

Report No.: SEWM2311000454RG05
 Rev.: 01
 Page: 1 of 127

TEST REPORT

Application No.: SEWM2311000454RG
Applicant: Xiaomi Communications Co., Ltd.
Address of Applicant: #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
Manufacturer: Xiaomi Communications Co., Ltd.
Address of Manufacturer: #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
EUT Description: Mobile Phone
Model No.: XIG05
Trade Mark: Redmi
FCC ID: 2AFZZRA50J
Standards: FCC 47 CFR Part 2, Subpart J
 FCC 47 CFR Part 15, Subpart C
Date of Receipt: 2023/11/10
Date of Test: 2023/11/10 to 2024/03/17
Date of Issue: 2024/03/19

Test Result :	PASS *
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* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Well Wei
 Wireless Laboratory Manager


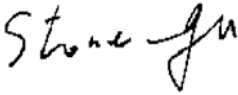


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1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2024/03/19		Original

Prepared By		 <hr/> (Ives Cheng) / Test Engineer
Checked By		 <hr/> (Stone Gu) / Reviewer



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2 Test Summary

Test Item	FCC Rule No.	Test Method	Test Result	Result
Antenna Requirement	15.203/15.247(b)	--	Clause 4.1	PASS
AC Power Line Conducted Emission	15.207	ANSI C63.10 2013 Section 6.2	Clause 4.2	PASS
Duty Cycle	--	ANSI C63.10 2013 Section 11.6	Clause 4.3	For Report Purpose
Conducted Output Power	15.247 (b)(3)	ANSI C63.10 2013 Section 11.9.1.3	Clause 4.4	PASS
DTS (6 dB) Bandwidth & 99% Occupied Bandwidth	15.247 (a)(2)	ANSI C63.10 2013 Section 11.8 Option 2 / 6.9.3	Clause 4.5	PASS
Power Spectral Density	15.247 (e)	ANSI C63.10 2013 Section 11.10.2	Clause 4.6	PASS
Band-edge for RF Conducted Emissions	15.247(d)	ANSI C63.10 2013 Section 11.11	Clause 4.7	PASS
RF Conducted Spurious Emissions	15.247(d)	ANSI C63.10 2013 Section 11.11	Clause 4.8	PASS
Radiated Spurious Emissions	15.247(d);15.205/15.209	ANSI C63.10 2013 Section 11.12	Clause 4.9	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.247(d);15.205/15.209	ANSI C63.10 2013 Section 11.12	Clause 4.10	PASS



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Contents

1	Version	2
2	Test Summary	3
3	General Information	5
3.1	Details of Client	5
3.2	Test Location	5
3.3	Test Facility	5
3.4	General Description of EUT	6
3.5	Test Environment and Mode	8
3.6	Description of Support Units	8
3.7	Worst-case configuration and mode	8
4	Test results and Measurement Data	9
4.1	Antenna Requirement	9
4.2	AC Power Line Conducted Emissions	11
4.3	Duty Cycle	15
4.4	Conducted Output Power	16
4.5	DTS (6 dB) Bandwidth & 99% Occupied Bandwidth	17
4.6	Power Spectral Density	18
4.7	Band-edge for RF Conducted Emissions	19
4.8	RF Conducted Spurious Emissions	20
4.9	Radiated Spurious Emissions	21
4.10	Restricted bands around fundamental frequency	24
5	Measurement Uncertainty (95% confidence levels, k=2)	27
6	Equipment List	28
7	Photographs - Setup Photos	30



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3 General Information

3.1 Details of Client

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

3.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	Ives Cheng, Tizzy Song

3.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

<ul style="list-style-type: none"> • A2LA (Certificate No. 6336.01) SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01. • Innovation, Science and Economic Development Canada SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory. CAB identifier: CN0120. IC#: 27594. • FCC –Designation Number: CN1312 SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory. Designation Number: CN1312. Test Firm Registration Number: 717327
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3.4 General Description of EUT

EUT Description:	Mobile Phone	
Model No.:	XIG05	
Trade Mark:	Redmi	
Hardware Version:	13510N16	
Software Version:	Xiaomi HyperOS 1.0	
Power Supply:	Lithium Battery (3.91V)	
IMEI:	RF Conducted	IMEI1:864594070003501 IMEI2:864594070003519
	RSE & AC power line	IMEI1:864594070012007 IMEI2:864594070012000
Operation Frequency:	802.11b/g/n(HT20):	2412MHz to 2462MHz
	802.11n(HT40):	2422MHz to 2452MHz
Modulation Type:	802.11b:	DSSS (DBPSK, DQPSK, CCK)
	802.11g/n:	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Number of Channels:	802.11b/g/n(HT20): 11 802.11n(HT40): 7	
Channel Spacing:	5MHz	
Smart System:	<input checked="" type="checkbox"/> SISO	802.11b/g/n
	<input checked="" type="checkbox"/> MIMO	802.11n: 2Tx & 2Rx
	<input checked="" type="checkbox"/> Diversity	802.11b/g: 2Tx & 2Rx
Antenna Type:	IFA Antenna	
Antenna Gain:	-3.1dBi (Ant10); 1.53dBi (Ant8)	
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.	
RF Cable:	1.0dB	
Remark:	As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.	



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Operation Frequency of each channel (802.11b/g/n HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		
Operation Frequency of each channel (802.11n HT40)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
3	2422MHz	6	2437MHz	9	2452MHz		
4	2427MHz	7	2442MHz				
5	2432MHz	8	2447MHz				
Remark: In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:							
Channel	Frequency for 802.11 b/g/n (HT20)			Frequency for 802.11n (HT40)			
The Lowest channel	2412MHz			2422MHz			
The Middle channel	2437MHz			2437MHz			
The Highest channel	2462MHz			2452MHz			



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3.5 Test Environment and Mode

Environment Parameter	101 kPa Selected Values During Tests	
Relative Humidity	44-46 % RH Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	22~23	3.91
Remark: NV: Normal Voltage NT: Normal Temperature		

3.6 Description of Support Units

The EUT has been tested as an independent unit.

3.7 Worst-case configuration and mode

Low data rate was used to test on antenna port conducted tests and radiated spurious emissions since it has the highest maximum power. Following are the worst-case data rates set for test:

Modulation Type	SISO - Data Rate	CDD/MIMO - Data Rate
802.11b	1 Mbps	2 Mbps
802.11g	6 Mbps	12 Mbps
802.11n (HT 20)	MCS0 (6.5 Mbps)	MCS0 (13 Mbps)
802.11n (HT 40)	MCS0 (13.5 Mbps)	MCS0 (27 Mbps)



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4 Test results and Measurement Data

4.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(b)
<p>15.203 requirement: 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p>15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>	
<p>The antenna is IFA Antenna and no consideration of replacement. The best case gain of the antenna is -3.1dBi (Ant10); 1.53dBi (Ant8)*</p> <p><i>*Note: The antenna gain are derived from the gain information report provided by the manufacturer.</i></p> <p><i>Remark: As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.</i></p>	



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Cyclic Delay Diversity (CDD) System:

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

If all antennas have the same gain, G_{ANT} , 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} ≤ 4;

For power, the directional gain may be calculated by using the formulas applicable to equal gain antennas with GANT set equal to the gain of the antenna having the highest gain.

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 6dbi.

The EUT supports CDD System.

Unequal antenna gain:

ANT Gain10 (dBi)	ANT Gain8 (dBi)	Power DG (dBi)	PSD DG (dBi)	Power Limit Reduction(dB)	PSD Limit Reduction(dB)
-3.1	1.53	1.53	2.53	0	0

Power Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) =0

PSD Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) =0



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4.2 AC Power Line Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013 Section 6.2		
Test Frequency Range:	150kHz to 30MHz		
Receiver Setup:	RBW = 9kHz, VBW = 30kHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		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.			
Test Procedure:	<p>1) The mains terminal disturbance voltage test was conducted in a shielded room.</p> <p>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</p> <p>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,</p> <p>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</p>		



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<p>Test Setup:</p>	
<p>Exploratory Test Mode:</p>	<p>Transmitting with all kind of modulations, data rates at lowest, middle and highest channel. Charge + Transmitting mode.</p>
<p>Final Test Mode:</p>	<p>Refer to section 3.7 for details. Only the worst case is recorded in the report.</p>
<p>Instruments Used:</p>	<p>Refer to section 6 for details.</p>
<p>Test Results:</p>	<p>Pass</p>



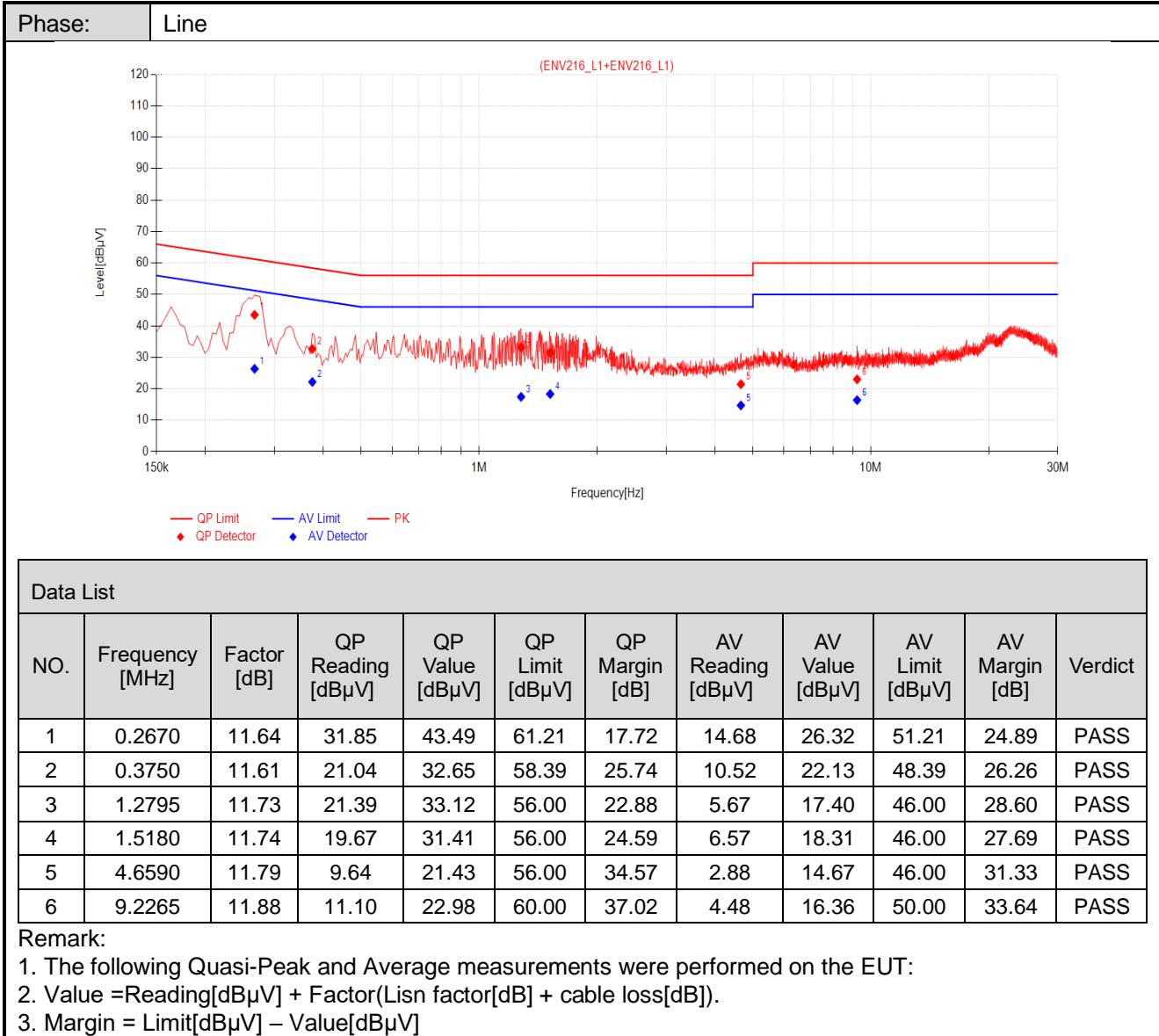
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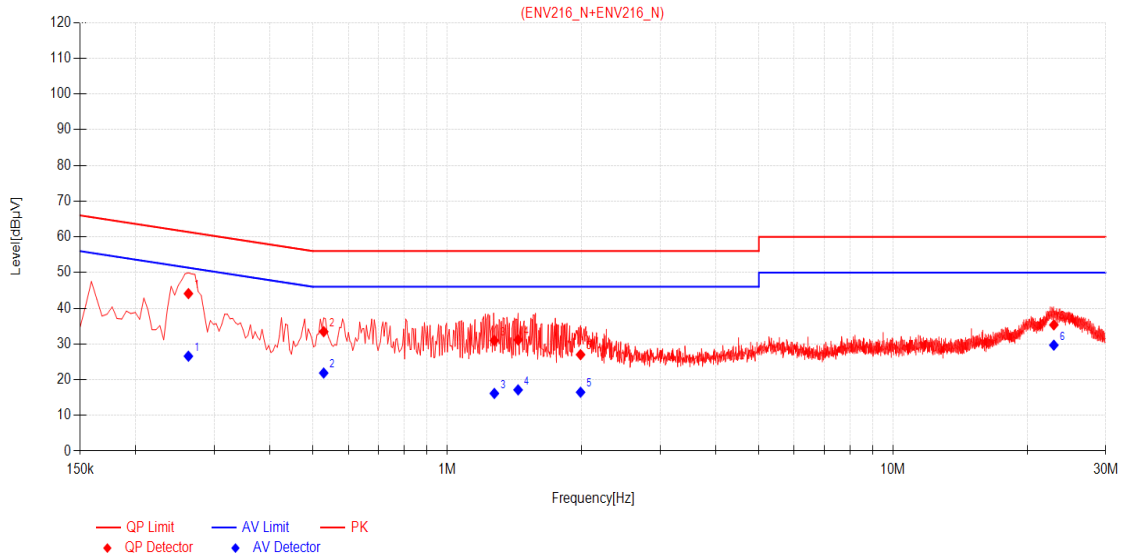
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Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



Phase: Neutral



Data List

NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.2625	11.63	32.47	44.10	61.35	17.25	14.94	26.57	51.35	24.78	PASS
2	0.5280	11.61	21.83	33.44	56.00	22.56	10.25	21.86	46.00	24.14	PASS
3	1.2750	11.73	19.25	30.98	56.00	25.02	4.42	16.15	46.00	29.85	PASS
4	1.4415	11.72	19.43	31.15	56.00	24.85	5.42	17.14	46.00	28.86	PASS
5	1.9905	11.73	15.29	27.02	56.00	28.98	4.76	16.49	46.00	29.51	PASS
6	22.9515	12.00	23.34	35.34	60.00	24.66	17.66	29.66	50.00	20.34	PASS

Remark:

- The following Quasi-Peak and Average measurements were performed on the EUT:
- Value = Reading[dBµV] + Factor(Lisn factor[dB] + cable loss[dB]).
- Margin = Limit[dBµV] – Value[dBµV]



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4.3 Duty Cycle

Test Requirement:	ANSI C63.10 :2013 Section 11.6
Test Method:	ANSI C63.10 :2013 Section 11.6
Test Setup:	
Instruments Used:	Refer to section 6 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	No restriction limits
Test Results:	For Report Purpose
The detailed test data see: Appendix	



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4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10 :2013 Section 11.9.1.3
Test Setup:	<p>* Test with power meter (Detector function: Peak)</p>
Test Instruments:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	30dBm
Test Results:	Pass
The detailed test data see: Appendix	



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4.5 DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013 Section 11.8 Option 2 / 6.9.3
Test Setup:	
Instruments Used:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	≥ 500 kHz for DTS Bandwidth
Test Results:	Pass
The detailed test data see: Appendix	



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4.6 Power Spectral Density

Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10 :2013 Section 11.10.2
Test Setup:	
Test Instruments:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	≤8.00dBm/3kHz
Test Results:	Pass
The detailed test data see: Appendix	



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4.7 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.11
Test Setup:	
Instruments Used:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test Results:	Pass
The detailed test data see: Appendix	



4.8 RF Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.11
Test Setup:	
Instruments Used:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test Results:	Pass
The detailed test data see: Appendix	



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4.9 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10 :2013 Section 11.12				
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Test Frequency:	9kHz ~ 25GHz				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak	
	Peak	1MHz	3MHz	Peak	
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
Remark: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.					



