

Prüfbericht-Nr.: <i>Test Report No.:</i>	17042741 002	Auftrags-Nr.: <i>Order No.:</i>	164020202	Seite 1 von 36 <i>Page 1 of 36</i>	
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	21.08.2014		
Auftraggeber: <i>Client:</i>	JDSU Uniphase Corporation, 1100 Perimeter Park Drive, Suite 101, Morrisville, NC 27560				
Prüfgegenstand: <i>Test item:</i>	WiFi Advisor				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	WFED-300AC				
Auftrags-Inhalt: <i>Order content:</i>	FCC approval				
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 CFR47 FCC Part 15: Subpart B Section 15.107 CFR47 FCC Part 15: Subpart B Section 15.109				
Wareneingangsdatum: <i>Date of receipt:</i>	18.09.2014				
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000135548-001, A000135548-002				
Prüfzeitraum: <i>Testing period:</i>	20.09.2014 - 03.12.2014				
Ort der Prüfung: <i>Place of testing:</i>	Accurate Technology Co., Ltd.				
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.				
Prüfergebnis*: <i>Test result*:</i>	Pass				
geprüft von / tested by: 		kontrolliert von / reviewed by: 			
05.12.2014	Tom Wang / Assistant Project Manager		10.12.2014	Sam Lin / Senior Project Manager	
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position	Unterschrift Signature
Sonstiges / Other: This report is for DTS equipment class.					
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(all) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(all) = failed a.m. test specification(s) N/A = not applicable N/T = not tested					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

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TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Passed

5.1.2 MAXIMUM CONDUCTED OUTPUT POWER

RESULT: Passed

5.1.3 6dB BANDWIDTH AND 99% BANDWIDTH

RESULT: Passed

5.1.4 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH

RESULT: Passed

5.1.5 POWER SPECTRAL DENSITY

RESULT: Passed

5.1.6 SPURIOUS EMISSIONS

RESULT: Passed

5.1.7 RADIATED EMISSIONS

RESULT: Passed

5.1.8 CONDUCTED EMISSIONS

RESULT: Passed

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1. General Remarks

1.1 Complementary Materials

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

Appendix A: Test Results of 1TX-Non Beamforming

Appendix B: Test Results of 2TX-Non Beamforming

Appendix C: Test Results of 3TX-Non Beamforming

Appendix D: Test Results of 2TX-Beamforming

Appendix E: Test Results of 3TX-Beamforming

Appendix F: Test Results of Spurious Emissions

Appendix G: Test Results of Radiated Emissions and Conducted Emissions

2. Test Sites

2.1 Test Facilities

Accurate Technology Co., Ltd.

(FCC Registration No.: 752051 & IC Registration Number: 5077A-2)

F1, Bldg A, Changyuan New Material Port, Keyuan Rd., Science & Industry Park,
Nanshan District, Shenzhen, 518057, P.R. China

The tests at the test site have been conducted under the supervision of a TÜV engineer.

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2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Radio Spectrum Test				
Spectrum Analyzer	Rohde&Schwarz	FSV40	101495	Jan.11, 2015
Test Receiver	Rohde & Schwarz	ESR	101817	Jul. 30, 2015
Spectrum Analyzer	Rohde&Schwarz	FSP30	100220	Jan.21, 2015
Power Meter	Rohde&Schwarz	NRP	100970	Jan. 21.2015
Power Sensor	Rohde&Schwarz	NRP-Z11	103642	Jan. 21.2015
Conducted emissions				
Test Receiver	Rohde & Schwarz	ESCS30	100307	Jan.11, 2015
L.I.S.N.	Schwarzbeck	NLSK8126	8126431	Jan.11, 2015
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100305	Jan.11, 2015
Radiated emissions				
Spectrum Analyzer	Rohde&Schwarz	FSV40	101495	Jan.11, 2015
Test Receiver	Rohde & Schwarz	ESR	101817	Jul. 30, 2015
Bilog Antenna	Schwarzbeck	VULB9163	9163-194	Jan.15, 2015
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan.15, 2015
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan.11, 2015
RF Switching Unit+PreAMP	Compliance Direction	RSU-M2	38322	Jan.11, 2015
Pre-Amplifier	Agilent	8447D	294A10619	Jan.11, 2015
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan.11, 2015

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, 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 as below table,

Items		Extended Uncertainty
CE	Disturbance Voltage (dBuV)	U=1.94dB, k=2, σ=95%
RE (9kHz-30MHz)	Field strength (dBuV/m)	U=3.08dB, k=2, σ=95%
RE (30-1000MHz)	Field strength (dBuV/m)	U=4.42dB, k=2, σ=95%
RE (above 1000MHz)	Field strength (dBuV/m)	U=4.06dB, k=2, σ=95%

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix1 of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The Accurate Technology Co., Ltd. facility located at F1, Bldg A, Changyuan New Material Port, Keyuan Rd., Science & Industry Park, Nanshan District, Shenzhen, 518057, P.R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. General Product Information

3.1 Product Function and Intended Use

The EUT is Wireless LAN Analyzer provides a complete, multi-dimensional map of real WiFi performance, highlighting margin and resiliency of WiFi connections at multiple locations within a site. It includes intuitive tools to quickly optimize and troubleshoot the in-home WiFi network. It provides valuable performance information to the end-user to help reduce unnecessary trouble calls and repeats.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

Technical Specification	Value
Kind of Equipment:	WiFi Advisor
Type Designation:	WFED-300AC
FCC ID:	WUW22073946
IC:	9613A-22073946
Type of Equipment:	Class A digital equipment
Equipment Class:	DTS
Wireless Technology:	Bluetooth 4.0 Low Energy and Wi-Fi
Operating Frequency Range:	2402-2480MHz for Bluetooth 2412-2462Mhz for Wi-Fi
Channel Number:	40 channels for Bluetooth 4.0 Low Energy 11 channels for Wi-Fi (802.11b/g/n) 7 channels for Wi-Fi (802.11n HT40 model only)
Channel Separation:	2MHz for Bluetooth 4.0 Low Energy 5MHz for Wi-Fi
Type of Modulation:	GFSK for Bluetooth 4.0 Low Energy DSSS for Wi-Fi 802.11b OFDM for Wi-Fi 802.11g/n
Operating Voltage:	DC 12V via marketed AC/DC adapter DC 7.2V via Lithium-ion battery
Operating Temperature Range:	0°C to 40°C
Antenna Type:	PCB Antenna for Bluetooth PCB Antenna for WiFi

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Smart Antenna Systems:	Applicable, 3x3 MIMO for Wi-Fi operation
Number of Antenna:	1 for Bluetooth 3 for Wi-Fi
Antenna Gain:	Max. 3.2 dBi for Bluetooth Max. 4.6 dBi for Wi-Fi Antenna 1 Max. 2.5 dBi for Wi-Fi Antenna 2 Max. 3.5 dBi for Wi-Fi Antenna 3

Table 3: Marketed AC/DC adapter

Description	Manufacturer	Model	S/N	Rating
AC/DC adapter	Universal Microelectronics	UP0351E-12P	C0192215468L G	Input: AC 100-240V, 50/60Hz, 0.8A MAX. Output: DC 12V, 3.0A

Table 4: List of Radio Frequency Channel, Bluetooth 4.0 Low Energy

RF Channel	Frequency (MHz)						
0	2402.00	11	2424.00	22	2446.00	33	2468.00
1	2404.00	12	2426.00	23	2448.00	34	2470.00
2	2406.00	13	2428.00	24	2450.00	35	2472.00
3	2408.00	14	2430.00	25	2452.00	36	2474.00
4	2410.00	15	2432.00	26	2454.00	37	2476.00
5	2412.00	16	2434.00	27	2456.00	38	2478.00
6	2414.00	17	2436.00	28	2458.00	39	2480.00
7	2416.00	18	2438.00	29	2460.00	--	--
8	2418.00	19	2440.00	30	2462.00	--	--
9	2420.00	20	2442.00	31	2464.00	--	--
10	2422.00	21	2444.00	32	2466.00	--	--

Table 5: List of Radio Frequency Channel, Wi-Fi 802.11 b/g/n 20MHz bandwidth

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2412.00	5	2432.00	9	2452.00
2	2417.00	6	2437.00	10	2457.00
3	2422.00	7	2442.00	11	2462.00
4	2427.00	8	2447.00	--	--

Table 6: List of Radio Frequency Channel, Wi-Fi 802.11 n 40MHz bandwidth

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
3	2422.00	6	2437.00	9	2452.00
4	2427.00	7	2442.00	--	--
5	2432.00	8	2447.00	--	--

3.3 Independent Operation Modes

The basic operation modes are:

- A. Transmitting
 - 1. Wi-Fi function
 - a. Low Channel
 - b. Mid Channel
 - c. High Channel
 - 2. Bluetooth function
 - a. Low Channel
 - b. Mid Channel
 - c. High Channel
- B. Receiving
- C. Standby
- D. Battery Charging
- E. Off

Table 7: List of Wi-Fi operation modes

Mode	Non-Beamforming						Beamforming			
	Single		Two		Three		Two		Three	
Antenna	20 MHz	40 MHz	20 MHz	40 MHz	20 MHz	40 MHz	20 MHz	40 MHz	20 MHz	40 MHz
Bandwidth	20 MHz	40 MHz	20 MHz	40 MHz	20 MHz	40 MHz	20 MHz	40 MHz	20 MHz	40 MHz
802.11b	✓	x	x	x	x	x	x	x	x	x
802.11g	✓	x	✓	x	✓	x	x	x	x	x
802.11n	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note:

1. The EUT support HT20 and HT40.
2. 802.11n support MCS0 ~ MCS23 data rates.

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

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

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation 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 5.

During testing, test software BlueSuite provided by the applicant was used to control the operating channel as well as output power for Bluetooth operation.

Test software 'Tera Term' provided by the applicant was used to control the operating channels as well as output power for Wi-Fi operation.

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Table 8: List of Frequencies under Test, Bluetooth Low Energy operation

RF Channel of Bluetooth 4.0 Low Energy			
Channel	Channel number	Frequency (MHz)	Power Level setting in software
Low	0	2402.00	54
Middle	19	2440.00	54
High	39	2480.00	54

Table 9: List of Frequencies under Test, Wi-Fi operation

RF Channel of 802.11 b, 802.11g and 802.11n (HT20)			RF Channel of 802.11n (HT40)		
Channel	Channel number	Frequency (MHz)	Channel	Channel number	Frequency (MHz)
Low	1	2412.00	Low	3	2422.00
Middle	6	2437.00	Middle	6	2437.00
High	11	2462.00	High	9	2452.00

Table 10: List of Operation mode under Test, Wi-Fi operation

Config	Data Rates	Transmit Chain
Transmit Chain - 1TX_Non-Beamforming		
802.11b	1Mbps	ANT 3
802.11g	6Mbps	ANT 3
802.11n HT20	MCS0	ANT 3
802.11n HT40	MCS0	ANT 3
Transmit Chain - 2TX_Non-Beamforming		
802.11g	6Mbps	ANT 1+ANT 3
802.11n HT20	MCS8	ANT 1+ANT 3
802.11n HT40	MCS8	ANT 1+ANT 3
Transmit Chain - 3TX_Non-Beamforming		
802.11g	6Mbps	ANT 1+ANT 2+ANT 3
802.11n HT20	MCS16	ANT 1+ANT 2+ANT 3
802.11n HT40	MCS16	ANT 1+ANT 2+ANT 3
Transmit Chain - 2TX_Beamforming		
802.11n HT20	MCS8	ANT 1+ANT 3
802.11n HT40	MCS8	ANT 1+ANT 3
Transmit Chain - 3TX_Beamforming		
802.11n HT20	MCS16	ANT 1+ANT 2+ANT 3
802.11n HT40	MCS16	ANT 1+ANT 2+ANT 3
Note: Preliminary tests were performed in different data rate and antenna chain to find the worst case. The data rate and antenna chain shown in the table is the worst case.		

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Table 11: Power level setting of Wi-Fi in test software

Power Level Setting in Test Software - Non Beamforming									
Channel	802.11b	802.11g			802.11n HT20			802.11n HT40	
Transmit Chain	1TX	1TX	2TX	3TX	1TX	2TX	3TX	1TX	2TX
Low	78	64	60	56	64	60	56	64	56
Middle	78	76	76	76	76	76	76	76	76
High	78	64	60	56	64	60	56	64	56
Power Level Setting in Test Software - Beamforming									
Channel	802.11b	802.11g			802.11n HT20			802.11n HT40	
Transmit Chain	1TX	1TX	2TX	3TX	1TX	2TX	3TX	1TX	2TX
Low						60	56	N/A	56
Middle	Not Applicable					76	76		76
High						60	56		48

4.3 Special Accessories and Auxiliary Equipment

Table 12: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Laptop PC	Lenovo	X200	L3-ANW2G	--

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

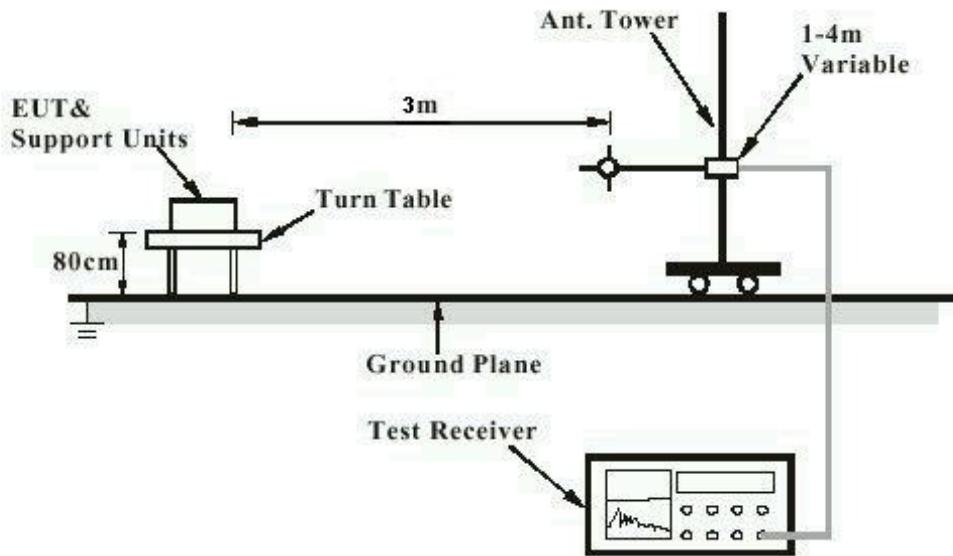
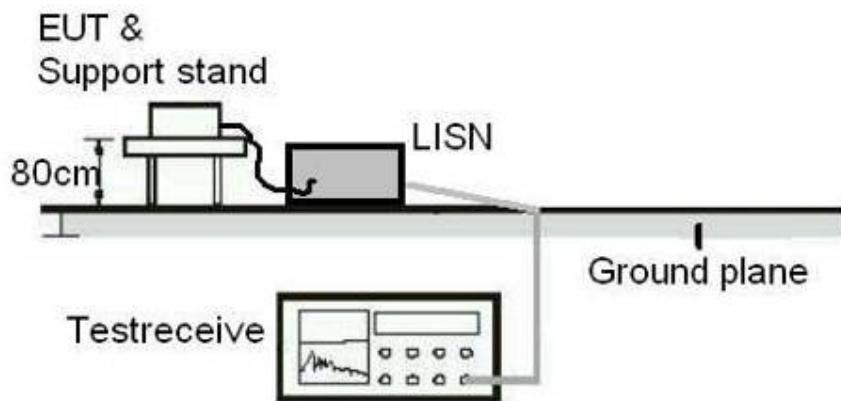


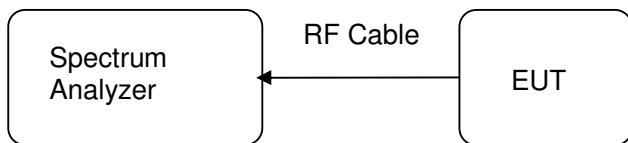
Diagram of Measurement Equipment Configuration for Conduction Measurement



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Diagram of Measurement Equipment Configuration for Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:

Passed

Test date	:	2014-09-20 to 2014-11-21
Test standard	:	FCC Part 15.247(b)(4) and Part 15.203
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 3.2dBi for Bluetooth and 4.6dBi, 2.5dBi and 3.5dBi for each antenna for WiFi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to compliance the provision.

Refer to EUT photo for details.

Total directional gain calculation:

The three antenna gains are different for Wi-Fi operation, the gains are unequal antenna gains and the EUT supports CDD and beamforming mode. Refer to KDB 662911 Multiple Transmitter Output, following is total directional gain for Wi-Fi operation.

TX Mode	Antenna Number_N _{ANT}	Antenna Gain (dBi)			Max. Total Directional Gain (dB)	Max. Total Directional Gain_CDD (dB)	Max. Total Directional Gain_BF (dB)
		Ant 1	Ant 2	Ant 3			
802.11g	MIMO	2	4.6	2.5	3.5	7.1	7.6
802.11g	MIMO	3	4.6	2.5	3.5	8.3	9.4
802.11n	MIMO	2	4.6	2.5	3.5	7.1	7.6
802.11n	MIMO	3	4.6	2.5	3.5	8.3	9.4

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5.1.2 Maximum Conducted Output Power

RESULT:

Passed

Test date	:	2014-09-20 to 2014-11-21
Test standard	:	FCC Part 15.247(b)(3)
Basic standard	:	ANSI C63.4: 2009
		FCC KDB 558074 v03r02
Limit	:	1Watt
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A.1 & A.2
Ambient temperature	:	22°C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

The applicable output power limit for Wi-Fi operation:

$$P_{\text{Out}} = P_{\text{Limit}} - (G_{\text{TX}} - 6)$$

2TX:

$$P_{\text{Out}} = 30 \text{ dBm} - (7.6 - 6) = 28.4 \text{ dBm}$$

3TX:

$$P_{\text{Out}} = 30 \text{ dBm} - (9.4 - 6) = 26.6 \text{ dBm}$$

Table 13: Test result of Peak Output Power, Bluetooth Low Energy operation

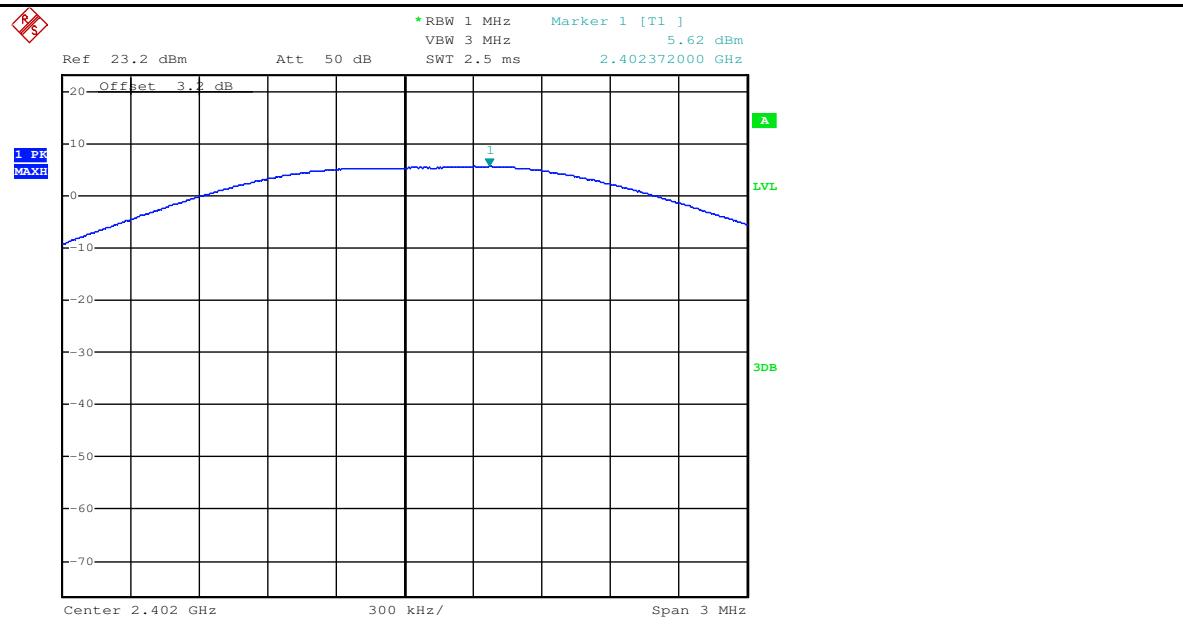
Channel	Channel Frequency (MHz)	Bluetooth 4.0 Low Energy		
		Peak Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2402	5.62	0.00365	1
Middle Channel	2440	8.34	0.00682	1
High Channel	2480	9.31	0.00853	1

Refer to attached Appendix A to Appendix E for details of test results of Wi-Fi operation.

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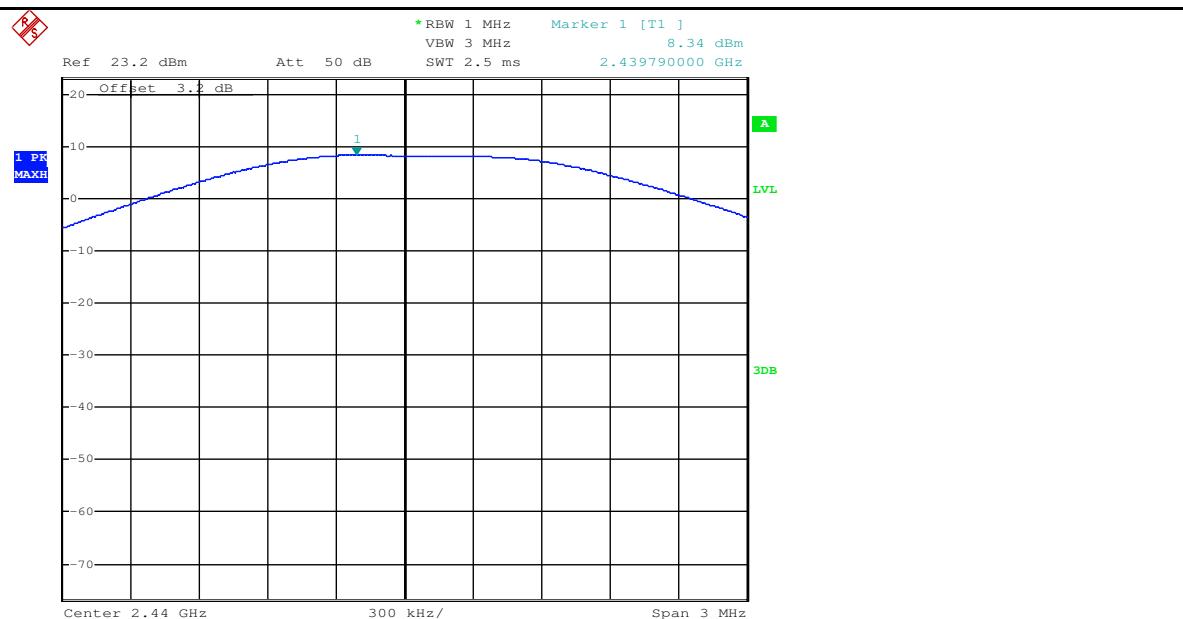
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Test Graph of Peak Output Power, Bluetooth 4.0 Low Energy mode Low Channel



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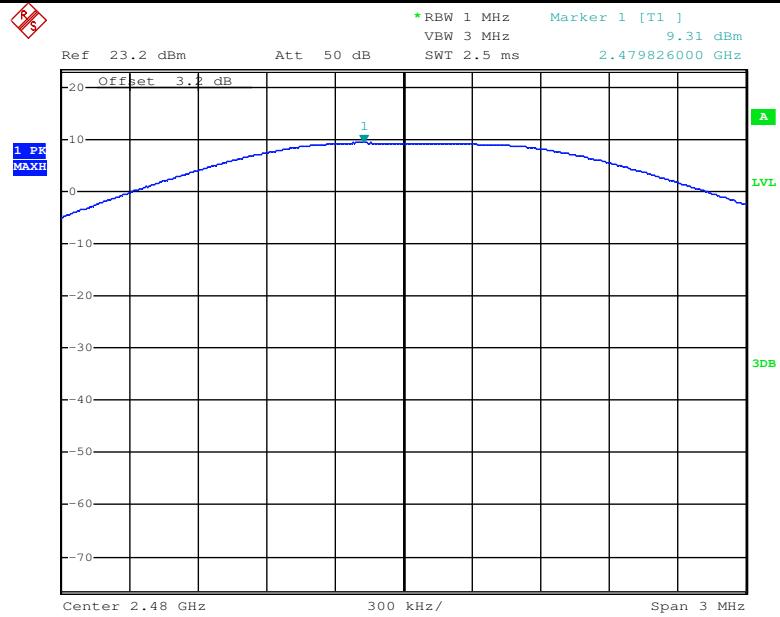
Middle Channel



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High Channel



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5.1.3 6dB Bandwidth and 99% Bandwidth

RESULT:**Passed**

Date of testing	:	2014-09-20 to 2014-11-21
Test standard	:	FCC Part 15.247(a)(2)
Basic standard	:	ANSI C63.4: 2009
Kind of test site	:	FCC KDB 558074 v03r02 Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A.1 & A.2
Ambient temperature	:	22°C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

Table 14: Test result of 6dB Bandwidth and 99% Bandwidth, Bluetooth Low Energy operation

Bluetooth 4.0 Low Energy				
Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	99% Bandwidth (kHz)	Result
Low Channel	2402	672	1050	Pass
Mid Channel	2440	672	1050	Pass
High Channel	2480	672	1044	Pass

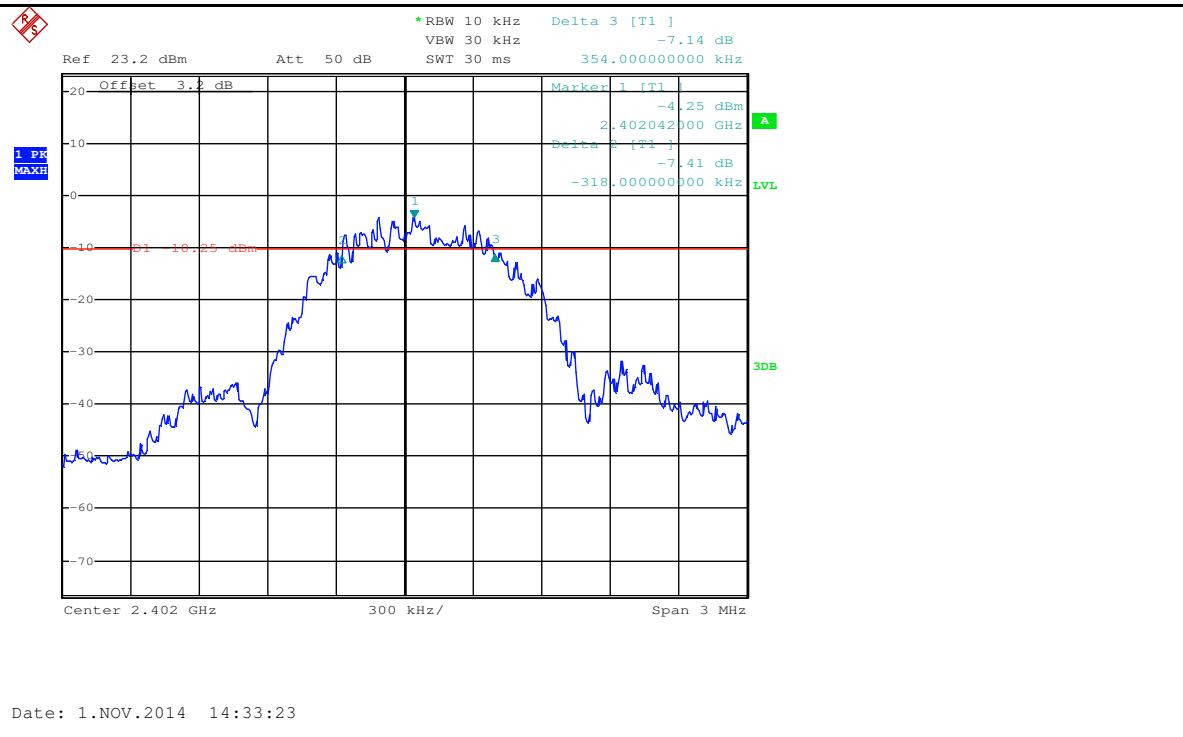
Refer to attached Appendix A to Appendix E for details of test results of Wi-Fi operation.

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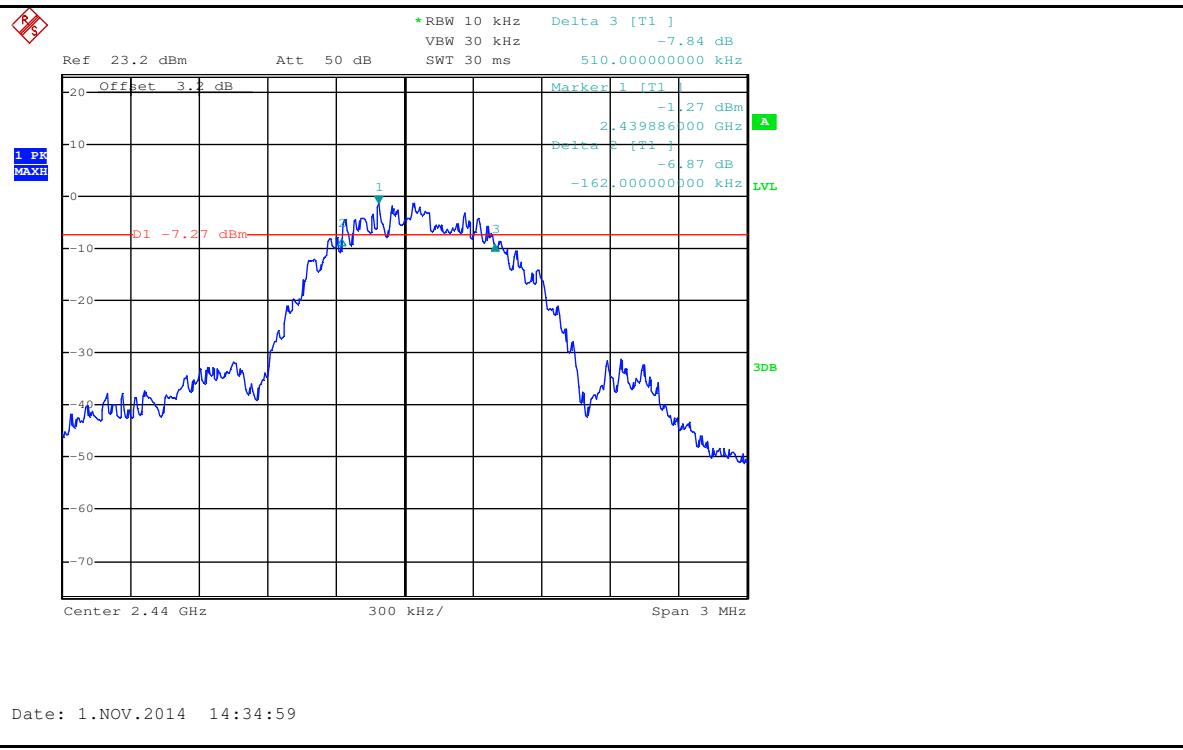
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Test Graph of 6dB Bandwidth, Bluetooth 4.0 Low Energy mode

Low Channel



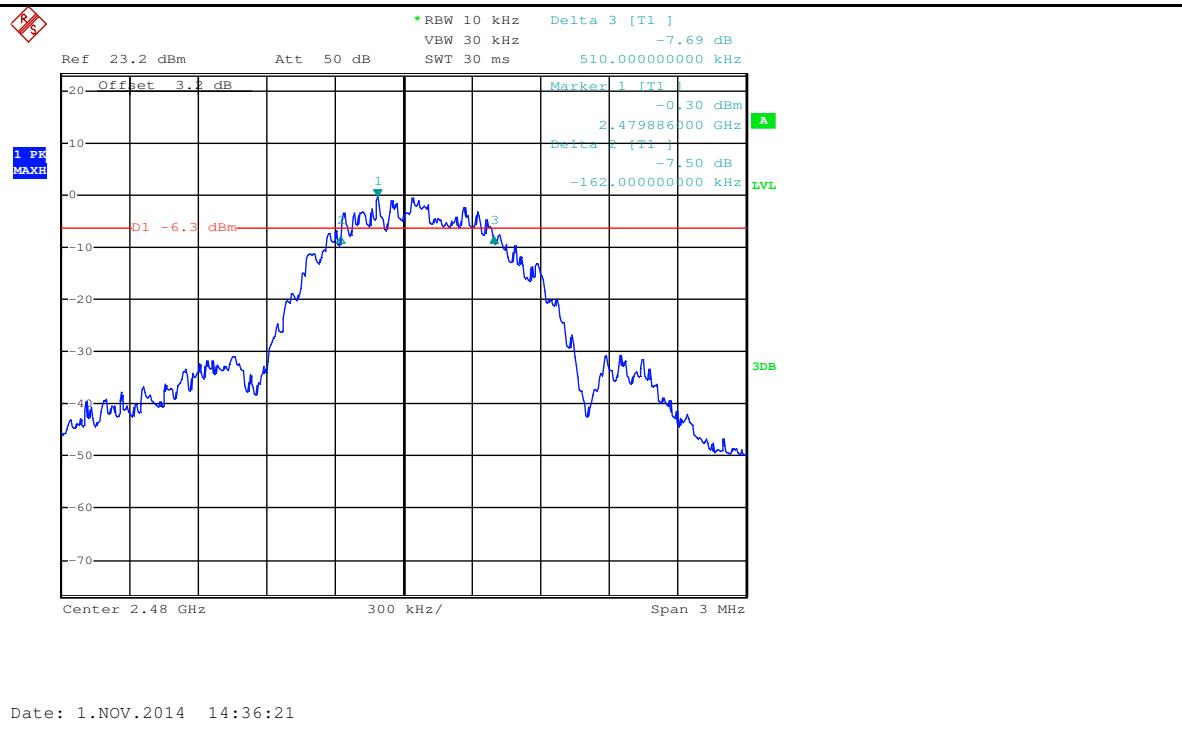
Middle Channel



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High Channel



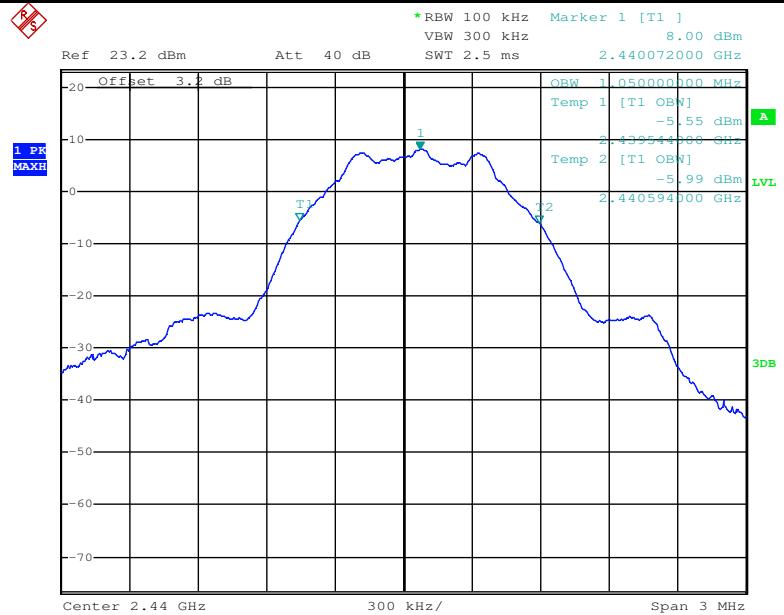
**Test Graph of 99% Bandwidth, Bluetooth 4.0 Low Energy mode
Low Channel**



Prüfbericht - Nr.: 17042741 002
Test Report No.

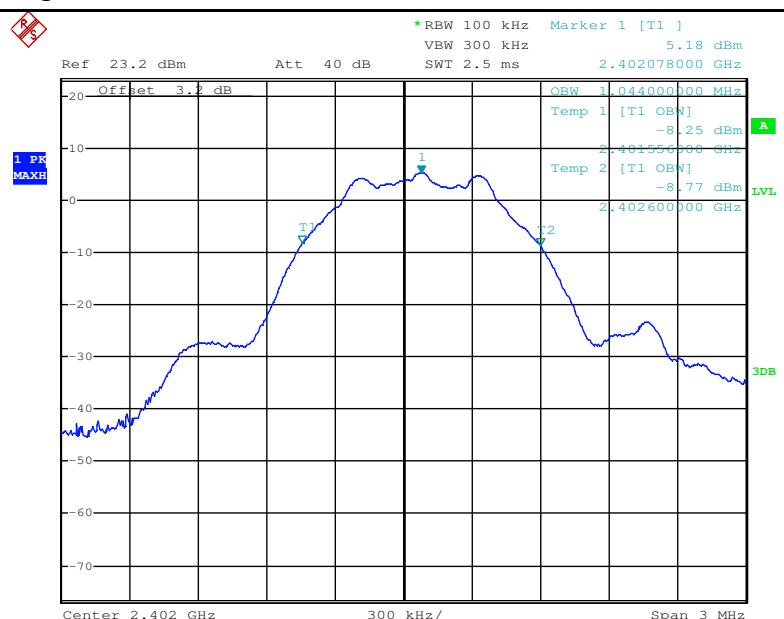
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Middle Channel



Date: 1.NOV.2014 14:42:52

High Channel



Date: 1.NOV.2014 14:43:48

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5.1.4 Conducted Spurious Emissions measured in 100 kHz Bandwidth

RESULT:**Passed**

Date of testing	:	2012-03-23 to 2012-05-04
Test standard	:	FCC part 15.247(d)
Basic standard	:	ANSI C63.4: 2009 FCC KDB 558074 v03r02
Limit	:	20dB or 30dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	:	Shield room

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A.1 & A.2
Ambient temperature	:	22°C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

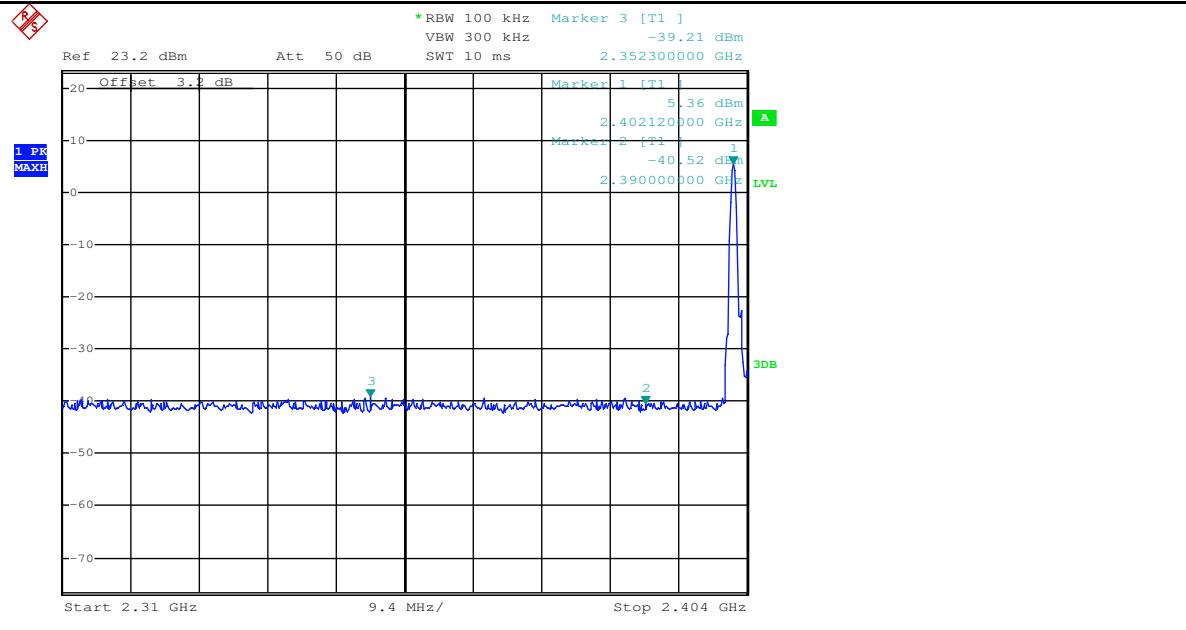
Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to following test graph, and compliance is achieved as well.

Refer to attached Appendix A to Appendix E for details of test results of Wi-Fi operation.

Prüfbericht - Nr.: 17042741 002
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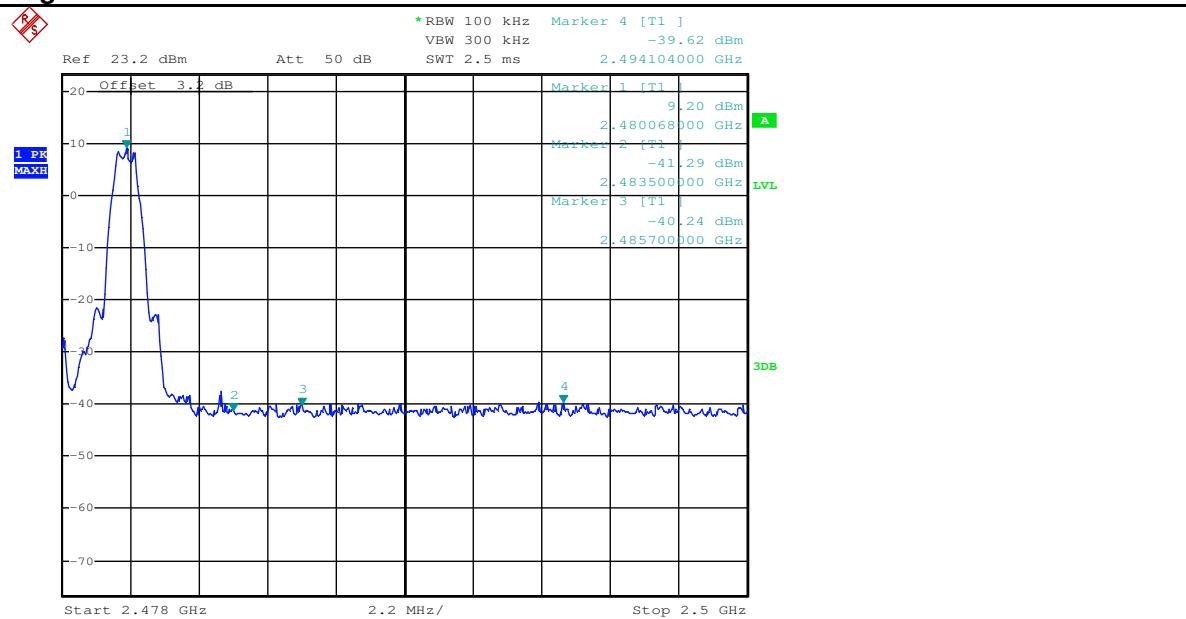
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**Test Graph of 100 kHz Bandwidth of Frequency Band Edge,
Bluetooth 4.0 Low Energy mode
Low Channel**



Date: 1.NOV.2014 14:50:21

High Channel

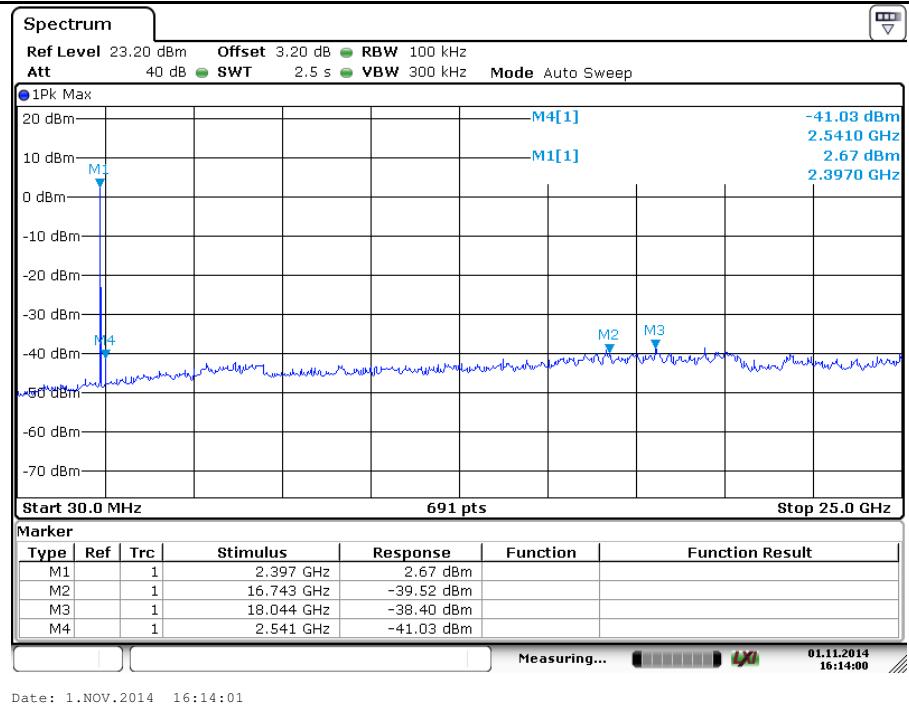


Date: 1.NOV.2014 14:51:35

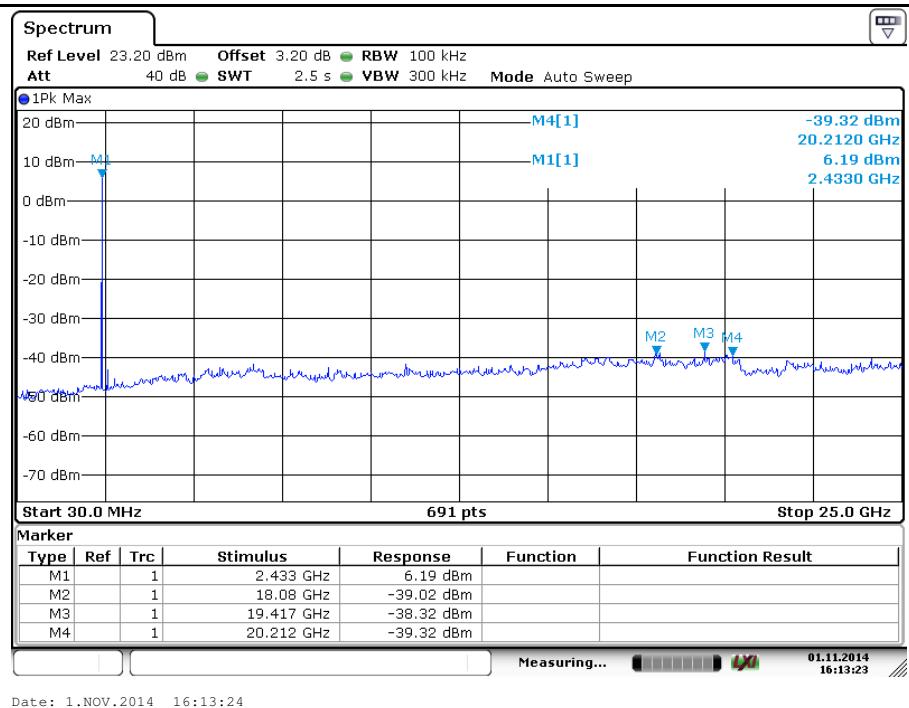
Prüfbericht - Nr.: 17042741 002
Test Report No.

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**Test Graph of Conducted spurious emissions measured in
100 kHz Bandwidth, Bluetooth 4.0 Low Energy mode
Low Channel**



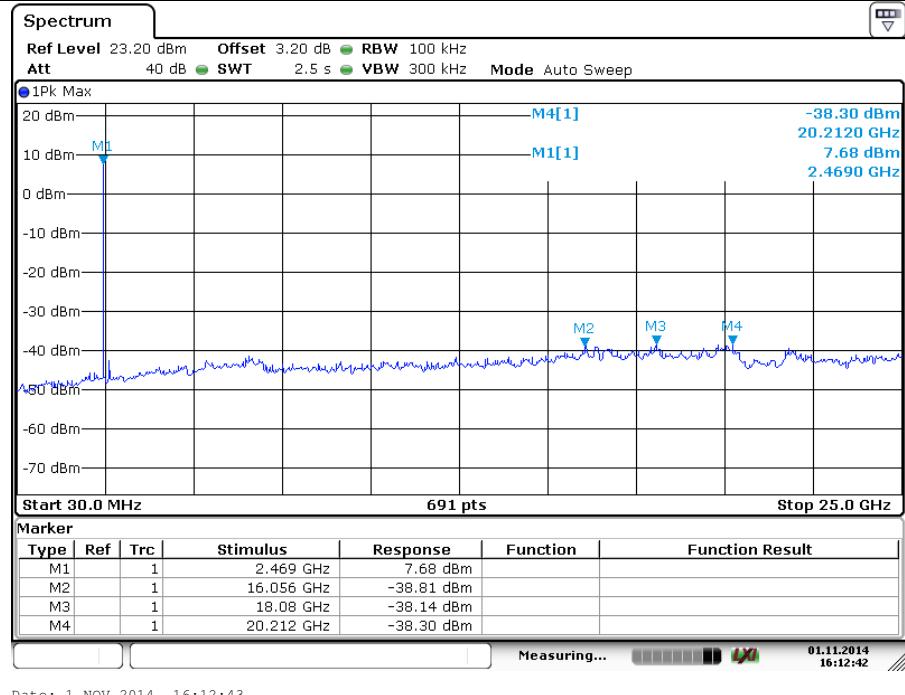
Middle Channel



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Test Report No.

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High Channel



5.1.5 Power spectral density

RESULT:
Passed

Date of testing	:	2014-09-20 to 2014-11-21
Test standard	:	FCC part 15.247(e)
Basic standard	:	ANSI C63.4: 2009
		FCC KDB 558074 v03r02
Limit	:	8dBm/3kHz
Kind of test site	:	Shield room

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A.1 & A.2
Ambient temperature	:	23°C
Relative humidity	:	48%
Atmospheric pressure	:	101kPa

The applicable limit for Wi-Fi operation:

$$PSD_{out} = PSD_{Limit} - (G_{TX} - 6)$$

2TX:

$$PSD_{out} = 8\text{dBm} - (7.6-6) = 6.4\text{dBm}$$

3TX:

$$PSD_{out} = 8\text{dBm} - (9.4-6) = 4.6\text{dBm}$$

Table 15: Test result of power spectral density, Bluetooth Low Energy operation

Operation Mode	Channel (MHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)	Conclusion
Bluetooth 4.0 Low Energy	2402	-10.53	8	Pass
	2440	-7.55	8	Pass
	2480	-6.54	8	Pass

Refer to attached Appendix A to Appendix E for details of test results of Wi-Fi operation.

Prüfbericht - Nr.: 17042741 002
Test Report No.

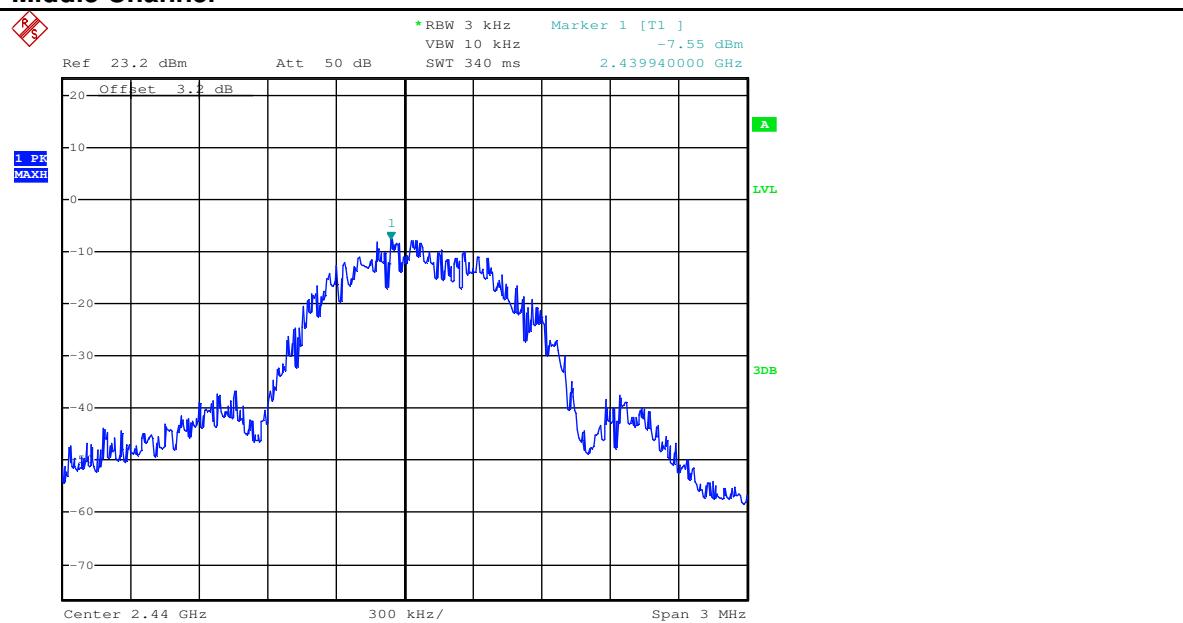
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**Test Graph of Power Spectral Density, Bluetooth 4.0 Low Energy mode
Low Channel**



Date: 1.NOV.2014 14:47:45

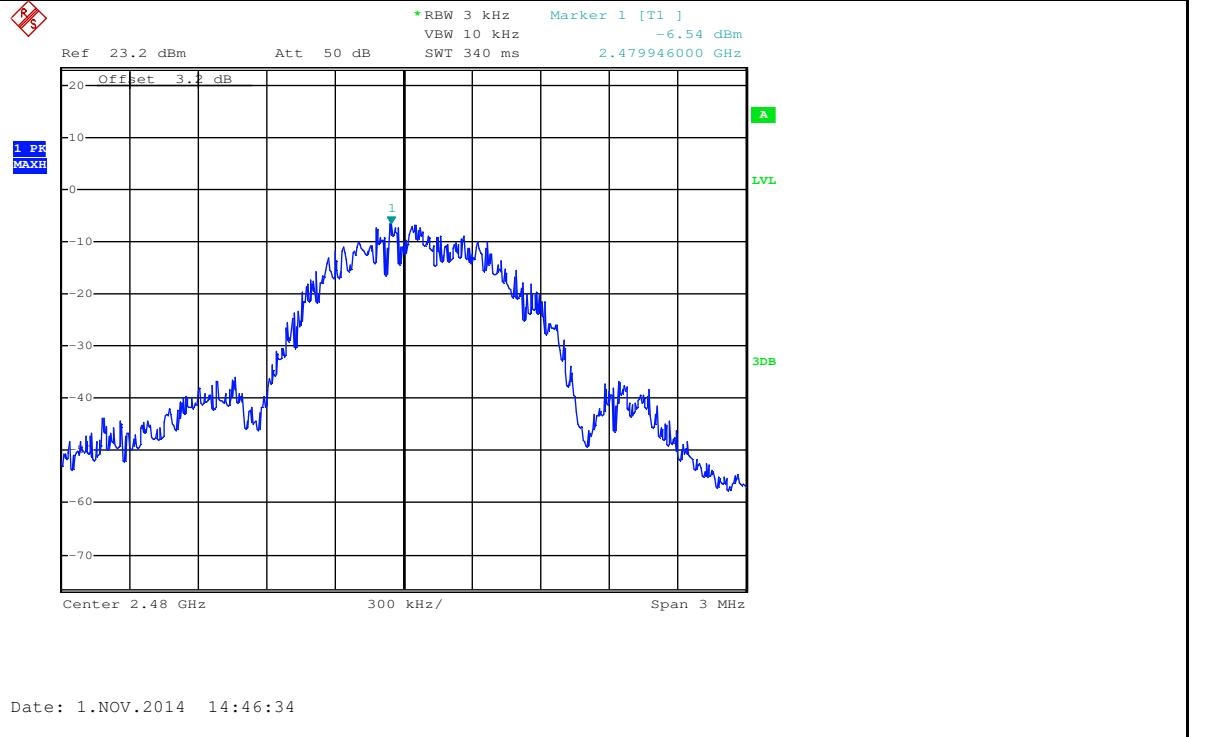
Middle Channel



Date: 1.NOV.2014 14:47:02

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High Channel



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5.1.6 Spurious Emissions

RESULT:

Passed

Date of testing : 2014-09-20 to 2014-11-21
Test standard : FCC part 15.247(d)
Basic standard : FCC part 15.209
Limits : ANSI C63.4: 2009
Kind of test site : Refer to 15.209(a)
Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Test Channel : Low/ Middle/ High
Operation mode : A.1 & A.2
Ambient temperature : 23°C
Relative humidity : 48%
Atmospheric pressure : 101.0 kPa

Refer to attached Appendix F for details.

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5.1.7 Radiated emissions

RESULT:

Passed

Date of testing	:	2014-09-20 to 2014-11-21
Test standard	:	FCC Part 15.109
Basic standard	:	ANSI C63.4: 2009
Frequency range	:	30 – 6000MHz
Limits	:	FCC Part 15.109(a)
Kind of test site	:	3m Semi-Anechoic Chamber

Test Setup

Input Voltage	:	DC 12V (via AC/DC adapter)
Operation Mode	:	A+D
Ambient temperature	:	23°C
Relative humidity	:	48%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix G for details.

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5.1.8 Conducted emissions

RESULT:

Passed

Date of testing	:	2014-09-20 to 2014-11-21
Test standard	:	FCC Part 15.207 FCC Part 15.107
Basic standard	:	ANSI C63.4: 2009
Frequency range	:	0.15MHz – 30MHz
Limits	:	FCC Part 15.207(a) FCC Part 15.107(a)
Kind of test site	:	Shield Room

Test Setup

Input Voltage	:	DC 12V (via AC/DC adapter)
Operation Mode	:	A+D
Ambient temperature	:	24°C
Relative humidity	:	50%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix G for details.

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Appendix A

Test Results of 1TX-Non Beamforming

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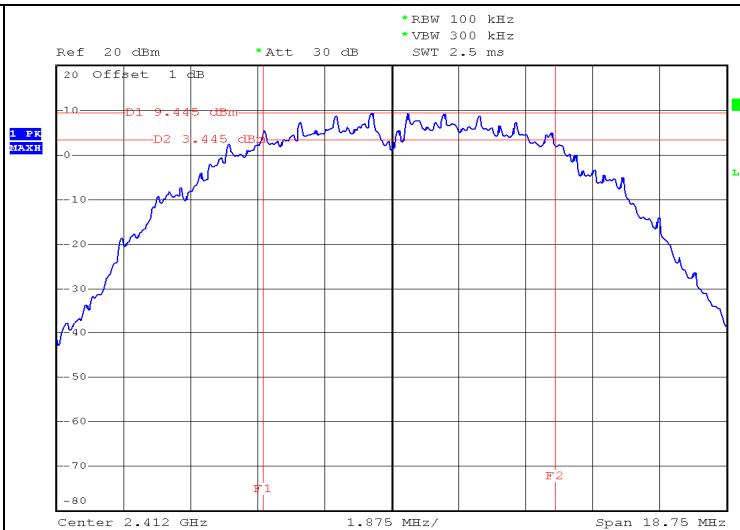
Appendix A.1: Maximum Conducted Output Power_802.11b

Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit(dBm)
Low Channel	2412	20.30	30
Middle Channel	2437	20.20	30
High Channel	2462	20.20	30

Appendix A.2: 6dB Bandwidth and 99% Bandwidth_802.11b

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	8.18	11.62
Middle Channel	2437	8.18	11.96
High Channel	2462	8.18	11.96

Low Channel 6dB Bandwidth



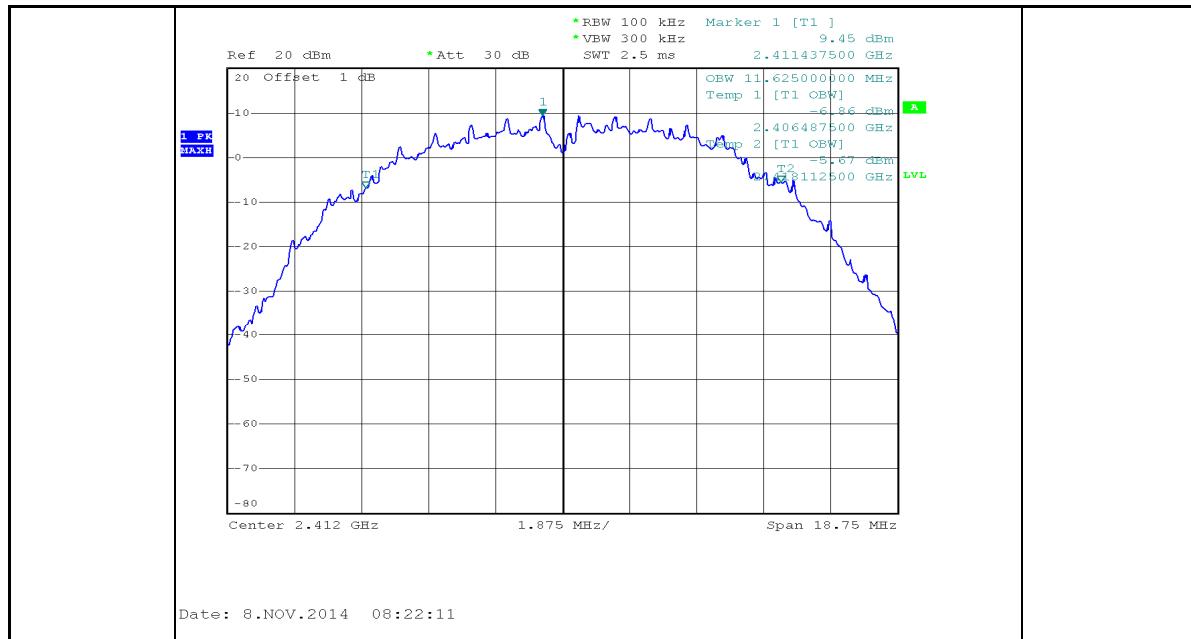
Low Channel 99% Bandwidth

Produkte

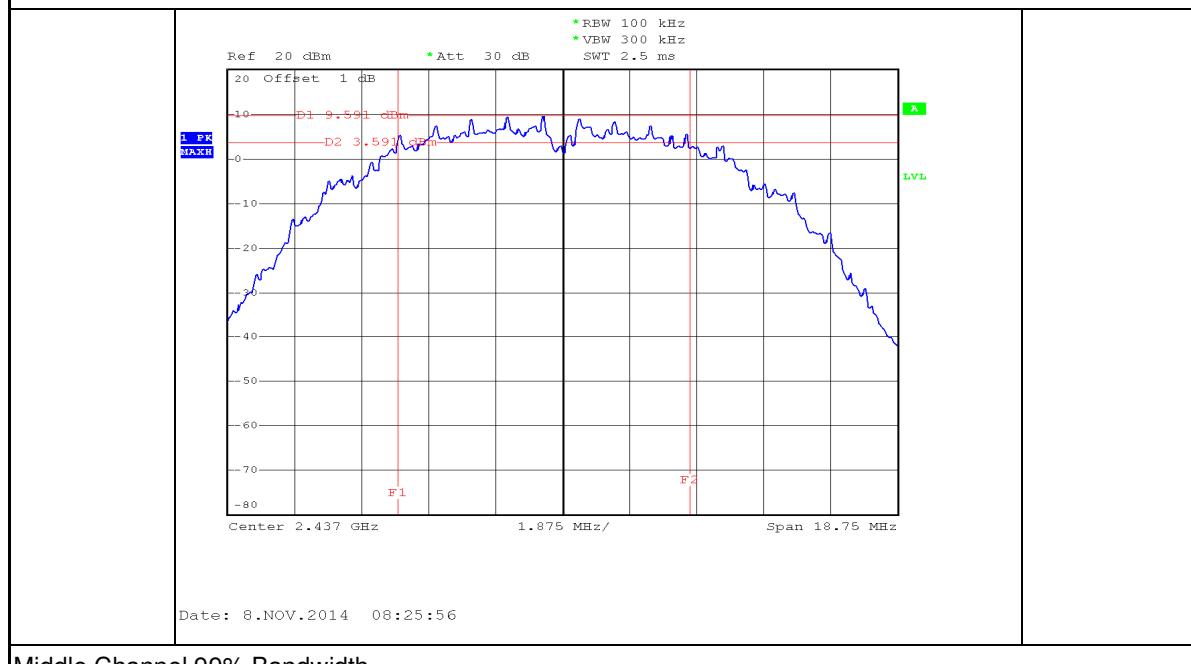
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Middle Channel 6dB Bandwidth



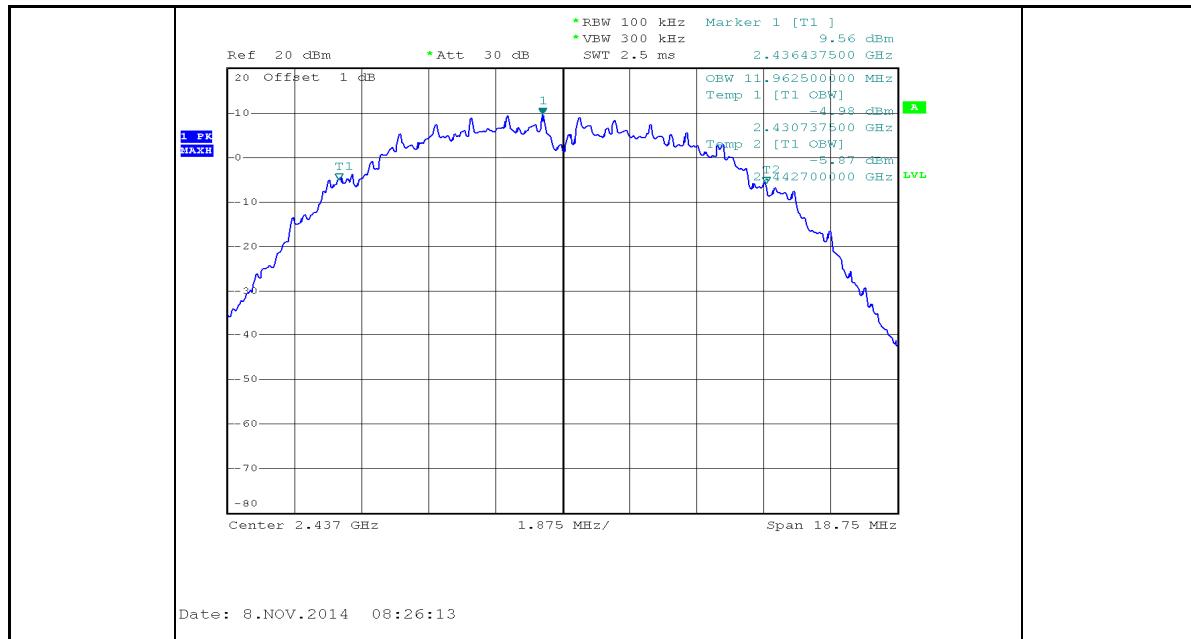
Middle Channel 99% Bandwidth

Produkte

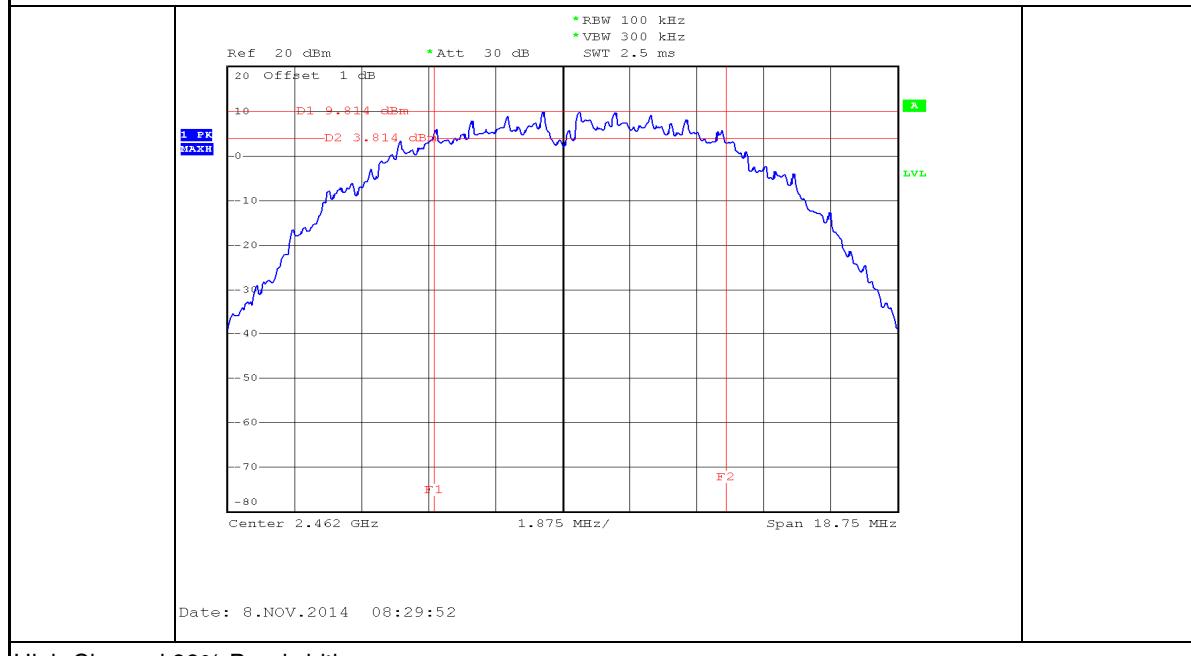
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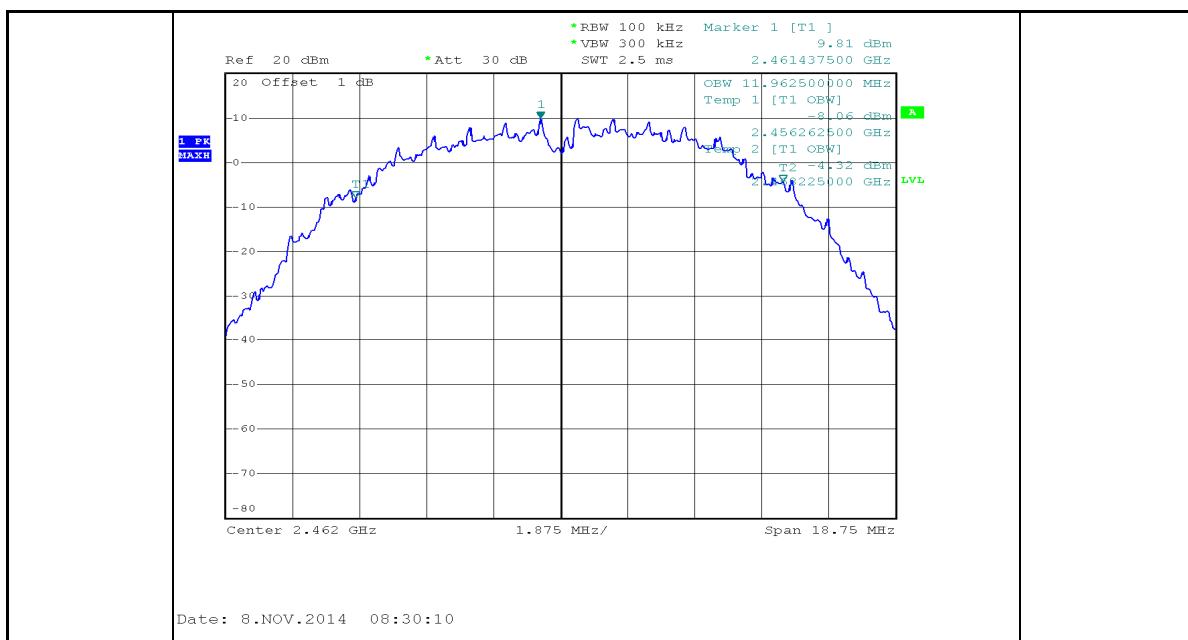
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High Channel 6dB Bandwidth

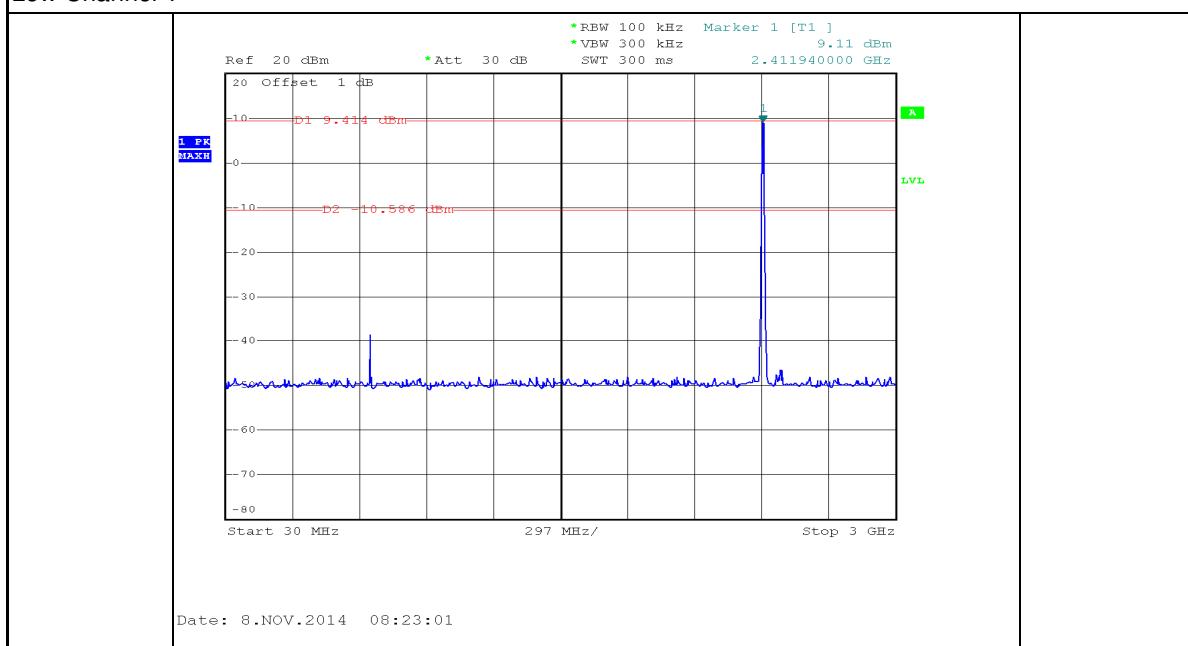


High Channel 99% Bandwidth



Appendix A.3: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11b

Low Channel 1



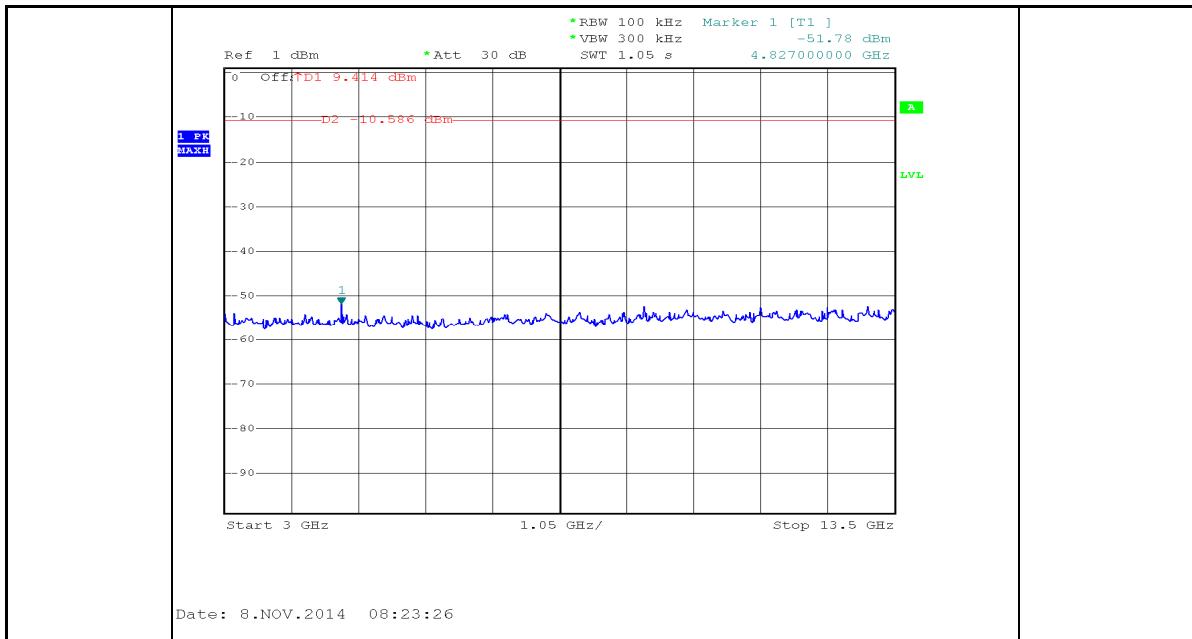
Low Channel 2

Produkte

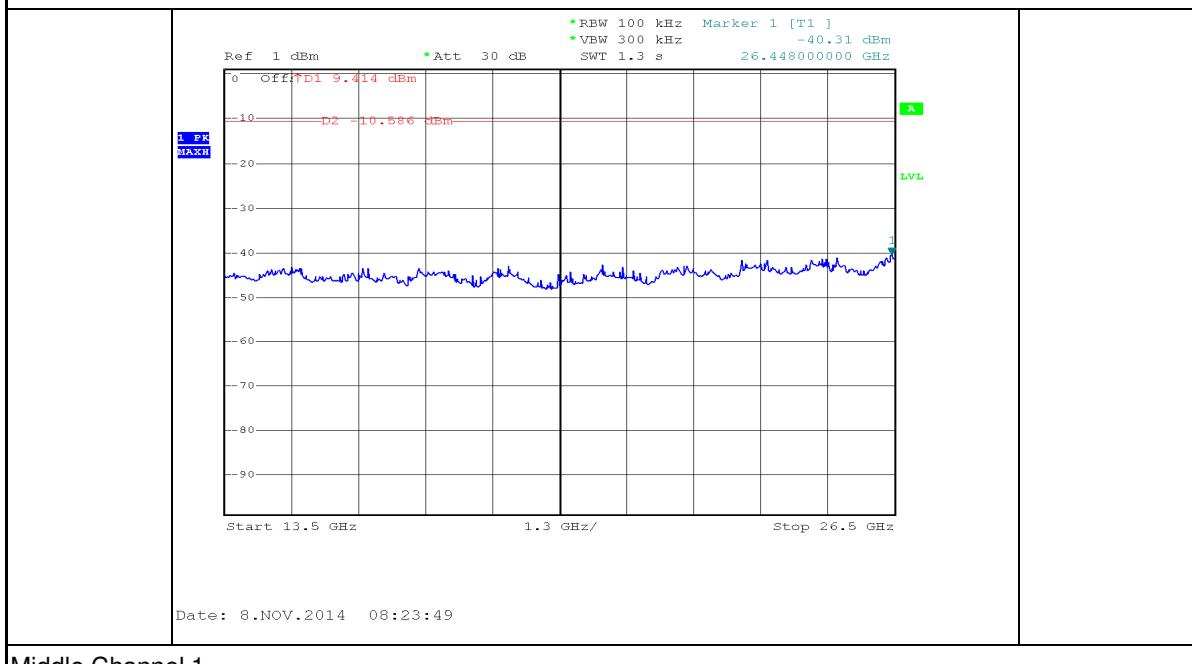
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Low Channel 3



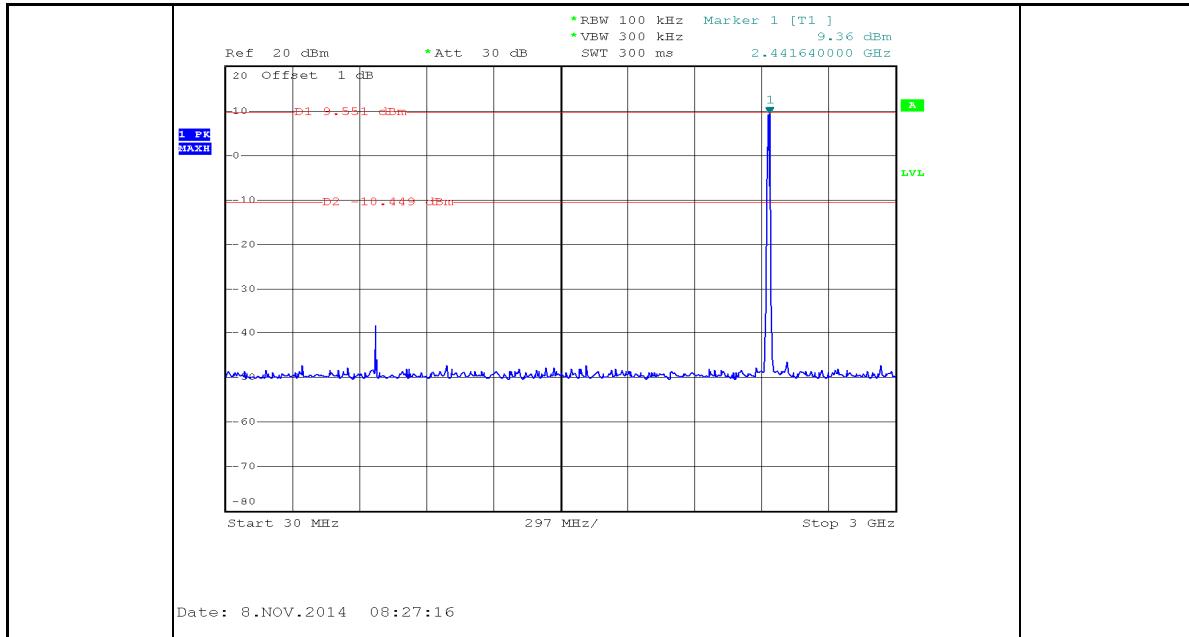
Middle Channel 1

Produkte

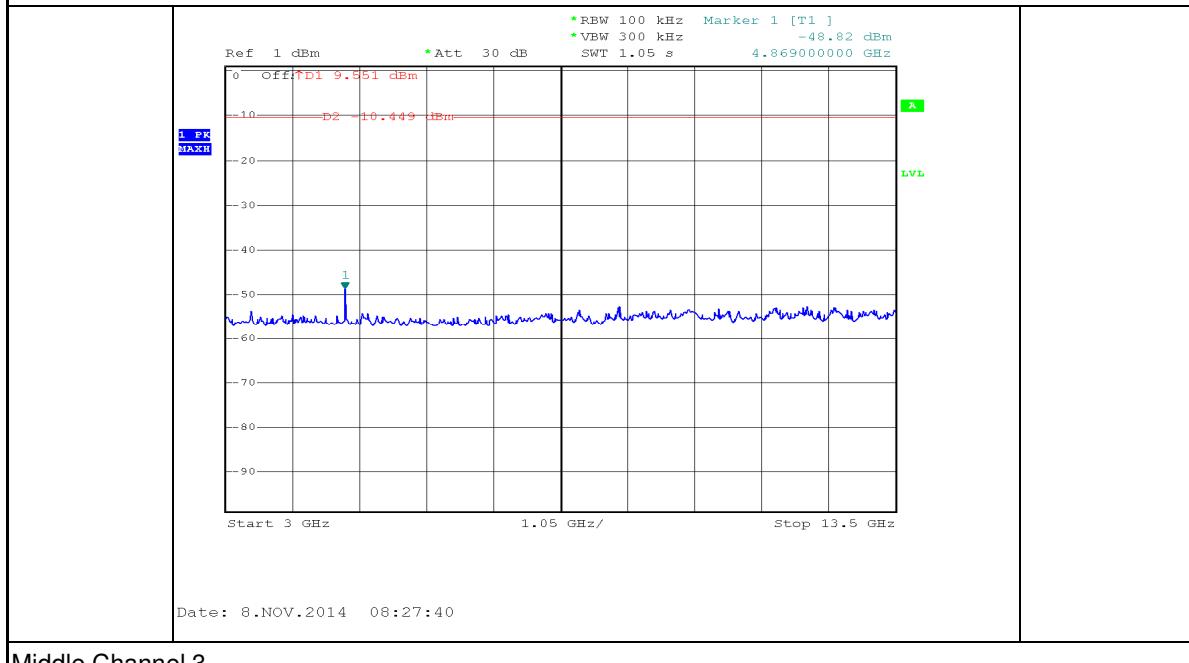
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Middle Channel 2



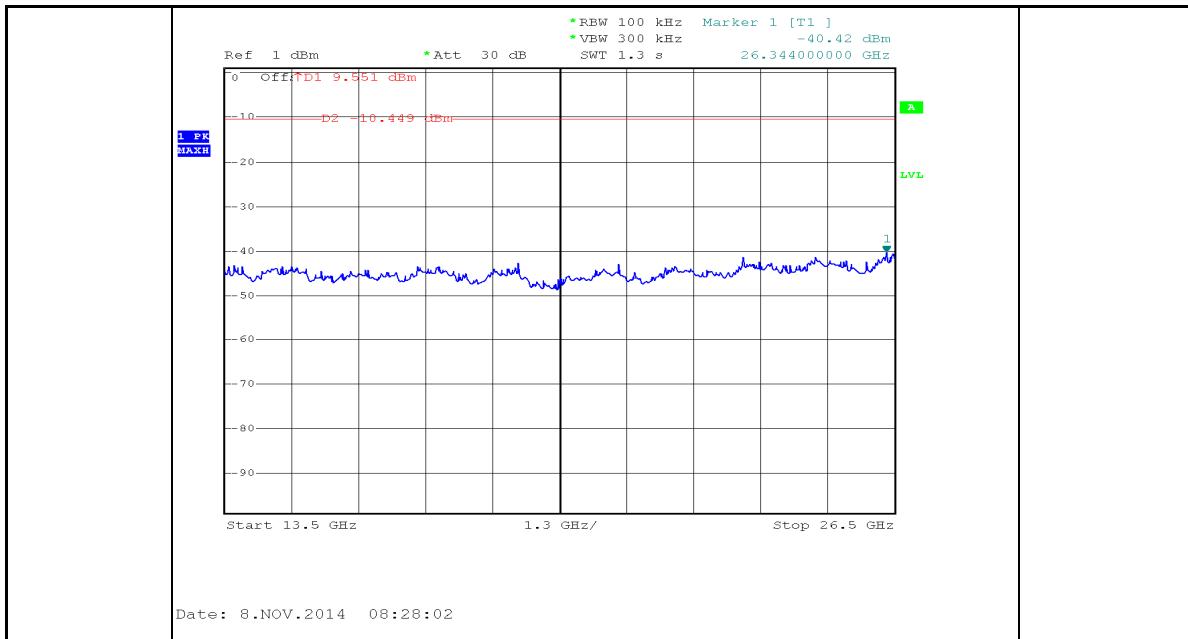
Middle Channel 3

Produkte

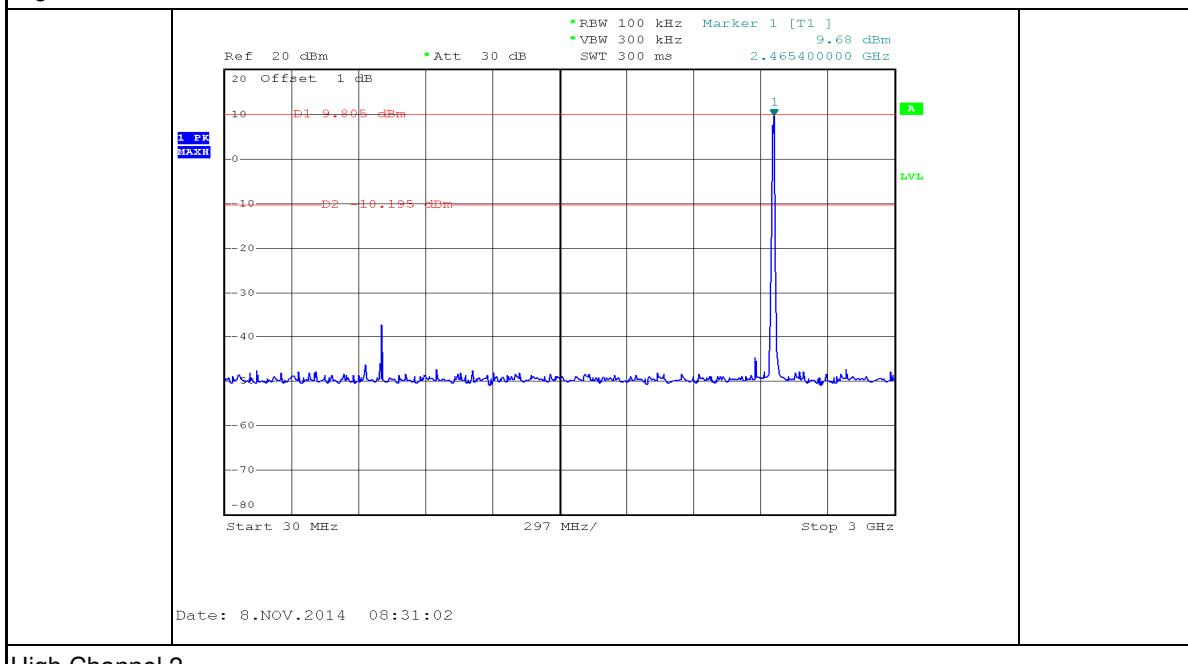
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High Channel 1



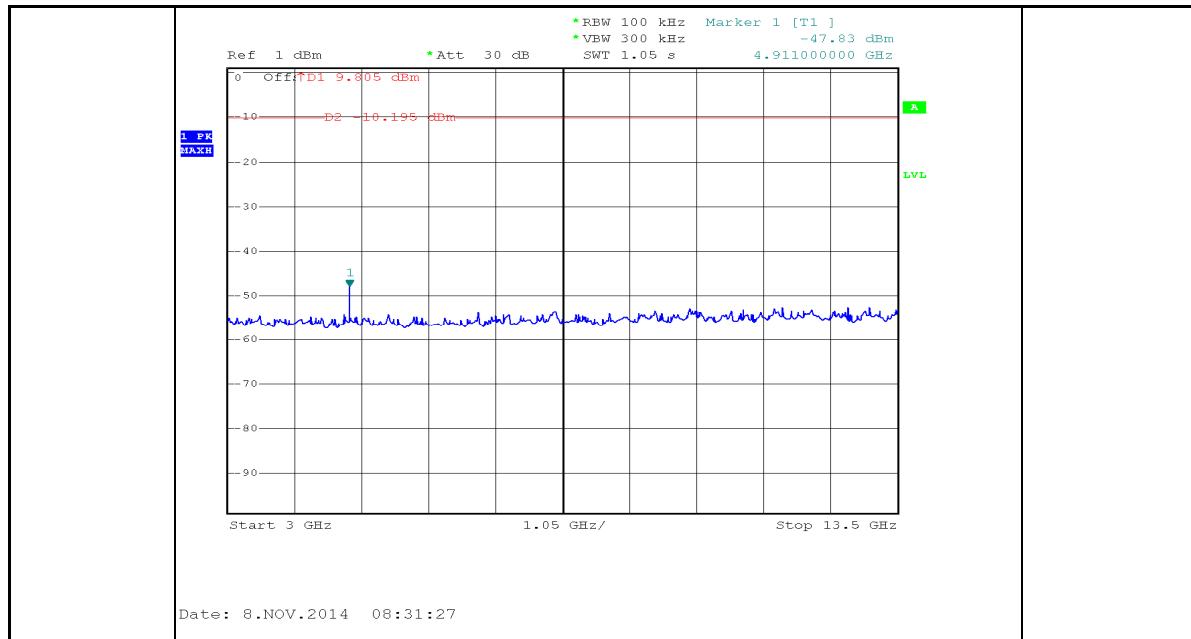
High Channel 2

Produkte

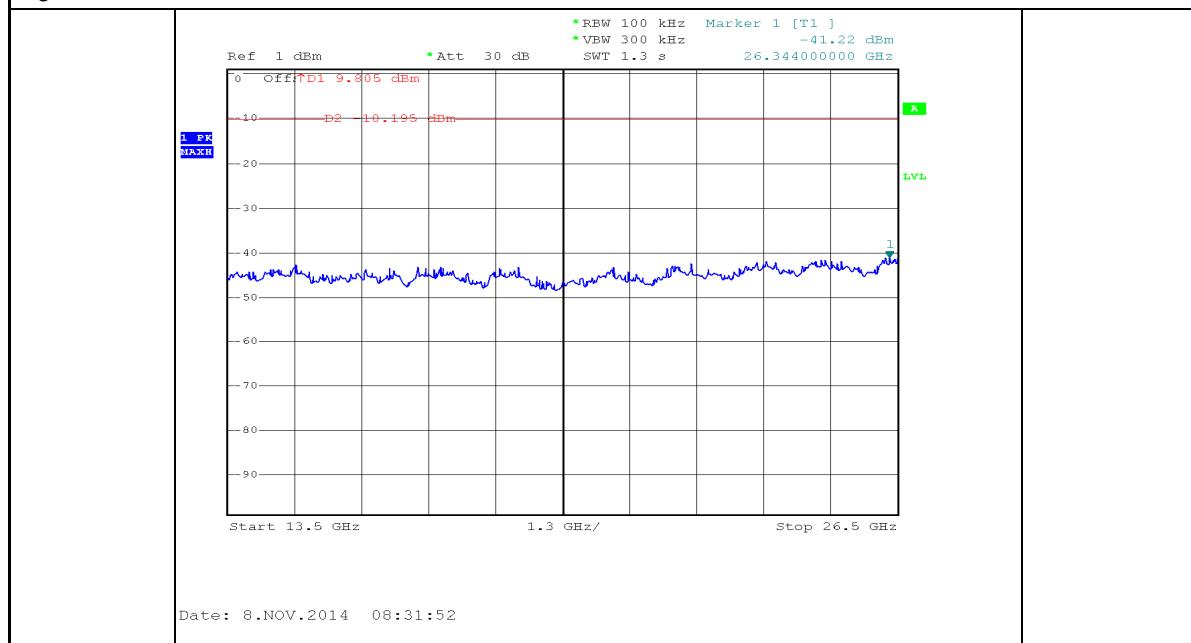
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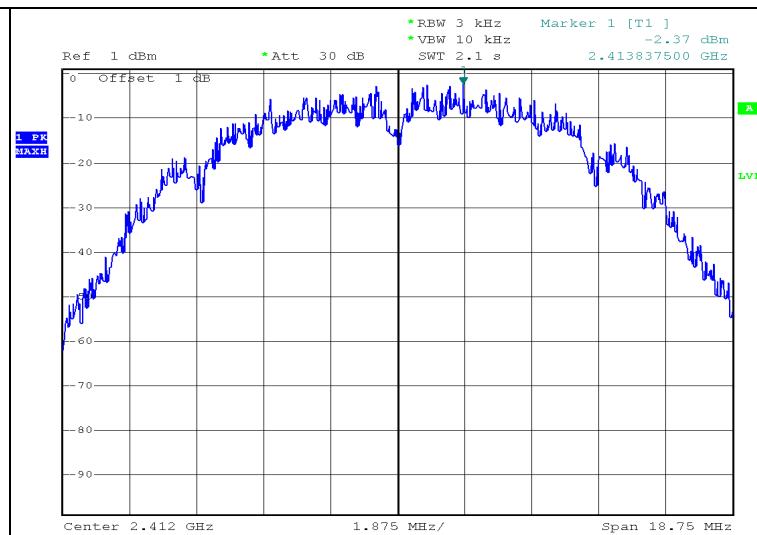
High Channel 3



Appendix A.4: Power spectral density_802.11b

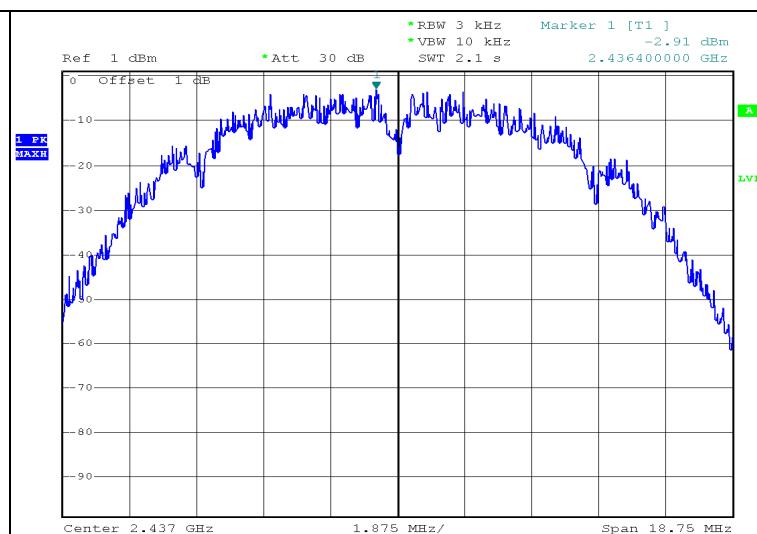
Channel (MHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)	Conclusion
2412	-2.37	8	Pass
2437	-2.98	8	Pass
2462	-2.12	8	Pass

2412 MHz



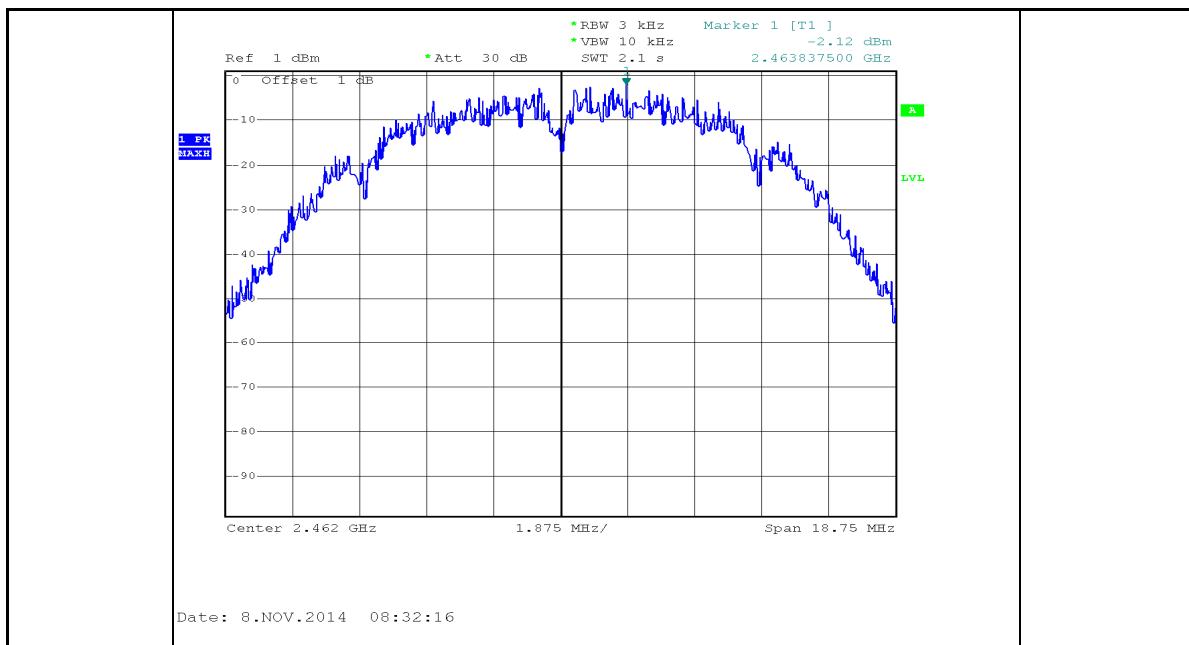
Date: 8.NOV.2014 08:24:13

2437 MHz



Date: 8.NOV.2014 08:28:27

2462 MHz

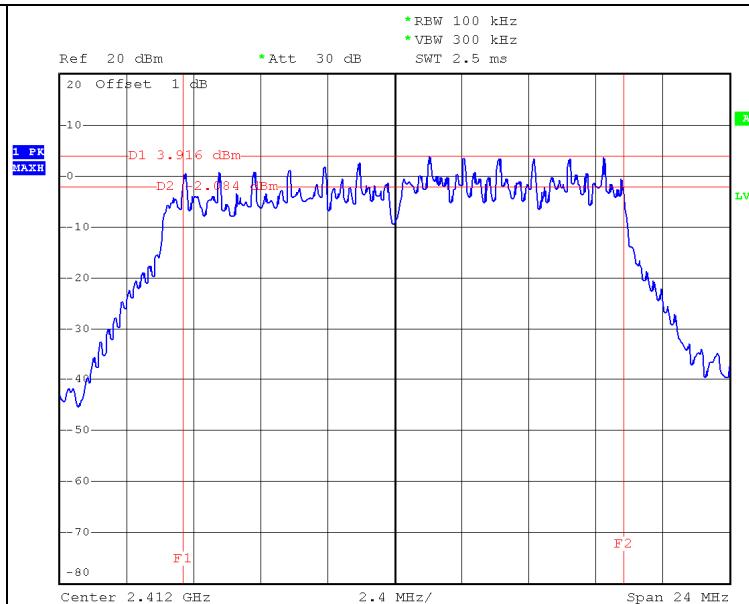


Appendix A.5: Test result of Maximum Conducted Output Power_802.11g

Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit(dBm)
Low Channel	2412	15.50	30
Middle Channel	2437	18.60	30
High Channel	2462	15.60	30

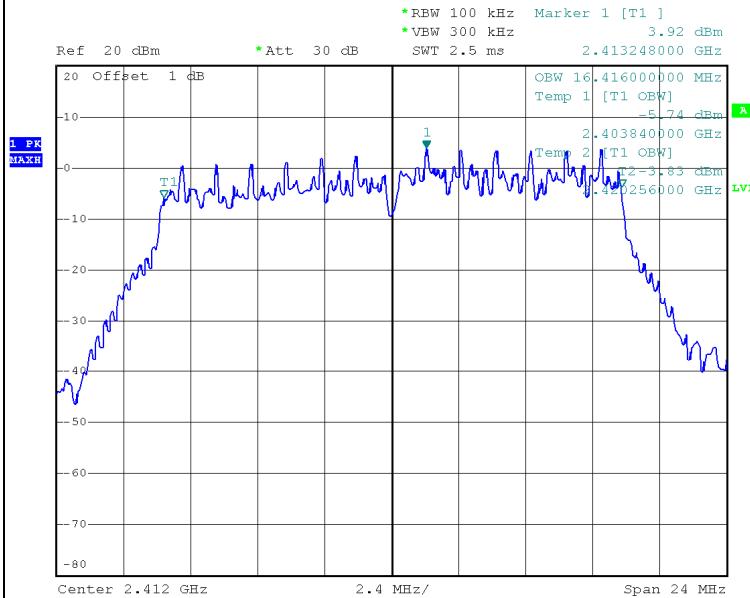
Appendix A.6: 6dB Bandwidth and 99% Bandwidth_802.11g

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.79	16.42
Middle Channel	2437	15.76	16.57
High Channel	2462	15.81	16.47

Low Channel 6dB Bandwidth

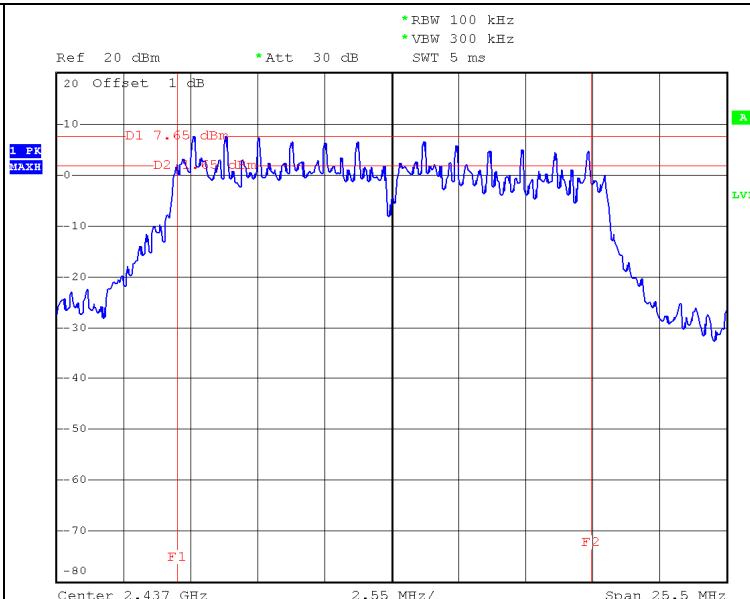
Date: 8.NOV.2014 08:38:38

Low Channel 99% Bandwidth



Date: 8.NOV.2014 08:38:55

Middle Channel 6dB Bandwidth



Date: 8.NOV.2014 08:42:40

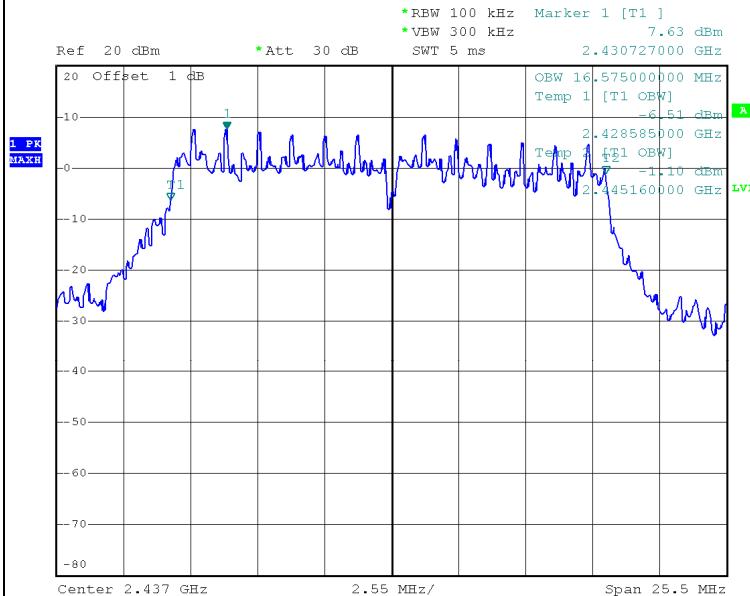
Middle Channel 99% Bandwidth

Produkte

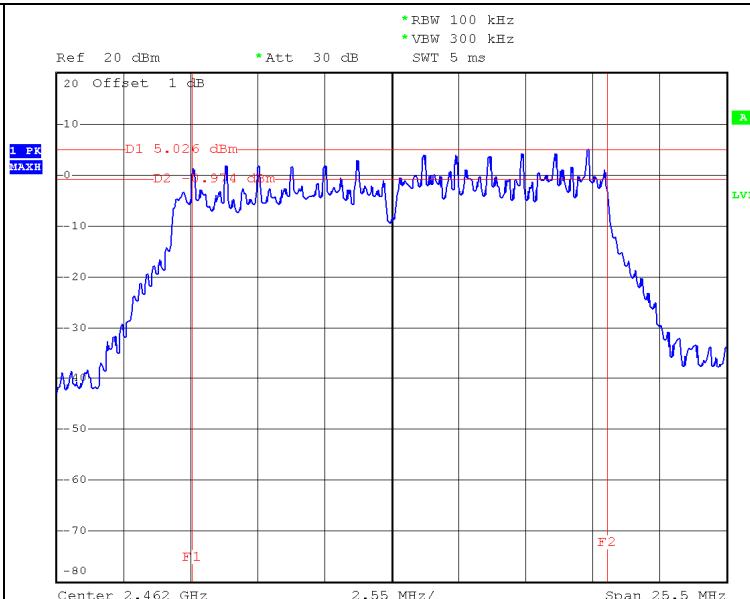
Products

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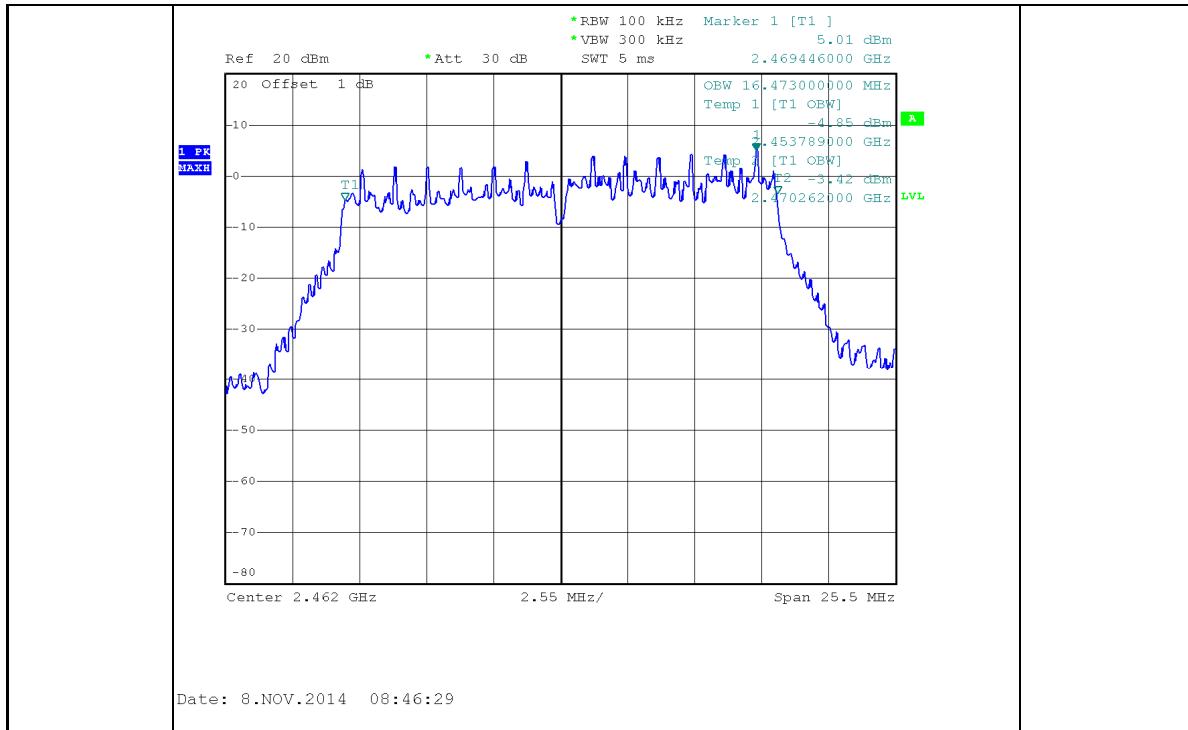


Date: 8.NOV.2014 08:42:57

High Channel 6dB Bandwidth

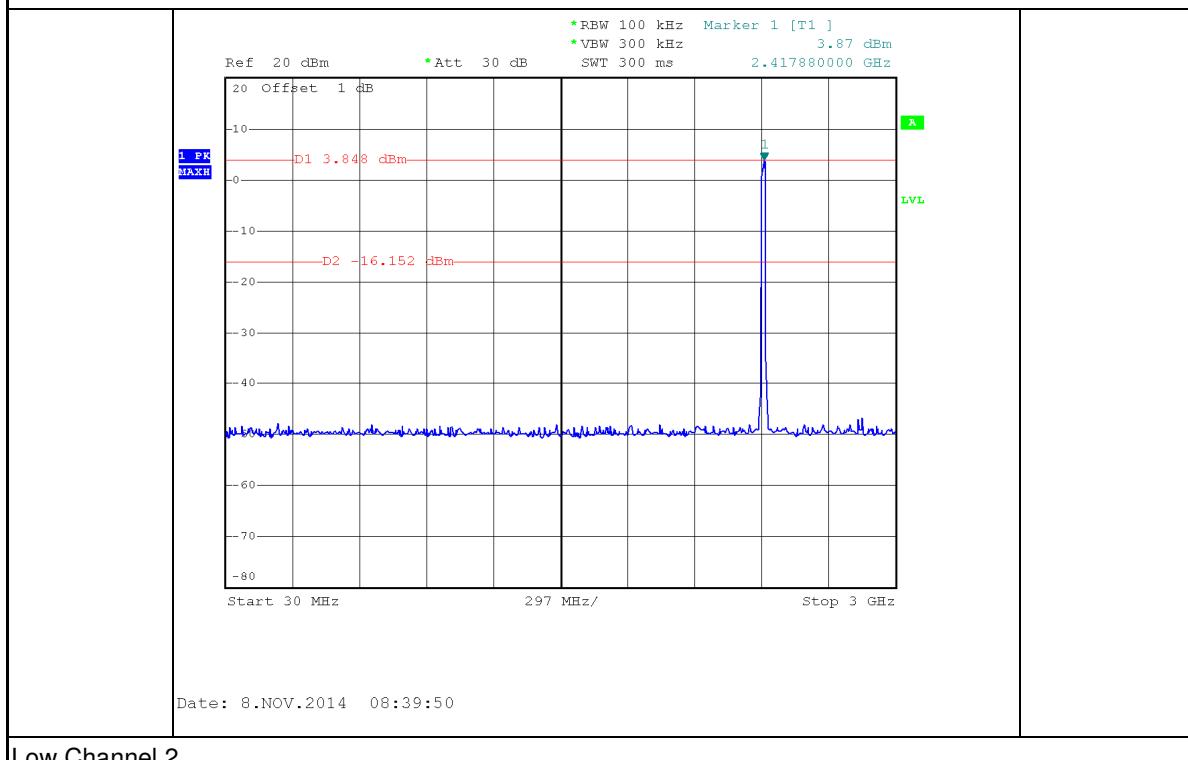
Date: 8.NOV.2014 08:46:11

High Channel 99% Bandwidth



Appendix A.7: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11g

Low Channel 1

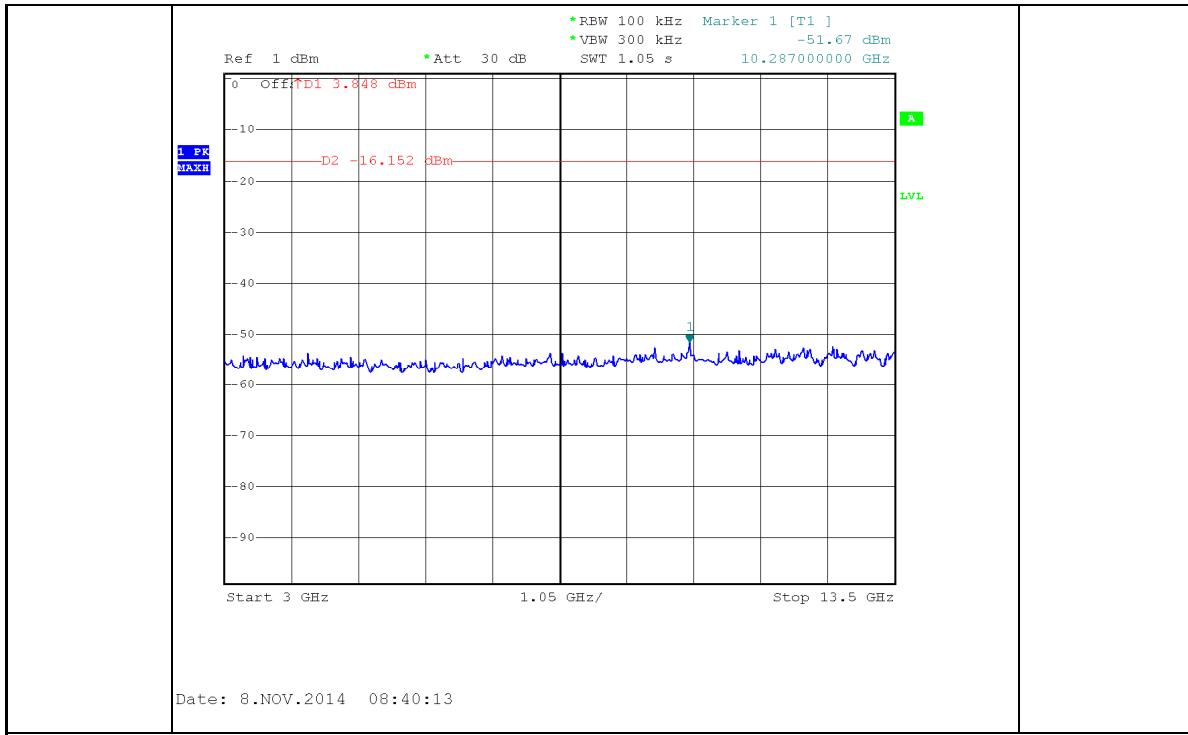
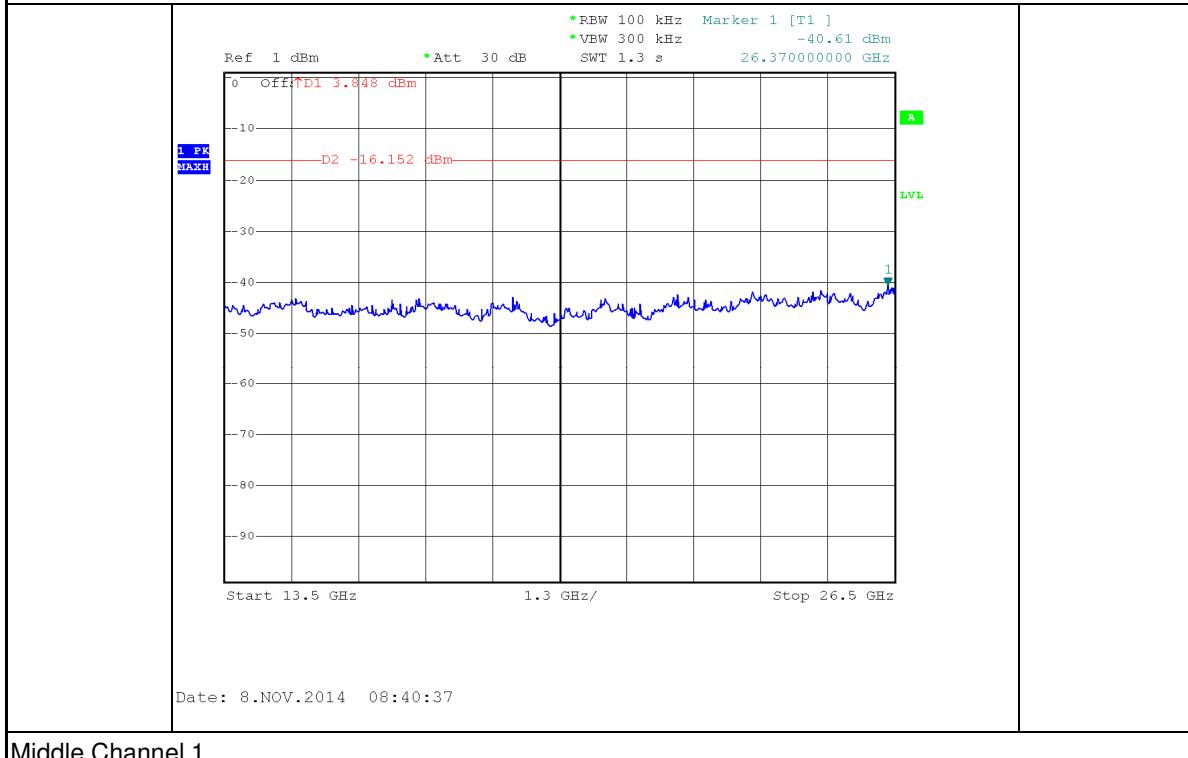


