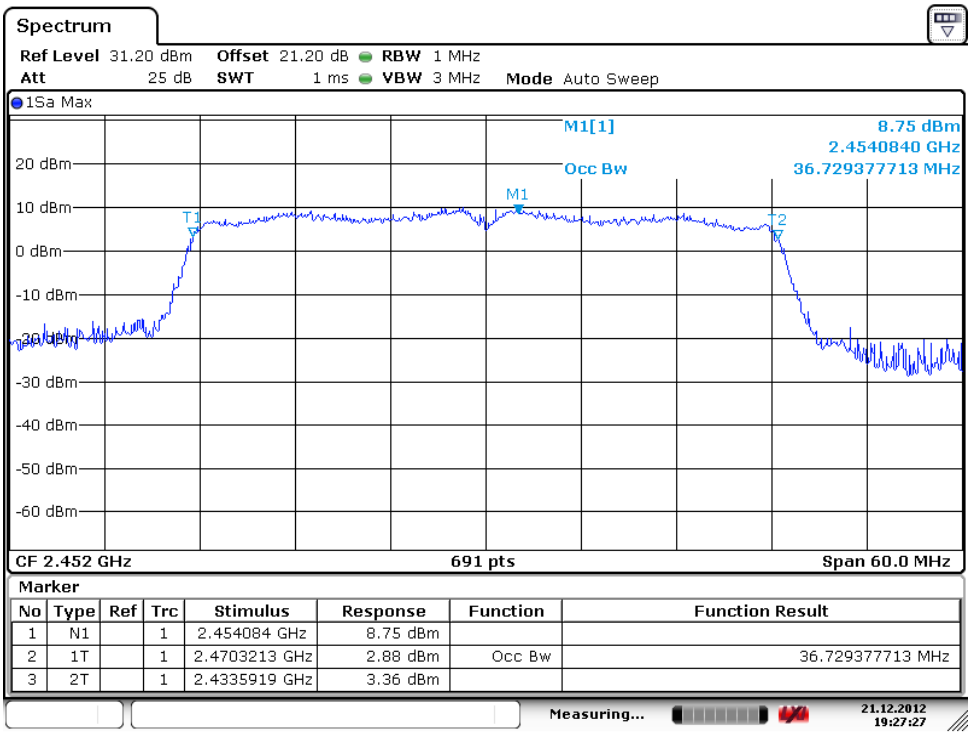
Date: 21.DEC.2012 19:26:34

Middle Channel



Date: 21.DEC.2012 19:27:00

High Channel



Date: 21.DEC.2012 19:27:27

5.1.2.4 Power Density

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC Part 15.247(e) , A8.2(2)
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

For the 802.11n modes, the EUT can be operated in 2x2 MIMO mode. Therefore, for those modes, in the tables below the limits are reduced by 3 dB.

Table 34: Test result of Power Density, 802.11b

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2412	-7.09	8	Pass
Mid Channel	2437	-6.99	8	Pass
High Channel	2462	-5.32	8	Pass

Table 35: Test result of Power Density, 802.11g

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2412	-9.21	8	Pass
Mid Channel	2437	-9.63	8	Pass
High Channel	2462	-8.22	8	Pass

Table 36: Test result of Power Density, 802.11n (20MHz)

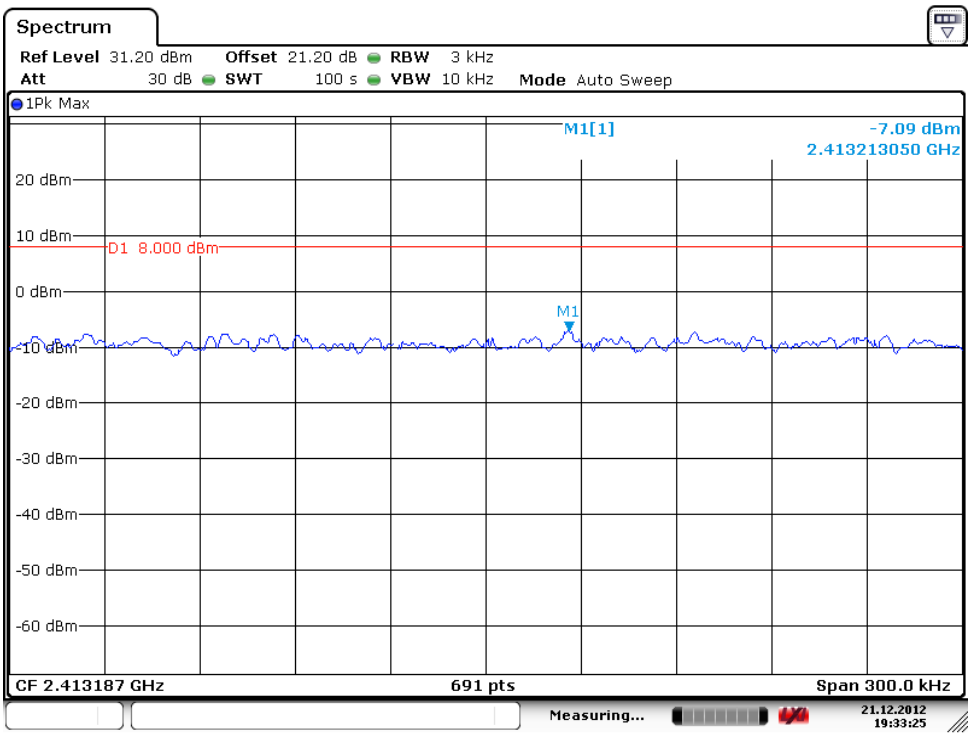
Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2412	-6.85	8-3	Pass
Mid Channel	2437	-8.02	8-3	Pass
High Channel	2462	-8.91	8-3	Pass

Table 37: Test result of Power Density, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2412	-12.91	8-3	Pass
Mid Channel	2437	-12.84	8-3	Pass
High Channel	2462	-13.14	8-3	Pass

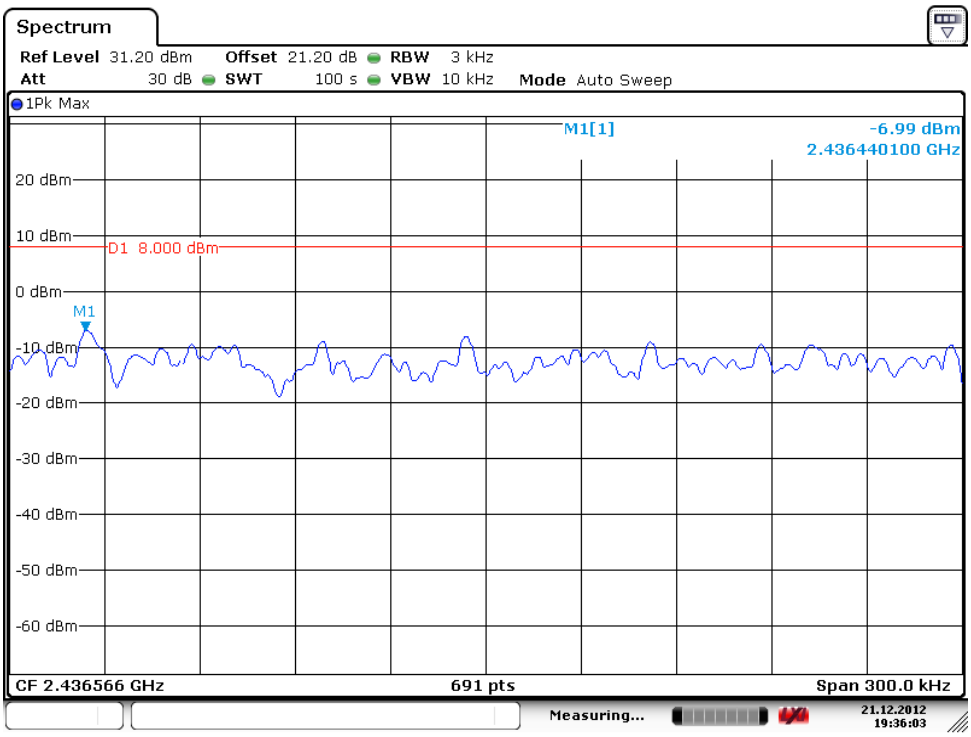
Test Plot of Power Density, 802.11b

Low Channel



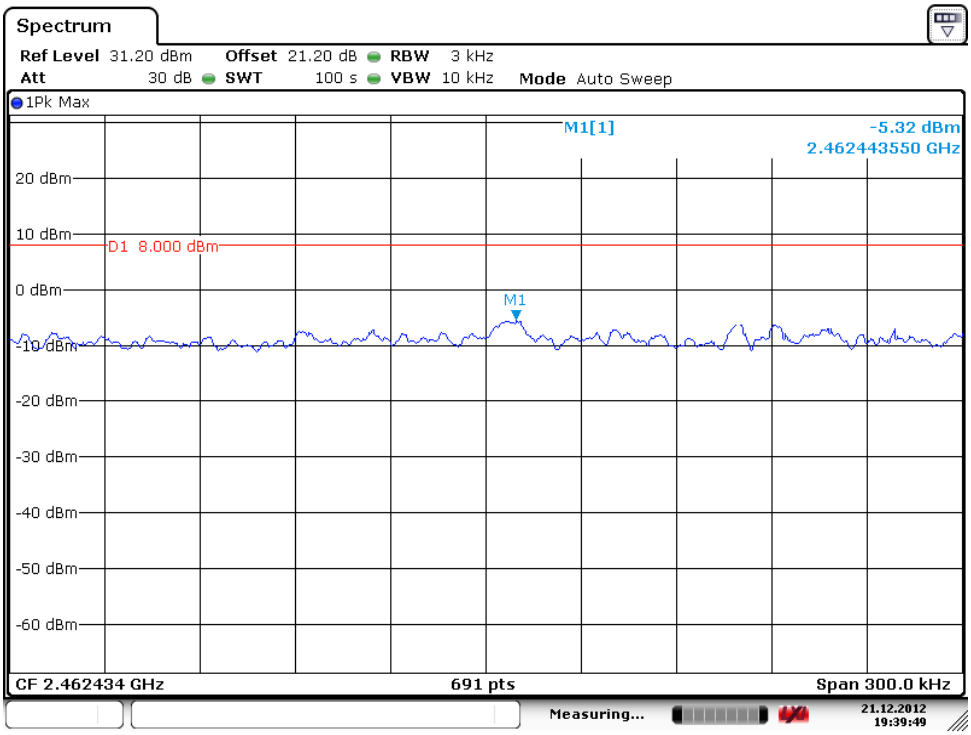
Date: 21.DEC.2012 19:33:25

Middle Channel



Date: 21.DEC.2012 19:36:04

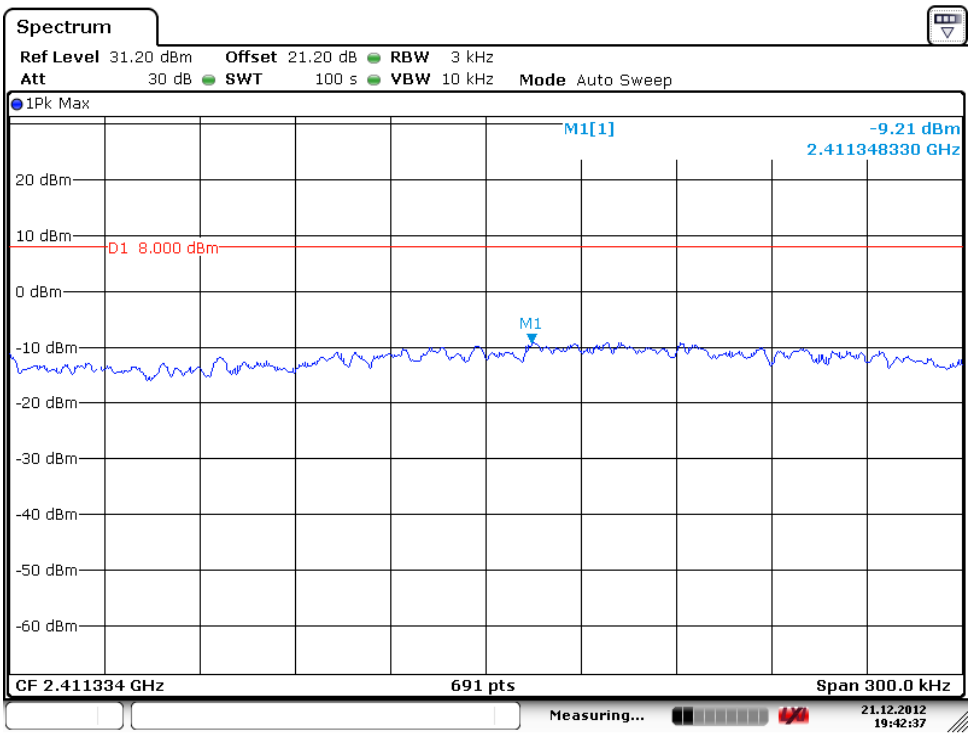
High Channel



Date: 21.DEC.2012 19:39:49

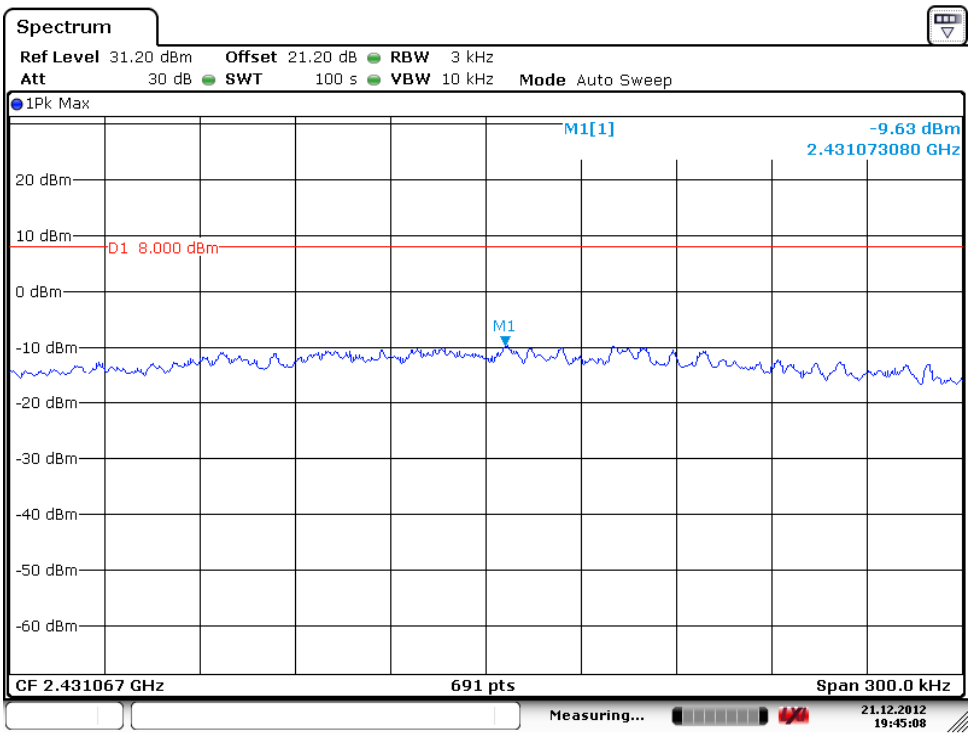
Test Plot of Power Density, 802.11g

Low Channel



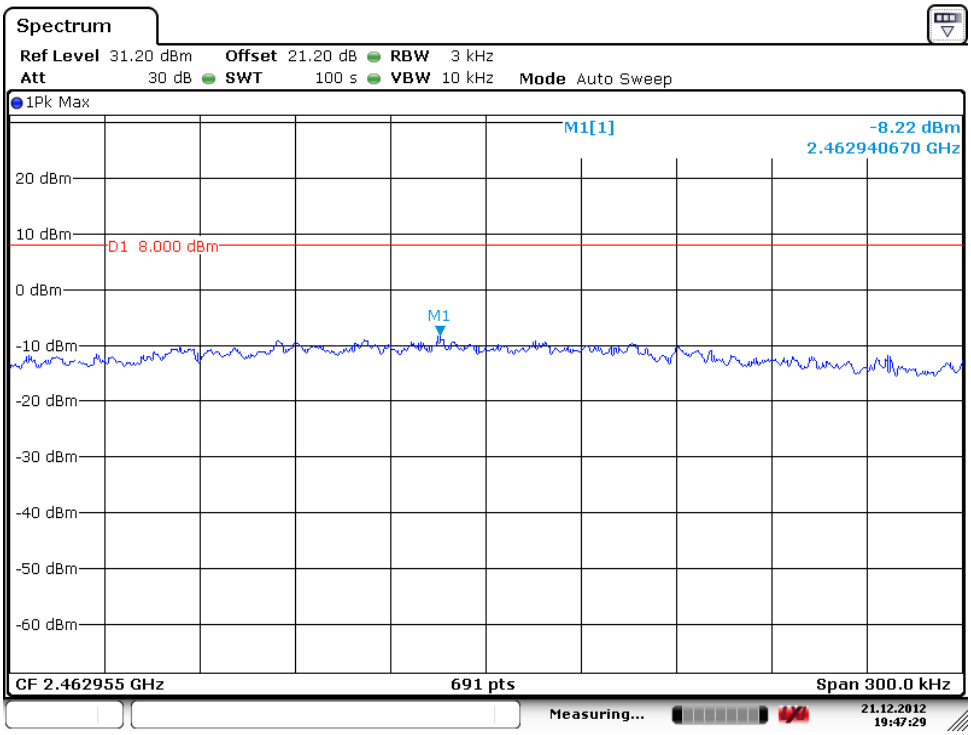
Date: 21.DEC.2012 19:42:36

Middle Channel



Date: 21.DEC.2012 19:45:07

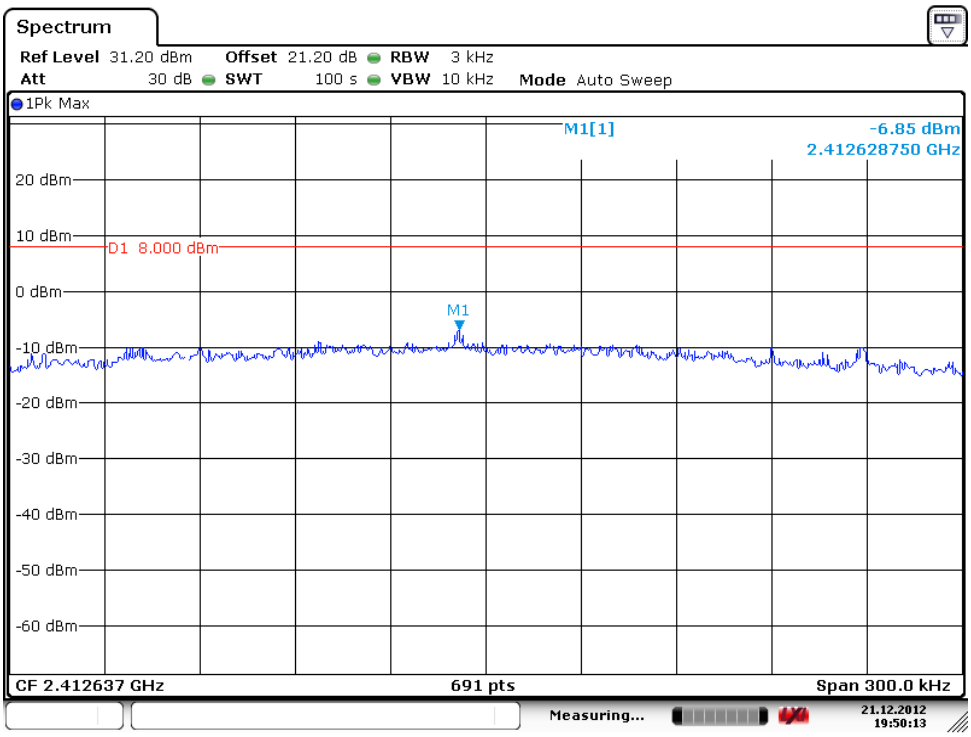
High Channel



Date: 21.DEC.2012 19:47:30

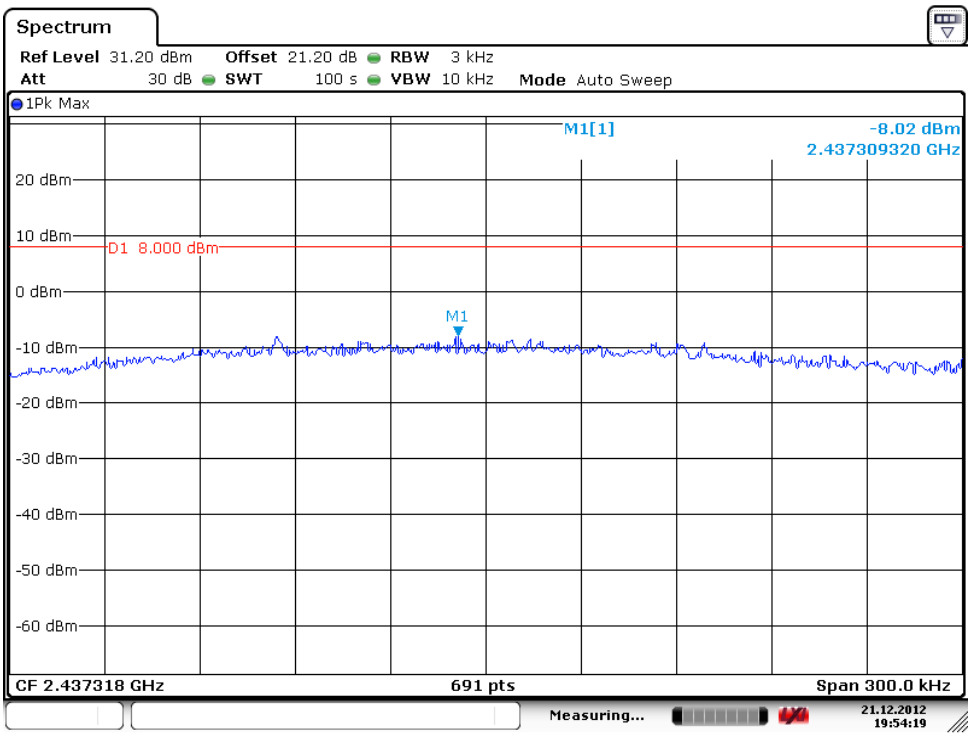
Test Plot of Power Density, 802.11n (20MHz)

Low Channel



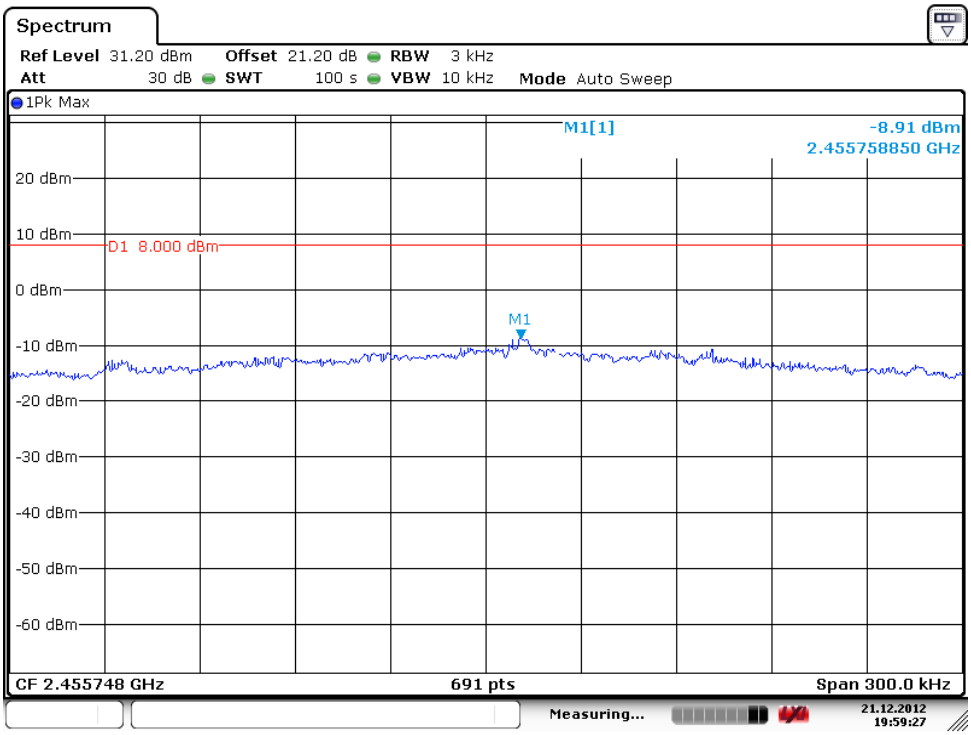
Date: 21.DEC.2012 19:50:13

Middle Channel



Date: 21.DEC.2012 19:54:20

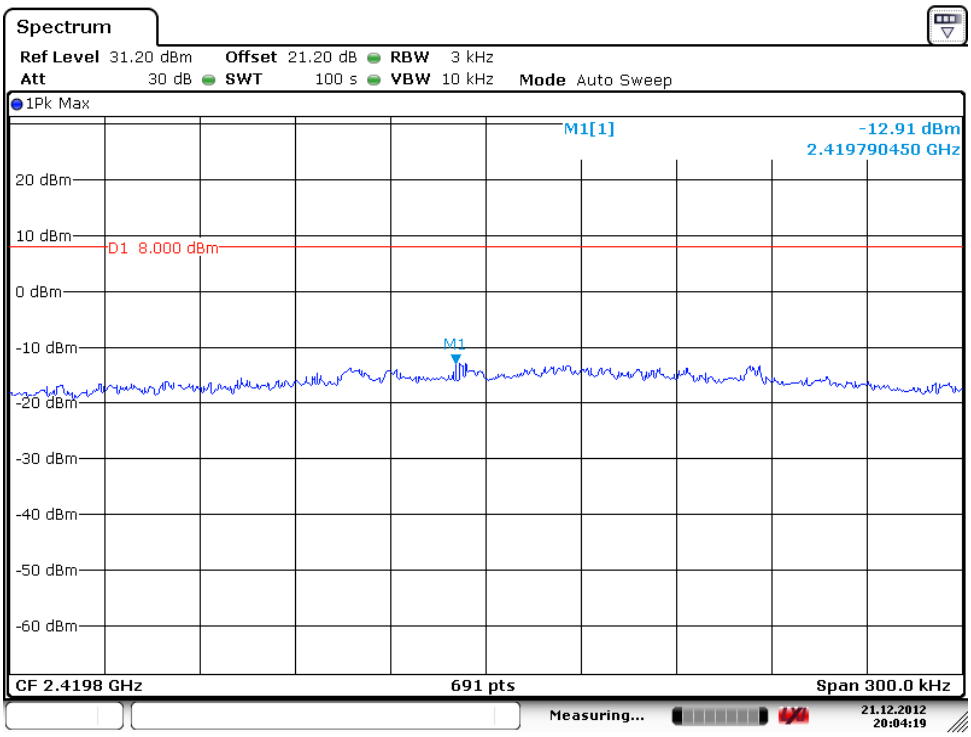
High Channel



Date: 21.DEC.2012 19:59:27

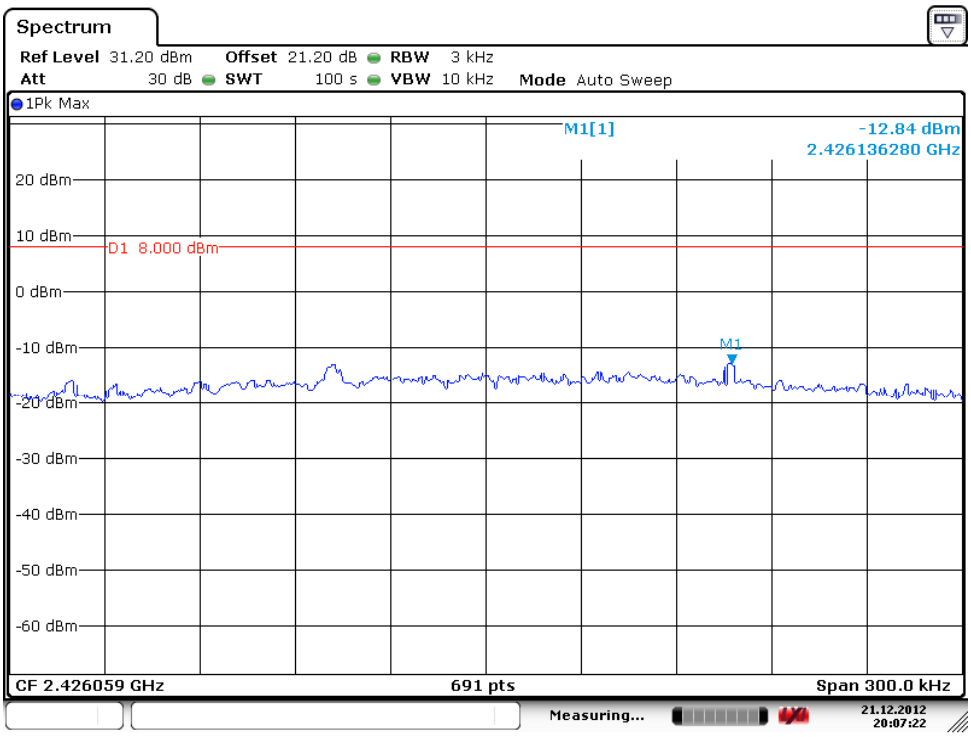
Test Plot of Power Density, 802.11n (40MHz)

Low Channel



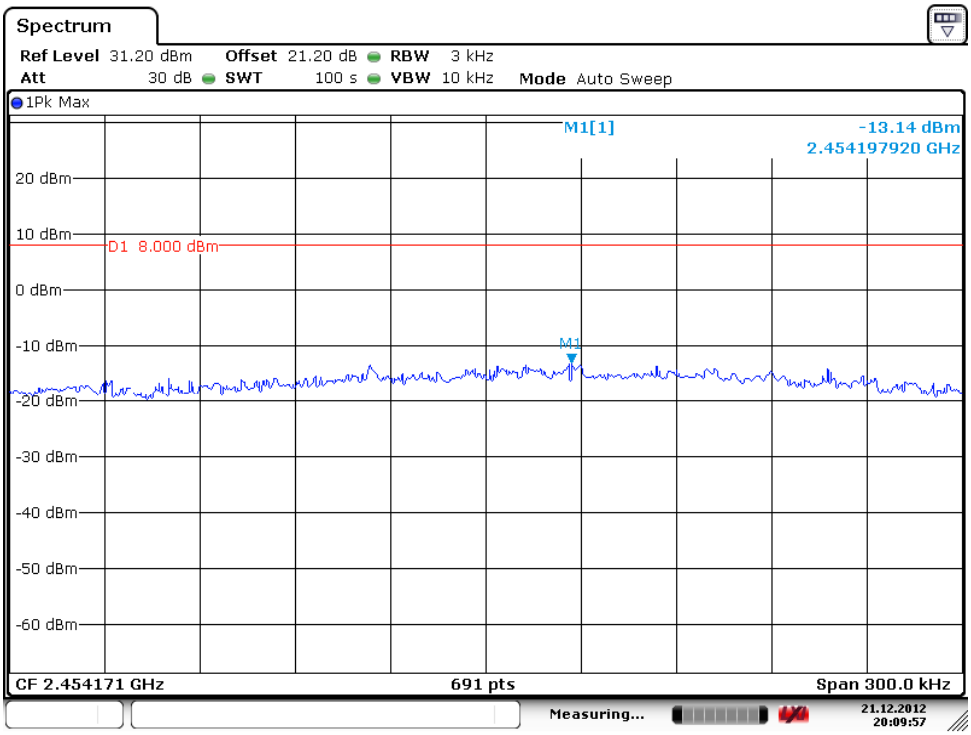
Date: 21.DEC.2012 20:04:20

Middle Channel



Date: 21.DEC.2012 20:07:23

High Channel



Date: 21.DEC.2012 20:09:56

5.1.2.5 Conducted spurious emissions measured in 100kHz Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC part 15.247(d), RSS-210 A8.5
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded room

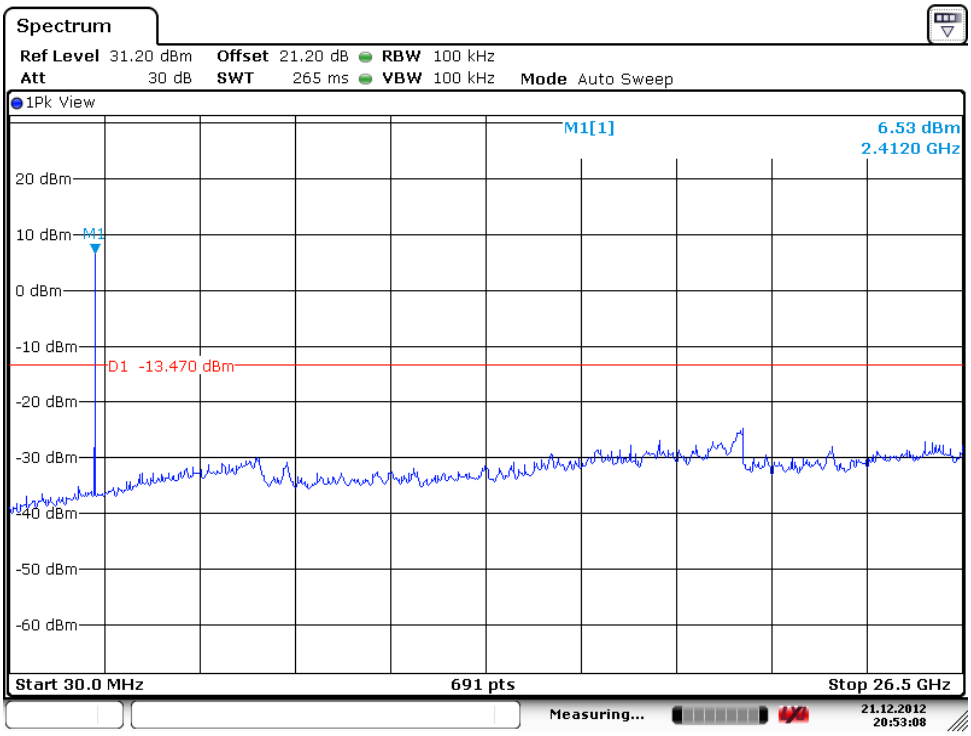
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

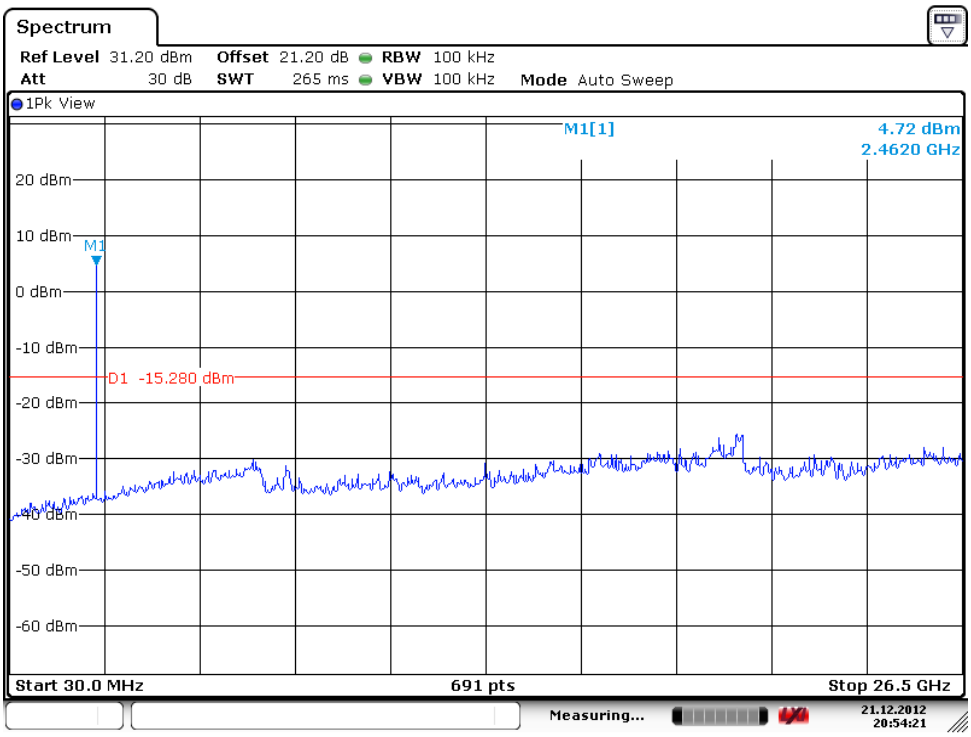
Test Plot of 100kHz Conducted Emissions, 802.11b

