



TESTING CERT #3478.01



TEST REPORT

EUT Description	Mobile Phone
Brand Name	Unimax Communications
Model Name	U307TG / MXG308
Serial Number	S/N: MB27560400118 / MGX3066330000016 / MB27560400064 / U307TG6303000285 (see section 4)
FCC ID	FCC ID: P46-UMX35INT
Antenna type	N/A
Hardware/Software Version	HW Config: B1.1, B1.2 / SW: 01.37.ww39_p3.2016 Test SW : Phone Tool version 218
Date of Sample Receipt	2016-03-02
Date of Test Start/End	2016-03-14 / 2016-05-20
Features	802.11 b/g/n Wireless LAN + Bluetooth v4.0 BDR/EDR/LE (see section 5)

Applicant	Unimax Communications
Address	18201 McDermott Street W. Suite E, Irvine, CA 92614
Contact Person	Dan Gannon
Telephone/Fax/ Email	+1-949-748-7485 / dangannon18@gmail.com

Reference Standards	FCC CFR Title 47 Part 15C (see section 1)
---------------------	---

Test Report number	160223-01.TR01
Revision Control	Rev. 02

The test results relate only to the samples tested.

The test report shall not be reproduced in full, without written approval of the laboratory.

Issued by

Reviewed by

Olivier FARGANT
(RF Test Lead)

Jose M. FORTES
(Technical Manager)

Intel Mobile Communications France S.A.S – WRF Lab
425 rue de Goa – Le Cargo B6 – 06600, Antibes, France
Tel. +33493001400 / Fax +33493001401

Table of Contents

1. Standards, reference documents and applicable test methods	3
2. General conditions, competences and guarantees	3
3. Environmental Conditions.....	3
4. Test samples.....	4
5. EUT features	4
6. Remarks and comments.....	4
7. Test Verdicts summary.....	5
7.1. 802.11 B/G/N – DTS	5
7.2. BLE – DTS	5
8. Document Revision History	5
Annex A. Test & System Description	6
A.1 TEST CONDITIONS	6
A.2 MEASUREMENT SYSTEM	7
A.3 TEST EQUIPMENT LIST	9
A.4 MEASUREMENT UNCERTAINTY EVALUATION.....	10
Annex B. Test Results DTS	11
B.1 6dB & 99% BANDWIDTH.....	11
B.2 MAXIMUM OUTPUT POWER AND ANTENNA GAIN.....	21
B.3 OUT-OF-BAND EMISSIONS (CONDUCTED)	29
B.4 POWER SPECTRAL DENSITY	55
B.5 RADIATED SPURIOUS EMISSION	62
Annex C. Test Results BLE	72
C.1 6dB & 99% BANDWIDTH.....	72
C.2 MAXIMUM OUTPUT POWER AND ANTENNA GAIN.....	76
C.3 OUT-OF-BAND EMISSIONS (CONDUCTED)	79
C.4 POWER SPECTRAL DENSITY	89
C.5 RADIATED SPURIOUS EMISSION	92
Annex D. Photographs.....	98

1. Standards, reference documents and applicable test methods

1. FCC 47 CFR part 15 - Subpart C – §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
2. FCC 47 CFR part 15 - Subpart C – §15.209 Radiated emission limits; general requirements.
3. FCC OET KDB 558074 D01 DTS Meas Guidance v03r05 – Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.
4. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. General conditions, competences and guarantees

- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a testing laboratory accredited by the American Association for Laboratory Accreditation (A2LA).
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm listed by the FCC, with Designation Number FR0011.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.
- ✓ Complete or partial reproduction of the report cannot be made without written permission of Intel WRF Lab.

3. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	22.5°C ± 2°C
Humidity	35% ± 5%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of reception	Note
#01	160223-01.S10	Mobile Phone	U307TG, Build B1	MB27560400118	2016-03-02	Used for conducted tests
	160223-01.S40	Mobile Phone	U307TG, Build B1.2	MGX3066330000016	2016-04-19	
	160223-01.S15	Battery UMX	U307TG	FH40A533000155	2016-03-02	
	160218-01.S08	USB-Micro USB cable	NA	NA	2016-02-29	
#02	160223-01.S04	Mobile Phone	U307TG, Build B1	MB27560400064	2016-03-02	Used for radiated tests
	160223-01.S15	Battery UMX	U307TG	FH40A533000382	2016-03-02	
	160218-01.S09	USB-Micro USB cable	NA	NA	2016-02-29	
#03	160223-01.S35	Mobile Phone	U307TG, Build B1.2	U307TG6303000285	2016-04-19	Used for radiated tests, only for 802.11b modes
	160223-01.S15	Battery UMX	U307TG	FH40A533000382	2016-03-02	
	160218-01.S09	USB-Micro USB cable	NA	NA	2016-02-29	

NA: Not Applicable

5. EUT features

These are the detailed bands and modes supported by the Equipment Under Test:

802.11b/g/n	2.4GHz (2400.0 – 2483.5 MHz)
BDR/EDR/BLE 4.0	2.4GHz (2400.0 – 2483.5 MHz)

6. Remarks and comments

N/A

7. Test Verdicts summary

7.1. 802.11 b/g/n – DTS

FCC part	Test name	Verdict
15.247 (a) (2)	6dB Bandwidth	P
15.247 (b) (3)	Maximum output power and antenna gain	P
15.247 (d)	Out-of-band Emissions (conducted)	P
15.247 (e)	Power spectral density	P
15.247 (d), 15.209	Out-of-band Emissions (radiated)	P

7.2. BLE – DTS

FCC part	Test name	Verdict
15.247 (a) (2)	6dB Bandwidth	P
15.247 (b) (3)	Maximum output power and antenna gain	P
15.247 (d)	Out-of-band Emissions (conducted)	P
15.247 (e)	Power spectral density	P
15.247 (d), 15.209	Out-of-band Emissions (radiated)	P

P: Pass

F: Fail

NM: Not Measured

NA: Not Applicable

8. Document Revision History

Revision #	Date	Modified by	Details
Rev. 00	2016-05-31	Z. Ouachicha	First Issue
Rev. 01	2016-06-08	O. Fargant	Editorial correction on page 6
Rev. 02	2016-06-22	O. Fargant	<ul style="list-style-type: none"> Added clarification about RBW and VBW used for spurious emission measurement in sections B.5 and C.5. Added restricted Band Edge results between 2310-2390MHz in sections B.3 and C.3.

Annex A. Test & System Description

A.1 Test Conditions

For 802.11b/g, 802.11n20 (20 MHz channel bandwidth), Bluetooth and Bluetooth Low energy modes the EUT can transmit only at one CHAIN A RF output.

The conducted RF output power at each chain was adjusted according to the client's supplied Target values (see following table) using Intel Phone Tools proprietary software, version 218, and measuring the power by using a spectrum analyzer with the channel integration method according to point II) E) 2) e) (Method SA-2 Alternative) of KDB 789033 D02.

Measured values for adjustment were within -0.2 dB/+0.3 dB from the declared Target values.

					Conducted Power, Target Value [dBm]
Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	Chain A
802.11b	20	1Mbps	1	2412	15.5
			6	2437	15.5
			11	2462	15.5
802.11g	20	6Mbps	1	2412	11.0
			6	2437	11.0
			11	2462	11.0
802.11n	20	HT0	1	2412	10.0
			6	2437	10.0
			11	2462	10.0
Bluetooth Low Energy	2	1Mbps	0	2412	5.5
			19	2437	5.0
			39	2462	4.5

Alternative channels to the highest channel have been also tested for Band Edge compliance.

The following data rates were selected based on preliminary testing that identified those rates as the worst cases for output power and spurious levels at the band edges:

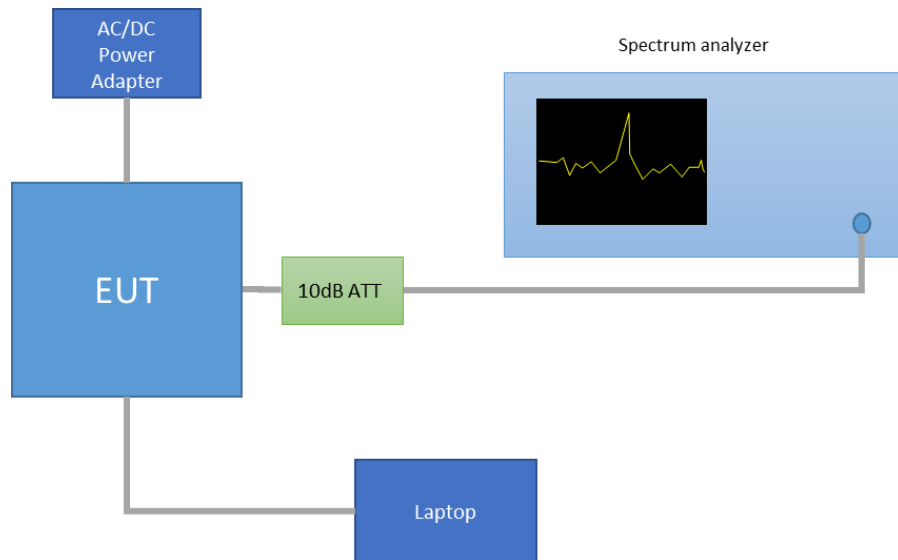
802.11b → 1Mbps
 802.11g → 6Mbps
 802.11n20 → 6.5Mbps

A.2 Measurement system

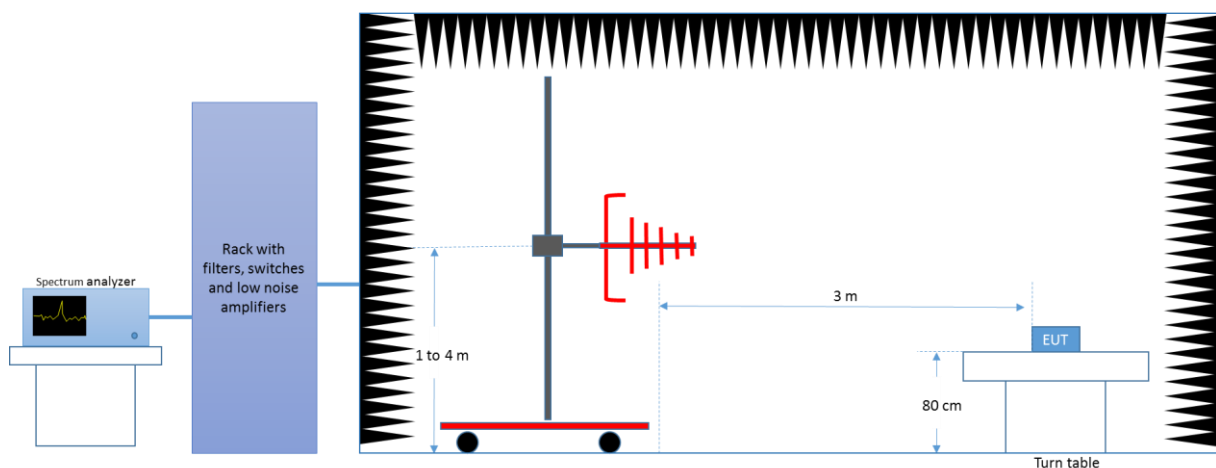
Measurements were performed using the following setups, made in accordance to the general provisions of FCC DTS Measurement KDB 558074 D01 DTS Meas Guidance.

The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. A laboratory laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the proprietary software Intel Phone tool.

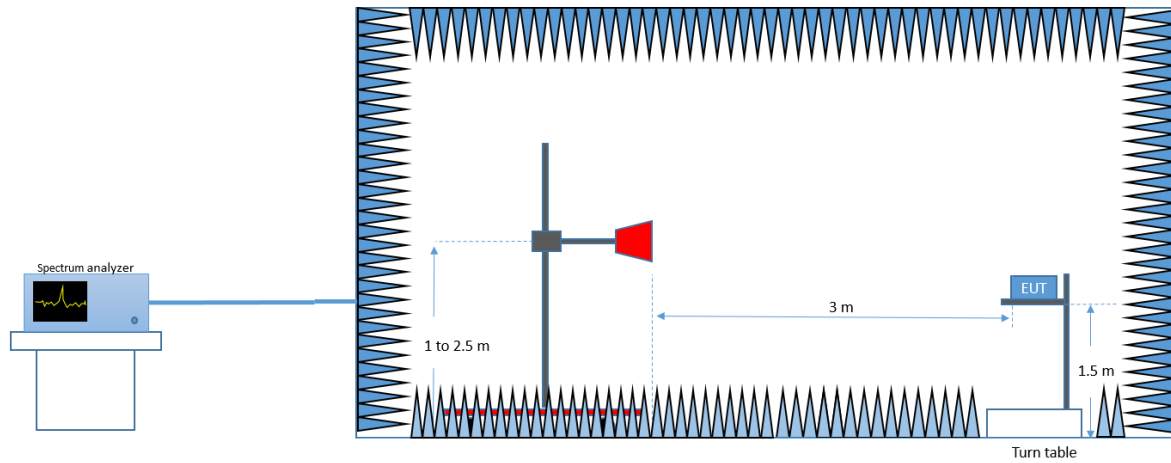
Conducted Setup



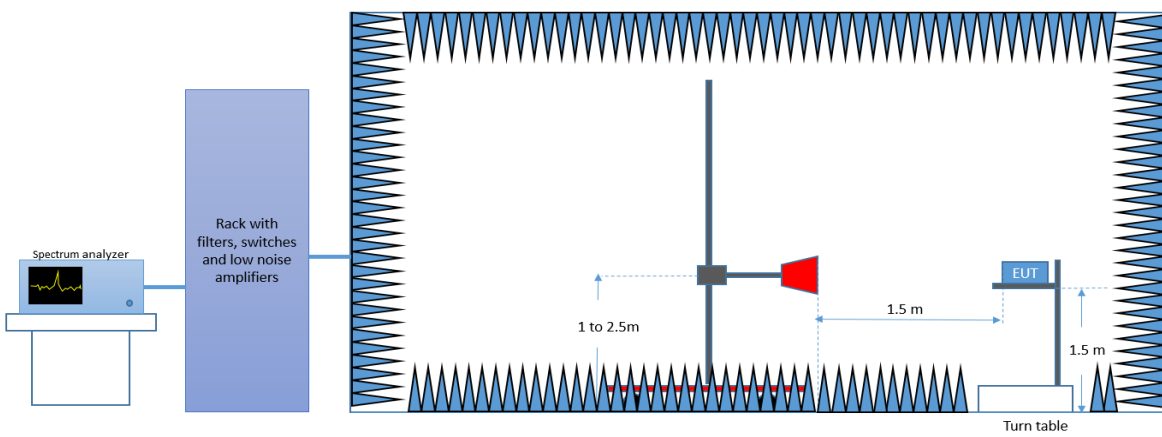
Radiated Setup < 1GHz



Radiated Setup 1GHz - 18GHz



Radiated Setup > 18GHz



A.3 Test Equipment List

Conducted Setup

ID#	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
0310	Spectrum analyzer	FSV40	101425	Rohde & Schwarz	2015-03-25	2017-03-25
0293	DC Power Supply	E3640A	MY40006885	Agilent	NA	NA
0299	Digital Multimeter	34401A	US36065790	HP	2015-10-08	2017-10-08

Radiated Setup

ID#	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
0133	Spectrum analyzer	FSV40	101358	Rohde & Schwarz	2016-04-15	2018-04-15
0258	Spectrum analyzer	FSV30	101318	Rohde & Schwarz	2016-04-27	2018-04-27
0137	Log antenna 30 MHz – 1 GHz	3142E	00156946	ETS Lindgren	2015-12-11	2017-12-11
0138	Horn antenna 1 GHz – 6.4 GHz	3117	00157734	ETS Lindgren	2016-03-14	2018-03-14
0343	Horn Antenna 6.4 GHz – 18 GHz	3117-PA	00201542	ETS Lindgren	2015-07-16	2017-07-16
0334	Horn Antenna 10 GHz – 40 GHz	3116C	00169308	ETS Lindgren	2015-07-15	2017-07-15
0139	Horn Antenna 18 GHz - 26.5 GHz	114514	00167100	ETS Lindgren	2014-08-14	2016-08-14
0135	Semi Anechoic chamber	FACT 3	5720	ETS Lindgren	2016-04-13	2016-05-28
0337	Full Anechoic chamber	RFD_FA_100	5996	ETS Lindgren	2015-09-08	2017-09-08
0329	Measurement Software	EMC32	1300.7027.00 (100401)	Rohde & Schwarz	N/A	N/A
N/A	Measurement Software	EMC32	012109650000013B (009977)	Rohde & Schwarz	N/A	N/A
0292	DC Power Supply	E3648A	MY40003316	Agilent	N/A	N/A
0036	Multimeter	IDM 103	03902163	ISO-TECH	2016-01-28	2018-01-28

A.4 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the below table:

Measurement type	Uncertainty [\pm dB]
Conducted Power	± 1.0
Conducted spurious emission	± 2.9
Radiated test < 1GHz	± 3.8
Radiated test 1GHz - 40 GHz	± 4.7

