FCC RF Test Report

APPLICANT	:	Motorola Mobility LLC
EQUIPMENT	:	Mobile Cellular Phone
BRAND NAME	:	Motorola
MODEL NAME	:	XT2503-1, XT2505-3
FCC ID	:	IHDT56AU7
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Dec. 18, 2024 ~ Dec. 30, 2024

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.

This report contains data that were produced under subcontract by Sporton International Inc. (Shenzhen)

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

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4D1311C	Rev. 01	Initial issue of report	Jan. 24, 2025

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 3.11 dB at 2483.98 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 13.67 dB at 0.161 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2503-1, XT2505-3
FCC ID	IHDT56AU7
IMEI / SN Code	Conducted: 354424860019573/354424860019581 Conduction: 354424860020134/354424860020142 Radiation: NM3R220146
HW Version	DVT2
SW Version	V2VC35.13
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, model name: XT2503-1 is sample 1 and model name: XT2505-3 is sample 2, the differences could be referred to the XT2503-1, XT2505-3_Operational Description of Product Equality Declaration which is exhibit separately. According to the difference, for RF report, we choose sample 1 to full test.

1.4 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	802.11b : 21.28 dBm (0.1343 W) 802.11g : 23.72 dBm (0.2355 W) 802.11n HT20 : 23.68 dBm (0.2333 W) 802.11n HT40 : 22.95 dBm (0.1972 W) 802.11ax HE20 : 23.77 dBm (0.2382 W) 802.11ax HE40 : 23.03 dBm (0.2009 W)
99% Occupied Bandwidth	802.11b : 13.955MHz 802.11g : 19.638MHz 802.11ax HE20 : 19.874MHz 802.11ax HE40 : 39.028MHz
Antenna Type / Gain	PIFA Antenna type with gain -2.5 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ax : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)

Note:

1. For 802.11n HT20 / ax HE20 and 802.11n HT40 / ax HE40 mode, the whole testing has assessed only 802.11ax HE20/ HE40 by referring to their higher conducted power.
2. 802.11ax support OFDMA full RU tone and partial RU tone, both full RU and partial RU-left (for low CH) and partial RU-right (for high CH) test output power, the full RU Power/PSD > partial RU, therefore the full RU perform full test to cover partial RU except for Spurious and bandedge.

1.5 Modification of EUT

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

1.6 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	CN1257	314309

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ	CN1256	421272

Test data subcontracted: conducted test case in section 3.1~3.4 of this report.

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH08-KS	AUDIX	E3	210616
2.	CO01-KS	AUDIX	E3	6.2009-8-24

1.8 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
- 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.

1.9 Specification of Accessory

Accessories Information				
AC Adapter 1(US)	**Brand Name**	Motorola(Chenyang)	**Model Name**	MC-681N
AC Adapter 1(EU)	**Brand Name**	Motorola(Chenyang)	**Model Name**	MC-682N
AC Adapter 1(UK)	**Brand Name**	Motorola(Chenyang)	**Model Name**	MC-683N
AC Adapter 1(AU)	**Brand Name**	Motorola(Chenyang)	**Model Name**	MC-685N
AC Adapter 1(AR)	**Brand Name**	Motorola(Chenyang)	**Model Name**	MC-686N
AC Adapter 1(BR)	**Brand Name**	Motorola(Chenyang)	**Model Name**	MC-687N
AC Adapter 1(CHILE)	**Brand Name**	Motorola(Chenyang)	**Model Name**	MC-689N
AC Adapter 2(US)	**Brand Name**	Motorola(Acbel)	**Model Name**	MC-681N
AC Adapter 2(EU)	**Brand Name**	Motorola(Acbel)	**Model Name**	MC-682N
AC Adapter 2(UK)	**Brand Name**	Motorola(Acbel)	**Model Name**	MC-683N
AC Adapter 2(AU)	**Brand Name**	Motorola(Acbel)	**Model Name**	MC-685N
AC Adapter 2(AR)	**Brand Name**	Motorola(Acbel)	**Model Name**	MC-686N
AC Adapter 2(BR)	**Brand Name**	Motorola(Acbel)	**Model Name**	MC-687N
AC Adapter 2(CHILE)	**Brand Name**	Motorola(Acbel)	**Model Name**	MC-689N
Battery 1	**Brand Name**	Motorola(ATL)	**Model Name**	RM52
Battery 2	**Brand Name**	Motorola(Cosmx)	**Model Name**	RM52
USB Cable 1	**Brand Name**	Motorola(saibao)	**Model Name**	SC18D71644
USB Cable 2	**Brand Name**	Motorola(Luxshare)	**Model Name**	SC18E08104
USB Cable 3	**Brand Name**	Motorola(saibao)	**Model Name**	SC18D86731
USB Cable 4	**Brand Name**	Motorola(Luxshare)	**Model Name**	SC18E08103
Wireless Earphones	**Brand Name**	Motorola	**Model Name**	XT2443-1

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 for Adapter mode and Earphone mode. The worst cases (X plane-Adapter mode) 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

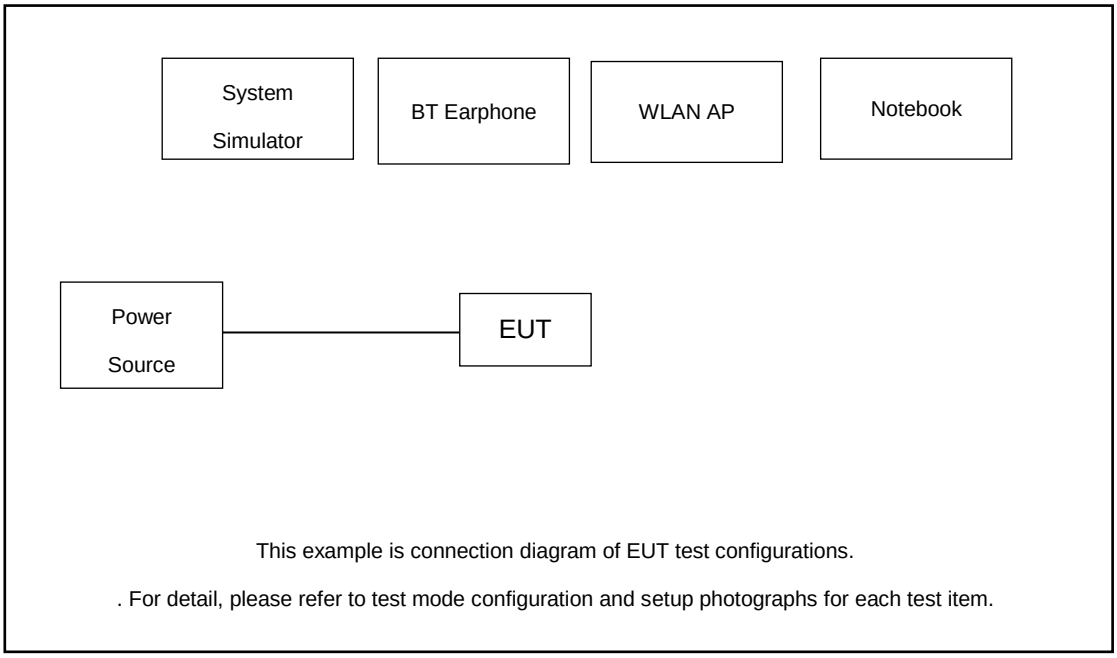
Final test modes are considering the modulation and worse data rates as below table.

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 :GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable 4(Charging from Adapter1)
Remark: For Radiated Test Cases, the tests were performed with Adapter1 and USB Cable 1.	

2.3 Connection Diagram of Test System

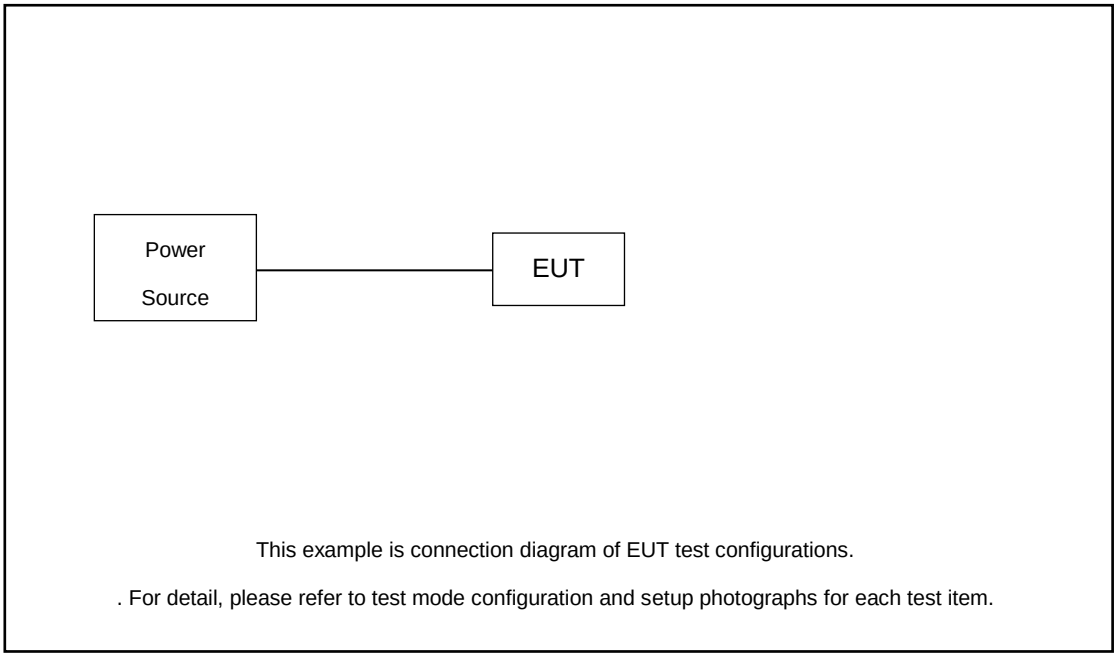
AC Conducted Emission:



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

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.	Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded,1.8m
2.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
3.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
4.	SD Card	Kingston	8GB	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 2.12 dB and 10dB attenuator.

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

= 2.12 + 10 = 12.12 (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) ≥ 3*RBW. 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) approximately three times the RBW.
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

Please refer to Appendix A.

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.

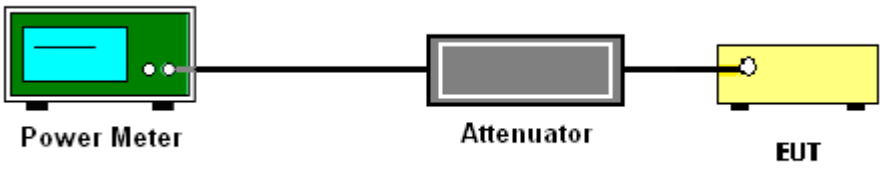
3.2.2 Measuring Instruments

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.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

2.4GHz Band											
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
						Ant 3	Ant 3	Ant 3	Ant 3	Ant 3	
11b	1Mbps	1	1	2412	Full	21.28	30.00	-2.50	18.78	36.00	Pass
11b	1Mbps	1	6	2437	Full	20.62	30.00	-2.50	18.12	36.00	Pass
11b	1Mbps	1	11	2462	Full	20.89	30.00	-2.50	18.39	36.00	Pass
11g	6Mbps	1	1	2412	Full	23.53	30.00	-2.50	21.03	36.00	Pass
11g	6Mbps	1	6	2437	Full	23.72	30.00	-2.50	21.22	36.00	Pass
11g	6Mbps	1	10	2457	Full	23.59	30.00	-2.50	21.09	36.00	Pass
11g	6Mbps	1	11	2462	Full	22.16	30.00	-2.50	19.66	36.00	Pass
HT20	MCS0	1	1	2412	Full	22.65	30.00	-2.50	20.15	36.00	Pass
HT20	MCS0	1	6	2437	Full	23.68	30.00	-2.50	21.18	36.00	Pass
HT20	MCS0	1	11	2462	Full	21.25	30.00	-2.50	18.75	36.00	Pass
HT40	MCS0	1	3	2422	Full	22.95	30.00	-2.50	20.45	36.00	Pass
HT40	MCS0	1	6	2437	Full	22.93	30.00	-2.50	20.43	36.00	Pass
HT40	MCS0	1	9	2452	Full	21.84	30.00	-2.50	19.34	36.00	Pass
HE20	MCS0	1	1	2412	Full	22.97	30.00	-2.50	20.47	36.00	Pass
					26/0	17.15	30.00	-2.50	14.65	36.00	Pass
					52/37	20.70	30.00	-2.50	18.20	36.00	Pass
					106/53	22.31	30.00	-2.50	19.81	36.00	Pass
HE20	MCS0	1	2	2417	Full	23.31	30.00	-2.50	20.81	36.00	Pass
HE20	MCS0	1	6	2437	Full	23.77	30.00	-2.50	21.27	36.00	Pass
HE20	MCS0	1	10	2457	Full	23.04	30.00	-2.50	20.54	36.00	Pass
HE20	MCS0	1	11	2462	Full	21.57	30.00	-2.50	19.07	36.00	Pass
					26/8	13.51	30.00	-2.50	11.01	36.00	Pass
					52/40	16.18	30.00	-2.50	13.68	36.00	Pass
					106/54	18.97	30.00	-2.50	16.47	36.00	Pass
HE40	MCS0	1	3	2422	Full	23.03	30.00	-2.50	20.53	36.00	Pass
HE40	MCS0	1	6	2437	Full	22.95	30.00	-2.50	20.45	36.00	Pass
HE40	MCS0	1	9	2452	Full	21.98	30.00	-2.50	19.48	36.00	Pass

3.2.6 Test Result of Average Output Power (Reporting Only)

2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	Setting
						Ant 3	Ant 3	Ant 3	Ant 3	Ant 3		Ant 3
11b	1Mbps	1	1	2412	Full	19.10	30.00	-2.50	16.60	36.00	Pass	20.00
11b	1Mbps	1	6	2437	Full	18.16	30.00	-2.50	15.66	36.00	Pass	19.00
11b	1Mbps	1	11	2462	Full	18.71	30.00	-2.50	16.21	36.00	Pass	20.00
11g	6Mbps	1	1	2412	Full	16.75	30.00	-2.50	14.25	36.00	Pass	17.50
11g	6Mbps	1	6	2437	Full	18.76	30.00	-2.50	16.26	36.00	Pass	20.00
11g	6Mbps	1	10	2457	Full	18.64	30.00	-2.50	16.14	36.00	Pass	20.00
11g	6Mbps	1	11	2462	Full	14.39	30.00	-2.50	11.89	36.00	Pass	15.50
HT20	MCS0	1	1	2412	Full	14.72	30.00	-2.50	12.22	36.00	Pass	15.50
HT20	MCS0	1	6	2437	Full	18.79	30.00	-2.50	16.29	36.00	Pass	20.00
HT20	MCS0	1	11	2462	Full	13.40	30.00	-2.50	10.90	36.00	Pass	14.50
HT40	MCS0	1	3	2422	Full	14.76	30.00	-2.50	12.26	36.00	Pass	15.50
HT40	MCS0	1	6	2437	Full	15.54	30.00	-2.50	13.04	36.00	Pass	16.00
HT40	MCS0	1	9	2452	Full	13.93	30.00	-2.50	11.43	36.00	Pass	14.50
HE20	MCS0	1	1	2412	Full	14.80	30.00	-2.50	12.30	36.00	Pass	15.50
					26/0	6.68	30.00	-2.50	4.18	36.00	Pass	7.00
					52/37	9.74	30.00	-2.50	7.24	36.00	Pass	10.00
					106/53	12.88	30.00	-2.50	10.38	36.00	Pass	13.00
HE20	MCS0	1	2	2417	Full	17.74	30.00	-2.50	15.24	36.00	Pass	18.50
HE20	MCS0	1	6	2437	Full	18.87	30.00	-2.50	16.37	36.00	Pass	20.00
HE20	MCS0	1	10	2457	Full	16.89	30.00	-2.50	14.39	36.00	Pass	18.00
HE20	MCS0	1	11	2462	Full	13.47	30.00	-2.50	10.97	36.00	Pass	14.50
					26/8	3.85	30.00	-2.50	1.35	36.00	Pass	5.00
					52/40	6.25	30.00	-2.50	3.75	36.00	Pass	7.00
					106/54	9.27	30.00	-2.50	6.77	36.00	Pass	10.00
HE40	MCS0	1	3	2422	Full	14.85	30.00	-2.50	12.35	36.00	Pass	15.50
HE40	MCS0	1	6	2437	Full	15.66	30.00	-2.50	13.16	36.00	Pass	16.00
HE40	MCS0	1	9	2452	Full	14.07	30.00	-2.50	11.57	36.00	Pass	14.50

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.

3.3.4 Test Setup

3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

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.

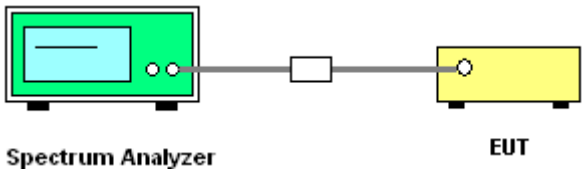
3.4.2 Measuring Instruments

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 11.11
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

Please refer to Appendix A.

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

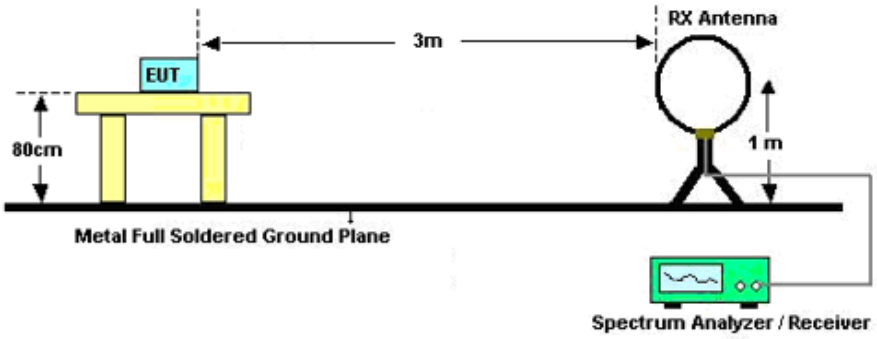
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

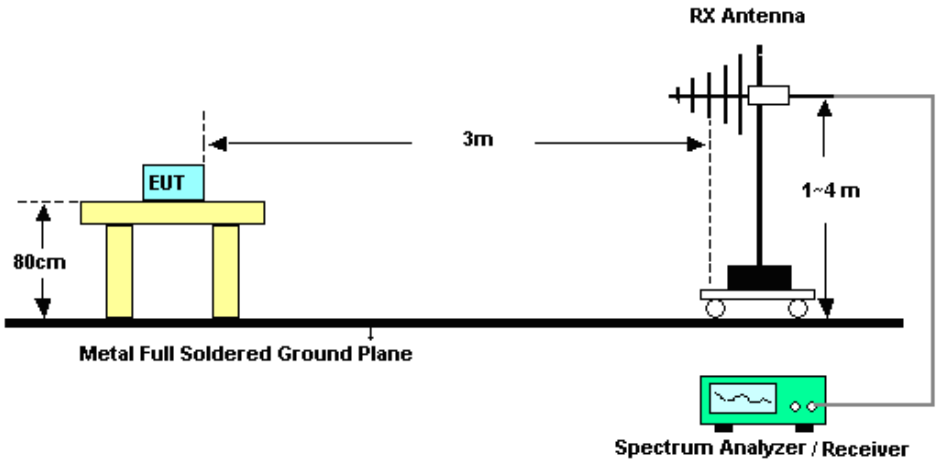
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

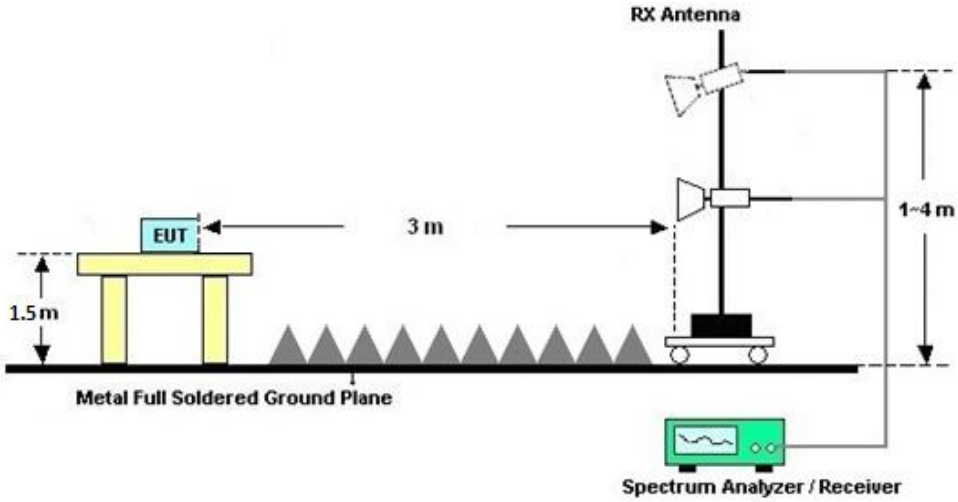
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

