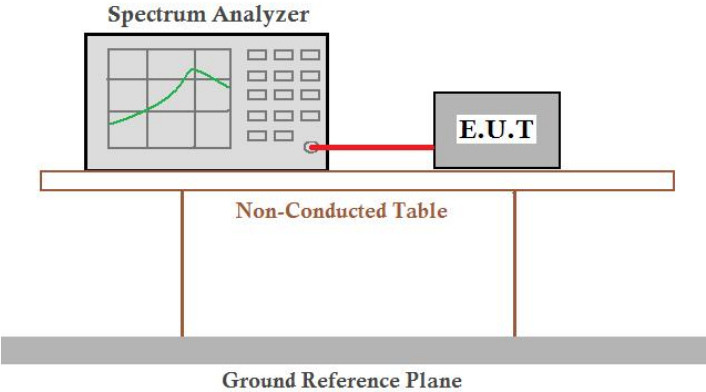


4.6 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013
Test Setup:	 Offset=cable loss+ attenuation factor
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Only the worst case is recorded in the report.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Results:	Pass

Test Result

ANT1:

TestMode	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Low	2412	-1.15	-39.73	≤ -31.15	PASS
	High	2462	0.95	-49.8	≤ -29.05	PASS
11G	Low	2412	-2.76	-44.42	≤ -32.76	PASS
	High	2462	0.62	-48.57	≤ -29.38	PASS
11N20SISO	Low	2412	-2.06	-42.21	≤ -32.06	PASS
	High	2462	-0.10	-48.79	≤ -30.1	PASS

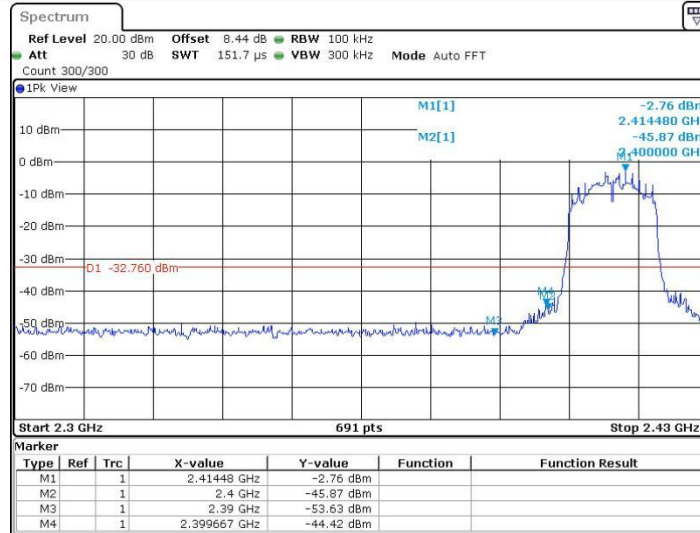
ANT2:

TestMode	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Low	2412	-1.03	-39.59	≤ -31.03	PASS
	High	2462	0.81	-49.8	≤ -29.19	PASS
11G	Low	2412	-2.54	-45.19	≤ -32.54	PASS
	High	2462	-2.07	-48.37	≤ -32.07	PASS
11N20SISO	Low	2412	-2.11	-43.38	≤ -32.11	PASS
	High	2462	-1.72	-49.36	≤ -31.72	PASS

4.6.1 Test Graphs



11G_Ant1_Low_2412



Date: 19 JUL 2023 11:03:16

11G_Ant1_High_2462



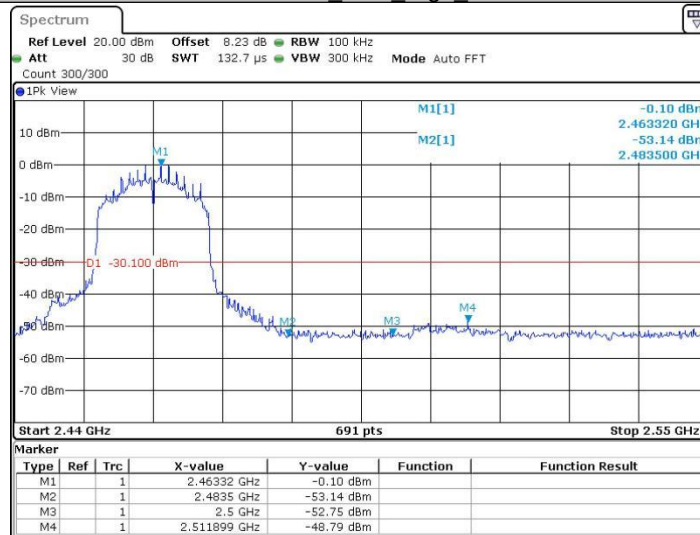
Date: 19 JUL 2023 11:08:51

11N20SISO_Ant1_Low_2412



Date: 19 JUL 2023 11:14:02

11N20SISO_Ant1_High_2462



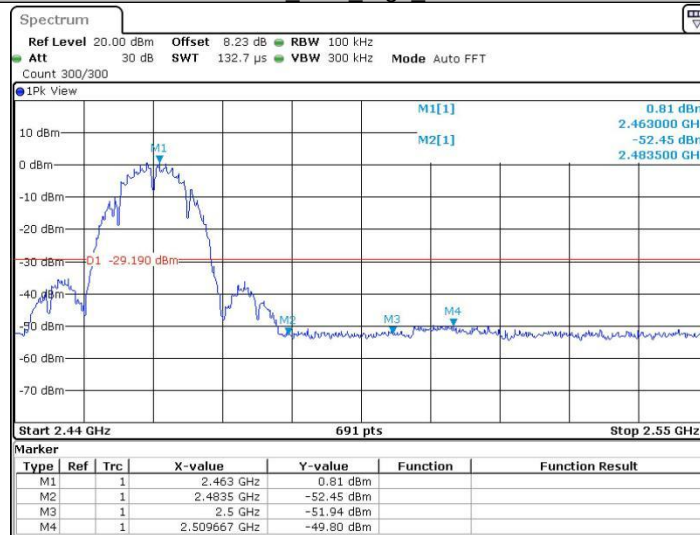
Date: 19 JUL 2023 11:19:58

11B_Ant2_Low_2412



Date: 19 JUL 2023 10:22:13

11B_Ant2_High_2462



Date: 19 JUL 2023 10:34:40

11G_Ant2_Low_2412



Date: 19 JUL 2023 10:37:17

11G_Ant2_High_2462



Date: 19 JUL 2023 10:41:48

11N20SISO_Ant2_Low_2412



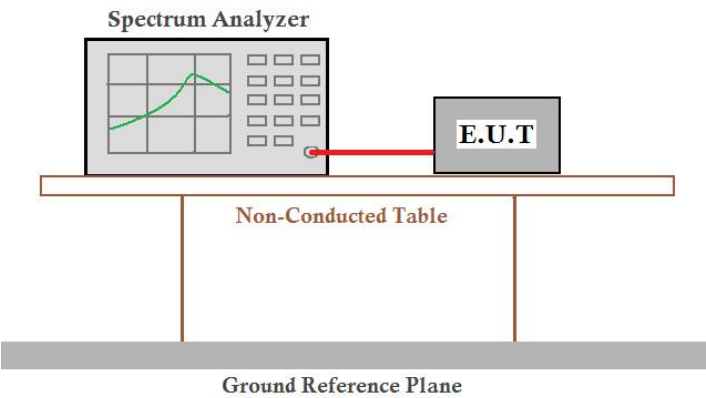
Date: 19 JUL 2023 10:44:42

11N20SISO_Ant2_High_2462



Date: 19 JUL 2023 10:50:53

4.7 RF Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013
Test Setup:	 Offset=cable loss+ attenuation factor
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Only the worst case is recorded in the report.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Results:	Pass

Test Result

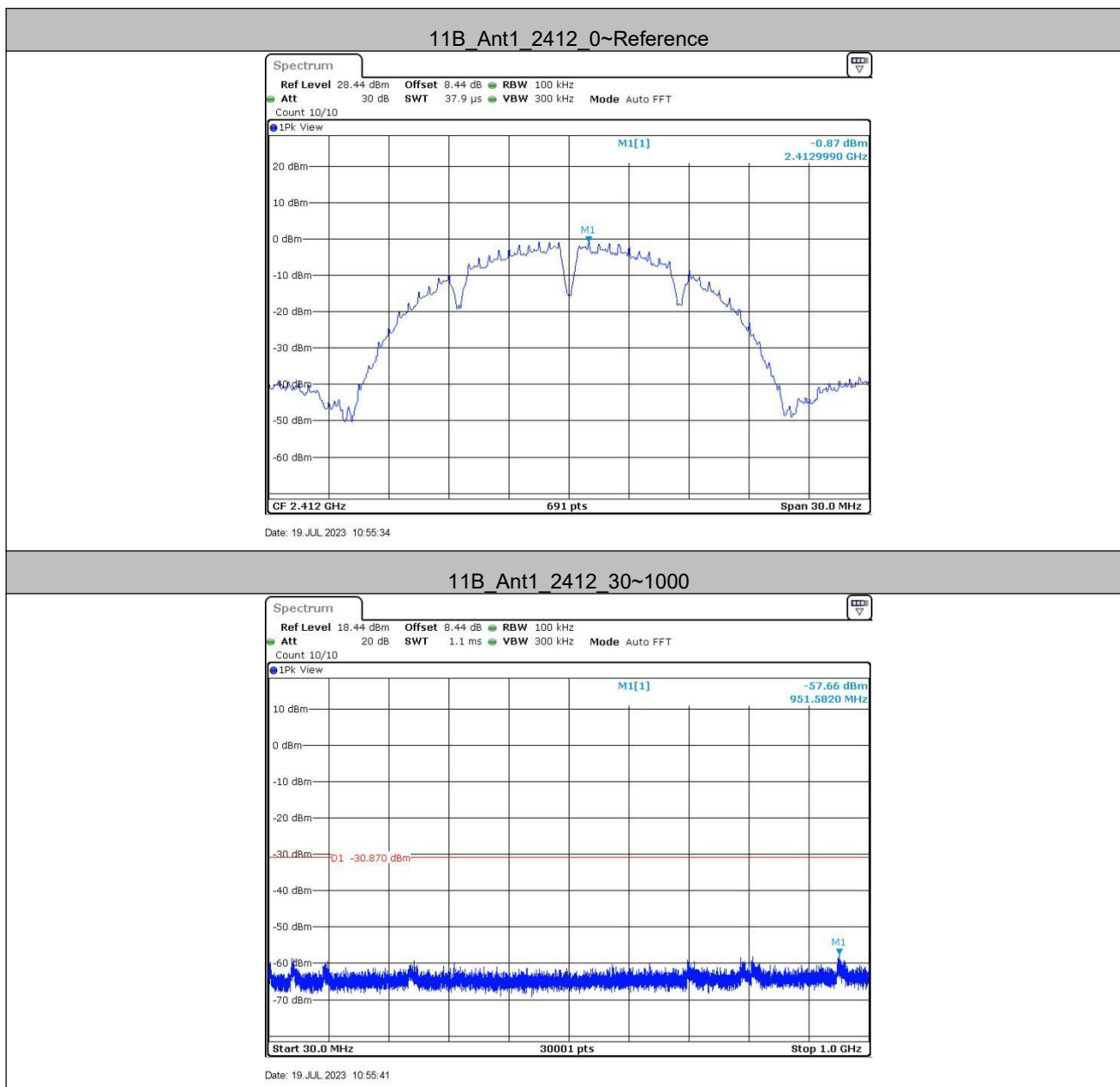
ANT1:

TestMode	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	2412	Reference	-0.87	-0.87	---	PASS
		30~1000	-0.87	-57.66	≤ -30.87	PASS
		1000~26500	-0.87	-49.04	≤ -30.87	PASS
	2437	Reference	0.72	0.72	---	PASS
		30~1000	0.72	-57.97	≤ -29.28	PASS
		1000~26500	0.72	-45.18	≤ -29.28	PASS
	2462	Reference	0.64	0.64	---	PASS
		30~1000	0.64	-58.38	≤ -29.36	PASS
		1000~26500	0.64	-45.59	≤ -29.36	PASS
11G	2412	Reference	-2.03	-2.03	---	PASS
		30~1000	-2.03	-56.87	≤ -32.03	PASS
		1000~26500	-2.03	-55.32	≤ -32.03	PASS
	2437	Reference	0.36	0.36	---	PASS
		30~1000	0.36	-57.81	≤ -29.64	PASS
		1000~26500	0.36	-54.77	≤ -29.64	PASS
	2462	Reference	0.59	0.59	---	PASS
		30~1000	0.59	-58.66	≤ -29.41	PASS
		1000~26500	0.59	-54.53	≤ -29.41	PASS
11N20SISO	2412	Reference	-1.98	-1.98	---	PASS
		30~1000	-1.98	-58.21	≤ -31.98	PASS
		1000~26500	-1.98	-54.64	≤ -31.98	PASS
	2437	Reference	-0.04	-0.04	---	PASS
		30~1000	-0.04	-58.61	≤ -30.04	PASS
		1000~26500	-0.04	-55.3	≤ -30.04	PASS
	2462	Reference	-0.06	-0.06	---	PASS
		30~1000	-0.06	-57.85	≤ -30.06	PASS
		1000~26500	-0.06	-55.56	≤ -30.06	PASS

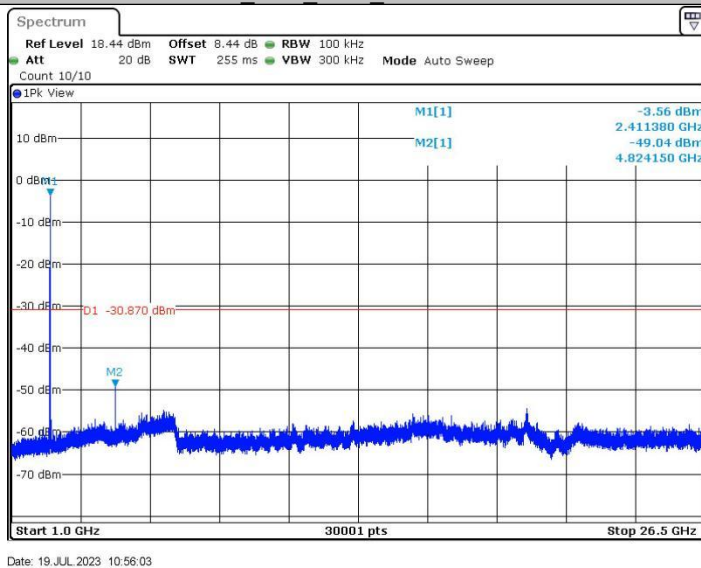
ANT2:

TestMode	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	2412	Reference	-0.40	-0.40	---	PASS
		30~1000	-0.40	-56.68	≤ -30.4	PASS
		1000~26500	-0.40	-48.28	≤ -30.4	PASS
	2437	Reference	0.92	0.92	---	PASS
		30~1000	0.92	-58.04	≤ -29.08	PASS
		1000~26500	0.92	-44.89	≤ -29.08	PASS
	2462	Reference	0.42	0.42	---	PASS
		30~1000	0.42	-58.94	≤ -29.58	PASS
		1000~26500	0.42	-45.34	≤ -29.58	PASS
11G	2412	Reference	-1.83	-1.83	---	PASS
		30~1000	-1.83	-58.14	≤ -31.83	PASS
		1000~26500	-1.83	-54.78	≤ -31.83	PASS
	2437	Reference	0.27	0.27	---	PASS
		30~1000	0.27	-57.5	≤ -29.73	PASS
		1000~26500	0.27	-55.27	≤ -29.73	PASS
	2462	Reference	0.46	0.46	---	PASS
		30~1000	0.46	-57.36	≤ -29.54	PASS
		1000~26500	0.46	-53.97	≤ -29.54	PASS
11N20SISO	2412	Reference	-1.74	-1.74	---	PASS
		30~1000	-1.74	-58	≤ -31.74	PASS
		1000~26500	-1.74	-54.91	≤ -31.74	PASS
	2437	Reference	-0.10	-0.10	---	PASS
		30~1000	-0.10	-58.15	≤ -30.1	PASS
		1000~26500	-0.10	-55	≤ -30.1	PASS
	2462	Reference	-0.10	-0.10	---	PASS
		30~1000	-0.10	-57.44	≤ -30.1	PASS
		1000~26500	-0.10	-55.07	≤ -30.1	PASS

