FCC RF Test Report

APPLICANT	:	Xiaomi Communications Co., Ltd.
EQUIPMENT	:	Tablet Computer
BRAND NAME	:	Xiaomi
MODEL NAME	:	24091RPADG
FCC ID	:	2AFZZ1RPADG
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Aug. 17, 2024 ~ Aug. 28, 2024

We, Sporton International Inc. (ShenZhen), 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. (ShenZhen), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED
Cert #5145.01

Sporton International Inc. (ShenZhen)

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People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR480902C	Rev. 01	Initial issue of report	Sep. 13, 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 3.16 dB at 2483.55 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.48 dB at 0.15 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

Xiaomi Communications Co., Ltd.
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.2 Manufacturer

Xiaomi Communications Co., Ltd.
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Tablet Computer
Brand Name	Xiaomi
Model Name	24091RPADG
FCC ID	2AFZZ1RPADG
IMEI Code/SN	Conducted: 7Q431K000503 Conduction: 85bacb2c Radiation: 588238cf
HW Version	135100O81
SW Version	Xiaomi HyperOS 2.0
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum Output Power to antenna (Average Power)	**<SISO_ANT0>** 802.11g : 18.91 dBm (0.0778 W) **<SISO_ANT2>** 802.11g : 19.16 dBm (0.0824 W) **<MIMO ANT.0+2>** 802.11b : 22.39 dBm (0.1734 W) 802.11n HT20 : 21.45 dBm (0.1396 W) 802.11n HT40 : 21.19 dBm (0.1315 W) 802.11be EHT20 : 21.85 dBm (0.1531 W) 802.11be EHT40 : 21.04 dBm (0.1271 W)
99% Occupied Bandwidth	802.11b : 13.379 MHz 802.11g : 17.658 MHz 802.11n HT20 : 18.566 MHz 802.11n HT40 : 37.476 MHz 802.11be EHT20 : 19.454 MHz 802.11be EHT40 : 38.684 MHz
Antenna Type	**<ANT0>** : PIFA Antenna **<ANT2>** : Resonant Cavity Antenna
Antenna Gain	**<ANT0>** : -3.8 dBi **<ANT2>** : -1.57 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) 802.11be: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM / 4096QAM)

Note:

1. The device support SISO mode for 11g, and support SISO & MIMO mode for 11b/11n/11ax/11be.
2. For WLAN SISO & MIMO CDD mode, the whole testing has assessed only MIMO CDD mode by referring to the higher normal output power.
3. For 802.11ax/11be mode, the 11ax power is set less than 11be power, thus whole testing have assessed only 802.11be EHT20/EHT40 by referring to the higher output power.
4. 802.11be 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, and partial RU verify bandedge/spurious.
5. 802.11be support OFDMA for small size RU, 52Tone + 26 Tone or 106Tone + 26Tone, test combination as below:

<Small size RU 52+26 Tone>:

Bandwidth	Tones		Index		For test modes configure
20MHz	26	52	1	38	1
20MHz	52	26	38	4	2
20MHz	52	26	39	7	3

<Small size RU 106+26 Tone>:

Bandwidth	Tones		Index		For test modes configure
20MHz	106	26	53	4	1
20MHz	26	106	4	54	2

6. The worse cases of RSE for partial RU and small size RU are shown in this report.

1.5 Modification of EUT

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

1.6 Testing Location

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.**
	CO01-SZ TH01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City, Guangdong Province 518103 People's Republic of China TEL: +86-755-86066985		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH04-SZ	AUDIX	E3	6.2009-8-24
2.	CO01-SZ	AUDIX	E3	6.120613b

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
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

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

2 Test Configuration of Equipment Under Test

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

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

2.1 Carrier Frequency and Channel

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

2.2 Test Mode

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

MIMO Antenna

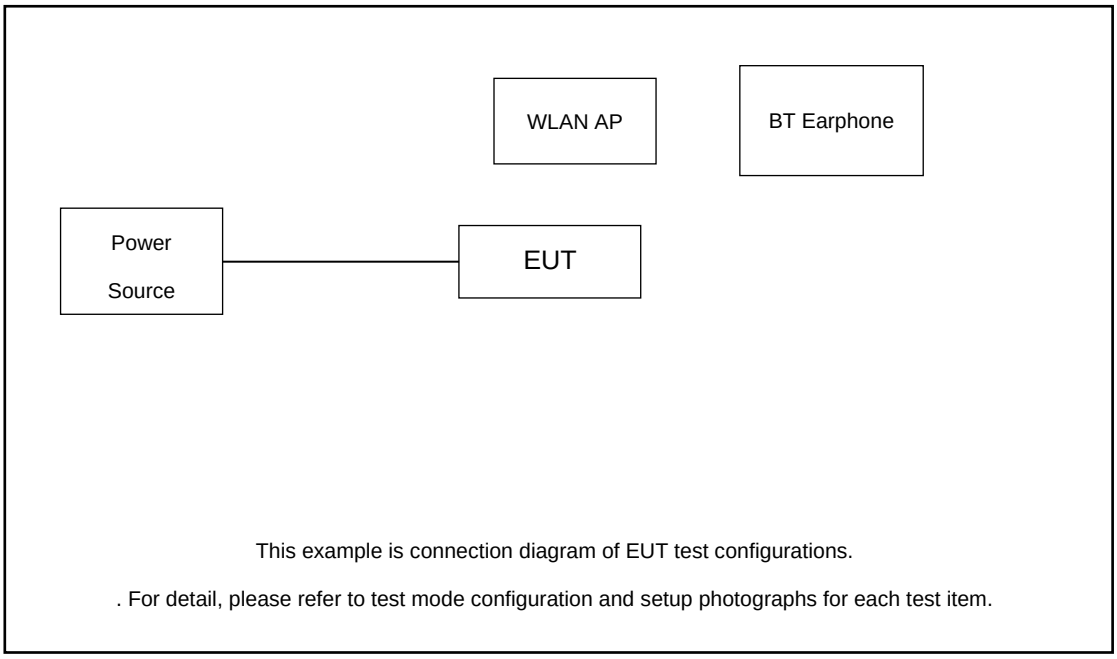
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11be EHT20 (Cover 11ax HE20)	MCS0
802.11be EHT40 (Cover 11ax HE40)	MCS0

Test Cases	
AC Conducted Emission	Mode 1 :Bluetooth Link + WLAN Link (2.4G) + USB Cable1 (Charging from Adapter) + Battery
Remark: For Radiated Test Cases, The tests were performance with Adapter and USB Cable 1.	

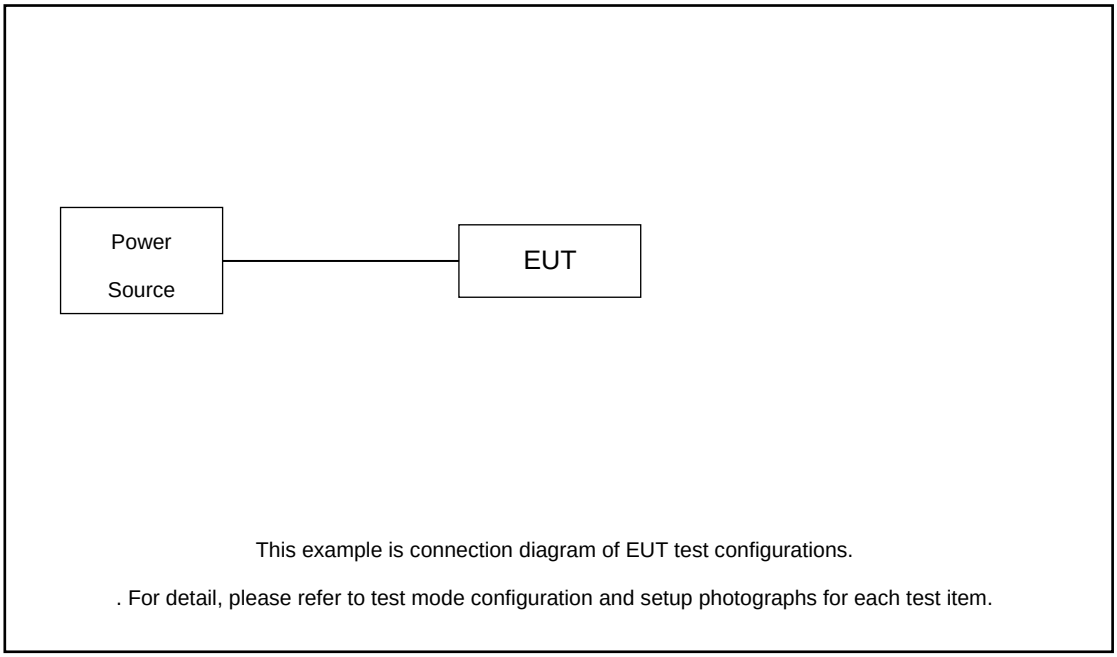
RSE Co-location
2.4G_11be EHT20_CH11_Full RU _TX + WPT TX (Charging for Pen)

2.3 Connection Diagram of Test System

AC Conducted Emission:



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.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A
2.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	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 2.12dB 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.

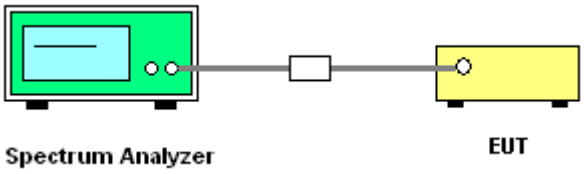
3.1.2 Measuring Instruments

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.

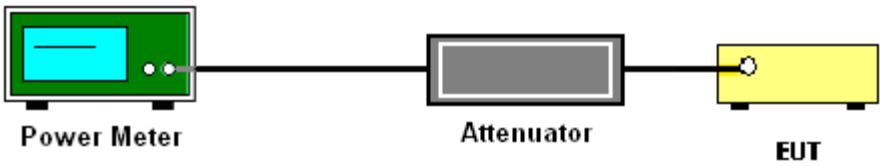
3.2.2 Measuring Instruments

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.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Average Output Power

2.4GHz Band Single Antenna																		
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Setting		Pass /Fail
					Ant0	Ant2	SUM	Ant0	Ant2	Ant0	Ant2	Ant0	Ant2	Ant0	Ant2	Ant0	Ant2	
11g	6Mbps	1	1	2412	18.91	19.16		30.00	30.00	-3.80	-1.57	15.11	17.59	36.00	36.00	19.00	19.00	Pass
11g	6Mbps	1	6	2437	18.67	18.44		30.00	30.00	-3.80	-1.57	14.87	16.87	36.00	36.00	19.00	19.00	Pass
11g	6Mbps	1	11	2462	18.75	18.85		30.00	30.00	-3.80	-1.57	14.95	17.28	36.00	36.00	19.00	19.00	Pass
11b	1Mbps	2	1	2412	19.24	19.44	22.35	30.00		-1.57		20.78		36.00		19.00		Pass
11b	1Mbps	2	6	2437	19.20	19.39	22.31	30.00		-1.57		20.74		36.00		19.00		Pass
11b	1Mbps	2	11	2462	19.35	19.40	22.39	30.00		-1.57		20.82		36.00		19.00		Pass
HT20	MCS0	2	1	2412	18.27	18.60	21.45	30.00		-1.57		19.88		36.00		18.50		Pass
HT20	MCS0	2	6	2437	18.18	18.38	21.29	30.00		-1.57		19.72		36.00		18.50		Pass
HT20	MCS0	2	11	2462	17.17	17.37	20.28	30.00		-1.57		18.71		36.00		17.50		Pass
HT40	MCS0	2	3	2422	16.97	17.47	20.24	30.00		-1.57		18.67		36.00		17.00		Pass
HT40	MCS0	2	6	2437	17.95	18.40	21.19	30.00		-1.57		19.62		36.00		18.00		Pass
HT40	MCS0	2	9	2452	17.47	17.80	20.65	30.00		-1.57		19.08		36.00		17.50		Pass

Note: Measured power (dBm) has offset with cable loss and Duty Factor.

2.4GHz Band MIMO																				
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)		Setting		Pass /Fail
						Ant0	Ant2	SUM	Ant0	Ant2	Ant0	Ant2	Ant0	Ant2	Ant0	Ant2	Ant0	Ant2	
EHT20	MCS0	2	1	2412	Full	18.73	18.93	21.84	30.00		-1.57		20.27		36.00		19.00		Pass
EHT20	MCS0	2	1	2412	26/0	7.94	8.10	11.03	30.00		-1.57		9.46		36.00		8.00		Pass
EHT20	MCS0	2	1	2412	52/37	11.93	12.10	15.03	30.00		-1.57		13.46		36.00		12.00		Pass
EHT20	MCS0	2	1	2412	106/53	13.87	14.11	17.00	30.00		-1.57		15.43		36.00		14.00		Pass
EHT20	MCS0	2	6	2437	Full	18.76	18.92	21.85	30.00		-1.57		20.28		36.00		19.00		Pass
EHT20	MCS0	2	11	2462	Full	16.86	16.91	19.90	30.00		-1.57		18.33		36.00		17.00		Pass
EHT20	MCS0	2	11	2462	26/8	9.44	9.44	12.45	30.00		-1.57		10.88		36.00		9.50		Pass
EHT20	MCS0	2	11	2462	52/40	11.81	11.84	14.84	30.00		-1.57		13.27		36.00		12.00		Pass
EHT20	MCS0	2	11	2462	106/54	14.82	14.89	17.87	30.00		-1.57		16.30		36.00		15.00		Pass
EHT40	MCS0	2	3	2422	Full	16.95	17.43	20.21	30.00		-1.57		18.64		36.00		17.00		Pass
EHT40	MCS0	2	6	2437	Full	17.80	18.25	21.04	30.00		-1.57		19.47		36.00		18.00		Pass
EHT40	MCS0	2	9	2452	Full	17.81	18.15	20.99	30.00		-1.57		19.42		36.00		18.00		Pass

Note: Measured power (dBm) has offset with cable loss and Duty Factor.

<802.11be Small RU>

Test Mode	Antenna	Channel	Mru Type	Mru Index	Set Power	Average power [dBm]	Duty Cycle [%]	DC Factor [dBm]	Result [dBm]	Limit [dBm]	Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
11BE20 MIMO	Ant0	2412	52+26_OFDMA	1	15	14.62	99.34	0.03	14.65	≤30.00	-3.8	10.85	≤36.00	PASS
			106+26_OFDMA	1	16	15.84	99.32	0.03	15.87	≤30.00	-3.8	12.07	≤36.00	PASS
	Ant2	2412	52+26_OFDMA	1	15	14.96	99.34	0.03	14.99	≤30.00	-1.57	13.42	≤36.00	PASS
			106+26_OFDMA	1	16	16.12	98.98	0.04	16.16	≤30.00	-1.57	14.59	≤36.00	PASS
	total	2412	52+26_OFDMA	1	---	---	---	---	17.83	≤30.00	-1.57	16.26	≤36.00	PASS
			106+26_OFDMA	1	---	---	---	---	19.03	≤30.00	-1.57	17.46	≤36.00	PASS
	Ant0	2462	52+26_OFDMA	3	14.5	14.15	99.63	0.02	14.17	≤30.00	-3.8	10.97	≤36.00	PASS
			106+26_OFDMA	2	14.5	14.31	99.63	0.02	14.33	≤30.00	-3.8	10.53	≤36.00	PASS
	Ant2	2462	52+26_OFDMA	3	14.5	14.22	99.63	0.02	14.24	≤30.00	-1.57	12.67	≤36.00	PASS
			106+26_OFDMA	2	14.5	14.51	99.63	0.02	14.53	≤30.00	-1.57	12.96	≤36.00	PASS
	total	2462	52+26_OFDMA	3	---	---	---	---	17.22	≤30.00	-1.57	15.65	≤36.00	PASS
			106+26_OFDMA	2	---	---	---	---	17.44	≤30.00	-1.57	15.87	≤36.00	PASS

Note: Measured power (dBm) has offset with cable loss and Duty Factor.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

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

3.3.2 Measuring Instruments

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

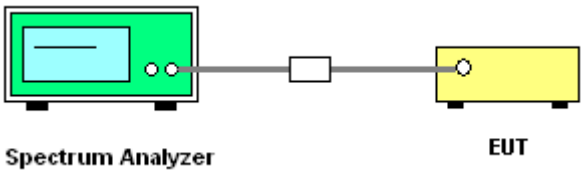
3.3.3 Test Procedures

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

   Method (b): Measure and sum spectral maxima across the outputs.

   The measurement on each individual output were performed with the same span and number on each individual output. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs.

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.

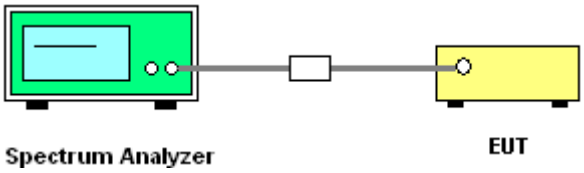
3.4.2 Measuring Instruments

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

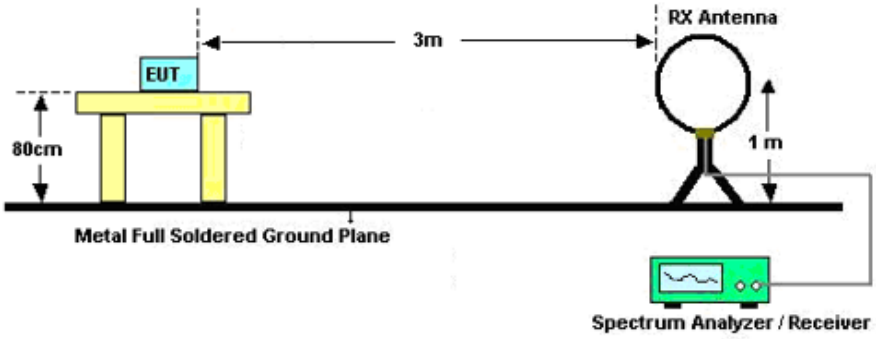
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

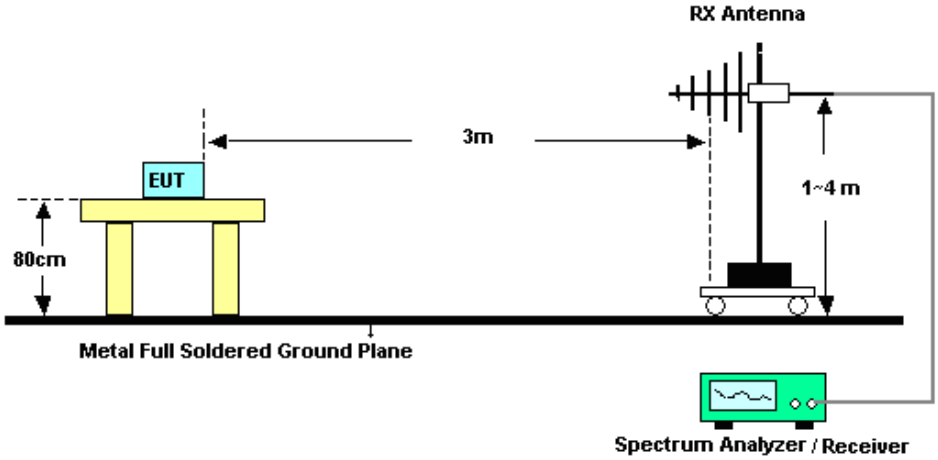
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

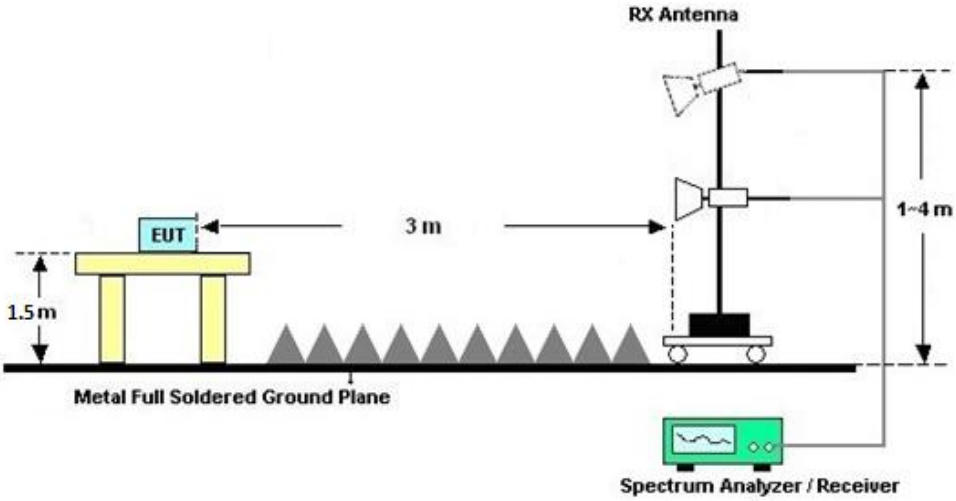
For radiated emissions below 30MHz



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.

