

FCC - TEST REPORT

Report Number : **68.930.16.038.01** Date of Issue: **March 16, 2017**

Model : **Acclarix AX8, Acclarix AX8 VET**

Product Type : **Diagnostic Ultrasound System**

Applicant : **EDAN INSTRUMENTS,INC.**

Address : **15# Jinhui Road, Jinsha Community, Kengzi Sub-District, Pingshan**
District, 518122 Shenzhen, P.R.China

Production Facility : **EDAN INSTRUMENTS,INC.**

Address : **15# Jinhui Road, Jinsha Community, Kengzi Sub-District, Pingshan**
District, 518122 Shenzhen, P.R.China

Test Result : **Positive** **Negative**

Total pages including Appendices : **61**

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 502708

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

3 Description of the Equipment Under Test

Product:	Diagnostic Ultrasound System
Model no.:	Acclarix AX8, Acclarix AX8 VET
FCC ID:	SMQAX8EDAN
Brand Name:	EDAN
Options and accessories:	NIL
Rating:	14.4Vdc 6150mAh supplied by Rechargeable Li-ion Battery Charged by and external adapter
Adapter Information	Model: MENB1150A1949F02 Input: 100-240Vac, 50/60Hz, Max 2.5A Output: 19Vdc, 7.8A
RF Transmission Frequency:	2412-2462MHz
No. of Operated Channel:	11
Modulation:	DSSS, OFDM
Antenna Type:	Internal Antenna
Antenna Gain:	Antenna0: 3.0dBi Antenna1: 3.0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Diagnostic Ultrasound System operated at 2.4GHz.

Remark 1: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Remark 2: As per Client Declaration, Acclarix AX8 and Acclarix AX8 VET are identical. So we use Acclarix AX8 as a representative to perform all testing.



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2016 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 DTS Meas Guidance v03r05 and ANSI C63.10 (2014).

5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	10	Site 1	Pass
§15.247(b)(1)	Conducted peak output power	13	Site 1	Pass
§15.247(a)(2)	20dB bandwidth	---	---	N/A
§15.247(a)(1)	6dB bandwidth and 99% Occupied Bandwidth	15	Site 1	Pass
§15.247(a)(1)	Carrier frequency separation	---	---	N/A
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	N/A
§15.247(a)(1)(iii)	Dwell Time	---	---	N/A
§15.247(e)	Power spectral density	21	Site 1	Pass
§15.247(d)	Spurious RF conducted emissions	22	Site1	Pass
§15.247(d)	Band edge	32	Site 1	Pass
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	36	Site 1	Pass
§15.203	Antenna requirement	See note 2		Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses an internal antenna, which gain is 3.0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: SMQAX8EDAN, complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

- Performed

- **Not** Performed

The Equipment Under Test

- **Fulfills** the general approval requirements.

- **Does not** fulfill the general approval requirements.

Sample Received Date: December 16, 2016

Testing Start Date: December 16, 2016

Testing End Date: January 10, 2017

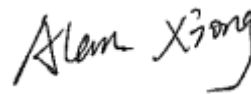
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by:

Prepared by:



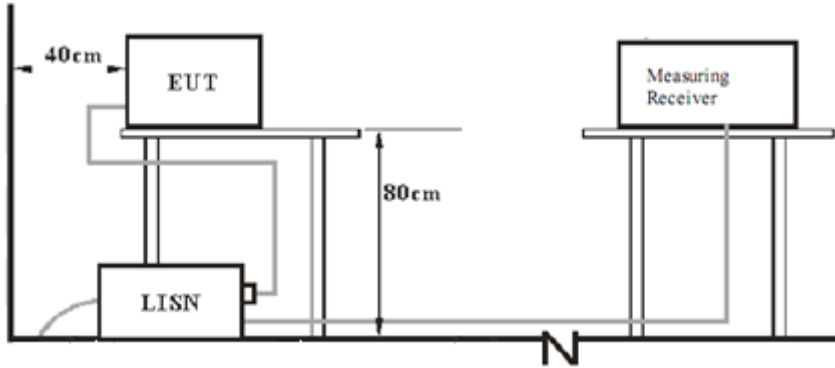
John Zhi
Section Manager



Alan Xiong
Project Engineer

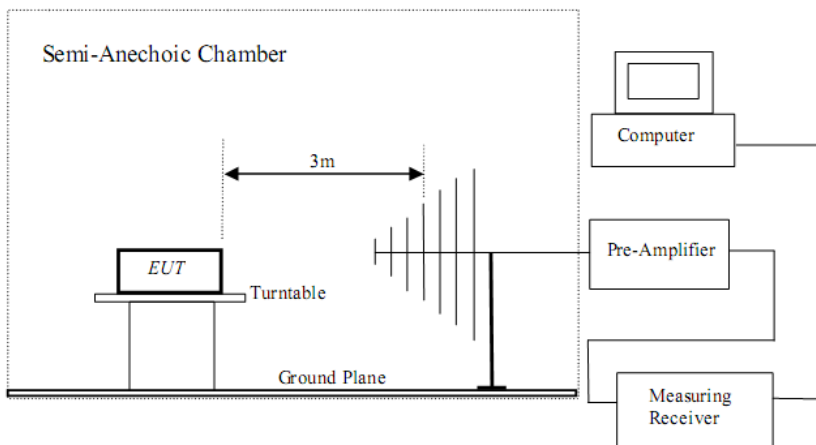
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

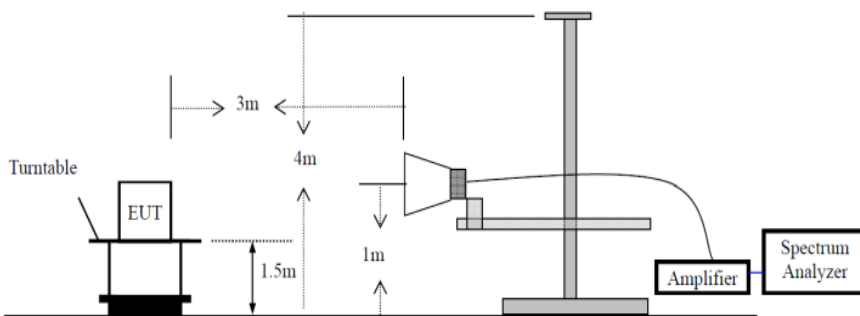


7.2 Radiated test setups

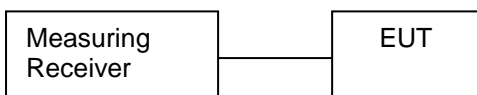
Below 1GHz:



Above 1GHz:



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
--	--	--	--

The system was configured to non-hopping mode.

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.

Through pre-scan all kind of modulation and all kind of rates, find the 1Mbps of rate is the worst case of 802.11b; the 6Mbps of rate is the worst case of 802.11g; the 6.5Mbps of rate is the worst case of 802.11N20; the 13.5Mbps of rate is the worst case of 802.11N40, only the worst case transmitter rate data mode in recorded in the report.

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

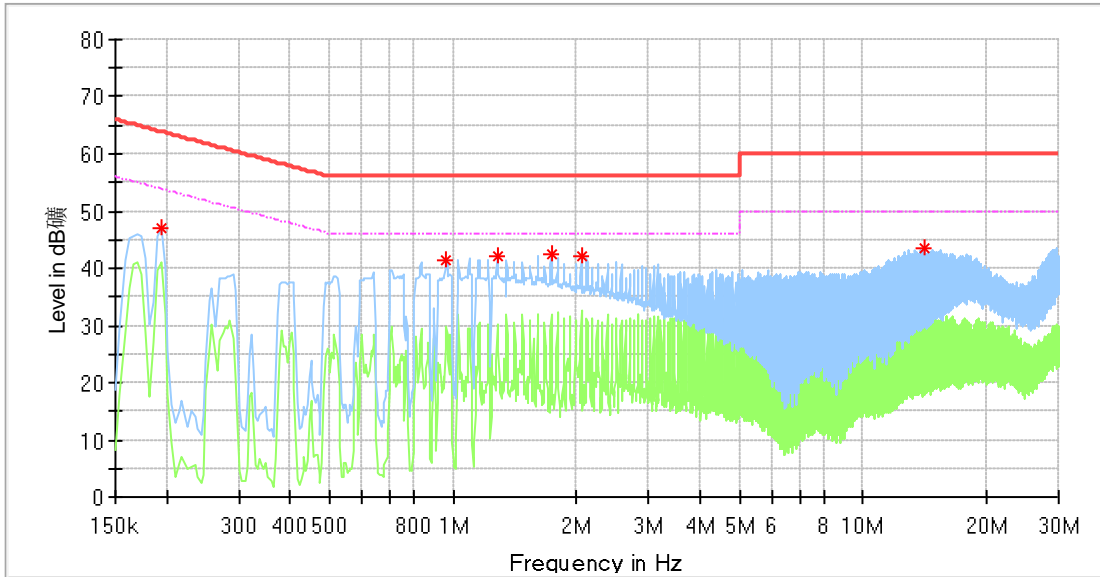
Limit

According to §15.207, conducted emissions limit as below:

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

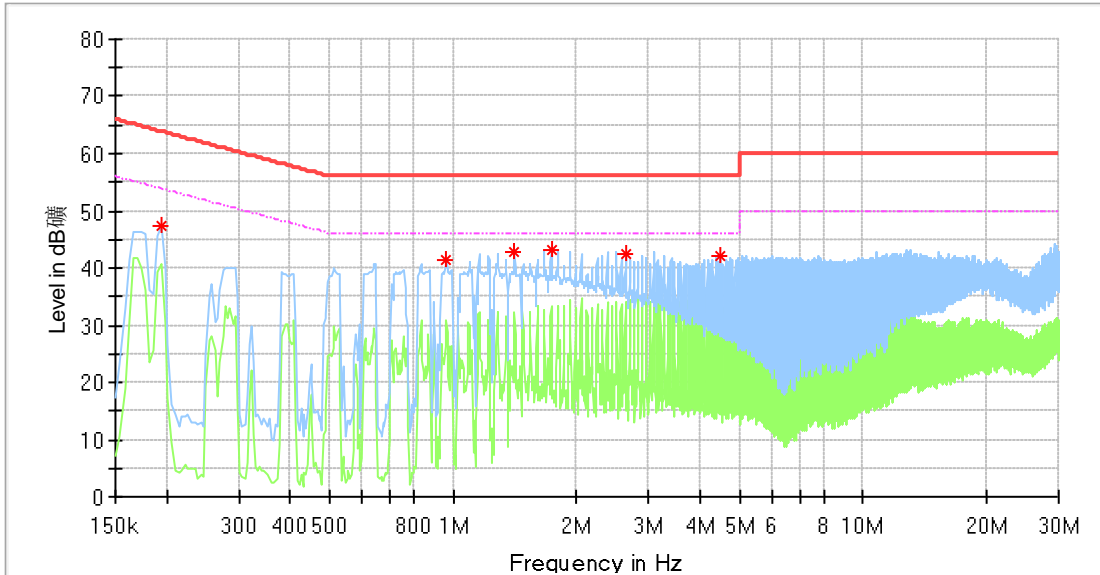
Decreasing linearly with logarithm of the frequency

Product Type : Diagnostic Ultrasound System
 M/N : Acclarix AX8
 Operating Condition : Normal Working with WiFi Traffic
 Test Specification : Line
 Comment : AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.194000	46.87	---	63.86	17.00	L1	9.7
0.962000	41.31	---	56.00	14.69	L1	9.7
1.282000	42.09	---	56.00	13.91	L1	9.7
1.734000	42.57	---	56.00	13.43	L1	9.7
2.054000	42.18	---	56.00	13.82	L1	9.7
14.186000	43.37	---	60.00	16.63	L1	10.1

Product Type : Diagnostic Ultrasound System
 M/N : Acclarix AX8
 Operating Condition : Normal Working with WiFi Traffic
 Test Specification : Neutral
 Comment : AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.194000	47.28	---	63.86	16.58	N	9.6
0.962000	41.35	---	56.00	14.65	N	9.7
1.414000	42.86	---	56.00	13.14	N	9.7
1.734000	43.05	---	56.00	12.95	N	9.7
2.634000	42.63	---	56.00	13.37	N	9.7
4.494000	42.28	---	56.00	13.72	N	9.8

9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW,
Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

Limits

According to §15.247 (b) (1) and RSS-210 A8.4, conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Conducted peak output power

802.11b modulation Test Result

Frequency (MHz)	Antenna	Conducted Peak Output Power (dBm)	Limit (dBm)	Result
Low channel 2412MHz	Antenna 0	9.27	30	Pass
	Antenna 1	9.05	30	Pass
Middle channel 2437MHz	Antenna 0	9.59	30	Pass
	Antenna 1	9.53	30	Pass
High channel 2462MHz	Antenna 0	9.51	30	Pass
	Antenna 1	9.52	30	Pass

802.11g modulation Test Result

Frequency (MHz)	Antenna	Conducted Peak Output Power (dBm)	Limit (dBm)	Result
Low channel 2412MHz	Antenna 0	9.67	30	Pass
	Antenna 1	9.51	30	Pass
Middle channel 2437MHz	Antenna 0	9.23	30	Pass
	Antenna 1	9.07	30	Pass
High channel 2462MHz	Antenna 0	9.09	30	Pass
	Antenna 1	9.29	30	Pass

802.11n-HT20 modulation Test Result

Frequency (MHz)	Antenna	Conducted Peak Output Power (dBm)	Limit (dBm)	Result
Low channel 2412MHz	Antenna 0	6.41	30	Pass
	Antenna 1	6.29	30	Pass
	MIMO	9.36	30	Pass
Middle channel 2437MHz	Antenna 0	6.54	30	Pass
	Antenna 1	6.84	30	Pass
	MIMO	9.70	30	Pass
High channel 2462MHz	Antenna 0	6.19	30	Pass
	Antenna 1	6.25	30	Pass
	MIMO	9.23	30	Pass

802.11n-HT40 modulation Test Result

Frequency (MHz)	Antenna	Conducted Peak Output Power (dBm)	Limit (dBm)	Result
Low channel 2422MHz	Antenna 0	7.08	30	Pass
	Antenna 1	6.63	30	Pass
	MIMO	9.35	30	Pass
Middle channel 2437MHz	Antenna 0	6.10	30	Pass
	Antenna 1	6.52	30	Pass
	MIMO	9.33	30	Pass
High channel 2452MHz	Antenna 0	6.40	30	Pass
	Antenna 1	6.45	30	Pass
	MIMO	9.44	30	Pass

9.3 6dB bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW \geq 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be \geq 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]

\geq 500

802.11b modulation Test Result

Frequency (MHz)	Antenna	6dB bandwidth (MHz)	Limit (MHz)	Result
Low channel 2412MHz	Antenna 0	10.072	0.5	Pass
	Antenna 1	10.116	0.5	Pass
Middle channel 2437MHz	Antenna 0	10.072	0.5	Pass
	Antenna 1	10.116	0.5	Pass
High channel 2462MHz	Antenna 0	10.116	0.5	Pass
	Antenna 1	10.116	0.5	Pass

802.11g modulation Test Result

Frequency (MHz)	Antenna	6dB bandwidth (MHz)	Limit (MHz)	Result
Low channel 2412MHz	Antenna 0	16.585	0.5	Pass
	Antenna 1	16.585	0.5	Pass
Middle channel 2437MHz	Antenna 0	16.541	0.5	Pass
	Antenna 1	16.585	0.5	Pass
High channel 2462MHz	Antenna 0	16.585	0.5	Pass
	Antenna 1	16.541	0.5	Pass

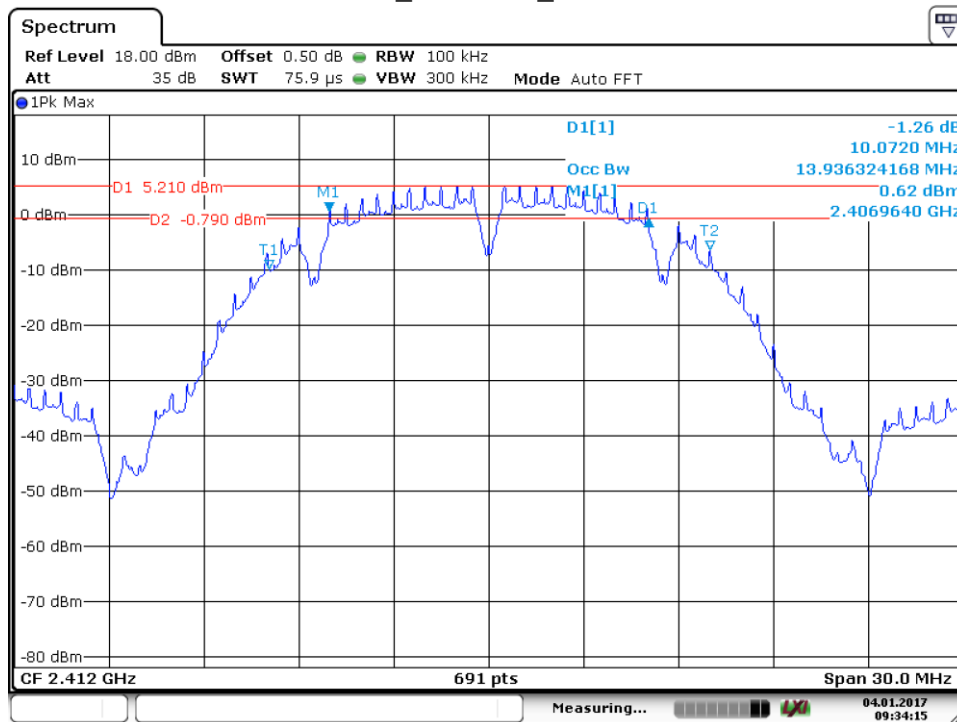
802.11n-HT20 modulation Test Result

Frequency (MHz)	Antenna	6dB bandwidth (MHz)	Limit (MHz)	Result
Low channel 2412MHz	Antenna 0	17.800	0.5	Pass
	Antenna 1	17.844	0.5	Pass
Middle channel 2437MHz	Antenna 0	17.844	0.5	Pass
	Antenna 1	17.844	0.5	Pass
High channel 2462MHz	Antenna 0	17.844	0.5	Pass
	Antenna 1	17.844	0.5	Pass

802.11n-HT40 modulation Test Result

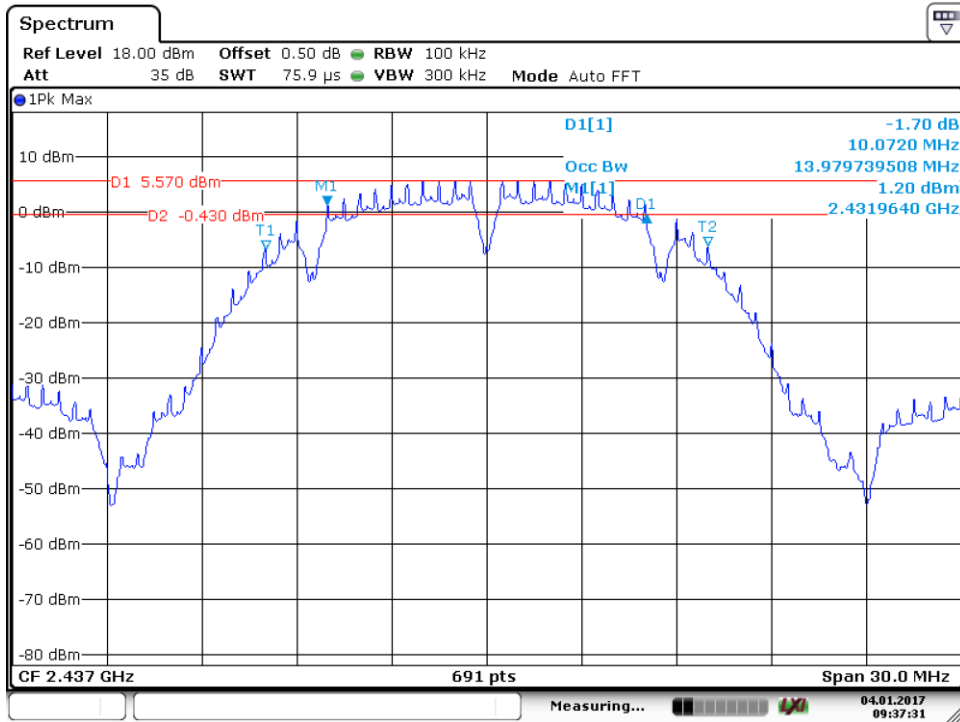
Frequency (MHz)	Antenna	6dB bandwidth (MHz)	Limit (MHz)	Result
Low channel 2422MHz	Antenna 0	36.643	0.5	Pass
	Antenna 1	36.556	0.5	Pass
Middle channel 2437MHz	Antenna 0	36.643	0.5	Pass
	Antenna 1	36.556	0.5	Pass
High channel 2452MHz	Antenna 0	36.556	0.5	Pass
	Antenna 1	36.577	0.5	Pass

802.11b_2412MHz_Antenna 0



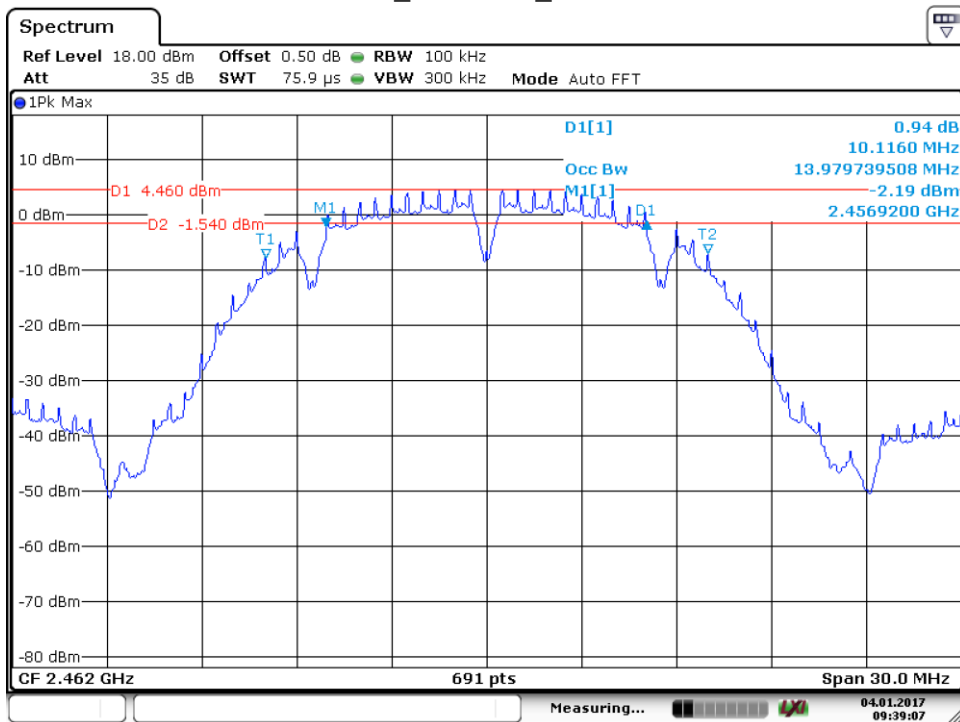
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802.11b_2437MHz_Antenna 0