Low Channel



Date: 21.DEC.2012 20:53:09

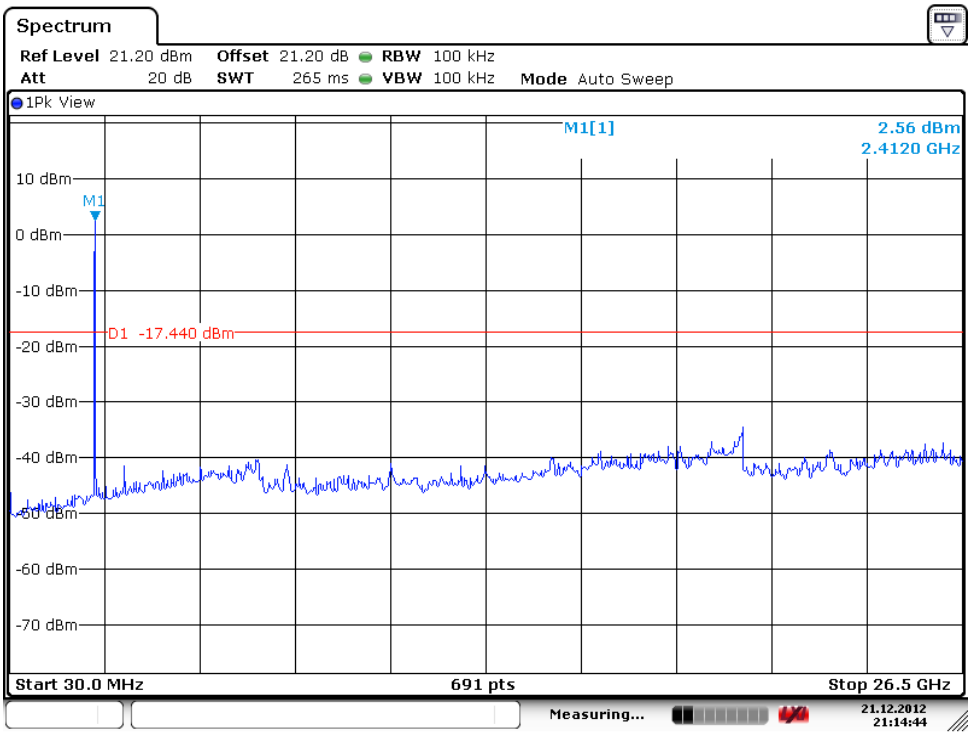
High Channel



Date: 21.DEC.2012 20:54:21

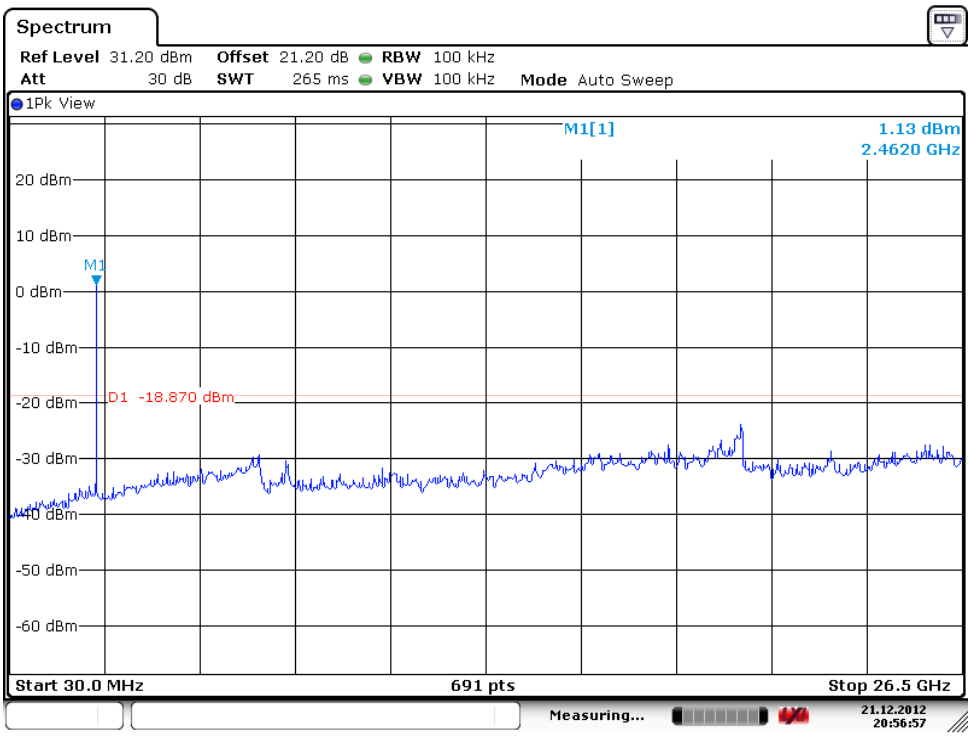
Test Plot of 100kHz Conducted Emissions, 802.11g

Low Channel



Date: 21.DEC.2012 21:14:43

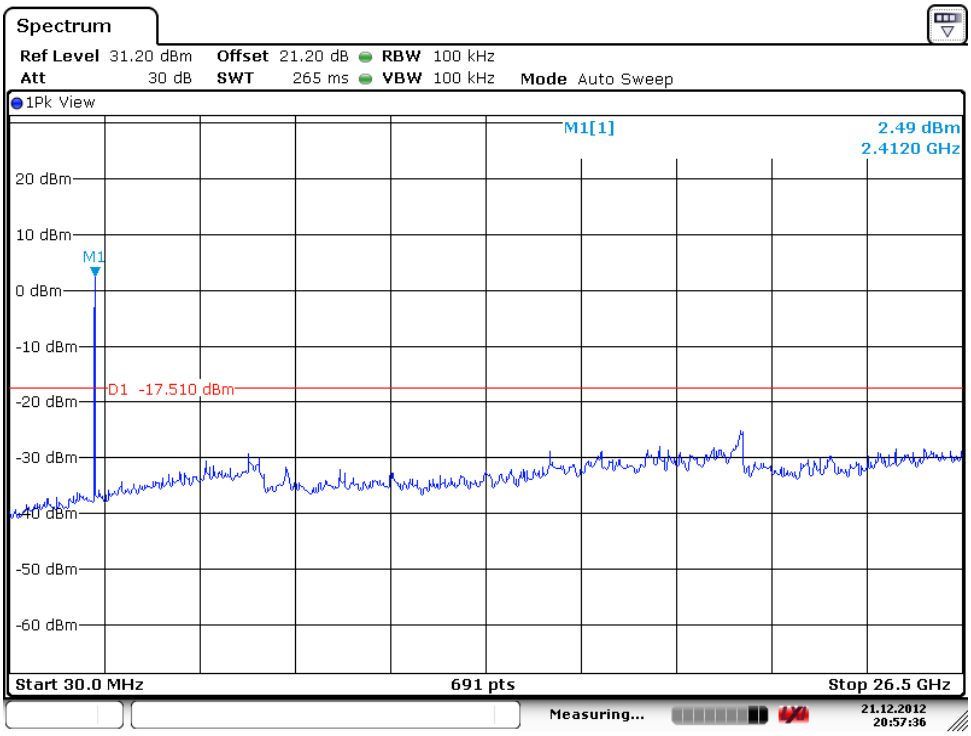
High Channel



Date: 21.DEC.2012 20:56:58

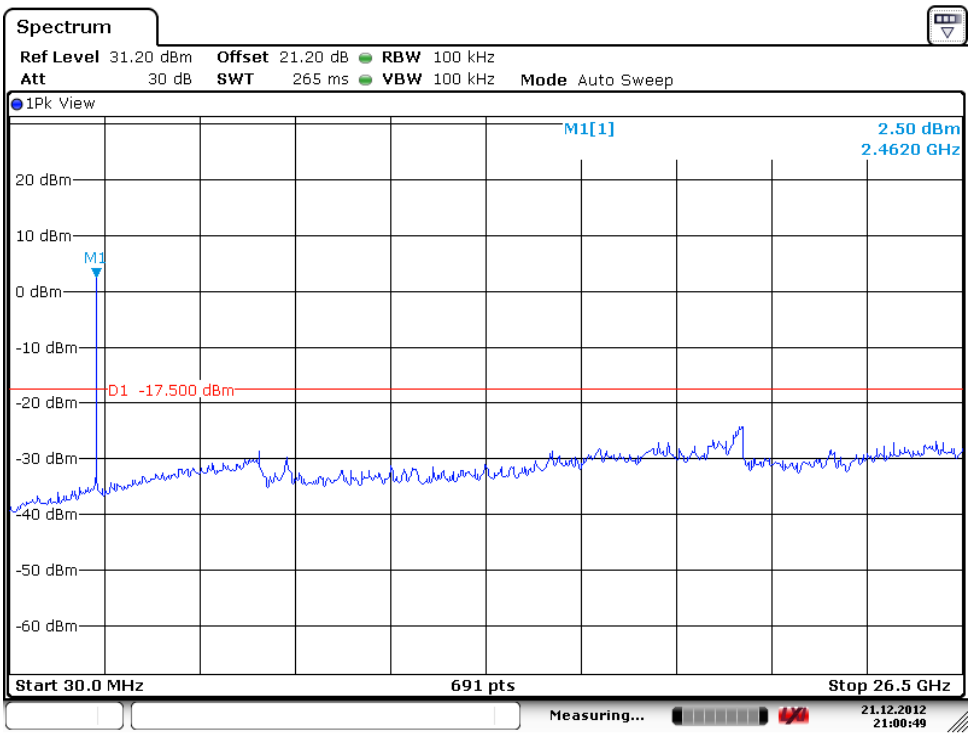
Test Plot of 100kHz Conducted Emissions, 802.11n (20MHz)

Low Channel



Date: 21.DEC.2012 20:57:37

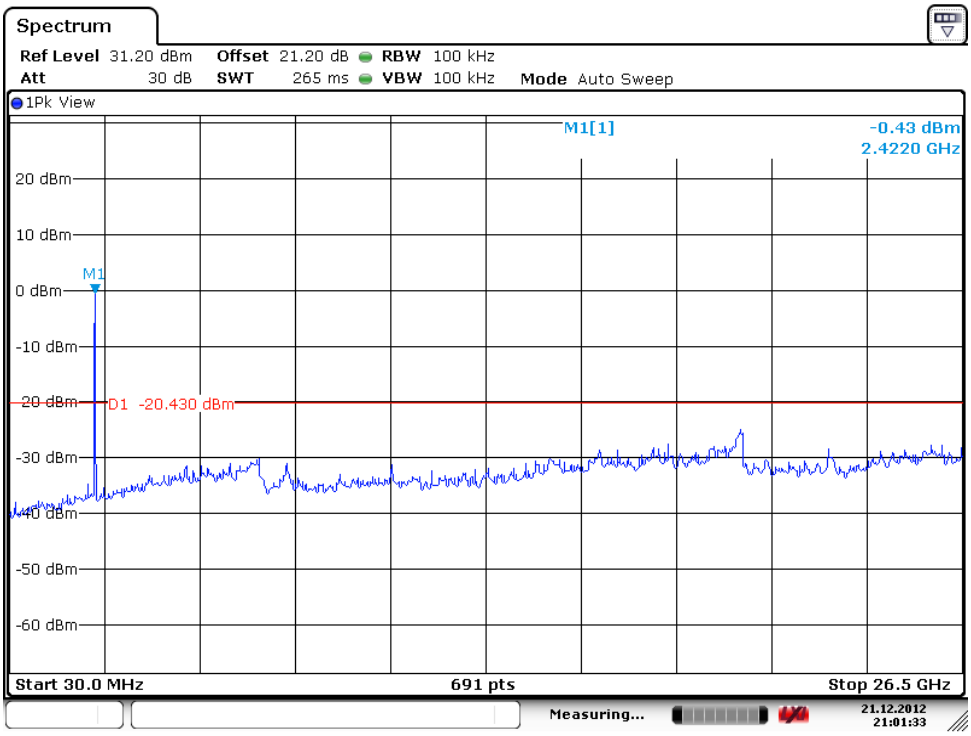
High Channel



Date: 21.DEC.2012 21:00:49

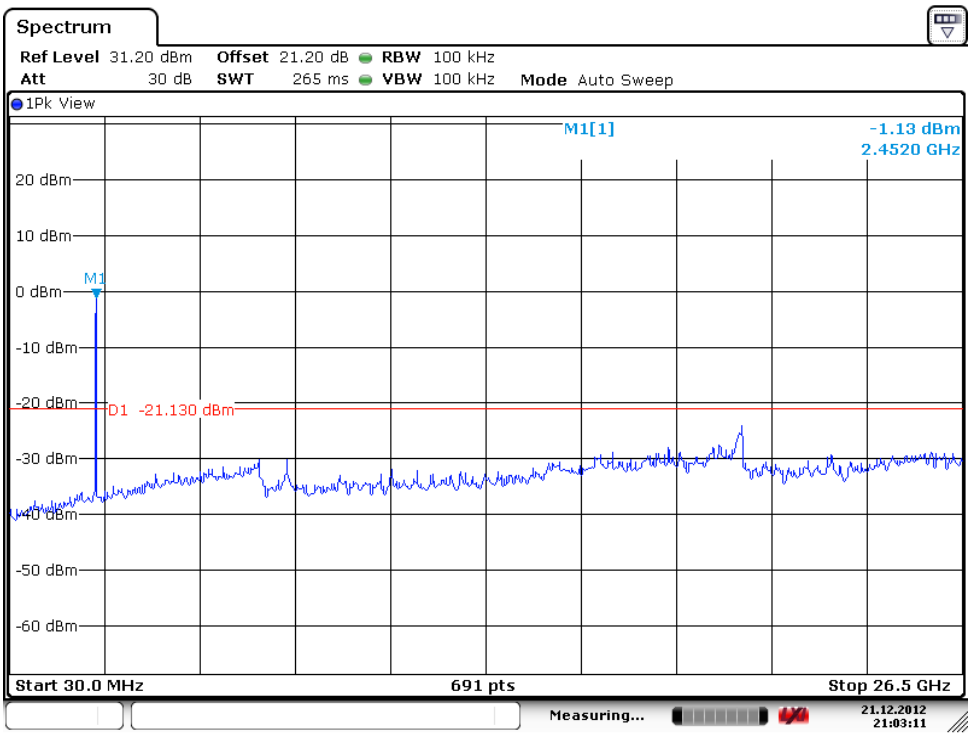
Test Plot of 100kHz Conducted Emissions, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 21:01:34

High Channel



Date: 21.DEC.2012 21:03:11

5.1.3 Antenna Ports Aggregation (TX0+TX1)

5.1.3.1 Power Density

RESULT: **Passed**

Date of testing	:	2012-12-22
Test standard	:	FCC Part 15.247(e) , A8.2(2)
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

For the 802.11n modes, the EUT can be operated in 2x2 MIMO mode. Therefore, for those modes, in the tables below the limits are reduced by 3 dB.

Table 38: Test result of Power Density, 802.11n (20MHz)

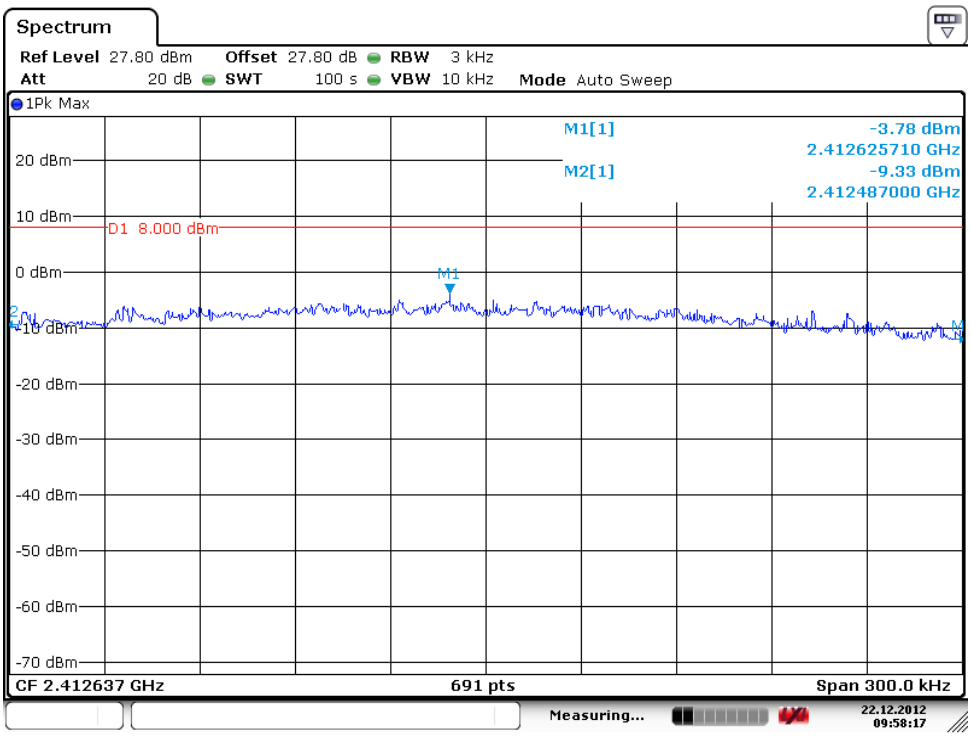
Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2412	-3.78	8-3	Pass
Mid Channel	2437	-3.59	8-3	Pass
High Channel	2462	-4.97	8-3	Pass

Table 39: Test result of Power Density, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2412	-8.23	8-3	Pass
Mid Channel	2437	-10.38	8-3	Pass
High Channel	2462	-8.44	8-3	Pass

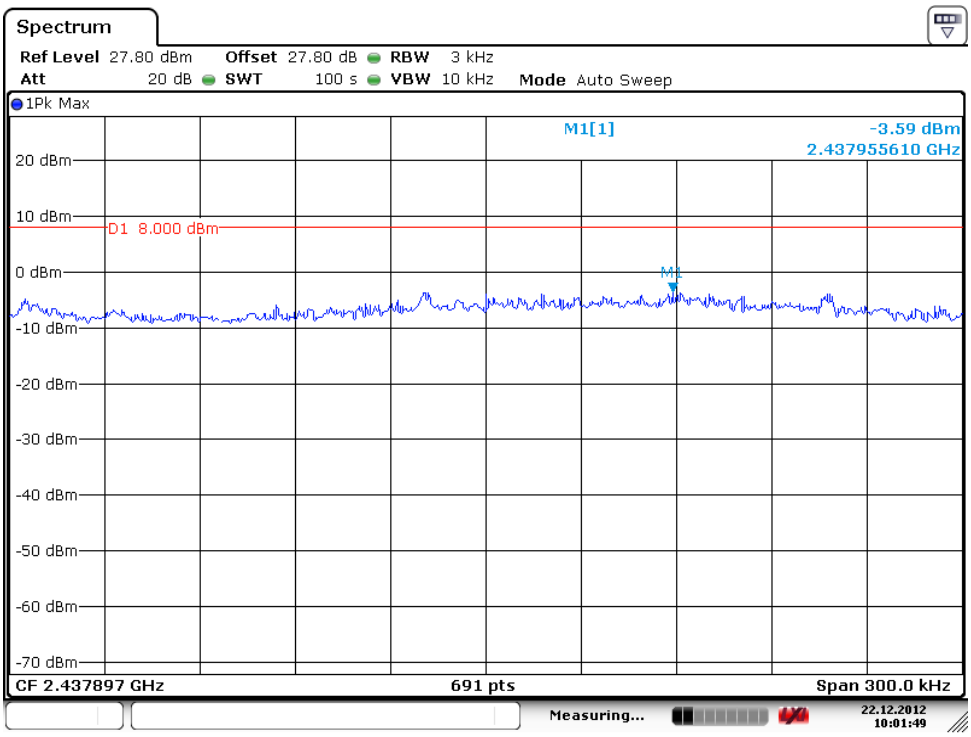
Test Plot of Power Density, 802.11n (20MHz)

Low Channel



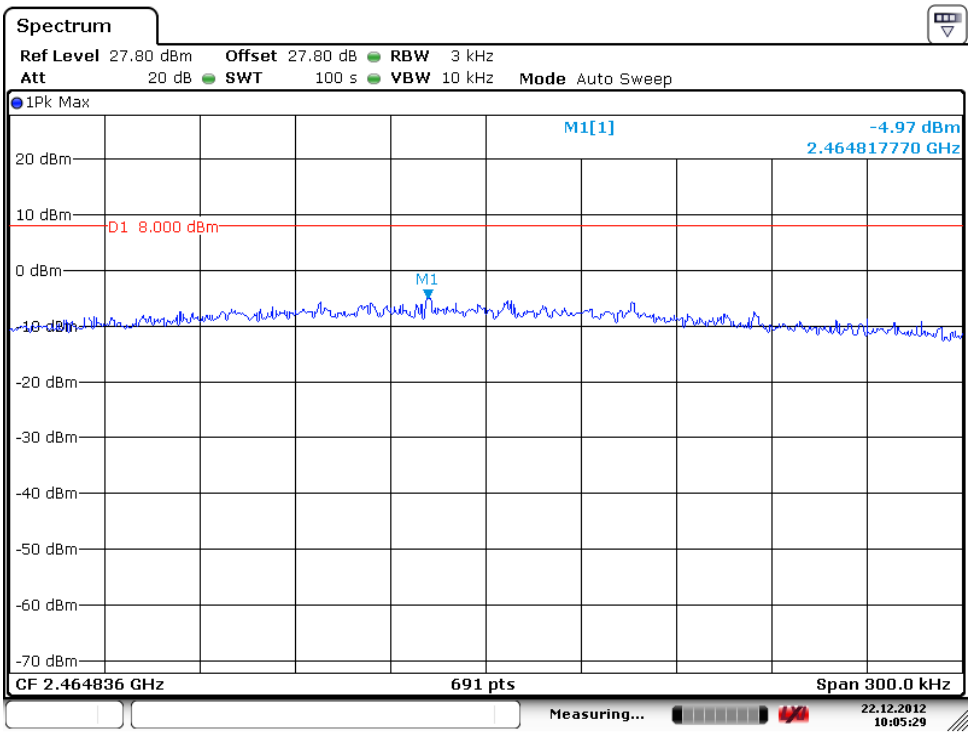
Date: 22.DEC.2012 09:58:17

Middle Channel



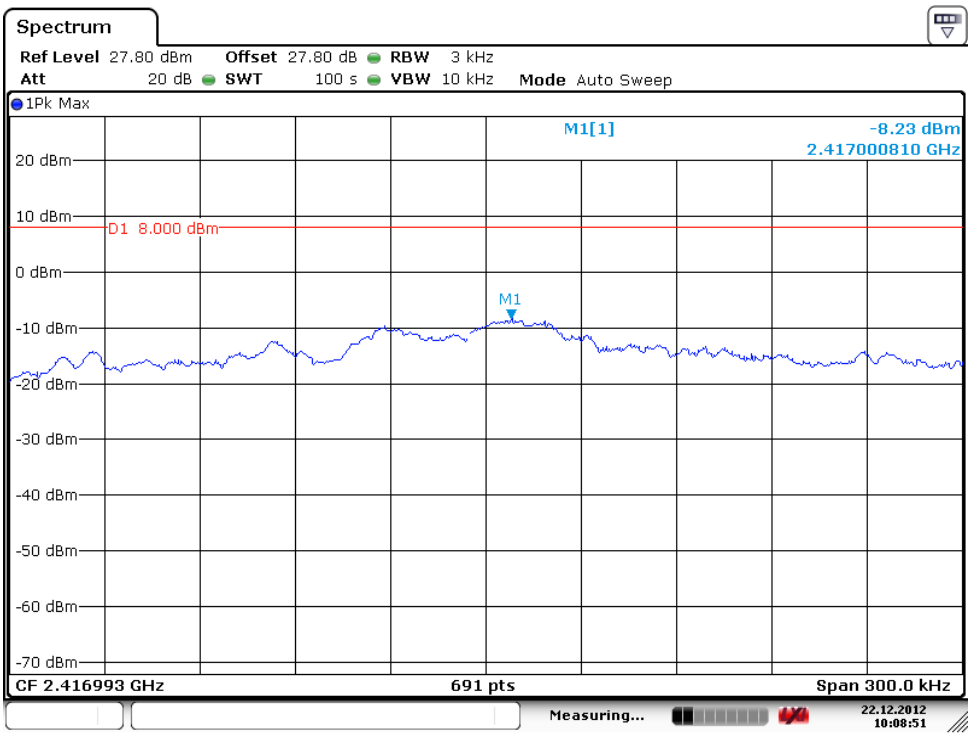
Date: 22.DEC.2012 10:01:50

High Channel



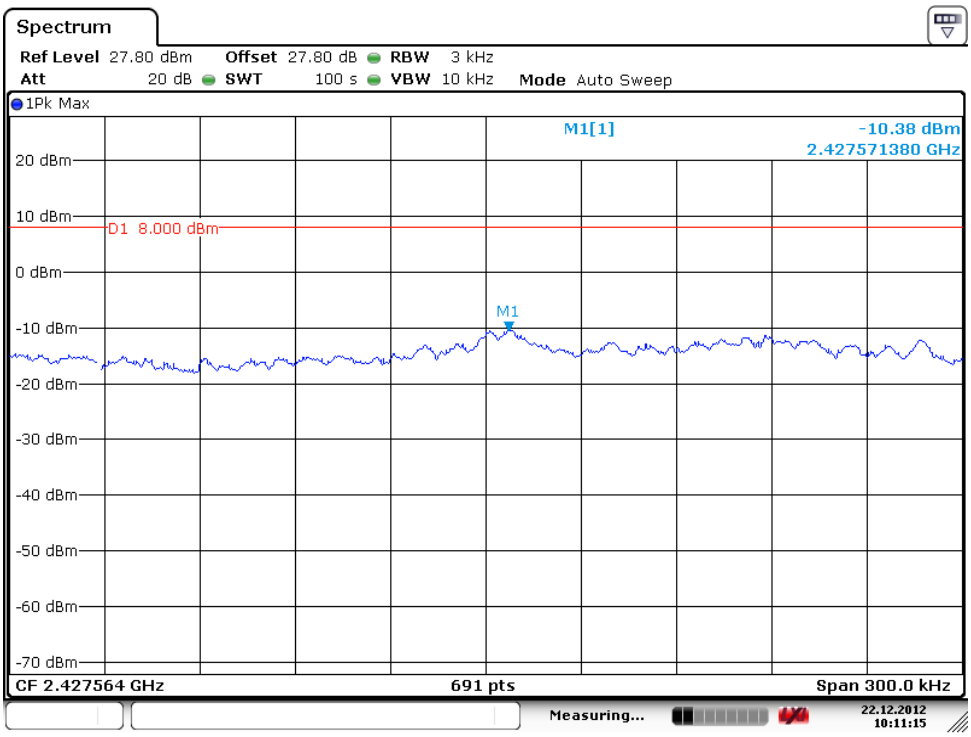
Test Plot of Power Density, 802.11n (40MHz)

Low Channel



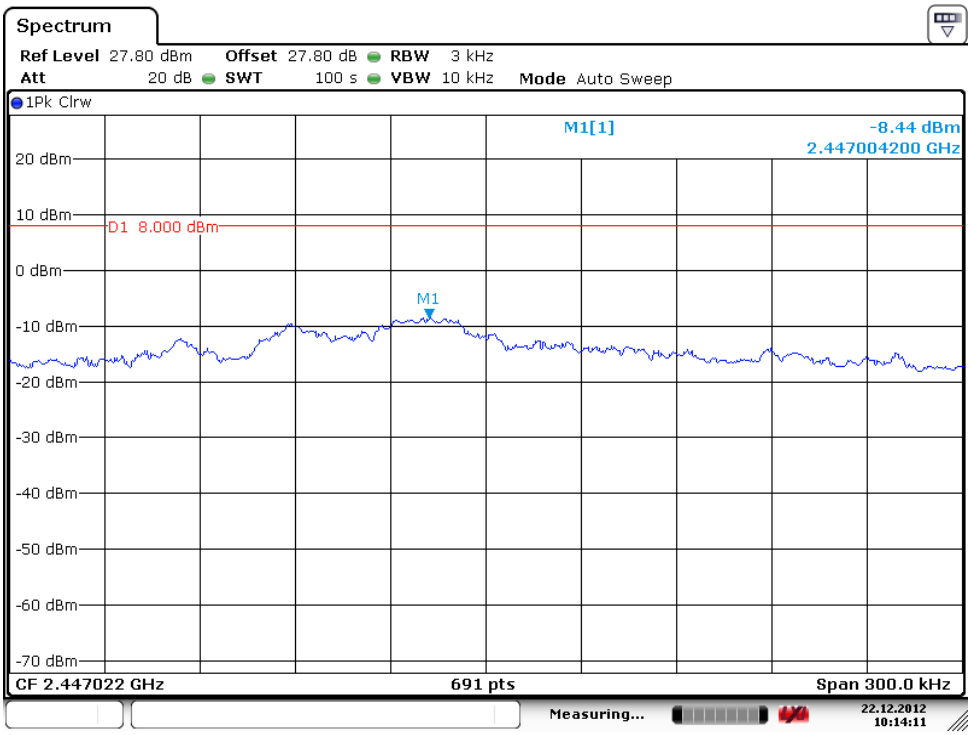
Date: 22.DEC.2012 10:08:52

Middle Channel



Date: 22.DEC.2012 10:11:16

High Channel



Date: 22.DEC.2012 10:14:12

5.1.3.2 Conducted spurious emissions measured in 100kHz Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-22
Test standard	:	FCC part 15.247(d), RSS-210 A8.5
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded room

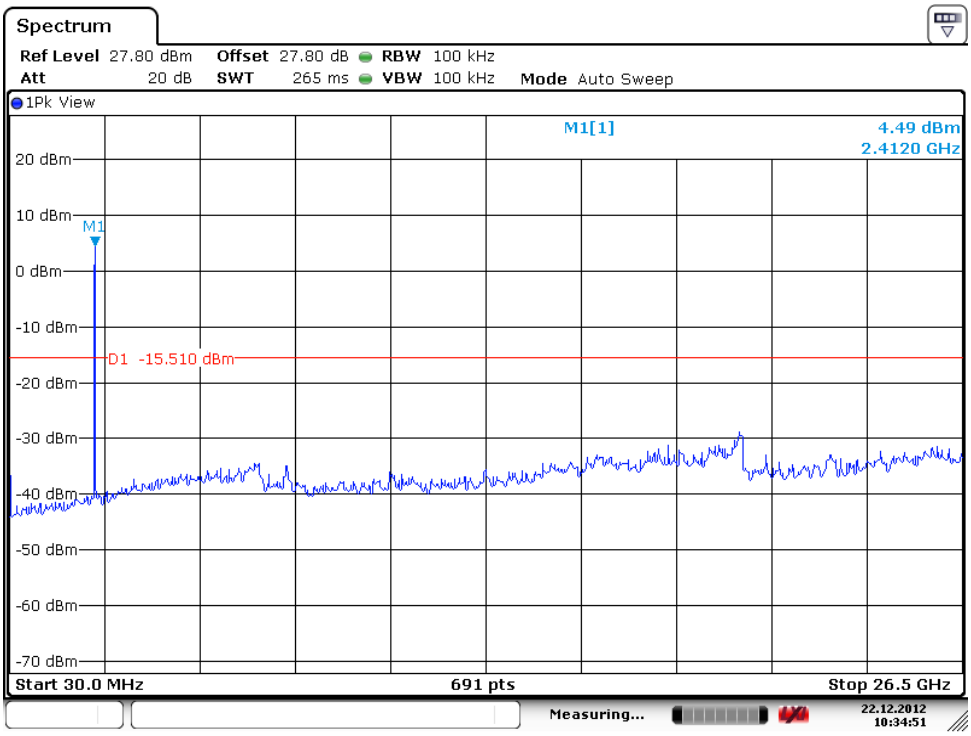
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

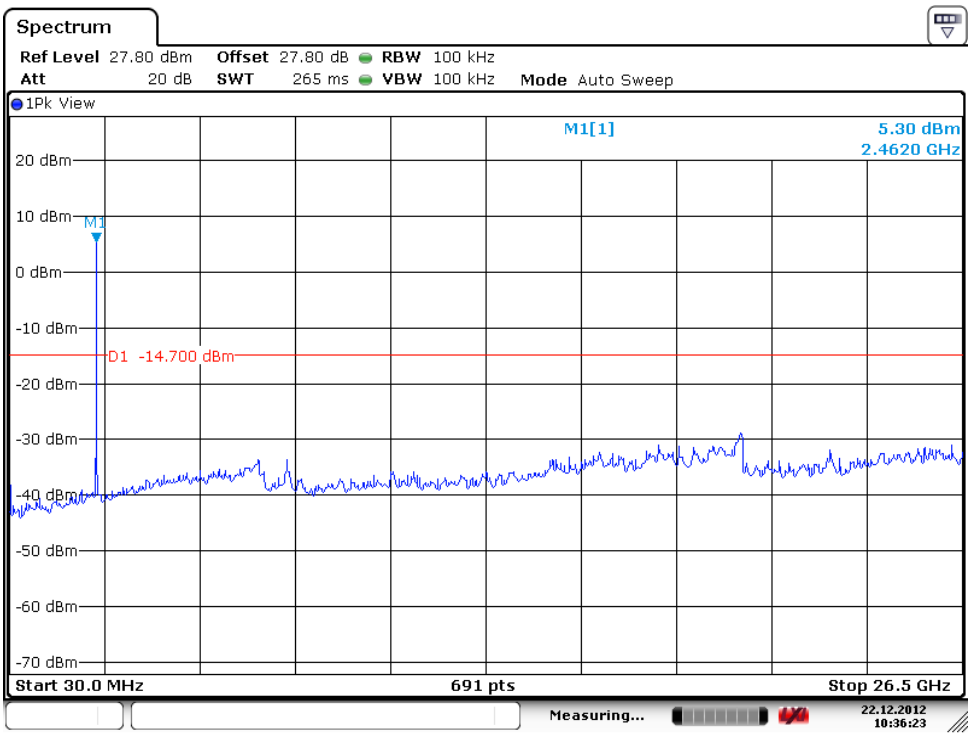
Test Plot of 100kHz Conducted Emissions, 802.11n (20MHz)

