FCC- TEST REPORT

Report Number	:	**64.790.20.02028.01**	Date of Issue:	**July 3, 2020**
Model	:	**M2240.-W**		
Product Type	:	Video indoor station 4.3		
Applicant	:	ABB Xiamen Smart Technology Co., Ltd.		
Address	:	No.7 Fangshan South Road, Torch High Technology, Development Zone (Xiang An), Industrial Zone, Xiamen, Fujian, China		
Production Facility	:	ABB Xiamen Smart Technology Co., Ltd.		
Address	:	No.7 Fangshan South Road, Torch High Technology, Development Zone (Xiang An), Industrial Zone, Xiamen, Fujian, China		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	57		

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

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

Description of the Equipment Under Test

Product:	Video indoor station 4.3
Model no.:	M2240.-W
FCC ID:	2AEBL-M2240
Options and accessories:	NIL
Ratings:	DC 24V
RF Transmission Frequency:	2412-2462MHz
No. of Operated Channel:	11
Modulation:	CCK, DQPSK, DBPSK for 802.11b QPSK, BPSK for 802.11g/n
Duty Cycle:	100%
Antenna Type:	Integral Antenna
Antenna Gain:	2.4dBi
Description of the EUT:	EUT is a video indoor station of door entry system.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2019 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 v05r02 DTS Measurement Guidance and ANSI C63.10 (2013).

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5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Result	Test Site
§15.207	Conducted emission AC power port	10	Pass	Site 1
§15.247(b)(1)	Conducted peak output power	13	Pass	Site 1
§15.247(a)(2)	6dB bandwidth and 99% Occupied Bandwidth	18	Pass	Site 1
§15.247(e)	Power spectral density*	26	Pass	Site 1
§15.247(a)(1)	Carrier frequency separation	--	N/A	--
§15.247(a)(1)(iii)	Number of hopping frequencies	--	N/A	--
§15.247(a)(1)(iii)	Dwell Time	--	N/A	--
§15.247(d)	Spurious RF conducted emissions	30	Pass	Site 1
§15.247(d)	Band edge	41	Pass	Site 1
§15.247(d) & §15.209 &	Spurious radiated emissions for transmitter	44	Pass	Site 1
§15.203	Antenna requirement	See note 1	Pass	--

Remark 1: N/A – Not Applicable.
Note 1: The EUT uses a permanently integral antenna, which gain is 2.4dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AEBL-M2240, complies with Section 15.207, 15.209, 15.205, 15.247 of the FCC Part 15, Subpart C rules.

The EUT has multiple work modes, the worst test results are listed in the report.

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: 2020-05-25

Testing Start Date: 2020-05-26

Testing End Date: 2020-06-07

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

Reviewed by:	Prepared by:	Tested by:
Tony Liu	Kevin Ouyang	Tree Zhan
Reviewer	EMC Project Engineer	EMC Test Engineer

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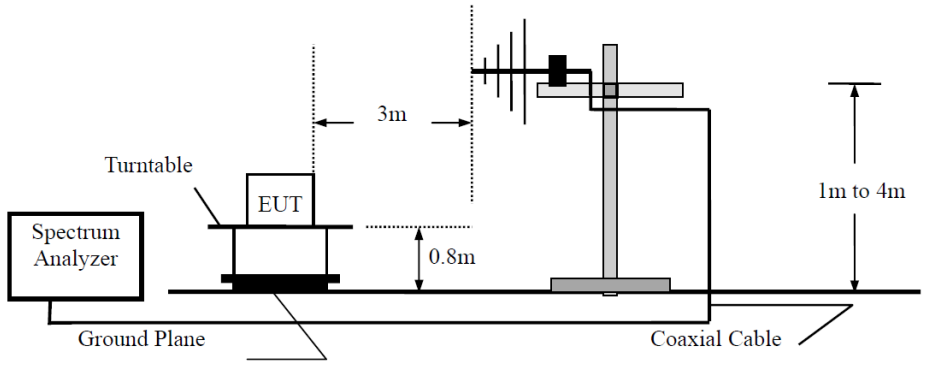
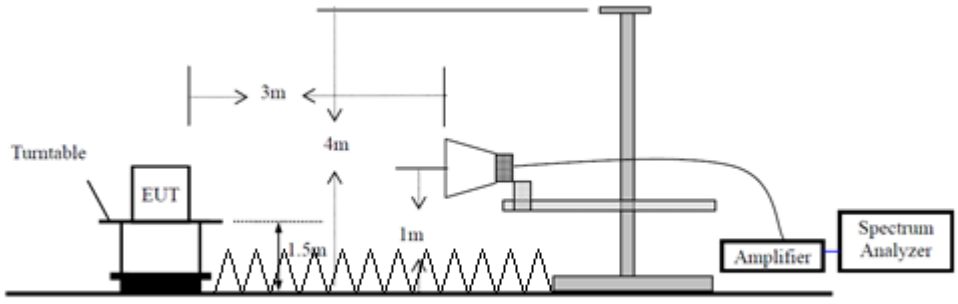
7 Test Setups

7.1 Radiated test setups

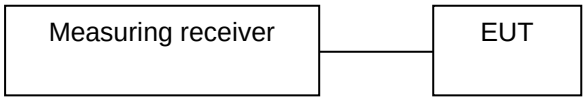
Below 1GHz



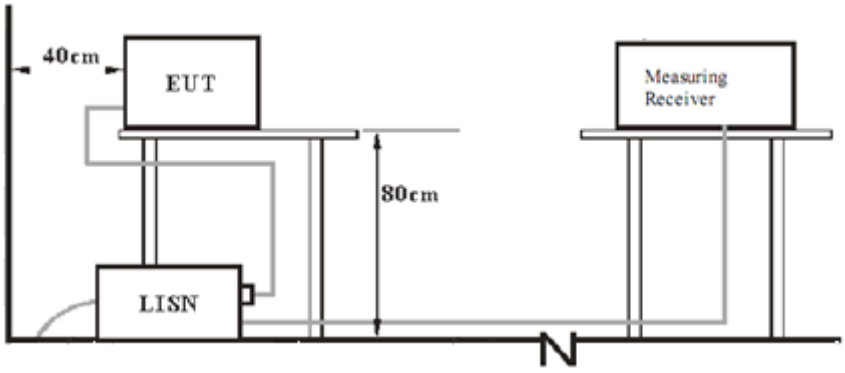
Above 1GHz



7.2 Conducted RF test setups



7.3 AC Power Line Conducted Emission test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
System controller	ABB	M2300	---
Outdoor station	ABB	M25138.M+51381.RP	---
Mobile phone	SAMSUNG	Note 3	---

Test software: SecureCRT
APP: Welcome
The system was configured to channel 1, 6 and 11 for the test.

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9 Technical Requirement

9.1 Conducted Emission

Test Method

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

Limit

According to §15.207, conducted emissions limit as below:

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

Remark: “*” Decreasing linearly with logarithm of the frequency

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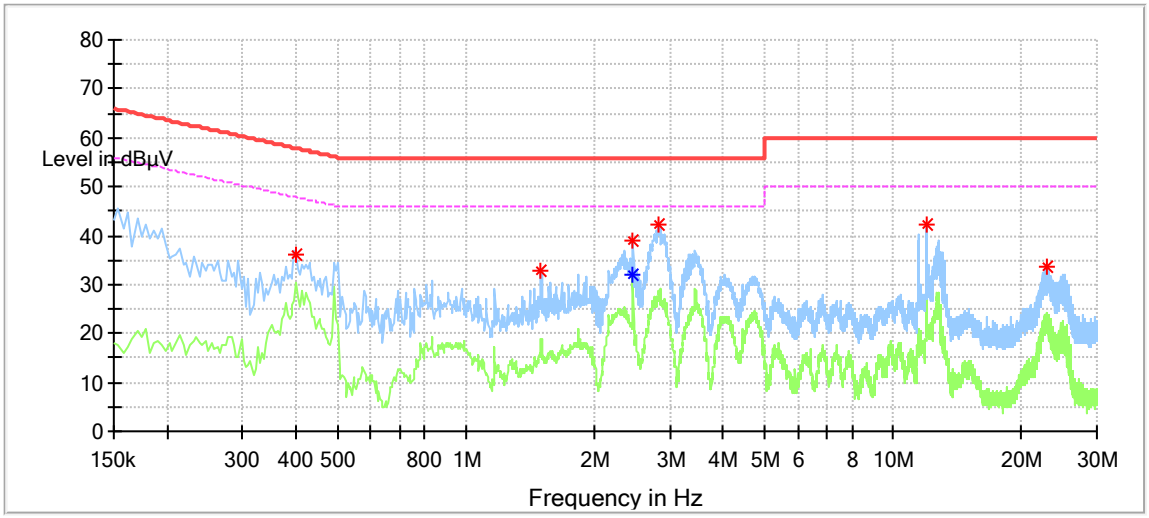
Conducted Emission Test 150kHz – 30MHz

M/N: M2240-.W
Op Cond.: WIFI communication mode.
Test Spec.: Power Line, Live

Temperature (°C): 22.5 Relative Humidity (%): 46.7 Atmospheric Pressure(mbar) : 1012



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.402000	36.05	---	57.81	21.76	L1	9.5
1.498000	32.69	---	56.00	23.31	L1	9.6
2.462000	---	31.96	46.00	14.04	L1	9.6
2.466000	38.83	---	56.00	17.17	L1	9.6
2.834000	42.37	---	56.00	13.63	L1	9.6
12.018000	42.32	---	60.00	17.68	L1	9.7
22.850000	33.45	---	60.00	26.55	L1	9.8

Remark： Correct factor=cable loss + LISN factor

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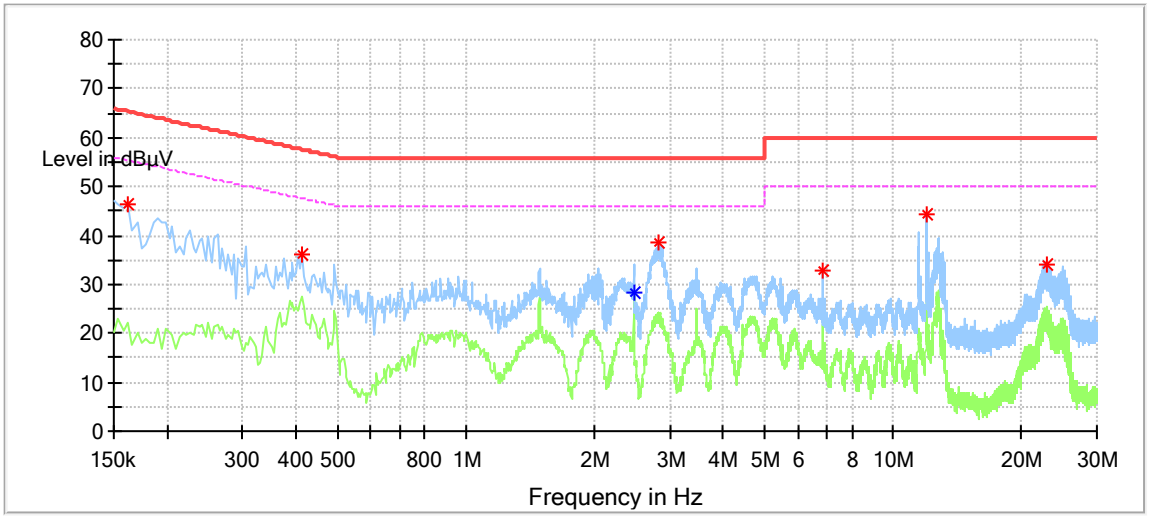
Conducted Emission Test 150kHz – 30MHz

M/N: M2240-.W
Op Cond.: WIFI communication mode.
Test Spec.: Power Line, Neutral

Temperature (°C): 22.5 Relative Humidity (%): 46.7 Atmospheric Pressure(mbar) : 1012



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.162000	46.20	---	65.36	19.16	N	9.5
0.414000	36.30	---	57.57	21.27	N	9.6
2.474000	---	28.44	46.00	17.56	N	9.6
2.834000	38.61	---	56.00	17.39	N	9.6
6.842000	32.98	---	60.00	27.02	N	9.7
12.018000	44.26	---	60.00	15.74	N	9.7
22.994000	34.15	---	60.00	25.85	N	9.9

Remark： Correct factor=cable loss + LISN factor

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9.2 Conducted peak output power

Test Method

1. 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 10log (1/x), where x is the duty cycle to the measurement result.

Limits

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

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

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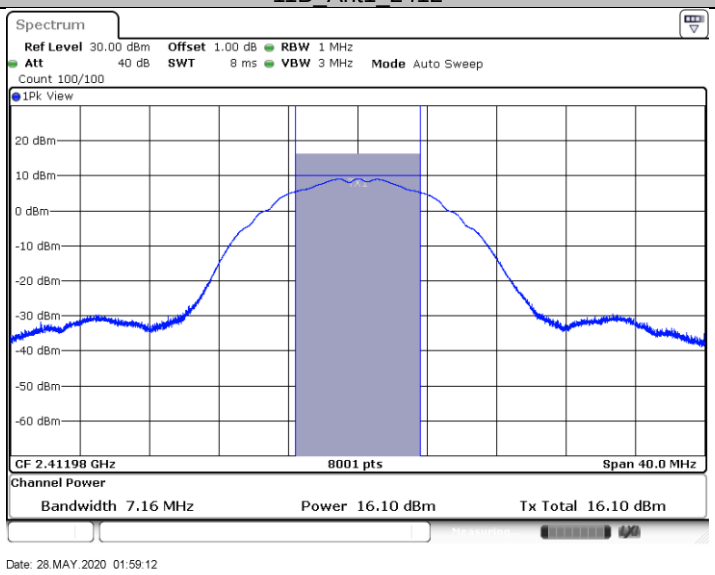
Test result as below table

TestMode	Frequency(MHz)	Result(dBm)	Limit(dBm)	Verdict
11B	2412	16.10	≤30	PASS
	2437	16.30	≤30	PASS
	2462	15.83	≤30	PASS
11G	2412	19.66	≤30	PASS
	2437	19.42	≤30	PASS
	2462	19.03	≤30	PASS
11N20SISO	2412	18.24	≤30	PASS
	2437	18.07	≤30	PASS
	2462	17.61	≤30	PASS

Test Graphs

11B_Ant1_2412



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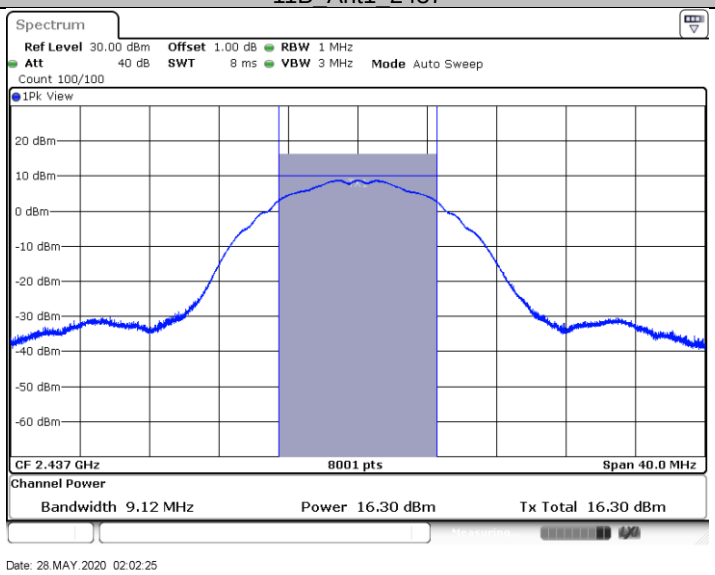

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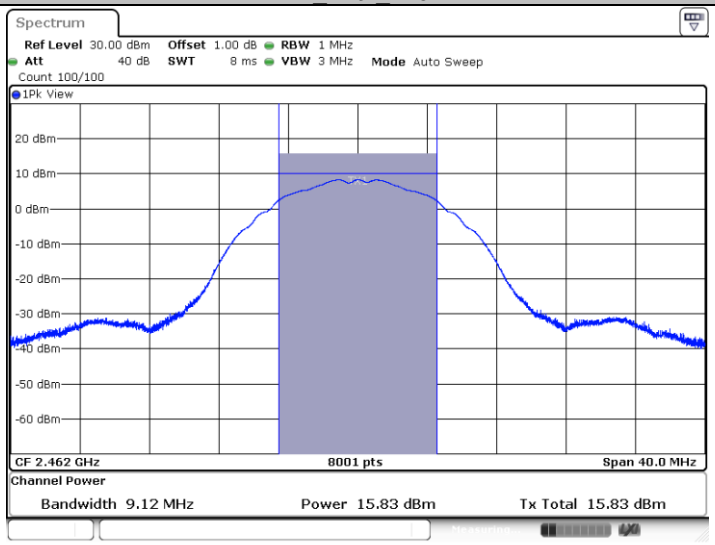

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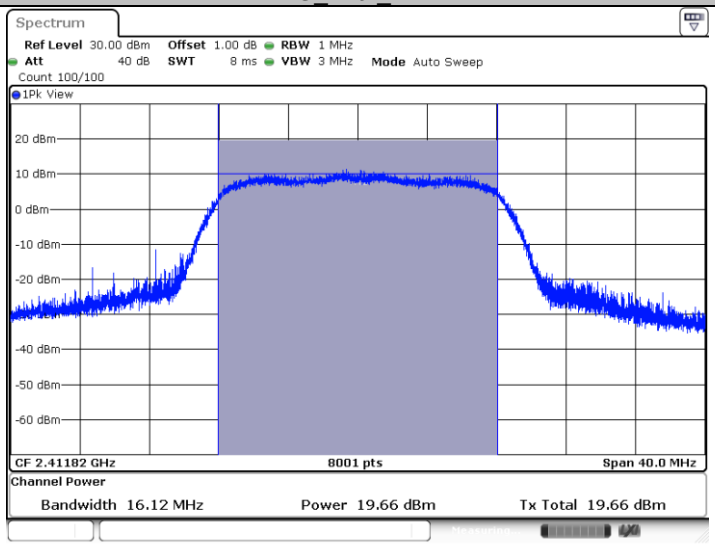

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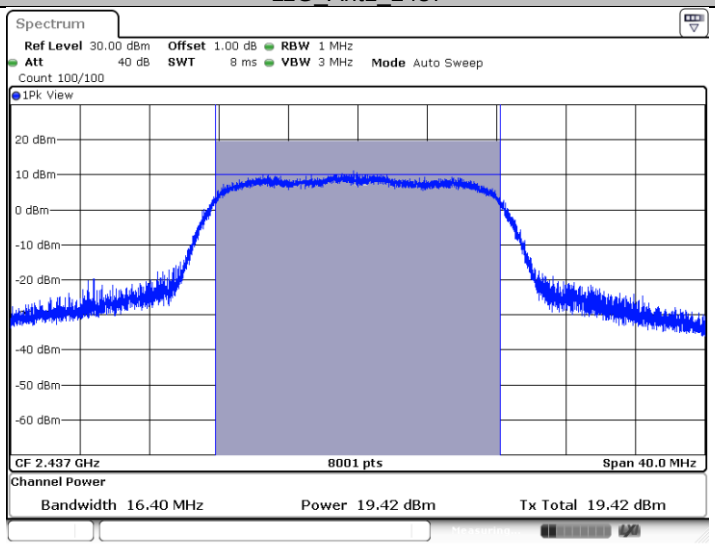

