TEST REPORT

Applicant Name :	AudioCodes Ltd.
Address :	1 Hayarden Street, Airport City, Lod, Israel.
Report Number :	RA221118-54917E-RF-00
FCC ID:	XAKM500LI-MT

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type:	VoIP gateway and router
Model No.:	Mediant 500Li (MT)
Multiple Model(s) No.:	N/A
Trade Mark:	audiocodes
Date Received:	2022/11/18
Report Date:	2023/03/31

Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Andy Yu
EMC Engineer

Approved By:

Candy Li
EMC Engineer

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RA221118-54917E-RF-00	Original Report	2023/03/31

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	Wi-Fi: 2412-2462MHz
Maximum Conducted Average Output Power	17.38dBm
Modulation Technique	Wi-Fi: DSSS, OFDM
Antenna Specification*	2.2dBi (provided by the applicant)
Voltage Range	DC 12V from adapter
Sample serial number	20J4-4 for Conducted and Radiated Emissions Test 1QLK-1 for RF Conducted Test (Assigned by ATC)
Sample/EUT Status	Good condition
Adapter information	Model: KSA-36W-120300D5 Input: AC 100-240V, 50/60Hz, 1.0A Output: DC12.0V, 3.0A, 36.0W

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.082*10^{-7}$
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	/	/
6	2437	/	/
7	2442	/	/

802.11b, 802.11g, 802.11n-HT20 mode was tested with Channel 1, 6 and 11.
802.11n-HT40 mode was tested with Channel 3, 6 and 9.

EUT supports three antenna ports for Wi-Fi

According to the manufacturer,

For 802.11 b mode, the device only support SISO mode.

For 802.11 g/n20/n40 mode, the device support SISO and MIMO modes, pre-scan with them, the MIMO mode was the worst mode which was selected to test.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

"Tera Term; Lantiq DUT"* software was used to test and power level as below:

Mode	Data rate	Power Level*		
		Low Channel	Middle Channel	High Channel
802.11b	1Mbps	30	30	30
802.11g	6Mbps	30	30	30
802.11n-HT20	MCS0	30	30	30
802.11n-HT40	MCS0	24	24	24

The software and power level was provided by applicant.

Duty cycle

Test Result: Compliant. Please refer to the Appendix Wi-Fi.

Support Equipment List and Details

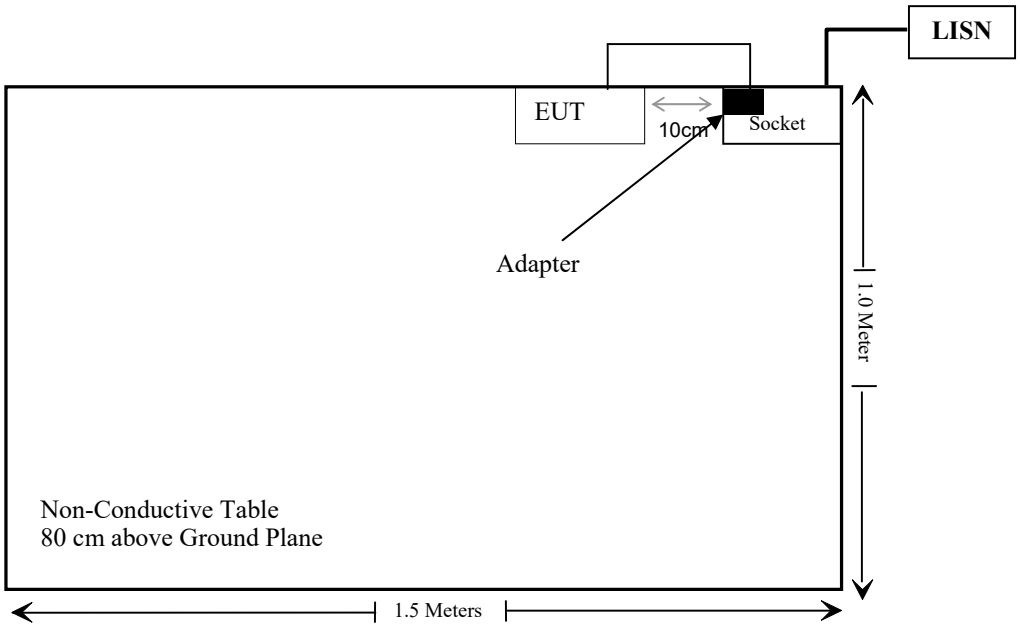
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

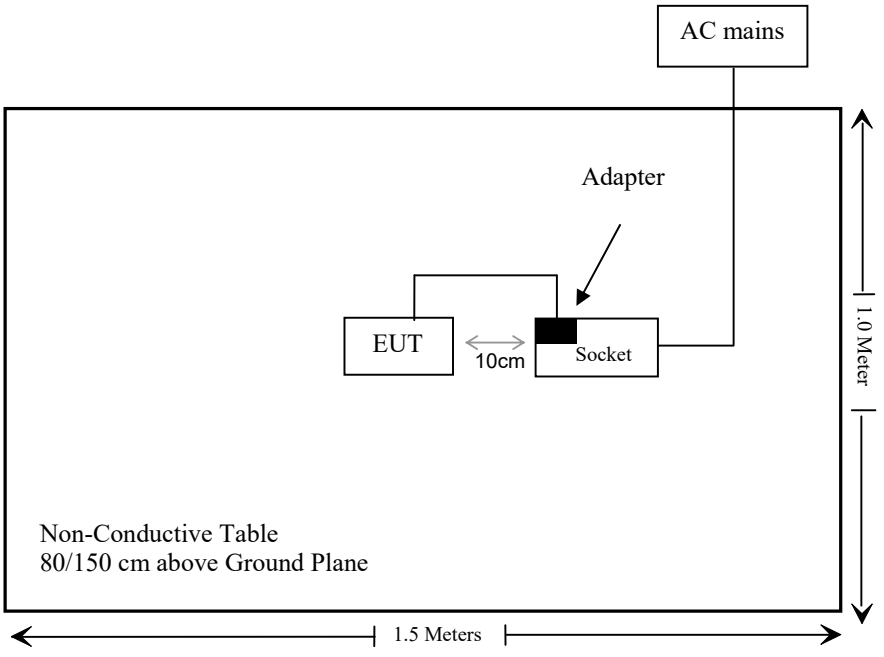
Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup

For conducted emission



For Radiated Emissions:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (3) & §2.1091	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Emission Bandwidth & Occupied Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2022/11/25	2023/11/24
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2022/11/25	2023/11/24
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2022/12/07	2023/12/06
Unknown	RF Coaxial Cable	No.17	N0350	2022/11/25	2023/11/24
Conducted Emission Test Software: e3 19821b (V9)					
Radiated Emissions Test (30MHz-1GHz)					
Rohde& Schwarz	Test Receiver	ESR	102725	2022/11/25	2023/11/24
SONOMA INSTRUMENT	Amplifier	310 N	186131	2022/11/08	2023/11/07
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Unknown	RF Coaxial Cable	No.12	N040	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.13	N300	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.14	N800	2022/11/25	2023/11/24
Radiated Emission Test Software: e3 19821b (V9)					
Radiated Emissions Test (Above 1GHz)					
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2022/11/25	2023/11/24
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2022/11/08	2023/11/07
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2022/11/08	2023/11/07
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2022/11/30	2025/11/29
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Unknown	RF Coaxial Cable	No.10	N050	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.11	N1000	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.15	N600	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.16	N650	2022/11/25	2023/11/24
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2022/11/25	2023/11/24
Radiated Emission Test Software: e3 19821b (V9)					
RF Conducted Test					
Rohde&Schwarz	Spectrum Analyzer	FSV-40	101590	2022/11/25	2023/11/24
Tonscend	RF Control Unit	JS0806-2	19G8060182	2022/10/24	2023/10/23
Agilent	USB wideband power sensor	U2021XA	MY54250003	2022/06/27	2023/06/26
WEINSCHEL	10dB Attenuator	5324	AU 3842	2022/11/25	2023/11/24
WEINSCHEL	3dB Attenuator	50-3	Unknown	2022/11/25	2023/11/24
Rohde&Schwarz	Spectrum Analyzer	FSU26	200982	2022/07/04	2023/07/03
Unknown	RF Coaxial Cable	No.31	RF-01	Each time	Each time

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (I) & §1.1307 (B) (3) & §2.1091- RF EXPOSURE

Applicable Standard

According to FCC §2.1091 and §1.1307(b) (3), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D04 Interim General RF Exposure Guidance

SAR-Based Exemption:

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum timeaveraged power or maximum time-averaged ERP, whichever is greater.

Per § 1.1307(b)(3)(i)(B), for single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

For multiple RF sources: Multiple RF sources are exempt if:

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation:

$$\sum_{i=1}^{a}\frac{P_i}{P_{th,i}} + \sum_{j=1}^{b}\frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k} \le 1$$

Result

Mode	Frequency (MHz)	Antenna Gain		Tune up conducted power		ERP		Evaluation Distance (m)	Pth (mW)
		(dBi)	(dBd)	(dBm)	(mW)	(dBm)	(mW)		
Wi-Fi	2412-2462	2.20	0.05	17.5	56.23	17.55	56.89	0.2	3060
WCDMA B2	1850-1910	1.59	-0.56	25	316.23	24.44	277.97	0.2	3060
WCDMA B4	1710-1755	2.00	-0.15	25	316.23	24.85	305.49	0.2	3060
WCDMA B5	824-849	2.53	0.38	25	316.23	25.38	345.14	0.2	1681
LTE B2	1850-1910	1.59	-0.56	25	316.23	24.44	277.97	0.2	3060
LTE B4	1710-1755	2.00	-0.15	25	316.23	24.85	305.49	0.2	3060
LTE B5	824-849	2.53	0.38	25	316.23	25.38	345.14	0.2	1681
LTE B12	699-716	3.95	1.80	25	316.23	26.80	478.63	0.2	1426
LTE B13	777-787	4.45	2.30	25	316.23	27.30	537.03	0.2	1585
LTE B14	788-798	4.45	2.30	25	316.23	27.30	537.03	0.2	1608
LTE B66	1710-1780	2.00	-0.15	25	316.23	24.85	305.49	0.2	3060
LTE B71	663-698	1.66	-0.49	25	316.23	24.51	282.49	0.2	1353

Note: the device contains a certified WWAN module, FCC ID: XMR201808EC25AF

Simultaneous transmitting consideration (worst case):

The ratio=$P_{Wi\text{-}Fi}$/Pth+P_{WWAN}/Pth=56.89/3060+537.03/1585=0.36＜1.0

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has three external antennas arrangement, which was RP-SAM connector and the antenna gain is 2.2dBi, fulfill the requirement of this section. Please refer to the EUT photos.

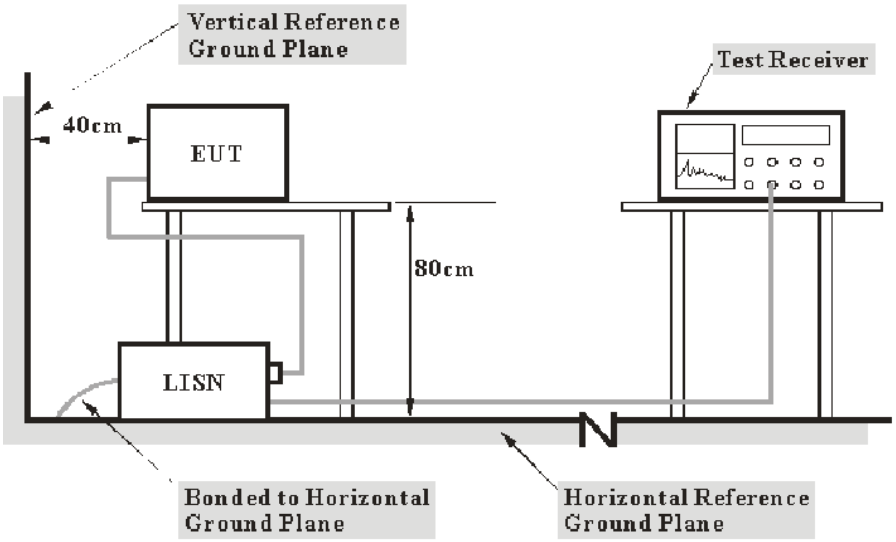
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the device was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Transd Factor & Margin Calculation

The Transd factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Transd Factor = LISN VDF + Cable Loss

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a over limit of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Over Limit = level – Limit
Level= reading level+ Transd Factor

Test Data

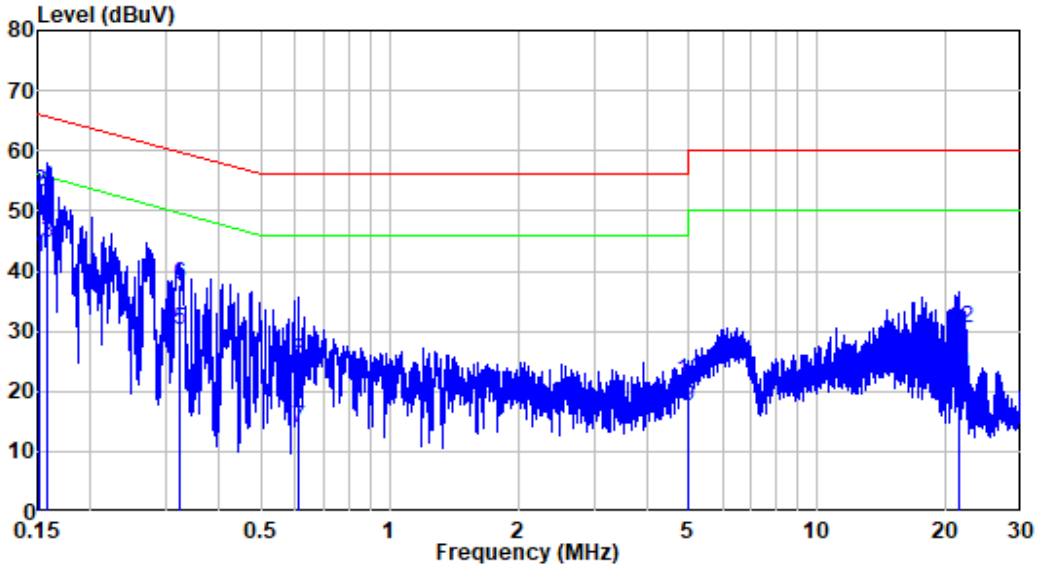
Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Jason Liu on 2022-12-29.

EUT operation mode: Transmitting (Worst case is 802.11N20_MIMO mode, high Channel)

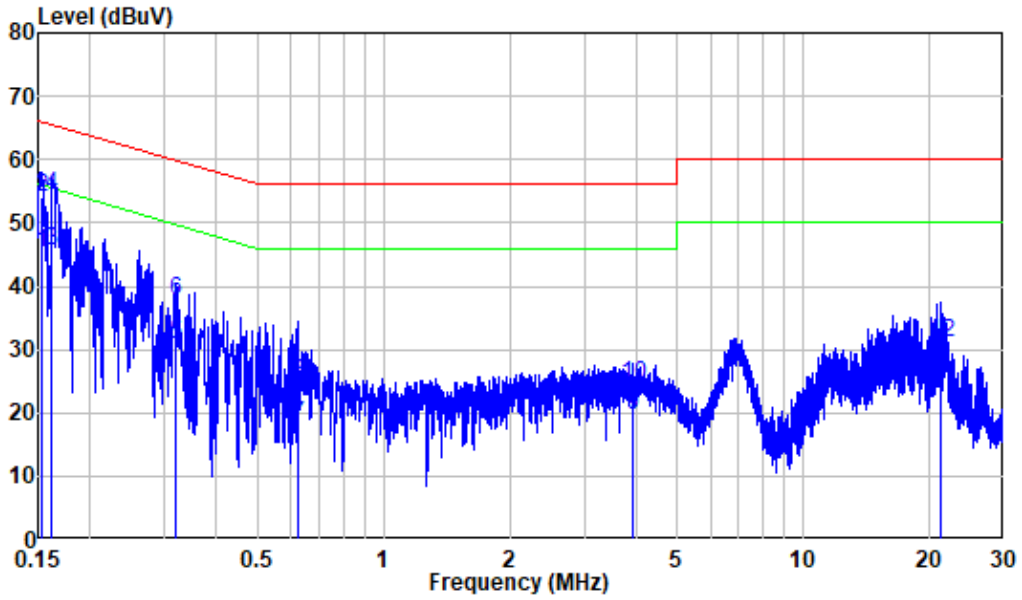
AC 120V/60 Hz, Line



Site : Shielding Room
Condition: Line
Job No. : RA221118-54917E-RF
Mode : 2.4G WIFI Transmitting
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.151	9.80	32.42	42.22	55.93	-13.71	Average
2	0.151	9.80	43.39	53.19	65.93	-12.74	QP
3	0.159	9.80	35.03	44.83	55.54	-10.71	Average
4	0.159	9.80	44.06	53.86	65.54	-11.68	QP
5	0.321	9.80	20.40	30.20	49.67	-19.47	Average
6	0.321	9.80	27.83	37.63	59.67	-22.04	QP
7	0.613	9.81	3.98	13.79	46.00	-32.21	Average
8	0.613	9.81	15.33	25.14	56.00	-30.86	QP
9	5.001	9.85	7.66	17.51	50.00	-32.49	Average
10	5.001	9.85	11.86	21.71	60.00	-38.29	QP
11	21.373	10.01	12.52	22.53	50.00	-27.47	Average
12	21.373	10.01	20.58	30.59	60.00	-29.41	QP

AC 120V/60 Hz, Neutral



Site : Shielding Room
Condition: Neutral
Job No. : RA221118-54917E-RF
Mode : 2.4G WIFI Transmitting
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.154	9.80	35.50	45.30	55.80	-10.50	Average
2	0.154	9.80	44.26	54.06	65.80	-11.74	QP
3	0.162	9.80	35.86	45.66	55.36	-9.70	Average
4	0.162	9.80	44.47	54.27	65.36	-11.09	QP
5	0.321	9.80	21.08	30.88	49.69	-18.81	Average
6	0.321	9.80	28.01	37.81	59.69	-21.88	QP
7	0.628	9.81	8.40	18.21	46.00	-27.79	Average
8	0.628	9.81	15.00	24.81	56.00	-31.19	QP
9	3.907	9.84	9.67	19.51	46.00	-26.49	Average
10	3.907	9.84	14.48	24.32	56.00	-31.68	QP
11	21.260	10.11	13.39	23.50	50.00	-26.50	Average
12	21.260	10.11	20.93	31.04	60.00	-28.96	QP

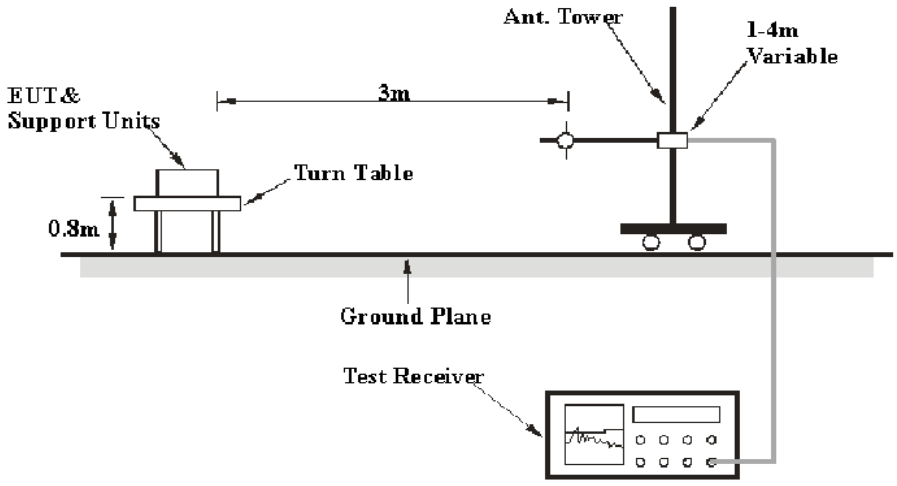
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

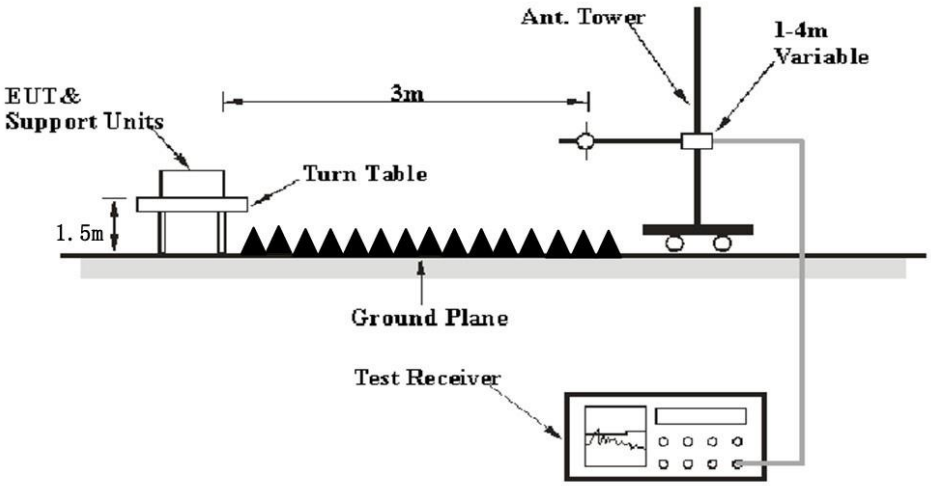
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, FCC 15.247.

EMI Test Receiver & Spectrum Analyzer Setup

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz Note 1	/	Average
	1MHz	＞1/T Note 2	/	Average

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Factor & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit or Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a overlimit/margin of -7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin/Over Limit = Corrected Amplitude/Level-Limit
Corrected Amplitude/Level = Reading + Corrected Factor

Test Data

Environmental Conditions

Temperature:	24~25.6 ℃
Relative Humidity:	50~59 %
ATM Pressure:	101.0 kPa

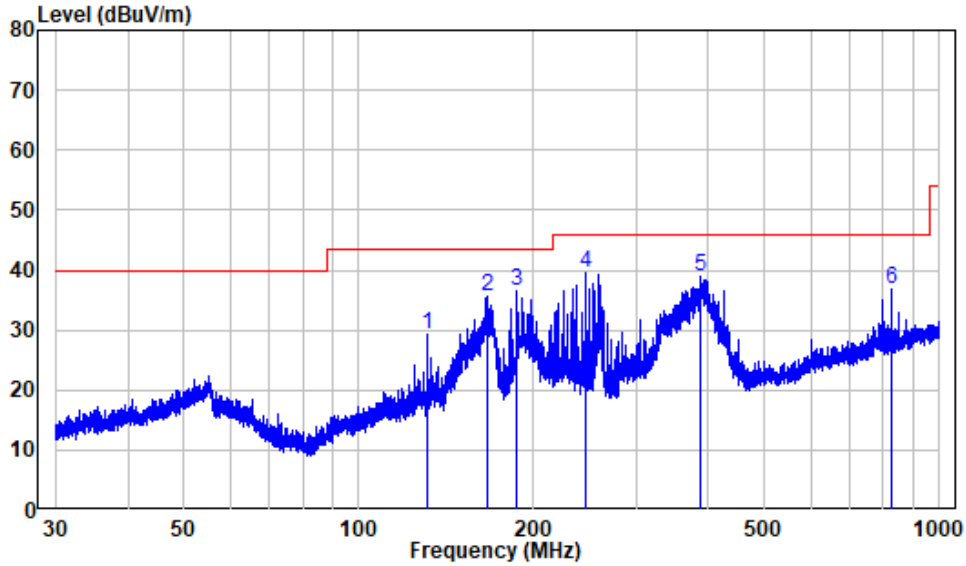
The testing was performed by Jimi Zheng on 2023-02-10 for below 1GHz and on 2022-12-09 for above 1GHz.

EUT operation mode: Transmitting (Pre-scan in the X, Y and Z axes of orientation, the worst case X-axis of orientation was recorded)

30MHz-1GHz: (Worst case is 802.11N20_MIMO mode, high Channel)

Note: When the test result of peak was less than the limit of QP more than 6dB, just peak value were recorded.