Annex B. Test Results DTS

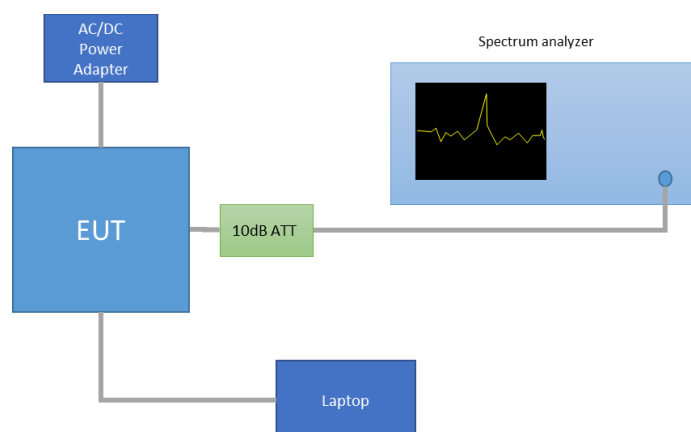
B.1 6dB & 99% Bandwidth

Test limits:

FCC part	Limits
15.247 (a) (2)	Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure:

The setup below was used to measure the 6dB & 99% Bandwidth. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

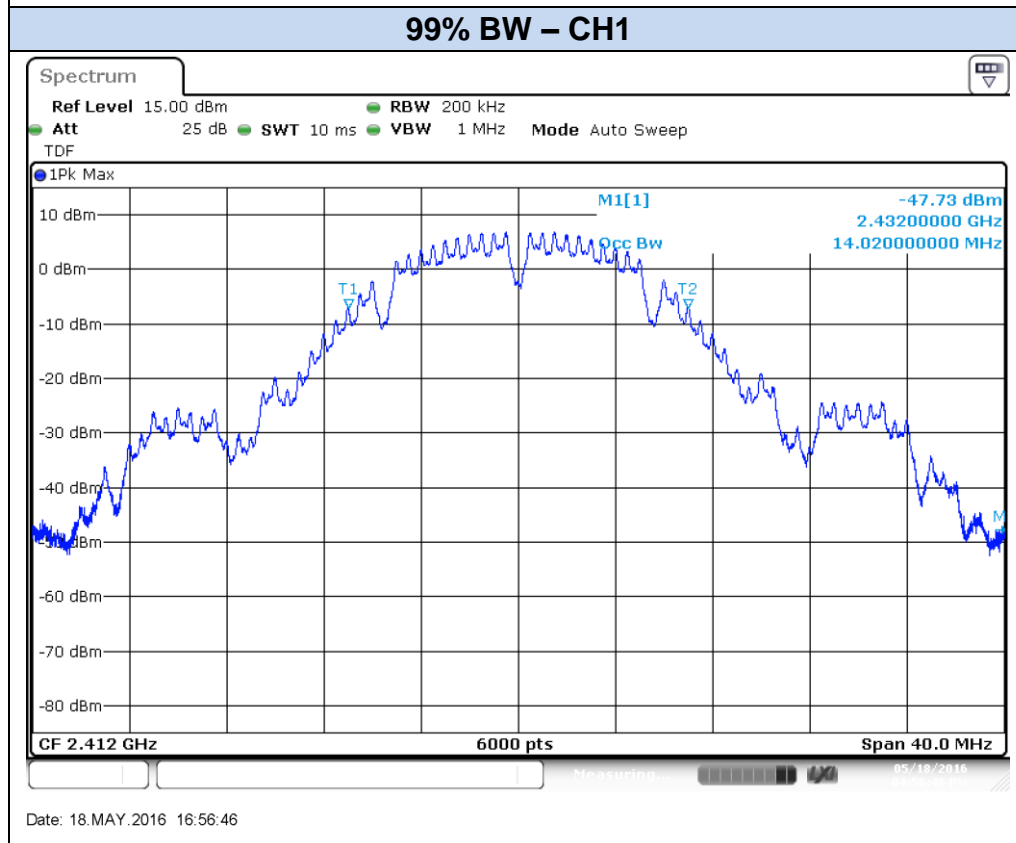
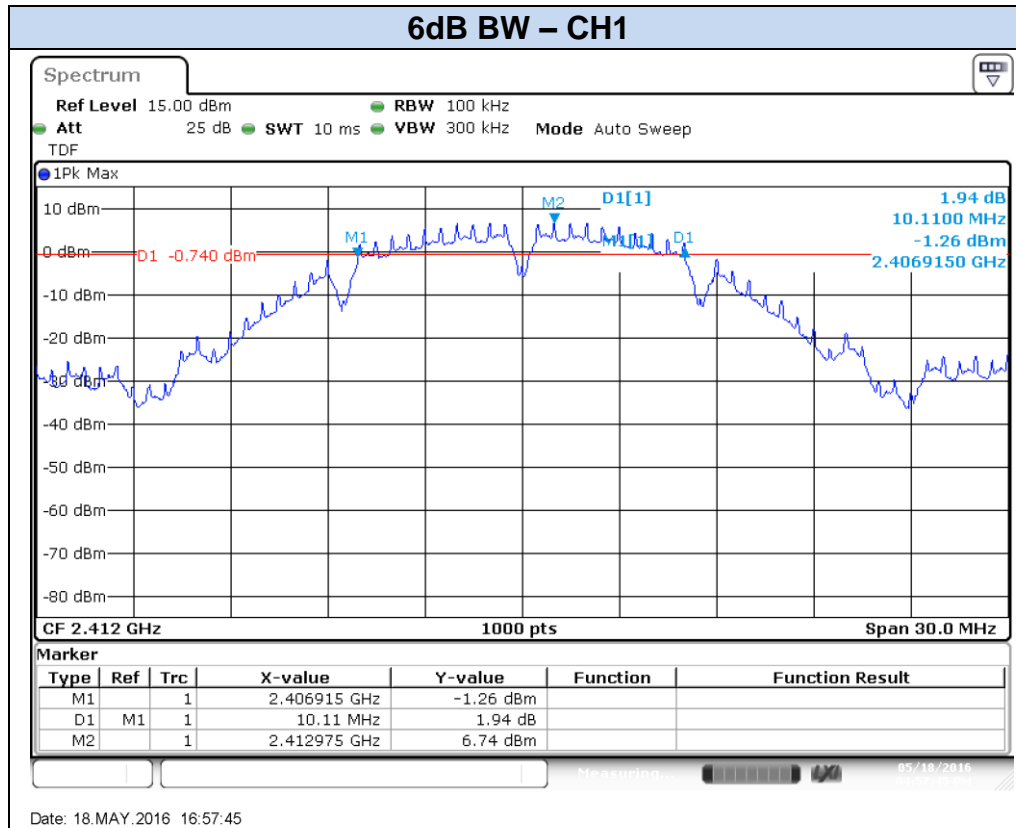


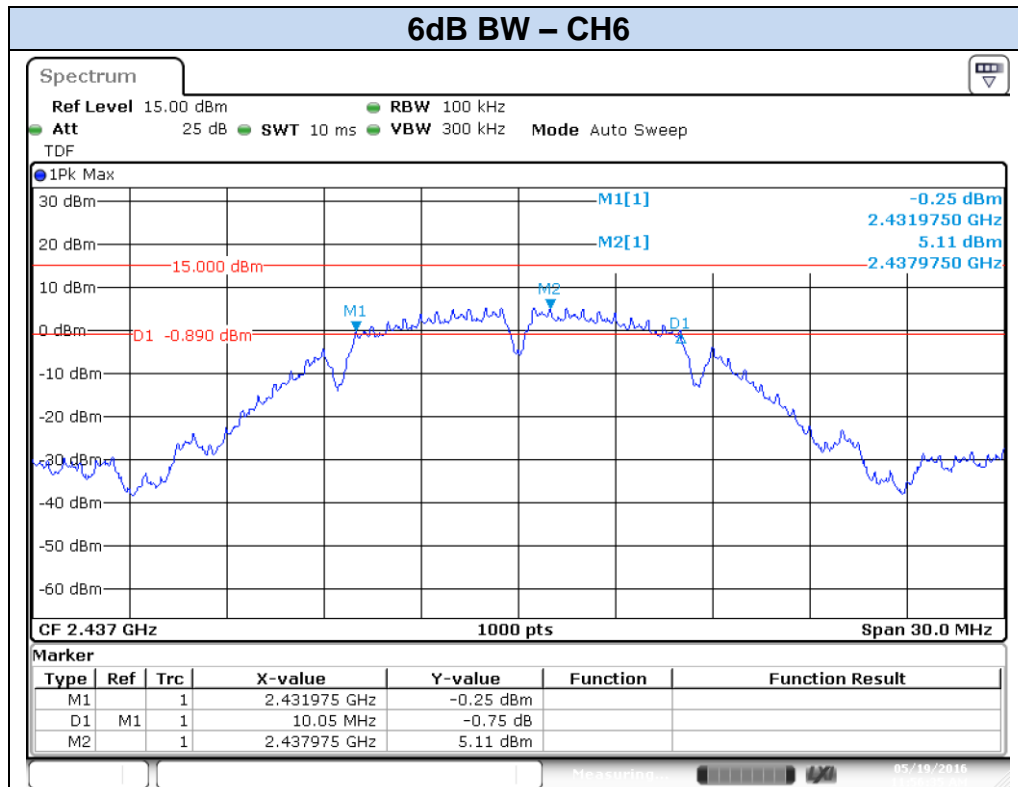
Results tables:

Mode	Rate	Antenna	Channel	Frequency [MHz]	6dB BW [MHz]	99% BW [MHz]
802.11b	1Mbps	SISO CHAIN A	1	2412	10.11	14.02
			6	2437	10.05	13.51
			11	2462	10.08	13.41
802.11g	6Mbps	SISO CHAIN A	1	2412	16.41	16.83
			6	2437	16.38	16.87
			11	2462	16.38	16.82
802.11n20	HT0	SISO CHAIN A	1	2412	17.58	17.92
			6	2437	17.64	17.98
			11	2462	17.49	18.01

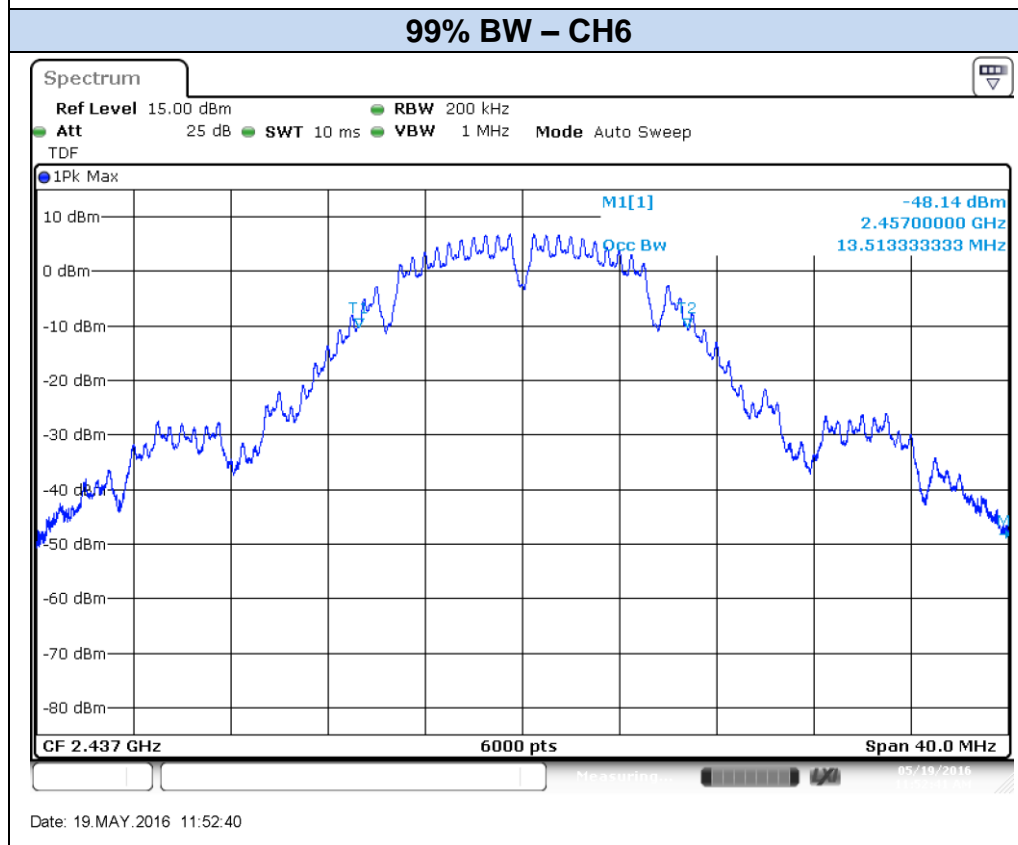
Results screenshot:

802.11b, 1Mbps – Chain A

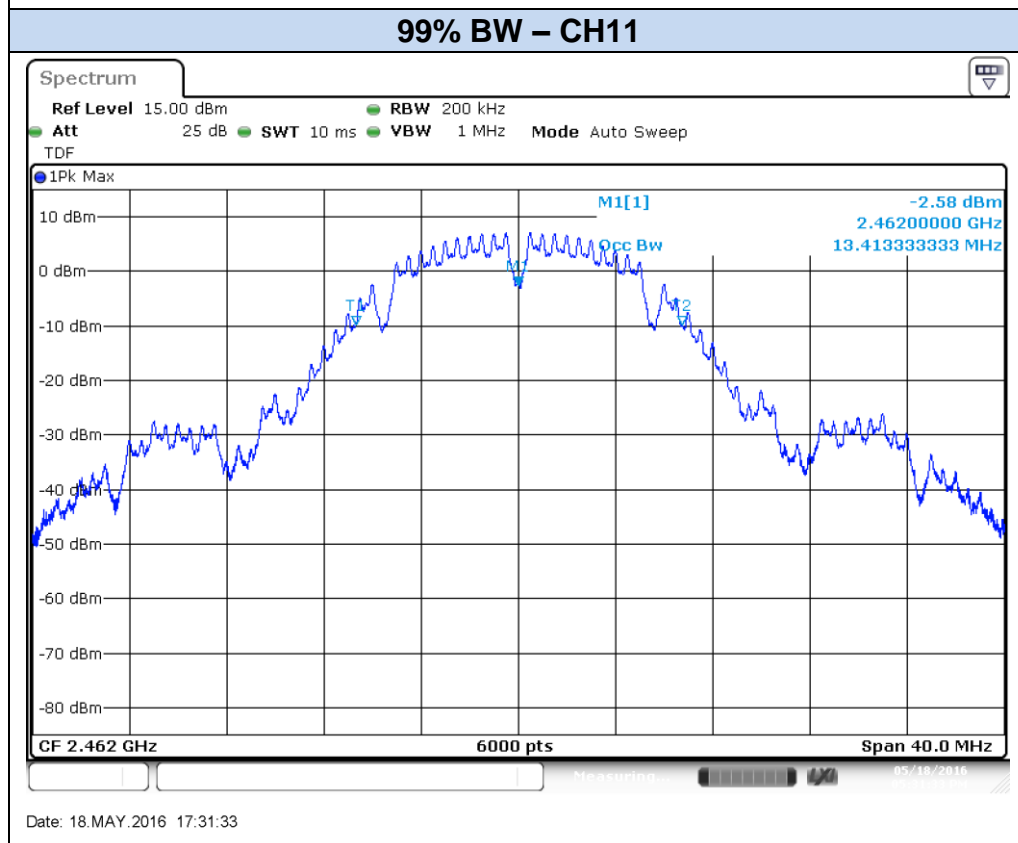
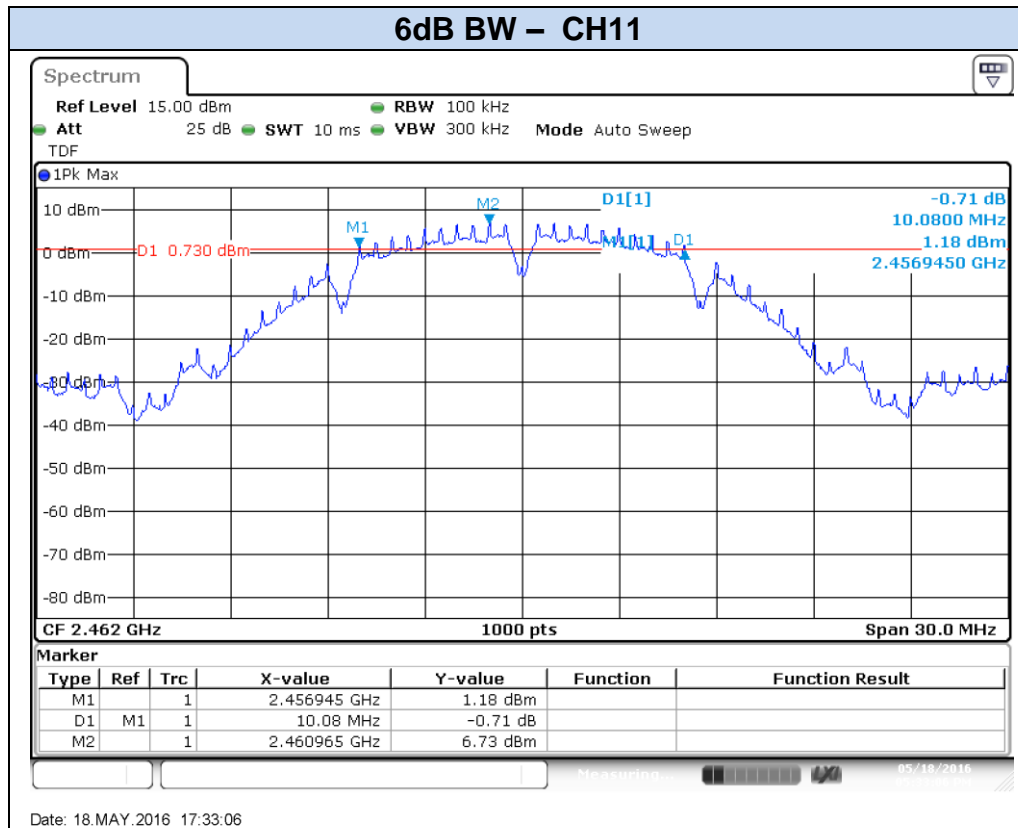