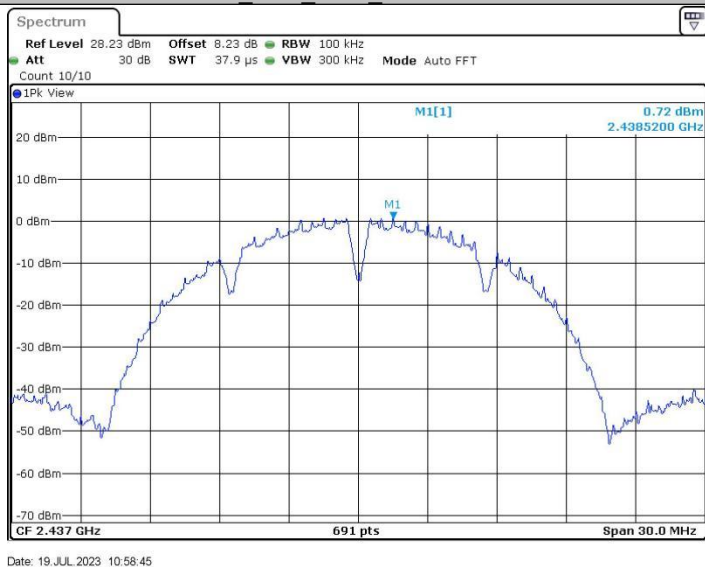
Test Graphs



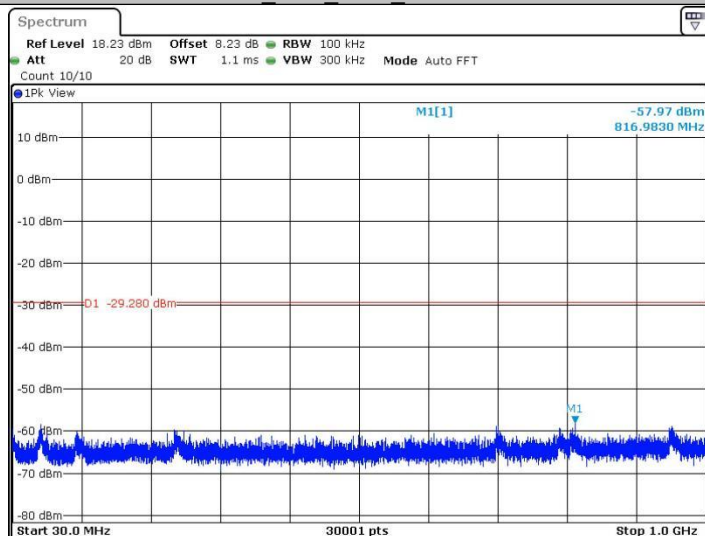
11B_Ant1_2412_1000~26500



11B_Ant1_2437_0~Reference

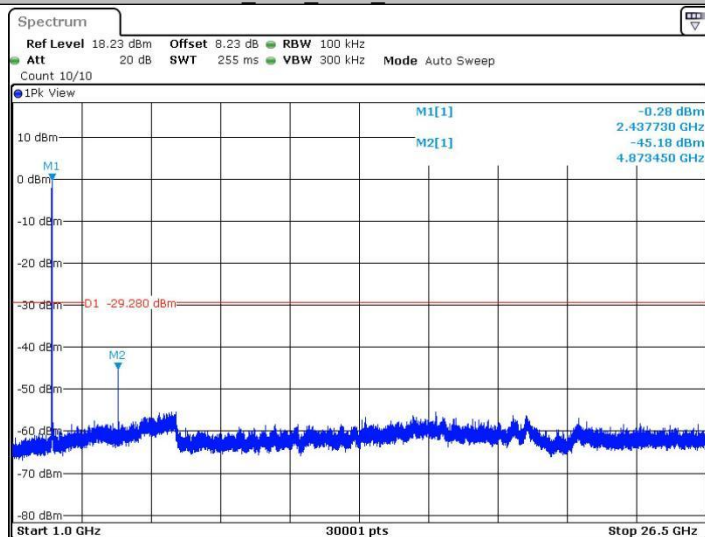


11B_Ant1_2437_30~1000



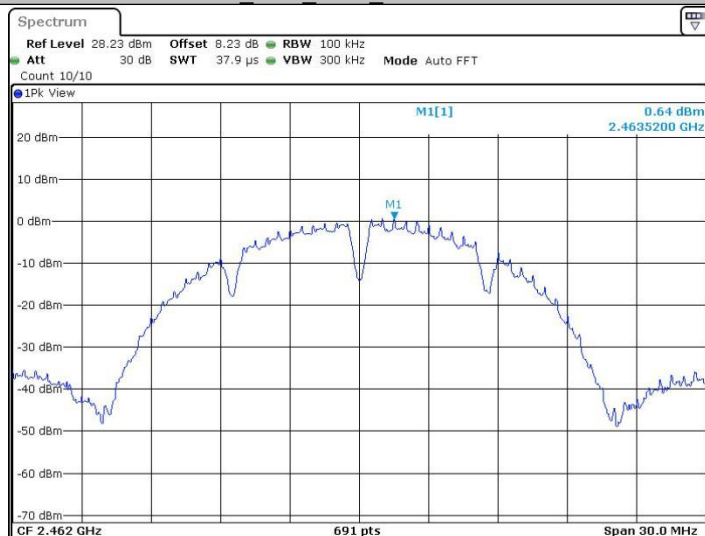
Date: 19 JUL 2023 10:58:51

11B_Ant1_2437_1000~26500



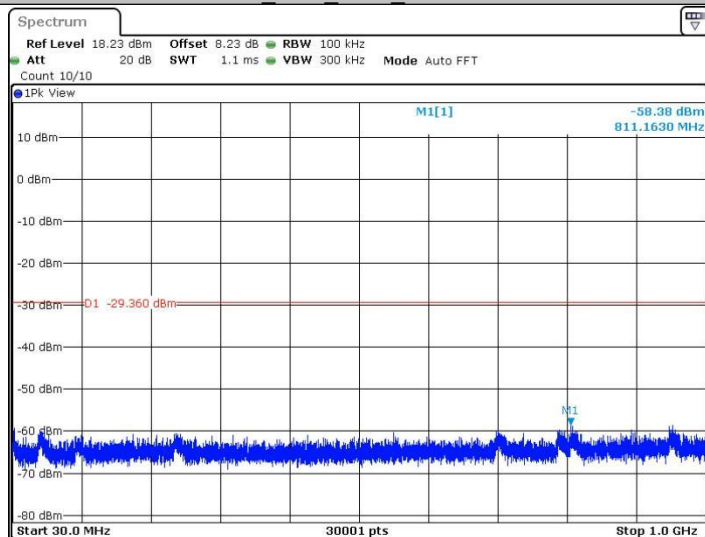
Date: 19 JUL 2023 10:59:14

11B_Ant1_2462_0~Reference



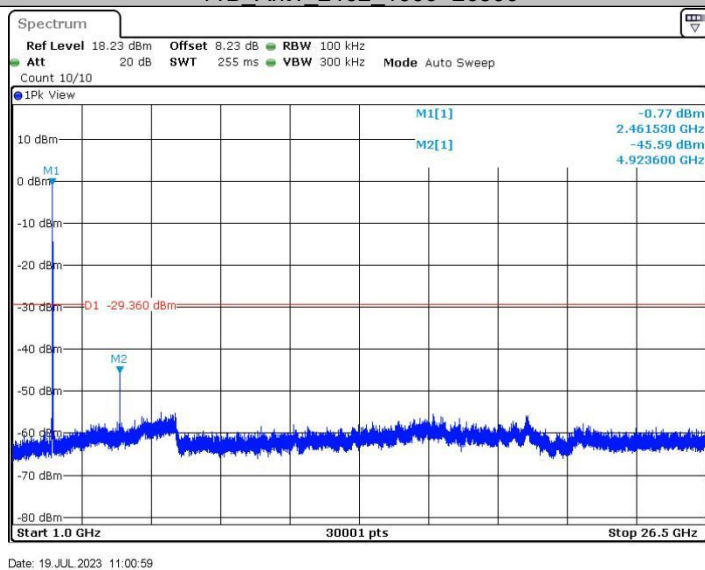
Date: 19 JUL 2023 11:00:31

11B_Ant1_2462_30~1000

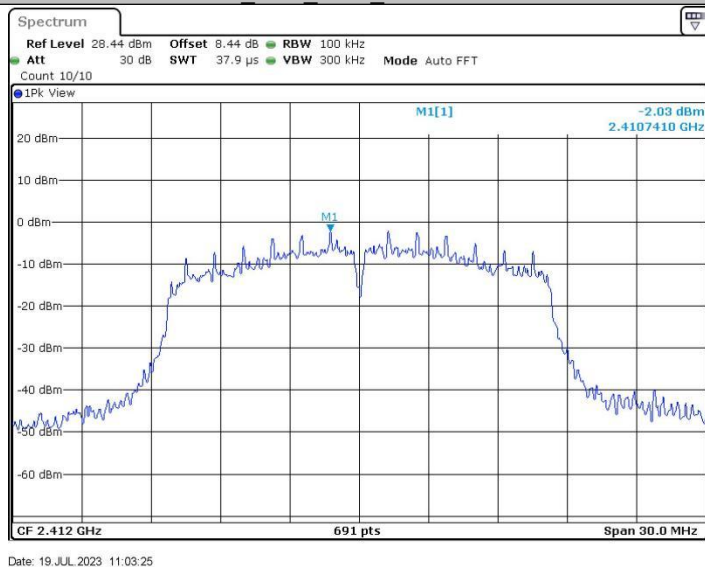


Date: 19 JUL 2023 11:00:37

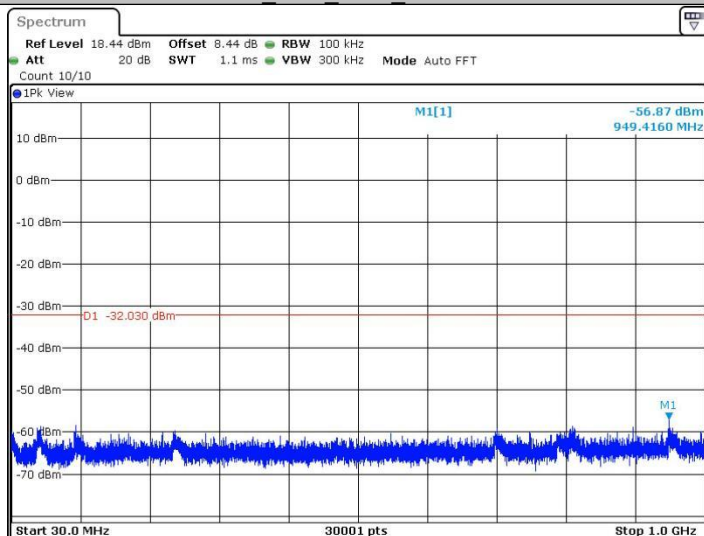
11B_Ant1_2462_1000~26500



11G_Ant1_2412_0~Reference

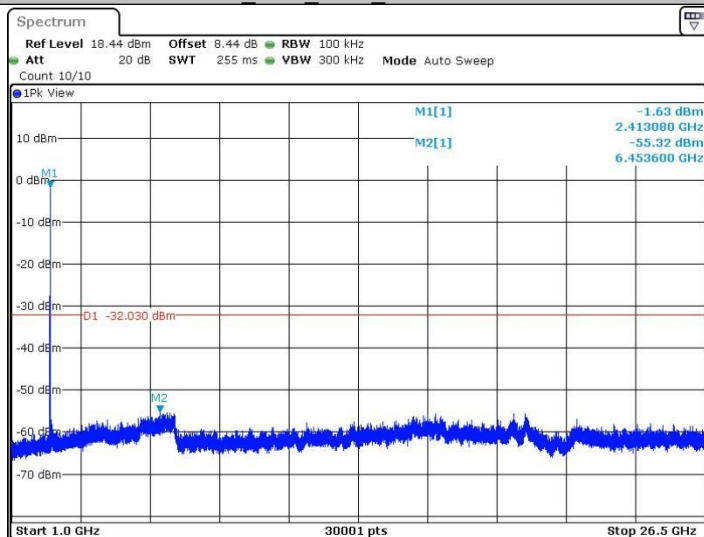


11G_Ant1_2412_30~1000



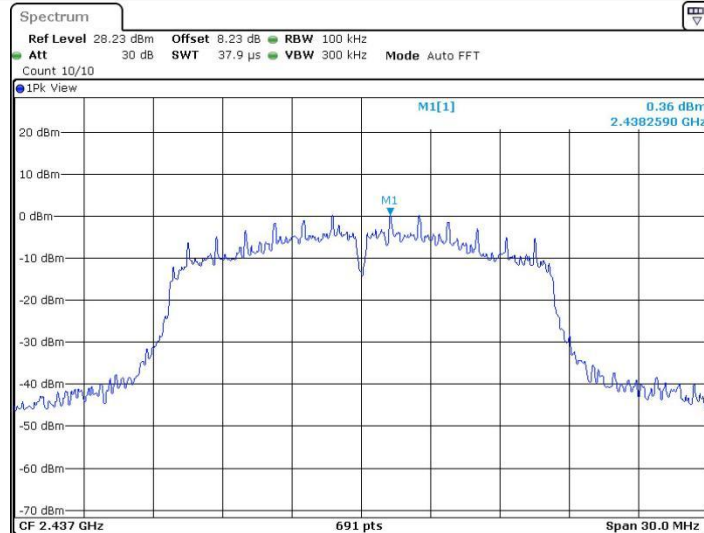
Date: 19 JUL 2023 11:03:32

11G_Ant1_2412_1000~26500



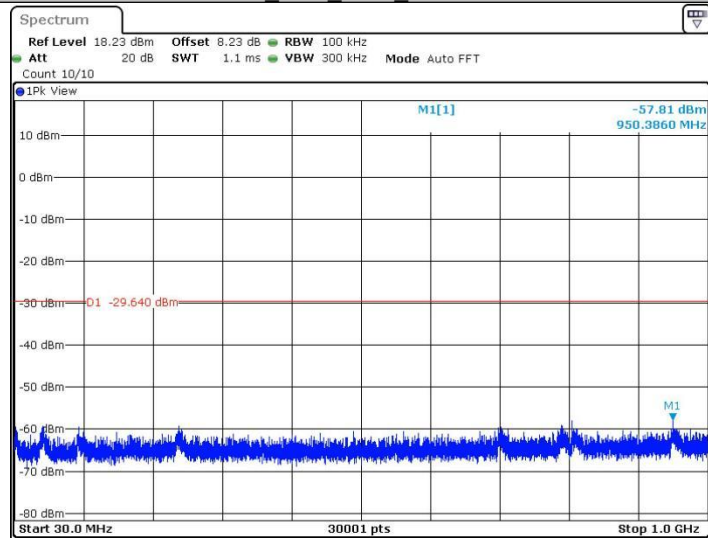
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11G_Ant1_2437_0~Reference



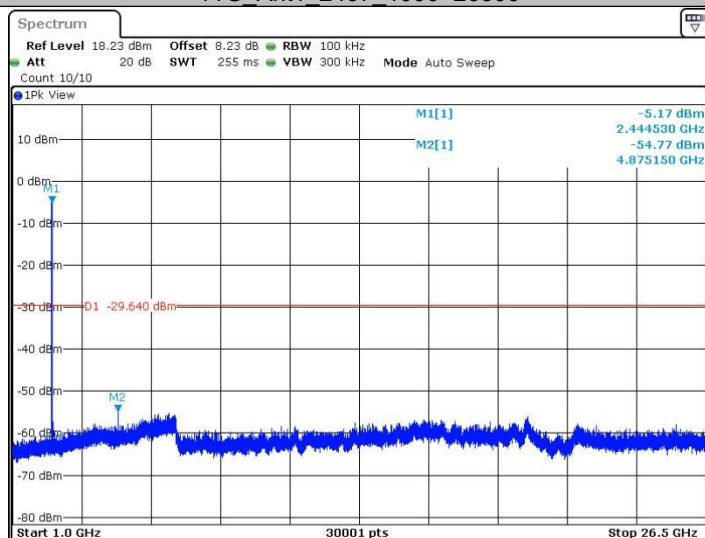
Date: 19 JUL 2023 11:05:43

11G_Ant1_2437_30~1000



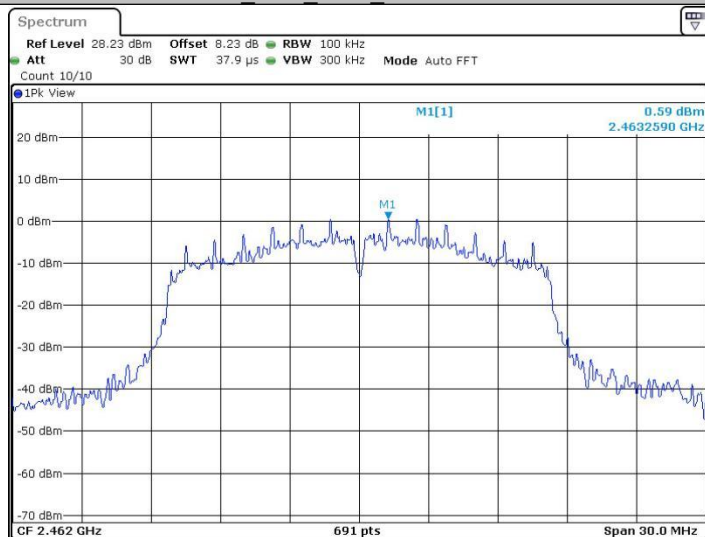
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11G_Ant1_2437_1000~26500



