FCC - TEST REPORT

Report Number	:	**68.950.21.0153.01**	Date of Issue:	**2021-03-15**
Model	:	**MWB-S-WB01**		
Product Type	:	Bluetooth & 2.4GHz Wi-Fi dual band Communication Module		
Applicant	:	GD Midea Air-Conditioning Equipment Co., Ltd.		
Address	:	Lingang Road, Beijiao, Shunde 528311 Foshan, Guangdong PEOPLE'S REPUBLIC OF CHINA		
Manufacturer	:	GD Midea Air-Conditioning Equipment Co., Ltd.		
Address	:	Lingang Road, Beijiao, Shunde 528311 Foshan, Guangdong PEOPLE'S REPUBLIC OF CHINA		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**53**		

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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 518052 P.R. China
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299
FCC Registration No.:	514049
FCC Designation Number:	CA5009
IC Registration No.:	10320A

3 Description of the Equipment Under Test

Product:	Bluetooth & 2.4GHz Wi-Fi dual band Communication Module
Model no.:	MWB-S-WB01
FCC ID:	2ADQOMWB-SWB01
Options and accessories:	N/A
Rating:	5Vdc, 0.5A
RF Transmission Frequency:	2412MHz-2462MHz
No. of Operated Channel:	11
Modulation:	DSSS, OFDM
Antenna Type:	Integrated antenna
Antenna Gain:	2.0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Bluetooth & 2.4GHz Wi-Fi dual band Communication Module which support Bluetooth function and Wi-Fi operated and 2.4GHz.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2020 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 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 Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	10	Site 1	☒	☐	☐
§15.247 (b) (1)	Conducted peak output power	13	Site 1	☒	☐	☐
§15.247(a)(1)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Dwell Time	---	---	☐	☐	☒
§15.247(a)(2)	6dB bandwidth and 99% Occupied Bandwidth	14	Site 1	☒	☐	☐
§15.247(e)	Power spectral density	23	Site 1	☒	☐	☐
§15.247(d)	Spurious RF conducted emissions	27	Site 1	☒	☐	☐
§15.247(d)	Band edge	38	Site 1	☒	☐	☐
§15.247(d)	Spurious radiated emissions for transmitter	42	Site 1	☒	☐	☐
§15.203	Antenna requirement	See note 2		☒	☐	☐

Note 1: N/A=Not Applicable.
Note 2: The EUT uses an internal antenna, which gain is 2.0dBi. In accordance 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: 2ADQOMWB-SWB01 complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules.

This report is for 2.4GHz Wi-Fi only.

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:	2021-02-01
Testing Start Date:	2021-02-01
Testing End Date:	2021-03-10

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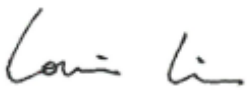
Reviewed by:	Prepared by:	Tested by:
		
John Zhi	Warlen Song	Louise Liu
Project Manager	Project Engineer	Test Engineer

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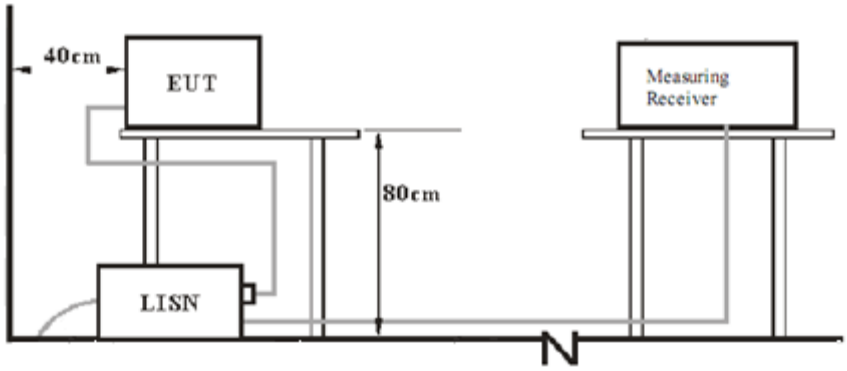
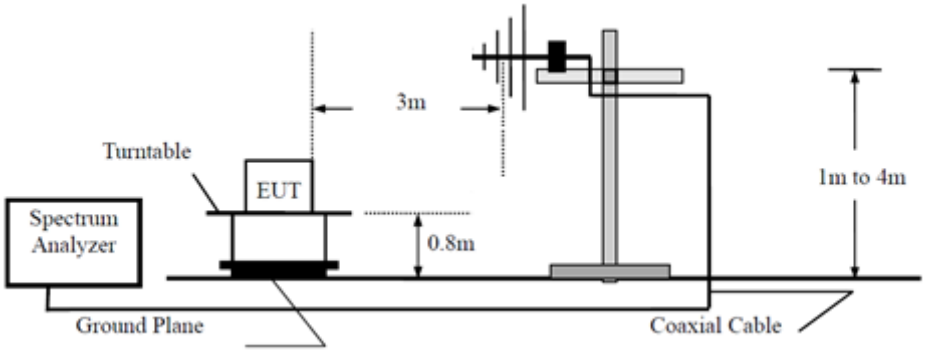
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

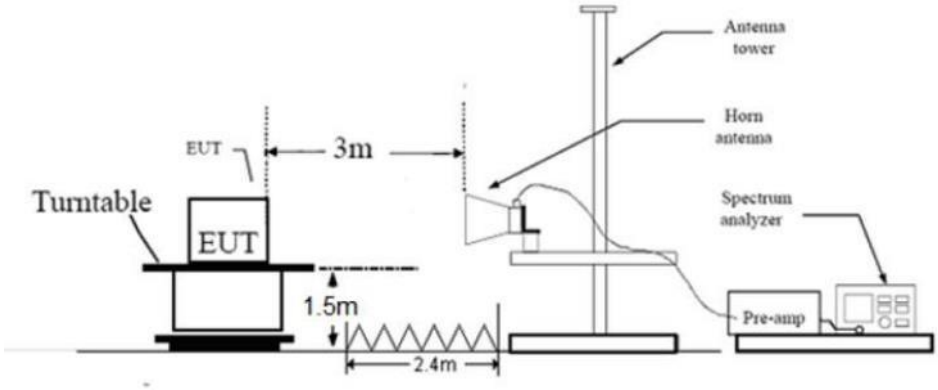


7.2 Radiated test setups

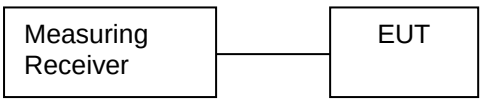
Below 1GHz



Above 1GHz



7.3 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
PC	Lenovo	X240	---
Adapter	Apple	A1442	---

The system was configured to non-hopping mode.

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.

Through pre-scan all kind of modulation and all kind of rates, find the 1Mbps of rate is the worst case of 802.11b; the 6Mbps of rate is the worst case of 802.11g; the 6.5Mbps of rate is the worst case of 802.11n20; only the worst case transmitter rate data mode in recorded in the report.

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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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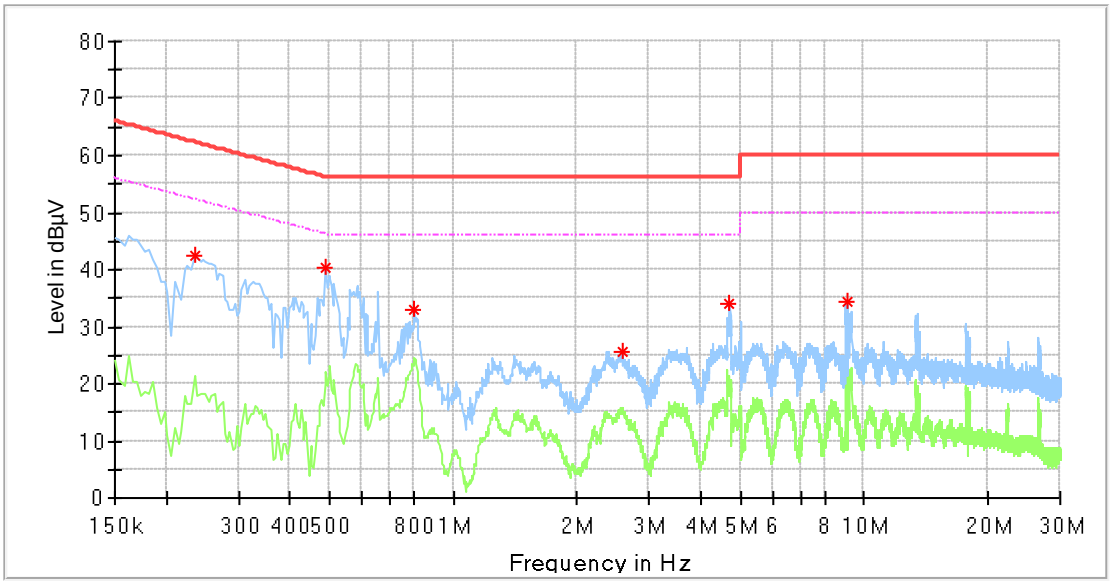
Conducted Emission

Product Type	:	Bluetooth & 2.4GHz Wi-Fi dual band Communication Module
M/N	:	MWB-S-WB01
Operating Condition	:	Transmit
Test Specification	:	Power Line, Live
Comment	:	AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.234000	42.39	---	62.31	19.92	L1	10.31
0.486000	40.34	---	56.24	15.89	L1	10.33
0.806000	33.10	---	56.00	22.90	L1	10.34
2.570000	25.76	---	56.00	30.24	L1	10.40
4.714000	34.17	---	56.00	21.83	L1	10.51
9.054000	34.22	---	60.00	25.78	L1	10.71

Remark：
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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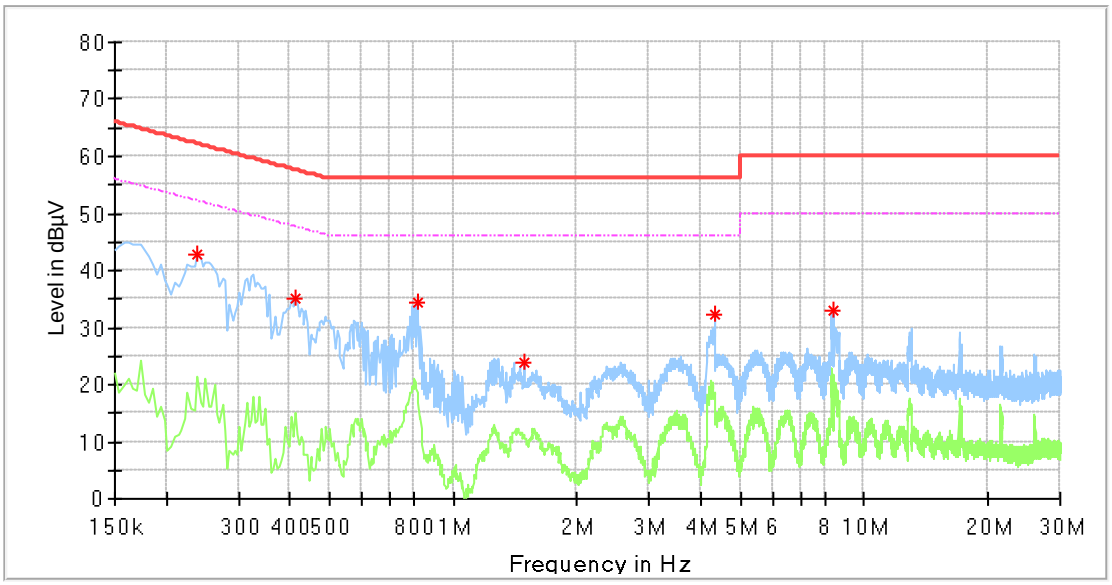
Conducted Emission

Product Type	:	Bluetooth & 2.4GHz Wi-Fi dual band Communication Module
M/N	:	MWB-S-WB01
Operating Condition	:	Transmit
Test Specification	:	Power Line, Neutral
Comment	:	AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.238000	42.64	---	62.17	19.53	N	10.33
0.414000	35.06	---	57.57	22.51	N	10.33
0.818000	34.32	---	56.00	21.68	N	10.35
1.486000	23.84	---	56.00	32.16	N	10.38
4.318000	32.46	---	56.00	23.54	N	10.51
8.386000	32.81	---	60.00	27.19	N	10.74

Remark：
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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9.2 Conducted peak output power

Test Method

1. The RF output of EUT was connected to the power meter by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following test receiver settings:
   Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
   RBW > the 20dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power and record the results in the test report.
5. Repeat above procedures until all frequencies measured were complete.

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

Test result as below table

Test Mode	Antenna	Channel(MHz)	Result(dBm)	Limit(dBm)	Verdict
11B	Ant1	2412	17.10	<=30	PASS
		2437	16.80	<=30	PASS
		2462	16.20	<=30	PASS
11G	Ant1	2412	16.50	<=30	PASS
		2437	16.20	<=30	PASS
		2462	15.90	<=30	PASS
11N20SISO	Ant1	2412	16.40	<=30	PASS
		2437	16.00	<=30	PASS
		2462	15.70	<=30	PASS

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9.3 6dB bandwidth and 99% Occupied Bandwidth

Test Method for 6 dB Bandwidth

1. Use the following spectrum analyzer settings:
RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Test Method for 99 % Bandwidth

1. Use the following spectrum analyzer settings:
RBW=1% to 5% of the actual occupied, VBW≥3RBW, Sweep = auto,
Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]
≥500

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6dB Bandwidth

TestMode	Antenna	Channel[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.160	2408.400	2416.560	0.5	PASS
		2437	9.120	2432.440	2441.560	0.5	PASS
		2462	9.120	2457.440	2466.560	0.5	PASS
11G	Ant1	2412	16.440	2403.760	2420.200	0.5	PASS
		2437	16.440	2428.760	2445.200	0.5	PASS
		2462	16.440	2453.760	2470.200	0.5	PASS
11N20SISO	Ant1	2412	17.800	2403.120	2420.920	0.5	PASS
		2437	17.400	2428.400	2445.800	0.5	PASS
		2462	17.800	2453.120	2470.920	0.5	PASS

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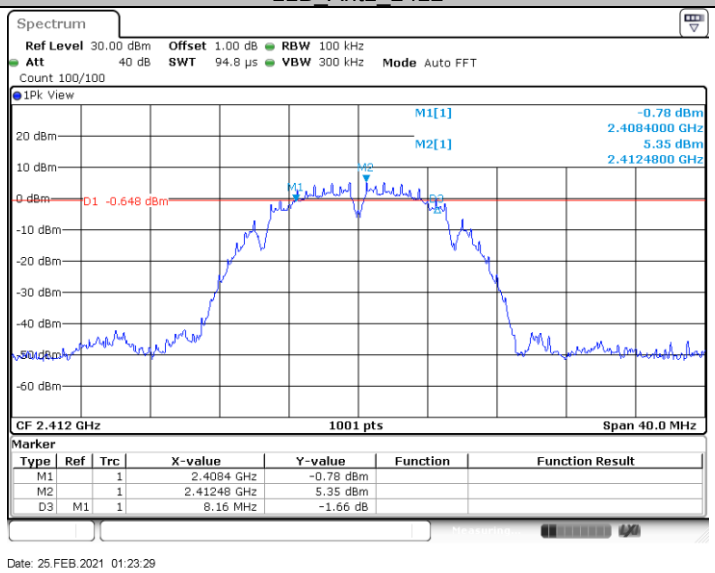

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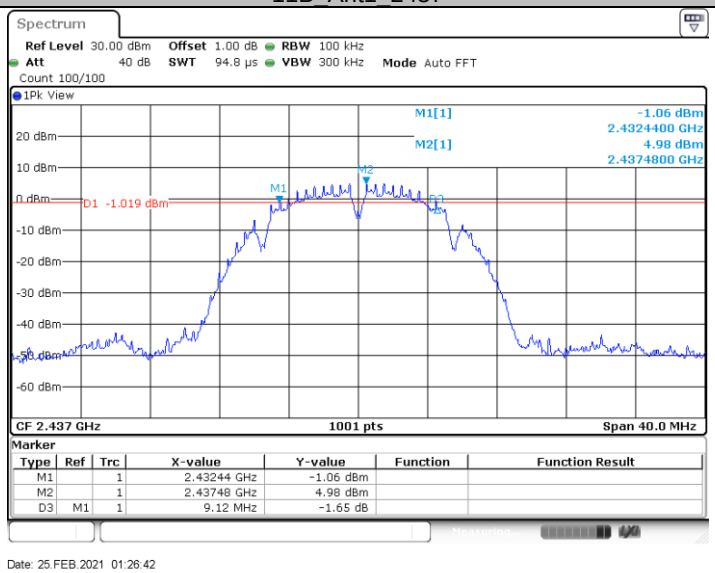