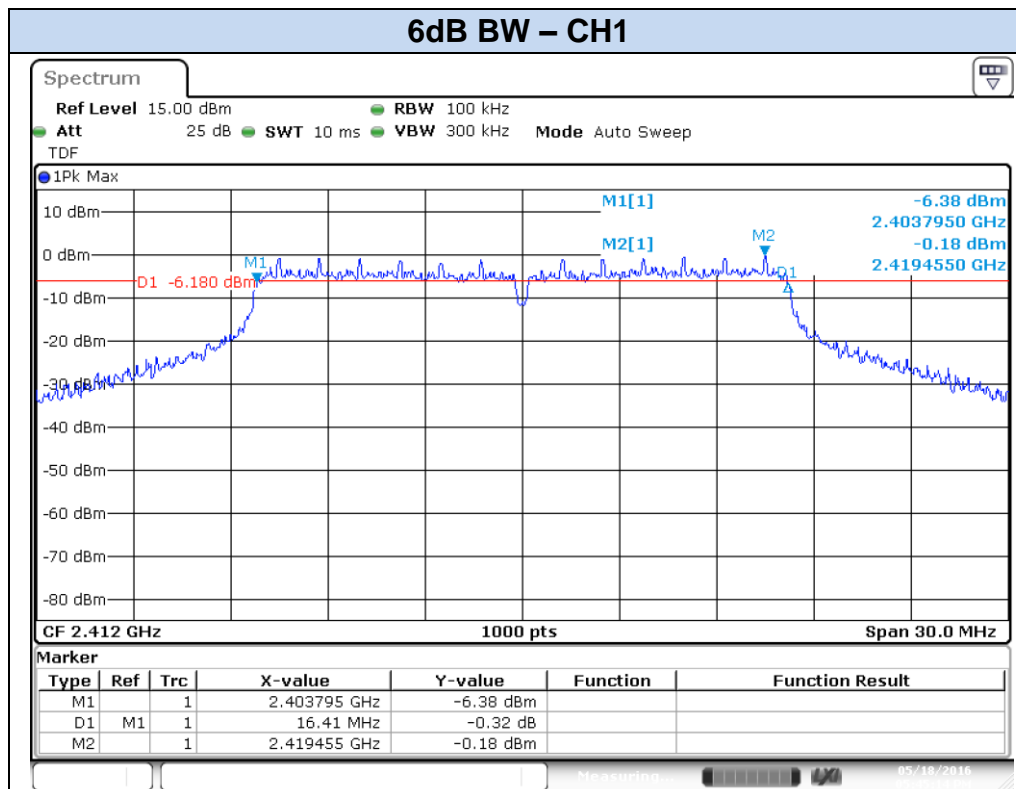
Date: 19.MAY.2016 11:56:35



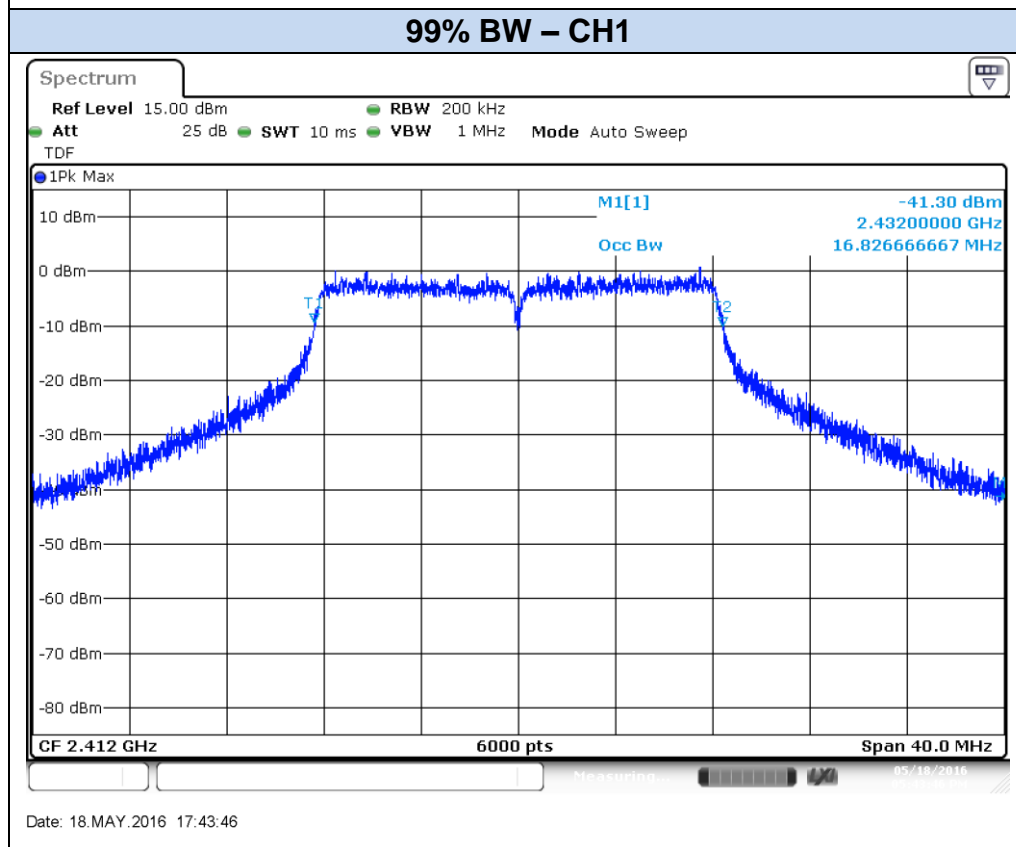
Date: 19.MAY.2016 11:52:40



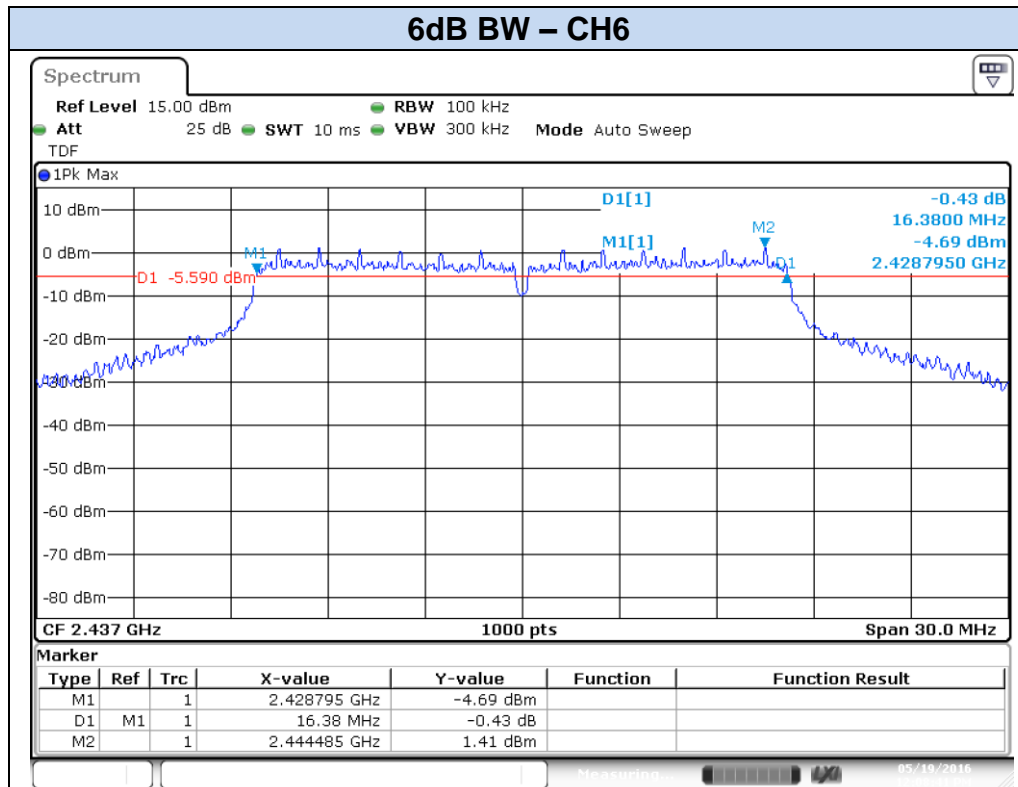
802.11g, 6Mbps – Chain A



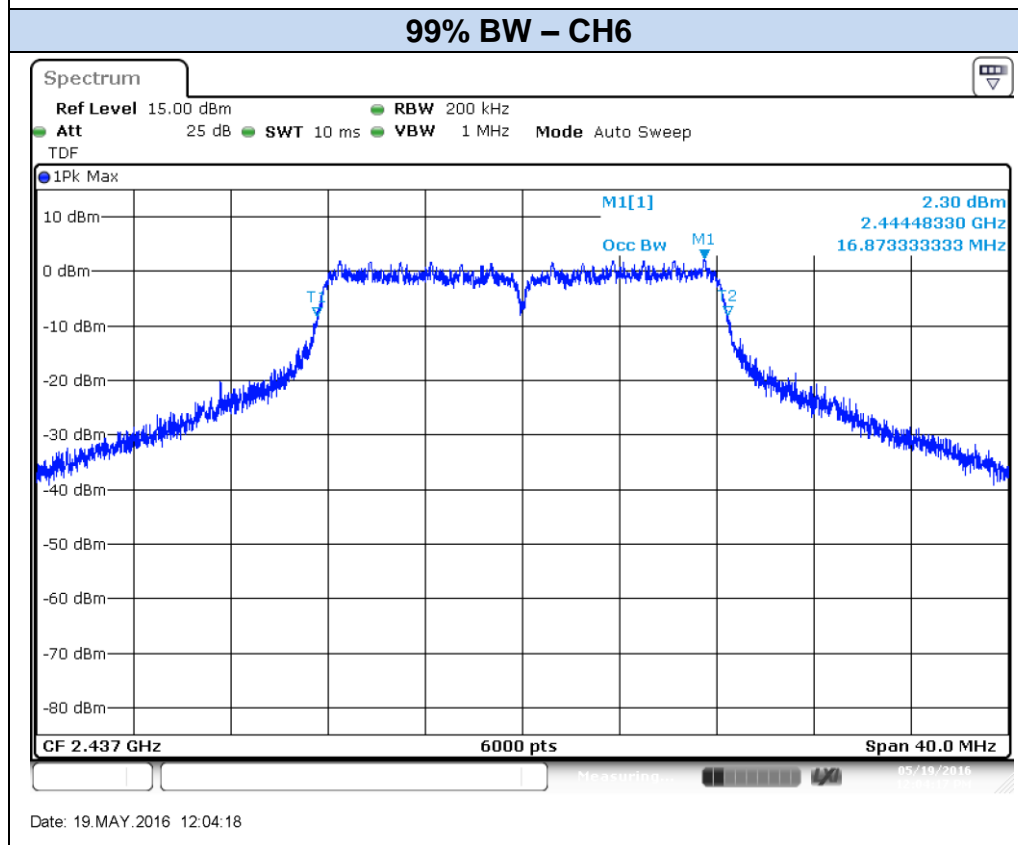
Date: 18.MAY.2016 17:45:14



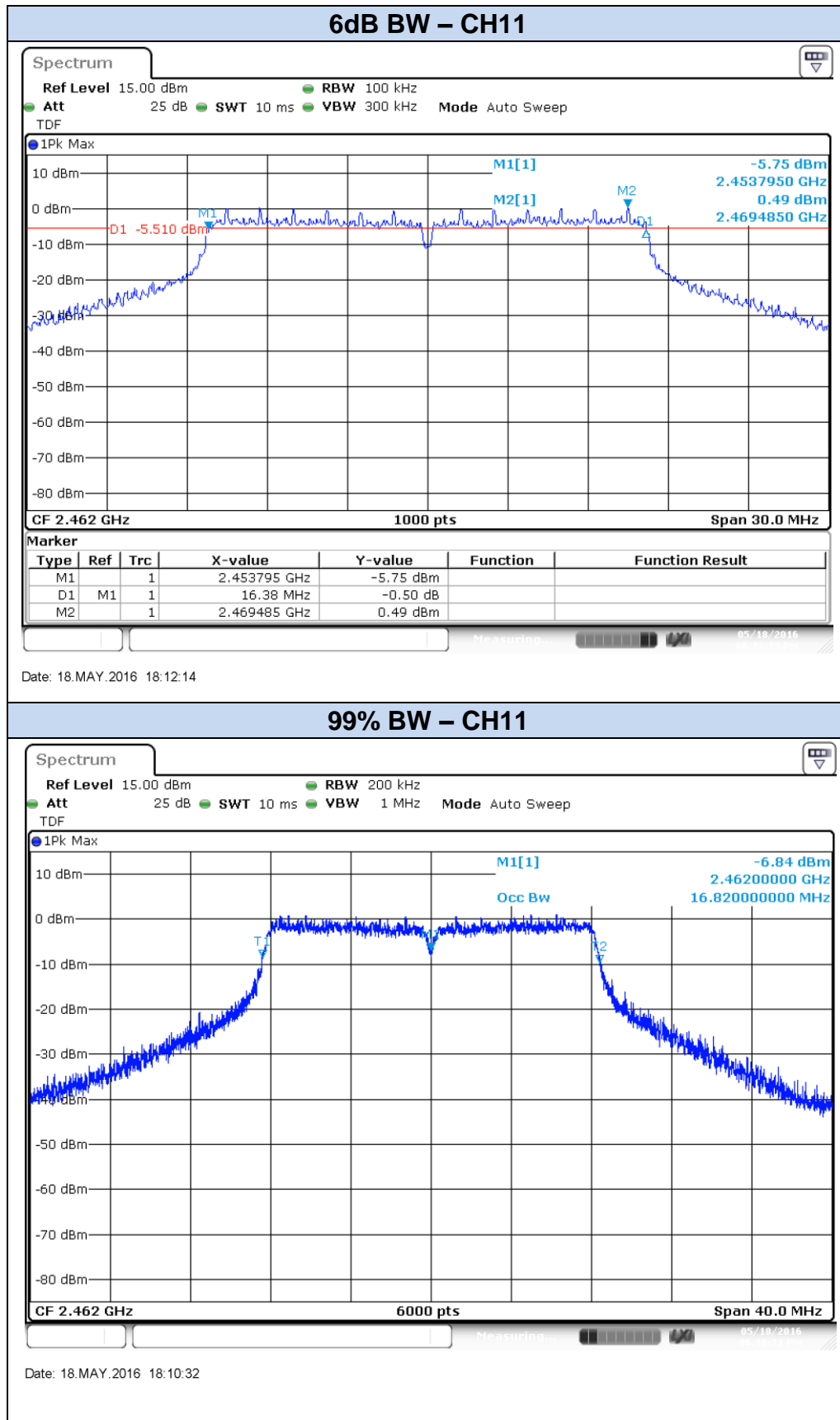
Date: 18.MAY.2016 17:43:46



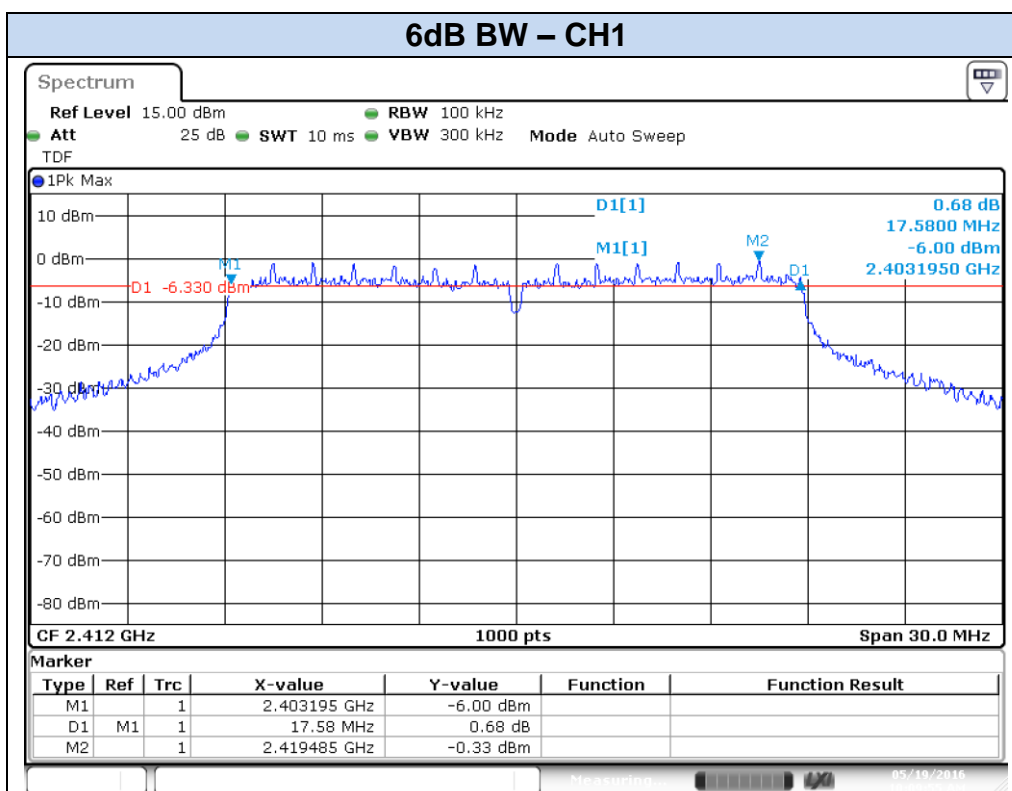
Date: 19.MAY.2016 12:08:41



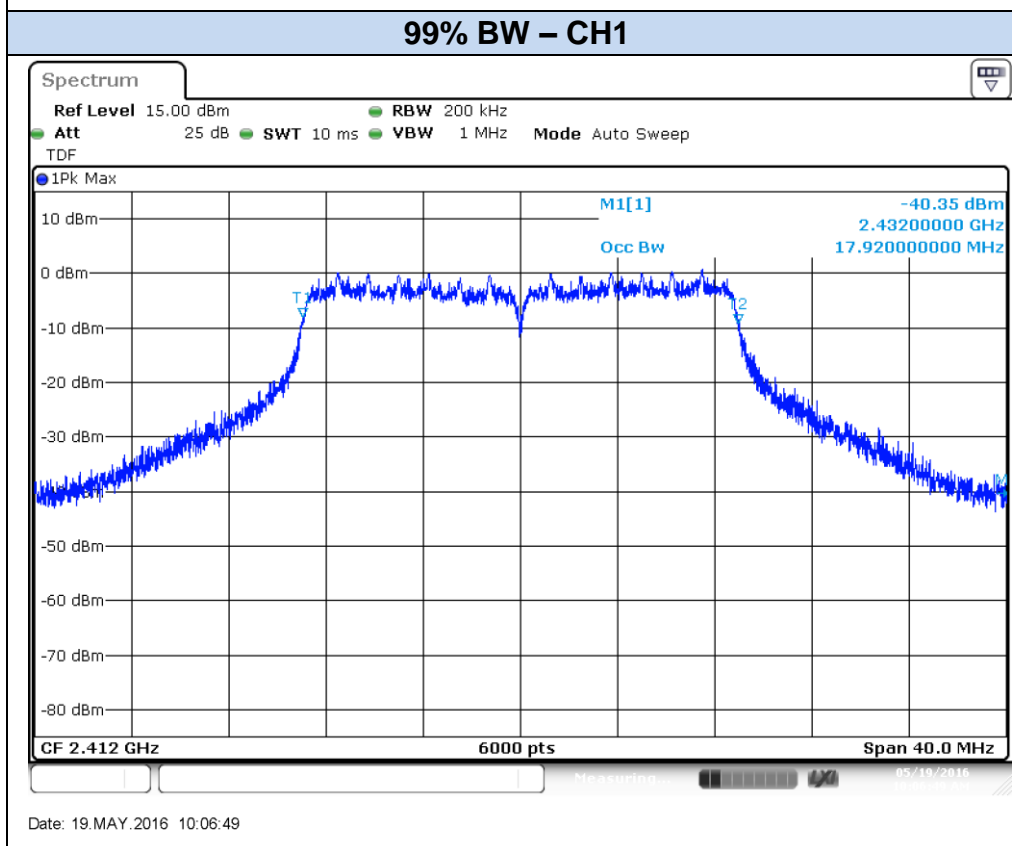
Date: 19.MAY.2016 12:04:18



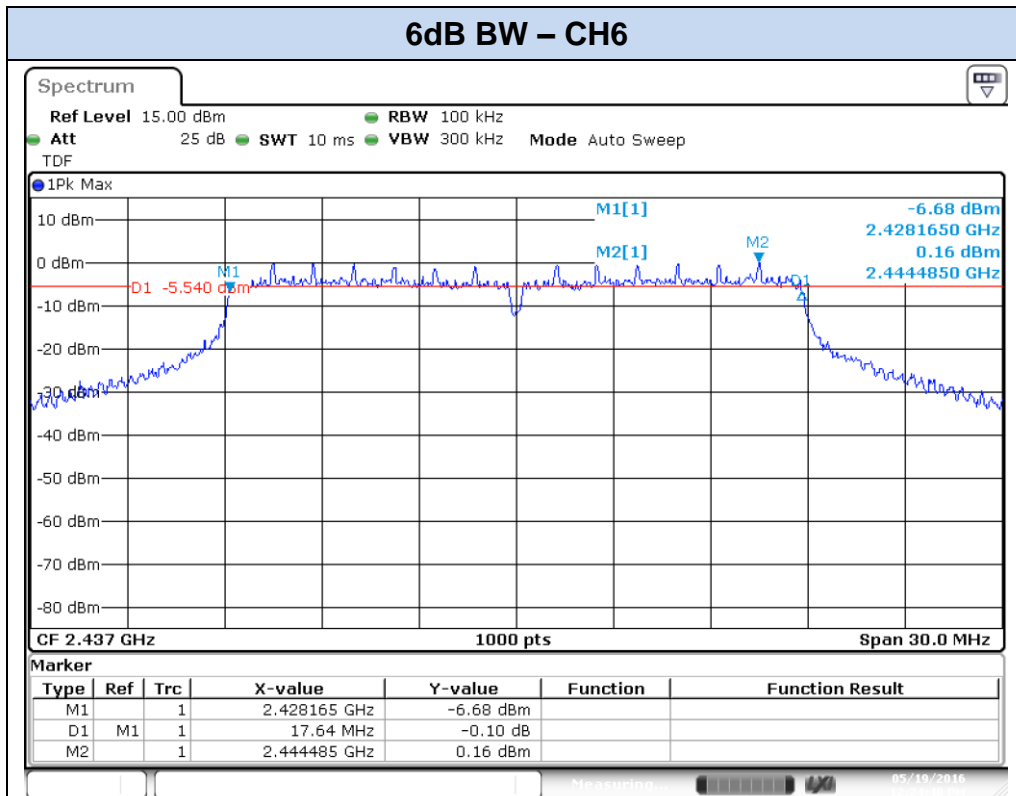
802.11n20, HT0 – Chain A



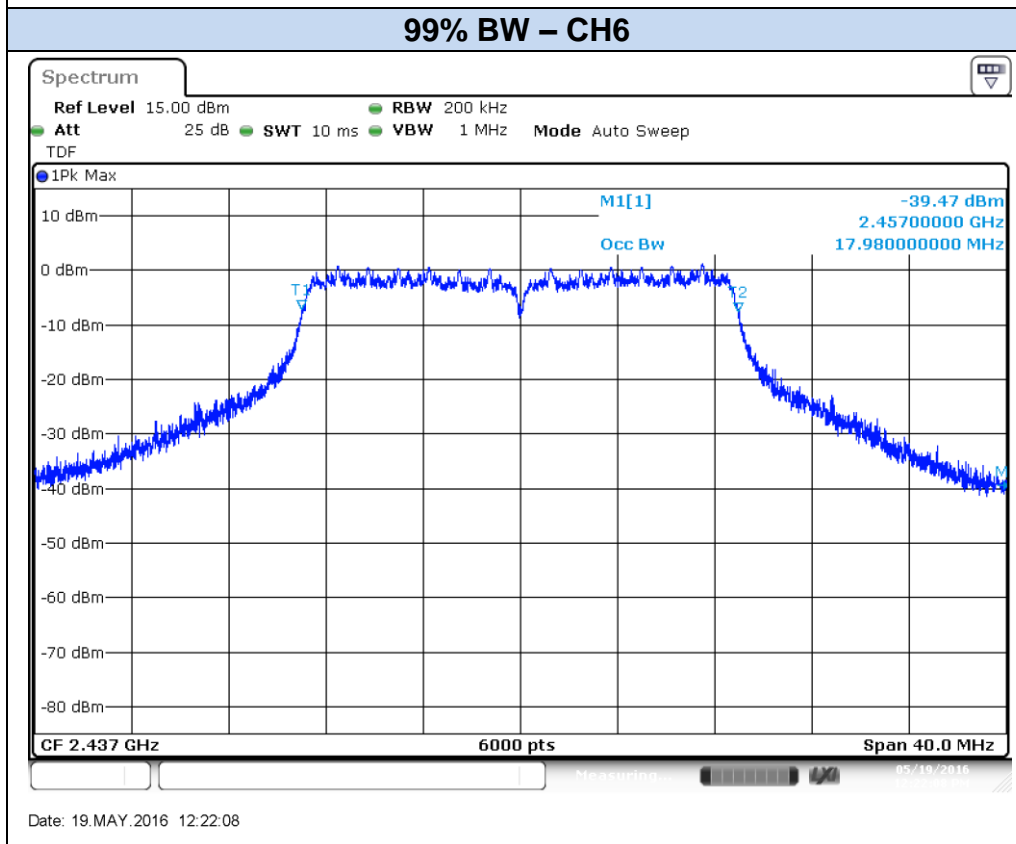
Date: 19.MAY.2016 10:09:56



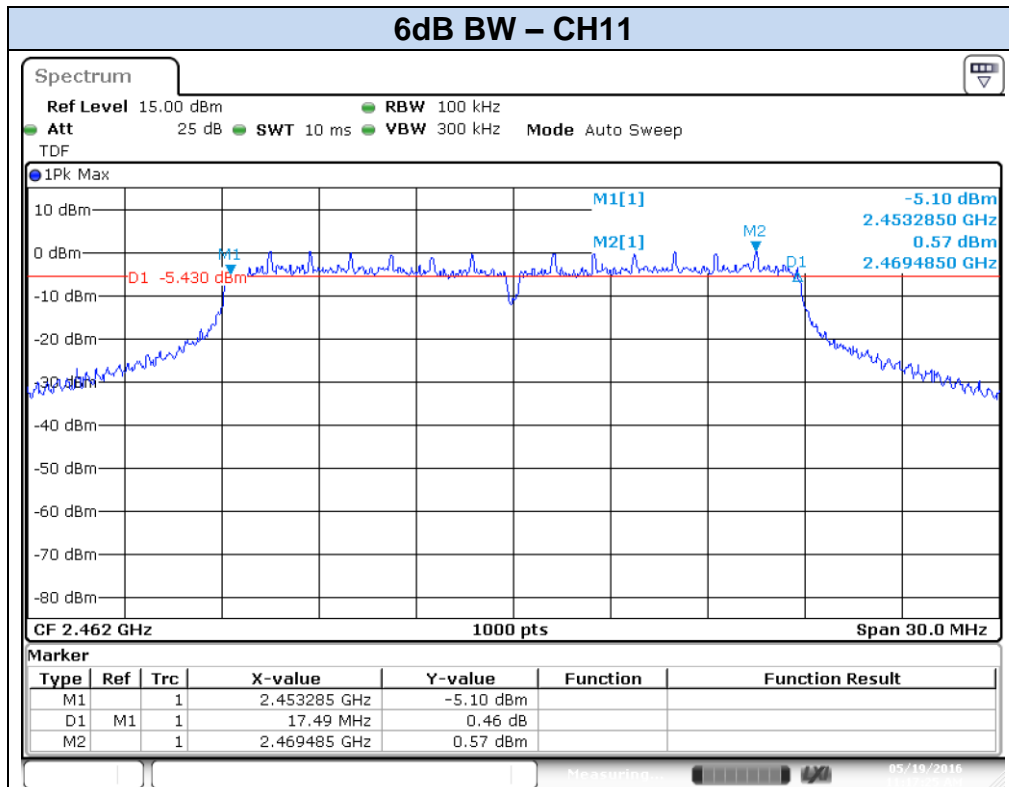
Date: 19.MAY.2016 10:06:49



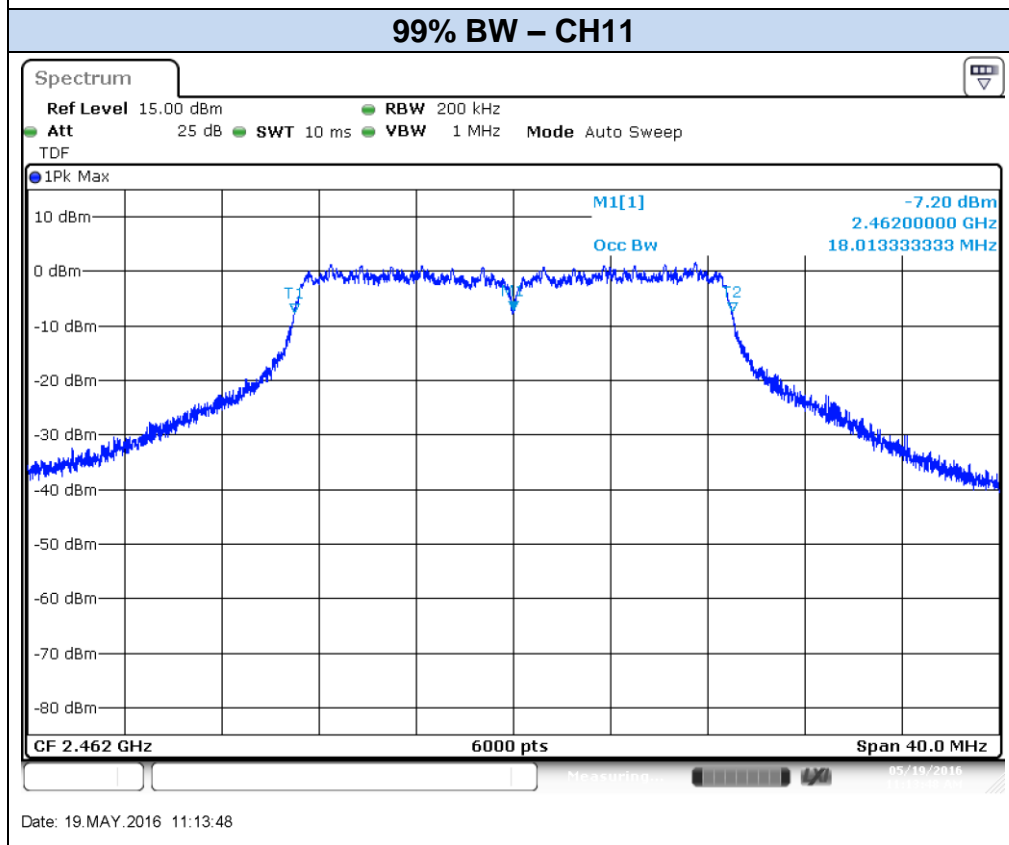
