FCC RF Test Report

APPLICANT	:	Amazon.com Services LLC
EQUIPMENT	:	Electronic Display Device
MODEL NAME	:	SA569P
FCC ID	:	2A4DH-5698
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Jan. 02, 2024 ~ May 16, 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.

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. CONDUCTED TEST RESULTS

APPENDIX B. AC CONDUCTED EMISSION TEST RESULT

APPENDIX C. RADIATED SPURIOUS EMISSION

APPENDIX D. DUTY CYCLE PLOTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR391903-01C	Rev. 01	Initial issue of report	Mar. 08, 2024
FR391903-01C	Rev. 02	1. Updated Conducted Power and PSD of 802.11b Channel13. 2. Updated the equipment list.	May 18, 2024
FR391903-01C	Rev. 03	Updated section 3.3.3 PSD Test Procedures to RMS detector test method.	Jun. 18, 2024
FR391903-01C	Rev. 04	Updated model name	Jul. 03, 2024

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	≤ 30dBc	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 3.12 dB at 2485.80 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 20.21 dB at 0.537 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

Amazon.com Services LLC
410 Terry Avenue N Seattle, WA 98109-5210 United States

1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Electronic Display Device
Model Name	SA569P
FCC ID	2A4DH-5698
SN Code	Conducted: PN43LB0134850405 Conduction: GN433W0435050018 Radiation: GN433W0435050037

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.3 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2472 MHz
Maximum Output Power to antenna	802.11b : 16.68 dBm (0.0466 W) 802.11g : 14.96 dBm (0.0313 W) 802.11n HT20 : 14.38 dBm (0.0274 W)
99% Occupied Bandwidth	802.11b : 12.987MHz 802.11g : 17.263MHz 802.11n HT20 : 18.102MHz
Antenna Type / Gain	PCB IFA Antenna type with gain 4 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.4 Modification of EUT

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

1.5 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

1.6 Test Software

Item	Site	Manufacturer	Name	Version
1.	TH01-KS	Tonscend	JS1120-3 test system China_210602	3.3.10
2.	03CH08-KS	AUDIX	E3	210616
3.	CO01-KS	AUDIX	E3	6.2009-8-24

1.7 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.

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	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472
	7	2442	-	-

2.2 Test Mode

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

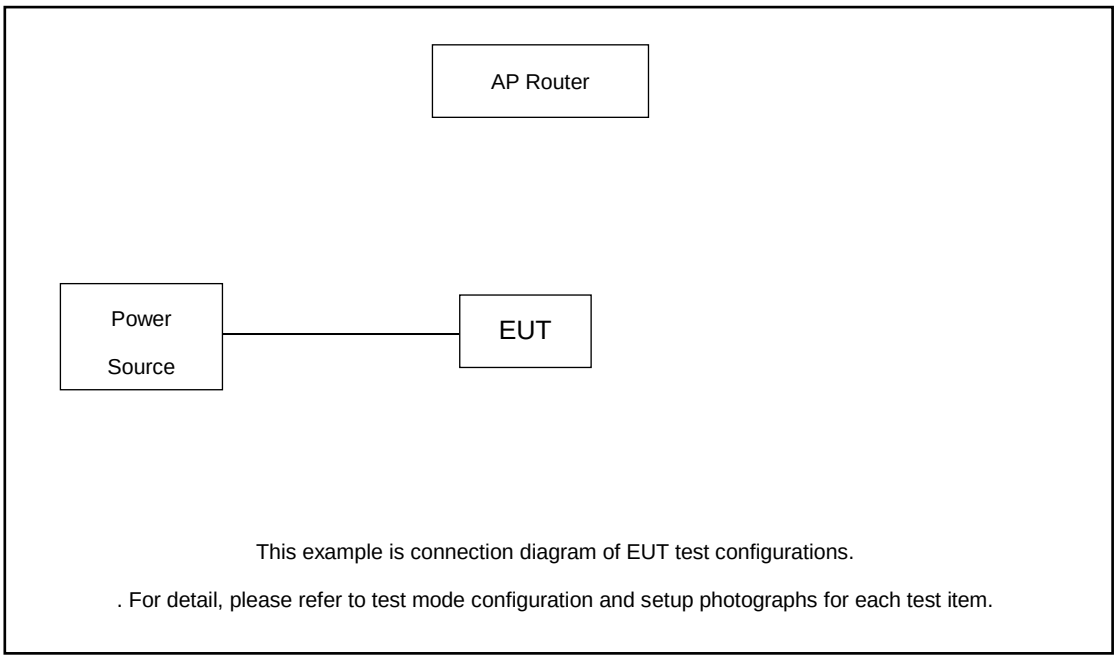
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0

Test Cases	
AC Conducted Emission	Mode 1 :WIFI(2.4G) Link + USB Cable(Charging from Adapter)
Remark: For Radiated Test Cases, The tests were performance with Adapter and USB Cable.	

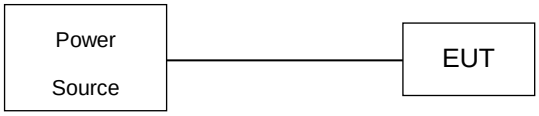
RSE Co-location
Bluetooth LE(2 Mbps) CH00_TX + 802.11b CH06 (2437MHz)

2.3 Connection Diagram of Test System

AC Conducted Emission:



Radiated 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.

2.4 Support Unit used in test configuration and system

Item	Equipment	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	V130-15IKB005	N/A	N/A	shielded cable DC O/P 1.8m, Unshielded AC I/P cable 1.8m
2.	WLAN AP	DIR-655	KA21R655B1	N/A	Unshielded,1.8m

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 1.8 dB and 10dB attenuator.

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

= 1.8 + 10 = 11.8 (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.

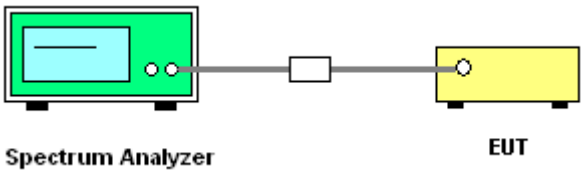
3.1.2 Measuring Instruments

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

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 output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the 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.

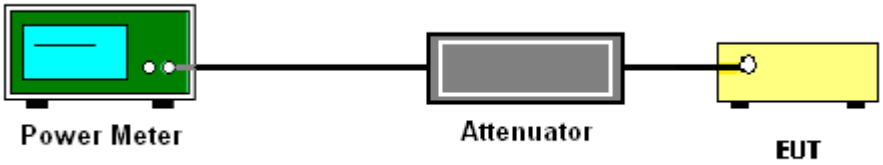
3.2.2 Measuring Instruments

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 Average Output Power

2.4GHz Band Single Antenna												
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	Setting
					Ant 1	Ant1	Ant1	Ant1	Ant1	Ant1		Ant1
11b	1Mbps	1	1	2412	0.00	16.65	30.00	4.00	20.65	36.00	Pass	17.50
11b	1Mbps	1	6	2437	0.00	16.63	30.00	4.00	20.63	36.00	Pass	17.50
11b	1Mbps	1	11	2462	0.00	16.68	30.00	4.00	20.68	36.00	Pass	17.50
11b	1Mbps	1	12	2467	0.00	16.58	30.00	4.00	20.58	36.00	Pass	17.50
11b	1Mbps	1	13	2472	0.00	14.33	30.00	4.00	18.33	36.00	Pass	15.50
11g	6Mbps	1	1	2412	0.00	14.96	30.00	4.00	18.96	36.00	Pass	16.00
11g	6Mbps	1	6	2437	0.00	14.94	30.00	4.00	18.94	36.00	Pass	16.00
11g	6Mbps	1	11	2462	0.00	14.91	30.00	4.00	18.91	36.00	Pass	16.00
11g	6Mbps	1	12	2467	0.00	14.15	30.00	4.00	18.15	36.00	Pass	15.50
11g	6Mbps	1	13	2472	0.00	10.18	30.00	4.00	14.18	36.00	Pass	11.50
HT20	MCS0	1	1	2412	0.00	14.38	30.00	4.00	18.38	36.00	Pass	15.50
HT20	MCS0	1	6	2437	0.00	14.35	30.00	4.00	18.35	36.00	Pass	15.50
HT20	MCS0	1	11	2462	0.00	14.32	30.00	4.00	18.32	36.00	Pass	15.50
HT20	MCS0	1	12	2467	0.00	13.11	30.00	4.00	17.11	36.00	Pass	14.50
HT20	MCS0	1	13	2472	0.00	6.94	30.00	4.00	10.94	36.00	Pass	8.50

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.

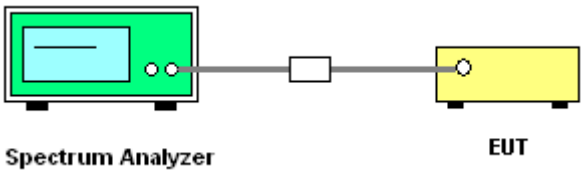
3.3.2 Measuring Instruments

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 11.10.3 Method AVGPSD-1.
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 = rms, 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 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

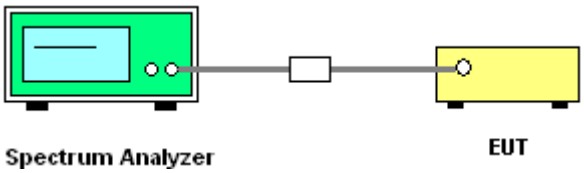
3.4.2 Measuring Instruments

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

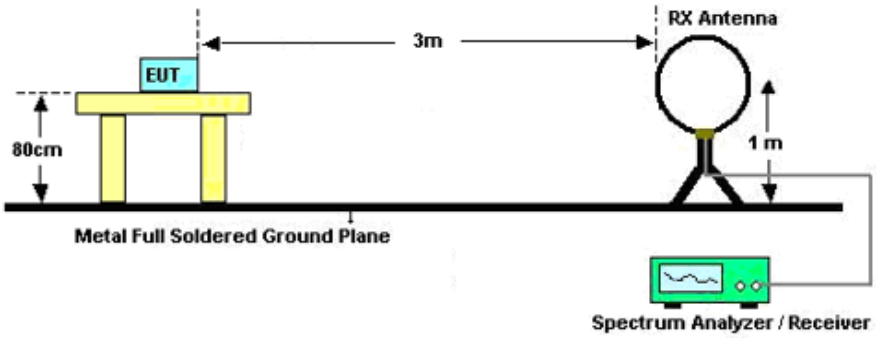
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

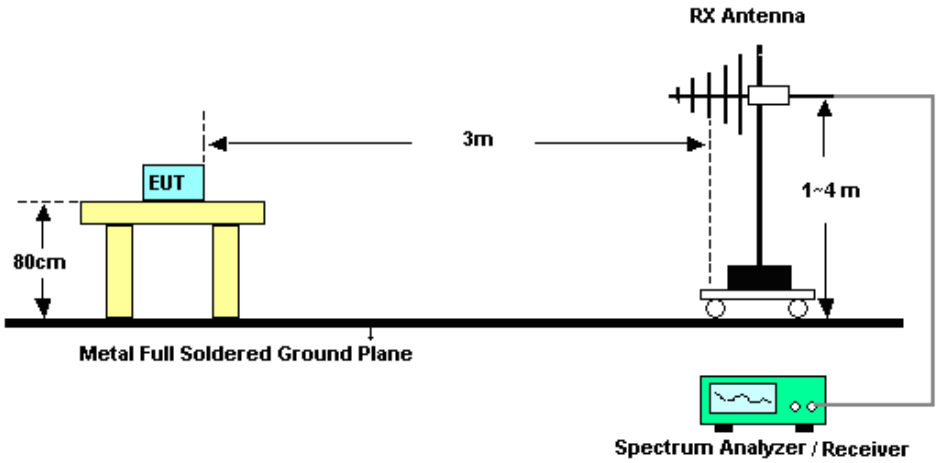
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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

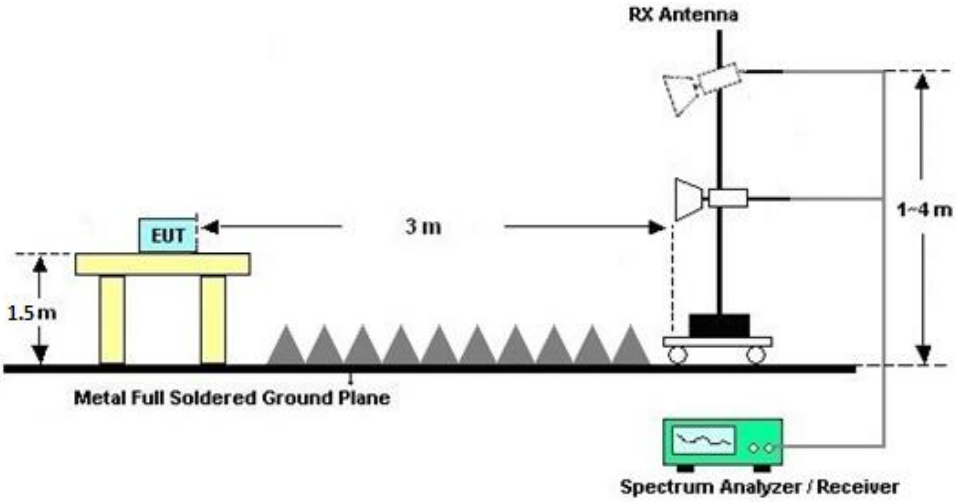
For radiated emissions below 30MHz



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.

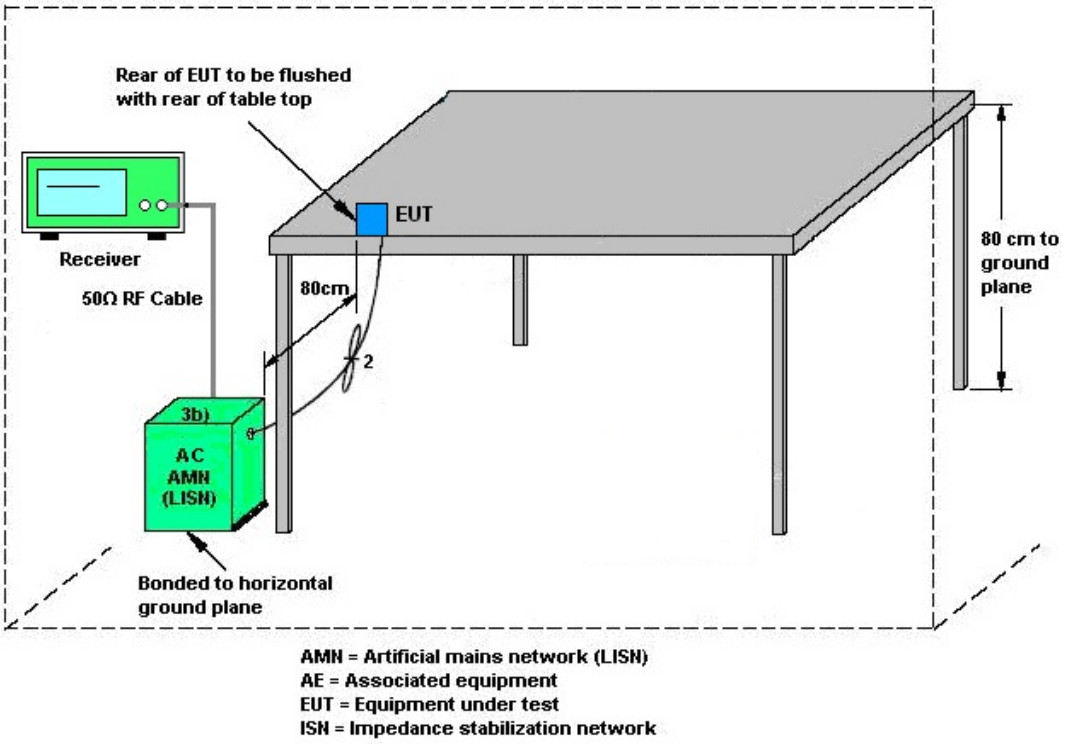
3.6.2 Measuring Instruments

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	MY56400023	3Hz~8.5GHz;Max 30dBm	Jan. 05, 2023	Jan. 02, 2024	Jan. 04, 2024	Radiation (03CH08-KS)
Spectrum Analyzer	R&S	FSV40	101932	10kHz~40GHz; Max 30dBm	Oct. 10, 2023	Jan. 02, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Oct. 10, 2023	Jan. 02, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Bilog Antenna	TESEQ& VGT	CBL 61110	59915	30MHz-1GHz	Aug. 12, 2023	Jan. 02, 2024	Aug. 11, 2024	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Mar. 18, 2023	Jan. 02, 2024	Mar. 17, 2024	Radiation (03CH08-KS)
high gain Amplifier	EM	EM01G18GA	060845	1Ghz-18Ghz	Jan. 05, 2023	Jan. 02, 2024	Jan. 04, 2024	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 08, 2023	Jan. 02, 2024	Jan. 07, 2024	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	413741	9KHz-1GHz	Jan. 05, 2023	Jan. 02, 2024	Jan. 04, 2024	Radiation (03CH08-KS)
Amplifier	EM	EM01G18GA	060834	1Ghz-18Ghz	Oct. 10, 2023	Jan. 02, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2023	Jan. 02, 2024	Jan. 04, 2024	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Jan. 02, 2024	NCR	Radiation (03CH08-KS)
Turn Table	EM	EM 1000-T	N/A	0~360 degree	NCR	Jan. 02, 2024	NCR	Radiation (03CH08-KS)
Antenna Mast	EM	EM 1000-A	N/A	1 m~4 m	NCR	Jan. 02, 2024	NCR	Radiation (03CH08-KS)
6db attenuator	TOJOIN	SMA(JK)	EMC01	2W/DC-18G	Jan. 10, 2023	Jan. 02, 2024	Jan. 09, 2024	Radiation (03CH08-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 16, 2023	Jan. 17, 2024	May 15, 2024	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2023	Jan. 17, 2024	Oct. 10, 2024	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 16, 2023	Jan. 17, 2024	May 15, 2024	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2023	Jan. 17, 2024	Oct. 10, 2024	Conduction (CO01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	Mar. 06, 2024~ May 16, 2024	Oct. 10, 2024	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 02, 2024	Mar. 06, 2024~ May 16, 2024	Jan. 01, 2025	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 02, 2024	Mar. 06, 2024~ May 16, 2024	Jan. 01, 2025	Conducted (TH01-KS)
RF Test System	Tonscend	TS1120-3	N/A	N/A	NCR	Mar. 06, 2024~ May 16, 2024	NCR	Conducted (TH01-KS)
automation control unit	Tonscend	JS0806-2	21H8060473	N/A	NCR	Mar. 06, 2024~ May 16, 2024	NCR	Conducted (TH01-KS)
power control unit	Tonscend	JS0806-4ADC	21J8060495	N/A	NCR	Mar. 06, 2024~ May 16, 2024	NCR	Conducted (TH01-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