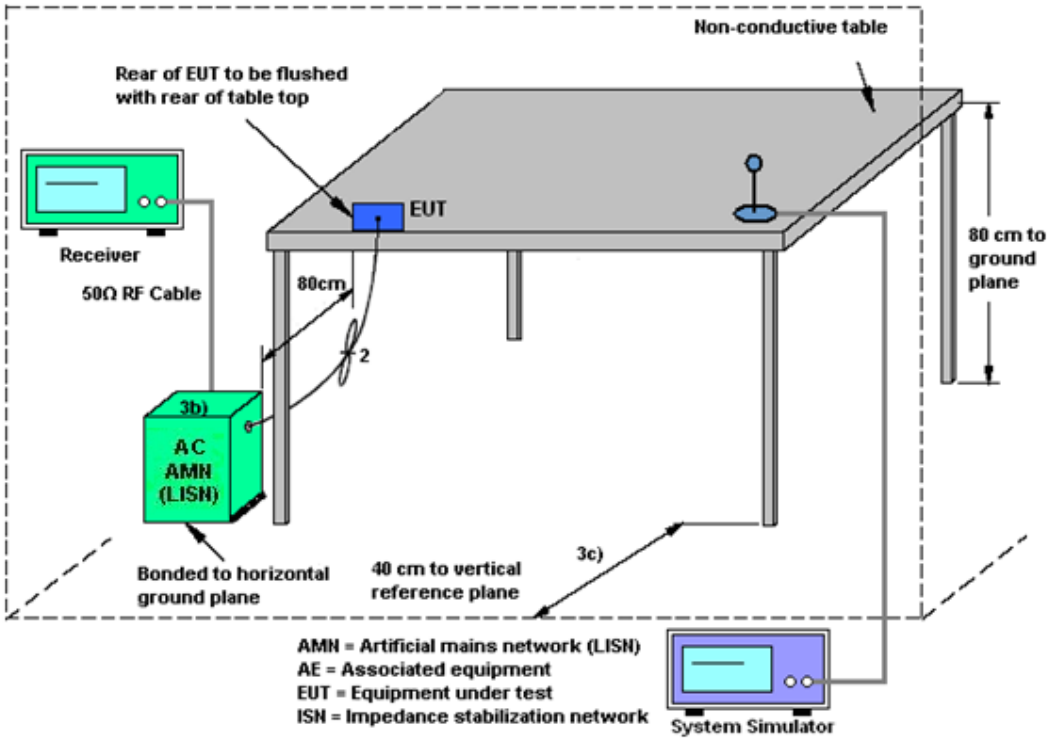
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	Keysight	N9038A	MY57290151	3Hz~8.5GHz;Max 30dBm	Jul. 04, 2024	Dec. 18, 2024	Jul. 03, 2025	Radiation (03CH08-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57441079	10Hz-44GHz	Oct. 09, 2024	Dec. 18, 2024	Oct. 08, 2025	Radiation (03CH08-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 08, 2024	Dec. 18, 2024	Sep. 07, 2025	Radiation (03CH08-KS)
Bilog Antenna	TESEQ	CBL 6111D	59915	30MHz-1GHz	Aug. 18, 2024	Dec. 18, 2024	Aug.17, 2025	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00240138	1GHz~18GHz	Jul. 06, 2024	Dec. 18, 2024	Jul. 05, 2025	Radiation (03CH08-KS)
high gain Amplifier	EM	EM01G18GA	060890	1Ghz-18Ghz	Jul. 23, 2024	Dec. 18, 2024	Jul. 22, 2025	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101116	18GHz~40GHz	Oct. 22, 2024	Dec. 18, 2024	Oct. 21, 2025	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	380826	9KHz-1GHz	Jul. 03, 2024	Dec. 18, 2024	Jul. 02, 2025	Radiation (03CH08-KS)
Amplifier	Keysight	83017A	MY53270417	500MHz~26.5GHz	Oct. 09, 2024	Dec. 18, 2024	Oct. 08, 2025	Radiation (03CH08-KS)
Amplifier	EM	EM18G40GGA	060737	18~40GHz	Jan. 03, 2024	Dec. 18, 2024	Jan. 02, 2025	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Dec. 18, 2024	NCR	Radiation (03CH08-KS)
Turn Table	EM	EM 1000-T	N/A	0~360 degree	NCR	Dec. 18, 2024	NCR	Radiation (03CH08-KS)
Antenna Mast	EM	EM 1000-A	N/A	1 m~4 m	NCR	Dec. 18, 2024	NCR	Radiation (03CH08-KS)
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 09, 2024	Dec. 29, 2024~ Dec. 30, 2024	Apr. 08, 2025	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 29, 2024	Dec. 29, 2024~ Dec. 30, 2024	Dec. 28, 2025	Conducted (TH01-SZ)
Thermo meter	Anymetre	JR593	#7	- 10℃ ~ 50℃ 10%RH~99%RH	Apr. 09, 2024	Dec. 29, 2024~ Dec. 30, 2024	Apr. 08, 2025	Conducted (TH01-SZ)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 18, 2024	Dec. 20, 2024	Apr. 17, 2025	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Aug. 20, 2024	Dec. 20, 2024	Aug. 19, 2025	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 18, 2024	Dec. 20, 2024	Apr. 17, 2025	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 09, 2024	Dec. 20, 2024	Oct. 08, 2025	Conduction (CO01-KS)

NCR: No Calibration Required

5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Spurious Emission & Bandedge	±1.34 dB
Occupied Channel Bandwidth	±0.012 MHz
Conducted Power	±1.34 dB
Conducted Power Spectral Density	±1.32 dB
Frequency	±1.3 Hz

Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.84 dB

Uncertainty of Radiated Emission Measurement (9 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.30 dB

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.04 dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.26 dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.40 dB

---------- THE END ----------

Appendix A. Conducted Test Results

Ambient Condition: 24-26 ℃, 45-55 %RH	
According Standard: ■Part15C	
Test Date: 2024.12.29~2024.12.30	**Test Engineer:** Chen ZhiQiang

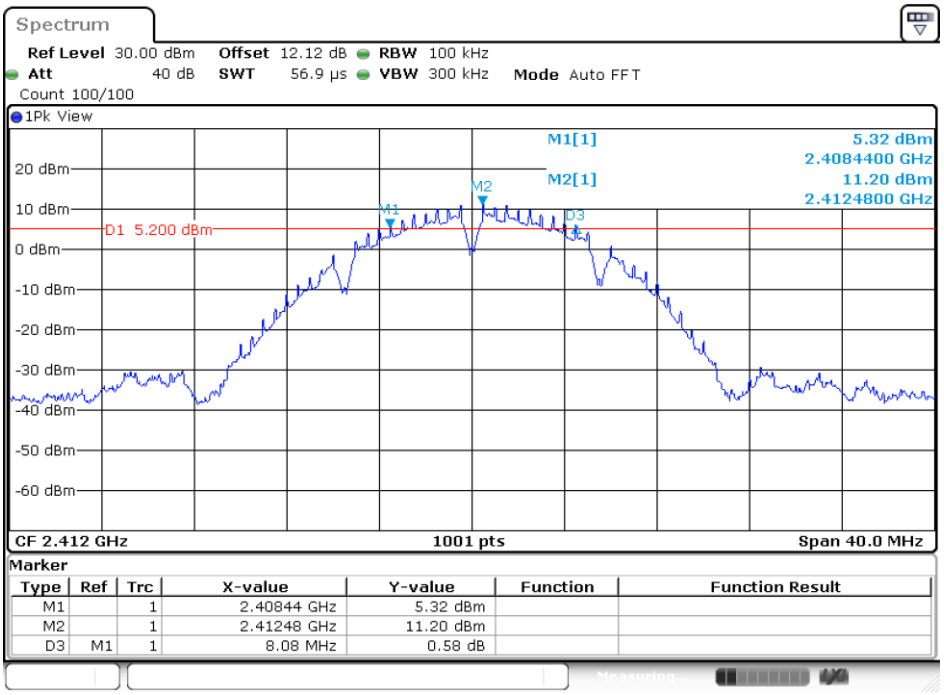
DTS Bandwidth

Test Result

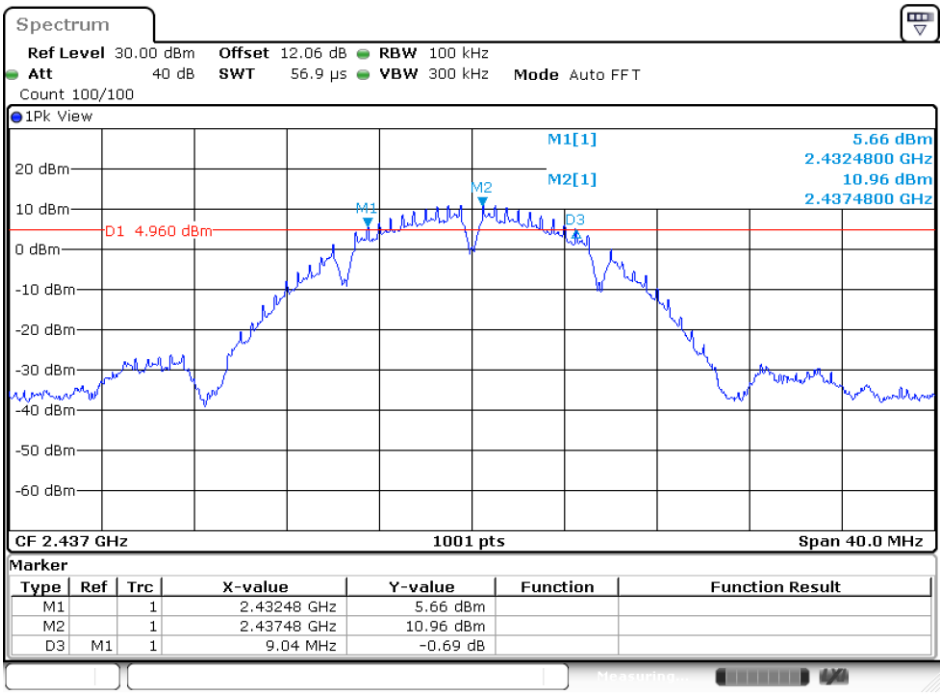
TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant3	2412	8.08	2408.44	2416.52	0.5	PASS
		2437	9.04	2432.48	2441.52	0.5	PASS
		2462	8.56	2457.96	2466.52	0.5	PASS
11G	Ant3	2412	14.48	2405.68	2420.16	0.5	PASS
		2437	16.28	2428.84	2445.12	0.5	PASS
		2462	16.04	2453.84	2469.88	0.5	PASS
11AX20SISO	Ant3	2412	15.72	2405.68	2421.40	0.5	PASS
		2437	18.48	2427.80	2446.28	0.5	PASS
		2462	17.84	2453.20	2471.04	0.5	PASS
11AX40SISO	Ant3	2422	35.92	2404.08	2440.00	0.5	PASS
		2437	37.28	2418.28	2455.56	0.5	PASS
		2452	36.88	2433.28	2470.16	0.5	PASS