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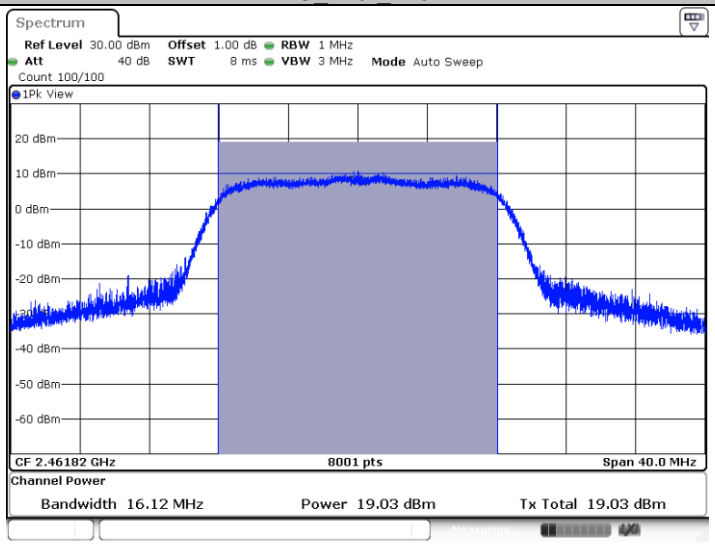
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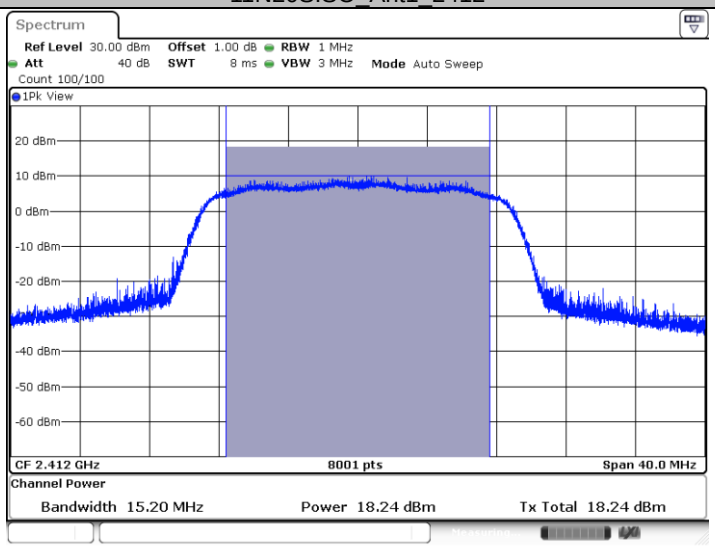
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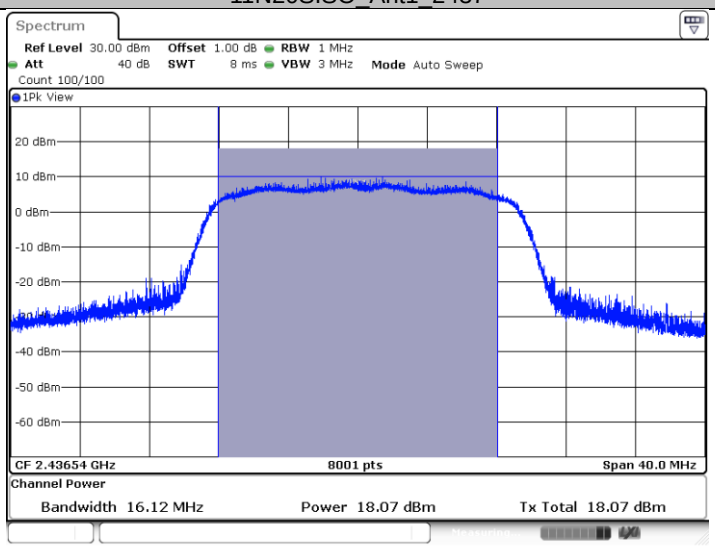

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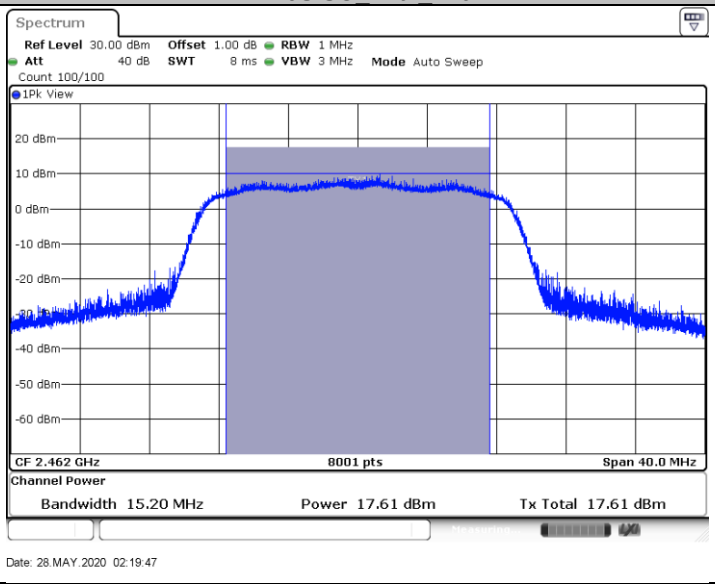

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9.3 6dB and 99% bandwidth

Test Method

1. Connect EUT test port to spectrum analyzer.
2. Use the following spectrum analyzer settings:
   Set RBW ≥ 1% of the 99% bandwidth, VBW ≥ RBW.
   Sweep = auto, Detector function = peak, Trace = max hold
3. 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.
4. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]
≥500

Test result

6dB bandwidth

TestMode	Frequency(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	2412	7.160	2408.400	2415.560	0.5	PASS
	2437	9.120	2432.440	2441.560	0.5	PASS
	2462	9.120	2457.440	2466.560	0.5	PASS
11G	2412	16.120	2403.760	2419.880	0.5	PASS
	2437	16.400	2428.800	2445.200	0.5	PASS
	2462	16.120	2453.760	2469.880	0.5	PASS
11N20SISO	2412	15.200	2404.400	2419.600	0.5	PASS
	2437	16.120	2428.480	2444.600	0.5	PASS
	2462	15.200	2454.400	2469.600	0.5	PASS

Test Graphs

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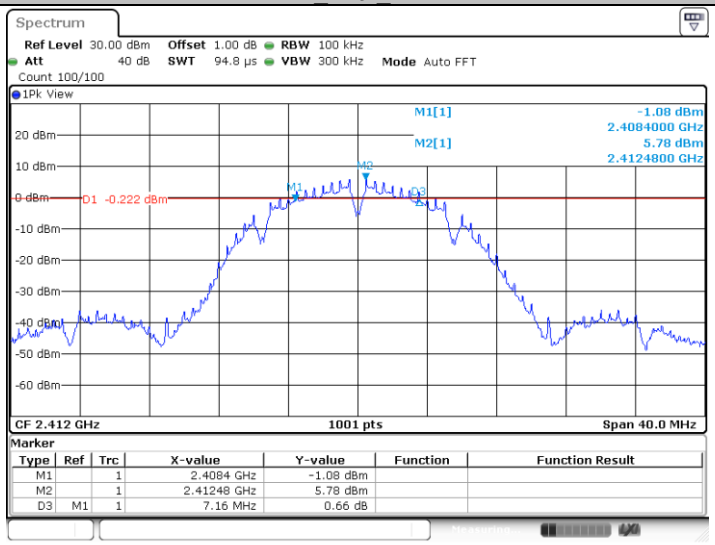

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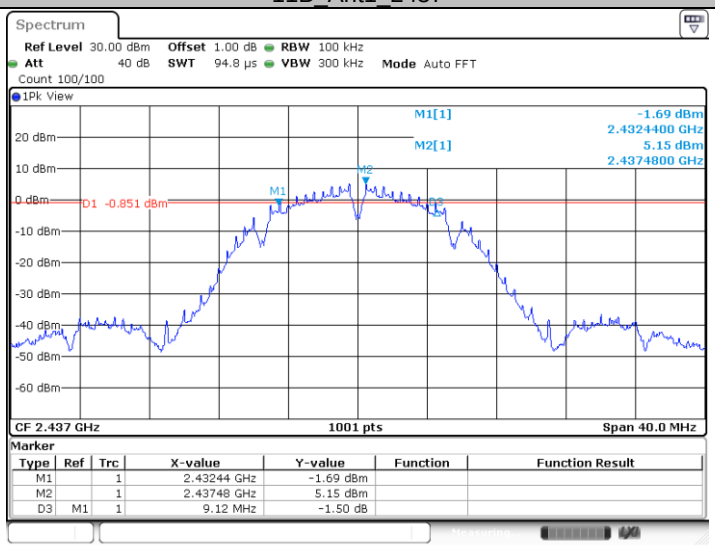

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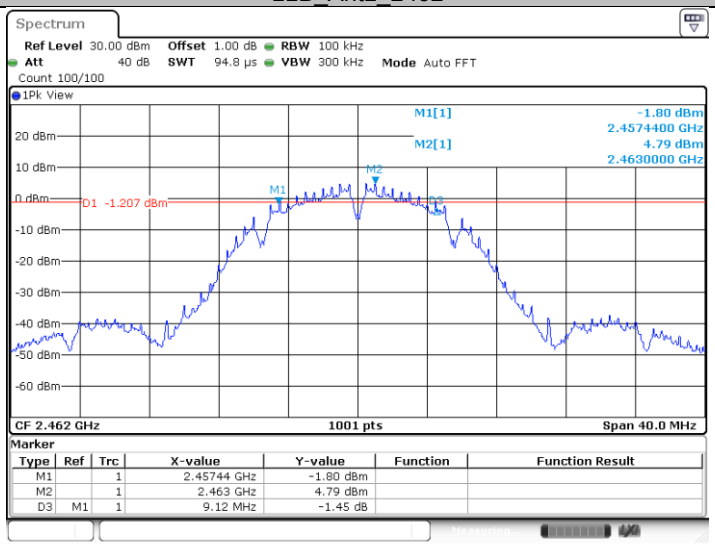

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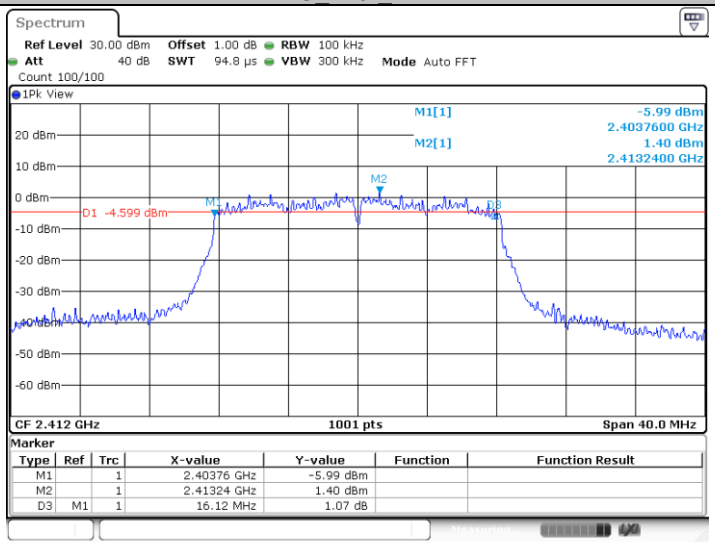

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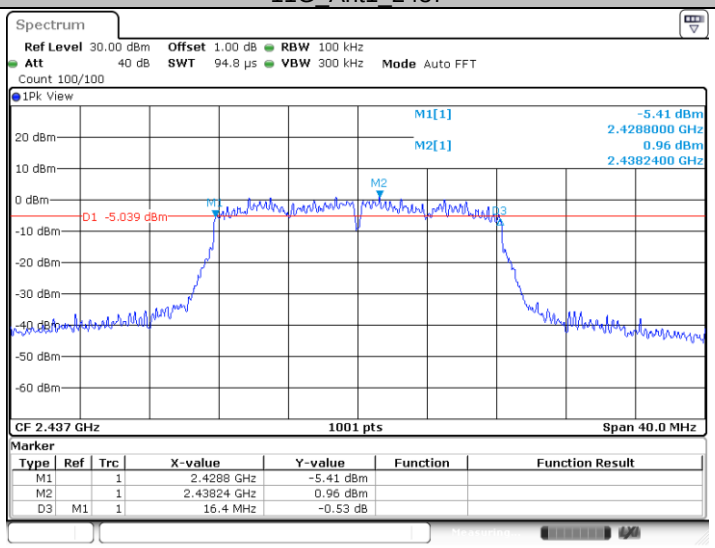

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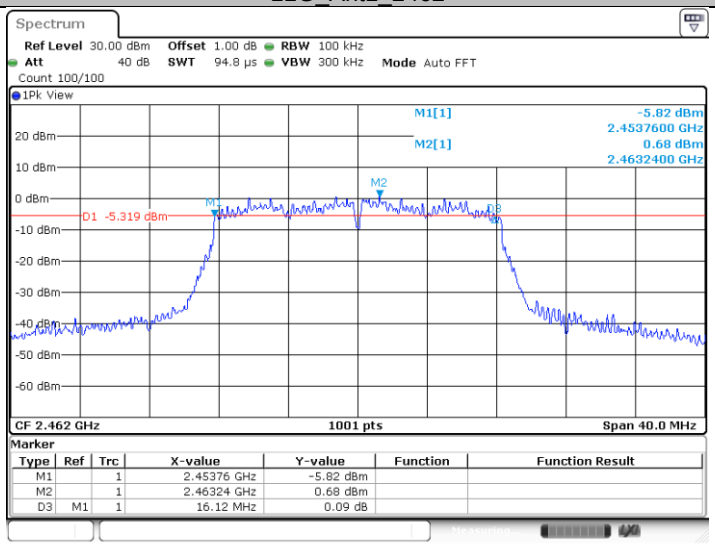

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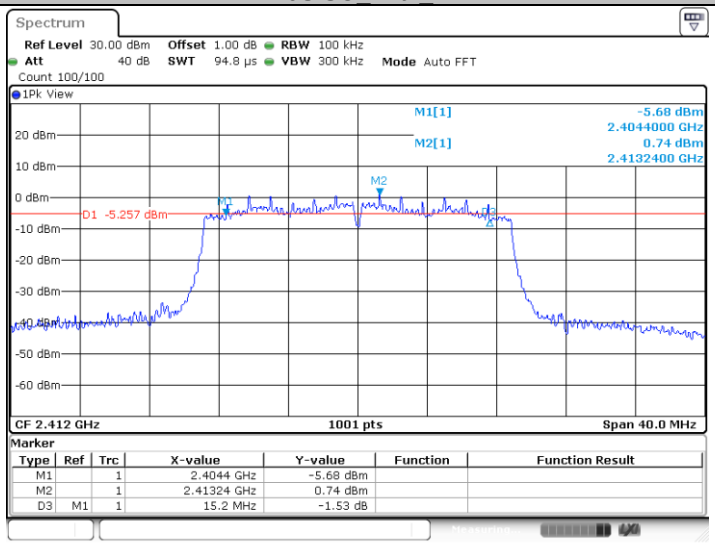
11N20SISO_Ant1_2412



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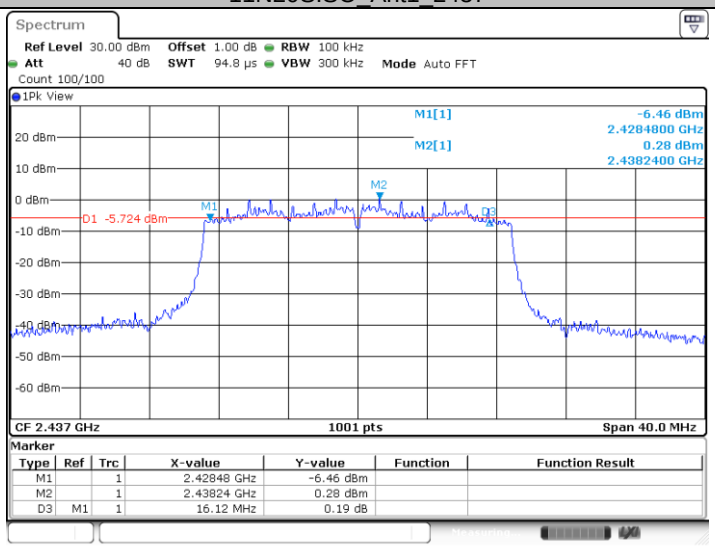

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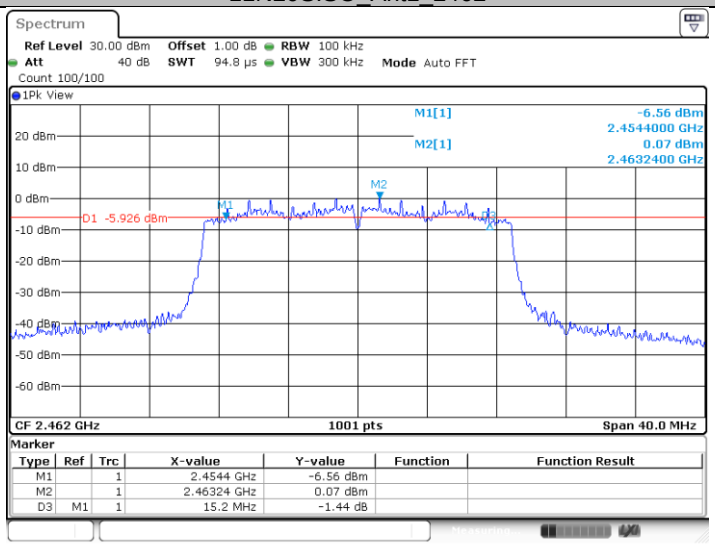
11N20SISO_Ant1_2462



Date: 28.MAY.2020 02:19:31

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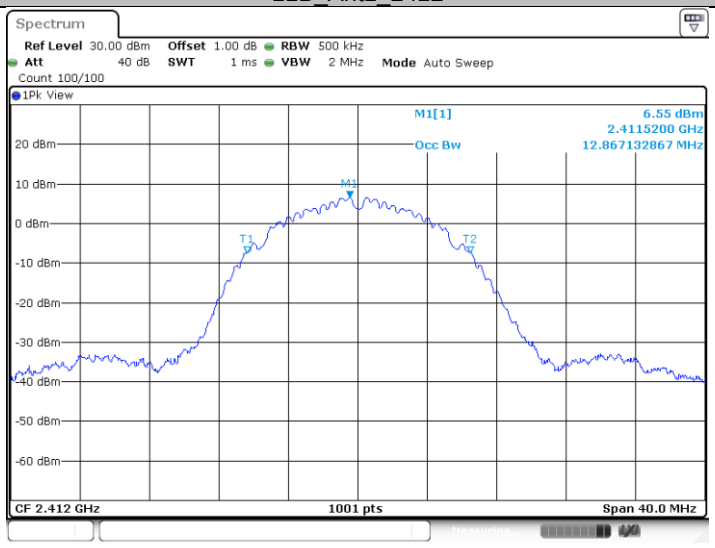
99% bandwidth
Test Result

TestMode	Frequency(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	2412	12.867	2405.606	2418.474	---	PASS
	2437	12.787	2430.606	2443.394	---	PASS
	2462	12.827	2455.606	2468.434	---	PASS
11G	2412	16.743	2403.608	2420.352	---	PASS
	2437	16.743	2428.608	2445.352	---	PASS
	2462	16.743	2453.648	2470.392	---	PASS
11N20SISO	2412	17.622	2403.169	2420.791	---	PASS
	2437	17.622	2428.169	2445.791	---	PASS
	2462	17.662	2453.169	2470.831	---	PASS

