

Report No.: SEWM2307000261RG06

Rev.: 01

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# TEST REPORT

**Application No.:** SEWM2307000261RG  
**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.:** 2312DRA50G  
**Trade Mark:** Redmi  
**FCC ID:** 2AFZZRA50G  
**Standards:** FCC 47 CFR Part 2, Subpart J  
FCC 47 CFR Part 15, Subpart E  
**Date of Receipt:** 2023/07/31  
**Date of Test:** 2023/08/05 to 2023/08/22  
**Date of Issue:** 2023/08/25

<b>Test Result :</b>	<b>PASS *</b>
----------------------	---------------

\* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Well Wei

Well Wei  
Wireless Laboratory Manager

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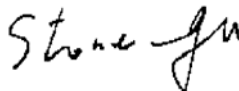
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## 1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023/08/25		Original

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



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## 2 Test Summary

Test Item	Band <sup>[1]</sup>	FCC rules No.	Test Requirements	Test Result	Result
Antenna Requirement	--	15.203/15.407(a)	--	Clause 4.1	PASS
26dB Emission Bandwidth	Band I	15.407(a)(1)	No limit.	Clause 4.5	For Report Purpose
	Band II-A	15.407(a)(2)			
	Band II-C	15.407(a)(2)			
6dB Emission Bandwidth	Band III	15.407(e)	≥ 500 kHz.	Clause 4.6	PASS
99% Occupied Bandwidth	Band I	KDB 789033 D02§ D	No limit.	Clause 4.7	For Report Purpose
	Band II-A				
	Band II-C				
	Band III				
Duty Cycle	Band I Band II-A Band II-C Band III	--	No limit.	Clause 4.3	For Report Purpose
Maximum Conducted Output Power	Band I	15.407(a)(iv)	< 250mW	Clause 4.4	PASS
	Band II-A	15.407(a)(2)	<MIN{250mW, 11dBm+10*lg(EBW)}		
	Band II-C	15.407(a)(3)	< 1W		
	Band III	15.407(a)(3)	< 1W		
Maximum Power Spectral Density	Band I	15.407(a)(iv)	<11dBm/MHz	Clause 4.8	PASS
	Band II-A	15.407(a)(2)	<11dBm/MHz		
	Band II-C	15.407(a)(2)	<11dBm/MHz		
	Band III	15.407(a)(3)	<30dBm/500KHz		
Radiated Spurious Emissions	Band I	15.407(b) 15.205/15.209	F<1GHz: §15.209 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.15-5.35 GHz). F≥1GHz & in-restricted: §15.209 limit (AV&PK).	Clause 4.9	PASS
	Band II-A	15.407(b) 15.205/15.209	F<1GHz: §15.209 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.25-5.35 GHz). F≥1GHz & in-restricted: §15.209 limit (AV&PK).		PASS
	Band II-C	15.407(b) 15.205/15.209	F<1GHz: §15.209 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.47-5.725 GHz). F≥1GHz & in-restricted: §15.209 limit (AV&PK).		PASS
	Band III	15.407(b) 15.205/15.209	F<1GHz: §15.209 limit (QP) F≥1GHz & out-restricted:(PK)		PASS



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			All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. F≥1GHz & in-restricted: §15.209 limit (AV&PK).		
Restricted bands around fundamental frequency	Band I Band II-A Band II-C Band III	15.407(b) 15.205/15.209	---	Clause 4.10	PASS
AC Power Line Conducted Emissions	Band I Band II-A Band II-C Band III	15.207	---	Clause 4.2	PASS
Dynamic Frequency Selection	Band II-A Band II-C	15.407	Channel Move Time:10 Seconds	Clause 4.11	PASS
Frequency Stability	Band I Band II-A Band II-C Band III	15.407(g)	Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual	N/A	N/A
Note 1: Band I: 5150-5250MHz Band II-A: 5250-5350MHz Band II-C: 5470-5725MHz Band III: 5725-5850MHz					



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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:

- **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.:	2312DRA50G	
Trade Mark:	Redmi	
Hardware Version:	P2	
Software Version:	MIUI 14	
Power Supply:	Lithium Battery (3.91V)	
IMEI:	RF Conducted	860949060049381
	RSE & AC power line	IMEI1: 860949060030241 IMEI2: 860949060030258
WLAN Mode Supported:	802.11a:	20 MHz channel bandwidth
	802.11n:	20 MHz / 40 MHz channel bandwidth
	802.11ac:	20 MHz / 40 MHz / 80 MHz channel bandwidth
Operation Frequency:	5150MHz to 5250MHz 5250MHz to 5350MHz 5470MHz to 5725MHz 5725MHz to 5850MHz	
Modulation Type:	802.11a:	OFDM (BPSK, QPSK, 16QAM, 64QAM)
	802.11n:	OFDM (BPSK, QPSK, 16QAM, 64QAM)
	802.11ac:	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Spacing:	20MHz:	802.11a/n(HT20)/ac(VHT20)
	40MHz:	802.11n(HT40)/ac(VHT40)
	80MHz:	802.11ac(VHT80)
Antenna Type:	IFA Antenna	
Antenna Gain:	5150MHz to 5250MHz: -2dBi (Ant11); -2.2dBi (Ant12); 5250MHz to 5350MHz: -1.4dBi (Ant11); -1.3dBi (Ant12); 5470MHz to 5725MHz: -1.5dBi (Ant11); -0.6dBi (Ant12); 5725MHz to 5850MHz: -1.6dBi (Ant11); -0.2dBi (Ant12);	
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.	
Smart System:	<input checked="" type="checkbox"/> SISO	802.11a/n/ac
	<input checked="" type="checkbox"/> MIMO	802.11n/ac: 2Tx & 2Rx
	<input checked="" type="checkbox"/> Diversity	802.11a: 2Tx & 2Rx
TPC Function:	<input checked="" type="checkbox"/> Support, <input type="checkbox"/> Not Support	
DFS Function:	<input type="checkbox"/> Master	
	<input type="checkbox"/> Slave with radar detection	<input checked="" type="checkbox"/> Slave without radar detection



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RF Cable:	2.0dB
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<b>Remark:</b> In FCC 15.31, for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table, and the selected channel to perform the test as below:		
Frequency range over which device operates	Number of Measurement Frequencies Required	Location of Measurement Frequency in Band of Operation
1 MHz or less	1	centre
1 MHz to 10 MHz	2	1 near high end, 1 near low end
Greater than 10 MHz	3	1 near high end, 1 near centre

For UNII Band I:		
Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5180
	The Middle channel	5200
	The Highest channel	5240
IEEE 802.11n/ac 40MHz	The Lowest channel	5190
	The Highest channel	5230
IEEE 802.11ac 80MHz	The Middle channel	5210

For UNII Band II-A:		
Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5260
	The Middle channel	5280
	The Highest channel	5320
IEEE 802.11n/ac 40MHz	The Lowest channel	5270
	The Highest channel	5310
IEEE 802.11ac 80MHz	The Middle channel	5290



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For UNII Band II-C:		
Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5500
	The Middle channel	5580
	The Highest channel	5700
IEEE 802.11n/ac 40MHz	The Lowest channel	5510
	The Middle channel	5550
	The Highest channel	5670
IEEE 802.11ac 80MHz	The Middle channel	5530

For UNII Band III:		
Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5745
	The Middle channel	5785
	The Highest channel	5825
IEEE 802.11n/ac 40MHz	The Lowest channel	5755
	The Highest channel	5795
IEEE 802.11ac 80MHz	The Middle channel	5775

Frequency Band	Channel	Freq.(MHz)	Channel	Freq.(MHz)
Straddle Channel	144 <sup>[1]</sup>	5720	142 <sup>[2]</sup>	5710
	138 <sup>[3]</sup>	5690		
TDWR Channel	120 <sup>[1]</sup>	5600	124 <sup>[1]</sup>	5620
	128 <sup>[1]</sup>	5640	118 <sup>[2]</sup>	5590
	126 <sup>[2]</sup>	5630	122 <sup>[3]</sup>	5610

Note:

1. The above Frequency and Channel were 802.11a, 802.11n HT20 and 802.11ac VHT20.
2. The above Frequency and Channel were 802.11n HT40 and 802.11ac VHT40.
3. The above Frequency and Channel were 802.11ac VHT80.



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### 3.5 Test Environment and Mode

Environment Parameter	101.0 kPa Selected Values During Tests	
Relative Humidity	44-46 % RH Ambient	
Value	Temperature(°C)	Voltage(Vdc)
NTNV	22~23	3.91
Remark: NV: Normal Voltage NT: Normal Temperature		

### 3.6 Description of Support Units

Test Equipment	Manufacturer	Model No.	Inventory No.
Router	TP-LINK	Archer BE800 (FCC ID 2AXJ4BE800)	SUWI-03-14-03

### 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
802.11a	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)
802.11ac (VHT 20)	MCS0 (6.5 Mbps)	MCS0 (13 Mbps)
802.11ac (VHT 40)	MCS0 (13.5 Mbps)	MCS0 (27 Mbps)
802.11ac (VHT 80)	MCS0 (29.3 Mbps)	MCS0 (58.5 Mbps)



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## 4 Test results and Measurement Data

### 4.1 Antenna Requirement

<b>Standard requirement:</b>	47 CFR Part 15 Section 15.203
<p>The antenna is IFA Antenna and no consideration of replacement.</p> <p>The best case gain of the antenna is</p> <p>5150MHz to 5250MHz: -2dBi (Ant11); -2.2dBi (Ant12);*</p> <p>5250MHz to 5350MHz: -1.4dBi (Ant11); -1.3dBi (Ant12);*</p> <p>5470MHz to 5725MHz: -1.5dBi (Ant11); -0.6dBi (Ant12);*</p> <p>5725MHz to 5850MHz: -1.6dBi (Ant11); -0.2dBi (Ant12);*</p> <p><i>*Note:</i></p> <p><i>The antenna gain are derived from the gain information report provided by the manufacturer.</i></p> <p><i>Remark:</i></p> <p><i>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,

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

- For power measurements on IEEE 802.11 devices:

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

For power, the directional gain may be calculated by using the formulas applicable to equal gain antennas with  $G_{ANT}$  set equal to the gain of the antenna having the highest gain.

