

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

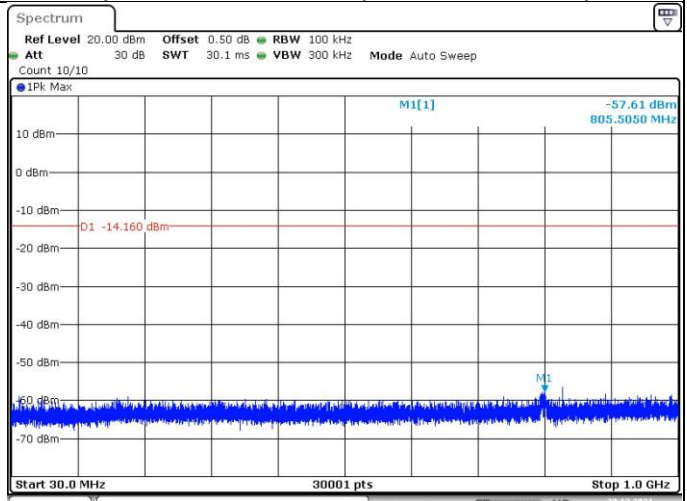
802.11b

Out-of-Band Emissions

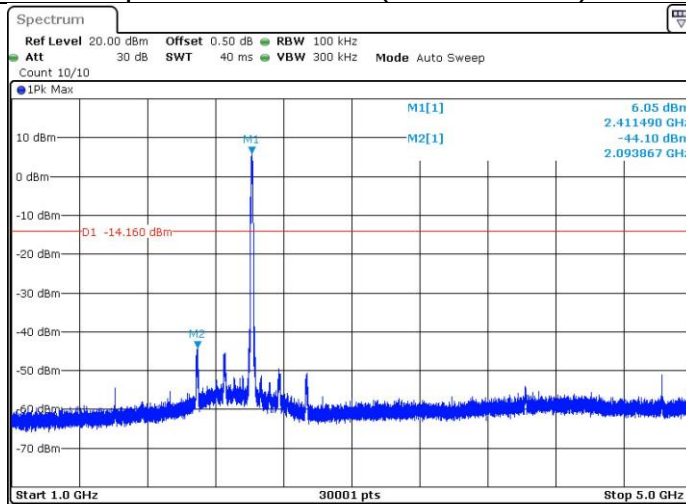
Channel 1 (2412MHz)

Reference point

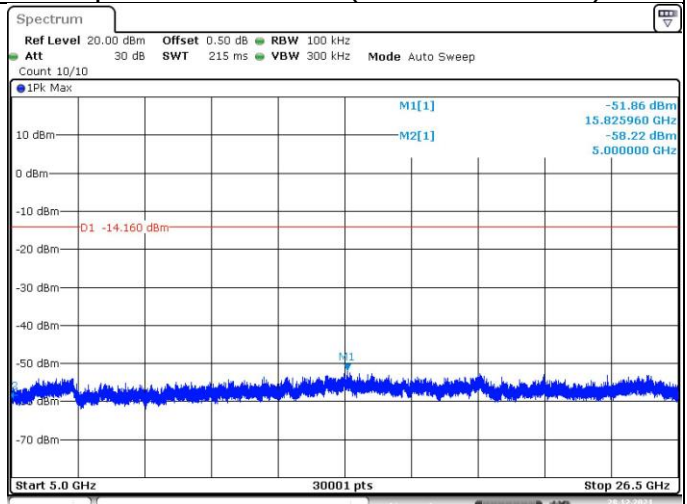
Date: 28 DEC 2021 09:47:38

Spurious Emission (30MHz – 1GHz)

Date: 28 DEC 2021 09:47:42

Spurious Emission (1GHz – 5GHz)

Date: 28 DEC 2021 09:47:54

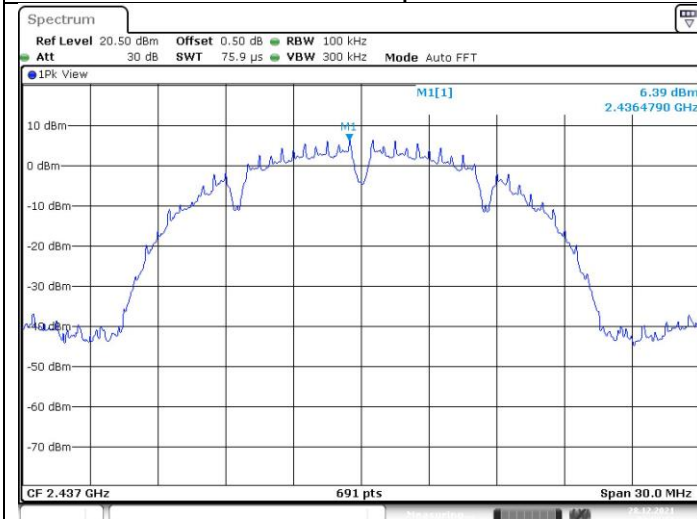
Spurious Emission (5GHz – 26.5GHz)

Date: 28 DEC 2021 09:48:26

Out-of-Band Emissions

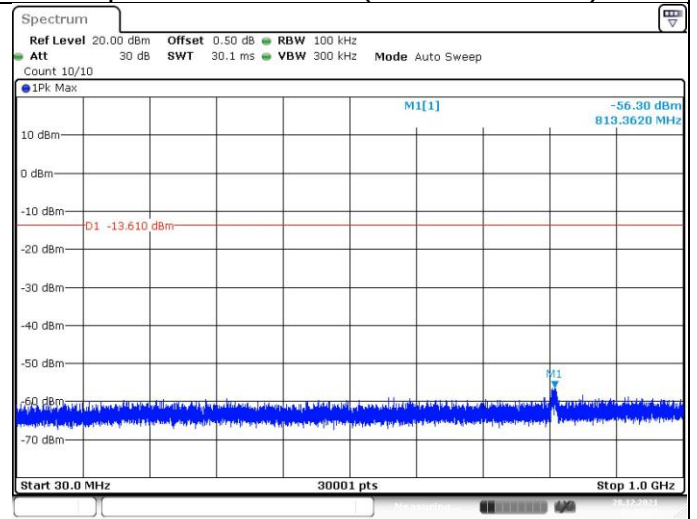
Channel 6 (2437MHz)

Reference point



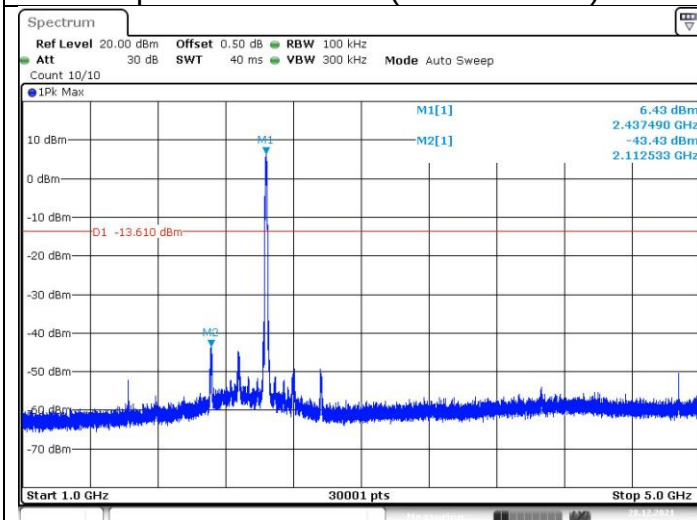
Date: 28 DEC 2021 09:50:30

Spurious Emission (30MHz – 1GHz)



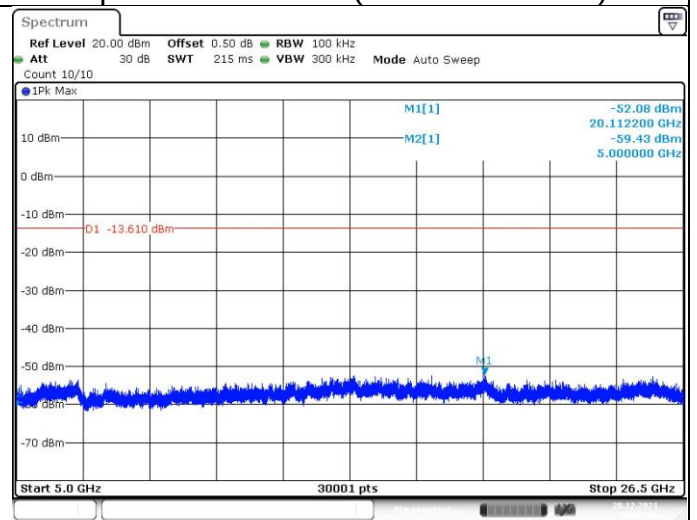
Date: 28 DEC 2021 09:50:34

Spurious Emission (1GHz – 5GHz)



Date: 28 DEC 2021 09:50:47

Spurious Emission (5GHz – 26.5GHz)



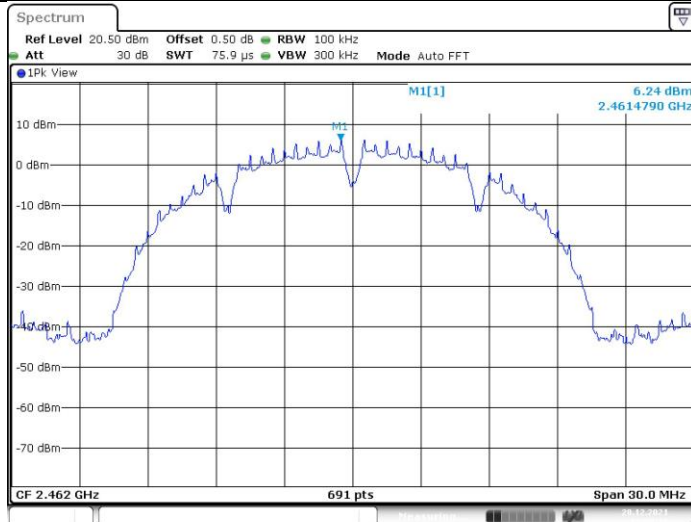
Date: 28 DEC 2021 09:51:18

Out-of-Band Emissions

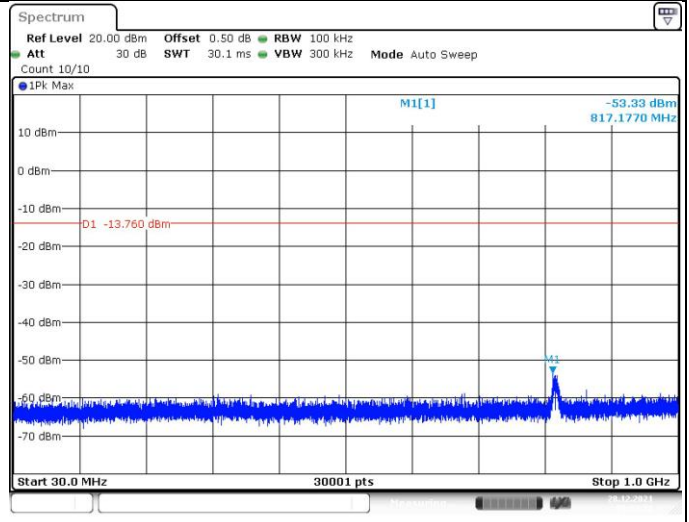
Channel 11 (2462MHz)

Reference point

Spurious Emission (30MHz – 1GHz)



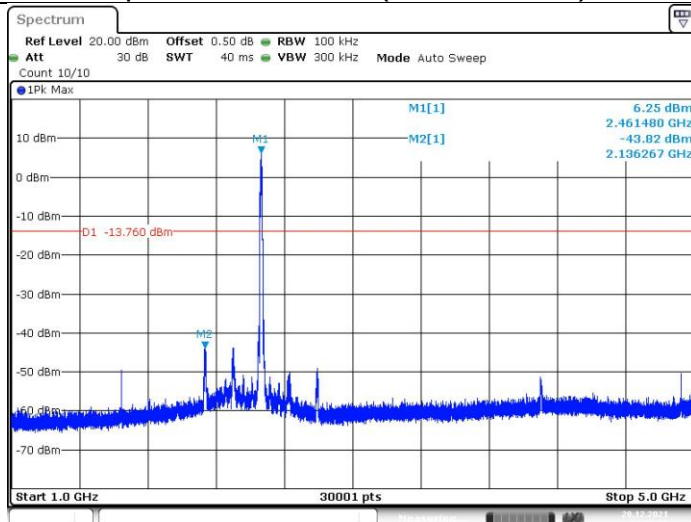
Date: 28 DEC 2021 09:52:19



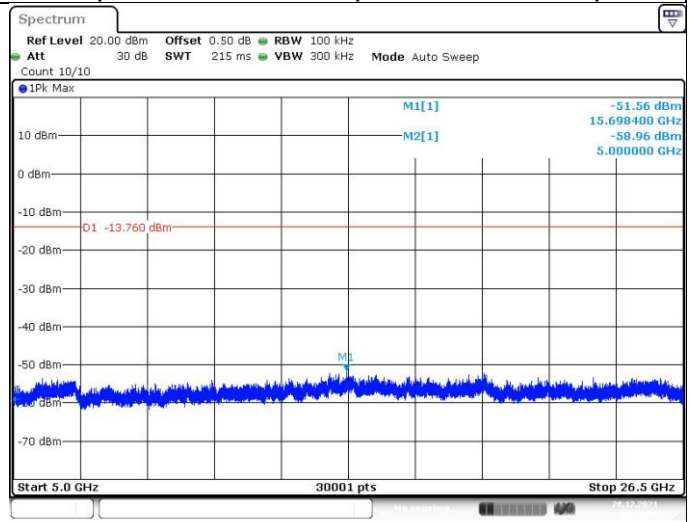
Date: 28 DEC 2021 09:52:23

Spurious Emission (1GHz –5GHz)

Spurious Emission (5GHz –26.5GHz)