Low Channel



Date: 22.DEC.2012 10:34:51

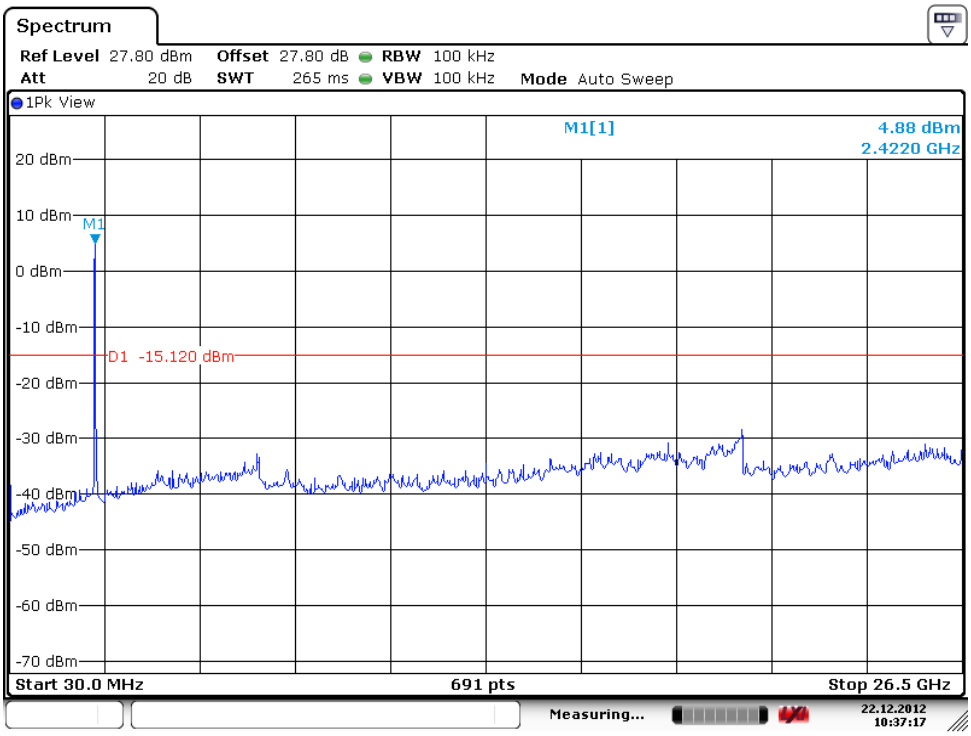
High Channel



Date: 22.DEC.2012 10:36:23

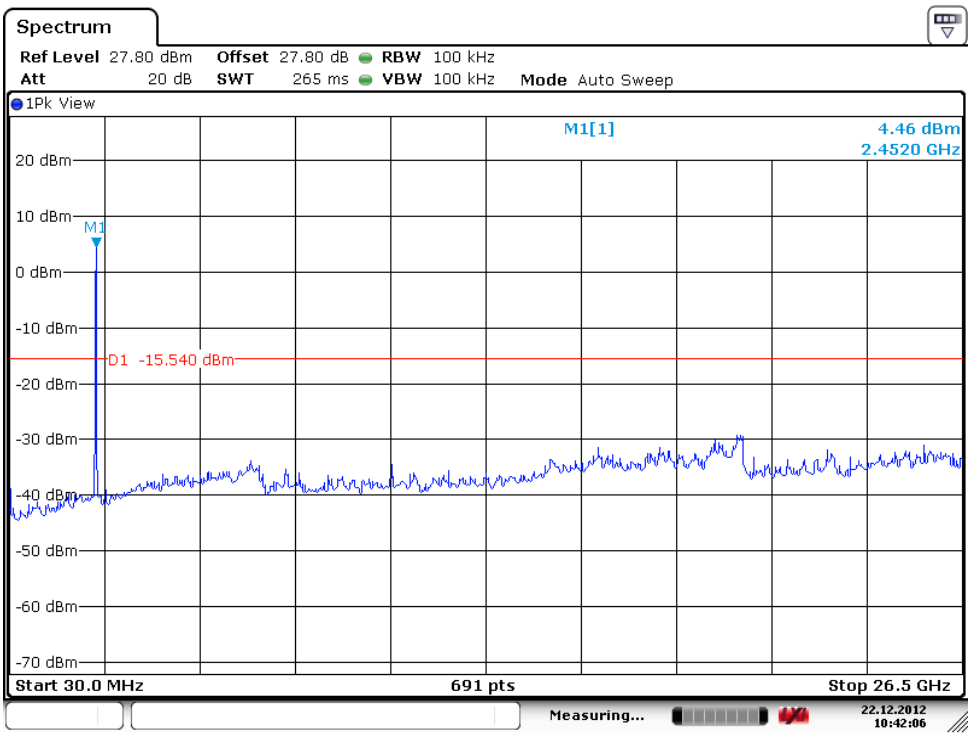
Test Plot of 100kHz Conducted Emissions, 802.11n (40MHz)

Low Channel



Date: 22.DEC.2012 10:37:17

High Channel



Date: 22.DEC.2012 10:42:06

5.1.4 Spurious Emission

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC part 15.247(d), FCC 15.205, FCC 15.209, RSS-210 2.2, RSS-210 A8.5 and RSS-Gen 7.2.1
Basic standard	:	ANSI C63.10: 2009
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-210 2.7 (Table 1), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-210 2.7 (Table 2 and 3). Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a) and FCC 15.249(a), RSS-210 2.7 (Table 2 and 3) and RSS-210 A2.9(a).
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A, C
Ambient temperature	:	24℃
Relative humidity	:	56%
Atmospheric pressure	:	102 kPa

Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic. For details refer to Appendix 2. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The Z Axis orientation is the worst-case and recorded in this test report. Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

5.2 5GHz Band Transmitter Requirement & Test Suites

5.2.1 Antenna Port 1 (TX0)

5.2.1.1 Antenna Requirement

RESULT: **Passed**

Test date	:	2012-12-21
Test standard	:	FCC Part 15.247(b)(4), Part 15.203 and RSS-Gen 7.1.4
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an internal antenna with an directional gain of 2.0 dBi, and the antenna is a pair of chip antenna, so that the aggregation gain is 4 dBi. The EUT is considered to comply the provision.

Refer to EUT photo and Antenna datasheet for details.

5.2.1.2 Output Power

RESULT: **Passed**

Test date	:	2012-12-21
Test standard	:	FCC Part 15.247(b)(3), RSS-210 A8.4(4)
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

For the 802.11n modes, the EUT can be operated in 2x2 MIMO mode. Therefore, for those modes, in the tables below the limits are reduced by 3 dB.

Table 40: Test result of Output Power, 802.11a

Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	5745	21.95	0.1567	1	PASS
Middle Channel	5785	22.14	0.1637	1	PASS
High Channel	5825	22.13	0.1633	1	PASS

Table 41: Test result of Output Power, 802.11n (20MHz)

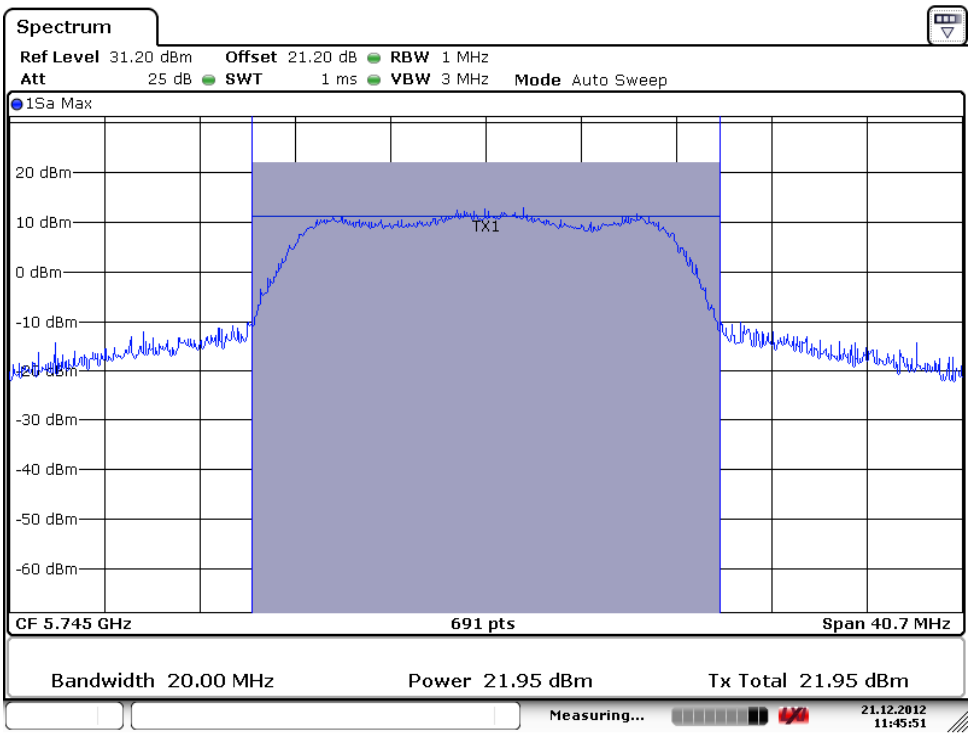
Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	5745	21.88	0.1542	0.5	PASS
Middle Channel	5785	21.94	0.1563	0.5	PASS
High Channel	5825	21.92	0.1556	0.5	PASS

Table 42: Test result of Output Power, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	5755	17.84	0.0608	0.5	PASS
High Channel	5795	17.63	0.0579	0.5	PASS

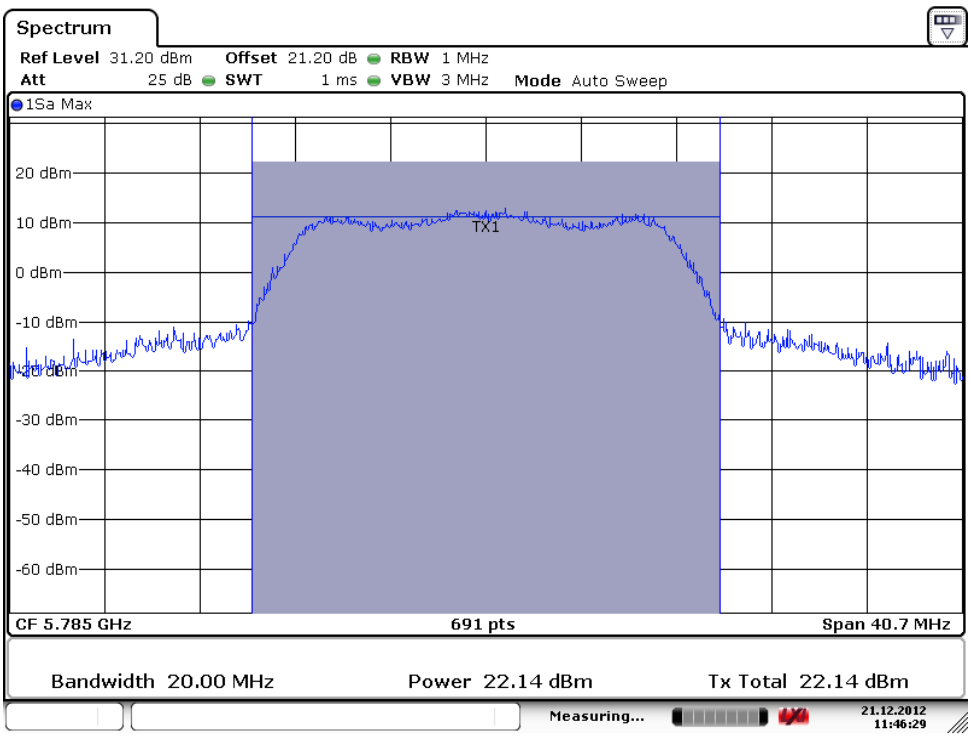
Test Plot of Output Power, 802.11a

Low Channel



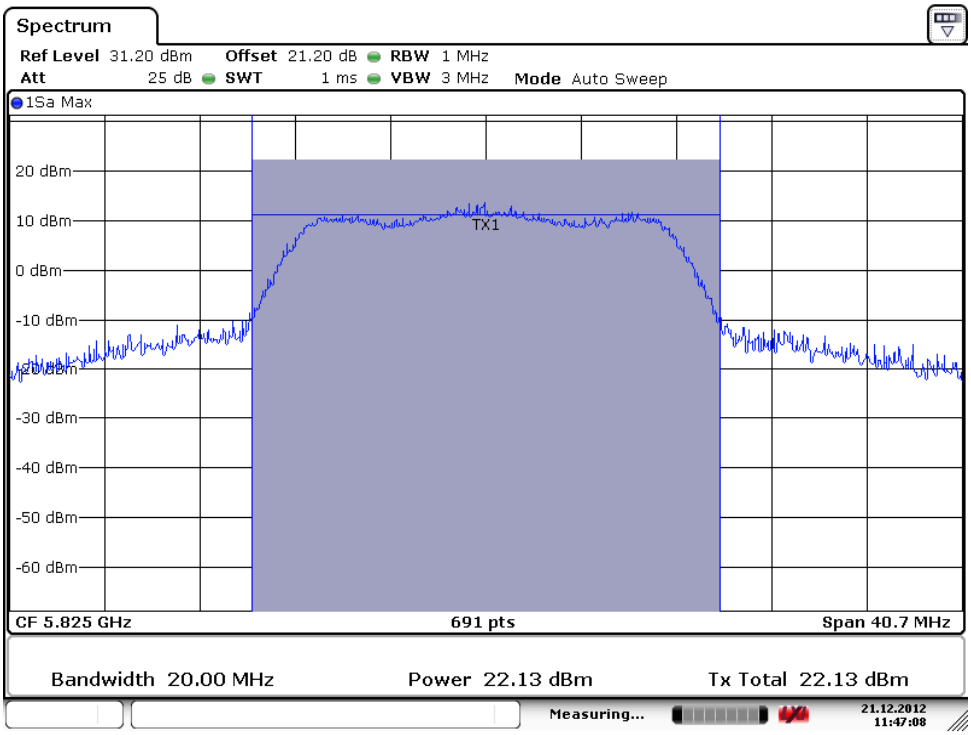
Date: 21.DEC.2012 11:45:52

Middle Channel



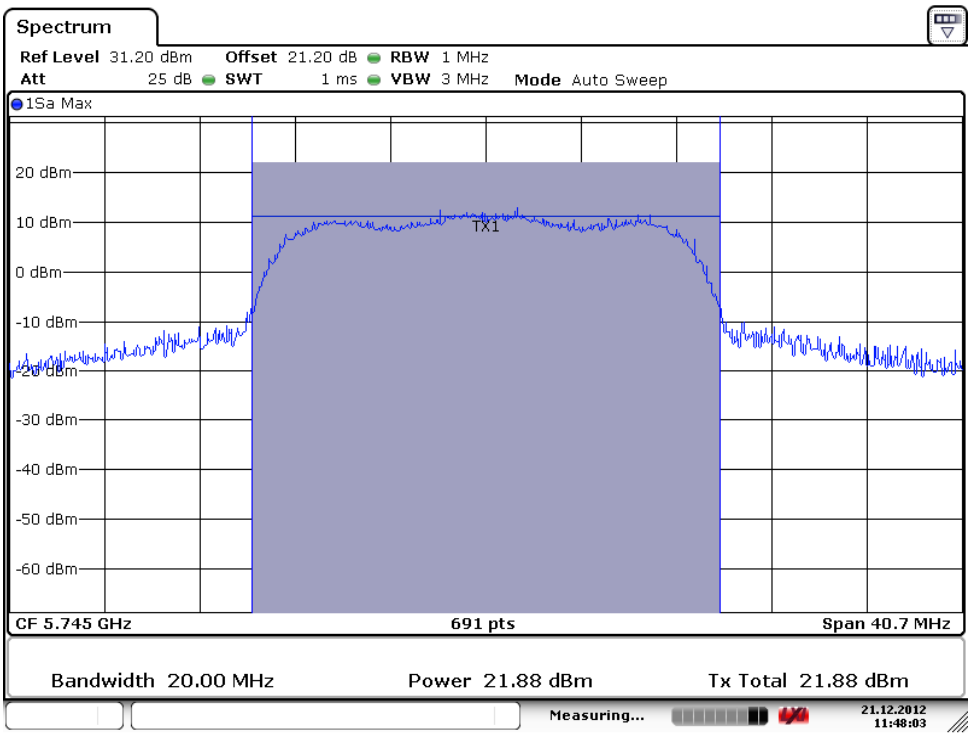
Date: 21.DEC.2012 11:46:29

High Channel



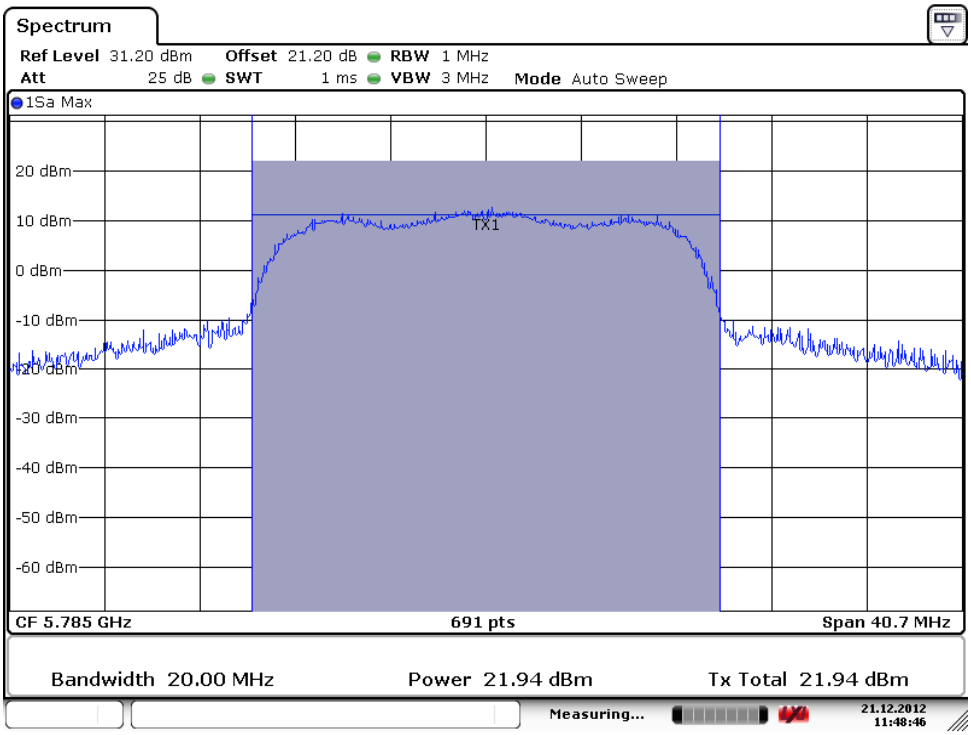
Test Plot of Output Power, 802.11n (20MHz)

Low Channel



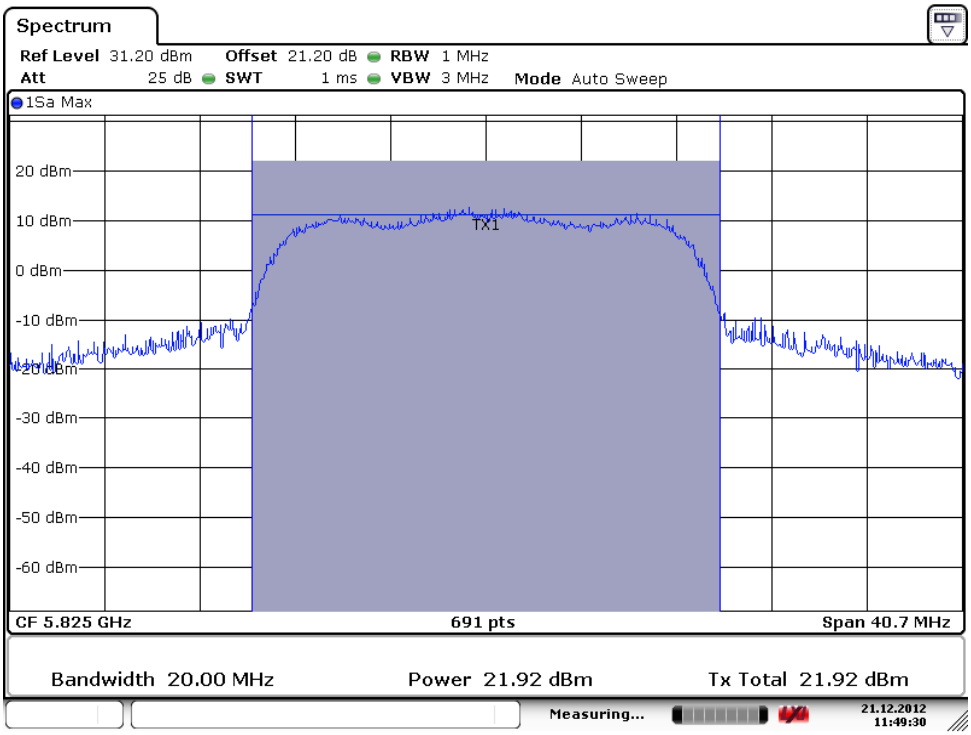
Date: 21.DEC.2012 11:48:04

Middle Channel



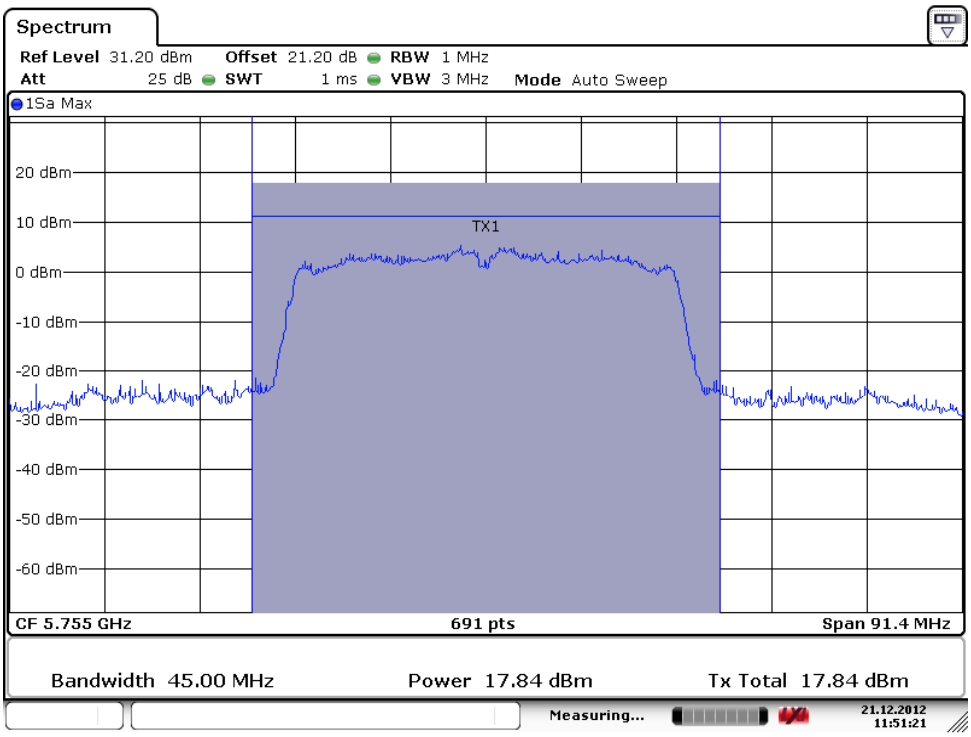
Date: 21.DEC.2012 11:48:46

High Channel



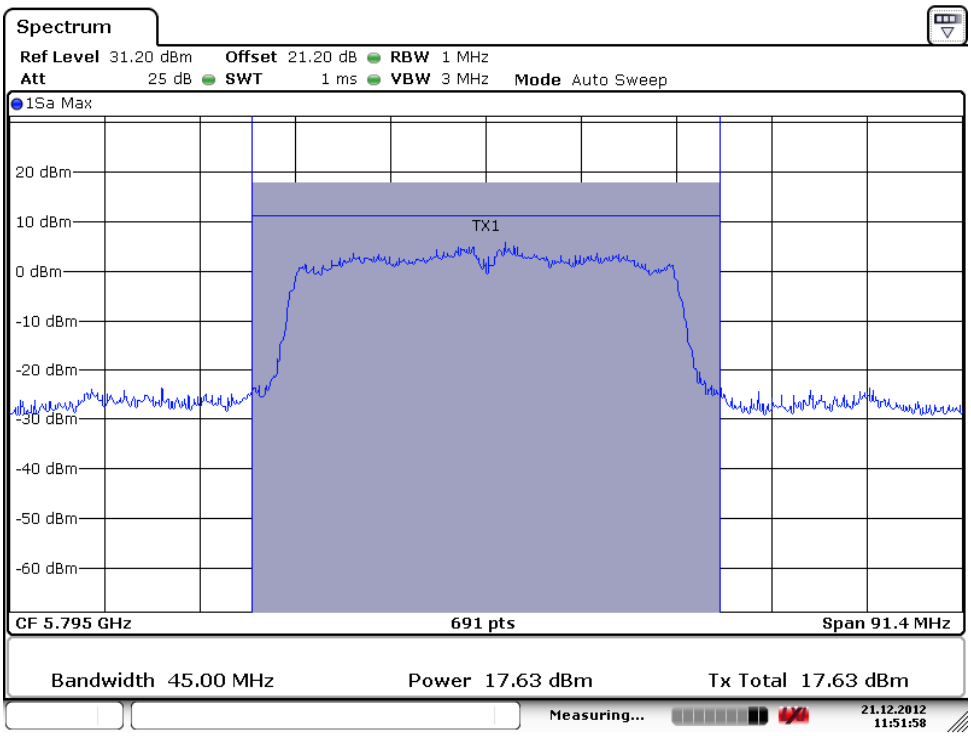
Test Plot of Output Power, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 11:51:21

High Channel



Date: 21.DEC.2012 11:51:58

5.2.1.3 6dB and 99% Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC Part 15.247(a)(2), RSS-210 A8.2(1)
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 43: Test result of 6dB Bandwidth, 802.11a

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5745	16.035	≧0.5	Pass
Mid Channel	5785	15.687	≧0.5	Pass
High Channel	5825	16.035	≧0.5	Pass

Table 44: Test result of 6dB Bandwidth, 802.11n (20MHz)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5745	16.845	≧0.5	Pass
Mid Channel	5785	16.614	≧0.5	Pass
High Channel	5825	15.731	≧0.5	Pass

Table 45: Test result of 6dB Bandwidth, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5755	36.469	≧0.5	Pass
High Channel	5795	36.469	≧0.5	Pass

Table 46: Test result of 99% Bandwidth, 802.11a

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	5745	16.628	/
Mid Channel	5785	16.628	/
High Channel	5825	16.628	/

Table 47: Test result of 99% Bandwidth, 802.11n (20MHz)

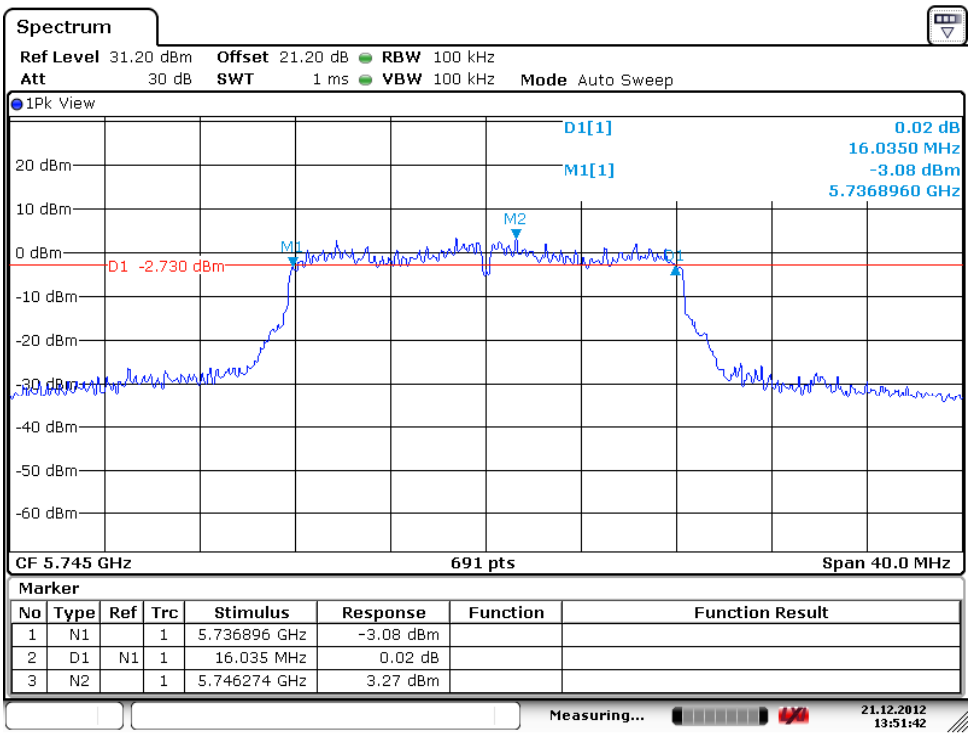
Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	5745	17.67	/
Mid Channel	5785	17.67	/
High Channel	5825	17.67	/

Table 48: Test result of 99% Bandwidth, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	5755	36.686	/
High Channel	5795	36.614	/

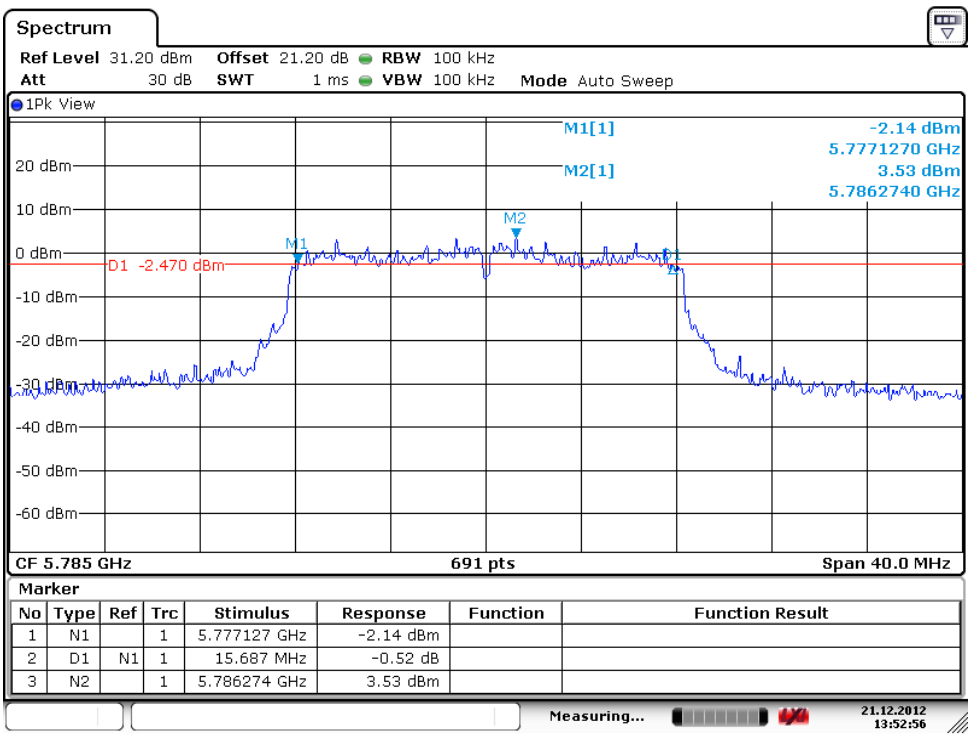
Test Plot of 6dB Bandwidth, 802.11a

Low Channel



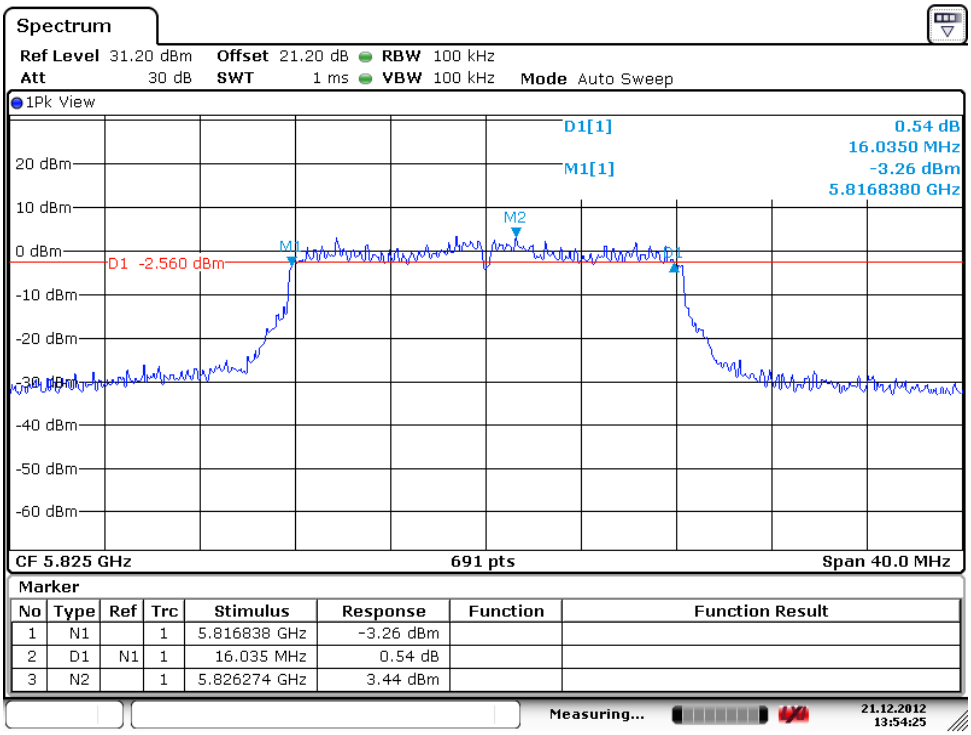
Date: 21.DEC.2012 13:51:43

Middle Channel



Date: 21.DEC.2012 13:52:56

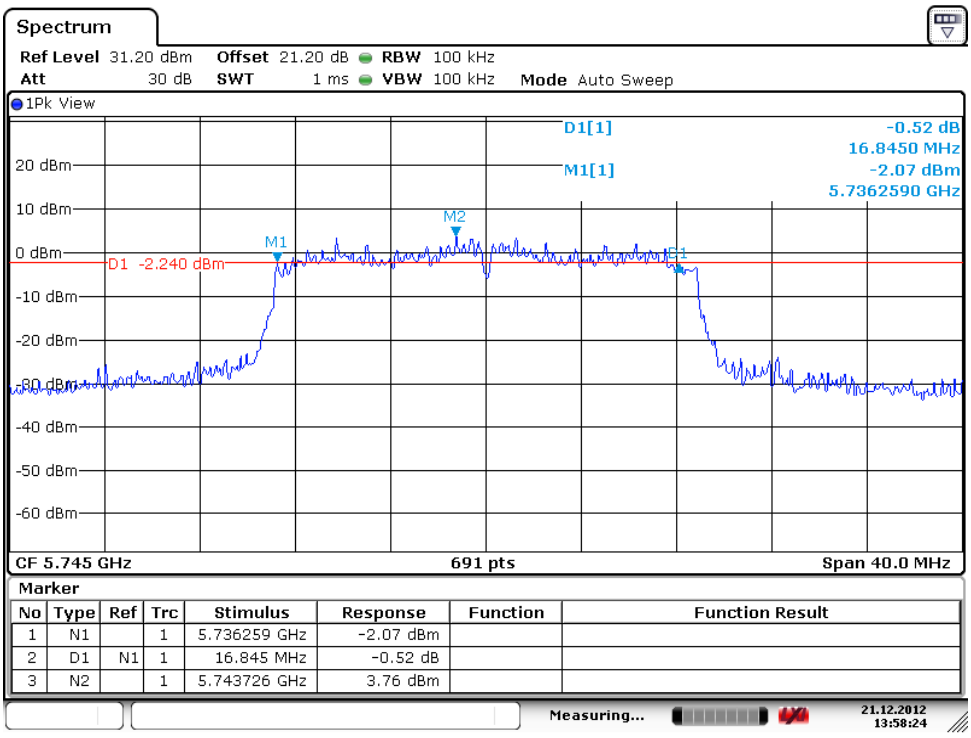
High Channel



Date: 21.DEC.2012 13:54:25

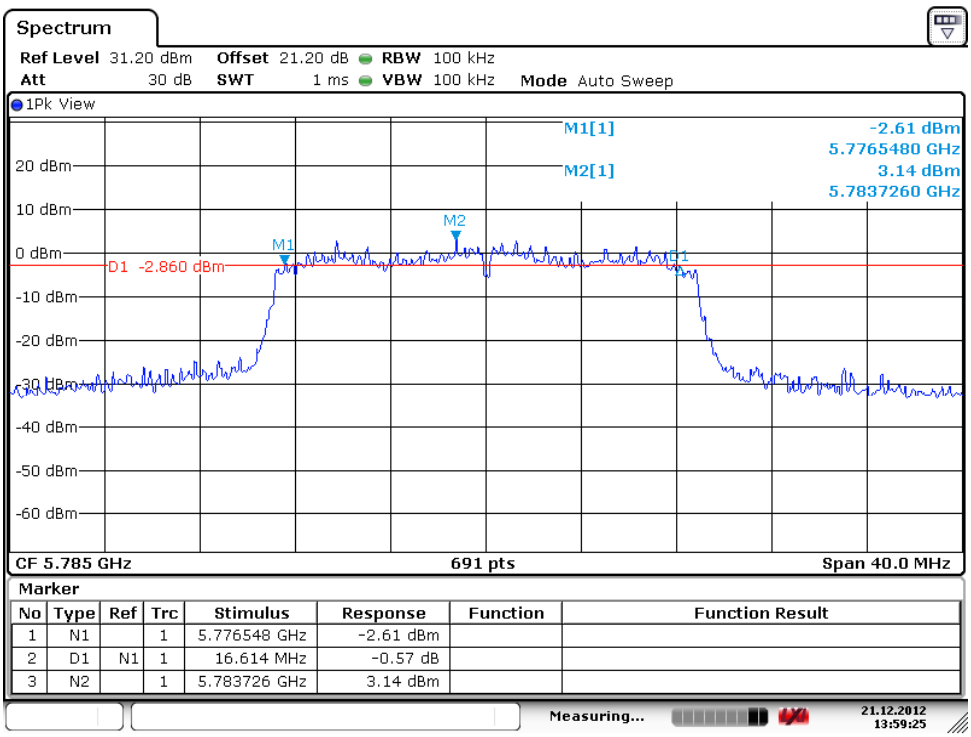
Test Plot of 6dB Bandwidth, 802.11n (20MHz)

