FCC RF Test Report

FCC ID	:	UZ7WCMTA
EQUIPMENT	:	Touch Computer
BRAND NAME	:	Zebra
MODEL NAME	:	WCMTA
APPLICANT	:	Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742
MANUFACTURER	:	Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Feb. 05, 2023 ~ Apr. 24, 2023

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED
Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

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APPENDIX A. AC CONDUCTED EMISSION TEST RESULT

APPENDIX B. RADIATED SPURIOUS EMISSION

APPENDIX C. DUTY CYCLE PLOTS

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR311602C	Rev. 01	Initial issue of report	Apr. 27, 2023

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Report Only	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 1.18 dB at 2487.400 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 14.67 dB at 0.183 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Touch Computer
Brand Name	Zebra
Model Name	WCMTA
FCC ID	UZ7WCMTA
Sample 1	Scanner(SE4710)
Sample 2	Scanner(SE5500)
HW Version	DV
SW Version	13-09-09.00-TG-U00-PRD-ATH-04
FW Version	FUSION_QA_4_1.1.0.001_T
MFD	09MAR23
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT: the main differences between them are the scanner and memory. According to the difference, we choose the Sample 1 to perform full test, and verify the worst RSE mode for Sample 2.

Specification of Accessory				
Battery 1	**Brand Name**	Zebra	**Model Number**	BT-000473

Supported Unit used in test configuration and system				
Battery 2	**Brand Name**	Zebra	**Model Number**	BT-000473B
Battery 3	**Brand Name**	Zebra	**Model Number**	BT-000473E
AC Adapter	**Brand Name**	Zebra	**Part Number**	PWR-WUA5V12W0US
Earphone 1	**Brand Name**	Zebra	**Part Number**	HDST-35MM-PTT1-01
Earphone 2	**Brand Name**	Zebra	**Part Number**	HDST-USBC-PTT1-01
USB Cable (Type C to Type A)	**Brand Name**	Zebra	**Part Number**	CBL-TC5X-USBC2A-01
Type C-Audio Cable (Type C to 3.5mm)	**Brand Name**	Zebra	**Part Number**	ADP-USBC-35MM1-01
Trigger Handle	**Brand Name**	Zebra	**Part Number**	TRG-TC2L-SNP1-01
Hand Strap	**Brand Name**	Zebra	**Part Number**	SG-TC2L-HSTRP1-01
Soft Holster	**Brand Name**	Zebra	**Part Number**	SG-TC2L-HLSTR1-01

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	**MIMO <Ant.7+8>** 802.11b : 25.90 dBm (0.3890 W) 802.11g : 29.35 dBm (0.8610 W) 802.11n HT20 : 28.86 dBm (0.7691 W) 802.11n HT40 : 29.38 dBm (0.8670 W) 802.11ac VHT20 : 29.00 dBm (0.7943 W) 802.11ac VHT40 : 29.41 dBm (0.8730 W) 802.11ax HE20 : 29.05 dBm (0.8035 W) 802.11ax HE40 : 29.43 dBm (0.8770 W)
99% Occupied Bandwidth	802.11b : 13.427MHz 802.11g : 26.014MHz 802.11ax HE20 : 20.180MHz 802.11ax HE40 : 38.282MHz
Antenna Type / Gain	Ant.7: IFA Antenna type with gain -1.26 dBi Ant.8: IFA Antenna type with gain -1.79 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM) 802.11ax: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM/1024QAM)

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.
2. For 802.11n/ac & 802.11ax mode, the whole testing have assessed only 802.11ax HE20/40 by referring to the higher output power.
3. For WLAN SISO & MIMO (CDD) mode, the whole testing has assessed only MIMO mode by referring to the higher normal conducted power.
4. 802.11ax support Tx Beamforming mode for 802.11ax, and the manufacturer declares that Tx Beamforming power/EIRP is not greater than CDD mode, so CDD mode covers Tx Beamforming mode.
5. 802.11ax support full RU tone and partial RU tone, both full RU and partial RU-left (for low CH) and partial RU-right (for high CH) are tested for conducted power/PSD/RSE, the full RU power > partial RU, therefore the full RU perform full test and Partial RU verified power/PSD/RSE.

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-KS 03CH08-KS TH01-KS	CN1257	314309

1.5 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH08-KS	AUDIX	E3	6.2009-8-24al
2.	CO01-KS	AUDIX	E3	6.2009-8-24

1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

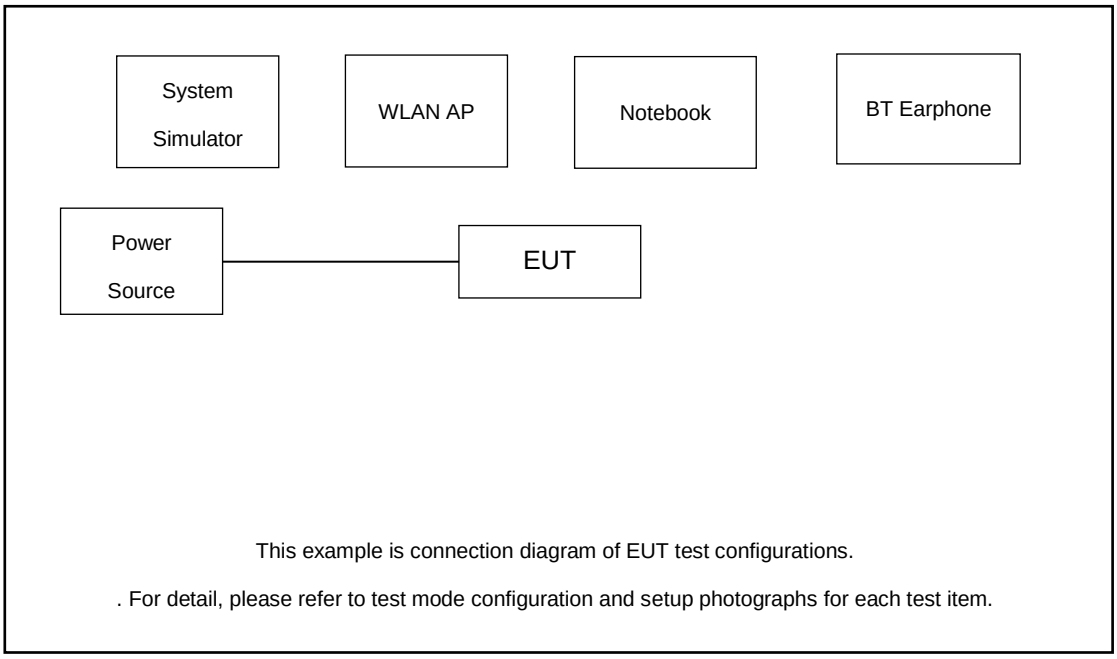
MIMO Antenna

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11ax HE20	MCS0
802.11ax HE40	MCS0

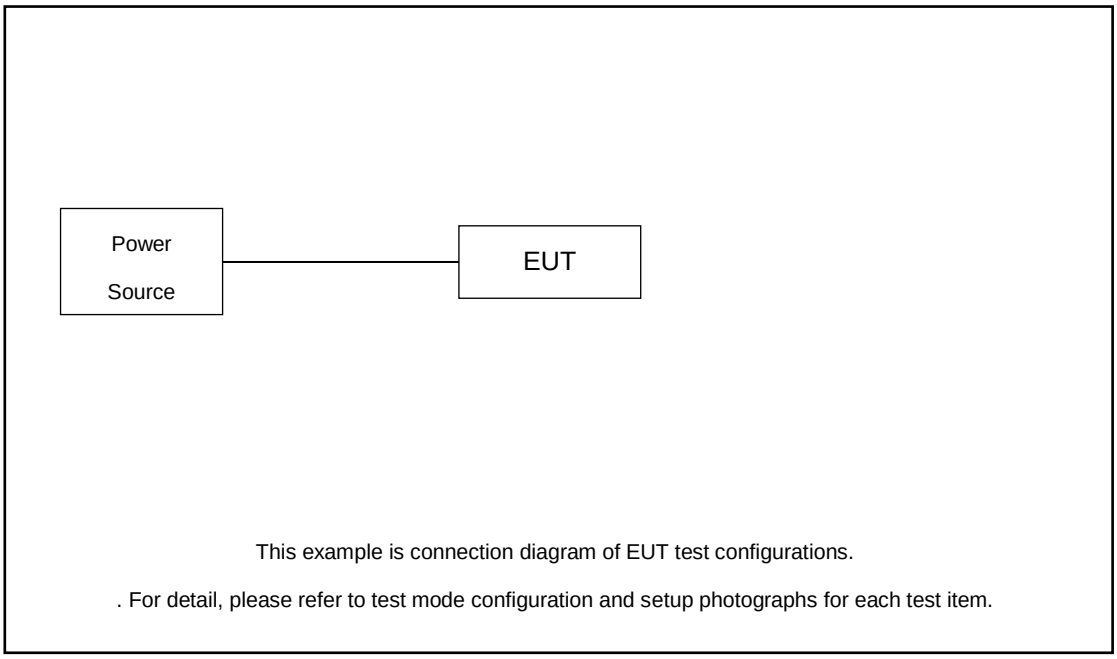
Test Cases	
AC Conducted Emission	Mode 1 :5G NR 71 Rx+ Bluetooth Link+ WIAN Link
Remark: For Radiated Test Cases, The tests were performed with Adapter and USB Cable.	

2.3 Connection Diagram of Test System

For Conducted Emission



For Radiated Emission



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritus	MT8821C	N/A	N/A	Unshielded,1.8m
2.	5GNR Base Station	Anritus	MT8000A	N/A	N/A	Unshielded,1.8m
3.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
4.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A

2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuous transmit.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 2.95 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 2.95 + 10 = 12.95 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

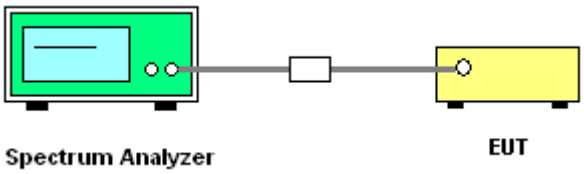
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1%~5% of OBW and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

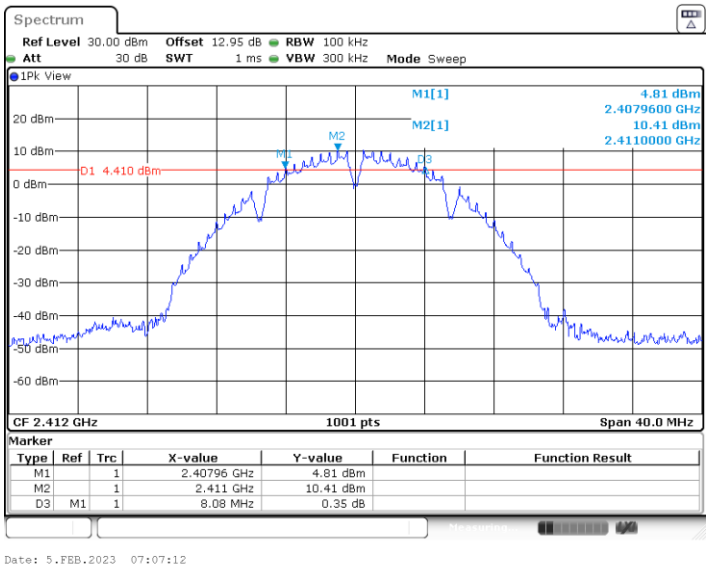
3.1.4 Test Setup



3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Test Mode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B-CDD	Ant7	2412	8.08	2407.96	2416.04	0.5	PASS
	Ant8	2412	8.52	2408.00	2416.52	0.5	PASS
	Ant7	2437	8.00	2433.00	2441.00	0.5	PASS
	Ant8	2437	8.04	2433.00	2441.04	0.5	PASS
	Ant7	2462	8.52	2457.48	2466.00	0.5	PASS
	Ant8	2462	8.56	2457.48	2466.04	0.5	PASS
11G-CDD	Ant7	2412	15.96	2404.20	2420.16	0.5	PASS
	Ant8	2412	16.32	2403.84	2420.16	0.5	PASS
	Ant7	2437	16.32	2428.84	2445.16	0.5	PASS
	Ant8	2437	16.32	2428.84	2445.16	0.5	PASS
	Ant7	2462	15.72	2453.84	2469.56	0.5	PASS
	Ant8	2462	15.72	2453.84	2469.56	0.5	PASS
11AX20MIMO	Ant7	2412	18.52	2402.84	2421.36	0.5	PASS
	Ant8	2412	18.60	2402.72	2421.32	0.5	PASS
	Ant7	2437	18.92	2427.52	2446.44	0.5	PASS
	Ant8	2437	18.96	2427.52	2446.48	0.5	PASS
	Ant7	2462	18.56	2452.52	2471.08	0.5	PASS
	Ant8	2462	18.64	2452.52	2471.16	0.5	PASS
11AX40MIMO	Ant7	2422	37.44	2403.12	2440.56	0.5	PASS
	Ant8	2422	36.40	2403.20	2439.60	0.5	PASS
	Ant7	2437	38.08	2417.96	2456.04	0.5	PASS
	Ant8	2437	38.08	2417.88	2455.96	0.5	PASS
	Ant7	2452	36.32	2433.44	2469.76	0.5	PASS
	Ant8	2452	37.36	2433.20	2470.56	0.5	PASS

11B-CDD_Ant7_2412



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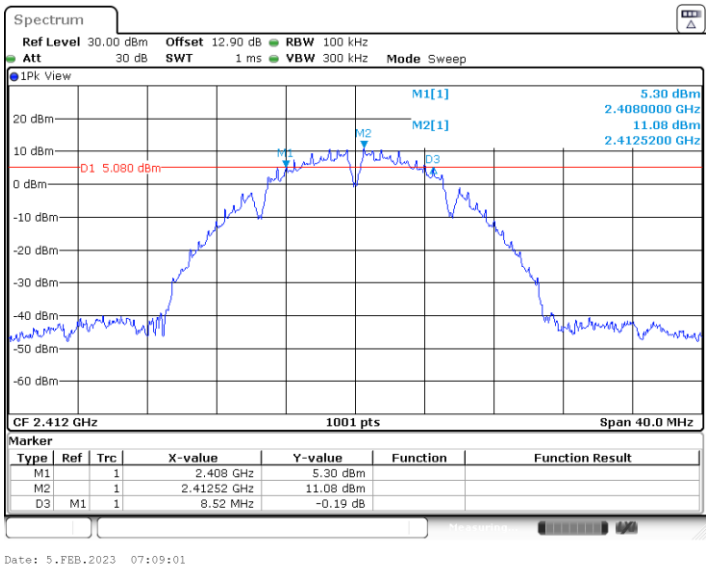

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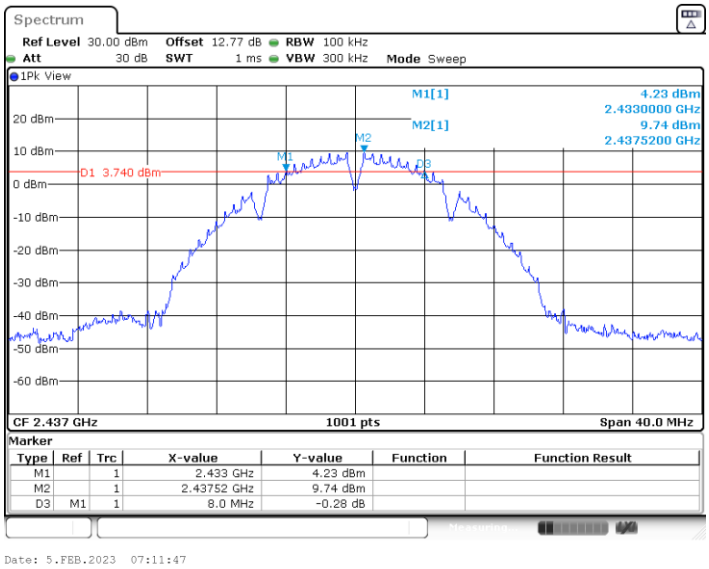

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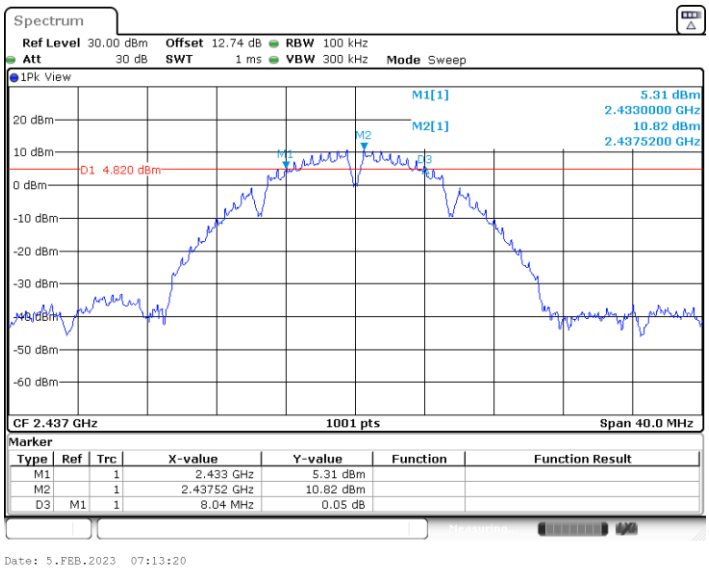

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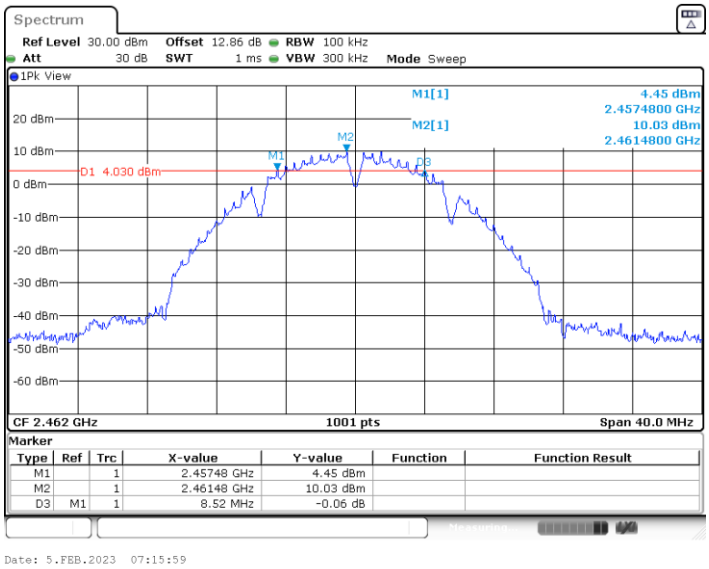

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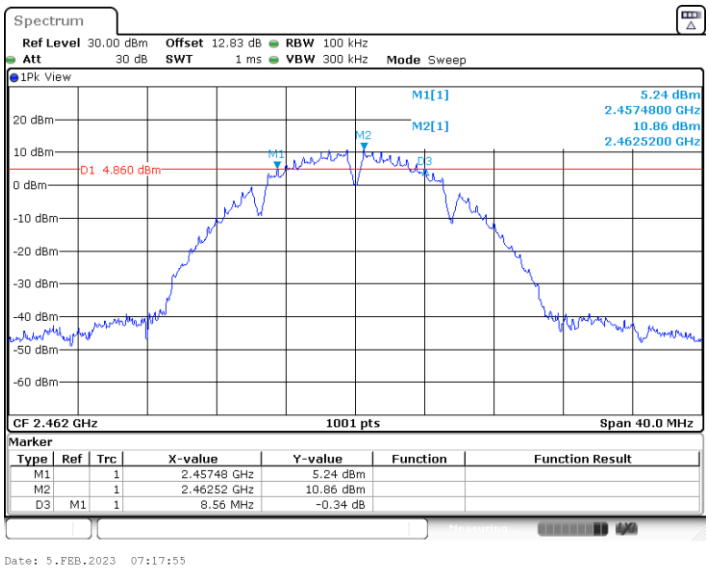

