

FCC - TEST REPORTReport Number : **708881863802-00** Date of Issue: July 16, 2018Model : CJXJSQ02ZMProduct Type : Smartmi Evaporative HumidifierFCC ID : 2AP98-CJXJSQ02ZMApplicant : Beijing Smartmi Electronic Technology Co., Ltd.Address : 11-1102, Office Building Rainbow City, No.68 Qinghe Mid-Street,
Haidian District, Beijing, ChinaProduction Facility : Beijing Smartmi Electronic Technology Co., Ltd.Address : 11-1102, Office Building Rainbow City, No.68 Qinghe Mid-Street,
Haidian District, Beijing, ChinaTest Result : ☒ **Positive** ☐ **Negative**Total pages including
Appendices : 49

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1 Table of Contents

1	Table of Contents	2
2	Details about the Test Laboratory	3
3	Description of the Equipment under Test	4
4	Summary of Test Standards	5
5	Summary of Test Results	6
6	General Remarks	7
7	Test Setups	8
8	Systems test configuration	11
9	Technical Requirement	12
9.1	Conducted Emission	12
9.2	Conducted Average output power	15
9.3	6dB bandwidth Occupied Bandwidth	16
9.4	Power spectral density	21
9.5	Conducted Band Edge and Out-of-Band Emissions	26
9.6	Spurious radiated emissions for transmitter	39
10	Test Equipment List	48
11	System Measurement Uncertainty	49



2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai
Branch
No.16 Lane, 1951 Du Hui Road,
Shanghai 201108,
P.R. China
FCC Registration No.: 820234
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Fax: +86 21 6140 8600

3 Description of the Equipment under Test

Description of the Equipment Under Test

Product: Smartmi Evaporative Humidifier

Model no.: CJXJSQ02ZM

FCC ID: 2AP98-CJXJSQ02ZM

Trade Mark: Smartmi

Options and accessories: NA

Input Rated Voltage: 100-240V~, 50/60Hz, 8W

RF Transmission Frequency: 802.11b/g/n-HT20: 2412 ~ 2462 MHz
802.11n-HT40: 2422 ~ 2452 MHz

No. of Operated Channel: 11 for 802.11b/802.11g/802.11(H20) 7 for 802.11n(H40)

Channel Space: 5MHz

Channel list:

Operation Frequency each of channel For 802.11b/g/n(H20)							
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 each of channel For 802.11n(H40)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
		4	2427MHz	7	2442MHz		
		5	2432MHz	8	2447MHz		
3	2422MHz	6	2437MHz	9	2452MHz		

Radio technology: IEEE 802.11b/802.11g/802.11(H20)/802.11n(H40)

Modulation: Direct Sequence Spread Spectrum (DSSS) for 802.11b
Orthogonal Frequency Division Multiplexing(OFDM) for 802.11g/n

Data speed (IEEE 802.11b): 1Mbps, 2Mbps, 5.5Mbps, 11Mbps

Data speed (IEEE 802.11g): 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps

Data speed (IEEE 802.11n): Up to 135Mbps

Control Board Hardware version: Humidifier_B1_V3.3S

Firmware version: 1010

Antenna Type: Integral Antenna

Antenna Gain: 1.5dBi

Description of the EUT: The Equipment Under Test (EUT) is an Evaporative Humidifier supports 2.4GHz WIFI functions.



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 DTS Measurement Guidance v04 and ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart C						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	---	---	☒	☐	☐
§15.247 (b) (1)	Conducted peak output power	12	Site 1	☒	☐	☐
§15.247(a)(1)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Dwell Time	---	---	☐	☐	☒
§15.247(e)	Power spectral density	18	Site 1	☒	☐	☐
§15.247(a)(2)	6dB bandwidth and 99% Occupied Bandwidth	13	Site 1	☒	☐	☐
§15.247(d)	Spurious RF conducted emissions	23	Site 1	☒	☐	☐
§15.247(d)	Spurious radiated emissions and Band edge for transmitter	22	Site 1	☒	☐	☐
§15.203	Antenna requirement	See note 1		☒	☐	☐

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses a permanently integral antenna, which gain is 1.5dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

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. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AP98-CJXJSQ02ZM, 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: May 7, 2018

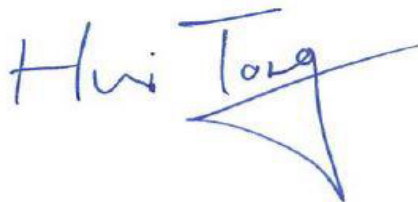
Testing Start Date: May 18, 2018

Testing End Date: June 23, 2018

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

Reviewed by:

Prepared by:



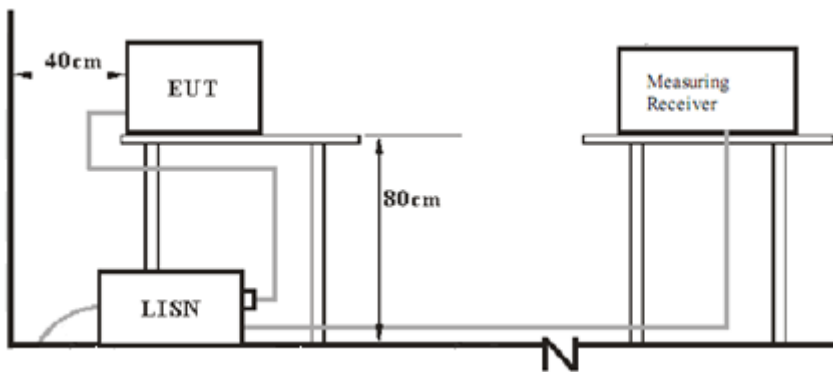
Hui TONG
Review Engineer



Jiayi XU
Project Engineer

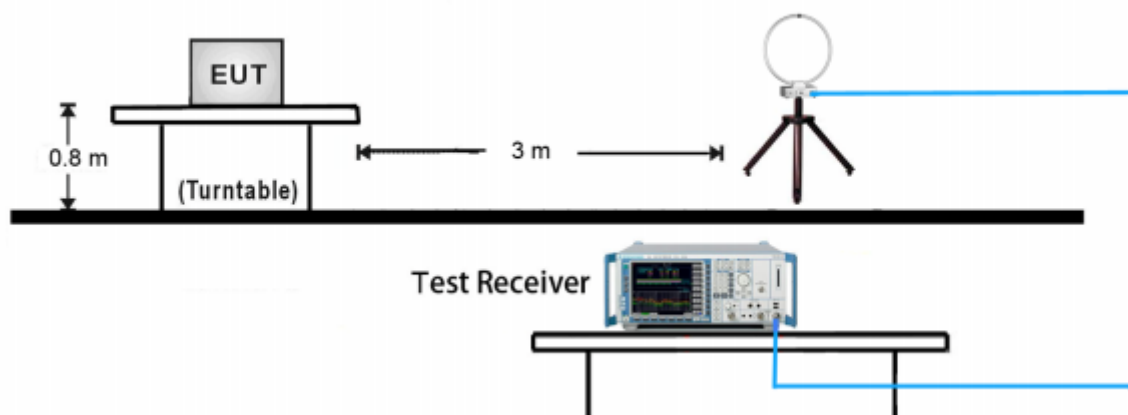
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

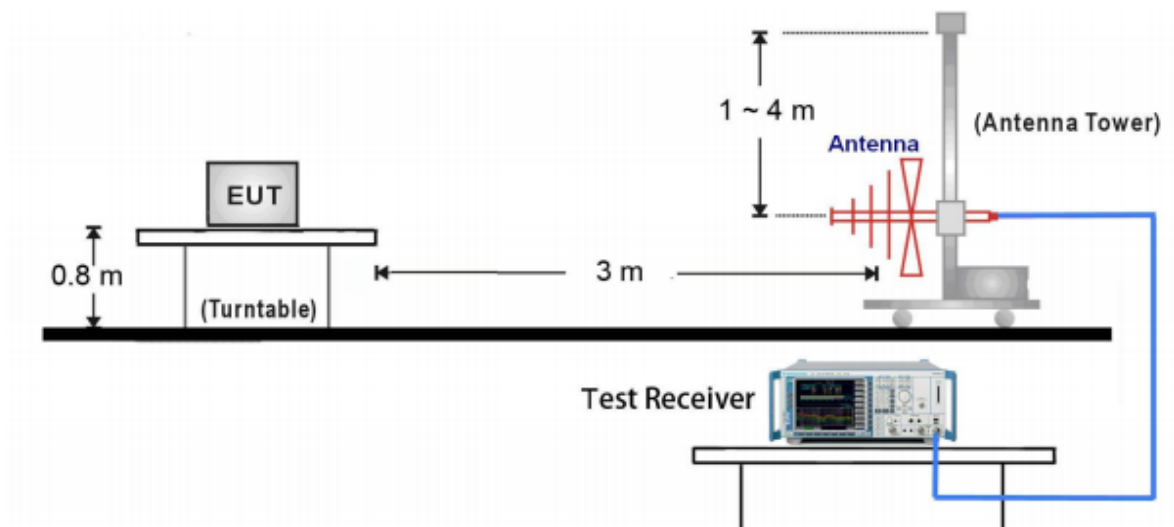


7.2 Radiated test setups

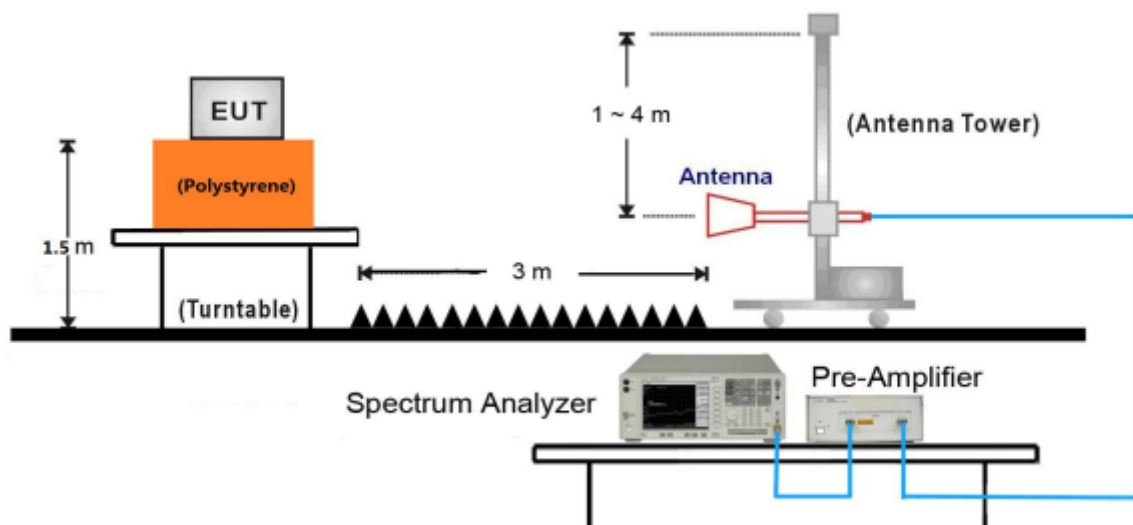
9kHz ~ 30MHz Test Setup:



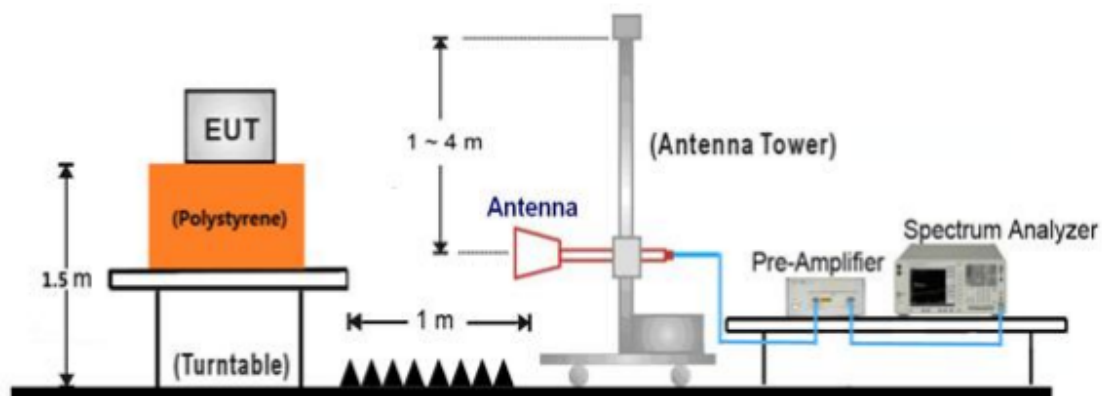
30MHz ~ 1GHz Test Setup:



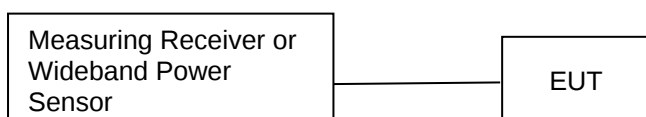
1GHz ~ 18GHz Test Setup:



18GHz ~ 25GHz Test Setup:



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)
Notebook	Lenove	X240

Test channel & mode:

The Smartmi Evaporative Humidifier was configured using a proprietary communication interface provided by the client. The interface allows power level and channel control required to support the evaluation. The power level settings in the table below were used for the evaluation.

Test software	MT7637 QA 0.0.1.60
---------------	--------------------

802.11b/802.11g/802.11n-HT20

Test mode	Channel	Frequency (MHz)
Tx	1	2412
Tx	6	2437
Tx	11	2462

802.11n-HT40

Test mode	Channel	Frequency (MHz)
Tx	3	2422
Tx	6	2437
Tx	9	2452

The pre-test has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

Tested Channel	Modulation Type	Data Rate
Low, Middle, High	802.11b: DSSS	1Mbps
Low, Middle, High	802.11g: OFDM	6Mbps
Low, Middle, High	802.11n (HT20): OFDM	MCS0 (6.5Mbps)
Low, Middle, High	802.11n (HT40): OFDM	MCS0 (13.5Mbps)

Device Capabilities

This device contains the following capabilities:

802.11b/g/n-HT20/n-HT40 Wi-Fi Device.

Duty Cycle: 100%

Note: 2.4GHz WLAN (DTS) operation is possible in 20MHz, and 40MHz channel bandwidths.