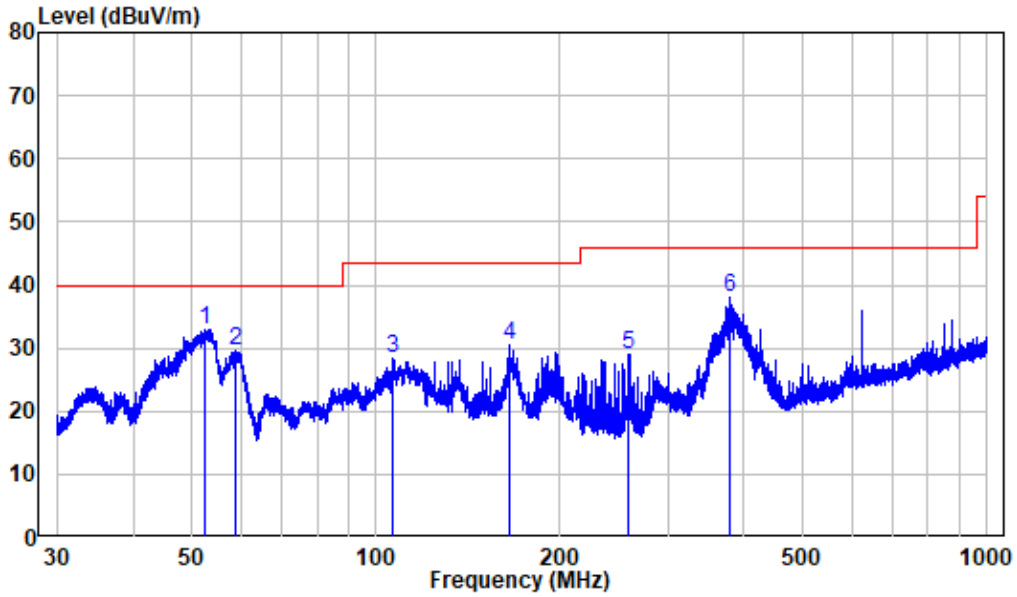
Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : RA221118-54917E-RF
Test Mode: 2.4G WIFI

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	131.067	-14.93	44.23	29.30	43.50	-14.20	Peak
2	165.923	-13.99	49.47	35.48	43.50	-8.02	Peak
3	186.359	-12.01	48.50	36.49	43.50	-7.01	Peak
4	245.735	-10.60	50.21	39.61	46.00	-6.39	Peak
5	387.143	-6.98	46.01	39.03	46.00	-6.97	Peak
6	825.320	0.07	36.68	36.75	46.00	-9.25	Peak

Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : RA221118-54917E-RF
Test Mode: 2.4G WIFI

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	52.322	-10.03	42.95	32.92	40.00	-7.08	Peak
2	58.741	-10.18	39.86	29.68	40.00	-10.32	Peak
3	106.665	-11.94	40.28	28.34	43.50	-15.16	Peak
4	165.559	-14.05	44.48	30.43	43.50	-13.07	Peak
5	258.100	-10.60	39.73	29.13	46.00	-16.87	Peak
6	380.247	-7.14	45.26	38.12	46.00	-7.88	Peak

1-25 GHz:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave.		Height (m)	Polar (H/V)				
802.11b_ANT1 (Worst Case)									
Low Channel(2412MHz)									
2310	63.95	PK	355	2.4	H	-7.24	56.71	74	-17.29
2310	48.97	AV	355	2.4	H	-7.24	41.73	54	-12.27
2310	65.67	PK	24	2.3	V	-7.24	58.43	74	-15.57
2310	51.18	AV	24	2.3	V	-7.24	43.94	54	-10.06
2390	65.40	PK	336	2.1	H	-7.22	58.18	74	-15.82
2390	50.81	AV	336	2.1	H	-7.22	43.59	54	-10.41
2390	66.65	PK	204	2.4	V	-7.22	59.43	74	-14.57
2390	52.45	AV	204	2.4	V	-7.22	45.23	54	-8.77
4824	57.00	PK	285	2.4	H	-3.52	53.48	74	-20.52
4824	59.54	PK	223	1.7	V	-3.52	56.02	74	-17.98
4824	52.62	AV	223	1.7	V	-3.52	49.10	54	-4.90
Middle Channel(2437MHz)									
4874	56.97	PK	38	1.4	H	-3.36	53.61	74	-20.39
4874	59.78	PK	243	1.9	V	-3.36	56.42	74	-17.58
4874	53.54	AV	243	1.9	V	-3.36	50.18	54	-3.82
High Channel(2462 MHz)									
2483.5	64.70	PK	291	1.6	H	-7.20	57.5	74	-16.50
2483.5	50.08	AV	291	1.6	H	-7.20	42.88	54	-11.12
2483.5	68.41	PK	206	2	V	-7.20	61.21	74	-12.79
2483.5	55.02	AV	206	2	V	-7.20	47.82	54	-6.18
2500	64.20	PK	291	2.3	H	-7.18	57.02	74	-16.98
2500	49.37	AV	291	2.3	H	-7.18	42.19	54	-11.81
2500	68.44	PK	24	2.4	V	-7.18	61.26	74	-12.74
2500	54.14	AV	24	2.4	V	-7.18	46.96	54	-7.04
4924	56.72	PK	153	2.1	H	-3.16	53.56	74	-20.44
4924	60.38	PK	266	2.1	V	-3.16	57.22	74	-16.78
4924	54.50	AV	266	2.1	V	-3.16	51.34	54	-2.66

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave.		Height (m)	Polar (H/V)				
802.11g_MIMO (Worst Case)									
Low Channel(2412MHz)									
2310	63.13	PK	20	1.6	H	-7.24	55.89	74	-18.11
2310	49.29	AV	20	1.6	H	-7.24	42.05	54	-11.95
2310	66.12	PK	281	2.2	V	-7.24	58.88	74	-15.12
2310	51.88	AV	281	2.2	V	-7.24	44.64	54	-9.36
2390	65.22	PK	1	2.4	H	-7.22	58.00	74	-16.00
2390	51.25	AV	1	2.4	H	-7.22	44.03	54	-9.97
2390	68.22	PK	200	1.9	V	-7.22	61.00	74	-13.00
2390	54.15	AV	200	1.9	V	-7.22	46.93	54	-7.07
4824	56.58	PK	209	2	H	-3.52	53.06	74	-20.94
4824	62.09	PK	137	1.2	V	-3.52	58.57	74	-15.43
4824	47.55	AV	137	1.2	V	-3.52	44.03	54	-9.97
Middle Channel(2437MHz)									
4874	56.82	PK	177	2.1	H	-3.36	53.46	74	-20.54
4874	64.93	PK	302	2.4	V	-3.36	61.57	74	-12.43
4874	50.13	AV	302	2.4	V	-3.36	46.77	54	-7.23
High Channel(2462 MHz)									
2483.5	67.64	PK	60	1.4	H	-7.20	60.44	74	-13.56
2483.5	52.49	AV	60	1.4	H	-7.20	45.29	54	-8.71
2483.5	73.10	PK	189	1.7	V	-7.20	65.9	74	-8.10
2483.5	59.14	AV	189	1.7	V	-7.20	51.94	54	-2.06
2500	64.91	PK	331	2.5	H	-7.18	57.73	74	-16.27
2500	51.41	AV	331	2.5	H	-7.18	44.23	54	-9.77
2500	71.74	PK	266	2.3	V	-7.18	64.56	74	-9.44
2500	58.16	AV	266	2.3	V	-7.18	50.98	54	-3.02
4924	56.90	PK	14	1.9	H	-3.16	53.74	74	-20.26
4924	65.46	PK	326	1.8	V	-3.16	62.30	74	-11.70
4924	51.58	AV	326	1.8	V	-3.16	48.42	54	-5.58

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave.		Height (m)	Polar (H/V)				
802.11n20_MIMO (Worst Case)									
Low Channel(2412MHz)									
2310	63.20	PK	27	2.3	H	-7.24	55.96	74	-18.04
2310	49.55	AV	27	2.3	H	-7.24	42.31	54	-11.69
2310	66.71	PK	231	1.7	V	-7.24	59.47	74	-14.53
2310	53.48	AV	231	1.7	V	-7.24	46.24	54	-7.76
2390	64.69	PK	51	1.7	H	-7.22	57.47	74	-16.53
2390	51.15	AV	51	1.7	H	-7.22	43.93	54	-10.07
2390	68.98	PK	279	1.9	V	-7.22	61.76	74	-12.24
2390	55.88	AV	279	1.9	V	-7.22	48.66	54	-5.34
4824	56.93	PK	146	1.8	H	-3.52	53.41	74	-20.59
4824	61.53	PK	79	1.3	V	-3.52	58.01	74	-15.99
4824	46.72	AV	79	1.3	V	-3.52	43.20	54	-10.80
Middle Channel(2437MHz)									
4874	56.92	PK	84	2	H	-3.36	53.56	74	-20.44
4874	62.96	PK	92	1.5	V	-3.36	59.6	74	-14.40
4874	48.35	AV	92	1.5	V	-3.36	44.99	54	-9.01
High Channel(2462 MHz)									
2483.5	66.24	PK	203	2	H	-7.20	59.04	74	-14.96
2483.5	52.36	AV	203	2	H	-7.20	45.16	54	-8.84
2483.5	74.69	PK	267	1.2	V	-7.20	67.49	74	-6.51
2483.5	58.70	AV	267	1.2	V	-7.20	51.5	54	-2.50
2500	65.29	PK	109	1.9	H	-7.18	58.11	74	-15.89
2500	51.32	AV	109	1.9	H	-7.18	44.14	54	-9.86
2500	71.01	PK	114	1.6	V	-7.18	63.83	74	-10.17
2500	57.32	AV	114	1.6	V	-7.18	50.14	54	-3.86
4924	56.80	PK	13	1.6	H	-3.16	53.64	74	-20.36
4924	65.68	PK	291	1.8	V	-3.16	62.52	74	-11.48
4924	51.30	AV	291	1.8	V	-3.16	48.14	54	-5.86

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave.		Height (m)	Polar (H/V)				
802.11n40_MIMO (Worst Case)									
Low Channel(2422MHz)									
2310	62.37	PK	154	2.2	H	-7.24	55.13	74	-18.87
2310	48.92	AV	154	2.2	H	-7.24	41.68	54	-12.32
2310	64.13	PK	10	1.7	V	-7.24	56.89	74	-17.11
2310	51.01	AV	10	1.7	V	-7.24	43.77	54	-10.23
2390	67.50	PK	33	1	H	-7.22	60.28	74	-13.72
2390	51.25	AV	33	1	H	-7.22	44.03	54	-9.97
2390	71.47	PK	293	2.1	V	-7.22	64.25	74	-9.75
2390	54.10	AV	293	2.1	V	-7.22	46.88	54	-7.12
4844	56.87	PK	49	2.3	H	-3.54	53.33	74	-20.67
4844	56.48	PK	340	2.3	V	-3.54	52.94	74	-21.06
Middle Channel(2437MHz)									
4874	57.12	PK	22	1.9	H	-3.42	53.7	74	-20.30
4874	58.61	PK	65	1.2	V	-3.42	55.19	74	-18.81
4874	45.68	AV	65	1.2	V	-3.42	42.26	54	-11.74
High Channel(2452MHz)									
2483.5	67.65	PK	230	1.9	H	-7.20	60.45	74	-13.55
2483.5	51.96	AV	230	1.9	H	-7.20	44.76	54	-9.24
2483.5	74.18	PK	22	1.6	V	-7.20	66.98	74	-7.02
2483.5	58.40	AV	22	1.6	V	-7.20	51.2	54	-2.80
2500	64.04	PK	31	1.8	H	-7.18	56.86	74	-17.14
2500	51.13	AV	31	1.8	H	-7.18	43.95	54	-10.05
2500	69.88	PK	65	2.3	V	-7.18	62.7	74	-11.30
2500	56.23	AV	65	2.3	V	-7.18	49.05	54	-4.95
4904	56.95	PK	223	2	H	-3.26	53.69	74	-20.31
4904	58.74	PK	118	2	V	-3.26	55.48	74	-18.52
4904	45.75	AV	118	2	V	-3.26	42.49	54	-11.51

Note:

Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Absolute Level (Corrected Amplitude） = Factor + Reading

Margin = Absolute Level - Limit

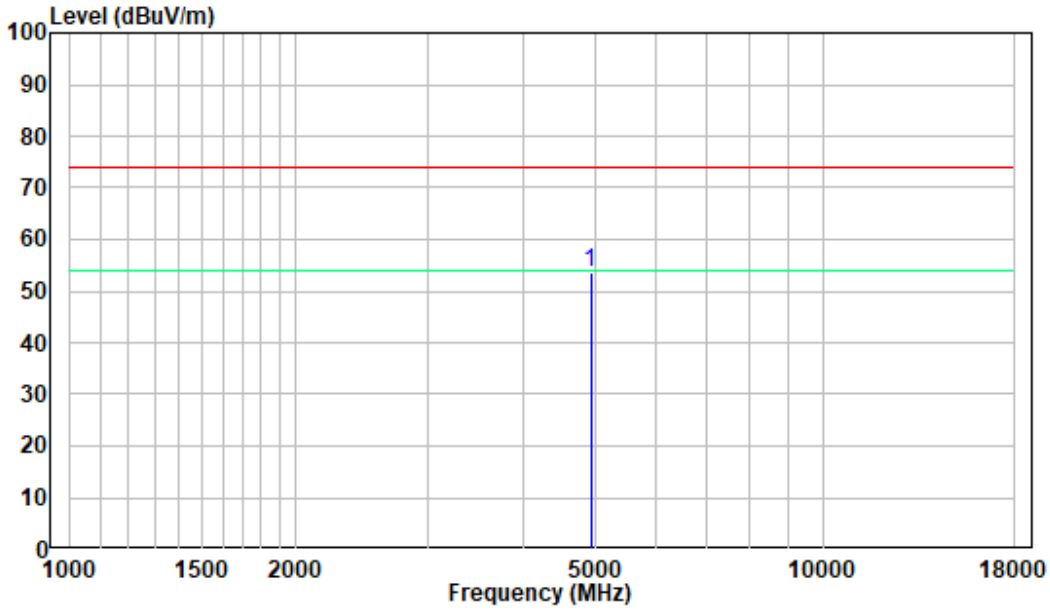
The other spurious emission which is 20dB below to the limit was not recorded.

The test result of peak was less than the limit of average, so just peak values were recorded.

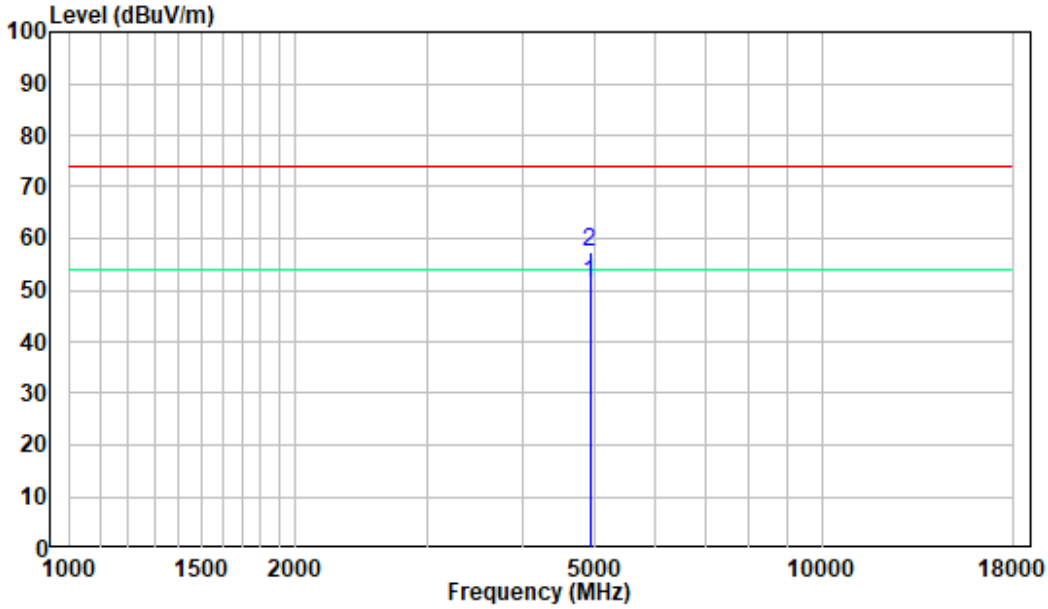
1-18 GHz:

Pre-scan Plots:

802.11 b High Channel
Horizontal



Vertical

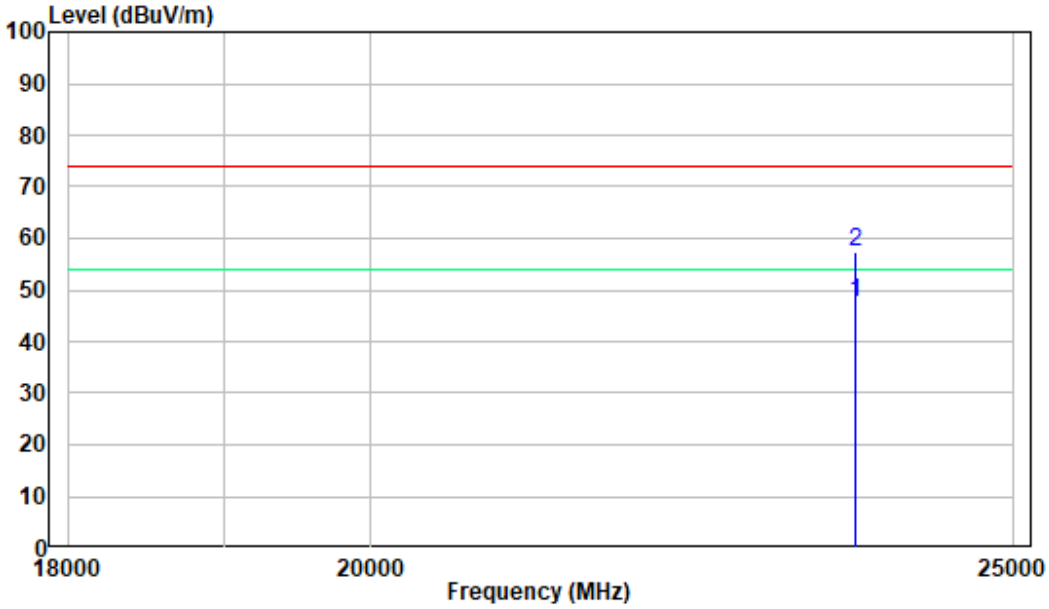


18 -25GHz:

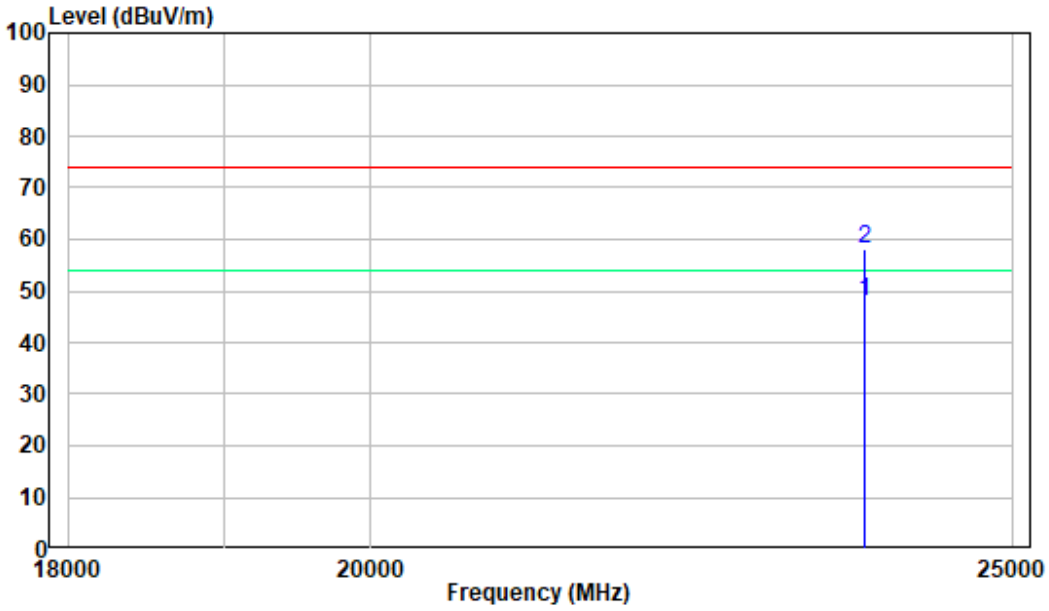
Pre-scan Plots:

802.11 b High Channel

Horizontal



Vertical



FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH & OCCUPIED BANDWIDTH

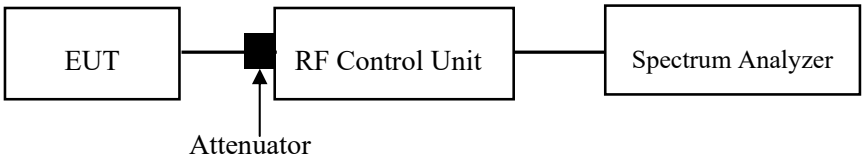
Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.8.1 & Clause 6.9.3

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	59 %
ATM Pressure:	101.0 kPa

The testing was performed by Glenn Jiang from 2022-12-09 to 2022-12-15.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

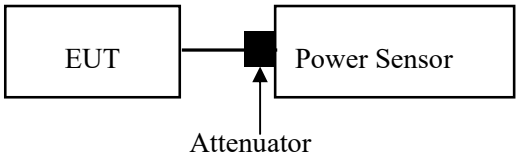
Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.9.2.3

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	59 %
ATM Pressure:	101.0 kPa

The testing was performed by Glenn Jiang on 2023-02-10.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

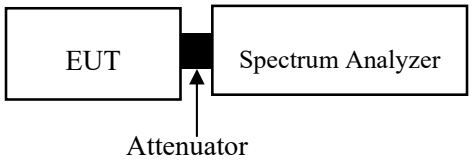
Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.11

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	59 %
ATM Pressure:	101.0 kPa

The testing was performed by Glenn Jiang on 2023-02-10.

EUT operation mode: Transmitting

Test Result: Compliant.

Conducted Band Edge Result:

Please refer to the Appendix.

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

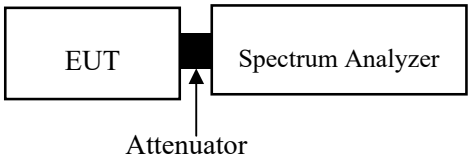
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.10.3 &11.10.5

Use this procedure when the maximum average conducted output power in the fundamental emission is used to demonstrate compliance.

1. Measure the duty cycle (*D*) of the transmitter output signal as described in ANSI C63.10-2013 11.6.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = Power Averaging (rms).
6. Ensure that the number of measurement points in the sweep ≥ [2 × span / RBW].
7. Sweep time = auto couple.
8. Trace mode = trace averaging (rms) mode over a minimum of 100 traces.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level.
11. When the EUT cannot be configured to transmit continuously (i.e.,*D* < 98%), when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than ±2%), add [10 log (1 / D)], where D is the duty cycle measured in step 1), to the measured PSD to compute the average PSD during the actual transmission time.
12. When the EUT transmits continuously (or with a *D* ⩾ 98%), step 11 is not required.
13. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	59 %
ATM Pressure:	101.0 kPa

The testing was performed by Glenn Jiang on 2023-02-10.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

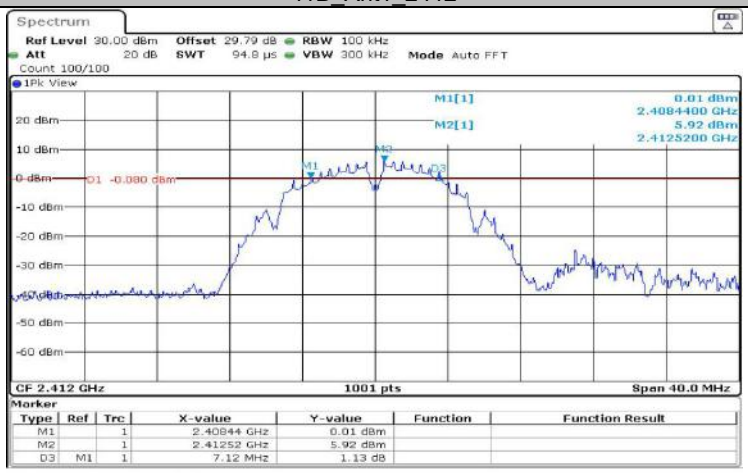
APPENDIX

Appendix A: DTS Bandwidth
Test Result

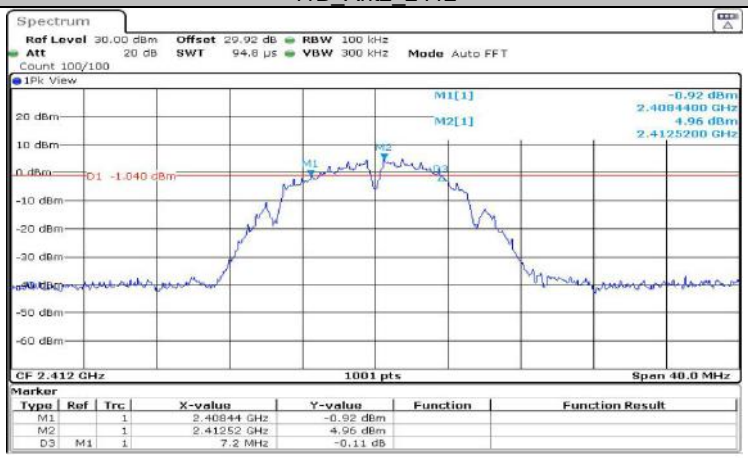
Test Mode	Antenna	Frequency[MHz]	DTS BW [MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	7.12	0.5	PASS
	Ant2	2412	7.20	0.5	PASS
	Ant3	2412	7.08	0.5	PASS
	Ant1	2437	7.16	0.5	PASS
	Ant2	2437	7.20	0.5	PASS
	Ant3	2437	7.20	0.5	PASS
	Ant1	2462	6.60	0.5	PASS
	Ant2	2462	7.08	0.5	PASS
	Ant3	2462	7.24	0.5	PASS
11G-CDD	Ant1	2412	15.80	0.5	PASS
	Ant2	2412	16.32	0.5	PASS
	Ant3	2412	16.28	0.5	PASS
	Ant1	2437	15.68	0.5	PASS
	Ant2	2437	16.08	0.5	PASS
	Ant3	2437	15.72	0.5	PASS
	Ant1	2462	16.12	0.5	PASS
	Ant2	2462	16.32	0.5	PASS
	Ant3	2462	16.32	0.5	PASS
11N20MIMO	Ant1	2412	16.80	0.5	PASS
	Ant2	2412	17.16	0.5	PASS
	Ant3	2412	17.16	0.5	PASS
	Ant1	2437	15.96	0.5	PASS
	Ant2	2437	16.32	0.5	PASS
	Ant3	2437	16.32	0.5	PASS
	Ant1	2462	16.92	0.5	PASS
	Ant2	2462	17.28	0.5	PASS
	Ant3	2462	17.16	0.5	PASS
11N40MIMO	Ant1	2422	35.68	0.5	PASS
	Ant2	2422	35.52	0.5	PASS
	Ant3	2422	35.76	0.5	PASS
	Ant1	2437	35.68	0.5	PASS
	Ant2	2437	35.52	0.5	PASS
	Ant3	2437	35.52	0.5	PASS
	Ant1	2452	35.84	0.5	PASS
	Ant2	2452	35.68	0.5	PASS
	Ant3	2452	35.92	0.5	PASS