Low Channel



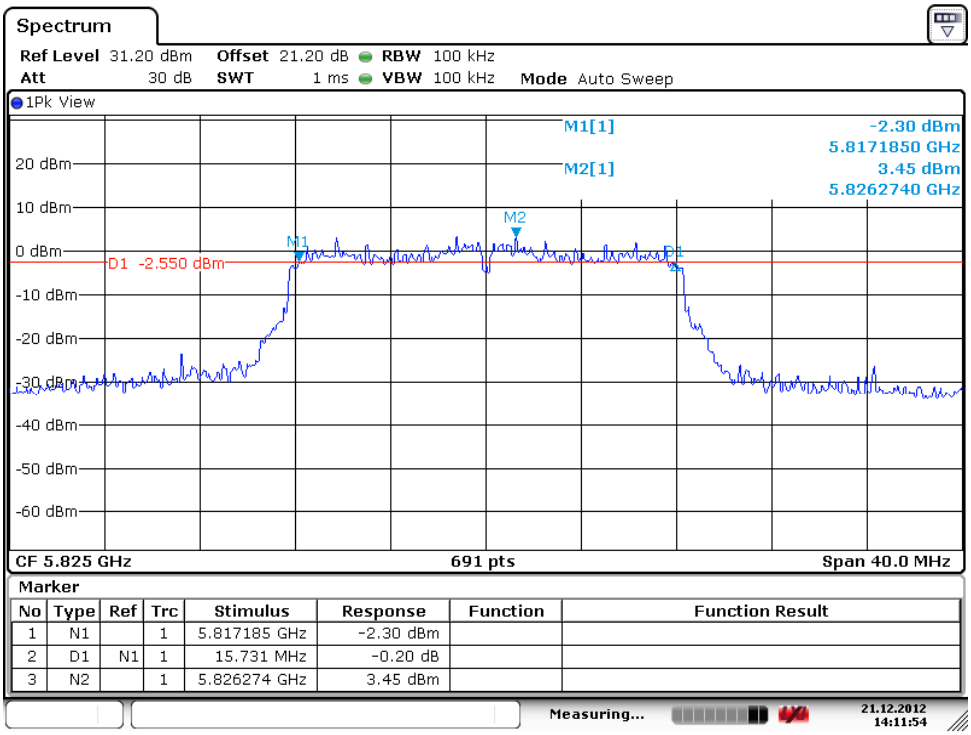
Date: 21.DEC.2012 13:58:24

Middle Channel



Date: 21.DEC.2012 13:59:26

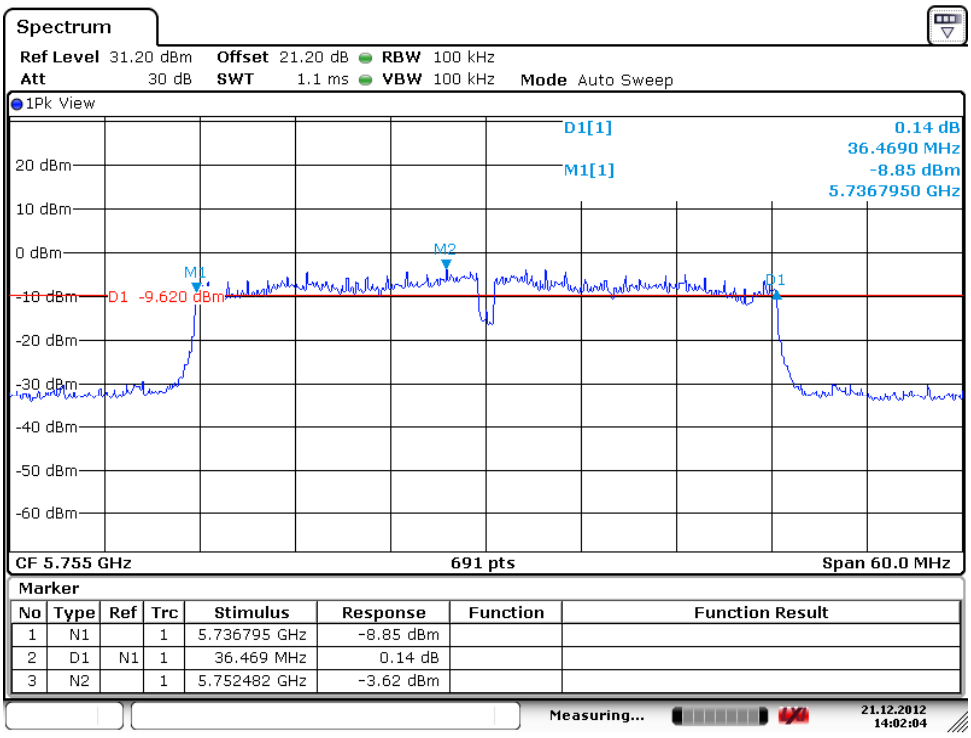
High Channel



Date: 21.DEC.2012 14:11:54

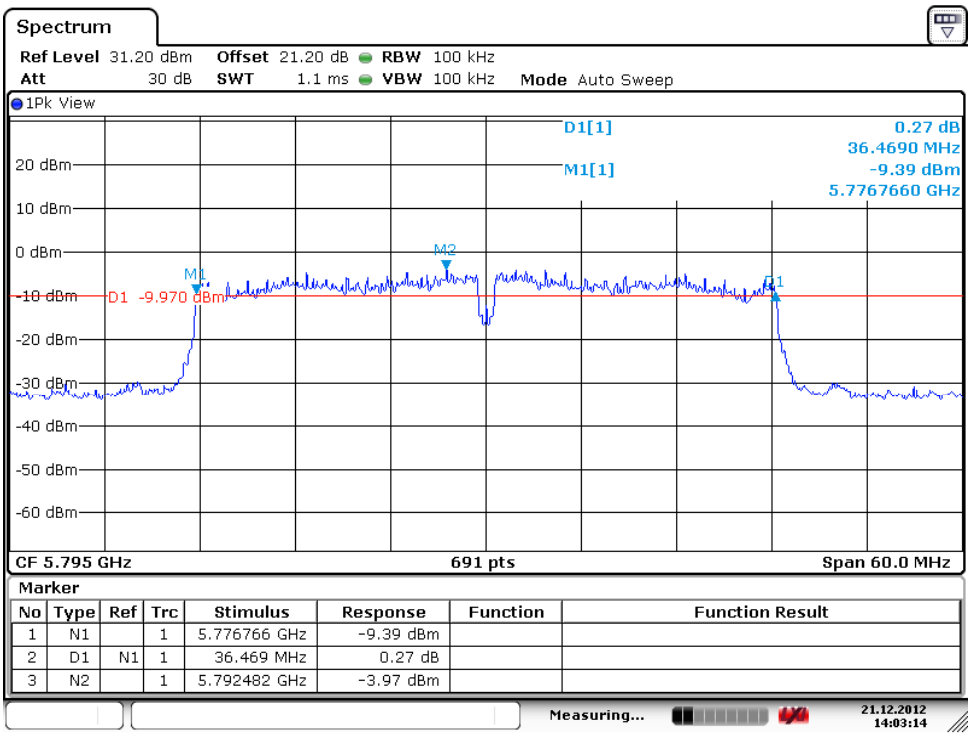
Test Plot of 6dB Bandwidth, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 14:02:04

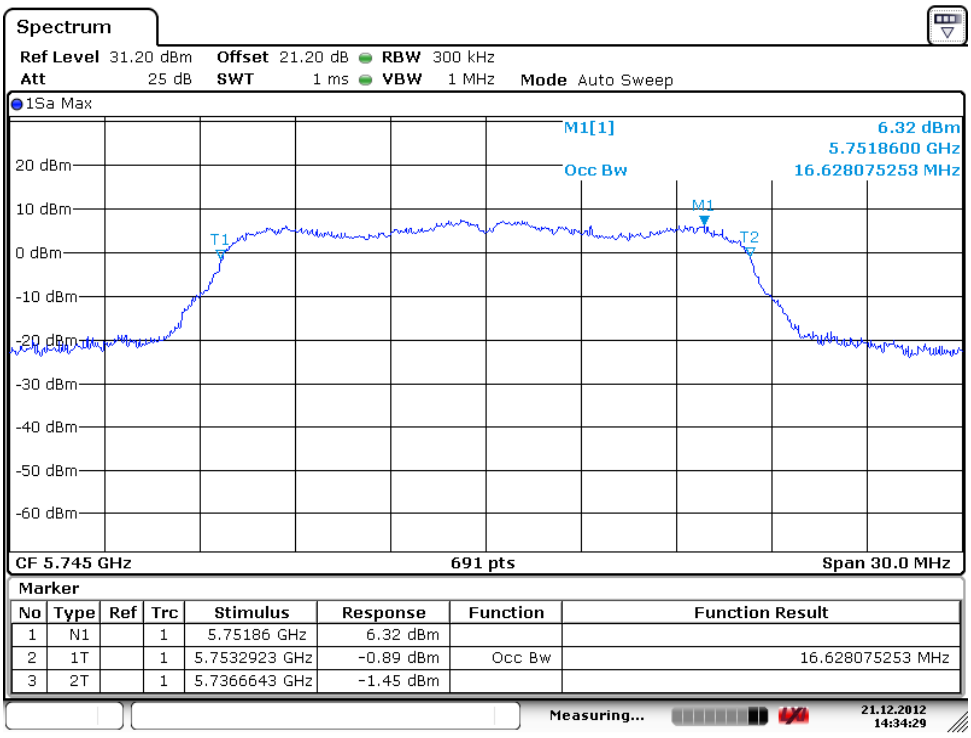
High Channel



Date: 21.DEC.2012 14:03:15

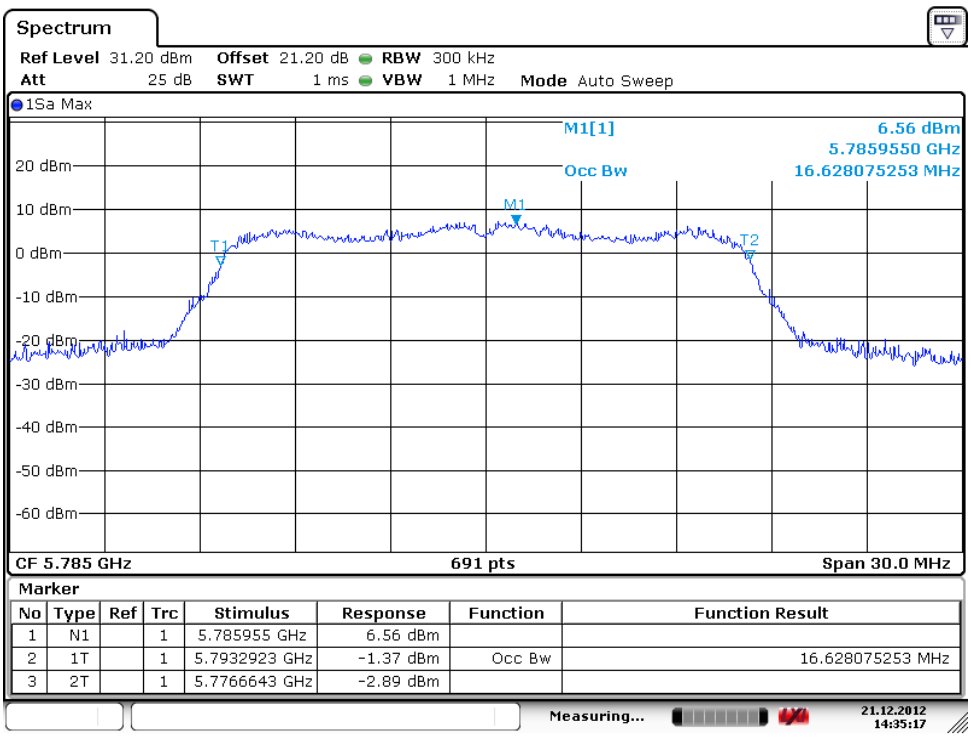
Test Plot of 99% Bandwidth, 802.11a

Low Channel



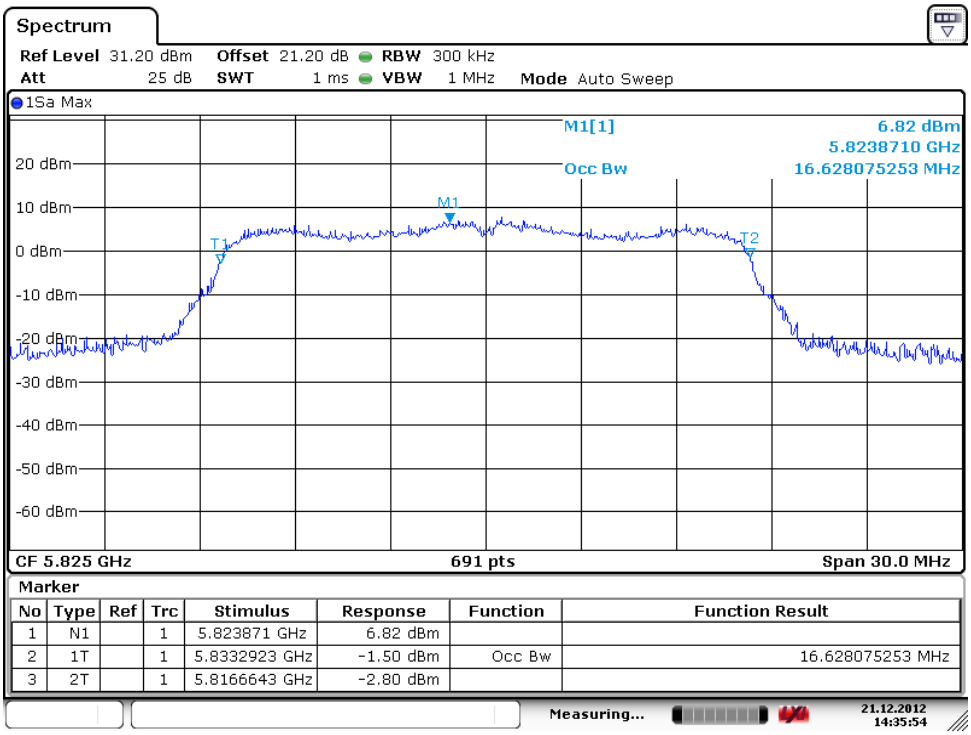
Date: 21.DEC.2012 14:34:30

Middle Channel



Date: 21.DEC.2012 14:35:17

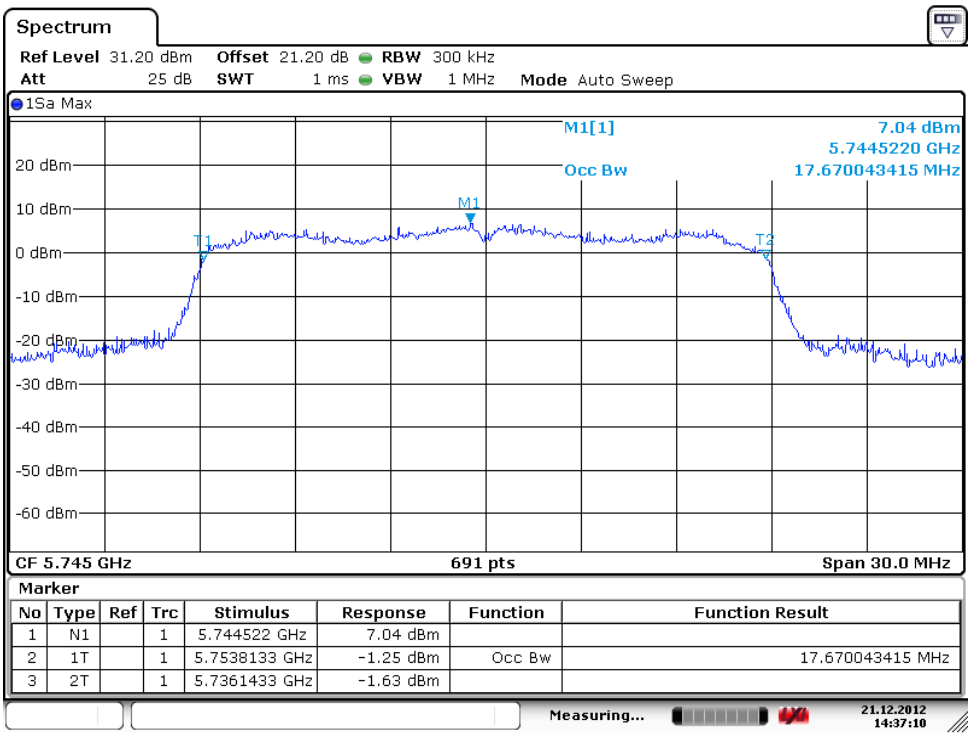
High Channel



Date: 21.DEC.2012 14:35:54

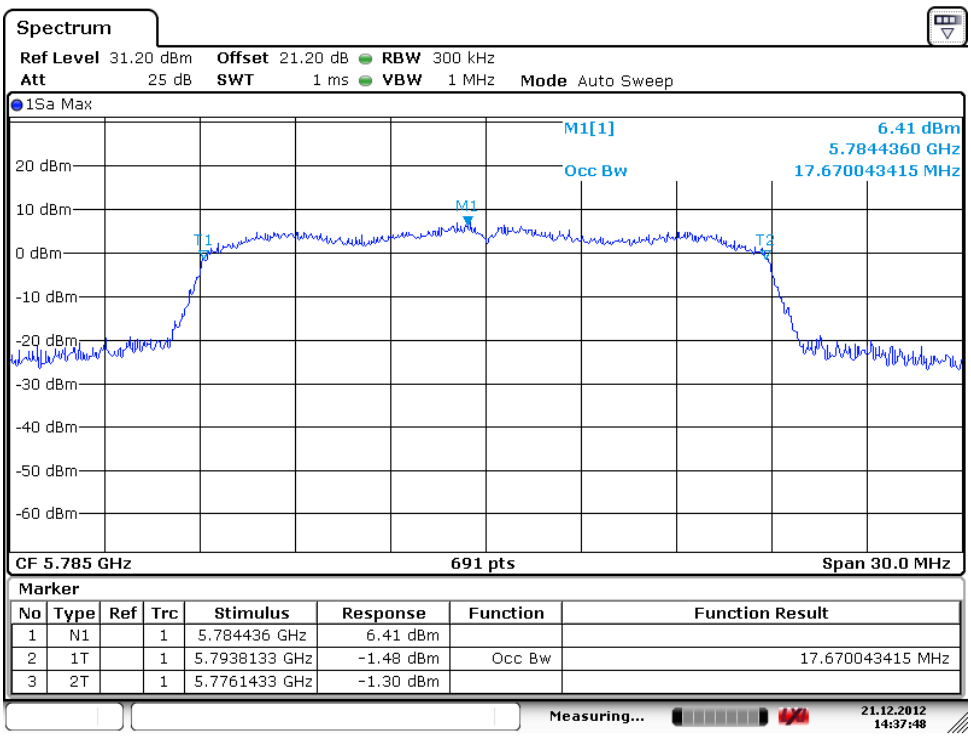
Test Plot of 99% Bandwidth, 802.11n (20MHz)

Low Channel



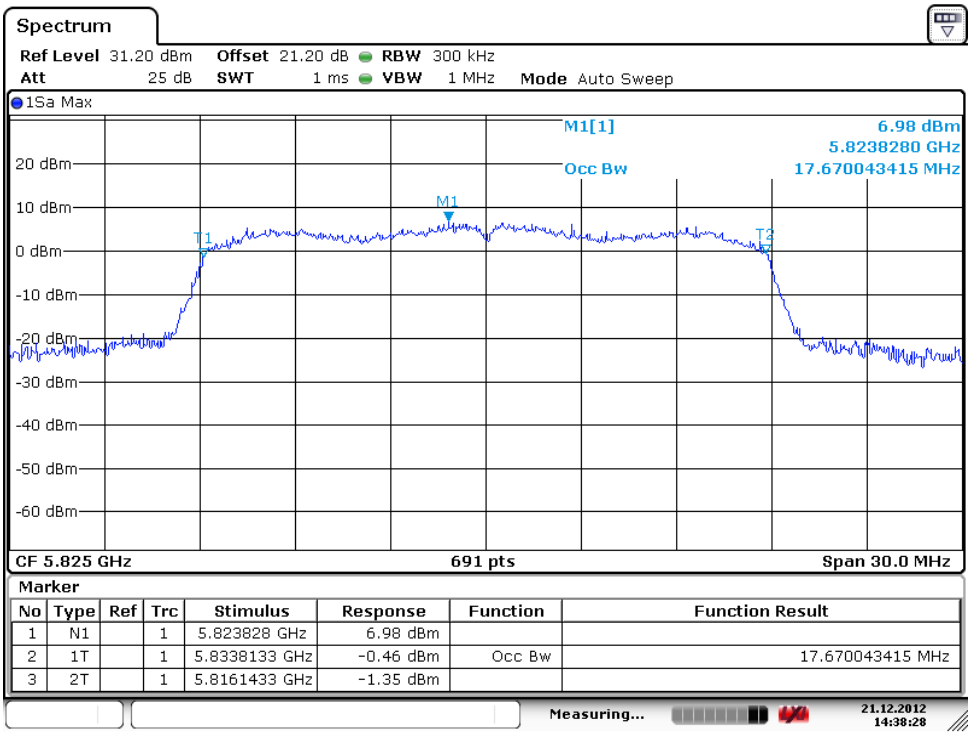
Date: 21.DEC.2012 14:37:10

Middle Channel



Date: 21.DEC.2012 14:37:48

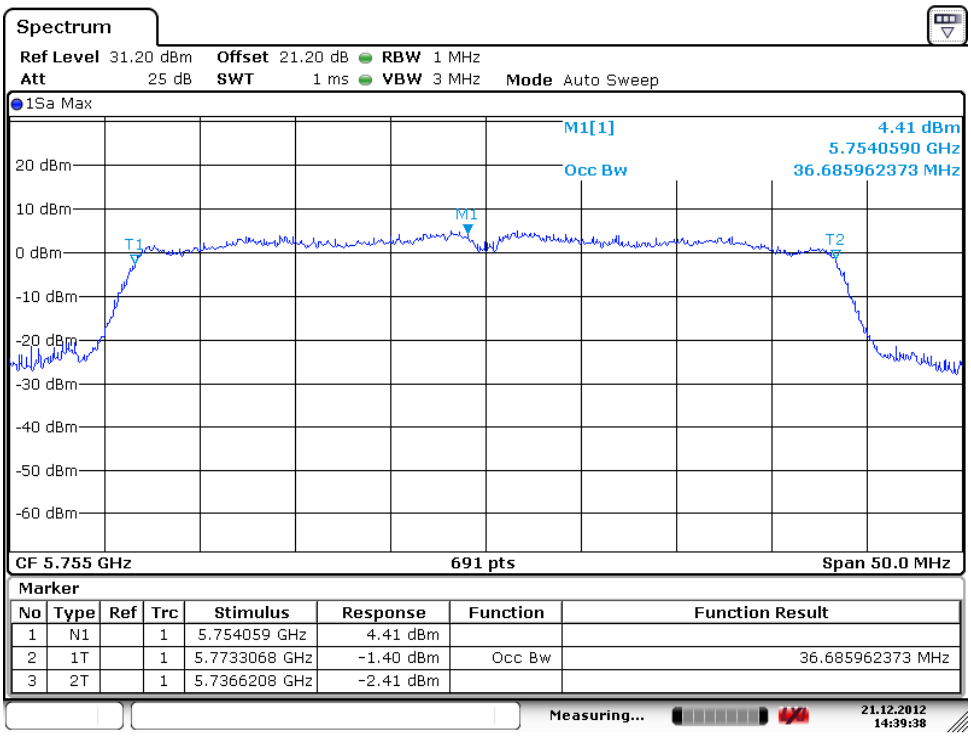
High Channel



Date: 21.DEC.2012 14:38:28

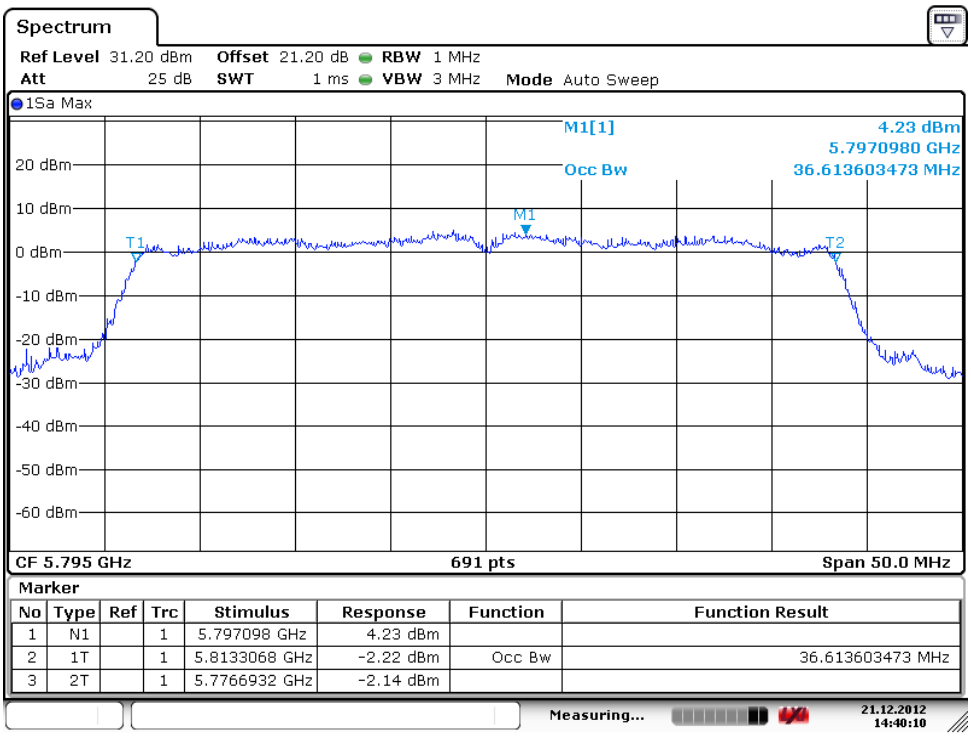
Test Plot of 99% Bandwidth, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 14:39:38

High Channel



Date: 21.DEC.2012 14:40:11

5.2.1.4 Power Density

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC Part 15.247(e), A8.2(2)
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 49: Test result of Power Density, 802.11a

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	5745	-9.85	8	Pass
Mid Channel	5785	-11.38	8	Pass
High Channel	5825	-9.9	8	Pass

Table 50: Test result of Power Density, 802.11n (20MHz)

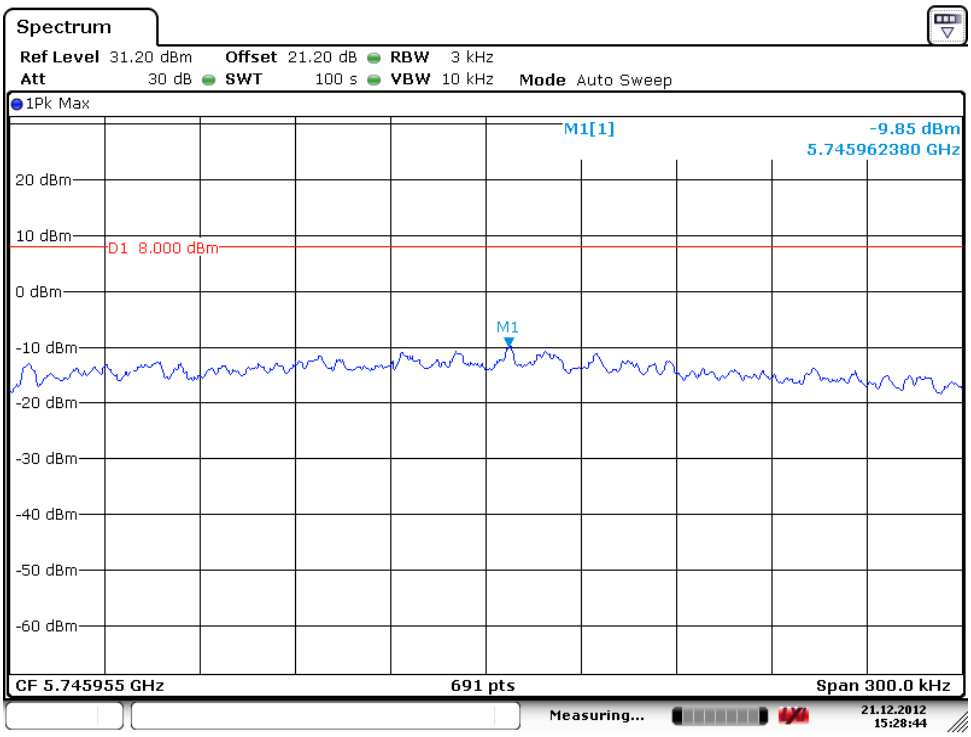
Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	5745	-10.68	8-3	Pass
Mid Channel	5785	-10.51	8-3	Pass
High Channel	5825	-12.02	8-3	Pass

Table 51: Test result of Power Density, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	5755	-18.55	8-3	Pass
High Channel	5795	-18.72	8-3	Pass