Produkte

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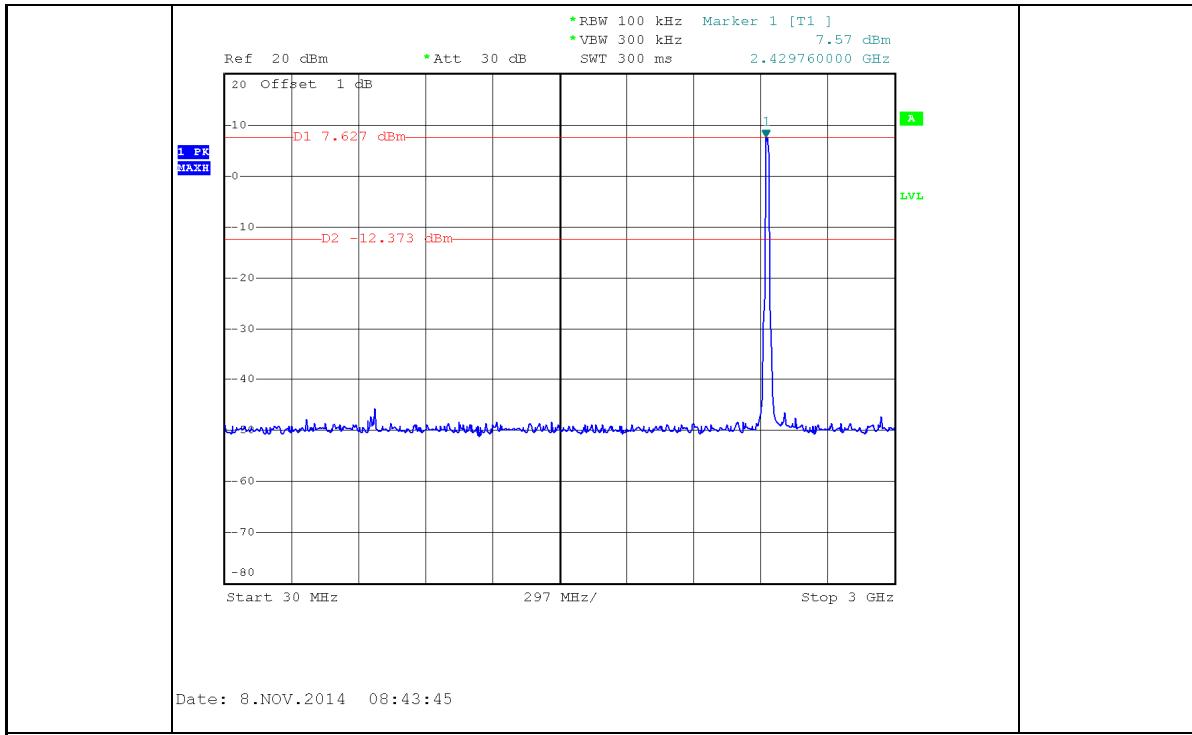
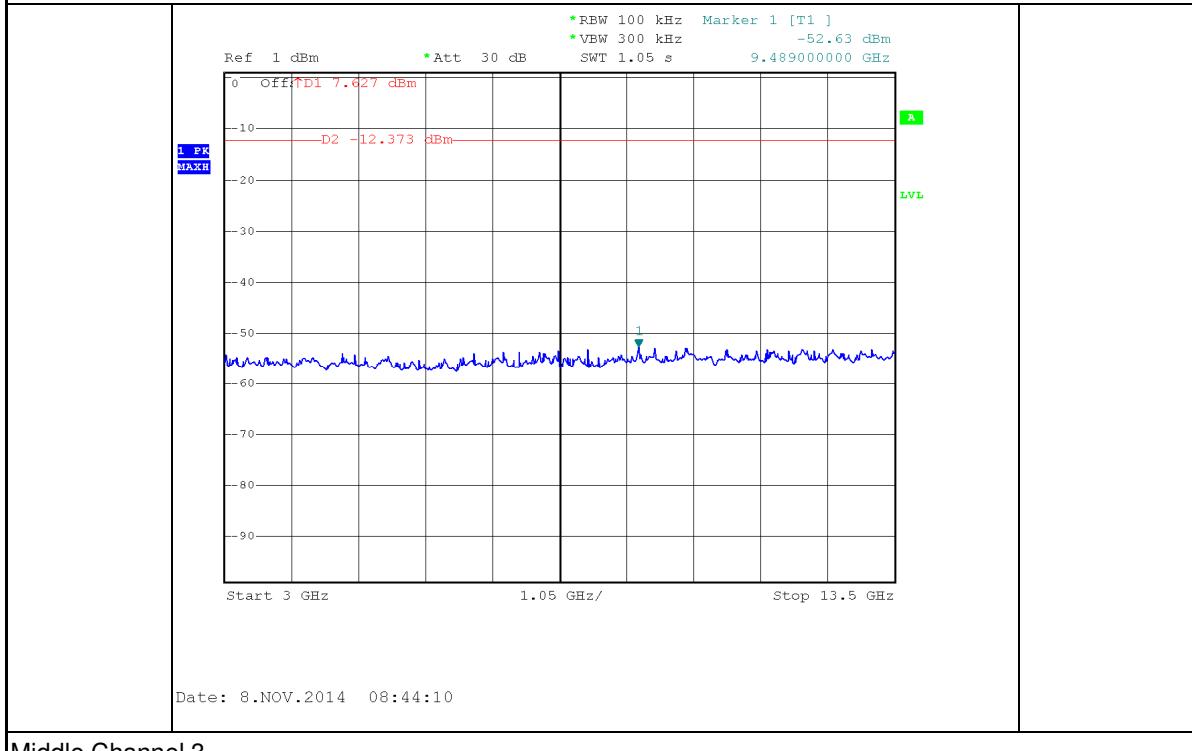
**Low Channel 3**

Produkte

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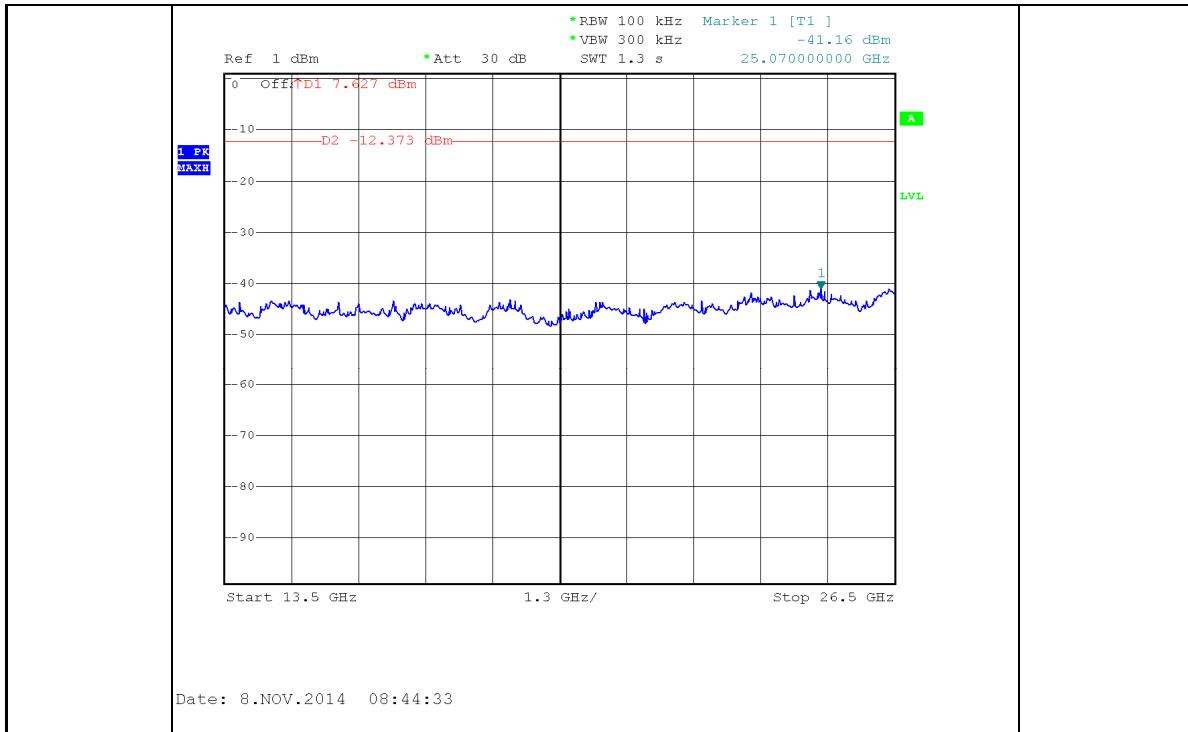
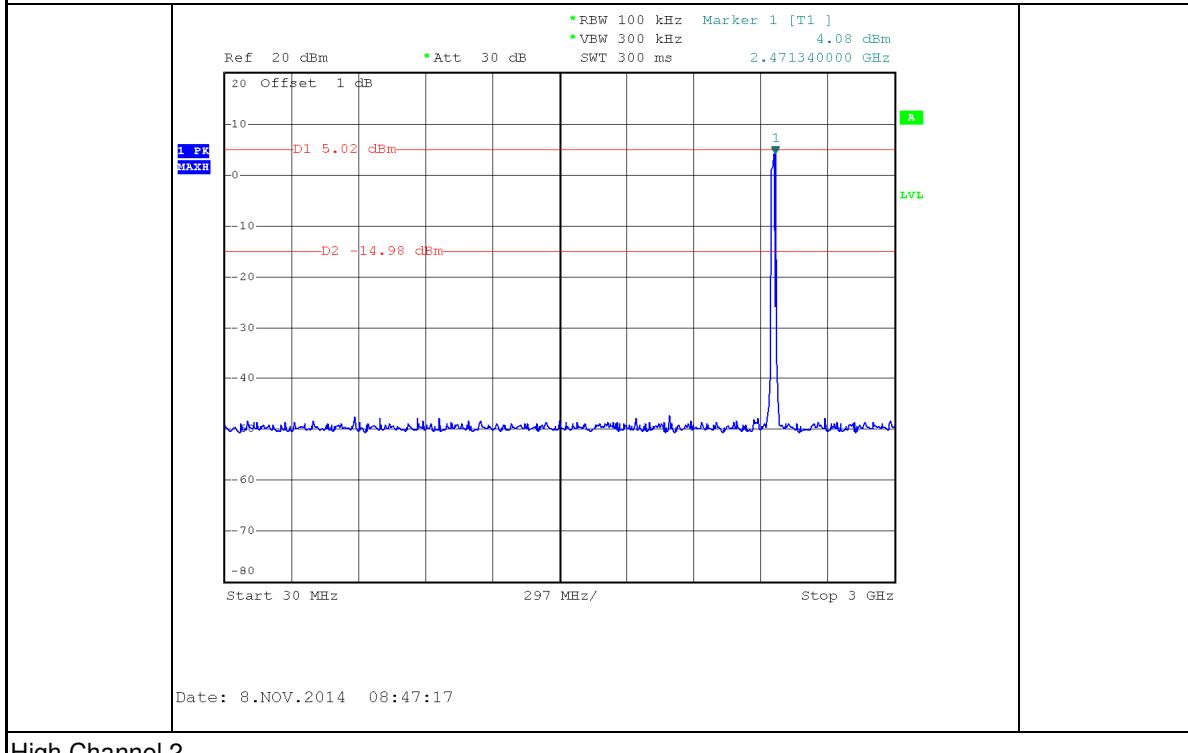
**Middle Channel 2**

Produkte

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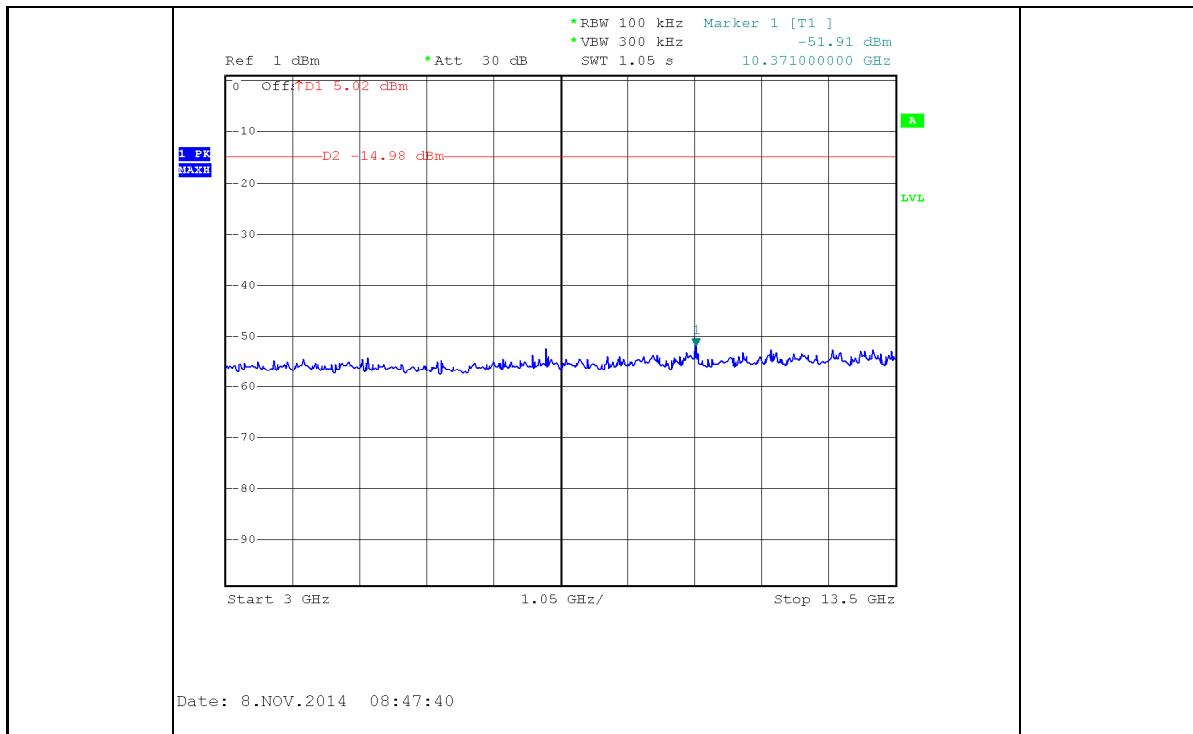
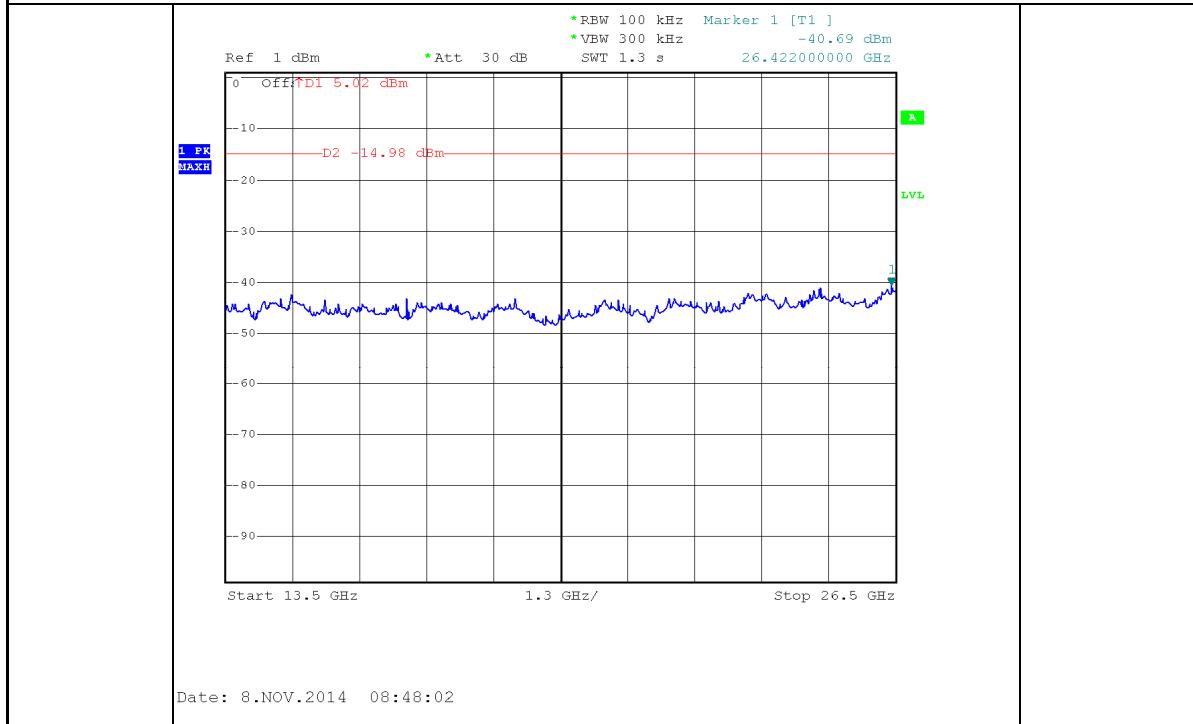
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**High Channel 1**

Produkte*Products***17042741 002**

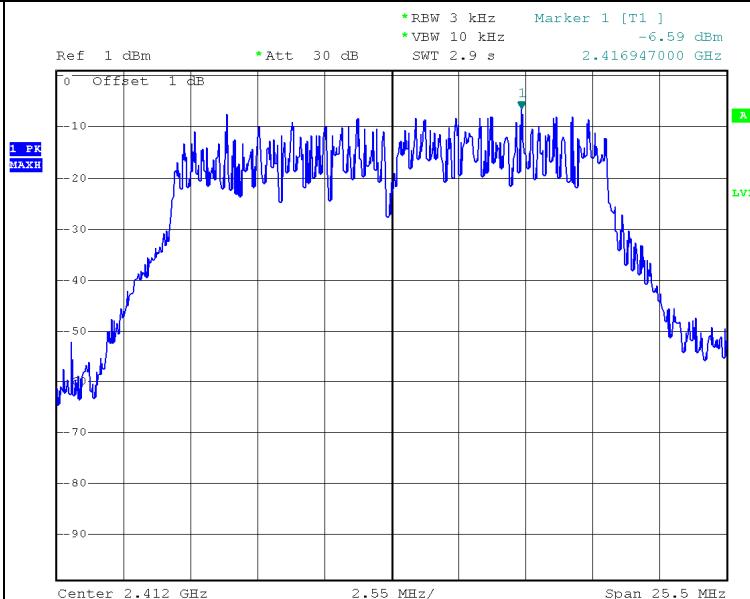
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**High Channel 3**

Appendix A.8: Power Spectral Density 802.11g

Channel (MHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)	Conclusion
2412	-6.59	8	Pass
2437	-0.75	8	Pass
2462	-6.22	8	Pass

2412 MHz



Date: 8.NOV.2014 08:41:01

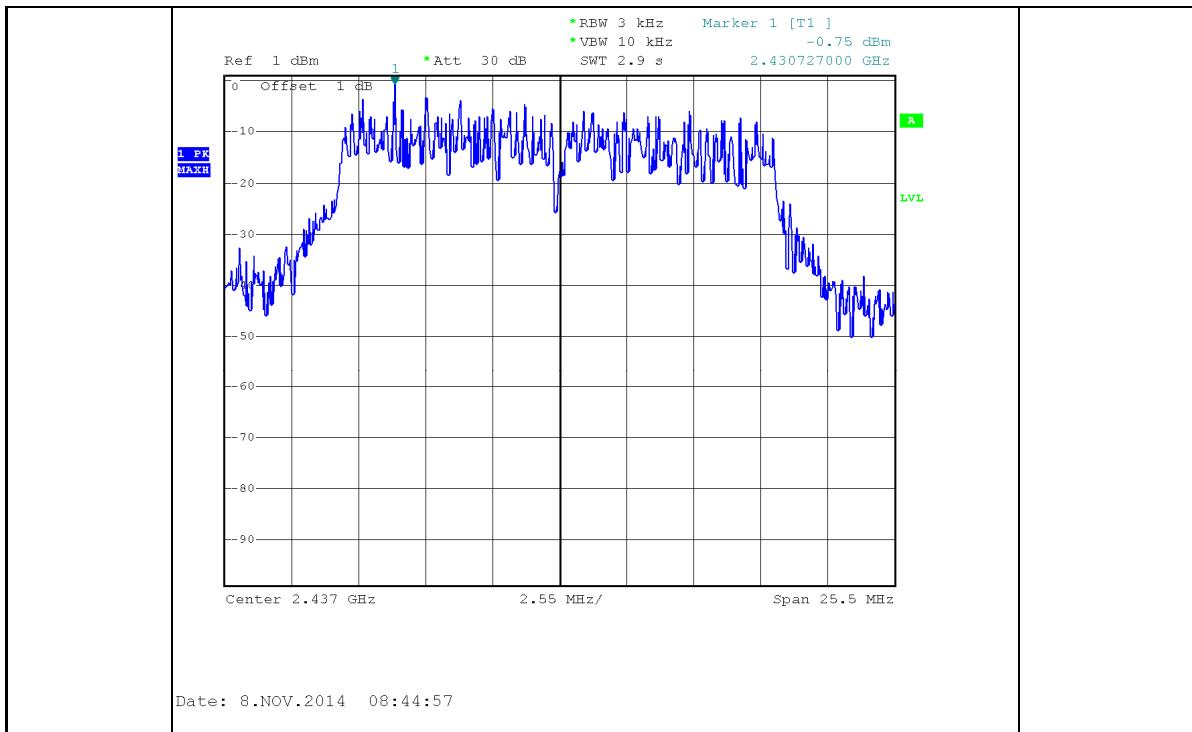
2437 MHz

Produkte

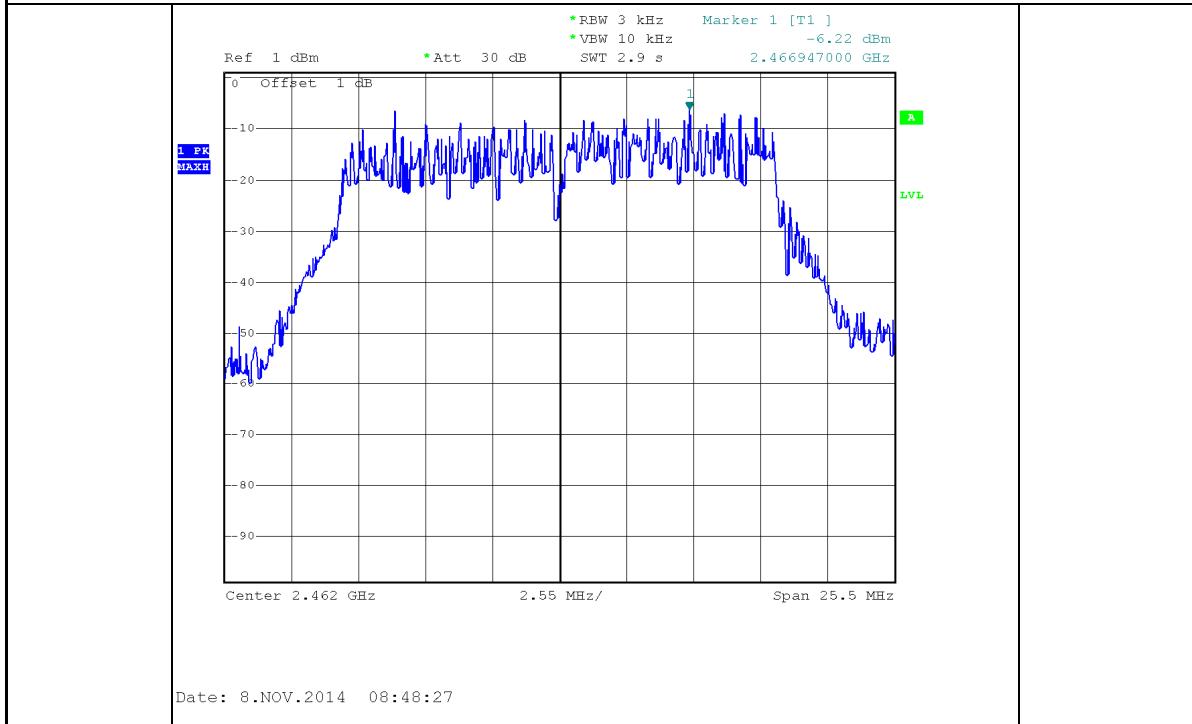
Products

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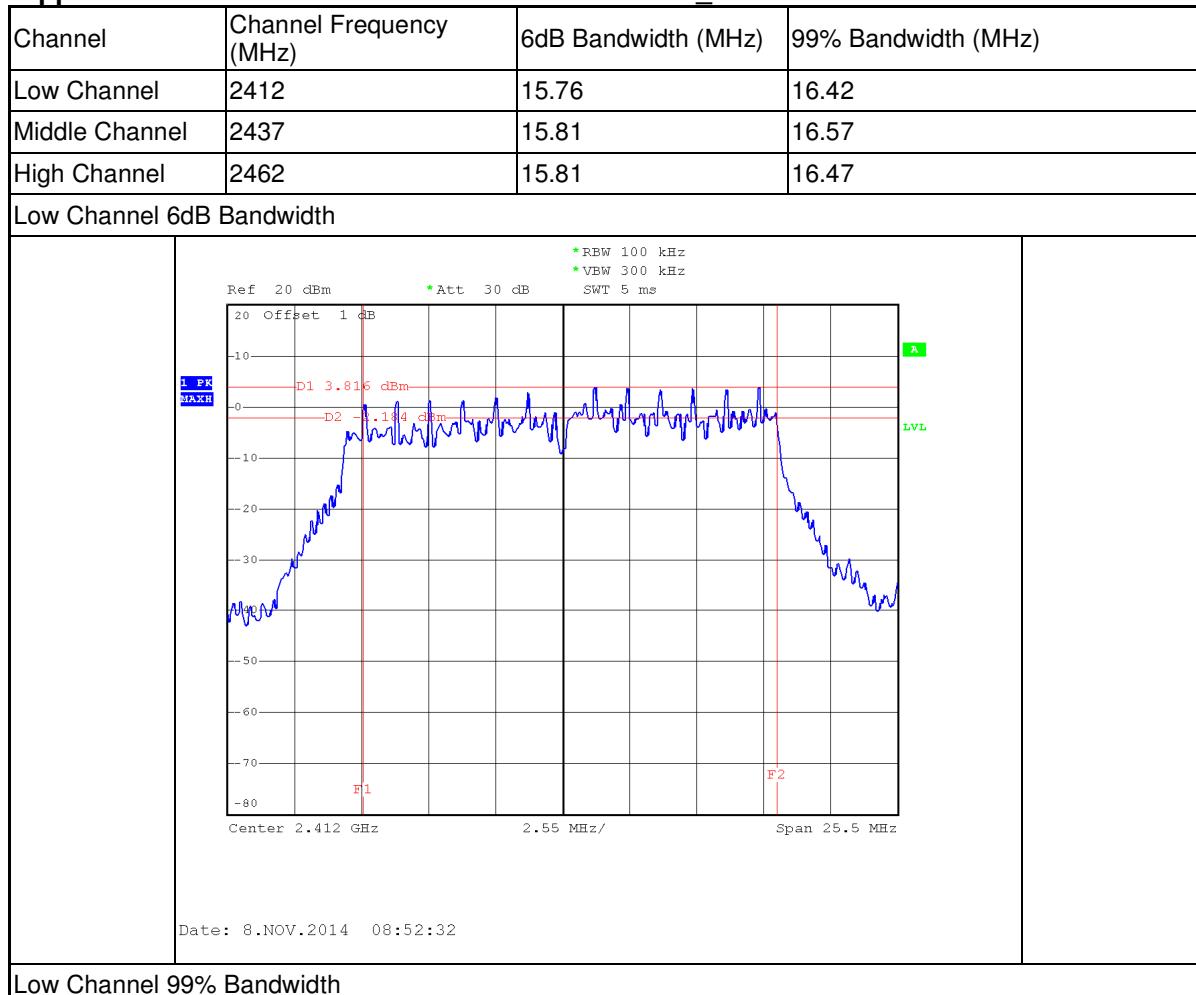


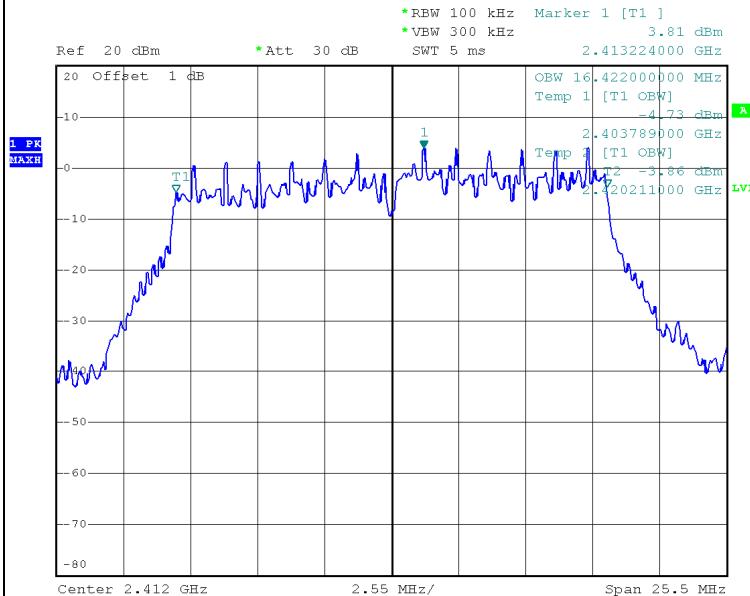
2462 MHz



Appendix A.9: Maximum Conducted Output Power_802.11n HT20

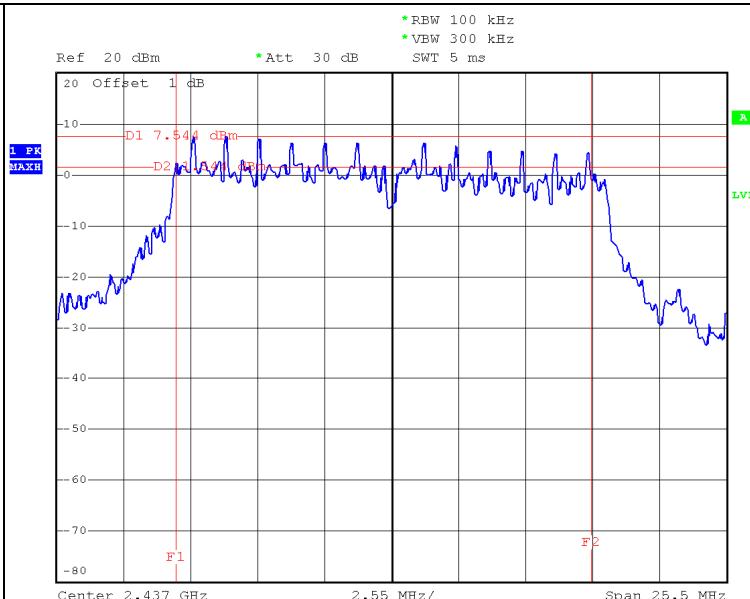
Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit(dBm)
Low Channel	2412	15.40	30
Middle Channel	2437	18.60	30
High Channel	2462	15.30	30

Appendix A.10: 6dB Bandwidth and 99% Bandwidth_802.11n HT20



Date: 8.NOV.2014 08:52:49

Middle Channel 6dB Bandwidth



Date: 8.NOV.2014 08:56:58

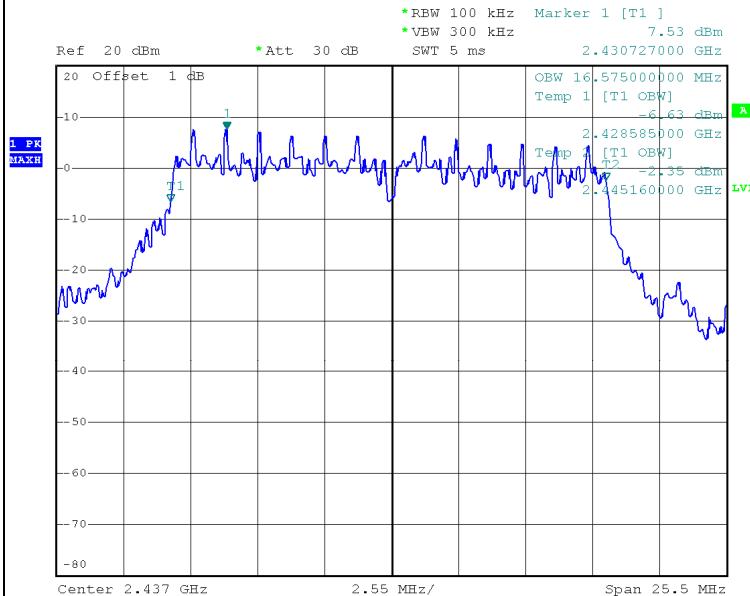
Middle Channel 99% Bandwidth

Produkte

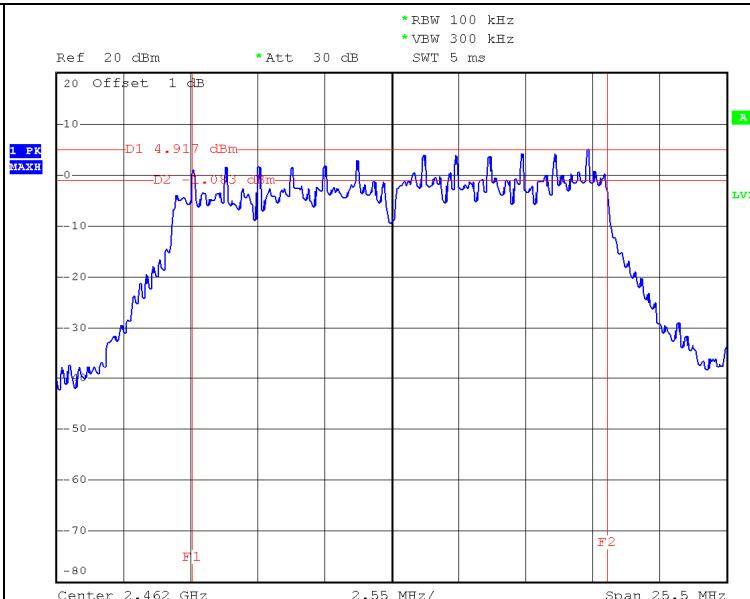
Products

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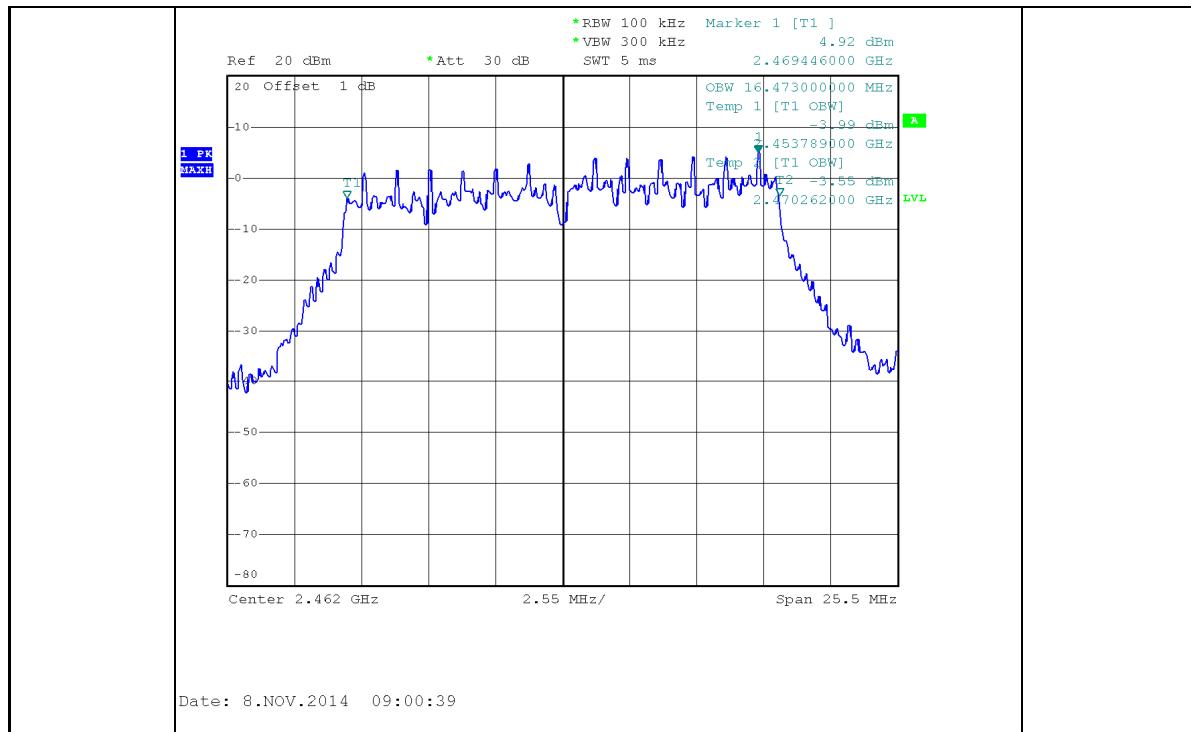


Date: 8.NOV.2014 08:57:16

High Channel 6dB Bandwidth

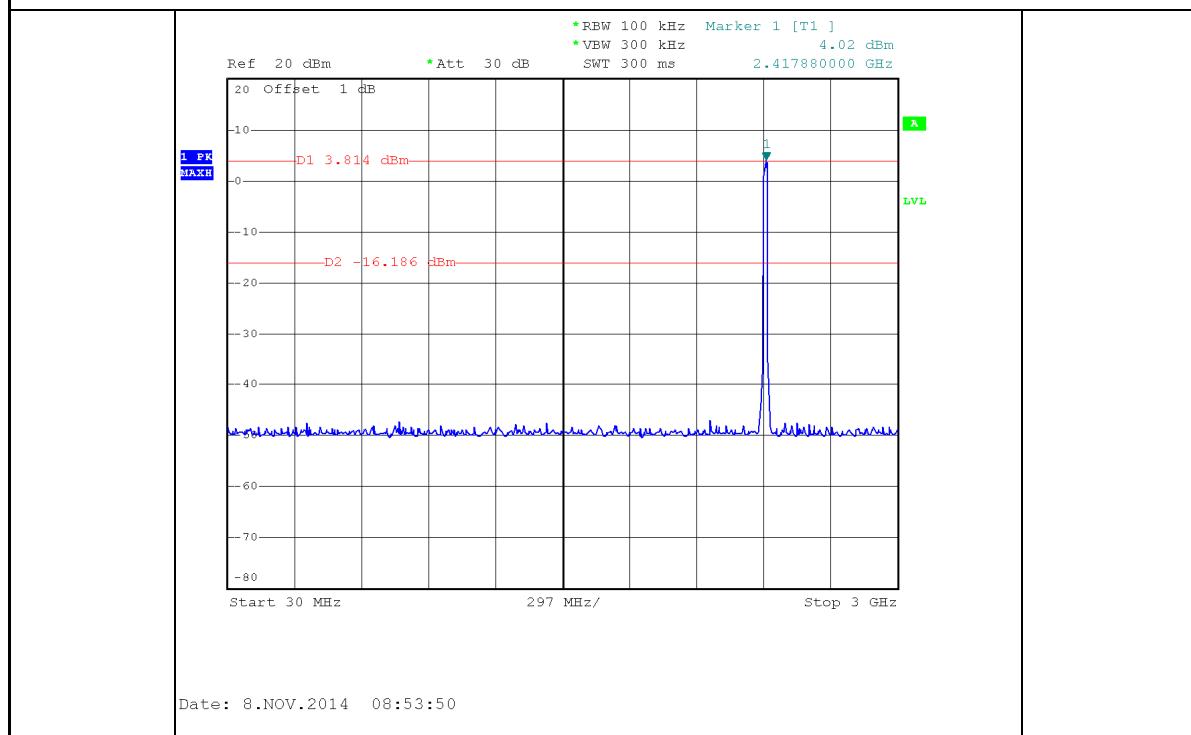
Date: 8.NOV.2014 09:00:21

High Channel 99% Bandwidth



Appendix A.11: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT20

Low Channel 1



Low Channel 2

Appendix A

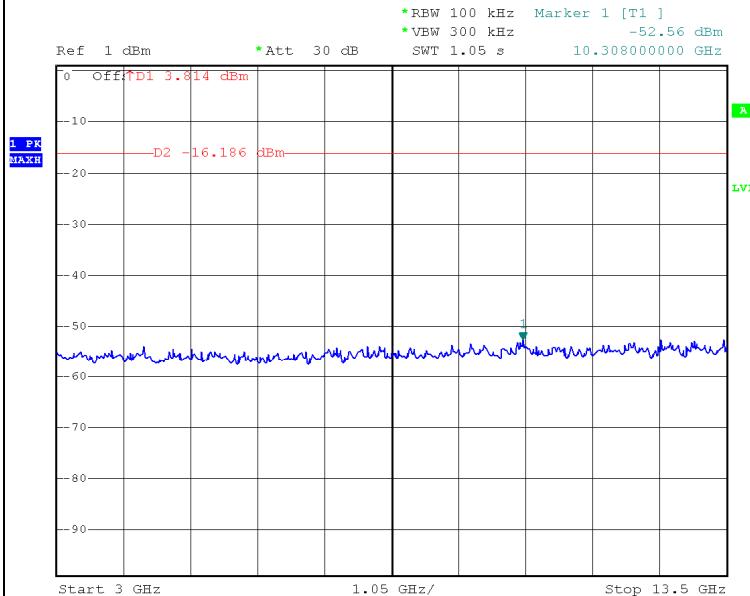
 TÜV Rheinland®

Produkte

Products

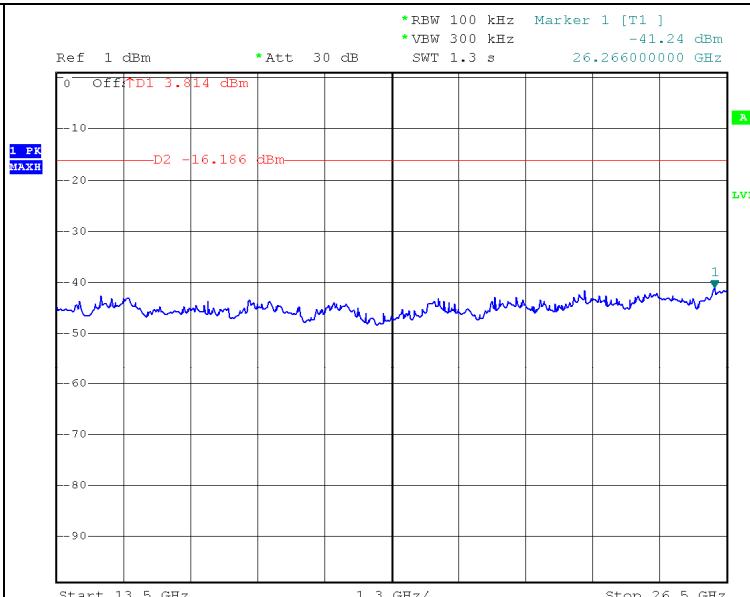
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Date: 8.NOV.2014 08:54:15

Low Channel 3



Date: 8.NOV.2014 08:54:38

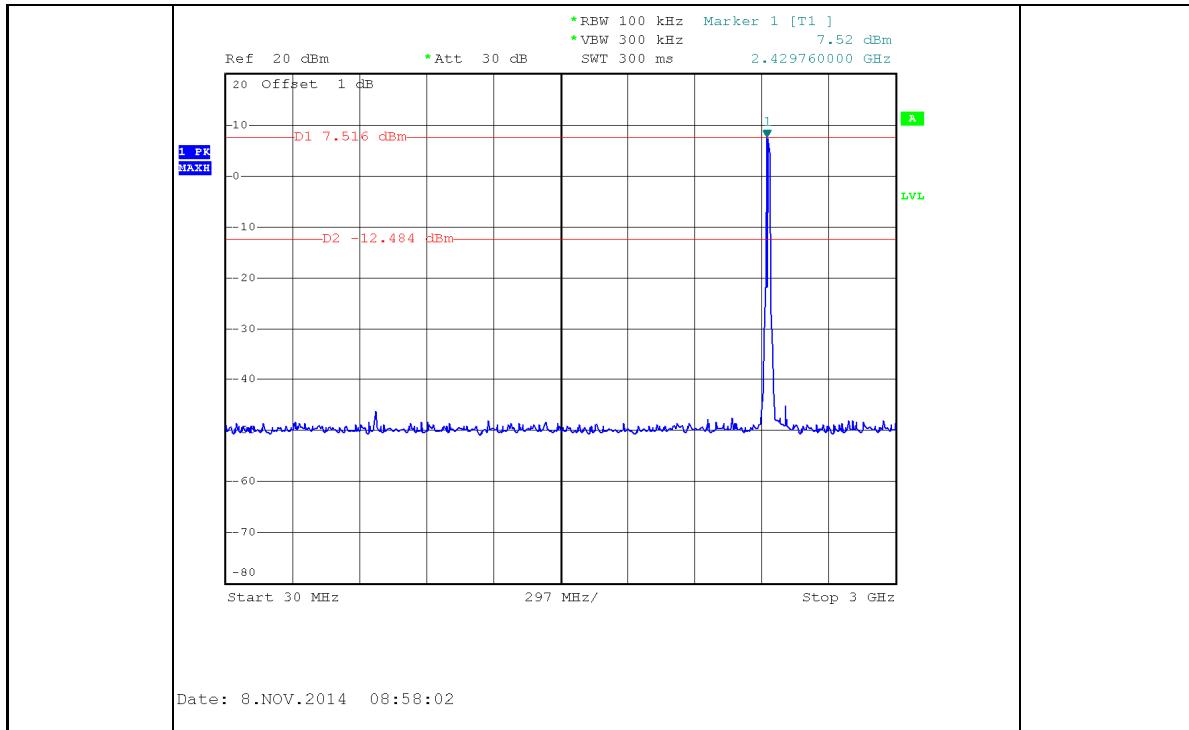
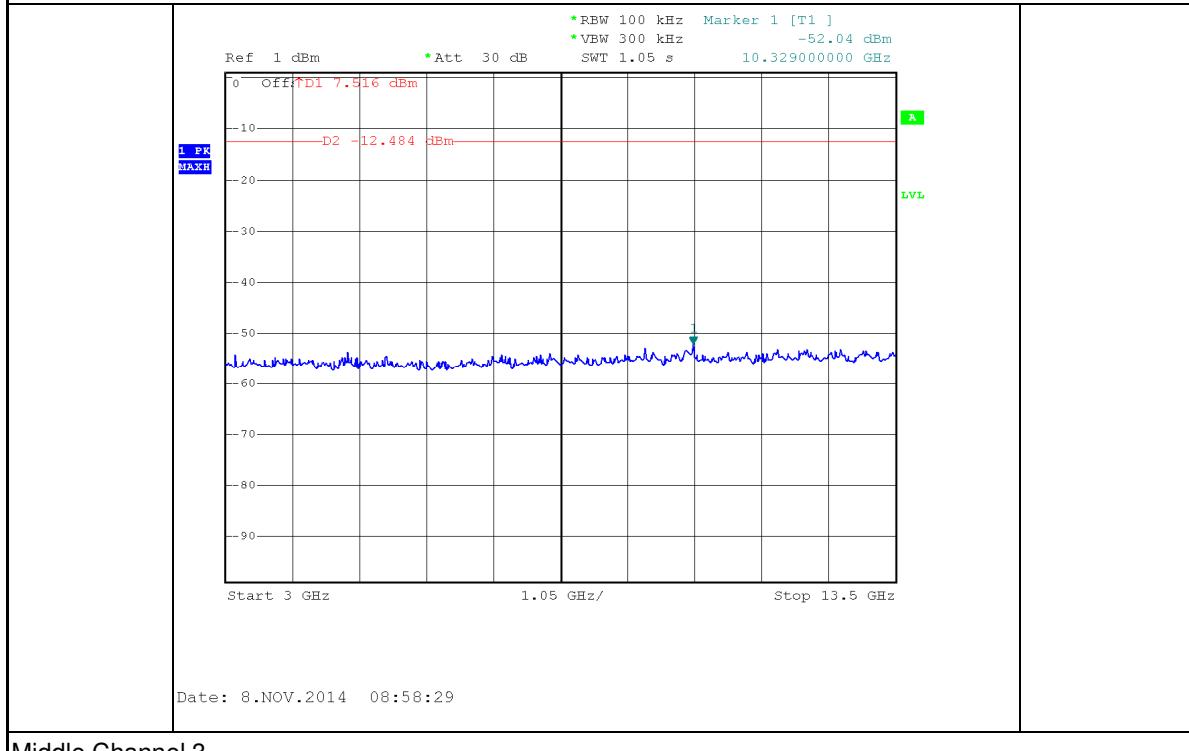
Middle Channel 1

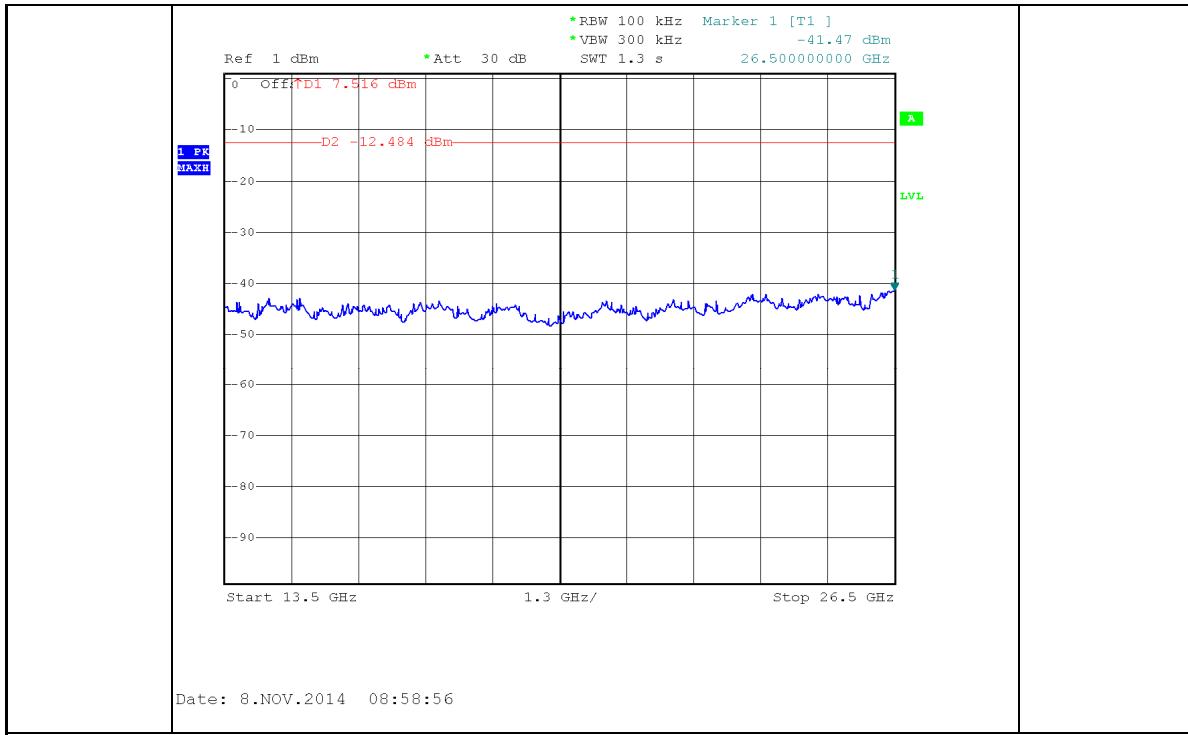
Produkte

Products

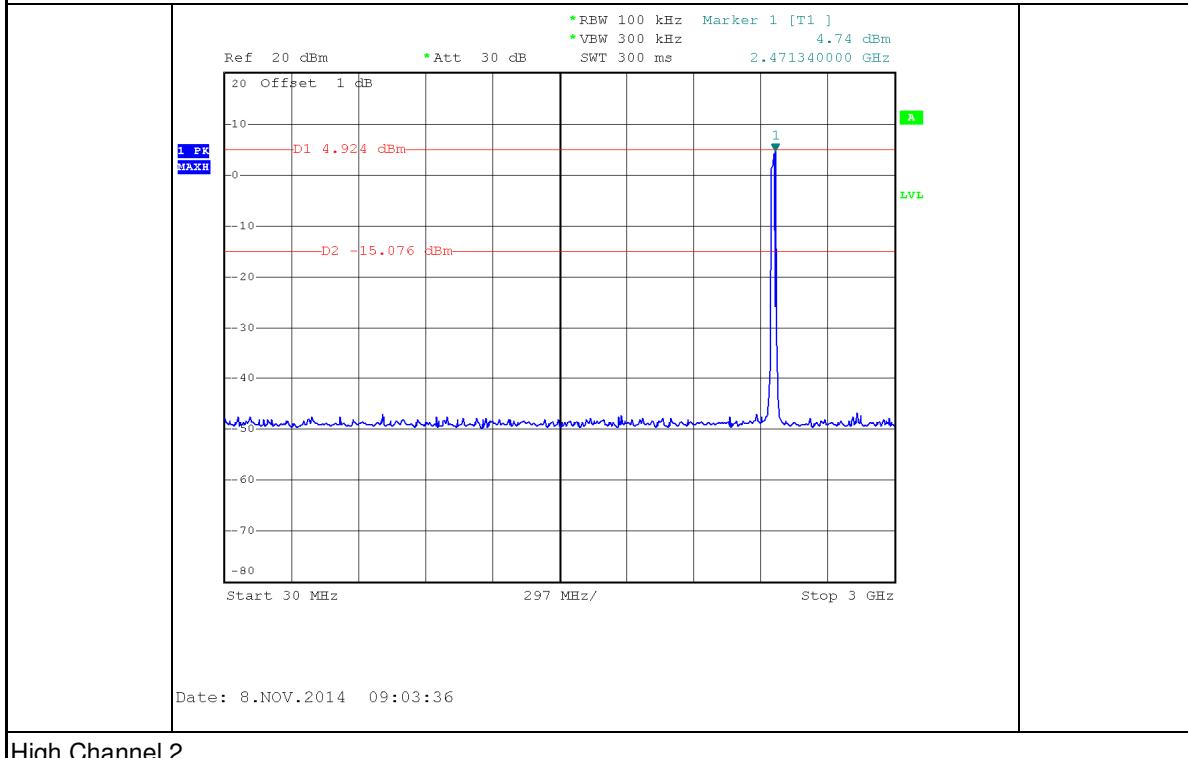
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**Middle Channel 2**



High Channel 1

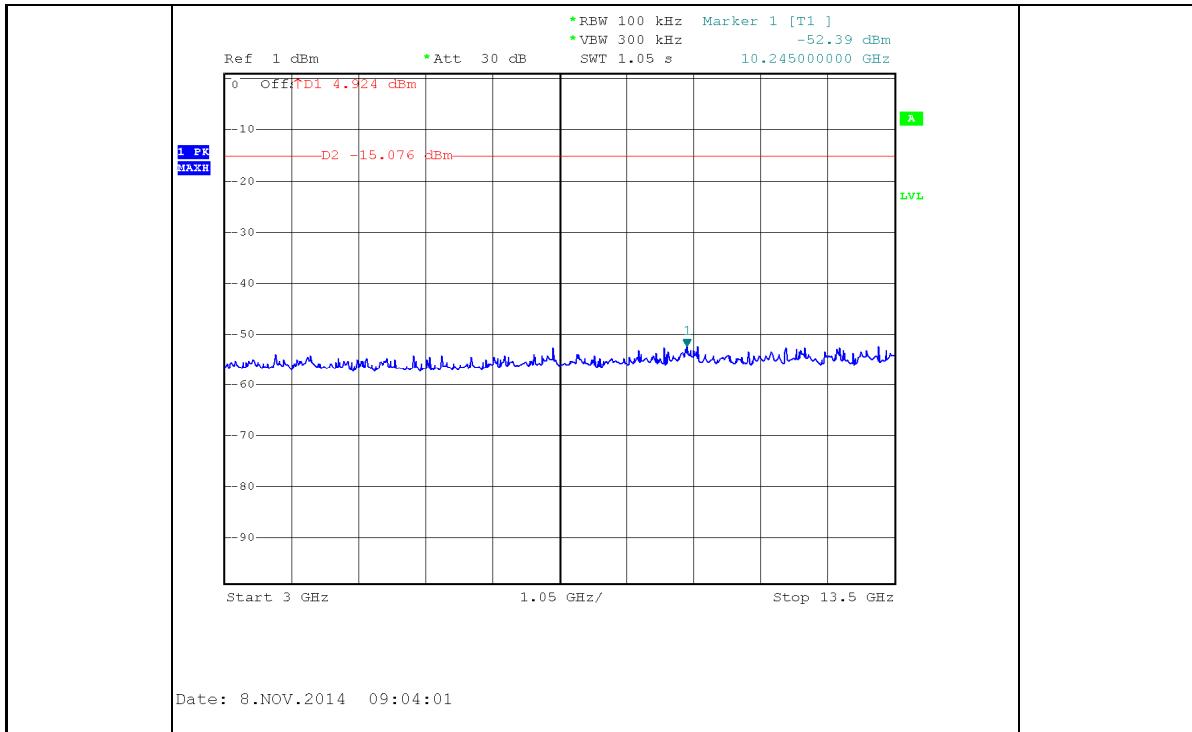
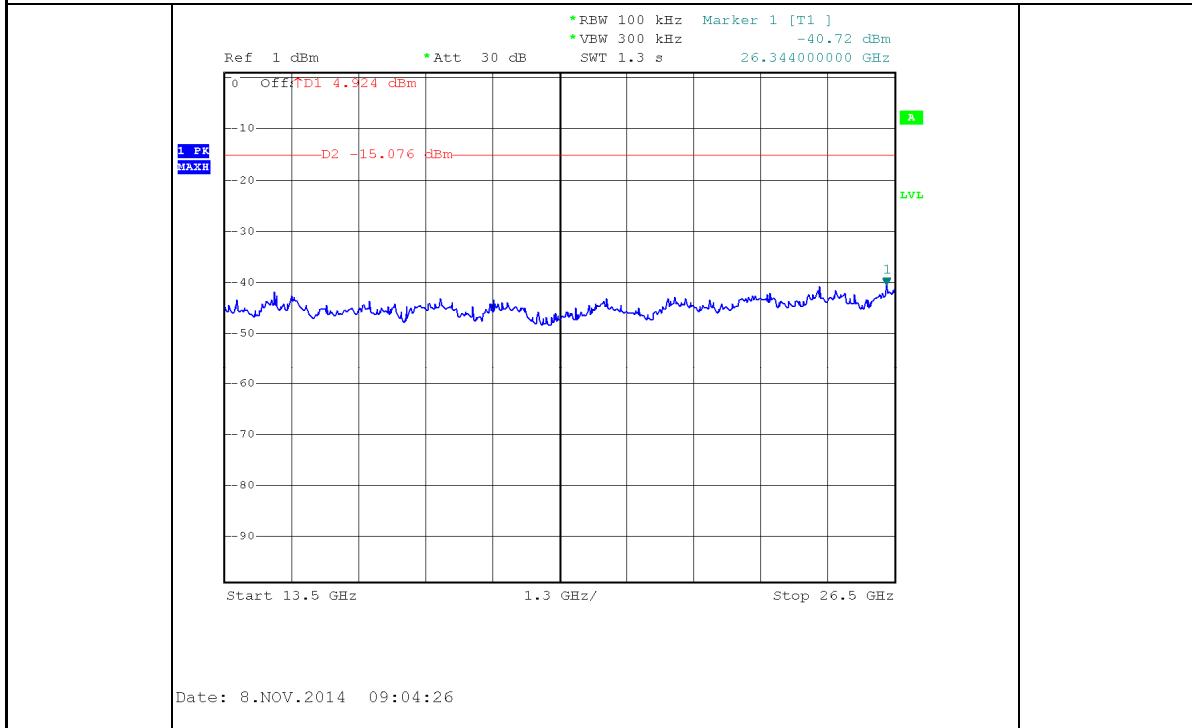


Produkte

Products

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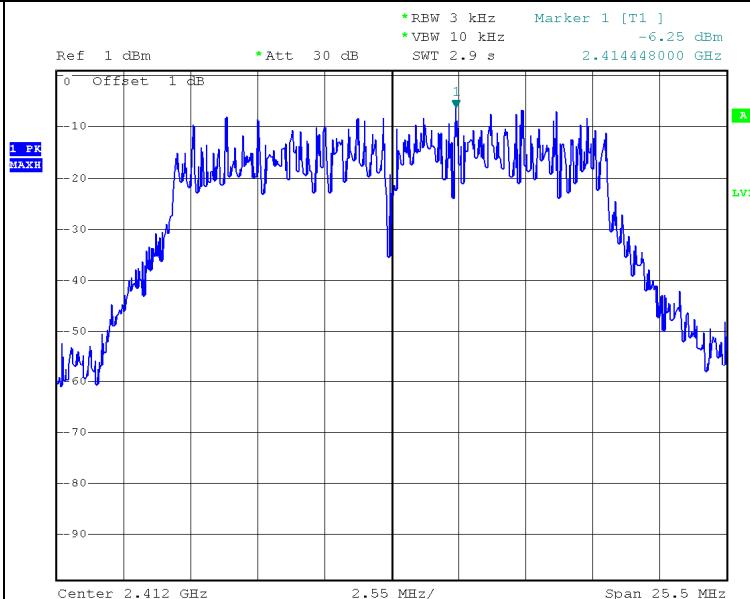
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**High Channel 3**

Appendix A.12: Power Spectral Density_802.11n HT20

Channel (MHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)	Conclusion
2412	-6.25	8	Pass
2437	-1.54	8	Pass
2462	-5.94	8	Pass

2412 MHz



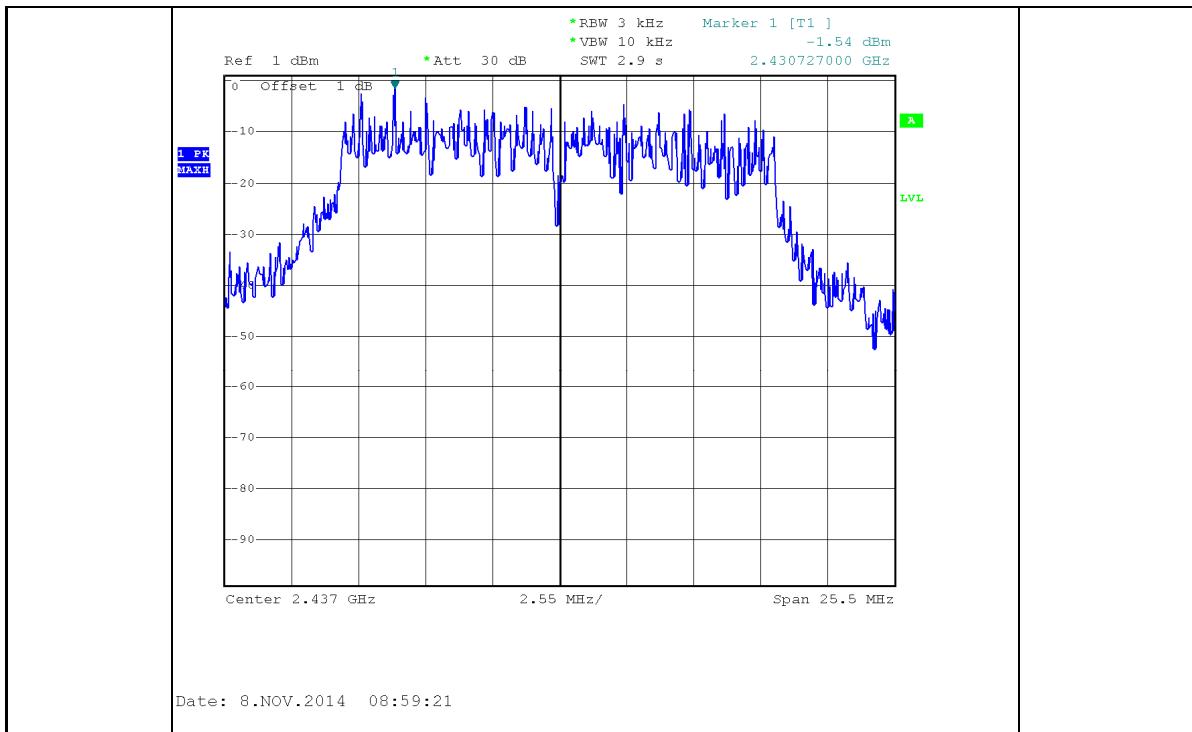
2437 MHz

Produkte

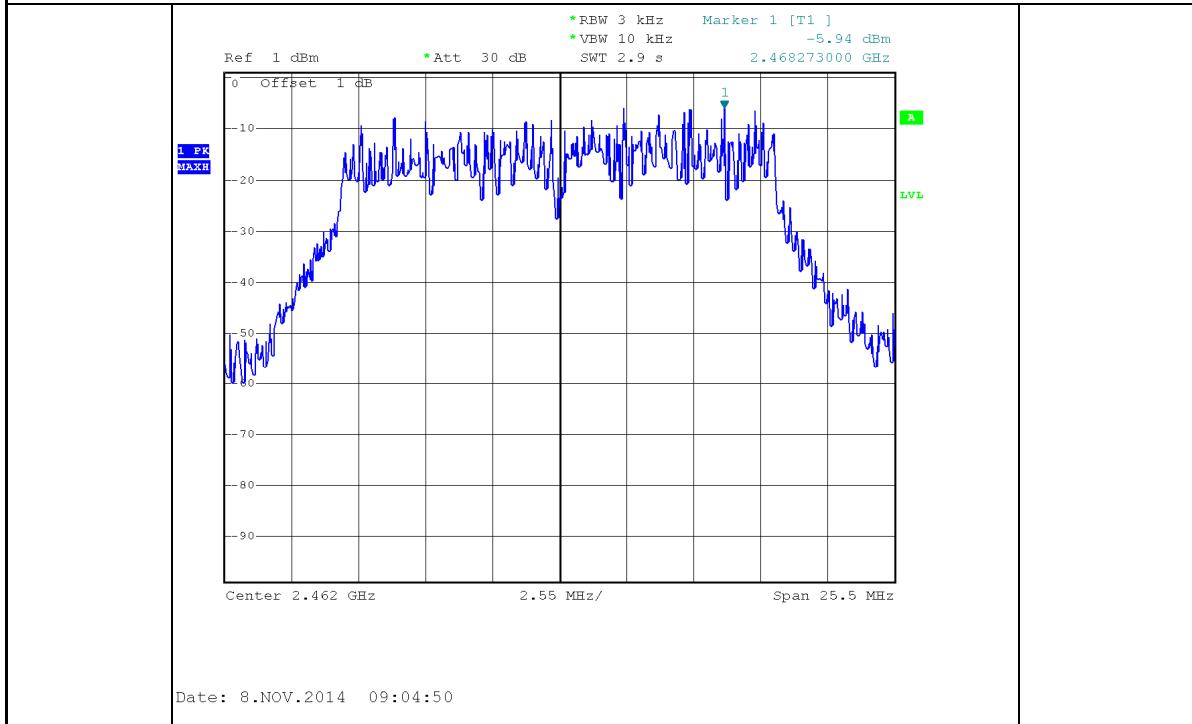
Products

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2462 MHz



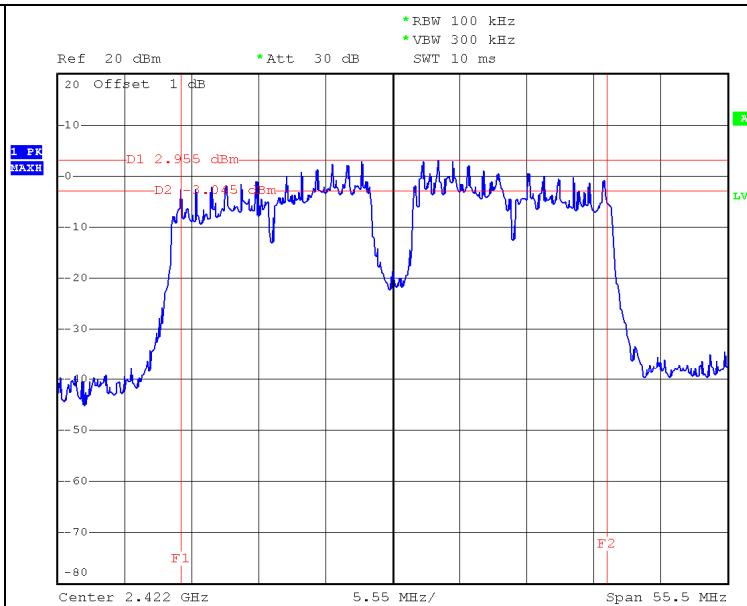
Appendix A.13: Maximum Conducted Output Power_802.11n HT40

Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit(dBm)
Low Channel	2422	16.40	30
Middle Channel	2437	19.10	30
High Channel	2452	16.10	30

Appendix A.14: 6dB Bandwidth and 99% Bandwidth_802.11n HT40

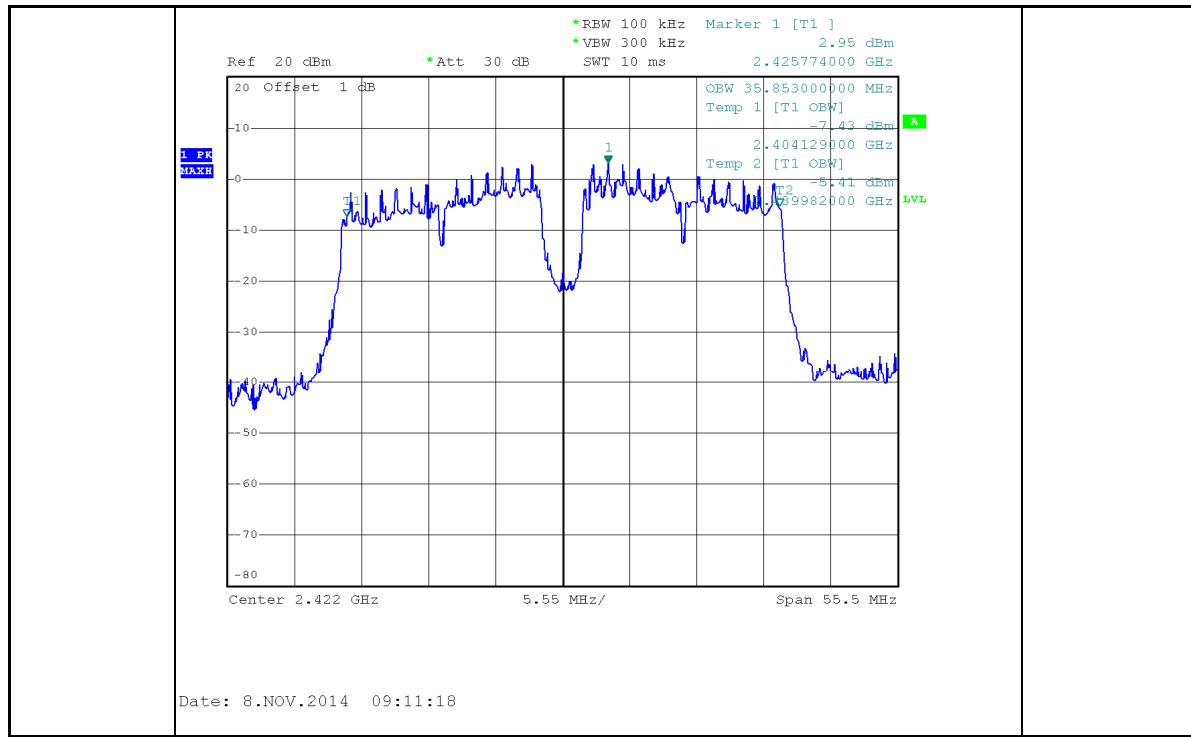
Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2422	35.30	35.85
Middle Channel	2437	35.85	36.19
High Channel	2452	35.96	36.41

Low Channel 6dB Bandwidth

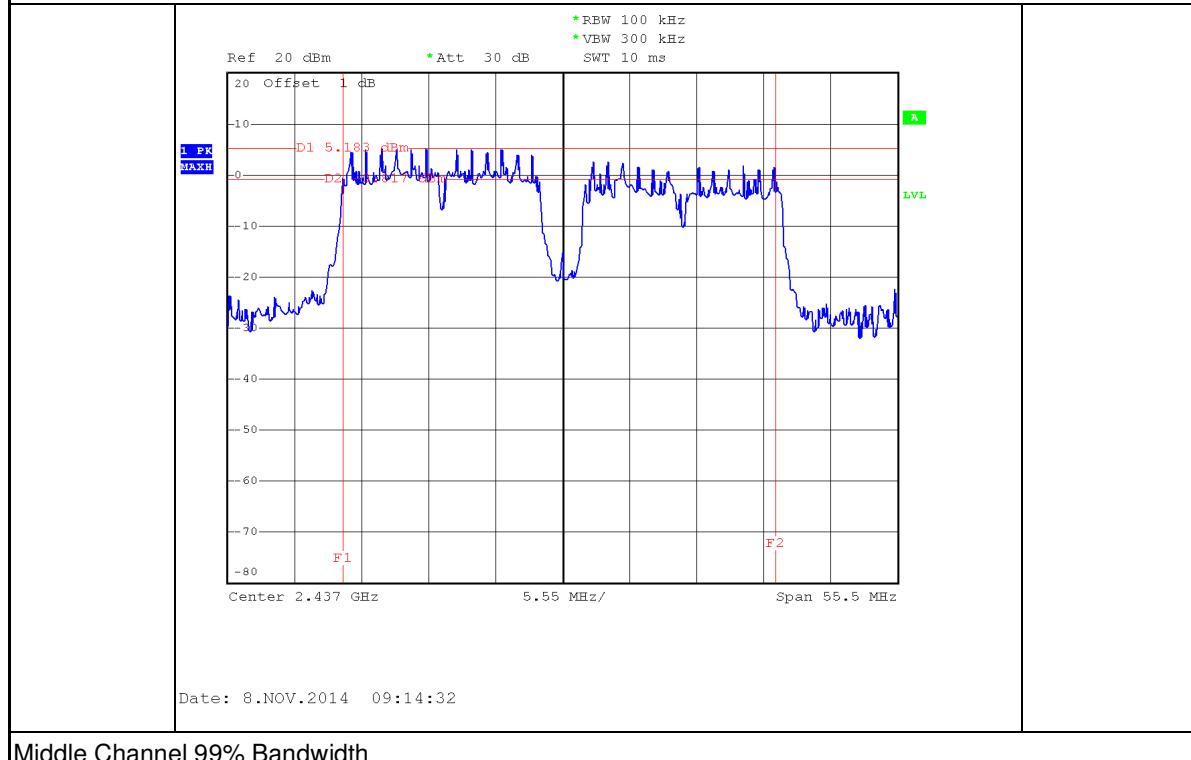


Date: 8.NOV.2014 09:11:01

Low Channel 99% Bandwidth



Middle Channel 6dB Bandwidth

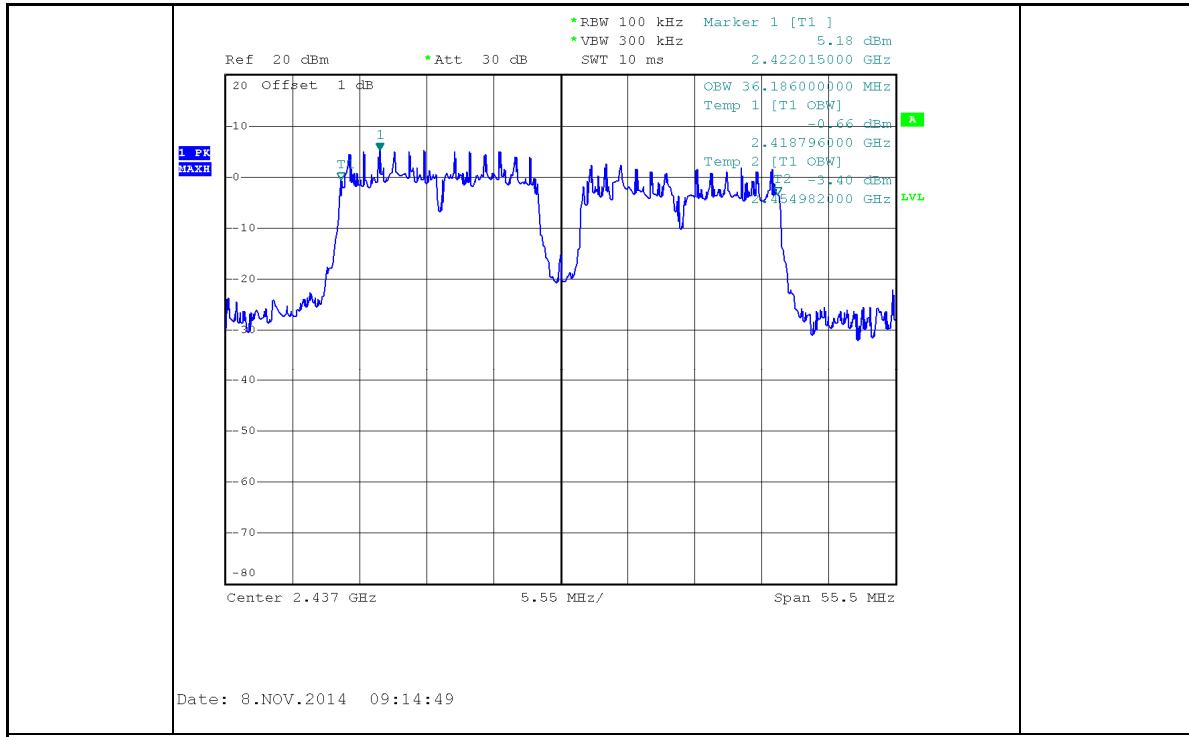
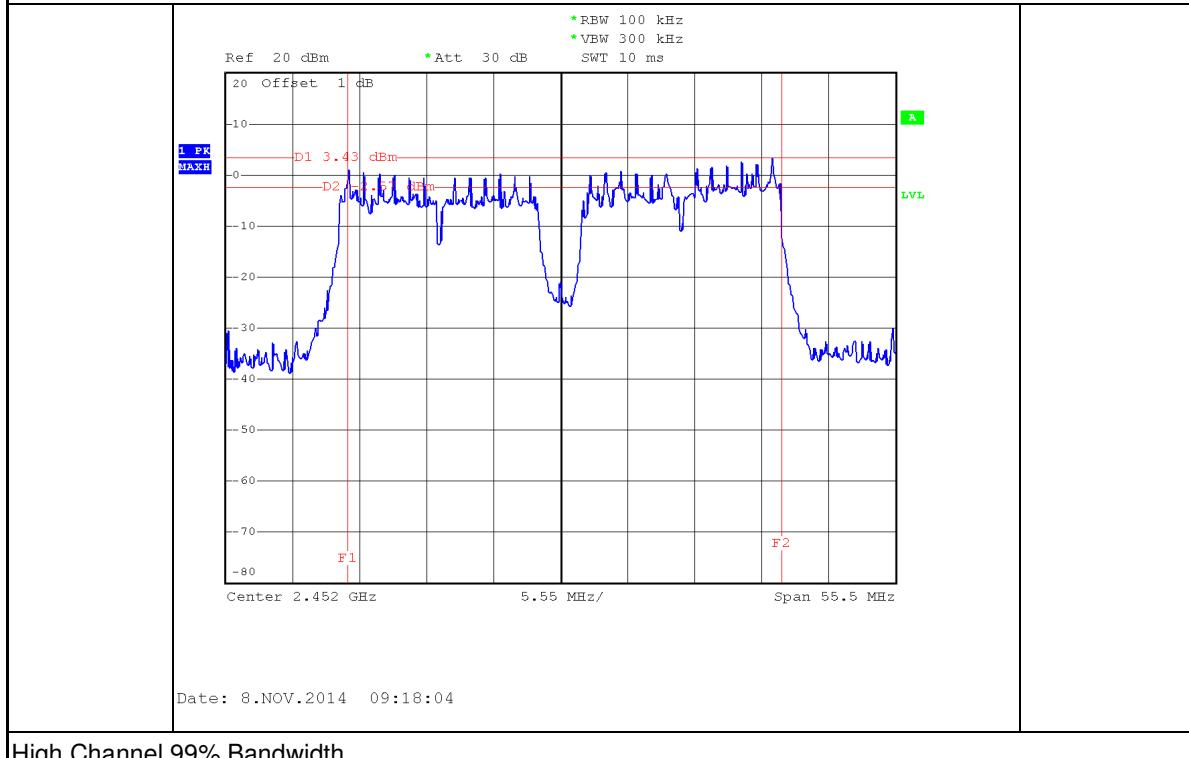


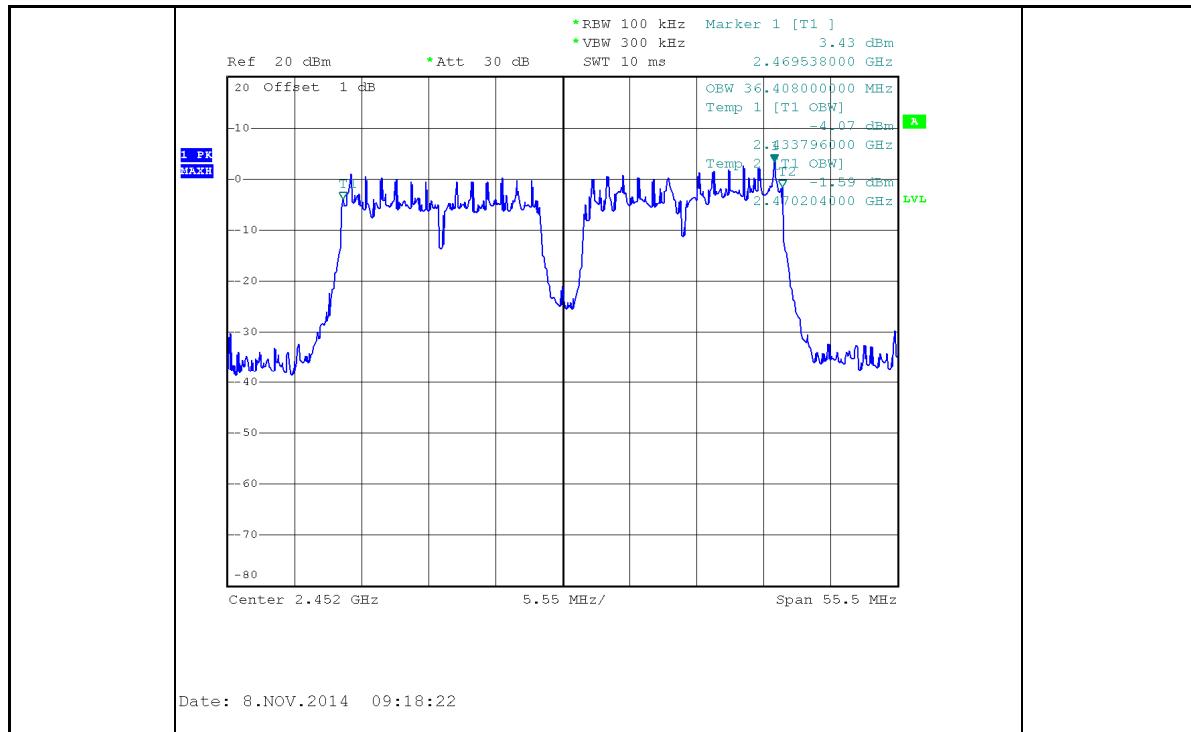
Produkte

Products

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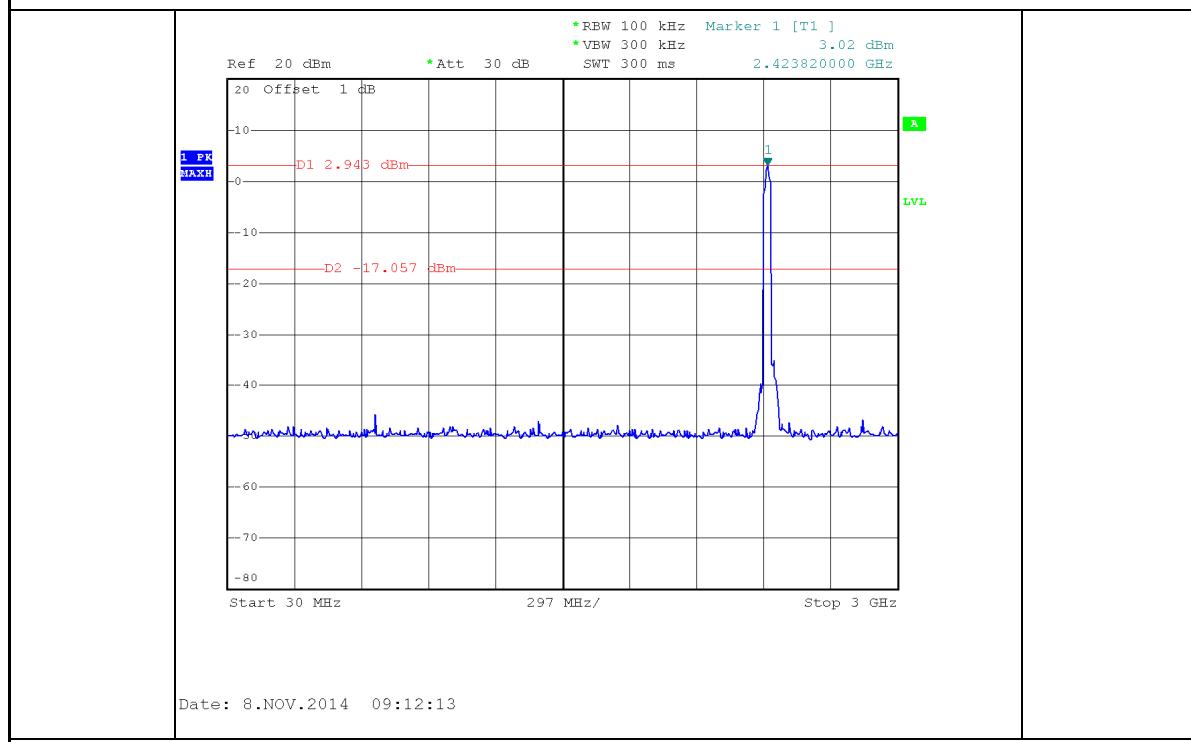
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**High Channel 6dB Bandwidth**



Appendix A.15: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT40

Low Channel 1



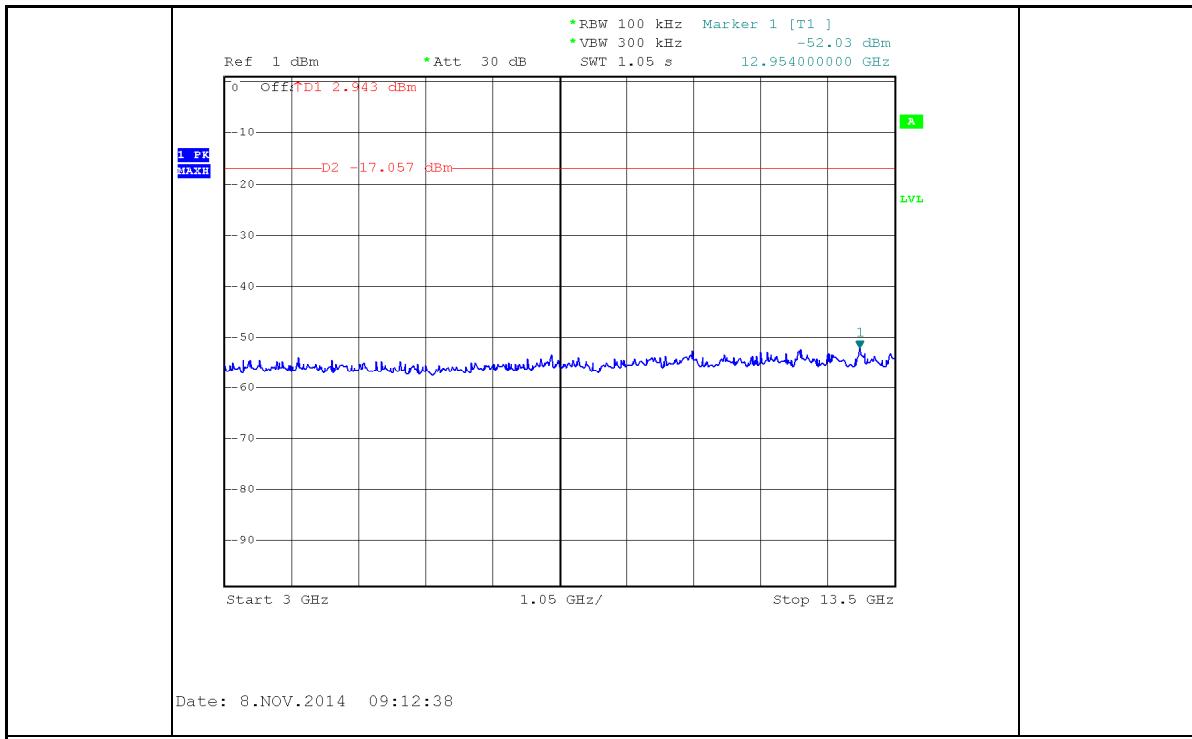
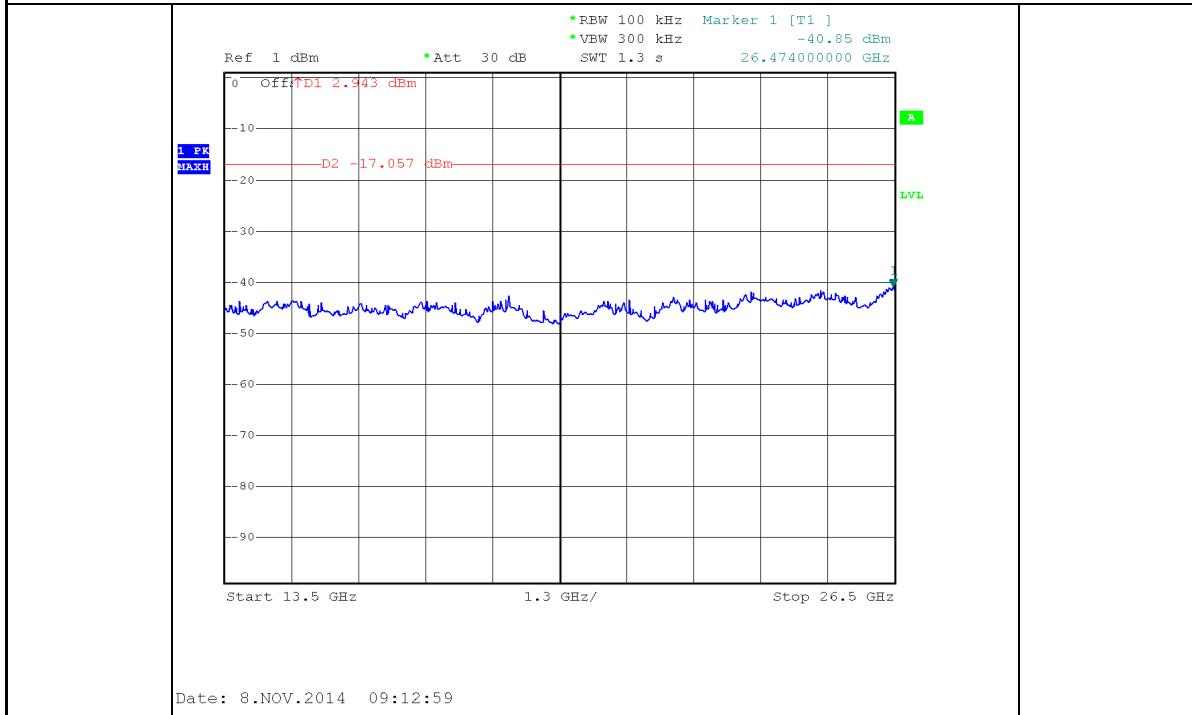
Low Channel 2

Produkte

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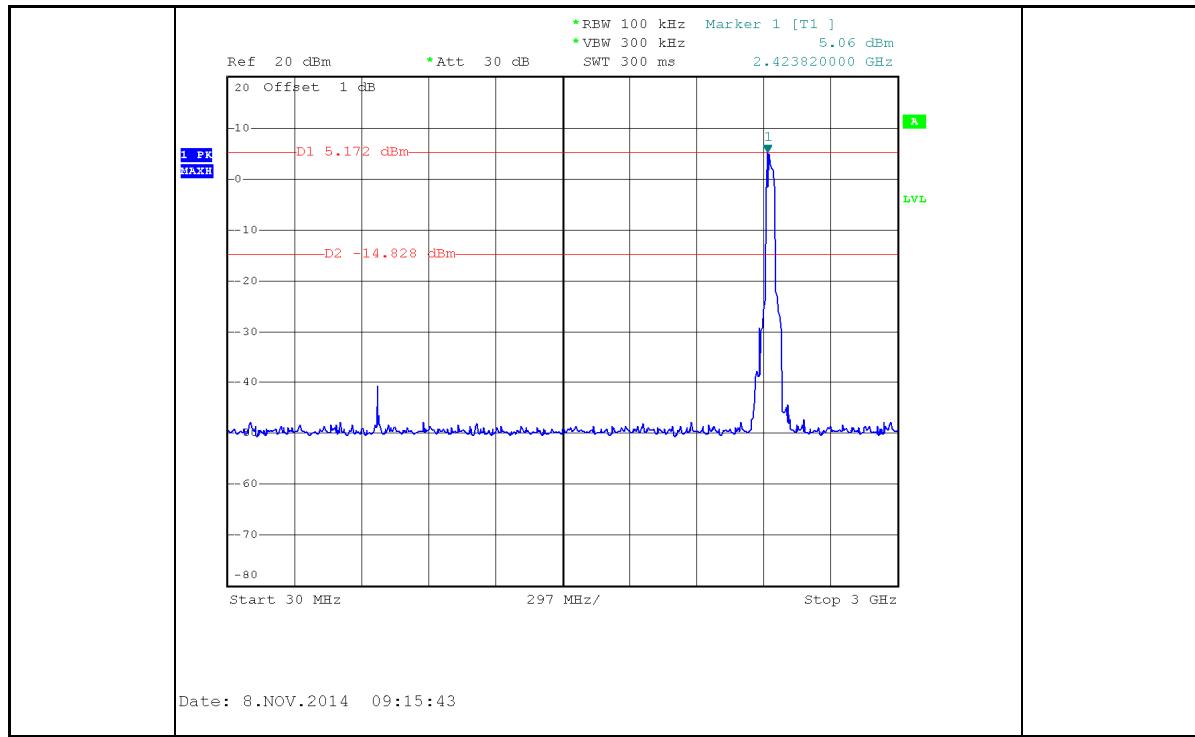
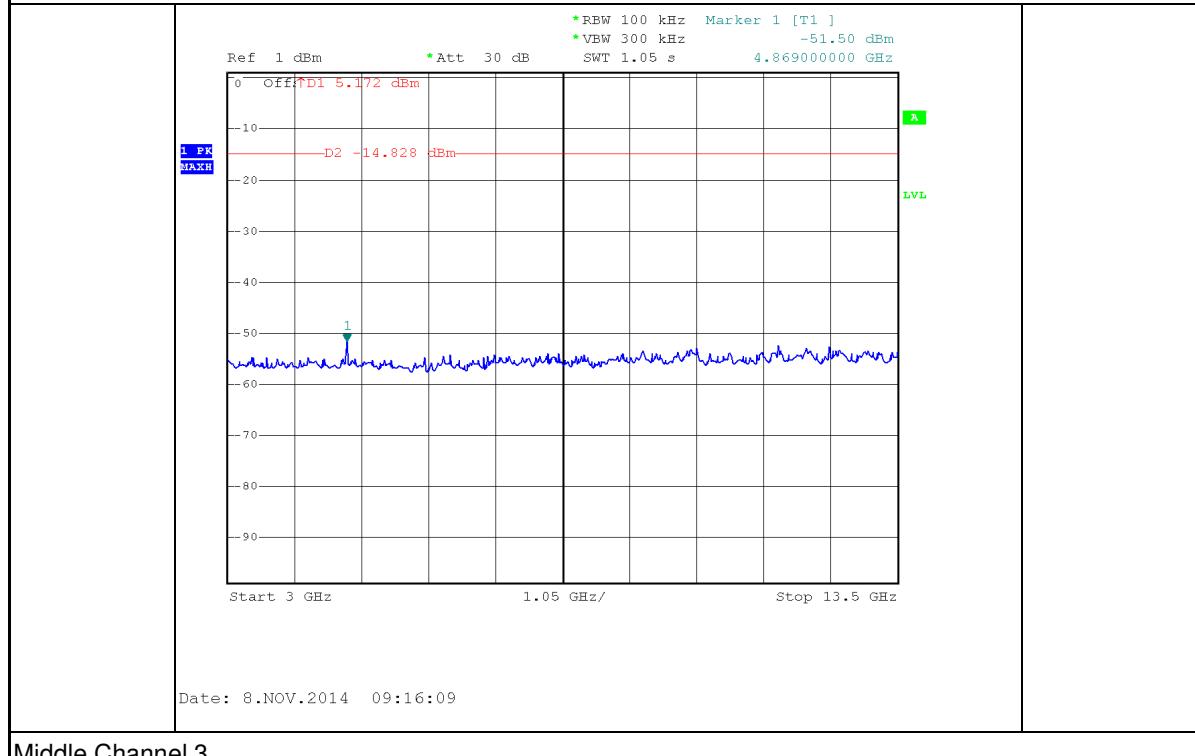
**Low Channel 3****Middle Channel 1**

Produkte

Products

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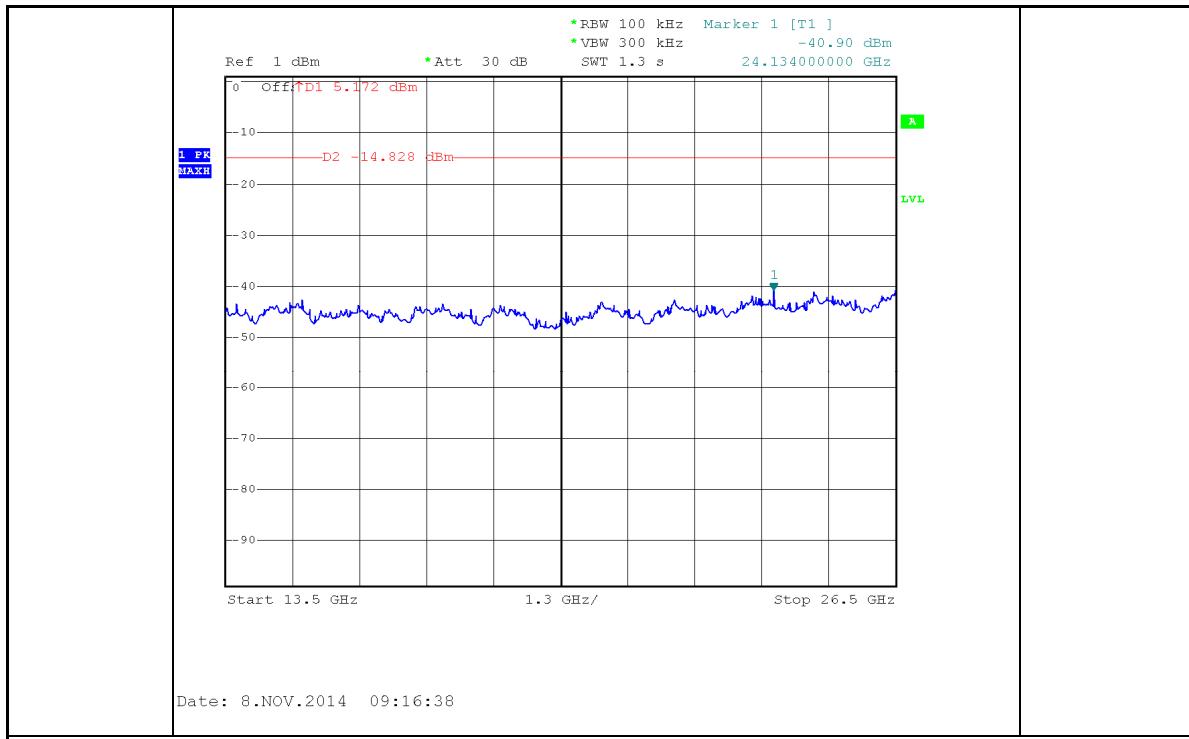
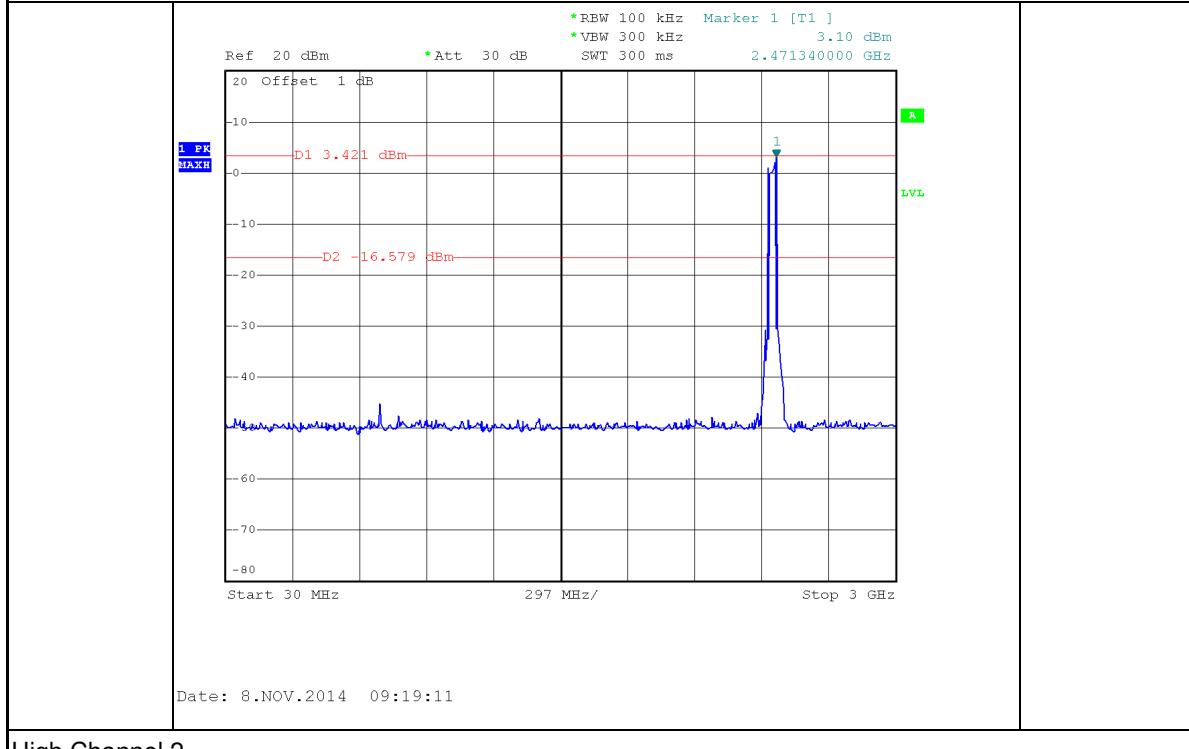
**Middle Channel 2**

Produkte

Products

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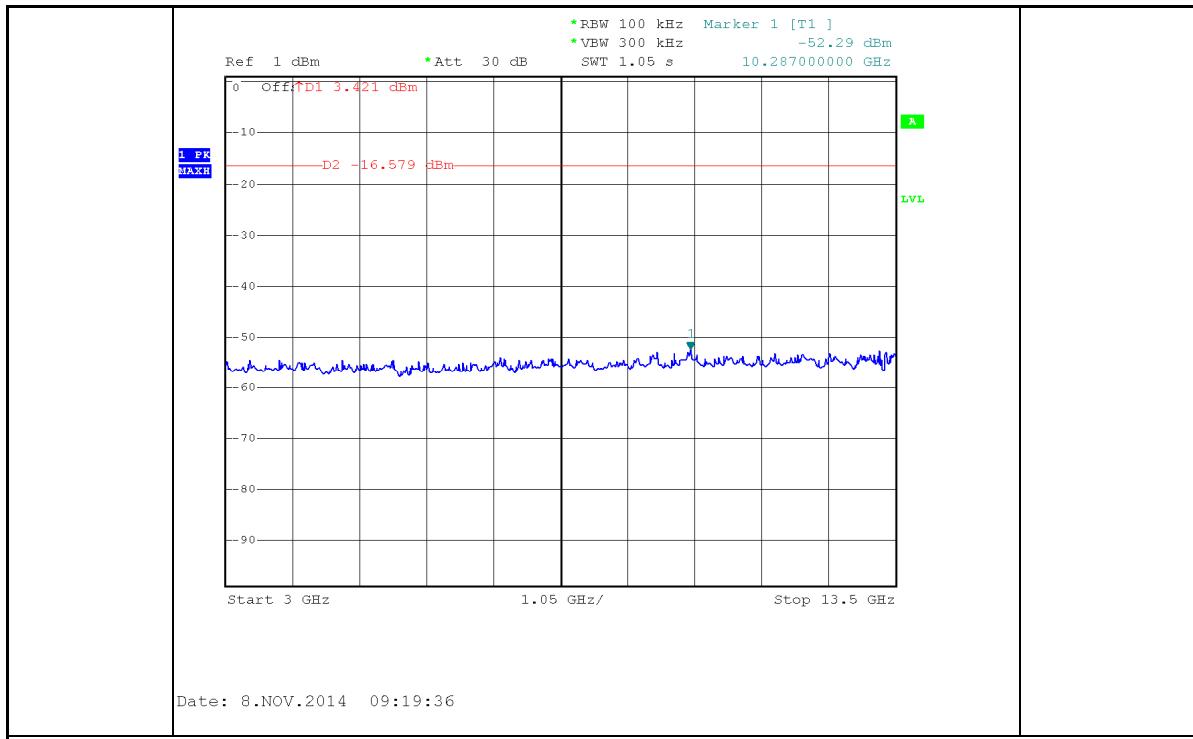
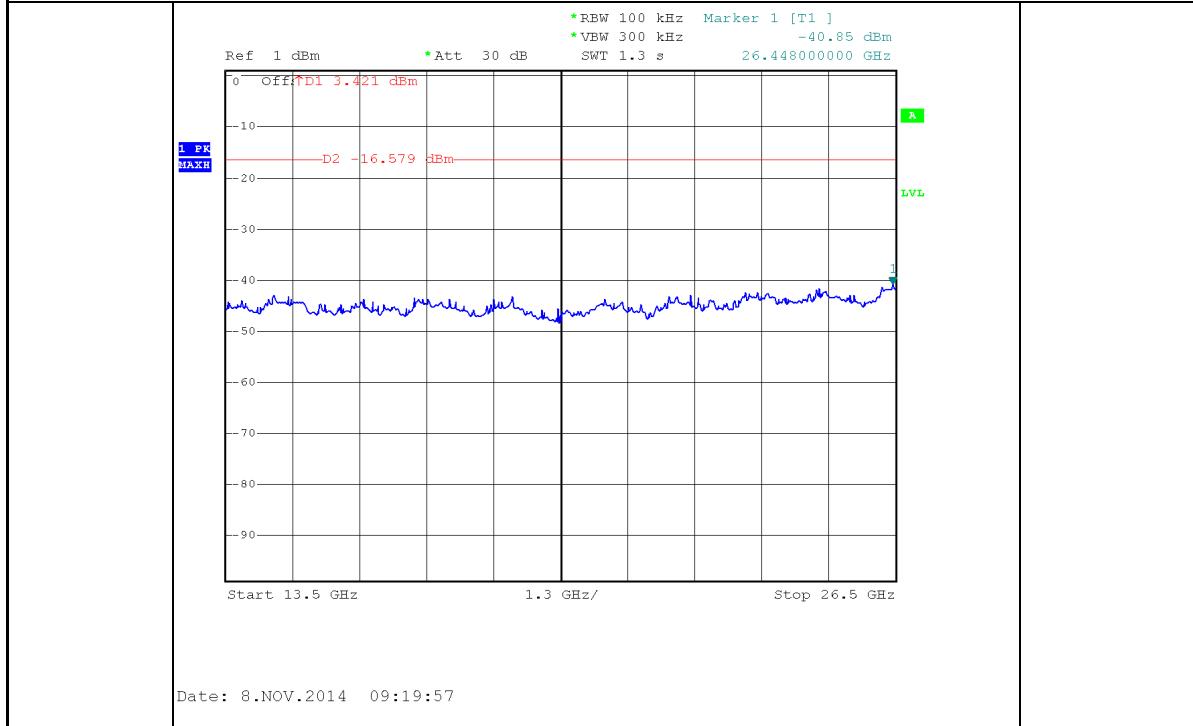
**High Channel 1**

Produkte

Products

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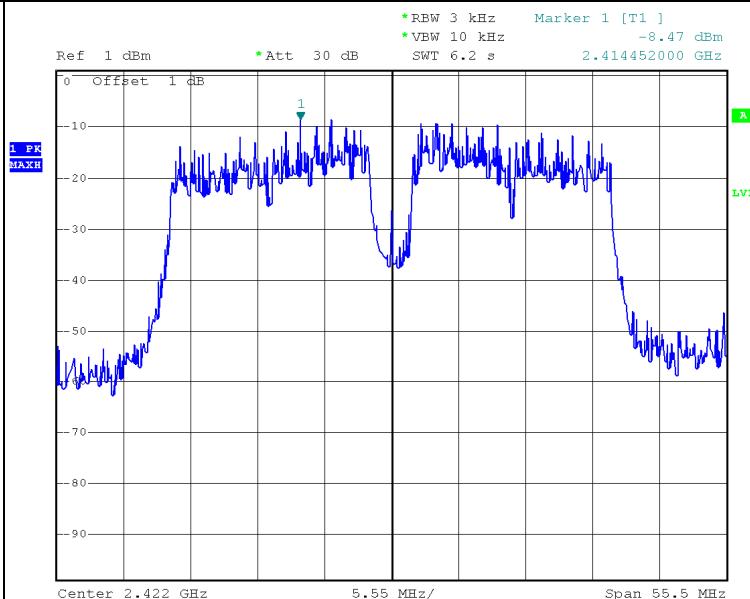
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**High Channel 3**

Appendix A.16: Power Spectral Density_802.11n HT40

Channel (MHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)	Conclusion
2422	-8.47	8	Pass
2437	-5.01	8	Pass
2452	-8.67	8	Pass

2422 MHz



Date: 8.NOV.2014 09:13:24

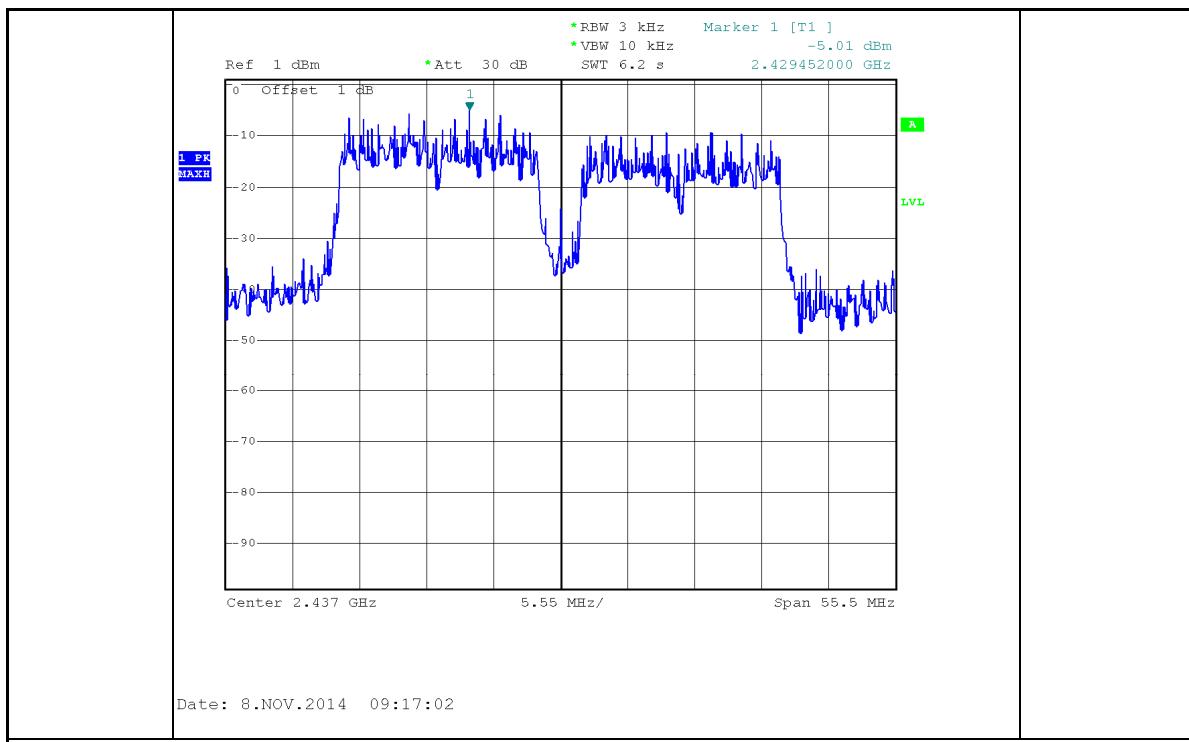
2437 MHz

Produkte

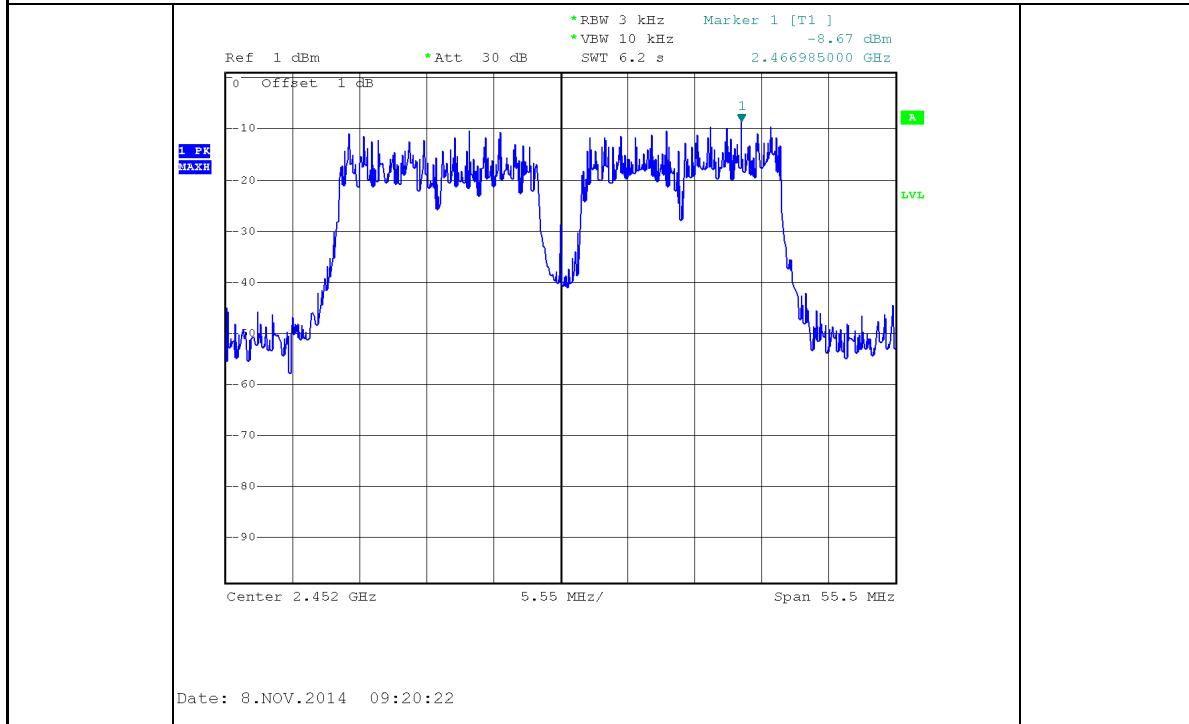
Products

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2452 MHz



Appendix B

Test Results of 2TX-Non Beamforming

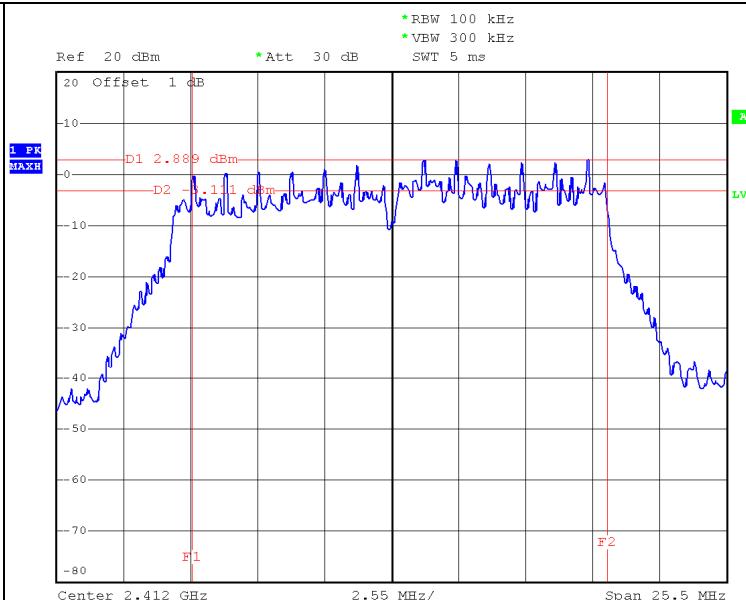
APPENDIX B.1: MAXIMUM CONDUCTED OUTPUT POWER_802.11G	2
APPENDIX B.2: 6dB BANDWIDTH AND 99% BANDWIDTH_802.11G_ANT1	2
APPENDIX B.3: CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100kHz BANDWIDTH_802.11G_ANT1	5
APPENDIX B.4: POWER SPECTRAL DENSITY_802.11G	10
APPENDIX B.5: 6dB BANDWIDTH AND 99% BANDWIDTH_802.11G_ANT3	14
APPENDIX B.6: CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100kHz BANDWIDTH_802.11G_ANT3	17
APPENDIX B.7: MAXIMUM CONDUCTED OUTPUT POWER_802.11N HT20	22
APPENDIX B.8: 6dB BANDWIDTH AND 99% BANDWIDTH_802.11N HT20_ANT1	22
APPENDIX B.9: CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100kHz BANDWIDTH_802.11N HT20_ANT1	25
APPENDIX B.10: POWER SPECTRAL DENSITY_802.11N HT20	30
APPENDIX B.11: 6dB BANDWIDTH AND 99% BANDWIDTH_802.11N HT20_ANT3	34
APPENDIX B.12: CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100kHz BANDWIDTH_802.11N HT20_ANT3	37
APPENDIX B.13: MAXIMUM CONDUCTED OUTPUT POWER_802.11N HT40	42
APPENDIX B.14: 6dB BANDWIDTH AND 99% BANDWIDTH_802.11N HT40_ANT1	42
APPENDIX B.15: CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100kHz BANDWIDTH_802.11N HT40_ANT1	45
APPENDIX B.16: POWER SPECTRAL DENSITY_802.11N HT40	50
APPENDIX B.17: 6dB BANDWIDTH AND 99% BANDWIDTH_802.11N HT40_ANT3	54
APPENDIX B.18: CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100kHz BANDWIDTH_802.11N HT40_ANT3	57

