Report Number: 68.950.15.274.01

FCC/IC - TEST REPORT

Report Number	:	**68.950.15.274.01**	Date of Issue:	October 20, 2015
Model	:	**NM112BU**		
Product Type	:	Video Baby Monitor (Baby Unit)		
Applicant	:	Cvision (HK) Limited		
Address	:	Rm 902, Wilson House, 19-27 Wyndham Street, Central, Hong Kong.		
Production Facility	:	TATUNG COMPANY		
Address	:	22 Chungshan N. Rd. 3rd Sec. Taipei 104 Taiwan.		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	49		

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1 Table of Contents

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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 No.:	502708
IC Registration No:	10320A-1
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299

3 Description of the Equipment Under Test

Product:	Video Baby Monitor (Baby unit)
Model no.:	NM112BU
FCC ID:	2AC9F-112BU
IC ID:	12001A-112BU
Options and accessories:	NIL
Rating:	DC 5.0V/1000mA Powered by external power supply: Adaptor Input: 100-240VAC, 50/60Hz; 200mA Adaptor Output: 5.0V, 1000mA
RF Transmission Frequency:	2412-2462MHz 2422-2452MHz
No. of Operated Channel:	11 7
Modulation:	OFDM, DSSS
Antenna Type:	Integral Antenna
Antenna Gain:	0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Baby Monitor operated at 2.4GHz

Channel list (MHz) (802.11b/g/n – HT20)				
CH 1 = 2412	CH 2 = 2417	CH 3 = 2422	CH 4 = 2427	CH 5 = 2432
CH 6 = 2437	CH 7 = 2442	CH 8 = 2447	CH 9 = 2452	CH 10 = 2457
CH 11 = 2462	---	---	---	---

Channel list (MHz) (802.11n – HT40)				
CH 3 = 2422	CH 4 = 2427	CH 5 = 2432	CH 6 = 2437	CH 7 = 2442
CH 8 = 2447	CH 9 = 2452	---	---	---

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 4 November 2014	General Requirements for the Certification of Radio Apparatus
RSS-247 Issue 1 May 2015	RSS-247 —Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices
RSS-102 Issue 5 March 2015	Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)

All the test methods were according to KDB558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2013).

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5 Summary of Test Results

Technical Requirements							
FCC Part 15 Subpart C, RSS-Gen, RSS-247							
Test Condition			Pages	Test Site	Test Result		
					Pass	Fail	N/A
§15.207	RSS-GEN A8.8	Conducted emission AC power port	10	Site 1	☒	☐	☐
§15.247 (b) (1)	RSS-247 5.4(4)	Conducted peak output power	13	Site 1	☒	☐	☐
§15.247(a)(1)	RSS-247 5.1(2)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	RSS-247 5.1(2)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	RSS-247 5.1(3)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	RSS-247 5.1(3)	Dwell Time	---	---	☐	☐	☒
§15.247(a)(2)	RSS-247 5.2 (1)	6dB bandwidth and 99% Occupied Bandwidth	14	Site 1	☒	☐	☐
§15.247(e)	RSS-247 5.2 (2)	Power spectral density	24	Site 1	☒	☐	☐
§15.247(d)	RSS-247 5.5	Spurious RF conducted emissions	26	Site 1	☒	☐	☐
§15.247(d)	RSS-247 5.5	Band edge	39	Site 1	☒	☐	☐
§15.247(d) & §15.209	RSS-247 5.5 & RSS-GEN 6.13	Spurious radiated emissions for transmitter	40	Site 1	☒	☐	☐
---	RSS-102 Section 2.2.5	RF Exposure Evaluation	47	Site 1	☒	☐	☐
§15.203	RSS-GEN 8.3	Antenna requirement	See note 2		☒	☐	☐

Note 1: N/A=Not Applicable.
Note 2: The EUT uses an integral antenna, which gain is 0dBi. In accordance to §15.203 and § RSSGEN 8.3, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AC9F-112BU, IC: 12001A-112BU complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules, RSS-Gen, RSS-247 and RSS-102.

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: September 21, 2015

Testing Start Date: September 21, 2015

Testing End Date: October 19, 2015

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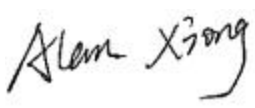
Reviewed by:

John Zhi
EMC Project Manager

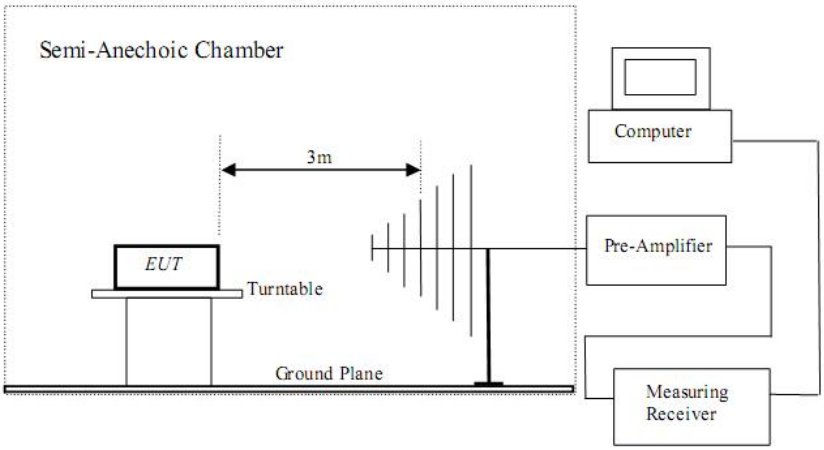
Prepared by:



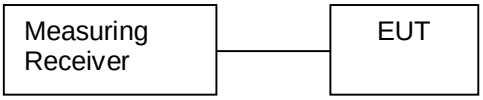
Alan Xiong
EMC Project Engineer

7 Test Setups

7.1 Radiated test setups



7.2 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenovo	X240	---

The system was configured to channel 1(2412MHz), 6(2437MHz), and 11(2462MHz) for the test.

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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 a 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 & RSS-GEN A8.8, conducted emissions limit as below:

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

Decreasing linearly with logarithm of the frequency

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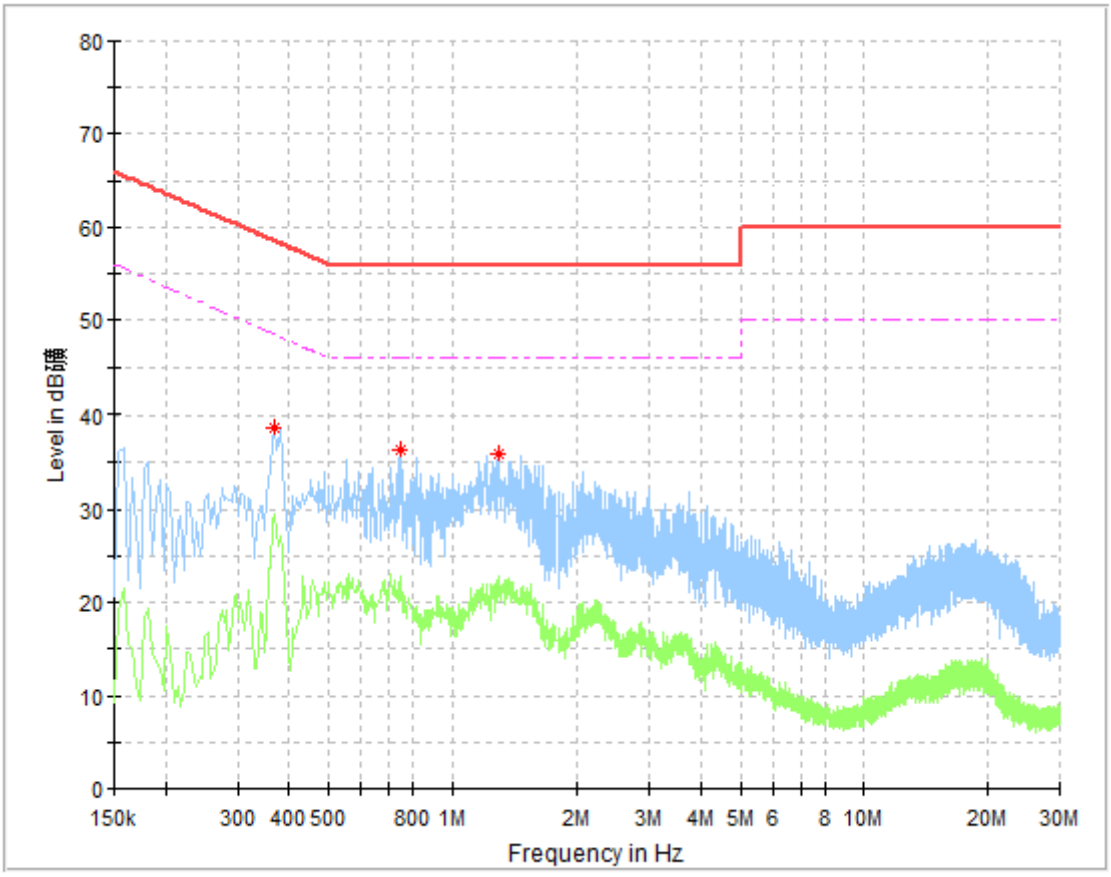
Product Type	:	Video Baby Monitor (Baby Unit)
M/N	:	NM112BU
Operating Condition	:	Transmitting
Test Specification	:	Line
Comment	:	AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.370000	38.57	58.50	19.93	L1	10.2
0.746000	36.31	56.00	19.69	L1	9.9
1.294000	35.98	56.00	20.02	L1	9.8

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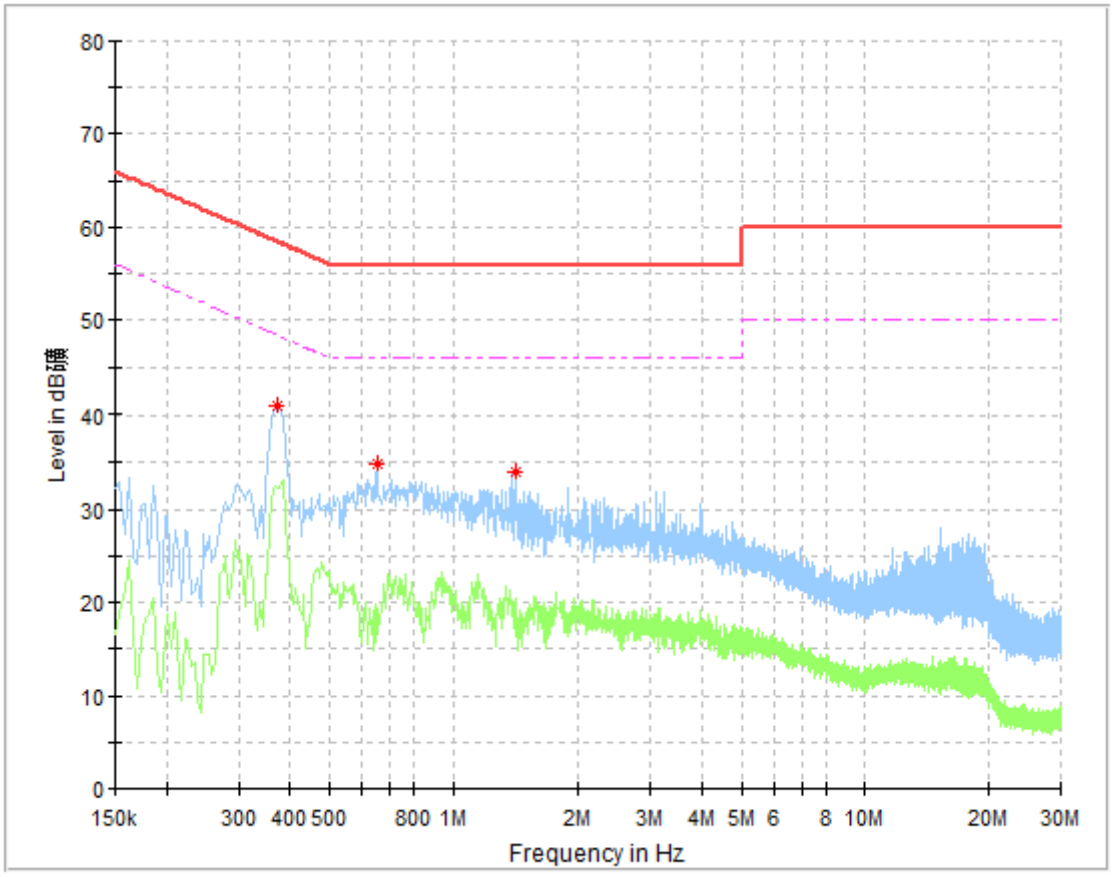
Product Type	:	Video Baby Monitor (Baby Unit)
M/N	:	NM112BU
Operating Condition	:	Transmitting
Test Specification	:	Neutral
Comment	:	AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.374000	40.95	58.41	17.46	N	10.1
0.654000	34.89	56.00	21.11	N	9.9
1.422000	33.89	56.00	22.11	N	9.8

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9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   RBW > the 6 dB bandwidth of the emission being measured, VBW≥3RBW, Span≥3RBW
   Sweep = auto, Detector function = peak, Trace = max hold.
2. Add a correction factor to the display.
3. Use a power meter to measure the conducted peak output power.