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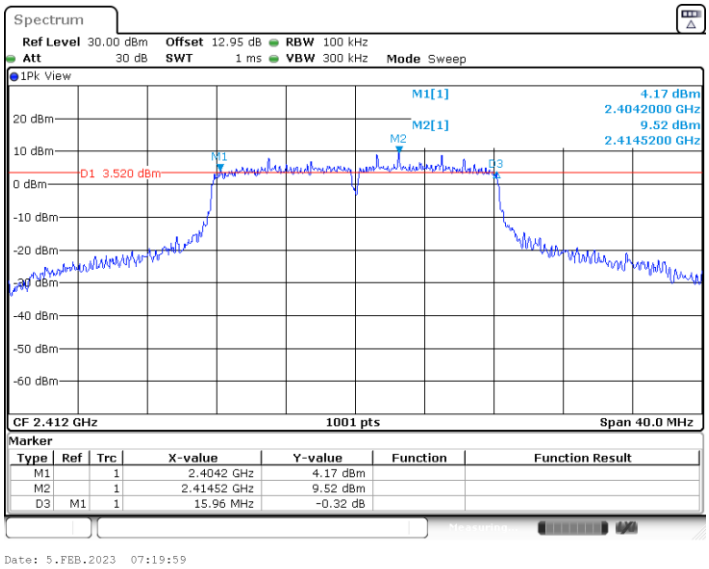

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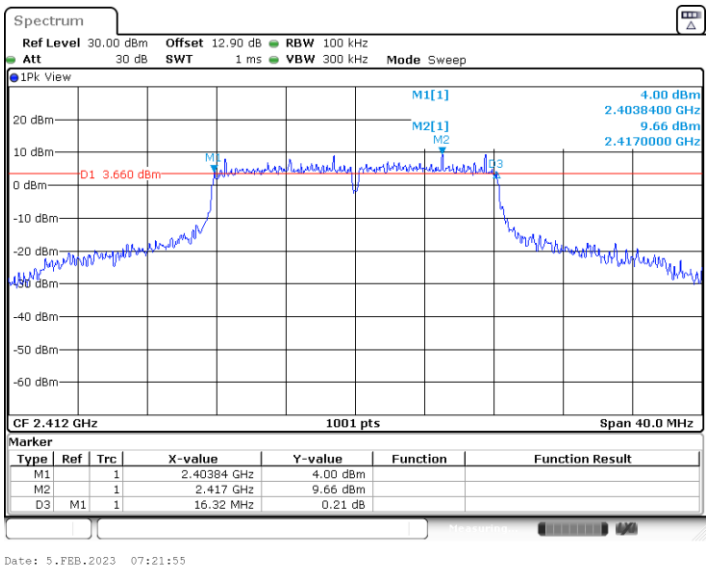

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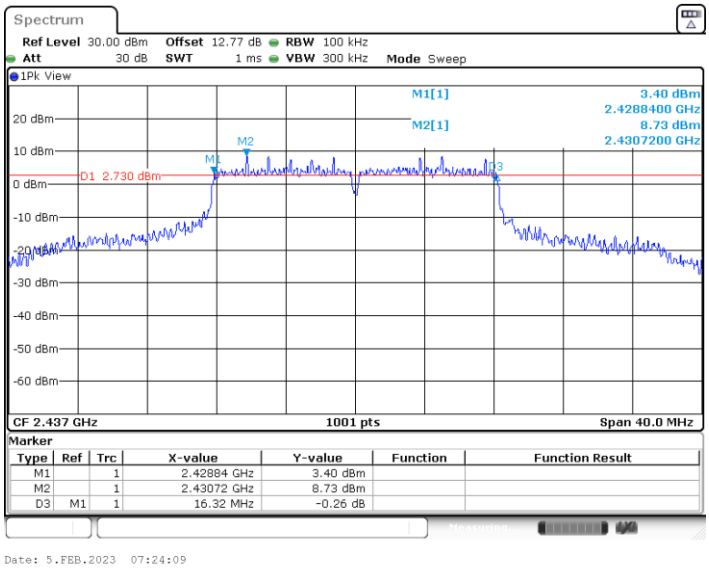

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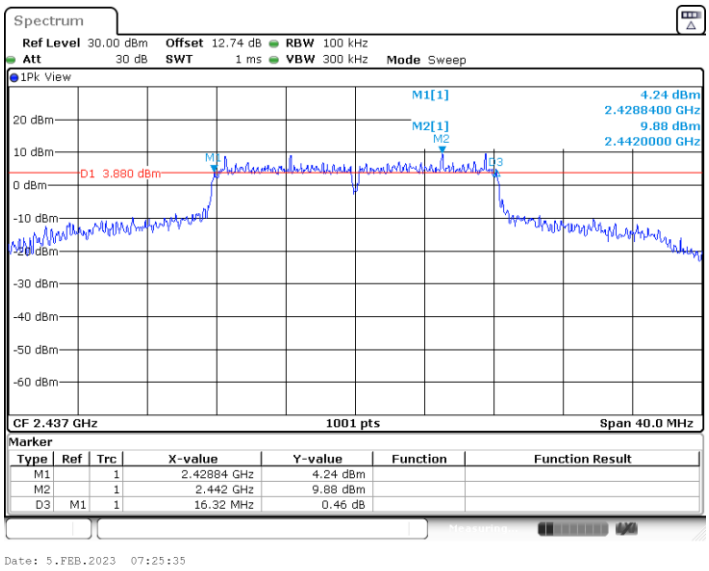

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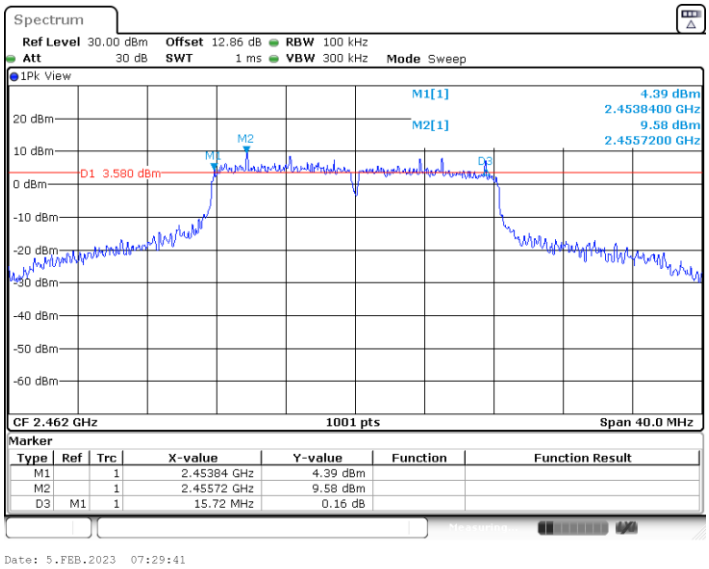

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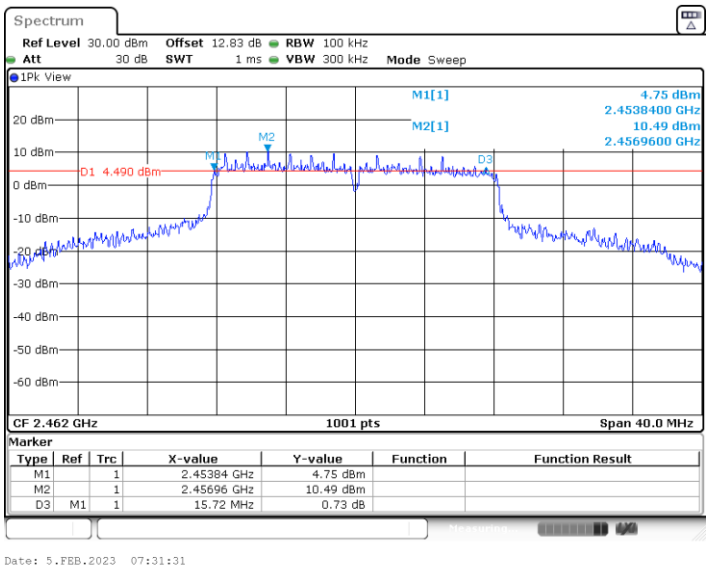

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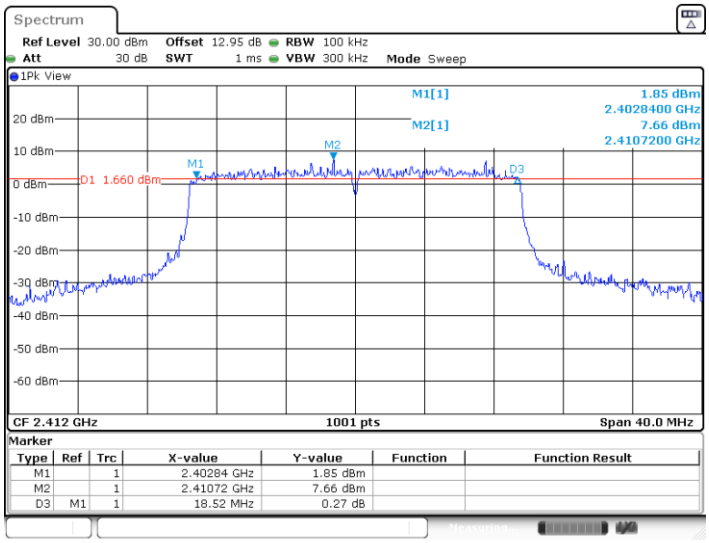

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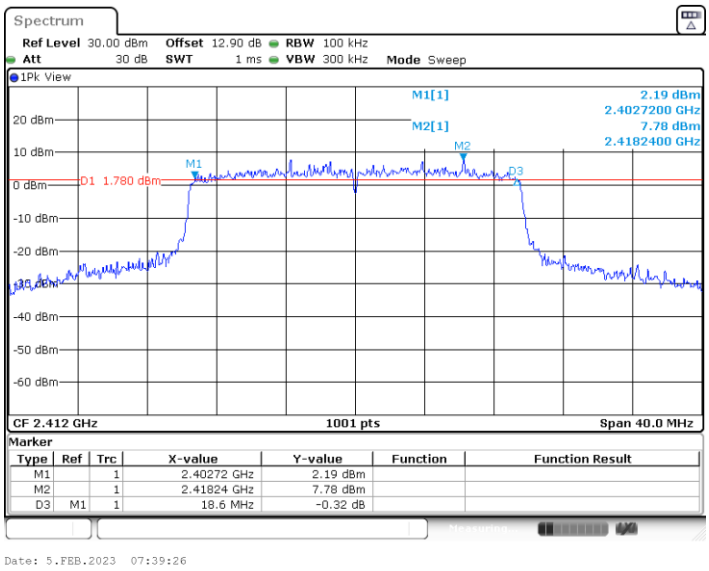

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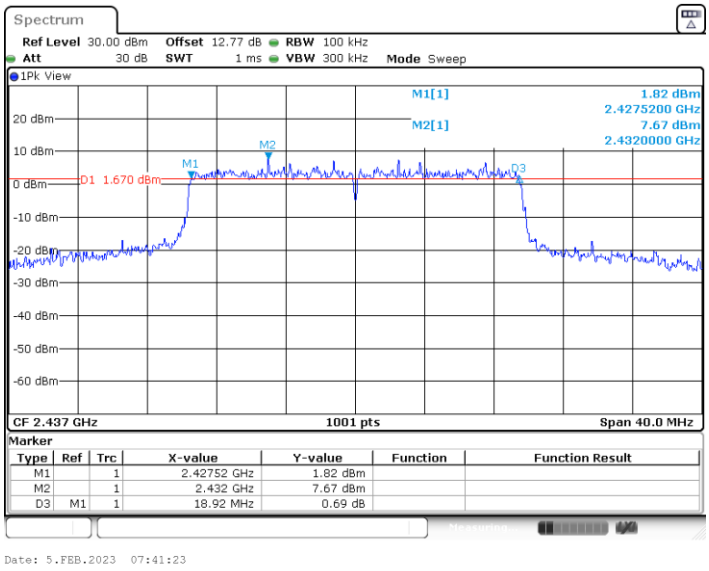

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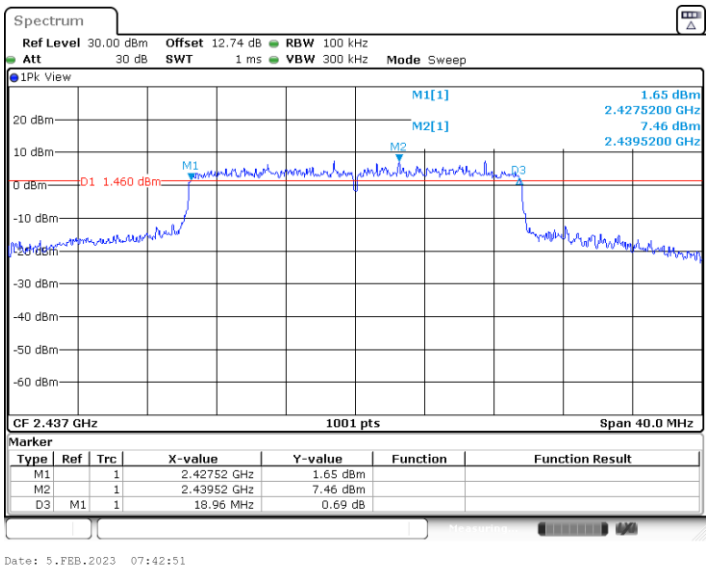

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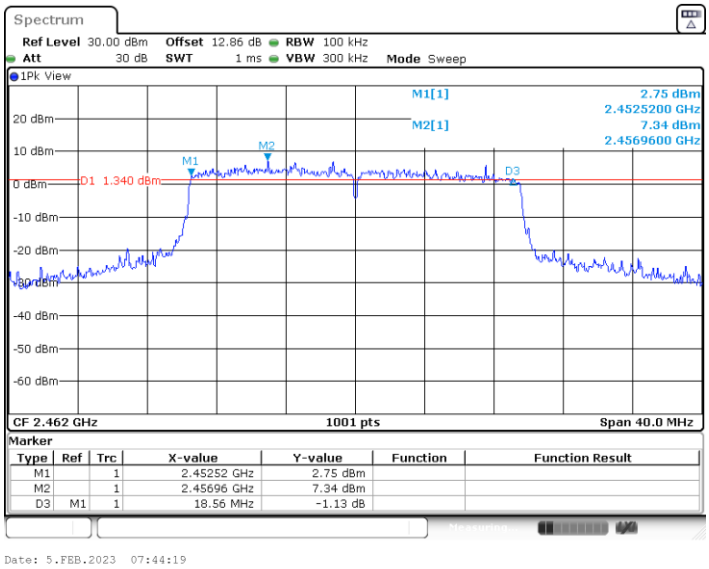

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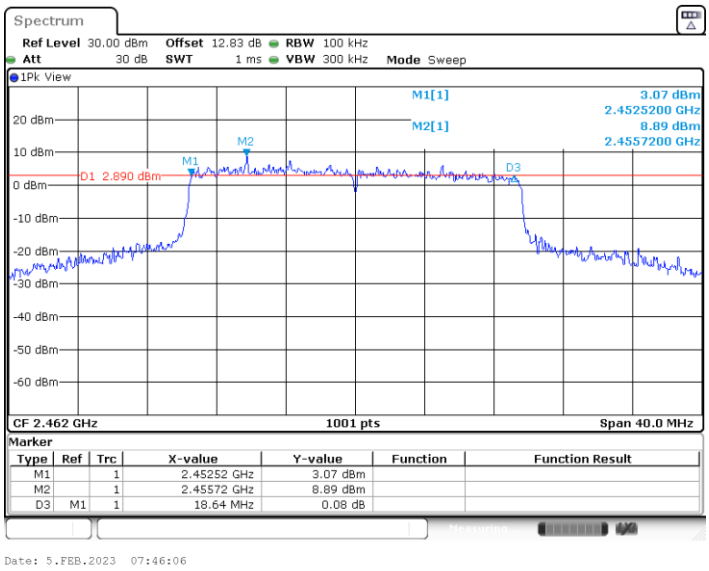

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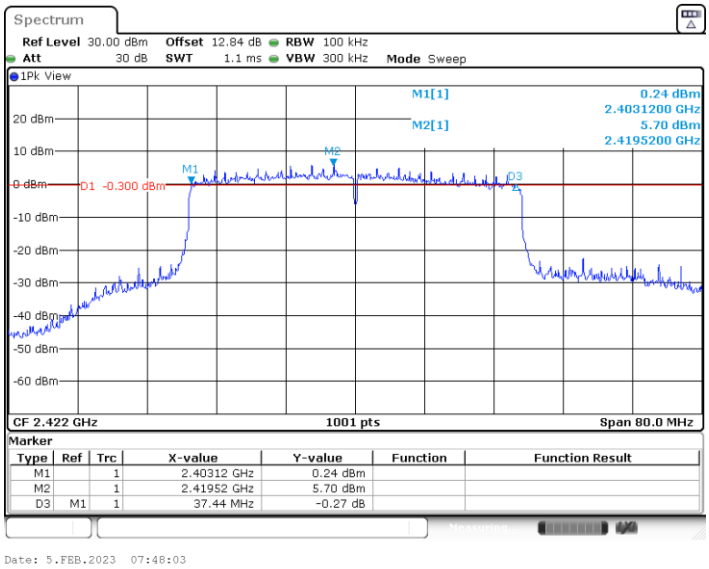

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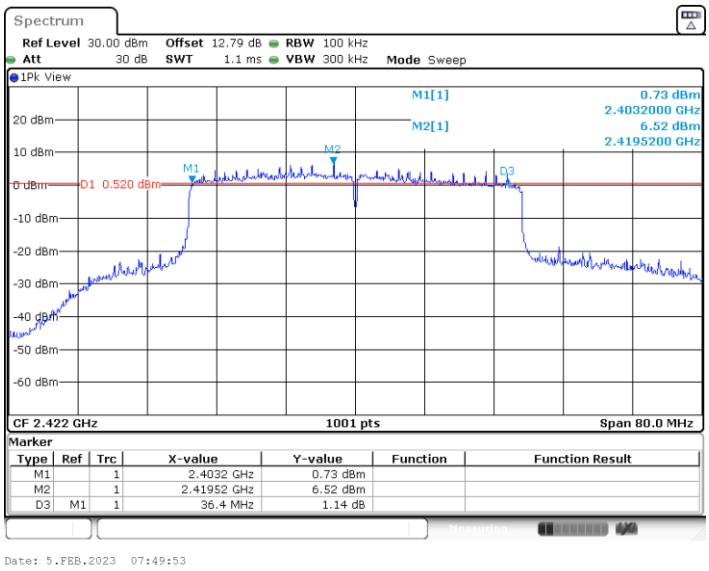
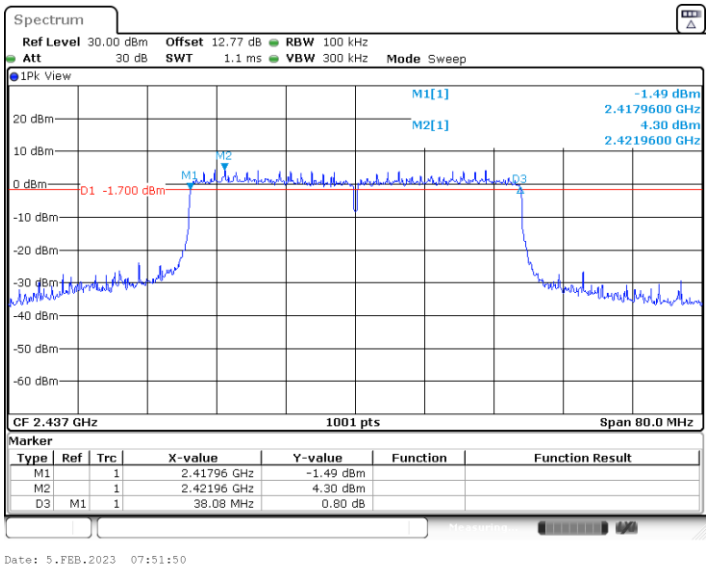
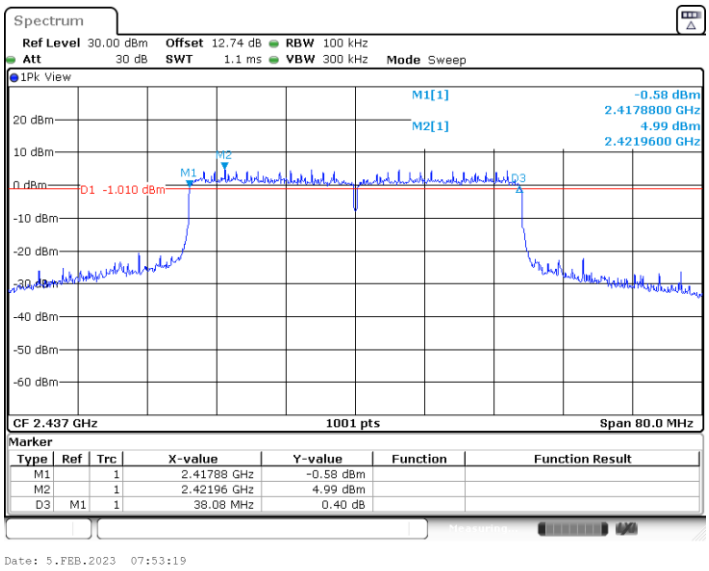