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Test Setup:

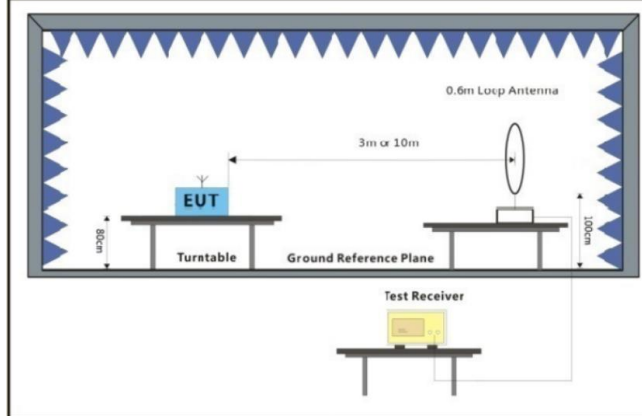


Figure 1. Below 30MHz

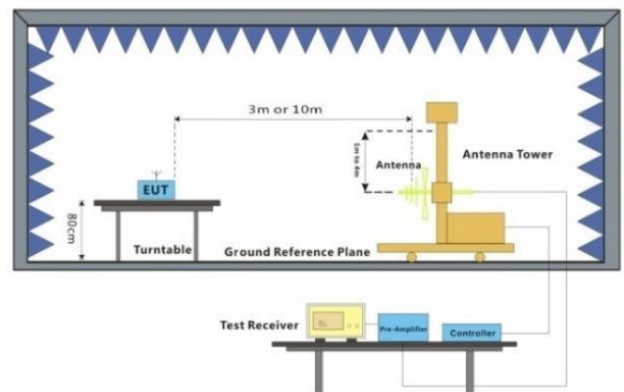


Figure 2. 30MHz to 1GHz

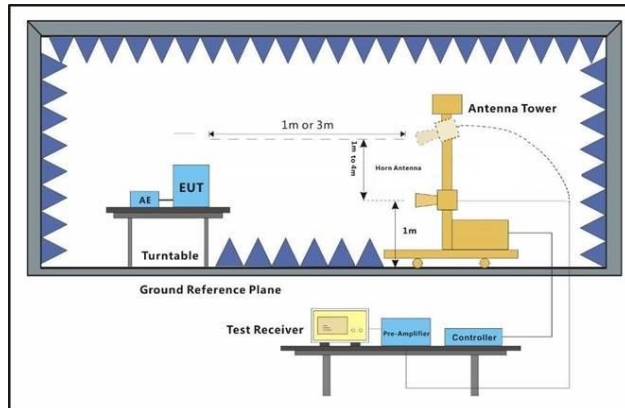


Figure 3. Above 1 GHz

Test Procedure:

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Distance from antenna to EUT is 1m for measurements >18GHz).
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.



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	<p>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>g. Test the EUT in the lowest channel, the middle channel ,the Highest channel.</p> <p>h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.</p> <p>i. Repeat above procedures until all frequencies measured was complete.</p> <p>j. 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</p> <p>k. The disturbance above 18GHz was very low, and the harmonics were the highest point could be found when testing, so only the harmonics had been displayed.</p> <p>l. At a measurement distance of 1 meter the limit line was increased by $20 \cdot \text{LOG}(3/1) = 9.54 \text{ dB}$.</p>
Test Configuration:	<p>Measurements below 30MHz</p> <ul style="list-style-type: none"> • RBW = 10 kHz • VBW = 30 kHz • Detector = Peak & Average & Quasi-peak • Trace mode = max hold <p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> • RBW = 120 kHz • VBW = 300 kHz • Detector = Quasi-peak • Trace mode = max hold <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> • RBW = 1 MHz • VBW \geq 3 MHz • Detector = Peak • Sweep time = auto • Trace mode = max hold <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> • RBW = 1 MHz • VBW = 10 Hz, when duty cycle is no less than 98 percent. • VBW \geq 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.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.
Final Test Mode:	Refer to section 3.7 for details. For below 1GHz part, through pre-scan all channels, but only the worst case is recorded in the report.
Instruments Used:	Refer to section 6 for details.
Test Results:	Pass
The detailed test data see: Appendix	



4.10 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2013 Section 11.12		
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m)	Remark
	30MHz-88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1GHz	54.0	Quasi-peak
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

Test Setup:

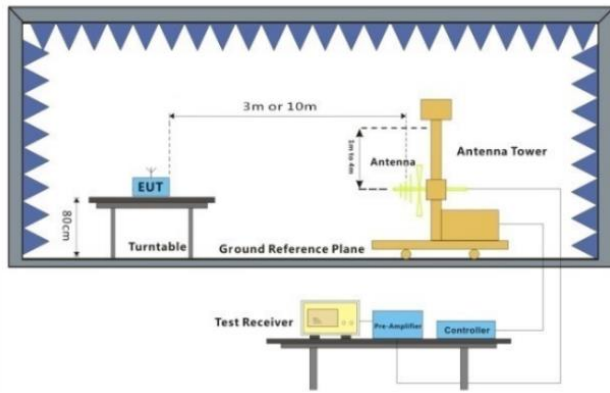


Figure 1. 30MHz to 1GHz

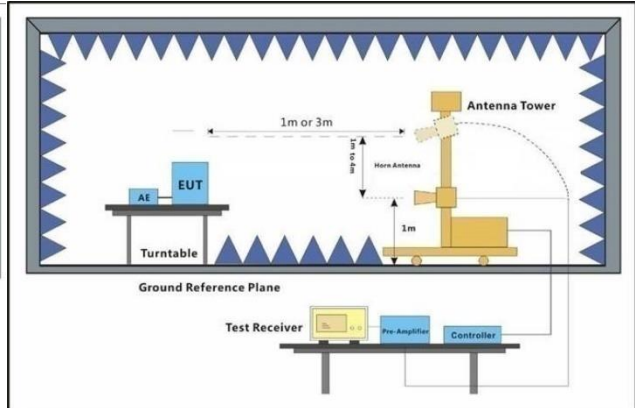


Figure 2. Above 1 GHz



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<p>Test Procedure:</p>	<ol style="list-style-type: none"> For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel Test the EUT in the lowest channel , the Highest channel The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. Repeat above procedures until all frequencies measured was complete.
<p>Test Configuration:</p>	<p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> • RBW = 120 kHz • VBW = 300 kHz • Detector = Quasi-peak • Trace mode = max hold <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> • RBW = 1 MHz • VBW ≥ 3 MHz • Detector = Peak • Sweep time = auto • Trace mode = max hold <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> • RBW = 1 MHz • 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.
<p>Exploratory Test Mode:</p>	<p>Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.</p>
<p>Final Test Mode:</p>	<p>Refer to section 3.7 for details.</p>
<p>Instruments Used:</p>	<p>Refer to section 6 for details.</p>



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Report No.: SEWM2311000454RG05

Rev.: 01

Page: 26 of 127

Test Results:	Pass
The detailed test data see: Appendix	



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5 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.54dB
2	RF power density, conducted	±1.03dB
3	Spurious emissions, conducted	±0.54dB
4	Radio Frequency	±1.0 %
5	Duty Cycle	±0.37%
6	Occupied Bandwidth	±1.0 %
7	Conduction Emission	± 2.90dB (150kHz to 30MHz)
8	Radiated Emission	± 3.13dB (9k -30MHz)
		± 4.88dB (30M -1GHz)
		± 4.75dB (1GHz to 18GHz)
		± 4.77dB (Above 18GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than $U_{CISPR/ETSI}$ (CISPR/ETSI Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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6 Equipment List

RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal. Due date
				(yyyy/mm/dd)	(yyyy/mm/dd)
Shielding Room	Brilliant-emc	N/A	SUWI-04-01-06	2021/05/08	2024/05/07
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-07	2023/02/06	2024/02/05
				2024/02/18	2025/02/17
Measurement Software	Tonscend	JS1120-3 Test System V 3.3.20	SUWI-02-09-09	NCR	NCR
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2023/05/11	2024/05/10
Temperature Chamber	ESPEC	SU-242	SUWI-01-13-01	2023/02/06	2024/02/05
				2024/02/04	2025/02/03
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2023/02/06	2024/02/05
				2024/02/04	2025/02/03
Power meter	Anritsu	ML2495A	SUWI-01-31-01	2023/11/21	2024/11/20
Pulse power sensor	Anritsu	MA2411B	SUWI-01-32-01	2023/11/21	2024/11/20
MXG Vector signal genitor	KEYSIGHT	N5182B	SUWI-01-38-01	2023/02/06	2024/02/05
				2024/02/04	2025/02/03

Conduction Test Equipment					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal. Due date
				(yyyy/mm/dd)	(yyyy/mm/dd)
Shielding Room	Brilliant-emc	N/A	SUWI-04-03-01	2021/05/08	2024/05/07
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2023/02/08	2024/02/07
				2024/02/01	2025/01/31
Temperature and humidity meter*	MingGao	TH101B	SUWI-01-01-06	2023/02/07	2024/02/06
				2024/02/08	2025/02/07
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-03	2023/02/08	2024/02/07
				2024/02/04	2025/02/03
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-04	2023/02/08	2024/02/07
				2024/02/04	2025/02/03
Measurement Software	Tonscend	JS32-CE V4.0.0.2	SUWI-02-09-05	NCR	NCR

*Note: The equipment will not be used after 2024/02/06 to 2024/02/08.



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RSE Test System					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-02	2021/11/25	2024/11/24
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-13	2023/02/07	2024/02/06
				2024/02/08	2025/02/07
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2023/05/11	2024/05/10
Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-06	2023/11/21	2024/11/20
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2023/02/08	2024/02/07
				2024/02/01	2025/01/31
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9168	SUWI-01-11-04	2023/11/25	2024/11/24
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-05	2023/11/25	2024/11/24
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	2023/05/12	2024/05/11
Active Loop Antenna	SCHWRZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	2023/05/13	2024/05/12
Amplifier	Tonscend	TAP9K3G32	SUWI-01-14-06	2023/11/21	2024/11/20
Amplifier	Tonscend	TAP01018050	SUWI-01-14-04	2023/11/21	2024/11/20
Amplifier	Tonscend	TAP30M7G30	SUWI-01-14-05	2023/11/21	2024/11/20
Measurement Software	Tonscend	JS32-RE V4.0.0.0	SUWI-02-09-04	NCR	NCR

Remark: NCR=No Calibration Requirement.



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Report No.: SEWM2311000454RG05

Rev.: 01

Page: 30 of 127

7 Photographs - Setup Photos

Refer to Appendix A.2 WLAN Setup Photos.



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Report No.: SEWM2311000454RG05

Rev.: 01

Page: 31 of 127

Appendix



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**DTS Bandwidth
 Test Result**

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11b-CDD	Ant10	2412	8.16	2407.88	2416.04	≥0.5	PASS
11b-CDD	Ant8	2412	8.16	2407.88	2416.04	≥0.5	PASS
11b-CDD	Ant10	2437	8.12	2432.92	2441.04	≥0.5	PASS
11b-CDD	Ant8	2437	8.12	2432.92	2441.04	≥0.5	PASS
11b-CDD	Ant10	2462	8.12	2457.92	2466.04	≥0.5	PASS
11b-CDD	Ant8	2462	8.12	2457.92	2466.04	≥0.5	PASS
11g-CDD	Ant10	2412	15.44	2404.16	2419.60	≥0.5	PASS
11g-CDD	Ant8	2412	16.00	2403.80	2419.80	≥0.5	PASS
11g-CDD	Ant10	2437	15.24	2429.36	2444.60	≥0.5	PASS
11g-CDD	Ant8	2437	13.96	2430.60	2444.56	≥0.5	PASS
11g-CDD	Ant10	2462	15.36	2454.16	2469.52	≥0.5	PASS
11g-CDD	Ant8	2462	15.24	2454.36	2469.60	≥0.5	PASS
11n20MIMO	Ant10	2412	16.88	2403.52	2420.40	≥0.5	PASS
11n20MIMO	Ant8	2412	16.88	2403.52	2420.40	≥0.5	PASS
11n20MIMO	Ant10	2437	15.24	2429.36	2444.60	≥0.5	PASS
11n20MIMO	Ant8	2437	16.84	2428.56	2445.40	≥0.5	PASS
11n20MIMO	Ant10	2462	16.88	2453.52	2470.40	≥0.5	PASS
11n20MIMO	Ant8	2462	16.12	2454.04	2470.16	≥0.5	PASS
11n40MIMO	Ant10	2422	35.92	2404.32	2440.24	≥0.5	PASS
11n40MIMO	Ant8	2422	36.48	2403.76	2440.24	≥0.5	PASS
11n40MIMO	Ant10	2437	35.28	2419.32	2454.60	≥0.5	PASS
11n40MIMO	Ant8	2437	34.08	2420.52	2454.60	≥0.5	PASS
11n40MIMO	Ant10	2452	35.44	2434.16	2469.60	≥0.5	PASS
11n40MIMO	Ant8	2452	36.48	2433.76	2470.24	≥0.5	PASS

Remark:

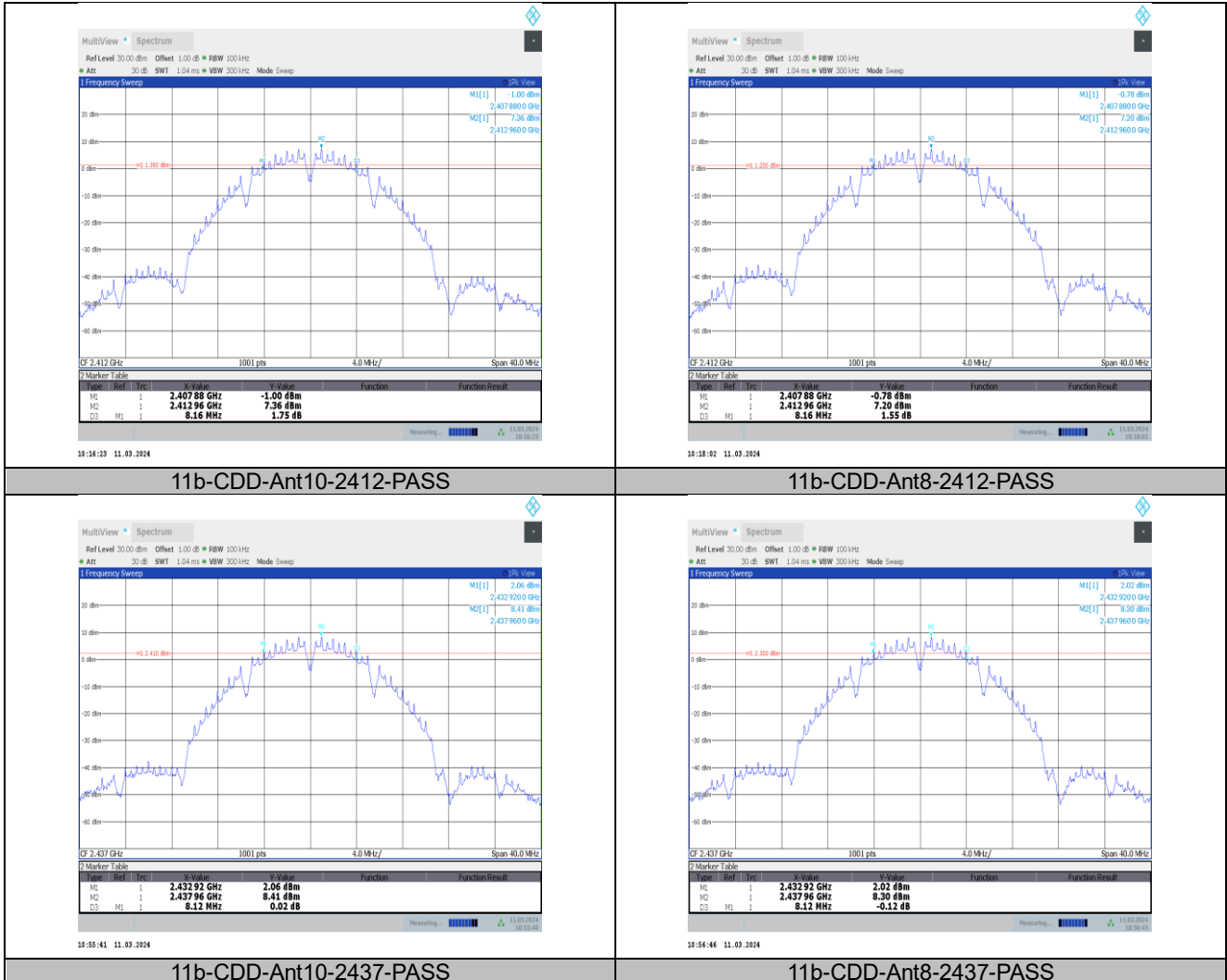
For WLAN SISO & CDD/MIMO mode for 802.11b/g/n mode, the whole testing has assessed only CDD/MIMO mode by referring to their higher output power.



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Test Graphs



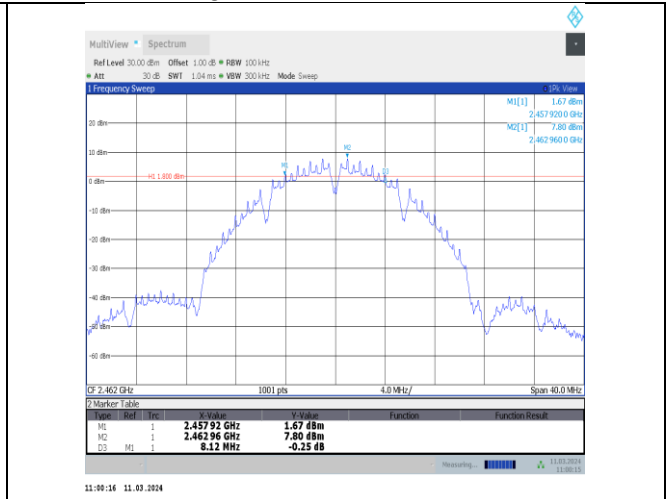
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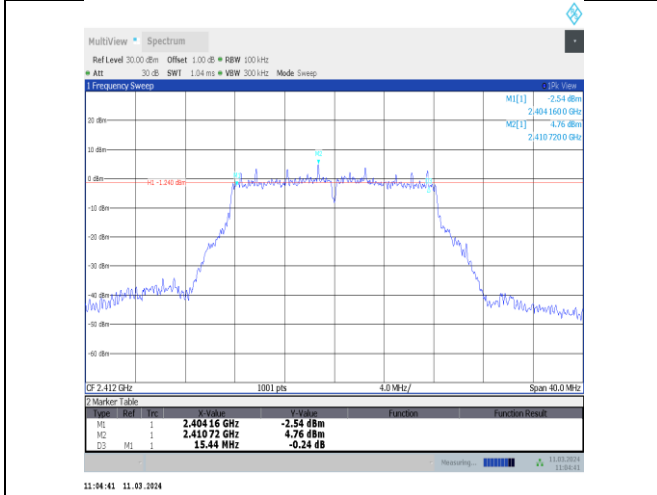
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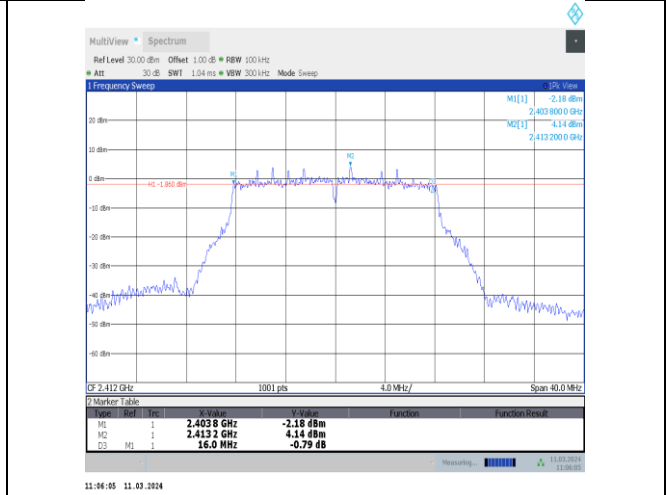
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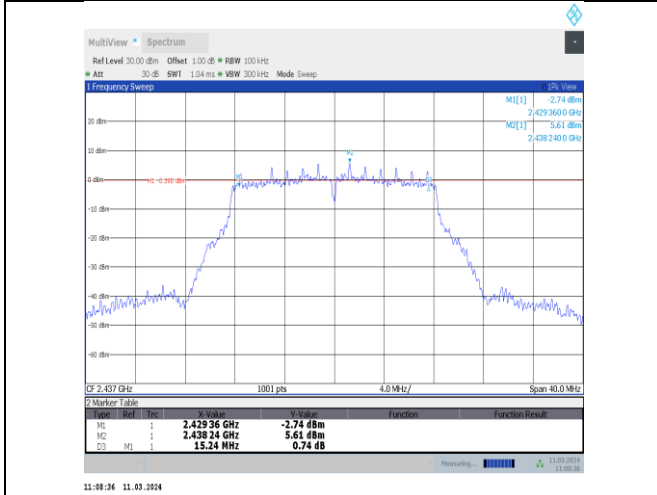
11b-CDD-Ant8-2462-PASS



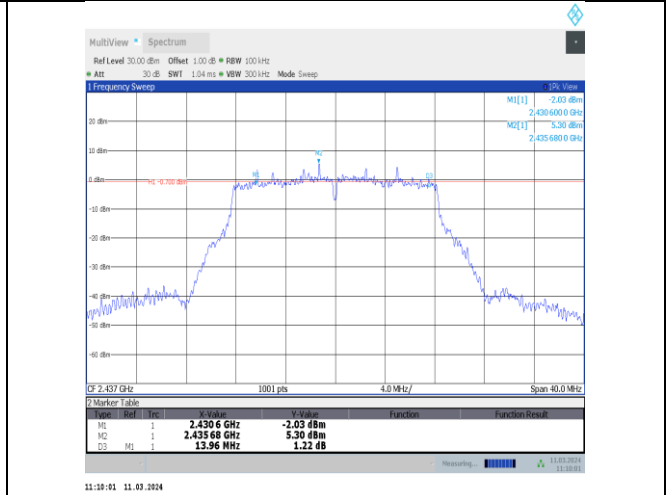
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11g-CDD-Ant8-2412-PASS



11g-CDD-Ant10-2437-PASS



11g-CDD-Ant8-2437-PASS

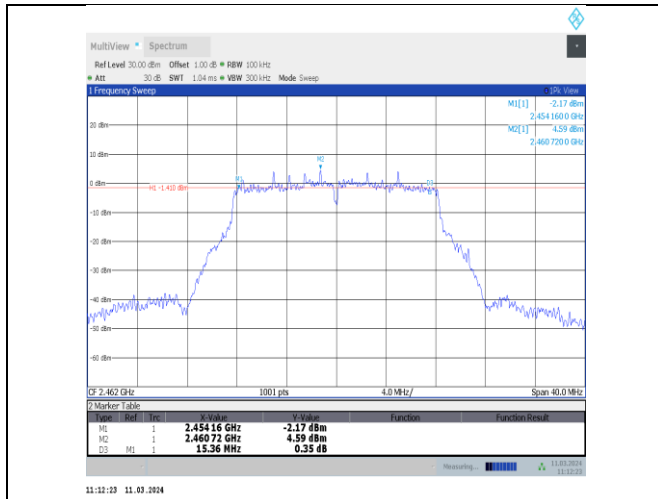


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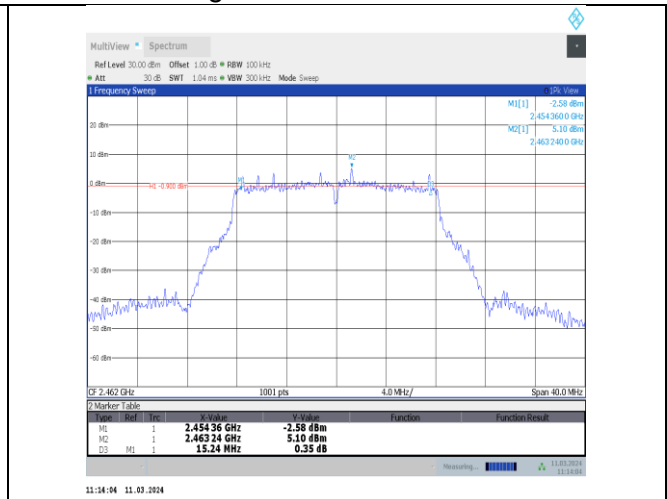
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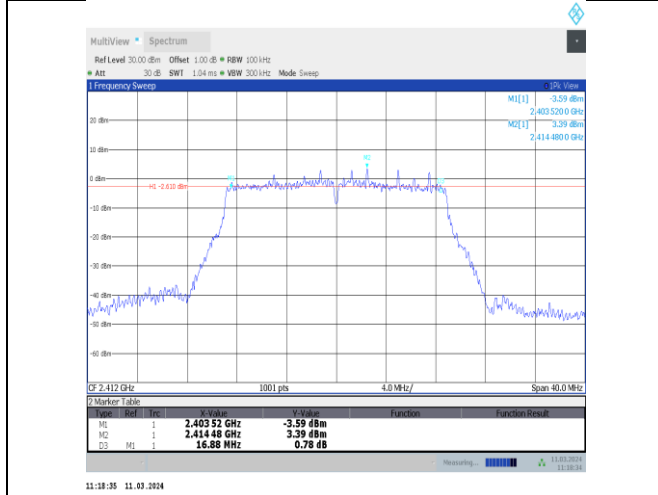
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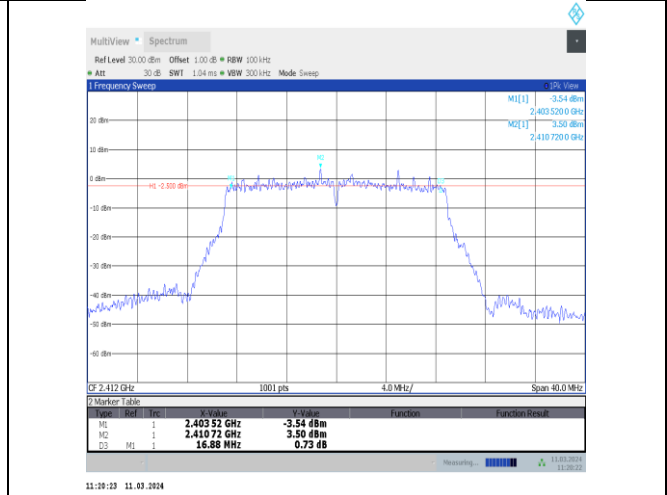
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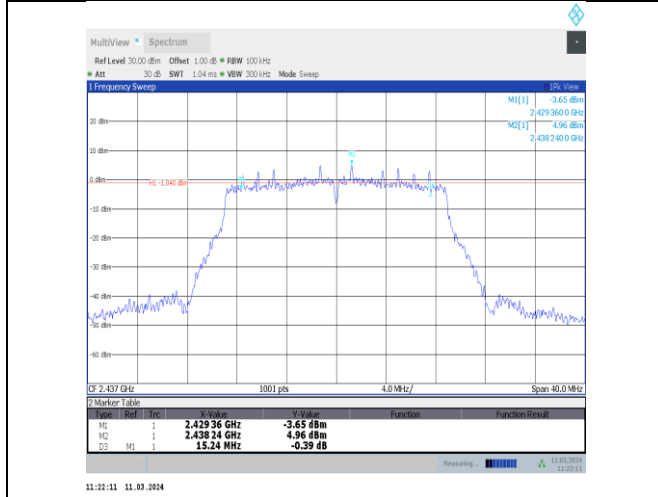
11g-CDD-Ant8-2462-PASS



