

FCC/IC - TEST REPORT

Report Number : **7095022999908-00B** Date of Issue: August 30, 2022Model : ZPDYJ03HTProduct Type : Xiaomi Instant Photo Printer 1SApplicant : Hannto Technology Co., Ltd.Address : Room 704, Building 1, No. 88, Shengrong Road,
Pudong, Shanghai, ChinaManufacturer : Hannto Technology Co., Ltd.Address : Room 704, Building 1, No. 88, Shengrong Road,
Pudong, Shanghai, ChinaTest Result : ☒ **Positive** ☐ **Negative**Total pages including
Appendices : 54

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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. Shanghai Branch
No.16 Lane, 1951 Du Hui Road,
Shanghai 201108,
P.R. China

Test Firm FCC
Registration
Number: 820234

Designation
number: CN1183

IC Company
Number: 25988

CAB identifier: CN0101

Telephone: +86 21 6141 0123
Fax: +86 21 6140 8600

3 Description of the Equipment under Test

Description of the Equipment Under Test

Product: Xiaomi Instant Photo Printer 1S

PMN / HVIN / Model no.: ZPDYJ03HT

FCC ID: 2AZHDZPDYJ03HT

IC: 28632-ZPDYJ03HT

Rating: For AC adapter: Input:100~240V~,50/60Hz,1.0A
Output:24V DC,1.6A
For printer:24V DC,1.6A

RF Transmission Frequency: For 802.11b/g/n-HT20: 2412~2462 MHz
For Bluetooth LE:2402~2480 MHz

No. of Operated Channel: 2.4GHz WIFI: 11 for 802.11b/802.11g/802.11(H20)
2.4GHz BLE: 40

Modulation: For 2.4GHz WIFI:
Direct Sequence Spread Spectrum (DSSS) for 802.11b
Orthogonal Frequency Division Multiplexing (OFDM) for 802.11g/n
For 2.4GHz BLE: GFSK

Channel list:

802.11b/g/n(HT20)			
Ch	Fre(MHz)	Ch	Fre(MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

Bluetooth Low Energy							
Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

Antenna Type: PCB antenna

Antenna Gain: 2.53dBi

Description of the EUT: The Equipment Under Test (EUT) is a Xiaomi Instant Photo Printer 1S which equipped with Wi-Fi and Bluetooth module.
We tested it and listed the worst data in this report.

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5 Amendment 2 February 2021	General Requirements for Compliance of Radio Apparatus
RSS-247 Issue 2 February 2017	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 and ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207 & RSS-GEN 8.8	Conducted emission AC power port	13-17	Site 1	☒	☐	☐
§15.247 (b) (1) & RSS-247 5.4(d)	Conducted peak output power	18	Site 1	☒	☐	☐
§15.247(a)(1) & RSS-247 5.1(b)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1) & RSS-247 5.1(b)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii) & RSS-247 5.1(d)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii) & RSS-247 5.1(d)	Dwell Time	---	---	☐	☐	☒
§15.247(a)(2) & RSS-247 5.2(a) & RSS-GEN 6.7	6dB bandwidth and 99% Occupied Bandwidth	19-25	Site 1	☒	☐	☐
§15.247(e) & RSS-247 5.2(b)	Power spectral density	26-29	Site 1	☒	☐	☐
§15.247(d) & RSS-247 5.5	Spurious RF conducted emissions	30-39	Site 1	☒	☐	☐
§15.247(d) & RSS-247 5.5	Band edge	40-43	Site 1	☒	☐	☐
§15.247(d) & §15.209 & RSS-247 5.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	44-50	Site 1	☒	☐	☐
§15.203 & RSS-Gen 6.8	Antenna requirement	See note 1		☒	☐	☐

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses PCB antenna, which gain is 2.53dBi. In accordance to §15.203 and RSS-Gen 6.8, 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: 2AZHDZPDYJ03HT, IC: 28632-ZPDYJ03HT complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules and RSS-247, RSS-GEN.

This report is only for the 2.4GHz Wi-Fi test report, for the 2.4GHz BLE test report please refer to 7095022999908-00C.

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: June 13, 2022

Testing Start Date: June 17, 2022

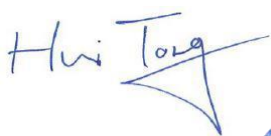
Testing End Date: August 17, 2022

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

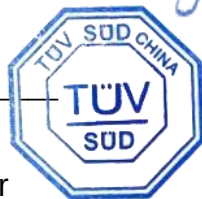
Reviewed by:

Prepared by:

Tested by:



Hui TONG
Review Engineer



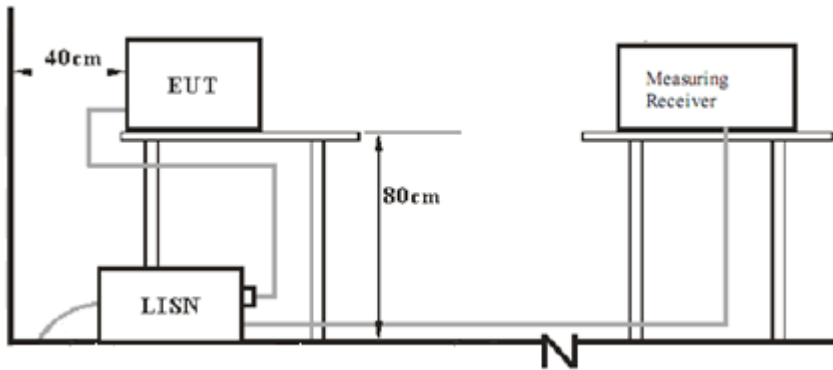
Jiaxi XU
Project Engineer



Cheng Huali
Test Engineer

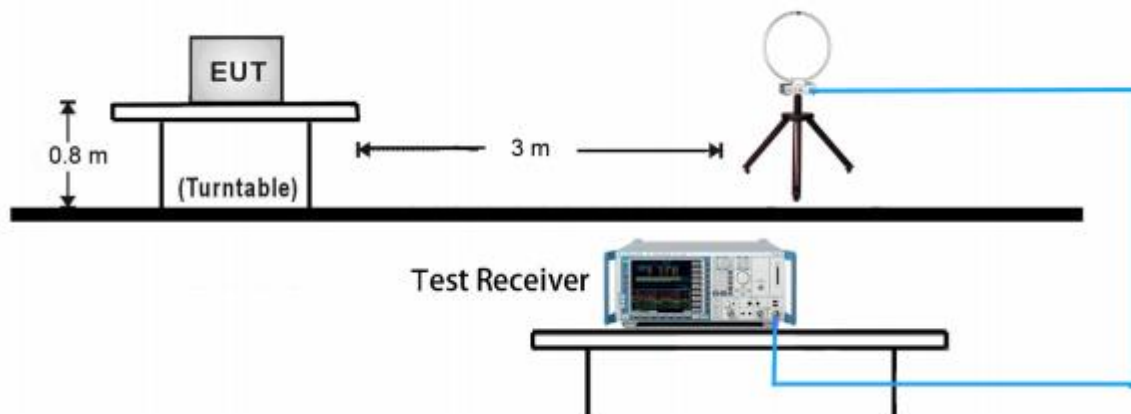
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

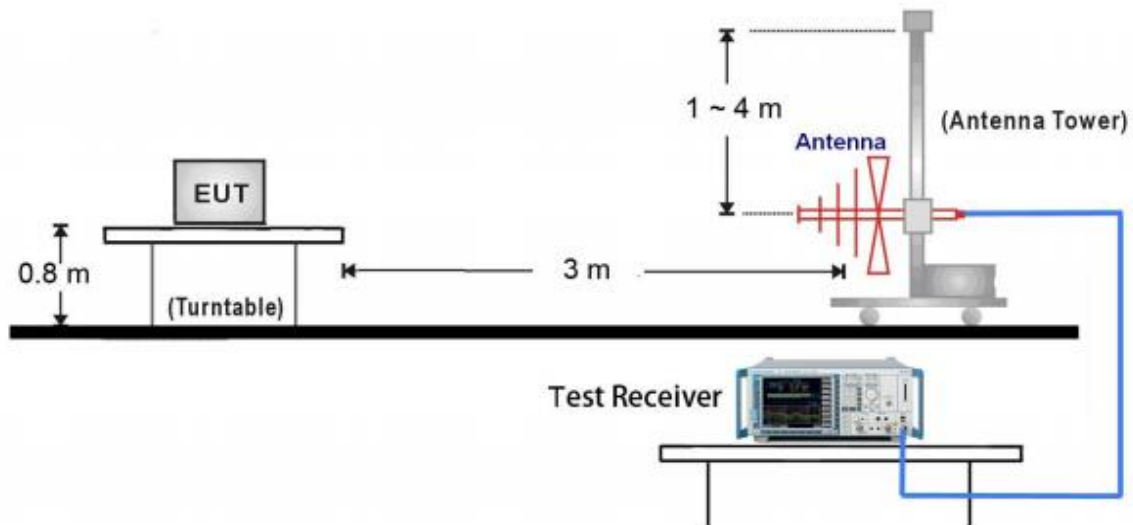


7.2 Radiated test setups

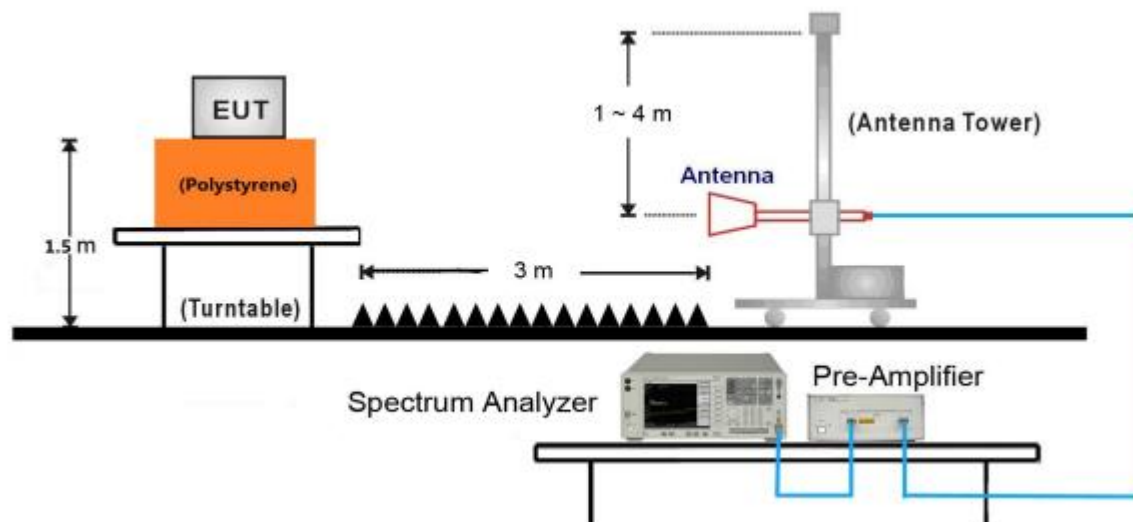
9kHz ~ 30MHz Test Setup:



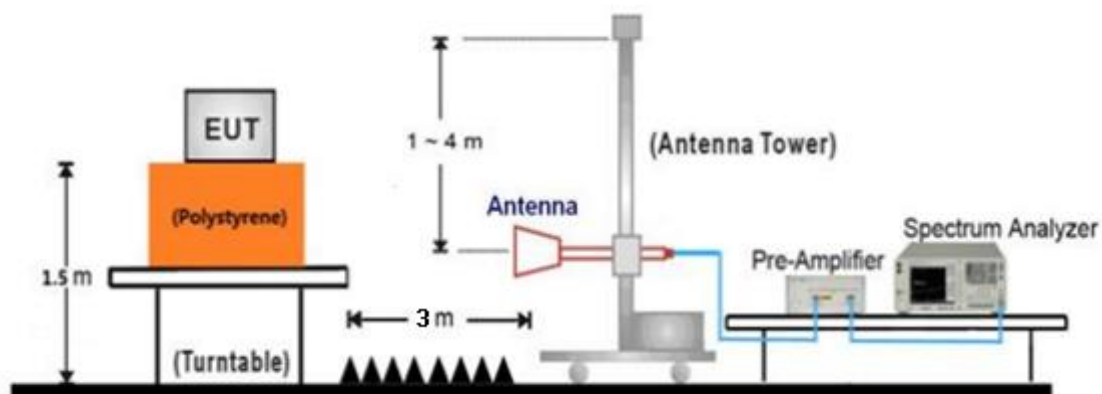
30MHz ~ 1GHz Test Setup:



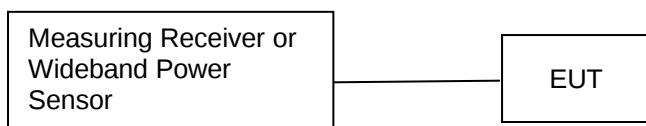
1GHz ~ 18GHz Test Setup:



18GHz ~ 25GHz Test Setup:



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenove	E470	PF-OU5TS7 17/09

Test software: dbgmon.exe

The system was configured to channel 1(2412MHz), 6(2437MHz), and 11(2462MHz) for 802.11 b/g/n HT20 test.

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.

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 8.8, 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

Conducted Emission

150k-30MHz Conducted Emission Test

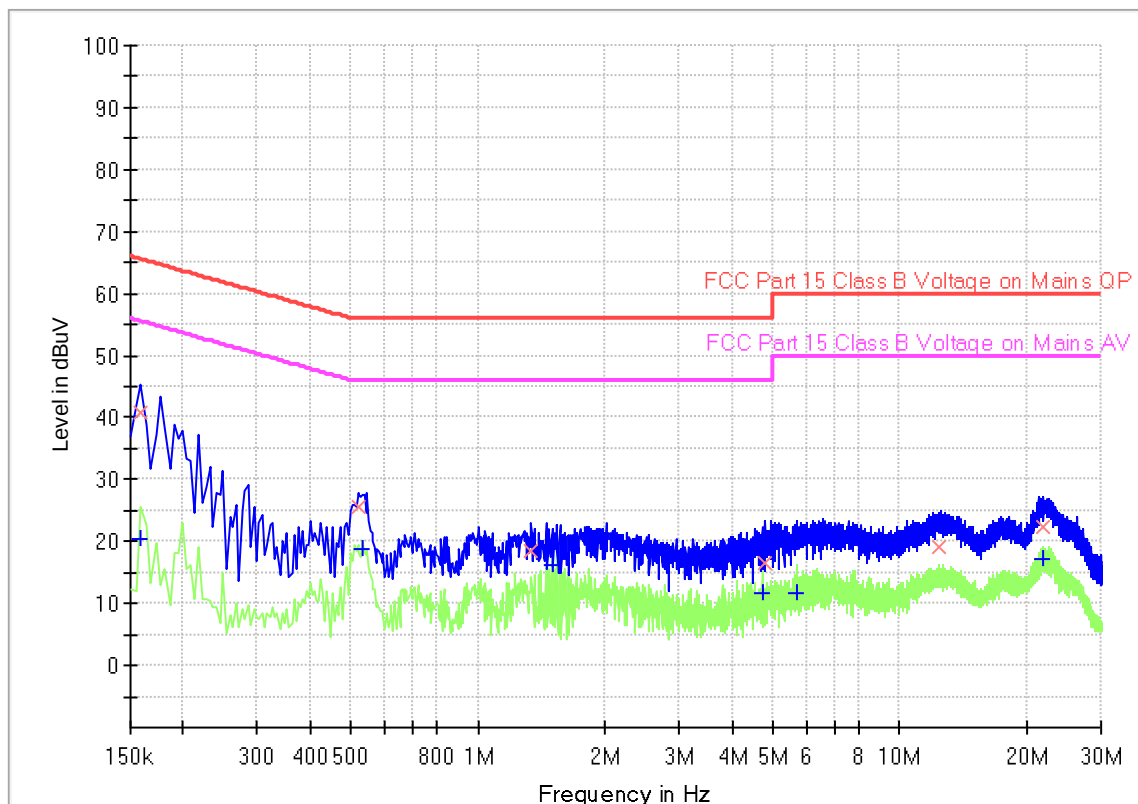
EUT Information

EUT Name: Xiaomi Instant Photo Printer 1S
 Model: ZPDYJ03HT
 Client: Hannto Technology Co., Ltd.
 Op Cond: Power on, TX_2412MHz for g mode, AC 120V/60Hz, T21.3, H56.3%,
 Operator: Cheng Huali
 Standard: FCC Part 15B Class B
 Comment: Phase L
 Sample No.: SHA-654939-1