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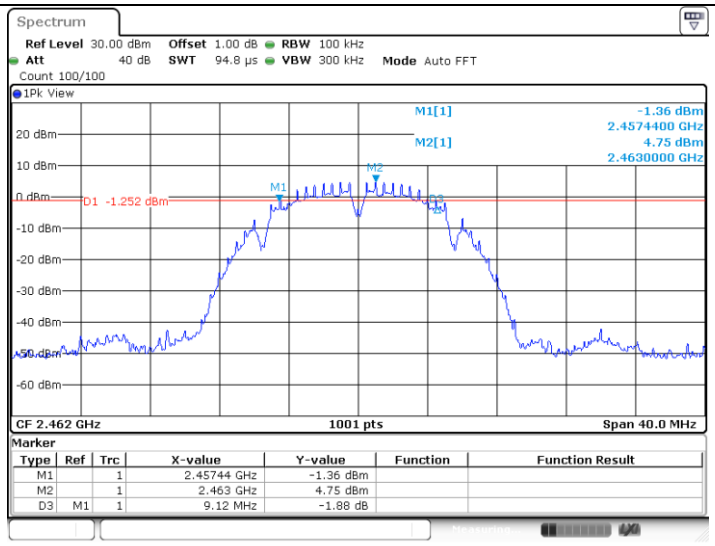

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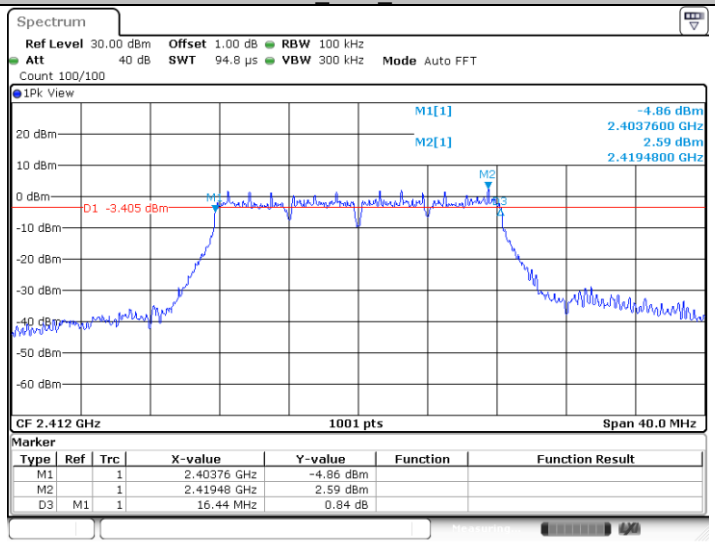

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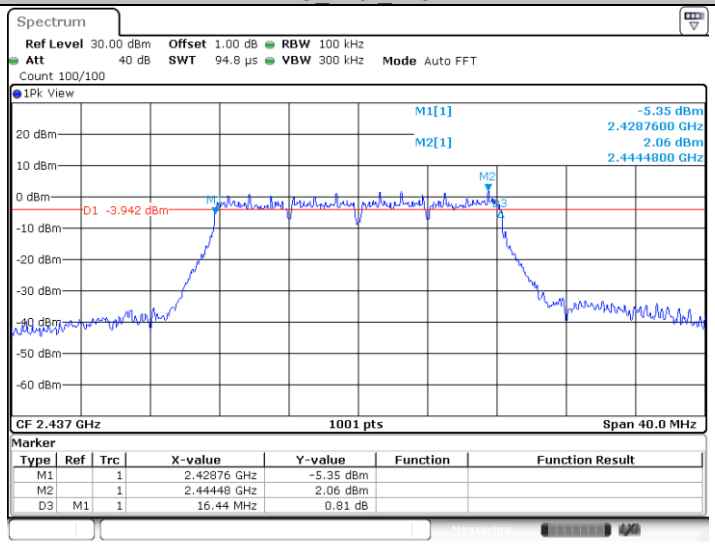

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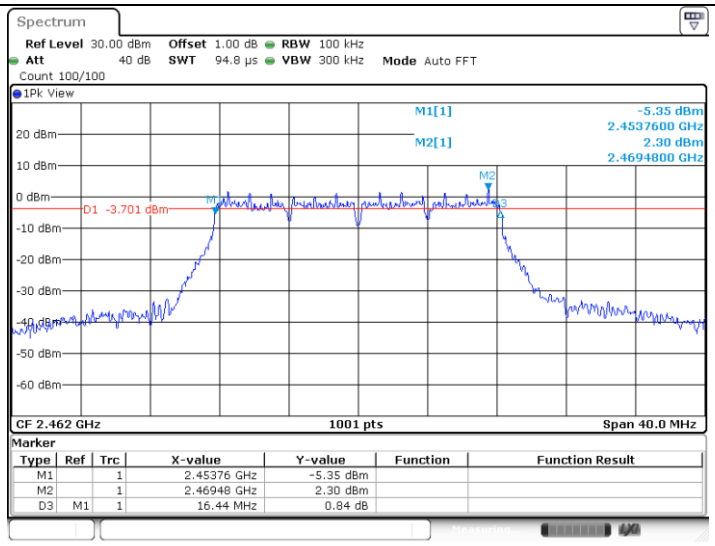

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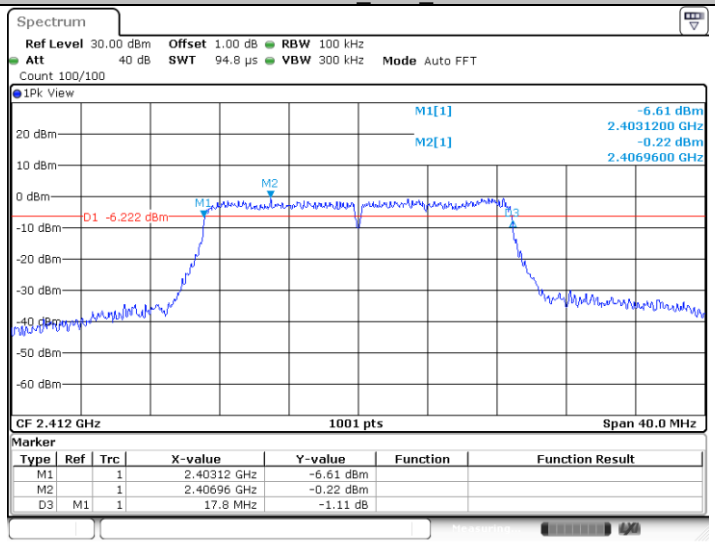

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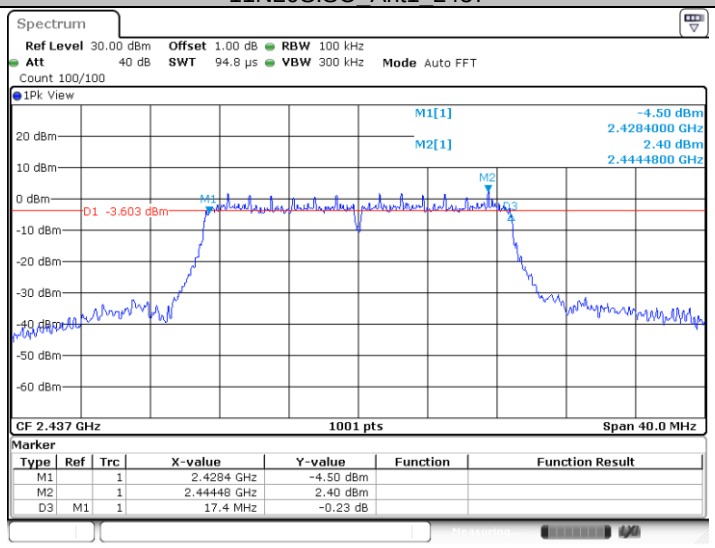

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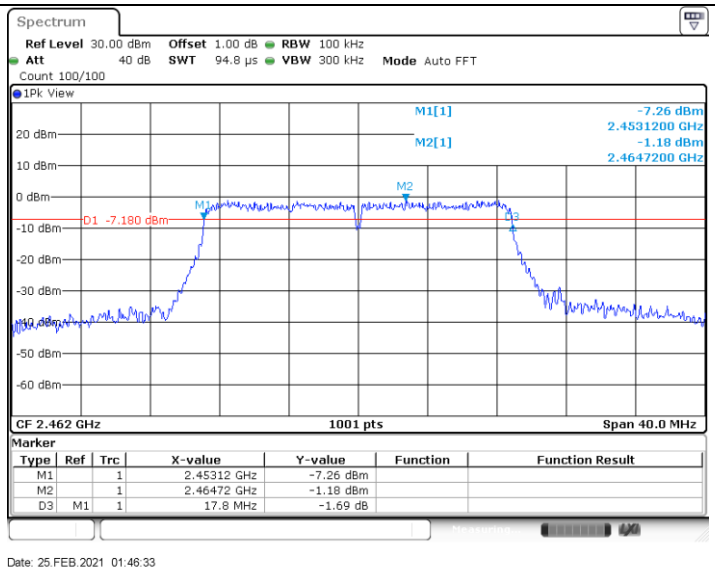

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99% Bandwidth

TestMode	Antenna	Channel[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	12.068	2406.006	2418.074	---	PASS
		2437	12.108	2430.966	2443.074	---	PASS
		2462	12.188	2455.926	2468.114	---	PASS
11G	Ant1	2412	17.423	2403.369	2420.791	---	PASS
		2437	17.383	2428.329	2445.711	---	PASS
		2462	17.343	2453.369	2470.711	---	PASS
11N20SISO	Ant1	2412	18.142	2403.009	2421.151	---	PASS
		2437	18.142	2427.969	2446.111	---	PASS
		2462	18.142	2452.929	2471.071	---	PASS

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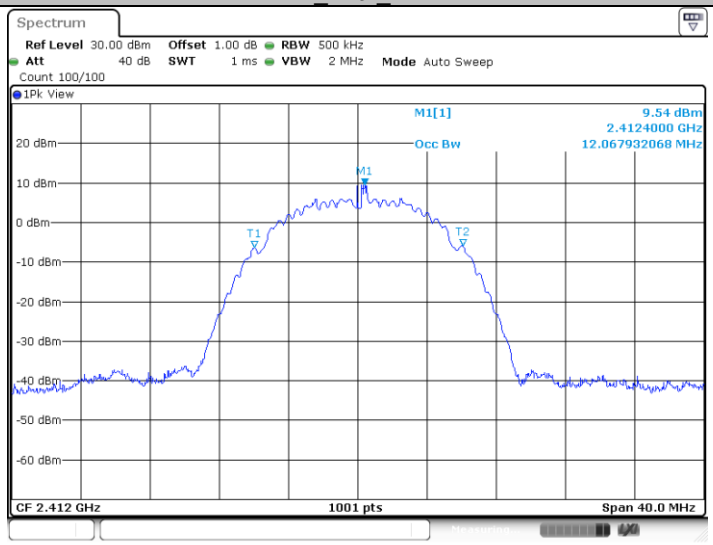

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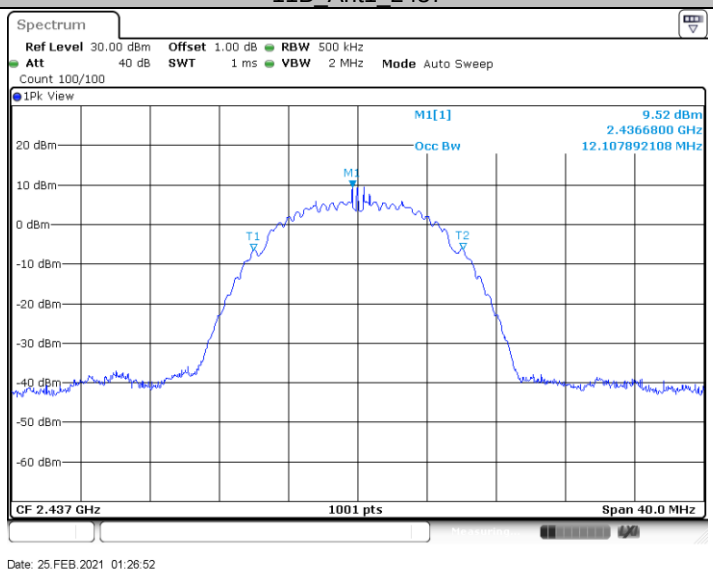

11B_Ant1_2462

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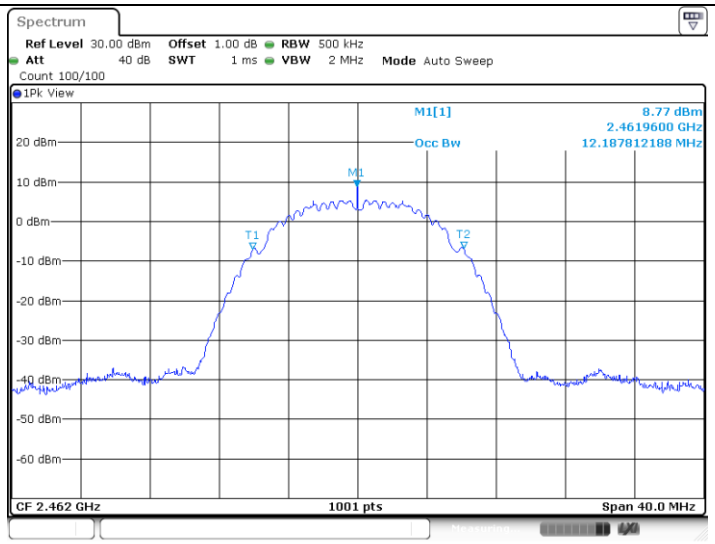

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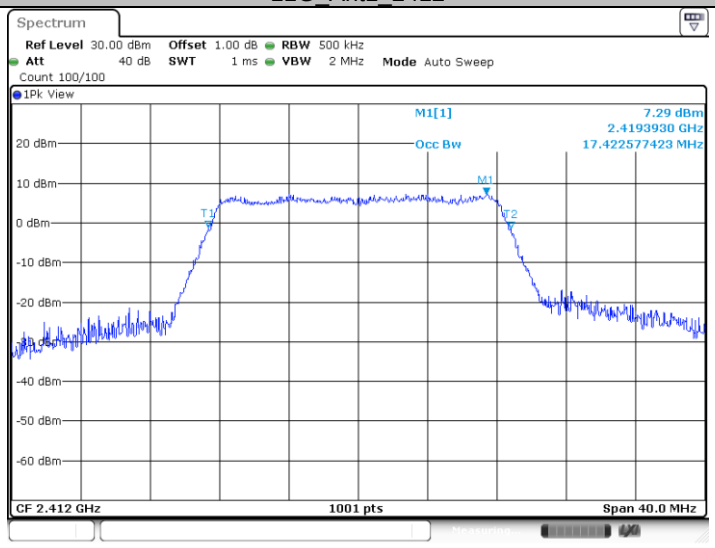