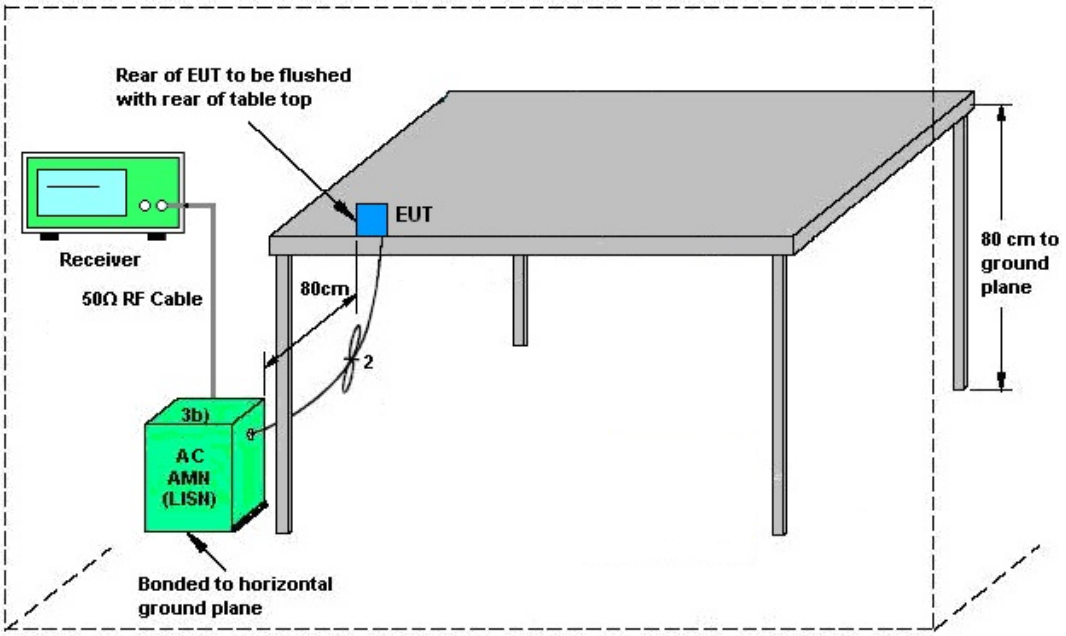
3.6.2 Measuring Instruments

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



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

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

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N_{ANT}/N_{SS}=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

<CDD Modes>

	Ant. 0 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	-3.80	-1.57	-1.57	0.40	0.00	0.00

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 09, 2024	Aug. 17, 2024~ Aug. 28, 2024	Apr. 08, 2025	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 29, 2023	Aug. 17, 2024~ Aug. 28, 2024	Dec. 28, 2024	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Aug. 21, 2023	Aug. 17, 2024~ Aug. 28, 2024	Aug. 20, 2024	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Aug. 20, 2024		Aug. 19, 2025	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Oct. 18, 2023	Aug. 19, 2024~ Aug. 25, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 03, 2024	Aug. 19, 2024~ Aug. 25, 2024	Jul. 02, 2025	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2E	101141	9kHz~30MHz	Dec. 29, 2023	Aug. 19, 2024~ Aug. 25, 2024	Dec. 28, 2024	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-2206	1GHz~18GHz	Apr. 09, 2024	Aug. 19, 2024~ Aug. 25, 2024	Apr. 08, 2025	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Jul. 04, 2024	Aug. 19, 2024~ Aug. 25, 2024	Jul. 03, 2025	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2023	Aug. 19, 2024~ Aug. 25, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 18, 2023	Aug. 19, 2024~ Aug. 25, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY57280136	500MHz~26.5GHz	Jul. 03, 2024	Aug. 19, 2024~ Aug. 25, 2024	Jul. 02, 2025	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 03, 2024	Aug. 19, 2024~ Aug. 25, 2024	Jul. 02, 2025	Radiation (03CH04-SZ)
AC Power Source	APC	AFV-S-600B	F119050019	N/A	Oct. 18, 2023	Aug. 19, 2024~ Aug. 25, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Aug. 19, 2024~ Aug. 25, 2024	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Aug. 19, 2024~ Aug. 25, 2024	NCR	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Jul. 04, 2024	Aug. 27, 2024	Jul. 03, 2025	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Jul. 04, 2024	Aug. 27, 2024	Jul. 03, 2025	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 16, 2023	Aug. 27, 2024	Oct. 15, 2024	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Aug. 14, 2024	Aug. 27, 2024	Aug. 13, 2025	Conduction (CO01-SZ)

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))	2.5 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.8 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1 dB

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

Appendix A. Conducted Test Results

Ambient Condition: 24-26 ℃, 45-55 %RH	
Test Date: 2024.08.17~2024.8.28	**Test Engineer:** Wen Shiwei

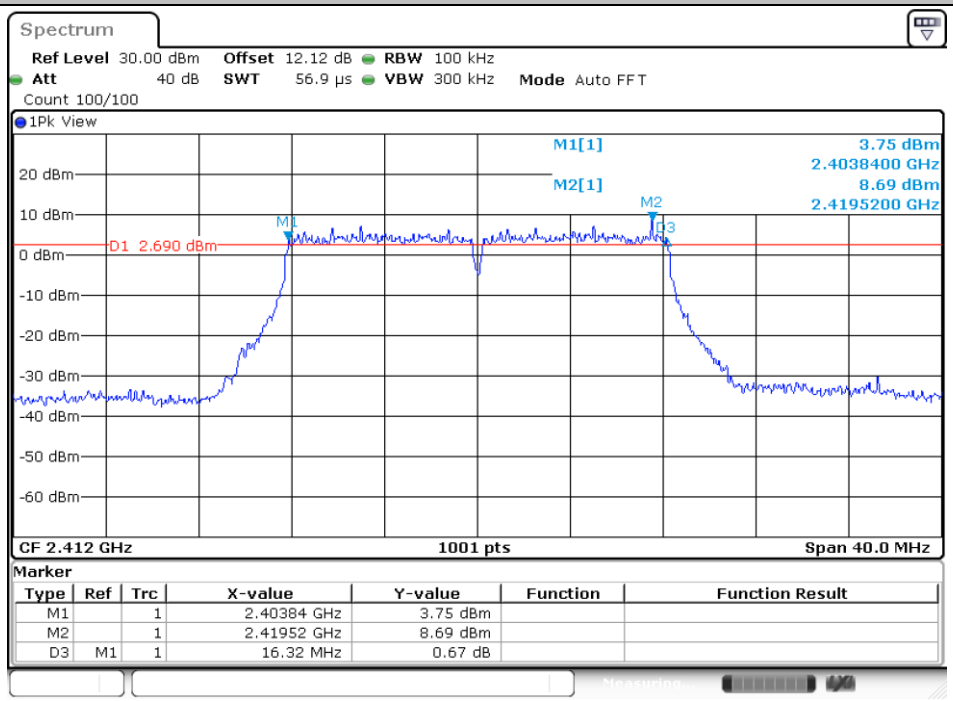
DTS Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11G-SISO	Ant0	2412	16.32	2403.84	2420.16	0.5	PASS
	Ant2	2412	16.32	2403.84	2420.16	0.5	PASS
	Ant0	2437	16.32	2428.84	2445.16	0.5	PASS
	Ant2	2437	16.36	2428.84	2445.20	0.5	PASS
	Ant0	2462	16.48	2453.72	2470.20	0.5	PASS
	Ant2	2462	16.32	2453.84	2470.16	0.5	PASS
11B-CDD	Ant0	2412	9.08	2407.48	2416.56	0.5	PASS
	Ant2	2412	9.12	2407.44	2416.56	0.5	PASS
	Ant0	2437	7.12	2433.44	2440.56	0.5	PASS
	Ant2	2437	7.12	2433.44	2440.56	0.5	PASS
	Ant0	2462	7.12	2458.44	2465.56	0.5	PASS
	Ant2	2462	7.12	2458.44	2465.56	0.5	PASS
11N20MIMO -CDD	Ant0	2412	17.60	2403.20	2420.80	0.5	PASS
	Ant2	2412	17.60	2403.20	2420.80	0.5	PASS
	Ant0	2437	17.84	2428.08	2445.92	0.5	PASS
	Ant2	2437	17.60	2428.20	2445.80	0.5	PASS
	Ant0	2462	17.60	2453.20	2470.80	0.5	PASS
	Ant2	2462	17.60	2453.20	2470.80	0.5	PASS
11N40MIMO -CDD	Ant0	2422	36.32	2403.84	2440.16	0.5	PASS
	Ant2	2422	36.32	2403.84	2440.16	0.5	PASS
	Ant0	2437	36.40	2418.84	2455.24	0.5	PASS
	Ant2	2437	36.32	2418.84	2455.16	0.5	PASS
	Ant0	2452	36.40	2433.84	2470.24	0.5	PASS
	Ant2	2452	36.32	2433.84	2470.16	0.5	PASS
11BE20MIMO -CDD	Ant0	2412	18.96	2402.52	2421.48	0.5	PASS
	Ant2	2412	19.00	2402.52	2421.52	0.5	PASS
	Ant0	2437	19.04	2427.48	2446.52	0.5	PASS
	Ant2	2437	19.04	2427.48	2446.52	0.5	PASS
	Ant0	2462	19.00	2452.52	2471.52	0.5	PASS
	Ant2	2462	19.00	2452.52	2471.52	0.5	PASS
11BE40MIMO -CDD	Ant0	2422	38.40	2402.80	2441.20	0.5	PASS
	Ant2	2422	38.16	2402.88	2441.04	0.5	PASS
	Ant0	2437	38.16	2417.88	2456.04	0.5	PASS
	Ant2	2437	38.32	2417.88	2456.20	0.5	PASS
	Ant0	2452	38.24	2432.88	2471.12	0.5	PASS
	Ant2	2452	38.24	2432.88	2471.12	0.5	PASS

Test Graphs

11G_Ant0_2412



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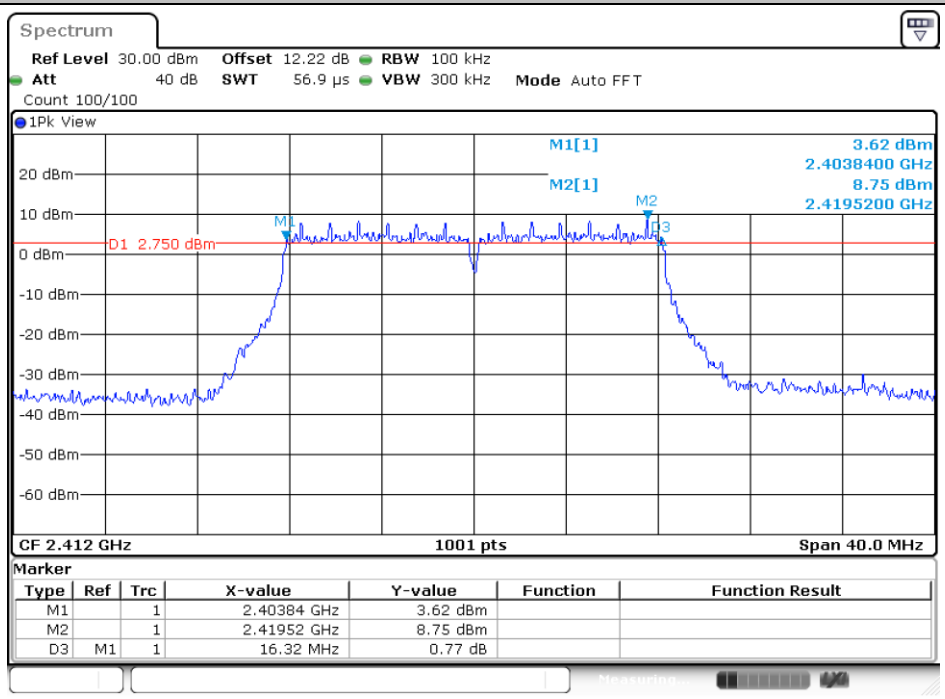

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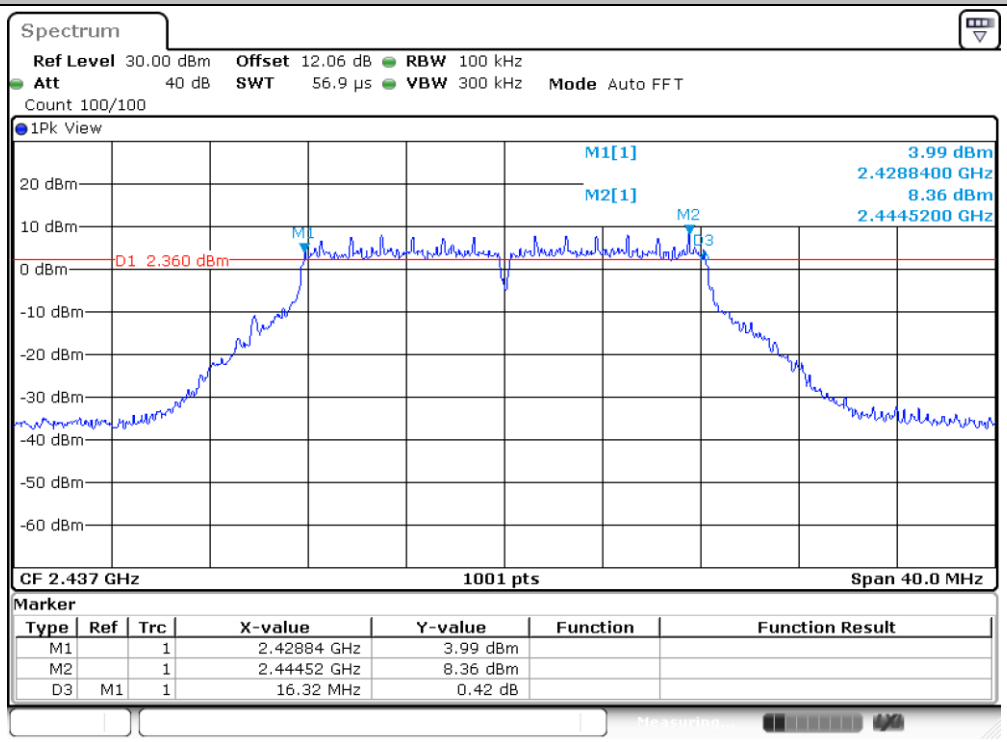

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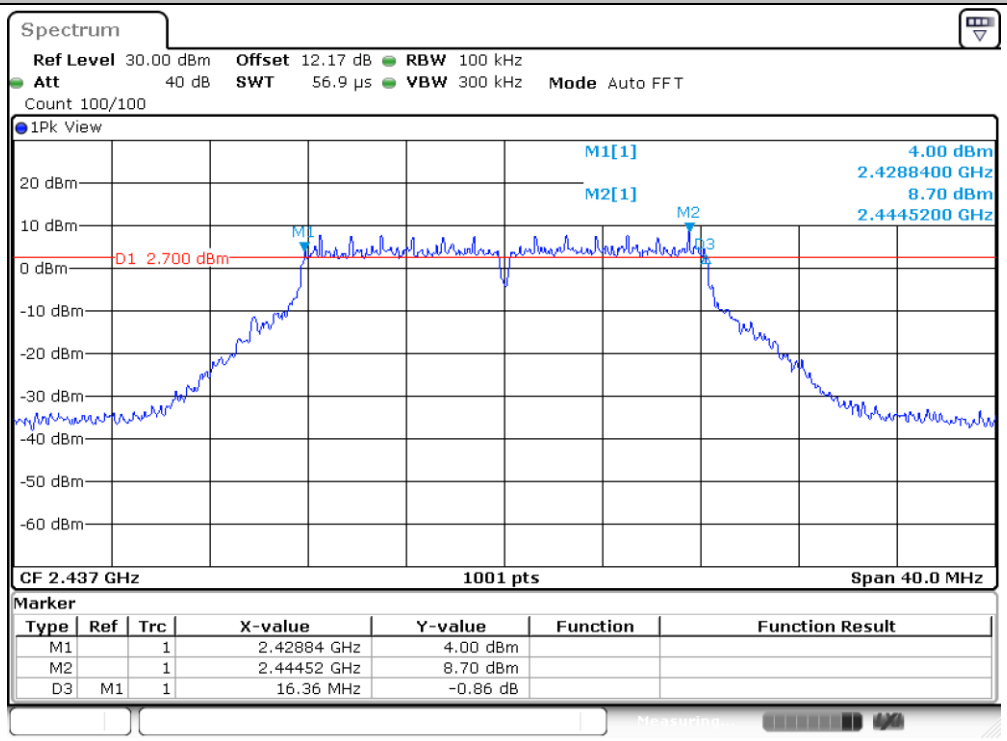

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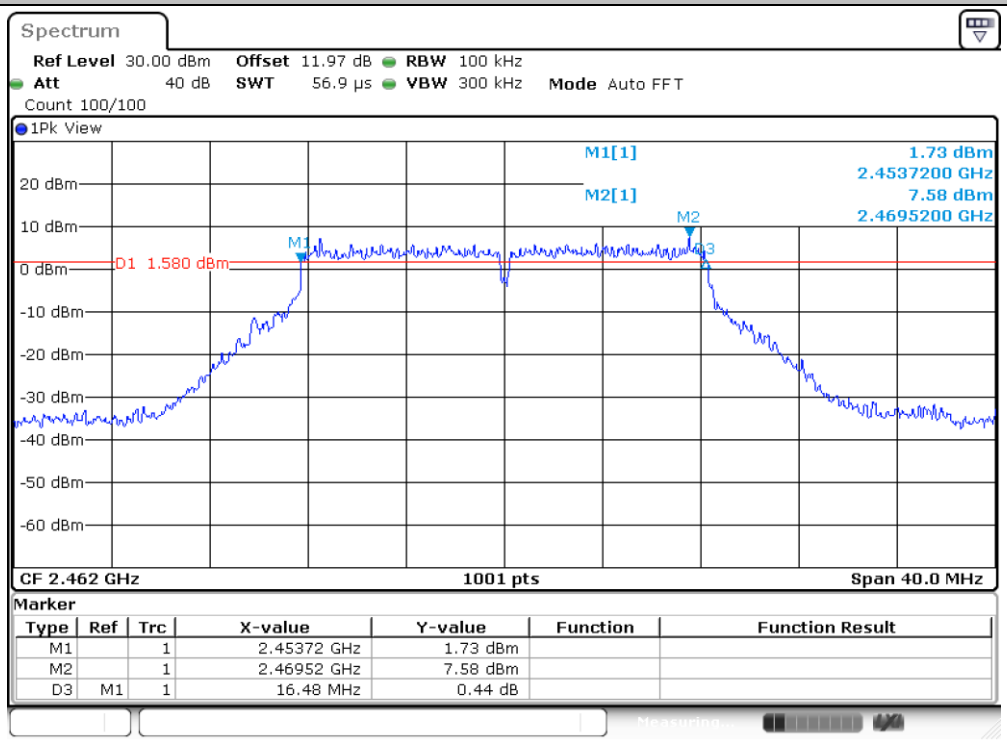

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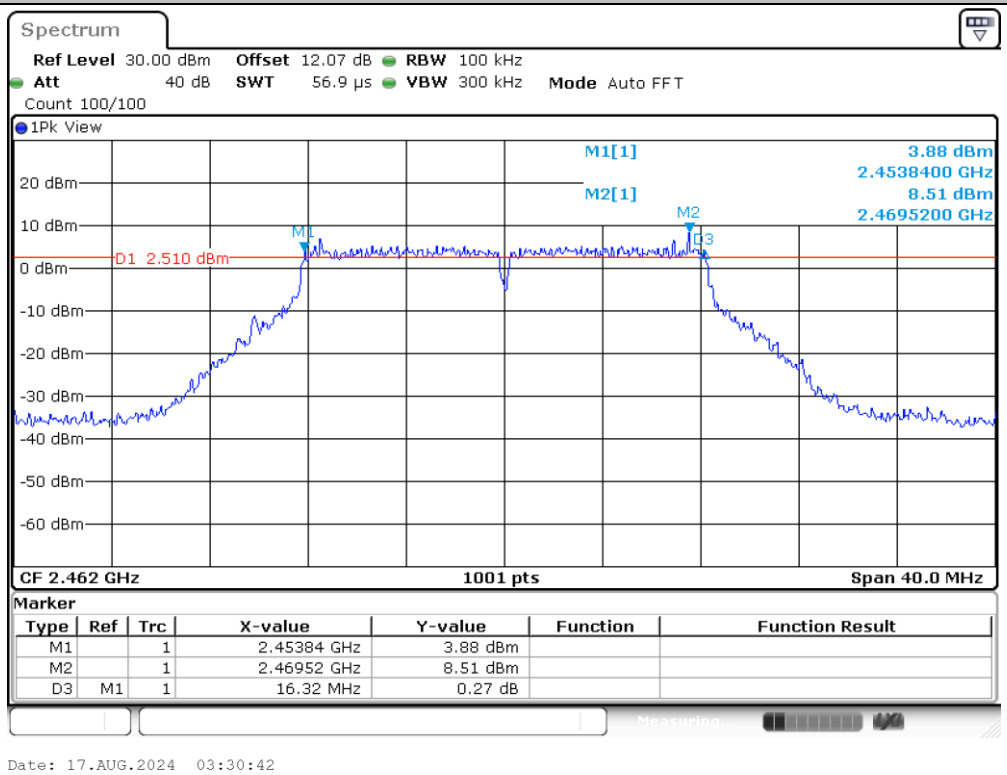