Test Graphs

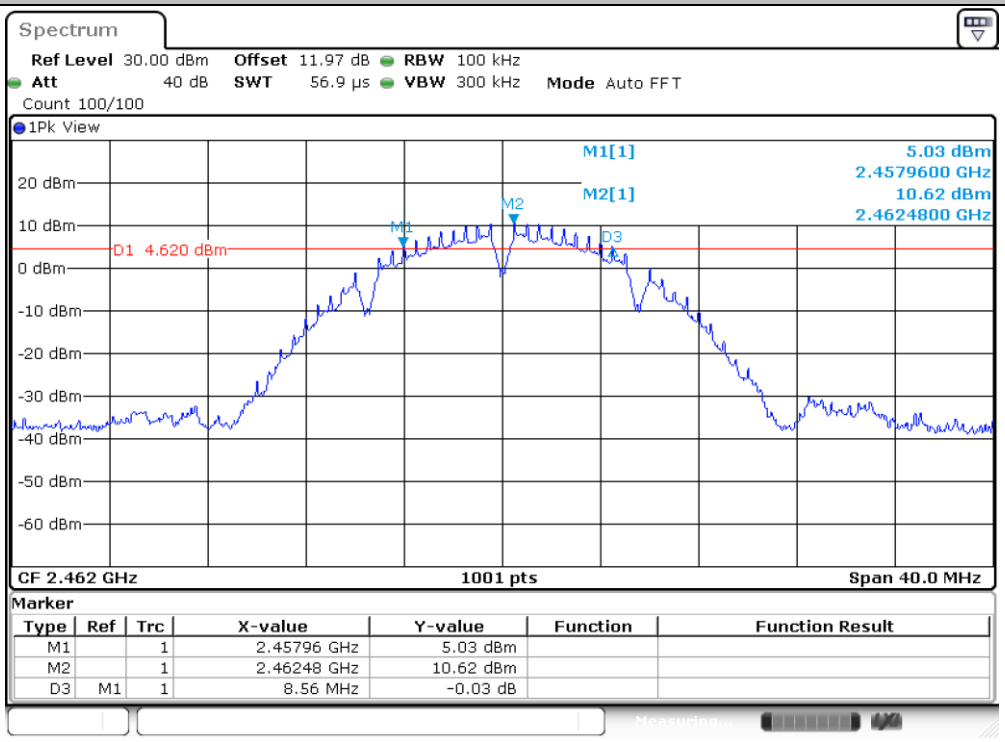
11B_Ant3_2412



11B_Ant3_2437

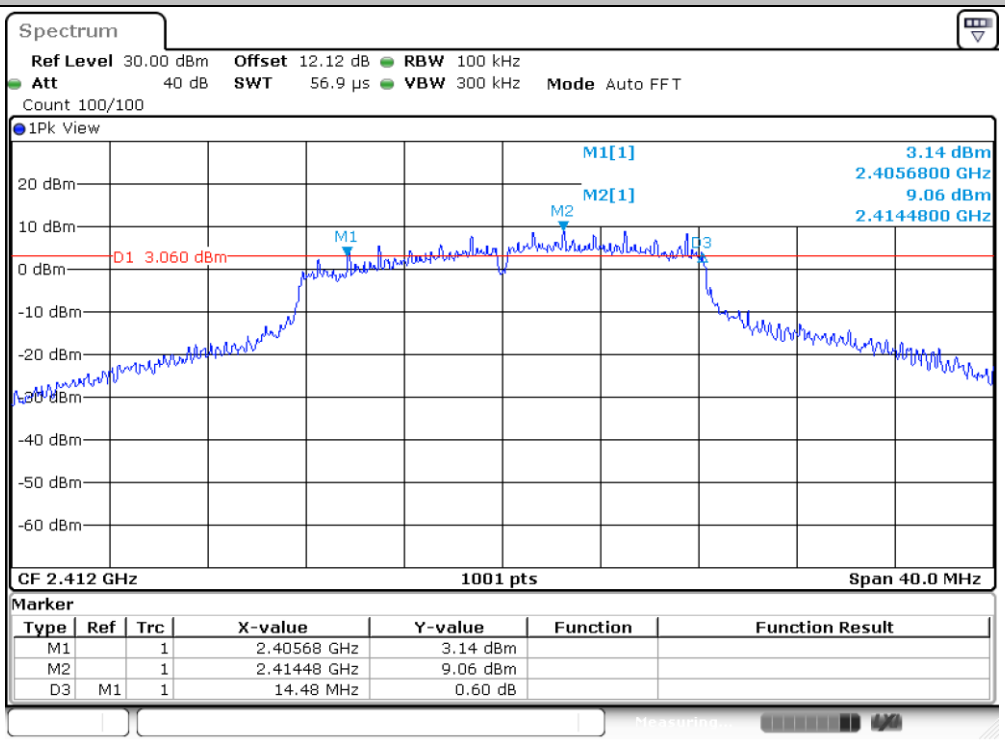


11B_Ant3_2462



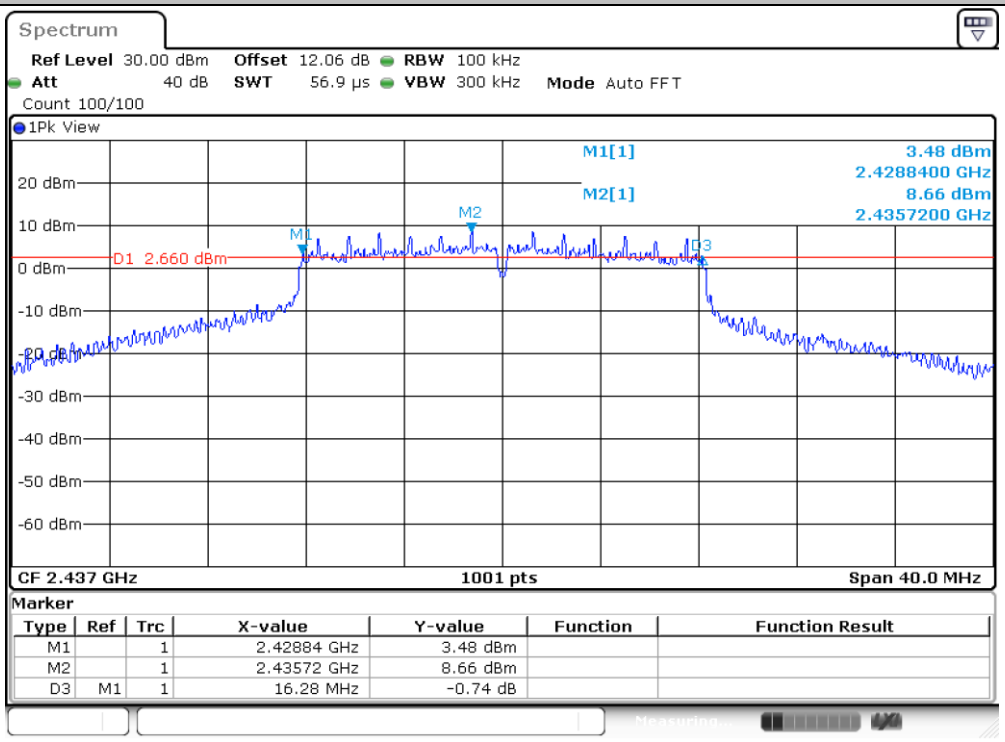
Date: 29.DEC.2024 21:08:06

11G_Ant3_2412



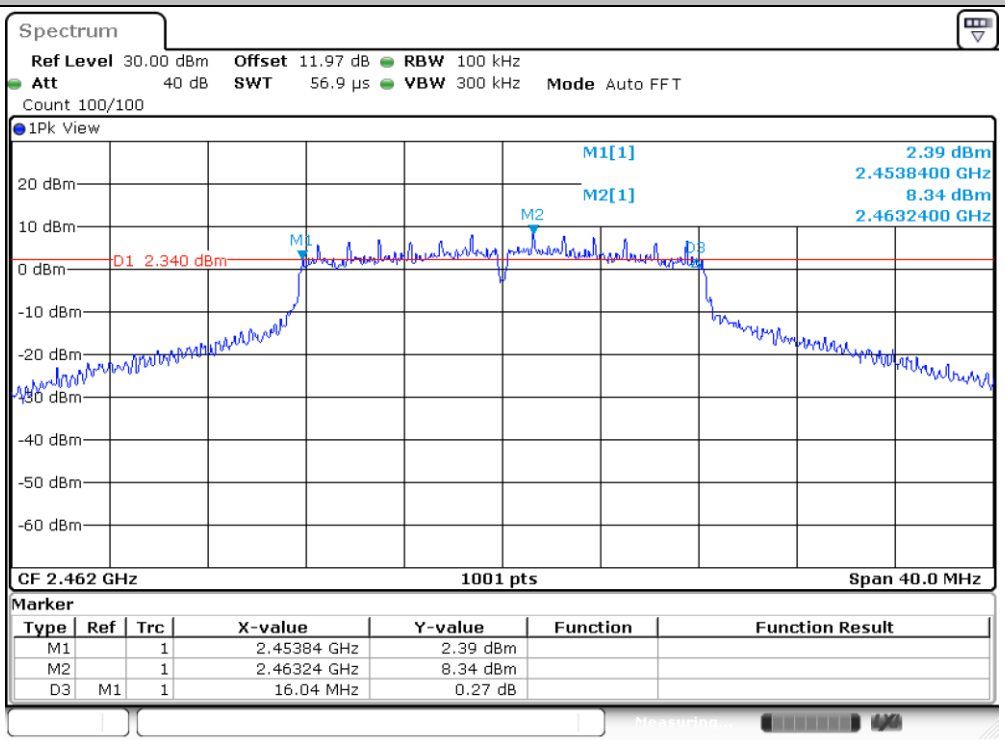
Date: 29.DEC.2024 21:10:52

11G_Ant3_2437



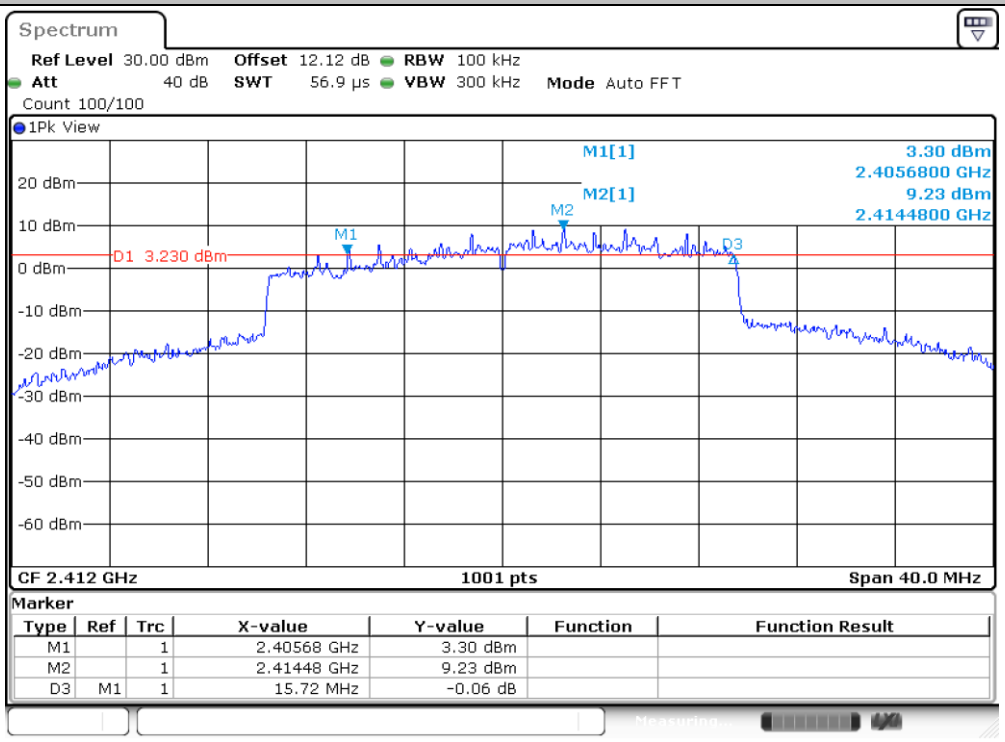
Date: 29.DEC.2024 21:20:44

11G_Ant3_2462



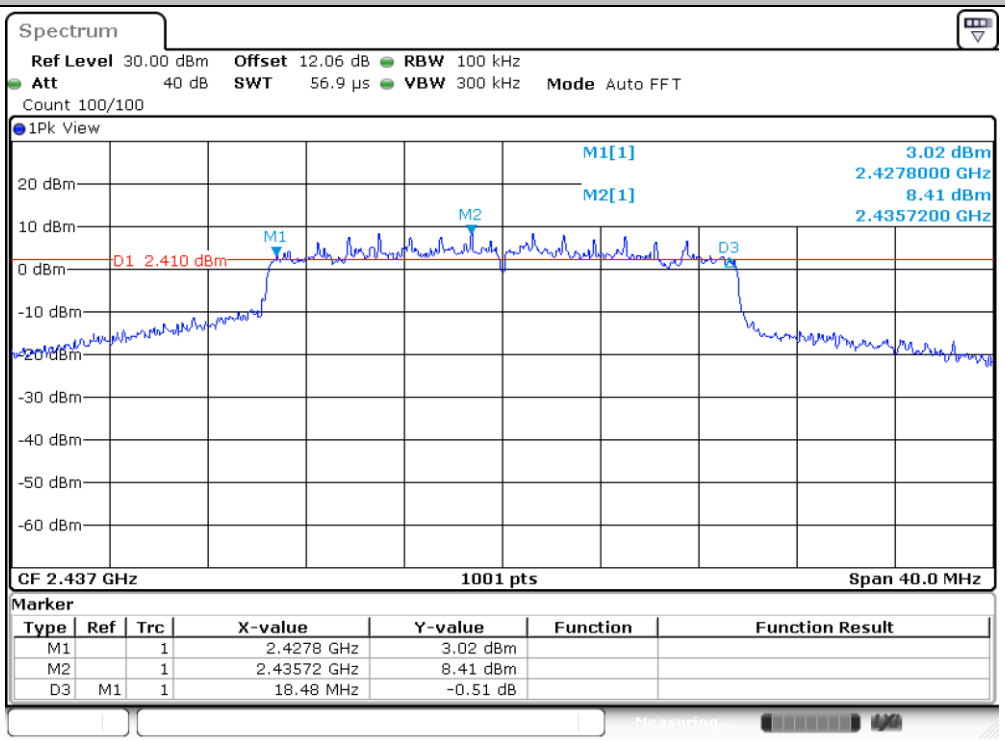
Date: 29.DEC.2024 21:25:53

11AX20SISO_Ant3_2412



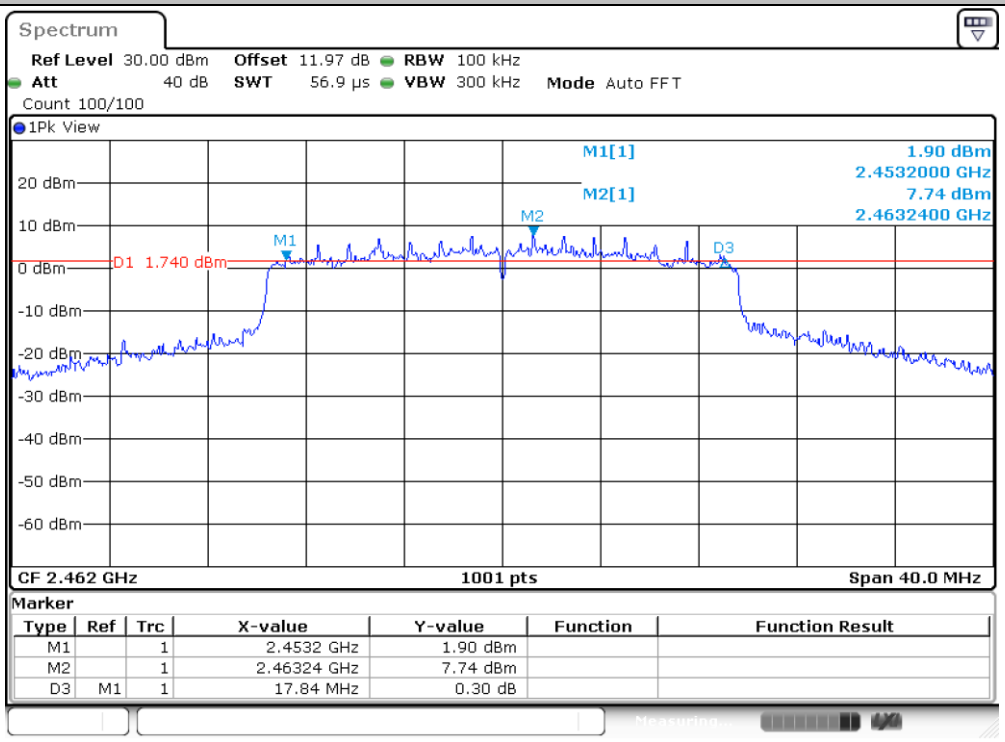
Date: 29.DEC.2024 21:34:30

11AX20SISO_Ant3_2437



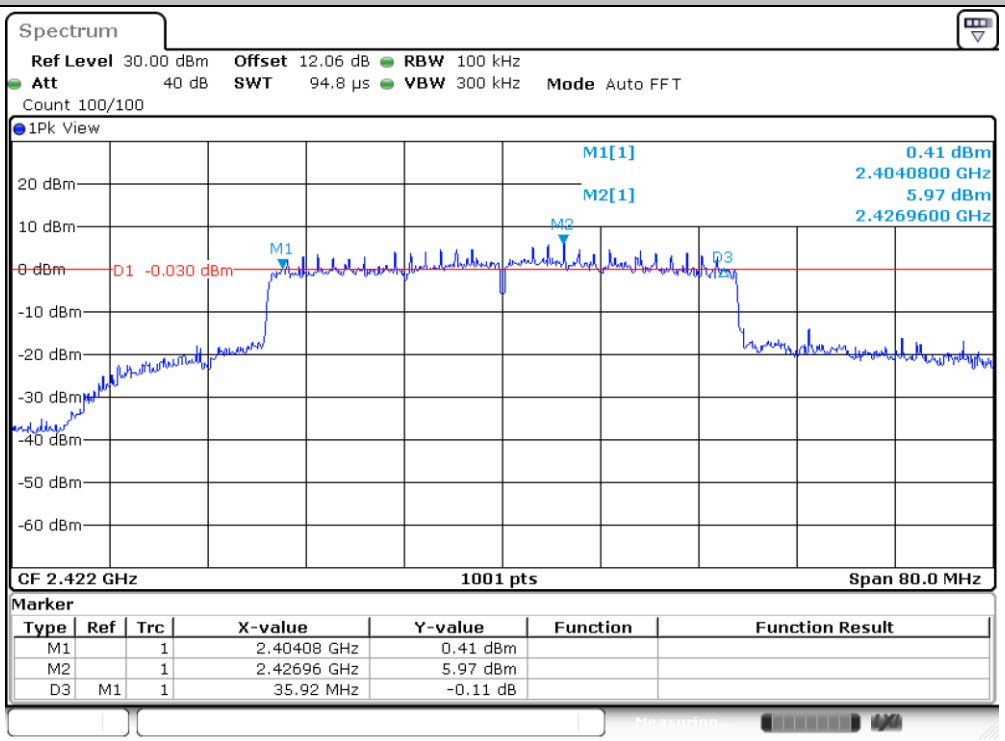
Date: 29.DEC.2024 21:40:20

11AX20SISO_Ant3_2462



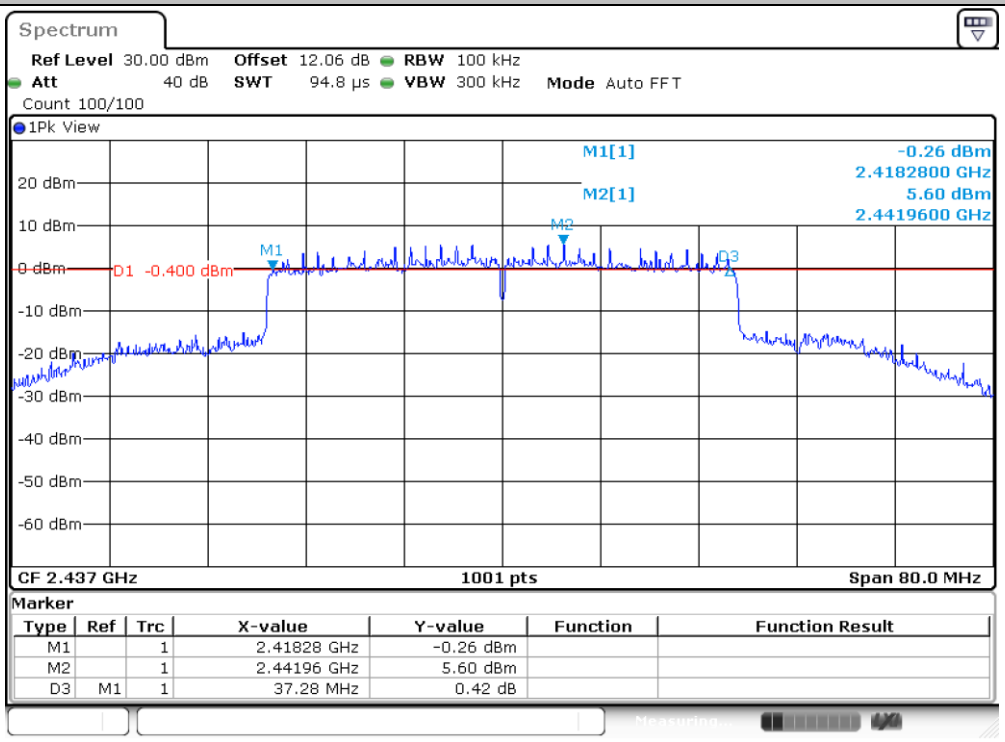
Date: 29.DEC.2024 21:44:58

11AX40SISO_Ant3_2422



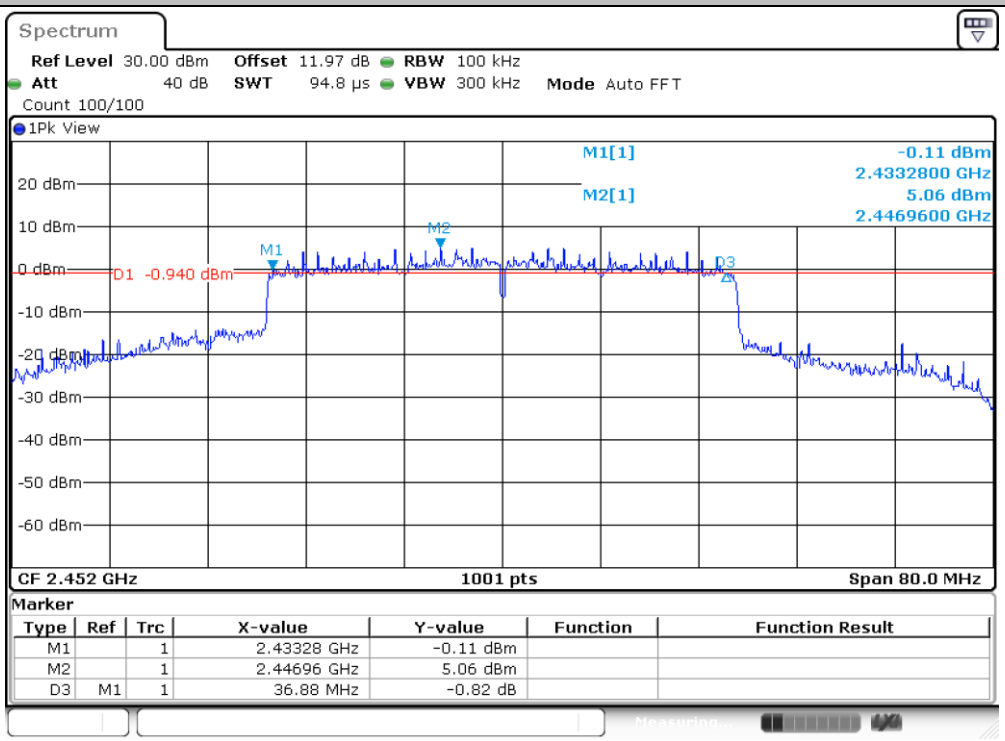
Date: 29.DEC.2024 22:00:48

11AX40SISO_Ant3_2437



Date: 29.DEC.2024 22:02:10

11AX40SISO_Ant3_2452



Date: 29.DEC.2024 22:06:02

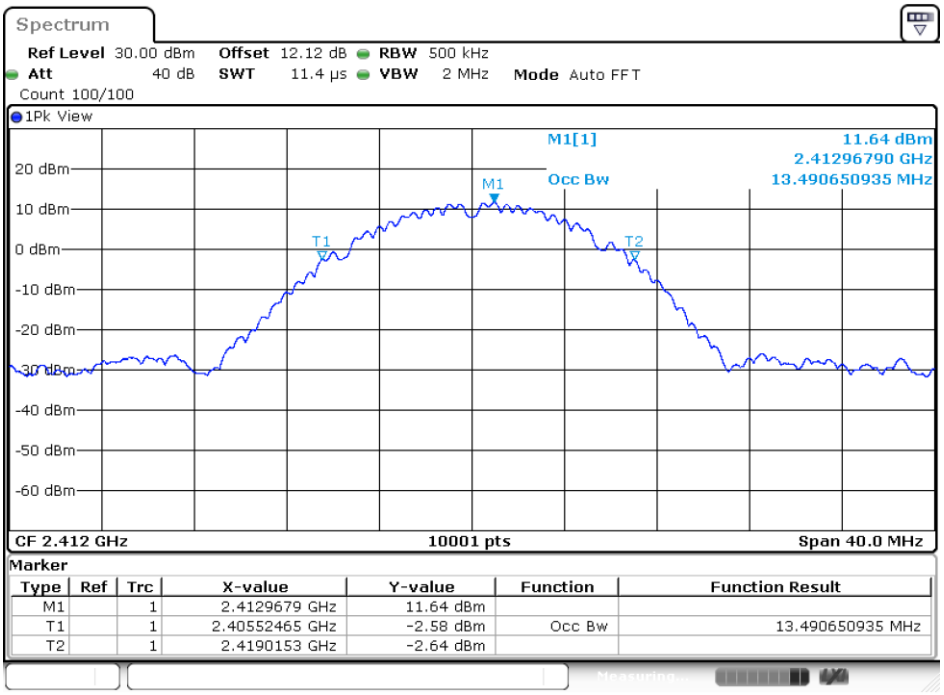
Occupied Channel Bandwidth

Test Result

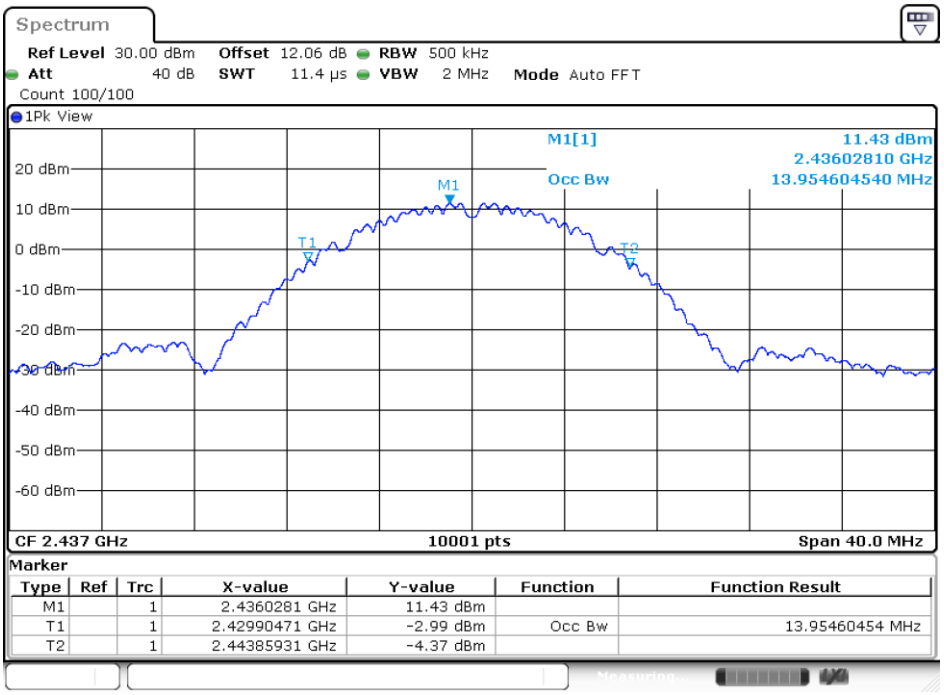
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]
11B	Ant3	2412	13.491	2405.5246	2419.0153
		2437	13.955	2429.9047	2443.8593
		2462	13.443	2455.4487	2468.8913
11G	Ant3	2412	19.382	2403.5568	2422.9389
		2437	19.638	2426.1691	2445.8071
		2462	18.046	2453.1689	2471.2151
11AX20SISO	Ant3	2412	19.79	2402.5569	2422.3470
		2437	19.874	2426.7610	2446.6350
		2462	19.606	2452.1610	2471.7670
11AX40SISO	Ant3	2422	39.028	2402.7139	2441.7420
		2437	39.004	2417.5859	2456.5900
		2452	38.98	2432.0820	2471.0621