Date: 4.JAN.2017 09:37:31

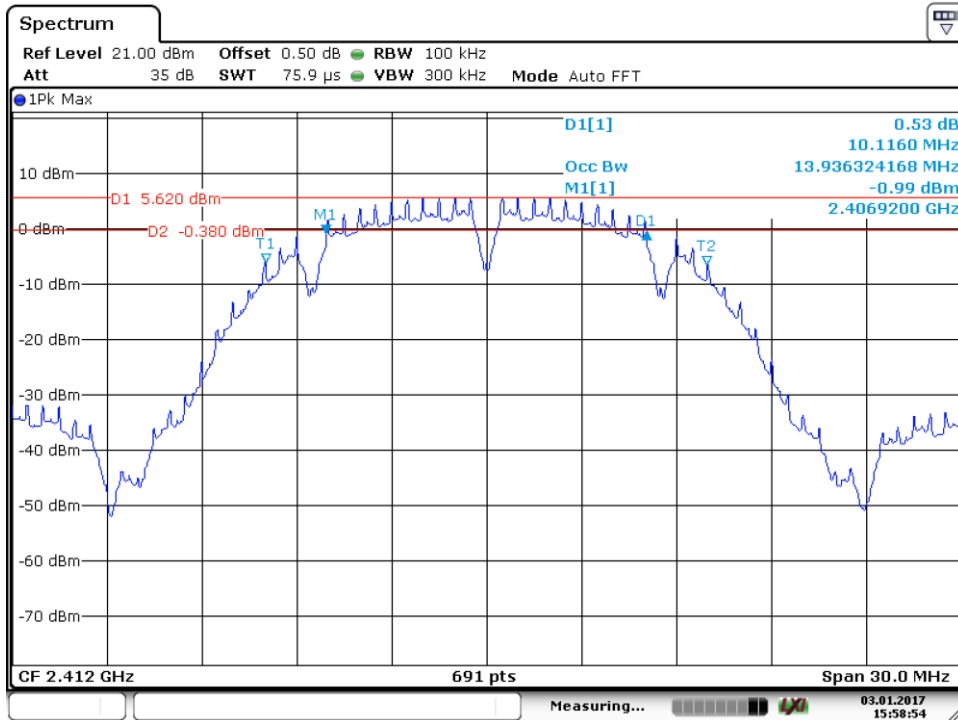
802.11b_2462MHz_Antenna 0



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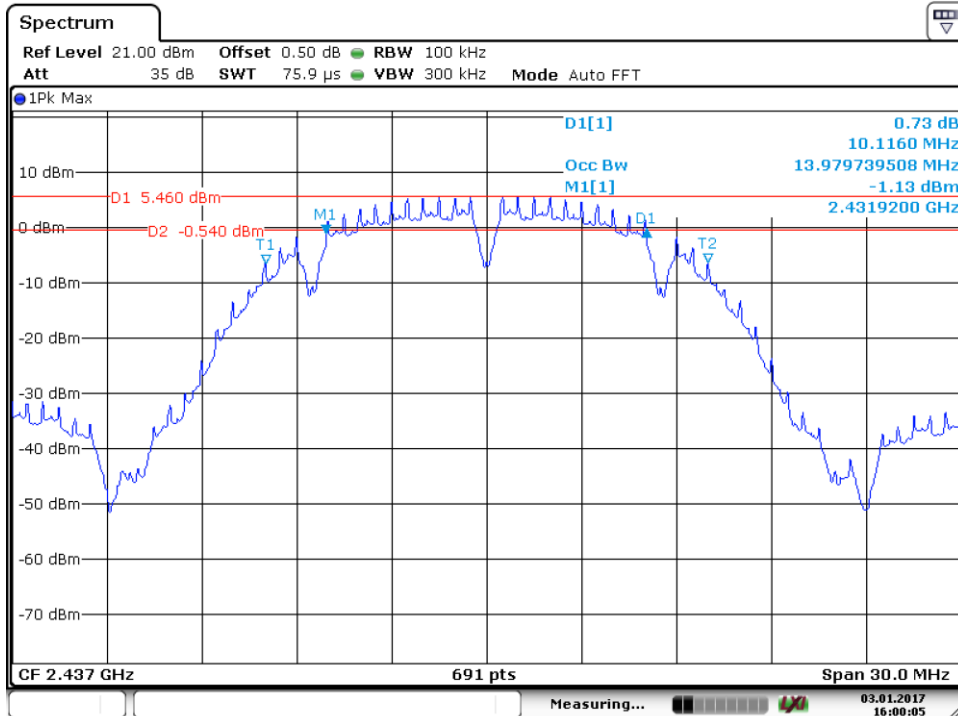


802.11b_2412MHz_Antenna 1



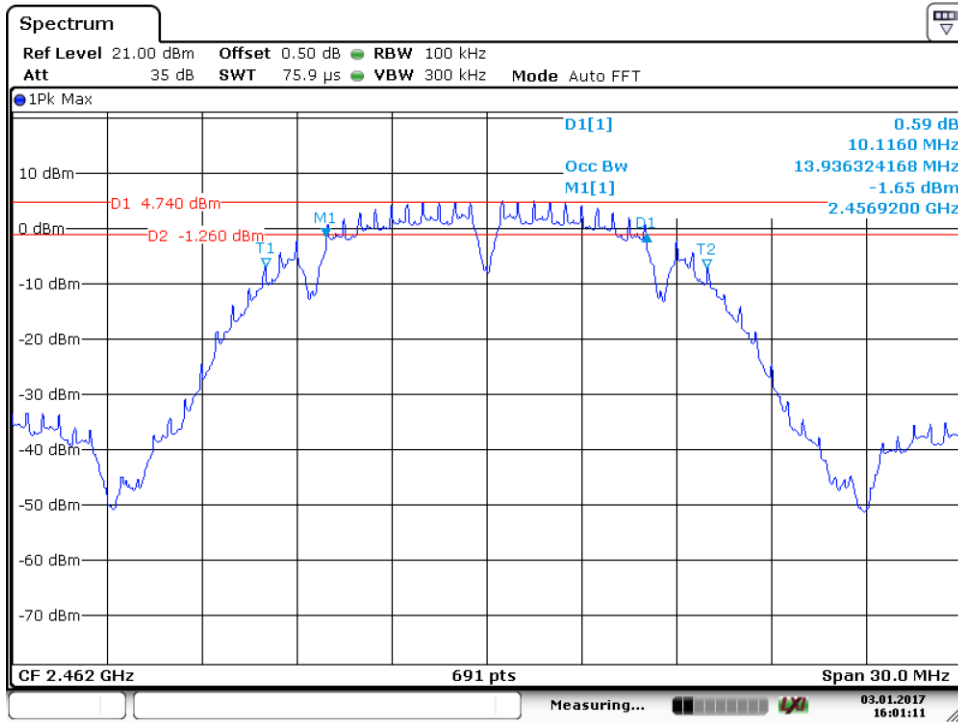
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802.11b_2437MHz_Antenna 1



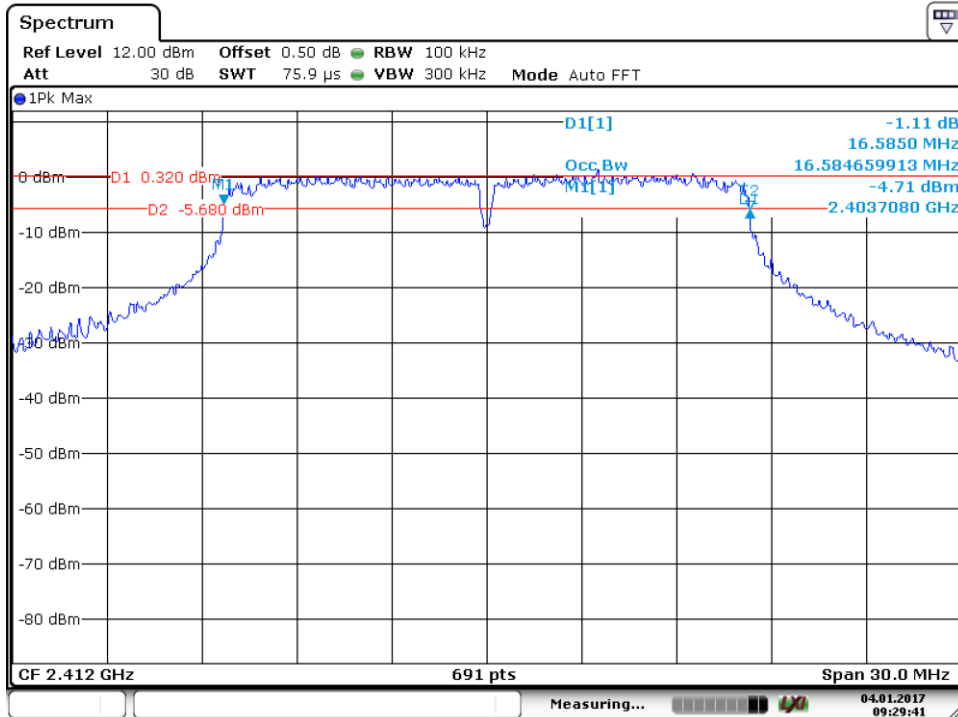
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802.11b_2462MHz_Antenna1



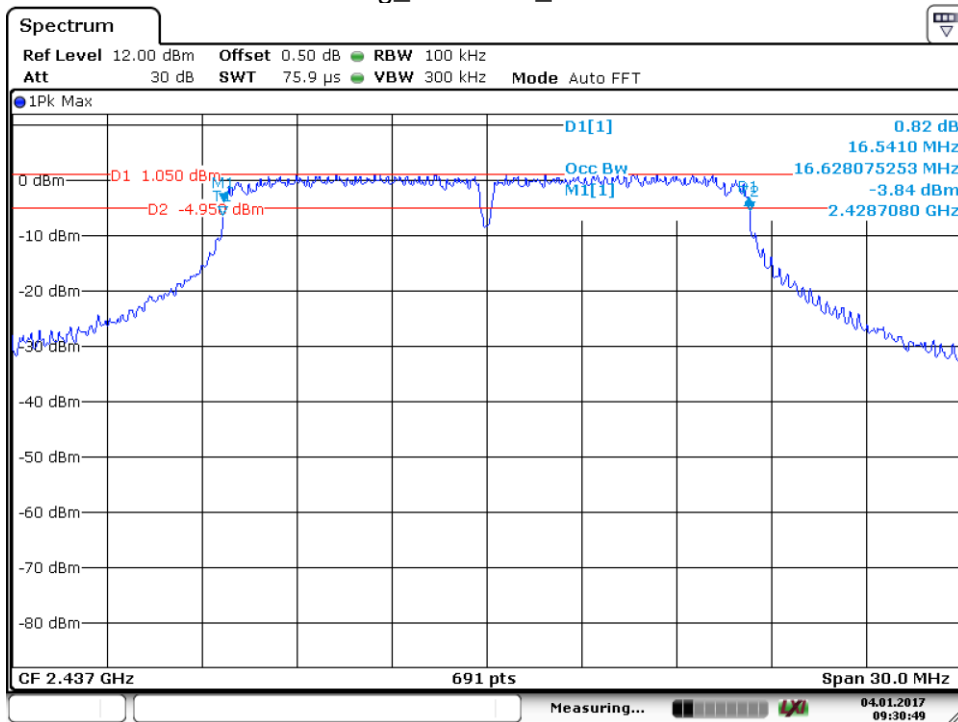
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802.11g_2412MHz_Antenna0



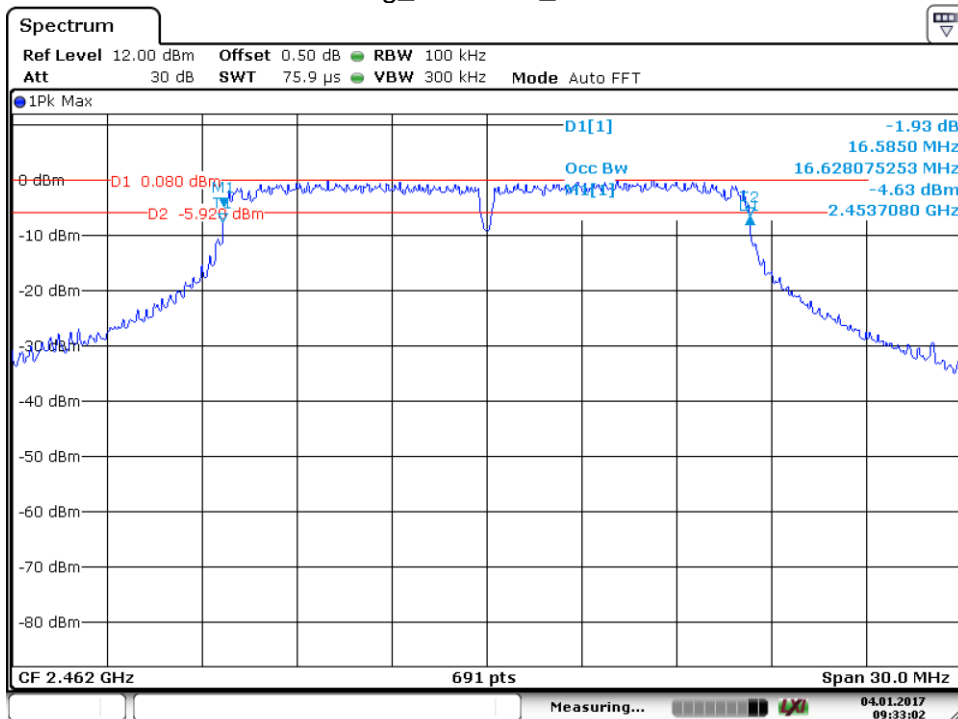
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802.11g_2437MHz_Antenna 0



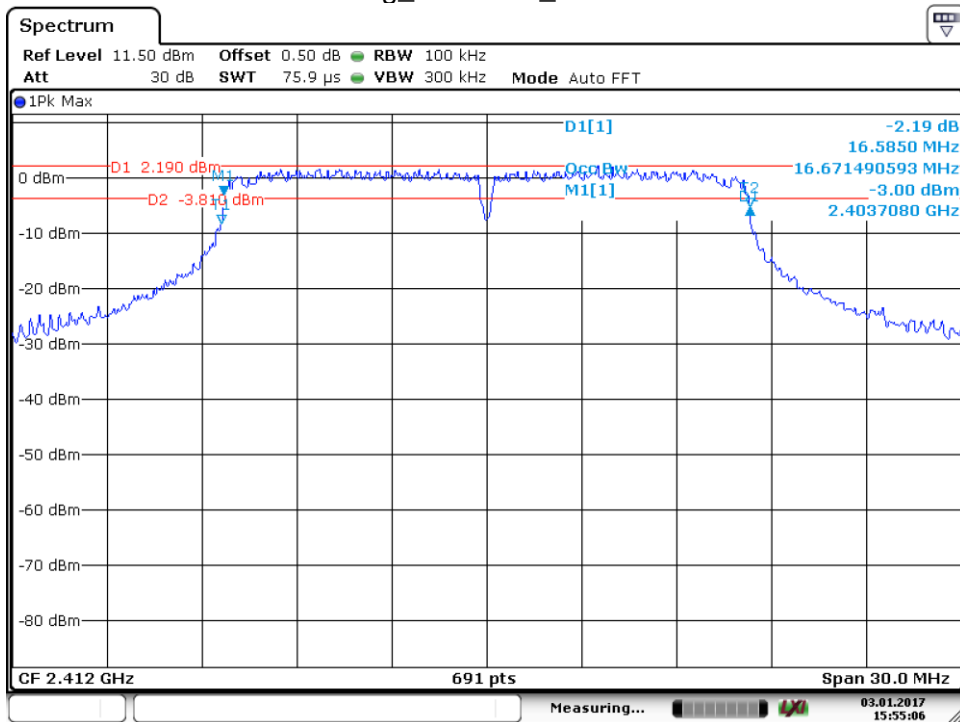
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802.11g_2462MHz_Antenna0



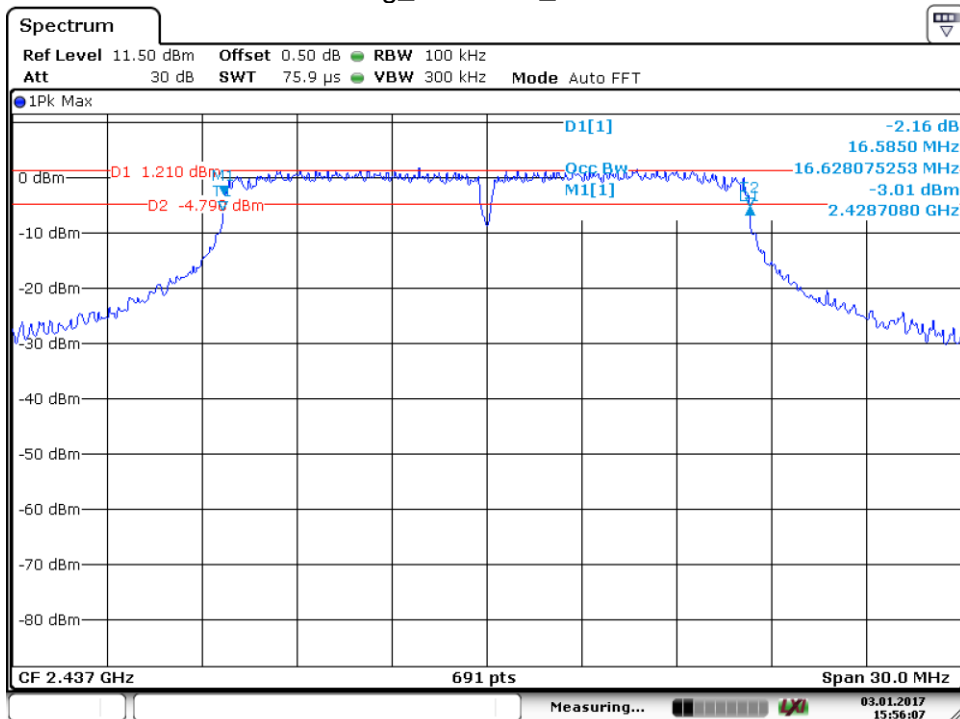
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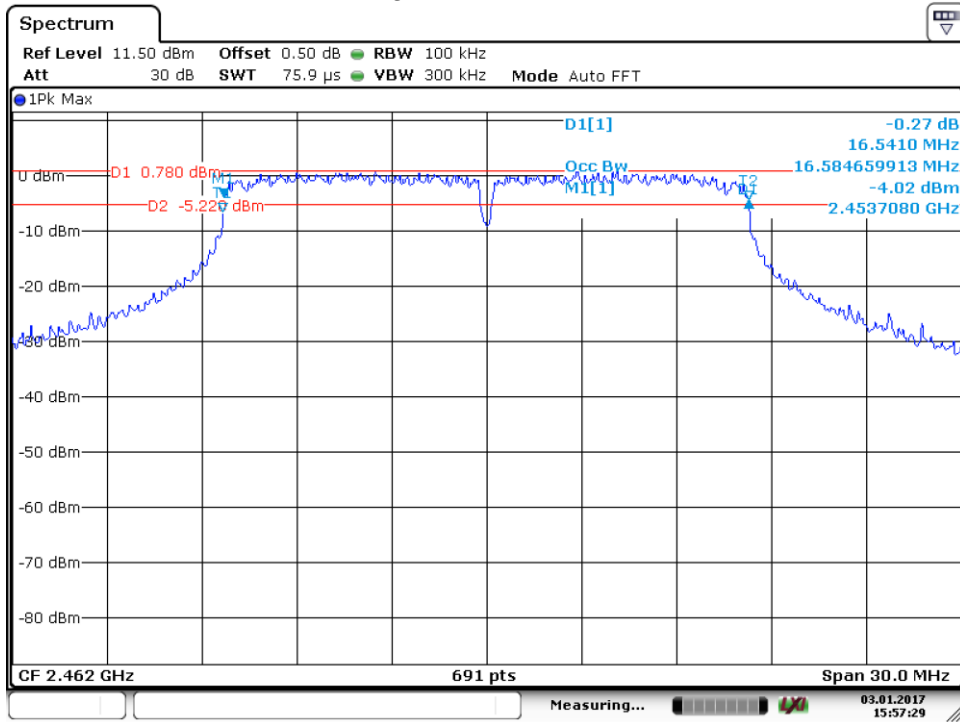
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802.11g_2437MHz_Antenna1



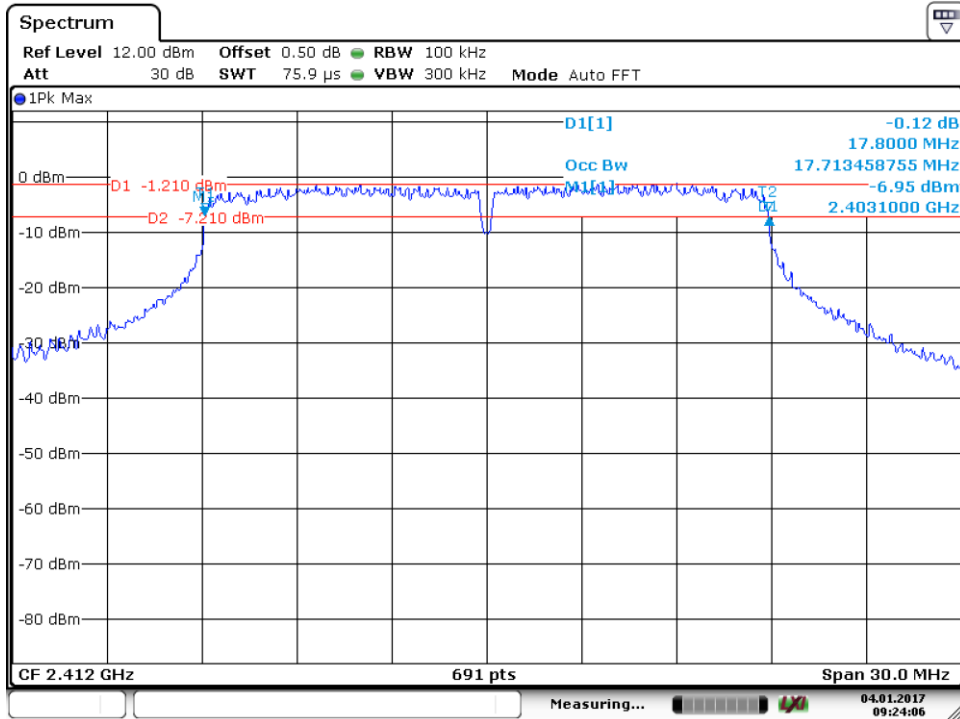
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802.11g_2462MHz_Antenn1