Appendix B.1: Maximum Conducted Output Power_802.11g

Channel	Channel Frequency (MHz)	Maximum Conducted Output Power_ANT1 (dBm)	Maximum Conducted Output Power_ANT 3 (dBm)	Maximum Conducted Output Power_Total (dBm)	Limit(dBm)
Low Channel	2412	14.10	14.20	17.16	28.4
Middle Channel	2437	18.20	18.70	21.47	28.4
High Channel	2462	14.50	14.30	17.41	28.4

Appendix B.2: 6dB Bandwidth and 99% Bandwidth_802.11g_ANT1

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.81	16.42
Middle Channel	2437	15.76	16.52
High Channel	2462	15.81	16.47

Low Channel 6dB Bandwidth

Date: 8.NOV.2014 12:47:16

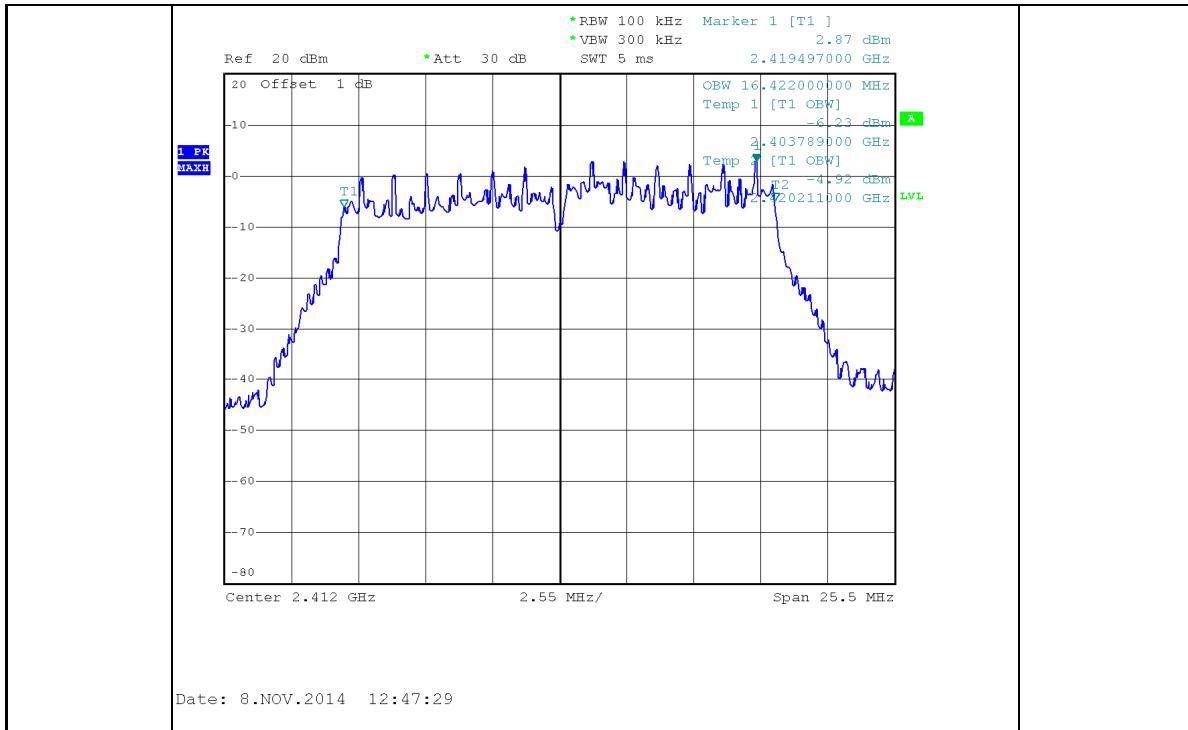
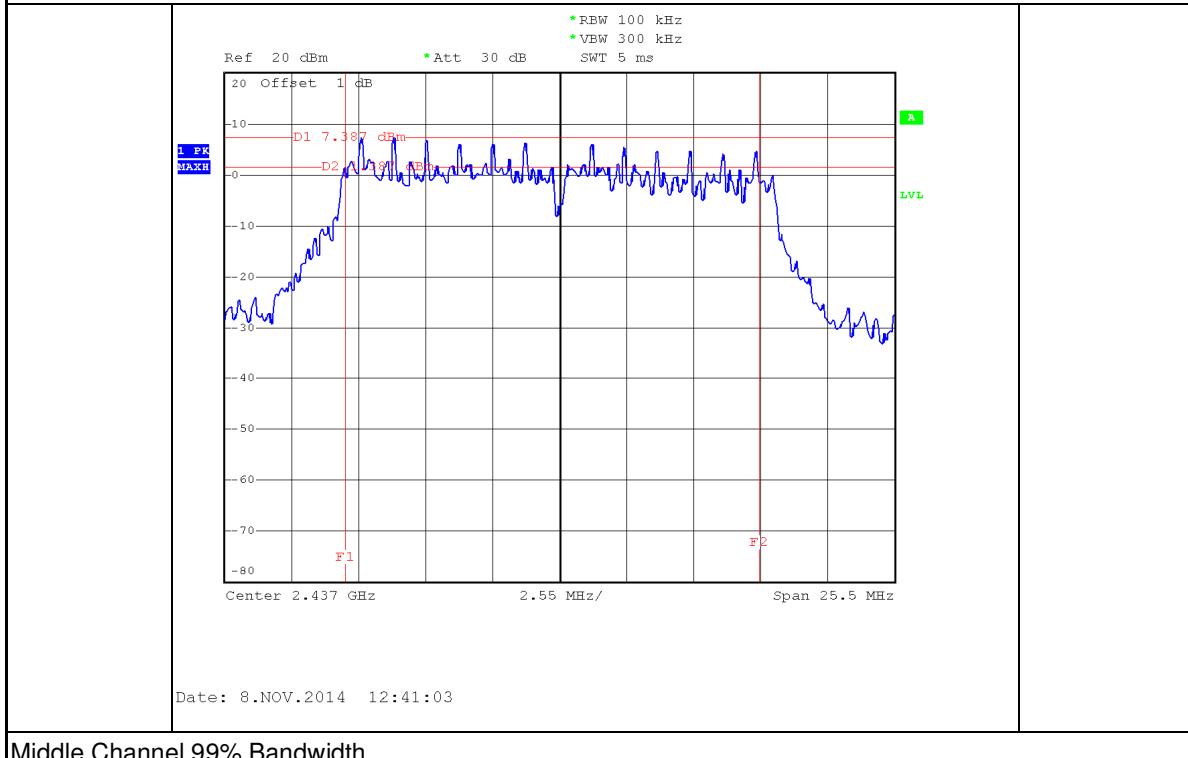
Low Channel 99% Bandwidth

Produkte

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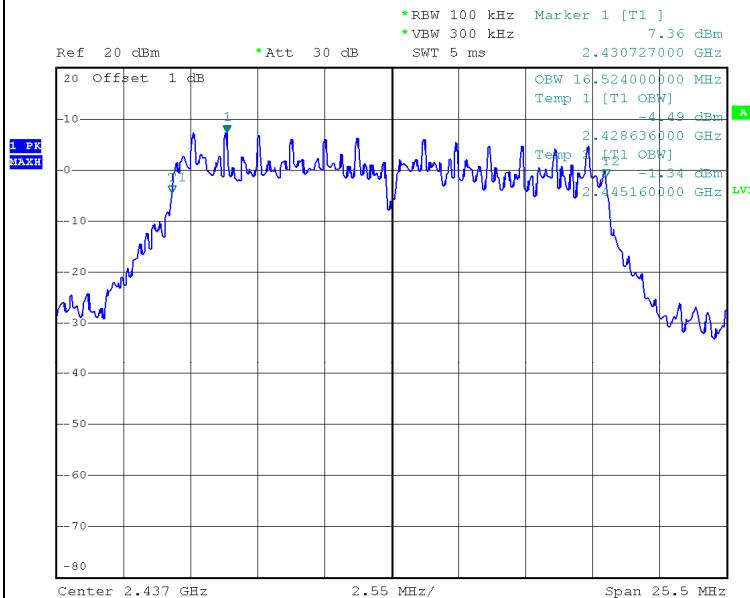
**Middle Channel 6dB Bandwidth**

Produkte

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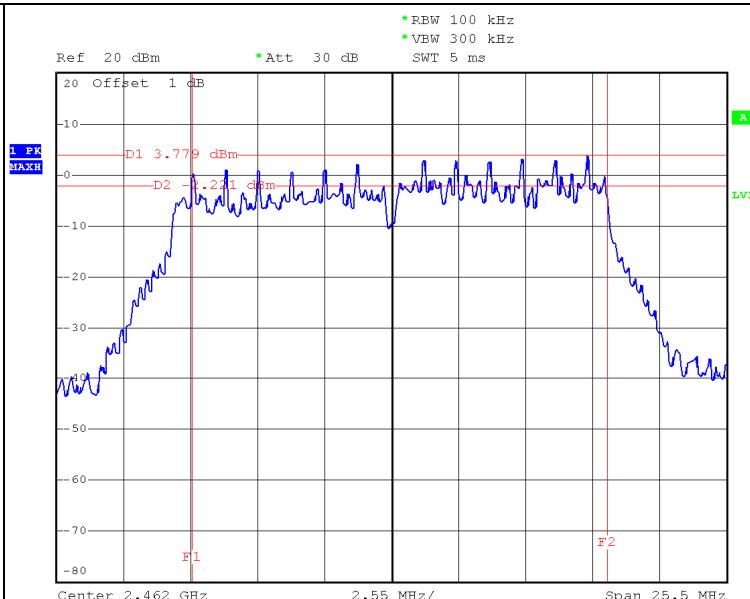
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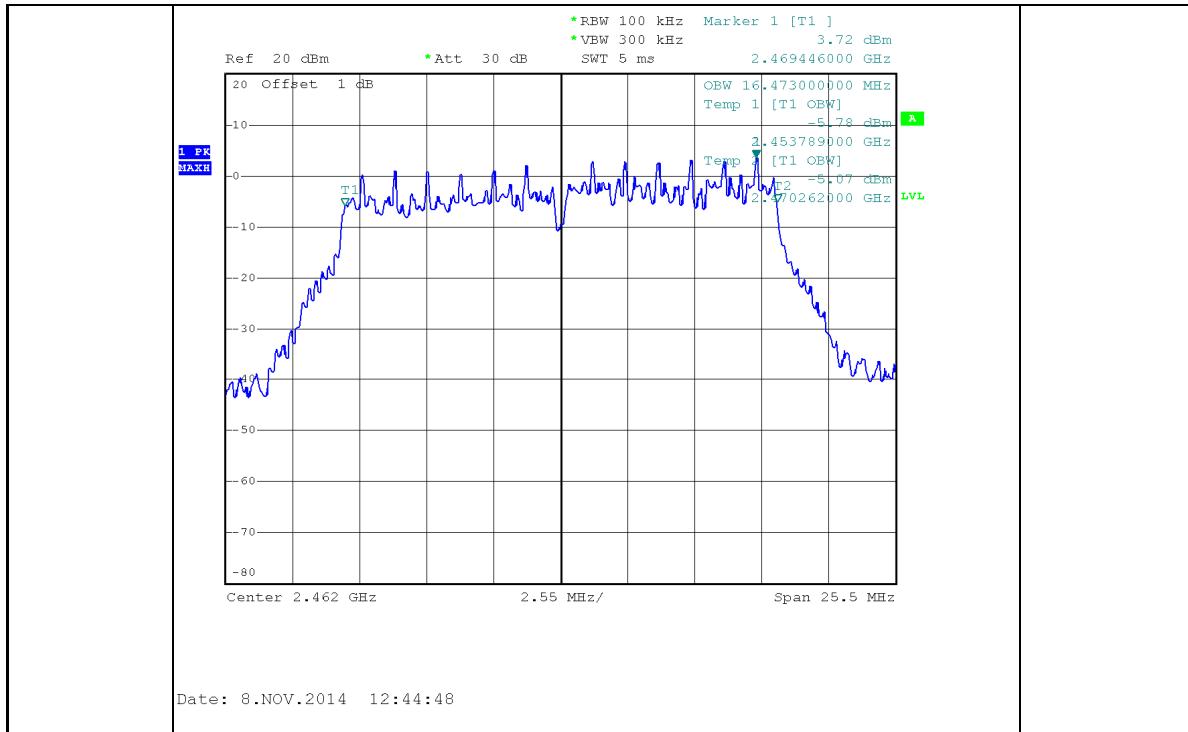
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High Channel 6dB Bandwidth



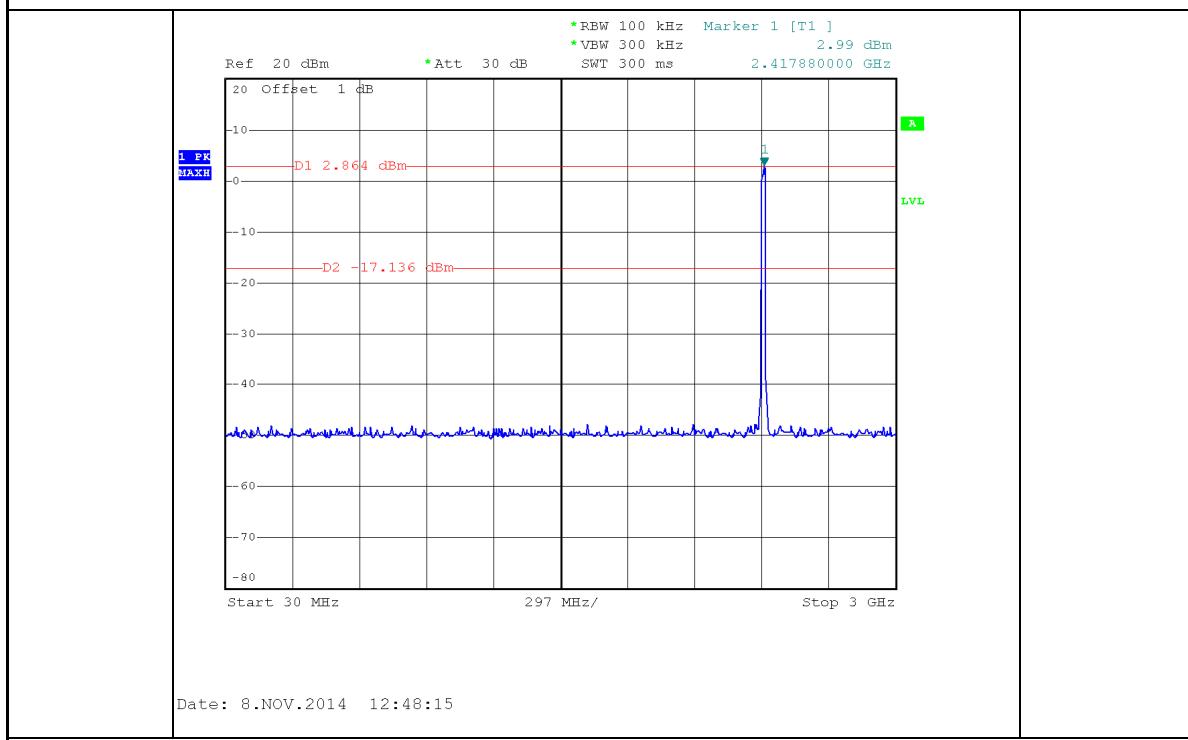
Date: 8.NOV.2014 12:44:36

High Channel 99% Bandwidth



Appendix B.3: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11g_ANT1

Low Channel 1



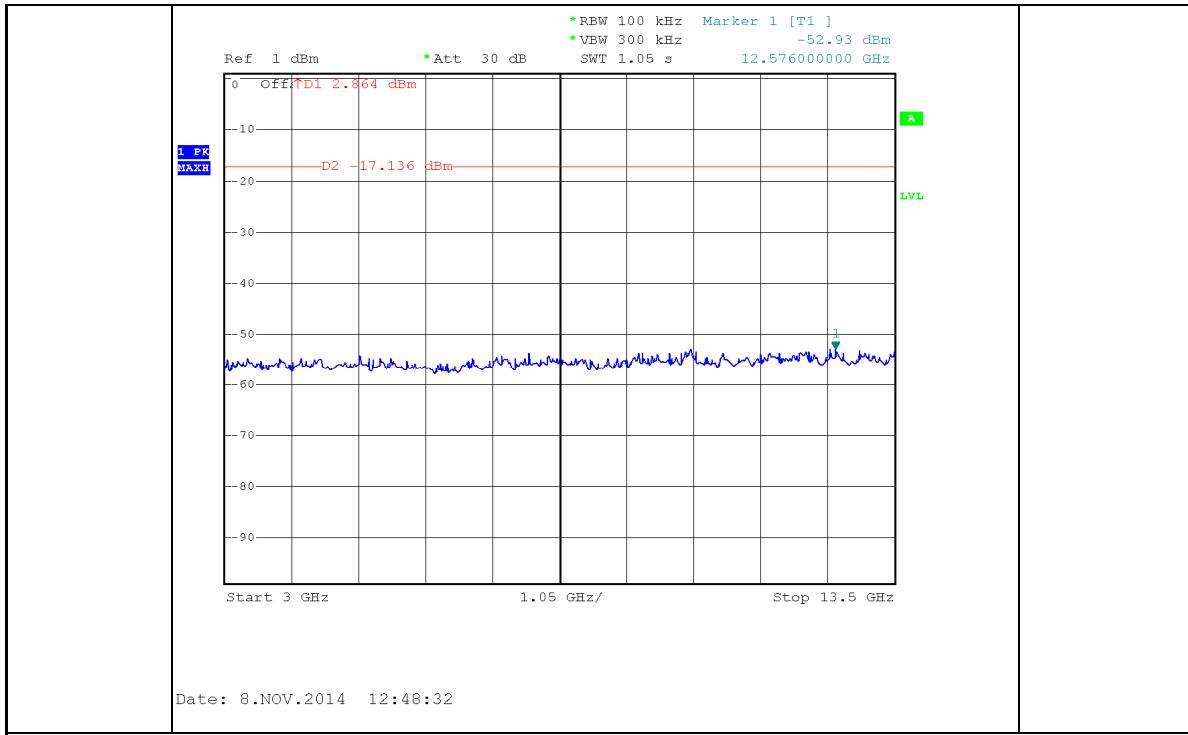
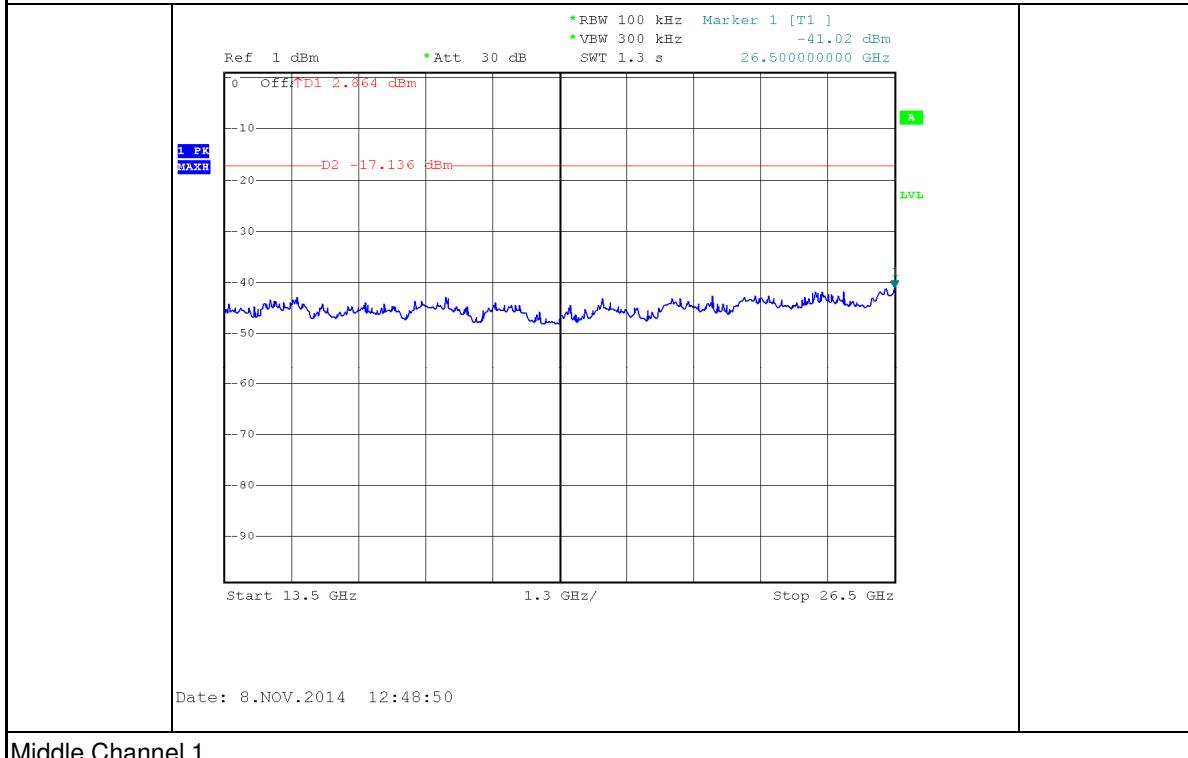
Low Channel 2

Produkte

Products

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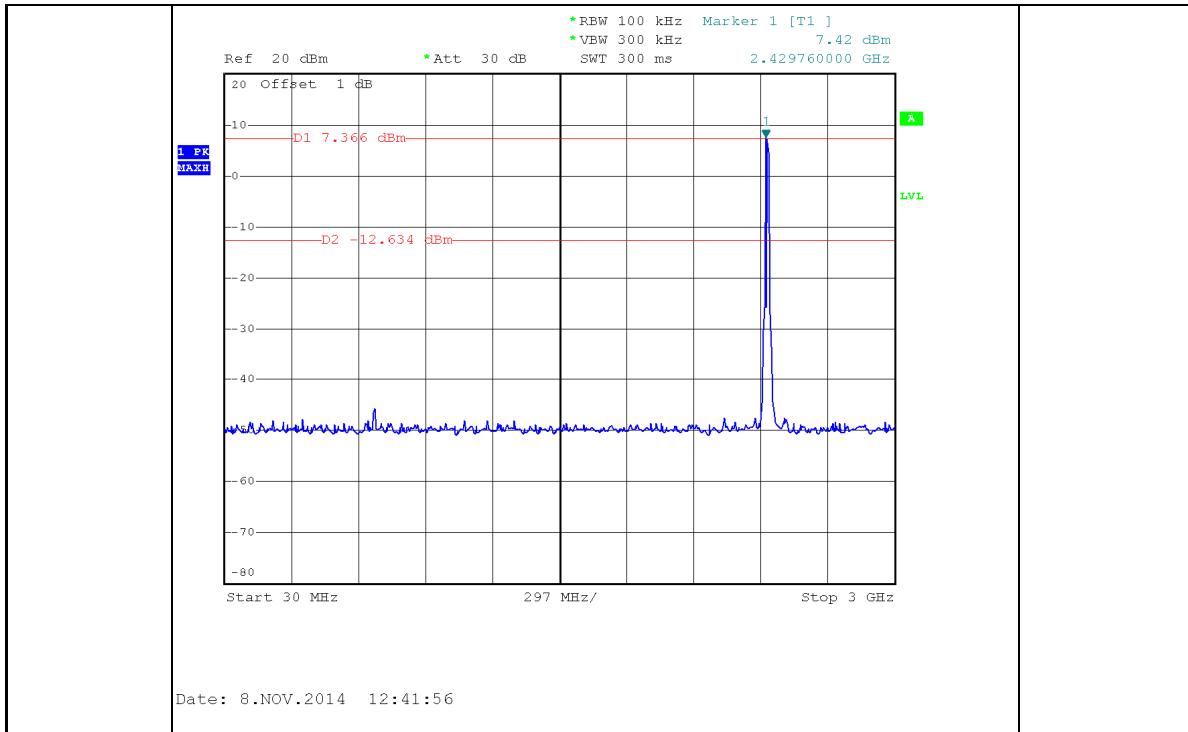
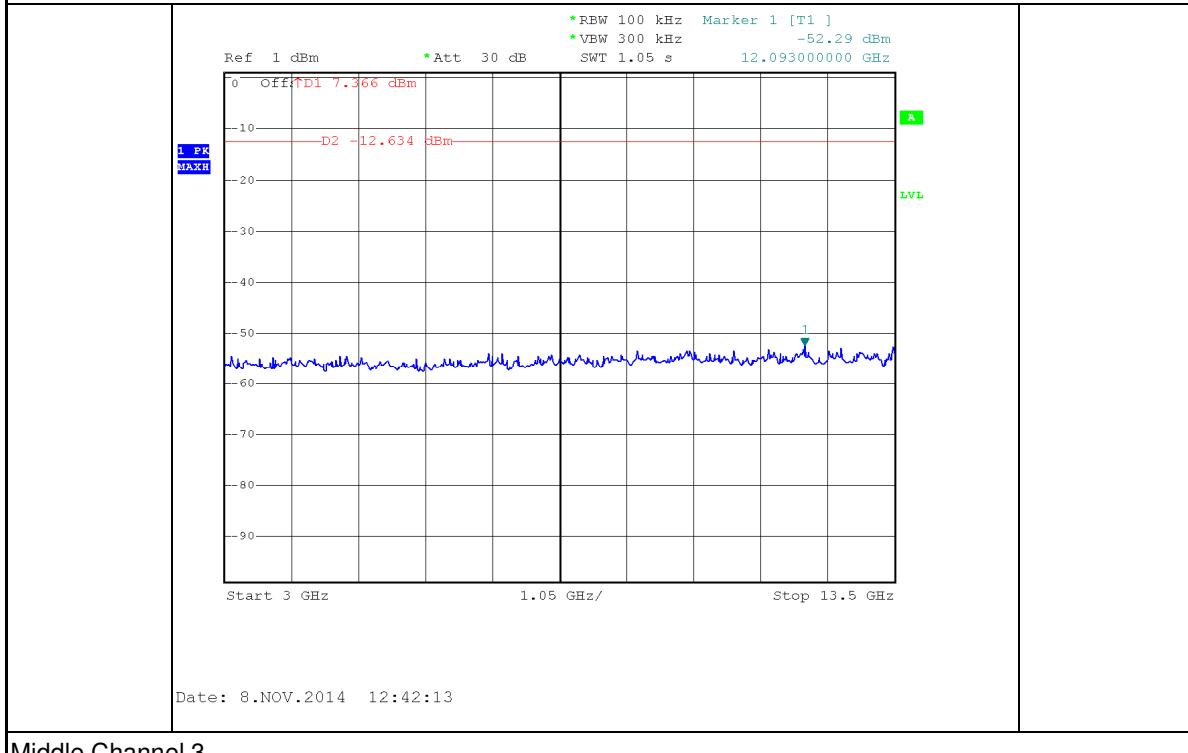
**Low Channel 3****Middle Channel 1**

Produkte

Products

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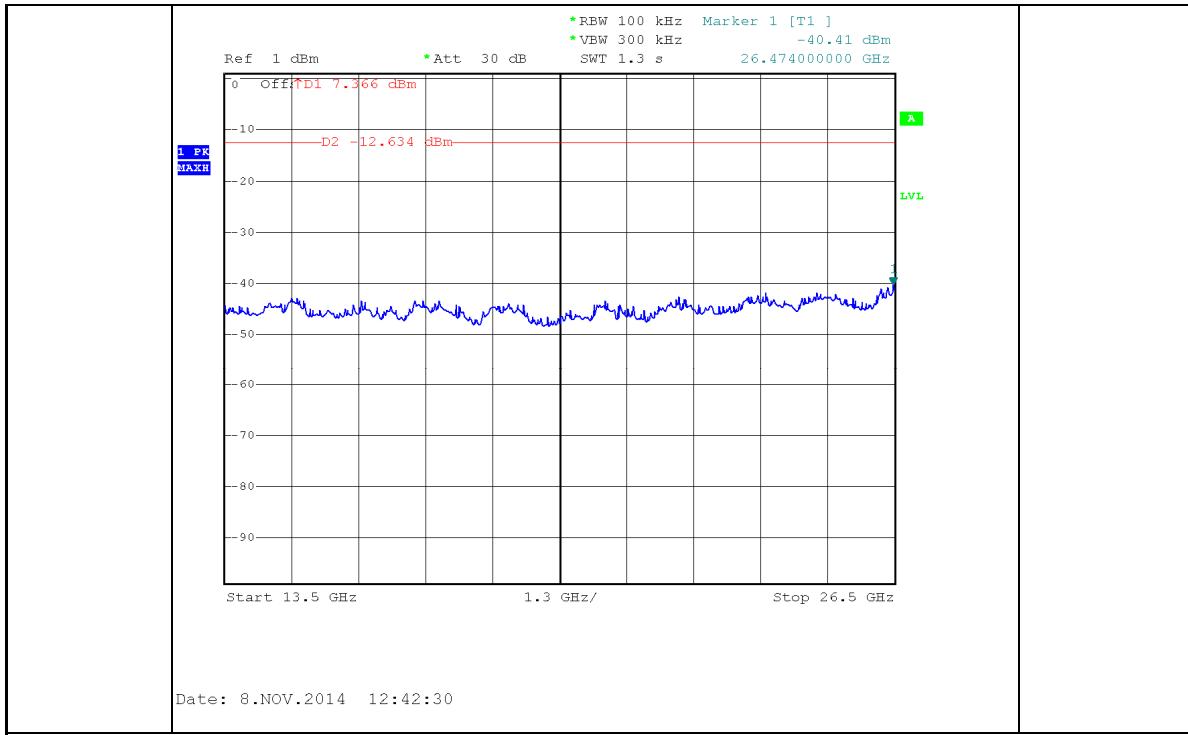
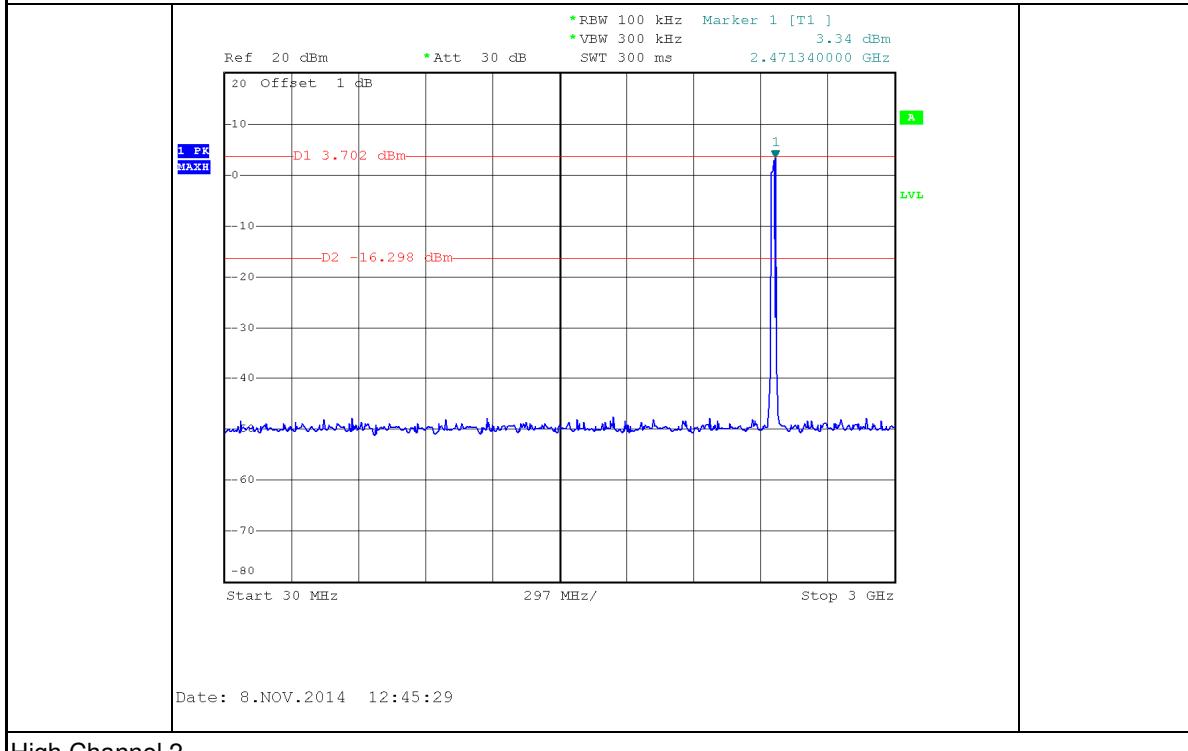
**Middle Channel 2**

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**High Channel 1****High Channel 2**

Appendix B

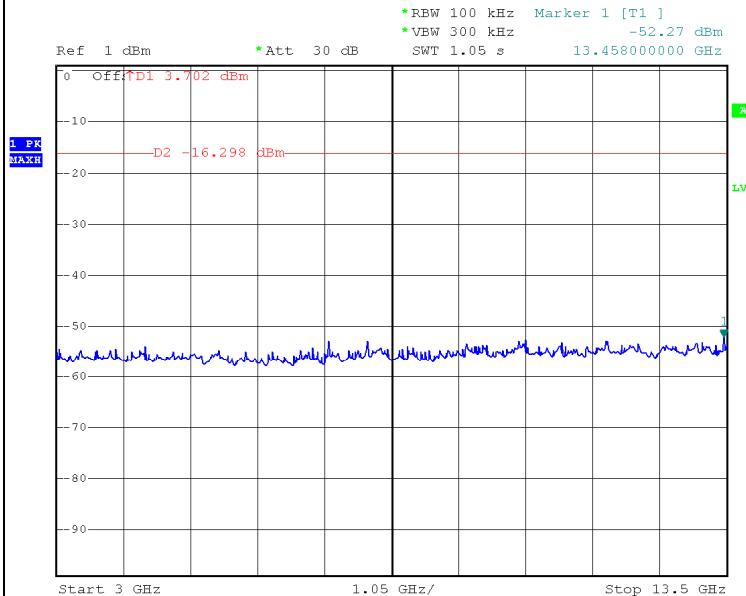
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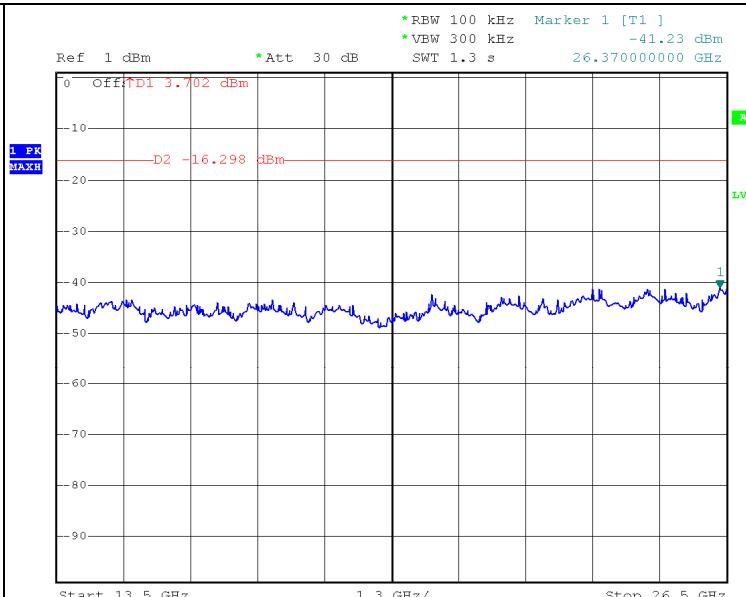
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Date: 8.NOV.2014 12:45:46

High Channel 3



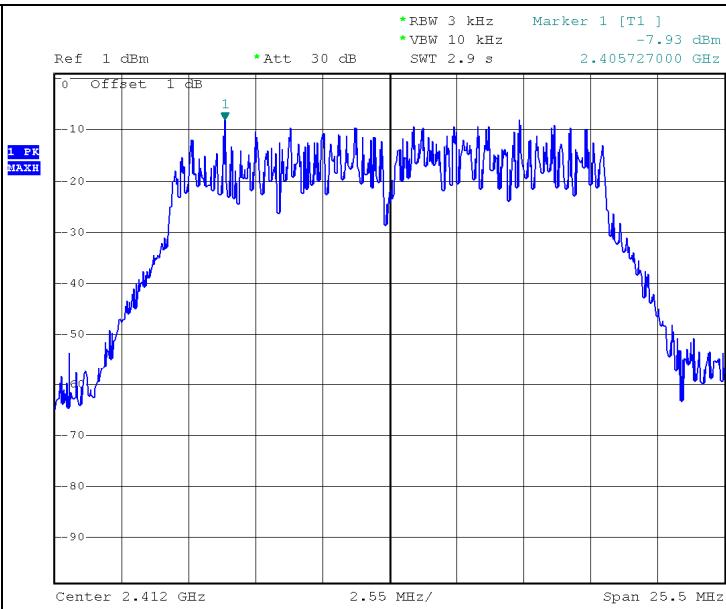
Date: 8.NOV.2014 12:46:05

Appendix B.4: Power Spectral Density_802.11g

Channel	Channel Frequency (MHz)	PSD_ANT1 (dBm/3kHz)	PSD_ANT 3 (dBm/3kHz)	PSD_Total (dBm/3kHz)	Limit (dBm/3kHz)
Low Channel	2412	-7.93	-7.99	-4.95	6.4
Middle Channel	2437	-0.66	-1.74	1.84	6.4
High Channel	2462	-7.21	-7.32	-4.25	6.4

Power Spectral Density_AN1T1

2412 MHz



Date: 8.NOV.2014 12:49:09

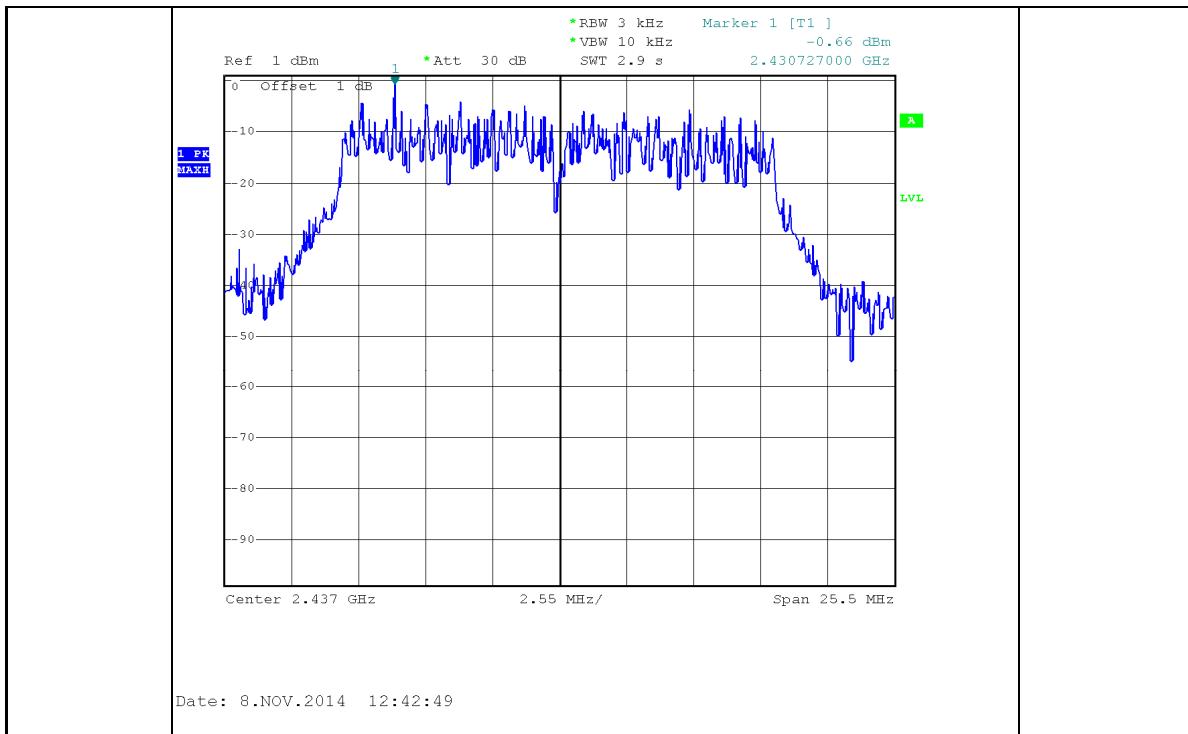
2437 MHz

Produkte

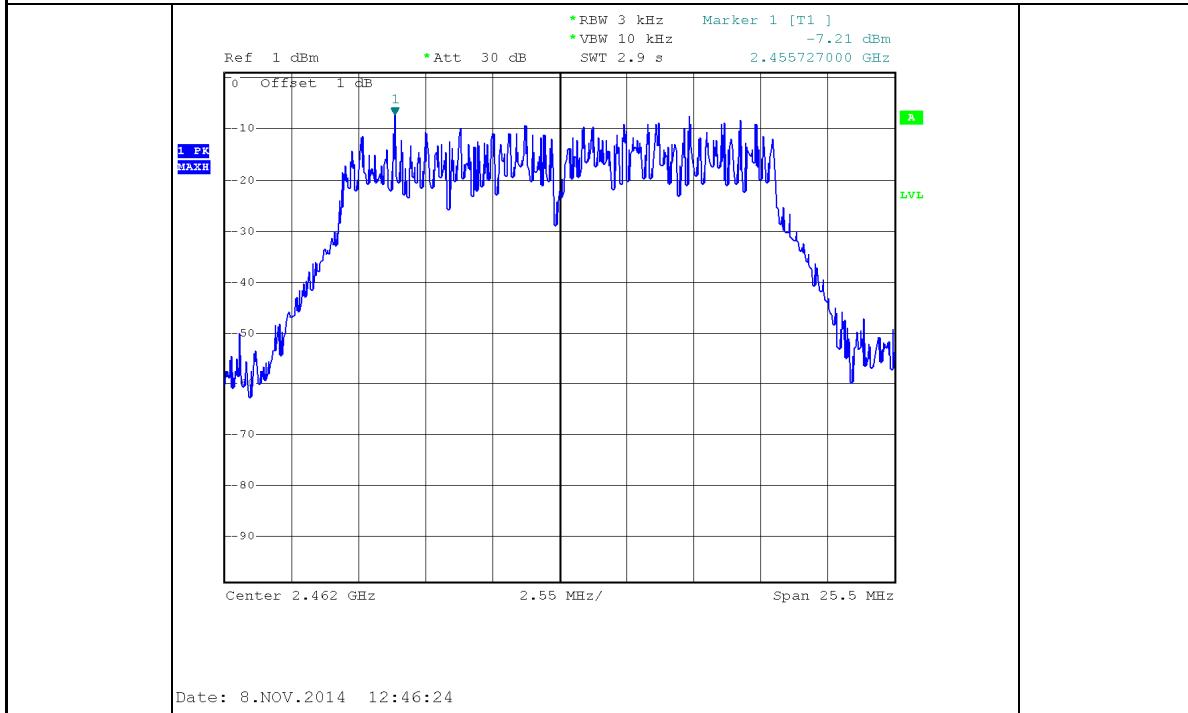
Products

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2462 MHz



Power Spectral Density_AN3

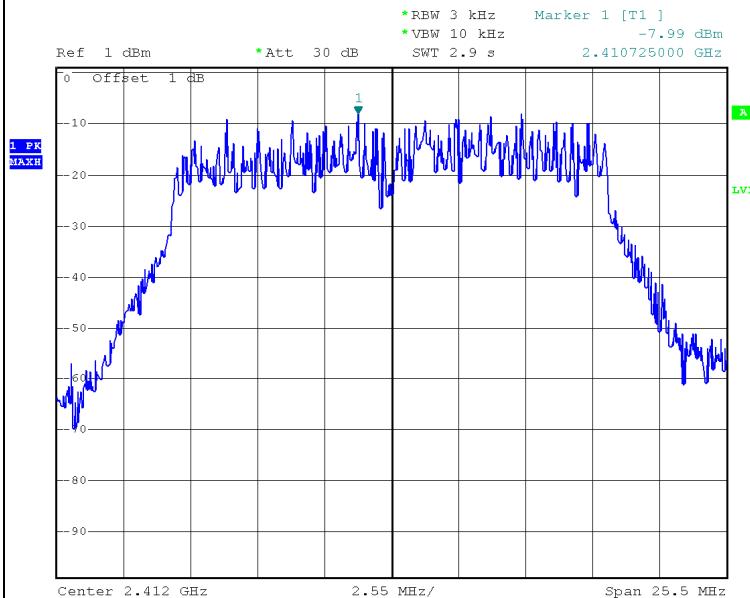
2412 MHz

Produkte

Products

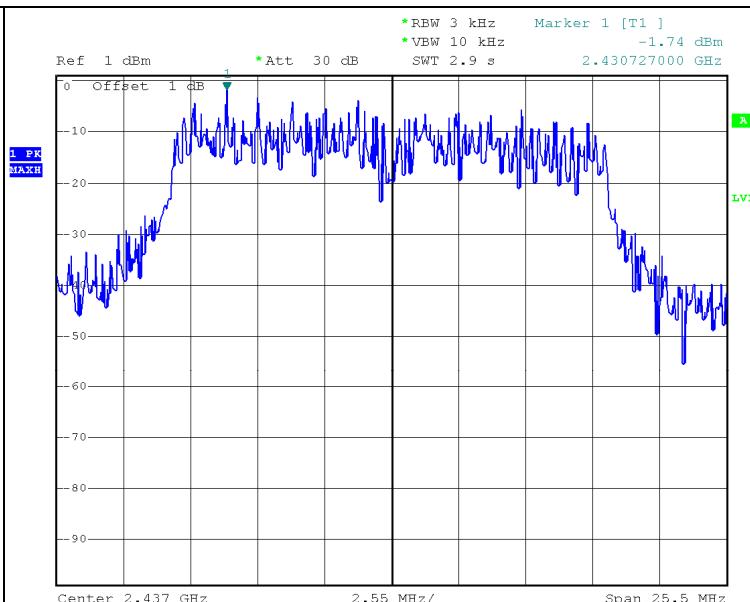
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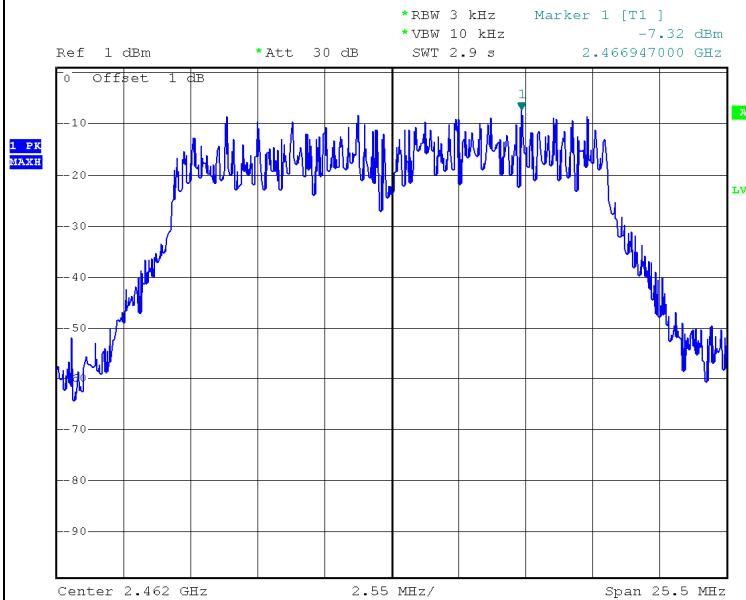
Date: 8.NOV.2014 09:52:23

2437 MHz



Date: 8.NOV.2014 09:55:22

2462 MHz

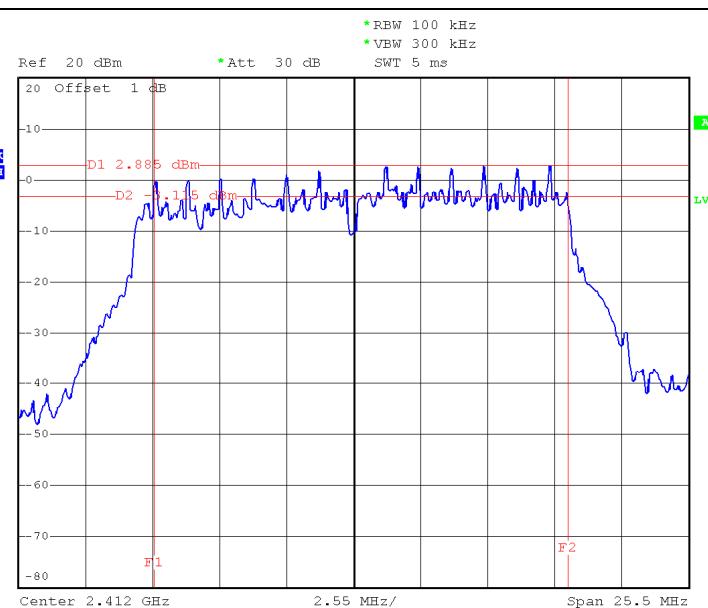


Date: 8.NOV.2014 09:58:04

Appendix B.5: 6dB Bandwidth and 99% Bandwidth_802.11g_ANT3

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.76	16.37
Middle Channel	2437	15.55	16.47
High Channel	2462	15.81	16.42

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 09:50:32

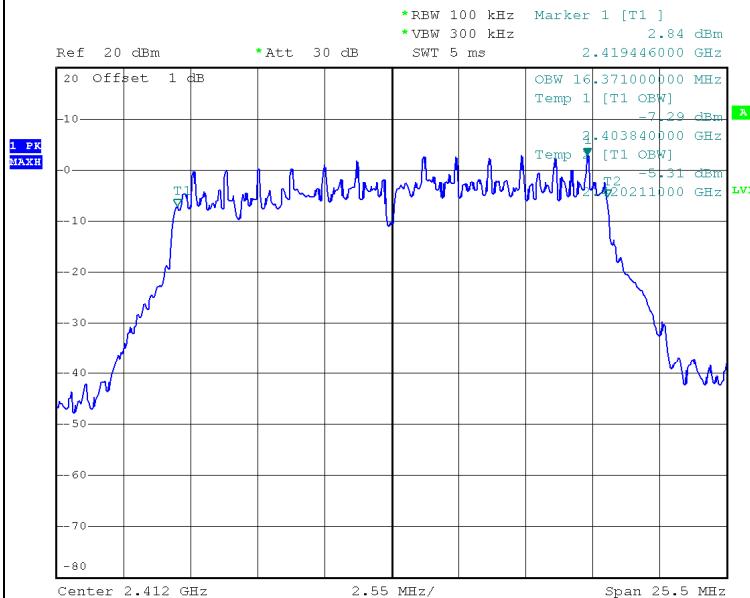
Low Channel 99% Bandwidth

Produkte

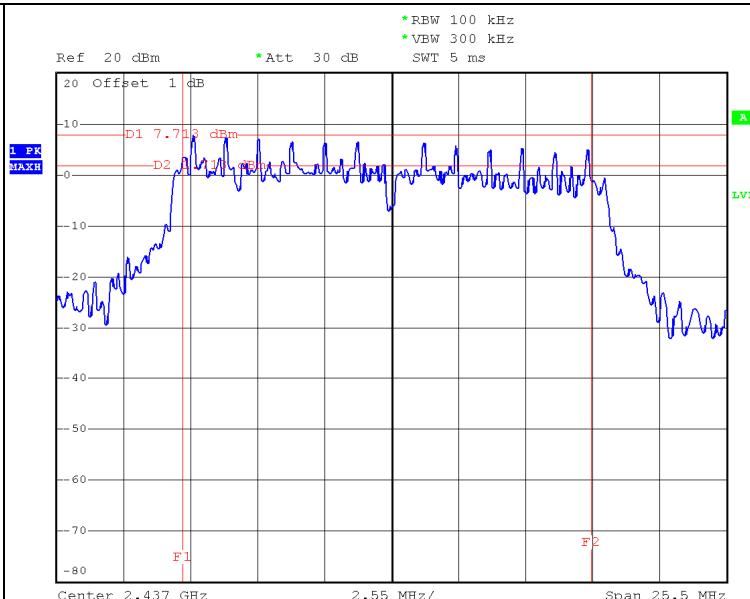
Products

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Date: 8.NOV.2014 09:50:45

Middle Channel 6dB Bandwidth

Date: 8.NOV.2014 09:53:33

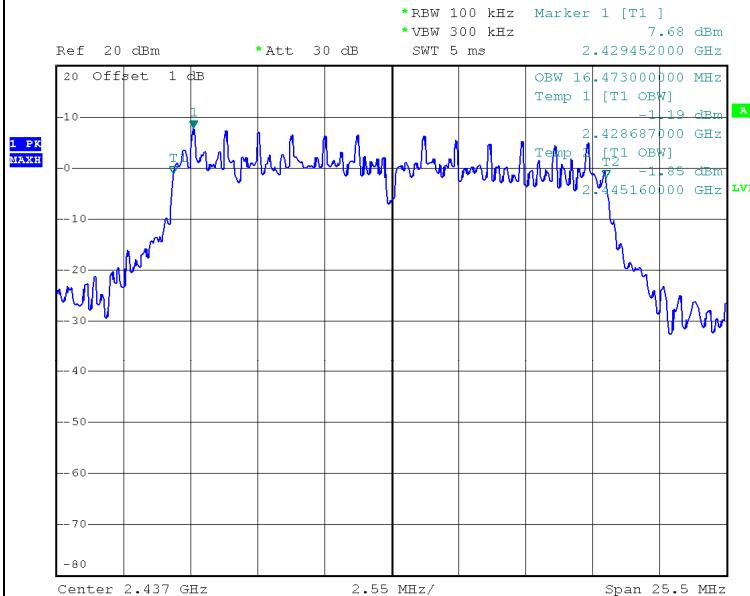
Middle Channel 99% Bandwidth

Produkte

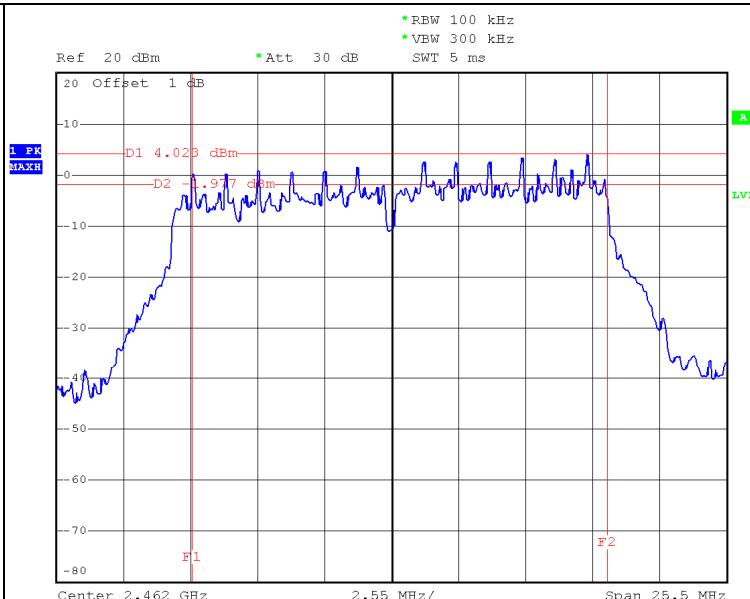
Products

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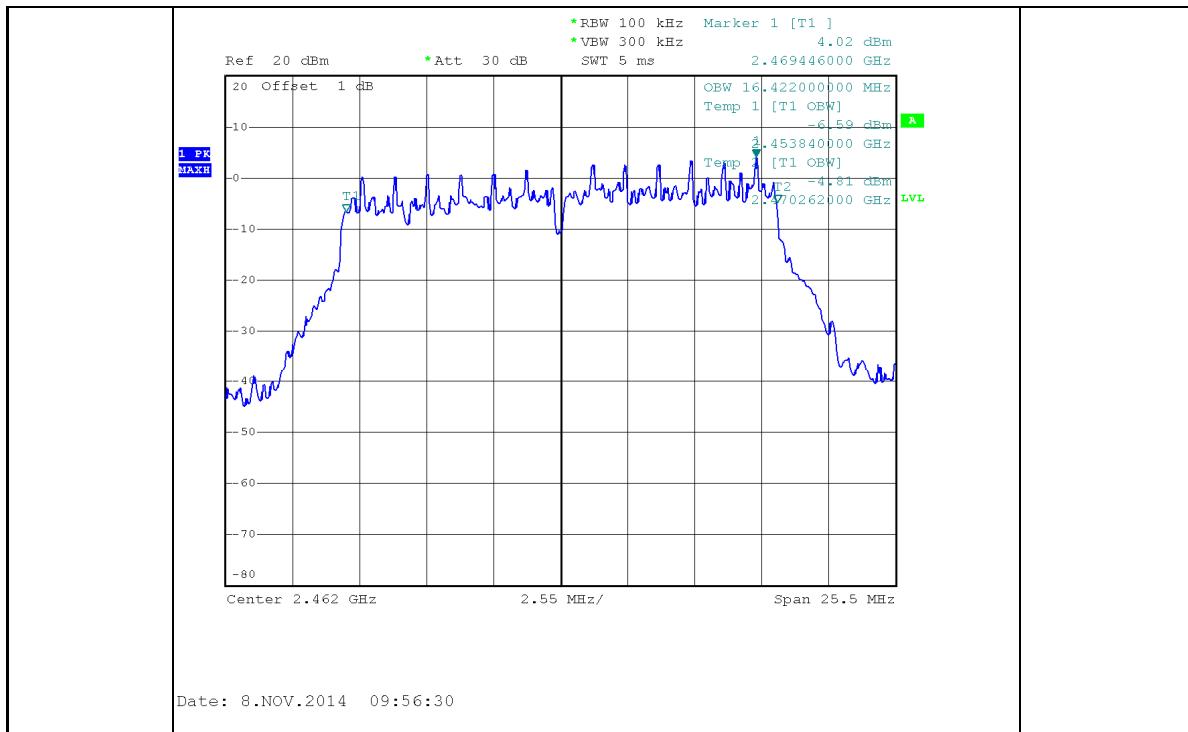


Date: 8.NOV.2014 09:53:46

High Channel 6dB Bandwidth

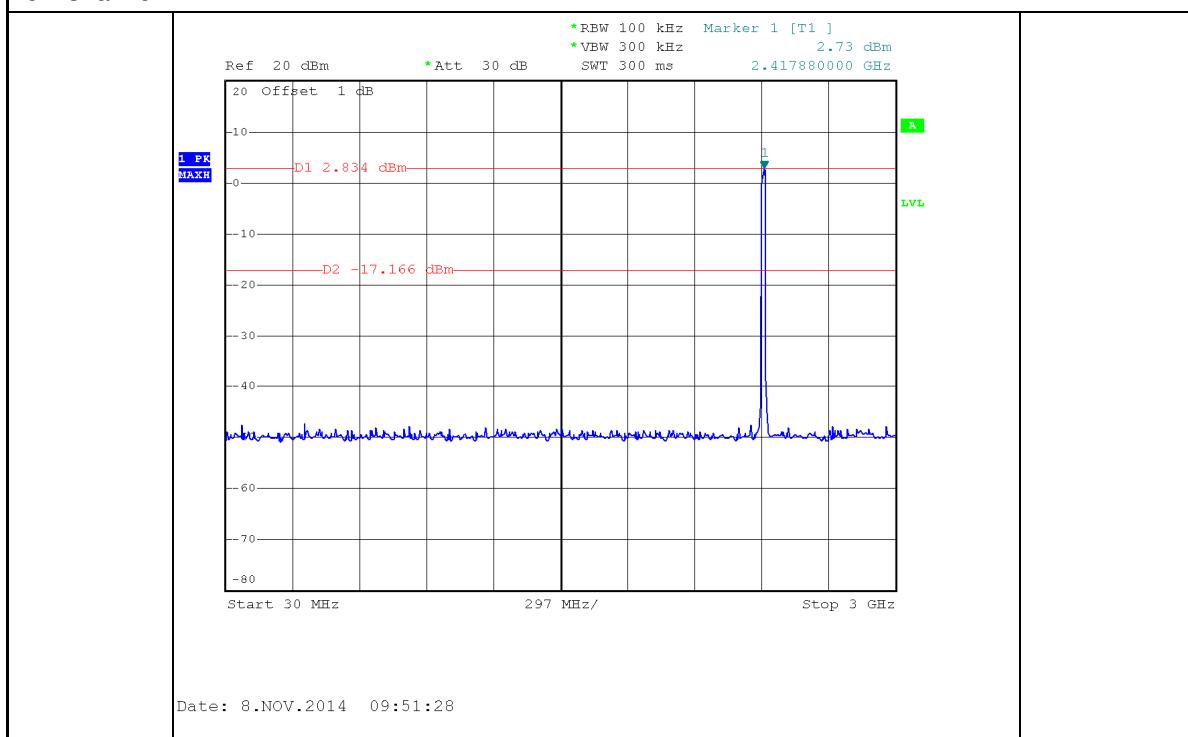
Date: 8.NOV.2014 09:56:18

High Channel 99% Bandwidth



Appendix B.6: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11g_ANT3

Low Channel 1



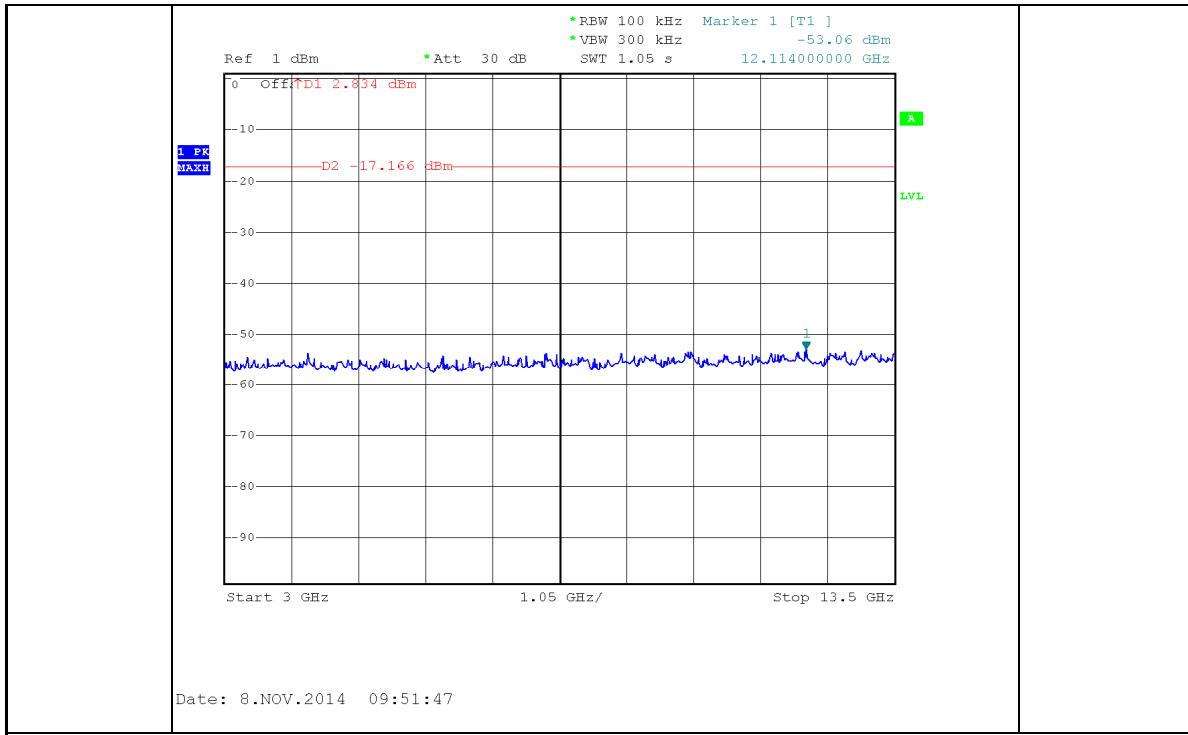
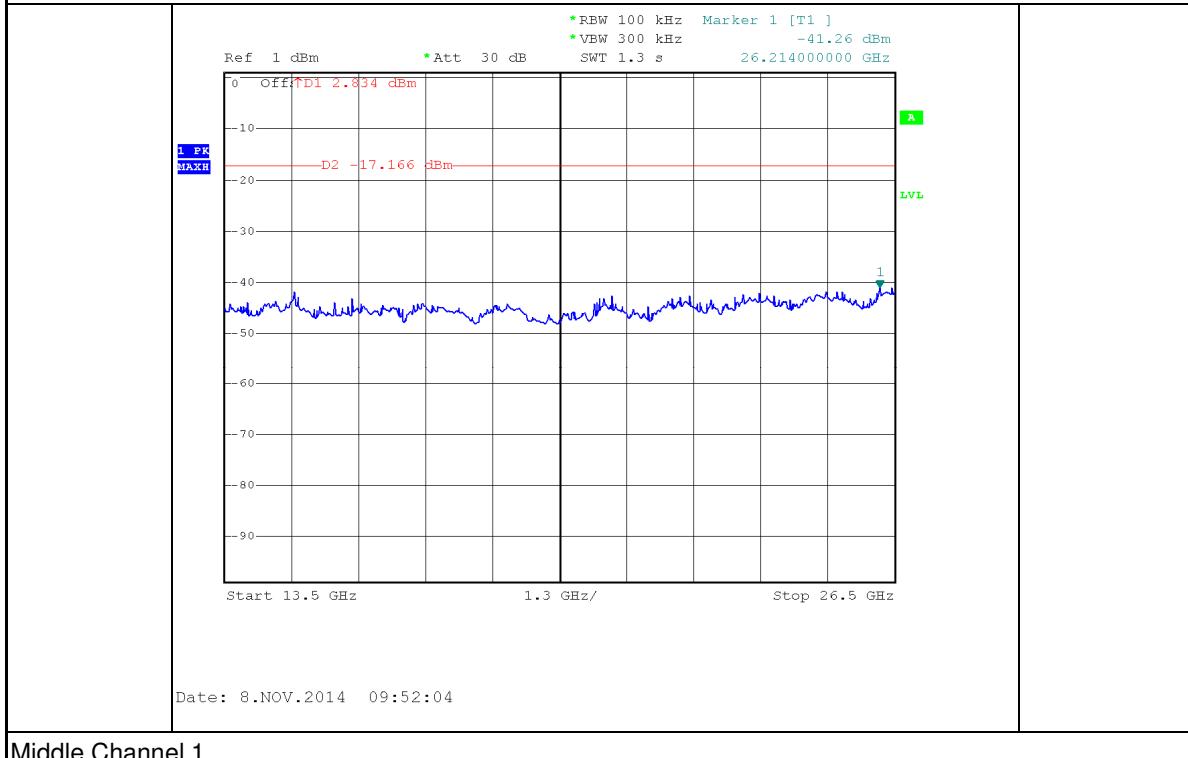
Low Channel 2

Produkte

Products

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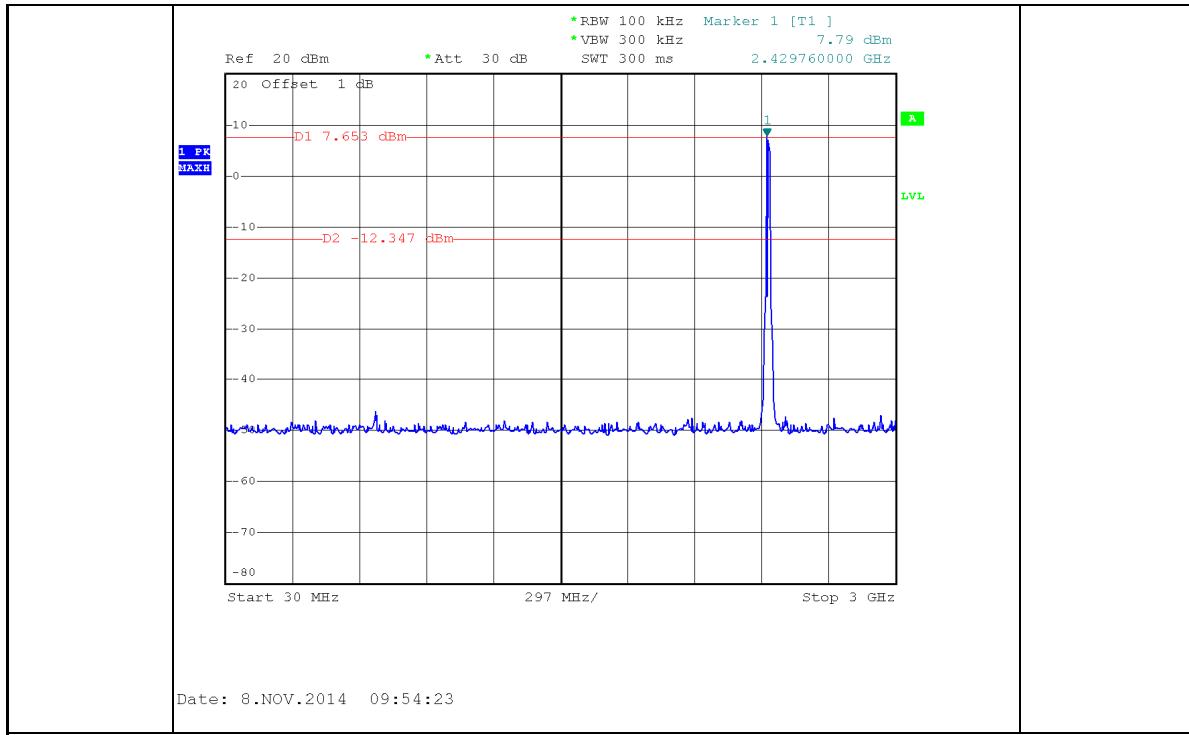
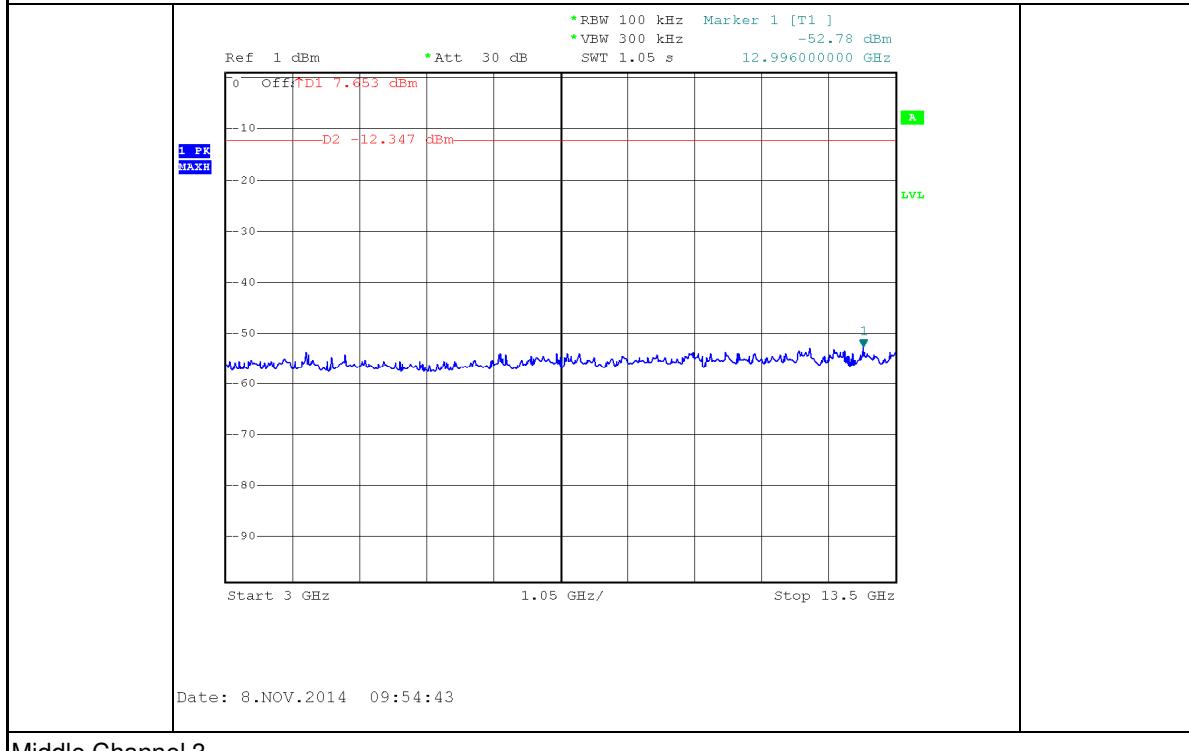
**Low Channel 3**

Produkte

Products

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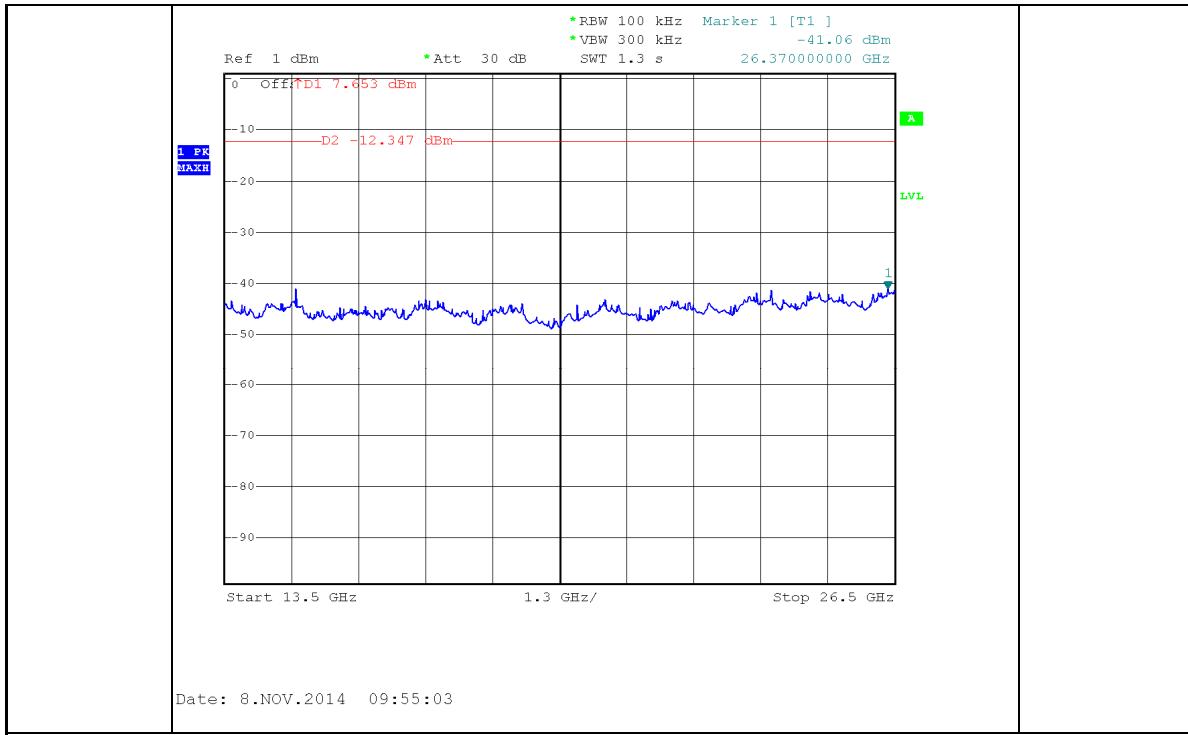
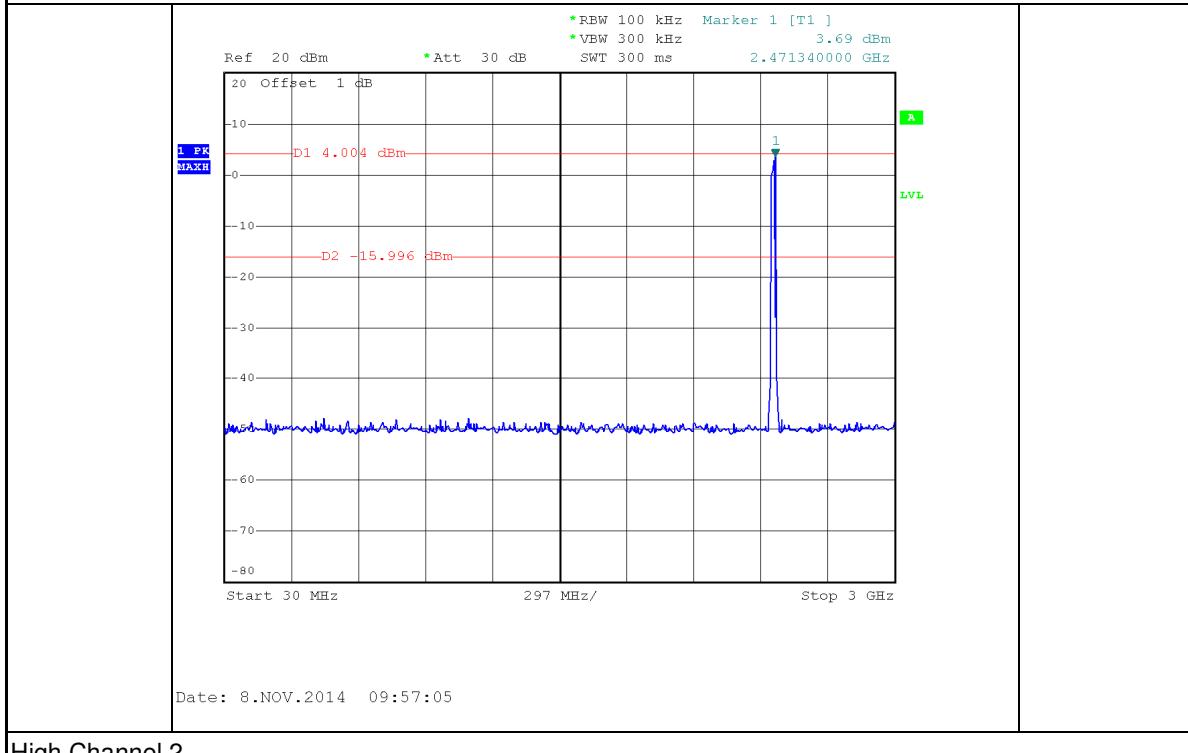
**Middle Channel 2**

Produkte

Products

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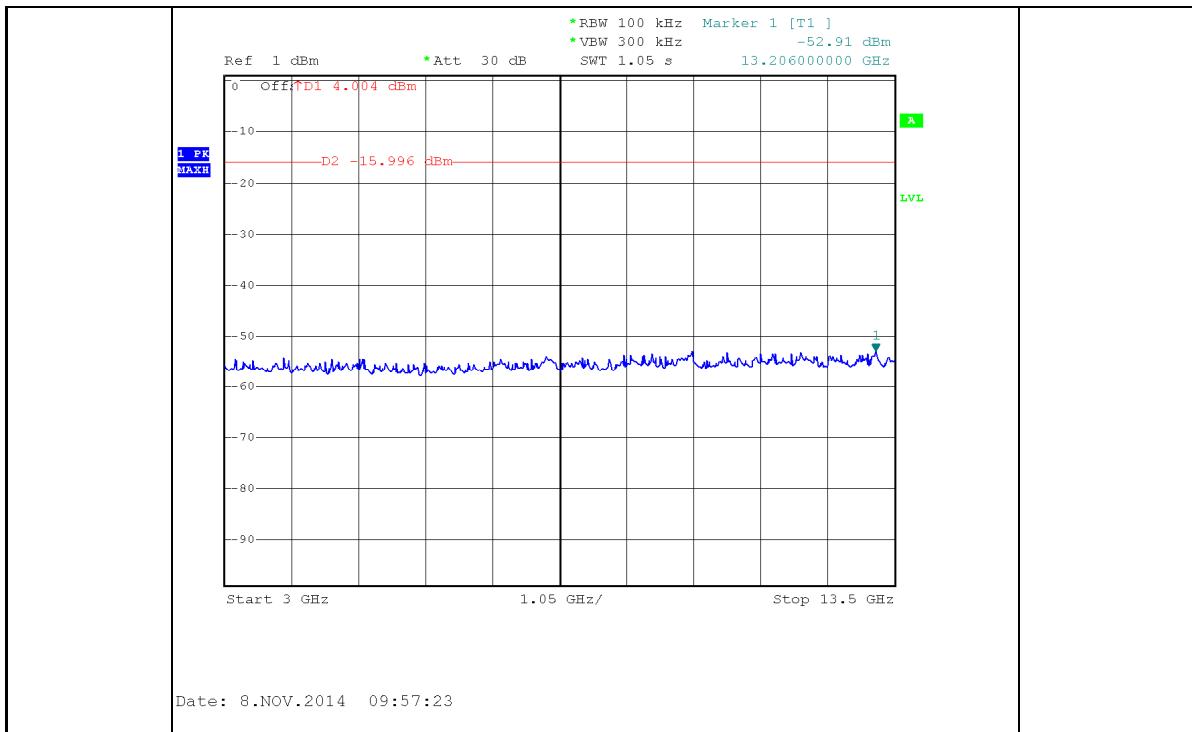
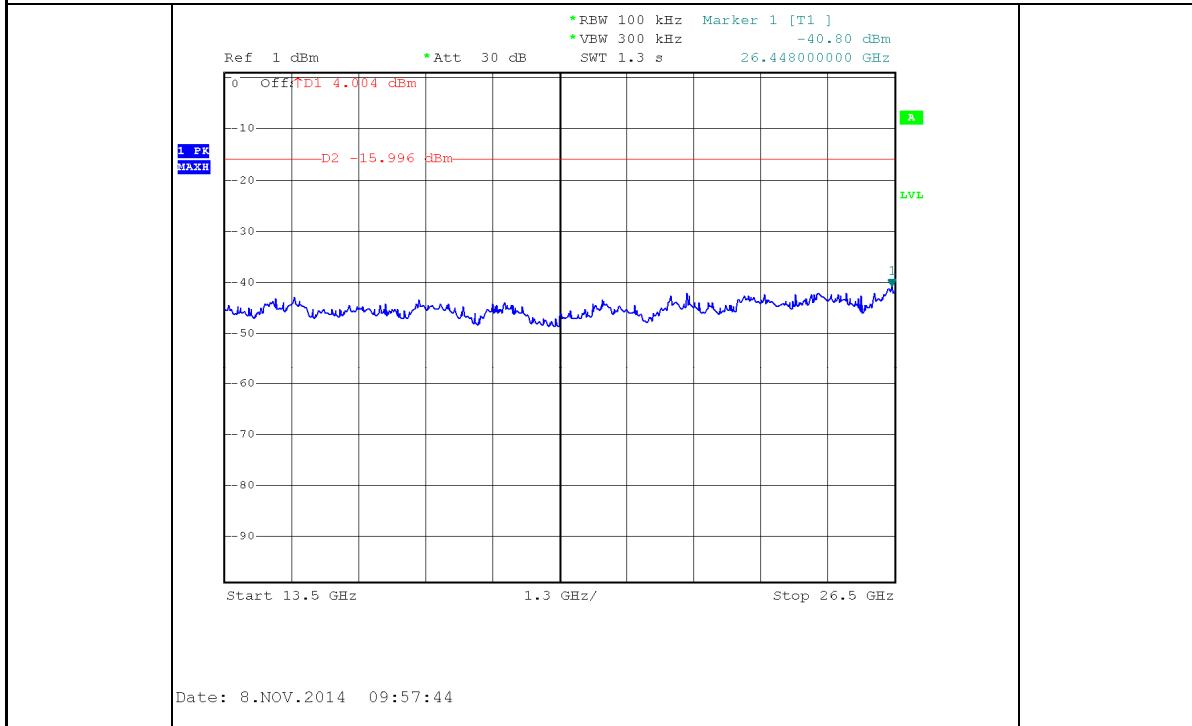
**High Channel 1**

Produkte

Products

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**High Channel 3**

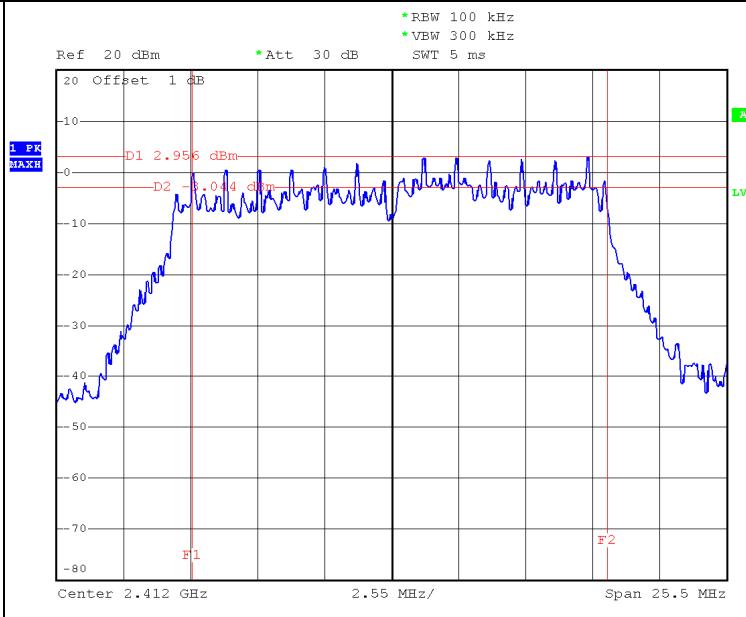
Appendix B.7: Maximum Conducted Output Power_802.11n HT20

Channel	Channel Frequency (MHz)	Maximum Conducted Output Power_ANT1 (dBm)	Maximum Conducted Output Power_ANT 3 (dBm)	Maximum Conducted Output Power_Total (dBm)	Limit(dBm)
Low Channel	2412	14.20	14.10	17.16	28.4
Middle Channel	2437	18.10	18.60	21.37	28.4
High Channel	2462	14.10	14.50	17.31	28.4

Appendix B.8: 6dB Bandwidth and 99% Bandwidth_802.11n HT20 ANT1

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.81	16.42
Middle Channel	2437	15.86	16.52
High Channel	2462	15.81	16.47

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 10:42:34

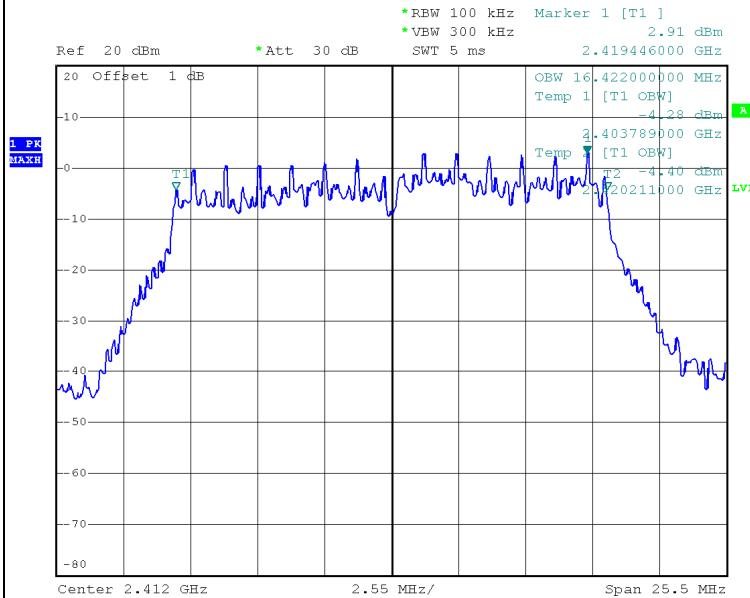
Low Channel 99% Bandwidth

Produkte

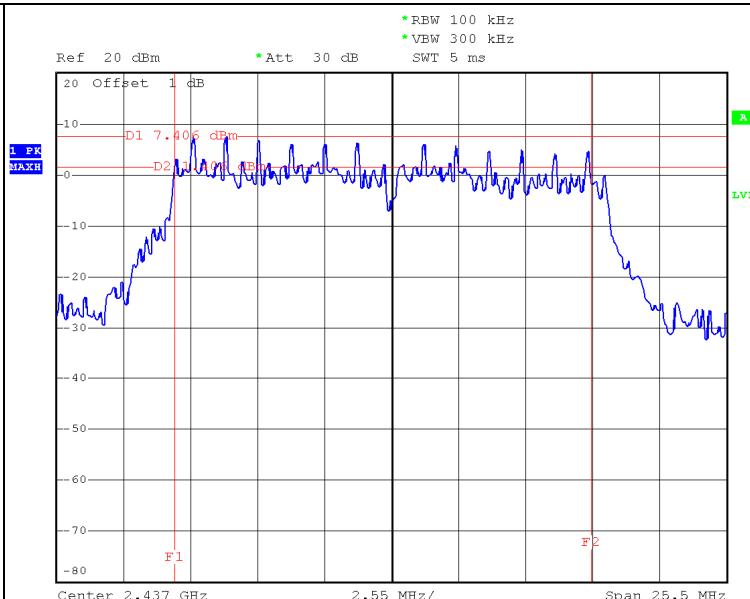
Products

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Date: 8.NOV.2014 10:42:46

Middle Channel 6dB Bandwidth

Date: 8.NOV.2014 10:45:19

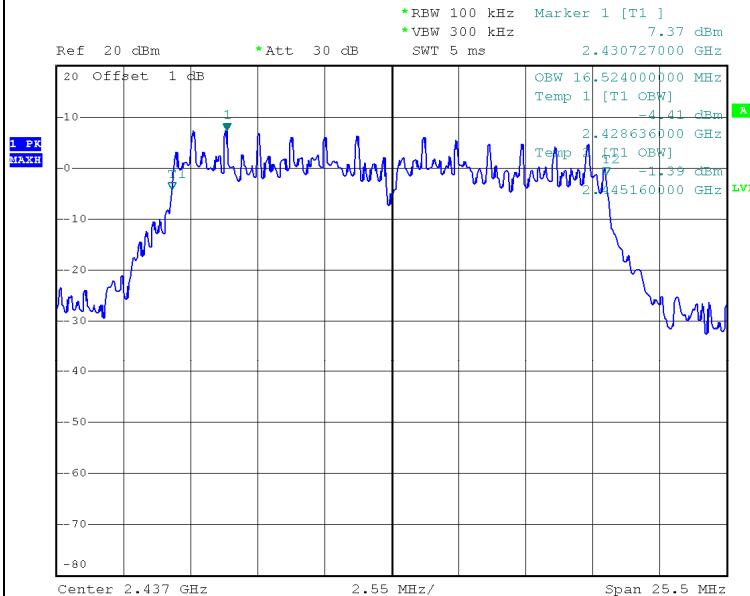
Middle Channel 99% Bandwidth

Produkte

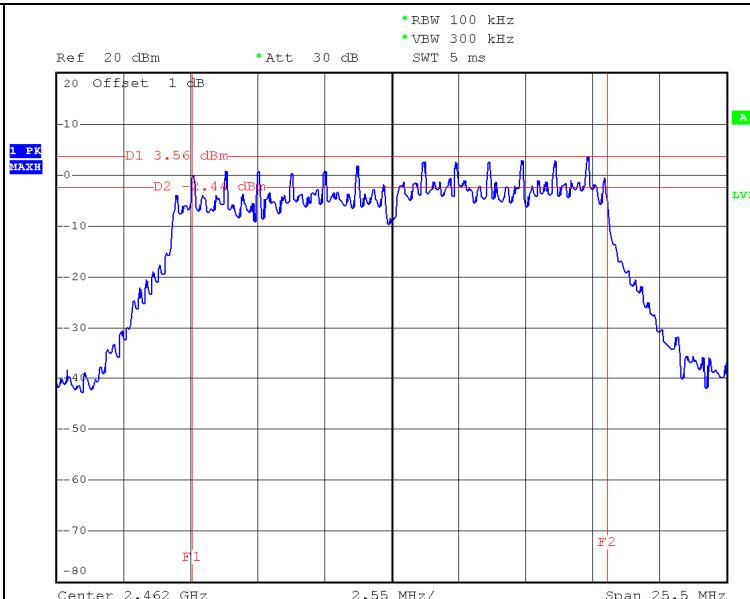
Products

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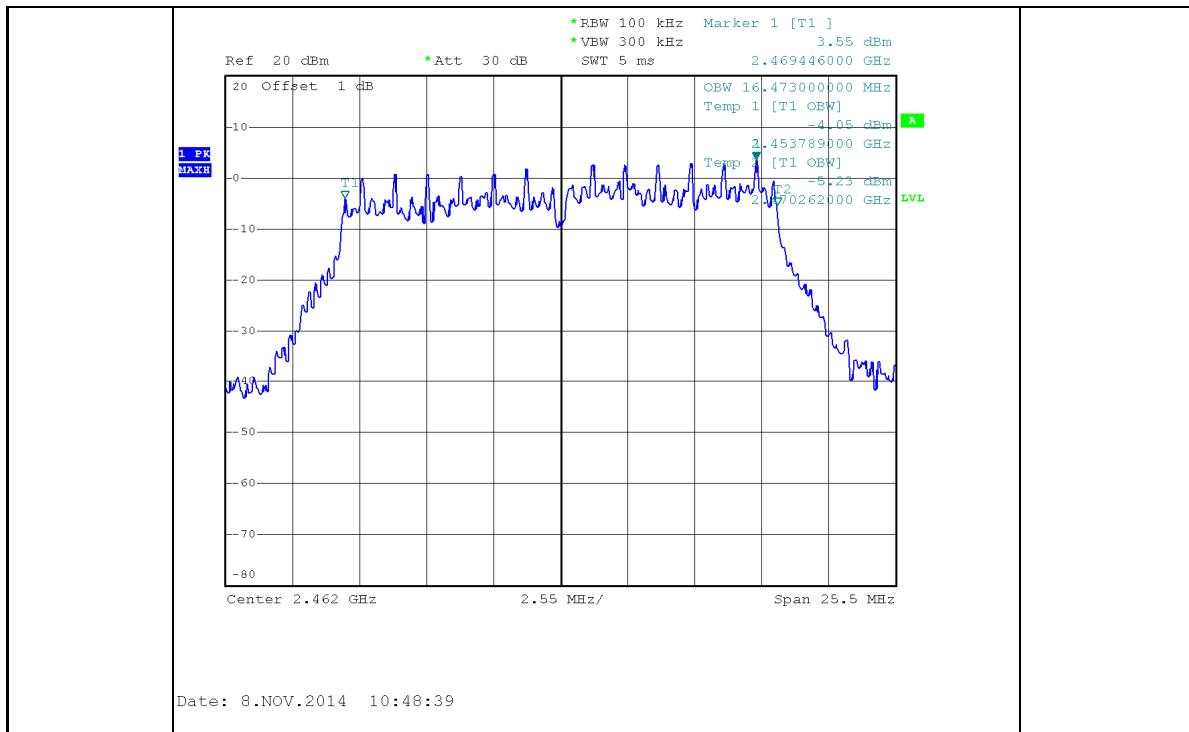


Date: 8.NOV.2014 10:45:31

High Channel 6dB Bandwidth

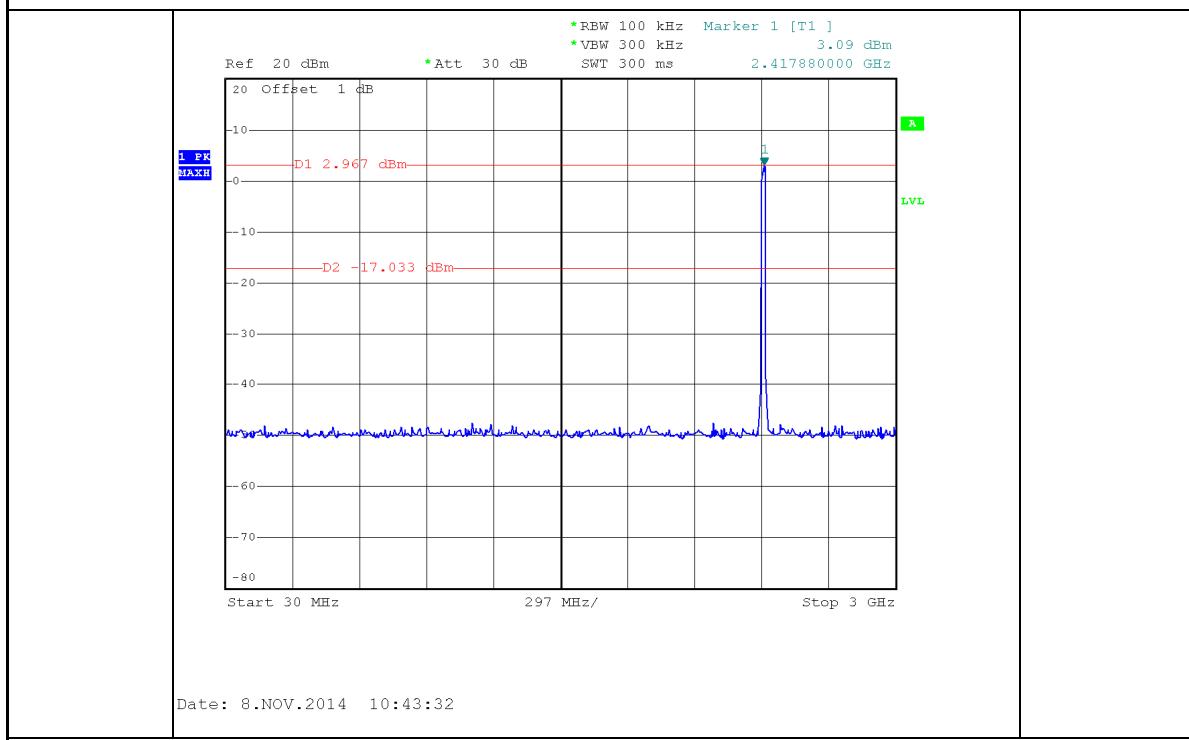
Date: 8.NOV.2014 10:48:27

High Channel 99% Bandwidth



Appendix B.9: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT20_ANT1

Low Channel 1



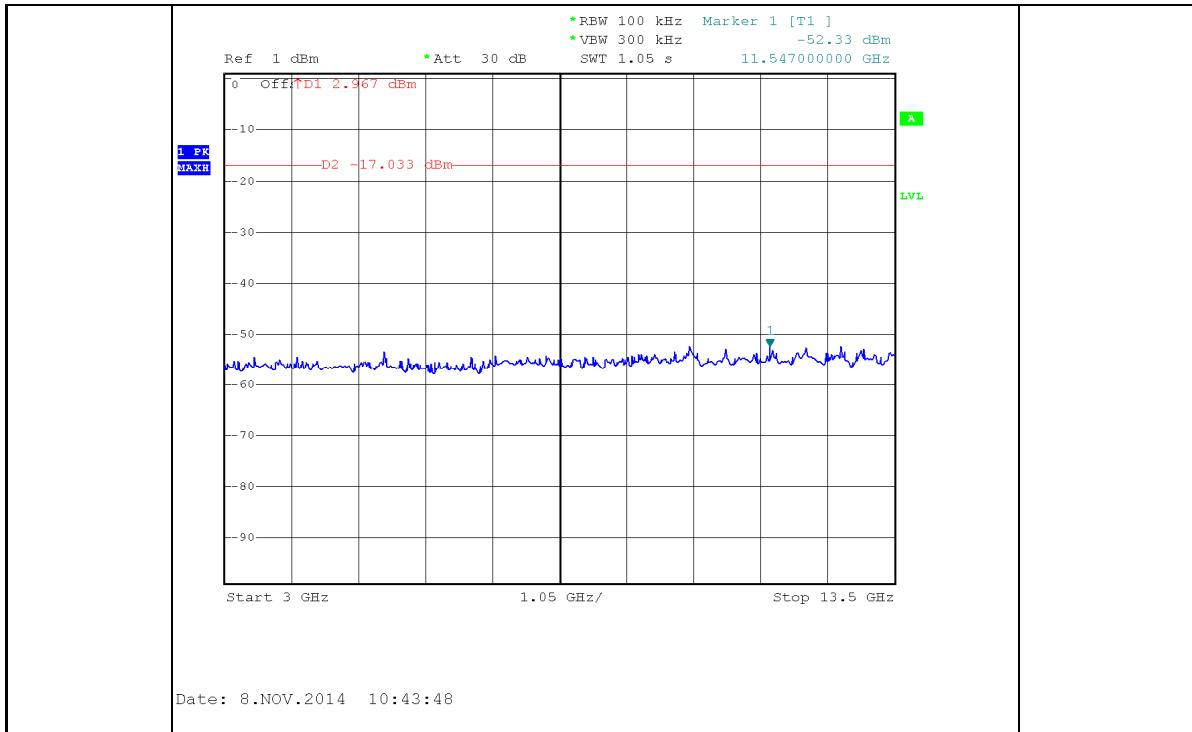
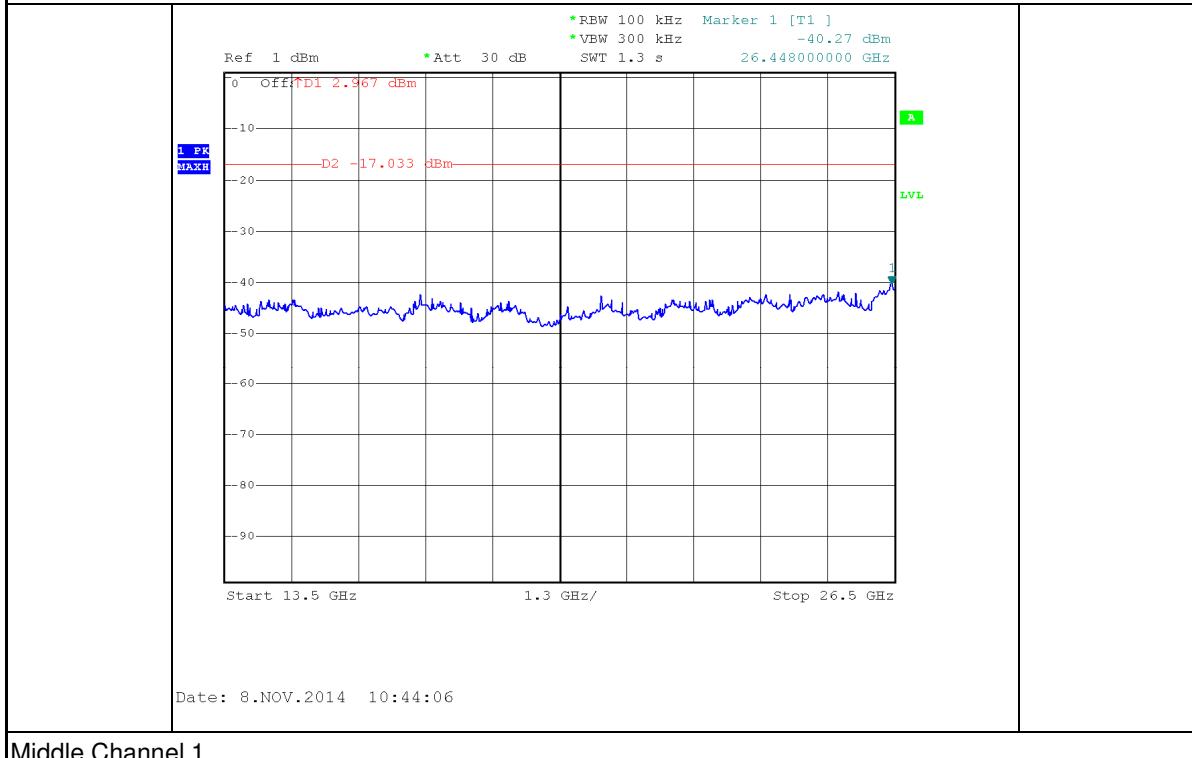
Low Channel 2

Produkte

Products

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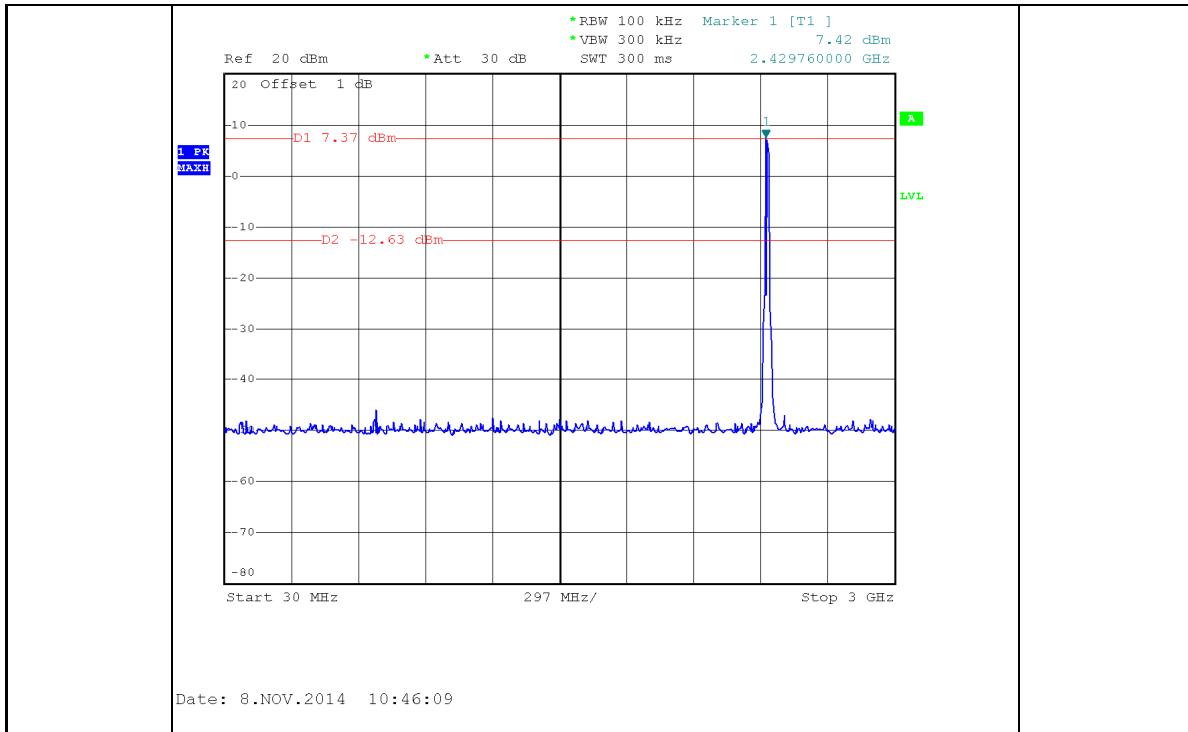
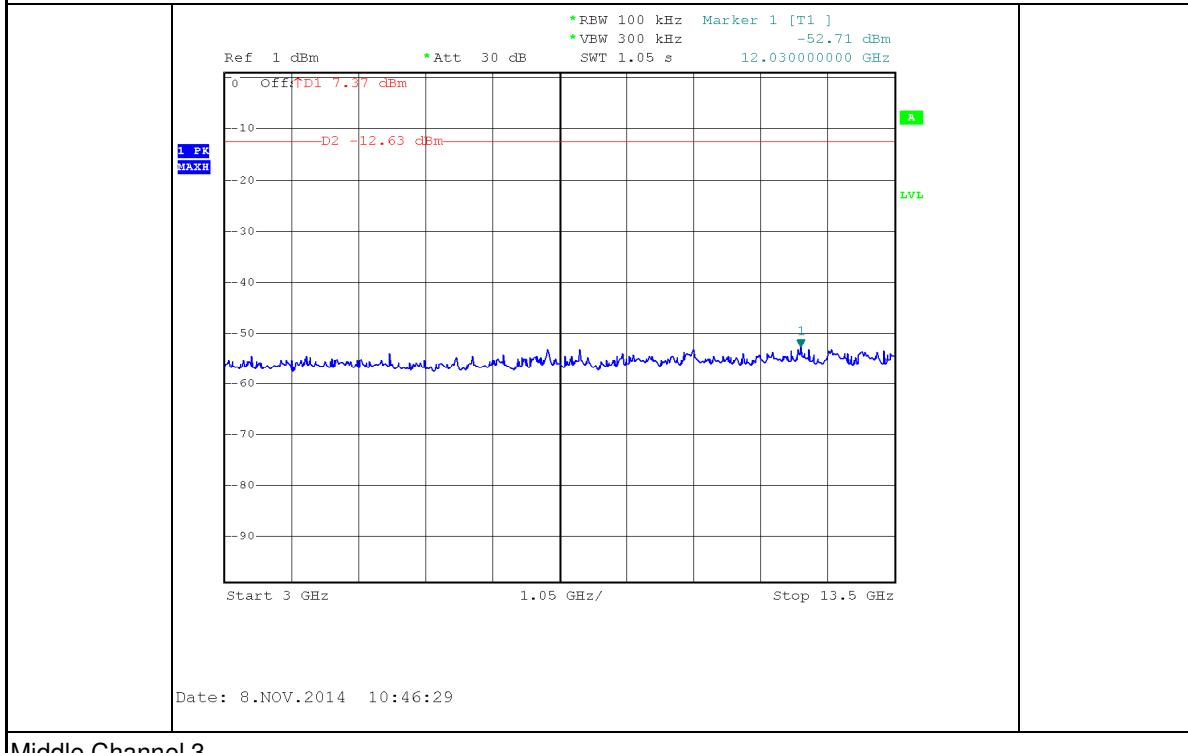
**Low Channel 3****Middle Channel 1**

Produkte

Products

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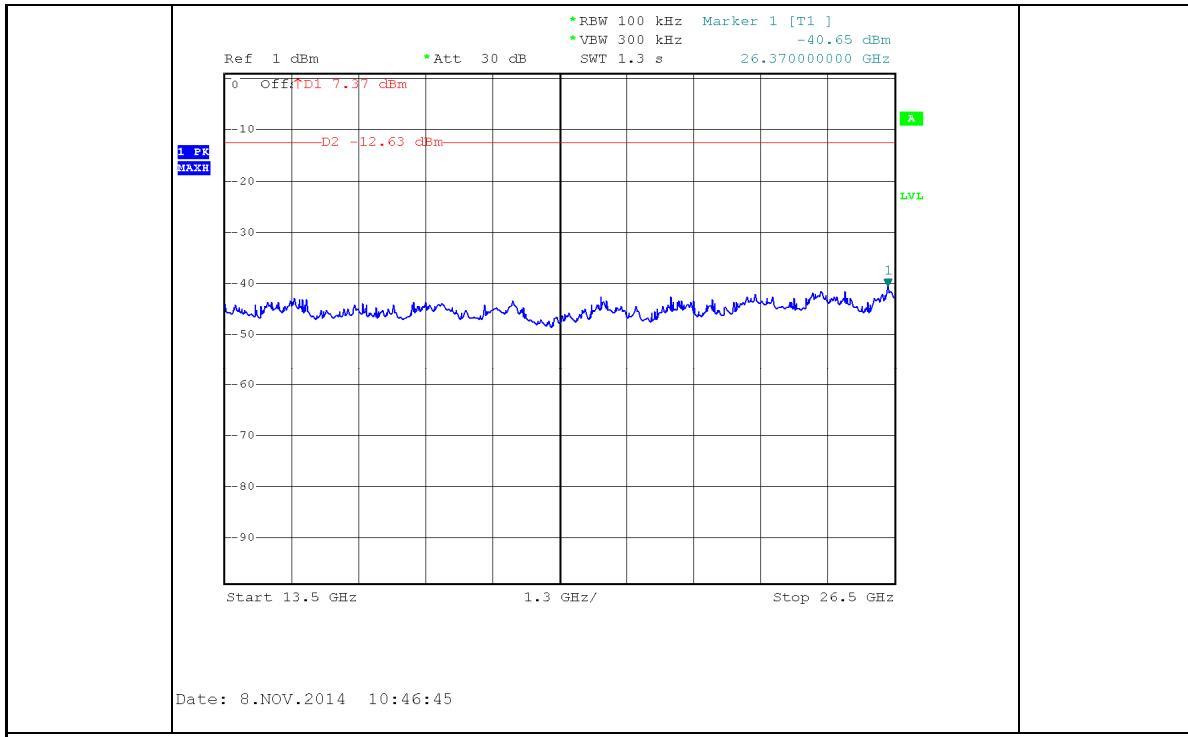
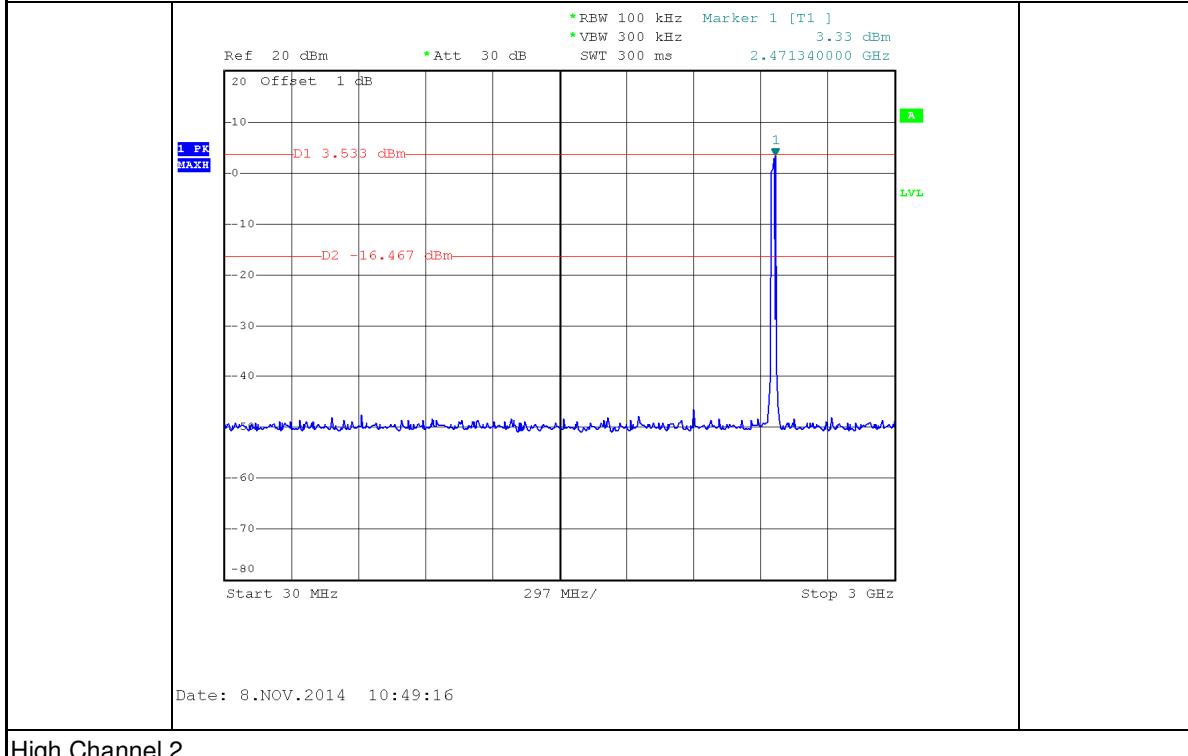
**Middle Channel 2**