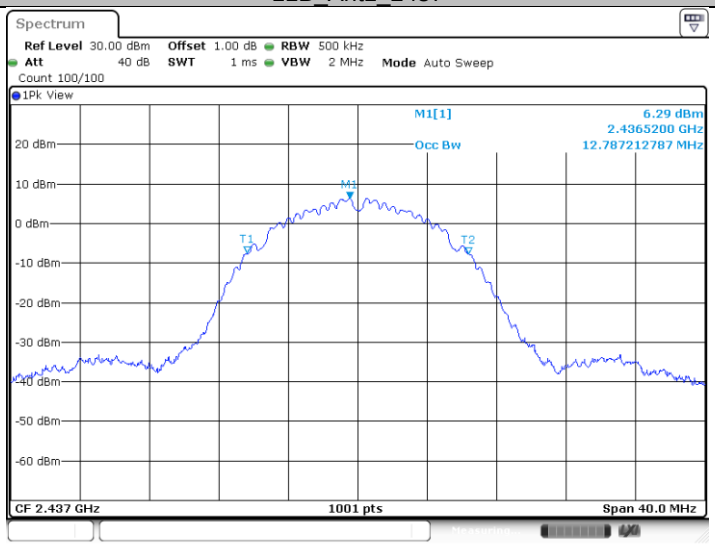
Test Graphs

11B_Ant1_2412



Date: 28.MAY.2020 01:59:07

11B_Ant1_2437



Date: 28.MAY.2020 02:02:19

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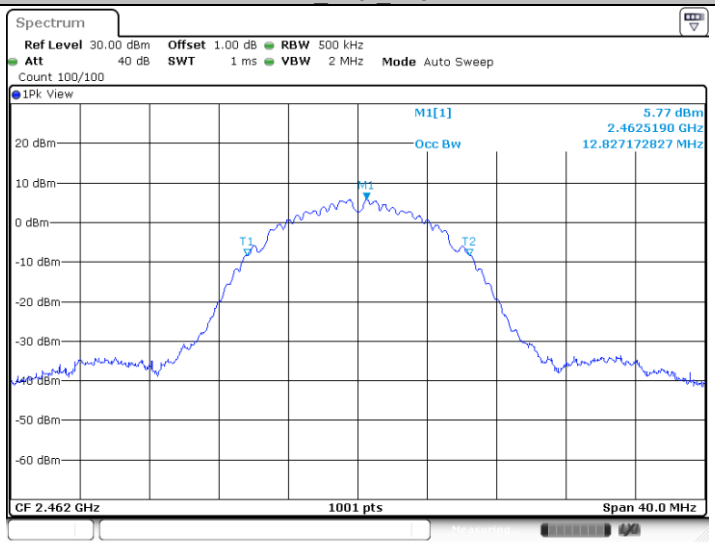
11B_Ant1_2462



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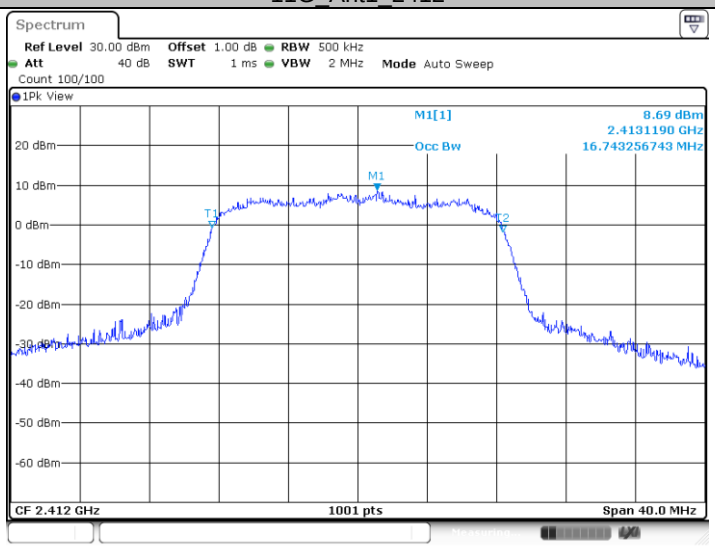
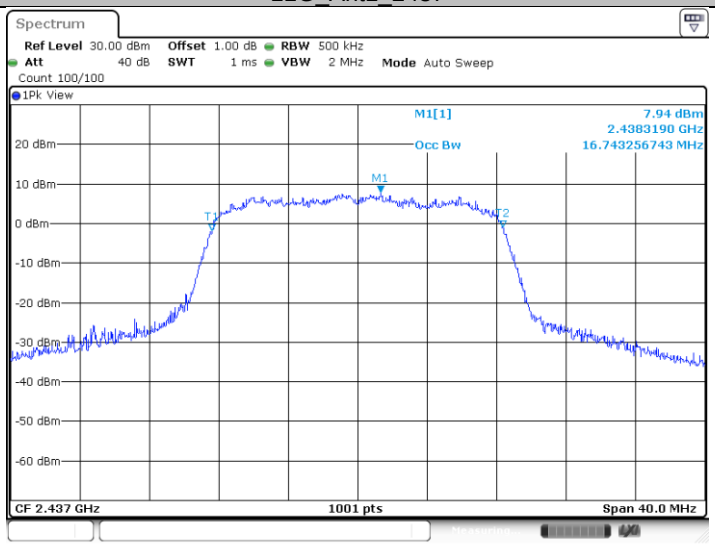
11G_Ant1_2412



Date: 28.MAY.2020 02:06:47

11G_Ant1_2437



Date: 28.MAY.2020 02:09:29

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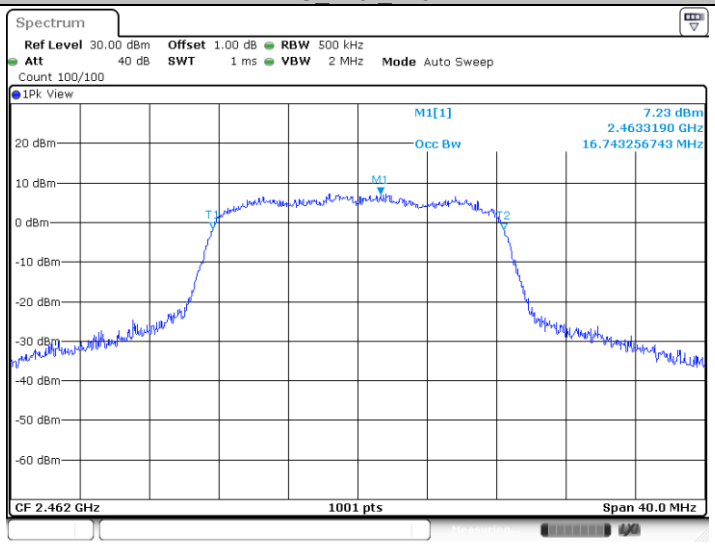
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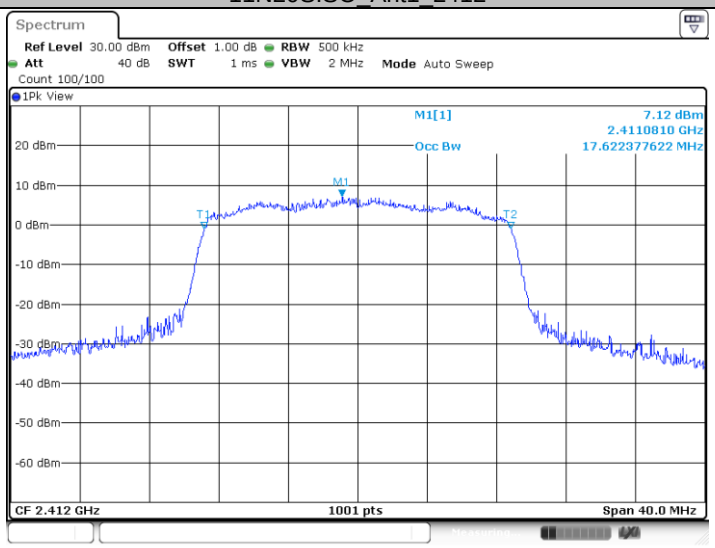
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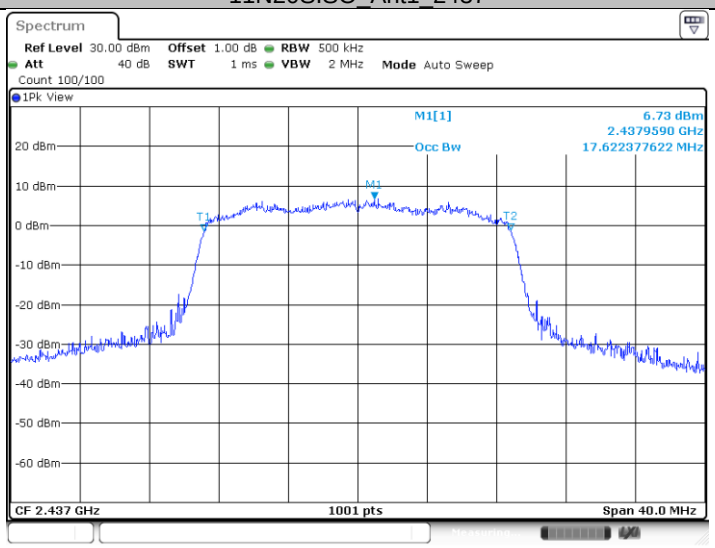

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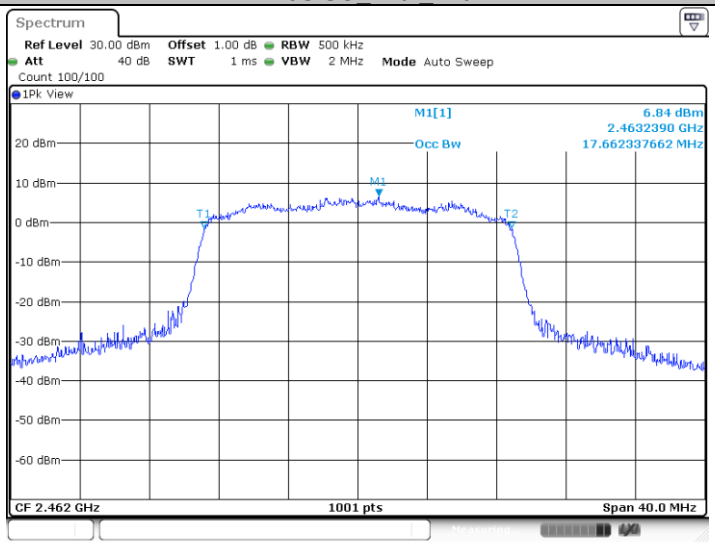
11N20SISO_Ant1_2462


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9.4 Power spectral density

Test Method

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

Limit

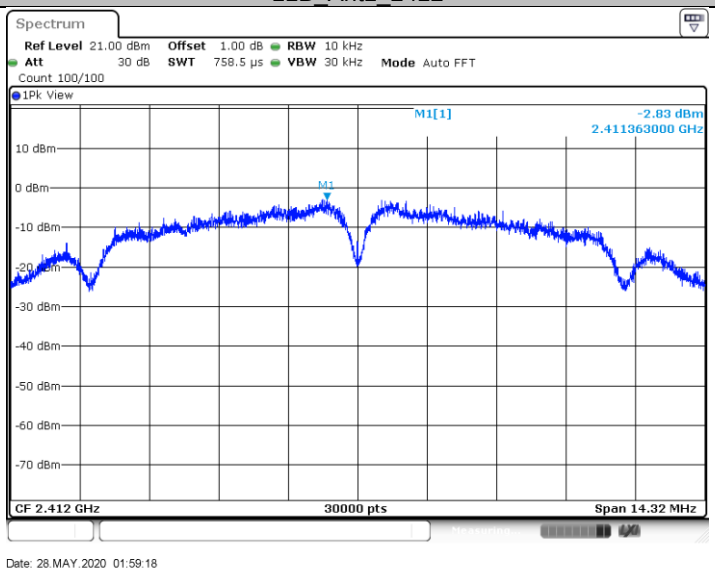
Limit [dBm/3KHz]
≤8

Test result

TestMode	Frequency(MHz)	Result(dBm/3KHz)	L(dBm/3KHz)imit	Verdict
11B	2412	-2.83	≤8	PASS
	2437	-3.25	≤8	PASS
	2462	-3.29	≤8	PASS
11G	2412	-6.74	≤8	PASS
	2437	-7.13	≤8	PASS
	2462	-7.47	≤8	PASS
11N20SISO	2412	-8.38	≤8	PASS
	2437	-8.4	≤8	PASS
	2462	-9.43	≤8	PASS

Test Graphs

11B_Ant1_2412



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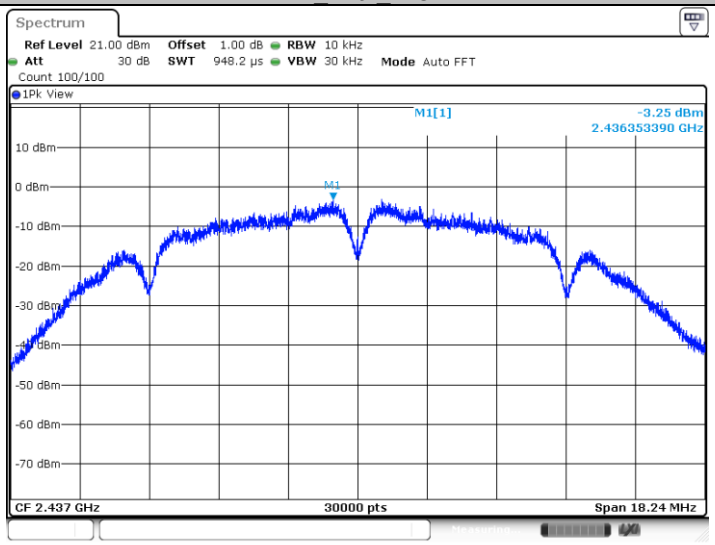
11B_Ant1_2437
 Date: 28.MAY.2020 02:02:31
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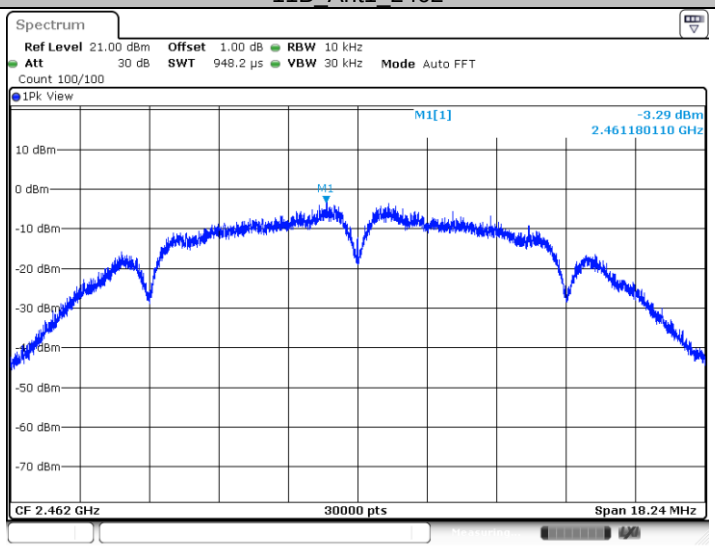 Date: 28.MAY.2020 02:04:10
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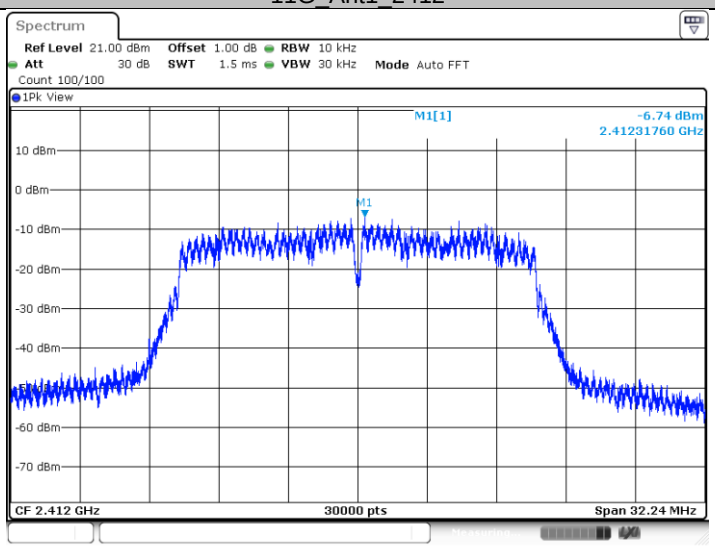 Date: 28.MAY.2020 02:06:58

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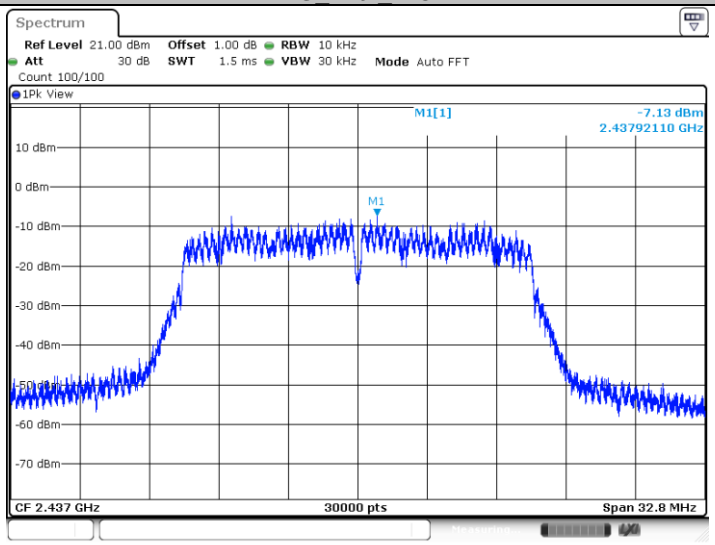
11G_Ant1_2437
 Date: 28.MAY.2020 02:09:40
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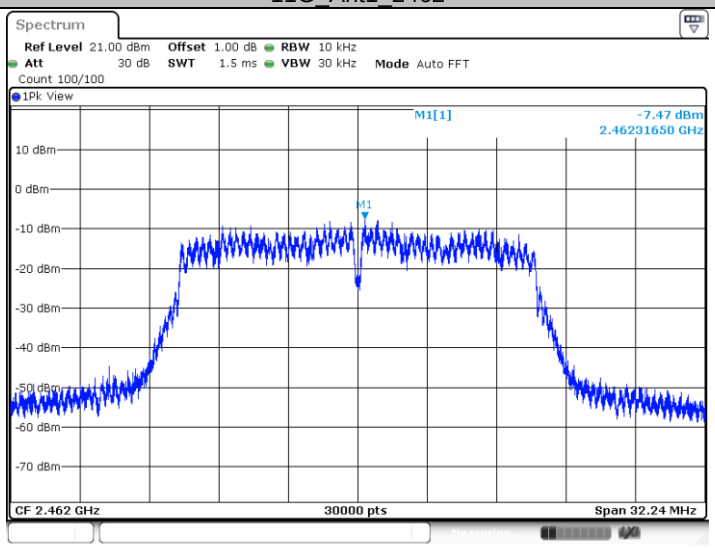 Date: 28.MAY.2020 02:11:26
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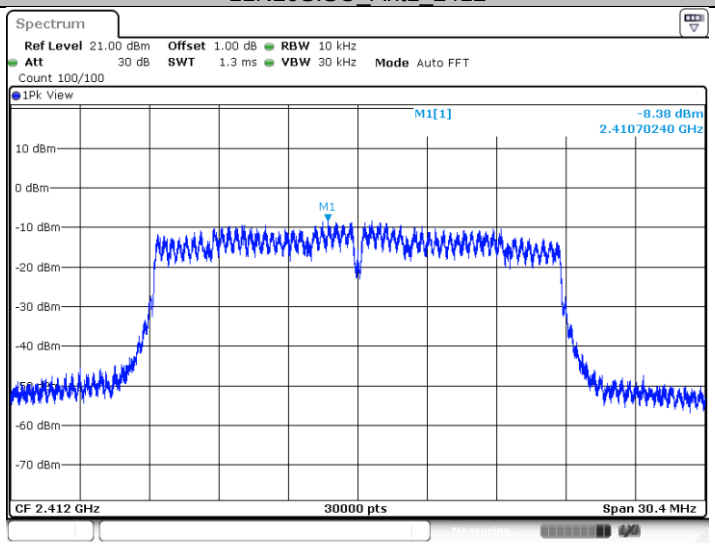 Date: 28.MAY.2020 02:15:16

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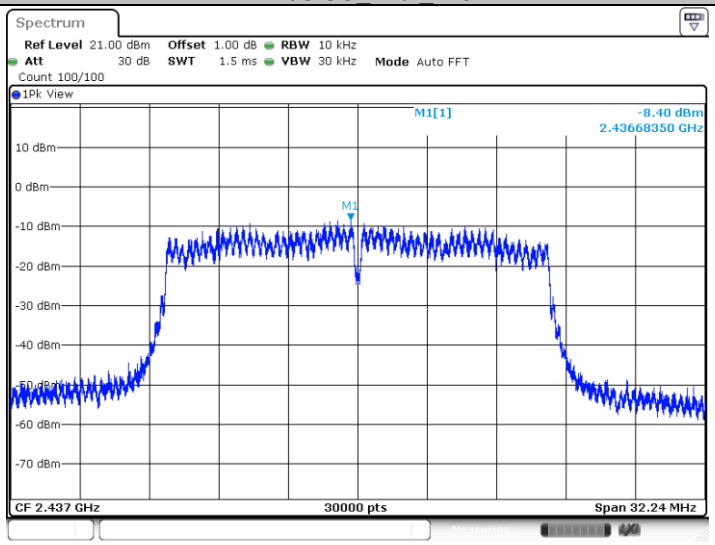
11N20SISO_Ant1_2437
 Date: 28.MAY.2020 02:18:09
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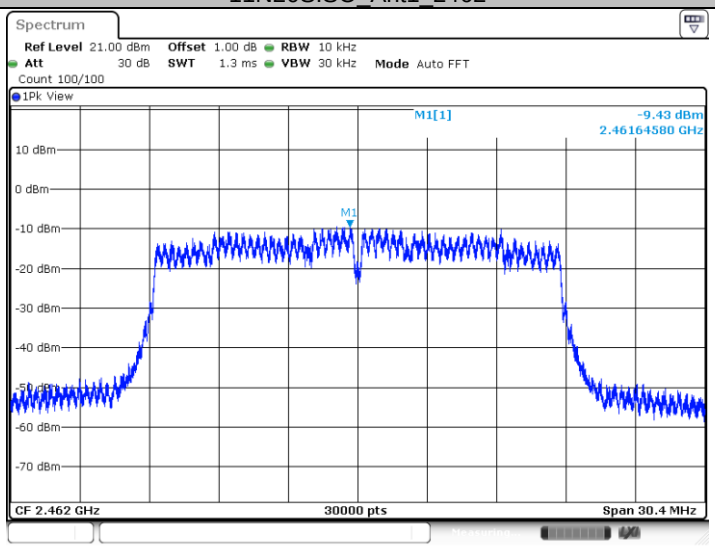 Date: 28.MAY.2020 02:19:53

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9.5 Spurious RF conducted emissions

Test Method

1. Connect EUT test port to spectrum analyzer.
2. Establish a reference level by using the following procedure:
   a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
   b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
3. 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.
4. Repeat above procedures until other frequencies measured were completed.