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

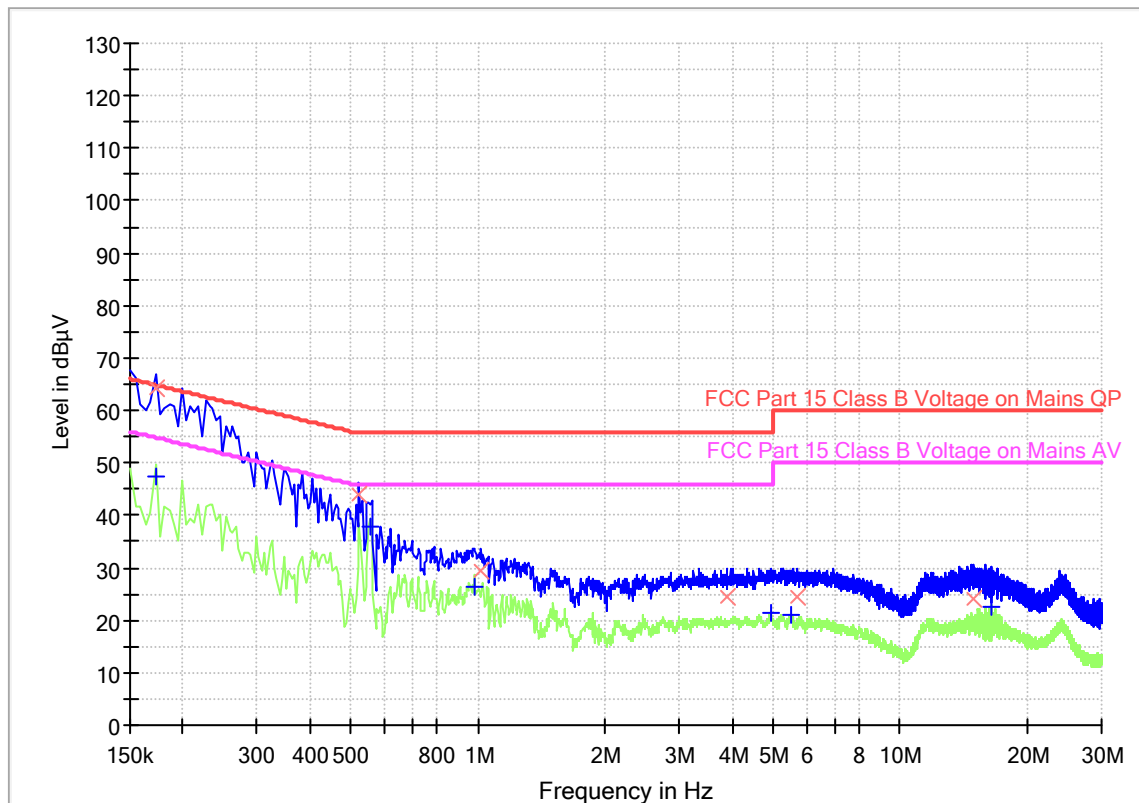
Limit

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

Conducted Emission

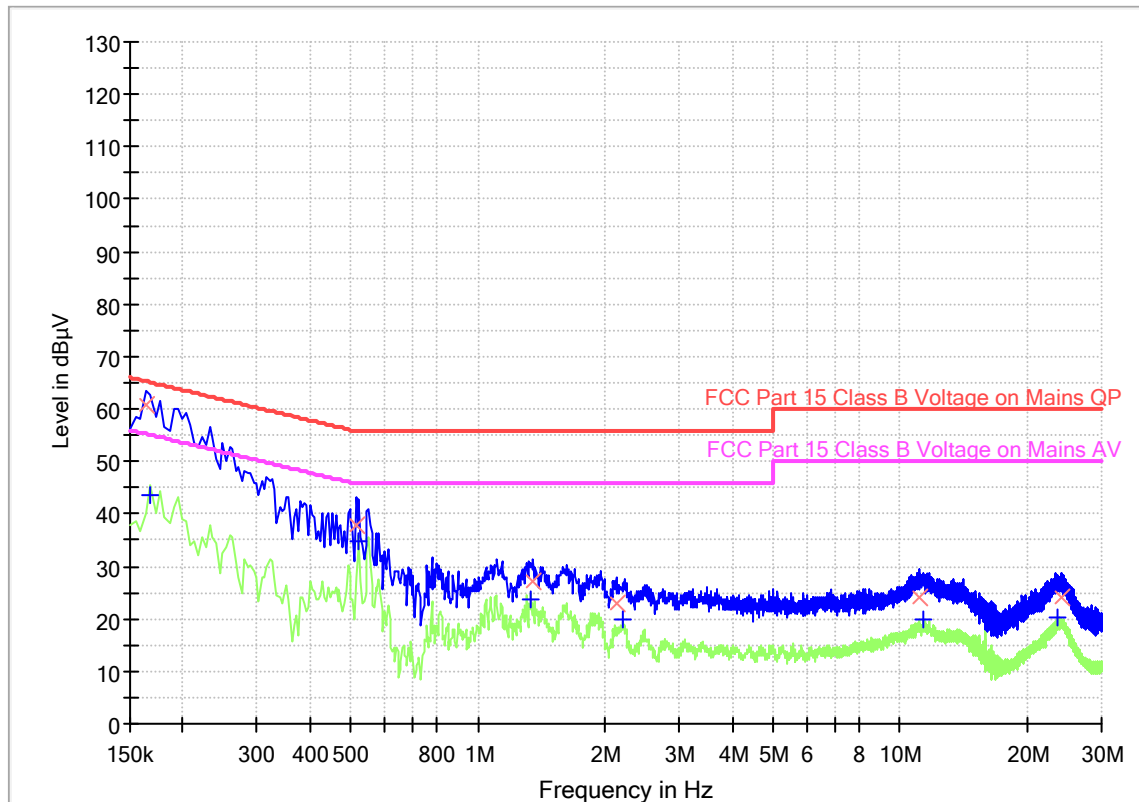
Product Type : Smartmi Evaporative Humidifier
 M/N : CJXJSQ02ZM
 Operating Condition : Mode 1: Tx_802.11b 2437MHz
 Test Specification : FCC_Part15.207
 Comment : Line, AC 120V/60Hz



Final Result

Frequency (MHz)	Quasi Peak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.172500	64.29	---	64.84	0.55	1000.0	9.000	L1
0.172500	---	47.48	54.84	7.36	1000.0	9.000	L1
0.523500	43.80	---	56.00	12.20	1000.0	9.000	L1
0.555000	---	37.79	46.00	8.21	1000.0	9.000	L1
0.982500	---	26.39	46.00	19.61	1000.0	9.000	L1
1.018500	29.59	---	56.00	26.41	1000.0	9.000	L1
3.885000	24.57	---	56.00	31.43	1000.0	9.000	L1
4.960500	---	21.39	46.00	24.61	1000.0	9.000	L1
5.500500	---	21.17	50.00	28.83	1000.0	9.000	L1
5.703000	24.36	---	60.00	35.64	1000.0	9.000	L1
14.910000	24.02	---	60.00	35.98	1000.0	9.000	L1
16.516500	---	22.64	50.00	27.36	1000.0	9.000	L1

Product Type : Smartmi Evaporative Humidifier
 M/N : CJXJSQ02ZM
 Operating Condition : Mode 1: Tx_802.11b 2437MHz
 Test Specification : FCC_Part15.207
 Comment : Neutral, AC 120V/60Hz



Final Result

Frequency (MHz)	Quasi Peak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.163500	60.96	---	65.28	4.32	1000.0	9.000	N
0.168000	---	43.64	55.06	11.42	1000.0	9.000	N
0.514500	37.71	---	56.00	18.29	1000.0	9.000	N
0.523500	---	34.94	46.00	11.06	1000.0	9.000	N
1.333500	---	23.87	46.00	22.13	1000.0	9.000	N
1.351500	26.96	---	56.00	29.04	1000.0	9.000	N
2.125500	22.80	---	56.00	33.20	1000.0	9.000	N
2.211000	---	20.07	46.00	25.93	1000.0	9.000	N
11.121000	23.91	---	60.00	36.09	1000.0	9.000	N
11.328000	---	20.01	50.00	29.99	1000.0	9.000	N
23.680500	---	20.10	50.00	29.90	1000.0	9.000	N
24.067500	23.91	---	60.00	36.09	1000.0	9.000	N

9.2 Conducted Average output power

Test Method

Connect the power meter to the EUT

- a) The EUT is configured to transmit continuously, or to transmit with a constant duty factor.
 - b) At all times the EUT is transmitting at its maximum power control level.
 - c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
 3. Adjust the measurement in dBm by adding $10\log(1/x)$, where x is the duty cycle to the measurement result.

Limits

According to §15.247 (b) (1), conducted AV output power limit as below:

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

Test result as below table

FCC Part 15.247						
Mode	Antenna Gain (dBi)	Channel	Frequency (MHz)	Final Power Setting Value	Average Power (dBm)	Limit (dBm)
b	1.5	CH01	2412	13	12.1	30.00
		CH06	2437	16	15.4	30.00
		CH11	2462	13	12.4	30.00
g		CH01	2412	13	11.1	30.00
		CH06	2437	16	13.4	30.00
		CH11	2462	12	9.4	30.00
n-HT20		CH01	2412	13	11.2	30.00
		CH06	2437	16	12.4	30.00
		CH11	2462	13	9.3	30.00
n-HT40		CH03	2422	13	8.4	30.00
		CH06	2437	16	11.6	30.00
		CH09	2452	14	9.6	30.00

9.3 6dB bandwidth Occupied 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 6 dB Bandwidth value.

Limit

Limit [kHz]

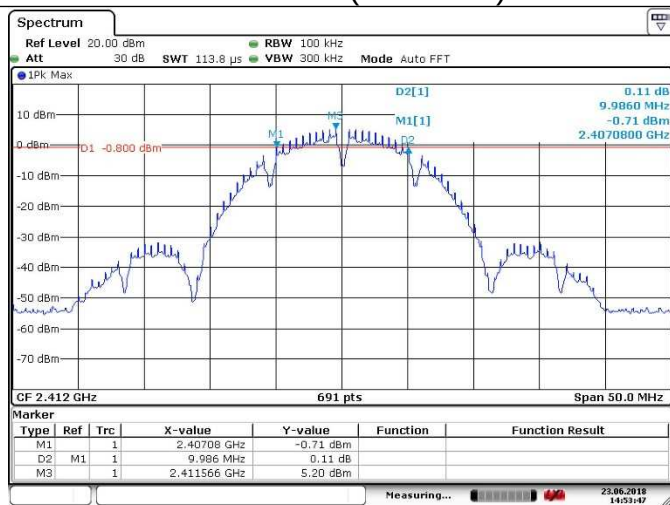
≥ 500

Test result

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	6db Bandwidth (MHz)	Limit (MHz)	Result
802.11b	1Mbps	01	2412	9.986	≥ 0.5	Pass
802.11b	1Mbps	06	2437	9.998	≥ 0.5	Pass
802.11b	1Mbps	11	2462	10.018	≥ 0.5	Pass
802.11g	6Mbps	01	2412	16.353	≥ 0.5	Pass
802.11g	6Mbps	06	2437	16.005	≥ 0.5	Pass
802.11g	6Mbps	11	2462	16.037	≥ 0.5	Pass
802.11n-HT20	6.5Mbps	01	2412	17.377	≥ 0.5	Pass
802.11n-HT20	6.5Mbps	06	2437	17.516	≥ 0.5	Pass
802.11n-HT20	6.5Mbps	11	2462	17.267	≥ 0.5	Pass
802.11n-HT40	13.5Mbps	03	2422	35.753	≥ 0.5	Pass
802.11n-HT40	13.5Mbps	06	2437	36.273	≥ 0.5	Pass
802.11n-HT40	13.5Mbps	09	2452	35.765	≥ 0.5	Pass

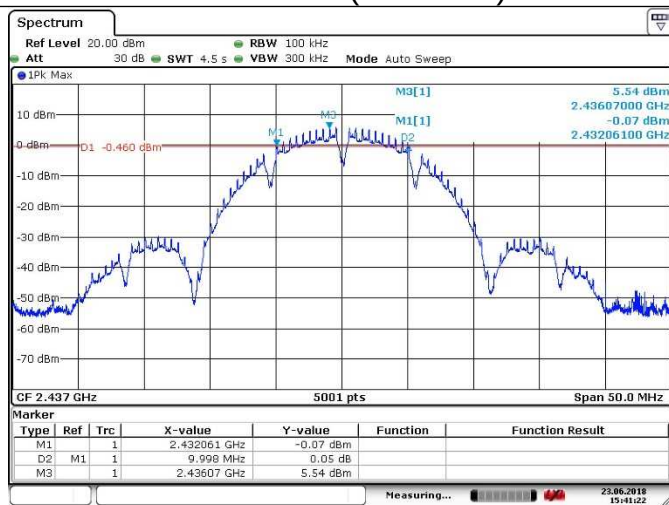
802.11b 6dB Bandwidth

Channel 01 (2412MHz)



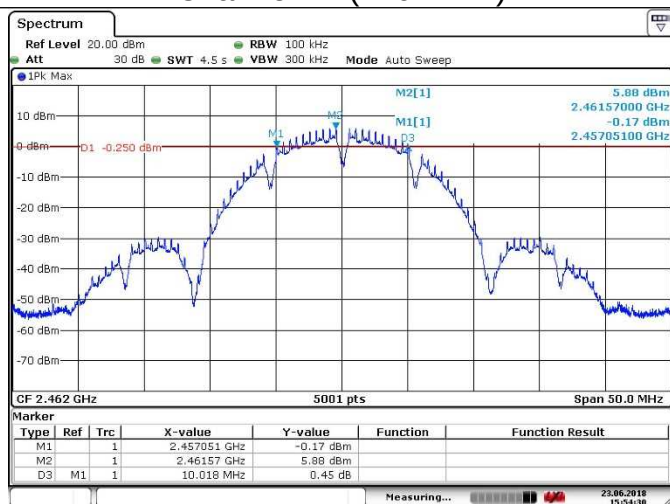
Date: 23 JUN 2018 14:53:47

Channel 06 (2437MHz)



Date: 23 JUN 2018 15:41:22

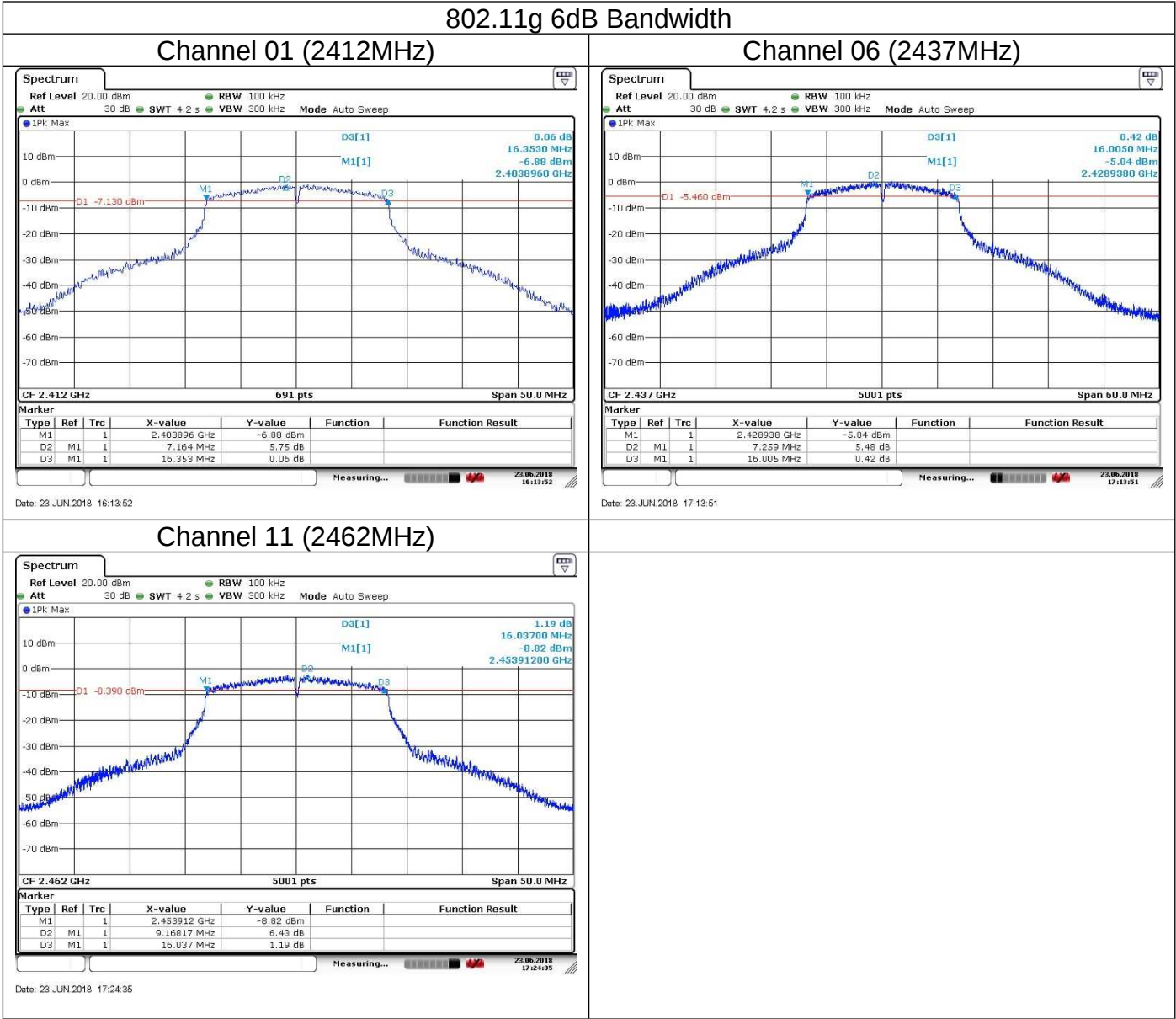
Channel 11 (2462MHz)