Limits

According to §15.247 (b) (1) && RSS-247 5.4(4), conducted peak output power limit as below:

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

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Conducted peak output power

Test result as below table

802.11B

Frequency	Conducted Peak Output Power	Result
MHz	**dBm**	
Low channel 2412MHz	17.45	Pass
Middle channel 2437MHz	17.78	Pass
High channel 2462MHz	17.47	Pass

802.11G

Frequency	Conducted Peak Output Power	Result
MHz	**dBm**	
Low channel 2412MHz	15.43	Pass
Middle channel 2437MHz	15.77	Pass
High channel 2462MHz	13.89	Pass

802.11N20

Frequency	Conducted Peak Output Power	Result
MHz	**dBm**	
Low channel 2412MHz	13.95	Pass
Middle channel 2437MHz	14.07	Pass
High channel 2462MHz	13.37	Pass

802.11N40

Frequency	Conducted Peak Output Power	Result
MHz	**dBm**	
Low channel 2422MHz	12.36	Pass
Middle channel 2437MHz	12.23	Pass
High channel 2452MHz	12.19	Pass

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9.3 6dB bandwidth and 99% Occupied Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
   RBW=100K, VBW≥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 ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]
≥500

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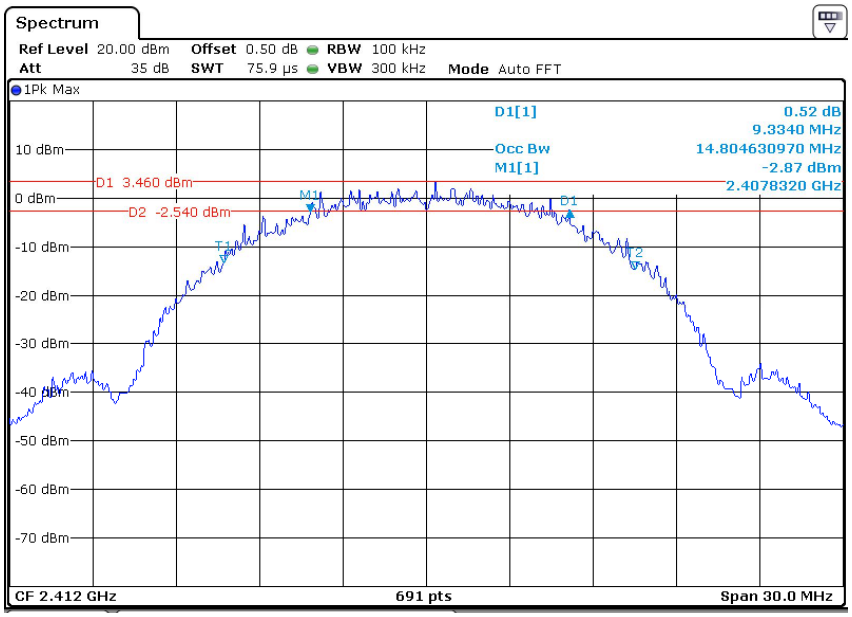
6dB bandwidth and 99% Occupied Bandwidth

Test result

802.11B

Frequency MHz	6dB bandwidth MHz	99% occupied bandwidth MHz	Result
Low channel 2412MHz	9.334	14.805	Pass
Middle channel 2437MHz	9.334	14.761	Pass
High channel 2462MHz	9.291	14.935	Pass

2412MHz



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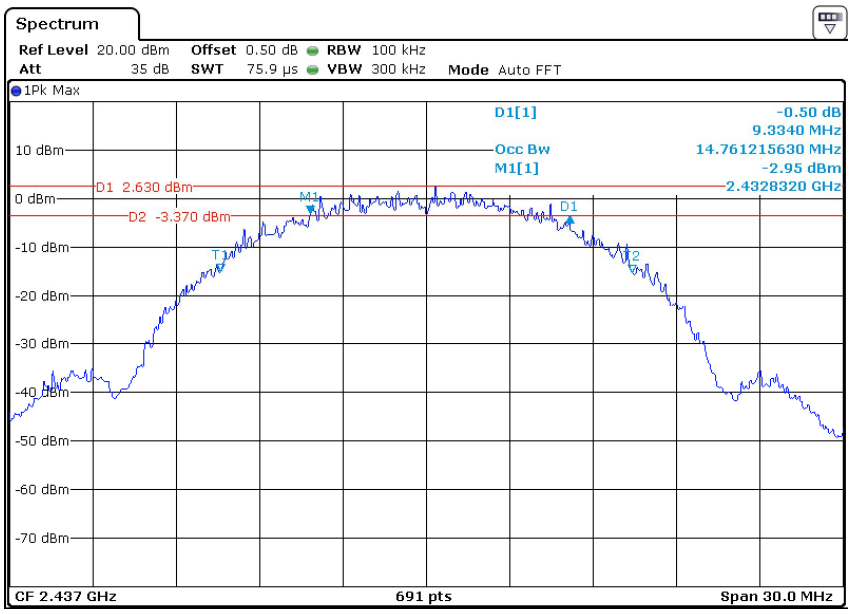
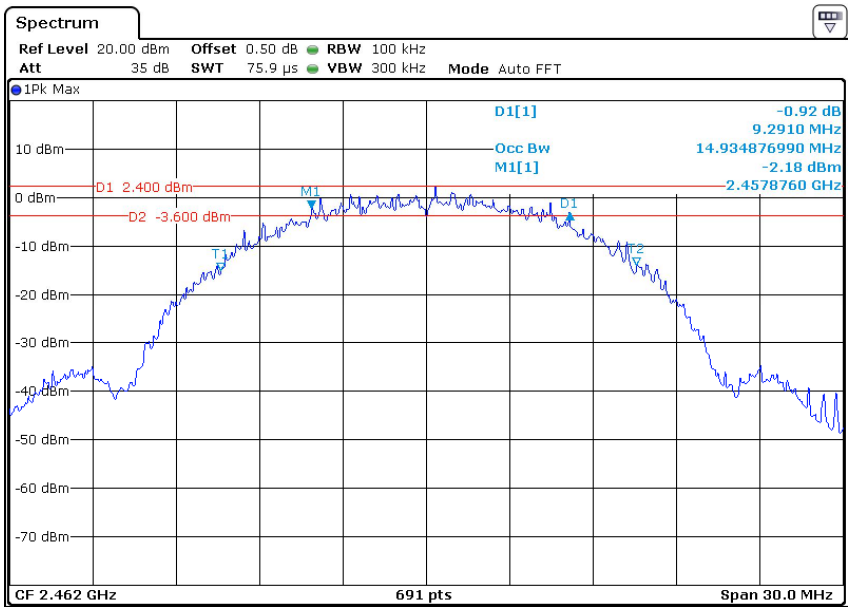
2437MHz



2462MHz



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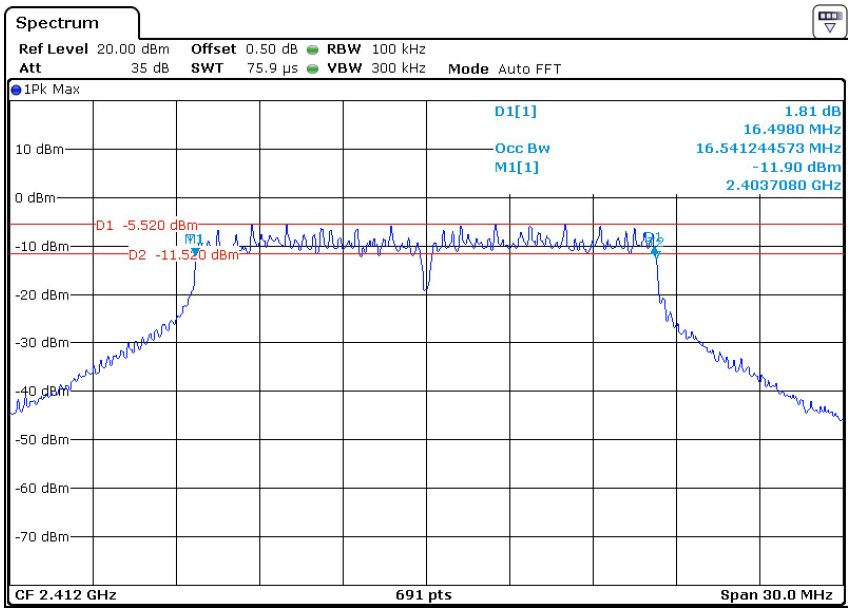
802.11G

Frequency MHz	6dB bandwidth MHz	99% occupied bandwidth MHz	Result
Low channel 2412MHz	16.498	16.541	Pass
Middle channel 2437MHz	16.498	16.498	Pass
High channel 2462MHz	16.494	16.541	Pass

2412MHz



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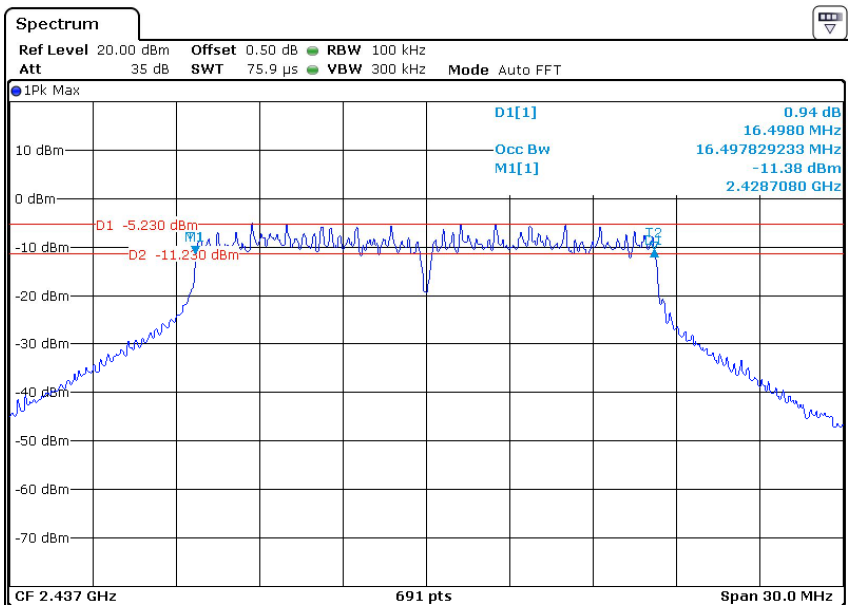
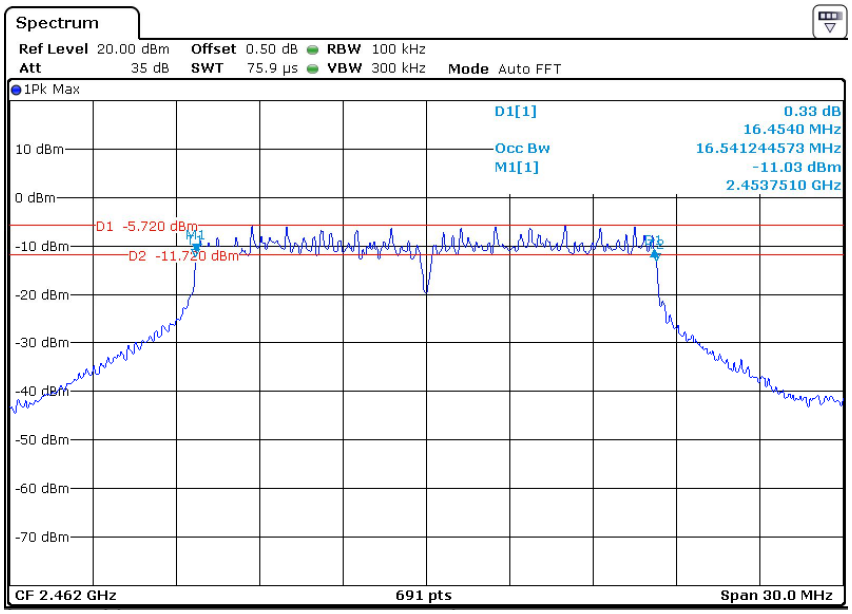
2437MHz