Date: 28 DEC 2021 09:52:35



Date: 28 DEC 2021 09:53:06

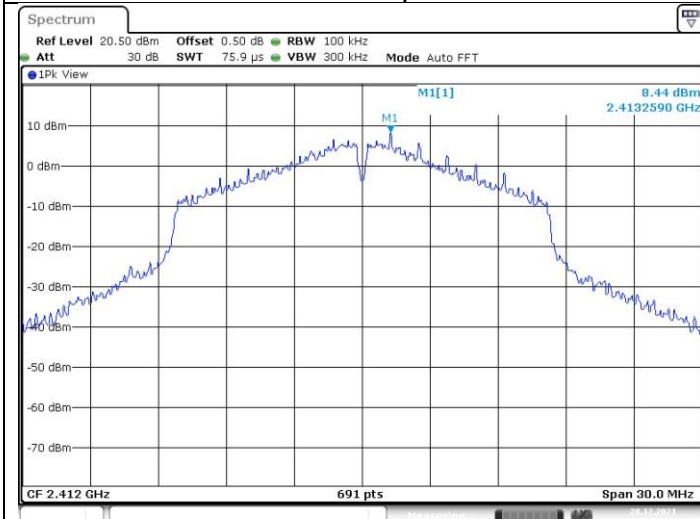
802.11g

Out-of-Band Emissions

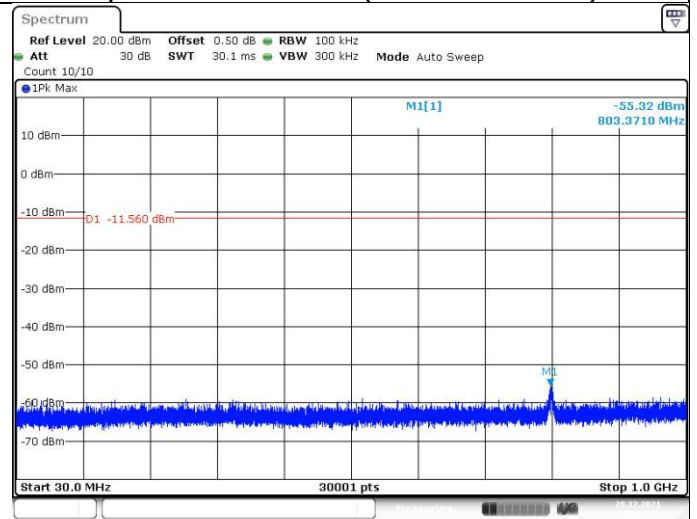
Channel 1 (2412MHz)

Reference point

Spurious Emission (30MHz – 1GHz)



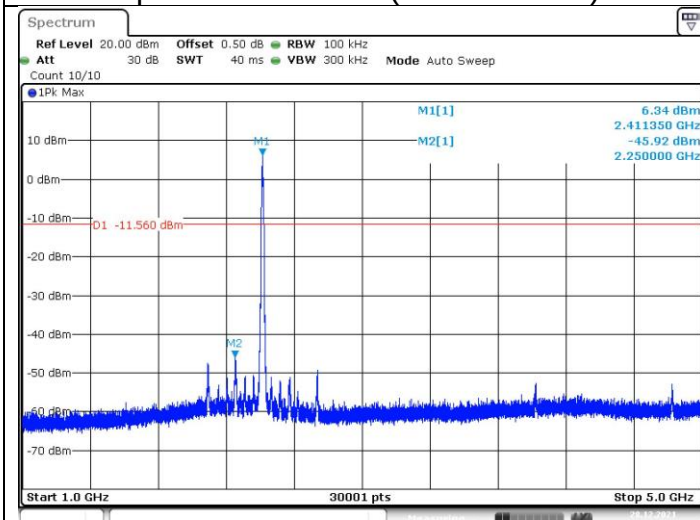
Date: 28 DEC 2021 09:54:23



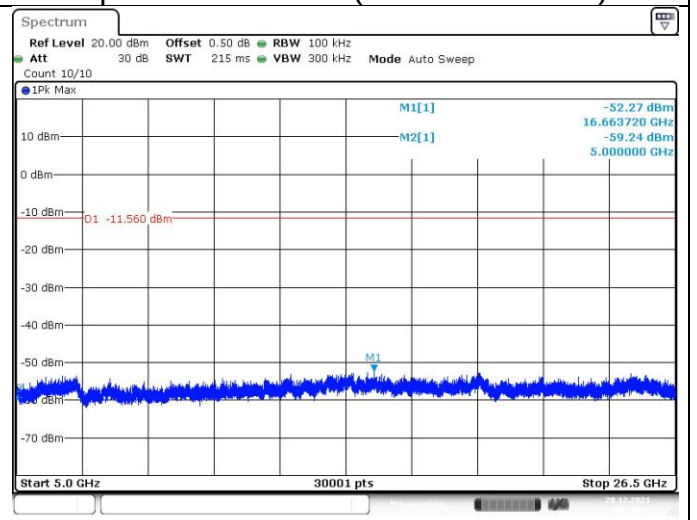
Date: 28 DEC 2021 09:54:28

Spurious Emission (1GHz – 5GHz)

Spurious Emission (5GHz – 26.5GHz)



Date: 28 DEC 2021 09:54:40



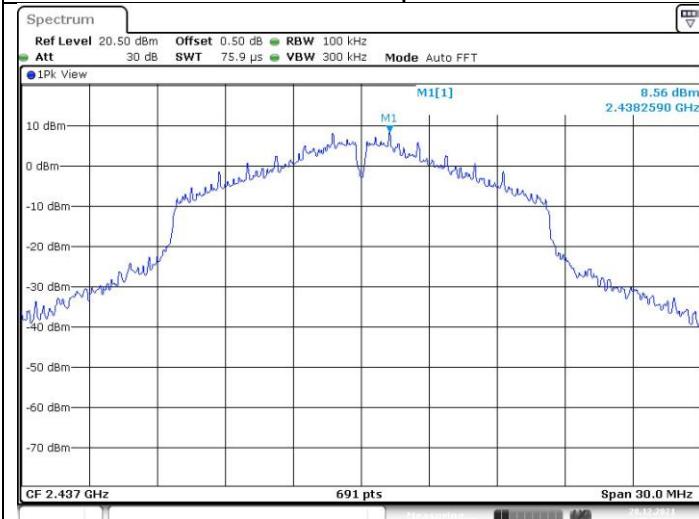
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Out-of-Band Emissions

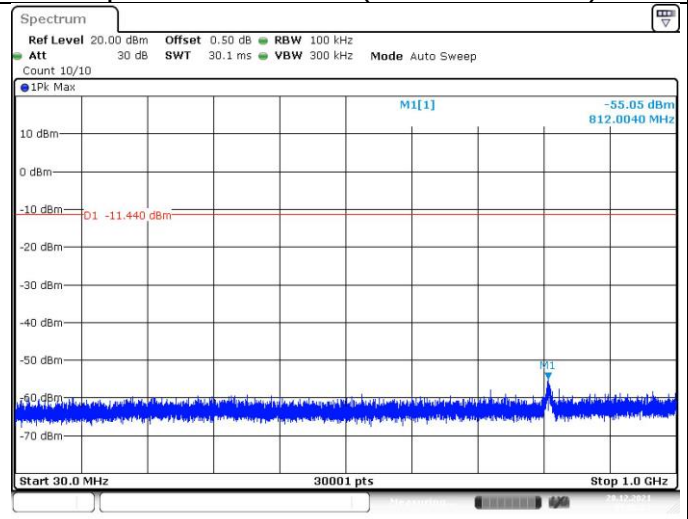
Channel 6 (2437MHz)

Reference point

Spurious Emission (30MHz – 1GHz)



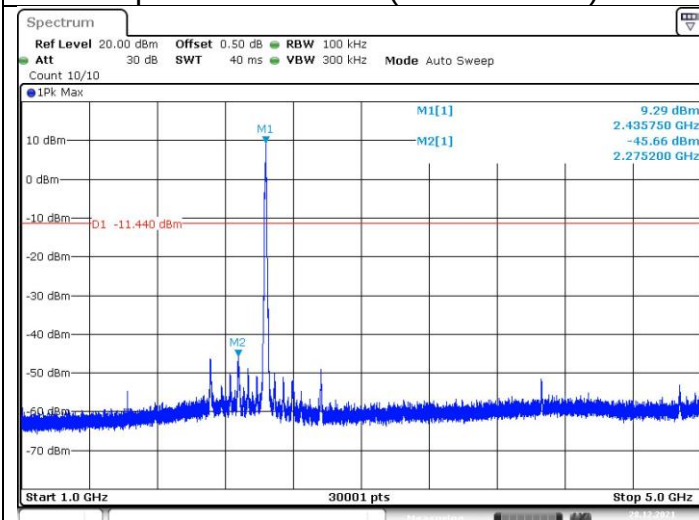
Date: 28 DEC 2021 09:56:16



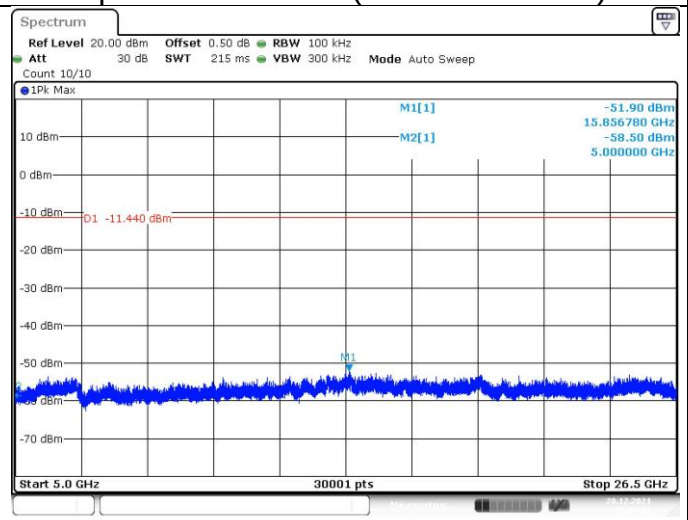
Date: 28 DEC 2021 09:56:21

Spurious Emission (1GHz – 5GHz)

Spurious Emission (5GHz – 26.5GHz)



Date: 28 DEC 2021 09:56:33

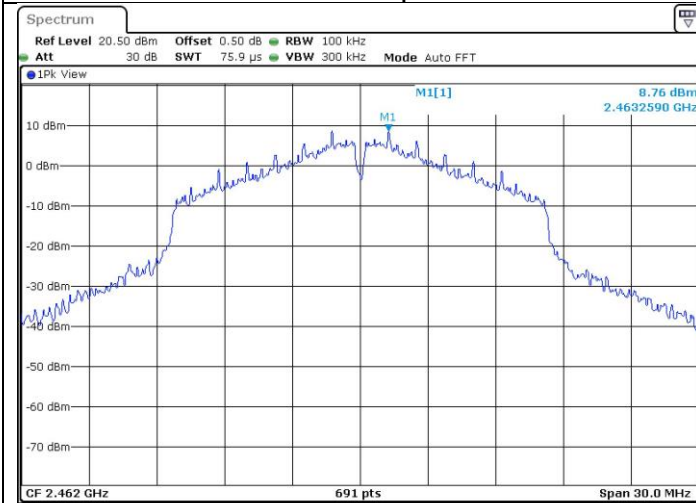


Date: 28 DEC 2021 09:57:04

Out-of-Band Emissions

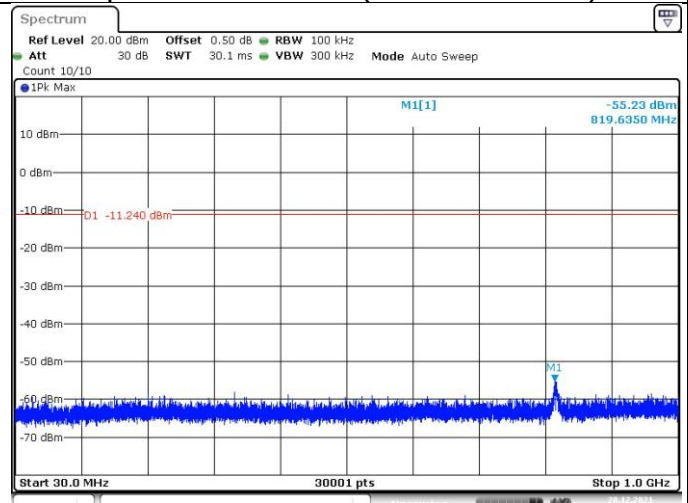
Channel 11 (2462MHz)

Reference point



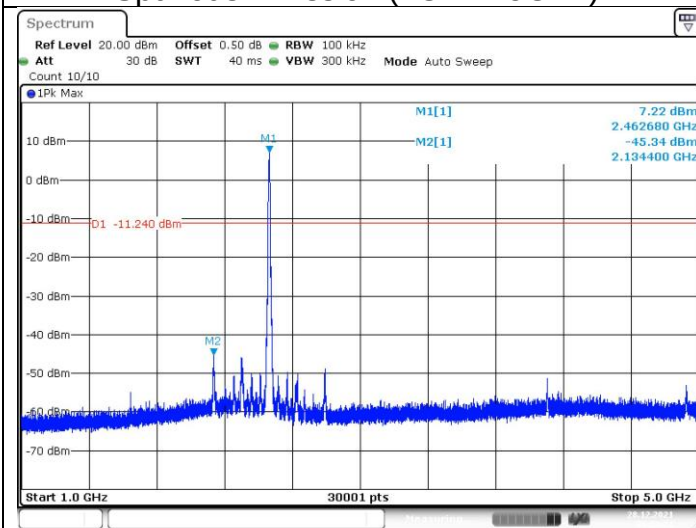
Date: 28 DEC 2021 09:58:05

Spurious Emission (30MHz – 1GHz)