11AX40MIMO_Ant7_2437



11AX40MIMO_Ant8_2437



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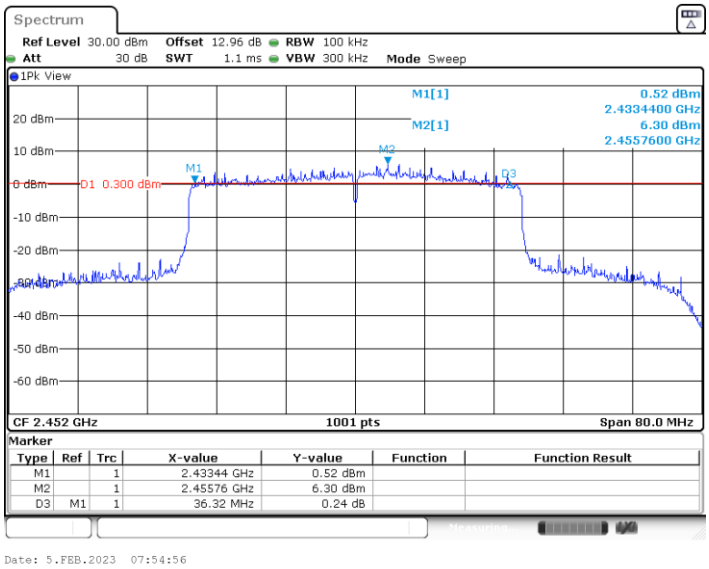

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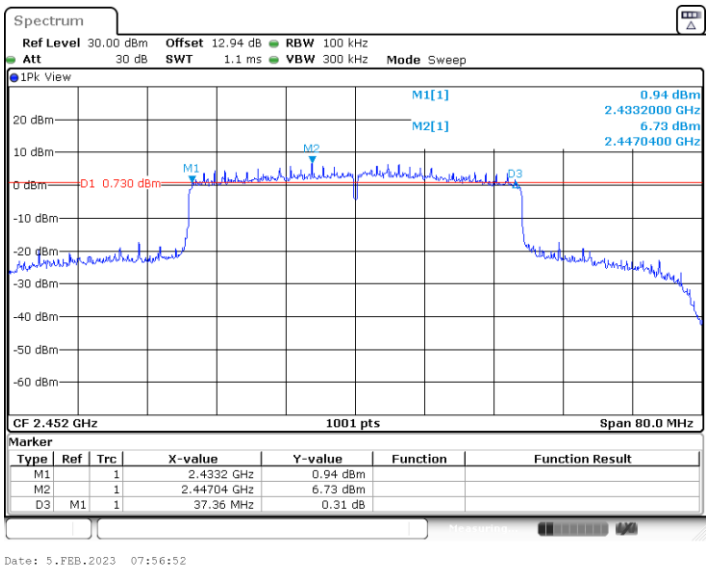
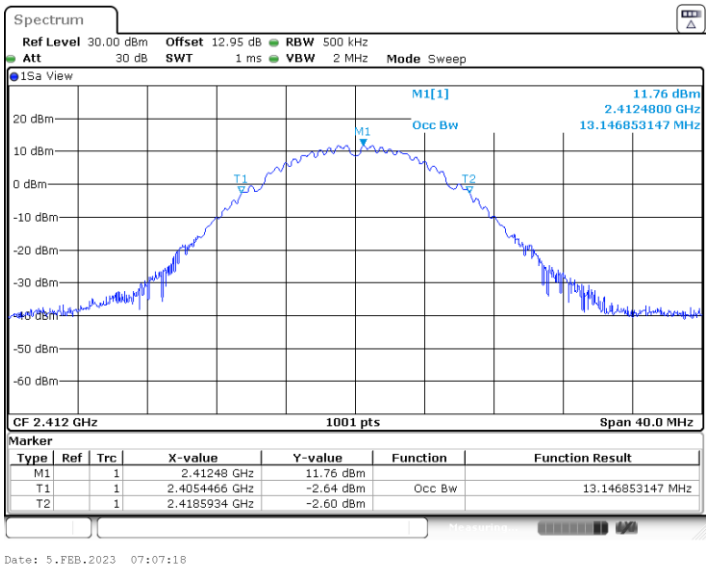
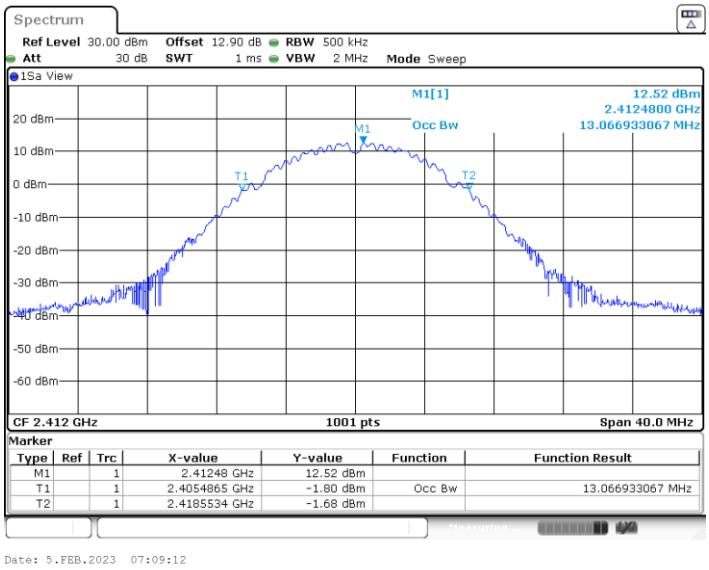


Test Mode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B-CDD	Ant7	2412	13.147	2405.4466	2418.5934	---	---
	Ant8	2412	13.067	2405.4865	2418.5534	---	---
	Ant7	2437	13.387	2430.2468	2443.6334	---	---
	Ant8	2437	13.427	2430.2468	2443.6733	---	---
	Ant7	2462	13.307	2455.1269	2468.4336	---	---
	Ant8	2462	13.227	2455.2068	2468.4336	---	---
11G-CDD	Ant7	2412	16.983	2403.5285	2420.5115	---	---
	Ant8	2412	16.903	2403.5684	2420.4715	---	---
	Ant7	2437	21.099	2426.2108	2447.3097	---	---
	Ant8	2437	24.775	2424.5125	2449.2877	---	---
	Ant7	2462	17.383	2453.1688	2470.5514	---	---
	Ant8	2462	19.061	2452.2098	2471.2707	---	---
11AX20MIMO	Ant7	2412	19.061	2402.4895	2421.5504	---	---
	Ant8	2412	19.101	2402.4496	2421.5504	---	---
	Ant7	2437	19.421	2427.2897	2446.7103	---	---
	Ant8	2437	20.18	2426.8501	2447.0300	---	---
	Ant7	2462	19.181	2452.3297	2471.5105	---	---
	Ant8	2462	19.261	2452.3297	2471.5904	---	---
11AX40MIMO	Ant7	2422	37.962	2402.9790	2440.9411	---	---
	Ant8	2422	38.042	2402.9790	2441.0210	---	---
	Ant7	2437	38.122	2417.8991	2456.0210	---	---
	Ant8	2437	38.282	2417.8192	2456.1009	---	---
	Ant7	2452	37.882	2433.0589	2470.9411	---	---
	Ant8	2452	38.122	2432.8991	2471.0210	---	---