Test Graphs

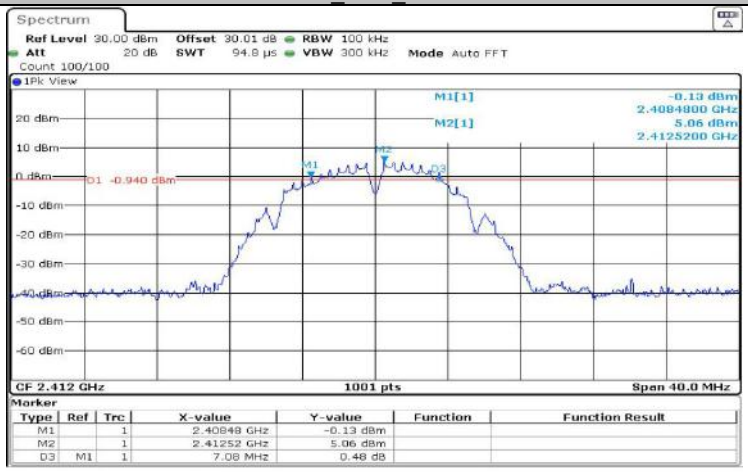
11B_Ant1_2412



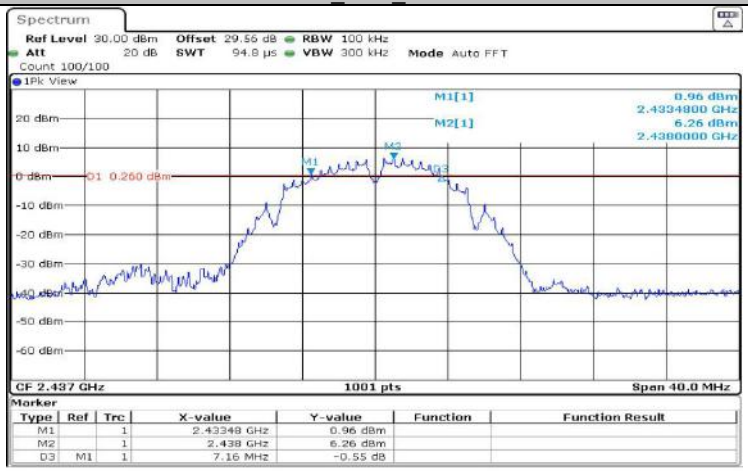
11B_Ant2_2412



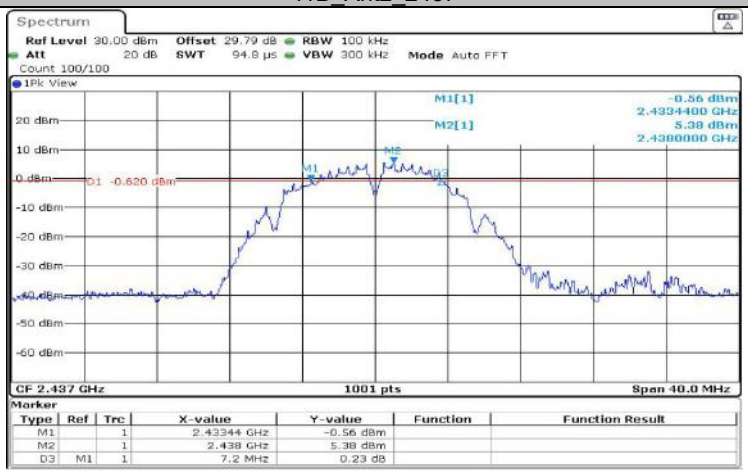
11B_Ant3_2412



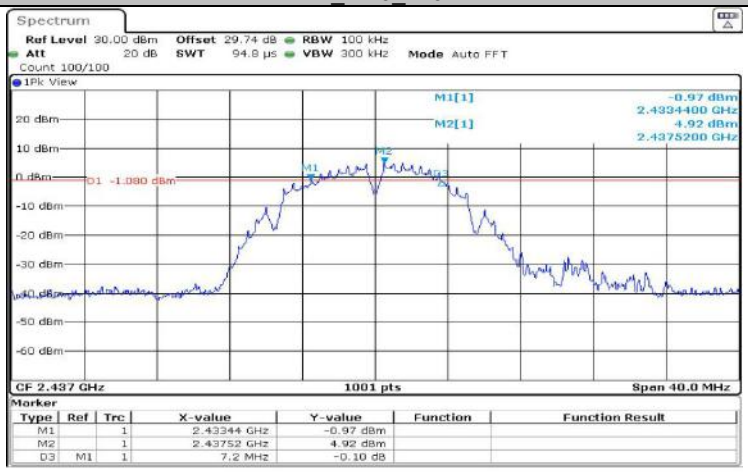
11B_Ant1_2437



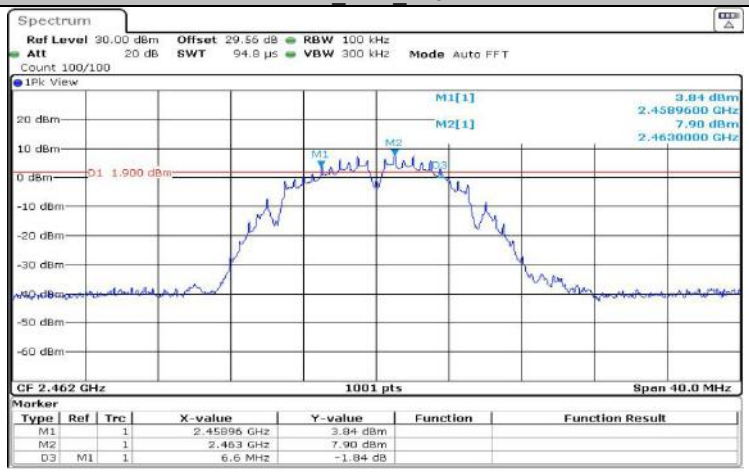
11B_Ant2_2437



11B_Ant3_2437

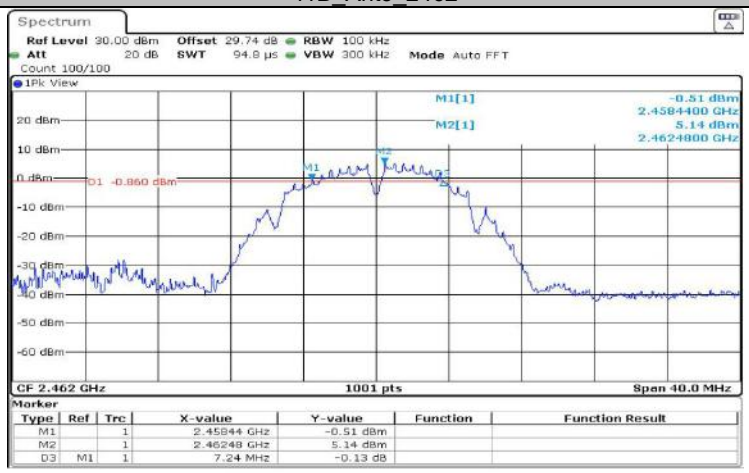


11B_Ant1_2462

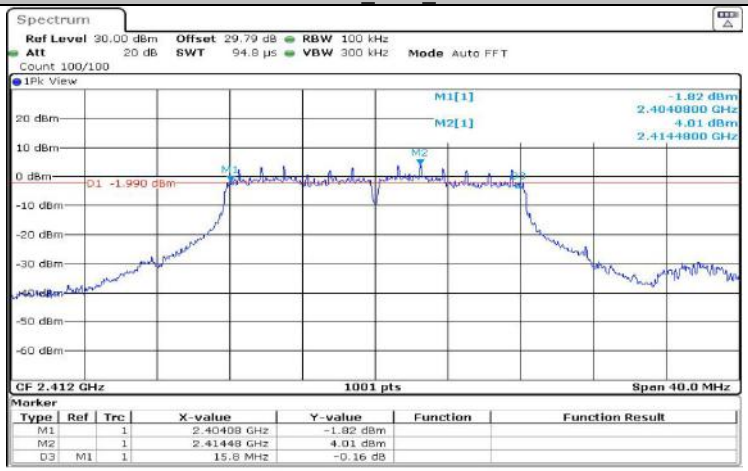


11B_Ant2_2462

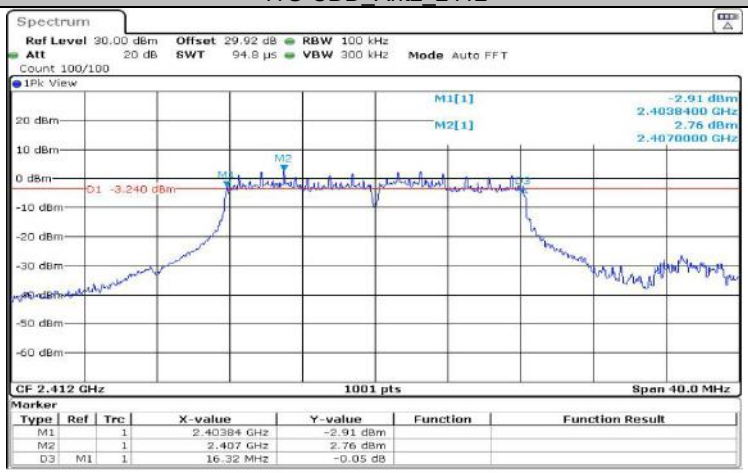
11B_Ant3_2462



11G-CDD_Ant1_2412



11G-CDD_Ant2_2412



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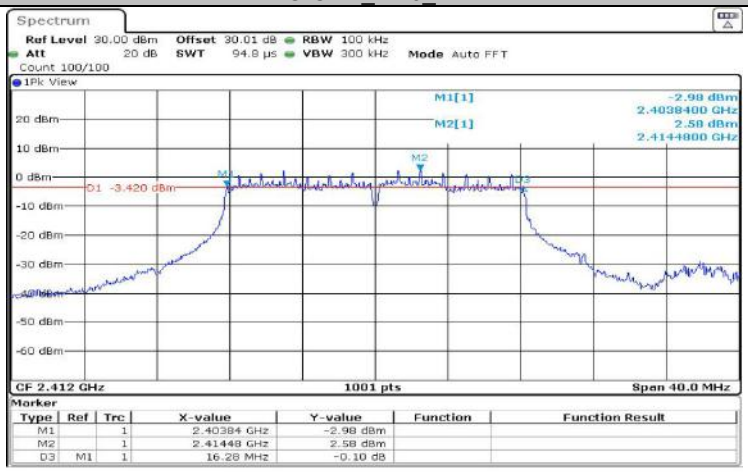

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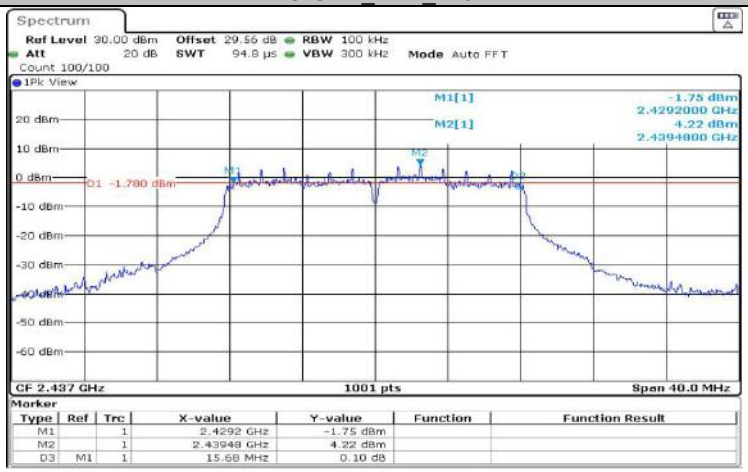

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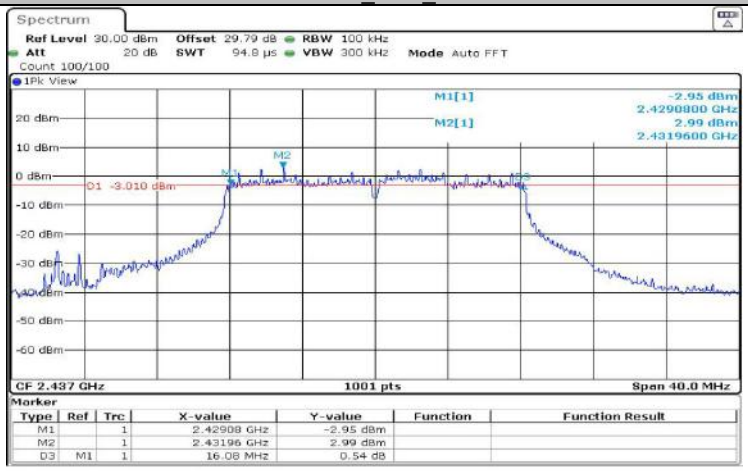
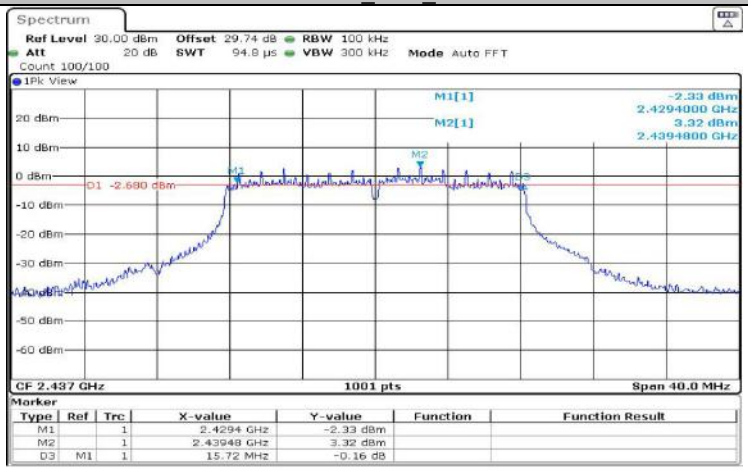
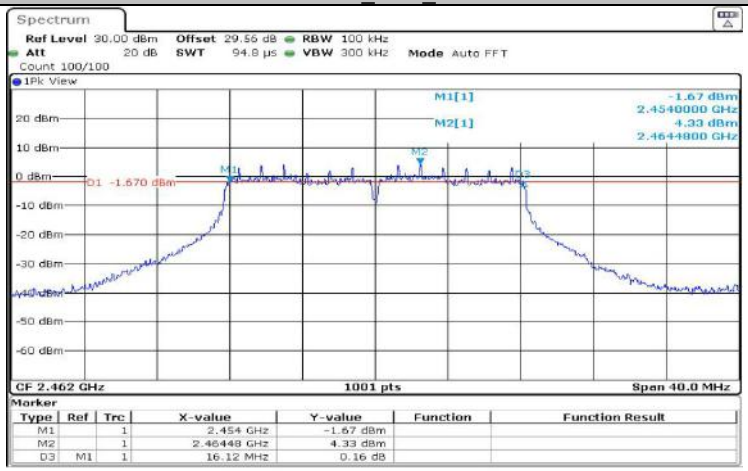


11G-CDD_Ant3_2437



11G-CDD_Ant1_2462



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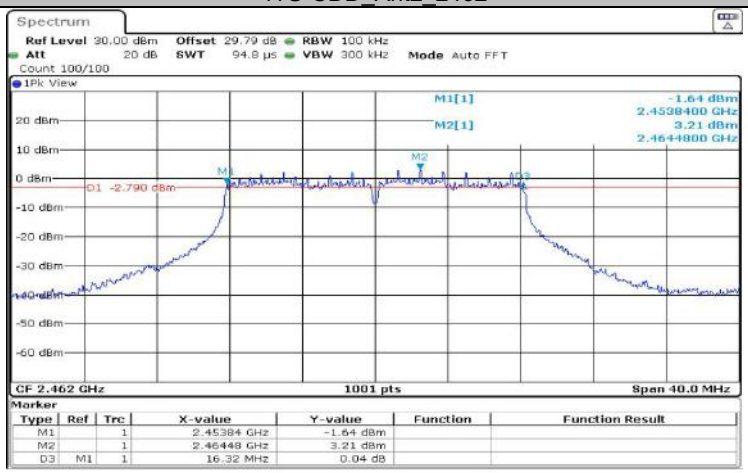
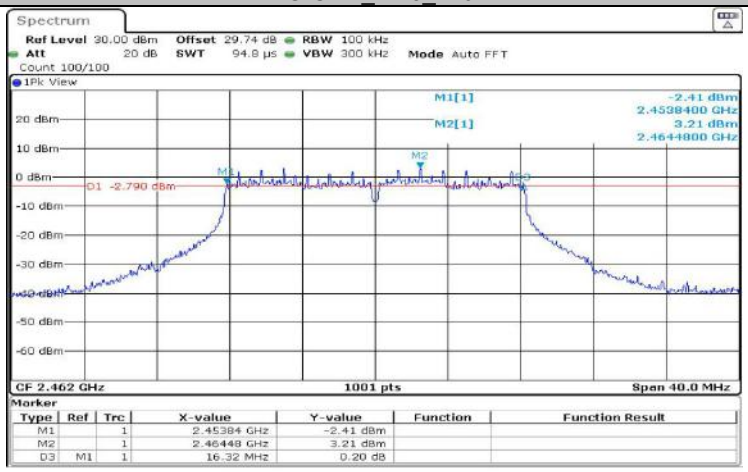
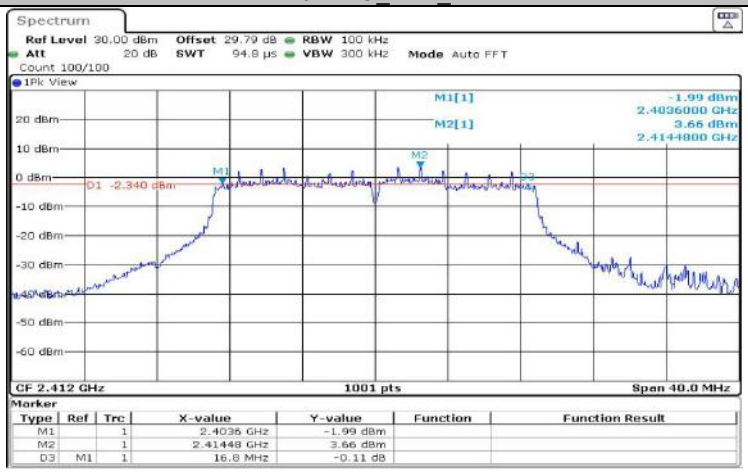


11G-CDD_Ant3_2462



11N20MIMO_Ant1_2412



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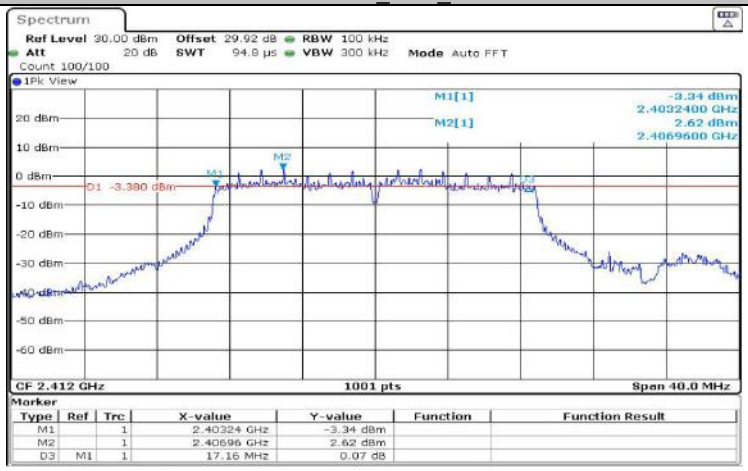

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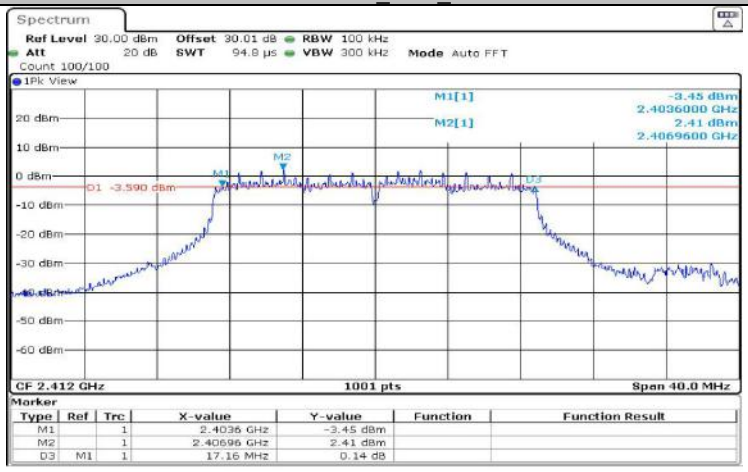

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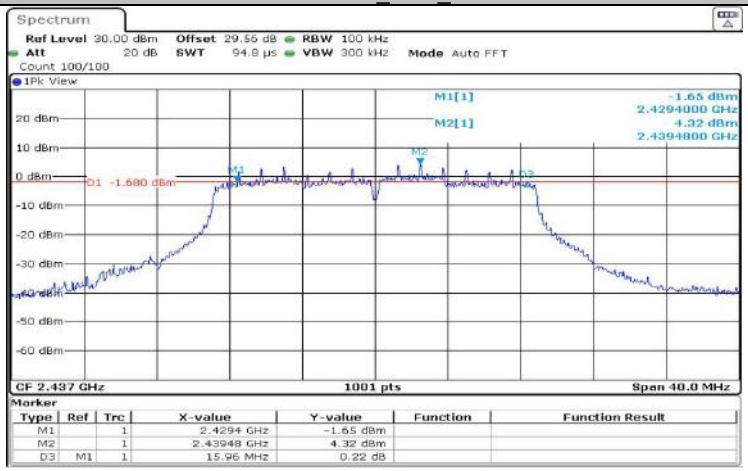

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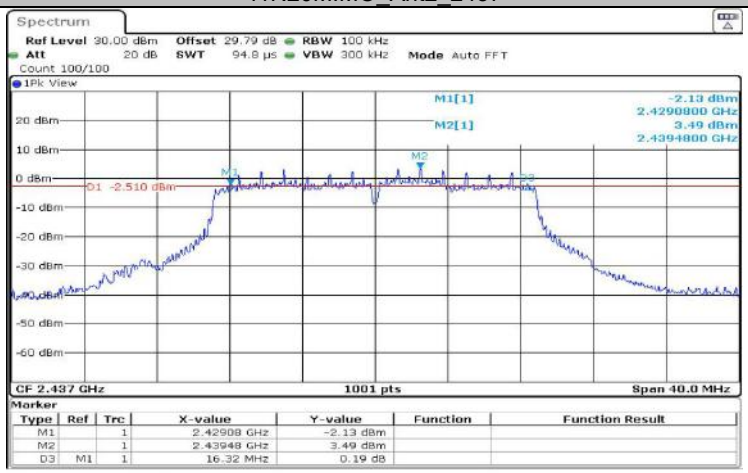

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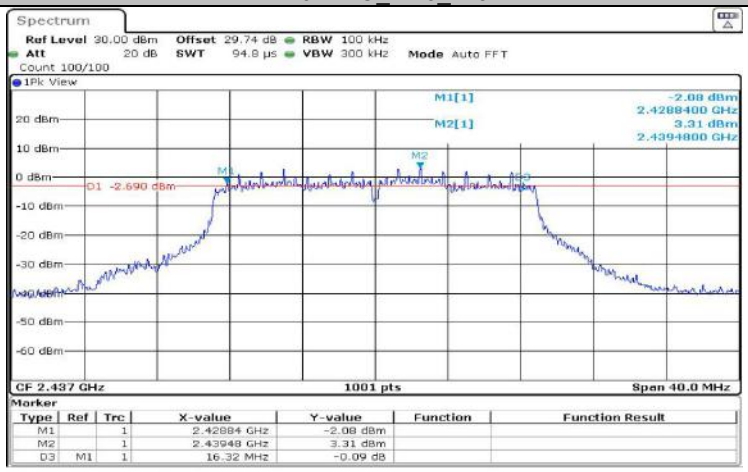

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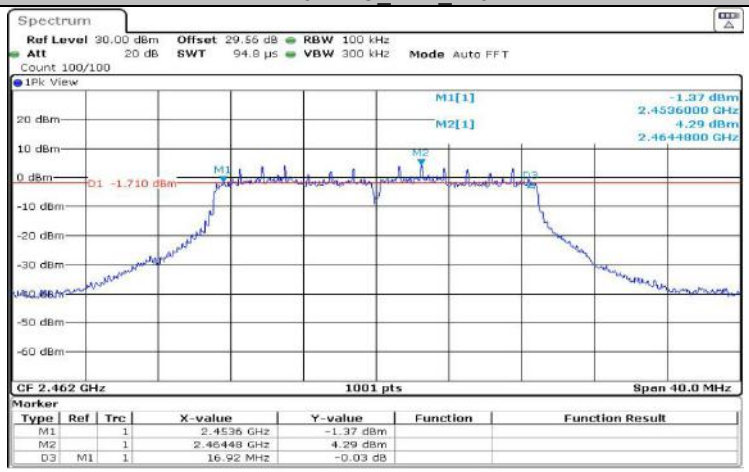

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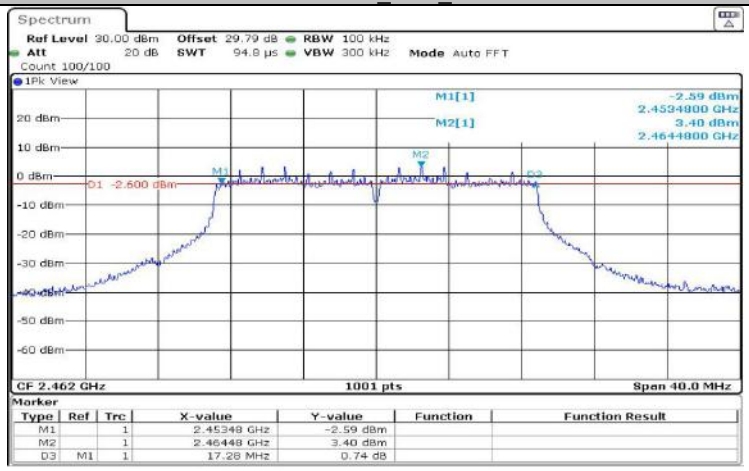

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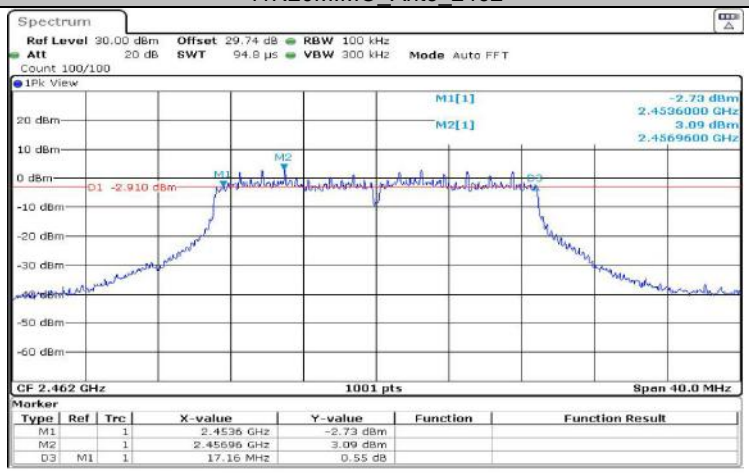
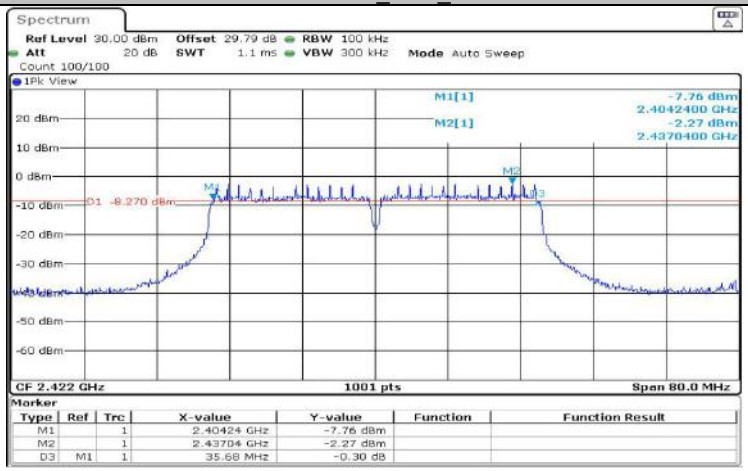