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:

Operation Frequency	ANT Gain11 (dBi)	ANT Gain12 (dBi)	Directional gain For Power (dBi)	Directional gain For PSD (dBi)	Power Limit Reduction (dBm)	PSD Limit Reduction (dBm)
5150MHz to 5250MHz	-2	-2.2	-2	0.91	0	0
5250MHz to 5350MHz	-1.4	-1.3	-1.3	1.66	0	0
5470MHz to 5725MHz	-1.5	-0.6	-0.6	1.97	0	0
5725MHz to 5850MHz	-1.6	-0.2	-0.2	2.14	0	0

5150MHz to 5250MHz:

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

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

5250MHz to 5350MHz:

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

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

5470MHz to 5725MHz:

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

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

5725MHz to 5850MHz:

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 15 Section 15.207		
Test Method:	ANSI C63.10-2020 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:	<ol style="list-style-type: none"> <li>1) The mains terminal disturbance voltage test was conducted in a shielded room.</li> <li>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.</li> <li>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,</li> <li>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.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10-2020 on conducted measurement.</li> </ol>		



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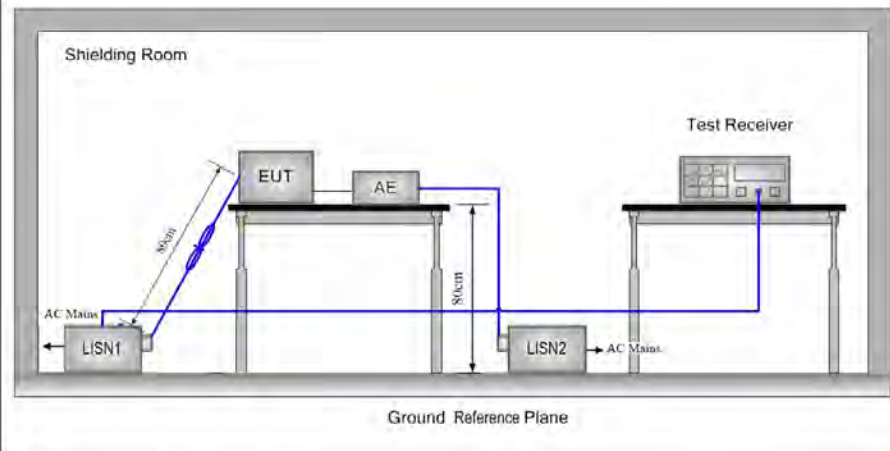
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Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel. Charge + Transmitting mode.
Final Test Mode:	Refer to section 3.7 for details. Only the worst case is recorded in the report.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



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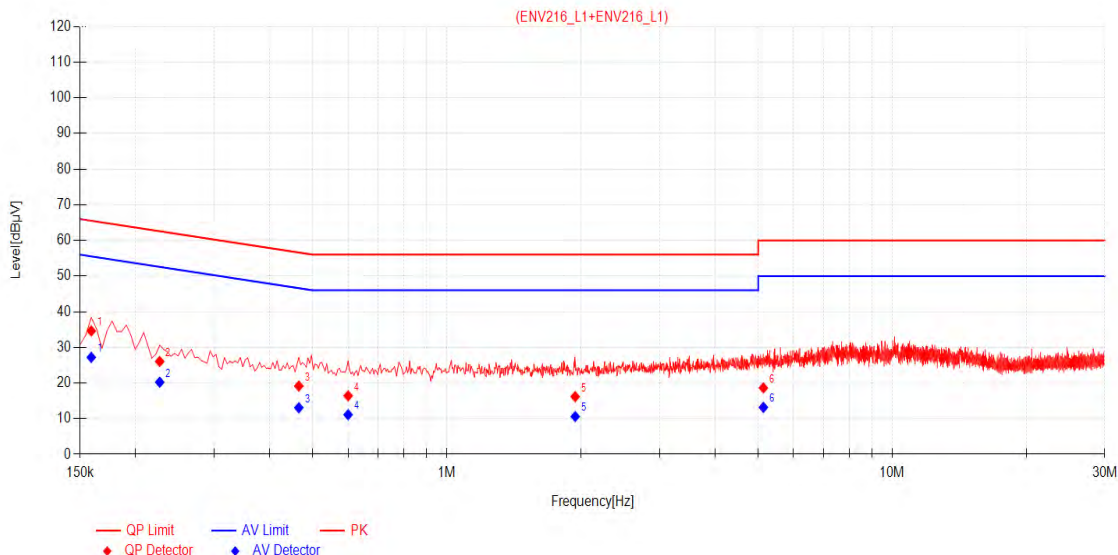
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### Measurement Data

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:	Line
--------	------



### 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	0.1590	11.82	22.78	34.60	65.52	30.92	15.38	27.20	55.52	28.32	PASS
2	0.2265	11.64	14.40	26.04	62.58	36.54	8.59	20.23	52.58	32.35	PASS
3	0.4650	11.60	7.55	19.15	56.60	37.45	1.45	13.05	46.60	33.55	PASS
4	0.6000	11.63	4.79	16.42	56.00	39.58	-0.52	11.11	46.00	34.89	PASS
5	1.9410	11.74	4.44	16.18	56.00	39.82	-1.14	10.60	46.00	35.40	PASS
6	5.1360	11.82	6.81	18.63	60.00	41.37	1.35	13.17	50.00	36.83	PASS

### Remark:

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



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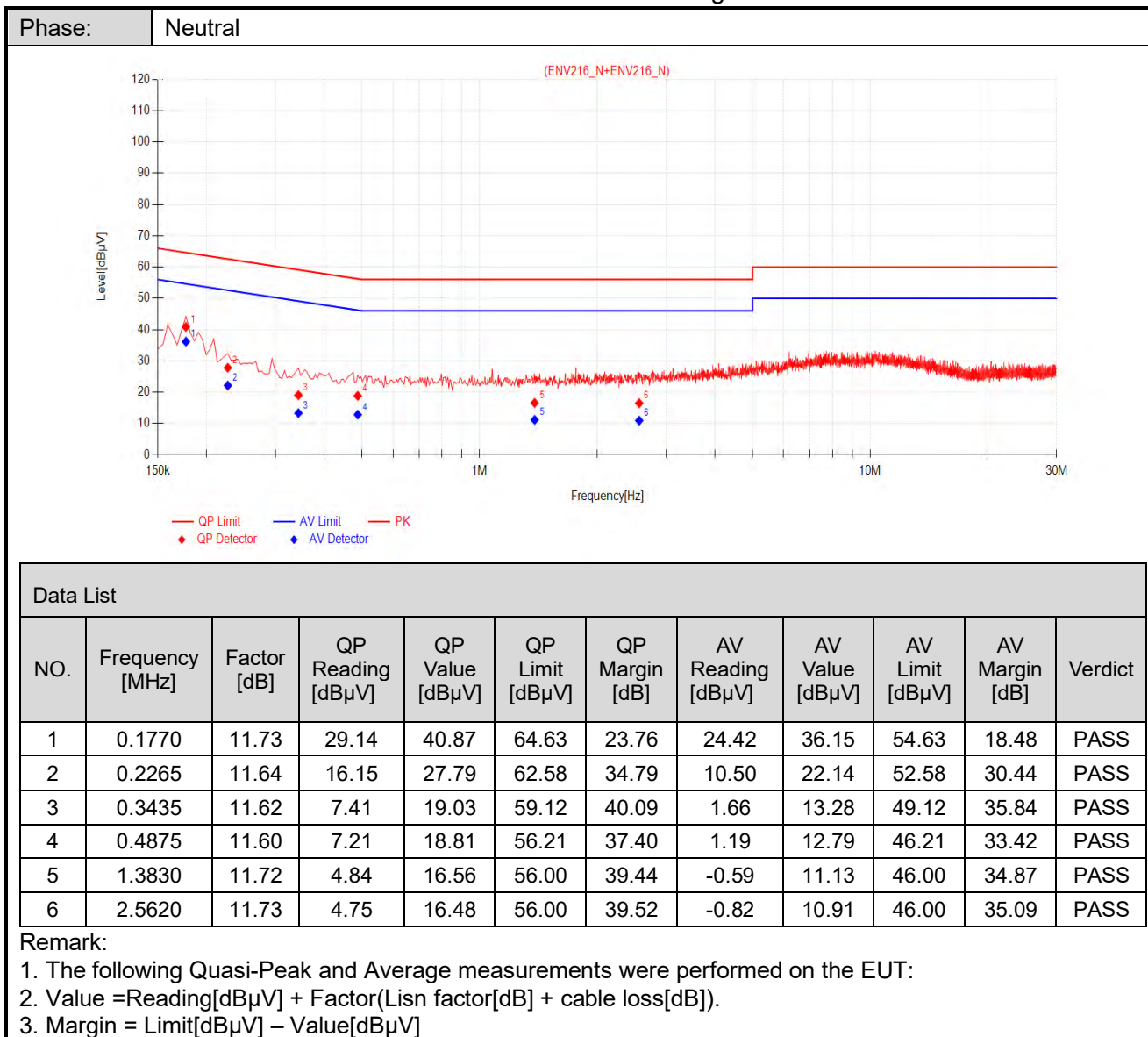
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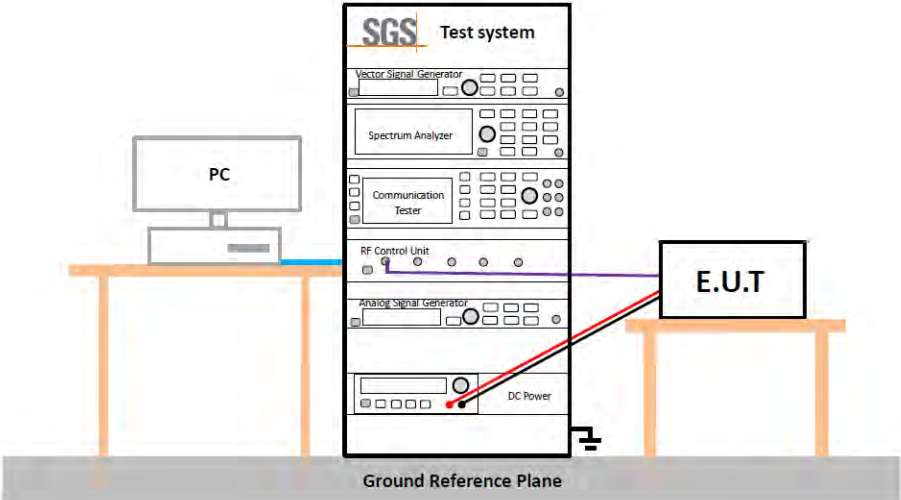
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### 4.3 Duty Cycle

Test Requirement:	ANSI C63.10-2020 Section 12.2
Test Method:	ANSI C63.10-2020 Section 12.2
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: <b>Appendix</b>	



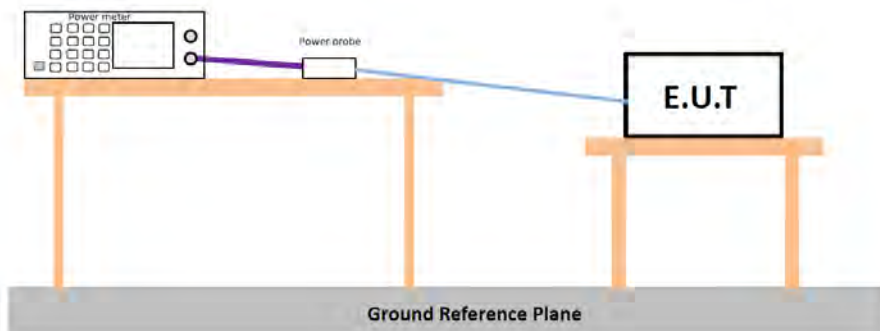
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### 4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15 Section 15.407(a)	
Test Method:	ANSI C63.10-2020 Section 12.4.3.2	
Test Setup:	<div></div> <p>* Test with power meter (Detector function: Average) Method PM-G is measurement using a gated RF average power meter. Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.</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:	Frequency Band	Limit
	5150-5250MHz	Not exceed 250mW(23.98dBm)
	5250-5350MHz	The lesser of 250mW(23.98dBm) or 11+ 10logB
	5470-5725MHz	The lesser of 250mW(23.98dBm) or 11+ 10logB
	5725-5850MHz	Not exceed 1W(30dBm)
	*Where B is the 26dB emission bandwidth in MHz	
Test Results:	Pass	
The detailed test data see: <b>Appendix</b>		