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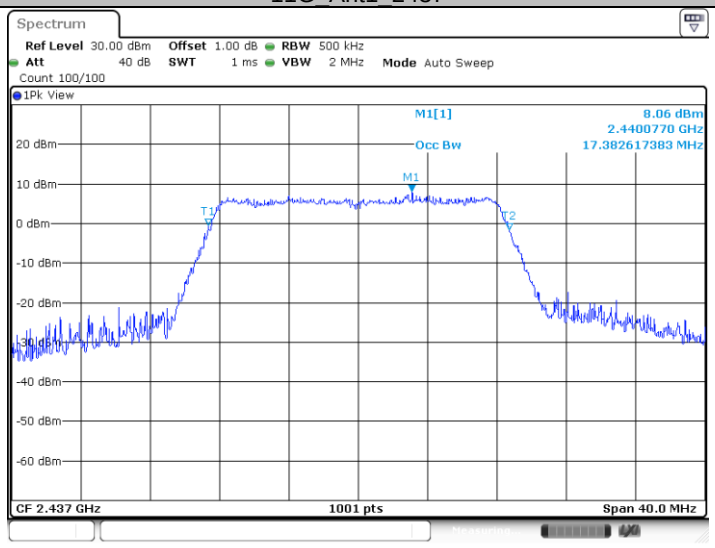

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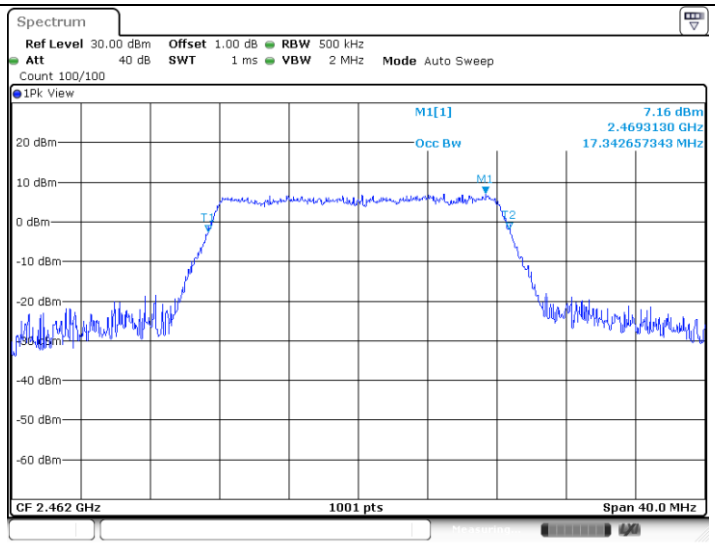

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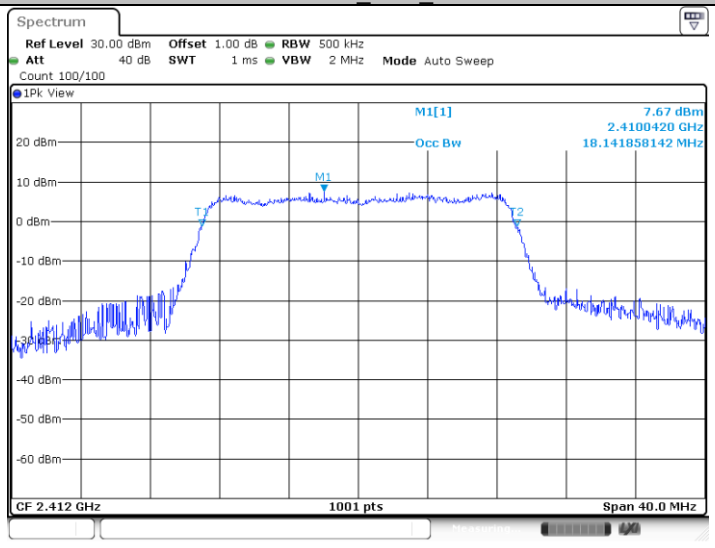

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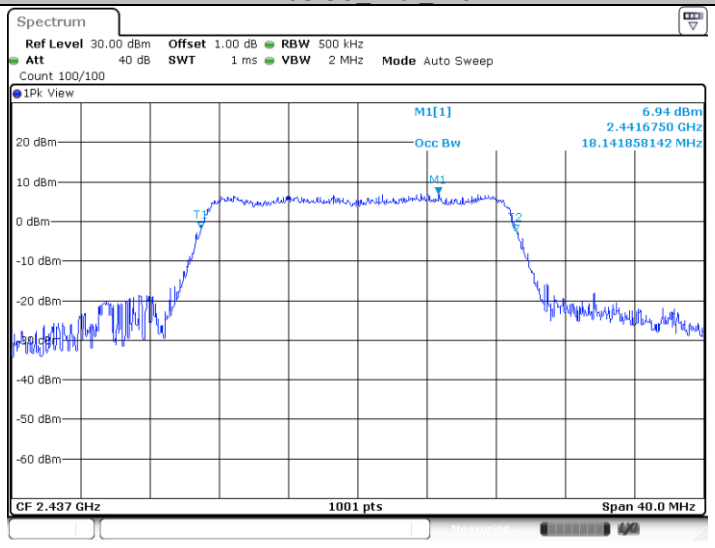

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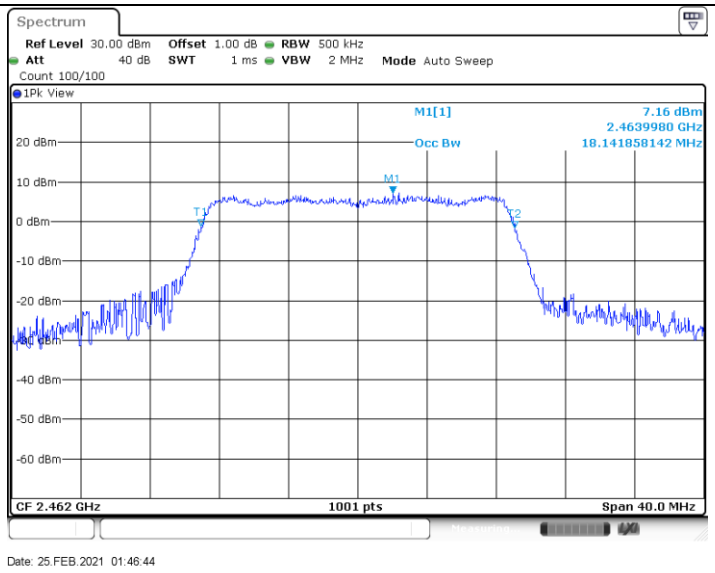

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9.4 Power spectral density

Test Method

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

1. The RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
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

TestMode	Antenna	Channel(MHz)	Result(dBm/3KHz)	Limit(dBm/3KHz)	Verdict
11B	Ant1	2412	-6.77	<=8	PASS
		2437	-7.02	<=8	PASS
		2462	-7.50	<=8	PASS
11G	Ant1	2412	-11.95	<=8	PASS
		2437	-12.07	<=8	PASS
		2462	-11.60	<=8	PASS
11N20SISO	Ant1	2412	-11.35	<=8	PASS
		2437	-11.73	<=8	PASS
		2462	-11.56	<=8	PASS

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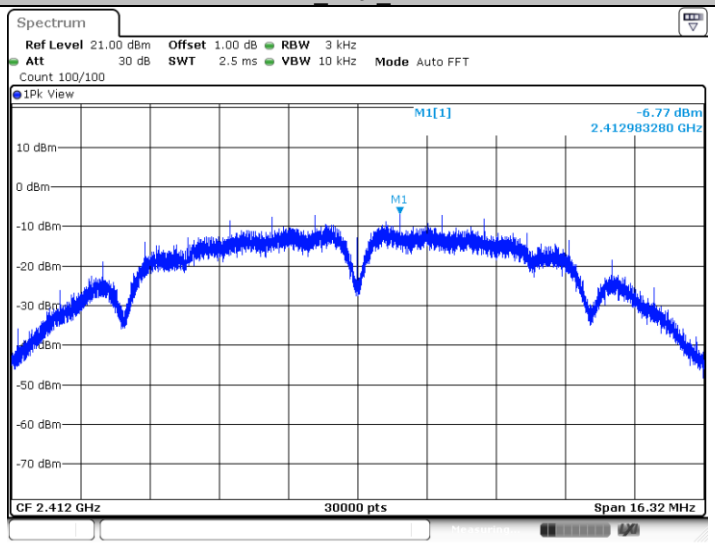 Date: 25.FEB.2021 01:23:52
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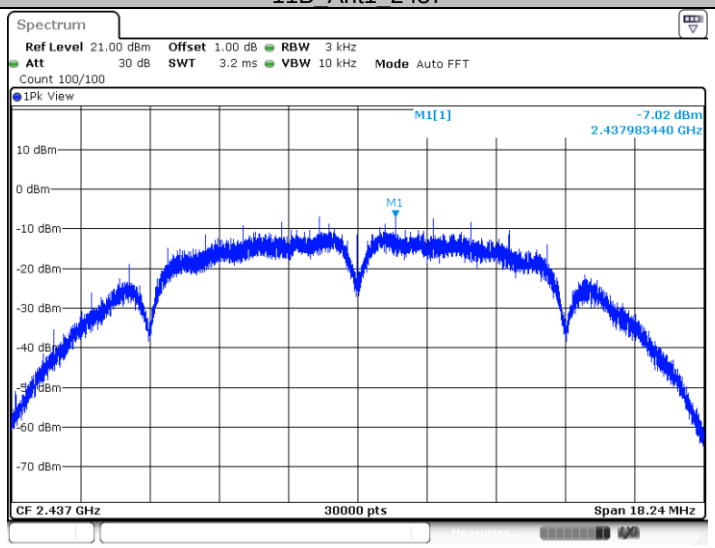 Date: 25.FEB.2021 01:27:04
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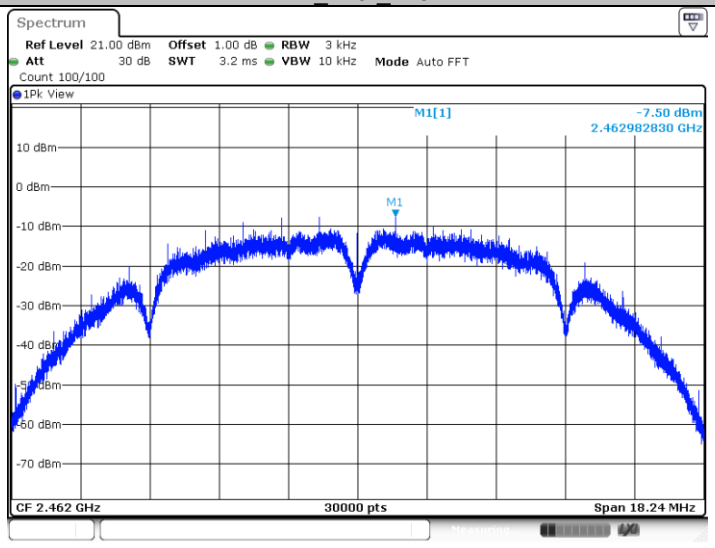 Date: 25.FEB.2021 01:29:23

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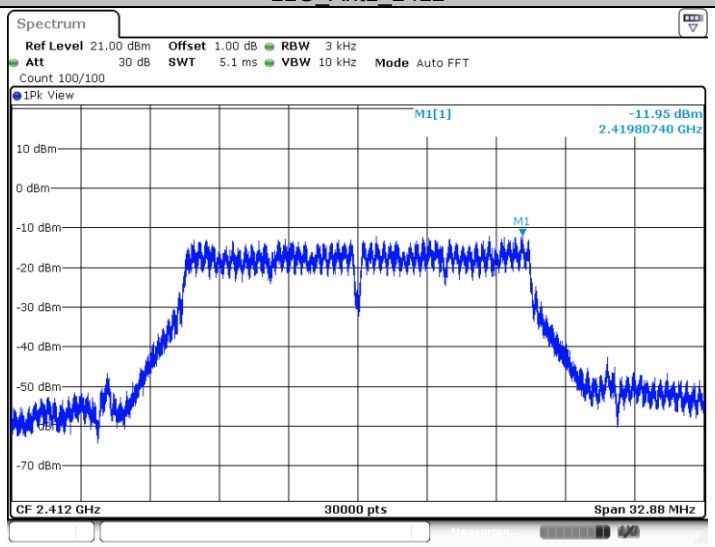 Date: 25.FEB.2021 01:32:18
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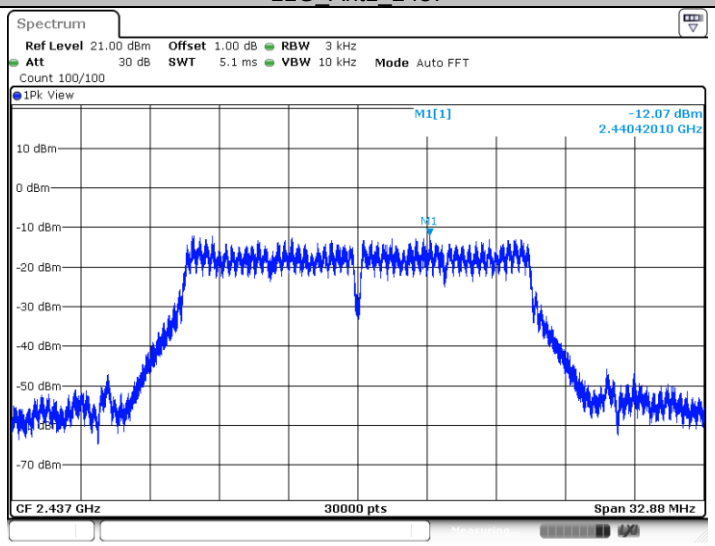 Date: 25.FEB.2021 01:35:32
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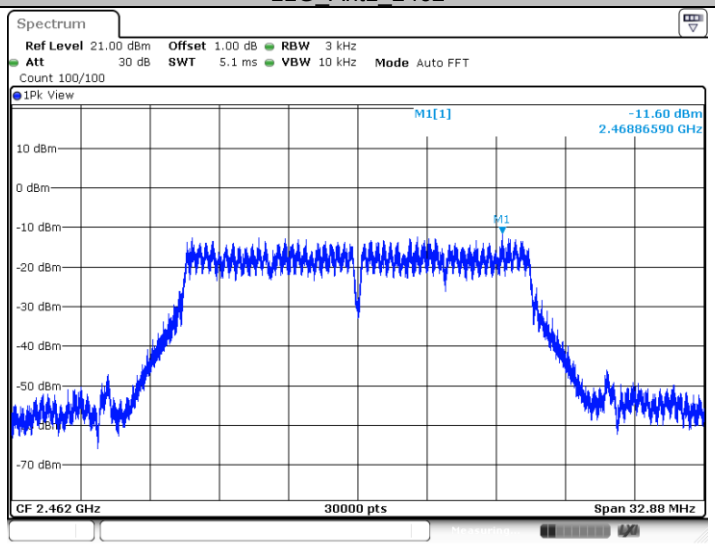 Date: 25.FEB.2021 01:37:29
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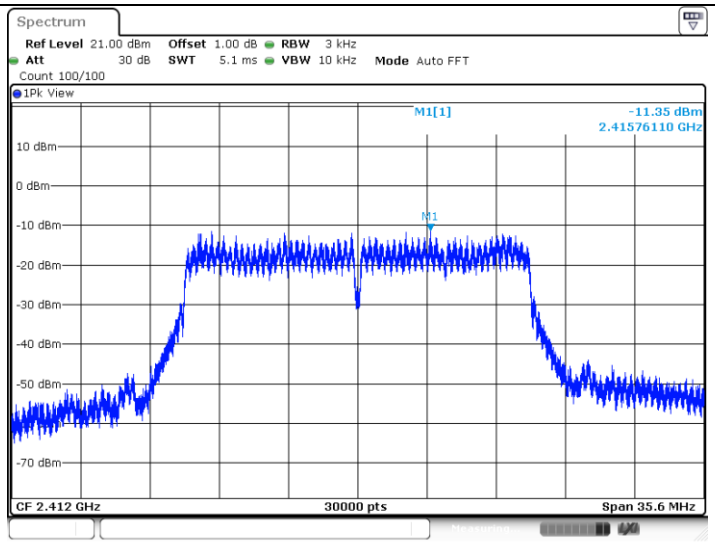

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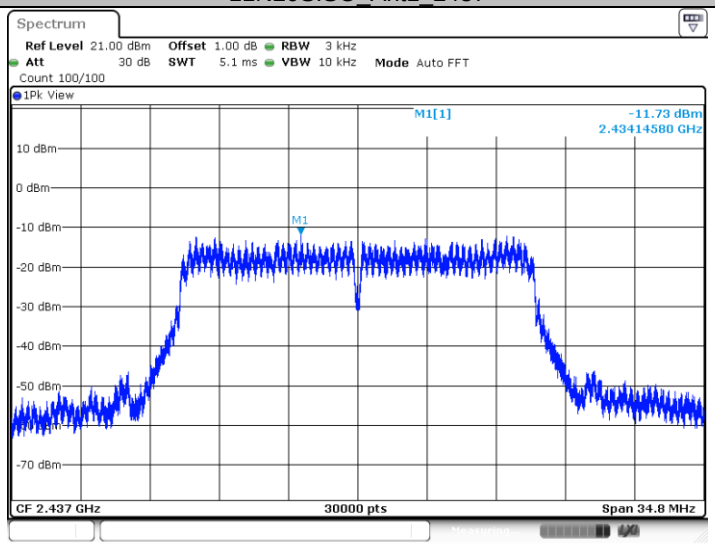

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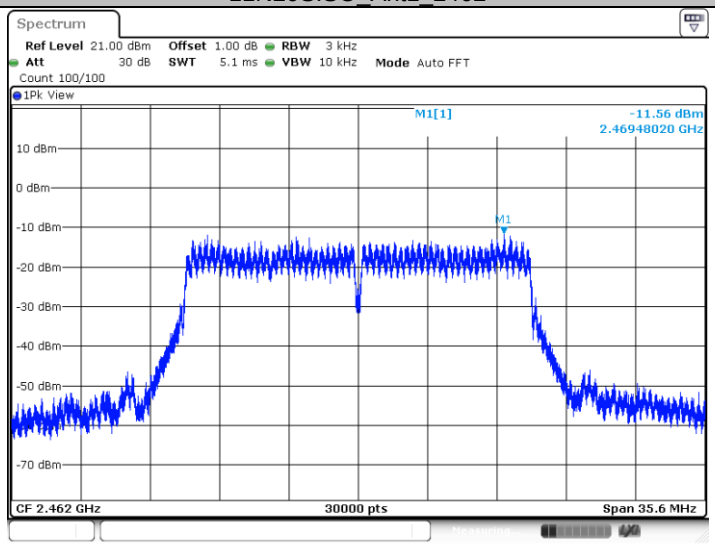

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9.5 Spurious RF conducted emissions

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
3. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
4. The level displayed must comply with the limit specified in this Section. Submit these plots.
5. Repeat above procedures until all frequencies measured were complete.