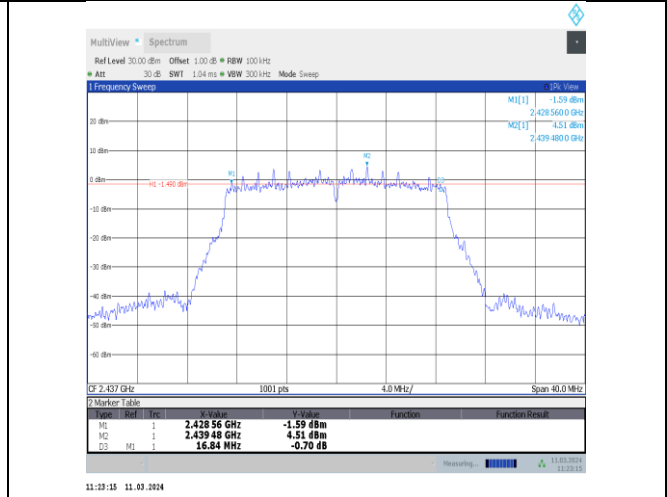
11n20MIMO-Ant10-2412-PASS



11n20MIMO-Ant8-2412-PASS



11n20MIMO-Ant10-2437-PASS



11n20MIMO-Ant8-2437-PASS

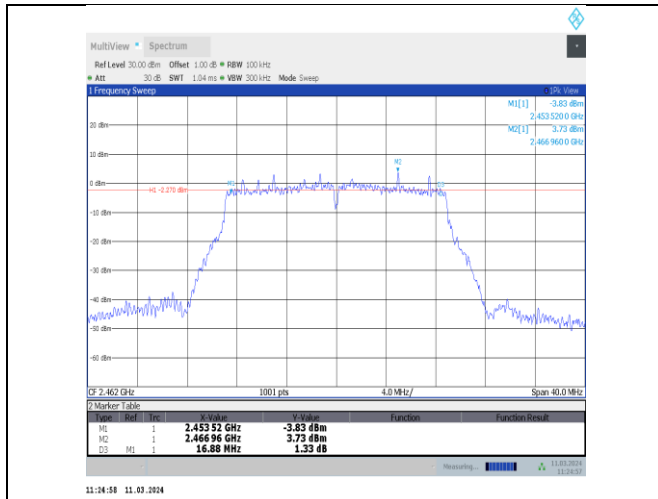


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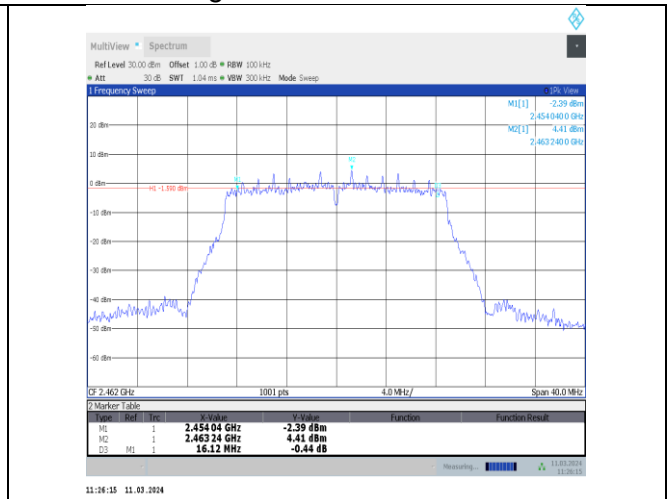
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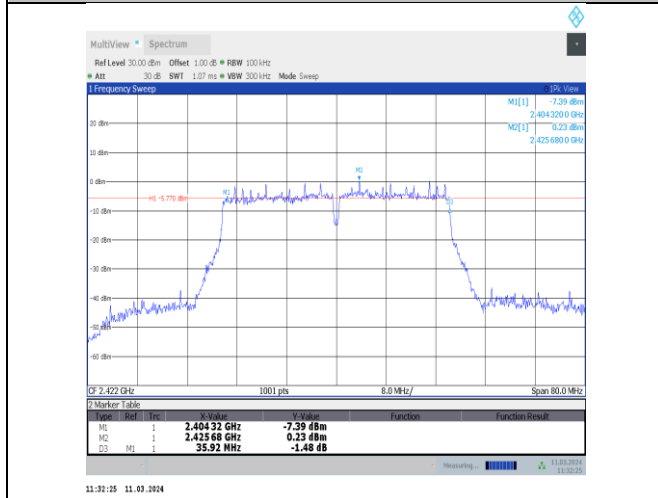
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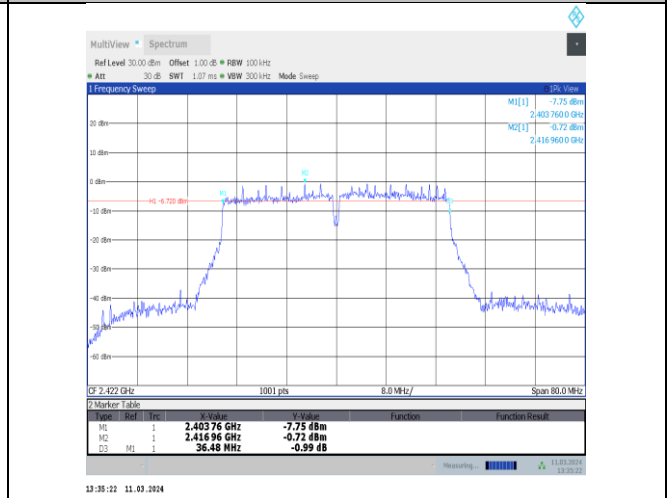
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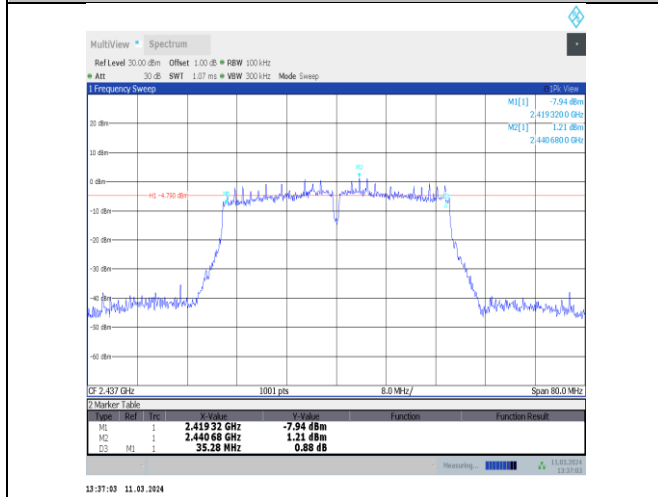
11n20MIMO-Ant8-2462-PASS



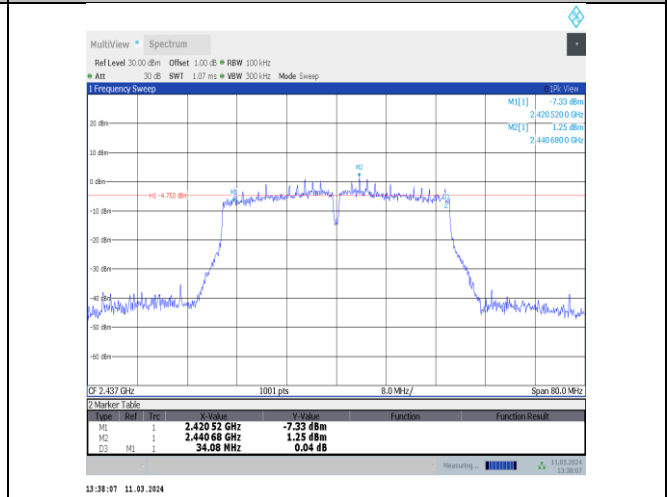
11n40MIMO-Ant10-2422-PASS



11n40MIMO-Ant8-2422-PASS



11n40MIMO-Ant10-2437-PASS



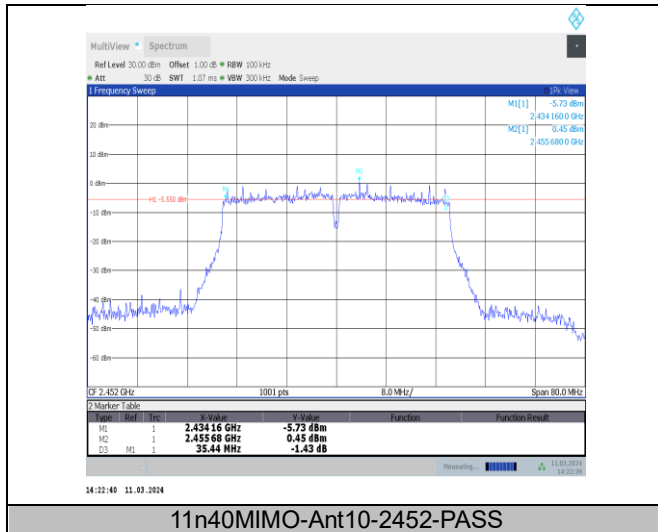
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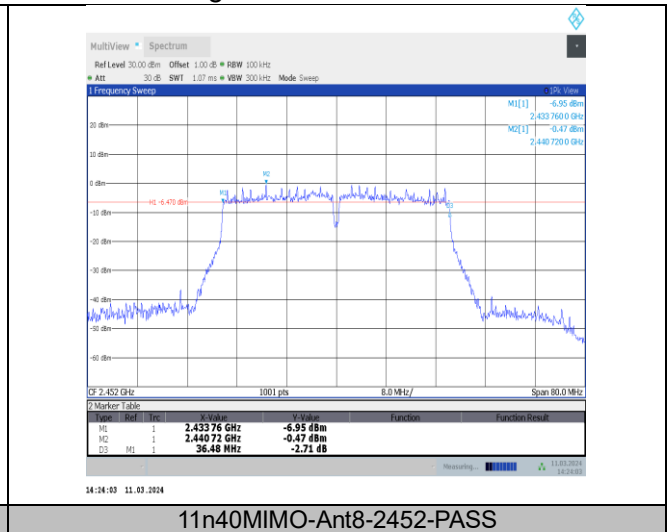
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11n40MIMO-Ant10-2452-PASS



11n40MIMO-Ant8-2452-PASS



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Occupied Channel Bandwidth Test Result

TestMode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
11b-CDD	Ant10	2412	13.922	2404.9865	2418.9085	For Report Purpose
11b-CDD	Ant8	2412	13.928	2404.9787	2418.9068	
11b-CDD	Ant10	2437	13.662	2430.2030	2443.8651	
11b-CDD	Ant8	2437	13.673	2430.1878	2443.8609	
11b-CDD	Ant10	2462	13.81	2455.0840	2468.8940	
11b-CDD	Ant8	2462	13.808	2455.0850	2468.8934	
11g-CDD	Ant10	2412	16.818	2403.5557	2420.3733	
11g-CDD	Ant8	2412	16.846	2403.5323	2420.3785	
11g-CDD	Ant10	2437	16.803	2428.5921	2445.3946	
11g-CDD	Ant8	2437	16.732	2428.6237	2445.3560	
11g-CDD	Ant10	2462	16.818	2453.5477	2470.3656	
11g-CDD	Ant8	2462	16.839	2453.5469	2470.3857	
11n20MIMO	Ant10	2412	17.952	2402.9863	2420.9386	
11n20MIMO	Ant8	2412	17.947	2403.0030	2420.9503	
11n20MIMO	Ant10	2437	17.843	2428.0740	2445.9169	
11n20MIMO	Ant8	2437	17.872	2428.0438	2445.9160	
11n20MIMO	Ant10	2462	17.927	2453.0198	2470.9467	
11n20MIMO	Ant8	2462	17.914	2453.0069	2470.9209	
11n40MIMO	Ant10	2422	36.589	2403.7988	2440.3874	
11n40MIMO	Ant8	2422	36.554	2403.8253	2440.3790	
11n40MIMO	Ant10	2437	36.359	2418.8956	2455.2548	
11n40MIMO	Ant8	2437	36.343	2418.9094	2455.2525	
11n40MIMO	Ant10	2452	36.486	2433.7545	2470.2405	
11n40MIMO	Ant8	2452	36.533	2433.7370	2470.2696	

Remark:

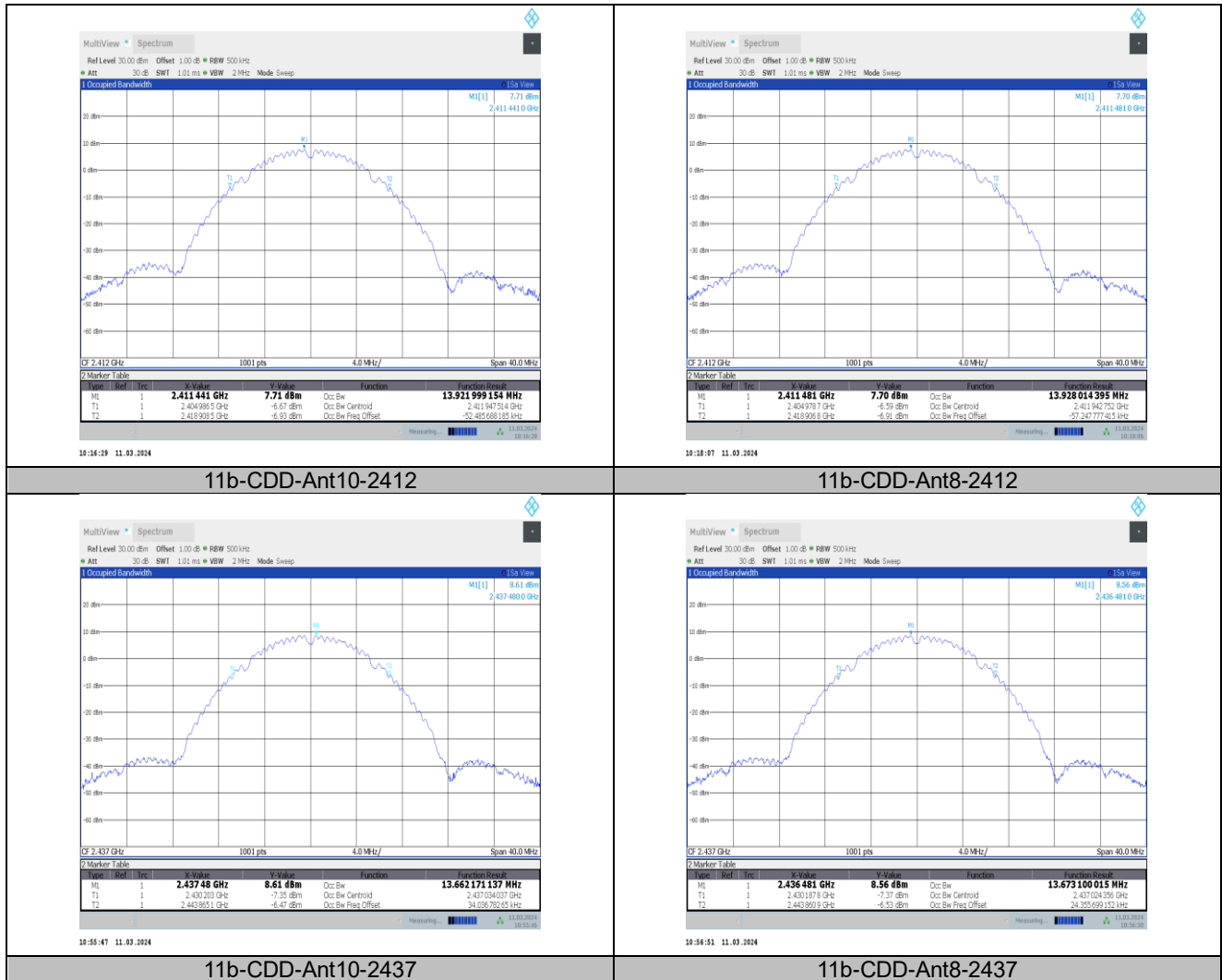
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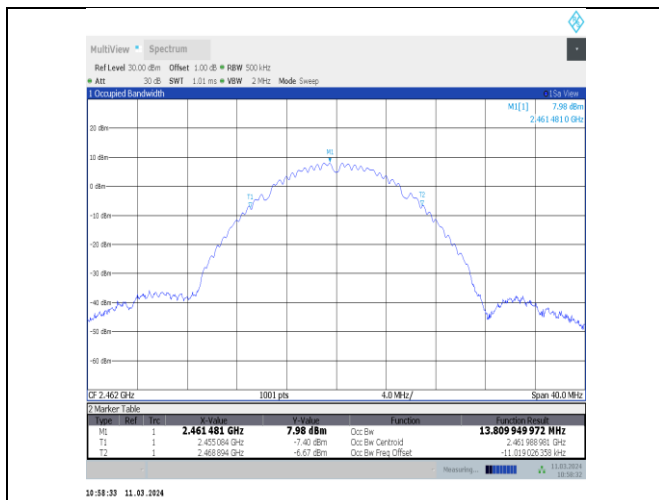
Test Graphs