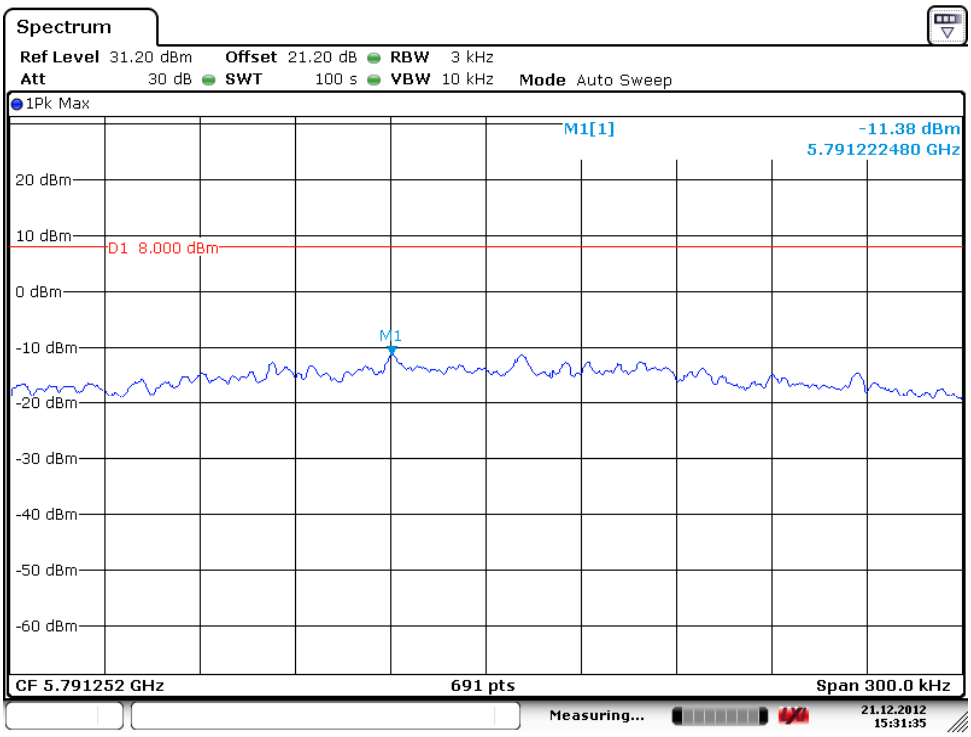
Test Plot of Power Density, 802.11a

Low Channel



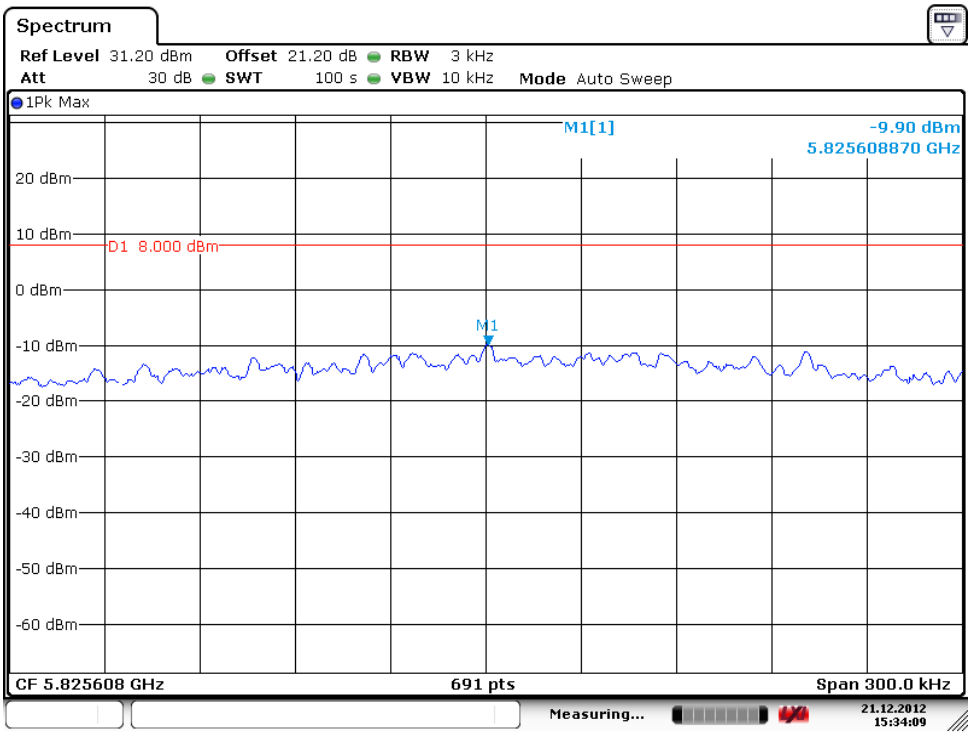
Date: 21.DEC.2012 15:28:44

Middle Channel



Date: 21.DEC.2012 15:31:36

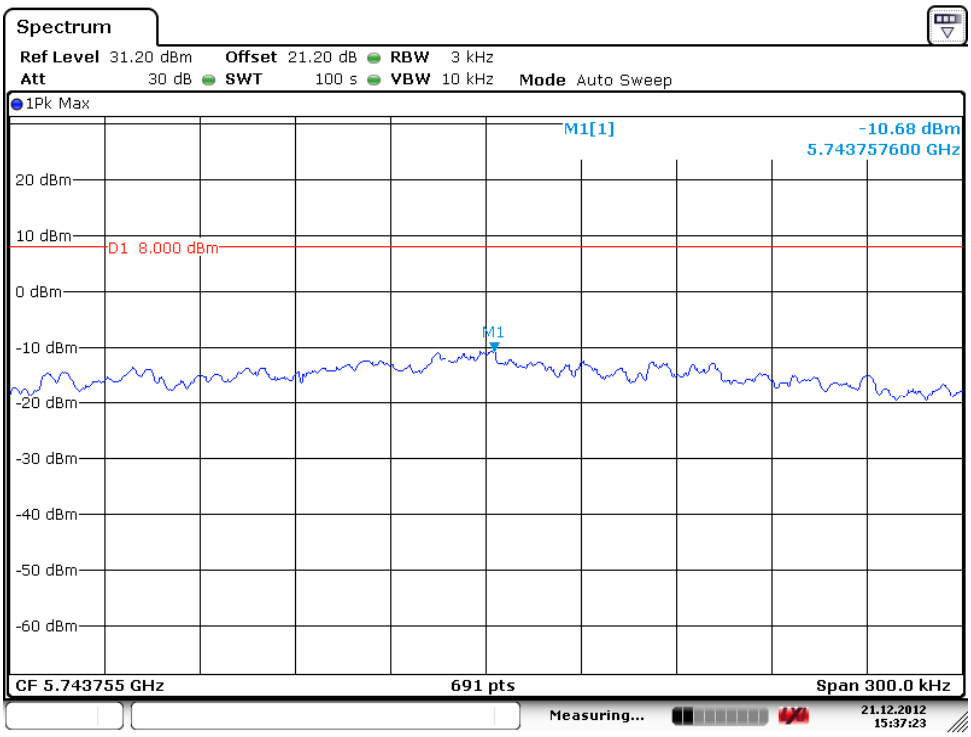
High Channel



Date: 21.DEC.2012 15:34:10

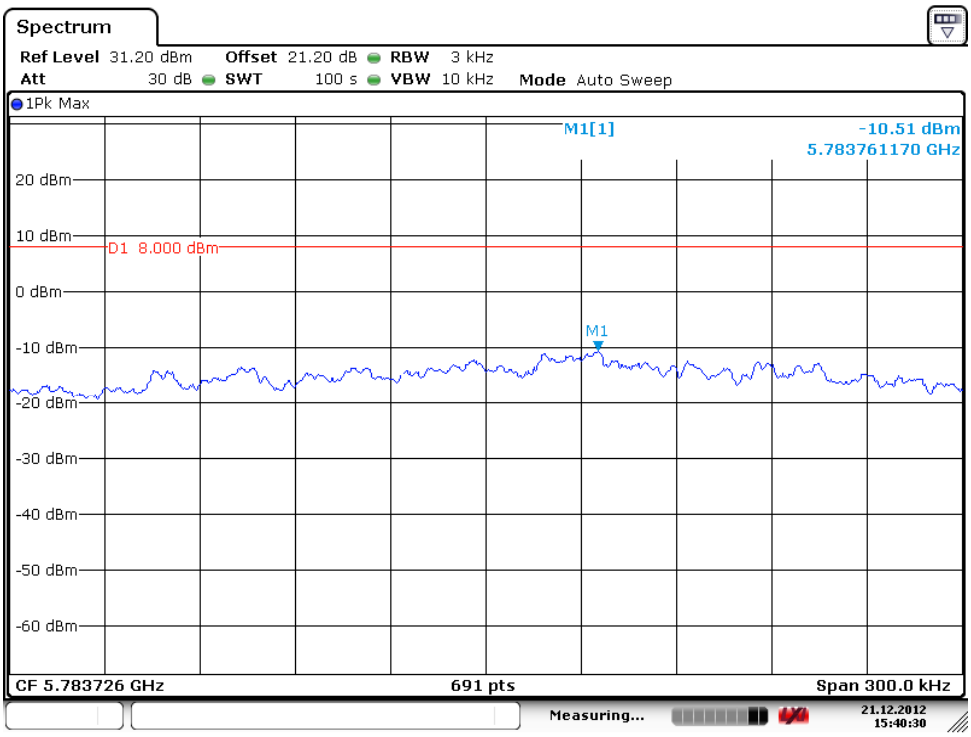
Test Plot of Power Density, 802.11n (20MHz)

Low Channel



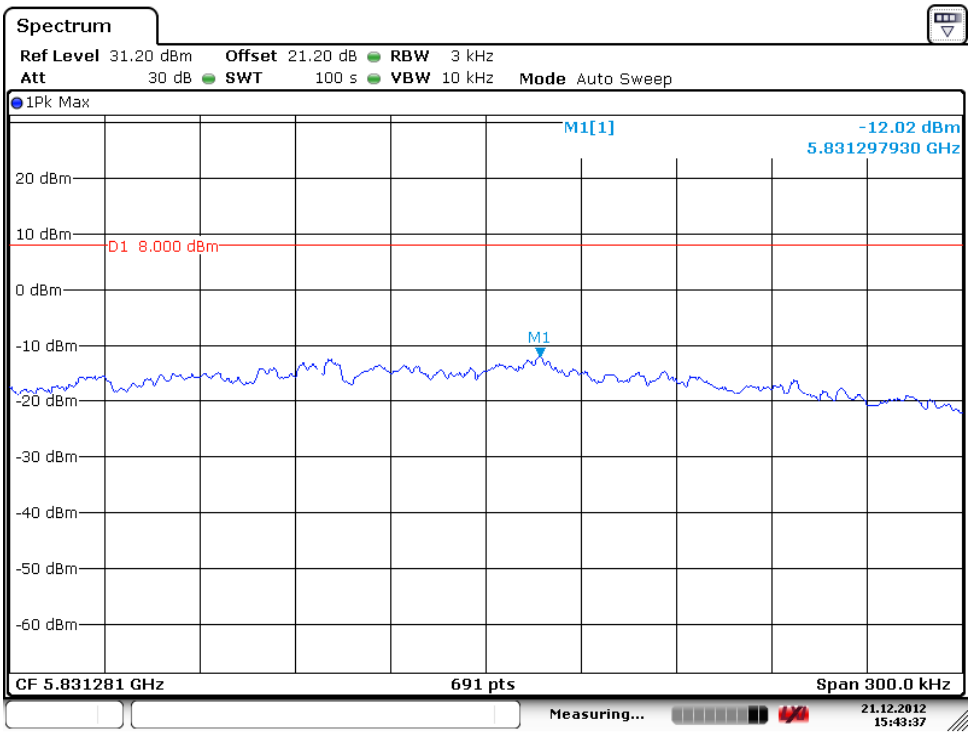
Date: 21.DEC.2012 15:37:23

Middle Channel



Date: 21.DEC.2012 15:40:31

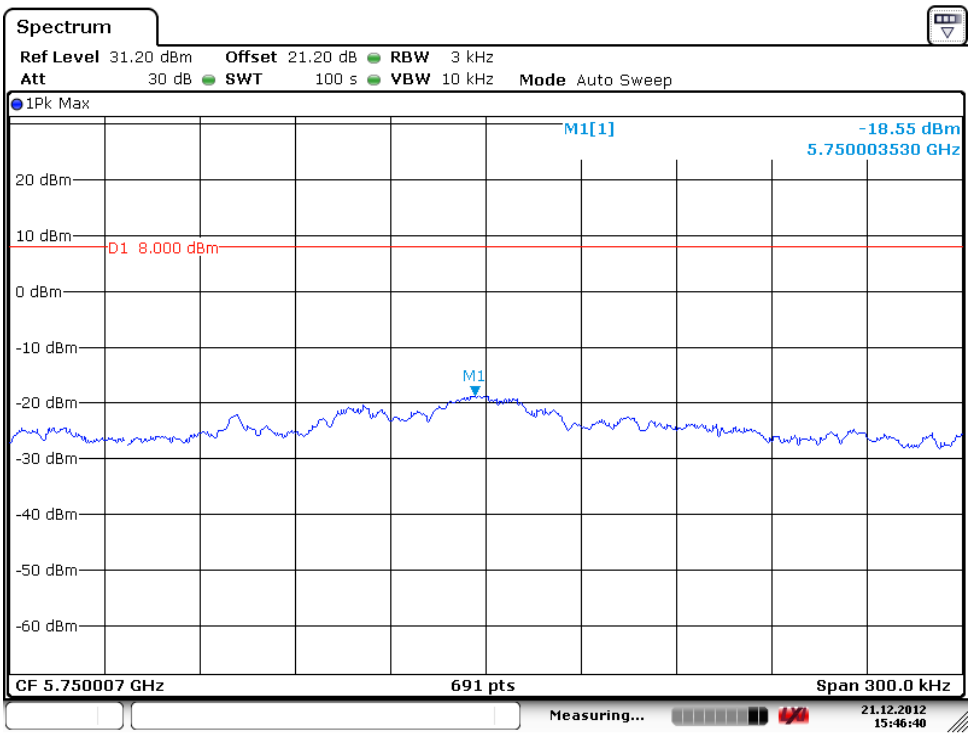
High Channel



Date: 21.DEC.2012 15:43:37

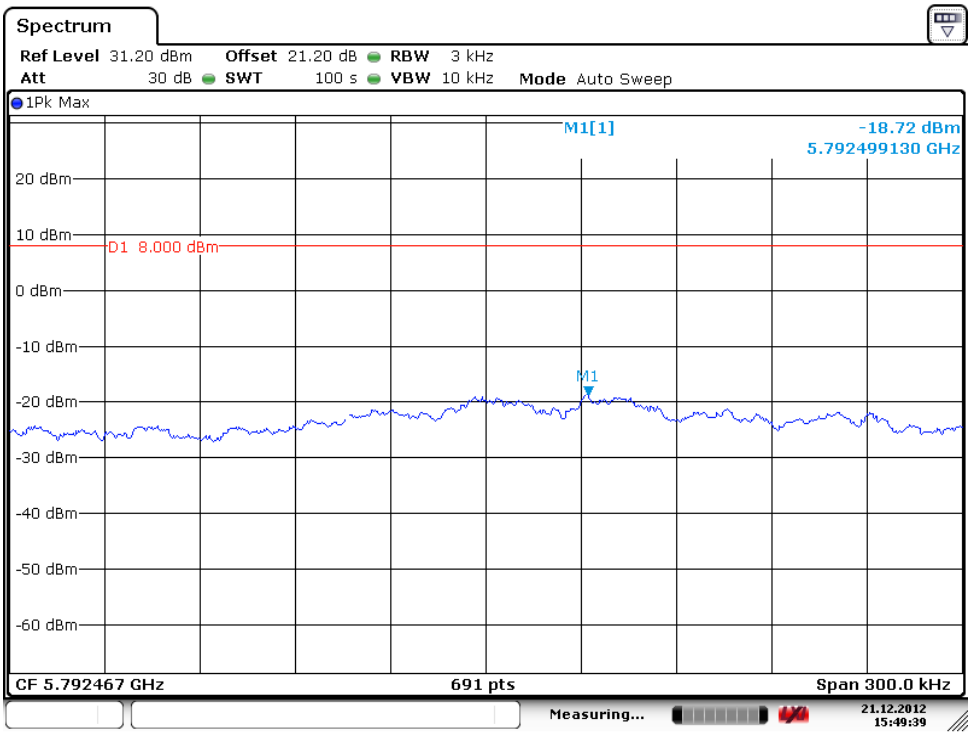
Test Plot of Power Density, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 15:46:40

High Channel



Date: 21.DEC.2012 15:49:39

5.2.1.5 Conducted spurious emissions measured in 100kHz Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC part 15.247(d), RSS-210 A8.5
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded room

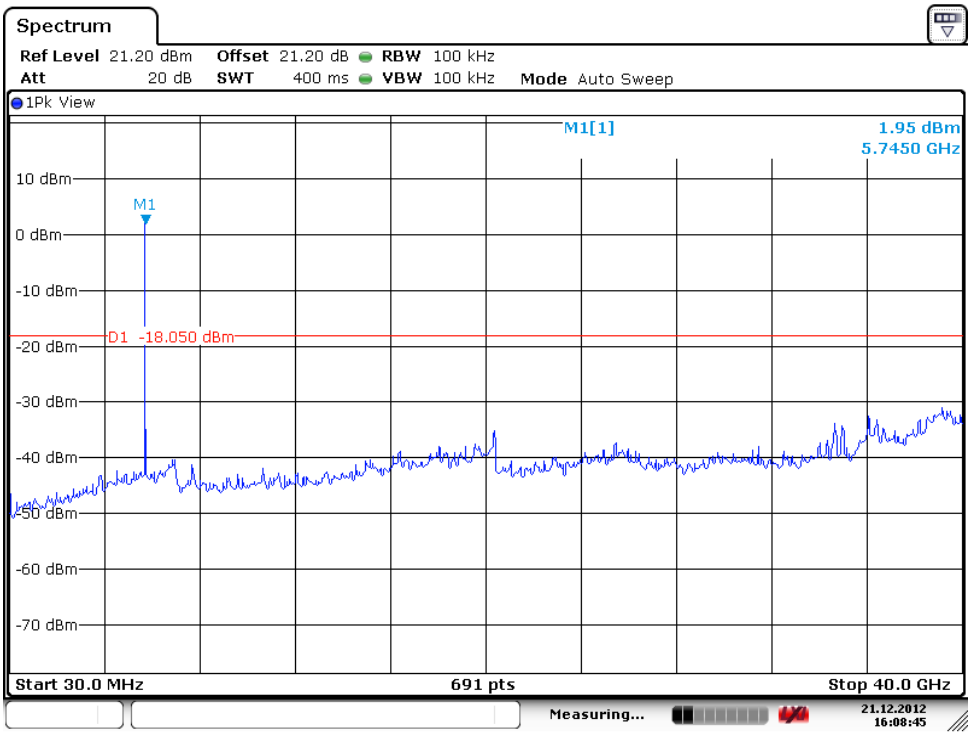
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

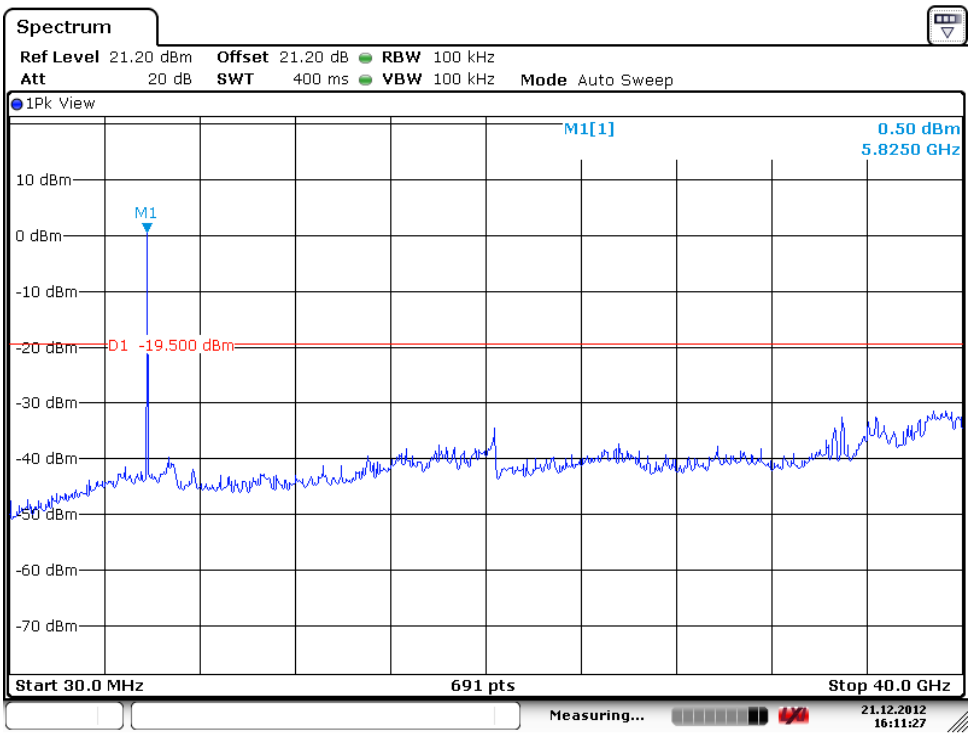
Test Plot of 100kHz Conducted Emissions, 802.11a

Low Channel



Date: 21.DEC.2012 16:08:45

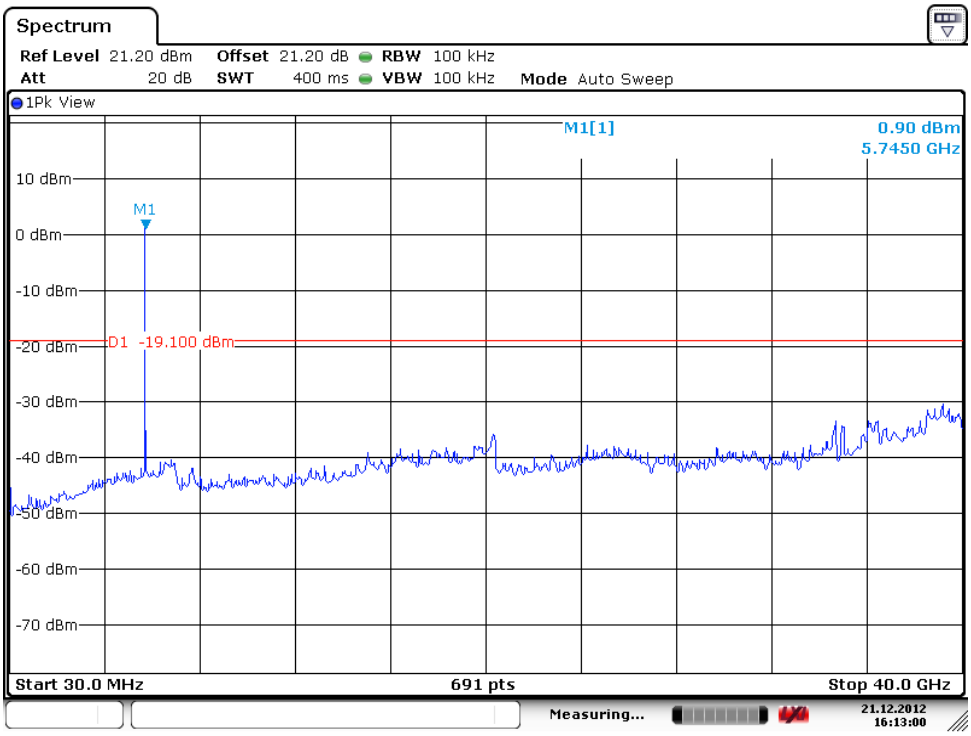
High Channel



Date: 21.DEC.2012 16:11:28

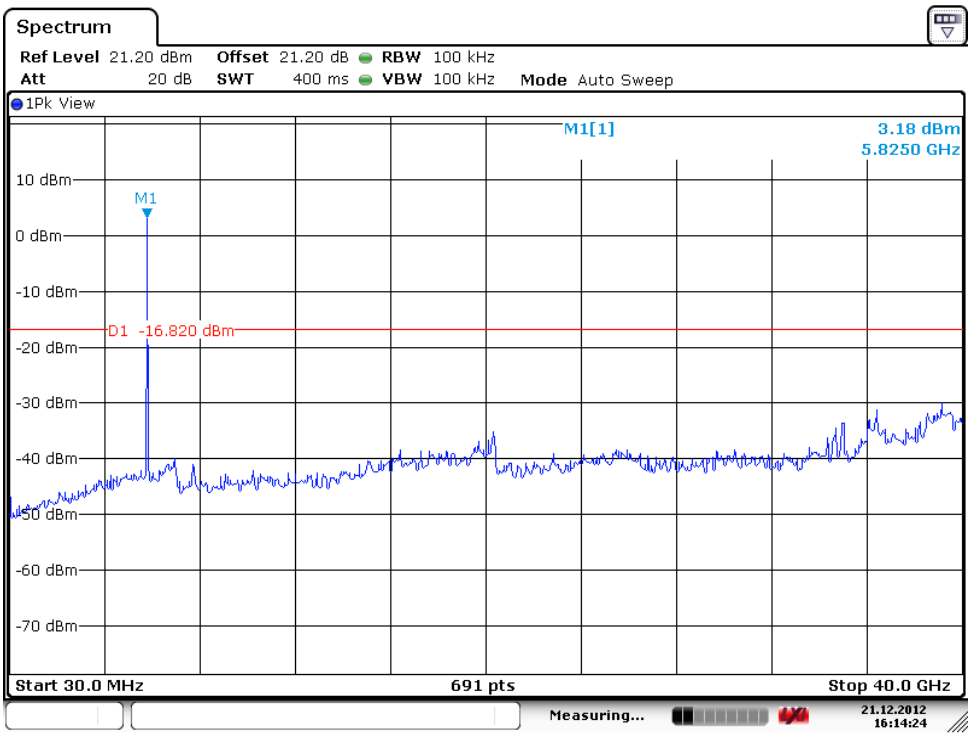
Test Plot of 100kHz Conducted Emissions, 802.11n (20MHz)

Low Channel



Date: 21.DEC.2012 16:13:00

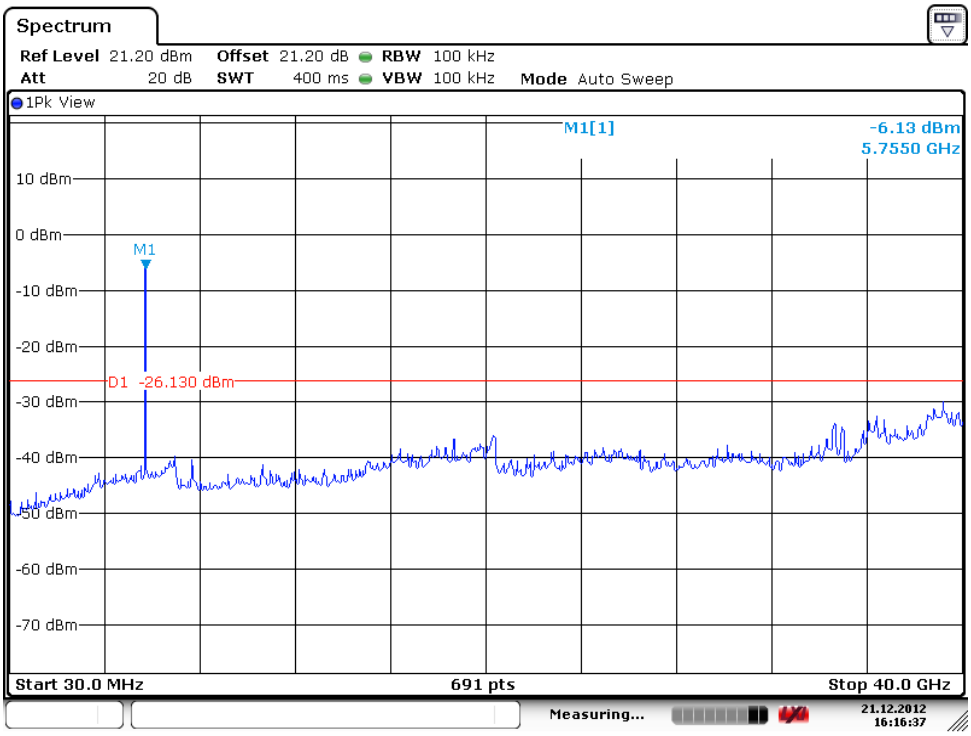
High Channel



Date: 21.DEC.2012 16:14:25

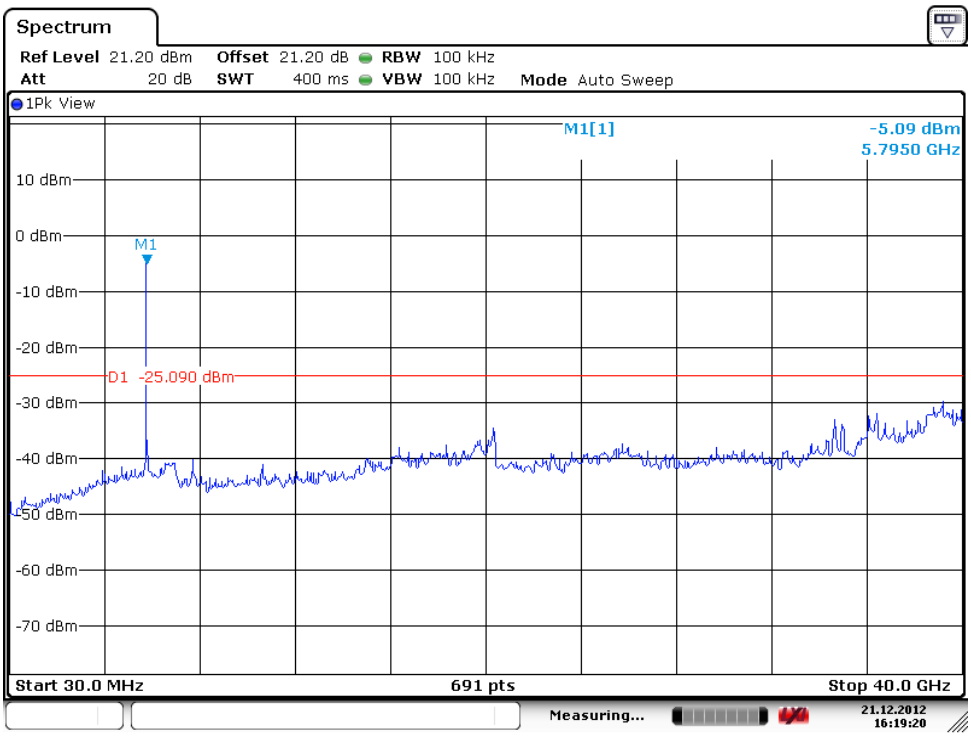
Test Plot of 100kHz Conducted Emissions, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 16:16:37

High Channel



Date: 21.DEC.2012 16:19:21

5.2.2 Antenna Port 1 (TX1)

5.2.2.1 Antenna Requirement

RESULT: **Passed**

Test date	:	2012-12-21
Test standard	:	FCC Part 15.247(b)(4), Part 15.203 and RSS-Gen 7.1.4
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an internal antenna with an directional gain of 2.0 dBi, and the antenna is a pair of chip antenna, so that the aggregation gain is 4 dBi. The EUT is considered to comply the provision.

Refer to EUT photo and Antenna datasheet for details.

5.2.2.2 Output Power

RESULT: **Passed**

Test date	:	2012-12-21
Test standard	:	FCC Part 15.247(b)(3), RSS-210 A8.4(4)
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

For the 802.11n modes, the EUT can be operated in 2x2 MIMO mode. Therefore, for those modes, in the tables below the limits are reduced by 3 dB.
.

Table 52: Test result of Output Power, 802.11a

Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	5745	22.62	0.1828	1	PASS
Middle Channel	5785	22.21	0.1663	1	PASS
High Channel	5825	22.39	0.1734	1	PASS

Table 53: Test result of Output Power, 802.11n (20MHz)

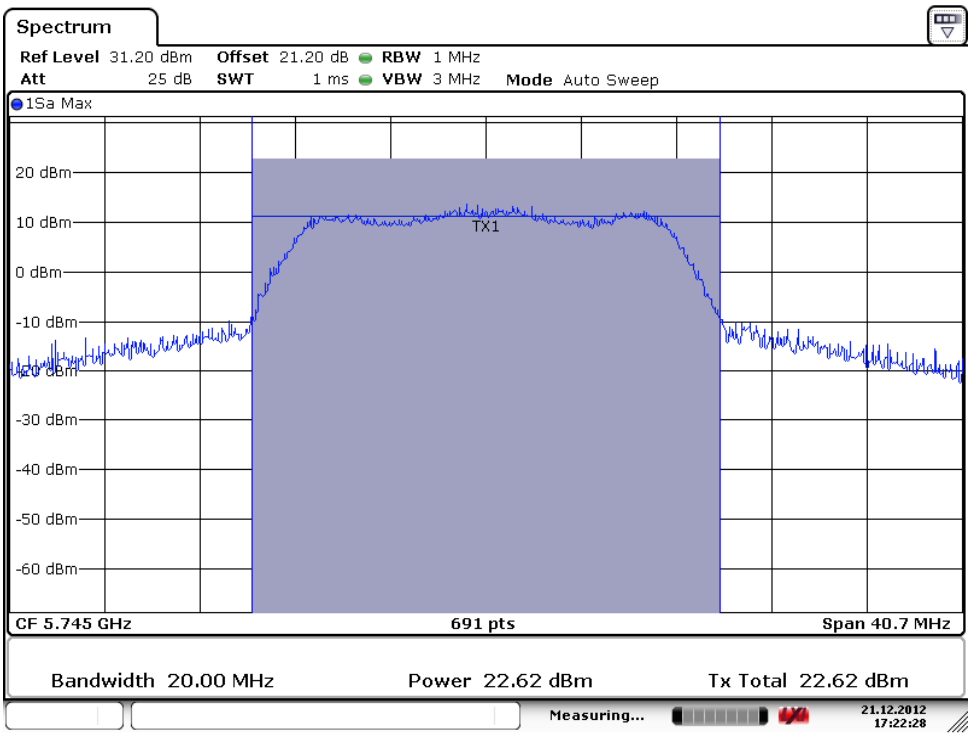
Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	5745	21.38	0.1374	0.5	PASS
Middle Channel	5785	21.54	0.1426	0.5	PASS
High Channel	5825	21.57	0.1435	0.5	PASS

Table 54: Test result of Output Power, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	Peak Output Power		Limit	Result
		(dBm)	(W)	(W)	
Low Channel	5755	17.92	0.0619	0.5	PASS
High Channel	5795	17.64	0.0581	0.5	PASS

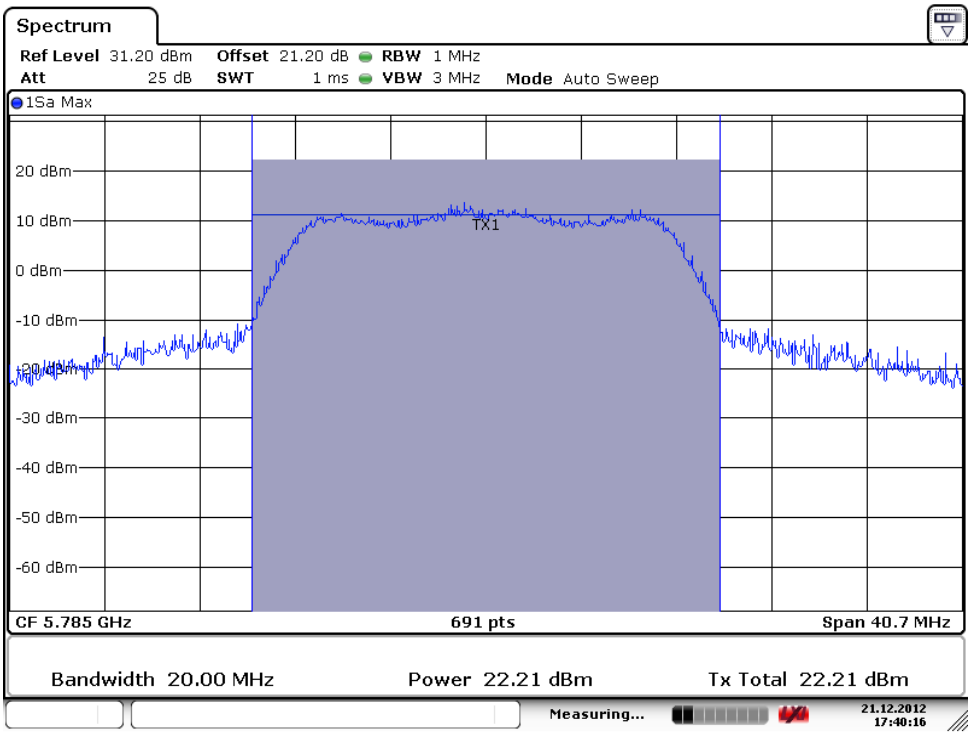
Test Plot of Output Power, 802.11a

Low Channel



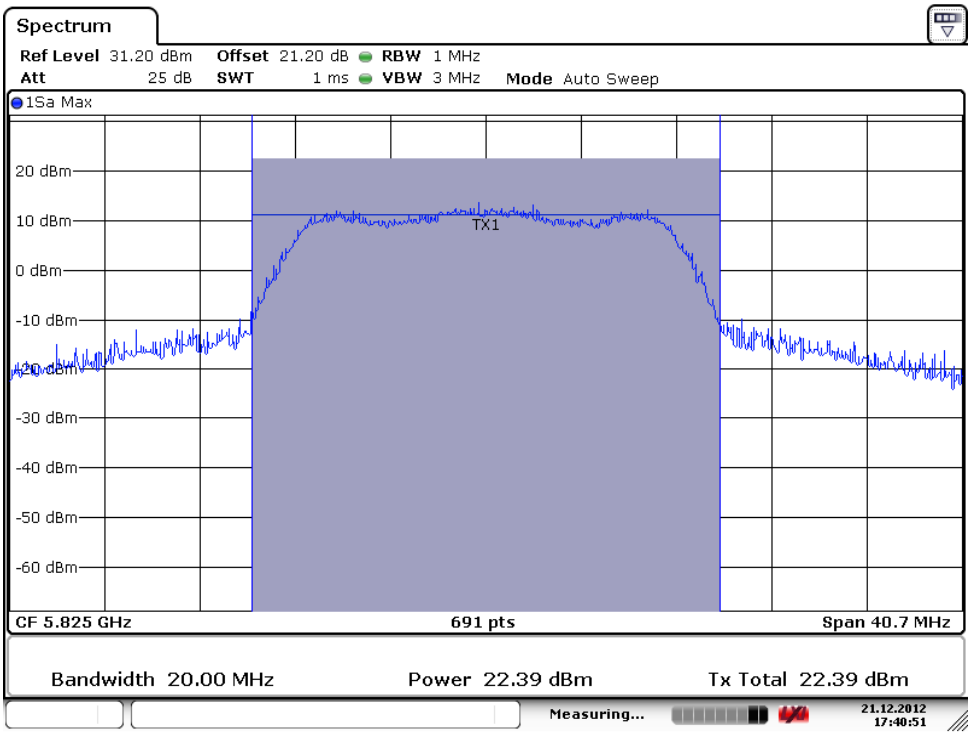
Date: 21.DEC.2012 17:22:29

Middle Channel



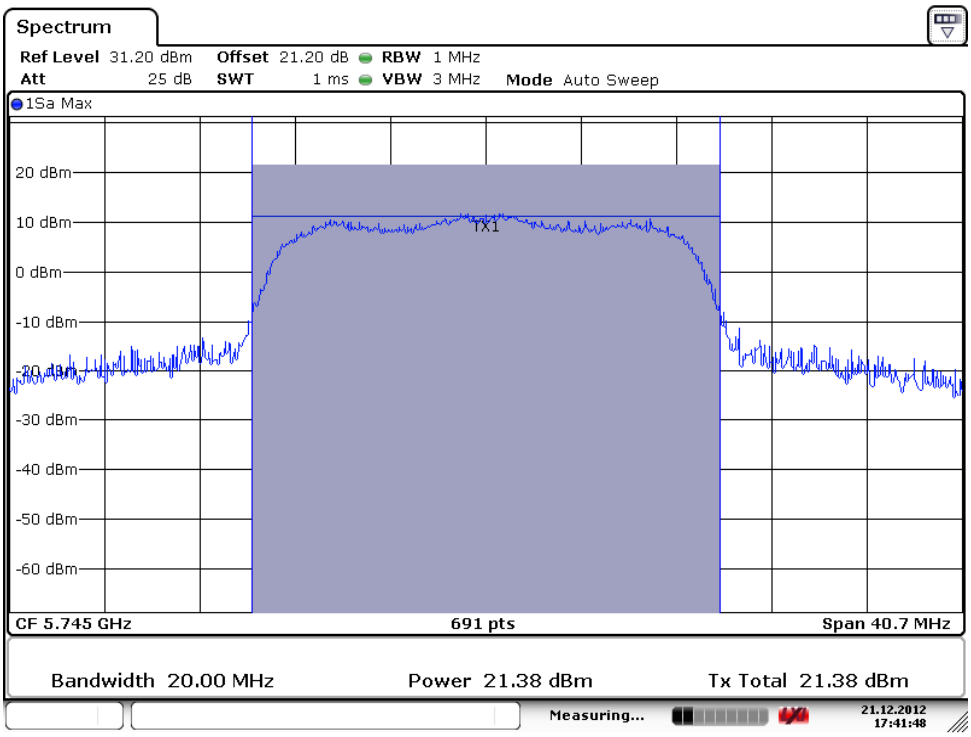
Date: 21.DEC.2012 17:40:16

High Channel



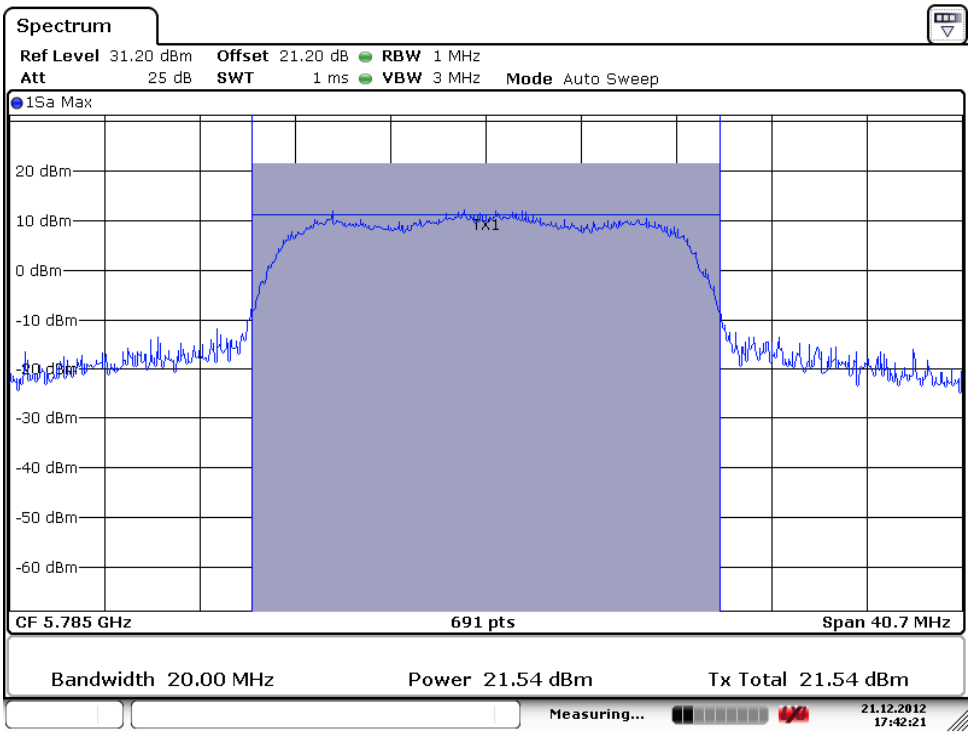
Test Plot of Output Power, 802.11n (20MHz)