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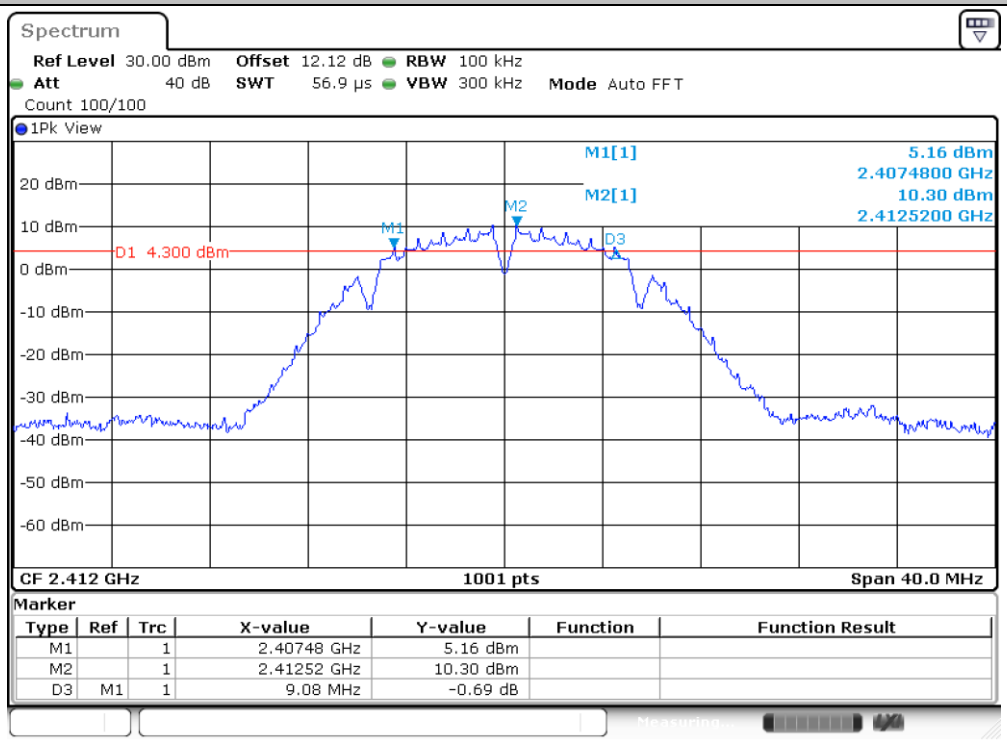

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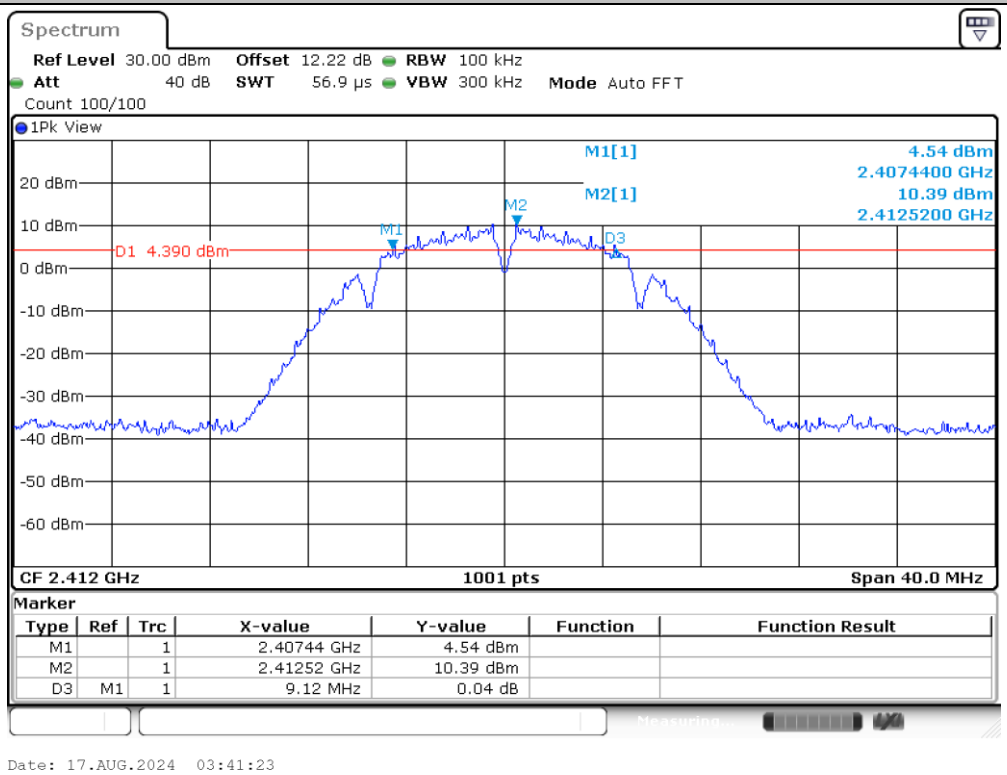

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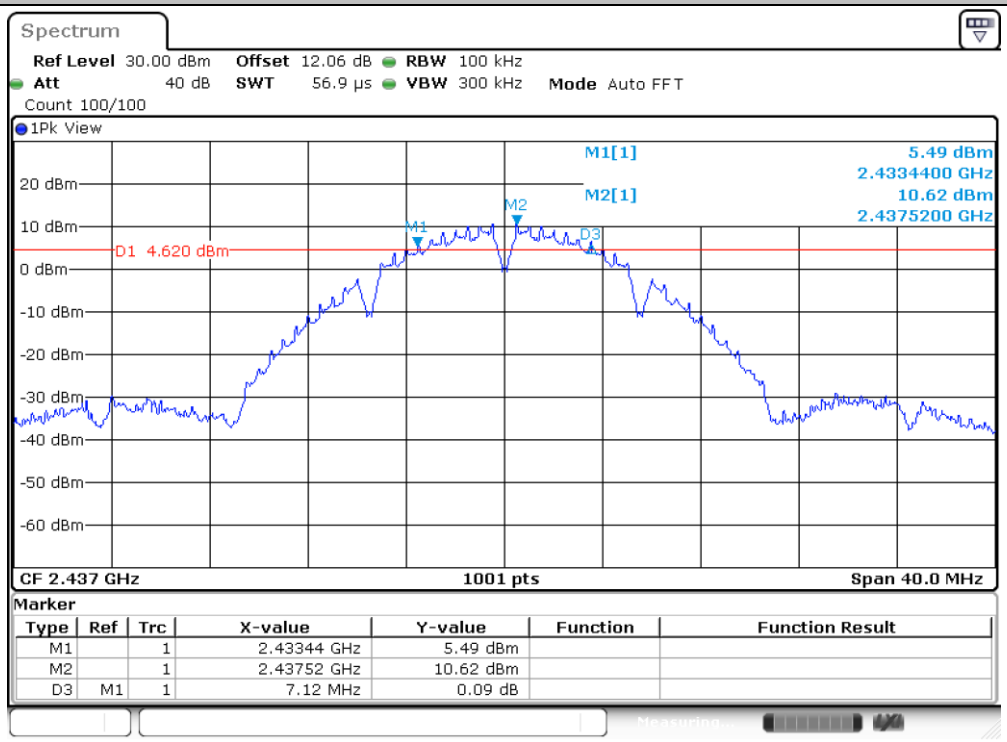

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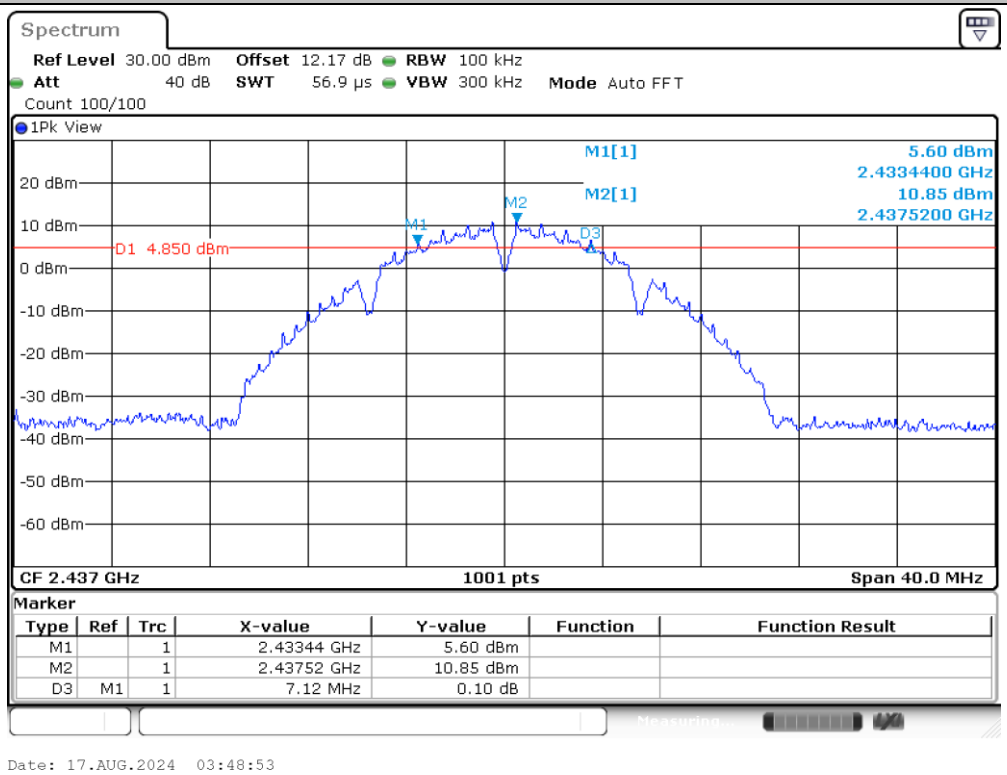

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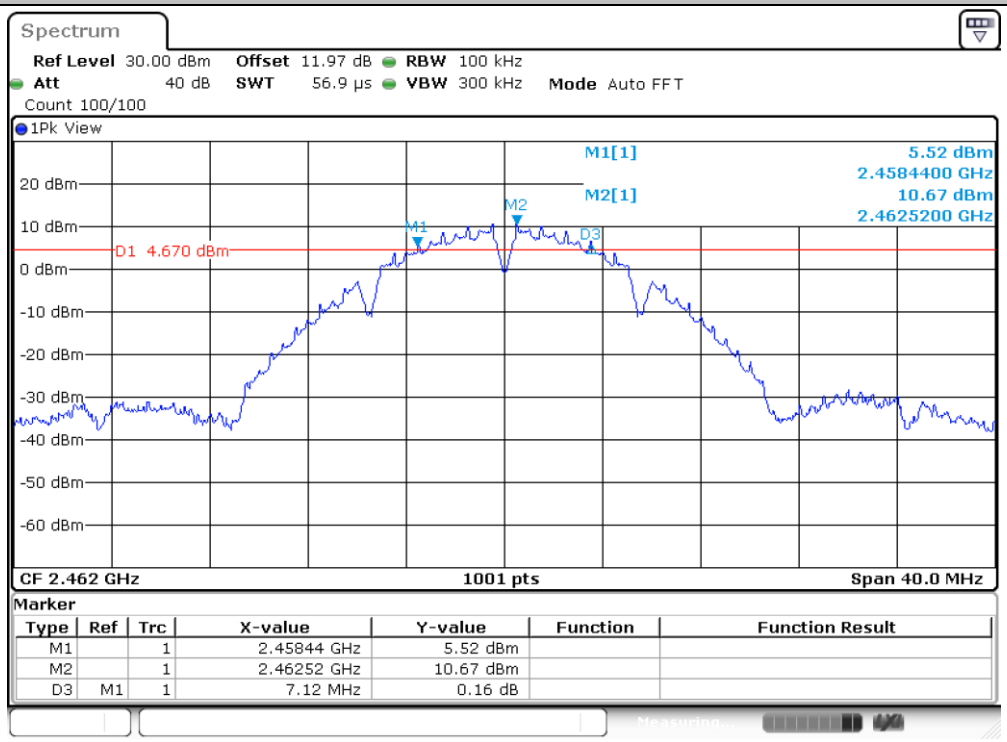

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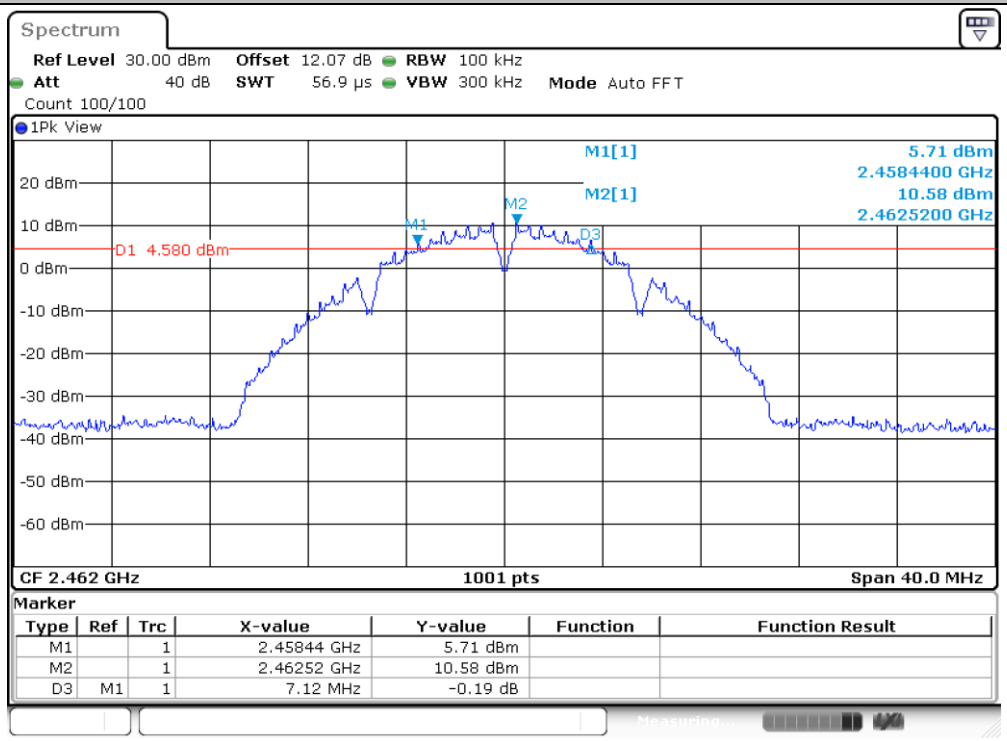

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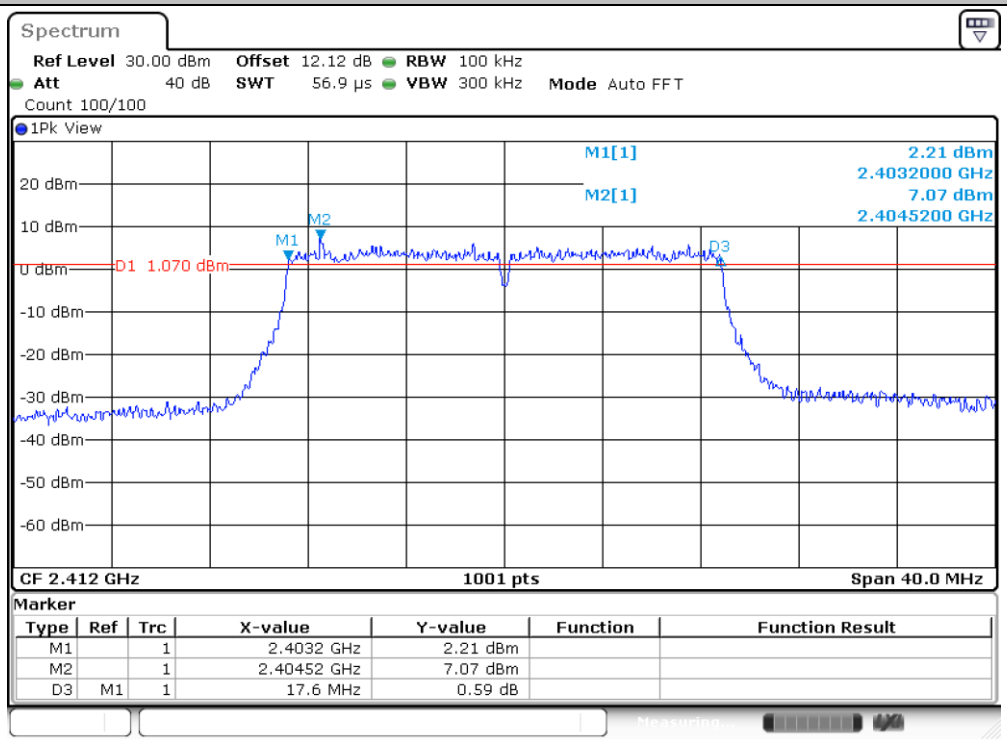

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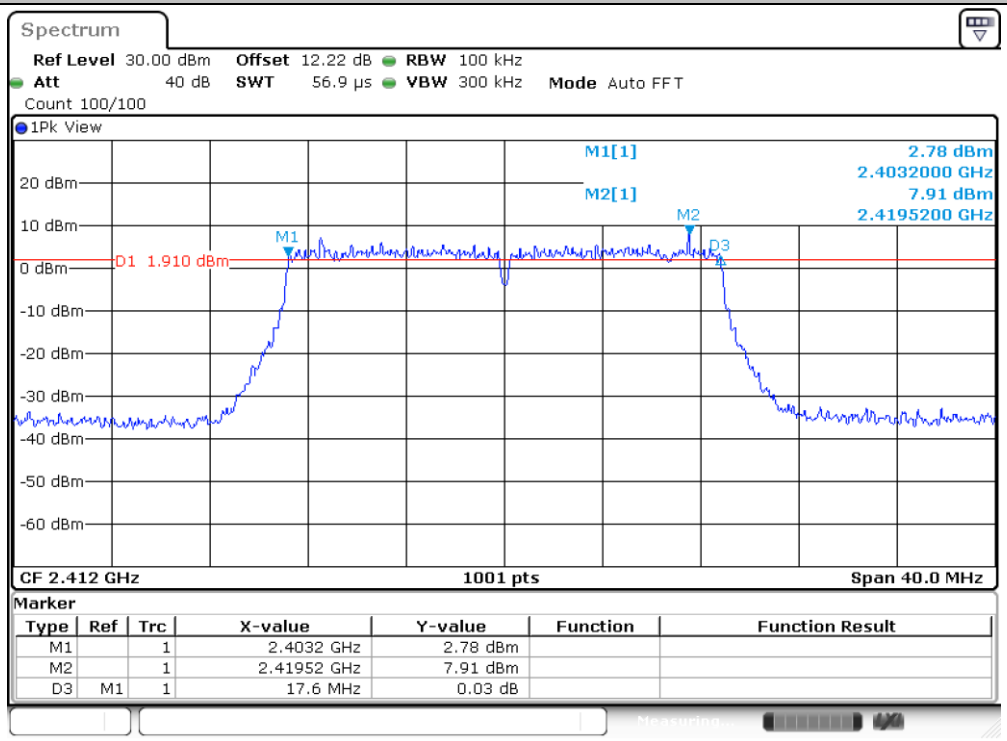

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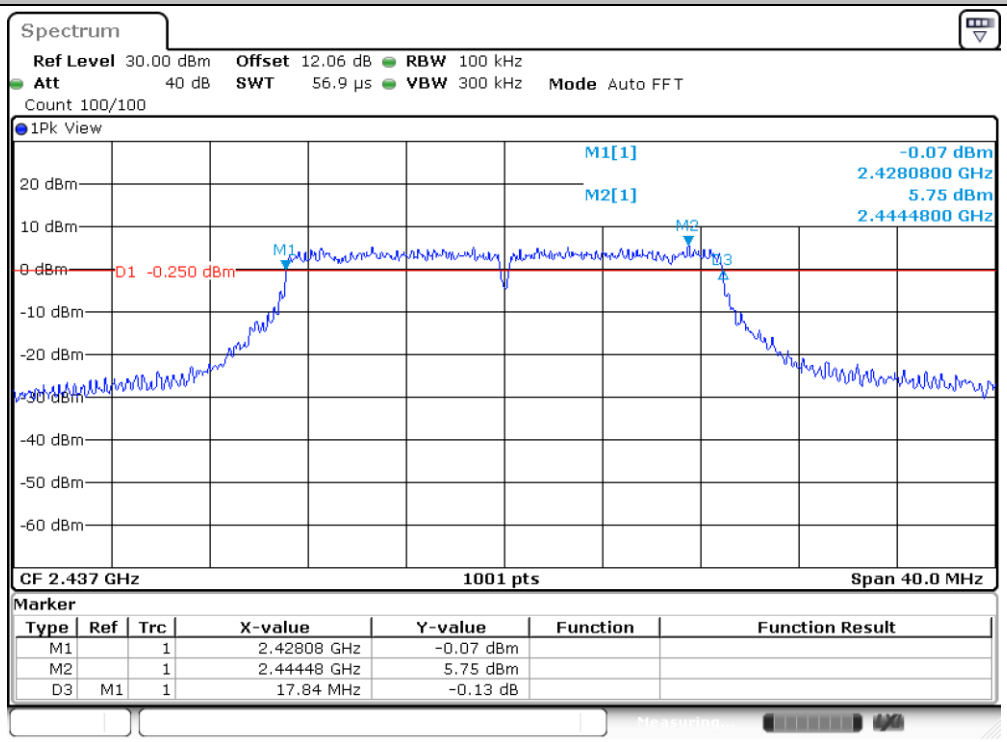