Limit

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

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Spurious RF conducted emissions

TestMode	Antenna	Channel	FreqRange(MHz)	RefLevel	Result(dBm)	Limit(dBm)	Verdict
11B	Ant1	2412	Reference	5.42 dBm	5.42	---	PASS
			30~1000	30~1000 MHz	-65.22	<=-14.58	PASS
			1000~26500	1000~26500 MHz	-40.95	<=-14.58	PASS
		2437	Reference	5.12 dBm	5.12	---	PASS
			30~1000	30~1000 MHz	-65.29	<=-14.88	PASS
			1000~26500	1000~26500 MHz	-42.65	<=-14.88	PASS
		2462	Reference	3.48 dBm	3.48	---	PASS
			30~1000	30~1000 MHz	-64.6	<=-16.52	PASS
			1000~26500	1000~26500 MHz	-42.84	<=-16.52	PASS
11G	Ant1	2412	Reference	1.73 dBm	1.73	---	PASS
			30~1000	30~1000 MHz	-68.37	<=-18.27	PASS
			1000~26500	1000~26500 MHz	-38.04	<=-18.27	PASS
		2437	Reference	-1.10 dBm	-1.10	---	PASS
			30~1000	30~1000 MHz	-68.42	<=-21.1	PASS
			1000~26500	1000~26500 MHz	-52.02	<=-21.1	PASS
		2462	Reference	1.21 dBm	1.21	---	PASS
			30~1000	30~1000 MHz	-67.91	<=-18.79	PASS
			1000~26500	1000~26500 MHz	-46.81	<=-18.79	PASS
11N20SISO	Ant1	2412	Reference	1.26 dBm	1.26	---	PASS
			30~1000	30~1000 MHz	-67.3	<=-18.74	PASS
			1000~26500	1000~26500 MHz	-36.89	<=-18.74	PASS
		2437	Reference	1.51 dBm	1.51	---	PASS
			30~1000	30~1000 MHz	-67.62	<=-18.49	PASS
			1000~26500	1000~26500 MHz	-51.55	<=-18.49	PASS
		2462	Reference	-0.14 dBm	-0.14	---	PASS
			30~1000	30~1000 MHz	-67.57	<=-20.14	PASS
			1000~26500	1000~26500 MHz	-46.57	<=-20.14	PASS

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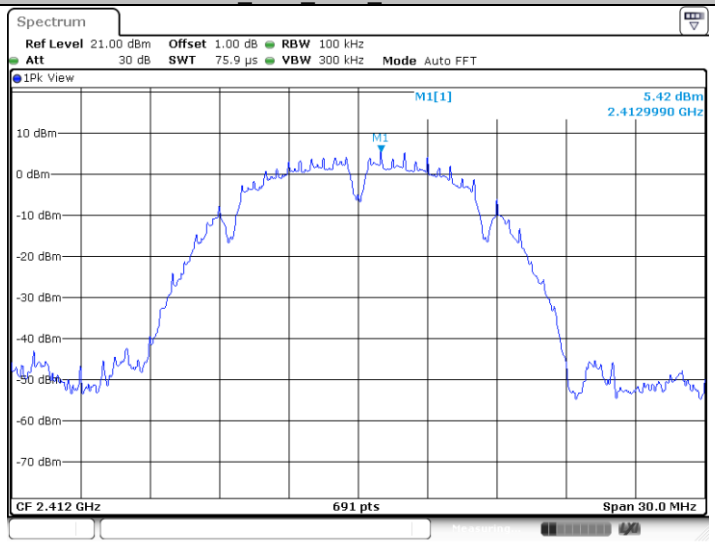

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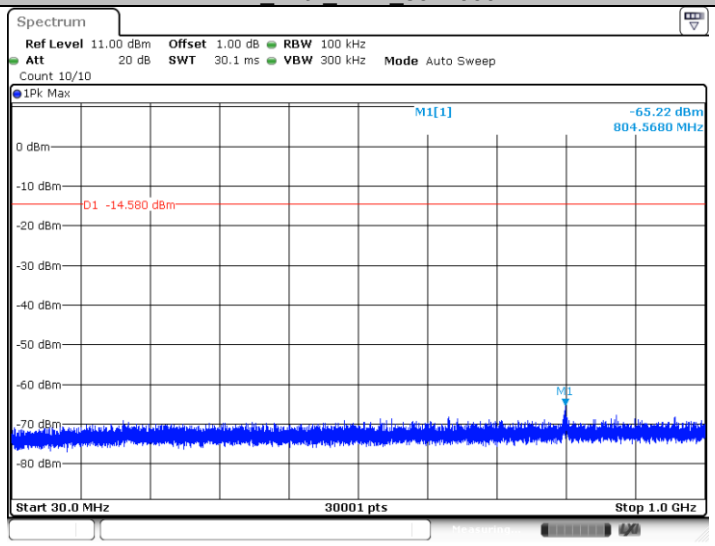
11B_Ant1_2412_30~1000



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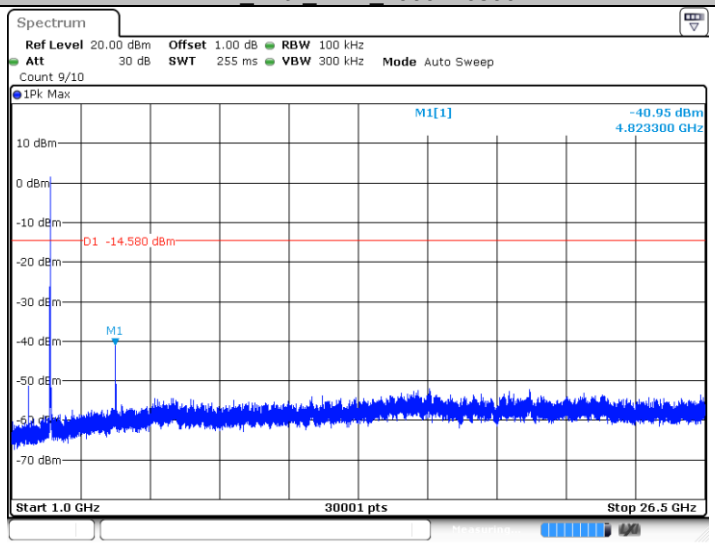

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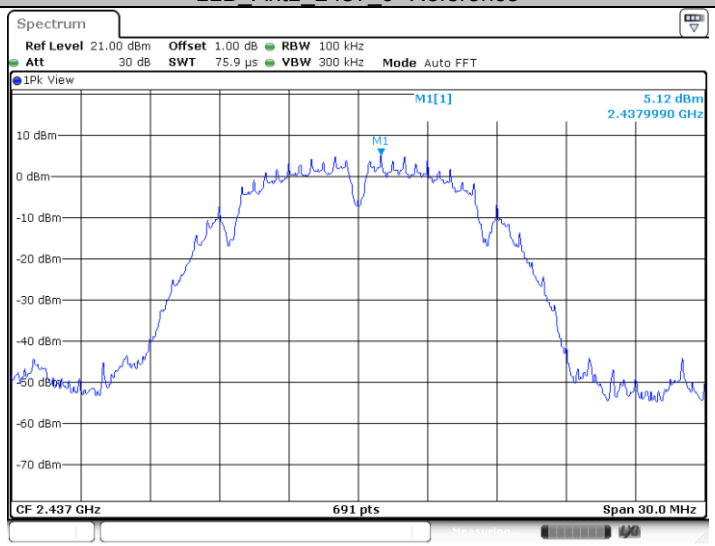
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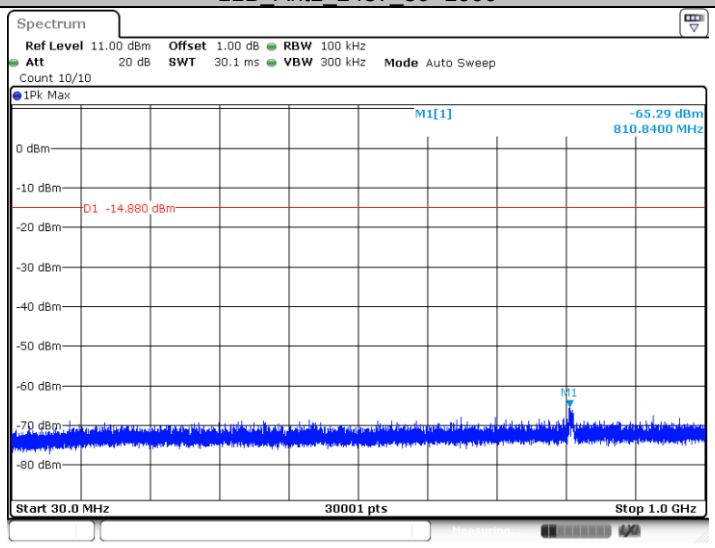
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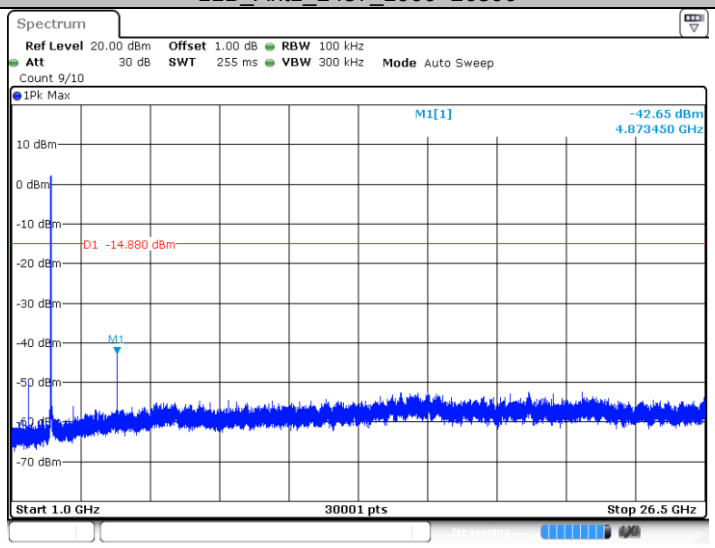
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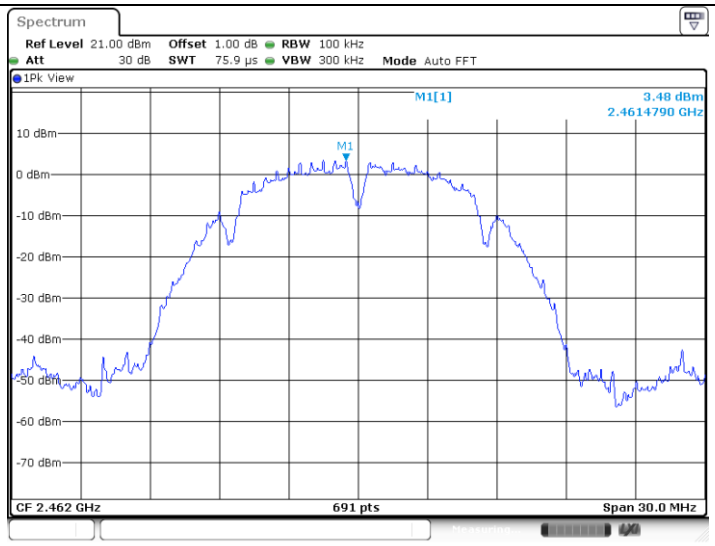

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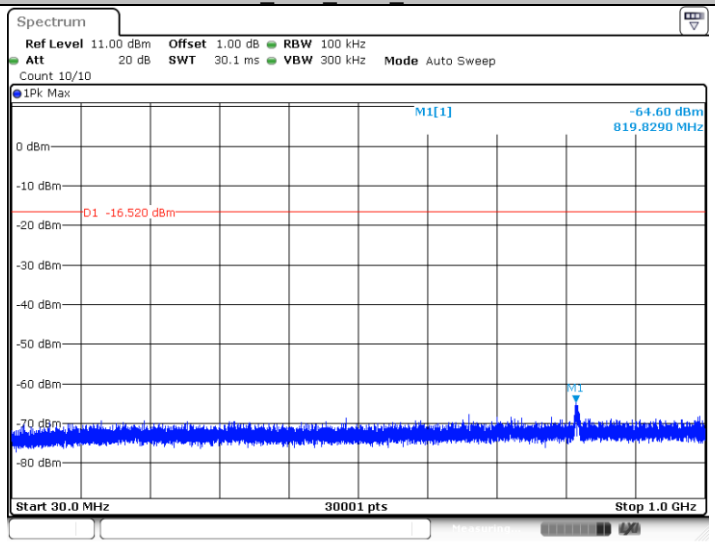

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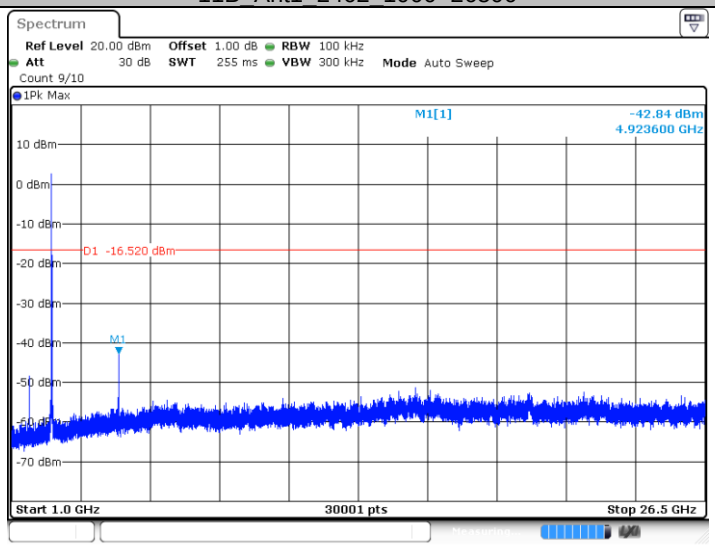