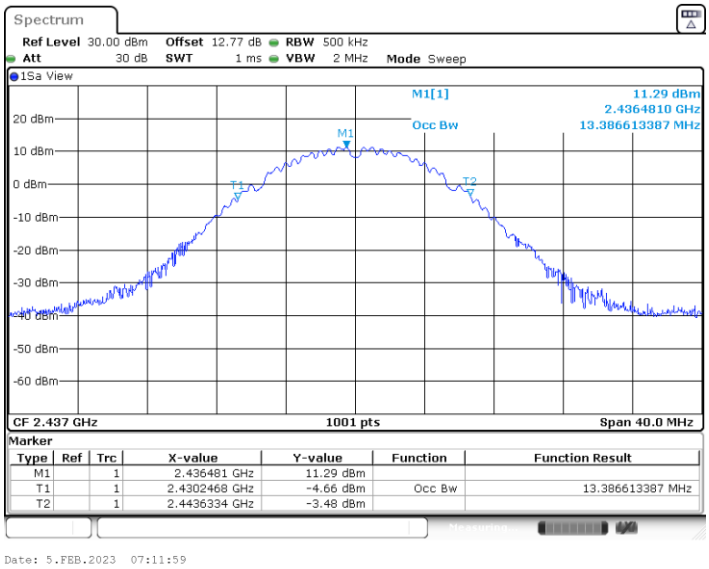
11B-CDD_Ant7_2412



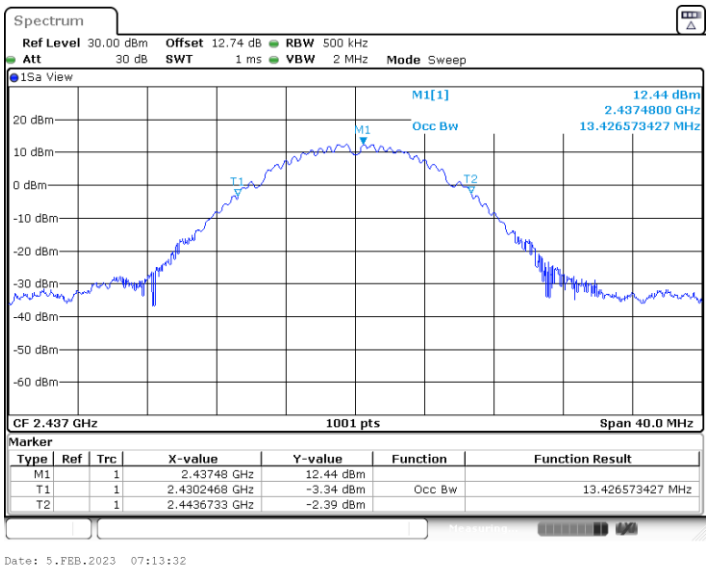
11B-CDD_Ant8_2412



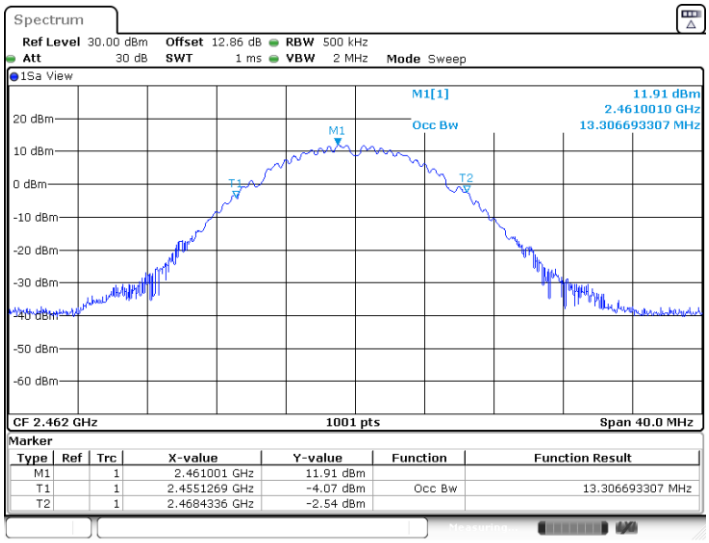
11B-CDD_Ant7_2437



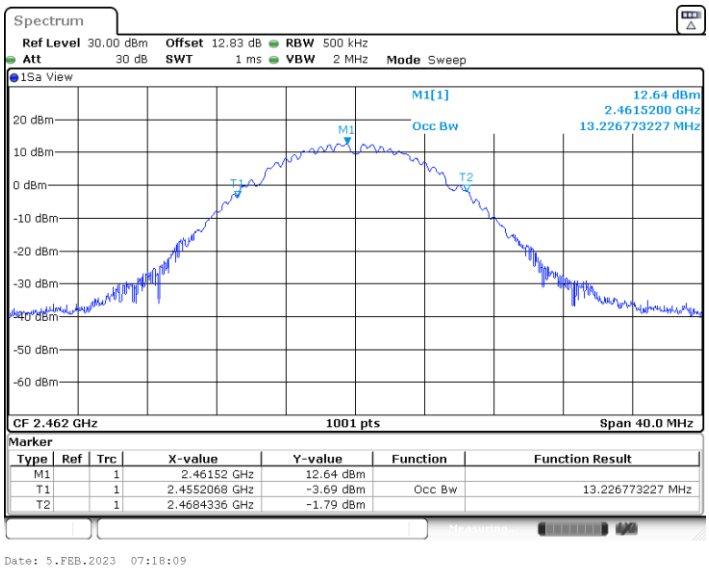
11B-CDD_Ant8_2437



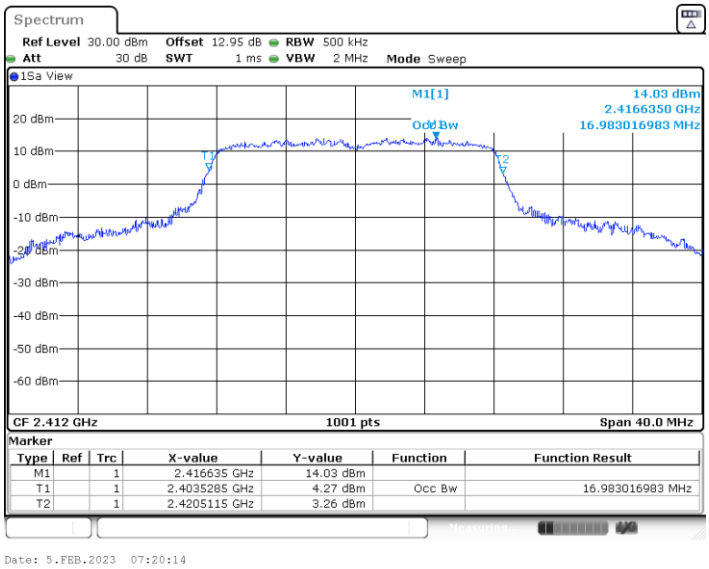
11B-CDD_Ant7_2462



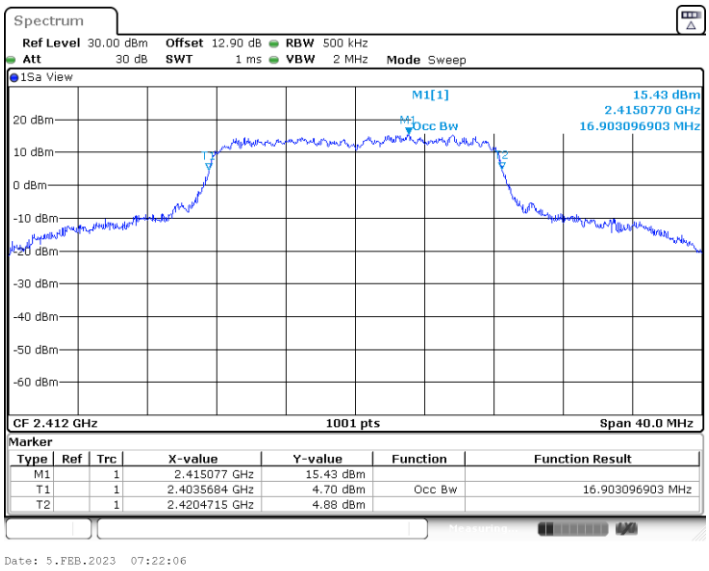
11B-CDD_Ant8_2462



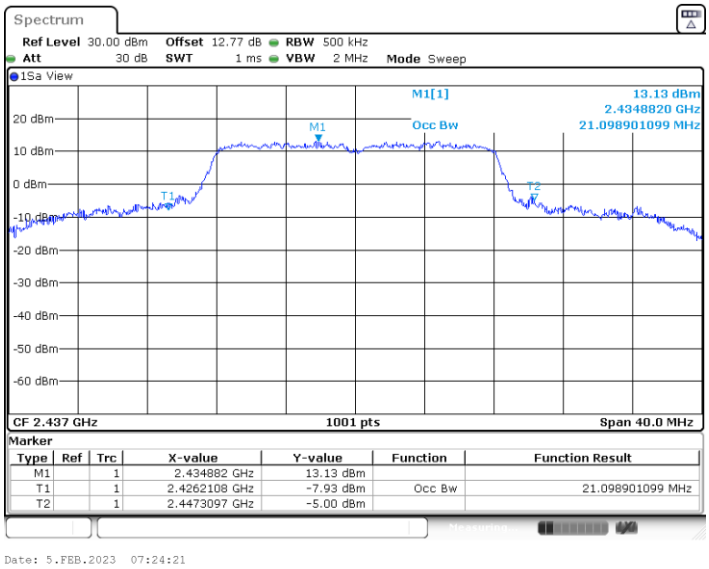
11G-CDD_Ant7_2412



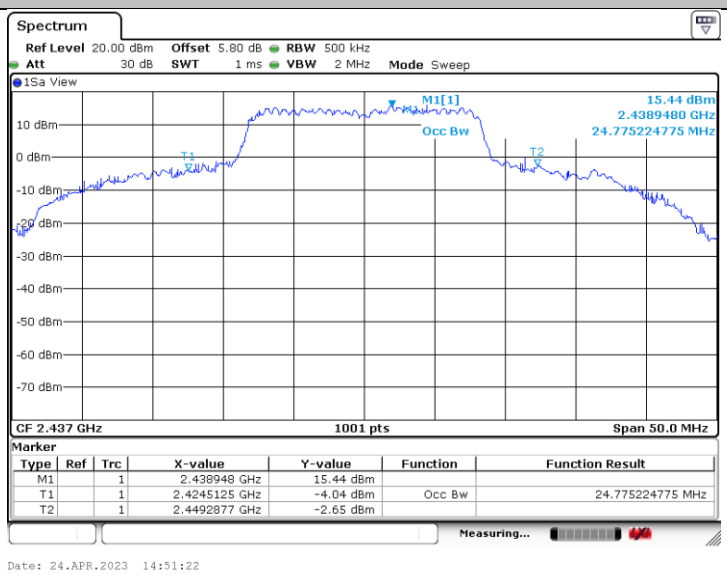
11G-CDD_Ant8_2412



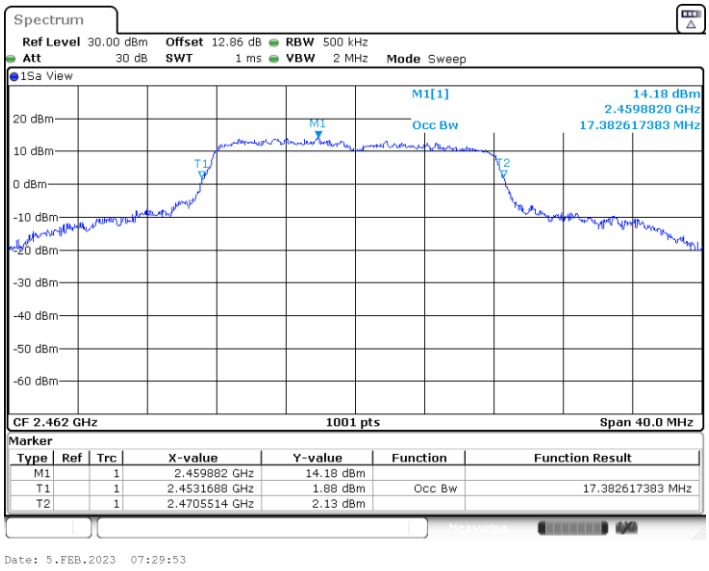
11G-CDD_Ant7_2437



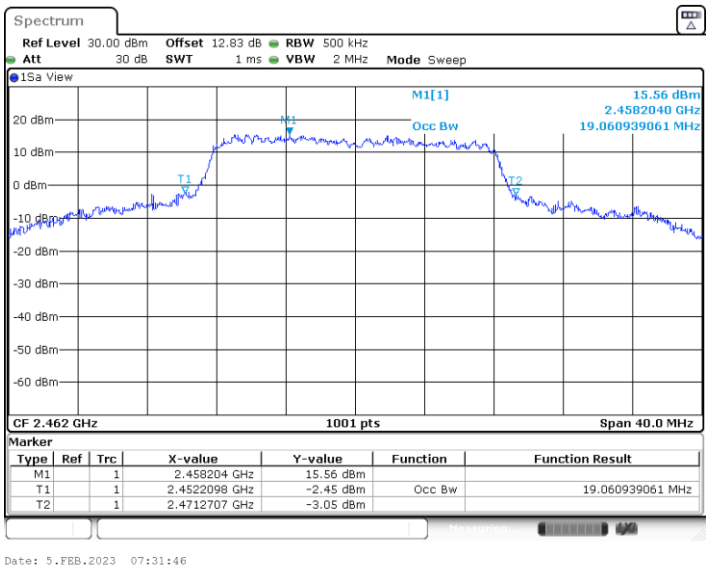
11G-CDD_Ant8_2437



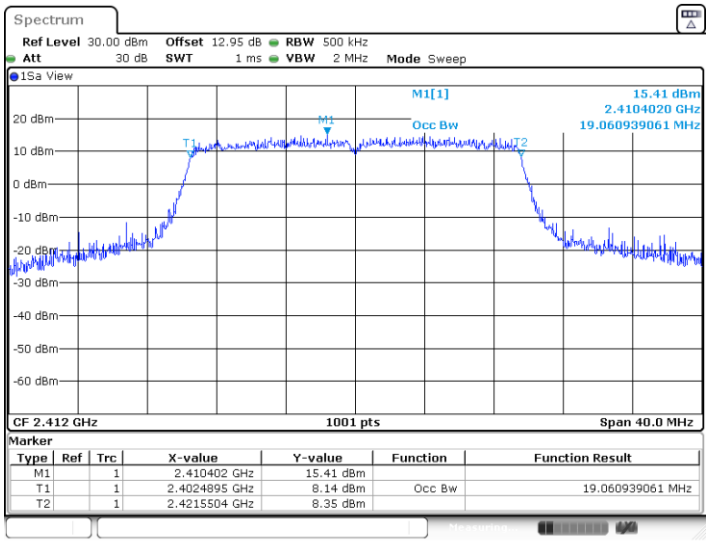
11G-CDD_Ant7_2462



11G-CDD_Ant8_2462



11AX20MIMO_Ant7_2412



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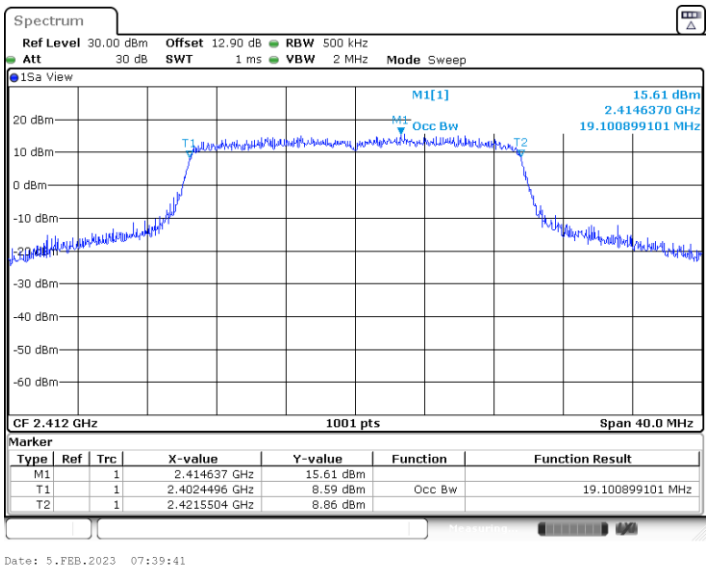
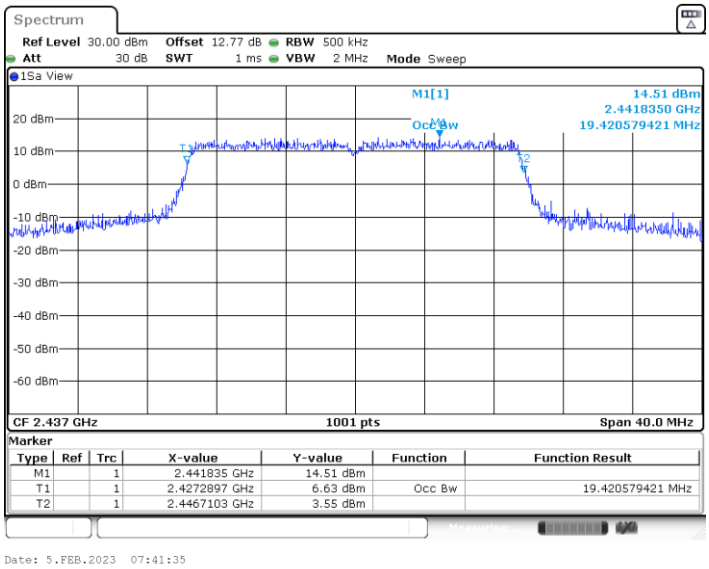
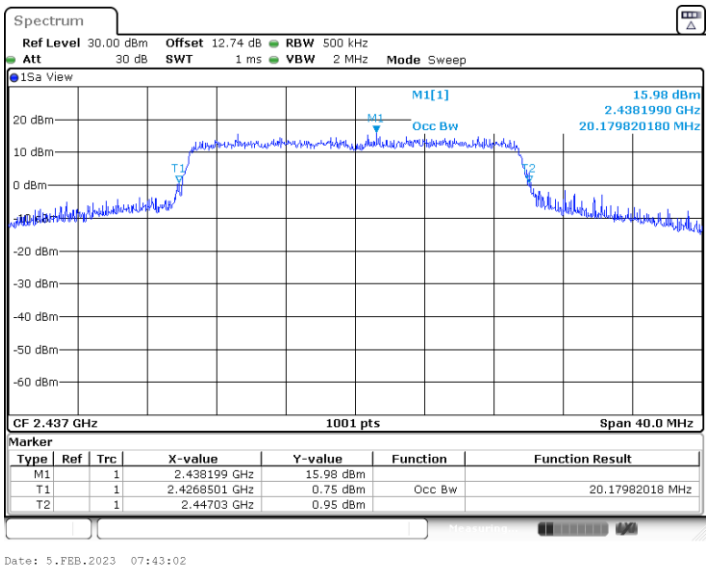


11AX20MIMO_Ant7_2437



11AX20MIMO_Ant8_2437



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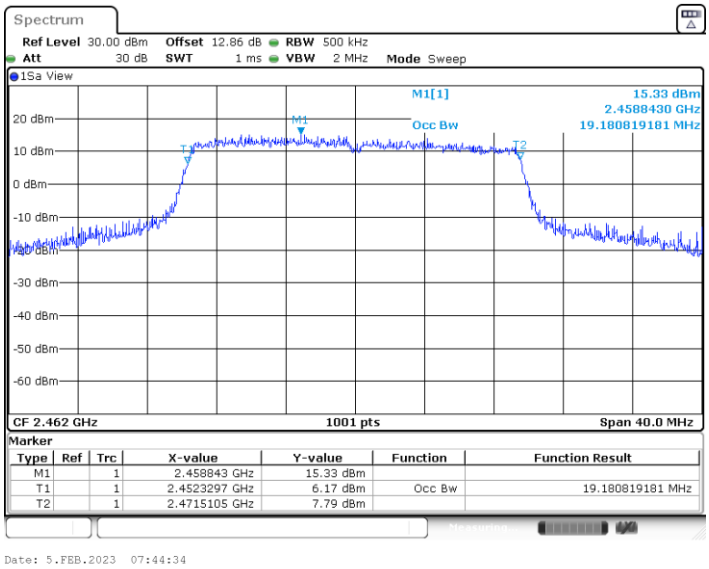

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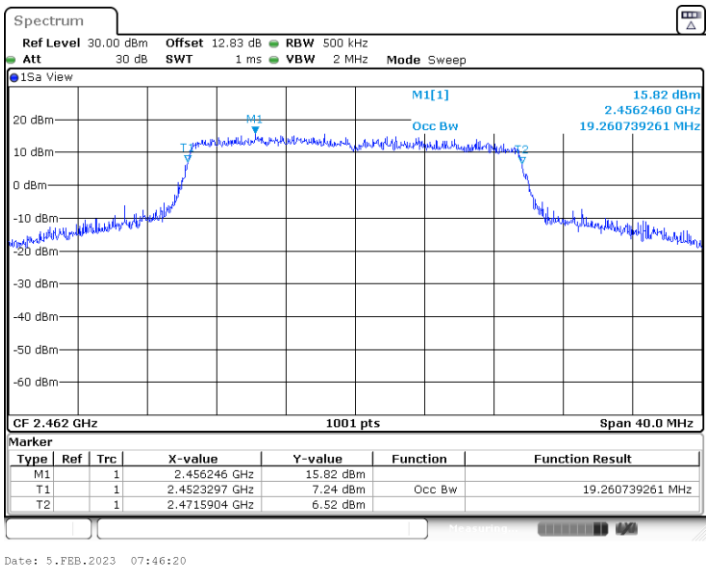
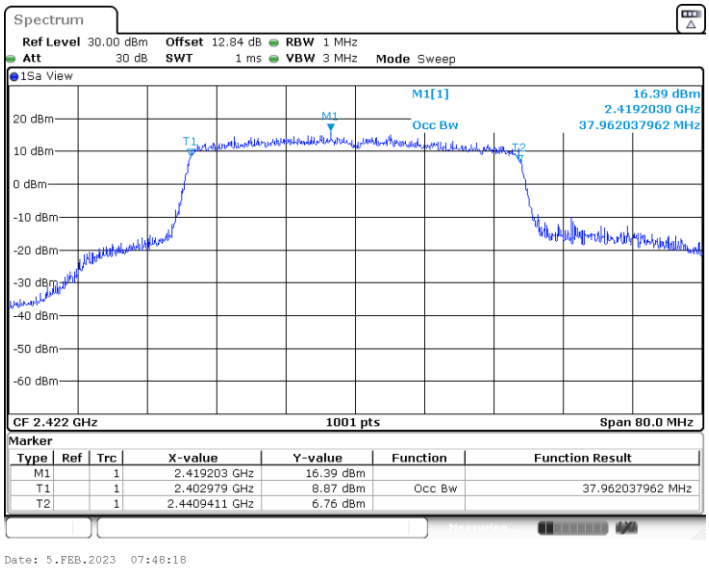
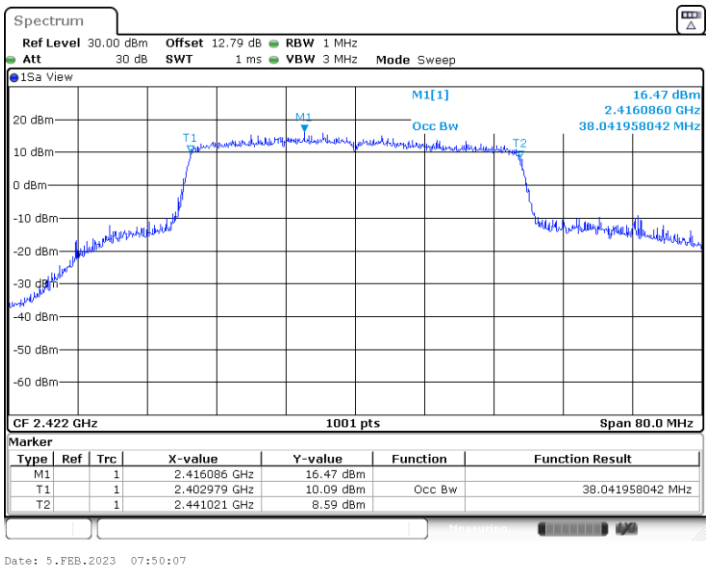


11AX40MIMO_Ant7_2422



11AX40MIMO_Ant8_2422



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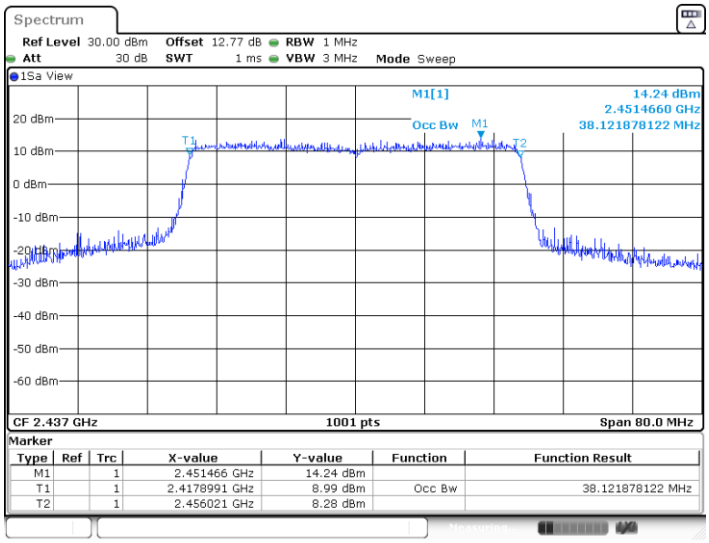
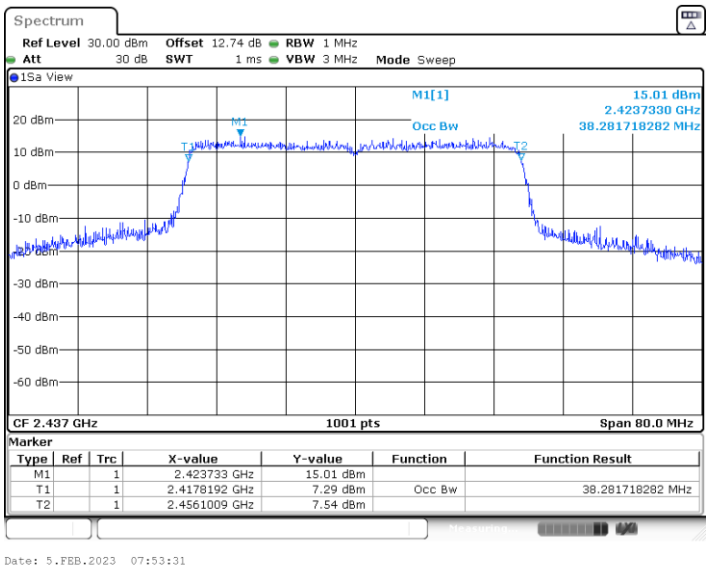


11AX40MIMO_Ant8_2437



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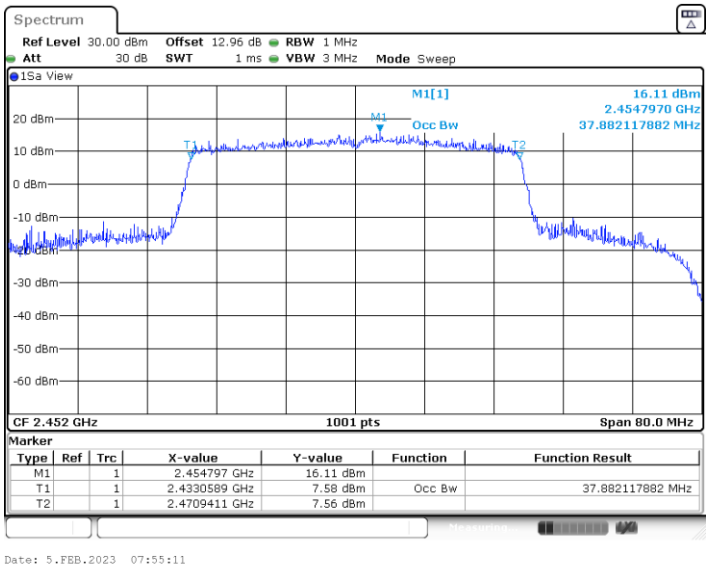
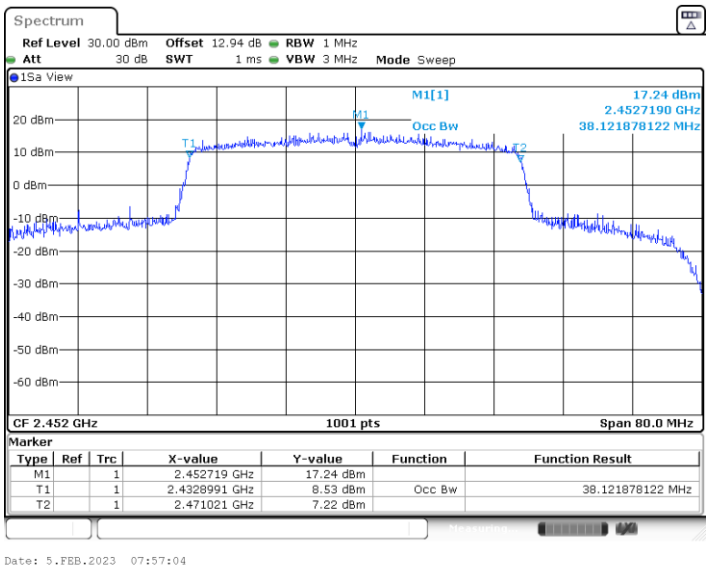


11AX40MIMO_Ant8_2452



Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

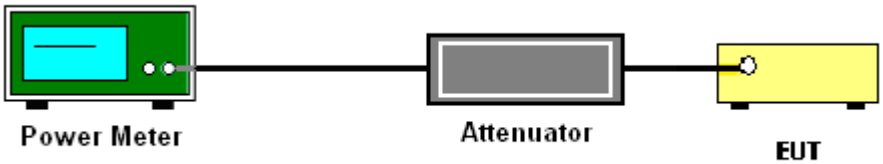
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.1 Method AVGPM method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

2.4GHz Band MIMO																	
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant7	Ant8	SUM	Ant7	Ant8	Ant7	Ant8	Ant7	Ant8	Ant7	Ant8	
11b	1Mbps	2	1	2412	22.52	23.09	25.82	30.00		-1.26		24.56		36.00		Pass
11b	1Mbps	2	6	2437	22.63	23.11	25.89	30.00		-1.26		24.63		36.00		Pass
11b	1Mbps	2	11	2462	22.54	23.21	25.90	30.00		-1.26		24.64		36.00		Pass
11g	6Mbps	2	1	2412	26.23	25.98	29.12	30.00		-1.26		27.86		36.00		Pass
11g	6Mbps	2	6	2437	26.46	26.22	29.35	30.00		-1.26		28.09		36.00		Pass
11g	6Mbps	2	11	2462	25.24	25.19	28.23	30.00		-1.26		26.97		36.00		Pass
HT20	MCS0	2	1	2412	25.95	25.72	28.85	30.00		-1.26		27.59		36.00		Pass
HT20	MCS0	2	6	2437	25.82	25.75	28.80	30.00		-1.26		27.54		36.00		Pass
HT20	MCS0	2	11	2462	26.01	25.68	28.86	30.00		-1.26		27.60		36.00		Pass
HT40	MCS0	2	3	2422	26.34	26.39	29.38	30.00		-1.26		28.12		36.00		Pass
HT40	MCS0	2	6	2437	25.81	25.76	28.80	30.00		-1.26		27.54		36.00		Pass
HT40	MCS0	2	9	2452	25.09	25.28	28.20	30.00		-1.26		26.94		36.00		Pass
VHT20	MCS0	2	1	2412	25.98	25.83	28.92	30.00		-1.26		27.66		36.00		Pass
VHT20	MCS0	2	6	2437	25.86	25.81	28.85	30.00		-1.26		27.59		36.00		Pass
VHT20	MCS0	2	11	2462	26.03	25.94	29.00	30.00		-1.26		27.74		36.00		Pass
VHT40	MCS0	2	3	2422	26.36	26.44	29.41	30.00		-1.26		28.15		36.00		Pass
VHT40	MCS0	2	6	2437	25.86	25.82	28.85	30.00		-1.26		27.59		36.00		Pass
VHT40	MCS0	2	9	2452	25.11	25.29	28.21	30.00		-1.26		26.95		36.00		Pass