11N40MIMO_Ant1_2422



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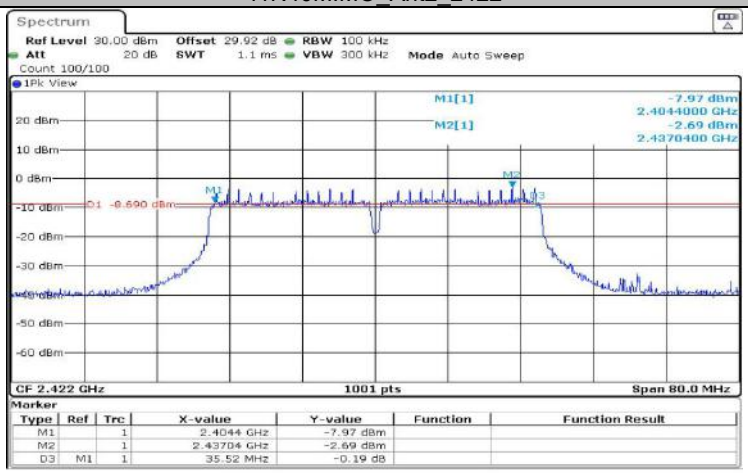
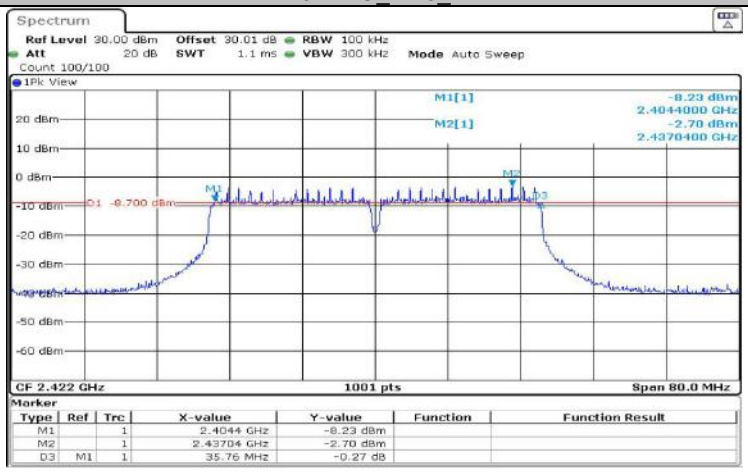


11N40MIMO_Ant3_2422



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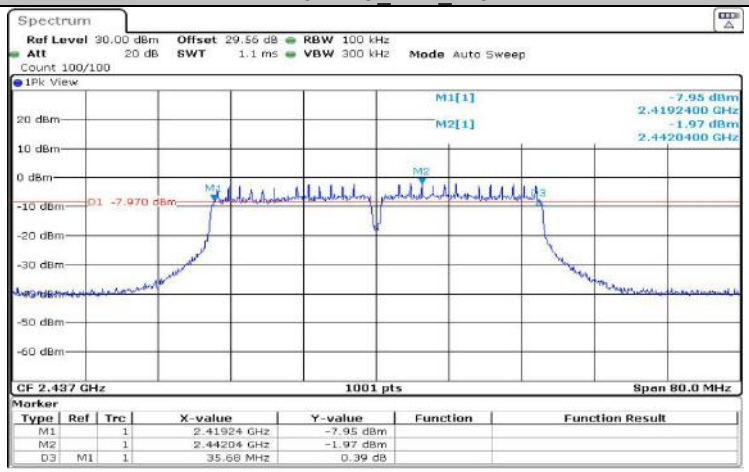

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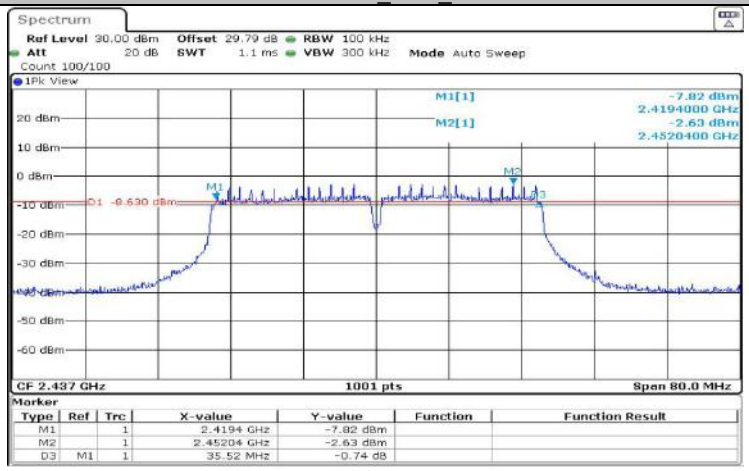

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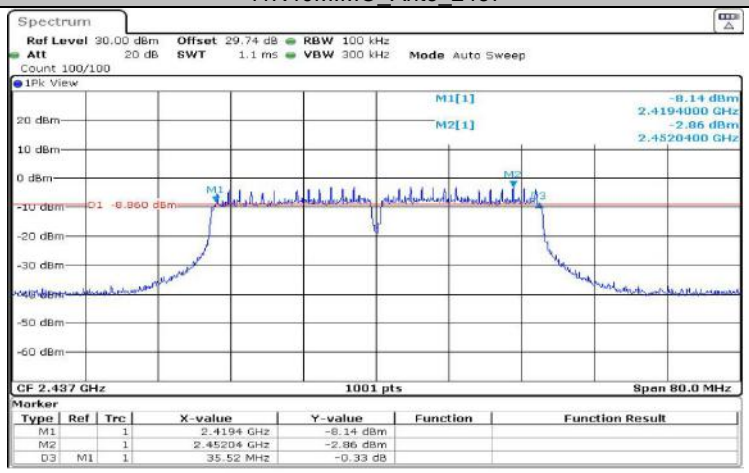
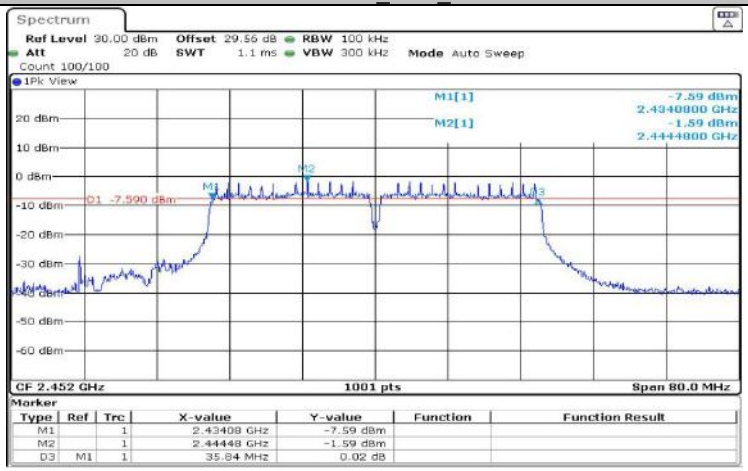
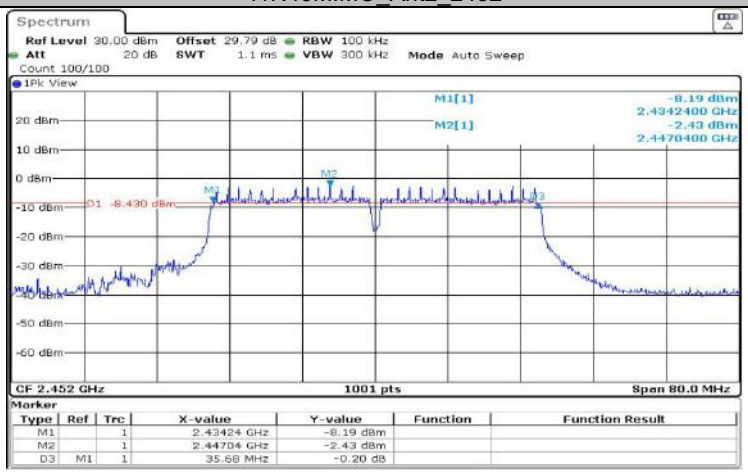


11N40MIMO_Ant1_2452



11N40MIMO_Ant2_2452



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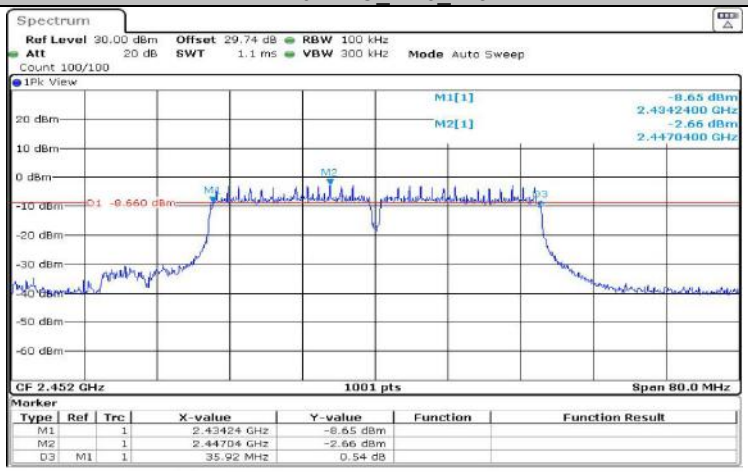
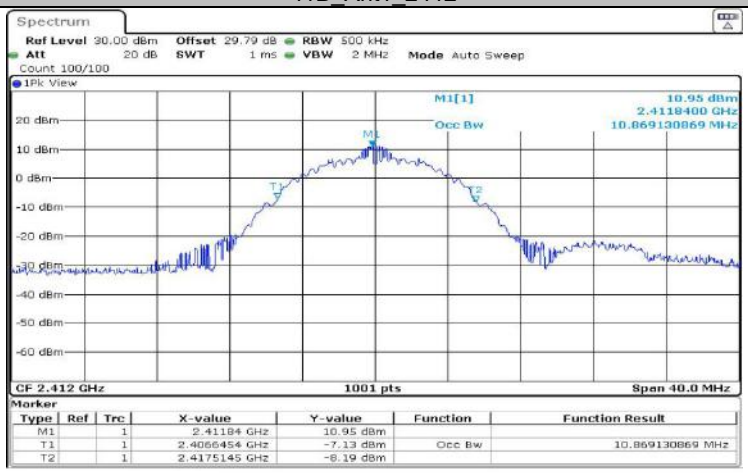


Appendix B: Occupied Channel Bandwidth
Test Result

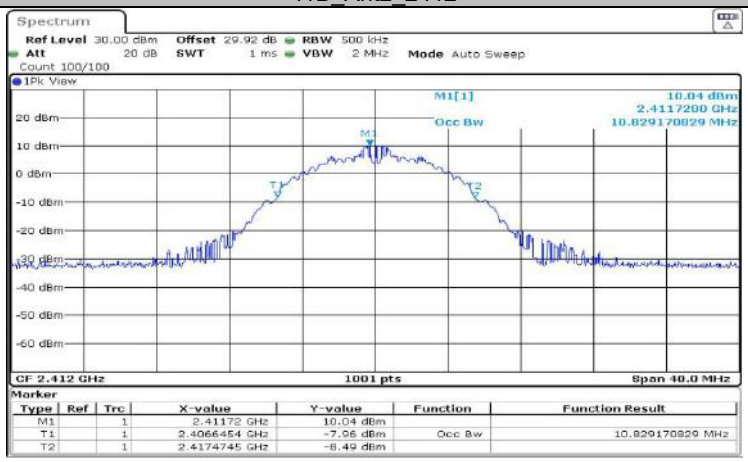
Test Mode	Antenna	Channel Frequency[MHz]	OCB [MHz]
11B	Ant1	2412	10.869
	Ant2	2412	10.829
	Ant3	2412	11.029
	Ant1	2437	11.029
	Ant2	2437	10.909
	Ant3	2437	10.829
	Ant1	2462	10.949
	Ant2	2462	10.909
	Ant3	2462	11.069
11G-CDD	Ant1	2412	17.822
	Ant2	2412	17.463
	Ant3	2412	17.263
	Ant1	2437	17.822
	Ant2	2437	17.423
	Ant3	2437	17.303
	Ant1	2462	17.822
	Ant2	2462	17.423
	Ant3	2462	17.303
11N20MIMO	Ant1	2412	18.741
	Ant2	2412	18.581
	Ant3	2412	18.262
	Ant1	2437	18.621
	Ant2	2437	18.462
	Ant3	2437	18.182
	Ant1	2462	18.741
	Ant2	2462	18.462
	Ant3	2462	18.302
11N40MIMO	Ant1	2422	37.882
	Ant2	2422	37.962
	Ant3	2422	37.403
	Ant1	2437	37.802
	Ant2	2437	37.562
	Ant3	2437	37.243
	Ant1	2452	37.722
	Ant2	2452	37.642
	Ant3	2452	37.243

Test Graphs

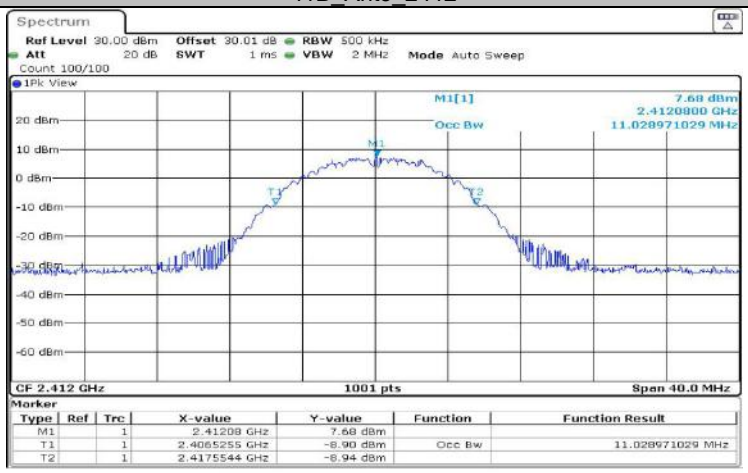
11B_Ant1_2412



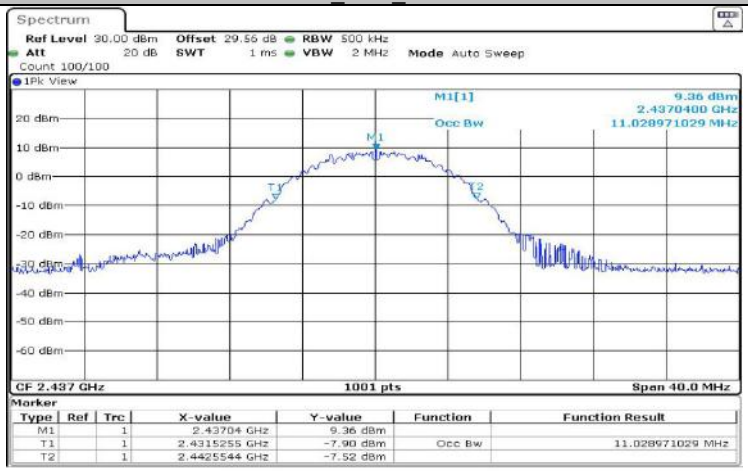
11B_Ant2_2412



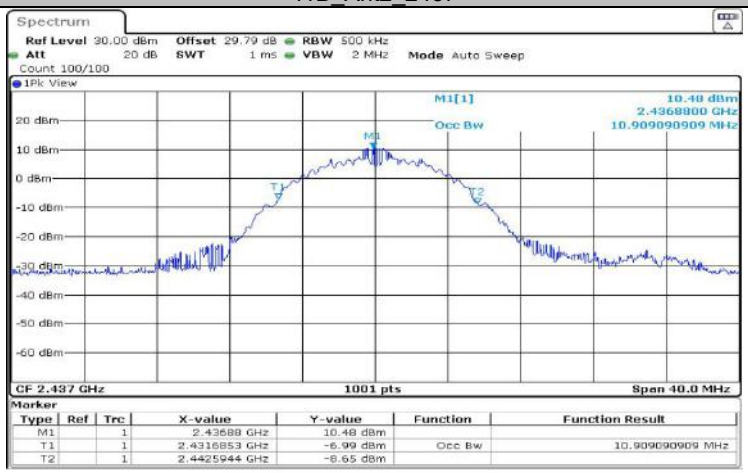
11B_Ant3_2412



11B_Ant1_2437



11B_Ant2_2437



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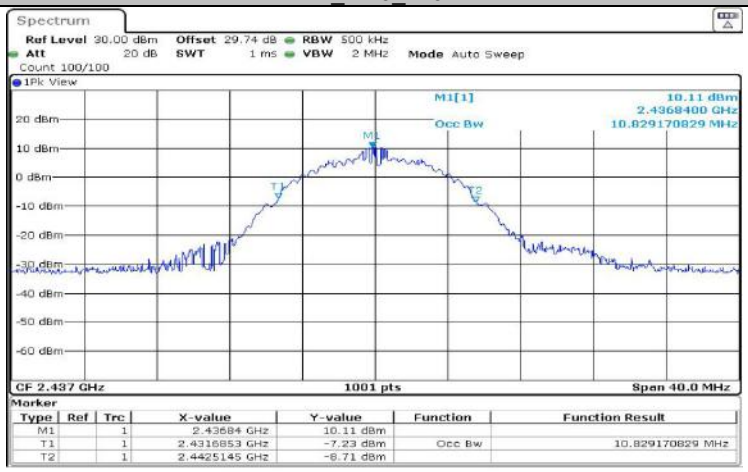

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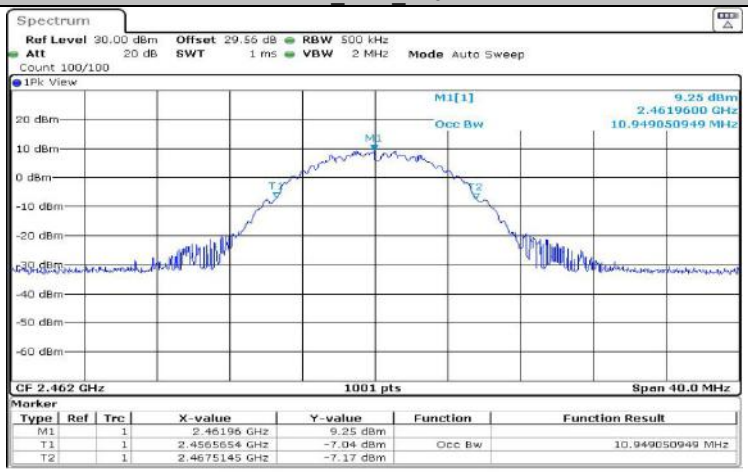

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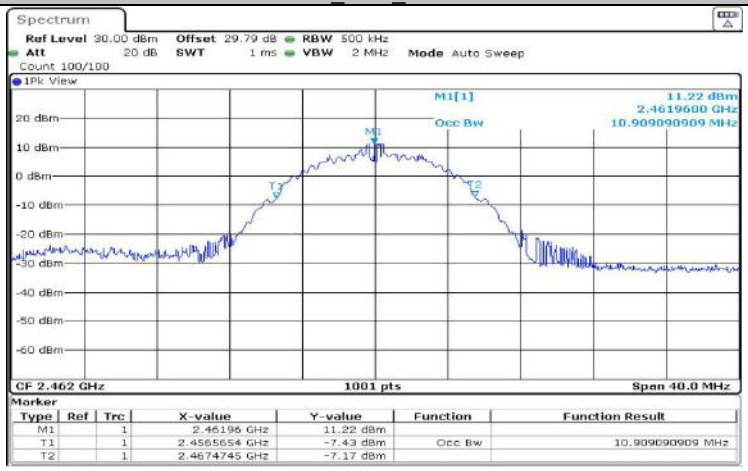
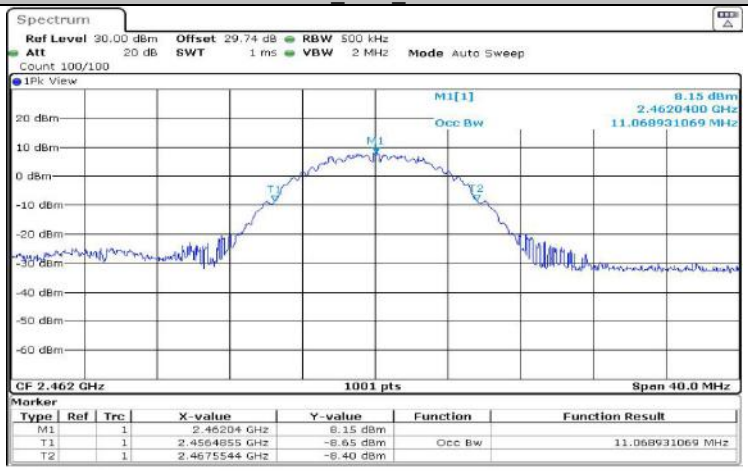
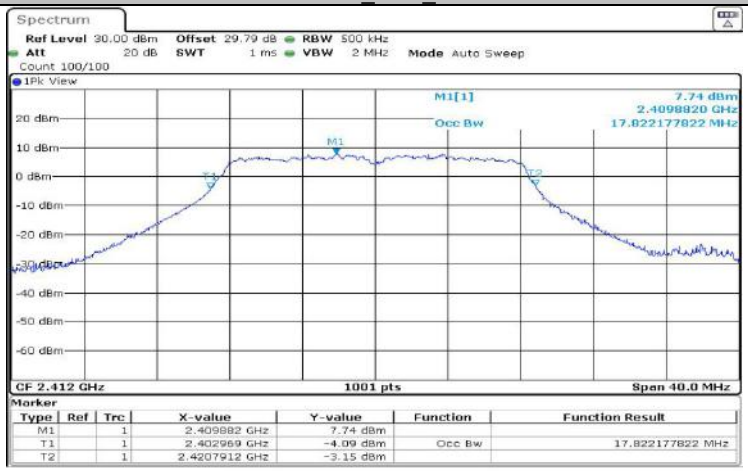