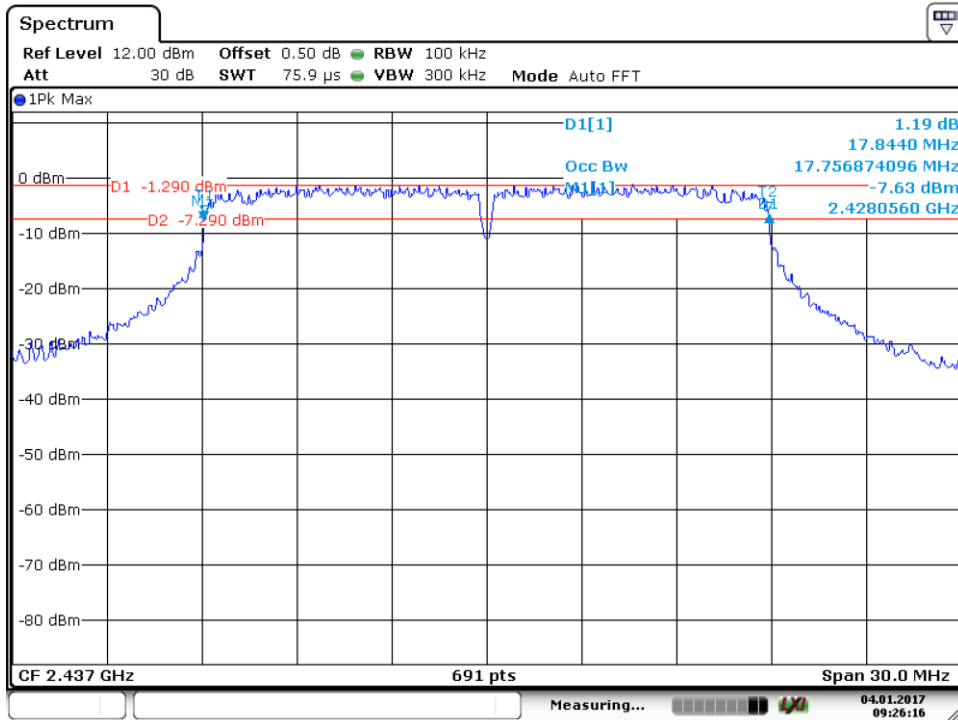
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802.11N20_2412MHz_Antenna0



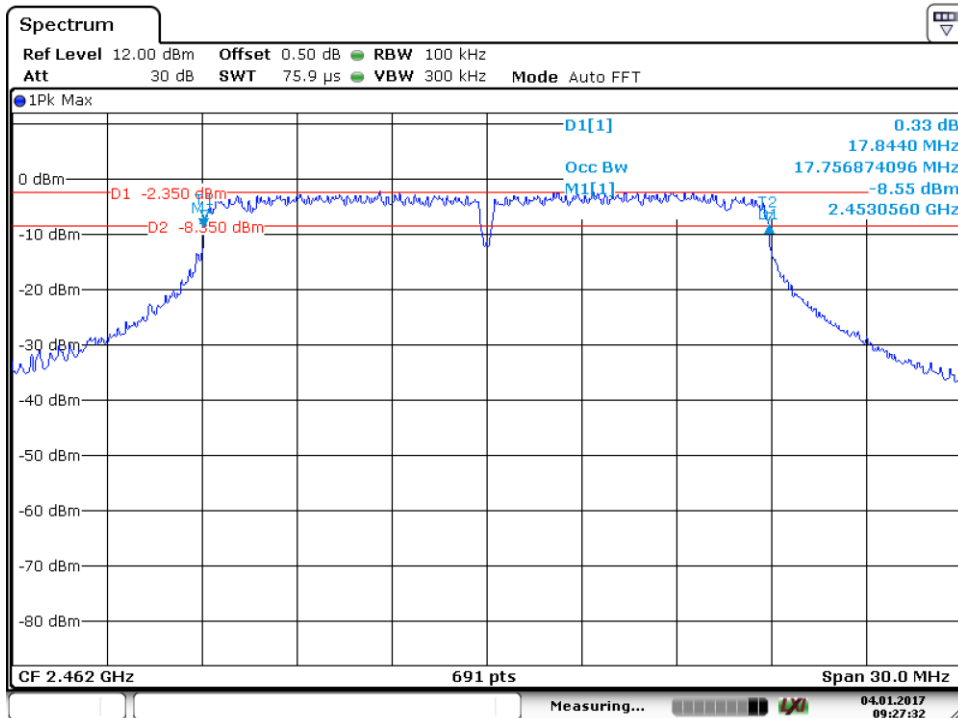
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802.11N20_2437MHz_Antenna0



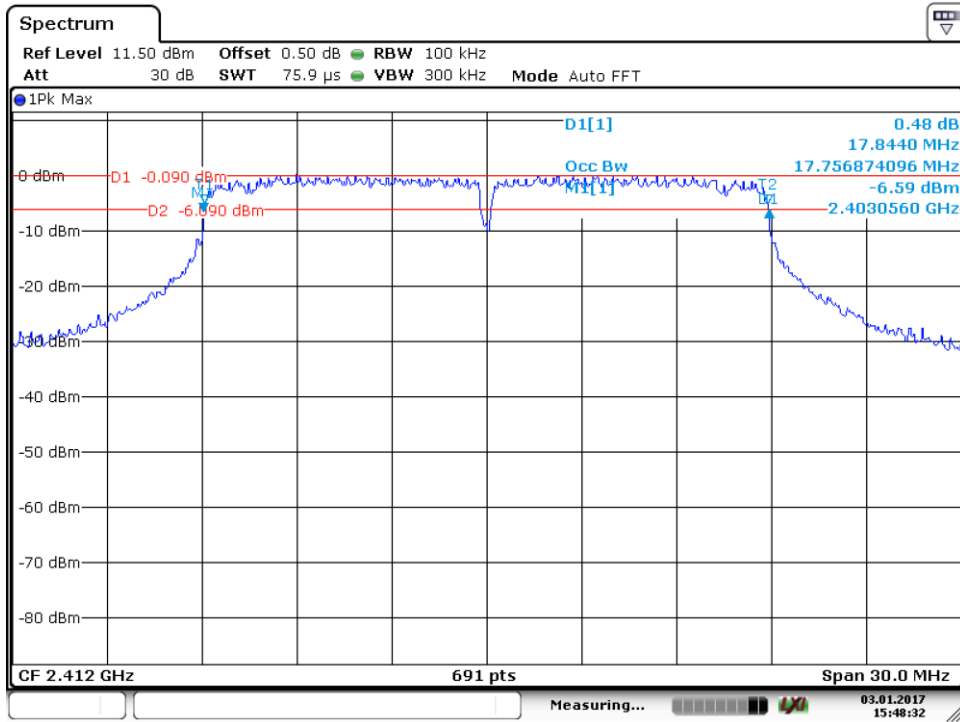
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802.11N20_2462MHz_Antenna0



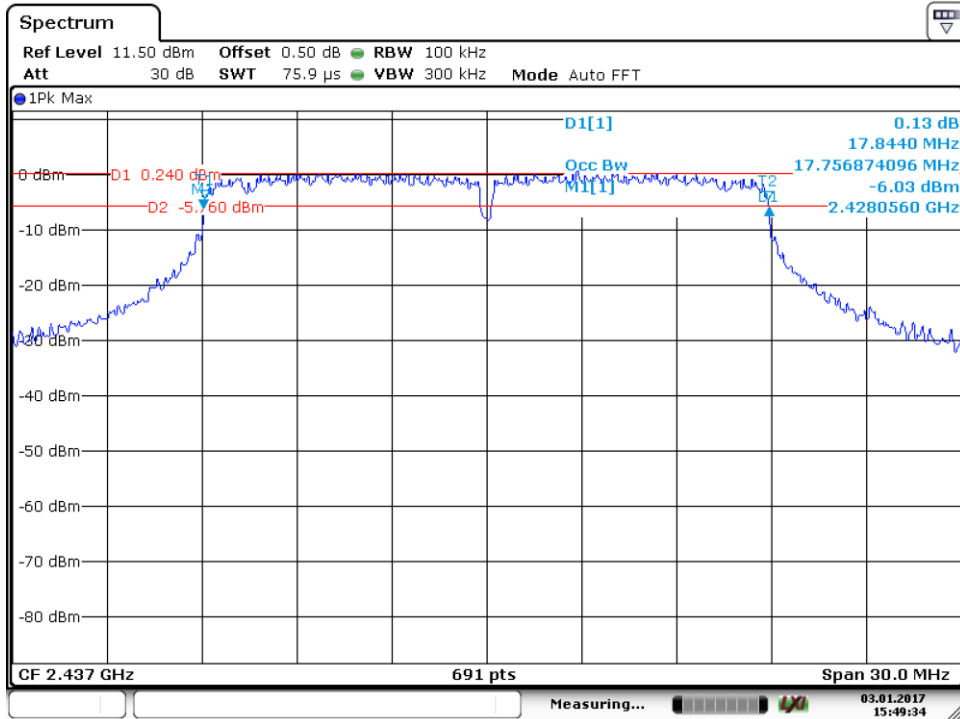
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802.11N20_2412MHz_Antenna1



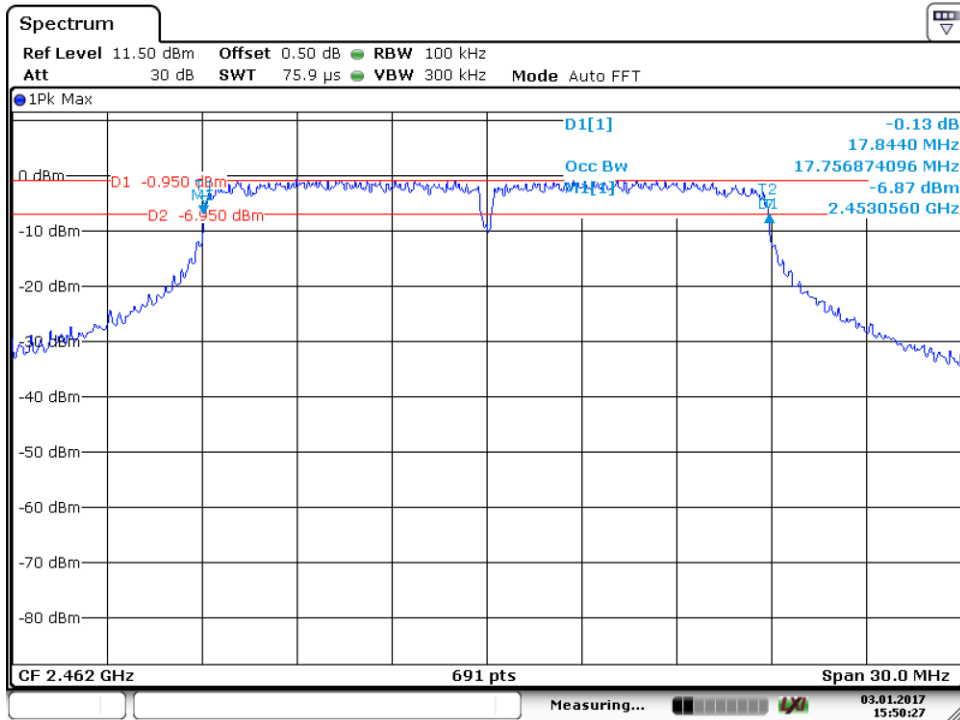
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802.11N20_2437MHz_Antenna1



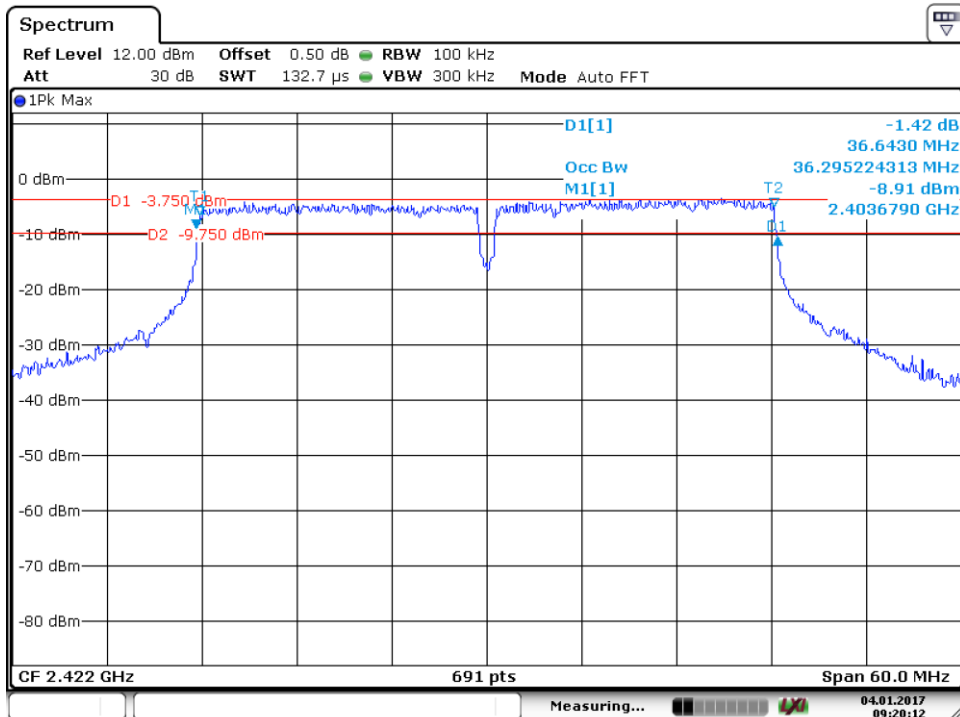
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802.11N20_2462MHz_Antenna1



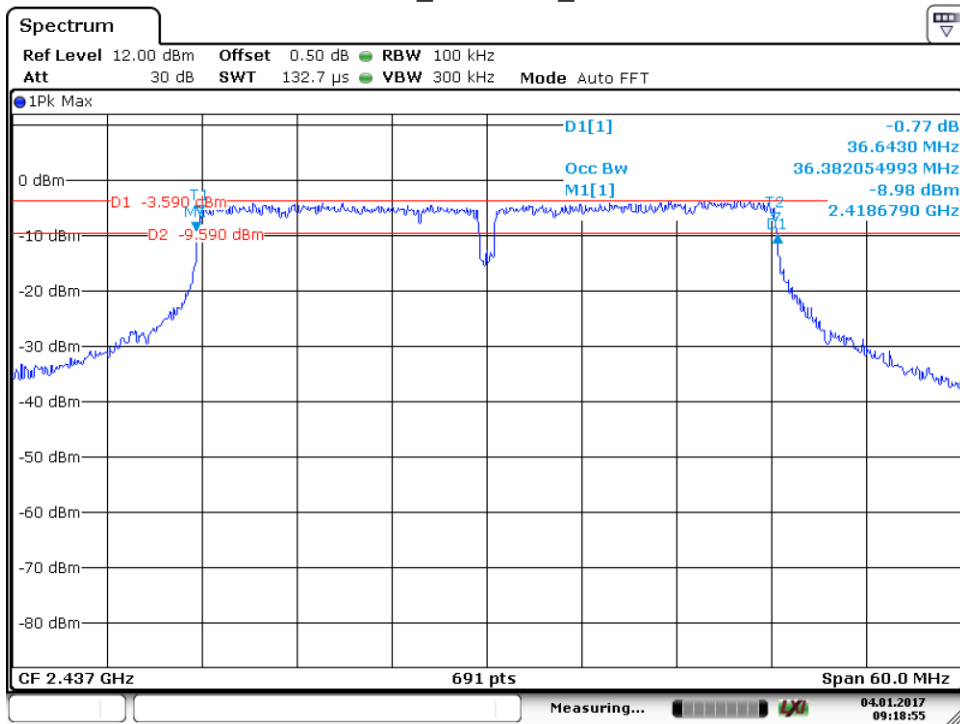
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802.11N40_2422MHz_Antenna0



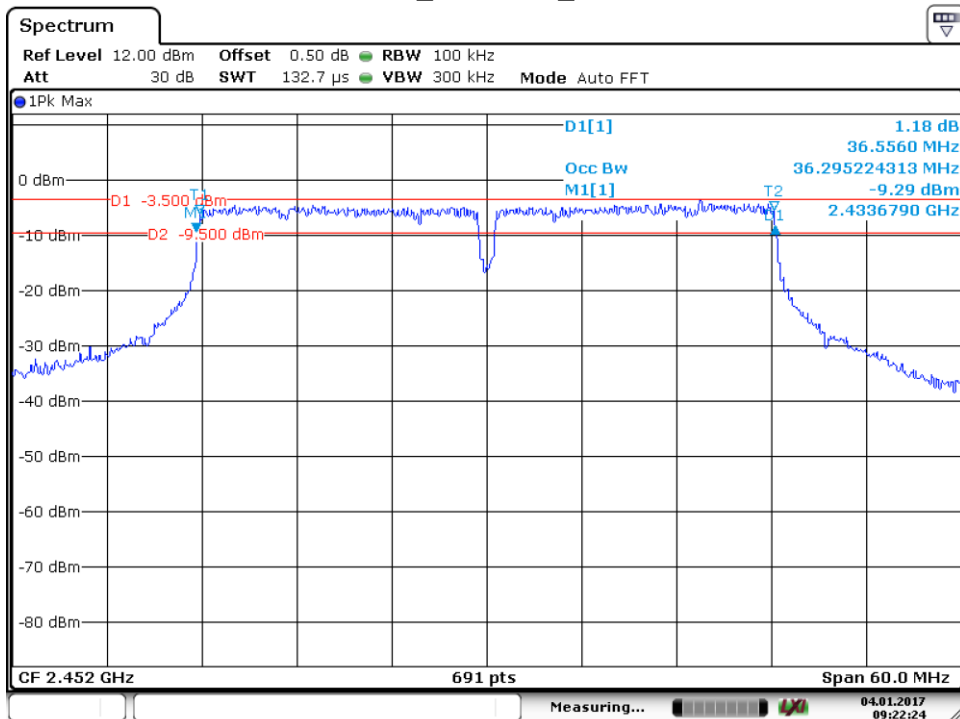
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802.11N40_2437MHz_Antenna0



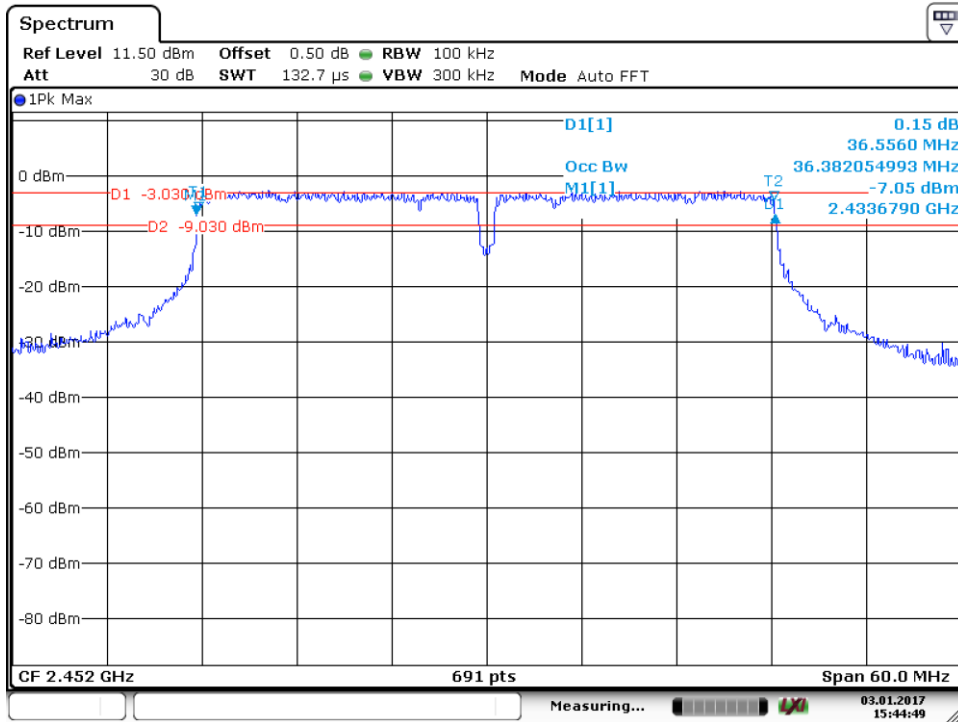
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802.11N40_2452MHz_Antenna0



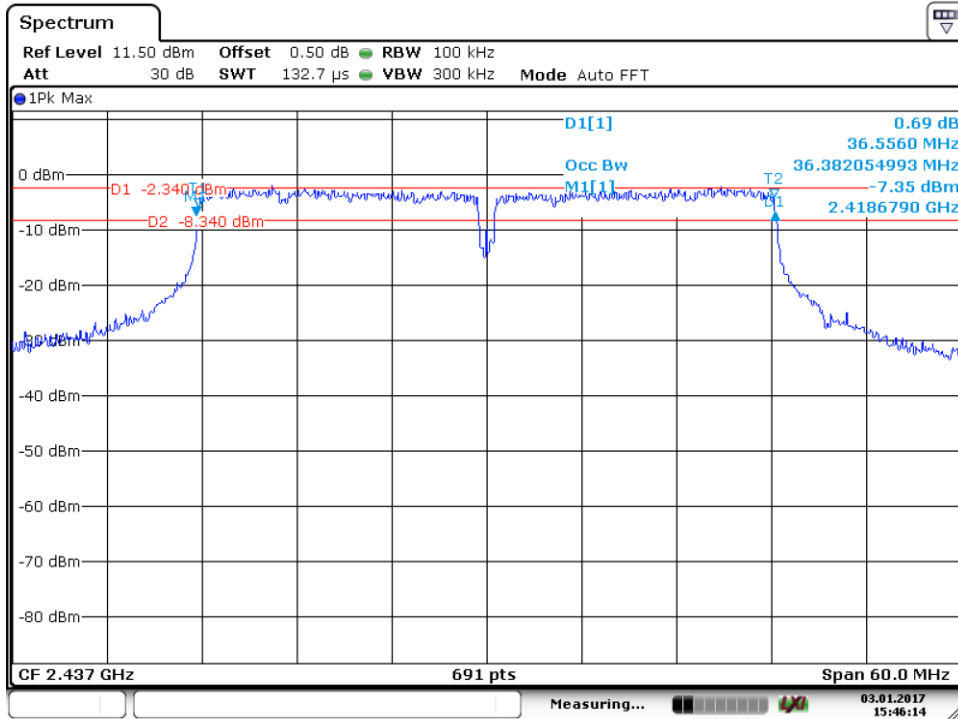
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802.11N40_2422MHz_Antenna1