Produkte

Products

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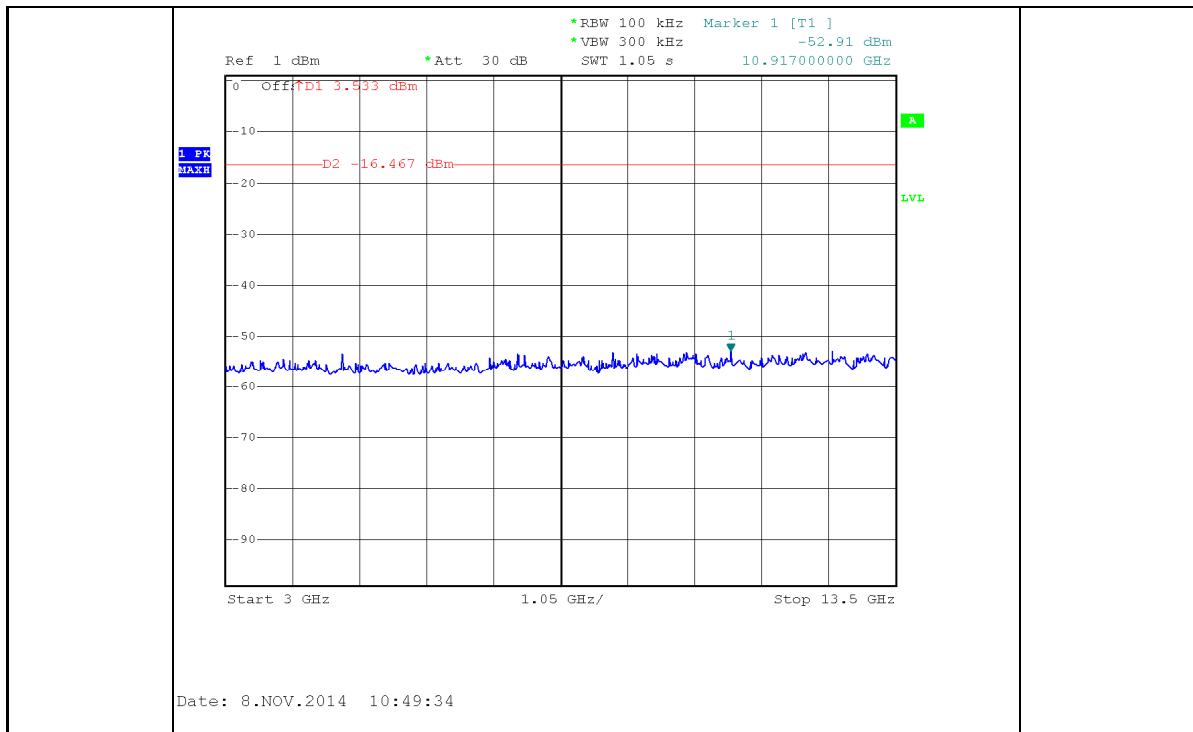
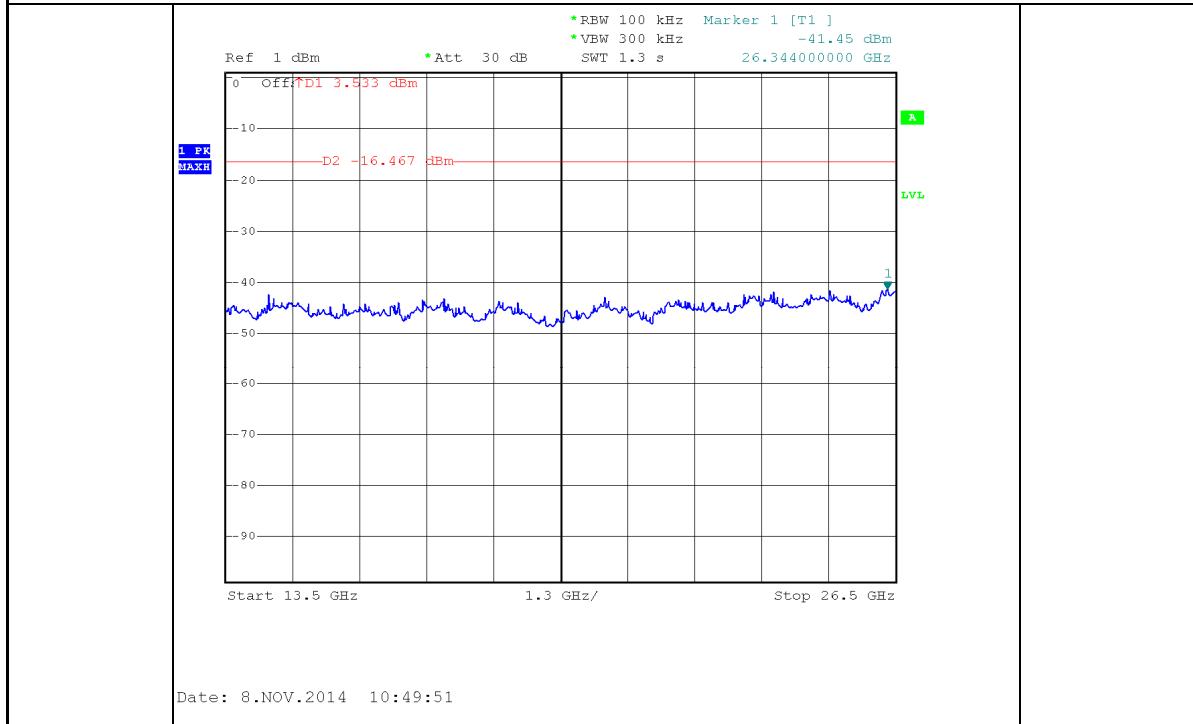
**High Channel 1****High Channel 2**

Produkte

Products

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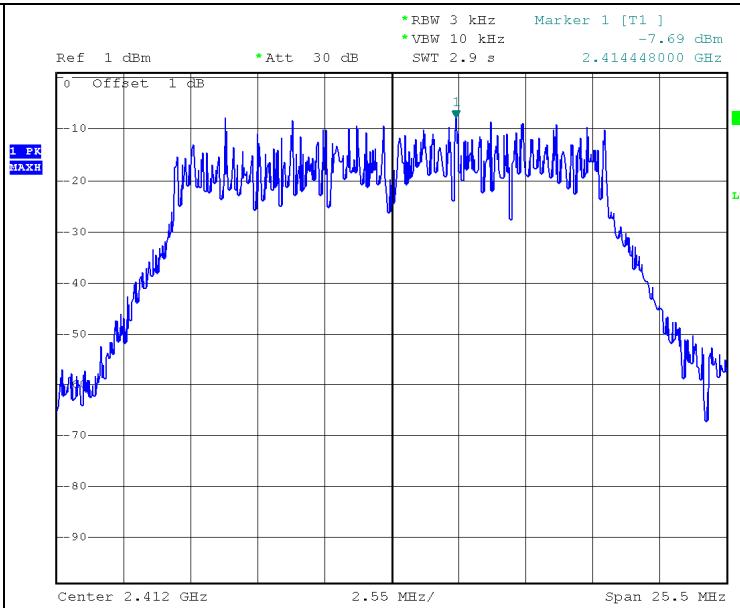
**High Channel 3**

Appendix B.10: Power Spectral Density_802.11n HT20

Channel	Channel Frequency (MHz)	PSD_ANT1 (dBm/3kHz)	PSD_ANT 3 (dBm/3kHz)	PSD_Total (dBm/3kHz)	Limit (dBm/3kHz)
Low Channel	2412	-7.69	-7.96	-4.81	6.4
Middle Channel	2437	-0.58	-2.03	1.77	6.4
High Channel	2462	-7.74	-7.11	-4.40	6.4

Power Spectral Density_AN1

2412 MHz



Date: 8.NOV.2014 10:44:25

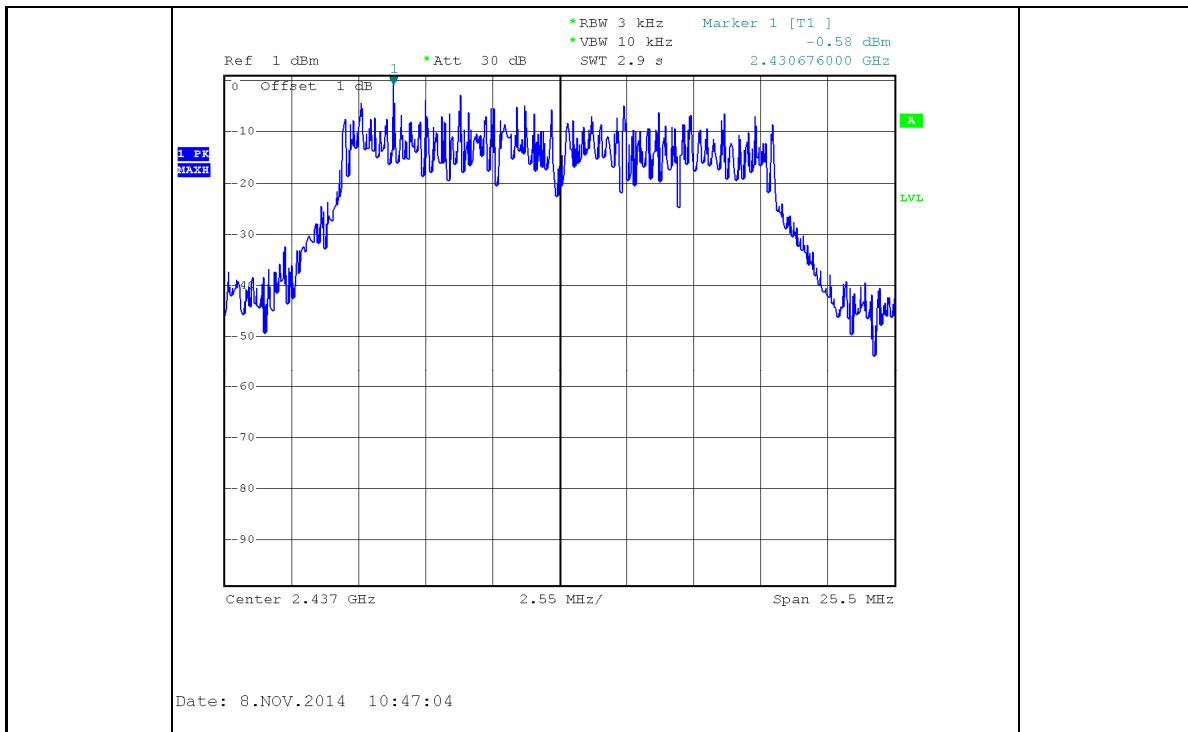
2437 MHz

Produkte

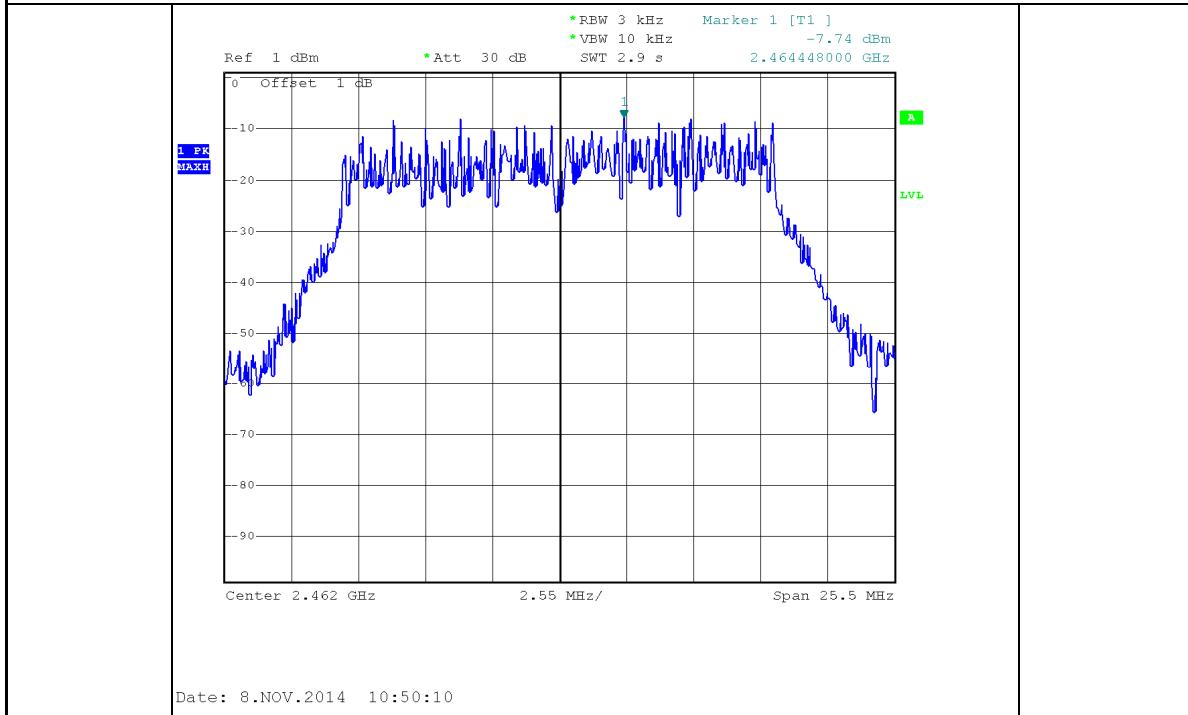
Products

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2462 MHz



Power Spectral Density_AN3

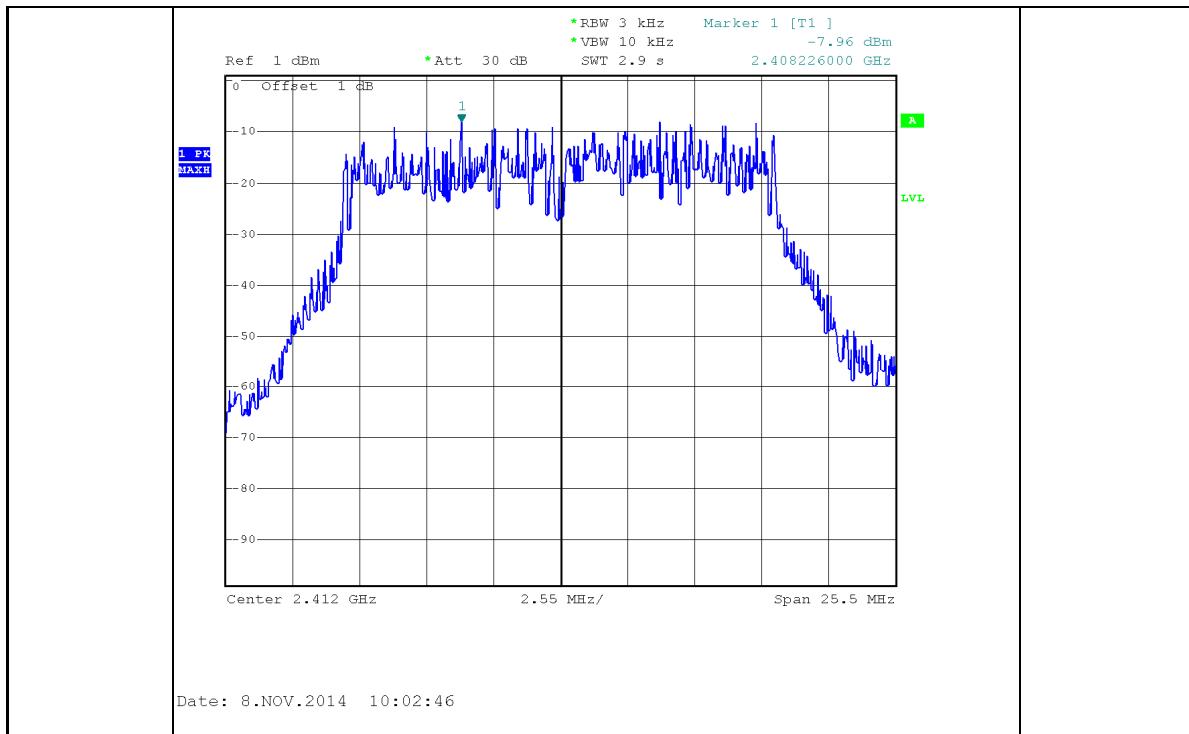
2412 MHz

Produkte

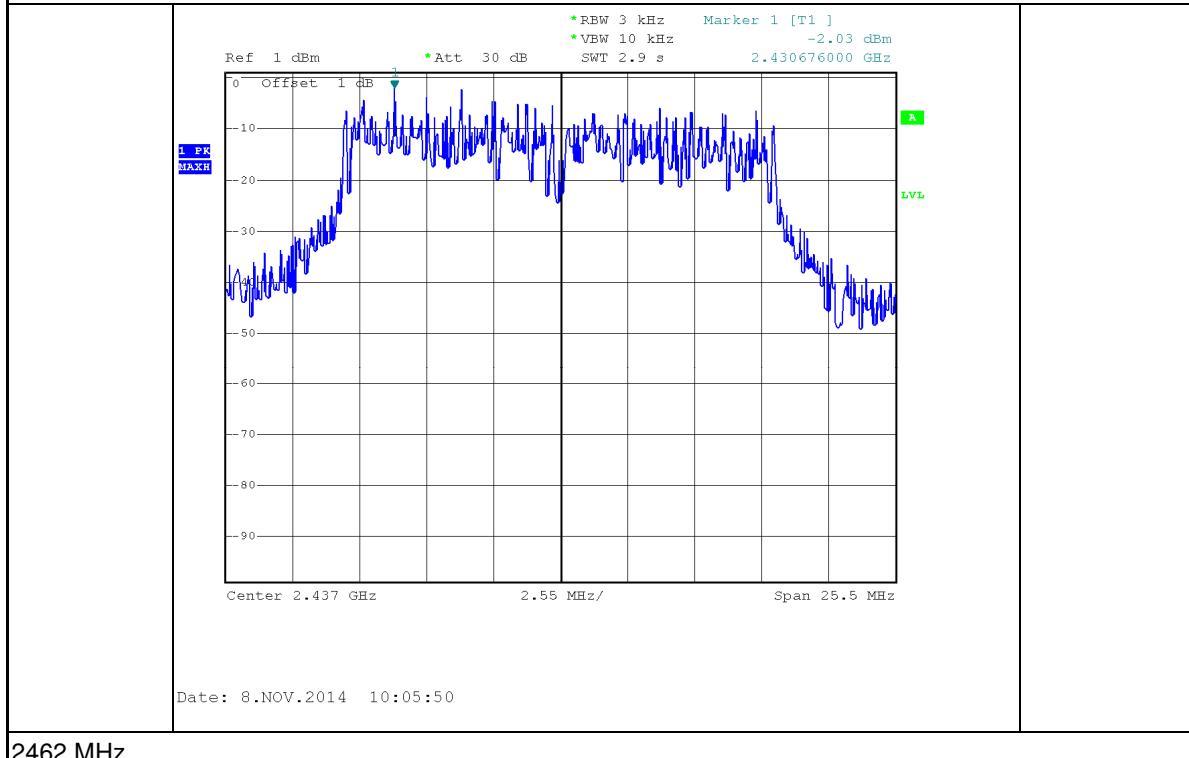
Products

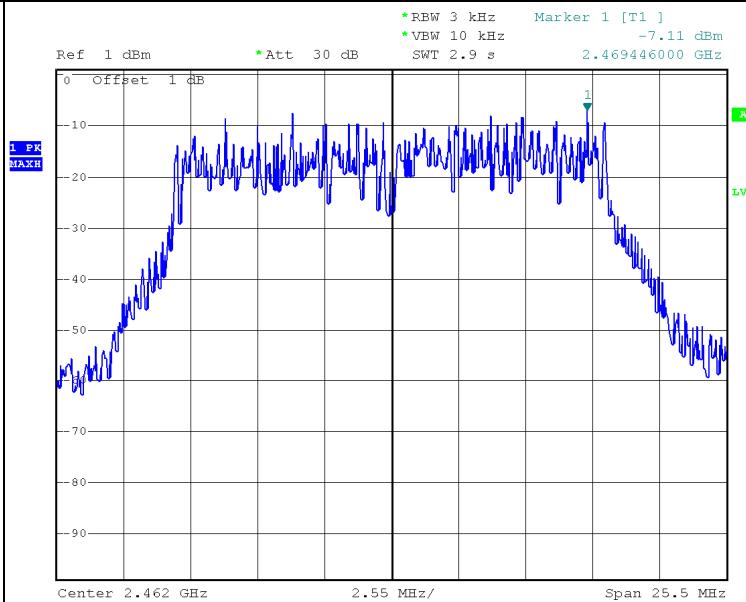
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2437 MHz



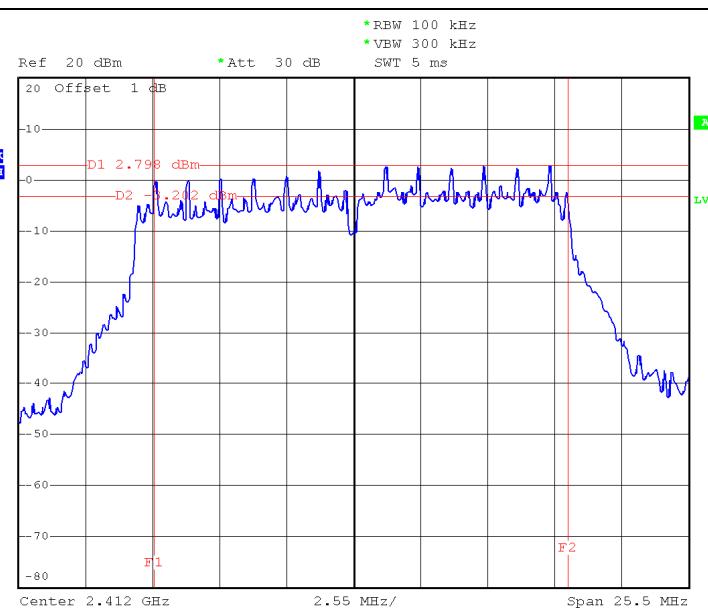


Date: 8.NOV.2014 10:08:32

Appendix B.11: 6dB Bandwidth and 99% Bandwidth_802.11n HT20_ANT3

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.76	16.37
Middle Channel	2437	15.81	16.42
High Channel	2462	15.81	16.42

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 10:00:58

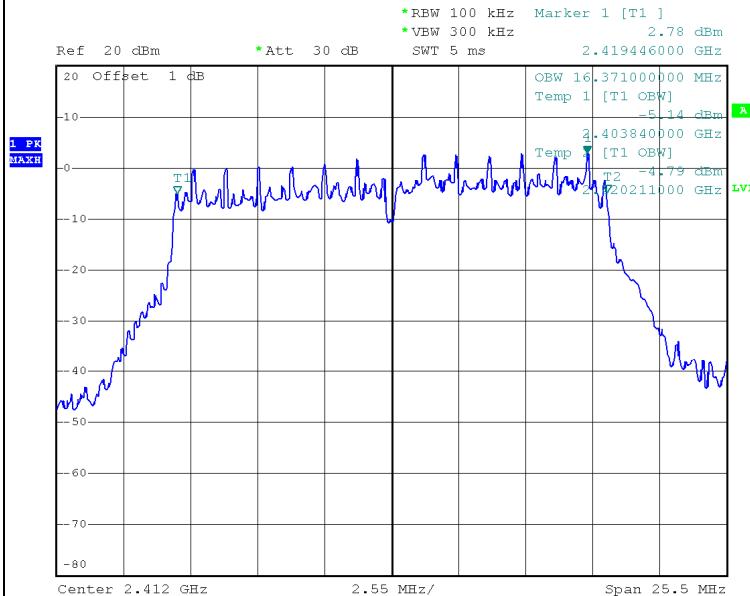
Low Channel 99% Bandwidth

Produkte

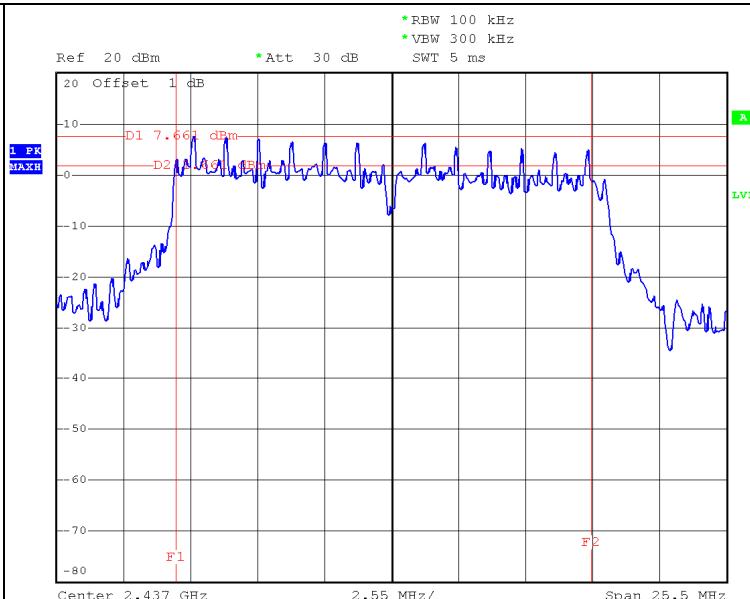
Products

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Date: 8.NOV.2014 10:01:11

Middle Channel 6dB Bandwidth

Date: 8.NOV.2014 10:04:07

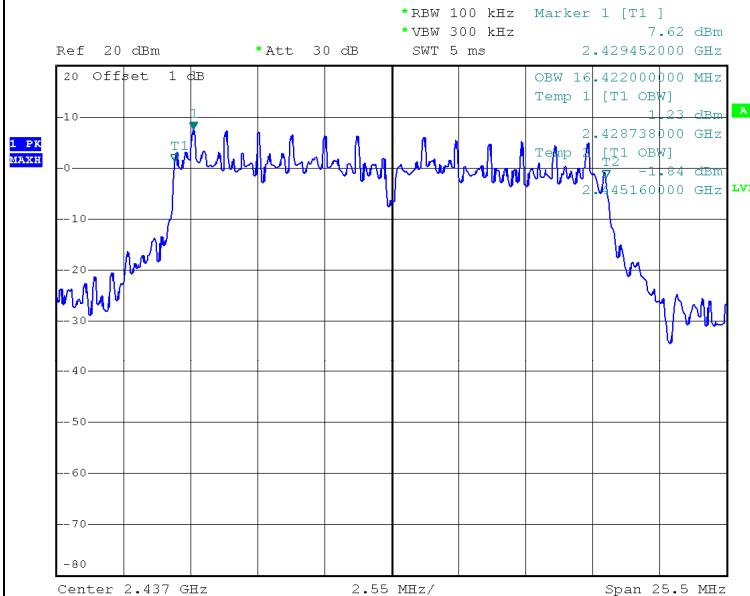
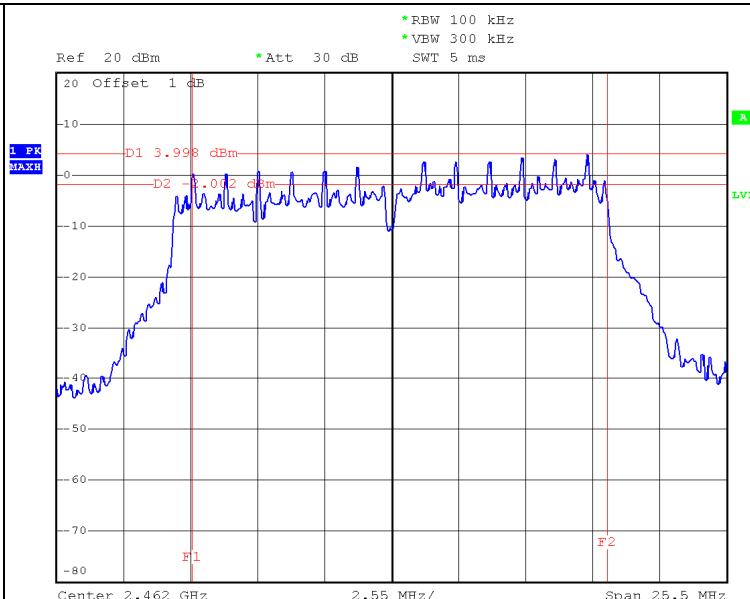
Middle Channel 99% Bandwidth

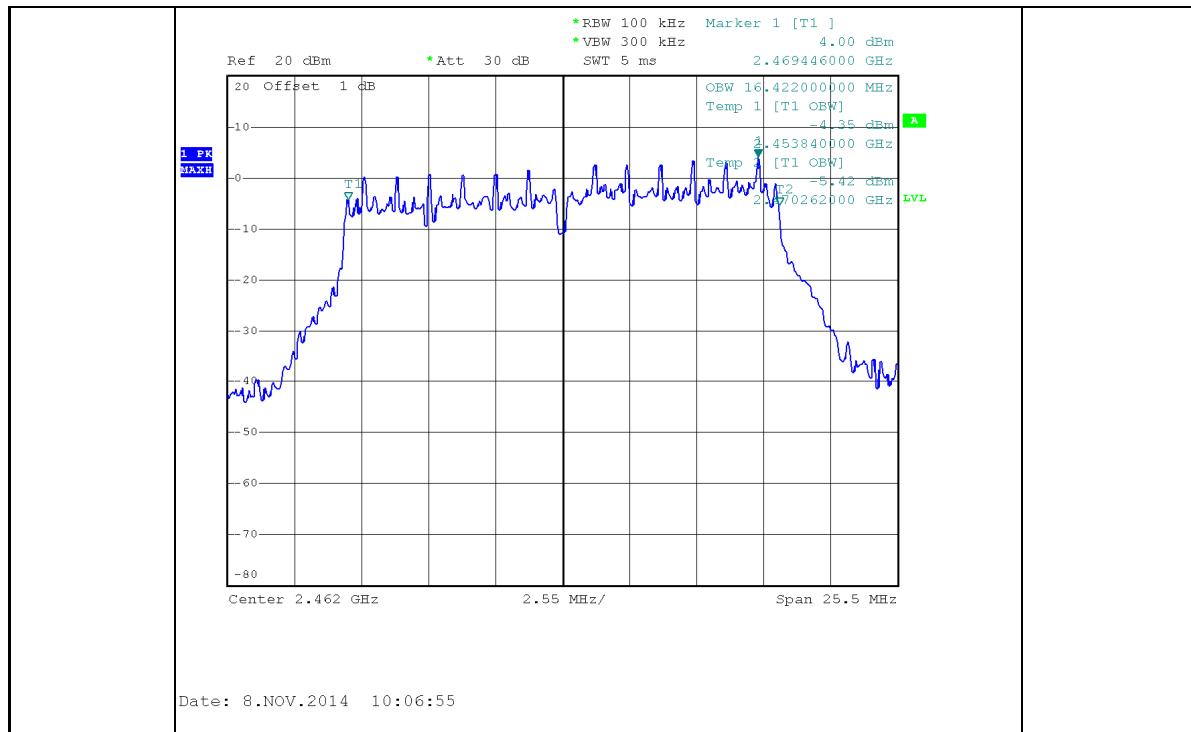
Produkte

Products

17042741 002

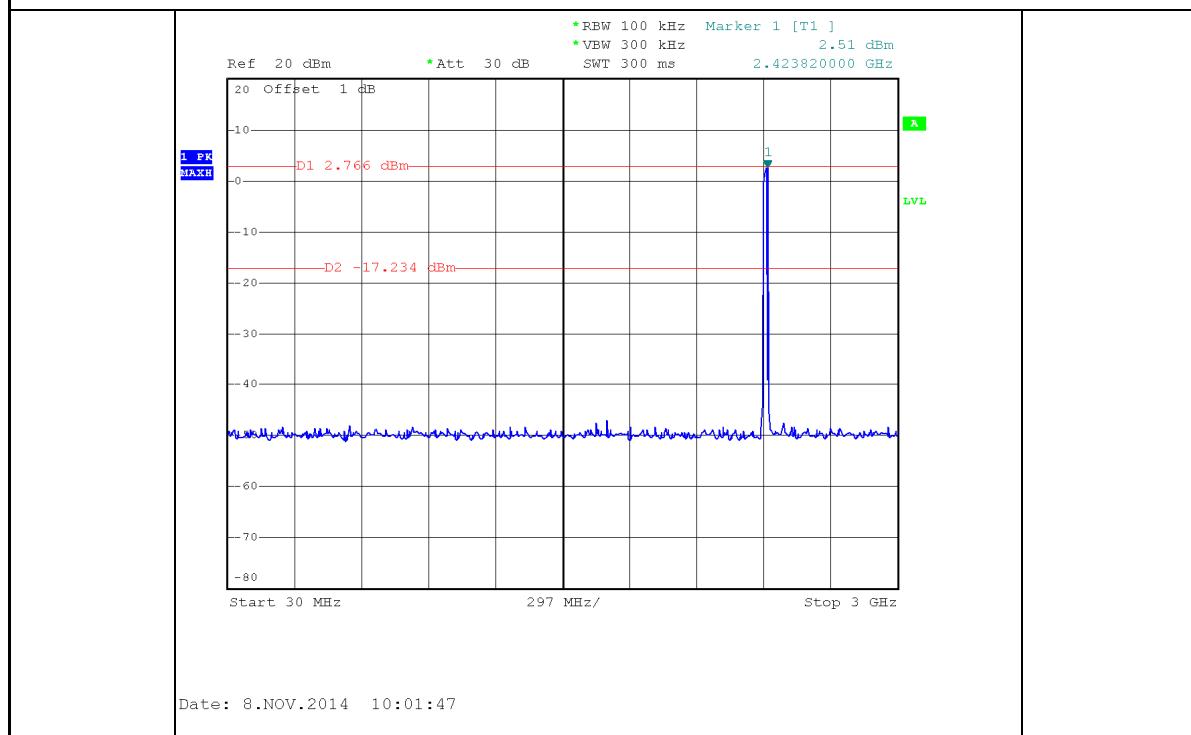
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**High Channel 6dB Bandwidth****High Channel 99% Bandwidth**



Appendix B.12: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT20_ANT3

Low Channel 1



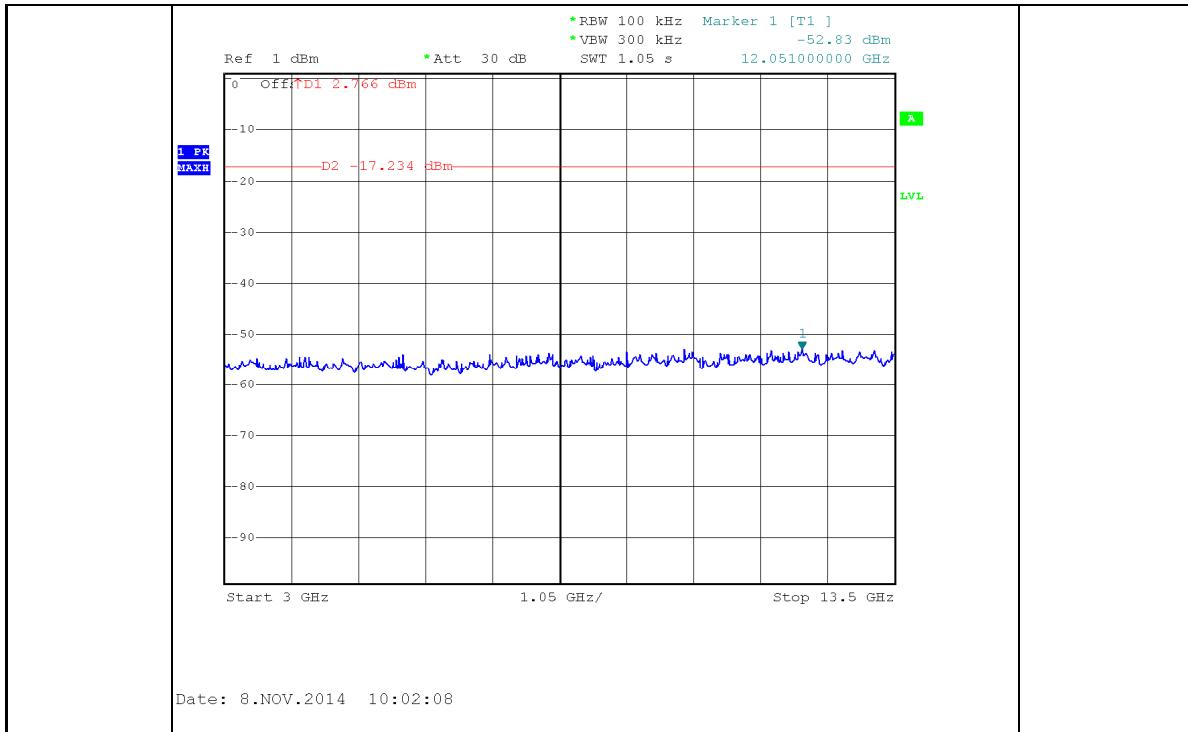
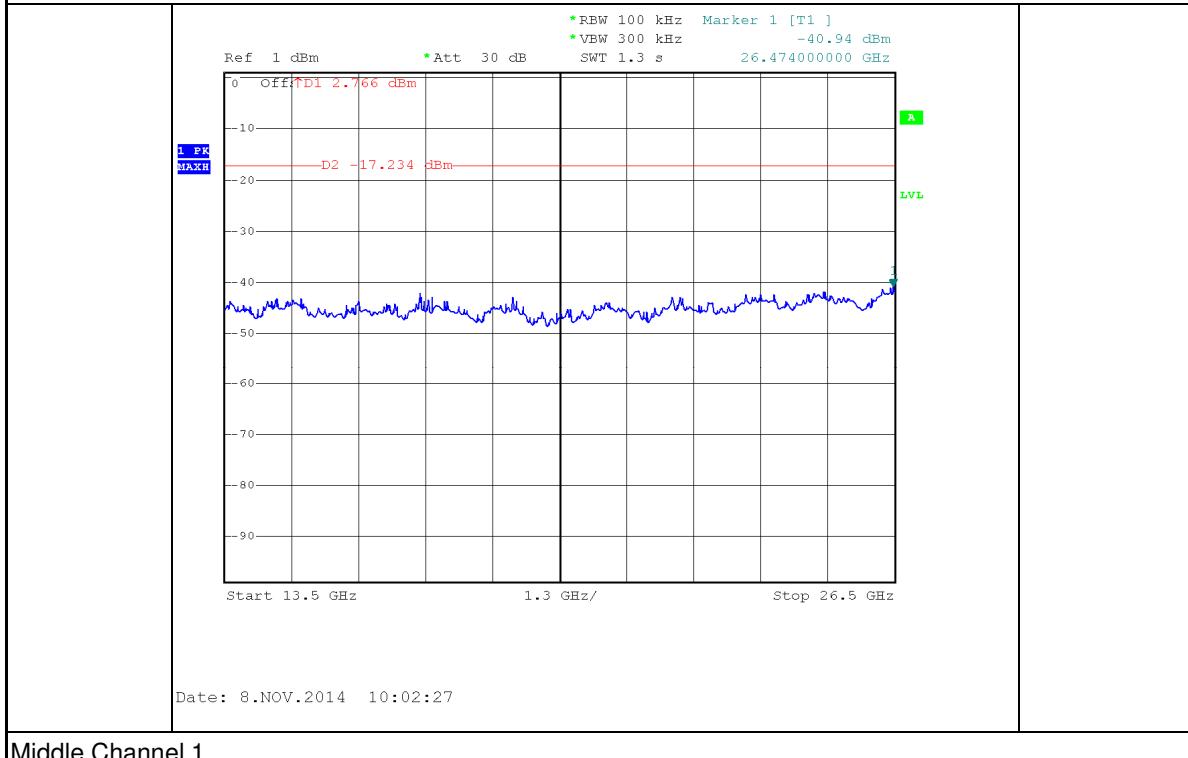
Low Channel 2

Produkte

Products

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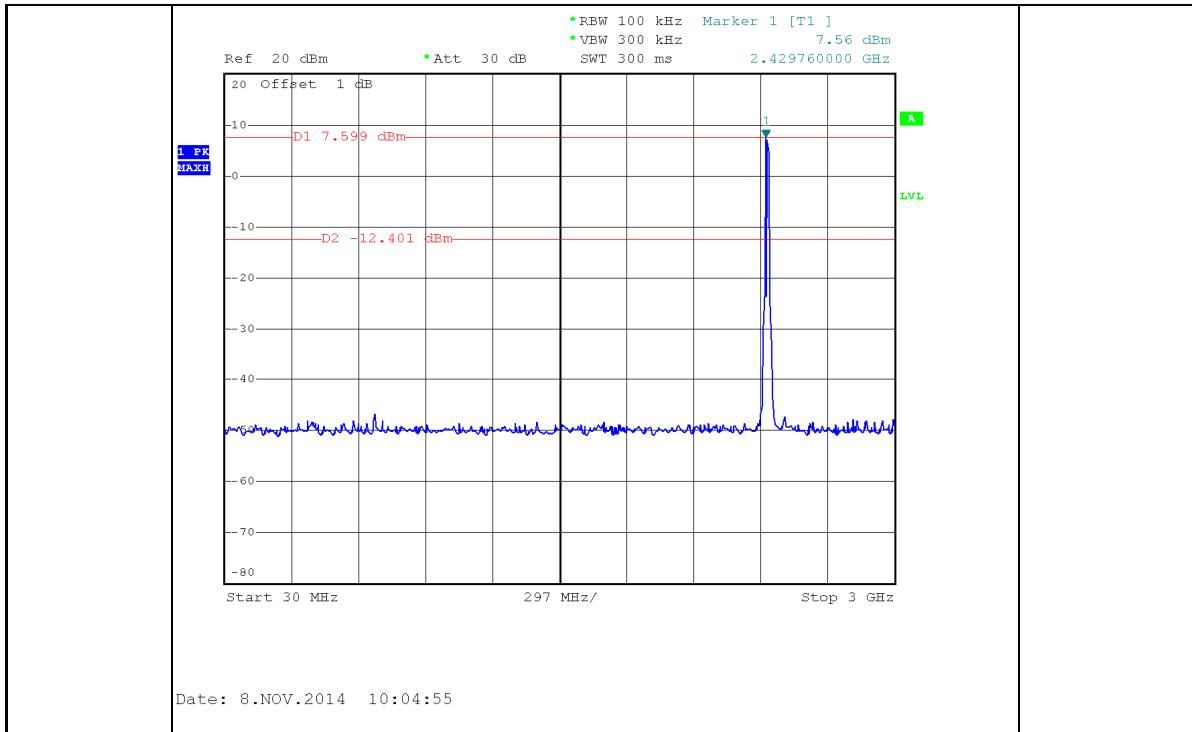
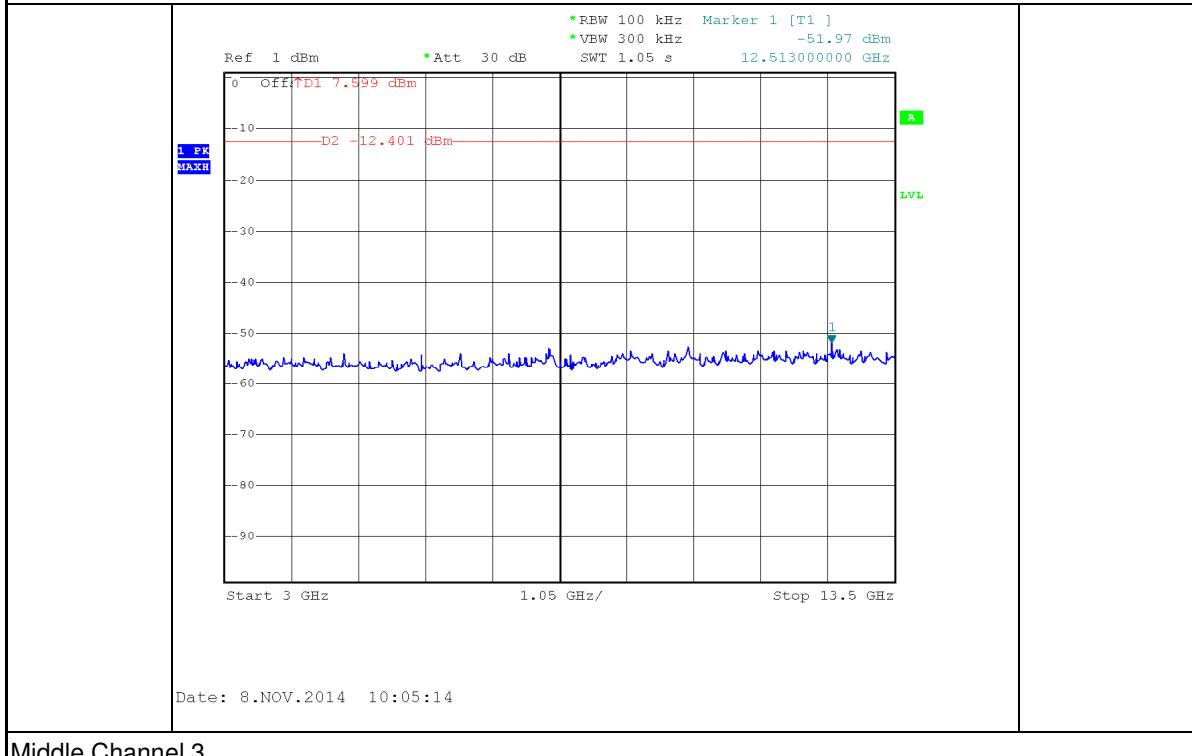
**Low Channel 3**

Produkte

Products

17042741 002

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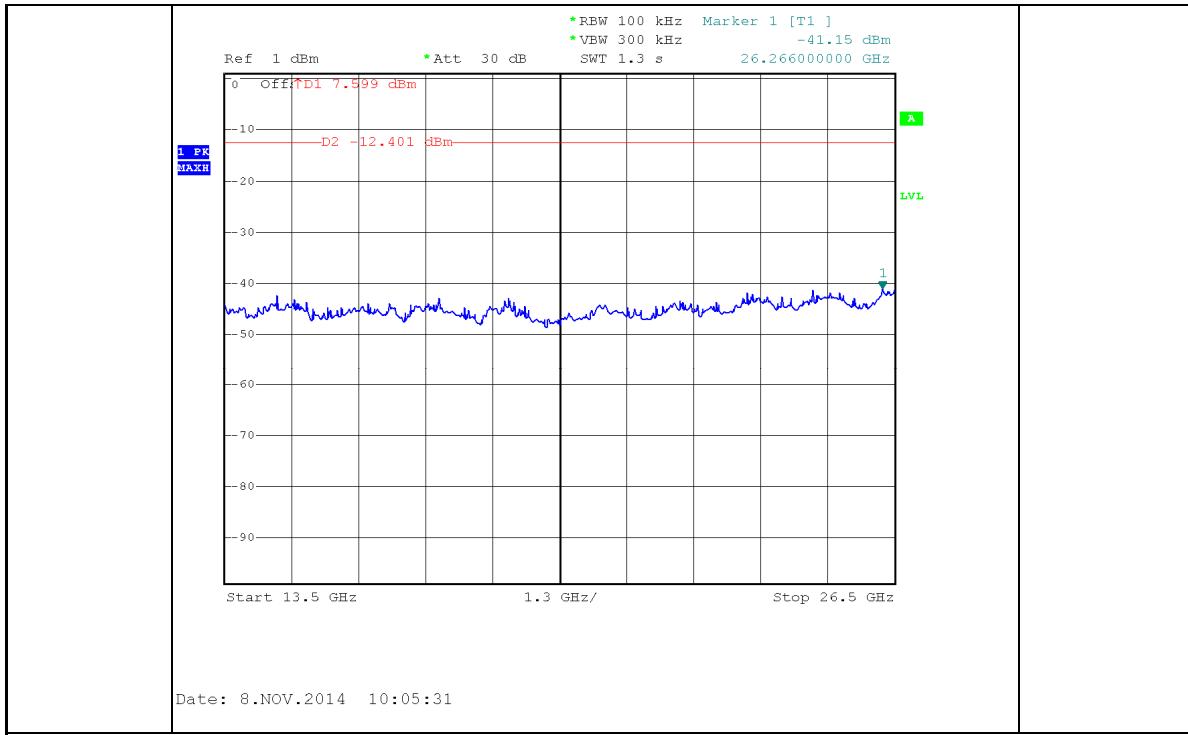
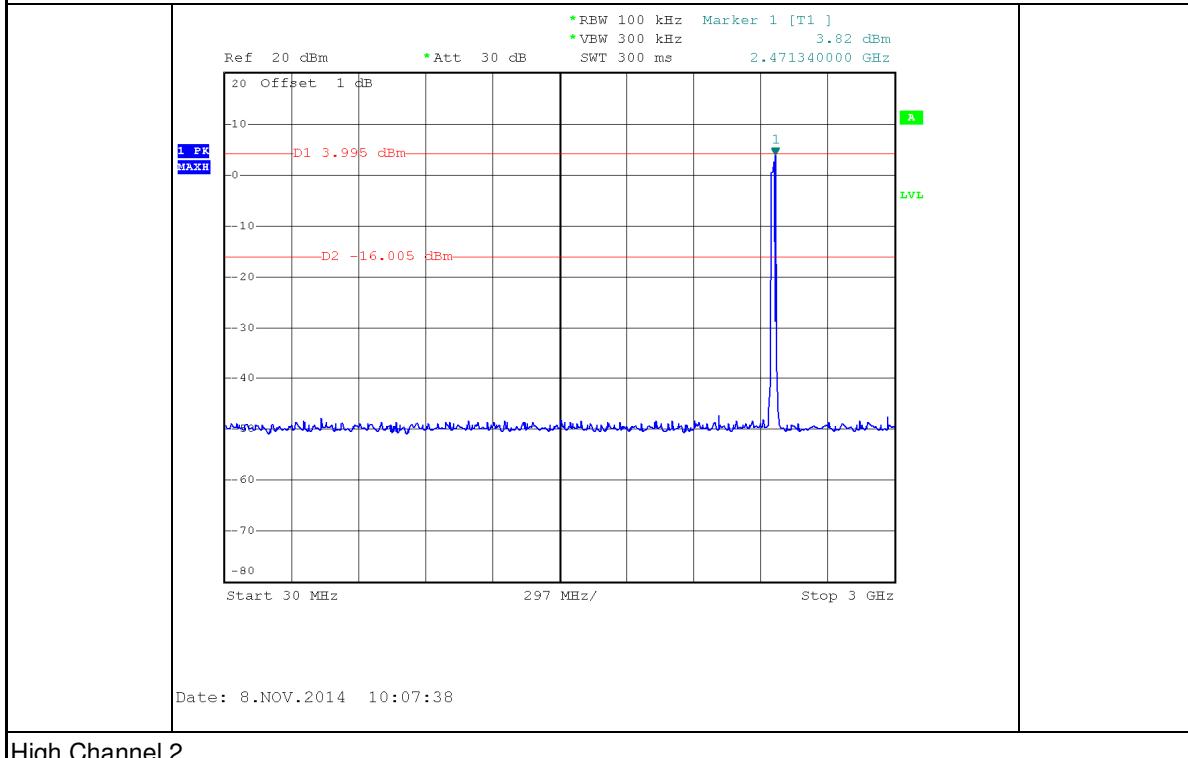
**Middle Channel 2**

Produkte

Products

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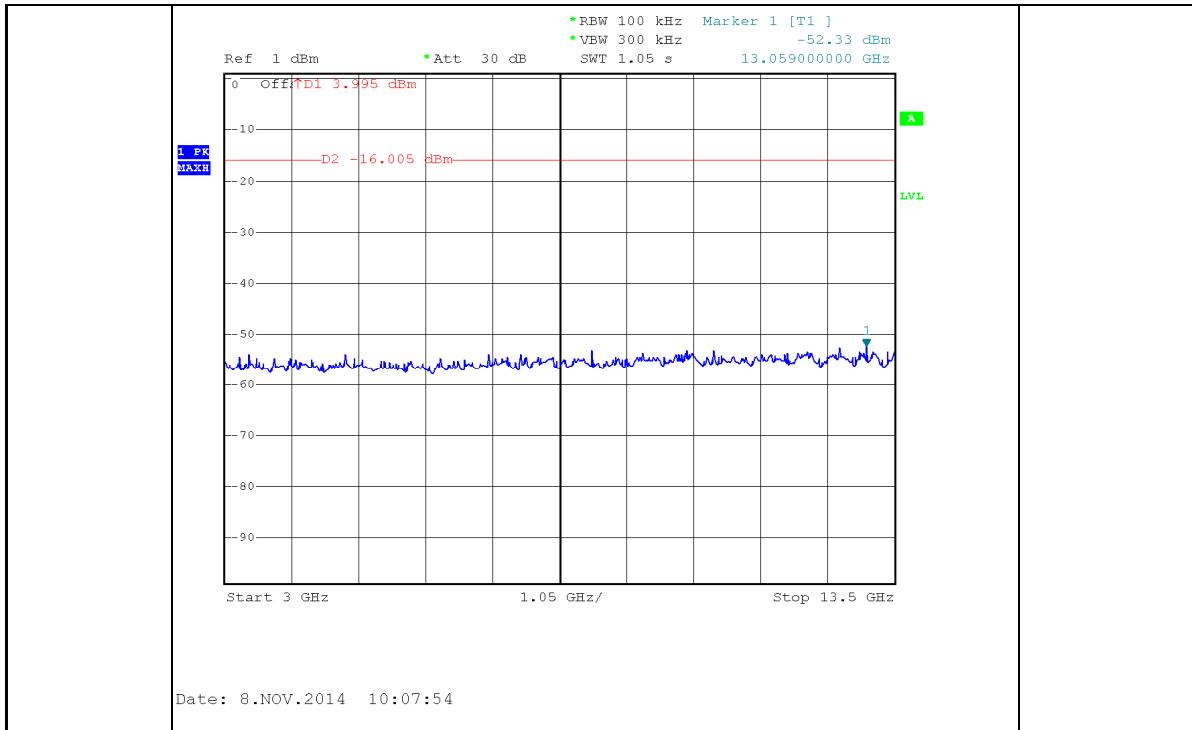
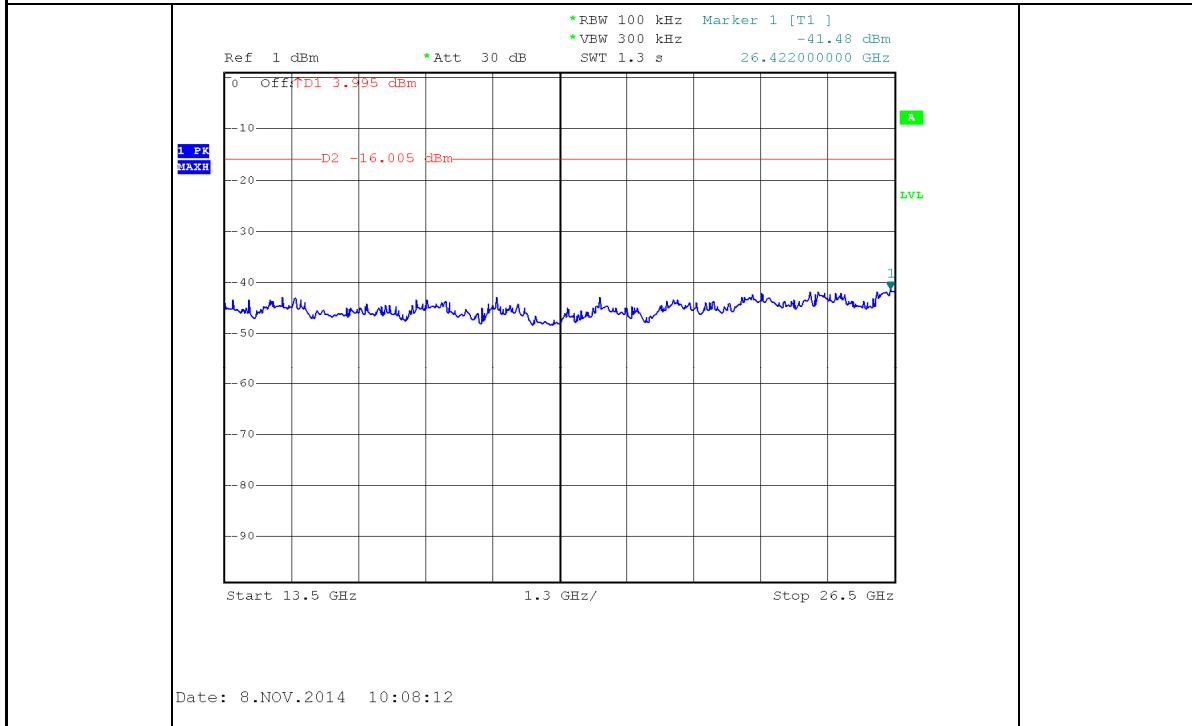
**High Channel 1**

Produkte

Products

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**High Channel 3**

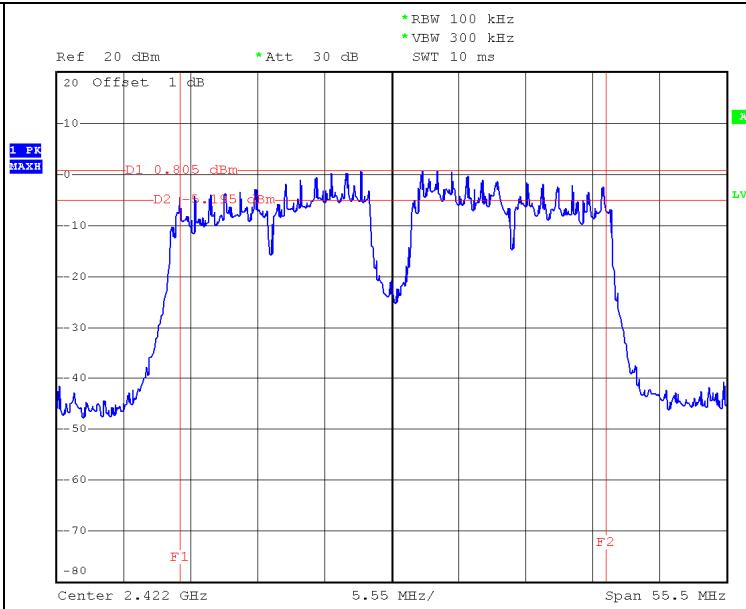
Appendix B.13: Maximum Conducted Output Power_802.11n HT40

Channel	Channel Frequency (MHz)	Maximum Conducted Output Power_ANT1 (dBm)	Maximum Conducted Output Power_ANT 3 (dBm)	Maximum Conducted Output Power_Total (dBm)	Limit(dBm)
Low Channel	2422	14.40	14.20	17.31	28.4
Middle Channel	2437	18.90	19.00	21.96	28.4
High Channel	2452	14.20	14.00	17.11	28.4

Appendix B.14: 6dB Bandwidth and 99% Bandwidth_802.11n HT40_ANT1

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2422	35.30	35.96
Middle Channel	2437	35.52	36.30
High Channel	2452	36.19	36.41

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 10:27:45

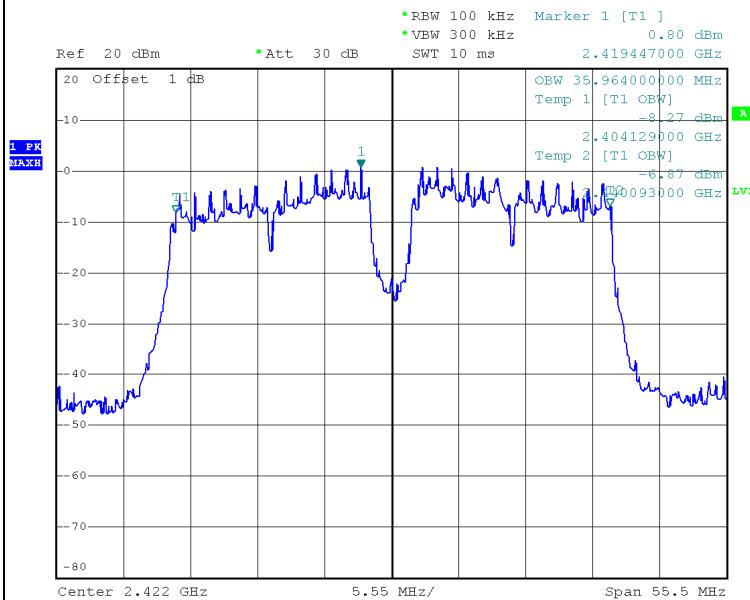
Low Channel 99% Bandwidth

Produkte

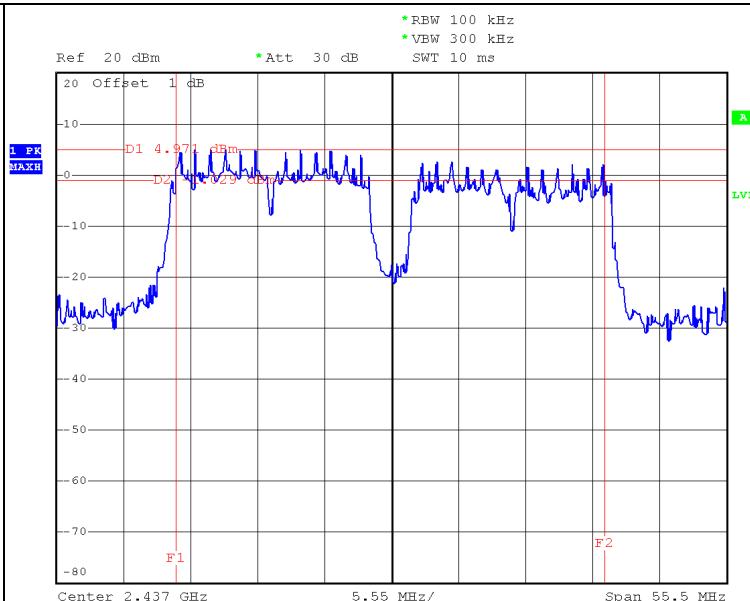
Products

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Date: 8.NOV.2014 10:27:57

Middle Channel 6dB Bandwidth

Date: 8.NOV.2014 10:30:29

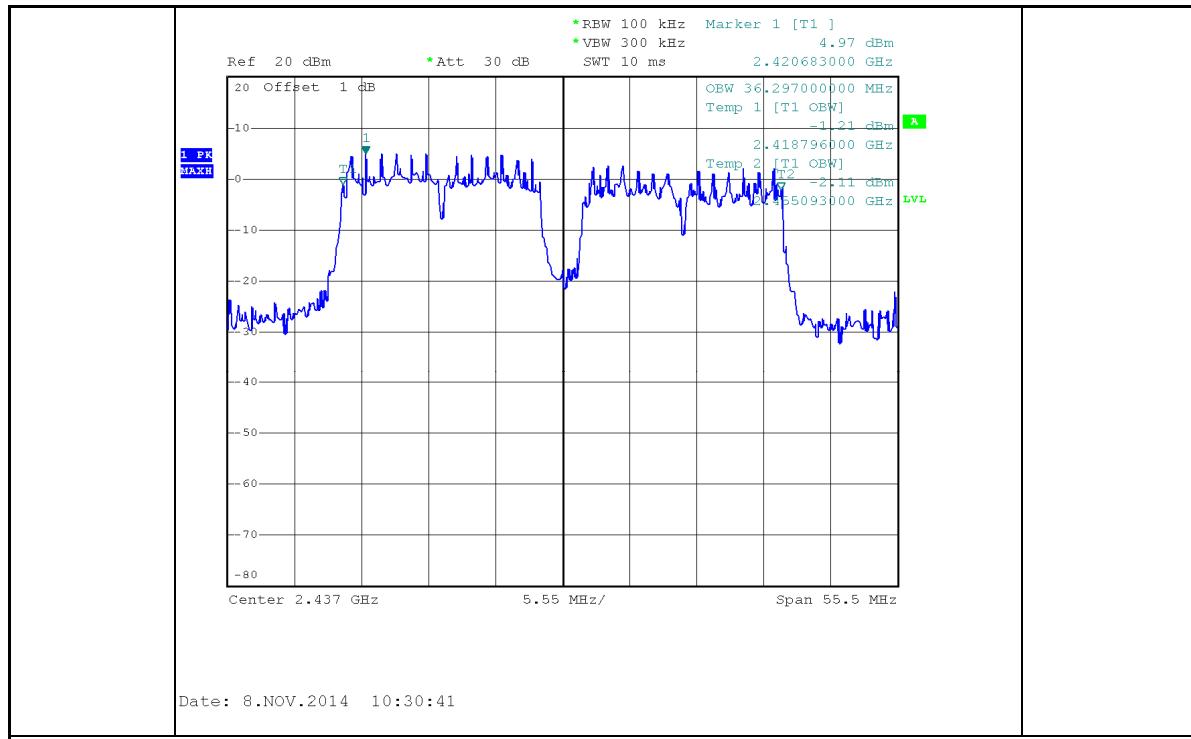
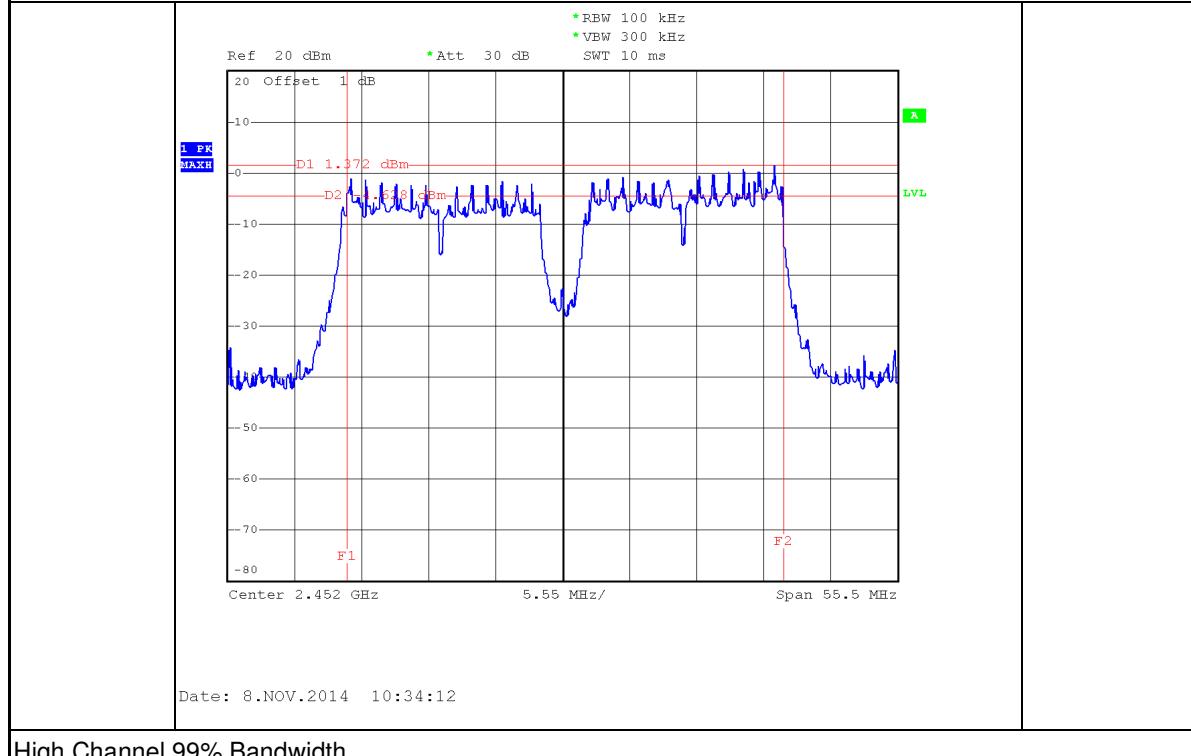
Middle Channel 99% Bandwidth

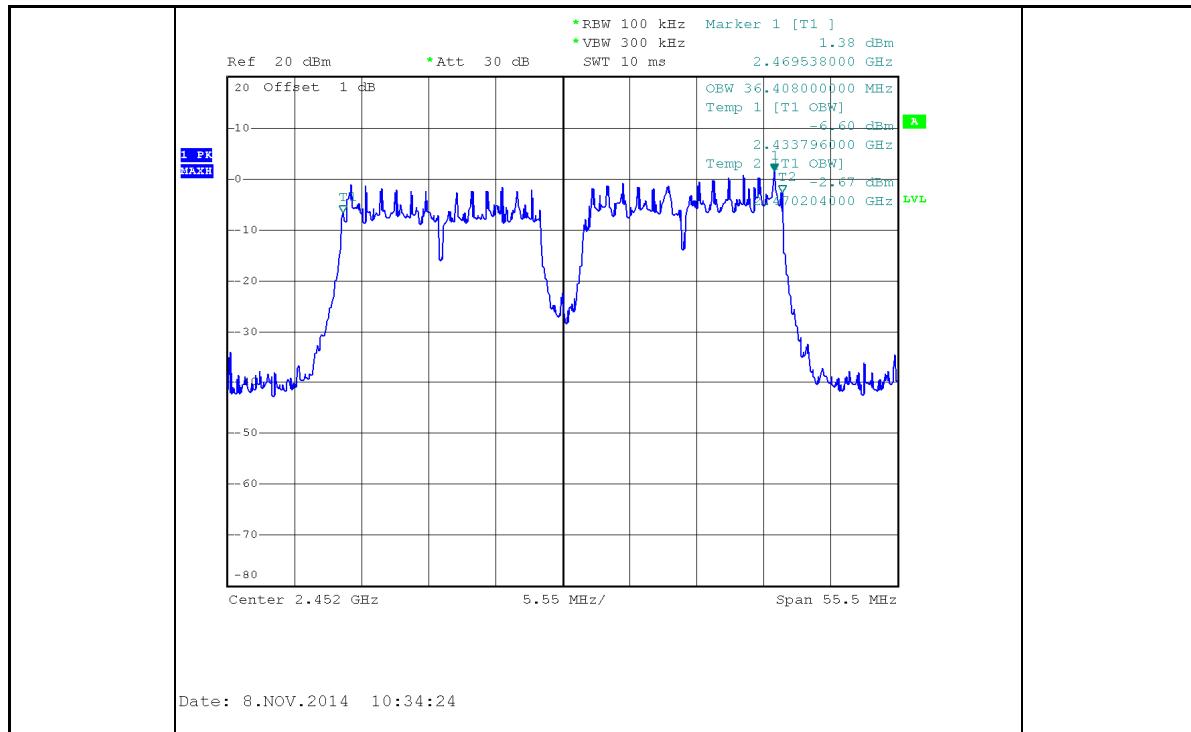
Produkte

Products

17042741 002

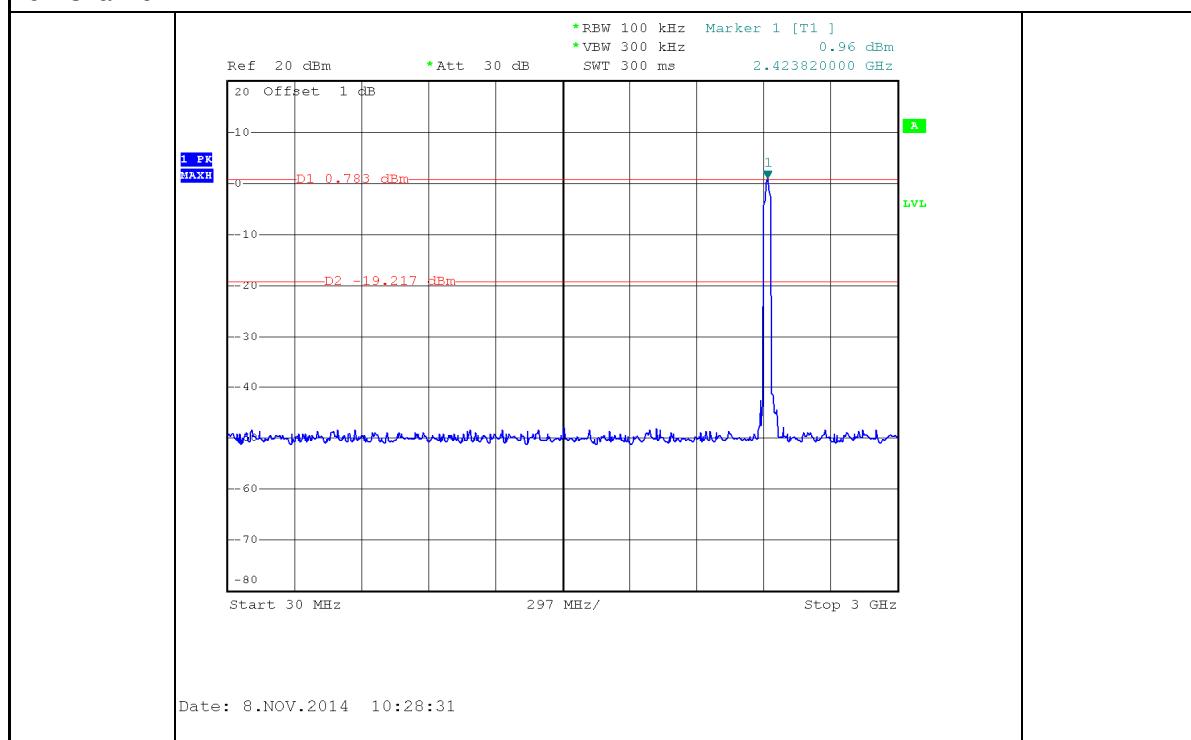
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**High Channel 6dB Bandwidth**



Appendix B.15: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT40_ANT1

Low Channel 1



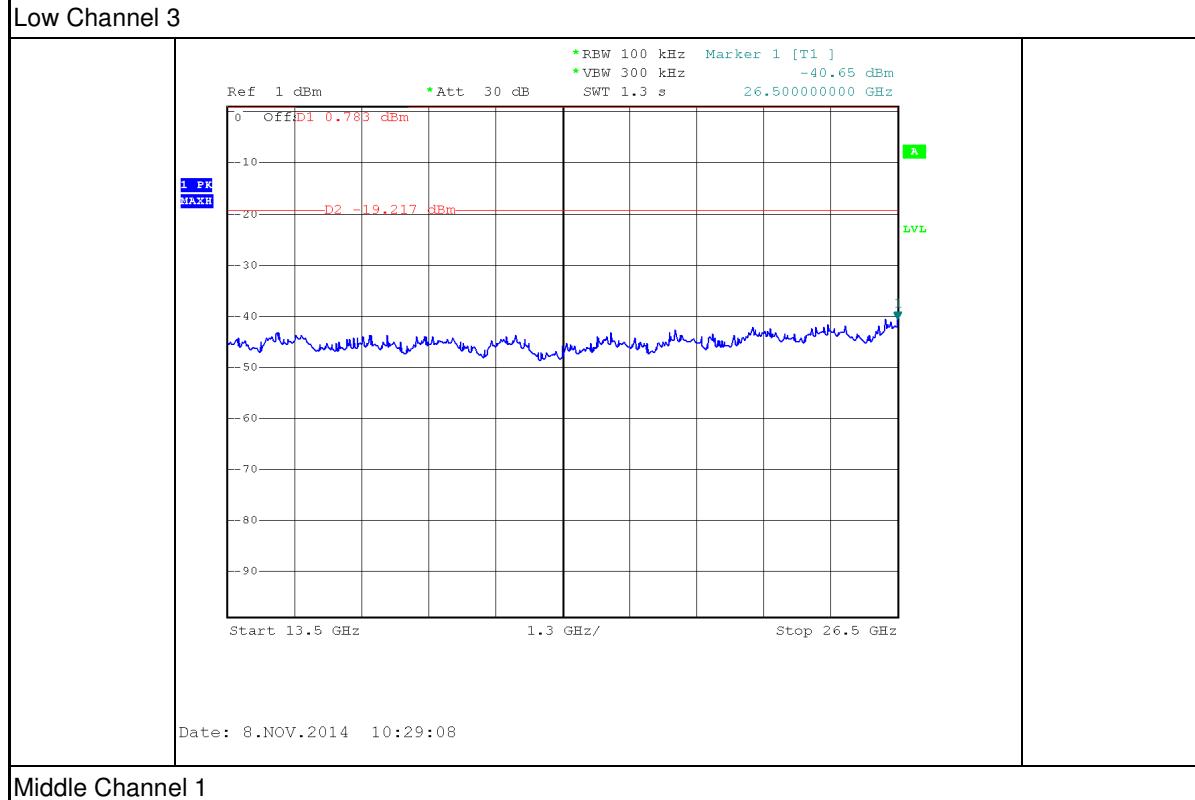
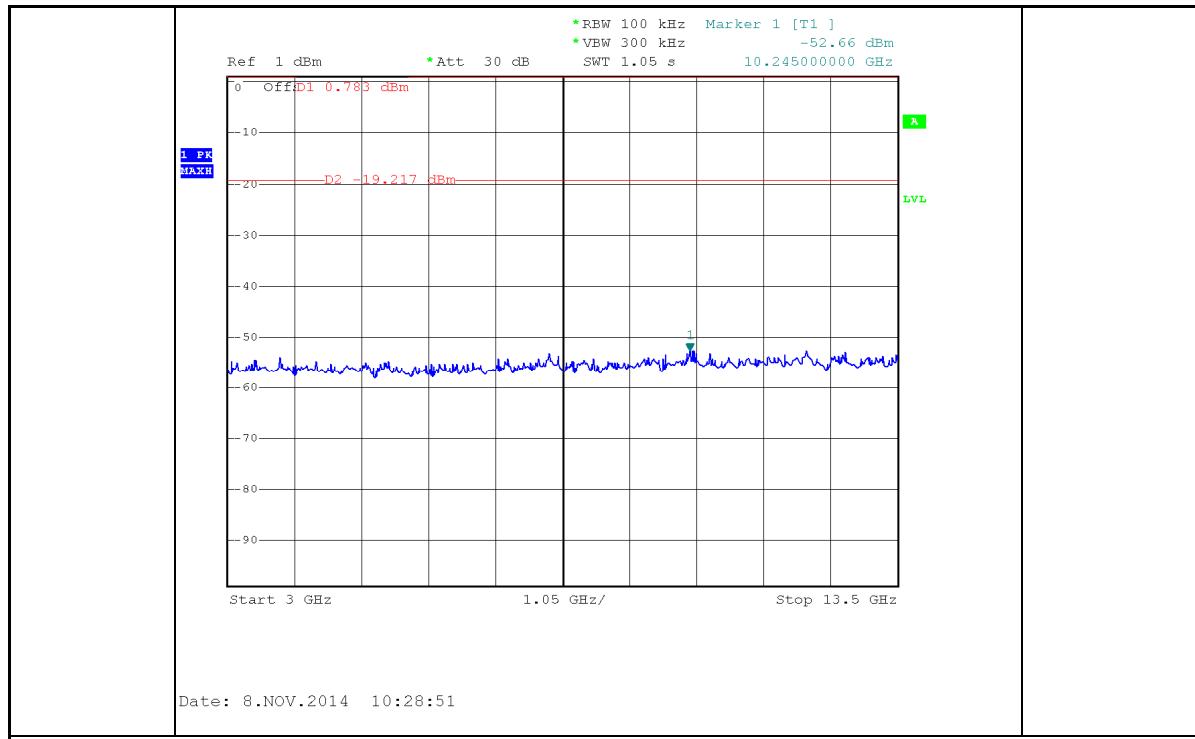
Low Channel 2

Produkte

Products

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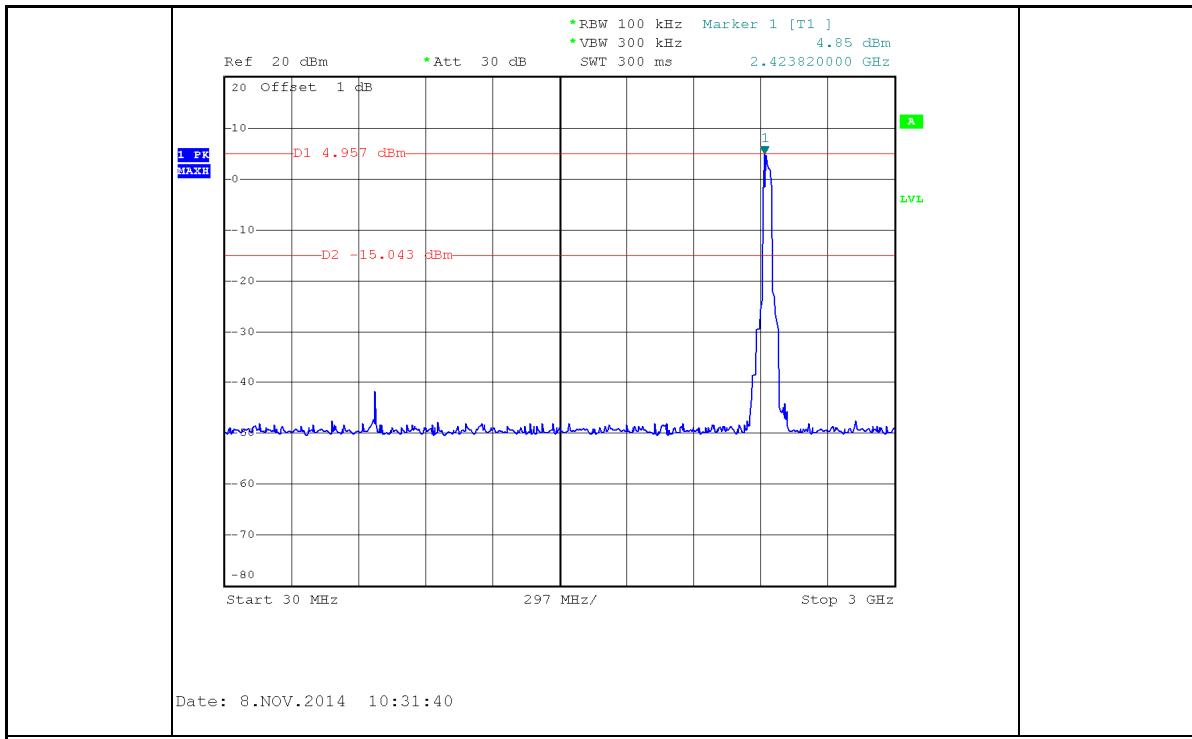
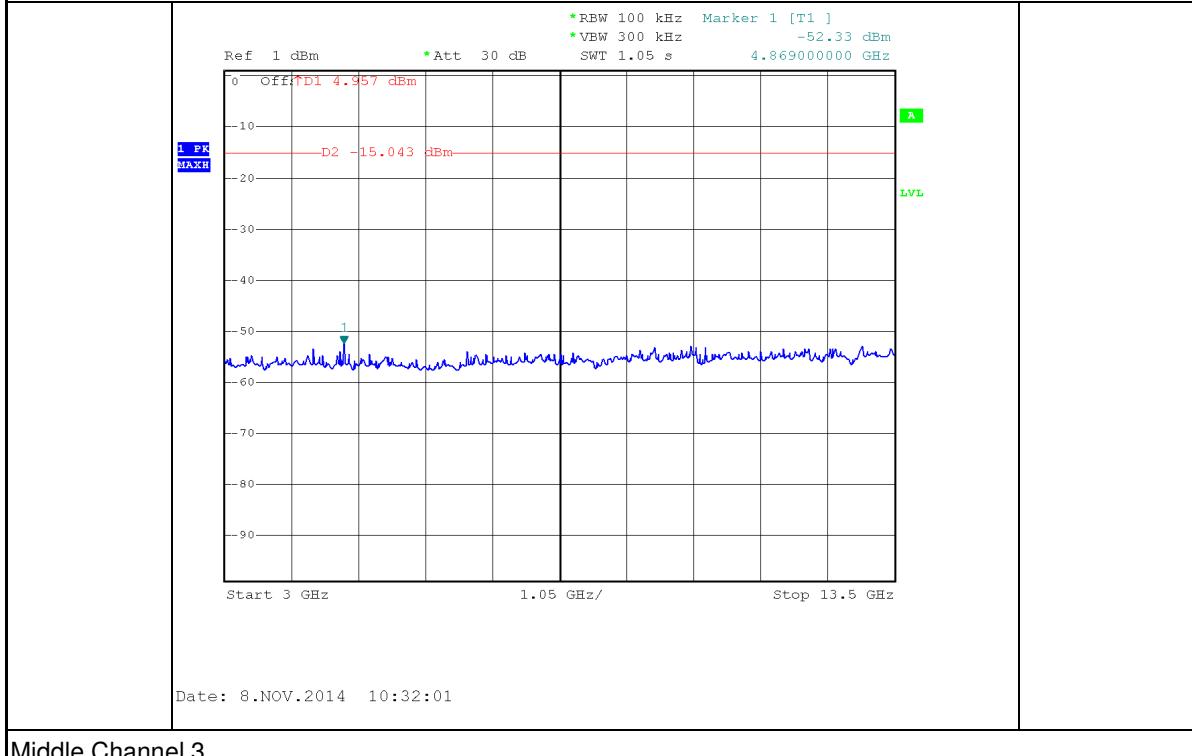


Produkte

Products

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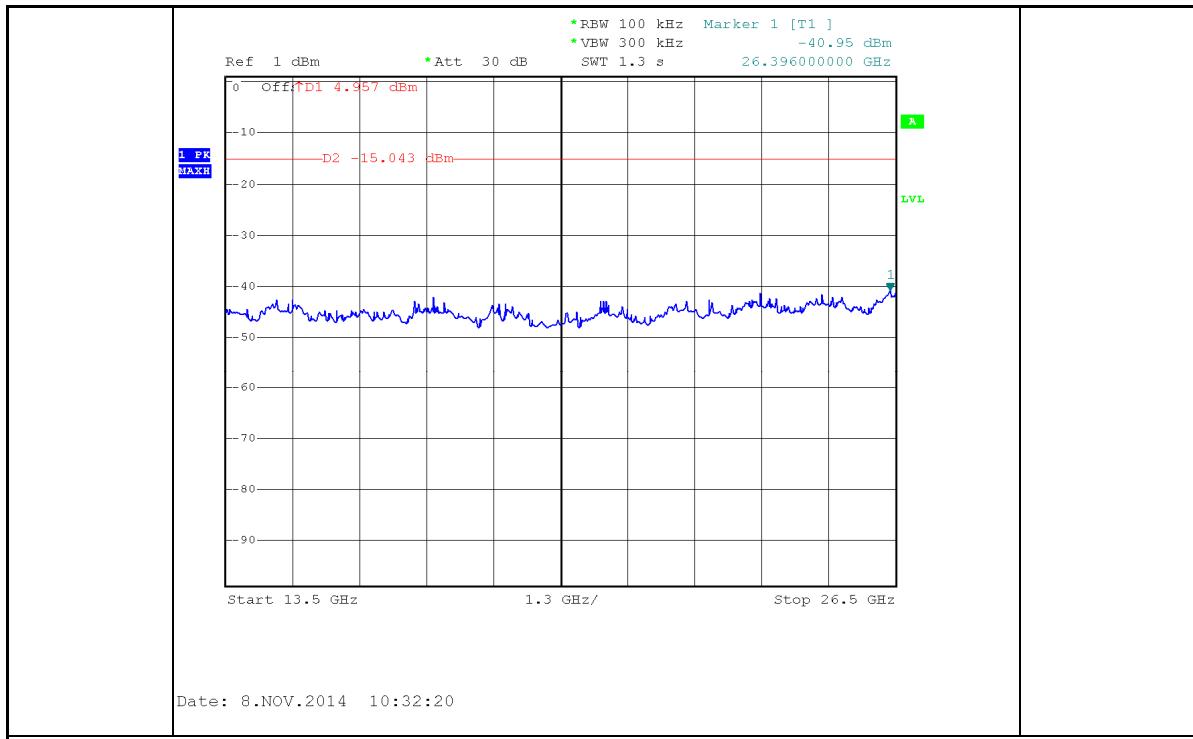
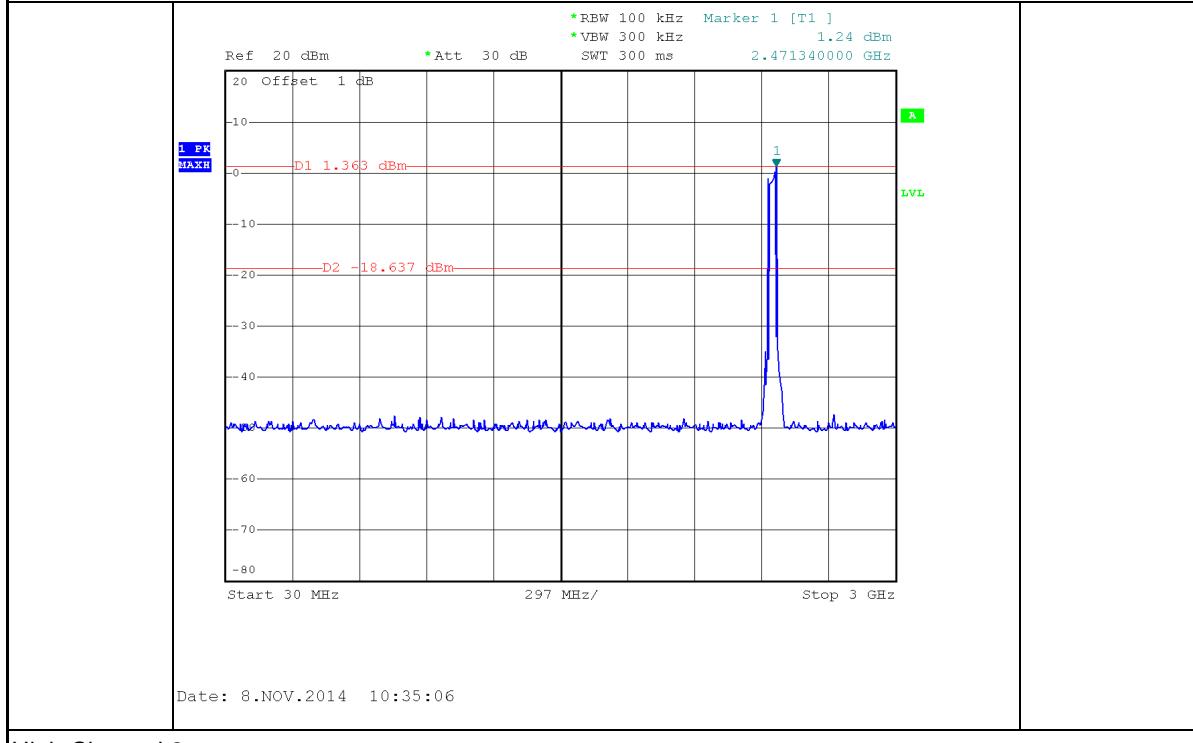
**Middle Channel 2****Middle Channel 3**

Produkte

Products

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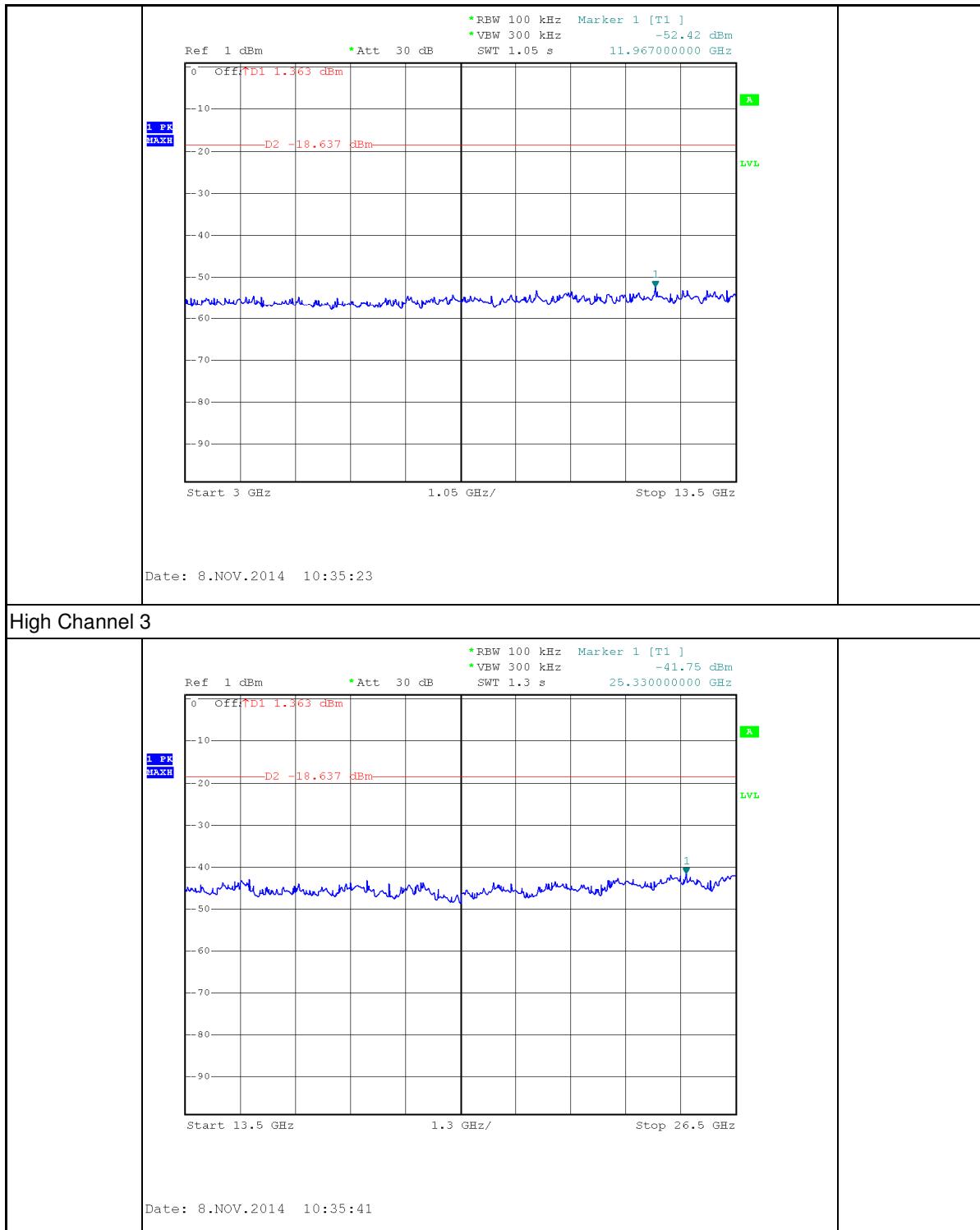
**High Channel 1**

Produkte

Products

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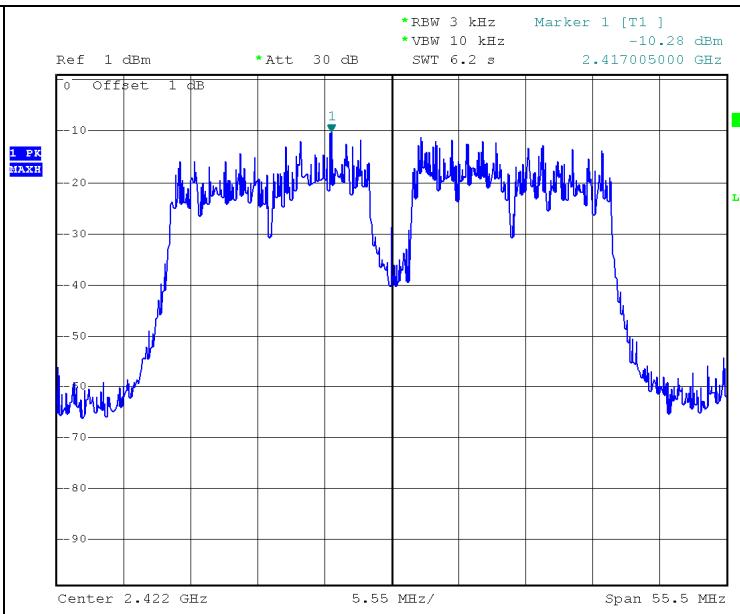


Appendix B.16: Power Spectral Density_802.11n HT40

Channel	Channel Frequency (MHz)	PSD_ANT1 (dBm/3kHz)	PSD_ANT 3 (dBm/3kHz)	PSD_Total (dBm/3kHz)	Limit (dBm/3kHz)
Low Channel	2422	-10.28	-10.66	-7.36	6.4
Middle Channel	2437	-5.21	-5.83	-2.50	6.4
High Channel	2452	-10.16	-9.54	-6.83	6.4

Power Spectral Density_AN1

2422 MHz



Date: 8.NOV.2014 10:29:33

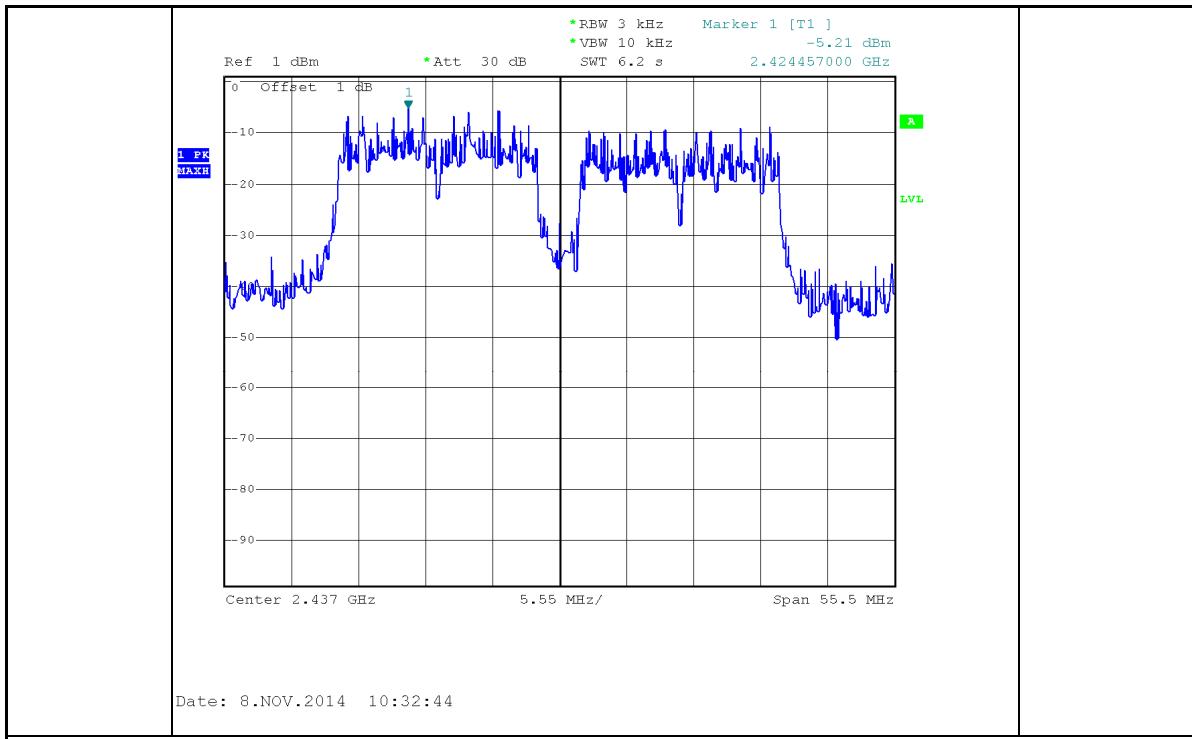
2437 MHz

Produkte

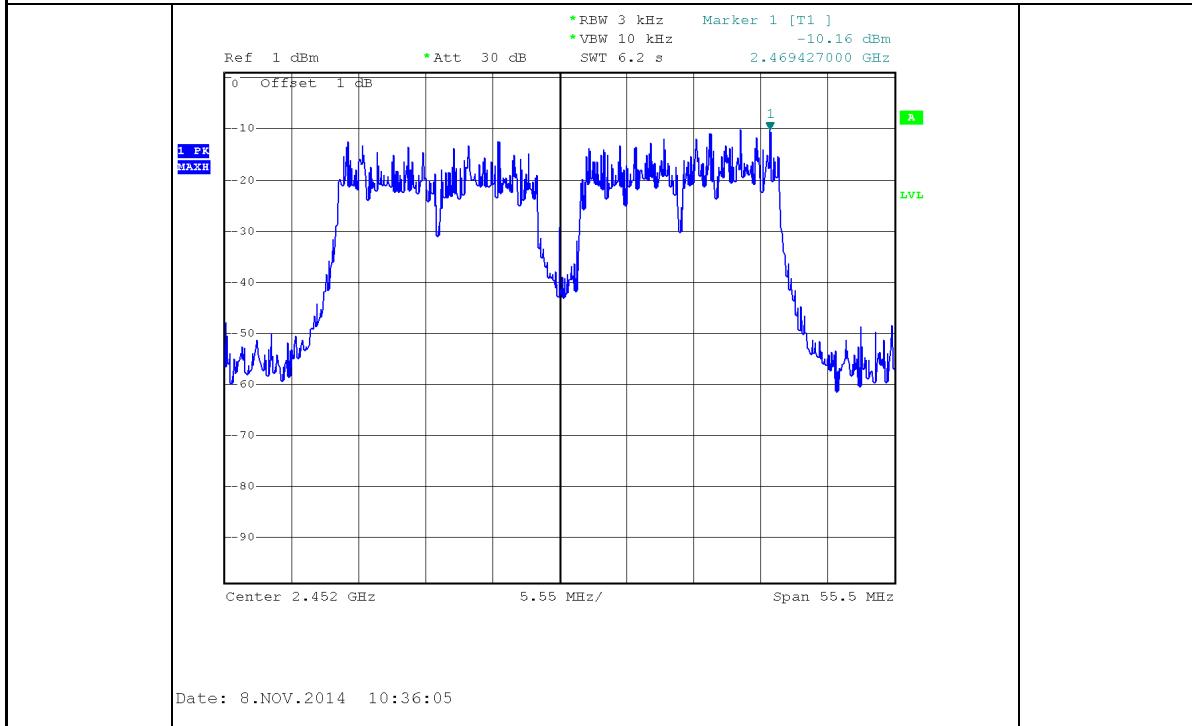
Products

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2452 MHz



Power Spectral Density_AN3

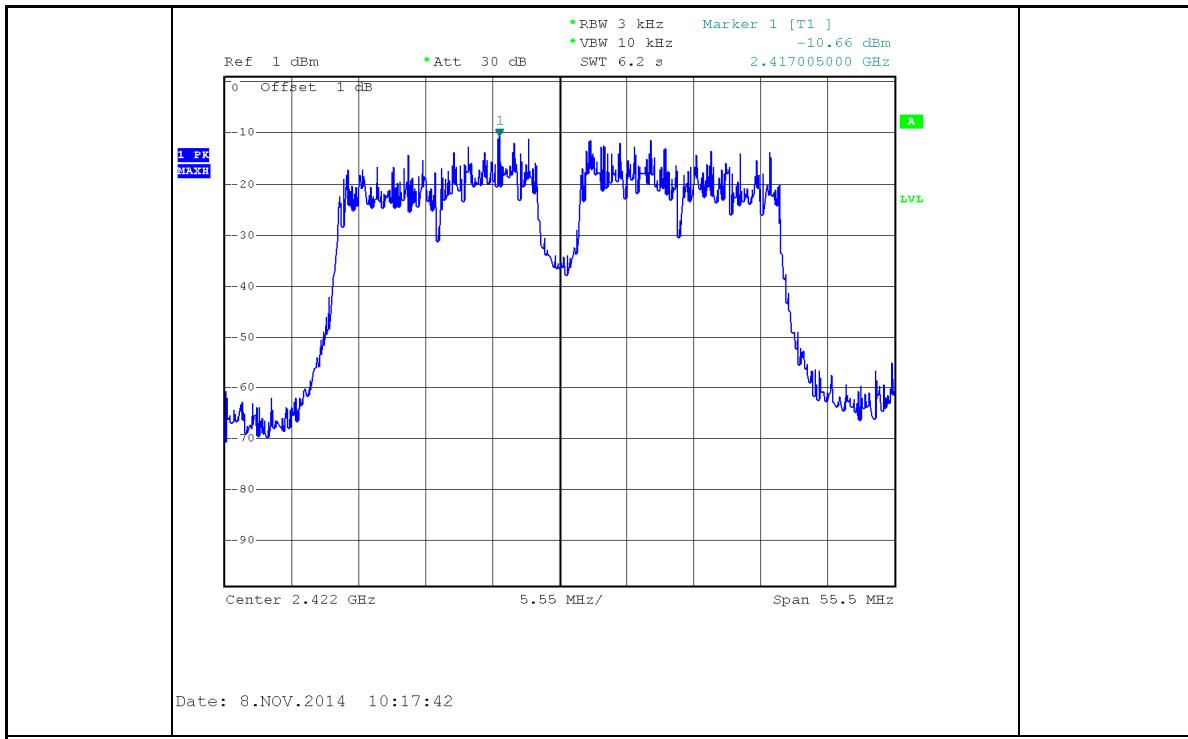
2422 MHz

Produkte

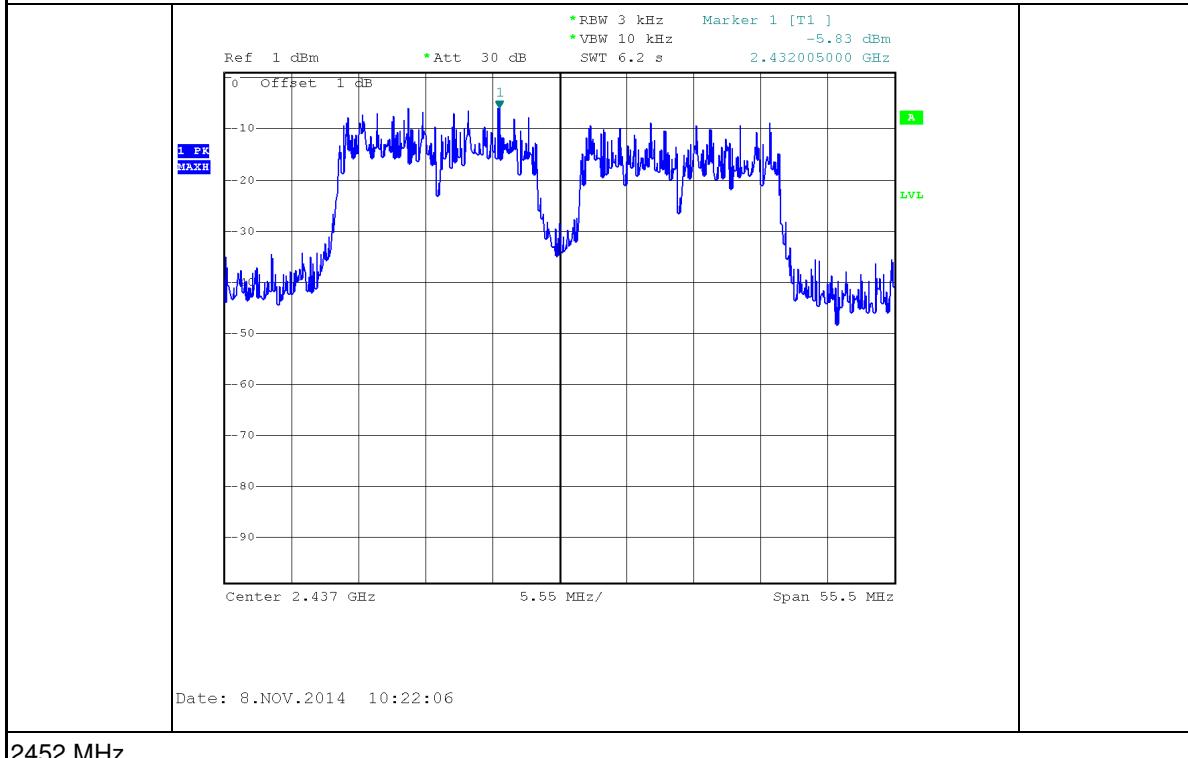
Products

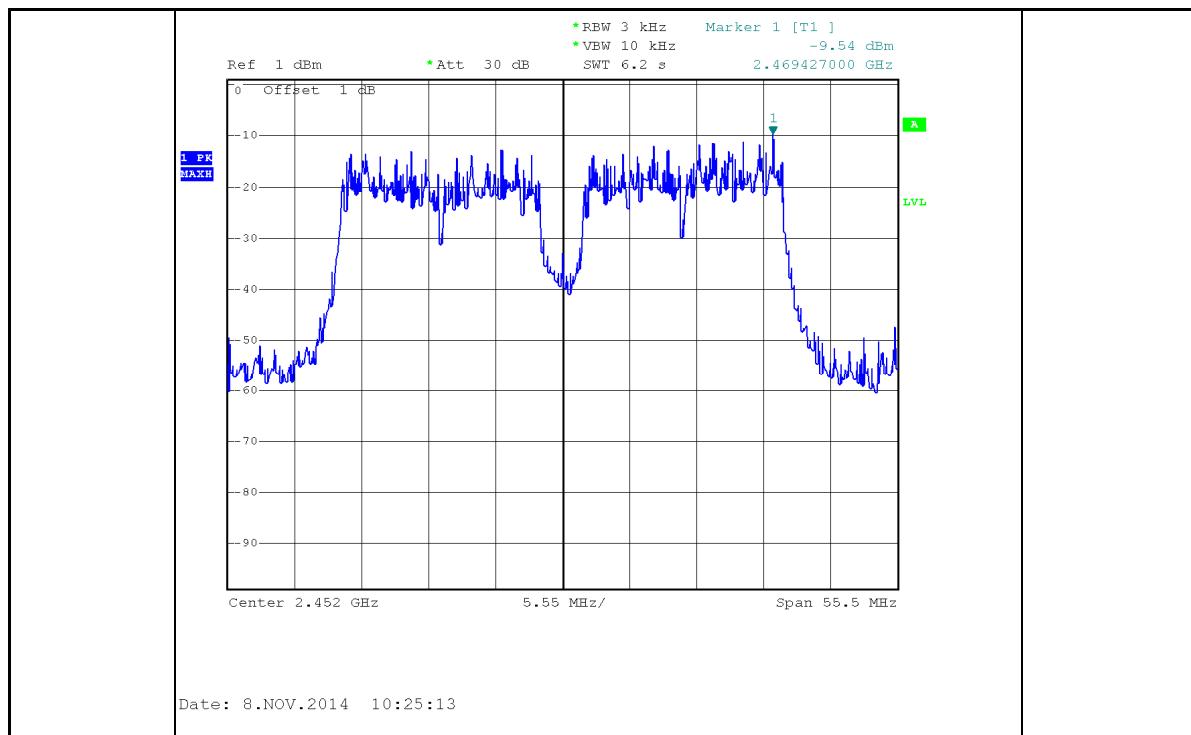
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2437 MHz

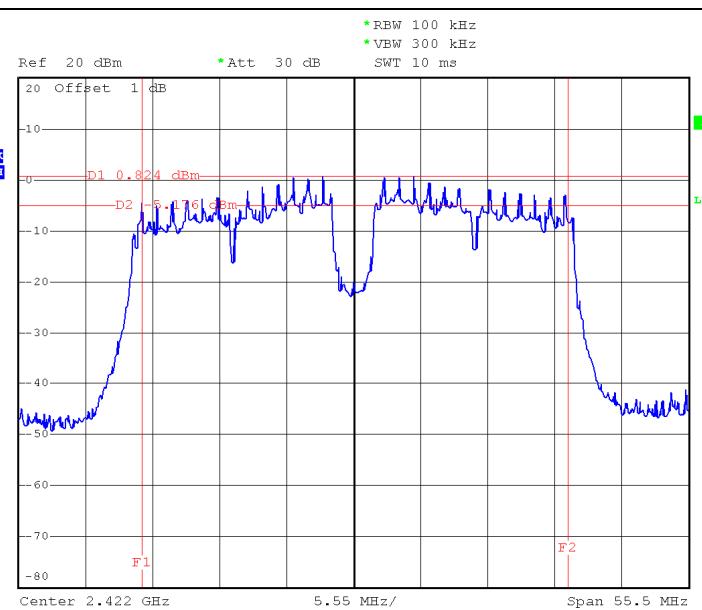




Appendix B.17: 6dB Bandwidth and 99% Bandwidth_802.11n HT40_ANT3

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2422	35.30	35.96
Middle Channel	2437	35.52	36.30
High Channel	2452	35.96	36.41

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 10:15:33

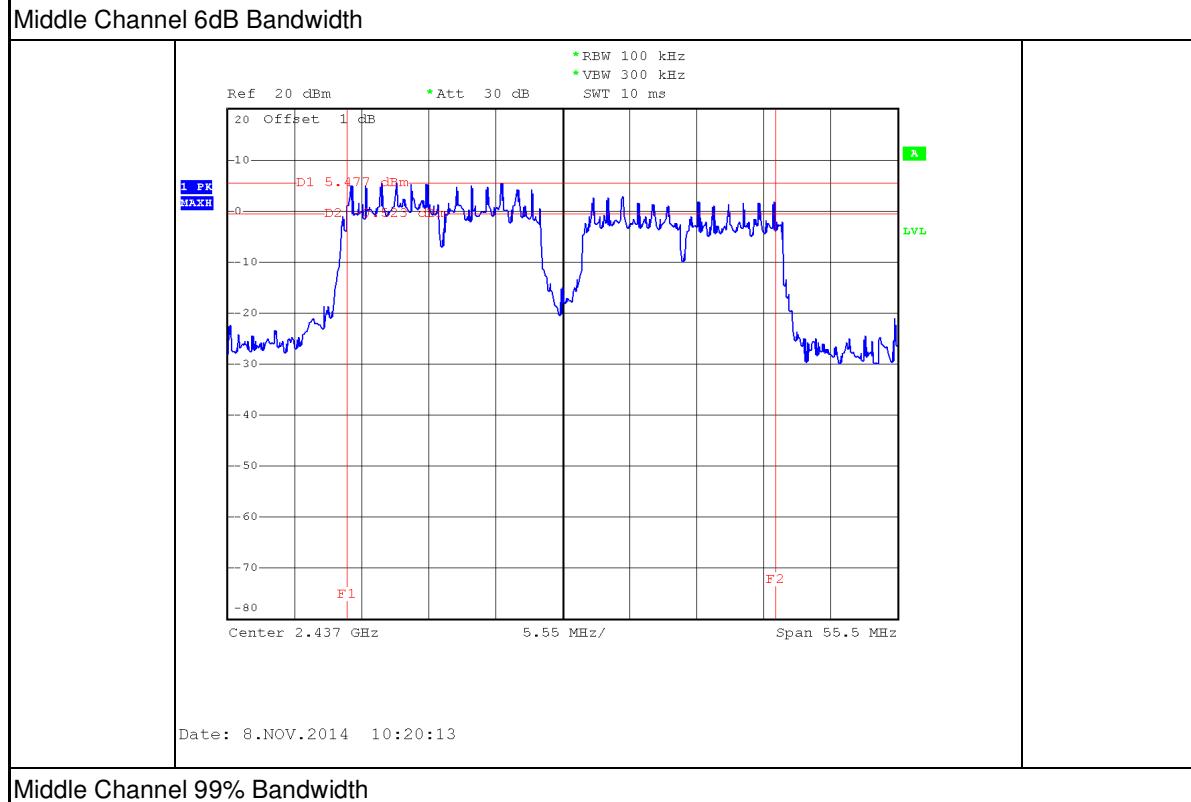
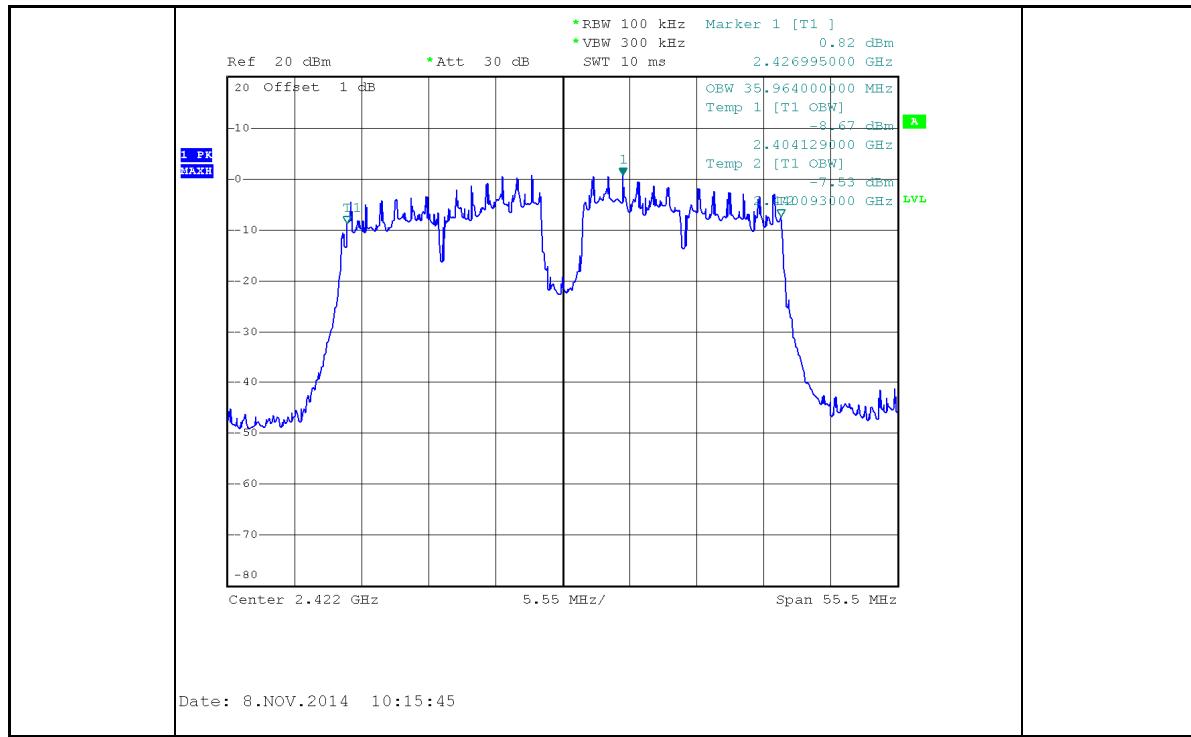
Low Channel 99% Bandwidth

Produkte

Products

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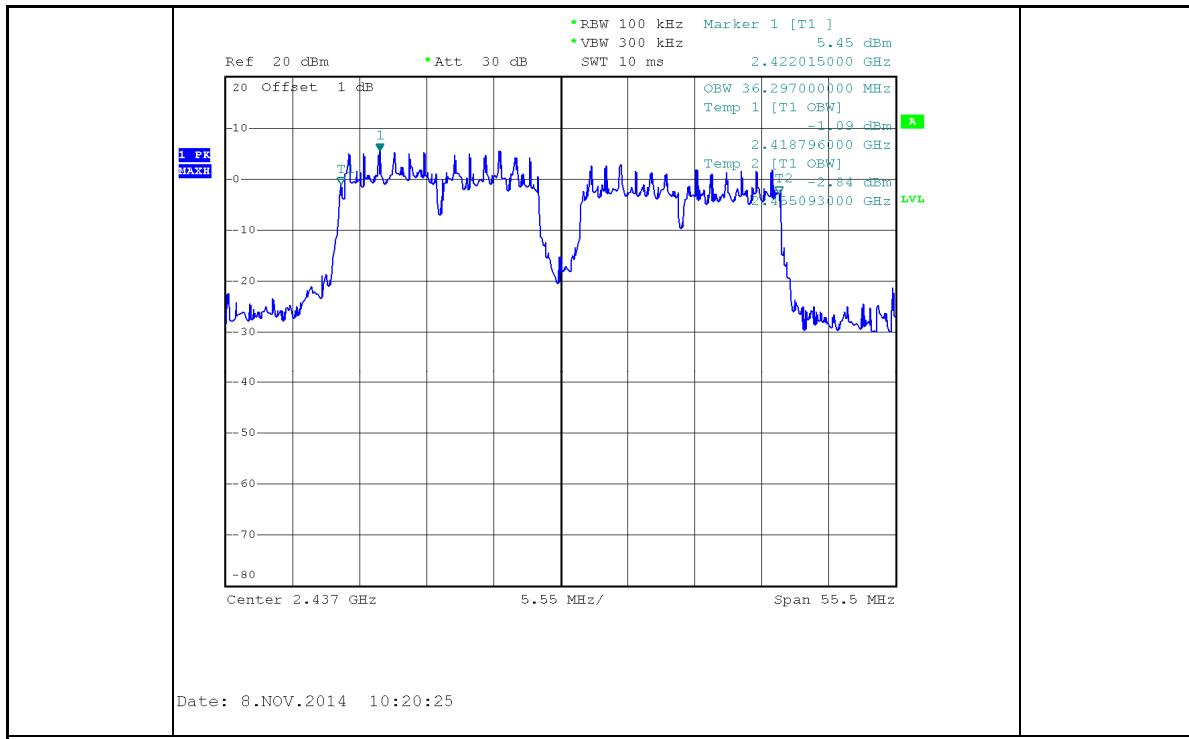
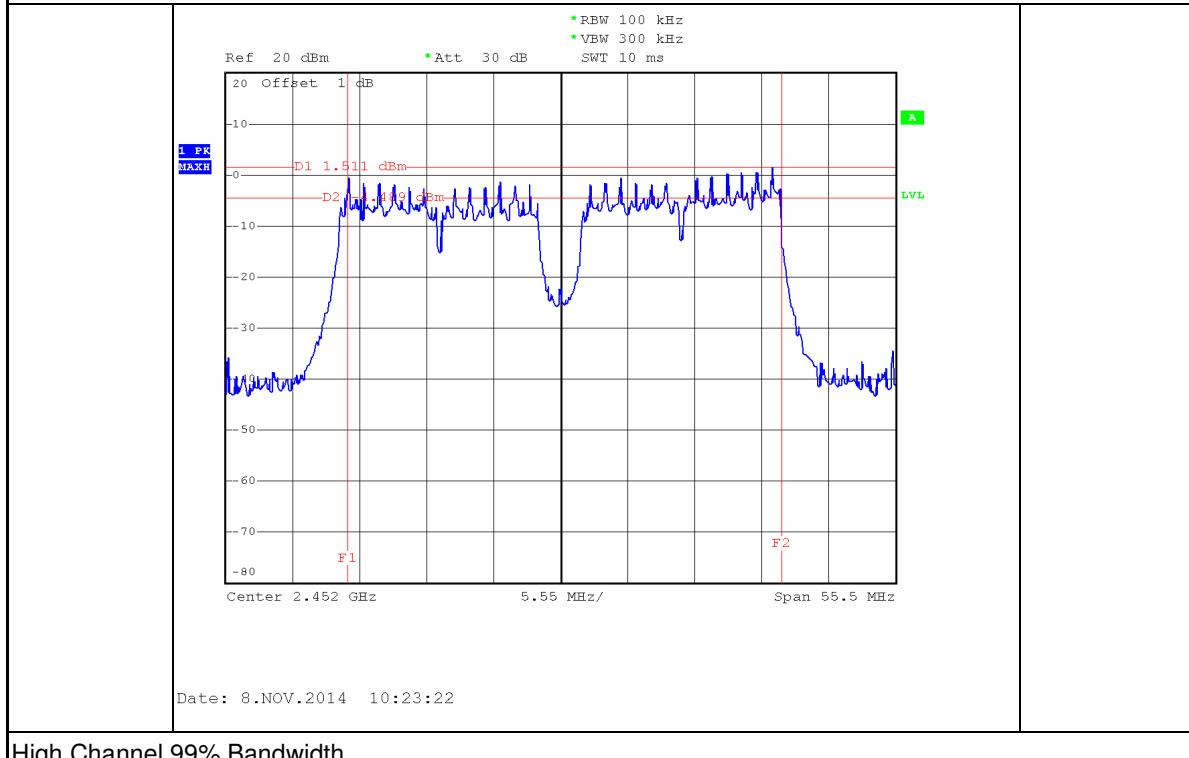