Test Graphs

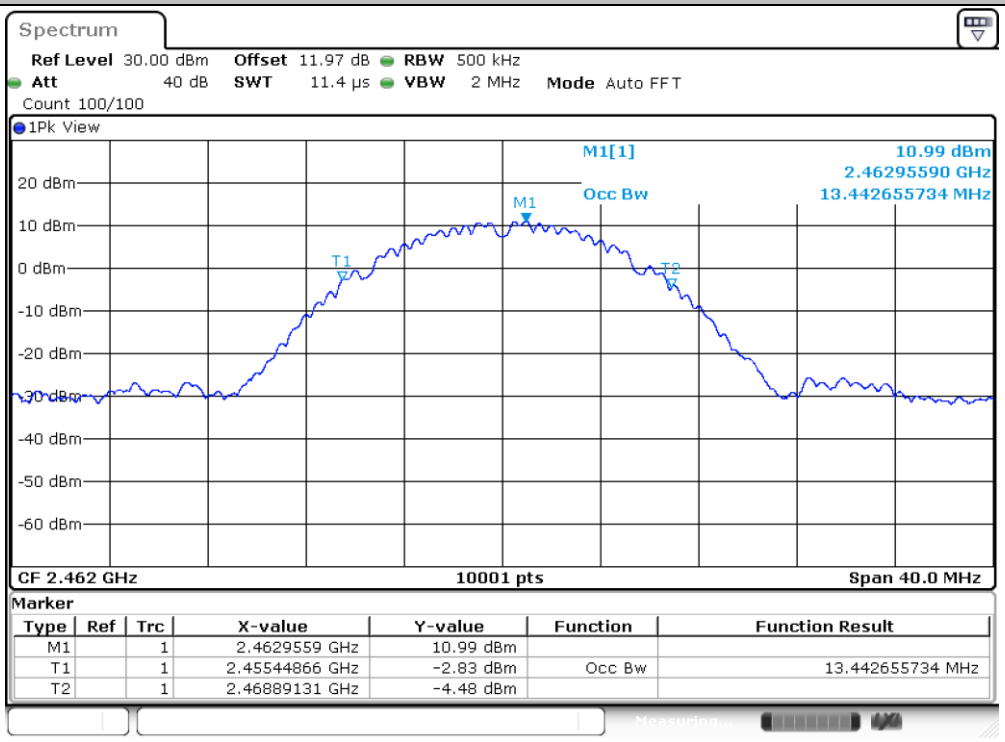
11B_Ant3_2412



11B_Ant3_2437

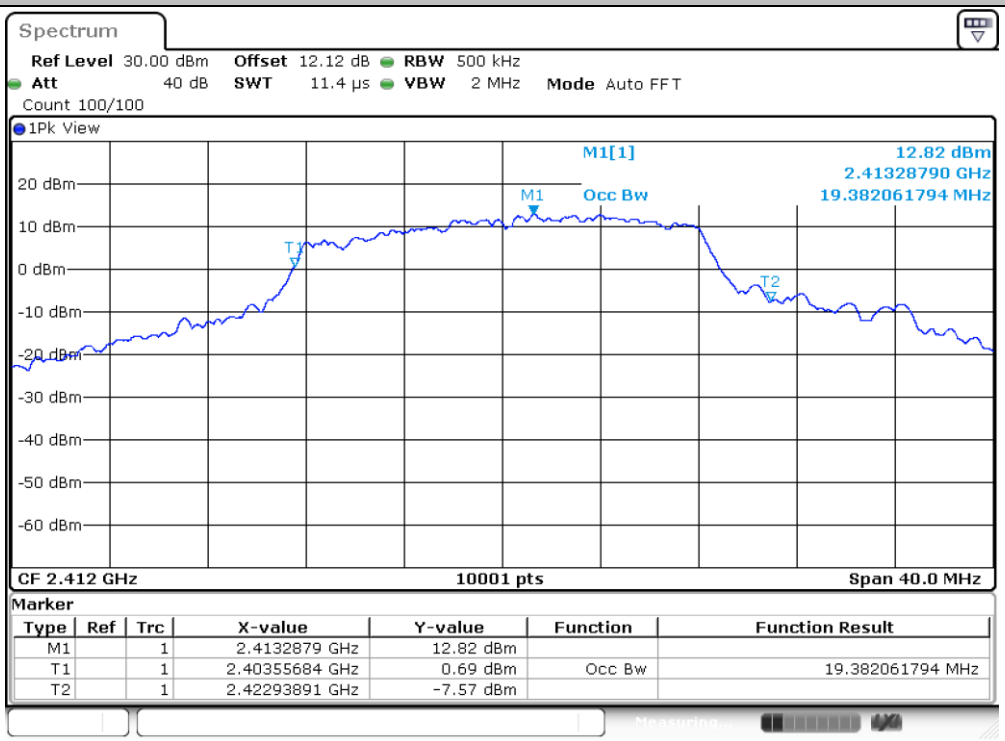


11B_Ant3_2462



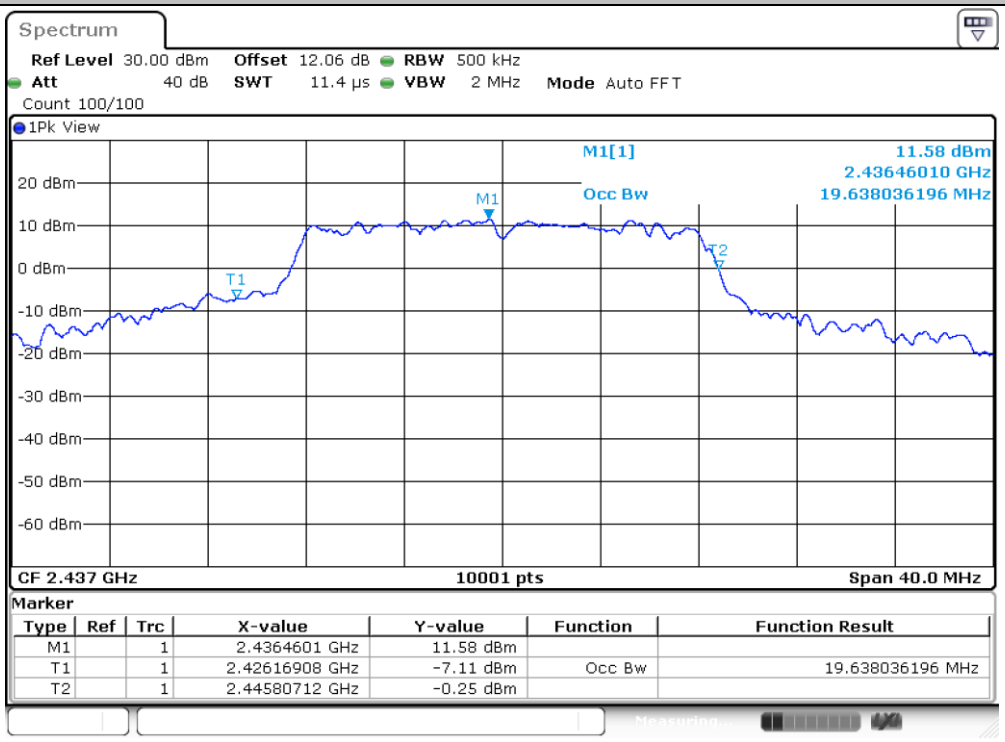
Date: 29.DEC.2024 21:08:12

11G_Ant3_2412



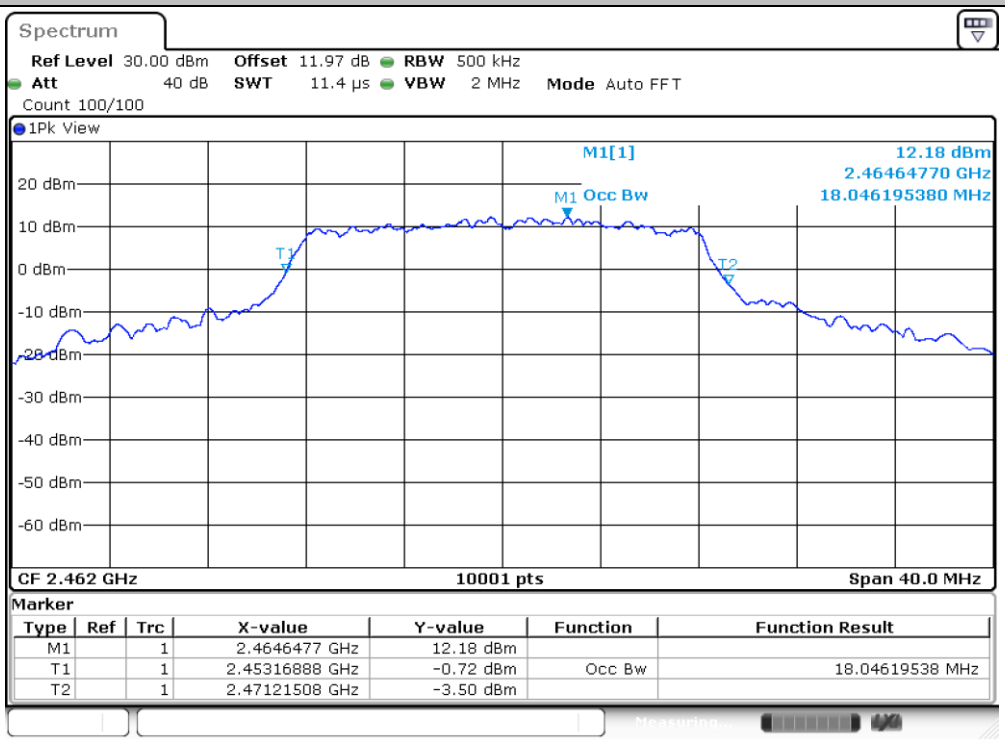
Date: 29.DEC.2024 21:10:59

11G_Ant3_2437



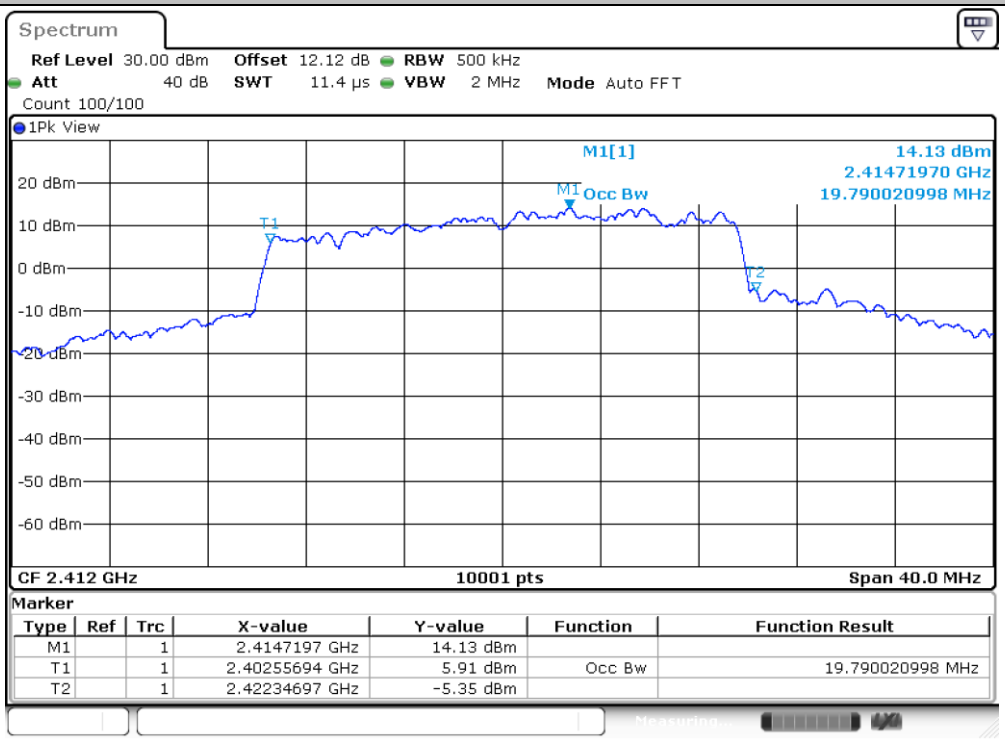
Date: 30.DEC.2024 09:31:43

11G_Ant3_2462



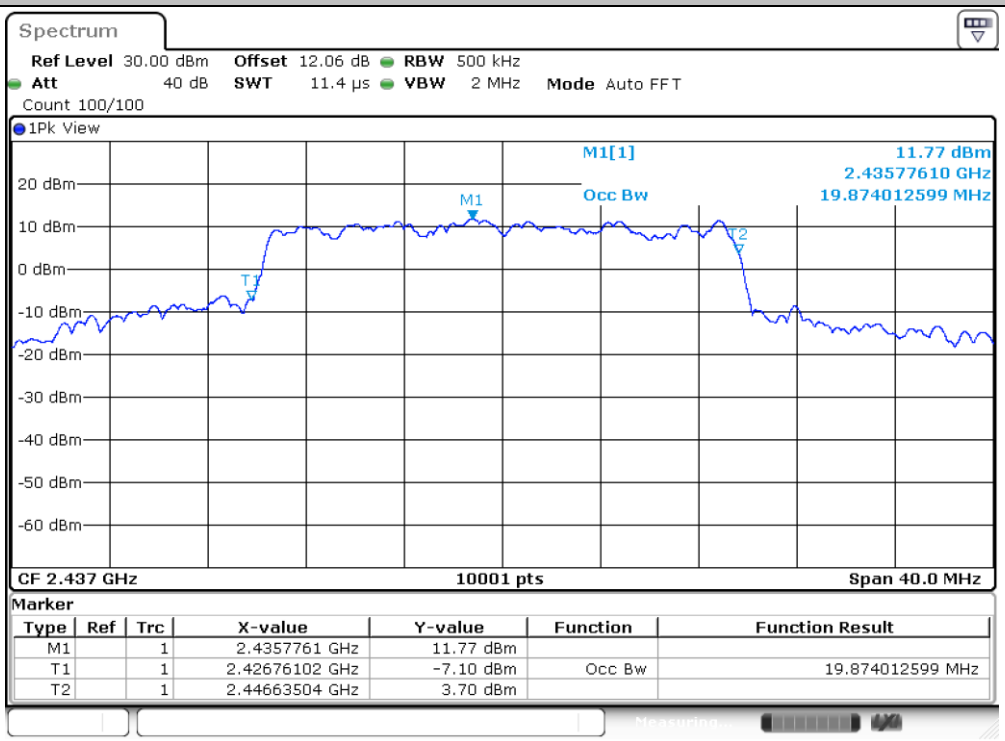
Date: 29.DEC.2024 21:26:00

11AX20SISO_Ant3_2412



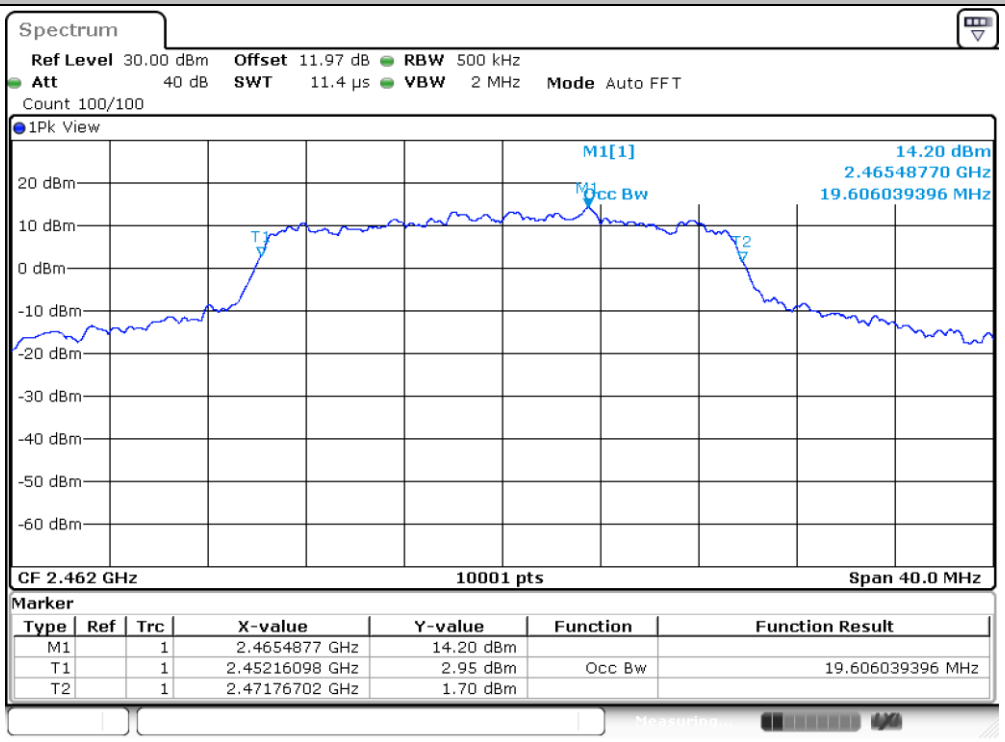
Date: 29.DEC.2024 21:34:37

11AX20SISO_Ant3_2437



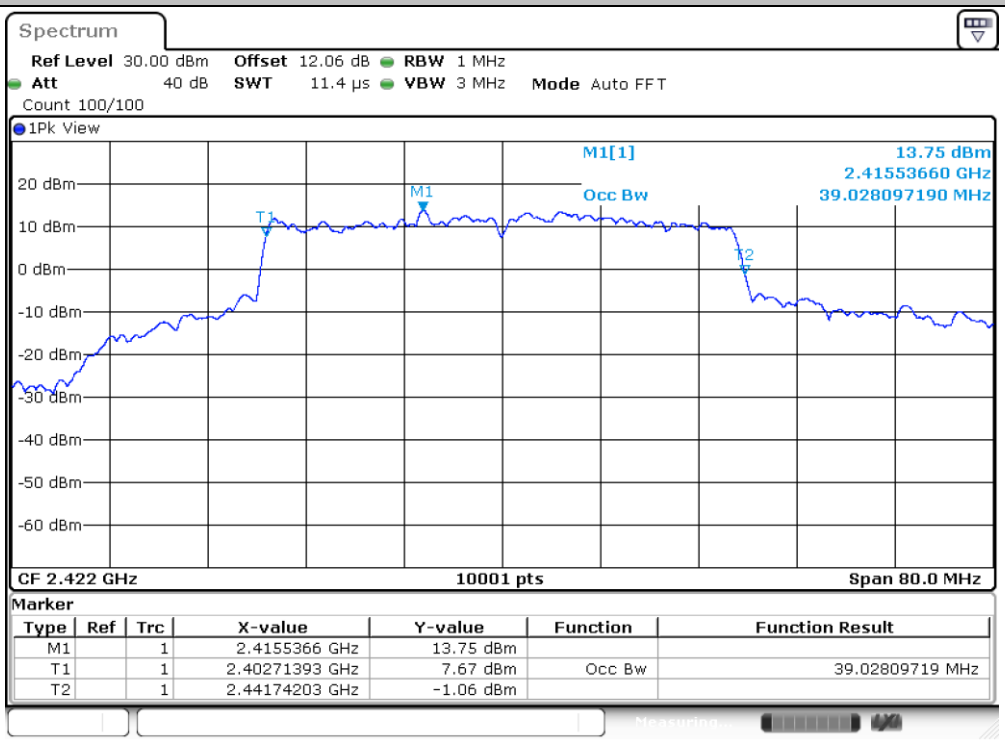
Date: 30.DEC.2024 09:32:24

11AX20SISO_Ant3_2462



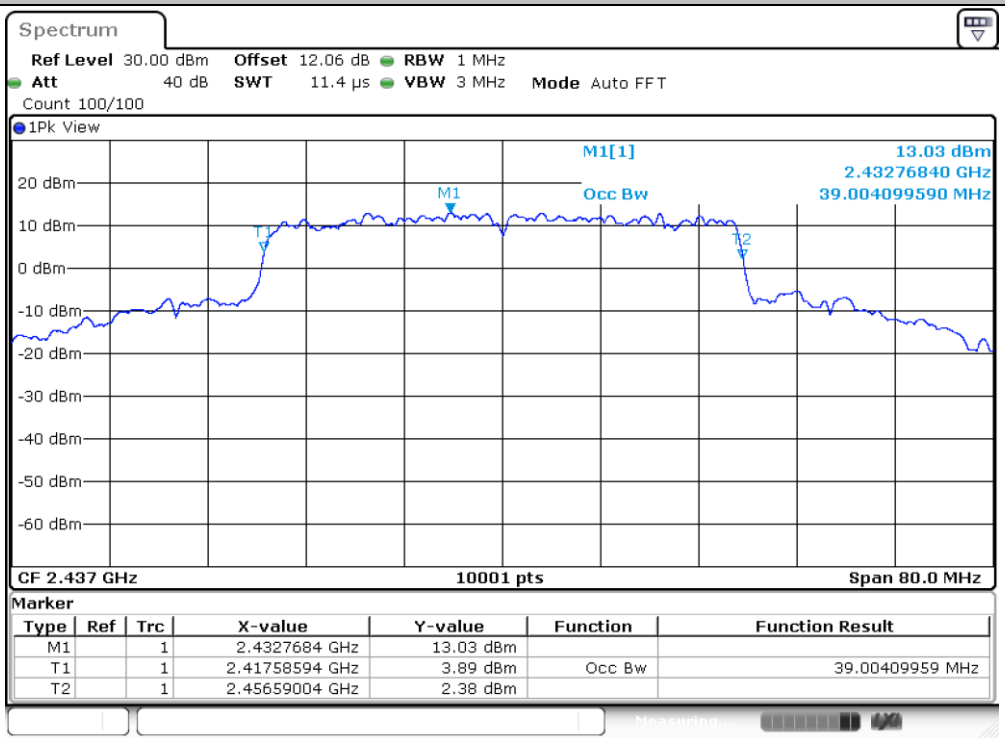
Date: 29.DEC.2024 21:45:05

11AX40SISO_Ant3_2422



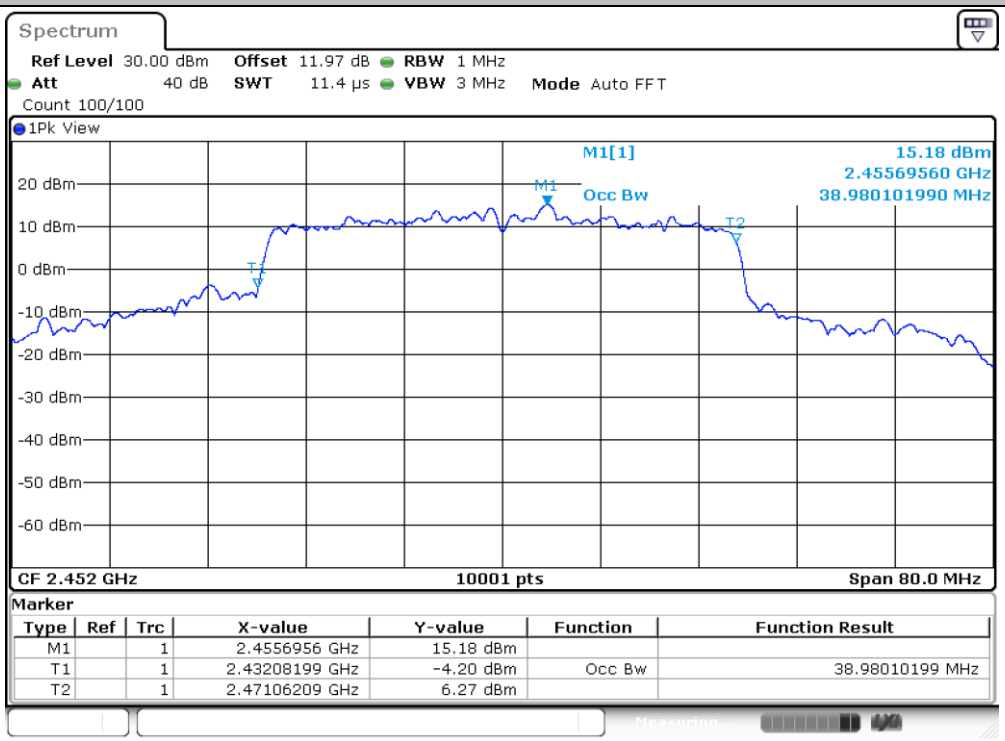
Date: 29.DEC.2024 22:00:55

11AX40SISO_Ant3_2437



Date: 29.DEC.2024 22:02:16

11AX40SISO_Ant3_2452



Date: 29.DEC.2024 22:06:09

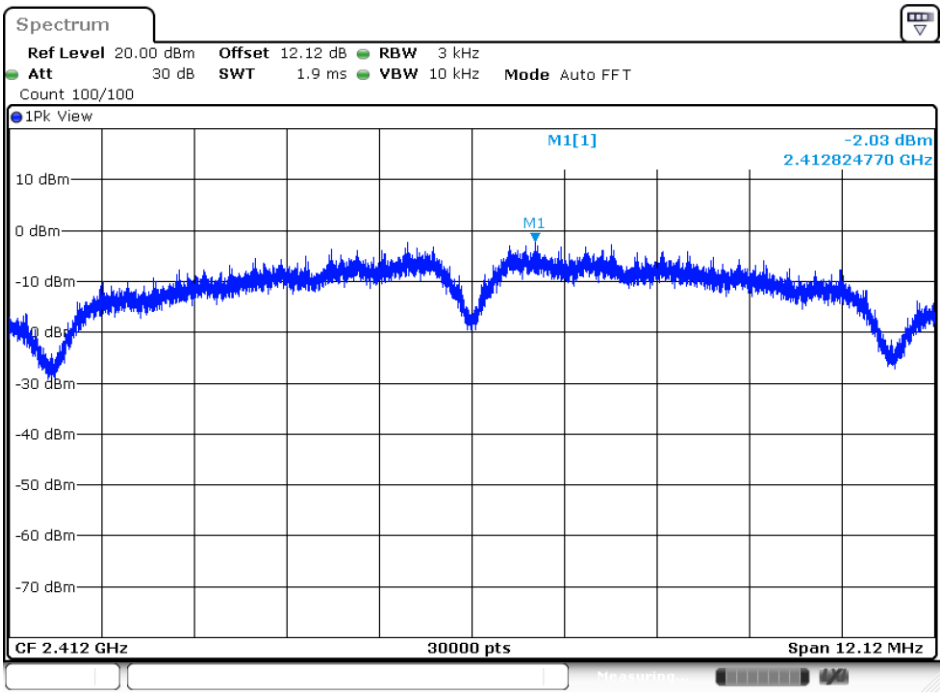
Maximum power spectral density

Test Result

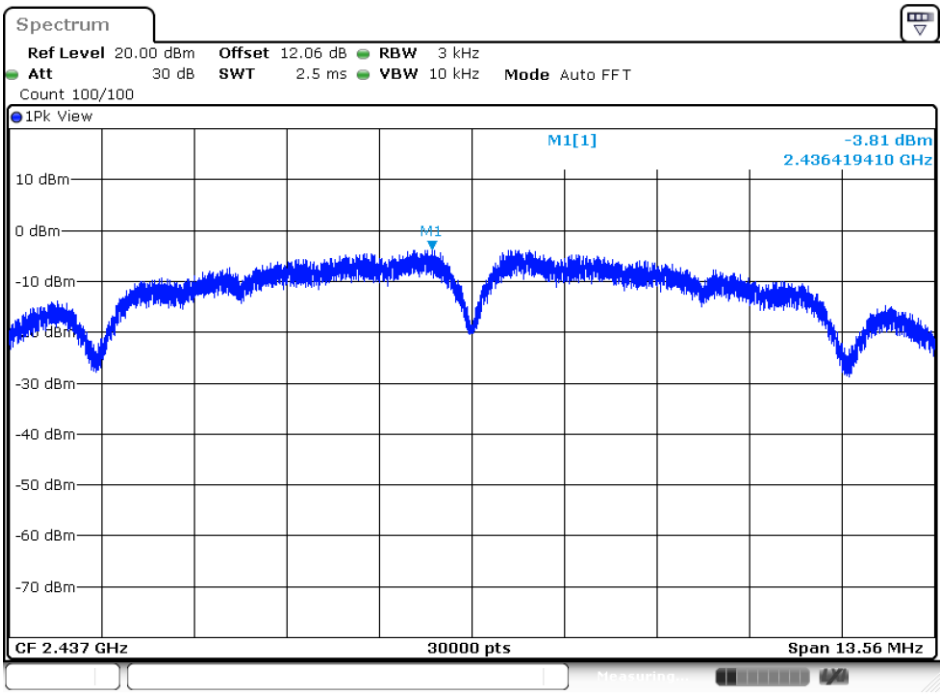
TestMode	Antenna	Freq(MHz)	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant3	2412	-2.03	≤8.00	PASS
		2437	-3.81	≤8.00	PASS
		2462	-2.28	≤8.00	PASS
11G	Ant3	2412	-4.58	≤8.00	PASS
		2437	-5.42	≤8.00	PASS
		2462	-6.01	≤8.00	PASS
11AX20SISO	Ant3	2412	-5.54	≤8.00	PASS
		2437	-6.15	≤8.00	PASS
		2462	-6.59	≤8.00	PASS
11AX40SISO	Ant3	2422	-9.34	≤8.00	PASS
		2437	-8.92	≤8.00	PASS
		2452	-9.57	≤8.00	PASS