Scan Setup: Voltage with 2-Line-LISN pre [EMI conducted]

Hardware Setup: Voltage with 2-Line-LISN
 Receiver: [ESR 3]
 Level Unit: dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	100 Hz	PK+	200 Hz	0.02 s	0 dB
150 kHz - 30 MHz	4.5 kHz	PK+; AVG	9 kHz	0.01 s	0 dB



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.159000	---	20.55	55.52	34.97	1000.0	9.000	L1	19.5
0.159000	40.69	---	65.52	24.83	1000.0	9.000	L1	19.5
0.519000	25.69	---	56.00	30.31	1000.0	9.000	L1	19.5
0.532500	---	18.86	46.00	27.14	1000.0	9.000	L1	19.5
1.338000	18.52	---	56.00	37.48	1000.0	9.000	L1	19.5
1.495500	---	16.10	46.00	29.90	1000.0	9.000	L1	19.5
4.713000	---	11.67	46.00	34.33	1000.0	9.000	L1	19.6
4.803000	16.55	---	56.00	39.45	1000.0	9.000	L1	19.6
5.725500	---	11.58	50.00	38.42	1000.0	9.000	L1	19.6
12.349500	19.15	---	60.00	40.85	1000.0	9.000	L1	19.7
21.754500	22.49	---	60.00	37.51	1000.0	9.000	L1	20.0
21.781500	---	17.05	50.00	32.95	1000.0	9.000	L1	20.0

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

Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

150k-30MHz Conducted Emission Test

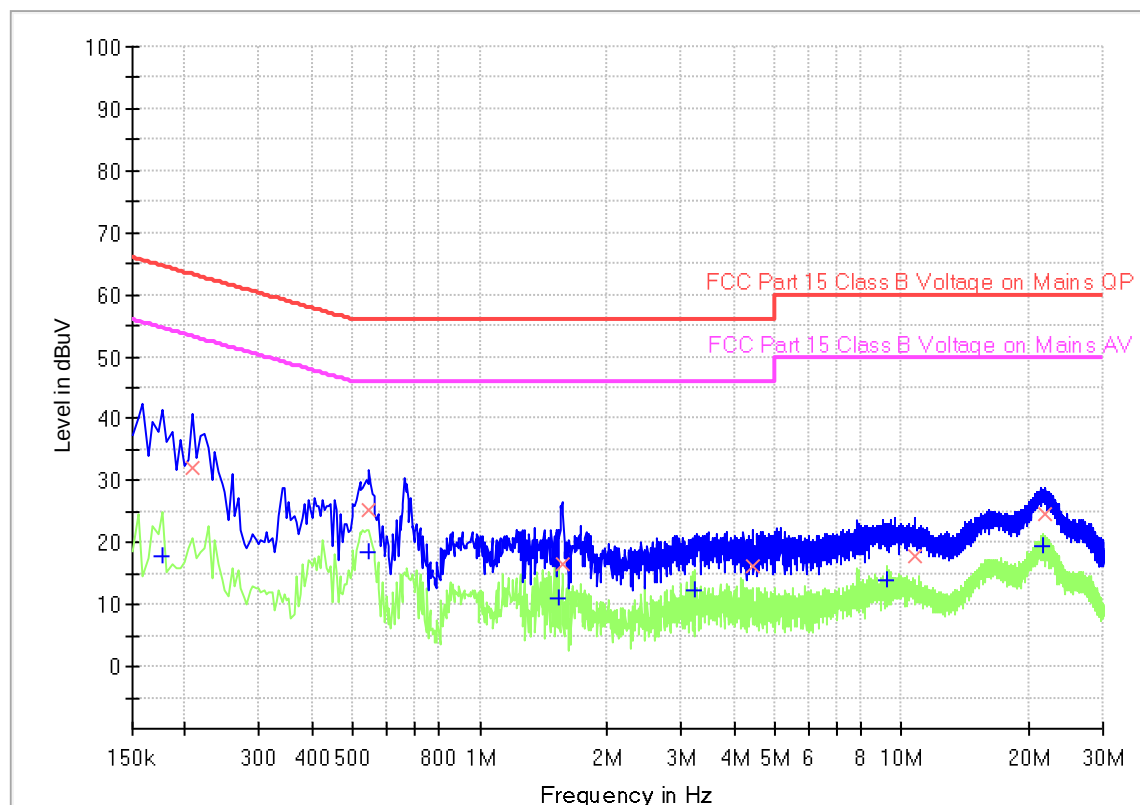
EUT Information

EUT Name: Xiaomi Instant Photo Printer 1S
 Model: ZPDYJ03HT
 Client: Hannto Technology Co., Ltd.
 Op Cond: Power on, TX_2412MHz for g mode, AC 120V/60Hz, T21.3, H56.3%,
 Operator: Cheng Huali
 Standard: FCC Part 15B Class B
 Comment: Phase N
 Sample No.: SHA-654939-1

Scan Setup: Voltage with 2-Line-LISN pre [EMI conducted]

Hardware Setup: Voltage with 2-Line-LISN
 Receiver: [ESR 3]
 Level Unit: dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	100 Hz	PK+	200 Hz	0.02 s	0 dB
150 kHz - 30 MHz	4.5 kHz	PK+; AVG	9 kHz	0.01 s	0 dB



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.177000	---	17.68	54.63	36.95	1000.0	9.000	N	19.5
0.208500	32.02	---	63.26	31.24	1000.0	9.000	N	19.5
0.546000	---	18.57	46.00	27.43	1000.0	9.000	N	19.5
0.546000	25.30	---	56.00	30.70	1000.0	9.000	N	19.5
1.540500	---	11.18	46.00	34.82	1000.0	9.000	N	19.5
1.563000	16.37	---	56.00	39.63	1000.0	9.000	N	19.5
3.228000	---	12.46	46.00	33.54	1000.0	9.000	N	19.5
4.447500	16.10	---	56.00	39.90	1000.0	9.000	N	19.5
9.262500	---	13.86	50.00	36.14	1000.0	9.000	N	19.7
10.734000	17.67	---	60.00	42.33	1000.0	9.000	N	19.7
21.525000	---	19.46	50.00	30.54	1000.0	9.000	N	20.0
21.903000	24.75	---	60.00	35.25	1000.0	9.000	N	20.0

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

Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

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(d), conducted peak output power limit as below:

Conducted peak output power

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

e.i.r.p.

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤4	≤36

Test result as below table

802.11b: Antenna gain=2.53dBi						
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (1)			e.i.r.p. (dBm) RSS-247 5.4(d)		
	Result	limit	Verdict	Result	limit	Verdict
2412MHz	16.65	≤30	Pass	19.18	≤36	Pass
2437MHz	16.14	≤30	Pass	18.67	≤36	Pass
2462MHz	15.87	≤30	Pass	18.40	≤36	Pass

802.11g: Antenna gain=2.53dBi						
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (1)			e.i.r.p. (dBm) RSS-247 5.4(d)		
	Result	limit	Verdict	Result	limit	Verdict
2412MHz	25.87	≤30	Pass	28.40	≤36	Pass
2437MHz	25.37	≤30	Pass	27.90	≤36	Pass
2462MHz	24.91	≤30	Pass	27.44	≤36	Pass

802.11n: Antenna gain=2.53dBi						
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (1)			e.i.r.p. (dBm) RSS-247 5.4(d)		
	Result	limit	Verdict	Result	limit	Verdict
2412MHz	25.74	≤30	Pass	28.27	≤36	Pass
2437MHz	25.21	≤30	Pass	27.74	≤36	Pass
2462MHz	24.62	≤30	Pass	27.15	≤36	Pass

9.3 6dB bandwidth and 99% 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 ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]

≥ 500

Test Method for 99 % Bandwidth

1. Use the following spectrum analyzer settings:
RBW=1% to 5% of the actual occupied, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, 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]

N/A

Test result

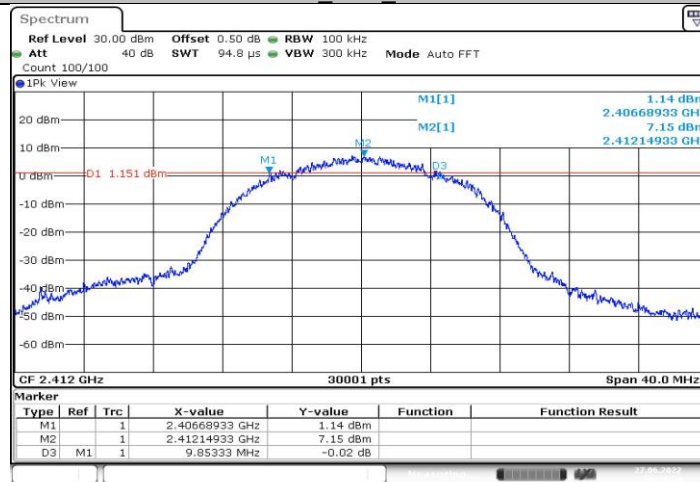
Test Mode	Frequency MHz	6dB bandwidth (MHz)		Result verdict	99% occupied bandwidth MHz
		result	limit		
802.11B	2412	9.853	≥ 0.5	Pass	13.866
	2437	9.520	≥ 0.5	Pass	13.906
	2462	9.260	≥ 0.5	Pass	13.906

Test Mode	Frequency MHz	6dB bandwidth (MHz)		Result verdict	99% occupied bandwidth MHz
		result	limit		
802.11G	2412	15.117	≥ 0.5	Pass	17.063
	2437	15.119	≥ 0.5	Pass	17.063
	2462	15.117	≥ 0.5	Pass	17.023

Test Mode	Frequency MHz	6dB bandwidth (MHz)		Result verdict	99% occupied bandwidth MHz
		result	limit		
802.11N	2412	15.117	≥ 0.5	Pass	18.062
	2437	15.065	≥ 0.5	Pass	18.062
	2462	16.537	≥ 0.5	Pass	18.062

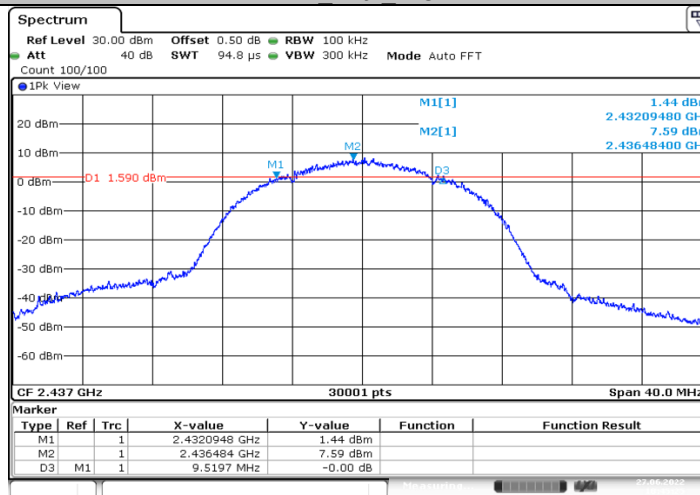
6 dB Bandwidth

11B_Ant1_2412



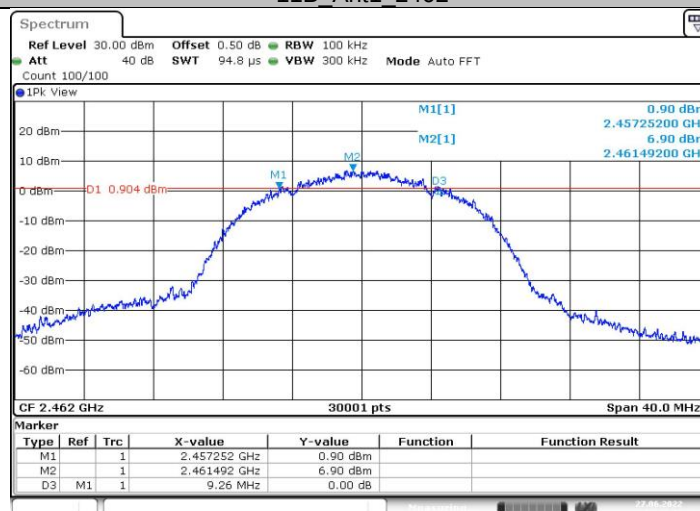
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11B_Ant1_2437