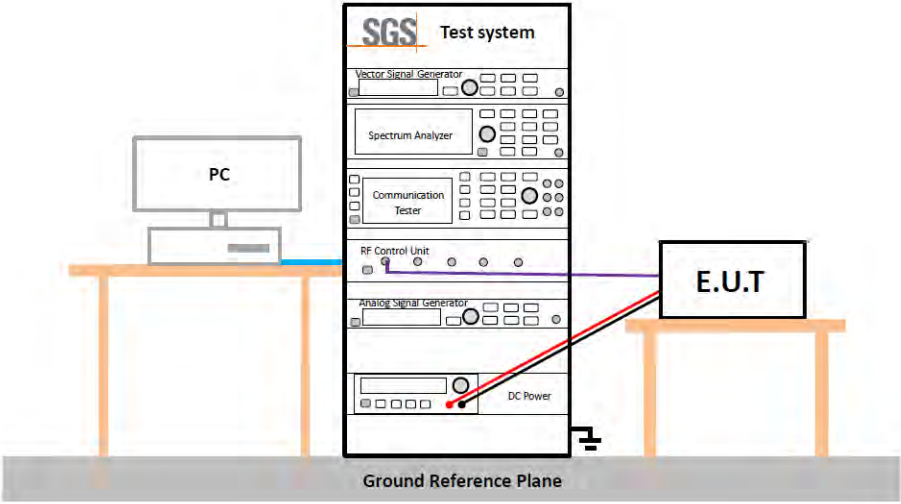
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## 4.5 26dB Emission Bandwidth

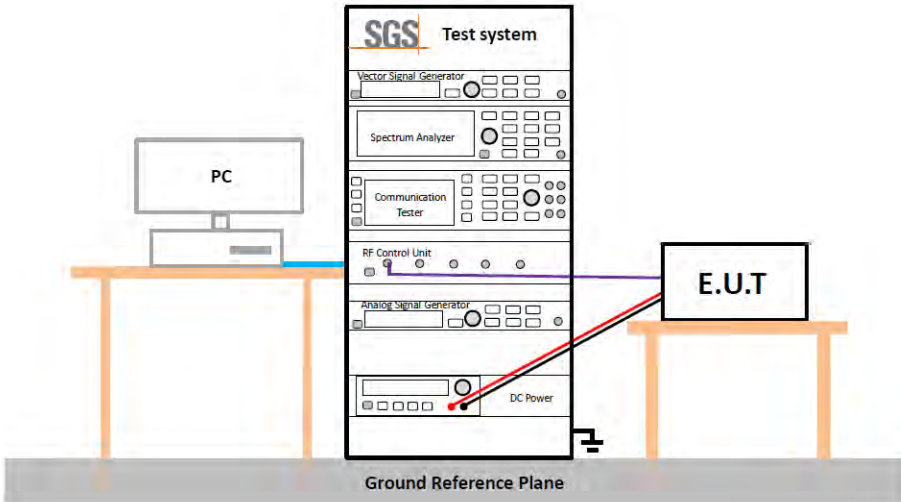
Test Requirement:	47 CFR Part 15 Section 15.407(a), KDB 789033 D02& C
Test Method:	ANSI C63.10-2020 Section 12.5.2
Test Setup:	
Instruments Used:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	No restriction limits
Test Results:	For Report Purpose
The detailed test data see: <b>Appendix</b>	

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### 4.6 6dB Emission Bandwidth

Test Requirement:	47 CFR Part 15 Section 15.407(e)	
Test Method:	ANSI C63.10-2020 Section 12.5.1	
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:	Frequency Band	Limit
	5725-5850MHz	At lease 500kHz
Test Results:	Pass	
The detailed test data see: <b>Appendix</b>		



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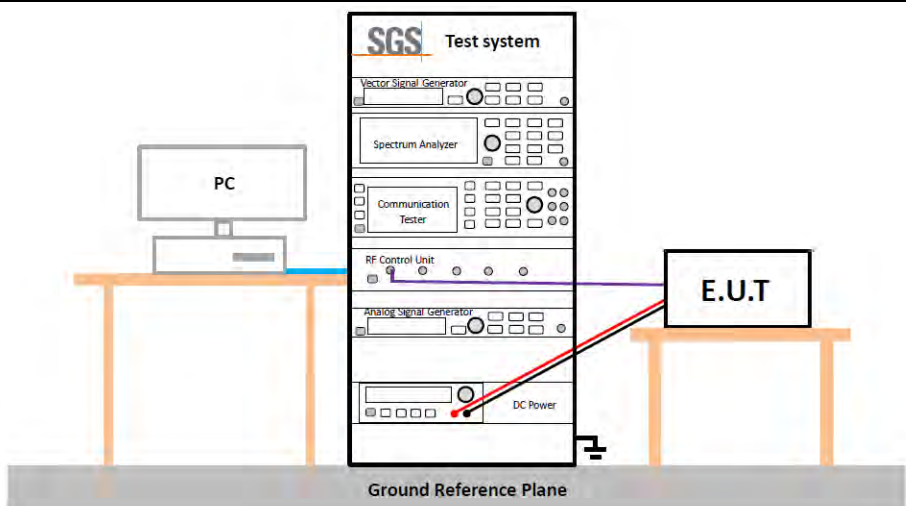
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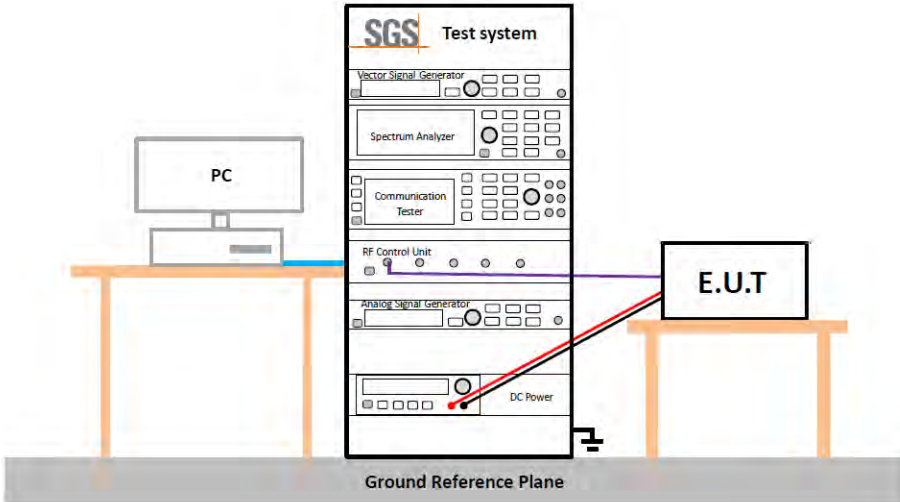
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## 4.7 99% Occupied Bandwidth

Test Requirement:	KDB 789033 D02§ D
Test Method:	ANSI C63.10-2020 Section 12.5.3
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:	No restriction limits
Test Results:	For Report Purpose
The detailed test data see: <b>Appendix</b>	

## 4.8 Power Spectral Density

Test Requirement:	47 CFR Part 15 Section 15.407(a)	
Test Method:	ANSI C63.10-2020 Section 12.6 KDB 789033 D02 v02r01, Section F.	
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:	Frequency Band	Limit
	5150-5250MHz	The power spectral density less than 11dBm/1MHz
	5250-5350MHz	The power spectral density less than 11dBm/1MHz
	5470-5725MHz	The power spectral density less than 11dBm/1MHz
	5725-5850MHz	The power spectral density less than <30dBm/500KHz
Test Results:	Pass	
The detailed test data see: <b>Appendix</b>		

### 4.9 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15 Section 15.205/15.209/15.407(b)
Test Method:	ANSI C63.10-2020 Section 6.4 / 6.5 / 6.6
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)
Test frequency:	9kHz ~ 40GHz(or 10 Harmonic)

#### Test Setup:

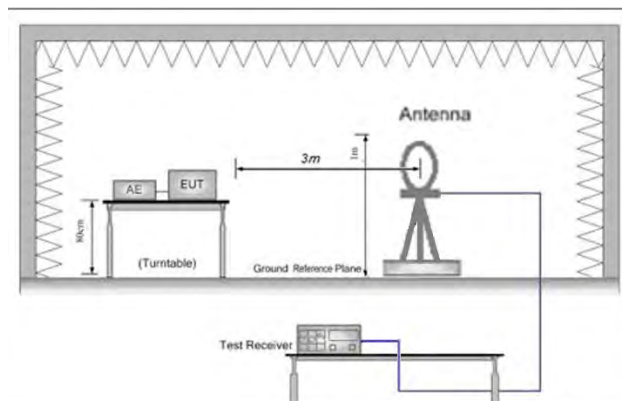


Figure 1. 9kHz to 30MHz

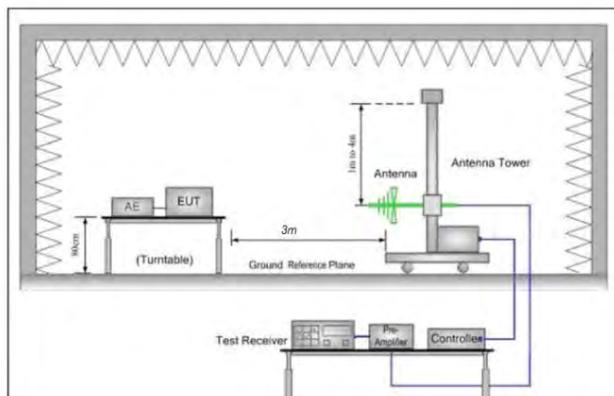


Figure 1. 30MHz to 1GHz

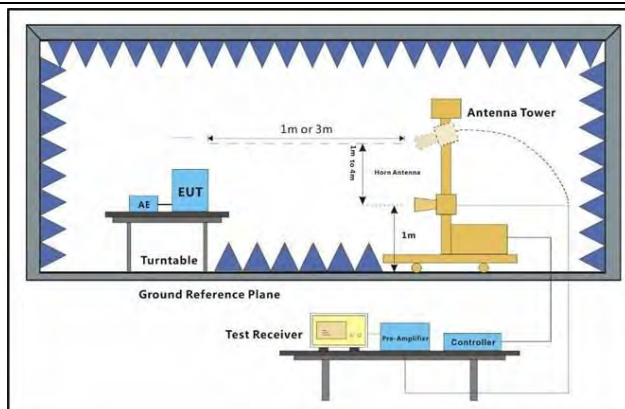


Figure 2. Above 1 GHz

#### Test Procedure:

- For below 1GHz test, 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 test, 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).
- 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.