Conducted Spurious Emission & Bandedge	**±2.26 dB**
Occupied Channel Bandwidth	**±0.1%**
Conducted Power	**±0.46 dB**
Conducted Power Spectral Density	**±0.88 dB**
Frequency	**±0.4 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))	**3.32 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**6.28 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.90 dB**

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

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

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

Appendix A. Conducted Test Results

Ambient Condition: 25 ℃, 45 %RH	
Test Date: 2024.3.6~5.16	**Test Engineer:** Gene Wang

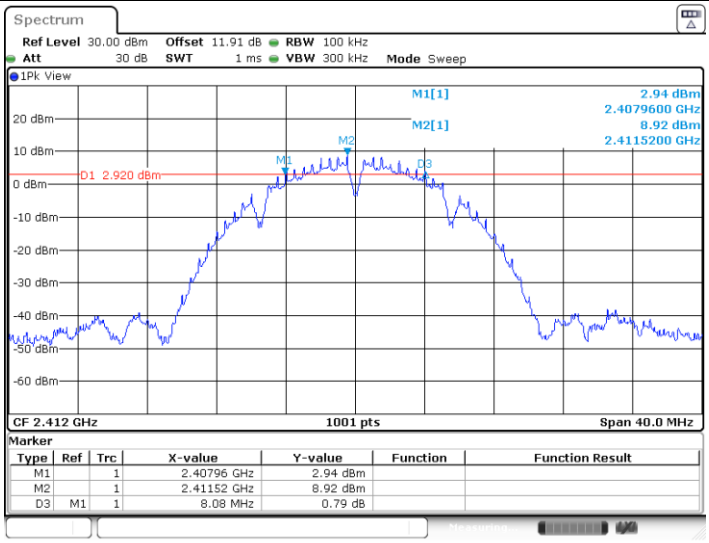
DTS Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.08	2407.96	2416.04	0.5	PASS
		2437	8.04	2433.00	2441.04	0.5	PASS
		2462	8.04	2458.00	2466.04	0.5	PASS
		2467	8.04	2463.00	2471.04	0.5	PASS
		2472	8.04	2468.00	2476.04	0.5	PASS
11G	Ant1	2412	16.36	2403.84	2420.20	0.5	PASS
		2437	16.36	2428.84	2445.20	0.5	PASS
		2462	16.36	2453.84	2470.20	0.5	PASS
		2467	16.32	2458.84	2475.16	0.5	PASS
		2472	16.36	2463.84	2480.20	0.5	PASS
11N20SISO	Ant1	2412	17.64	2403.20	2420.84	0.5	PASS
		2437	17.60	2428.24	2445.84	0.5	PASS
		2462	17.56	2453.24	2470.80	0.5	PASS
		2467	17.56	2458.24	2475.80	0.5	PASS
		2472	17.56	2463.24	2480.80	0.5	PASS

Test Graphs

11B_Ant1_2412



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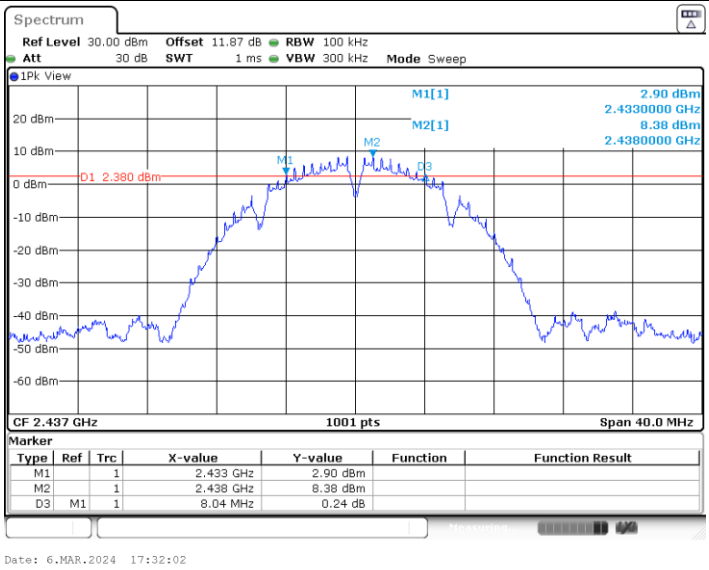
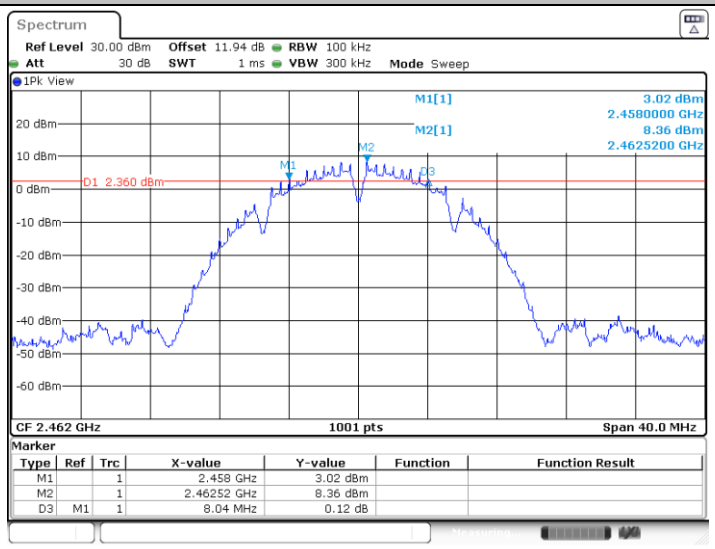
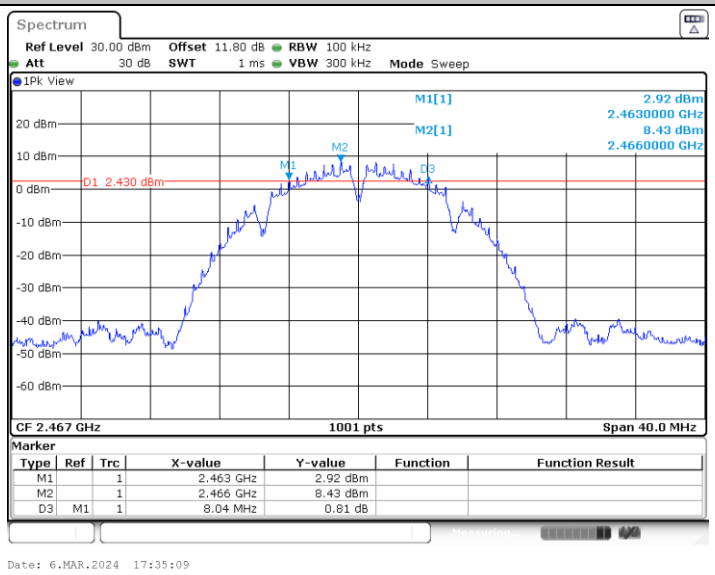


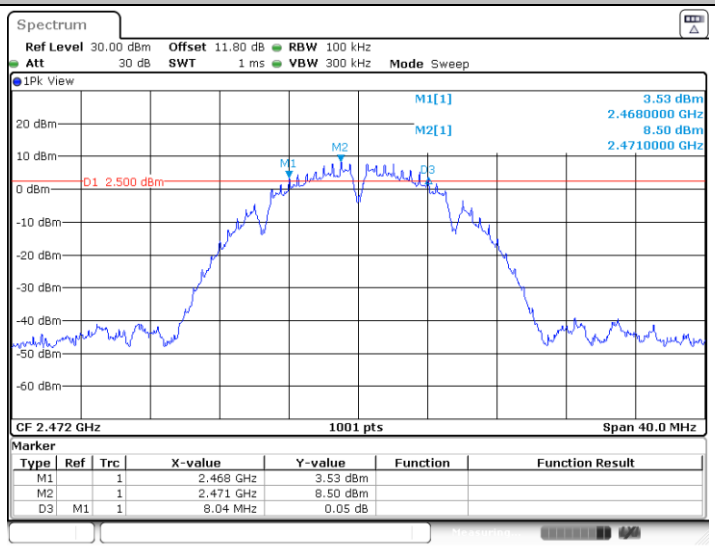
11B_Ant1_2462



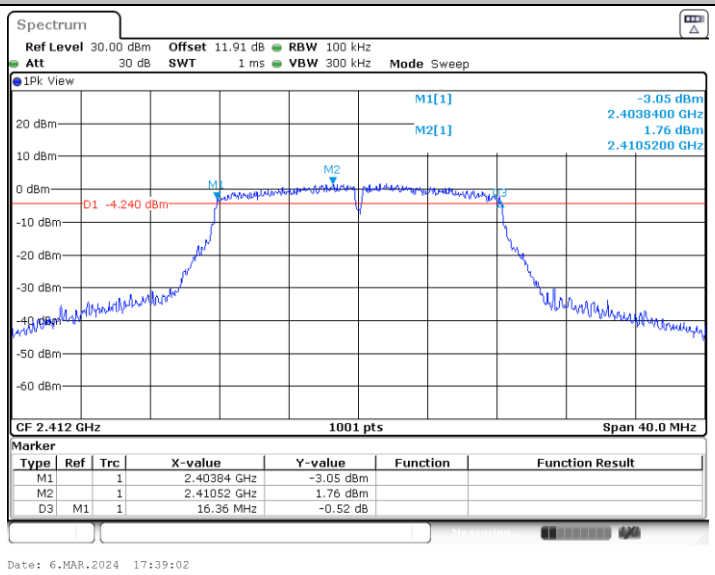
11B_Ant1_2467



11B_Ant1_2472



11G_Ant1_2412



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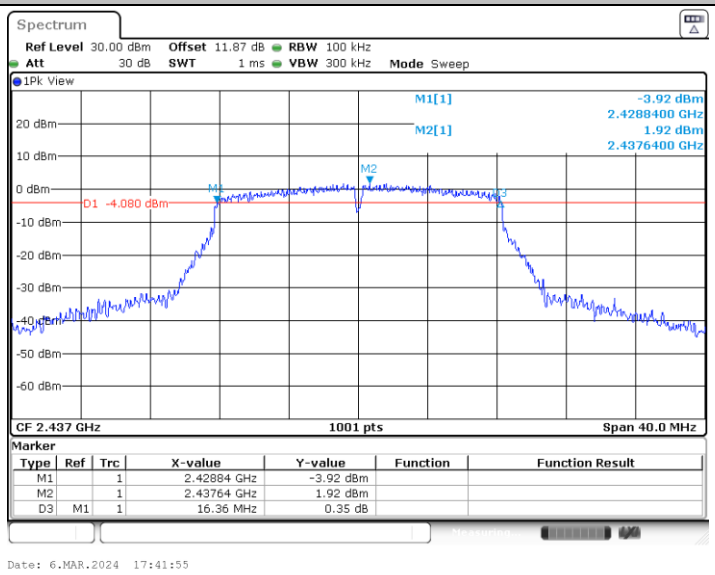

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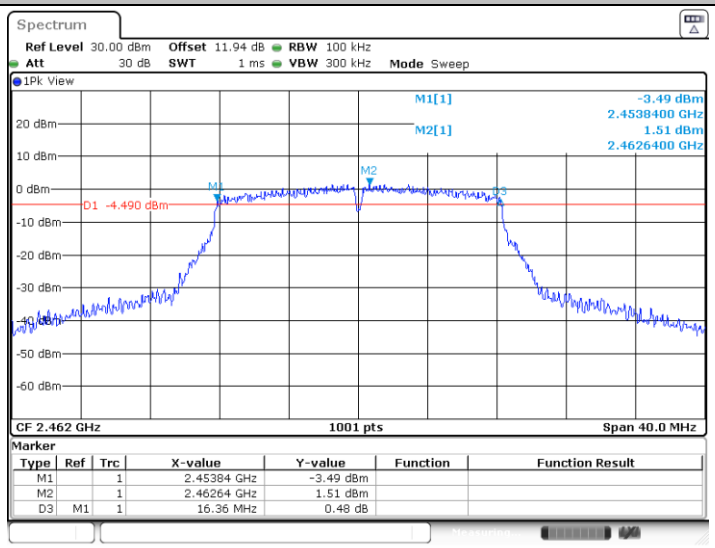

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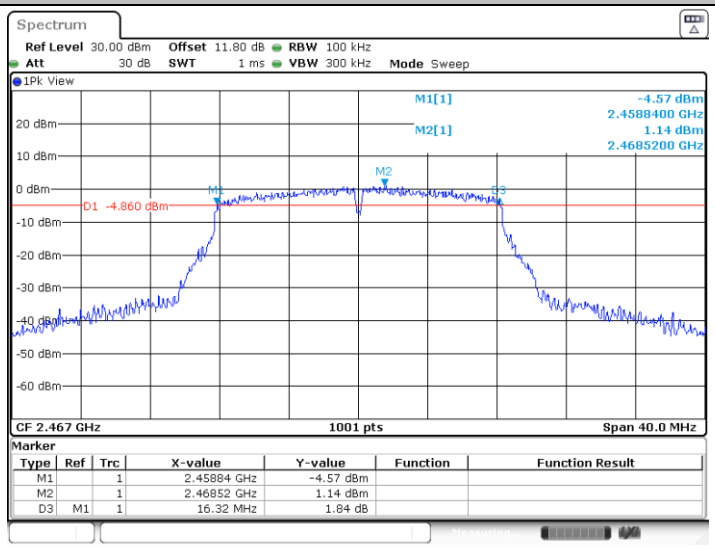

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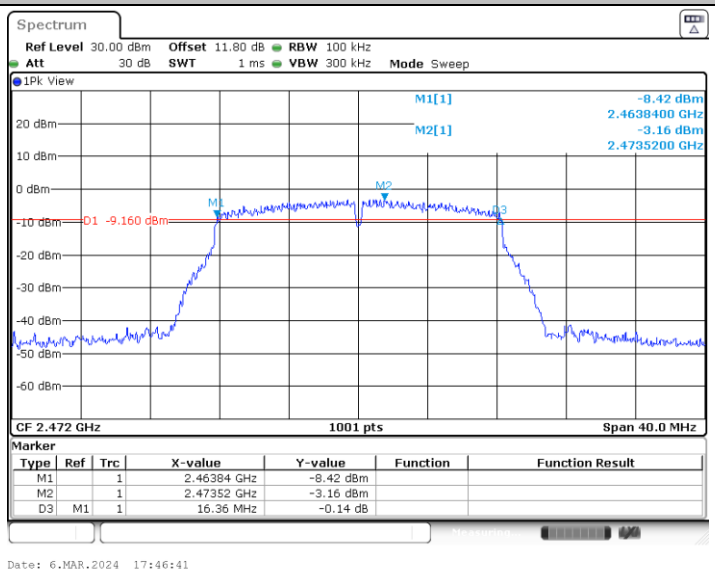