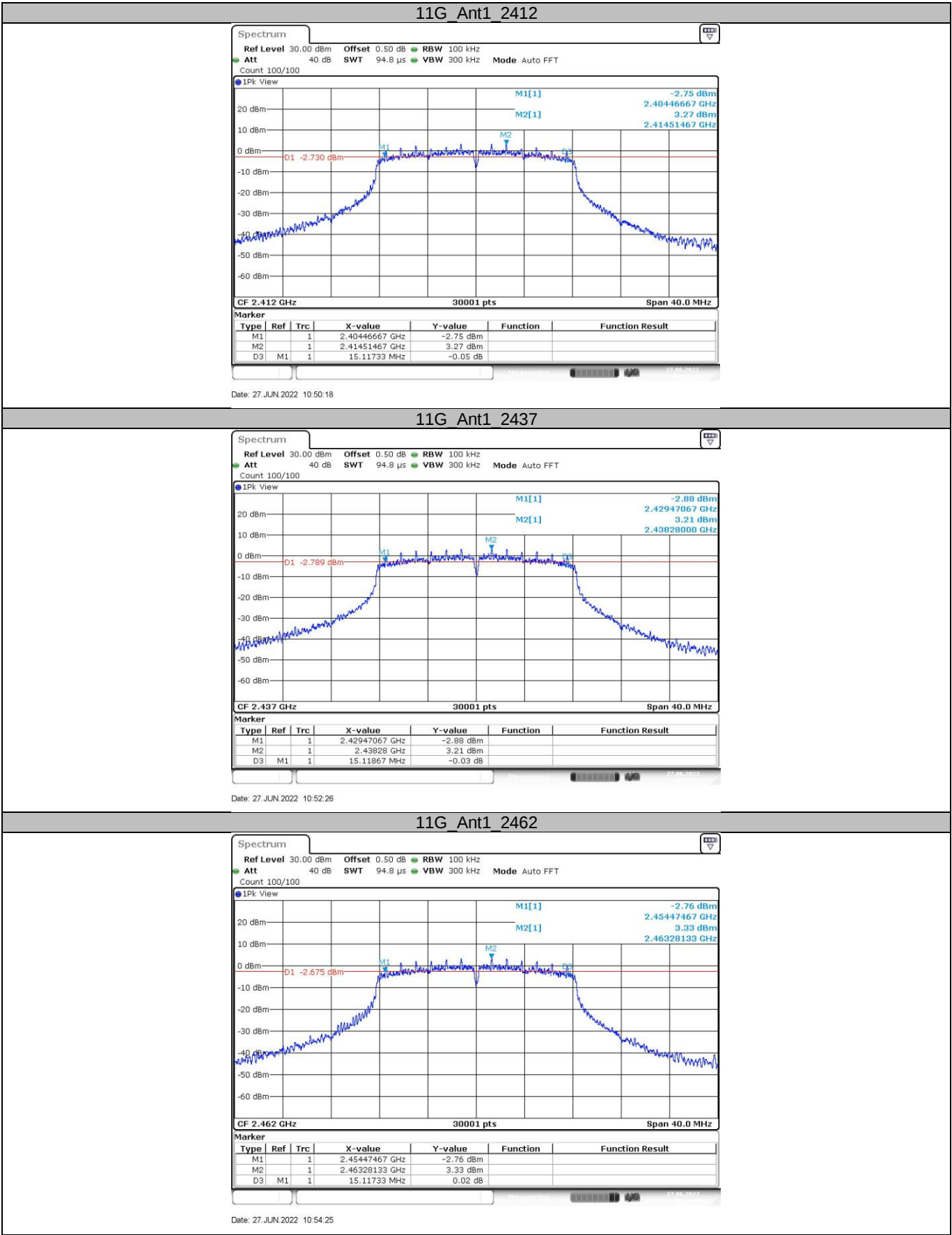


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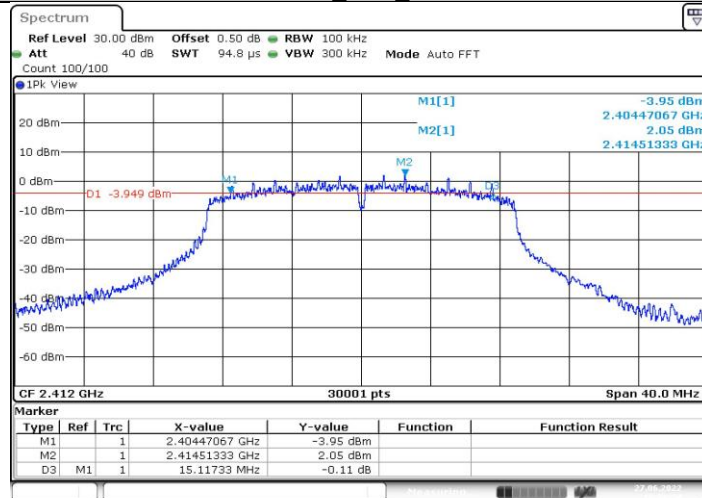
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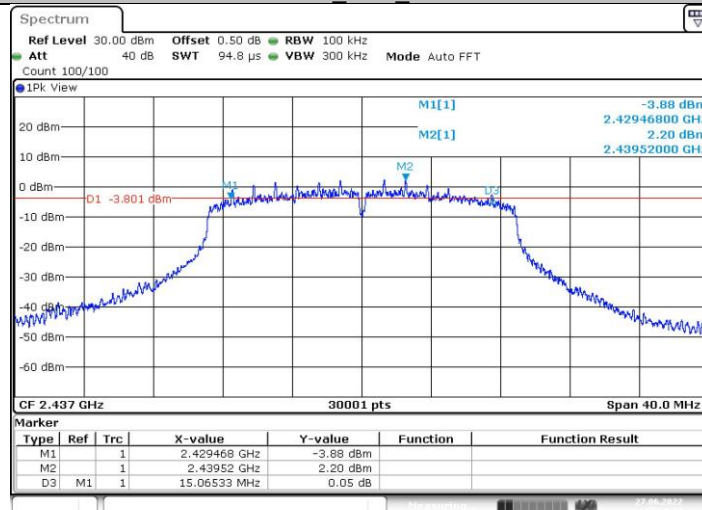


11N20_Ant1_2412



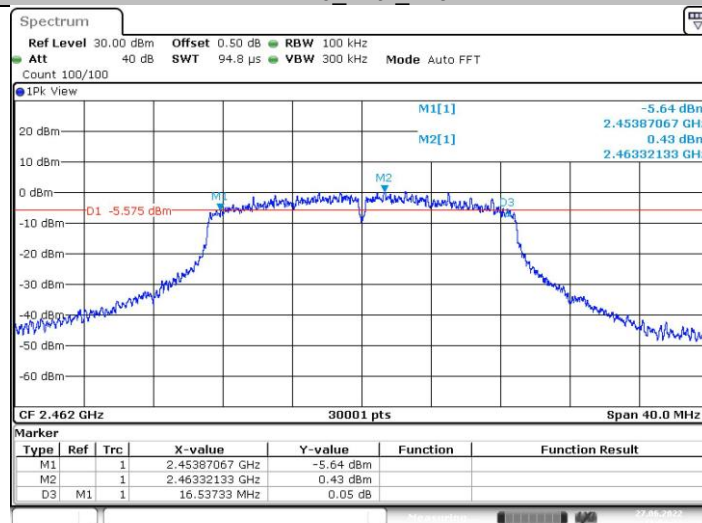
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11N20_Ant1_2437

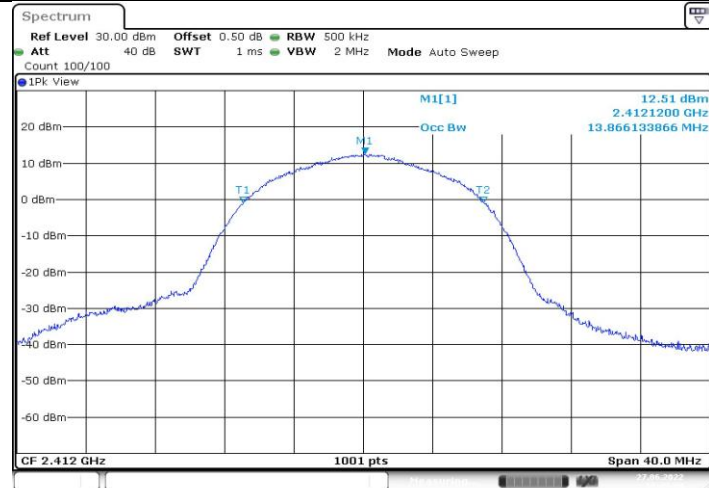


Date: 27 JUN 2022 10:58:47

11N20_Ant1_2462



Date: 27 JUN 2022 11:00:33

99% Bandwidth**11B_Ant1_2412**

Date: 27 JUN 2022 10:43:34

11B_Ant1_2437

Date: 27 JUN 2022 10:45:35

11B_Ant1_2462

Date: 27 JUN 2022 10:47:32

11G Ant1 2412



Date: 27 JUN 2022 10:50:28

11G Ant1 2437



Date: 27 JUN 2022 10:52:36

11G Ant1 2462



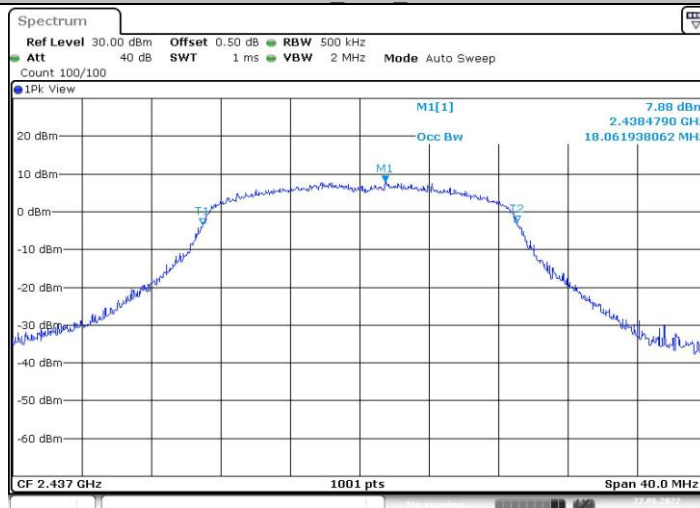
Date: 27 JUN 2022 10:54:35

11N20_Ant1_2412



Date: 27 JUN 2022 10:57:05

11N20_Ant1_2437



Date: 27 JUN 2022 10:58:57

11N20_Ant1_2462



Date: 27 JUN 2022 11:00:43

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 $\geq$ 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

802.11 B

Frequency MHz	Power spectral density dBm/3kHz	Result
Low channel 2412MHz	-6.78	Pass
Middle channel 2437MHz	-6.15	Pass
High channel 2462MHz	-5.89	Pass

802.11 G

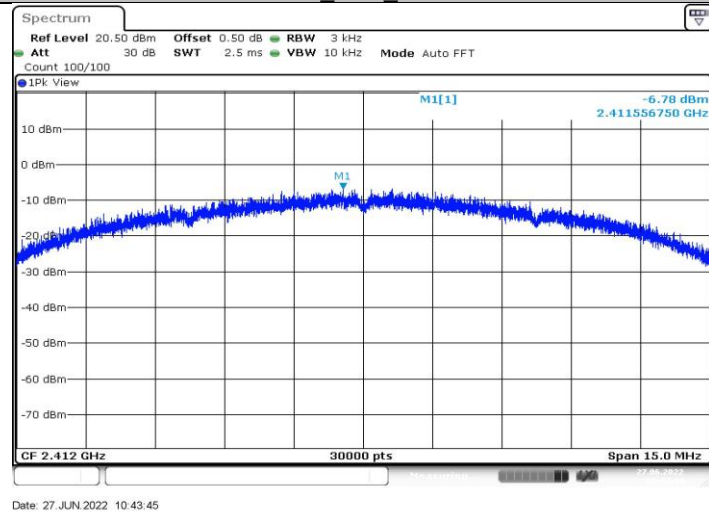
Frequency MHz	Power spectral density dBm	Result
Low channel 2412MHz	-9.94	Pass
Middle channel 2437MHz	-10.00	Pass
High channel 2462MHz	-9.75	Pass

802.11 N HT20

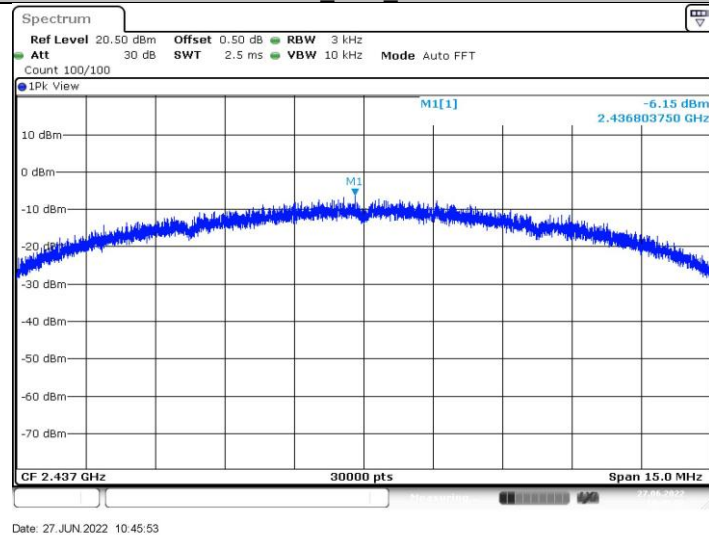
Frequency MHz	Power spectral density dBm	Result
Low channel 2412MHz	-11.70	Pass
Middle channel 2437MHz	-11.43	Pass
High channel 2462MHz	-11.16	Pass