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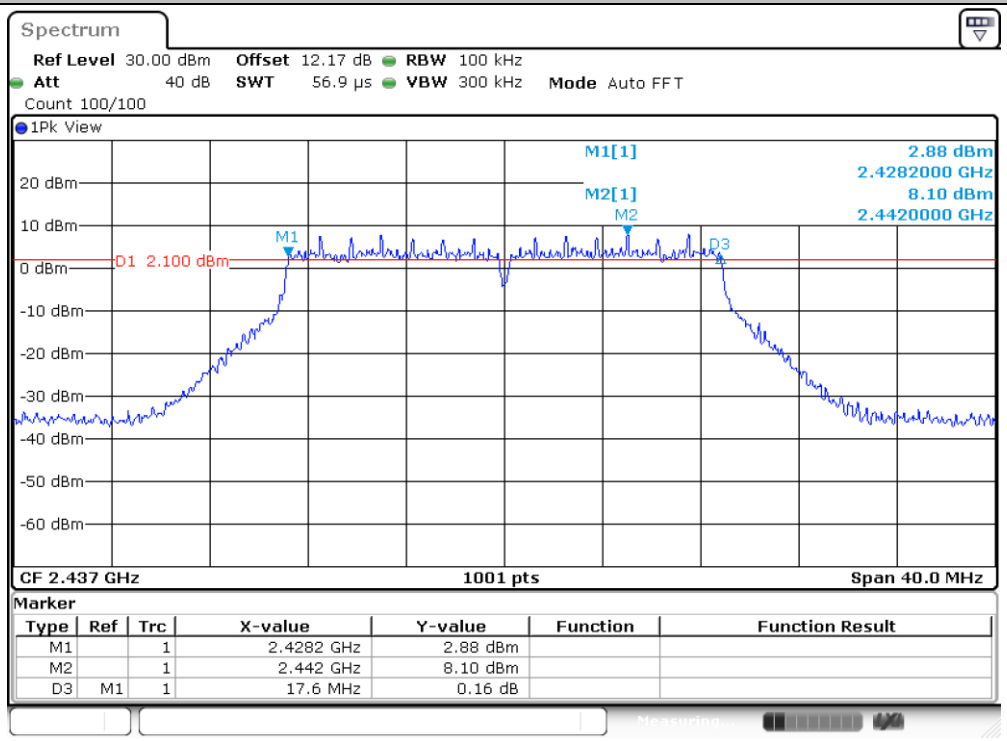
11N20MIMO_Ant2_2437



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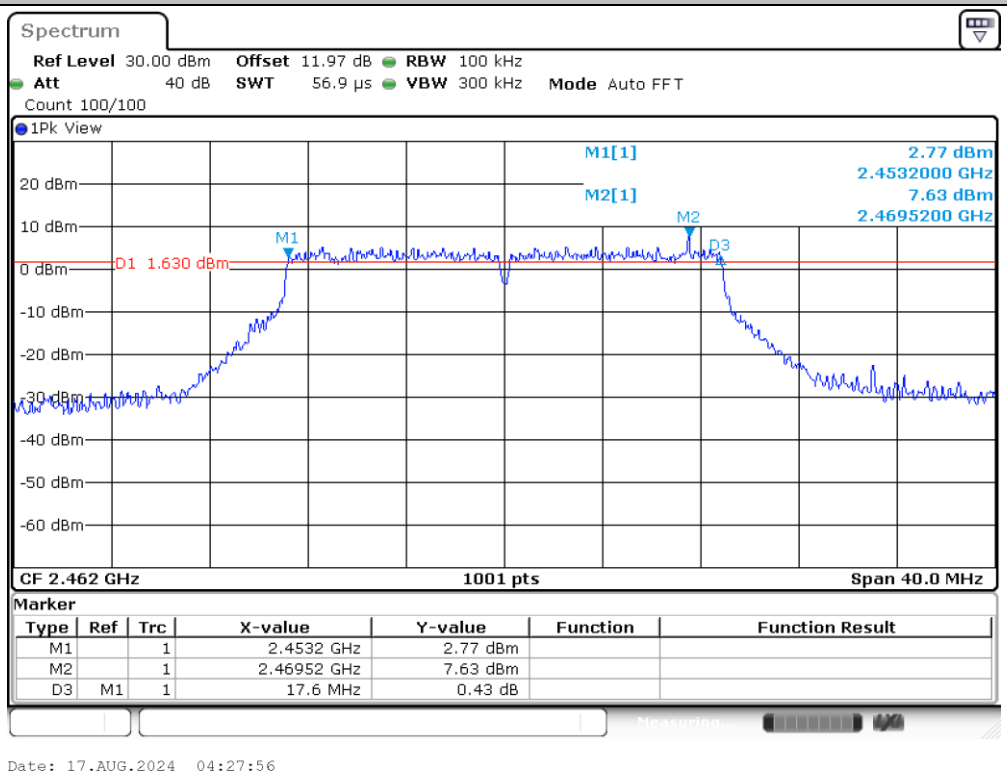

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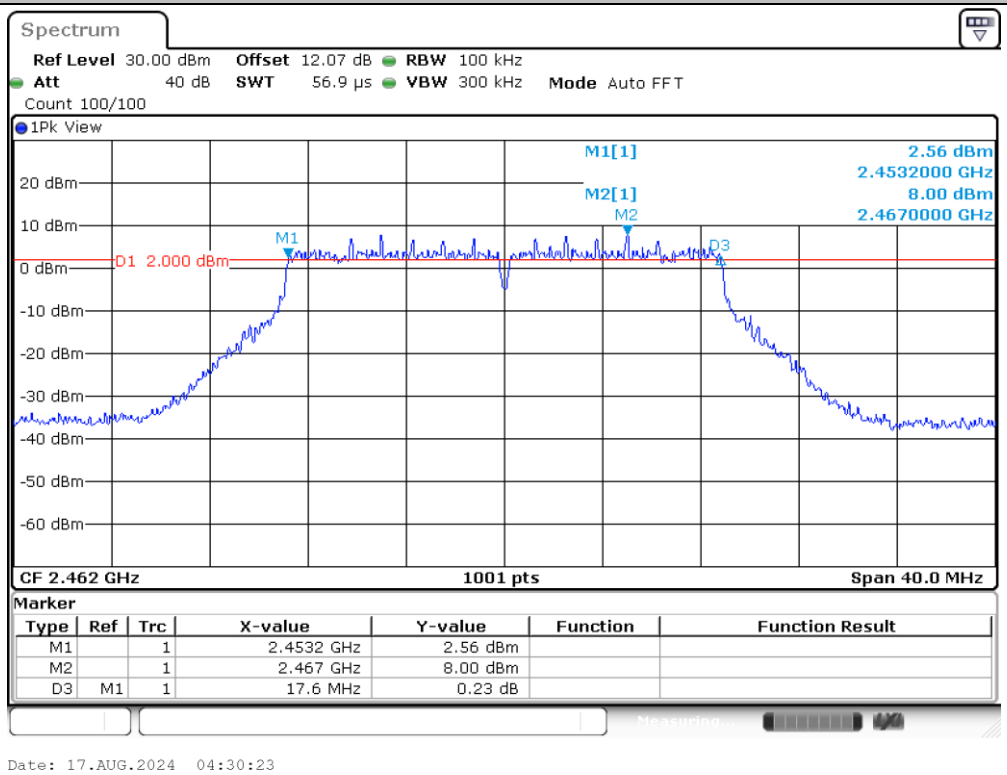

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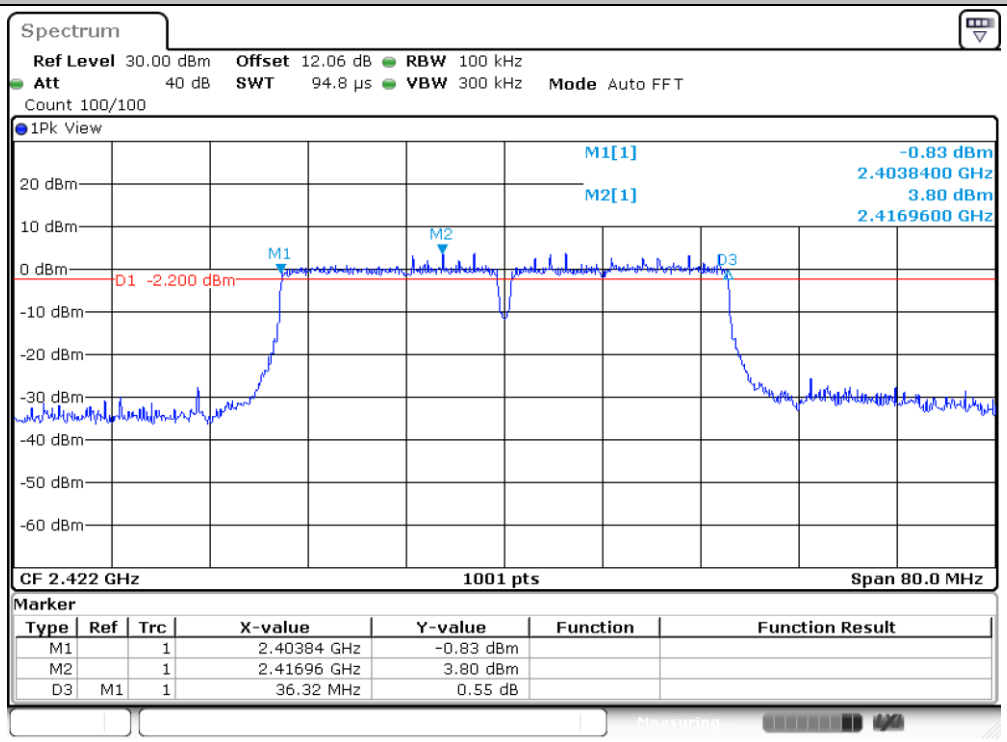

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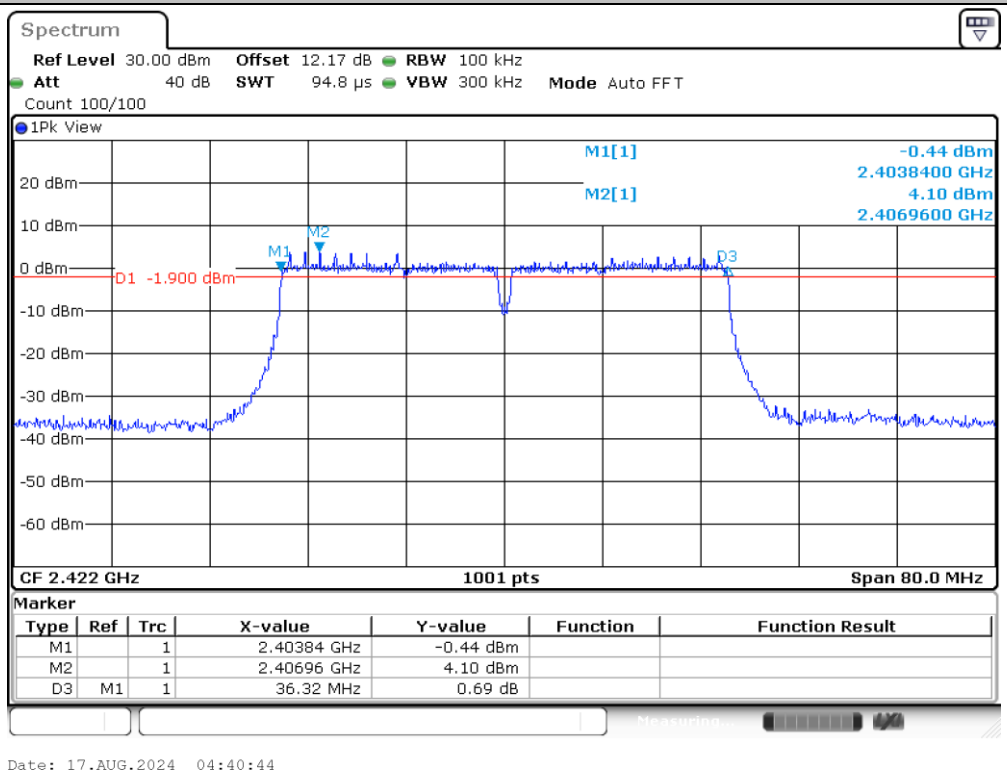

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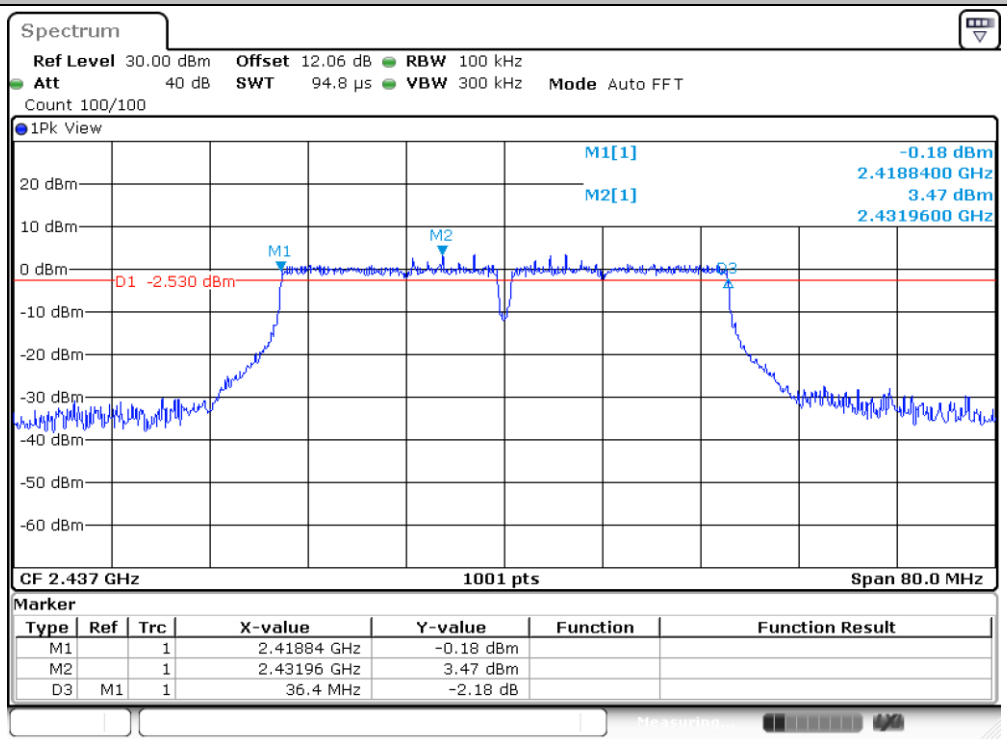

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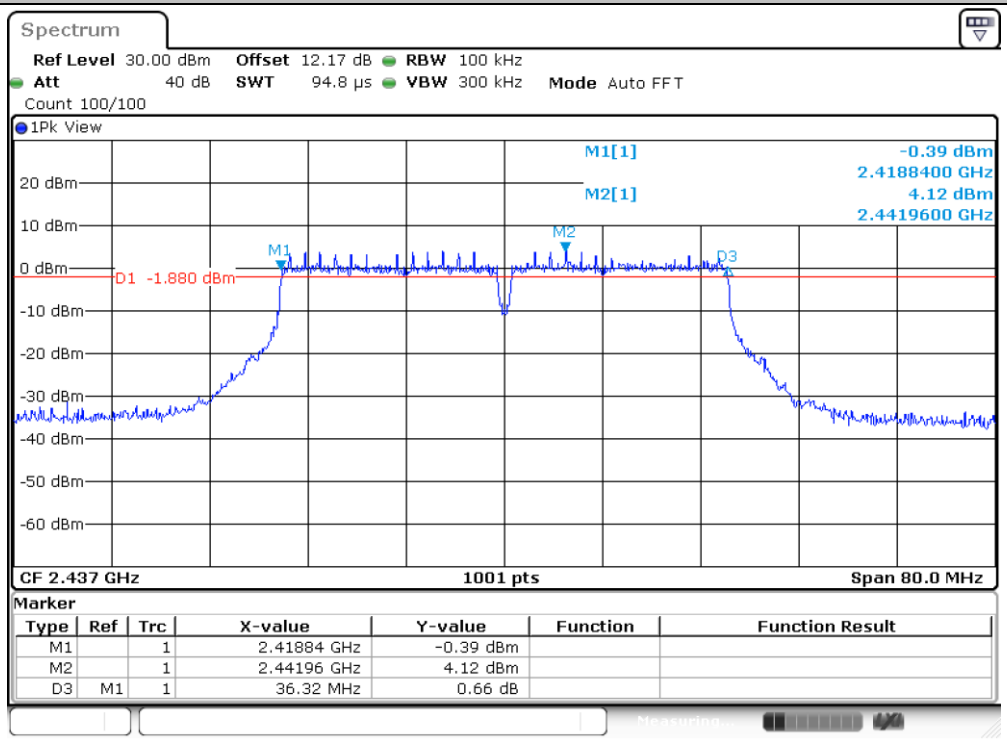

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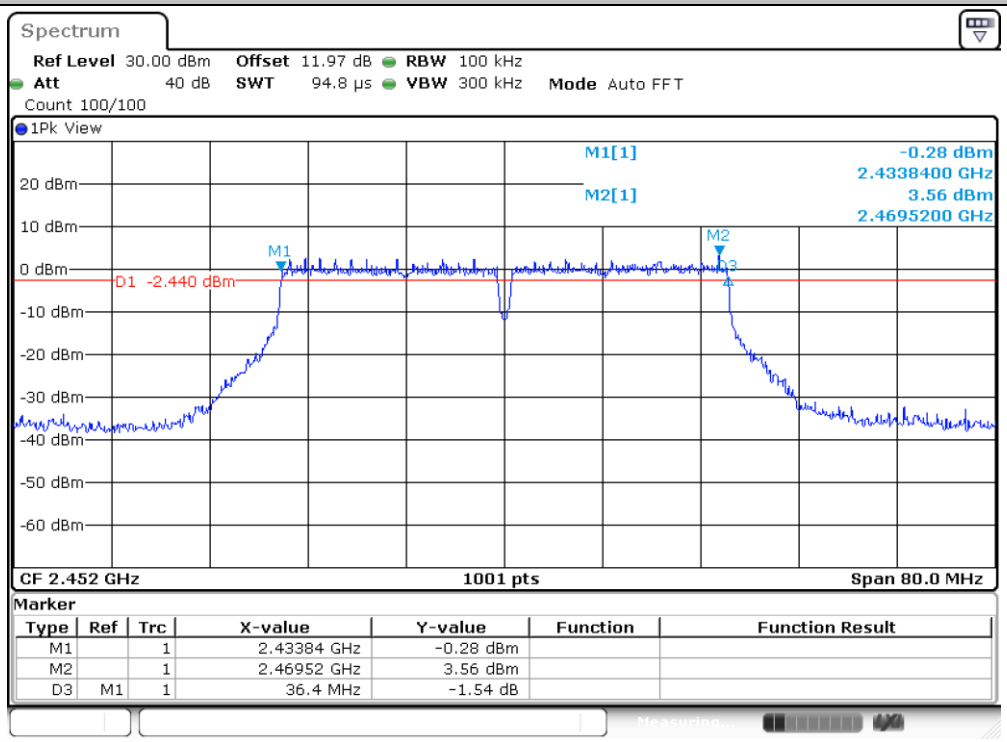

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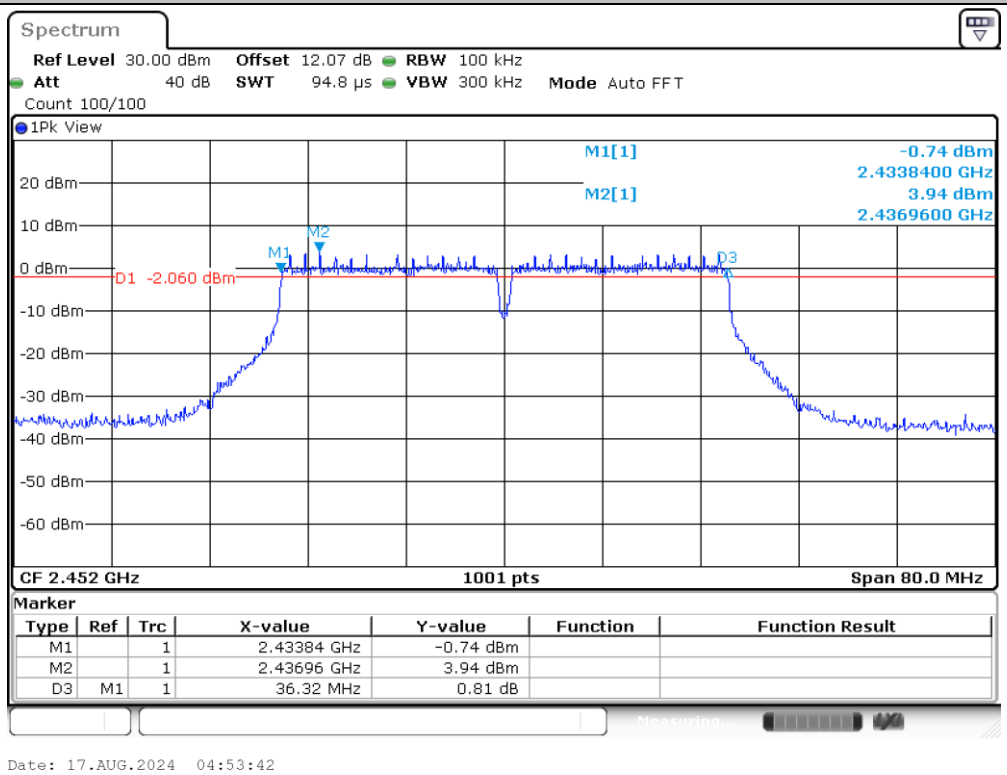