Date: 19.MAY.2016 12:24:41



Date: 19.MAY.2016 12:22:08



Date: 19.MAY.2016 11:17:26



Date: 19.MAY.2016 11:13:48

B.2 Maximum Output Power and antenna gain

Test limits:

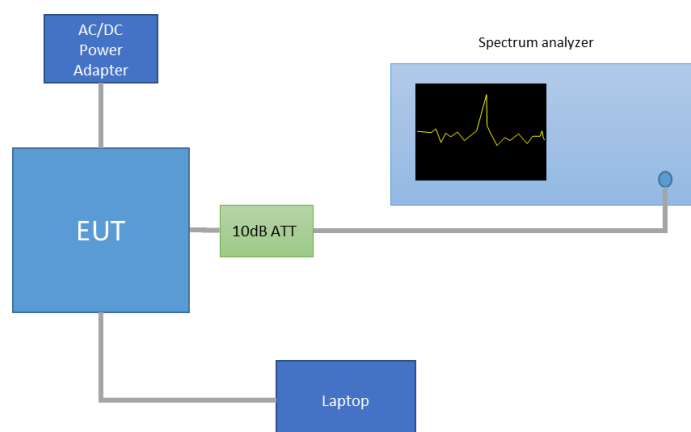
FCC part	Limits
15.247 (b) (3)	<p>(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:</p> <p>(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level.</p> <p>(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.</p>

Test procedure:

The Maximum Peak Conducted Output Power was measured using the channel integration method as authorized in chapter 2.0 "*Power limits, definitions and device configuration*" of FCC KDB 558074 D01.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power. The maximum declared antenna gain is 1.5dBi.