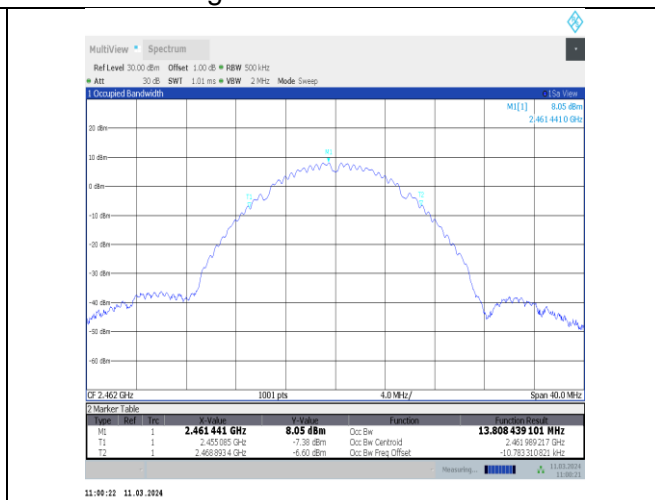
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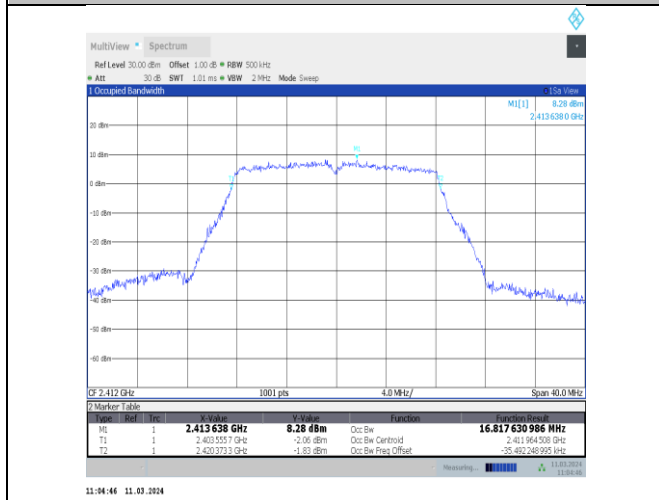
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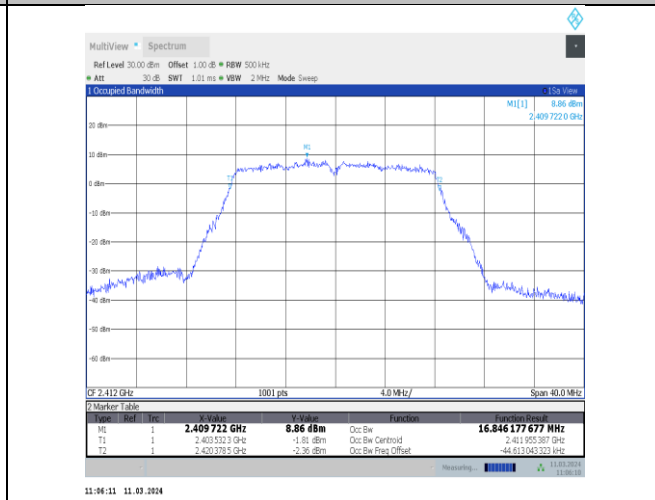
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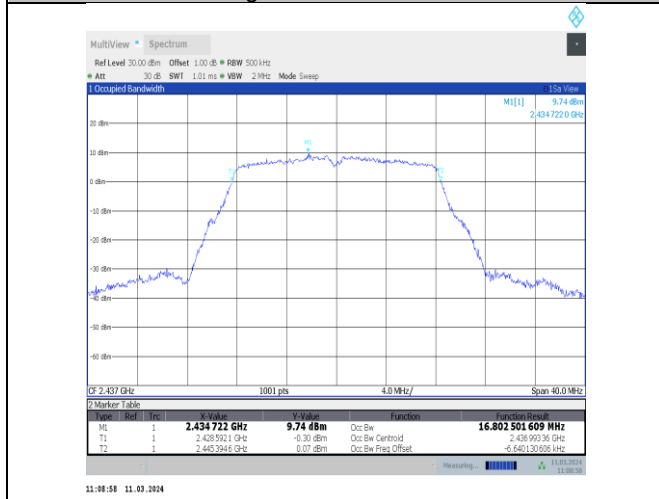
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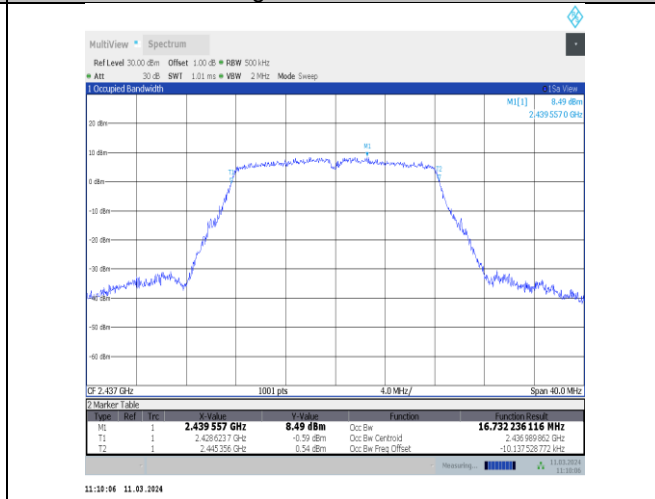
11g-CDD-Ant10-2412



11g-CDD-Ant8-2412



11g-CDD-Ant10-2437



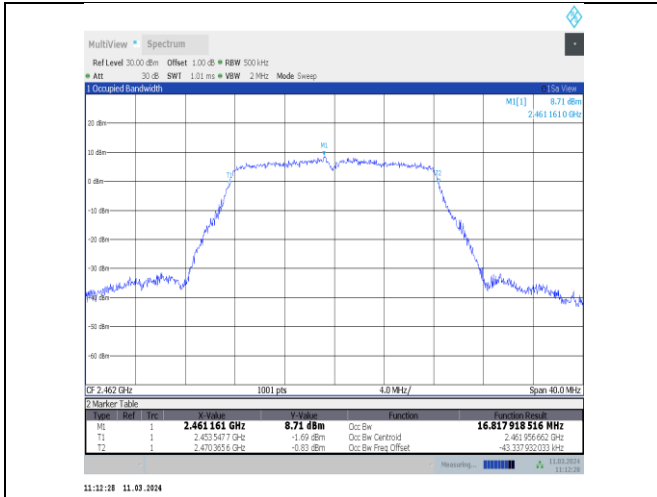
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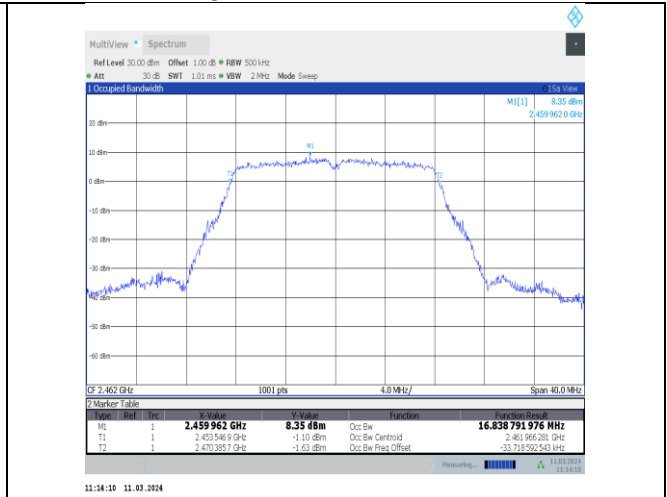
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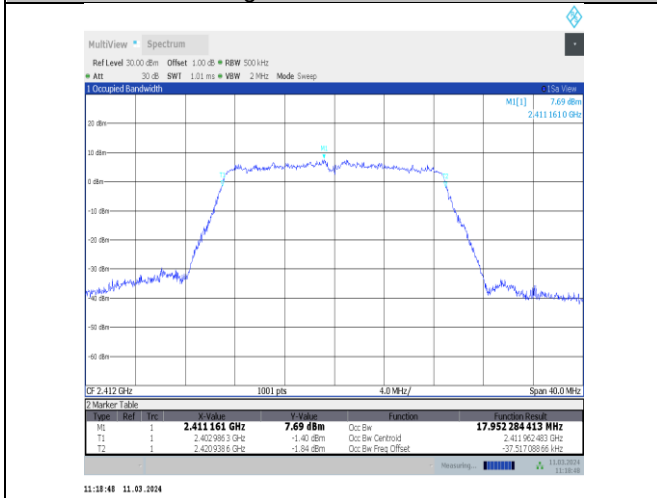
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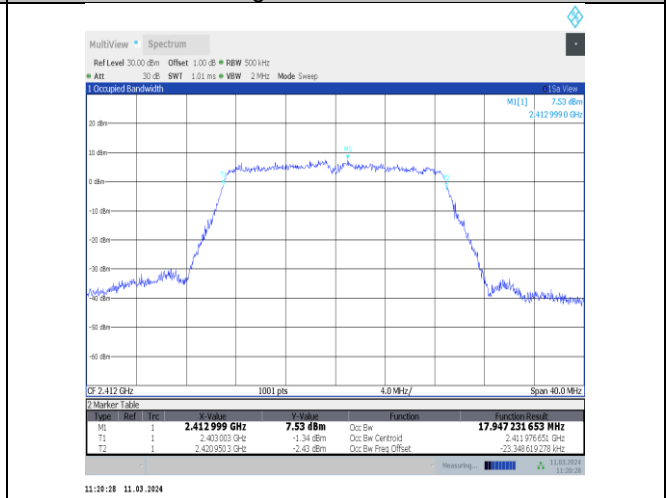
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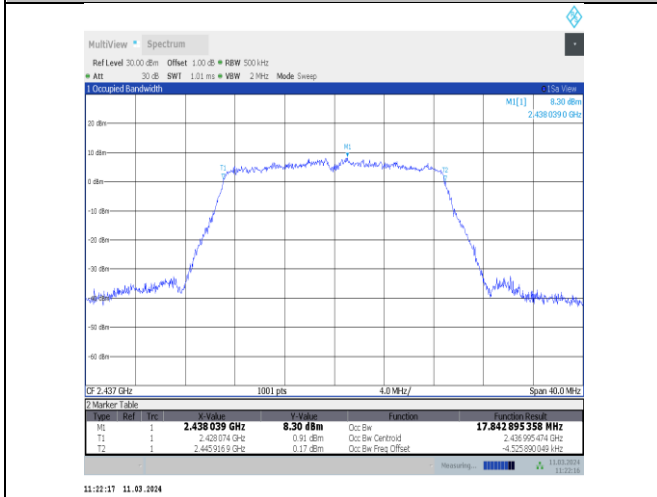
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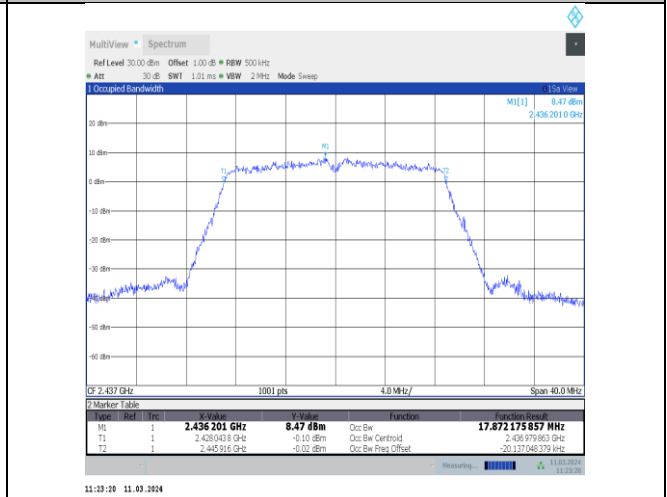
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11n20MIMO-Ant8-2412