2.4GHz Band MIMO																	
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
						Ant7	Ant8	SUM	Ant7	Ant8	Ant7	Ant8	Ant7	Ant8	Ant7	Ant8	
HE20	MCS0	2	1	2412	Full	26.03	25.85	28.95	30.00		-1.26		27.69		36.00		Pass
HE20	MCS0	2	1	2412	26/0	19.45	20.01	22.75	30.00		-1.26		21.49		36.00		Pass
HE20	MCS0	2	1	2412	52/37	22.93	23.51	26.24	30.00		-1.26		24.98		36.00		Pass
HE20	MCS0	2	1	2412	106/53	25.98	25.82	28.91	30.00		-1.26		27.65		36.00		Pass
HE20	MCS0	2	6	2437	Full	26.22	25.86	29.05	30.00		-1.26		27.79		36.00		Pass
HE20	MCS0	2	6	2437	26/0	20.77	20.79	23.79	30.00		-1.26		22.53		36.00		Pass
HE20	MCS0	2	6	2437	52/37	24.08	24.54	27.33	30.00		-1.26		26.07		36.00		Pass
HE20	MCS0	2	6	2437	106/53	26.19	25.82	29.02	30.00		-1.26		27.76		36.00		Pass
HE20	MCS0	2	11	2462	Full	26.09	25.98	29.05	30.00		-1.26		27.79		36.00		Pass
HE20	MCS0	2	11	2462	26/8	19.48	19.63	22.57	30.00		-1.26		21.31		36.00		Pass
HE20	MCS0	2	11	2462	52/40	22.73	22.89	25.82	30.00		-1.26		24.56		36.00		Pass
HE20	MCS0	2	11	2462	106/54	25.04	25.59	28.33	30.00		-1.26		27.07		36.00		Pass
HE40	MCS0	2	3	2422	Full	26.37	26.46	29.43	30.00		-1.26		28.17		36.00		Pass
HE40	MCS0	2	3	2422	242/61	26.14	26.33	29.25	30.00		-1.26		27.99		36.00		Pass
HE40	MCS0	2	6	2437	Full	25.92	25.87	28.91	30.00		-1.26		27.65		36.00		Pass
HE40	MCS0	2	6	2437	242/61	25.78	25.98	28.89	30.00		-1.26		27.63		36.00		Pass
HE40	MCS0	2	9	2452	Full	25.15	25.32	28.25	30.00		-1.26		26.99		36.00		Pass
HE40	MCS0	2	9	2452	242/62	24.63	25.19	27.93	30.00		-1.26		26.67		36.00		Pass

3.2.6 Test Result of Average Output Power (Reporting Only)

2.4GHz Band MIMO																			
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power with duty factor (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	Ant7	Ant8	SUM	Ant7	Ant8	Ant7	Ant8	Ant7	Ant8	Ant7	Ant8	
11b	1Mbps	2	1	2412	0.09	0.09	20.14	20.76	23.47	30.00		-1.26		22.21		36.00		Pass
11b	1Mbps	2	6	2437	0.09	0.09	20.15	20.80	23.50	30.00		-1.26		22.24		36.00		Pass
11b	1Mbps	2	11	2462	0.09	0.09	20.35	20.95	23.67	30.00		-1.26		22.41		36.00		Pass
11g	6Mbps	2	1	2412	0.04	0.03	19.06	19.46	22.27	30.00		-1.26		21.01		36.00		Pass
11g	6Mbps	2	6	2437	0.04	0.03	20.80	20.81	23.82	30.00		-1.26		22.56		36.00		Pass
11g	6Mbps	2	11	2462	0.04	0.03	17.69	17.96	20.84	30.00		-1.26		19.58		36.00		Pass
HT20	MCS0	2	1	2412	0.00	0.00	18.38	18.65	21.53	30.00		-1.26		20.27		36.00		Pass
HT20	MCS0	2	6	2437	0.00	0.00	19.65	19.69	22.68	30.00		-1.26		21.42		36.00		Pass
HT20	MCS0	2	11	2462	0.00	0.00	18.02	18.12	21.08	30.00		-1.26		19.82		36.00		Pass
HT40	MCS0	2	3	2422	0.00	0.00	18.53	18.83	21.69	30.00		-1.26		20.43		36.00		Pass
HT40	MCS0	2	6	2437	0.00	0.00	17.81	17.83	20.83	30.00		-1.26		19.57		36.00		Pass
HT40	MCS0	2	9	2452	0.00	0.00	17.25	17.33	20.30	30.00		-1.26		19.04		36.00		Pass
VHT20	MCS0	2	1	2412	0.00	0.00	18.40	18.69	21.56	30.00		-1.26		20.30		36.00		Pass
VHT20	MCS0	2	6	2437	0.00	0.00	19.68	19.71	22.71	30.00		-1.26		21.45		36.00		Pass
VHT20	MCS0	2	11	2462	0.00	0.00	18.05	18.14	21.11	30.00		-1.26		19.85		36.00		Pass
VHT40	MCS0	2	3	2422	0.00	0.00	18.59	18.89	21.75	30.00		-1.26		20.49		36.00		Pass
VHT40	MCS0	2	6	2437	0.00	0.00	17.85	17.87	20.87	30.00		-1.26		19.61		36.00		Pass
VHT40	MCS0	2	9	2452	0.00	0.00	17.29	17.35	20.33	30.00		-1.26		19.07		36.00		Pass

2.4GHz Band MIMO																			
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)		Average Conducted Power with duty factor (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
						Ant7	Ant8	Ant7	Ant8	SUM	Ant7	Ant8	Ant7	Ant8	Ant7	Ant8	Ant7	Ant8	
HE20	MCS0	2	1	2412	Full	0.00	0.00	18.41	18.72	21.58	30.00		-1.26		20.32		36.00		Pass
HE20	MCS0	2	1	2412	26/0	0.00	0.00	7.92	8.81	11.40	30.00		-1.26		10.14		36.00		Pass
HE20	MCS0	2	1	2412	52/37	0.00	0.00	11.29	12.05	14.70	30.00		-1.26		13.44		36.00		Pass
HE20	MCS0	2	1	2412	106/53	0.00	0.00	14.12	14.85	17.51	30.00		-1.26		16.25		36.00		Pass
HE20	MCS0	2	6	2437	Full	0.00	0.00	19.79	19.87	22.84	30.00		-1.26		21.58		36.00		Pass
HE20	MCS0	2	6	2437	26/0	0.00	0.00	10.32	10.48	13.41	30.00		-1.26		12.15		36.00		Pass
HE20	MCS0	2	6	2437	52/37	0.00	0.00	13.46	13.83	16.66	30.00		-1.26		15.40		36.00		Pass
HE20	MCS0	2	6	2437	106/53	0.00	0.00	15.42	15.53	18.49	30.00		-1.26		17.23		36.00		Pass
HE20	MCS0	2	11	2462	Full	0.00	0.00	18.09	18.15	21.13	30.00		-1.26		19.87		36.00		Pass
HE20	MCS0	2	11	2462	26/8	0.00	0.00	8.13	8.41	11.28	30.00		-1.26		10.02		36.00		Pass
HE20	MCS0	2	11	2462	52/40	0.00	0.00	11.48	11.73	14.62	30.00		-1.26		13.36		36.00		Pass
HE20	MCS0	2	11	2462	106/54	0.00	0.00	13.89	15.06	17.52	30.00		-1.26		16.26		36.00		Pass
HE40	MCS0	2	3	2422	Full	0.00	0.00	18.61	18.92	21.78	30.00		-1.26		20.52		36.00		Pass
HE40	MCS0	2	3	2422	242/61	0.00	0.00	15.84	16.04	18.95	30.00		-1.26		17.69		36.00		Pass
HE40	MCS0	2	6	2437	Full	0.00	0.00	17.93	17.92	20.94	30.00		-1.26		19.68		36.00		Pass
HE40	MCS0	2	6	2437	242/61	0.00	0.00	14.92	16.12	18.57	30.00		-1.26		17.31		36.00		Pass
HE40	MCS0	2	9	2452	Full	0.00	0.00	17.31	17.37	20.35	30.00		-1.26		19.09		36.00		Pass
HE40	MCS0	2	9	2452	242/62	0.00	0.00	14.29	15.19	17.77	30.00		-1.26		16.51		36.00		Pass

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

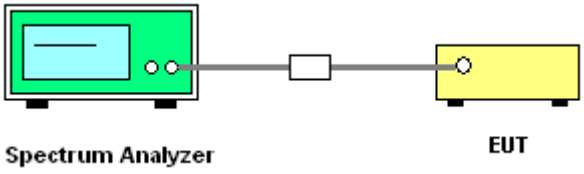
   If measurements performed using method (2) plus 10 log (N) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

   Method (1): Measure and sum the spectra across the outputs.

   The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

   Method (2): Measure and add 10 log (N) dB, where N is the number of outputs. (N=2)

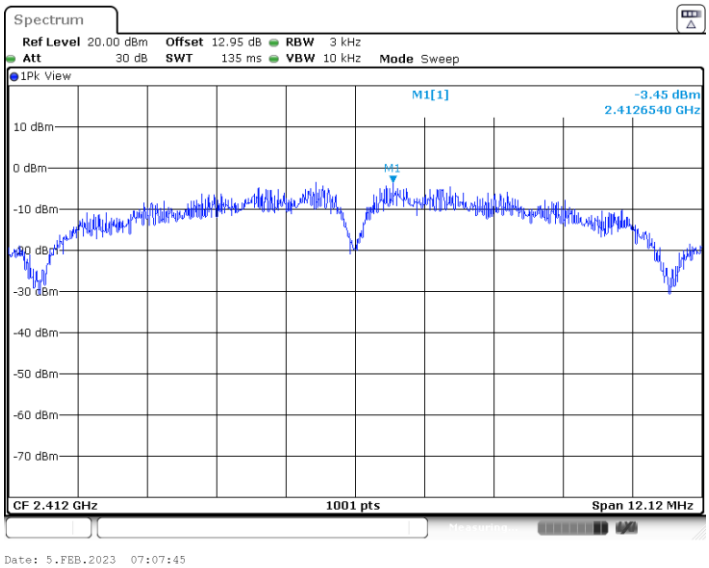
3.3.4 Test Setup



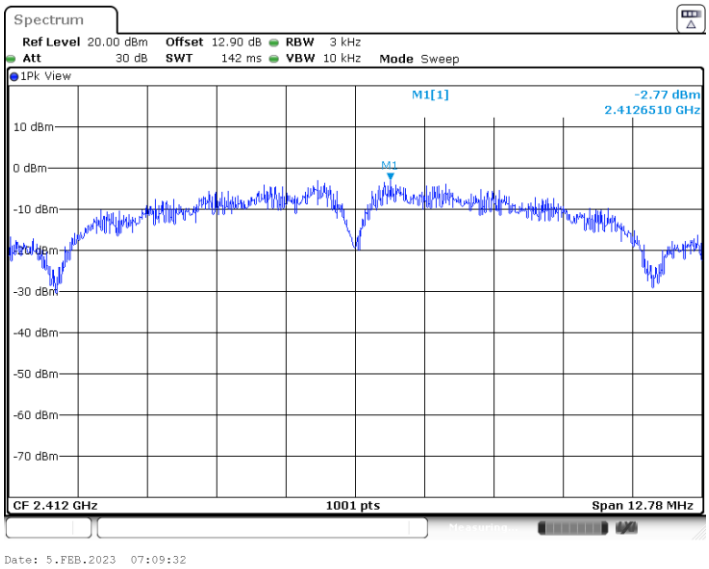
3.3.5 Test Result of Power Spectral Density

Test Mode	Antenna	Freq(MHz)	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11B-CDD	Ant7	2412	-3.45	≤8.00	PASS
	Ant8	2412	-2.77	≤8.00	PASS
	total	2412	-0.09	≤8.00	PASS
	Ant7	2437	-4.39	≤8.00	PASS
	Ant8	2437	-3.14	≤8.00	PASS
	total	2437	-0.71	≤8.00	PASS
	Ant7	2462	-3.79	≤8.00	PASS
	Ant8	2462	-3.07	≤8.00	PASS
	total	2462	-0.40	≤8.00	PASS
11G-CDD	Ant7	2412	-6.93	≤8.00	PASS
	Ant8	2412	-7.36	≤8.00	PASS
	total	2412	-4.13	≤8.00	PASS
	Ant7	2437	-6.78	≤8.00	PASS
	Ant8	2437	-5.23	≤8.00	PASS
	total	2437	-2.93	≤8.00	PASS
	Ant7	2462	-8.87	≤8.00	PASS
	Ant8	2462	-8.63	≤8.00	PASS
	total	2462	-5.74	≤8.00	PASS
11AX20MIMO	Ant7	2412	-7.3	≤8.00	PASS
	Ant8	2412	-7.5	≤8.00	PASS
	total	2412	-4.39	≤8.00	PASS
	Ant7	2437	-6.66	≤8.00	PASS
	Ant8	2437	-6.21	≤8.00	PASS
	total	2437	-3.42	≤8.00	PASS
	Ant7	2462	-8	≤8.00	PASS
	Ant8	2462	-7.98	≤8.00	PASS
	total	2462	-4.98	≤8.00	PASS
11AX40MIMO	Ant7	2422	-9.62	≤8.00	PASS
	Ant8	2422	-9.79	≤8.00	PASS
	total	2422	-6.69	≤8.00	PASS
	Ant7	2437	-11.58	≤8.00	PASS
	Ant8	2437	-11.37	≤8.00	PASS
	total	2437	-8.46	≤8.00	PASS
	Ant7	2452	-10.7	≤8.00	PASS
	Ant8	2452	-11.45	≤8.00	PASS
	total	2452	-8.05	≤8.00	PASS

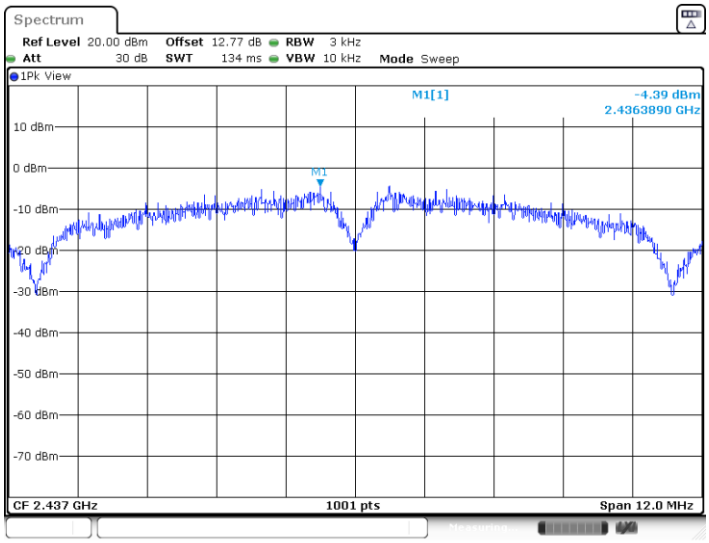
11B-CDD_Ant7_2412



11B-CDD_Ant8_2412



11B-CDD_Ant7_2437



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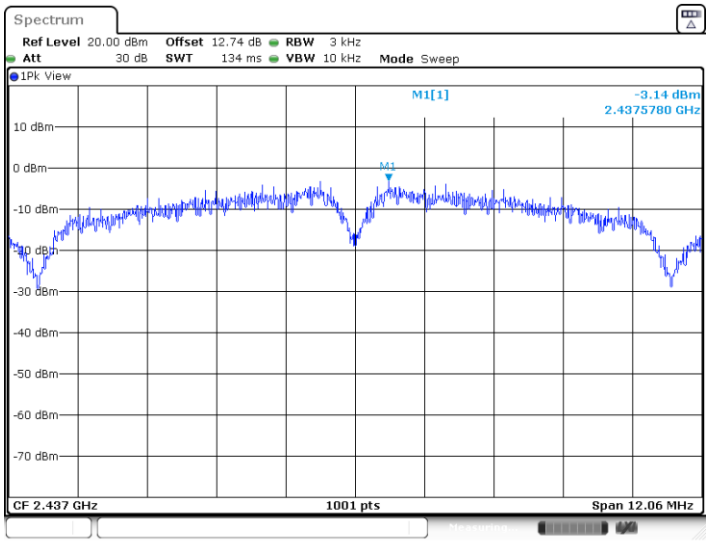

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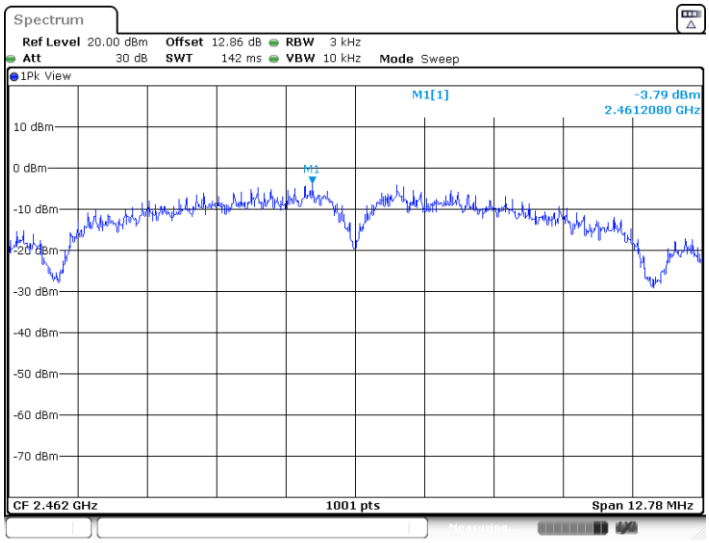

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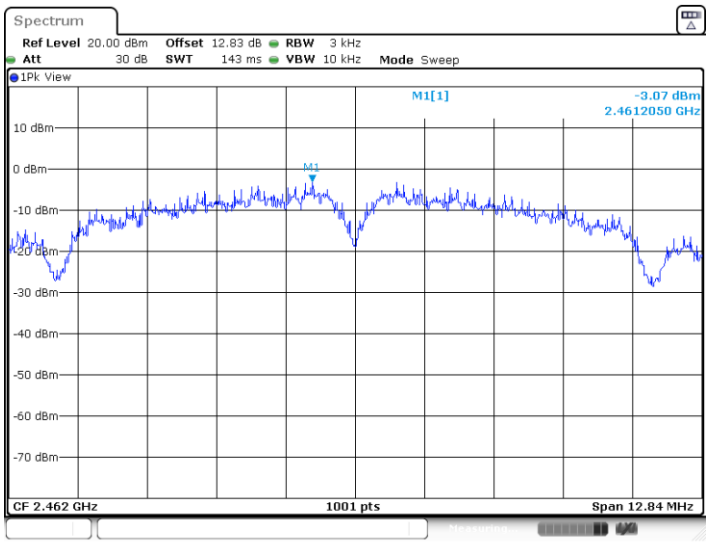