Date: 23 JUN 2018 15:54:38



China

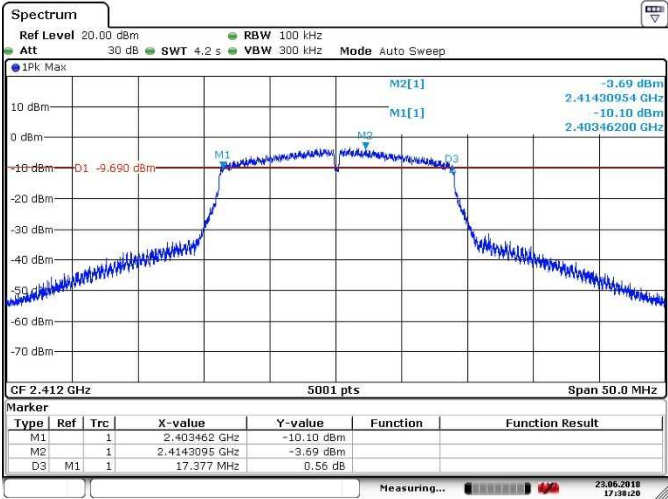




China

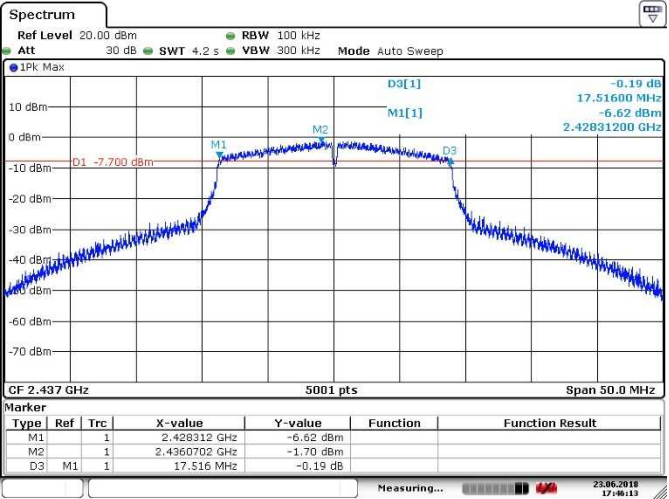
802.11n HT20 6dB Bandwidth

Channel 01 (2412MHz)



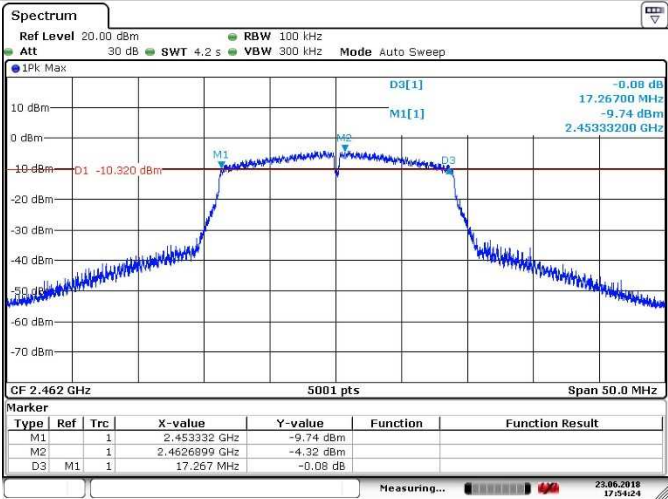
Date: 23 JUN 2018 17:38:20

Channel 06 (2437MHz)



Date: 23 JUN 2018 17:46:13

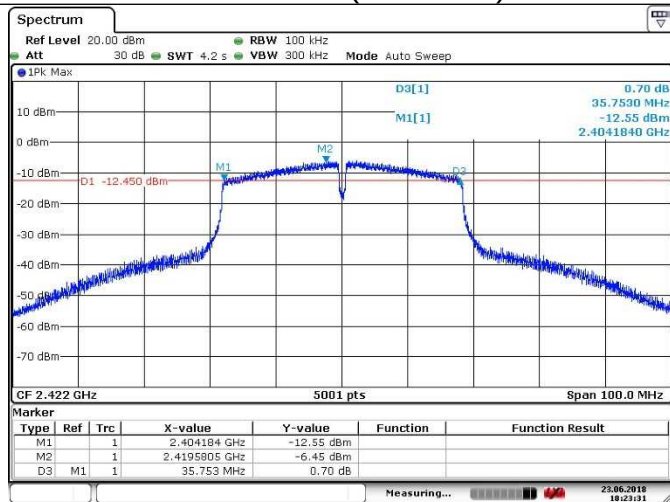
Channel 11 (2462MHz)



Date: 23 JUN 2018 17:54:24

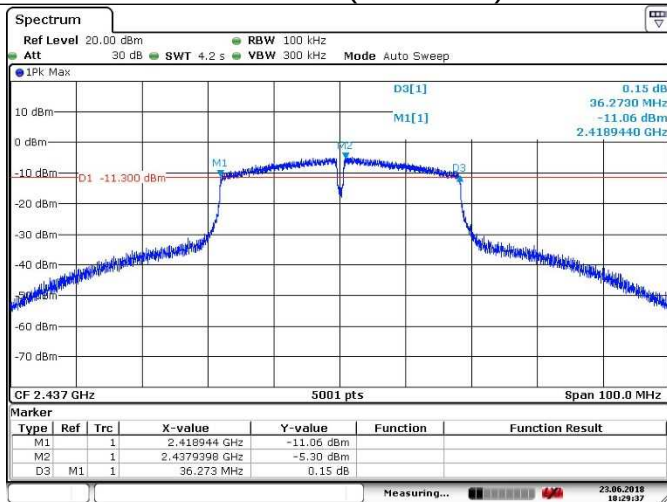
802.11n HT40 6dB Bandwidth

Channel 03 (2422MHz)



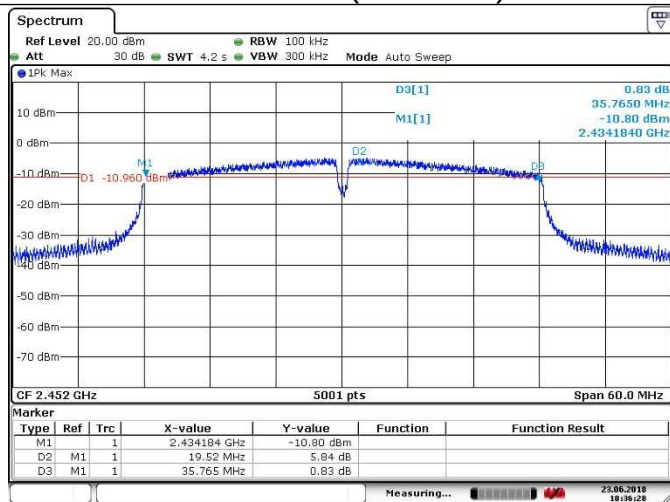
Date: 23 JUN 2018 18:23:31

Channel 06 (2437MHz)



Date: 23 JUN 2018 18:29:37

Channel 09 (2452MHz)



Date: 23 JUN 2018 18:36:28

9.4 Power spectral density

Test Method

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

1. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW $\geq$ 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

Test result

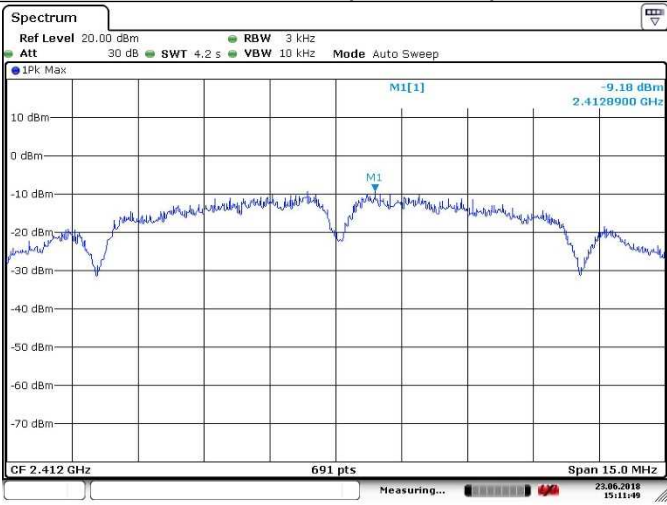
Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	PSD (dBm / 10kHz)	Limit (dBm/3kHz)	Result
802.11b	1Mbps	01	2412	-7.21	≤ 8	Pass
802.11b	1Mbps	06	2437	-7.49	≤ 8	Pass
802.11b	1Mbps	11	2462	-7.79	≤ 8	Pass
802.11g	6Mbps	01	2412	-12.46	≤ 8	Pass
802.11g	6Mbps	06	2437	-12.79	≤ 8	Pass
802.11g	6Mbps	11	2462	-13.31	≤ 8	Pass
802.11n-HT20	6.5Mbps	01	2412	-12.97	≤ 8	Pass
802.11n-HT20	6.5Mbps	06	2437	-13.78	≤ 8	Pass
802.11n-HT20	6.5Mbps	11	2462	-14.36	≤ 8	Pass
802.11n-HT40	13.5Mbps	03	2422	-14.74	≤ 8	Pass
802.11n-HT40	13.5Mbps	06	2437	-15.44	≤ 8	Pass
802.11n-HT40	13.5Mbps	09	2452	-15.28	≤ 8	Pass



China

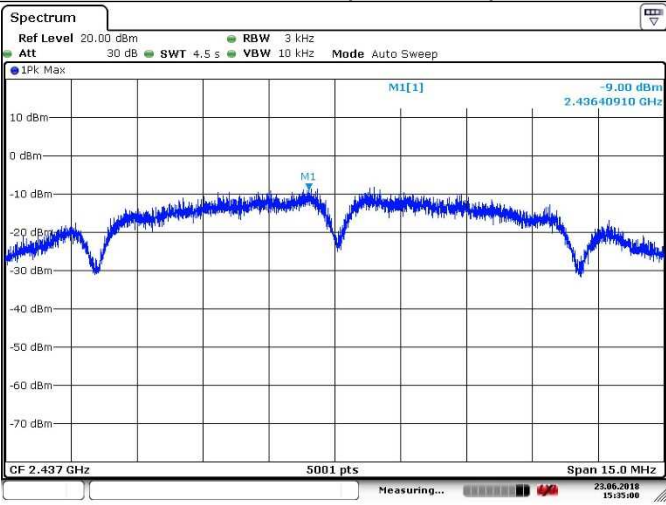
802.11b PSD

Channel 01 (2412MHz)



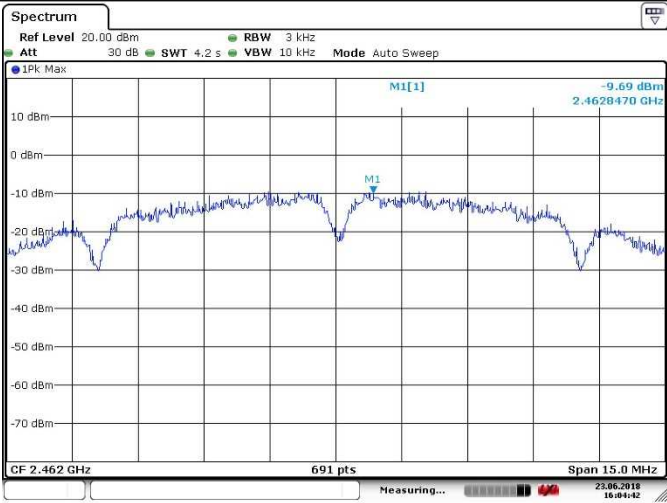
Date: 23 JUN 2018 15:11:49

Channel 06 (2437MHz)



Date: 23 JUN 2018 15:35:00

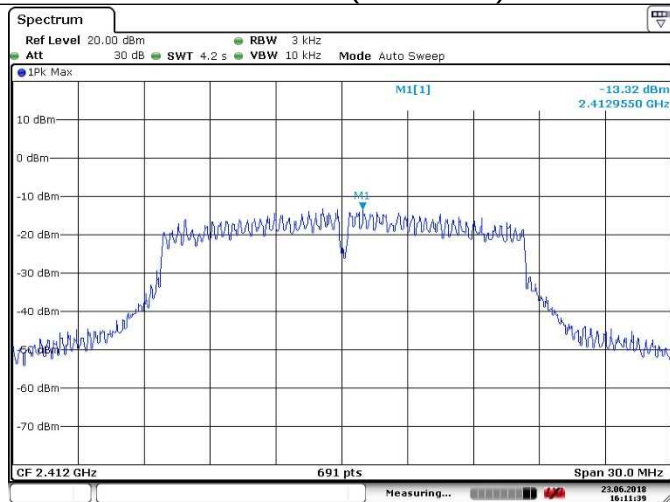
Channel 11 (2462MHz)



Date: 23 JUN 2018 16:04:41

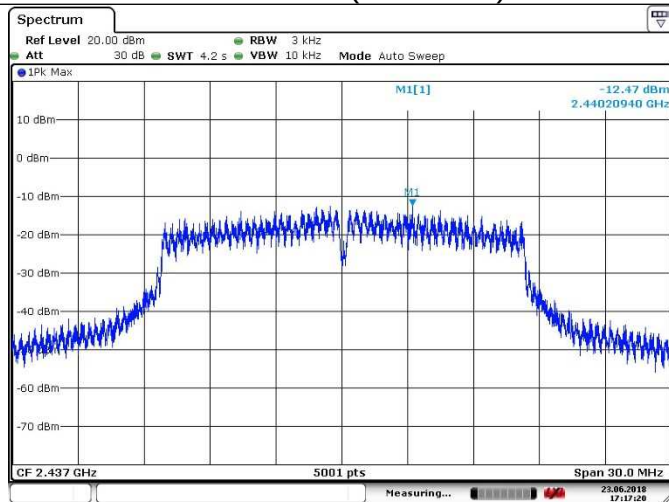
802.11g PSD

Channel 01 (2412MHz)