11n20MIMO-Ant10-2437



11n20MIMO-Ant8-2437

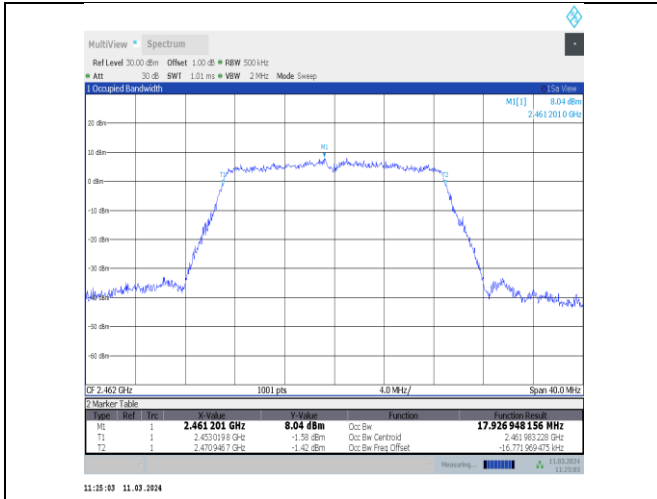


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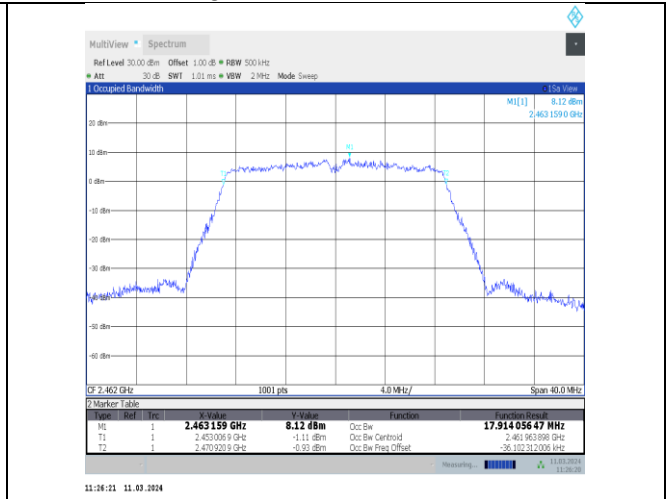
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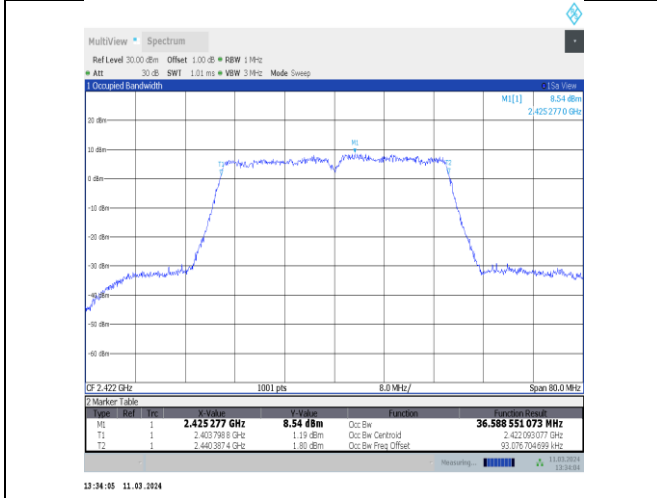
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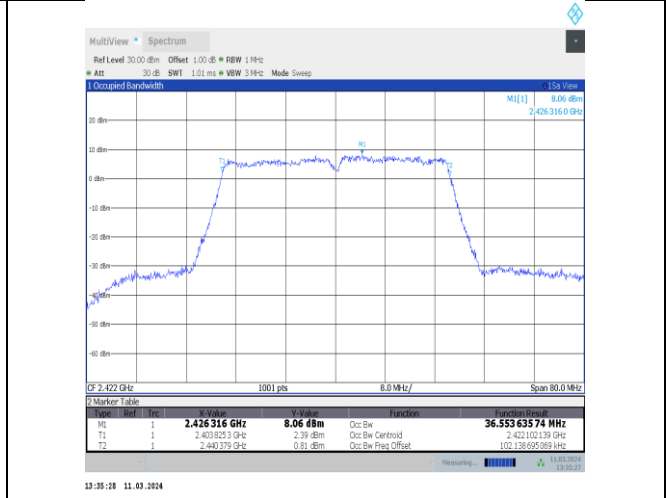
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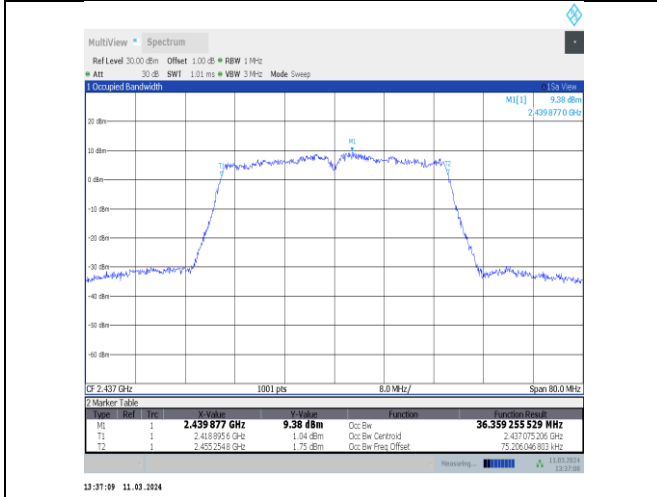
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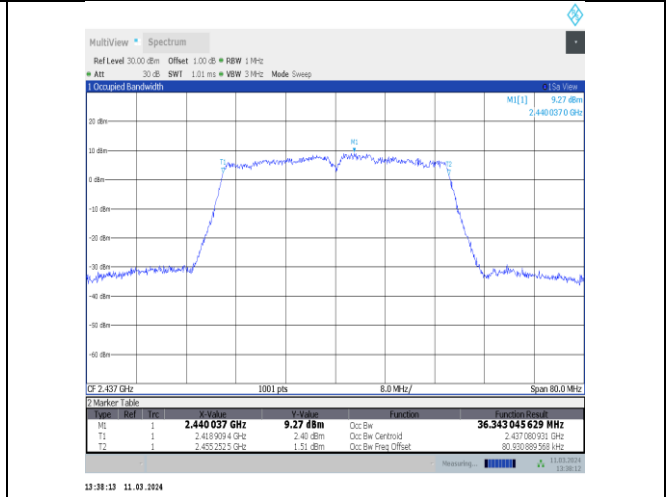
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11n40MIMO-Ant8-2422



11n40MIMO-Ant10-2437



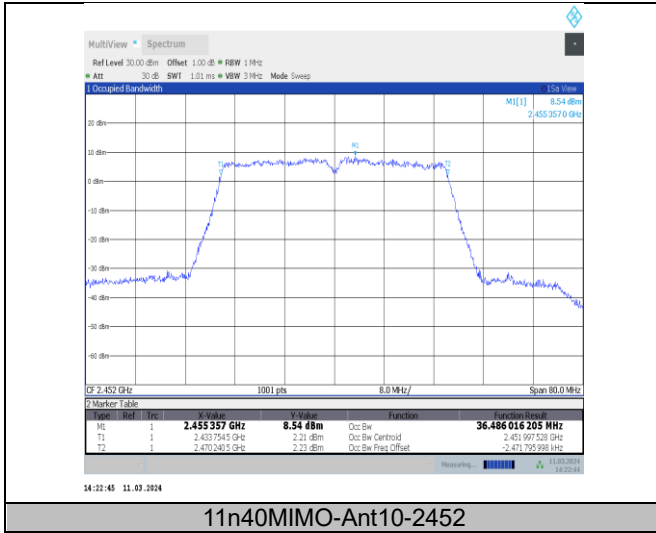
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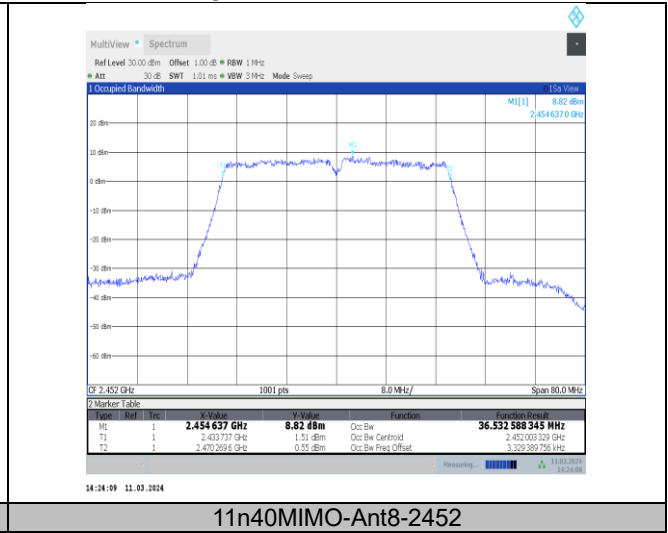
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11n40MIMO-Ant10-2452



11n40MIMO-Ant8-2452



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**Maximum conducted output power
Test Result Peak**

TestMode	Antenna	Frequency[MHz]	Peak Power[dBm]	Conducted Limit[dBm]	Verdict
11b-CDD	Ant10	2412	18.22	≤30.00	PASS
11b-CDD	Ant8	2412	17.81	≤30.00	PASS
11b-CDD	total	2412	21.03	≤30.00	PASS
11b-CDD	Ant10	2437	18.18	≤30.00	PASS
11b-CDD	Ant8	2437	17.69	≤30.00	PASS
11b-CDD	total	2437	20.95	≤30.00	PASS
11b-CDD	Ant10	2462	18.16	≤30.00	PASS
11b-CDD	Ant8	2462	17.89	≤30.00	PASS
11b-CDD	total	2462	21.04	≤30.00	PASS
11g-CDD	Ant10	2412	20.31	≤30.00	PASS
11g-CDD	Ant8	2412	20.06	≤30.00	PASS
11g-CDD	total	2412	23.20	≤30.00	PASS
11g-CDD	Ant10	2437	20.28	≤30.00	PASS
11g-CDD	Ant8	2437	20.10	≤30.00	PASS
11g-CDD	total	2437	23.20	≤30.00	PASS
11g-CDD	Ant10	2462	20.43	≤30.00	PASS
11g-CDD	Ant8	2462	20.22	≤30.00	PASS
11g-CDD	total	2462	23.34	≤30.00	PASS
11n20MIMO	Ant10	2412	19.36	≤30.00	PASS
11n20MIMO	Ant8	2412	19.32	≤30.00	PASS
11n20MIMO	total	2412	22.35	≤30.00	PASS
11n20MIMO	Ant10	2437	19.32	≤30.00	PASS
11n20MIMO	Ant8	2437	19.28	≤30.00	PASS
11n20MIMO	total	2437	22.31	≤30.00	PASS
11n20MIMO	Ant10	2462	19.33	≤30.00	PASS
11n20MIMO	Ant8	2462	19.16	≤30.00	PASS
11n20MIMO	total	2462	22.26	≤30.00	PASS
11n40MIMO	Ant10	2422	20.03	≤30.00	PASS
11n40MIMO	Ant8	2422	20.06	≤30.00	PASS
11n40MIMO	total	2422	23.06	≤30.00	PASS
11n40MIMO	Ant10	2437	19.88	≤30.00	PASS
11n40MIMO	Ant8	2437	19.87	≤30.00	PASS
11n40MIMO	total	2437	22.89	≤30.00	PASS
11n40MIMO	Ant10	2452	19.98	≤30.00	PASS
11n40MIMO	Ant8	2452	19.74	≤30.00	PASS
11n40MIMO	total	2452	22.87	≤30.00	PASS

Remark:

For WLAN SISO & CDD/MIMO mode for 802.11b/g/n mode, the whole testing has assessed only CDD/MIMO mode by referring to their higher output power.



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**Maximum power spectral density
Test Result**

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11b-CDD	Ant10	2412	-10.02	≤8.00	PASS
11b-CDD	Ant8	2412	-10.34	≤8.00	PASS
11b-CDD	total	2412	-7.17	≤8.00	PASS
11b-CDD	Ant10	2437	-9.84	≤8.00	PASS
11b-CDD	Ant8	2437	-9.02	≤8.00	PASS
11b-CDD	total	2437	-6.40	≤8.00	PASS
11b-CDD	Ant10	2462	-10.24	≤8.00	PASS
11b-CDD	Ant8	2462	-9.81	≤8.00	PASS
11b-CDD	total	2462	-7.01	≤8.00	PASS
11g-CDD	Ant10	2412	-11.70	≤8.00	PASS
11g-CDD	Ant8	2412	-11.23	≤8.00	PASS
11g-CDD	total	2412	-8.45	≤8.00	PASS
11g-CDD	Ant10	2437	-10.44	≤8.00	PASS
11g-CDD	Ant8	2437	-11.36	≤8.00	PASS
11g-CDD	total	2437	-7.87	≤8.00	PASS
11g-CDD	Ant10	2462	-11.39	≤8.00	PASS
11g-CDD	Ant8	2462	-12.13	≤8.00	PASS
11g-CDD	total	2462	-8.73	≤8.00	PASS
11n20MIMO	Ant10	2412	-11.91	≤8.00	PASS
11n20MIMO	Ant8	2412	-13.01	≤8.00	PASS
11n20MIMO	total	2412	-9.41	≤8.00	PASS
11n20MIMO	Ant10	2437	-11.59	≤8.00	PASS
11n20MIMO	Ant8	2437	-12.57	≤8.00	PASS
11n20MIMO	total	2437	-9.04	≤8.00	PASS
11n20MIMO	Ant10	2462	-12.48	≤8.00	PASS
11n20MIMO	Ant8	2462	-12.30	≤8.00	PASS
11n20MIMO	total	2462	-9.38	≤8.00	PASS
11n40MIMO	Ant10	2422	-15.57	≤8.00	PASS
11n40MIMO	Ant8	2422	-16.07	≤8.00	PASS
11n40MIMO	total	2422	-12.80	≤8.00	PASS
11n40MIMO	Ant10	2437	-14.35	≤8.00	PASS
11n40MIMO	Ant8	2437	-15.42	≤8.00	PASS
11n40MIMO	total	2437	-11.84	≤8.00	PASS
11n40MIMO	Ant10	2452	-15.71	≤8.00	PASS
11n40MIMO	Ant8	2452	-13.99	≤8.00	PASS
11n40MIMO	total	2452	-11.76	≤8.00	PASS

Remark:

For WLAN SISO & CDD/MIMO mode for 802.11b/g/n mode, the whole testing has assessed only CDD/MIMO mode by referring to their higher output power.

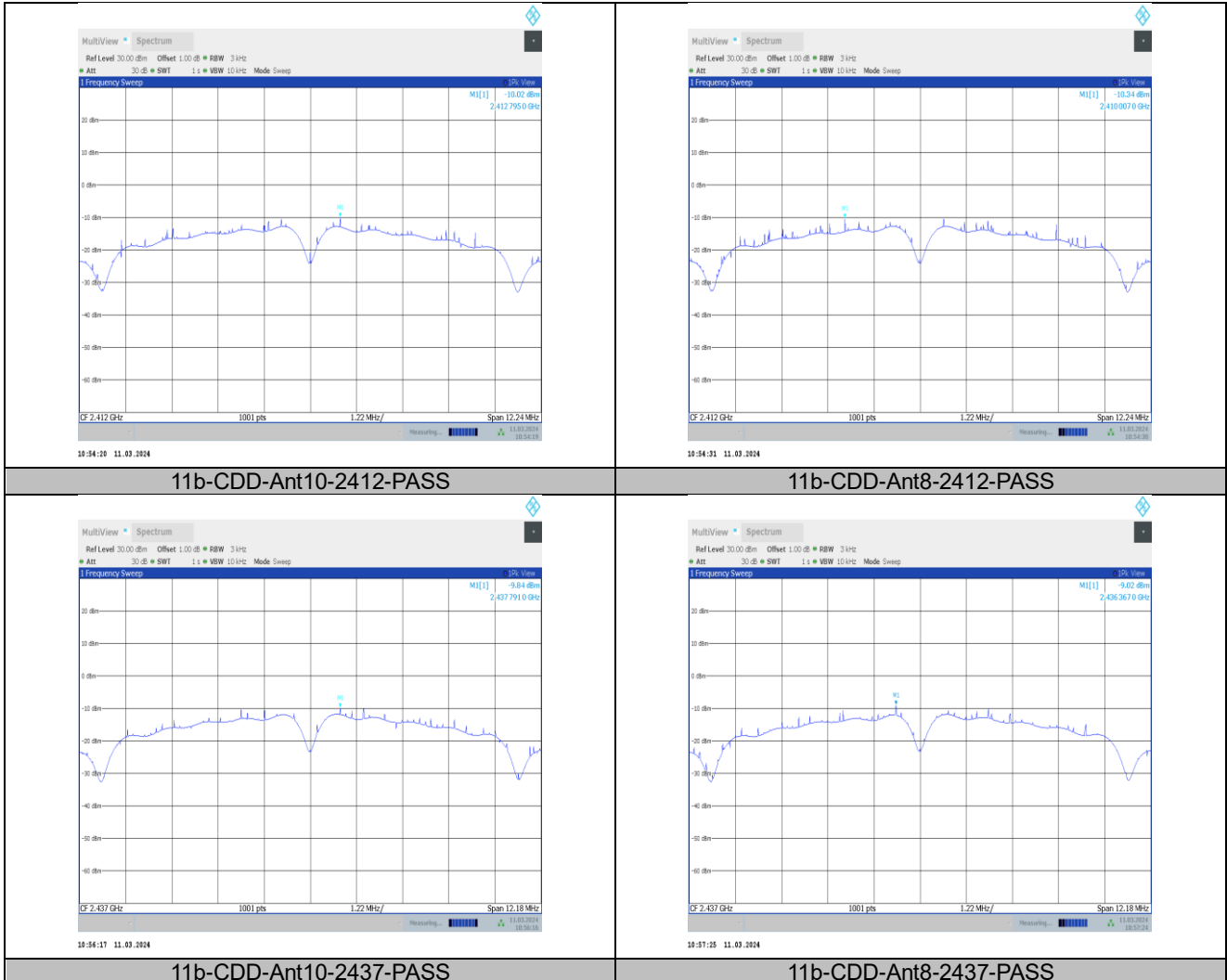


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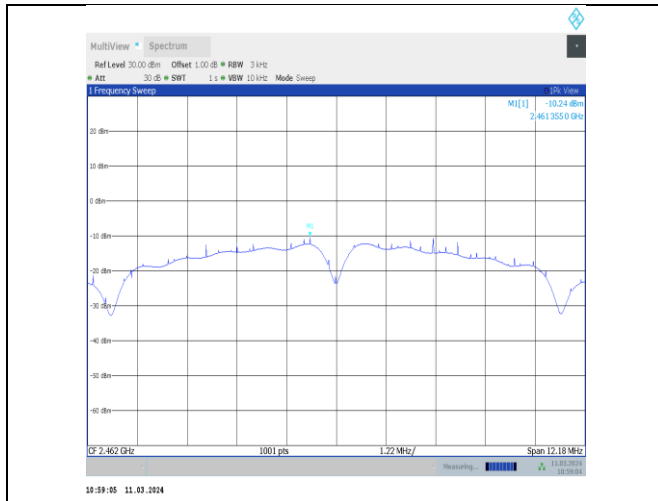
Test Graphs