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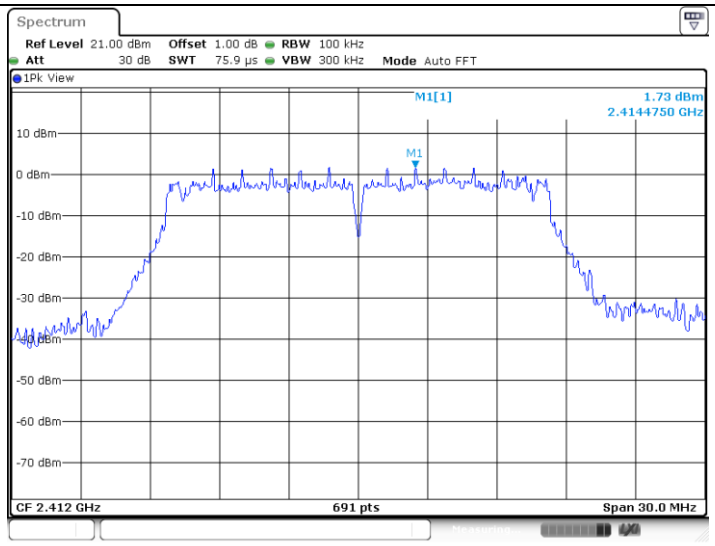

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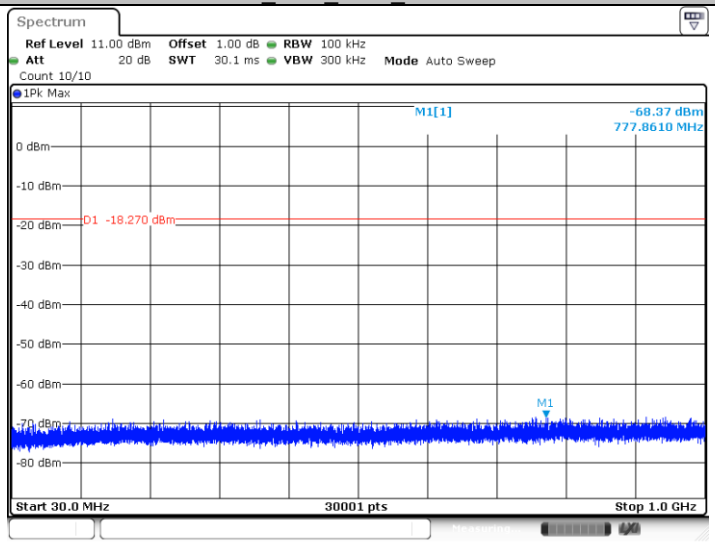

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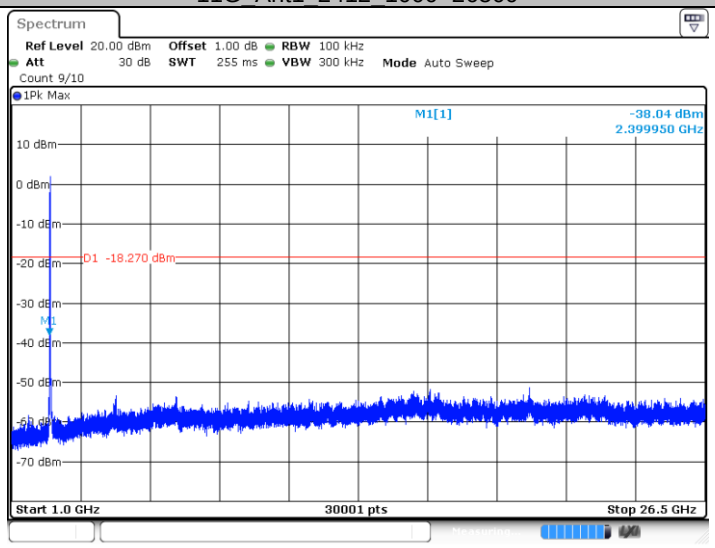

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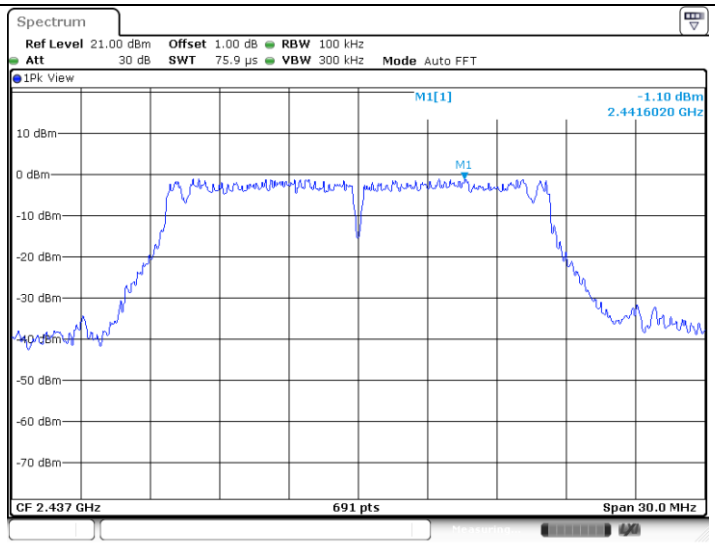

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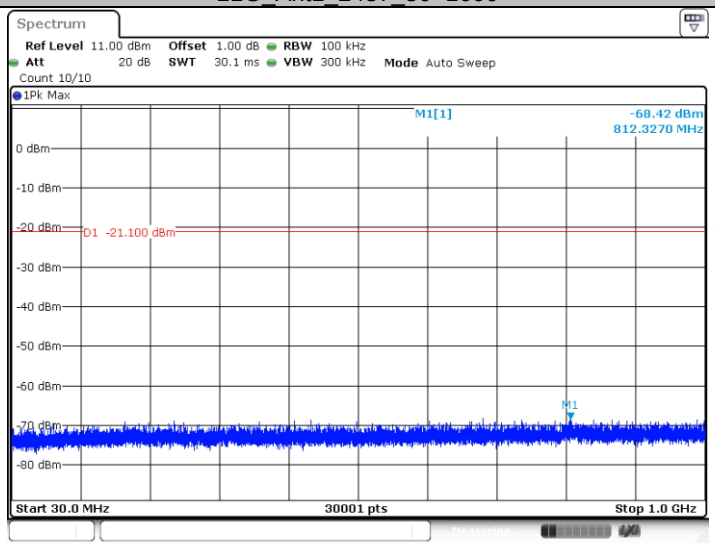

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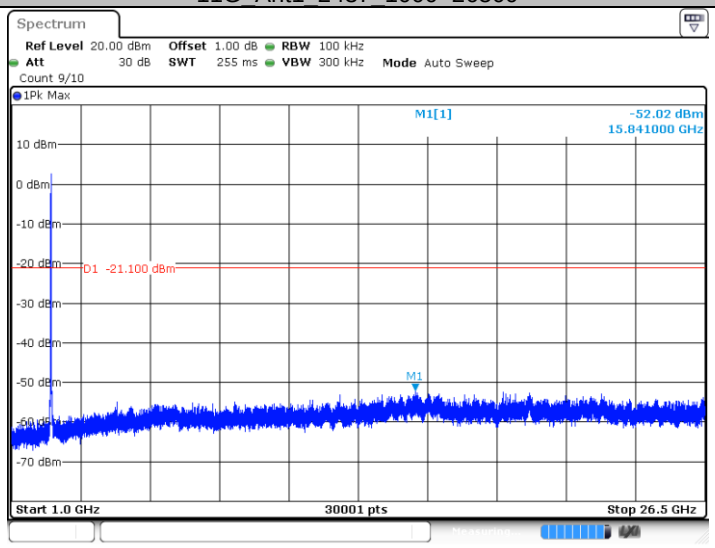

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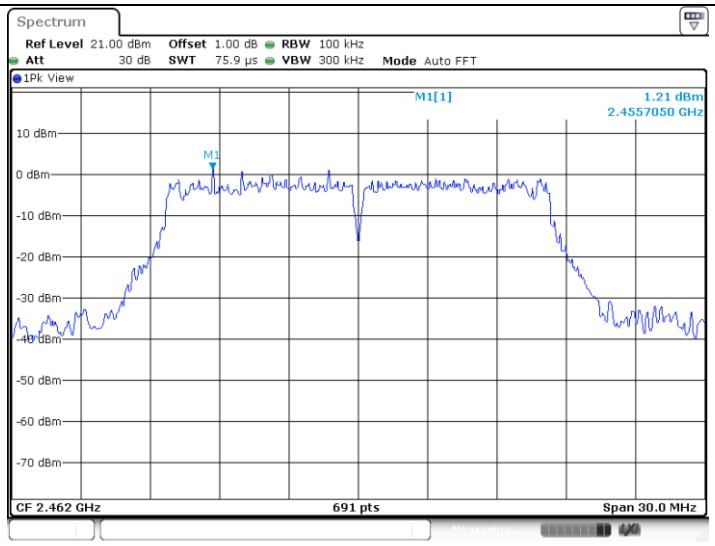

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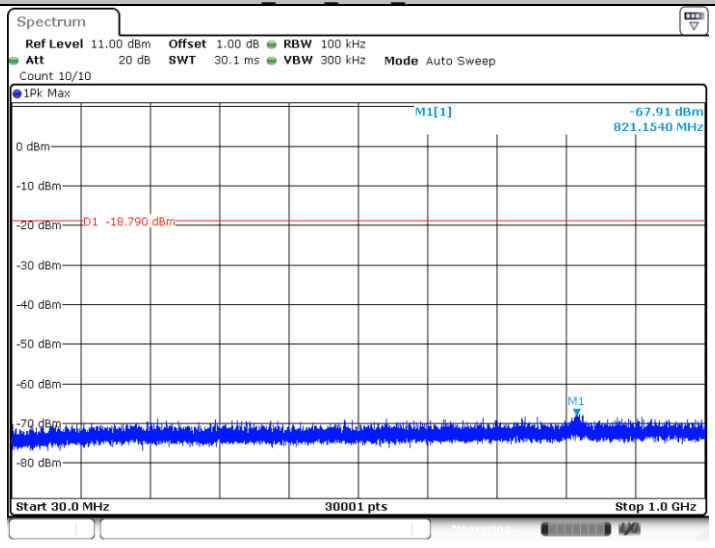

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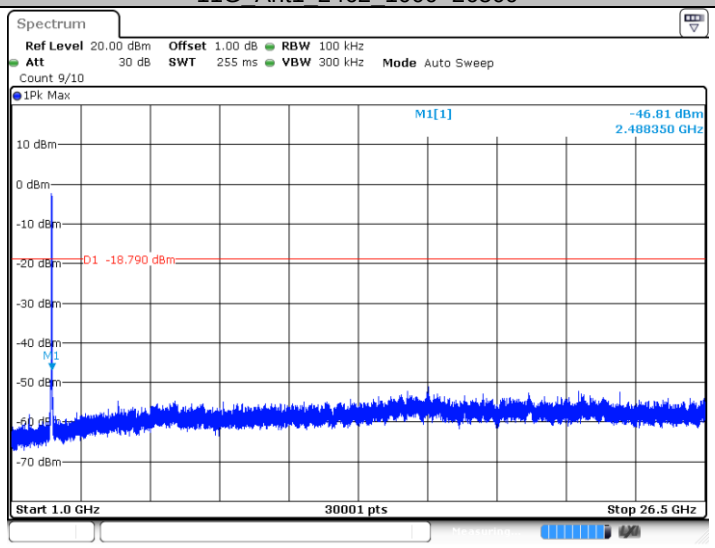

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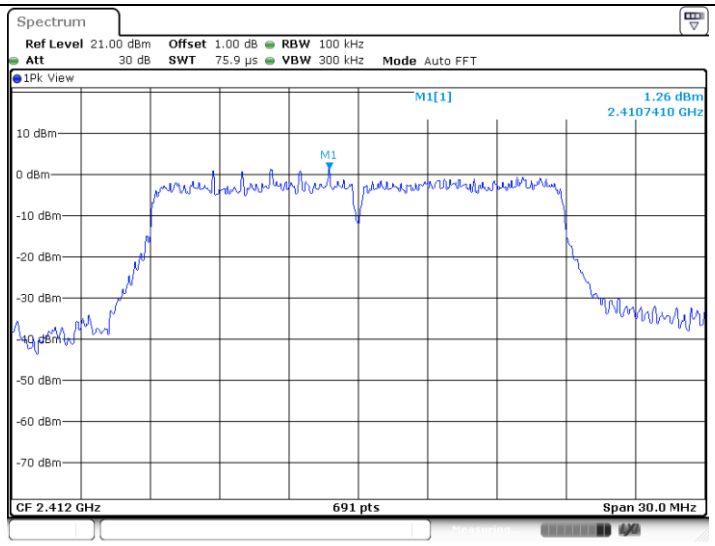

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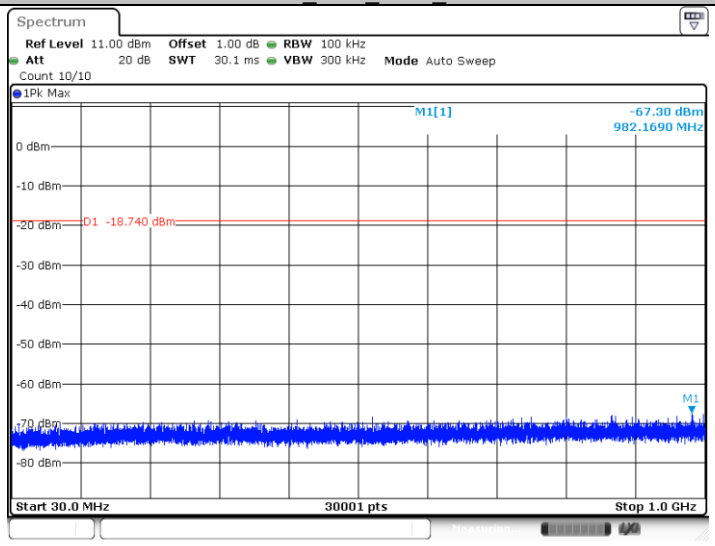

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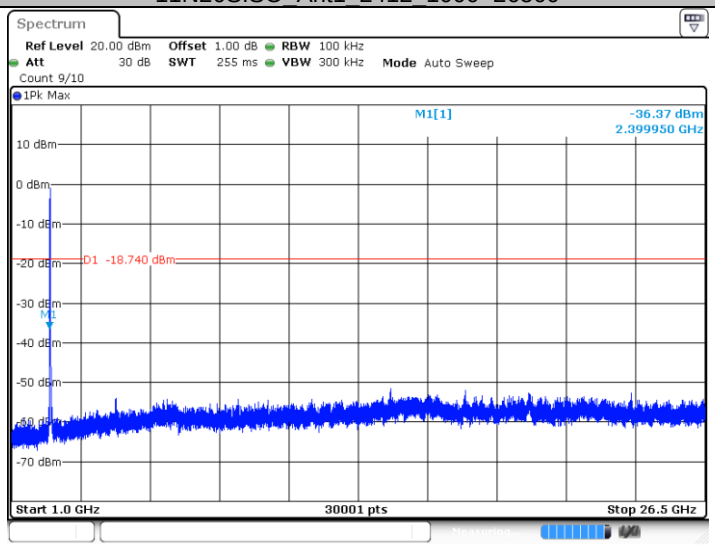

