

# FCC TEST REPORT

**Application No:** HR/2019/40008  
**Applicant:** Huawei Technologies Co., Ltd.  
**Address of Applicant:** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C  
**Manufacturer:** Huawei Technologies Co., Ltd.  
**Address of Manufacturer:** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C  
**EUT Description:** Mobile Phone  
**Model No.:** YAL-L21  
**Trade Mark:** Honor  
**FCC ID:** QISYAL-L21  
**Standards:** 47 CFR FCC Part 2, Subpart J  
 47 CFR Part 15, Subpart C  
**Test Method:** KDB558074 D01 15.247 Meas Guidance v05  
 ANSI C63.10 (2013)  
**Date of Receipt:** 2019/4/10  
**Date of Test:** 2019/4/10 to 2019/4/24  
**Date of Issue:** 2019/4/25

<b>Test Result:</b>	<b>PASS *</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

Derek Yang  
Wireless Laboratory Manager



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# 1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2019/4/25		Original

<b>Authorized for issue by:</b>			
<b>Tested By</b>	<i>Mike Hu</i>	2019/4/25	
	_____	_____	
	<b>(Mike Hu) /Project Engineer</b>	<b>Date</b>	
<b>Checked By</b>	<i>David Chen</i>	2019/4/25	
	_____	_____	
	<b>(David Chen) /Reviewer</b>	<b>Date</b>	



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## 2 Test Summary

Test Item	Test Requirement	Test method	Test Result	Result
AC Power Line Conducted Emission	15.207	ANSI C63.10 2013	Clause 4.2	PASS
Duty Cycle	--	--	Clause 4.3	PASS
Conducted Output Power	15.247 (b)(3)	ANSI C63.10 2013	Clause 4.4	PASS
DTS (6 dB) Bandwidth & 99% Occupied Bandwidth	15.247 (a)(2)	ANSI C63.10 2013	Clause 4.5	PASS
Power Spectral Density	15.247 (e)	ANSI C63.10 2013	Clause 4.6	PASS
Band-edge for RF Conducted Emissions	15.247(d)	ANSI C63.10 2013	Clause 4.7	PASS
RF Conducted Spurious Emissions	15.247(d)	ANSI C63.10 2013	Clause 4.8	PASS
Radiated Spurious Emissions	15.247(d);15.205/15.209	ANSI C63.10 2013	Clause 4.9	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.247(d);15.205/15.209	ANSI C63.10 2013	Clause 4.10	PASS



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### 3 General Information

#### 3.1 Client Information

Applicant:	Huawei Technologies Co., Ltd.
Address of Applicant:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Manufacturer:	Huawei Technologies Co., Ltd.
Address of Manufacturer:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

#### 3.2 Test Location

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
Post code:	518057
Telephone:	+86 (0) 755 2601 2053
Fax:	+86 (0) 755 2671 0594
E-mail:	ee.shenzhen@sgs.com



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### 3.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.



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### 3.4 General Description of EUT

EUT Description::	Mobile Phone
Model No.:	YAL-L21
Trade Mark:	Honor
Hardware Version:	HL2YALEM01
Software Version:	9.1.0.101(SP1C900E101R1P2)
IEEE 802.11 WLAN Mode Supported	<input checked="" type="checkbox"/> 802.11B (20 MHz channel bandwidth), <input checked="" type="checkbox"/> 802.11G (20 MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11N (20 MHz channel bandwidth), <input checked="" type="checkbox"/> 802.11N (40 MHz channel bandwidth)
Operation Frequency:	2400 MHz -2483.5MHz $f_c = 2407 \text{ MHz} + N * 5 \text{ MHz}$ , where: - $f_c$ = "Operating Frequency" in MHz, - $N$ = "Channel Number" with the range from 1 to 11 for the 20 MHz channel bandwidth, or 3 to 9 for the 40 MHz channel bandwidth.
Type of Modulation:	IEEE for 802.11B: DSSS IEEE for 802.11G : OFDM IEEE for 802.11N(HT20 and HT20) : OFDM IEEE for 802.11N(HT20 and HT40) : OFDM
Sample Type:	<input checked="" type="checkbox"/> Portable Device, <input type="checkbox"/> Module
Antenna Type:	<input type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated
Antenna Ports	<input checked="" type="checkbox"/> Ant 1, <input checked="" type="checkbox"/> Ant 2, <input type="checkbox"/> Ant 3
Smart System	<input checked="" type="checkbox"/> SISO (for 802.11B/G/N), <input checked="" type="checkbox"/> MIMO (for 802.11N): 2 Tx & 2 Rx, <input type="checkbox"/> Diversity (for 802.11B/G) :       Tx &       Rx
Antenna Gain:	-1.5dBi
Power Supply	<input checked="" type="checkbox"/> AC/DC Adapter; <input type="checkbox"/> Battery <input type="checkbox"/> PoE;; <input type="checkbox"/> Other:
Accessories	Model: HW-050450E01 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.75A Output Voltage: 5V <input checked="" type="checkbox"/> 2A OR 4.5V <input checked="" type="checkbox"/> 5A OR 5V <input checked="" type="checkbox"/> 4.5A Model: HW-050450A01 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.75A Output Voltage: 5V <input checked="" type="checkbox"/> 2A OR 4.5V <input checked="" type="checkbox"/> 5A OR 5V <input checked="" type="checkbox"/> 4.5A Model: HW-050450E00 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.75A Output Voltage: 5V <input checked="" type="checkbox"/> 2A OR 4.5V <input checked="" type="checkbox"/> 5A OR 5V <input checked="" type="checkbox"/> 4.5A Model: HW-050450A00



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	<p>Manufacturer: Huawei Technologies Co.,Ltd.          Input Voltage: 100-240V ~50/60Hz 0.75A          Output Voltage: 5V <b>===</b> 2A OR 4.5V <b>===</b> 5A OR 5V <b>===</b> 4.5A          Model: HW-050450B00</p> <p>Manufacturer: Huawei Technologies Co.,Ltd.          Input Voltage: 100-240V ~50/60Hz 0.75A          Output Voltage: 5V <b>===</b> 2A OR 4.5V <b>===</b> 5A OR 5V <b>===</b> 4.5A          Model: HW-050450U00</p> <p>Manufacturer: Huawei Technologies Co.,Ltd.          Input Voltage: 100-240V ~50/60Hz 0.75A          Output Voltage: 5V <b>===</b> 2A OR 4.5V <b>===</b> 5A OR 5V <b>===</b> 4.5A</p>
--	---

Operation Frequency of each channel (802.11B/G/N HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Operation Frequency of each channel (802.11N HT40)					
Channel	Frequency	Channel	Frequency	Channel	Frequency
3	2422MHz	6	2437MHz	9	2452MHz
4	2427MHz	7	2442MHz		
5	2432MHz	8	2447MHz		

Remark:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency for 802.11B/G/N (HT20)	Frequency for 802.11N (HT40)
The Lowest channel	2412MHz	2422MHz
The Middle channel	2437MHz	2437MHz
The Highest channel	2462MHz	2452MHz





### 3.5 Test Environment and Mode

<b>Operating Environment:</b>	
Temperature:	25.0 °C
Humidity:	50 % RH
Atmospheric Pressure:	101.30 KPa
<b>Test mode:</b>	
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

### 3.6 Description of Support Units

The EUT has been tested independent unit.



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## 4 Test results and Measurement Data

### 4.1 Antenna Requirement

<b>Standard requirement:</b>	47 CFR Part 15C Section 15.203 /247(c)
<p>15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p>15.247(b) (4) requirement: 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. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>	
<p>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -1.5dBi.</p>	



## 4.2 AC Power Line Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	<ol style="list-style-type: none"> <li>1) The mains terminal disturbance voltage test was conducted in a shielded room.</li> <li>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</li> <li>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,</li> <li>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol>		



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<p>Test Setup:</p>	
<p>Exploratory Test Mode:</p>	<p>Transmitting with all kind of modulations, data rates at lowest, middle and highest channel. Charge + Transmitting mode.</p>
<p>Final Test Mode:</p>	<p>Through Pre-scan, find the 1Mbps of rate of 802.11B at lowest channel is the worst case. Charge + Transmitting mode. Only the worst case is recorded in the report.</p>
<p>Instruments Used:</p>	<p>Refer to section 5.10 for details</p>
<p>Test Results:</p>	<p>Pass</p>



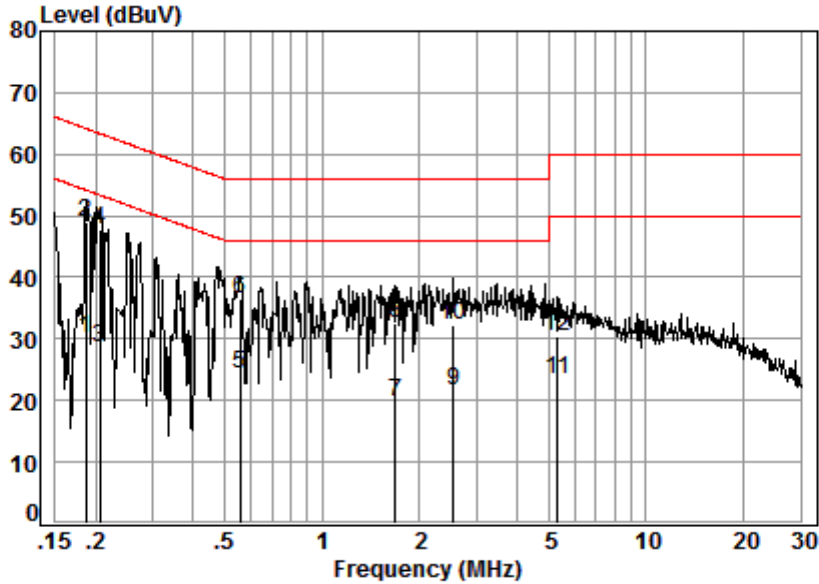


Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:



Site : Shielding Room  
 Condition: Neutral  
 Job No. : 12626CR  
 Test mode: d

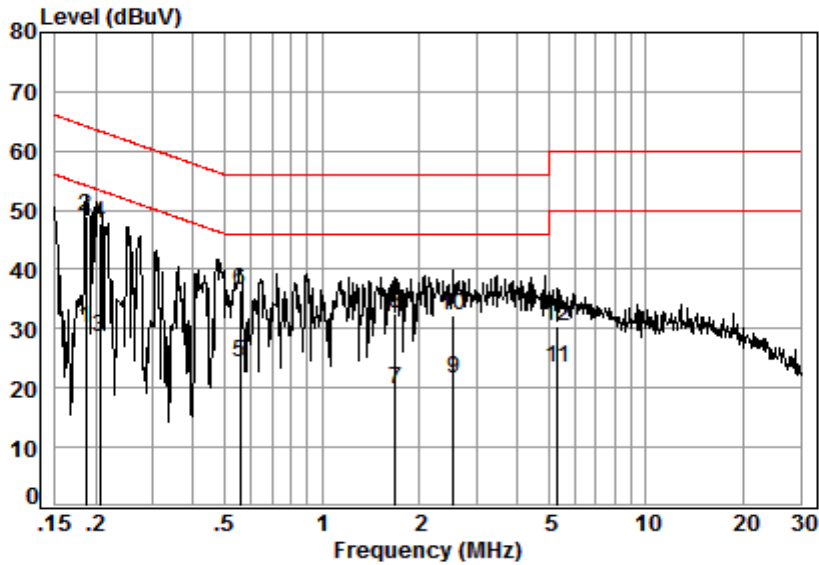
	Freq	Cable Loss	LISN Factor	Read Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dB	
1	0.19	0.02	9.64	20.30	54.20	-24.24	Average
2	0.19	0.02	9.64	39.27	64.20	-15.27	QP
3	0.21	0.02	9.64	18.87	53.36	-24.83	Average
4	0.21	0.02	9.64	38.02	63.36	-15.68	QP
5	0.56	0.07	9.64	14.69	46.00	-21.60	Average
6	0.56	0.07	9.64	26.83	56.00	-19.46	QP
7	1.69	0.14	9.70	10.00	46.00	-26.16	Average
8	1.69	0.14	9.70	22.81	56.00	-23.35	QP
9	2.54	0.16	9.68	11.84	46.00	-24.32	Average
10	2.54	0.16	9.68	22.41	56.00	-23.75	QP
11	5.33	0.17	9.72	13.66	50.00	-26.45	Average
12	5.33	0.17	9.72	20.38	60.00	-29.73	QP



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Neutral Line:



Site : Shielding Room  
 Condition: Neutral  
 Job No. : 12626CR  
 Test mode: d

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.19	0.02	9.64	20.30	29.96	54.20	-24.24	Average
2	0.19	0.02	9.64	39.27	48.93	64.20	-15.27	QP
3	0.21	0.02	9.64	18.87	28.53	53.36	-24.83	Average
4	0.21	0.02	9.64	38.02	47.68	63.36	-15.68	QP
5	0.56	0.07	9.64	14.69	24.40	46.00	-21.60	Average
6	0.56	0.07	9.64	26.83	36.54	56.00	-19.46	QP
7	1.69	0.14	9.70	10.00	19.84	46.00	-26.16	Average
8	1.69	0.14	9.70	22.81	32.65	56.00	-23.35	QP
9	2.54	0.16	9.68	11.84	21.68	46.00	-24.32	Average
10	2.54	0.16	9.68	22.41	32.25	56.00	-23.75	QP
11	5.33	0.17	9.72	13.66	23.55	50.00	-26.45	Average
12	5.33	0.17	9.72	20.38	30.27	60.00	-29.73	QP

Remarks:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.



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### 4.3 Duty Cycle

#### 4.3.1 Test Results

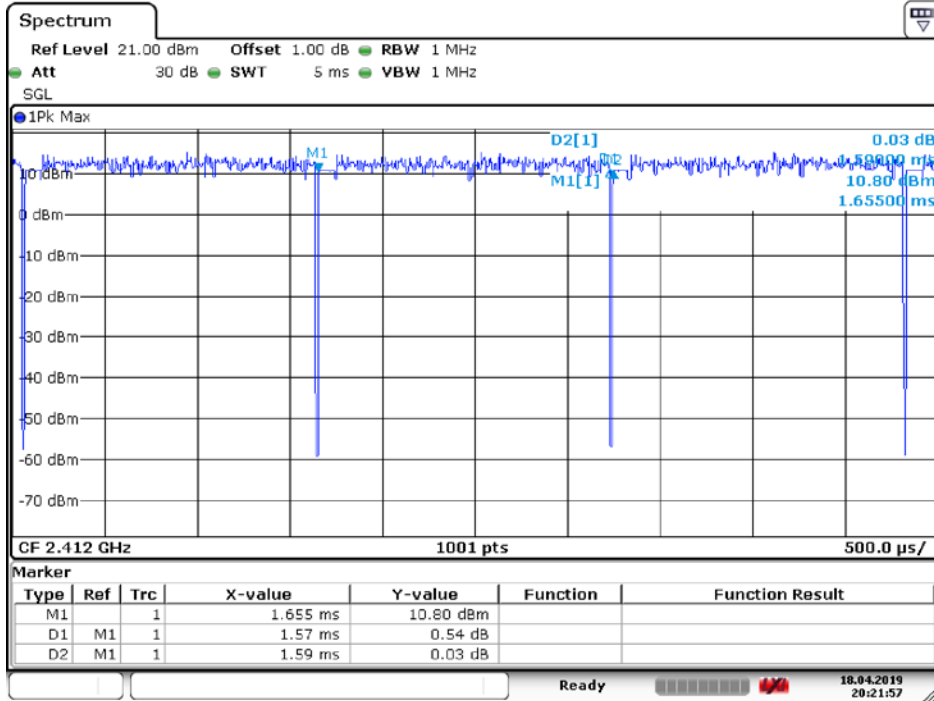
Test Mode	TX Freq. [MHz]	Duty cycle [%]
11B	Ant 1: CH1	98.74
11G	Ant 1: CH1	98.54
11G_CDD	Ant 1: CH1	98.34
11N20	Ant 1: CH1	98.82
11N20_MIMO	Ant 1: CH1	97.27
11N40	Ant 1: CH3	96.02
11N40_MIMO	Ant 1: CH3	92.31
11B	Ant 2: CH1	98.73
11G	Ant 2: CH1	98.70
11G_CDD	Ant 2: CH1	98.06
11N20	Ant 2: CH1	98.59
11N20_MIMO	Ant 2: CH1	96.97
11N40	Ant 2: CH3,	95.62
11N40_MIMO	Ant 2: CH3	92.16