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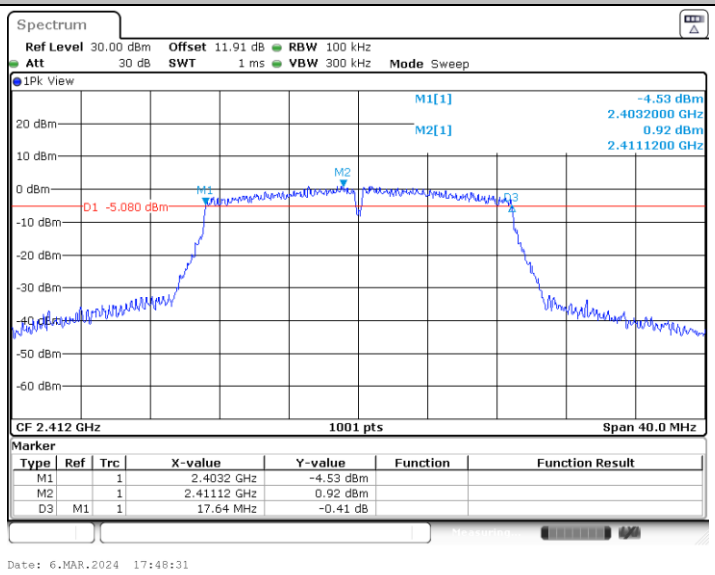

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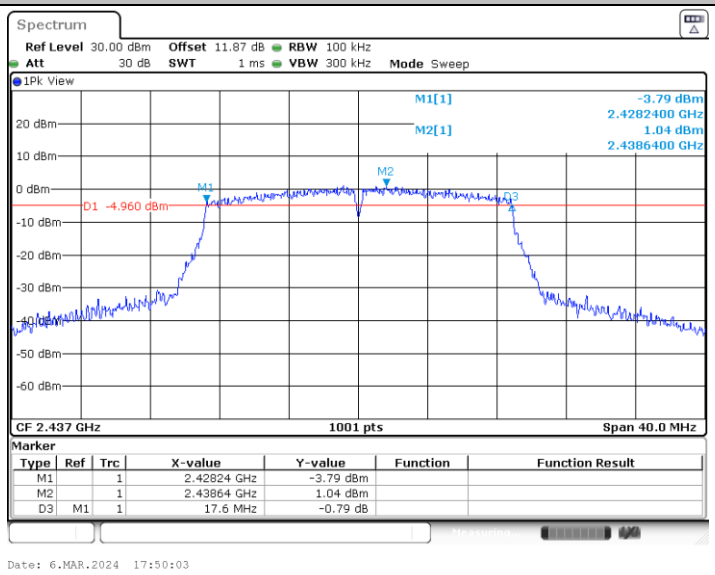

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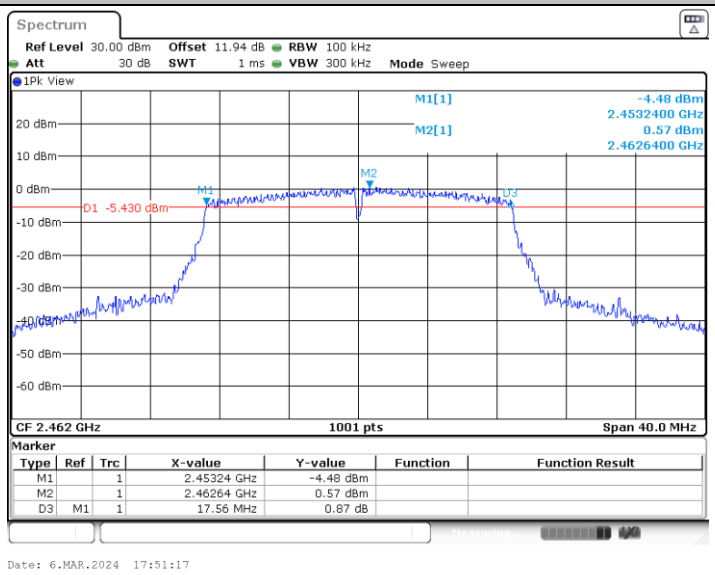

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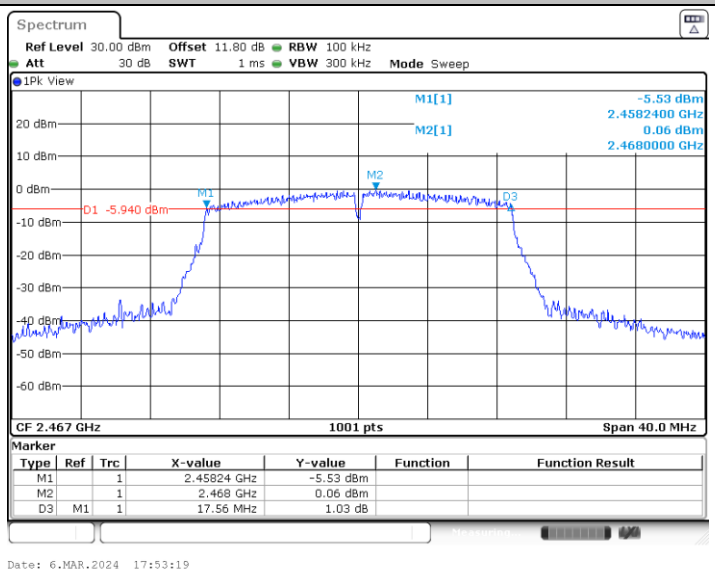

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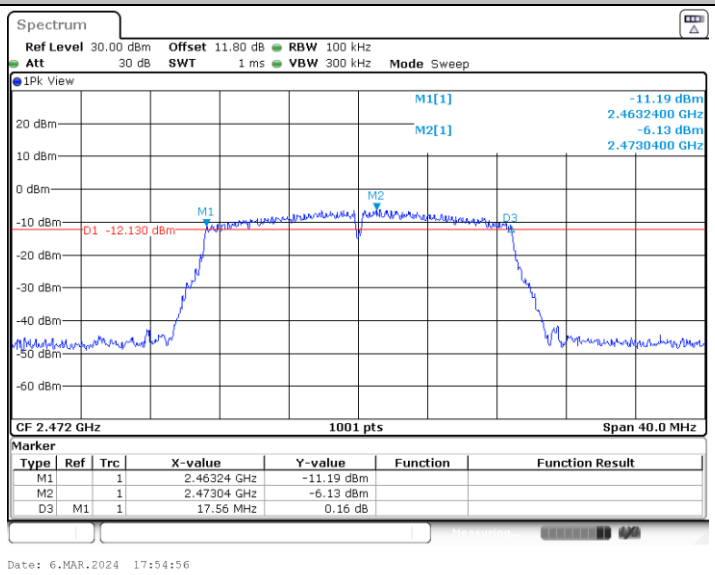


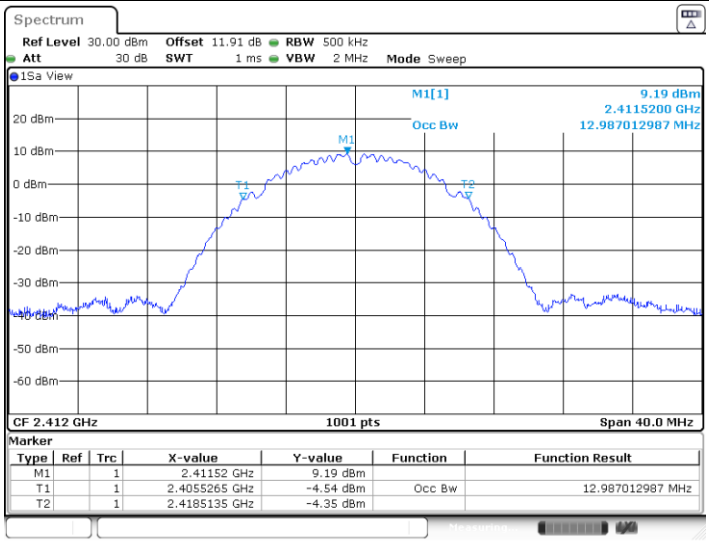
Occupied Channel Bandwidth

Test Result

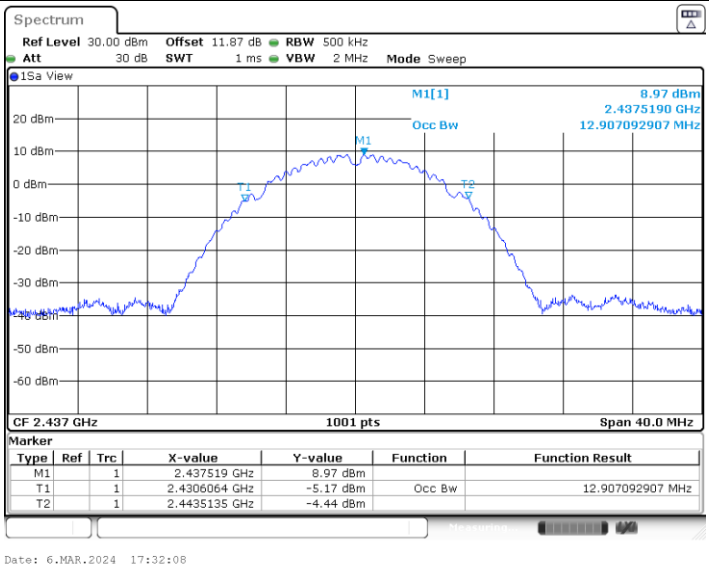
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	12.987	2405.5265	2418.5135	---	---
		2437	12.907	2430.6064	2443.5135	---	---
		2462	12.907	2455.6064	2468.5135	---	---
		2467	12.867	2460.6464	2473.5135	---	---
		2472	12.867	2465.6064	2478.4735	---	---
11G	Ant1	2412	17.223	2403.4086	2420.6314	---	---
		2437	17.143	2428.4885	2445.6314	---	---
		2462	17.263	2453.4086	2470.6713	---	---
		2467	17.103	2458.5285	2475.6314	---	---
		2472	17.143	2463.4486	2480.5914	---	---
11N20SISO	Ant1	2412	18.102	2402.9690	2421.0709	---	---
		2437	18.022	2428.0490	2446.0709	---	---
		2462	18.102	2452.9690	2471.0709	---	---
		2467	18.022	2458.0490	2476.0709	---	---
		2472	17.942	2463.0490	2480.9910	---	---

Test Graphs

11B_Ant1_2412



11B_Ant1_2437



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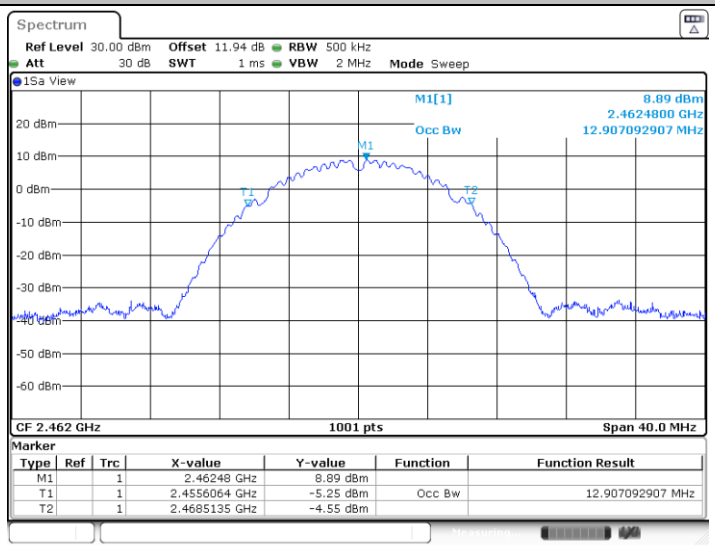

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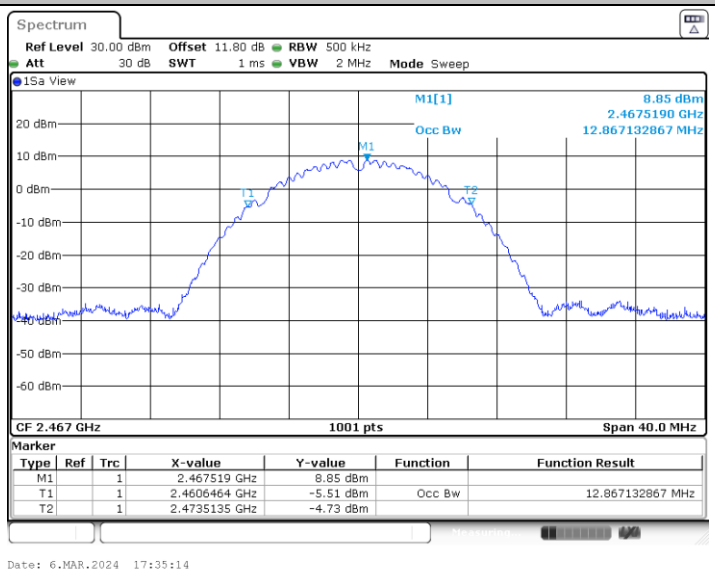

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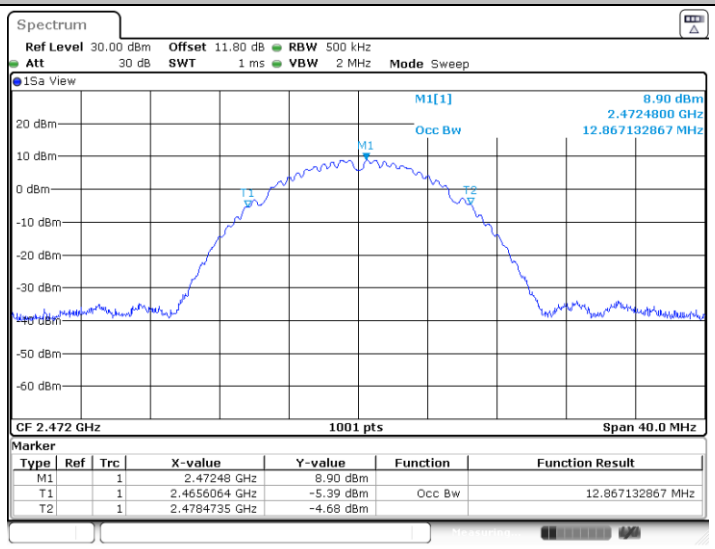
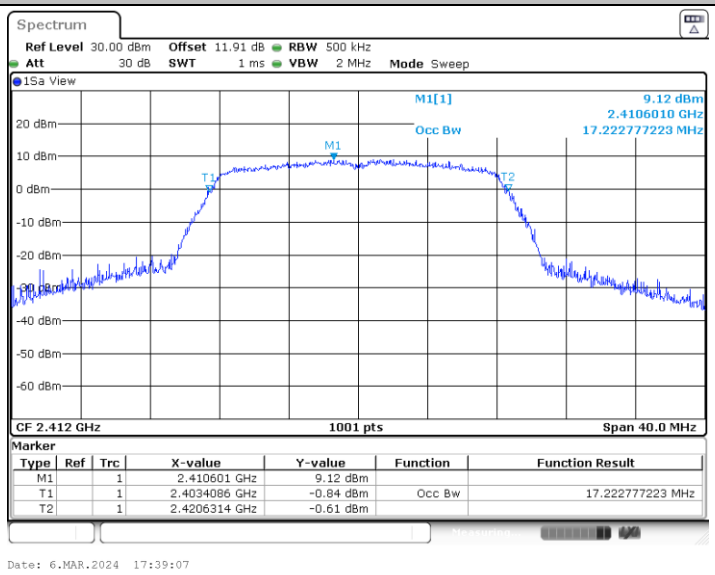


11G_Ant1_2412



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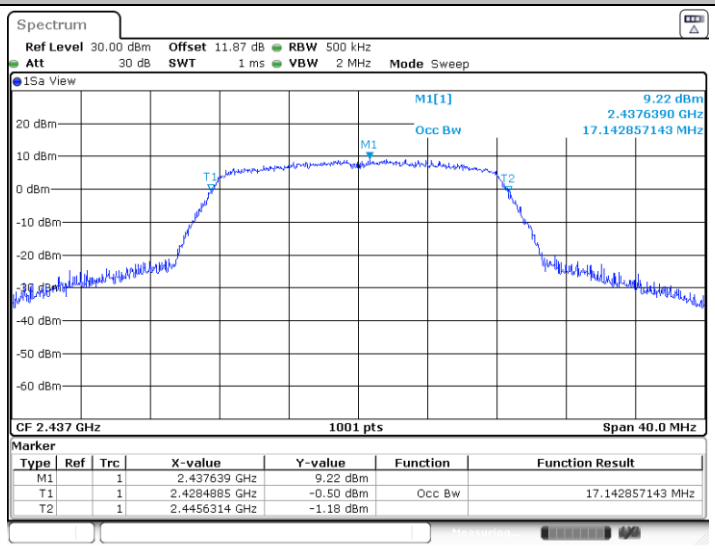