Limit

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

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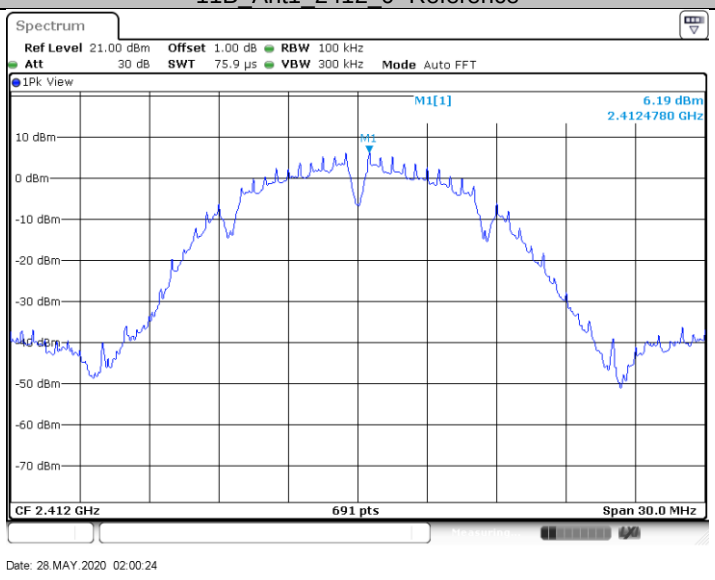
Spurious RF conducted emissions

Test Result

TestMode	Frequency(MHz)	FreqRange (MHz)	RefLevel (dBm)	Result (dBm)	Limit (dB)	Verdict
11B	2412	Reference	6.19	6.19	---	PASS
		30~1000	30~1000	-66.54	≤-13.81	PASS
		1000~26500	1000~26500	-36.86	≤-13.81	PASS
	2437	Reference	5.17	5.17	---	PASS
		30~1000	30~1000	-65.77	≤-14.83	PASS
		1000~26500	1000~26500	-51.78	≤-14.83	PASS
	2462	Reference	5.15	5.15	---	PASS
		30~1000	30~1000	-65.74	≤-14.85	PASS
		1000~26500	1000~26500	-51.49	≤-14.85	PASS
11G	2412	Reference	1.49	1.49	---	PASS
		30~1000	30~1000	-66.67	≤-18.51	PASS
		1000~26500	1000~26500	-38.4	≤-18.51	PASS
	2437	Reference	0.98	0.98	---	PASS
		30~1000	30~1000	-66.03	≤-19.02	PASS
		1000~26500	1000~26500	-52.09	≤-19.02	PASS
	2462	Reference	0.80	0.80	---	PASS
		30~1000	30~1000	-66.06	≤-19.2	PASS
		1000~26500	1000~26500	-49.6	≤-19.2	PASS
11N20SISO	2412	Reference	0.49	0.49	---	PASS
		30~1000	30~1000	-67.18	≤-19.51	PASS
		1000~26500	1000~26500	-37.74	≤-19.51	PASS
	2437	Reference	0.20	0.20	---	PASS
		30~1000	30~1000	-65.96	≤-19.8	PASS
		1000~26500	1000~26500	-52.48	≤-19.8	PASS
	2462	Reference	-0.11	-0.11	---	PASS
		30~1000	30~1000	-65.29	≤-20.11	PASS
		1000~26500	1000~26500	-50.25	≤-20.11	PASS

Test Graphs

11B_Ant1_2412_0~Reference



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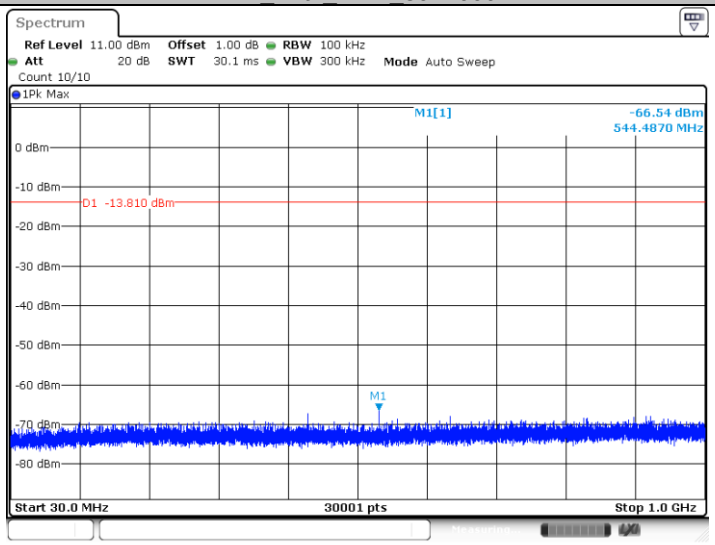
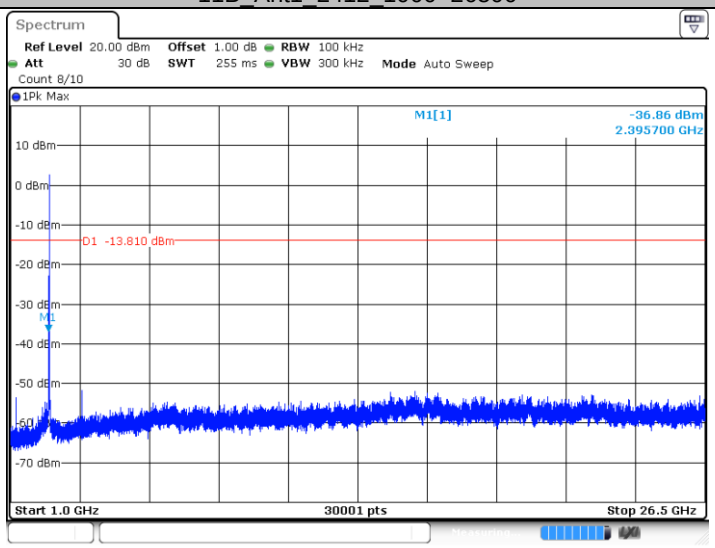
11B_Ant1_2412_30~1000
 Date: 28.MAY.2020 02:00:30
11B_Ant1_2412_1000~26500
 Date: 28.MAY.2020 02:00:38
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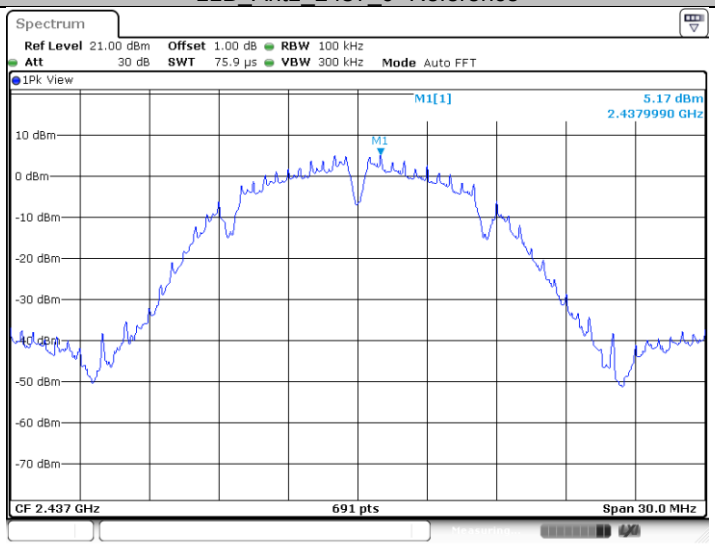 Date: 28.MAY.2020 02:02:36

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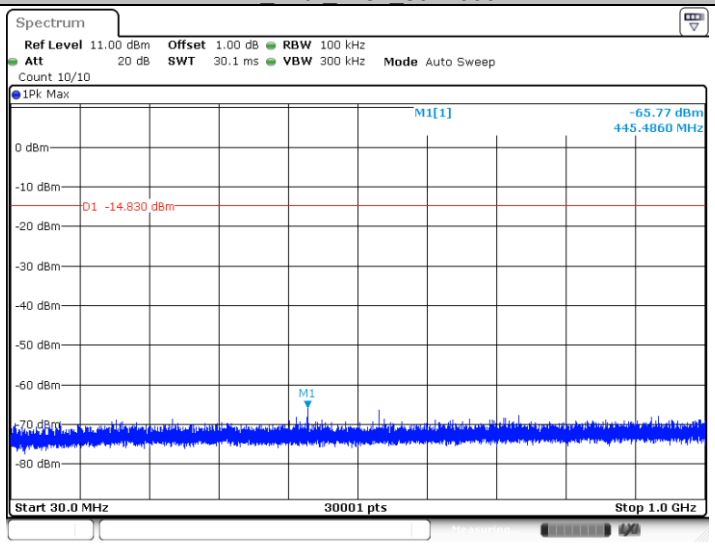
11B_Ant1_2437_30~1000
 Date: 28.MAY.2020 02:02:42
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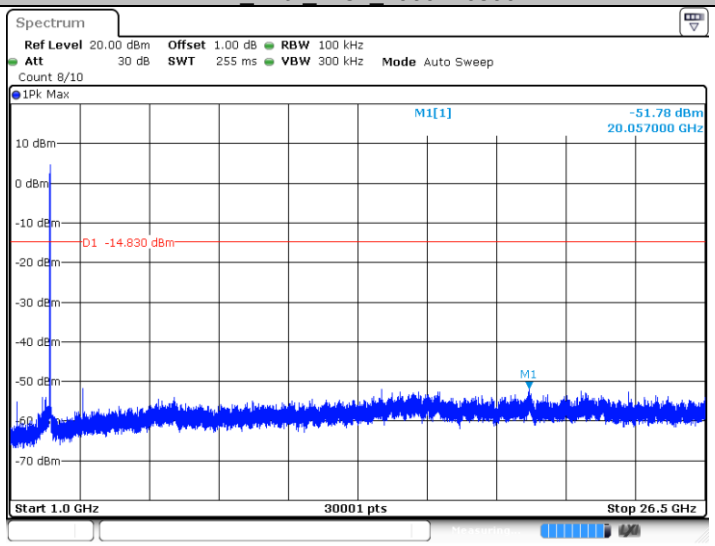 Date: 28.MAY.2020 02:02:50
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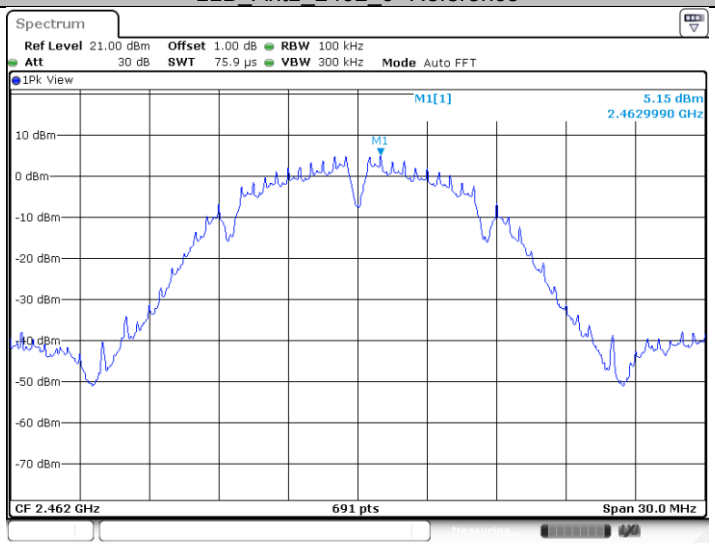 Date: 28.MAY.2020 02:05:16

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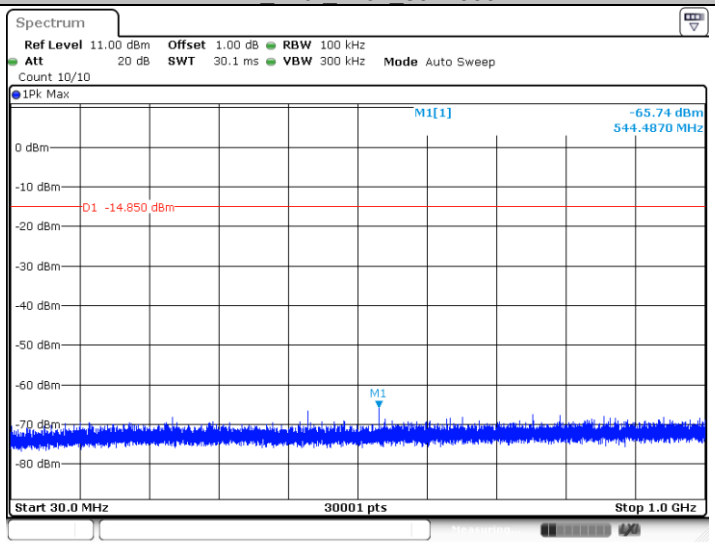
11B_Ant1_2462_30~1000
 Date: 28.MAY.2020 02:05:22
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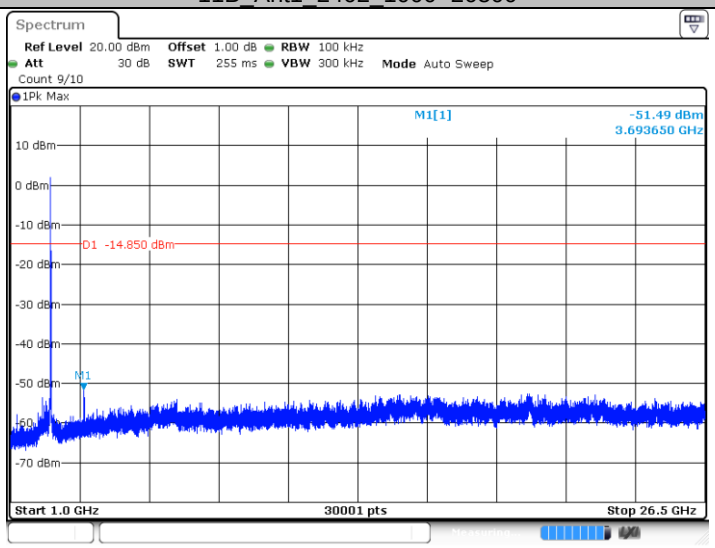
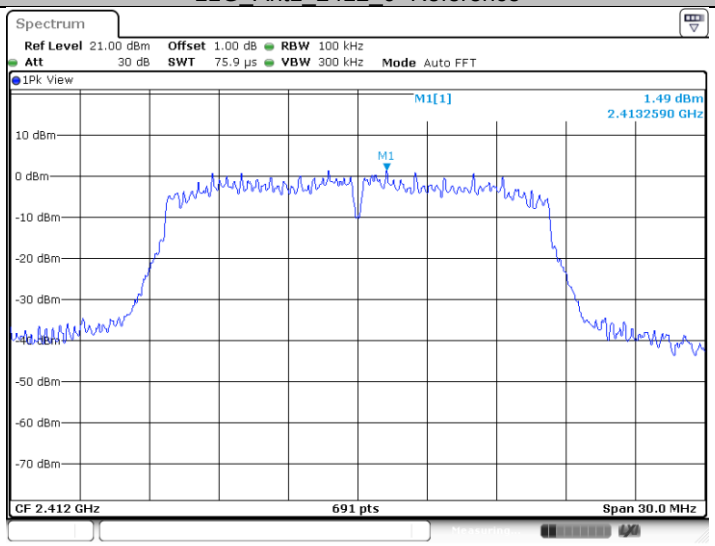
 Date: 28.MAY.2020 02:05:30
11G_Ant1_2412_0~Reference
 Date: 28.MAY.2020 02:08:04

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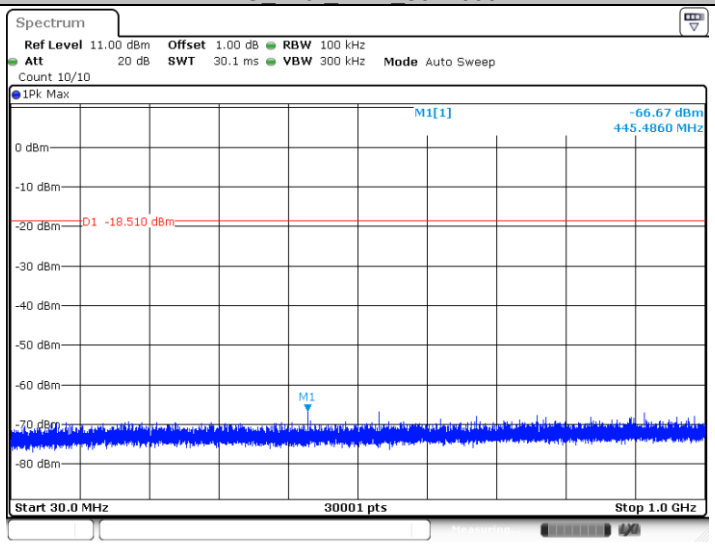
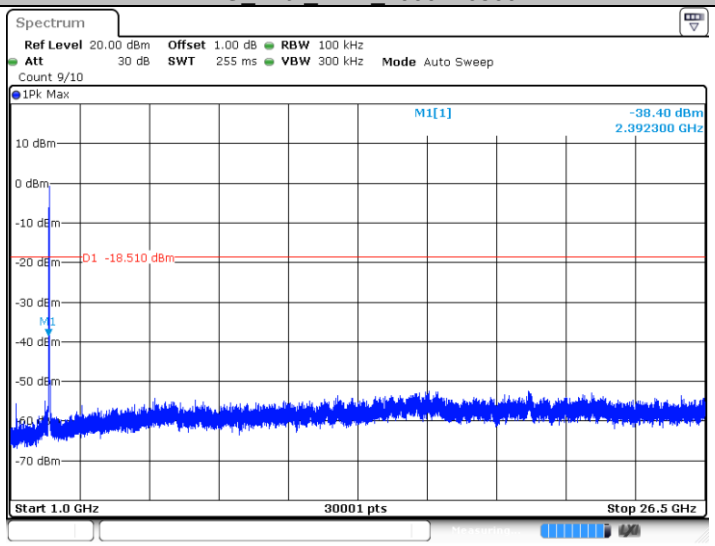
11G_Ant1_2412_30~1000