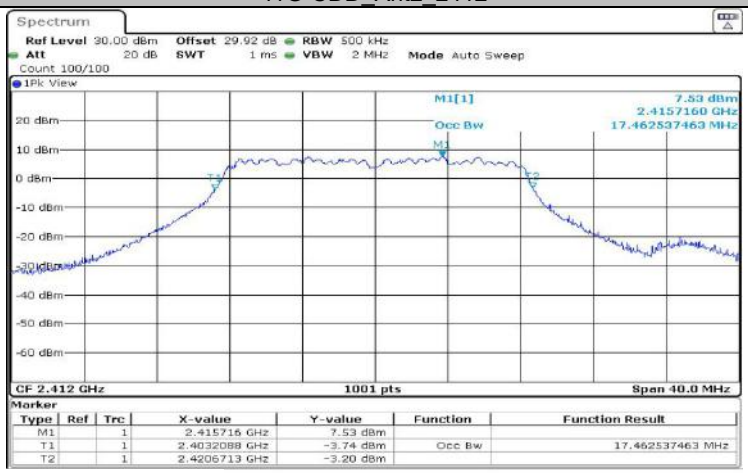
11B_Ant3_2462



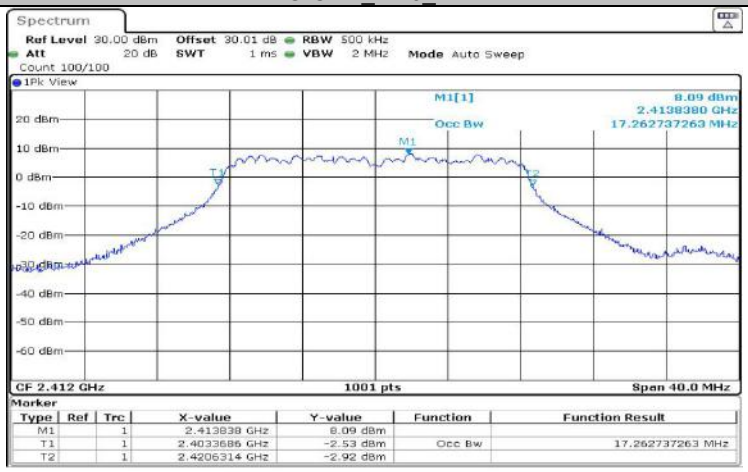
11G-CDD_Ant1_2412



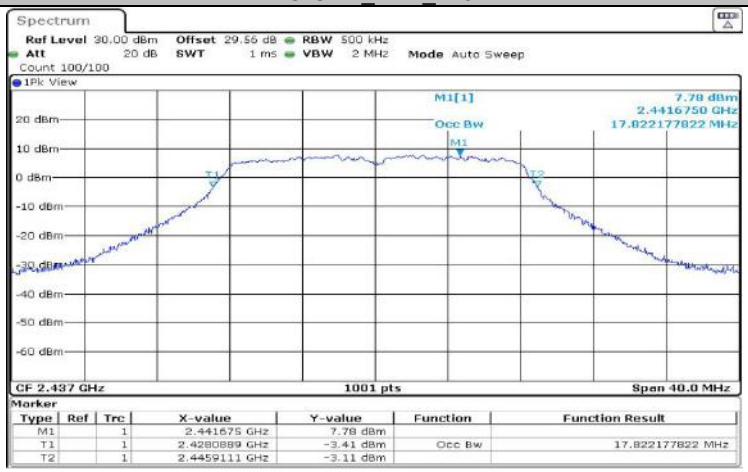
11G-CDD_Ant2_2412



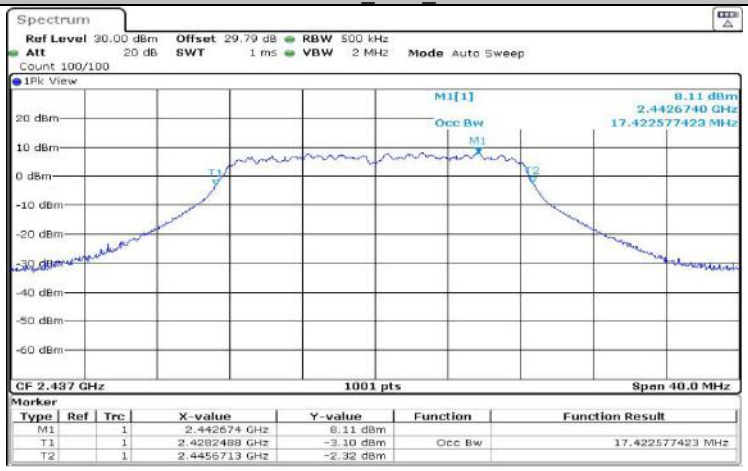
11G-CDD_Ant3_2412



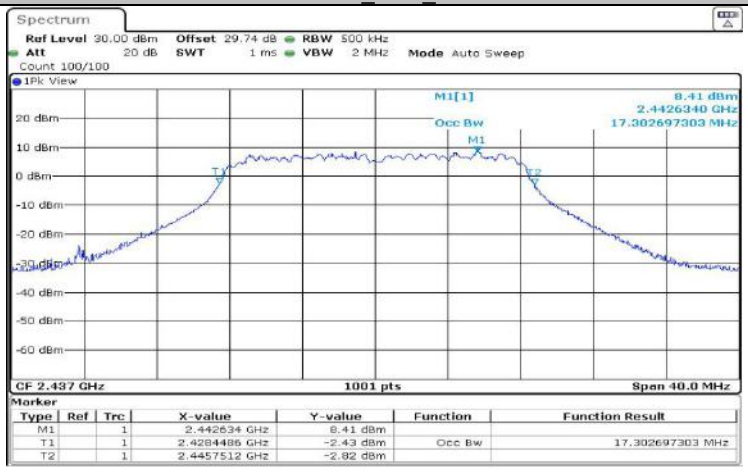
11G-CDD_Ant1_2437



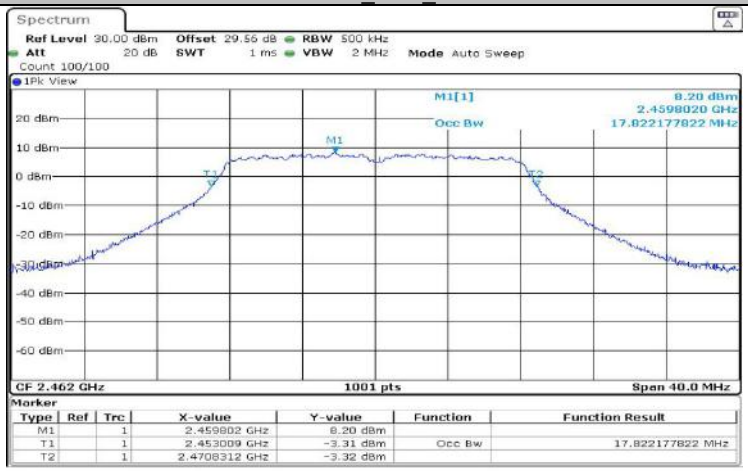
11G-CDD_Ant2_2437



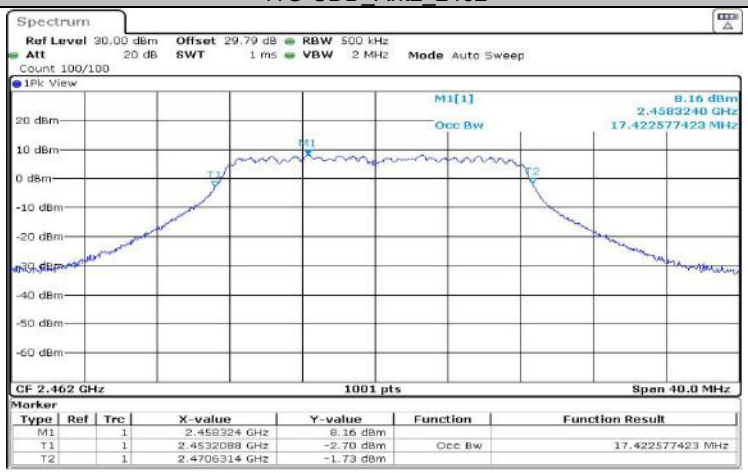
11G-CDD_Ant3_2437



11G-CDD_Ant1_2462



11G-CDD_Ant2_2462



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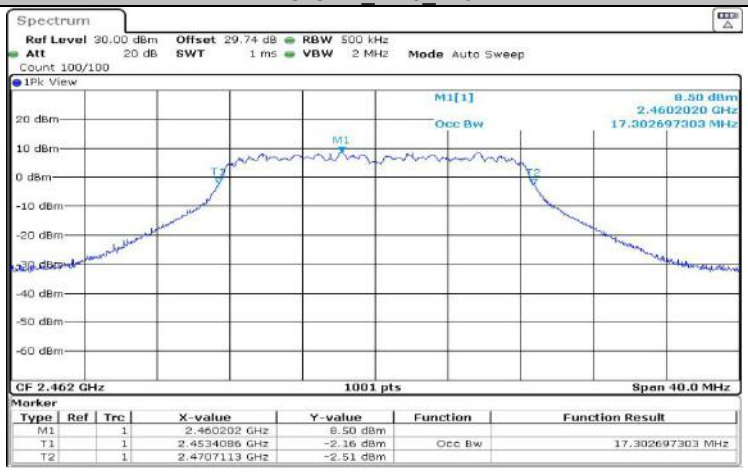

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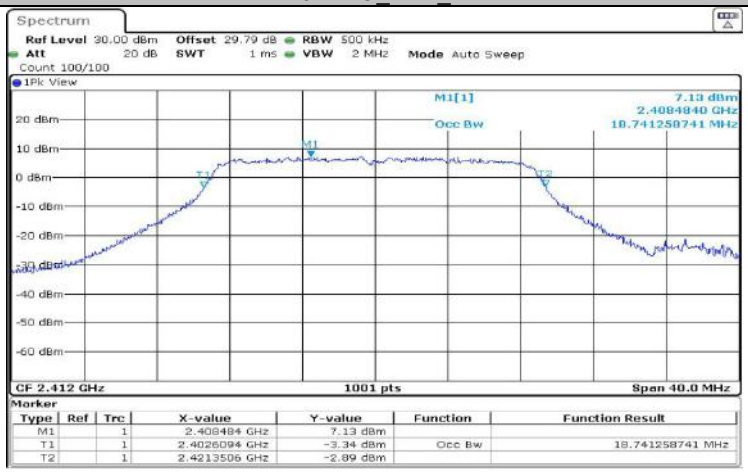

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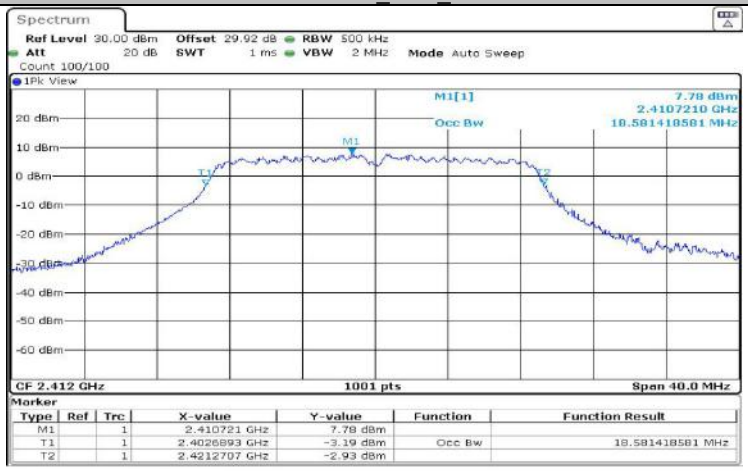
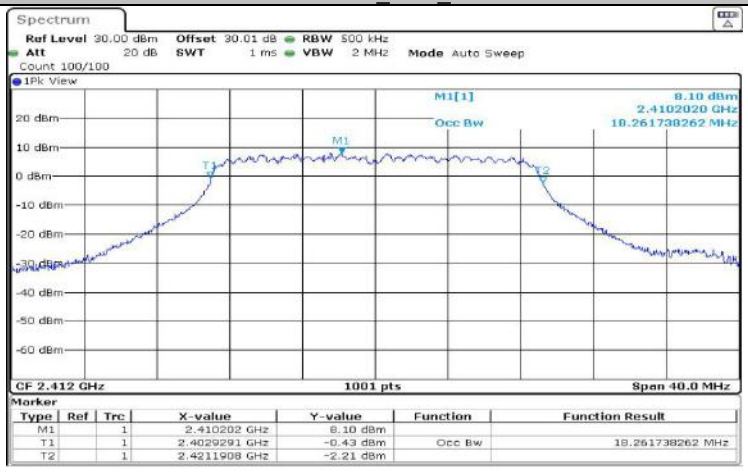
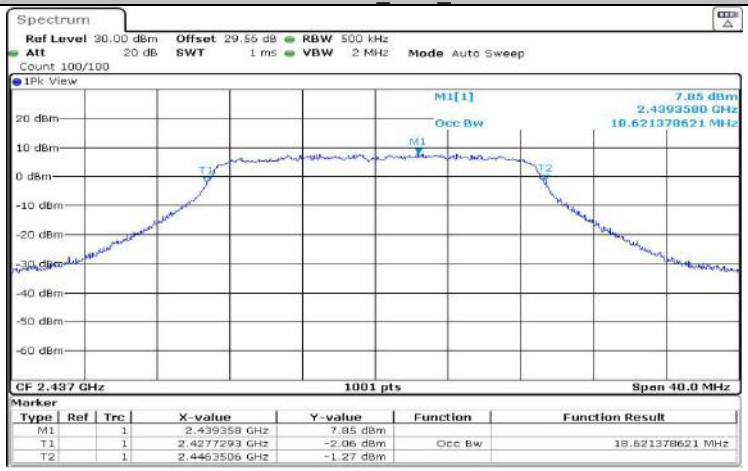


11N20MIMO_Ant3_2412



11N20MIMO_Ant1_2437



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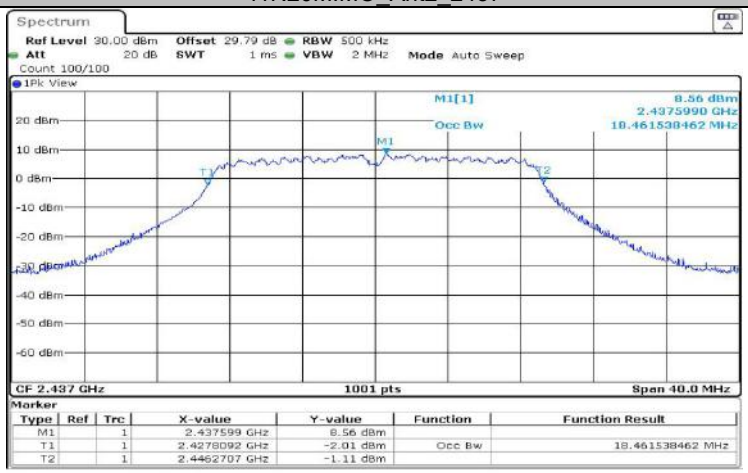
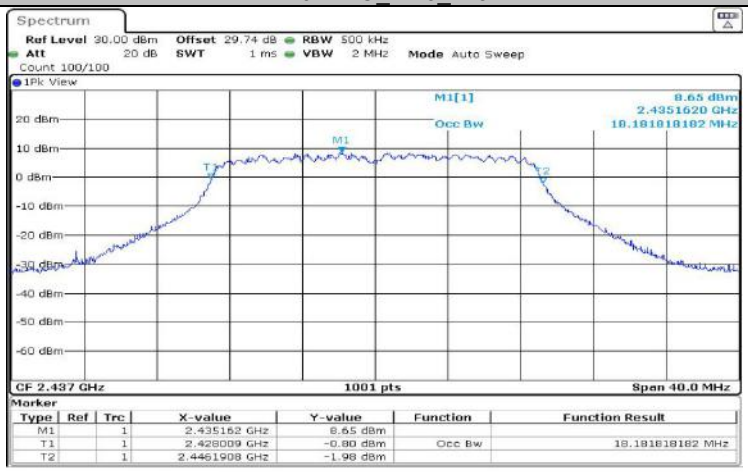
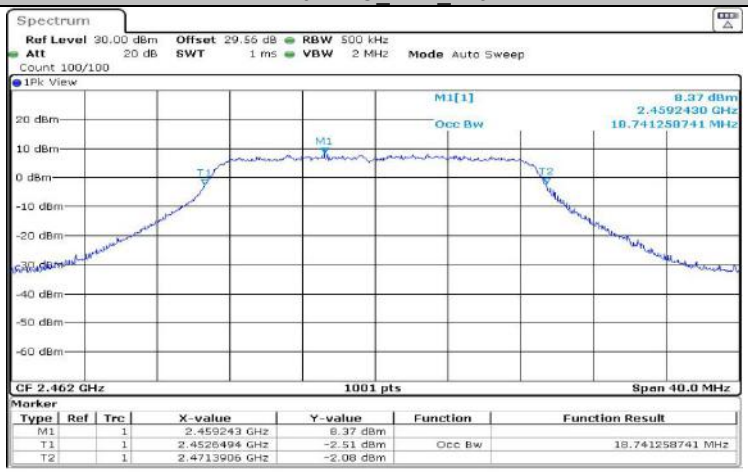


11N20MIMO_Ant3_2437



11N20MIMO_Ant1_2462



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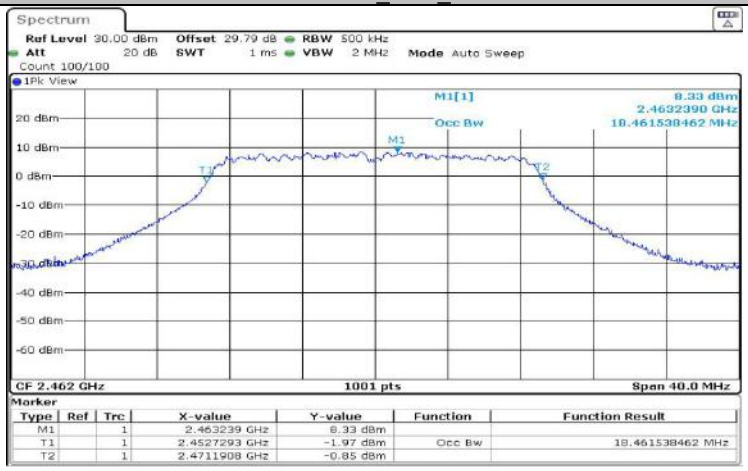

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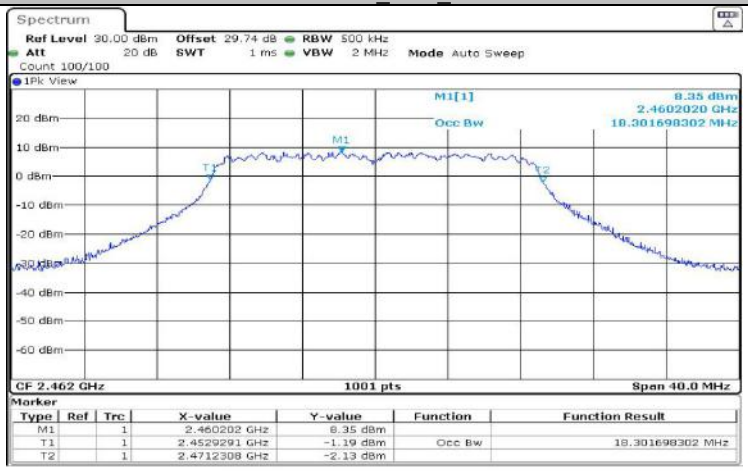
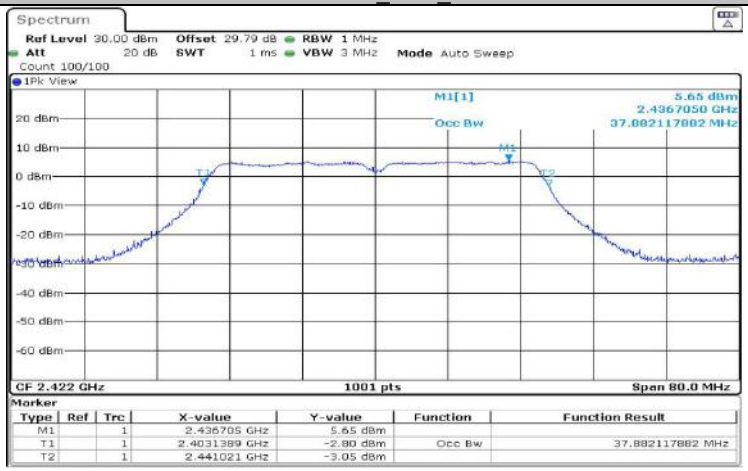


11N40MIMO_Ant1_2422



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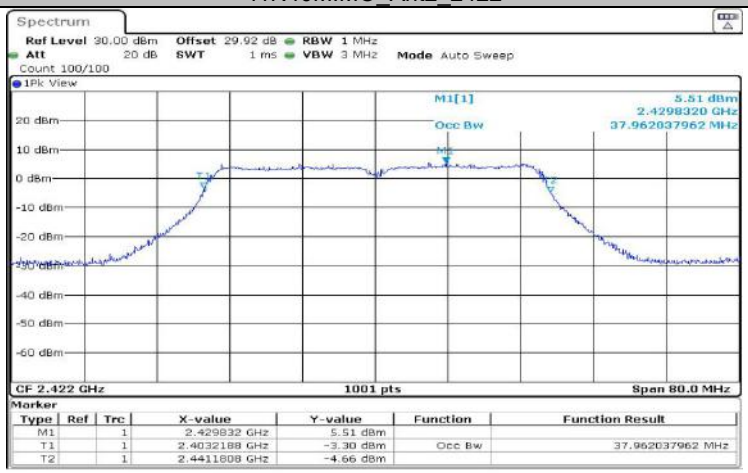
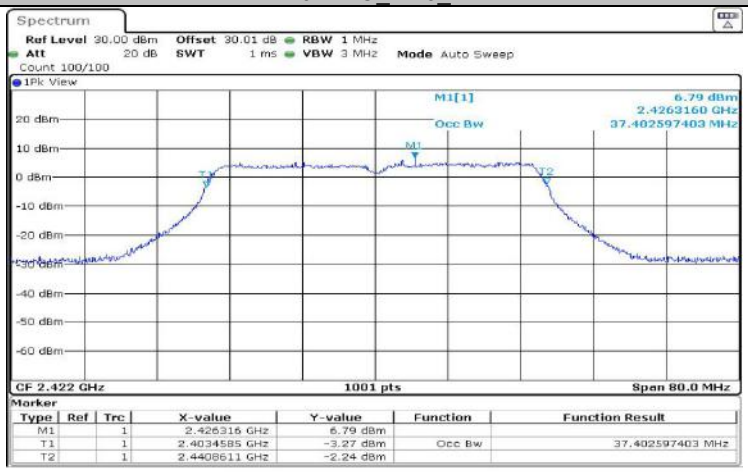


11N40MIMO_Ant3_2422



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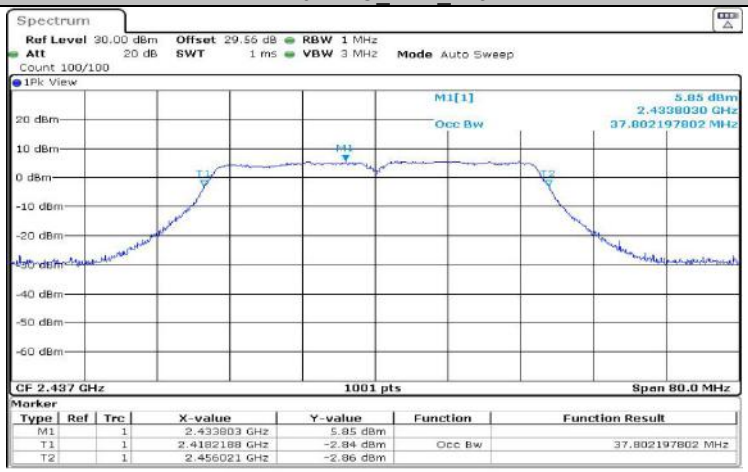

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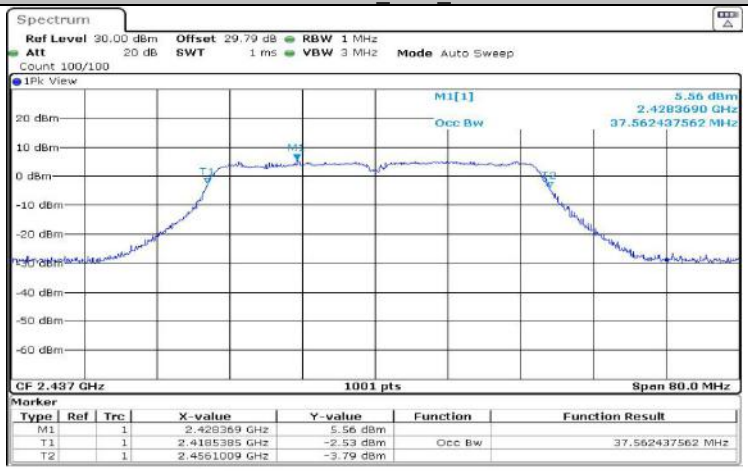

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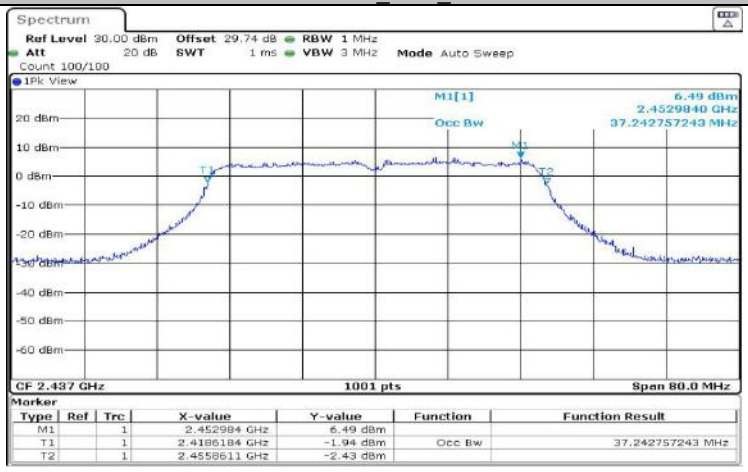
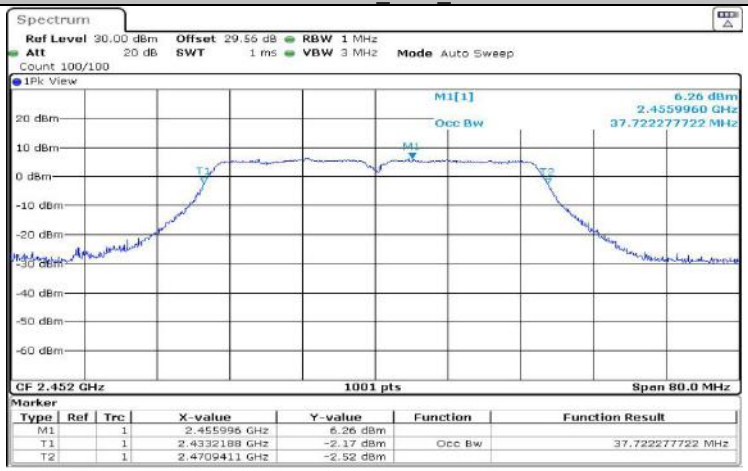


11N40MIMO_Ant1_2452



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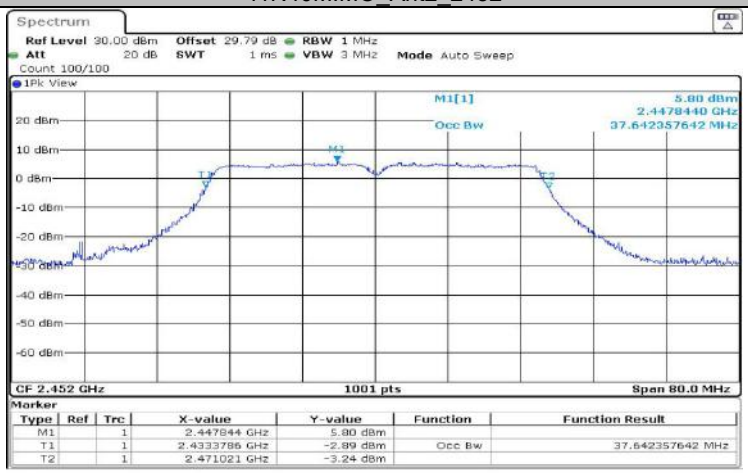

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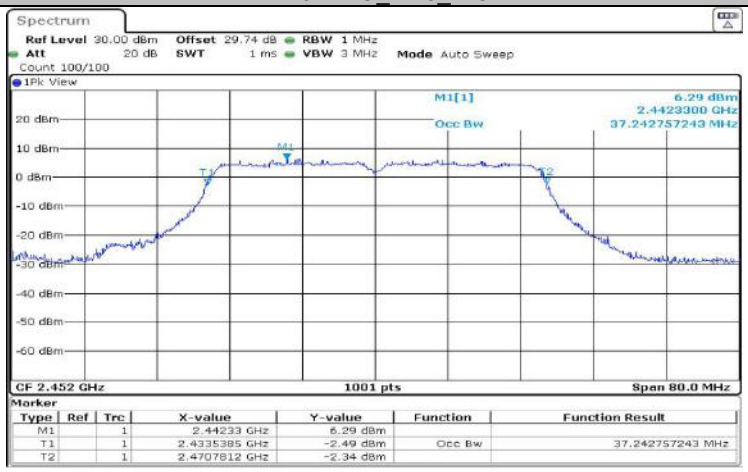


Appendix C: Maximum conducted output power
Test Result

Test Mode	Antenna	Frequency[MHz]	Average Power [dBm]	Conducted Limit[dBm]	Verdict
11B	Ant1	2412	12.25	≤30.00	PASS
	Ant2	2412	12.40	≤30.00	PASS
	Ant3	2412	12.19	≤30.00	PASS
	Ant1	2437	13.18	≤30.00	PASS
	Ant2	2437	12.95	≤30.00	PASS
	Ant3	2437	12.92	≤30.00	PASS
	Ant1	2462	14.40	≤30.00	PASS
	Ant2	2462	13.66	≤30.00	PASS
	Ant3	2462	12.30	≤30.00	PASS
11G-CDD	Ant1	2412	11.50	≤30.00	PASS
	Ant2	2412	11.41	≤30.00	PASS
	Ant3	2412	11.16	≤30.00	PASS
	total	2412	16.13	≤30.00	PASS
	Ant1	2437	11.70	≤30.00	PASS
	Ant2	2437	12.34	≤30.00	PASS
	Ant3	2437	12.11	≤30.00	PASS
	total	2437	16.83	≤30.00	PASS
	Ant1	2462	12.19	≤30.00	PASS
	Ant2	2462	12.94	≤30.00	PASS
	Ant3	2462	12.62	≤30.00	PASS
	total	2462	17.37	≤30.00	PASS
11N20MIMO	Ant1	2412	11.43	≤30.00	PASS
	Ant2	2412	11.65	≤30.00	PASS
	Ant3	2412	11.82	≤30.00	PASS
	total	2412	16.41	≤30.00	PASS
	Ant1	2437	11.53	≤30.00	PASS
	Ant2	2437	12.29	≤30.00	PASS
	Ant3	2437	12.06	≤30.00	PASS
	total	2437	16.74	≤30.00	PASS
	Ant1	2462	12.12	≤30.00	PASS
	Ant2	2462	12.96	≤30.00	PASS
	Ant3	2462	12.71	≤30.00	PASS
	total	2462	**17.38**	≤30.00	PASS
11N40MIMO	Ant1	2422	9.07	≤30.00	PASS
	Ant2	2422	9.08	≤30.00	PASS
	Ant3	2422	9.39	≤30.00	PASS
	total	2422	13.95	≤30.00	PASS
	Ant1	2437	9.19	≤30.00	PASS
	Ant2	2437	9.30	≤30.00	PASS
	Ant3	2437	9.41	≤30.00	PASS
	total	2437	14.07	≤30.00	PASS
	Ant1	2452	9.26	≤30.00	PASS
	Ant2	2452	9.65	≤30.00	PASS
	Ant3	2452	9.61	≤30.00	PASS
	total	2452	14.28	≤30.00	PASS

Note:

For 802.11g/n mode, the EUT employ CDD for MIMO

Directional Gain = G_{ANT} + Array Gain

The Array Gain is 0dB for N_{ANT} less than 4.