	<p>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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <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 outermost channels.</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 <math>20 \cdot \text{LOG}(3/1) = 9.54 \text{ dB}</math>.</p>
Test Configuration:	<p>Measurements below 30MHz</p> <ul style="list-style-type: none"> <li>• RBW = 10 kHz</li> <li>• VBW = 30 kHz</li> <li>• Detector = Peak &amp; Average &amp; Quasi-peak</li> <li>• Trace mode = max hold</li> </ul> <p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 120 kHz</li> <li>• VBW = 300 kHz</li> <li>• Detector = Quasi-peak</li> <li>• Trace mode = max hold</li> </ul> <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW <math>\geq 3 \text{ MHz}</math></li> <li>• Detector = Peak</li> <li>• Sweep time = auto</li> <li>• Trace mode = max hold</li> </ul> <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW = 10Hz, when duty cycle is no less than 98 percent.</li> <li>• VBW <math>\geq 1/T</math>, 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.</li> </ul>
Exploratory Test Mode:	<p>Transmitting with all kind of modulations, data rates.</p> <p>Charge + Transmitting mode.</p>
Final Test Mode:	<p>Refer to section 3.7 for details.</p> <p>For below 1GHz part, through pre-scan all channels, but only the worst case is recorded in the report.</p>
Instruments Used:	<p>Refer to section 6 for details.</p>







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Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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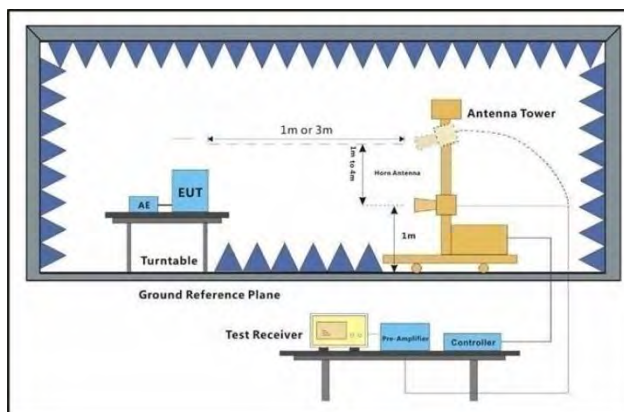
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### 4.10 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15 Section 15.205/15.209/15.407(b)		
Test Method:	ANSI C63.10-2020 Section 12.7		
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:



#### Test Procedure:

- 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 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 outermost channels.
- The radiation measurements are performed in X, Y, Z axis positioning for

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	Transmitting mode, And found the X axis positioning which it is worse case. i. Repeat above procedures until all frequencies measured was complete.
Test Configuration:	<p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 120 kHz</li> <li>• VBW = 300 kHz</li> <li>• Detector = Quasi-peak</li> <li>• Trace mode = max hold</li> </ul> <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW <math>\geq</math> 3 MHz</li> <li>• Detector = Peak</li> <li>• Sweep time = auto</li> <li>• Trace mode = max hold</li> </ul> <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW = 10Hz, when duty cycle is no less than 98 percent.</li> <li>• VBW <math>\geq</math> 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.</li> </ul>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.
Final Test Mode:	Refer to section 3.7 for details.
Instruments Used:	Refer to section 6 for details.
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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## 4.11 Dynamic Frequency Selection

### 4.11.1 DFS Overview

**Table 1: Applicability of DFS Requirements Prior to Use of a Channel**

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
<i>Non-Occupancy Period</i>	Yes	Not required	Yes
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Availability Check Time</i>	Yes	Not required	Not required
<i>U-NII Detection Bandwidth</i>	Yes	Not required	Yes

**Table 2: Applicability of DFS requirements during normal operation**

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>DFS Detection Threshold</i>	Yes	Not required
<i>Channel Closing Transmission Time</i>	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes
<i>U-NII Detection Bandwidth</i>	Yes	Not required
<b>Additional requirements for devices with multiple bandwidth modes</b>	<b>Master Device or Client with Radar Detection</b>	<b>Client Without Radar Detection</b>
<i>U-NII Detection Bandwidth and Statistical Performance Check</i>	All BW modes must be tested	Not required
<i>Channel Move Time and Channel Closing Transmission Time</i>	Test using widest BW mode available	Test using the widest BW mode available for the link
<i>All other tests</i>	Any single BW mode	Not required
<b>Note:</b> Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		



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#### 4.11.2 DFS Detection Thresholds

**Table 3: DFS Detection Thresholds for Master Devices  
and Client Devices with Radar Detection**

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP $\geq$ 200 milliwatt	-64 dBm
EIRP $<$ 200 milliwatt and power spectral density $<$ 10 dBm/MHz	-62 dBm
EIRP $<$ 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
<p><b>Note 1:</b> This is the level at the input of the receiver assuming a 0 dBi receive antenna.</p> <p><b>Note 2:</b> Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.</p> <p><b>Note3:</b> EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.</p>	



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### 4.11.3 RADAR TEST WAVEFORMS

**Table 5 – Short Pulse Radar Test Waveforms**

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup $\left\{ \left( \frac{1}{360} \right) \cdot \left( \frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
<b>Note 1:</b> Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					



**Table 5a - Pulse Repetition Intervals Values for Test A**

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

The aggregate is the average of the percentage of successful detections of Short Pulse Radar Types 1-4. For example, the following table indicates how to compute the aggregate of percentage of successful detections.

Radar Type	Number of Trials	Number of Successful Detections	Minimum Percentage of Successful Detection
1	35	29	82.9%
2	30	18	60%
3	30	27	90%
4	50	44	88%
Aggregate $(82.9\% + 60\% + 90\% + 88\%) / 4 = 80.2\%$			



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**Table 6 – Long Pulse Radar Test Waveform**

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

**Table 7 – Frequency Hopping Radar Test Waveform**

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

#### 4.11.4 Response Requirements

**Table 4: DFS Response Requirement Values**

Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

**Note 1:** *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

**Note 2:** The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

**Note 3:** During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

The detailed test data see: **Appendix**





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

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

**Remark:**

The  $U_{\text{lab}}$  (lab Uncertainty) is less than  $U_{\text{CISPR/ETSI}}$  (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 Test Equipment					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (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
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
Wideband Radio Communication Tester	ROHDE&SCHWARZ	CMW500	SUWI-01-16-05	2023/02/06	2024/02/05
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2023/02/06	2024/02/05
Power meter	Anritsu	ML2495A	SUWI-01-31-01	2022/11/23	2023/11/22
Pulse power sensor	Anritsu	MA2411B	SUWI-01-32-01	2022/11/23	2023/11/22
MXG Vector signal genitor	KEYSIGHT	N5182B	SUWI-01-38-01	2023/02/06	2024/02/05
Signal Generator	ROHDE&SCHWARZ	SMM100A	SN:101716	2023/02/22	2024/02/21

Conduction Test Equipment					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (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
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2023/02/07	2024/02/06
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-03	2023/02/08	2024/02/07
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-04	2023/02/08	2024/02/07
Measurement Software	Tonscend	JS32-CE V4.0.0.2	SUWI-02-09-05	NCR	NCR



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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
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2023/05/11	2024/05/10
Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-06	2022/11/23	2023/11/22
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2023/02/08	2024/02/07
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9168	SUWI-01-11-04	2021/12/05	2023/12/04
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-05	2021/12/05	2023/12/04
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	2022/11/23	2023/11/22
Amplifier	Tonscend	TAP01018050	SUWI-01-14-04	2022/11/23	2023/11/22
Amplifier	Tonscend	TAP30M7G30	SUWI-01-14-05	2022/11/23	2023/11/22
Measurement Software	Tonscend	JS32-RE V4.0.0.0	SUWI-02-09-04	NCR	NCR



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## 7 Photographs - Setup Photos

Refer to Appendix A.2 WLAN Setup Photos.



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# Appendix



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## Emission Bandwidth Test Result

TestMode	Antenna	Frequency[MHz]	26dB EBW [MHz]	FL[MHz]	FH[MHz]	Verdict
11a-CDD	Ant11	5180	23.80	5168.84	5192.64	For Report Purpose
11a-CDD	Ant12	5180	21.24	5169.28	5190.52	
11a-CDD	Ant11	5220	21.92	5208.88	5230.80	
11a-CDD	Ant12	5220	21.44	5209.24	5230.68	
11a-CDD	Ant11	5240	21.80	5228.92	5250.72	
11a-CDD	Ant12	5240	24.80	5225.60	5250.40	
11a-CDD	Ant11	5260	21.68	5249.08	5270.76	
11a-CDD	Ant12	5260	25.32	5245.12	5270.44	
11a-CDD	Ant11	5300	21.32	5289.36	5310.68	
11a-CDD	Ant12	5300	20.92	5289.48	5310.40	
11a-CDD	Ant11	5320	21.24	5309.32	5330.56	
11a-CDD	Ant12	5320	21.20	5309.24	5330.44	
11a-CDD	Ant11	5500	22.20	5488.92	5511.12	
11a-CDD	Ant12	5500	21.40	5489.16	5510.56	
11a-CDD	Ant11	5580	23.20	5568.68	5591.88	
11a-CDD	Ant12	5580	21.16	5569.40	5590.56	
11a-CDD	Ant11	5700	22.32	5688.76	5711.08	
11a-CDD	Ant12	5700	20.80	5689.76	5710.56	
11a-CDD	Ant11	5720	21.20	5709.52	5730.72	
11a-CDD	Ant12	5720	20.92	5709.60	5730.52	
11a-CDD	Ant11	5720 UNII-2C	15.48	5709.52	5725	
11a-CDD	Ant12	5720 UNII-2C	15.4	5709.60	5725	
11a-CDD	Ant11	5720 UNII-3	5.72	5725	5730.72	
11a-CDD	Ant12	5720 UNII-3	5.52	5725	5730.52	
11a-CDD	Ant11	5745	21.32	5734.44	5755.76	
11a-CDD	Ant12	5745	21.72	5733.76	5755.48	
11a-CDD	Ant11	5785	21.72	5774.08	5795.80	
11a-CDD	Ant12	5785	21.00	5774.48	5795.48	
11a-CDD	Ant11	5825	21.72	5814.08	5835.80	
11a-CDD	Ant12	5825	21.20	5814.28	5835.48	
11ac20MIMO	Ant11	5180	22.84	5168.44	5191.28	
11ac20MIMO	Ant12	5180	22.28	5168.92	5191.20	
11ac20MIMO	Ant11	5220	23.28	5208.40	5231.68	
11ac20MIMO	Ant12	5220	22.40	5208.80	5231.20	
11ac20MIMO	Ant11	5240	23.52	5228.60	5252.12	
11ac20MIMO	Ant12	5240	22.12	5228.80	5250.92	
11ac20MIMO	Ant11	5260	23.24	5248.48	5271.72	
11ac20MIMO	Ant12	5260	22.44	5248.80	5271.24	
11ac20MIMO	Ant11	5300	22.92	5288.00	5310.92	
11ac20MIMO	Ant12	5300	23.04	5288.24	5311.28	
11ac20MIMO	Ant11	5320	23.32	5308.44	5331.76	
11ac20MIMO	Ant12	5320	29.20	5302.84	5332.04	
11ac20MIMO	Ant11	5500	23.48	5488.28	5511.76	
11ac20MIMO	Ant12	5500	23.56	5488.24	5511.80	
11ac20MIMO	Ant11	5580	22.68	5568.72	5591.40	
11ac20MIMO	Ant12	5580	22.88	5568.44	5591.32	
11ac20MIMO	Ant11	5700	22.56	5688.80	5711.36	
11ac20MIMO	Ant12	5700	22.24	5688.84	5711.08	
11ac20MIMO	Ant11	5720	22.36	5708.88	5731.24	
11ac20MIMO	Ant12	5720	22.28	5709.04	5731.32	