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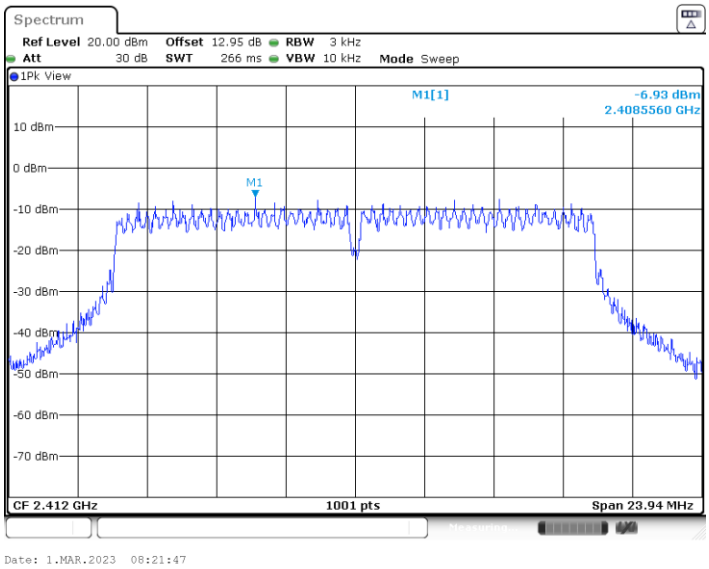

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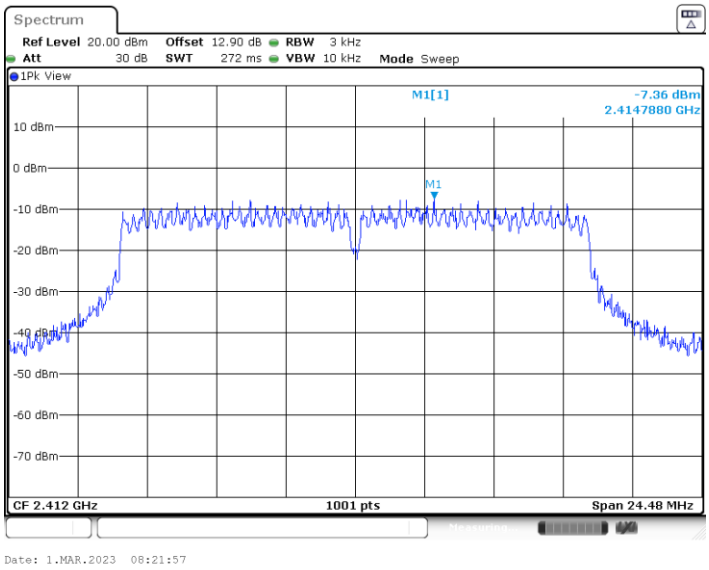

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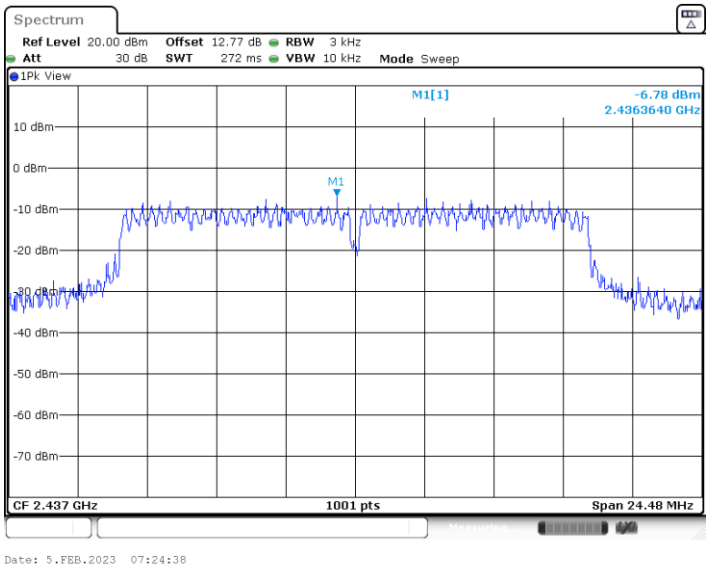

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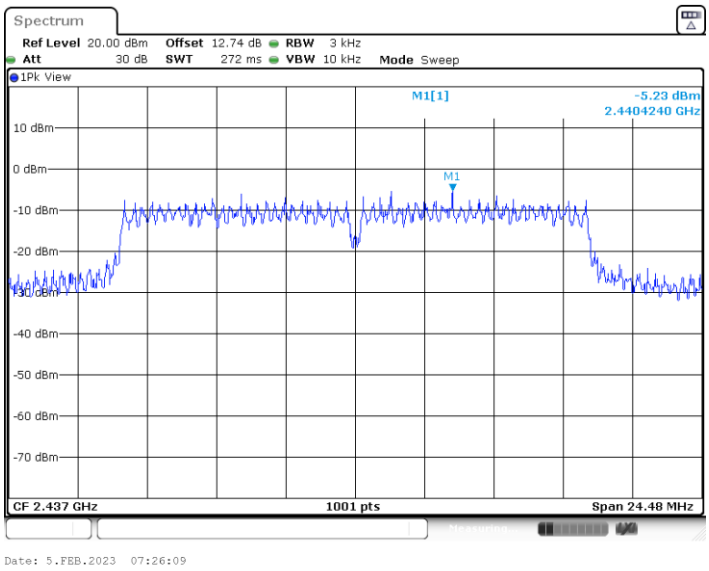

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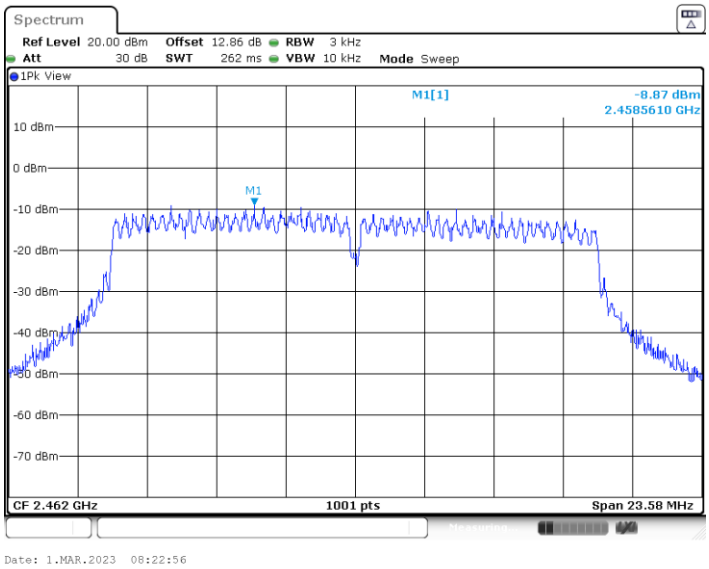
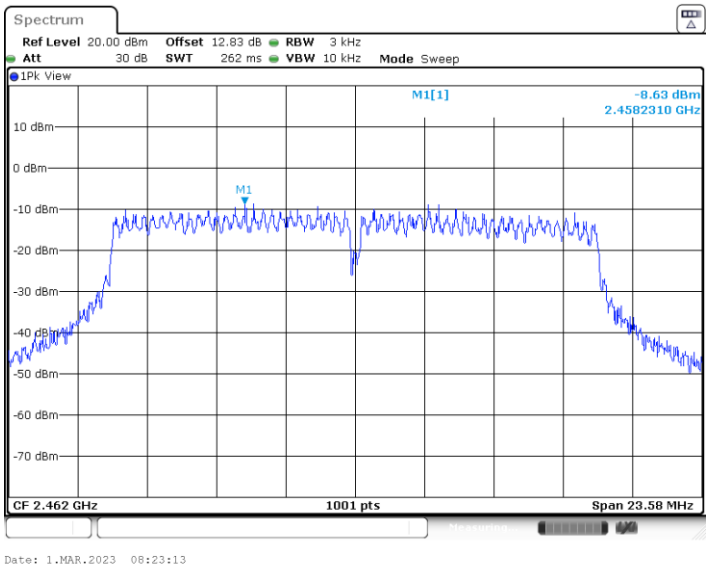
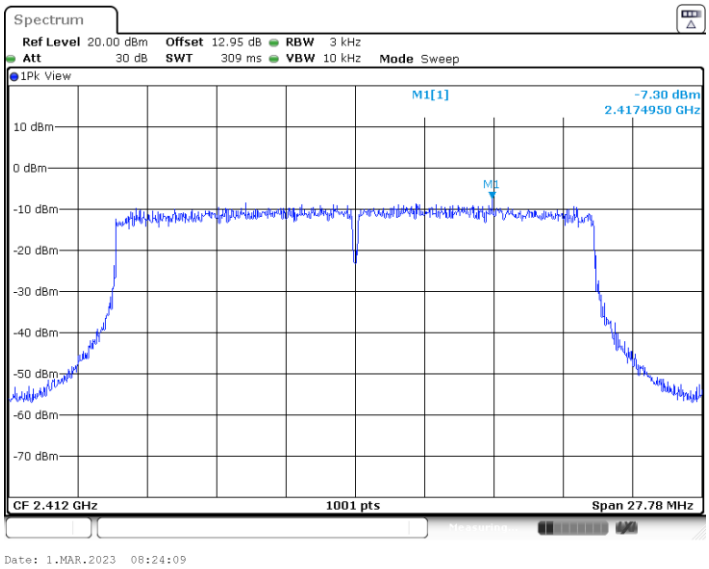


11G-CDD_Ant8_2462



11AX20MIMO_Ant7_2412



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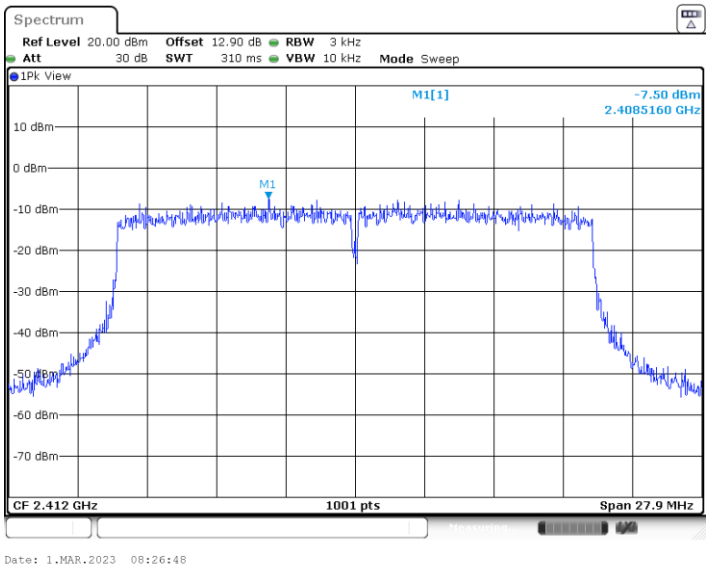

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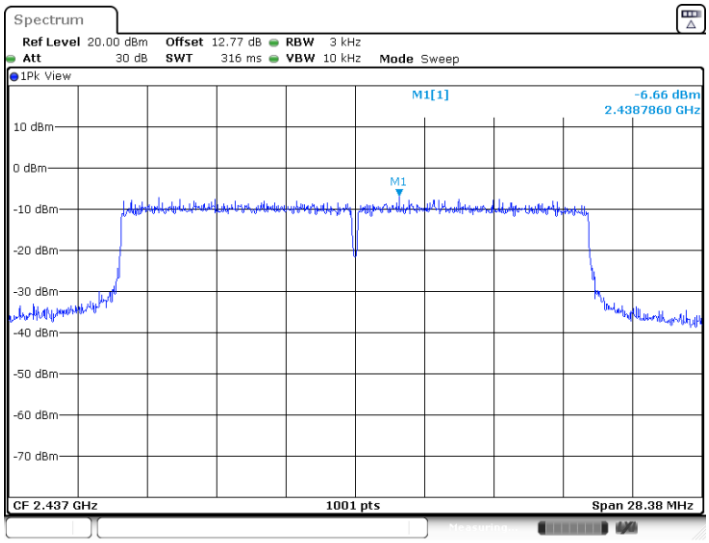

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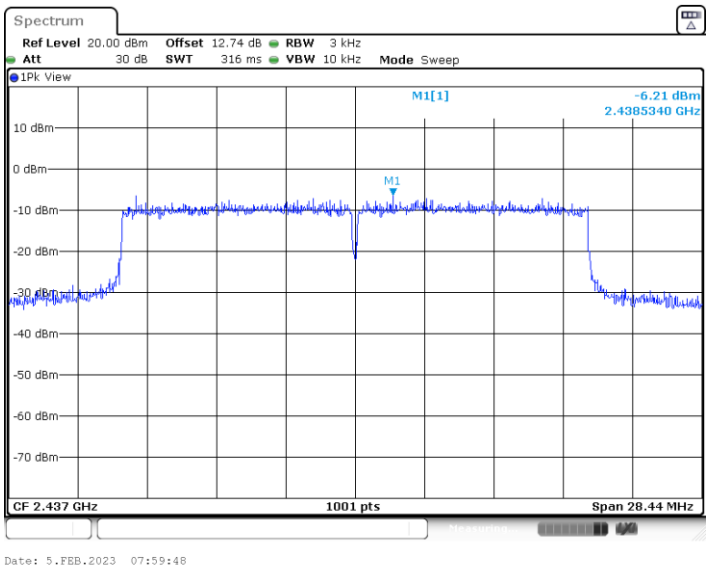

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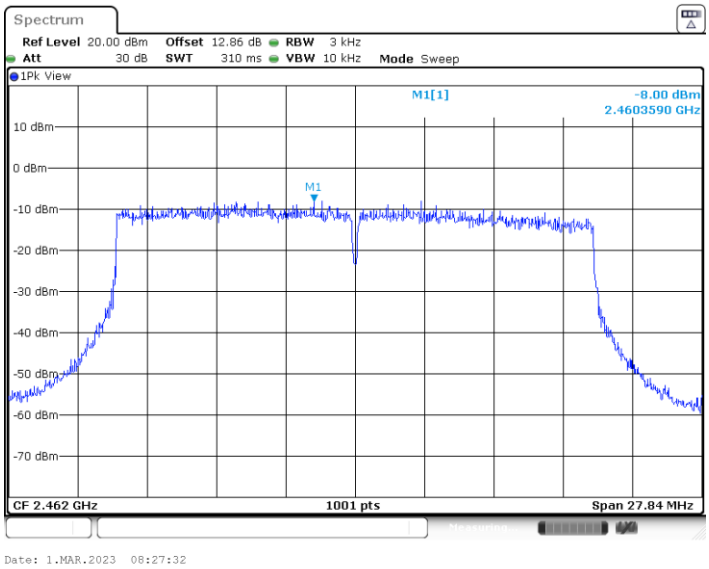

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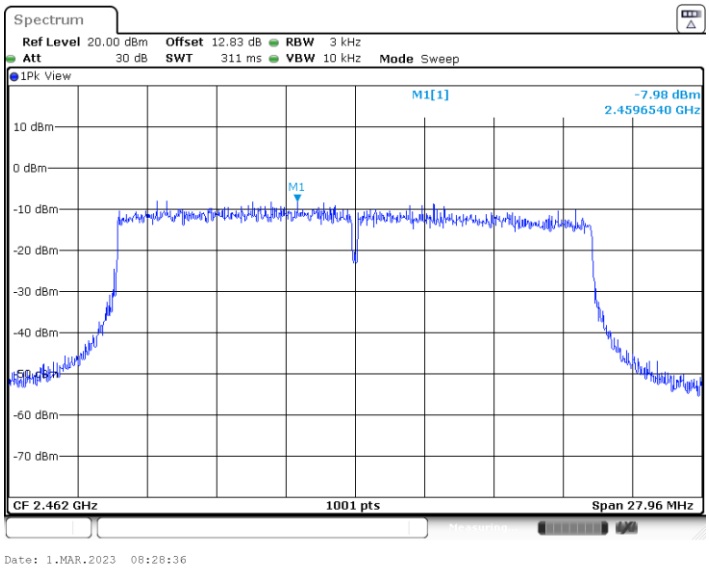

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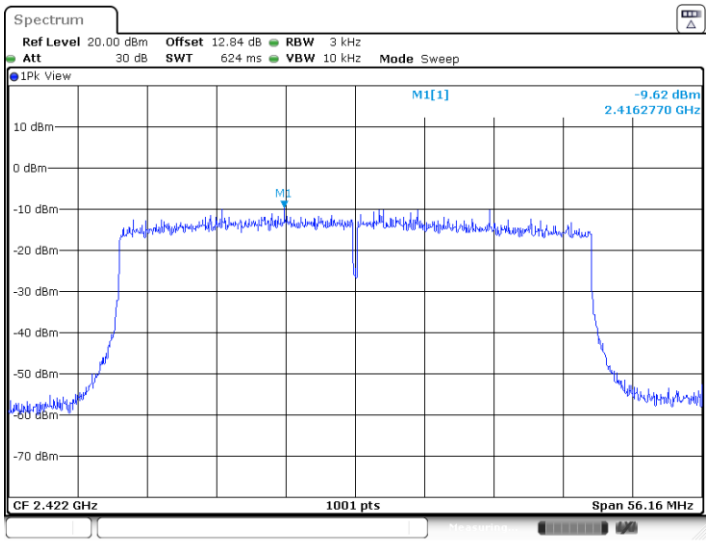

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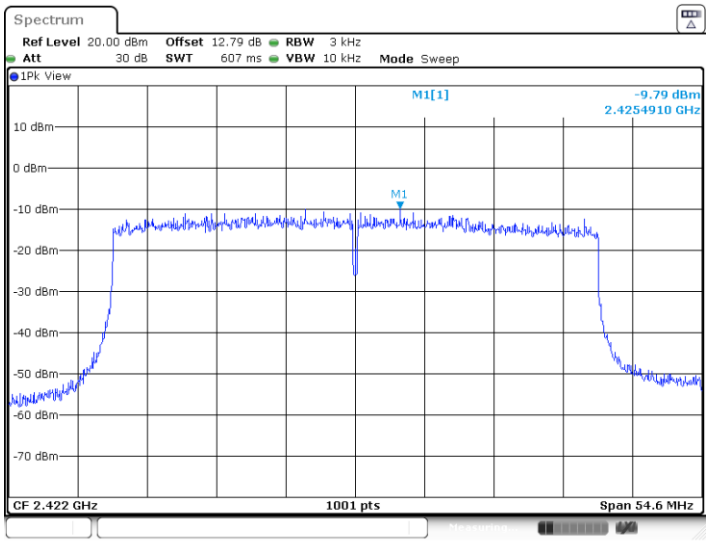

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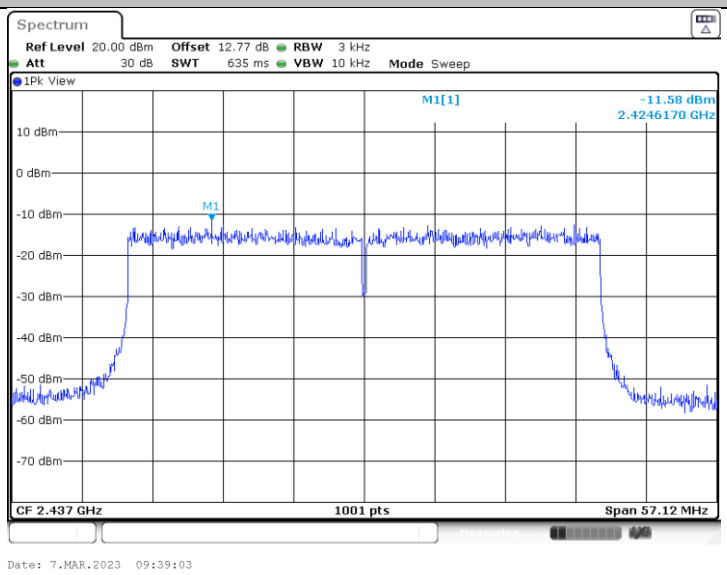