So the Directional Gain = 2.2dBi

Appendix D: Maximum power spectral density
Test Result

Test Mode	Antenna	Frequency[MHz]	Reading [dBm/10kHz]	Duty Cycle Factor [dB]	Result [dBm/10kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-12.79	-	-12.79	≤8	PASS
	Ant2	2412	-12.95	-	-12.95	≤8	PASS
	Ant3	2412	-12.59	-	-12.59	≤8	PASS
	Ant1	2437	-13.28	-	-13.28	≤8	PASS
	Ant2	2437	-12.44	-	-12.44	≤8	PASS
	Ant3	2437	-12.21	-	-12.21	≤8	PASS
	Ant1	2462	-11.75	-	-11.75	≤8	PASS
	Ant2	2462	-11.13	-	-11.13	≤8	PASS
	Ant3	2462	-11.78	-	-11.78	≤8	PASS
11G-CDD	Ant1	2412	-16.51	-	-16.51	≤7.03	PASS
	Ant2	2412	-16.23	-	-16.23	≤7.03	PASS
	Ant3	2412	-16.65	-	-16.65	≤7.03	PASS
	total	2412	-11.69	-	-11.69	≤7.03	PASS
	Ant1	2437	-16.16	-	-16.16	≤7.03	PASS
	Ant2	2437	-15.94	-	-15.94	≤7.03	PASS
	Ant3	2437	-16.17	-	-16.17	≤7.03	PASS
	total	2437	-11.32	-	-11.32	≤7.03	PASS
	Ant1	2462	-15.64	-	-15.64	≤7.03	PASS
	Ant2	2462	-15.53	-	-15.53	≤7.03	PASS
	Ant3	2462	-15.36	-	-15.36	≤7.03	PASS
	total	2462	-10.74	-	-10.74	≤7.03	PASS
11N20MIMO	Ant1	2412	-17.02	0.10	-16.92	≤7.03	PASS
	Ant2	2412	-16.69	0.10	-16.59	≤7.03	PASS
	Ant3	2412	-16.04	0.10	-15.94	≤7.03	PASS
	total	2412	-11.79	0.10	-11.69	≤7.03	PASS
	Ant1	2437	-16.66	0.10	-16.56	≤7.03	PASS
	Ant2	2437	-16.05	0.10	-15.95	≤7.03	PASS
	Ant3	2437	-15.97	0.10	-15.87	≤7.03	PASS
	total	2437	-11.44	0.10	-11.34	≤7.03	PASS
	Ant1	2462	-15.76	0.10	-15.66	≤7.03	PASS
	Ant2	2462	-13.88	0.10	-13.78	≤7.03	PASS
	Ant3	2462	-15.56	0.10	-15.46	≤7.03	PASS
	total	2462	-10.21	0.10	-10.11	≤7.03	PASS
11N40MIMO	Ant1	2422	-21.31	0.20	-21.11	≤7.03	PASS
	Ant2	2422	-21.88	0.20	-21.68	≤7.03	PASS
	Ant3	2422	-21.94	0.20	-21.74	≤7.03	PASS
	total	2422	-16.93	0.20	-16.73	≤7.03	PASS
	Ant1	2437	-21.51	0.20	-21.31	≤7.03	PASS
	Ant2	2437	-21.88	0.20	-21.68	≤7.03	PASS
	Ant3	2437	-21.54	0.20	-21.34	≤7.03	PASS
	total	2437	-16.87	0.20	-16.67	≤7.03	PASS
	Ant1	2452	-21.45	0.20	-21.25	≤7.03	PASS
	Ant2	2452	-21.30	0.20	-21.10	≤7.03	PASS
	Ant3	2452	-21.43	0.20	-21.23	≤7.03	PASS
	total	2452	-16.62	0.20	-16.42	≤7.03	PASS

Note:

For 802.11g/n mode, the EUT employ CDD for MIMO

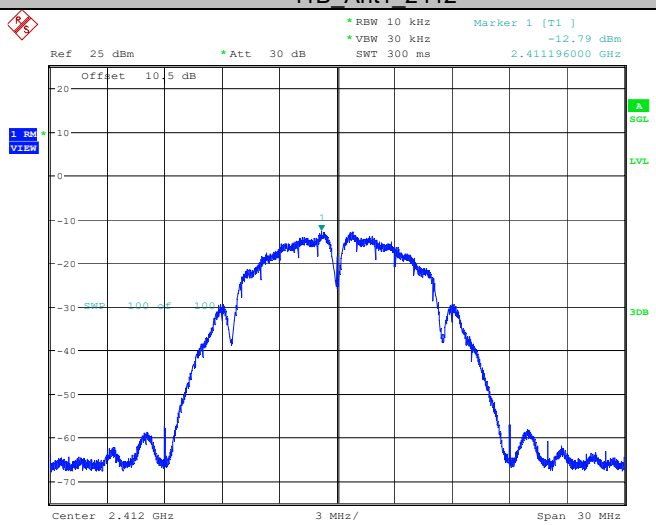
Directional Gain = G_{ANT} + *Array Gain*

Array Gain = 10*logN_{ANT}=10*log3=4.77dB

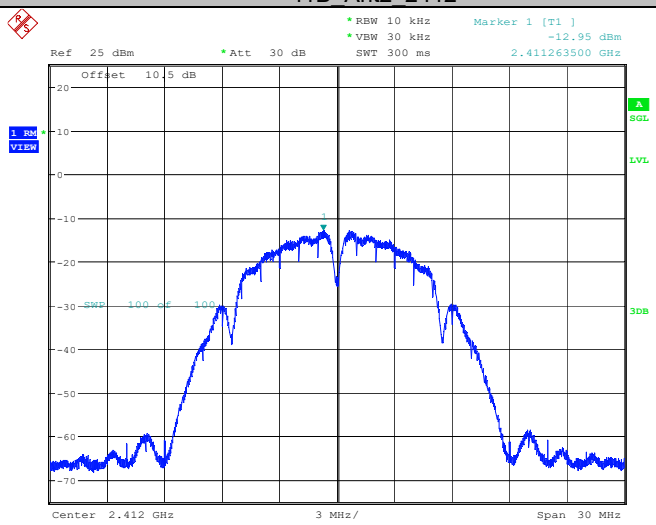
G_{ANT} = *2.2dBi, Directional Gain* = 2.2dBi + 4.77dB = 6.97dBi *>6dBi; So the limit should be reduce (6.97-6) dB=0.97dB*

Test Graphs

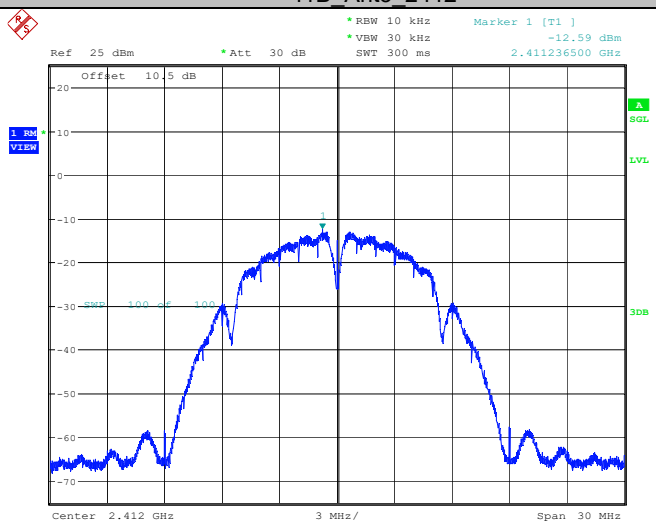
11B_Ant1_2412



11B_Ant2_2412



11B_Ant3_2412



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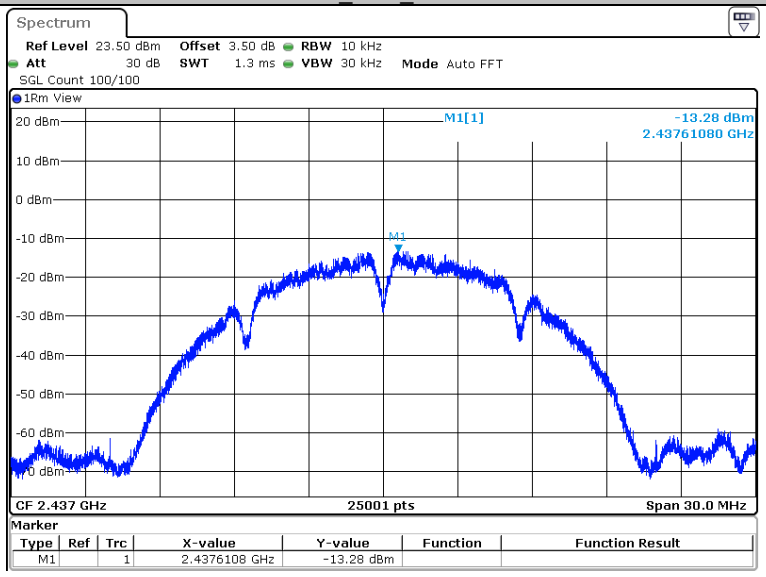

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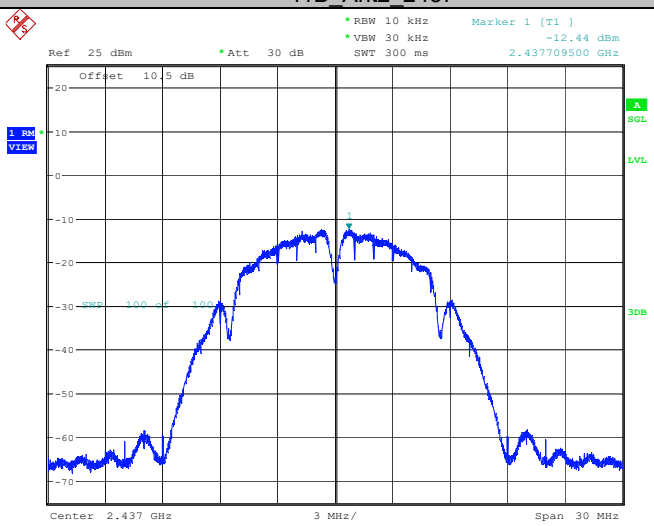

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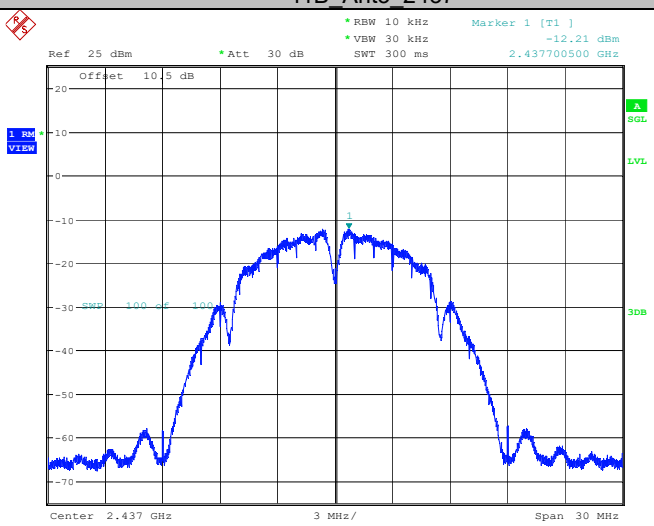

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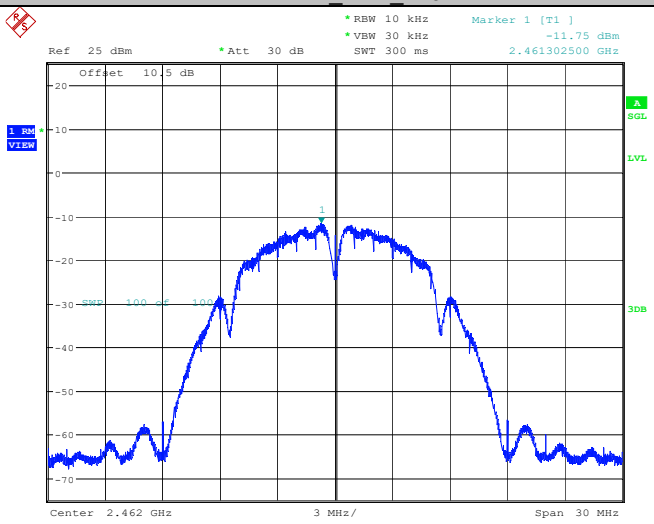

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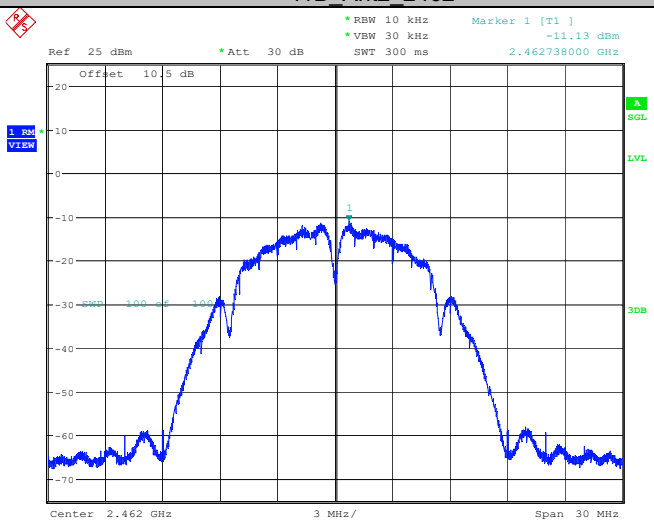
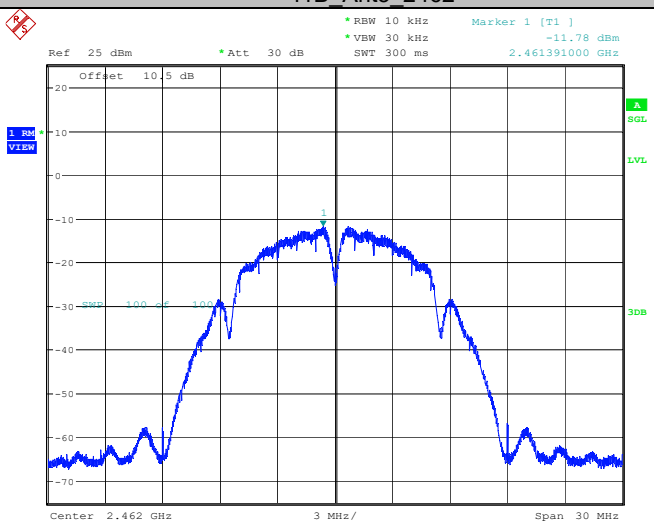
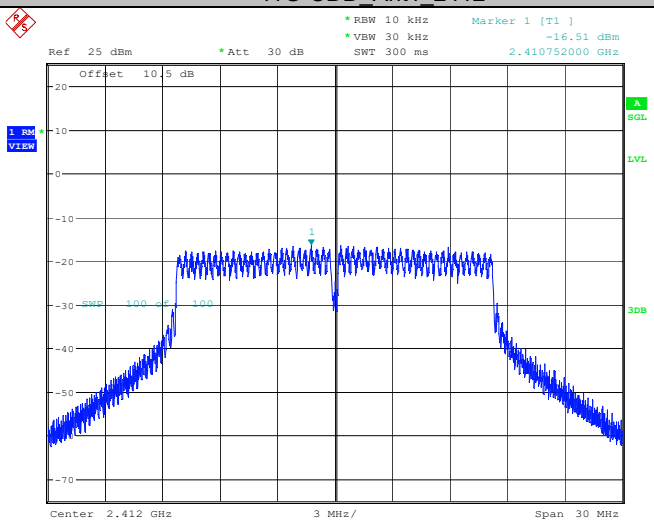


11B_Ant3_2462



11G-CDD_Ant1_2412



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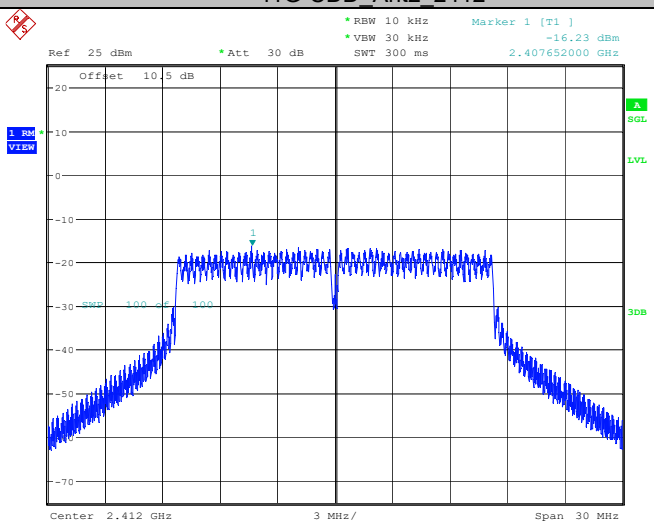

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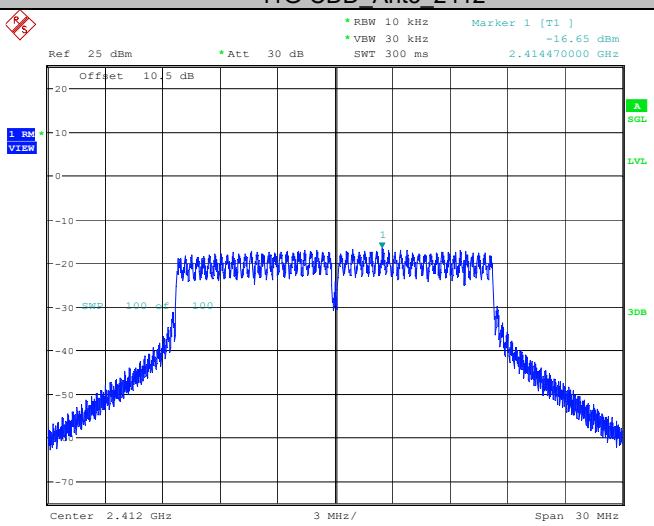

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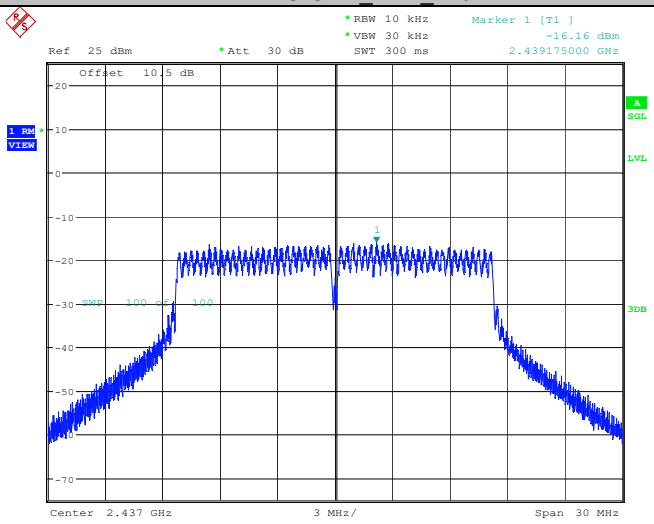
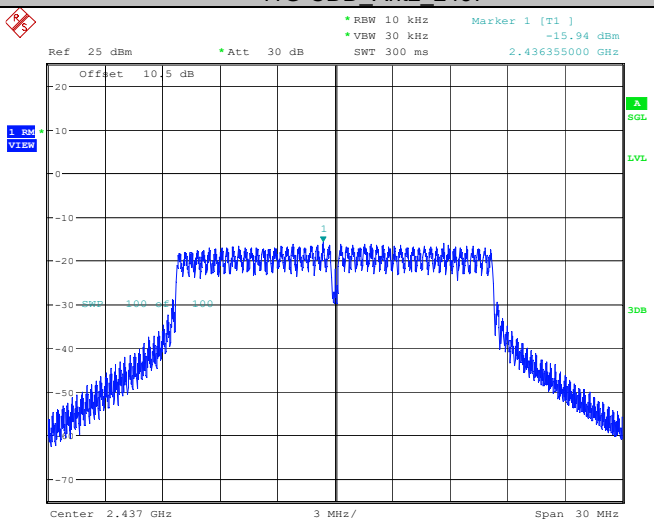


11G-CDD_Ant2_2437



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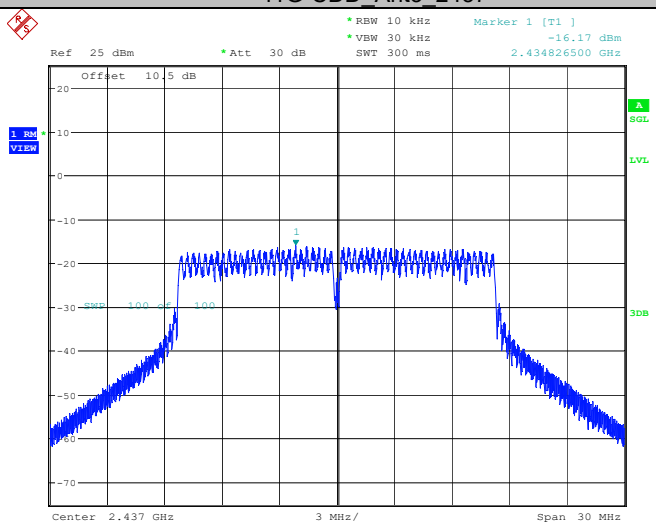

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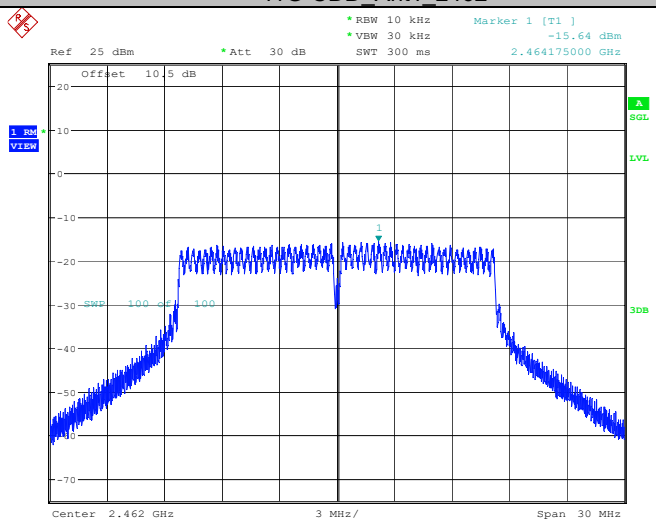

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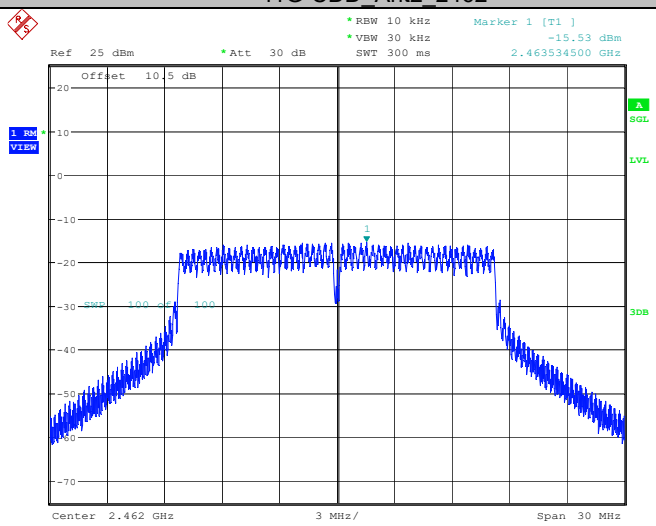
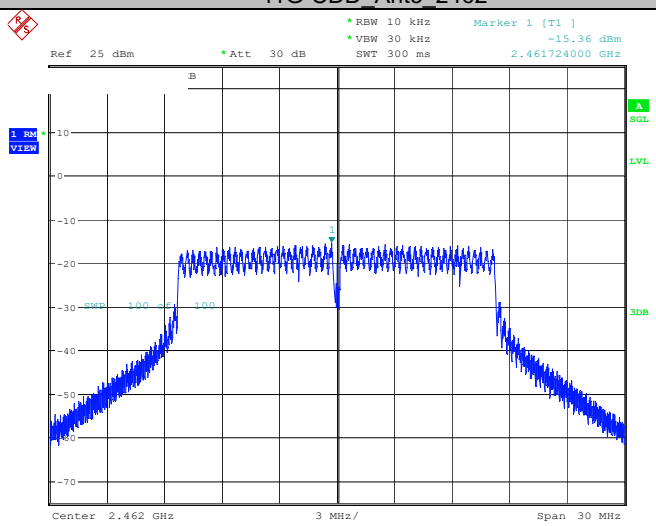
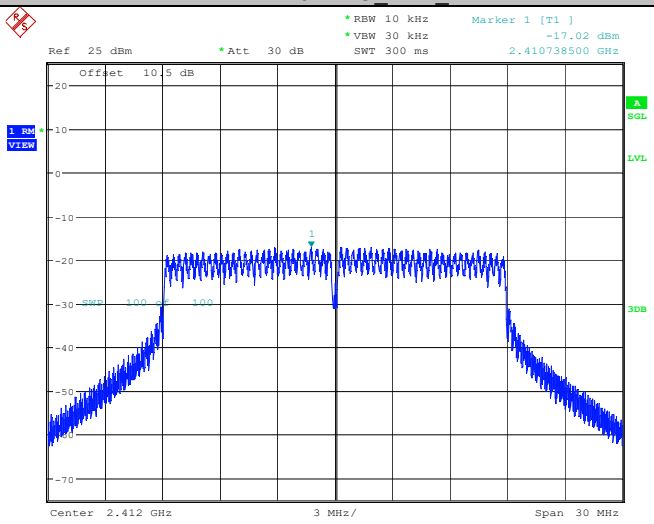