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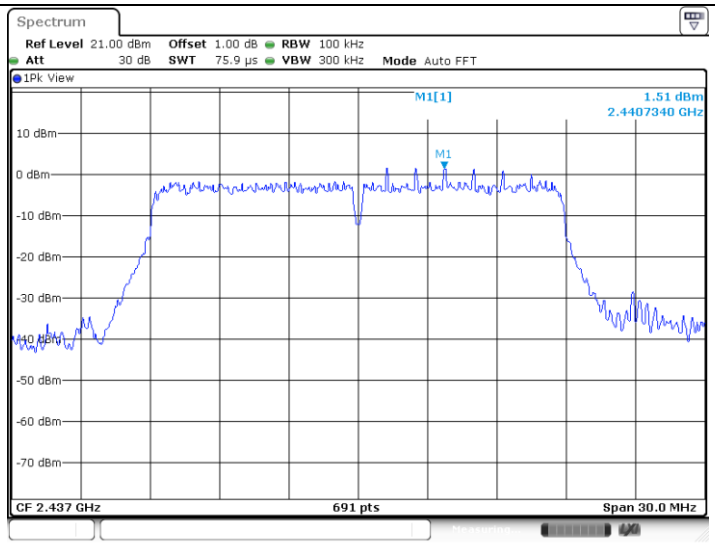
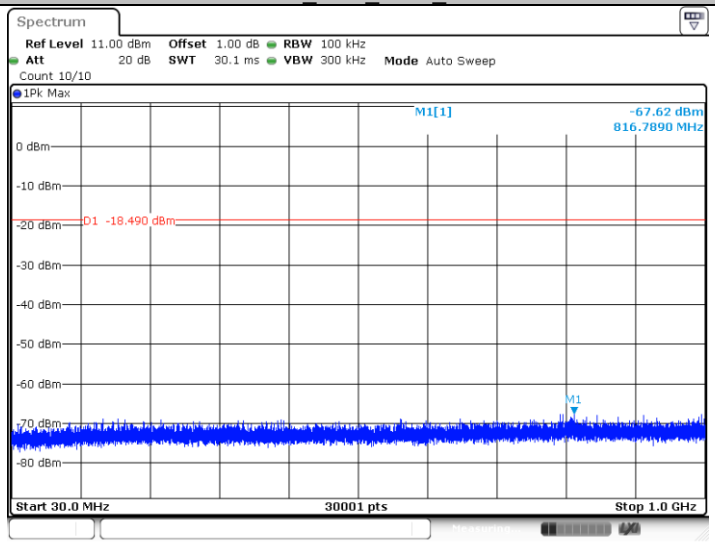


11N20SISO_Ant1_2437_30~1000



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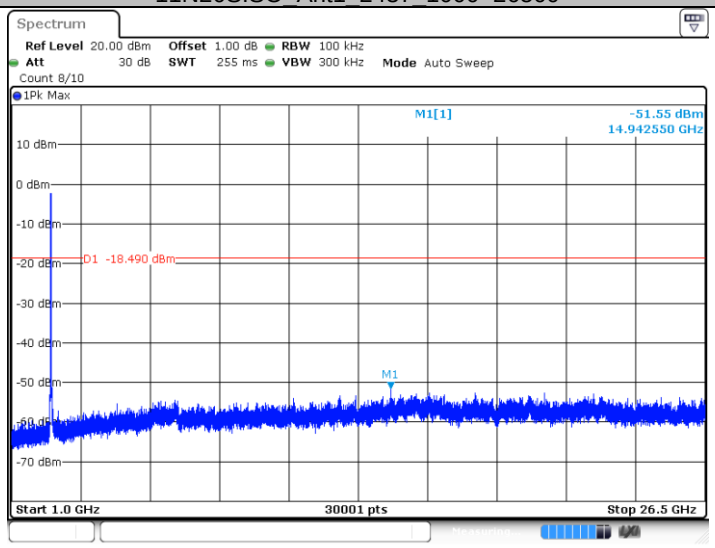

11N20SISO_Ant1_2462_0~Reference

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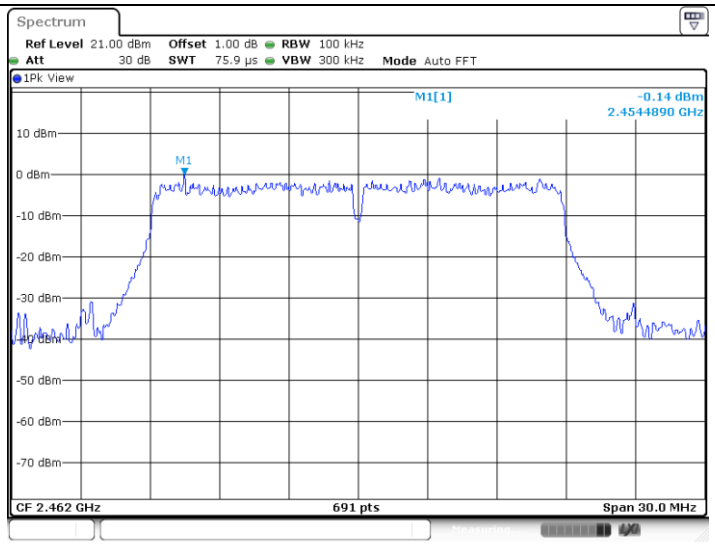

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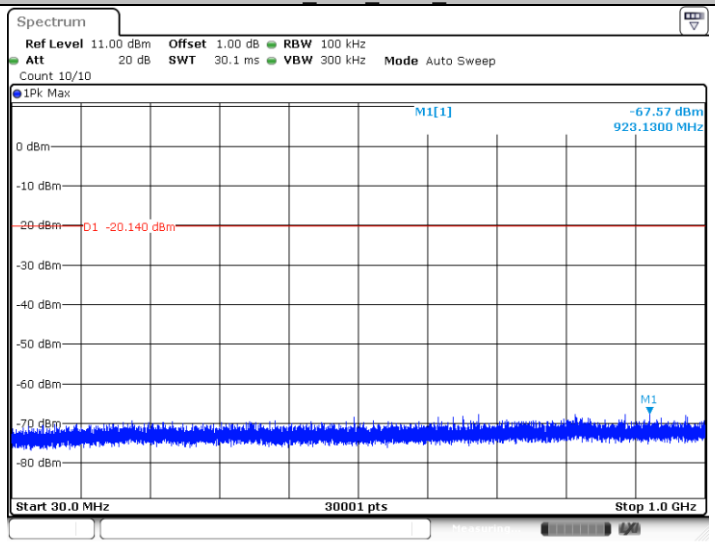
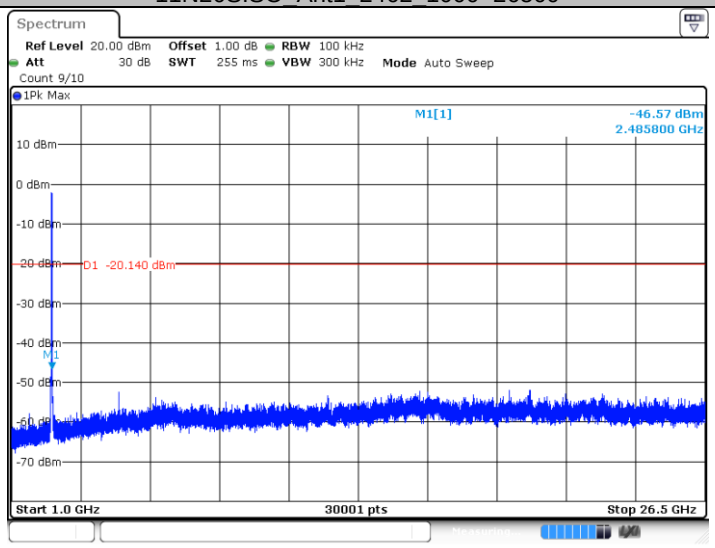


11N20SISO_Ant1_2462_1000~26500



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9.6 Band edge testing

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious
   RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
3. Allow the trace to stabilize, use the peak and delta measurement to record the result.
4. The level displayed must comply with the limit specified in this Section.
5. Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

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

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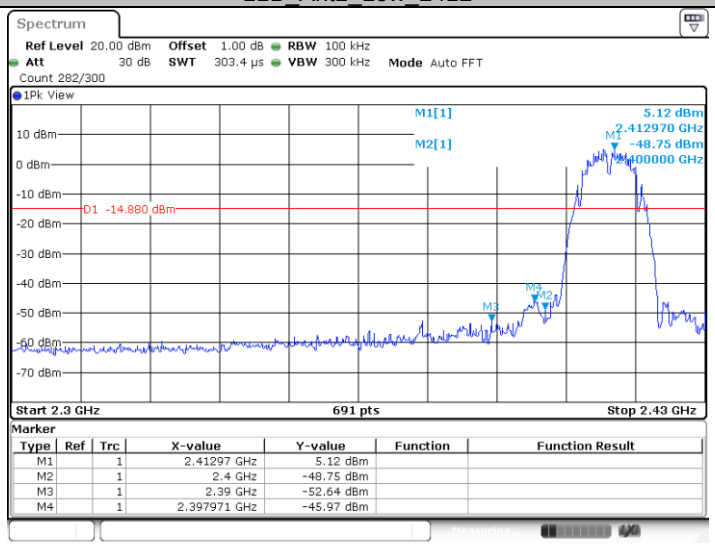
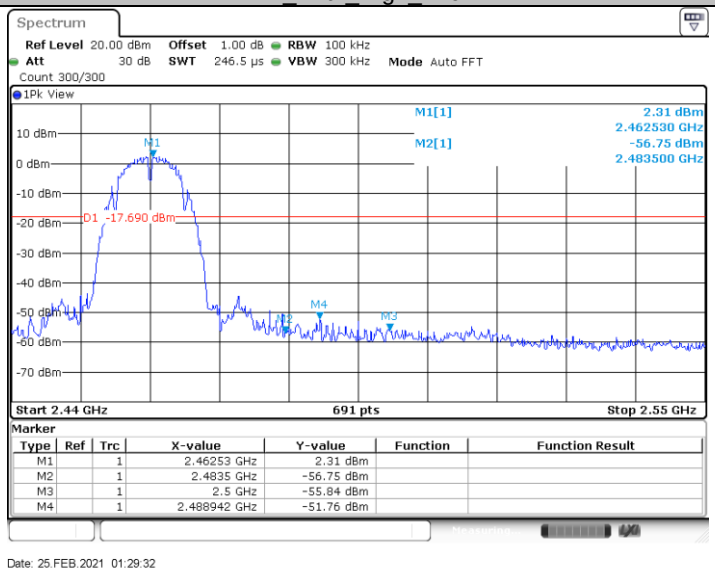
Band edge testing

TestMode	Antenna	ChName	Channel(MHz)	RefLevel(dBm)	Result(dBm)	Limit(dBm)	Verdict
11B	Ant1	Low	2412	5.12	-45.97	<=-14.88	PASS
		High	2462	2.31	-51.76	<=-17.69	PASS
11G	Ant1	Low	2412	-0.62	-35.85	<=-20.62	PASS
		High	2462	-1.08	-40.45	<=-21.08	PASS
11N20SISO	Ant1	Low	2412	-1.01	-33.7	<=-21.01	PASS
		High	2462	1.77	-43.23	<=-18.23	PASS

11B_Ant1_Low_2412



11B_Ant1_High_2462



11G_Ant1_Low_2412

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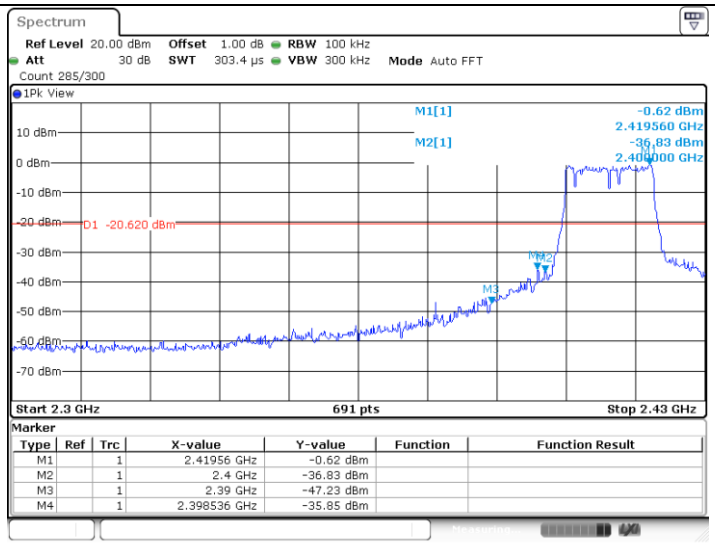
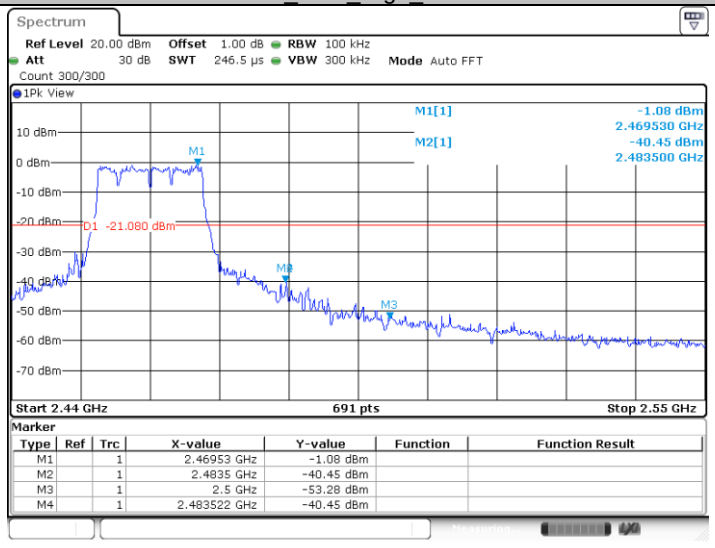
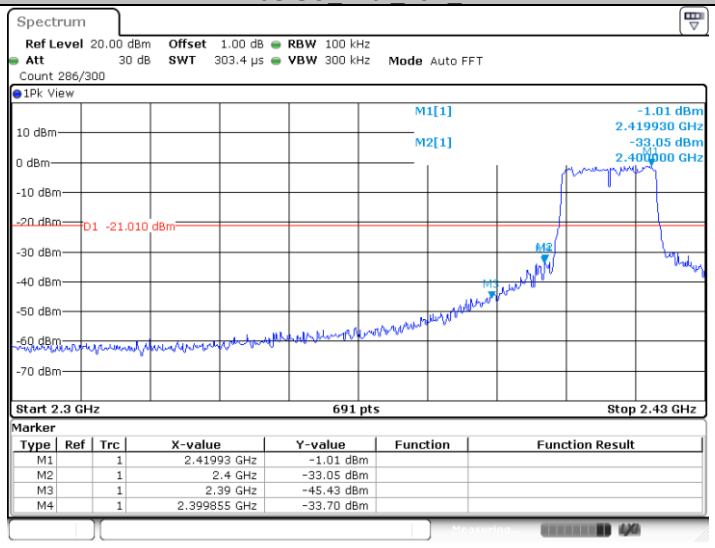


11G_Ant1_High_2462



11N20SISO_Ant1_Low_2412



11N20SISO_Ant1_High_2462

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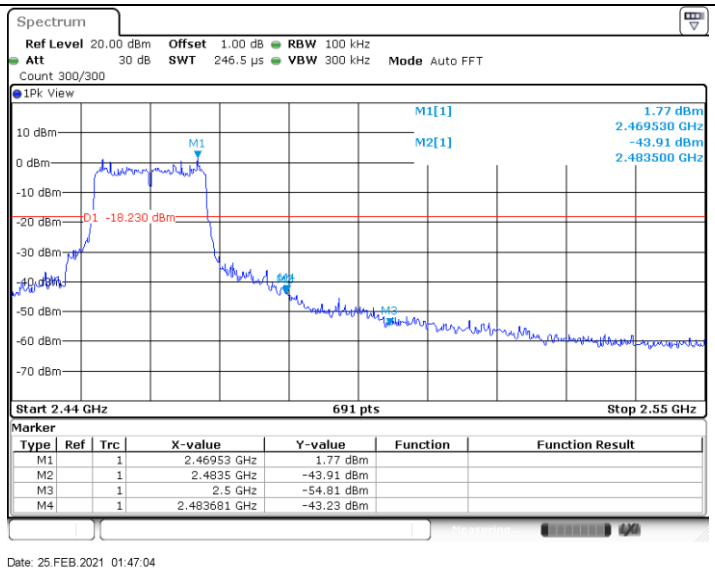

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9.7 Spurious radiated emissions for transmitter

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 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
4. 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.
5. 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.
6. Use the following spectrum analyzer settings According to C63.10:
   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.
   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.
7. 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:
   1) If power averaging (rms) mode was used in the preceding step e), then the correction

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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.