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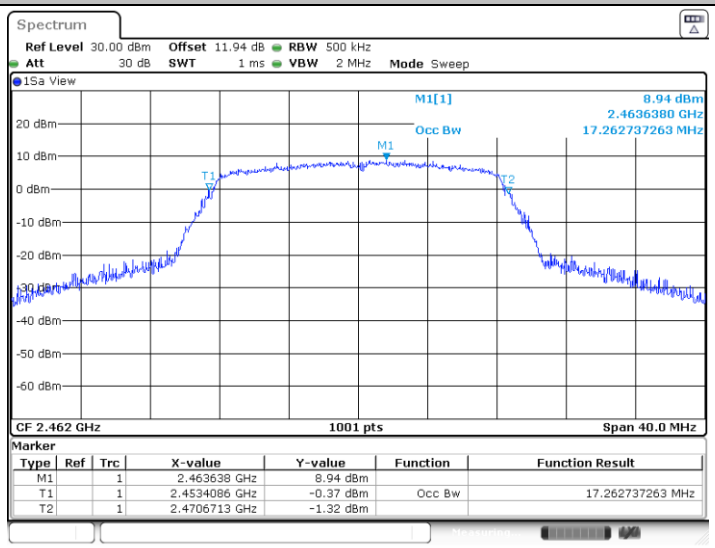

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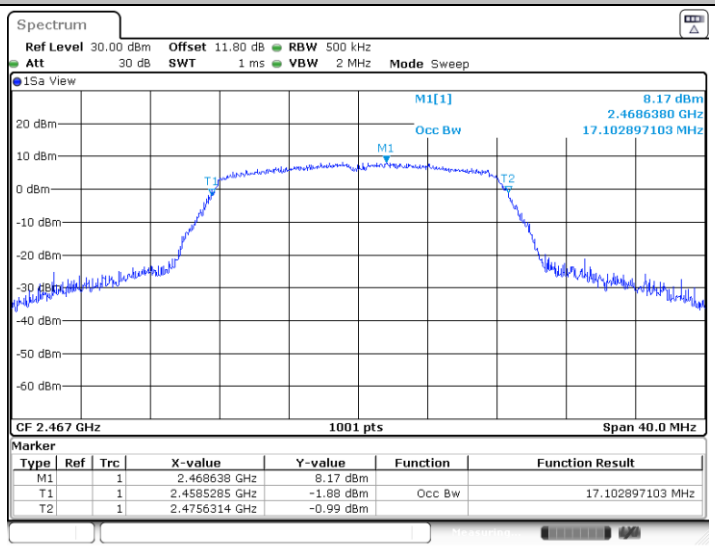

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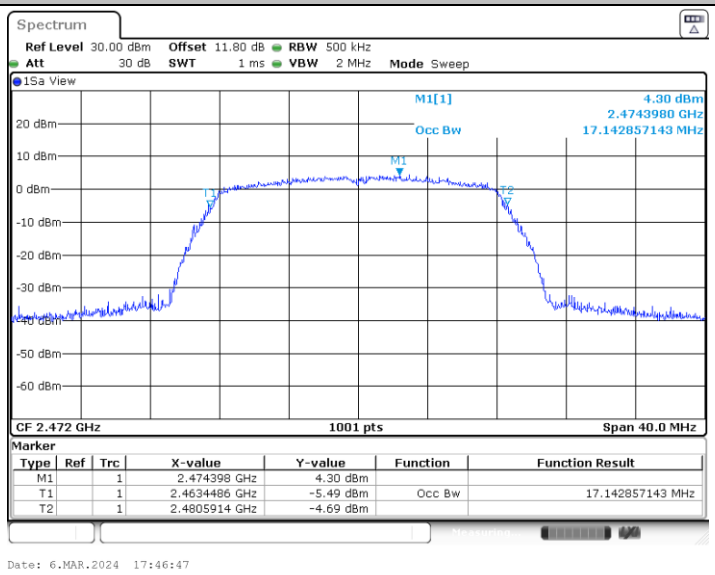

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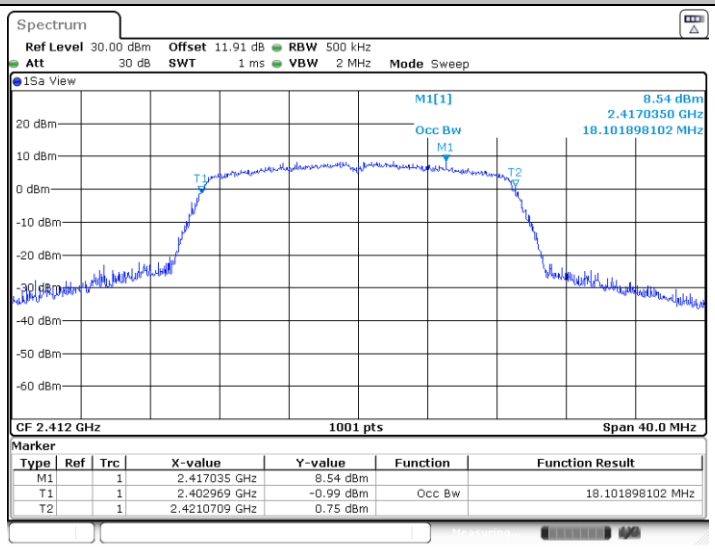

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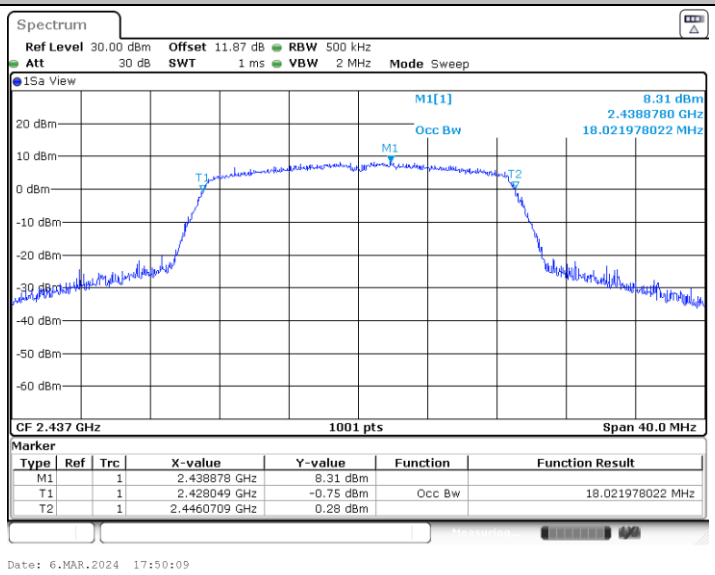

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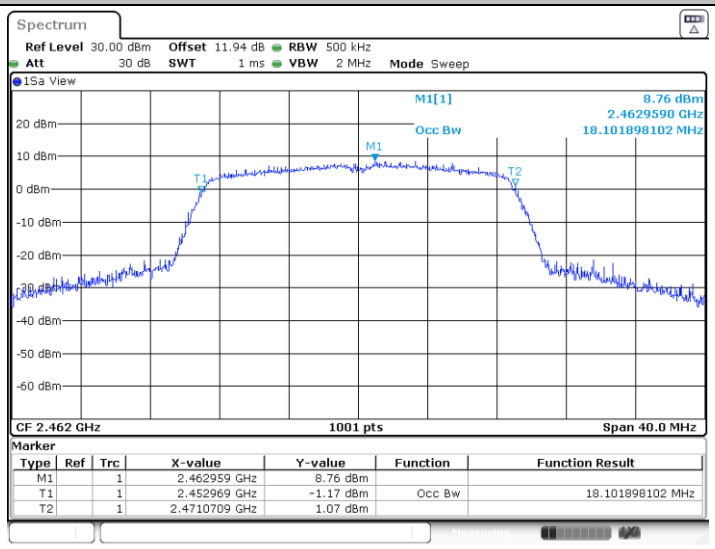

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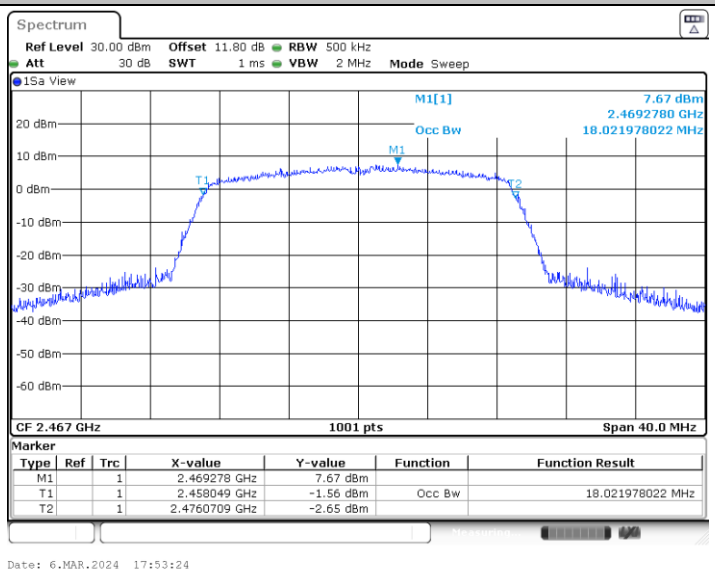

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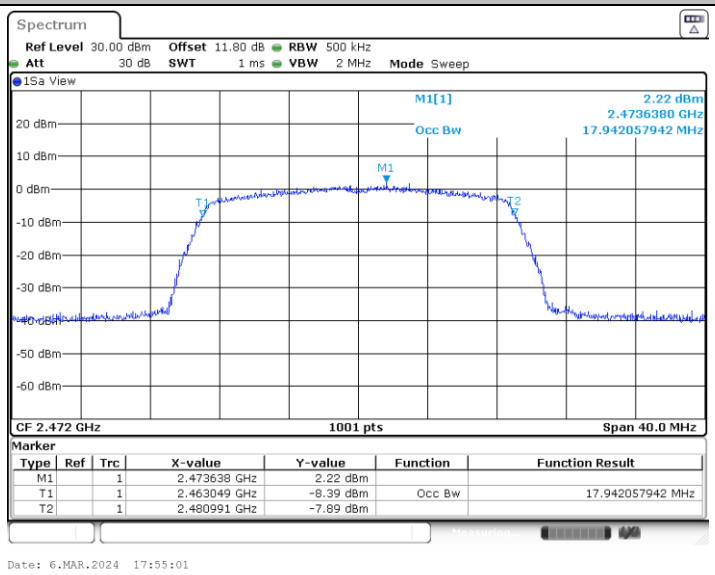


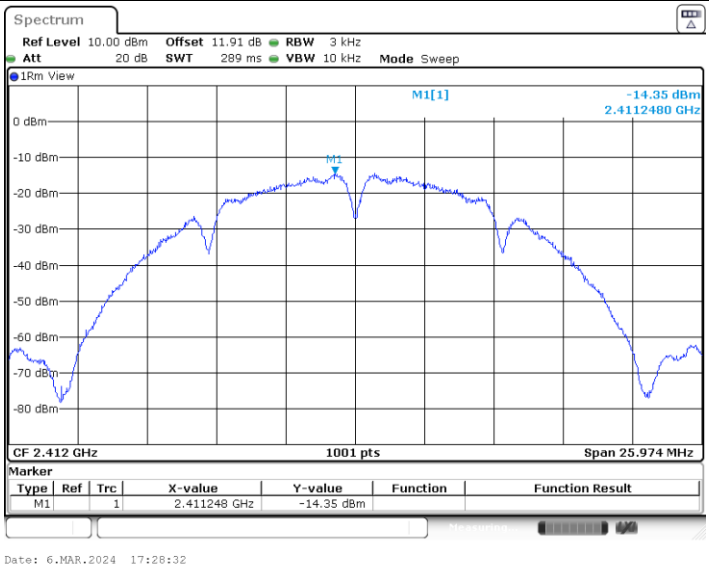
Maximum power spectral density

Test Result

TestMode	Antenna	Freq(MHz)	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-14.35	≤8.00	PASS
		2437	-14.39	≤8.00	PASS
		2462	-14.9	≤8.00	PASS
		2467	-14.85	≤8.00	PASS
		2472	-16.82	≤8.00	PASS
11G	Ant1	2412	-18.58	≤8.00	PASS
		2437	-18.6	≤8.00	PASS
		2462	-18.66	≤8.00	PASS
		2467	-19.36	≤8.00	PASS
		2472	-23.08	≤8.00	PASS
11N20SISO	Ant1	2412	-19.24	≤8.00	PASS
		2437	-19.35	≤8.00	PASS
		2462	-19.63	≤8.00	PASS
		2467	-20.43	≤8.00	PASS
		2472	-26.24	≤8.00	PASS

Test Graphs

11B_Ant1_2412



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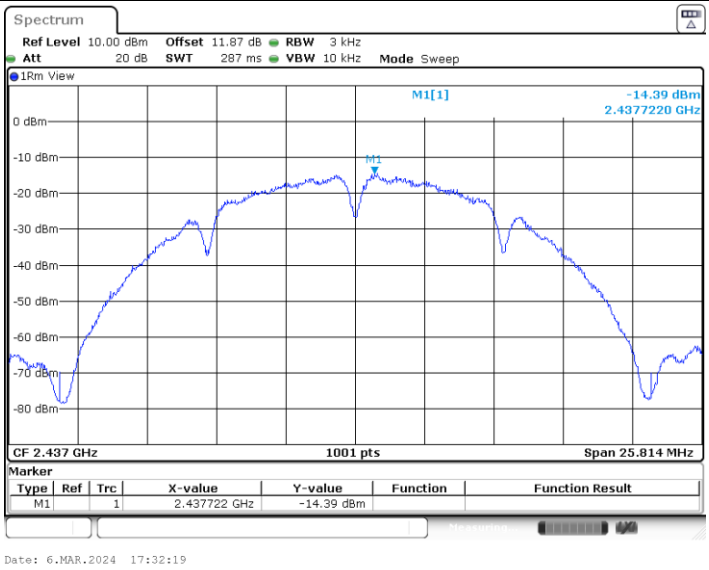

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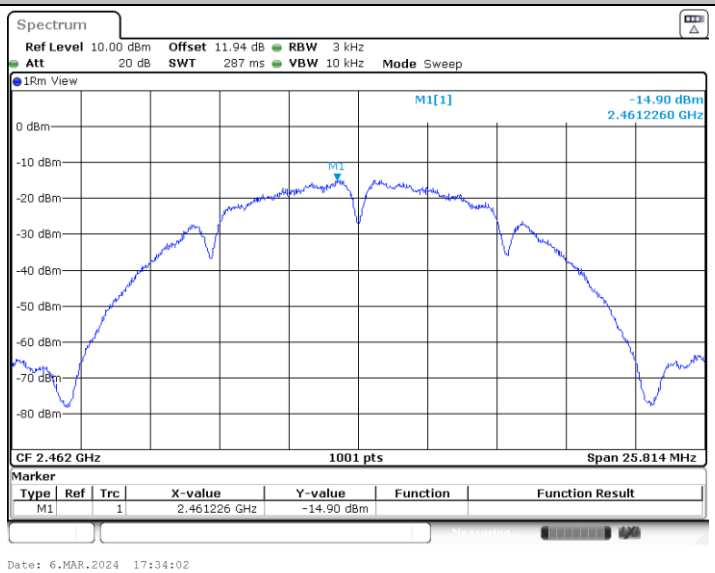