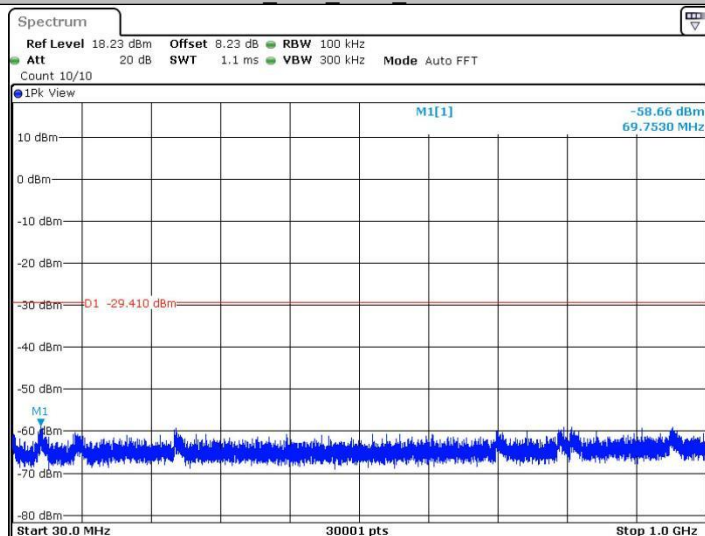
Date: 19 JUL 2023 11:06:11

11G_Ant1_2462_0~Reference



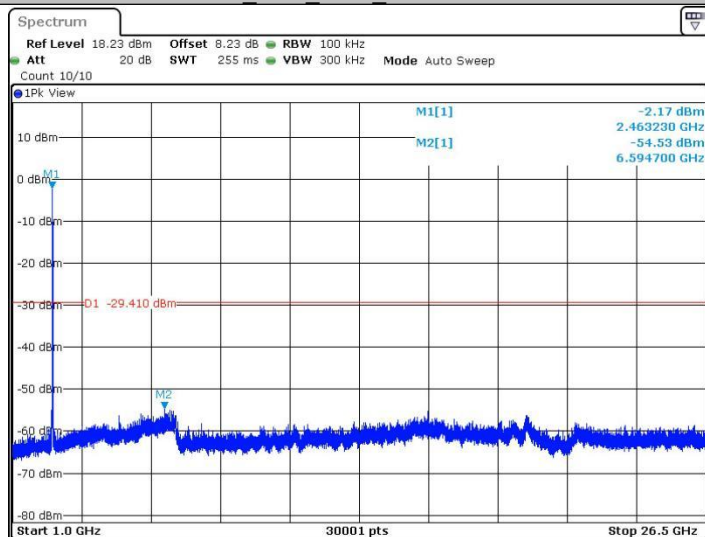
Date: 19 JUL 2023 11:09:00

11G_Ant1_2462_30~1000



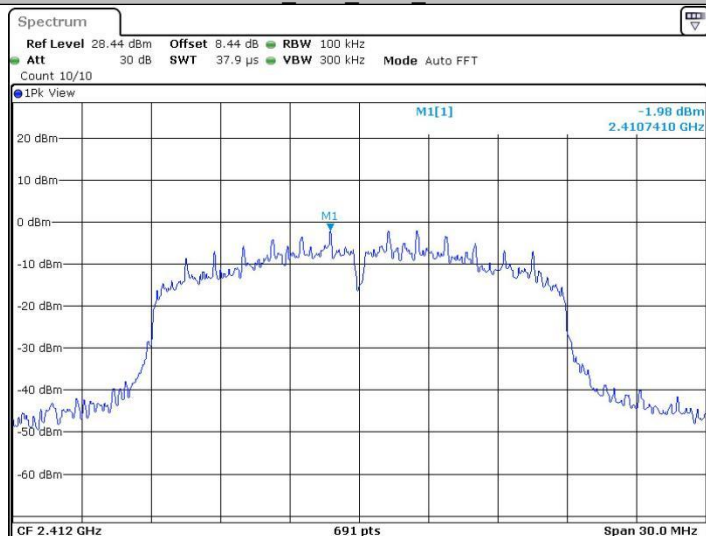
Date: 19 JUL 2023 11:09:07

11G_Ant1_2462_1000~26500



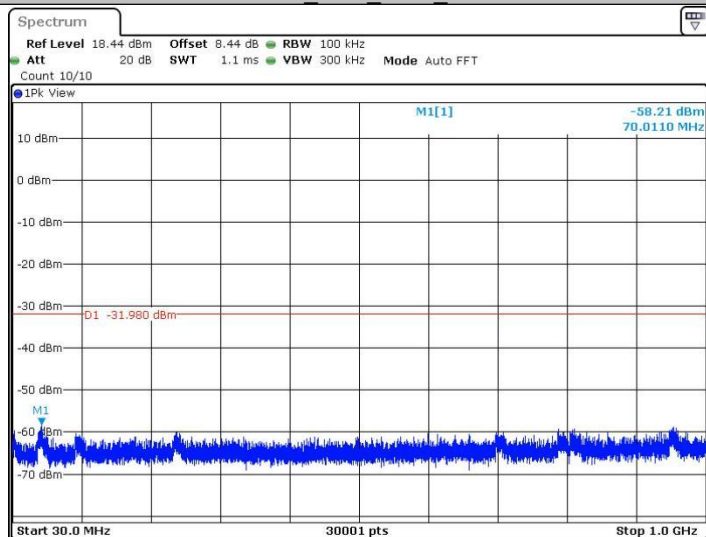
Date: 19 JUL 2023 11:09:29

11N20SISO_Ant1_2412_0~Reference



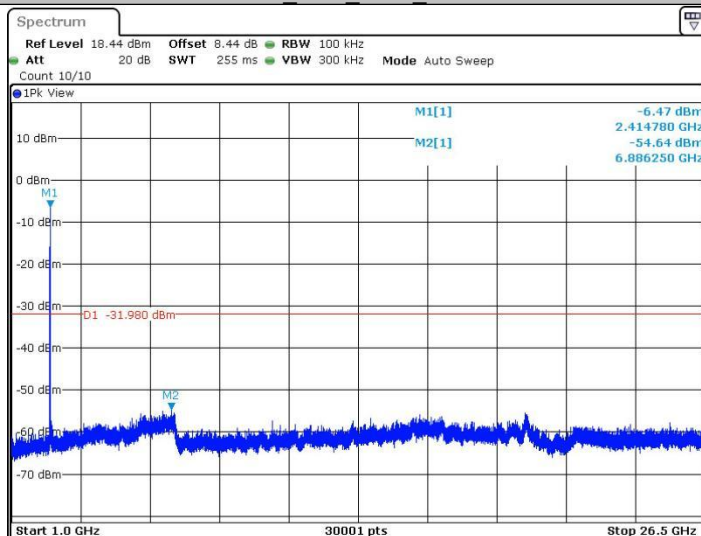
Date: 19 JUL 2023 11:14:11

11N20SISO_Ant1_2412_30~1000



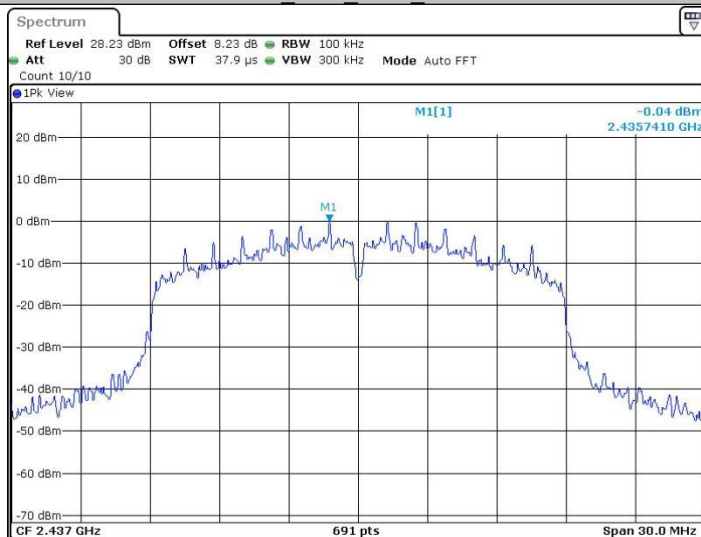
Date: 19 JUL 2023 11:14:17

11N20SISO_Ant1_2412_1000~26500



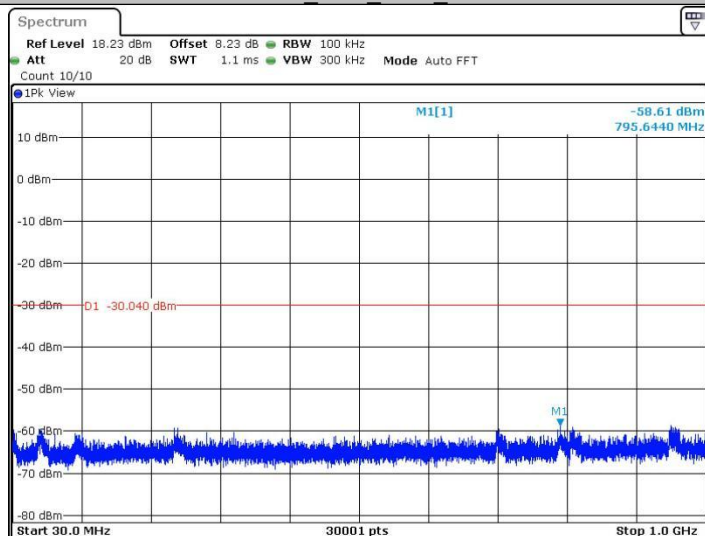
Date: 19 JUL 2023 11:14:40

11N20SISO_Ant1_2437_0~Reference



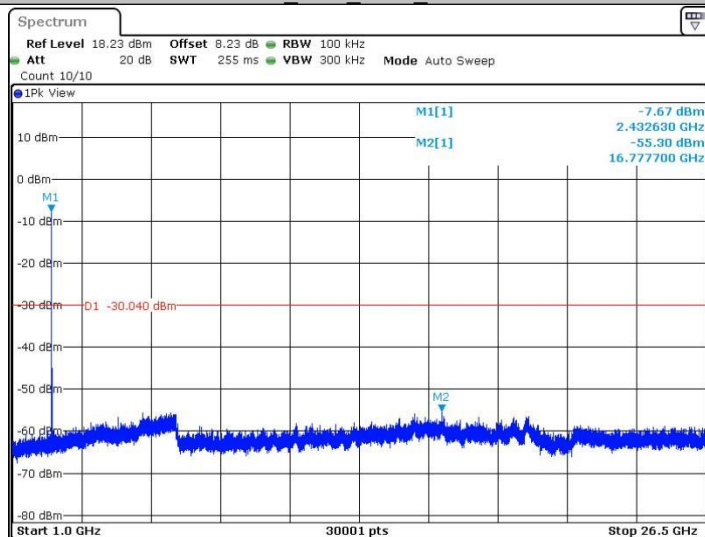
Date: 19 JUL 2023 11:17:36

11N20SISO_Ant1_2437_30~1000



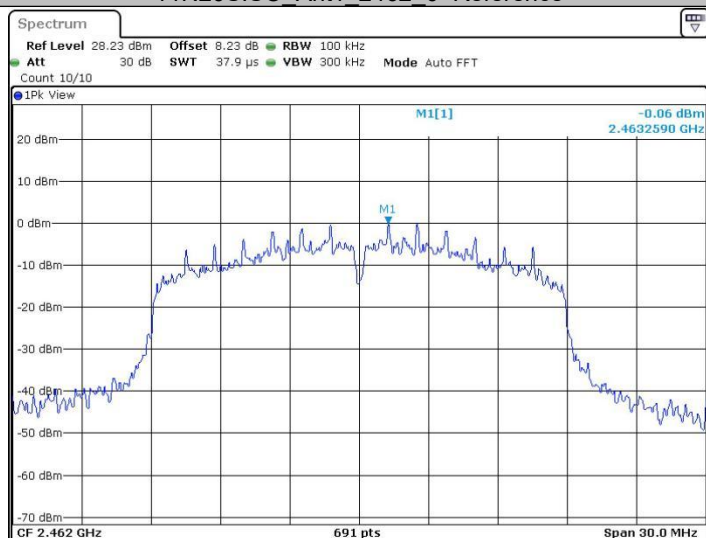
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11N20SISO_Ant1_2437_1000~26500



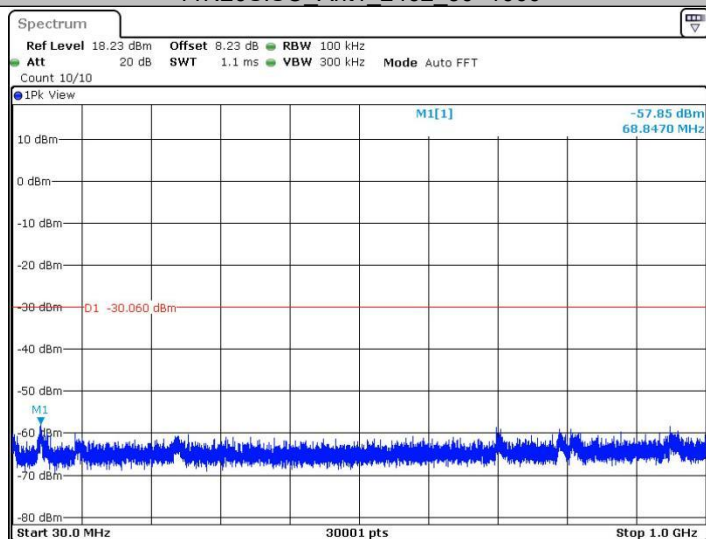
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11N20SISO_Ant1_2462_0~Reference