**4.3.1 Test Plots**

**4.3.1.1 ANT1**

**4.3.1.1.1 11B**

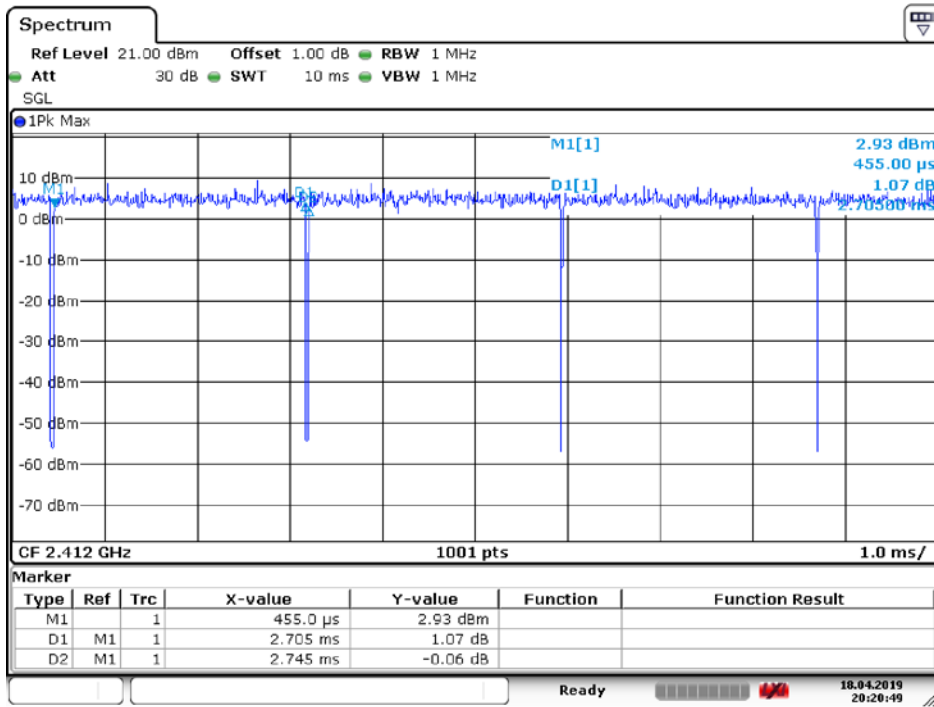


Date: 18.APR.2019 20:21:58



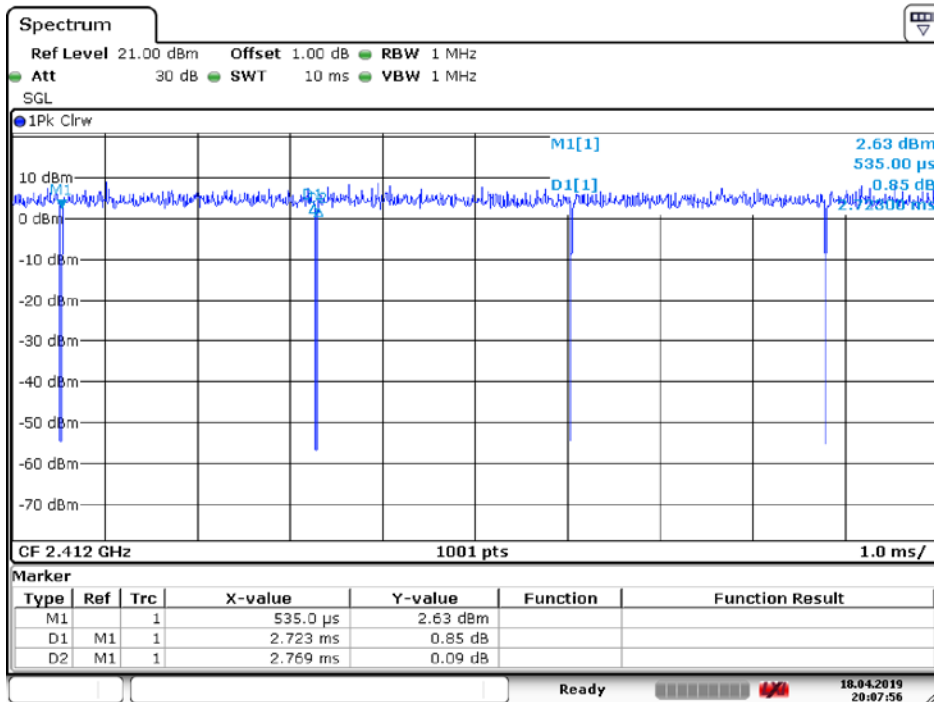


4.3.1.1.2 11G



Date: 18.APR.2019 20:20:50

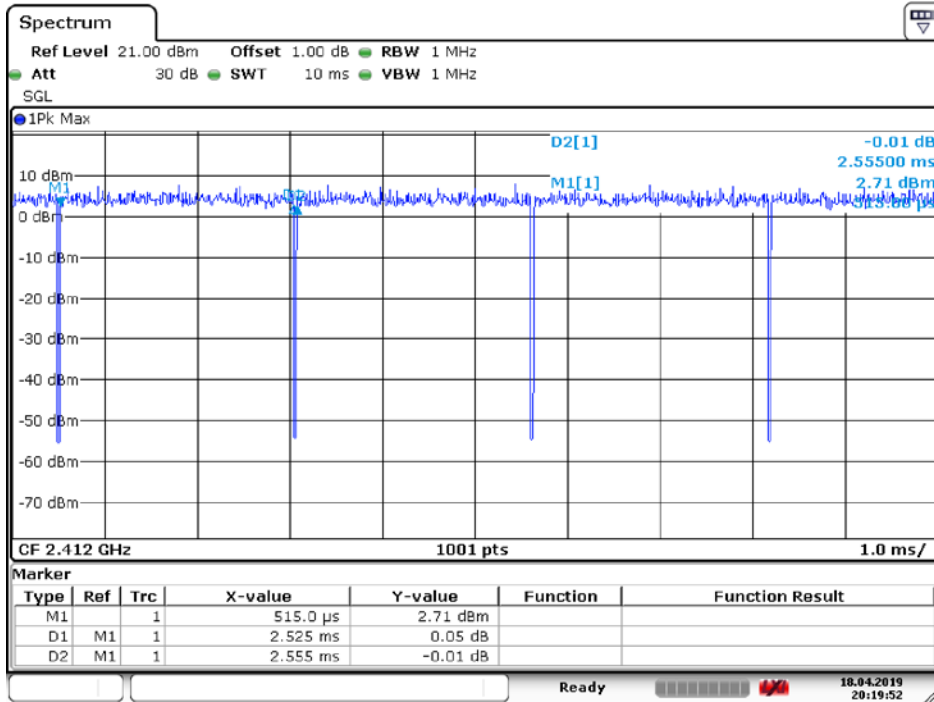
4.3.1.1.3 11G\_CDD



Date: 18.APR.2019 20:07:56

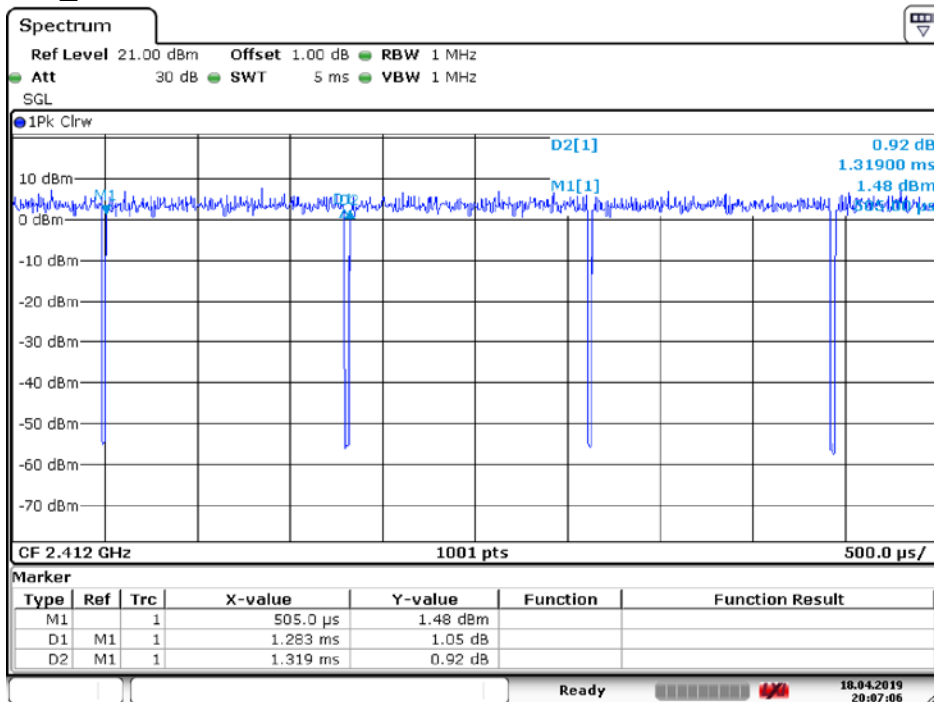


**4.3.1.1.4 11N20**



Date: 18.APR.2019 20:19:52

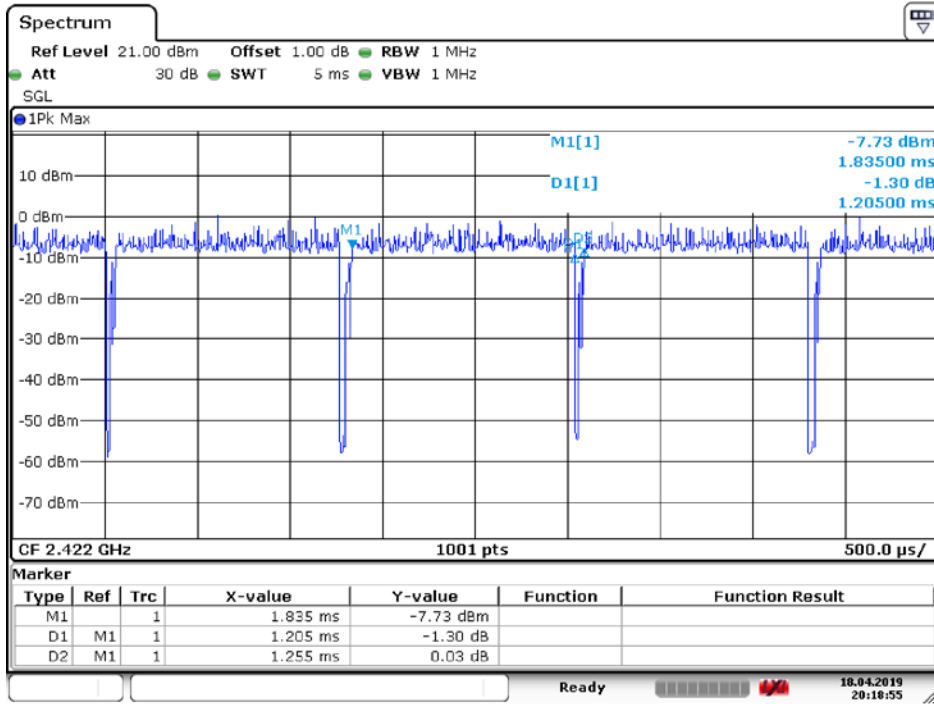
**4.3.1.1.5 11N20\_MIMO**



Date: 18.APR.2019 20:07:06

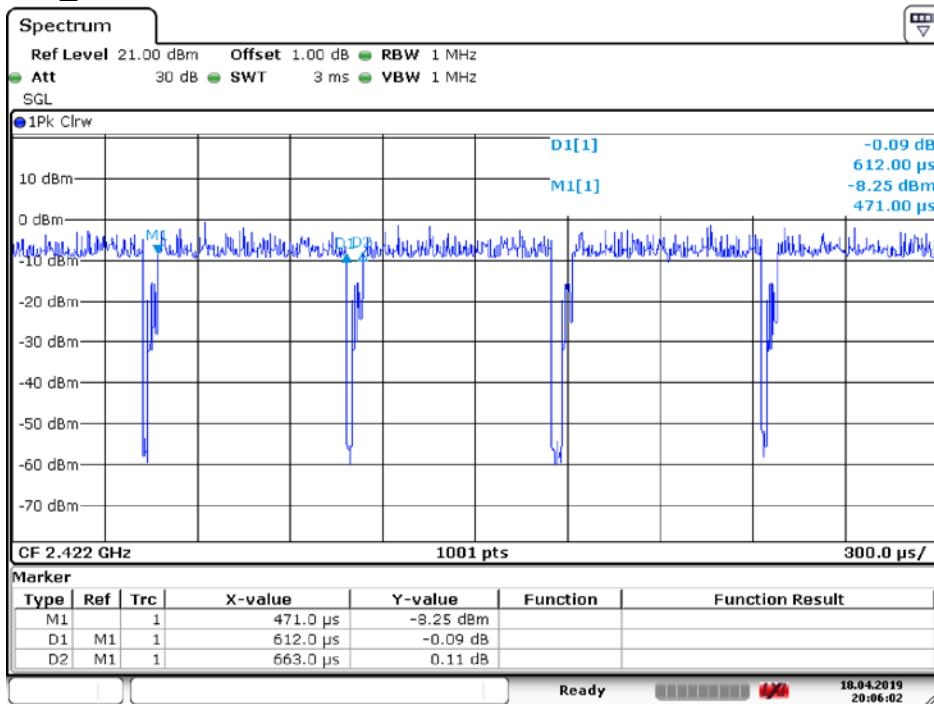


4.3.1.1.6 11N40



Date: 18.APR.2019 20:18:56

4.3.1.1.7 11N40\_MIMO

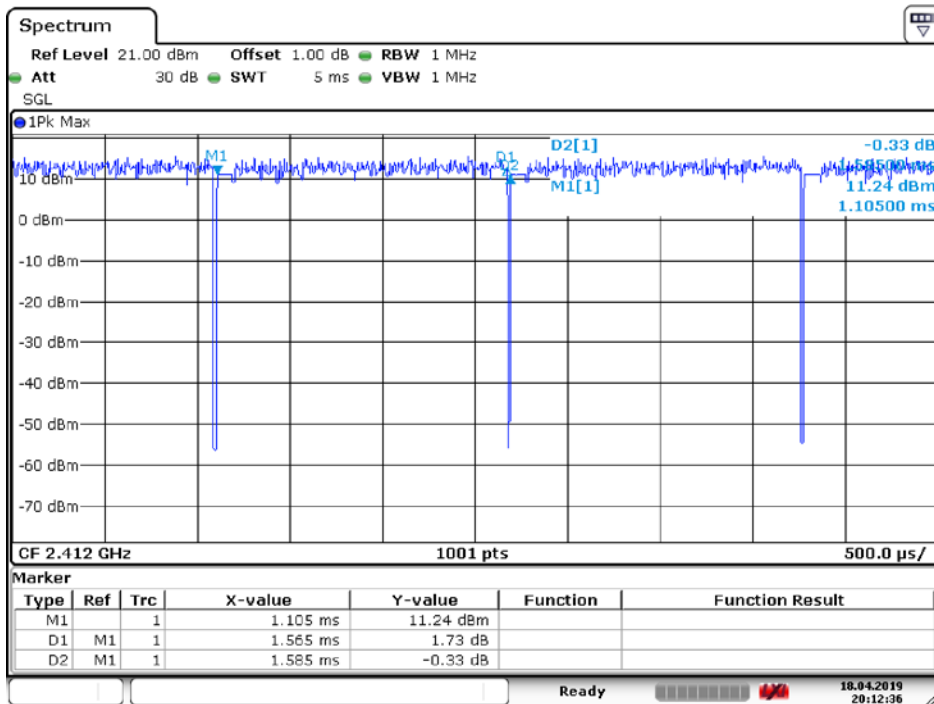


Date: 18.APR.2019 20:06:02



4.3.1.2 ANT2

4.3.1.2.1 11B



Date: 18.APR.2019 20:12:37



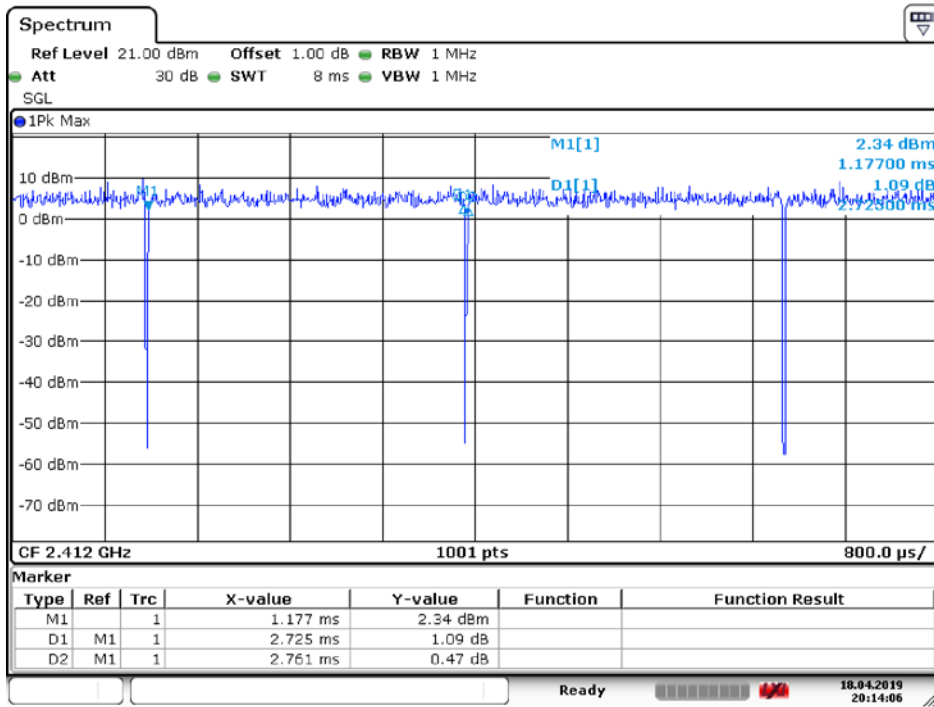
SGS-CSTC Standards Technical Services Co., Ltd.  
Shenzhen Branch Inspection & Testing Services Laboratory

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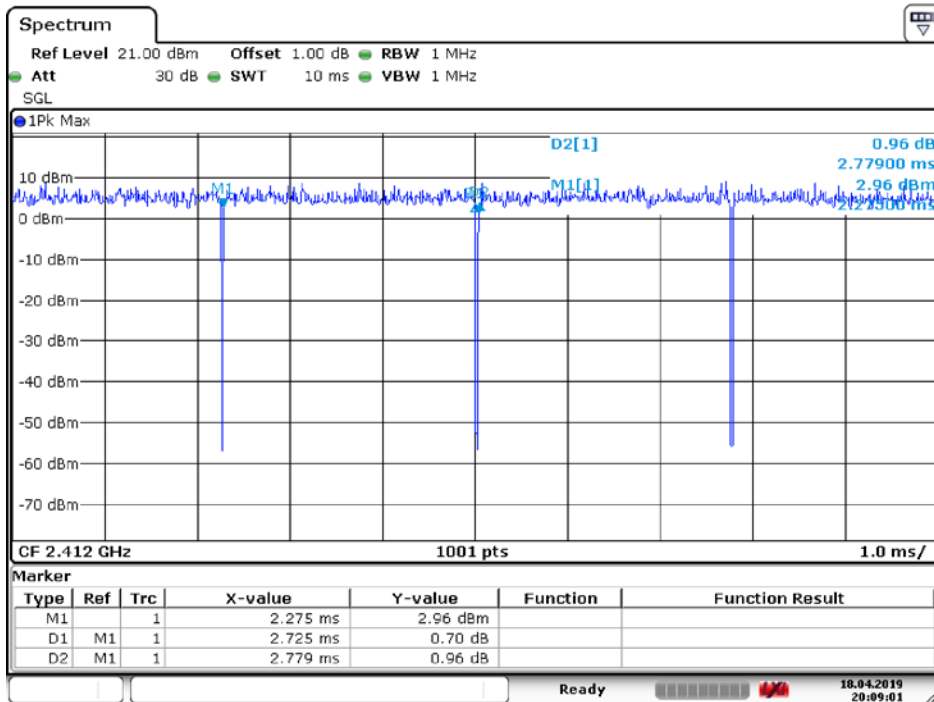