Date: 28.MAY.2020 02:08:10

11G_Ant1_2412_1000~26500



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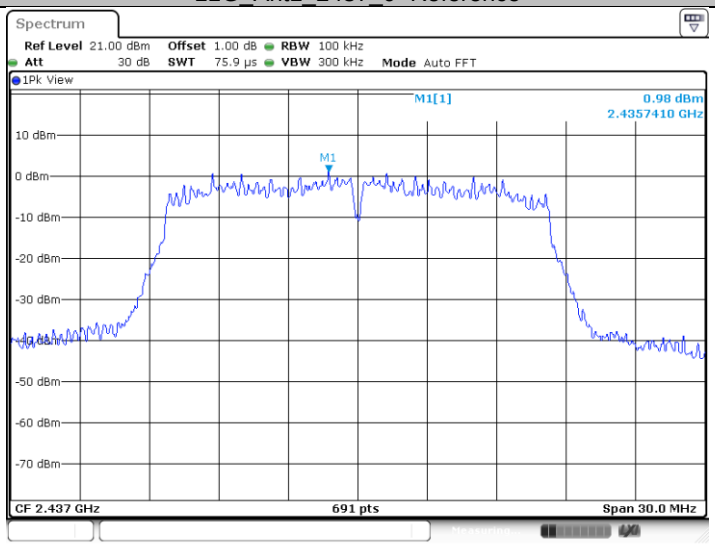
11G_Ant1_2437_0~Reference



Date: 28.MAY.2020 02:09:46

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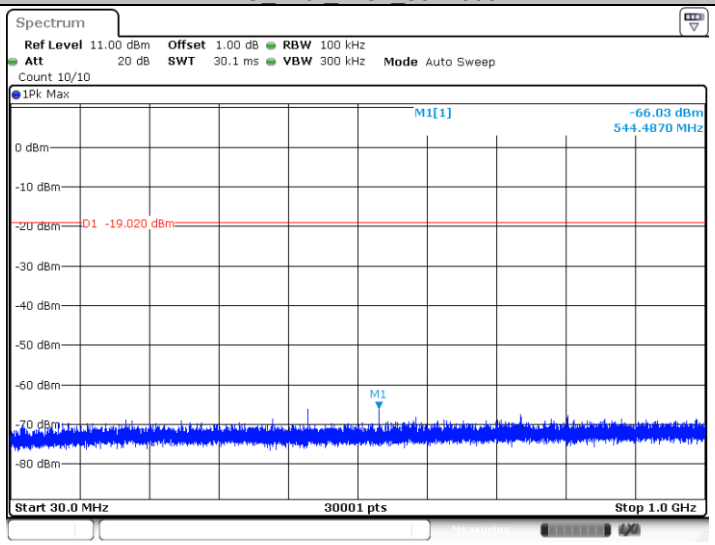
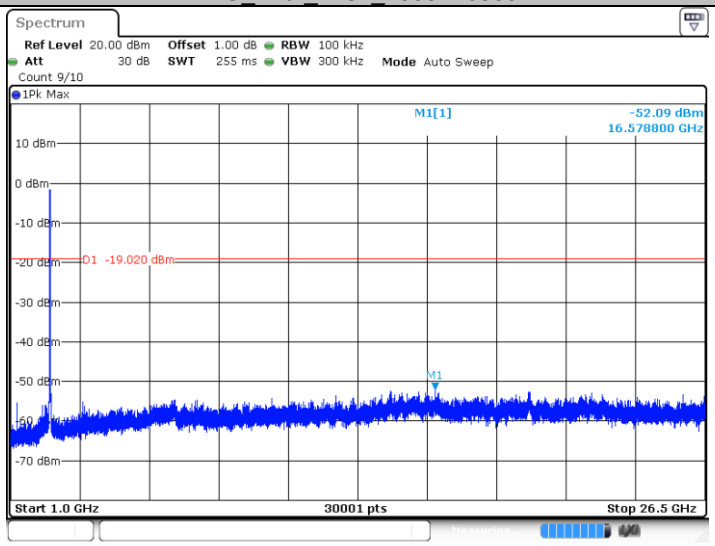
11G_Ant1_2437_30~1000



Date: 28.MAY.2020 02:09:52

11G_Ant1_2437_1000~26500



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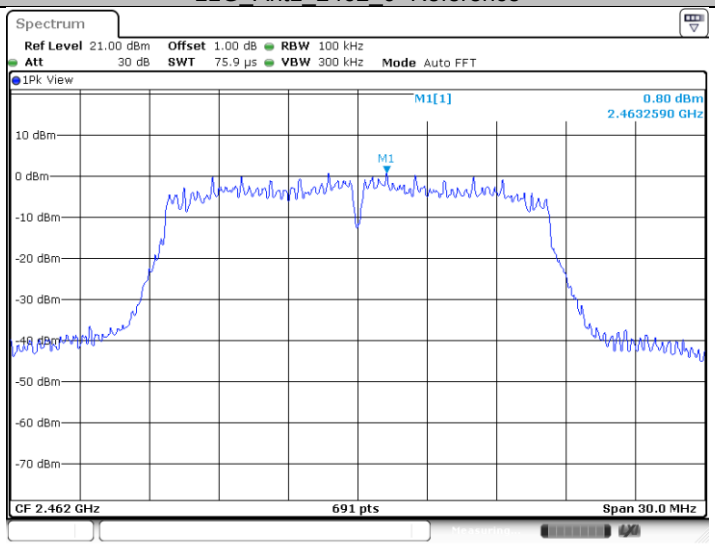
11G_Ant1_2462_0~Reference



Date: 28.MAY.2020 02:12:31

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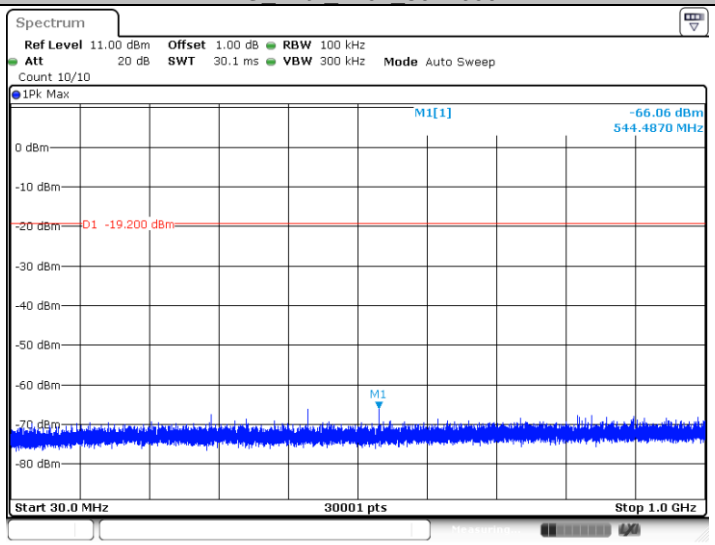
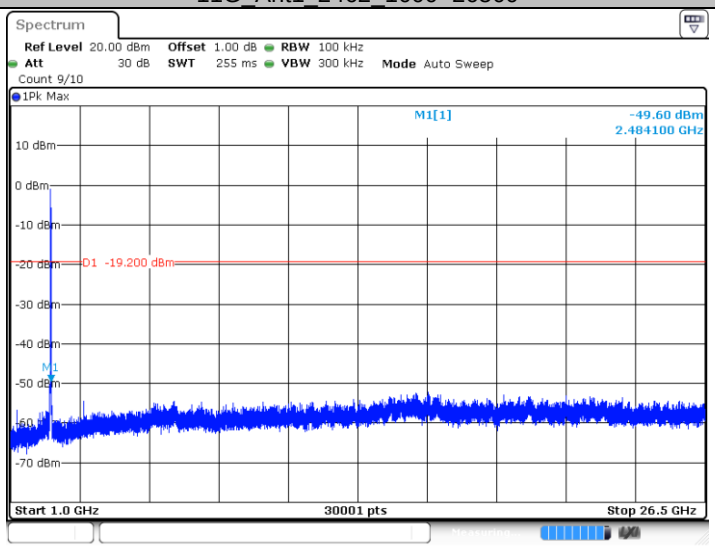
11G_Ant1_2462_30~1000



Date: 28.MAY.2020 02:12:37

11G_Ant1_2462_1000~26500



Date: 28.MAY.2020 02:12:45

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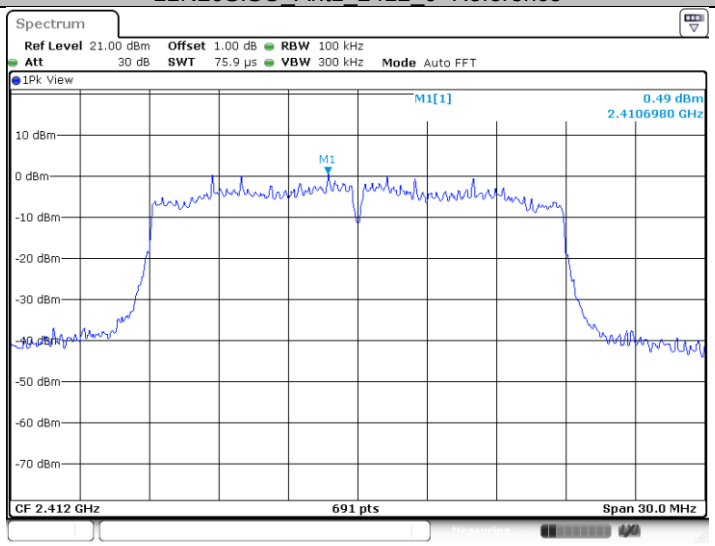

Date: 28.MAY.2020 02:16:22

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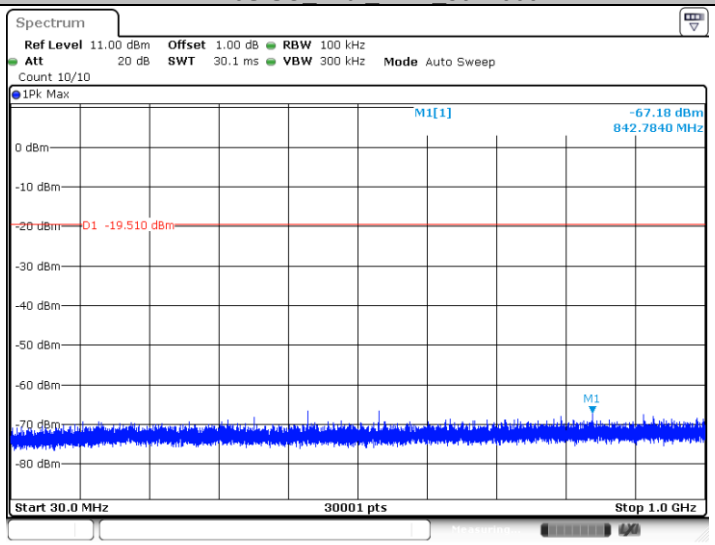
11N20SISO_Ant1_2412_30~1000
 Date: 28.MAY.2020 02:16:28
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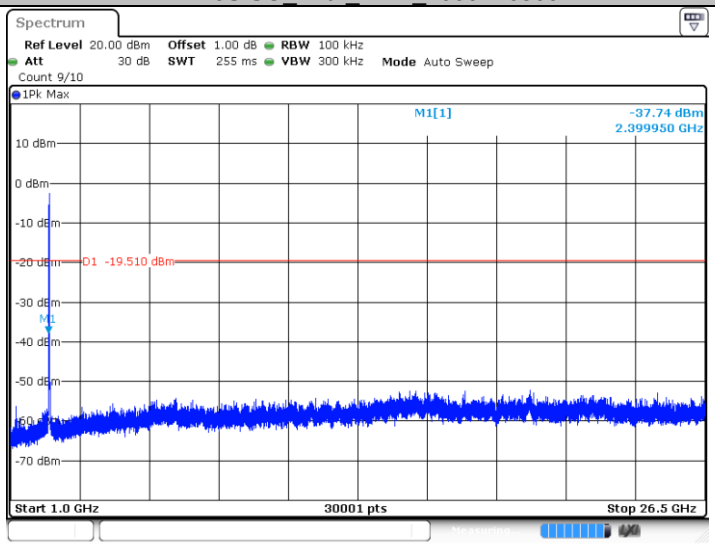 Date: 28.MAY.2020 02:16:36
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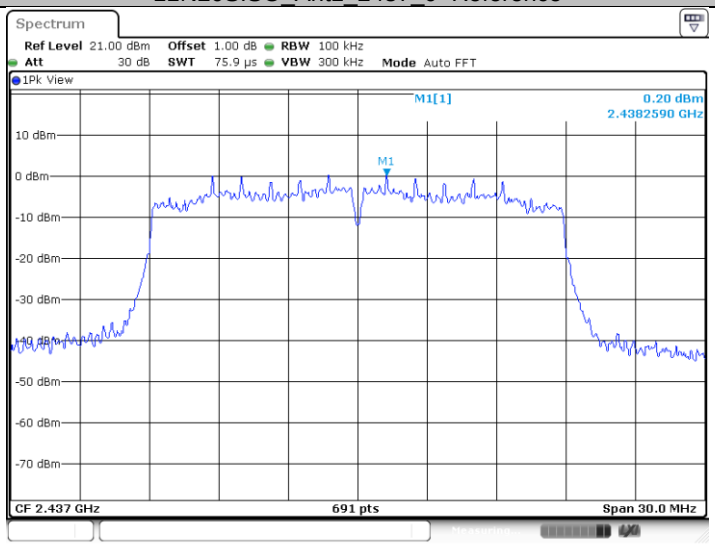 Date: 28.MAY.2020 02:18:15

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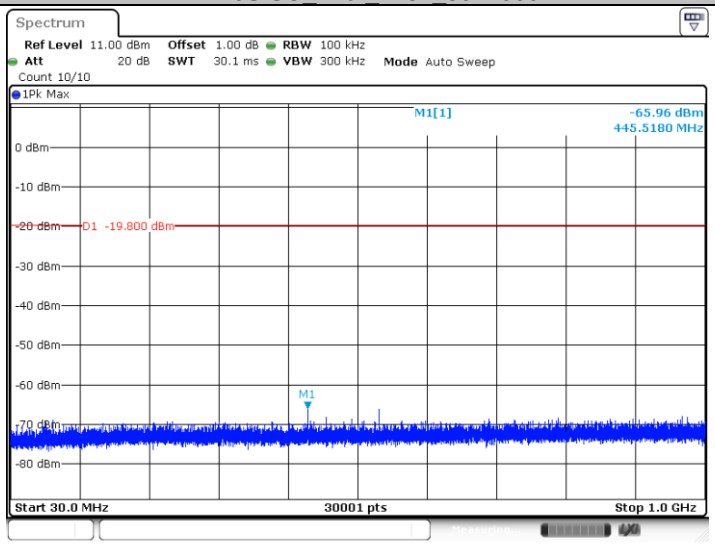
11N20SISO_Ant1_2437_30~1000
 Date: 28.MAY.2020 02:18:21
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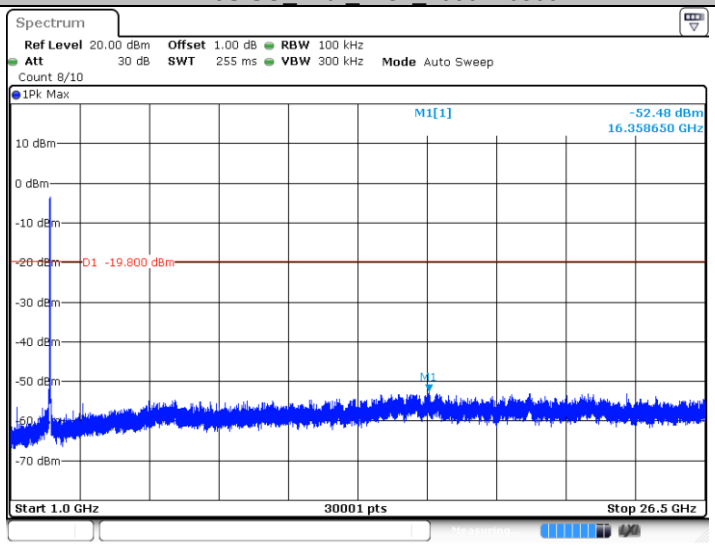 Date: 28.MAY.2020 02:18:29
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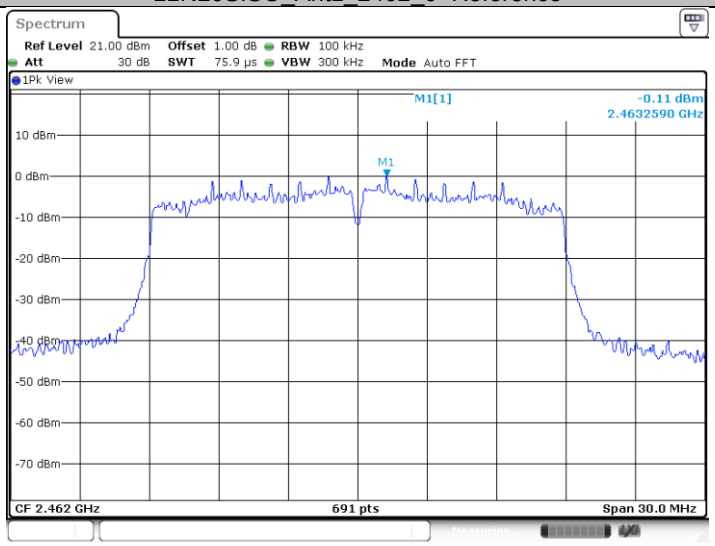 Date: 28.MAY.2020 02:20:59

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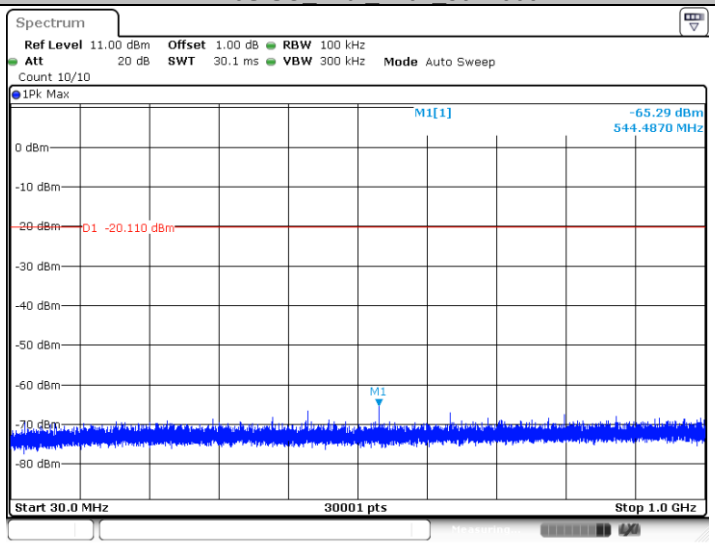
11N20SISO_Ant1_2462_30~1000
 Date: 28.MAY.2020 02:21:05
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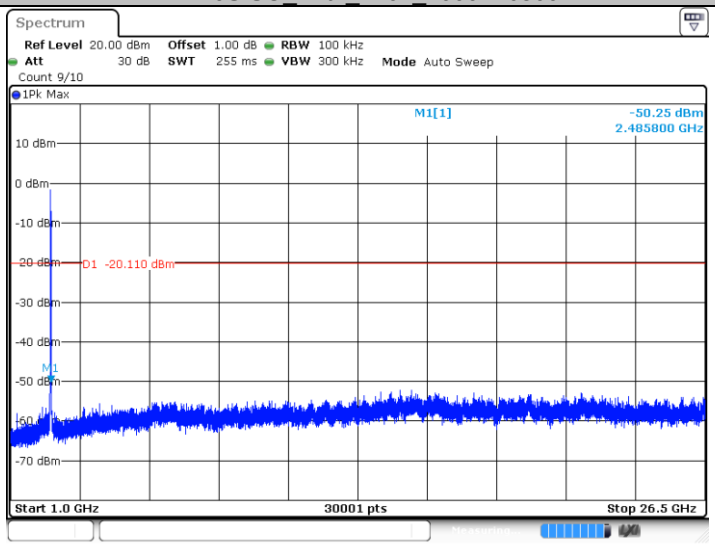 Date: 28.MAY.2020 02:21:13

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9.6 Band edge

Test Method

1. Connect EUT test port to spectrum analyzer.
2. Set spectrum analyzer setting as below:
   Set RBW ≥ 1% of the span, VBW ≥ RBW.
   Set Sweep = auto. Set Detector function = peak. Allow the trace to stabilize.
   Set Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.
3. Repeat above procedures until all frequencies measured were complete.