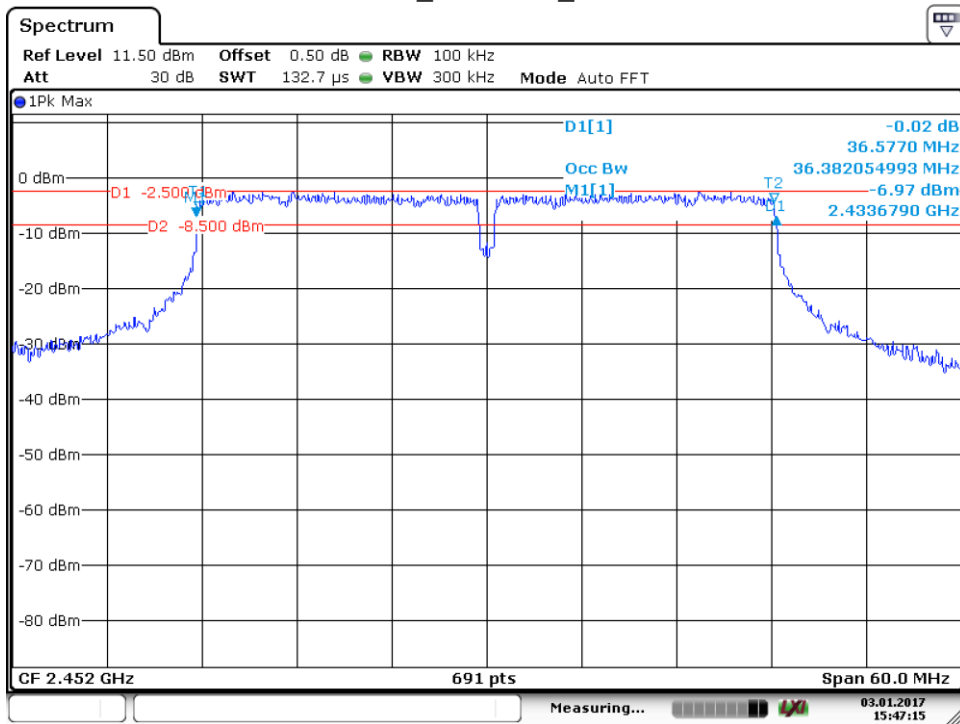
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802.11N40_2437MHz_Antenna1



Date: 3.JAN.2017 15:46:14

802.11N40_2452MHz_Antenna1



Date: 3.JAN.2017 15:47:16

9.4 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency.
RBW=3kHz,VBW≥3RBW,Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm]

≤8

802.11b modulation Test Result

Frequency (MHz)	Antenna	Power spectral density (dBm)	Limit (dBm)	Result
Low channel 2412MHz	Antenna 0	-8.57	8	Pass
	Antenna 1	-8.14	8	Pass
Middle channel 2437MHz	Antenna 0	-7.88	8	Pass
	Antenna 1	-6.50	8	Pass
High channel 2462MHz	Antenna 0	-8.75	8	Pass
	Antenna 1	-8.79	8	Pass

802.11g modulation Test Result

Frequency (MHz)	Antenna	Power spectral density (dBm)	Limit (dBm)	Result
Low channel 2412MHz	Antenna 0	-10.19	8	Pass
	Antenna 1	-8.38	8	Pass
Middle channel 2437MHz	Antenna 0	-9.37	8	Pass
	Antenna 1	-9.56	8	Pass
High channel 2462MHz	Antenna 0	-10.96	8	Pass
	Antenna 1	-9.44	8	Pass

802.11n-HT20 modulation Test Result

Frequency (MHz)	Antenna	Power spectral density (dBm)	Limit (dBm)	Result
Low channel 2412MHz	Antenna 0	-11.76	8	Pass
	Antenna 1	-10.24	8	Pass
	MIMO	-7.92	8	Pass
Middle channel 2437MHz	Antenna 0	-11.49	8	Pass
	Antenna 1	-7.88	8	Pass
	MIMO	-6.31	8	Pass
High channel 2462MHz	Antenna 0	-13.48	8	Pass
	Antenna 1	-10.96	8	Pass
	MIMO	-9.03	8	Pass

802.11n-HT40 modulation Test Result

Frequency (MHz)	Antenna	Power spectral density (dBm)	Limit (dBm)	Result
Low channel 2422MHz	Antenna 0	-12.88	8	Pass
	Antenna 1	-12.12	8	Pass
	MIMO	-9.47	8	Pass
Middle channel 2437MHz	Antenna 0	-12.89	8	Pass
	Antenna 1	-11.29	8	Pass
	MIMO	-9.01	8	Pass
High channel 2452MHz	Antenna 0	-14.61	8	Pass
	Antenna 1	-12.09	8	Pass
	MIMO	-10.16	8	Pass

9.5 Spurious RF conducted emissions

Test Method

1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

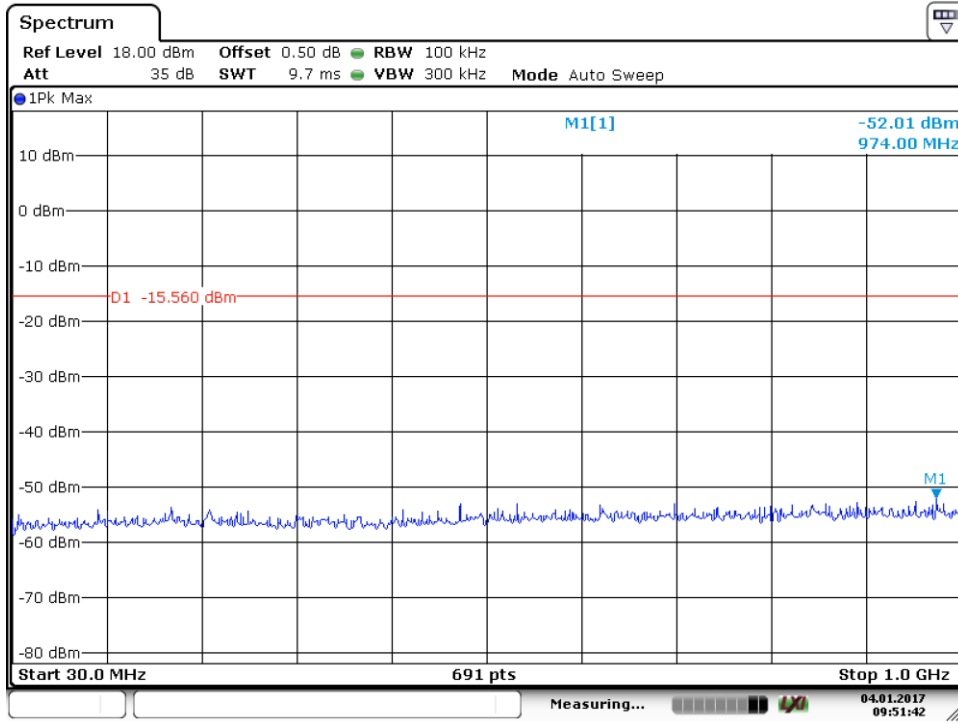
Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

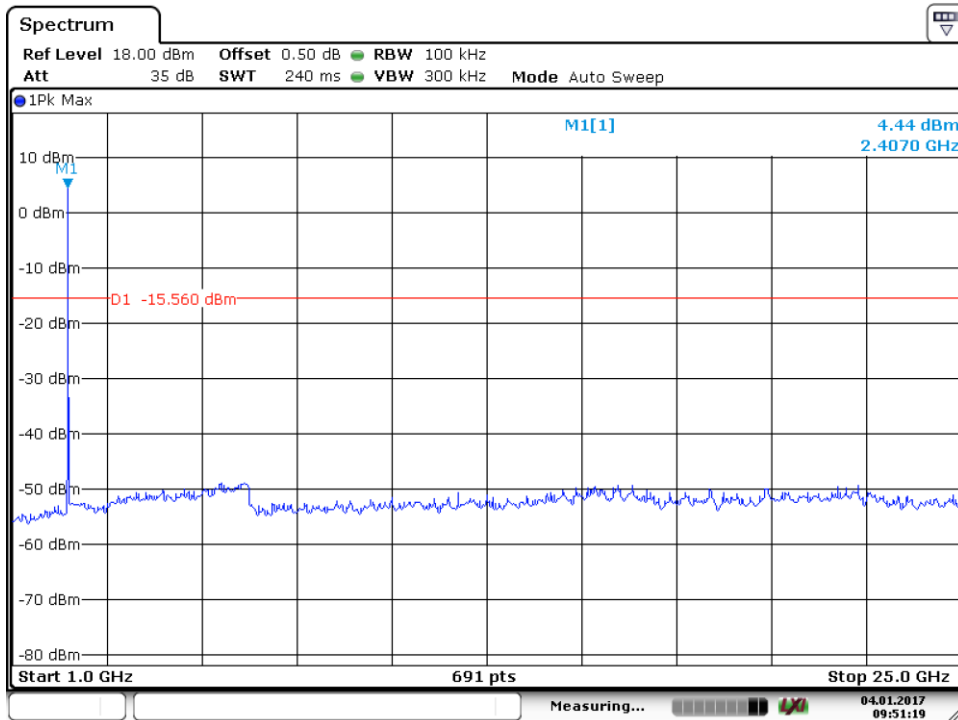
Spurious RF conducted emissions

All modulation test result is listed in the report.