**4.3.1.2.2 11G**



Date: 18.APR.2019 20:14:07

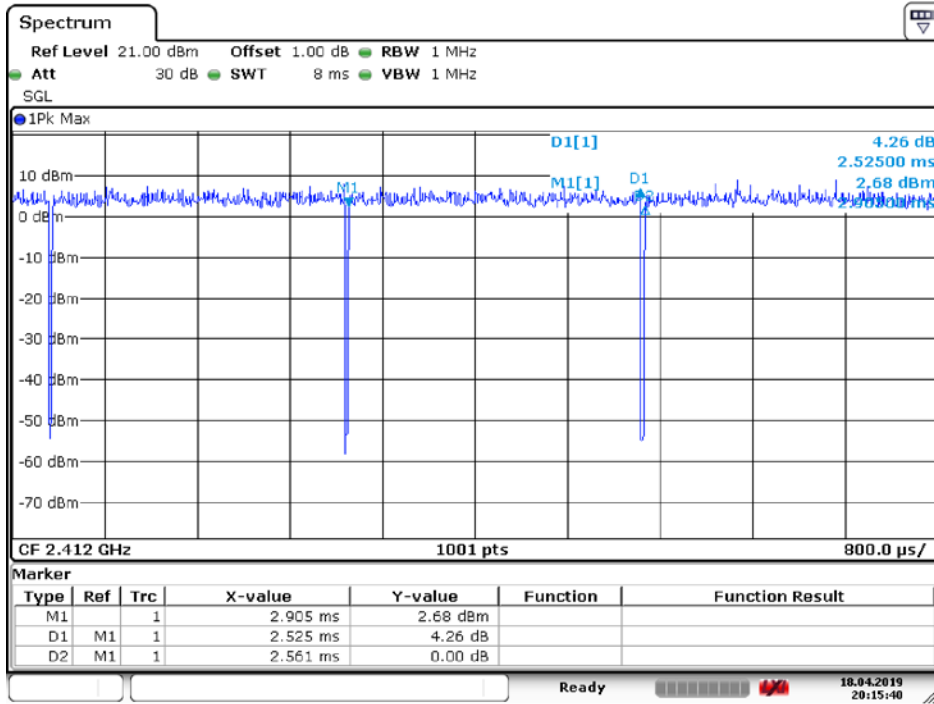
**4.3.1.2.3 11G\_CDD**



Date: 18.APR.2019 20:09:02

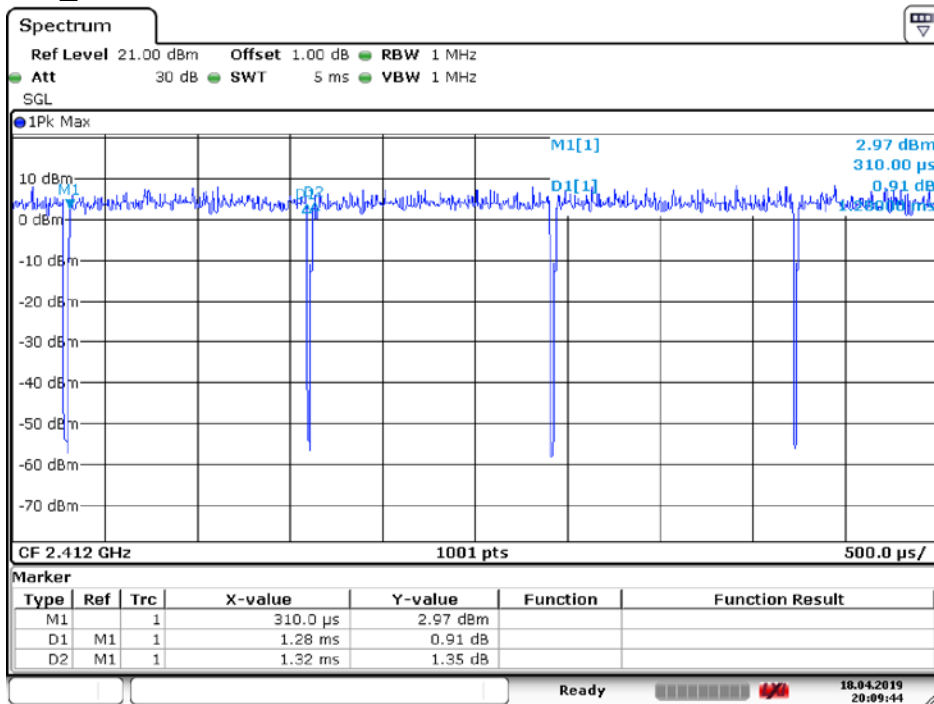


**4.3.1.2.4 11N20**



Date: 18.APR.2019 20:15:40

**4.3.1.2.5 11N20\_MIMO**

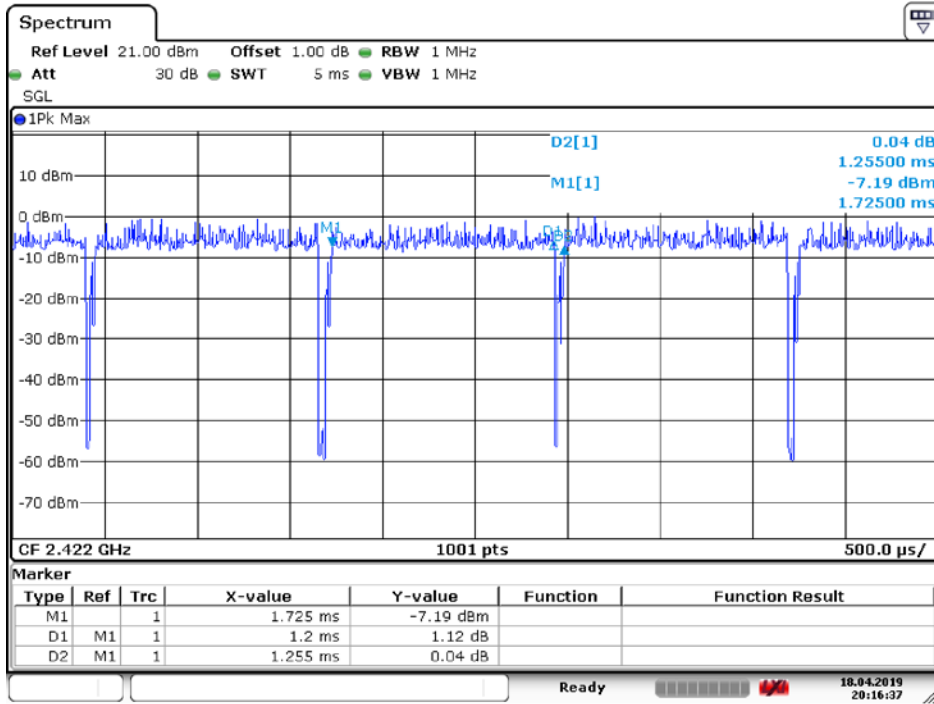


Date: 18.APR.2019 20:09:44



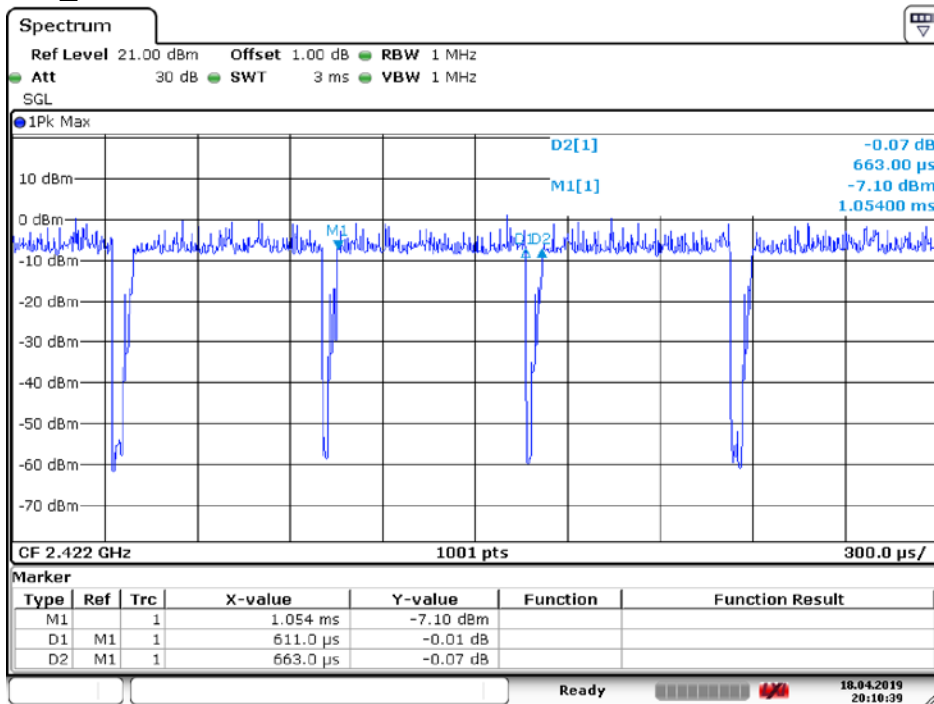
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**4.3.1.2.6 11N40**



Date: 18.APR.2019 20:16:37

**4.3.1.2.7 11N40\_MIMO**



Date: 18.APR.2019 20:10:39



### 4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10 :2013 Section 11.9.1.3
Test Setup:	<p>The diagram illustrates the test setup. A 'POWER METER' (represented by a black box) and an 'E.U.T.' (represented by a grey box) are connected by a red line. They are placed on a 'Non-Conducted Table' (a white rectangular platform). Below the table is a 'Ground Reference Plane' (a grey horizontal bar).</p>
Test Instruments:	Refer to section 5.10 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 11Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G ; 6.5Mbps of rate is the worst case of 802.11N(HT20); 13.5Mbps of rate is the worst case of 802.11N(HT40).
Limit:	30dBm
Test Results:	Pass



### 4.4.1 Test Results

Measurement Data of Average Power:

Ant1:

Mode	Test Channel	Average Output Power (dBm)	Result
802.11B	Lowest	17.01	Report purpose only
	Middle	17.08	Report purpose only
	Highest	17.78	Report purpose only
802.11G	Lowest	12.73	Report purpose only
	Middle	17.08	Report purpose only
	Highest	12.97	Report purpose only
802.11G_CDD	Lowest	13.31	Report purpose only
	Middle	17.26	Report purpose only
	Highest	12.97	Report purpose only
802.11N20	Lowest	12.66	Report purpose only
	Middle	16.88	Report purpose only
	Highest	12.87	Report purpose only
802.11N20_MIMO	Lowest	12.79	Report purpose only
	Middle	16.64	Report purpose only
	Highest	12.99	Report purpose only
802.11N40	Lowest	11.31	Report purpose only
	Middle	14.87	Report purpose only
	Highest	11.17	Report purpose only
802.11N40_MIMO	Lowest	10.97	Report purpose only
	Middle	15.05	Report purpose only
	Highest	10.96	Report purpose only



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**Ant2:**

Mode	Test Channel	Average Output Power (dBm)	Result
802.11B	Lowest	17.13	Report purpose only
	Middle	17.21	Report purpose only
	Highest	17.74	Report purpose only
802.11G	Lowest	12.39	Report purpose only
	Middle	17.06	Report purpose only
	Highest	12.27	Report purpose only
802.11G_CDD	Lowest	12.66	Report purpose only
	Middle	16.79	Report purpose only
	Highest	12.33	Report purpose only
802.11N20	Lowest	12.20	Report purpose only
	Middle	16.45	Report purpose only
	Highest	12.15	Report purpose only
802.11N20_MIMO	Lowest	12.16	Report purpose only
	Middle	16.17	Report purpose only
	Highest	12.29	Report purpose only
802.11N40	Lowest	10.65	Report purpose only
	Middle	14.15	Report purpose only
	Highest	10.41	Report purpose only
802.11N40_MIMO	Lowest	12.29	Report purpose only
	Middle	14.23	Report purpose only
	Highest	10.96	Report purpose only



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**Measurement Data of Peak Power:**

**Ant1**

Mode	Test Channel	Peak Output Power (dBm)	Limit (dBm)	Result
802.11B	Lowest	24.40	30.00	Pass
	Middle	24.77	30.00	Pass
	Highest	25.30	30.00	Pass
802.11G	Lowest	20.90	30.00	Pass
	Middle	25.53	30.00	Pass
	Highest	21.37	30.00	Pass
802.11G_CDD	Lowest	20.54	30.00	Pass
	Middle	25.23	30.00	Pass
	Highest	20.51	30.00	Pass
802.11N20	Lowest	20.73	30.00	Pass
	Middle	25.00	30.00	Pass
	Highest	20.76	30.00	Pass
802.11N20_MIMO	Lowest	20.12	30.00	Pass
	Middle	24.41	30.00	Pass
	Highest	20.51	30.00	Pass
802.11N40	Lowest	19.29	30.00	Pass
	Middle	24.94	30.00	Pass
	Highest	19.09	30.00	Pass
802.11N40_MIMO	Lowest	18.88	30.00	Pass
	Middle	22.77	30.00	Pass
	Highest	18.88	30.00	Pass

**Ant2:**

Mode	Test Channel	Peak Output Power (dBm)	Limit (dBm)	Result
802.11B	Lowest	25.22	30.00	Pass
	Middle	24.88	30.00	Pass
	Highest	25.47	30.00	Pass
802.11G	Lowest	21.34	30.00	Pass
	Middle	26.73	30.00	Pass
	Highest	21.46	30.00	Pass
802.11G_CDD	Lowest	21.23	30.00	Pass
	Middle	25.20	30.00	Pass
	Highest	21.04	30.00	Pass
802.11N20	Lowest	21.15	30.00	Pass
	Middle	24.91	30.00	Pass
	Highest	21.25	30.00	Pass
802.11N20_MIMO	Lowest	21.33	30.00	Pass
	Middle	24.84	30.00	Pass
	Highest	20.88	30.00	Pass
802.11N40	Lowest	19.24	30.00	Pass
	Middle	24.74	30.00	Pass
	Highest	19.20	30.00	Pass



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802.11N40_MIMO	Lowest	20.32	30.00	Pass
	Middle	23.91	30.00	Pass
	Highest	20.20	30.00	Pass



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### 4.5 DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013 Section 11.8.1 Option 1
Test Setup:	
Instruments Used:	Refer to section 5.10 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 11Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G; 6.5Mbps of rate is the worst case of 802.11N(HT20); 13.5Mbps of rate is the worst case of 802.11N(HT40).
Limit:	≥ 500 kHz
Test Results:	Pass



**4.5.1 Test Results**

Mode	Test Channel	Occupied Bandwidth (MHz)	6dB Emission Bandwidth (MHz)	Limit (kHz)	Result
802.11B	Lowest	11.59	8.79	≥500	Pass
	Middle	11.59	8.79	≥500	Pass
	Highest	11.67	8.79	≥500	Pass
802.11G	Lowest	16.26	15.19	≥500	Pass
	Middle	16.38	15.70	≥500	Pass
	Highest	16.42	15.86	≥500	Pass
802.11G_CDD	Lowest	16.22	15.82	≥500	Pass
	Middle	16.42	15.47	≥500	Pass
	Highest	16.38	15.78	≥500	Pass
802.11N20	Lowest	17.38	15.90	≥500	Pass
	Middle	17.38	16.10	≥500	Pass
	Highest	17.50	16.94	≥500	Pass
802.11N20_MIMO	Lowest	17.34	15.39	≥500	Pass
	Middle	17.42	16.02	≥500	Pass
	Highest	17.46	17.06	≥500	Pass
802.11N40	Lowest	36.20	35.56	≥500	Pass
	Middle	36.28	35.25	≥500	Pass
	Highest	36.20	35.39	≥500	Pass
802.11N40_MIMO	Lowest	36.52	35.80	≥500	Pass
	Middle	36.28	35.64	≥500	Pass
	Highest	36.44	36.12	≥500	Pass

Mode	Test Channel	Occupied Bandwidth (MHz)	6dB Emission Bandwidth (MHz)	Limit (kHz)	Result
802.11B	Lowest	11.67	9.03	≥500	Pass
	Middle	11.71	9.07	≥500	Pass
	Highest	11.79	8.55	≥500	Pass
802.11G	Lowest	16.38	15.62	≥500	Pass
	Middle	16.42	15.82	≥500	Pass
	Highest	16.46	15.94	≥500	Pass
802.11G_CDD	Lowest	16.30	15.74	≥500	Pass
	Middle	16.42	15.14	≥500	Pass
	Highest	16.34	15.62	≥500	Pass
802.11N20	Lowest	17.42	16.06	≥500	Pass
	Middle	17.46	15.62	≥500	Pass
	Highest	17.50	16.98	≥500	Pass
802.11N20_MIMO	Lowest	17.38	16.30	≥500	Pass
	Middle	17.46	16.86	≥500	Pass
	Highest	17.46	16.42	≥500	Pass
802.11N40	Lowest	36.12	35.56	≥500	Pass
	Middle	36.28	35.56	≥500	Pass
	Highest	36.36	36.04	≥500	Pass



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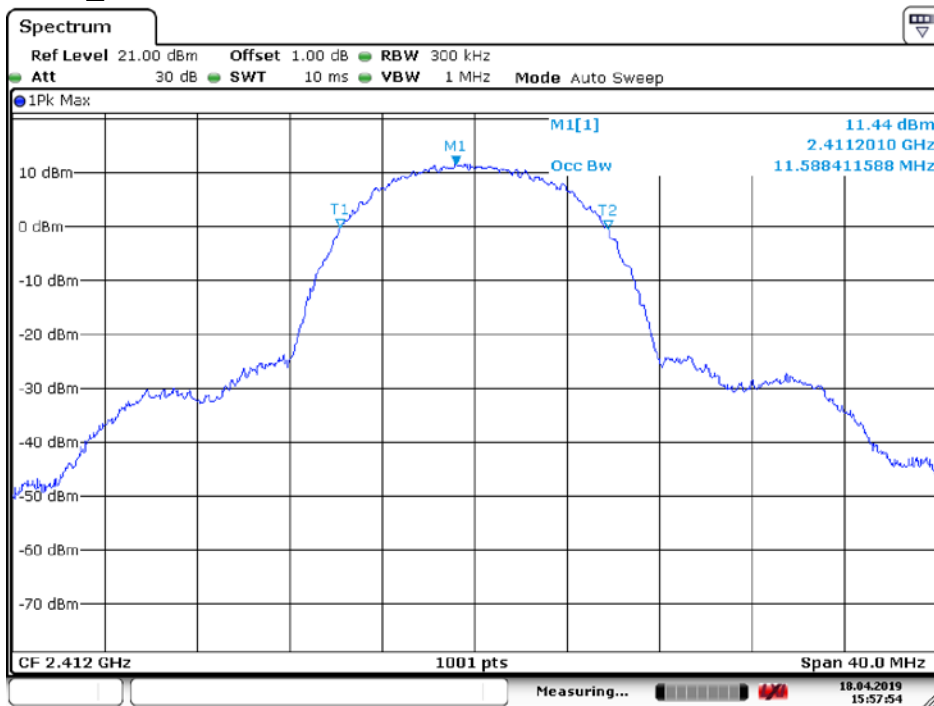


802.11N40 _MIMO	Lowest	36.20	36.12	≥500	Pass
	Middle	36.12	35.56	≥500	Pass
	Highest	36.36	36.12	≥500	Pass

## 4.5.2 Test plots

### 4.5.2.1 ANT1

#### 4.5.2.1.1 802.11B\_Lowest Channel

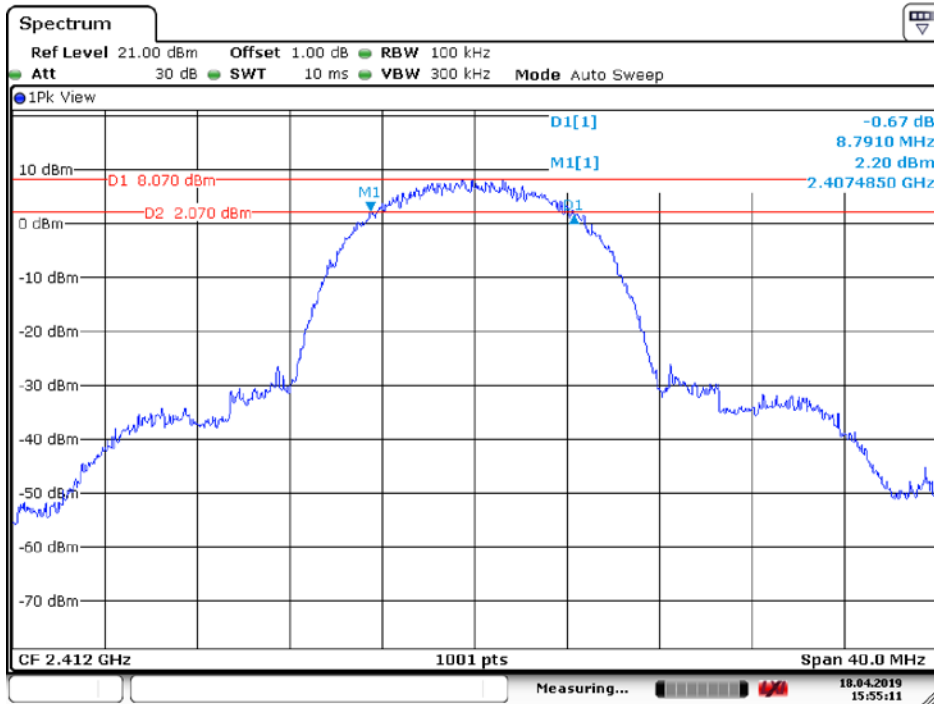


Date: 18.APR.2019 15:57:54



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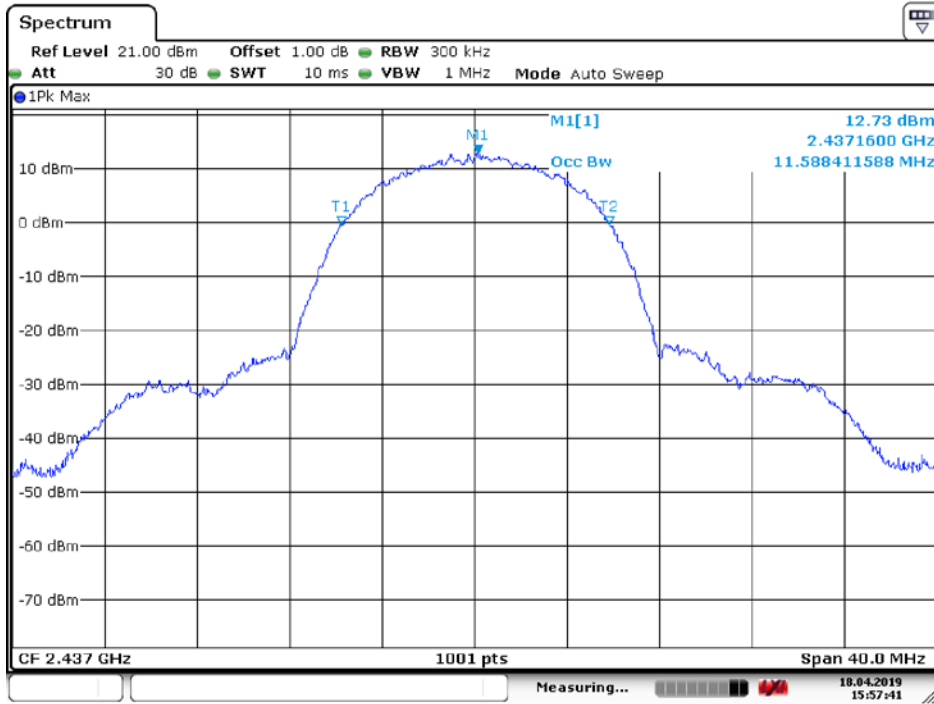


Date: 18.APR.2019 15:55:12

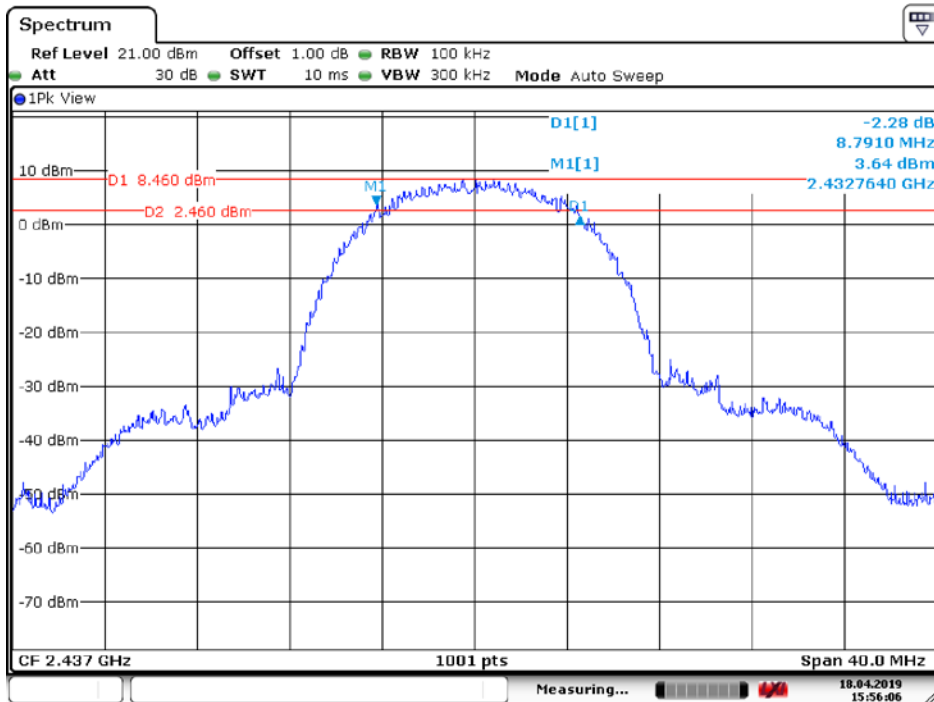


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**4.5.2.1.2 802.11B\_ Middle Channel**