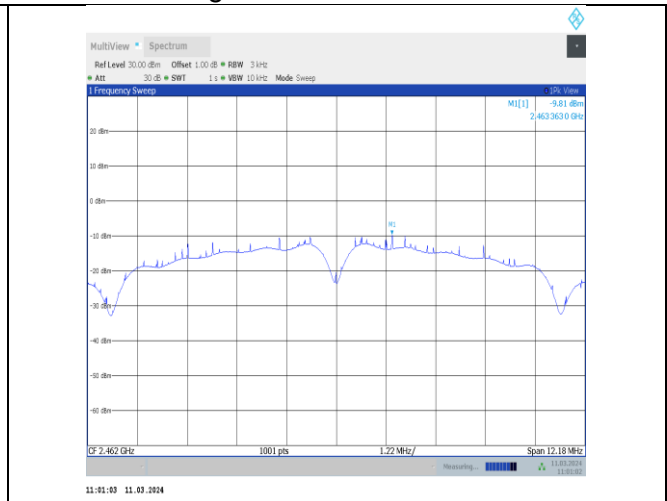
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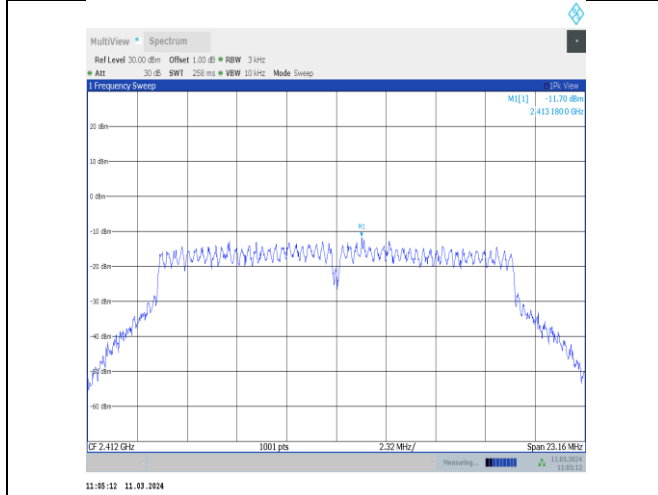
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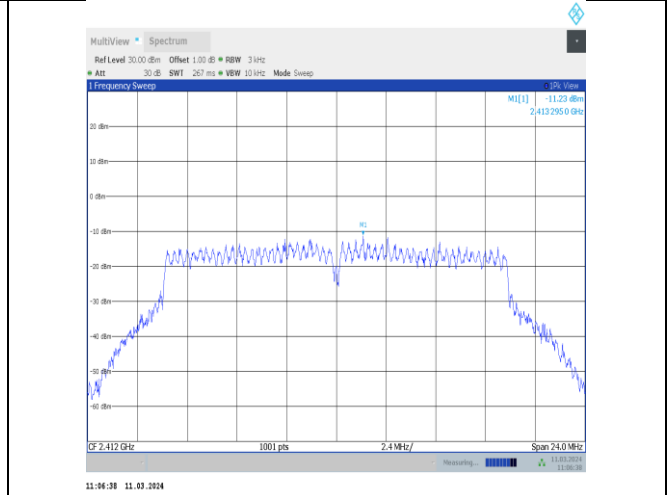
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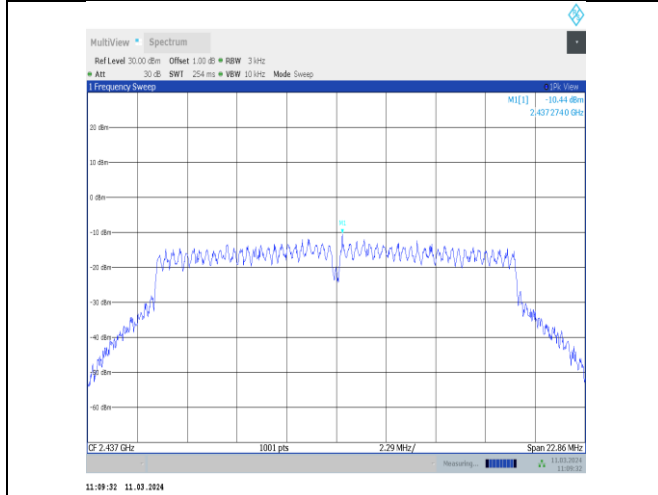
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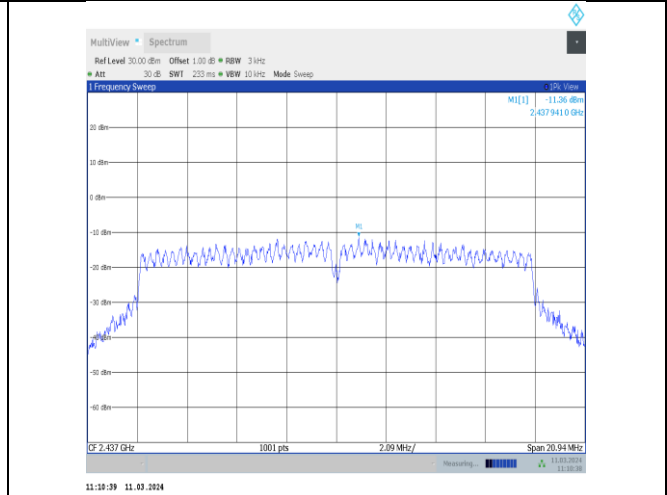
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11g-CDD-Ant8-2412-PASS



11g-CDD-Ant10-2437-PASS



11g-CDD-Ant8-2437-PASS

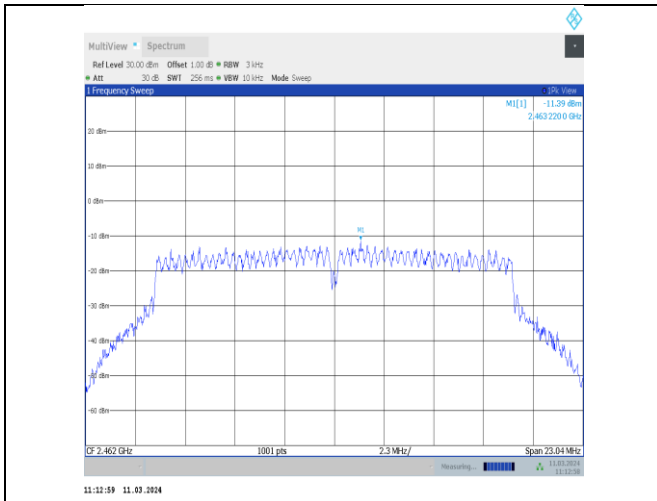


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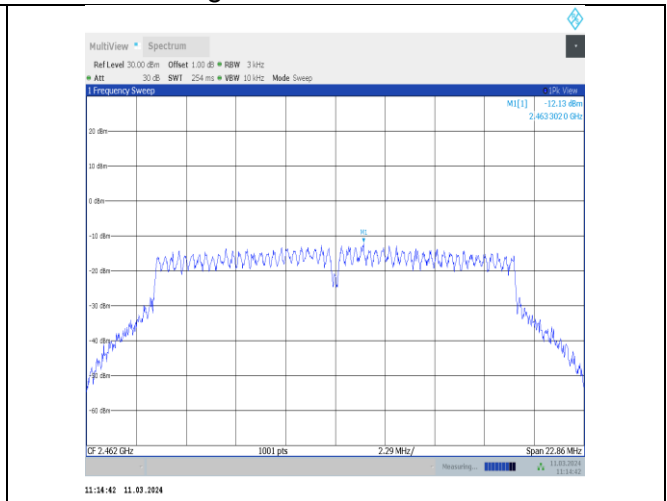
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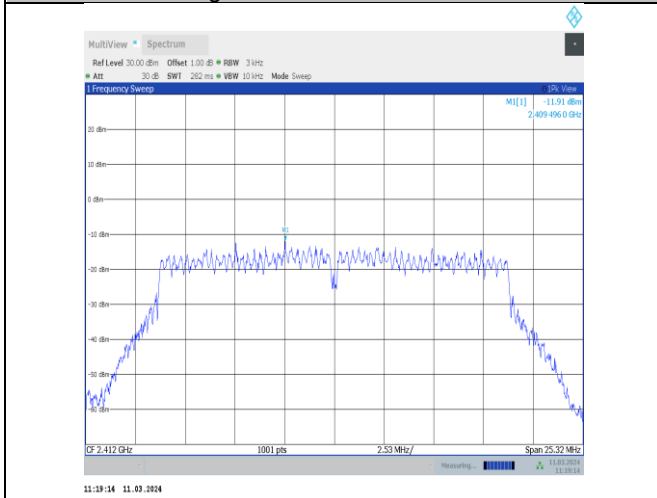
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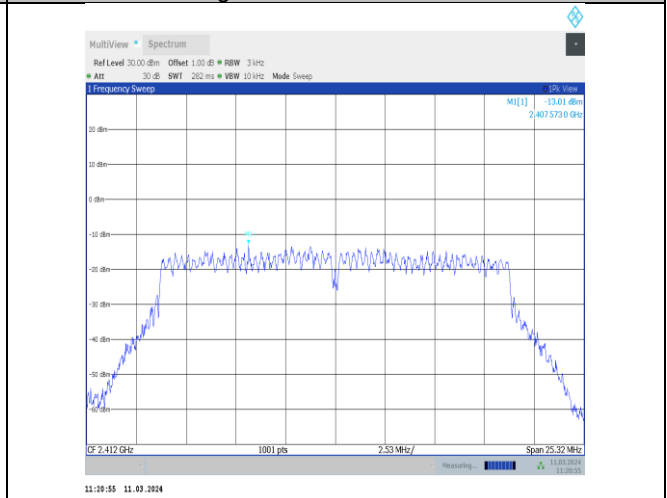
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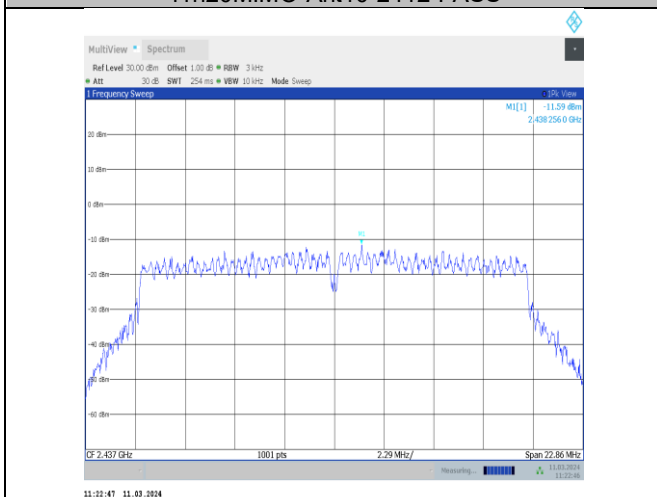
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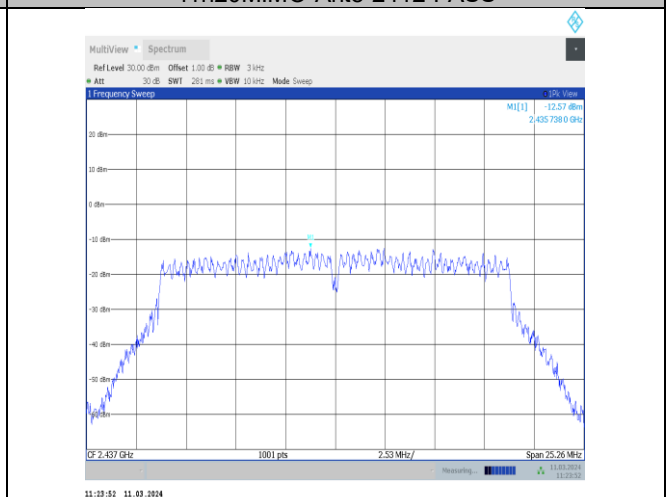
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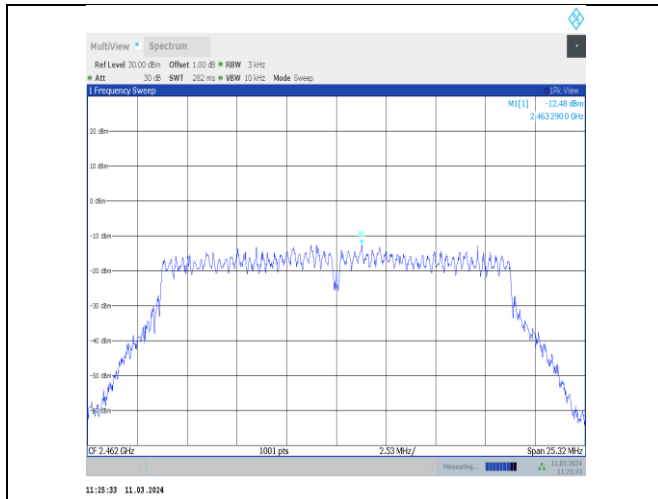