Power spectral density

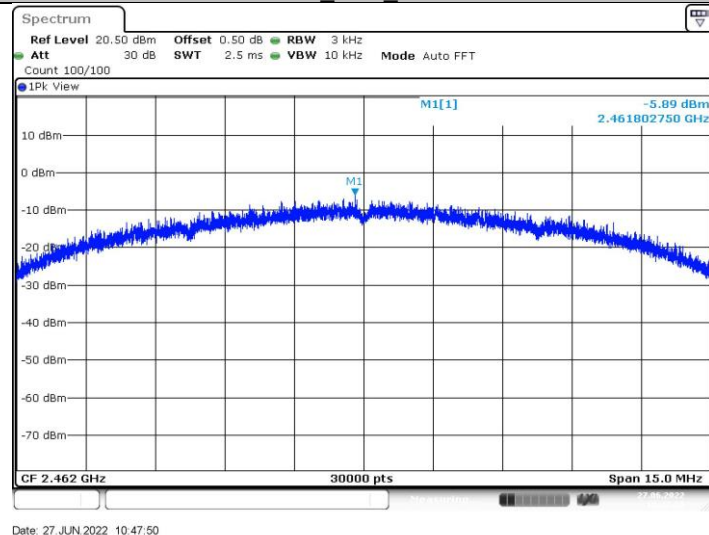
11B_Ant1_2412



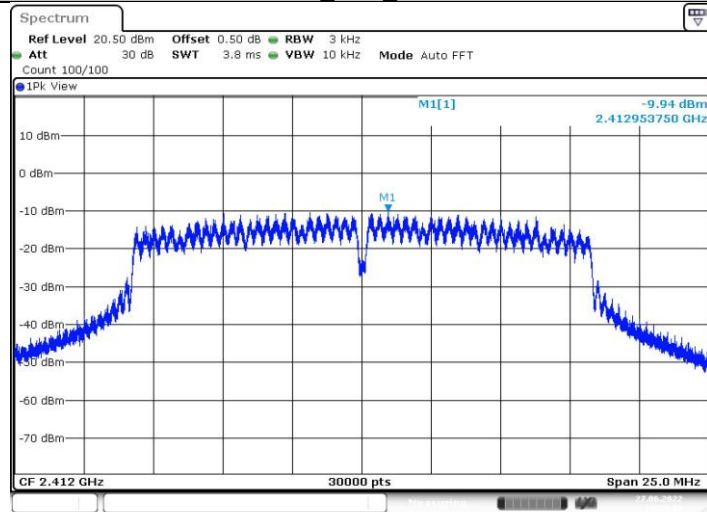
11B_Ant1_2437



11B_Ant1_2462

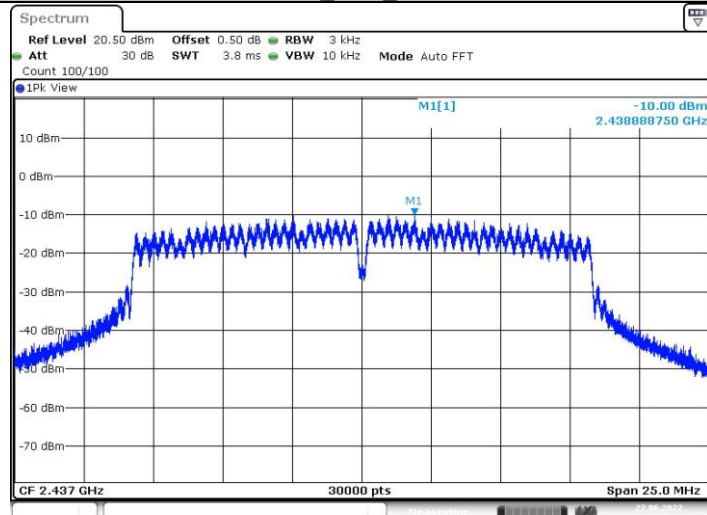


11G Ant1 2412



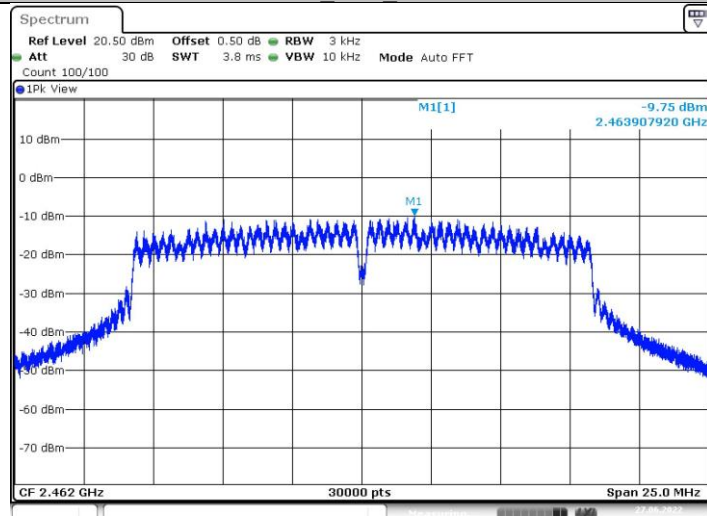
Date: 27 JUN 2022 10:50:38

11G Ant1 2437



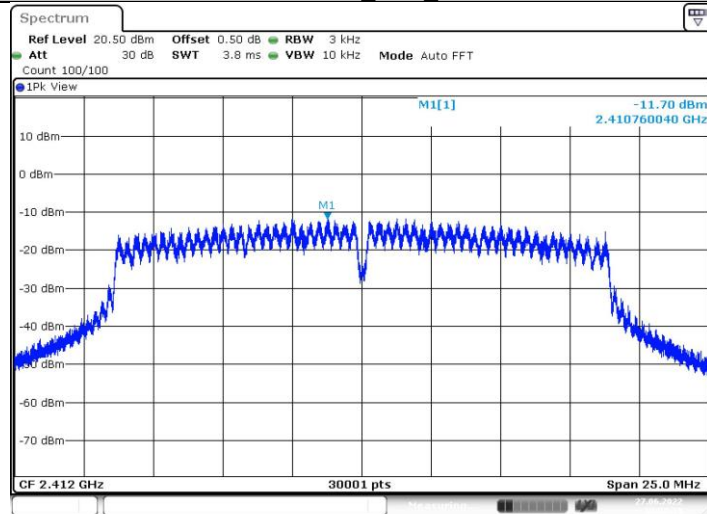
Date: 27 JUN 2022 10:52:54

11G Ant1 2462



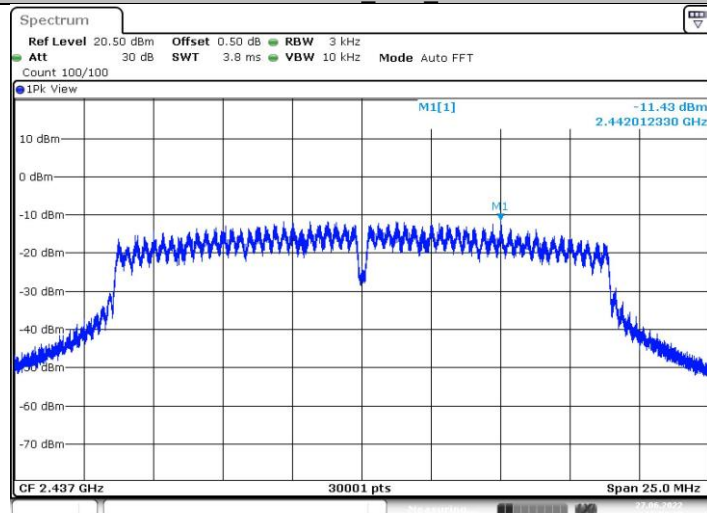
Date: 27 JUN 2022 10:54:53

11N20SISO_Ant1_2412



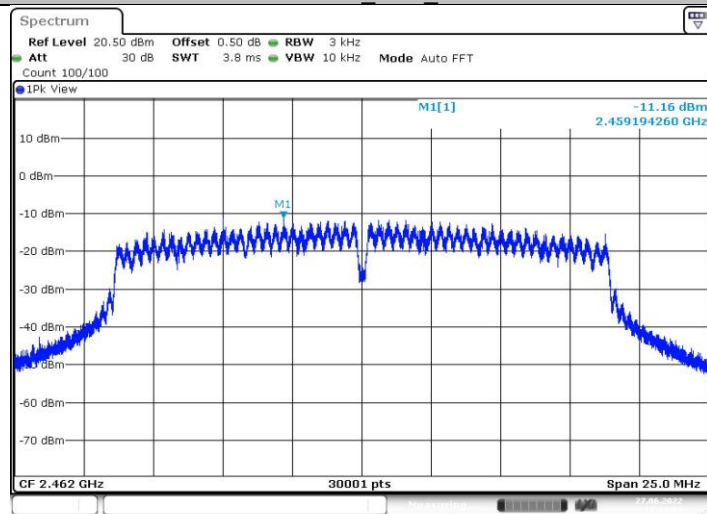
Date: 27 JUN 2022 10:57:15

11N20SISO_Ant1_2437



Date: 27 JUN 2022 10:59:15

11N20SISO_Ant1_2462



Date: 27 JUN 2022 11:01:01

9.5 Spurious RF conducted 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

Spurious RF conducted emissions

802.11 B

Out-of-Band Emissions

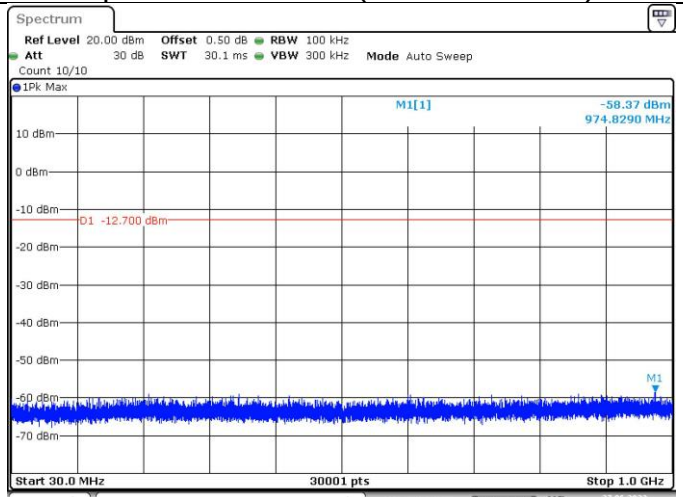
Channel 1 (2412MHz)

Reference point



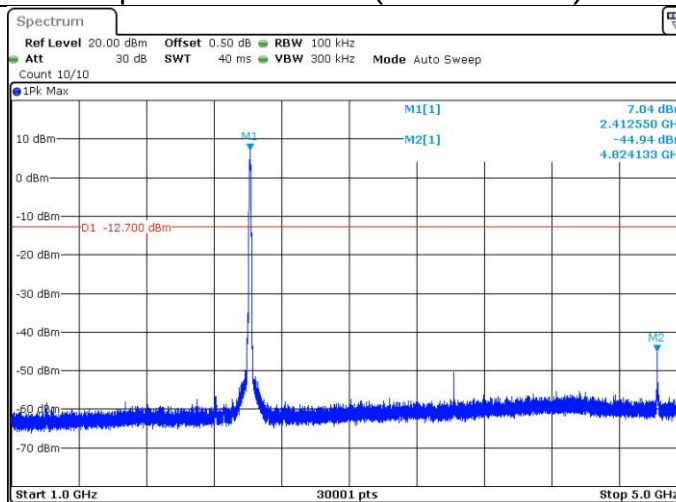
Date: 27 JUN 2022 10:43:59

Spurious Emission (30MHz – 1GHz)



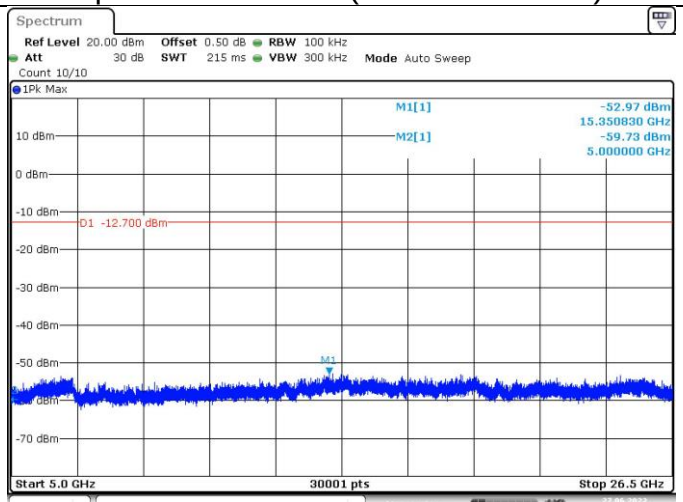
Date: 27 JUN 2022 10:44:04

Spurious Emission (1GHz – 5GHz)



Date: 27 JUN 2022 10:44:16

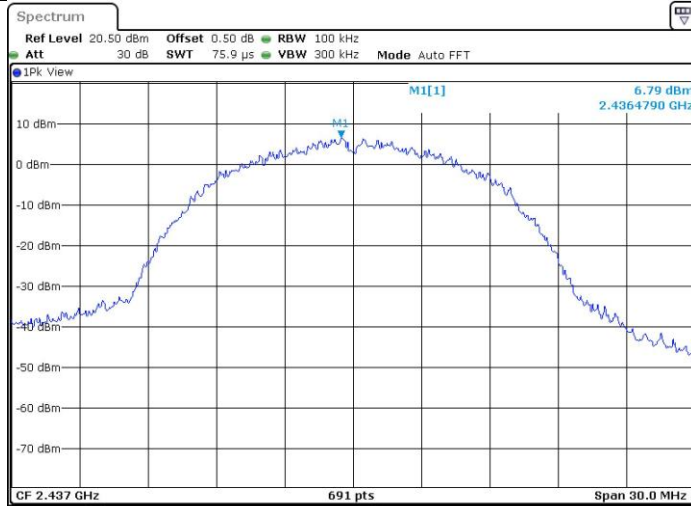
Spurious Emission (5GHz – 26.5GHz)



Date: 27 JUN 2022 10:44:17

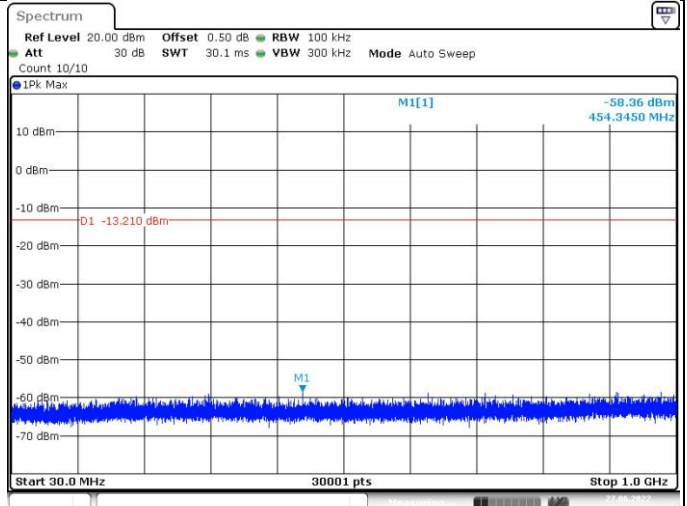
Out-of-Band Emissions Channel 6 (2437MHz)

Reference point



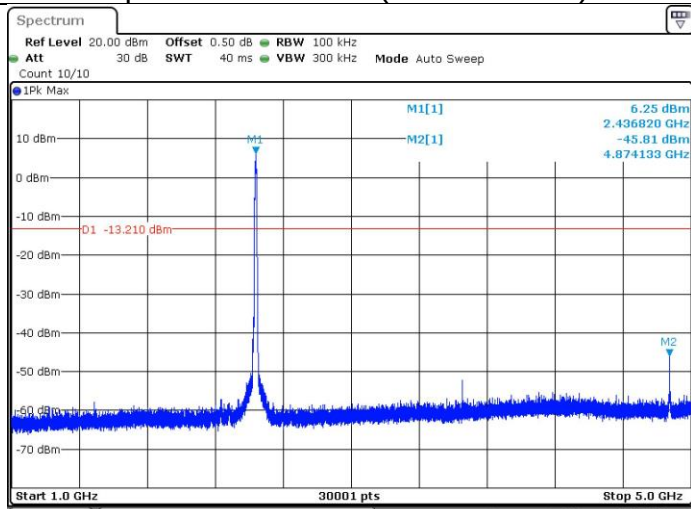
Date: 27 JUN 2022 10:45:57

Spurious Emission (30MHz – 1GHz)



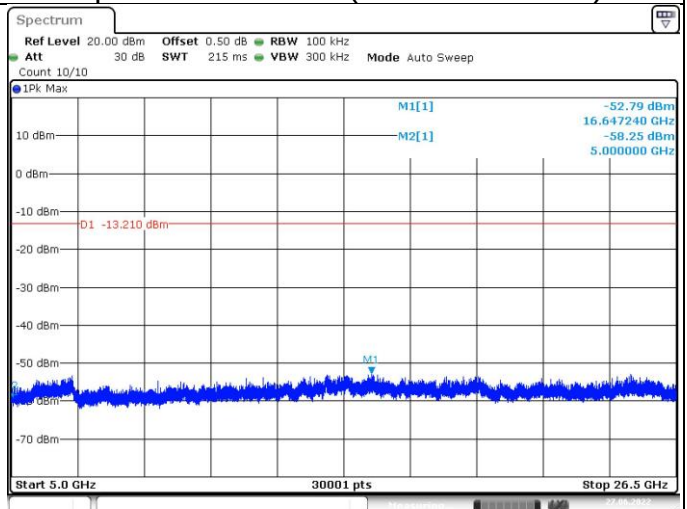
Date: 27 JUN 2022 10:46:02

Spurious Emission (1GHz – 5GHz)



Date: 27 JUN 2022 10:46:14

Spurious Emission (5GHz – 26.5GHz)



Date: 27 JUN 2022 10:46:45

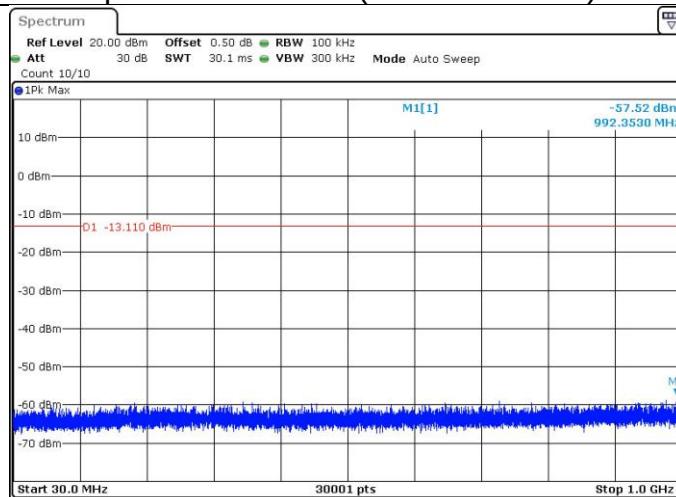
Out-of-Band Emissions Channel 11 (2462MHz)