Test Graphs

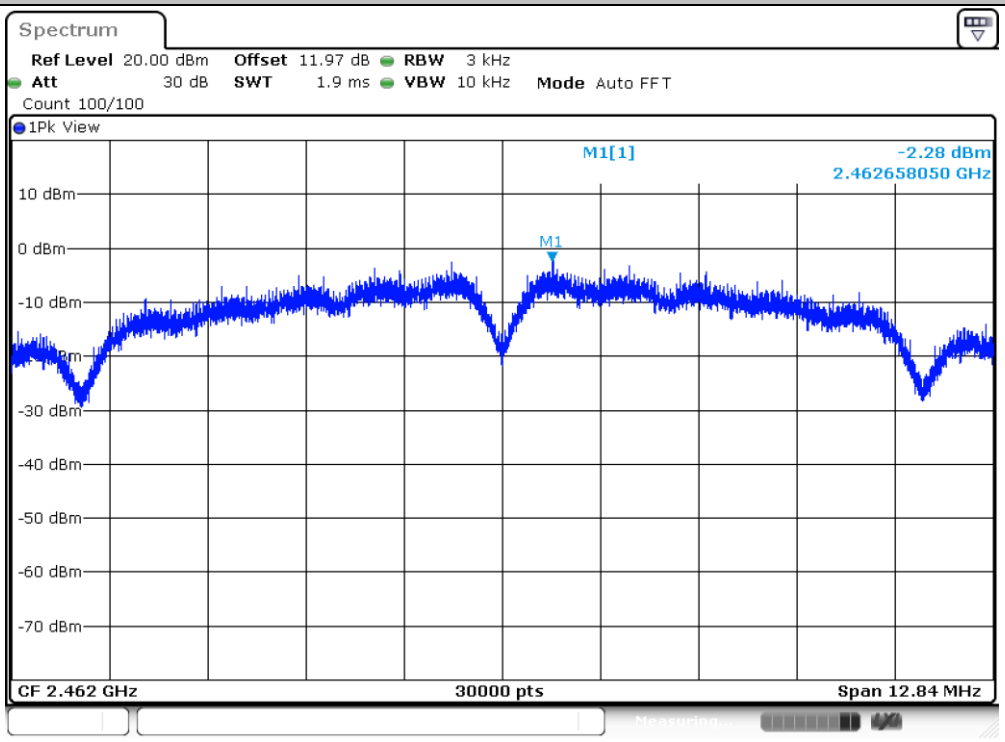
11B_Ant3_2412



11B_Ant3_2437

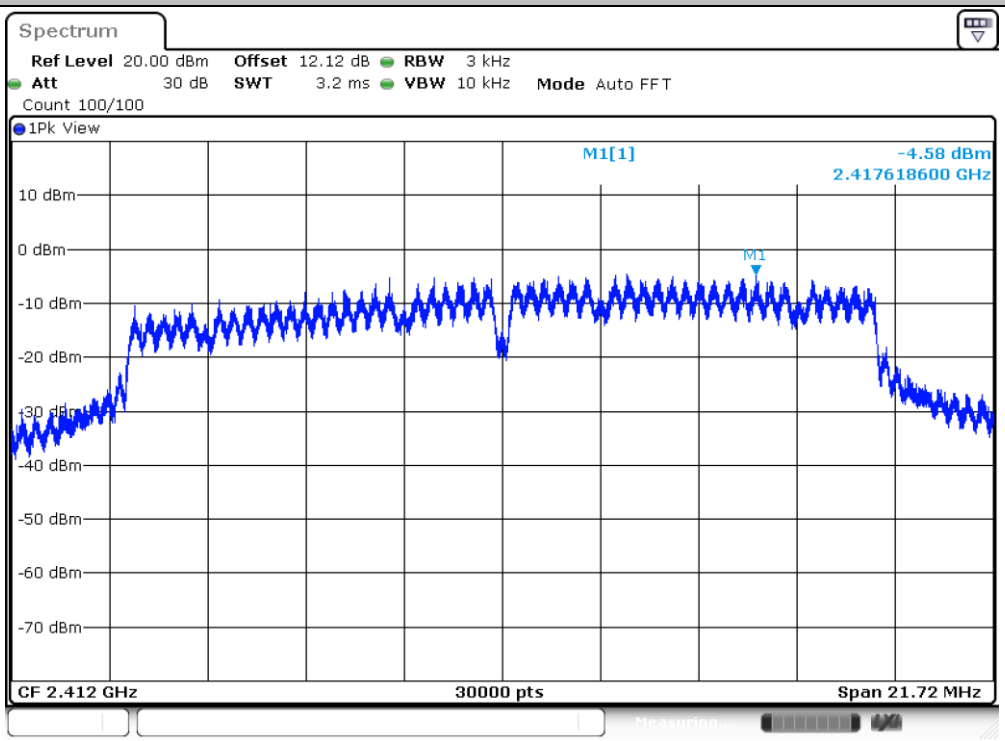


11B_Ant3_2462



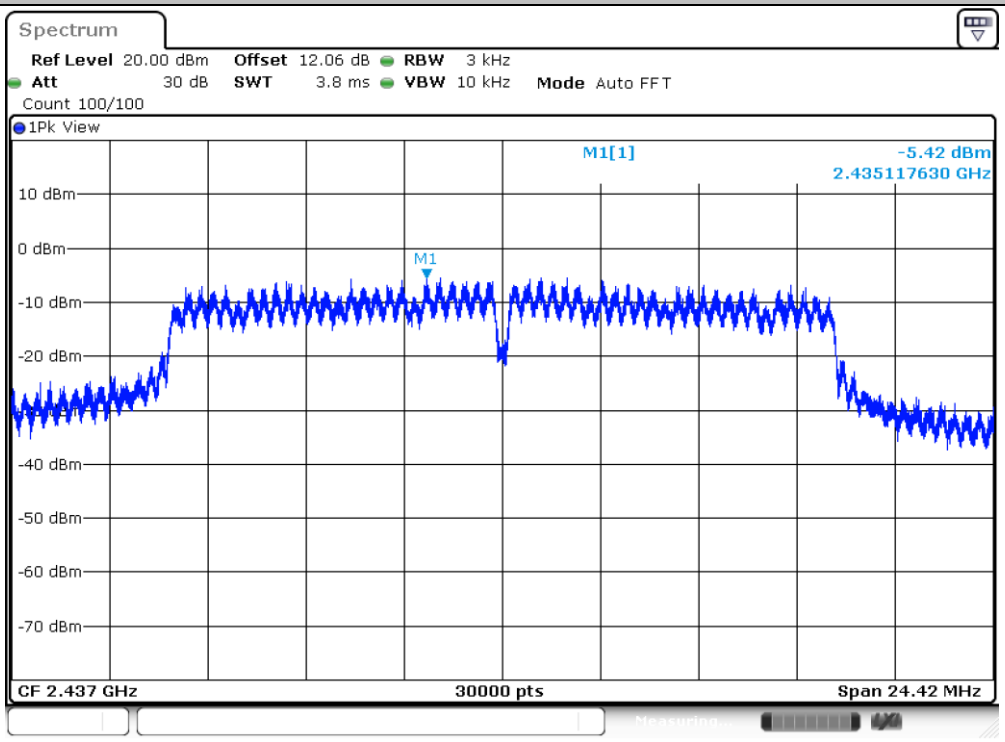
Date: 29.DEC.2024 21:08:20

11G_Ant3_2412

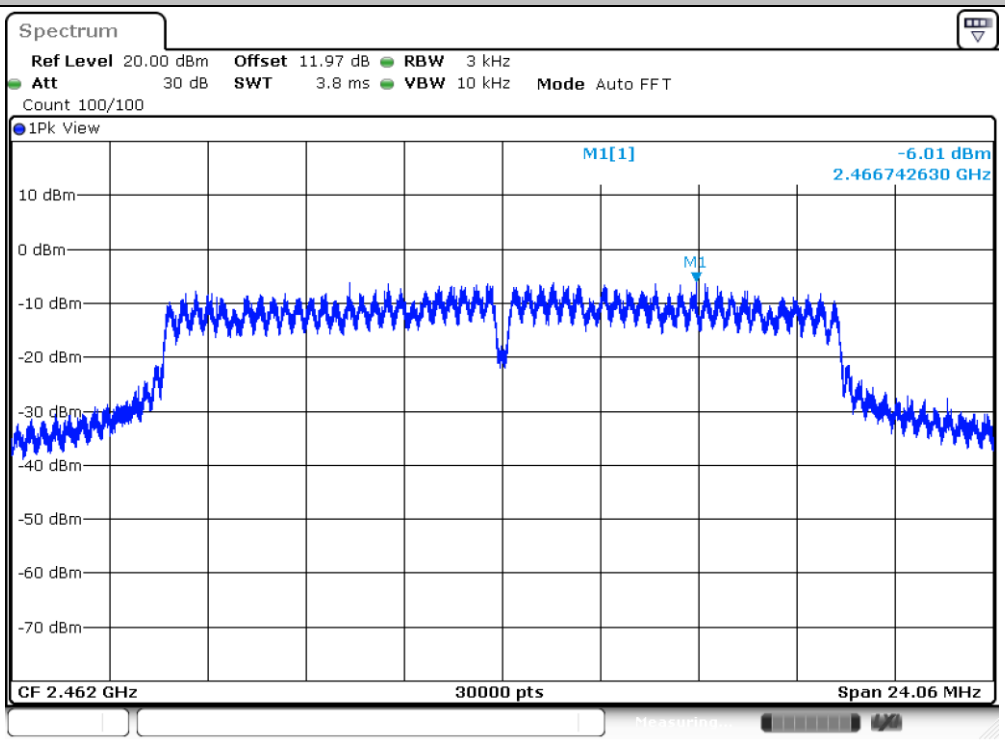


Date: 29.DEC.2024 21:11:07

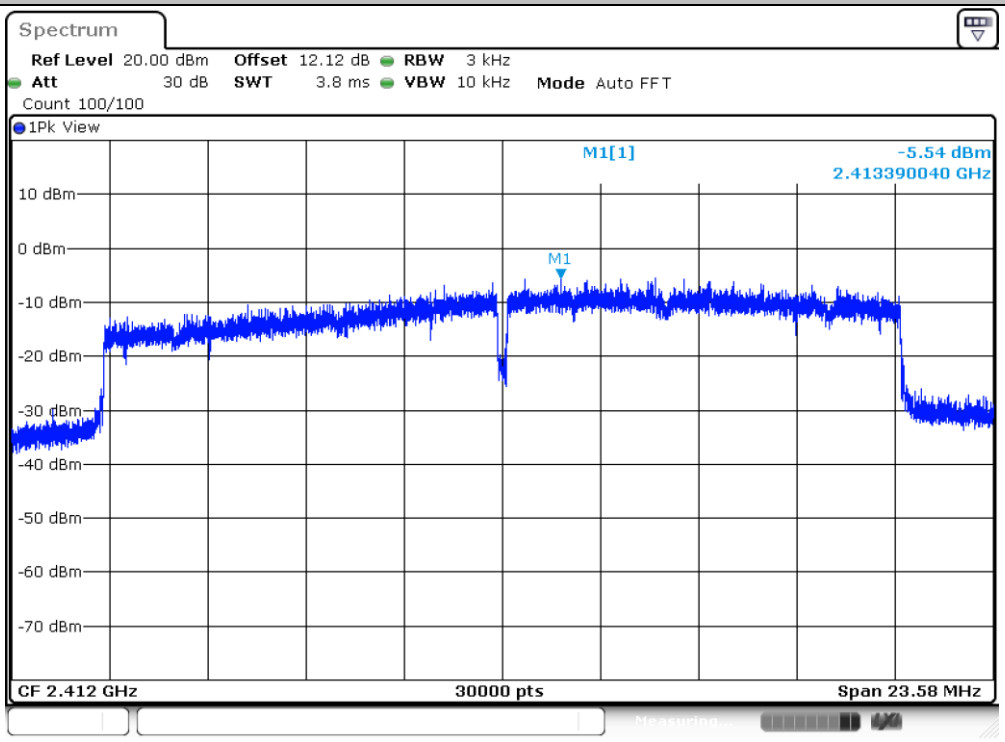
11G_Ant3_2437



11G_Ant3_2462

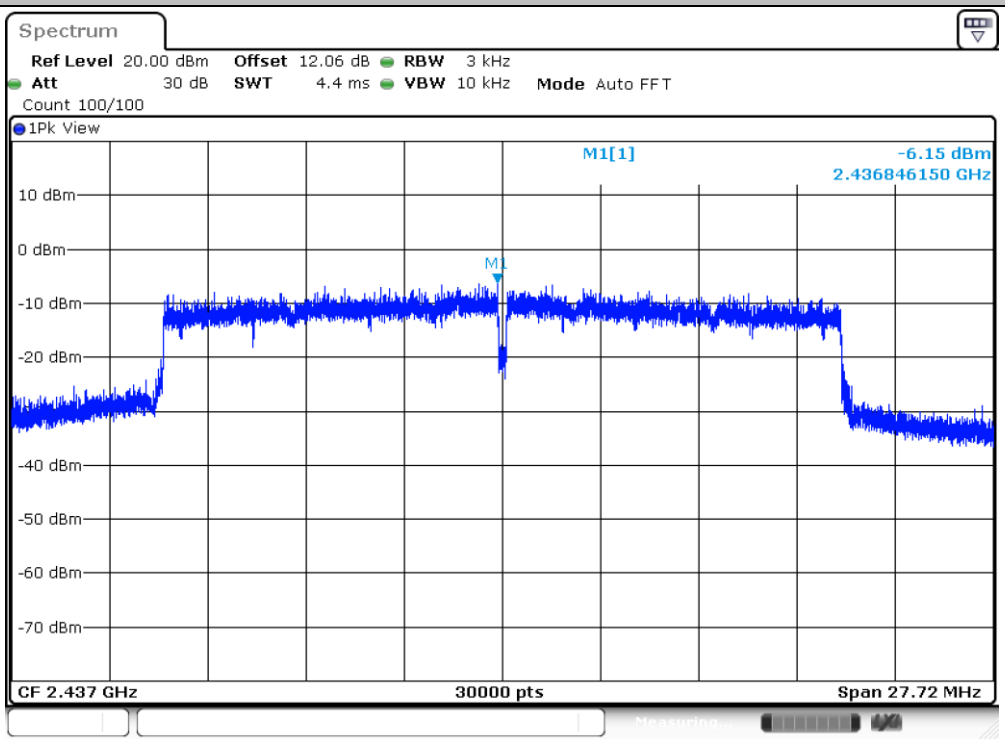


11AX20SISO_Ant3_2412



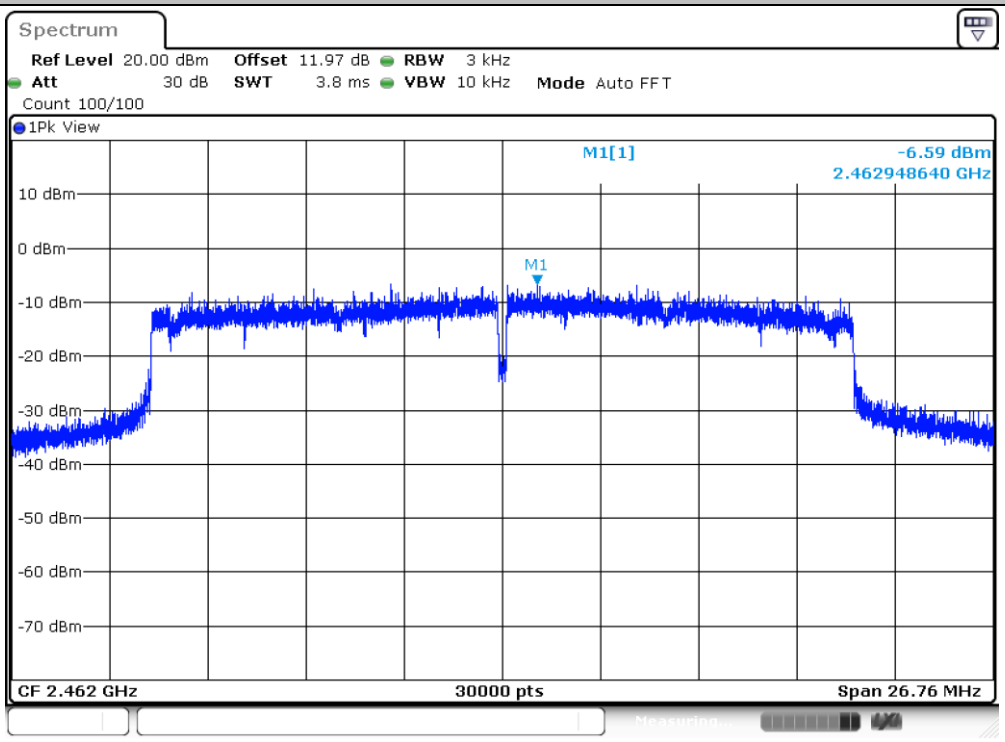
Date: 29.DEC.2024 21:34:45

11AX20SISO_Ant3_2437



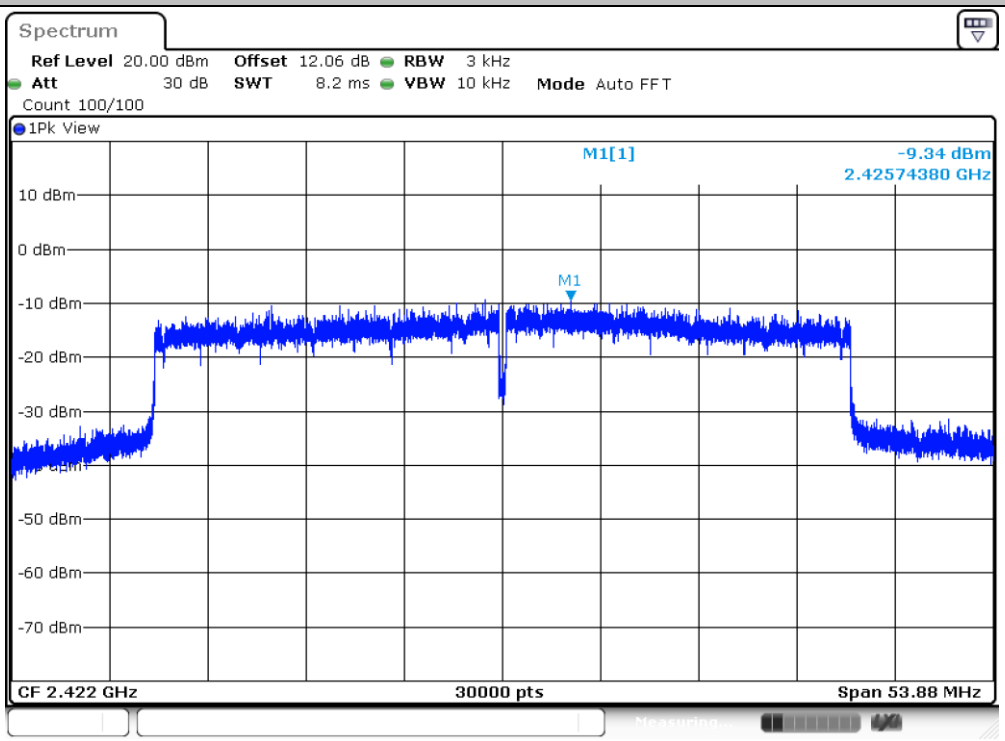
Date: 29.DEC.2024 21:40:35

11AX20SISO_Ant3_2462



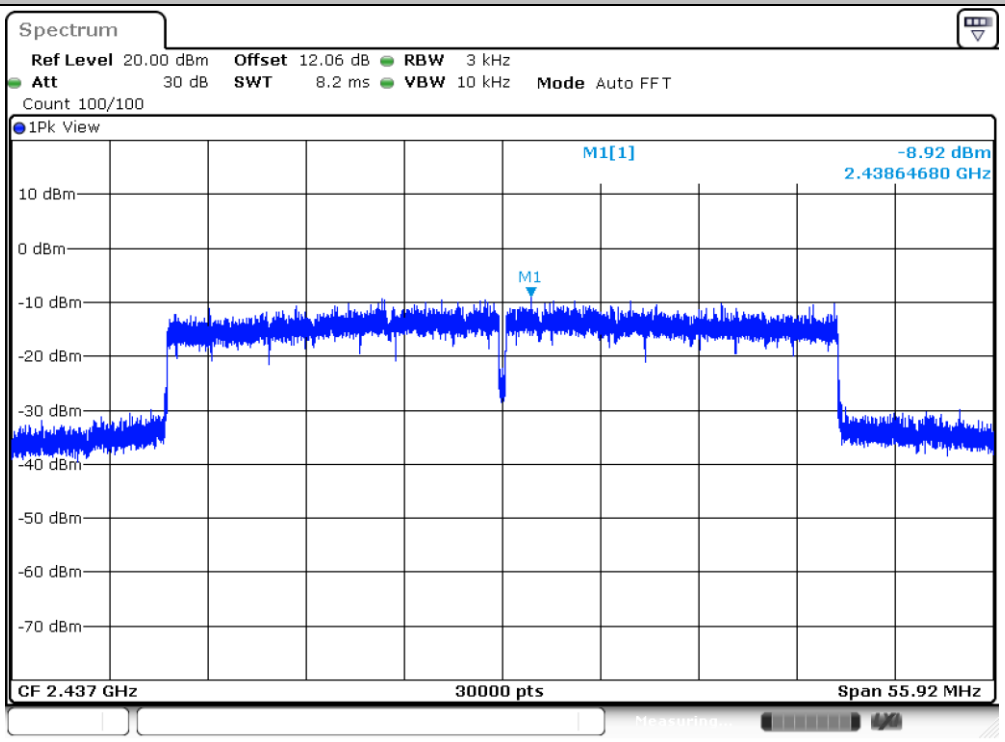
Date: 29.DEC.2024 21:45:13

11AX40SISO_Ant3_2422



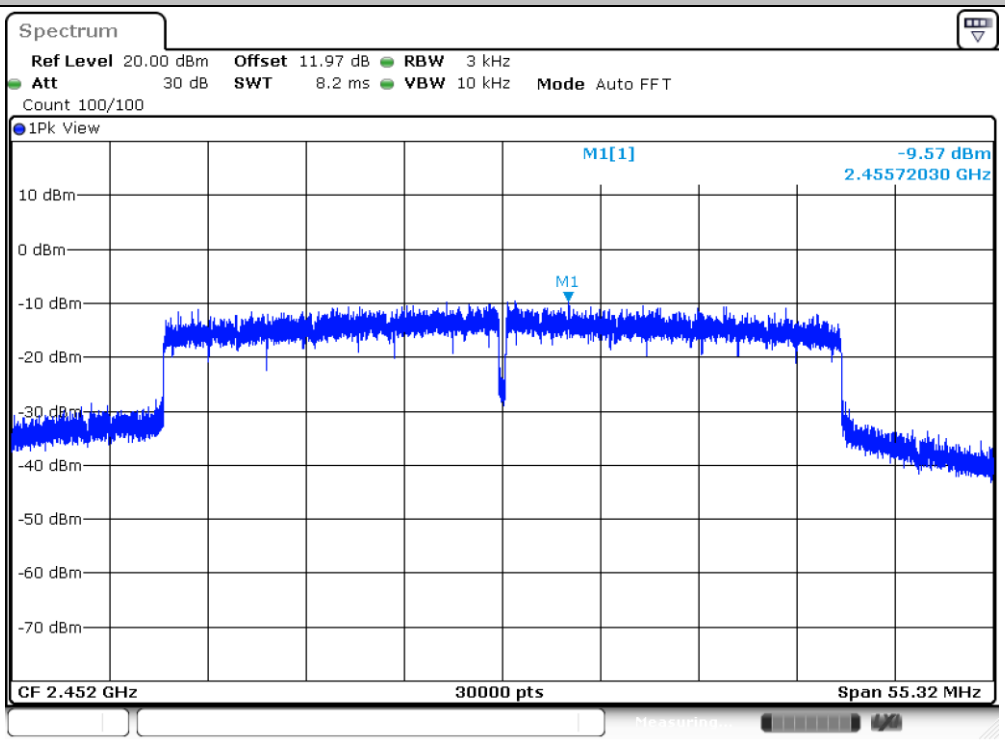
Date: 29.DEC.2024 22:01:03

11AX40SISO_Ant3_2437



Date: 29.DEC.2024 22:02:25

11AX40SISO_Ant3_2452



Date: 29.DEC.2024 22:06:17

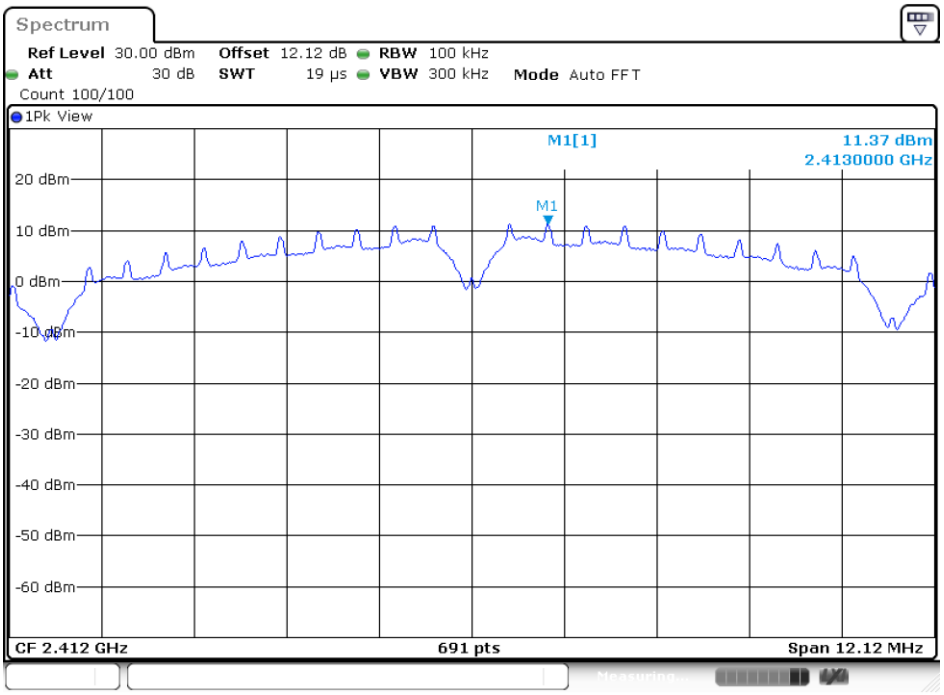
Reference level measurement

Test Result

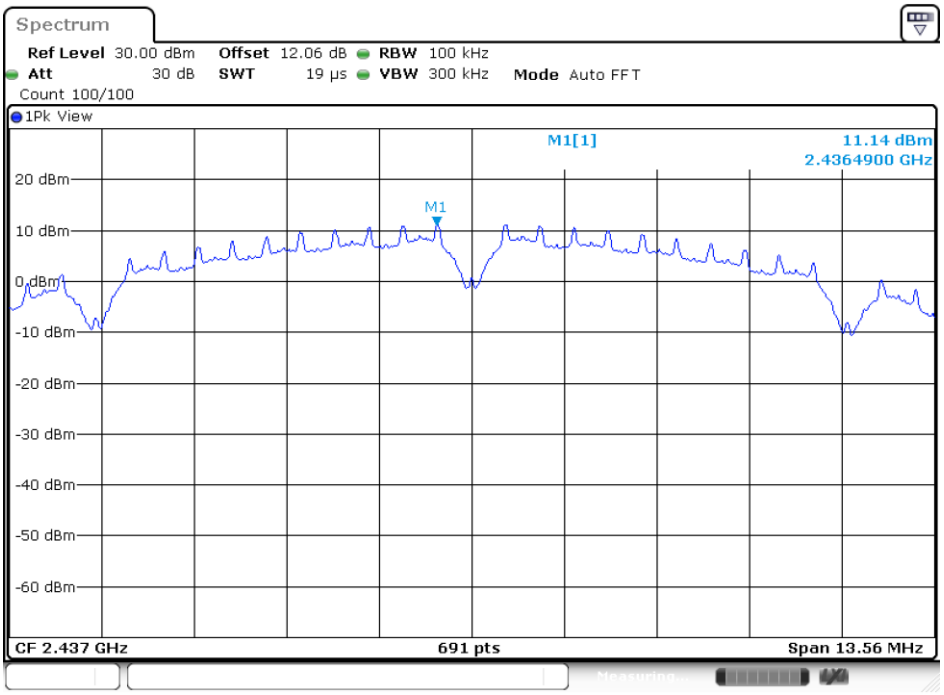
TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm/100KHz]
11B	Ant3	2412	2413.00	11.37
		2437	2436.49	11.14
		2462	2462.50	10.47
11G	Ant3	2412	2414.48	9.42
		2437	2438.24	8.56
		2462	2463.25	8.32
11AX20SISO	Ant3	2412	2414.49	9.33
		2437	2438.24	8.37
		2462	2463.24	8.24
11AX40SISO	Ant3	2422	2426.99	5.99
		2437	2440.72	5.50
		2452	2455.76	5.34