802.11b_2412MHz_Antenna 0

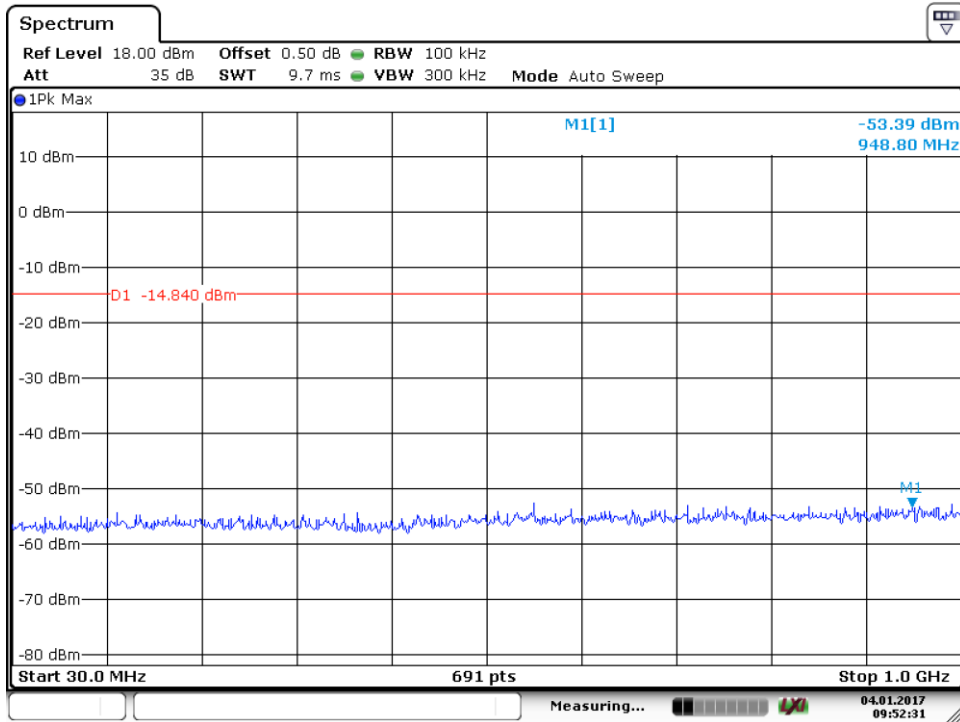


Date: 4.JAN.2017 09:51:42

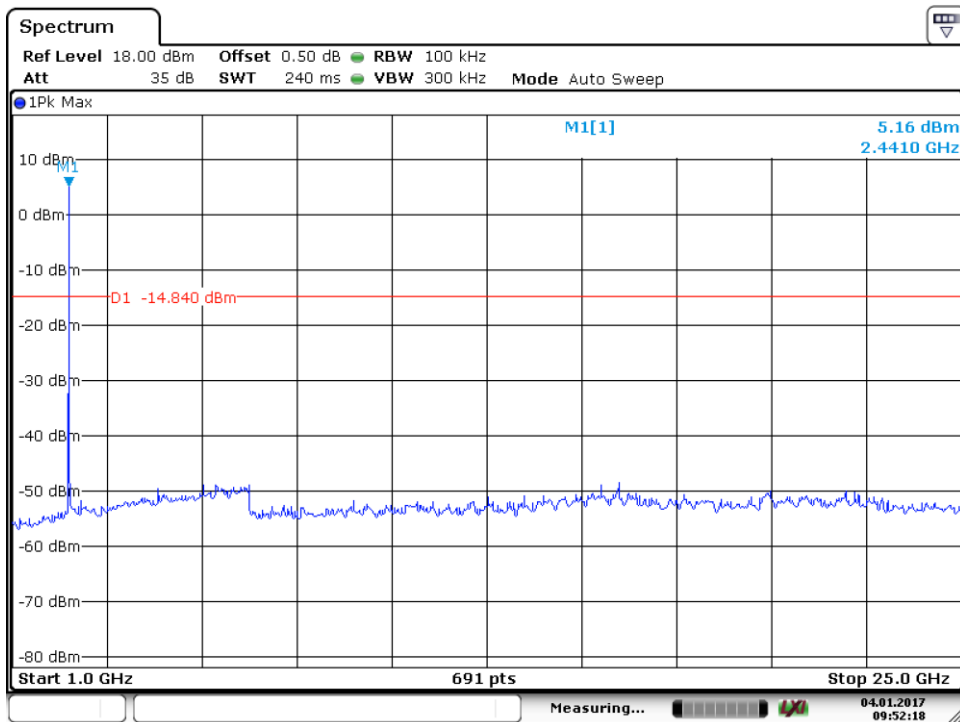


Date: 4.JAN.2017 09:51:19

802.11b_2437MHz_Antenna 0

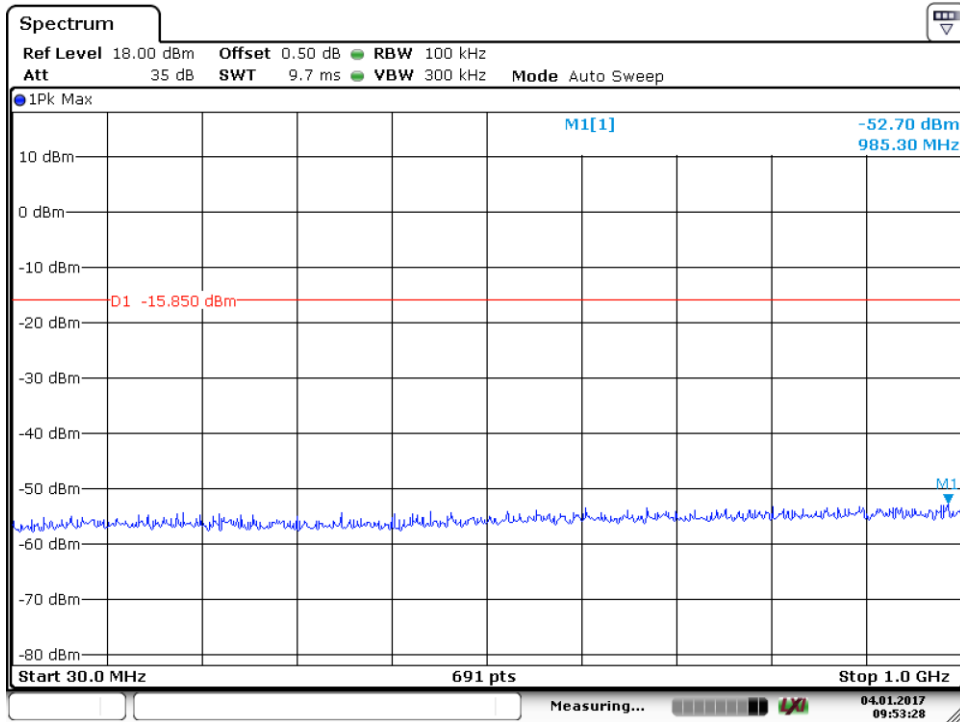


Date: 4.JAN.2017 09:52:31

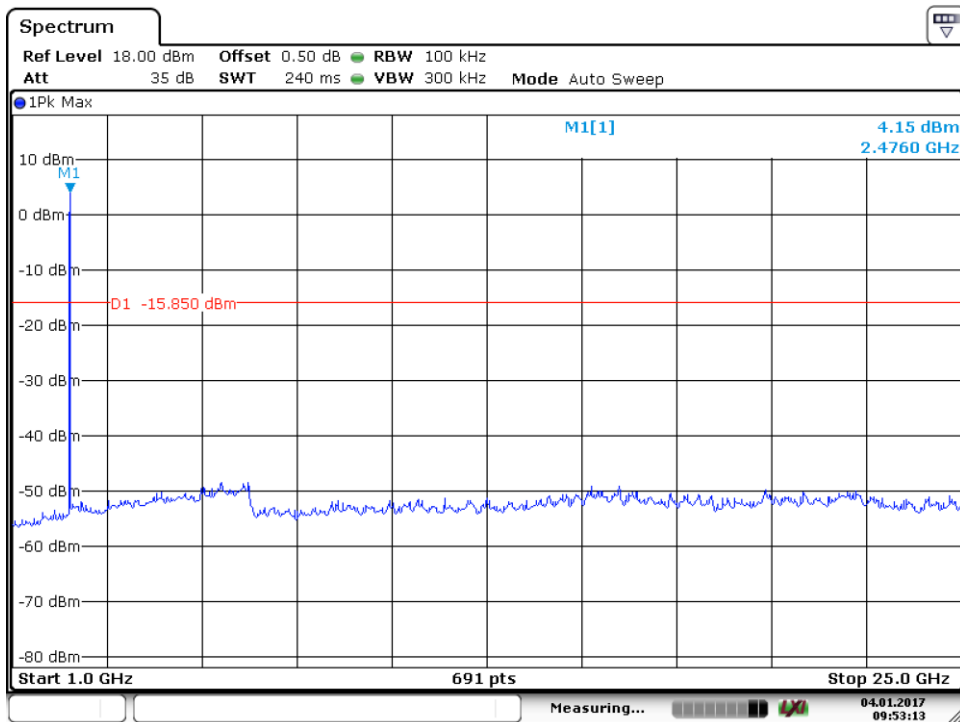


Date: 4.JAN.2017 09:52:18

802.11b_2462MHz_Antenna 0

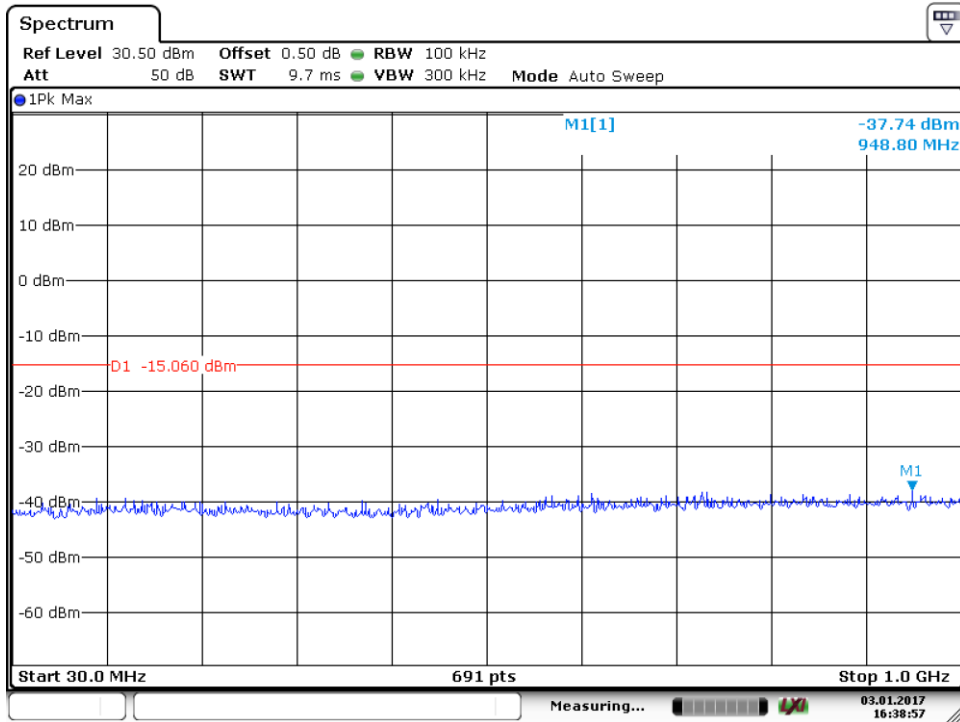


Date: 4.JAN.2017 09:53:28

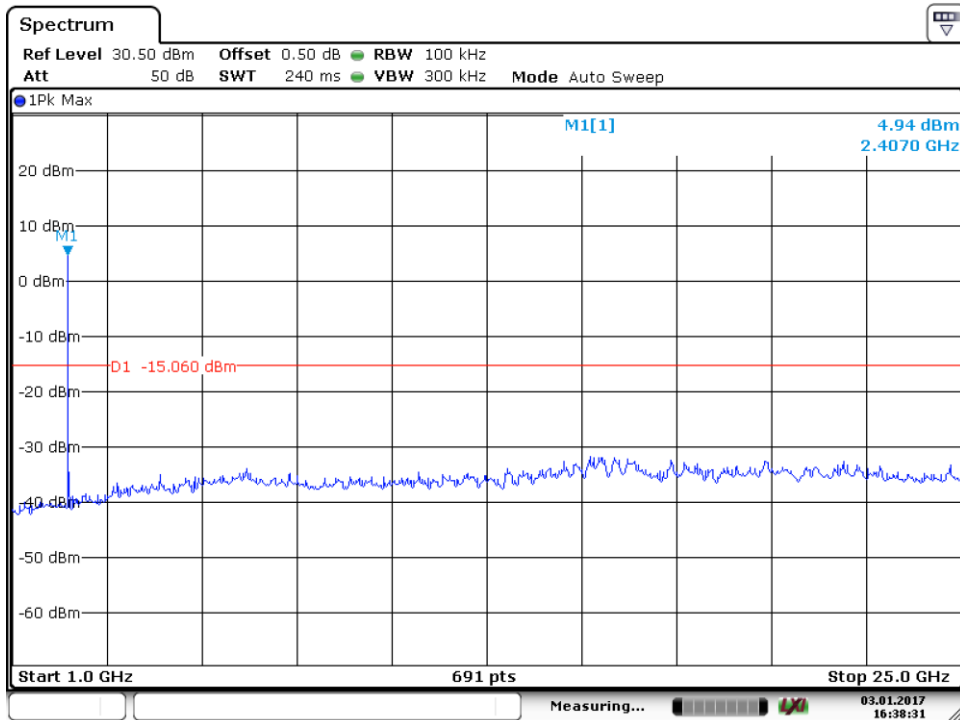


Date: 4.JAN.2017 09:53:13

802.11b_2412MHz_Antenna 1

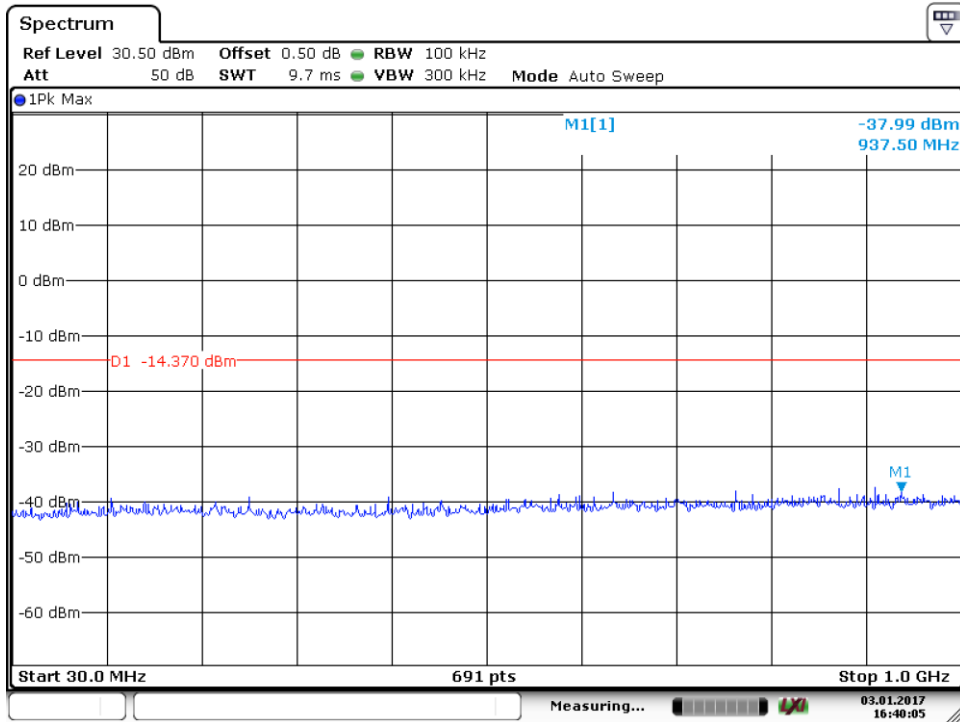


Date: 3.JAN.2017 16:38:57

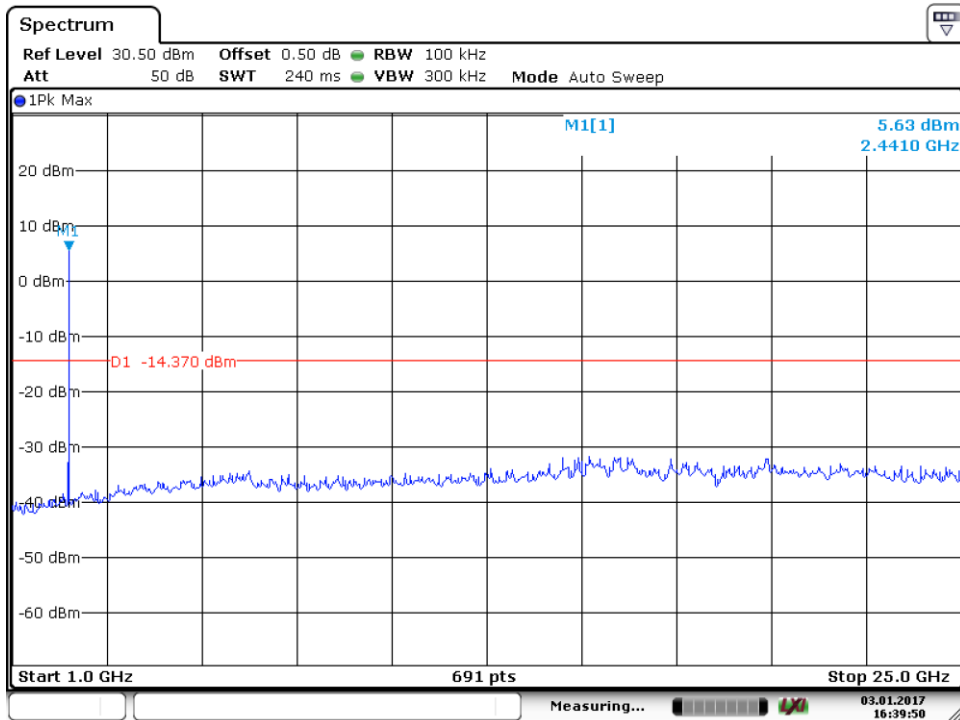


Date: 3.JAN.2017 16:38:31

802.11b_2437MHz_Antenna 1

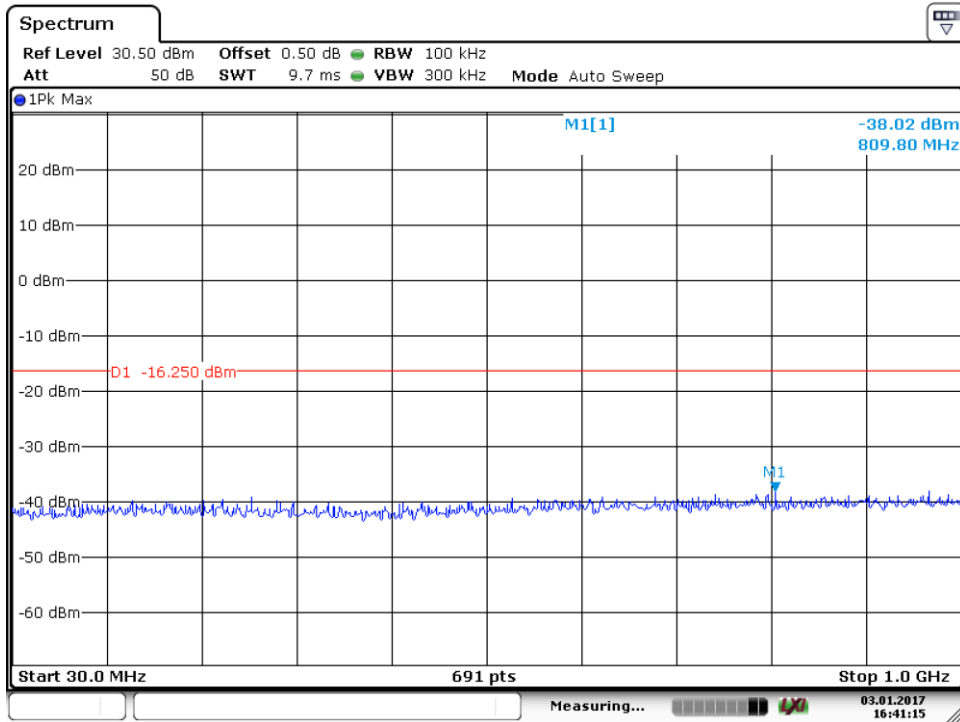


Date: 3.JAN.2017 16:40:05

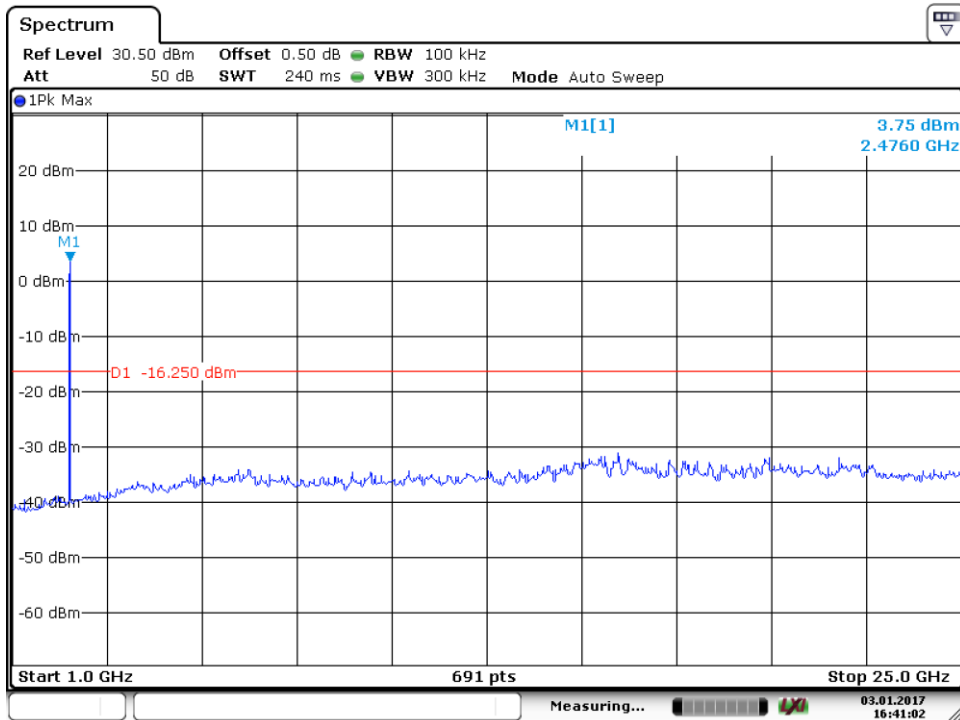


Date: 3.JAN.2017 16:39:50

802.11b_2462MHz_Antenna 1

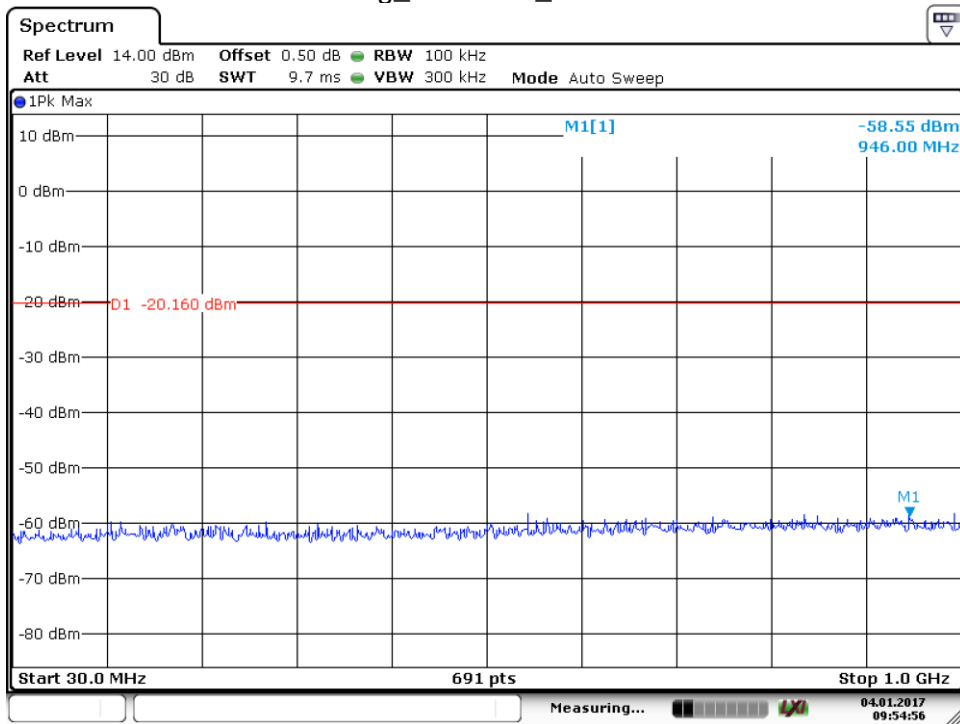


Date: 3.JAN.2017 16:41:15

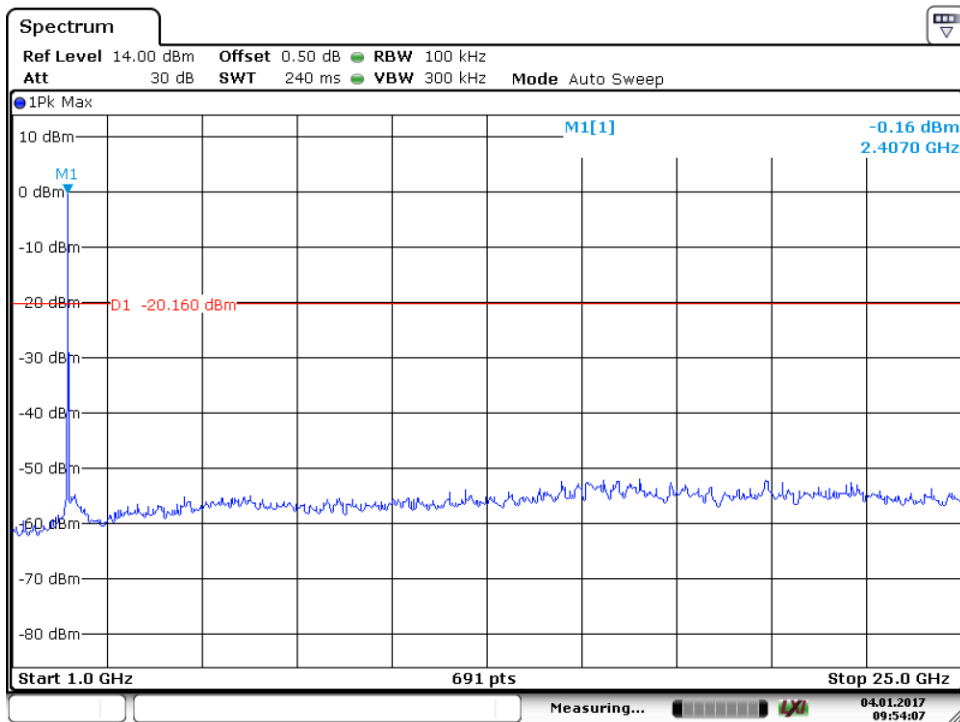


Date: 3.JAN.2017 16:41:01

802.11g_2412MHz_Antenna 0

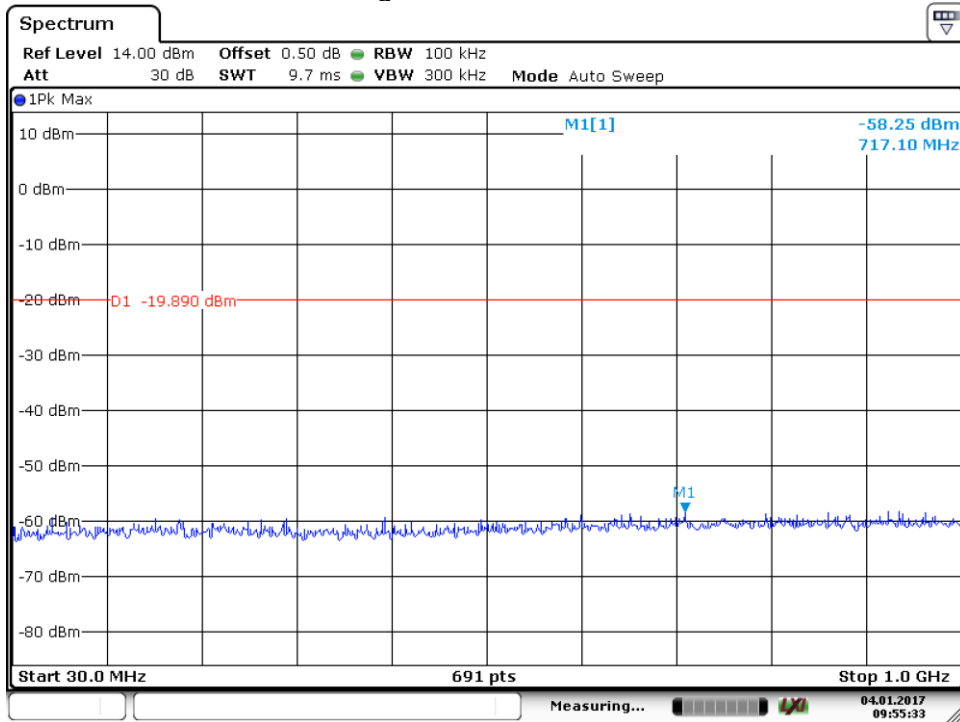


Date: 4.JAN.2017 09:54:56