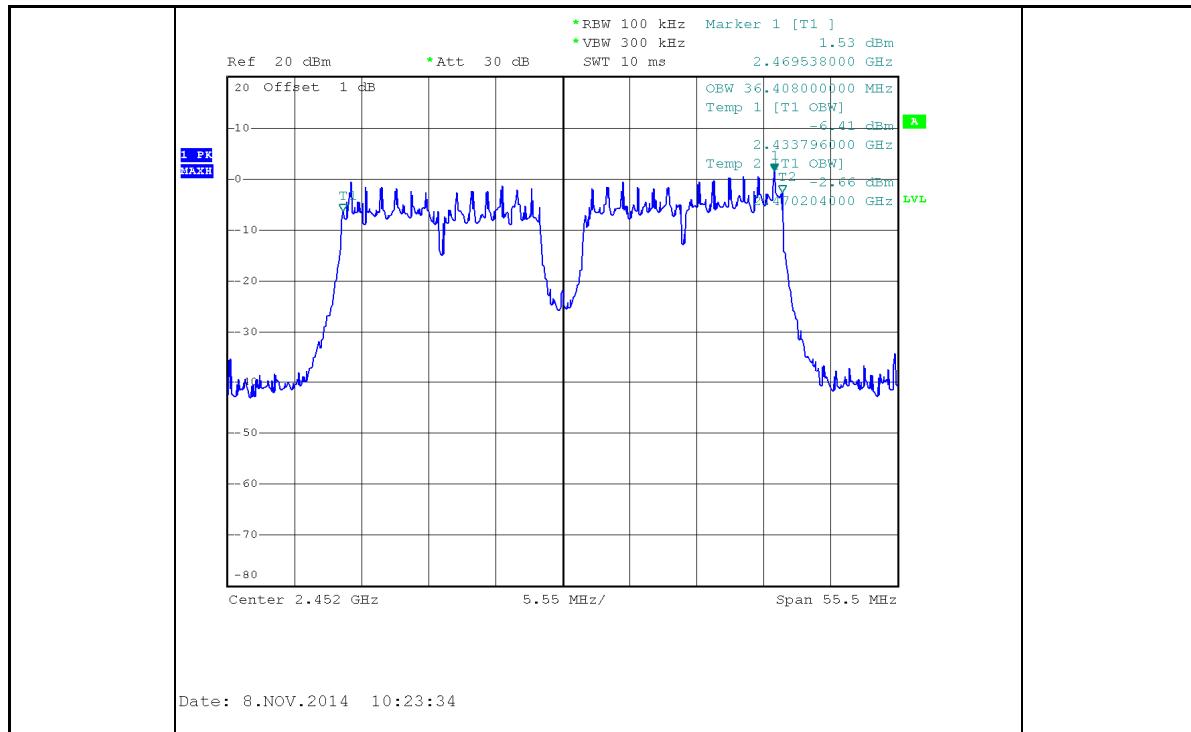
Produkte

Products

17042741 002

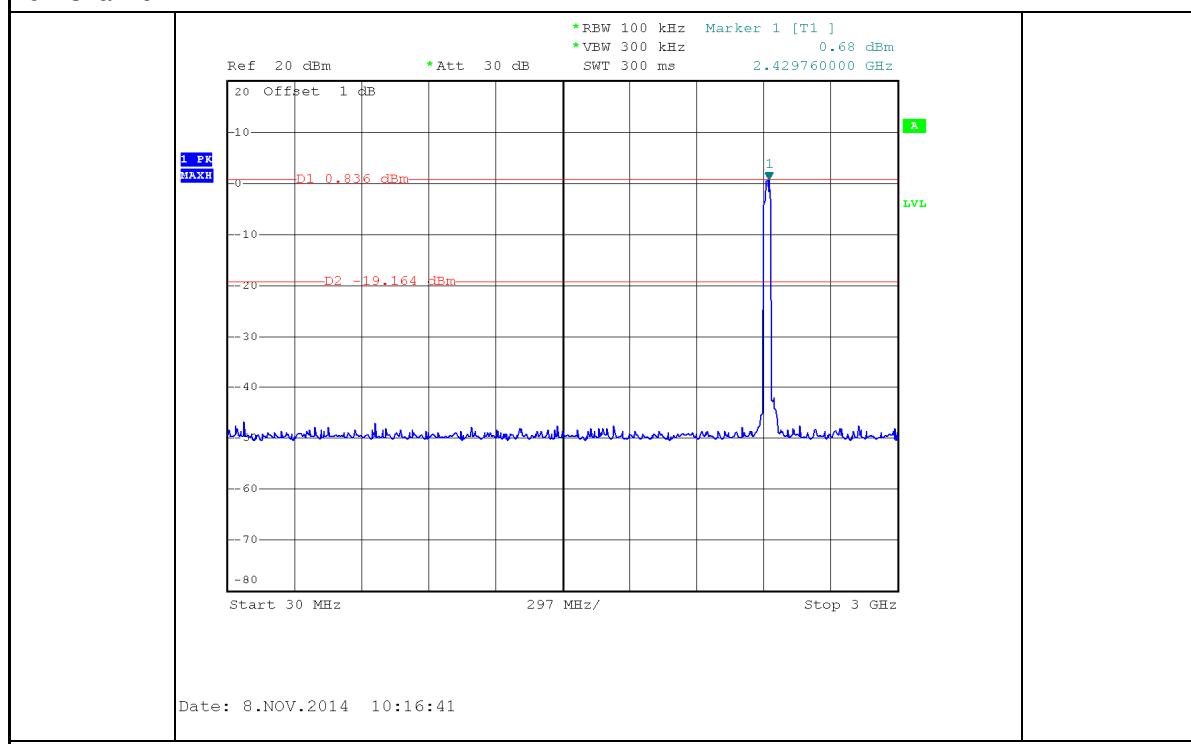
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**High Channel 6dB Bandwidth**



Appendix B.18: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT40_ANT3

Low Channel 1



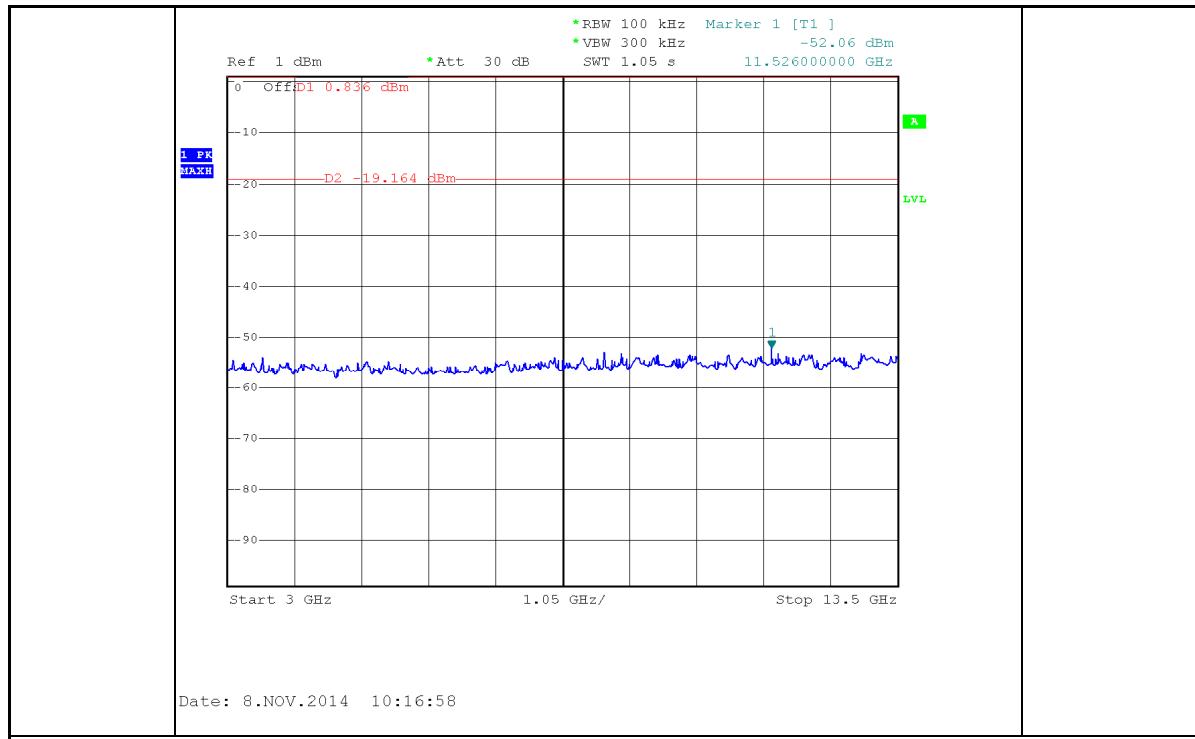
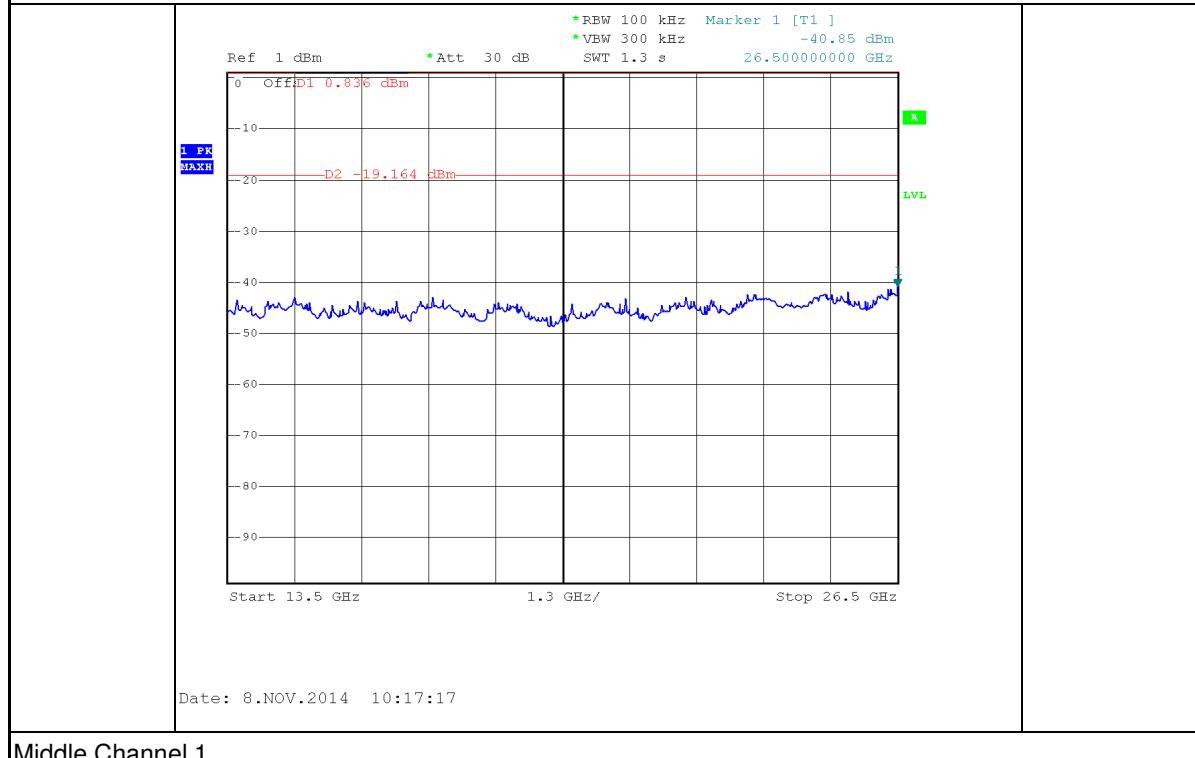
Low Channel 2

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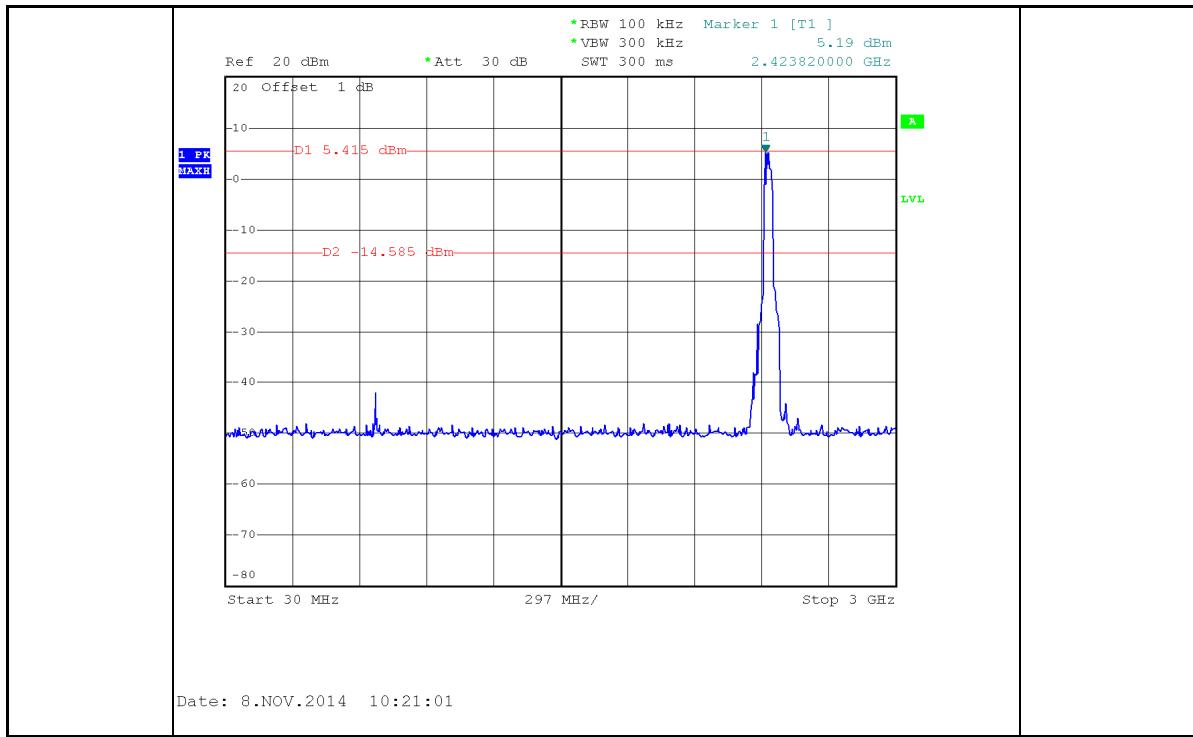
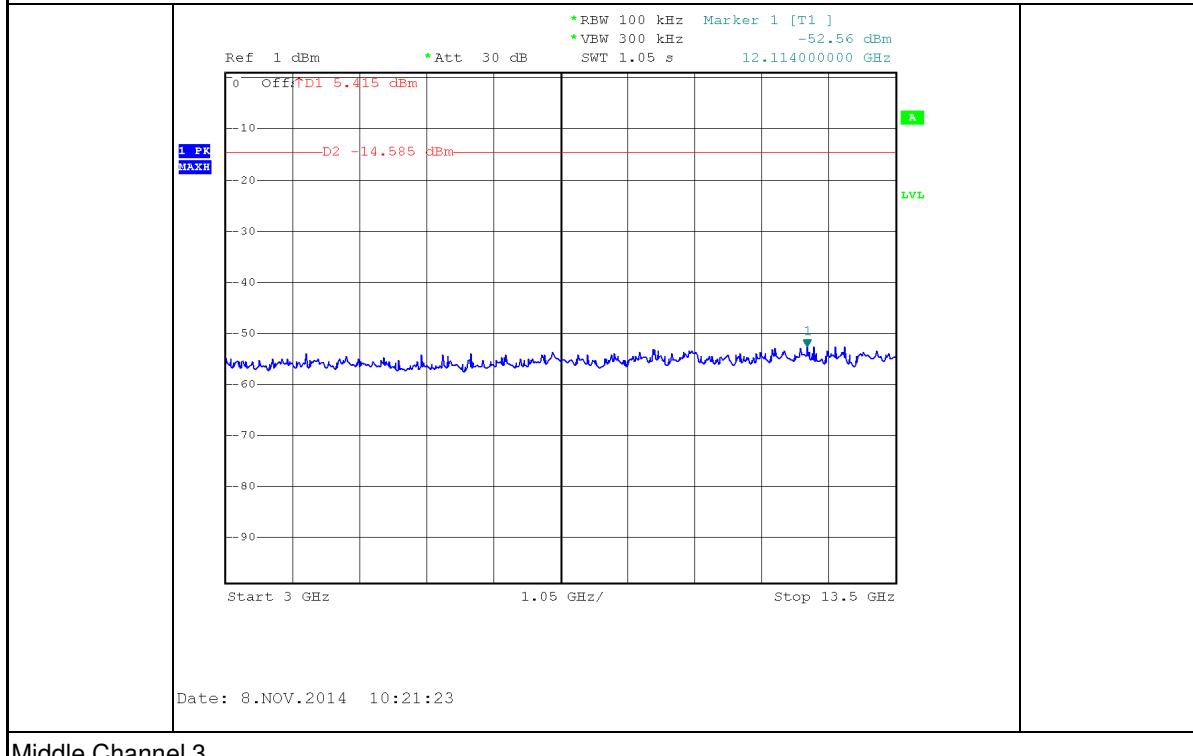
**Low Channel 3****Middle Channel 1**

Produkte

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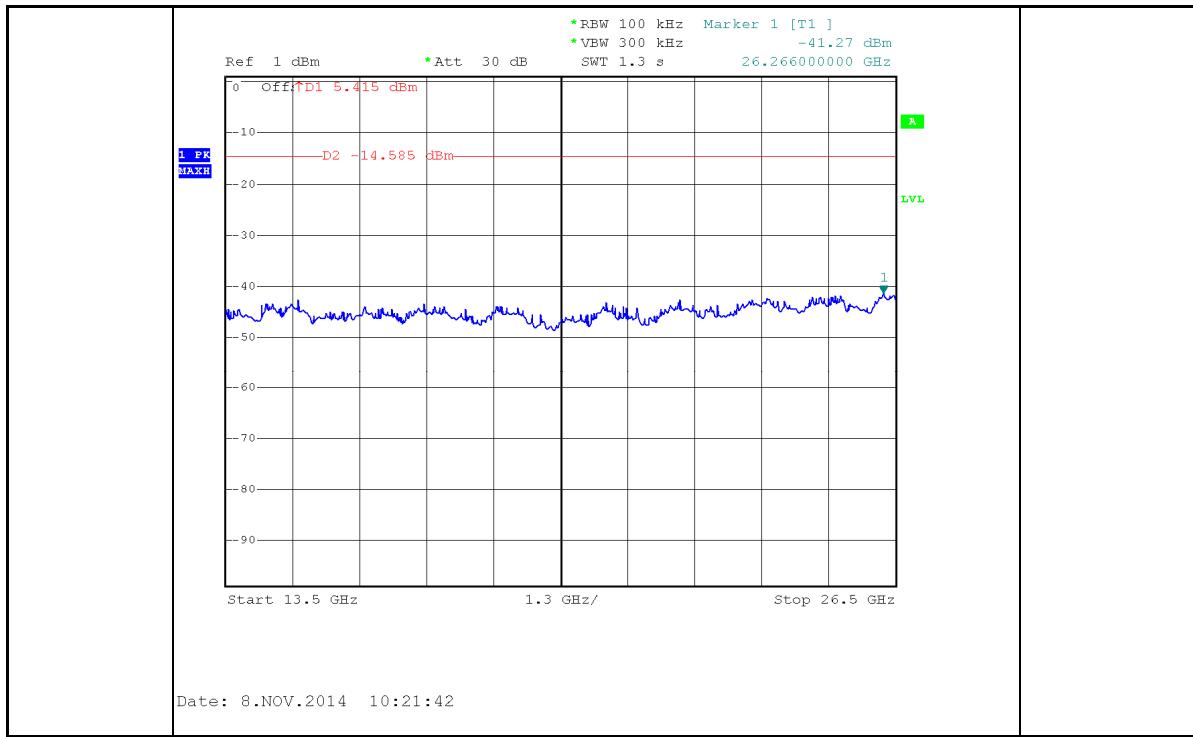
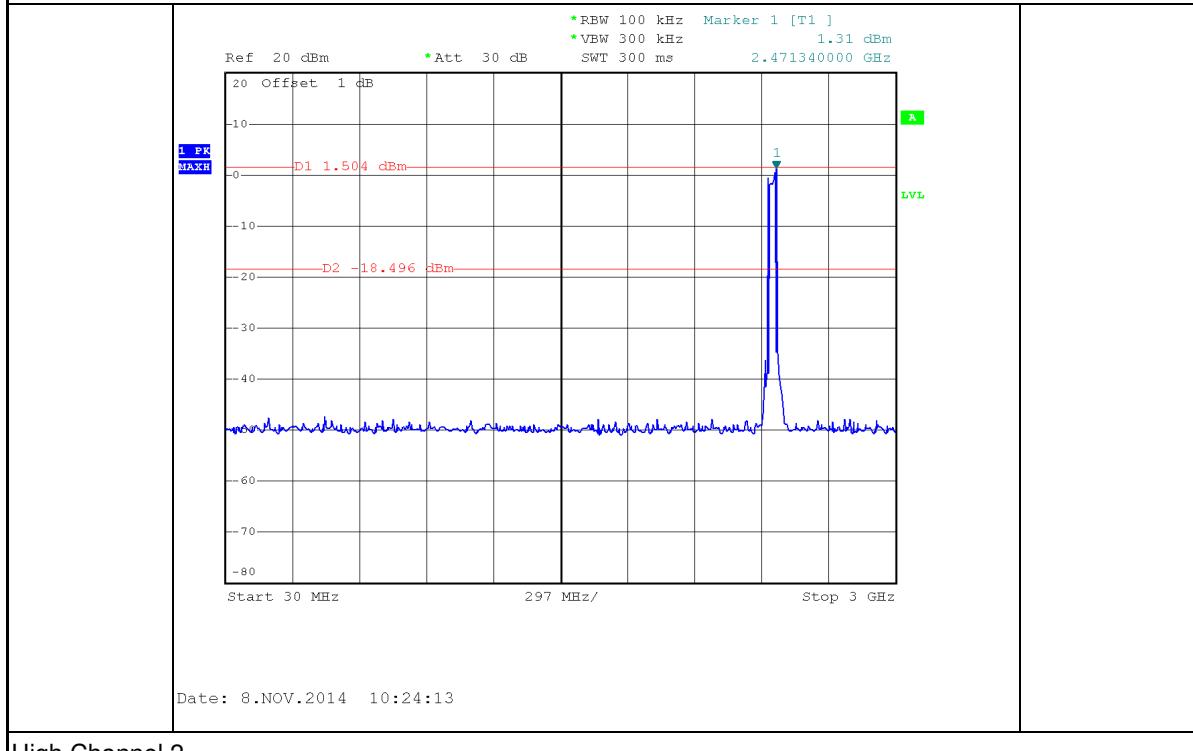
**Middle Channel 2**

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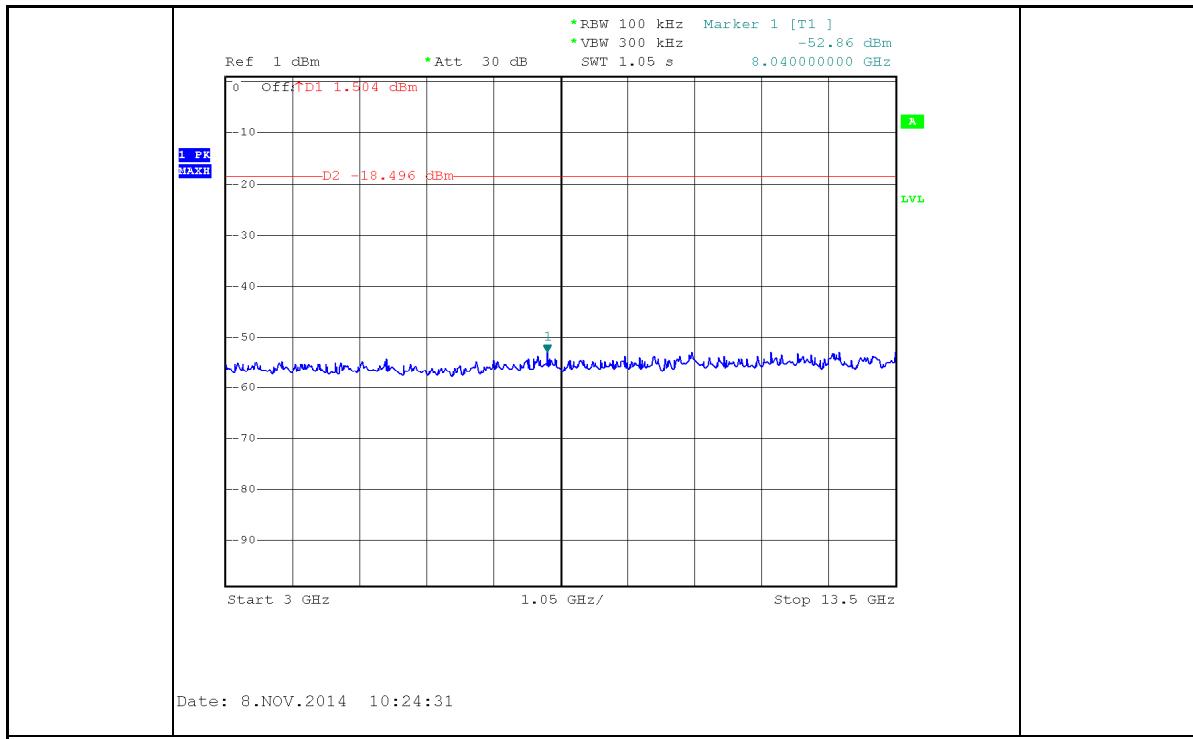
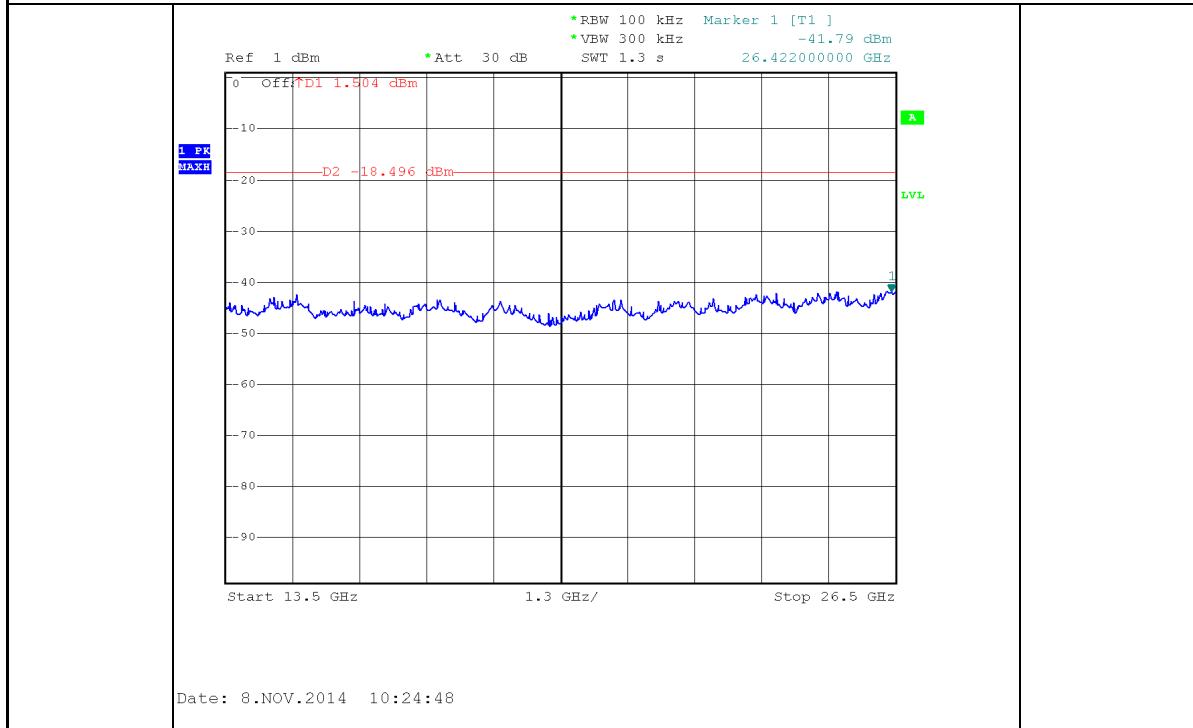
**High Channel 1**

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**High Channel 3**

Appendix C

Test Results of 3TX-Non Beamforming

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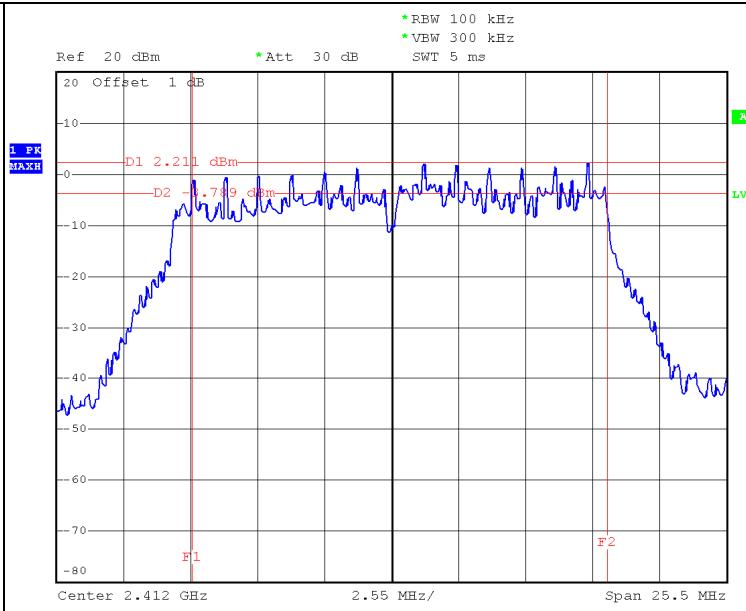
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Appendix C.1: Maximum Conducted Output Power 802.11g

Channel	Channel Frequency (MHz)	Maximum Conducted Output Power_ANT1 (dBm)	Maximum Conducted Output Power_ANT2 (dBm)	Maximum Conducted Output Power_ANT 3 (dBm)	Maximum Conducted Output Power_Total (dBm)	Limit(dBm)
Low Channel	2412	13.30	13.20	13.20	18.00	26.6
Middle Channel	2437	18.30	18.30	18.40	23.10	26.6
High Channel	2462	13.50	13.40	13.40	18.20	26.6

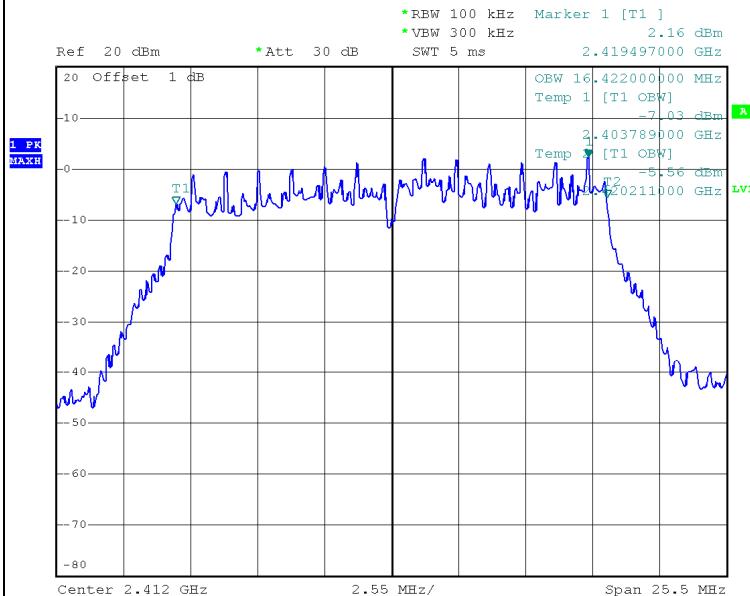
Appendix C.2: 6dB Bandwidth and 99% Bandwidth 802.11g_ANT1

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.81	16.42
Middle Channel	2437	15.76	16.52
High Channel	2462	15.81	16.47

Low Channel 6dB Bandwidth

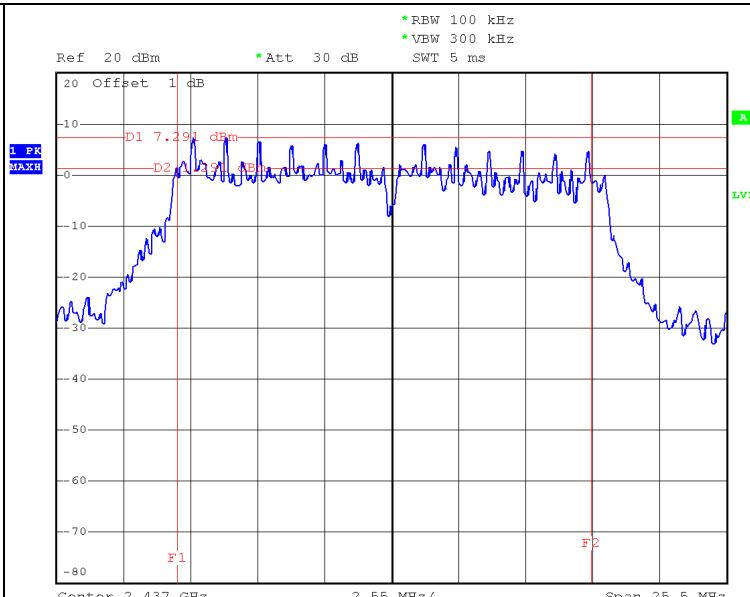
Date: 8.NOV.2014 12:52:24

Low Channel 99% Bandwidth



Date: 8.NOV.2014 12:52:36

Middle Channel 6dB Bandwidth



Date: 8.NOV.2014 12:55:55

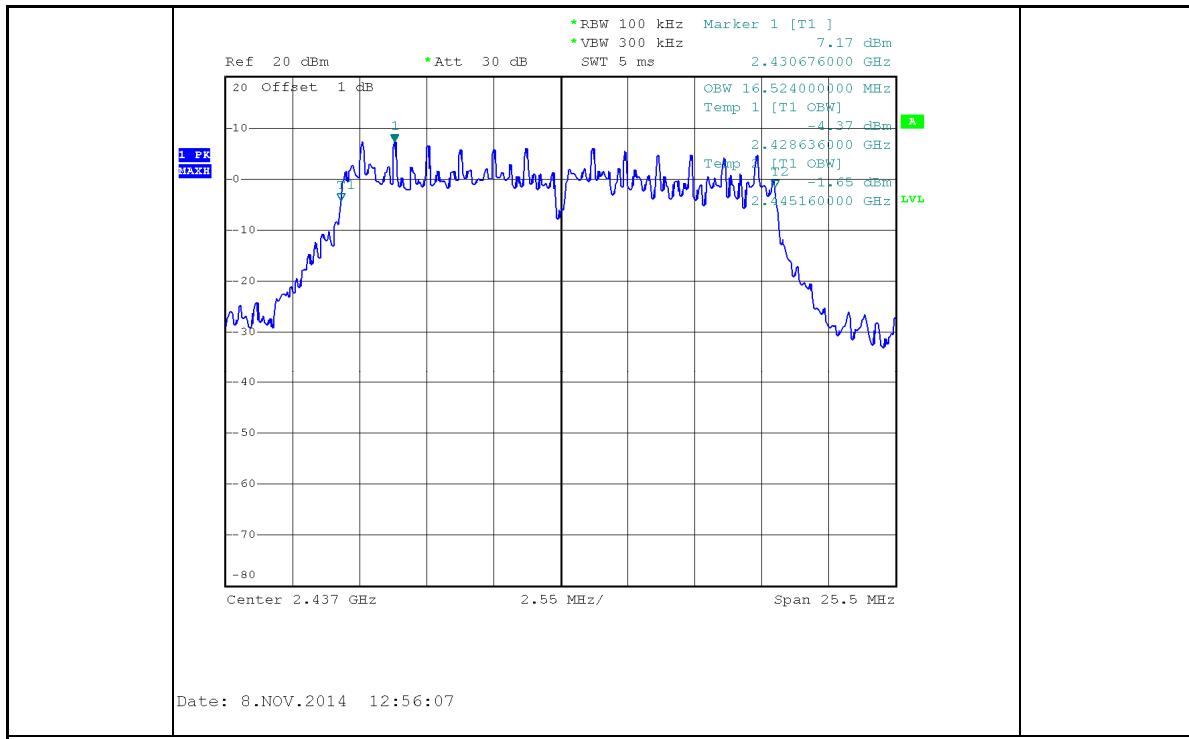
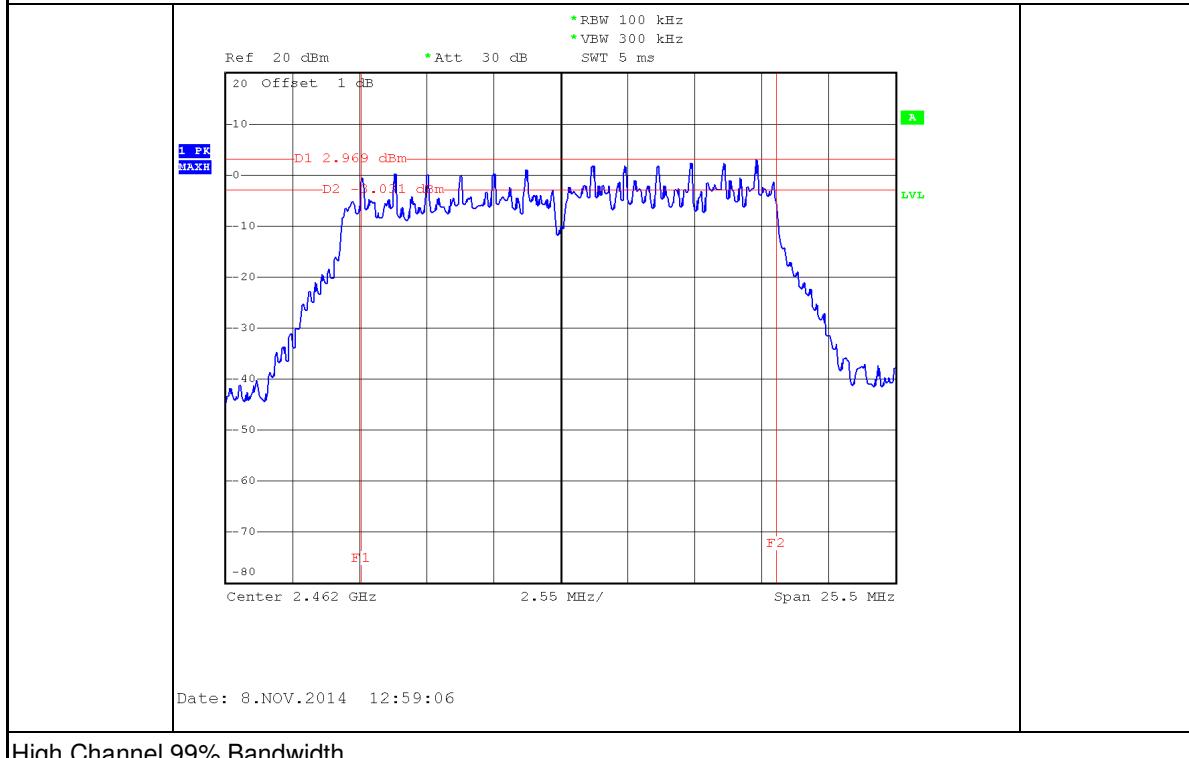
Middle Channel 99% Bandwidth

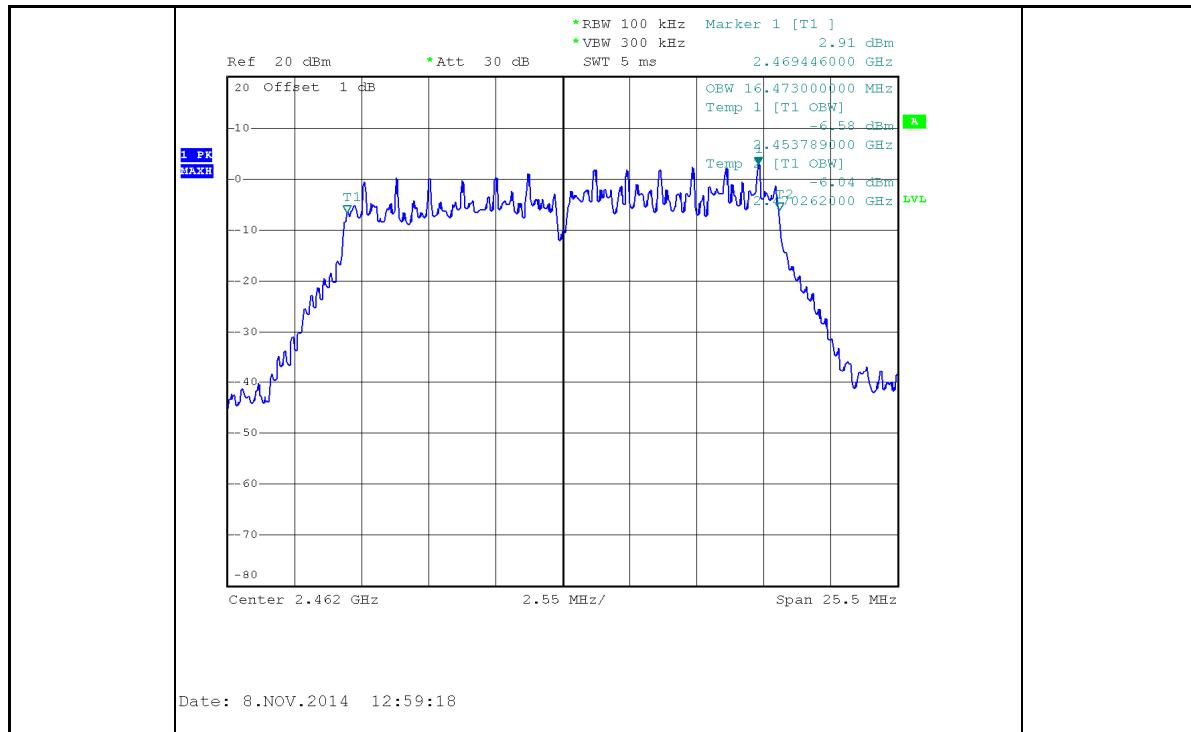
Produkte

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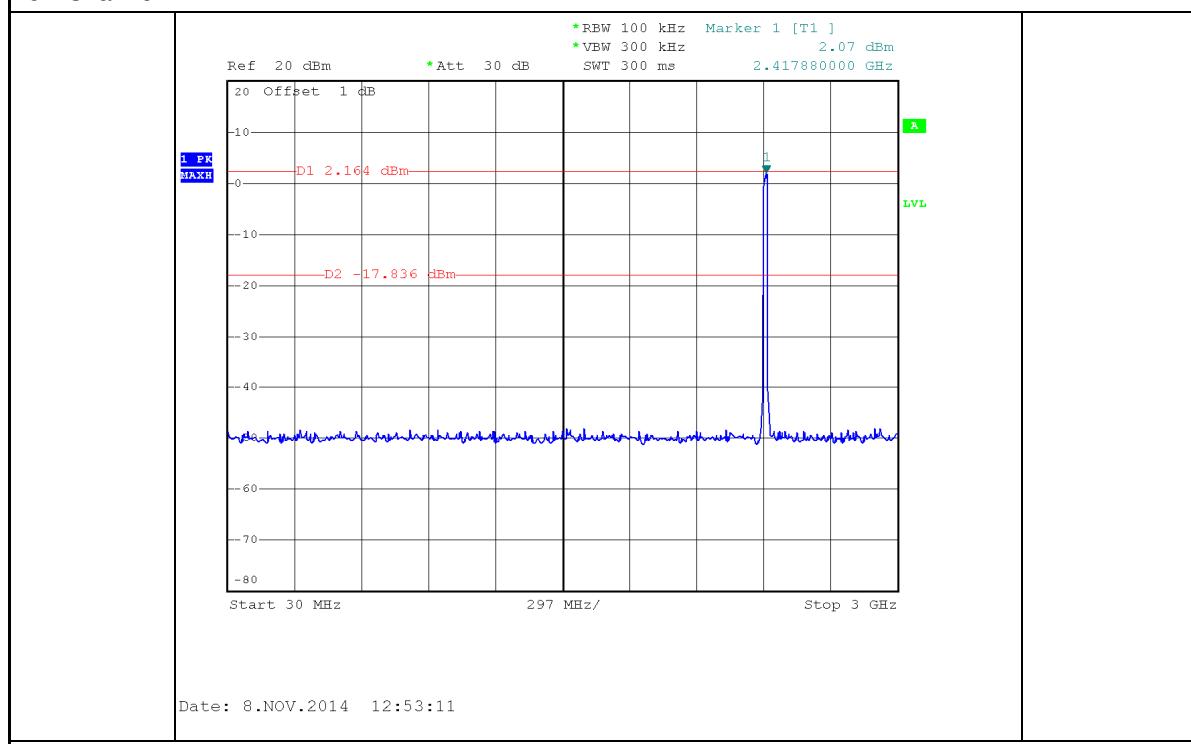
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**High Channel 6dB Bandwidth**



Appendix C.3: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11g_ANT1

Low Channel 1



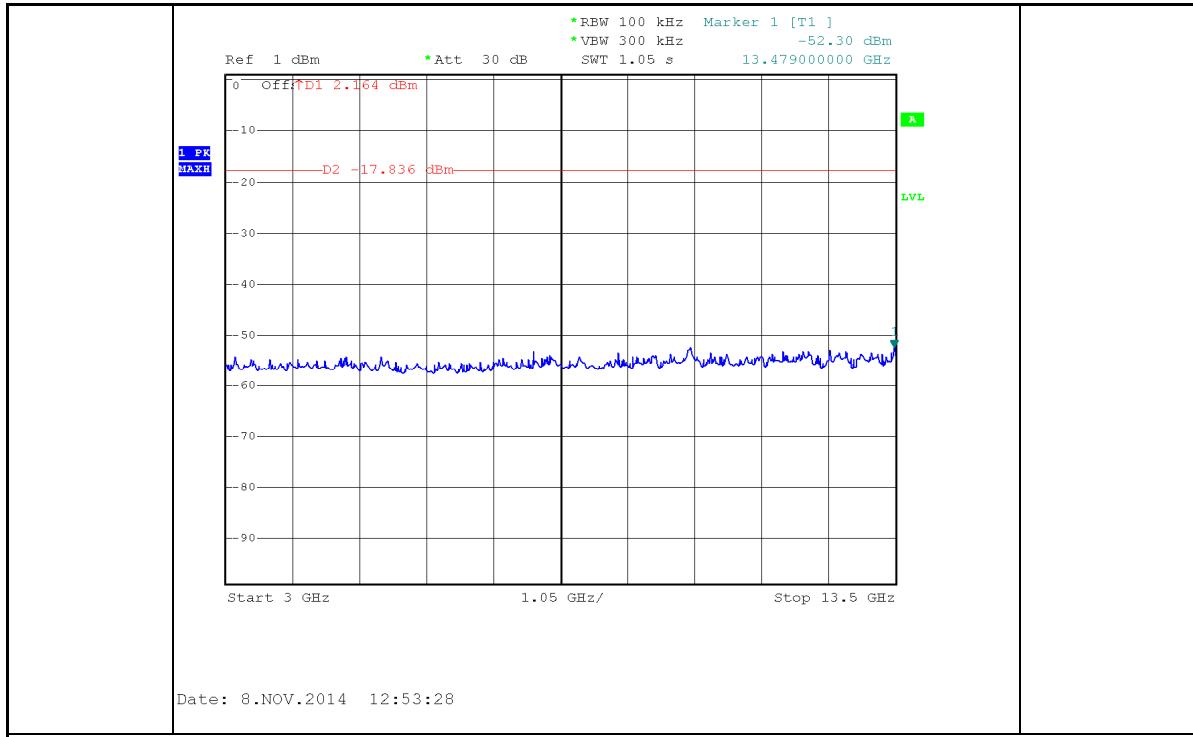
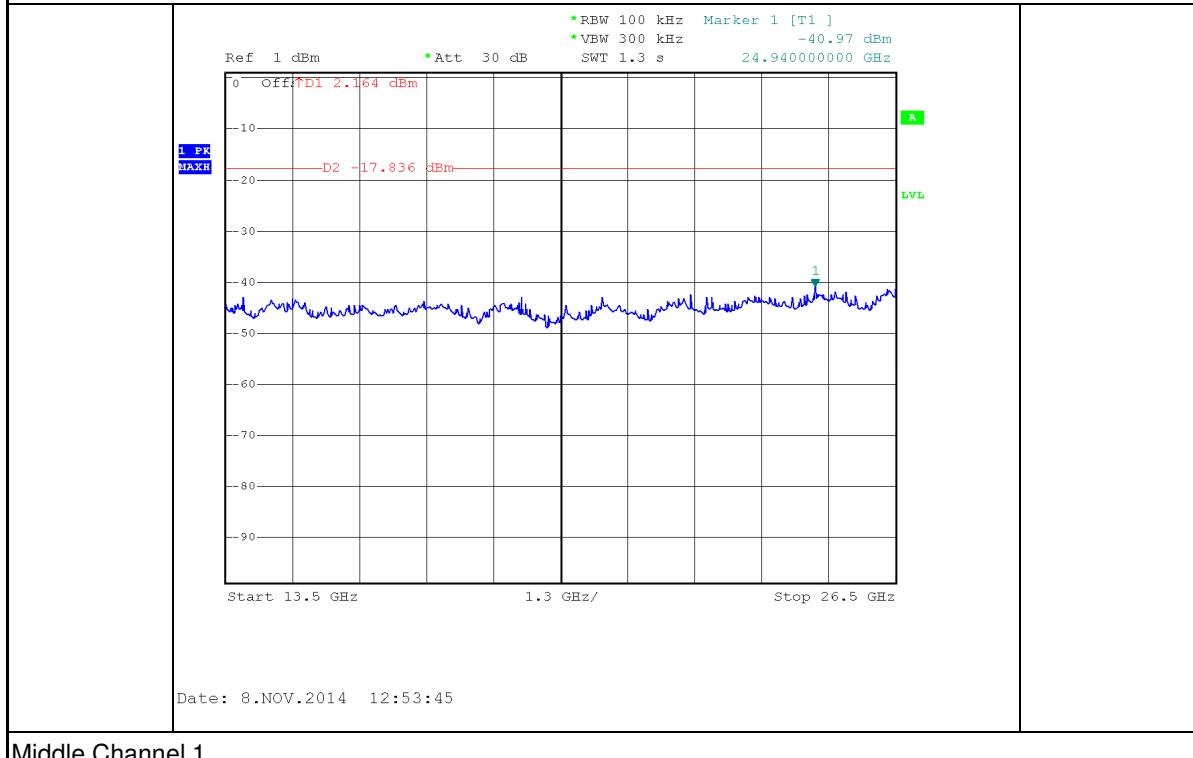
Low Channel 2

Produkte

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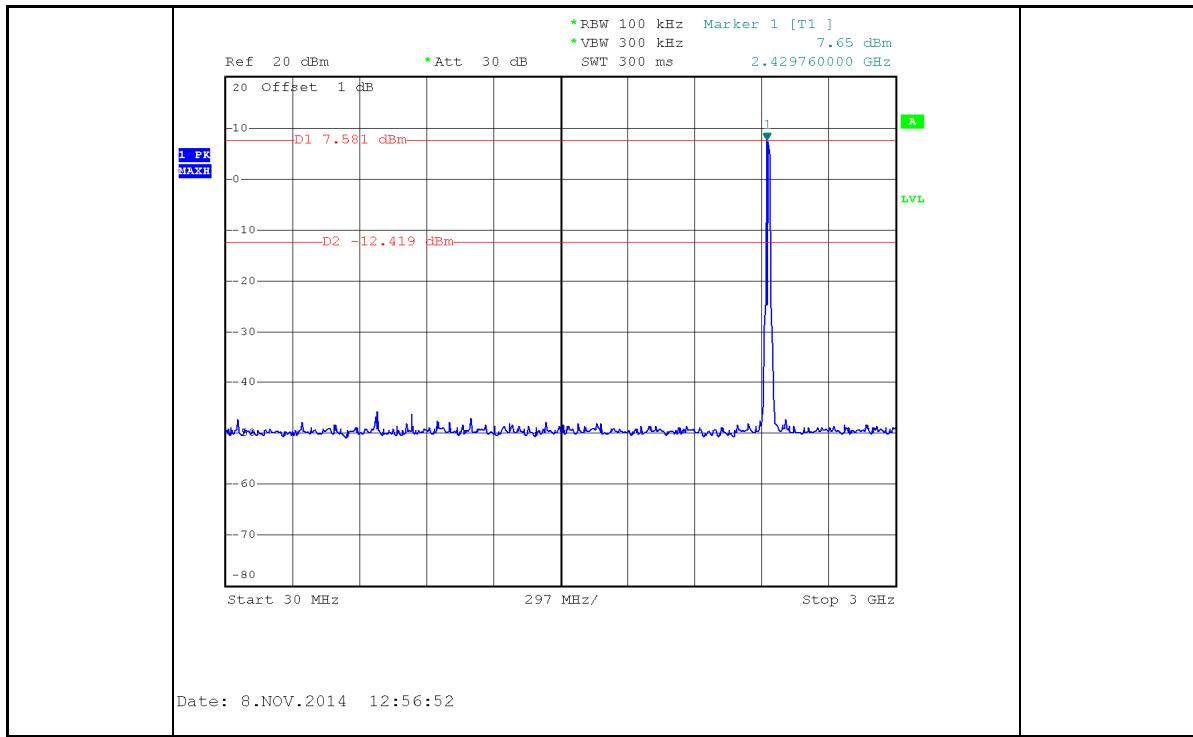
**Low Channel 3****Middle Channel 1**

Produkte

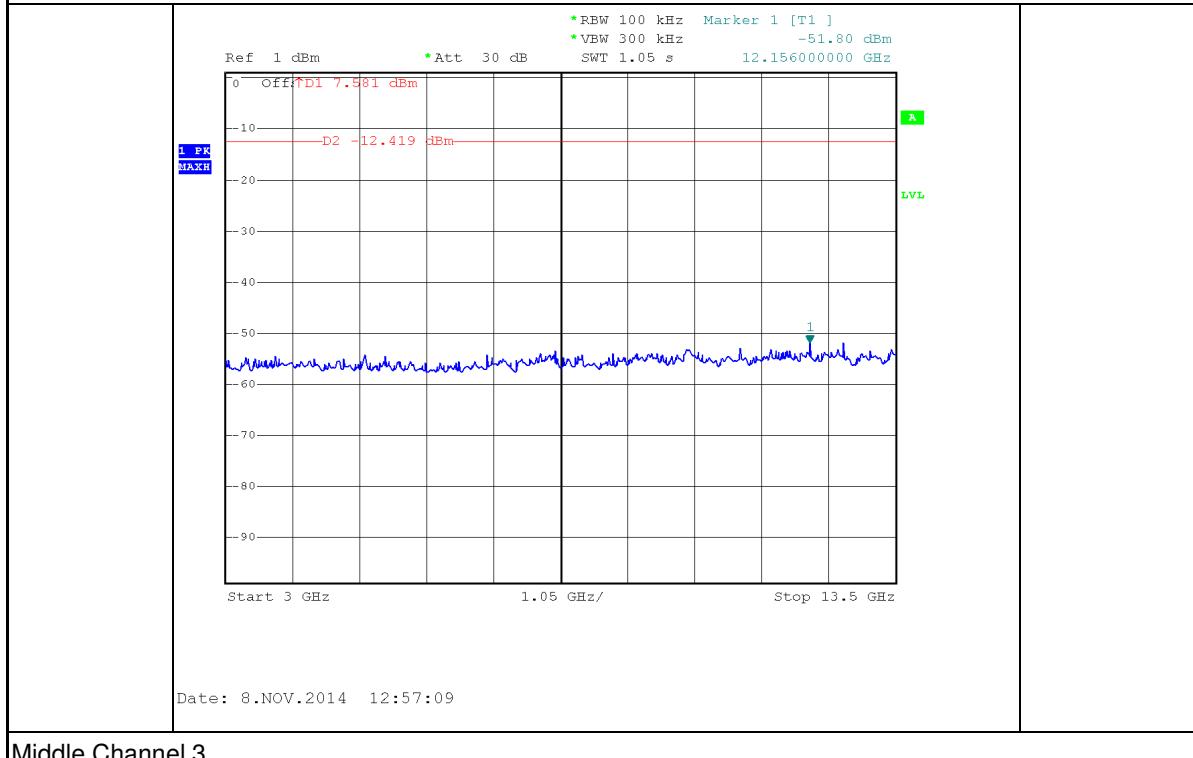
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Middle Channel 2



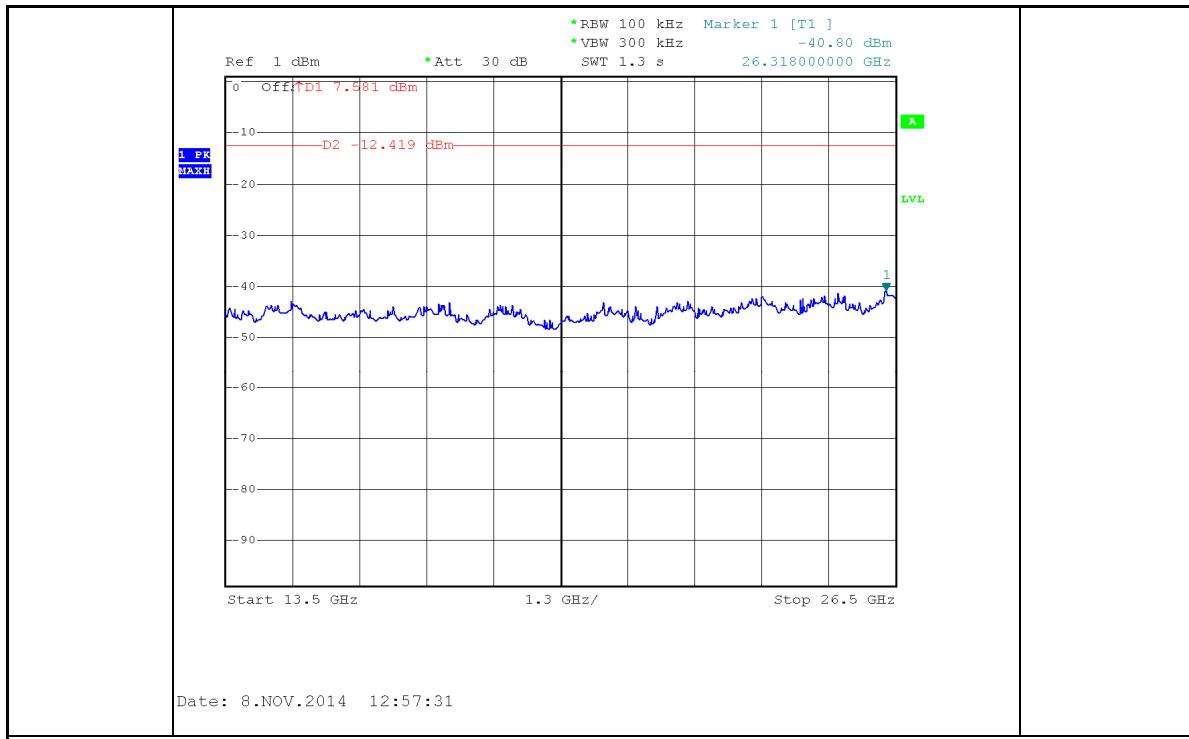
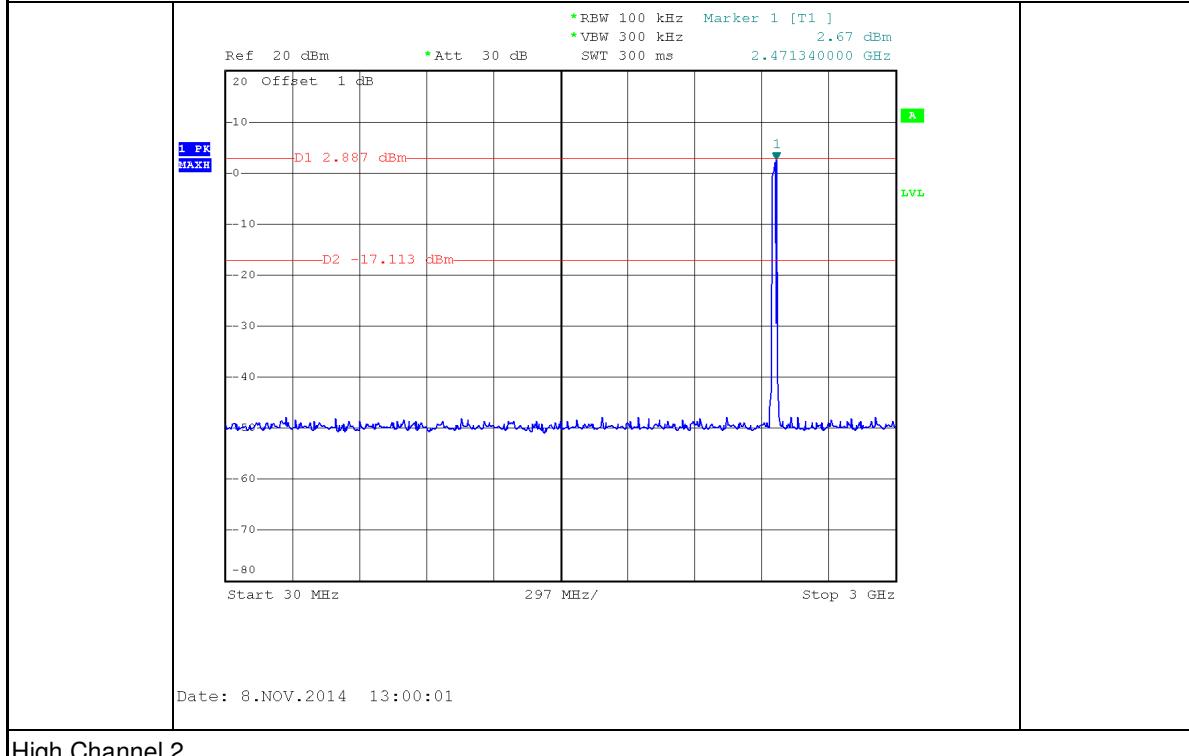
Middle Channel 3

Produkte

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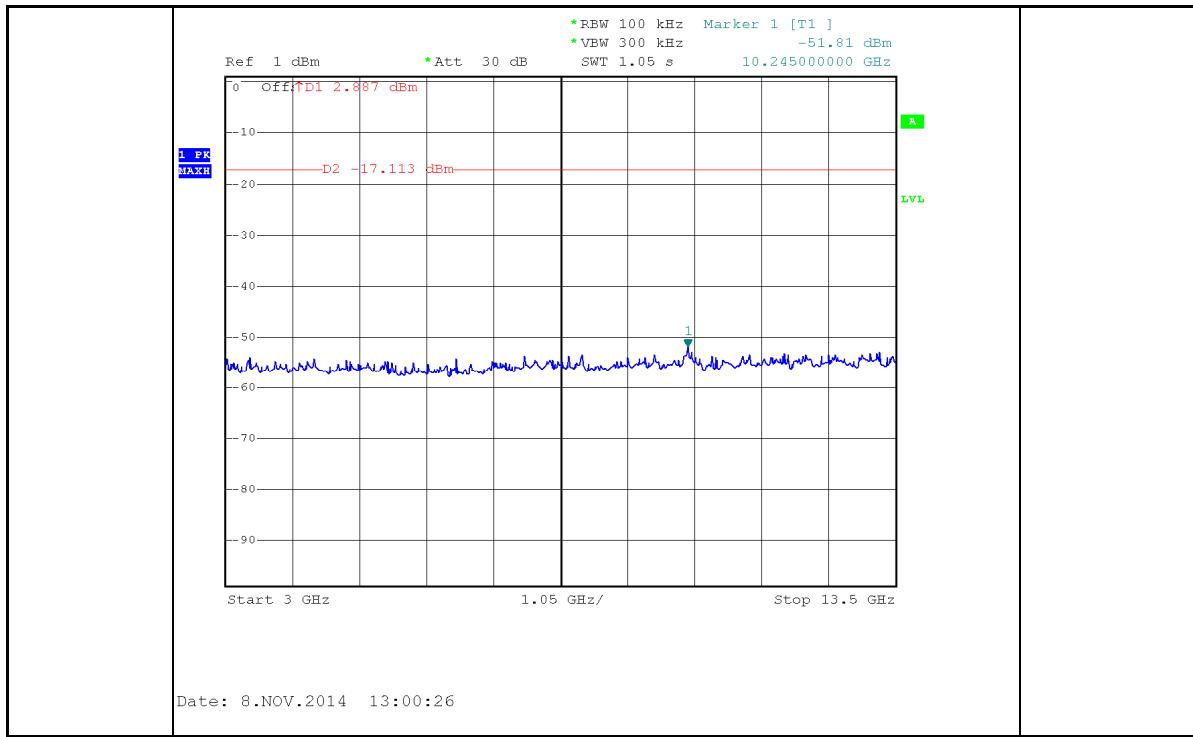
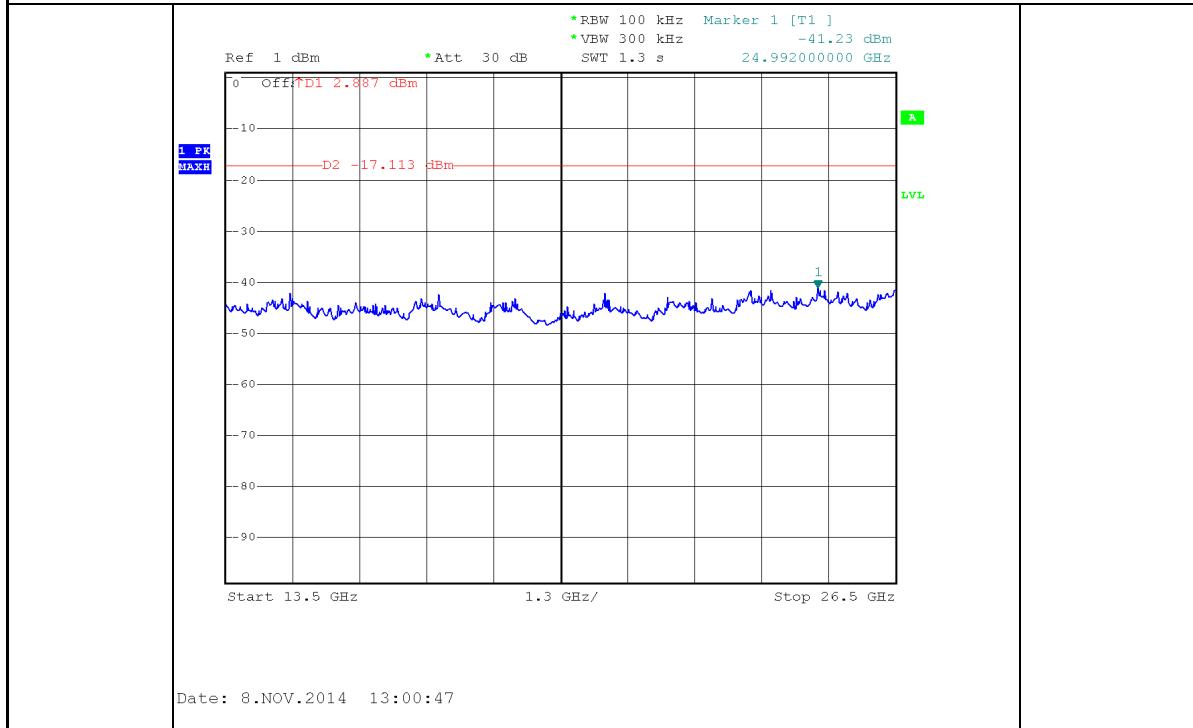
**High Channel 1**

Produkte

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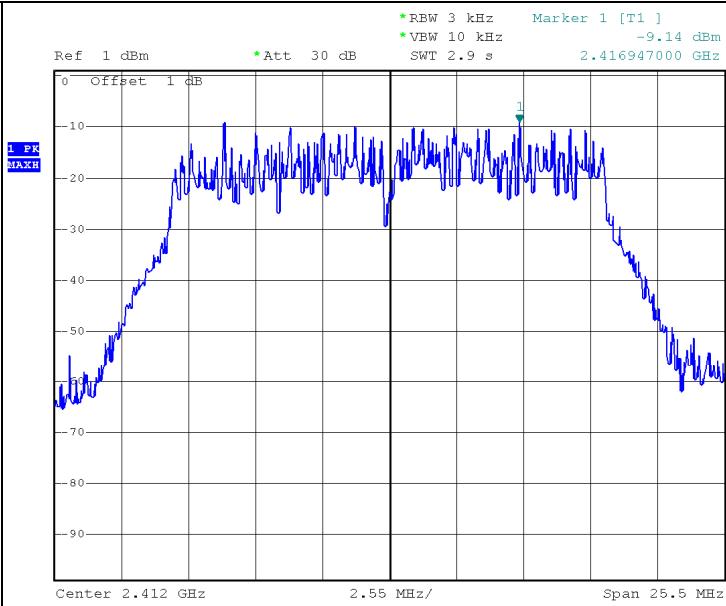
**High Channel 3**

Appendix C.4: Power Spectral Density_802.11g

Channel	Channel Frequency (MHz)	PSD_ANT1 (dBm/3kHz)	PSD_ANT2 (dBm/3kHz)	PSD_ANT 3 (dBm/3kHz)	PSD_Total (dBm/3kHz)	Limit (dBm/3kHz)
Low Channel	2412	-9.14	-8.21	-8.85-	-3.94	4.6
Middle Channel	2437	-1.06	-1.24	-1.98	3.36	4.6
High Channel	2462	-8.33	-7.81	-8.00	-3.27	4.6

Power Spectral Density_ANT1

2412 MHz



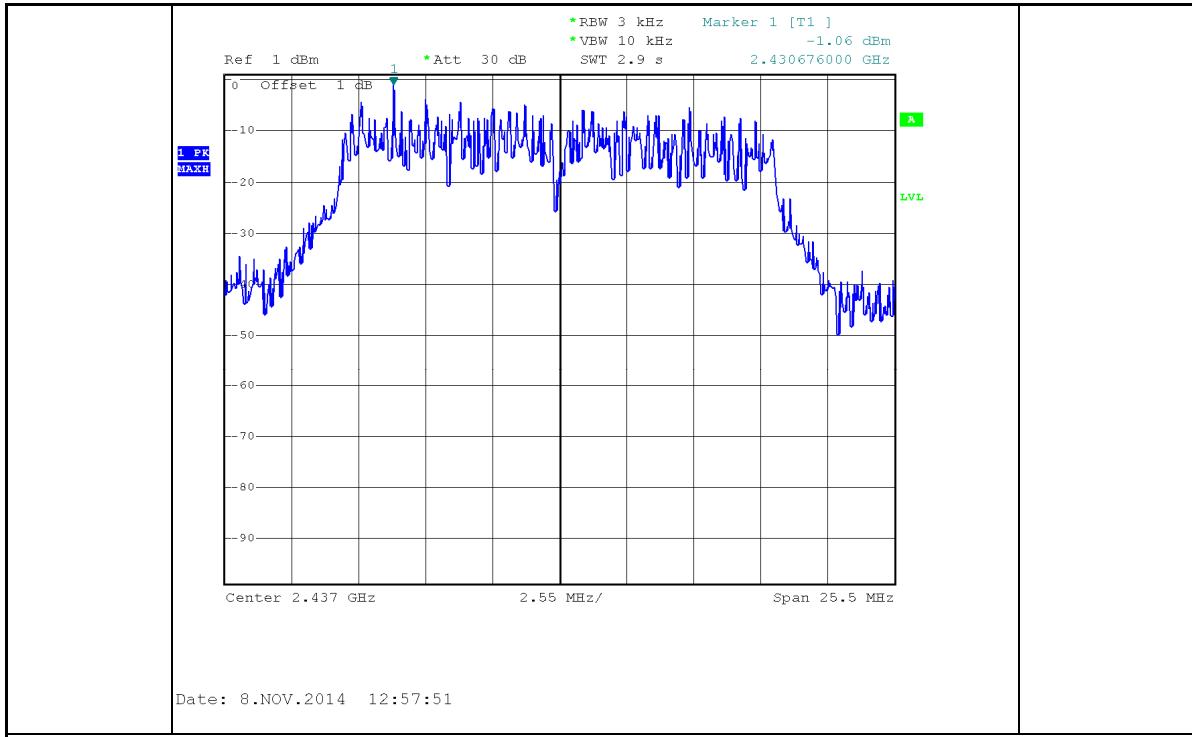
2437 MHz

Produkte

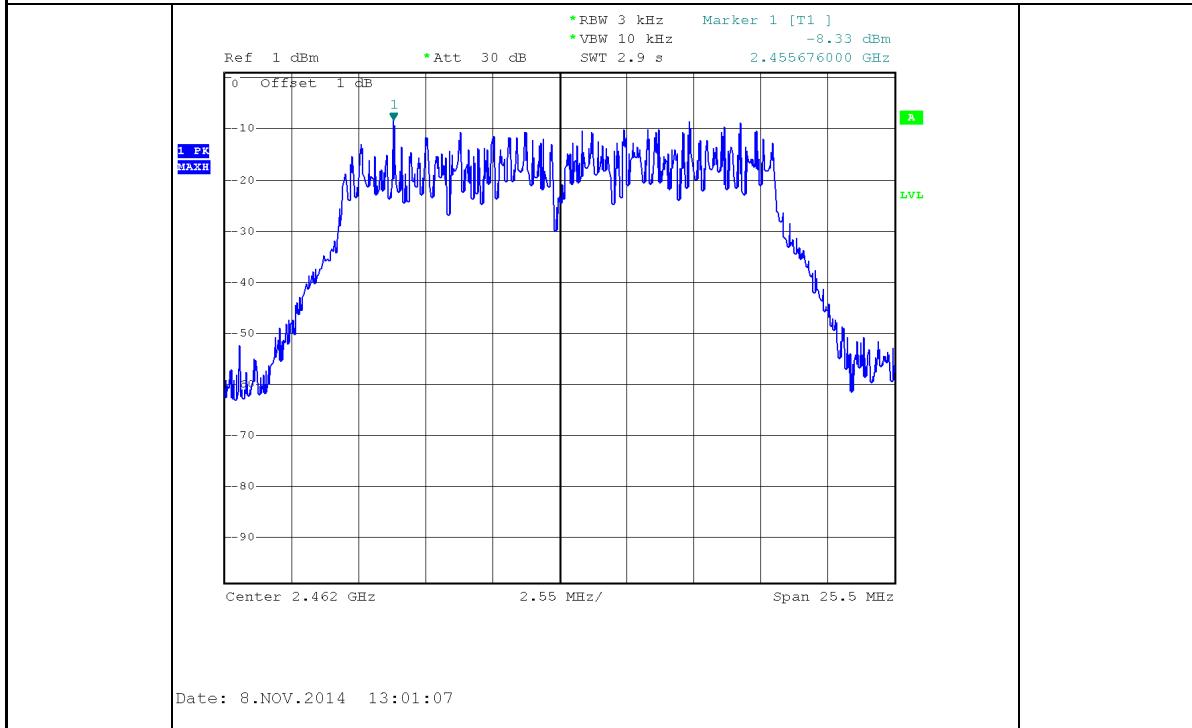
Products

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2462 MHz



Power Spectral Density_AN2

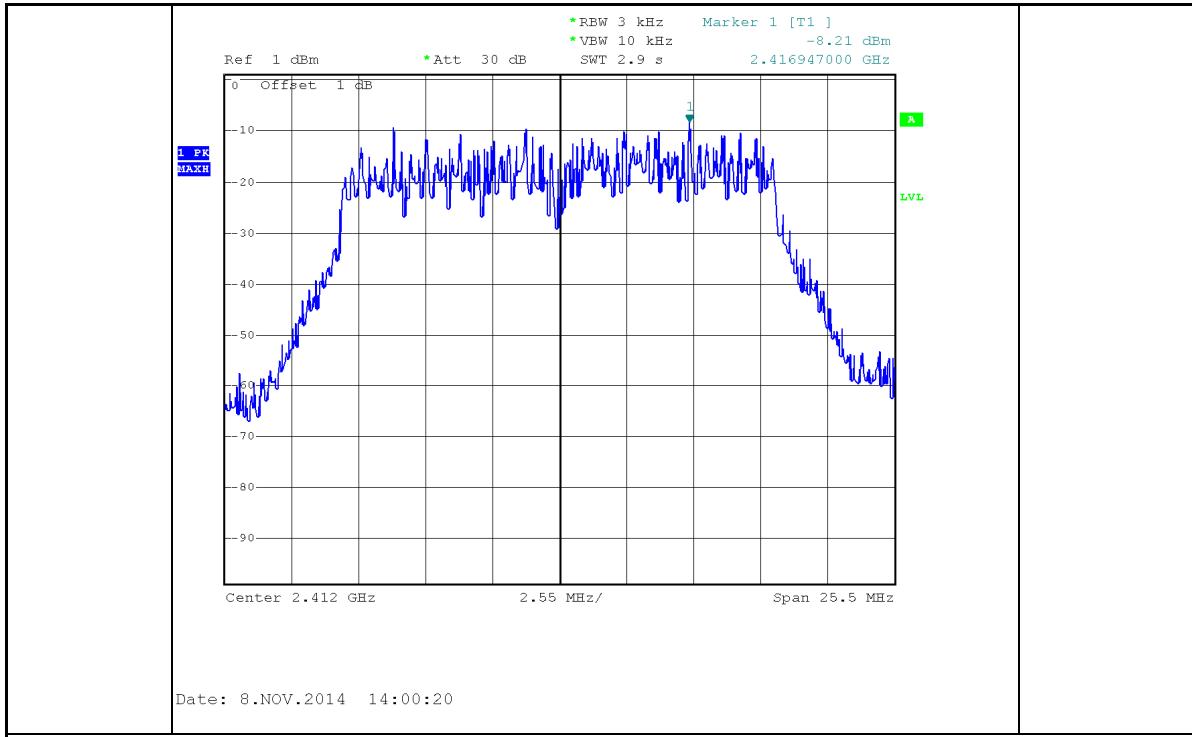
2412 MHz

Produkte

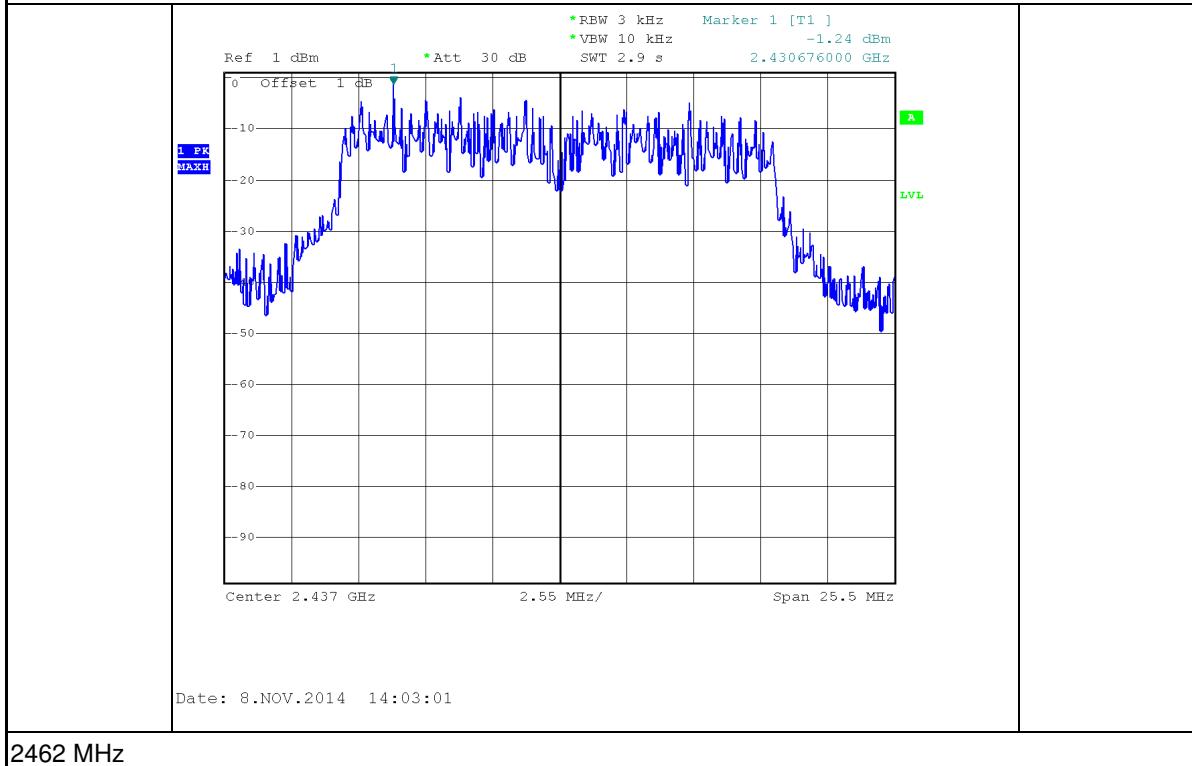
Products

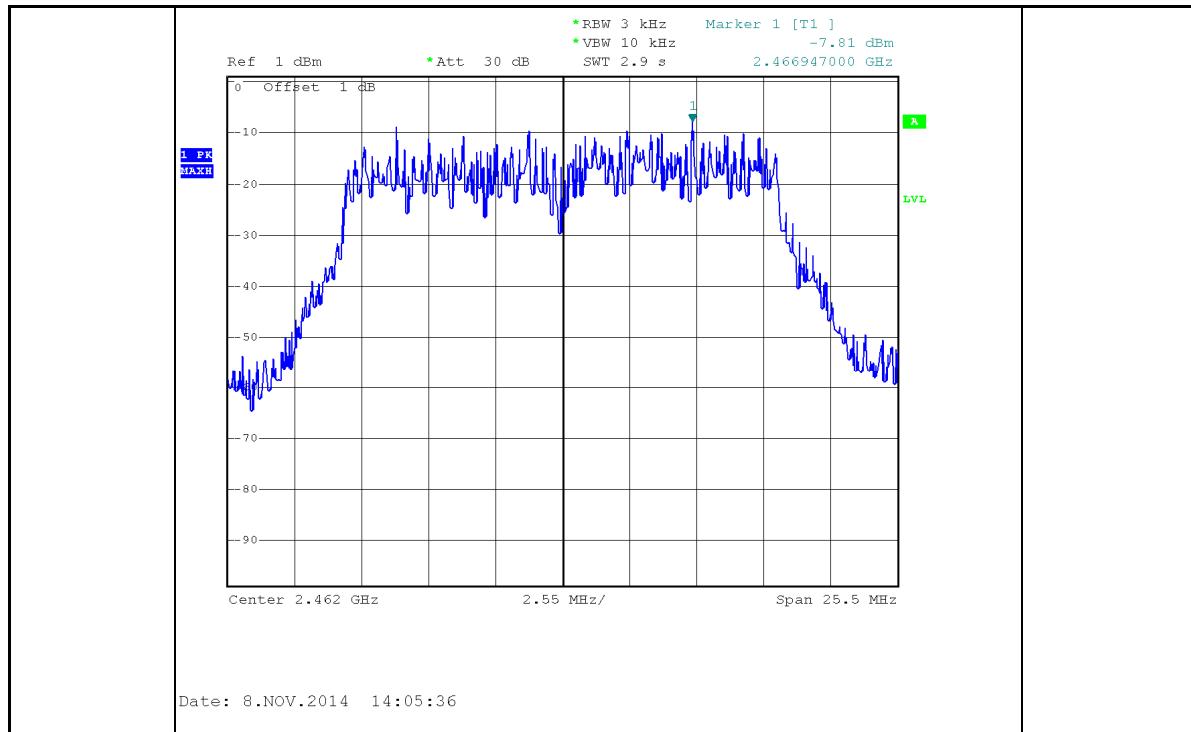
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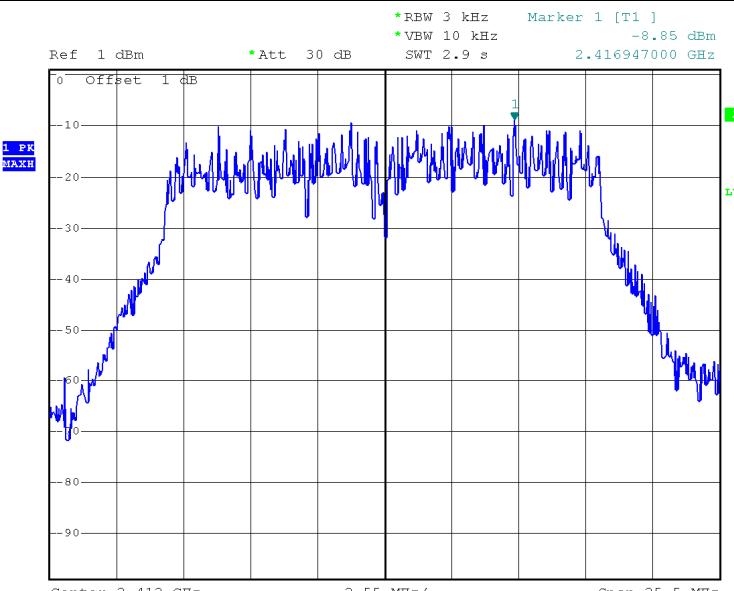
2437 MHz





Power Spectral Density_ANT3

2412 MHz



Date: 8.NOV.2014 14:09:40

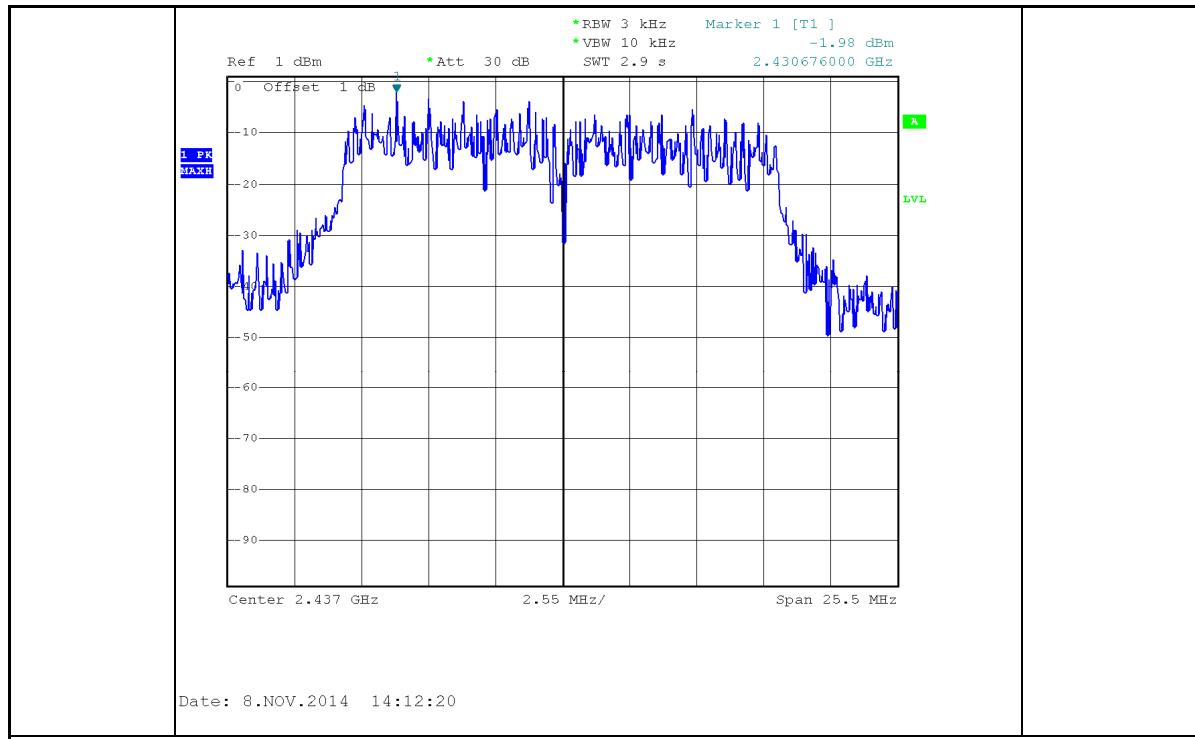
2437 MHz

Produkte

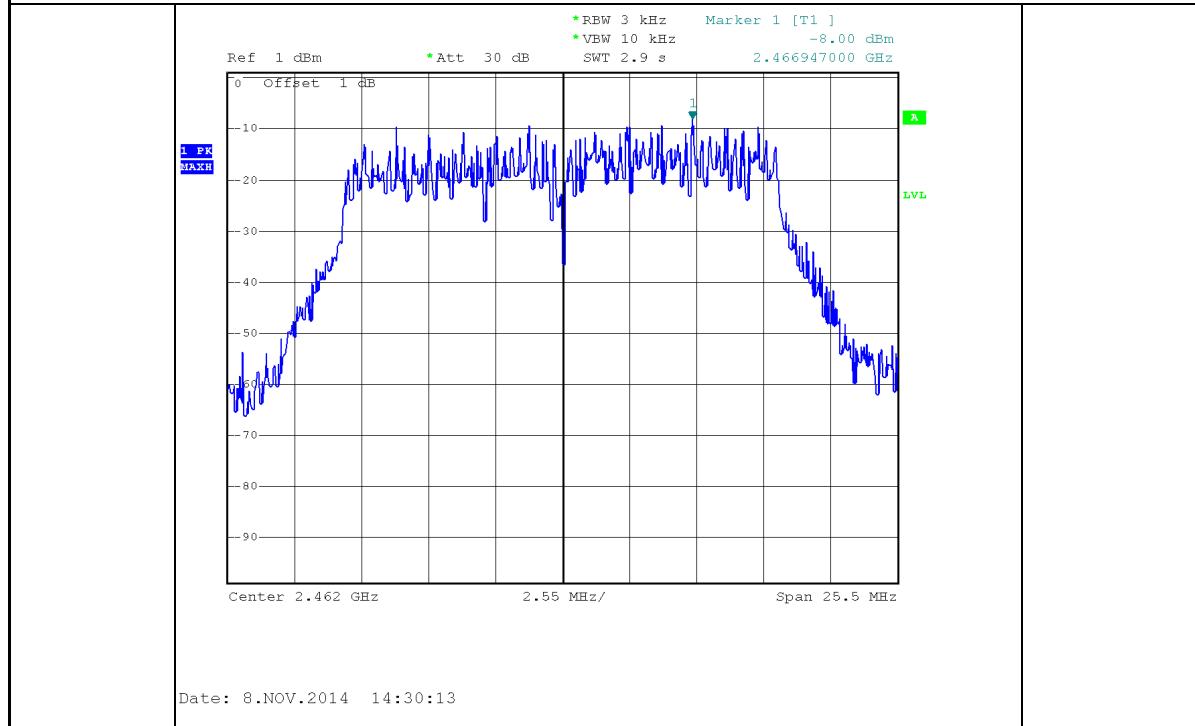
Products

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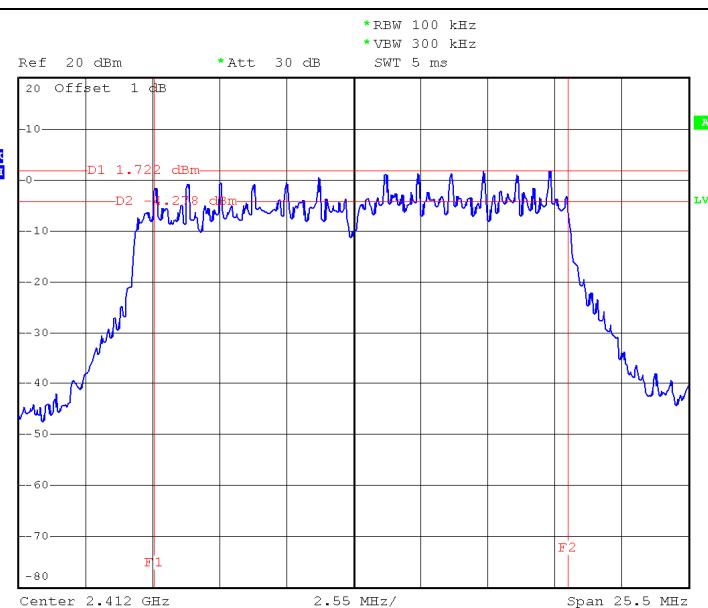
2462 MHz



Appendix C.5: 6dB Bandwidth and 99% Bandwidth_802.11g_ANT2

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.76	16.37
Middle Channel	2437	15.55	16.37
High Channel	2462	15.81	16.37

Low Channel 6dB Bandwidth



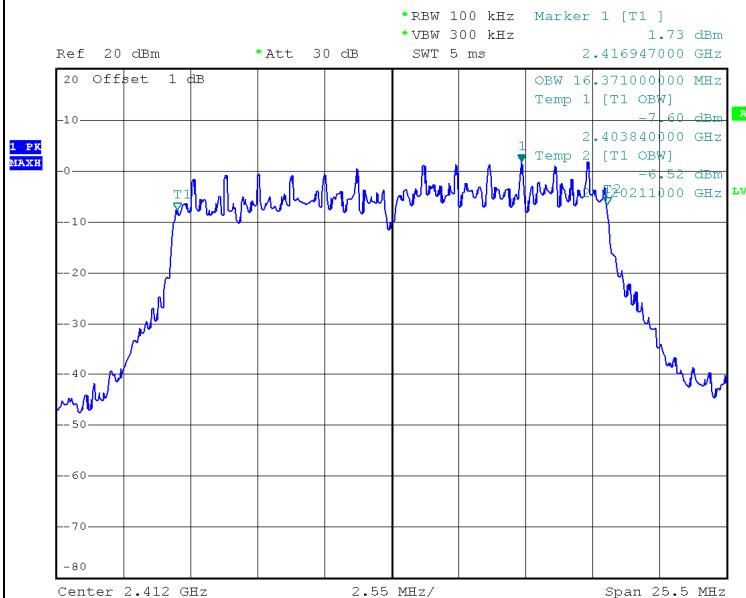
Low Channel 99% Bandwidth

Produkte

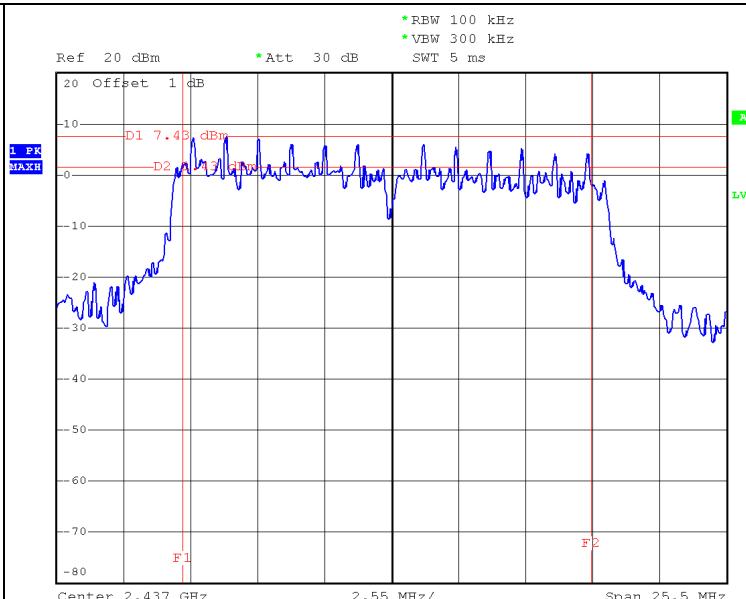
Products

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Date: 8.NOV.2014 13:58:47

Middle Channel 6dB Bandwidth

Date: 8.NOV.2014 14:01:15

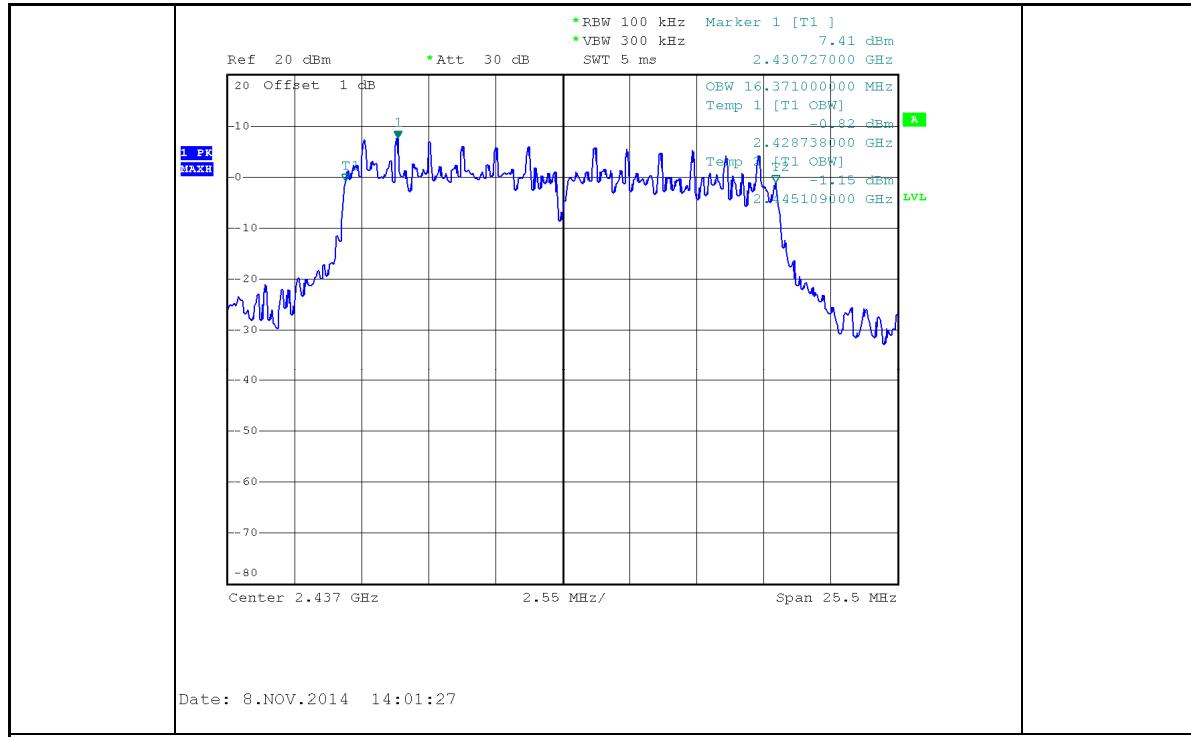
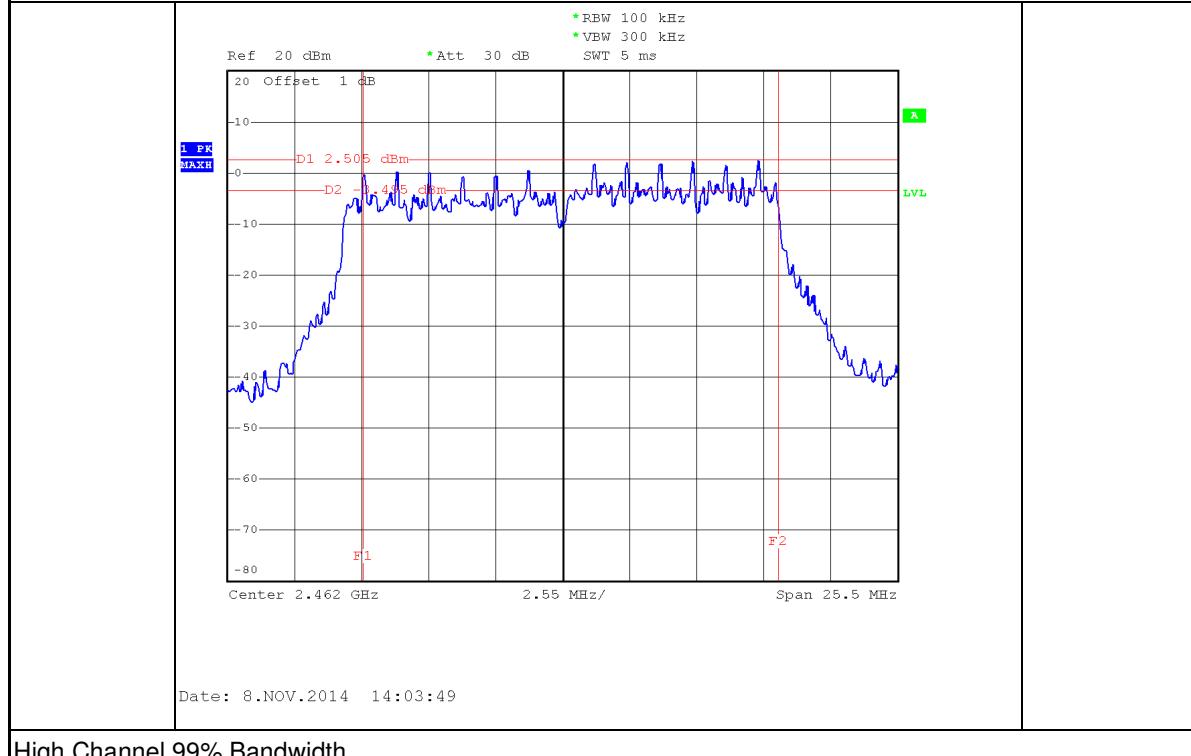
Middle Channel 99% Bandwidth

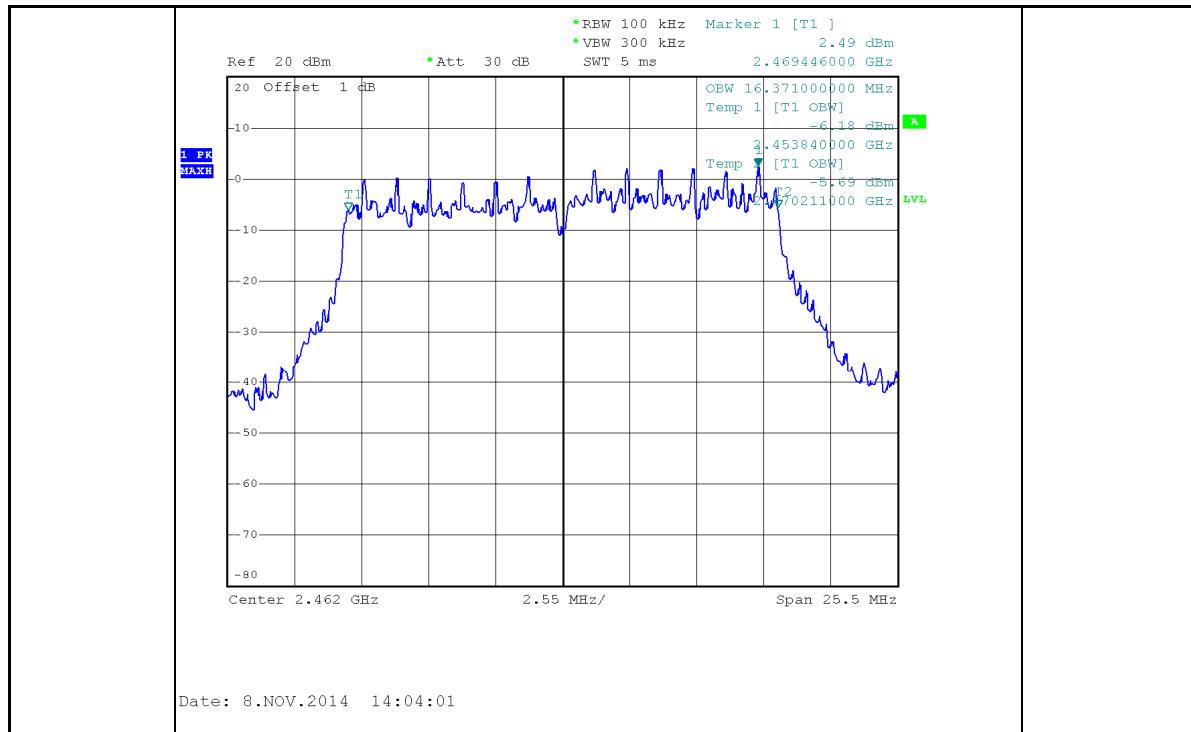
Produkte

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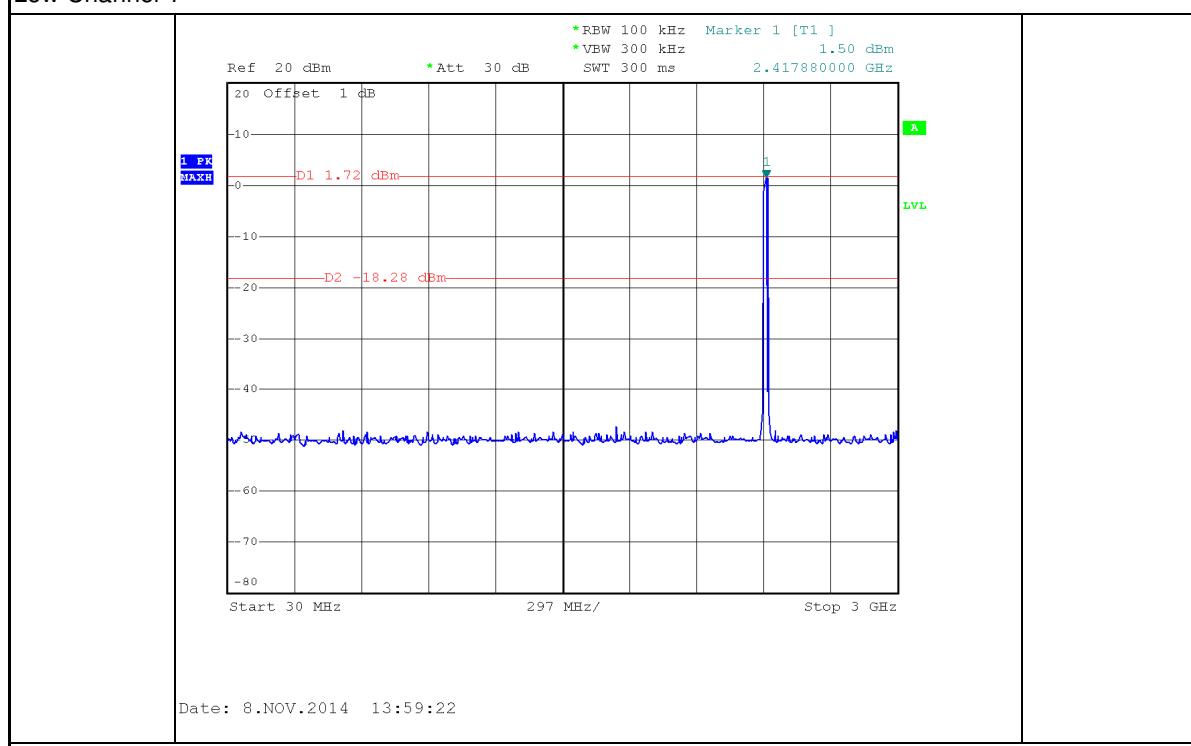
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**High Channel 6dB Bandwidth**



Appendix C.6: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11g_ANT2

Low Channel 1



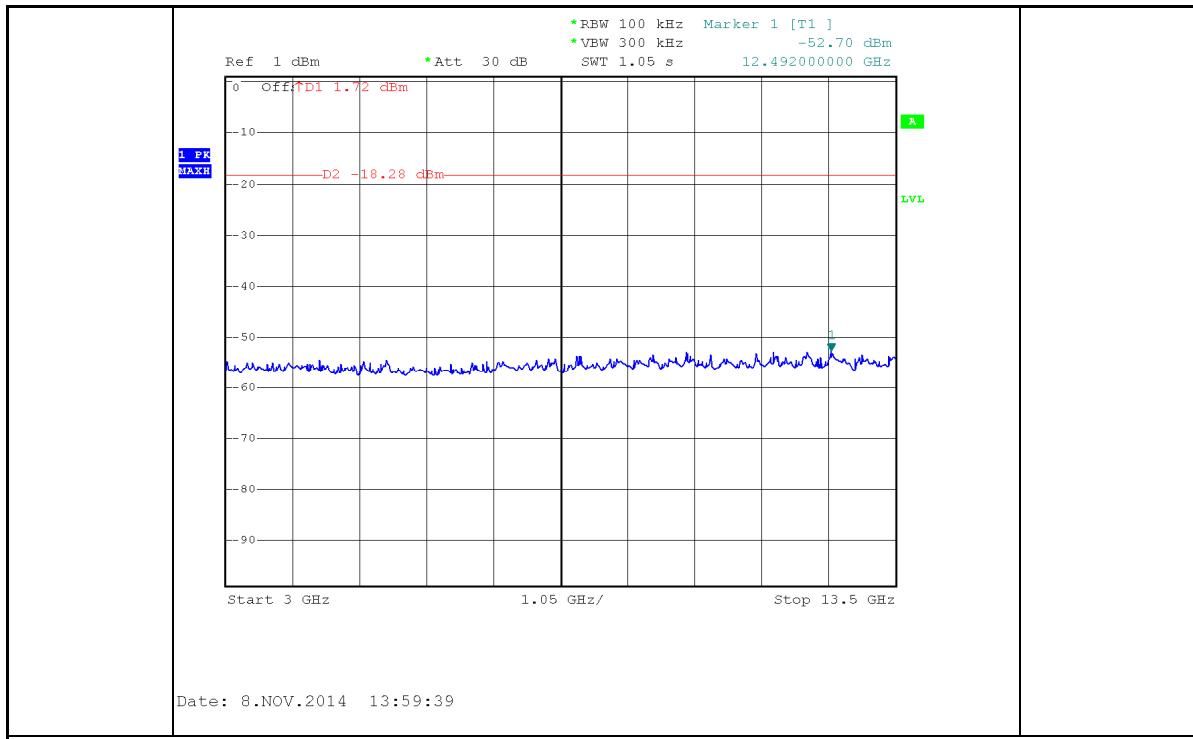
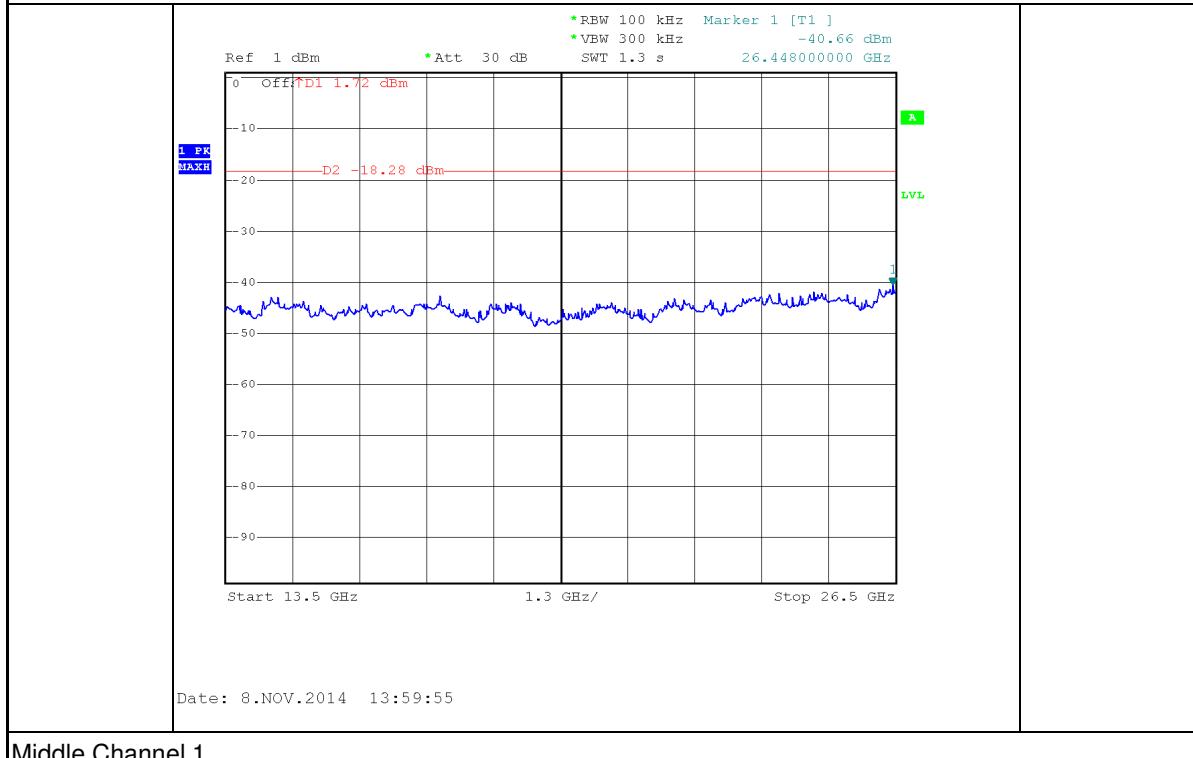
Low Channel 2

Produkte

Products

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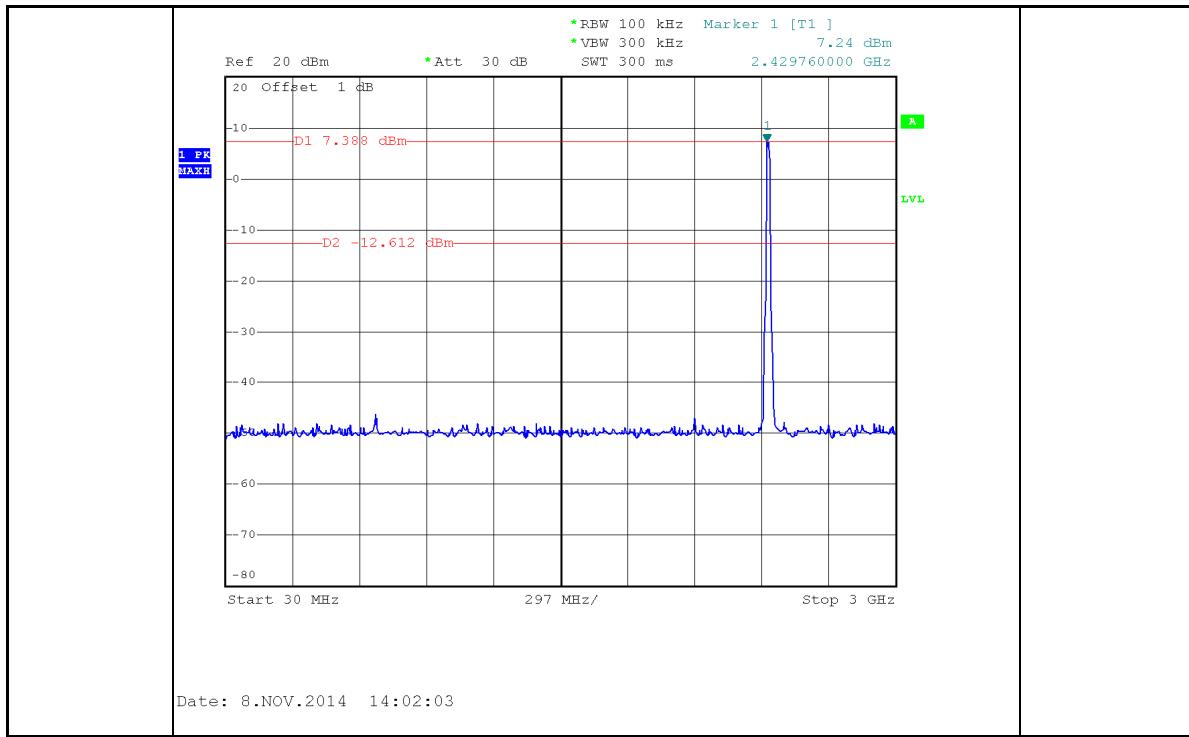
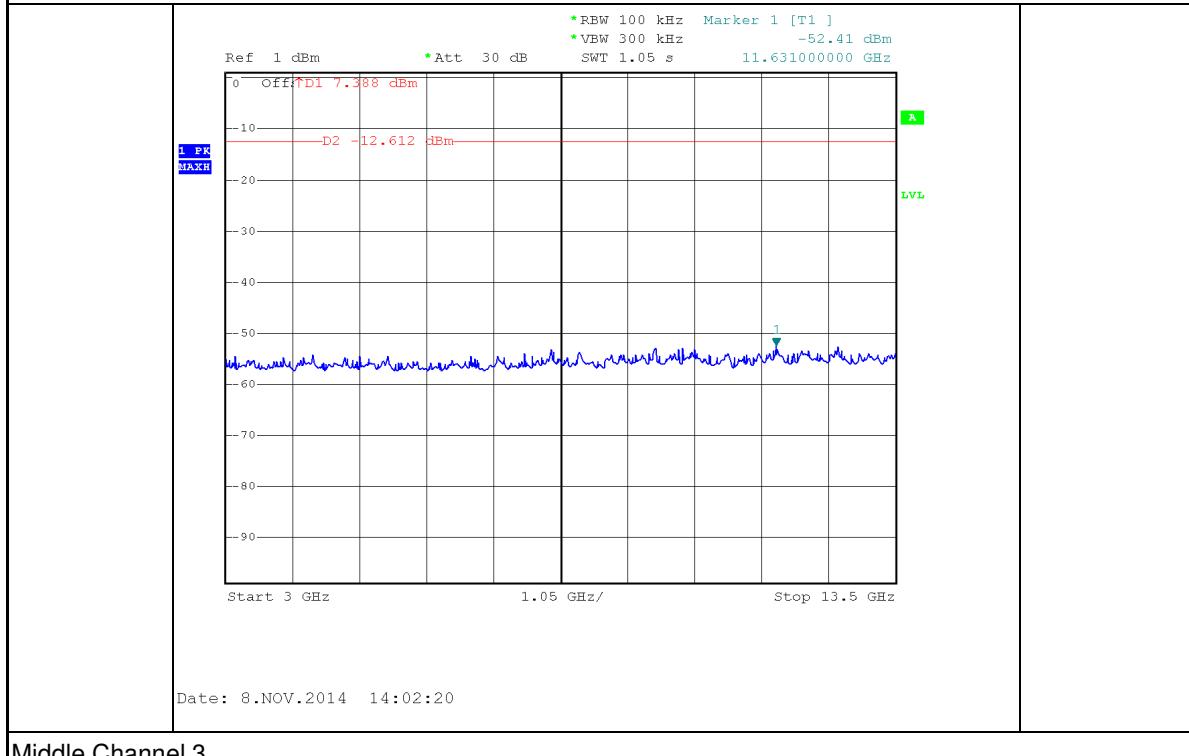
**Low Channel 3**