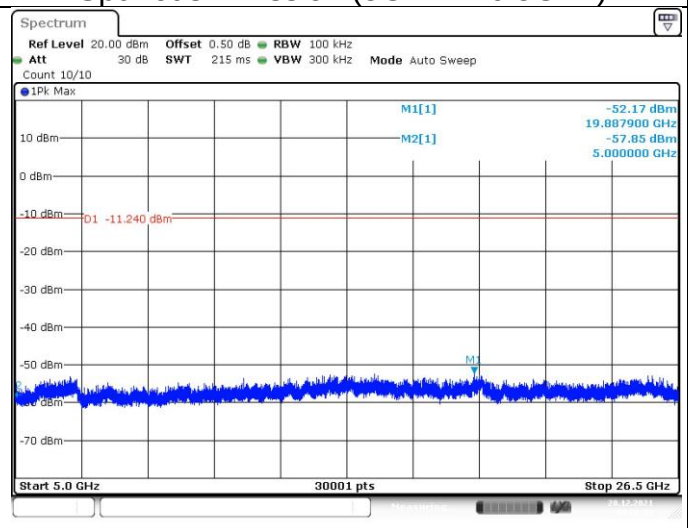
Date: 28 DEC 2021 09:58:10

Spurious Emission (1GHz – 5GHz)



Date: 28 DEC 2021 09:58:22

Spurious Emission (5GHz – 26.5GHz)



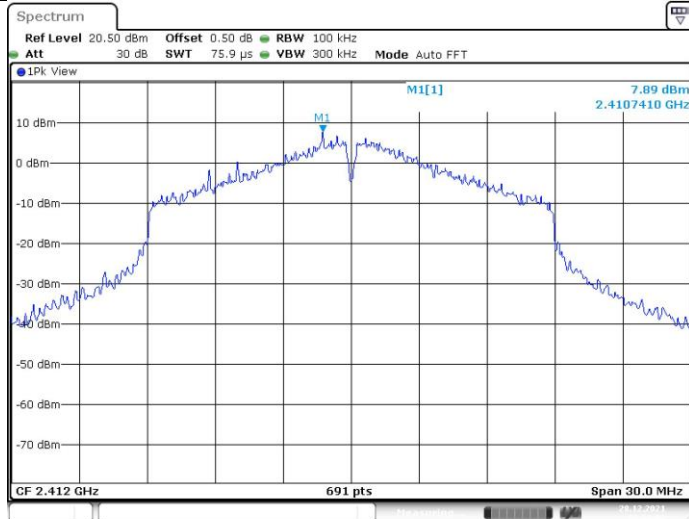
Date: 28 DEC 2021 09:58:53

802.11n(HT20)

Out-of-Band Emissions

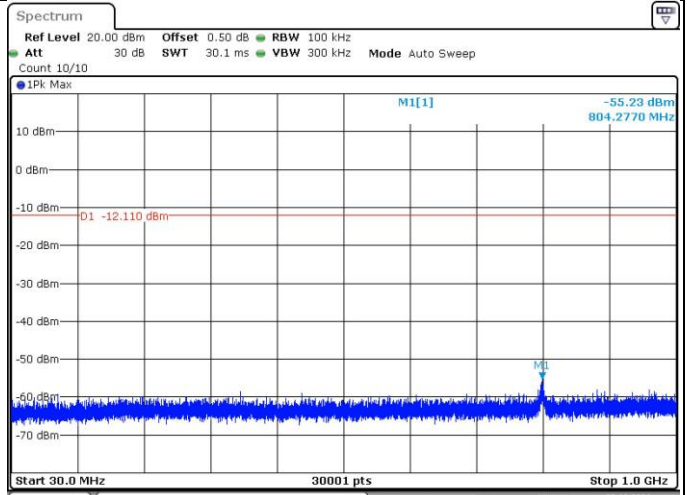
Channel 1 (2412MHz)

Reference point



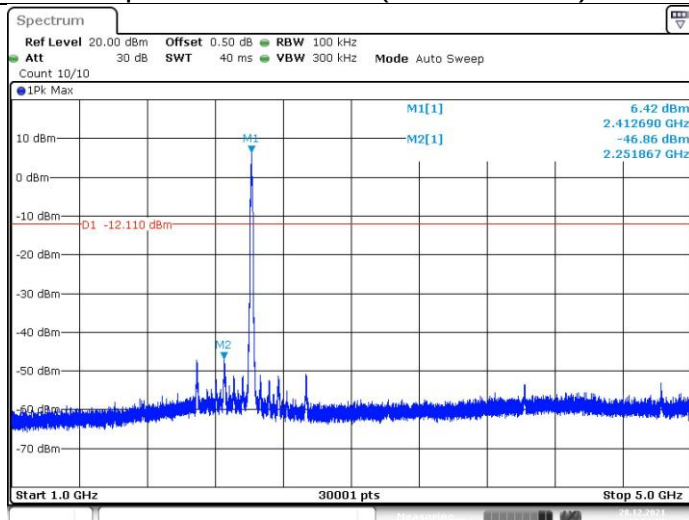
Date: 28 DEC 2021 10:00:06

Spurious Emission (30MHz – 1GHz)



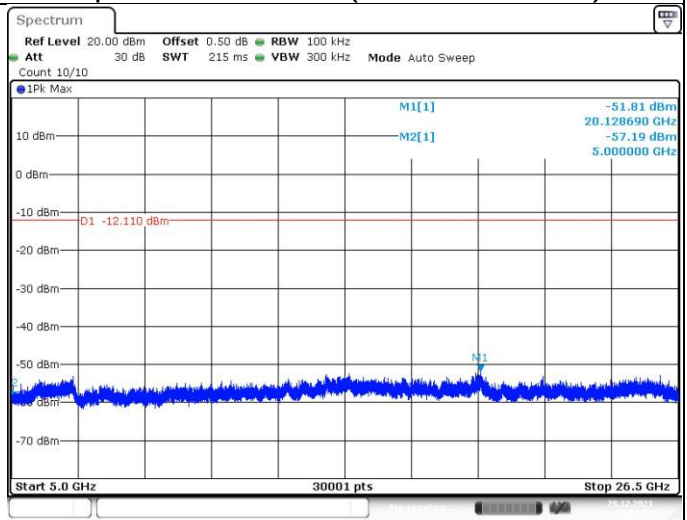
Date: 28 DEC 2021 10:00:11

Spurious Emission (1GHz – 5GHz)



Date: 28 DEC 2021 10:00:23

Spurious Emission (5GHz – 26.5GHz)



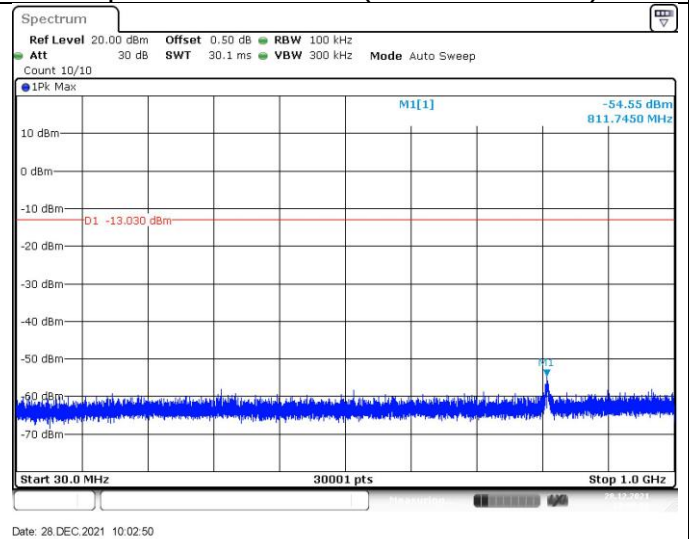
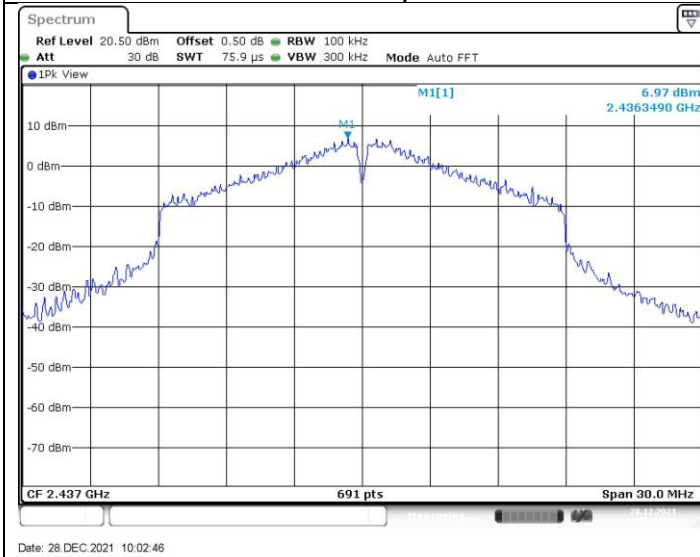
Date: 28 DEC 2021 10:00:54

Out-of-Band Emissions

Channel 6 (2437MHz)

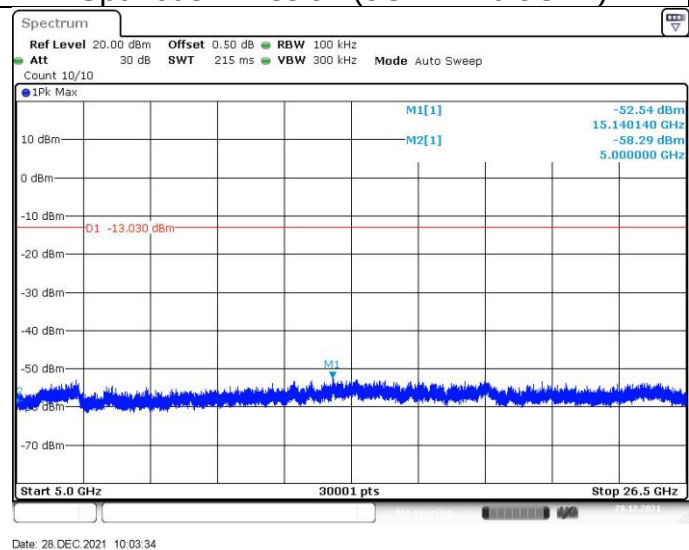
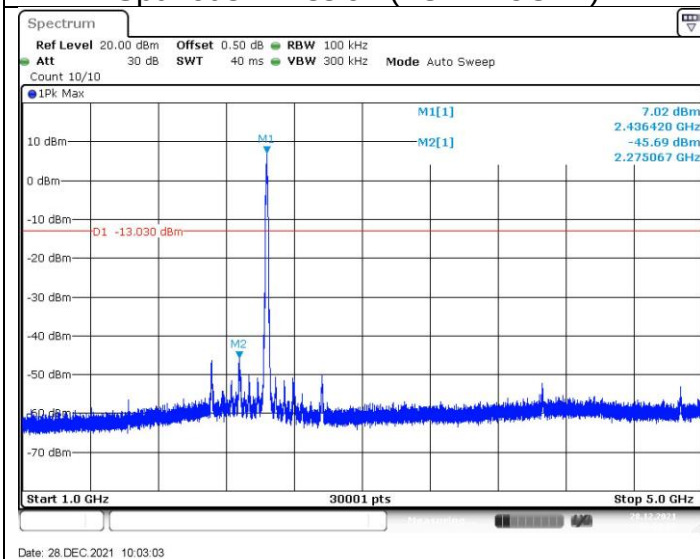
Reference point

Spurious Emission (30MHz – 1GHz)



Spurious Emission (1GHz –5GHz)

Spurious Emission (5GHz –26.5GHz)

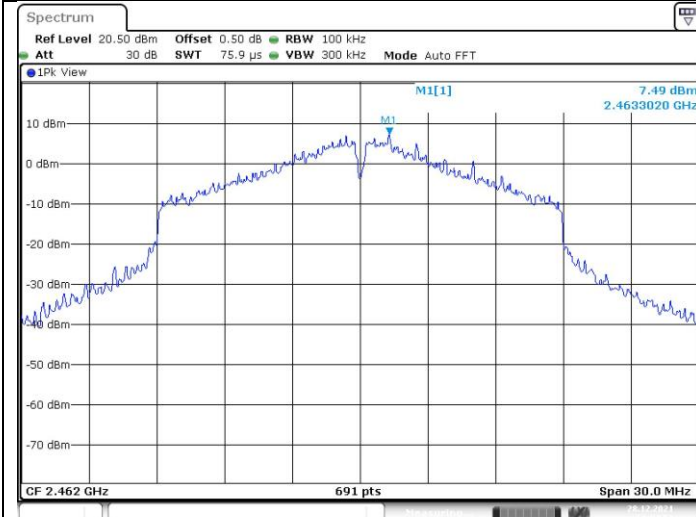


Out-of-Band Emissions

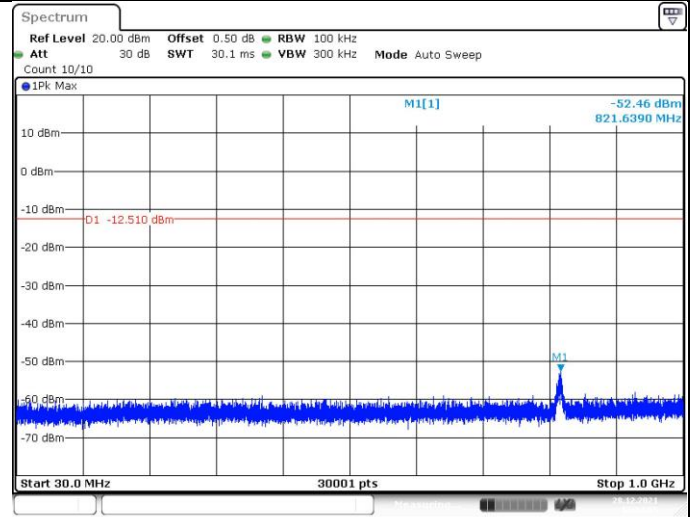
Channel 11 (2462MHz)

Reference point

Spurious Emission (30MHz – 1GHz)