Test Graphs

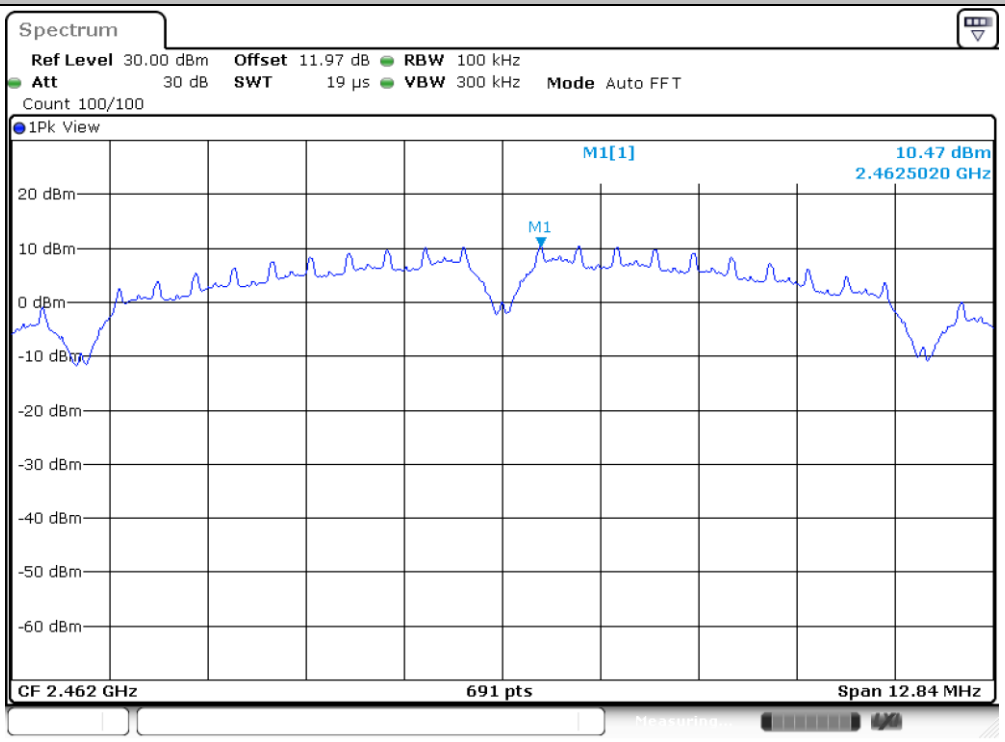
11B_Ant3_2412



11B_Ant3_2437

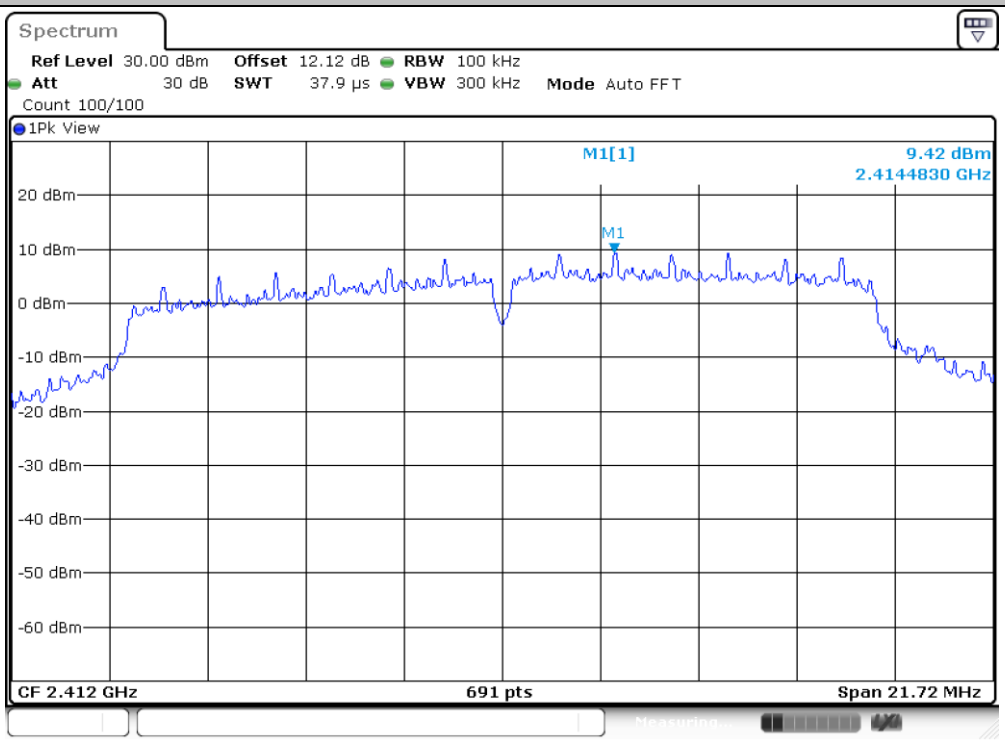


11B_Ant3_2462



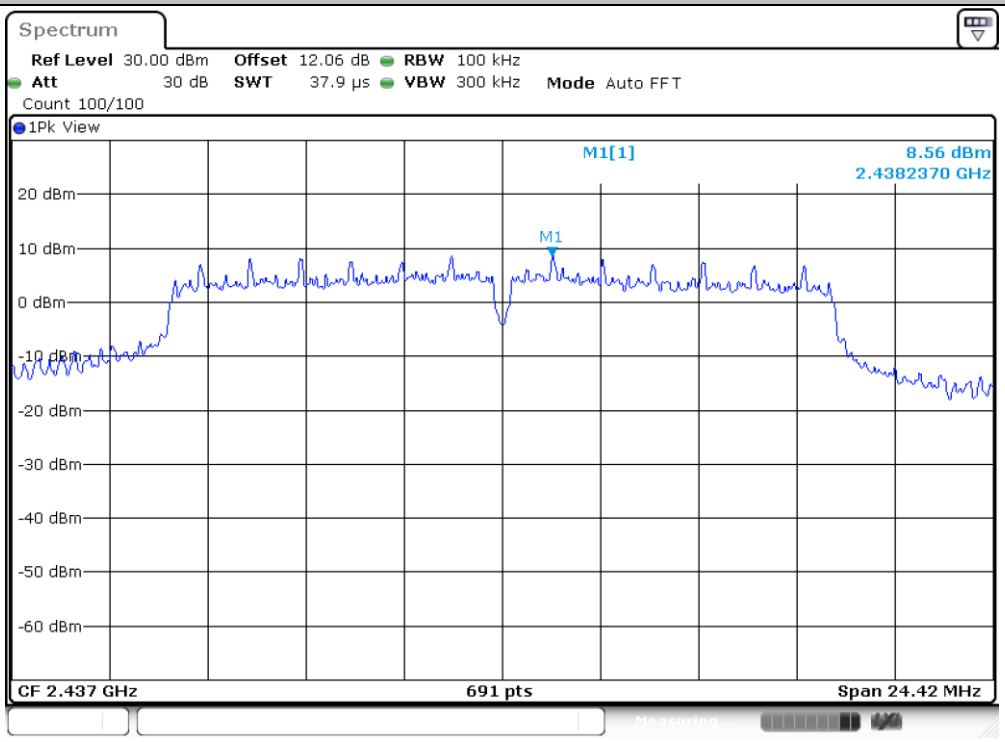
Date: 29.DEC.2024 21:08:29

11G_Ant3_2412



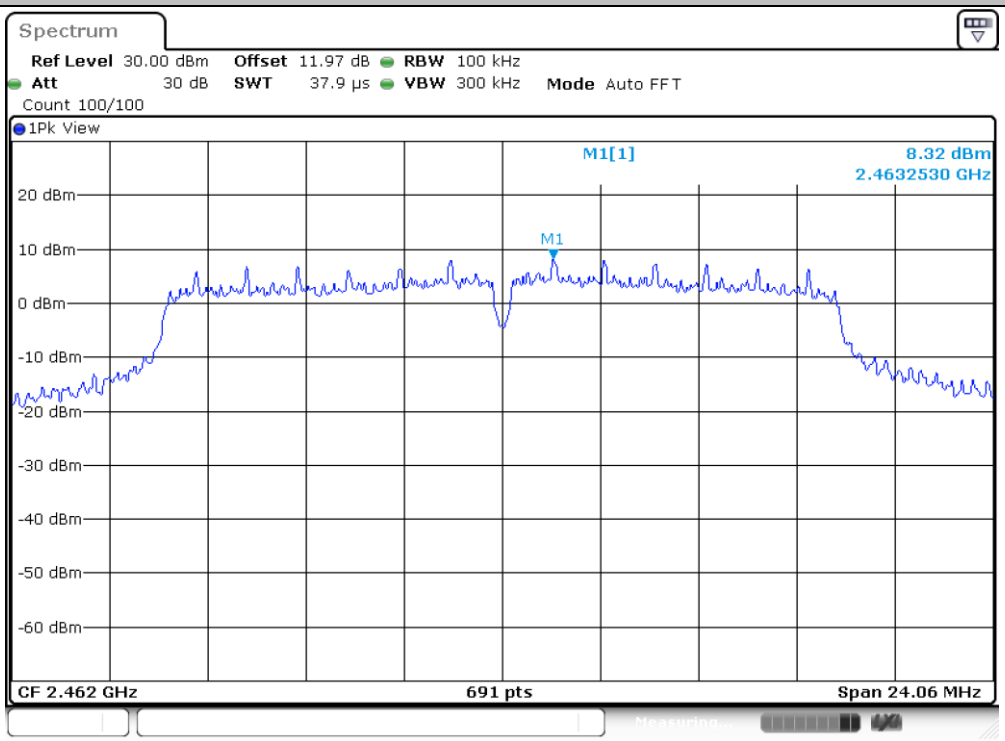
Date: 29.DEC.2024 21:11:15

11G_Ant3_2437



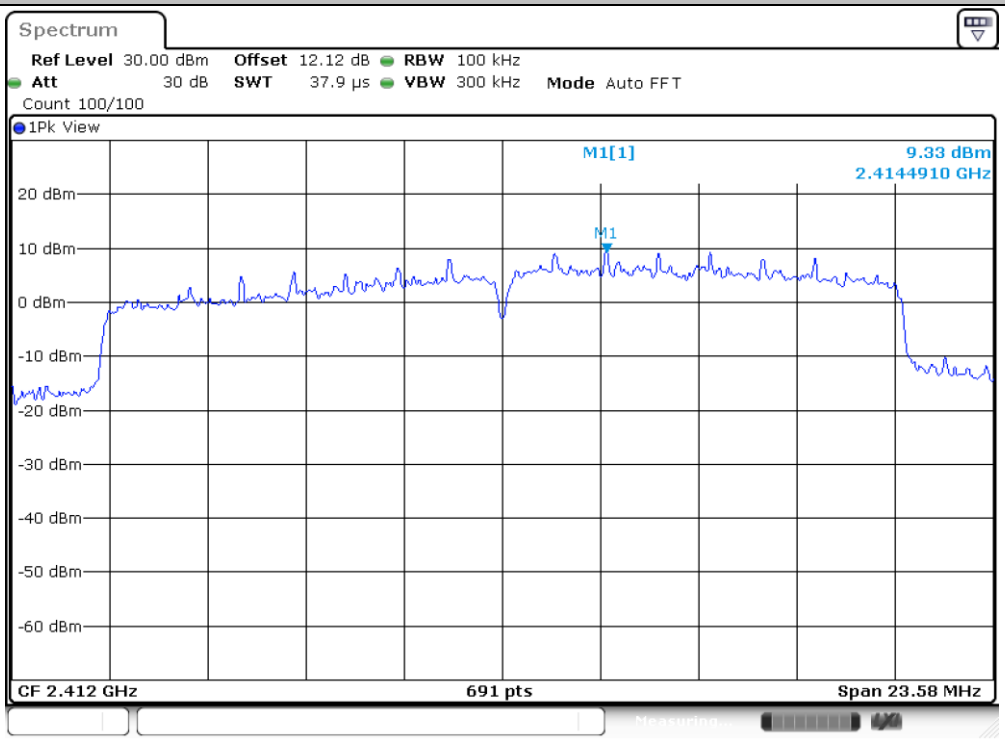
Date: 29.DEC.2024 21:21:07

11G_Ant3_2462



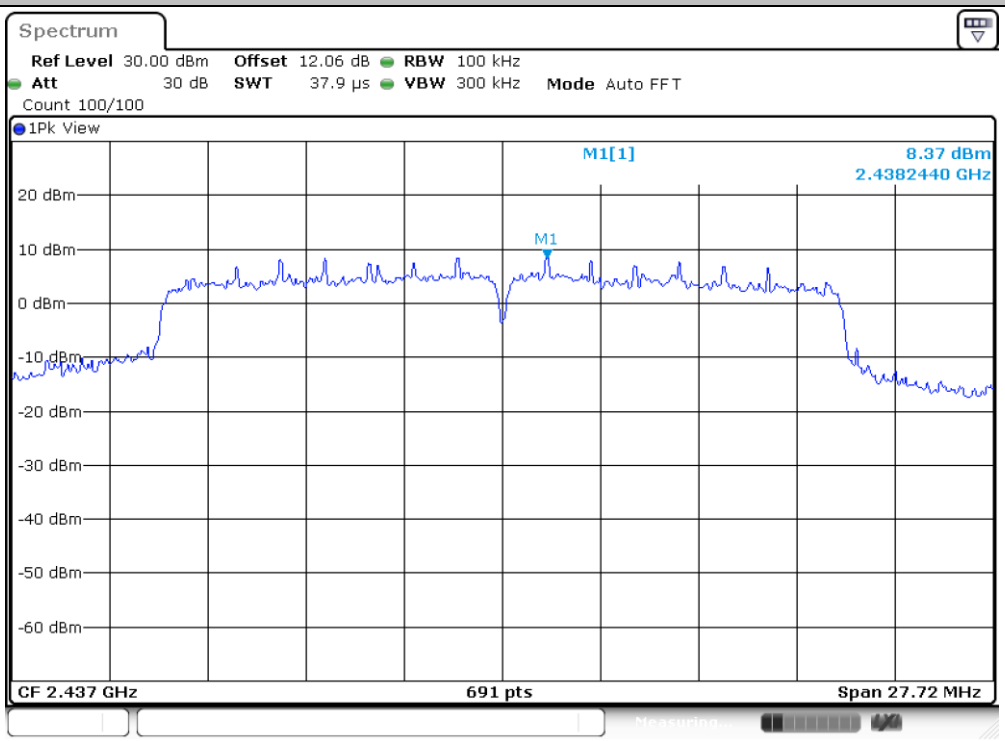
Date: 29.DEC.2024 21:26:17

11AX20SISO_Ant3_2412



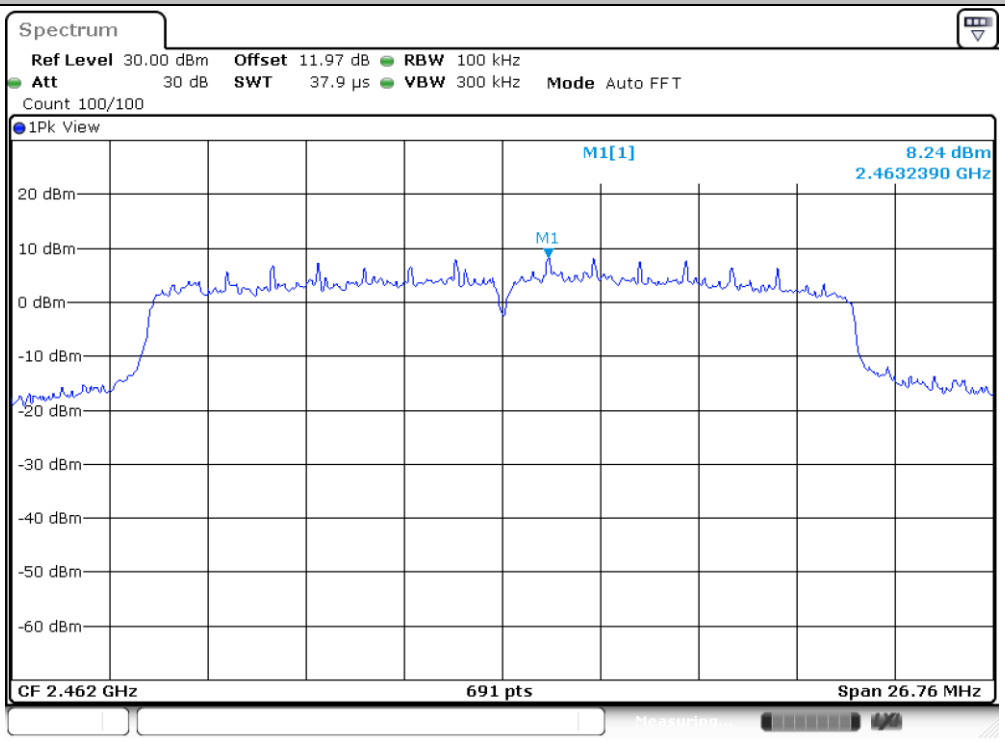
Date: 29.DEC.2024 21:34:54

11AX20SISO_Ant3_2437



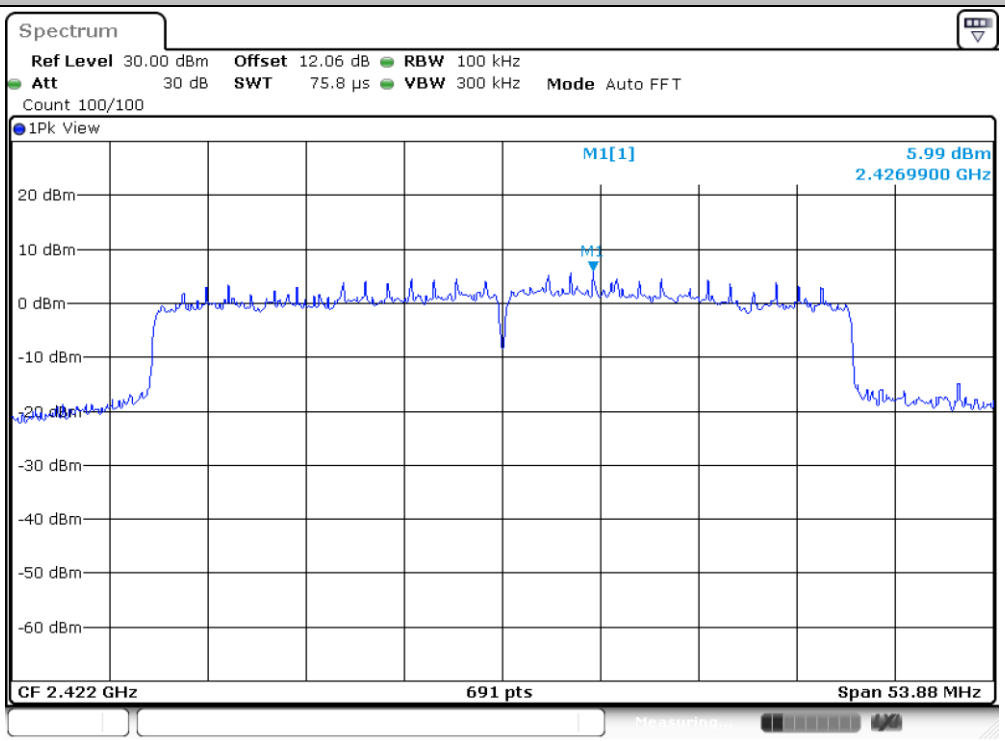
Date: 29.DEC.2024 21:40:44

11AX20SISO_Ant3_2462



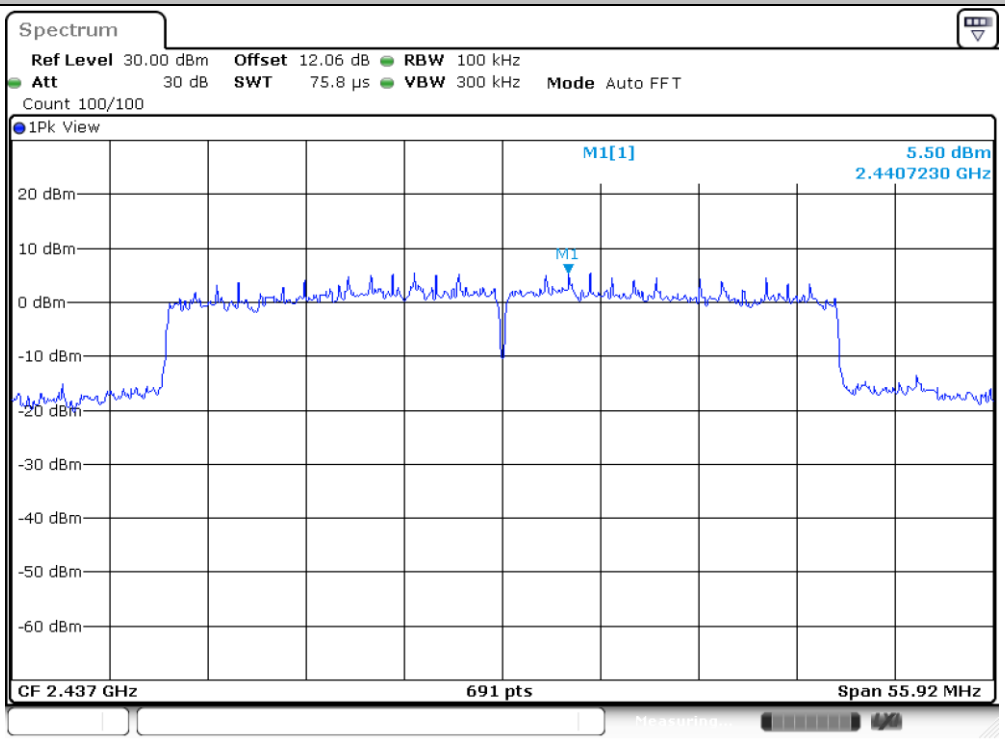
Date: 29.DEC.2024 21:45:21

11AX40SISO_Ant3_2422



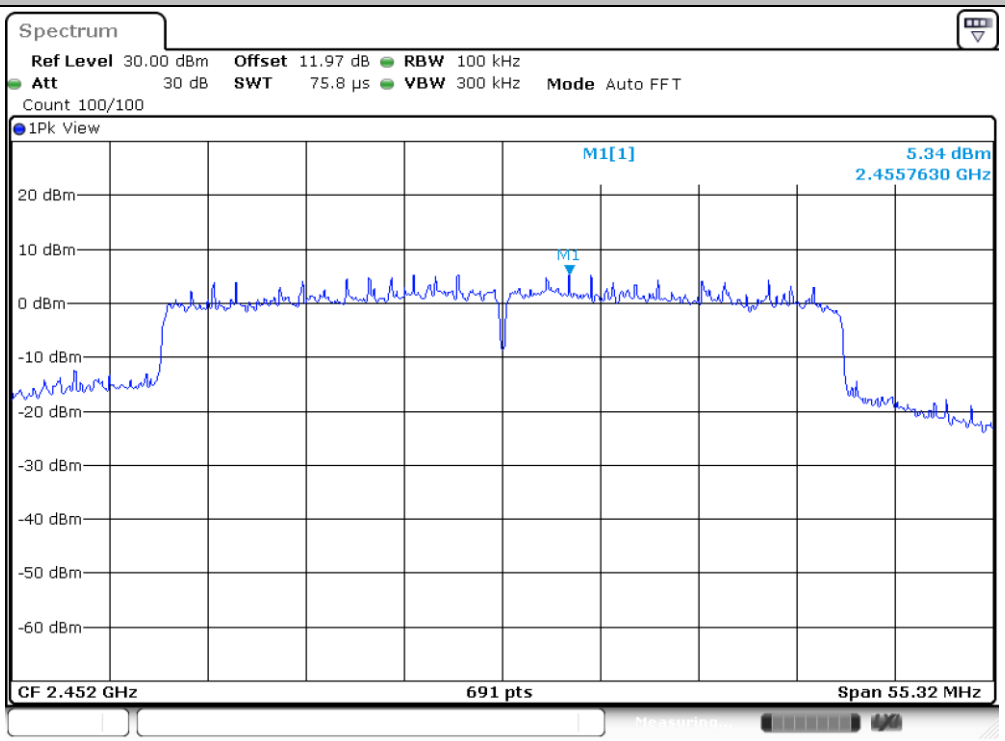
Date: 29.DEC.2024 22:01:12

11AX40SISO_Ant3_2437



Date: 29.DEC.2024 22:02:33

11AX40SISO_Ant3_2452



Date: 29.DEC.2024 22:06:26

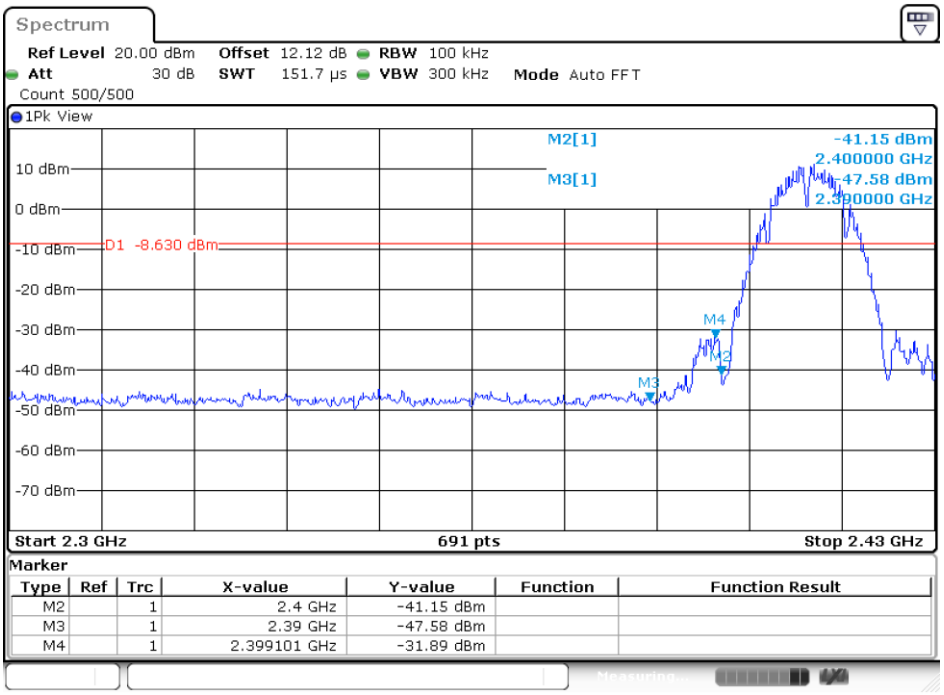
Band edge measurements

Test Result

TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm/100KHz]	Result[dBm/100KHz]	Limit[dBm/100KHz]	Verdict
11B	Ant3	Low	2412	11.37	-31.89	≤-8.63	PASS
		High	2462	10.47	-43.93	≤-9.53	PASS
11G	Ant3	Low	2412	9.42	-18.74	≤-10.58	PASS
		High	2462	8.32	-28.27	≤-11.68	PASS
11AX20SISO	Ant3	Low	2412	9.33	-14.78	≤-10.67	PASS
		High	2462	8.24	-24.25	≤-11.76	PASS
11AX40SISO	Ant3	Low	2422	5.99	-18.48	≤-14.01	PASS
		High	2452	5.34	-17.51	≤-14.66	PASS