2462MHz



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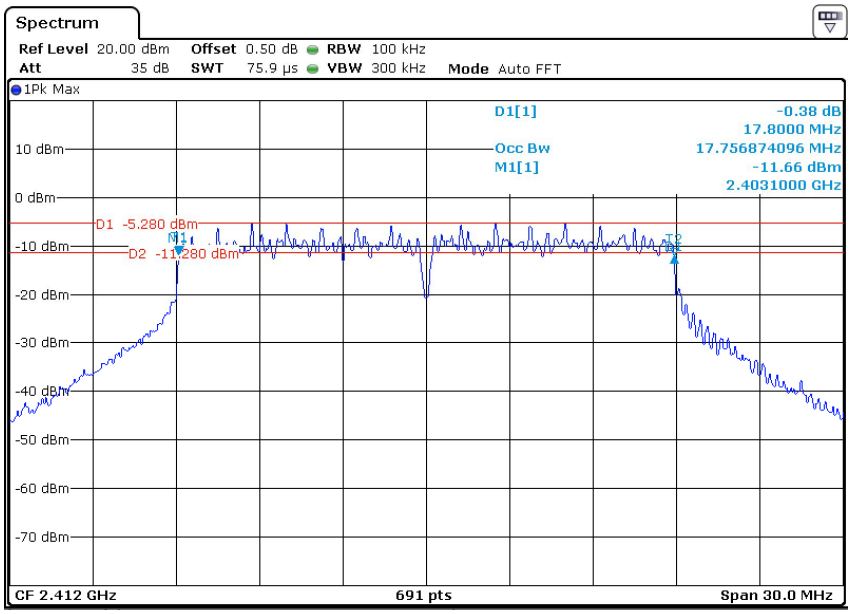
802.11N20

Frequency MHz	6dB bandwidth MHz	99% occupied bandwidth MHz	Result
Low channel 2412MHz	17.800	17.757	Pass
Middle channel 2437MHz	17.670	17.757	Pass
High channel 2462MHz	17.713	17.757	Pass

2412MHz



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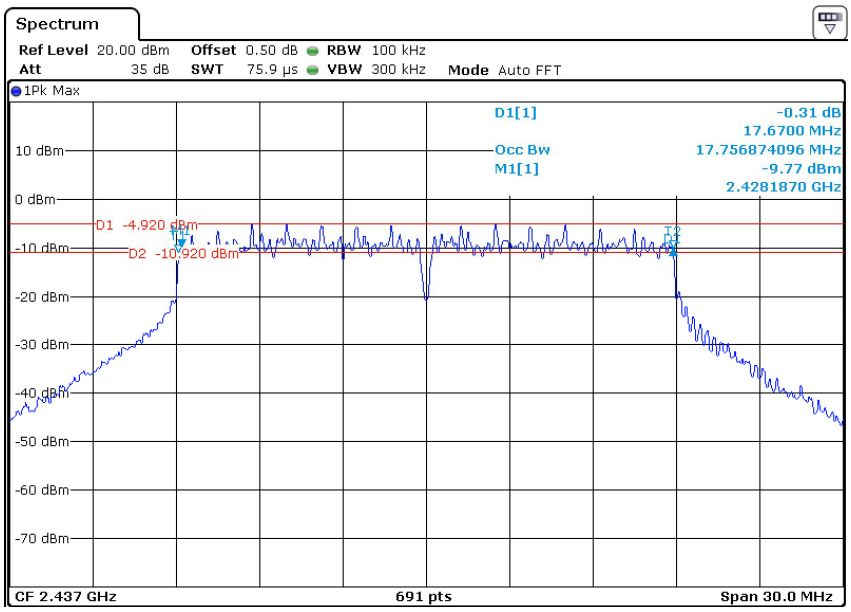
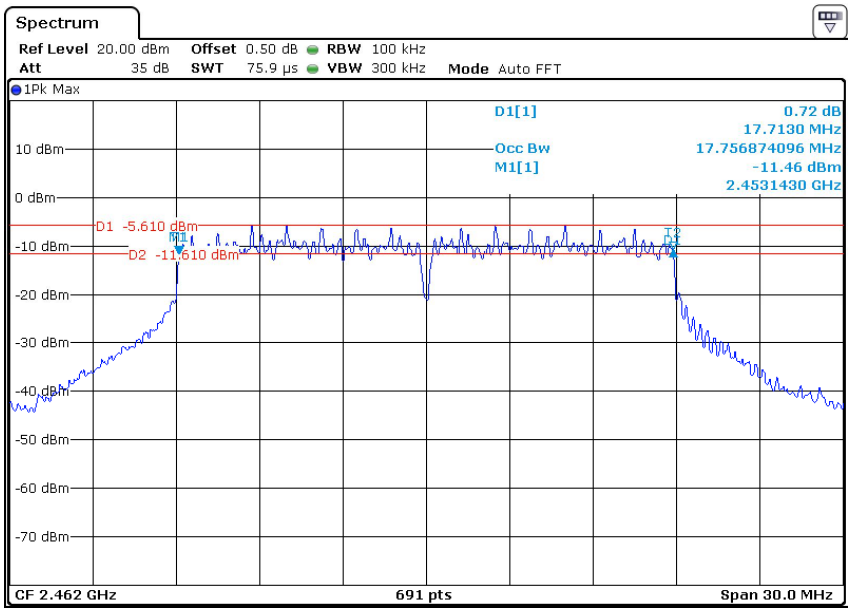
2437MHz



2462MHz



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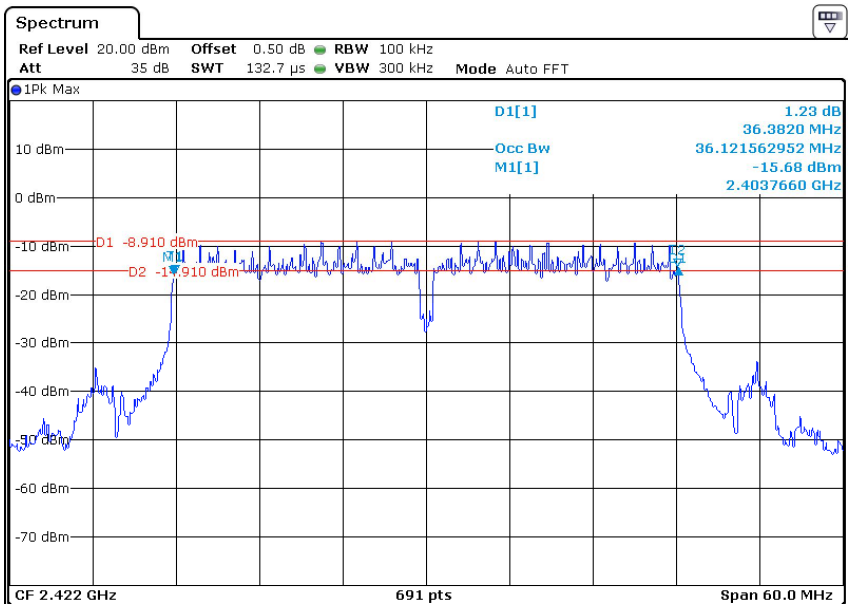
802.11N40

Frequency MHz	6dB bandwidth MHz	99% occupied bandwidth MHz	Result
Low channel 2422MHz	36.382	36.122	Pass
Middle channel 2437MHz	36.208	36.122	Pass
High channel 2452MHz	36.469	36.122	Pass

2422MHz



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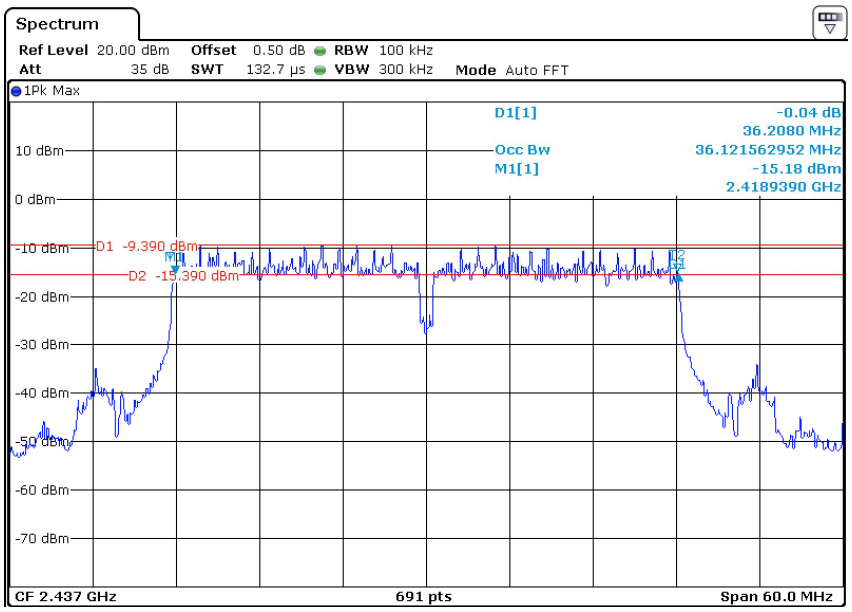
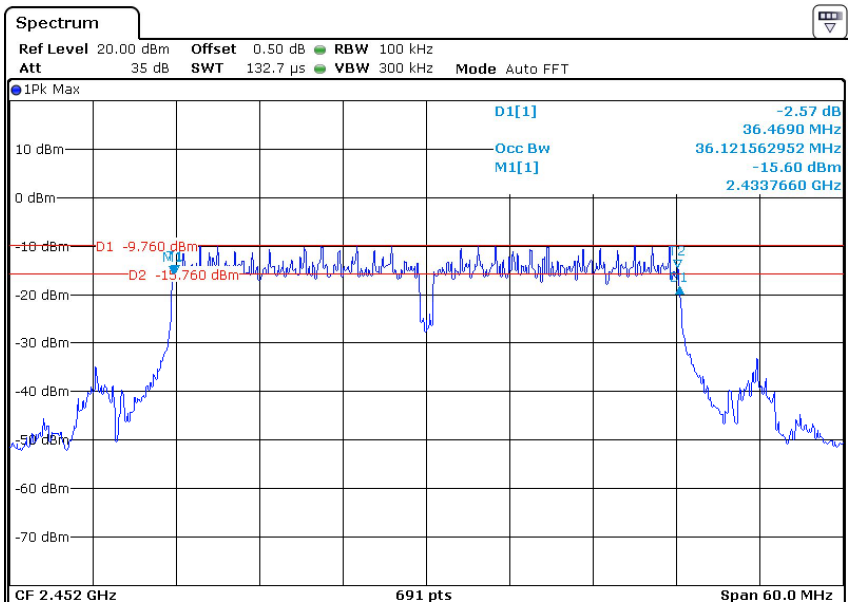
2437MHz