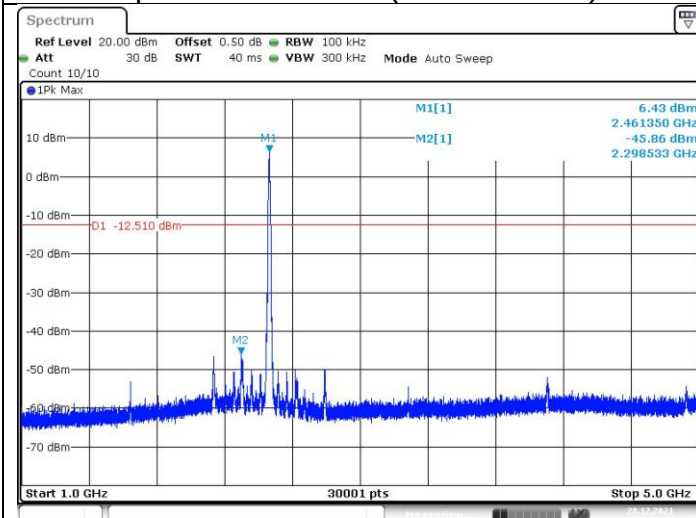
Date: 28 DEC.2021 10:04:51



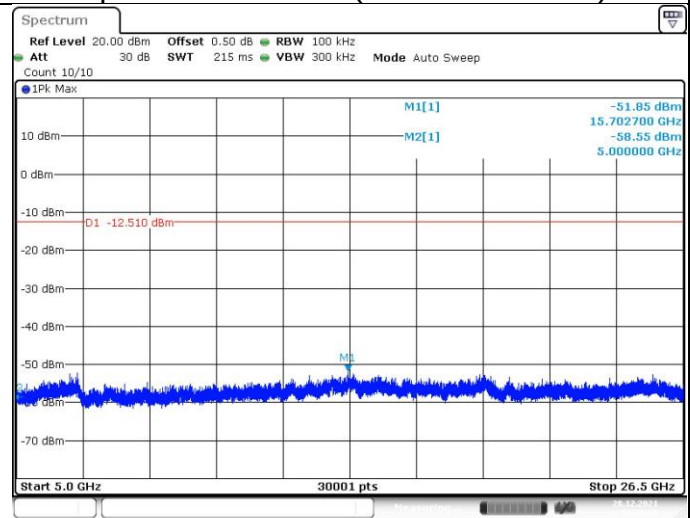
Date: 28 DEC.2021 10:04:55

Spurious Emission (1GHz –5GHz)

Spurious Emission (5GHz –26.5GHz)



Date: 28 DEC.2021 10:05:08



Date: 28 DEC.2021 10:05:39

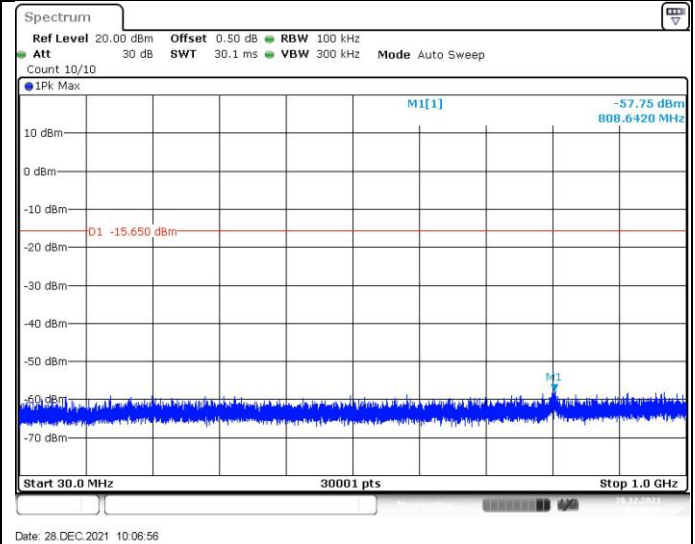
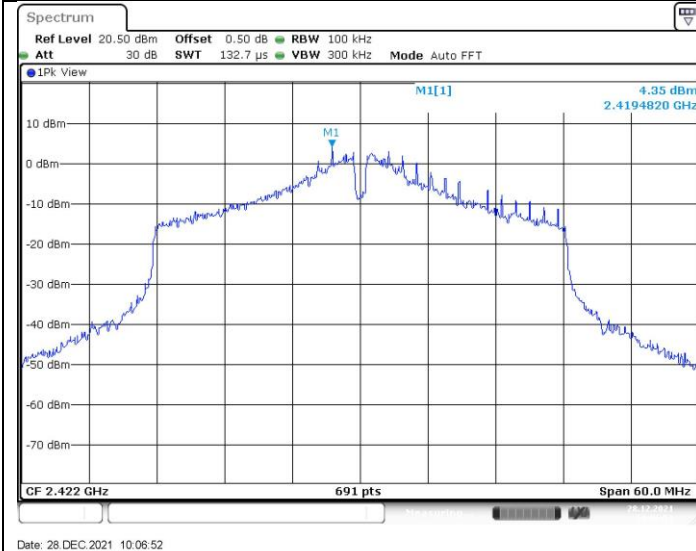
802.11n(HT40)

Out-of-Band Emissions

Channel 3 (2422MHz)

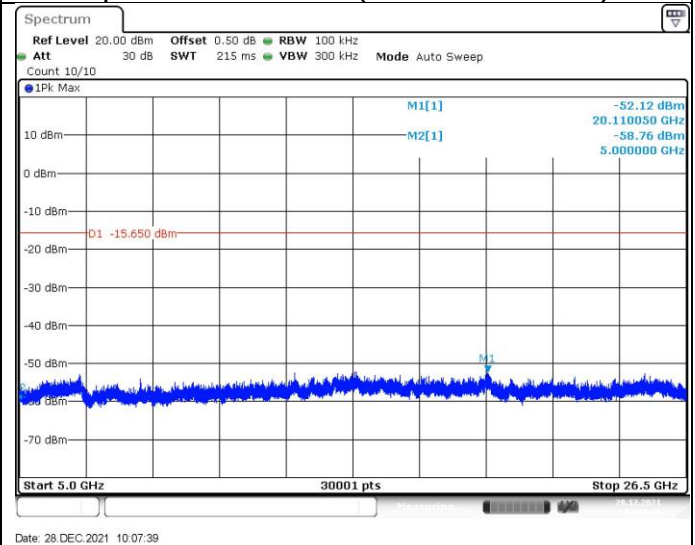
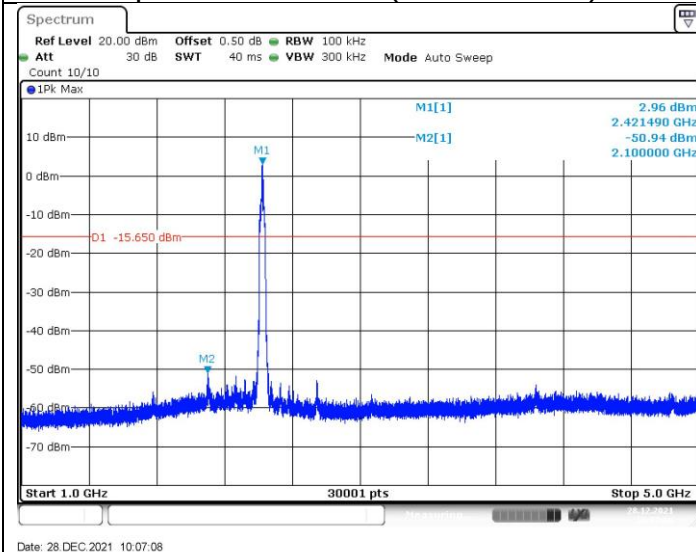
Reference point

Spurious Emission (30MHz – 1GHz)



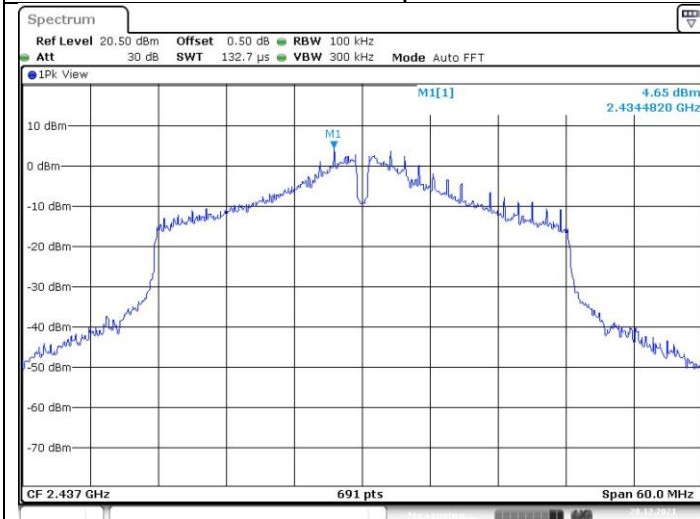
Spurious Emission (1GHz –5GHz)

Spurious Emission (5GHz –26.5GHz)



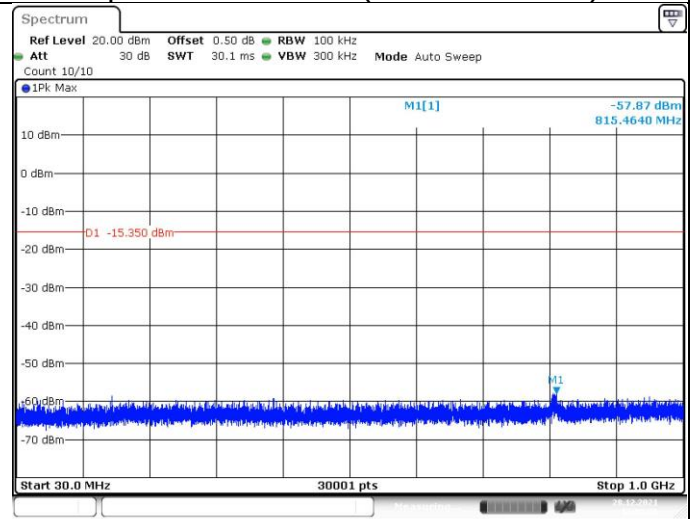
Out-of-Band Emissions Channel 6 (2437MHz)

Reference point



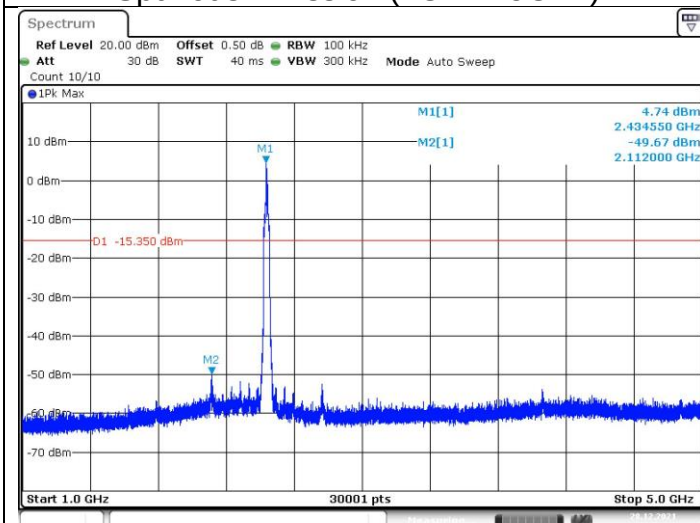
Date: 28 DEC 2021 10:08:32

Spurious Emission (30MHz – 1GHz)



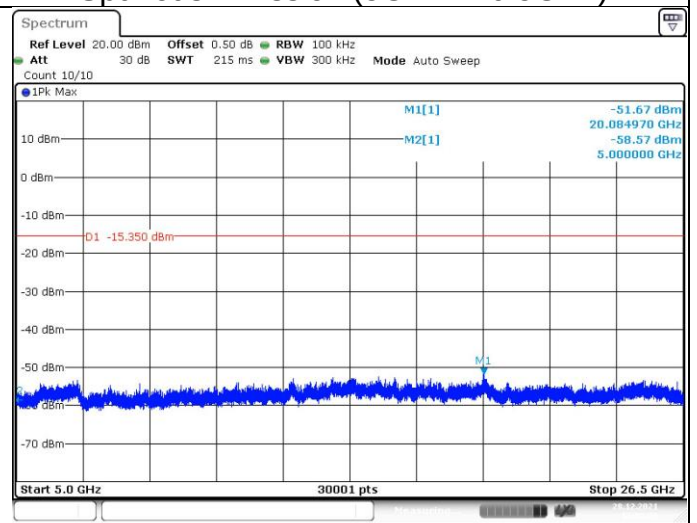
Date: 28 DEC 2021 10:08:36

Spurious Emission (1GHz – 5GHz)



Date: 28 DEC 2021 10:08:49

Spurious Emission (5GHz – 26.5GHz)



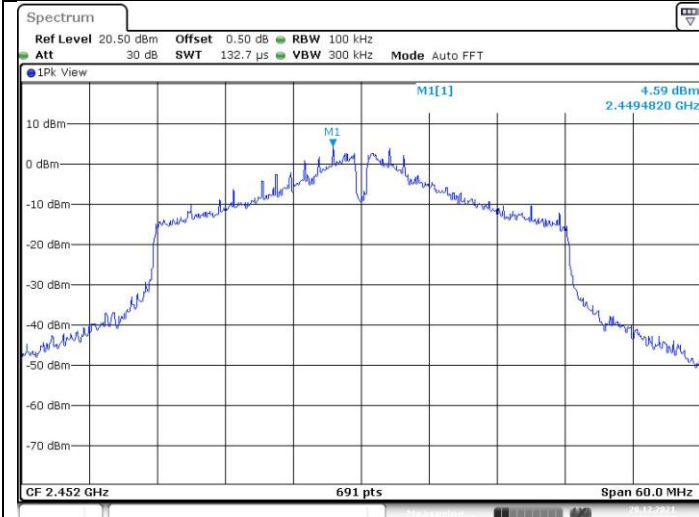
Date: 28 DEC 2021 10:09:20

Out-of-Band Emissions

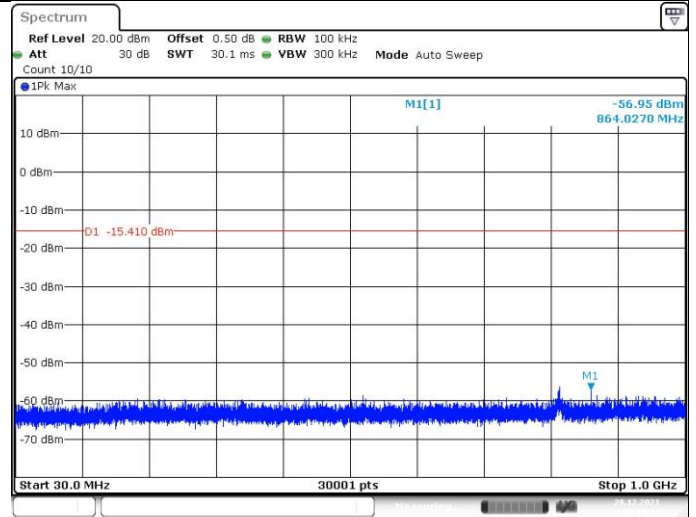
Channel 9 (2452MHz)