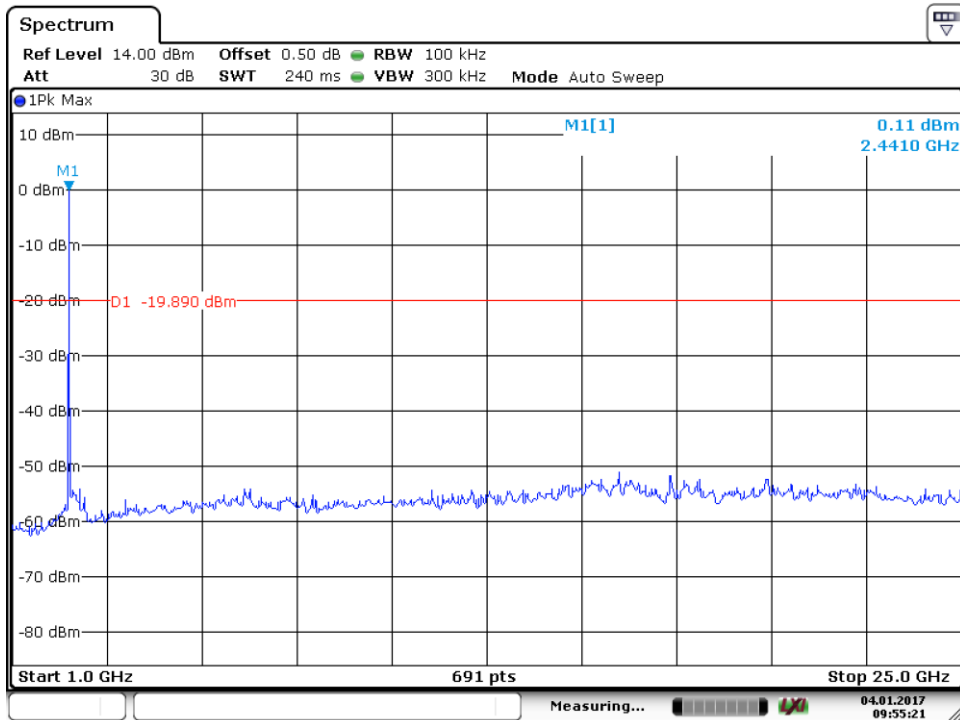


Date: 4.JAN.2017 09:54:07

802.11g_2437MHz_Antenna 0

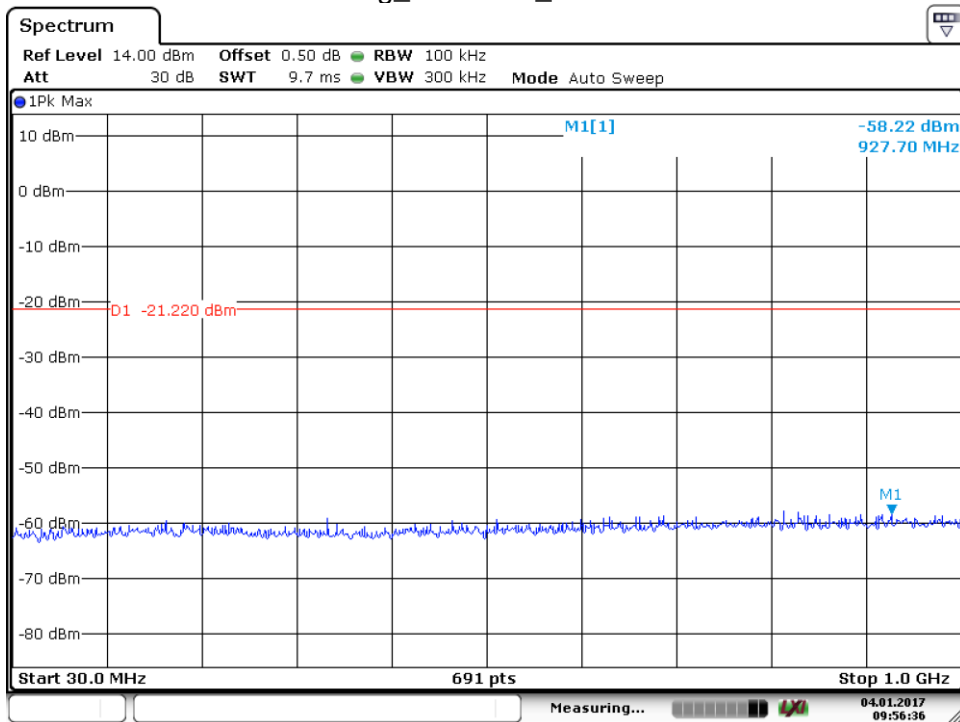


Date: 4.JAN.2017 09:55:34

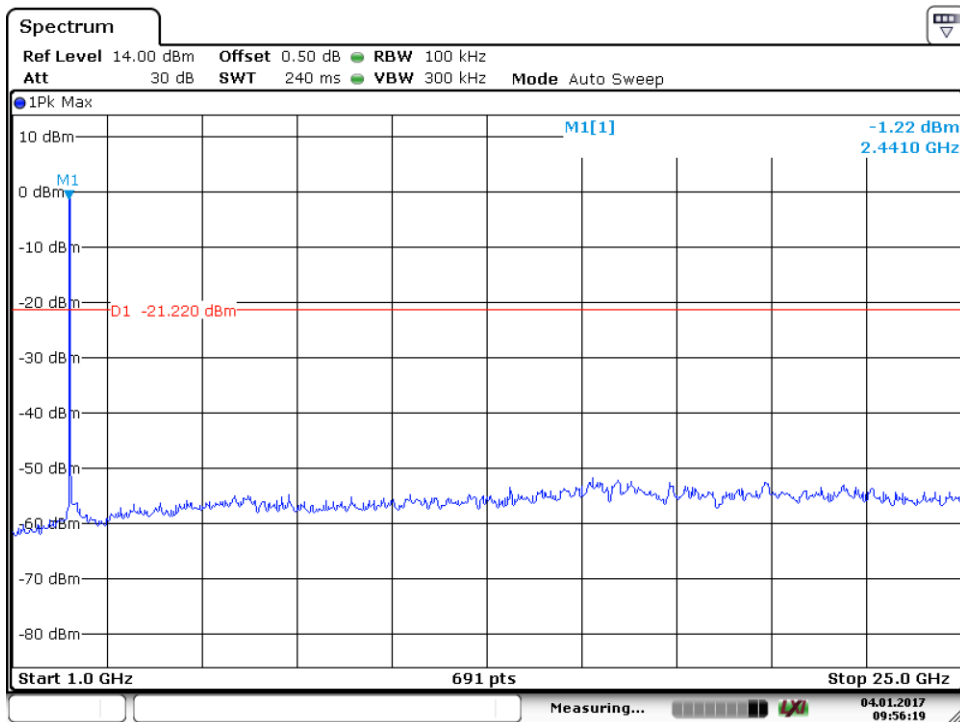


Date: 4.JAN.2017 09:55:21

802.11g_2462MHz_Antenna 0

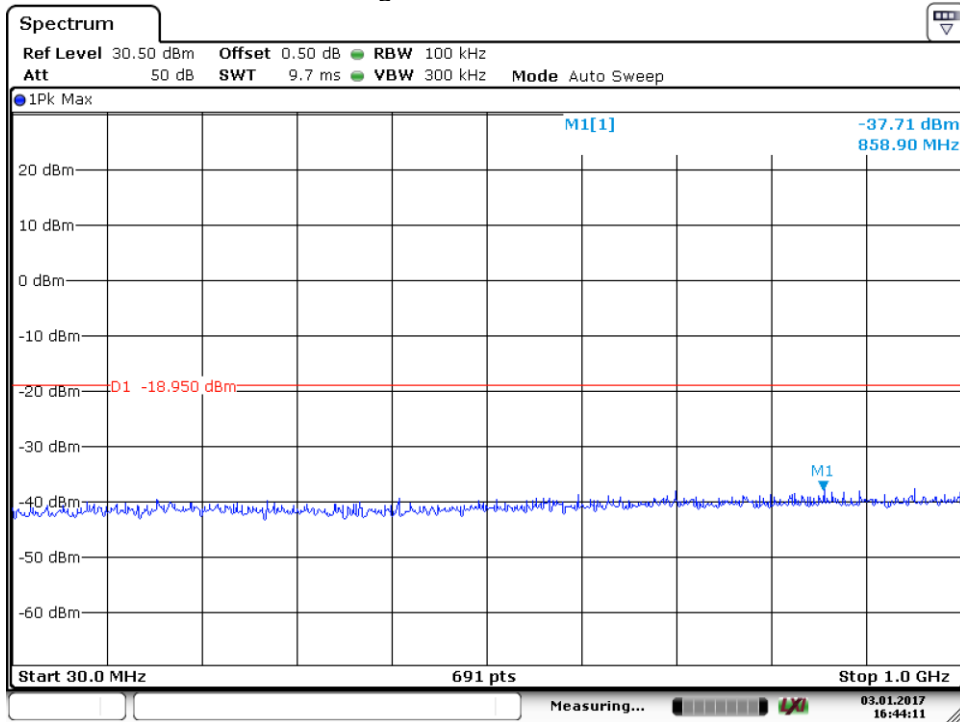


Date: 4.JAN.2017 09:56:37

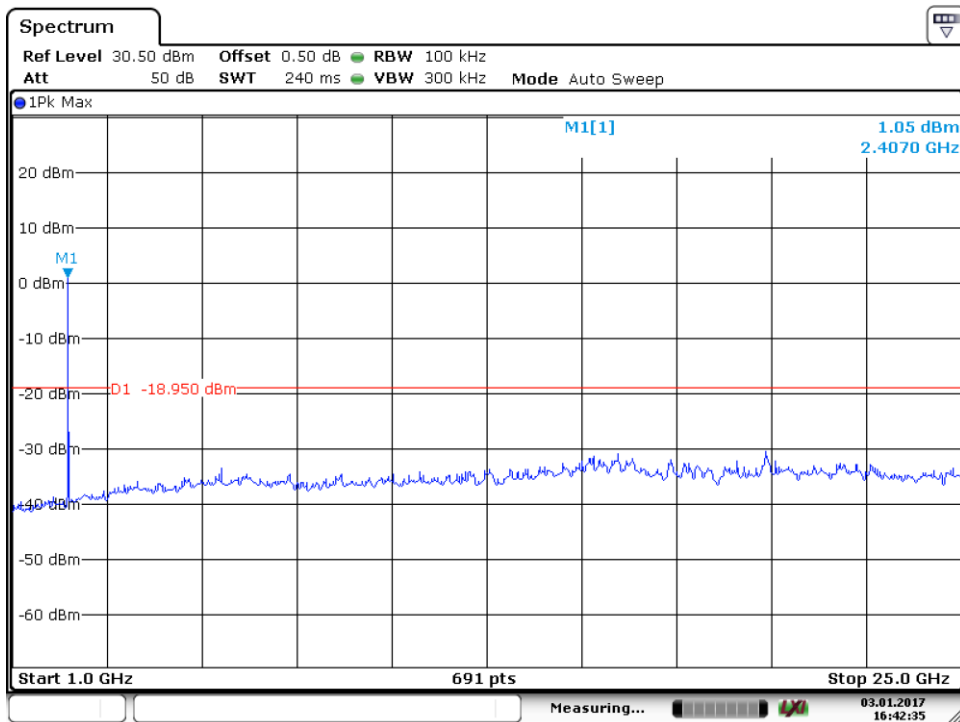


Date: 4.JAN.2017 09:56:19

802.11g_2412MHz_Antenna 1

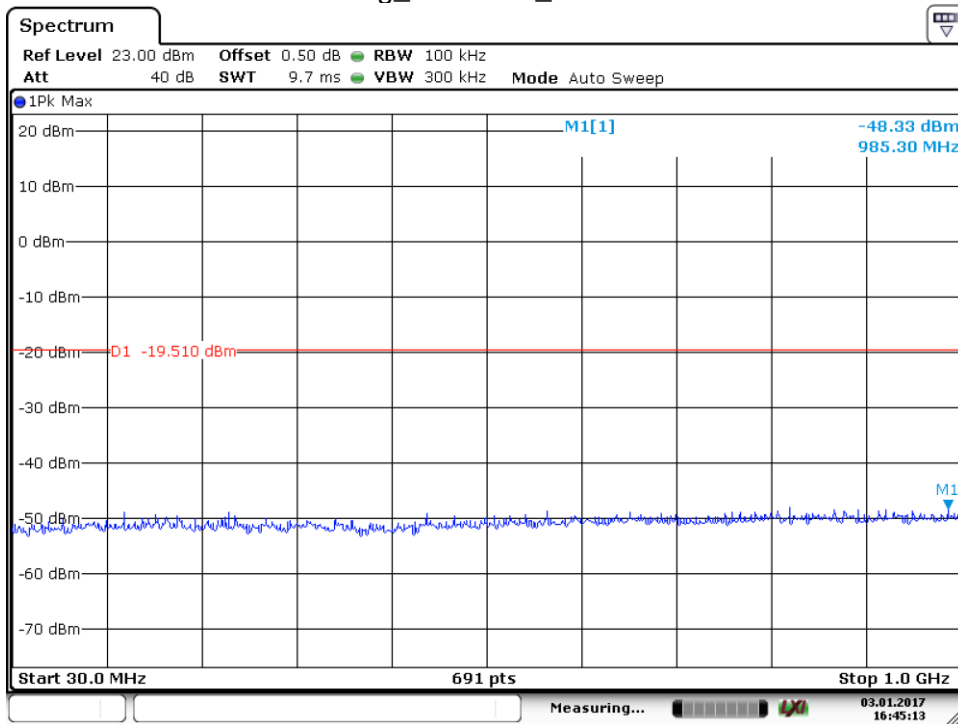


Date: 3.JAN.2017 16:44:11

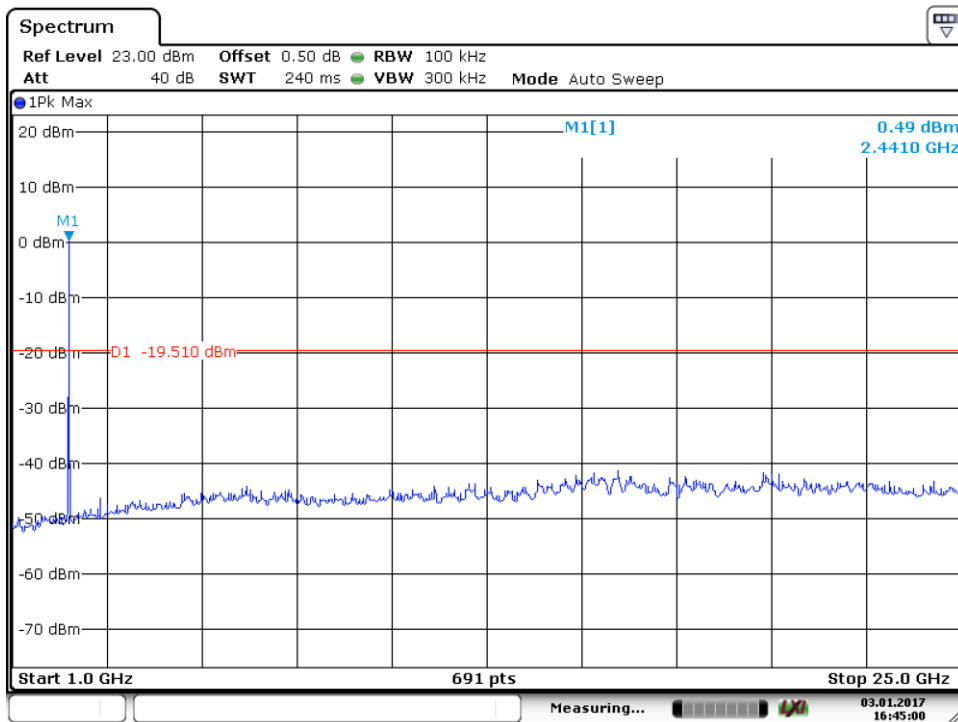


Date: 3.JAN.2017 16:42:35

802.11g_2437MHz_Antenna 1

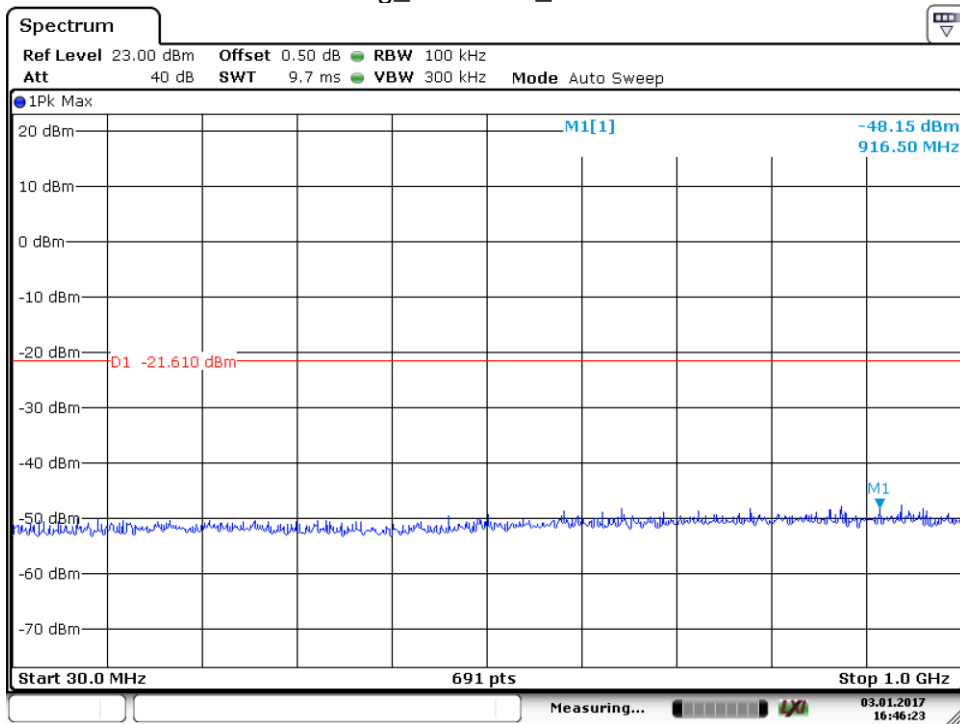


Date: 3.JAN.2017 16:45:14

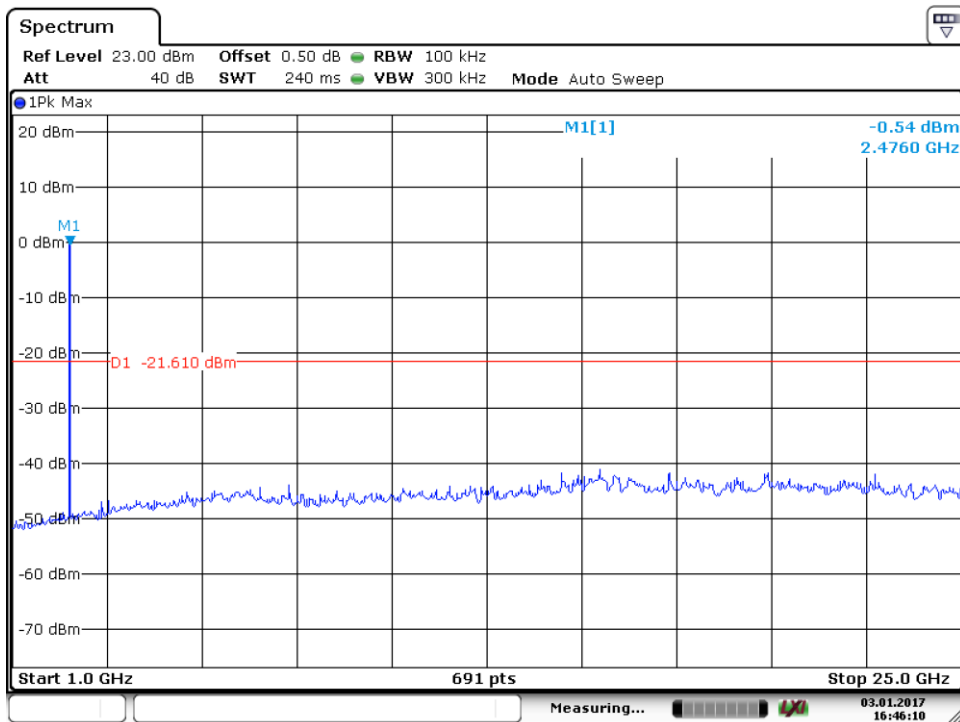


Date: 3.JAN.2017 16:45:00

802.11g_2462MHz_Antenna 1

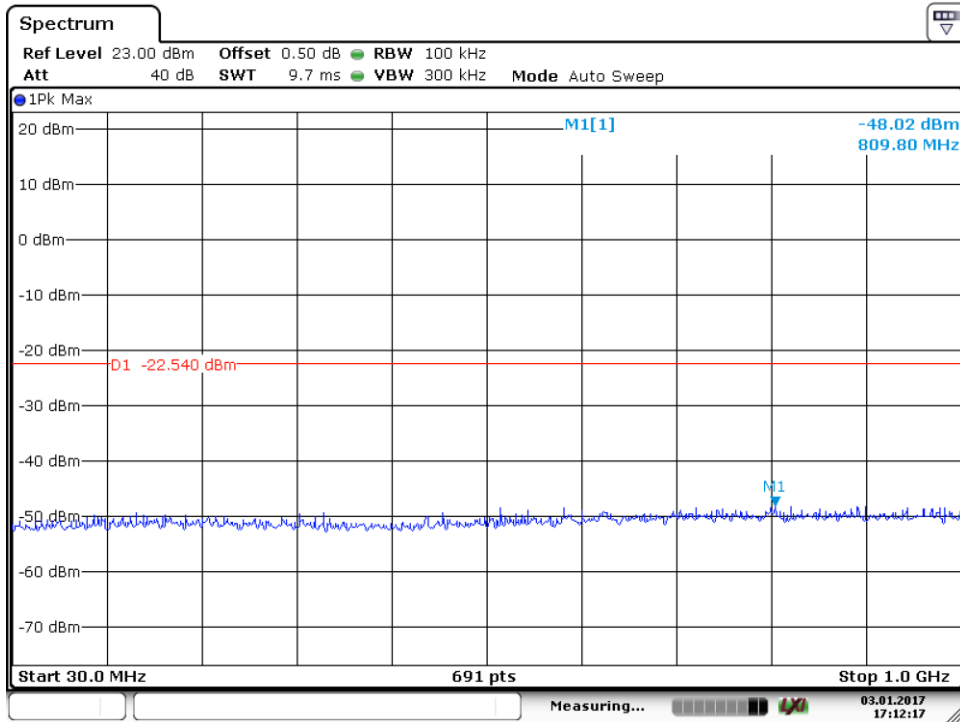


Date: 3.JAN.2017 16:46:23

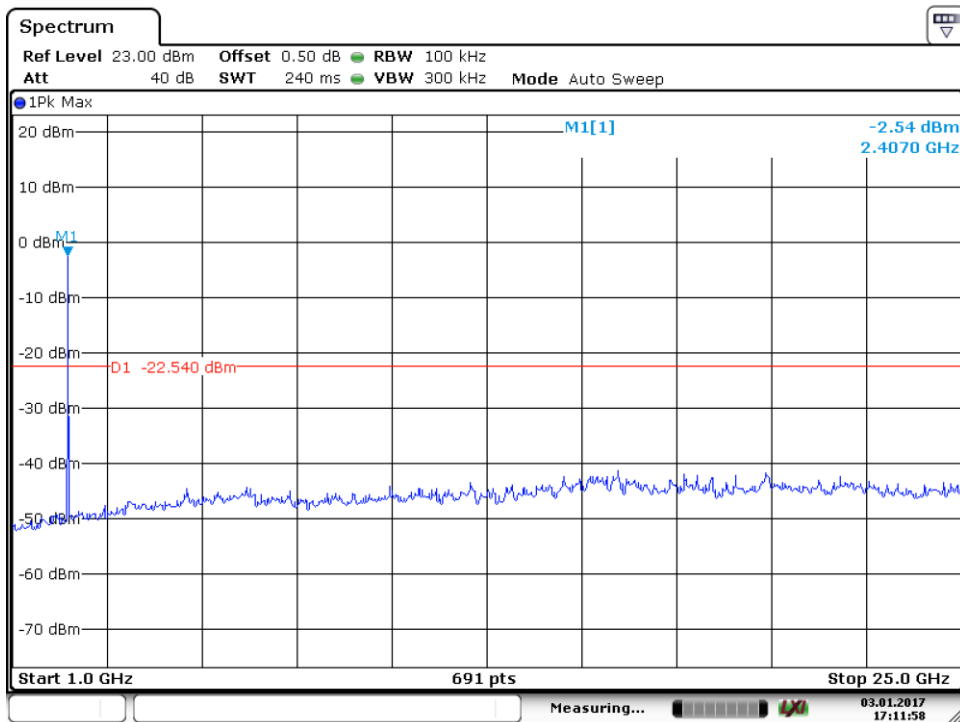


Date: 3.JAN.2017 16:46:10

802.11N20_2412MHz_MIMO

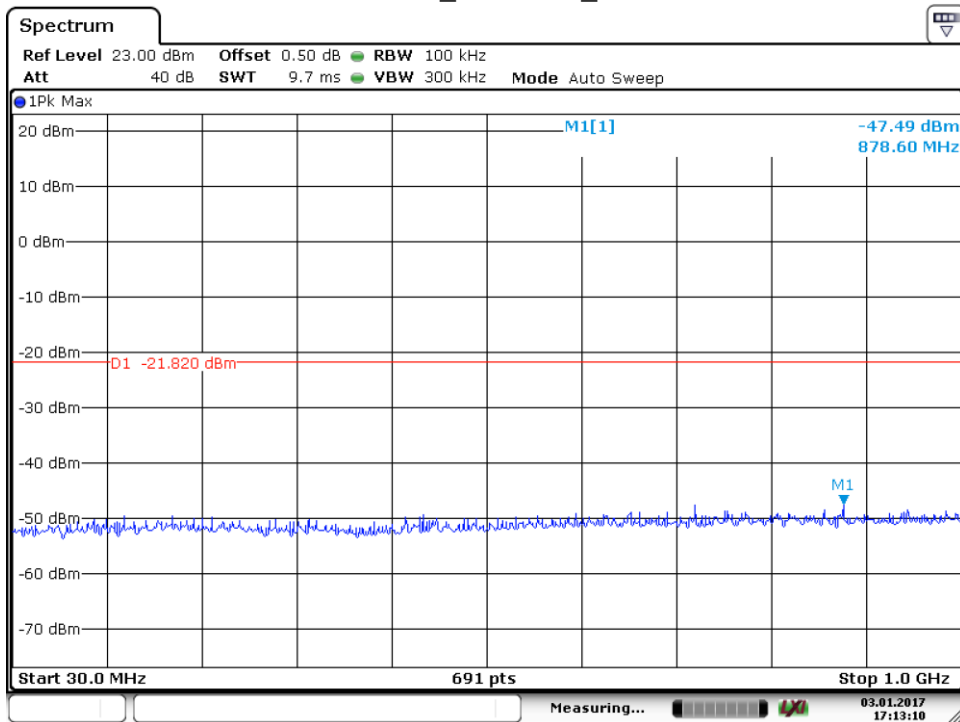


Date: 3.JAN.2017 17:12:16

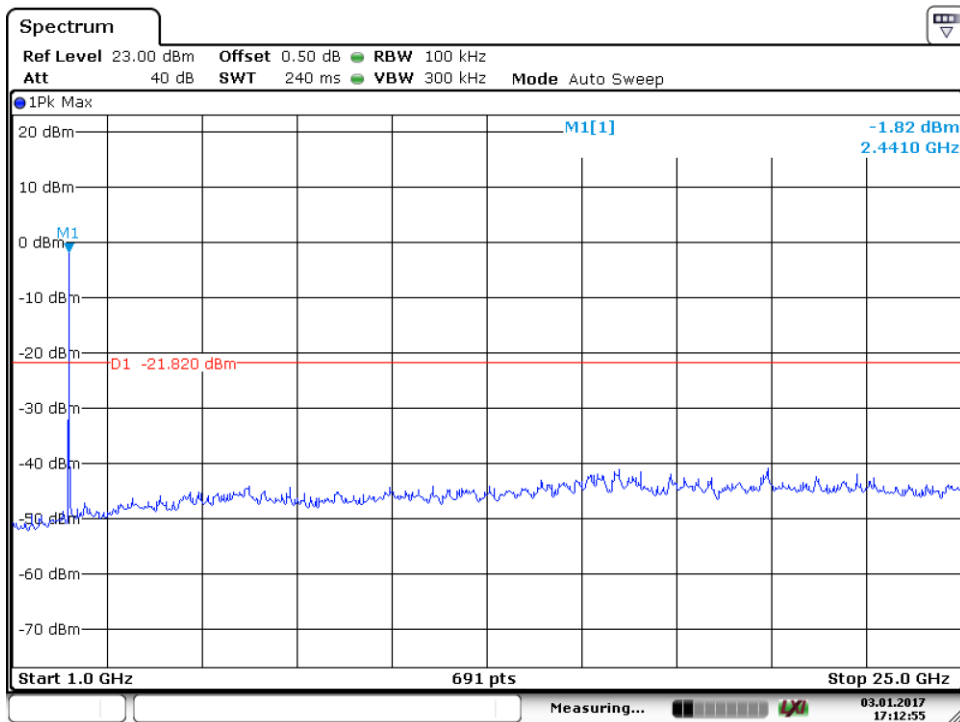


Date: 3.JAN.2017 17:11:58

802.11N20_2437MHz_MIMO