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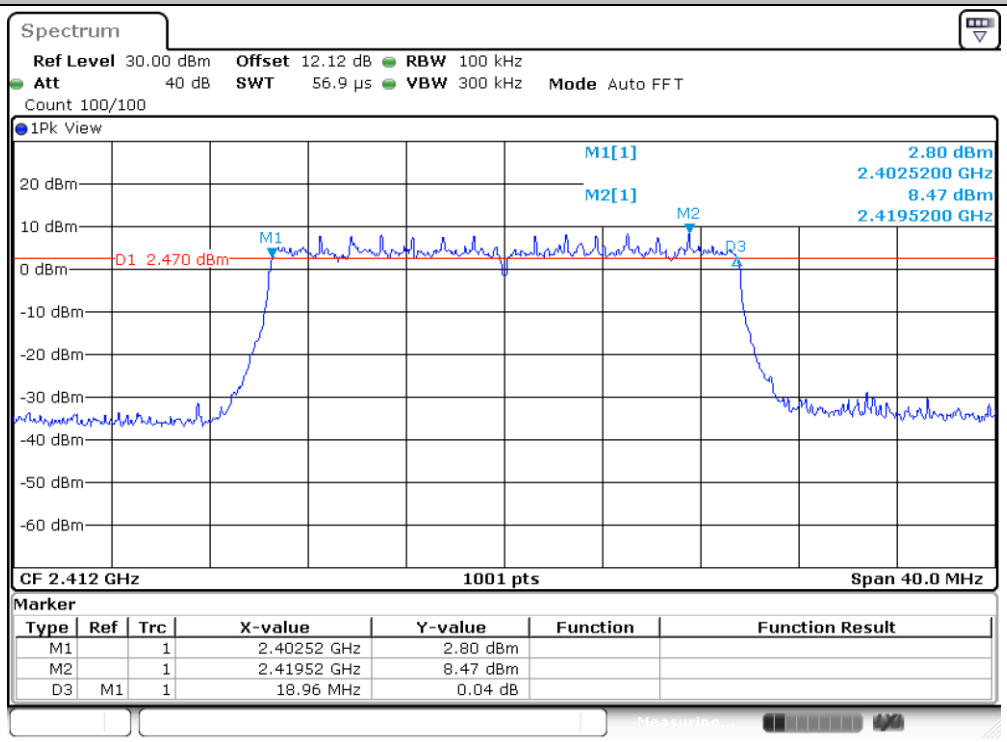

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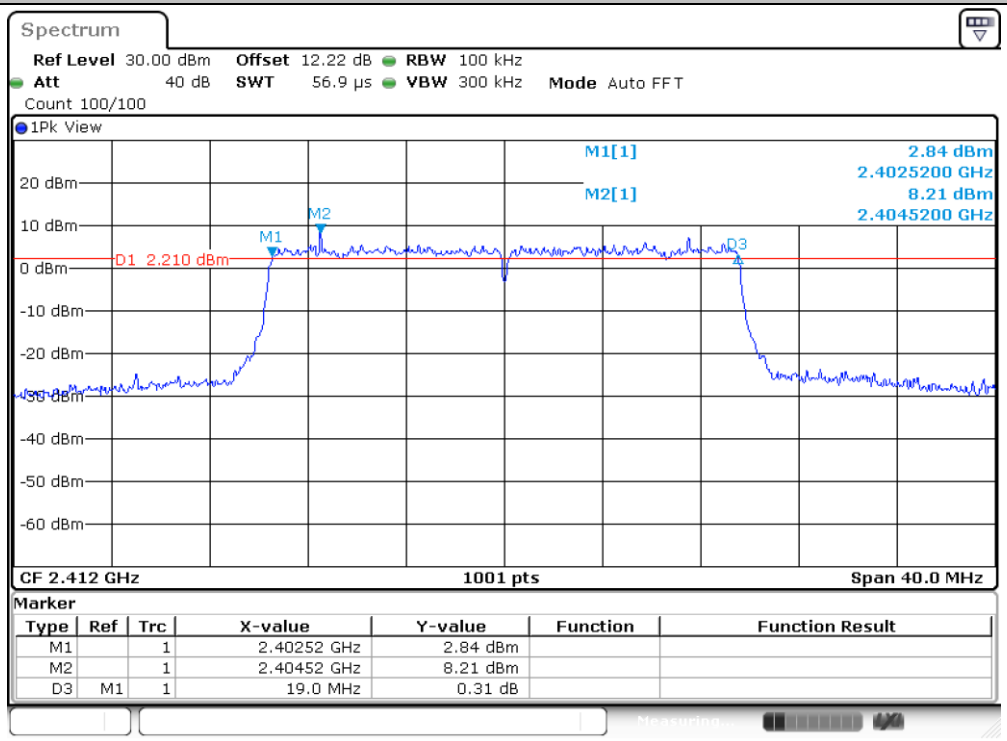

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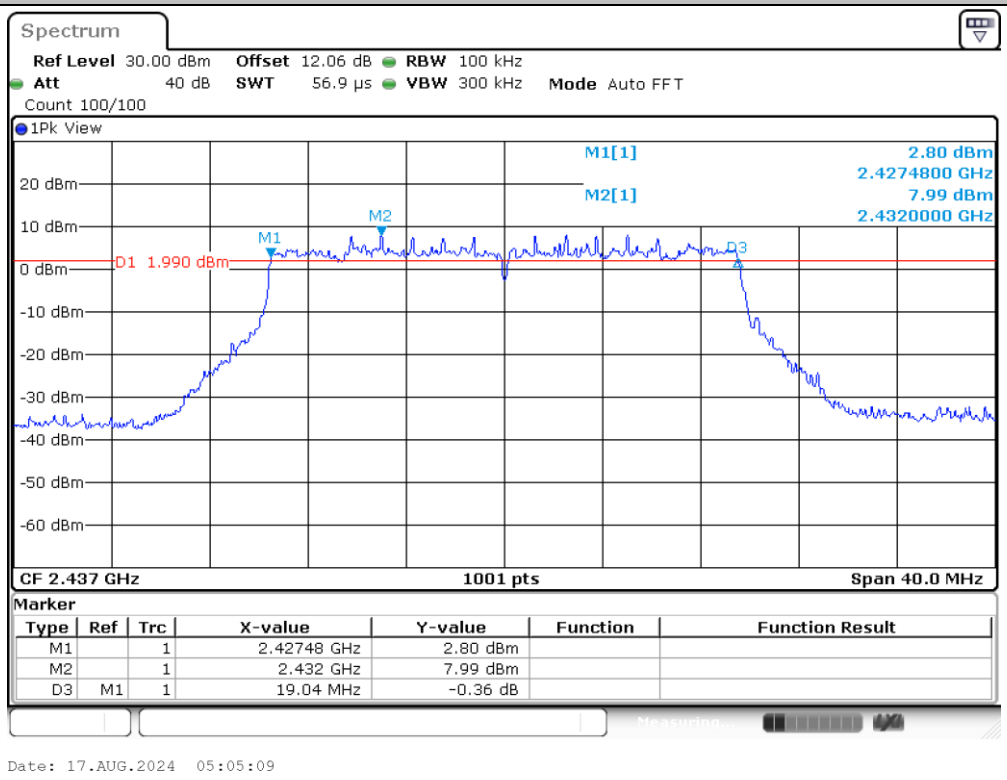

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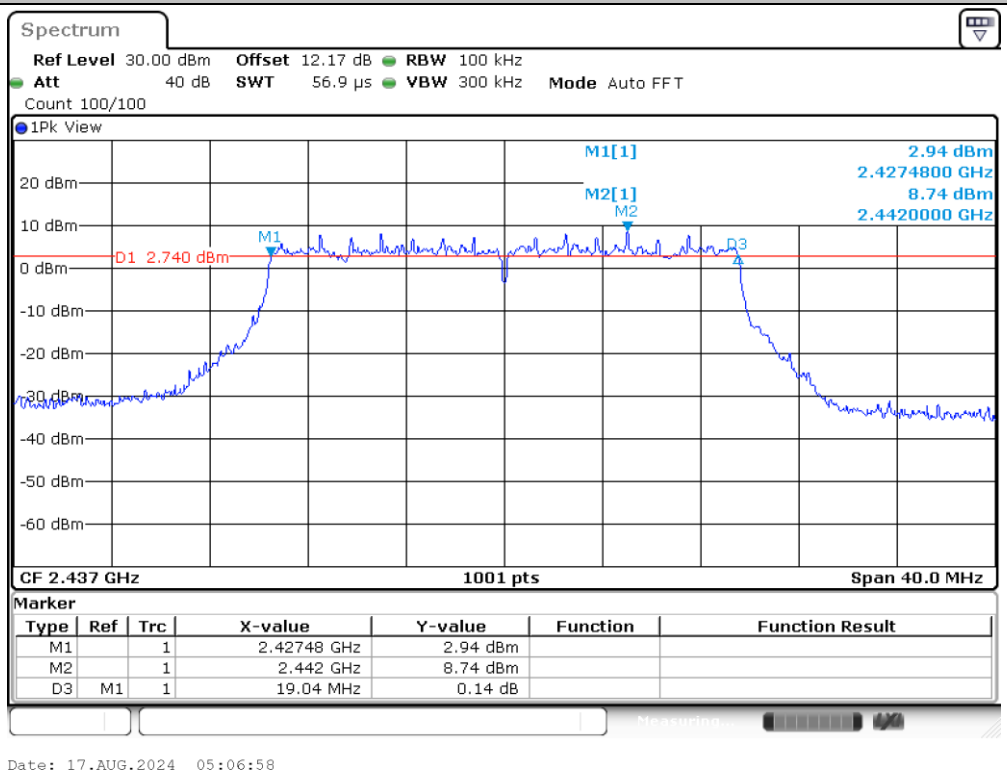

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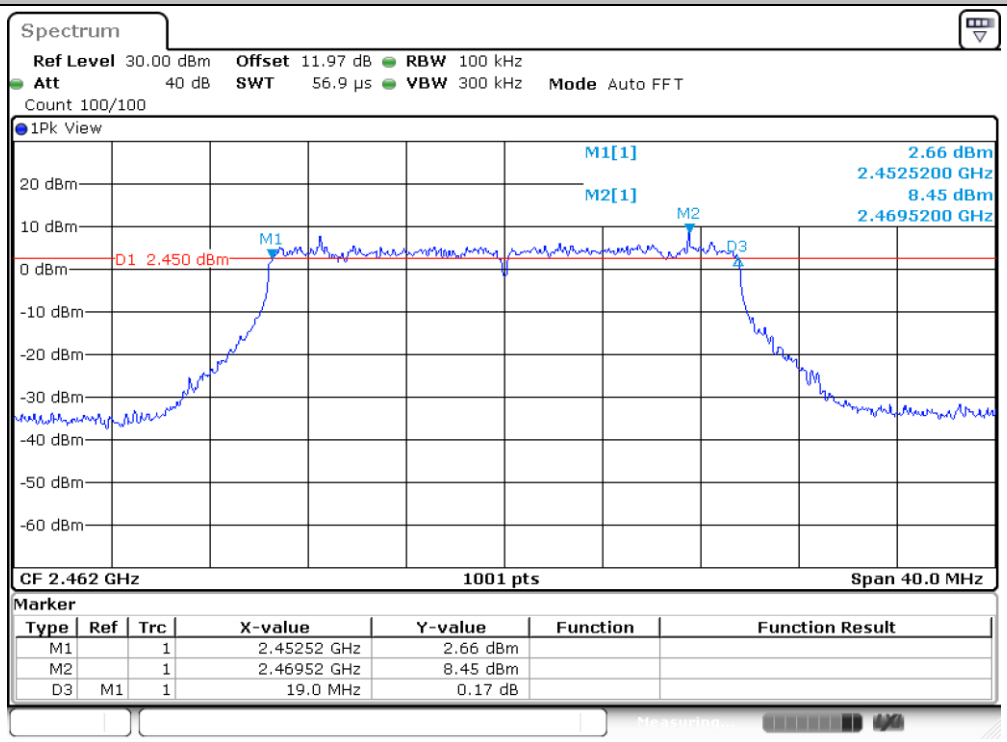

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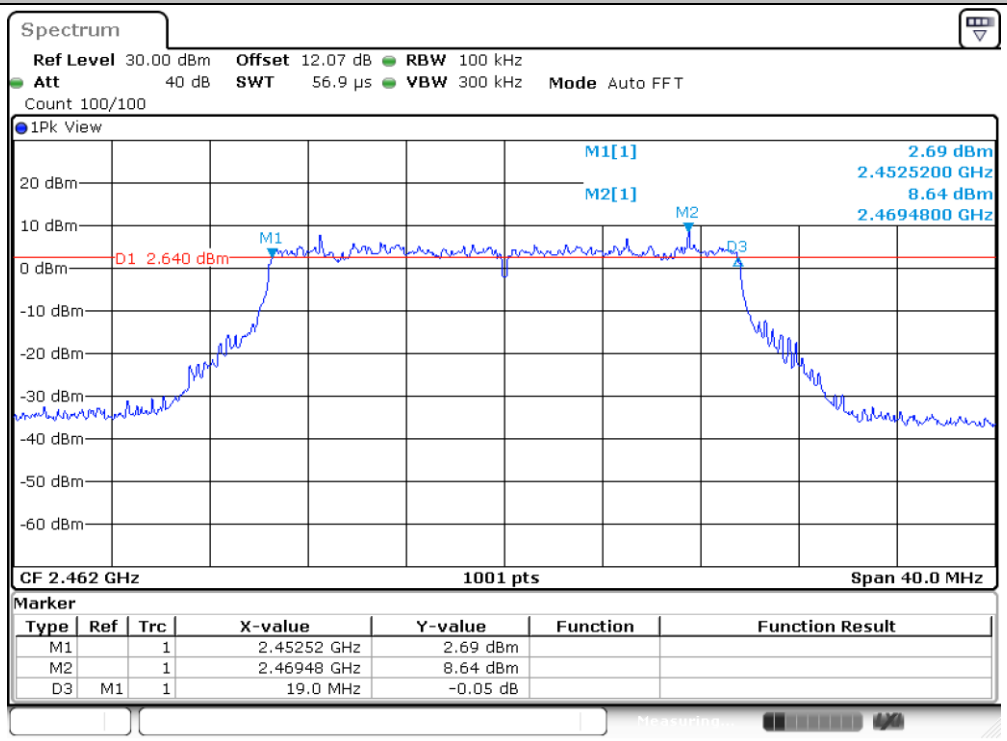

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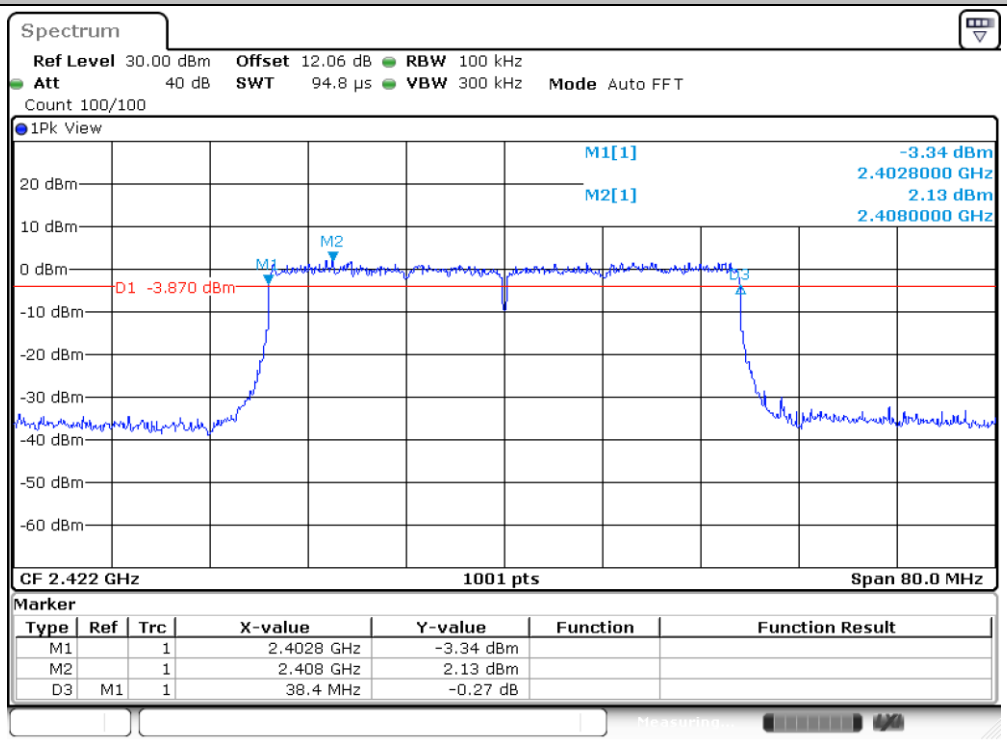

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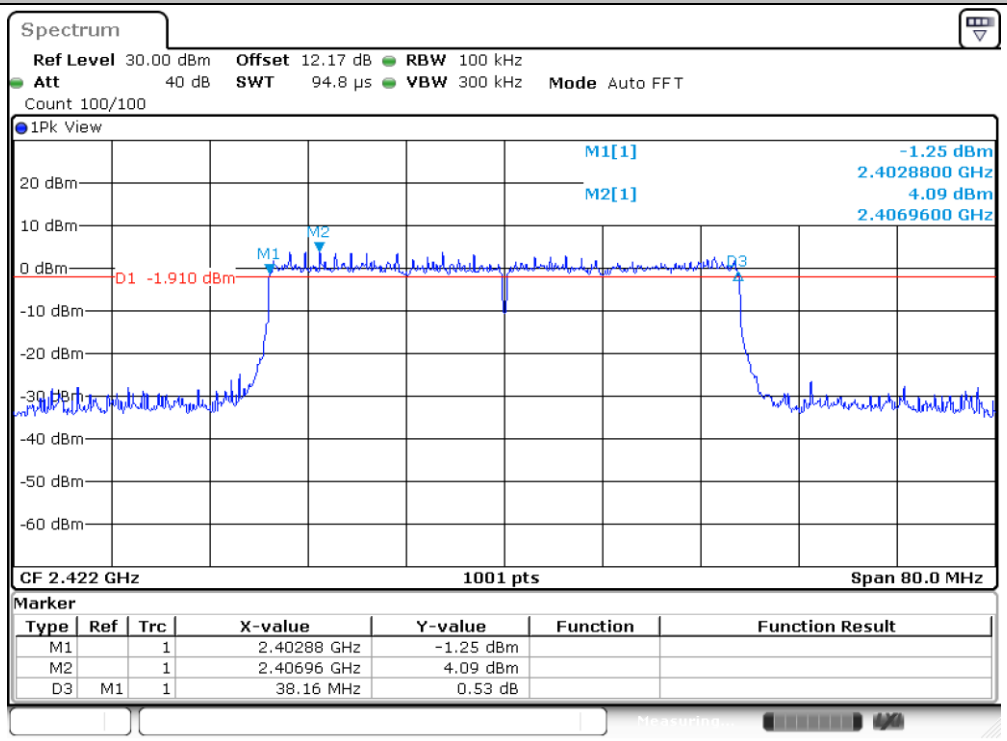

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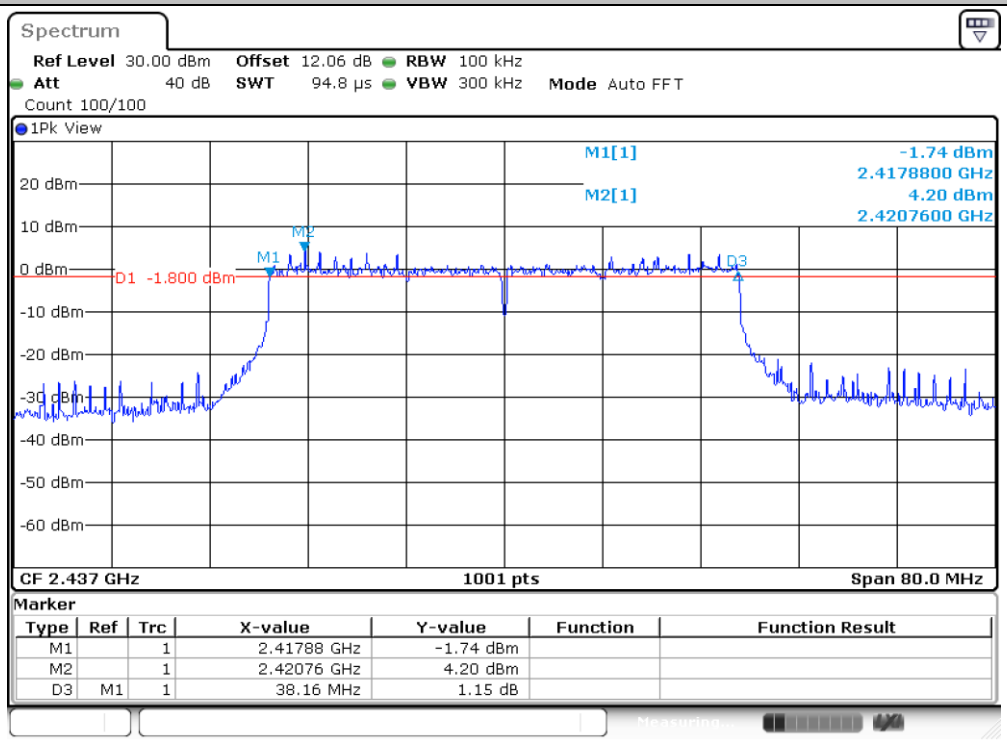