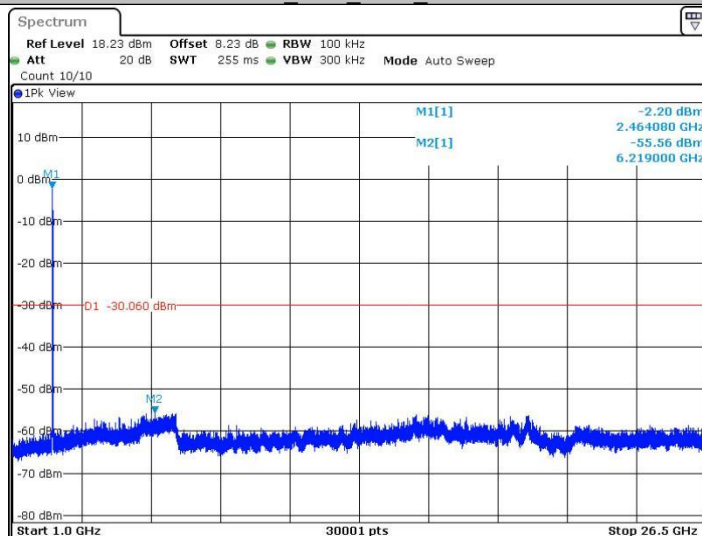
Date: 19 JUL 2023 11:20:07

11N20SISO_Ant1_2462_30~1000



Date: 19 JUL 2023 11:20:13

11N20SISO Ant1 2462 1000~26500



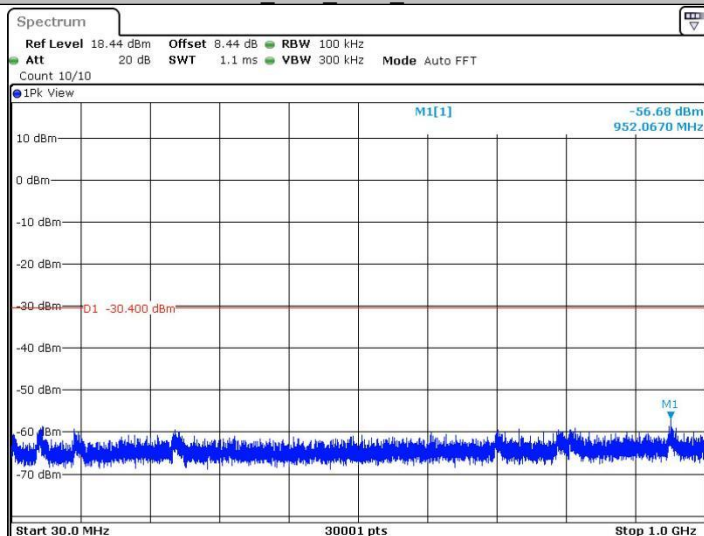
Date: 19 JUL 2023 11:20:36

11B_Ant2 2412 0~Reference



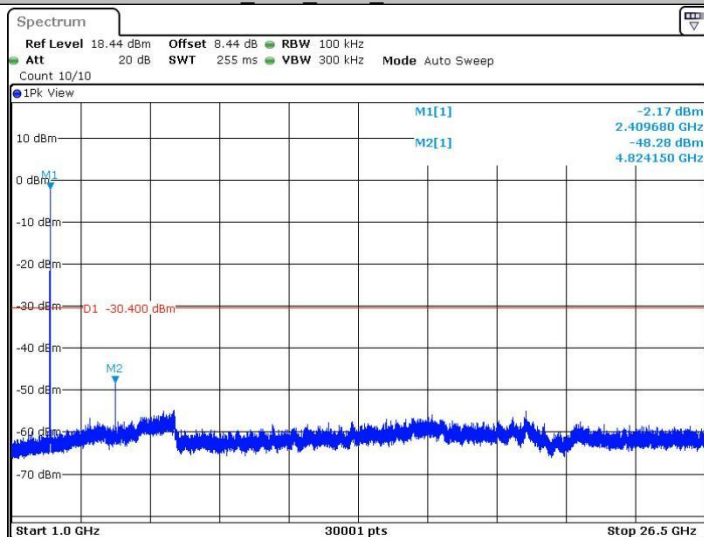
Date: 19 JUL 2023 10:22:23

11B_Ant2_2412_30~1000



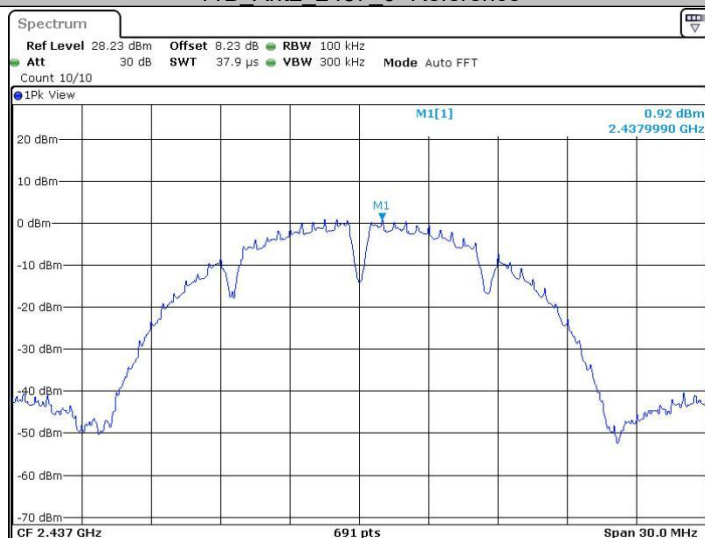
Date: 19 JUL 2023 10:22:29

11B_Ant2_2412_1000~26500



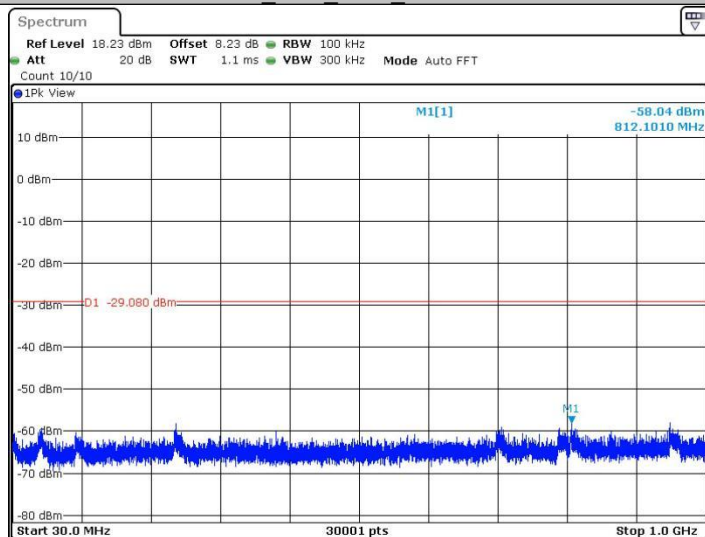
Date: 19 JUL 2023 10:22:52

11B_Ant2_2437_0~Reference



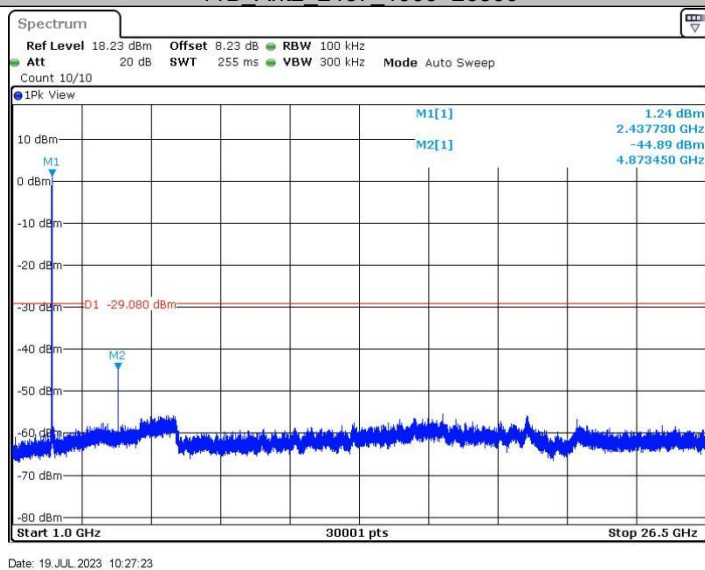
Date: 19 JUL 2023 10:26:54

11B_Ant2_2437_30~1000



Date: 19 JUL 2023 10:27:00

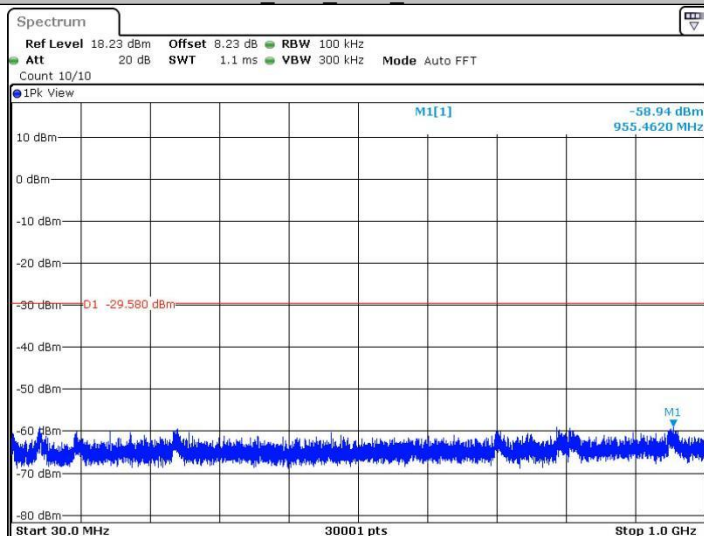
11B_Ant2_2437_1000~26500



11B_Ant2_2462_0~Reference

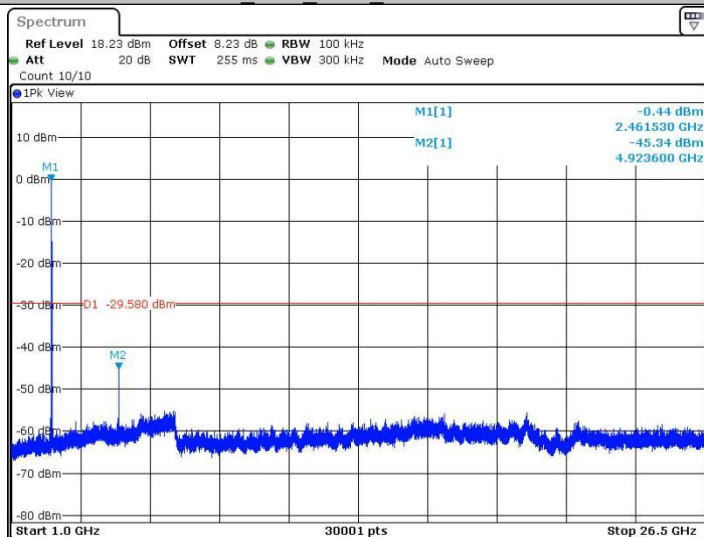


11B_Ant2_2462_30~1000