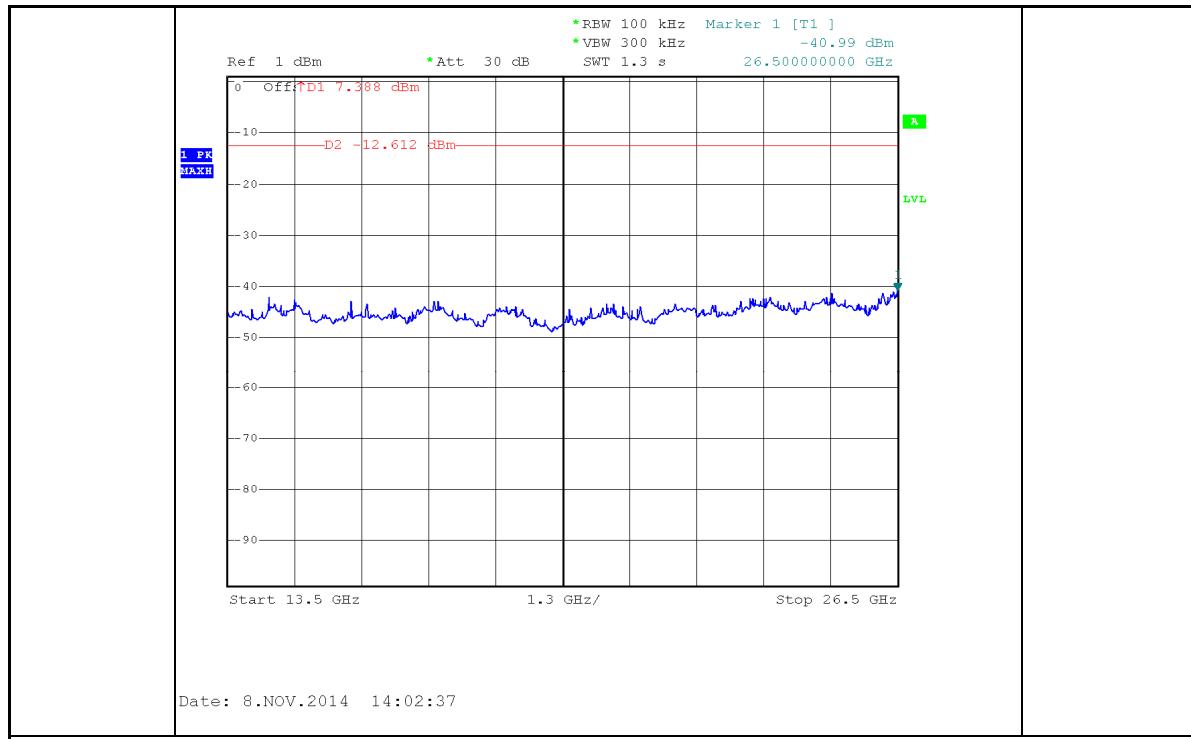
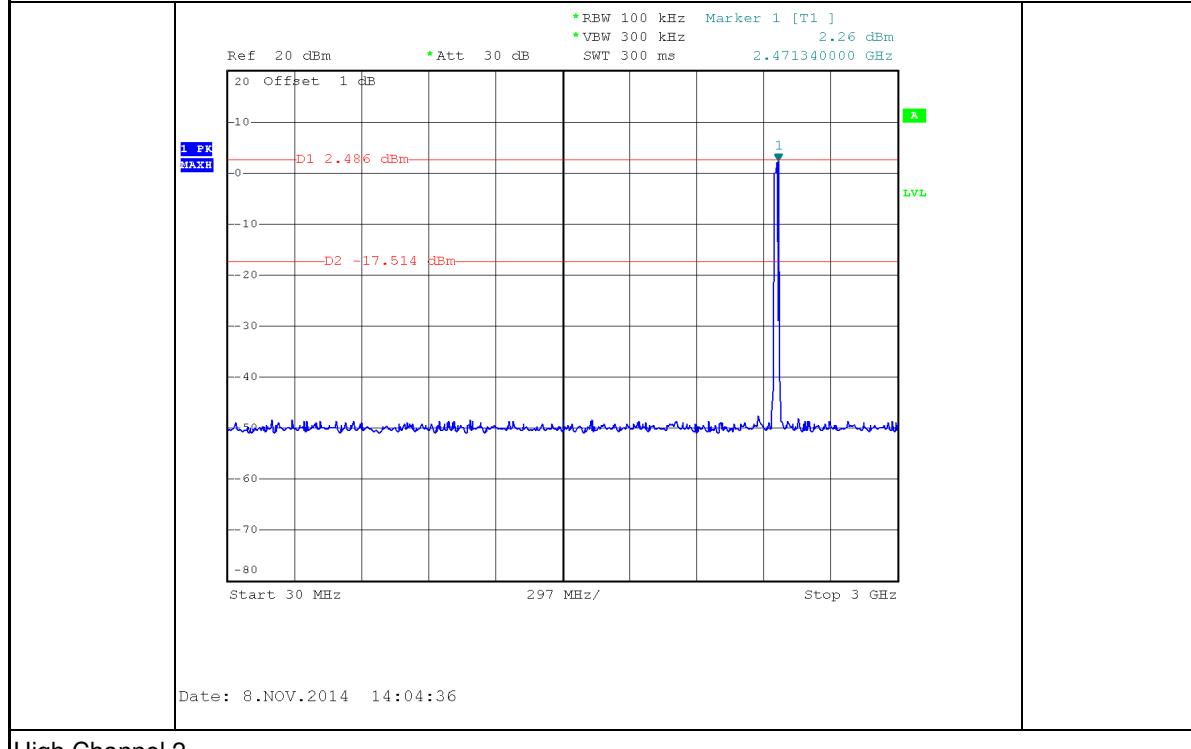
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**Middle Channel 2**

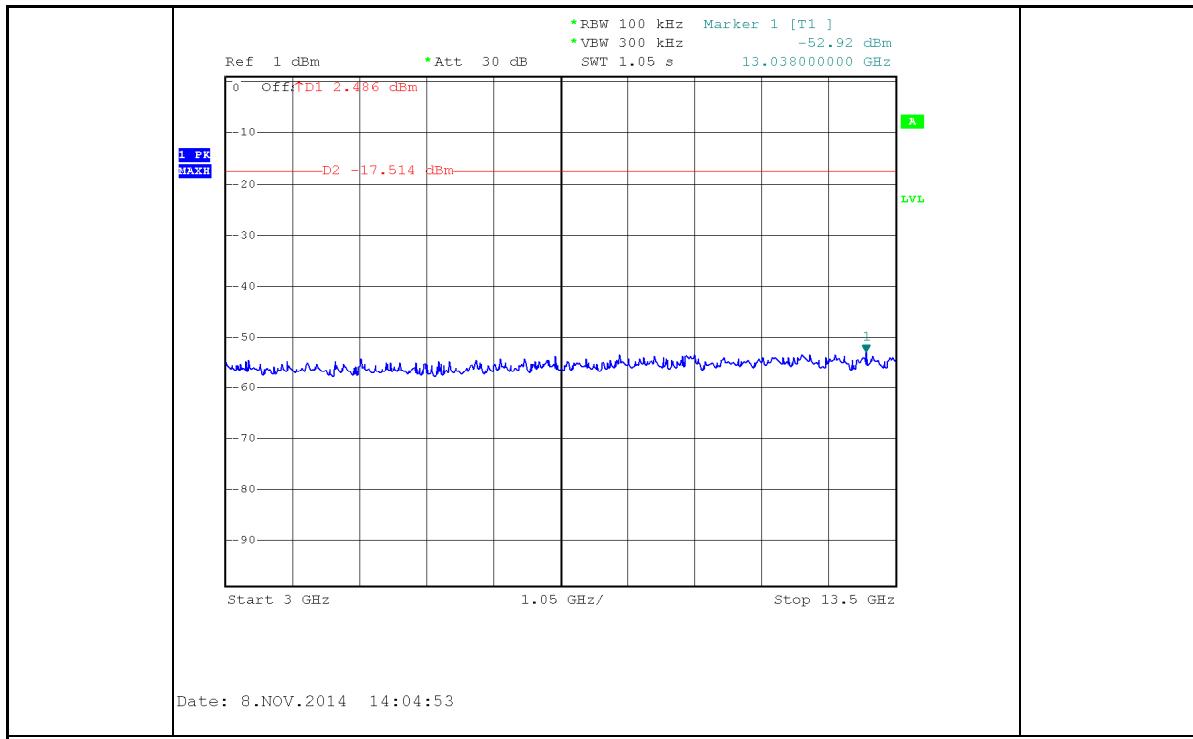
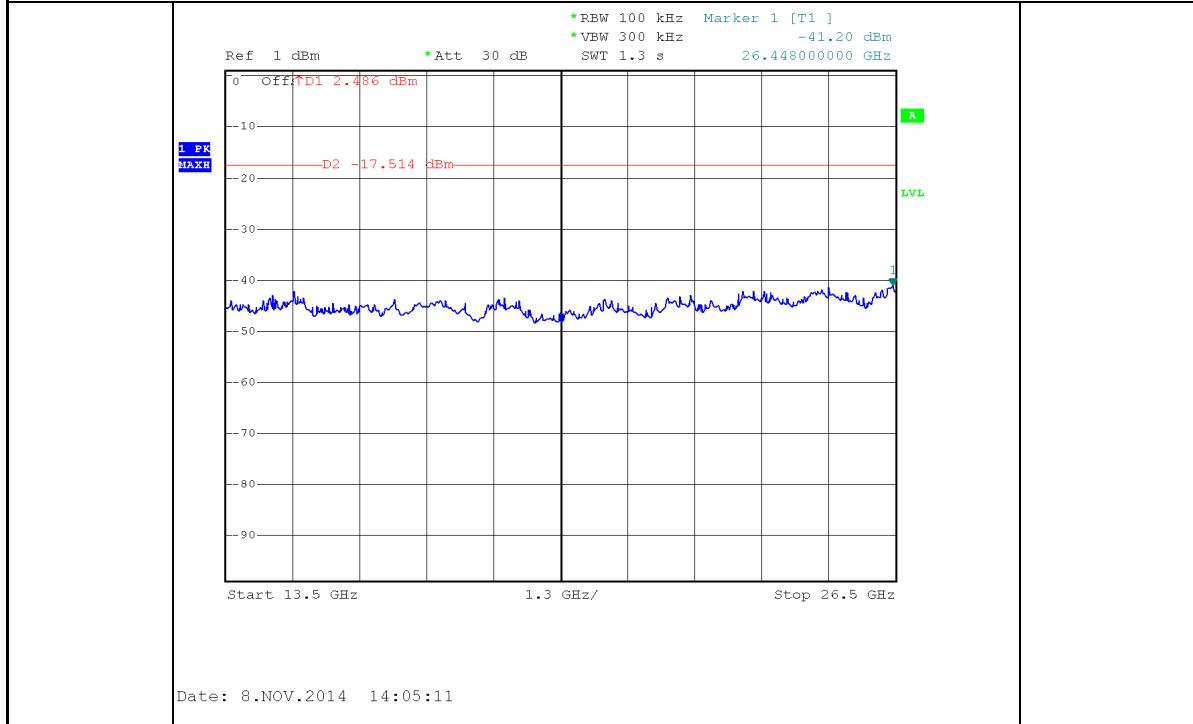
**High Channel 1**

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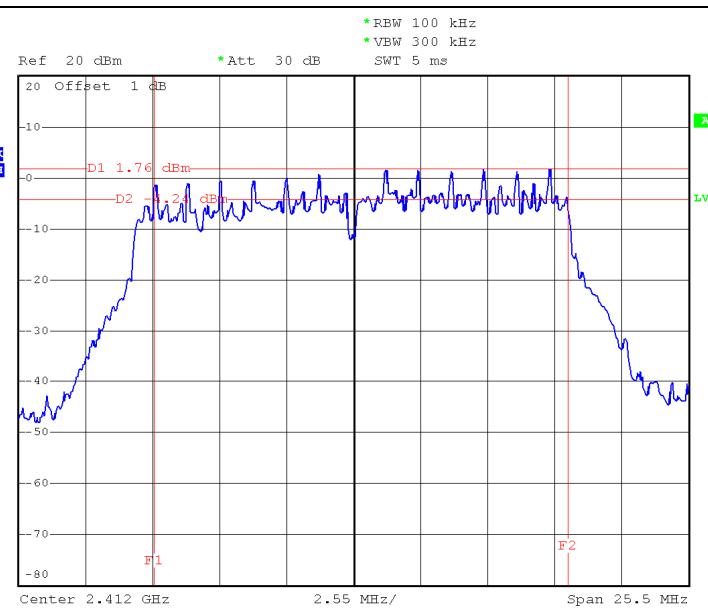
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**High Channel 3**

Appendix C.7: 6dB Bandwidth and 99% Bandwidth_802.11g_ANT3

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.76	16.37
Middle Channel	2437	15.55	16.47
High Channel	2462	15.81	16.42

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 14:07:47

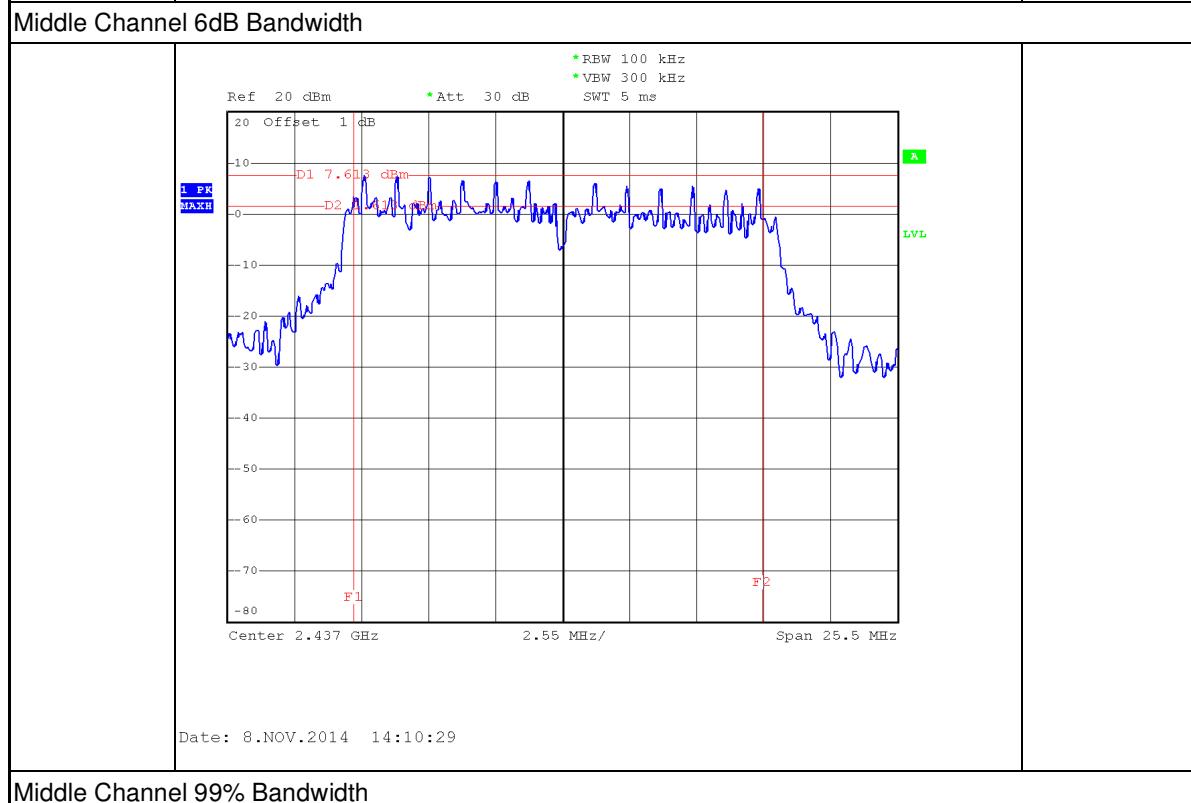
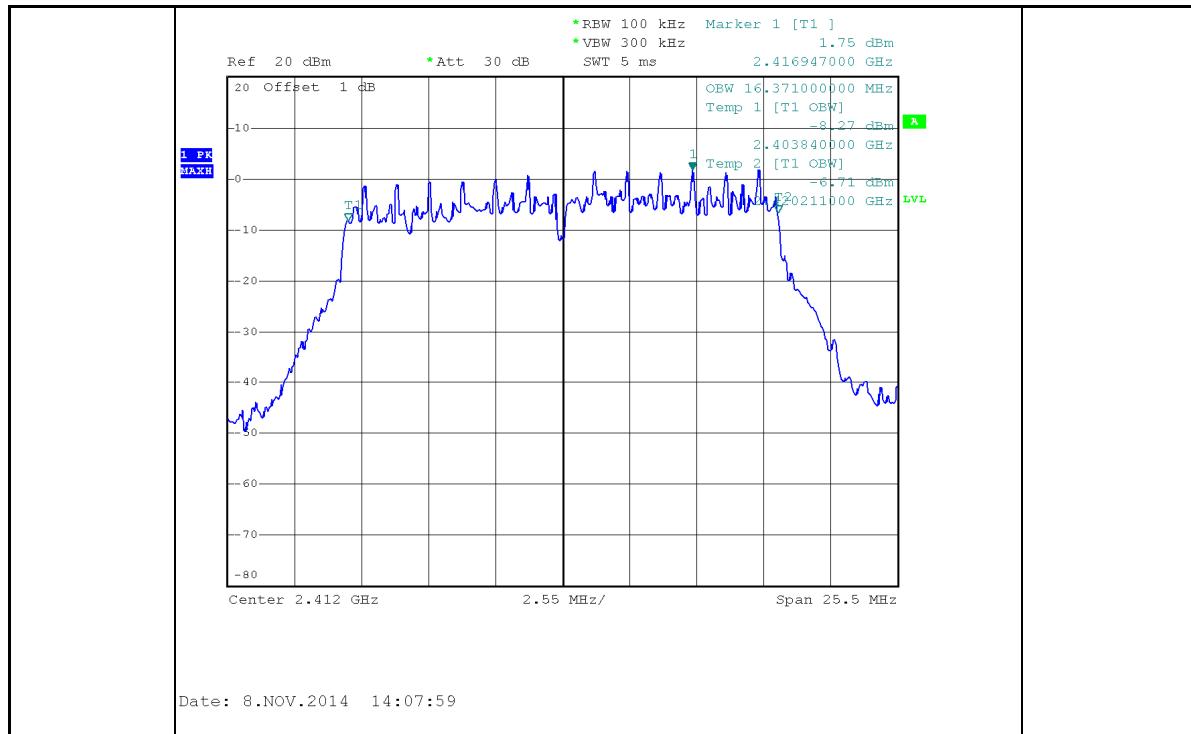
Low Channel 99% Bandwidth

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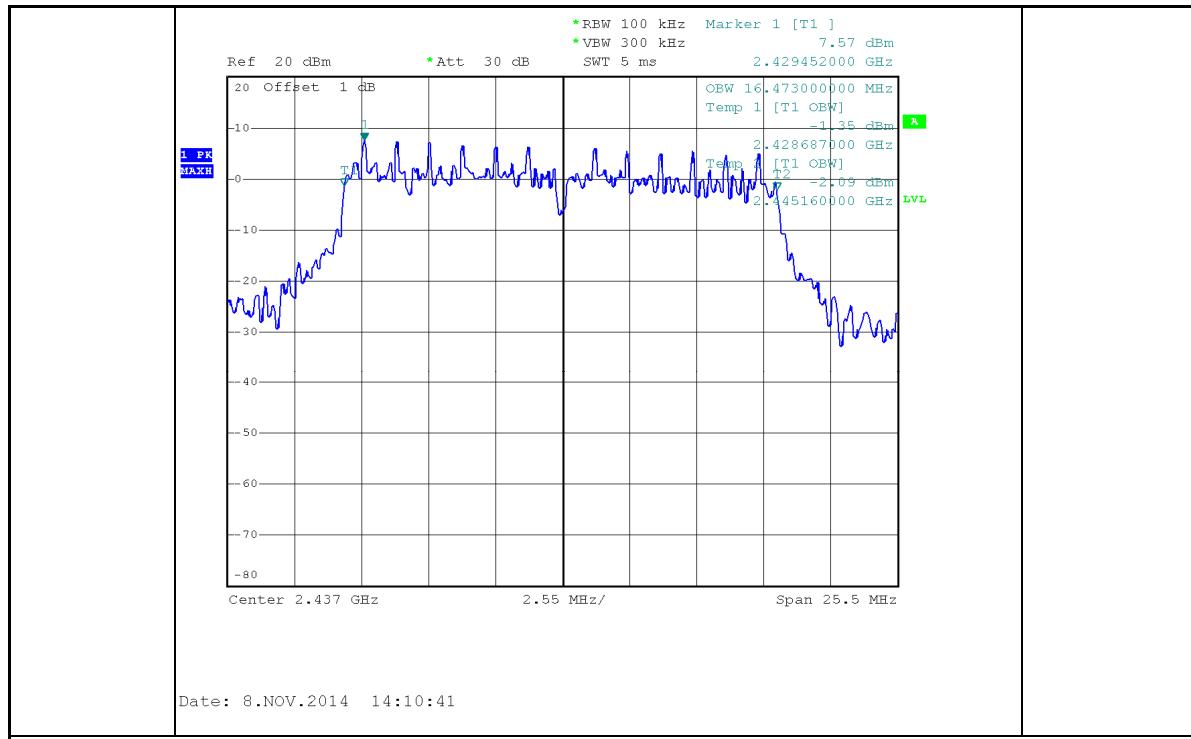
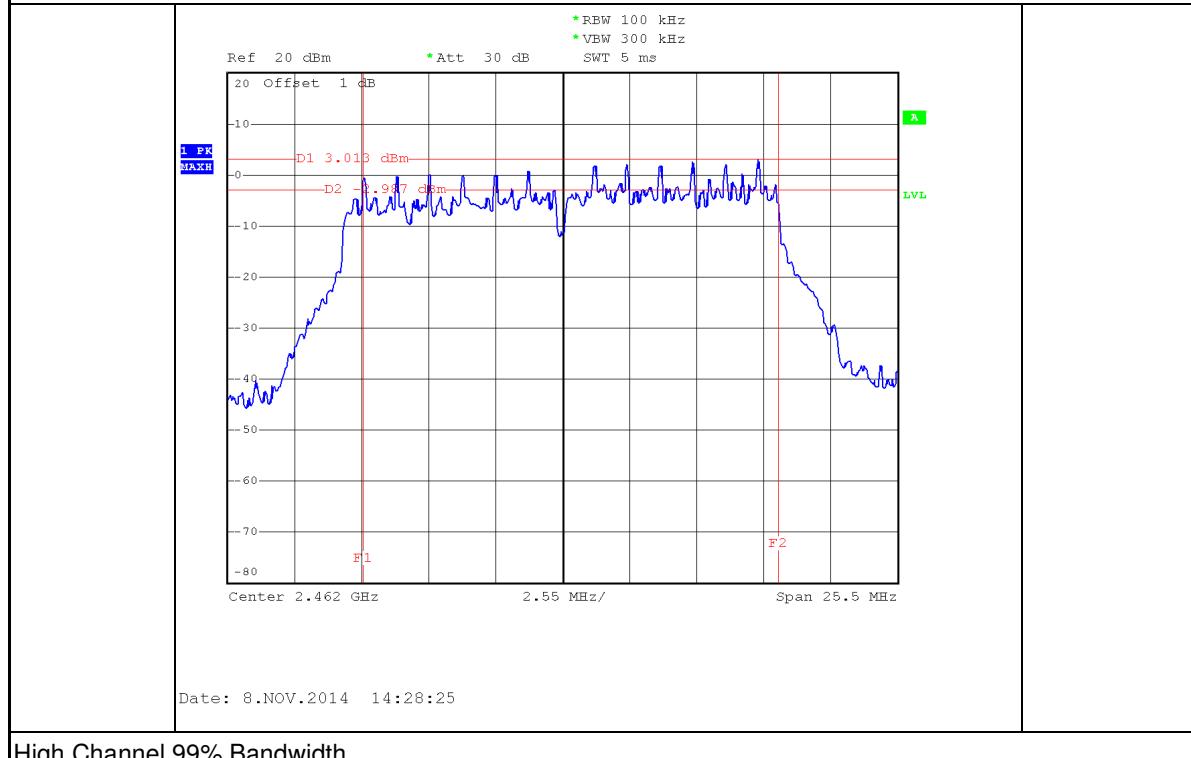


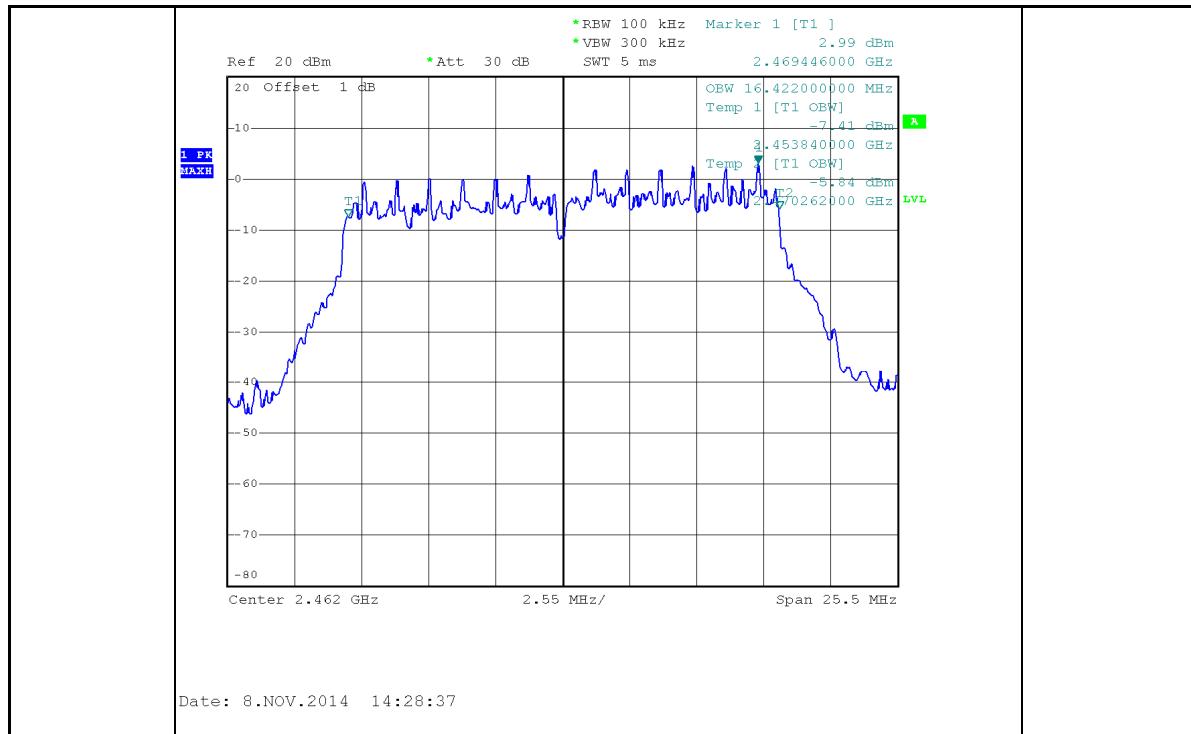
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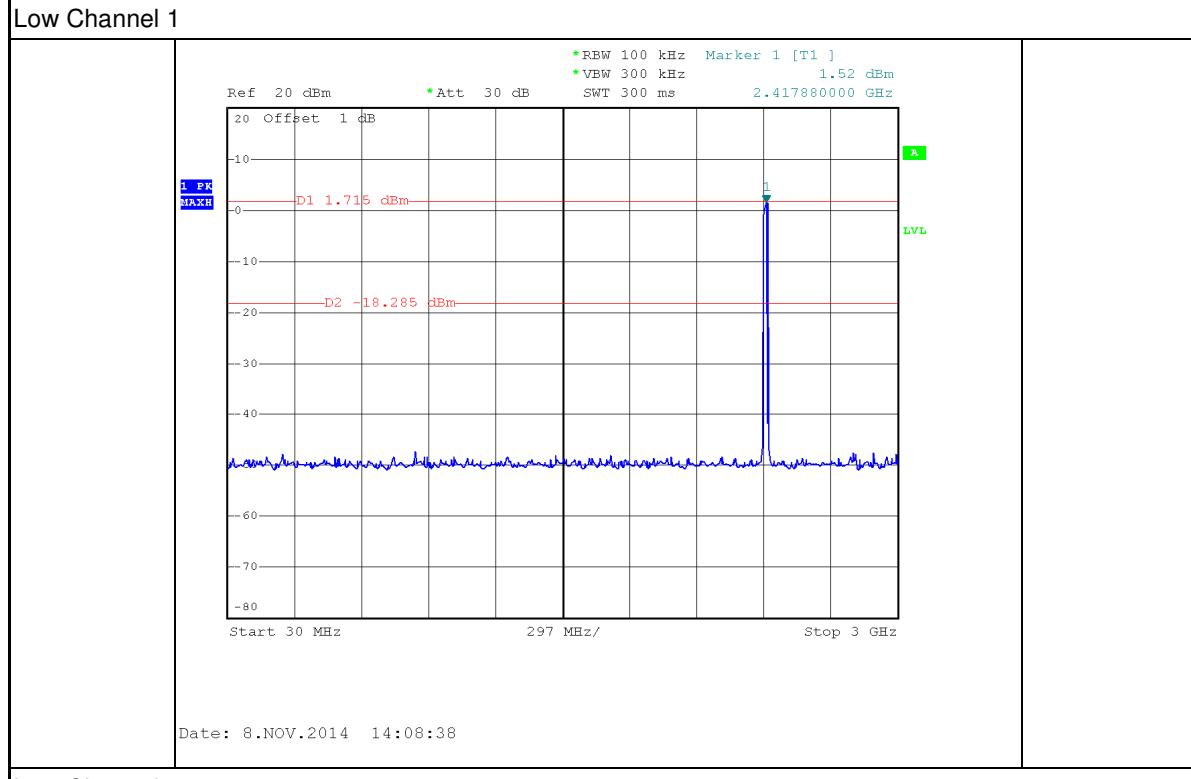
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**High Channel 6dB Bandwidth**



Appendix C.8: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11g_ANT3

Low Channel 1



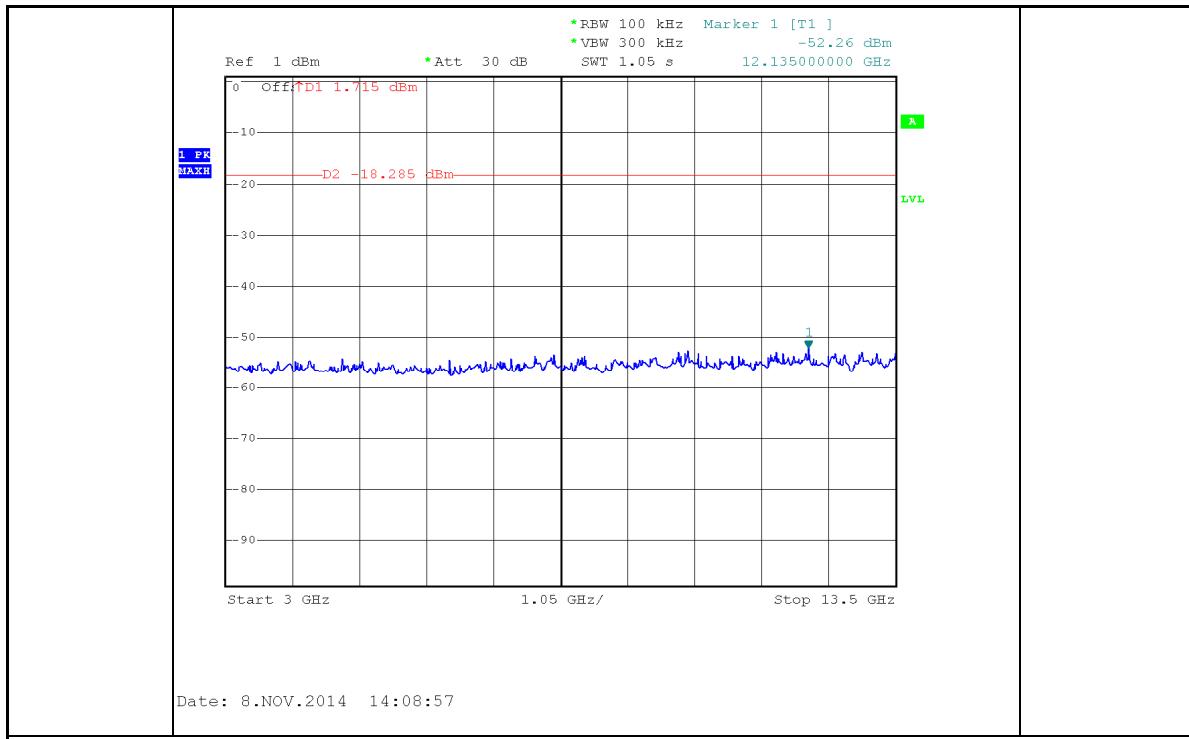
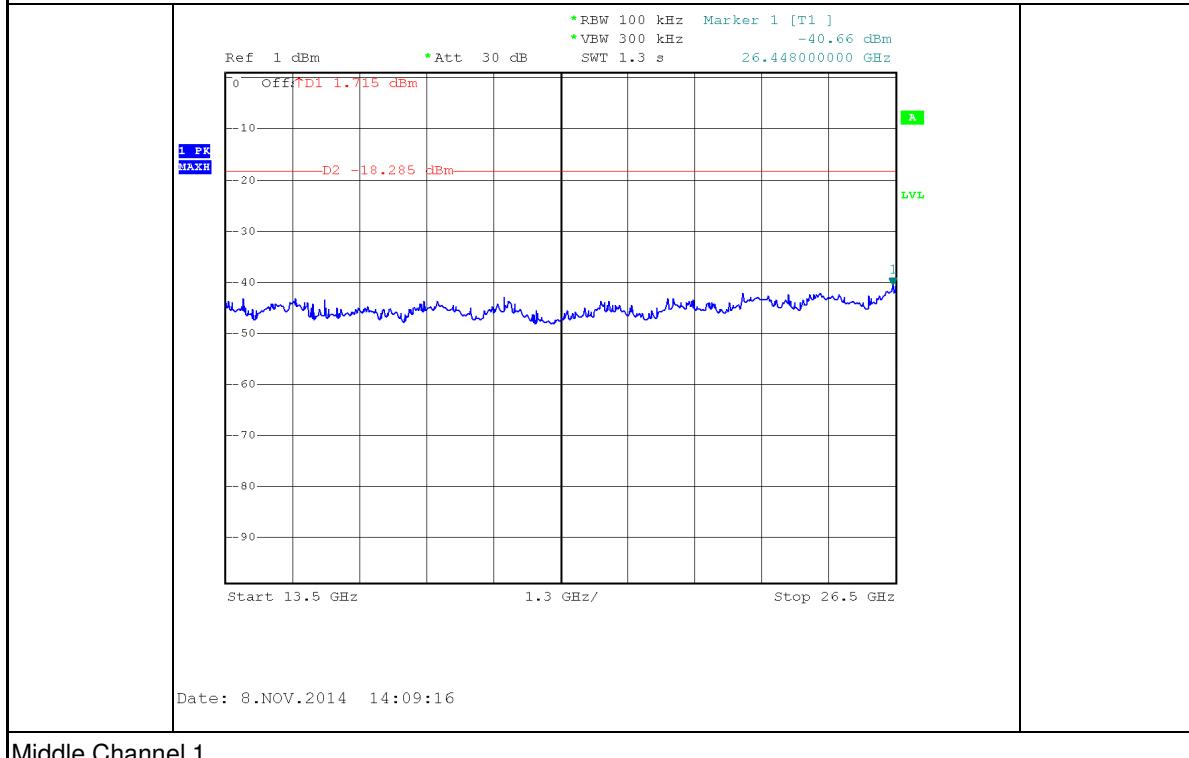
Low Channel 2

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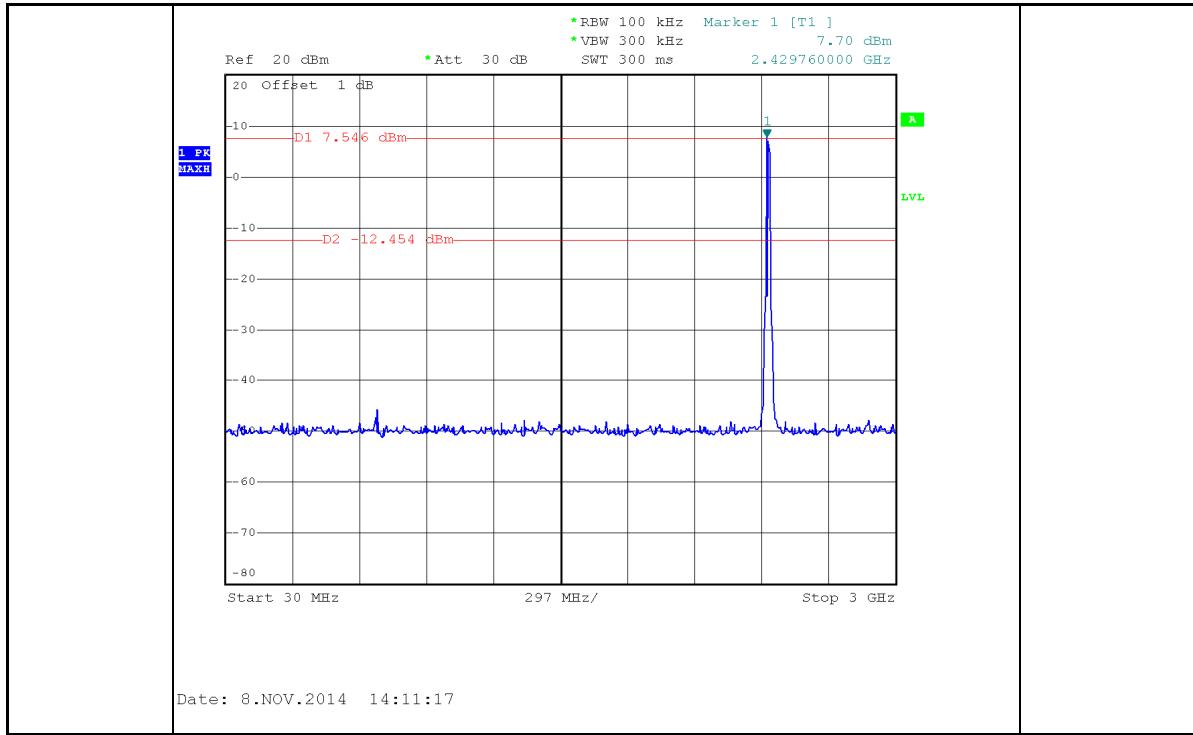
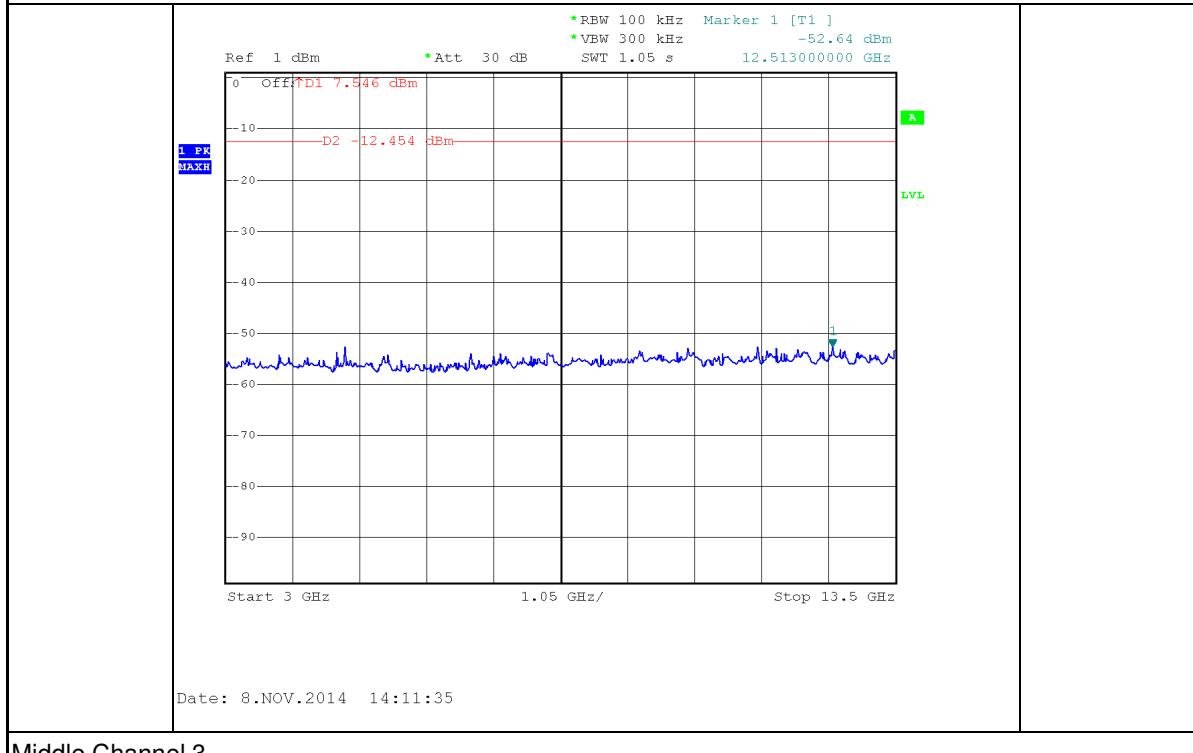
**Low Channel 3**

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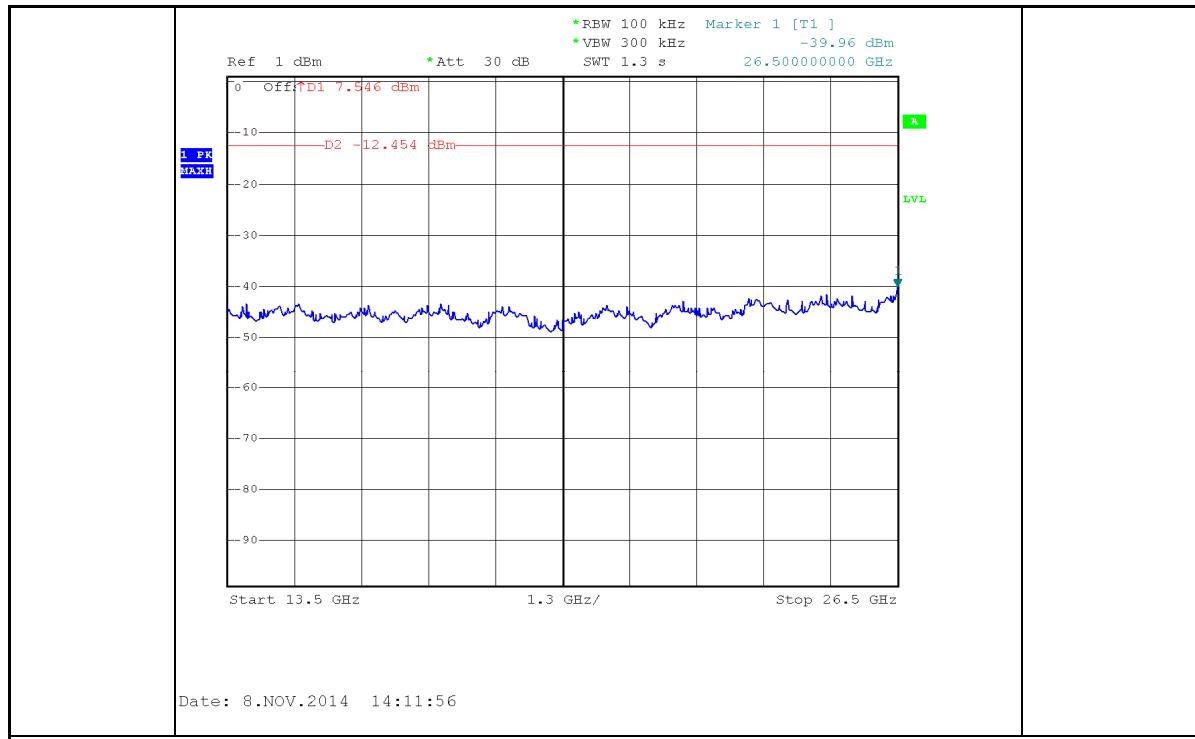
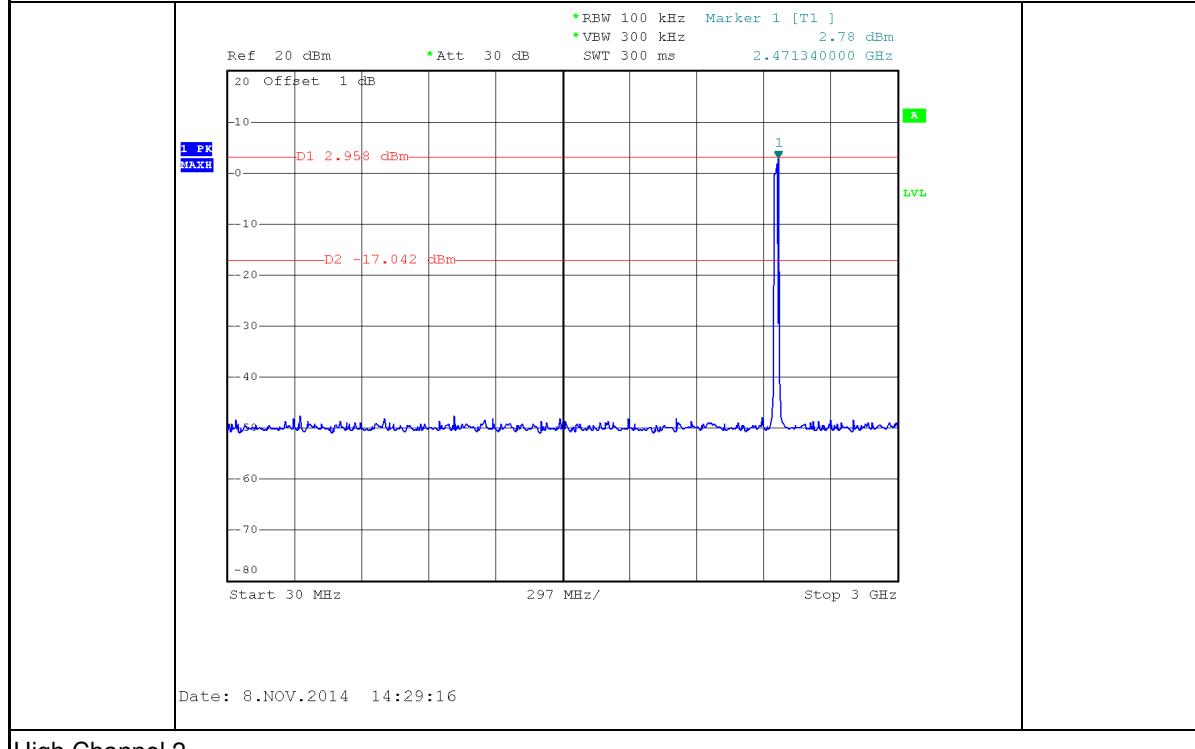
**Middle Channel 2**

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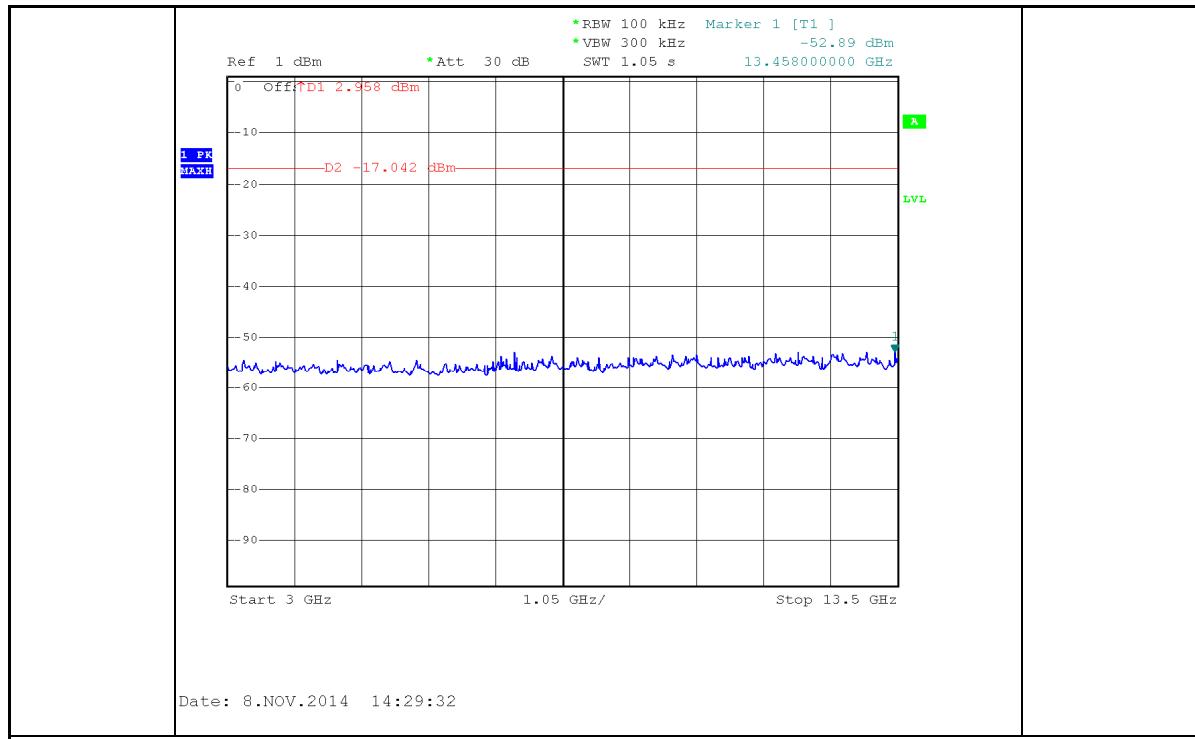
**High Channel 1**

Produkte

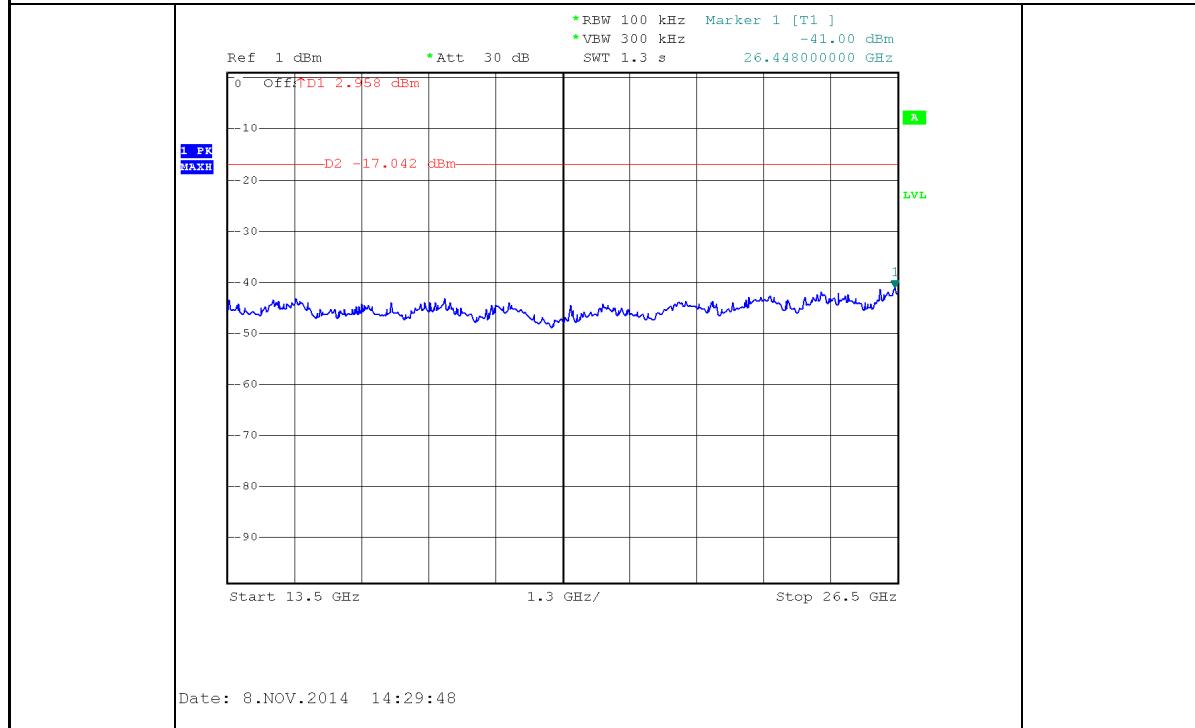
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High Channel 3



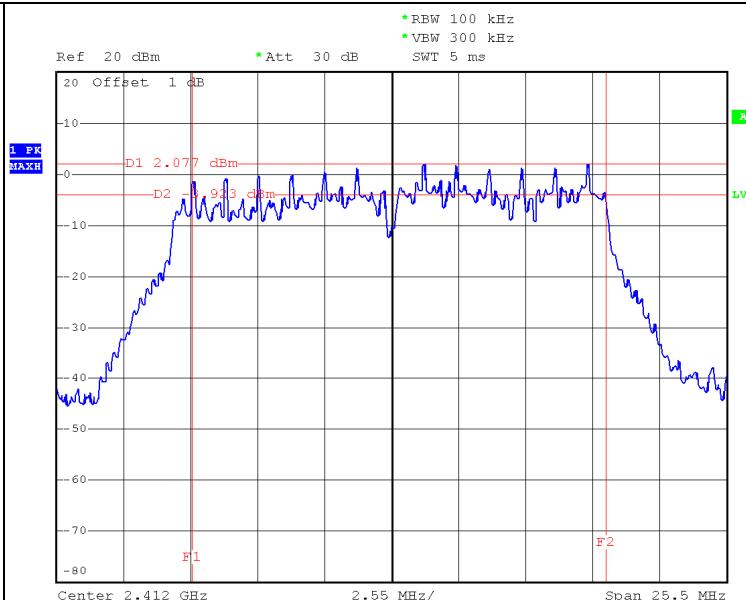
Appendix C.9: Maximum Conducted Output Power 802.11n HT20

Channel	Channel Frequency (MHz)	Maximum Conducted Output Power_ANT1 (dBm)	Maximum Conducted Output Power_ANT2 (dBm)	Maximum Conducted Output Power_ANT 3 (dBm)	Maximum Conducted Output Power_Total (dBm)	Limit(dBm)
Low Channel	2412	13.40	13.20	13.30	18.07	26.6
Middle Channel	2437	18.40	18.40	18.40	23.17	26.6
High Channel	2462	13.40	13.40	13.50	18.20	26.6

Appendix C.10: 6dB Bandwidth and 99% Bandwidth_802.11n HT20_ANT1

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.76	16.42
Middle Channel	2437	15.76	16.57
High Channel	2462	15.81	16.47

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 13:04:14

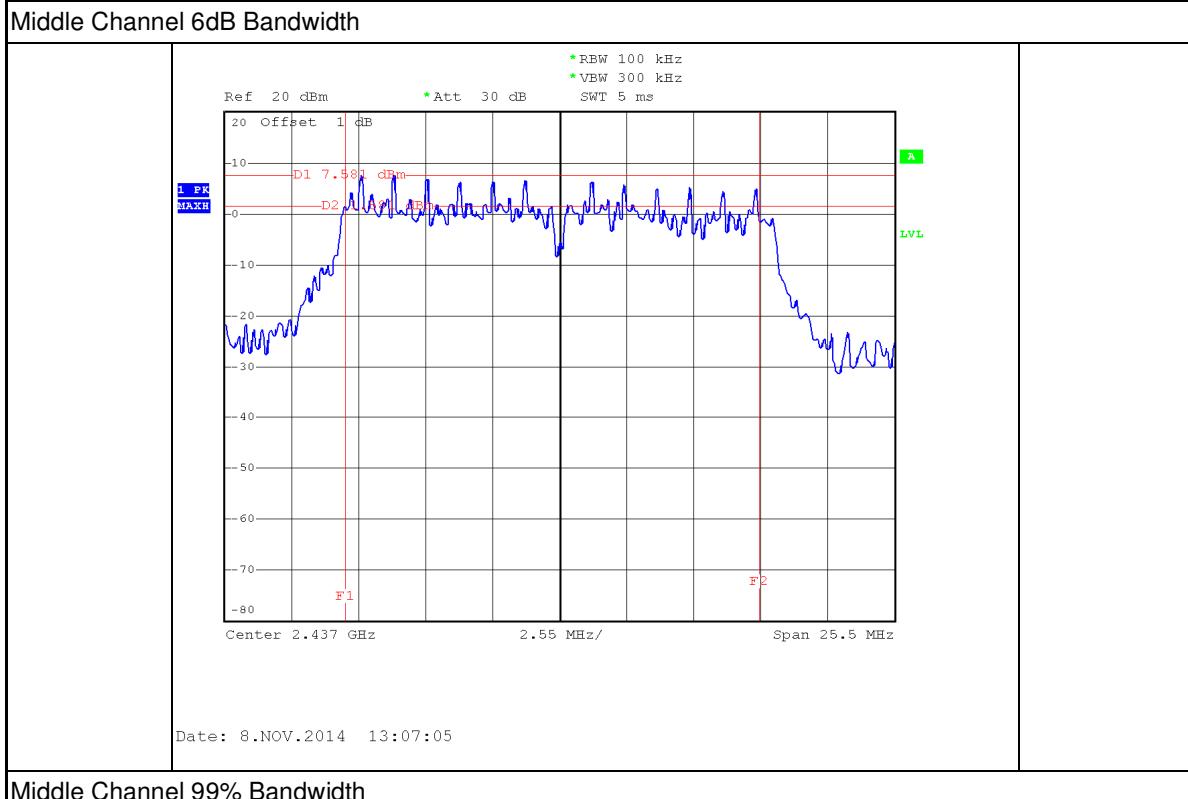
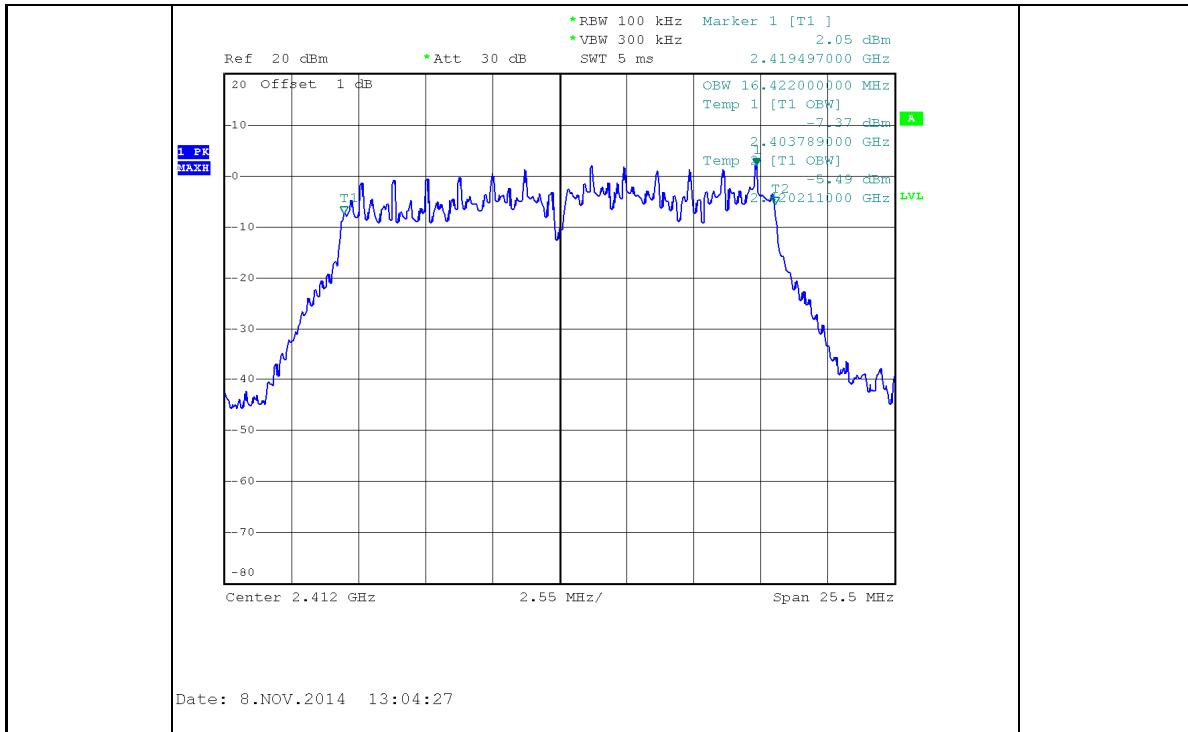
Low Channel 99% Bandwidth

Produkte

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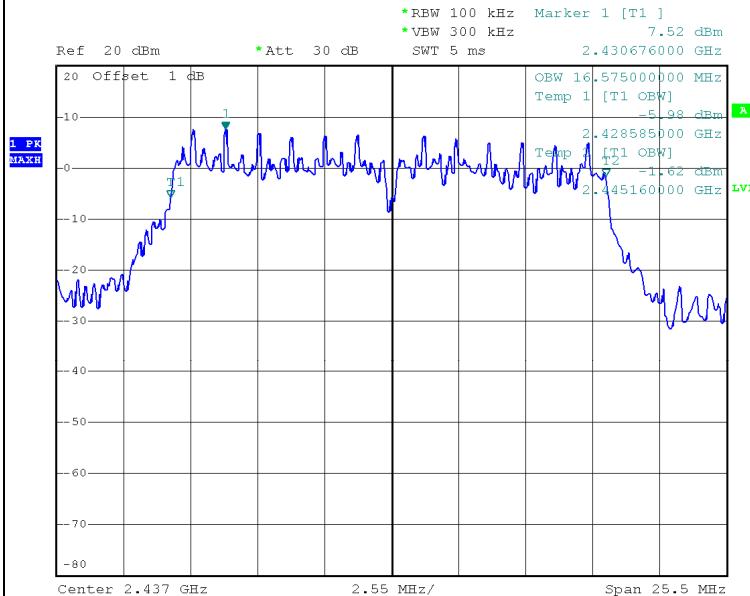


Produkte

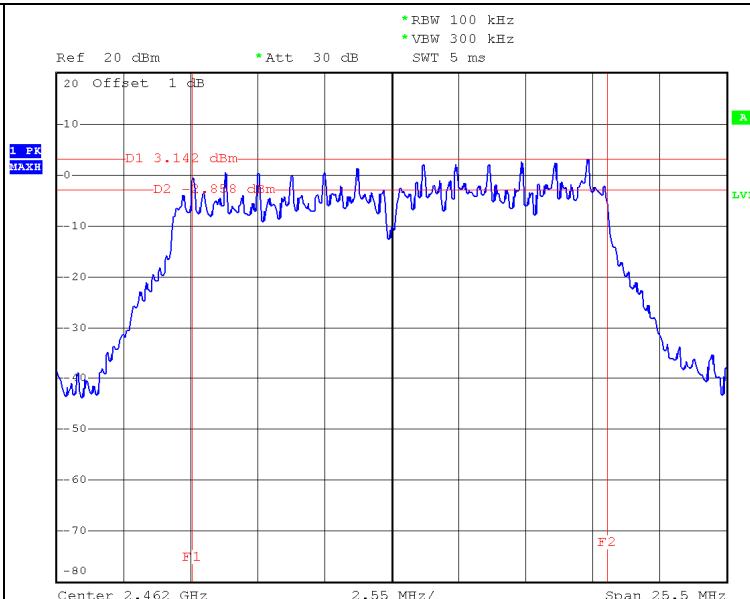
Products

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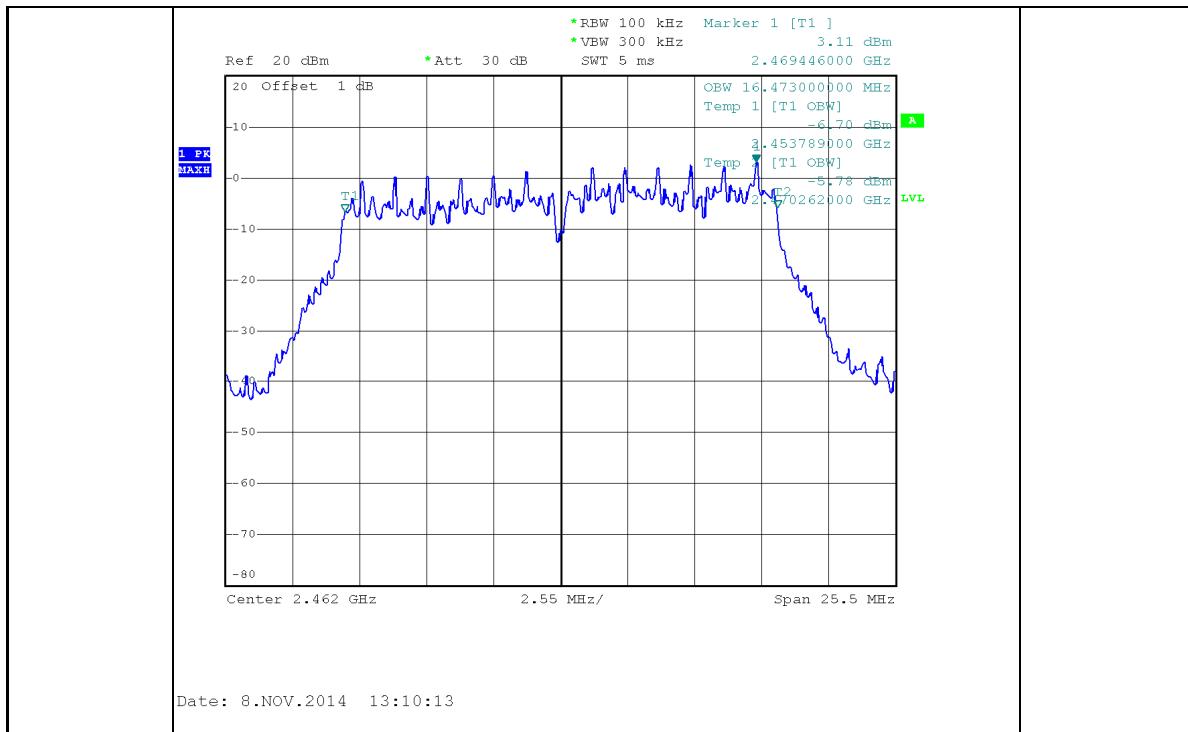


Date: 8.NOV.2014 13:07:17

High Channel 6dB Bandwidth

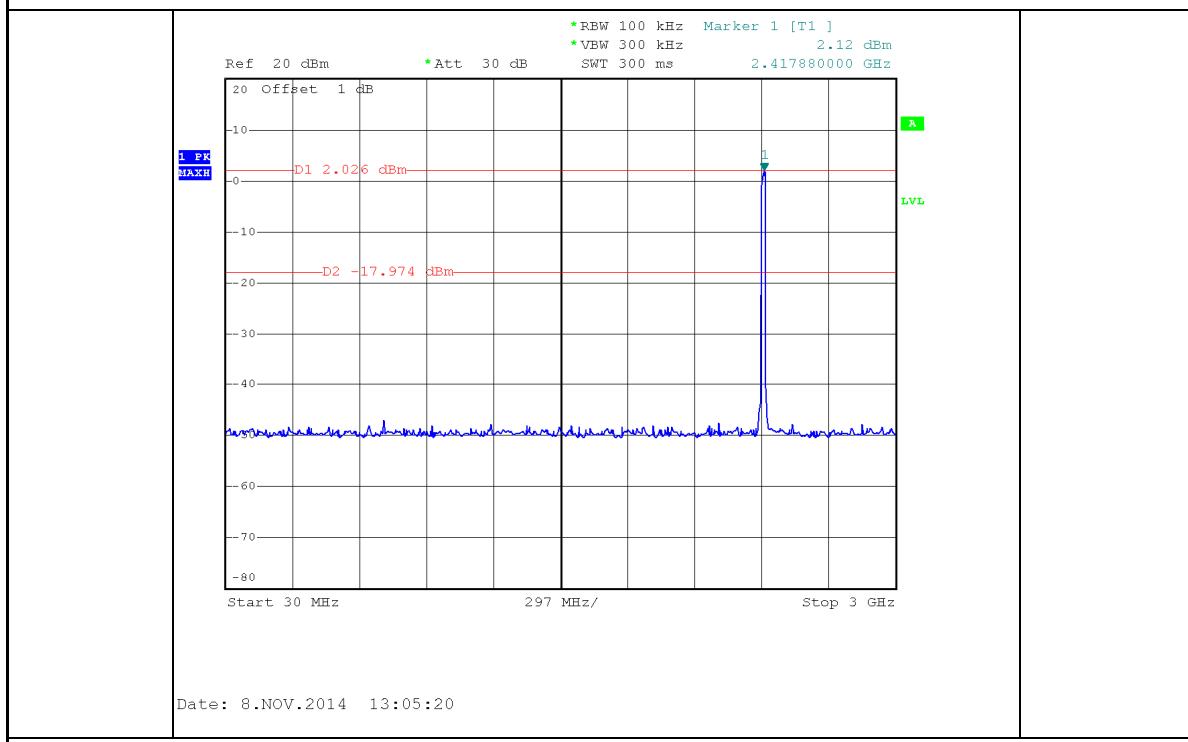
Date: 8.NOV.2014 13:10:01

High Channel 99% Bandwidth



Appendix C.11: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT20_ANT1

Low Channel 1



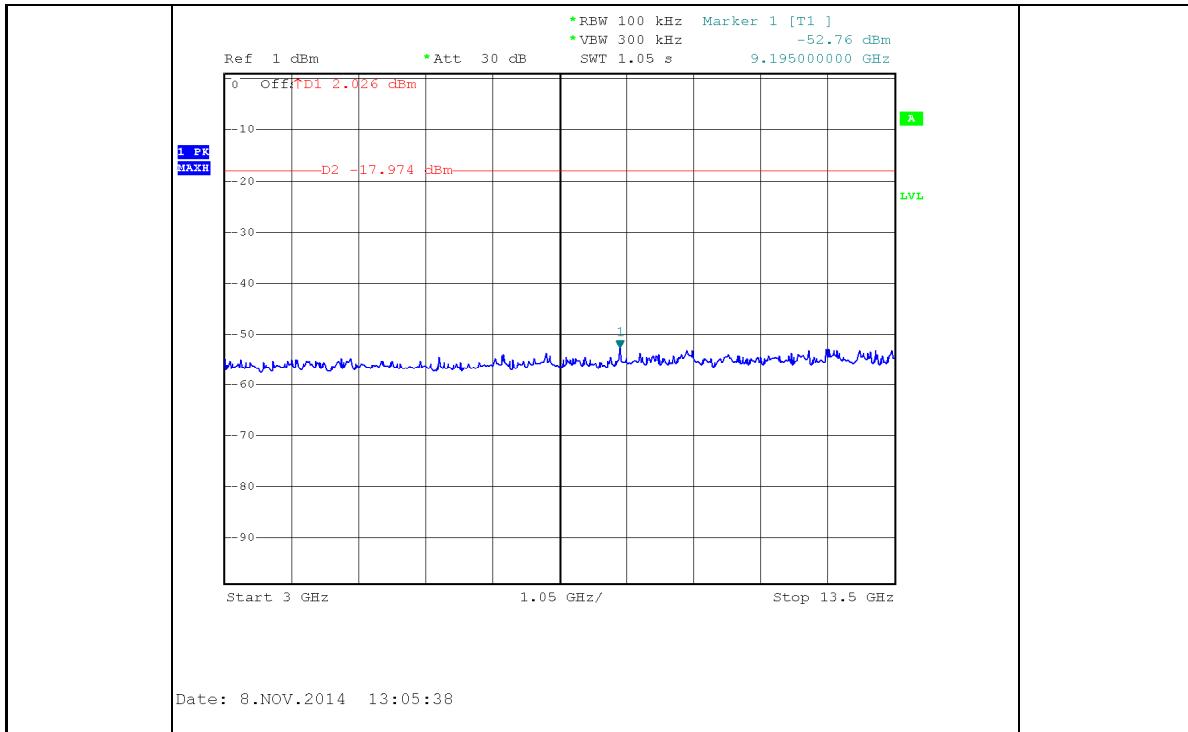
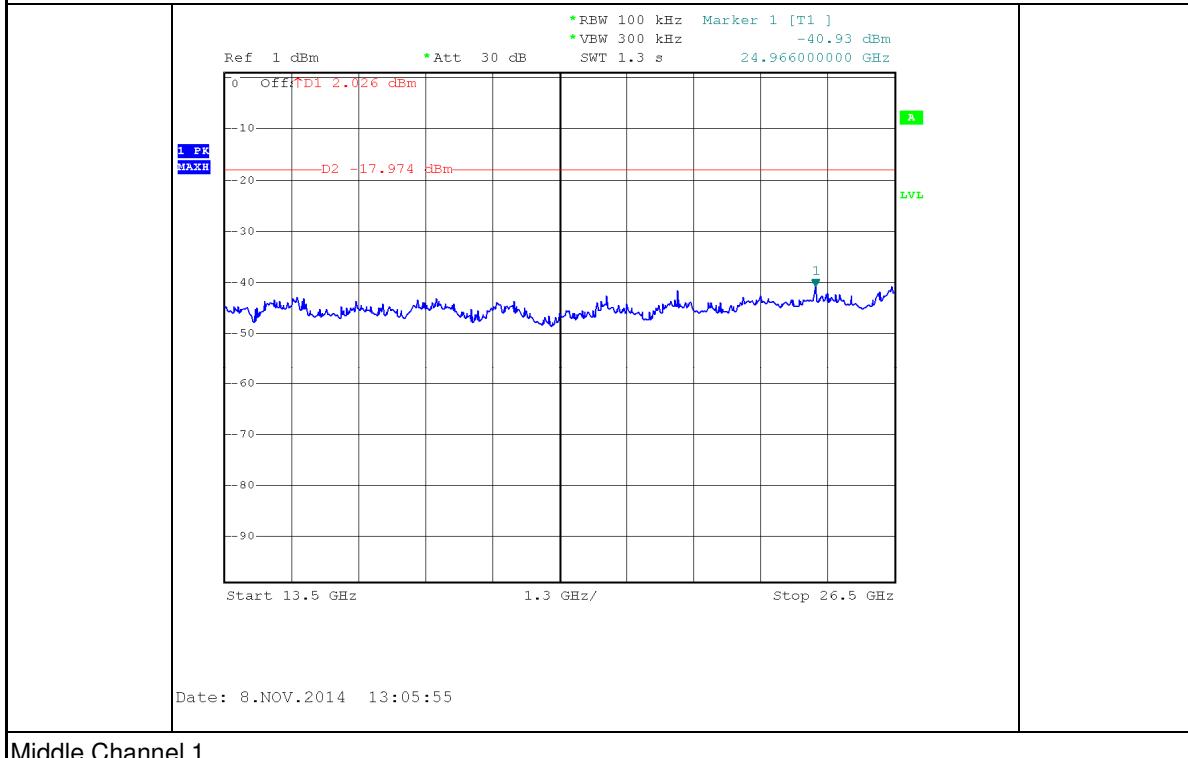
Low Channel 2

Produkte

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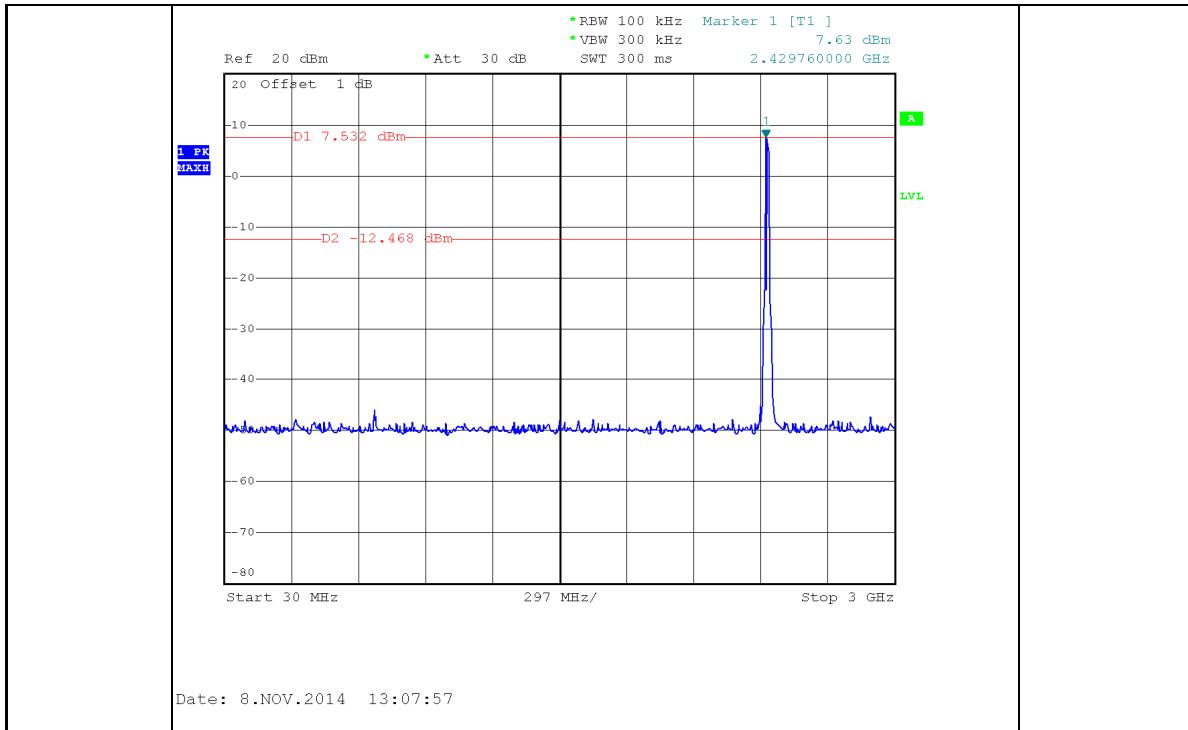
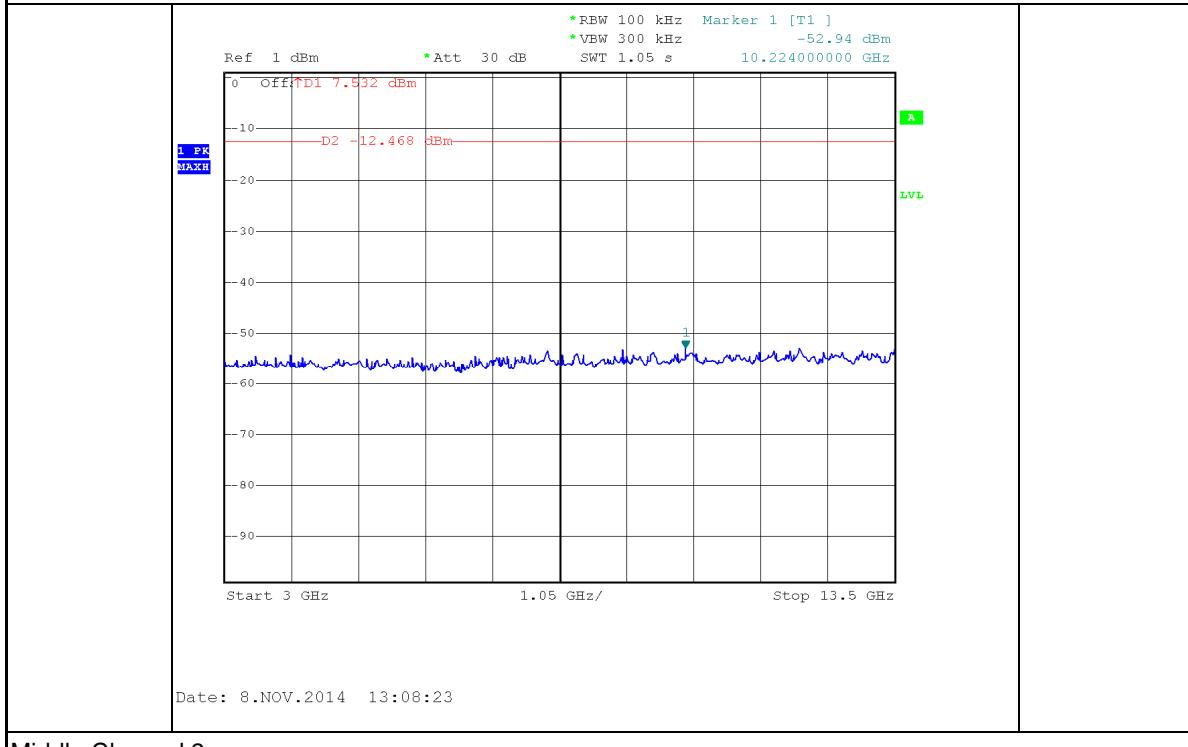
**Low Channel 3**

Produkte

Products

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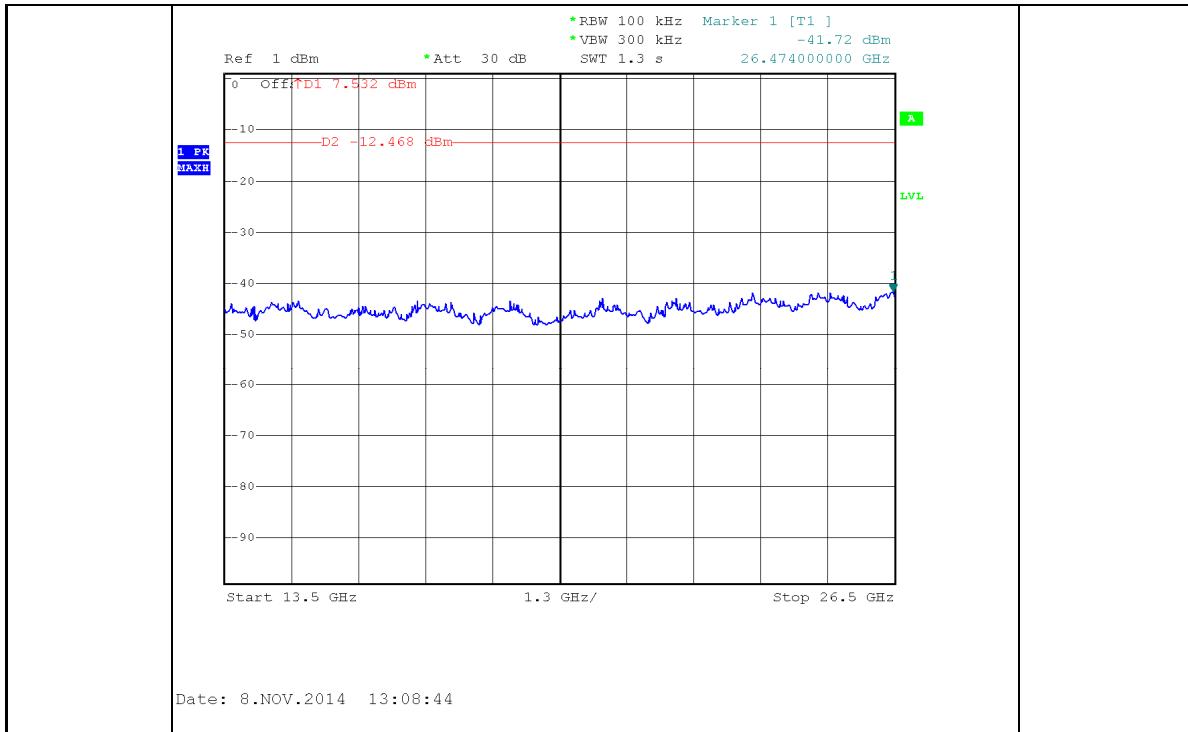
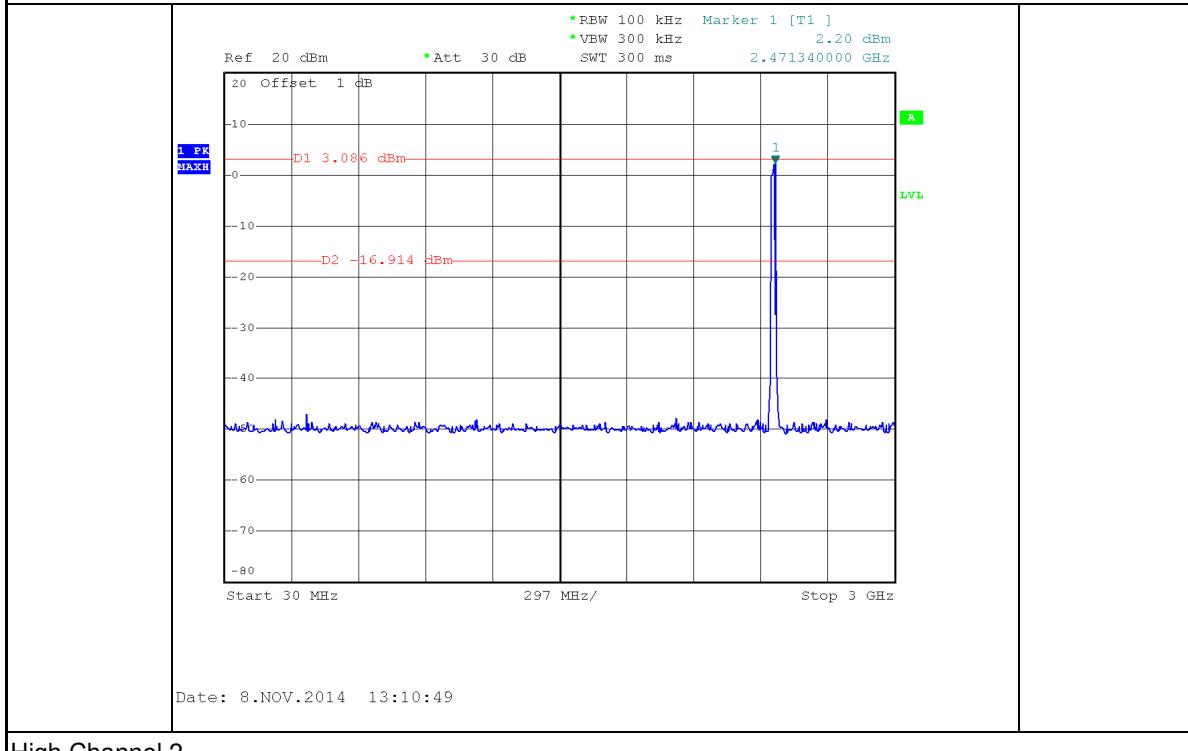
**Middle Channel 2**

Produkte

Products

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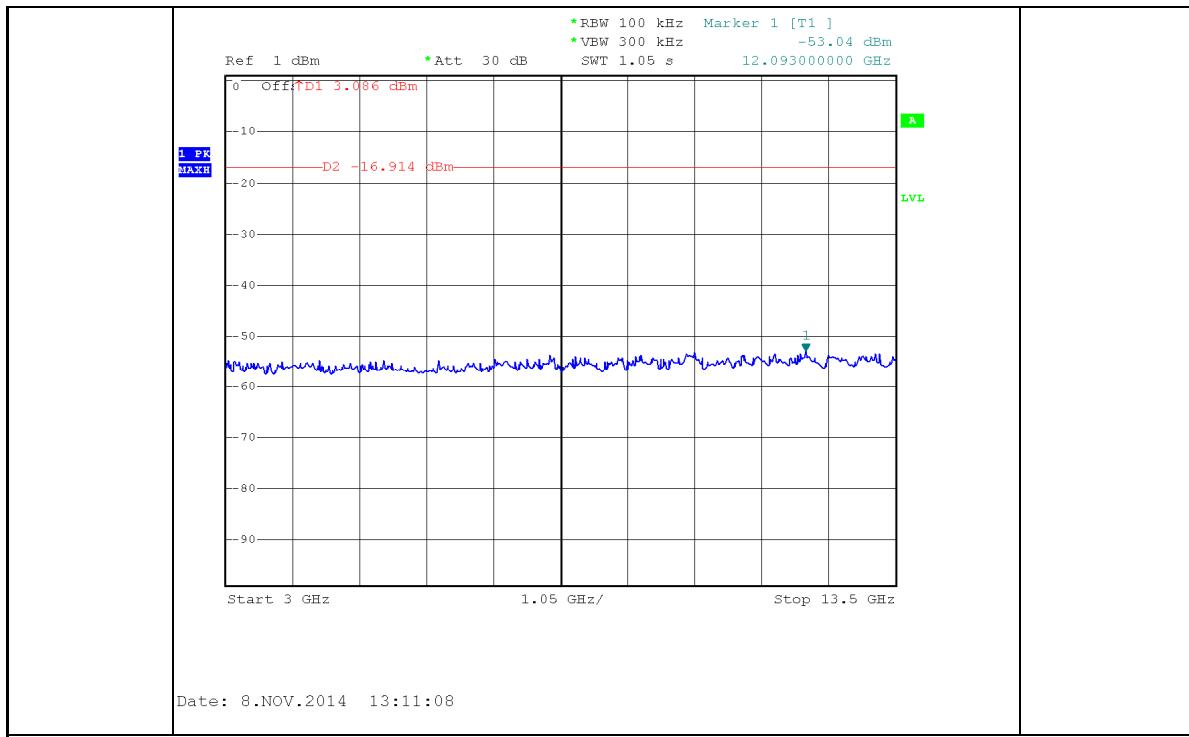
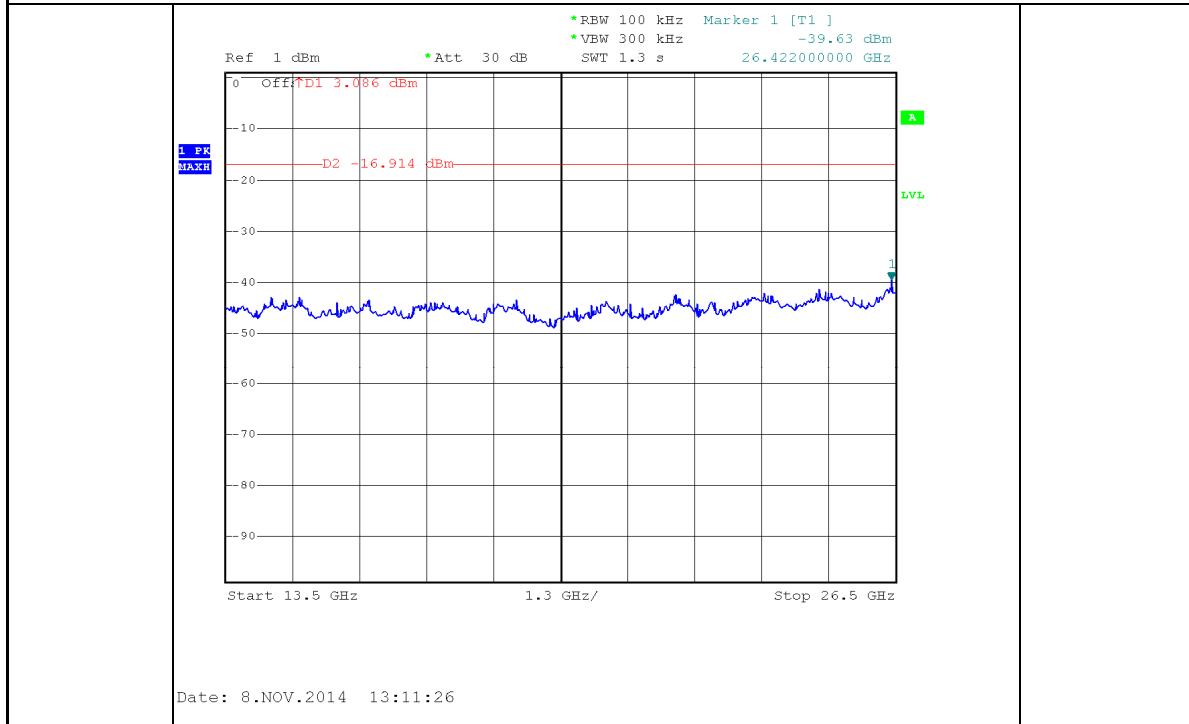
**High Channel 1****High Channel 2**

Produkte

Products

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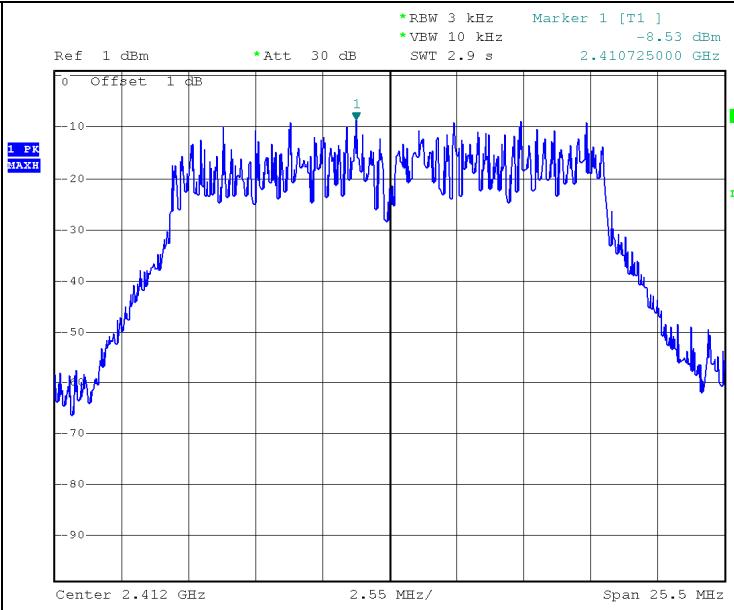
**High Channel 3**

Appendix C.12: Power Spectral Density_802.11n HT20

Channel	Channel Frequency (MHz)	PSD_ANT1 (dBm/3kHz)	PSD_ANT2 (dBm/3kHz)	PSD_ANT 3 (dBm/3kHz)	PSD_Total (dBm/3kHz)	Limit (dBm/3kHz)
Low Channel	2412	-8.53	-7.82	-8.27	-3.43	4.6
Middle Channel	2437	-1.00	-2.33	-2.06	3.01	4.6
High Channel	2462	-7.71	-8.02	-8.31	-3.24	4.6

Power Spectral Density_AN1

2412 MHz



Date: 8.NOV.2014 13:06:15

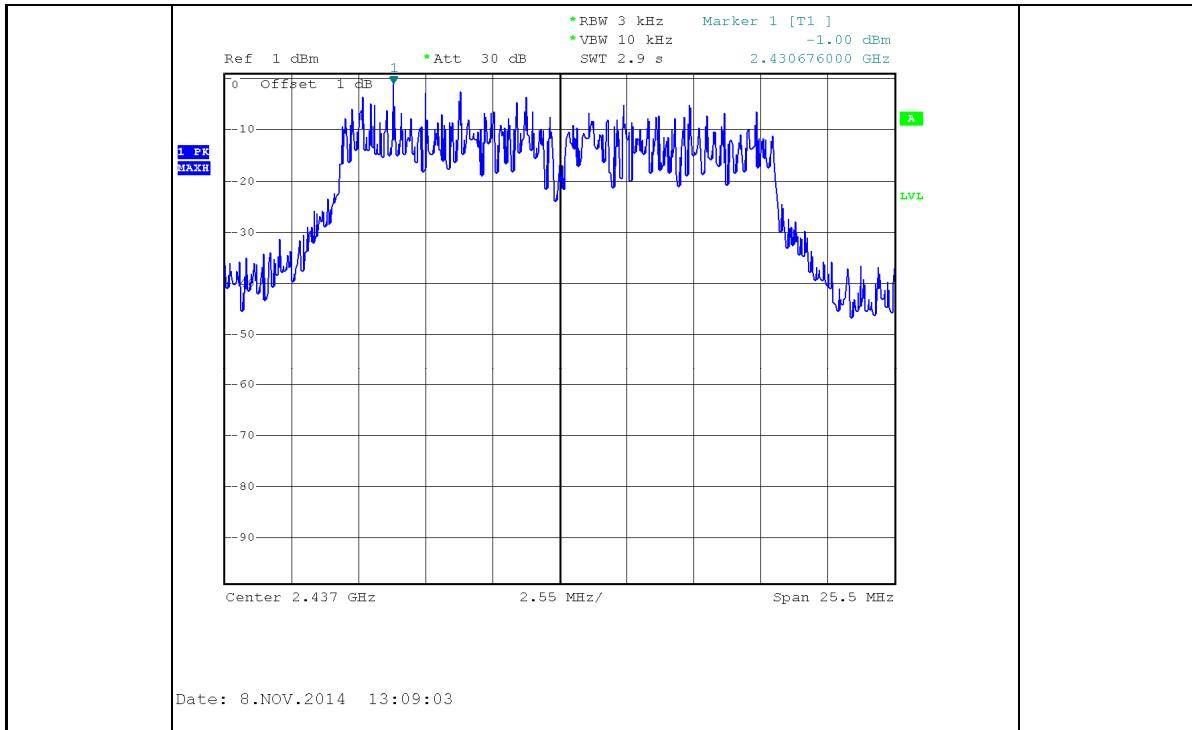
2437 MHz

Produkte

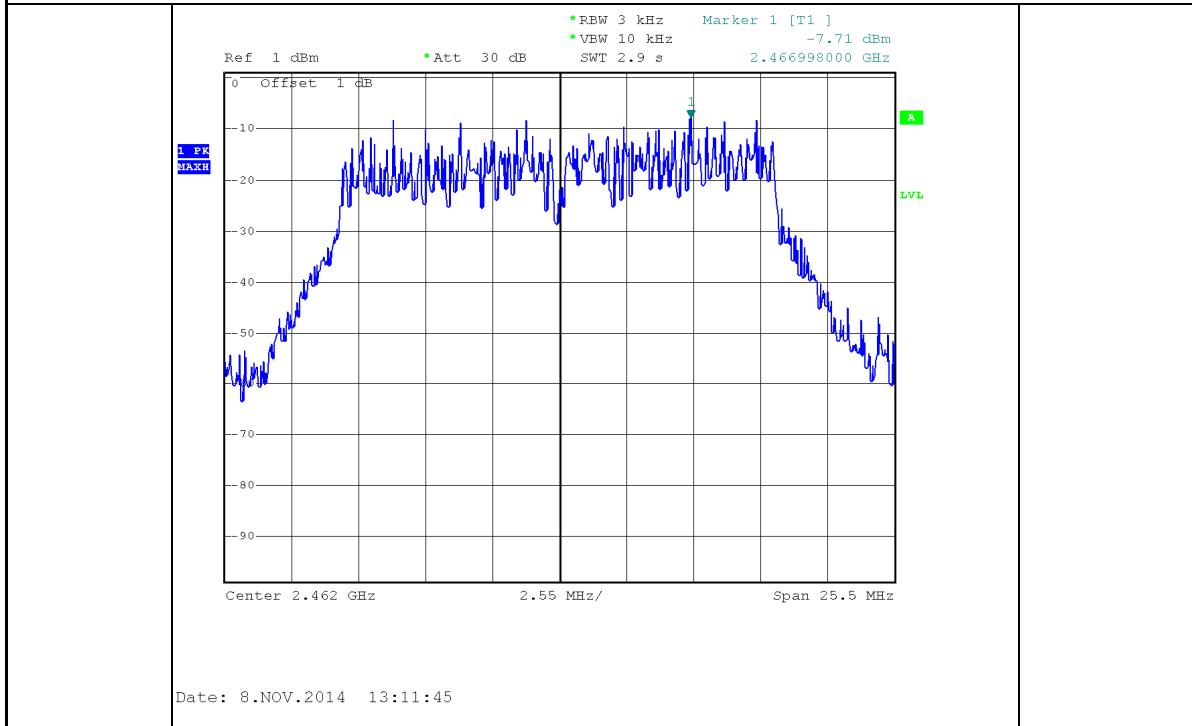
Products

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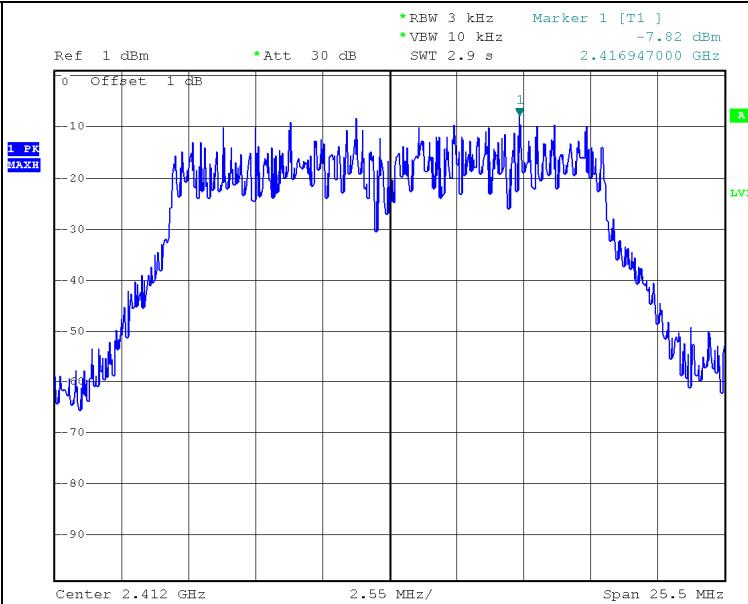


2462 MHz



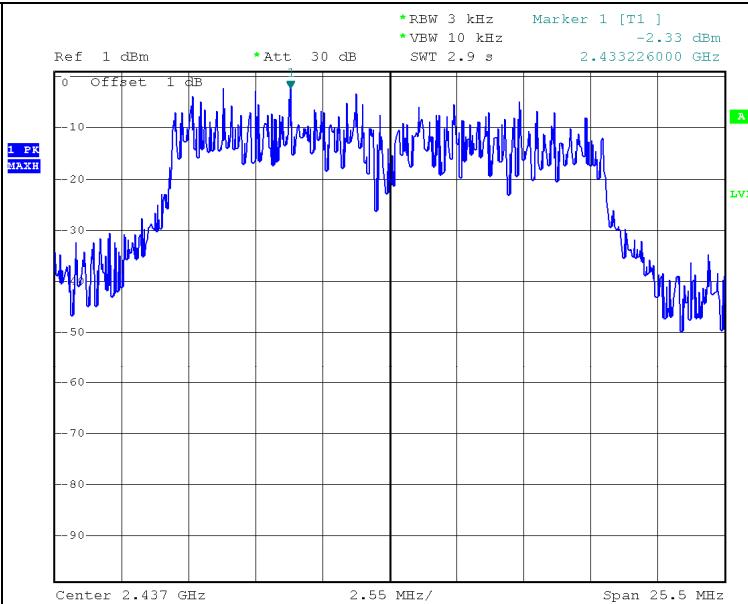
Power Spectral Density_ANT2

2412 MHz



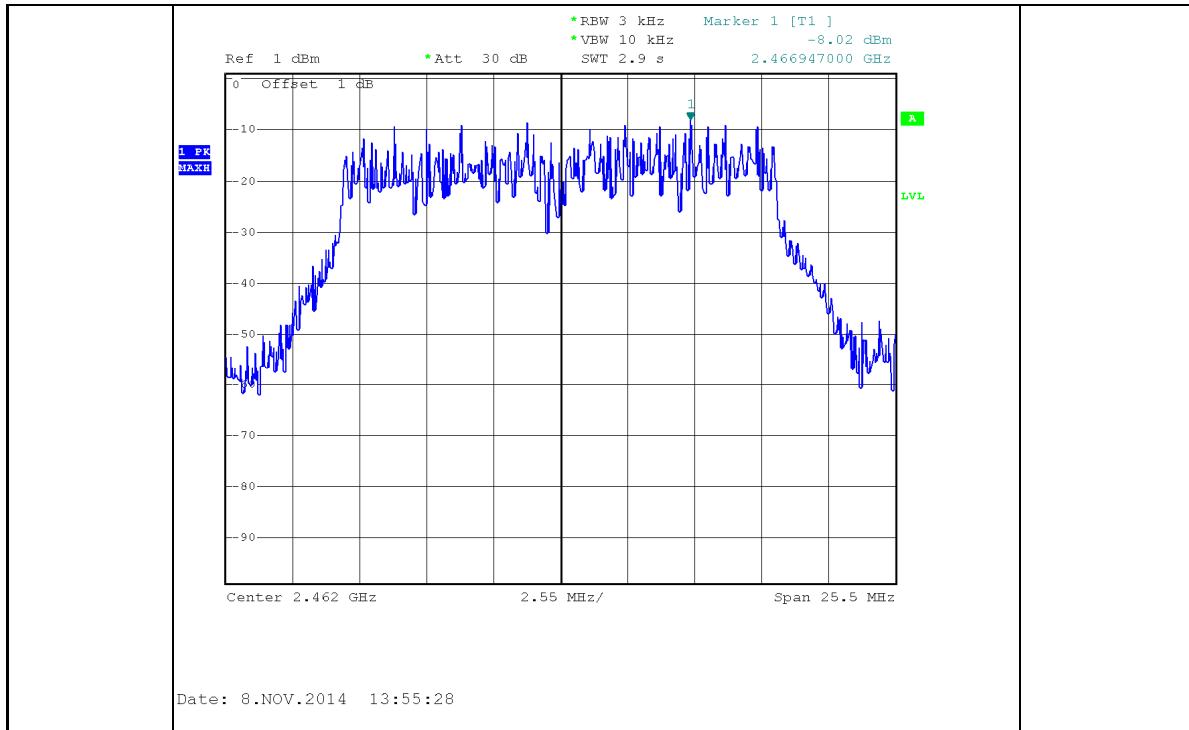
Date: 8.NOV.2014 13:50:04

2437 MHz



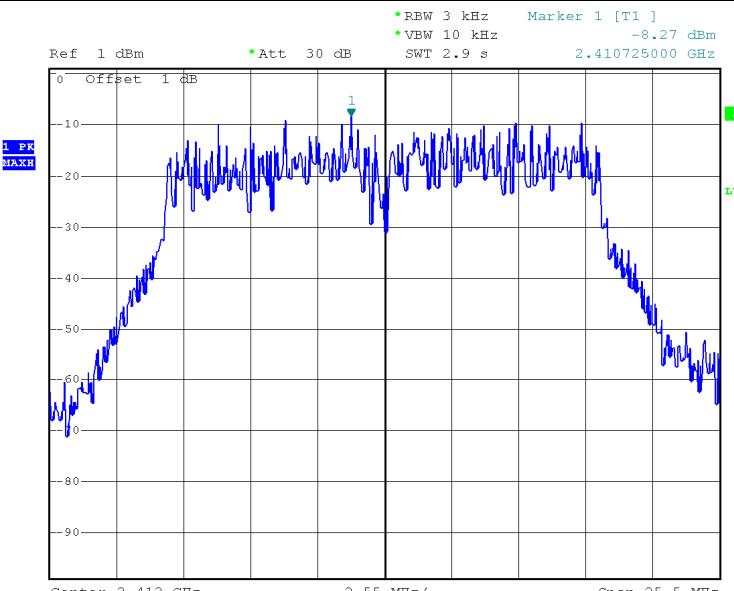
Date: 8.NOV.2014 13:52:46

2462 MHz



Power Spectral Density_ANT3

2412 MHz



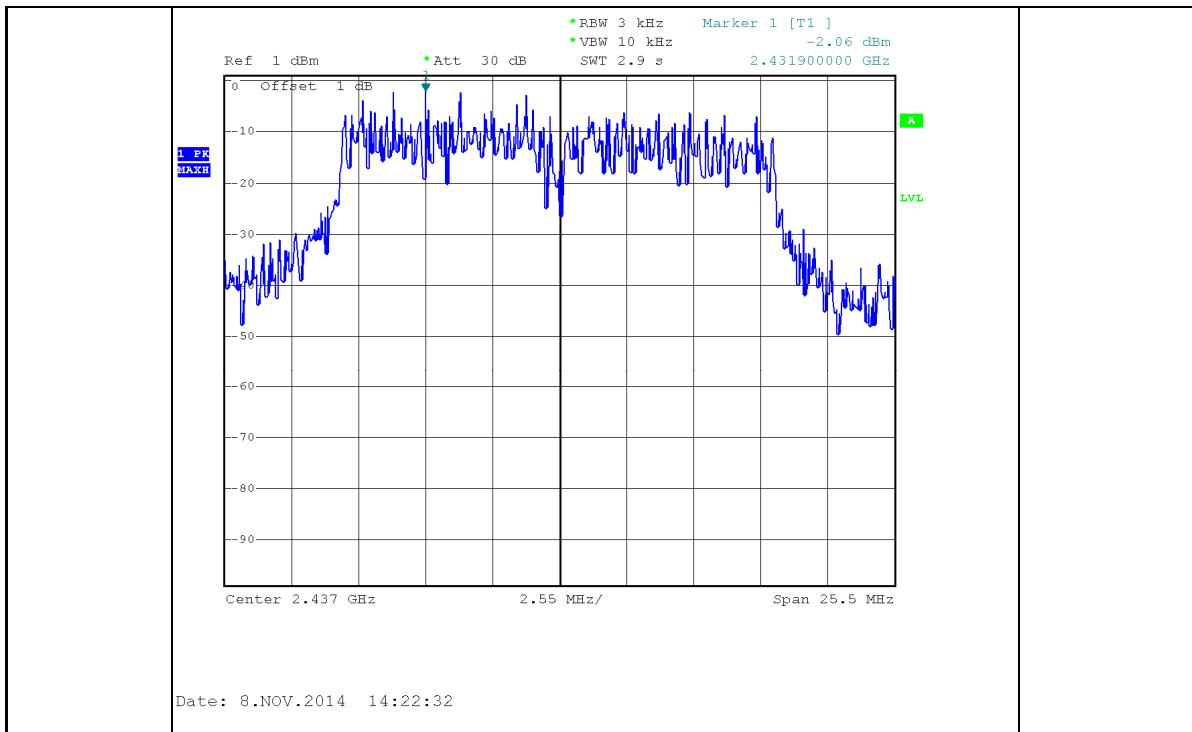
2437 MHz

Produkte

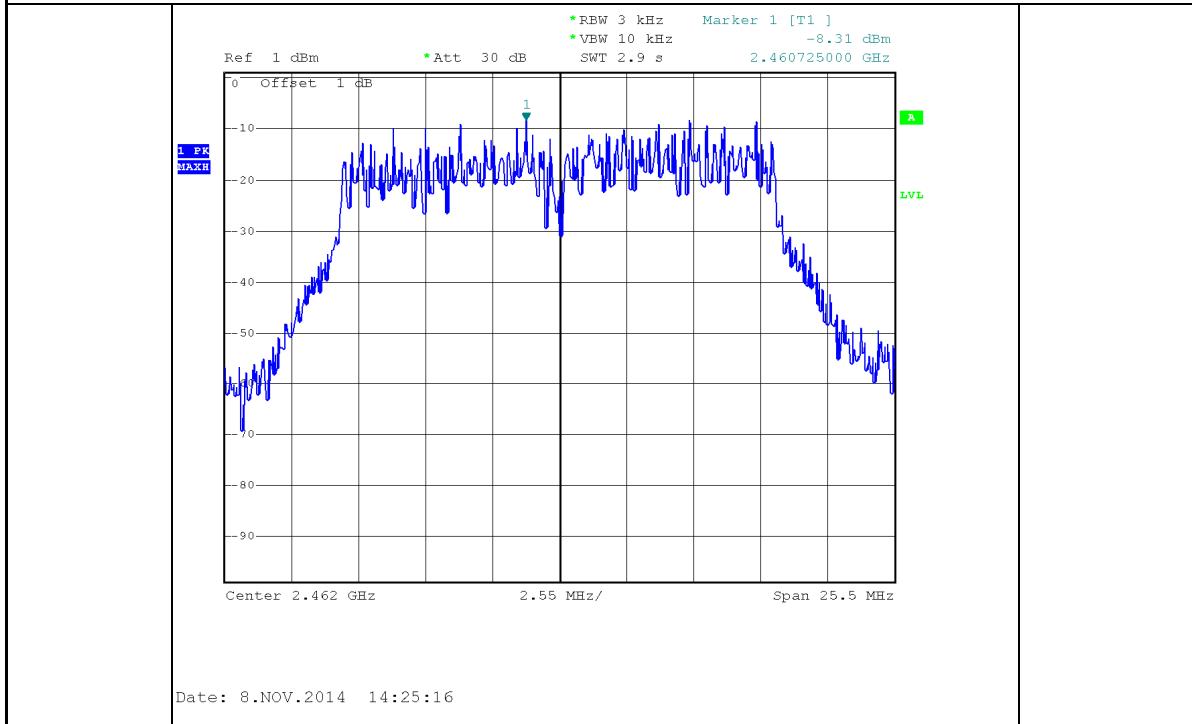
Products

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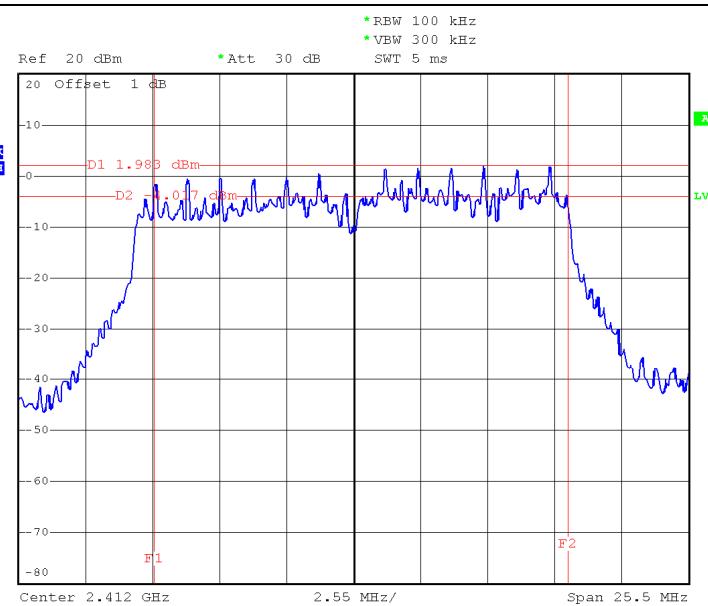
2462 MHz



Appendix C.13: 6dB Bandwidth and 99% Bandwidth_802.11n HT20_ANT2

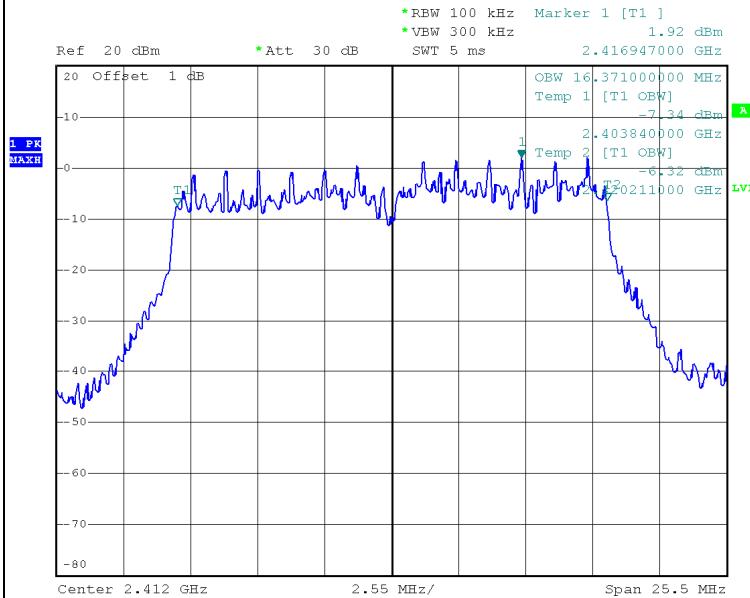
Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.76	16.37
Middle Channel	2437	15.61	16.37
High Channel	2462	16.12	16.37