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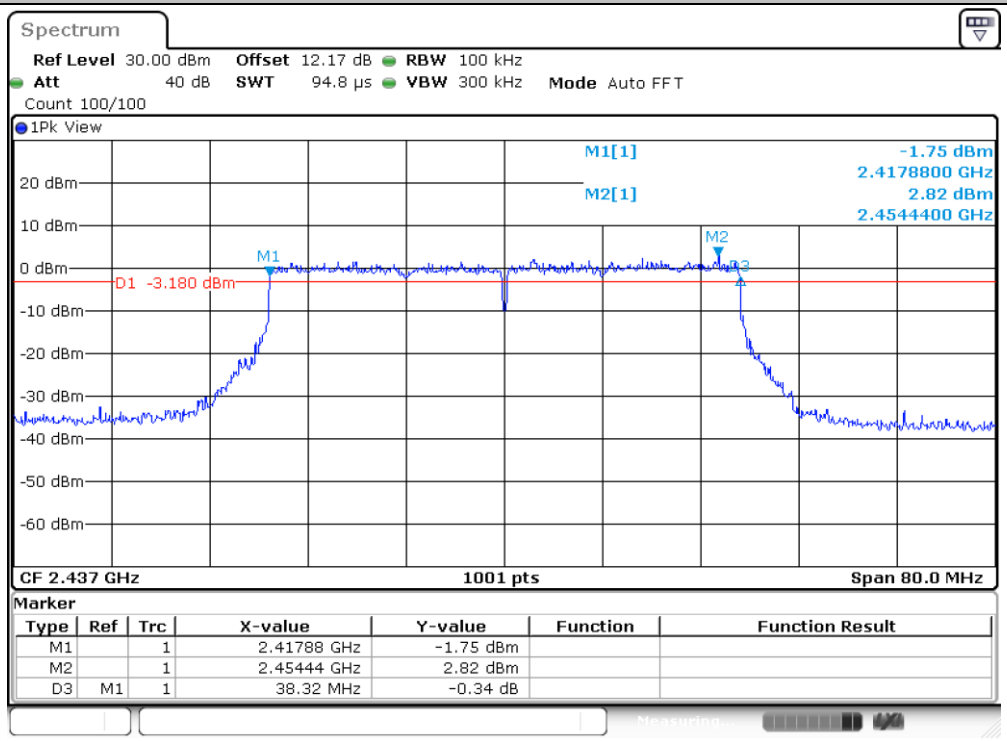

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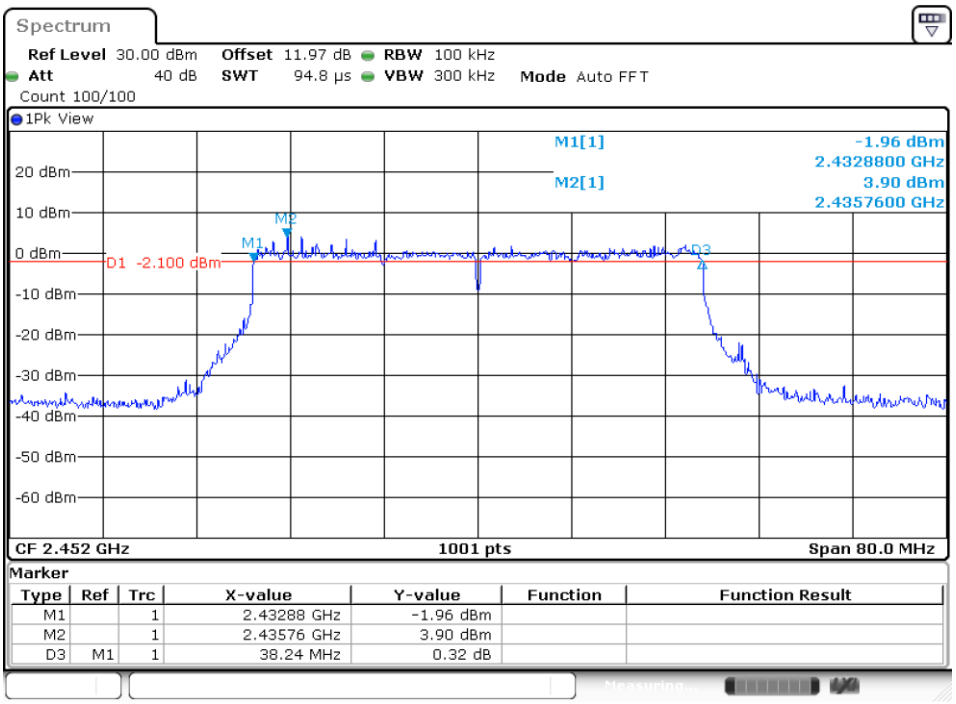

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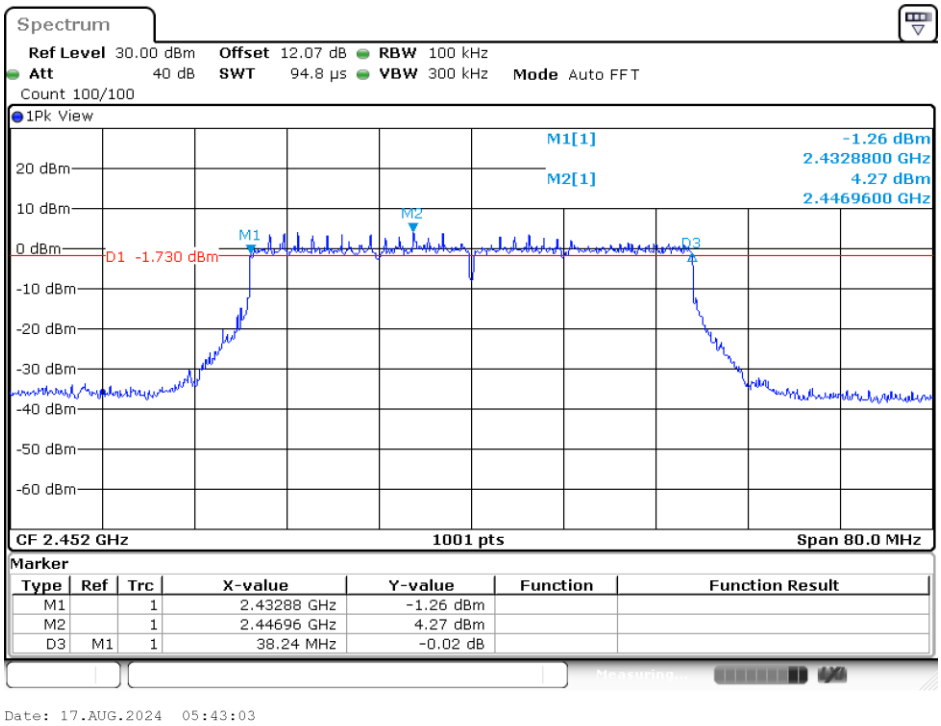


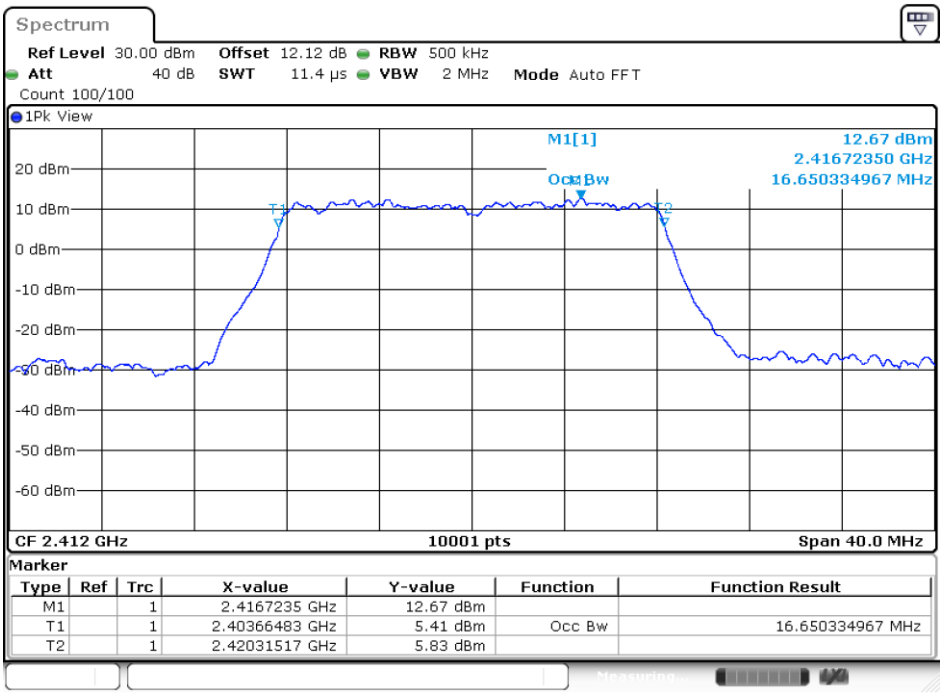
Occupied Channel Bandwidth

Test Result

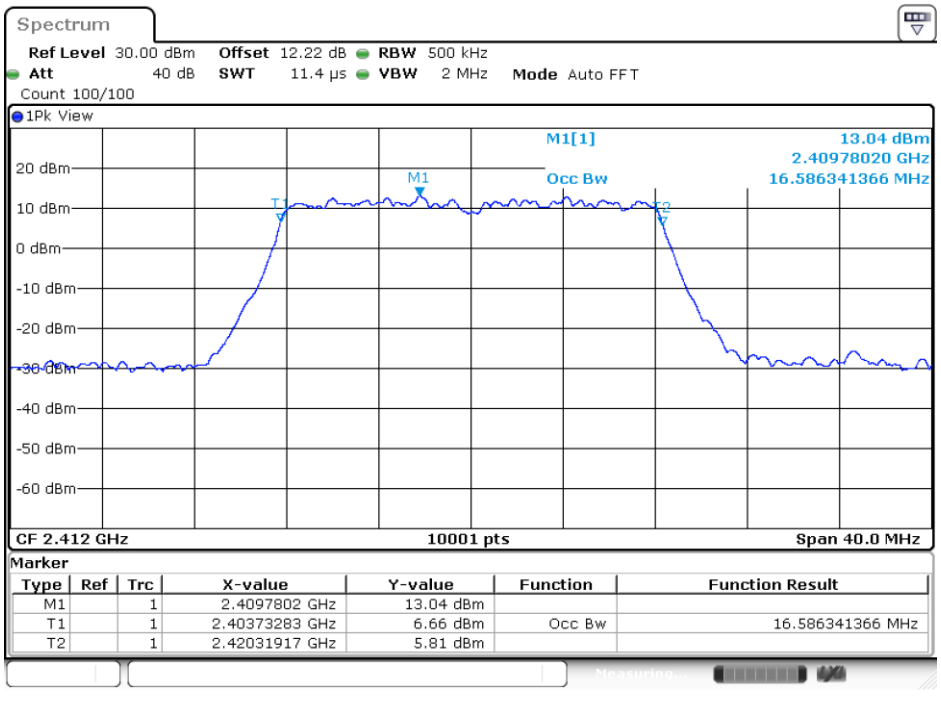
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]
11G-SISO	Ant0	2412	16.65	2403.6648	2420.3152
	Ant2	2412	16.586	2403.7328	2420.3192
	Ant0	2437	17.59	2428.2049	2445.7951
	Ant2	2437	17.658	2428.1609	2445.8191
	Ant0	2462	17.306	2453.3409	2470.6471
	Ant2	2462	17.418	2453.2529	2470.6711
11B-CDD	Ant0	2412	13.071	2405.4887	2418.5593
	Ant2	2412	13.003	2405.4567	2418.4594
	Ant0	2437	13.263	2430.3887	2443.6513
	Ant2	2437	13.271	2430.3927	2443.6633
	Ant0	2462	13.319	2455.3967	2468.7153
	Ant2	2462	13.379	2455.3407	2468.7193
11N20MIMO -CDD	Ant0	2412	17.774	2403.1129	2420.8871
	Ant2	2412	17.782	2403.1129	2420.8951
	Ant0	2437	18.482	2427.7769	2446.2591
	Ant2	2437	18.546	2427.7889	2446.3351
	Ant0	2462	18.566	2452.6609	2471.2271
	Ant2	2462	18.326	2452.8409	2471.1671
11N40MIMO -CDD	Ant0	2422	36.46	2403.8178	2440.2782
	Ant2	2422	36.54	2403.6898	2440.2302
	Ant0	2437	37.34	2418.2739	2455.6141
	Ant2	2437	37.028	2418.5778	2455.6061
	Ant0	2452	37.476	2433.2659	2470.7421
	Ant2	2452	37.212	2433.3539	2470.5661
11BE20MIMO -CDD	Ant0	2412	19.098	2402.4450	2421.5430
	Ant2	2412	19.138	2402.4250	2421.5630
	Ant0	2437	19.234	2427.3530	2446.5870
	Ant2	2437	19.262	2427.3530	2446.6150
	Ant0	2462	19.454	2452.3170	2471.7710
	Ant2	2462	19.326	2452.3450	2471.6710
11BE40MIMO -CDD	Ant0	2422	38.148	2402.9459	2441.0941
	Ant2	2422	38.124	2402.9699	2441.0941
	Ant0	2437	38.476	2417.7539	2456.2301
	Ant2	2437	38.524	2417.8179	2456.3421
	Ant0	2452	38.684	2432.8179	2471.5020
	Ant2	2452	38.348	2432.8019	2471.1501

Test Graphs

11G_Ant0_2412



11G_Ant2_2412



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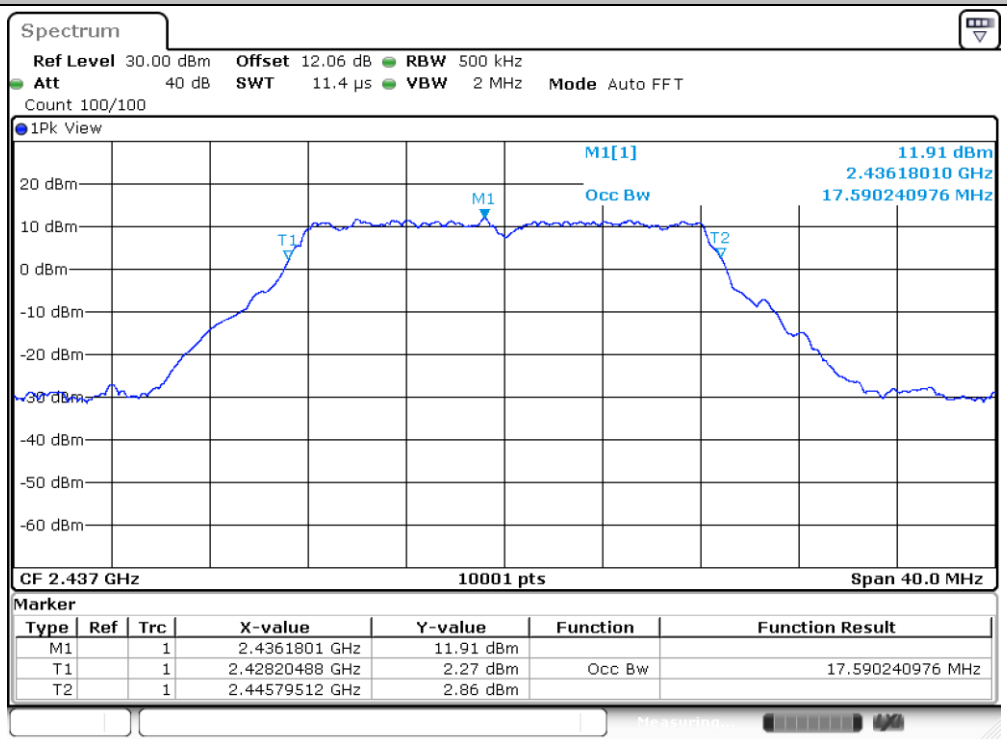

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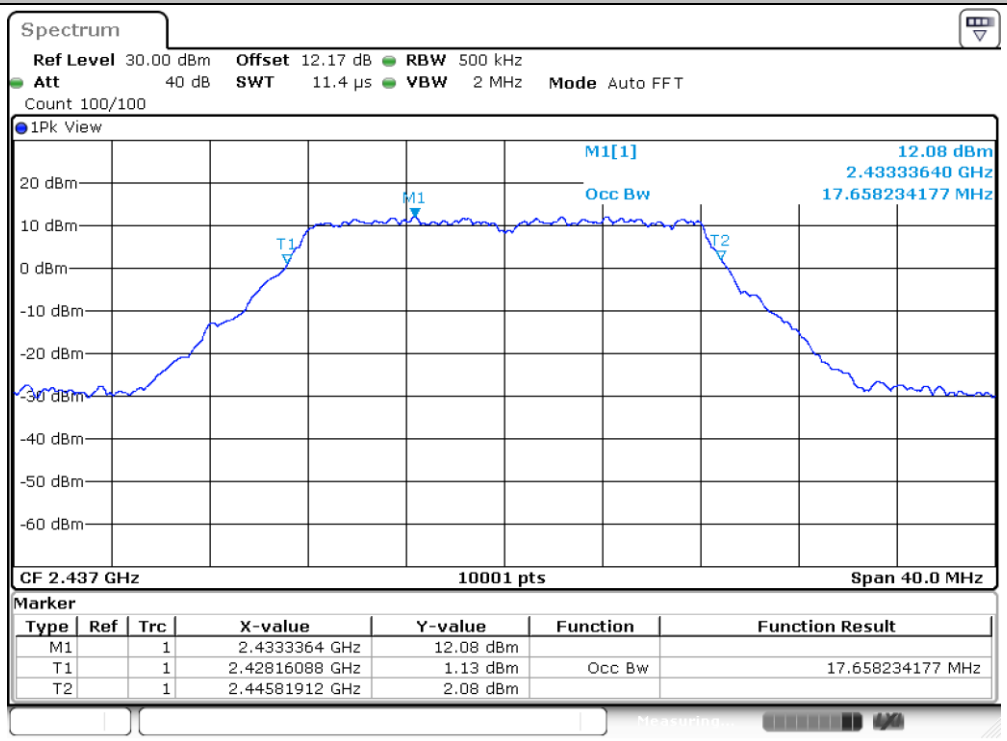

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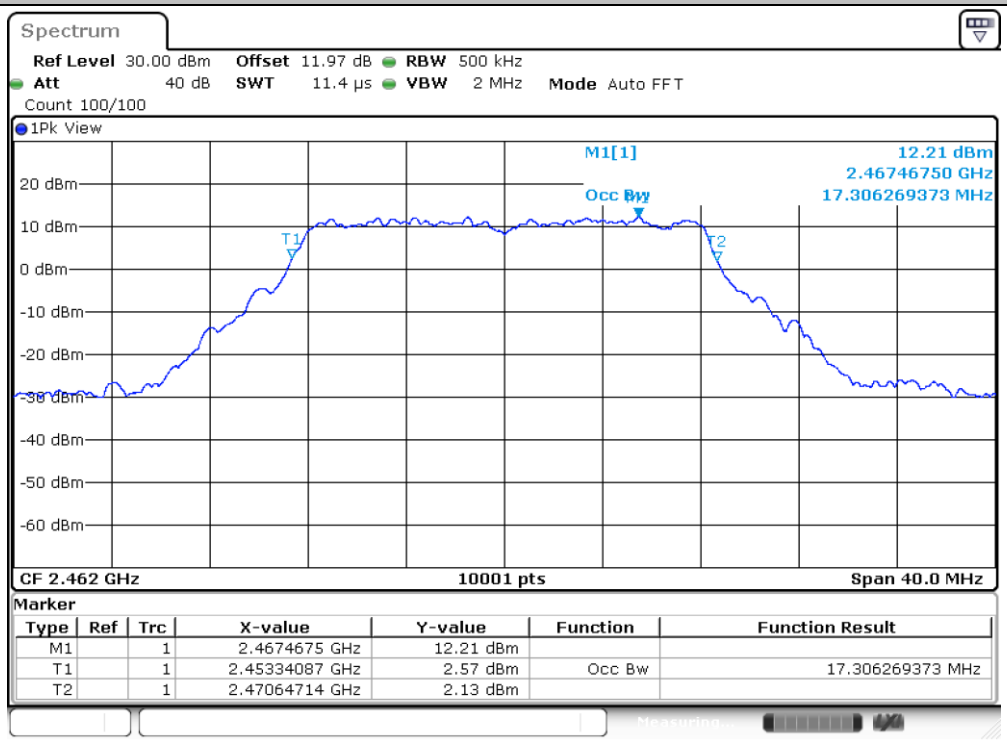

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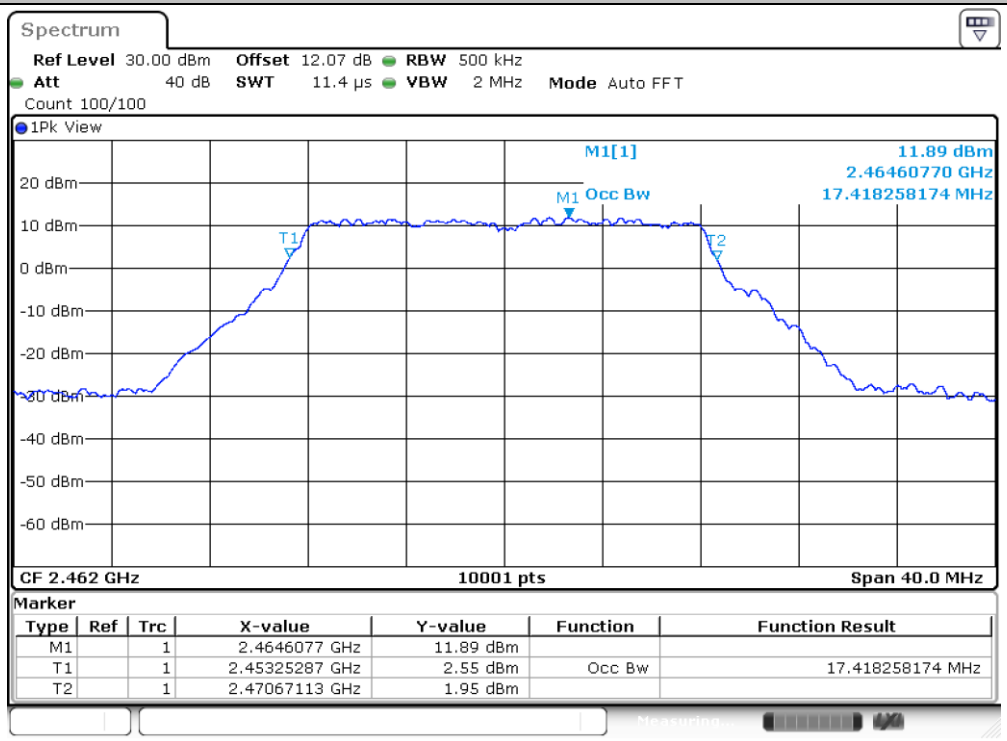