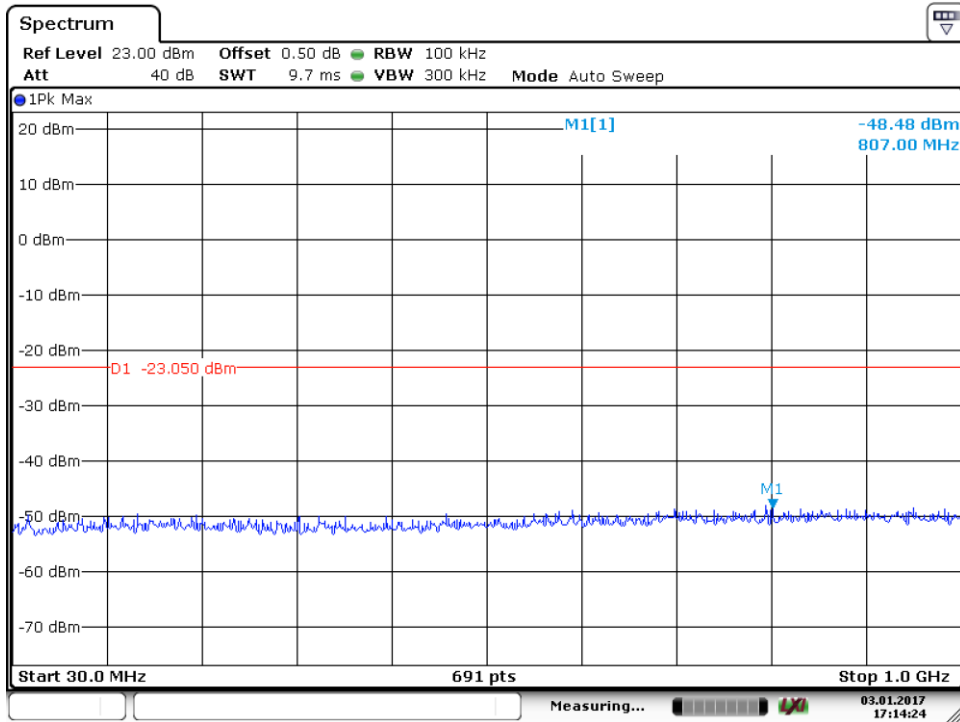


Date: 3.JAN.2017 17:13:11

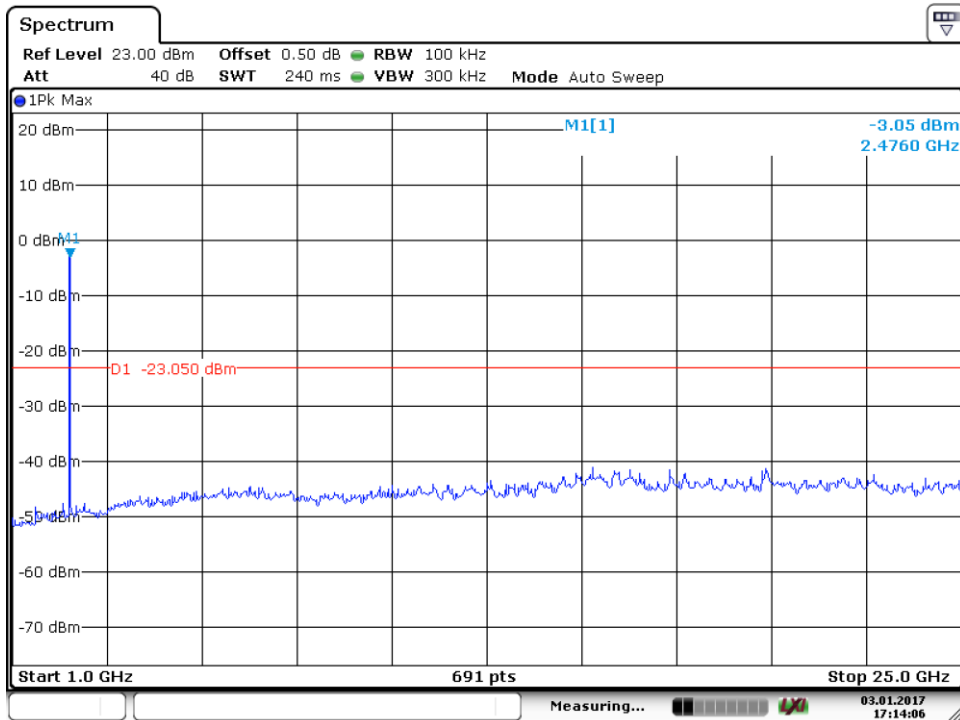


Date: 3.JAN.2017 17:12:55

802.11N20_2462MHz_MIMO

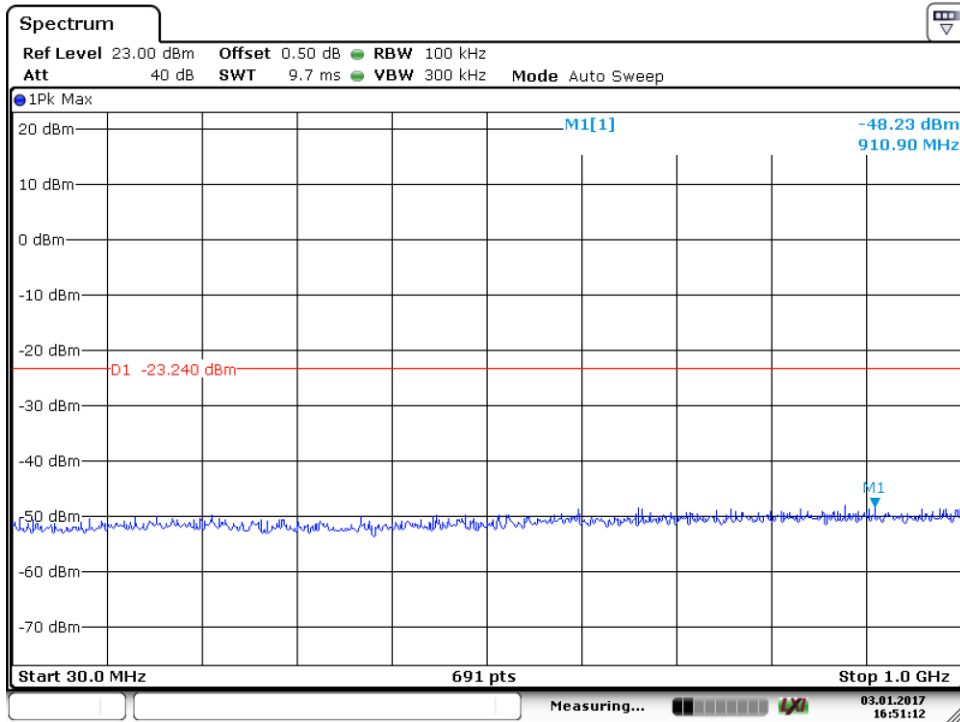


Date: 3.JAN.2017 17:14:25

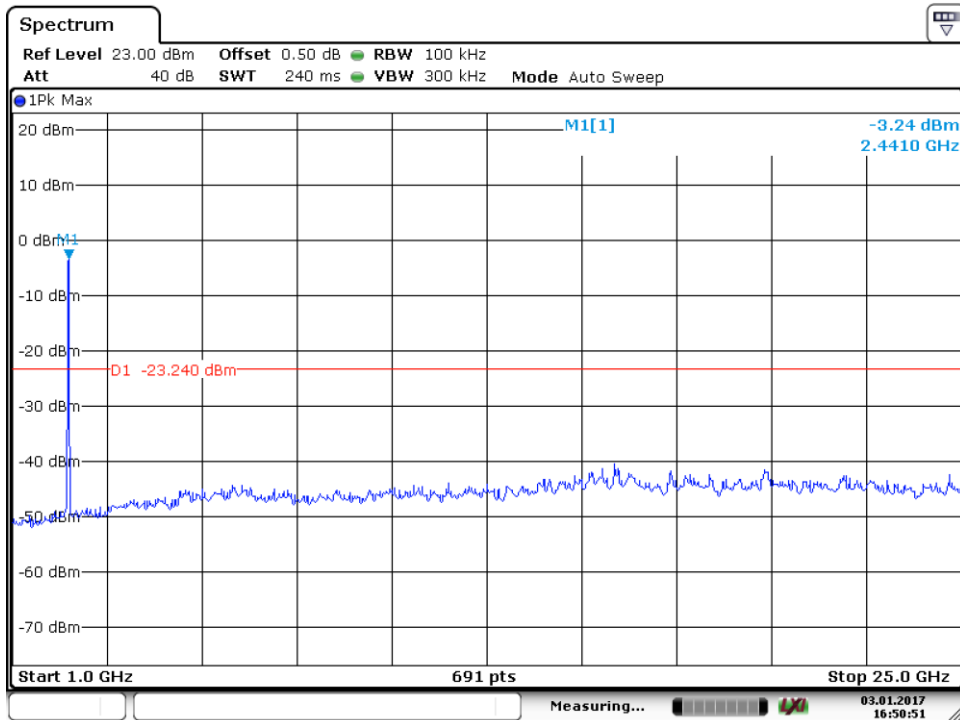


Date: 3.JAN.2017 17:14:06

802.11N40_2422MHz_MIMO

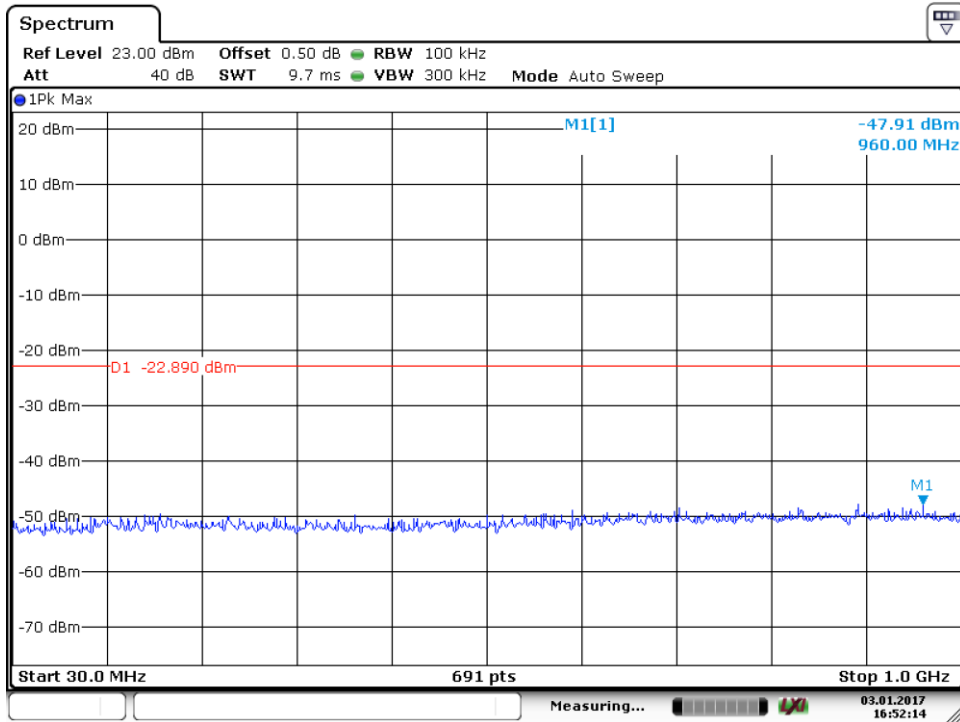


Date: 3.JAN.2017 16:51:13

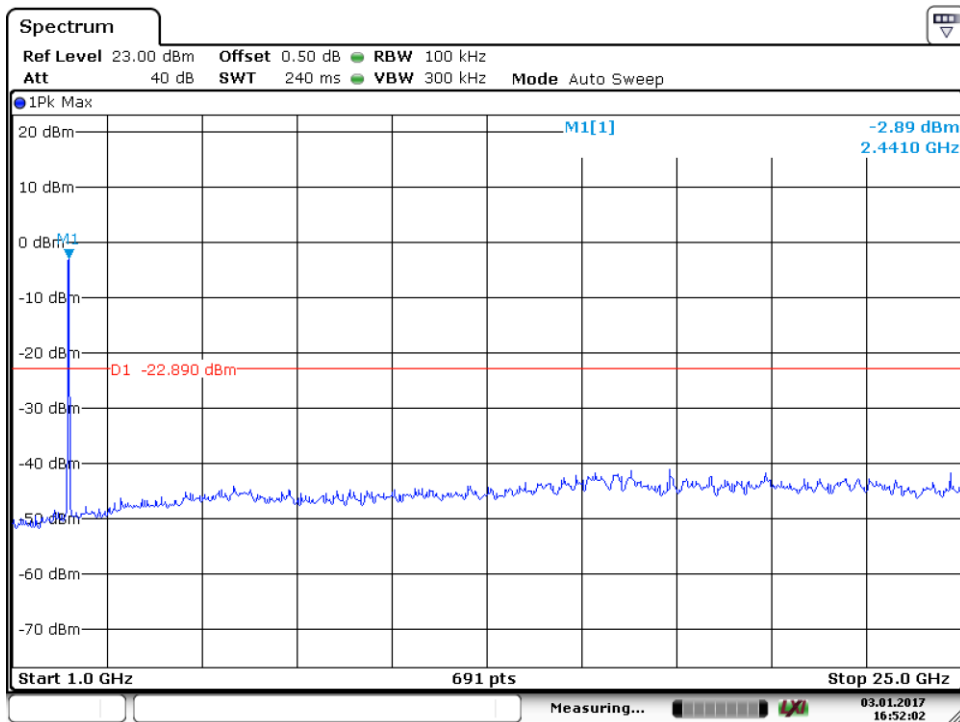


Date: 3.JAN.2017 16:50:51

802.11N40_2437MHz_MIMO

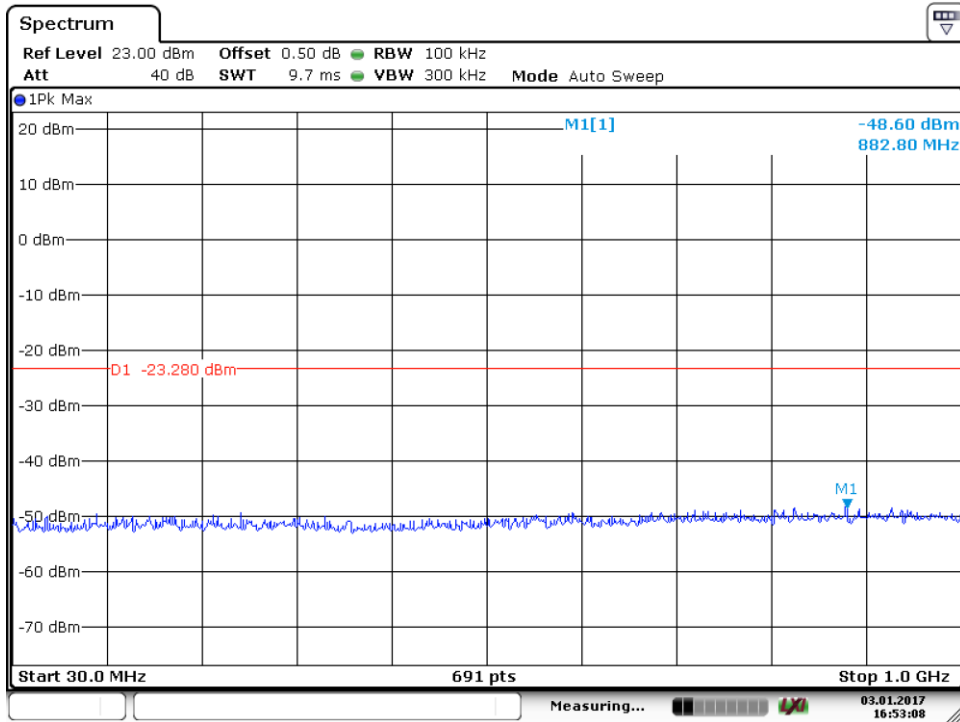


Date: 3.JAN.2017 16:52:14

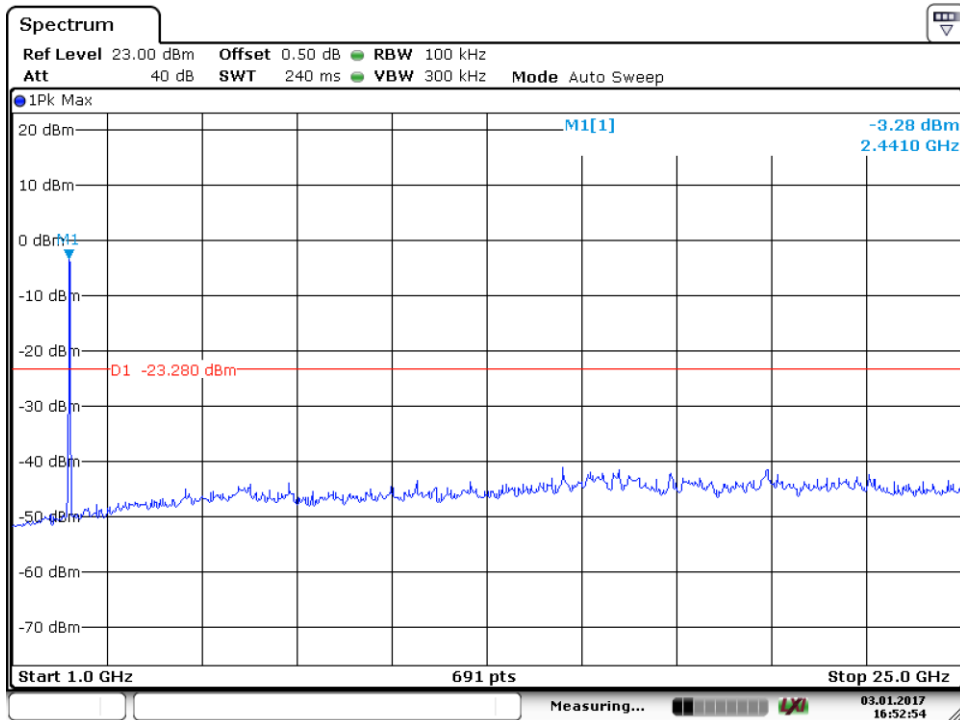


Date: 3.JAN.2017 16:52:02

802.11N40_2452MHz_MIMO



Date: 3.JAN.2017 16:53:08



Date: 3.JAN.2017 16:52:53

9.6 Band edge testing

Test Method

- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section. .
- 4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

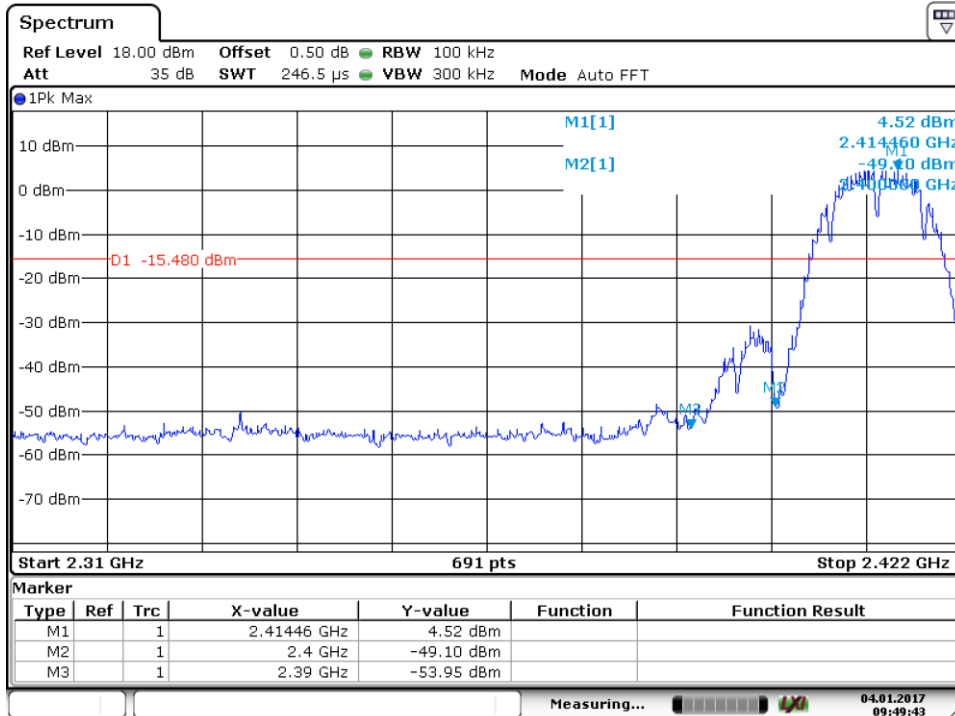
Limit:

According to §15.247(d) and RSS-210 A8.5, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) and RSS-Gen7.2.2, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

Band edge testing

Test Result:

802.11b_2412MHz_Antenna 0



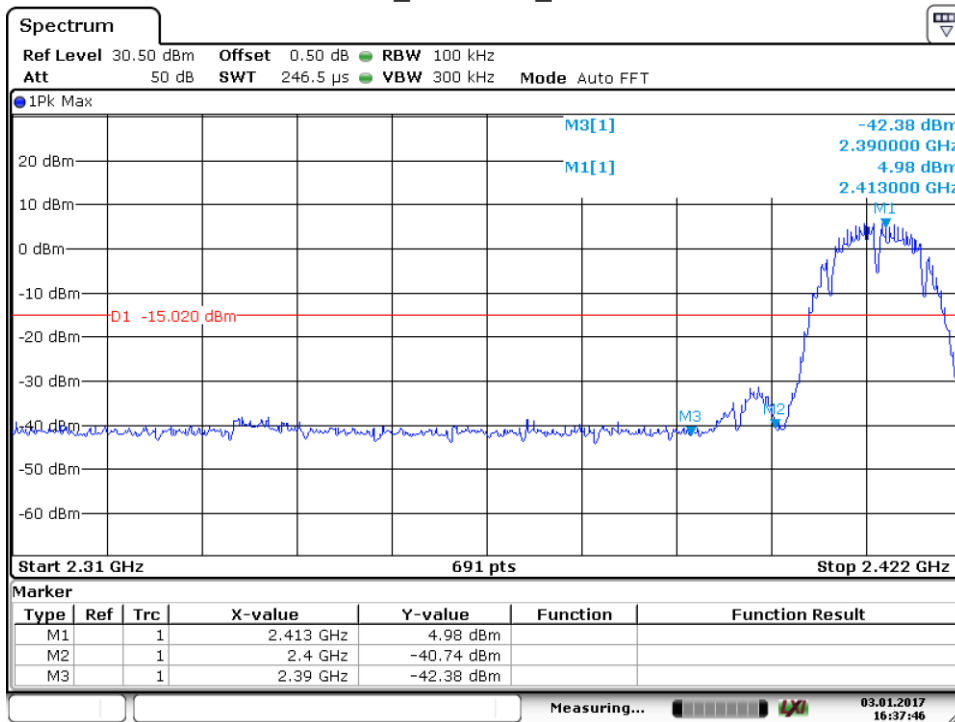
Date: 4.JAN.2017 09:49:42

802.11b_2462MHz_Antenna 0



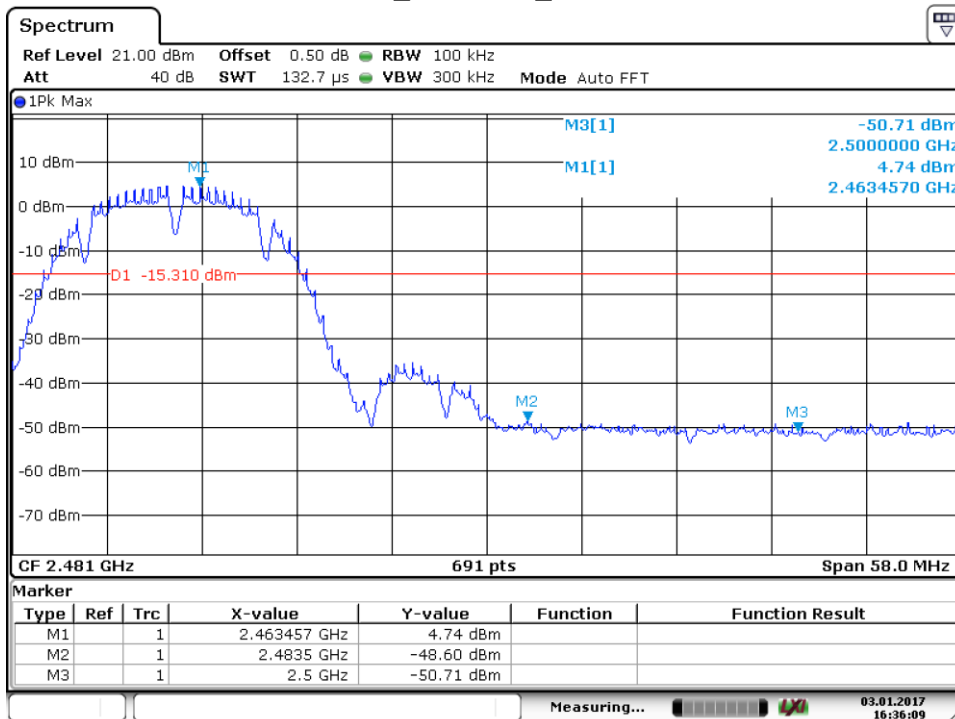
Date: 4.JAN.2017 09:41:42

802.11b_2412MHz_Antenna 1



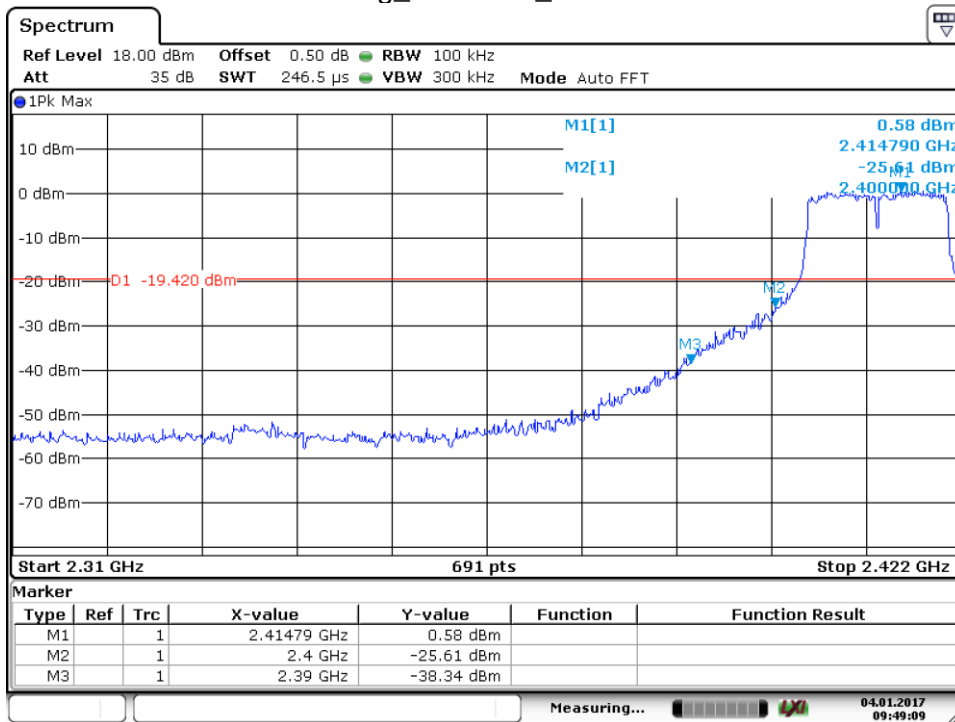
Date: 3.JAN.2017 16:37:46

802.11b_2462MHz_Antenna 1



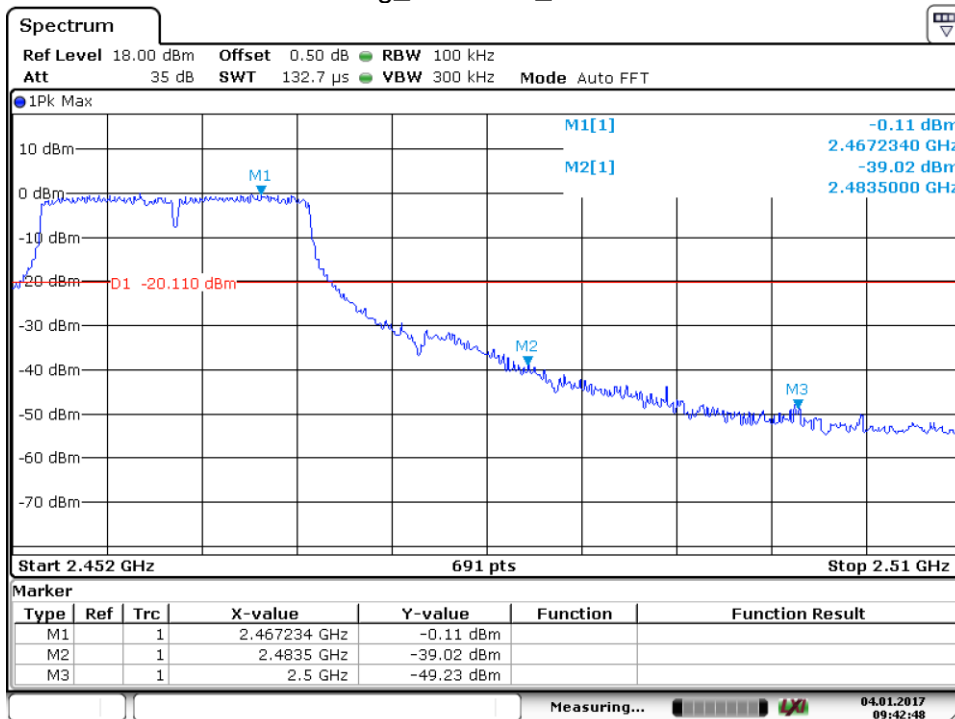
Date: 3.JAN.2017 16:36:09

802.11g_2412MHz_Antenna 0



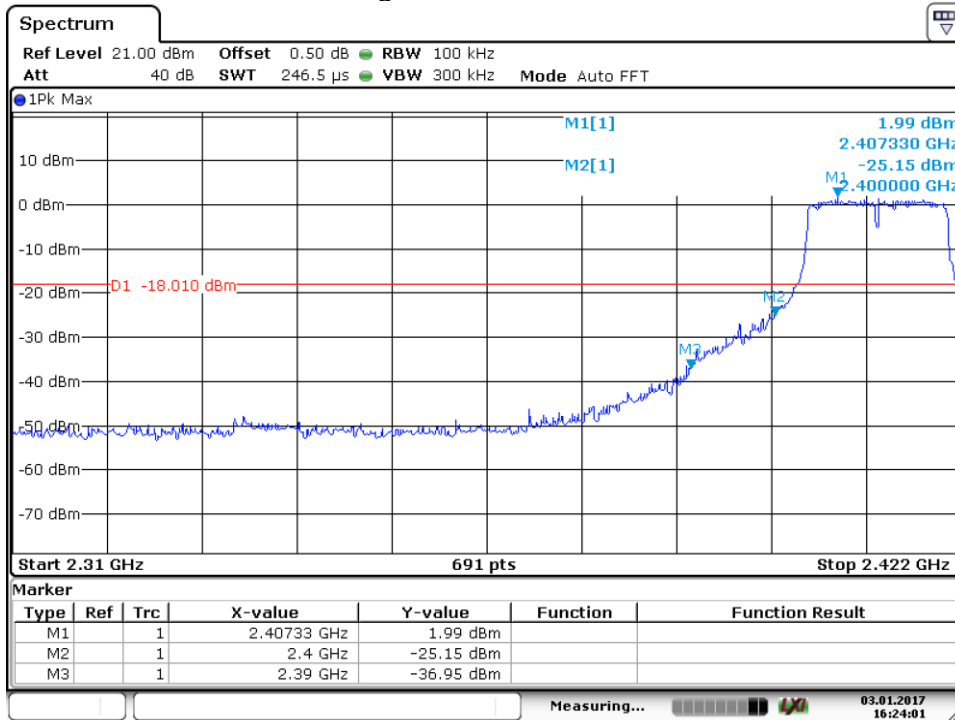
Date: 4.JAN.2017 09:49:09

802.11g_2462MHz_Antenna 0



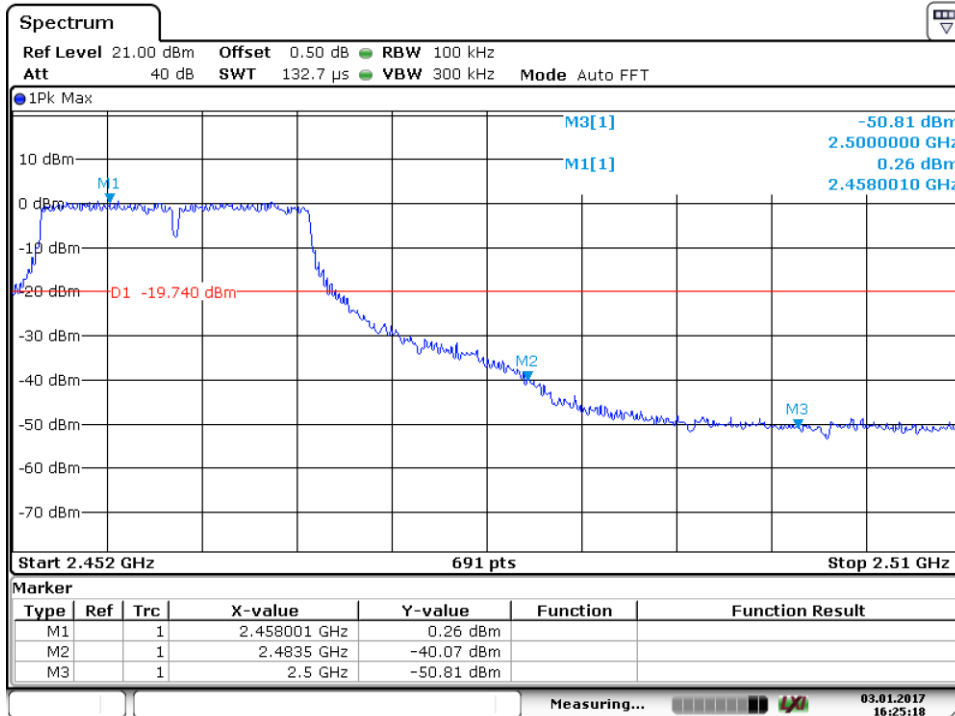
Date: 4.JAN.2017 09:42:48

802.11g_2412MHz_Antenna 1



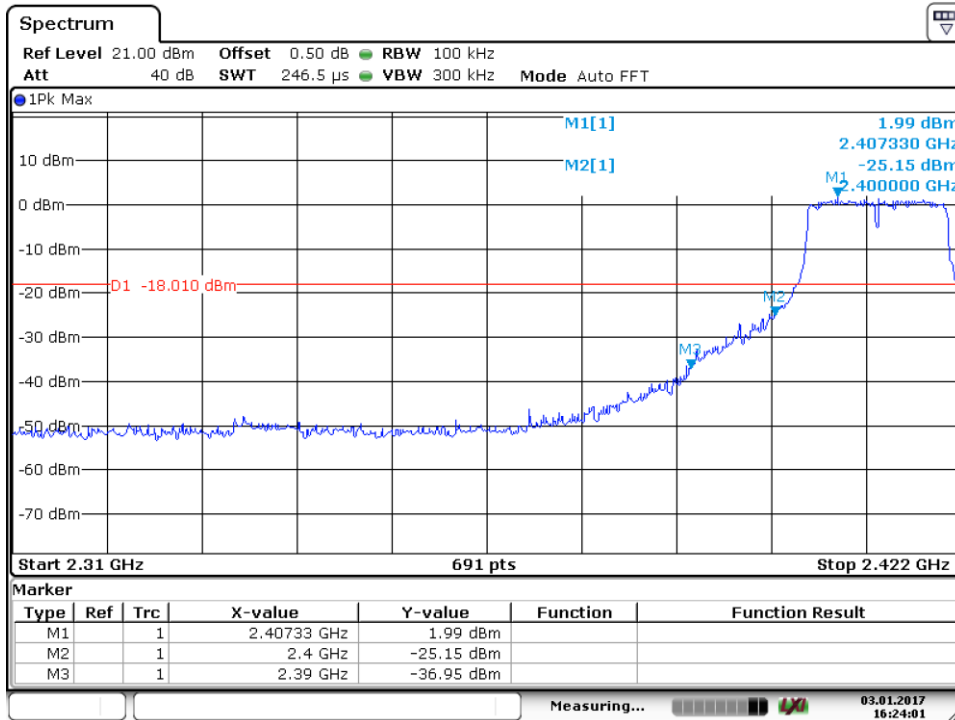
Date: 3.JAN.2017 16:24:01

802.11g_2462MHz_Antenna 1



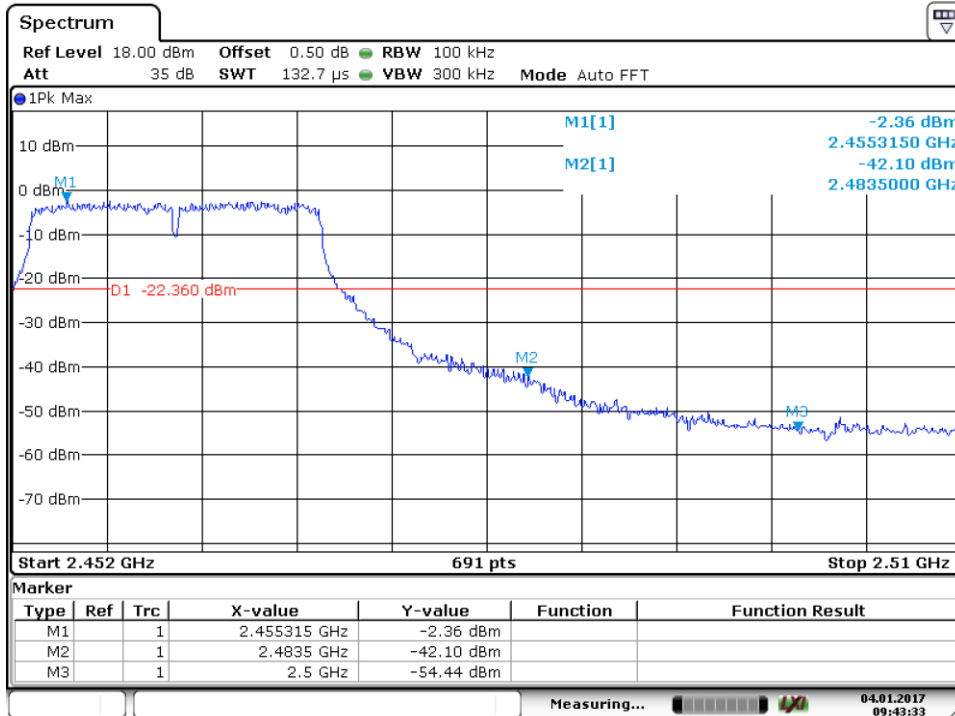
Date: 3.JAN.2017 16:25:17

802.11N20_2412MHz_MIMO



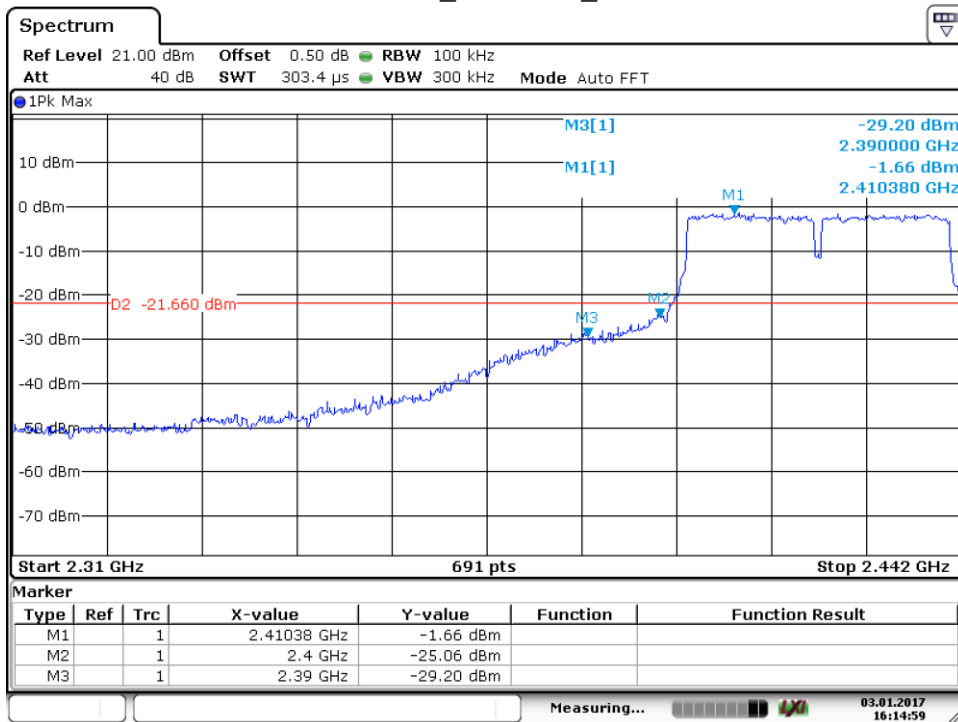
Date: 3.JAN.2017 16:24:01

802.11N20_2462MHz_MIMO



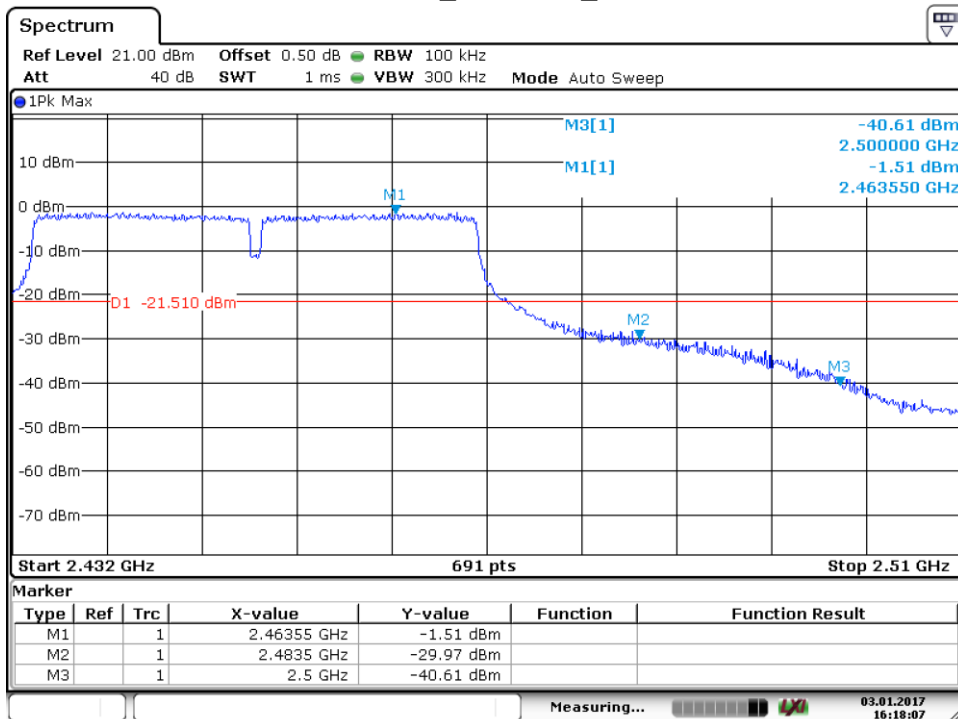
Date: 4.JAN.2017 09:43:34

802.11N40_2422MHz_MIMO



Date: 3.JAN.2017 16:15:00

802.11N40_2452MHz_MIMO



Date: 3.JAN.2017 16:18:06

9.7 Spurious radiated emissions for transmitter

Test Method

1. The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned
5. Use the following spectrum analyzer settings According to C63.10:
For Above 1GHz
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW \geq RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.
For Below 1GHz
Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, VBW \geq RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

Limit

According to part 15.247(d), the radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

The only worse case (802.11B mode) test result is listed in the report.

Transmitting spurious emission test result as below:

802.11B Modulation 2412MHz_Antenna 0 Test Result

Frequency	Emission Level	Polarization	Limit	Margin	Detector	Result
MHz	dBuV/m		dBuV/m	dB		
159.98	33.60	Horizontal	43.50	9.90	QP	Pass
320.84	41.34	Horizontal	46.00	4.66	QP	Pass
619.01	41.36	Horizontal	46.00	4.64	QP	Pass
64.06	33.87	Vertical	40.00	6.13	QP	Pass
74.51	31.97	Vertical	40.00	8.03	QP	Pass
256.33	41.82	Vertical	46.00	4.18	QP	Pass
320.62	44.48	Vertical	46.00	1.52	QP	Pass
2560	51.75	Horizontal	74.00	22.25	PK	Pass
*4824	41.55	Horizontal	74.00	32.45	PK	Pass
2560	52.16	Vertical	74.00	21.84	PK	Pass
*4824	41.40	Vertical	74.00	32.60	PK	Pass

802.11B Modulation 2437MHz_Antenna 0 Test Result

Frequency	Emission Level	Polarization	Limit	Margin	Detector	Result
MHz	dBuV/m		dBuV/m	dB		
2560	52.06	Horizontal	74.00	21.94	PK	Pass
*4874	38.68	Horizontal	74.00	35.32	PK	Pass
2560	52.18	Vertical	74.00	21.82	PK	Pass
*4874	40.78	Vertical	74.00	33.22	PK	Pass

802.11B Modulation 2462MHz_Antenna 0 Test Result

Frequency	Emission Level	Polarization	Limit	Margin	Detector	Result
MHz	dBuV/m		dBuV/m	dB		
2560	51.67	Horizontal	74.00	22.33	PK	Pass
*4924	40.53	Horizontal	74.00	33.47	PK	Pass
2560	51.84	Vertical	74.00	22.16	PK	Pass
*4924	40.43	Vertical	74.00	33.57	PK	Pass

Remark:

- (1) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (2) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

10 Test Equipment List

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2017-7-15
RE	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2017-7-15
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2017-8-3
	Horn Antenna	Rohde & Schwarz	HF907	102294	2017-7-15
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2017-7-15
	Signal Generator	Rohde & Schwarz	SMY01	839369/005	2017-7-15
	Attenuator	Agilent	8491A	MY39264334	2017-8-10
	3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A	

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth
- Power spectral density
- Spurious RF conducted emissions
- Band edge

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.99dB; Vertical: 4.97dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	Horizontal: 4.96dB; Vertical: 4.95dB;
Uncertainty for Conducted RF test	Power level test involved: 2.06dB Frequency test involved: 1.16×10^{-7}