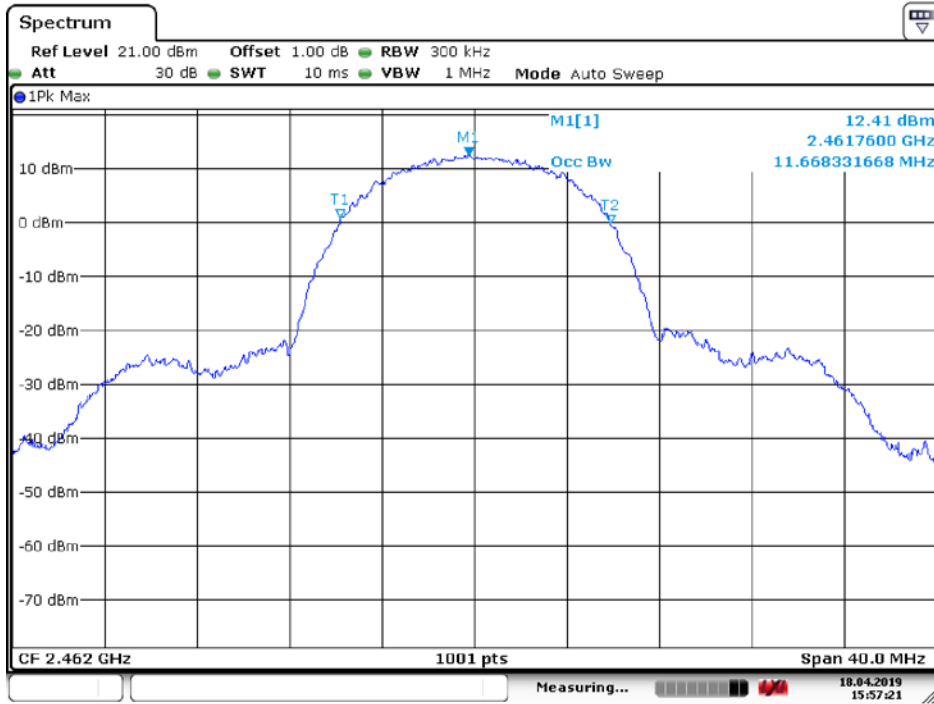
Date: 18.APR.2019 15:57:41



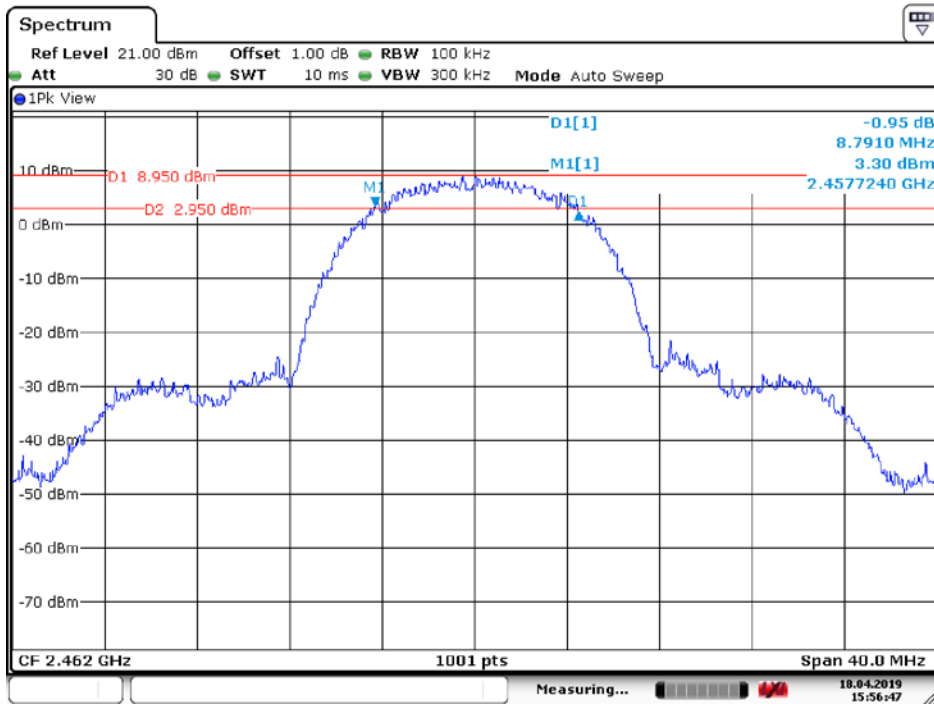
Date: 18.APR.2019 15:56:06



**4.5.2.1.3 802.11B\_ Highest Channel**



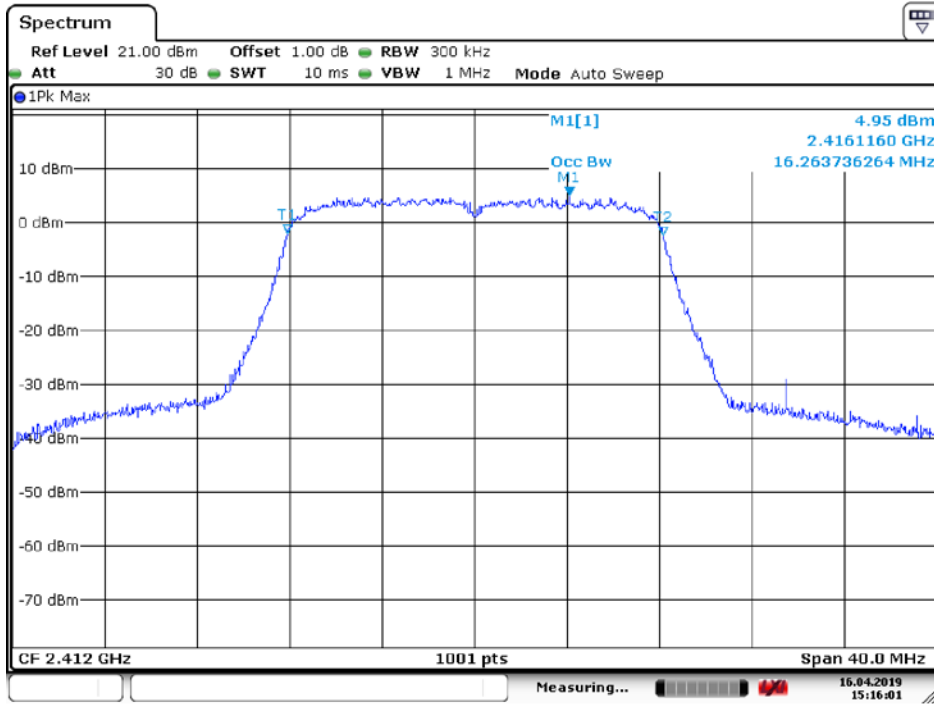
Date: 18.APR.2019 15:57:21



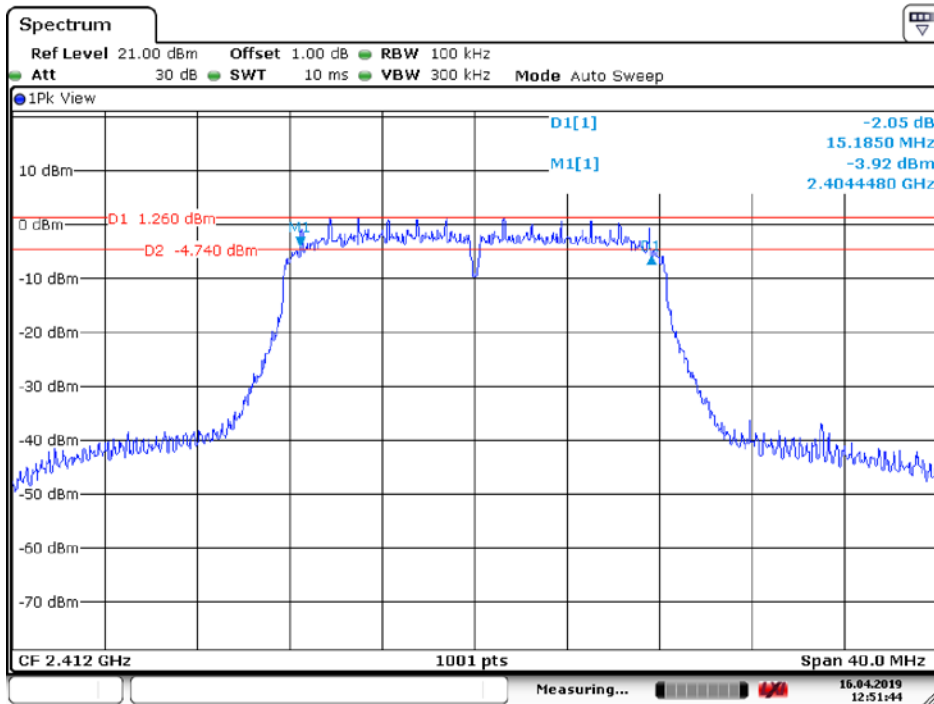
Date: 18.APR.2019 15:56:47



**4.5.2.1.4 802.11G\_Lowest Channel**



Date: 16.APR.2019 15:16:01

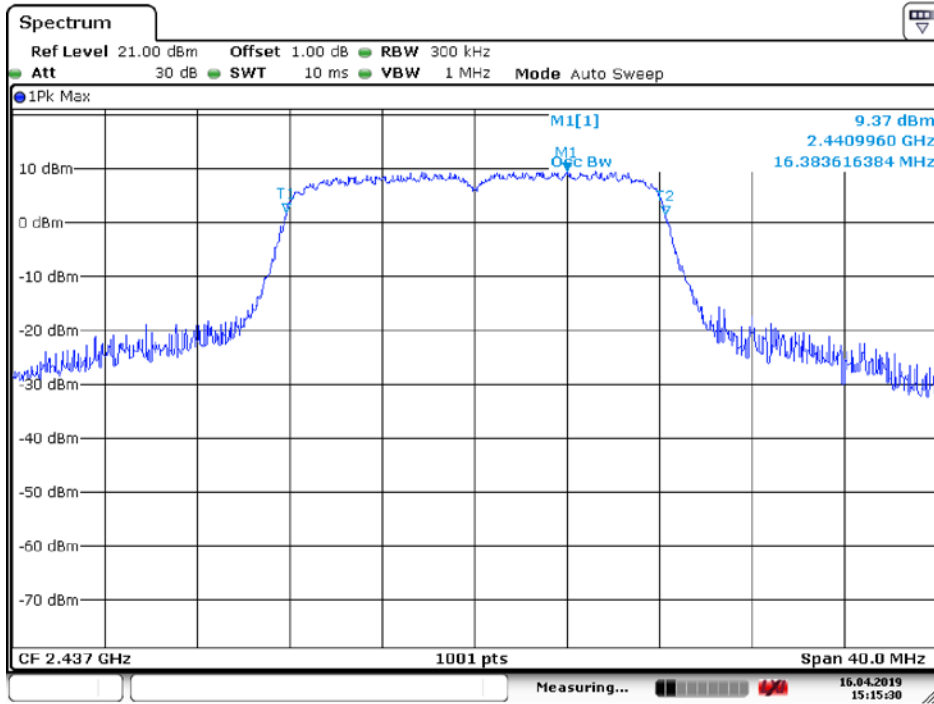


Date: 16.APR.2019 12:51:44

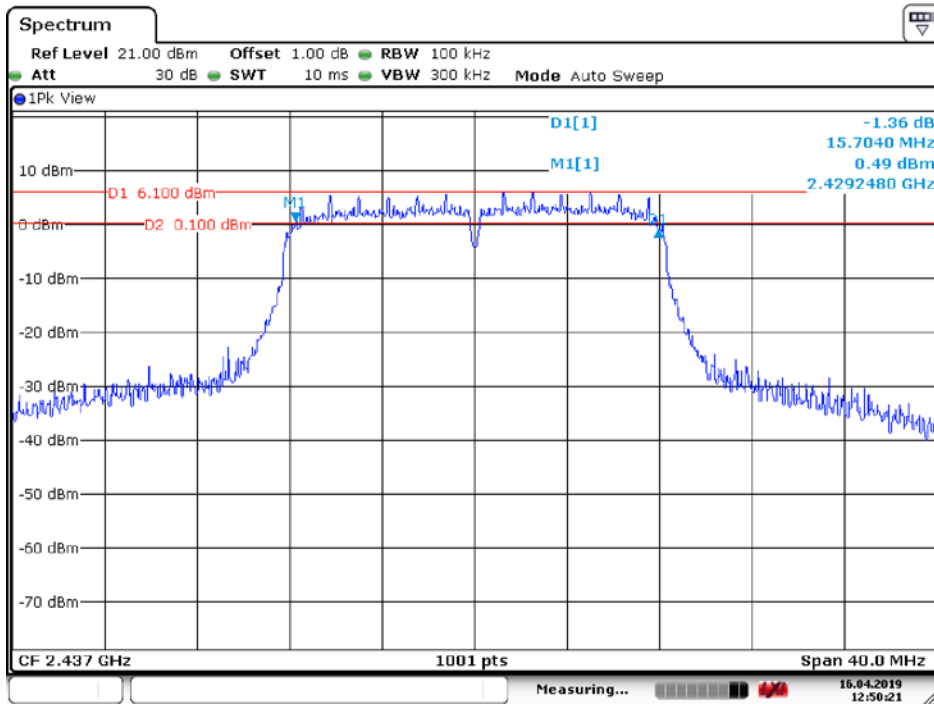




**4.5.2.1.5 802.11G\_ Middle Channel**



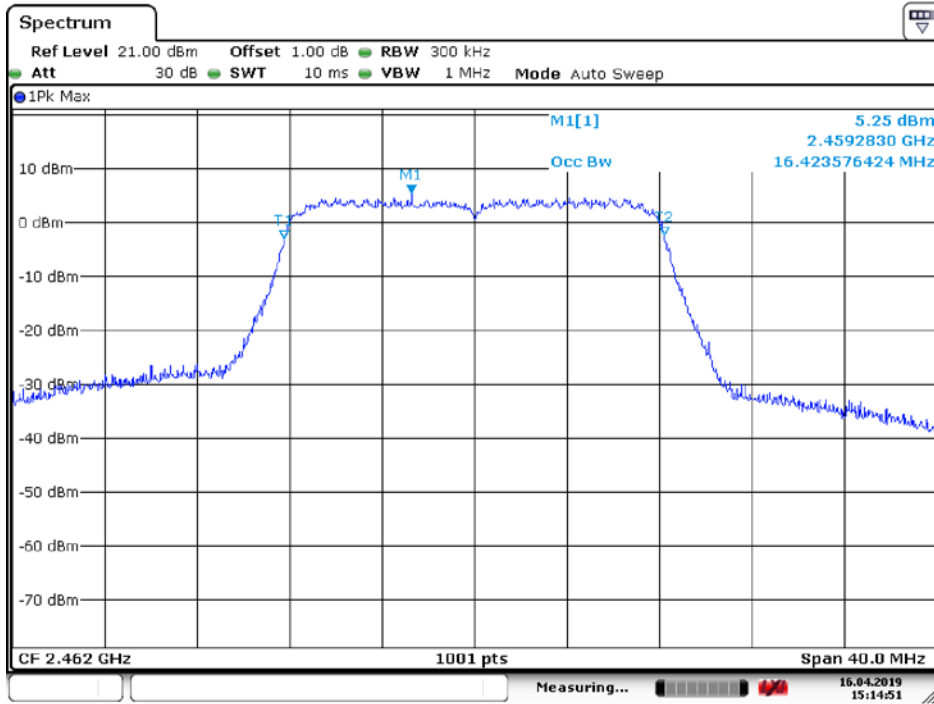
Date: 16.APR.2019 15:15:30



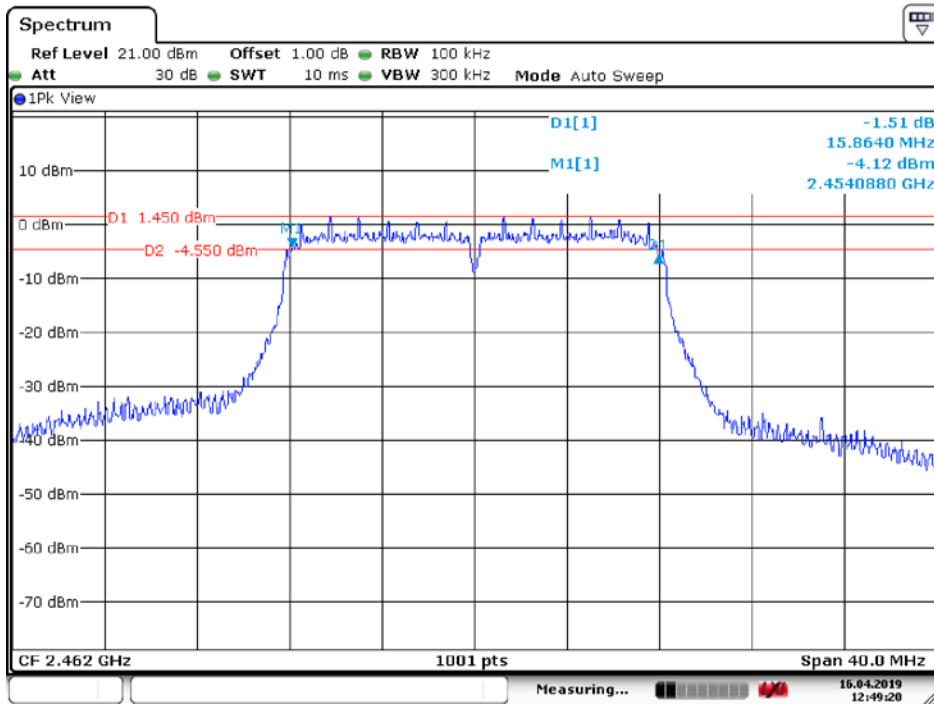
Date: 16.APR.2019 12:50:21



**4.5.2.1.6 802.11G\_Highest Channel**



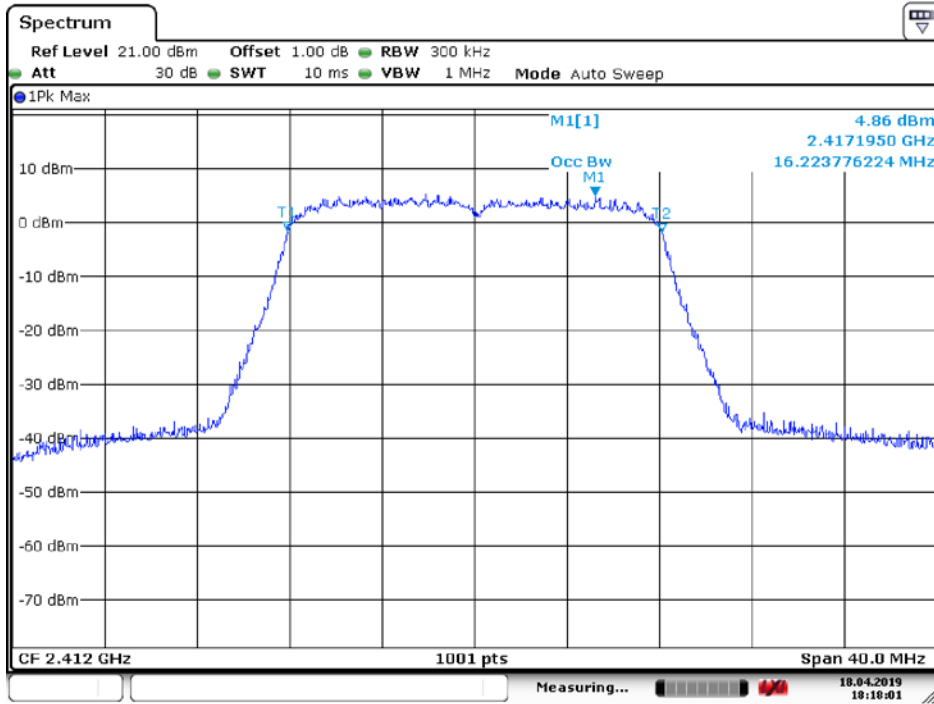