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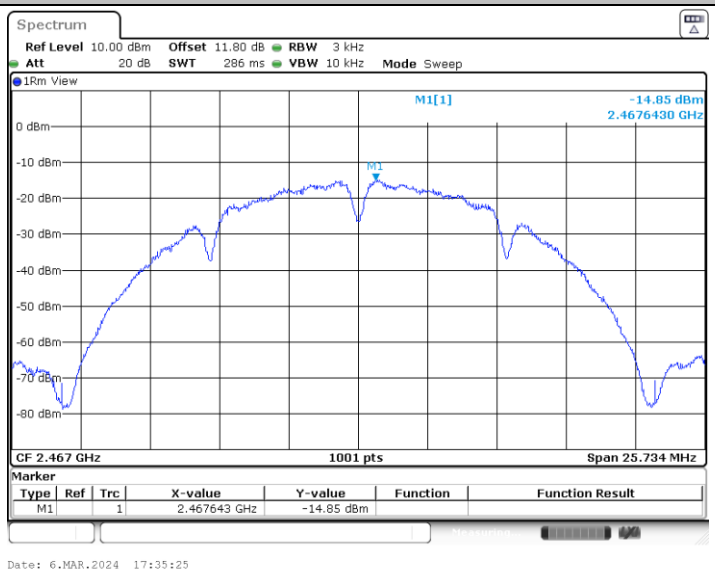
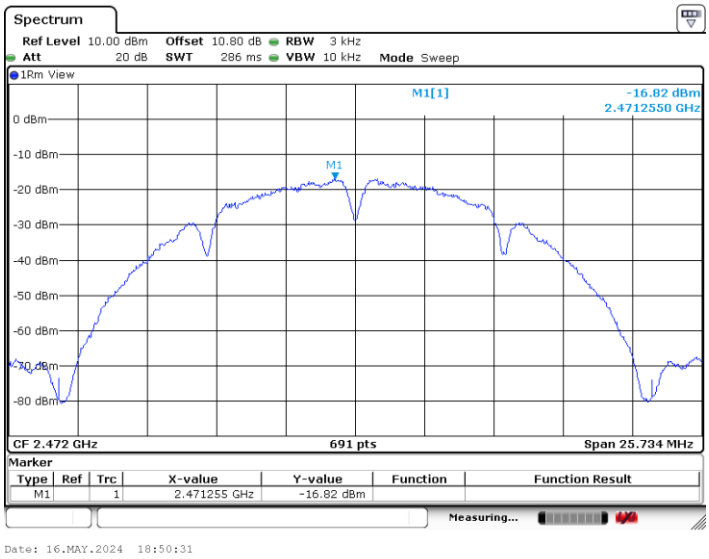
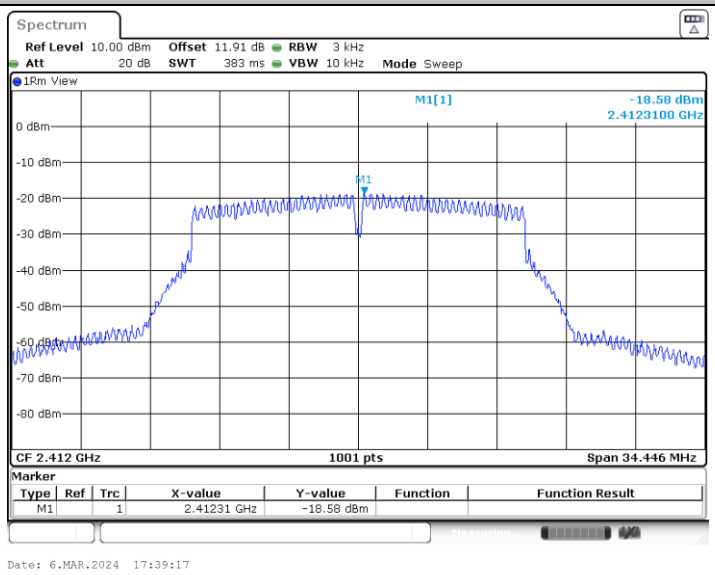


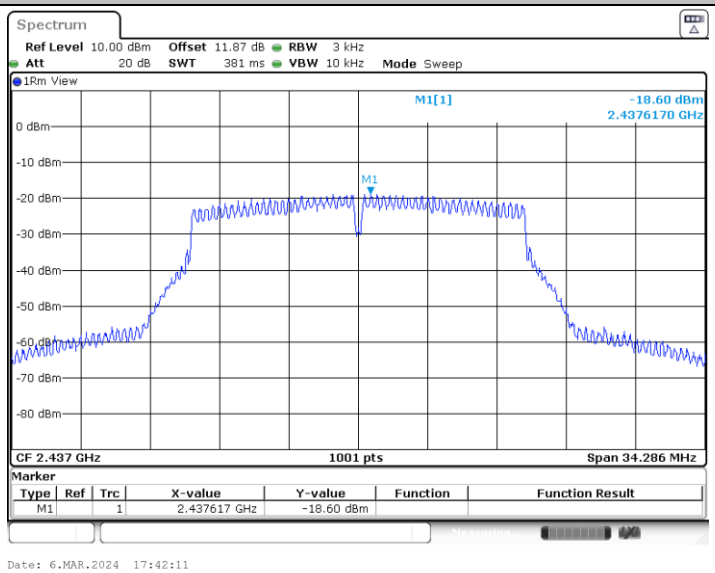
11B_Ant1_2472



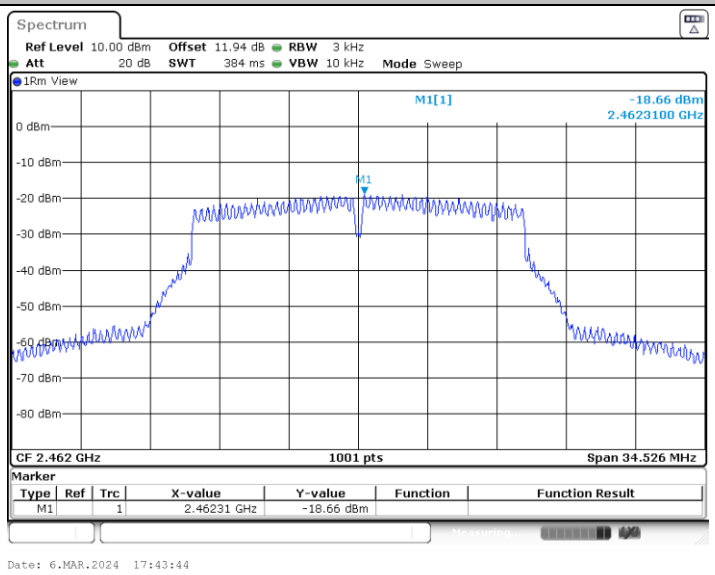
11G_Ant1_2412



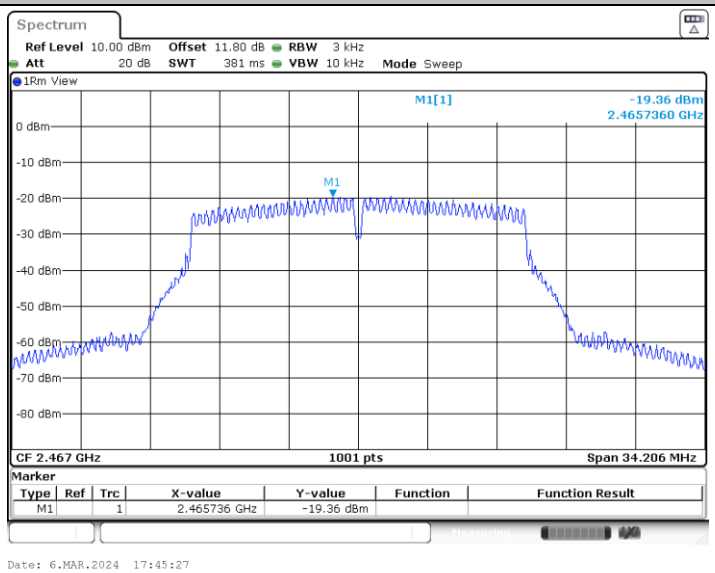
11G_Ant1_2437



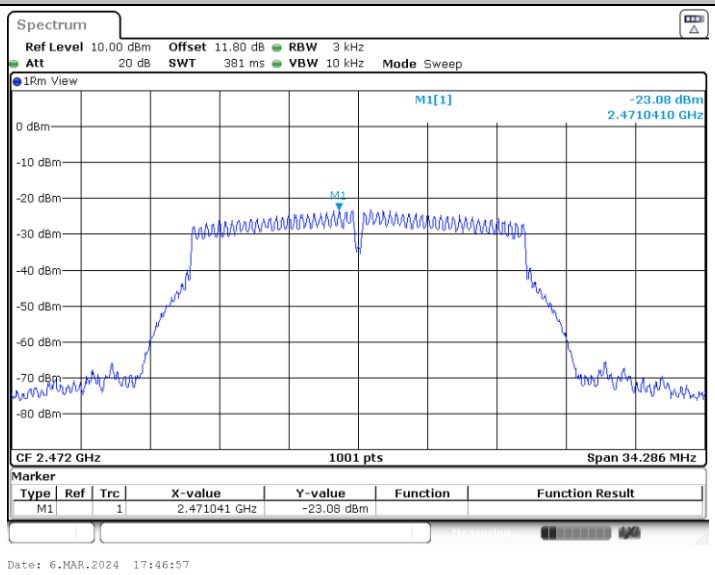
11G_Ant1_2462



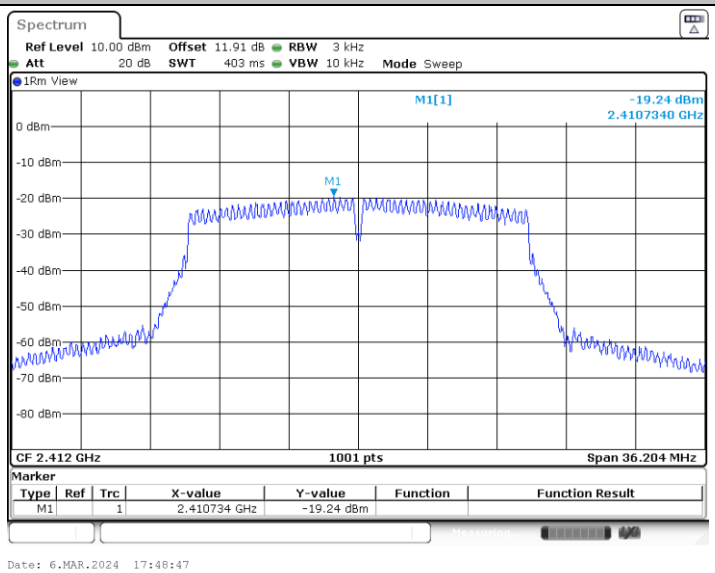
11G_Ant1_2467



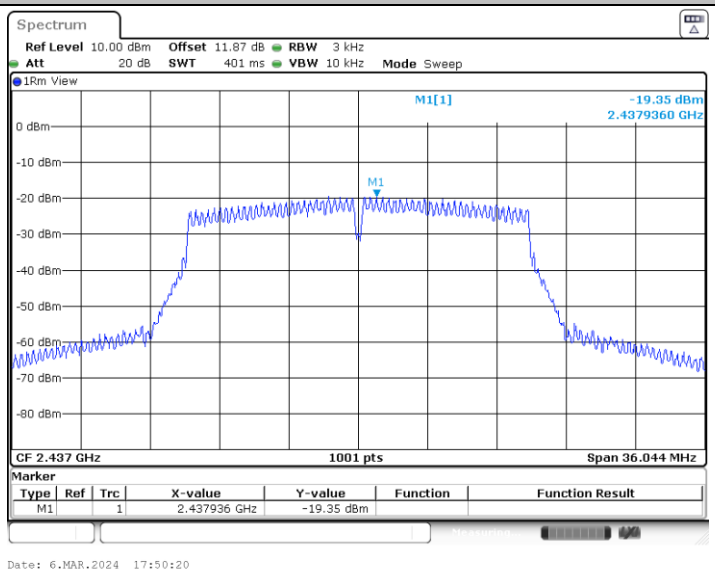
11G_Ant1_2472



11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



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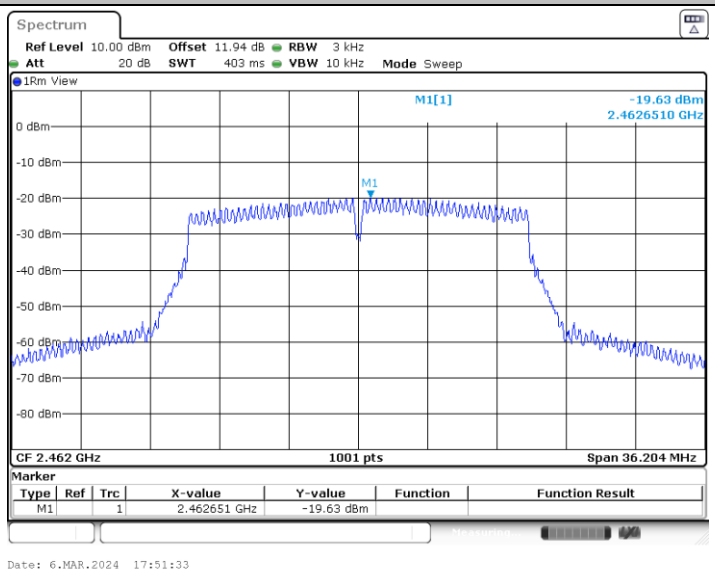
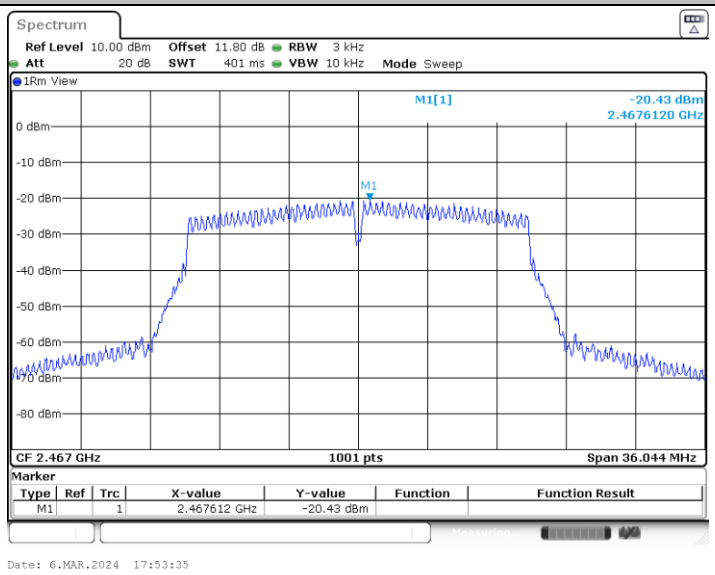
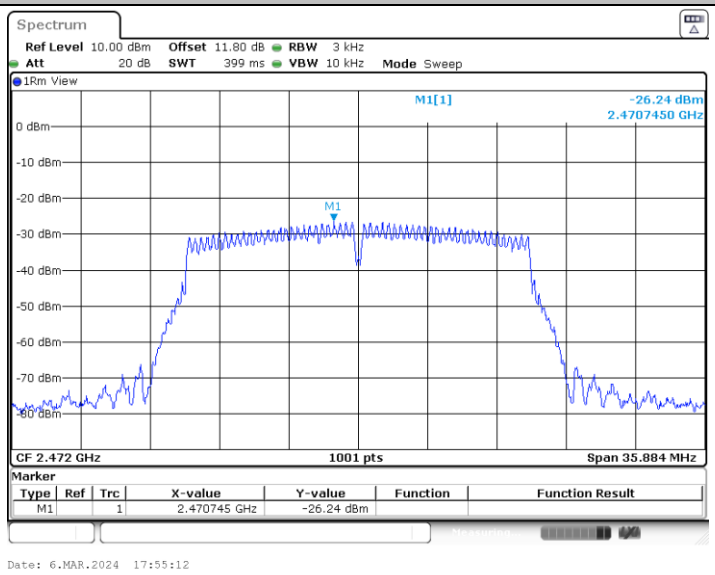