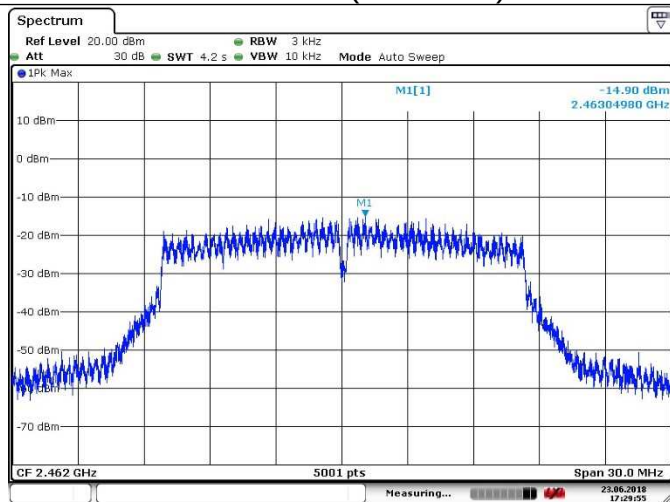
Date: 23 JUN 2018 16:11:40

Channel 06 (2437MHz)



Date: 23 JUN 2018 17:17:20

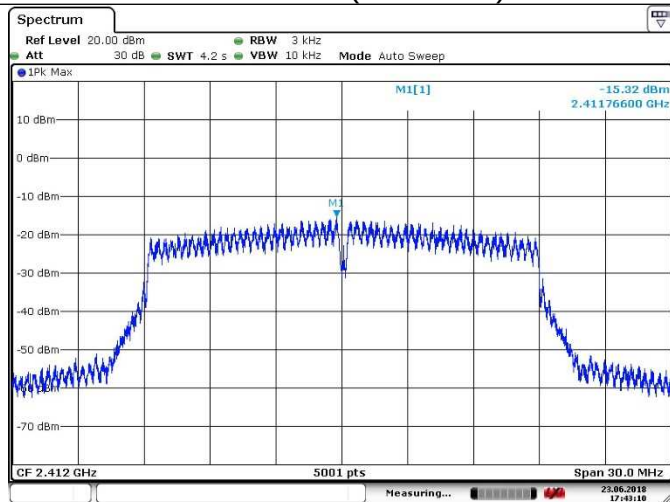
Channel 11 (2462MHz)



Date: 23 JUN 2018 17:29:55

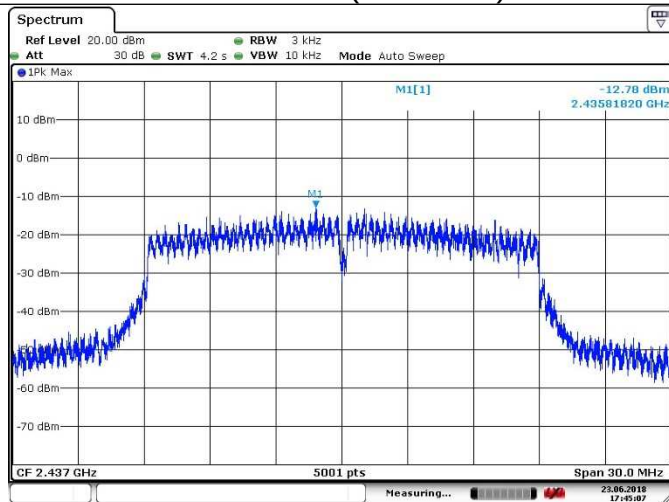
802.11n HT20 PSD

Channel 01 (2412MHz)



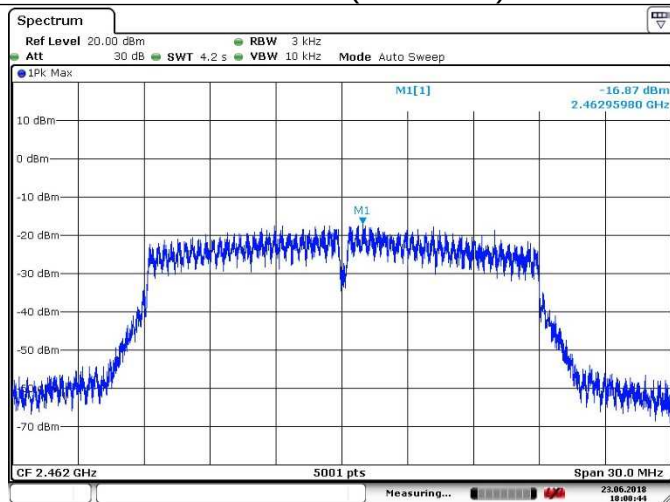
Date: 23 JUN 2018 17:43:10

Channel 06 (2437MHz)



Date: 23 JUN 2018 17:45:07

Channel 11 (2462MHz)



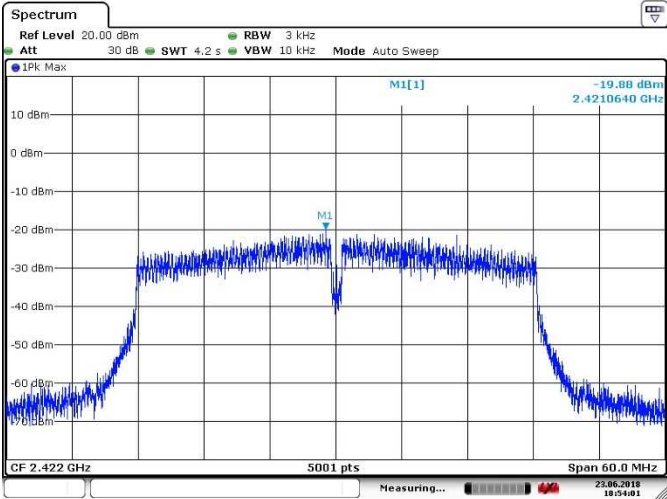
Date: 23 JUN 2018 18:00:44



China

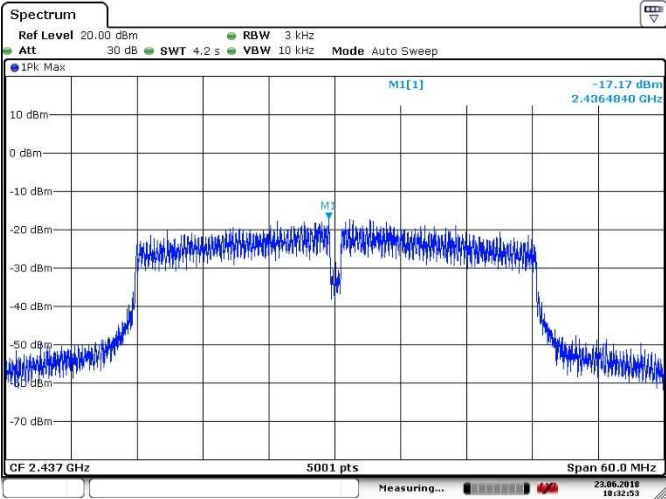
802.11n HT40 PSD

Channel 03 (2422MHz)



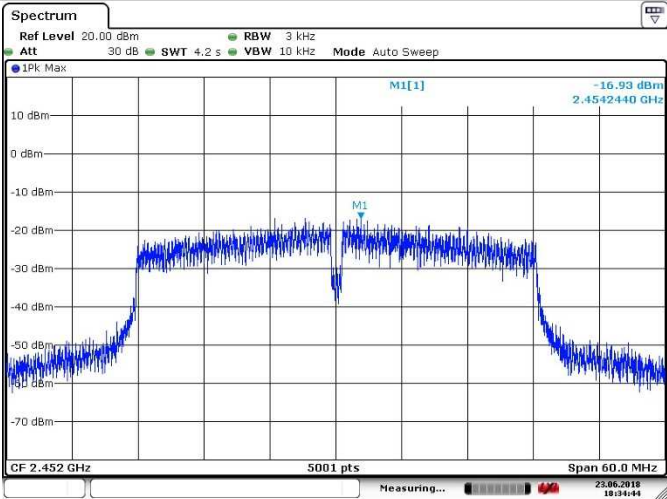
Date: 23 JUN 2018 18:54:01

Channel 06 (2437MHz)



Date: 23 JUN 2018 18:32:54

Channel 09 (2452MHz)



Date: 23 JUN 2018 18:34:44

9.5 Conducted Band Edge and Out-of-Band Emissions

Test Method

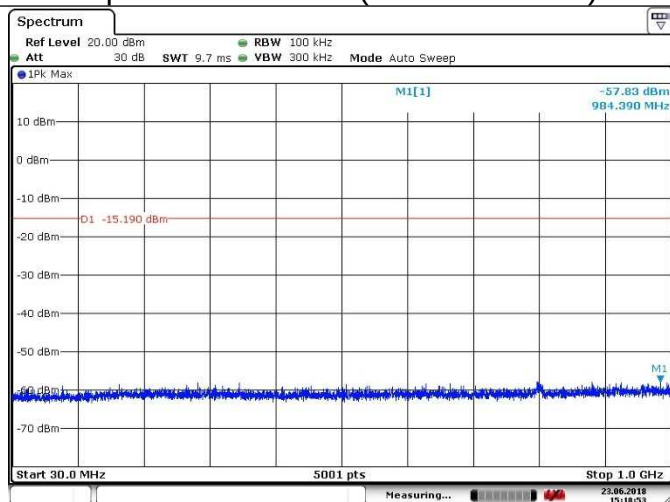
1. Establish a reference level by using the following procedure:
 - a. Set RBW=100 kHz. VBW $\geq$ 3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
 - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level 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

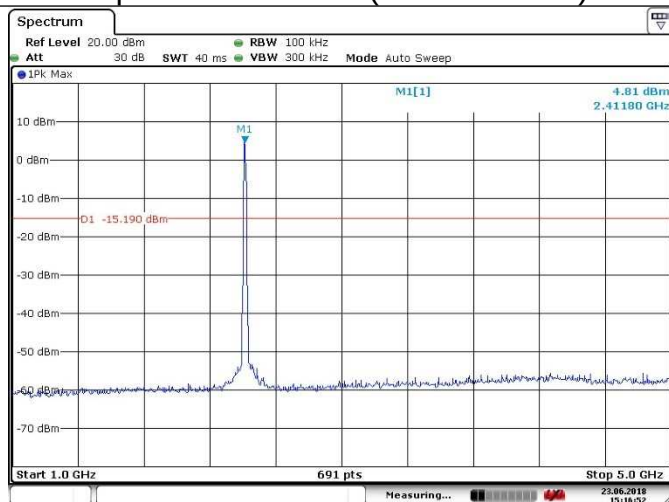
Frequency Range MHz	Limit (dBc)
30-25000	-20

Test result

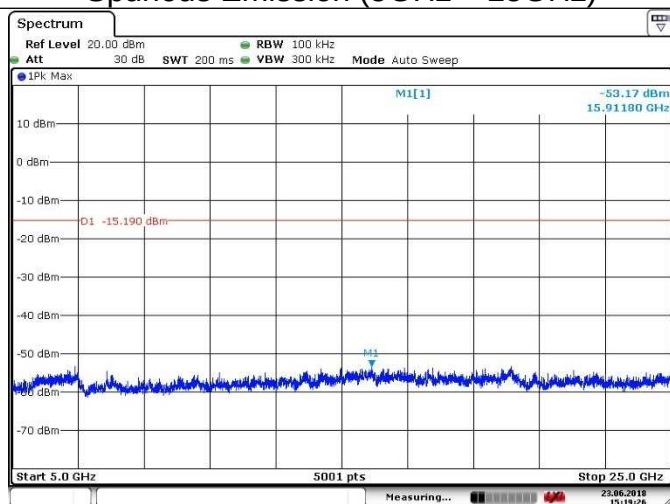
Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	Limit	Result
802.11b	1Mbps	01	2412	20dBc	Pass
802.11b	1Mbps	06	2437	20dBc	Pass
802.11b	1Mbps	11	2462	20dBc	Pass
802.11g	6Mbps	01	2412	20dBc	Pass
802.11g	6Mbps	06	2437	20dBc	Pass
802.11g	6Mbps	11	2462	20dBc	Pass
802.11n-HT20	6.5Mbps	01	2412	20dBc	Pass
802.11n-HT20	6.5Mbps	06	2437	20dBc	Pass
802.11n-HT20	6.5Mbps	11	2462	20dBc	Pass
802.11n-HT40	13.5Mbps	03	2422	20dBc	Pass
802.11n-HT40	13.5Mbps	06	2437	20dBc	Pass
802.11n-HT40	13.5Mbps	09	2452	20dBc	Pass

Spurious RF conducted emissions**802.11b Out-of-Band Emissions****Channel 01 (2412MHz)****Spurious Emission (30MHz – 1GHz)**

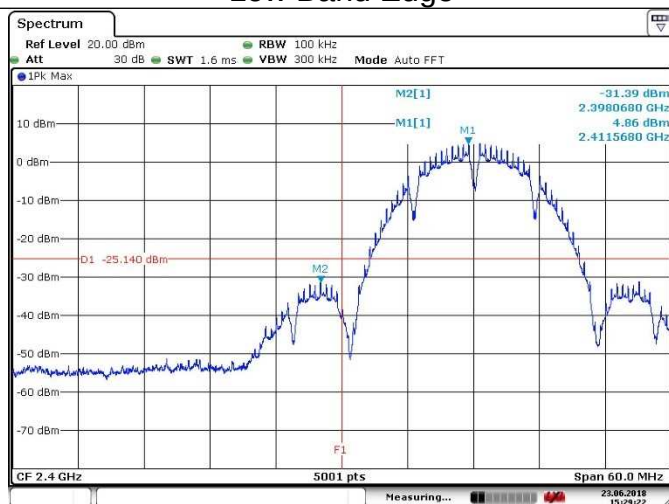
Date: 23 JUN 2018 15:16:53

Spurious Emission (1GHz – 5GHz)

Date: 23 JUN 2018 15:16:53

Spurious Emission (5GHz – 25GHz)