Date: 16.APR.2019 15:14:51



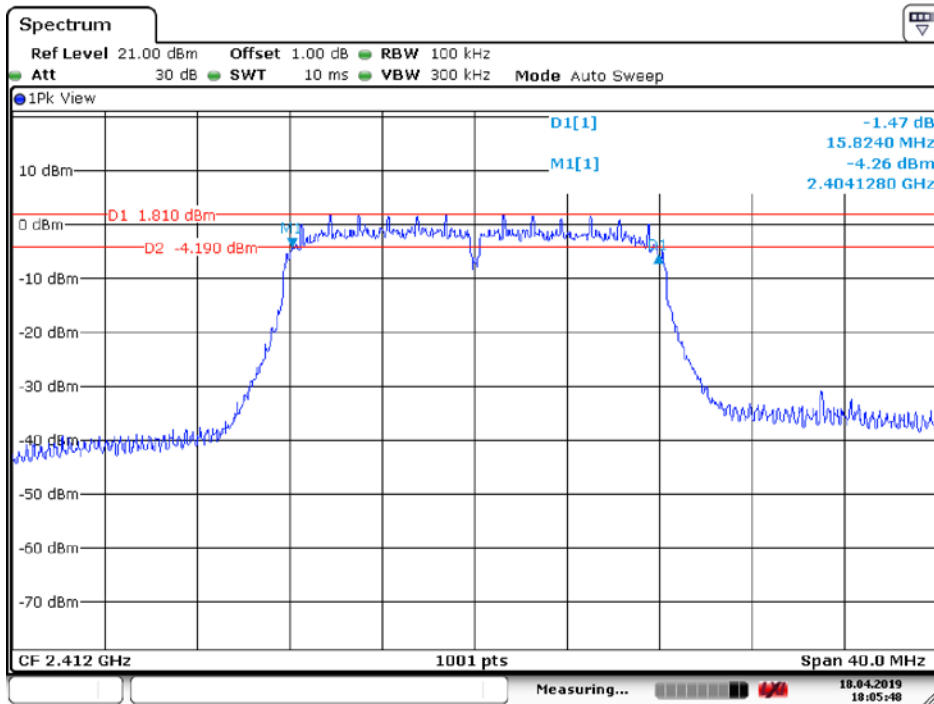
Date: 16.APR.2019 12:49:20



**4.5.2.1.7 802.11G\_CDD\_Lowest Channel**



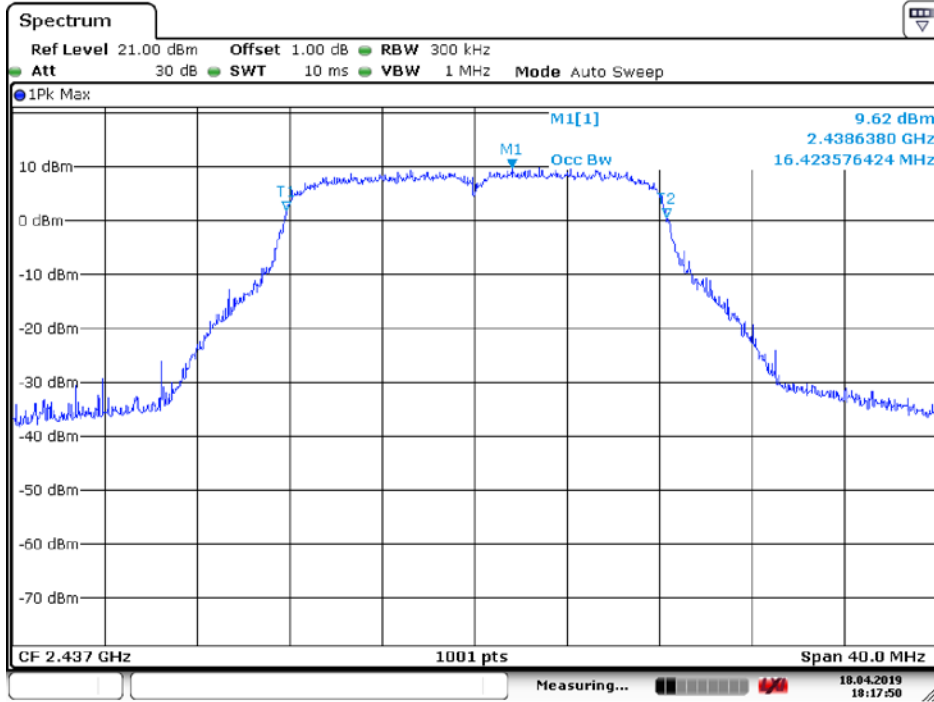
Date: 18.APR.2019 18:18:02



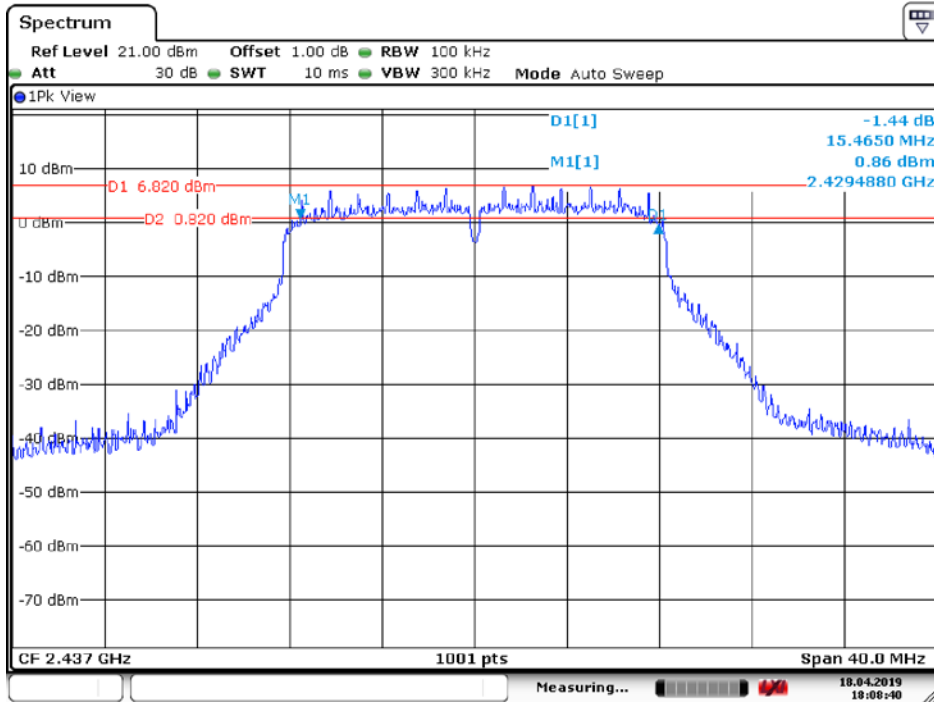
Date: 18.APR.2019 18:05:46



**4.5.2.1.8 802.11G\_CDD\_Middle Channel**



Date: 18.APR.2019 18:17:51

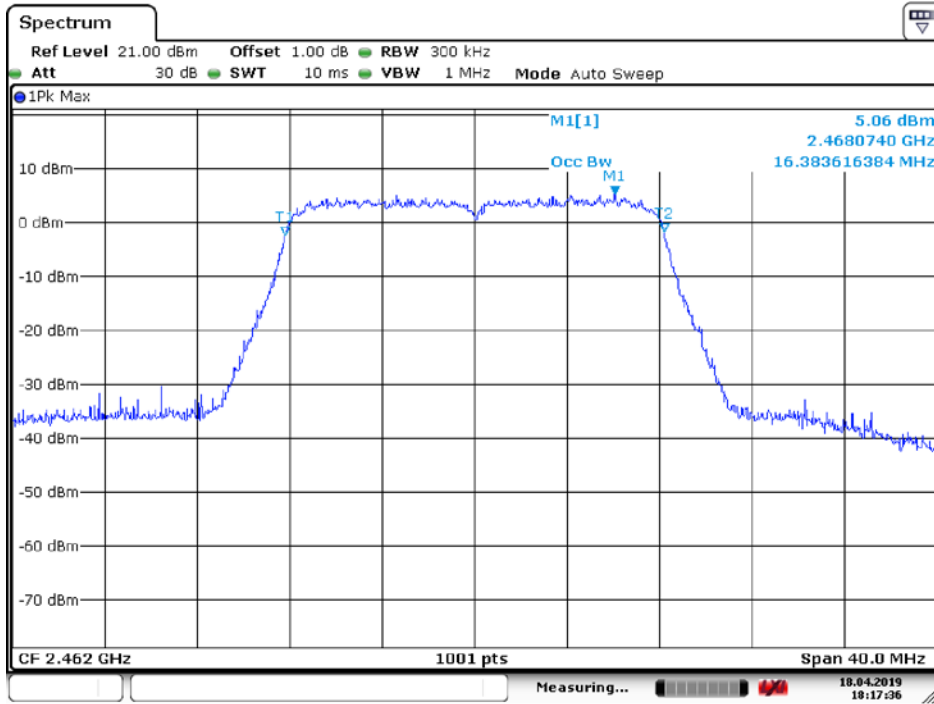


Date: 18.APR.2019 18:08:40

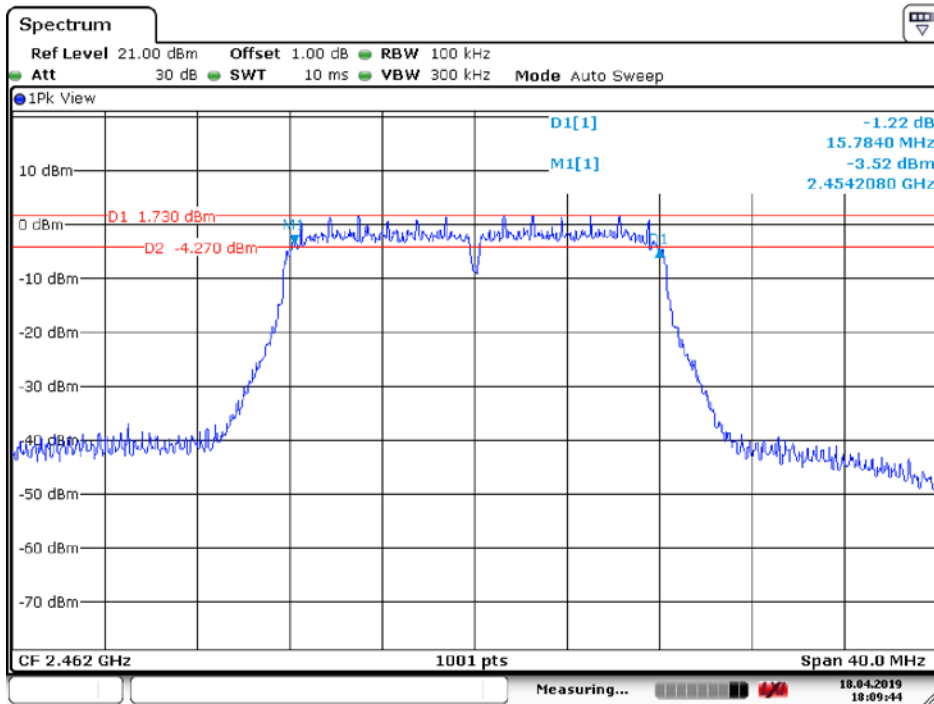




**4.5.2.1.9 802.11G\_CDD\_Highest Channel**



Date: 18.APR.2019 18:17:37

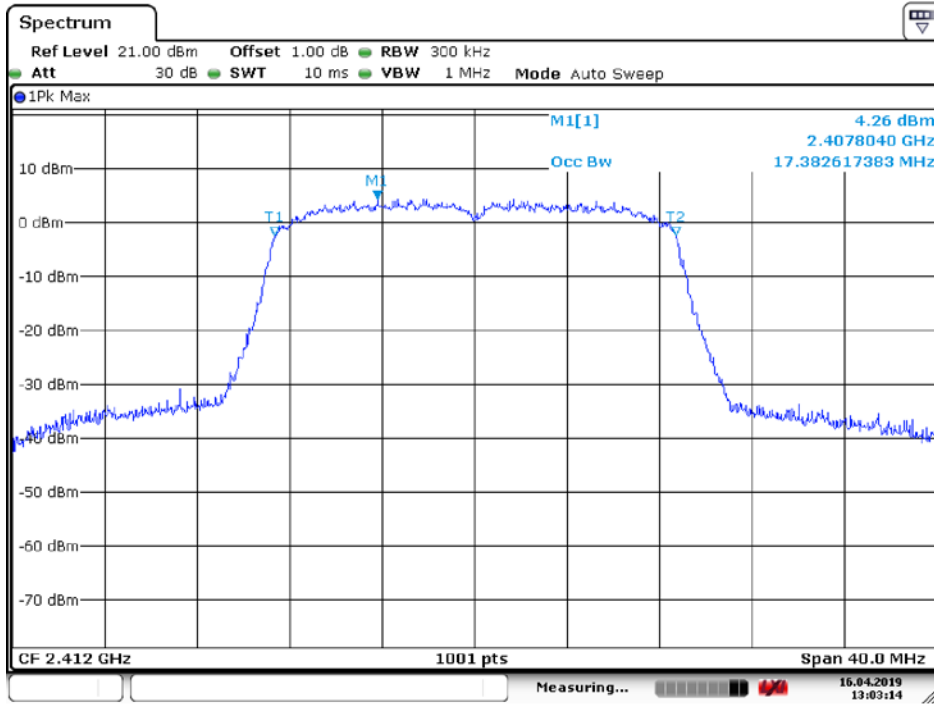


Date: 18.APR.2019 18:09:44

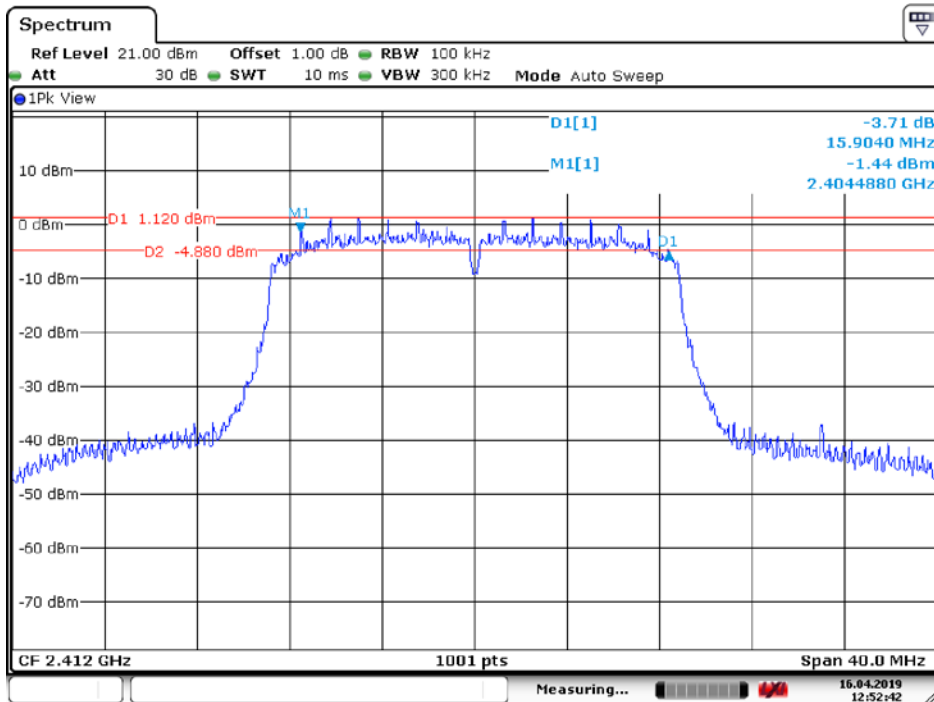




**4.5.2.1.10 802.11N20\_Lowest Channel**



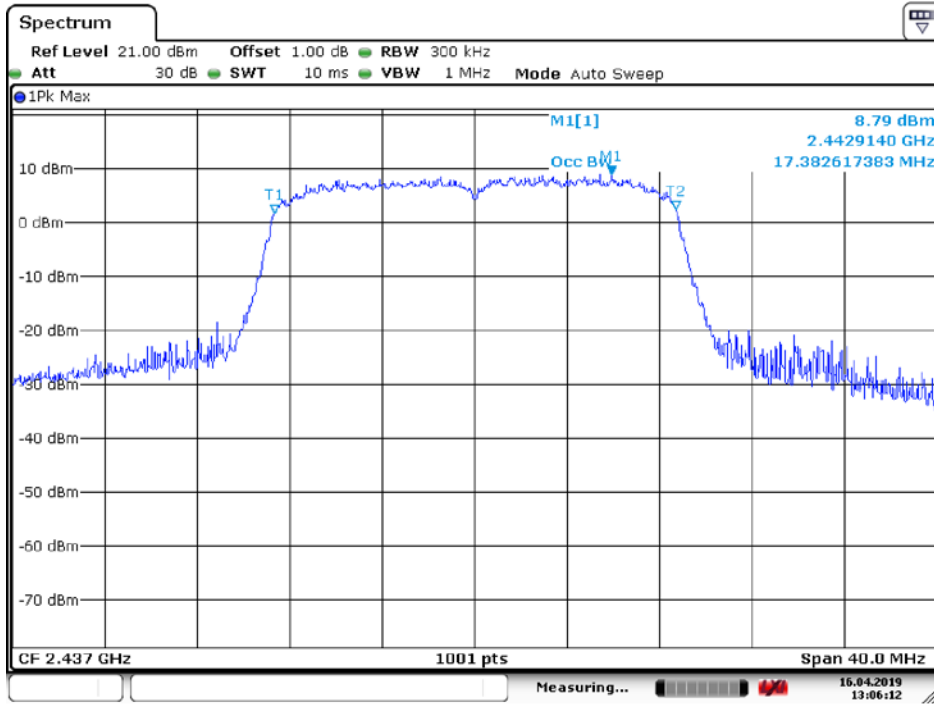
Date: 16.APR.2019 13:03:14