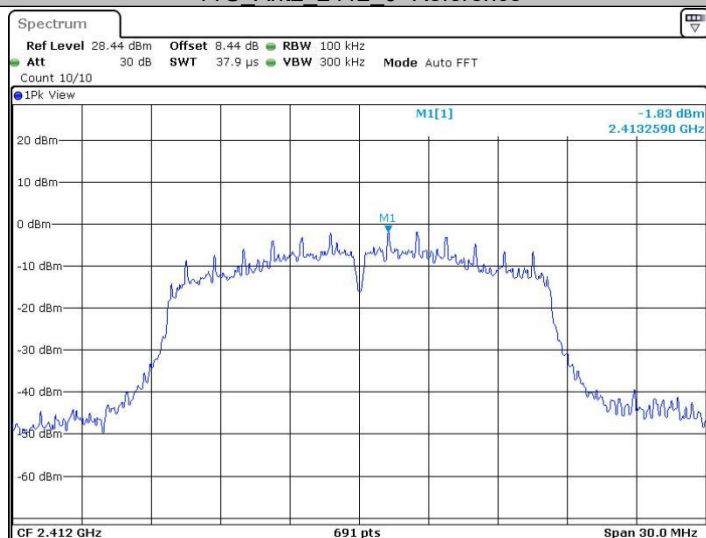
Date: 19 JUL 2023 10:34:56

11B_Ant2_2462_1000~26500



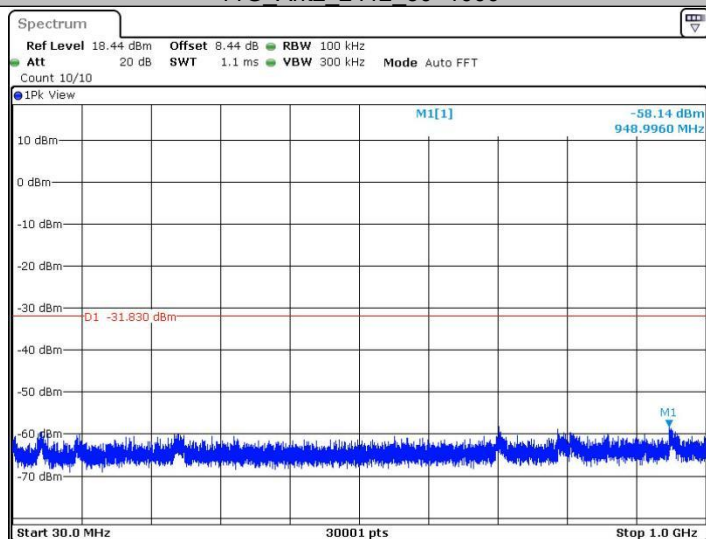
Date: 19 JUL 2023 10:35:18

11G_Ant2_2412_0~Reference



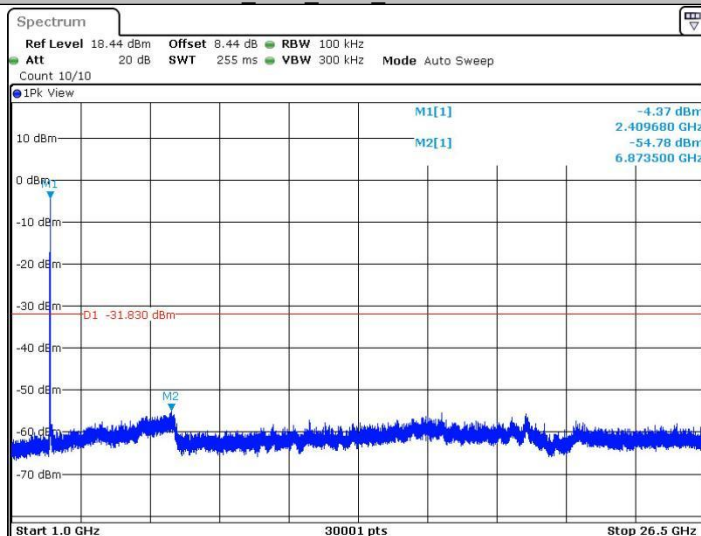
Date: 19 JUL 2023 10:37:26

11G_Ant2_2412_30~1000



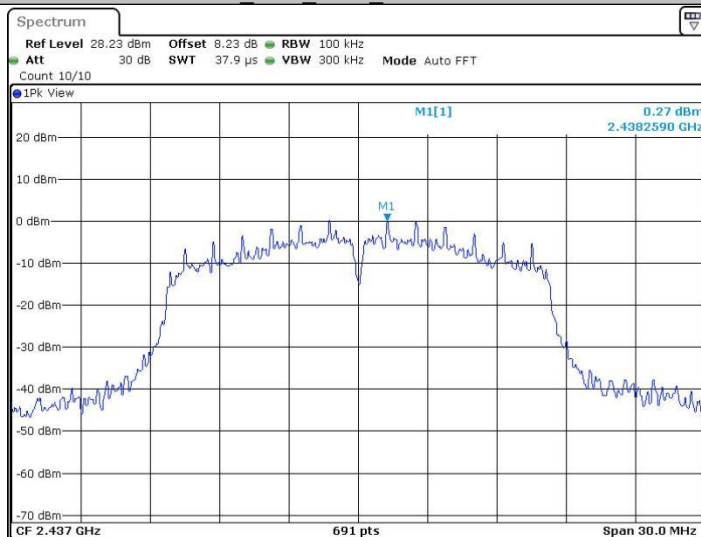
Date: 19 JUL 2023 10:37:33

11G_Ant2_2412_1000~26500



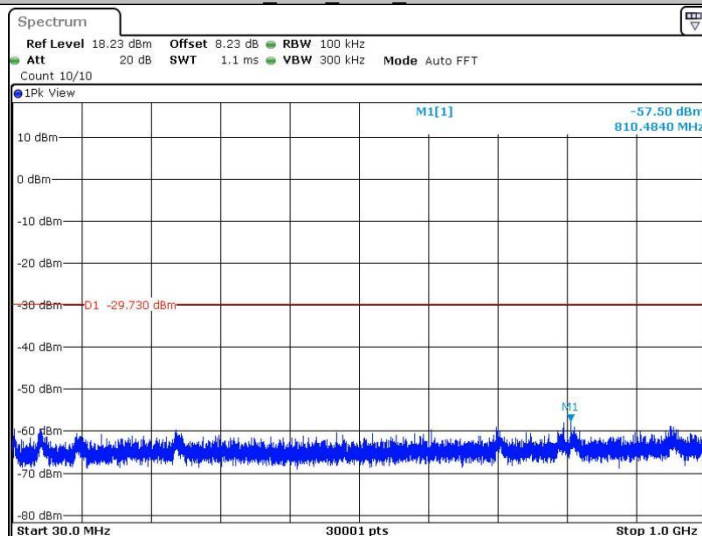
Date: 19 JUL 2023 10:37:55

11G_Ant2_2437_0~Reference



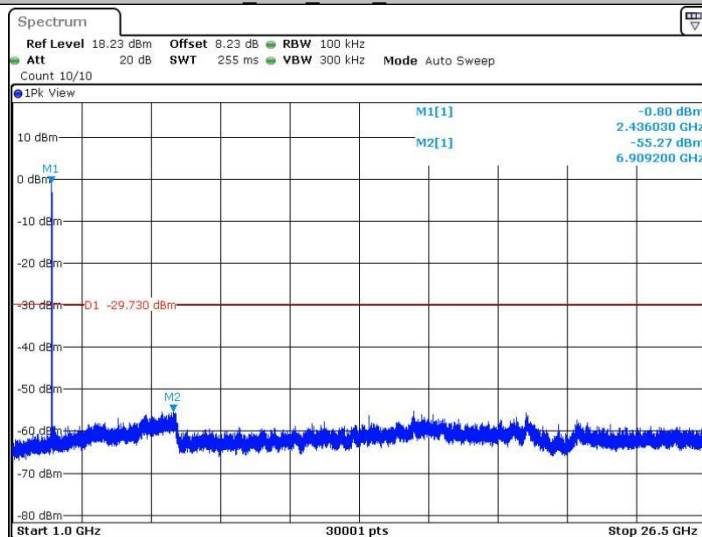
Date: 19 JUL 2023 10:39:22

11G_Ant2_2437_30~1000



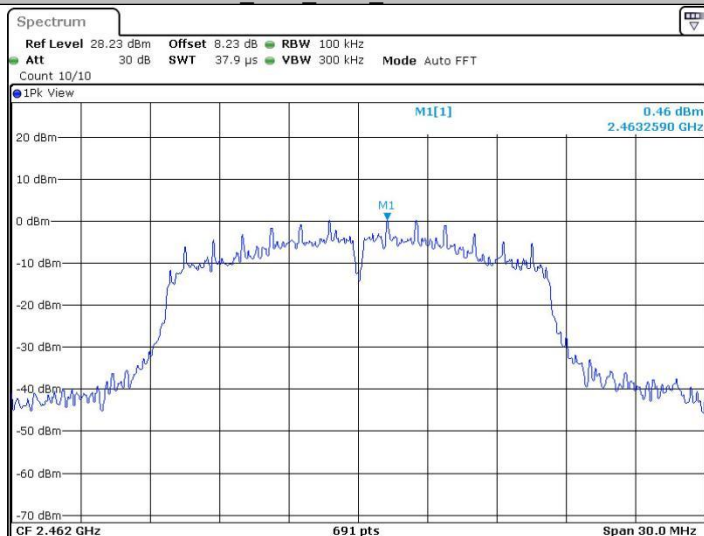
Date: 19 JUL 2023 10:39:29

11G_Ant2_2437_1000~26500



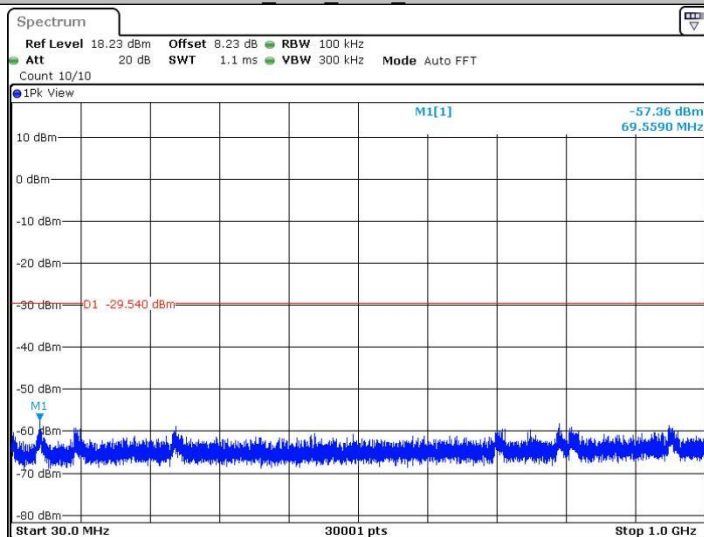
Date: 19 JUL 2023 10:39:51

11G_Ant2_2462_0~Reference



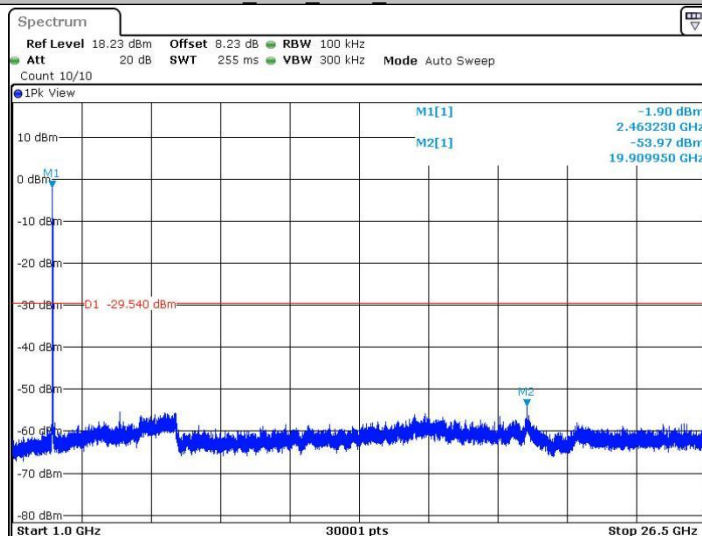