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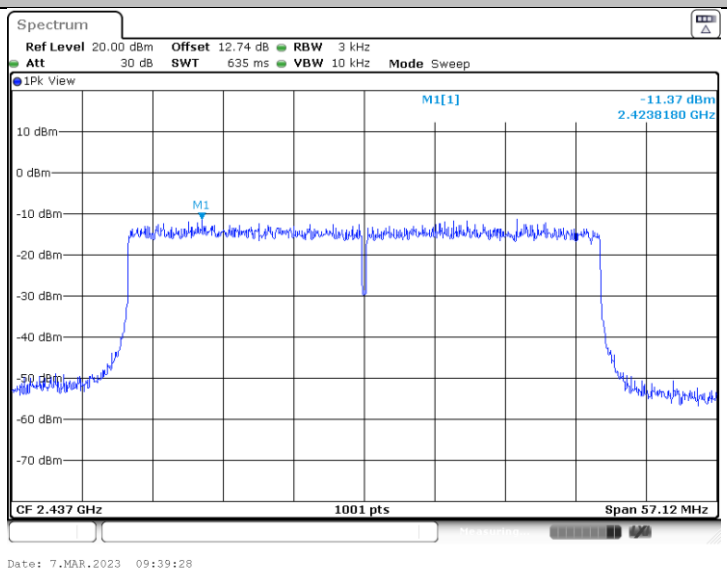

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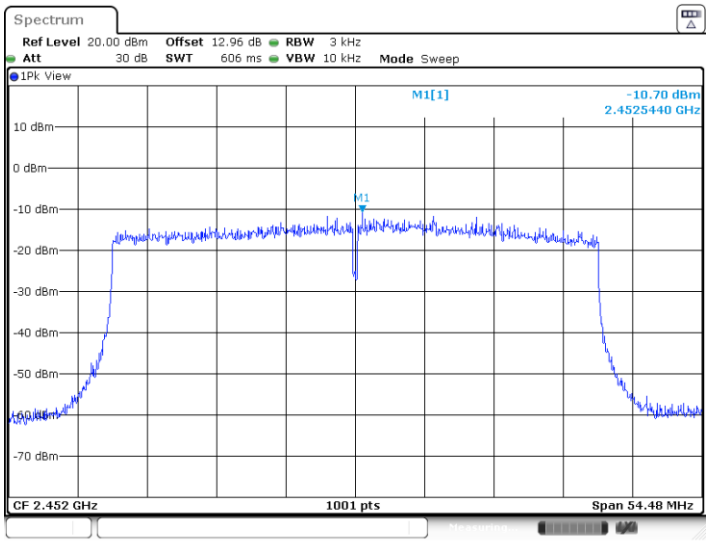

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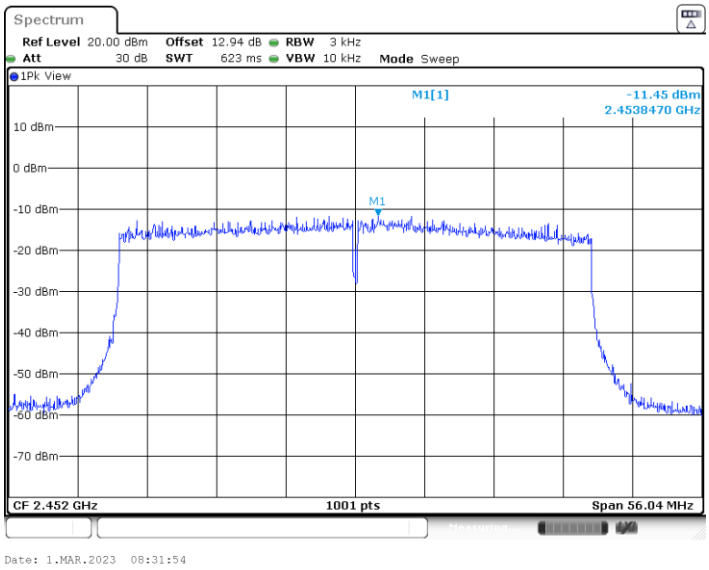
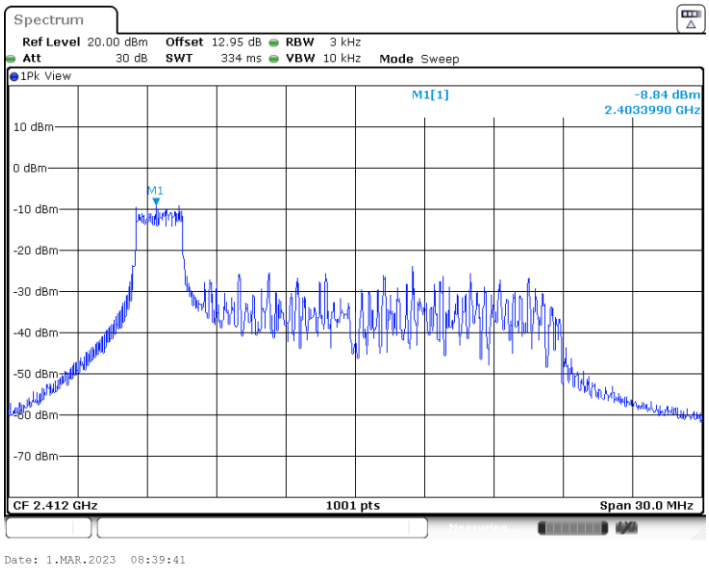


<Power Spectral Density for 802.11ax partial RU>

Test Mode	Antenna	Freq(MHz)	RuSize	RuIndex	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11AX20MIMO	Ant7	2412	26Tone	RU0	-8.84	≤8.00	PASS
			52Tone	RU37	-8.74	≤8.00	PASS
			106Tone	RU53	-8.01	≤8.00	PASS
	Ant8	2412	26Tone	RU0	-8.11	≤8.00	PASS
			52Tone	RU37	-8.24	≤8.00	PASS
			106Tone	RU53	-7.37	≤8.00	PASS
	total	2412	26Tone	RU0	-5.45	≤8.00	PASS
			52Tone	RU37	-5.47	≤8.00	PASS
			106Tone	RU53	-4.67	≤8.00	PASS
	Ant7	2437	26Tone	RU0	-7.11	≤8.00	PASS
			52Tone	RU37	-7.05	≤8.00	PASS
			106Tone	RU53	-6.81	≤8.00	PASS
	Ant8	2437	26Tone	RU0	-6.43	≤8.00	PASS
			52Tone	RU37	-6.55	≤8.00	PASS
			106Tone	RU53	-6.61	≤8.00	PASS
	total	2437	26Tone	RU0	-3.75	≤8.00	PASS
			52Tone	RU37	-3.78	≤8.00	PASS
			106Tone	RU53	-3.70	≤8.00	PASS
	Ant7	2462	26Tone	RU8	-9.23	≤8.00	PASS
			52Tone	RU40	-8.86	≤8.00	PASS
			106Tone	RU54	-8.7	≤8.00	PASS
	Ant8	2462	26Tone	RU8	-8.97	≤8.00	PASS
			52Tone	RU40	-8.6	≤8.00	PASS
			106Tone	RU54	-8	≤8.00	PASS
	total	2462	26Tone	RU8	-6.09	≤8.00	PASS
			52Tone	RU40	-5.72	≤8.00	PASS
			106Tone	RU54	-5.33	≤8.00	PASS
11AX40MIMO	Ant7	2422	242Tone	RU61	-10.59	≤8.00	PASS
	Ant8	2422	242Tone	RU61	-10.31	≤8.00	PASS
	total	2422	242Tone	RU61	-7.44	≤8.00	PASS
	Ant7	2437	242Tone	RU61	-11.44	≤8.00	PASS
	Ant8	2437	242Tone	RU61	-11.78	≤8.00	PASS
	total	2437	242Tone	RU61	-8.60	≤8.00	PASS
	Ant7	2452	242Tone	RU62	-11.36	≤8.00	PASS
	Ant8	2452	242Tone	RU62	-11.49	≤8.00	PASS
	total	2452	242Tone	RU62	-8.41	≤8.00	PASS

11AX20MIMO_Ant7_2412_26Tone_RU0



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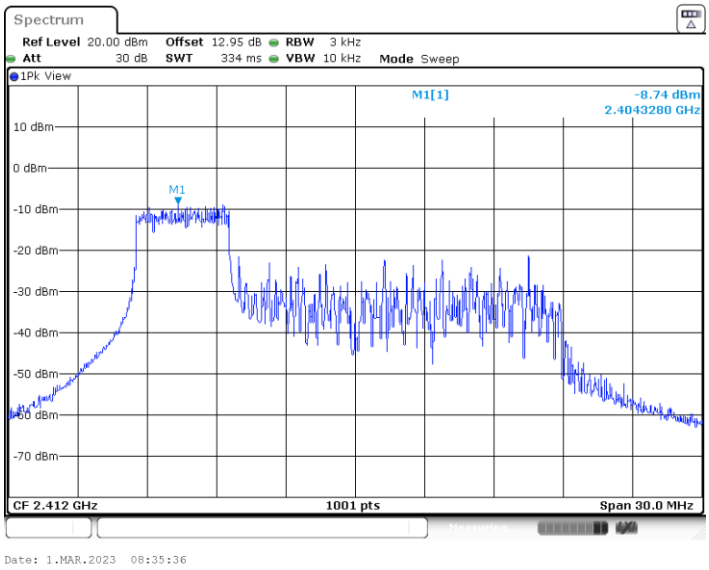

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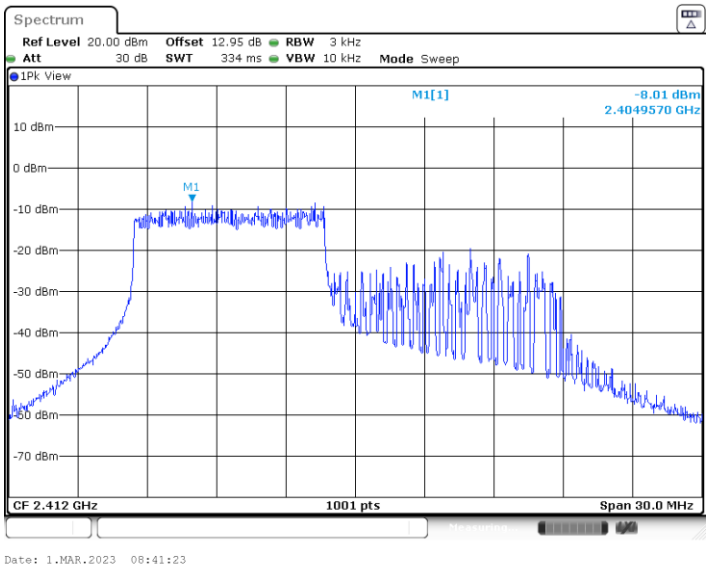

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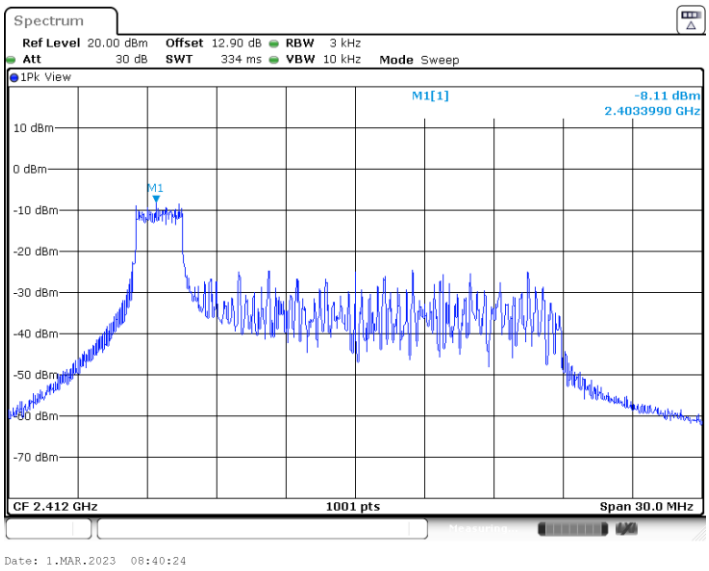

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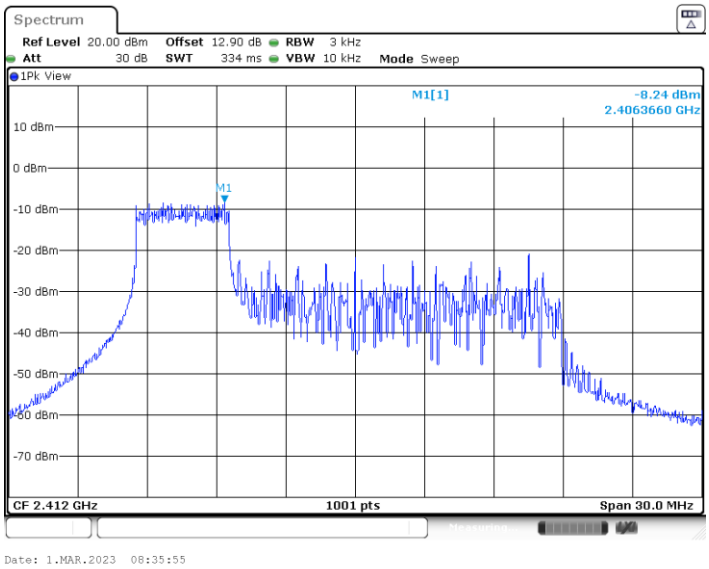

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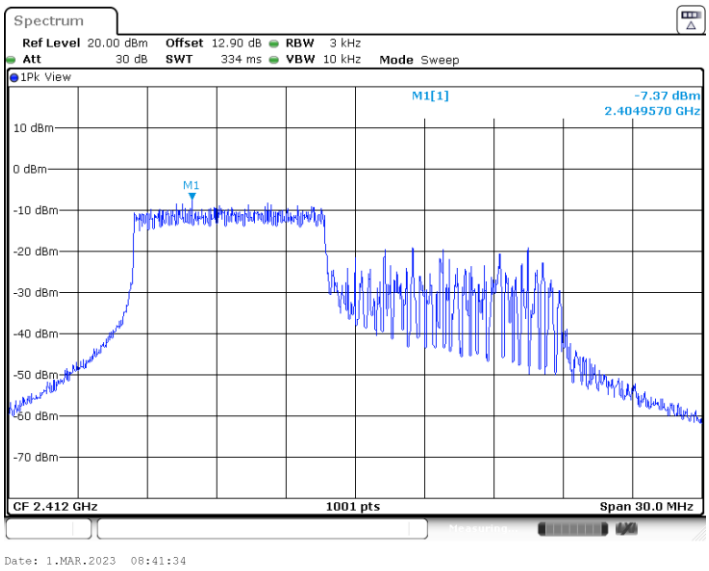

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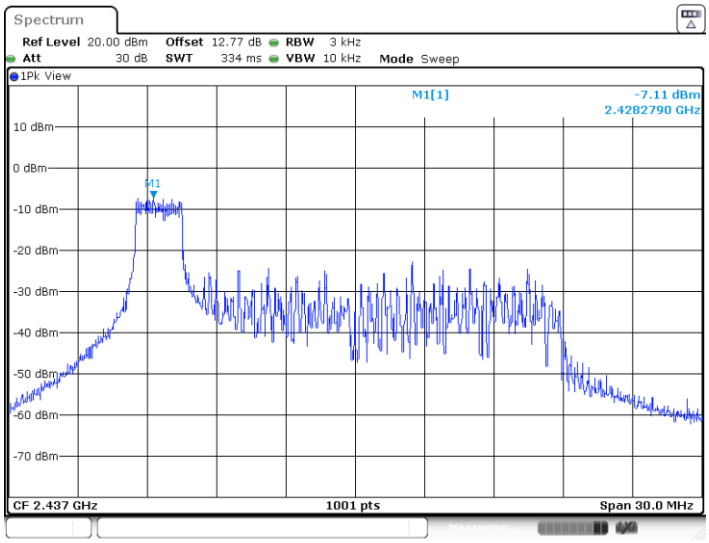

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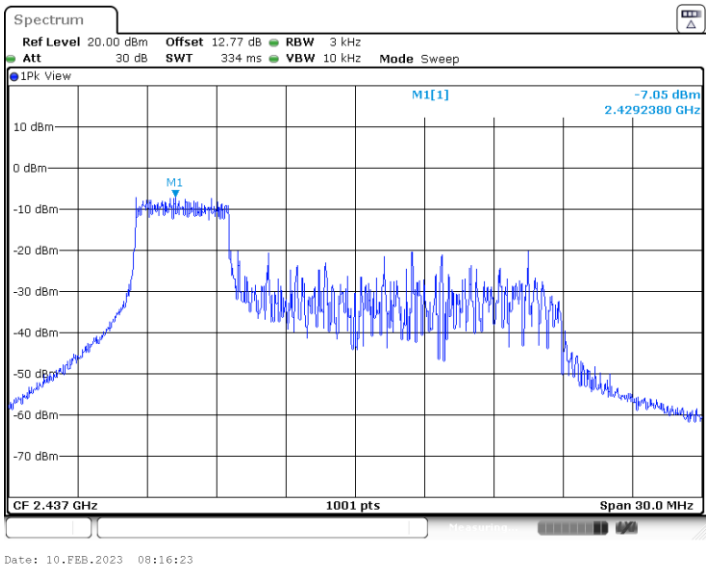

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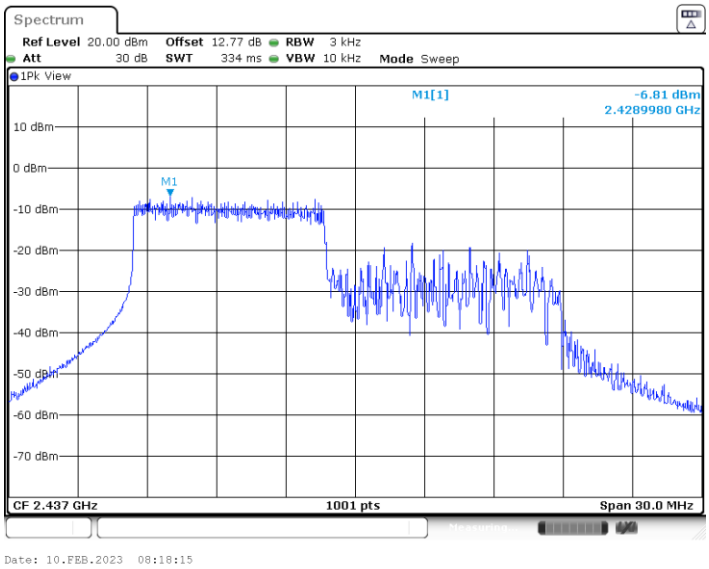

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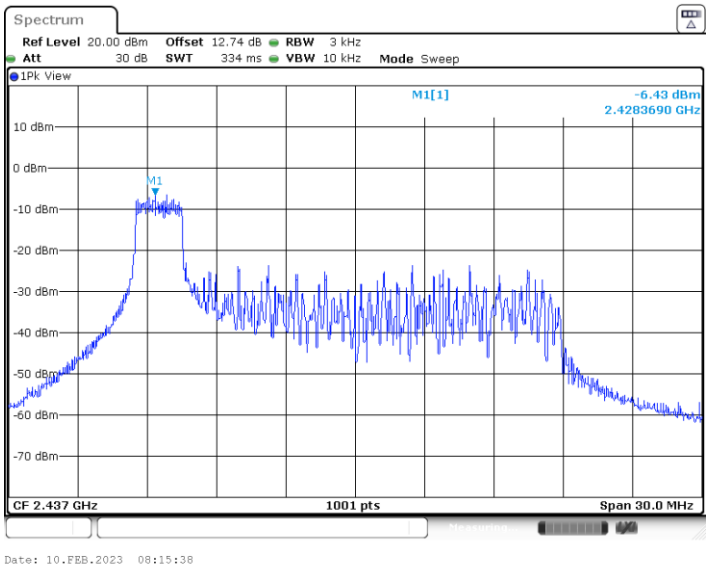