Reference point

Spurious Emission (30MHz – 1GHz)



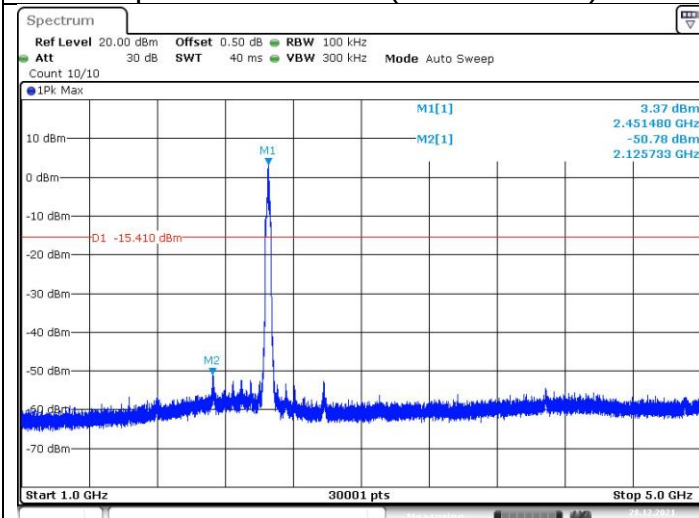
Date: 28.DEC.2021 10:10:36



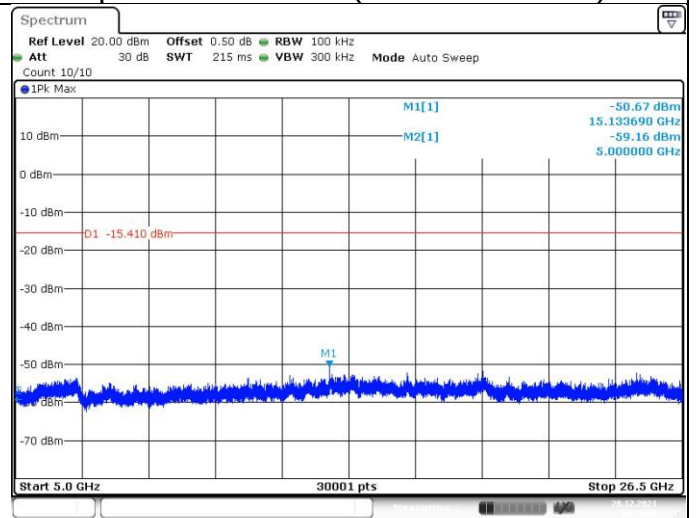
Date: 28.DEC.2021 10:10:41

Spurious Emission (1GHz –5GHz)

Spurious Emission (5GHz –26.5GHz)



Date: 28.DEC.2021 10:10:53



Date: 28.DEC.2021 10:11:24

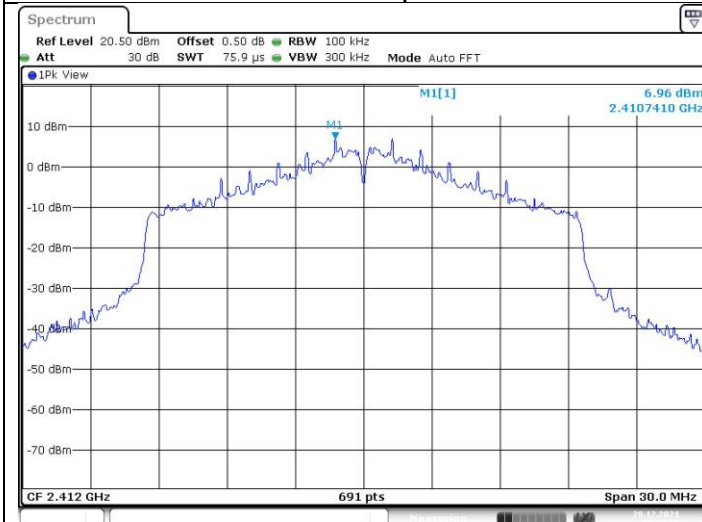
802.11ax(HE20)

Out-of-Band Emissions

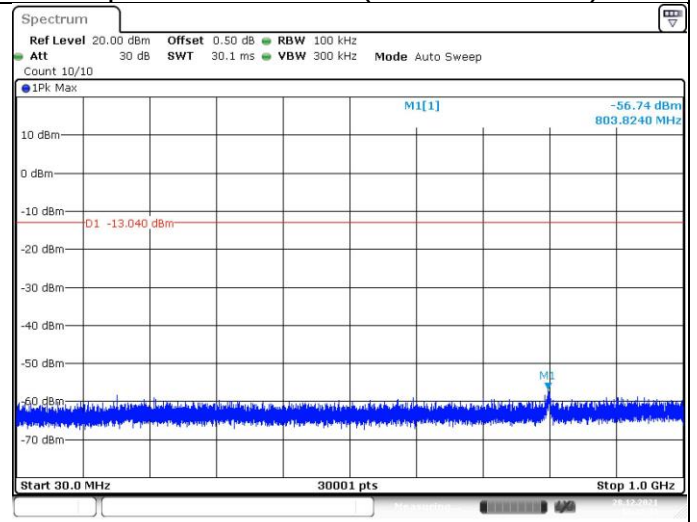
Channel 3 (2412MHz)

Reference point

Spurious Emission (30MHz – 1GHz)



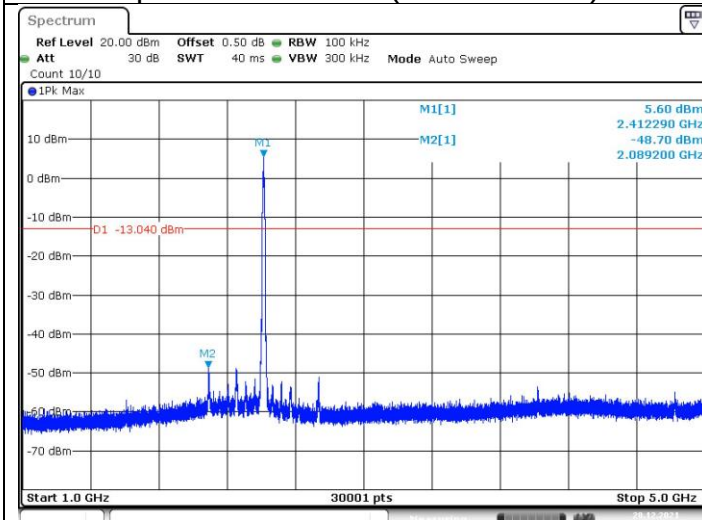
Date: 28.DEC.2021 10:12:40



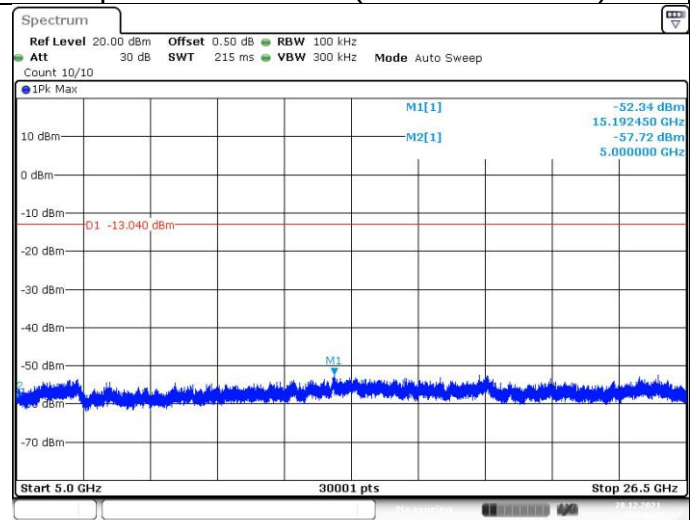
Date: 28.DEC.2021 10:12:44

Spurious Emission (1GHz –5GHz)

Spurious Emission (5GHz –26.5GHz)



Date: 28.DEC.2021 10:12:56



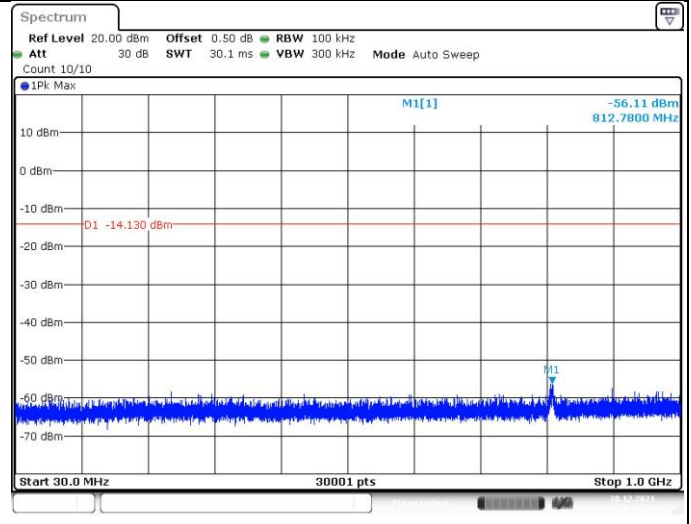
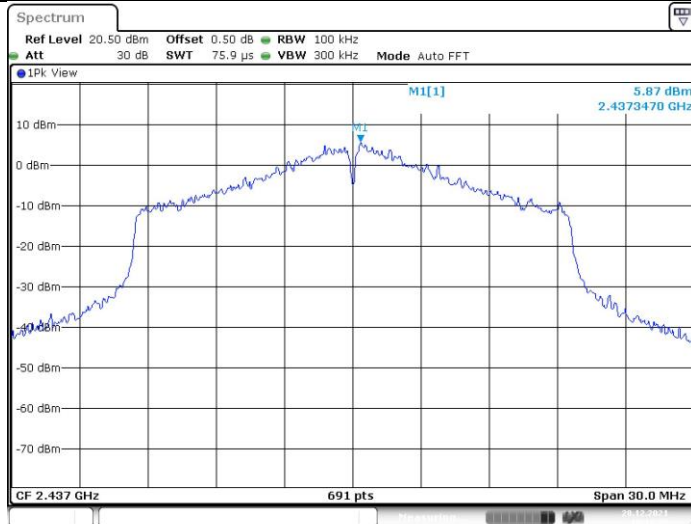
Date: 28.DEC.2021 10:13:28

Out-of-Band Emissions

Channel 6 (2437MHz)

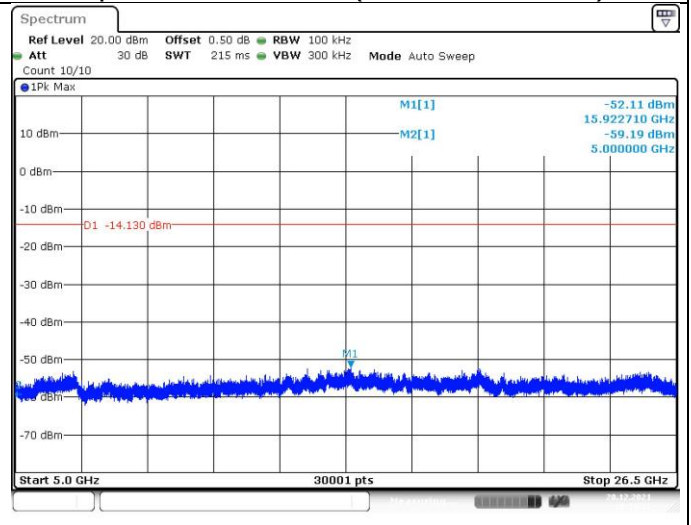
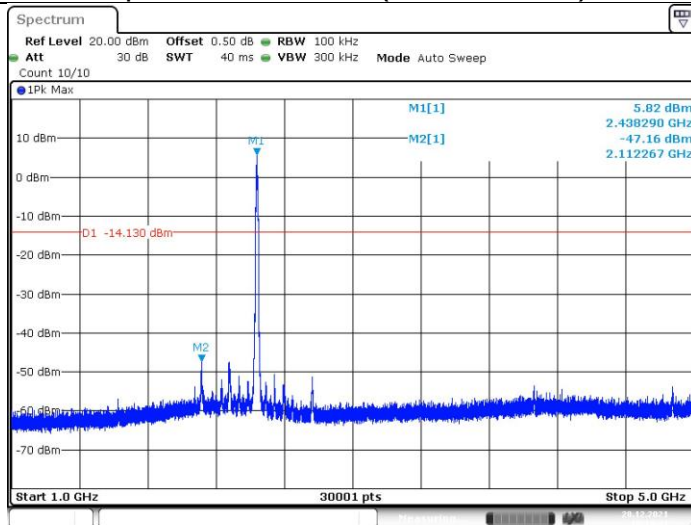
Reference point

Spurious Emission (30MHz – 1GHz)