Date: 19 JUL 2023 10:41:57

11G_Ant2_2462_30~1000



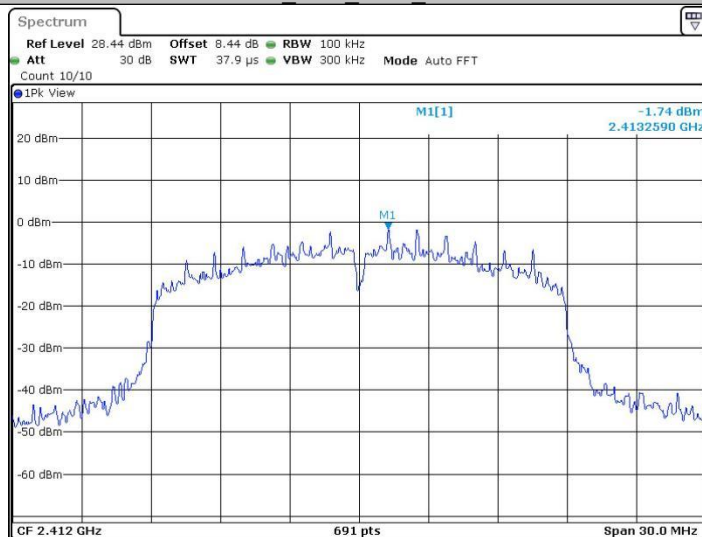
Date: 19 JUL 2023 10:42:04

11G_Ant2_2462_1000~26500



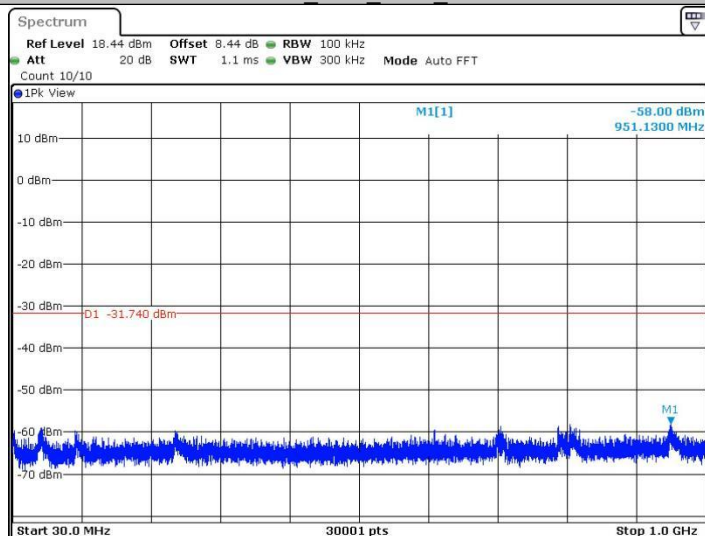
Date: 19 JUL 2023 10:42:26

11N20SISO_Ant2_2412_0~Reference



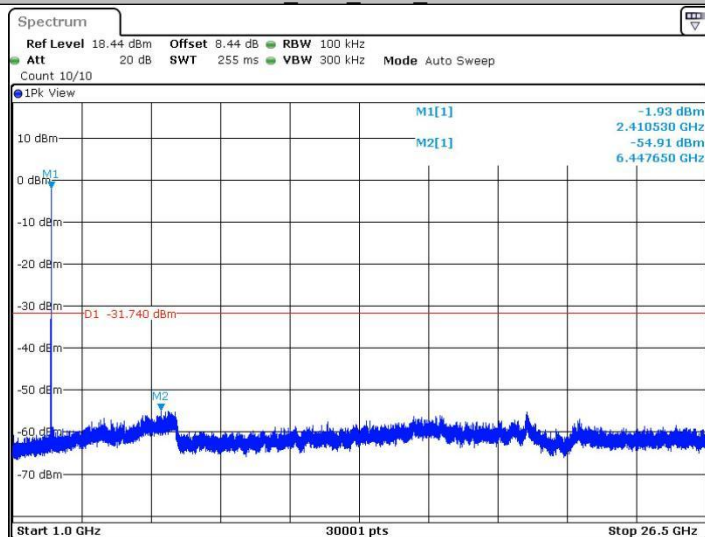
Date: 19 JUL 2023 10:44:51

11N20SISO_Ant2_2412_30~1000



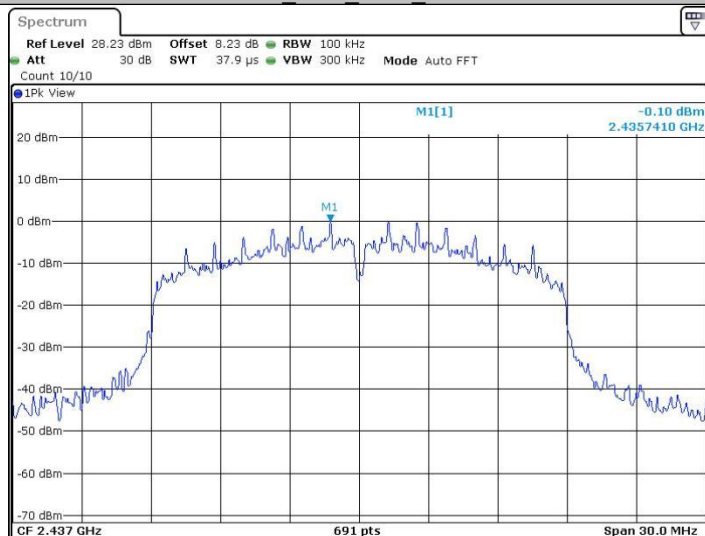
Date: 19 JUL 2023 10:44:57

11N20SISO_Ant2_2412_1000~26500



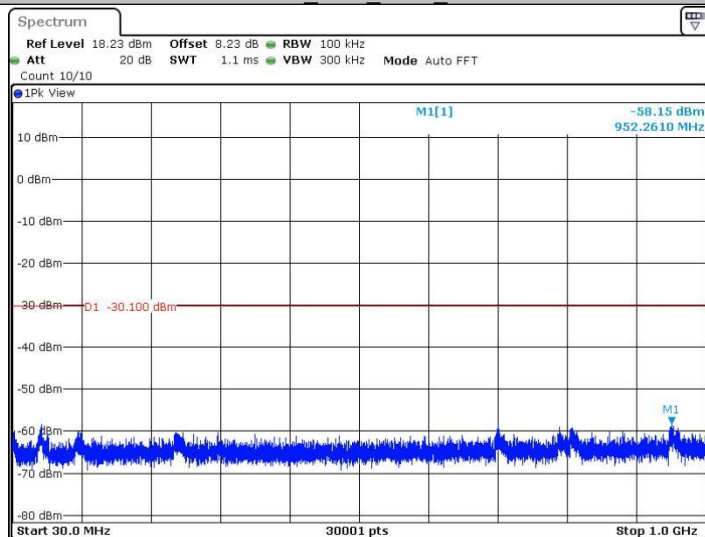
Date: 19 JUL 2023 10:45:19

11N20SISO_Ant2_2437_0~Reference



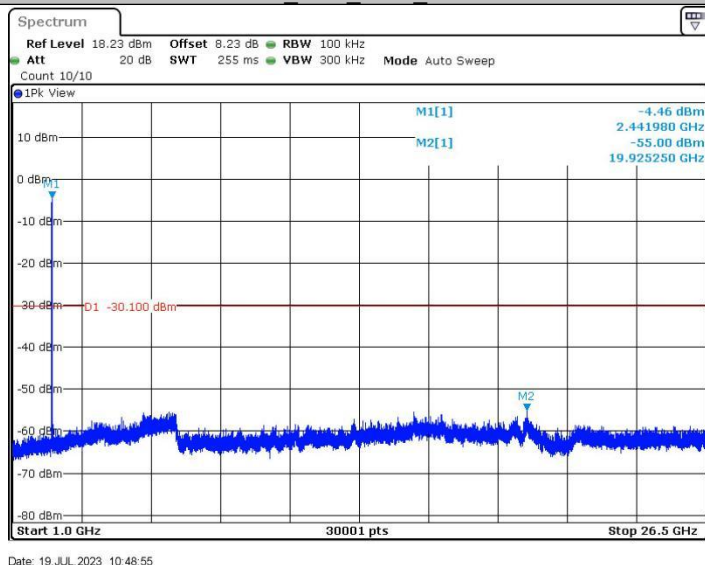
Date: 19 JUL 2023 10:48:26

11N20SISO_Ant2_2437_30~1000

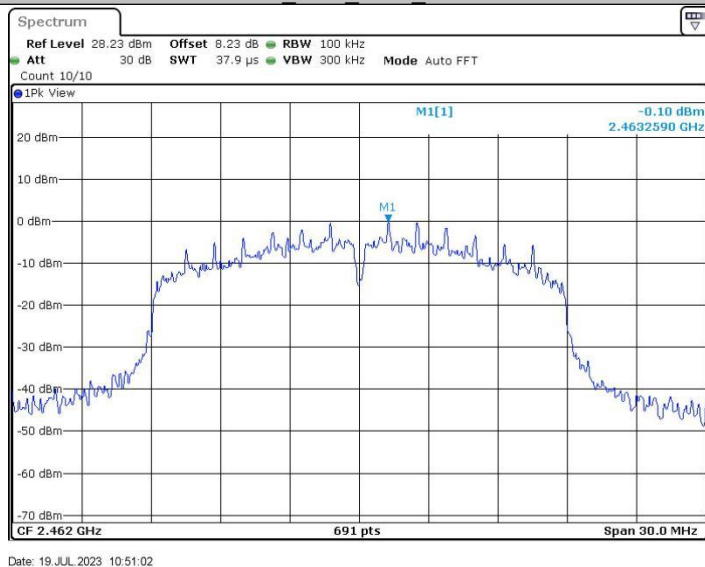


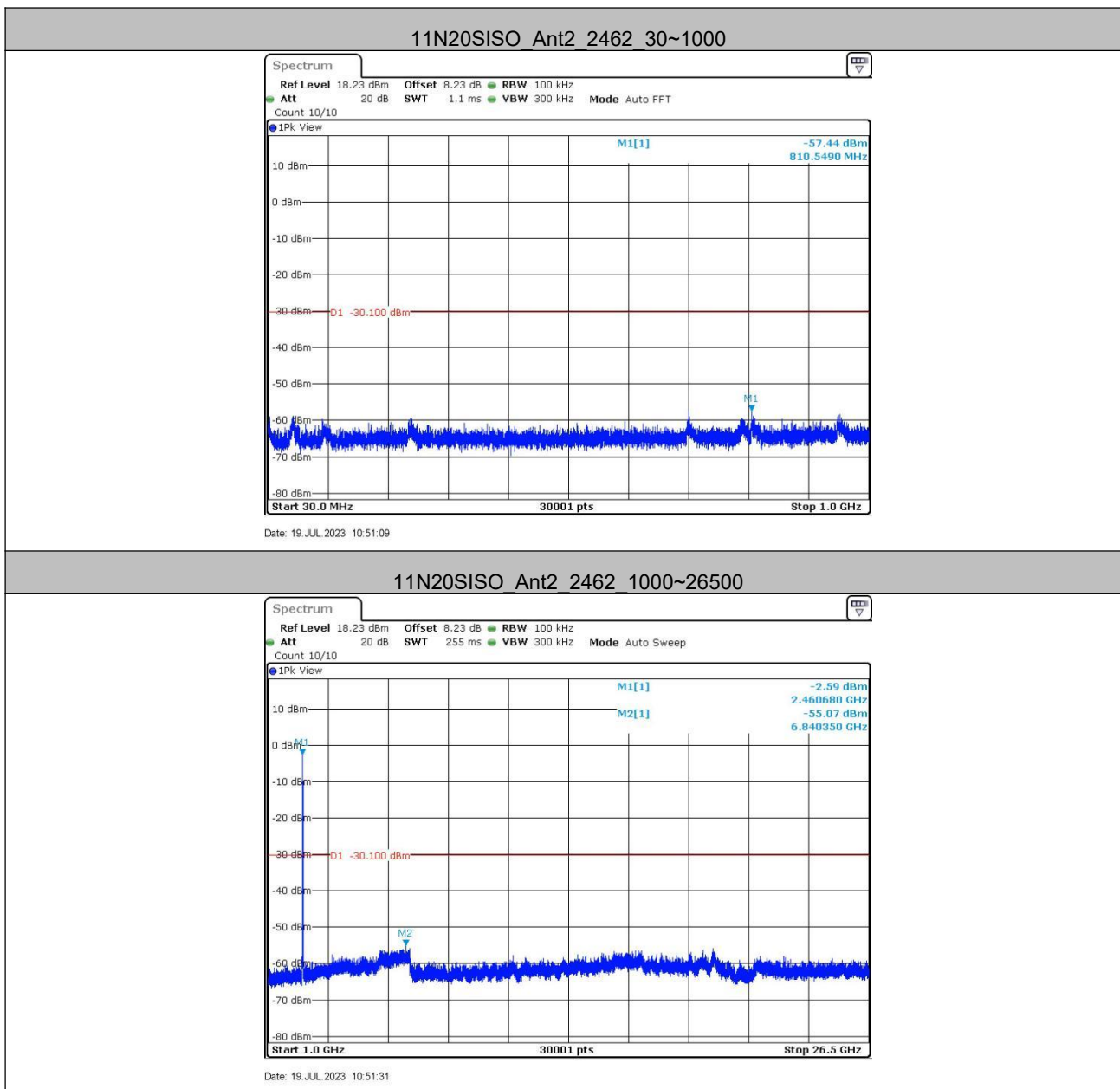
Date: 19 JUL 2023 10:48:32

11N20SISO_Ant2_2437_1000~26500