Reference point



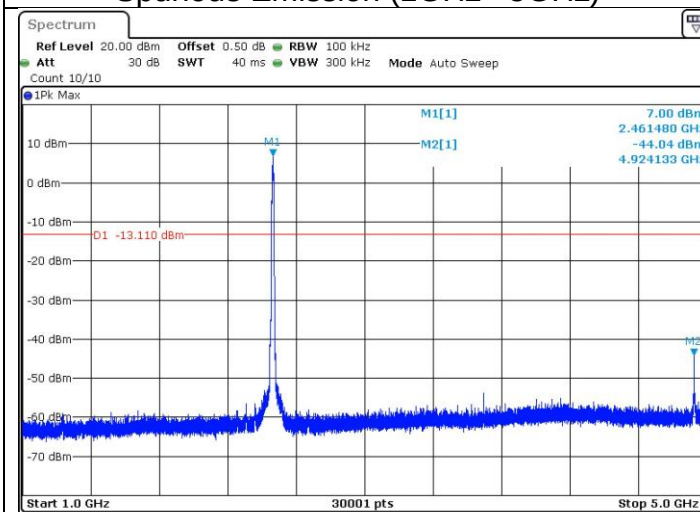
Date: 27 JUN 2022 10:48:04

Spurious Emission (30MHz – 1GHz)



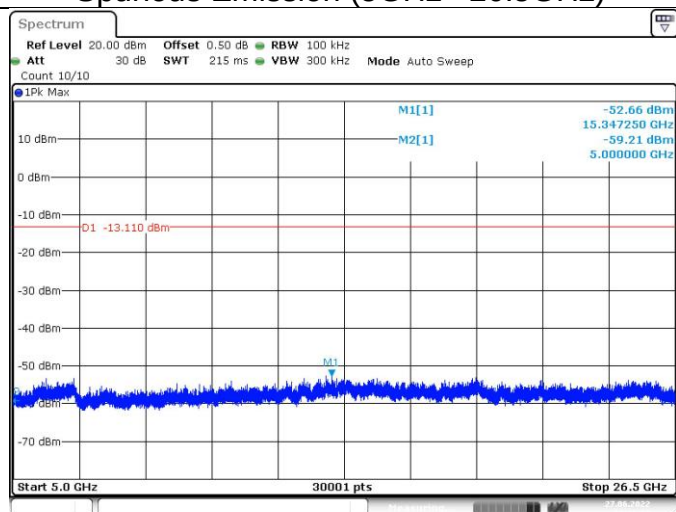
Date: 27 JUN 2022 10:48:08

Spurious Emission (1GHz –5GHz)



Date: 27 JUN 2022 10:48:21

Spurious Emission (5GHz –26.5GHz)



Date: 27 JUN 2022 10:48:52

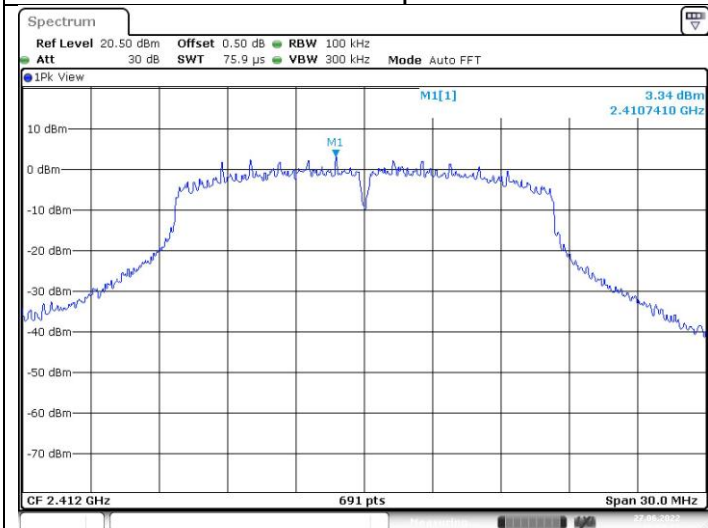
802.11 G

Out-of-Band Emissions

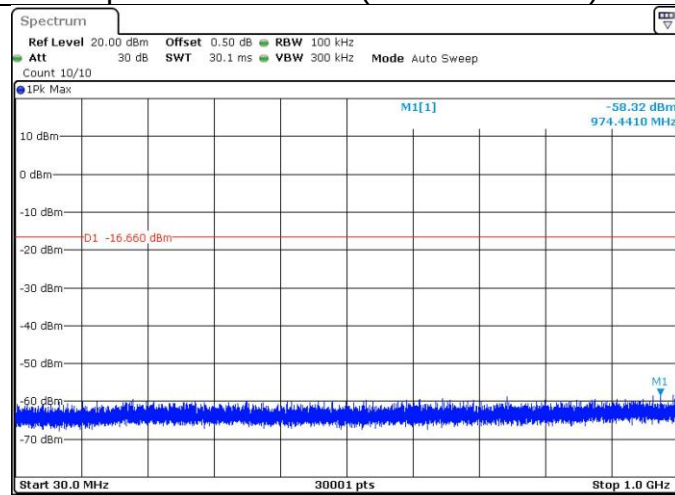
Channel 1 (2412MHz)

Reference point

Spurious Emission (30MHz – 1GHz)



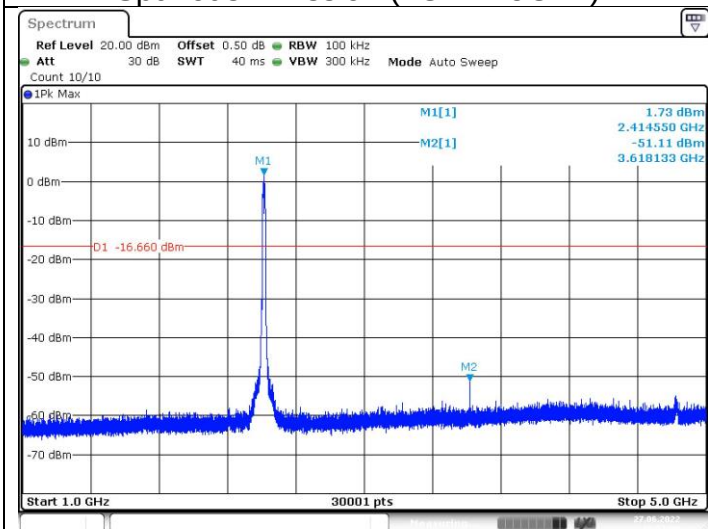
Date: 27 JUN 2022 10:50:52



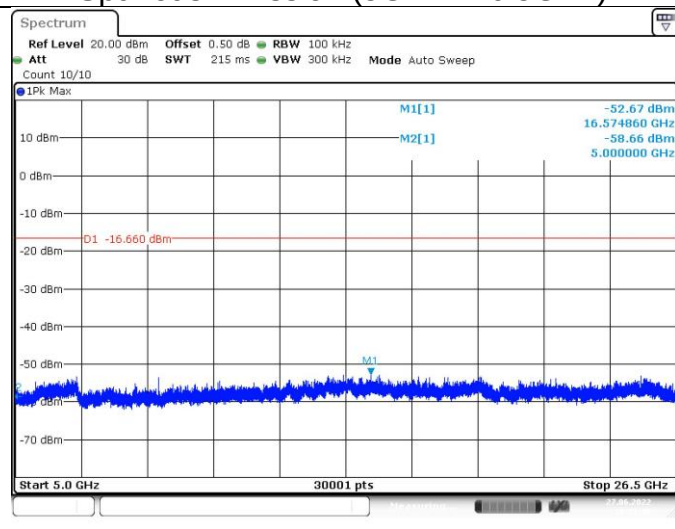
Date: 27 JUN 2022 10:50:57

Spurious Emission (1GHz – 5GHz)

Spurious Emission (5GHz – 26.5GHz)



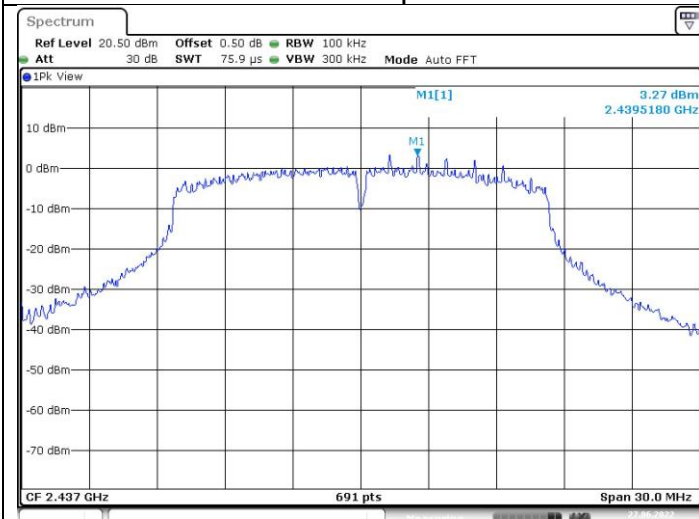
Date: 27 JUN 2022 10:51:09



Date: 27 JUN 2022 10:51:40

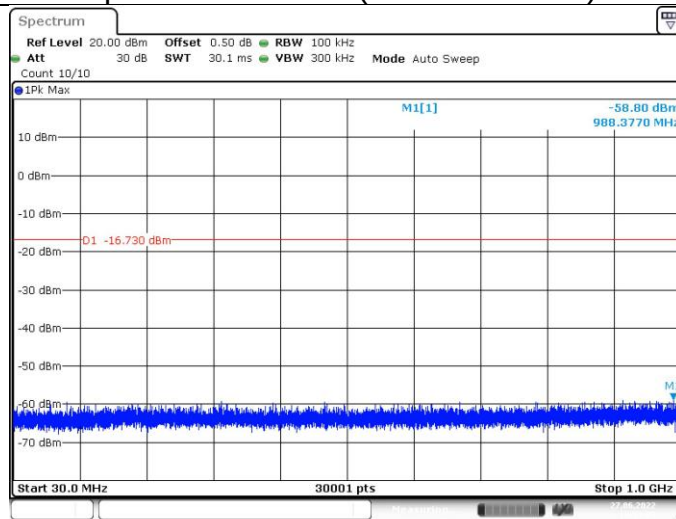
Out-of-Band Emissions Channel 6 (2437MHz)

Reference point



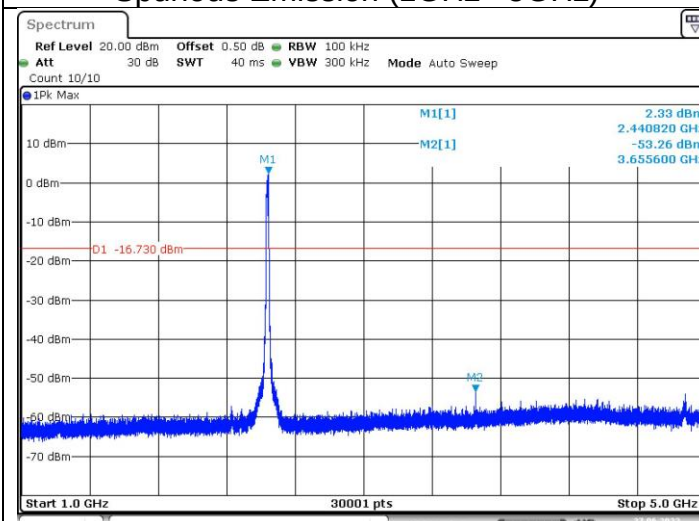
Date: 27 JUN 2022 10:52:59

Spurious Emission (30MHz – 1GHz)



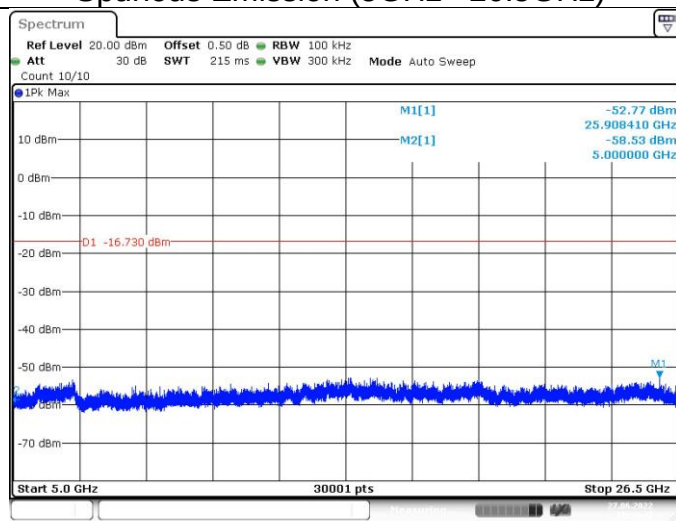
Date: 27 JUN 2022 10:53:03

Spurious Emission (1GHz – 5GHz)



Date: 27 JUN 2022 10:53:15

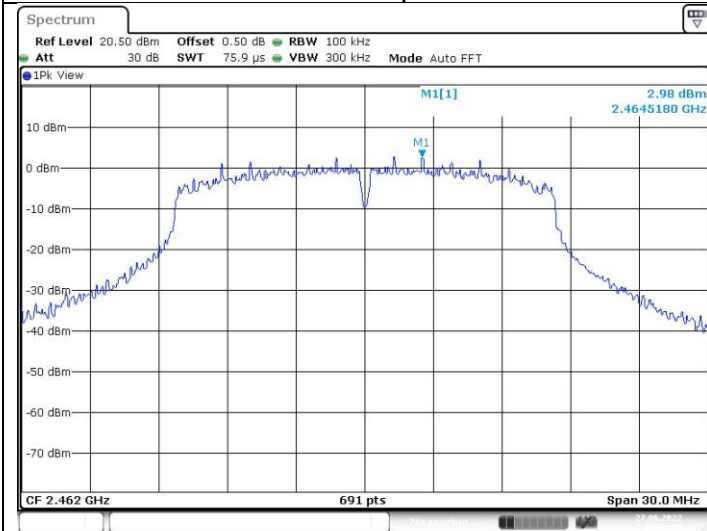
Spurious Emission (5GHz – 26.5GHz)



Date: 27 JUN 2022 10:53:46

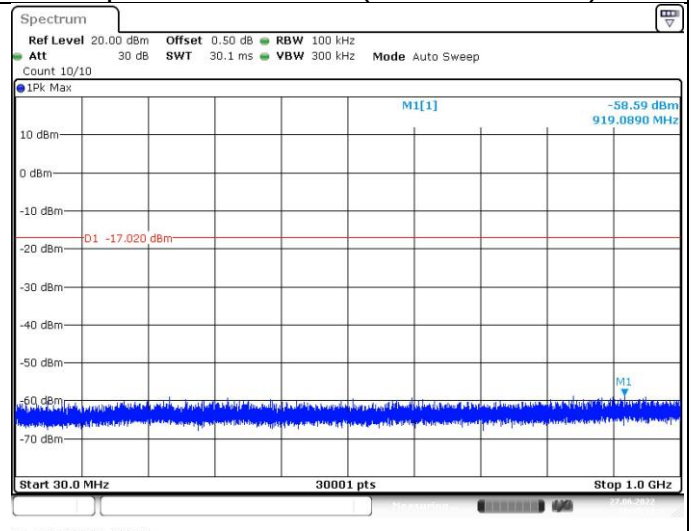
Out-of-Band Emissions Channel 11 (2462MHz)