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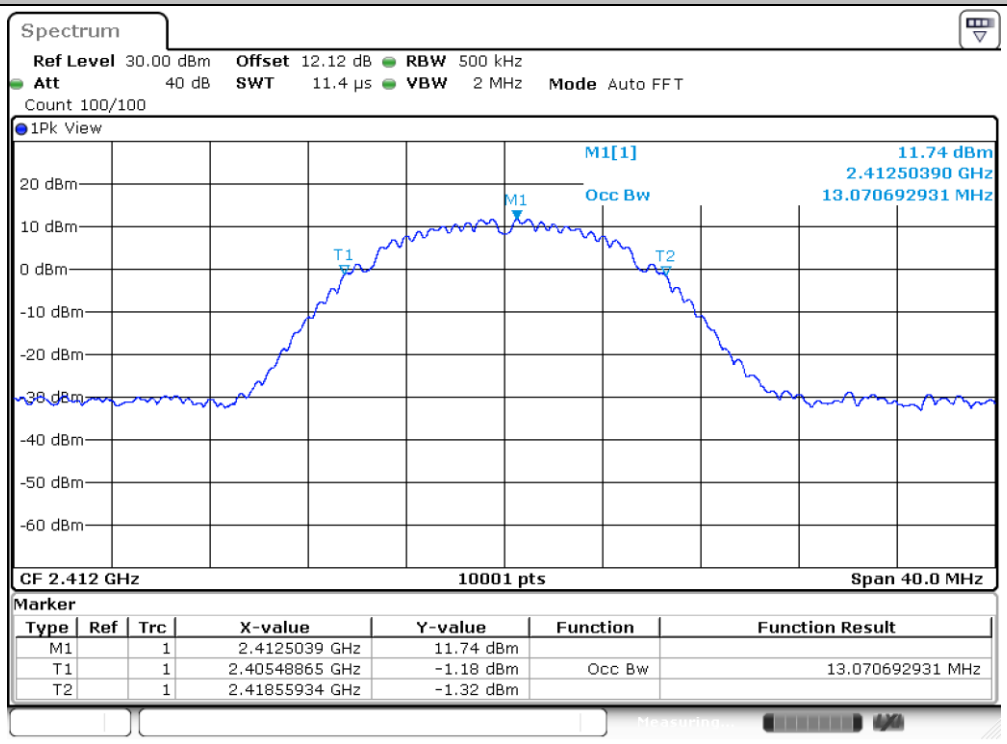

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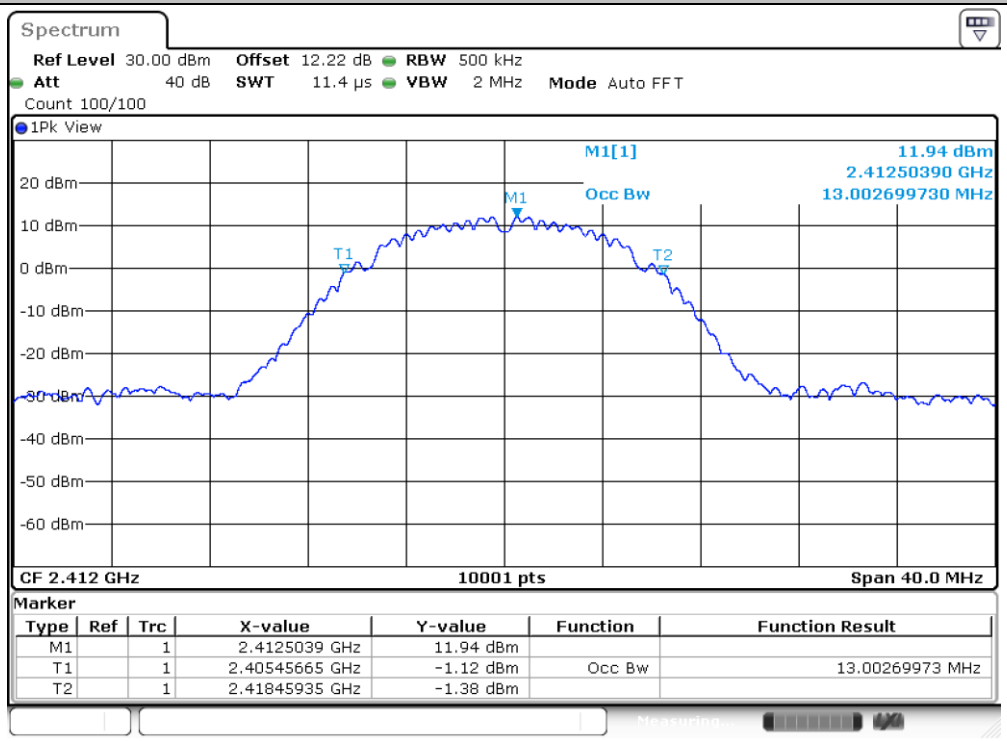

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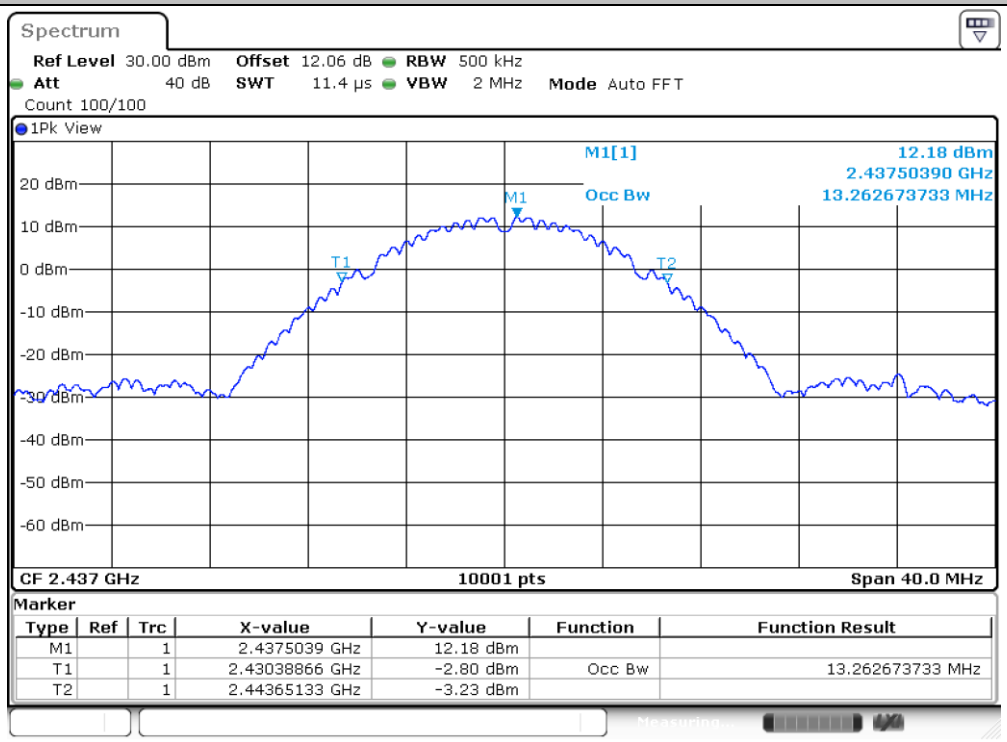

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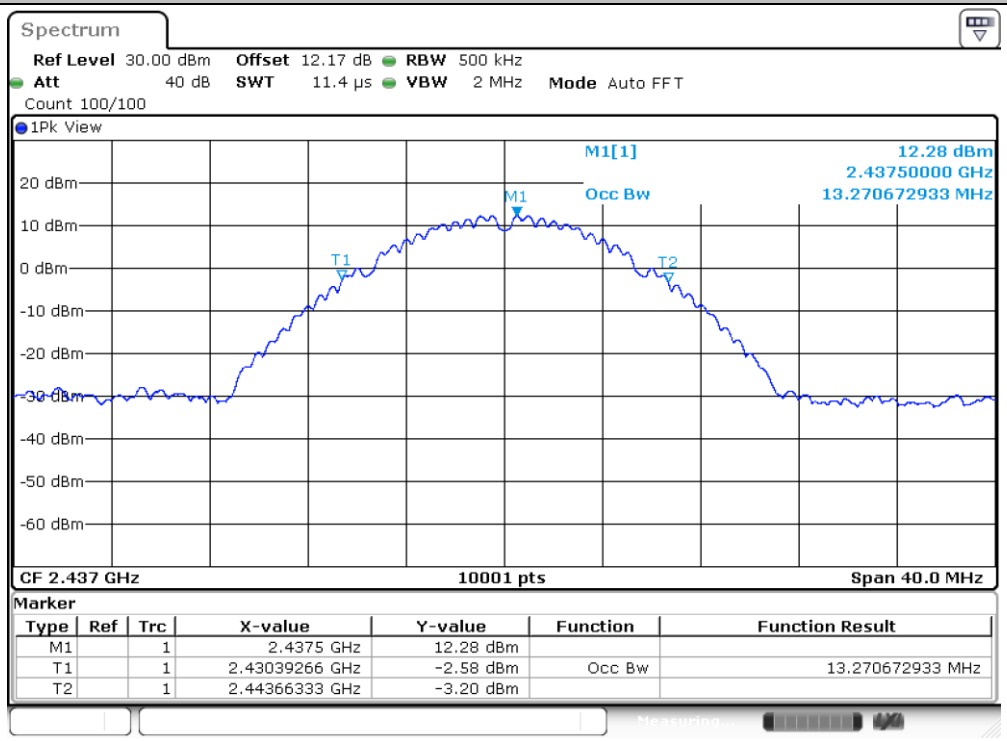

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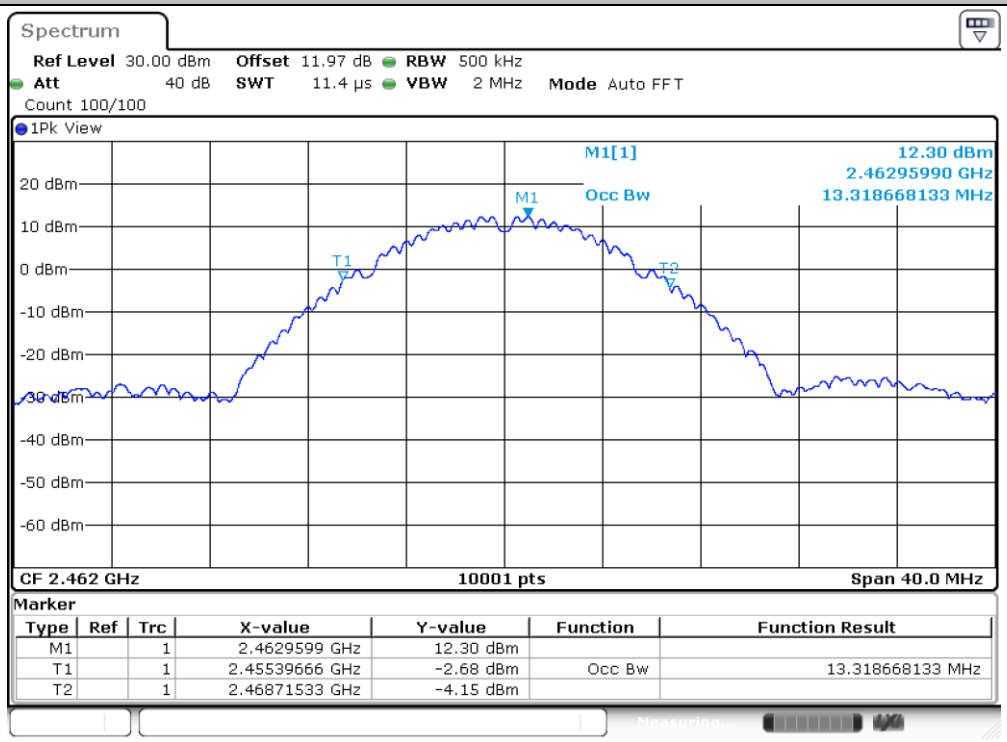

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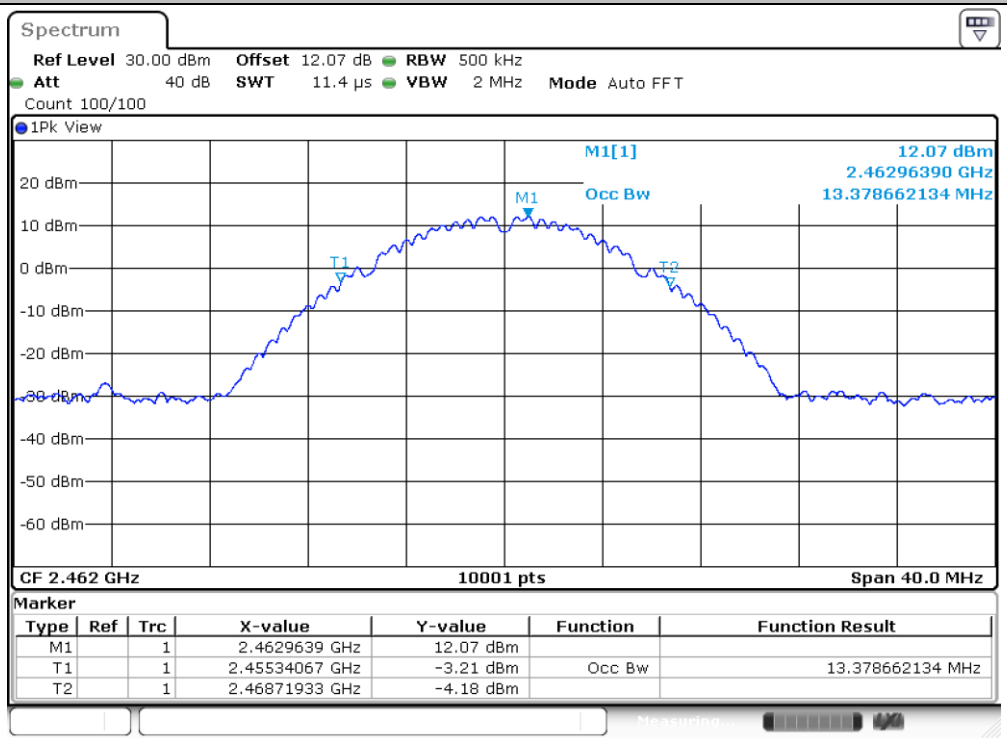

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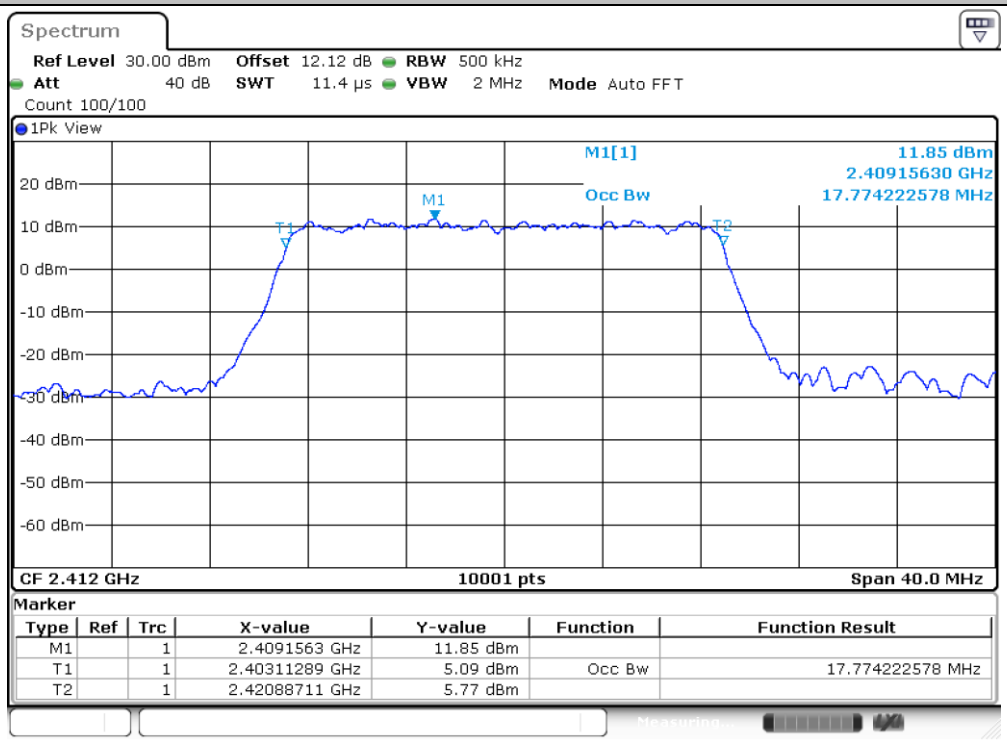

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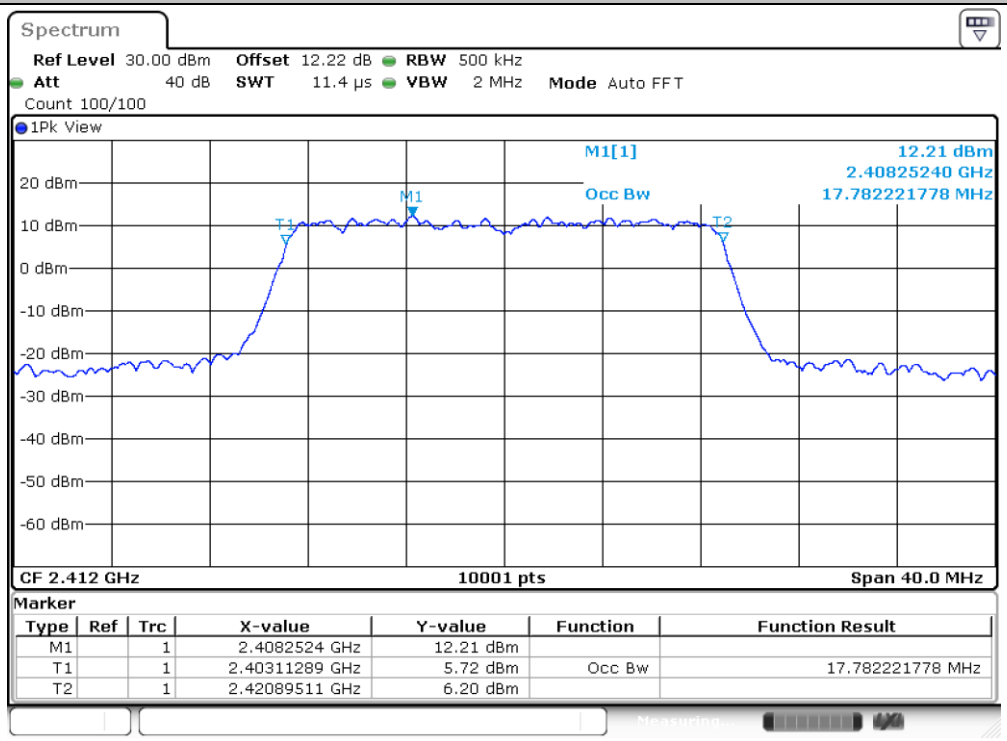

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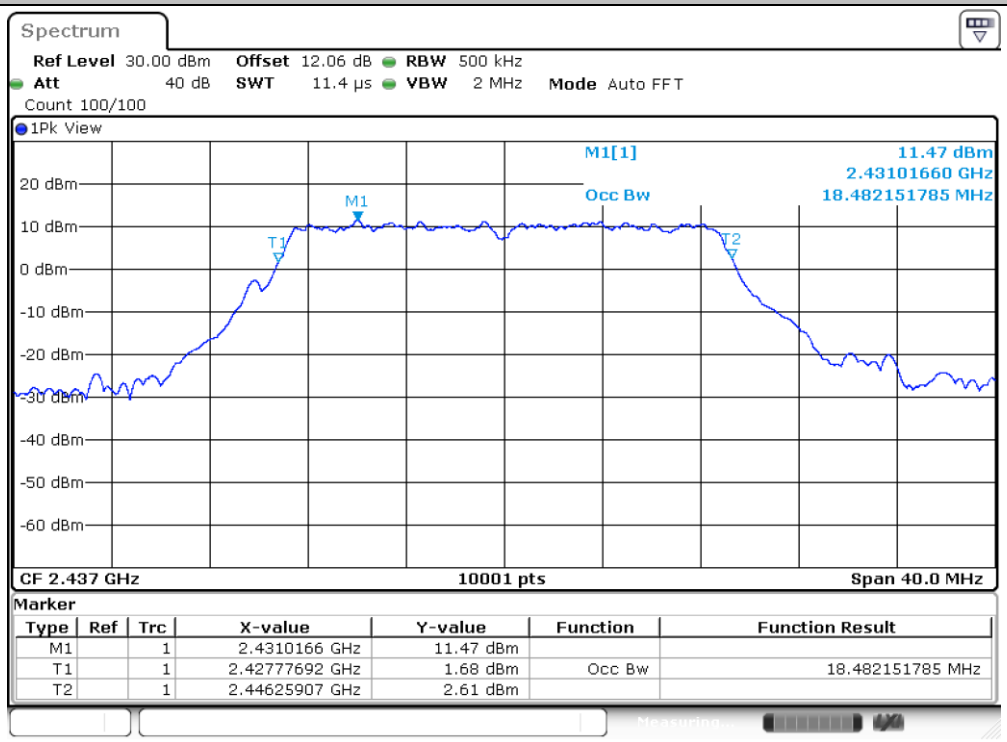