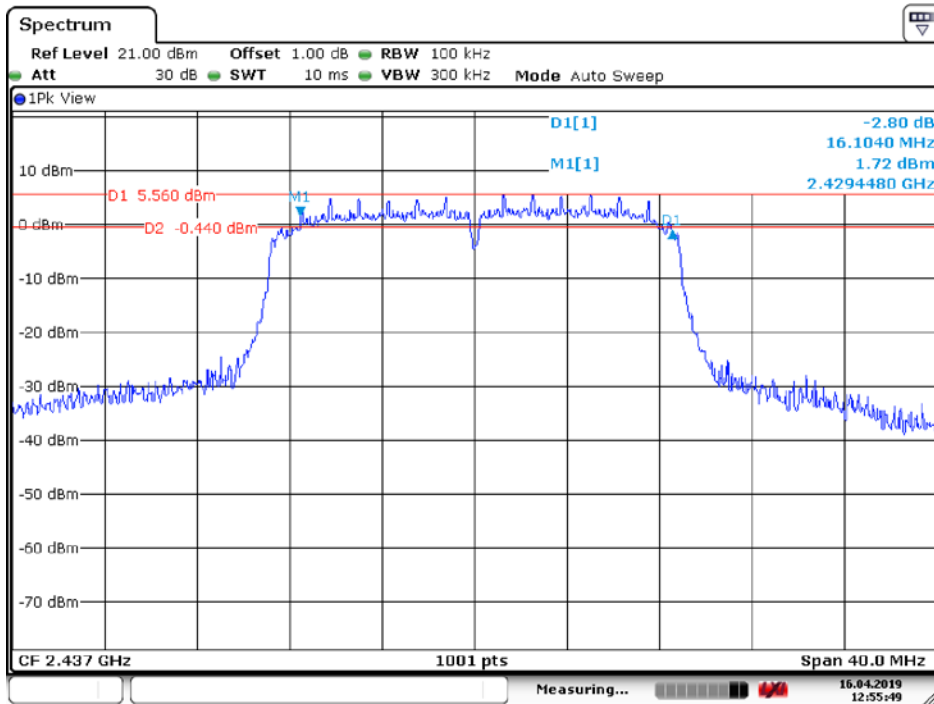
Date: 16.APR.2019 12:52:42



**4.5.2.1.11 802.11 N20\_ Middle Channel**



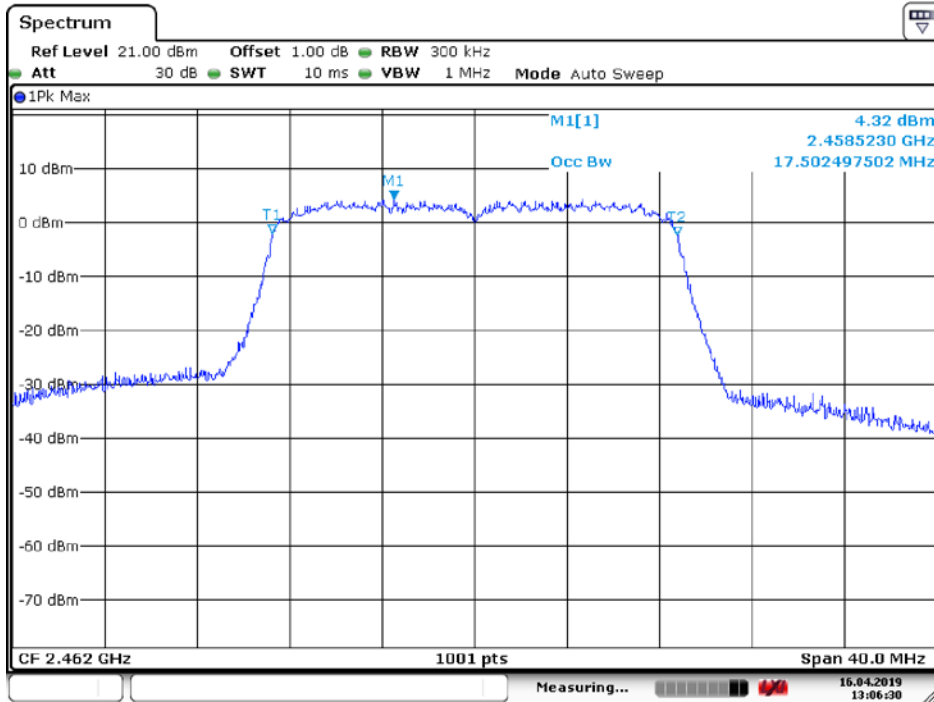
Date: 16.APR.2019 13:06:13



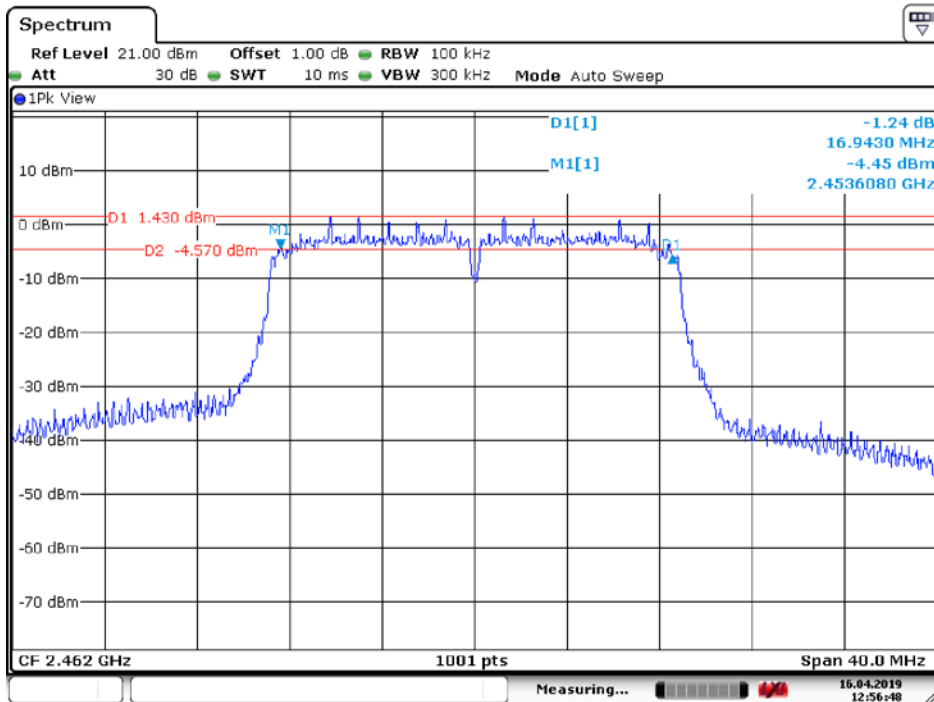
Date: 16.APR.2019 12:55:49



**4.5.2.1.12 802.11 N20\_ Highest Channel**



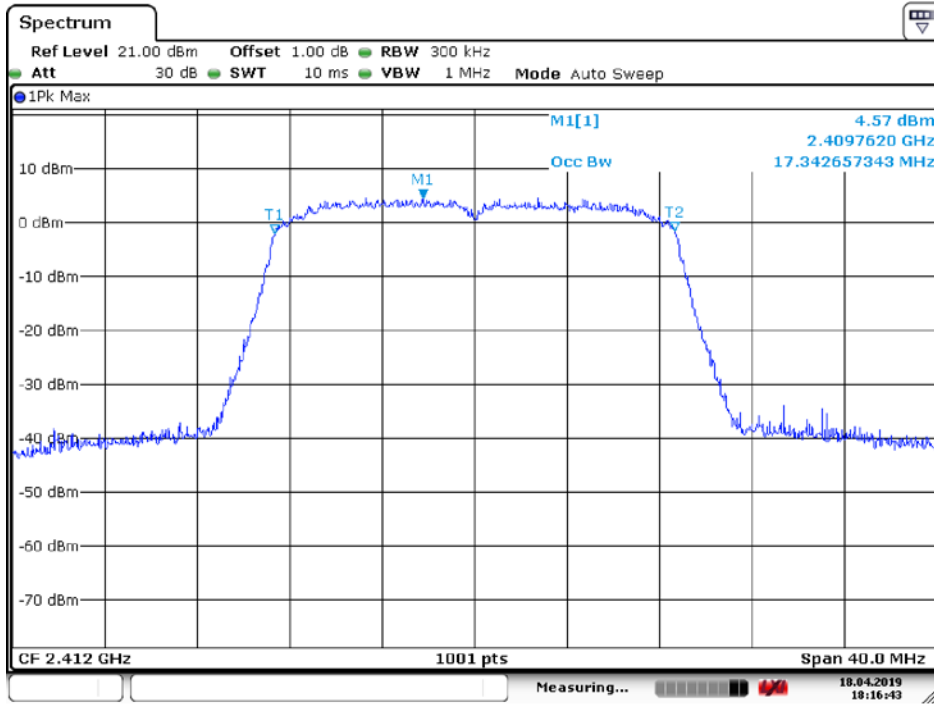
Date: 16.APR.2019 13:06:30



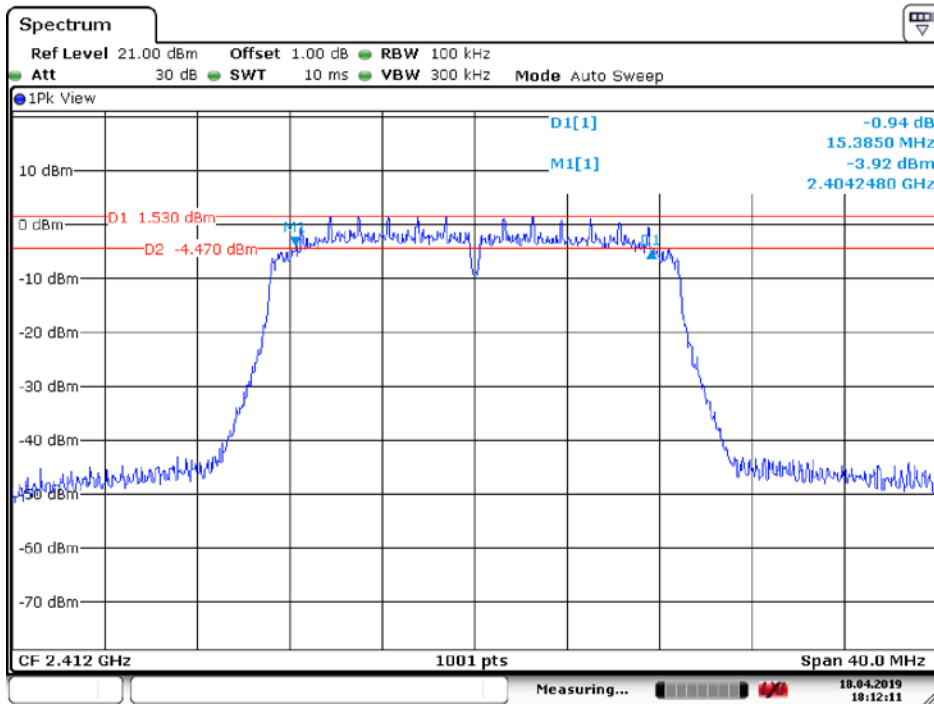
Date: 16.APR.2019 12:56:49



**4.5.2.1.13 802.11N20\_MIMO\_Lowest Channel**



Date: 18.APR.2019 18:16:44



Date: 18.APR.2019 18:12:11

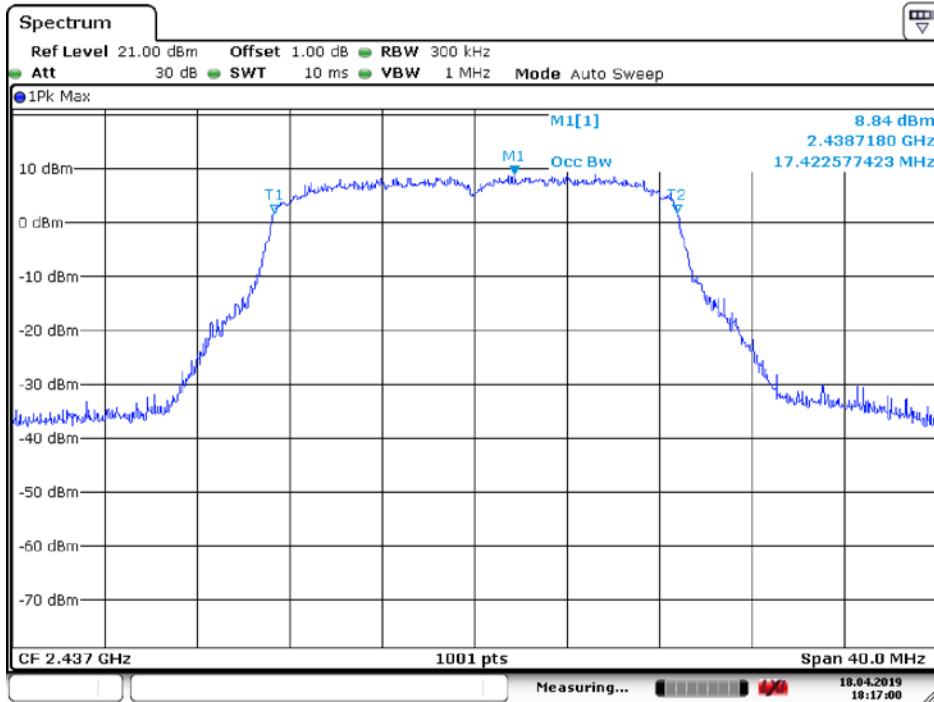


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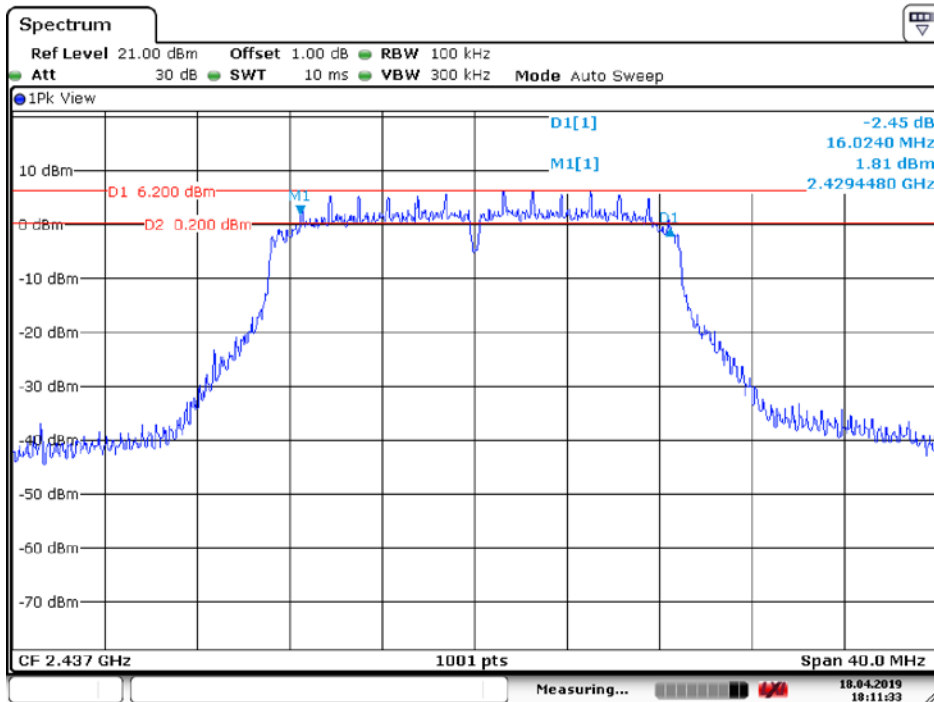
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**4.5.2.1.14 802.11 N20\_ MIMO\_ Middle Channel**