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11ac20MIMO	Ant11	5720 UNII-2C	16.12	5708.88	5725
11ac20MIMO	Ant12	5720 UNII-2C	15.96	5709.04	5725
11ac20MIMO	Ant11	5720 UNII-3	6.24	5725	5731.24
11ac20MIMO	Ant12	5720 UNII-3	6.32	5725	5731.32
11ac20MIMO	Ant11	5745	22.52	5733.80	5756.32
11ac20MIMO	Ant12	5745	22.44	5733.56	5756.00
11ac20MIMO	Ant11	5785	22.36	5773.68	5796.04
11ac20MIMO	Ant12	5785	22.48	5773.72	5796.20
11ac20MIMO	Ant11	5825	22.16	5813.64	5835.80
11ac20MIMO	Ant12	5825	22.20	5813.88	5836.08
11ac40MIMO	Ant11	5190	40.48	5169.84	5210.32
11ac40MIMO	Ant12	5190	40.40	5169.84	5210.24
11ac40MIMO	Ant11	5230	40.64	5209.76	5250.40
11ac40MIMO	Ant12	5230	40.40	5209.84	5250.24
11ac40MIMO	Ant11	5270	40.96	5249.44	5290.40
11ac40MIMO	Ant12	5270	45.60	5245.28	5290.88
11ac40MIMO	Ant11	5310	40.24	5289.84	5330.08
11ac40MIMO	Ant12	5310	41.04	5289.52	5330.56
11ac40MIMO	Ant11	5510	40.56	5489.76	5530.32
11ac40MIMO	Ant12	5510	40.16	5489.76	5529.92
11ac40MIMO	Ant11	5550	41.04	5529.68	5570.72
11ac40MIMO	Ant12	5550	40.96	5529.76	5570.72
11ac40MIMO	Ant11	5670	40.88	5649.68	5690.56
11ac40MIMO	Ant12	5670	40.80	5649.52	5690.32
11ac40MIMO	Ant11	5710	40.32	5689.68	5730.00
11ac40MIMO	Ant12	5710	40.40	5690.00	5730.40
11ac40MIMO	Ant11	5710 UNII-2C	35.32	5689.68	5725
11ac40MIMO	Ant12	5710 UNII-2C	35	5690.00	5725
11ac40MIMO	Ant11	5710 UNII-3	5	5725	5730.00
11ac40MIMO	Ant12	5710 UNII-3	5.4	5725	5730.40
11ac40MIMO	Ant11	5755	40.64	5734.92	5775.56
11ac40MIMO	Ant12	5755	40.24	5734.84	5775.08
11ac40MIMO	Ant11	5795	41.12	5774.04	5815.16
11ac40MIMO	Ant12	5795	40.16	5775.00	5815.16
11ac80MIMO	Ant11	5210	82.72	5168.88	5251.60
11ac80MIMO	Ant12	5210	83.04	5168.88	5251.92
11ac80MIMO	Ant11	5290	82.72	5248.88	5331.60
11ac80MIMO	Ant12	5290	83.36	5248.88	5332.24
11ac80MIMO	Ant11	5530	83.20	5488.72	5571.92
11ac80MIMO	Ant12	5530	82.88	5488.88	5571.76
11ac80MIMO	Ant11	5610	83.52	5568.40	5651.92
11ac80MIMO	Ant12	5610	82.56	5568.72	5651.28
11ac80MIMO	Ant11	5690	82.08	5649.04	5731.12
11ac80MIMO	Ant12	5690	83.04	5648.72	5731.76
11ac80MIMO	Ant11	5690 UNII-2C	75.96	5649.04	5725
11ac80MIMO	Ant12	5690 UNII-2C	76.28	5648.72	5725
11ac80MIMO	Ant11	5690 UNII-3	6.12	5725	5731.12
11ac80MIMO	Ant12	5690 UNII-3	6.76	5725	5731.76
11ac80MIMO	Ant11	5775	82.40	5733.72	5816.12
11ac80MIMO	Ant12	5775	82.56	5733.72	5816.28

Remark:

For 802.11n HT20/ac VHT20 and 802.11n HT40/ac VHT40 mode, the whole testing have assessed only, 802.11ac VHT20/40 by referring to their higher output power.



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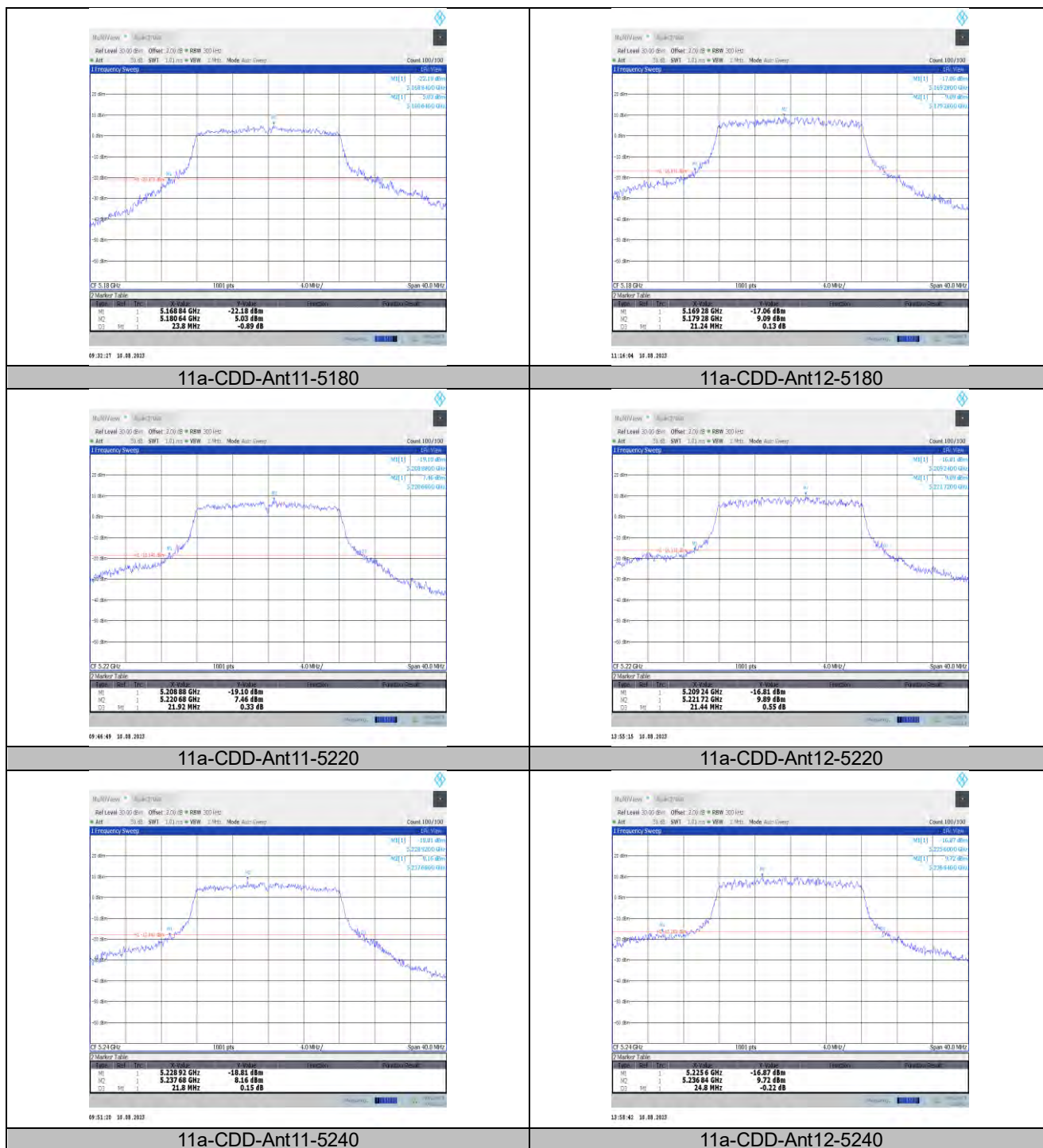
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### Test Graphs