Limit

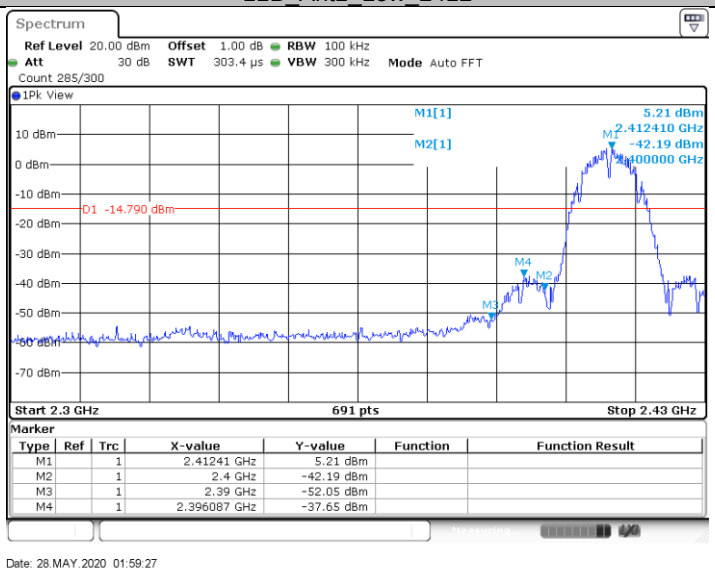
Frequency Range MHz	Limit (dBc)
30-25000	-20

Test result

TestMode	ChName	Frequency(MHz)	RefLevel(dBm)	Result(dBm)	Limit(dBm)	Verdict
11B	Low	2412	5.21	-37.65	≤-14.79	PASS
	High	2462	4.06	-52.25	≤-15.94	PASS
11G	Low	2412	1.29	-35.45	≤-18.71	PASS
	High	2462	0.49	-47.9	≤-19.51	PASS
11N20SISO	Low	2412	0.49	-37.69	≤-19.51	PASS
	High	2462	0.02	-47.54	≤-19.98	PASS

Test Graphs

11B_Ant1_Low_2412



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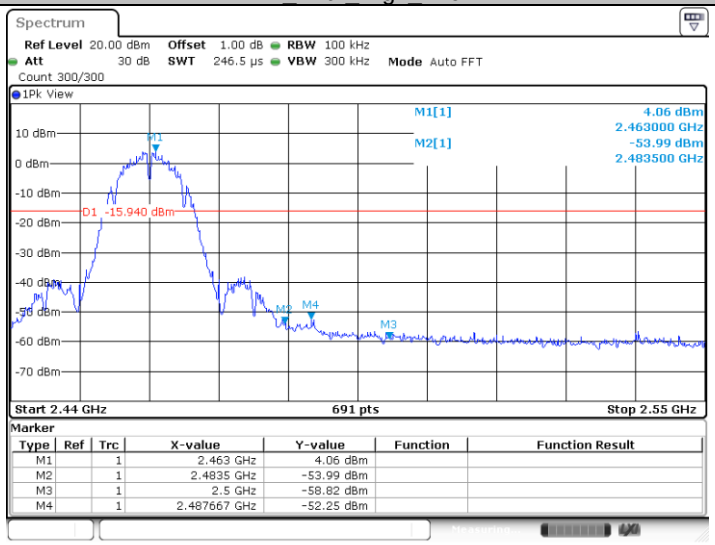
11B_Ant1_High_2462
 Date: 28.MAY.2020 02:04:19
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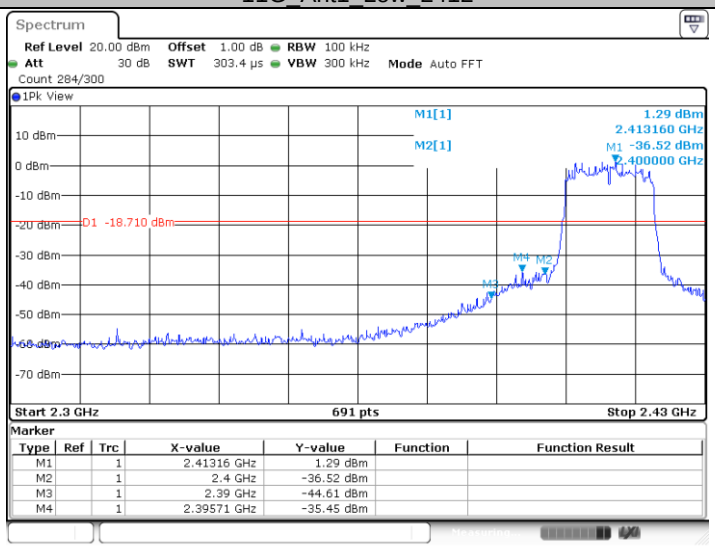 Date: 28.MAY.2020 02:07:07
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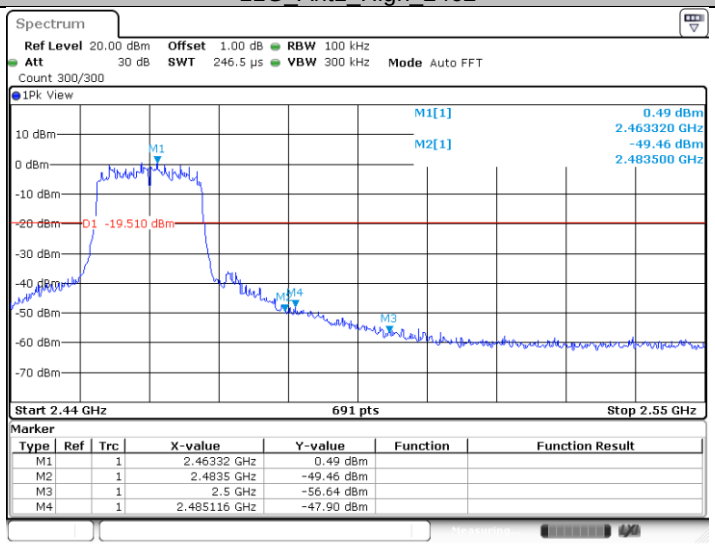 Date: 28.MAY.2020 02:11:35

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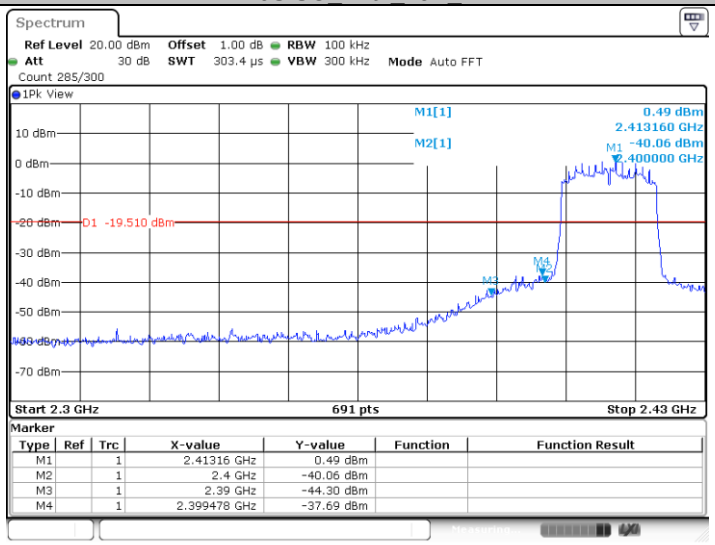
11N20SISO_Ant1_Low_2412
 Date: 28.MAY.2020 02:15:25
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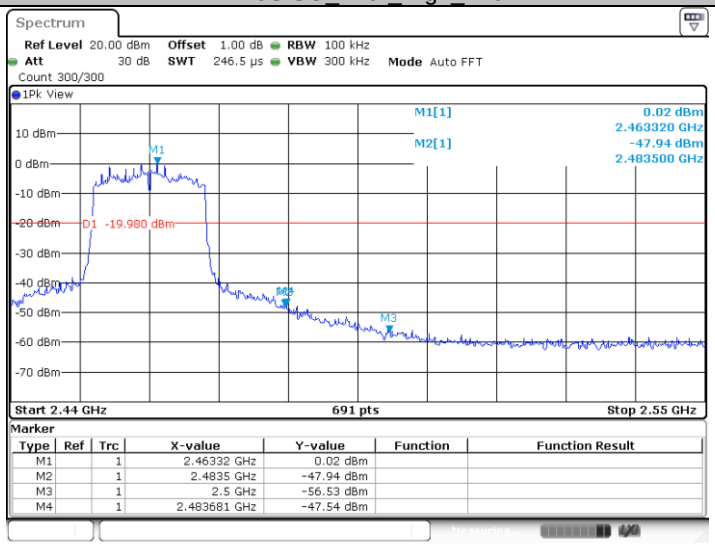 Date: 28.MAY.2020 02:20:02

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9.7 Spurious radiated emissions for transmitter

Test Method

1: The EUT was place 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 120KHz, 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 = 1 MHz.
b) VBW \ [3 × RBW].
c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ 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:

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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 section15.205, must comply with the radiated emission limits specified in section 15.209.

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

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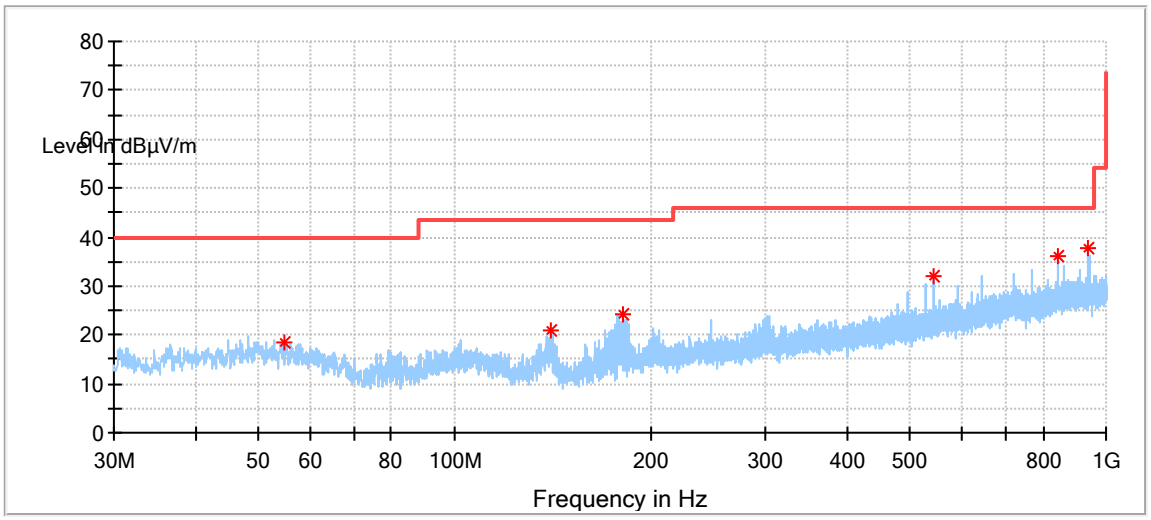
Spurious radiated emissions for transmitter

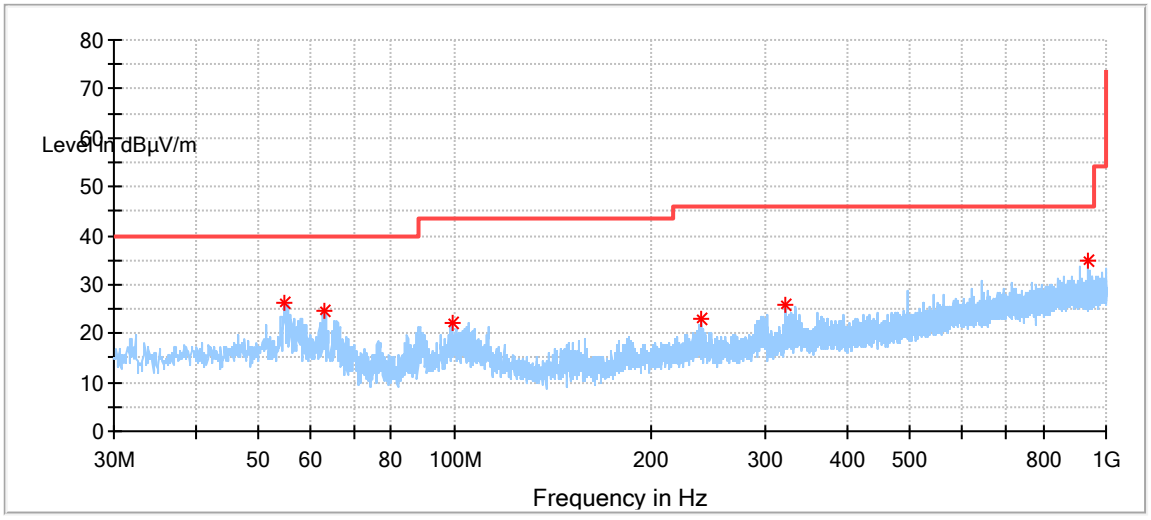
According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

Emission (30MHz – 1GHz)



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
54.681111	18.51	40.00	21.49	150.0	H	236.0	14.4
140.957222	20.92	43.50	22.58	150.0	H	143.0	9.2
180.888889	24.33	43.50	19.17	150.0	H	0.0	10.8
544.477222	31.92	46.00	14.08	150.0	H	49.0	18.8
841.512778	36.20	46.00	9.80	150.0	H	84.0	23.2
940.506667	37.69	46.00	8.31	150.0	H	72.0	24.1



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
54.788889	26.16	40.00	13.84	150.0	V	0.0	14.4

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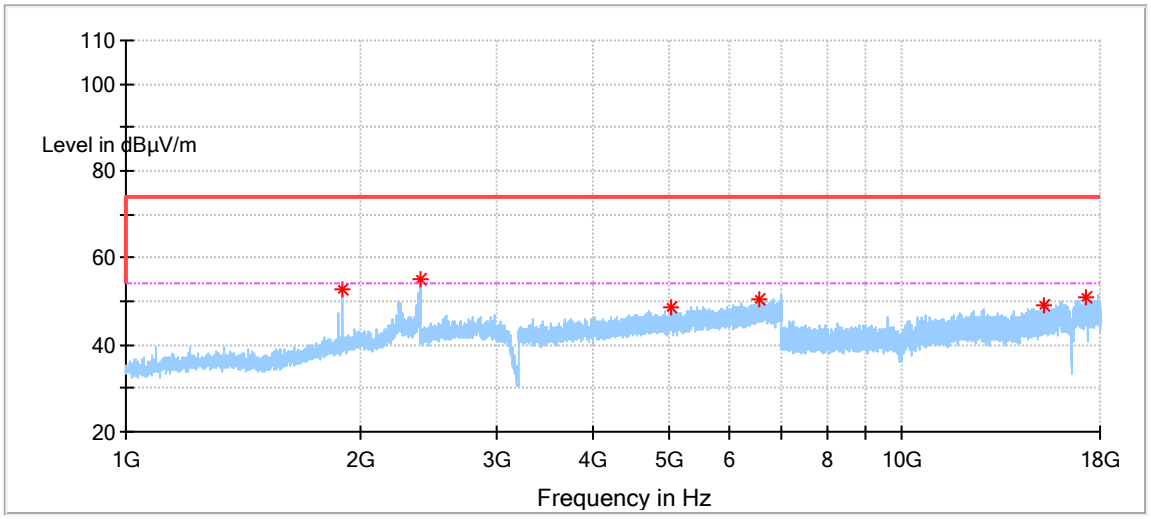
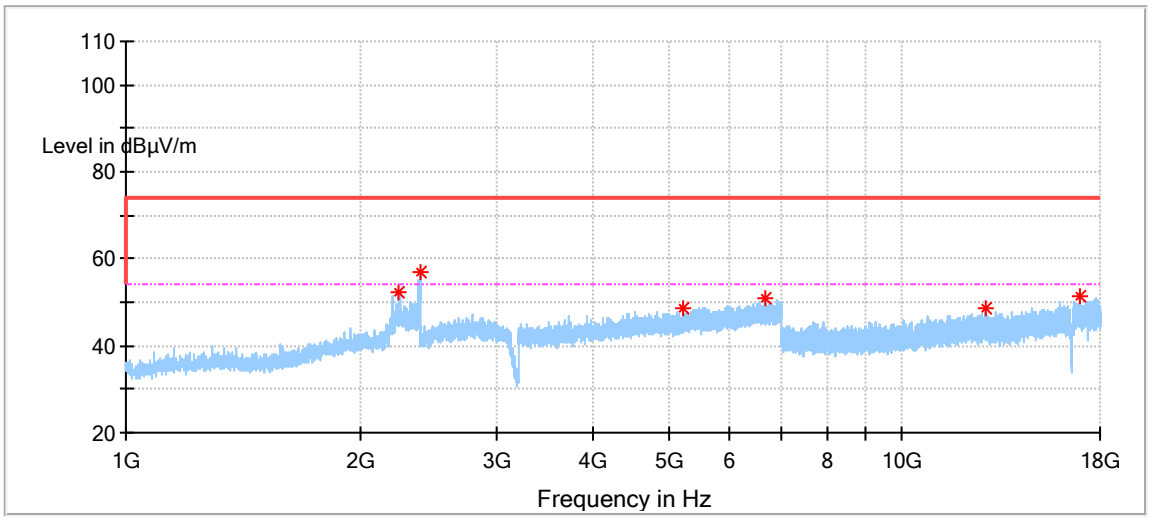
63.303333	24.57	40.00	15.43	150.0	V	0.0	12.8
98.977778	22.26	43.50	21.24	150.0	V	87.0	12.7
238.927222	23.15	46.00	22.85	150.0	V	1.0	13.2
322.886111	25.64	46.00	20.36	150.0	V	179.0	15.0
940.506667	35.02	46.00	10.98	150.0	V	157.0	24.1

Emission (Above 1GHz)
802.11b
2412MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1902.500000	52.62	74.00	21.38	150.0	H	1.0	-5.6
2393.500000	55.08	74.00	18.92	150.0	H	313.0	-3.9
5028.500000*	48.81	74.00	25.19	150.0	H	108.0	2.9
6544.000000	50.68	74.00	23.32	150.0	H	183.0	6.4
15239.500000	49.11	74.00	24.89	150.0	H	313.0	12.4
17277.000000	50.89	74.00	23.11	150.0	H	226.0	17.1



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2250.500000*	52.13	74.00	21.87	150.0	V	239.0	-4.8
2393.000000	56.71	74.00	17.29	150.0	V	282.0	-3.9
5233.000000	48.49	74.00	25.51	150.0	V	11.0	2.1
6651.500000	50.72	74.00	23.28	150.0	V	134.0	6.8
12803.000000	48.54	74.00	25.46	150.0	V	307.0	10.3
16967.500000	51.48	74.00	22.52	150.0	V	188.0	16.5