8. Repeat above procedures until all frequencies measured were complete.

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 µV/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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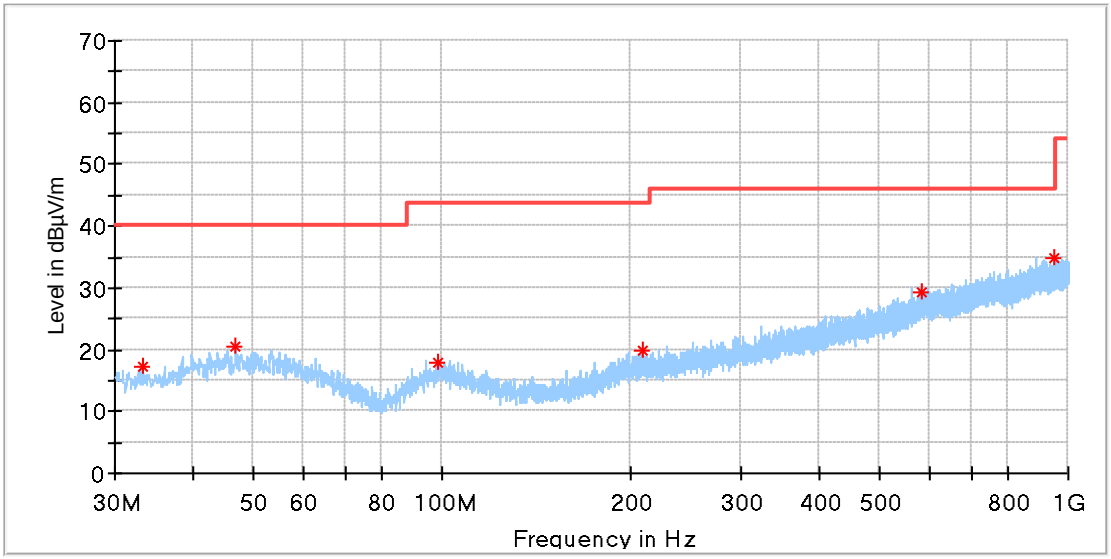
Spurious radiated emissions for transmitter

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.

The only worse case 802.11B mode test result is listed in the report.

Transmitting spurious emission test result as below:
30MHz-1000MHz:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
33.273750	17.24	40.00	22.76	200.0	H	23.0	14.56
46.853750	20.53	40.00	19.47	100.0	H	256.0	17.81
98.566875	17.86	43.50	25.64	100.0	H	298.0	16.07
209.207500	19.86	43.50	23.64	200.0	H	0.0	16.61
584.173125	29.38	46.00	16.62	200.0	H	0.0	25.15
952.712500	34.98	46.00	11.02	100.0	H	186.0	29.70

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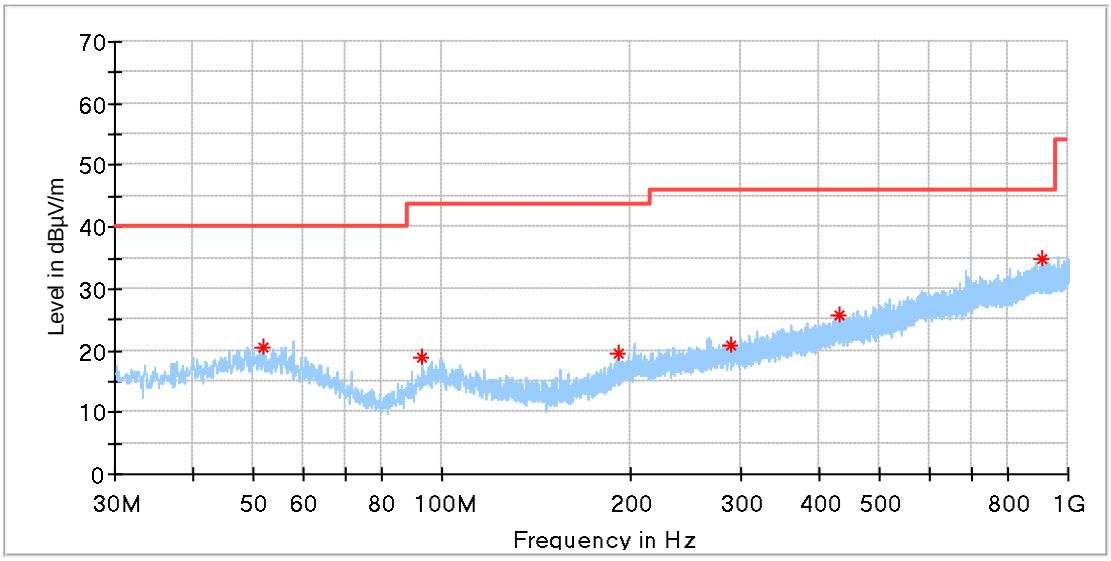

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
51.643125	20.37	40.00	19.63	200.0	V	0.0	17.83
93.110625	18.83	43.50	24.67	100.0	V	0.0	15.12
191.565625	19.68	43.50	23.82	200.0	V	0.0	15.69
289.414375	20.75	46.00	25.25	100.0	V	329.0	18.45
431.883125	25.60	46.00	20.40	100.0	V	33.0	22.05
908.274375	34.78	46.00	11.22	100.0	V	111.0	29.63

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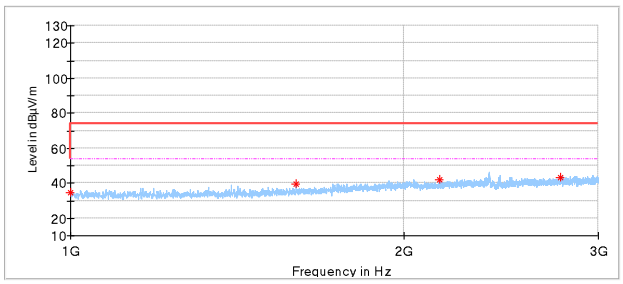
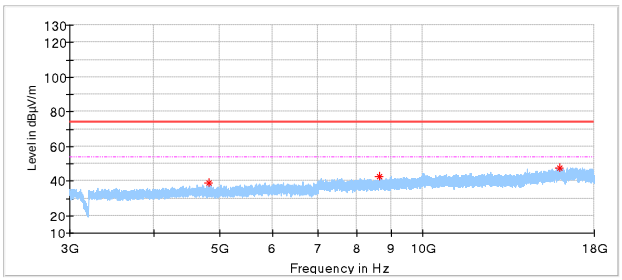
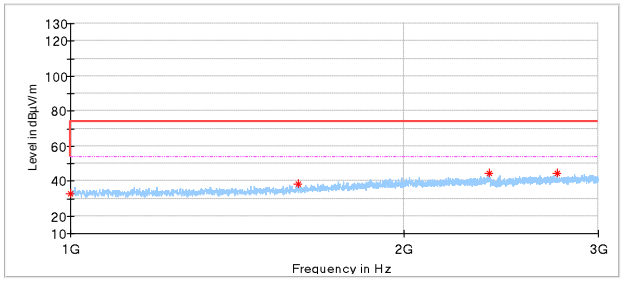
1GHz -18GHz:
11B-2412MHz
Horizontal:

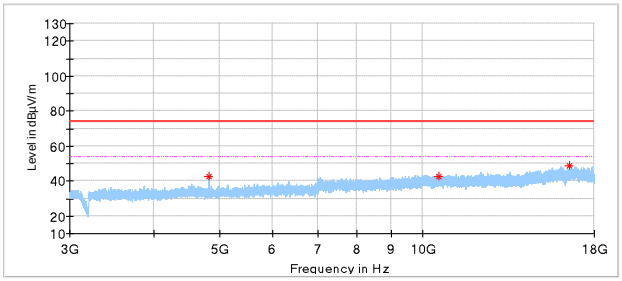




Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1000.000000	34.53	54.00	39.47	150.0	H	108.0	-10.20
1599.523810	39.35	74.00	34.65	150.0	H	240.0	-7.34
2154.761905	42.17	74.00	31.83	150.0	H	121.0	-3.89
2771.904762	43.48	74.00	30.52	150.0	H	246.0	-2.14
4824.000000	39.17	74.00	34.83	150.0	H	74.0	1.12
8658.000000	42.81	74.00	31.19	150.0	H	129.0	6.45
16026.000000	47.74	74.00	26.26	150.0	H	46.0	14.65

Vertical





Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1000.000000	32.46	54.00	41.54	150.0	V	297.0	-10.20
1605.238095	38.28	74.00	35.72	150.0	V	65.0	-7.31
2390.952381	44.31	74.00	29.69	150.0	V	252.0	-3.16
2754.761905	44.51	74.00	29.49	150.0	V	239.0	-2.20
4824.000000	42.91	74.00	31.09	150.0	V	58.0	1.12
10588.000000	42.75	74.00	31.25	150.0	V	29.0	8.50
16558.000000	48.73	74.00	25.27	150.0	V	58.0	15.69

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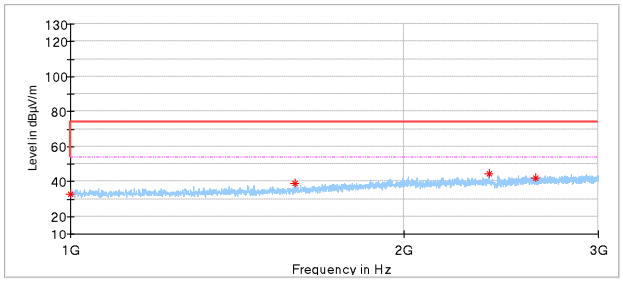
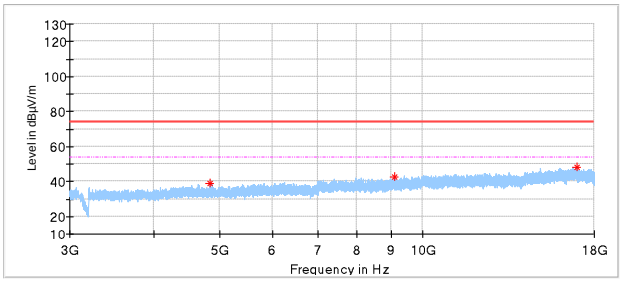
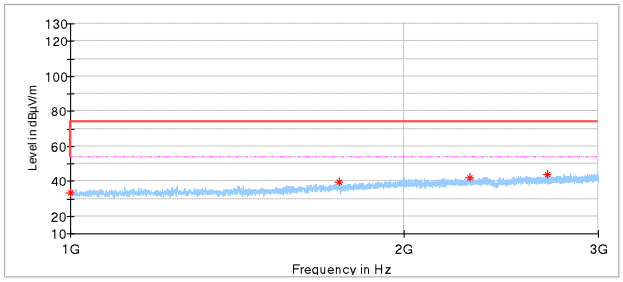
11B-2437MHz:
Horizontal:

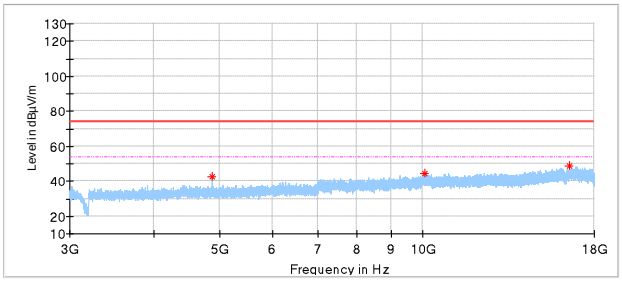




Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1000.000000	32.56	54.00	41.44	150.0	H	342.0	-10.20
1596.666667	38.64	74.00	35.36	150.0	H	335.0	-7.35
2388.571429	44.20	74.00	29.80	150.0	H	197.0	-3.16
2633.333333	41.75	74.00	32.25	150.0	H	316.0	-2.50
4846.000000	38.78	74.00	35.22	150.0	H	280.0	1.12
9111.500000	42.66	74.00	31.34	150.0	H	4.0	6.82
16980.500000	48.43	74.00	25.57	150.0	H	196.0	16.42

Vertical





Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1000.000000	33.47	54.00	40.53	150.0	V	201.0	-10.20
1750.476191	39.58	74.00	34.42	150.0	V	272.0	-6.07
2295.714286	42.04	74.00	31.96	150.0	V	140.0	-3.42
2697.619048	43.58	74.00	30.42	150.0	V	233.0	-2.34
4874.000000	42.39	74.00	31.61	150.0	V	52.0	1.11
10098.500000	44.33	74.00	29.67	150.0	V	80.0	9.21
16551.500000	48.74	74.00	25.26	150.0	V	136.0	15.68

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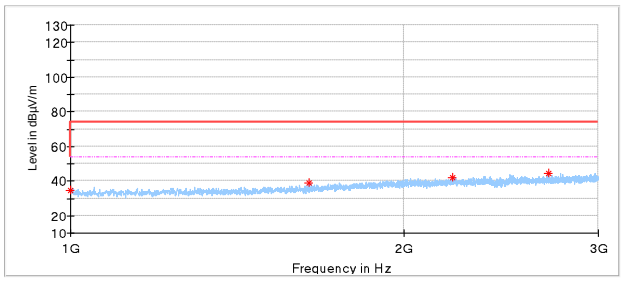
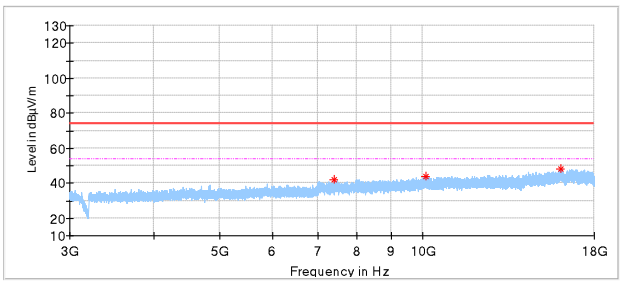
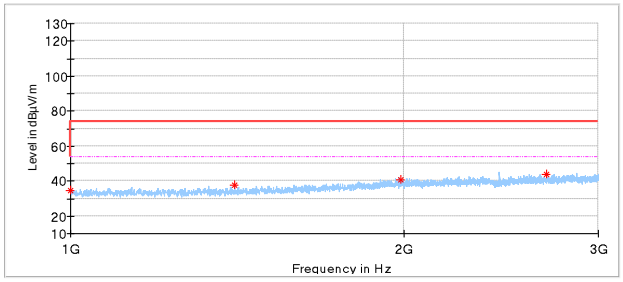
11B-2462MHz
Horizontal:

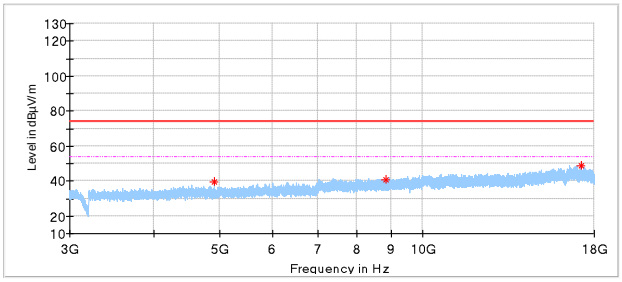




Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1000.000000	34.50	54.00	39.50	150.0	H	108.0	-10.20
1643.333333	39.23	74.00	34.77	150.0	H	108.0	-7.02
2216.666667	42.17	74.00	31.83	150.0	H	359.0	-3.69
2705.714286	44.29	74.00	29.71	150.0	H	134.0	-2.32
7400.500000	41.86	74.00	32.14	150.0	H	164.0	5.55
10125.000000	43.75	74.00	30.25	150.0	H	220.0	9.14
16044.000000	48.03	74.00	25.97	150.0	H	220.0	14.77

Vertical





Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1000.000000	34.54	54.00	39.46	150.0	V	33.0	-10.20
1407.619048	37.89	74.00	36.11	150.0	V	162.0	-8.58
1988.571429	41.07	74.00	32.93	150.0	V	104.0	-4.04
2691.428571	43.83	74.00	30.17	150.0	V	78.0	-2.35
4924.000000	39.71	74.00	34.29	150.0	V	4.0	1.10
8822.500000	41.06	74.00	32.94	150.0	V	356.0	6.44
17198.500000	48.89	74.00	25.11	150.0	V	356.0	15.82