Low Channel 6dB Bandwidth



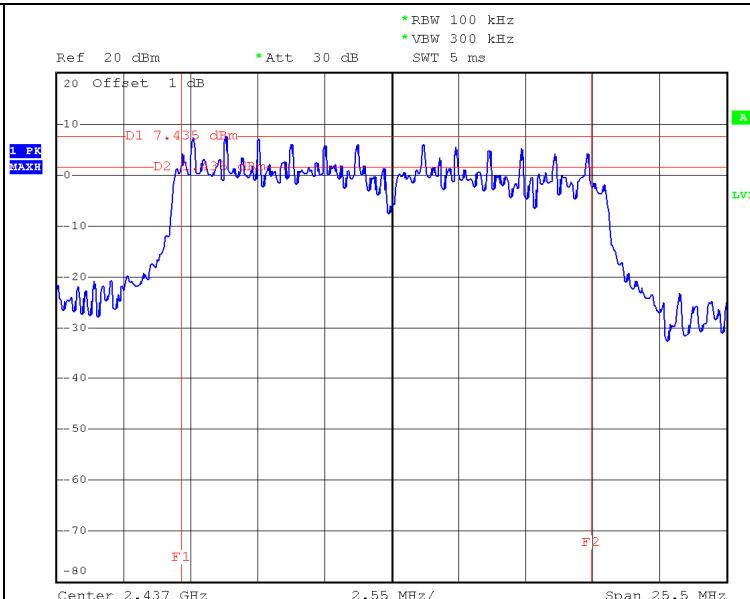
Date: 8.NOV.2014 13:48:13

Low Channel 99% Bandwidth



Date: 8.NOV.2014 13:48:26

Middle Channel 6dB Bandwidth



Date: 8.NOV.2014 13:50:59

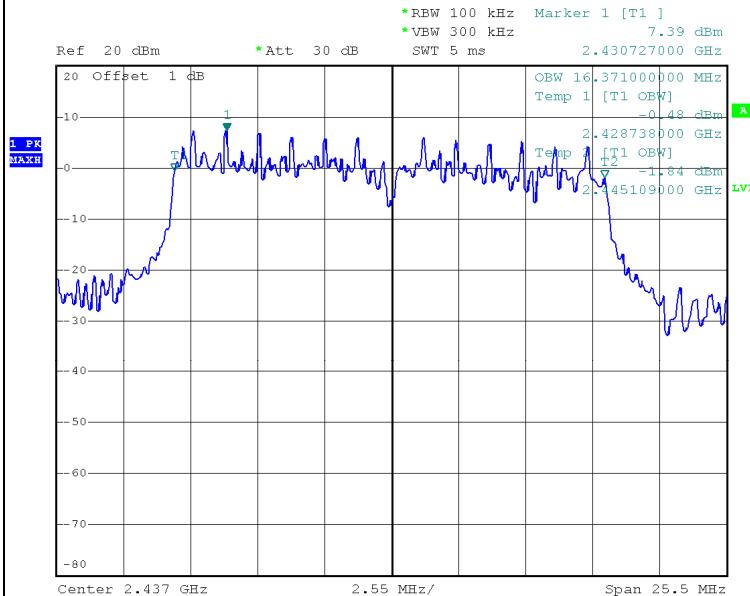
Middle Channel 99% Bandwidth

Produkte

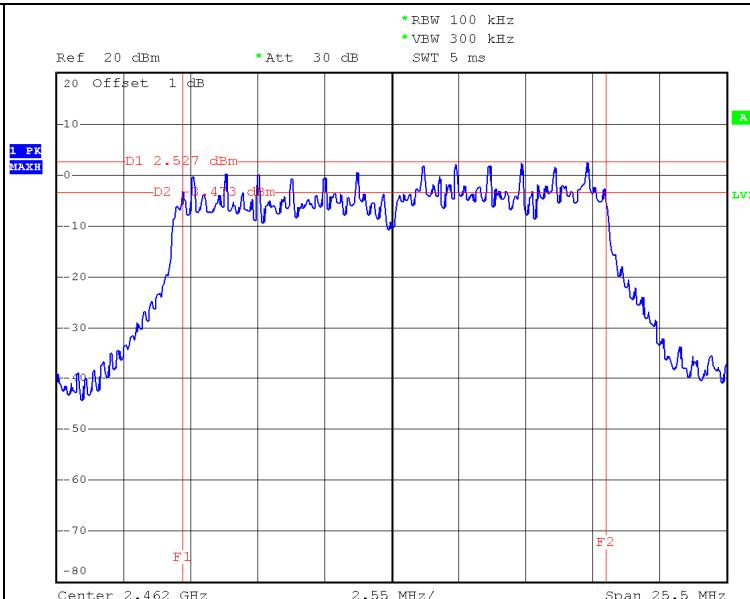
Products

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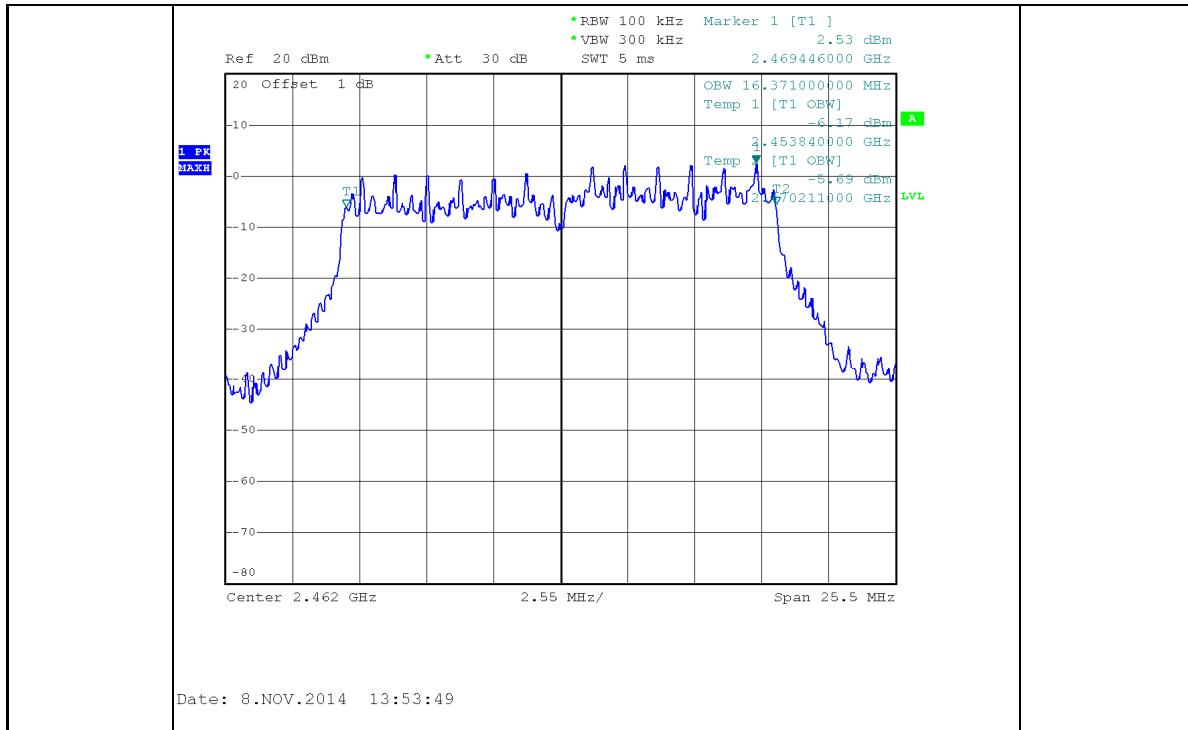


Date: 8.NOV.2014 13:51:12

High Channel 6dB Bandwidth

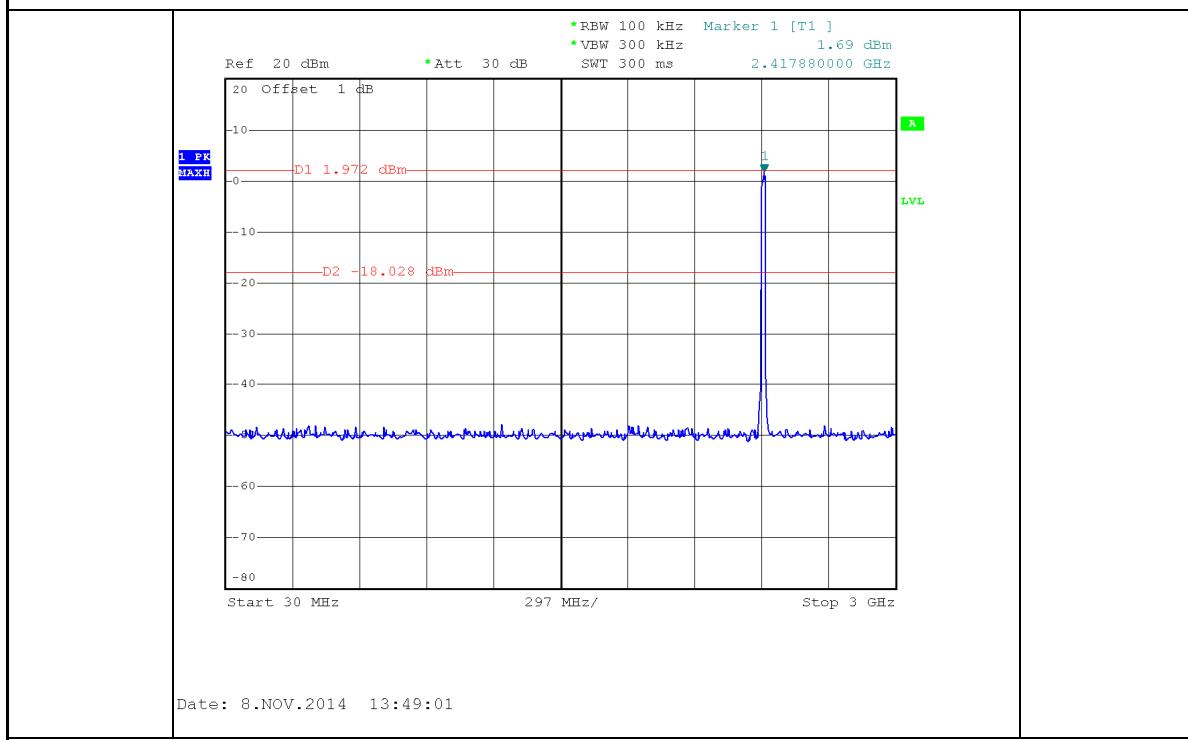
Date: 8.NOV.2014 13:53:37

High Channel 99% Bandwidth



Appendix C.14: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT20_ANT2

Low Channel 1



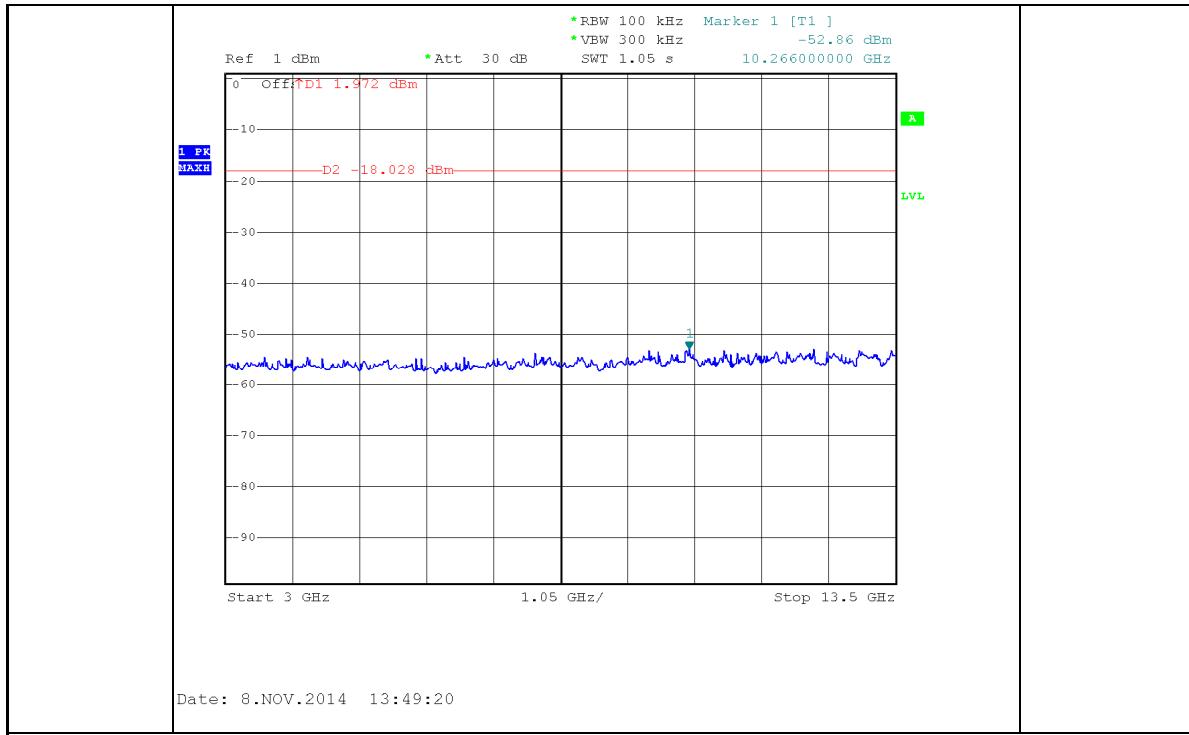
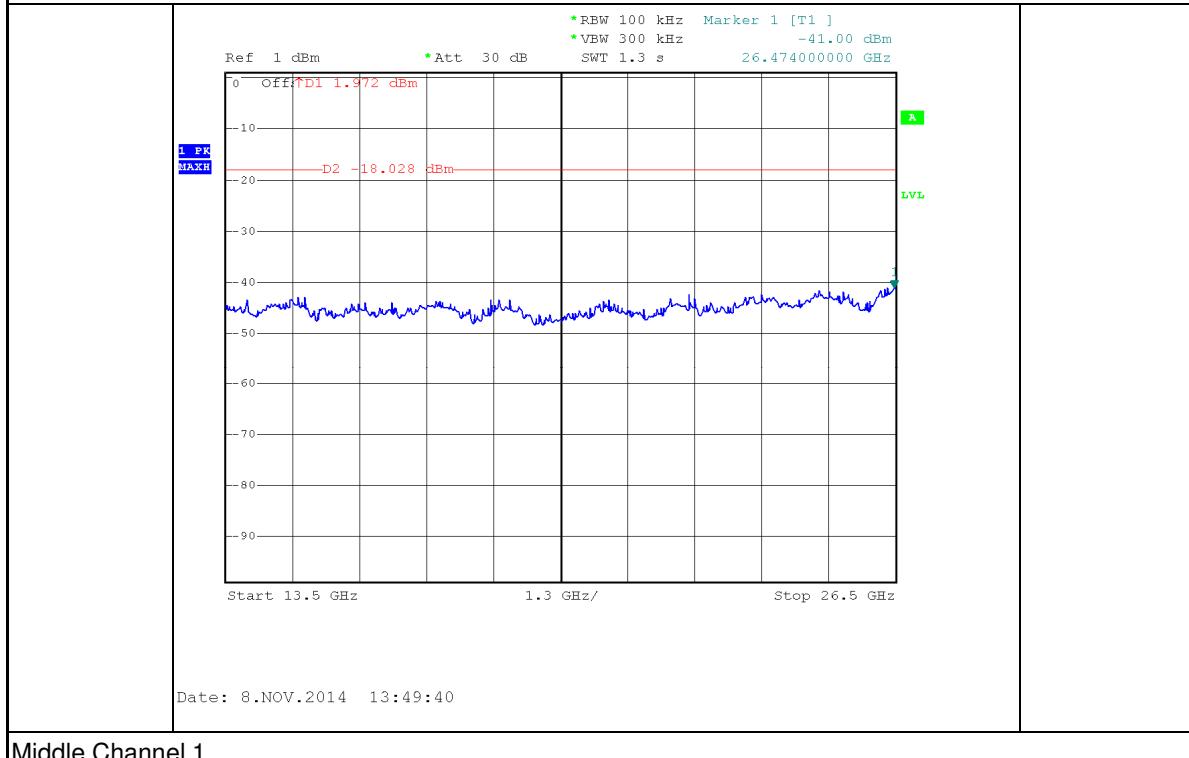
Low Channel 2

Produkte

Products

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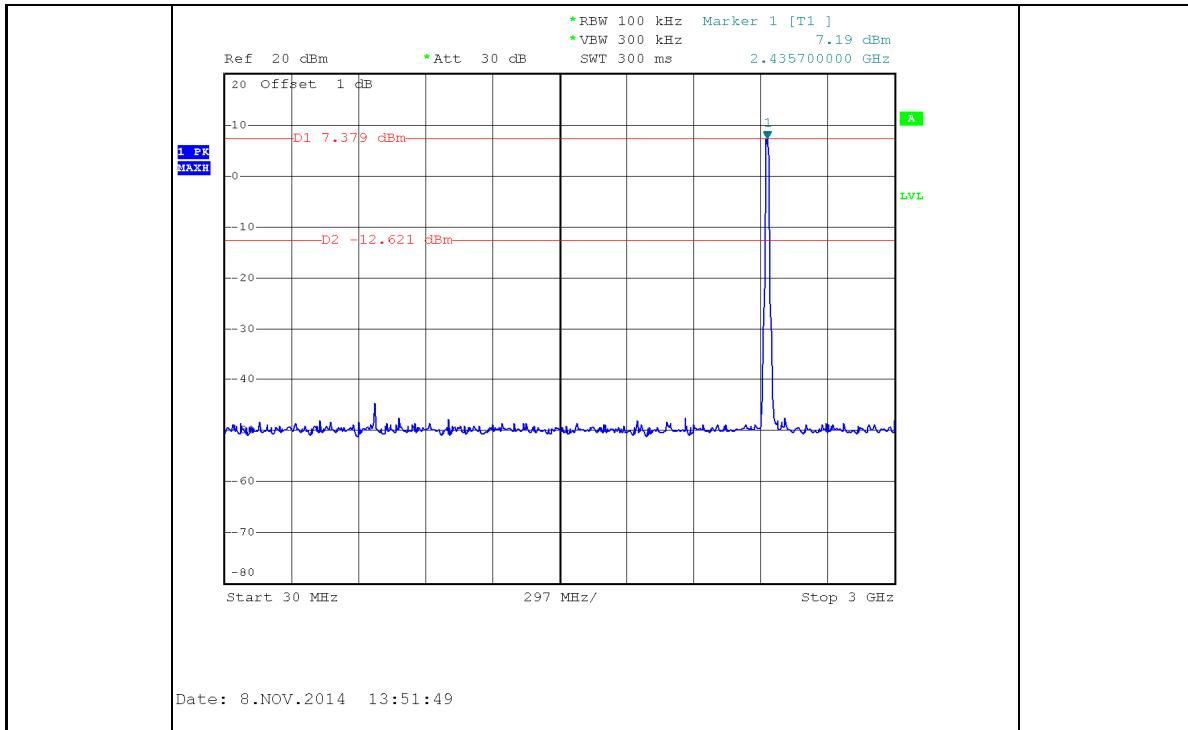
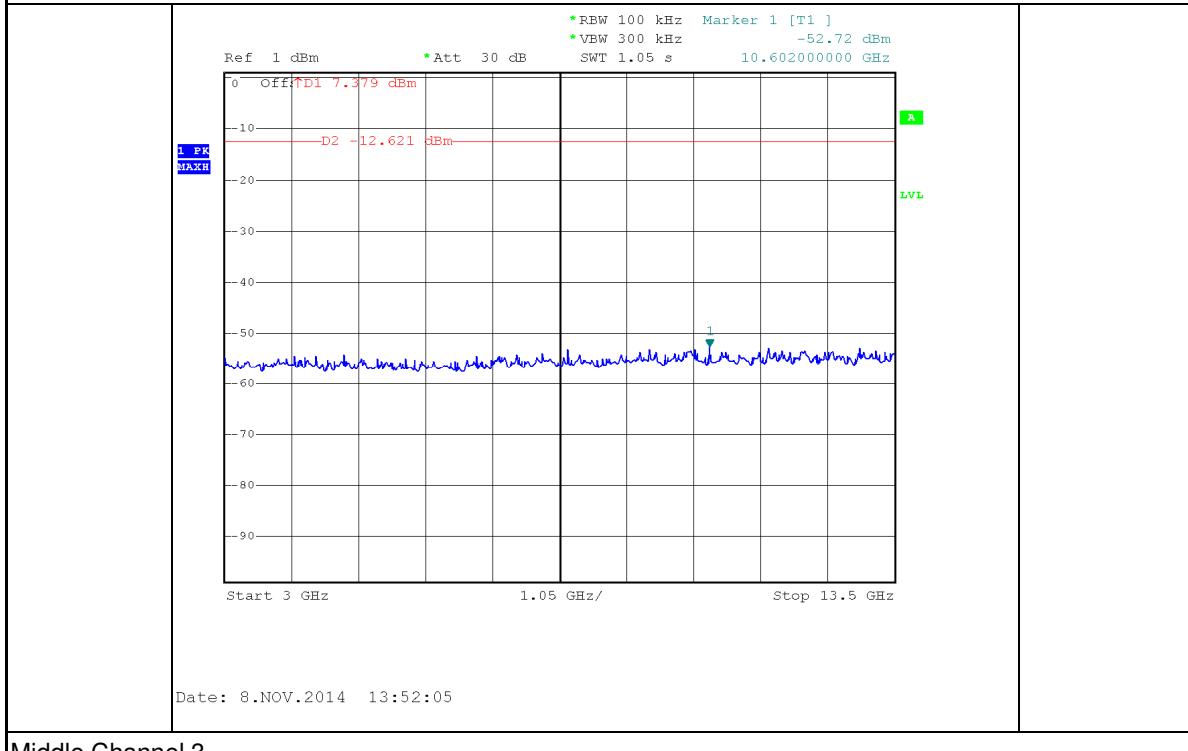
**Low Channel 3**

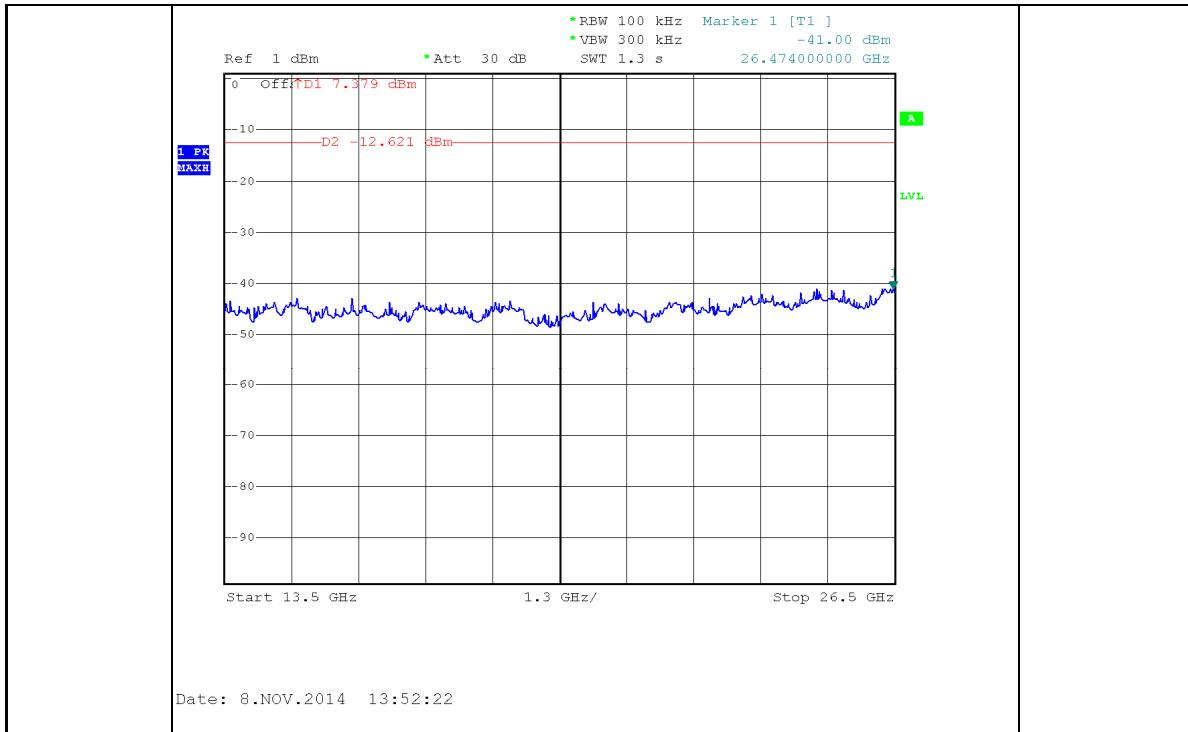
Produkte

Products

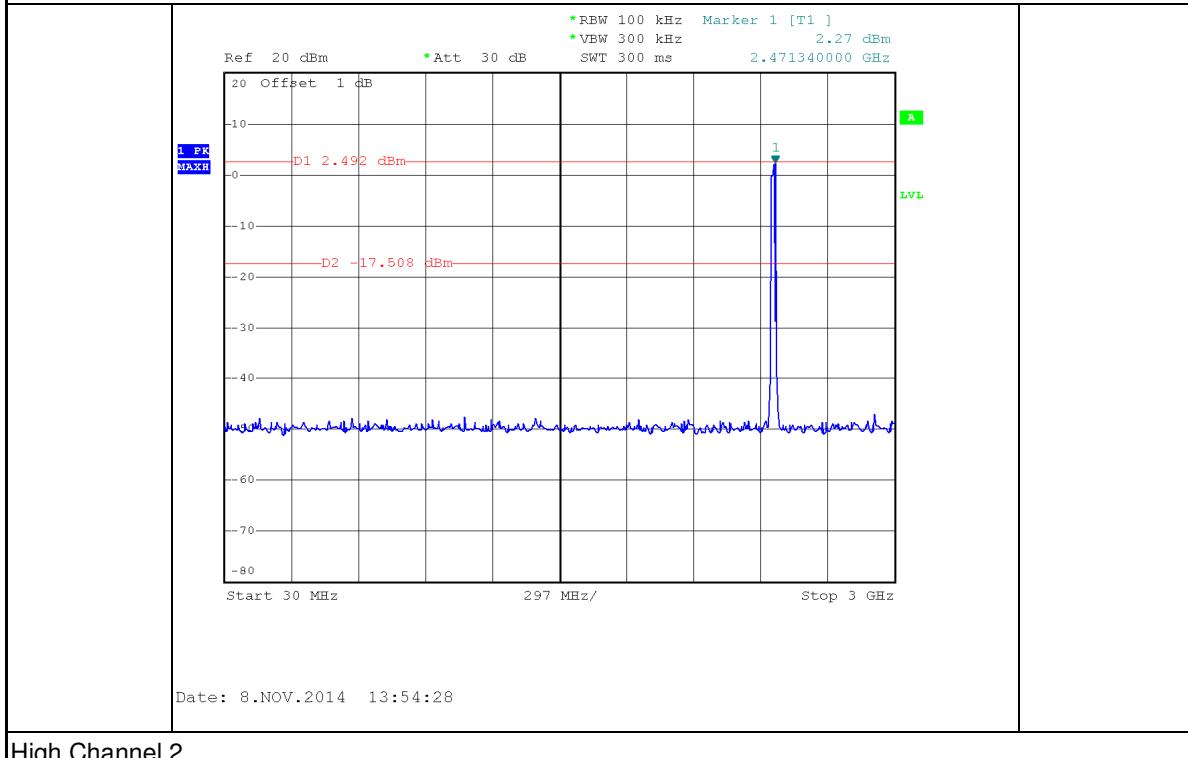
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**Middle Channel 2****Middle Channel 3**



High Channel 1

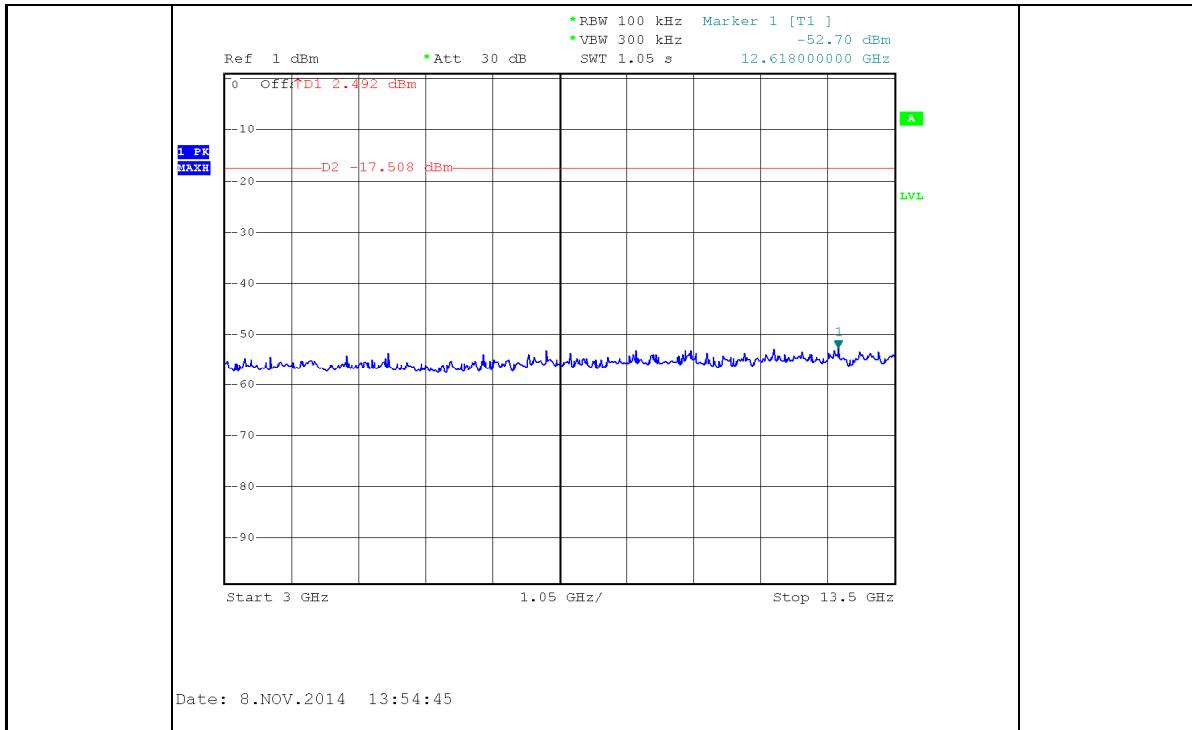
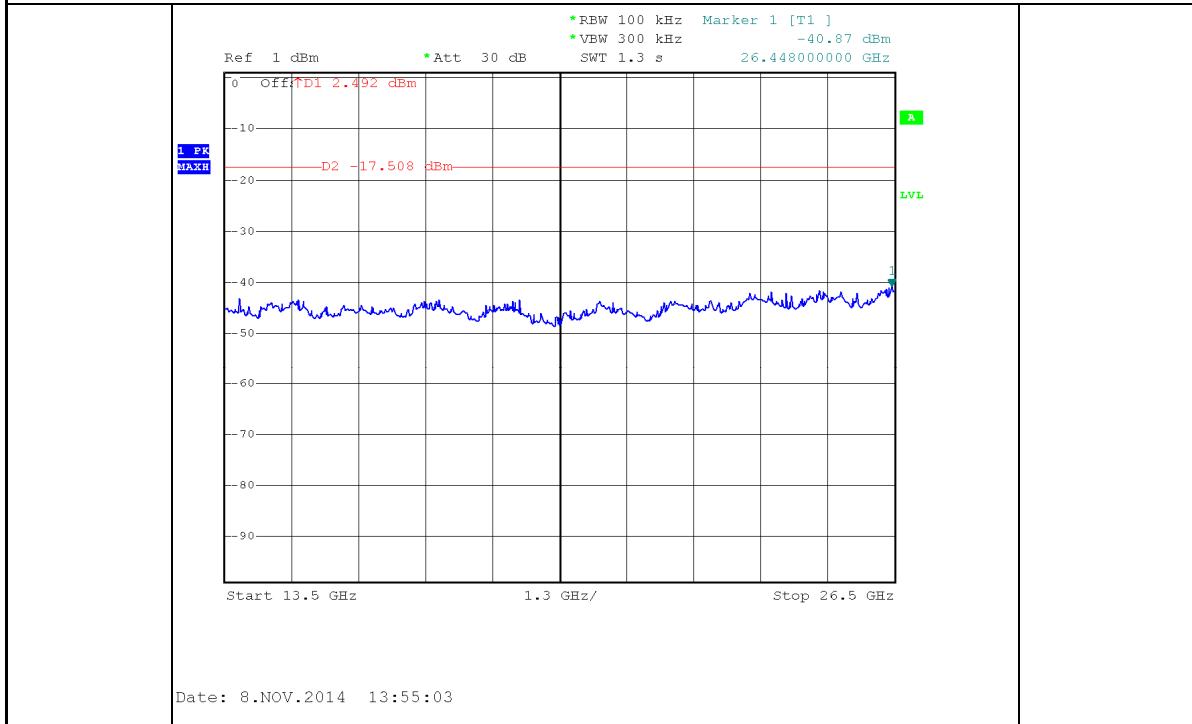


Produkte

Products

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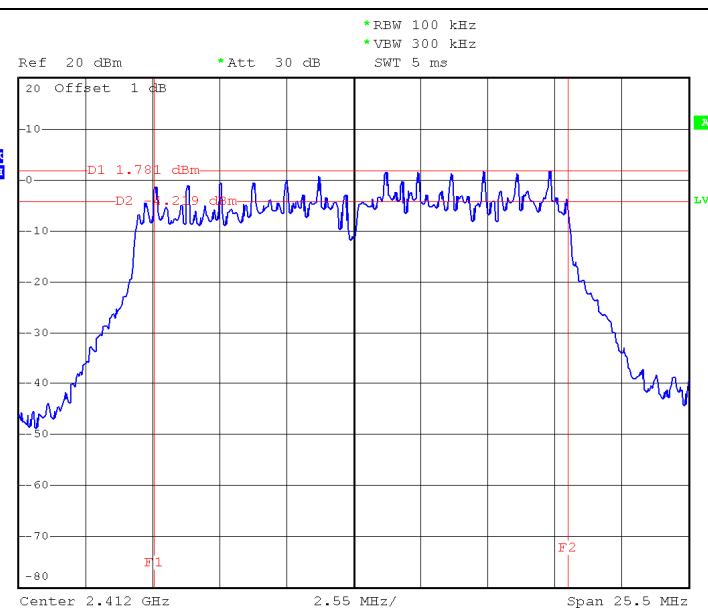
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**High Channel 3**

Appendix C.15: 6dB Bandwidth and 99% Bandwidth_802.11n HT20_ANT3

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.76	16.37
Middle Channel	2437	15.76	16.47
High Channel	2462	15.76	16.37

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 14:17:41

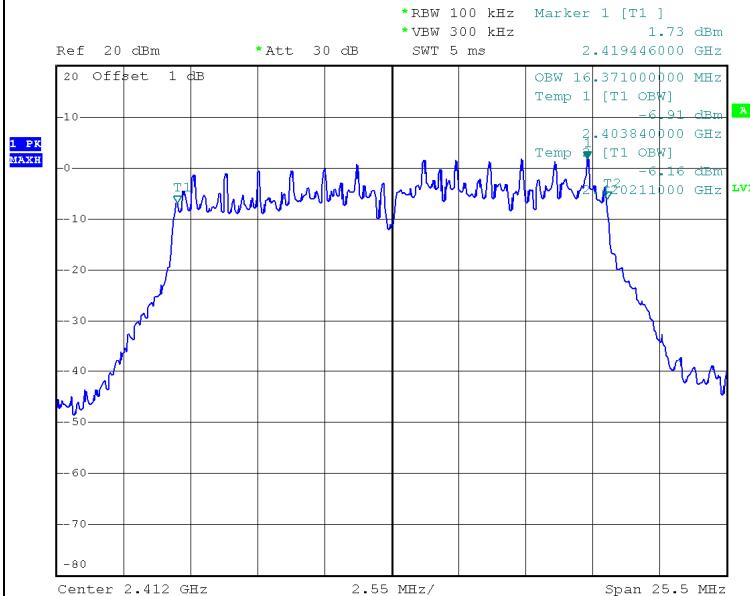
Low Channel 99% Bandwidth

Produkte

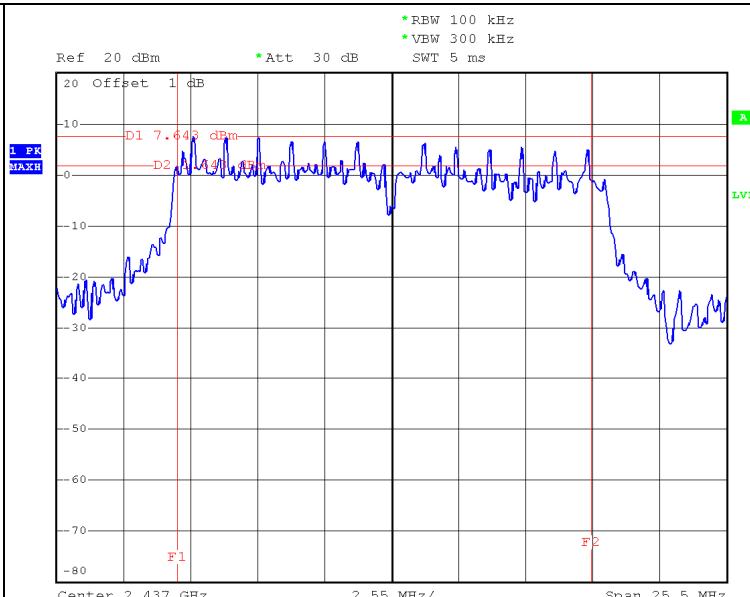
Products

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Date: 8.NOV.2014 14:17:54

Middle Channel 6dB Bandwidth

Date: 8.NOV.2014 14:20:45

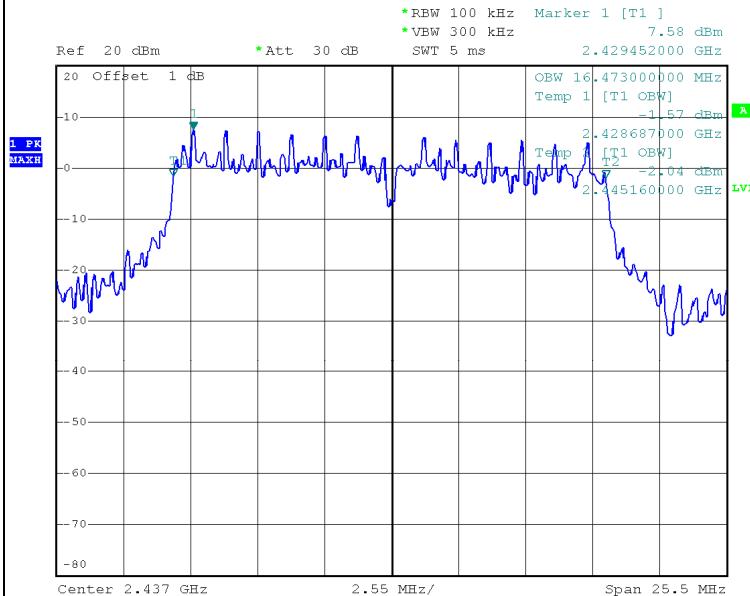
Middle Channel 99% Bandwidth

Produkte

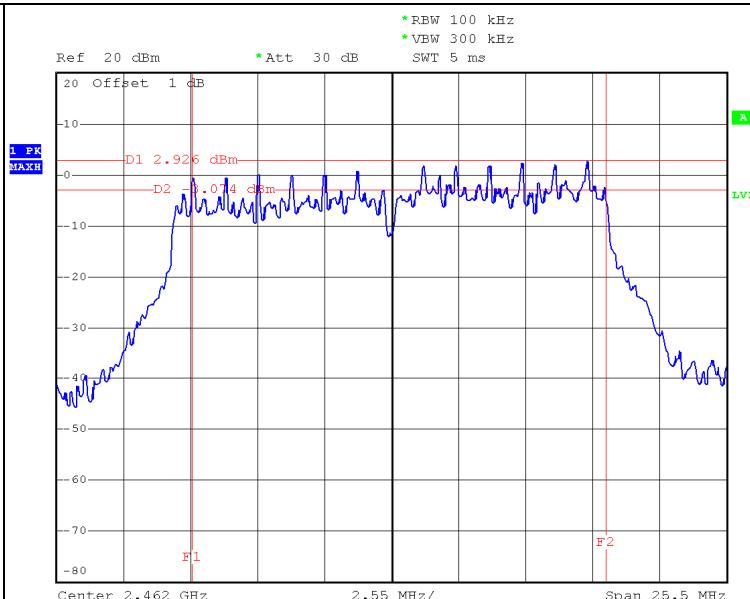
Products

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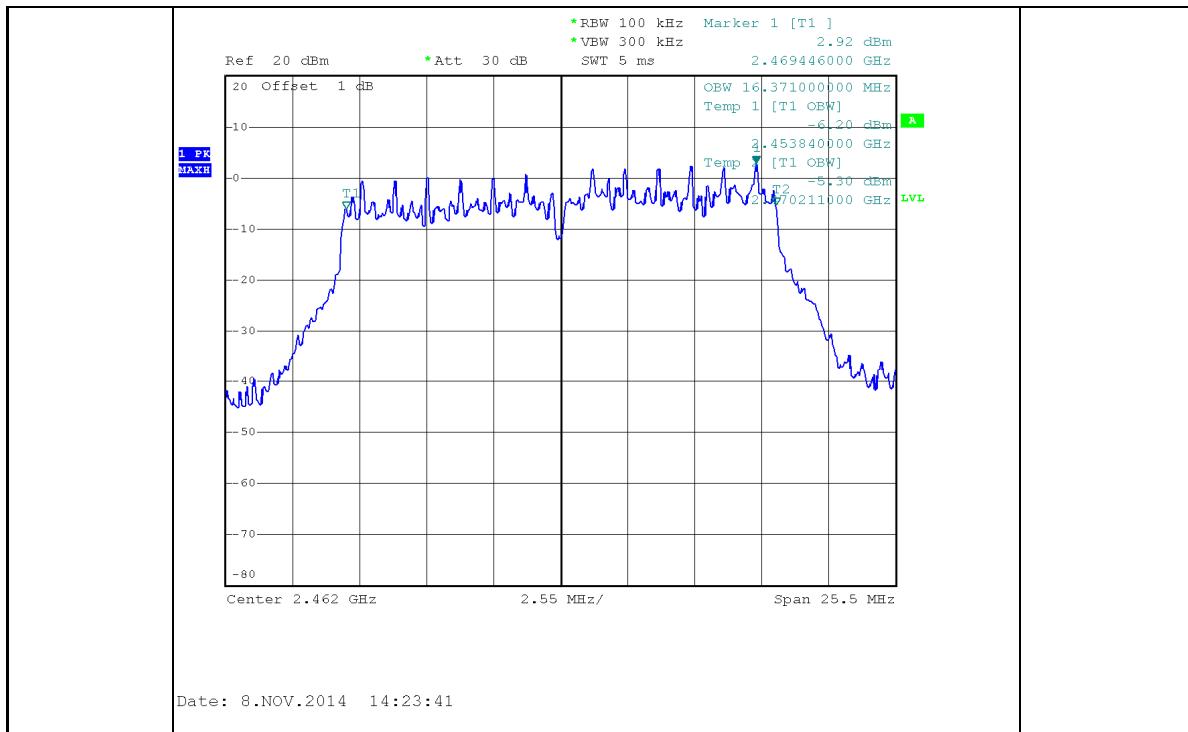


Date: 8.NOV.2014 14:20:57

High Channel 6dB Bandwidth

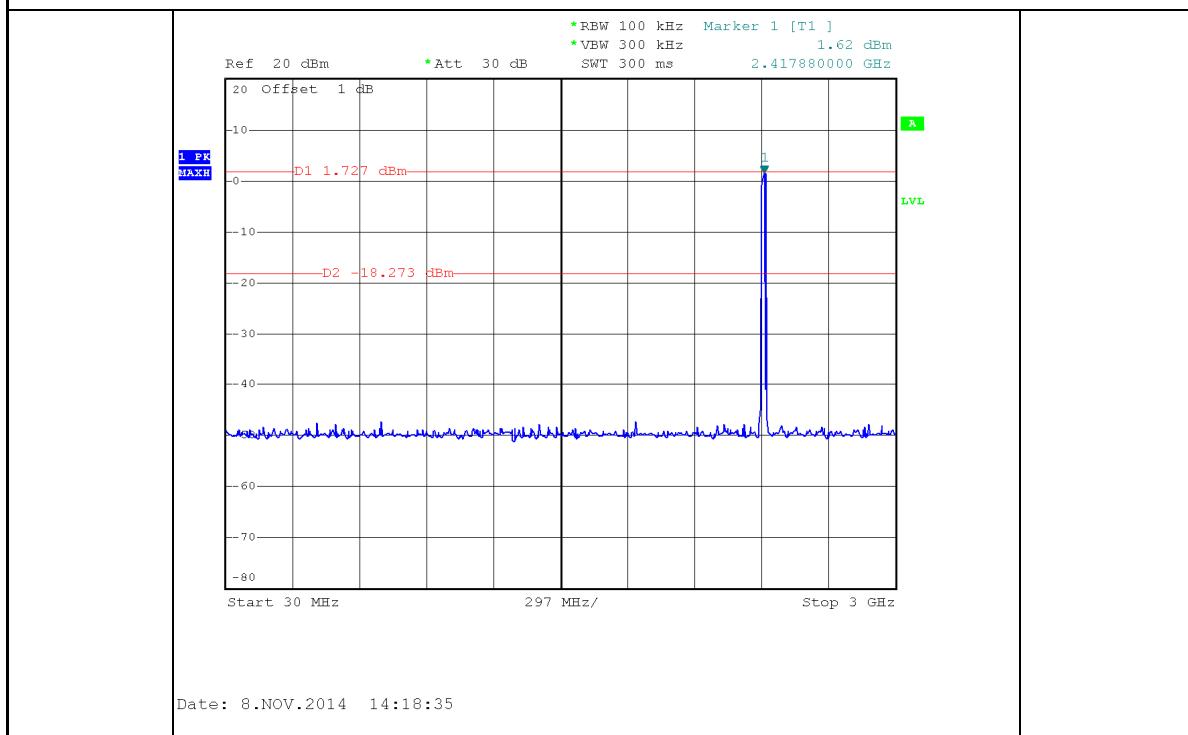
Date: 8.NOV.2014 14:23:29

High Channel 99% Bandwidth



Appendix C.16: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT20_ANT3

Low Channel 1



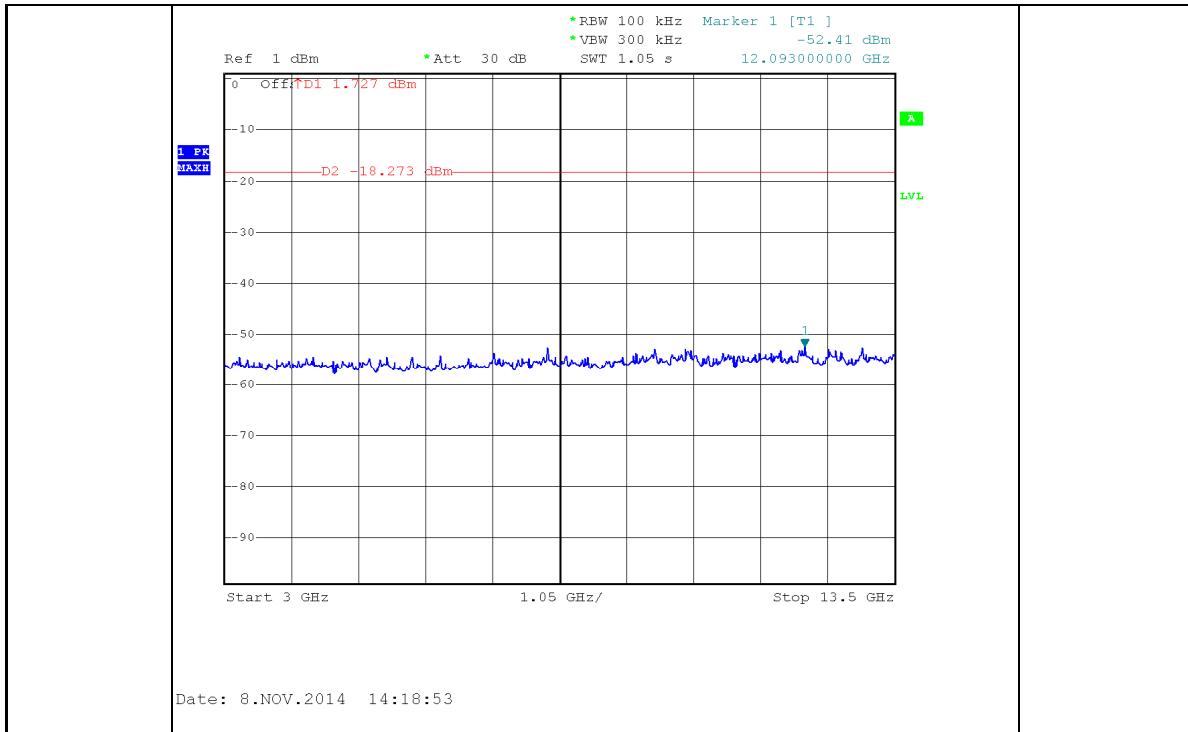
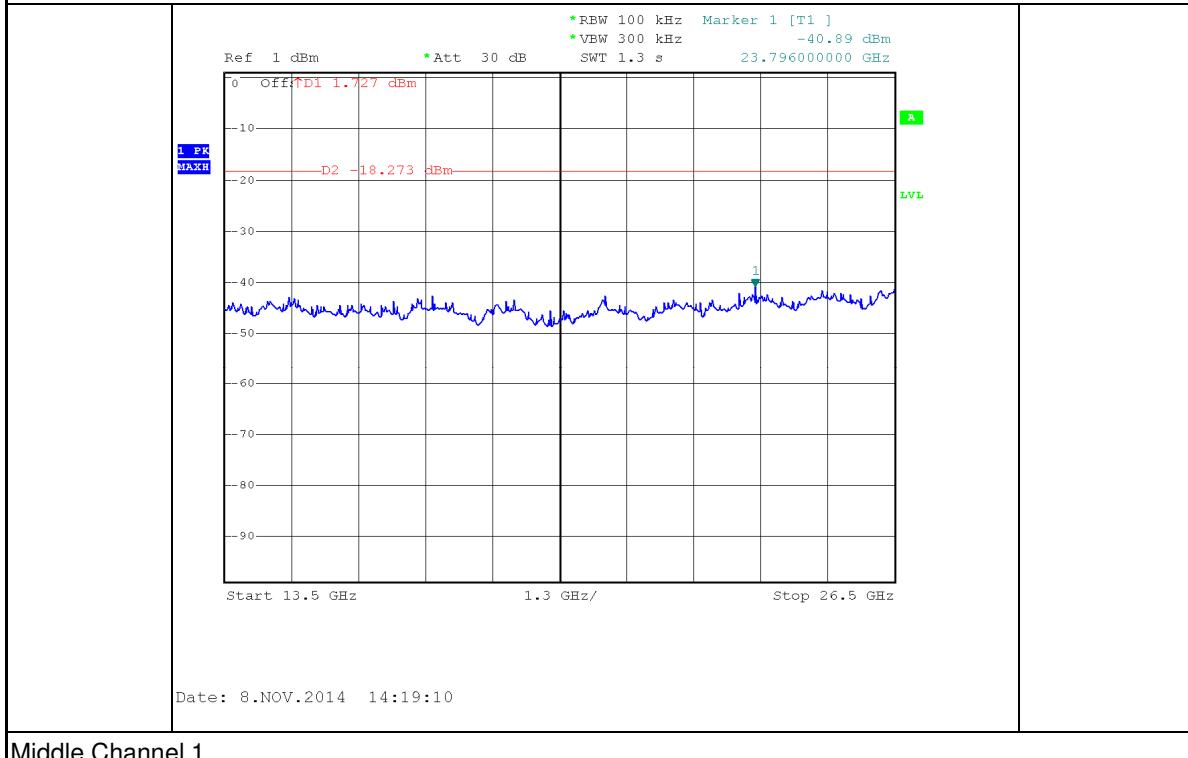
Low Channel 2

Produkte

Products

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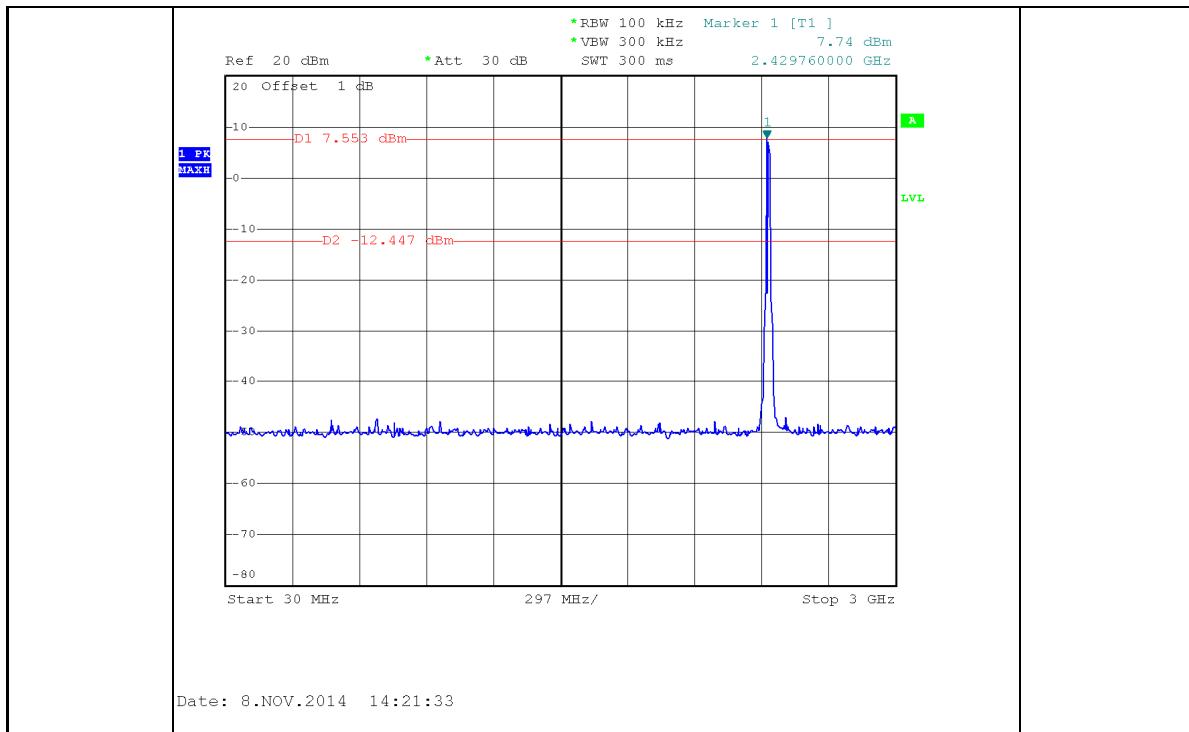
**Low Channel 3**

Produkte

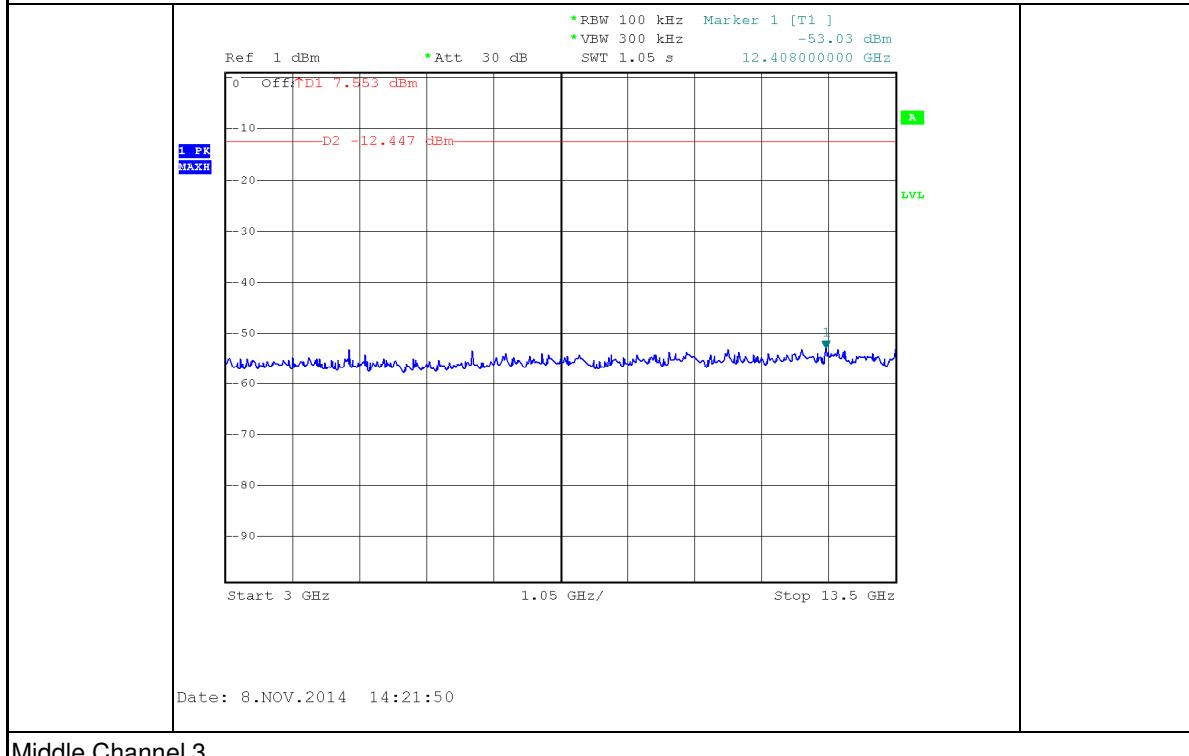
Products

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Middle Channel 2

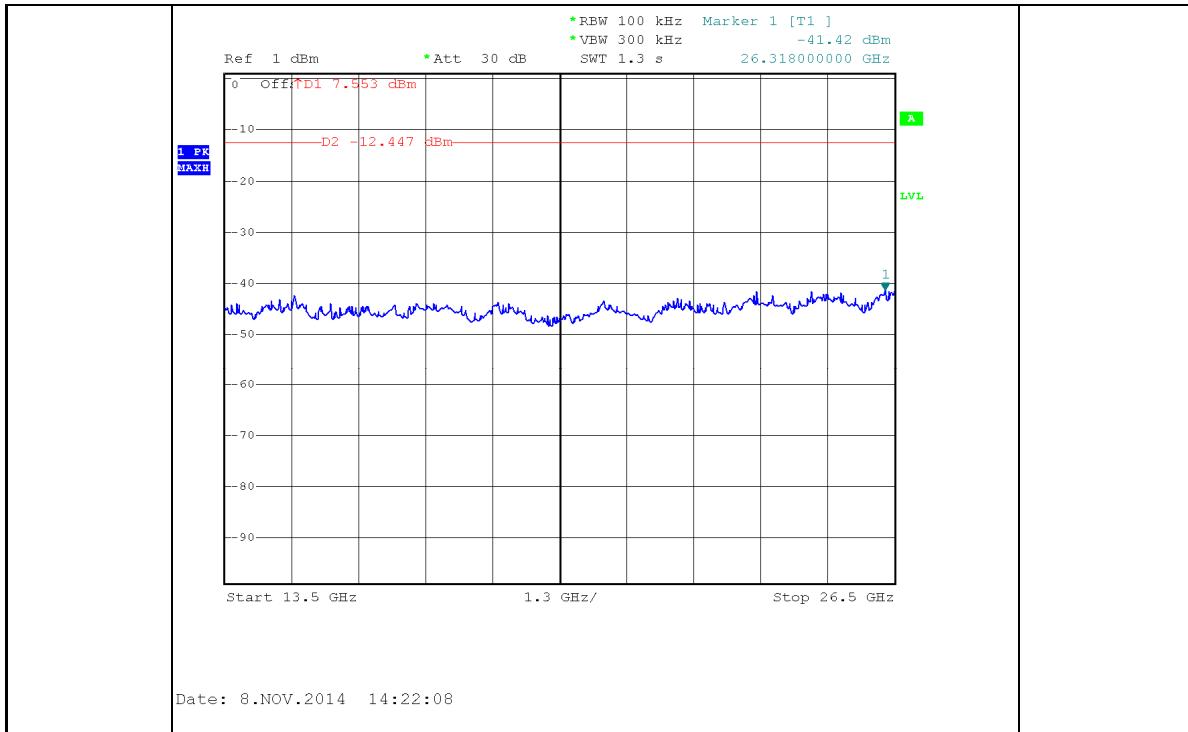
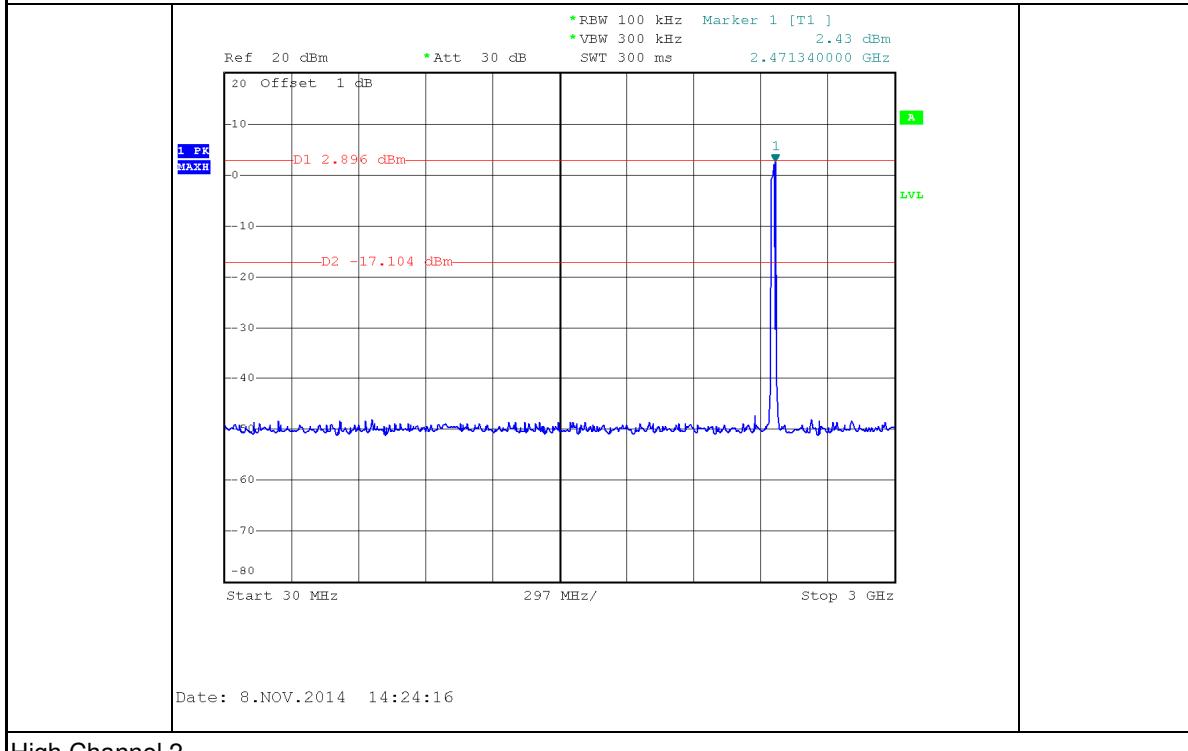


Produkte

Products

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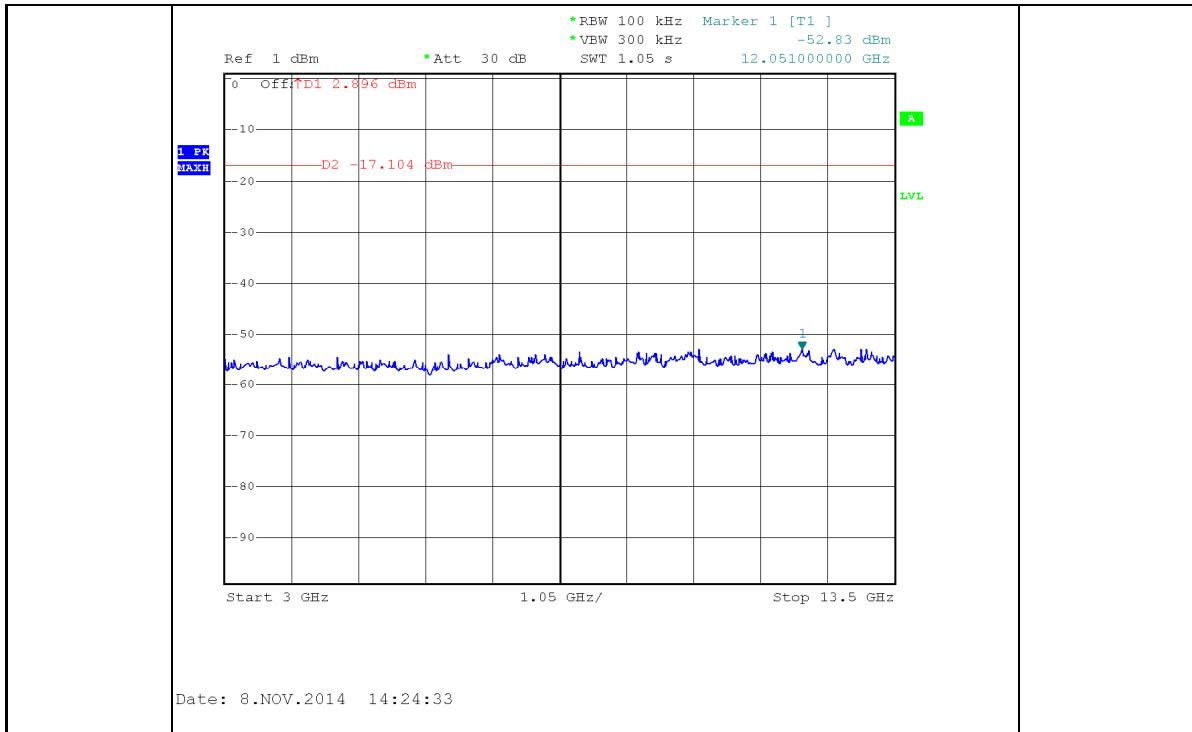
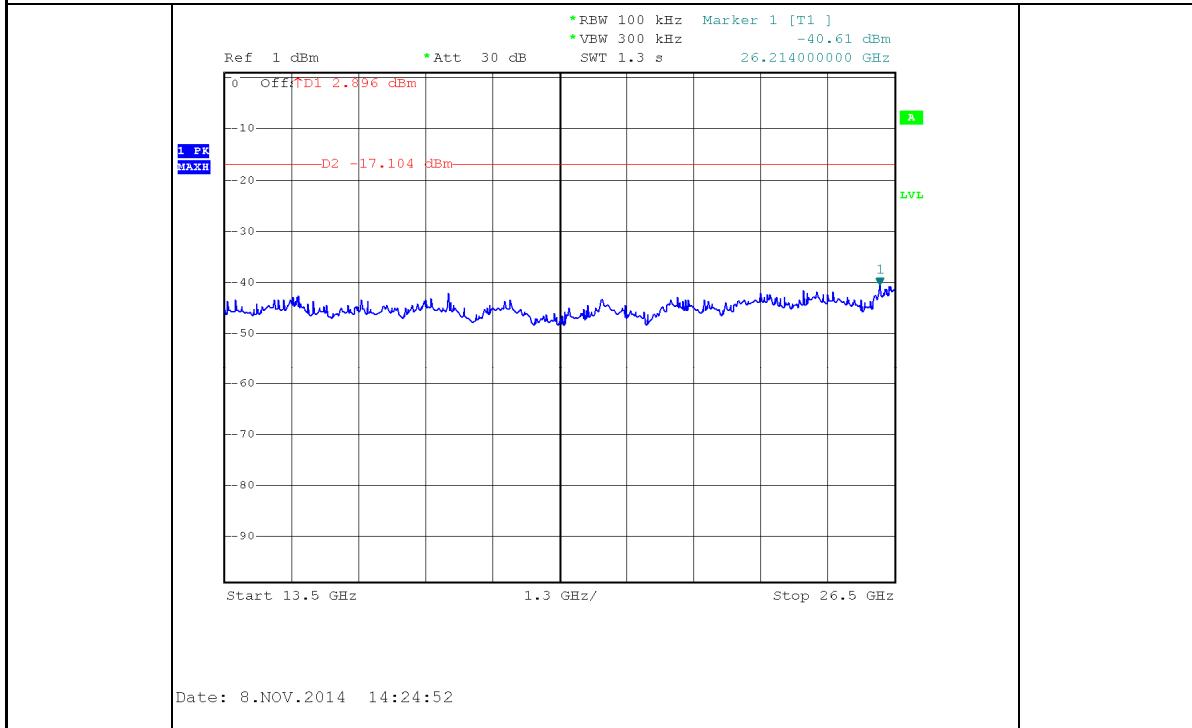
**High Channel 1**

Produkte

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**High Channel 3**

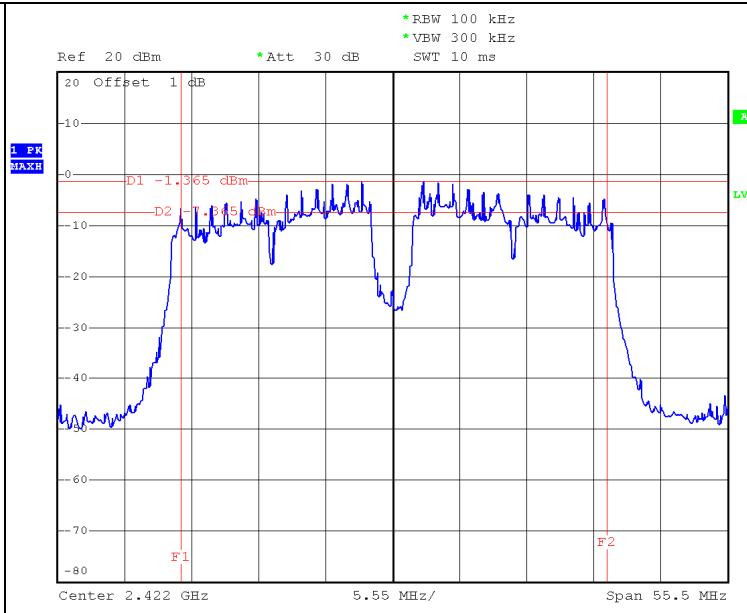
Appendix C.17: Maximum Conducted Output Power_802.11n HT40

Channel	Channel Frequency (MHz)	Maximum Conducted Output Power_ANT1 (dBm)	Maximum Conducted Output Power_ANT2 (dBm)	Maximum Conducted Output Power_ANT 3 (dBm)	Maximum Conducted Output Power_Total (dBm)	Limit(dBm)
Low Channel	2422	12.10	12.10	12.20	16.90	26.6
Middle Channel	2437	18.90	18.80	18.90	23.64	26.6
High Channel	2452	11.90	12.20	12.00	16.81	26.6

Appendix C.18: 6dB Bandwidth and 99% Bandwidth_802.11n HT40_ANT1

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2422	35.30	35.85
Middle Channel	2437	36.08	36.30
High Channel	2452	36.19	36.41

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 14:52:49

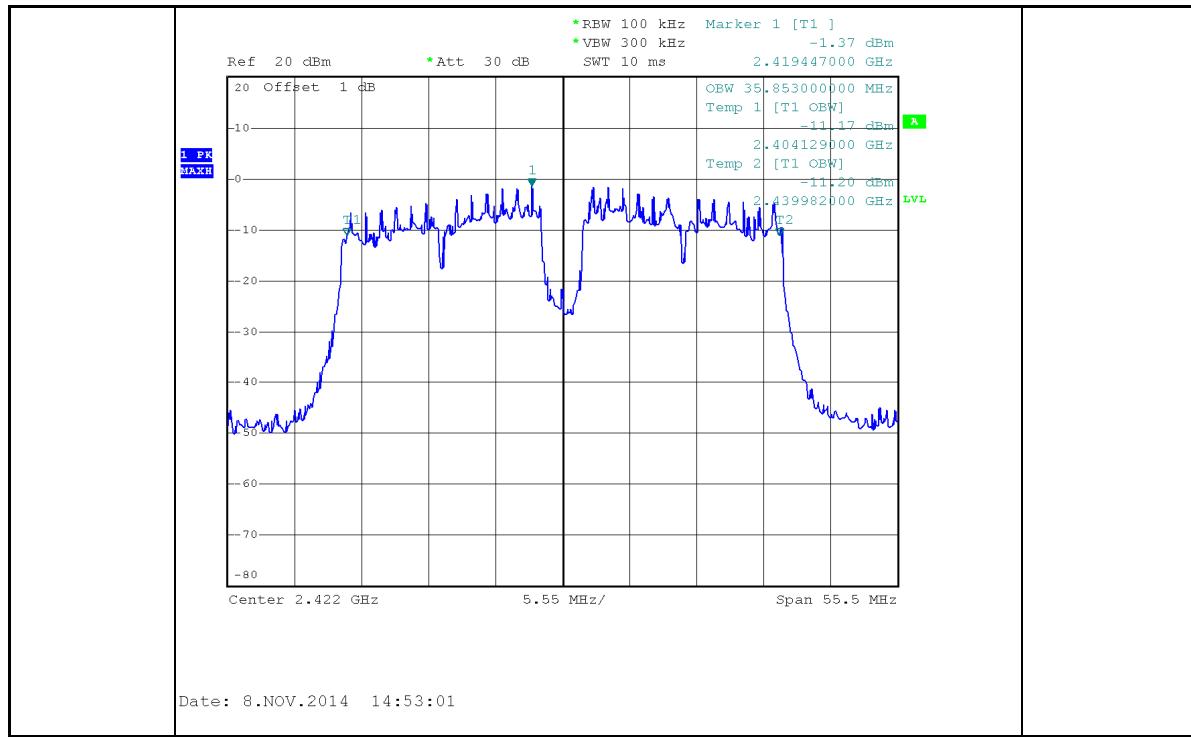
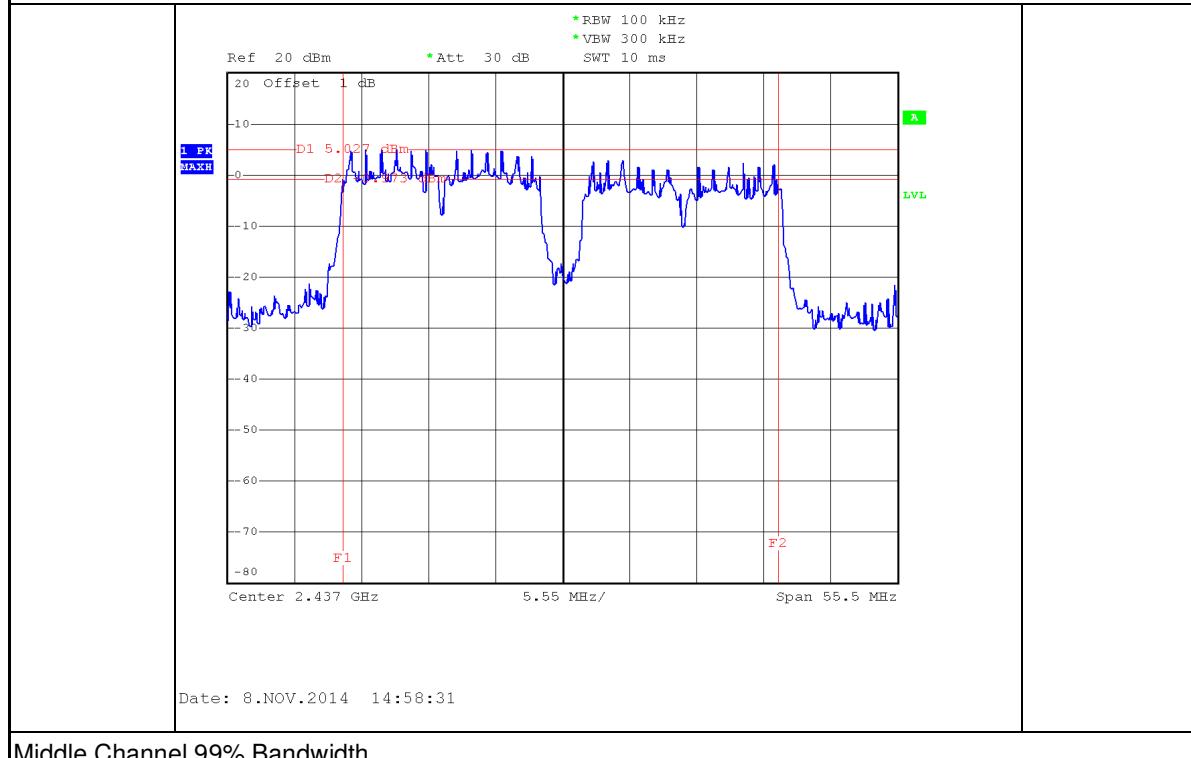
Low Channel 99% Bandwidth

Produkte

Products

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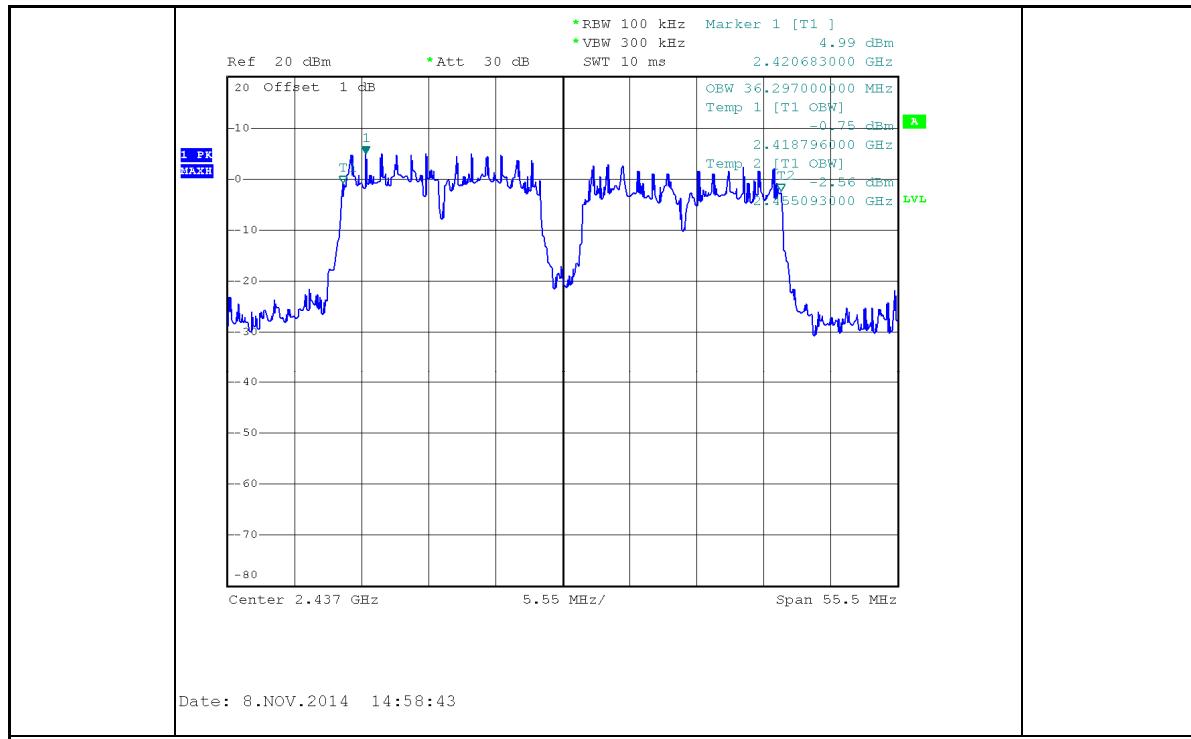
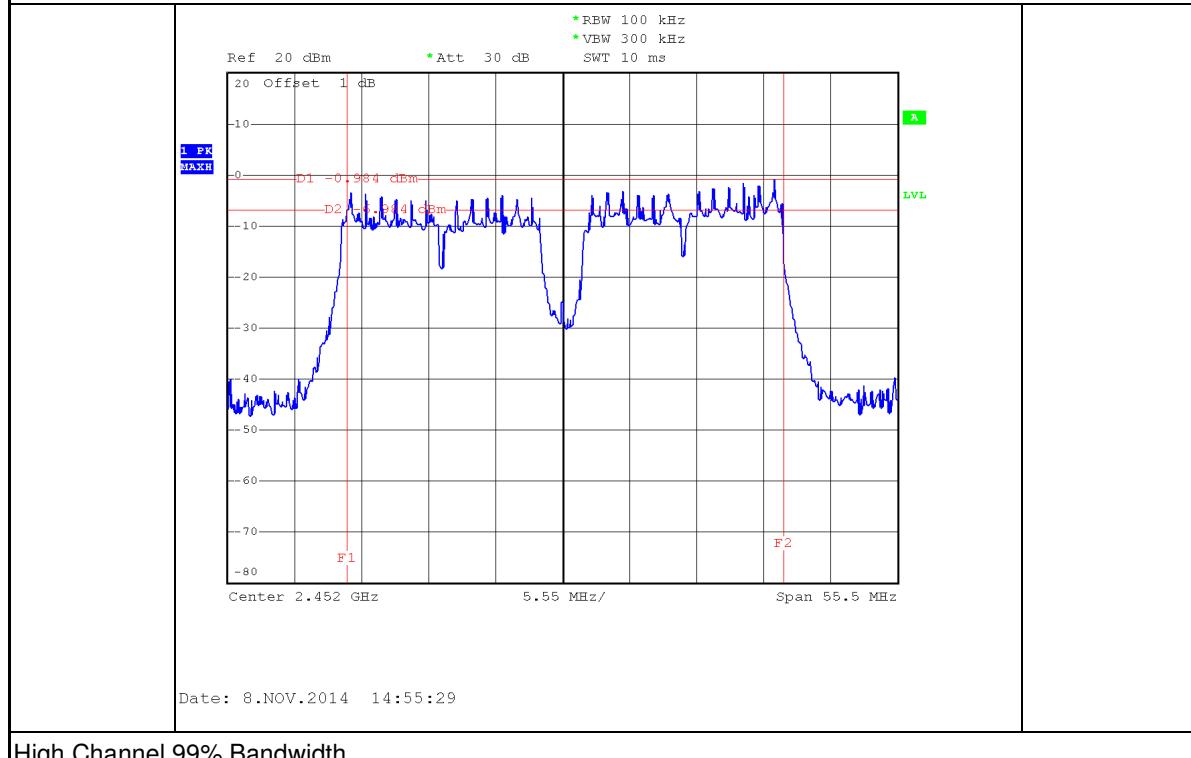
**Middle Channel 6dB Bandwidth**

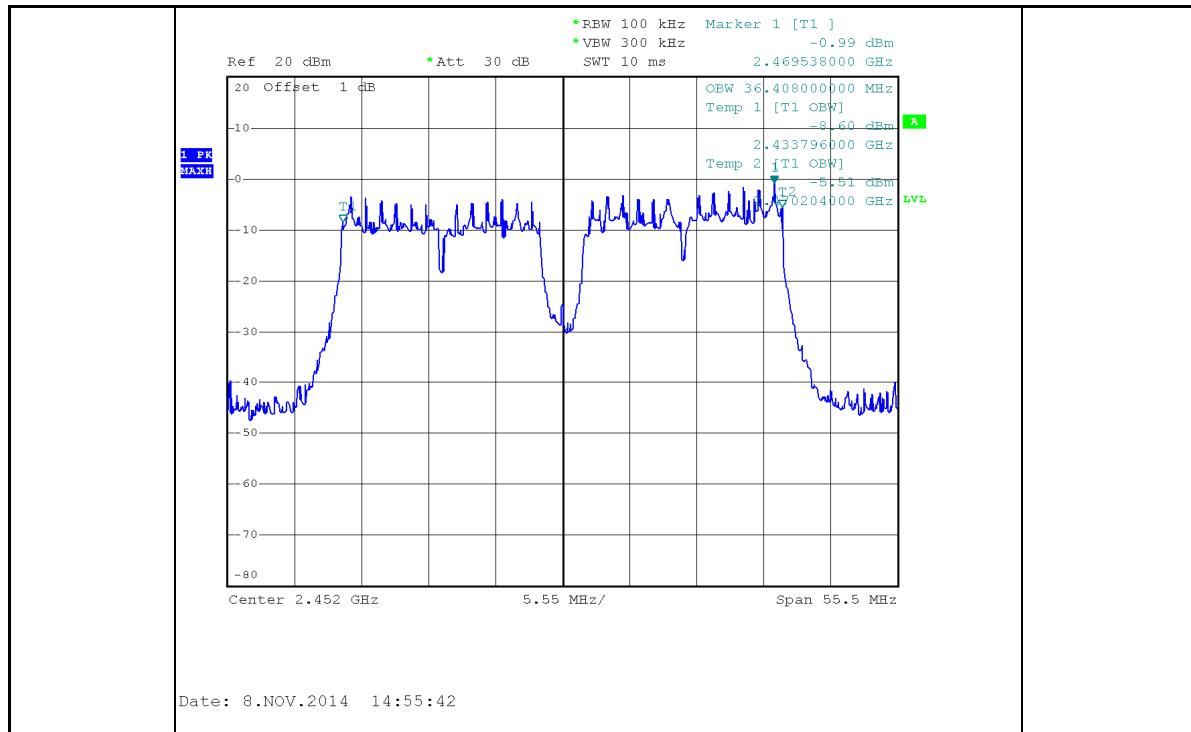
Produkte

Products

17042741 002

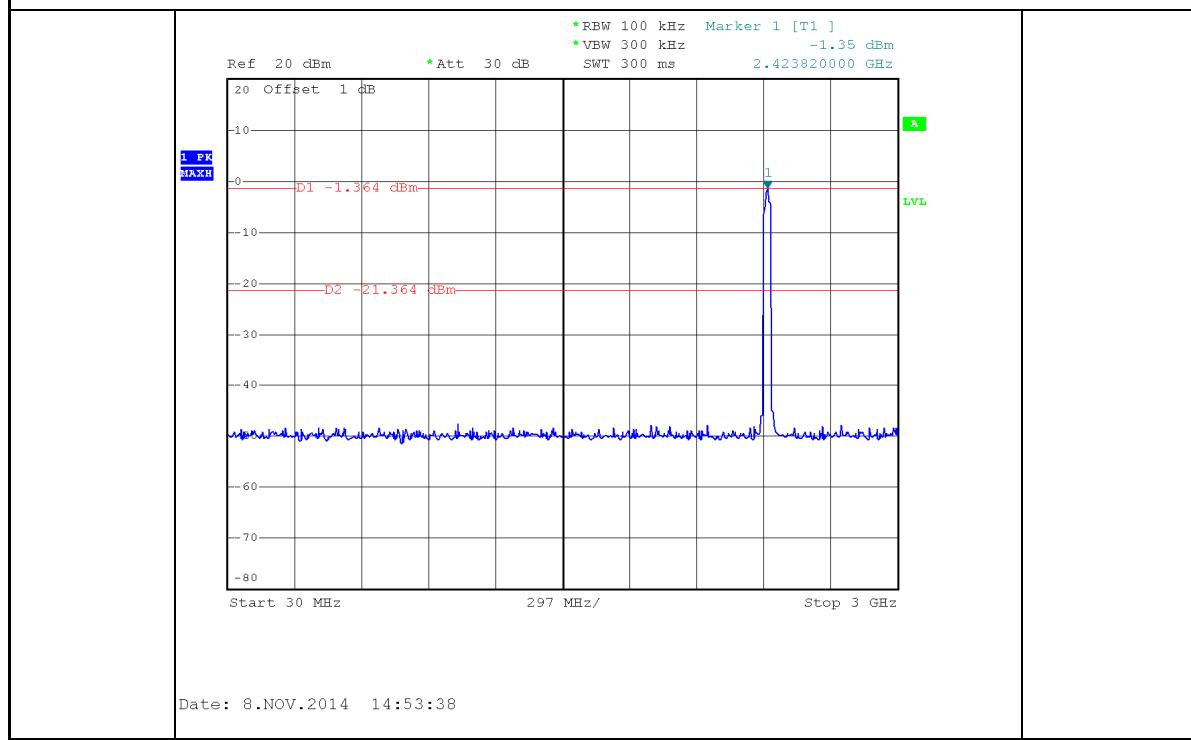
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**High Channel 6dB Bandwidth**



Appendix C.19: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT40_ANT1

Low Channel 1



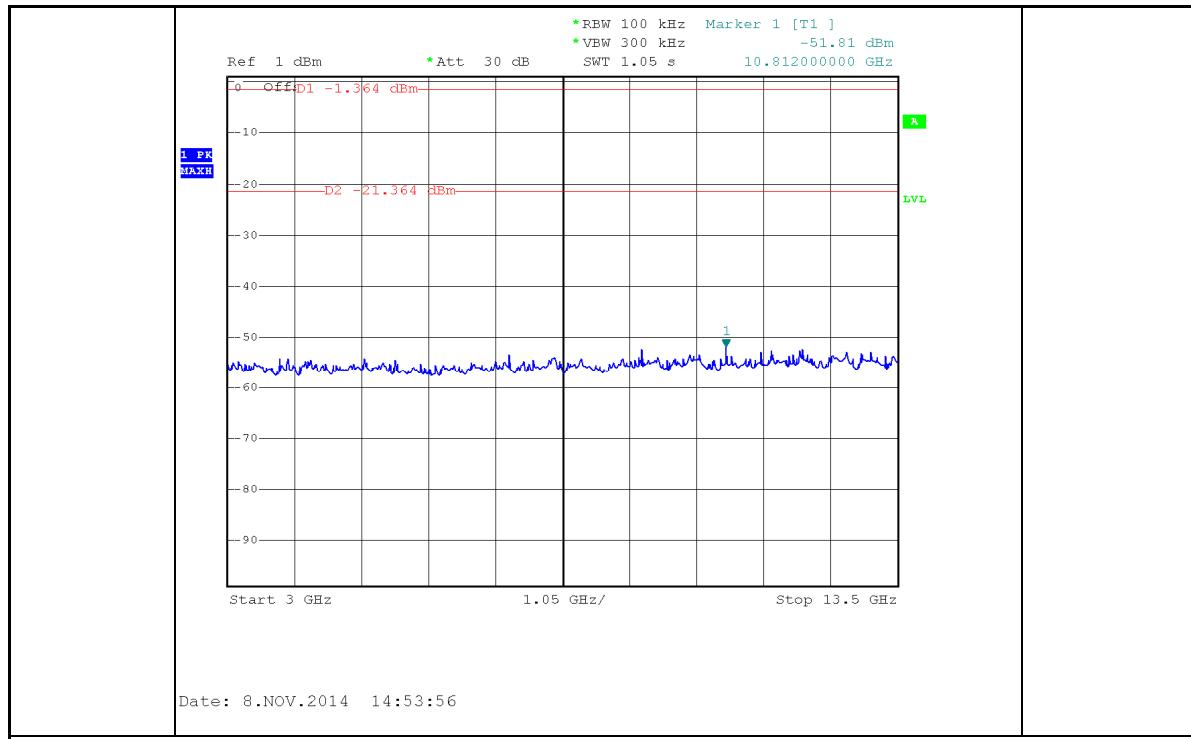
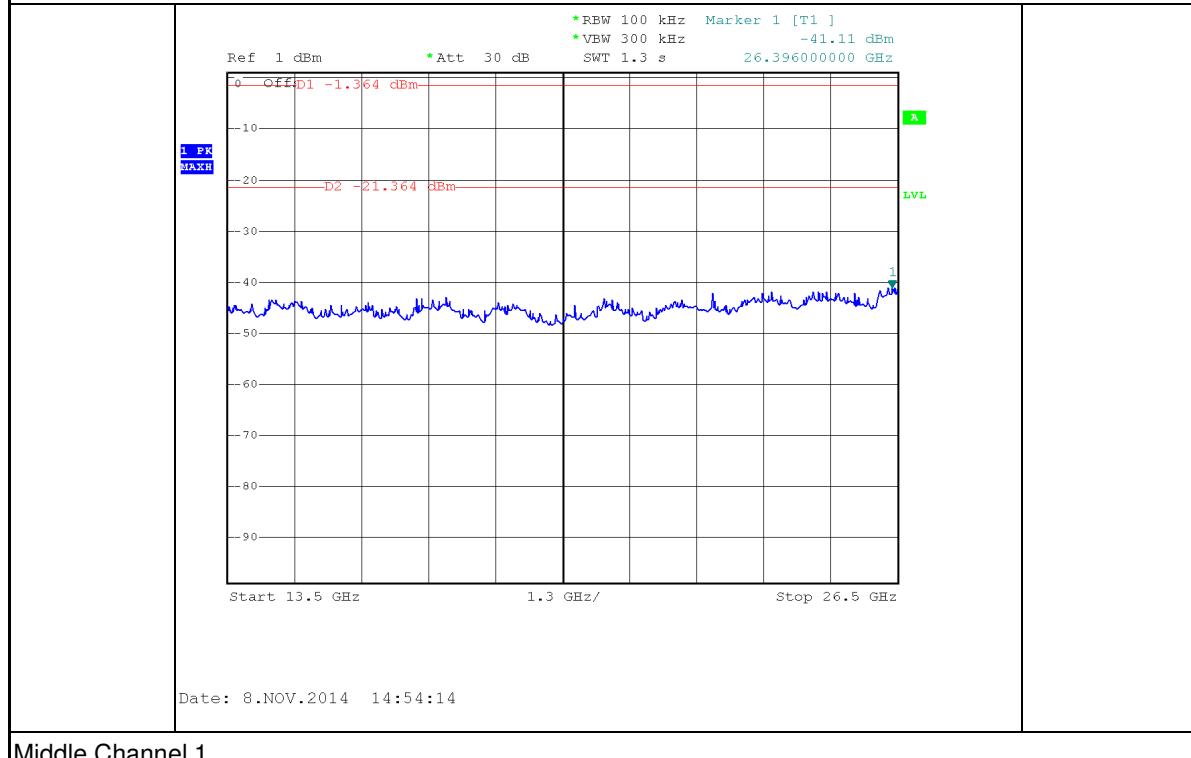
Low Channel 2

Produkte

Products

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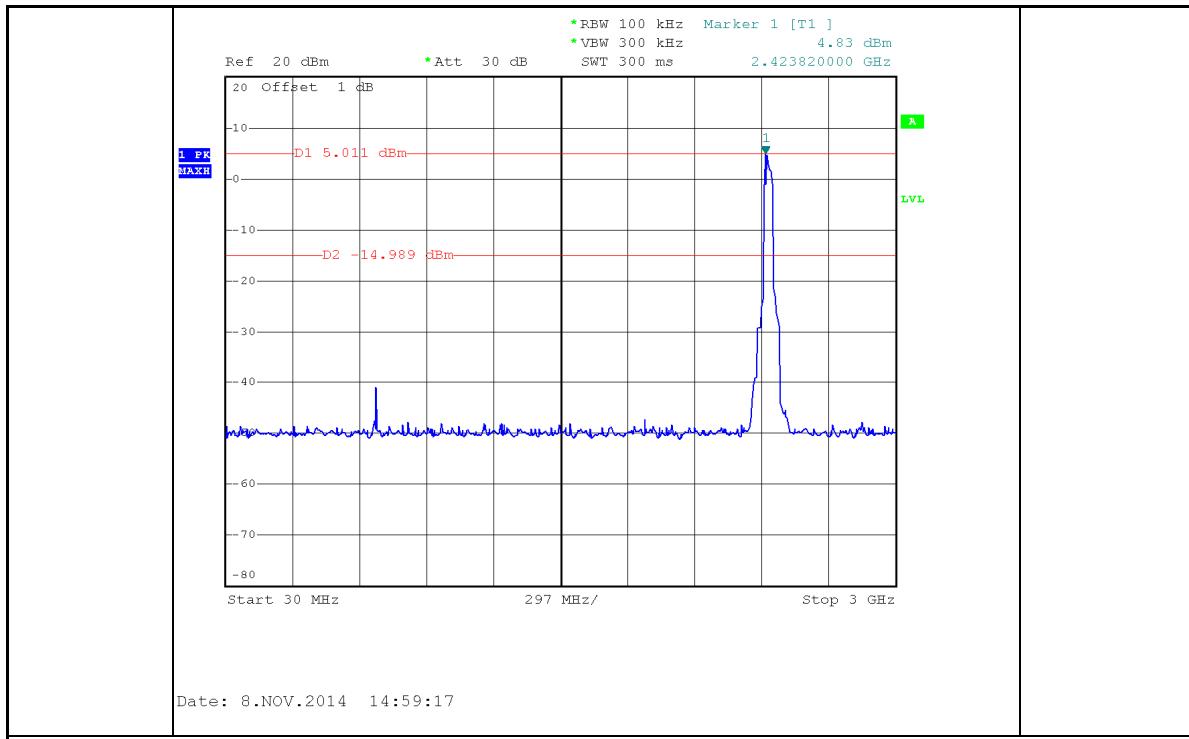
**Low Channel 3**

Produkte

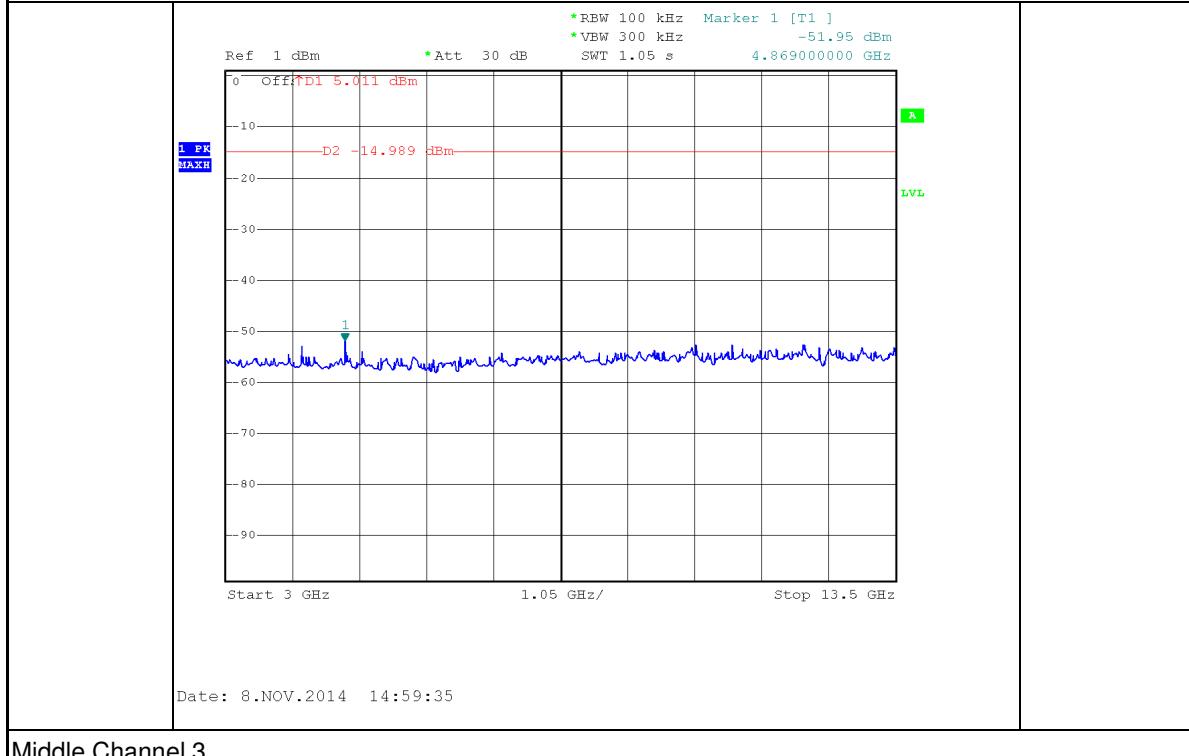
Products

17042741 002

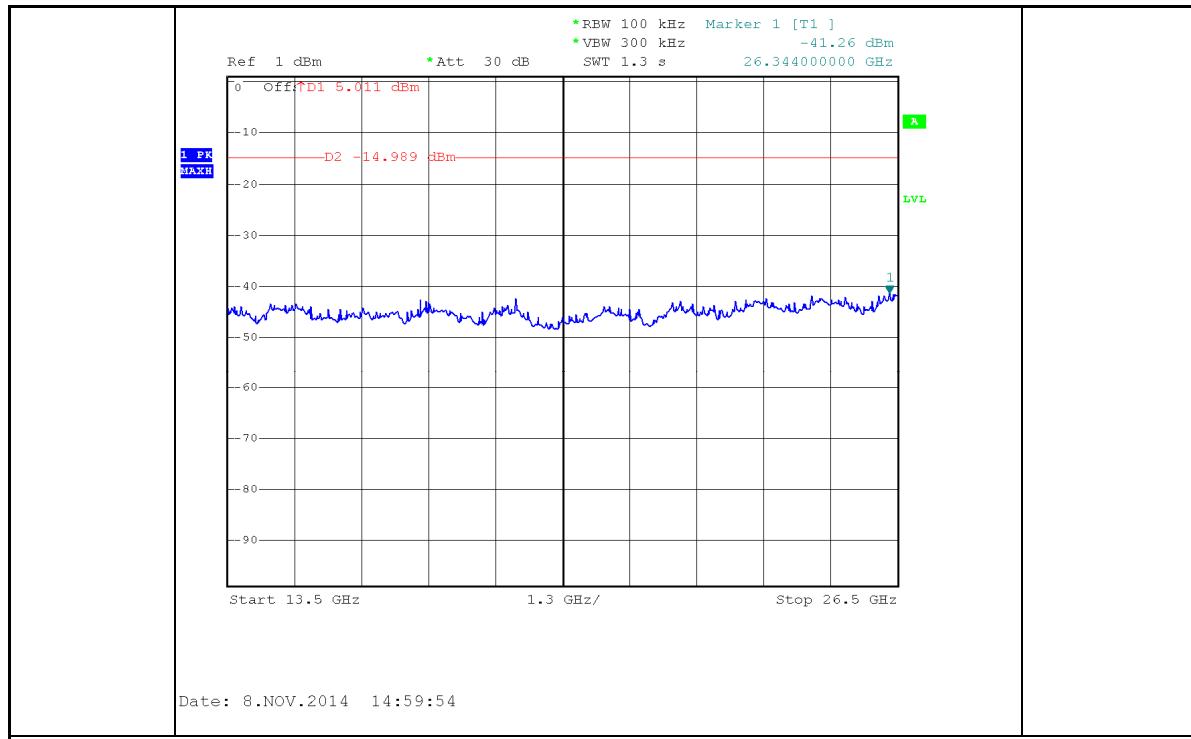
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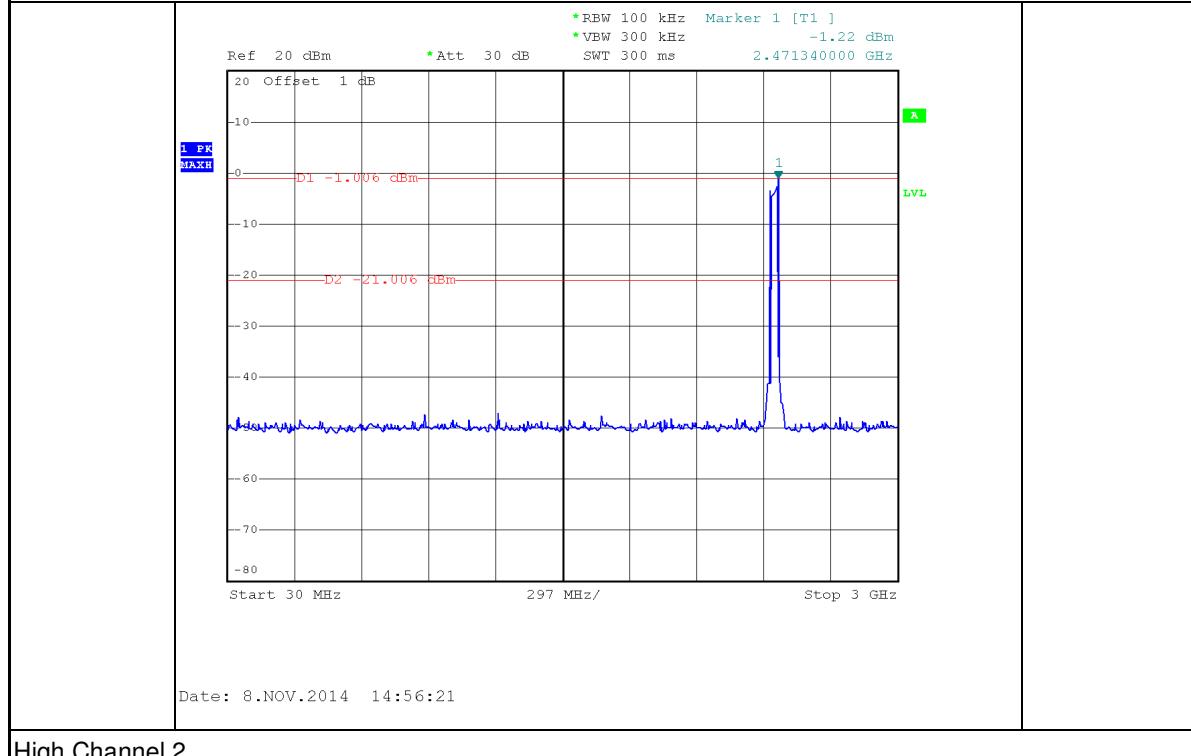
Middle Channel 2



Middle Channel 3



High Channel 1

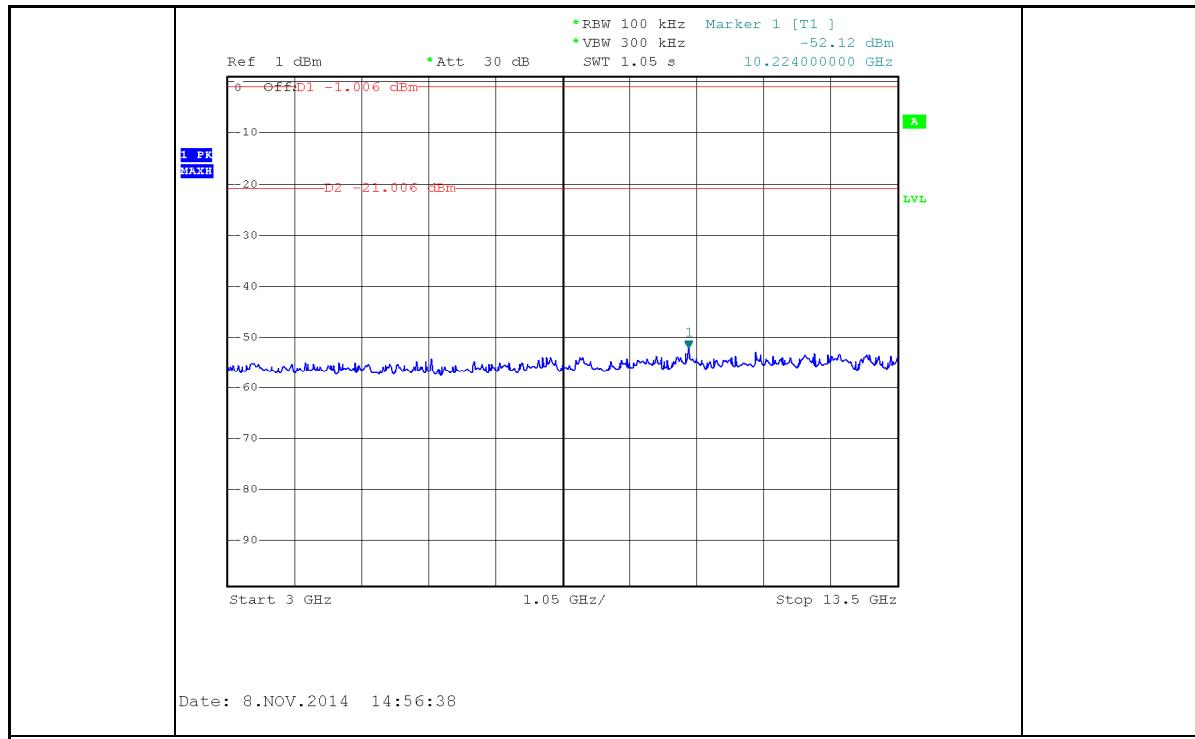


Produkte

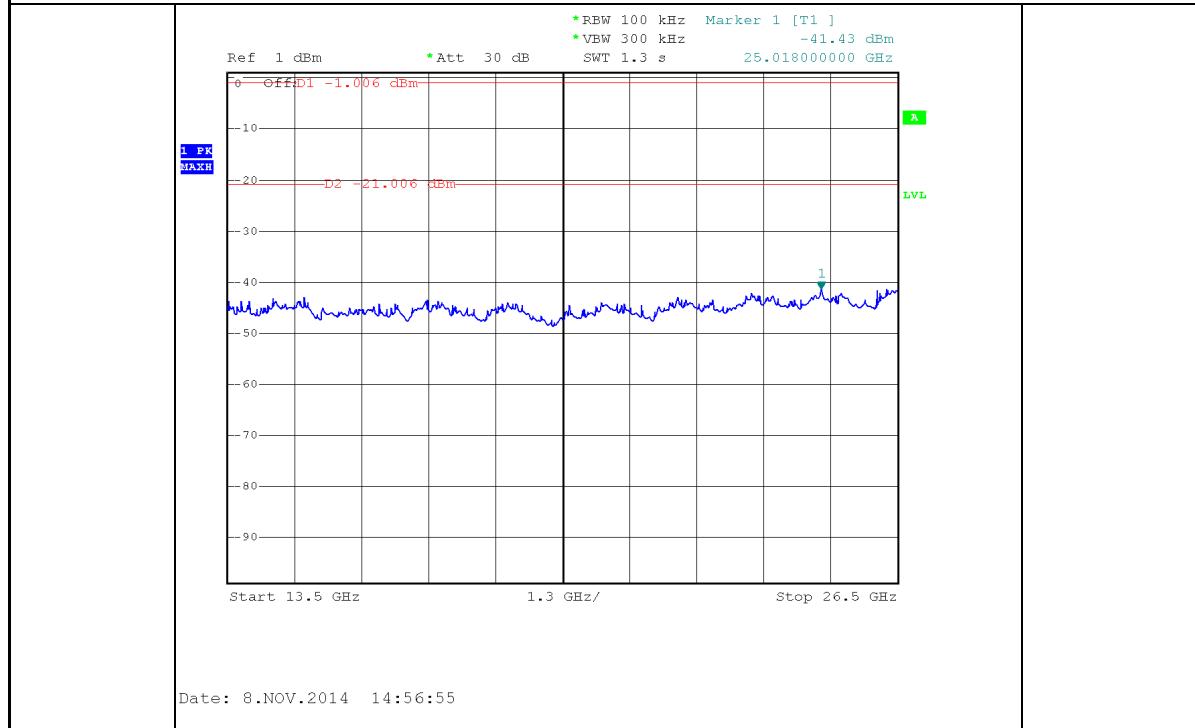
Products

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High Channel 3

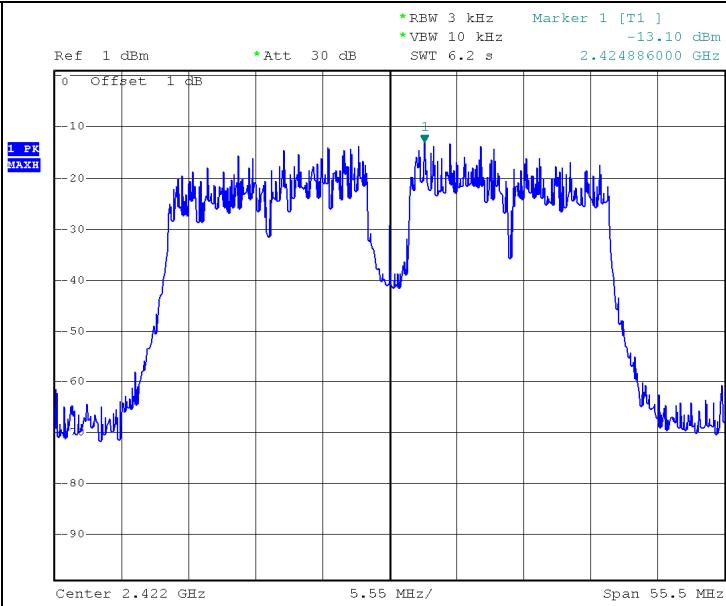


Appendix C.20: Power Spectral Density_802.11n HT40

Channel	Channel Frequency (MHz)	PSD_ANT1 (dBm/3kHz)	PSD_ANT2 (dBm/3kHz)	PSD_ANT 3 (dBm/3kHz)	PSD_Total (dBm/3kHz)	Limit (dBm/3kHz)
Low Channel	2422	-13.10	-12.63	-12.92	-8.11	4.6
Middle Channel	2437	-5.71	-5.85	-5.22	-0.81	4.6
High Channel	2452	-14.17	-13.76	-13.72	-9.11	4.6