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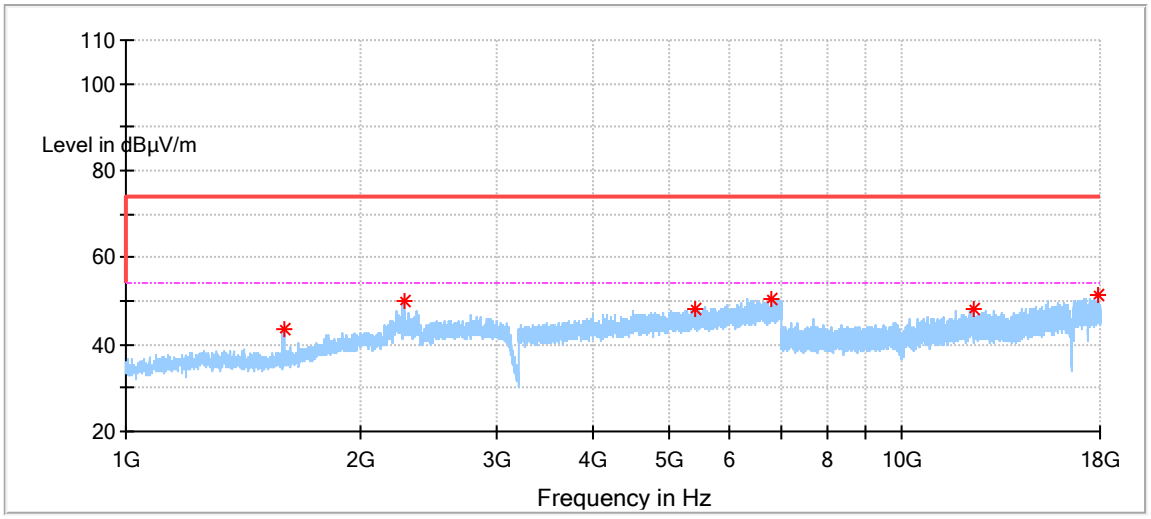
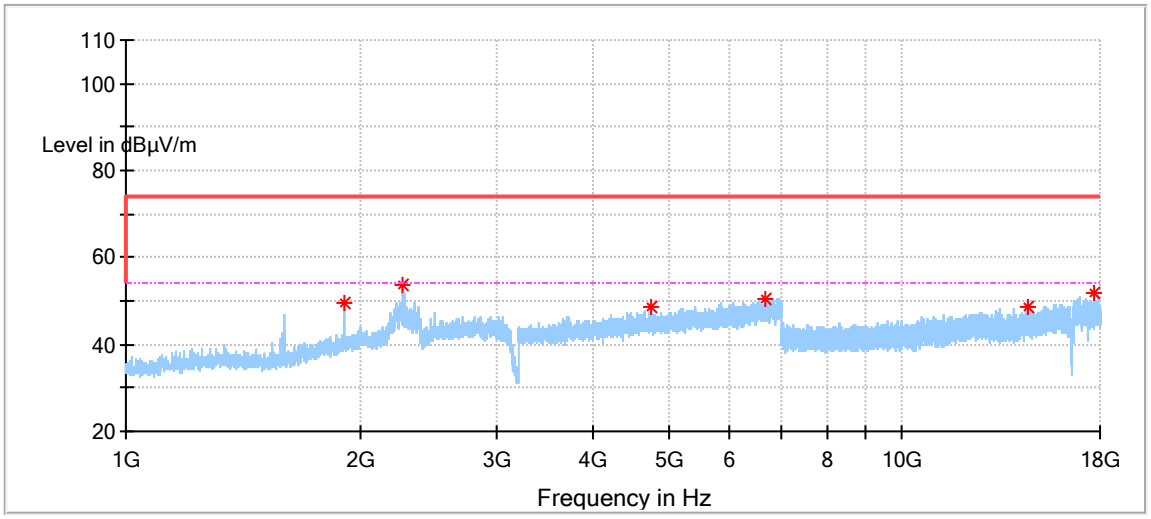
2437MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1595.500000*	43.45	74.00	30.55	150.0	H	309.0	-8.7
2279.000000*	49.90	74.00	24.10	150.0	H	299.0	-4.5
5413.000000*	48.12	74.00	25.88	150.0	H	4.0	3.1
6771.000000	50.51	74.00	23.49	150.0	H	135.0	6.6
12350.500000	48.29	74.00	25.71	150.0	H	100.0	10.1
17850.000000	51.22	74.00	22.78	150.0	H	152.0	17.2



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1914.000000	49.52	74.00	24.48	150.0	V	158.0	-5.4
2277.000000*	53.61	74.00	20.39	150.0	V	296.0	-4.5
4744.000000*	48.62	74.00	25.38	150.0	V	249.0	3.0
6659.000000	50.43	74.00	23.57	150.0	V	245.0	6.7
14573.500000	48.61	74.00	25.39	150.0	V	242.0	11.1
17715.000000	51.69	74.00	22.31	150.0	V	226.0	17.8

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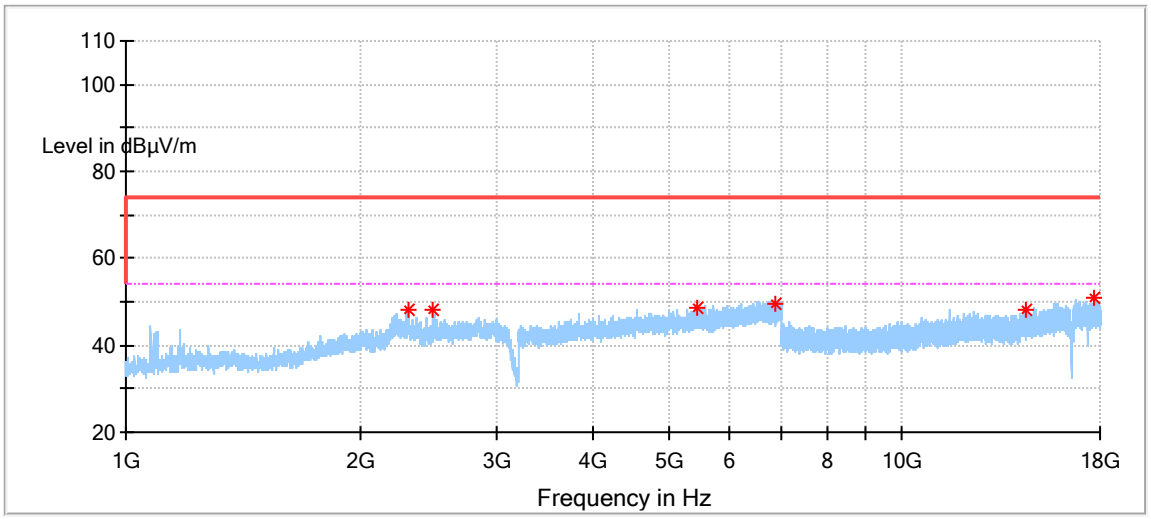
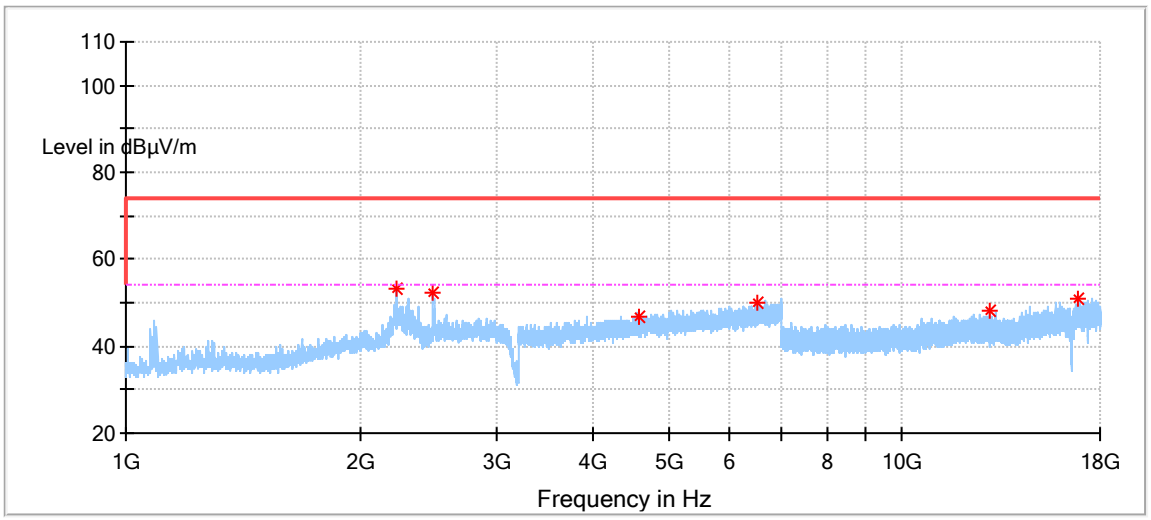
2462MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2307.000000	48.20	74.00	25.80	150.0	H	322.0	-4.3
2491.000000*	48.28	74.00	25.72	150.0	H	301.0	-3.4
5435.500000*	48.50	74.00	25.50	150.0	H	201.0	3.0
6849.500000	49.37	74.00	24.63	150.0	H	251.0	6.9
14477.500000	48.27	74.00	25.73	150.0	H	355.0	11.0
17715.000000	50.71	74.00	23.29	150.0	H	208.0	17.8



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2229.000000*	53.35	74.00	20.65	150.0	V	281.0	-4.8
2490.500000*	52.53	74.00	21.47	150.0	V	281.0	-3.4
4574.000000*	46.84	74.00	27.16	150.0	V	8.0	2.8
6528.000000	49.95	74.00	24.05	150.0	V	205.0	6.4
13009.500000	48.29	74.00	25.71	150.0	V	326.0	9.6
16891.000000	51.13	74.00	22.87	150.0	V	189.0	16.6

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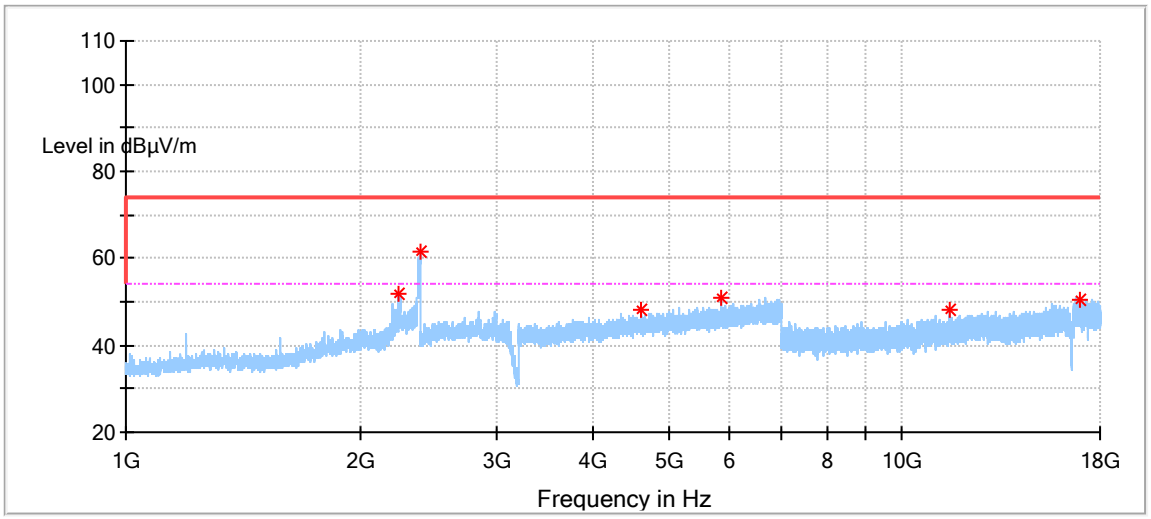
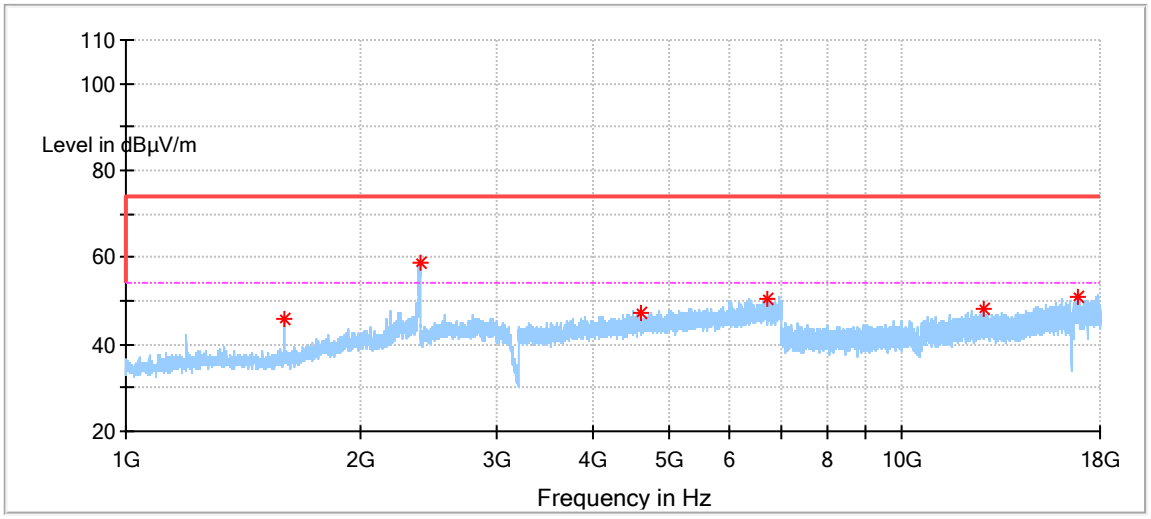
802.11g
2412MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2248.000000*	51.91	74.00	22.09	150.0	V	271.0	-4.8
2391.500000	61.59	74.00	12.41	150.0	V	271.0	-3.9
4624.500000*	48.02	74.00	25.98	150.0	V	83.0	2.7
5851.000000	50.78	74.00	23.22	150.0	V	184.0	4.1
11515.500000	48.00	74.00	26.00	150.0	V	218.0	8.8
16924.000000	50.69	74.00	23.31	150.0	V	44.0	16.7



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1596.000000*	45.86	74.00	28.14	150.0	H	232.0	-8.6
2393.000000	58.67	74.00	15.33	150.0	H	311.0	-3.9
4606.500000*	47.38	74.00	26.62	150.0	H	342.0	2.9
6707.500000	50.39	74.00	23.61	150.0	H	43.0	6.6
12719.500000	48.10	74.00	25.90	150.0	H	298.0	10.4
16892.500000	51.09	74.00	22.91	150.0	H	35.0	16.6

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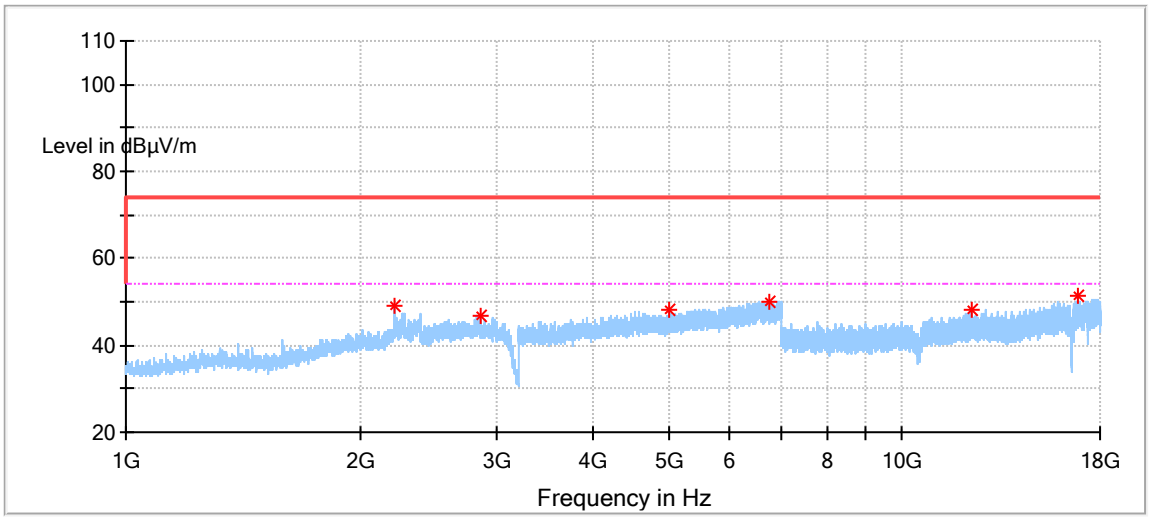
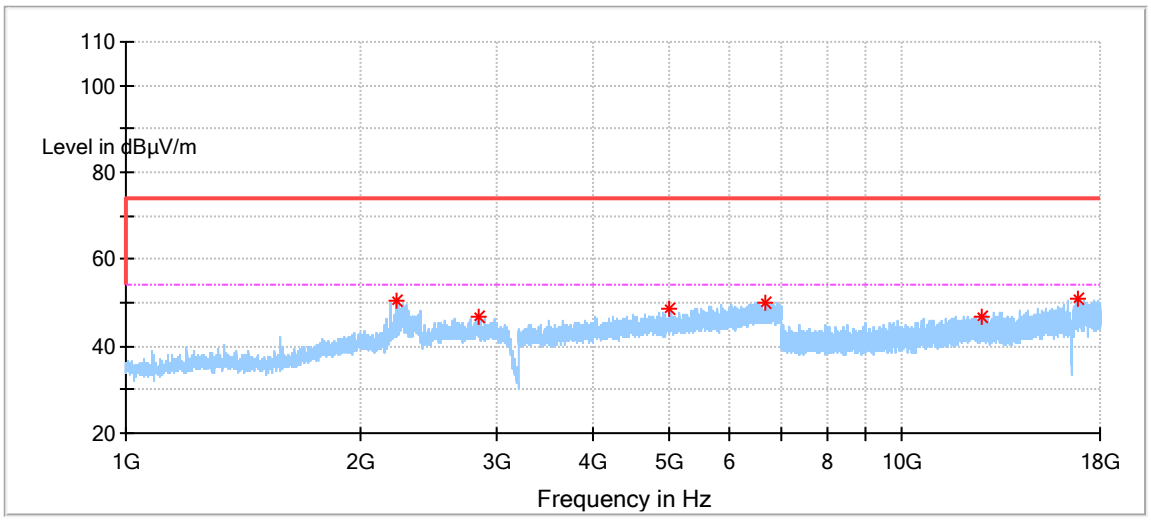
2437MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2224.500000*	49.10	74.00	24.90	150.0	H	315.0	-4.8
2863.500000*	46.72	74.00	27.28	150.0	H	170.0	-2.9
5014.000000*	48.02	74.00	25.98	150.0	H	24.0	2.7
6734.500000	49.98	74.00	24.02	150.0	H	164.0	6.6
12327.000000	47.95	74.00	26.05	150.0	H	65.0	10.1
16841.500000	51.36	74.00	22.64	150.0	H	140.0	16.5



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2231.000000	50.60	74.00	23.40	150.0	V	261.0	-4.8
2853.000000*	46.63	74.00	27.37	150.0	V	0.0	-2.9
5024.500000*	48.79	74.00	25.21	150.0	V	302.0	3.0
6657.500000	50.02	74.00	23.98	150.0	V	302.0	6.7
12671.000000	46.83	74.00	27.17	150.0	V	280.0	9.9
16818.500000	51.03	74.00	22.97	150.0	V	243.0	16.5