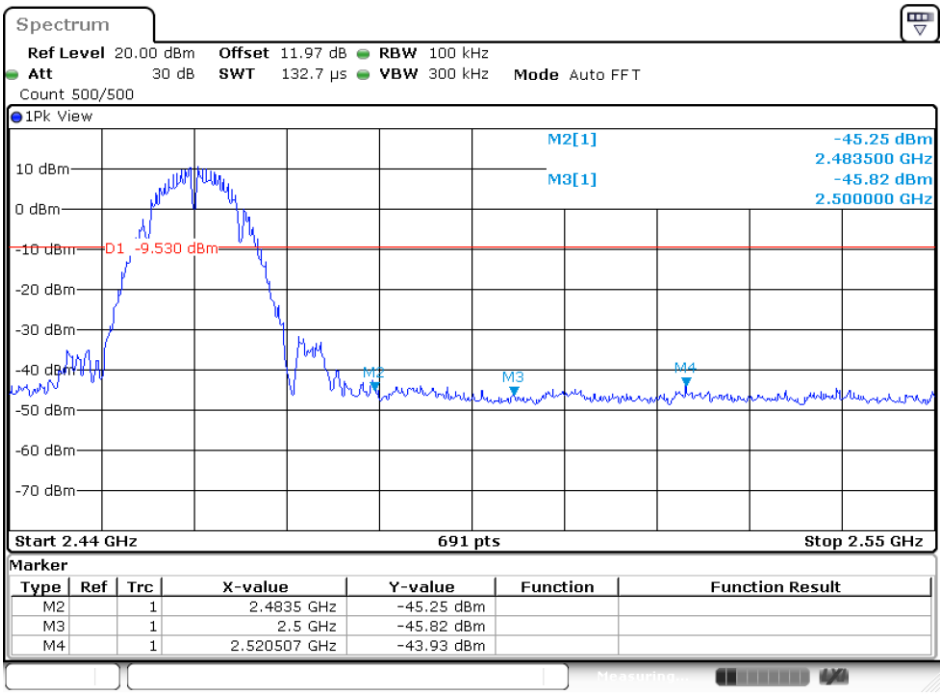
Test Graphs

11B_Ant3_Low_2412



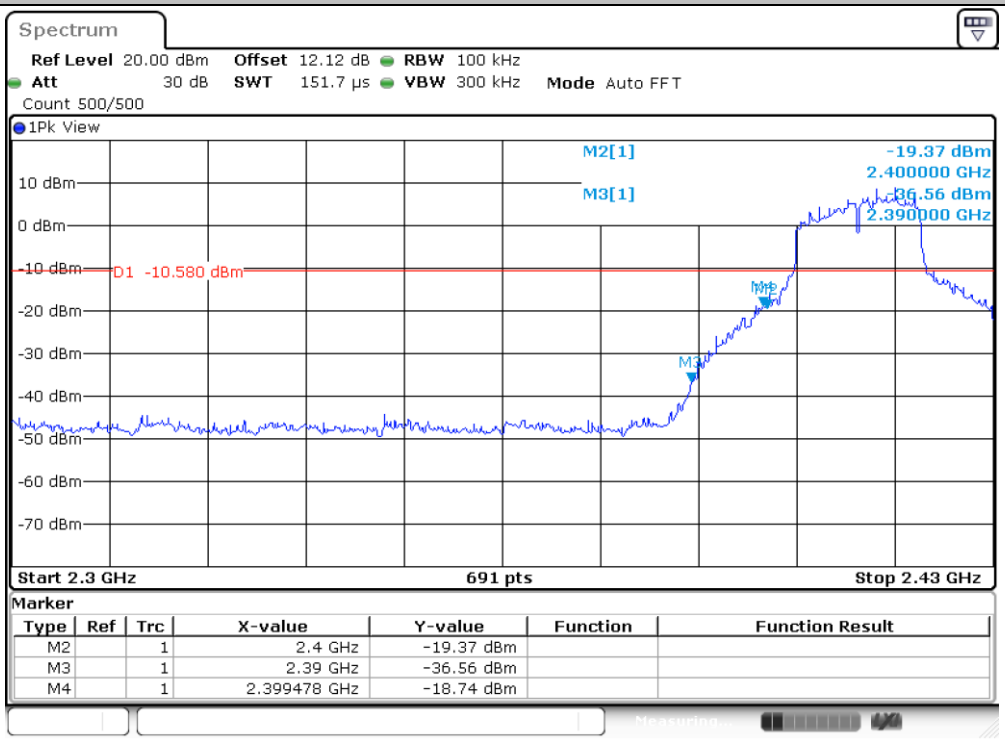
Date: 29.DEC.2024 21:02:48

11B_Ant3_High_2462



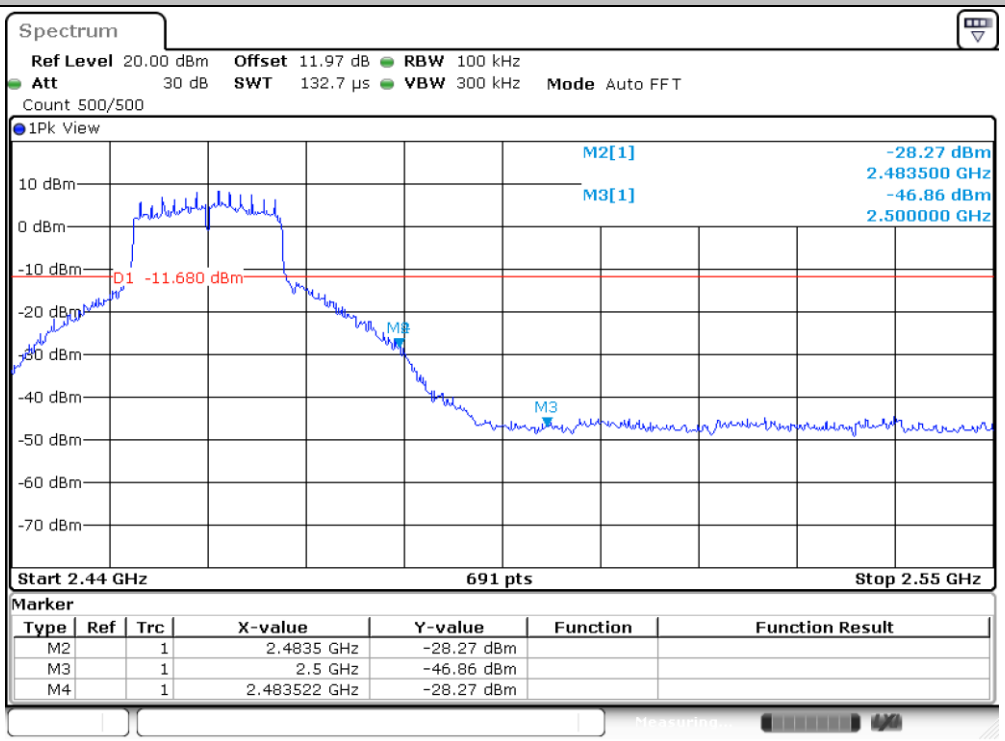
Date: 29.DEC.2024 21:08:38

11G_Ant3_Low_2412



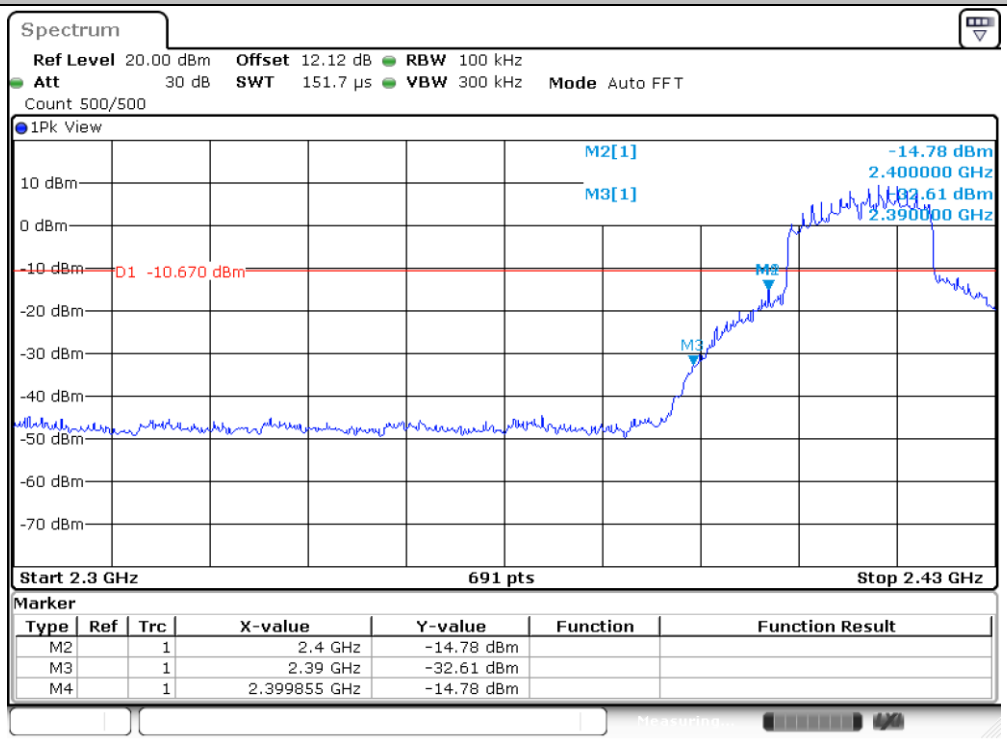
Date: 29.DEC.2024 21:11:25

11G_Ant3_High_2462



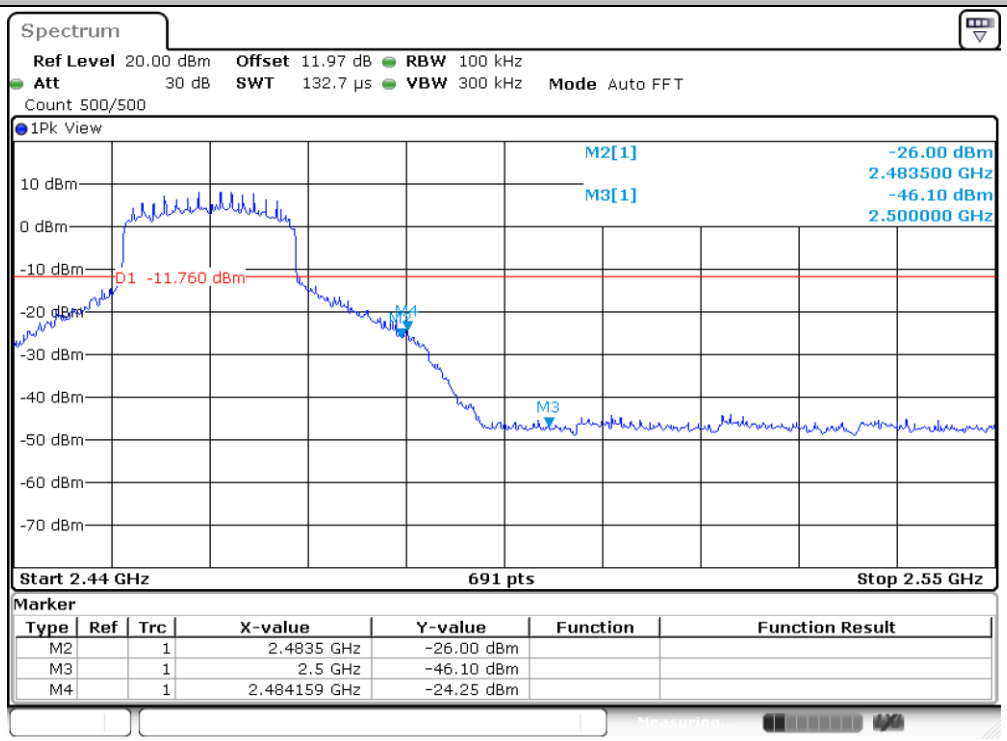
Date: 29.DEC.2024 21:26:26

11AX20SISO_Ant3_Low_2412



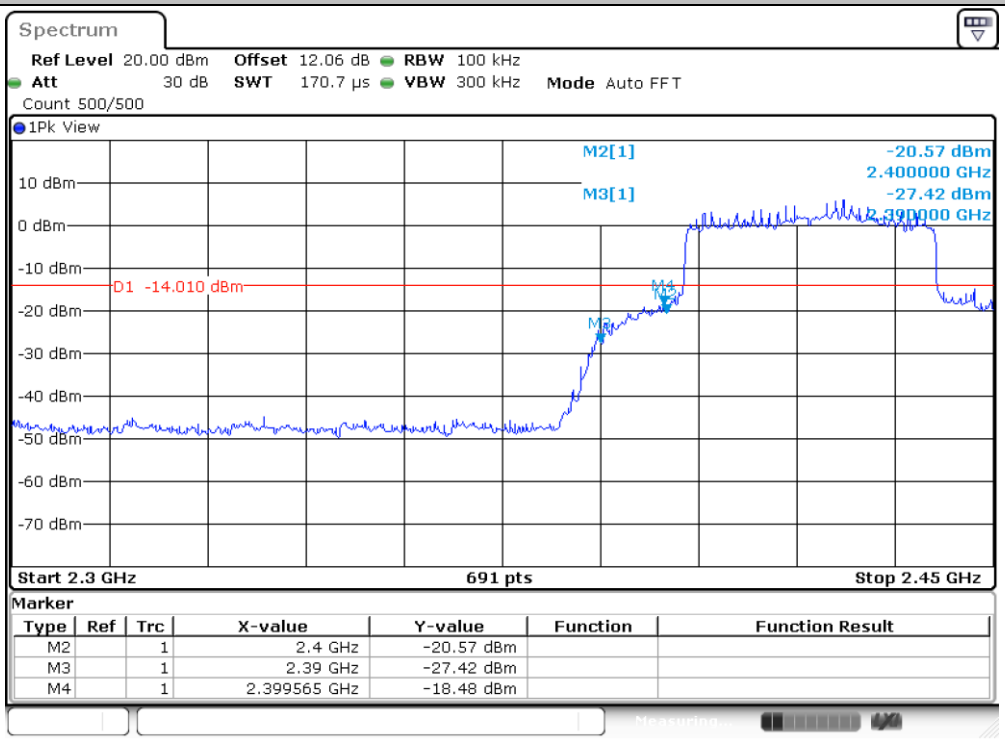
Date: 29.DEC.2024 21:35:03

11AX20SISO_Ant3_High_2462



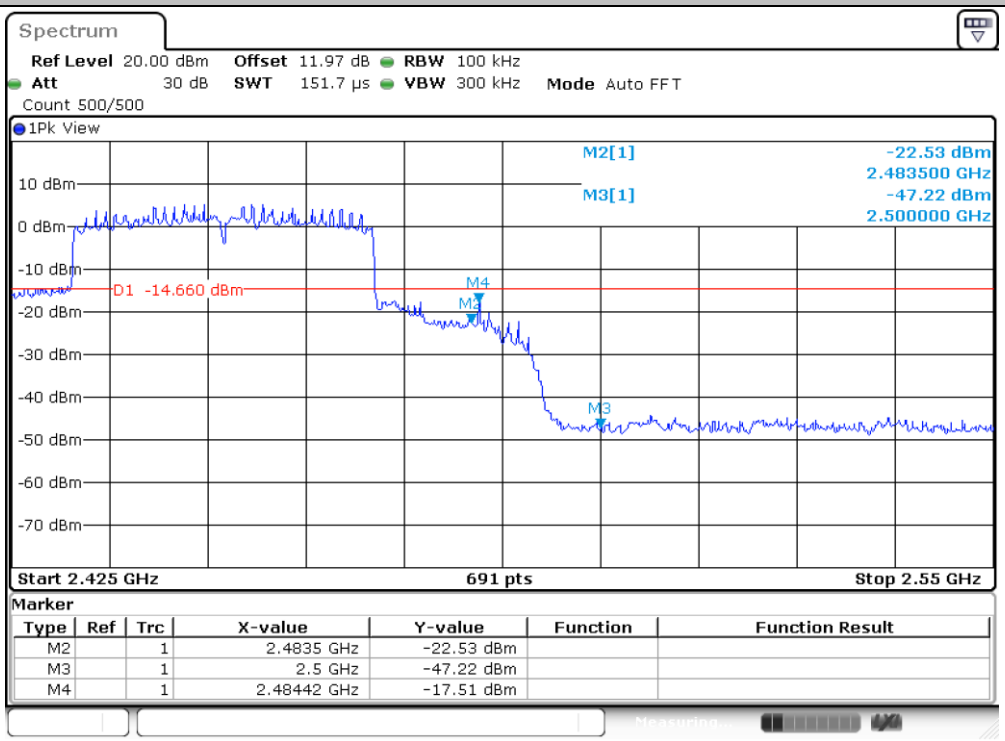
Date: 29.DEC.2024 21:45:31

11AX40SISO_Ant3_Low_2422



Date: 29.DEC.2024 22:01:21

11AX40SISO_Ant3_High_2452



Date: 29.DEC.2024 22:06:35

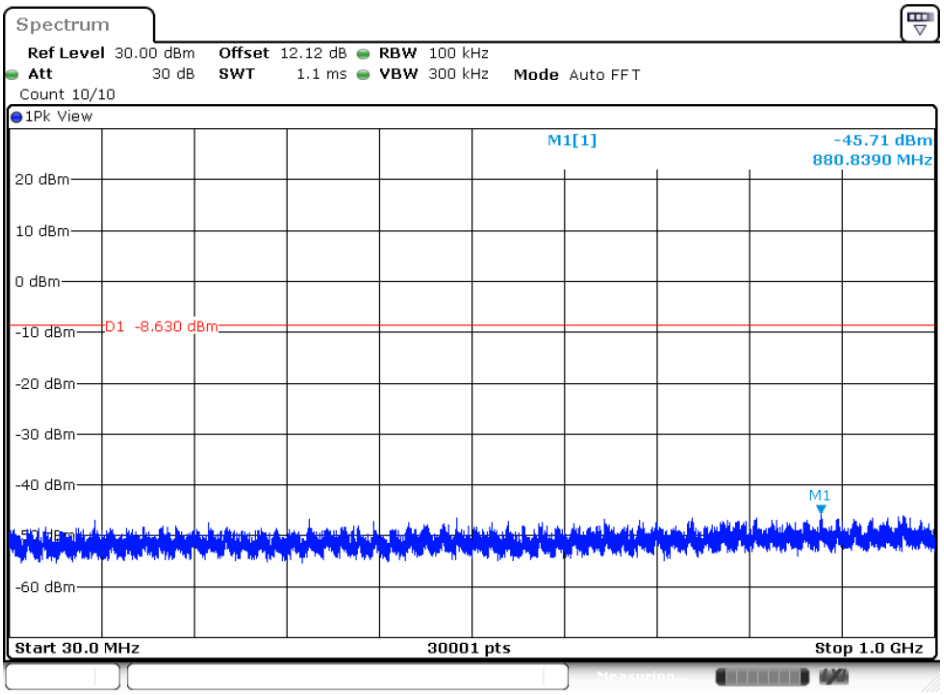
Conducted Spurious Emission

Test Result

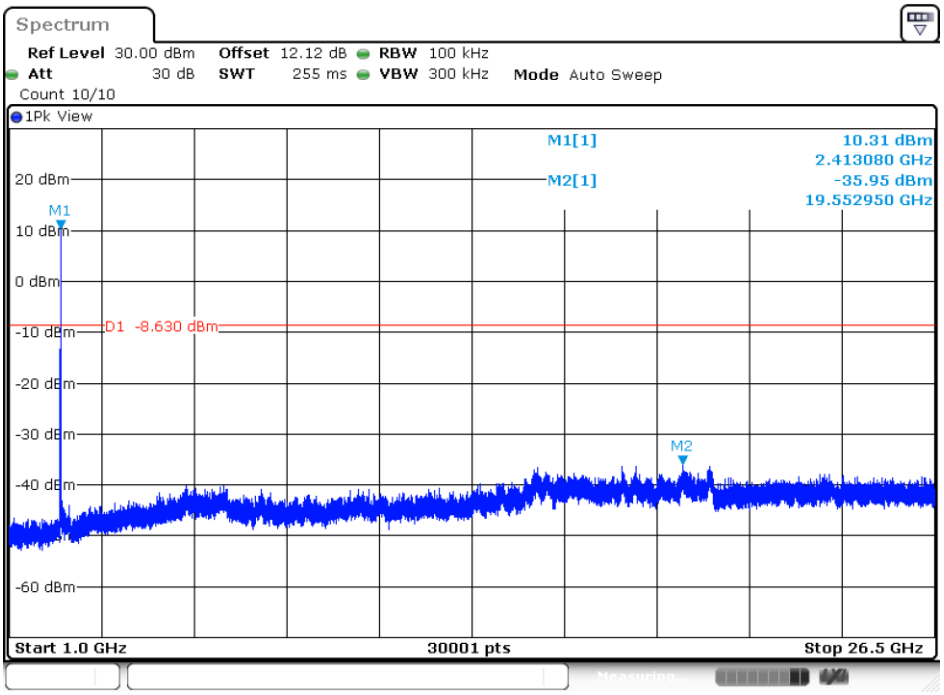
TestMode	Antenna	Freq(MHz)	FreqRange [Mhz]	RefLevel [dBm/100KHz]	Result [dBm/100KHz]	Limit [dBm/100KHz]	Verdict
11B	Ant3	2412	30~1000	11.37	-45.71	≤-8.63	PASS
			1000~26500	11.37	-35.95	≤-8.63	PASS
		2437	30~1000	11.14	-46.34	≤-8.86	PASS
			1000~26500	11.14	-35.97	≤-8.86	PASS
		2462	30~1000	10.47	-45.93	≤-9.53	PASS
			1000~26500	10.47	-36.83	≤-9.53	PASS