The setup below was used to measure the maximum conducted output power. The antenna terminal of the EUT is connected to the spectrum analyzer through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



Results tables:

Mode	Rate	Meas. Duty Cycle [%]	CH	Frequency [MHz]	Antenna	Peak Power [dBm]		Conducted Peak Output Power [mW]
						Maximum Conducted Output Power	EIRP	
802.11b	1Mbps	99.82	1	2412	SISO CHAIN A	18.39	19.89	69.02
			6	2437	SISO CHAIN A	18.77	20.27	75.34
			11	2462	SISO CHAIN A	18.45	19.95	69.98
802.11g	6Mbps	98.75	1	2412	SISO CHAIN A	18.66	20.16	73.45
			6	2437	SISO CHAIN A	20.07	21.57	101.62
			11	2462	SISO CHAIN A	19.33	20.83	85.70
802.11 n20	HT0	98.52	1	2412	SISO CHAIN A	18.29	19.79	67.45
			6	2437	SISO CHAIN A	19.07	20.57	80.72
			11	2462	SISO CHAIN A	19.39	20.89	86.90

Max Value

Min Value

Mode	Rate	Meas. Duty Cycle [%]	CH	Frequency [MHz]	Antenna	Average Power * [dBm]			Conducted Average Output Power [mW]
						Maximum Conducted Output Power	Maximum Conducted Output Power Duty cycle Compensated	EIRP	
802.11b	1Mbps	99.82	1	2412		15.62	15.63	17.13	36.56
			6	2437		15.80	15.81	17.31	38.11
			11	2462		15.70	15.71	17.21	37.24
802.11g	6Mbps	98.75	1	2412		10.87	10.92	12.42	12.36
			6	2437		11.50	11.55	13.05	14.29
			11	2462		11.16	11.21	12.71	13.21
802.11 n20	HT0	98.52	1	2412		9.75	9.81	11.31	9.57
			6	2437		10.34	10.40	11.9	10.96
			11	2462		10.79	10.85	12.35	12.16

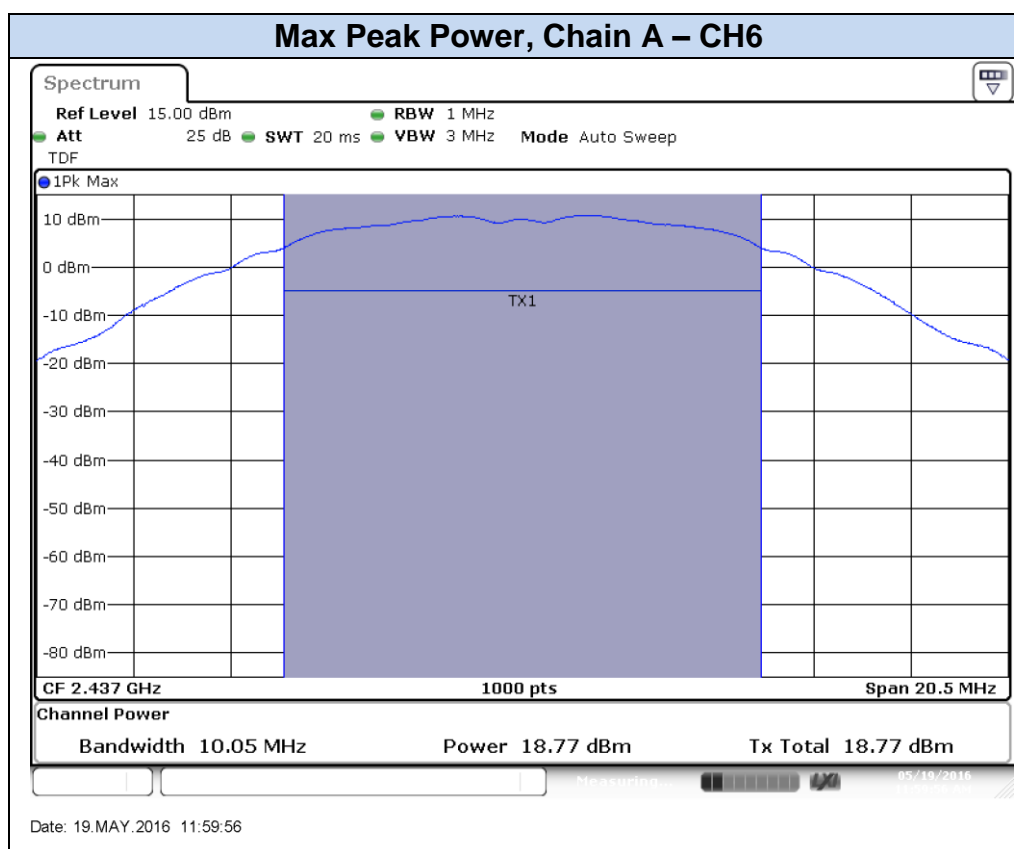
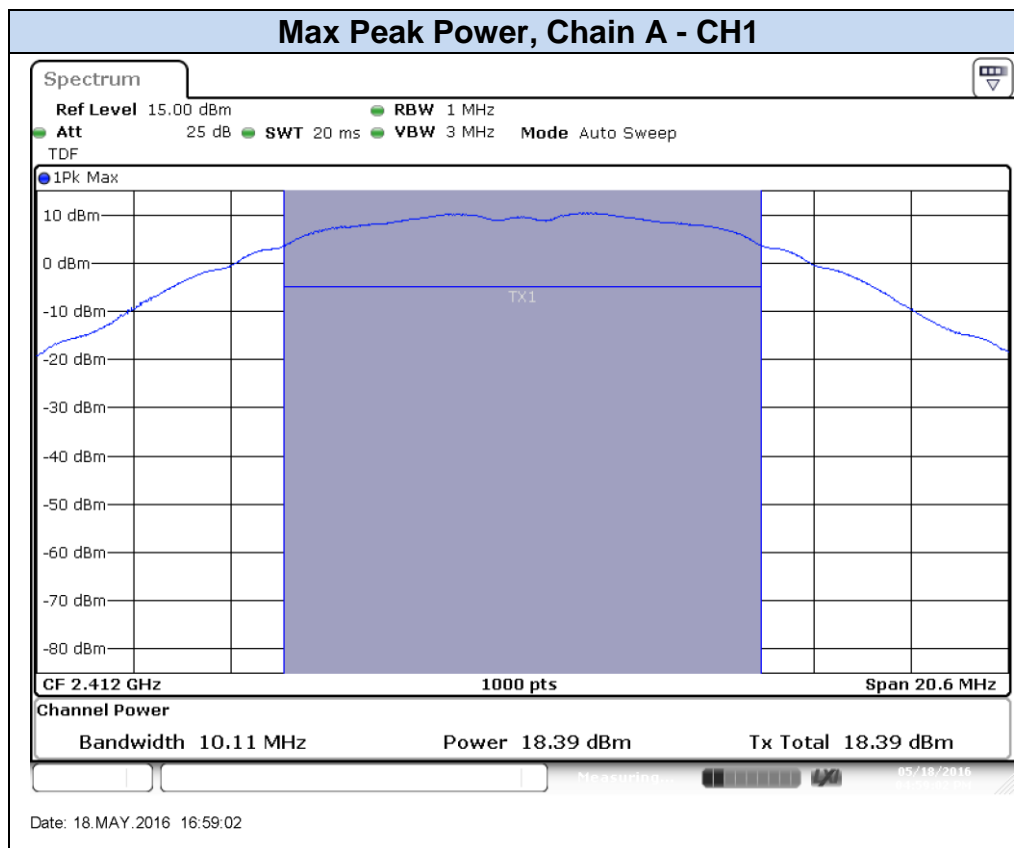
Max Value

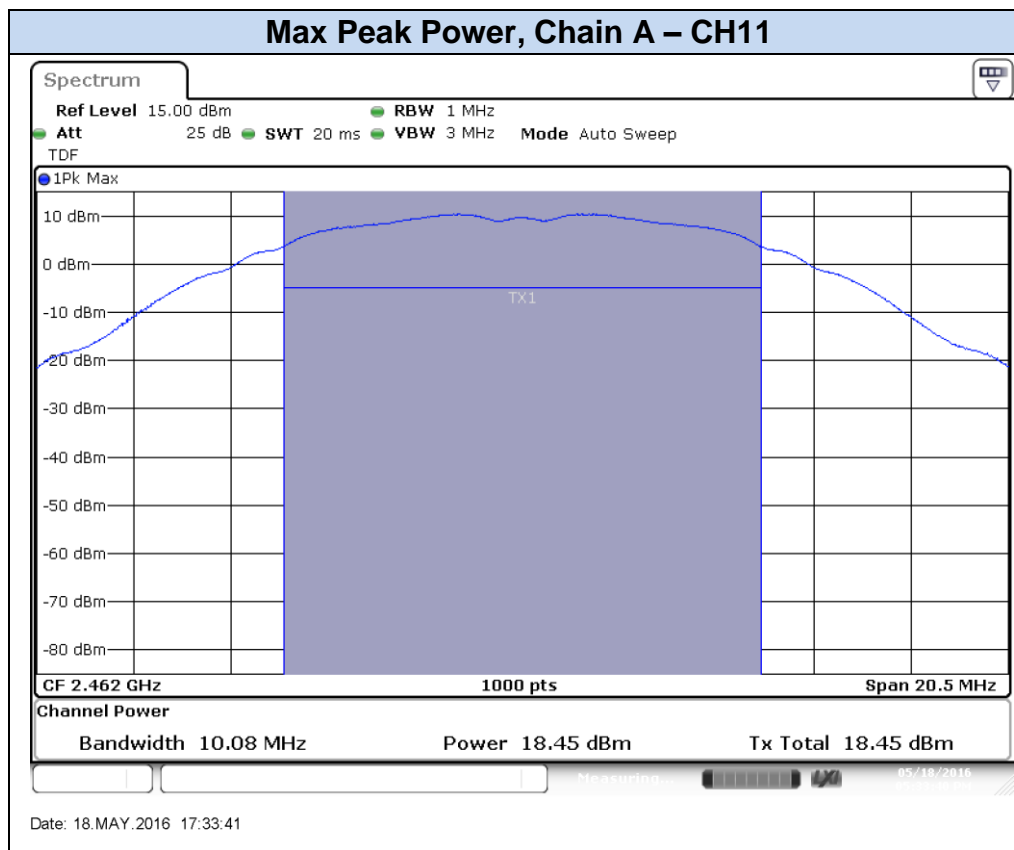
Min Value

* Average Output Power values are informative.

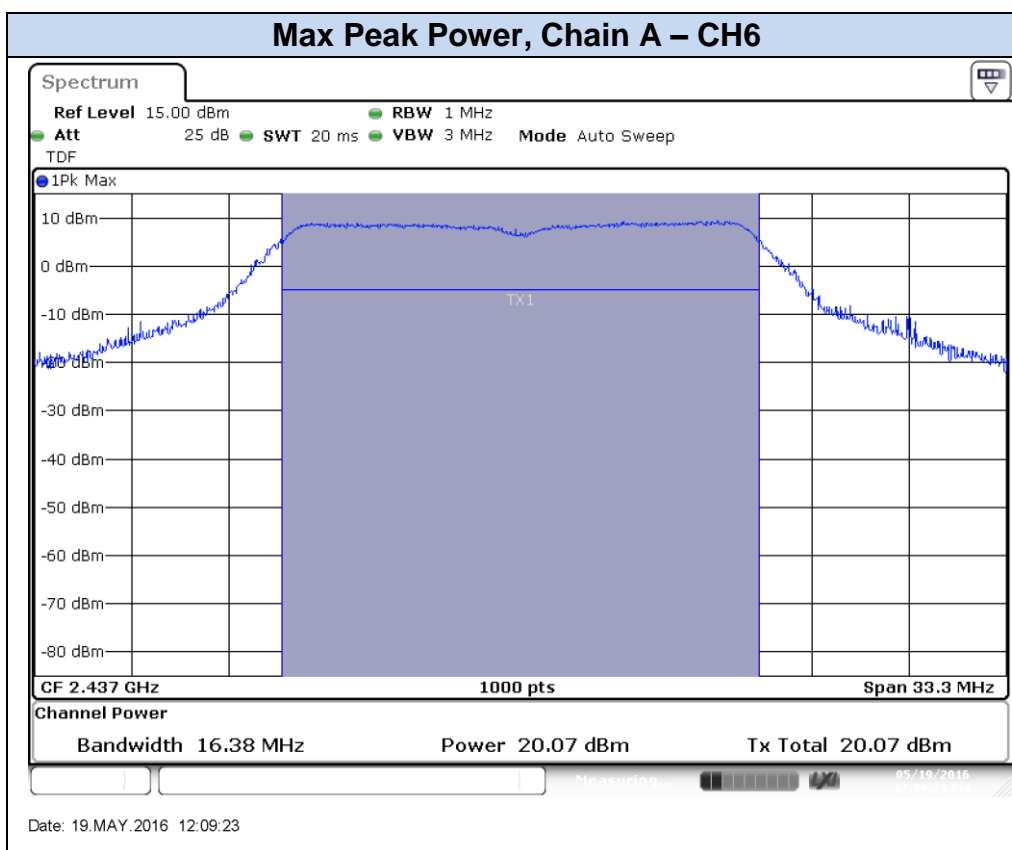
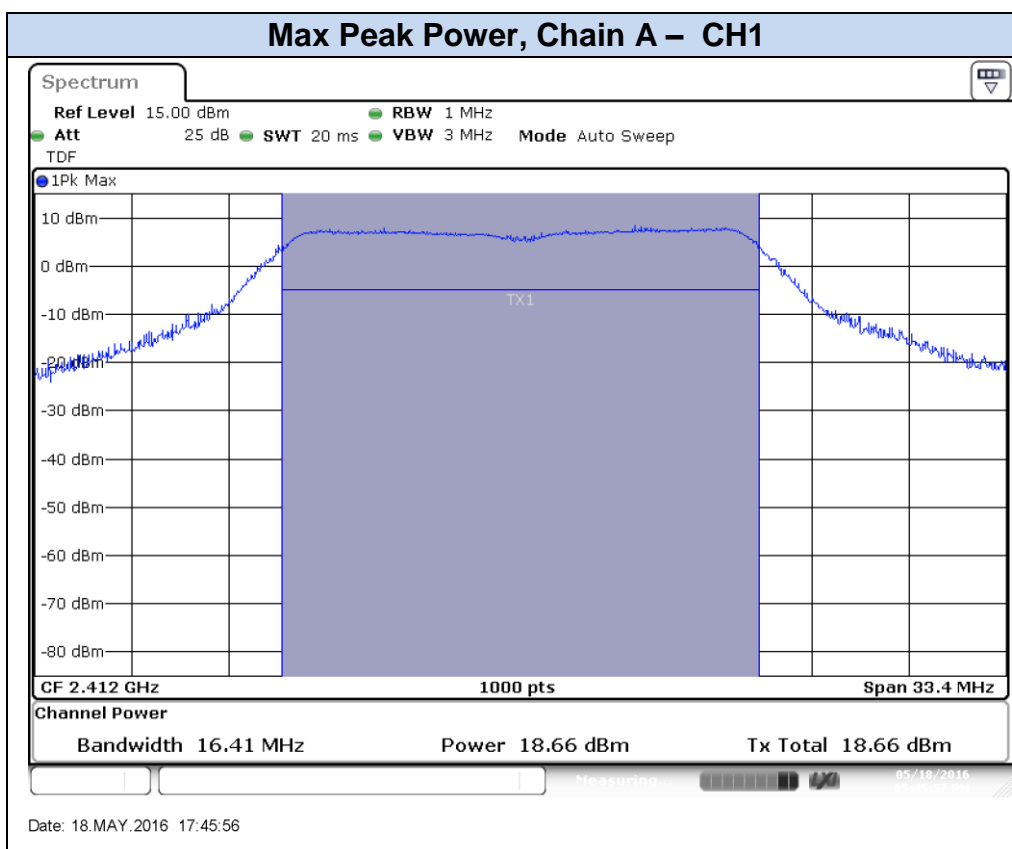
Results screenshot