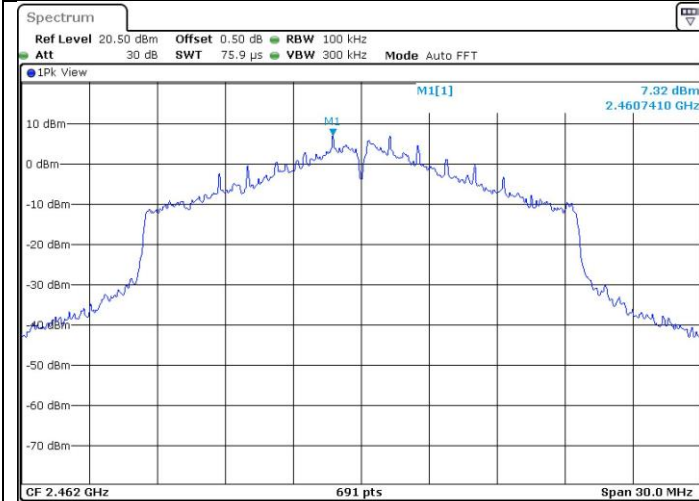
Spurious Emission (1GHz –5GHz)

Spurious Emission (5GHz –26.5GHz)



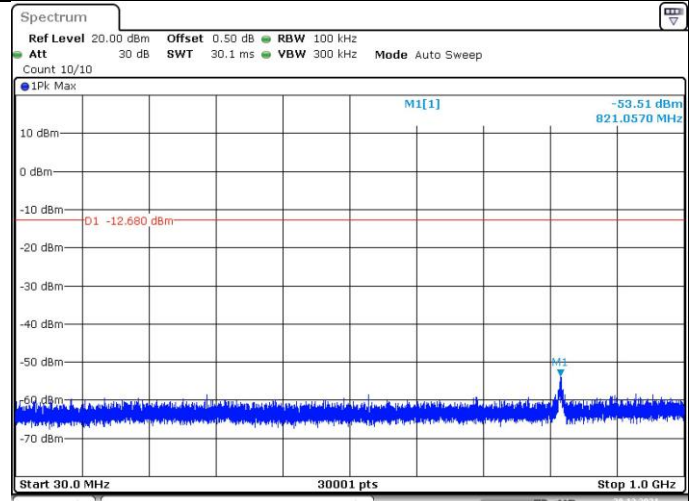
Out-of-Band Emissions Channel 9 (2462MHz)

Reference point



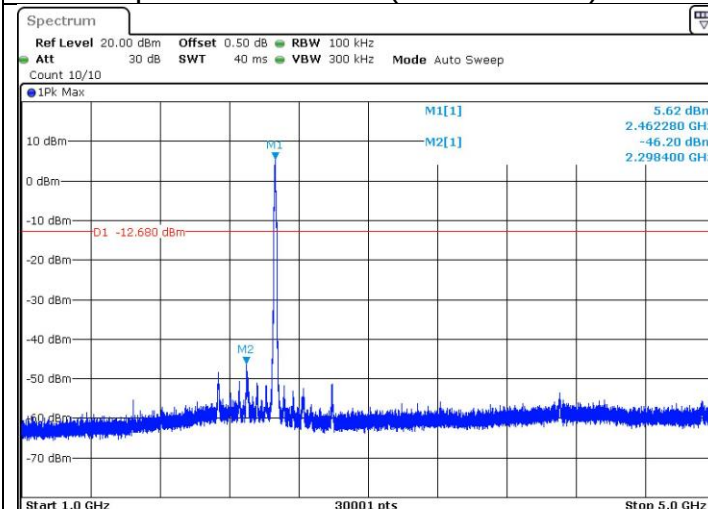
Date: 28 DEC 2021 10:16:17

Spurious Emission (30MHz – 1GHz)



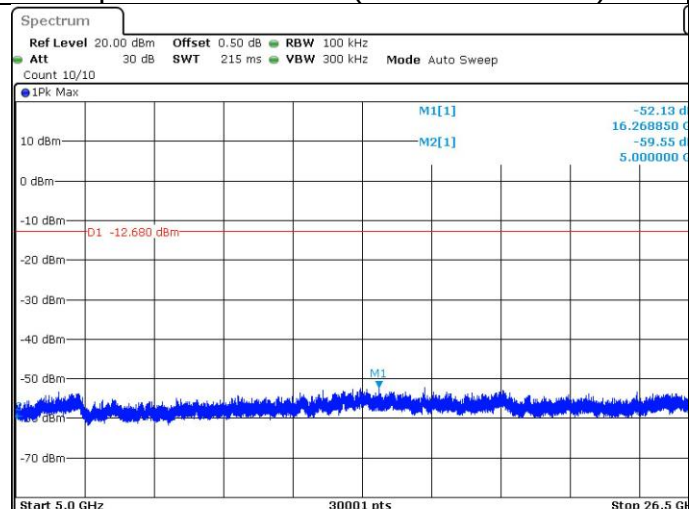
Date: 28 DEC 2021 10:16:22

Spurious Emission (1GHz – 5GHz)



Date: 28 DEC 2021 10:16:34

Spurious Emission (5GHz – 26.5GHz)



Date: 28 DEC 2021 10:17:05

9.6 Band edge

Test Method

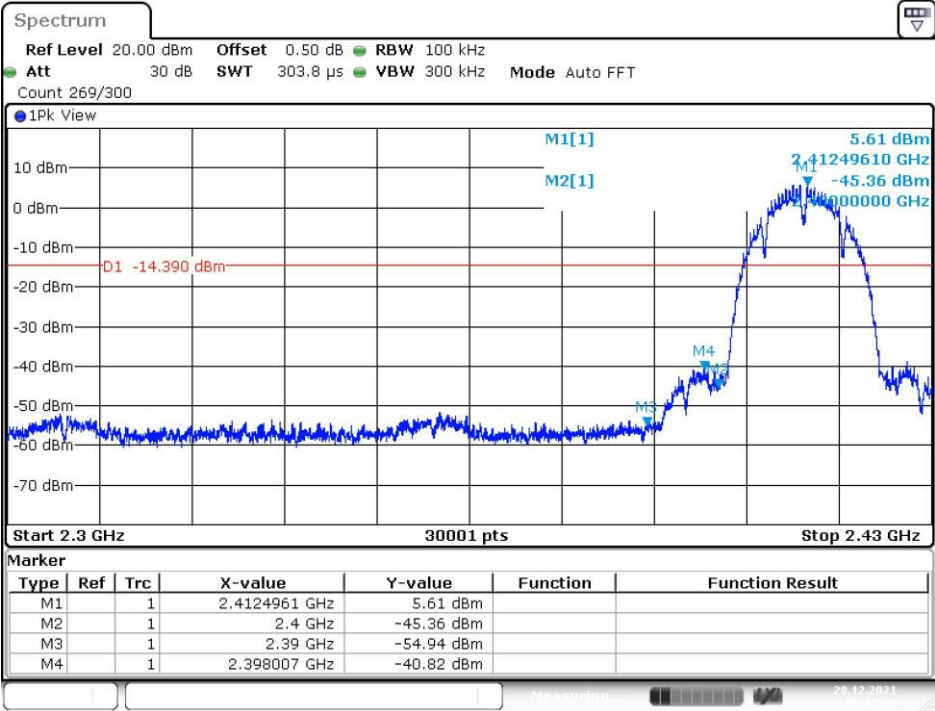
- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW $\geq$ RBW, Sweep = auto, Detector function = peak, Trace = max hold.
- 2 Allow the trace to stabilize, use the peak and delta measurement to record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

Limit

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-Gen8.10, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