11N20SISO_Ant1_2467



11N20SISO_Ant1_2472



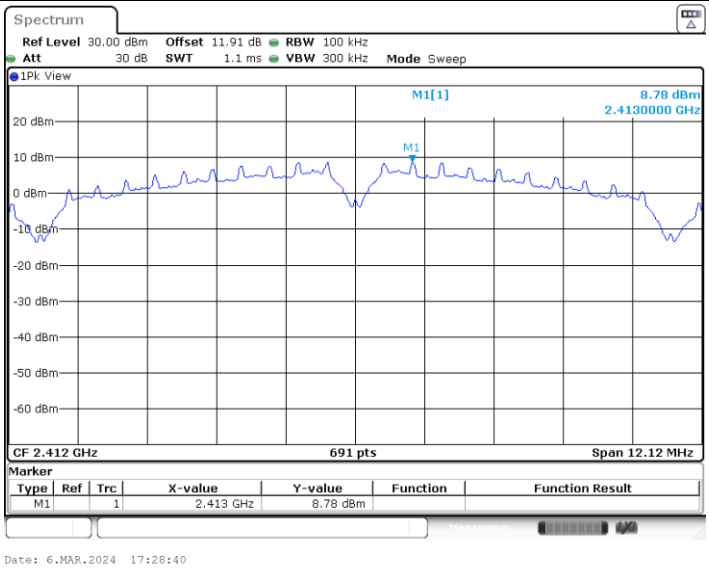
Reference level measurement

Test Result

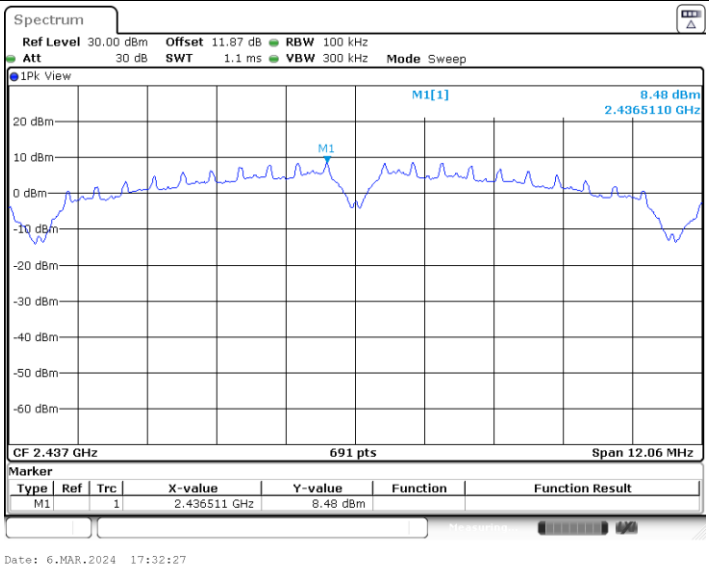
TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm/100KHz]
11B	Ant1	2412	2413.00	8.78
		2437	2436.51	8.48
		2462	2461.01	8.41
		2467	2467.51	8.57
		2472	2471.49	8.54
11G	Ant1	2412	2412.89	1.85
		2437	2436.01	2.05
		2462	2462.64	1.75
		2467	2467.64	1.26
		2472	2472.99	-2.71
11N20SISO	Ant1	2412	2413.03	0.92
		2437	2438.26	0.95
		2462	2464.25	0.47
		2467	2468.26	-0.45
		2472	2471.35	-6.17

Test Graphs

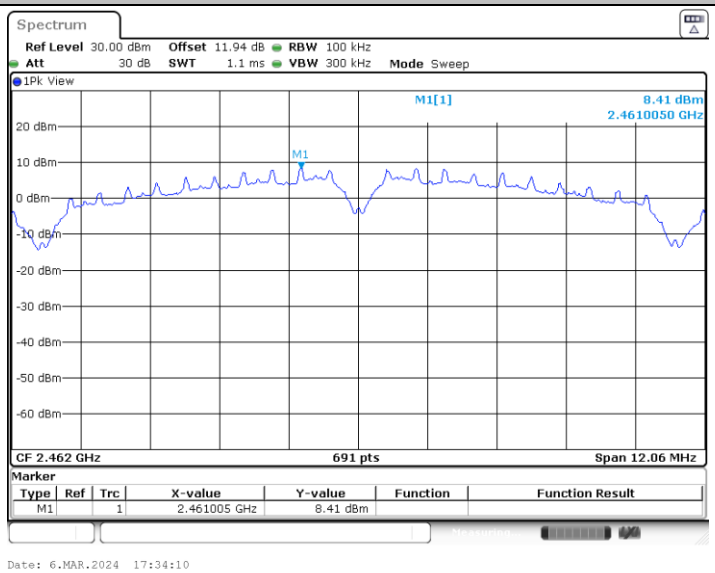
11B_Ant1_2412



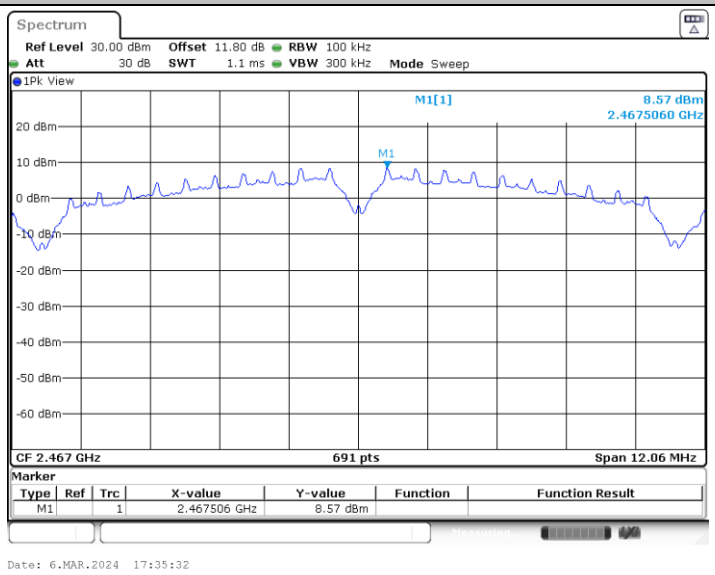
11B_Ant1_2437



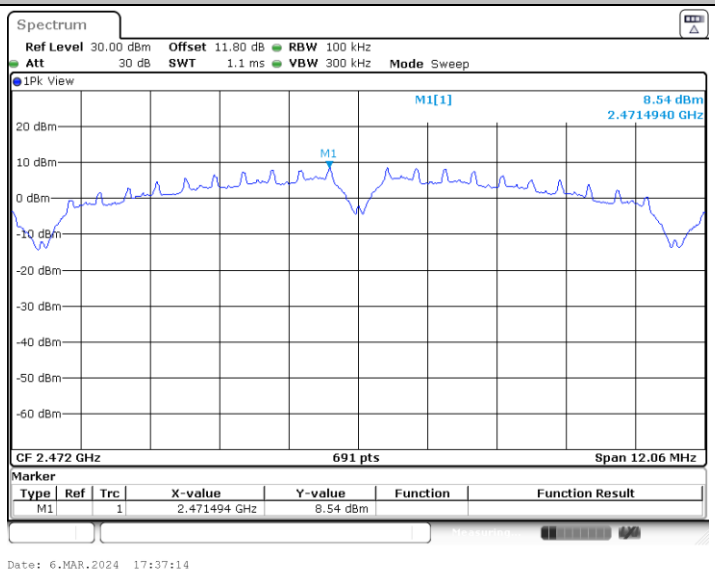
11B_Ant1_2462



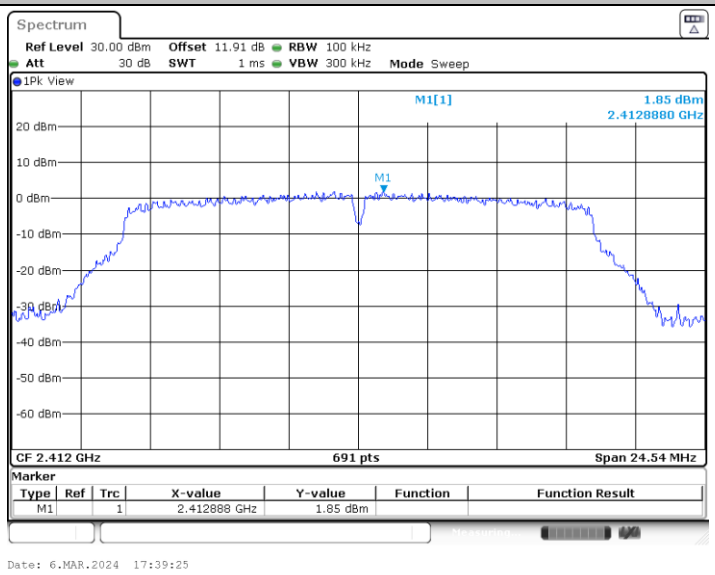
11B_Ant1_2467



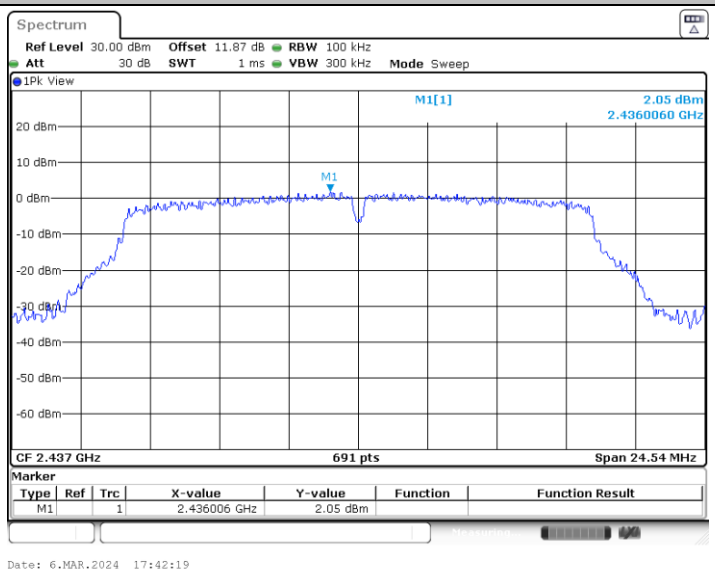
11B_Ant1_2472



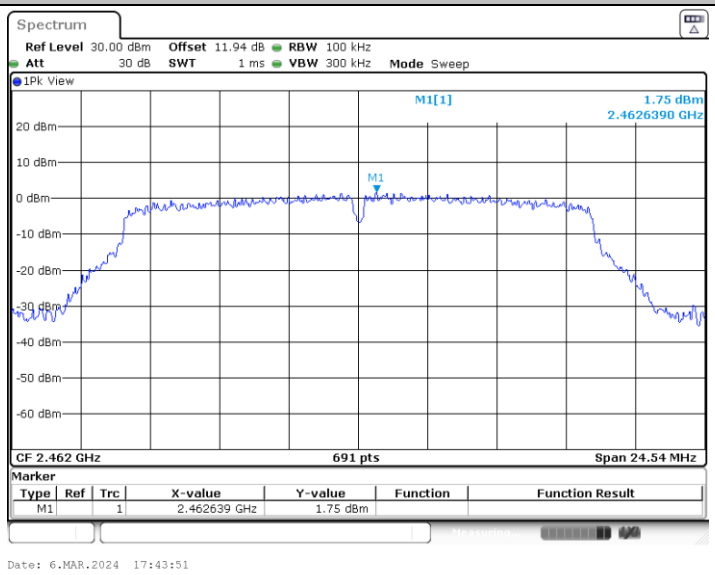
11G_Ant1_2412



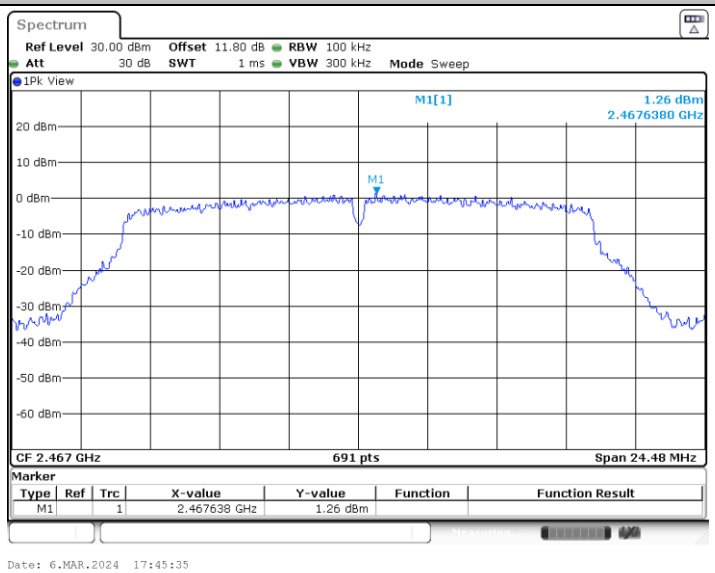
11G_Ant1_2437



11G_Ant1_2462



11G_Ant1_2467



Date: 6.MAR.2024 17:45:35

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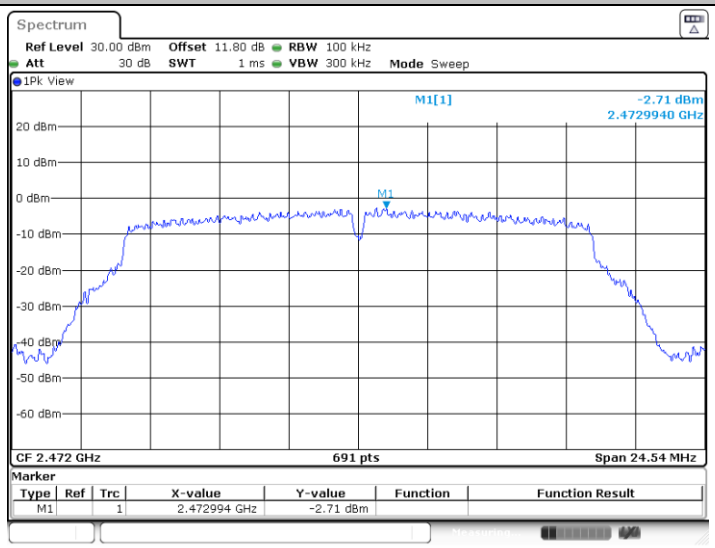

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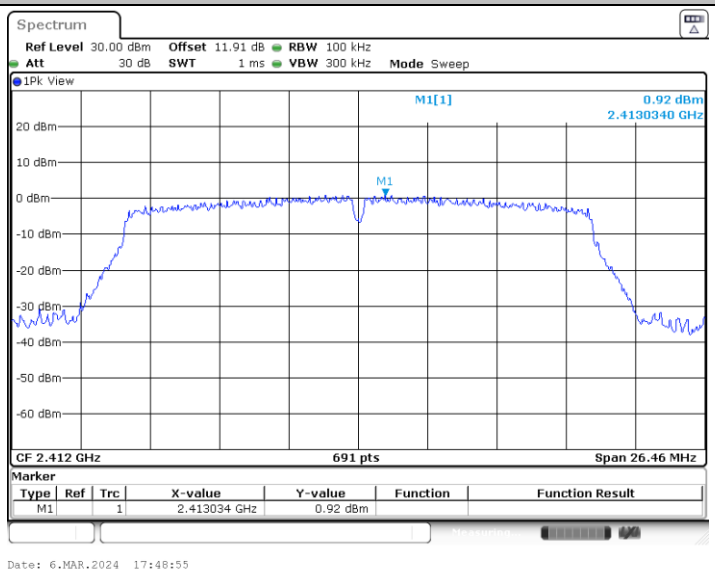
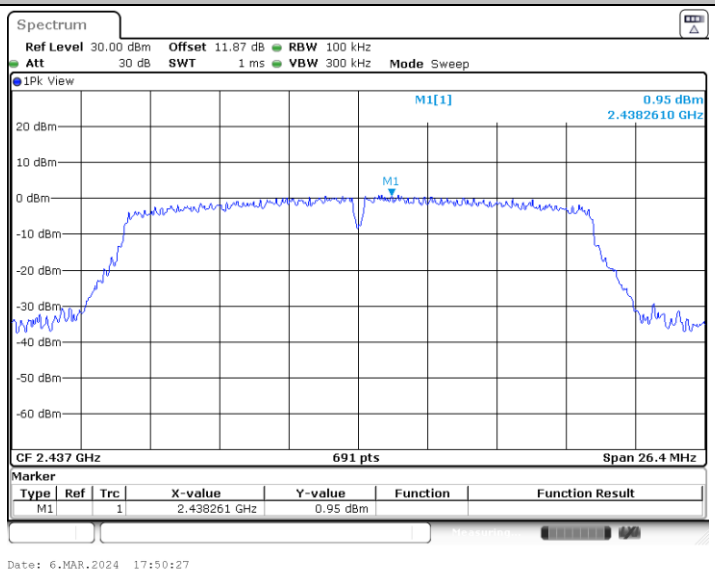
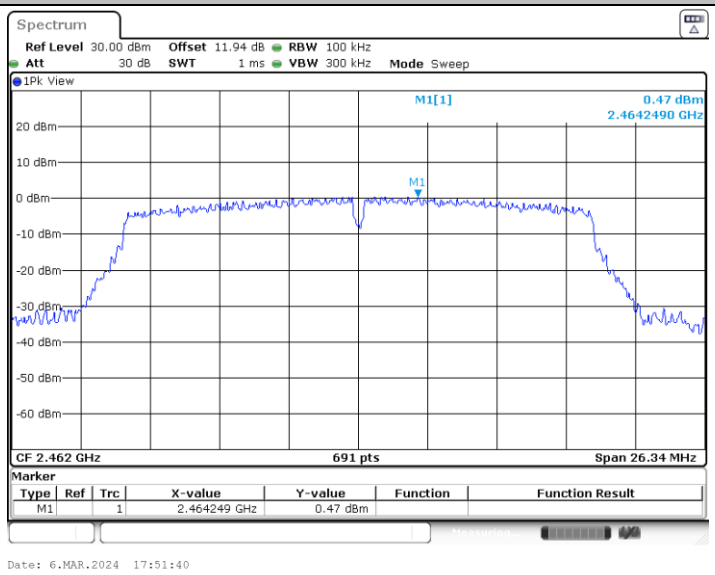
11N20SISO_Ant1_2412