Low Channel



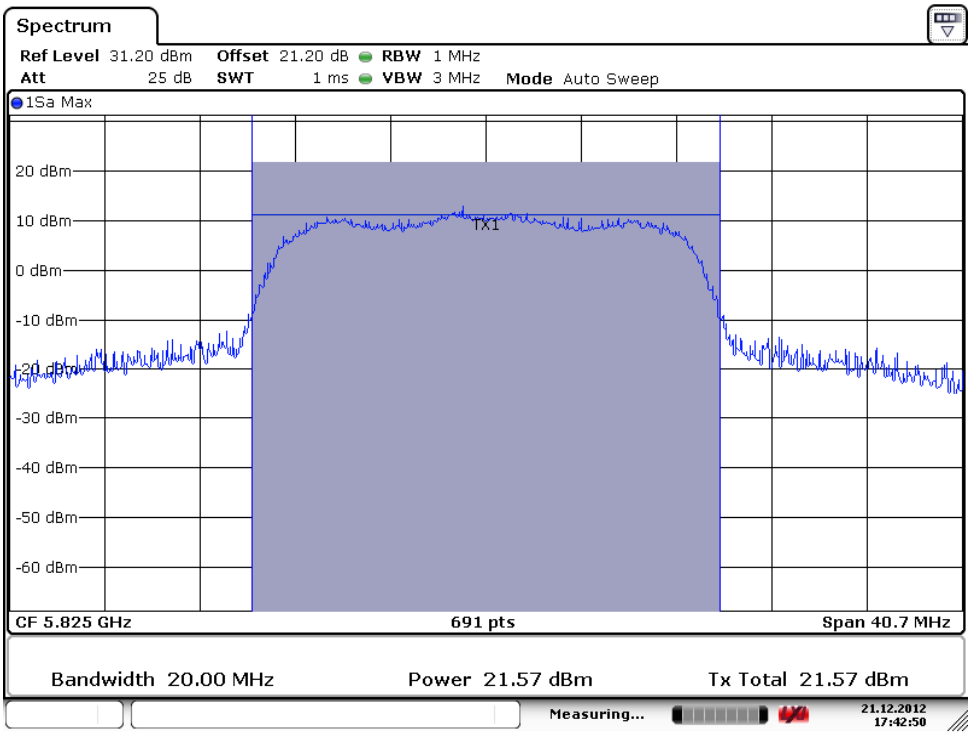
Date: 21.DEC.2012 17:41:48

Middle Channel



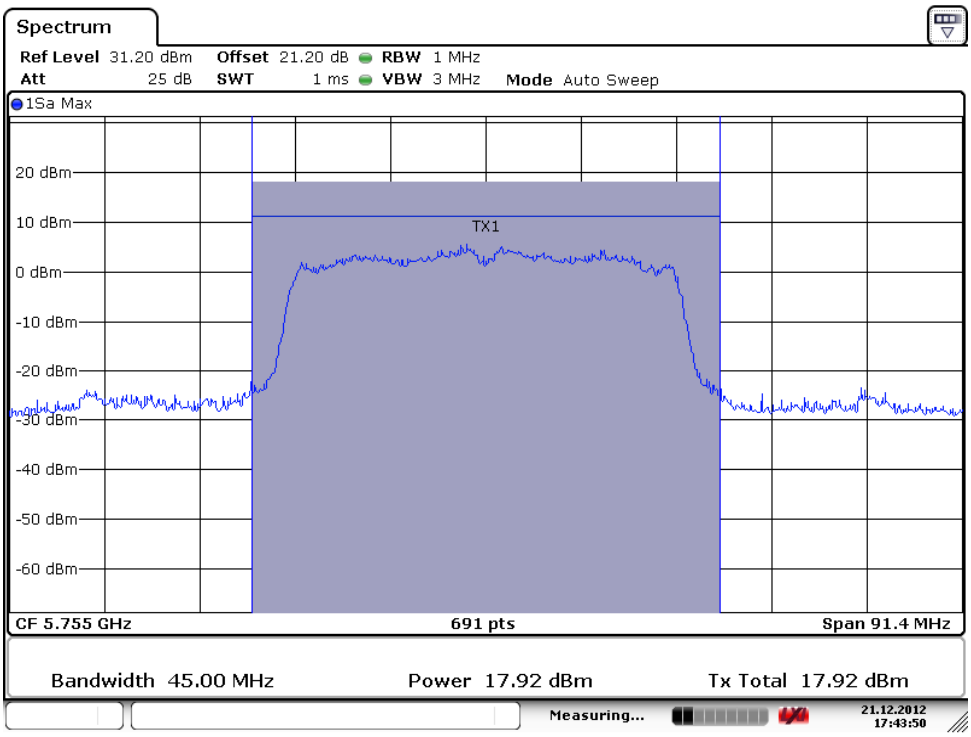
Date: 21.DEC.2012 17:42:22

High Channel



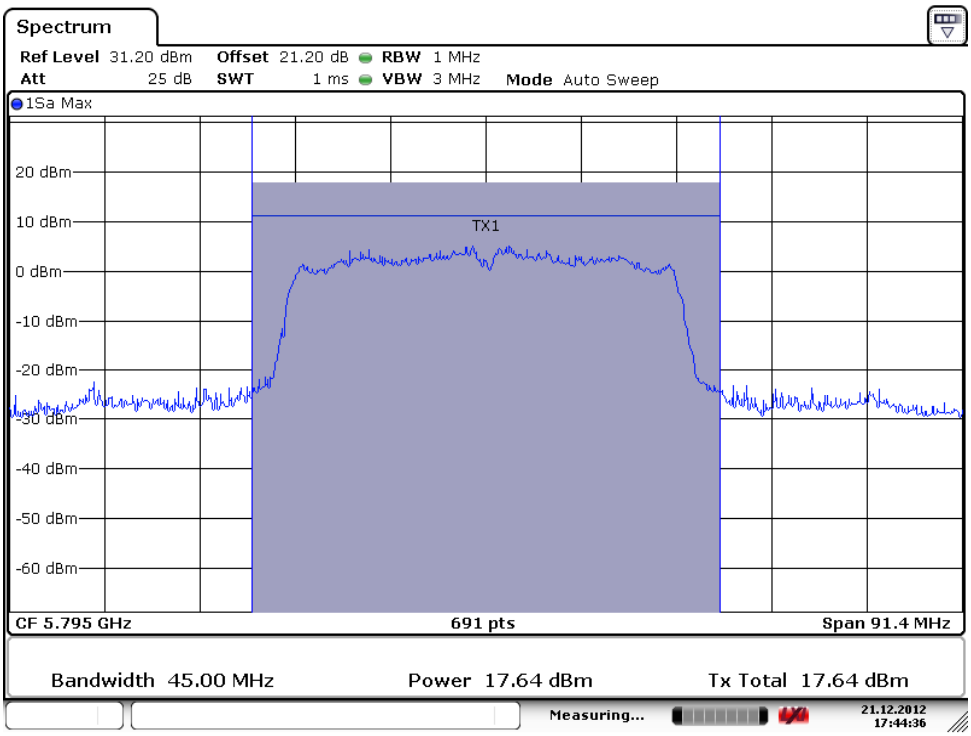
Test Plot of Output Power, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 17:43:51

High Channel



Date: 21.DEC.2012 17:44:36

5.2.2.3 6dB and 99% Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC Part 15.247(a)(2), RSS-210 A8.2(1)
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 55: Test result of 6dB Bandwidth, 802.11a

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5745	16.035	≧0.5	Pass
Mid Channel	5785	16.324	≧0.5	Pass
High Channel	5825	16.324	≧0.5	Pass

Table 56: Test result of 6dB Bandwidth, 802.11n (20MHz)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5745	17.54	≧0.5	Pass
Mid Channel	5785	16.729	≧0.5	Pass
High Channel	5825	17.54	≧0.5	Pass

Table 57: Test result of 6dB Bandwidth, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5755	36.469	≧0.5	Pass
High Channel	5795	36.44	≧0.5	Pass

Table 58: Test result of 99% Bandwidth, 802.11a

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	5745	16.541	/
Mid Channel	5785	16.541	/
High Channel	5825	16.541	/

Table 59: Test result of 99% Bandwidth, 802.11n (20MHz)

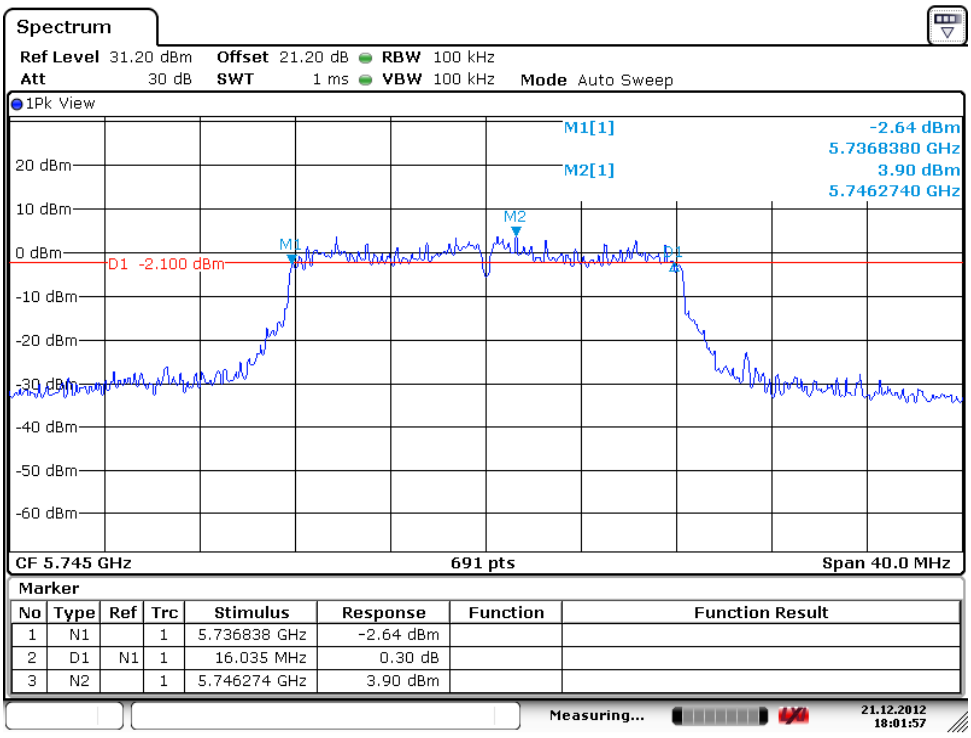
Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	5745	17.67	/
Mid Channel	5785	17.67	/
High Channel	5825	17.67	/

Table 60: Test result of 99% Bandwidth, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
Low Channel	5755	36.816	/
High Channel	5795	36.903	/

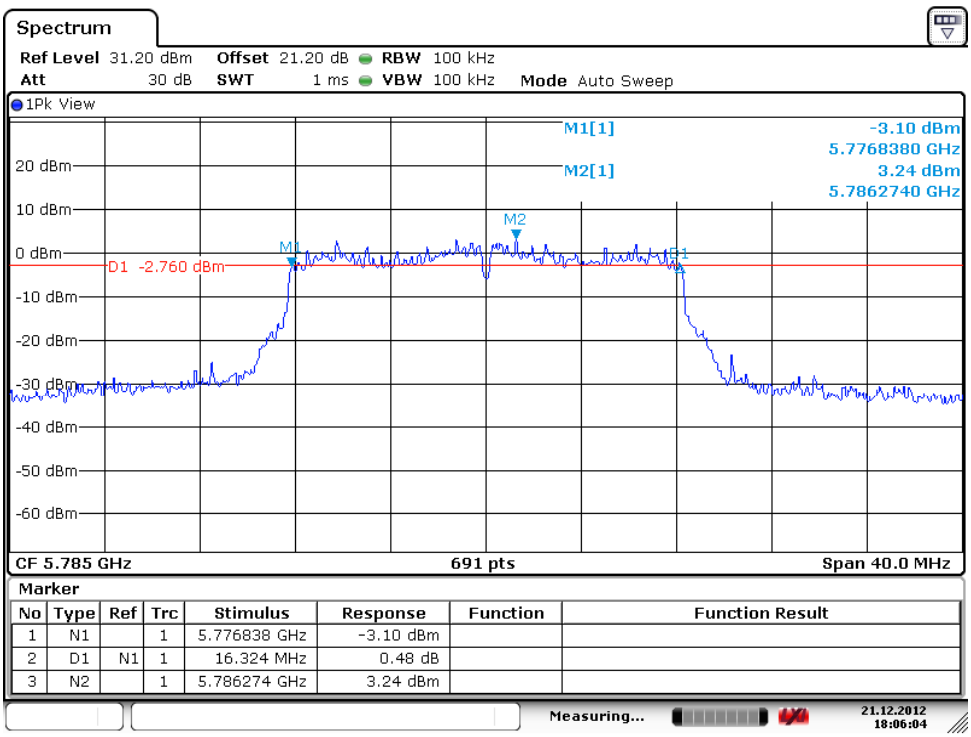
Test Plot of 6dB Bandwidth, 802.11a

Low Channel



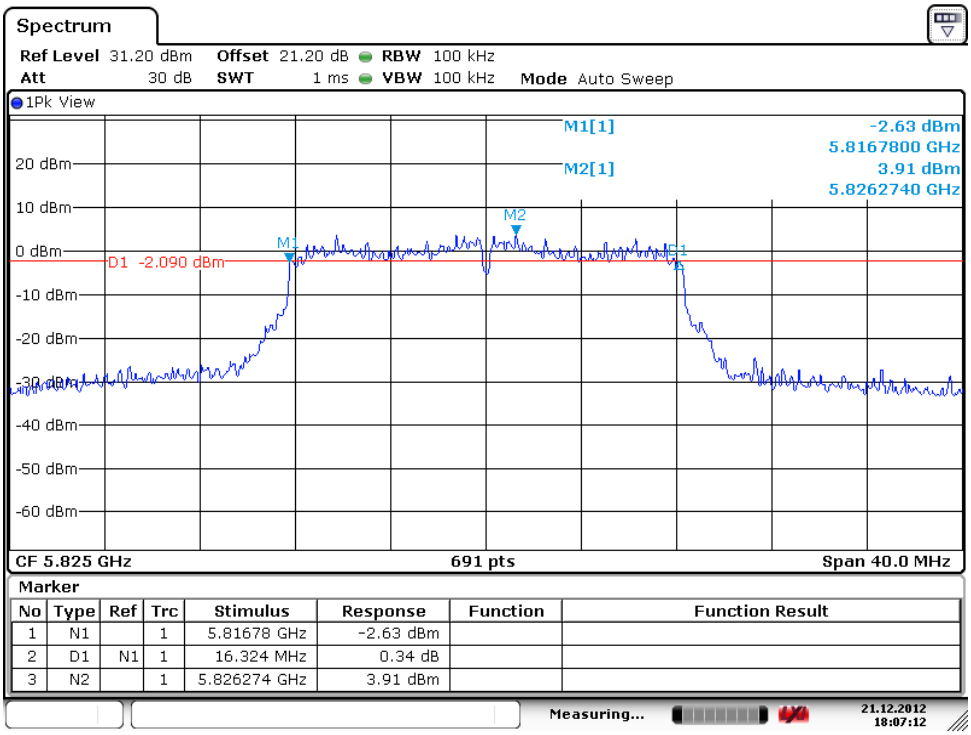
Date: 21.DEC.2012 18:01:58

Middle Channel



Date: 21.DEC.2012 18:06:05

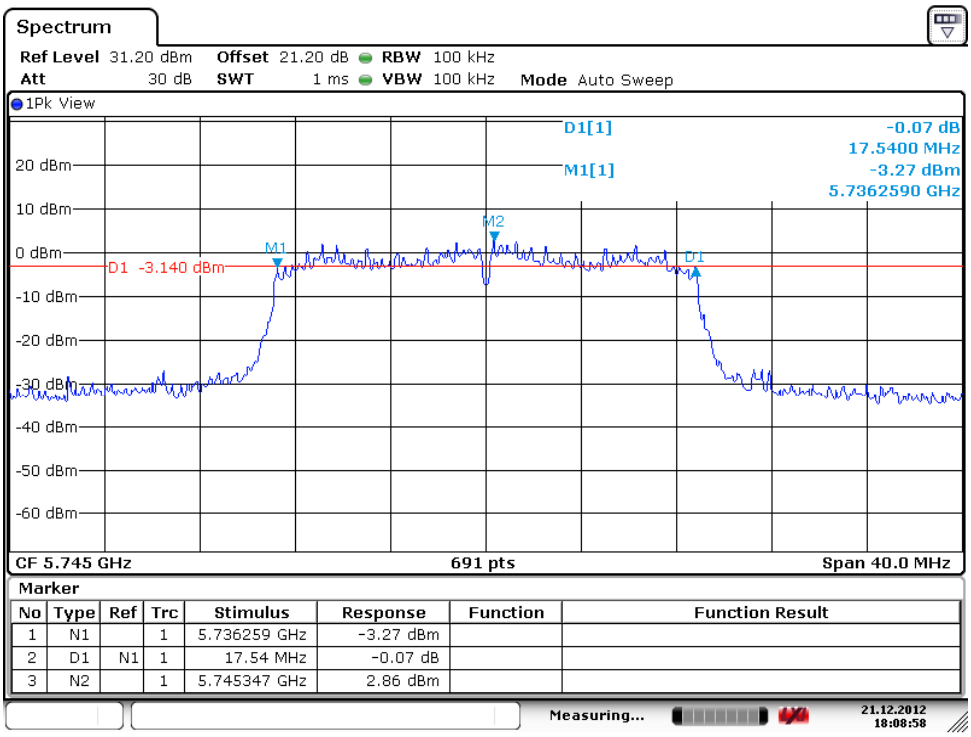
High Channel



Date: 21.DEC.2012 18:07:13

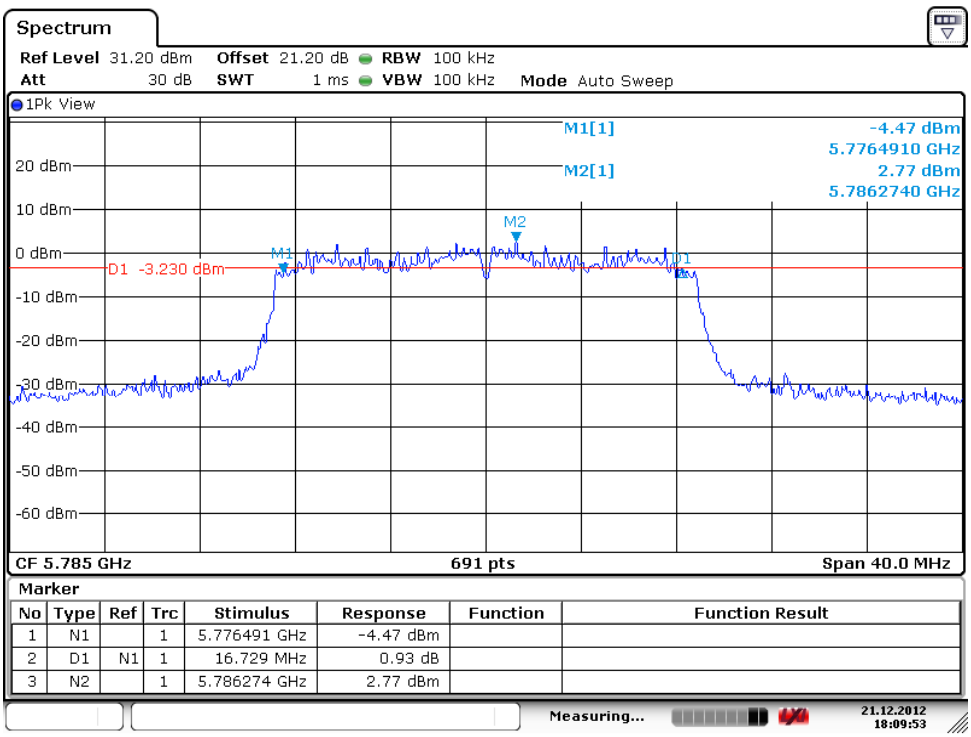
Test Plot of 6dB Bandwidth, 802.11n (20MHz)

Low Channel



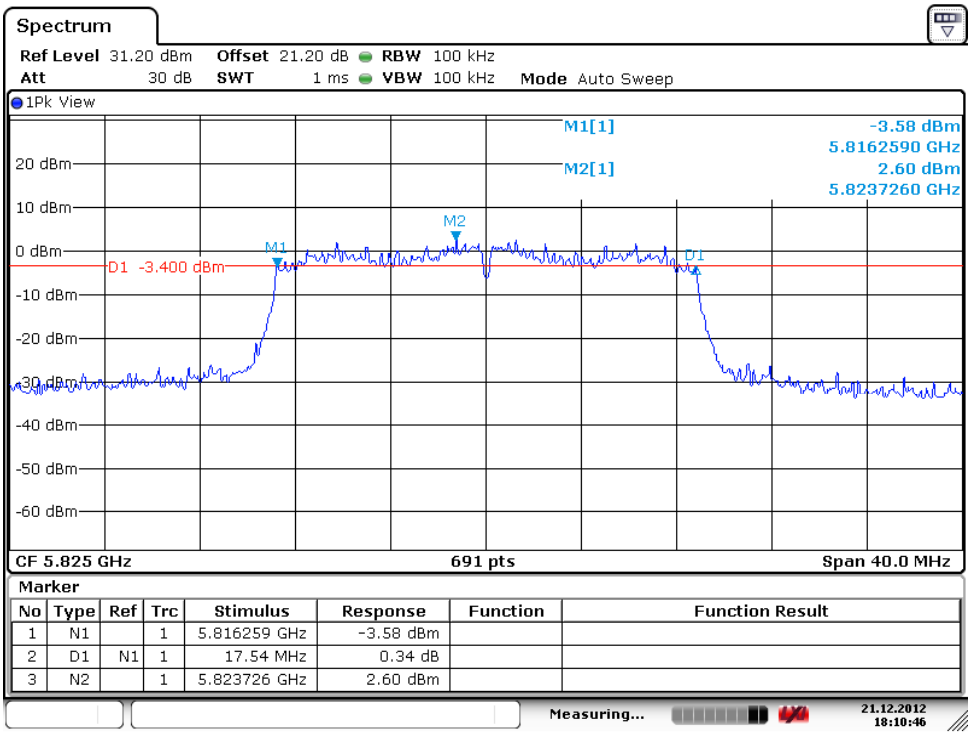
Date: 21.DEC.2012 18:08:58

Middle Channel



Date: 21.DEC.2012 18:09:54

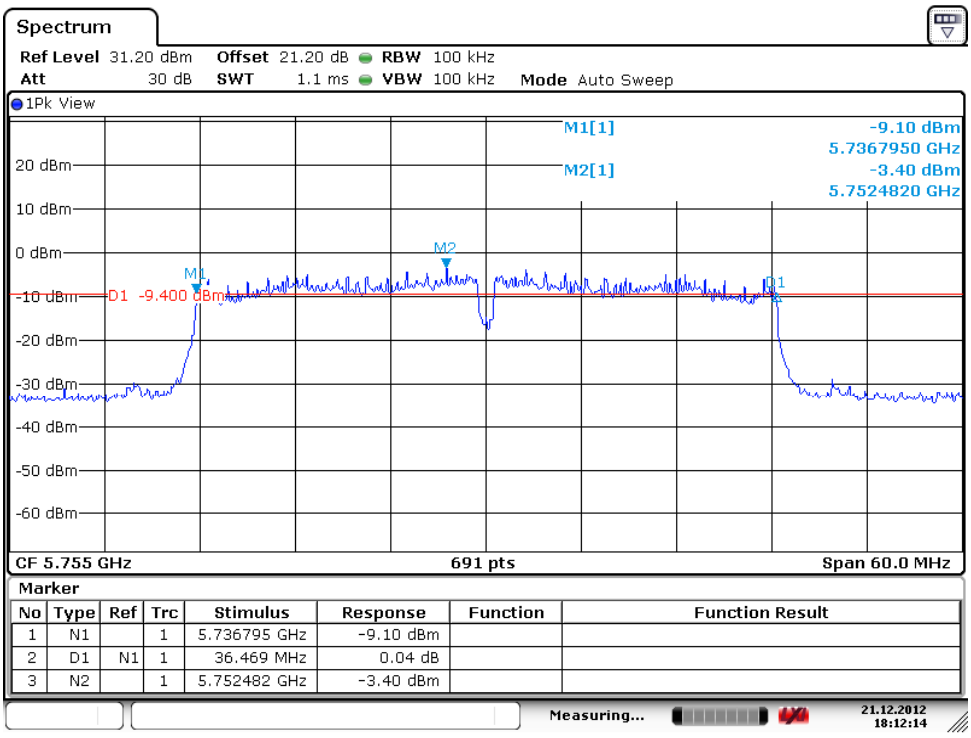
High Channel



Date: 21.DEC.2012 18:10:47

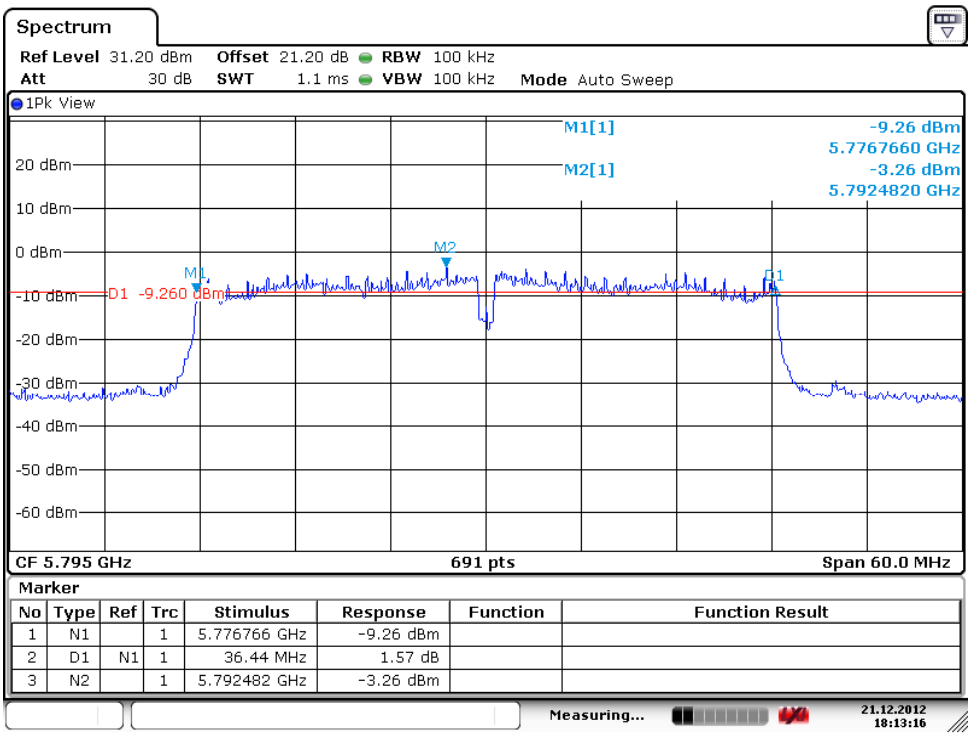
Test Plot of 6dB Bandwidth, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 18:12:14