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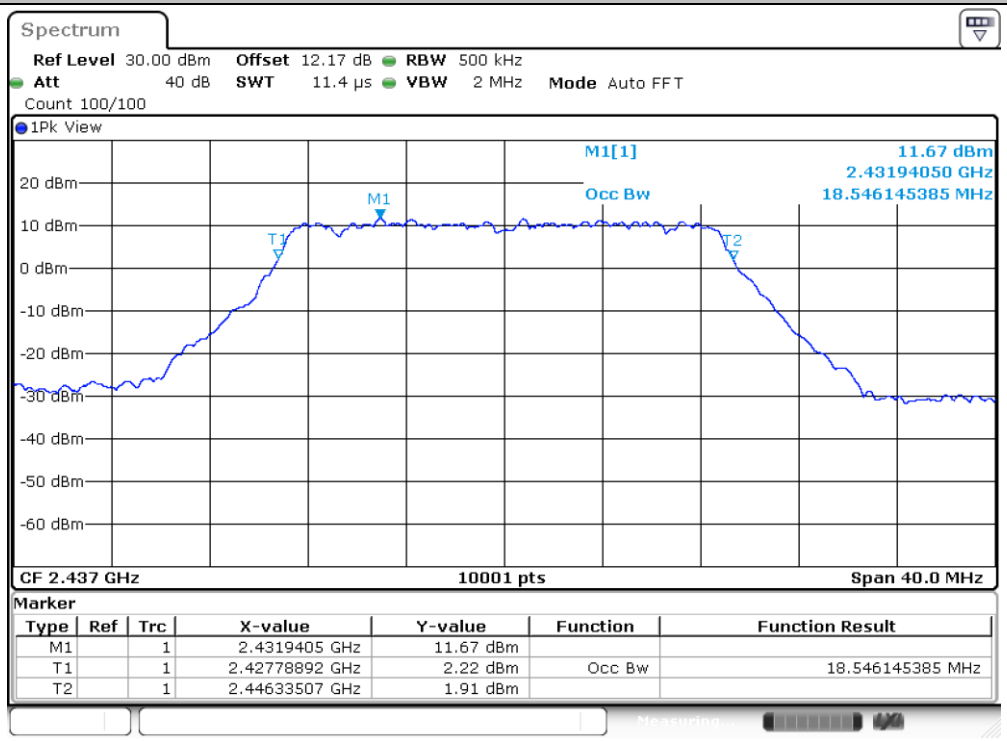

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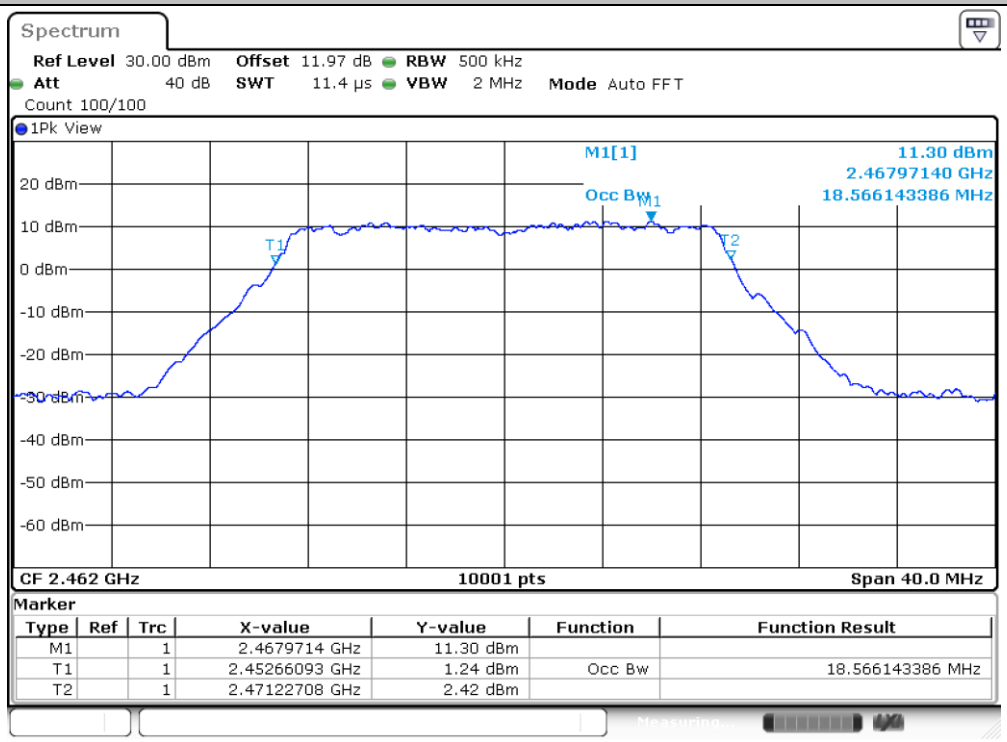

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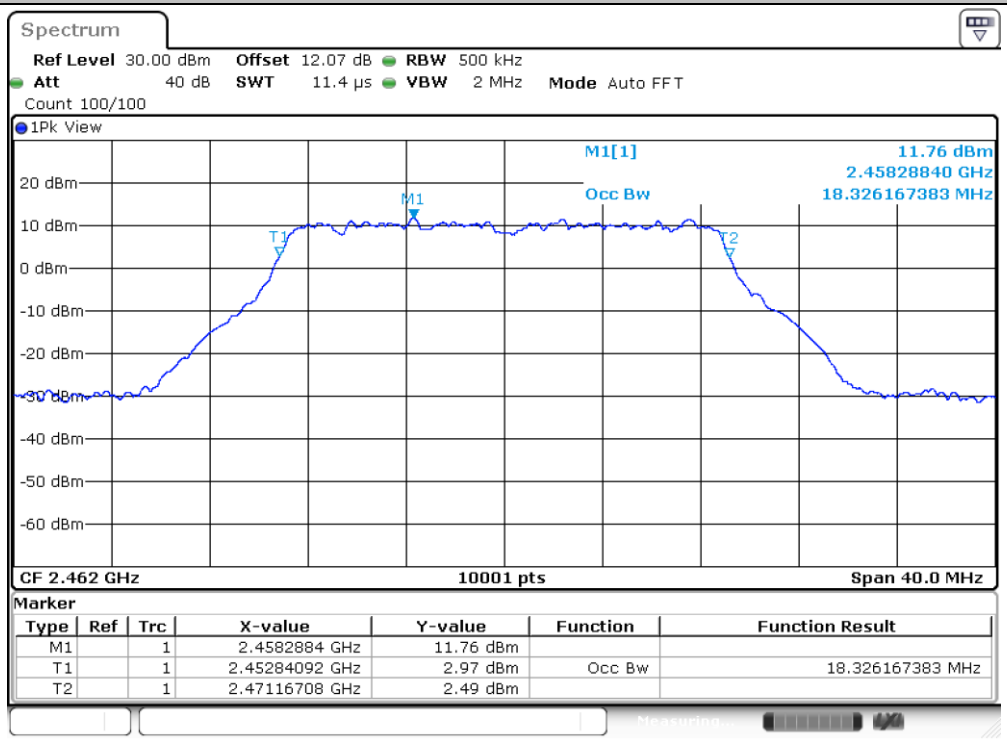

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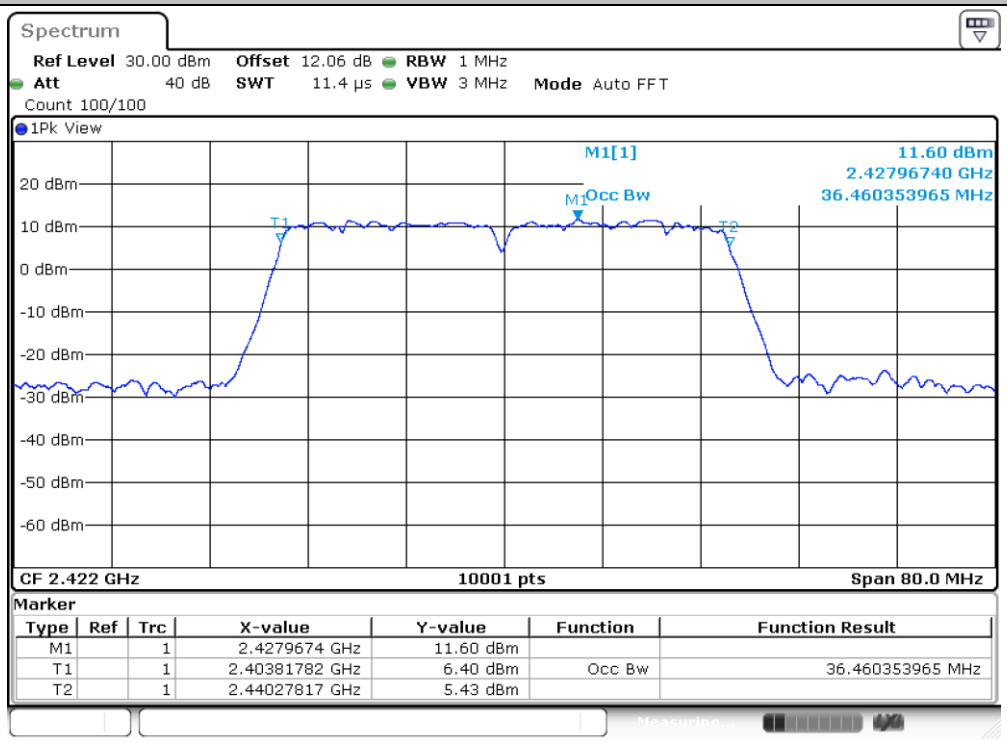

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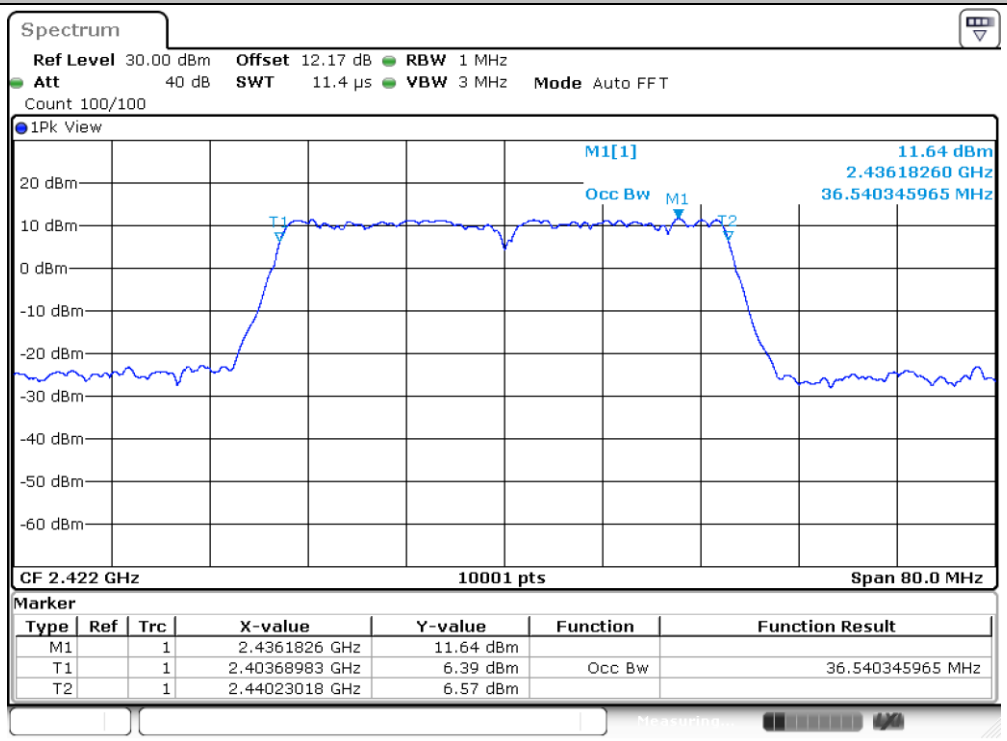

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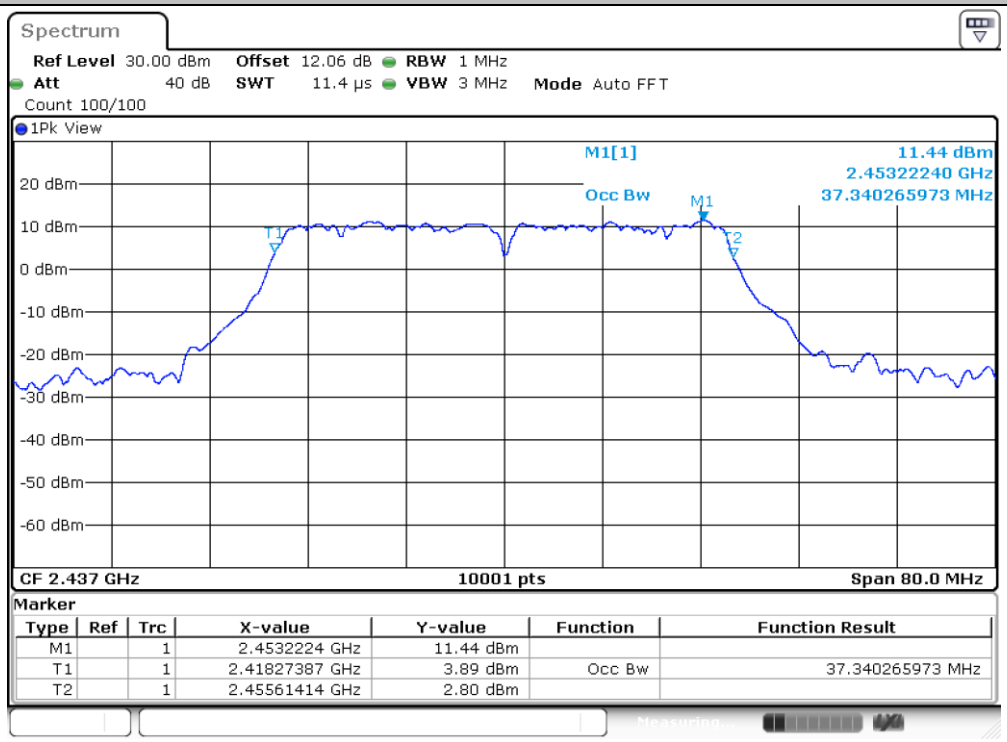

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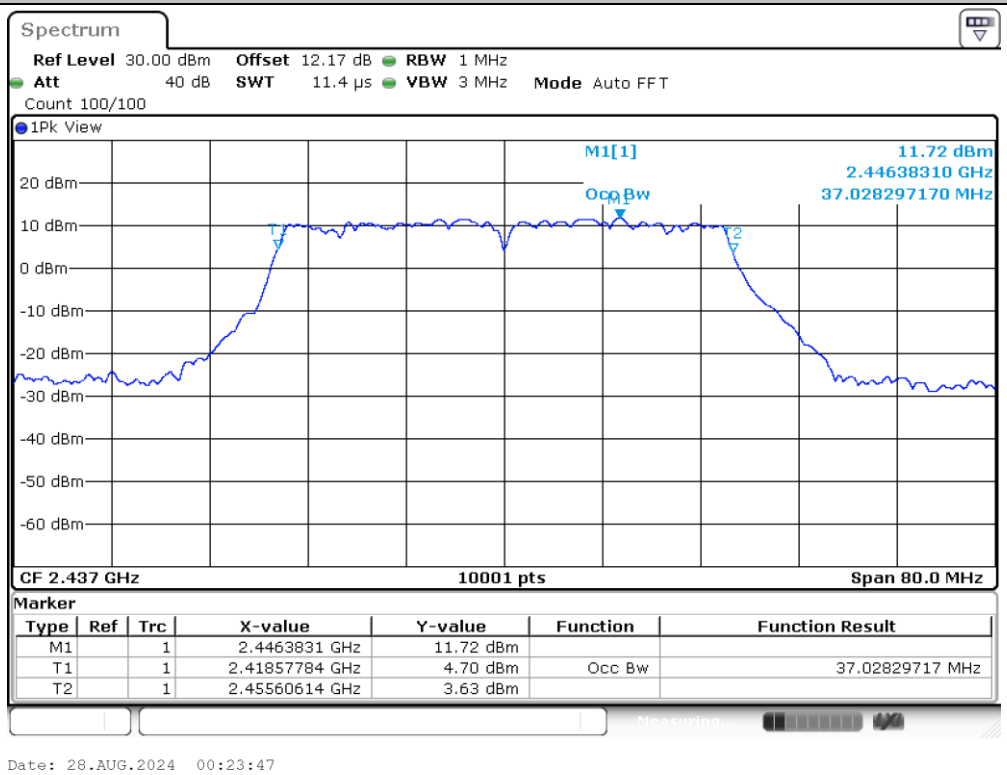

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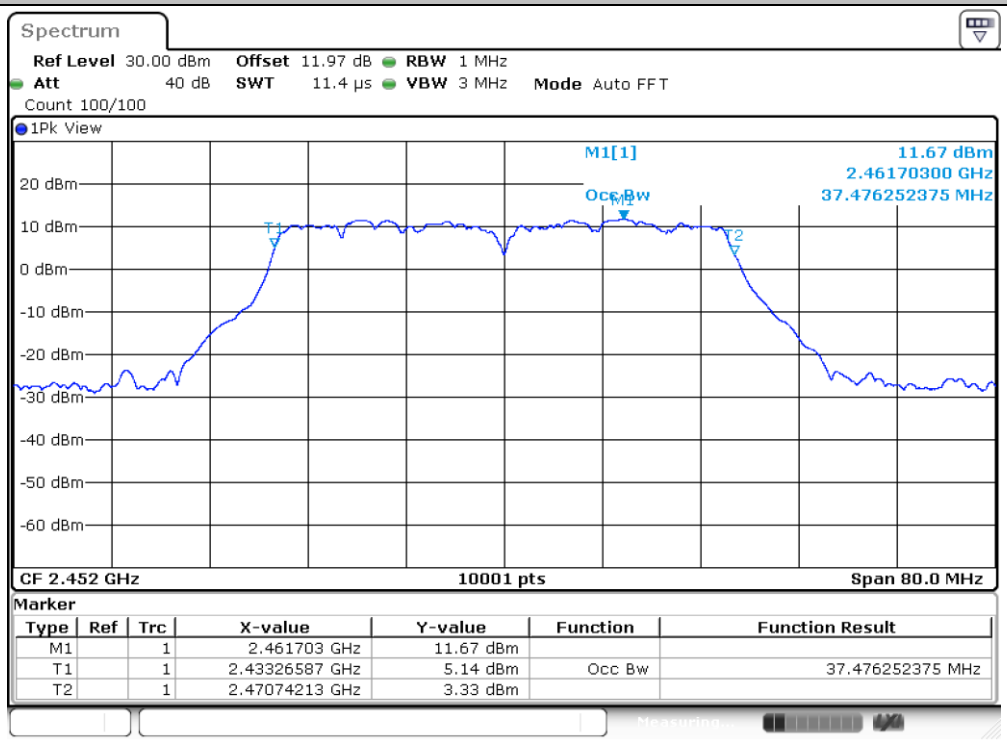
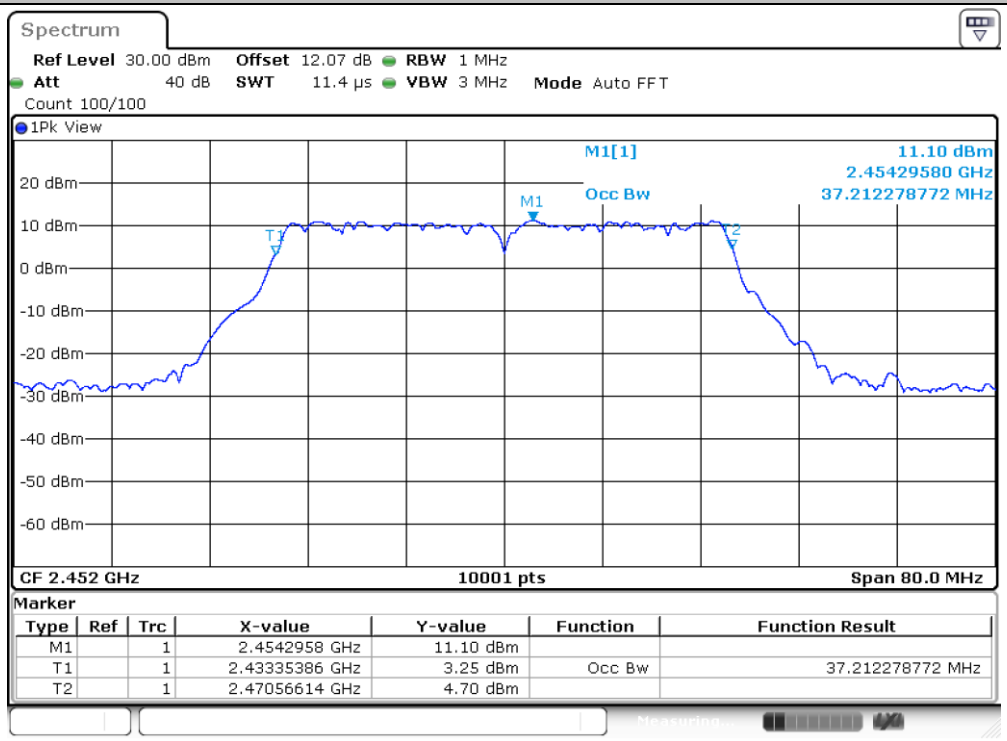
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