Date: 18.APR.2019 18:17:01

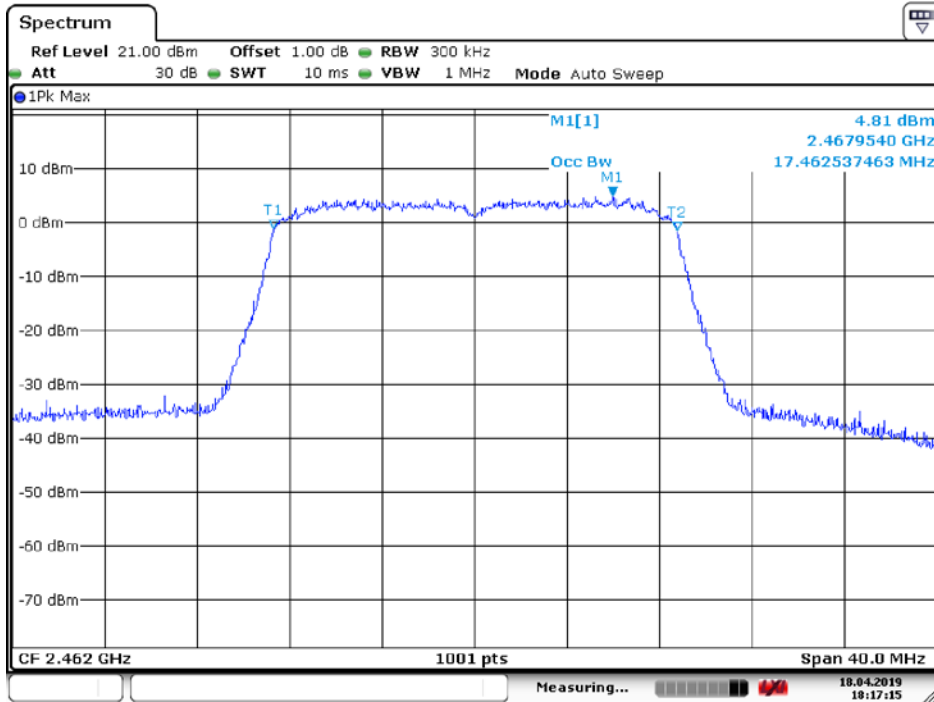


Date: 18.APR.2019 18:11:33

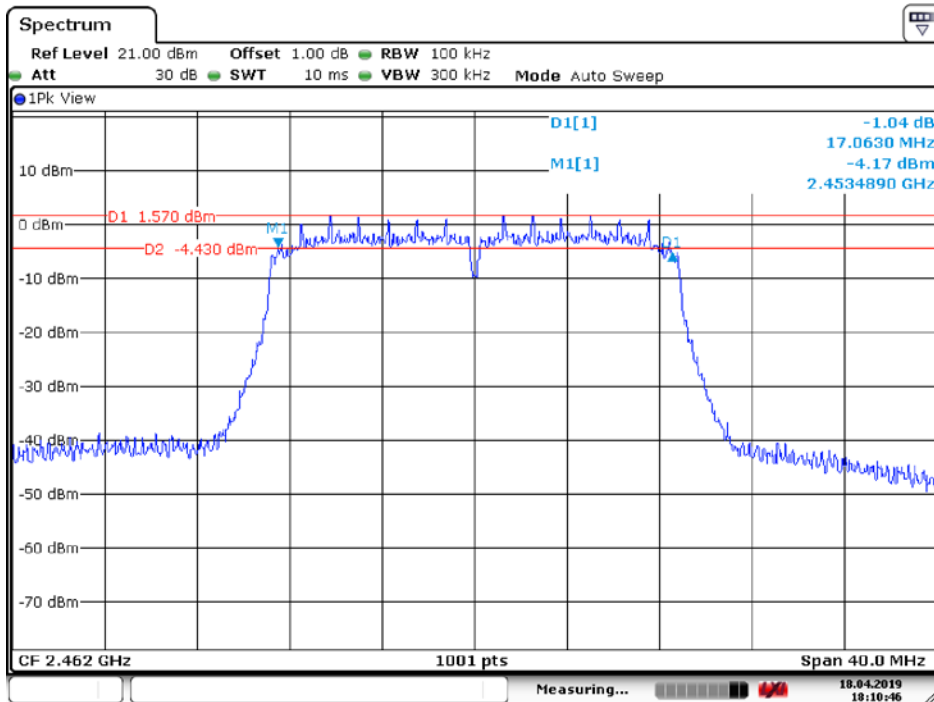




**4.5.2.1.15 802.11 N20\_ MIMO\_Highest Channel**



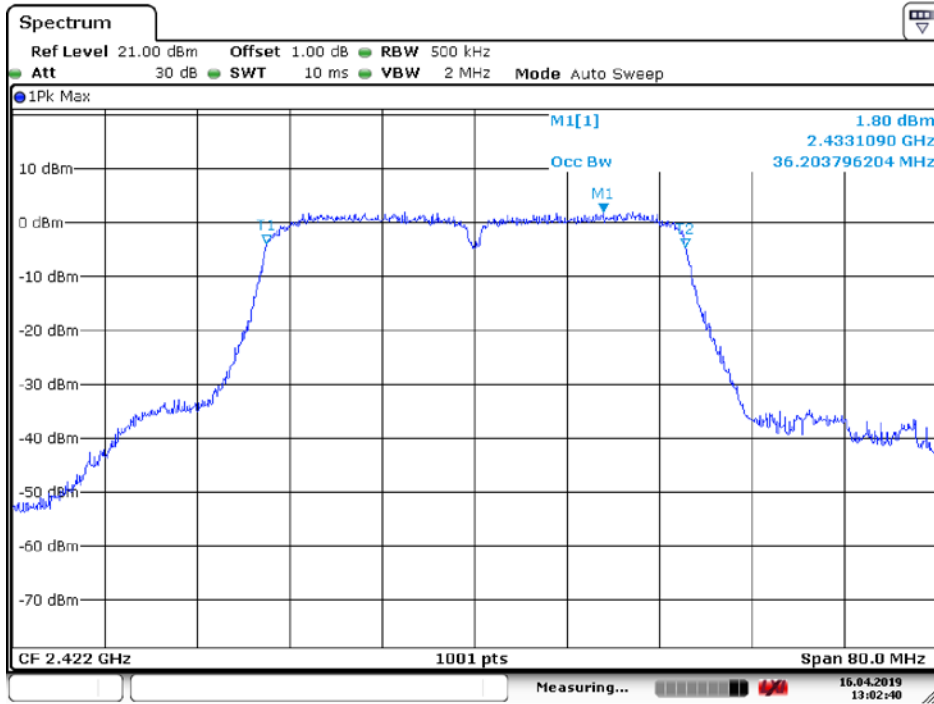
Date: 18.APR.2019 18:17:15



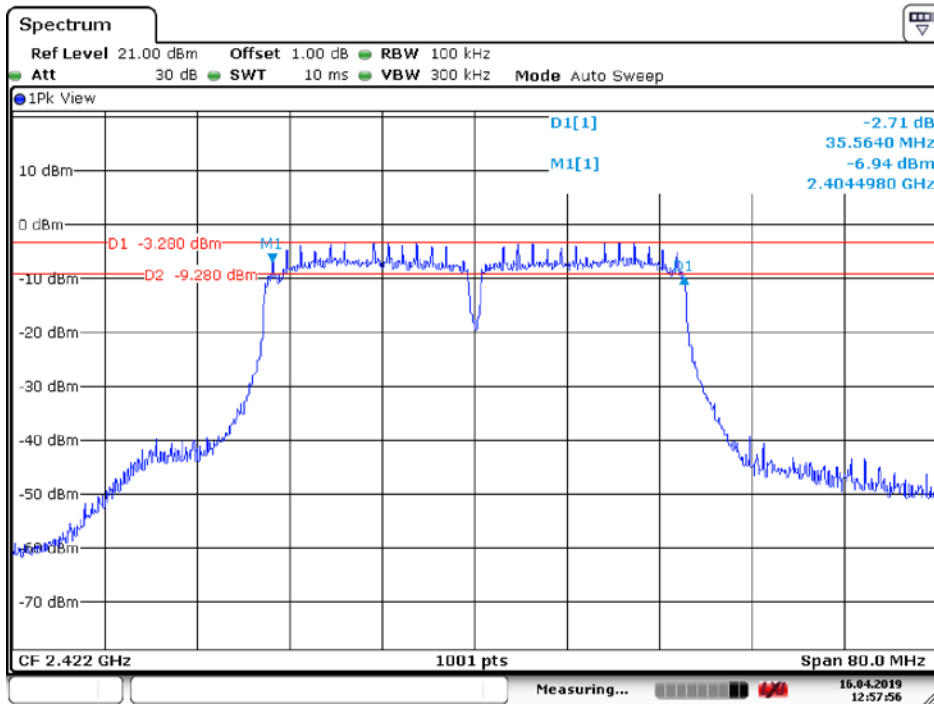
Date: 18.APR.2019 18:10:47



**4.5.2.1.16 802.11N40\_Lowest Channel**



Date: 16.APR.2019 13:02:41



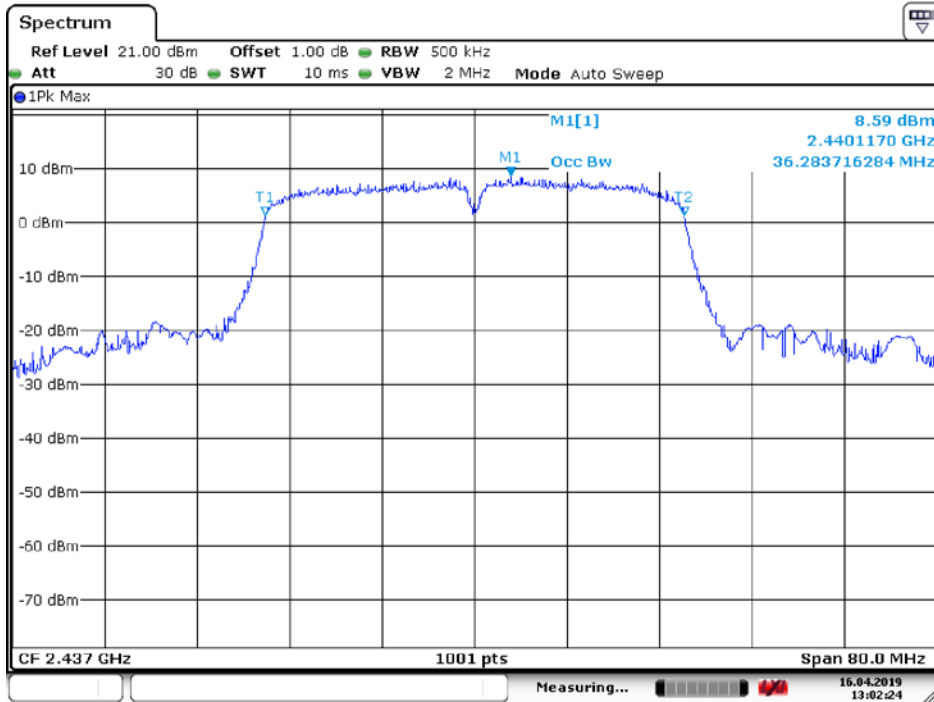
Date: 16.APR.2019 12:57:57



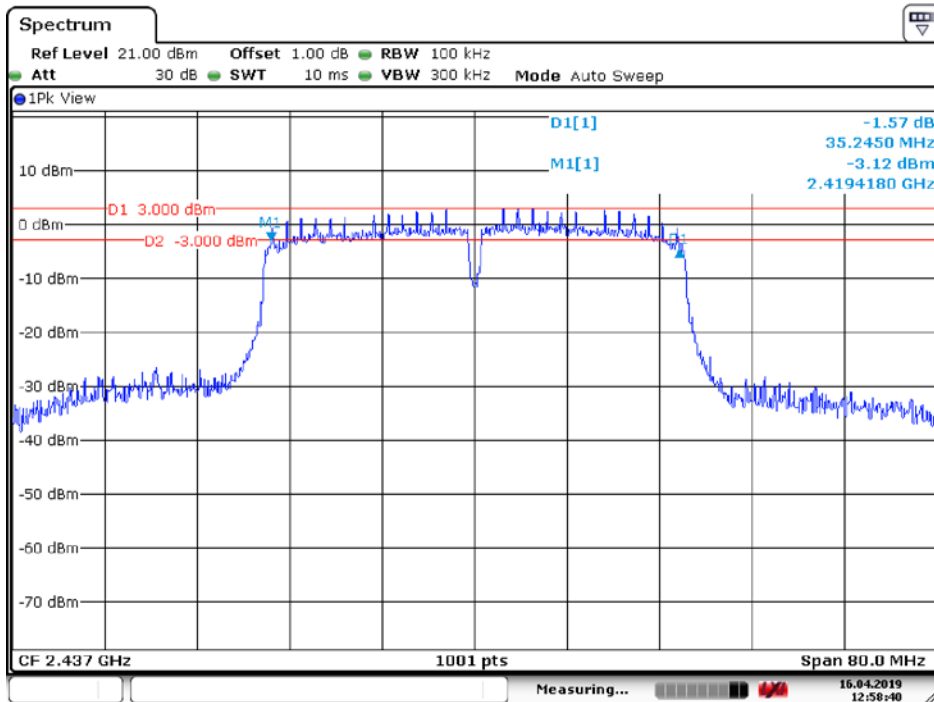
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**4.5.2.1.17 802.11 N40\_ Middle Channel**



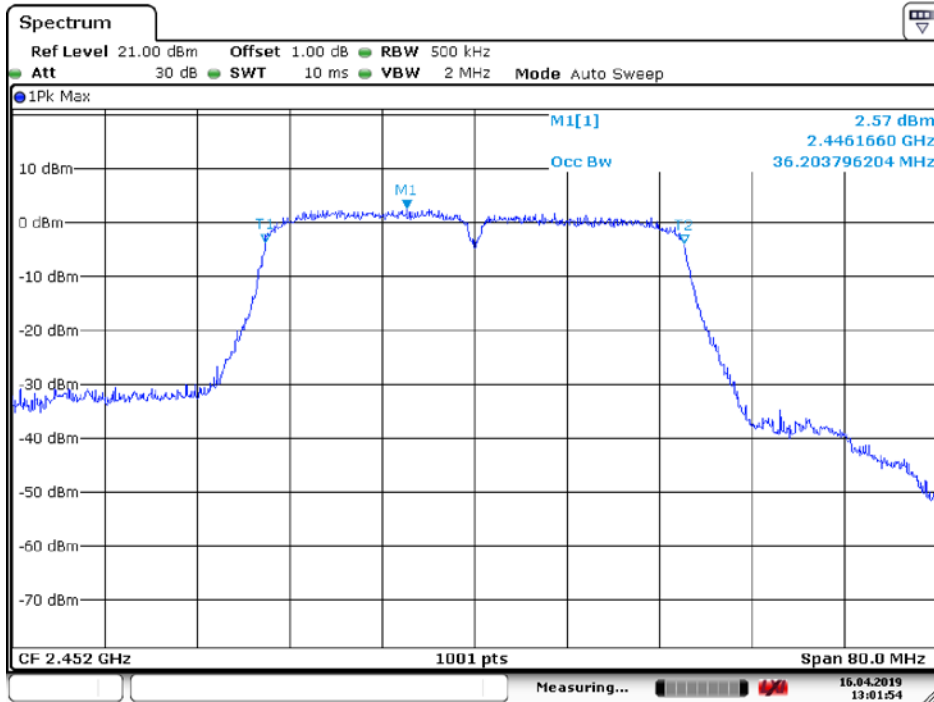
Date: 16.APR.2019 13:02:24



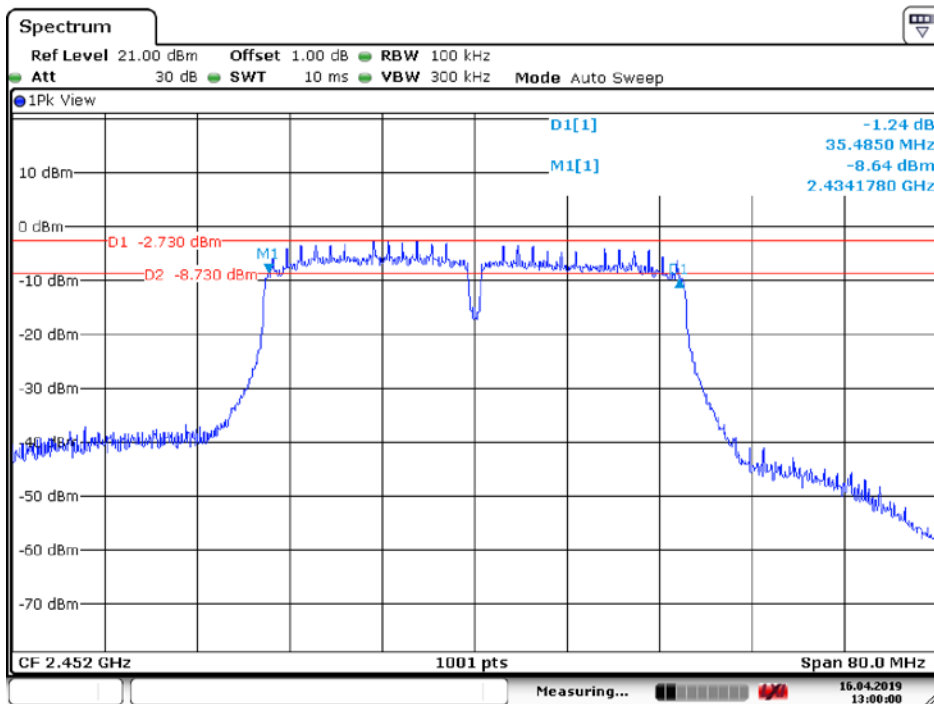
Date: 16.APR.2019 12:58:40



**4.5.2.1.18 802.11 N40\_ Highest Channel**



Date: 16.APR.2019 13:01:54



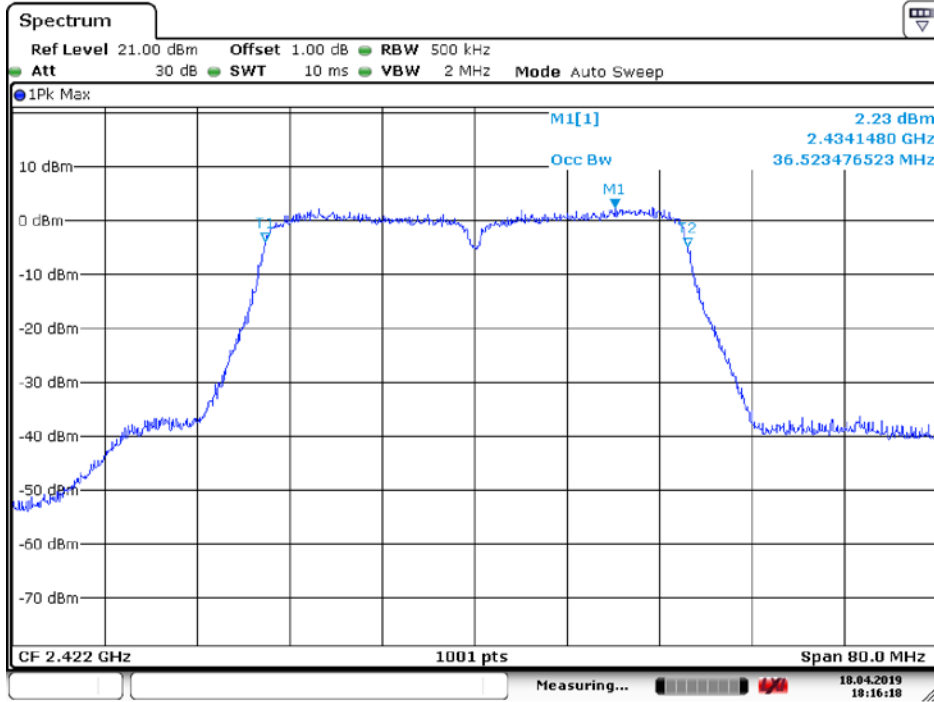
Date: 16.APR.2019 13:00:00



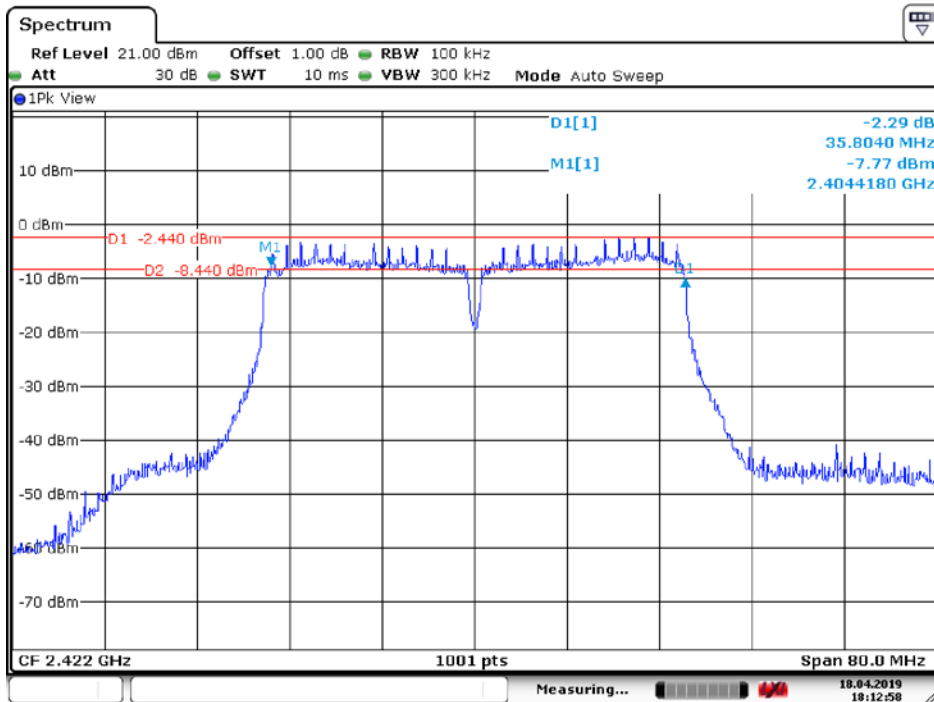
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**4.5.2.1.19 802.11N40\_MIMO\_Lowest Channel**