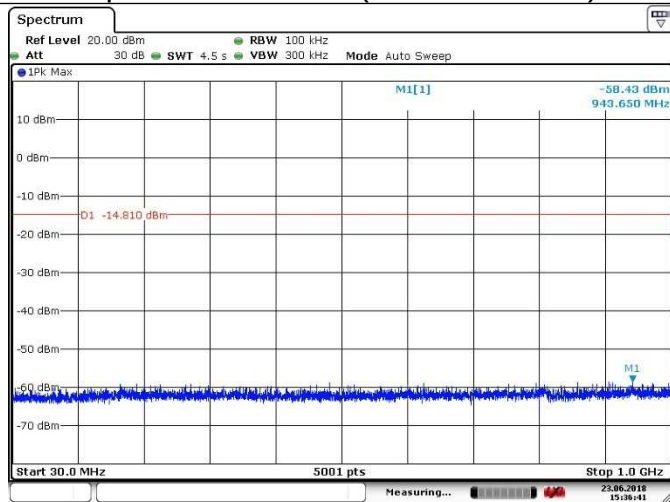
Date: 23 JUN 2018 15:19:27

Low Band Edge

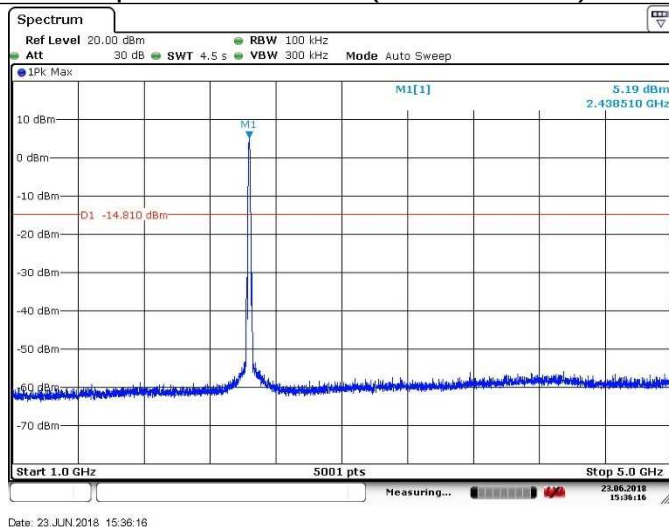
Date: 23 JUN 2018 15:29:23

Channel 06 (2437MHz)

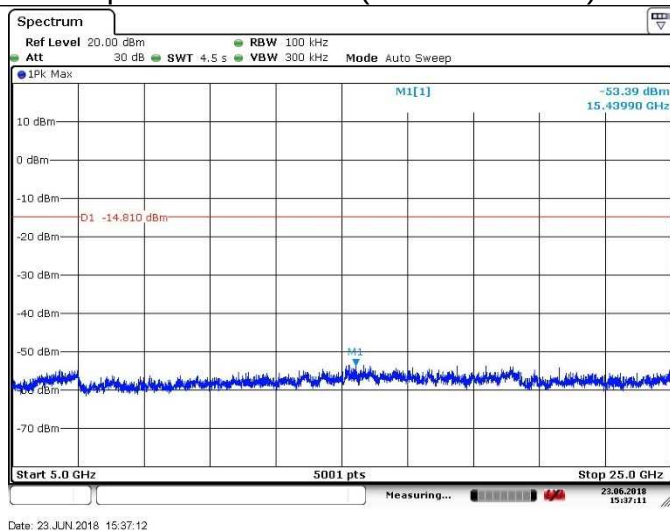
Spurious Emission (30MHz – 1GHz)



Spurious Emission (1GHz – 5GHz)

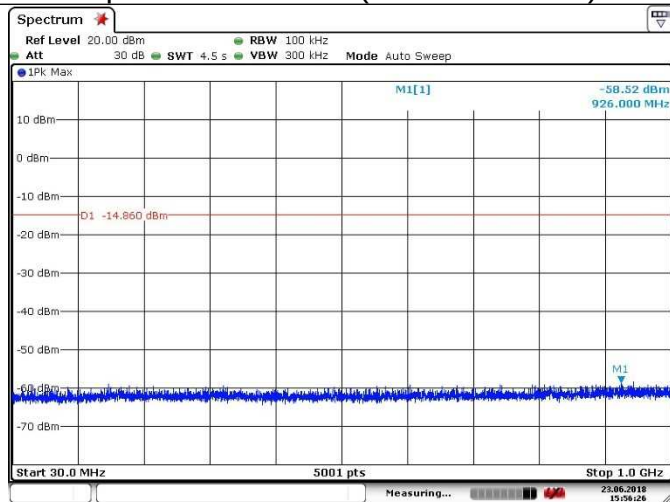


Spurious Emission (5GHz – 25GHz)



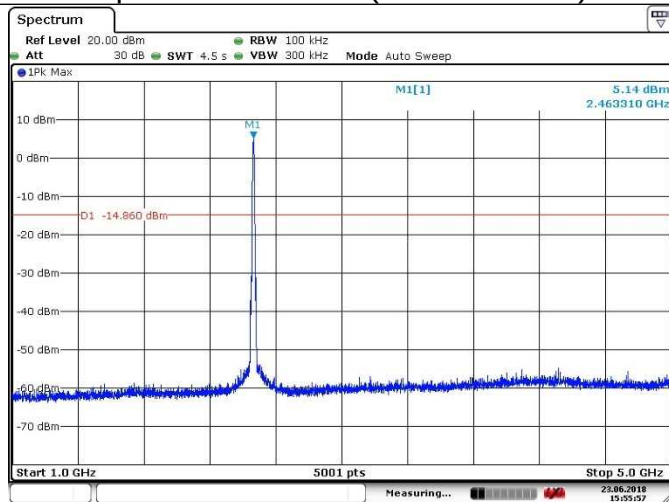
Channel 11 (2462MHz)

Spurious Emission (30MHz – 1GHz)



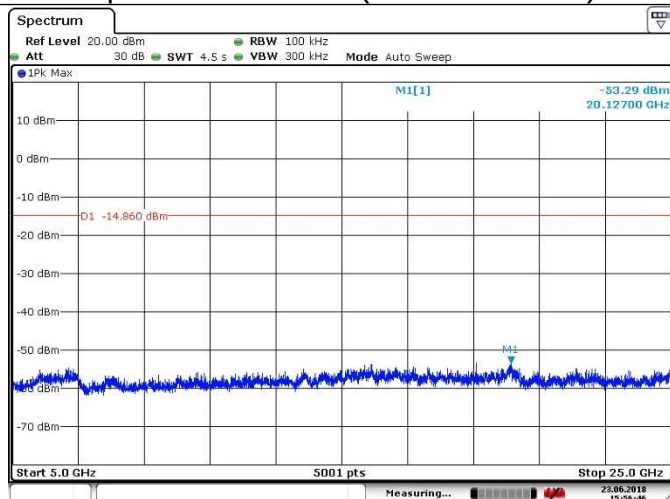
Date: 23 JUN 2018 15:56:26

Spurious Emission (1GHz – 5GHz)



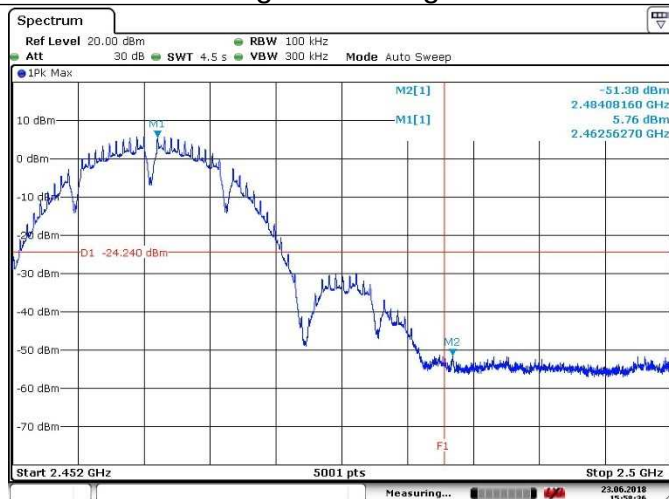
Date: 23 JUN 2018 15:55:57

Spurious Emission (5GHz – 25GHz)



Date: 23 JUN 2018 15:56:46

High Band Edge

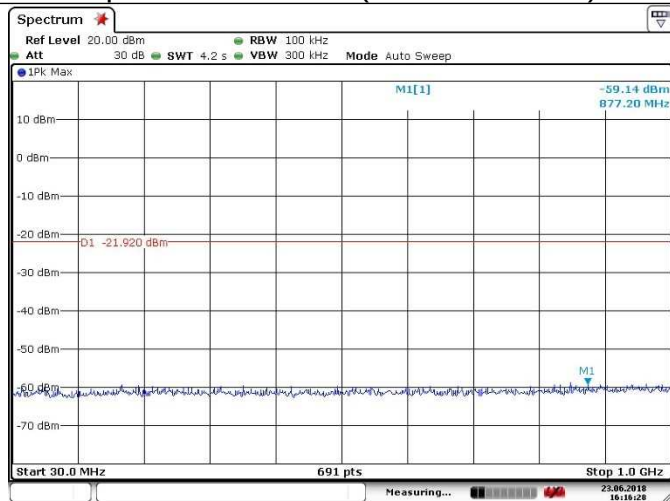


Date: 23 JUN 2018 15:58:36

802.11g Out-of-Band Emissions

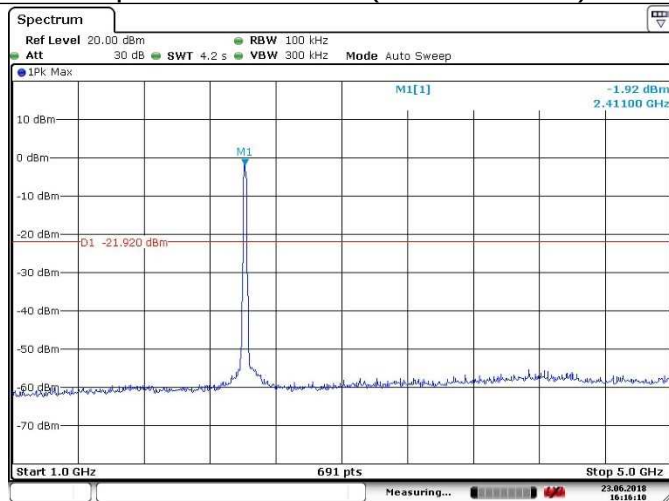
Channel 01 (2412MHz)

Spurious Emission (30MHz – 1GHz)



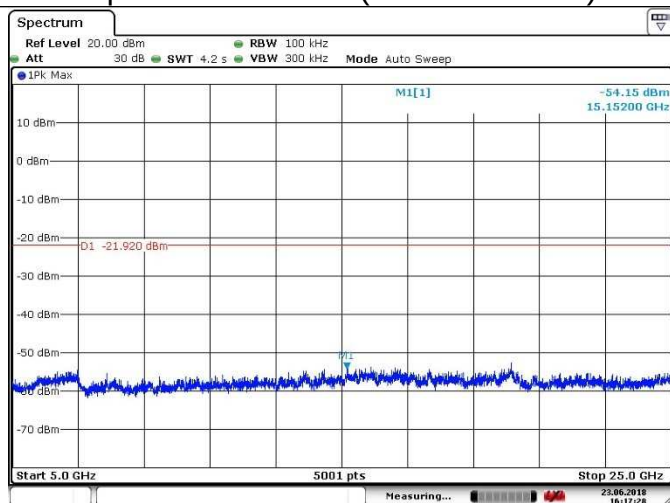
Date: 23 JUN 2018 16:16:28

Spurious Emission (1GHz – 5GHz)



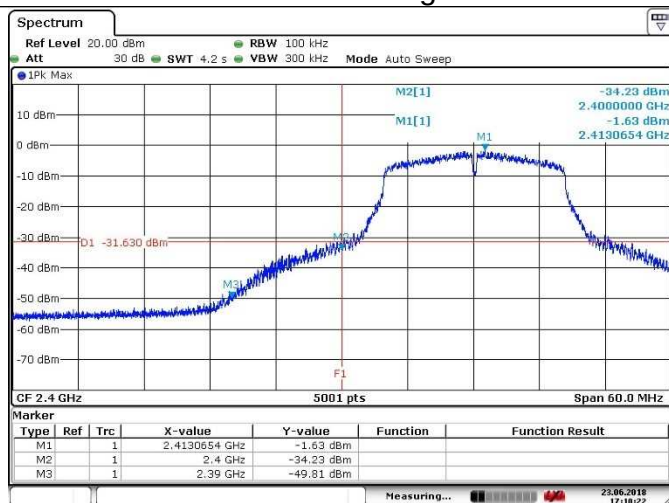
Date: 23 JUN 2018 16:16:11

Spurious Emission (5GHz – 25GHz)



Date: 23 JUN 2018 16:17:28

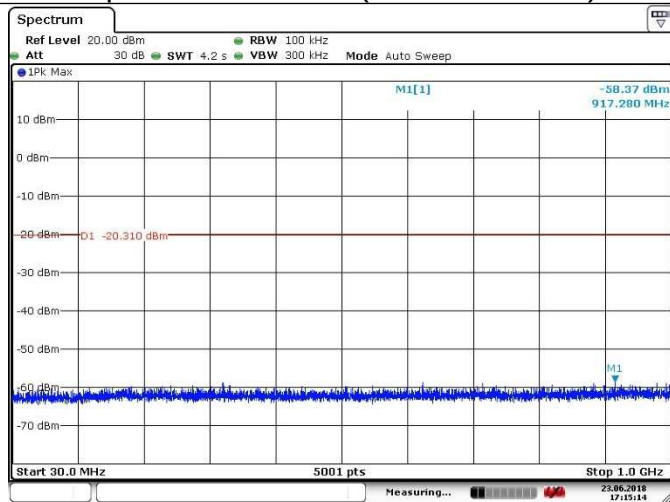
Low Band Edge



Date: 23 JUN 2018 17:10:22

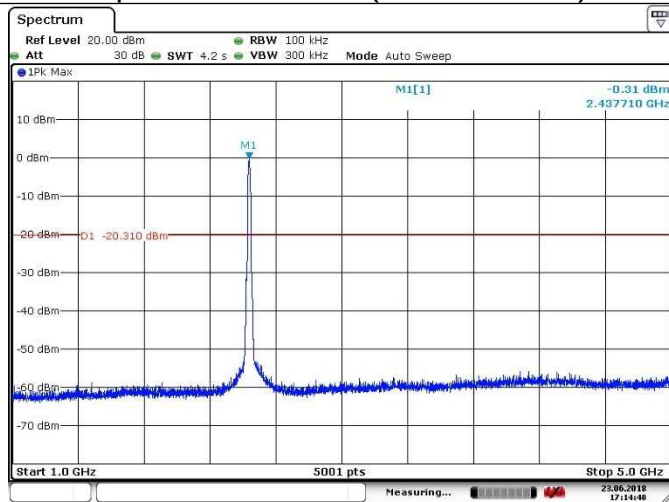
Channel 06 (2437MHz)

Spurious Emission (30MHz – 1GHz)



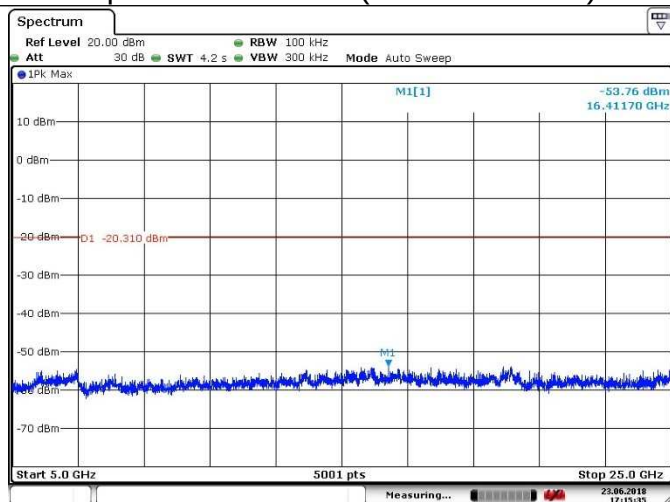
Date: 23 JUN 2018 17:15:14

Spurious Emission (1GHz – 5GHz)