11G-CDD_Ant3_2462



11N20MIMO_Ant1_2412



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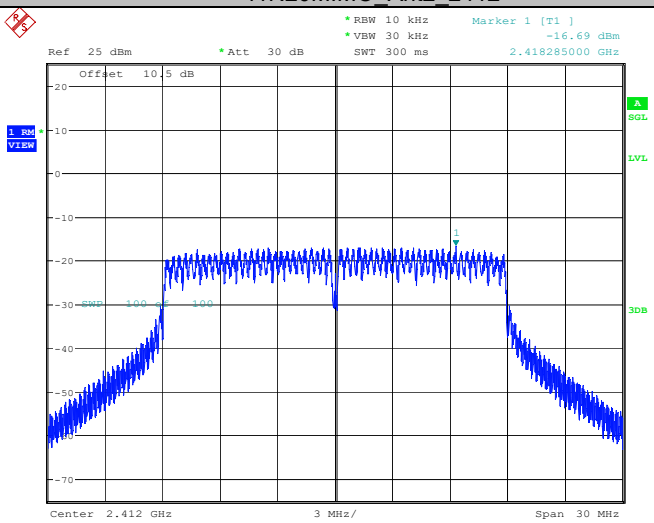

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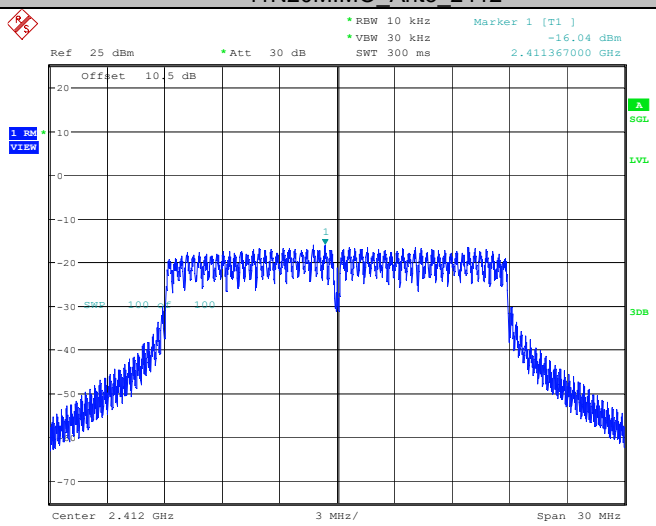

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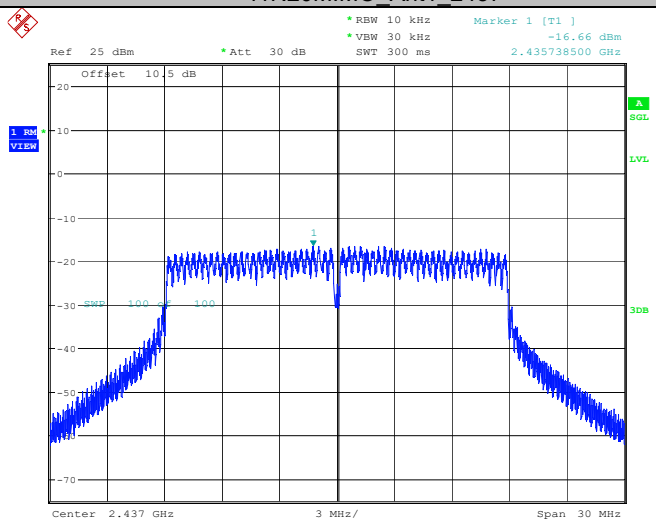

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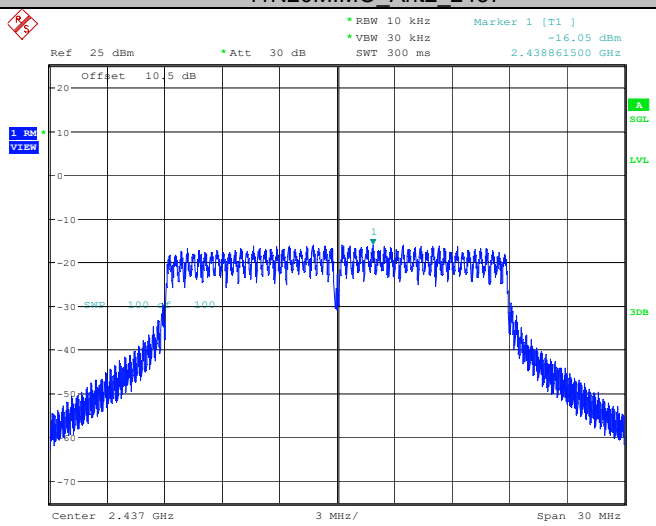
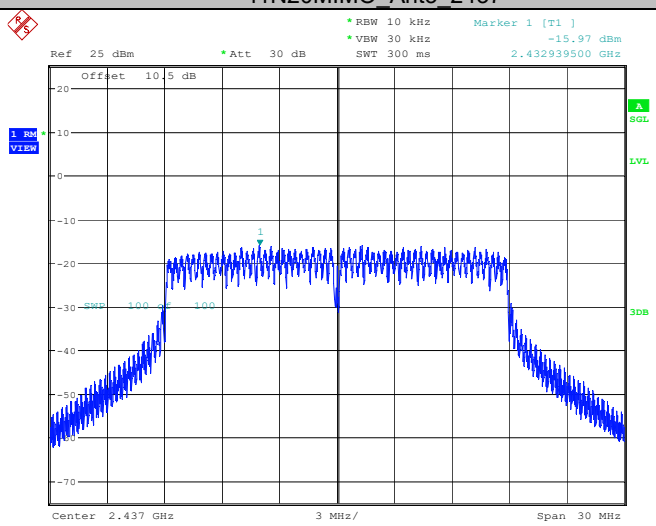
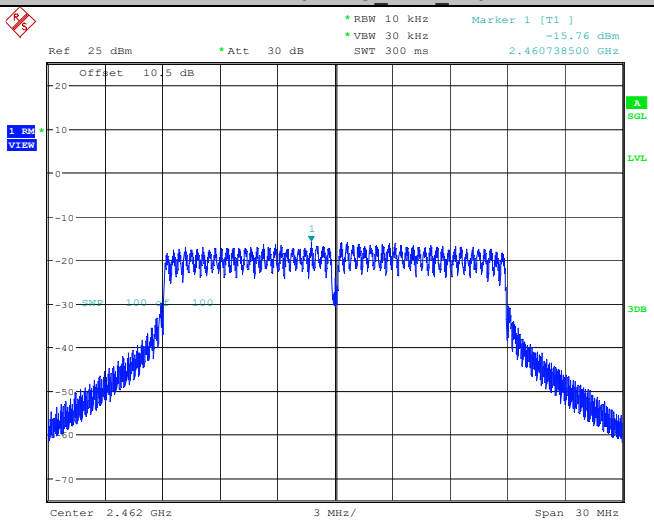


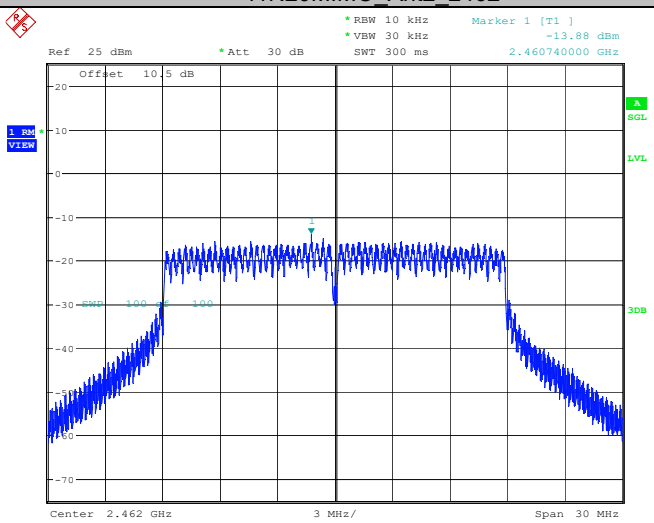
11N20MIMO_Ant3_2437



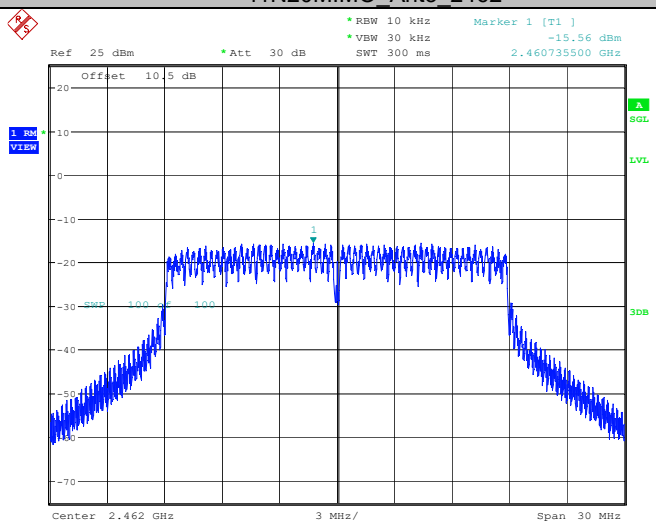
11N20MIMO_Ant1_2462



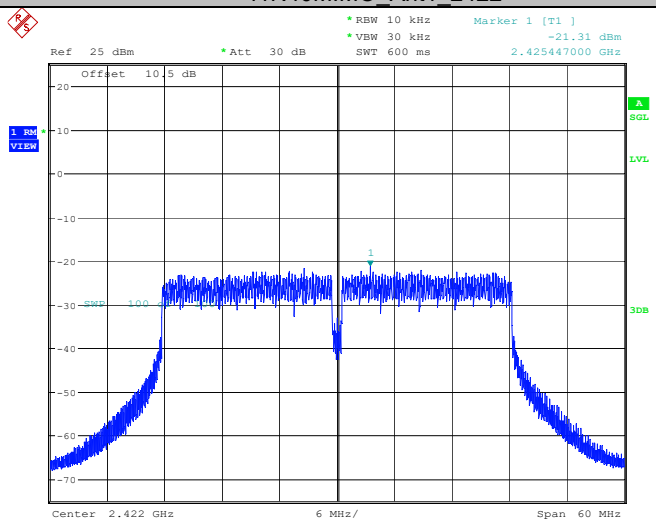
11N20MIMO_Ant2_2462



11N20MIMO_Ant3_2462



11N40MIMO_Ant1_2422



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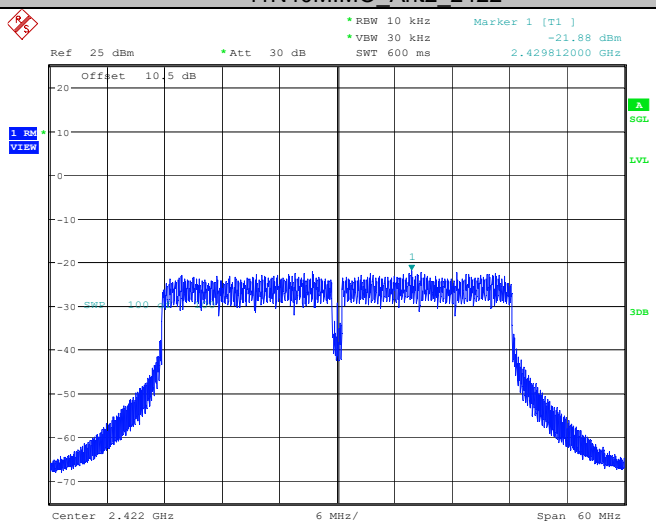

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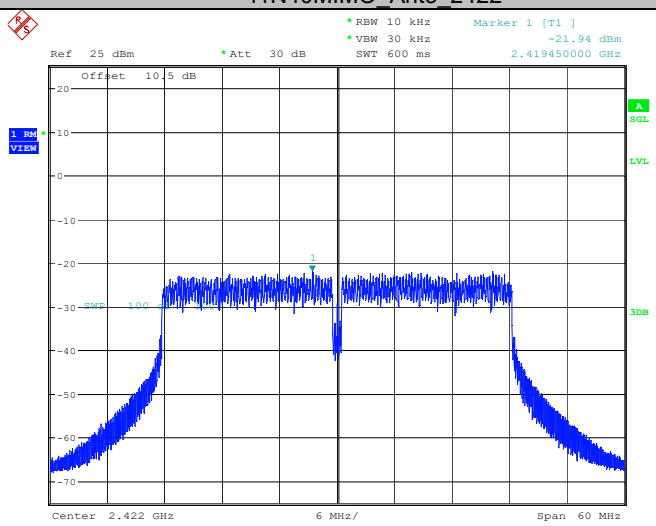
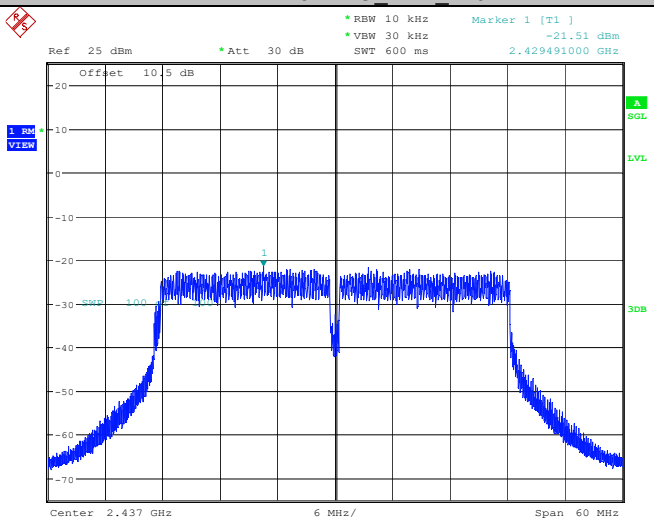


11N40MIMO_Ant1_2437



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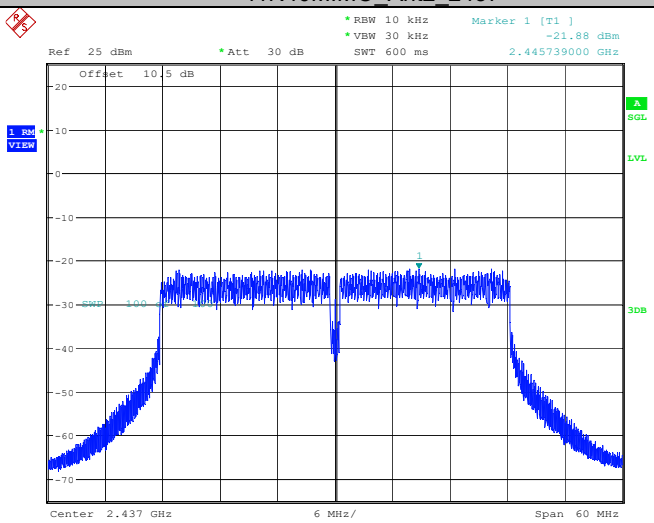
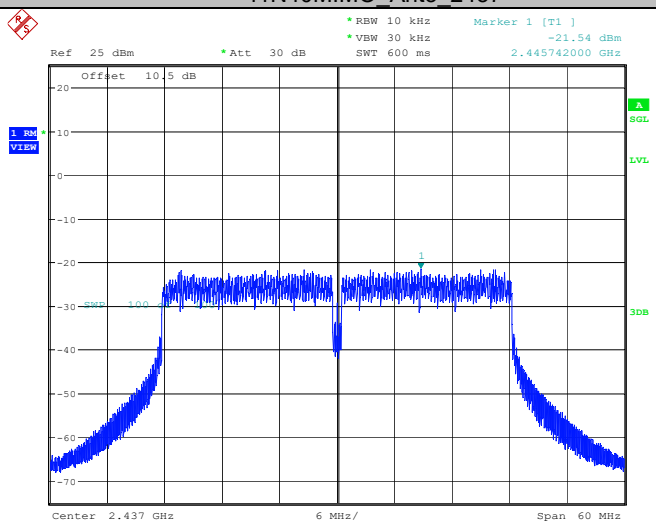
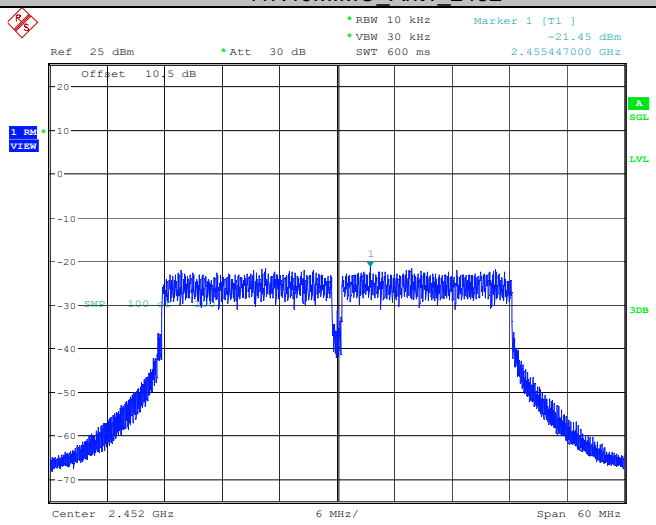