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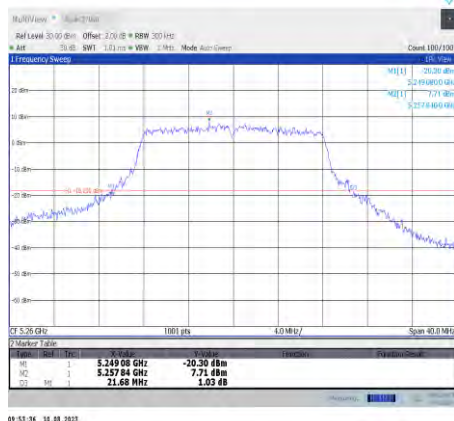
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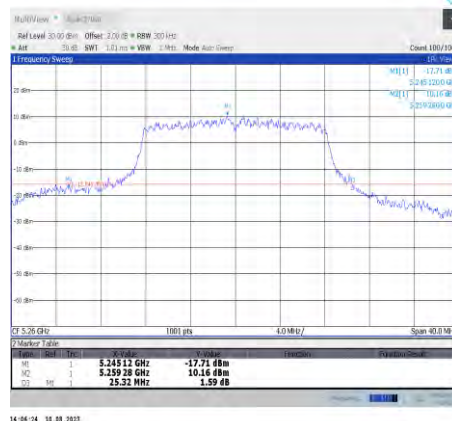
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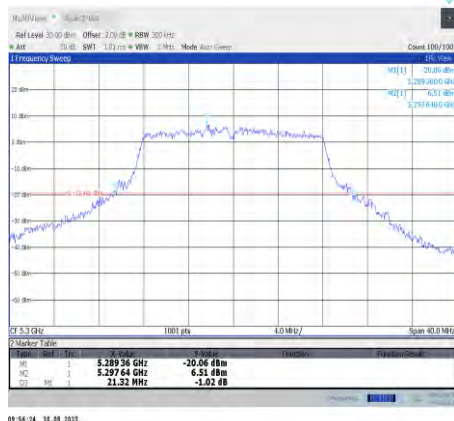
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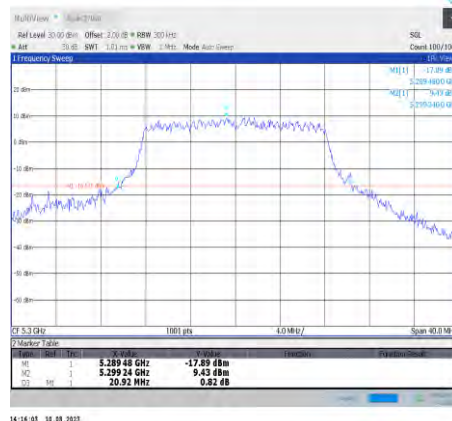
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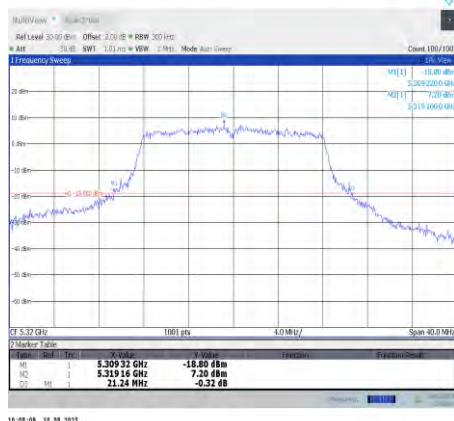
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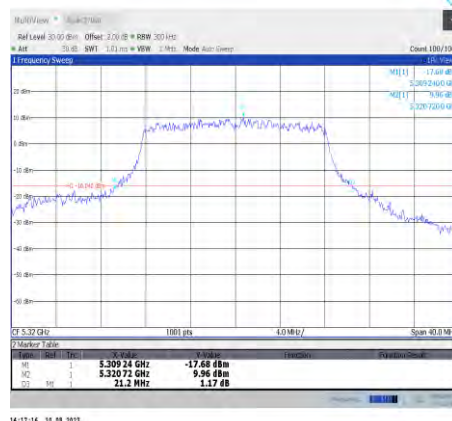
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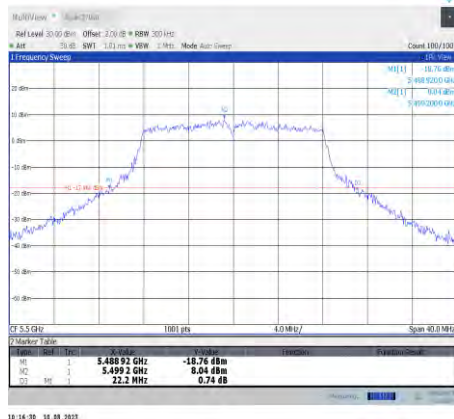
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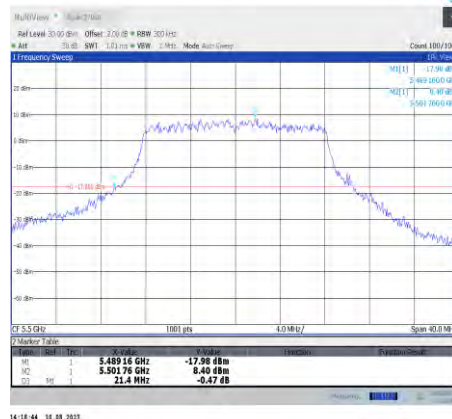
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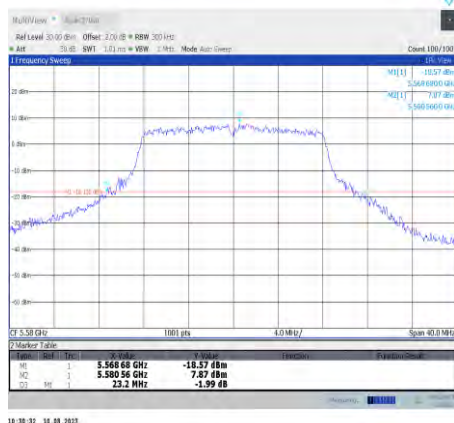
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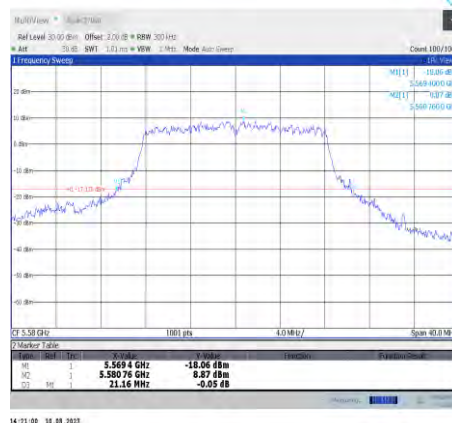
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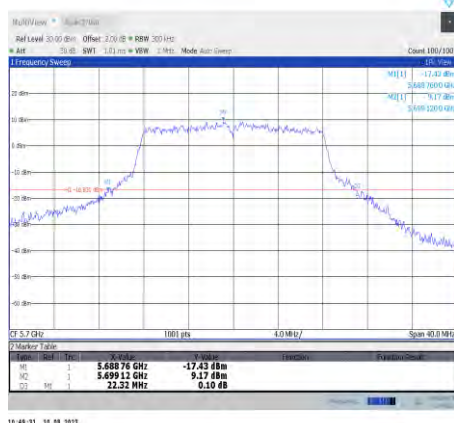
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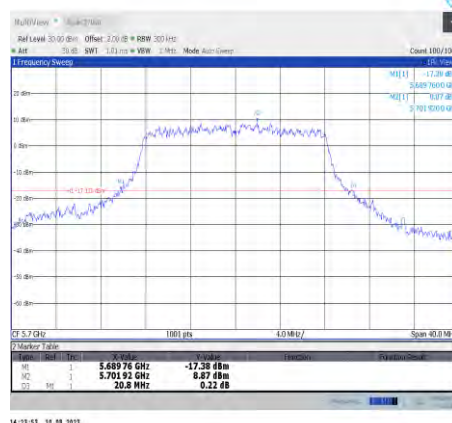
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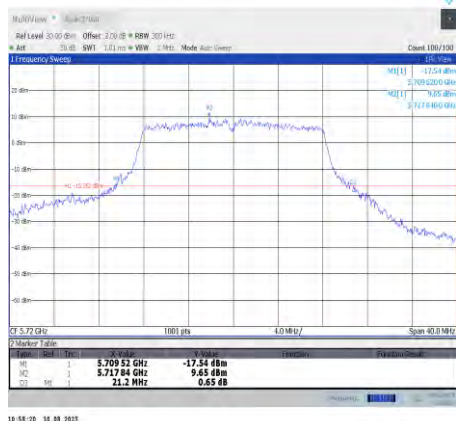


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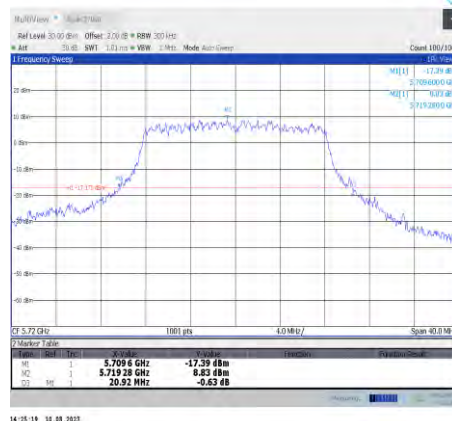
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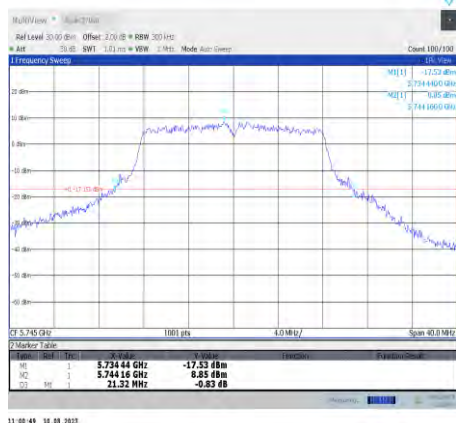