Reference point



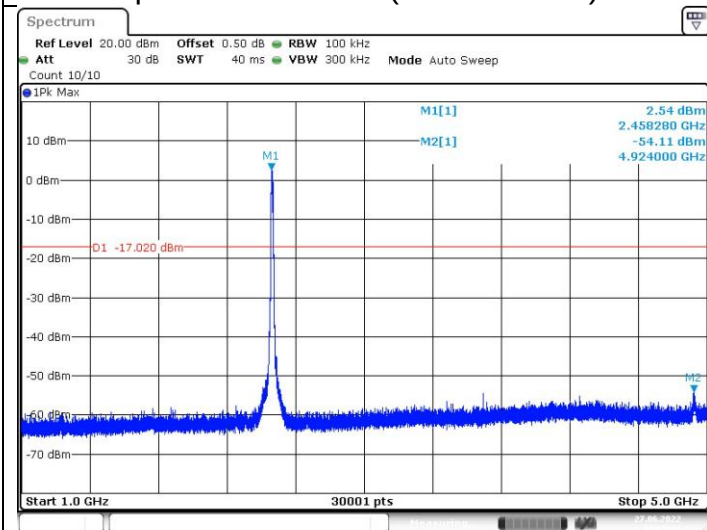
Date: 27 JUN 2022 10:55:07

Spurious Emission (30MHz – 1GHz)



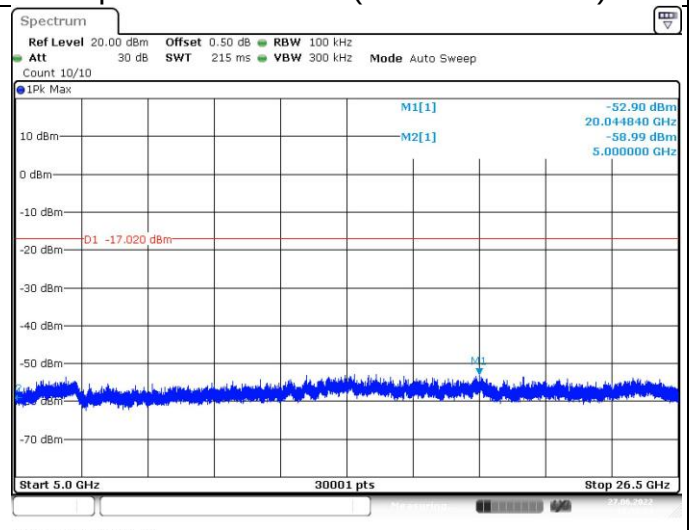
Date: 27 JUN 2022 10:55:11

Spurious Emission (1GHz – 5GHz)



Date: 27 JUN 2022 10:55:23

Spurious Emission (5GHz – 26.5GHz)

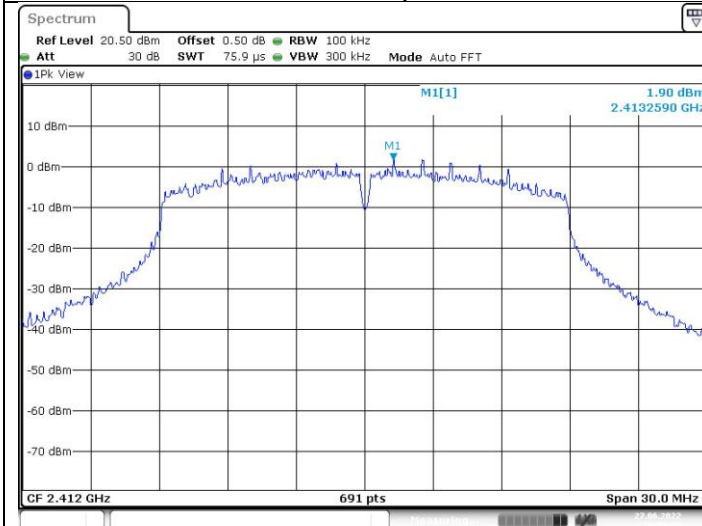


Date: 27 JUN 2022 10:55:55

802.11 N HT20

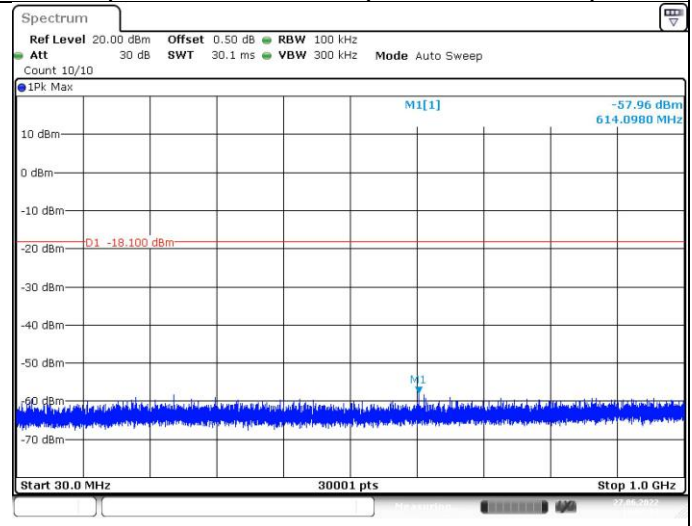
Out-of-Band Emissions
Channel 1 (2412MHz)

Reference point



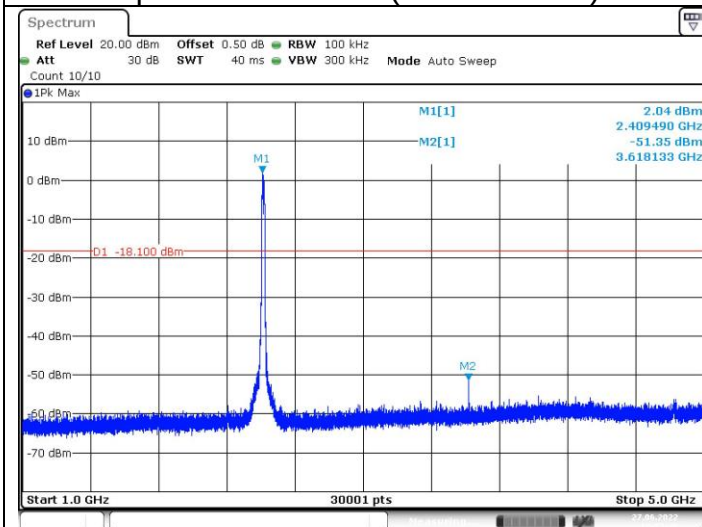
Date: 27 JUN 2022 10:57:29

Spurious Emission (30MHz – 1GHz)



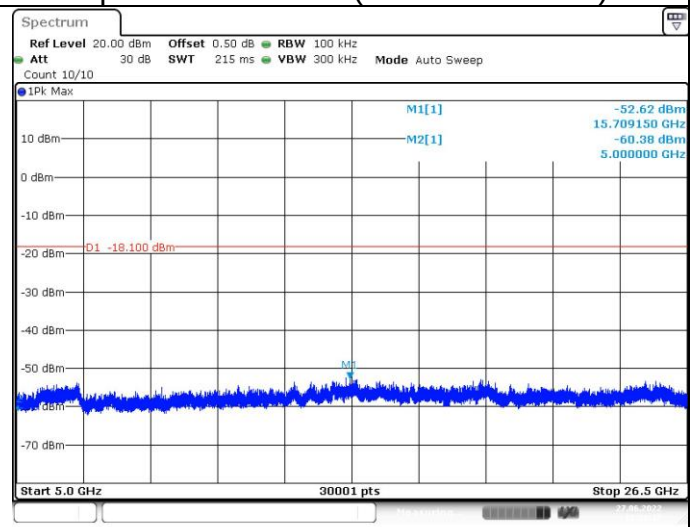
Date: 27 JUN 2022 10:57:34

Spurious Emission (1GHz – 5GHz)



Date: 27 JUN 2022 10:57:46

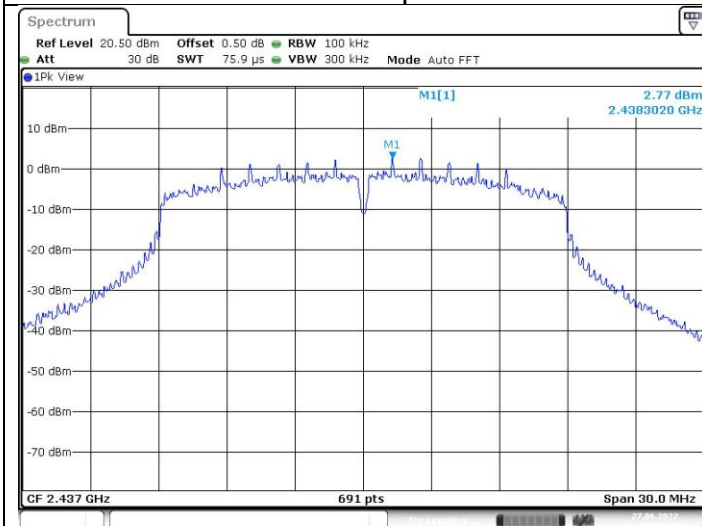
Spurious Emission (5GHz – 26.5GHz)



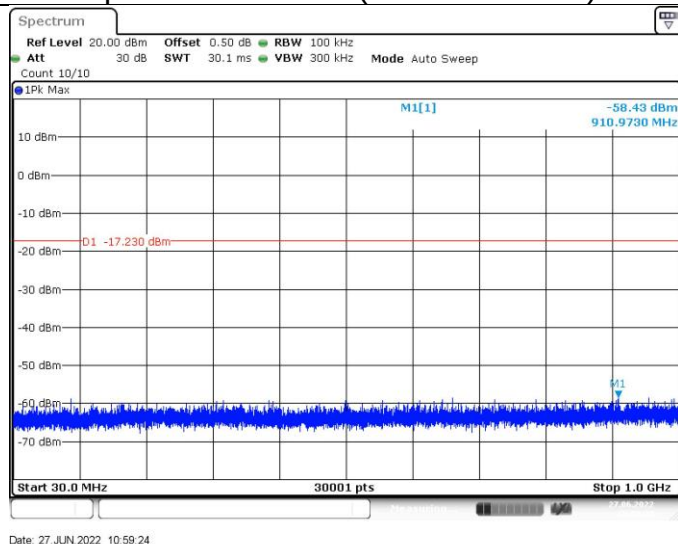
Date: 27 JUN 2022 10:58:17

Out-of-Band Emissions Channel 6 (2437MHz)

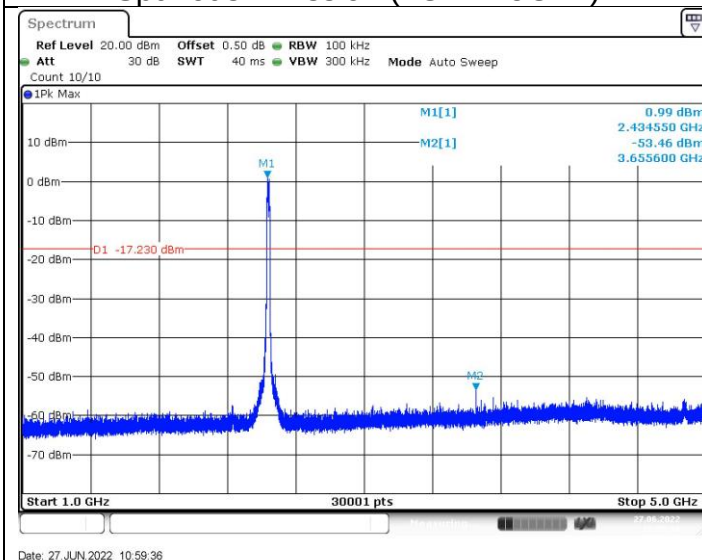
Reference point



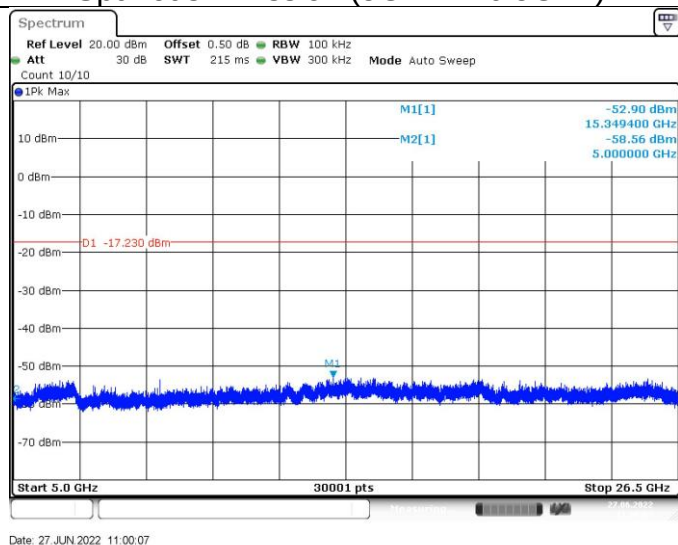
Spurious Emission (30MHz – 1GHz)



Spurious Emission (1GHz –5GHz)

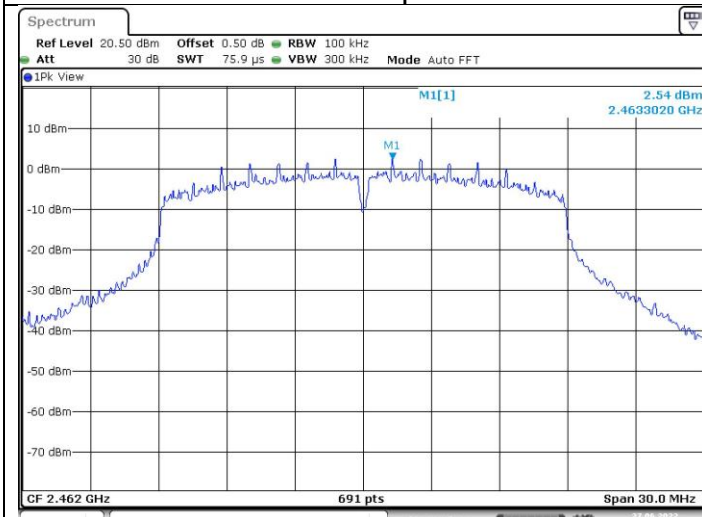


Spurious Emission (5GHz –26.5GHz)



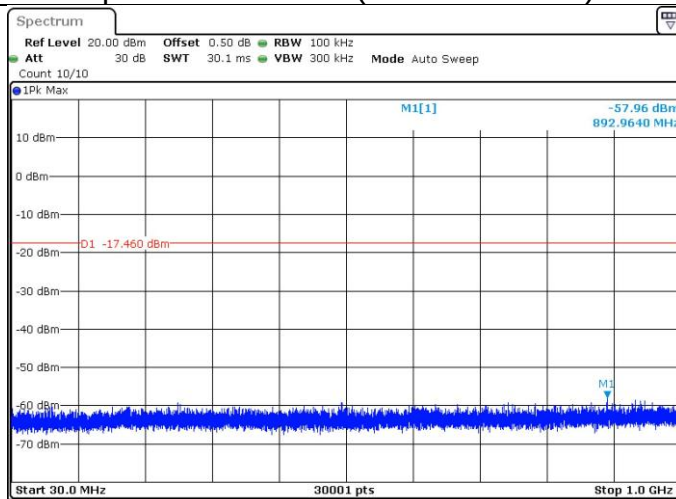
Out-of-Band Emissions Channel 11 (2462MHz)