Date: 23 JUN 2018 17:14:48

Spurious Emission (5GHz – 25GHz)



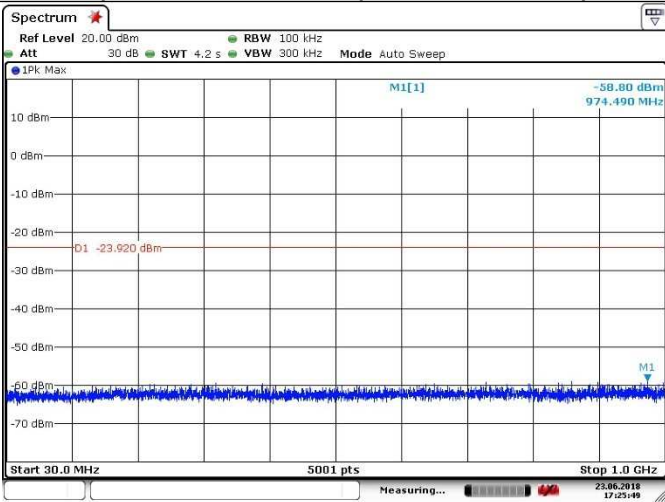
Date: 23 JUN 2018 17:15:35



China

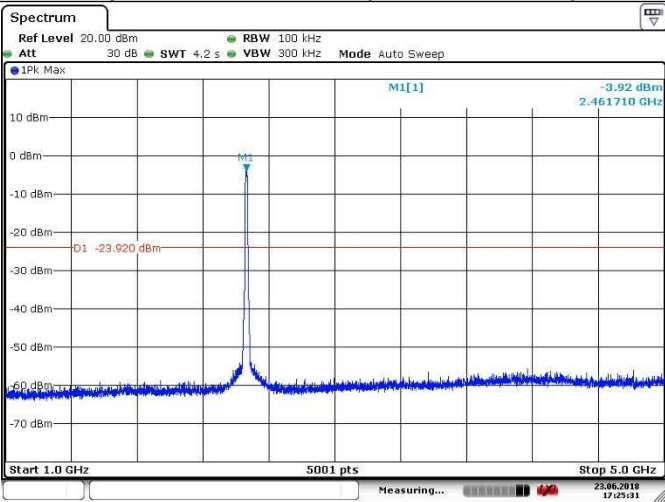
Channel 11 (2462MHz)

Spurious Emission (30MHz – 1GHz)



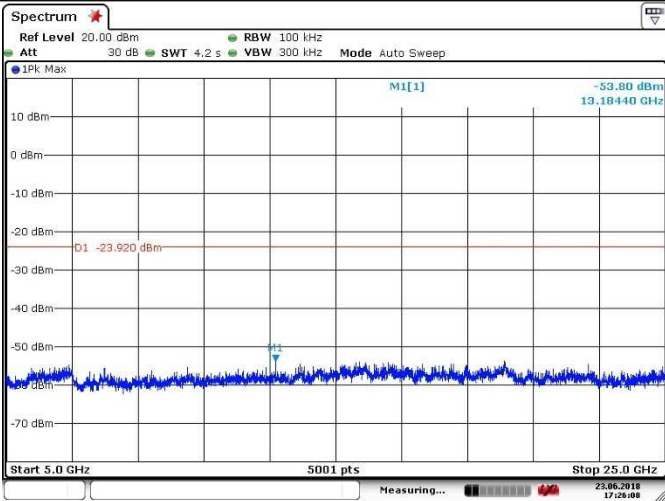
Date: 23 JUN 2018 17:25:50

Spurious Emission (1GHz – 5GHz)



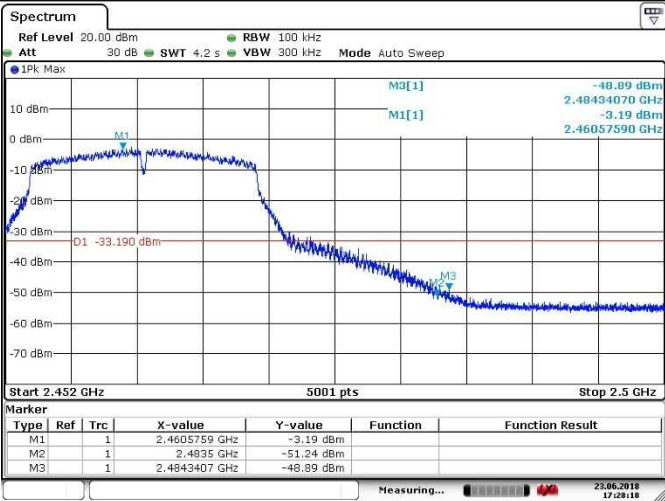
Date: 23 JUN 2018 17:25:31

Spurious Emission (5GHz – 25GHz)



Date: 23 JUN 2018 17:26:08

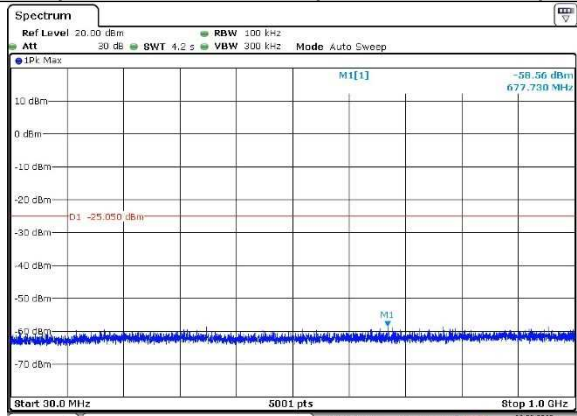
High Band Edge



Date: 23 JUN 2018 17:28:18

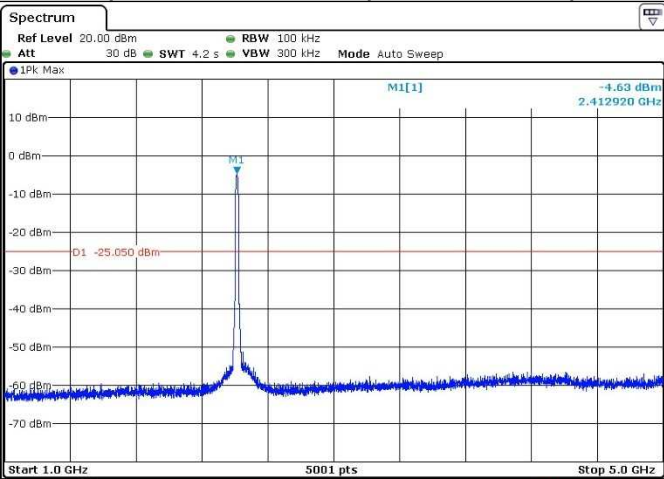
802.11n-HT20 Out-of-Band Emissions
Channel 01 (2412MHz)

Spurious Emission (30MHz – 1GHz)



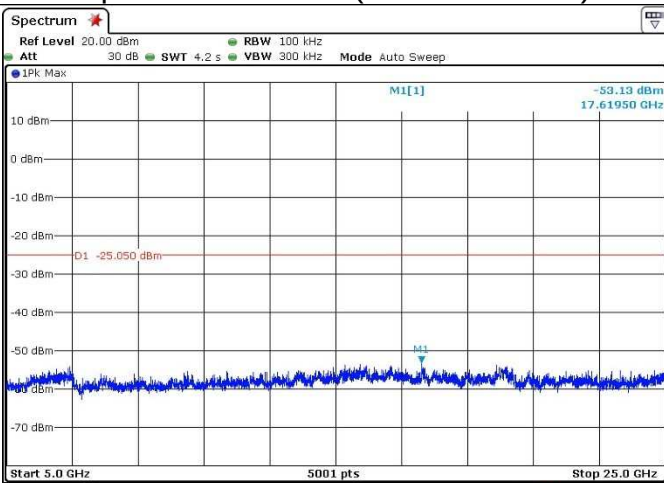
Date: 23 JUN 2018 17:40:24

Spurious Emission (1GHz – 5GHz)



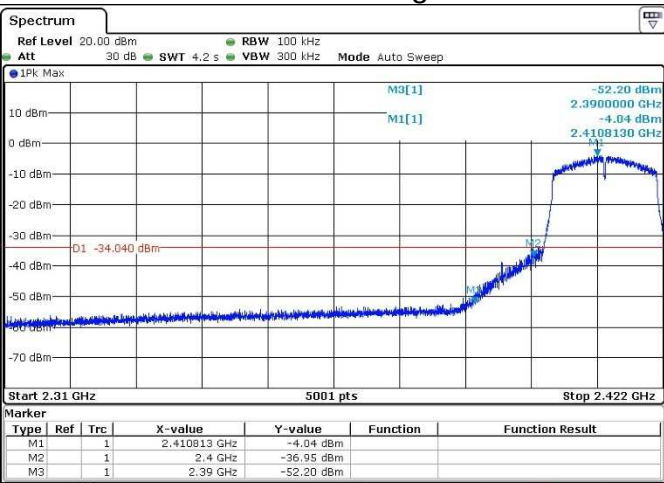
Date: 23 JUN 2018 17:39:58

Spurious Emission (5GHz – 25GHz)



Date: 23 JUN 2018 17:40:45

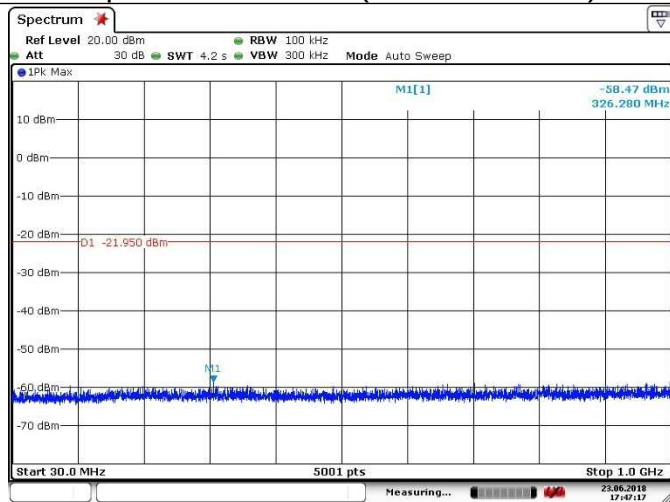
Low Band Edge



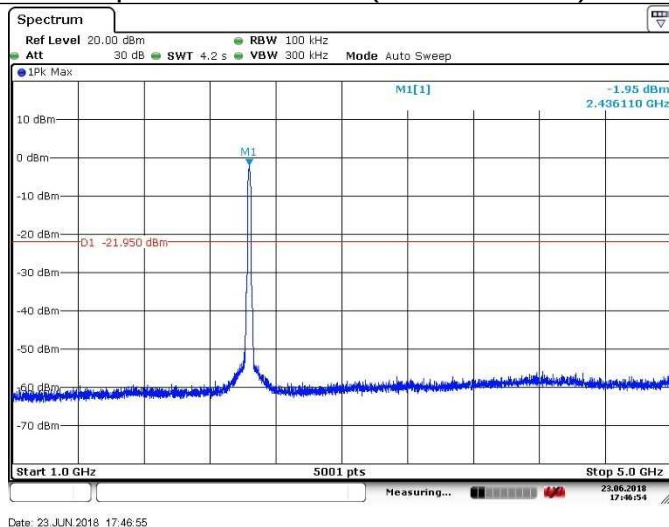
Date: 23 JUN 2018 17:39:26

Channel 06 (2437MHz)

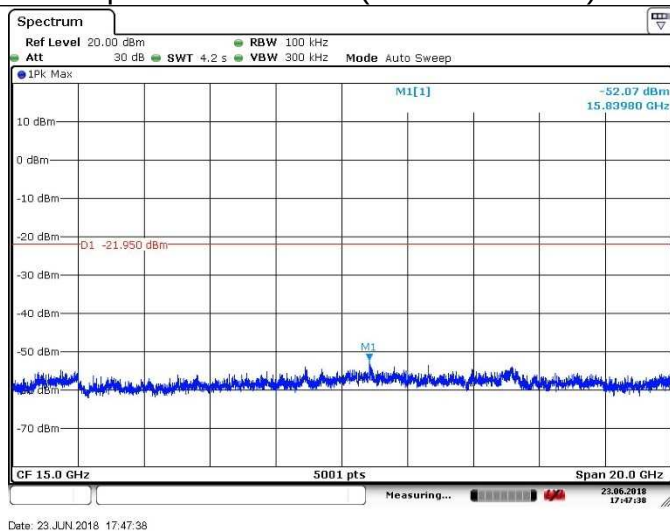
Spurious Emission (30MHz – 1GHz)



Spurious Emission (1GHz – 5GHz)



Spurious Emission (5GHz – 25GHz)

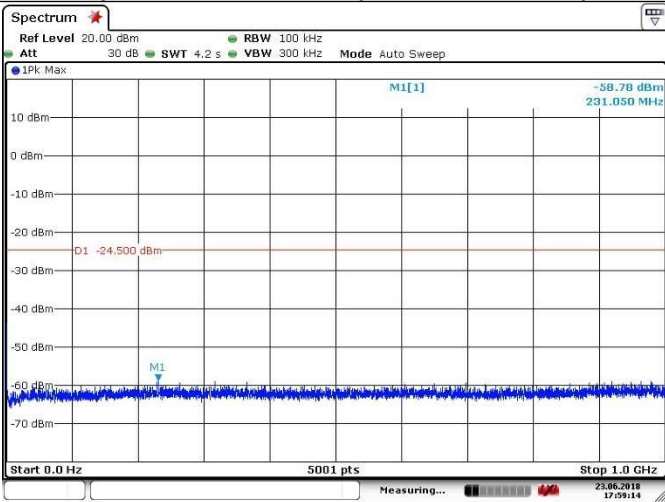




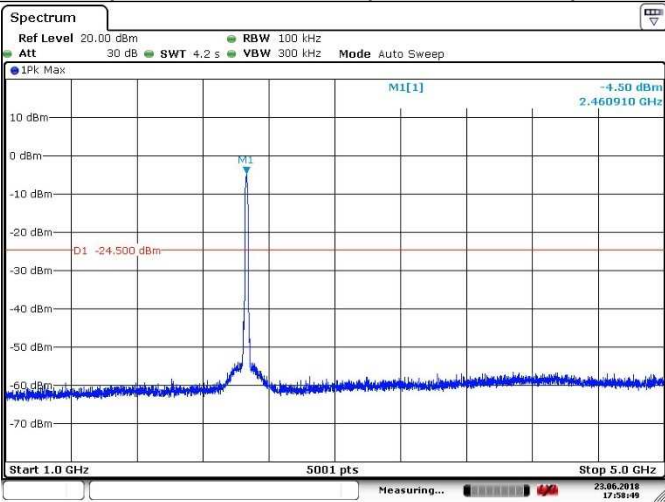
China

Channel 11 (2462MHz)