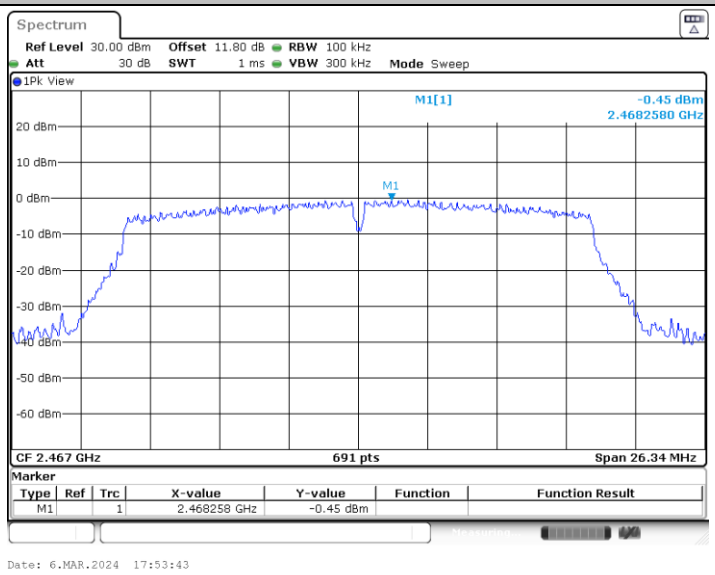
11N20SISO_Ant1_2437

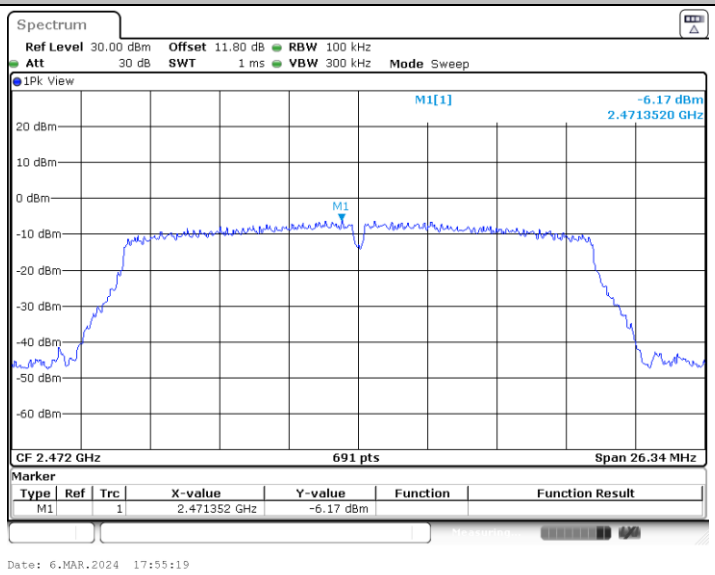


11N20SISO_Ant1_2462



11N20SISO_Ant1_2467



11N20SISO_Ant1_2472


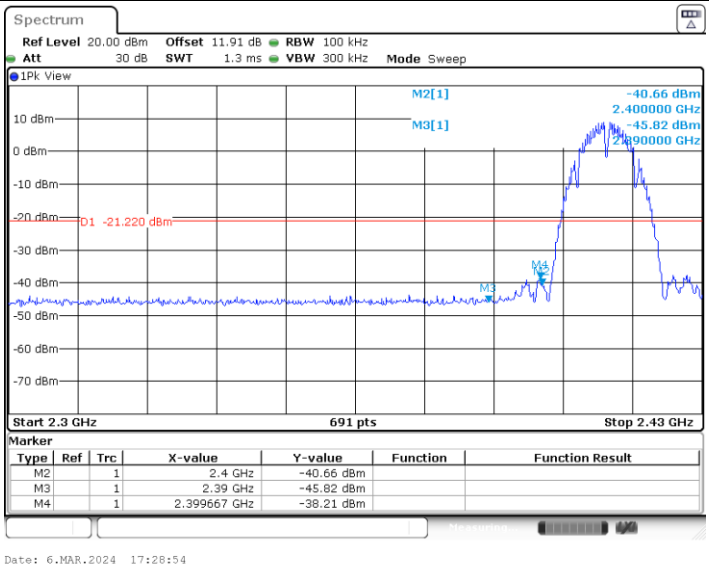
Band edge measurements

Test Result

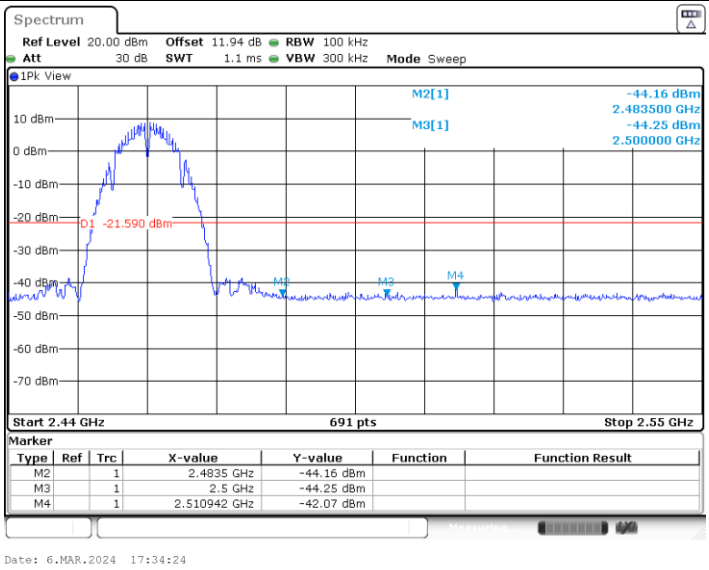
TestMode	Antenna	ChName	Freq(MHz)	RefLevel [dBm/100KHz]	Result [dBm/100KHz]	Limit [dBm/100KHz]	Verdict
11B	Ant1	Low	2412	8.78	-38.21	≤-21.22	PASS
		High	2462	8.41	-42.07	≤-21.59	PASS
			2467	8.57	-40.63	≤-21.43	PASS
			2472	8.54	-38.78	≤-21.46	PASS
11G	Ant1	Low	2412	1.85	-30.06	≤-28.15	PASS
		High	2462	1.75	-41.69	≤-28.25	PASS
			2467	1.26	-36.6	≤-28.74	PASS
			2472	-2.71	-39.58	≤-32.71	PASS
11N20SISO	Ant1	Low	2412	0.92	-31.8	≤-29.08	PASS
		High	2462	0.47	-40.91	≤-29.53	PASS
			2467	-0.45	-39.01	≤-30.45	PASS
			2472	-6.17	-42.08	≤-36.17	PASS

Test Graphs

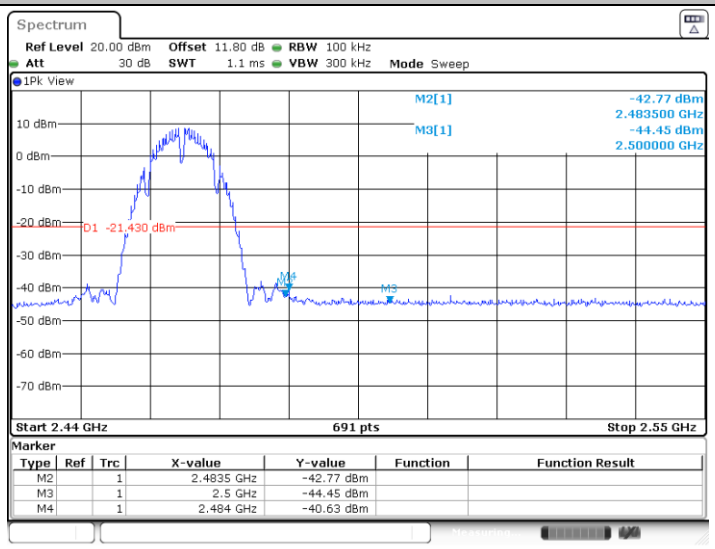
11B_Ant1_Low_2412



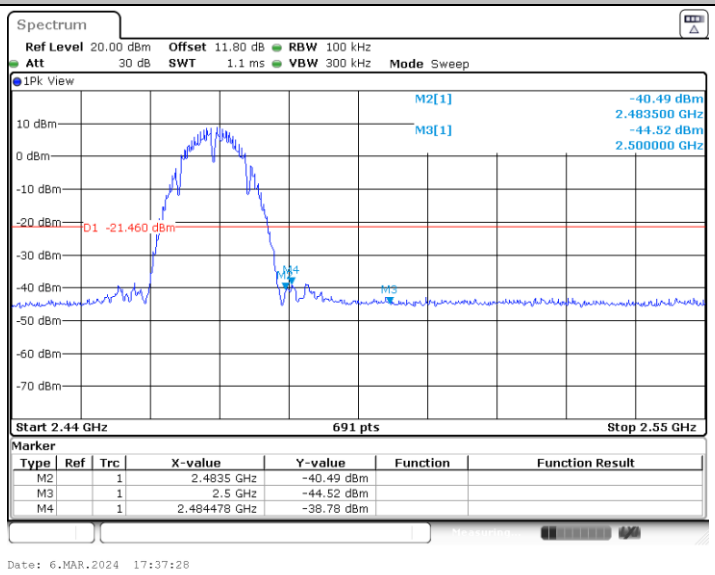
11B_Ant1_High_2462



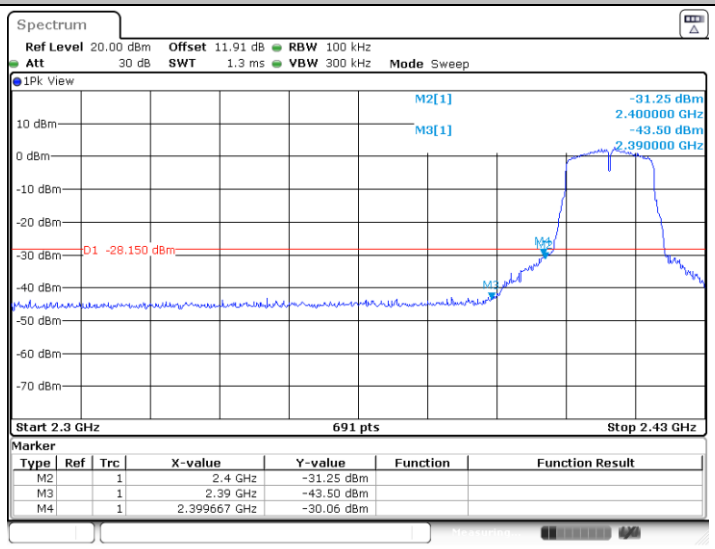
11B_Ant1_High_2467



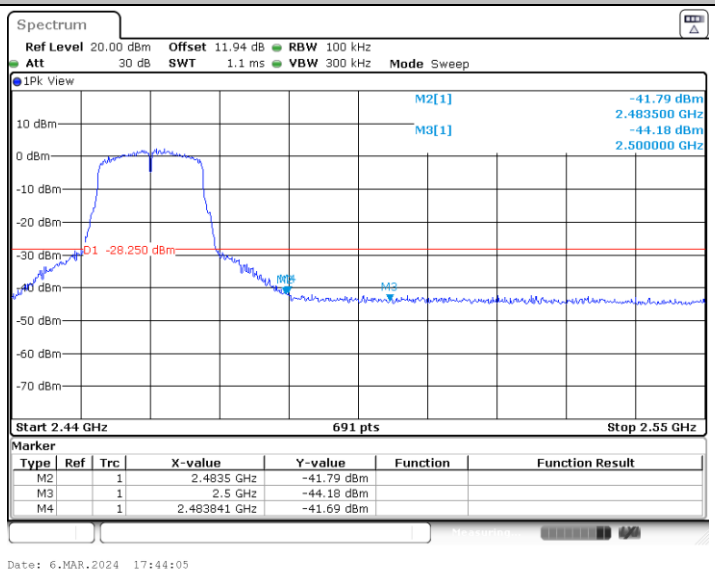
11B_Ant1_High_2472



11G_Ant1_Low_2412



11G_Ant1_High_2462



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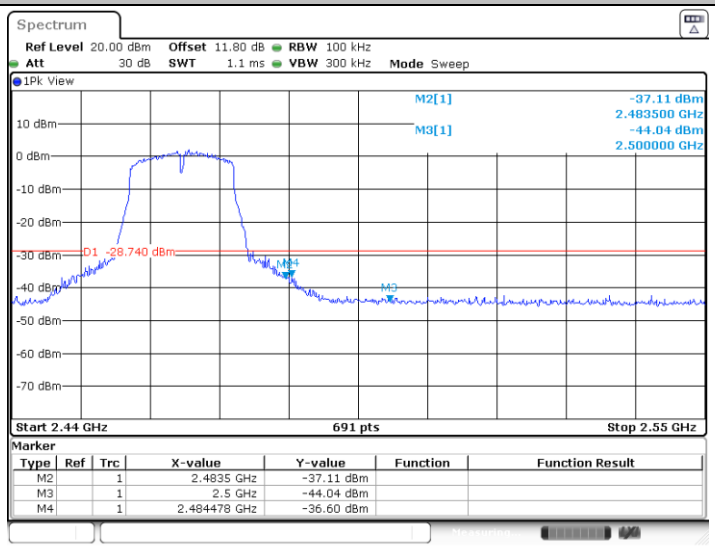
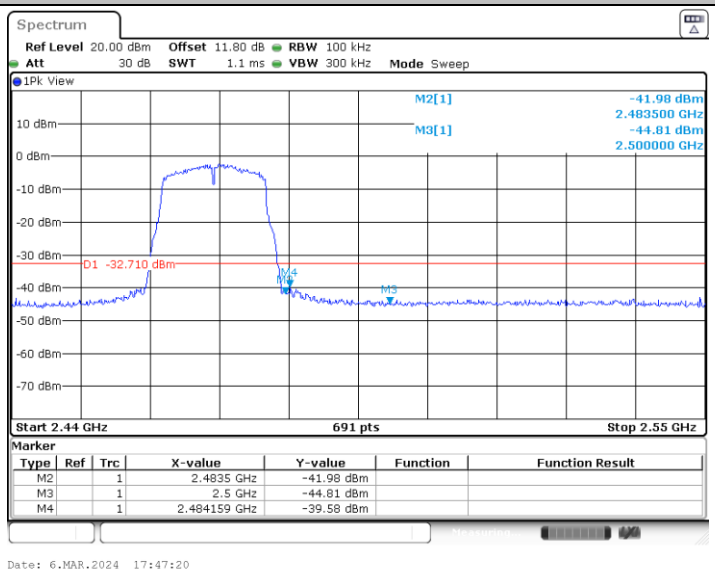
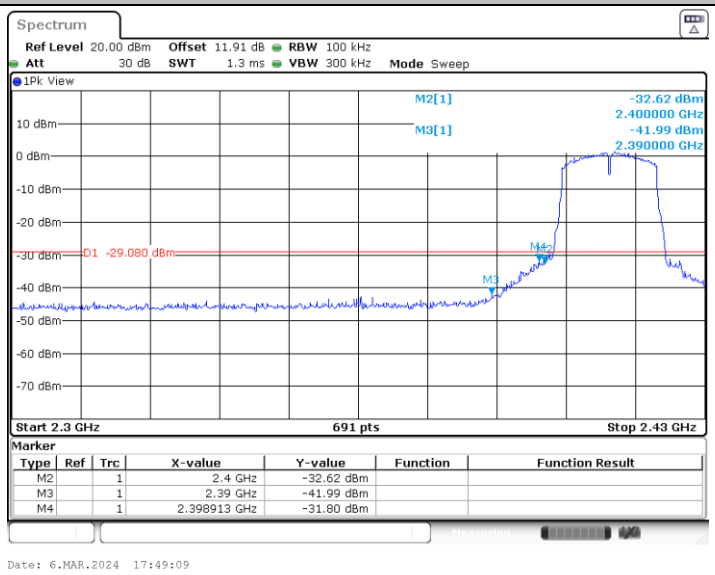