Reference point



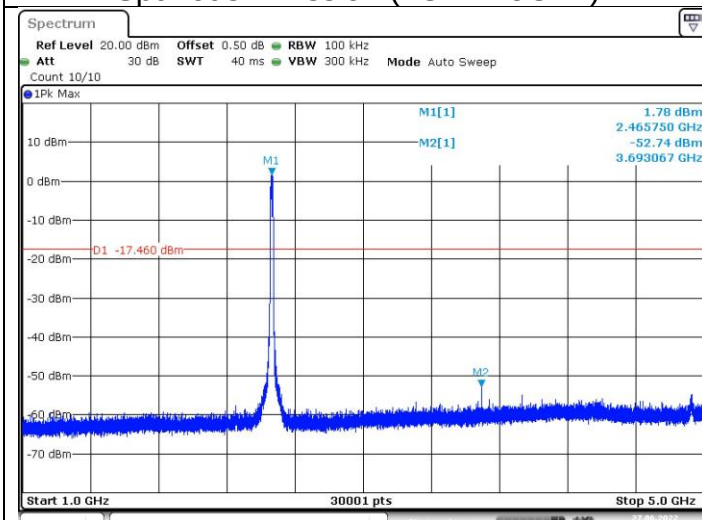
Date: 27 JUN 2022 11:01:15

Spurious Emission (30MHz – 1GHz)



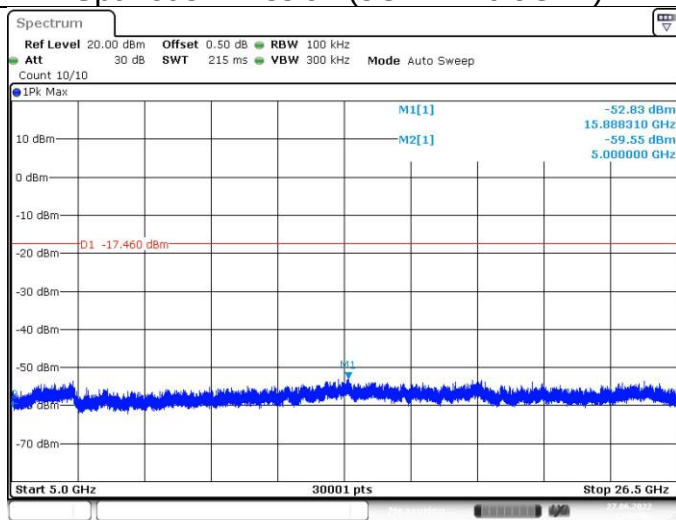
Date: 27 JUN 2022 11:01:19

Spurious Emission (1GHz – 5GHz)



Date: 27 JUN 2022 11:01:31

Spurious Emission (5GHz – 26.5GHz)



Date: 27 JUN 2022 11:02:02

9.6 Band edge

Test Method

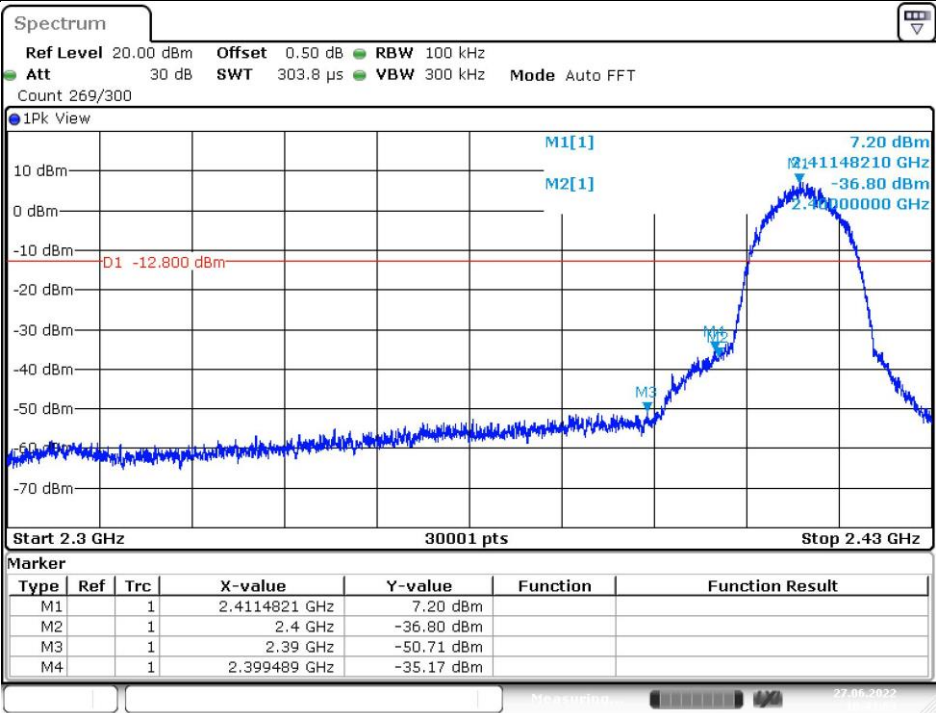
- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW $\geq$ RBW, Sweep = auto, Detector function = peak, Trace = max hold.
- 2 Allow the trace to stabilize, use the peak and delta measurement to record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

Limit

According to §15.247(d) and RSS-247 5.5, 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-Gen 8.10, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

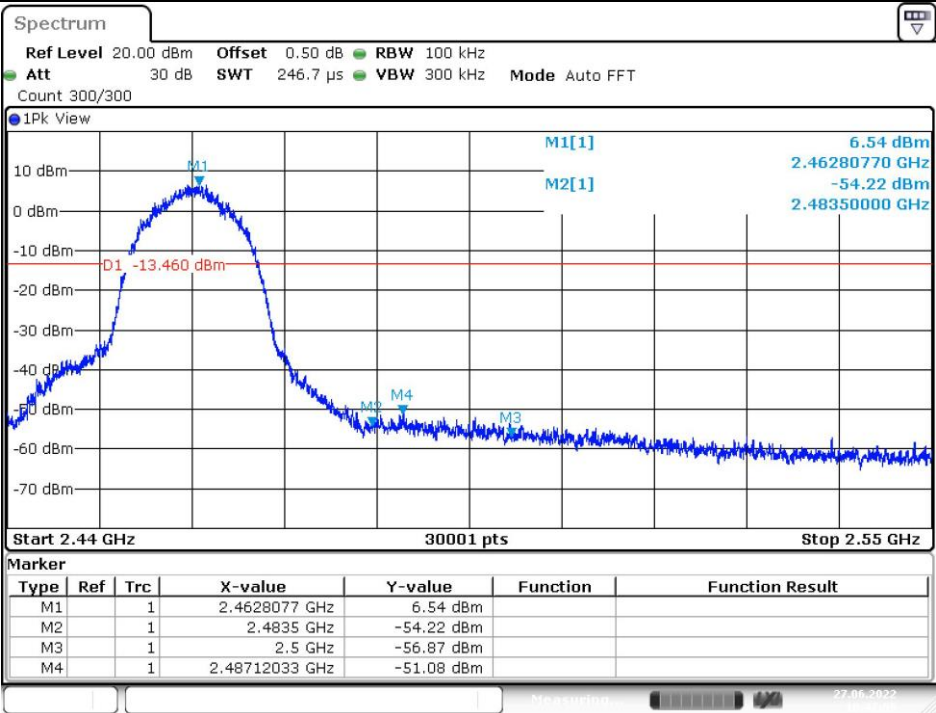
Test result

802.11 B
Low_2412



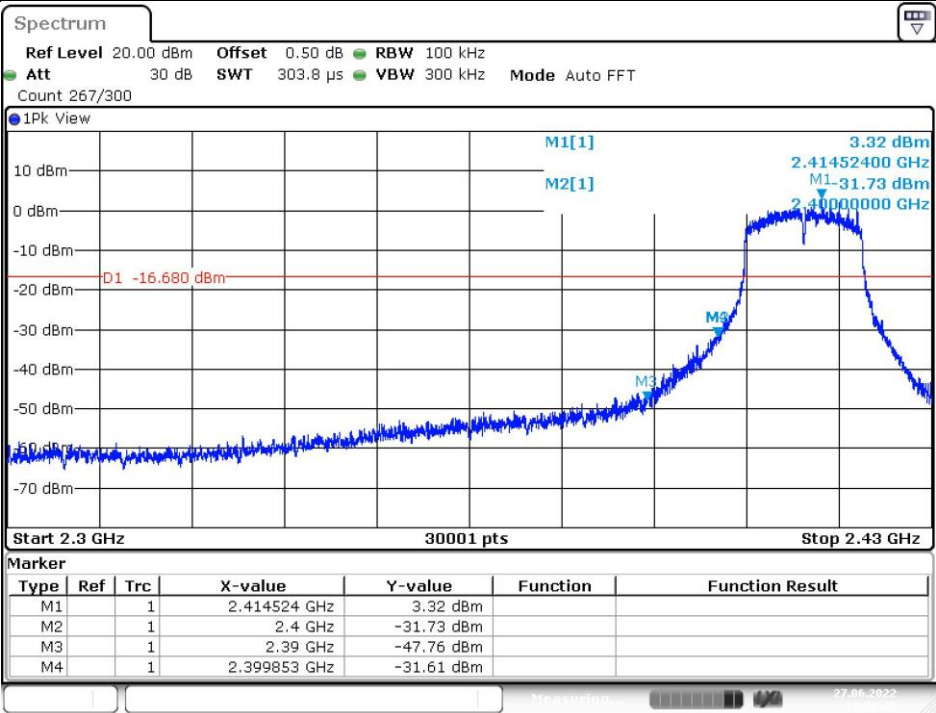
Date: 27.JUN.2022 10:43:54

High_2462



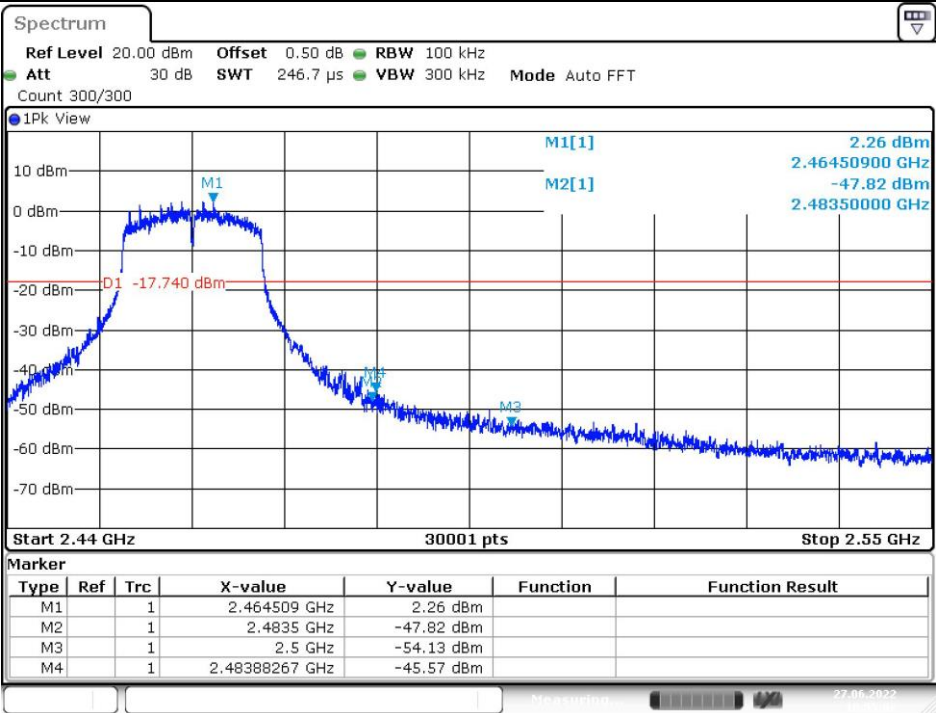
Date: 27.JUN.2022 10:47:59

802.11 G
Low_2412



Date: 27.JUN.2022 10:50:47

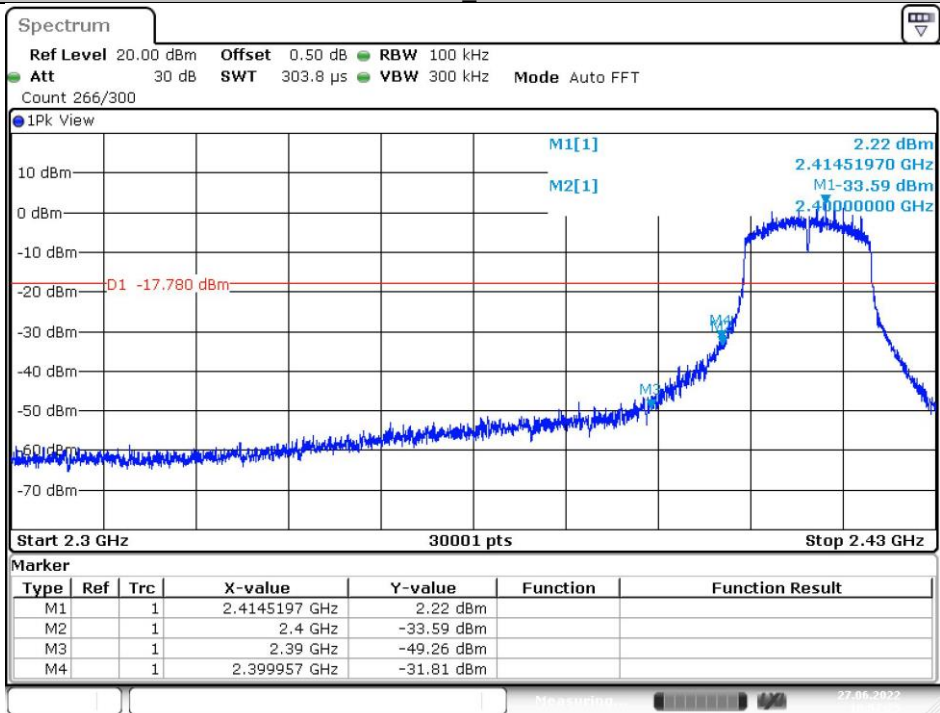
High_2462



Date: 27.JUN.2022 10:55:02

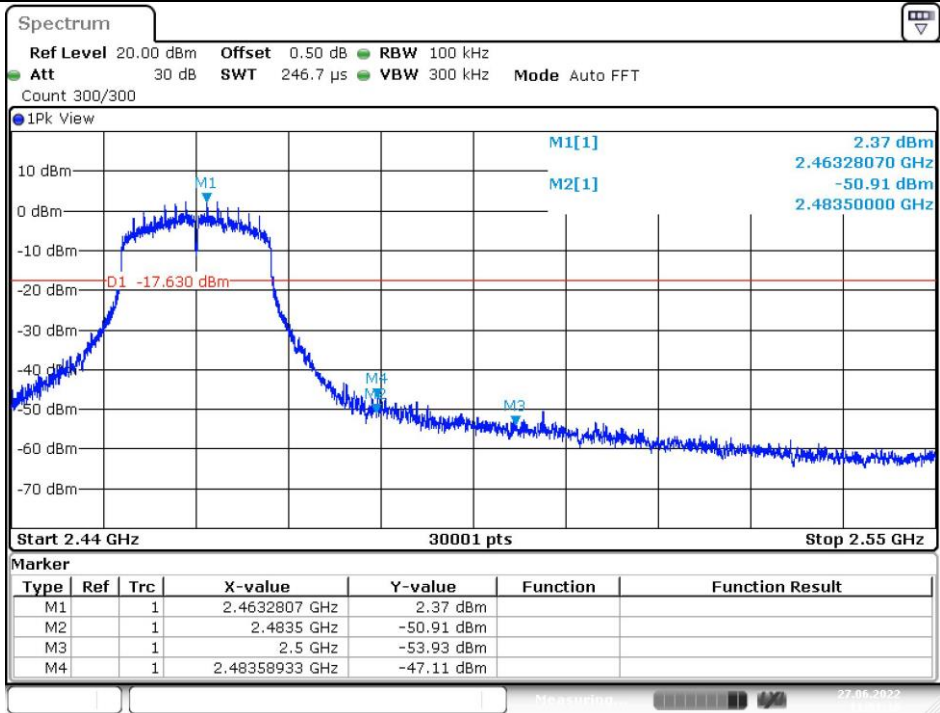
802.11 N HT20

Low_2412



Date: 27.JUN.2022 10:57:24

High_2462



Date: 27.JUN.2022 11:01:09

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 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 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 to 120 kHz, VBW ≥ RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions 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, Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz

- a) RBW = 1MHz.
- b) VBW ≥ [3 × RBW].
- c) Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \leq \text{RBW} / 2$.
 Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
- d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
- e) Sweep time = auto.
- f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of $1 / D$, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
- g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

- 1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is $[10 \log (1 / D)]$, where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.
- 2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is $[20 \log (1 / D)]$, where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
- 3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

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 and RSS-GEN 8.10 must comply with the radiated emission limits specified in section 15.209.