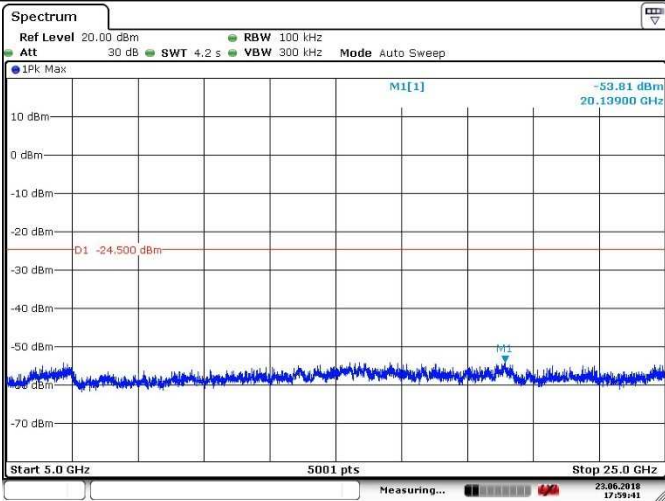
Spurious Emission (30MHz – 1GHz)



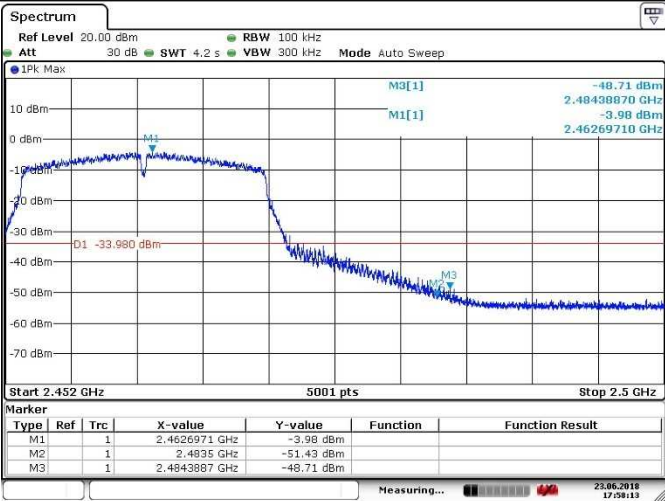
Spurious Emission (1GHz – 5GHz)



Spurious Emission (5GHz – 25GHz)



High Band Edge



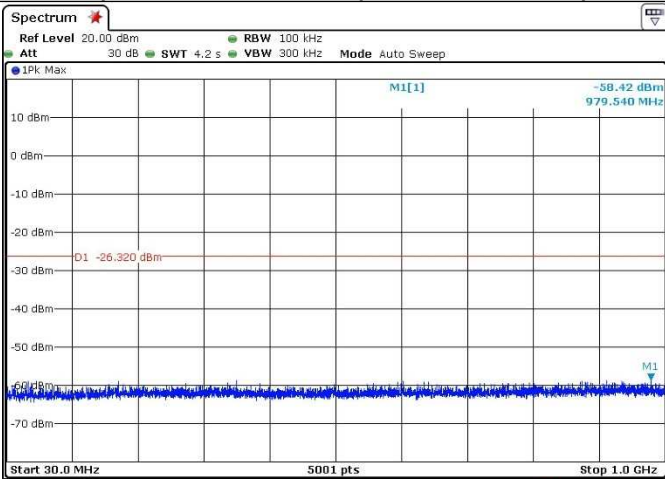


China

802.11n-HT40 Out-of-Band Emissions

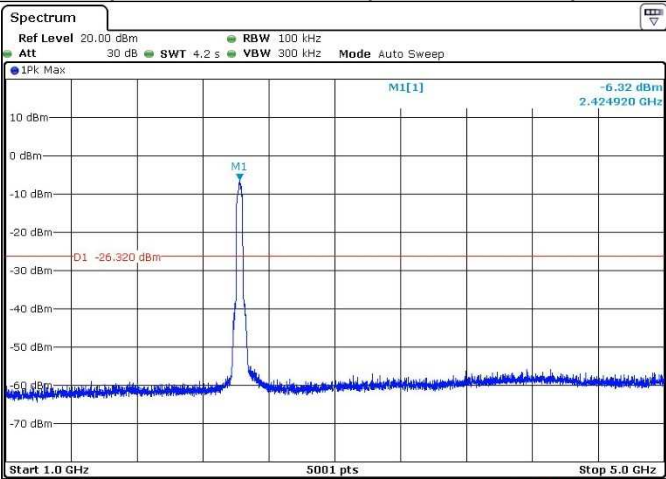
Channel 03 (2422MHz)

Spurious Emission (30MHz – 1GHz)



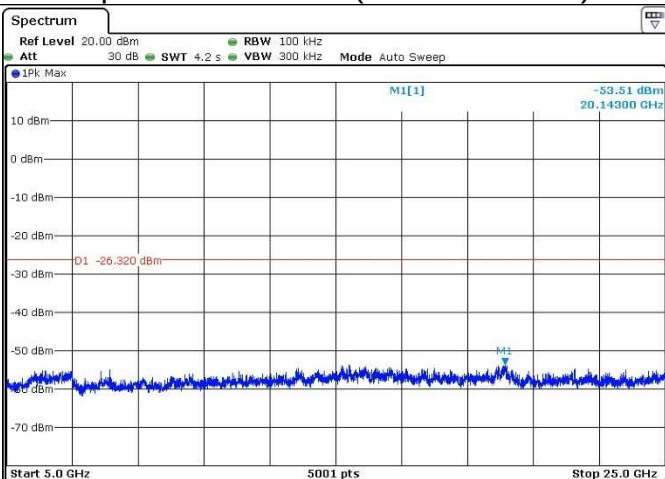
Date: 23 JUN 2018 18:21:24

Spurious Emission (1GHz – 5GHz)



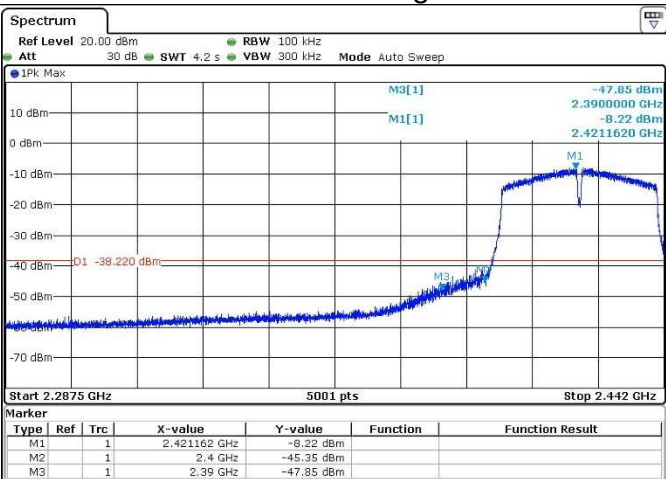
Date: 23 JUN 2018 18:20:59

Spurious Emission (5GHz – 25GHz)



Date: 23 JUN 2018 18:21:52

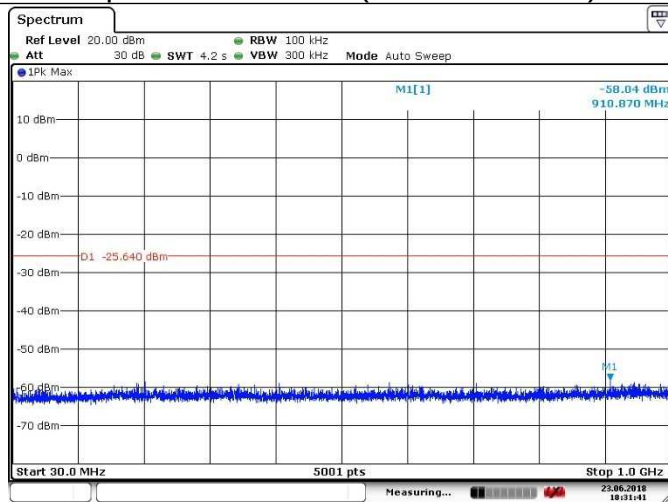
Low Band Edge



Date: 23 JUN 2018 18:51:26

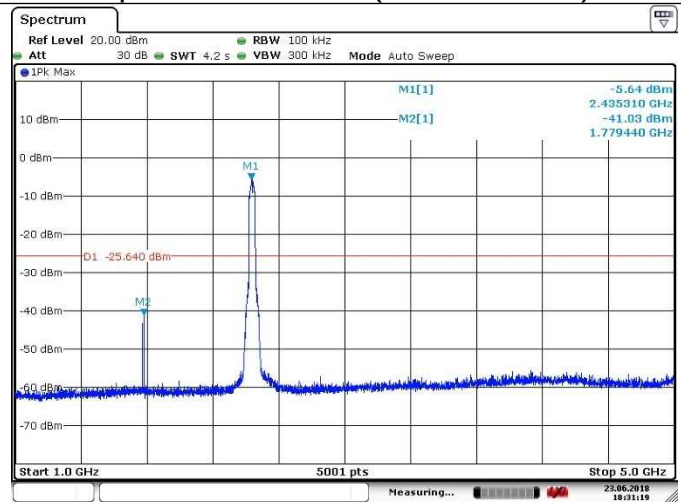
Channel 06 (2437MHz)

Spurious Emission (30MHz – 1GHz)



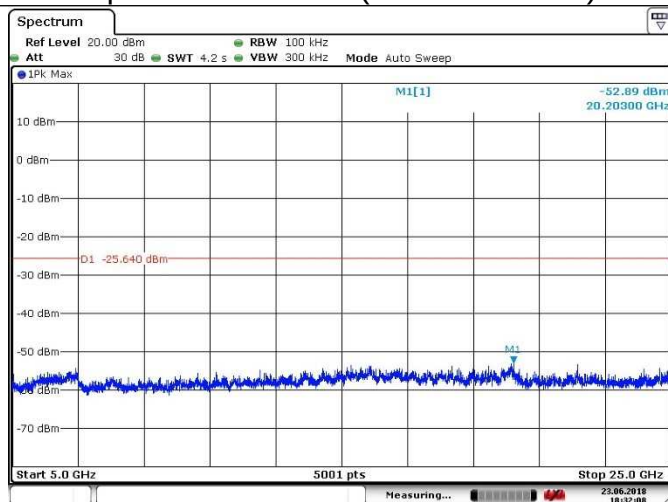
Date: 23 JUN 2018 18:31:42

Spurious Emission (1GHz – 5GHz)



Date: 23 JUN 2018 18:31:19

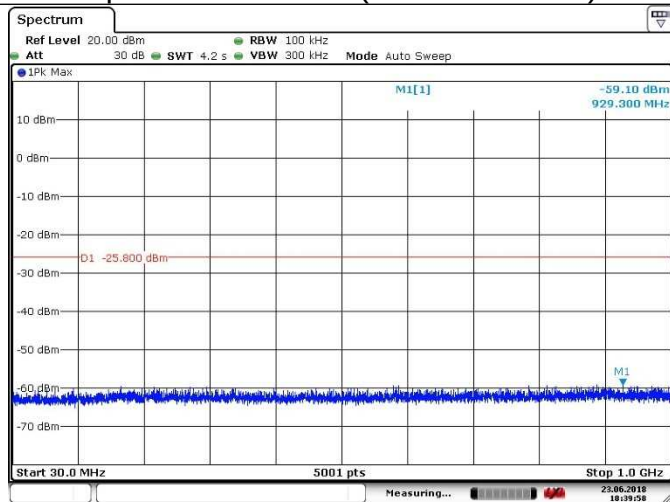
Spurious Emission (5GHz – 25GHz)



Date: 23 JUN 2018 18:32:08

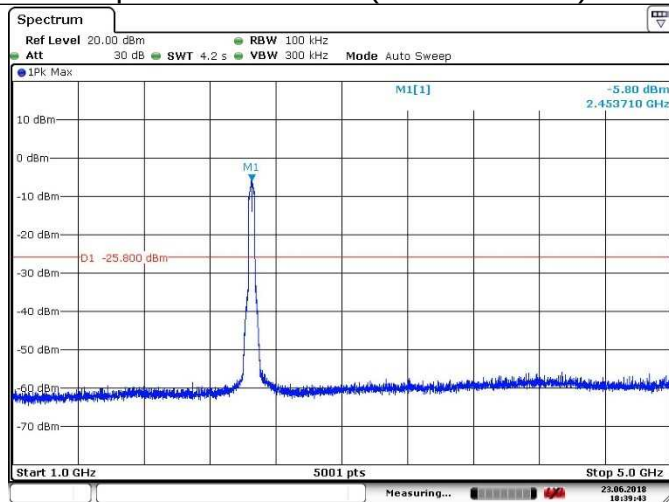
Channel 09 (2452MHz)

Spurious Emission (30MHz – 1GHz)



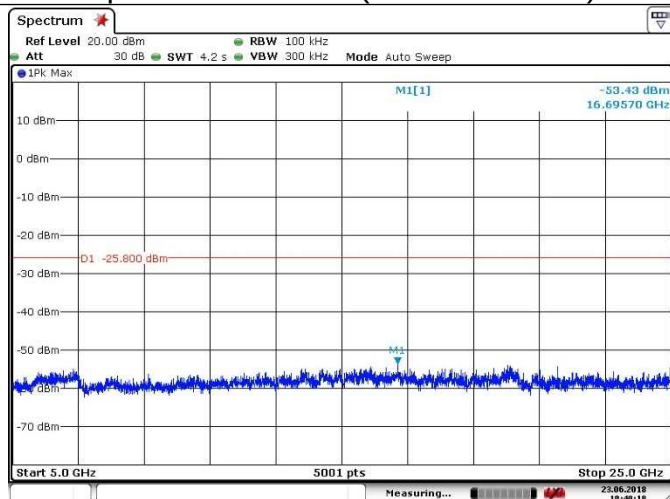
Date: 23 JUN 2018 18:39:58

Spurious Emission (1GHz – 5GHz)



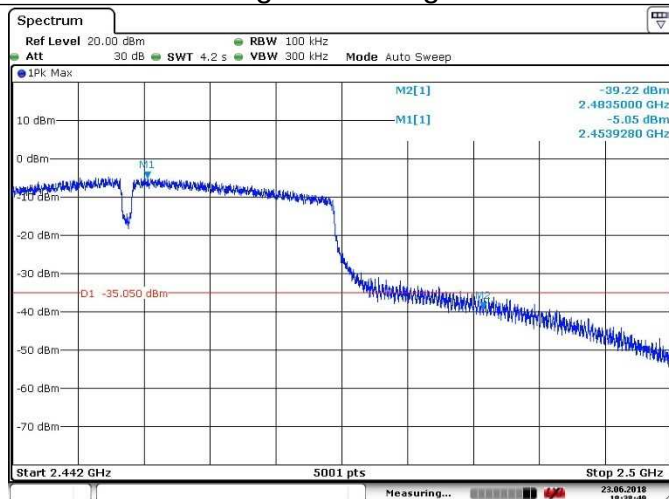
Date: 23 JUN 2018 18:39:43

Spurious Emission (5GHz – 25GHz)



Date: 23 JUN 2018 18:40:18

High Band Edge



Date: 23 JUN 2018 18:38:49

9.6 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 3-meter 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 from 0 degrees to 360 degrees to find the maximum reading.

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 ≥ 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 ≥ 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 ($20\log(1/\text{duty cycle})$).
- 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

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.

LIMITS OF RADIATED EMISSION MEASUREMENT (Frequency Range 9kHz-1000MHz)

Frequency MHz	Field Strength uV/m	Measured Distance Meters
0.009~0.490	2400/F (kHz)	300
0.490~1.705	24000/F (kHz)	30
1.705~30	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency MHz	Field Strength (dBuV/m) (at 3M) PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20logEmission level (uV/m).