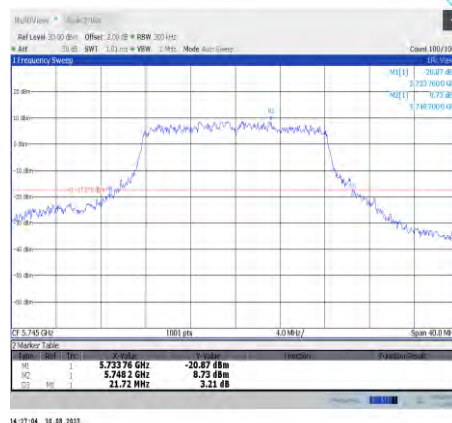
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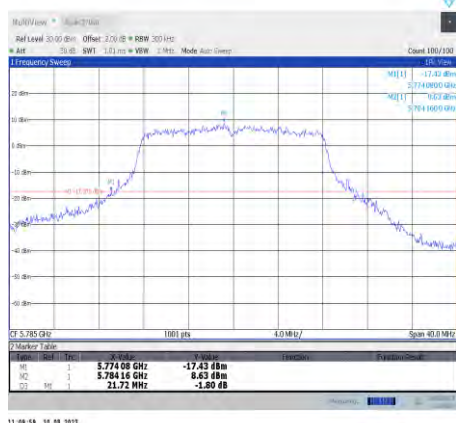
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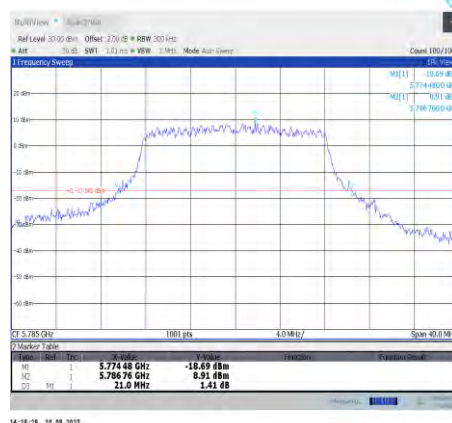
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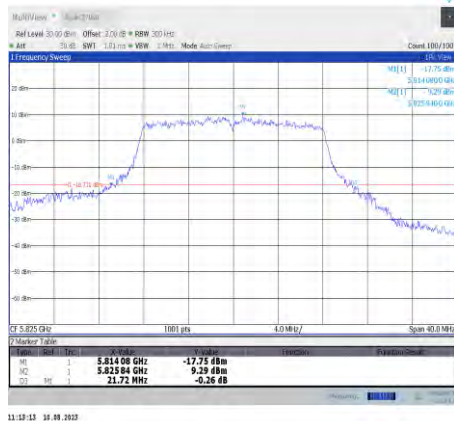
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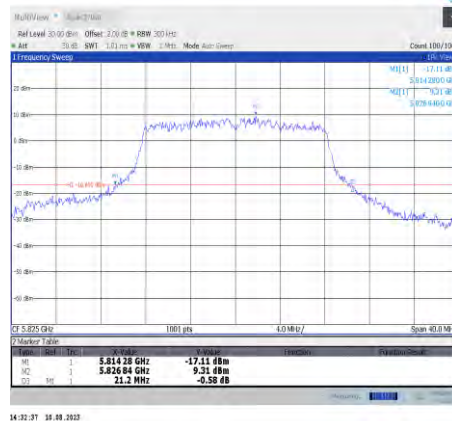
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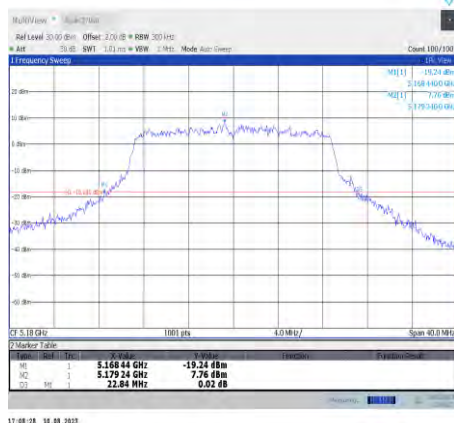
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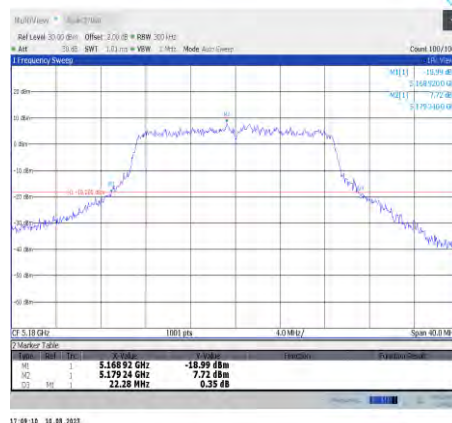
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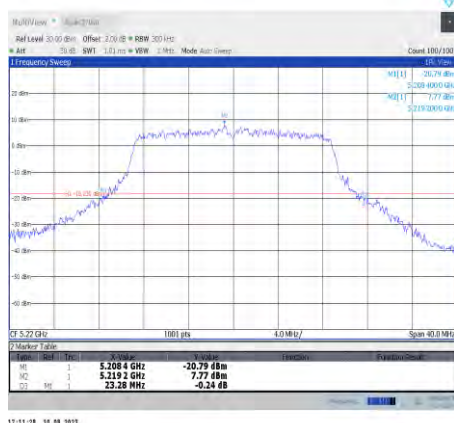
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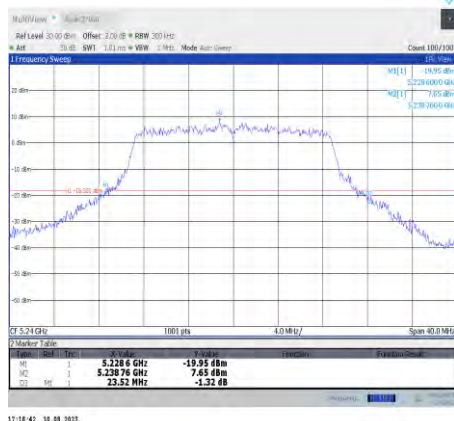
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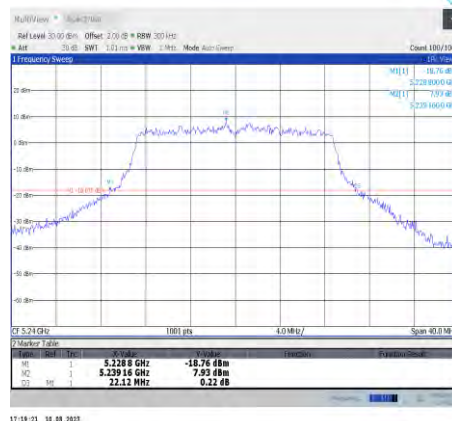
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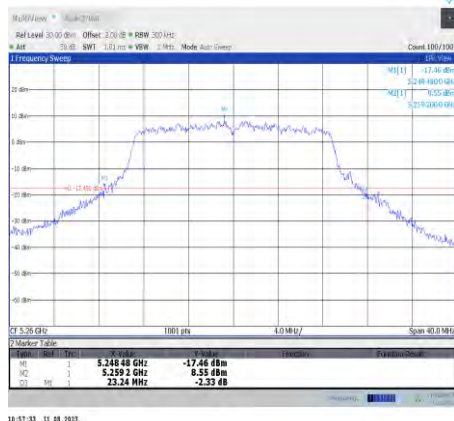
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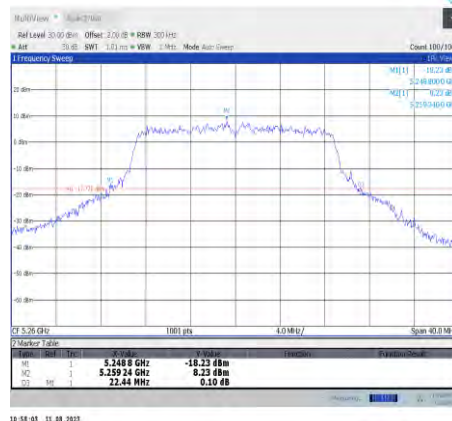
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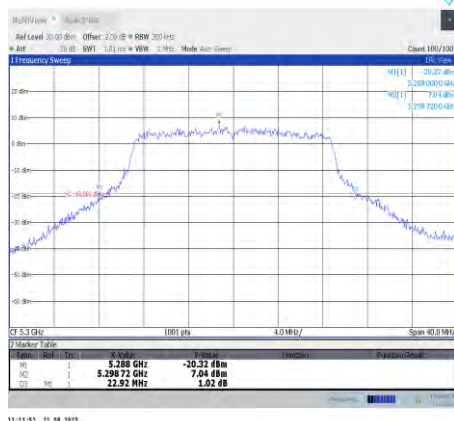
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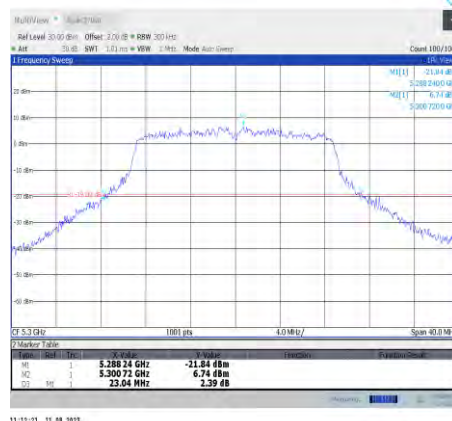
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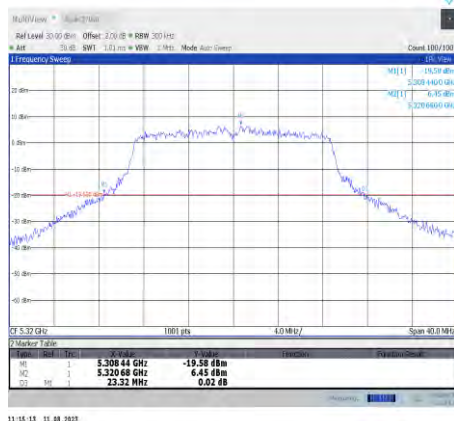
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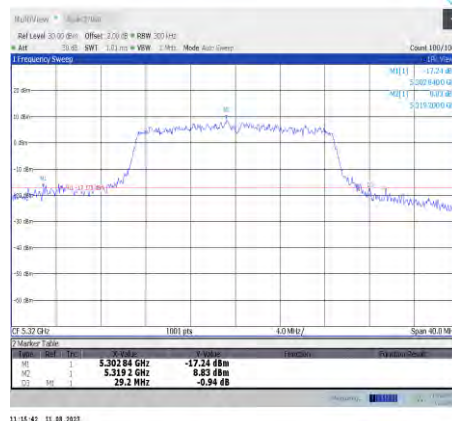
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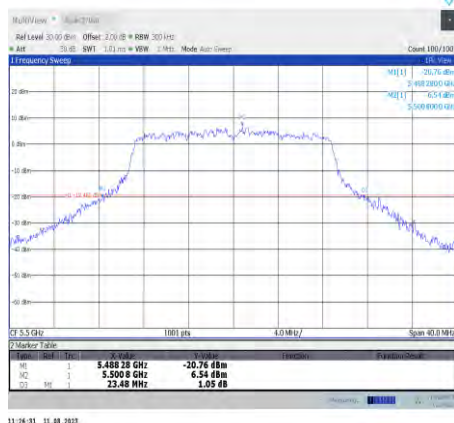
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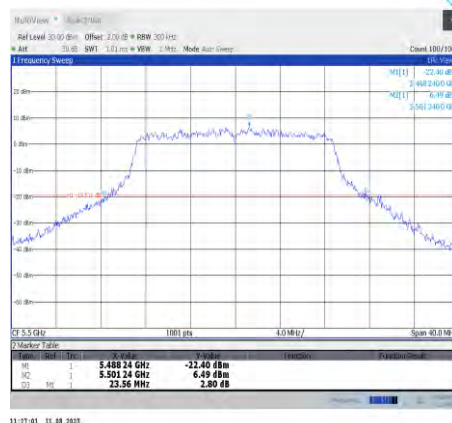
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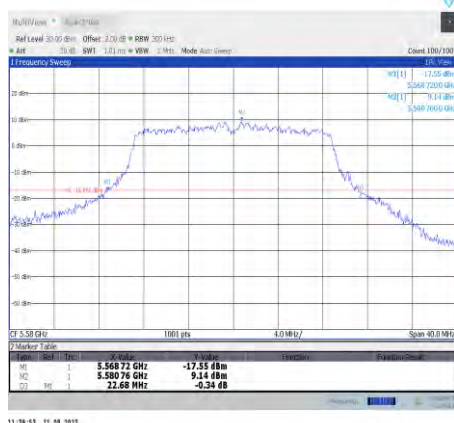
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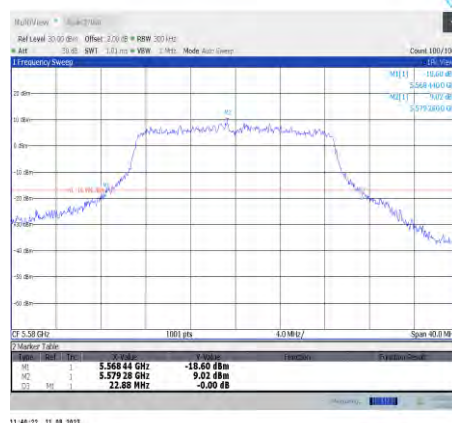
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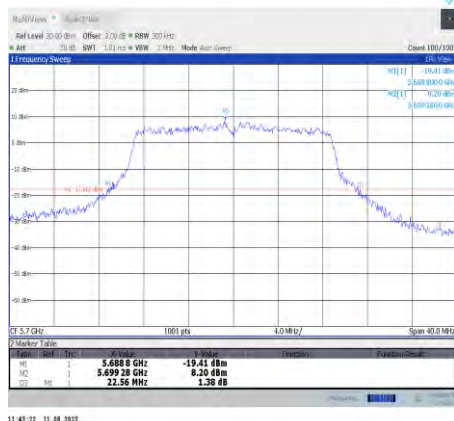
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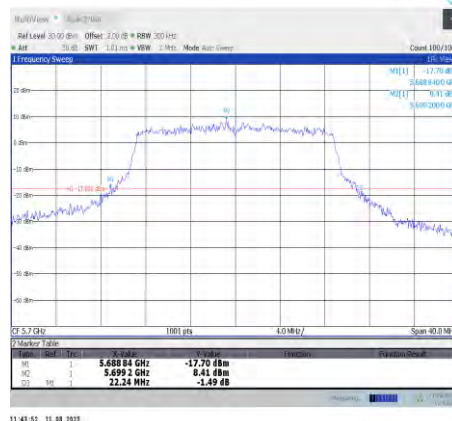
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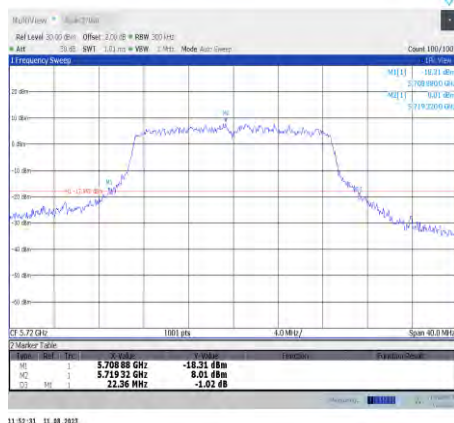