11N20SISO_Ant2_2462_0~Reference





Remark:

Pretest 9kHz to 25GHz, find the highest point when testing, so only the worst data were shown in the test report. Per FCC Part 15.33 (a) and 15.31 (o) ,The amplitude of spurious emissions from intentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

4.8 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10 2013				
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				

Test Setup:

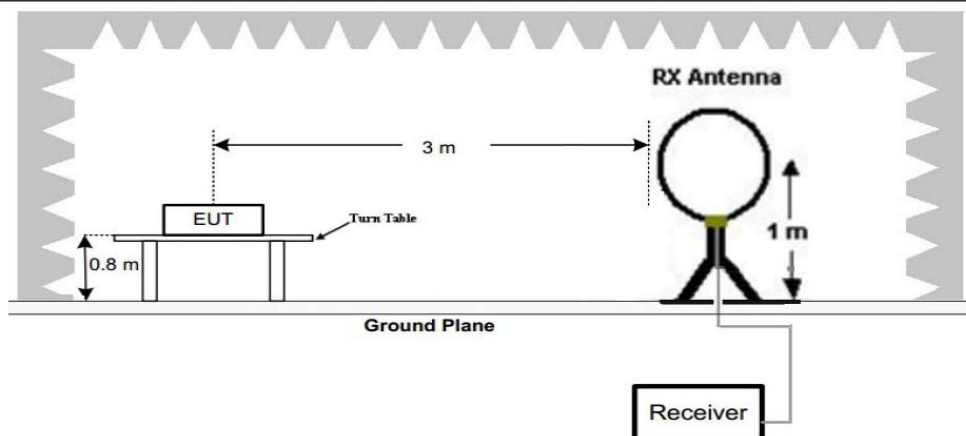


Figure 1. Below 30MHz

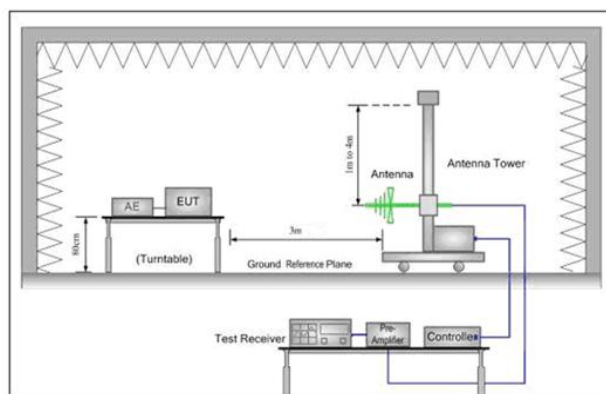


Figure 2. 30MHz to 1GHz

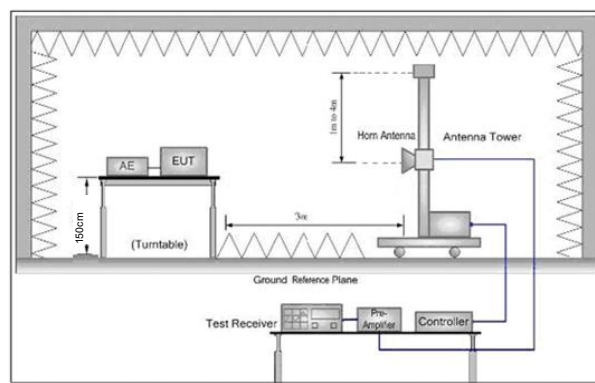


Figure 3. Above 1 GHz

Test Procedure:

- a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- Note: For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height 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.