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.

Transmitting spurious emission test result as below:

Remark 1: There are the ambient noise within frequency range 9kHz ~ 30MHz and 18GHz ~ 25GHz, the permissible value is not show in the report.

Remark 2: Average measurement was not performed if peak level lower than average limit.

Remark 3: Other frequency was 20dB below limit line with 1-18GHz, there is not show in the report.

Test Result

Test mode: 802.11b					
Channel 01 (2412MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2388.7	47.55	74.0	-26.45	Peak	Horizontal
4824.2	46.77	74.0	-27.23	Peak	Horizontal
7236.7	44.21	74.0	-29.79	Peak	Horizontal
2388.2	50.95	74.0	-23.05	Peak	Vertical
4824.2	50.53	74.0	-23.47	Peak	Vertical
7236.97	47.53	74.0	-26.47	Peak	Vertical

Test mode: 802.11b					
Channel 06 (2437 MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
4874.3	44.43	74.0	-29.57	Peak	Horizontal
7308.7	45.09	74.0	-28.91	Peak	Horizontal
9760.1	47.75	74.0	-26.25	Peak	Horizontal
4874.3	42.87	74.0	-31.13	Peak	Vertical
7324.8	45.87	74.0	-28.13	Peak	Vertical

Test mode: 802.11b					
Channel 11 (2462MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2483.5	67.12	74.0	-6.88	Peak	Horizontal
2483.5	51.32	54.0	-2.68	Average	Horizontal
4923.6	41.52	74.0	-32.48	Peak	Horizontal
5015.4	42.84	74.0	-31.16	Peak	Horizontal
7362.3	46.18	74.0	-27.82	Peak	Horizontal
2483.5	62.63	74.0	-11.37	Peak	Vertical
2483.5	43.14	54.0	-10.86	Average	Vertical
4949.1	42.15	74.0	-31.85	Peak	Vertical
7367.4	47.25	74.0	-26.75	Peak	Vertical

Remark:

- (1) Emission level= Original Receiver Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
- (3) Margin = limit – Corrected Reading

Test mode: 802.11g					
Channel 01 (2412MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2390.0	62.68	74.0	-11.32	Peak	Horizontal
2390.0	43.21	54.0	-10.79	Average	Horizontal
4821.6	42.86	74.0	-31.14	Peak	Horizontal
7236.4	44.31	74.0	-29.69	Peak	Horizontal
2390.0	54.42	74.0	-19.58	Peak	Vertical
2390.0	40.08	54.0	-13.92	Average	Vertical
4822.5	40.09	74.0	-33.91	Peak	Vertical
7246.6	43.96	74.0	-30.04	Peak	Vertical

Test mode: 802.11g					
Channel 06 (2437 MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
4879.4	40.99	74.0	-33.01	Peak	Horizontal
7312.0	46.06	74.0	-27.94	Peak	Horizontal
4879.4	41.49	74.0	-32.51	Peak	Vertical
7318.1	44.75	74.0	-29.25	Peak	Vertical

Test mode: 802.11g					
Channel 11 (2462MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2483.5	72.84	74.0	-1.16	Peak	Horizontal
2483.5	52.07	54.0	-1.93	Average	Horizontal
4930.4	41.41	74.0	-32.59	Peak	Horizontal
7391.2	45.61	74.0	-28.39	Peak	Horizontal
2483.5	66.59	74.0	-7.41	Peak	Vertical
2483.5	49.53	54.0	-4.47	Average	Vertical
4923.6	40.32	74.0	-33.68	Peak	Vertical
7383.5	46.40	74.0	-27.6	Peak	Vertical

Remark:

- (4) Emission level= Original Receiver Reading + Correct Factor
- (5) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
- (6) Margin = limit – Corrected Reading

Test mode: 802.11n-HT20					
Channel 01 (2412MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2390.0	61.62	74.0	-12.38	Peak	Horizontal
2390.0	41.33	54.0	-12.67	Average	Horizontal
4823.3	42.53	74.0	-31.47	Peak	Horizontal
7234.7	43.74	74.0	-30.26	Peak	Horizontal
2390.0	58.06	74.0	-15.94	Peak	Vertical
2390.0	36.71	54.0	-17.29	Average	Vertical
4823.6	40.32	74.0	-33.68	Peak	Vertical
7383,5	46.49	74.0	-27.51	Peak	Vertical

Test mode: 802.11n-HT20					
Channel 06 (2437 MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
4870.9	39.95	74.0	-34.05	Peak	Horizontal
7313.8	45.02	74.0	-28.98	Peak	Horizontal
4878.5	40.02	74.0	-33.98	Peak	Vertical
7312.1	43.84	74.0	-30.16	Peak	Vertical

Test mode: 802.11n-HT20					
Channel 11 (2462MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2483.5	67.79	74.0	-6.21	Peak	Horizontal
2483.5	51.78	54.0	-2.22	Average	Horizontal
4930.4	41.41	74.0	-32.59	Peak	Horizontal
7381.2	43.61	74.0	-30.39	Peak	Horizontal
2483.5	57.06	74.0	-16.94	Peak	Vertical
2483.5	45.59	54.0	-8.41	Average	Vertical
4923.6	40.32	74.0	-33.68	Peak	Vertical
7383.5	46.39	74.0	-27.61	Peak	Vertical

Remark:

- (1) Emission level= Original Receiver Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
- (3) Margin = limit – Corrected Reading

Test mode: 802.11n-HT40					
Channel 01 (2422MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2390.0	63.15	74.0	-10.85	Peak	Horizontal
2390.0	46.62	54.0	-7.38	Average	Horizontal
4847.9	40.34	74.0	-33.66	Peak	Horizontal
7274.7	44.29	74.0	-29.71	Peak	Horizontal
2390.0	65.21	74.0	-8.79	Peak	Vertical
2390.0	38.32	54.0	-15.68	Average	Vertical
4849.6	40.72	74.0	-33.28	Peak	Vertical
7251.7	45.38	74.0	-28.62	Peak	Vertical

Test mode: 802.11n-HT40					
Channel 06 (2437 MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
4871.7	41.28	74.0	-32.72	Peak	Horizontal
7311.3	44.52	74.0	-29.48	Peak	Horizontal
4895.5	40.97	74.0	-33.03	Peak	Vertical
7318.1	44.87	74.0	-29.13	Peak	Vertical

Test mode: 802.11n-HT40					
Channel 11 (2452MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2483.5	68.51	74.0	-5.49	Peak	Horizontal
2483.5	51.23	54.0	-2.77	Average	Horizontal
4901.5	41.18	74.0	-32.82	Peak	Horizontal
7371.6	45.86	74.0	-28.14	Peak	Horizontal
1330.7	38.71	74.0	-35.29	Peak	Vertical
2483.5	67.72	74.0	-6.28	Peak	Vertical
2483.5	44.43	54.0	-9.57	Average	Vertical
4905.8	39.66	74.0	-34.34	Peak	Vertical
7346.9	45.44	74.0	-28.56	Peak	Vertical

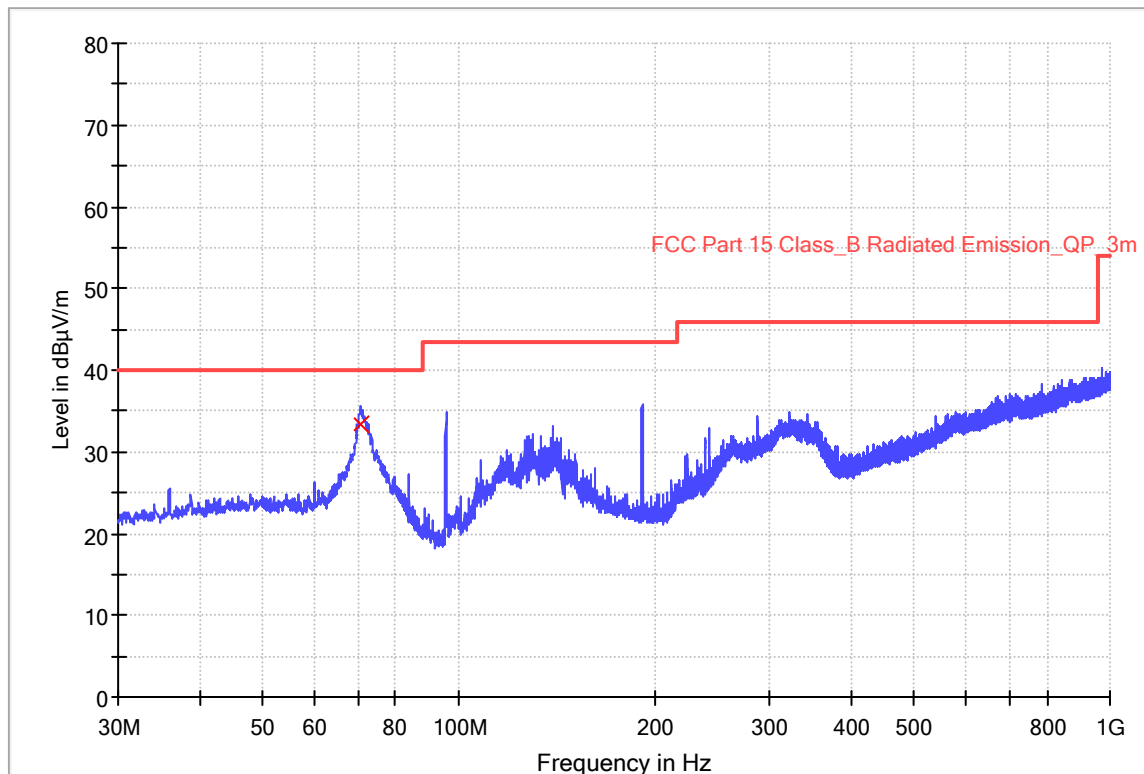
Remark:

- (1) Emission level= Original Receiver Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
- (3) Margin = limit – Corrected Reading

The worst case of Radiated Emission below 1GHz:

Site: 3 meter chamber	Time: 2018/06/23 - 17:01
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Jiaxi XU
Probe: VULB9163_0.03-8GHz	Polarity: Horizontal
EUT: Smartmi Evaporative Humidifier	Power: 120VAC, 60Hz
Note: Transmit by 802.11b at channel 2437MHz.	
Note: There is the worst case within frequency range 30MHz~1GHz.	

RE_VULB9163_pre_Cont_30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
70.600000	33.5	1000.0	120.000	100.3	H	1.0	12.3	6.5	40.0

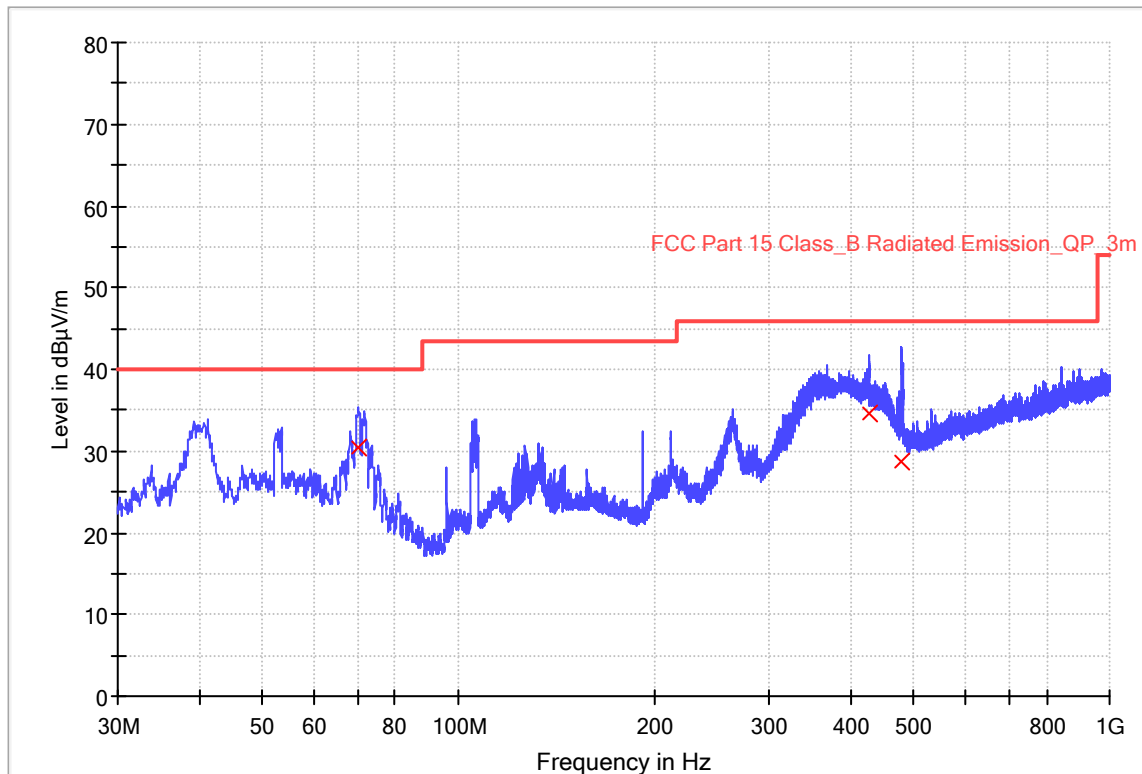
Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

Site: 3 meter chamber	Time: 2018/06/23 - 17:04
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Jiayi XU
Probe: VULB9163 0.03-8GHz	Polarity: Vertical
EUT: Smartmi Evaporative Humidifier	Power: 120VAC, 60Hz
Note: Transmit by 802.11b at channel 2437MHz.	
Note: There is the worst case within frequency range 30MHz~1GHz.	

RE_VULB9163_pre_Cont_30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
70.320000	30.4	1000.0	120.000	100.1	V	2.0	12.4	9.6	40.0
426.720000	34.6	1000.0	120.000	100.1	V	358.0	18.9	11.4	46.0
479.400000	28.8	1000.0	120.000	100.1	V	1.0	20.2	17.2	46.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

10 Test Equipment List

List of Test Instruments
Test Site1

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2018-8-7
	Wideband Power Sensor	Rohde & Schwarz	NRP-Z81	102116	2019-2-6
RE	EMI Test Receiver	Rohde & Schwarz	ESR3	101906	2018-8-7
	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2018-8-7
	Loop antenna	Rohde & Schwarz	HFH2-Z2	100443	2018-9-5
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	848	2018-9-17
	Horn Antenna	Rohde & Schwarz	HF907	102393	2018-9-17
	Pre-amplifier	Rohde & Schwarz	SCU-18D	19006451	2018-8-7
	3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-20
CE	EMI Test Receiver	Rohde & Schwarz	ESR 3	101907	2018-8-7
	LISN	Rohde & Schwarz	ENV4200	100224	2018-8-7
	LISN	Rohde & Schwarz	ENV216	101924	2018-8-7

C - Conducted RF tests

- Conducted peak output power
- 6dB Occupied Bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Conducted 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:

Test Site1

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, $\pm 2.73\text{dB}$
Radiated Disturbance	30MHz to 1GHz, $\pm 5.03\text{dB}$ (Horizontal) $\pm 5.11\text{dB}$ (Vertical) 1GHz to 18GHz, $\pm 5.15\text{dB}$ (Horizontal) $\pm 5.12\text{dB}$ (Vertical) 18GHz to 25GHz, $\pm 4.76\text{dB}$

THE END