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

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 test result is listed in the report.

Transmitting spurious emission test result as below:

Test mode: 802.11B					
Channel 1 (2412MHz)					
Frequency (MHz)	Measure Level (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2389.21	53.25	74.00	20.75	Peak	Horizontal
2389.21	44.21	54.00	9.79	AV	Horizontal
4823.86	49.11	74.00	24.89	Peak	Horizontal
7237.86	48.41	74.00	25.59	Peak	Horizontal
2388.00	53.22	74.00	20.78	Peak	Vertical
2388.00	46.40	54.00	7.60	AV	Vertical
4828.96	44.18	74.00	29.82	Peak	Vertical

Test mode: 802.11B					
Channel 6 (2437MHz)					
Frequency (MHz)	Measure Level (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
4874.30	48.14	74.00	25.86	Peak	Horizontal
7310.40	48.36	74.00	25.64	Peak	Horizontal
4874.30	46.87	74.00	27.13	Peak	Vertical
7310.98	42.33	74.00	31.67	Peak	Vertical

Test mode: 802.11B					
Channel 11 (2462MHz)					
Frequency (MHz)	Measure Level (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2483.81	51.16	74.00	22.84	Peak	Horizontal
4924.16	44.91	74.00	29.09	Peak	Horizontal
7385.76	52.11	74.00	21.89	Peak	Horizontal
7385.76	43.70	54.00	10.30	AV	Horizontal
2483.55	51.17	74.00	22.83	Peak	Vertical
4924.16	44.88	74.00	29.12	Peak	Vertical

Test mode: 802.11G					
Channel 1 (2412MHz)					
Frequency (MHz)	Measure Level (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2389.20	59.21	74.00	14.79	Peak	Horizontal
2389.20	50.40	54.00	3.60	AV	Horizontal
4824.43	45.07	74.00	28.93	Peak	Horizontal
7235.60	48.51	74.00	25.49	Peak	Horizontal
2388.00	53.01	74.00	20.99	Peak	Vertical
2388.00	46.40	54.00	7.60	AV	Vertical
4824.43	44.16	74.00	29.84	Peak	Vertical

Test mode: 802.11G					
Channel 6 (2437MHz)					
Frequency (MHz)	Measure Level (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
4868.06	46.64	74.00	27.36	Peak	Horizontal
7310.96	50.82	74.00	23.18	Peak	Horizontal
4876.00	42.17	74.00	31.83	Peak	Vertical

Test mode: 802.11G					
Channel 11 (2462MHz)					
Frequency (MHz)	Measure Level (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2483.50	58.17	74.00	15.83	Peak	Horizontal
2483.50	46.50	54.00	7.50	AV	Horizontal
4923.60	45.65	74.00	28.35	Peak	Horizontal
7382.93	48.73	74.00	25.27	Peak	Horizontal
2483.50	58.17	74.00	15.83	Peak	Vertical
2483.50	46.20	54.00	7.80	AV	Vertical
4928.13	42.35	74.00	31.65	Peak	Vertical

Test mode: 802.11N					
Channel 1 (2412MHz)					
Frequency	Measure	Limit	Margin	Detector	Polarization
(MHz)	Level (dBuV/M)	(dBuV/M)	(dB)		
2390.00	57.81	74.00	16.19	Peak	Horizontal
2390.00	47.6	54.00	6.40	AV	Horizontal
3618.00	44.84	74.00	29.16	Peak	Horizontal
4827.26	43.89	74.00	30.11	Peak	Horizontal
2389.12	56.78	74.00	17.22	Peak	Vertical
2389.12	49.5	54.00	4.50	AV	Vertical
3618.00	42.98	74.00	31.02	Peak	Vertical

Test mode: 802.11N					
Channel 6 (2437MHz)					
Frequency	Measure	Limit	Margin	Detector	Polarization
(MHz)	Level (dBuV/M)	(dBuV/M)	(dB)		
4878.83	43.69	74.00	30.31	Peak	Horizontal
4914.53	41.94	74.00	32.06	Peak	Vertical

Channel 11 (2462MHz)					
Frequency	Measure	Limit	Margin	Detector	Polarization
(MHz)	Level (dBuV/M)	(dBuV/M)	(dB)		
2483.50	57.21	74.00	16.79	Peak	Horizontal
2483.50	44.50	54.00	9.50	AV	Horizontal
4920.76	44.45	74.00	29.55	Peak	Horizontal
7387.46	49.78	74.00	24.22	Peak	Horizontal
2483.50	56.77	74.00	17.23	Peak	Vertical
2483.50	44.30	54.00	9.70	AV	Vertical
4931.15	43.65	74.00	30.35	Peak	Vertical

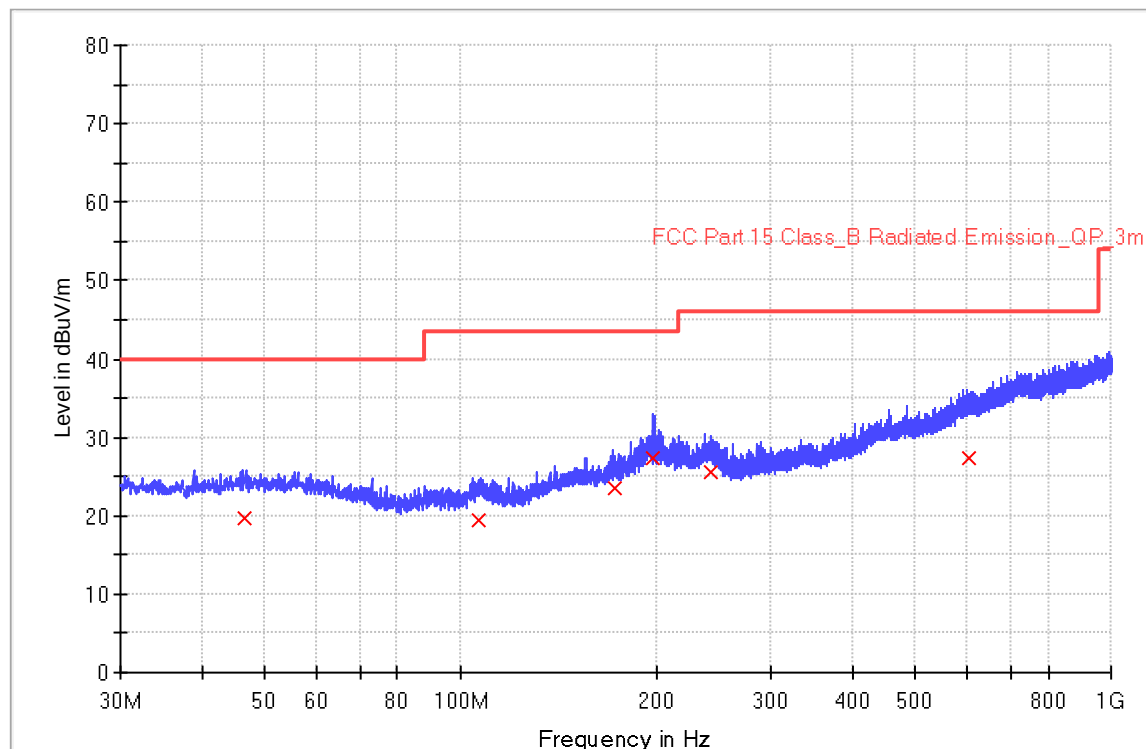
Remark:

- (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: 2022/06/31 - 15:43
Limit: FCC_Part15.209 and RSS-GEN 8.8 RE(3m)	Engineer: Cheng Huali
Probe: VULB9168	Polarity: Horizontal
EUT: Xiaomi Instant Photo Printer 1S	Power: 120VAC, 60Hz
Note: Transmit by 802.11g at channel 2412MHz.	
Note: There is the worst case within frequency range 30MHz~1GHz.	

RE_VULB9168_pre_Cont_30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
46.600000	19.8	1000.0	120.000	200.0	H	48.0	20.5	20.2	40.0
106.960000	19.5	1000.0	120.000	200.0	H	314.0	17.0	24.0	43.5
172.160000	23.4	1000.0	120.000	200.0	H	203.0	20.1	20.1	43.5
197.680000	27.4	1000.0	120.000	200.0	H	56.0	17.8	16.1	43.5
243.160000	25.4	1000.0	120.000	200.0	H	154.0	19.7	20.6	46.0
603.120000	27.3	1000.0	120.000	200.0	H	85.0	29.1	18.7	46.0

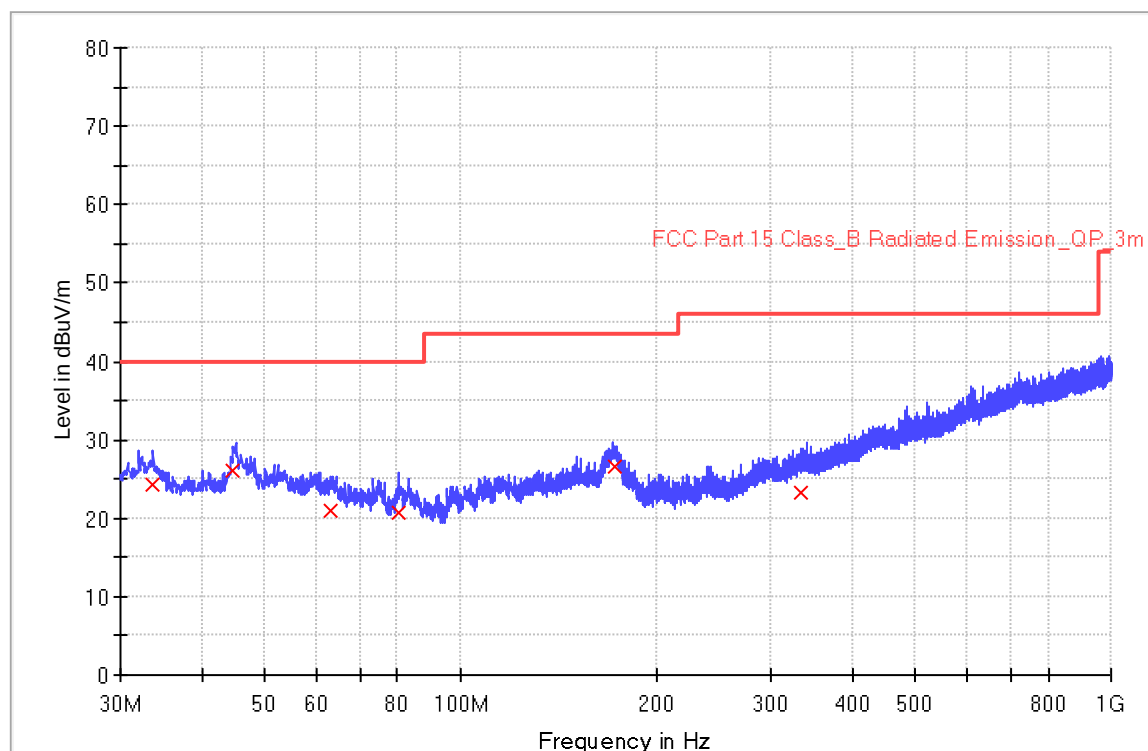
Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

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.

Site: 3-meter chamber	Time: 2022/06/31 - 15:59
Limit: FCC_Part15.209 and RSS-GEN 8.8_RE(3m)	Engineer: Cheng Huali
Probe: VULB9168	Polarity: Vertical
EUT: Xiaomi Instant Photo Printer 1S	Power: 120VAC, 60Hz
Note: Transmit by 802.11g at channel 2412MHz.	
Note: There is the worst case within frequency range 30MHz~1GHz.	

RE_VULB9168_pre_Cont_30-1000



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
33.640000	24.3	1000.0	120.000	100.0	V	144.0	19.4	15.7	40.0
44.680000	26.1	1000.0	120.000	100.0	V	41.0	20.3	14.0	40.0
63.040000	21.0	1000.0	120.000	100.0	V	254.0	19.7	19.0	40.0
80.120000	20.6	1000.0	120.000	100.0	V	214.0	15.8	19.4	40.0
172.560000	26.7	1000.0	120.000	100.0	V	99.0	20.2	16.8	43.5
332.640000	23.3	1000.0	120.000	100.0	V	300.0	22.6	22.7	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. DATE	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2022-8-1	2023-7-31
	Wideband power sensor	Rohde & Schwarz	NRP-Z81	104782	2022-3-18	2023-3-17
RE	EMI Test Receiver	Rohde & Schwarz	ESR3	101906	2022-8-1	2023-7-31
	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2022-8-1	2023-7-31
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9168	961	2019-9-23	2024-9-22
	Horn Antenna	Rohde & Schwarz	HF907	102393	2021-3-15	2024-3-14
	Pre-amplifier	Rohde & Schwarz	SCU-18D	19006451	2022-8-1	2023-7-31
	Loop antenna	Rohde & Schwarz	HFH2-Z2	100443	2022-6-13	2023-6-12
	DOUBLE-RIDGED WAVEGUIDE HORN WITH PRE-AMPLIFIER (18 GHZ - 40 GHZ)	ETS-Lindgren	3116C-PA	002222727	2020-9-23	2023-9-22
	3m Semi-anechoic chamber	TDK	9X6X6	----	2021-5-8	2024-5-7
CE	EMI Test Receiver	Rohde & Schwarz	ESR3	101907	2022-8-1	2023-7-31
	LISN	Rohde & Schwarz	ENV216	101924	2022-8-1	2023-7-31

Measurement Software Information

Test Item	Software	Manufacturer	Version
C	Bluetooth and WiFi Test System	Shenzhen JS tonscent co.,ltd	2.6.77.0518
RE	EMC 32	Rohde & Schwarz	V10.50.40
CE	EMC 32	Rohde & Schwarz	V9.15.03

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth and 99% Occupied 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:

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, $\pm 3.16\text{dB}$
Radiated Disturbance	30MHz to 1GHz, $\pm 5.03\text{dB}$ (Horizontal) $\pm 5.12\text{dB}$ (Vertical) 1GHz to 18GHz, $\pm 5.49\text{dB}$ 18GHz to 40GHz, $\pm 5.63\text{dB}$
Carrier power conducted measurement	50MHz~18GHz, $\pm 1.238\text{dB}$
Spurious Emission Conducted Measurement	9kHz ~40GHz, $\pm 1.224\text{dB}$

Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2021, clause 4.4.3 and 4.5.1.

12 Photographs of Test Set-ups

Refer to the < Test Setup photos >.

13 Photographs of EUT

Refer to the < External Photos > & < Internal Photos >.

THE END