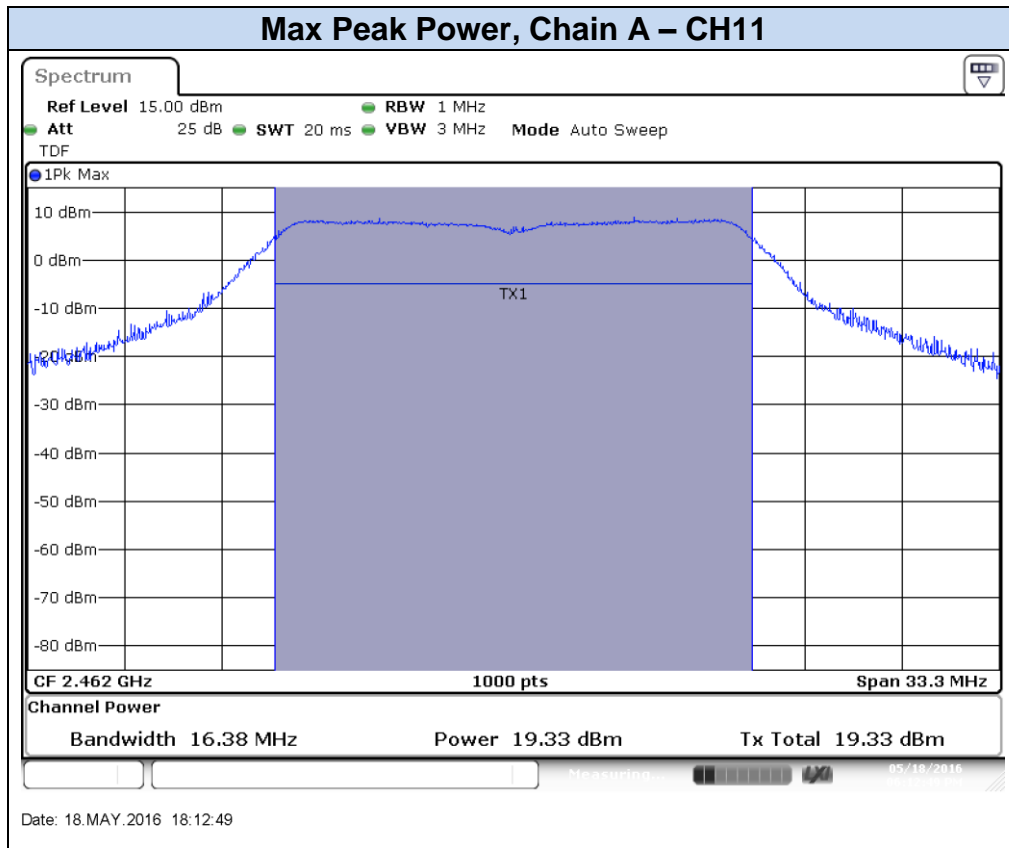
802.11b, 1Mbps



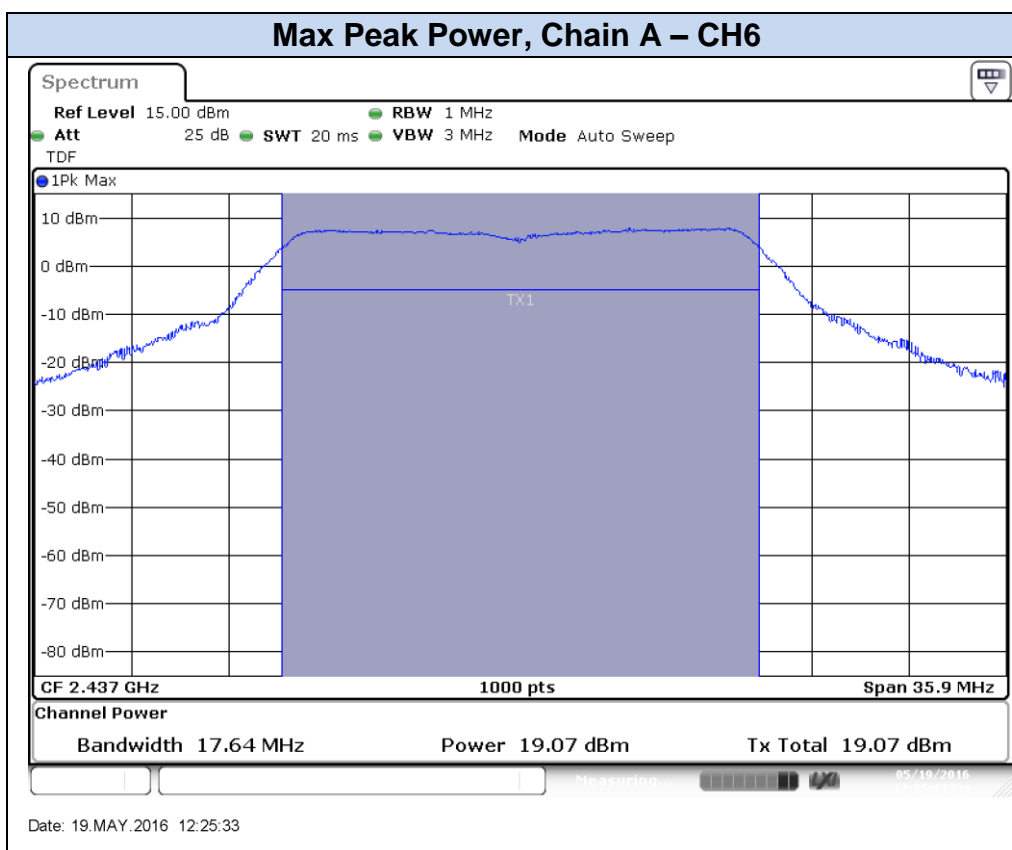
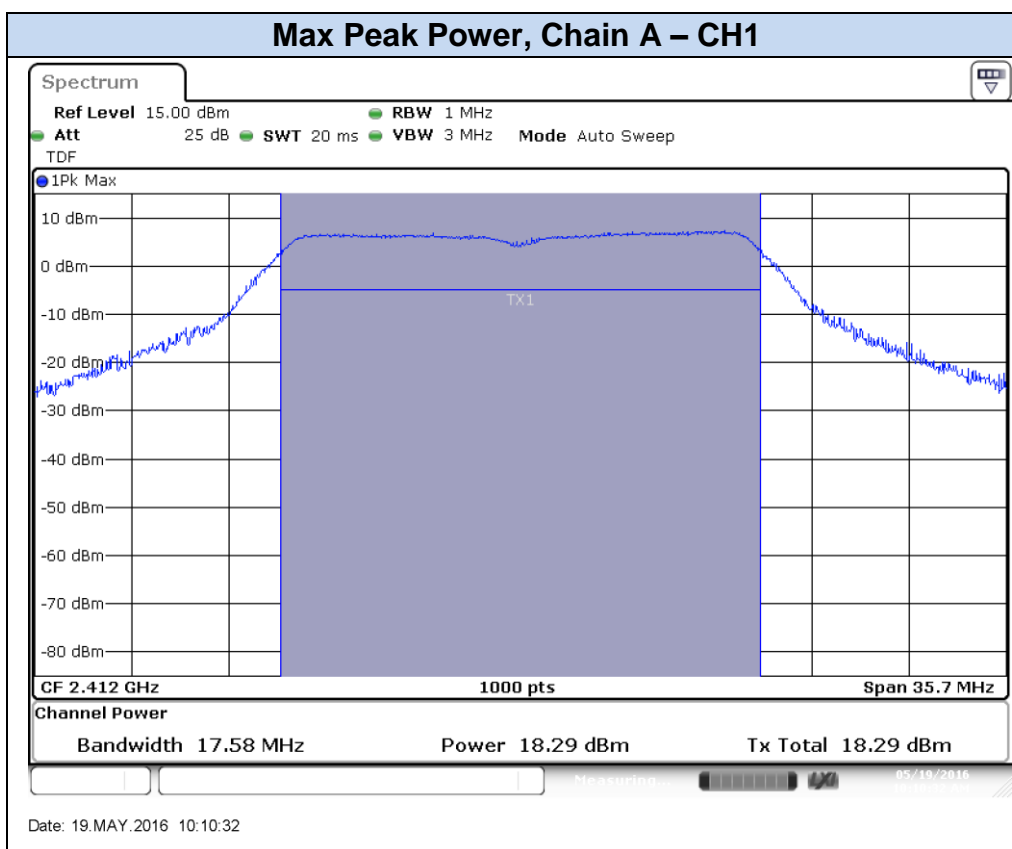


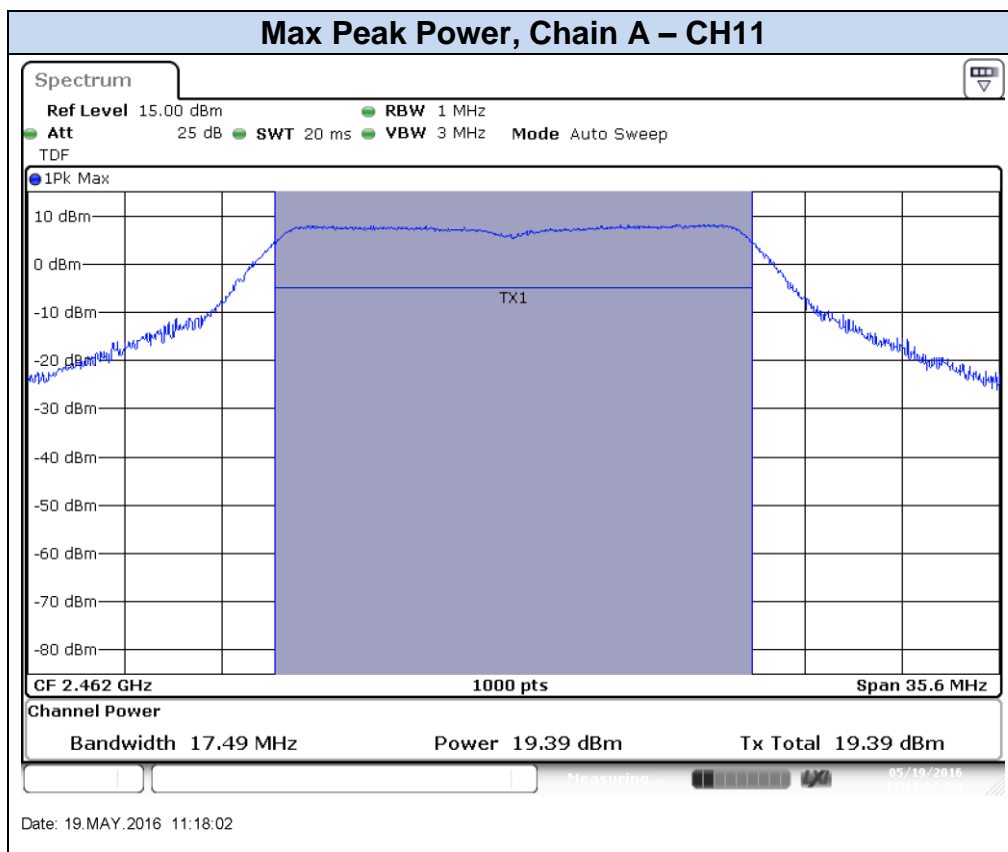
802.11g, 6Mbps





802.11n20, HT0





B.3 Out-of-band emissions (conducted)

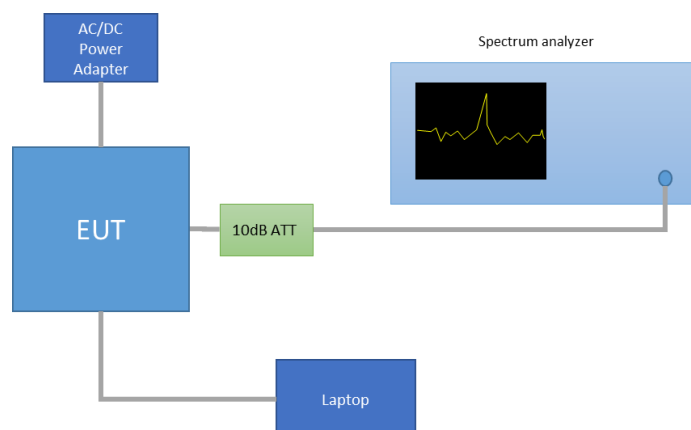
Test limits:

FCC part	Limits																																
15.247 (d)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.																																
15.209	<p>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):</p> <table><tr><th>Freq Range (MHz)</th><th>Field Strength (μV/m)</th><th>Field Strength (dBμV/m)</th><th>Meas. Distance (m)</th></tr><tr><td>0.009-0.490</td><td>2400/f(kHz)</td><td>-</td><td>300</td></tr><tr><td>0.490-1.705</td><td>24000/f(kHz)</td><td>-</td><td>300</td></tr><tr><td>1.705-30.0</td><td>30</td><td>-</td><td>30</td></tr><tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr><tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr><tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr><tr><td>960-25000</td><td>500</td><td>54</td><td>3</td></tr></table> <p>The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</p>	Freq Range (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Meas. Distance (m)	0.009-0.490	2400/f(kHz)	-	300	0.490-1.705	24000/f(kHz)	-	300	1.705-30.0	30	-	30	30-88	100	40	3	88-216	150	43.5	3	216-960	200	46	3	960-25000	500	54	3
Freq Range (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Meas. Distance (m)																														
0.009-0.490	2400/f(kHz)	-	300																														
0.490-1.705	24000/f(kHz)	-	300																														
1.705-30.0	30	-	30																														
30-88	100	40	3																														
88-216	150	43.5	3																														
216-960	200	46	3																														
960-25000	500	54	3																														

Test procedure:

The setup below was used to measure the out-of-band emissions. The antenna terminal of the EUT is connected to the spectrum analyzer through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

The Band Edge High, was measured using the method according to point 13.3 (Integration Method) of KDB 558074 D01 DTS Meas Guidance v03r05.



In case of Band Edge measurements falling in restricted bands, the declared Antenna Gain is also compensated in the graph. The maximum declared antenna gain is 1.5dBi.

For Band Edge measurements falling in restricted bands, the following limits in dBm were applied for the average detector after the conversion from the limits detailed above in dBμV/m, according to FCC 47 CFR part 15 - Subpart C – §15.209(a). The limits in dBm for peak detector are 20dB above the indicated values in the table.

§15.209(a)			Converted values	
Freq Range (MHz)	Distance (m)	Field strength (microvolts/meter)	Field strength (dB microvolts/meter)	Power (dBm)
960-25000	3	500	54.0	-41.2

The resolution/video bandwidth used for the conducted spurious measurement (delta method) is as follows:

Freq. Range	RBW	VBW
30MHz – 26.5GHz	100kHz	300kHz

Note: the below PSD_{Peak} values are shown just as a reference for the compliance of the Out-of-band Measurements in spurious domain. Thus the RBW used for these measurements was 100 kHz.

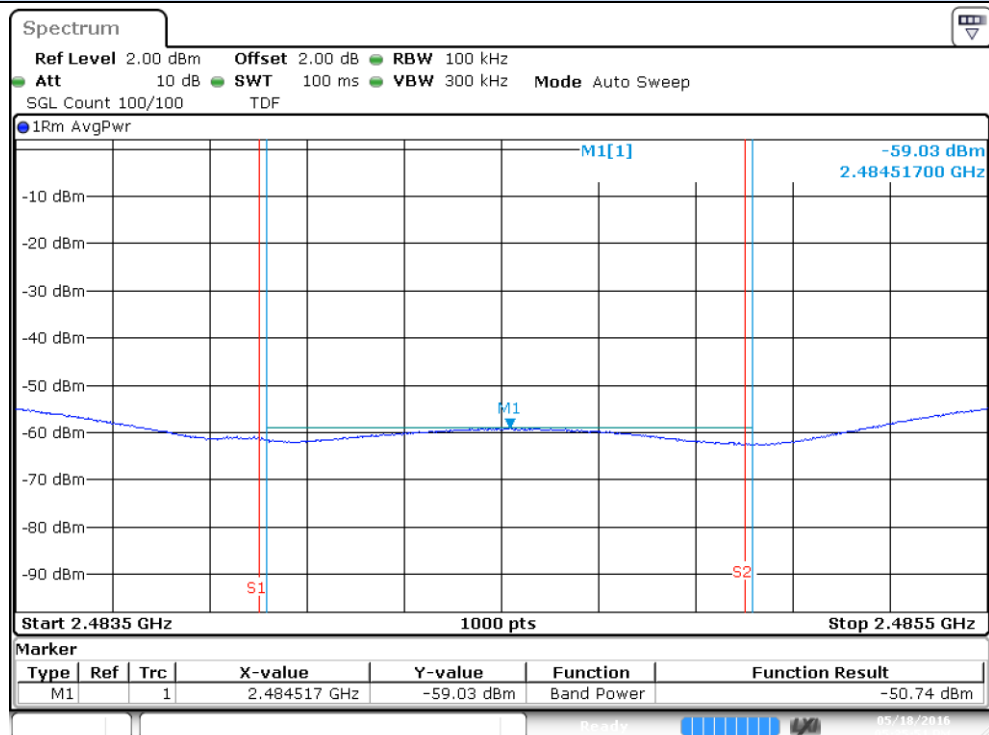
Mode	Rate	Meas. Duty Cycle [%]	CH	Frequency [MHz]	Antenna	PSD Peak [dBm]
802.11b	1Mbps	99.82	1	2412	SISO CHAIN A	6.16
			6	2437		6.88
			11	2462		6.62
802.11g	6Mbps	98.75	1	2412		0.03
			6	2437		0.32
			11	2462		0.55
802.1n20	HT0	98.52	1	2412		-0.18
			6	2437		0.32
			11	2462		0.64

Band Edge results Screenshot:

802.11b, 1Mbps

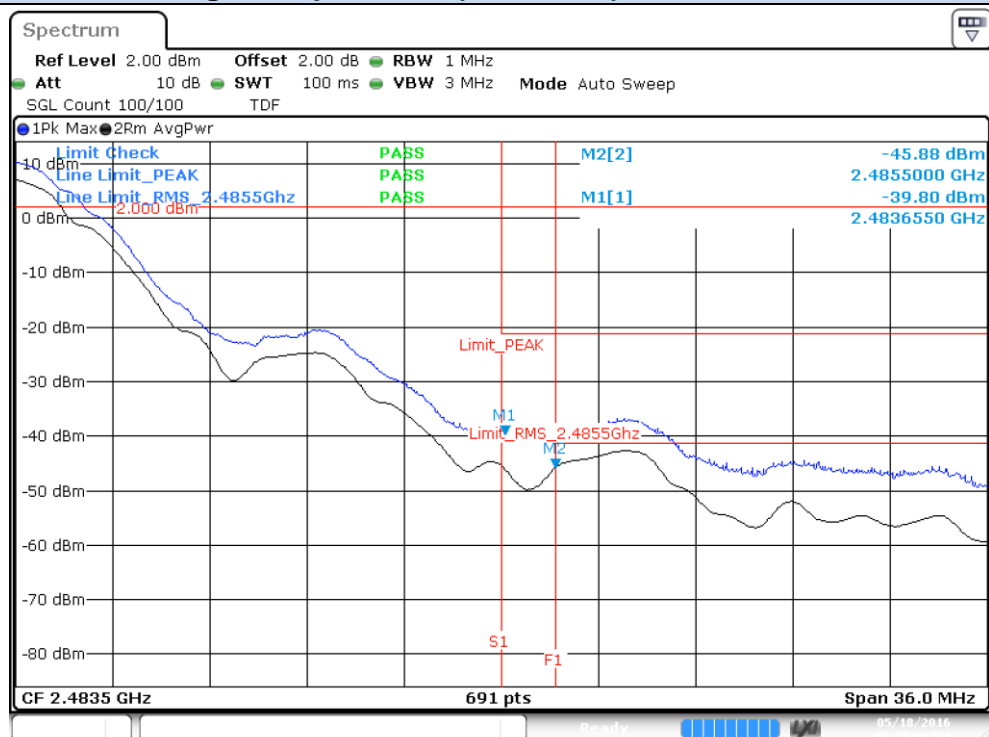


BE High Freq Section RMS within 2MHz (restricted), Chain A – CH11



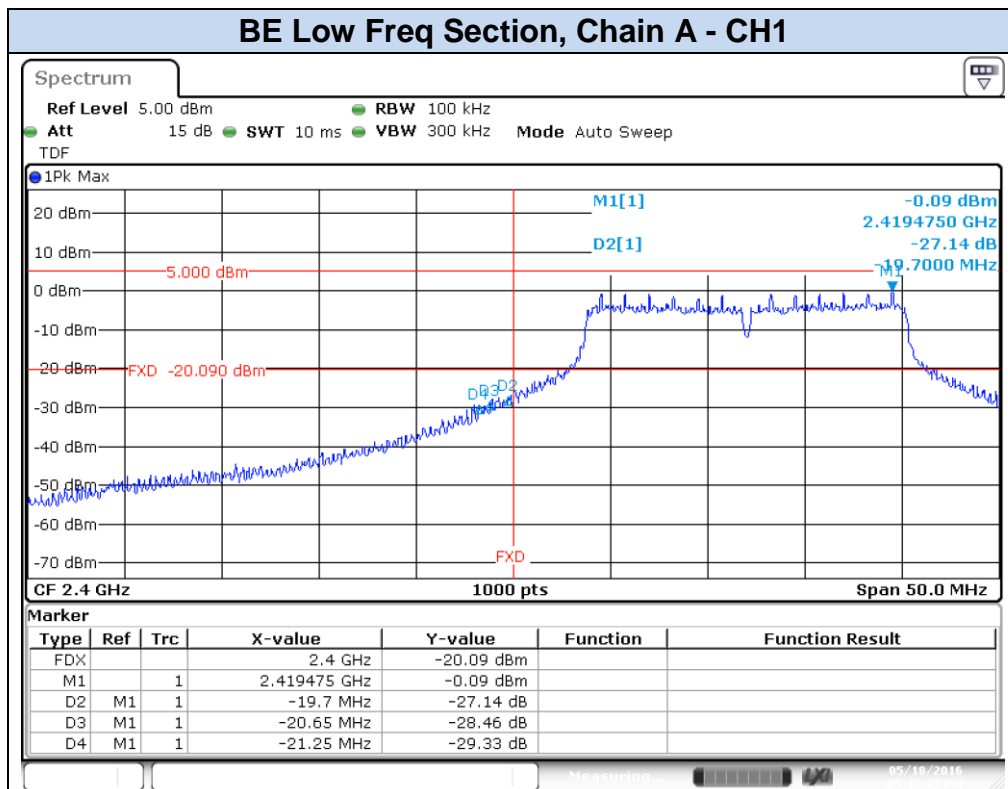
Date: 18.MAY.2016 17:35:52

BE High Freq Section (restricted), Chain A – CH11

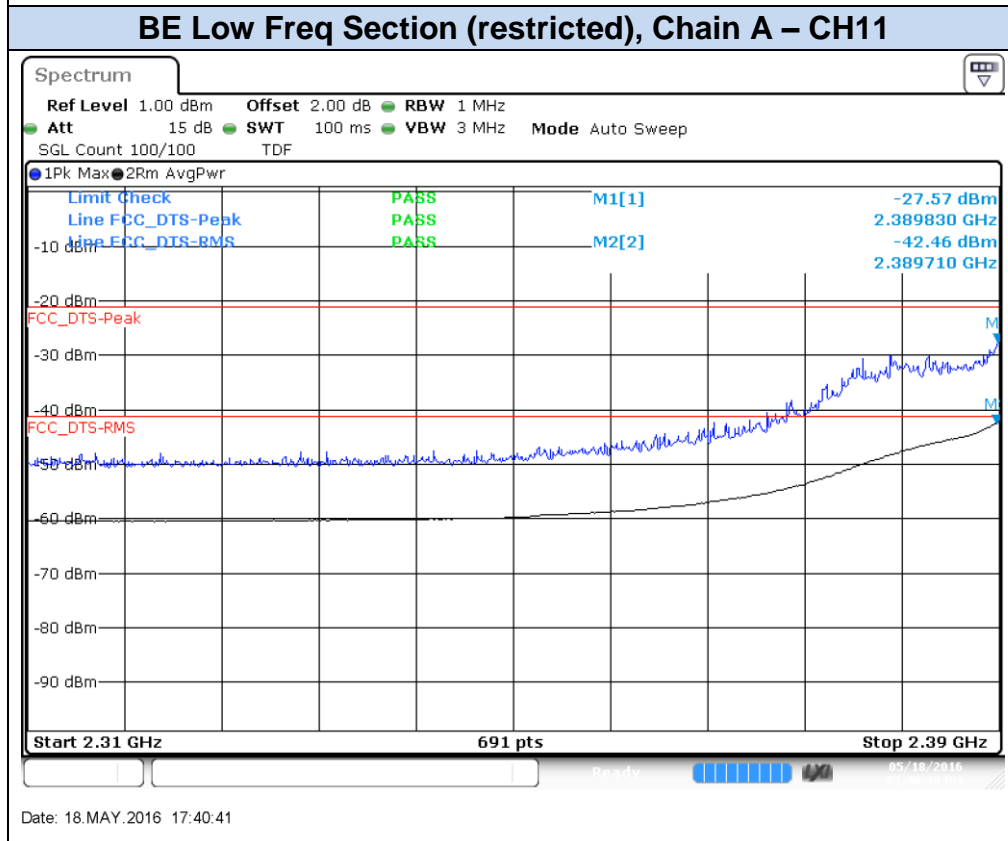


Date: 18.MAY.2016 17:35:01

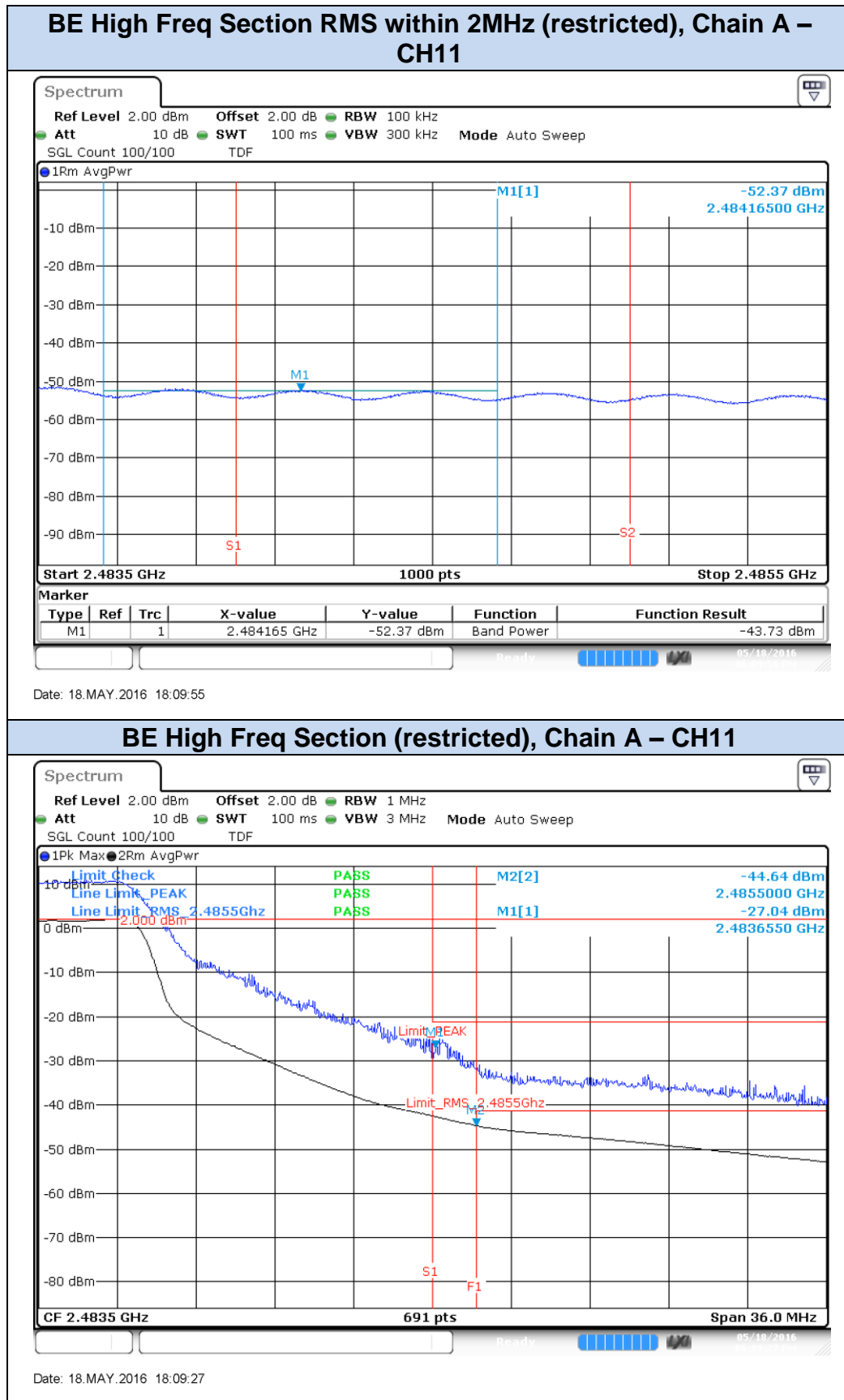
802.11g, 6Mbps



Date: 18.MAY.2016 17:42:48

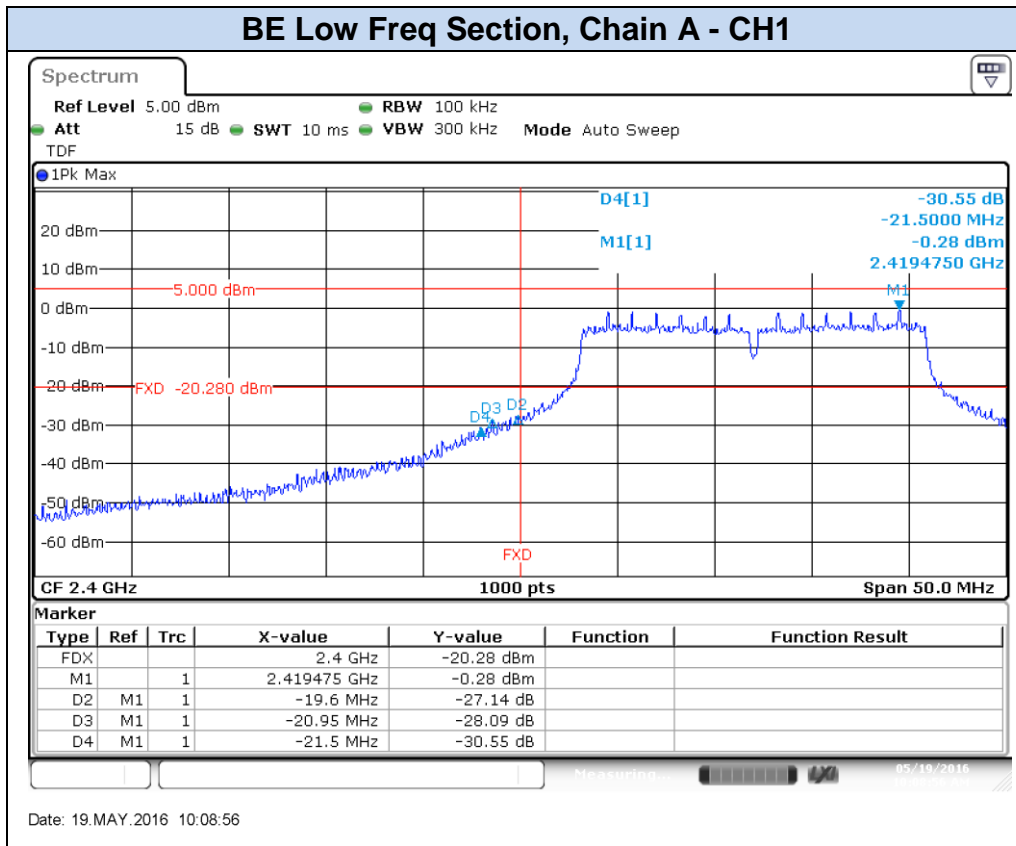


Date: 18.MAY.2016 17:40:41

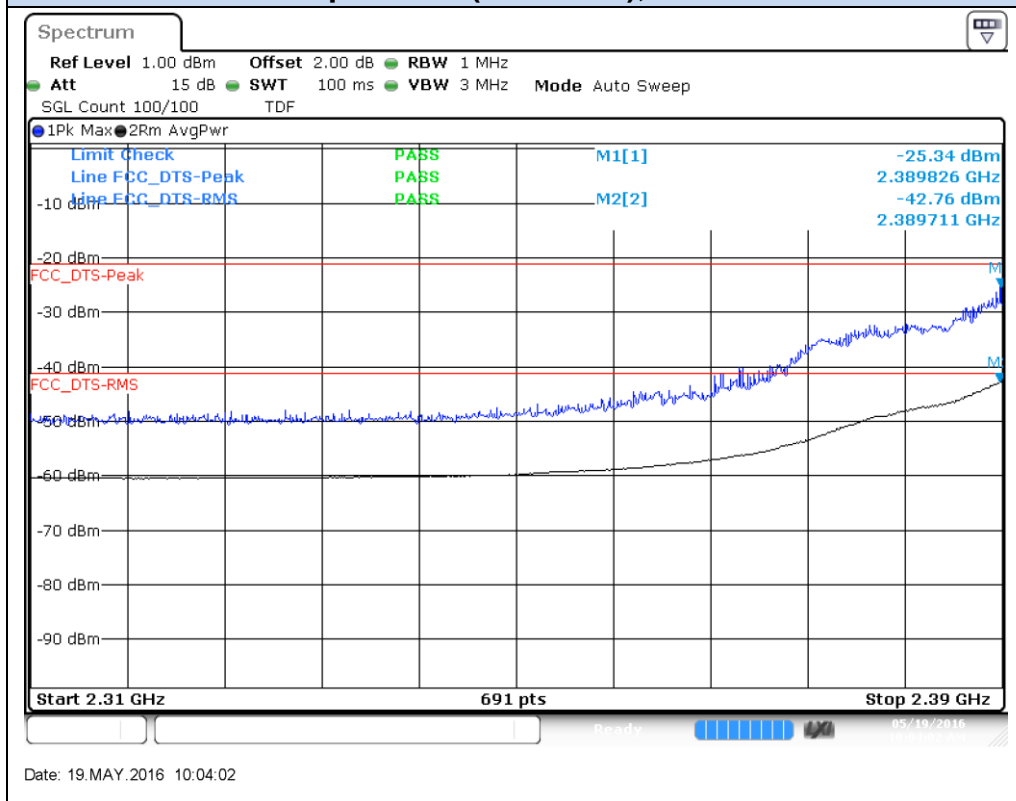


802.11n20, HT0

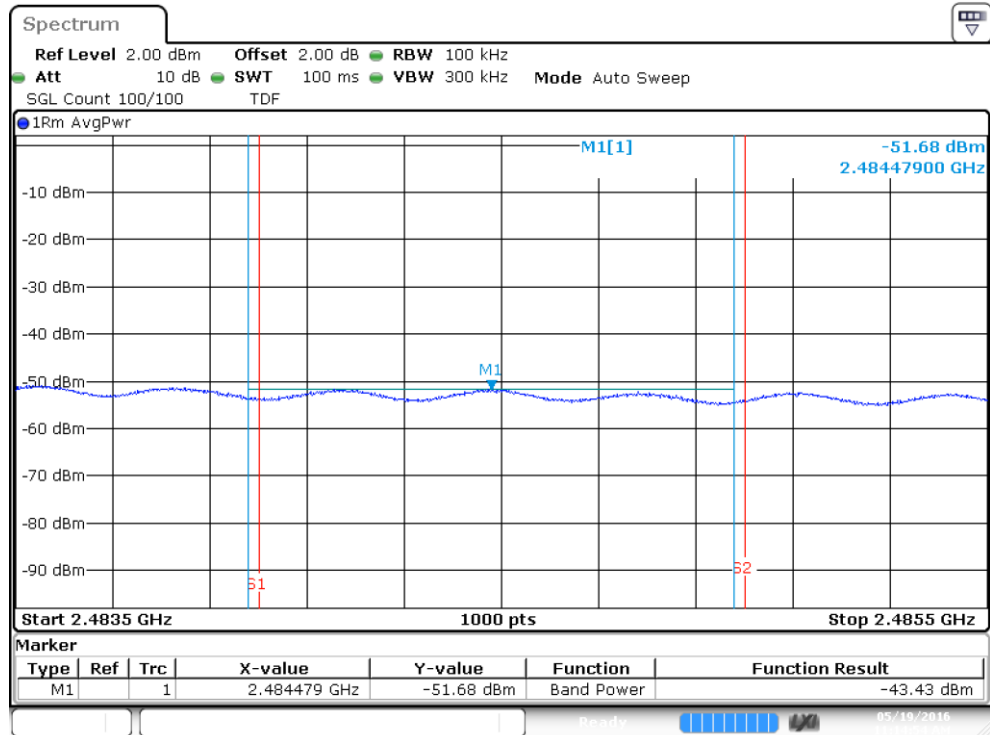
BE Low Freq Section, Chain A - CH1