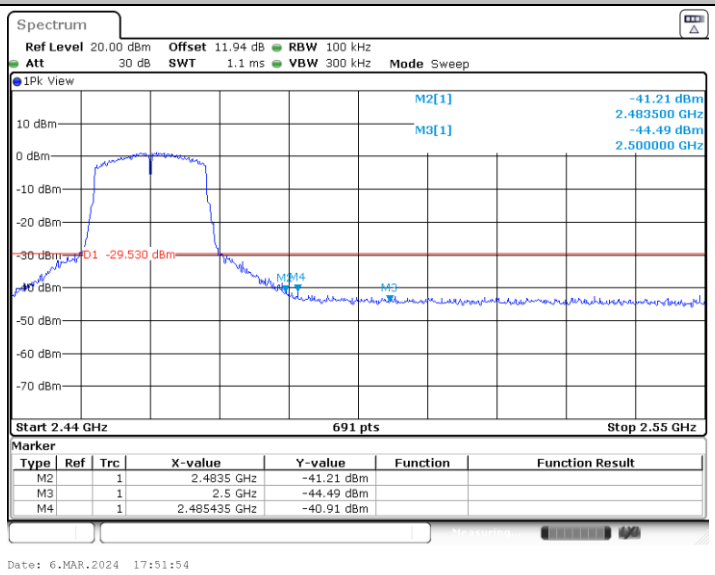
11G_Ant1_High_2472



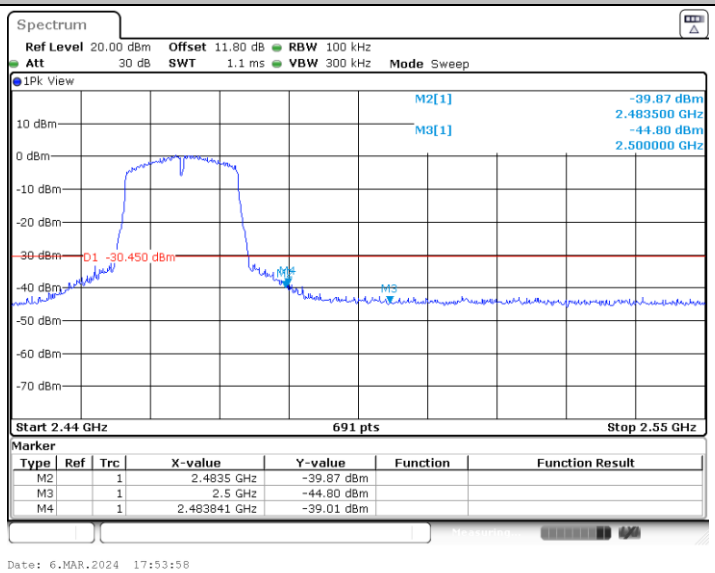
11N20SISO_Ant1_Low_2412



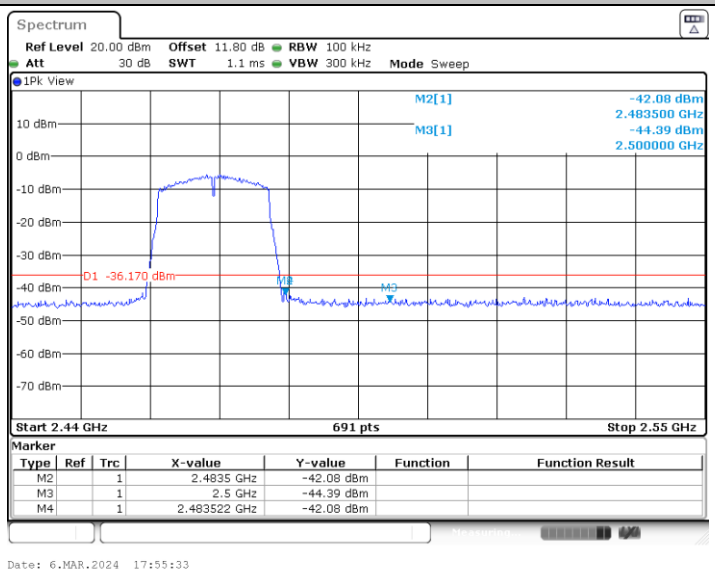
11N20SISO_Ant1_High_2462



11N20SISO_Ant1_High_2467



11N20SISO_Ant1_High_2472



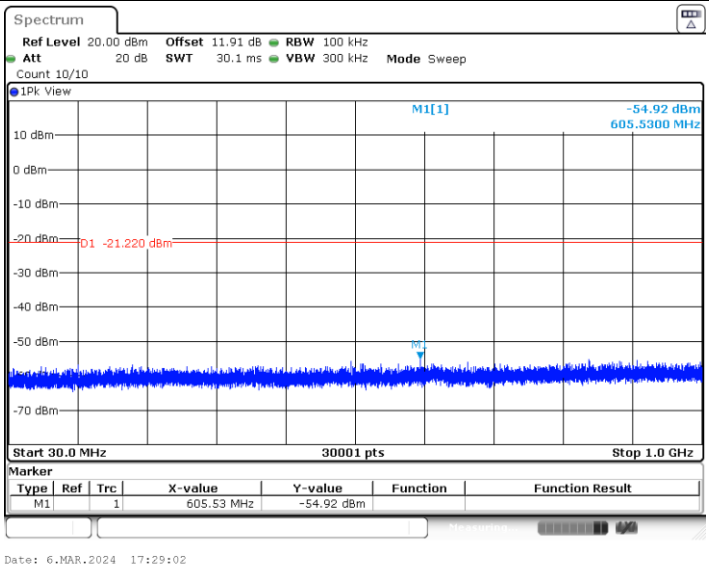
Conducted Spurious Emission

Test Result

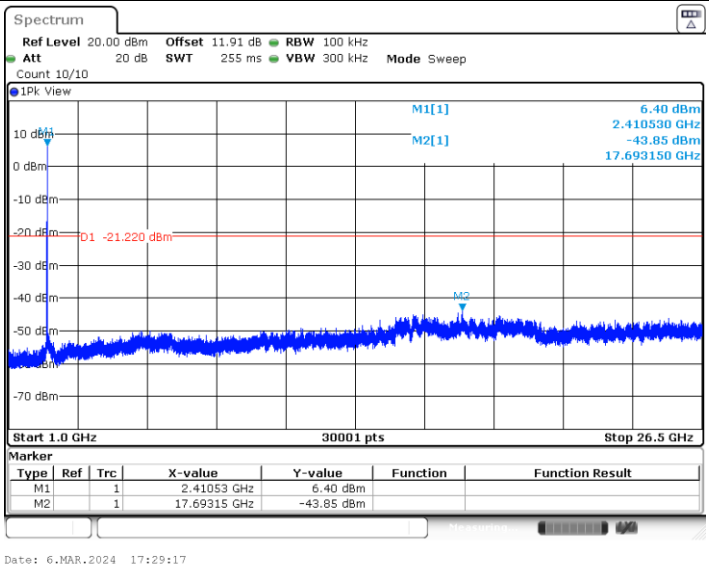
TestMode	Antenna	Freq(MHz)	FreqRange [Mhz]	RefLevel [dBm/100KHz]	Result [dBm/100KHz]	Limit [dBm/100KHz]	Verdict
11B	Ant1	2412	30~1000	8.78	-54.92	≤-21.22	PASS
			1000~26500	8.78	-43.85	≤-21.22	PASS
		2437	30~1000	8.48	-53.84	≤-21.52	PASS
			1000~26500	8.48	-44.58	≤-21.52	PASS
		2462	30~1000	8.41	-54.57	≤-21.59	PASS
			1000~26500	8.41	-44.93	≤-21.59	PASS
		2467	30~1000	8.57	-55.35	≤-21.43	PASS
			1000~26500	8.57	-45.06	≤-21.43	PASS
		2472	30~1000	8.54	-55.54	≤-21.46	PASS
			1000~26500	8.54	-44.41	≤-21.46	PASS
11G	Ant1	2412	30~1000	1.85	-55.32	≤-28.15	PASS
			1000~26500	1.85	-44.7	≤-28.15	PASS
		2437	30~1000	2.05	-55.38	≤-27.95	PASS
			1000~26500	2.05	-44.29	≤-27.95	PASS
		2462	30~1000	1.75	-54.65	≤-28.25	PASS
			1000~26500	1.75	-44.43	≤-28.25	PASS
		2467	30~1000	1.26	-55.55	≤-28.74	PASS
			1000~26500	1.26	-44.76	≤-28.74	PASS
		2472	30~1000	-2.71	-55.42	≤-32.71	PASS
			1000~26500	-2.71	-44.55	≤-32.71	PASS
11N20SISO	Ant1	2412	30~1000	0.92	-55.15	≤-29.08	PASS
			1000~26500	0.92	-43.73	≤-29.08	PASS
		2437	30~1000	0.95	-55.07	≤-29.05	PASS
			1000~26500	0.95	-44.24	≤-29.05	PASS
		2462	30~1000	0.47	-55.14	≤-29.53	PASS
			1000~26500	0.47	-44.35	≤-29.53	PASS
		2467	30~1000	-0.45	-55.26	≤-30.45	PASS
			1000~26500	-0.45	-44.25	≤-30.45	PASS
		2472	30~1000	-6.17	-54.89	≤-36.17	PASS
			1000~26500	-6.17	-44.97	≤-36.17	PASS

Test Graphs

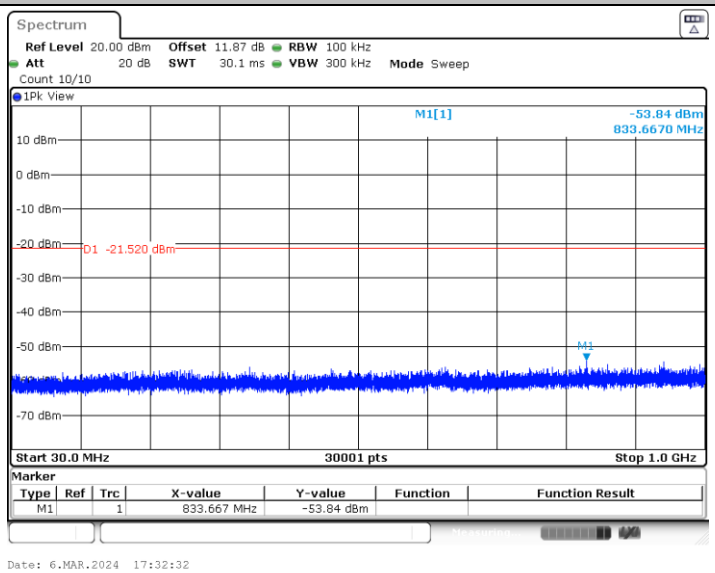
11B_Ant1_2412_30~1000



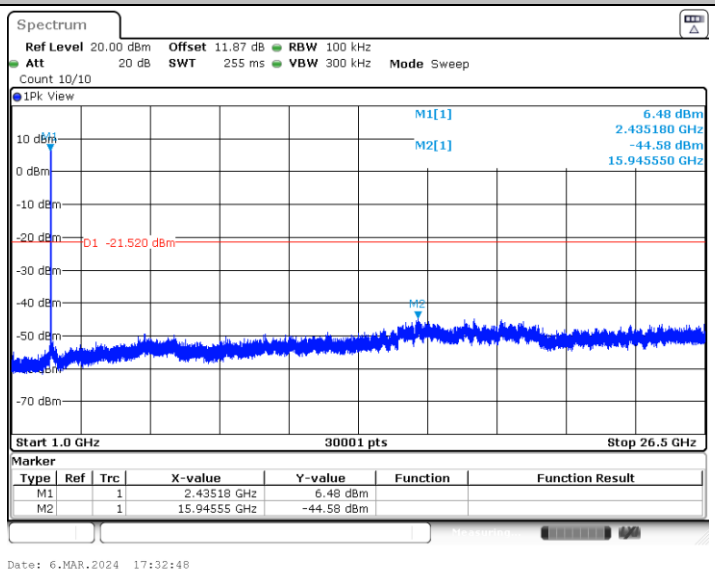
11B_Ant1_2412_1000~26500



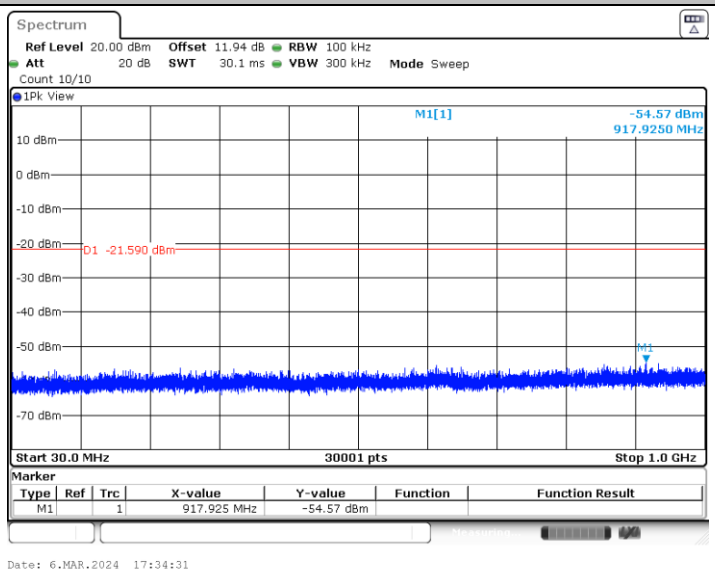
11B_Ant1_2437_30~1000



11B_Ant1_2437_1000~26500



11B_Ant1_2462_30~1000



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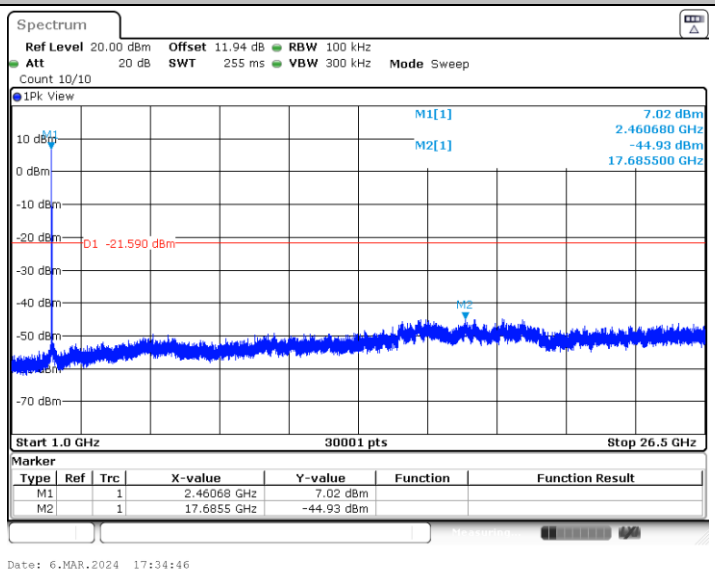

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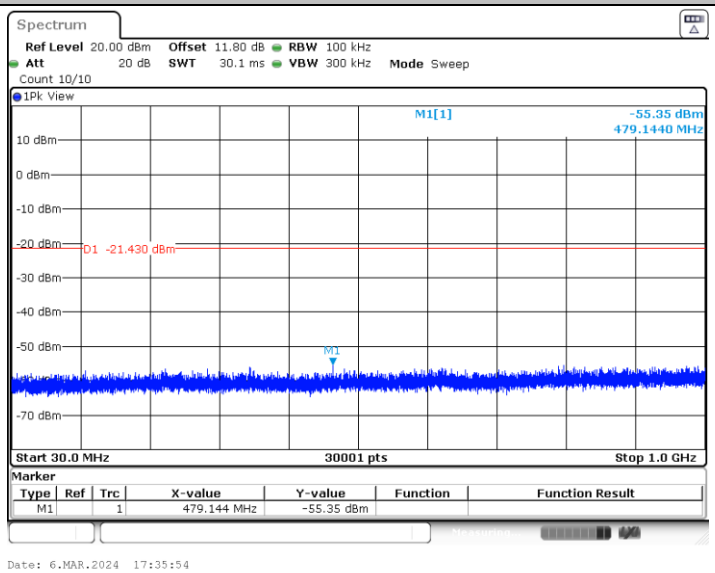
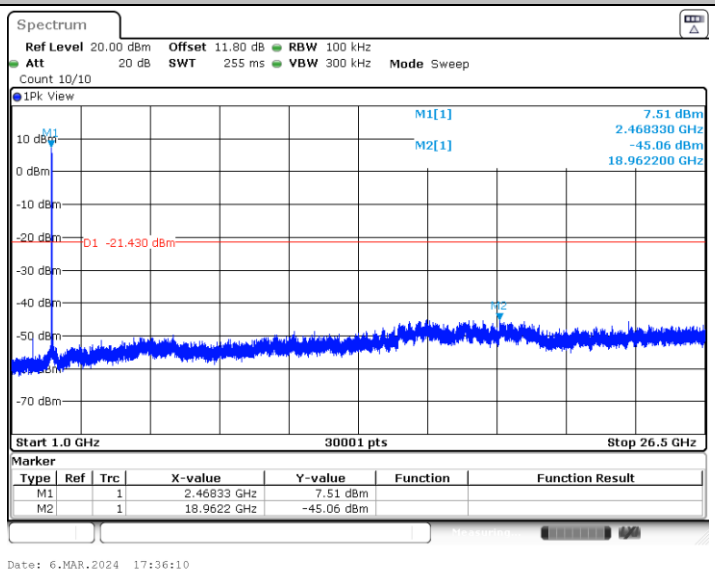
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