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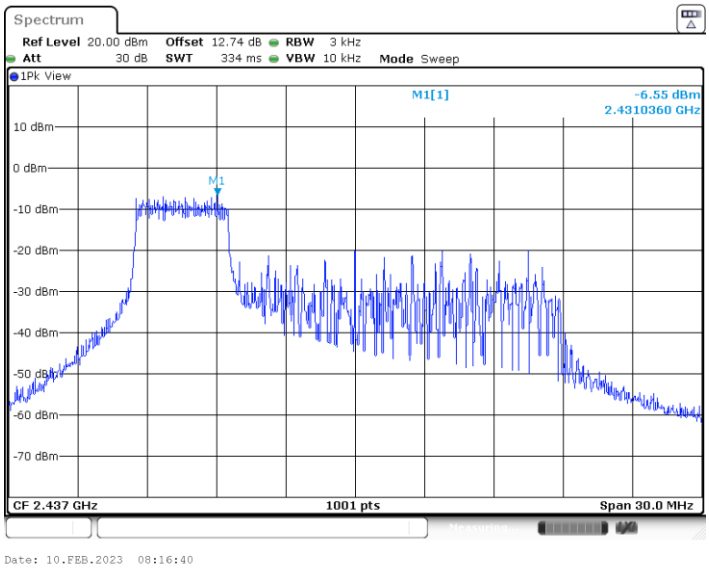

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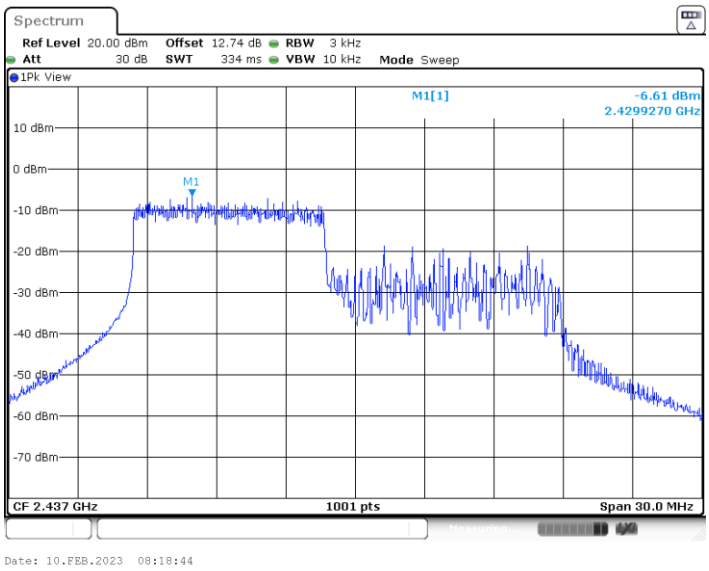

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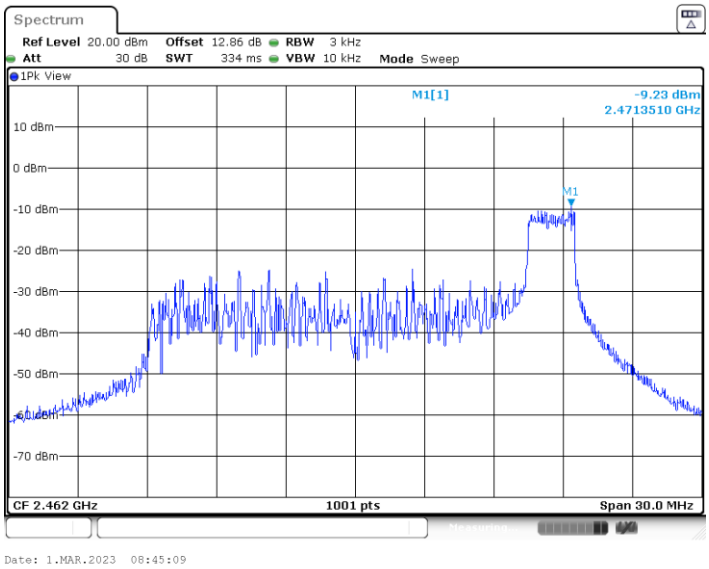

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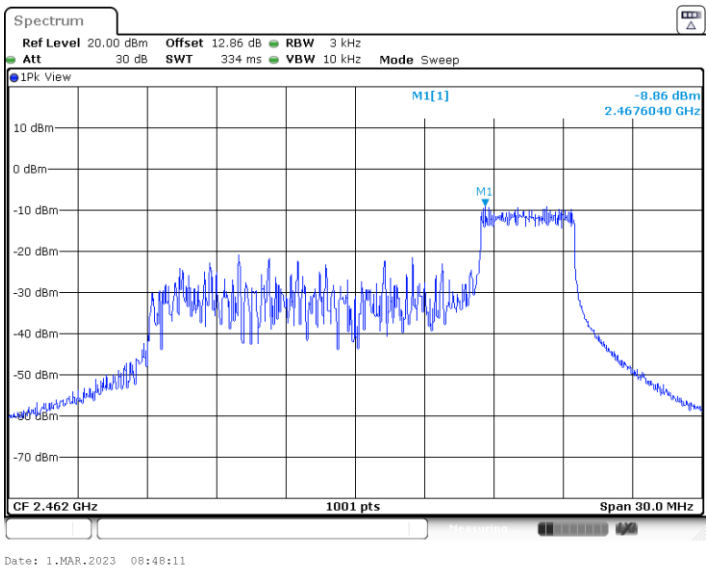

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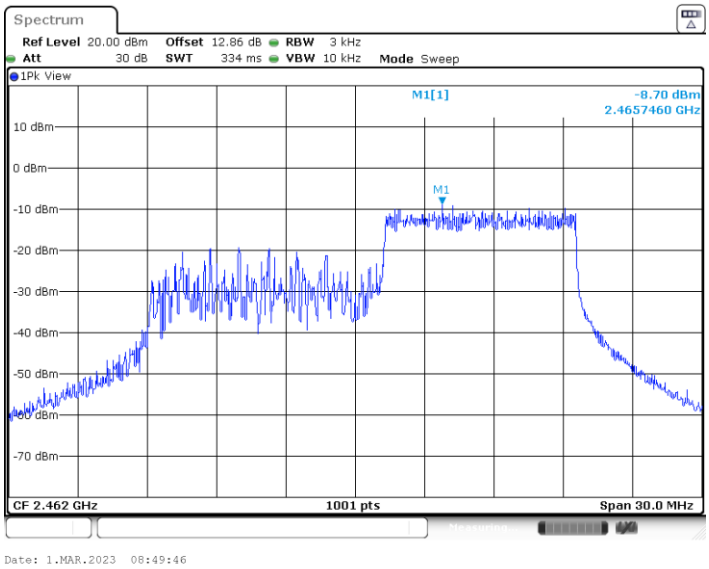

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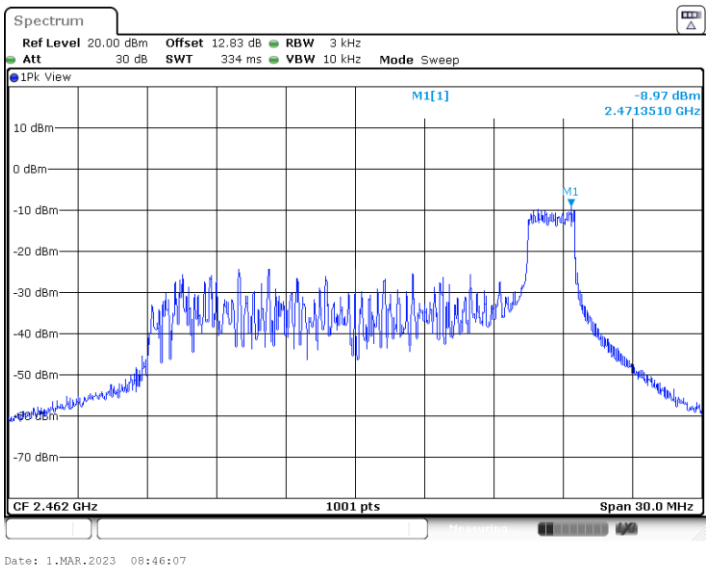

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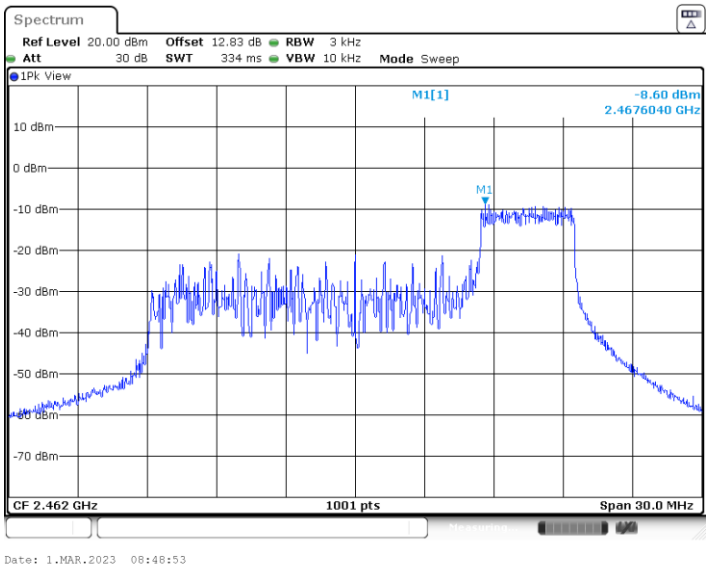

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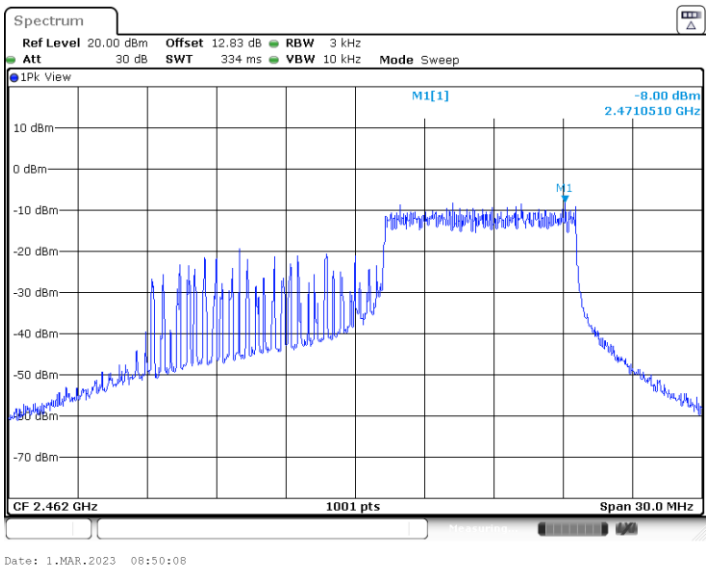

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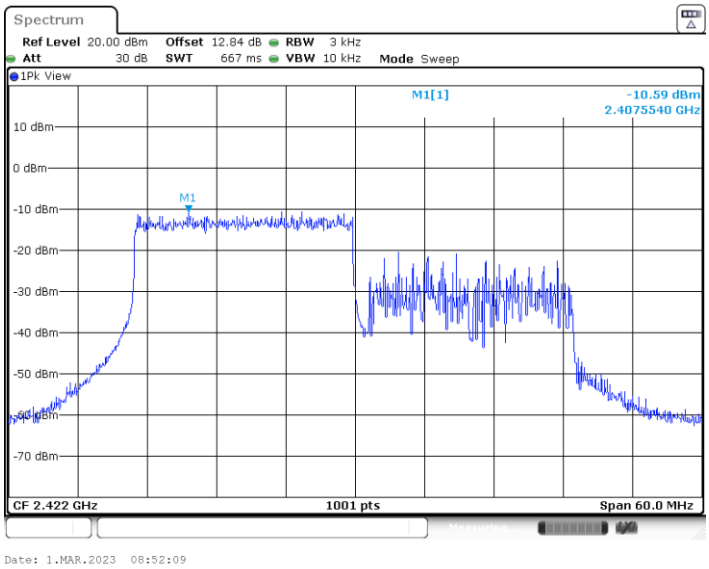

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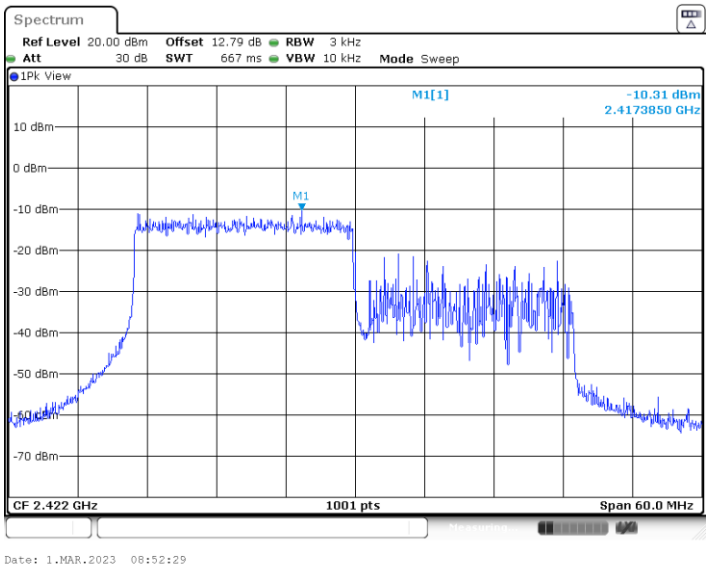

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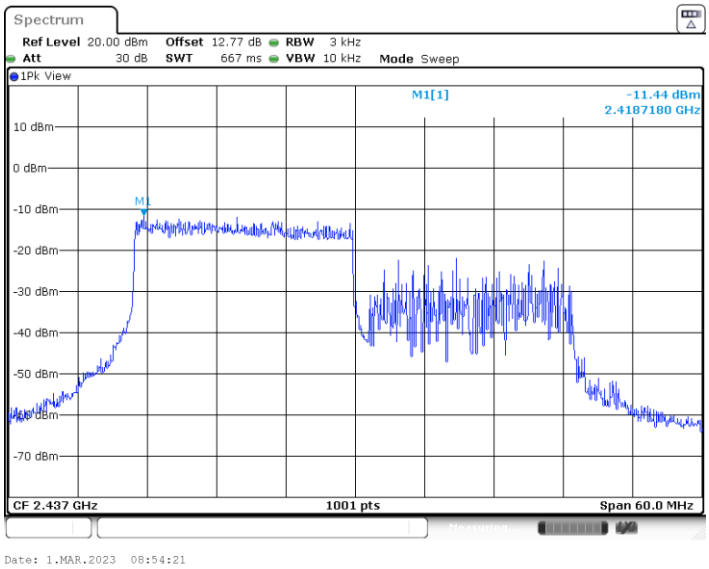

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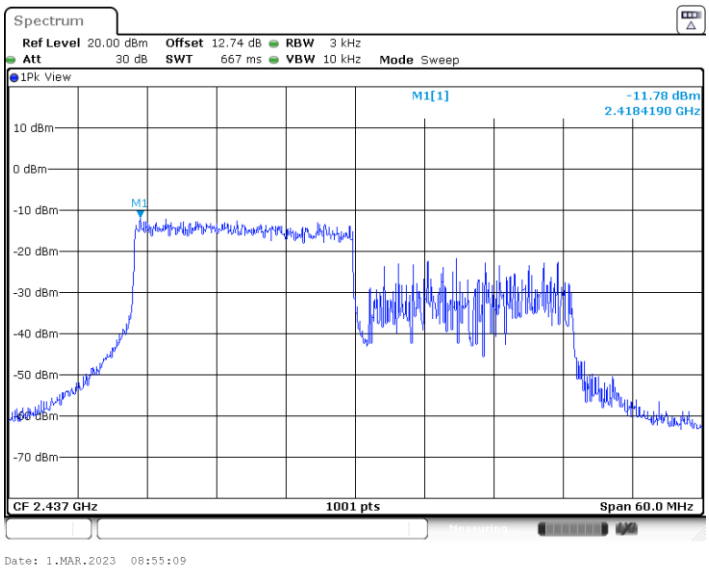

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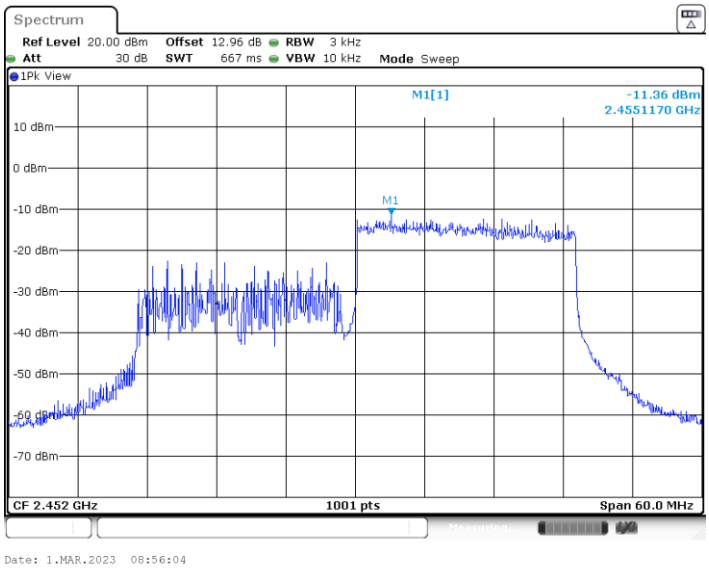

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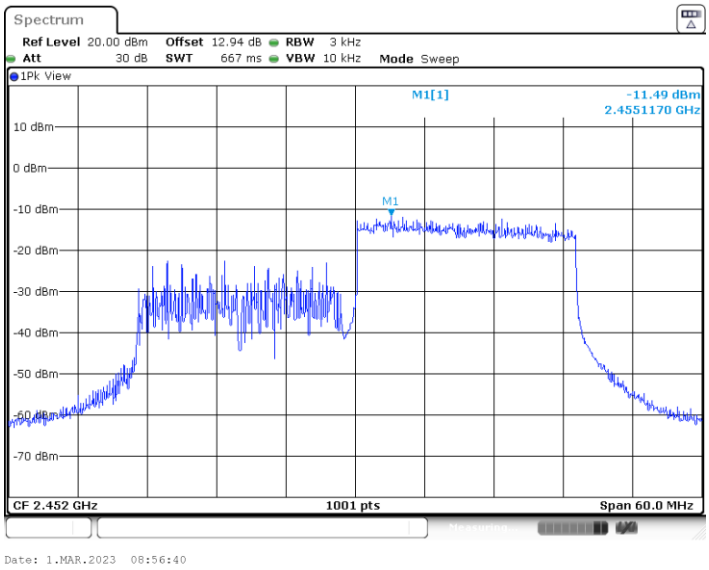


3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

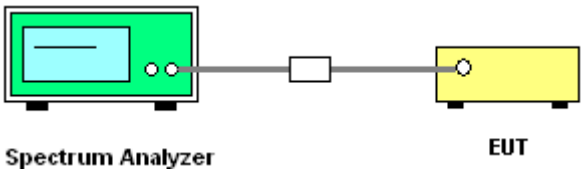
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.13
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Jiang Jun	Temperature :	21~25℃
		Relative Humidity :	51~54%

100kHz PSD

Test Mode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm/100KHz]
11B-CDD	Ant7	2412	2412.49	10.78
	Ant8	2412	2410.98	10.71
	Ant7	2437	2435.98	10.22
	Ant8	2437	2437.49	10.51
	Ant7	2462	2461.48	10.11
	Ant8	2462	2461.50	10.87
11G-CDD	Ant7	2412	2414.49	9.30
	Ant8	2412	2417.00	10.21
	Ant7	2437	2439.48	8.66
	Ant8	2437	2442.00	10.51
	Ant7	2462	2456.98	9.56
	Ant8	2462	2456.98	10.48
11AX20MIMO	Ant7	2412	2414.49	8.00
	Ant8	2412	2419.51	7.62
	Ant7	2437	2430.72	7.04
	Ant8	2437	2442.02	8.75
	Ant7	2462	2454.51	7.65
	Ant8	2462	2457.02	7.05
11AX40MIMO	Ant7	2422	2419.48	5.72
	Ant8	2422	2417.02	6.53
	Ant7	2437	2421.96	4.55
	Ant8	2437	2451.96	5.28
	Ant7	2452	2455.78	6.09
	Ant8	2452	2446.97	6.61