11G	Ant3	2412	30~1000	9.42	-45.36	≤-10.58	PASS
			1000~26500	9.42	-35.24	≤-10.58	PASS
		2437	30~1000	8.56	-46.04	≤-11.44	PASS
			1000~26500	8.56	-34.62	≤-11.44	PASS
		2462	30~1000	8.32	-45.47	≤-11.68	PASS
			1000~26500	8.32	-35.08	≤-11.68	PASS
11AX20SISO	Ant3	2412	30~1000	9.33	-45.46	≤-10.67	PASS
			1000~26500	9.33	-35.49	≤-10.67	PASS
		2437	30~1000	8.37	-45.8	≤-11.63	PASS
			1000~26500	8.37	-35.5	≤-11.63	PASS
		2462	30~1000	8.24	-45.49	≤-11.76	PASS
			1000~26500	8.24	-34.78	≤-11.76	PASS
11AX40SISO	Ant3	2422	30~1000	5.99	-45.33	≤-14.01	PASS
			1000~26500	5.99	-36.3	≤-14.01	PASS
		2437	30~1000	5.50	-45.98	≤-14.5	PASS
			1000~26500	5.50	-35.99	≤-14.5	PASS
		2452	30~1000	5.34	-45.5	≤-14.66	PASS
			1000~26500	5.34	-35.61	≤-14.66	PASS

Test Graphs

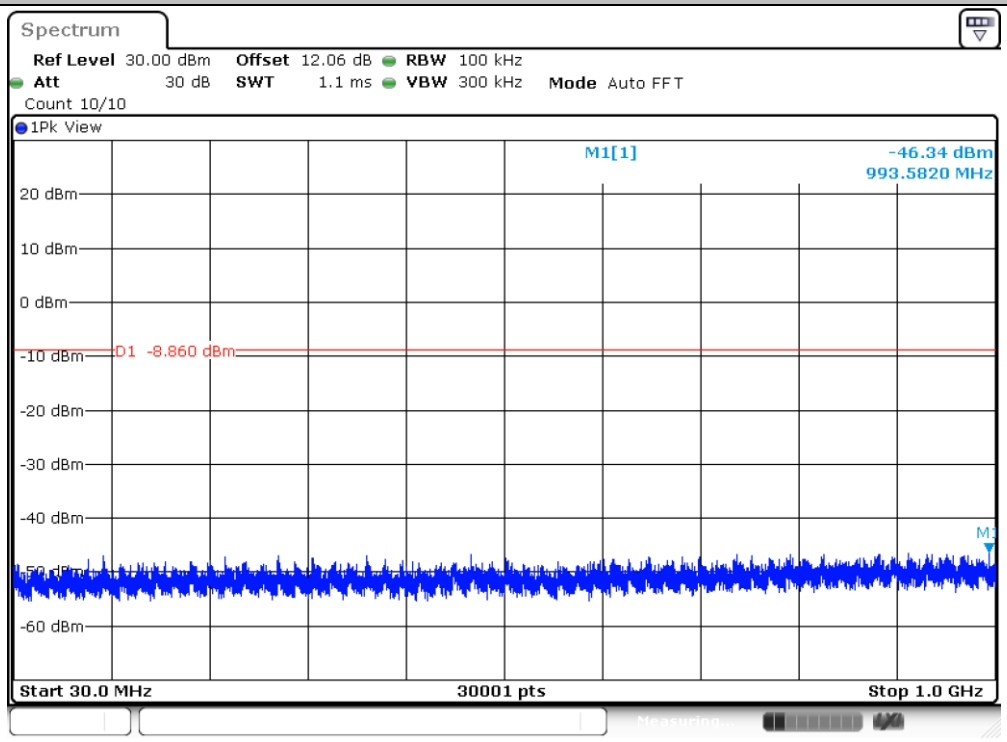
11B_Ant3_2412_30~1000



11B_Ant3_2412_1000~26500

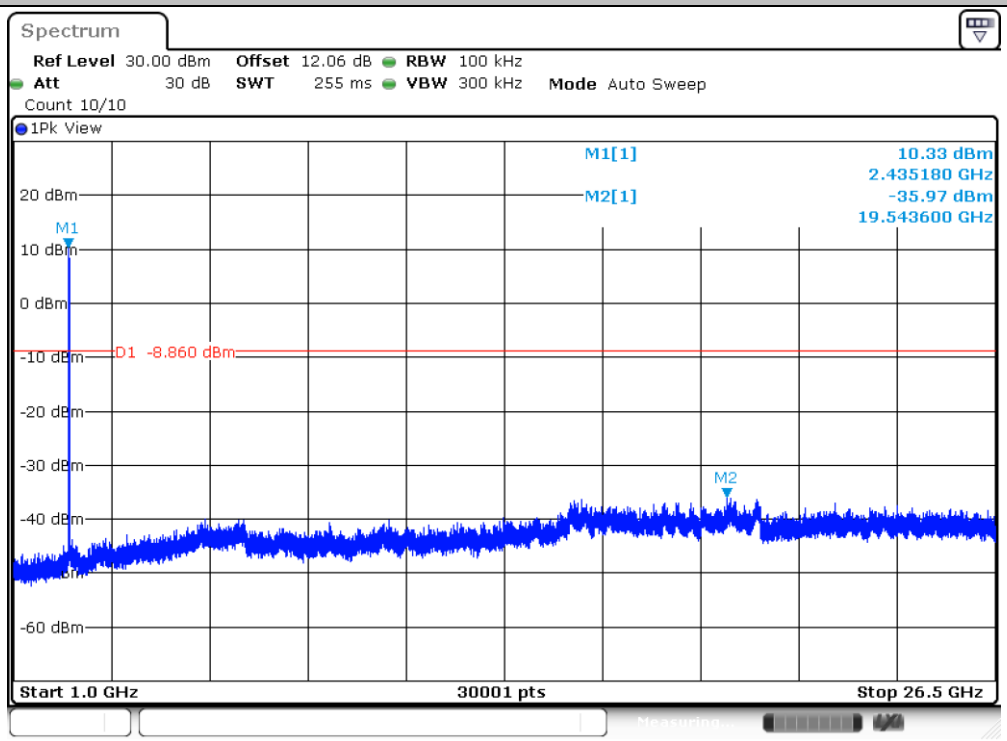


11B_Ant3_2437_30~1000



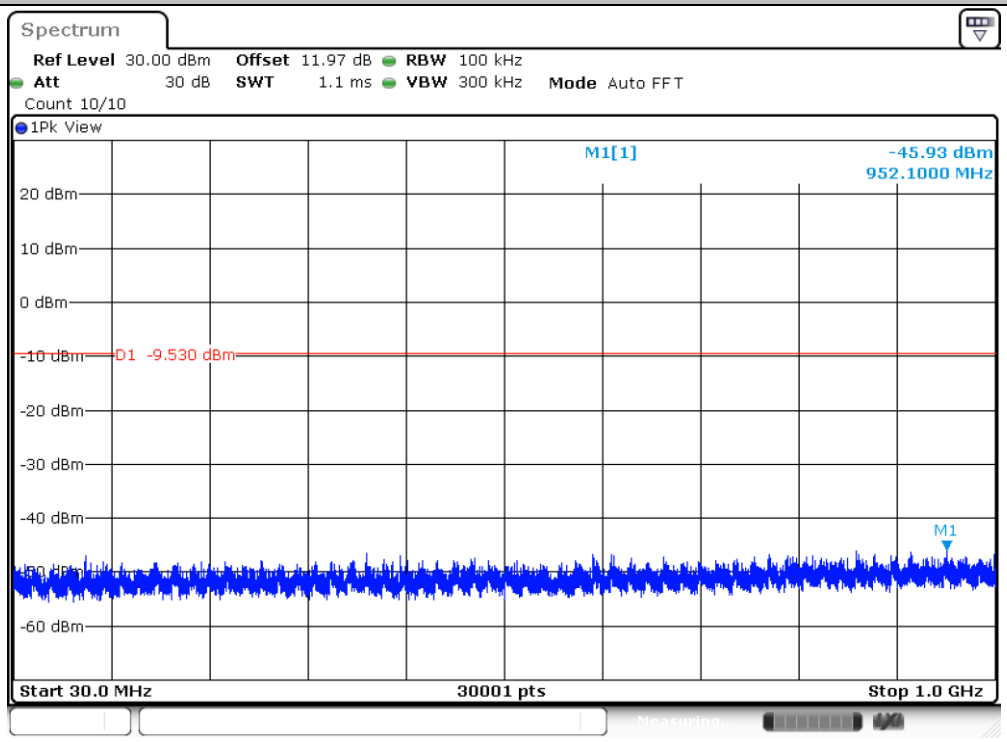
Date: 29.DEC.2024 21:07:13

11B_Ant3_2437_1000~26500



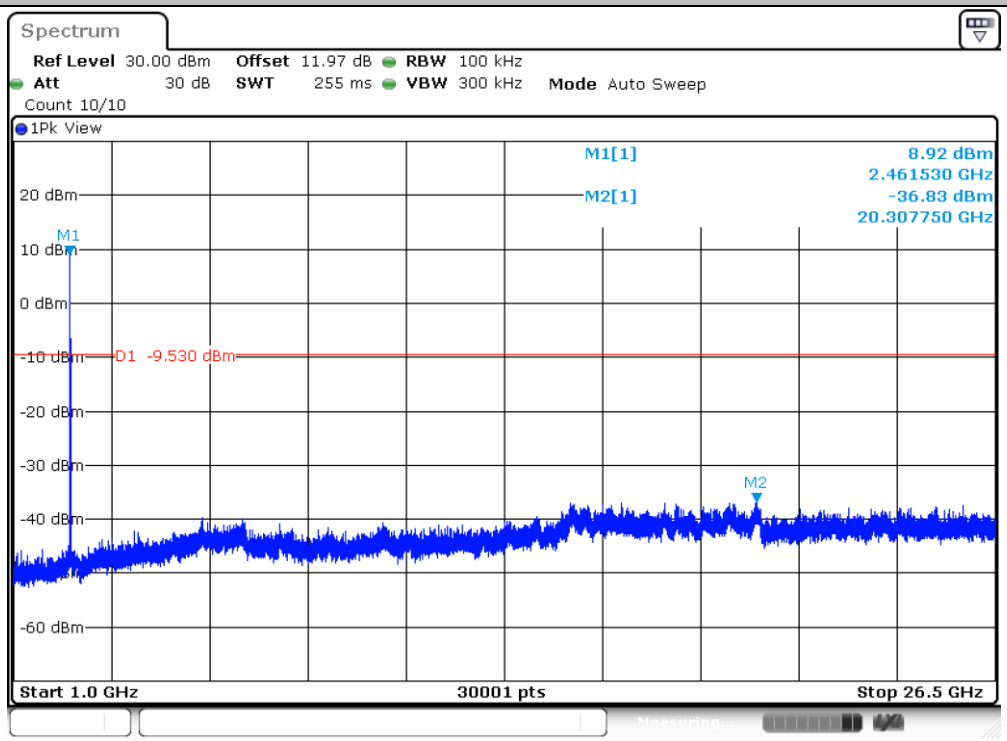
Date: 29.DEC.2024 21:07:43

11B_Ant3_2462_30~1000



Date: 29.DEC.2024 21:08:48

11B_Ant3_2462_1000~26500



Date: 29.DEC.2024 21:09:10