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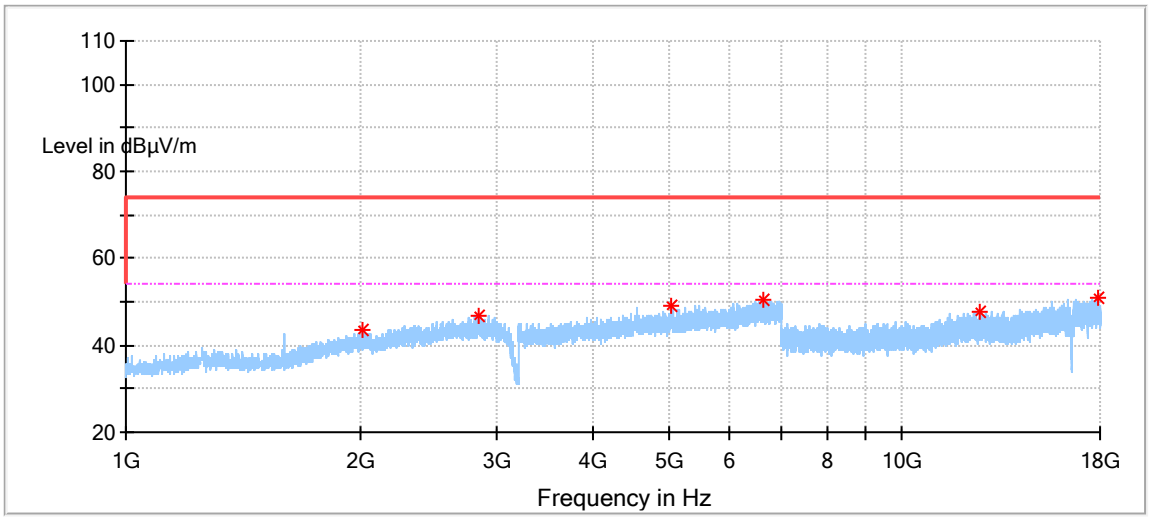
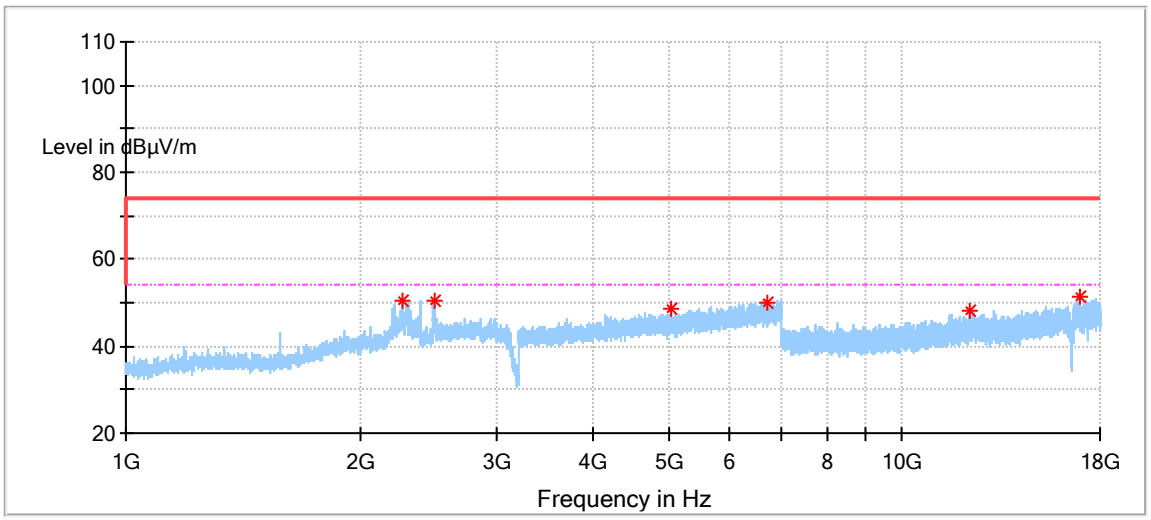
2462MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2018.000000	43.40	74.00	30.60	150.0	H	75.0	-5.0
2843.000000*	46.93	74.00	27.07	150.0	H	266.0	-2.9
5042.500000*	48.89	74.00	25.11	150.0	H	27.0	2.7
6636.000000	50.63	74.00	23.37	150.0	H	172.0	6.8
12585.000000	47.89	74.00	26.11	150.0	H	71.0	9.6
17902.000000	51.01	74.00	22.99	150.0	H	228.0	17.9



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2266.500000*	50.57	74.00	23.43	150.0	V	238.0	-4.5
2492.500000*	50.41	74.00	23.59	150.0	V	283.0	-3.4
5039.500000*	48.57	74.00	25.43	150.0	V	310.0	2.6
6691.500000	49.82	74.00	24.18	150.0	V	315.0	6.6
12223.500000	48.16	74.00	25.84	150.0	V	118.0	9.6
16915.000000	51.40	74.00	22.60	150.0	V	118.0	16.7

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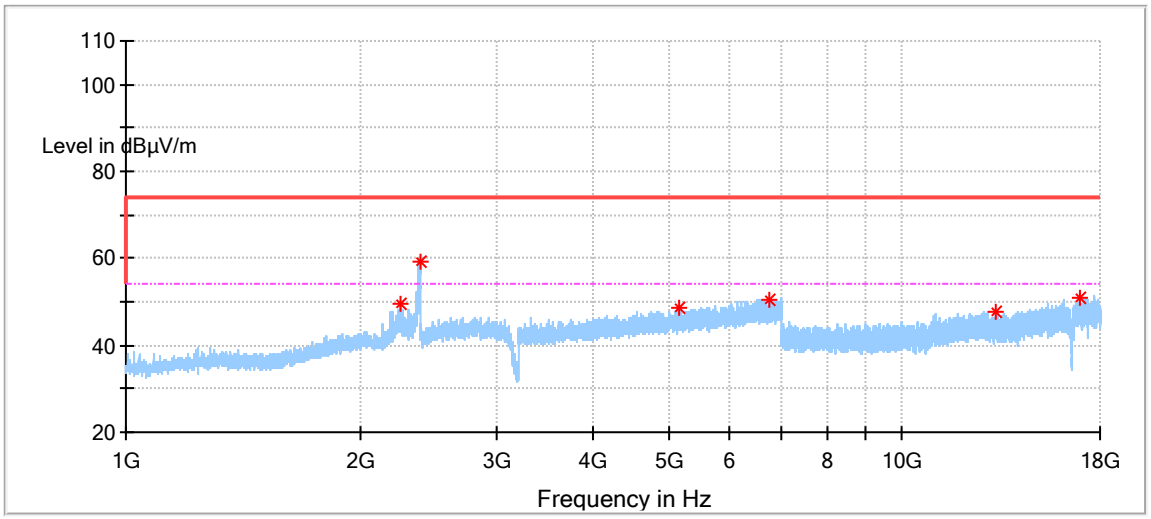
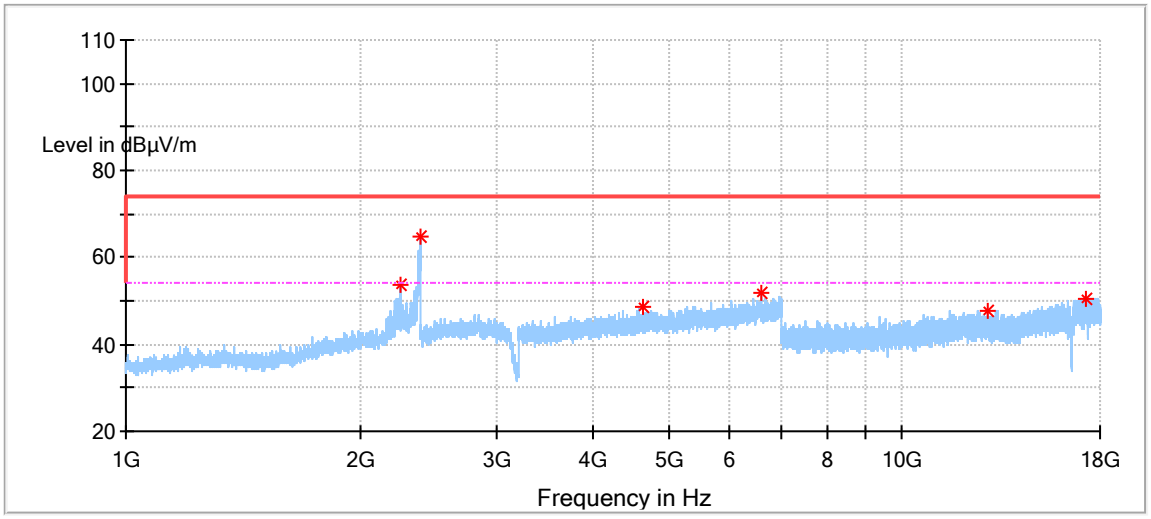
802.11nHT20
2412MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2257.000000*	49.53	74.00	24.47	150.0	H	234.0	-4.7
2392.000000	59.44	74.00	14.56	150.0	H	305.0	-3.9
5173.500000	48.39	74.00	25.61	150.0	H	128.0	2.5
6750.000000	50.61	74.00	23.39	150.0	H	42.0	6.6
13193.500000	47.59	74.00	26.41	150.0	H	139.0	9.5
16918.500000	50.91	74.00	23.09	150.0	H	306.0	16.8



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2263.500000*	53.49	74.00	20.51	150.0	V	239.0	-4.6
2390.500000	64.77	74.00	9.23	150.0	V	266.0	-3.9
4645.500000*	48.58	74.00	25.42	150.0	V	110.0	2.8
6597.500000	51.69	74.00	22.31	150.0	V	6.0	6.8
12863.500000	47.91	74.00	26.09	150.0	V	118.0	10.0
17279.000000	50.48	74.00	23.52	150.0	V	189.0	17.1

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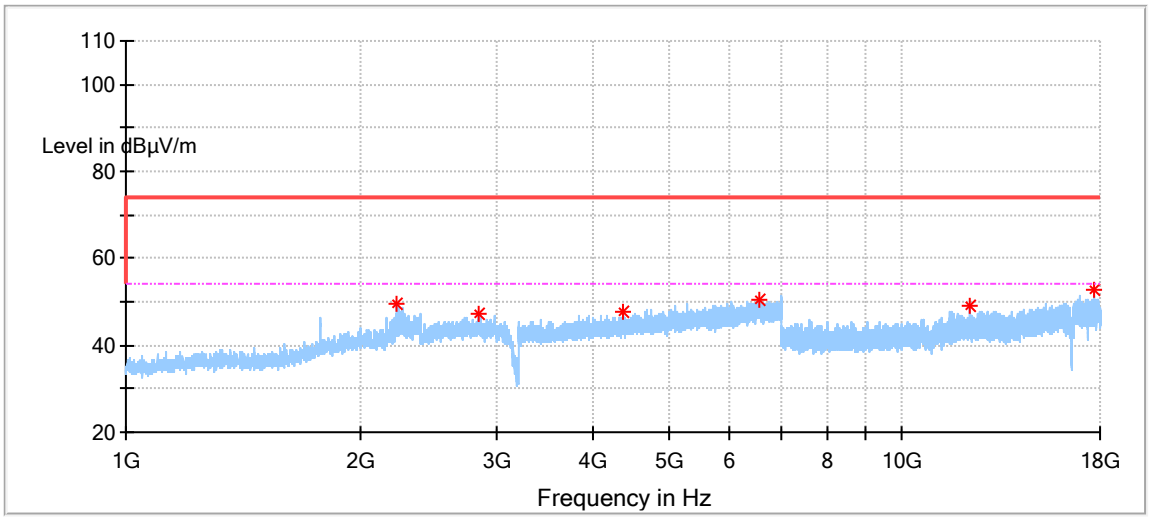
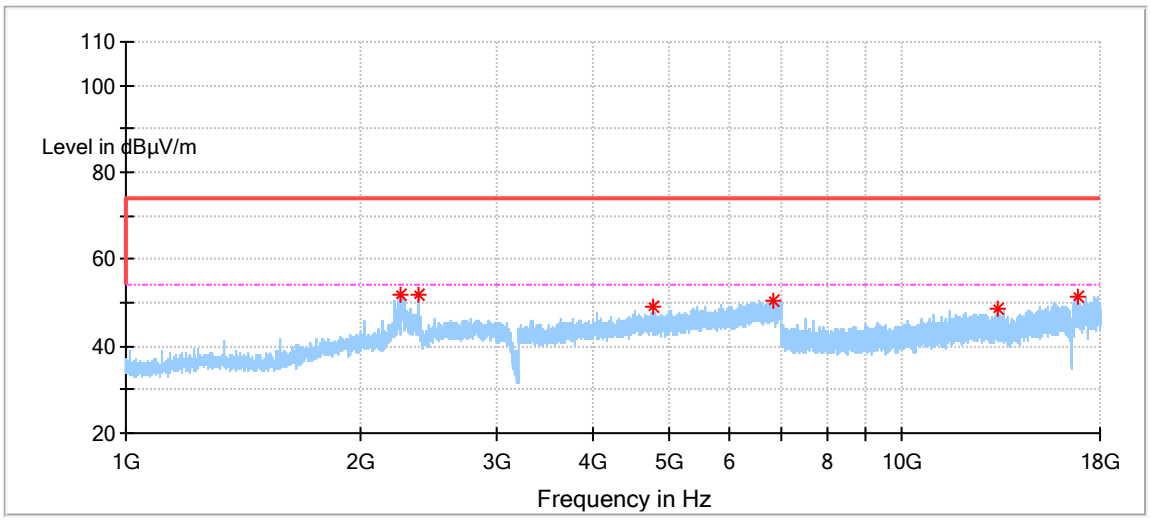
2437MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2238.500000*	49.50	74.00	24.50	150.0	H	294.0	-4.8
2849.000000	47.06	74.00	26.94	150.0	H	288.0	-3.0
4383.500000	47.90	74.00	26.10	150.0	H	118.0	2.9
6555.500000	50.61	74.00	23.39	150.0	H	198.0	6.7
12218.000000	48.90	74.00	25.10	150.0	H	100.0	9.6
17732.500000	52.67	74.00	21.33	150.0	H	295.0	17.7



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2262.000000*	51.82	74.00	22.18	150.0	V	265.0	-4.6
2389.000000*	51.91	74.00	22.09	150.0	V	15.0	-3.9
4769.500000*	48.96	74.00	25.04	150.0	V	172.0	2.7
6832.000000	50.45	74.00	23.55	150.0	V	113.0	7.0
13272.000000	48.76	74.00	25.24	150.0	V	29.0	9.8
16886.000000	51.44	74.00	22.56	150.0	V	47.0	16.8

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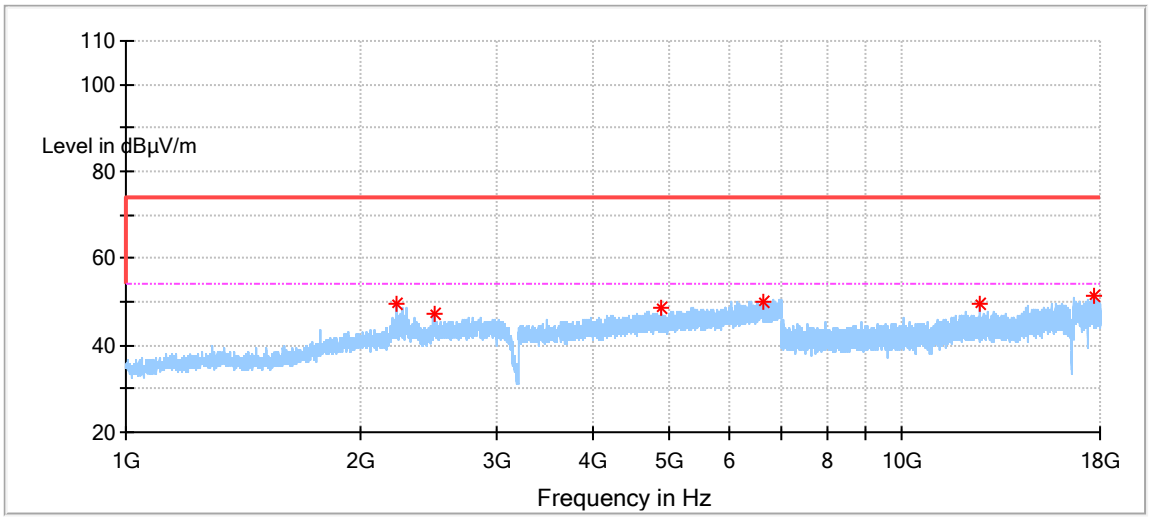
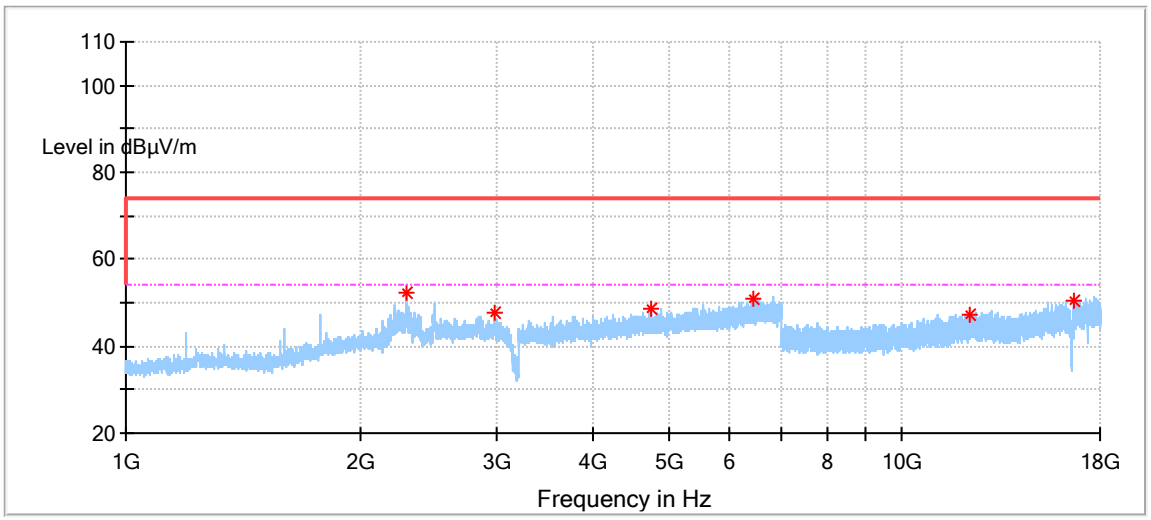
2462MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2227.500000*	49.34	74.00	24.66	150.0	H	4.0	-4.8
2494.500000*	47.43	74.00	26.57	150.0	H	211.0	-3.4
4886.500000*	48.39	74.00	25.61	150.0	H	36.0	2.7
6621.000000	50.01	74.00	23.99	150.0	H	212.0	6.7
12633.000000	49.37	74.00	24.63	150.0	H	279.0	10.1
17718.500000	51.52	74.00	22.48	150.0	H	123.0	17.8



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2303.000000	52.08	74.00	21.92	150.0	V	276.0	-4.3
2995.000000	47.65	74.00	26.35	150.0	V	0.0	-2.2
4747.500000*	48.70	74.00	25.30	150.0	V	262.0	3.0
6419.500000	50.80	74.00	23.20	150.0	V	125.0	6.2
12263.000000	47.08	74.00	26.92	150.0	V	243.0	9.6
16696.000000	50.65	74.00	23.35	150.0	V	298.0	16.6

Remark:

(1) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.

(2) Level=Reading Level + Correction Factor
Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)

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10 Test Equipment List

List of Test Instruments

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-14-001	101782	2020-6-28
LISN	Rohde & Schwarz	ENV216	68-4-87-14-002	100326	2020-6-28
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	2020-6-28
Test software	Rohde & Schwarz	EMC32	68-4-90-14-003-A10	Version9.15.00	N/A
Shielding Room	TDK	CSR	68-4-90-19-004	----	2020-7-19

RF Conducted Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
Communication Synthetical Test Instrument	Rohde & Schwarz	CMW 270	68-4-48-18-003	101251	2020-5-31
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	2020-6-28
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	68-4-93-14-003	101226/100851	2020-6-28
10dB Attenuator	Weinschel	4M-10	68-4-81-14-003	43152	2020-7-6
Test software	Rohde & Schwarz	EMC32	68-4-48-14-003-A10	Version 10.38.00	N/A
Test software	Tonscend	System for BT/WIFI	68-4-74-14-006-A13	Version 2.5.77.0418	N/A
Shielding Room	TDK	TS8997	68-4-90-19-003	----	2020-7-19

Radiated Spurious Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-003	101031	2020-6-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	68-4-80-14-003	708	2020-7-5
Horn Antenna	Rohde & Schwarz	HF907	68-4-80-14-004	102295	2020-7-5
Wideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	12827	2020-7-5
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	2020-7-7
Pre-amplifier	Rohde & Schwarz	SCU 18	68-4-29-14-001	102230	2020-6-28
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	2020-7-16
Fully Anechoic Chamber	TDK	8X4X4	68-4-90-14-002	--	2020-7-7
Test software	Rohde & Schwarz	EMC32	68-4-90-14-002-A10	Version 9.15.00	N/A

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11 System Measurement Uncertainty

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

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.80dB; Vertical: 4.87dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.59dB; Vertical: 4.58dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 5.05dB; Vertical: 5.04dB;
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.16dB Frequency test involved: 0.6×10^{-7} or 1%
Uncertainty Evaluation for Power Spectral Density Conducted measurement	1.17dB
Uncertainty Evaluation for Spurious emissions Conducted measurement	1.43dB

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