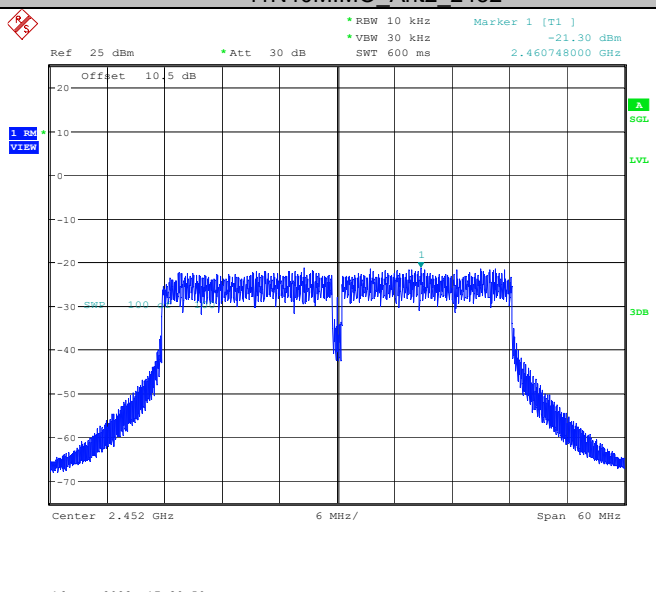
11N40MIMO_Ant3_2437



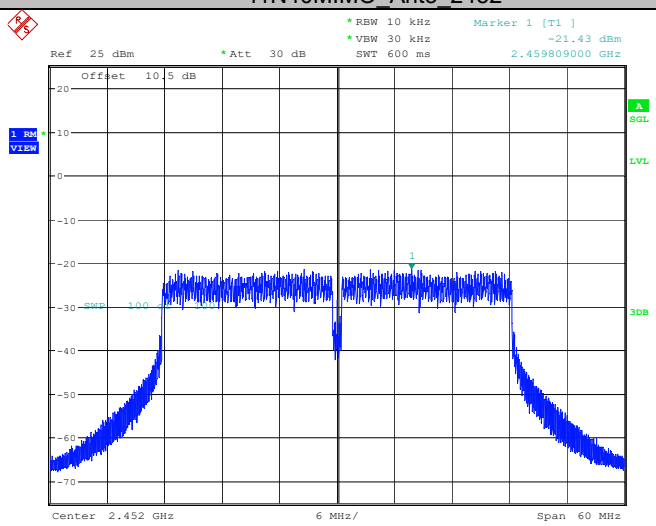
11N40MIMO_Ant1_2452



11N40MIMO_Ant2_2452



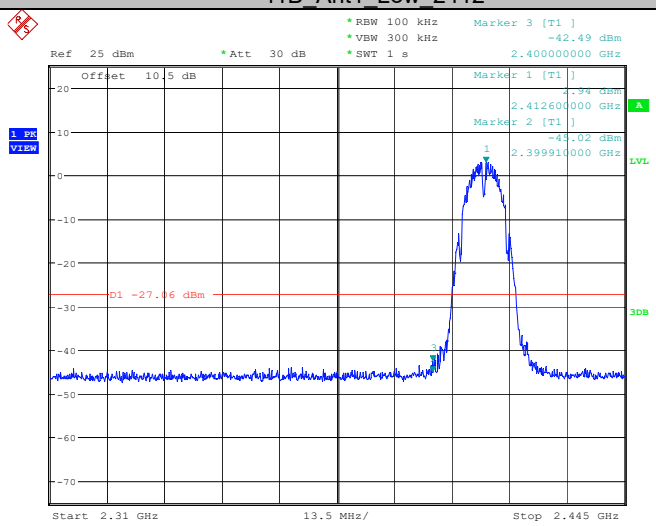
11N40MIMO_Ant3_2452



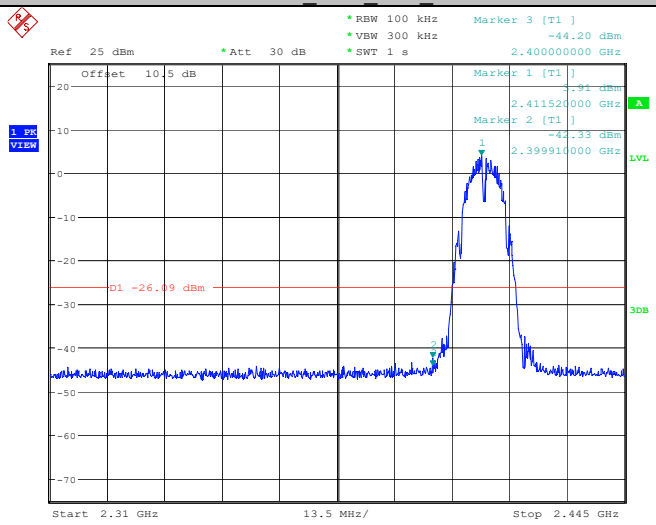
Appendix E: Band edge measurements

Test Graphs

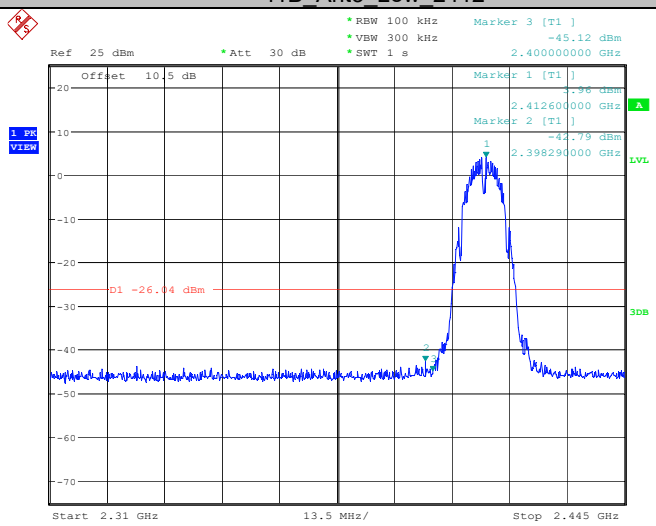
11B_Ant1_Low_2412



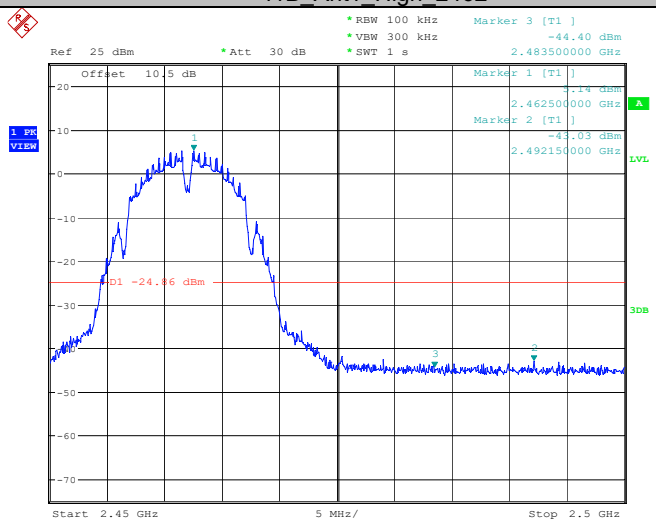
11B_Ant2_Low_2412



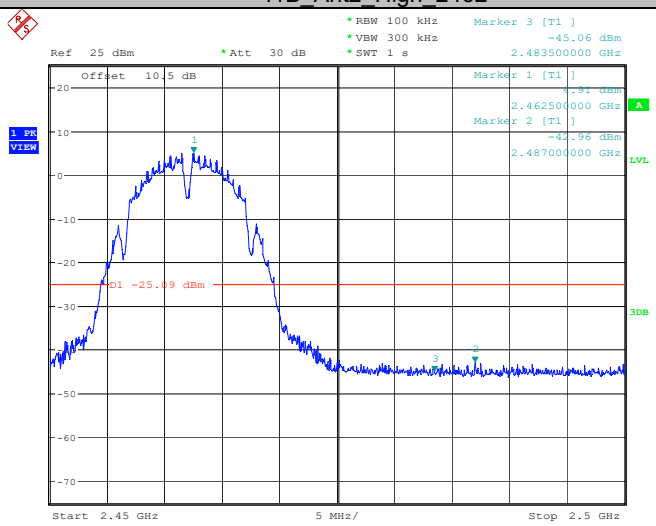
11B_Ant3_Low_2412



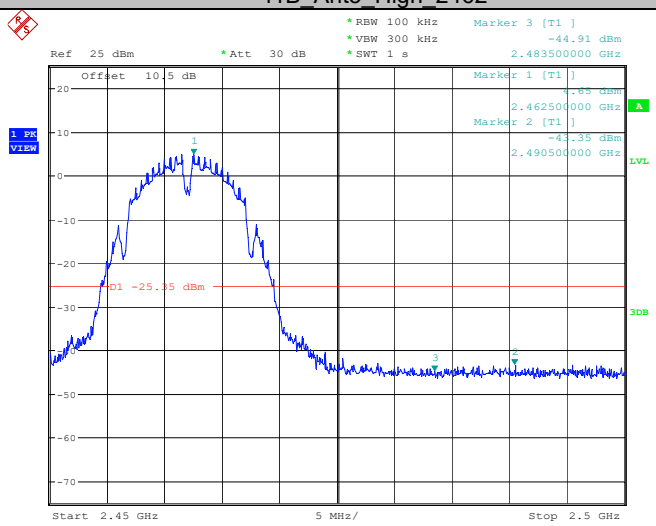
11B_Ant1_High_2462



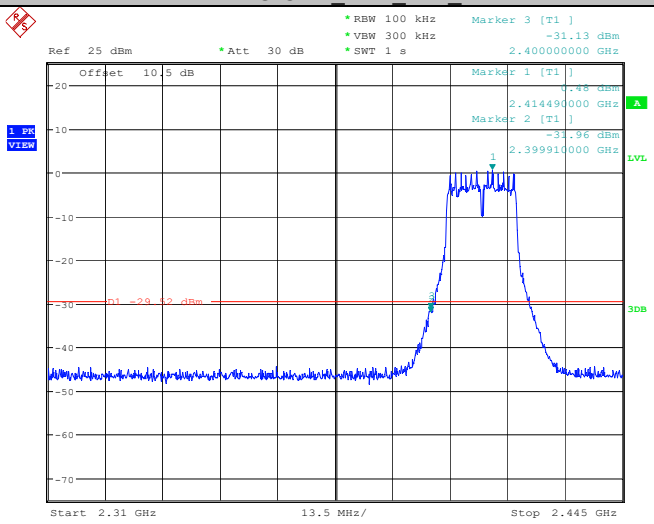
11B_Ant2_High_2462



11B_Ant3_High_2462



11G-CDD_Ant1_Low_2412



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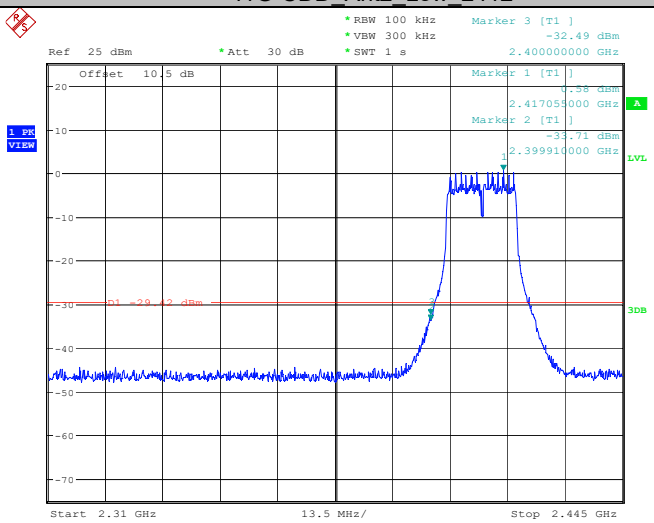
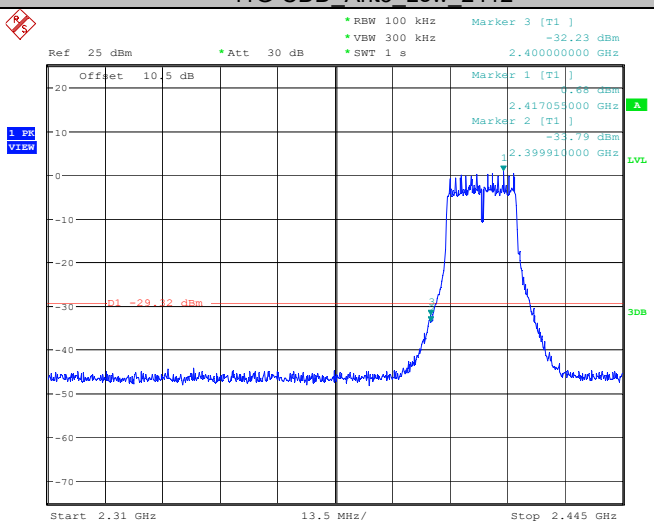


11G-CDD_Ant3_Low_2412



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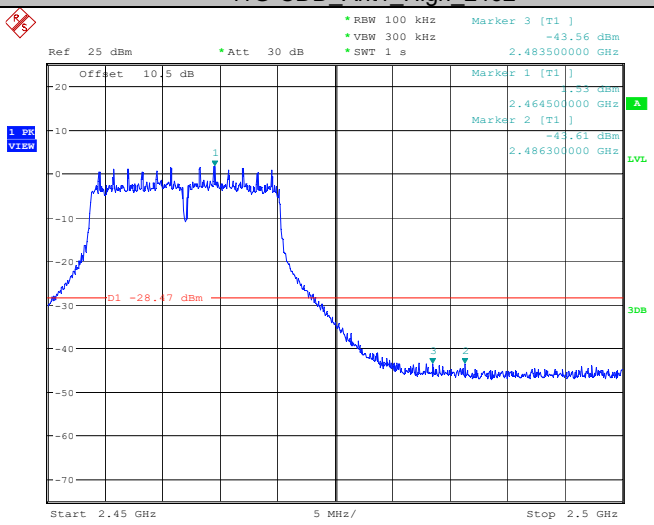

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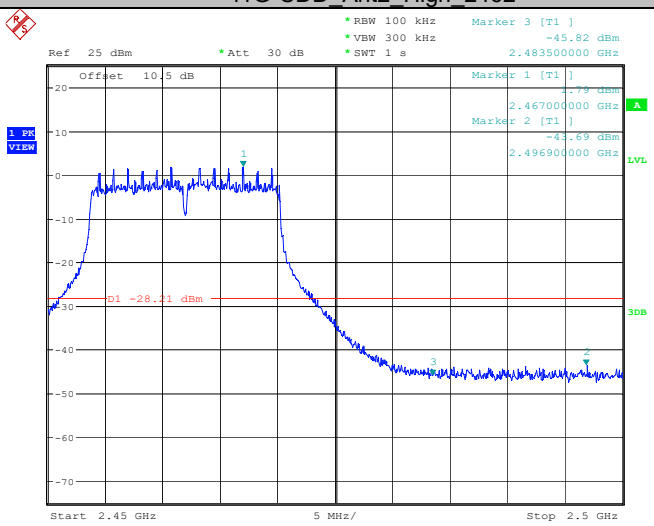
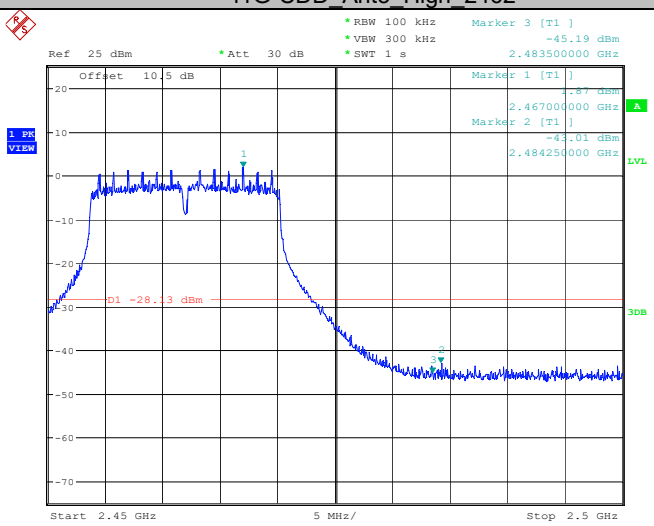
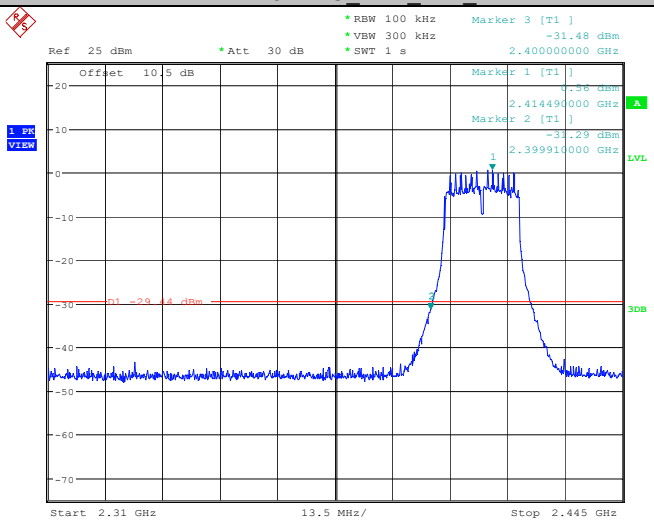


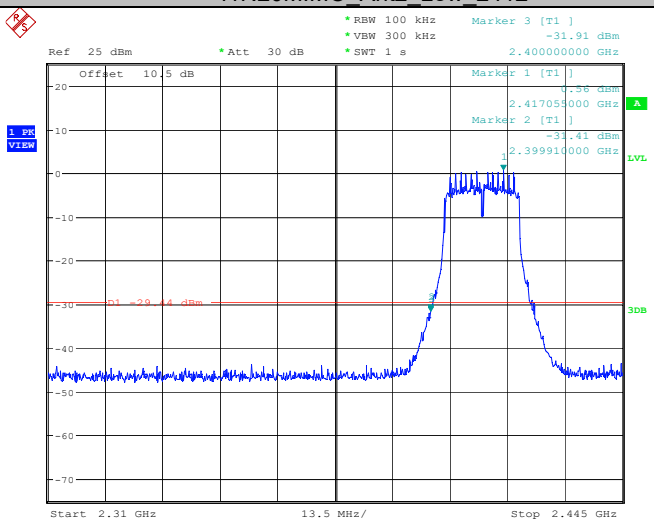
11G-CDD_Ant3_High_2462



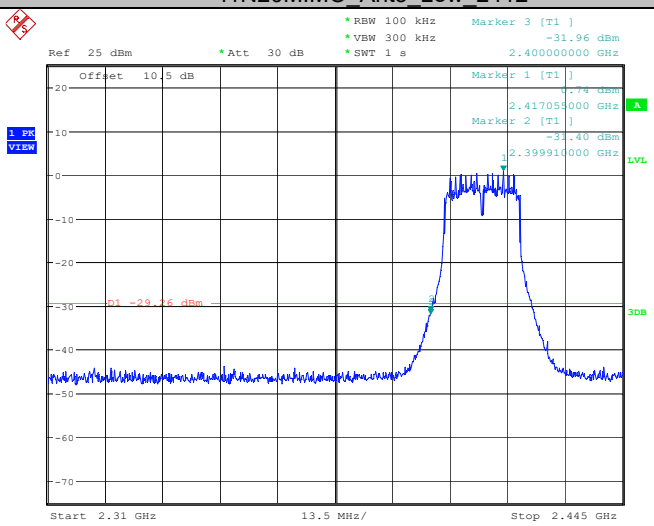
11N20MIMO_Ant1_Low_2412



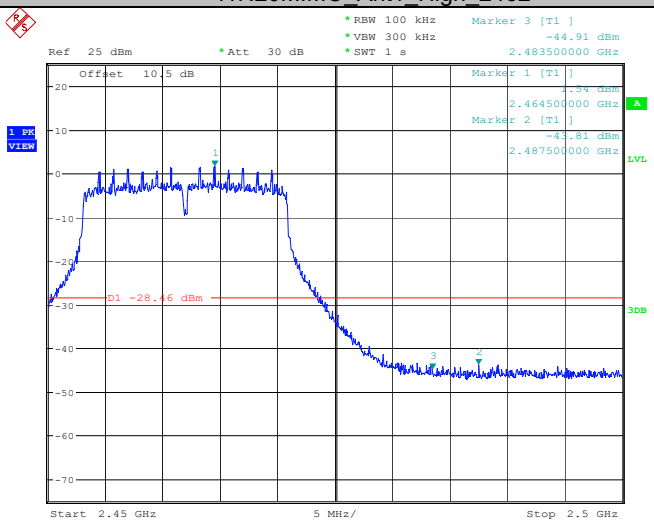
11N20MIMO_Ant2_Low_2412



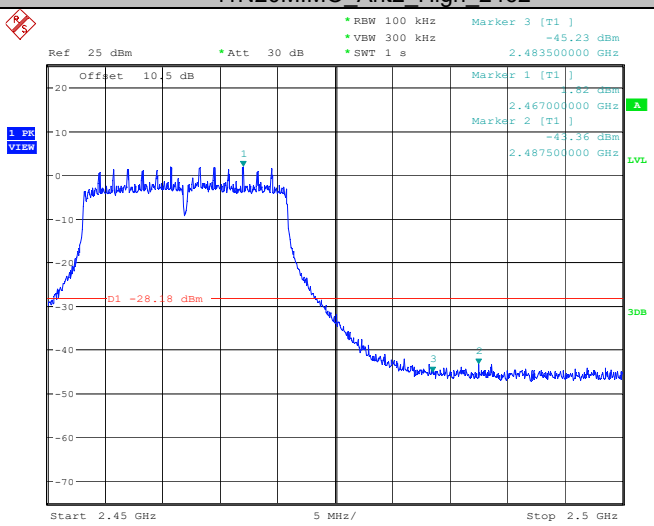
11N20MIMO_Ant3_Low_2412



11N20MIMO_Ant1_High_2462



11N20MIMO_Ant2_High_2462



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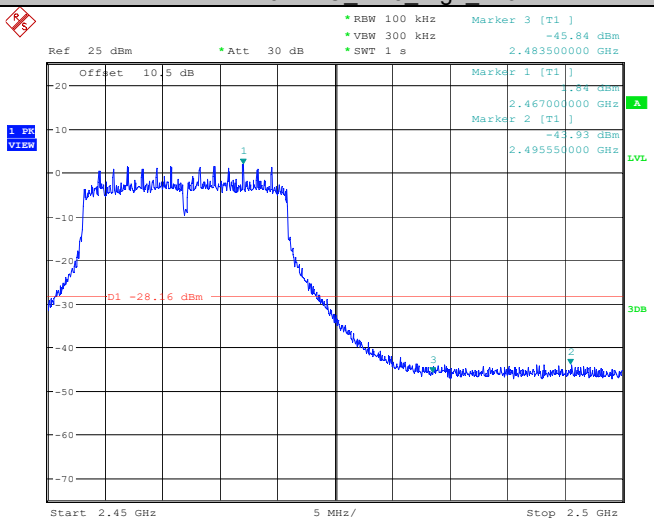
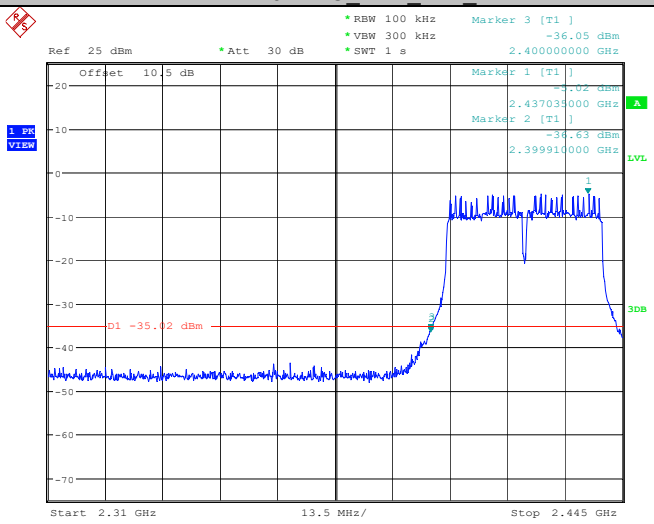


11N40MIMO_Ant1_Low_2422



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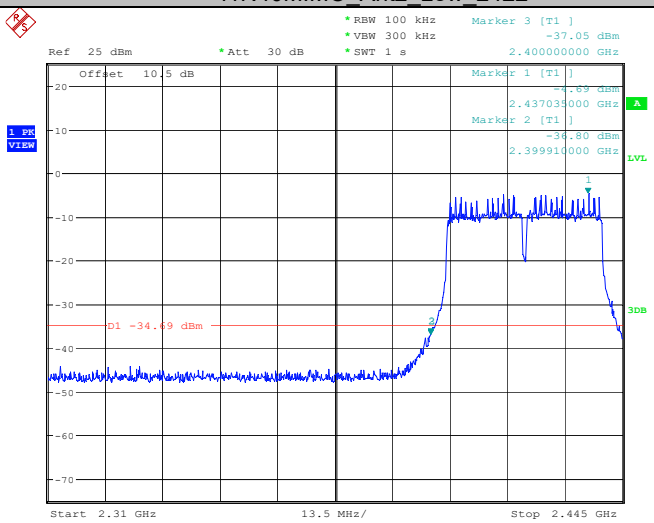
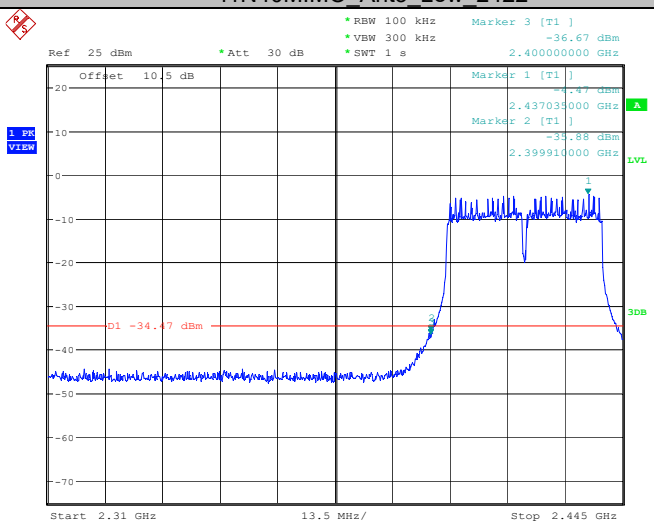
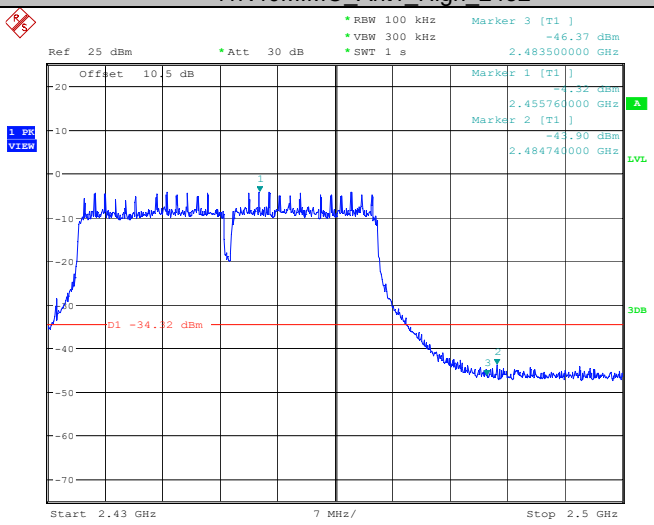


11N40MIMO_Ant3_Low_2422



11N40MIMO_Ant1_High_2452



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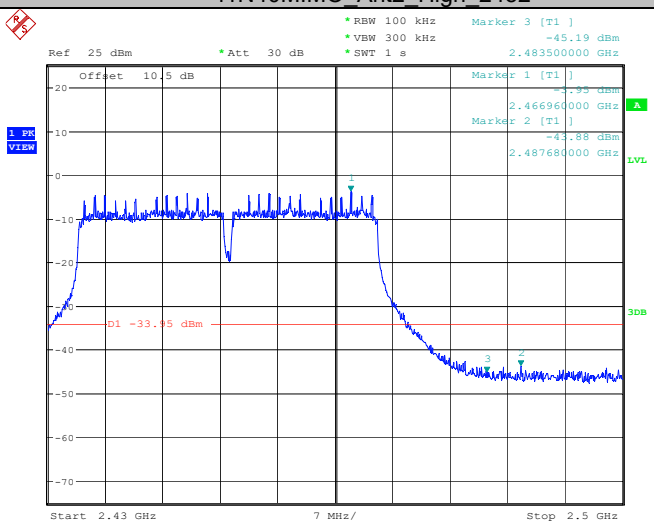

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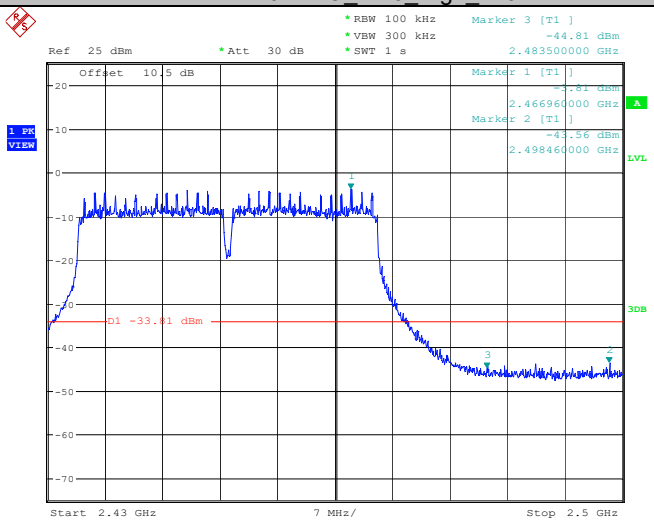


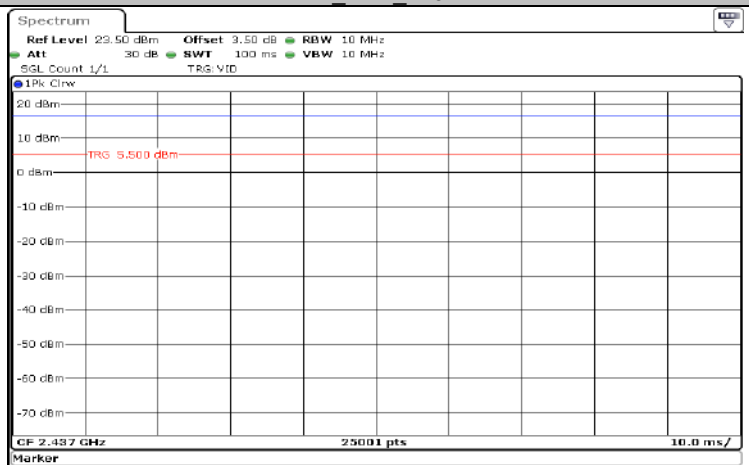
Appendix F: Duty Cycle

Test Result

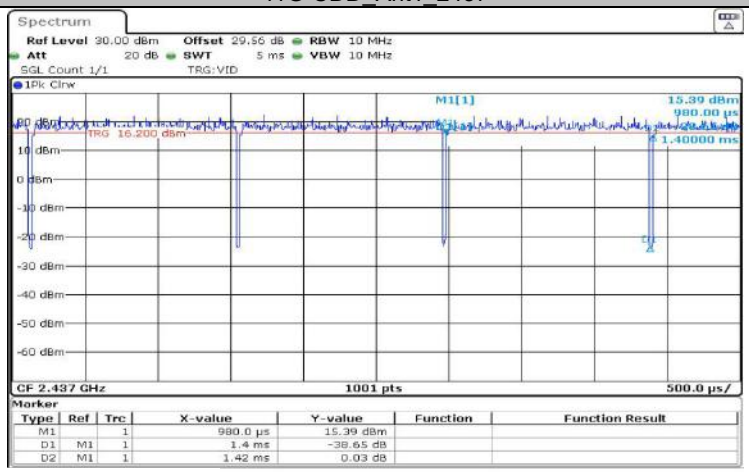
Test Mode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Duty Cycle Factor [dB]	1/T Minimum VBW [kHz]
11B	Ant1	2437	100.00	100.00	100.00	-	-
11G-CDD	Ant1	2437	1.40	1.42	98.59	-	-
11N20MIMO	Ant1	2437	1.30	1.33	97.74	0.10	0.77
11N40MIMO	Ant1	2437	0.64	0.67	95.52	0.20	1.56

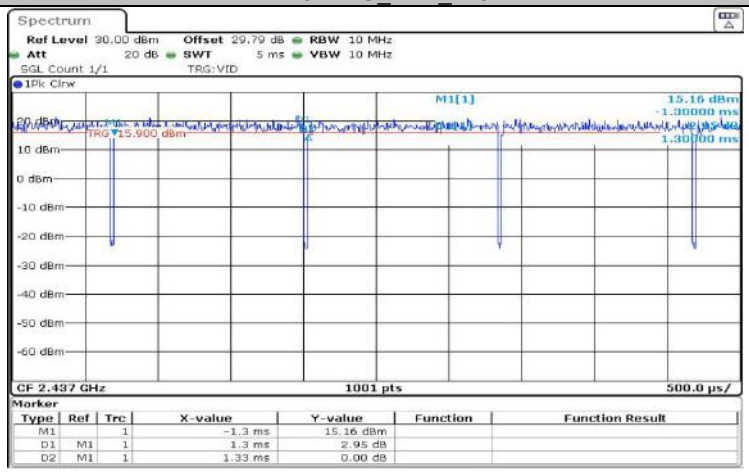
Test Graphs

11B_Ant1_2437



11G-CDD_Ant1_2437



11N20MIMO_Ant1_2437


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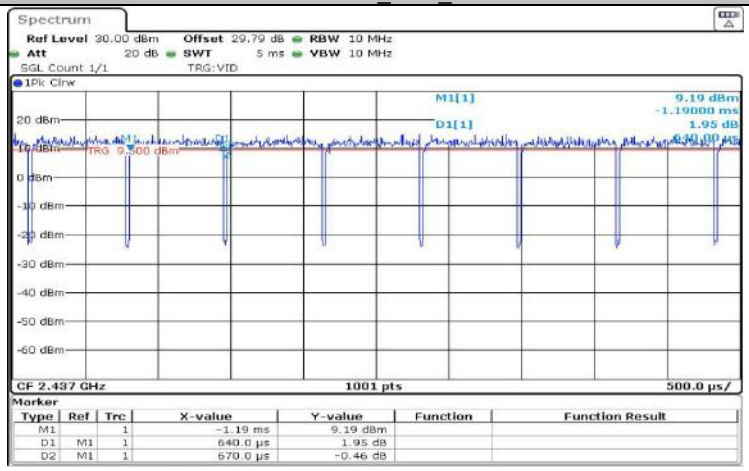

******* END OF REPORT *******