Date: 18.APR.2019 18:16:18

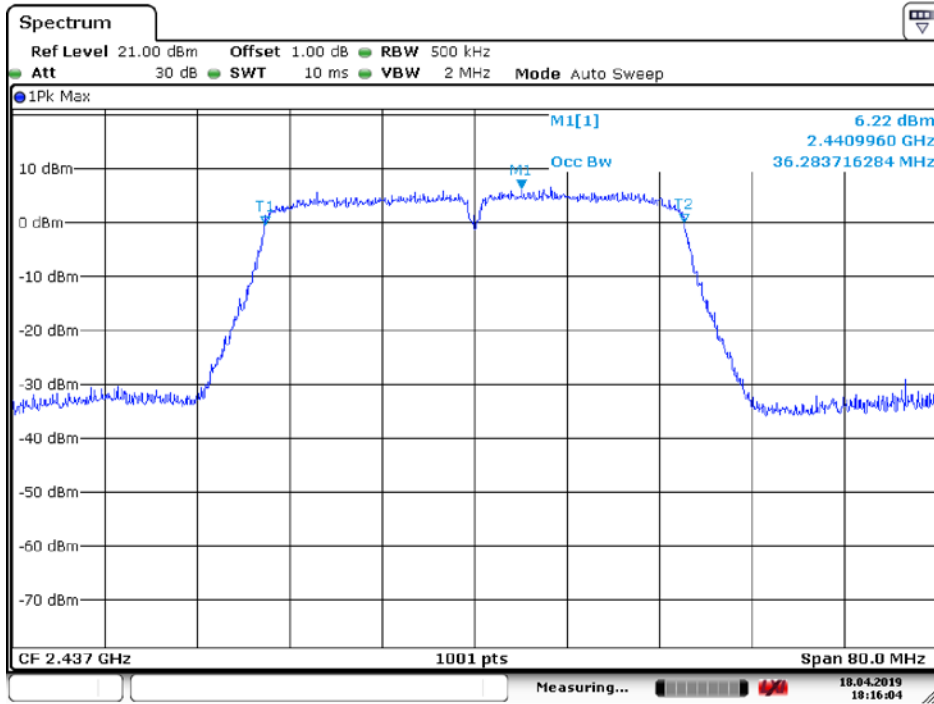


Date: 18.APR.2019 18:12:58

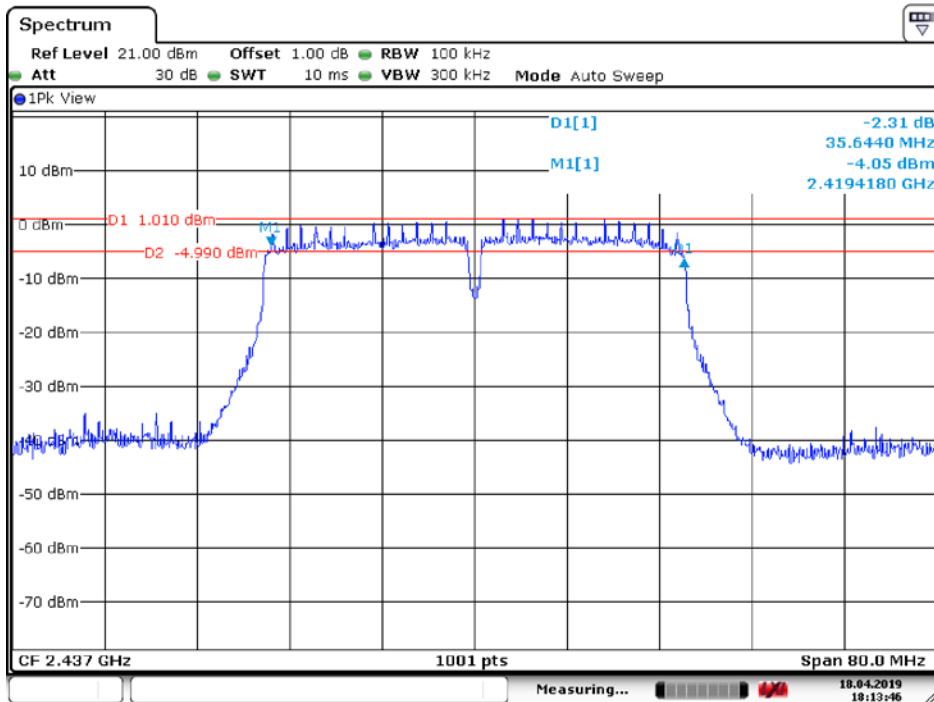




**4.5.2.1.20 802.11 N40\_ MIMO\_ Middle Channel**



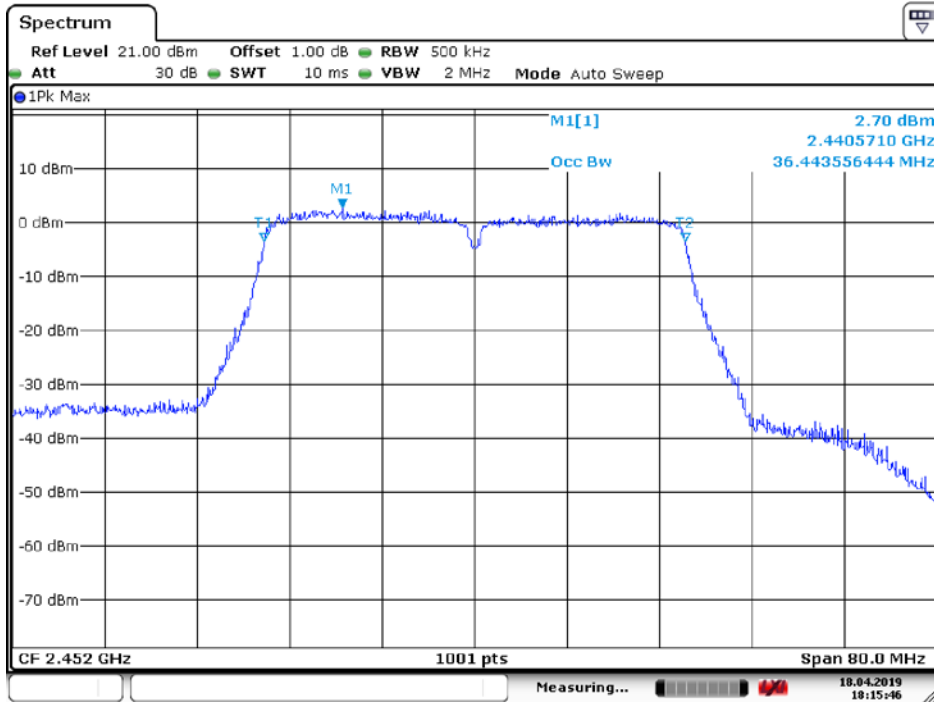
Date: 18.APR.2019 18:16:04



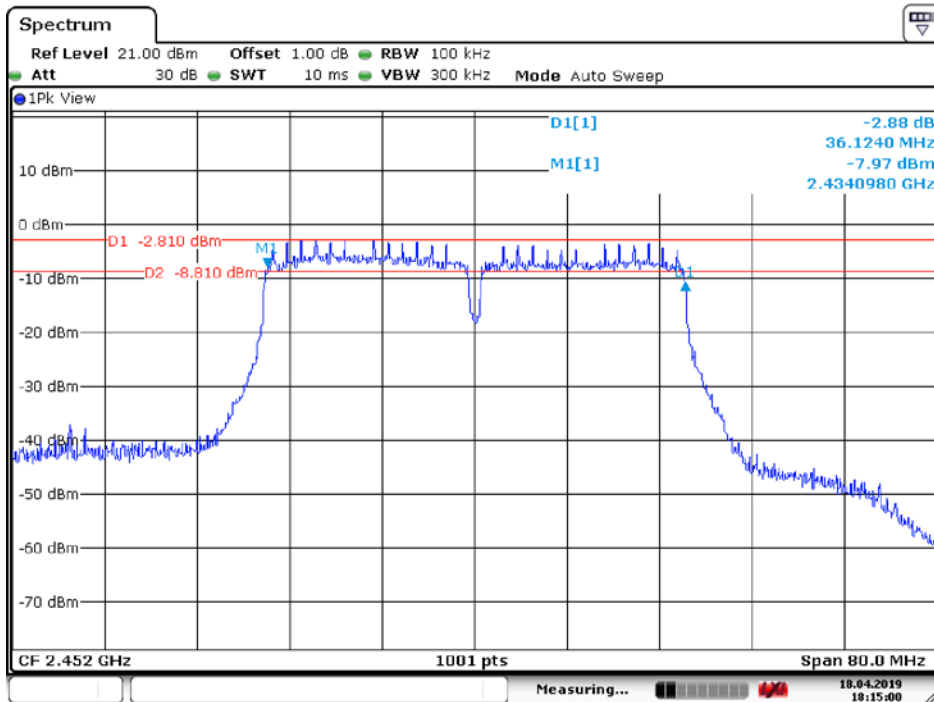
Date: 18.APR.2019 18:13:47



**4.5.2.1.21 802.11 N40\_MIMO\_ Highest Channel**



Date: 18.APR.2019 18:15:46



Date: 18.APR.2019 18:15:00

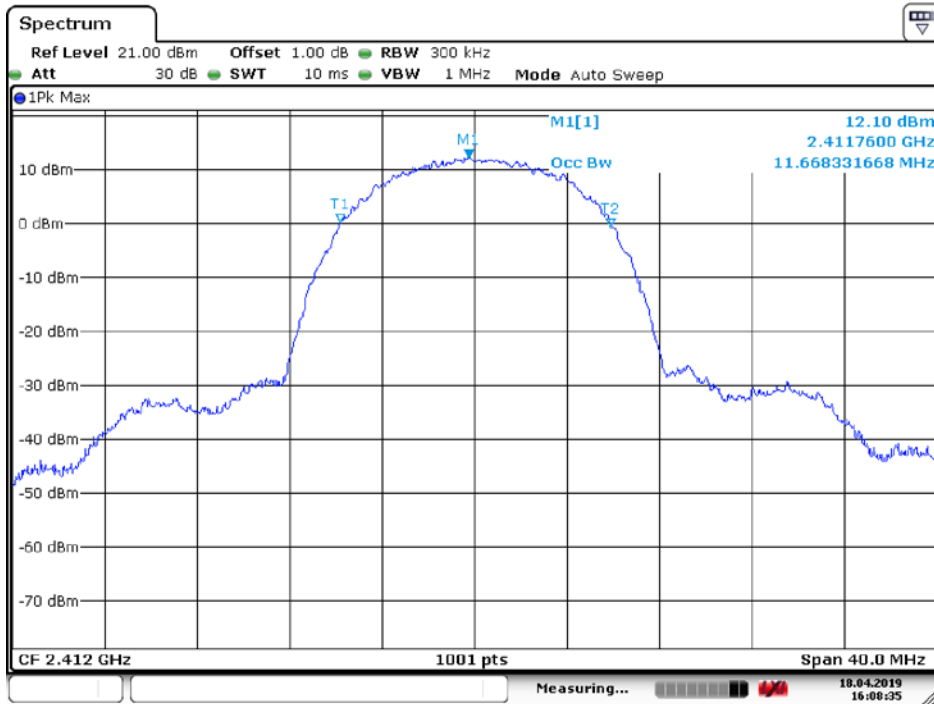


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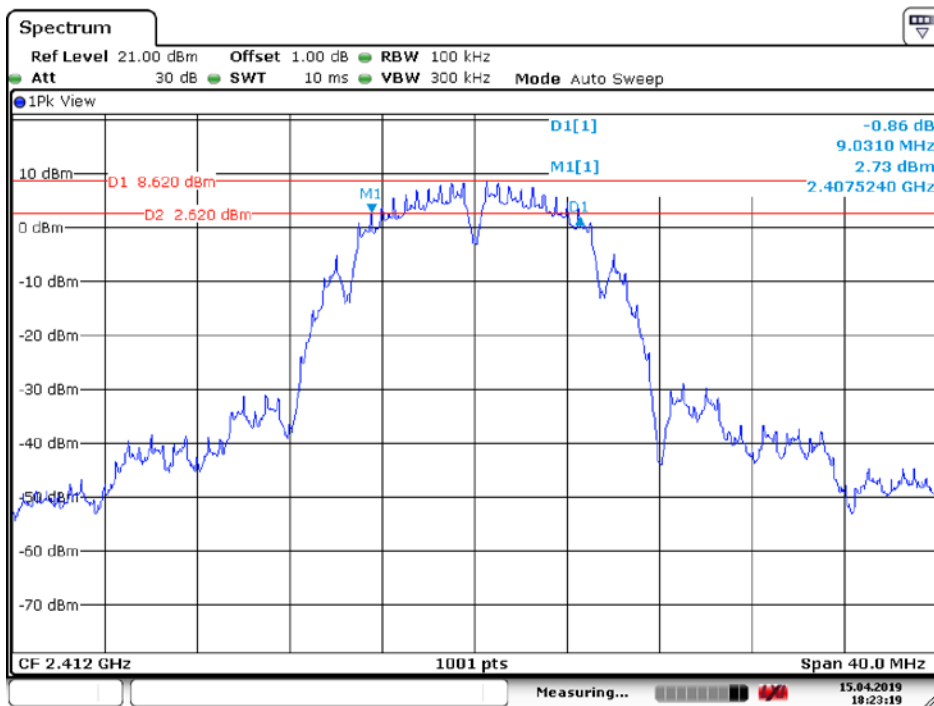
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**4.5.2.2 ANT2**

**4.5.2.2.1 802.11B\_Lowest Channel**



Date: 18.APR.2019 16:08:35

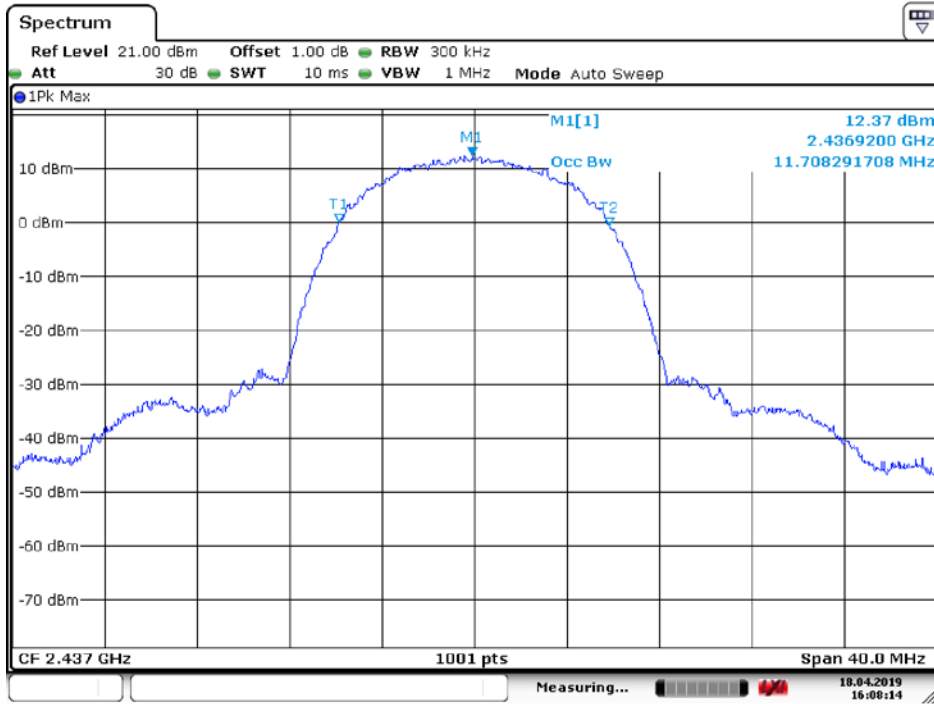


Date: 15.APR.2019 18:23:20

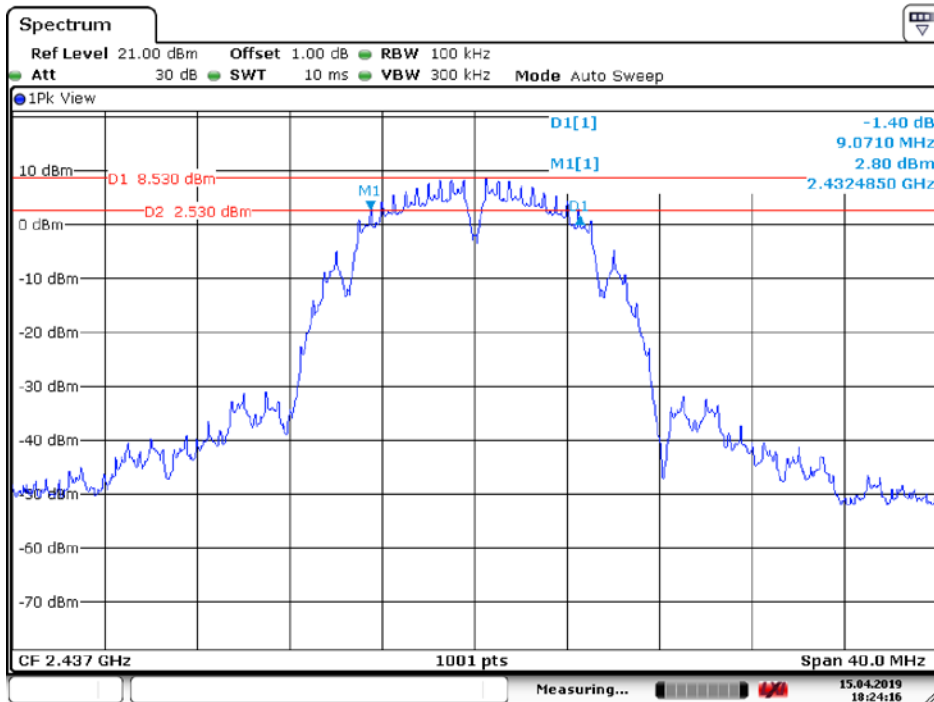


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**4.5.2.2.2 802.11B\_ Middle Channel**



Date: 18.APR.2019 16:08:15



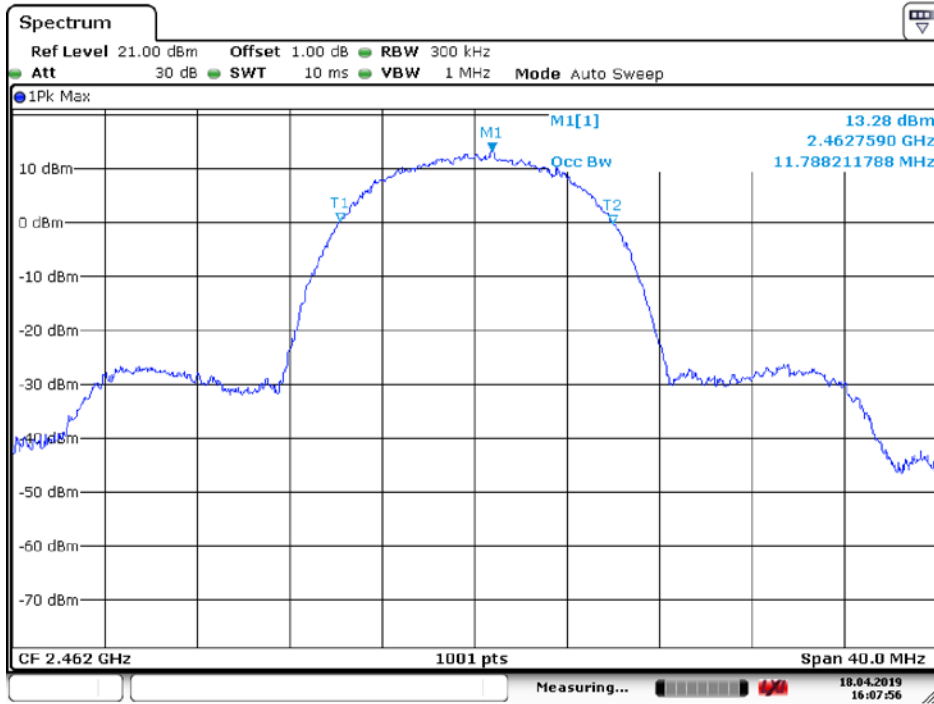
Date: 15.APR.2019 18:24:17



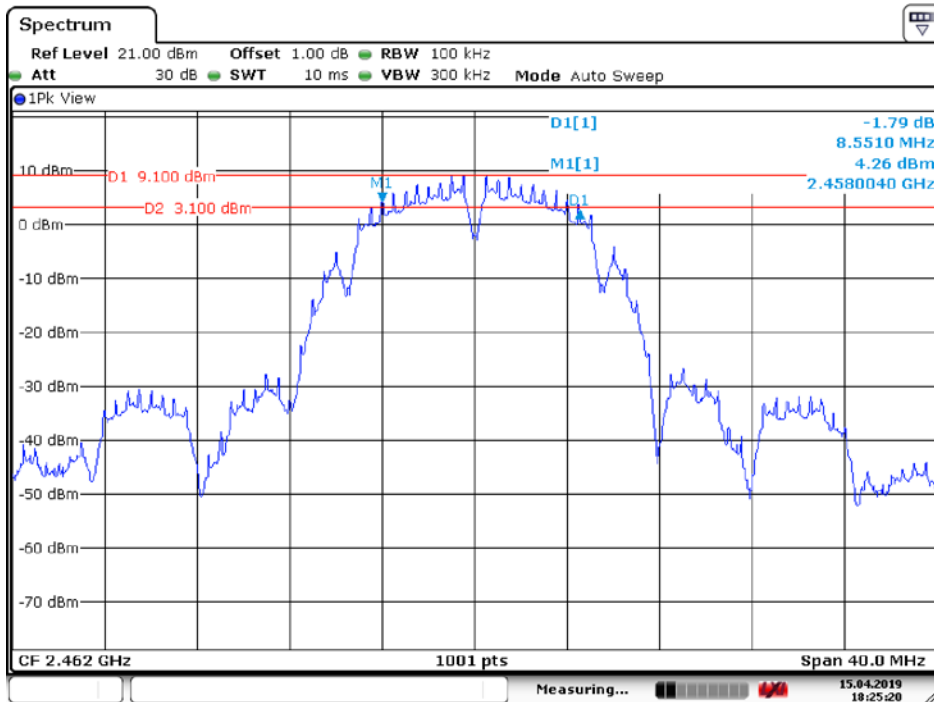
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**4.5.2.2.3 802.11B\_ Highest Channel**



Date: 18.APR.2019 16:07:57

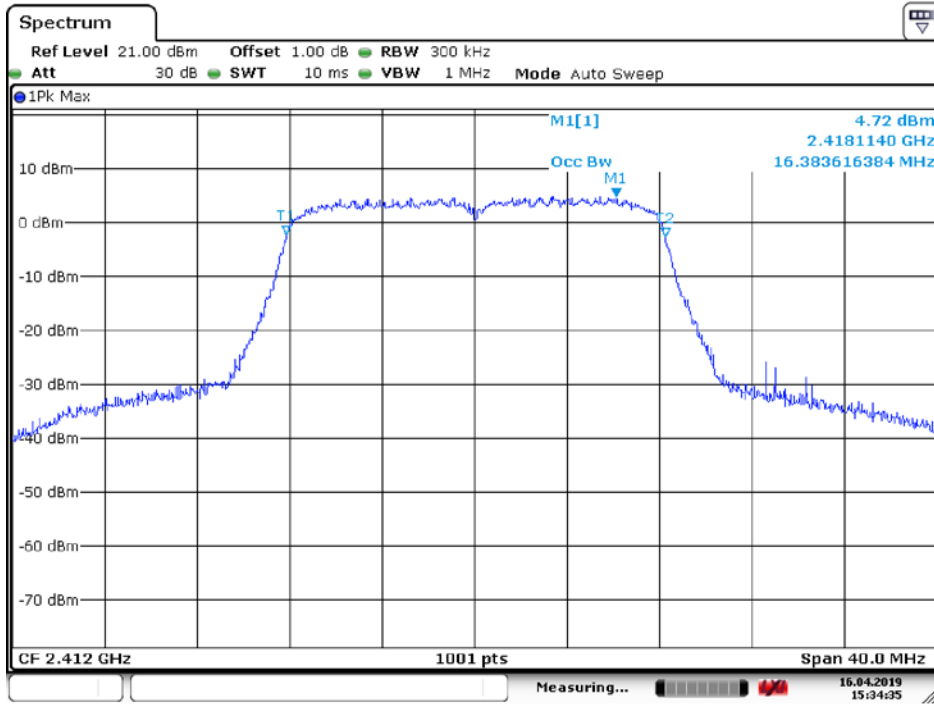


Date: 15.APR.2019 18:25:20

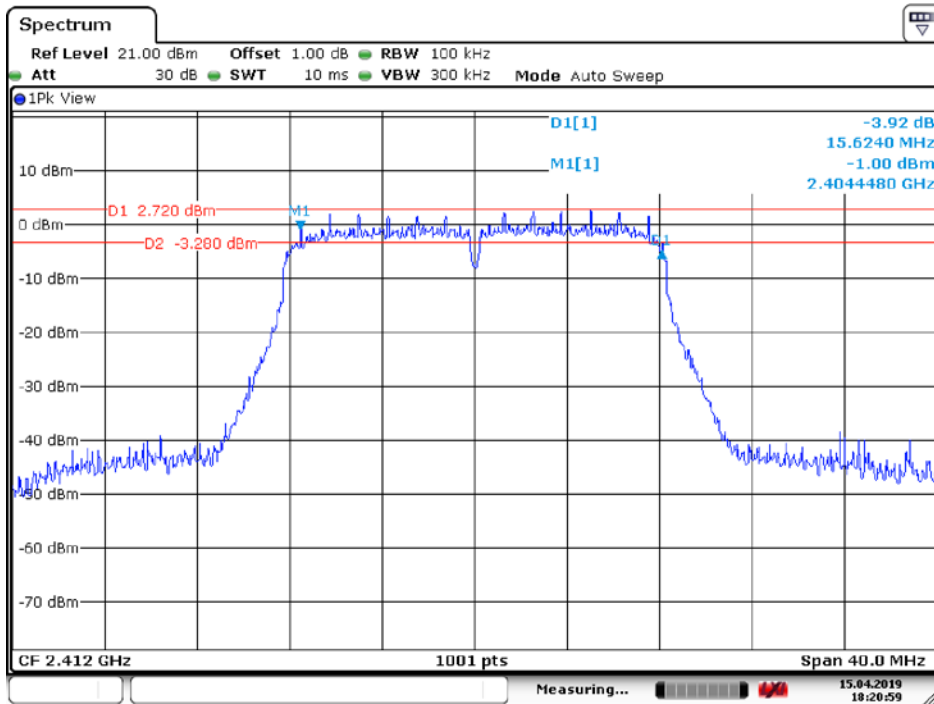




**4.5.2.2.4 802.11G\_Lowest Channel**



Date: 16.APR.2019 15:34:36



Date: 15.APR.2019 18:20:59