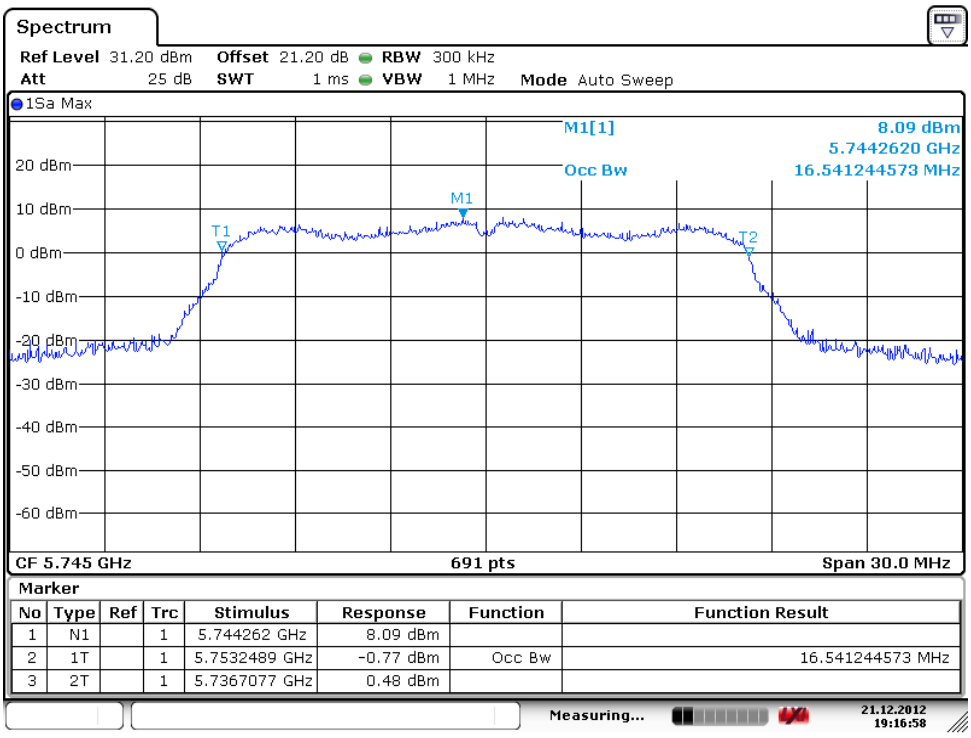
High Channel



Date: 21.DEC.2012 18:13:17

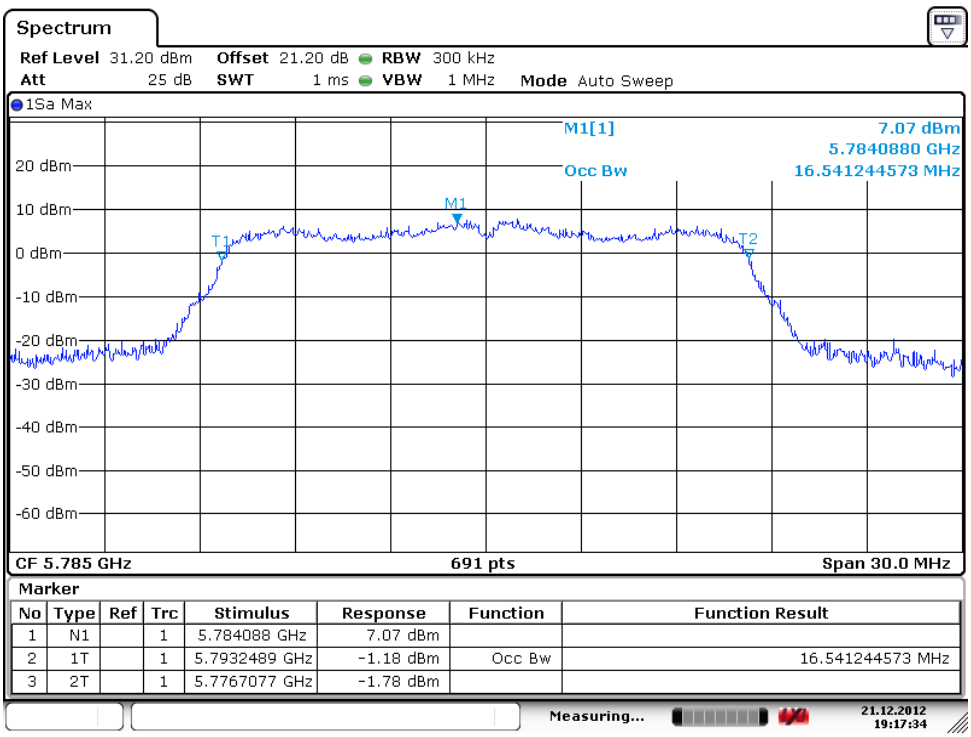
Test Plot of 99% Bandwidth, 802.11a

Low Channel



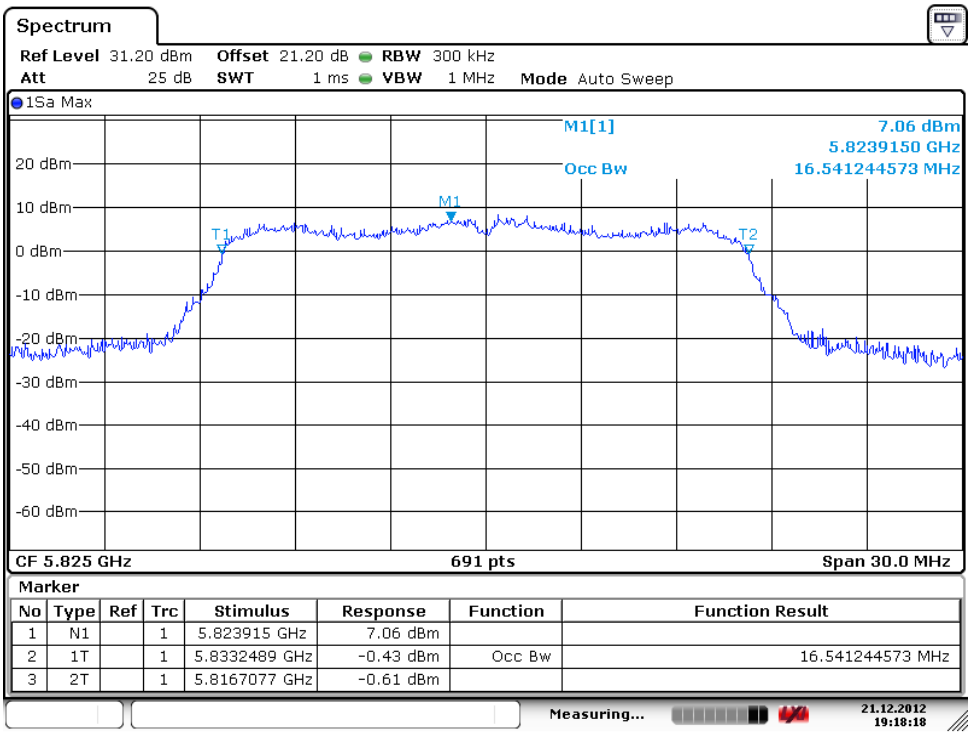
Date: 21.DEC.2012 19:16:57

Middle Channel



Date: 21.DEC.2012 19:17:35

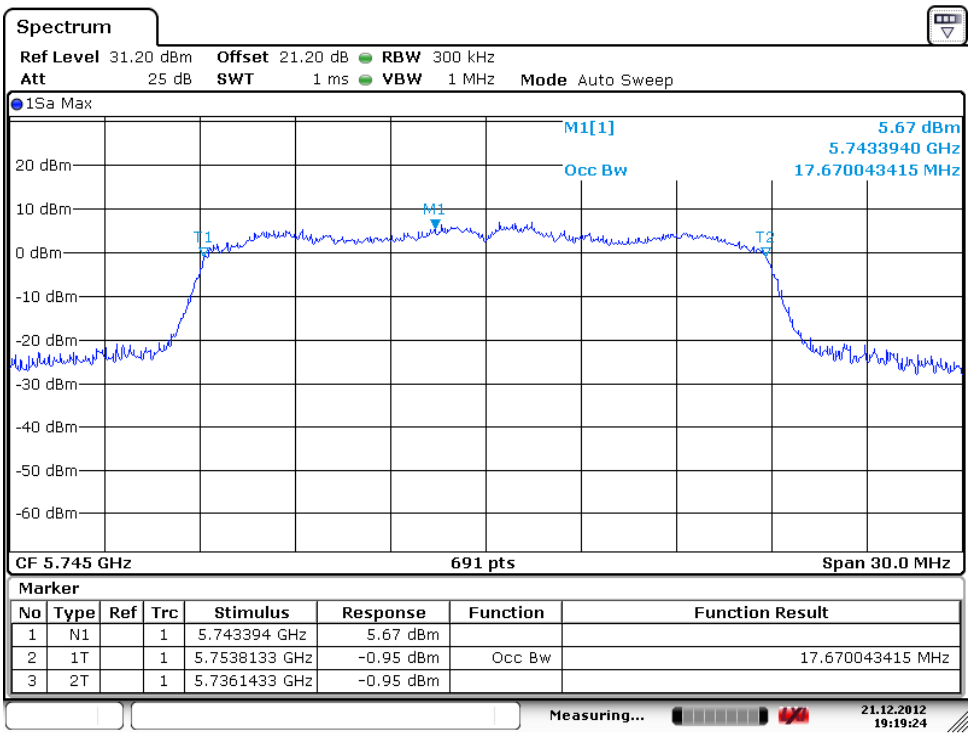
High Channel



Date: 21.DEC.2012 19:18:19

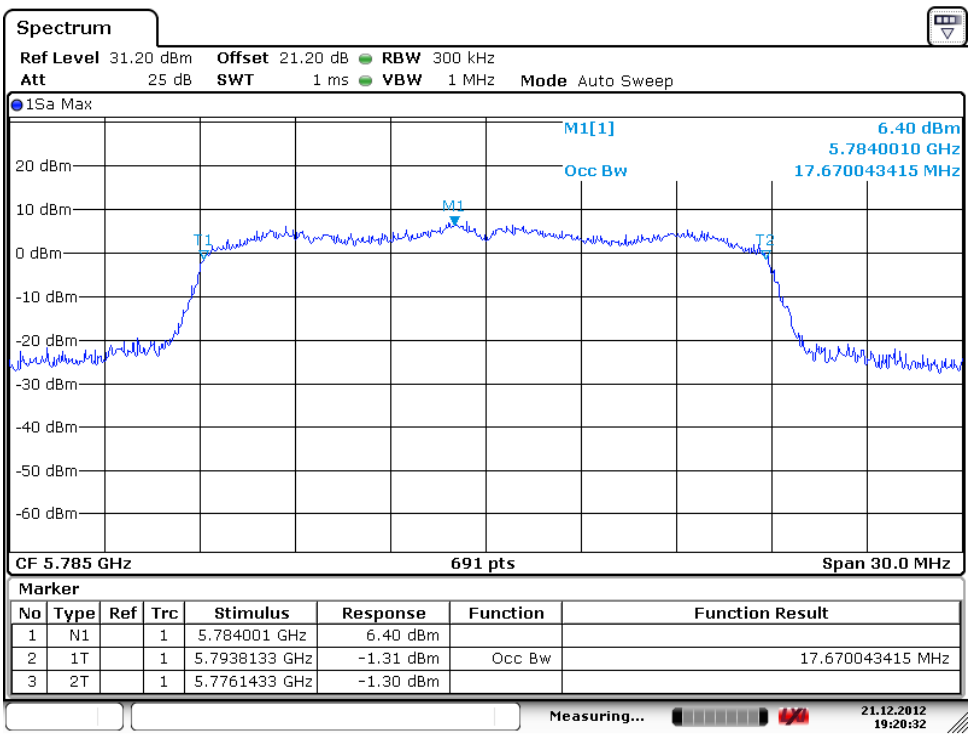
Test Plot of 99% Bandwidth, 802.11n (20MHz)

Low Channel



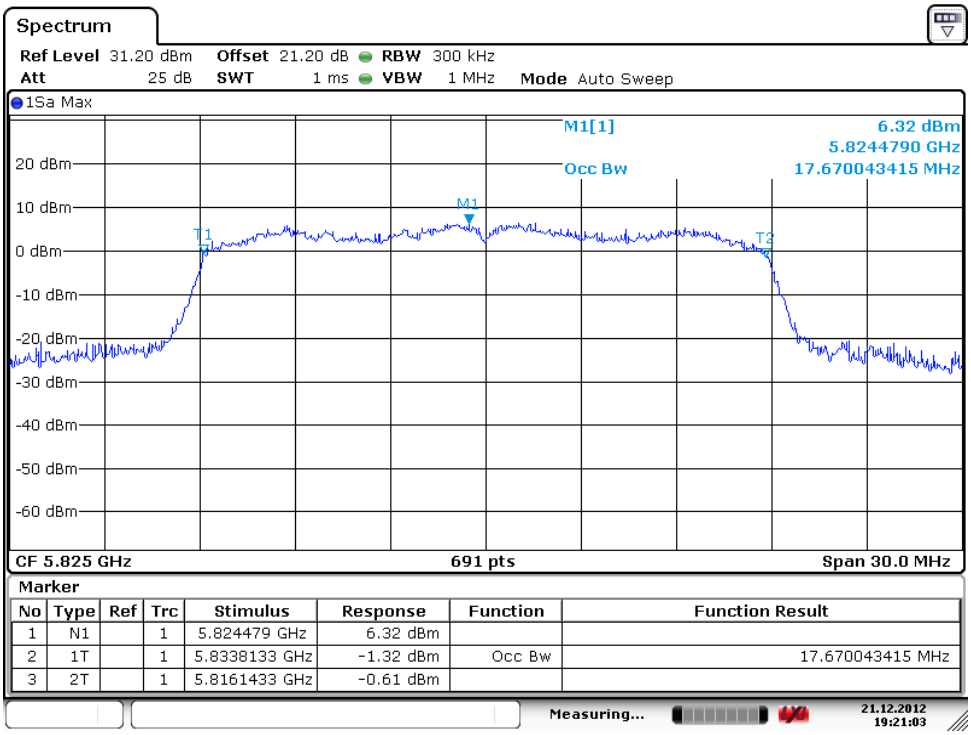
Date: 21.DEC.2012 19:19:24

Middle Channel



Date: 21.DEC.2012 19:20:31

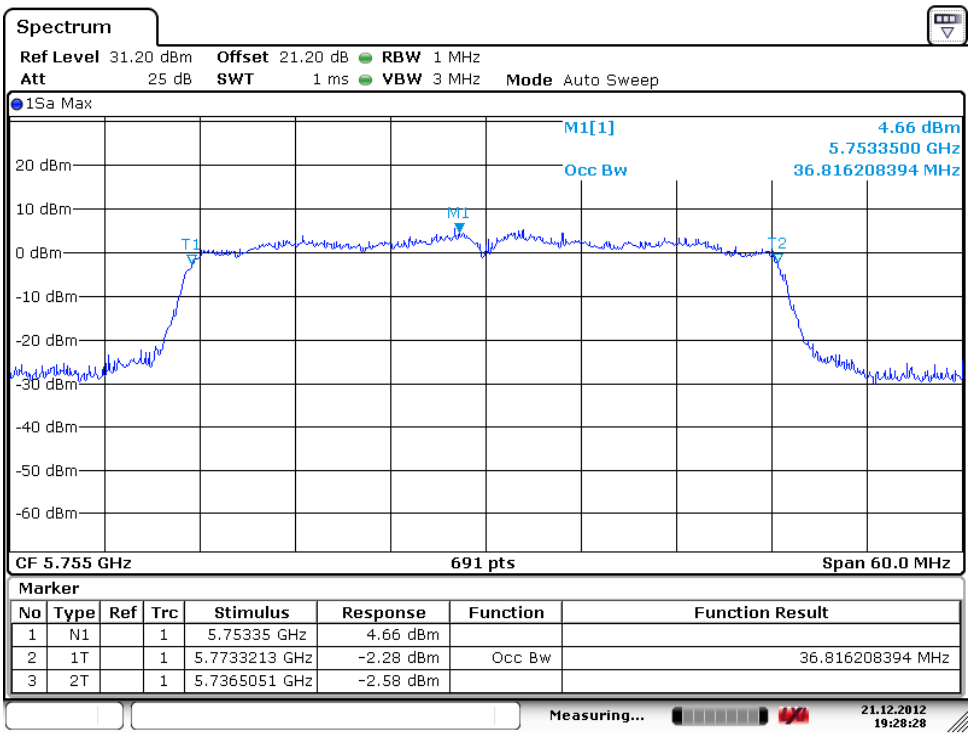
High Channel



Date: 21.DEC.2012 19:21:04

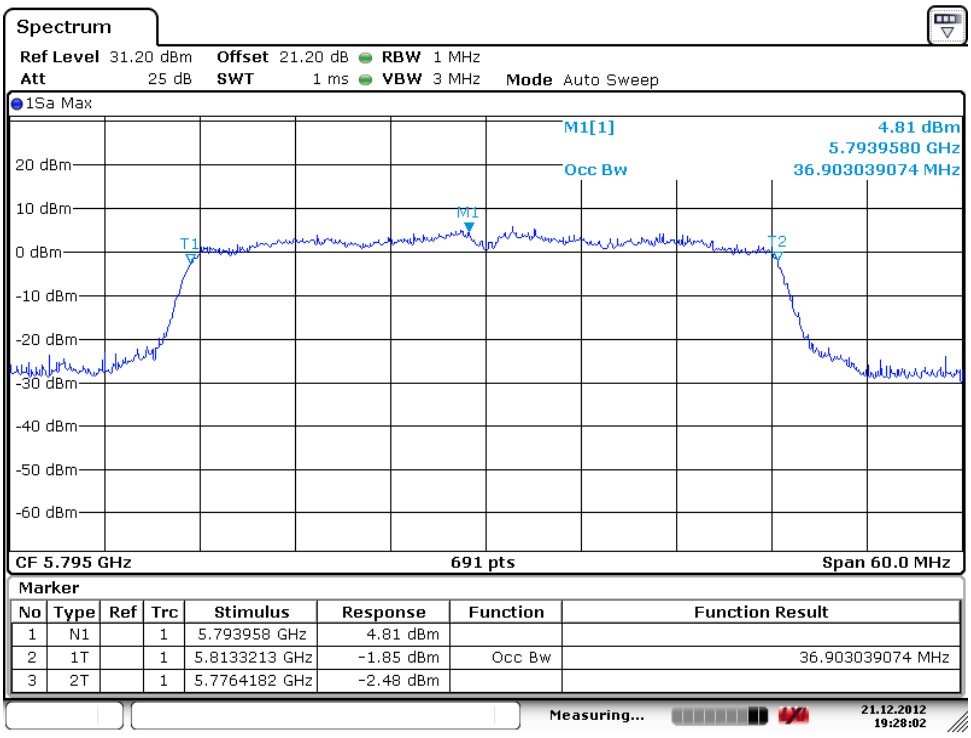
Test Plot of 99% Bandwidth, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 19:28:28

High Channel



Date: 21.DEC.2012 19:28:02

5.2.2.4 Power Density

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC Part 15.247(e), A8.2(2)
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

For the 802.11n modes, the EUT can be operated in 2x2 MIMO mode. Therefore, for those modes, in the tables below the limits are reduced by 3 dB.

Table 61: Test result of Power Density, 802.11a

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	5745	-14.9	8	Pass
Mid Channel	5785	-10.81	8	Pass
High Channel	5825	-12.43	8	Pass

Table 62: Test result of Power Density, 802.11n (20MHz)

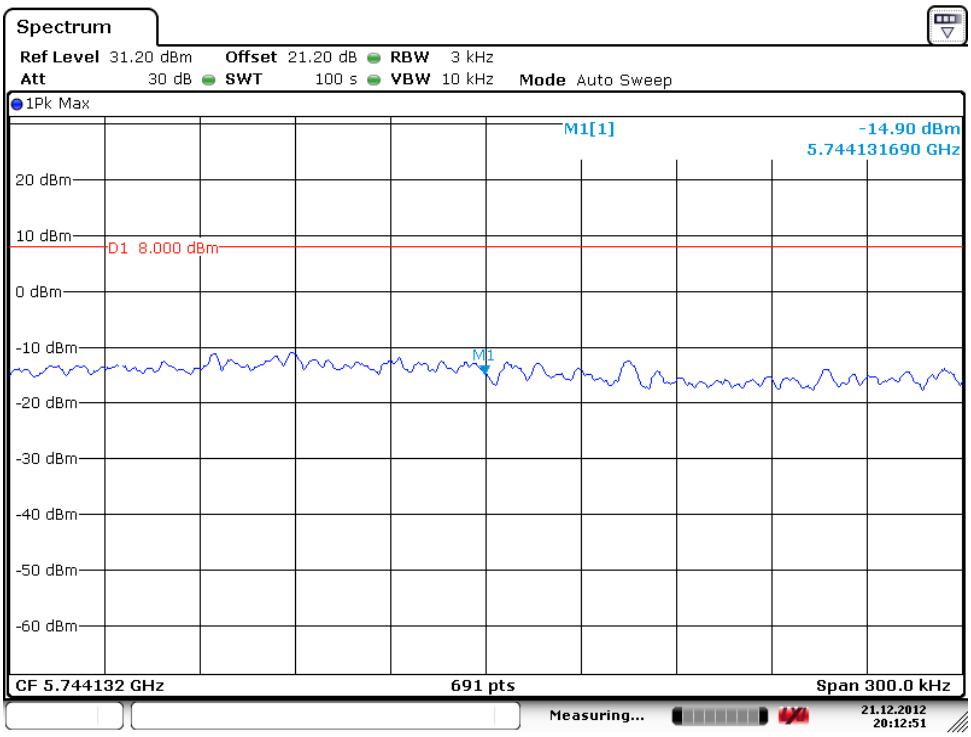
Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	5745	-10.84	8-3	Pass
Mid Channel	5785	-10.34	8-3	Pass
High Channel	5825	-11.17	8-3	Pass

Table 63: Test result of Power Density, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	5755	-17.41	8-3	Pass
High Channel	5795	-20.1	8-3	Pass

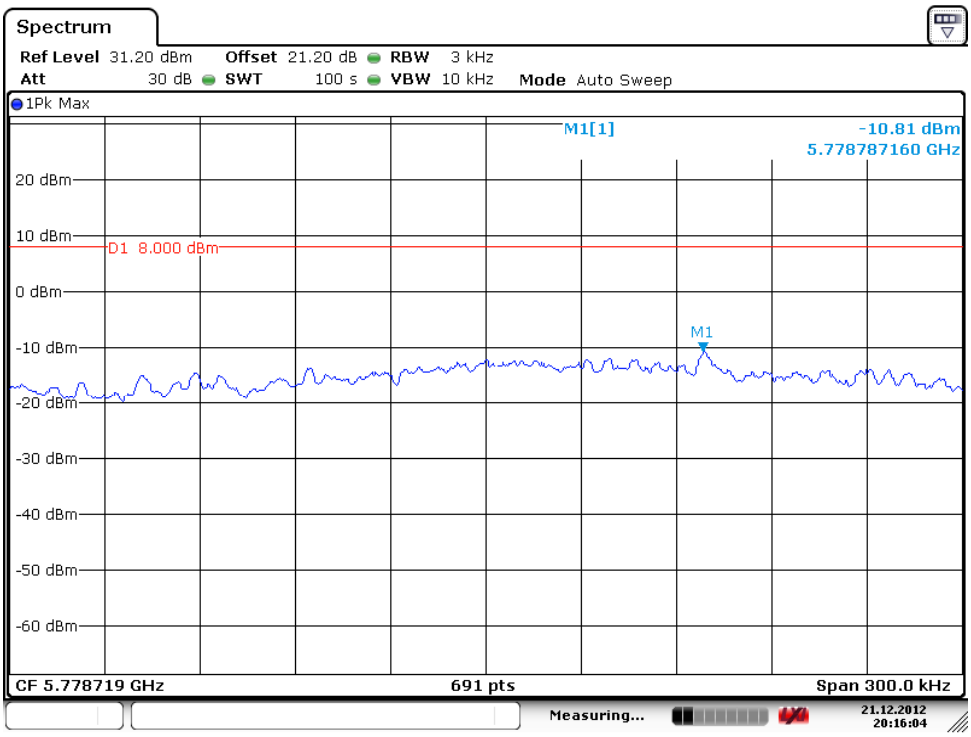
Test Plot of Power Density, 802.11a

Low Channel



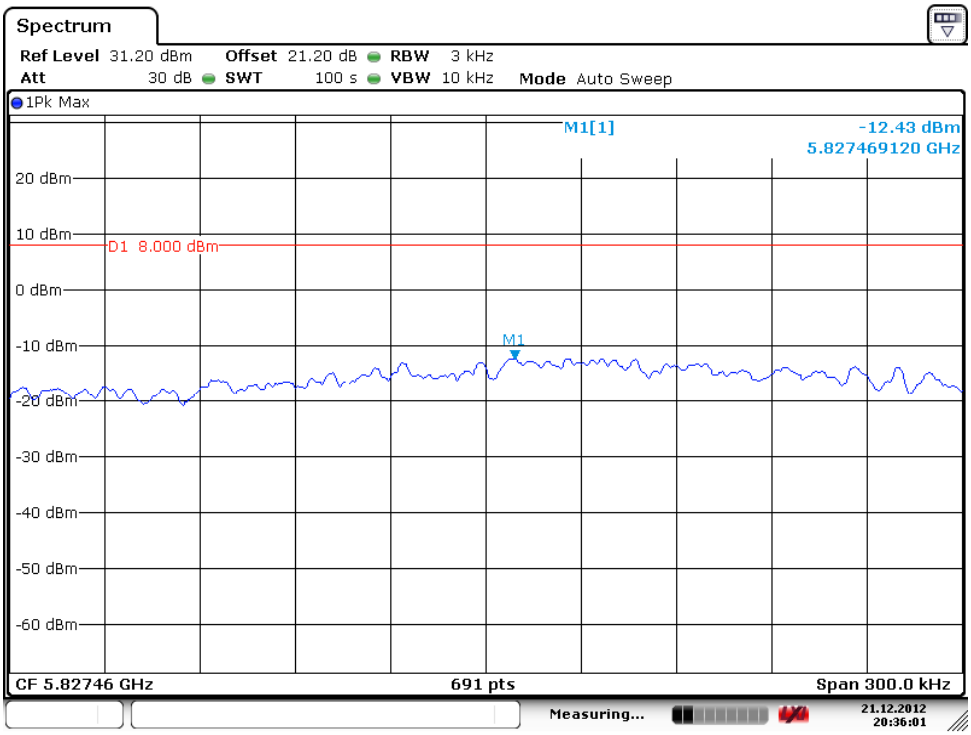
Date: 21.DEC.2012 20:12:51

Middle Channel



Date: 21.DEC.2012 20:16:05

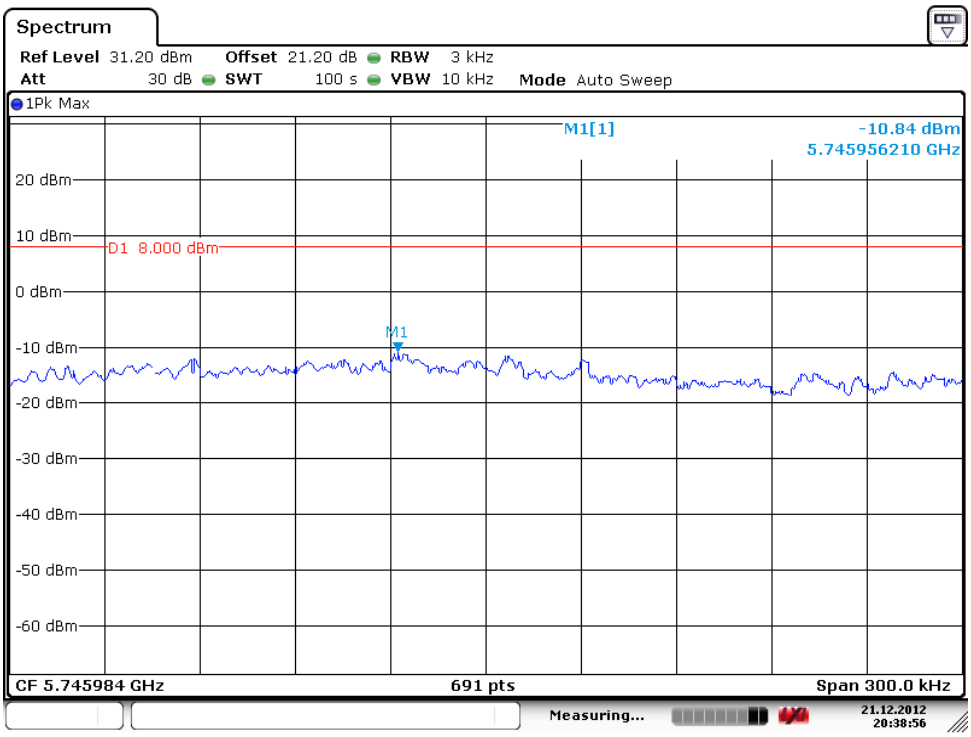
High Channel



Date: 21.DEC.2012 20:36:02

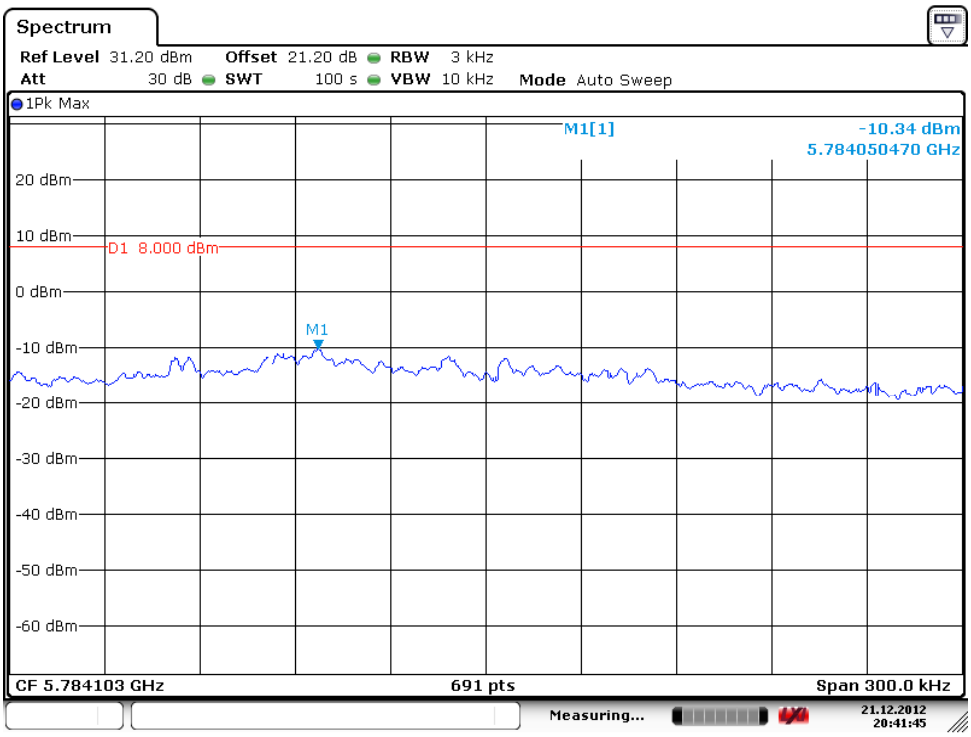
Test Plot of Power Density, 802.11n (20MHz)

Low Channel



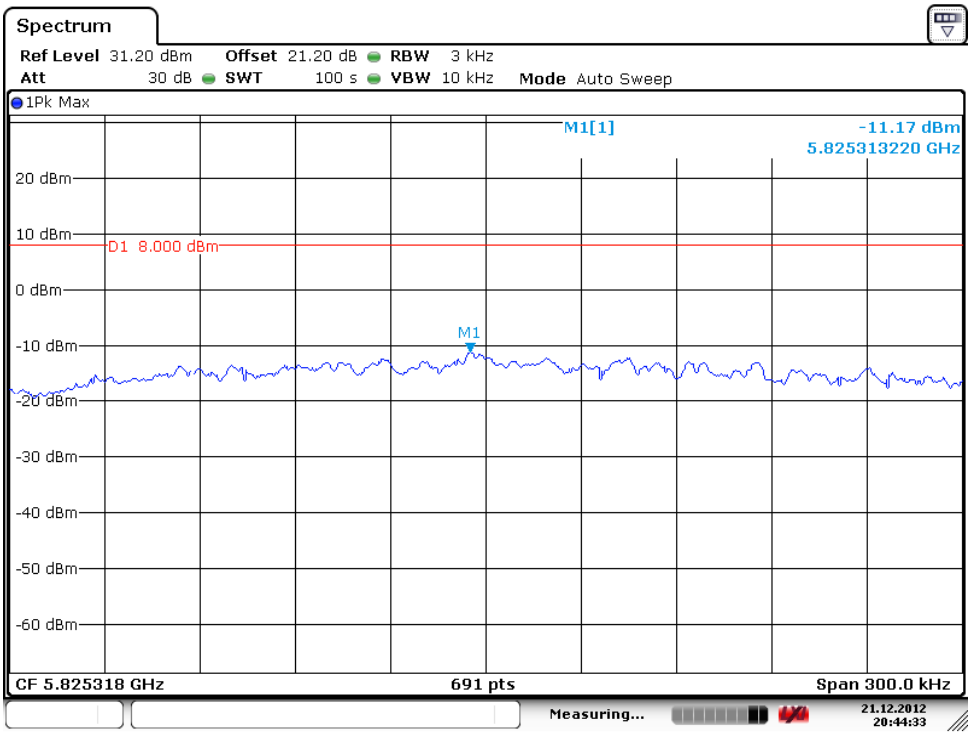
Date: 21.DEC.2012 20:38:57

Middle Channel



Date: 21.DEC.2012 20:41:46

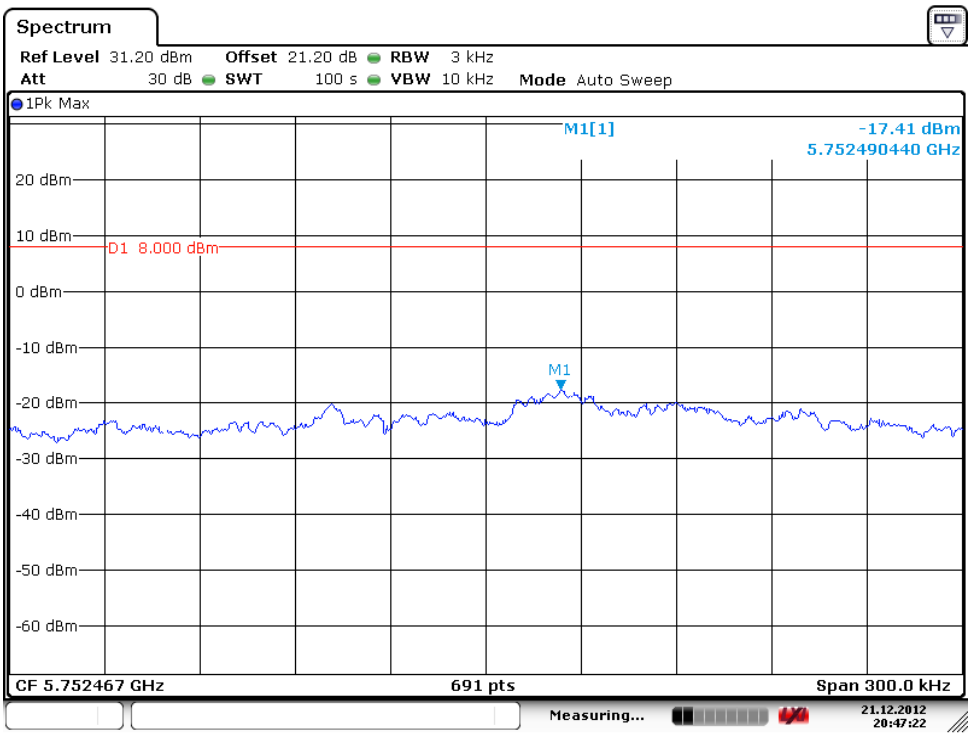
High Channel



Date: 21.DEC.2012 20:44:34

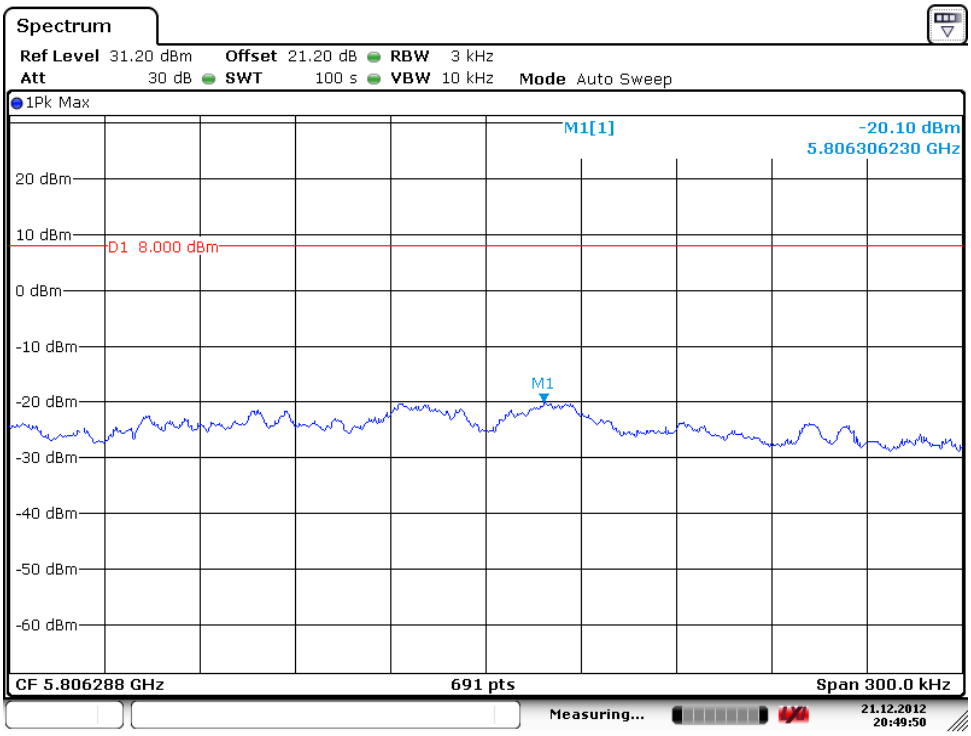
Test Plot of Power Density, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 20:47:22

High Channel



Date: 21.DEC.2012 20:49:50

5.2.2.5 Conducted spurious emissions measured in 100kHz Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-21
Test standard	:	FCC part 15.247(d), RSS-210 A8.5
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded room