Power Spectral Density_ANT1

2422 MHz



Date: 8.NOV.2014 14:54:38

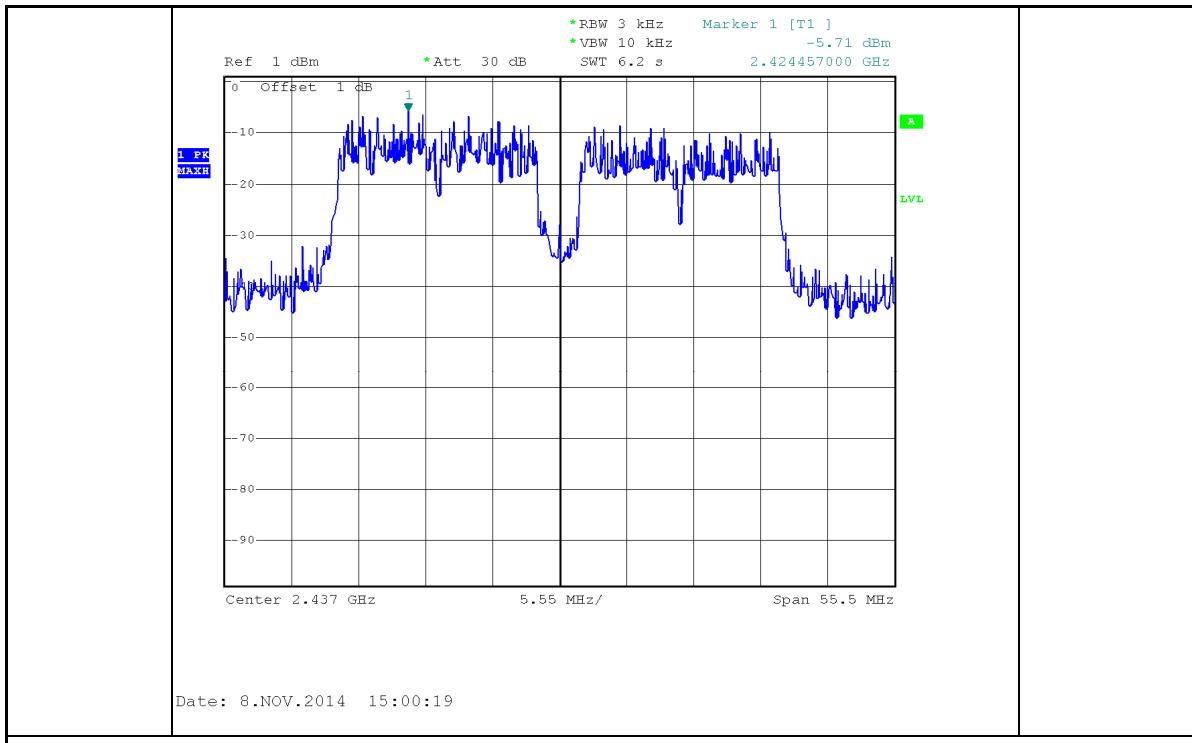
2437 MHz

Produkte

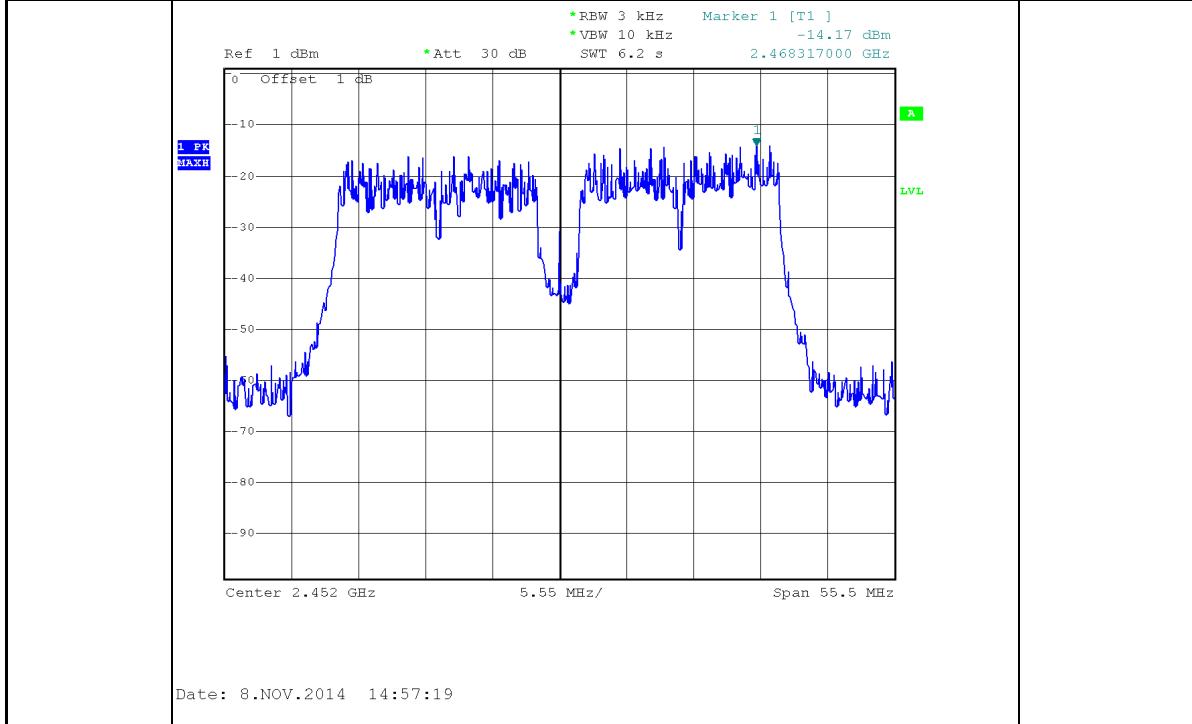
Products

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2452 MHz



Power Spectral Density_AN2

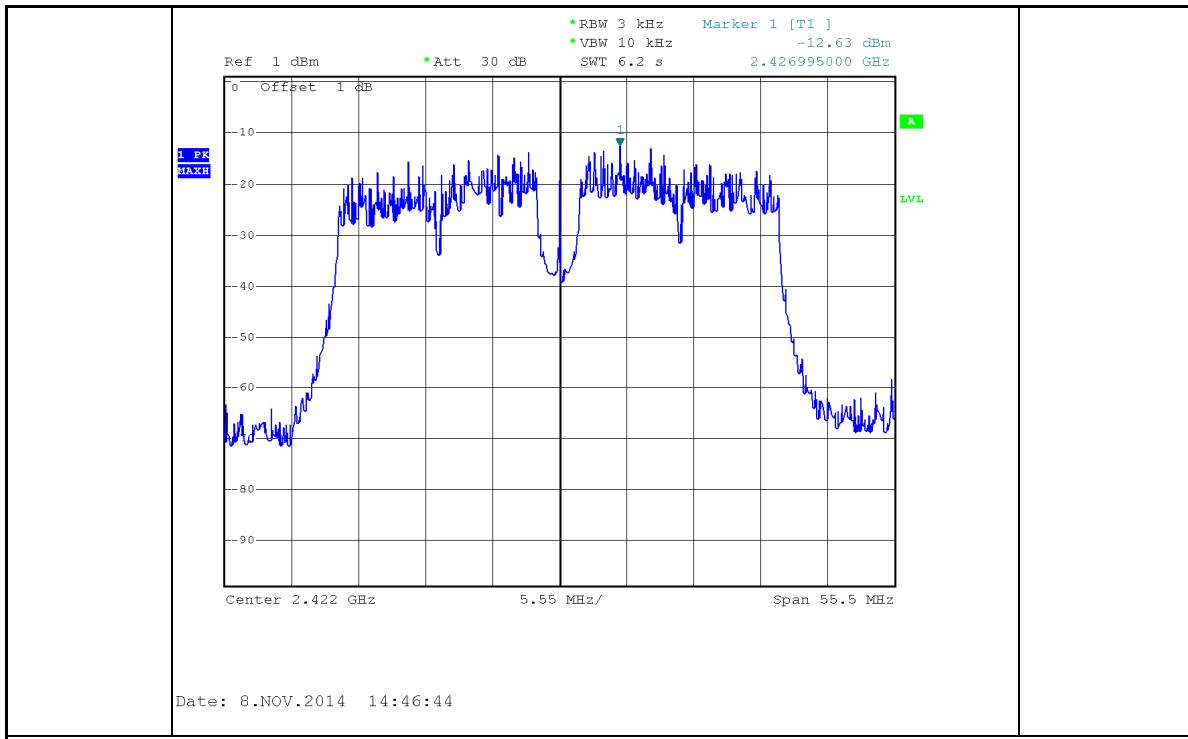
2422 MHz

Produkte

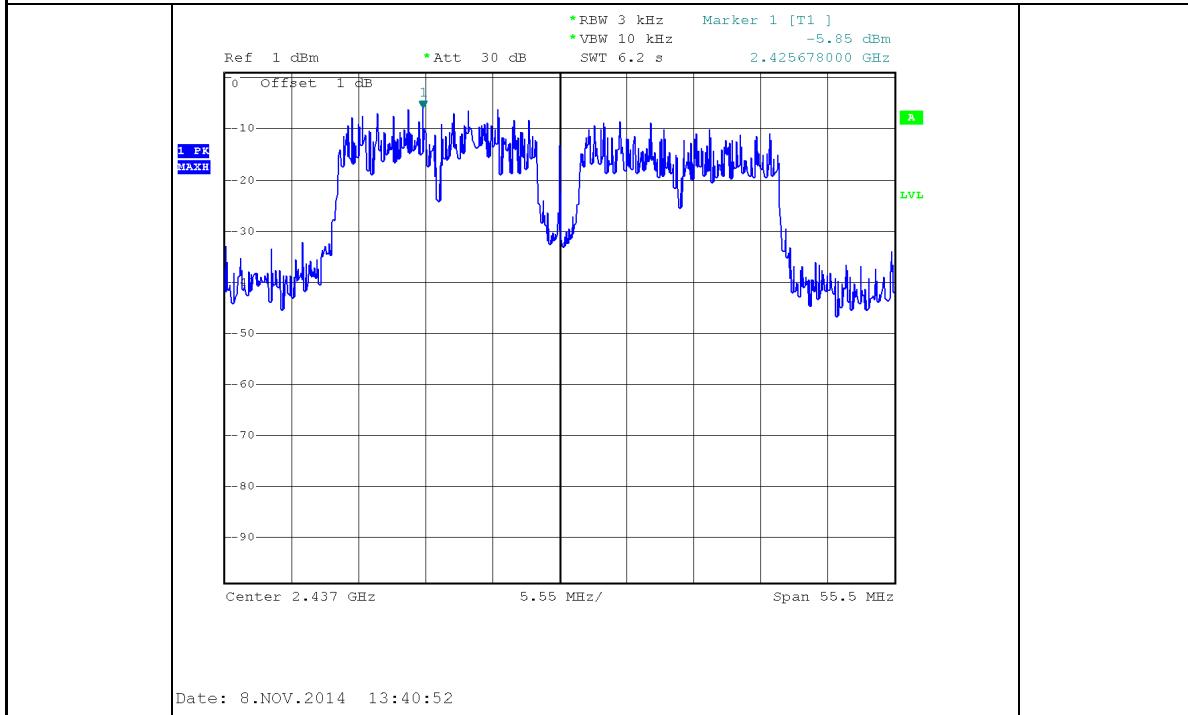
Products

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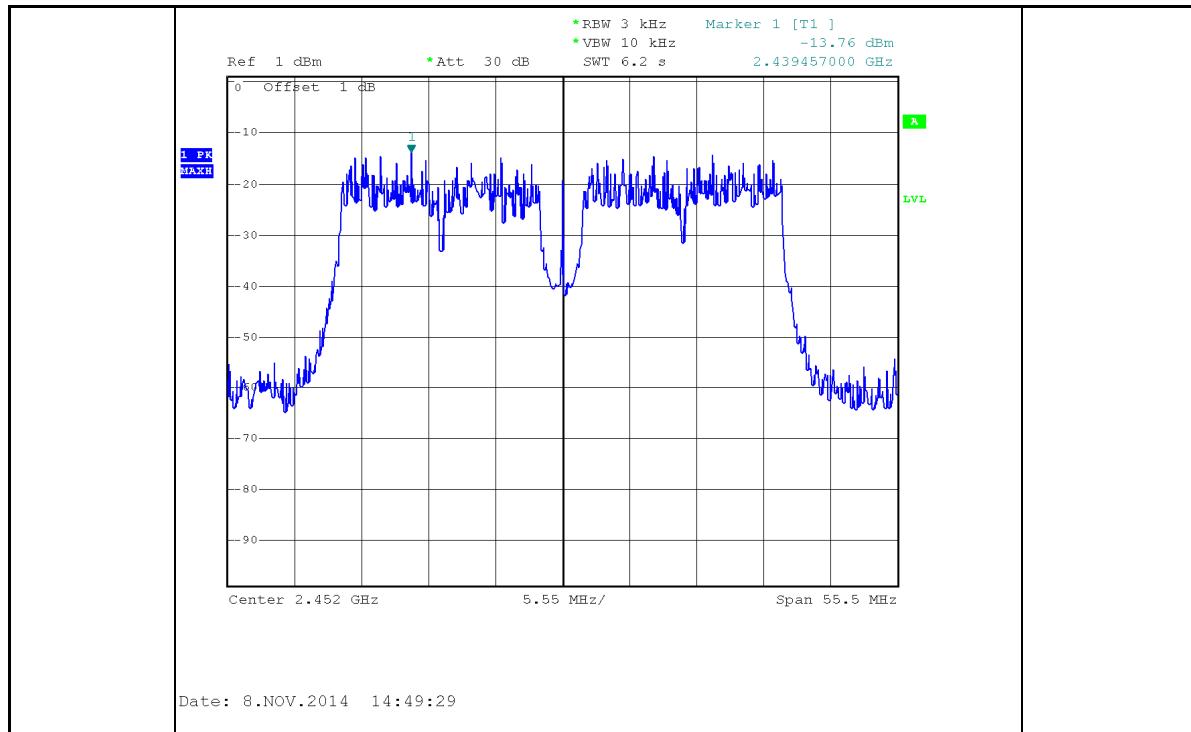
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2437 MHz

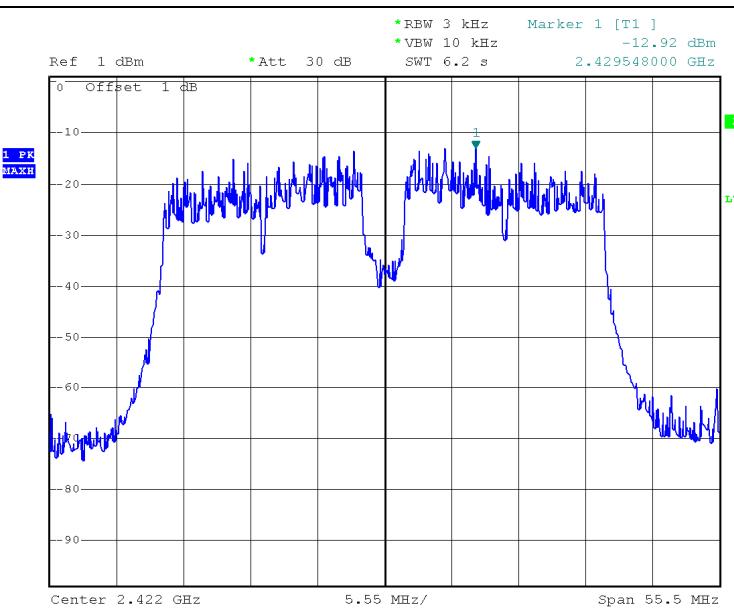


2452 MHz



Power Spectral Density_ANT3

2422 MHz



Date: 8.NOV.2014 14:36:09

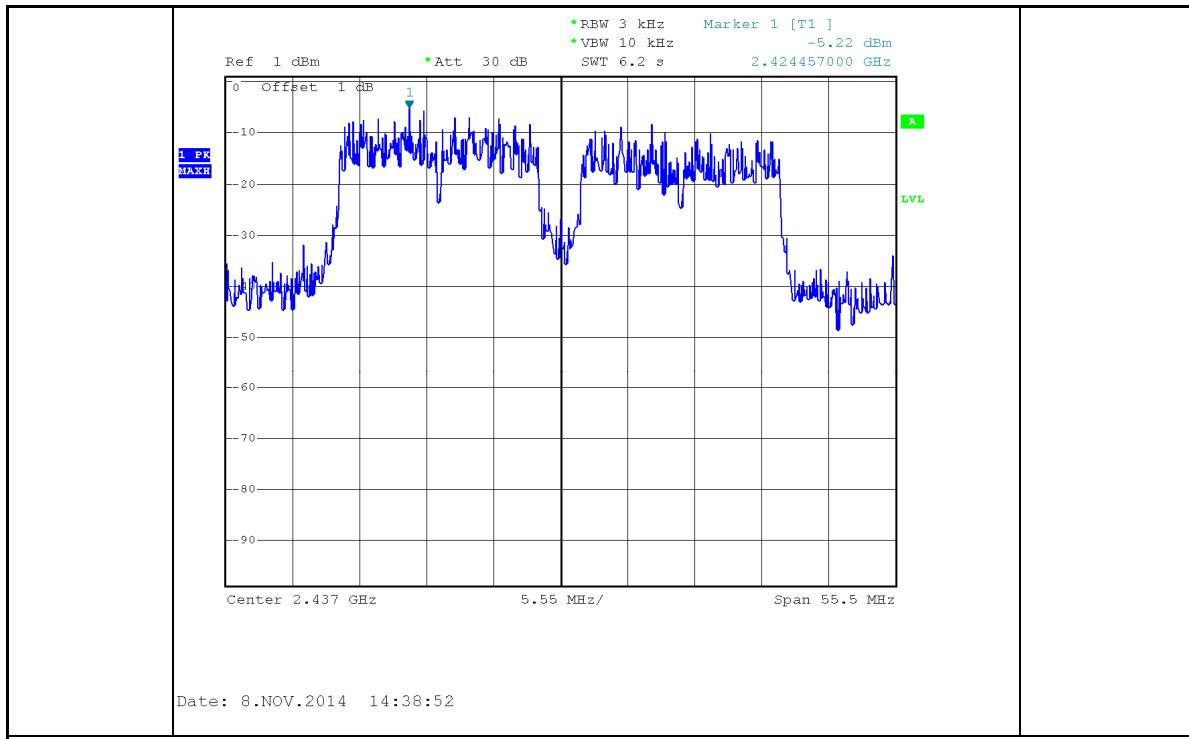
2437 MHz

Produkte

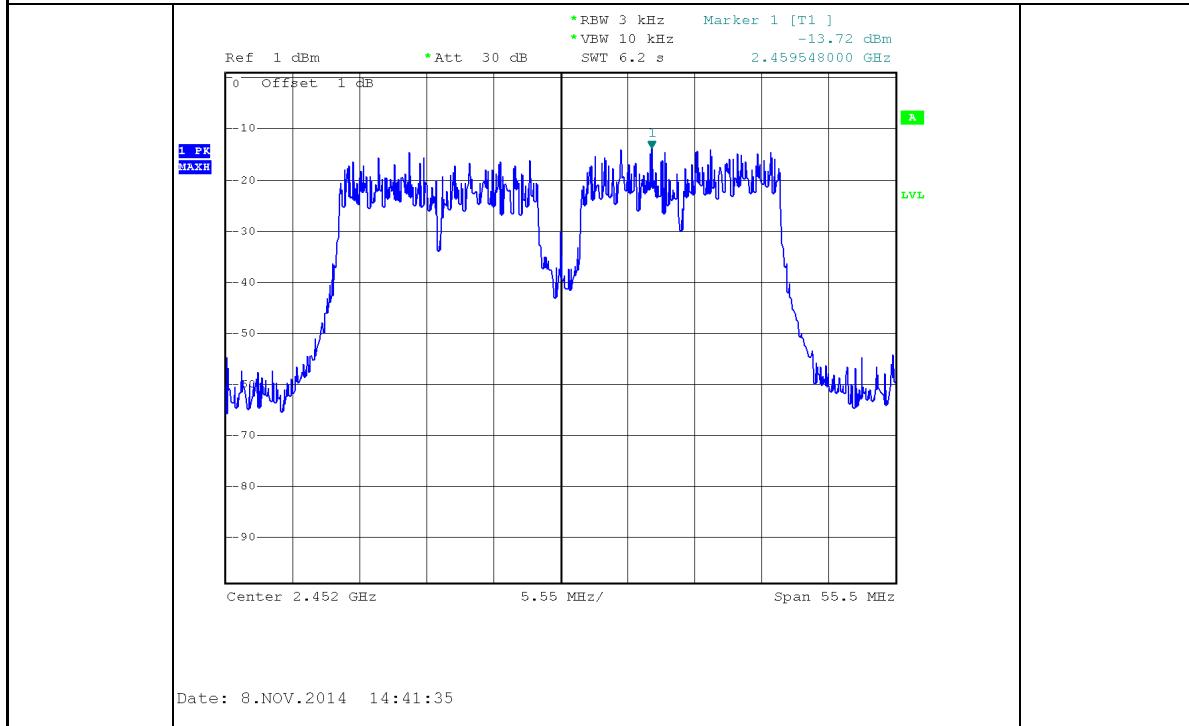
Products

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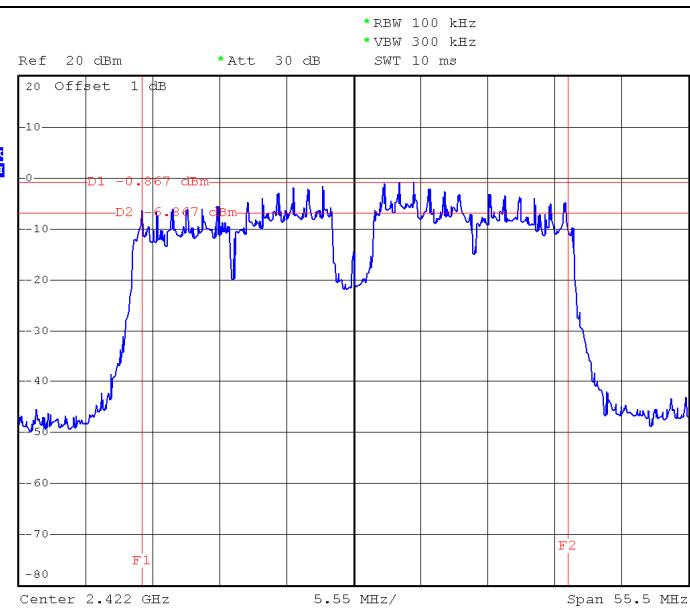
2452 MHz



Appendix C.21: 6dB Bandwidth and 99% Bandwidth_802.11n HT40_ANT2

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2422	35.30	35.85
Middle Channel	2437	35.52	36.19
High Channel	2452	36.19	36.41

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 14:44:59

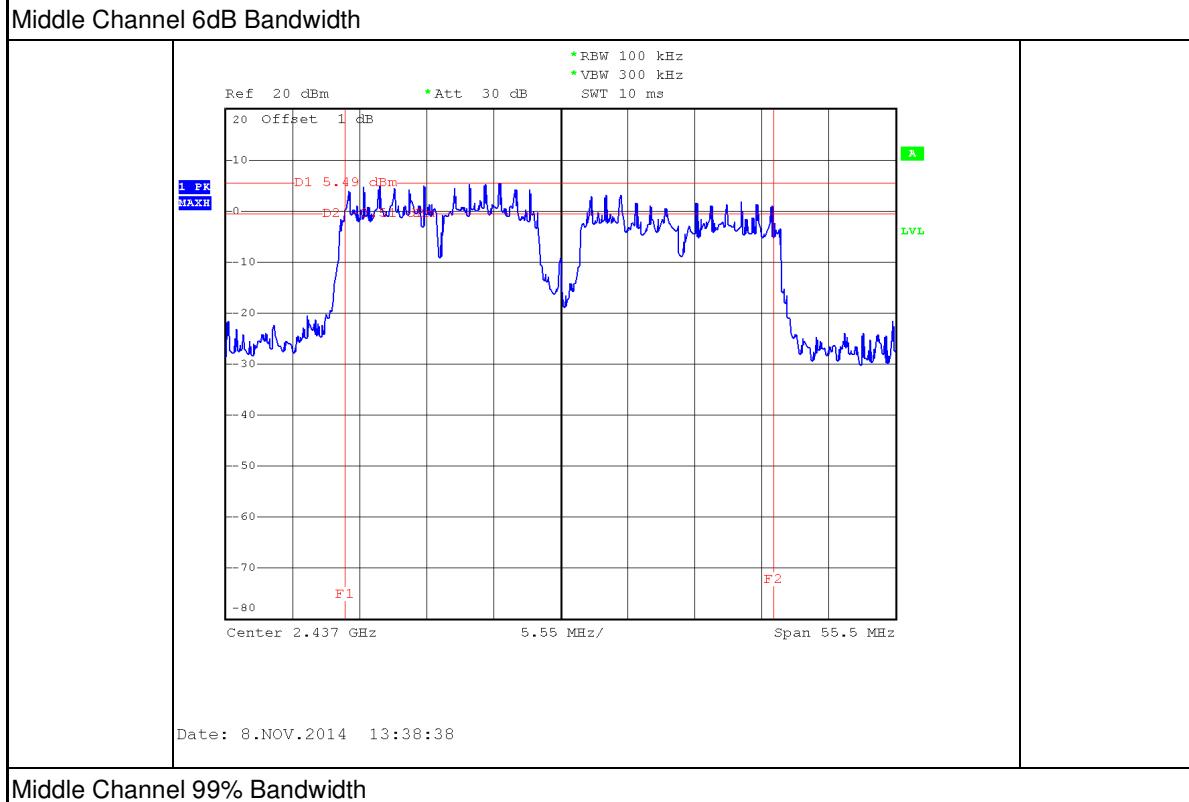
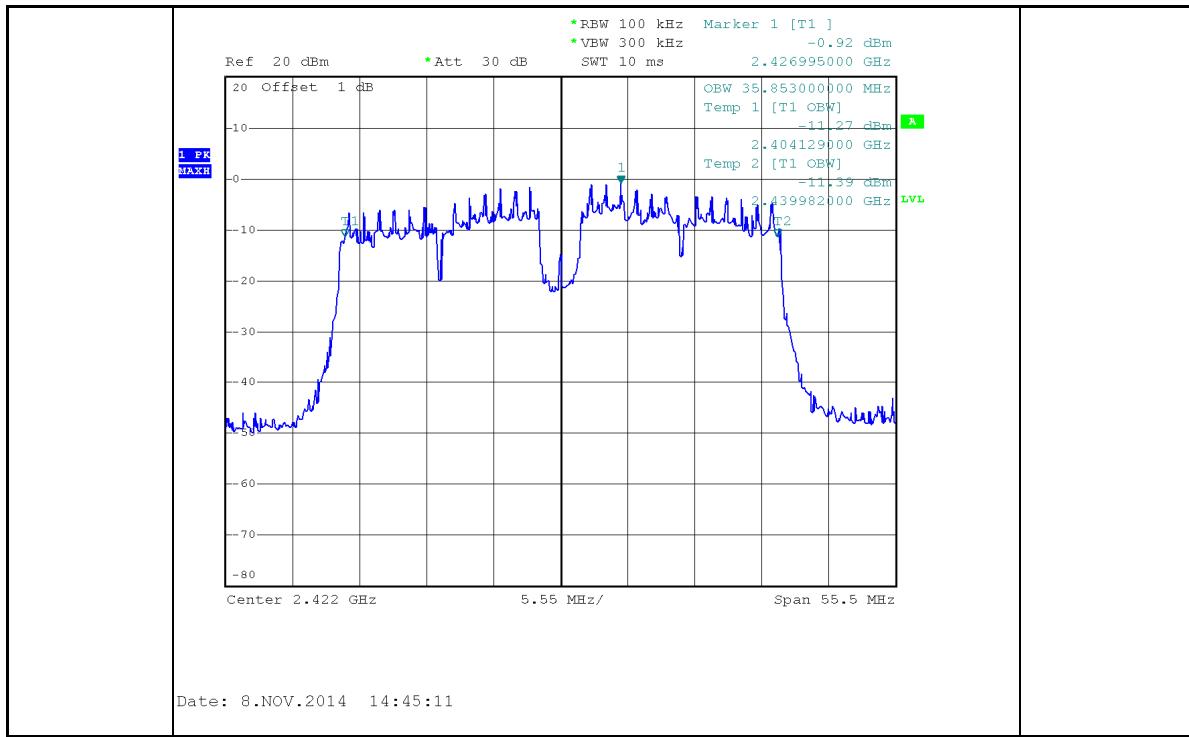
Low Channel 99% Bandwidth

Produkte

Products

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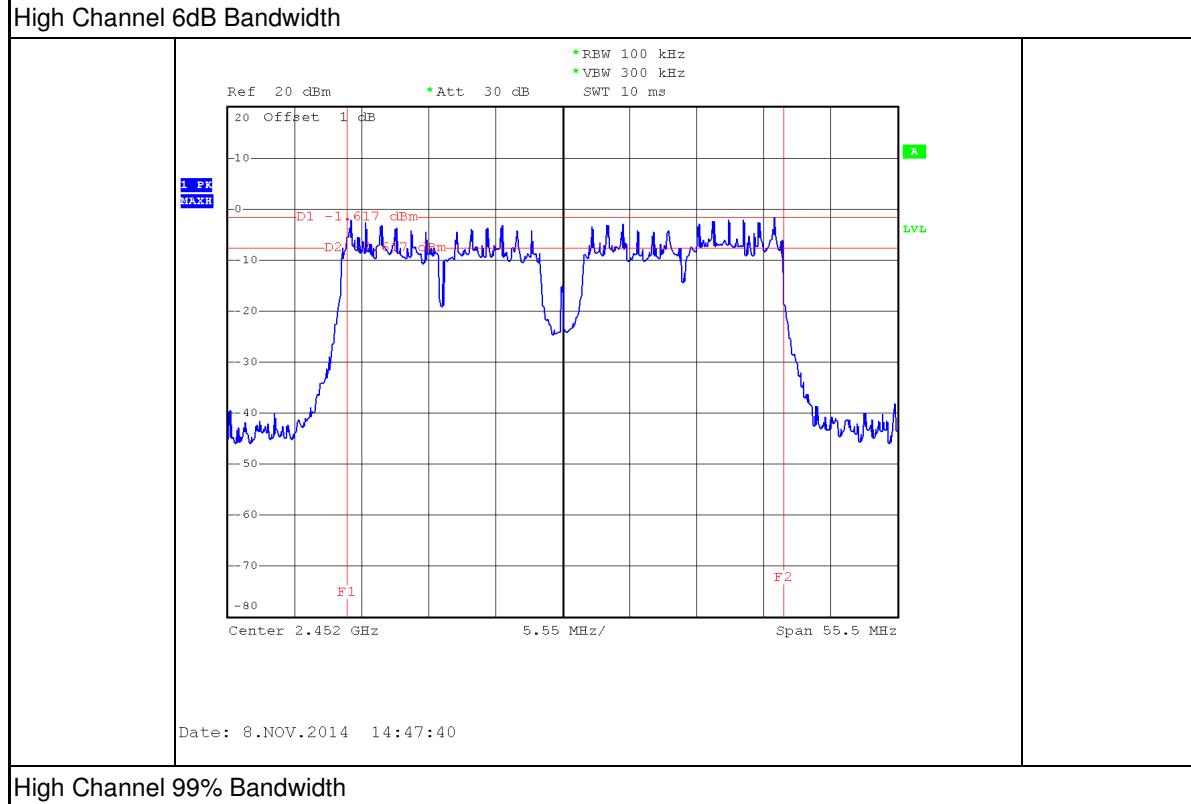
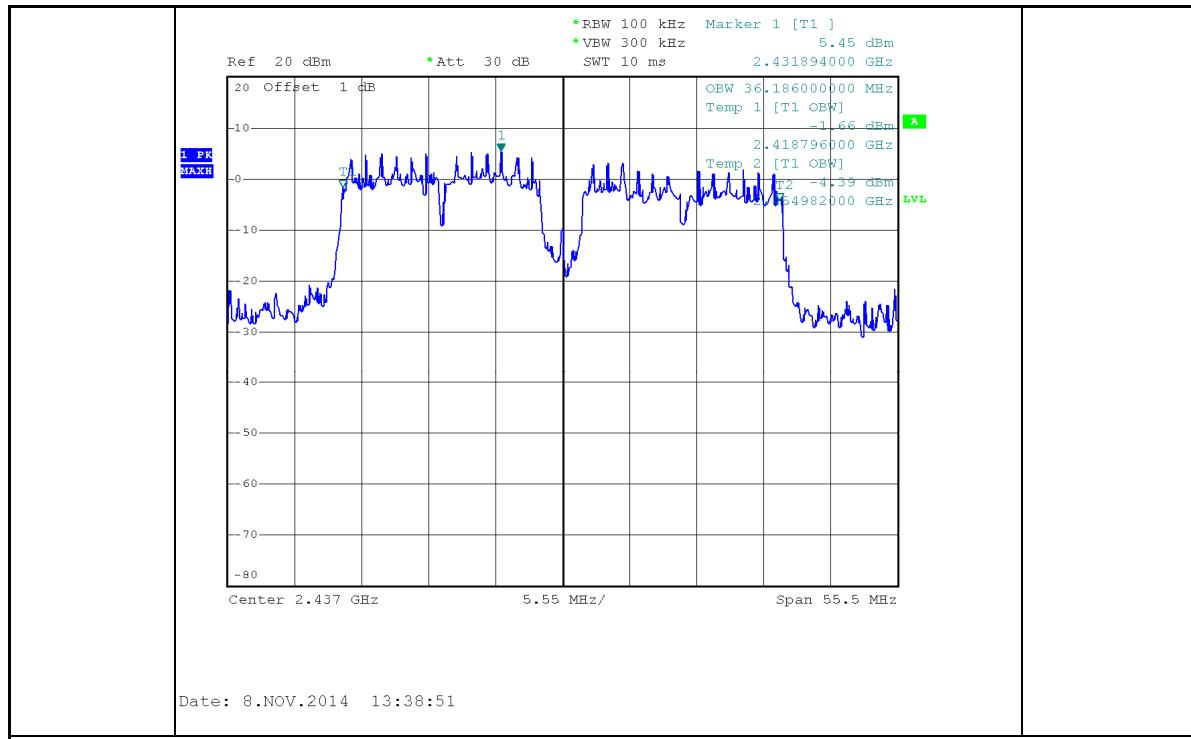


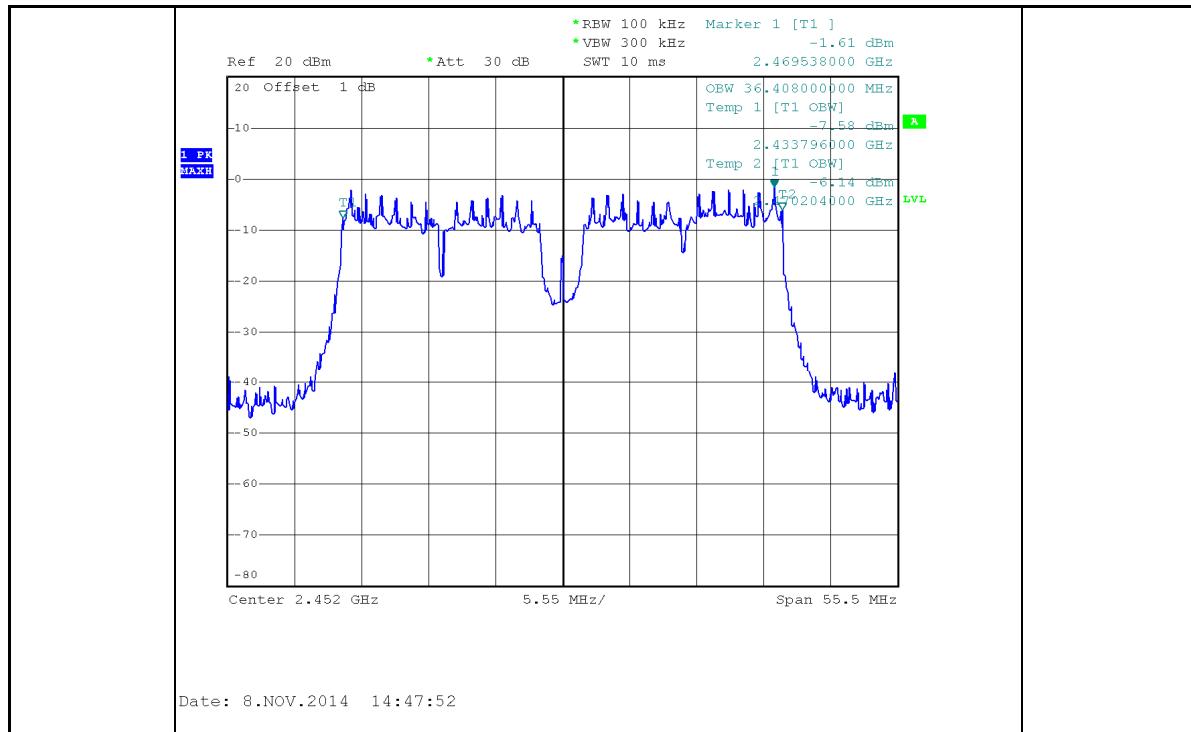
Produkte

Products

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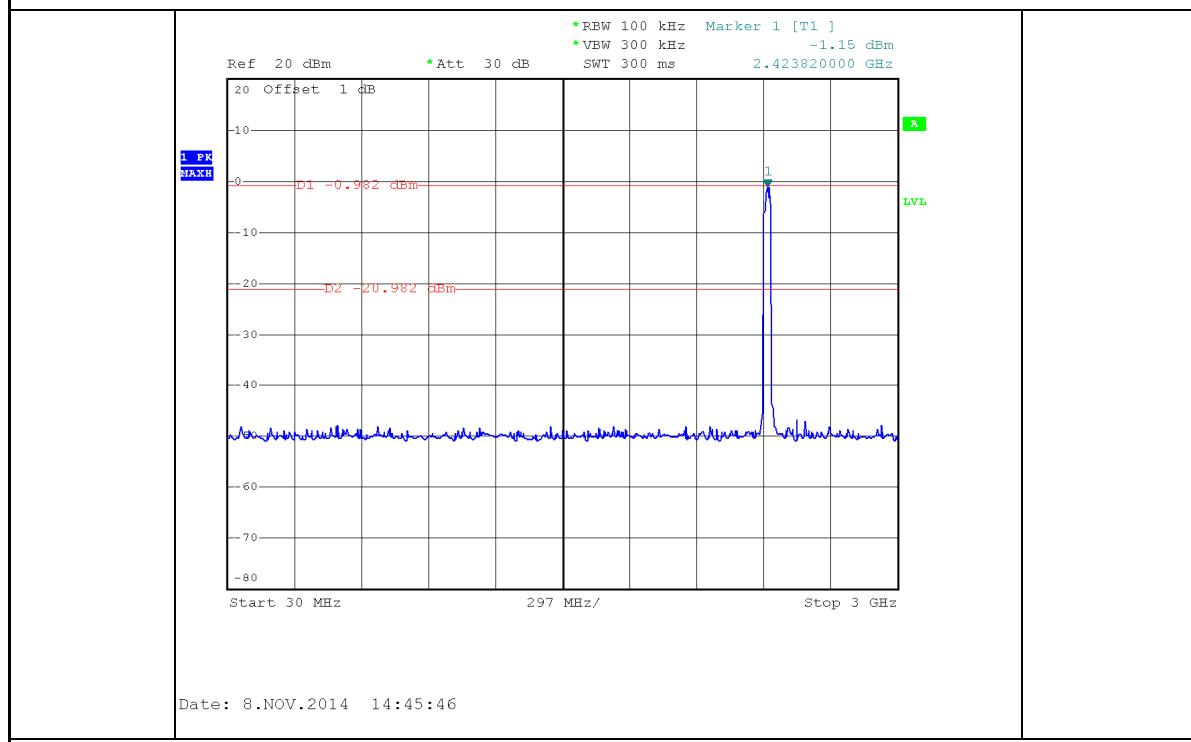
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Appendix C.22: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT40_ANT2

Low Channel 1



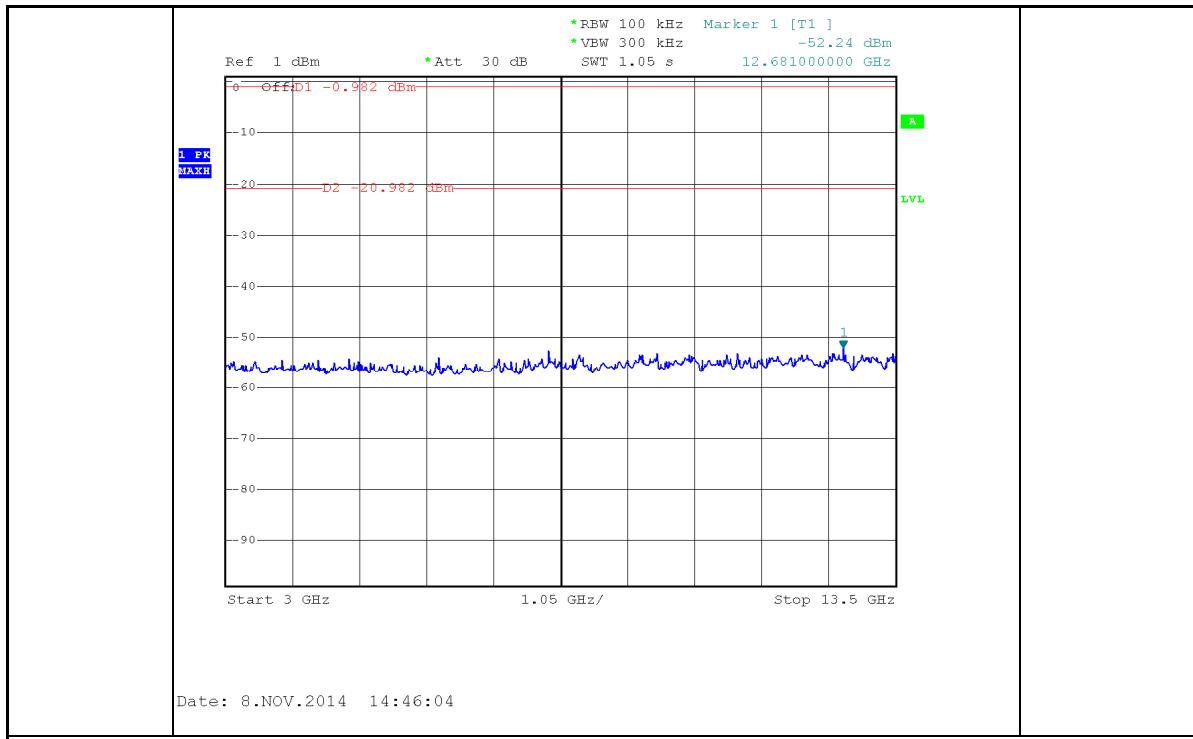
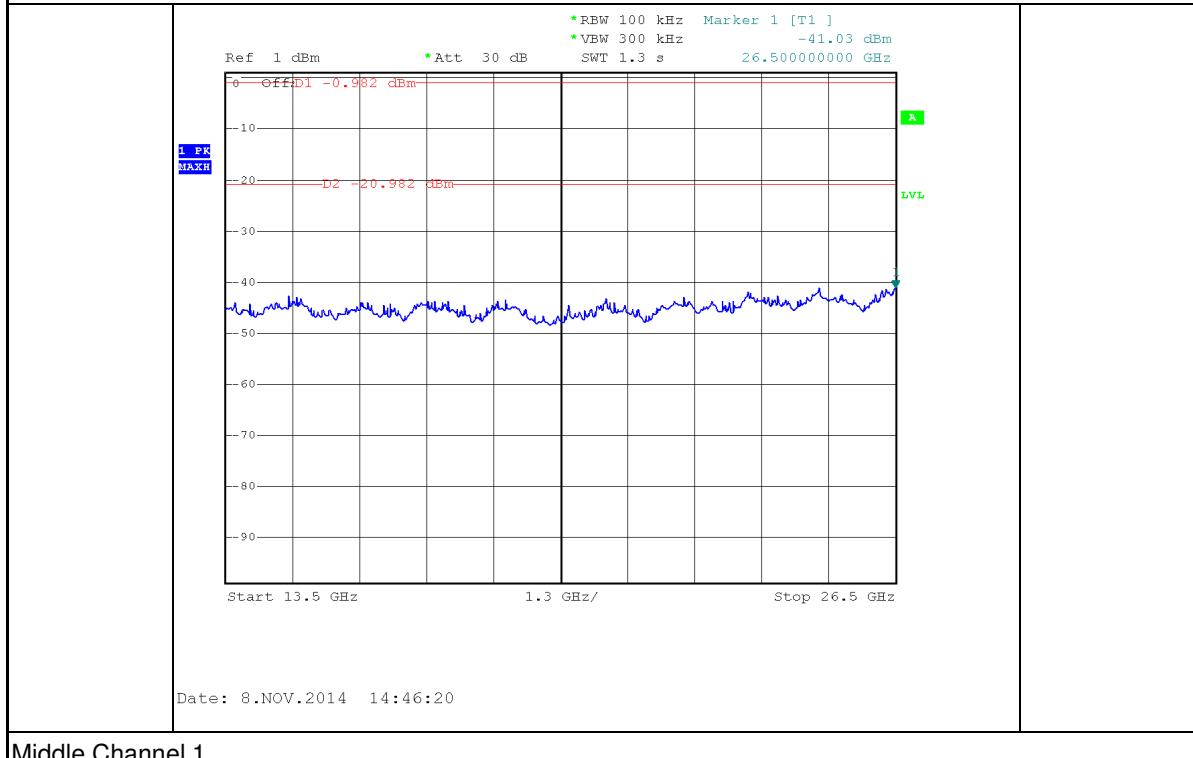
Low Channel 2

Produkte

Products

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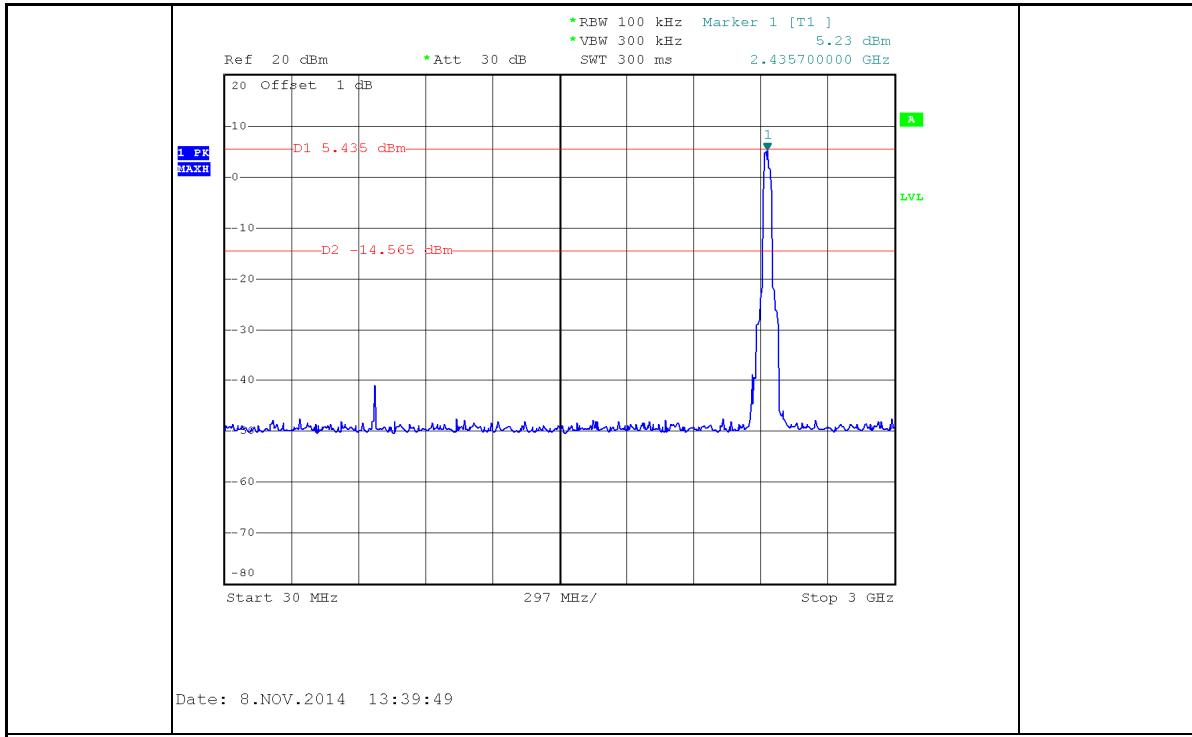
**Low Channel 3**

Produkte

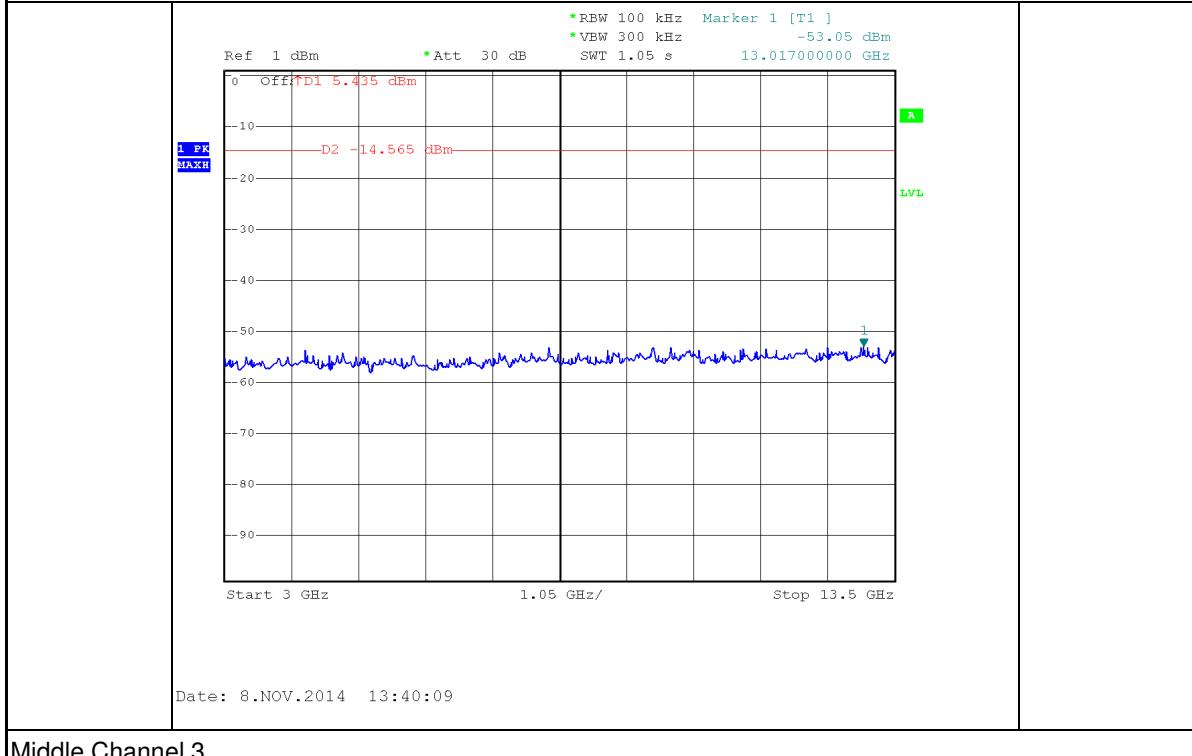
Products

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Middle Channel 2

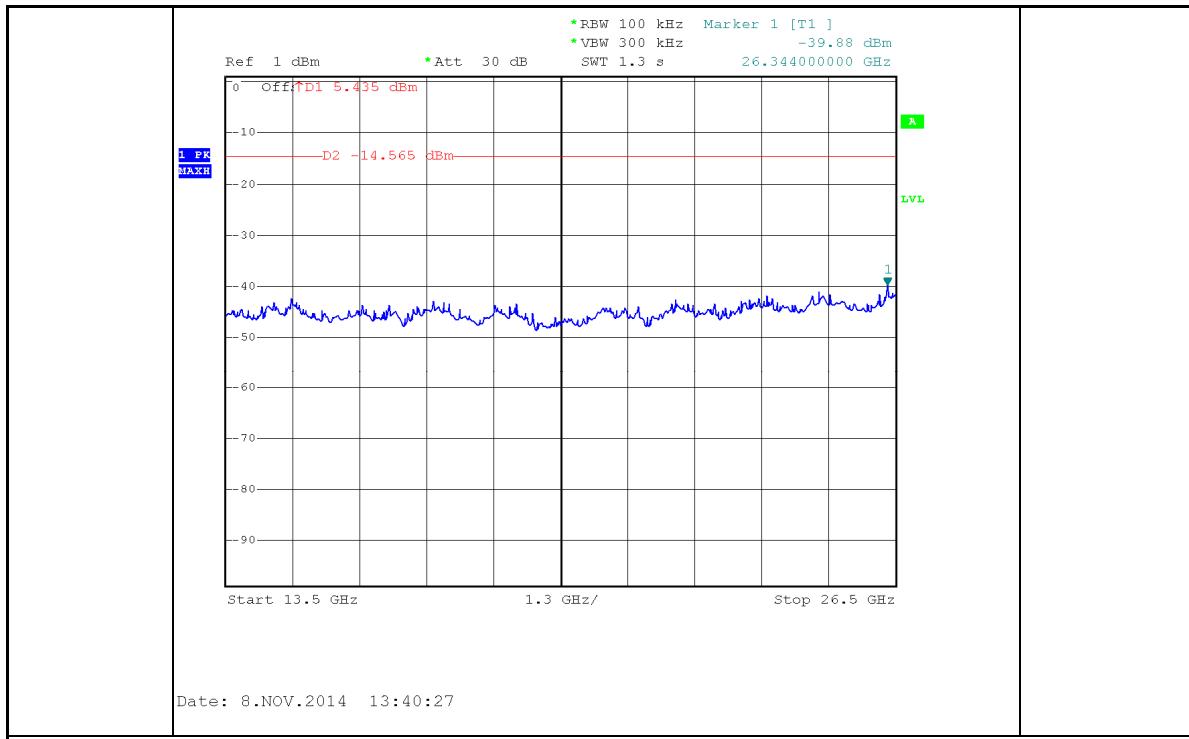
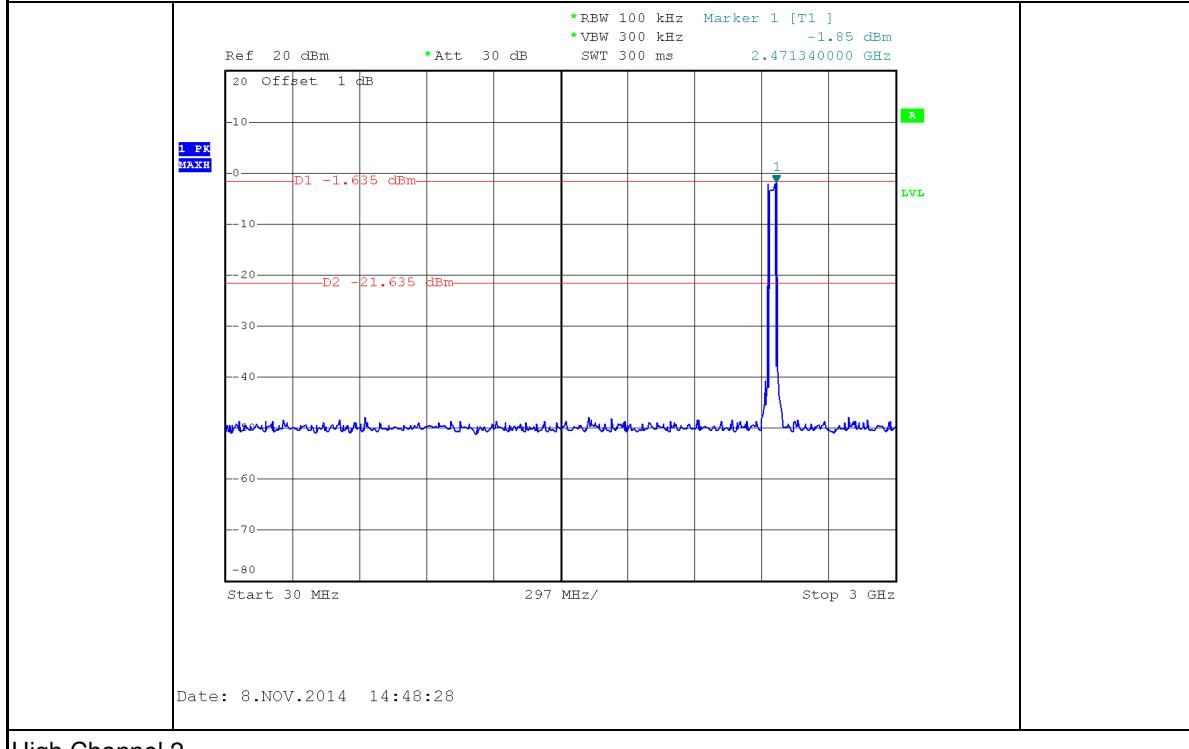


Produkte

Products

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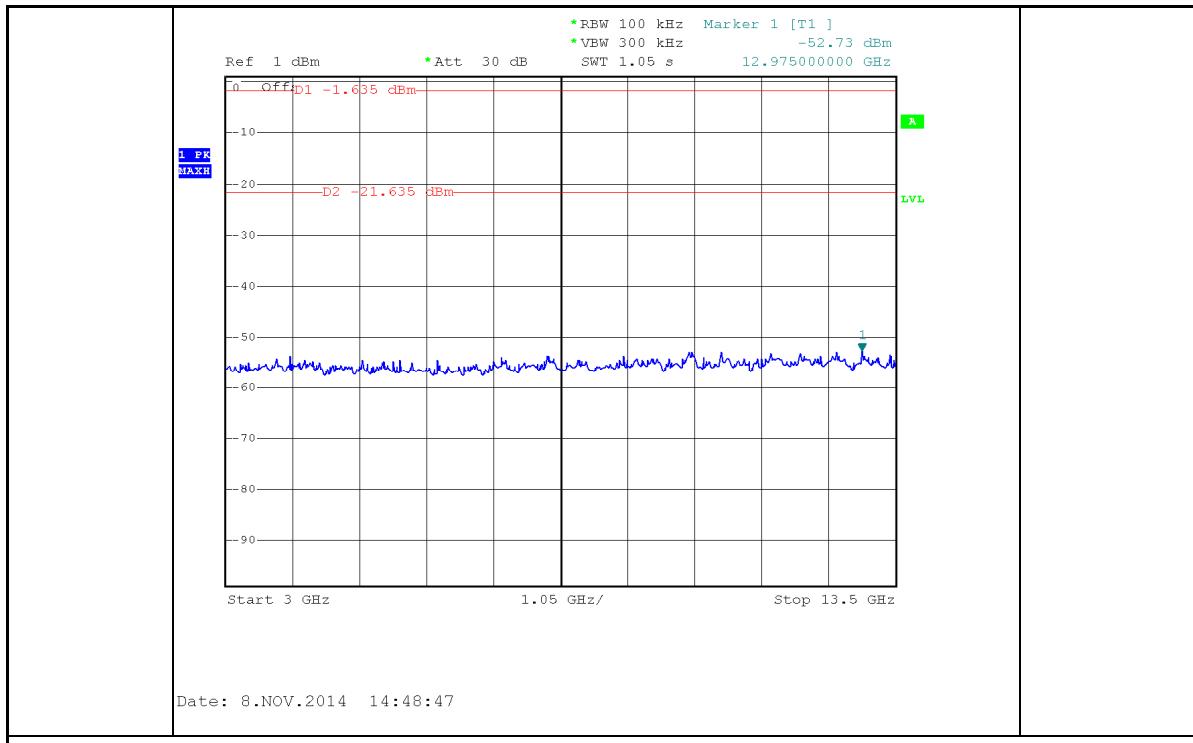
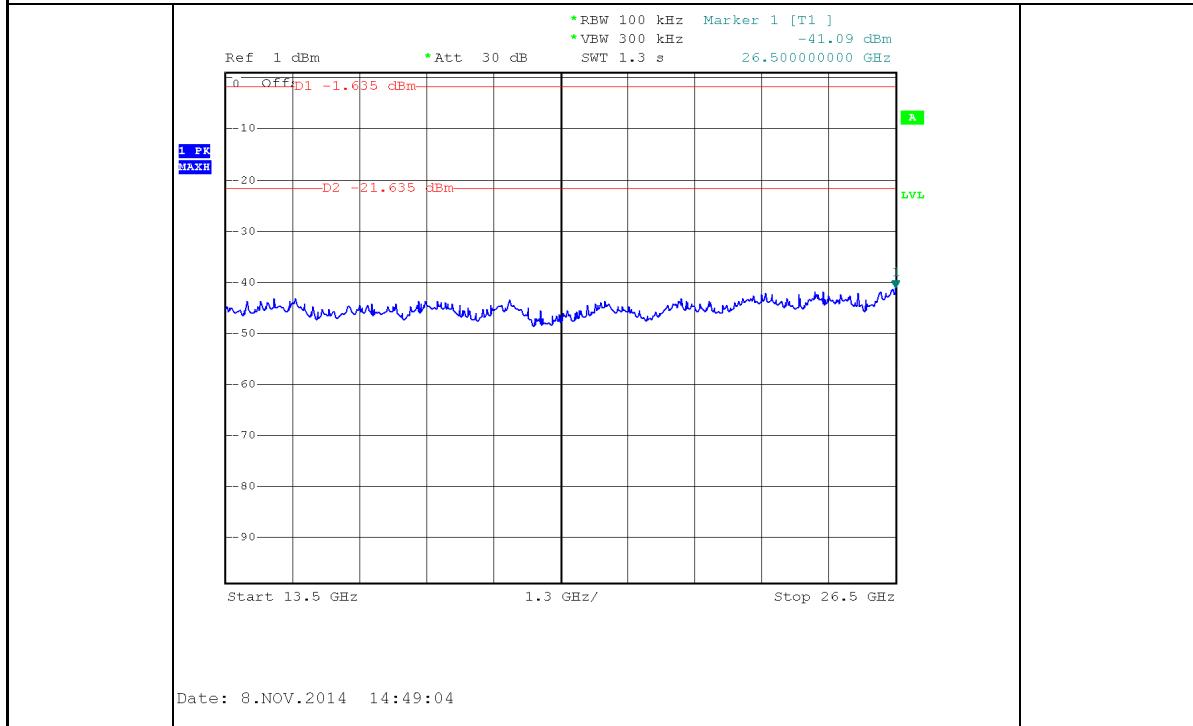
**High Channel 1**

Produkte

Products

17042741 002

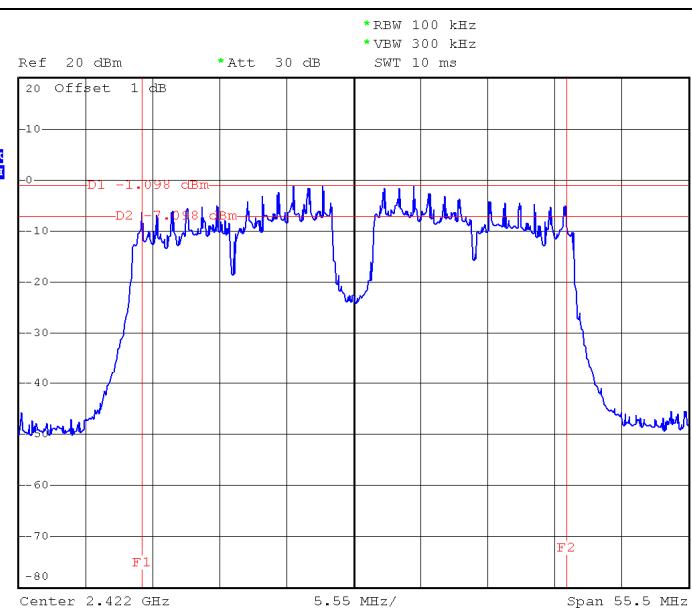
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**High Channel 3**

Appendix C.23: 6dB Bandwidth and 99% Bandwidth_802.11n HT40_ANT3

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2422	35.19	35.85
Middle Channel	2437	35.52	36.30
High Channel	2452	35.96	36.41

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 14:34:20

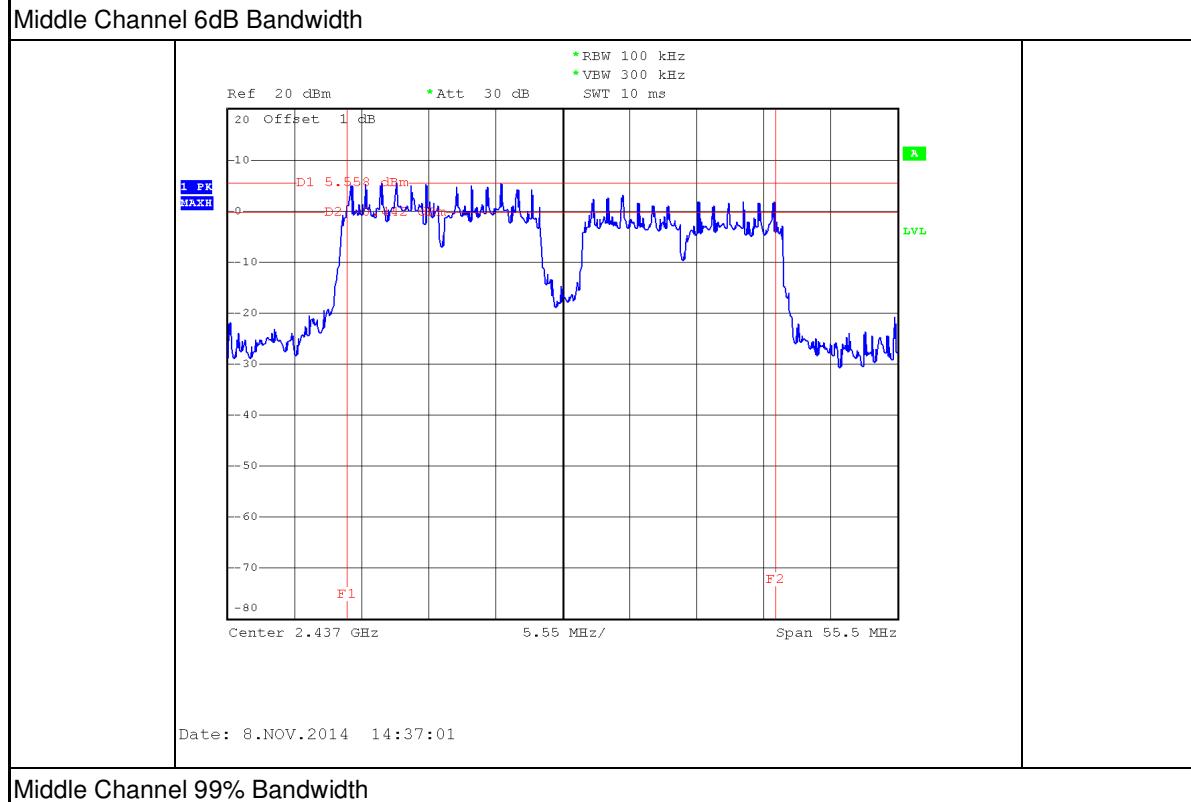
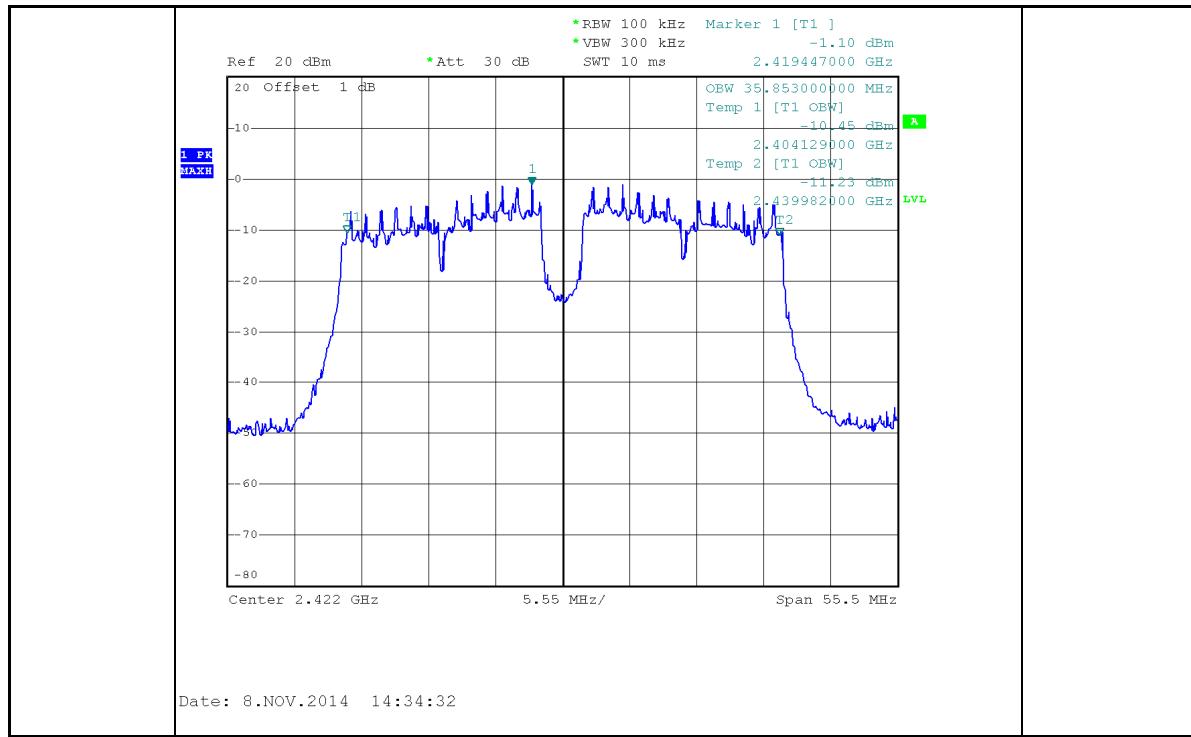
Low Channel 99% Bandwidth

Produkte

Products

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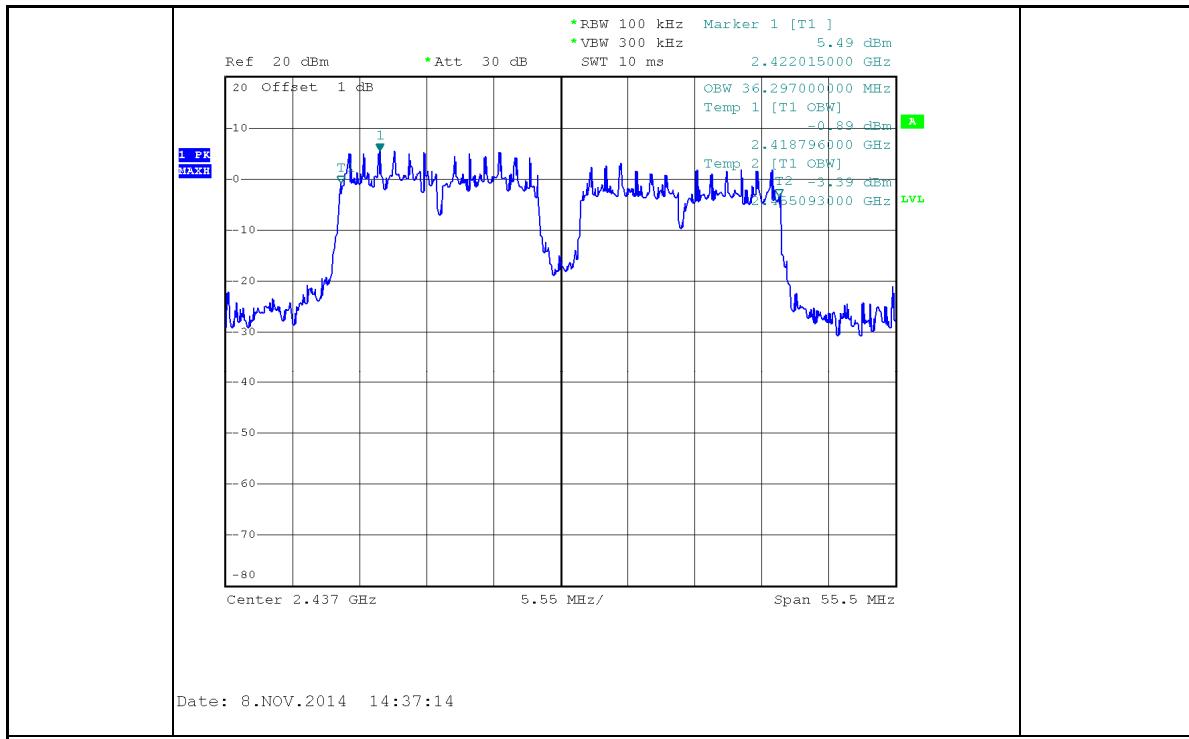
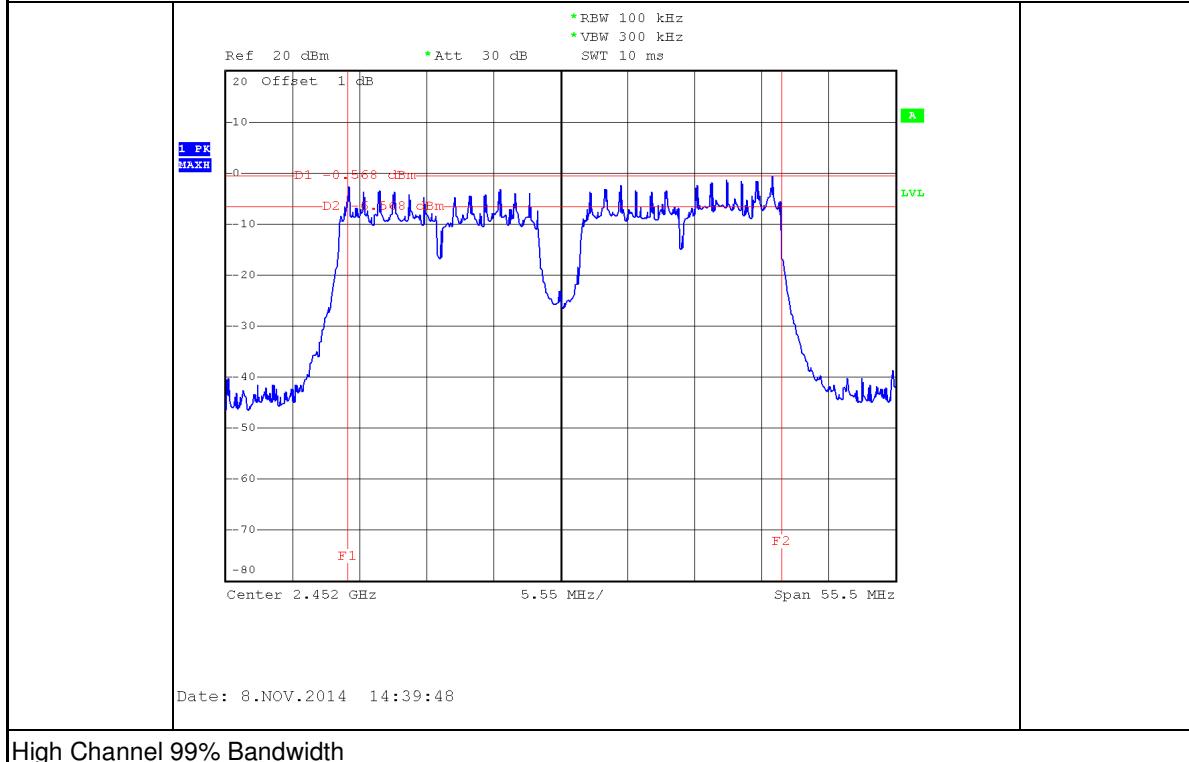


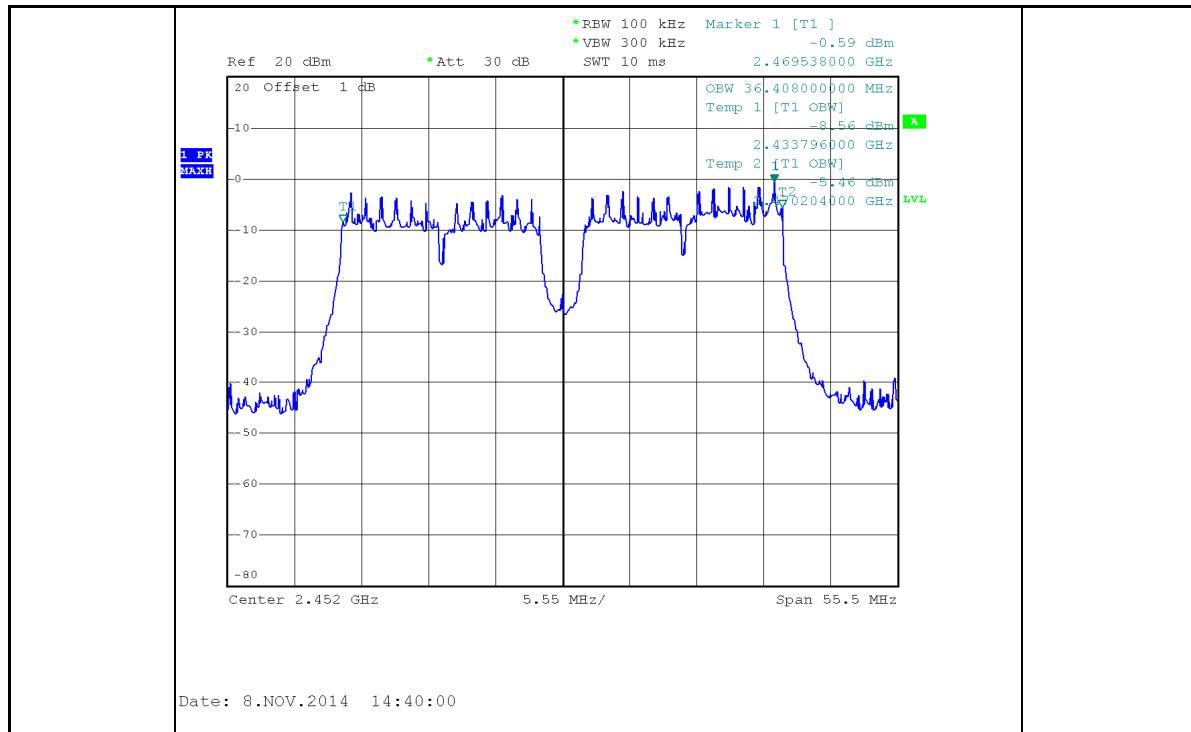
Produkte

Products

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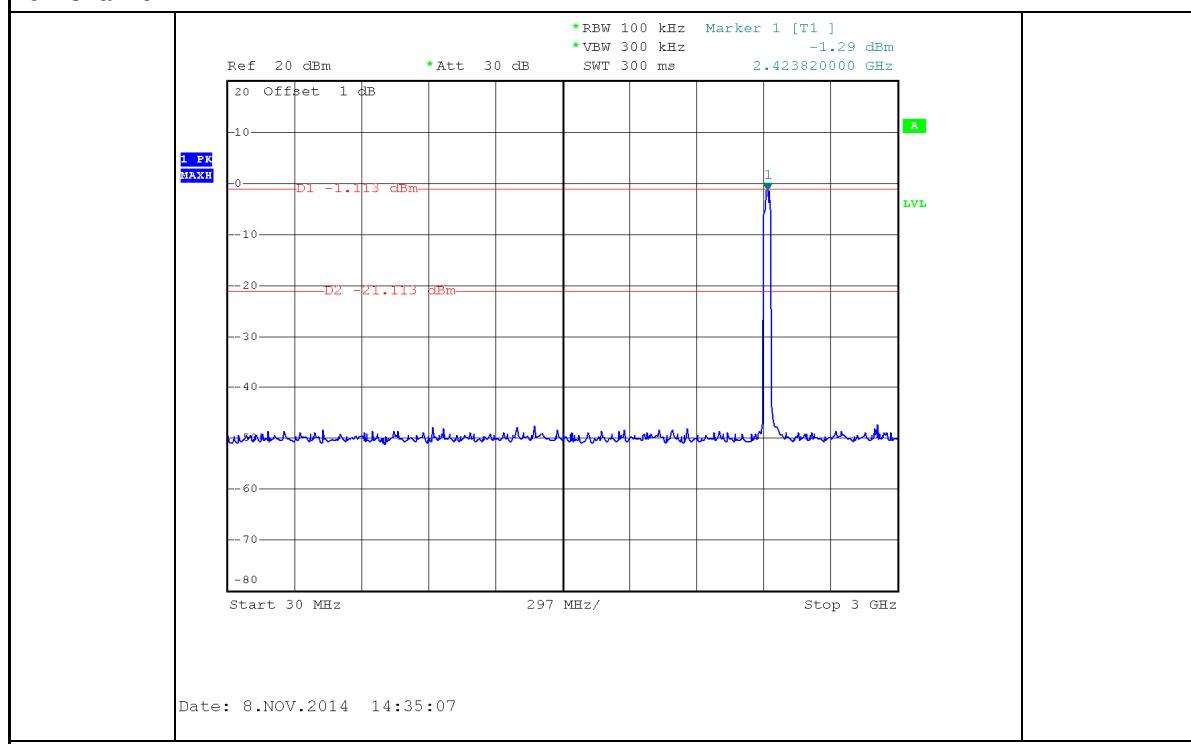
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**High Channel 6dB Bandwidth**



Appendix C.24: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT40_ANT3

Low Channel 1



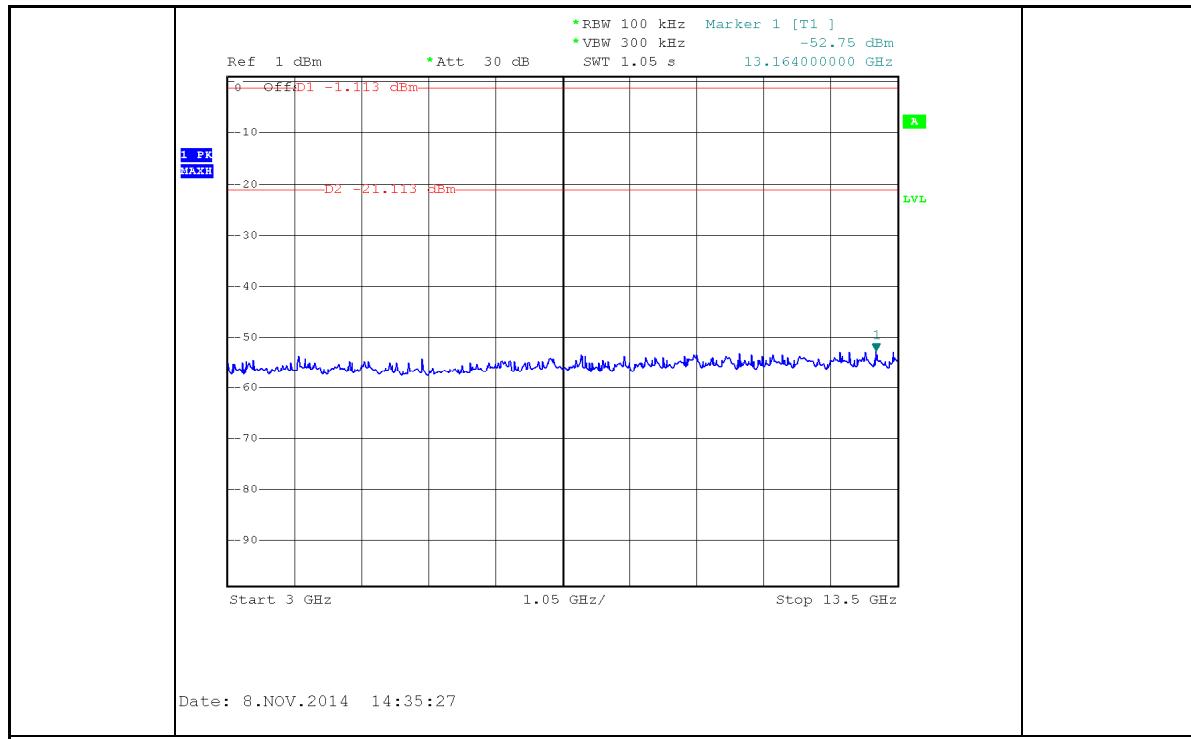
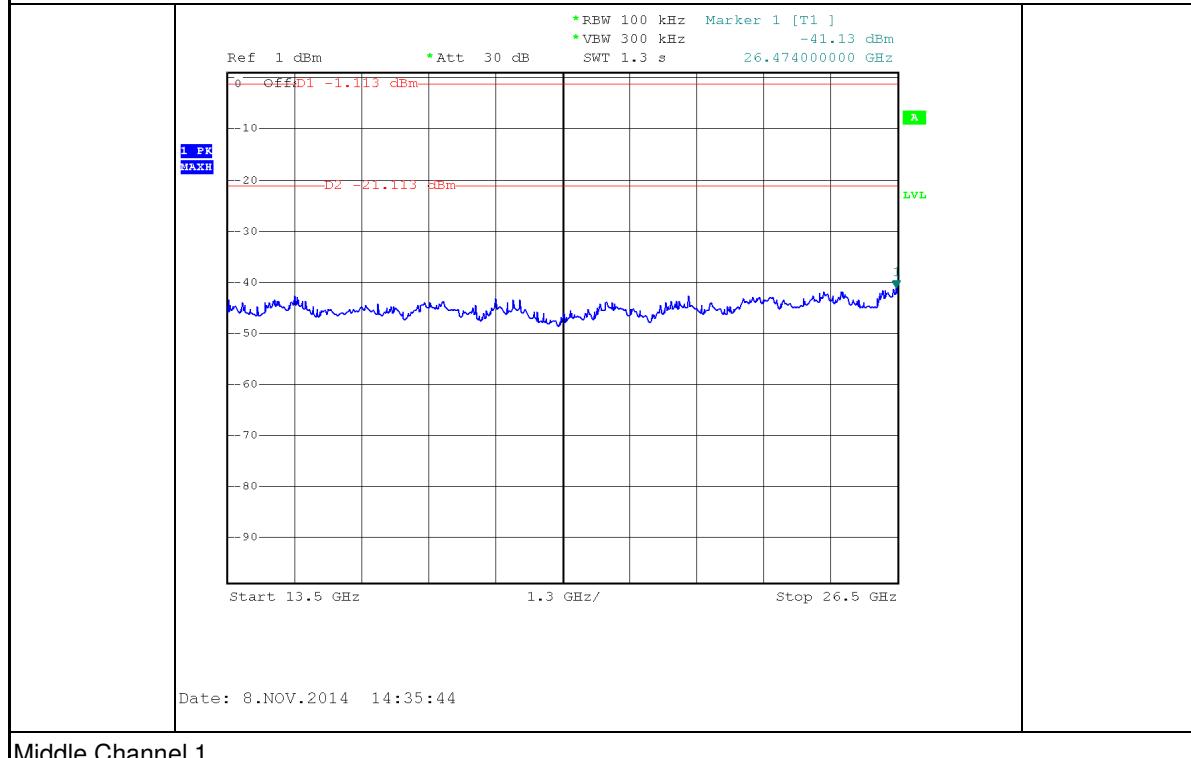
Low Channel 2

Produkte

Products

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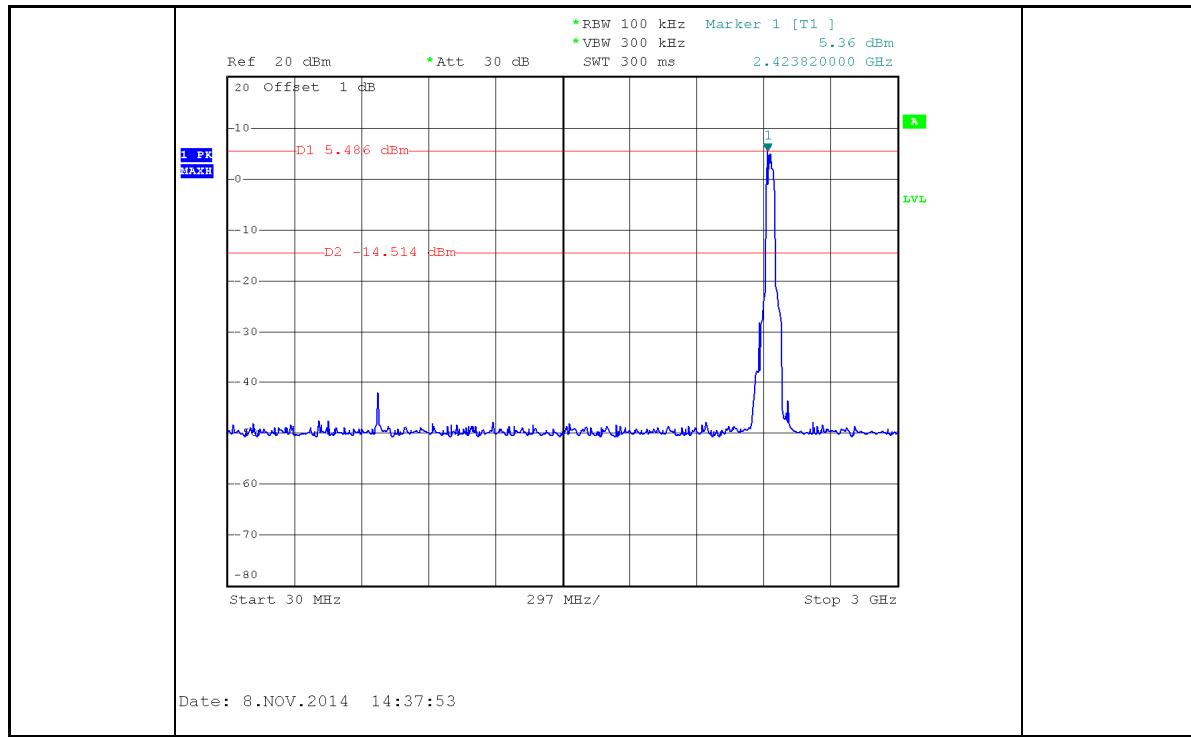
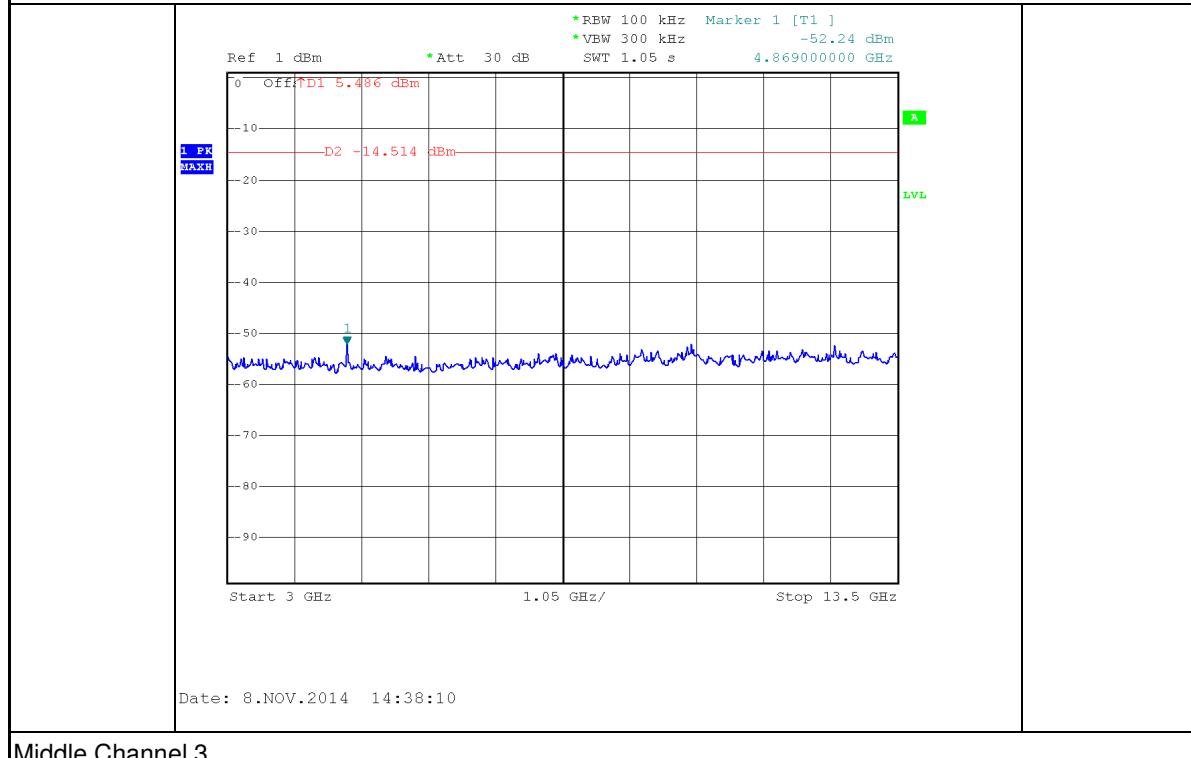
**Low Channel 3**

Produkte

Products

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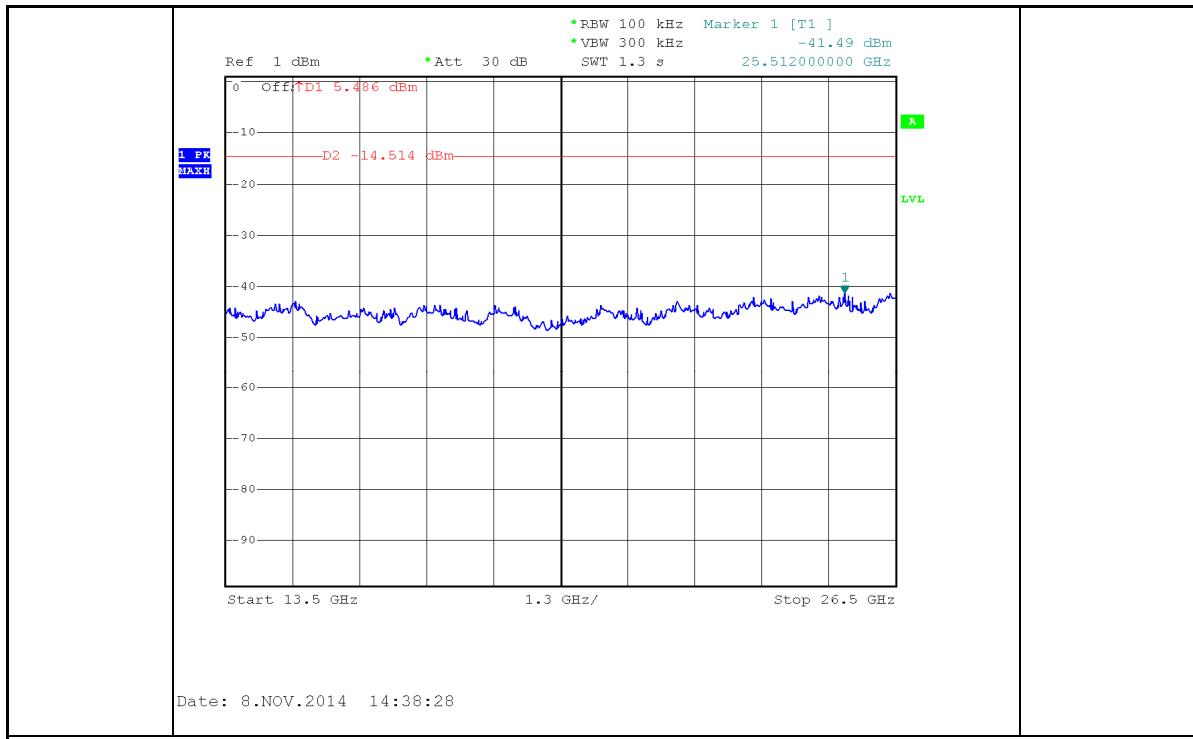
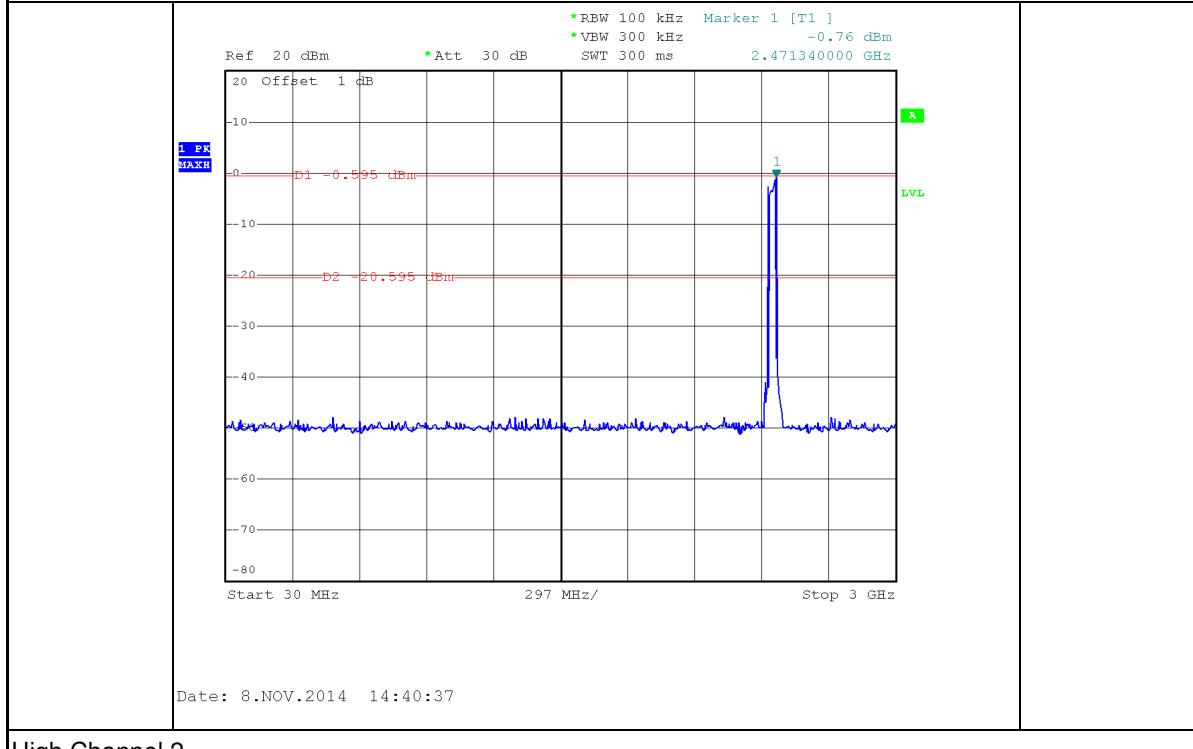
**Middle Channel 2**

Produkte

Products

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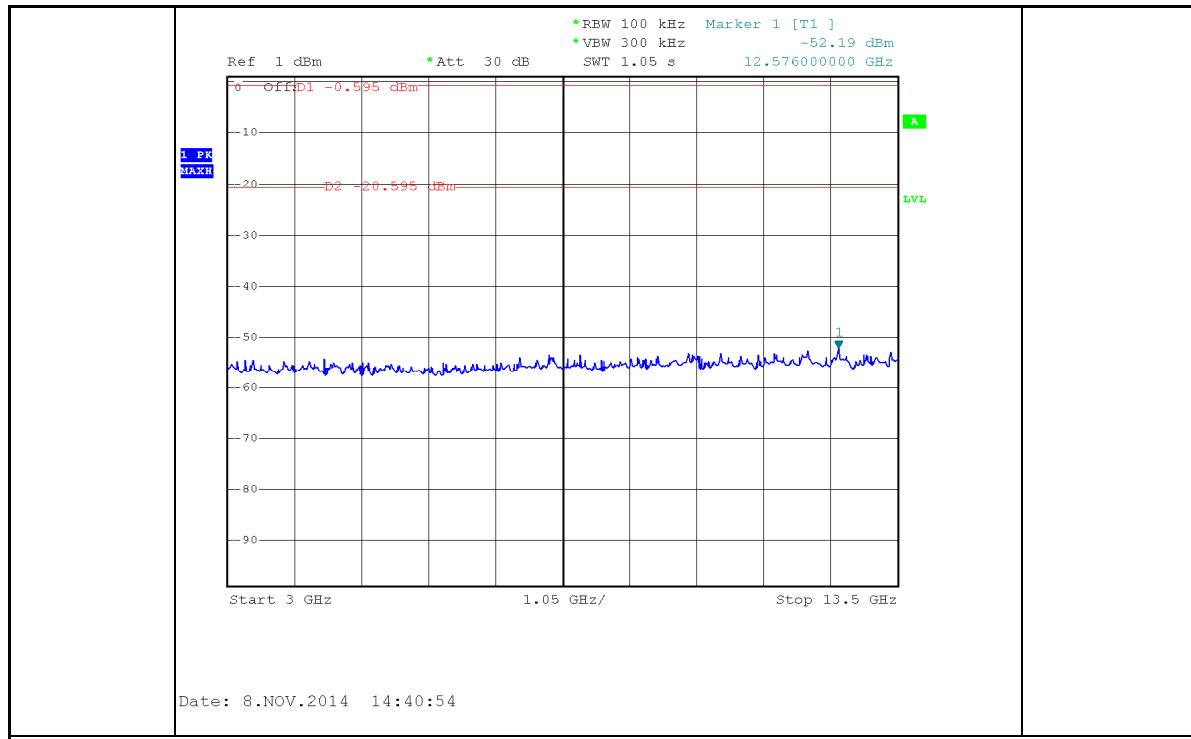
**High Channel 1**

Produkte

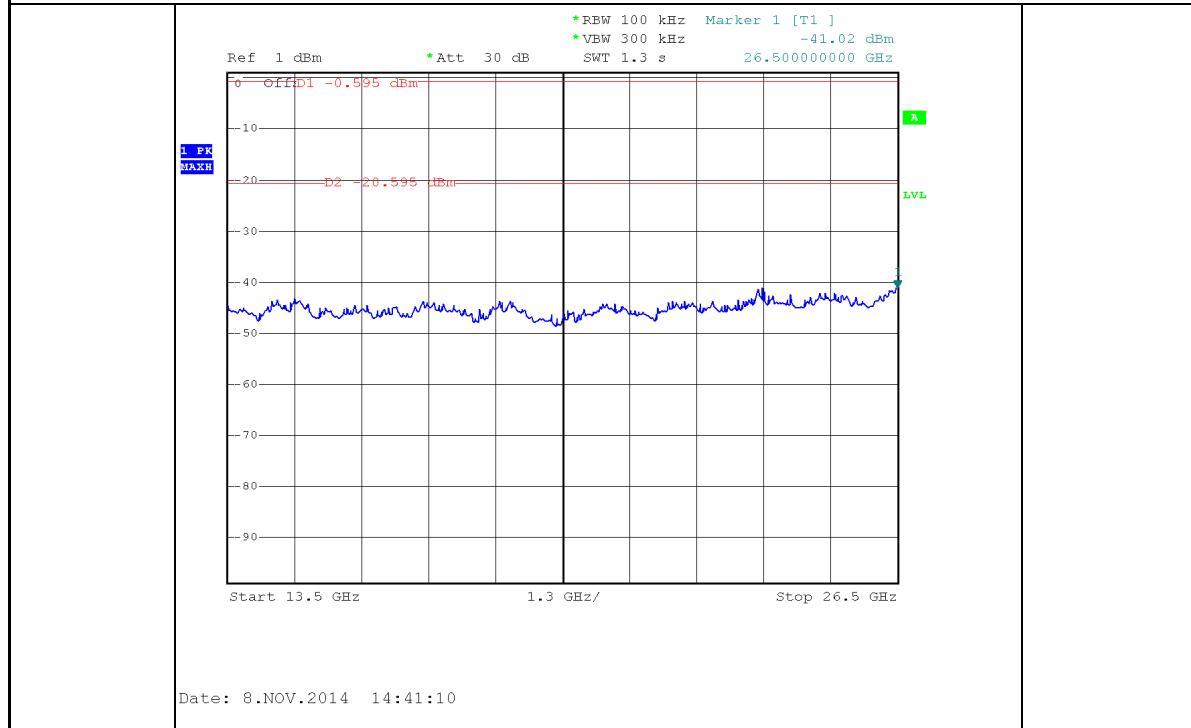
Products

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High Channel 3



Appendix D

Test Results of 2TX-Beamforming

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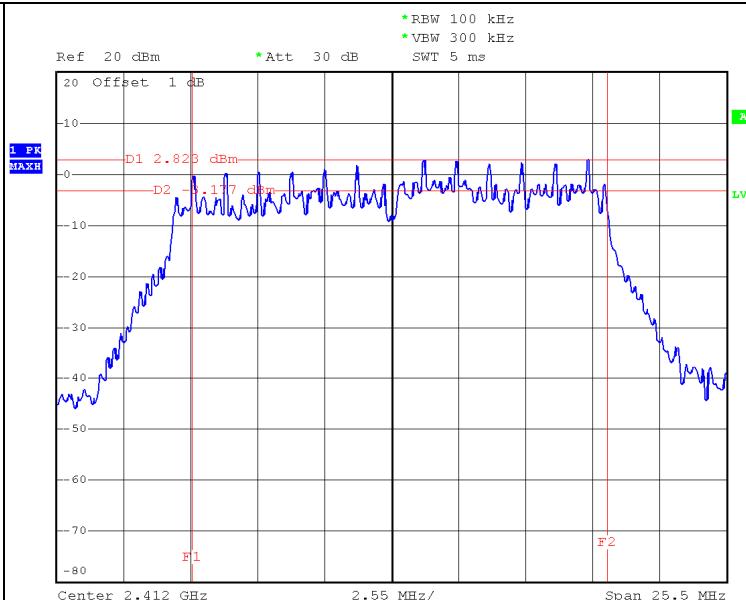
Appendix D.1: Maximum Conducted Output Power_802.11n HT20

Channel	Channel Frequency (MHz)	Maximum Conducted Output Power_ANT1 (dBm)	Maximum Conducted Output Power_ANT 3 (dBm)	Maximum Conducted Output Power_Total (dBm)	Limit(dBm)
Low Channel	2412	14.20	14.20	17.21	28.4
Middle Channel	2437	18.20	18.60	21.41	28.4
High Channel	2462	14.20	14.60	17.41	28.4

Appendix D.2: 6dB Bandwidth and 99% Bandwidth_802.11n HT20_ANT1

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	15.81	16.42
Middle Channel	2437	15.86	16.52
High Channel	2462	15.81	16.47

Low Channel 6dB Bandwidth



Date: 8.NOV.2014 18:05:34

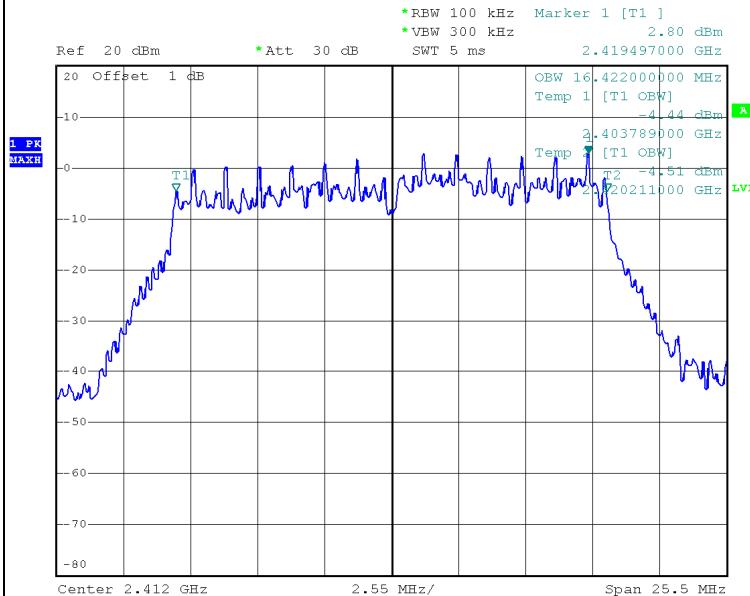
Low Channel 99% Bandwidth

Produkte

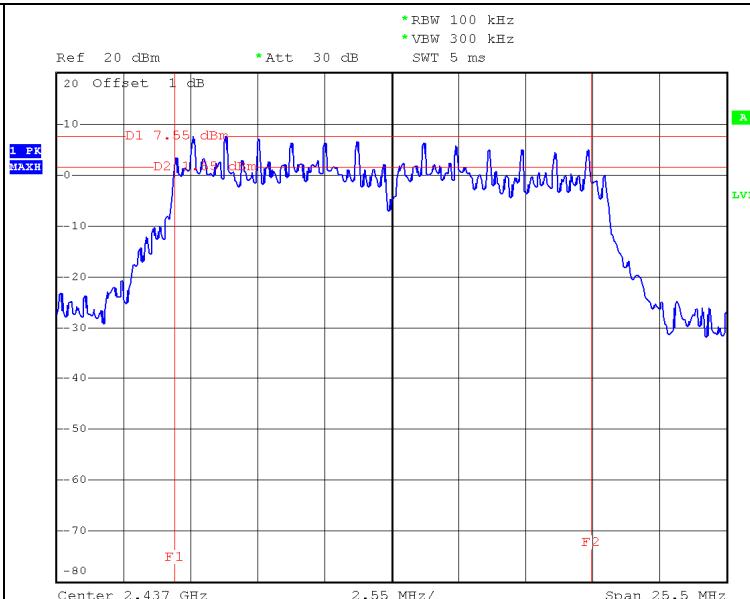
Products

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Date: 8.NOV.2014 18:05:46

Middle Channel 6dB Bandwidth

Date: 8.NOV.2014 17:58:40

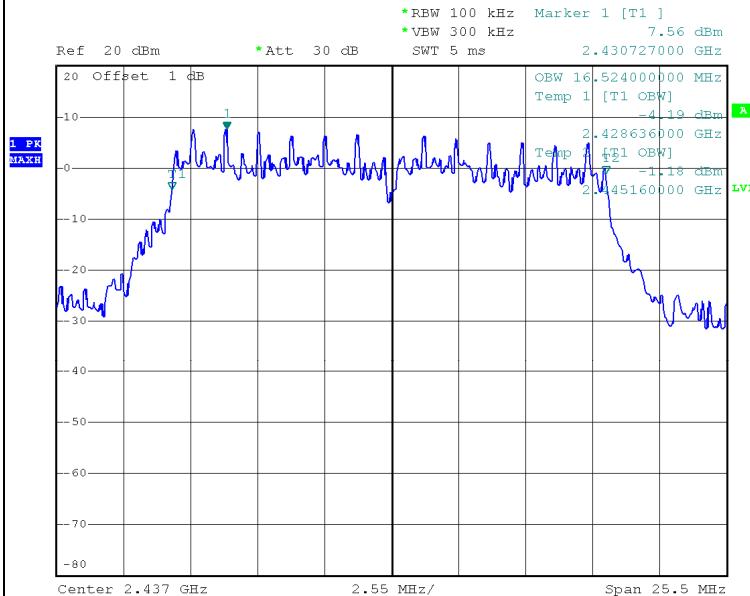
Middle Channel 99% Bandwidth

Produkte

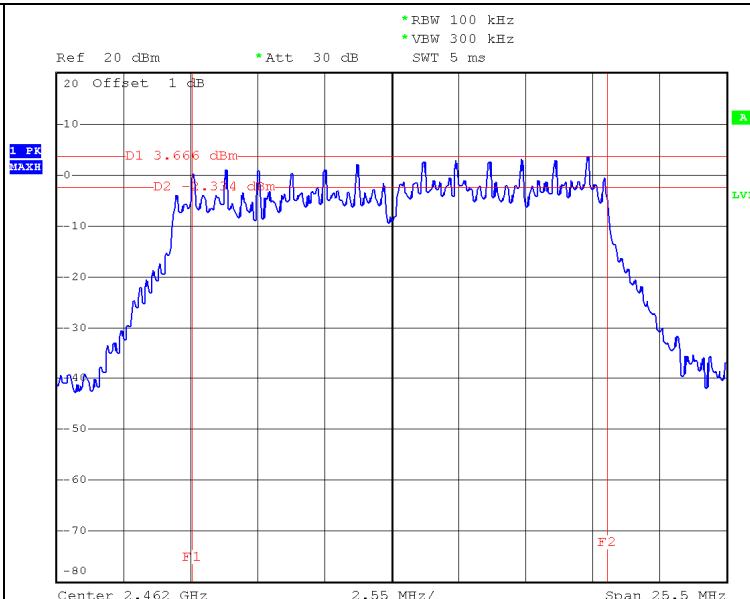
Products

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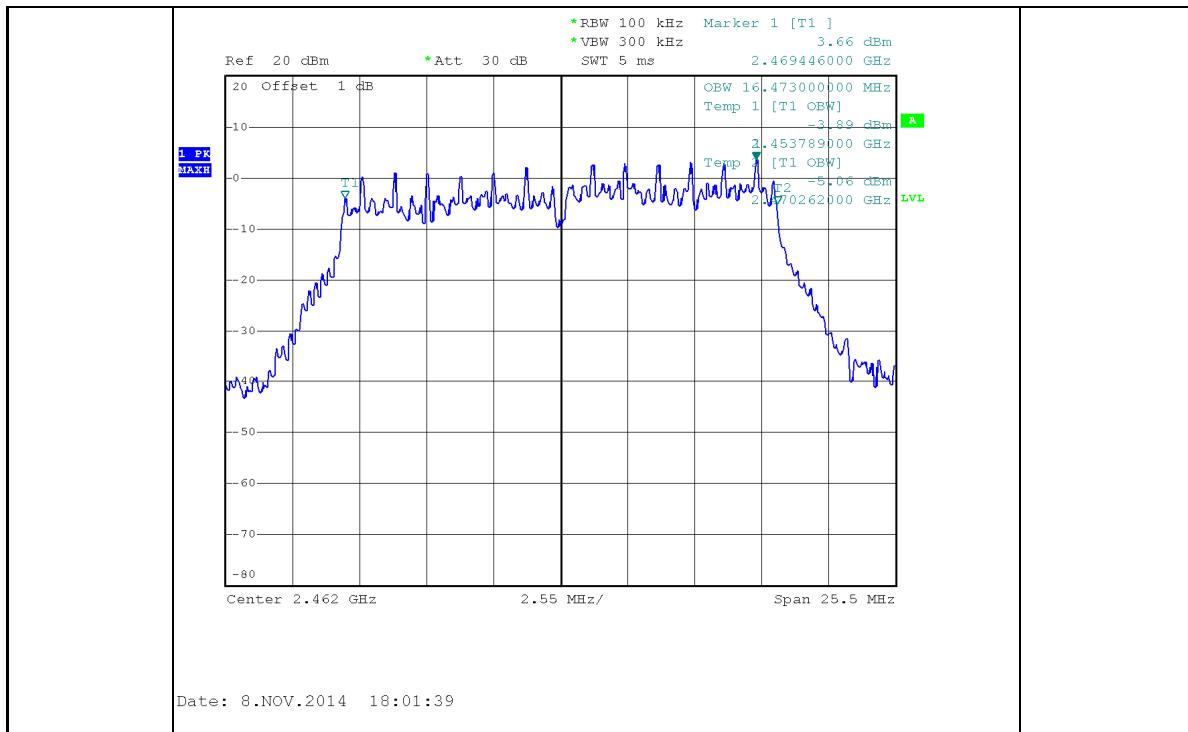


Date: 8.NOV.2014 17:58:53

High Channel 6dB Bandwidth

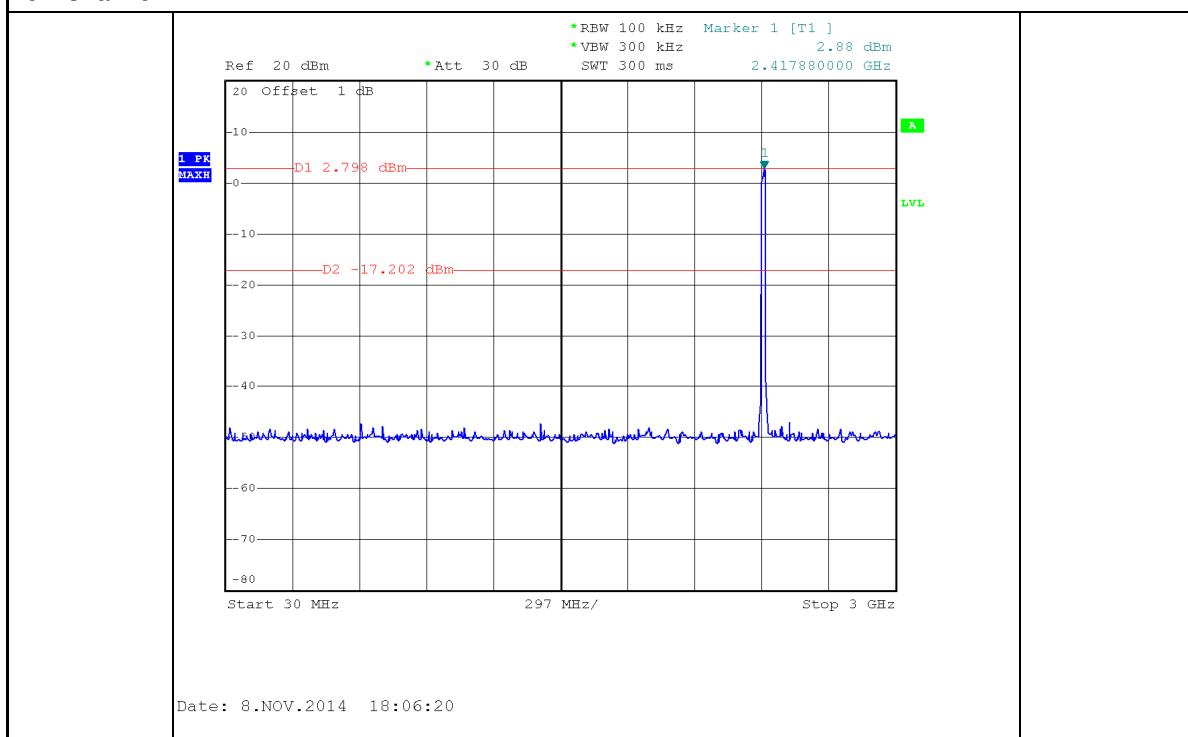
Date: 8.NOV.2014 18:01:27

High Channel 99% Bandwidth



Appendix D.3: Conducted Spurious Emissions measured in 100kHz Bandwidth_802.11n HT20_ANT1

Low Channel 1



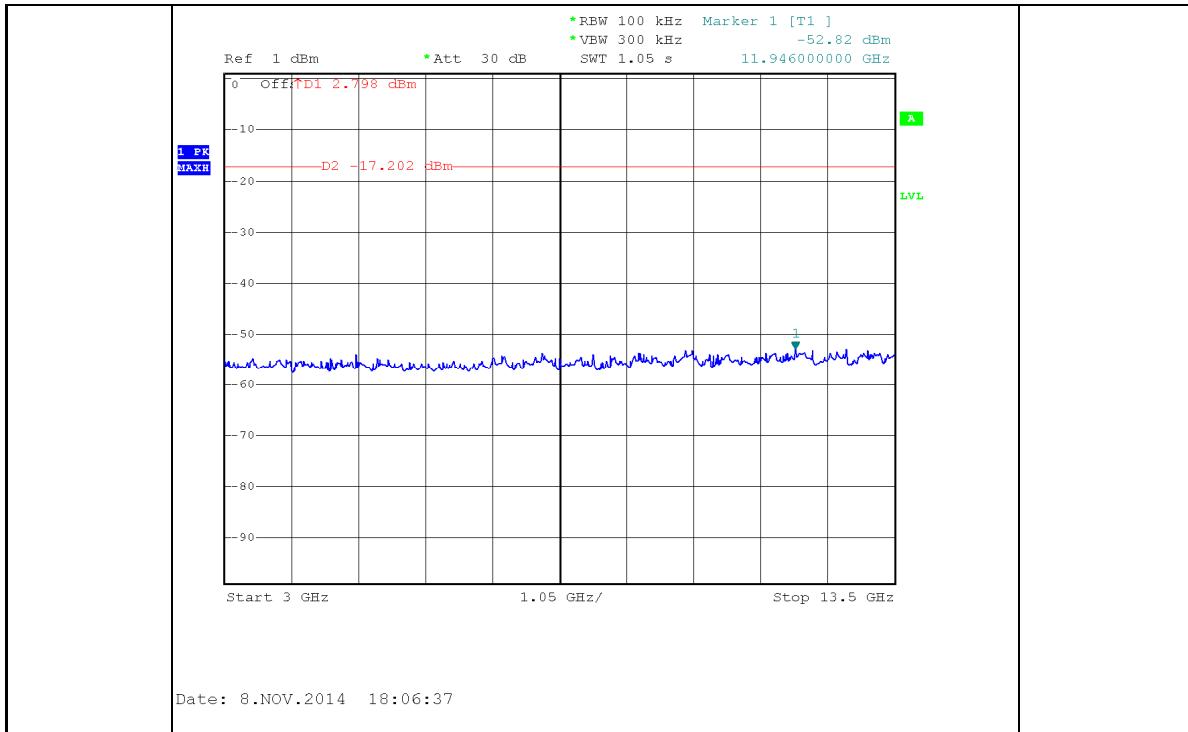
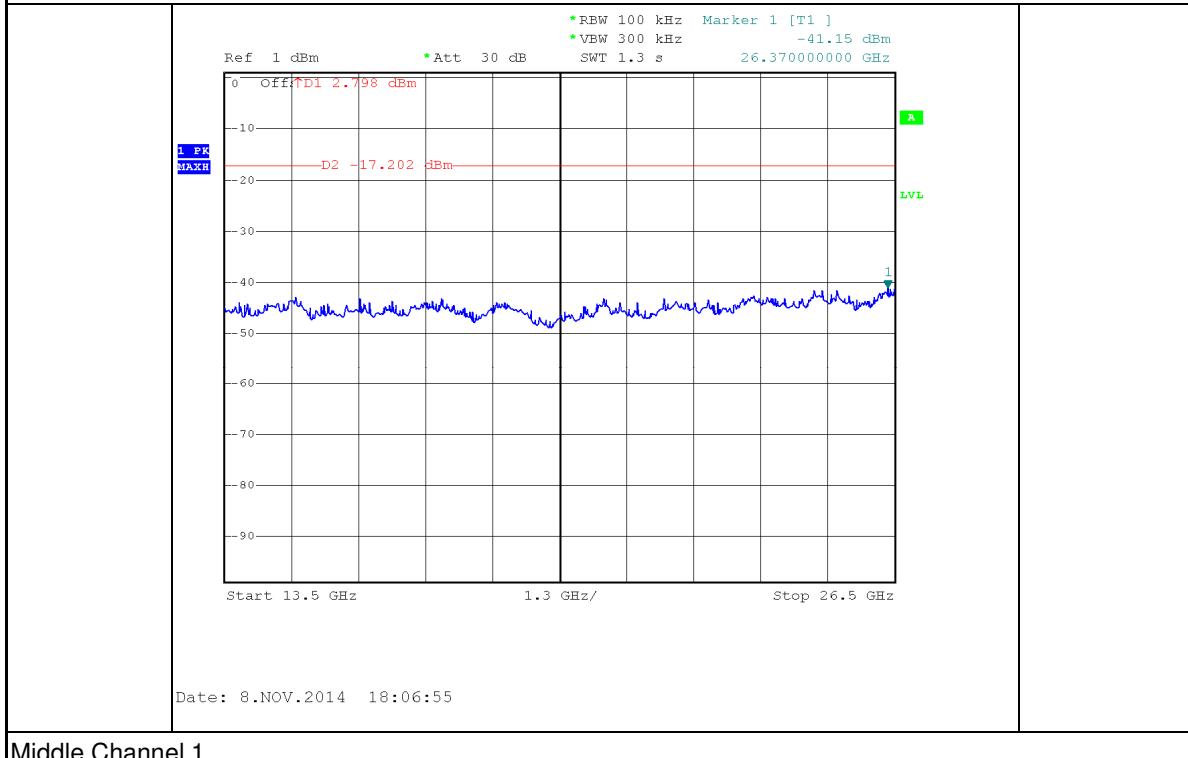
Low Channel 2

Produkte

Products

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**Low Channel 3****Middle Channel 1**