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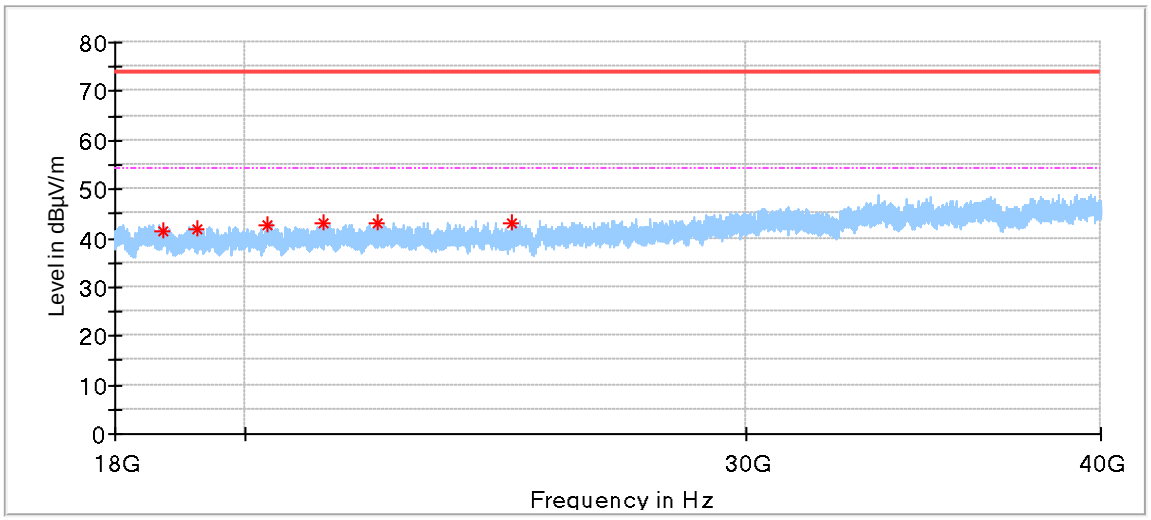
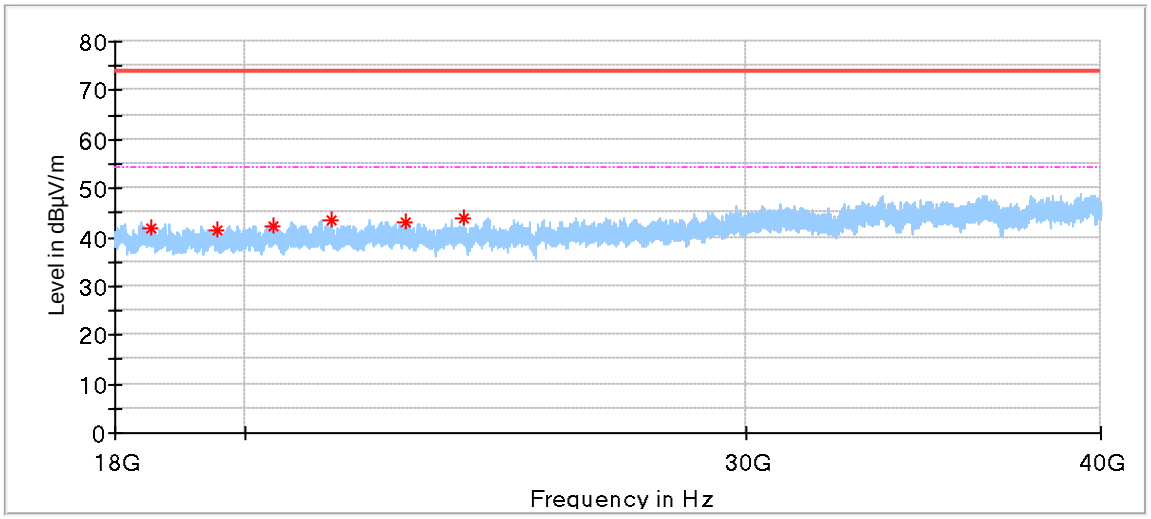
18GHz- 40GHz:
11B-2412MHz:
Horizontal:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18711.562500	41.50	74.00	32.50	150.0	H	296.0	-1.89
19232.687500	41.80	74.00	32.20	150.0	H	52.0	-1.90
20365.687500	42.78	74.00	31.22	150.0	H	174.0	-0.73
21317.187500	43.18	74.00	30.82	150.0	H	83.0	0.24
22255.625000	43.19	74.00	30.81	150.0	H	337.0	0.89
24815.875000	42.89	74.00	31.11	150.0	H	220.0	1.39

Vertical:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18536.937500	42.04	74.00	31.96	150.0	V	0.0	-1.68
19551.000000	41.26	74.00	32.74	150.0	V	199.0	-1.44
20457.812500	42.44	74.00	31.56	150.0	V	144.0	-0.57
21448.500000	43.61	74.00	30.39	150.0	V	83.0	0.29
22780.875000	43.21	74.00	30.79	150.0	V	6.0	0.98
23881.562500	43.78	74.00	30.22	150.0	V	75.0	1.03

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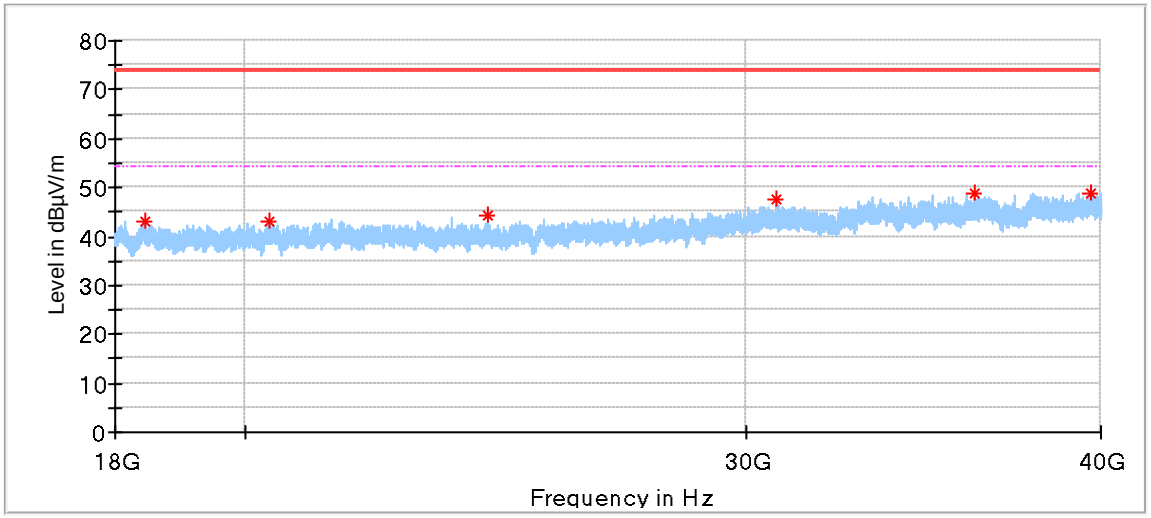
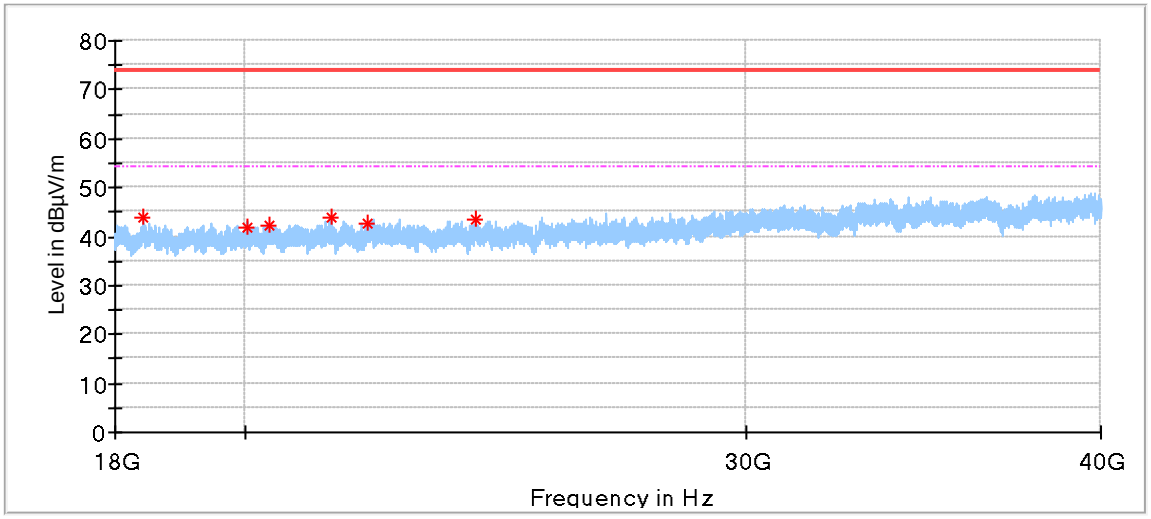
11B-2437MHz:
Horizontal:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18456.500000	43.19	74.00	30.81	150.0	H	4.0	-1.83
20388.375000	43.02	74.00	30.98	150.0	H	178.0	-0.69
24362.125000	44.19	74.00	29.81	150.0	H	155.0	1.18
30748.312500	47.64	74.00	26.36	150.0	H	125.0	2.97
36128.687500	48.87	74.00	25.13	150.0	H	110.0	5.93
39676.875000	48.86	74.00	25.14	150.0	H	247.0	9.24

Vertical:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18409.062500	44.03	74.00	29.97	150.0	V	193.0	-1.93
20024.000000	41.83	74.00	32.17	150.0	V	307.0	-1.40
20395.250000	42.45	74.00	31.55	150.0	V	223.0	-0.68
21437.500000	44.03	74.00	29.97	150.0	V	238.0	0.29
22067.250000	42.76	74.00	31.24	150.0	V	4.0	0.60
24112.562500	43.64	74.00	30.36	150.0	V	30.0	1.12

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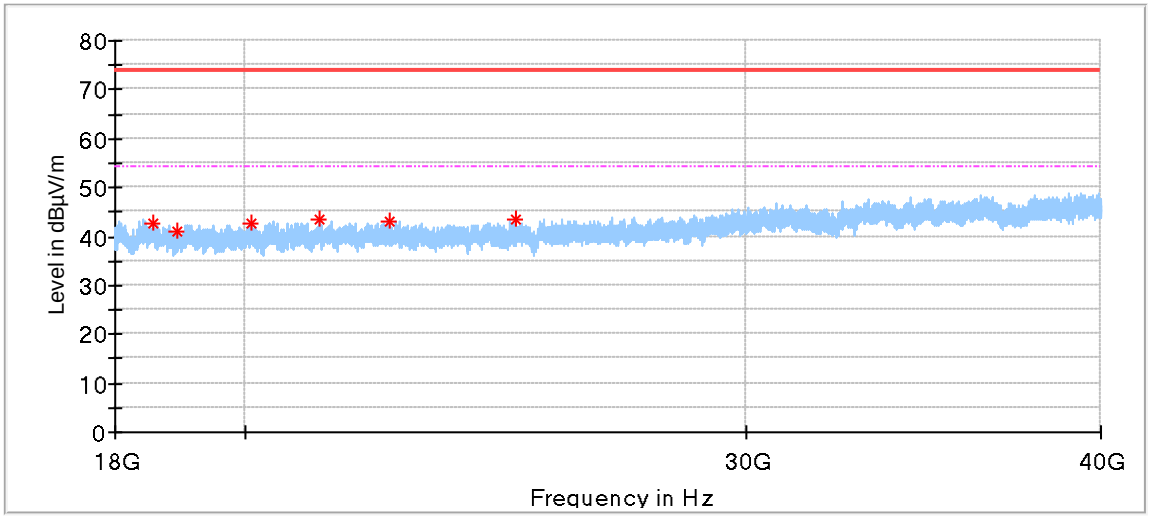
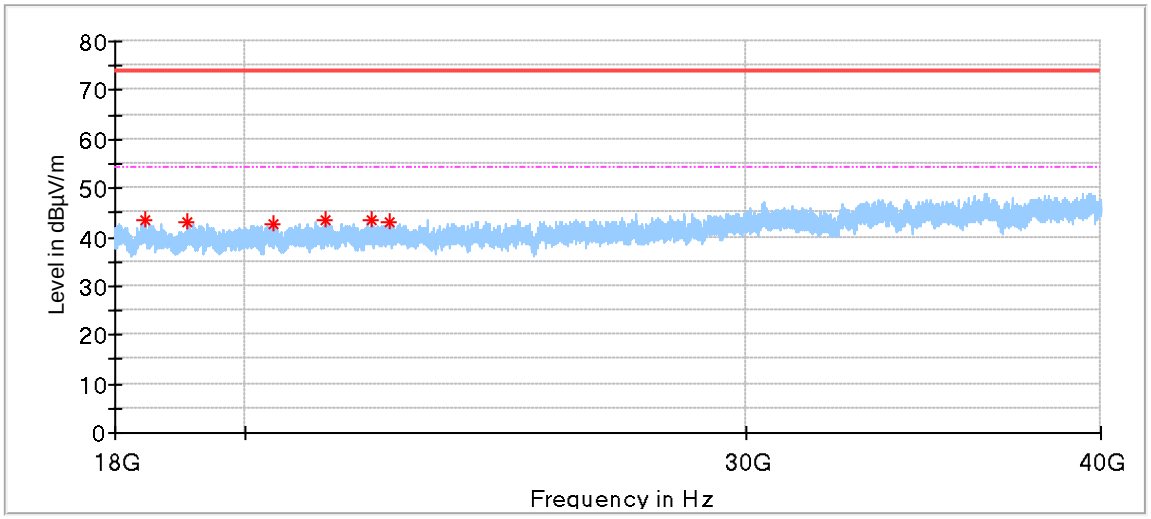
11B-2462MHz:
Horizontal:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18558.937500	42.64	74.00	31.36	150.0	H	299.0	-1.69
18943.937500	40.82	74.00	33.18	150.0	H	284.0	-1.84
20098.250000	42.54	74.00	31.46	150.0	H	39.0	-1.37
21253.250000	43.34	74.00	30.66	150.0	H	46.0	0.27
22465.312500	42.95	74.00	31.05	150.0	H	130.0	1.05
24910.750000	43.31	74.00	30.69	150.0	H	153.0	1.59

Vertical:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18429.687500	43.28	74.00	30.72	150.0	V	245.0	-1.89
19093.812500	43.02	74.00	30.98	150.0	V	321.0	-1.78
20452.312500	42.84	74.00	31.16	150.0	V	276.0	-0.58
21350.875000	43.40	74.00	30.60	150.0	V	91.0	0.25
22140.125000	43.35	74.00	30.65	150.0	V	0.0	0.73
22469.437500	43.05	74.00	30.95	150.0	V	15.0	1.04

Remark:

(1) Corrected Amplitude = Read level + Corrector 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

Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2021-6-29
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2021-8-4
Horn Antenna	Rohde & Schwarz	HF907	102294	2021-7-14
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2021-6-21
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2021-6-21
Attenuator	Agilent	8491A	MY39264334	2022-10-28
3m Semi-anechoic chamber	TDK	9X6X6	----	N/A

Conducted RF Test System

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2021-6-21
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2021-6-21
Power Splitter	Weinschel	1580	SC319	2021-7-16
Test software	Tonscend	System for BT/WIFI	Version 2.5.77.0418	N/A

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2021-6-29
LISN	Rohde & Schwarz	ENV4200	100249	2021-6-12
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2021-6-21
Test software	Rohde & Schwarz	EMC32	Version9.15.00	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: 4.91dB; Vertical: 4.89dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.80dB; Vertical: 4.79dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 5.05dB; Vertical: 5.04dB;
Uncertainty for Conducted Emission in shielding room (68-4-90-19-004) 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3.21dB
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.16dB Frequency test involved: 0.6×10^{-7} or 1%

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