2452MHz



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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

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Power spectral density

Test result

802.11 B

Frequency	Power spectral density	Result
MHz	**dBm**	
Low channel 2412MHz	-11.01	Pass
Middle channel 2437MHz	-11.44	Pass
High channel 2462MHz	-10.55	Pass

802.11 G

Frequency	Power spectral density	Result
MHz	**dBm**	
Low channel 2412MHz	-20.42	Pass
Middle channel 2437MHz	-19.12	Pass
High channel 2462MHz	-19.17	Pass

802.11 N20

Frequency	Power spectral density	Result
MHz	**dBm**	
Low channel 2412MHz	-19.98	Pass
Middle channel 2437MHz	-18.19	Pass
High channel 2462MHz	-18.67	Pass

802.11 N40

Frequency	Power spectral density	Result
MHz	**dBm**	
Low channel 2412MHz	-21.21	Pass
Middle channel 2437MHz	-21.40	Pass
High channel 2462MHz	-21.88	Pass

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9.5 Spurious RF conducted emissions

Test Method

1. Establish a reference level by using the following procedure:
   a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
   b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
   a. Set the center frequency and span to encompass frequency range to be measured.
   b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

Limit

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

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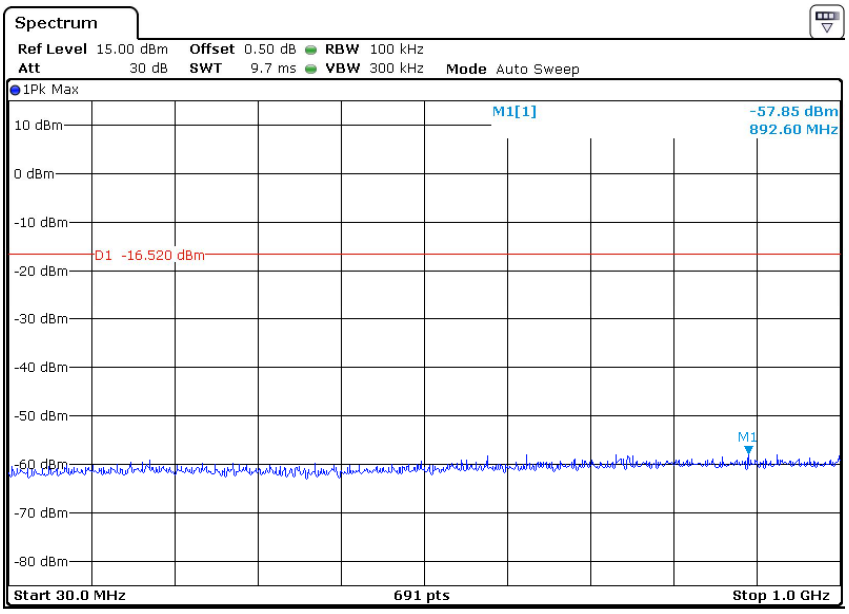
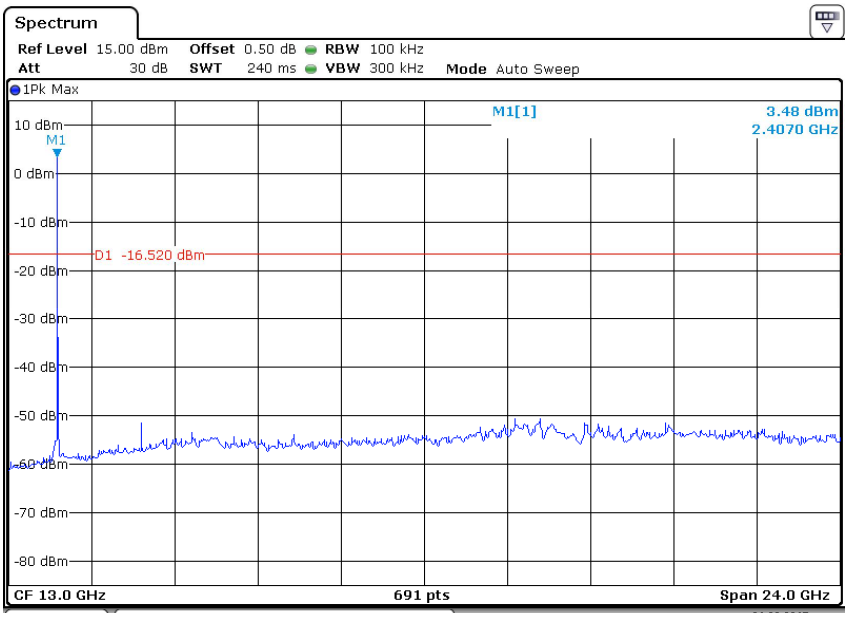
Spurious RF conducted emissions

802.11 B

2412MHz





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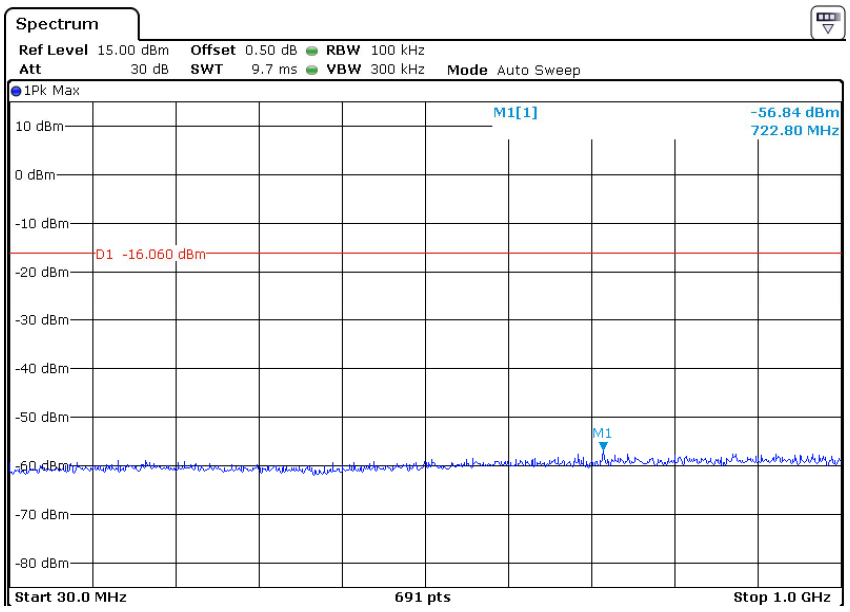
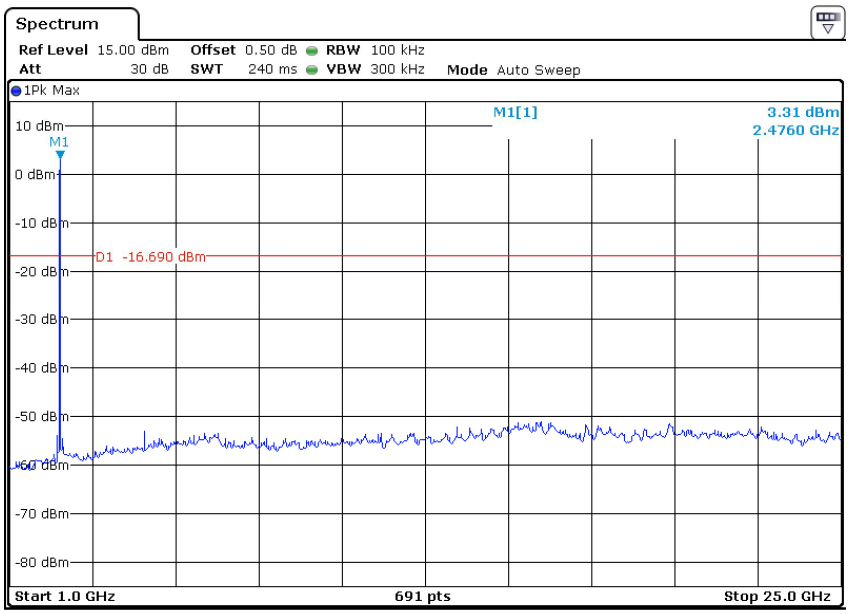
2437MHz





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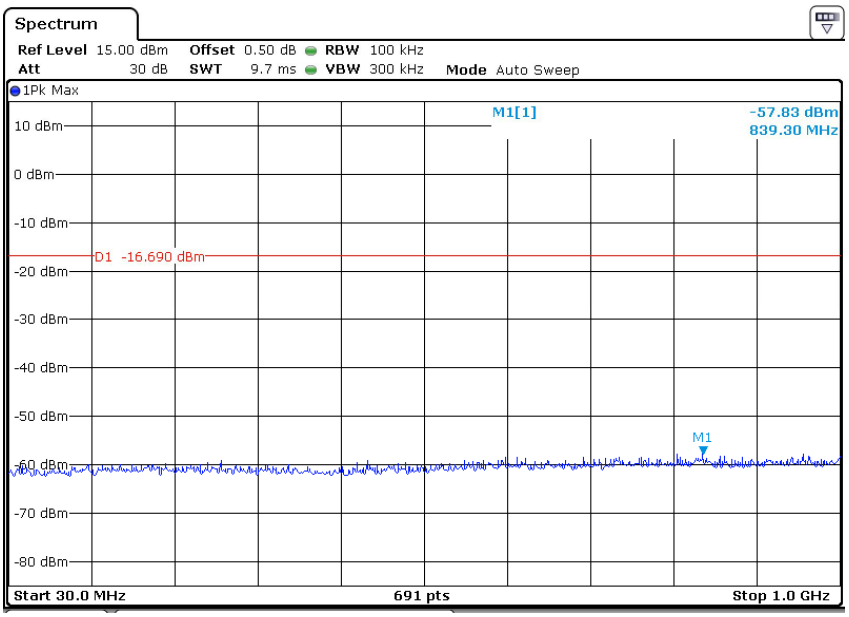
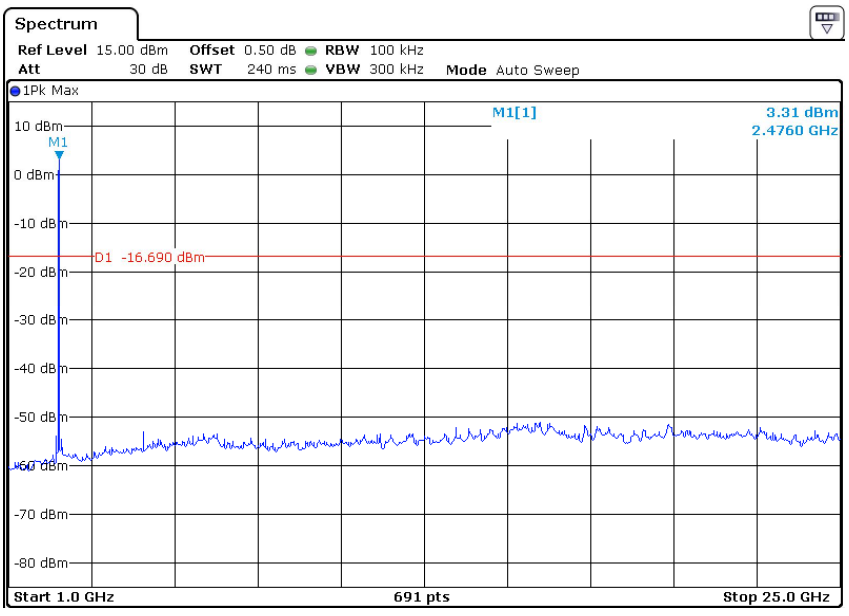
2462MHz