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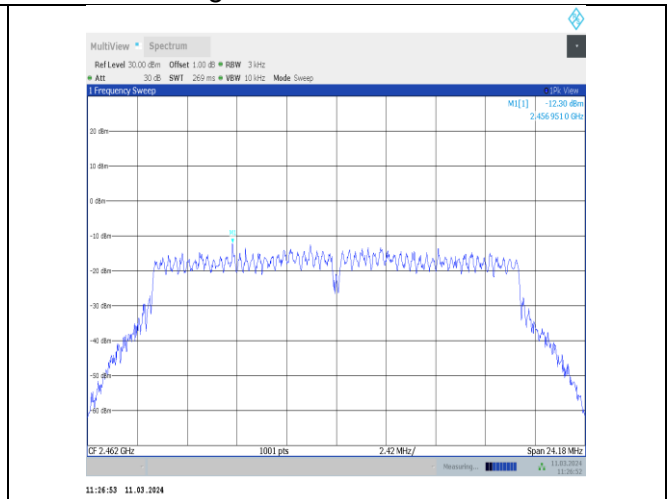
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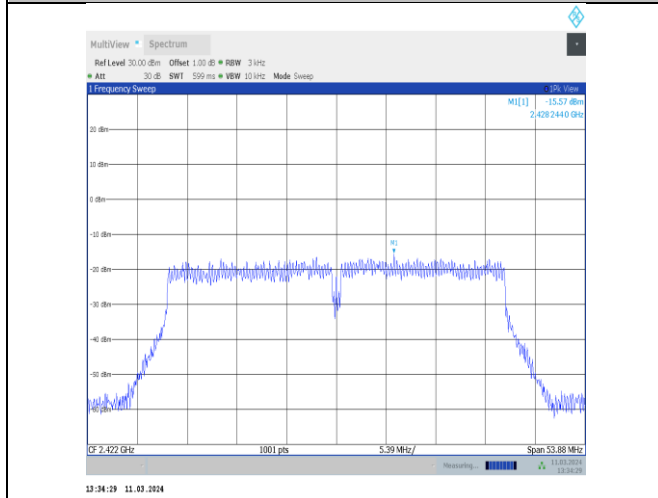
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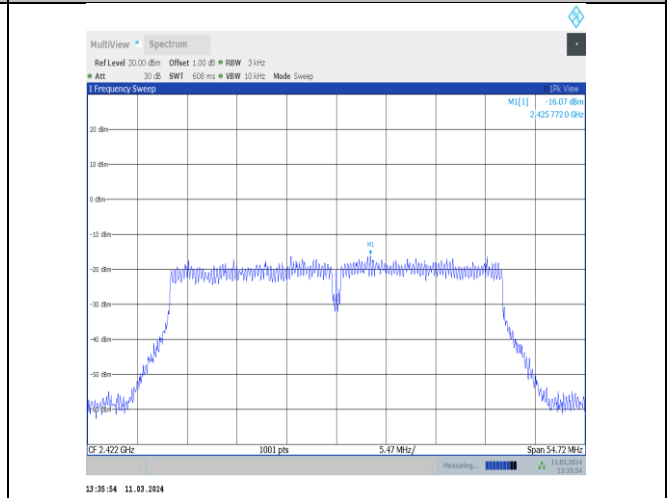
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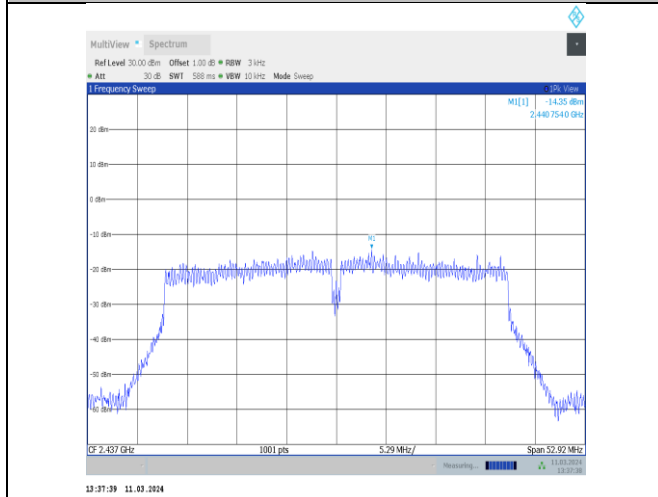
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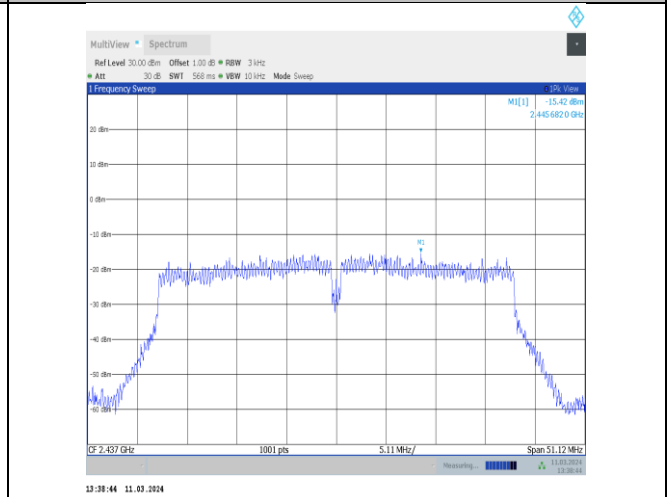
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11n40MIMO-Ant8-2422-PASS



11n40MIMO-Ant10-2437-PASS



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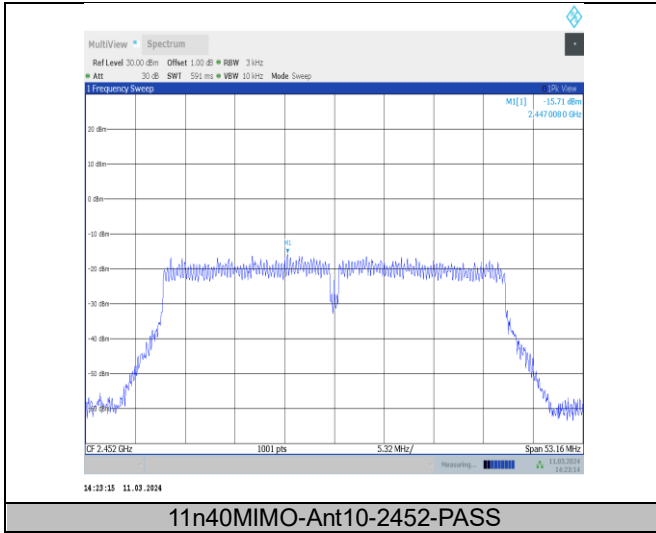


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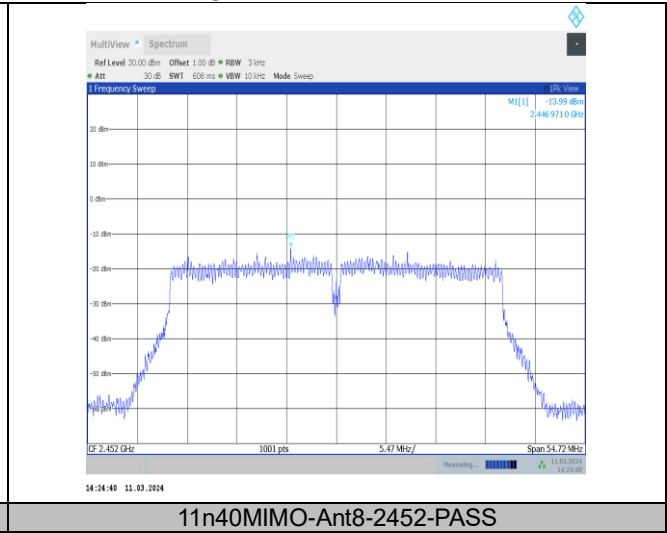
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11n40MIMO-Ant10-2452-PASS



11n40MIMO-Ant8-2452-PASS



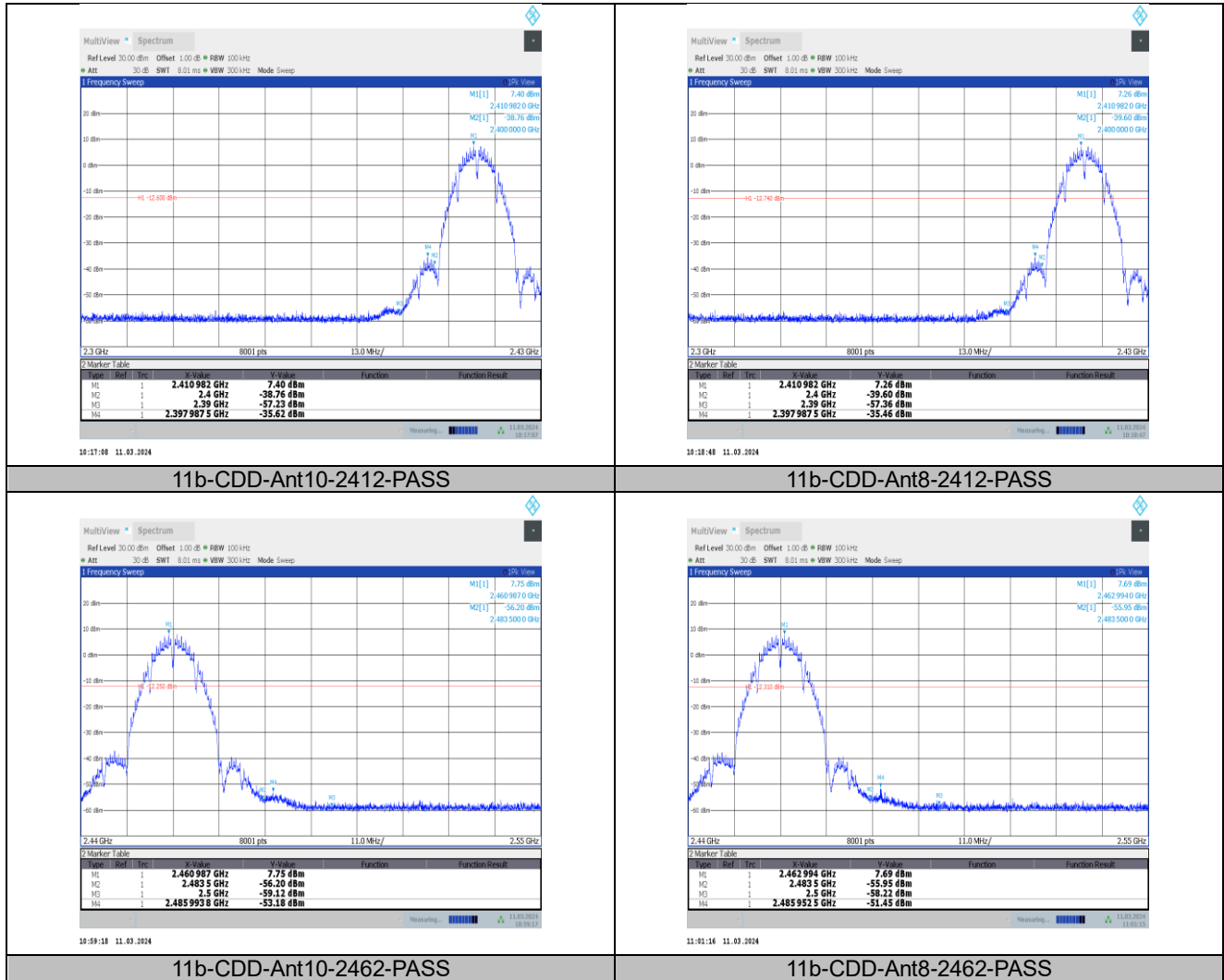
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Band edge measurements Test Graphs



11b-CDD-Ant10-2412-PASS

11b-CDD-Ant8-2412-PASS

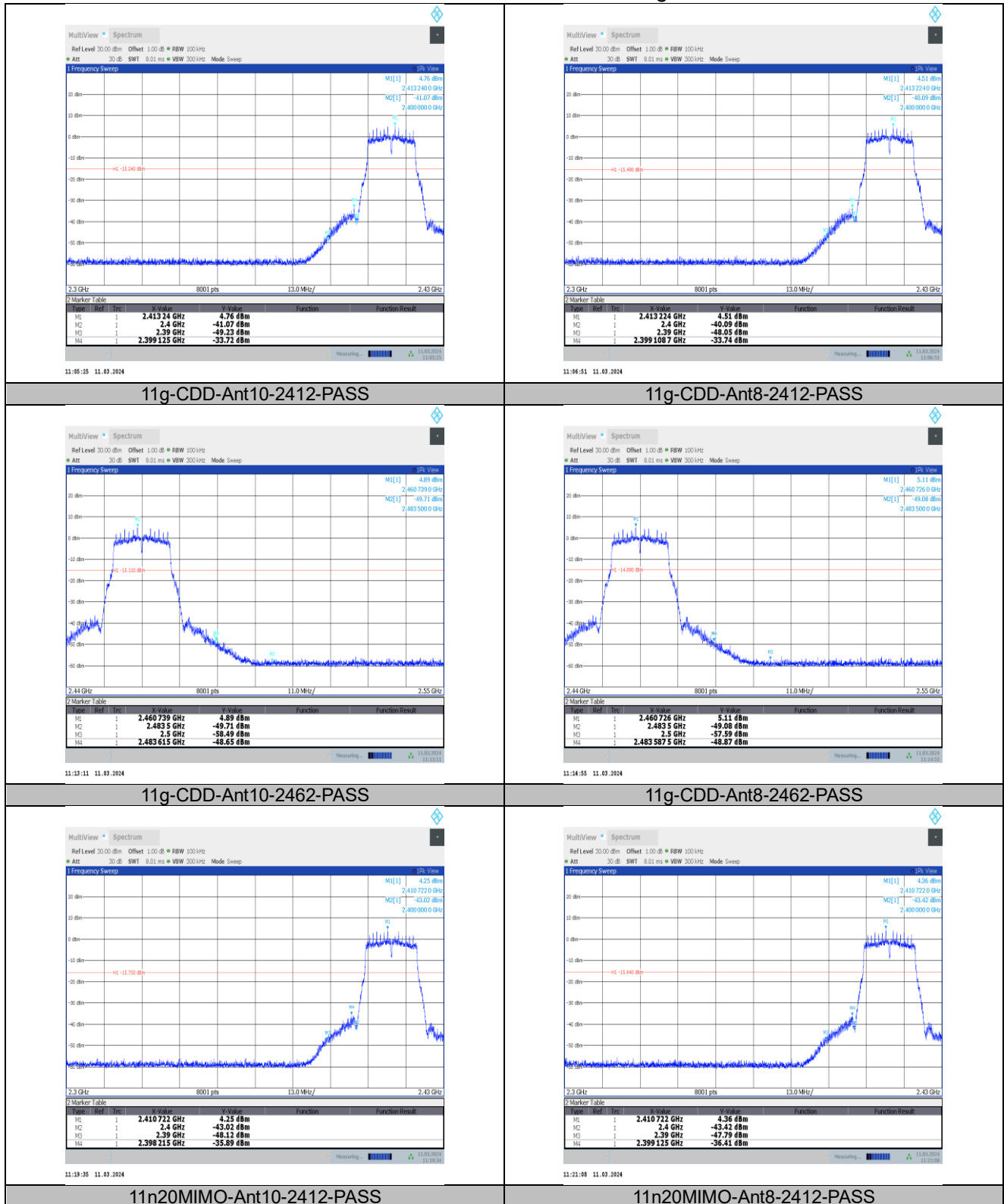
11b-CDD-Ant10-2462-PASS

11b-CDD-Ant8-2462-PASS



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