BE Low Freq Section (restricted), Chain A - CH11

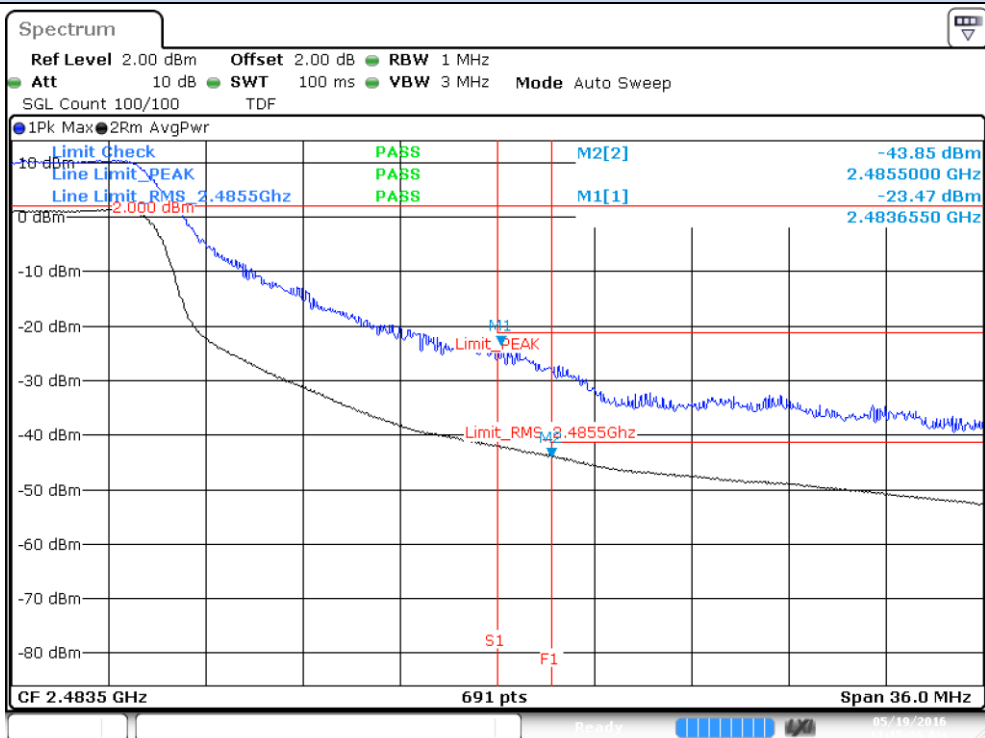


BE High Freq Section RMS within 2MHz (restricted), Chain A – CH11



Date: 19.MAY.2016 11:14:54

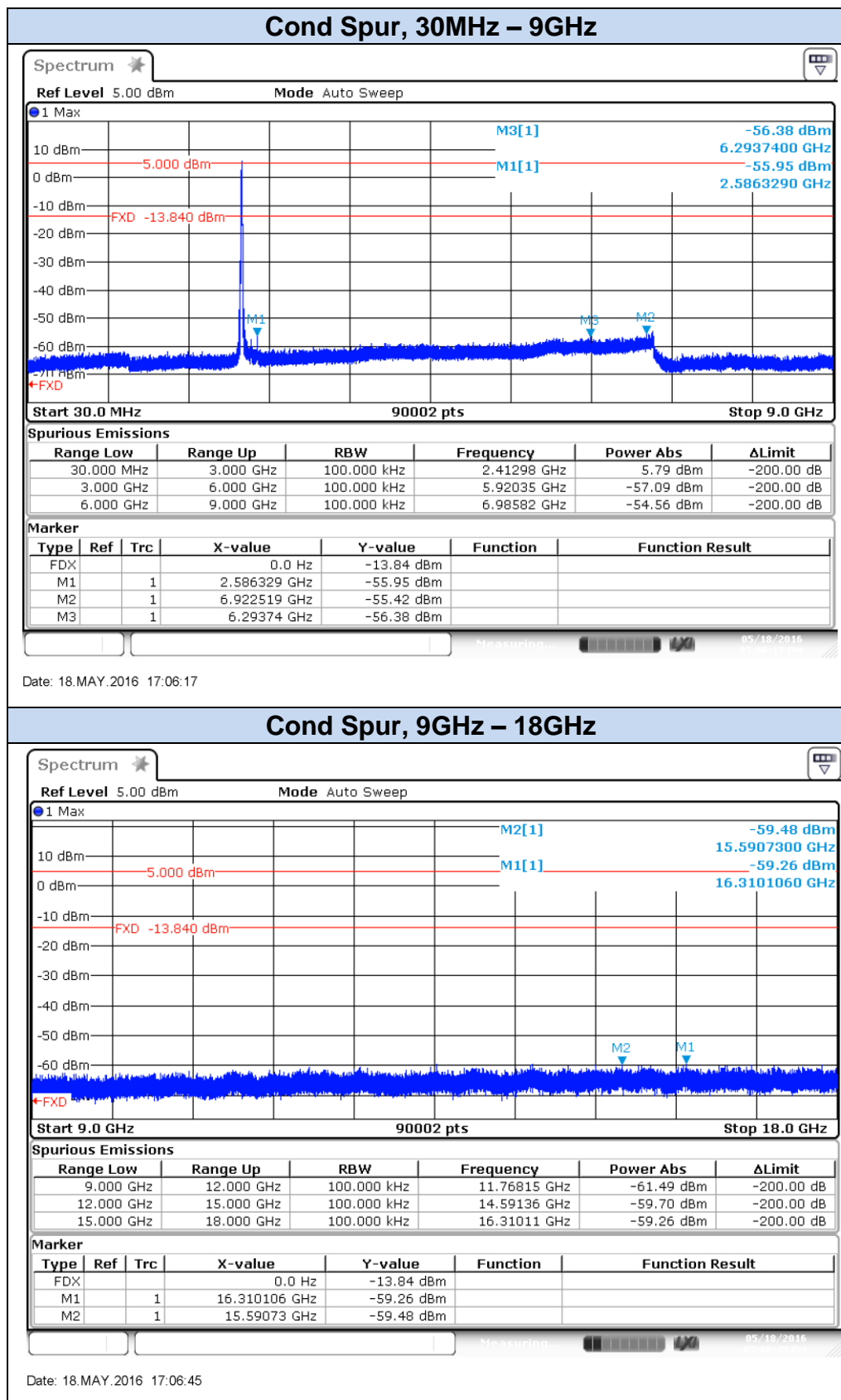
BE High Freq Section (restricted), Chain A – CH11

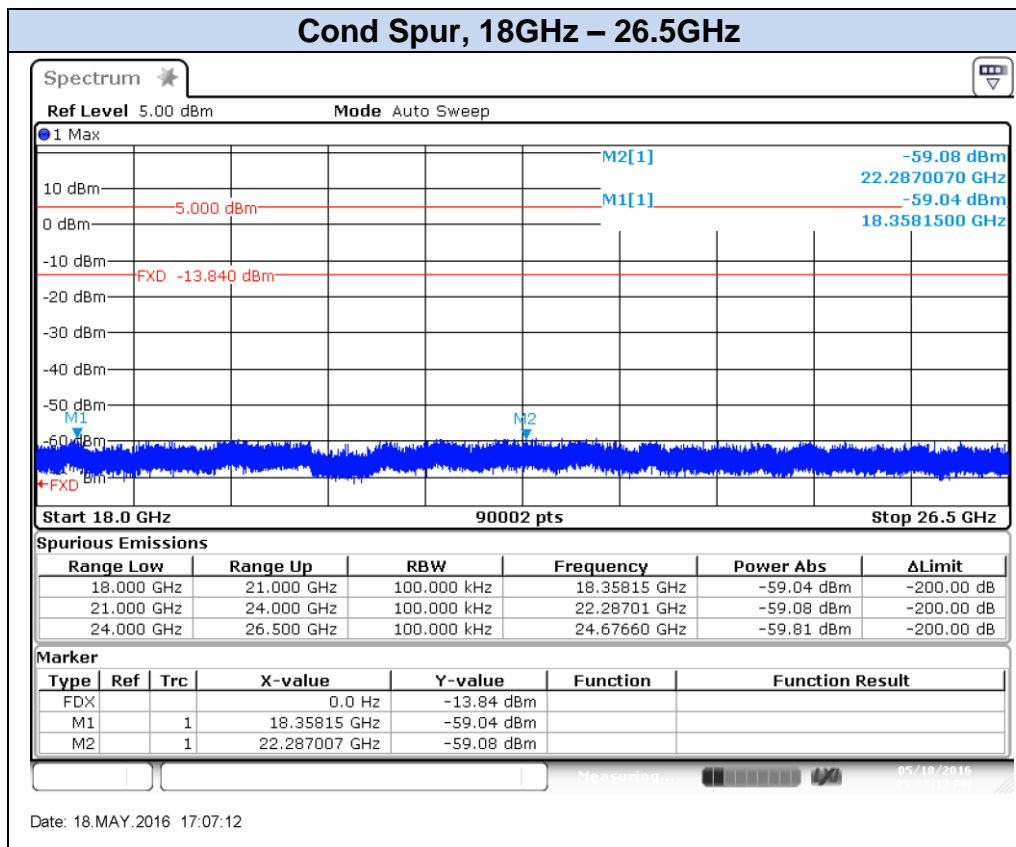


Date: 19.MAY.2016 11:15:26

Conducted Spurious results Screenshot:

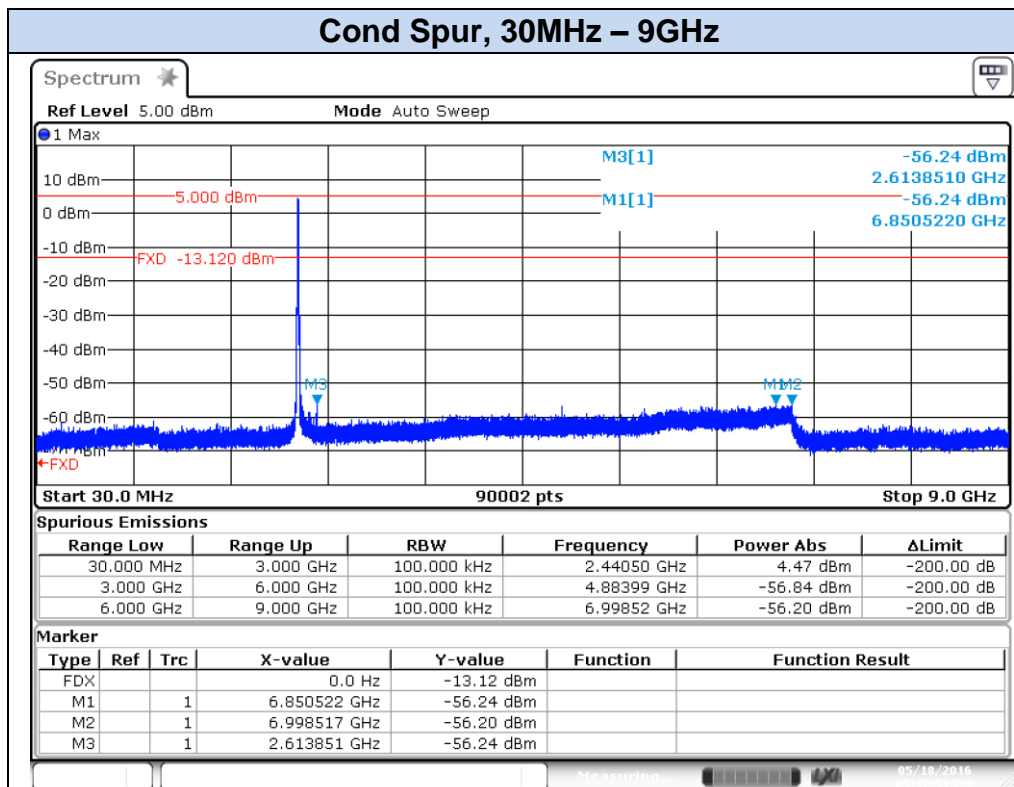
802.11b, 1Mbps – Chain A, CH1





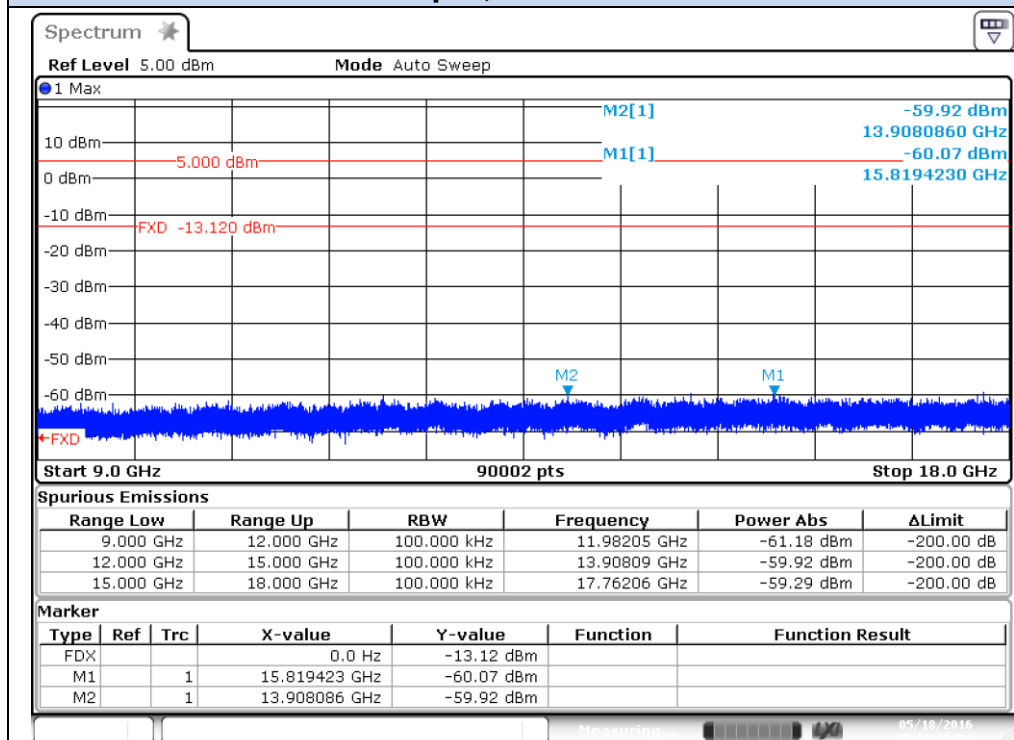
802.11b, 1Mbps – Chain A, CH6

Cond Spur, 30MHz – 9GHz



Date: 18.MAY.2016 17:17:52

Cond Spur, 9GHz – 18GHz



Date: 18.MAY.2016 17:18:22