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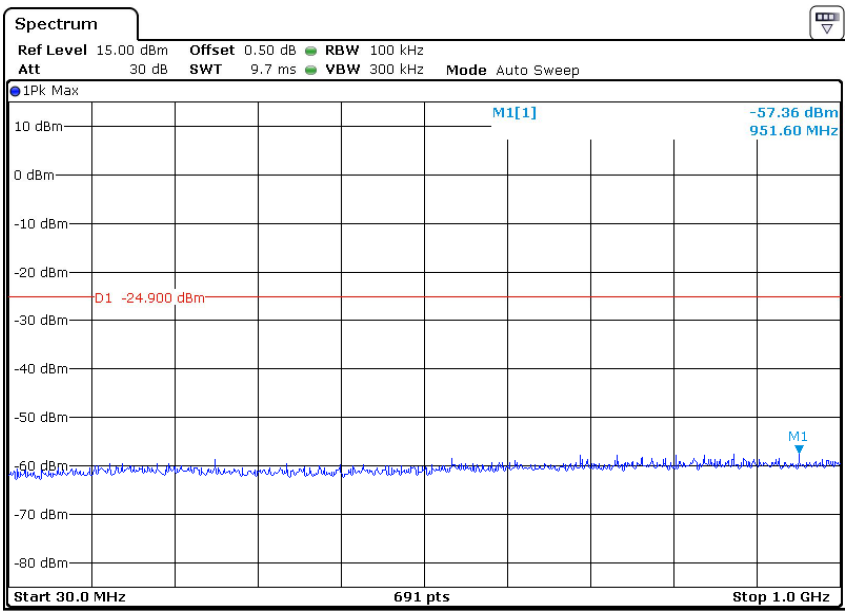
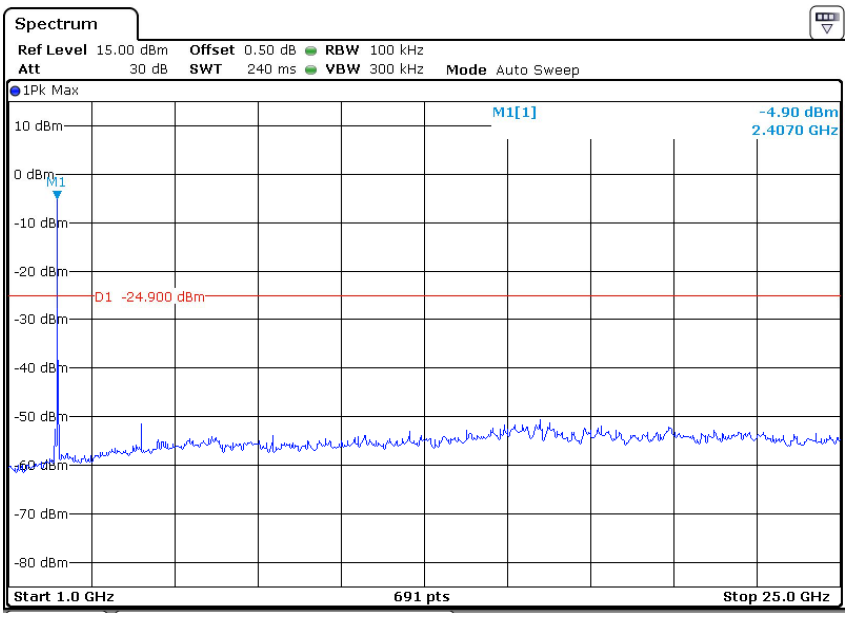
802.11 G

2412MHz





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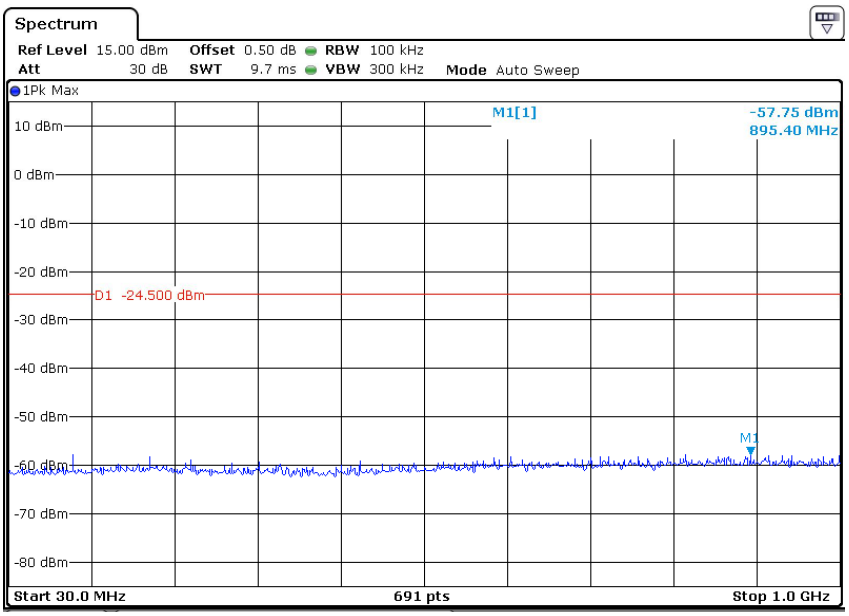
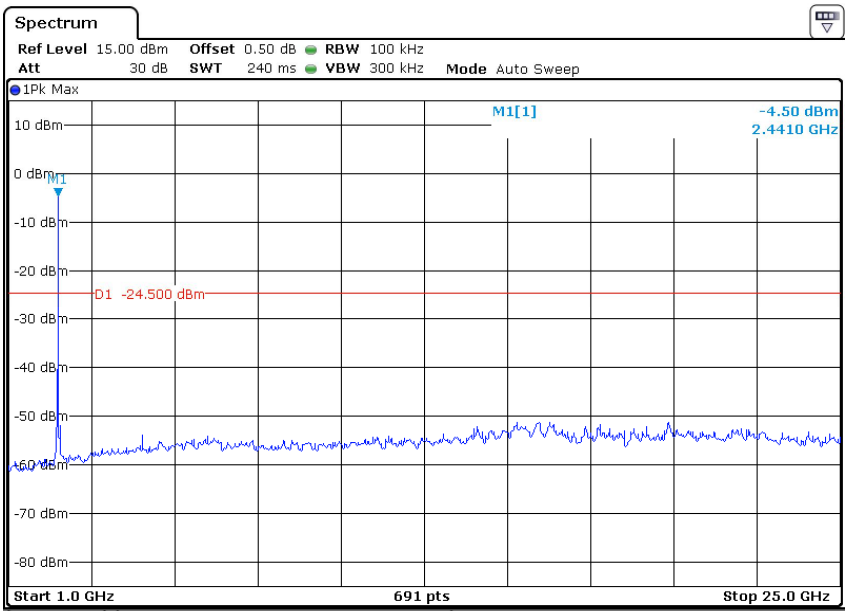
2437MHz





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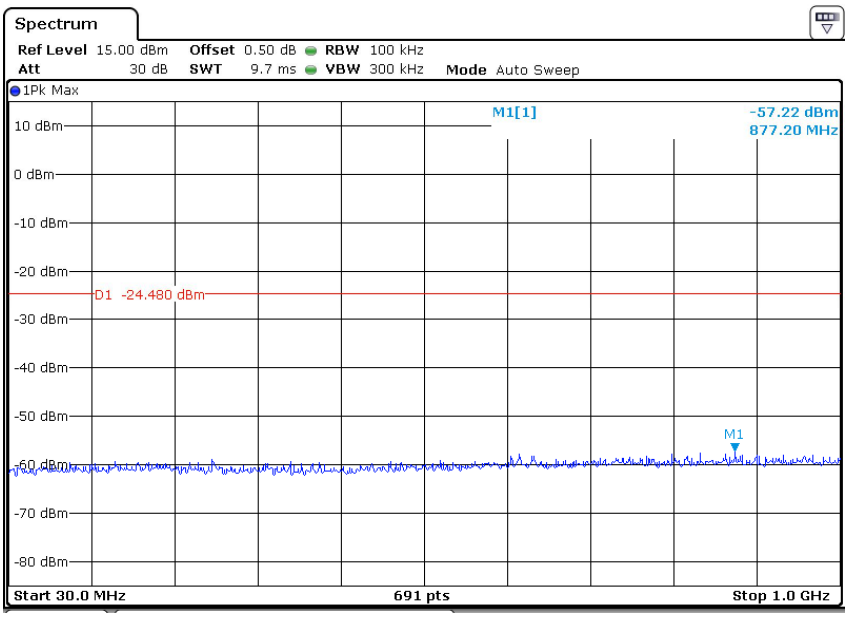
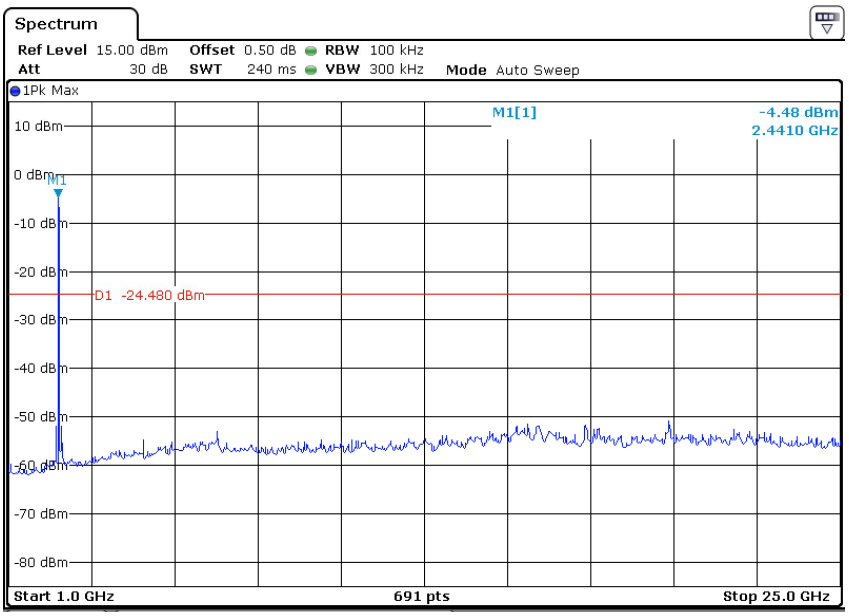
2462MHz





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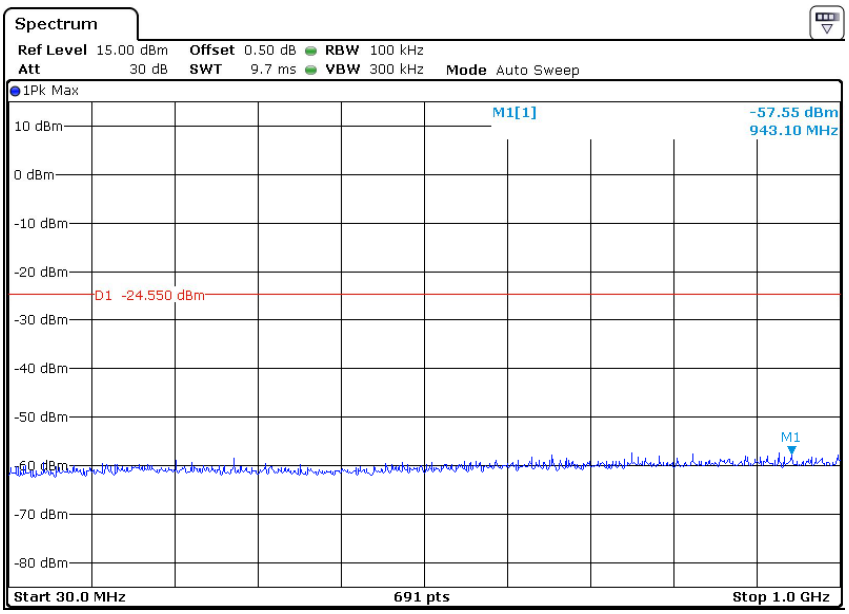
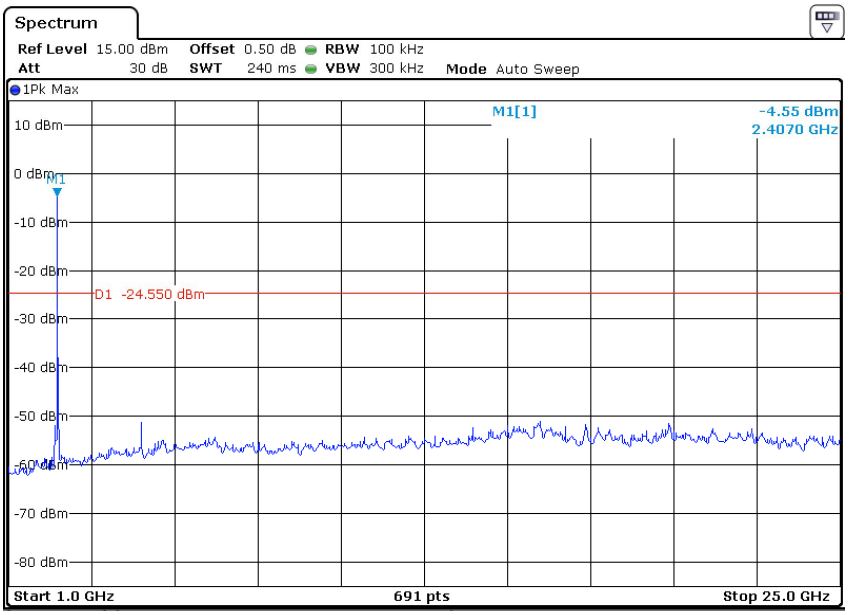
802.11 N20