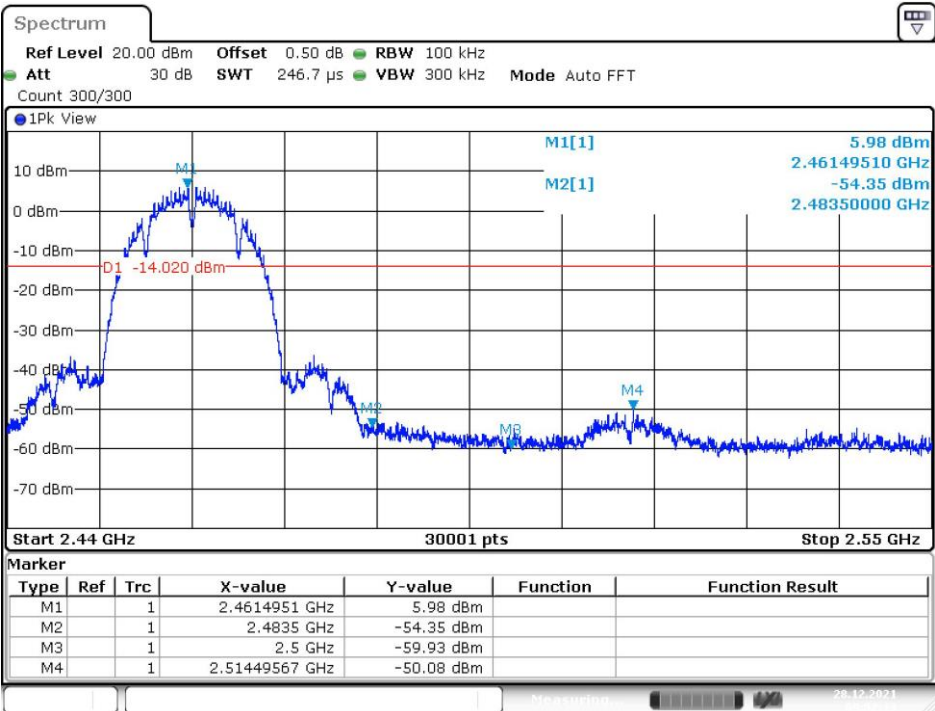
Test result

802.11b
2412



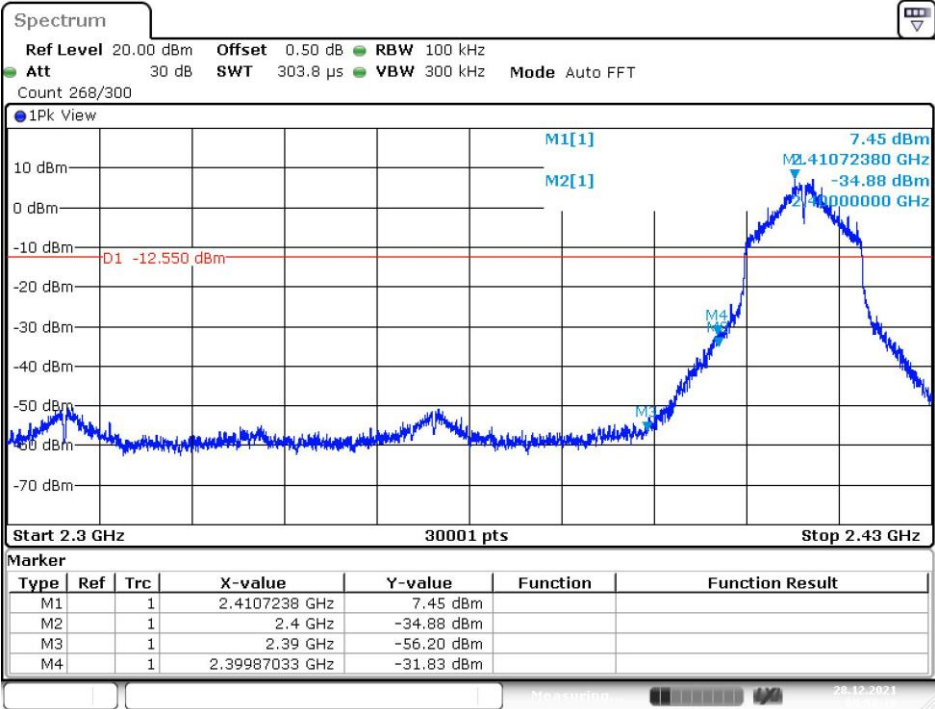
Date: 28.DEC.2021 09:47:33

2462



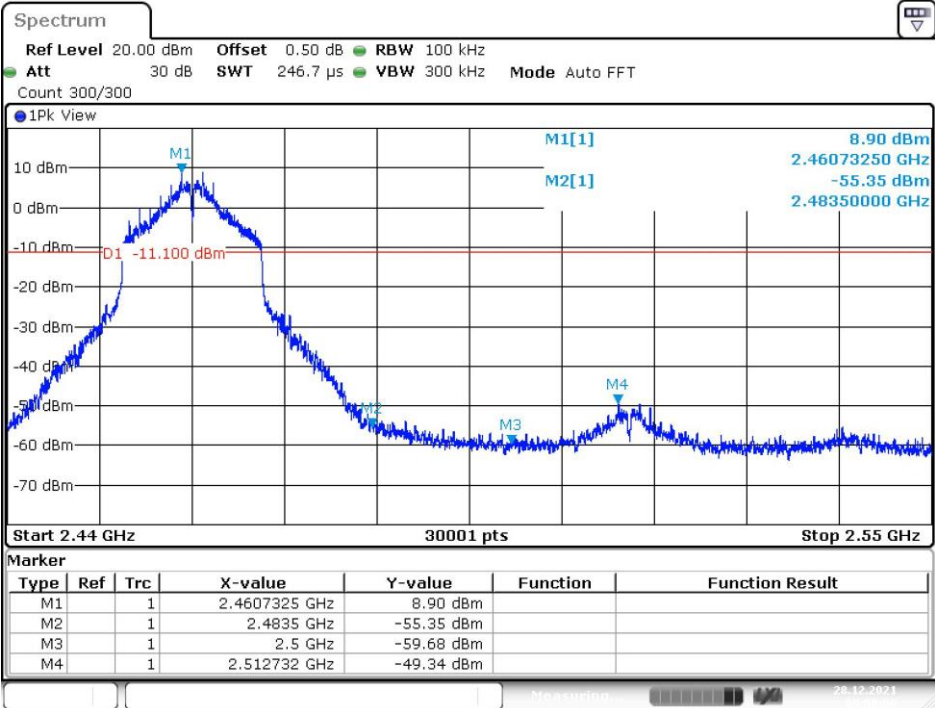
Date: 28.DEC.2021 09:52:13

802.11g
2412



Date: 28.DEC.2021 09:54:18

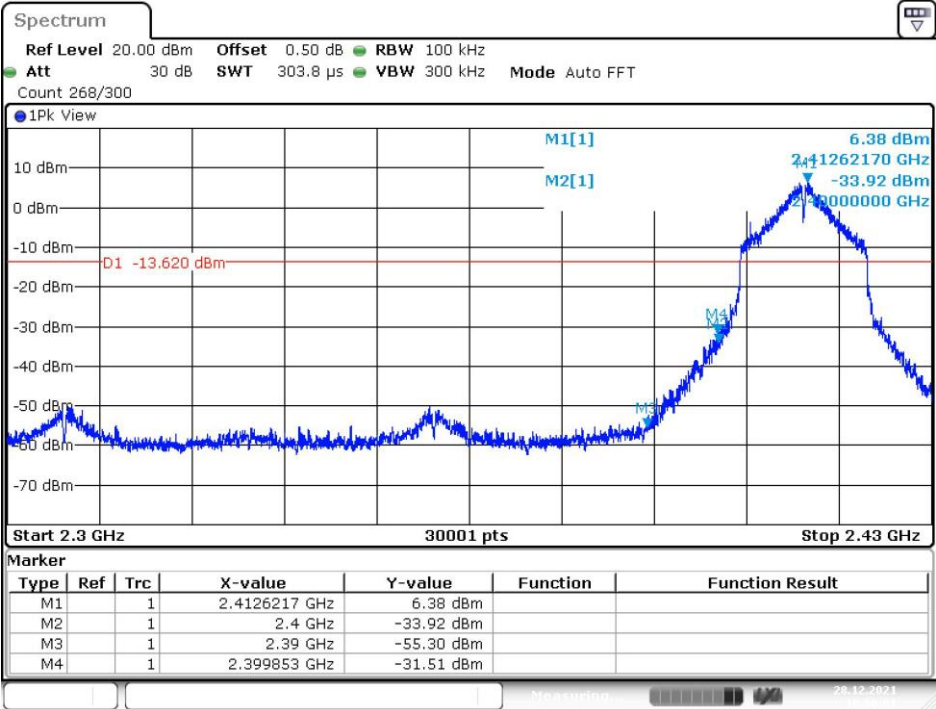
2462



Date: 28.DEC.2021 09:58:00

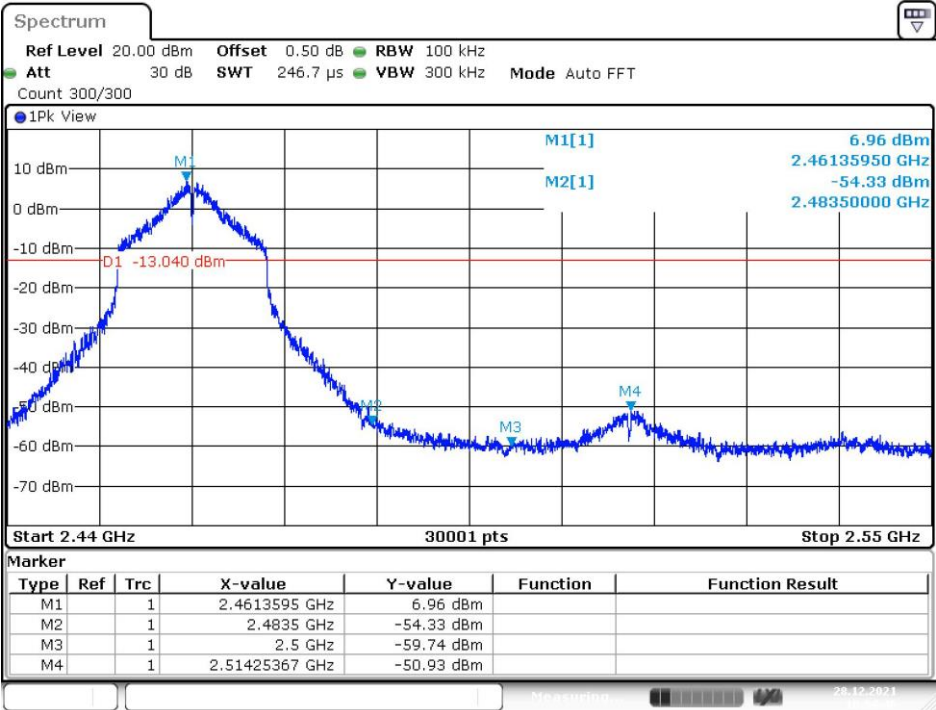
802.11n(HT20)

2412



Date: 28.DEC.2021 10:00:01

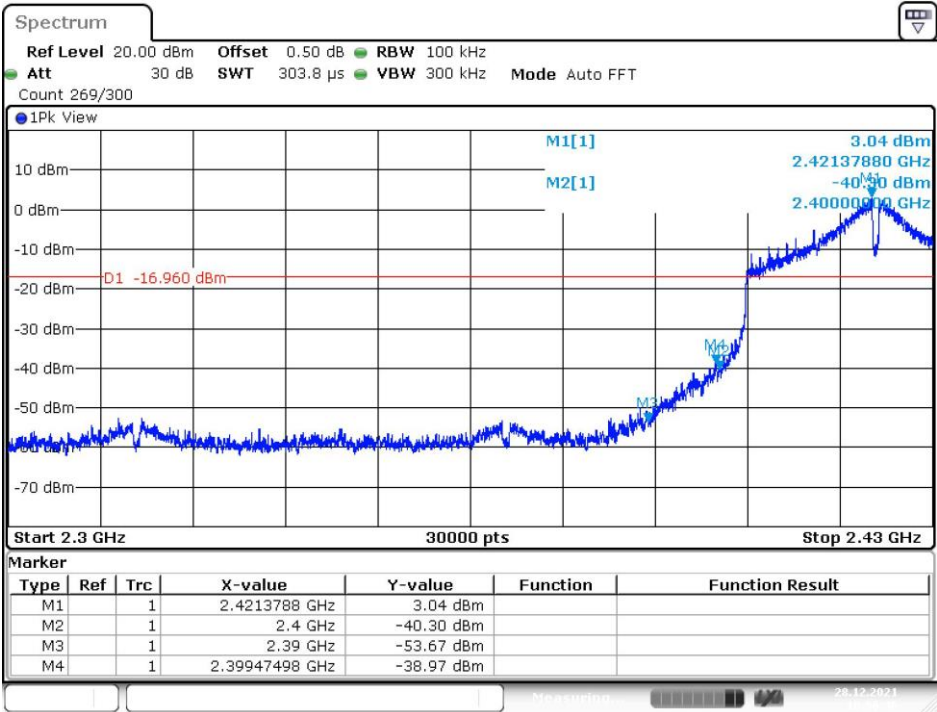
2462



Date: 28.DEC.2021 10:04:46

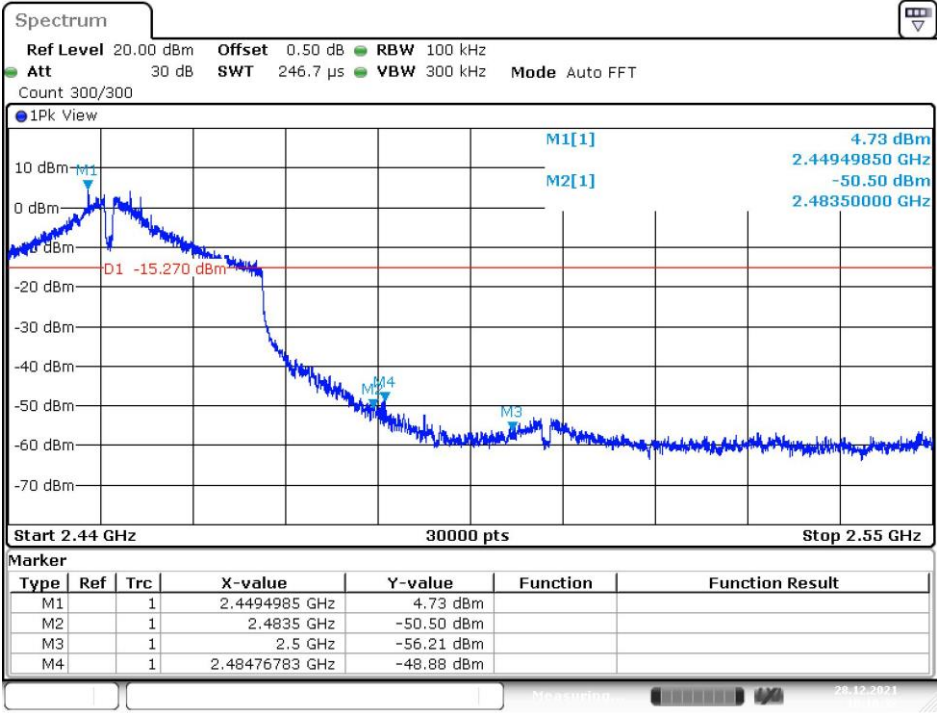


802.11n(HT40)
2422



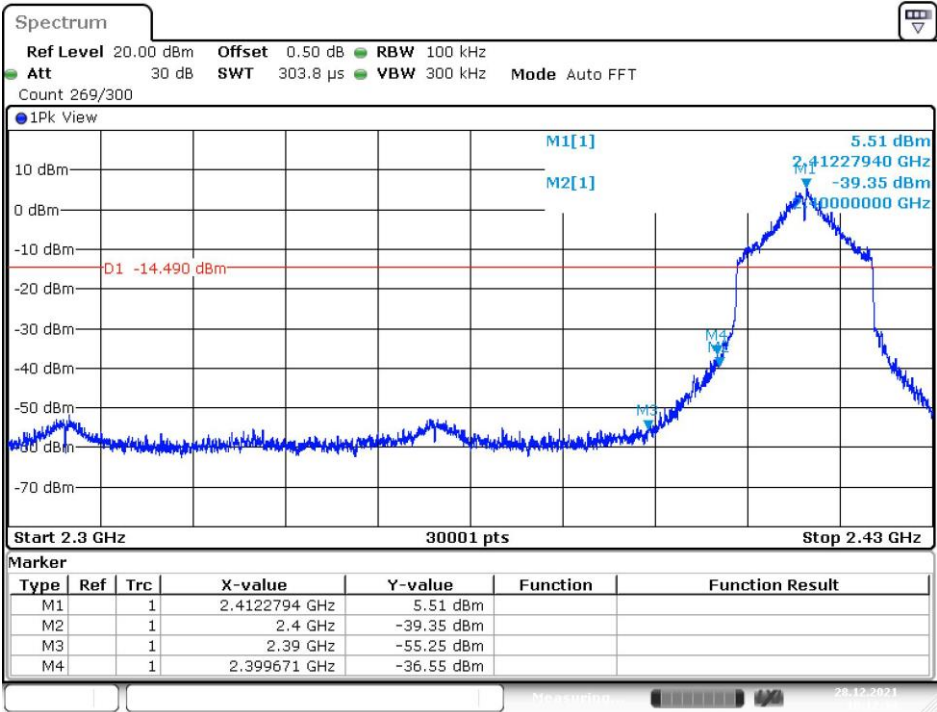
Date: 28.DEC.2021 10:06:47

2452

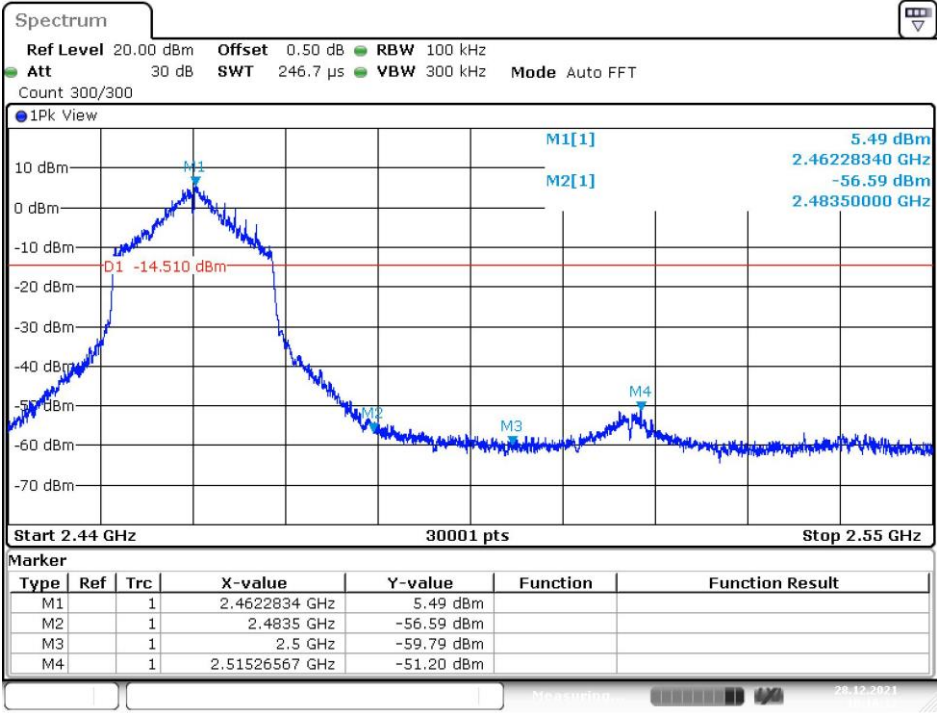


Date: 28.DEC.2021 10:10:31

802.11ax(HE20)
2412



2462



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) $VBW \geq [3 \times RBW]$.
- c) Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \leq RBW / 2$.
 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.