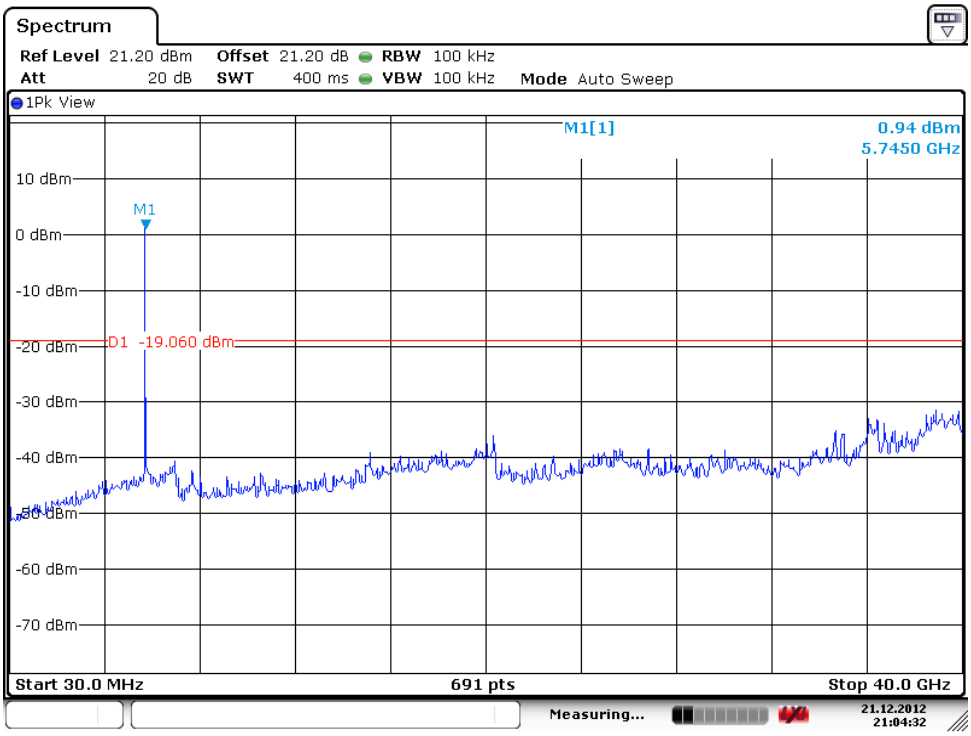
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

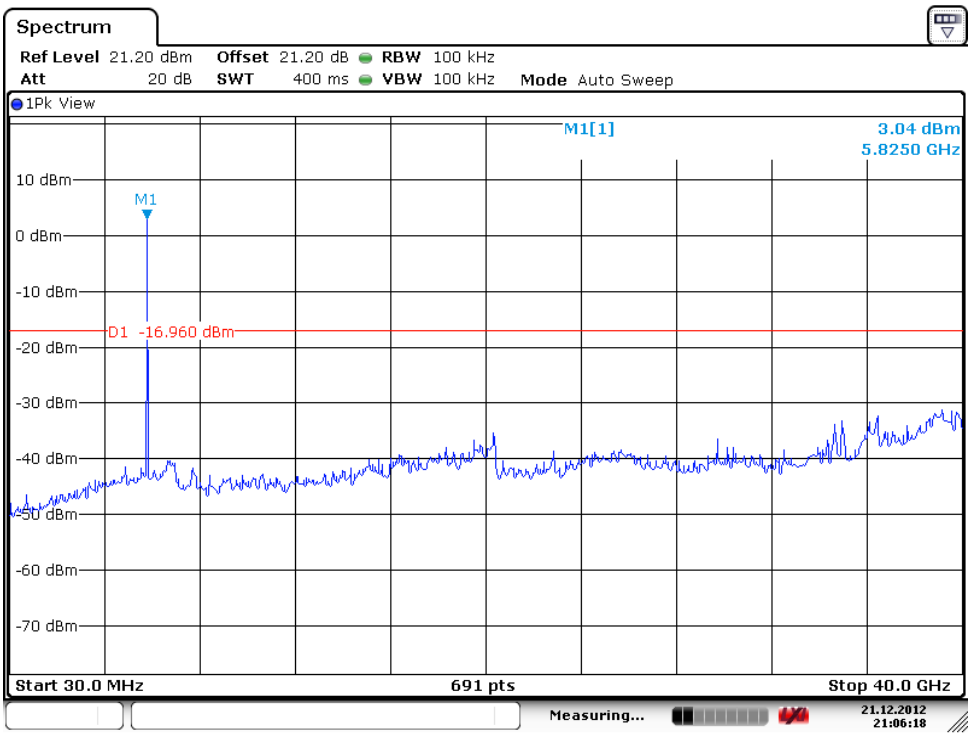
Test Plot of 100kHz Conducted Emissions, 802.11a

Low Channel



Date: 21.DEC.2012 21:04:33

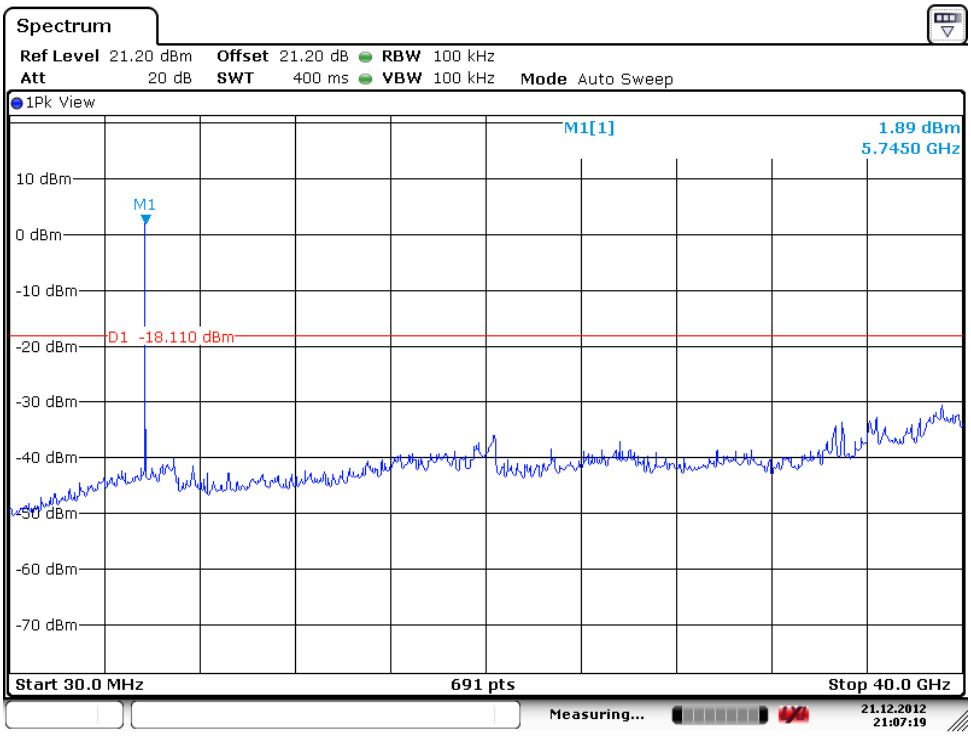
High Channel



Date: 21.DEC.2012 21:06:18

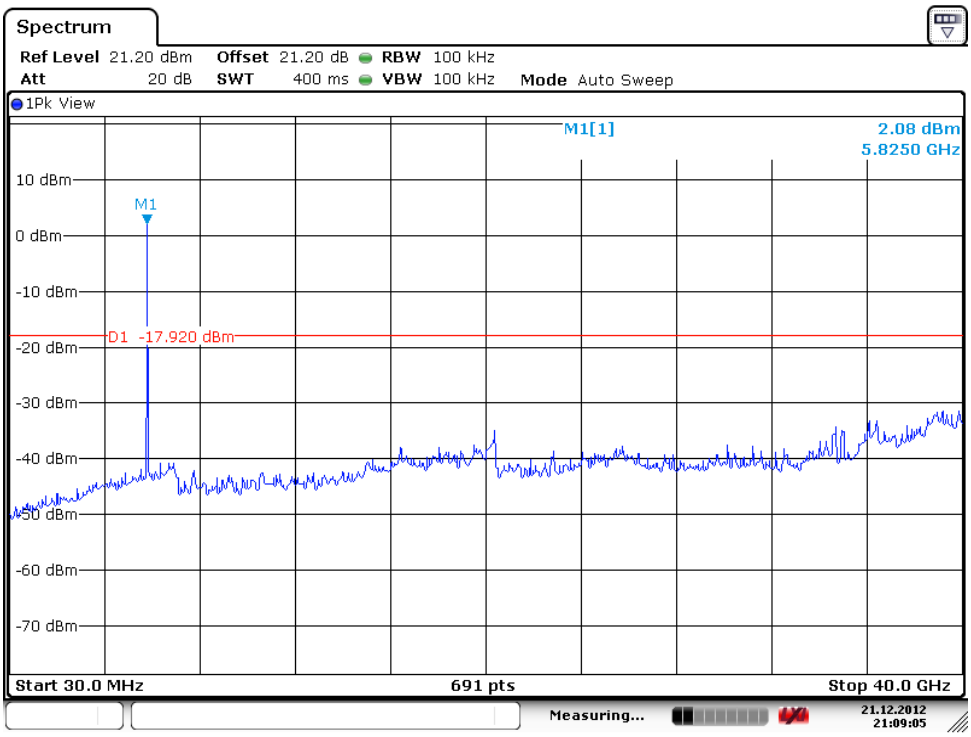
Test Plot of 100kHz Conducted Emissions, 802.11n (20MHz)

Low Channel



Date: 21.DEC.2012 21:07:20

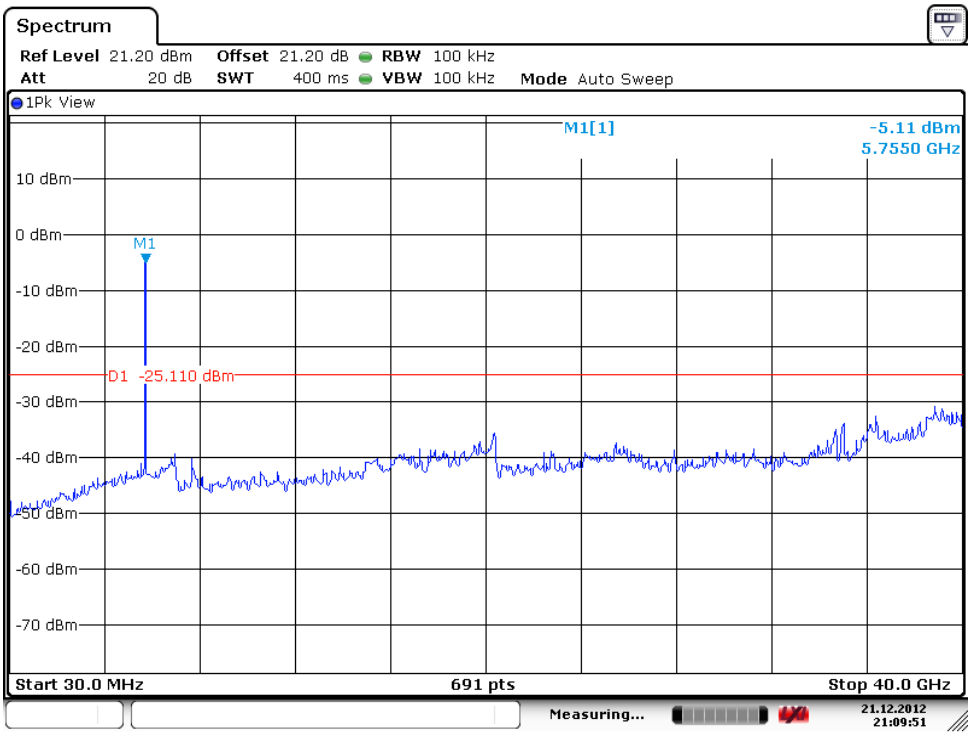
High Channel



Date: 21.DEC.2012 21:09:06

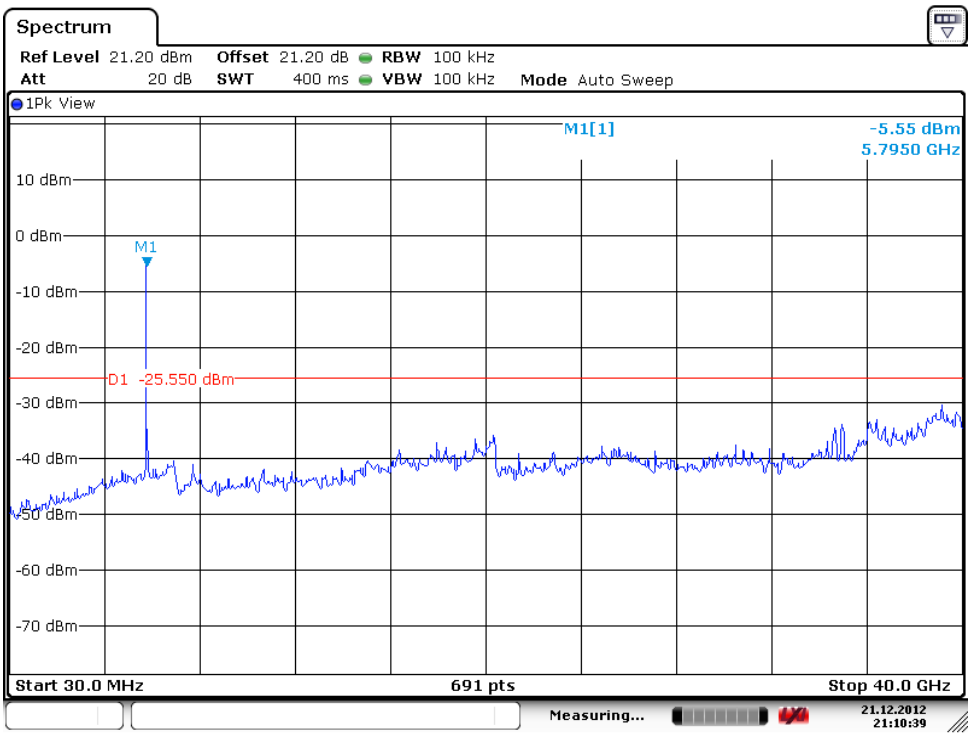
Test Plot of 100kHz Conducted Emissions, 802.11n (40MHz)

Low Channel



Date: 21.DEC.2012 21:09:52

High Channel



Date: 21.DEC.2012 21:10:38

5.2.3 Antenna Ports Aggregation (TX0+TX1)

5.2.3.1 Power Density

RESULT: **Passed**

Date of testing	:	2012-12-22
Test standard	:	FCC Part 15.247(e) , A8.2(2)
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

For the 802.11n modes, the EUT can be operated in 2x2 MIMO mode. Therefore, for those modes, in the tables below the limits are reduced by 3 dB.

Table 64: Test result of Power Density, 802.11n (20MHz)

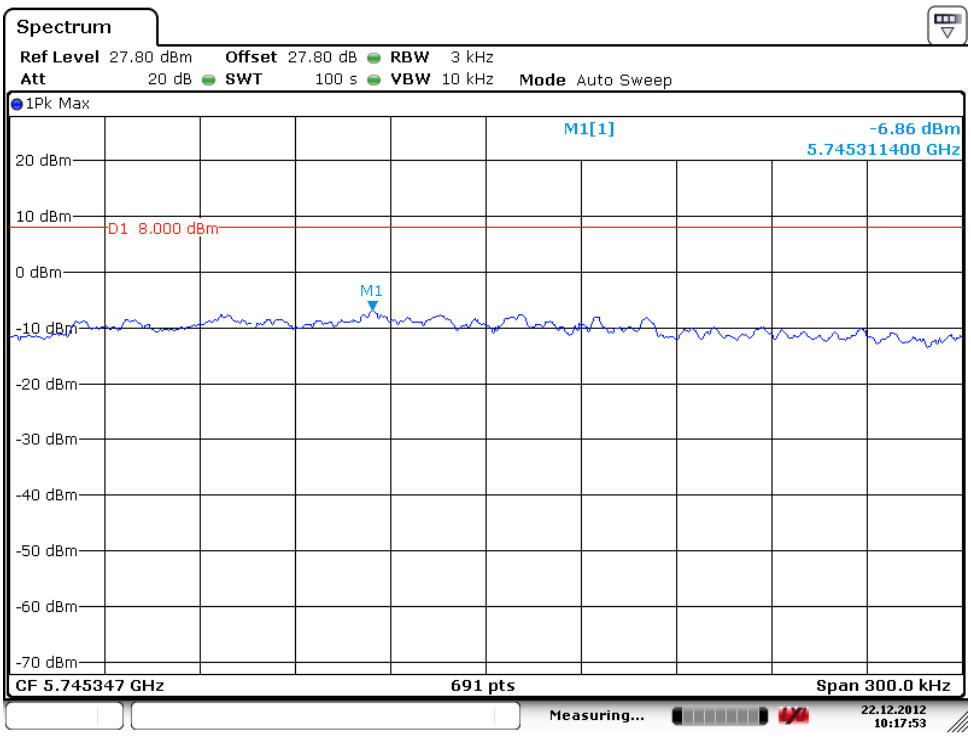
Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	5745	-6.86	8-3	Pass
Mid Channel	5785	-7.66	8-3	Pass
High Channel	5825	-6.33	8-3	Pass

Table 65: Test result of Power Density, 802.11n (40MHz)

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	5755	-16.52	8-3	Pass
High Channel	5795	-16.36	8-3	Pass

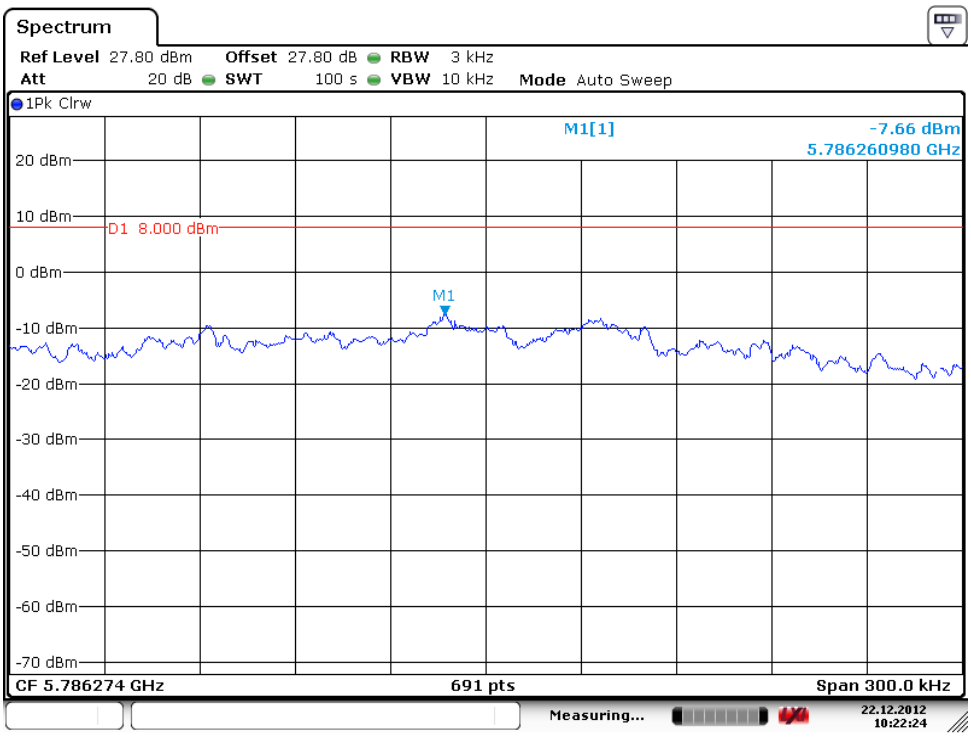
Test Plot of Power Density, 802.11n (20MHz)

Low Channel



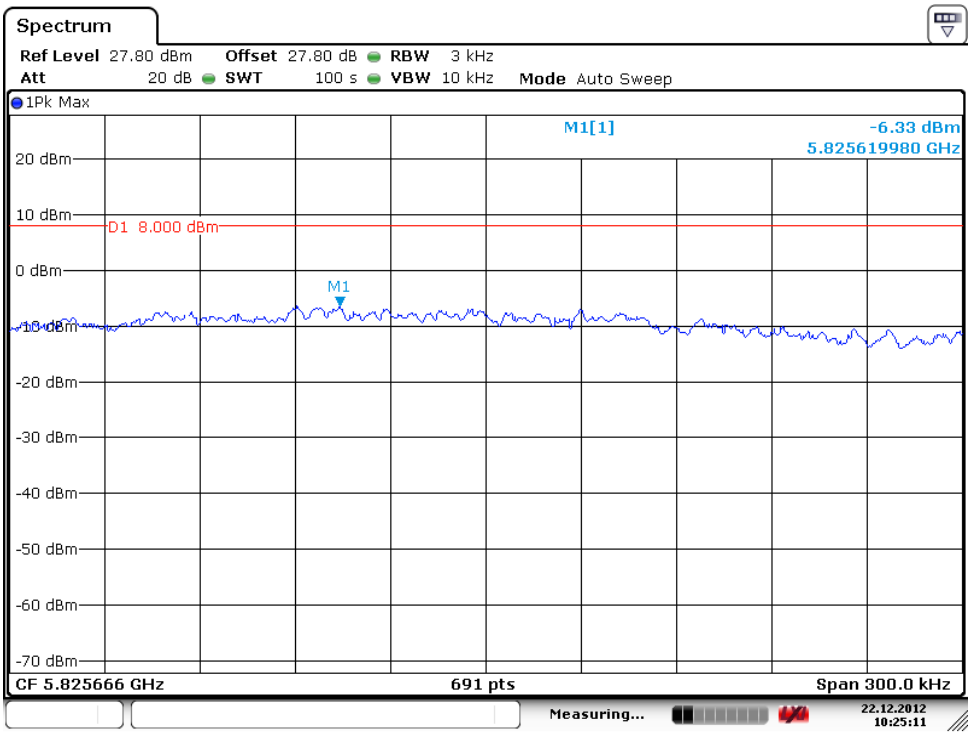
Date: 22.DEC.2012 10:17:54

Middle Channel



Date: 22.DEC.2012 10:22:25

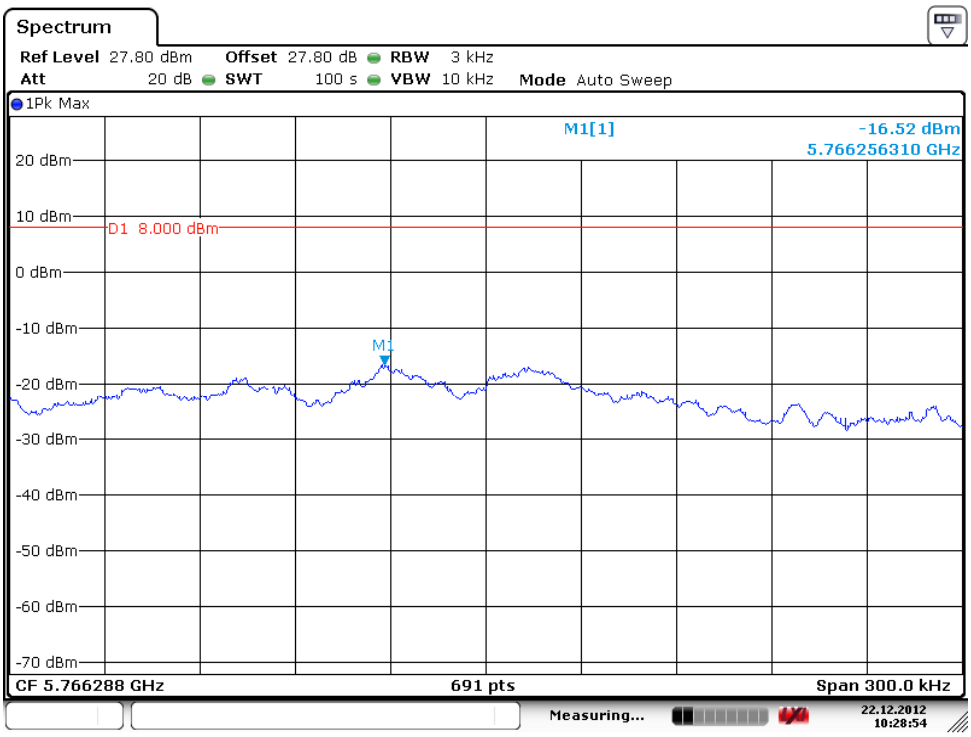
High Channel



Date: 22.DEC.2012 10:25:12

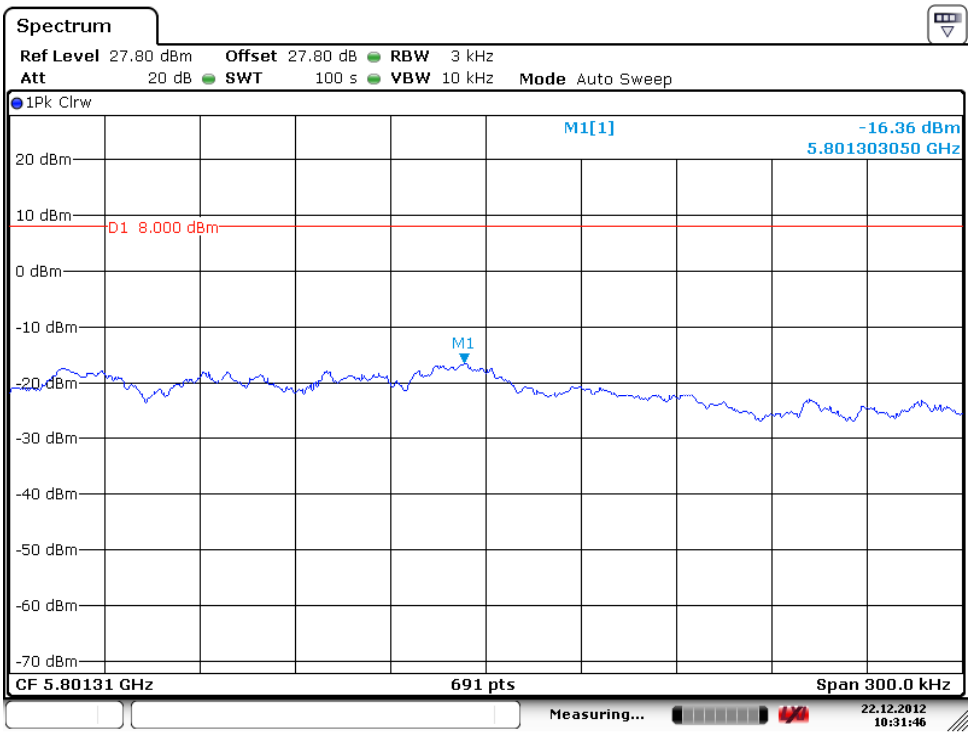
Test Plot of Power Density, 802.11n (40MHz)

Low Channel



Date: 22.DEC.2012 10:28:54

High Channel



Date: 22.DEC.2012 10:31:47

5.2.3.2 Conducted spurious emissions measured in 100kHz Bandwidth

RESULT: **Passed**

Date of testing	:	2012-12-22
Test standard	:	FCC part 15.247(d), RSS-210 A8.5
Basic standard	:	KDB 558074 D01 DTS Meas Guidance v02
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded room

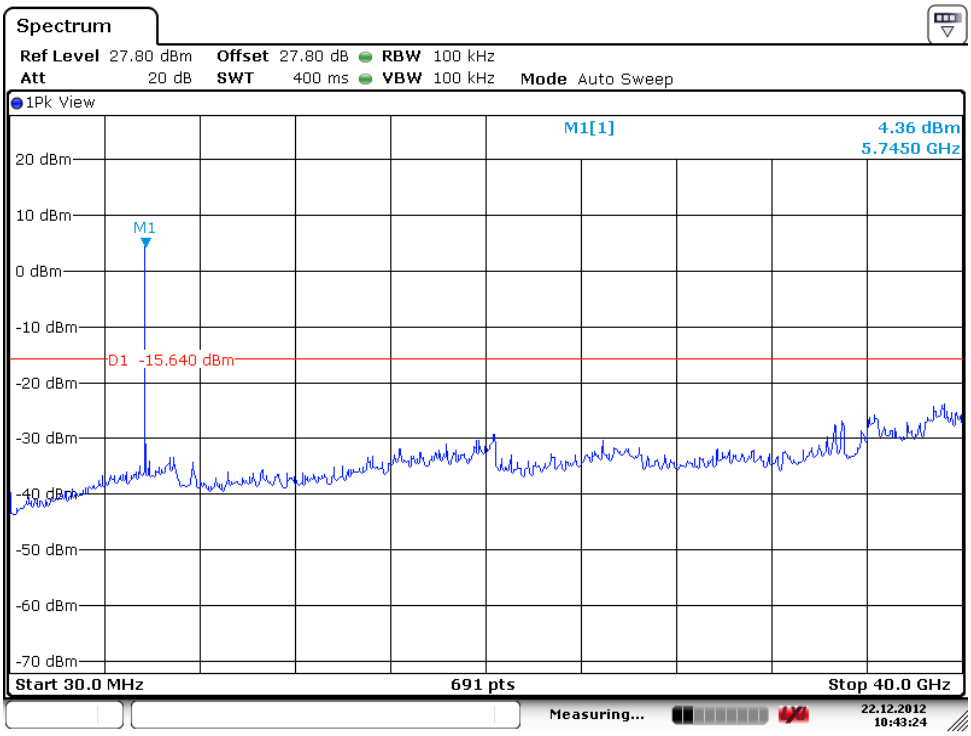
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

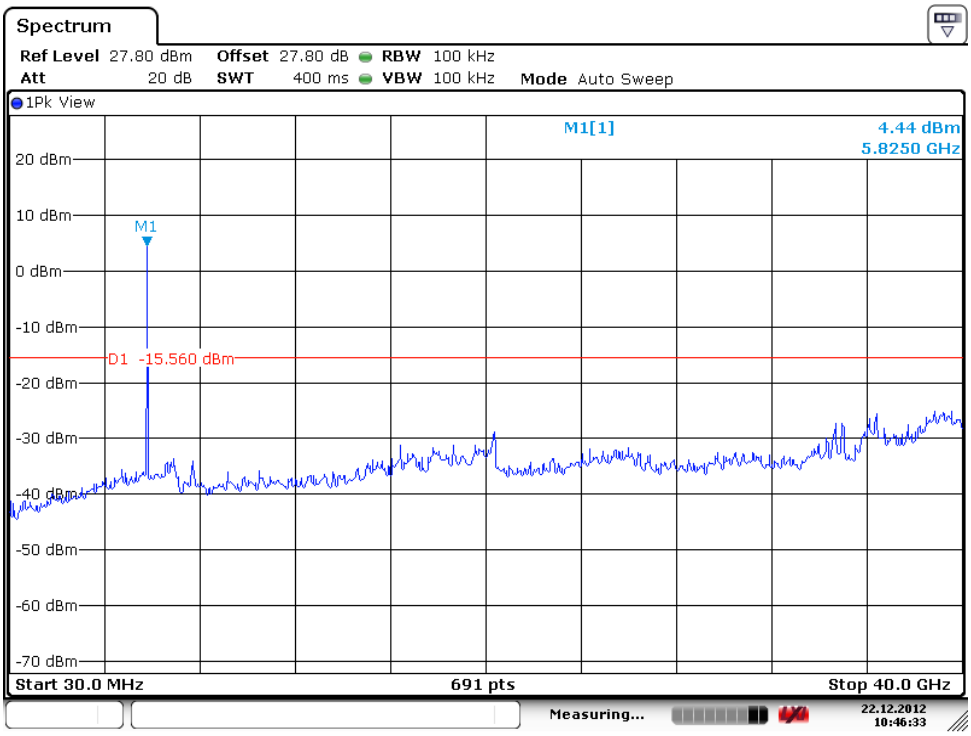
Test Plot of 100kHz Conducted Emissions, 802.11n (20MHz)

Low Channel



Date: 22.DEC.2012 10:43:25

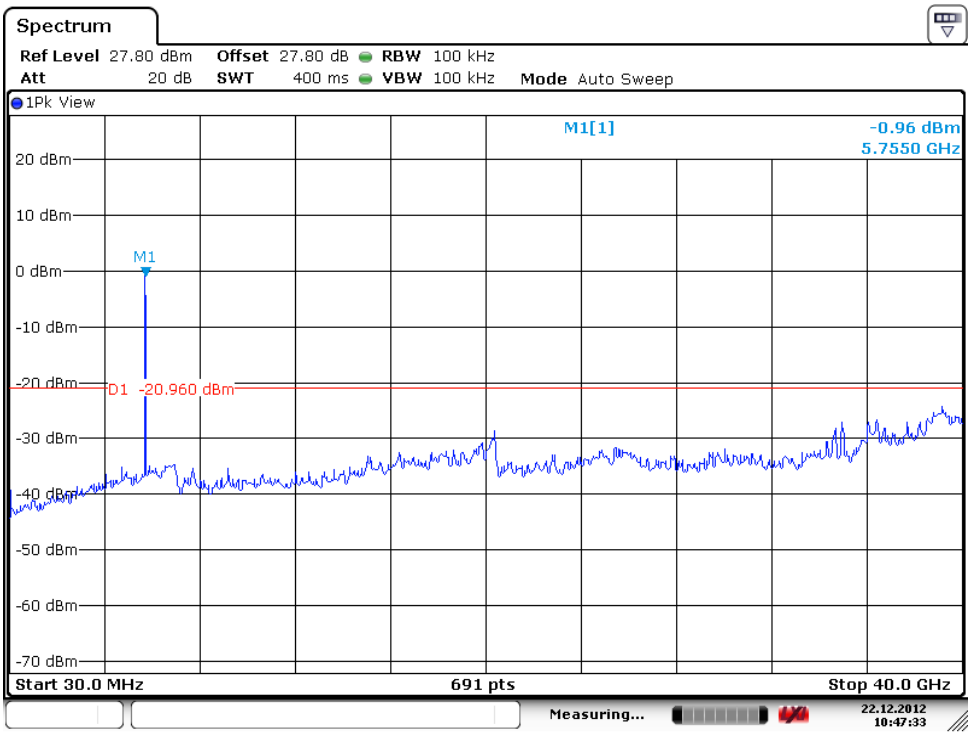
High Channel



Date: 22.DEC.2012 10:46:33

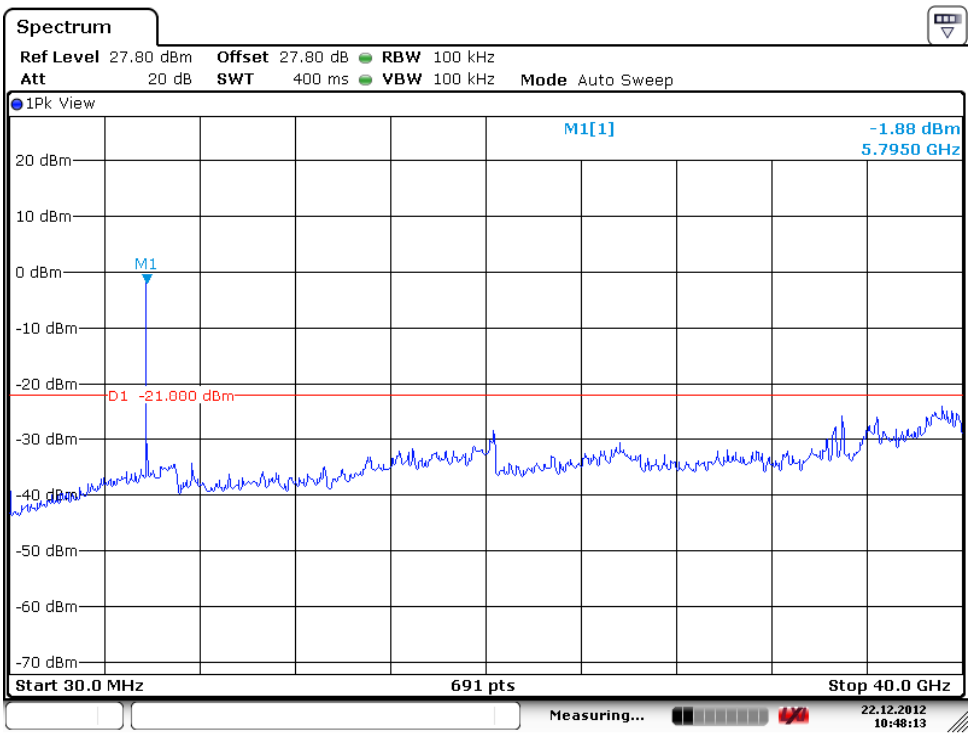
Test Plot of 100kHz Conducted Emissions, 802.11n (40MHz)

Low Channel



Date: 22.DEC.2012 10:47:33

High Channel



Date: 22.DEC.2012 10:48:14