2412MHz





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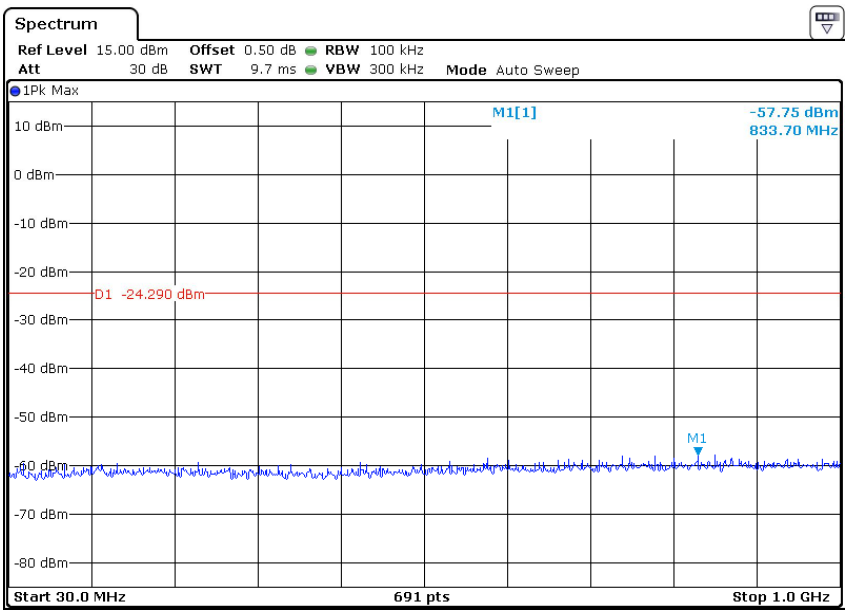
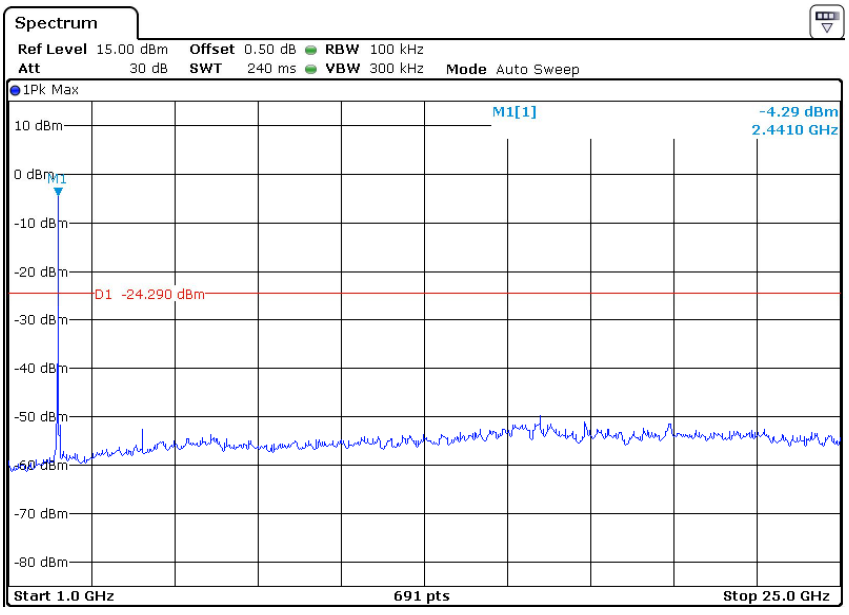
2437MHz





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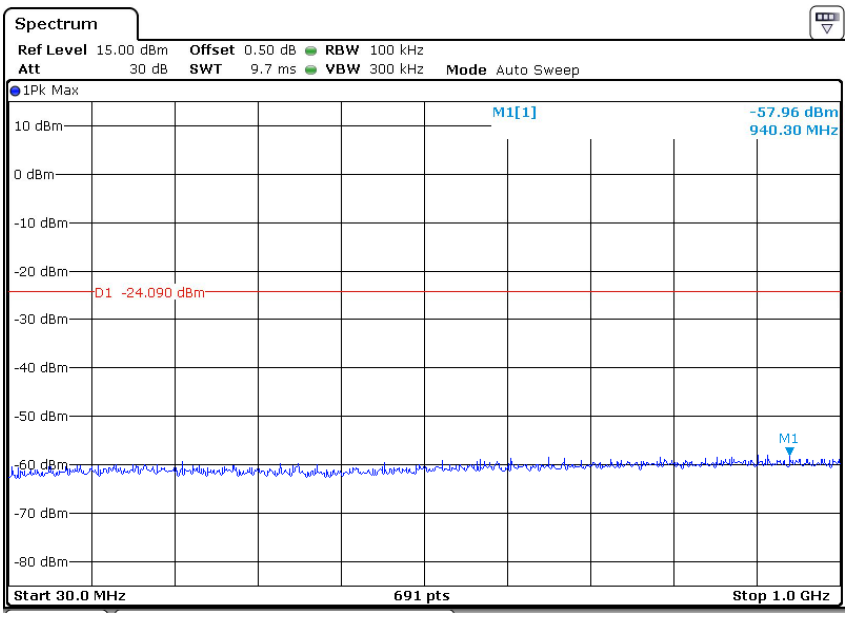
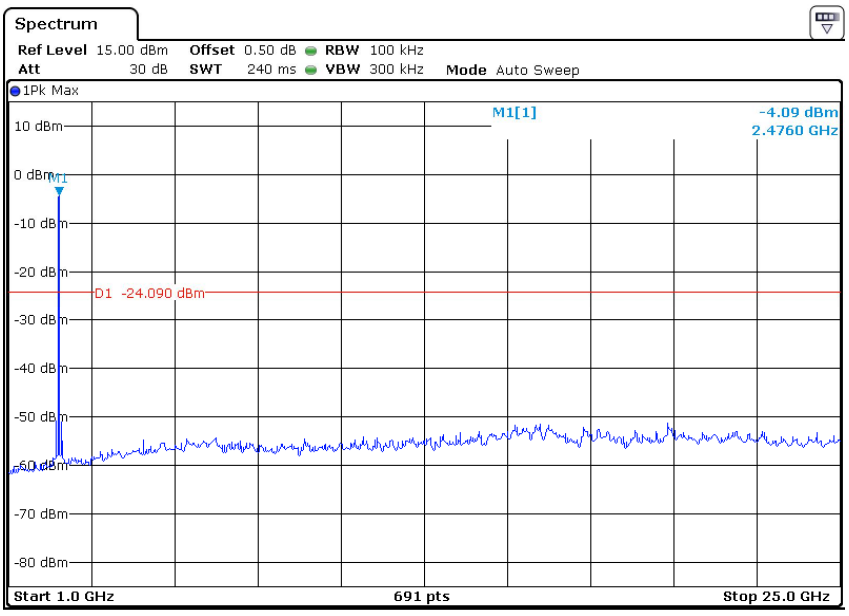
2462MHz





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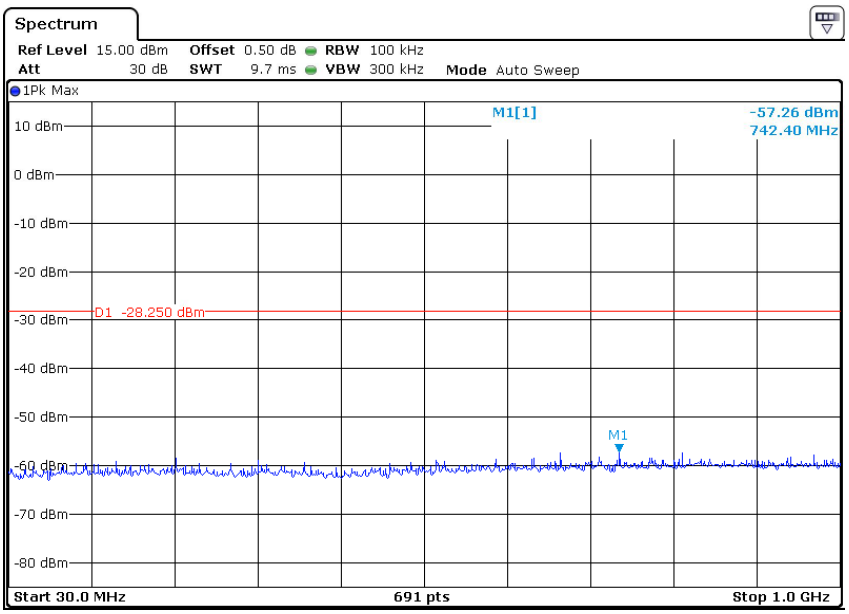
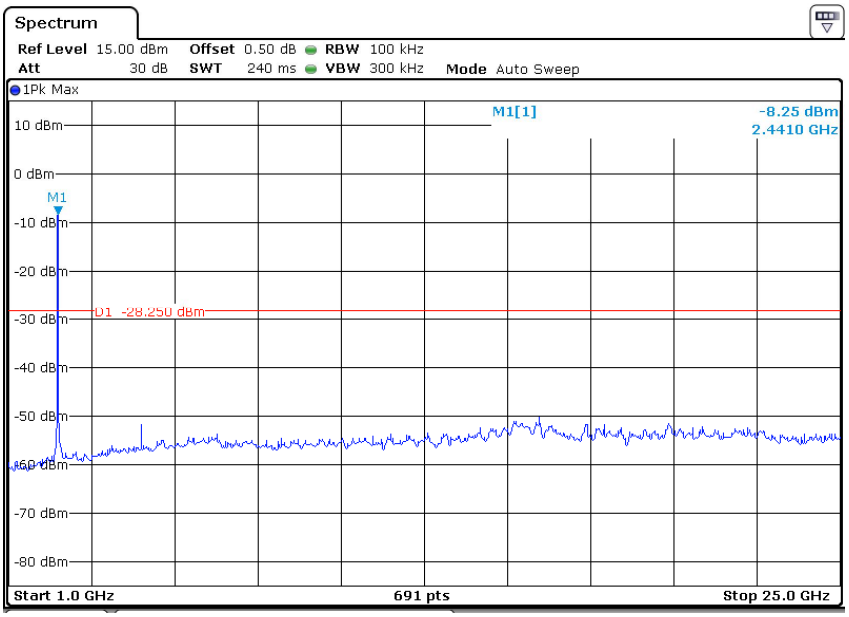
802.11 N40