Transmitting spurious emission test result as below:

Pre-scan with three orthogonal axis and worst case as X axis listed below table

Test mode: 802.11b					
Channel 1 (2412MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2091.9	49.89	74.00	24.11	Peak	Horizontal
2386.5	51.24	74.00	22.76	Peak	Horizontal
2389.6	50.48	74.00	23.52	Peak	Horizontal
4823.8	45.39	74.00	28.61	Peak	Horizontal
2384.4	45.30	74.00	28.70	Peak	Vertical
4824.4	43.12	74.00	30.88	Peak	Vertical

Test mode: 802.11b					
Channel 6 (2437MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2111.8	50.48	74.00	23.52	Peak	Horizontal
4873.7	45.74	74.00	28.26	Peak	Horizontal
4874.4	43.02	74.00	30.98	Peak	Vertical

Test mode: 802.11b					
Channel 11 (2462MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2136.1	50.14	74.00	23.86	Peak	Horizontal
2294.8	48.51	54.00	5.49	AV	Horizontal
2483.7	48.63	74.00	25.37	Peak	Horizontal
4924.1	44.16	74.00	29.84	Peak	Horizontal
2135.6	46.35	74.00	27.65	Peak	Vertical
2483.6	45.83	74.00	28.17	Peak	Vertical
4924.1	43.19	74.00	30.81	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 1 (2412MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2089.7	49.03	74.00	24.97	Peak	Horizontal
2386.9	50.67	74.00	23.33	Peak	Horizontal
4821.6	45.11	74.00	28.89	Peak	Horizontal
2091.4	43.51	74.00	30.49	Peak	Vertical
2387.8	54.84	74.00	19.16	Peak	Vertical
4823.8	42.37	74.00	31.63	Peak	Vertical

Test mode: 802.11g					
Channel 6 (2437MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2110.6	50.38	74.00	23.62	Peak	Horizontal
4873.1	46.13	74.00	27.87	Peak	Horizontal
4874.4	43.18	74.00	30.82	Peak	Vertical

Test mode: 802.11g					
Channel 11 (2462MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2134.4	53.47	74.00	20.53	Peak	Horizontal
2483.5	49.24	74.00	24.76	Peak	Horizontal
4925.5	44.32	74.00	29.68	Peak	Horizontal
2133.9	46.57	74.00	27.43	Peak	Vertical
2483.6	48.81	74.00	25.19	Peak	Vertical
4924.5	43.31	74.00	30.69	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(HT20)					
Channel 1 (2412MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2089.7	49.27	74.00	24.73	Peak	Horizontal
2386.6	51.00	74.00	23.00	Peak	Horizontal
4823.8	47.14	74.00	26.86	Peak	Horizontal
2089.7	45.88	74.00	28.12	Peak	Vertical
2387.8	47.74	74.00	26.26	Peak	Vertical
4824.4	43.10	74.00	30.90	Peak	Vertical

Test mode: 802.11n(HT20)					
Channel 6 (2437MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2273.8	53.54	74.00	20.46	Peak	Horizontal
2273.8	44.68	54.00	9.32	AV	Horizontal
4874.3	46.22	74.00	27.78	Peak	Horizontal
2275.0	47.14	74.00	26.86	Peak	Vertical
4871.2	42.30	74.00	31.70	Peak	Vertical

Test mode: 802.11n(HT20)					
Channel 11 (2462MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2134.4	49.88	74.00	24.12	Peak	Horizontal
2483.6	51.34	74.00	22.66	Peak	Horizontal
4924.1	45.81	74.00	28.19	Peak	Horizontal
2134.4	46.46	74.00	27.54	Peak	Vertical
2483.7	48.07	74.00	25.93	Peak	Vertical
4924.8	43.15	74.00	30.85	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 1 (2422MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2101.0	45.28	74.00	28.72	Peak	Horizontal
2387.2	55.64	74.00	18.36	Peak	Horizontal
2387.2	46.28	54.00	7.72	AV	Horizontal
4844.4	43.21	74.00	30.79	Peak	Horizontal
2101.3	42.18	74.00	31.82	Peak	Vertical
2386.5	46.53	74.00	27.47	Peak	Vertical
4844.4	43.01	74.00	30.99	Peak	Vertical

Test mode: 802.11n(HT40)					
Channel 6 (2437MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2113.5	47.62	74.00	26.38	Peak	Horizontal
4873.2	43.18	74.00	30.82	Peak	Horizontal
2113.5	41.98	74.00	32.02	Peak	Vertical
4873.2	43.12	74.00	30.88	Peak	Vertical

Test mode: 802.11n(HT40)					
Channel 9 (2452MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2125.9	46.67	74.00	27.33	Peak	Horizontal
2483.7	52.47	74.00	21.53	Peak	Horizontal
2483.7	48.50	54.00	5.50	AV	Horizontal
4904.1	43.27	74.00	30.73	Peak	Horizontal
2483.6	49.63	74.00	24.37	Peak	Vertical
4904.8	43.09	74.00	30.91	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: 802.11ax(HE20)					
Channel 1 (2412MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2089.6	50.50	74.00	23.50	Peak	Horizontal
2387.2	50.60	74.00	23.40	Peak	Horizontal
4824.4	45.52	74.00	28.48	Peak	Horizontal
2387.4	44.23	74.00	29.77	Peak	Vertical
4824.4	43.09	74.00	30.91	Peak	Vertical

Test mode: 802.11ax(HE20)					
Channel 6 (2437MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2111.2	52.42	74.00	21.58	Peak	Horizontal
4874.3	45.04	74.00	28.96	Peak	Horizontal
2111.2	46.78	74.00	27.22	Peak	Vertical
4874.4	43.66	74.00	30.34	Peak	Vertical

Test mode: 802.11ax(HE20)					
Channel 9 (2462MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2135.0	50.86	74.00	23.14	Peak	Horizontal
2483.6	49.17	74.00	24.83	Peak	Horizontal
4924.1	43.87	74.00	30.13	Peak	Horizontal
2133.3	46.53	74.00	27.47	Peak	Vertical
2483.6	47.64	74.00	26.36	Peak	Vertical
4924.1	42.37	74.00	31.63	Peak	Vertical

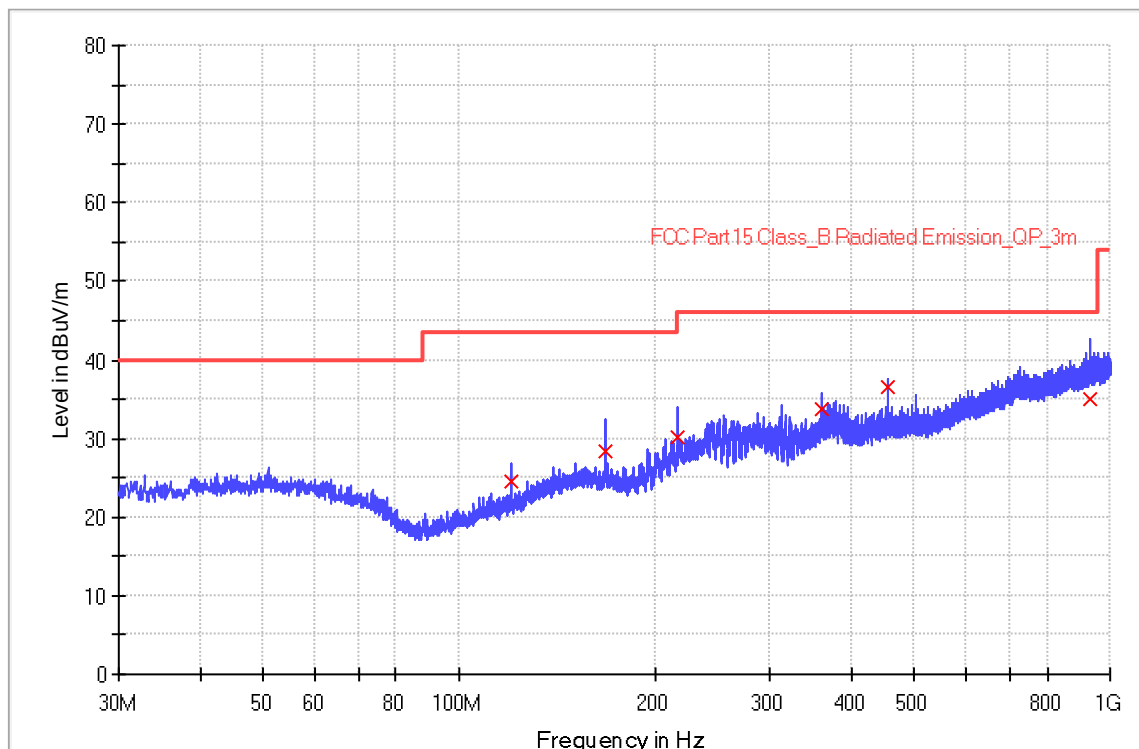
Remark:

- (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: 2021/12/31 - 11:58
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Wang Yiquan
Probe: VULB9168	Polarity: Horizontal
EUT: Wi-Fi and Bluetooth module, Model no: AXY3L	Power: DC 3.3V by debug board for EUT, AC 120V,60Hz for notebook
Note: Transmit by 802.11n20 at channel 2437MHz.	
Note: Pre-scan with three orthogonal axis and worst case as X axis.	

RE_VULB9168_pre_Corrt_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)
120.000000	24.5	1000.0	120.000	100.4	H	185.0	18.1	19.0	43.5
168.000000	28.4	1000.0	120.000	100.4	H	145.0	20.4	15.1	43.5
216.000000	30.2	1000.0	120.000	100.4	H	106.0	17.5	15.8	46.0
360.000000	33.7	1000.0	120.000	100.4	H	359.0	23.0	12.3	46.0
455.960000	36.6	1000.0	120.000	100.4	H	66.0	25.9	9.4	46.0
931.040000	34.9	1000.0	120.000	100.4	H	27.0	33.7	11.1	46.0

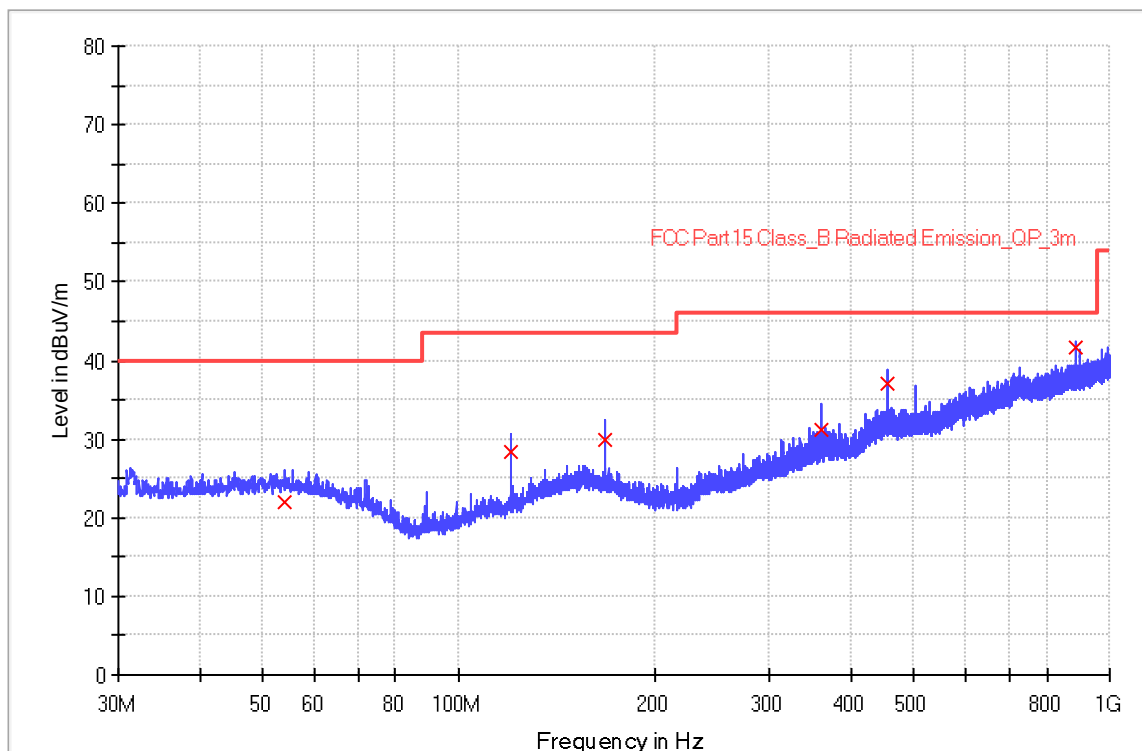
Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

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: 2021/12/31 - 11:12
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Wang Yiquan
Probe: VULB9168	Polarity: Vertical
EUT: Wi-Fi and Bluetooth module, Model no: AXY3L	Power: DC 3.3V by debug board for EUT, AC 120V,60Hz for notebook
Note: Transmit by 802.11n20 at channel 2437MHz.	
Note: Pre-scan with three orthogonal axis and worst case as X axis.	

PE_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)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
54.000000	21.9	1000.0	120.000	100.4	V	0.0	20.4	18.1	40.0
119.960000	28.4	1000.0	120.000	100.4	V	49.0	18.1	15.1	43.5
168.000000	30.0	1000.0	120.000	100.4	V	99.0	20.4	13.5	43.5
360.000000	31.1	1000.0	120.000	100.4	V	251.0	23.0	14.9	46.0
455.960000	37.0	1000.0	120.000	100.4	V	167.0	25.9	9.0	46.0
889.560000	41.7	1000.0	120.000	100.4	V	0.0	33.0	4.3	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	2021-8-2	2022-8-1
	Wideband power sensor	Rohde & Schwarz	NRP-Z81	104782	2020-12-23	2021-12-22
RE	EMI Test Receiver	Rohde & Schwarz	ESR3	101906	2021-8-2	2022-8-1
	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2021-8-2	2022-8-1
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9168	961	2019-3-16	2022-3-15
	Double-ridged waveguide horn antenna	Rohde & Schwarz	HF907	102868	2021-3-15	2024-3-14
	Pre-amplifier	Rohde & Schwarz	SCU-18D	19006451	2021-8-2	2022-8-1
	Loop antenna	Rohde & Schwarz	HFH2-Z2E	100933	2021-3-25	2022-3-24
	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	2021-8-2	2022-8-1
	LISN	Rohde & Schwarz	ENV216	101924	2021-8-2	2022-8-1

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	V9.15.00
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: 2007, 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