2422MHz





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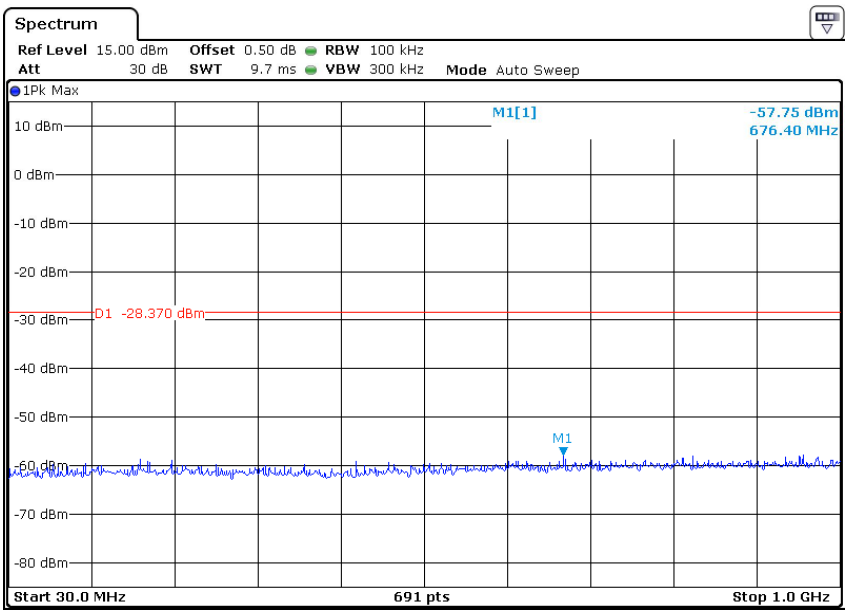
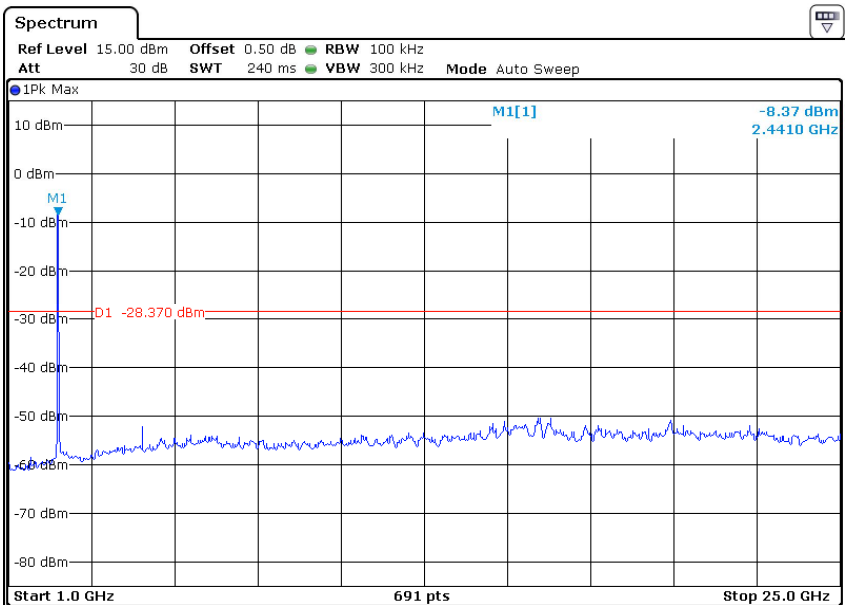
2437MHz





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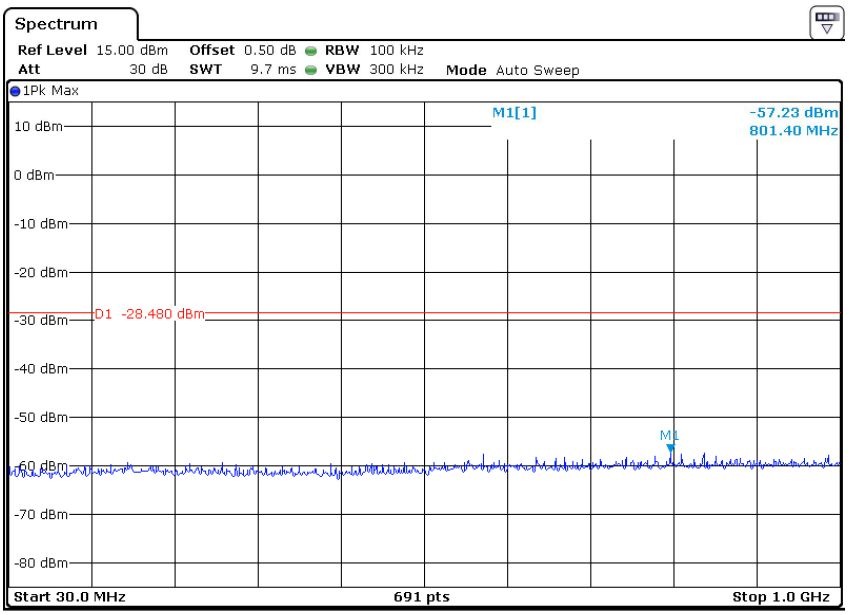
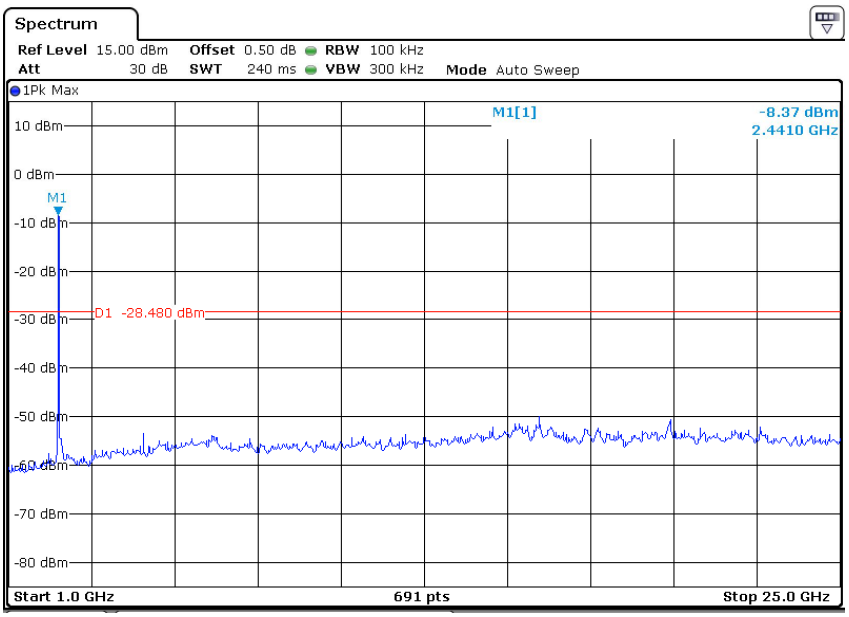
2452MHz





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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≥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. .

Limit:

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

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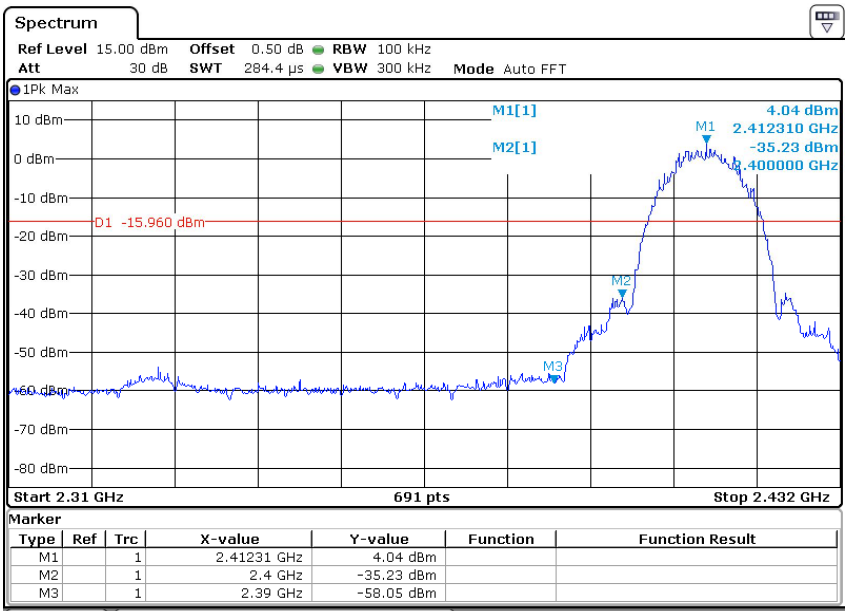
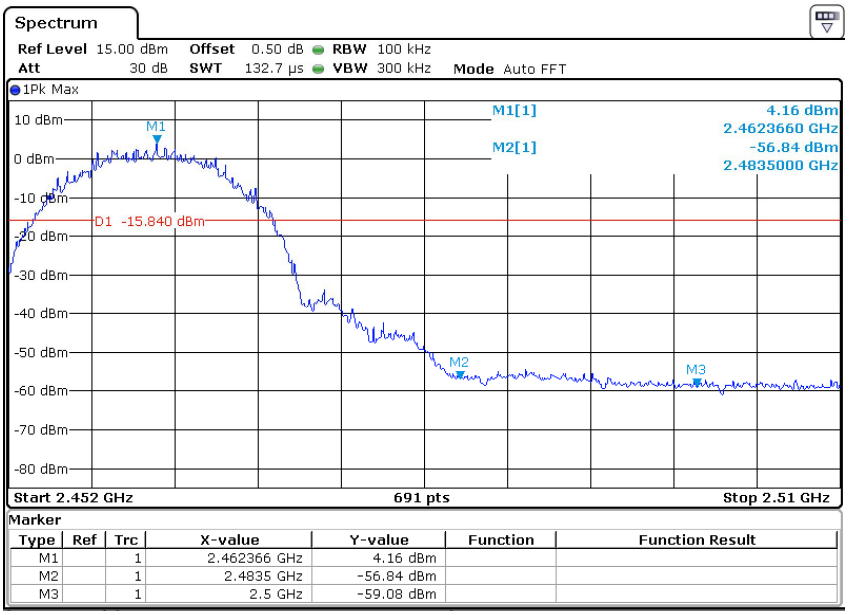
Band edge testing

802.11 B





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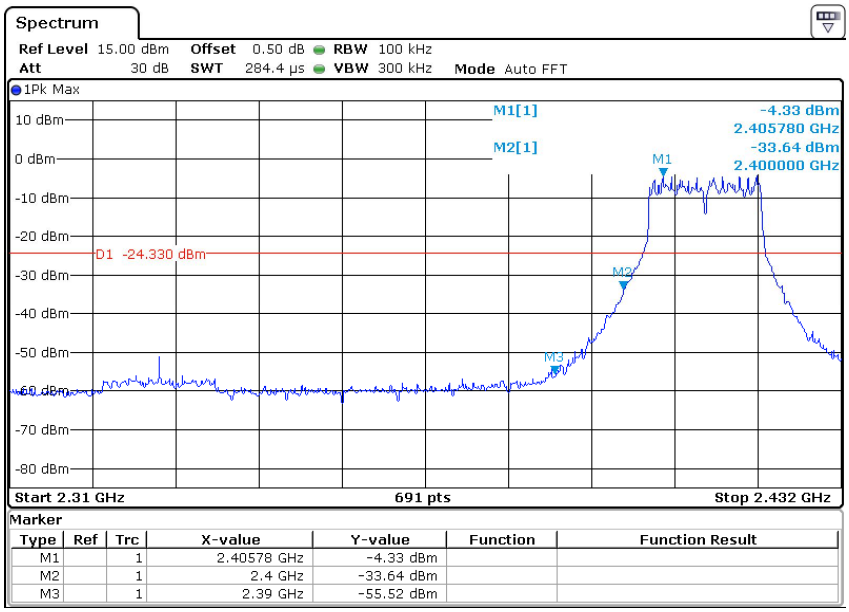
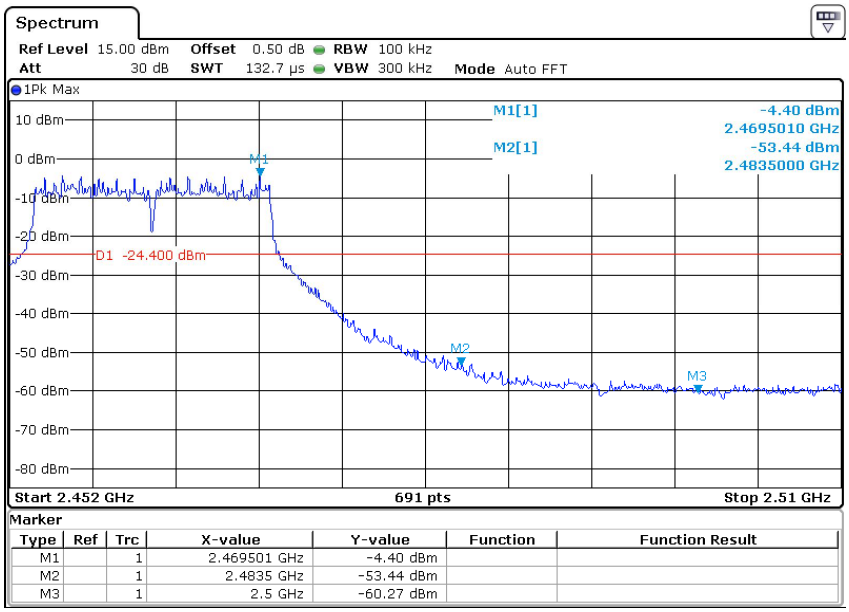
802.11 G





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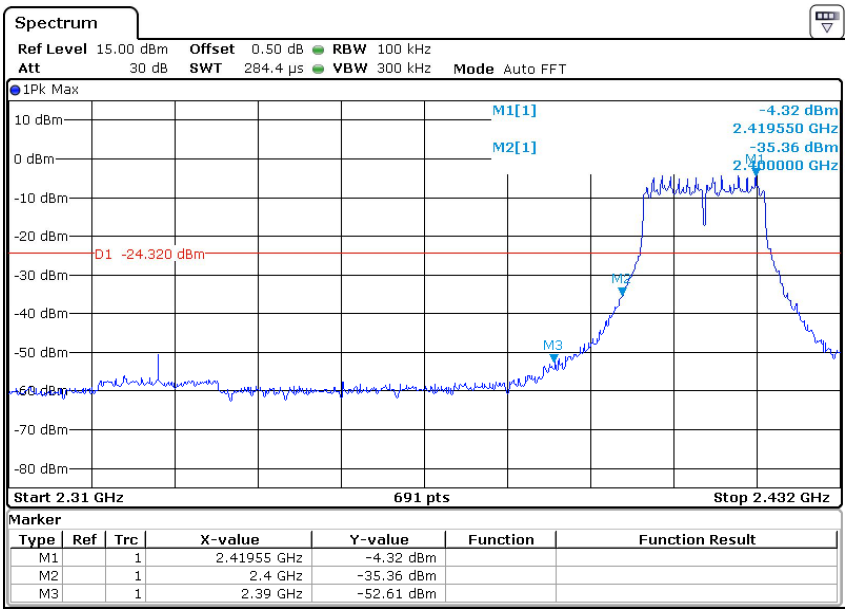
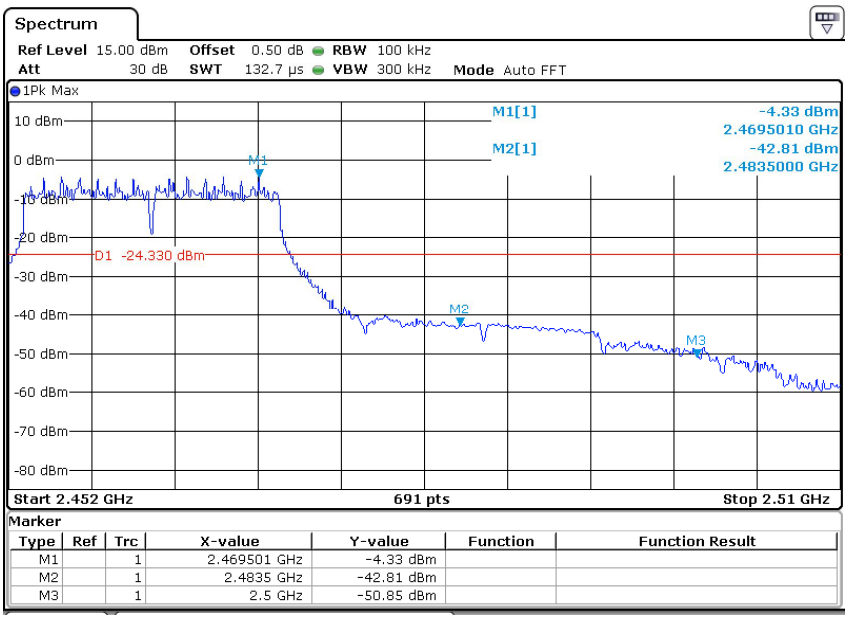
802.11 N20





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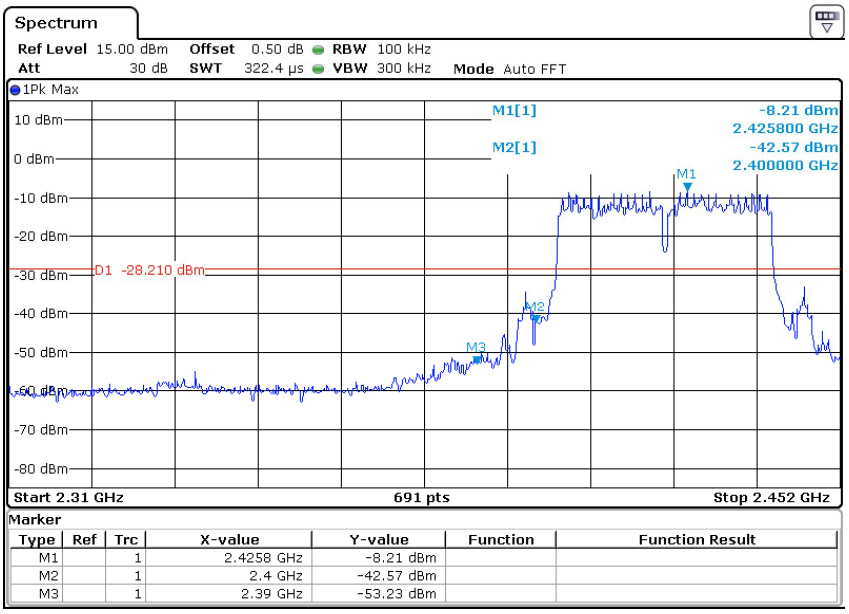
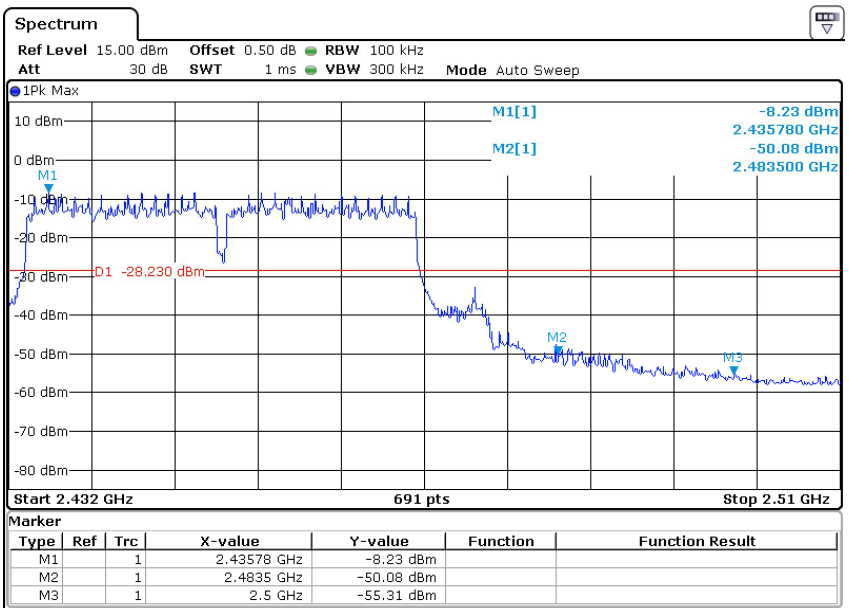
802.11 N40





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9.7 Spurious radiated emissions for transmitter

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
   Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for f ≥ 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-2009 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc.
   The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

According to part 15.247(d) & RSS-247 5.5, 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 section15.205, must comply with the radiated emission limits specified in section 15.209 & RSSGEN 6.13.

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

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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.
We test all mode and worse case recorded in the report.

Transmitting spurious emission test result as below:

802.11 B
2412MHz

Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBµV/m	Detector	Margin dBµV/m	Result
175.99	31.16	Horizontal	43.50	QP	12.34	Pass
432.25	42.63	Horizontal	46.00	QP	3.27	Pass
464.01	43.14	Horizontal	46.00	QP	2.86	Pass
175.99	38.16	Vertical	43.50	QP	5.34	Pass
383.99	40.92	Vertical	46.00	QP	5.08	Pass
720.03	42.68	Vertical	46.00	QP	3.32	Pass
*4824	61.32	Horizontal	74	PK	12.68	Pass
*4824	52.94	Horizontal	54	AV	1.06	Pass
7236	42.31	Horizontal	74	PK	31.69	Pass
9648	47.51	Horizontal	74	PK	26.49	Pass
*4824	57.09	Vertical	74	PK	16.91	Pass
*4824	50.02	Vertical	54	AV	3.98	Pass
7236	40.51	Vertical	74	PK	33.49	Pass
9648	46.73	Vertical	74	PK	27.27	Pass

2437MHz

Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBµV/m	Detector	Margin dBµV/m	Result
*4874	59.78	Horizontal	74	PK	14.22	Pass
*4874	50.27	Horizontal	54	AV	3.73	Pass
7311	41.04	Horizontal	74	PK	32.96	Pass
9748	43.77	Horizontal	74	PK	30.23	Pass
*4874	55.65	Vertical	74	PK	18.35	Pass
*4874	49.83	Vertical	54	AV	4.17	Pass
7311	44.96	Vertical	74	PK	29.04	Pass
9748	43.62	Vertical	74	PK	30.38	Pass

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2462MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
*4924	59.81	Horizontal	74	PK	14.19	Pass
*4924	50.62	Horizontal	54	AV	3.38	Pass
7386	43.74	Horizontal	74	PK	30.26	Pass
9848	43.46	Horizontal	74	PK	30.54	Pass
*4924	61.10	Vertical	74	PK	12.9	Pass
*4924	52.93	Vertical	54	AV	1.07	Pass
7386	41.22	Vertical	74	PK	32.78	Pass
9848	44.03	Vertical	74	PK	29.97	Pass

Remark:

(1) AV Emission Level= PK Emission Level+20log (dutycycle)

(2) Data of measurement within 30-1000MHz 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.

(3) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

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10 RF Exposure Evaluation

For the purpose of the exemption clause of RSS-102 section 2.5.2, the TP is calculated according to the following equation given in RSS-Gen section 6.12:

$$TP = \frac{(FS \times D)^2}{30 \times G}$$

where FS : Field Strength in volts/metre
D : Distance between two antennas in metres
G : Antenna gain, 0 dBi

According to clause 9.2, the Max. Output Power is 0.060 W @ 2437MHz.

EIRP = the maximum output power+ antenna gain

= 17.78 dBm + 0 dBi

= 17.78 dBm

= 60 mW

Therefore, for the device operating at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W *(adjusted for tune-up tolerance), where f is in MHz.*

maximum e.i.r.p. $\leq 1.31 \times 10^{-2} f^{0.6834}$ W

$\leq 1.31 \times 10^{-2} \ 2437^{0.6834}$ W

≤ 2.703 W

The power density at 20cm from the antenna : = EIRP / $4\pi R^2$

= 0.0119 mW / cm^2

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11 Test Equipment List

List of Test Instruments

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2016-7-24
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2016-8-14
Horn Antenna	Rohde & Schwarz	HF907	102294	2016-7-24
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2016-7-24
3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

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12 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	
Test Items	Extended Uncertainty
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.95dB; Vertical: 5.02dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.89dB; Vertical: 4.88dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 4.93dB; Vertical: 4.92dB;
Uncertainty for Conducted RF test	Power level test involved: 2.04dB Frequency test involved:1.1×10^{-7}

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