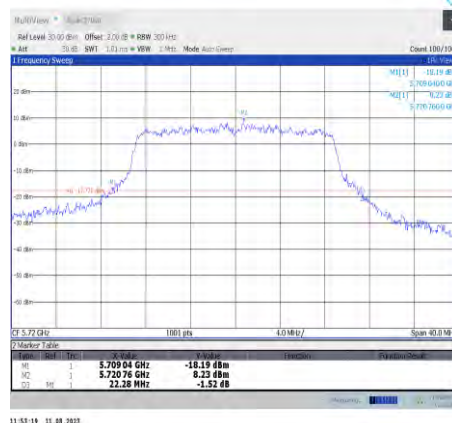
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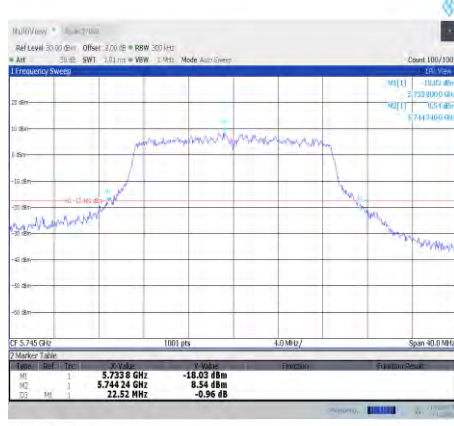
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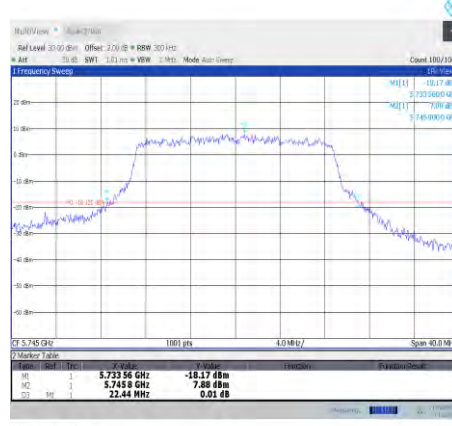
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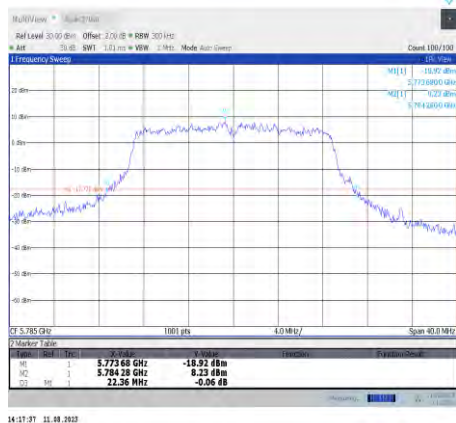
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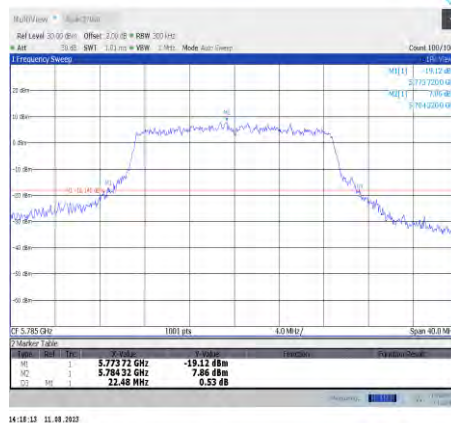
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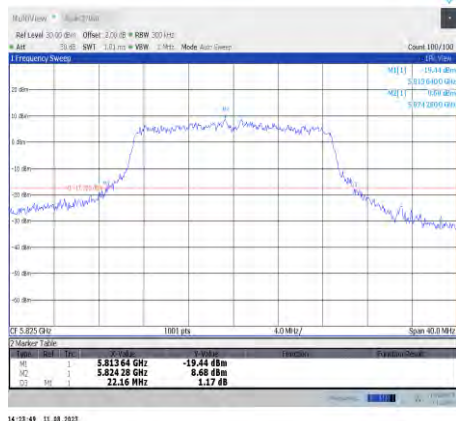
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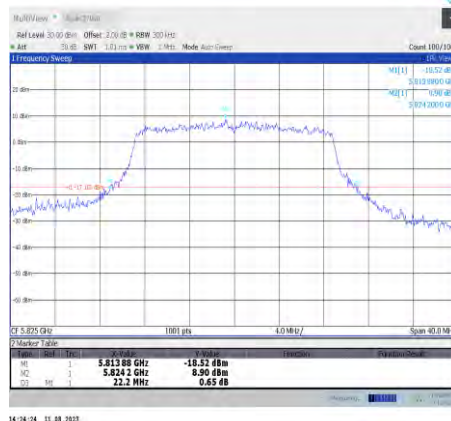
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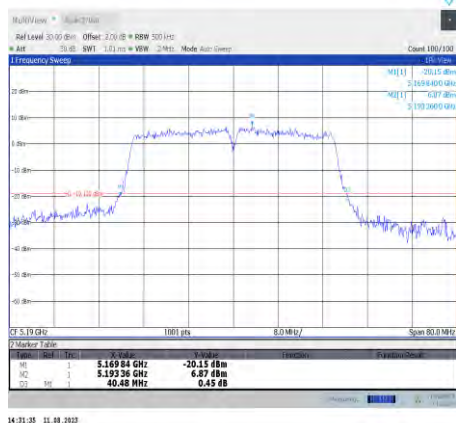
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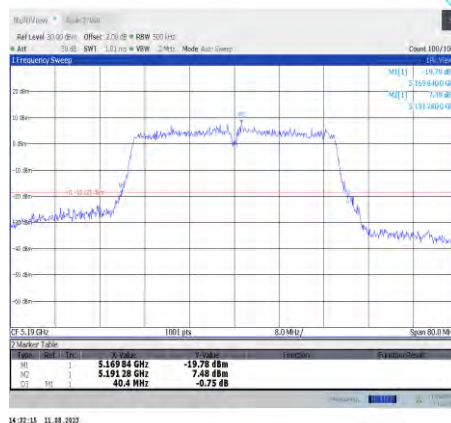
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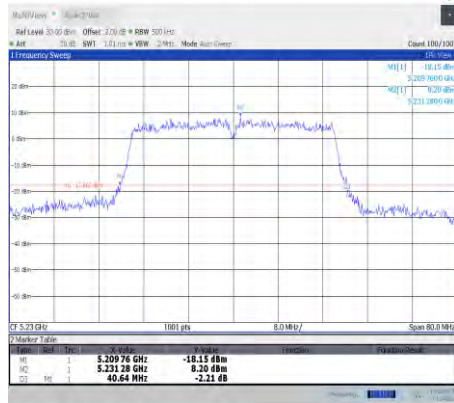
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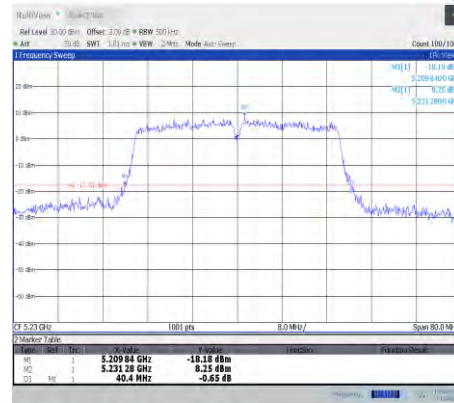
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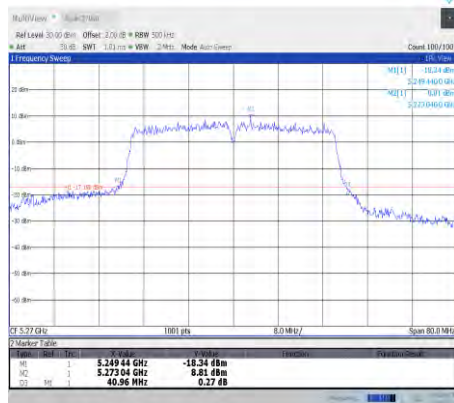
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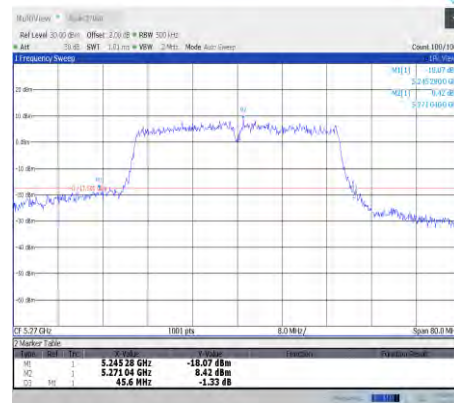
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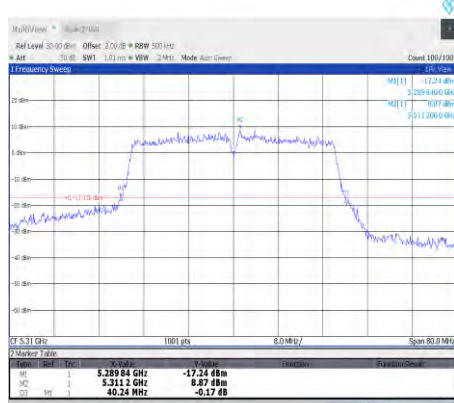
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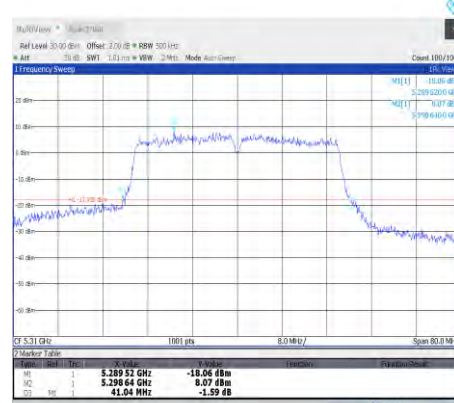
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11ac40MIMO-Ant12-5270



11ac40MIMO-Ant11-5310



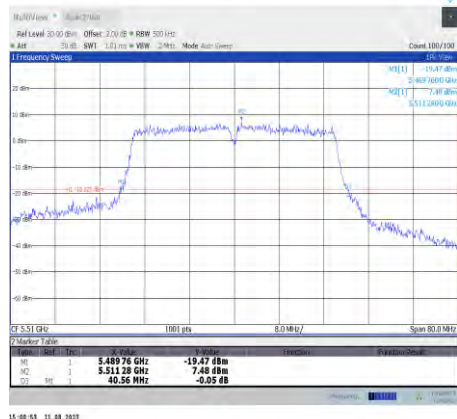
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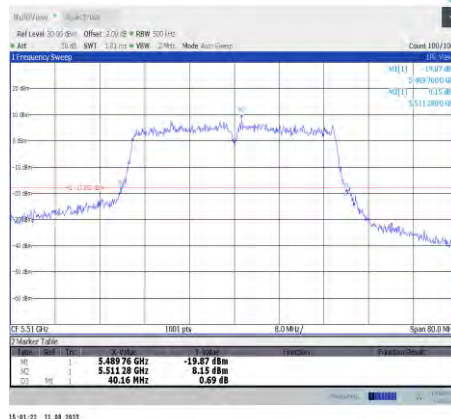
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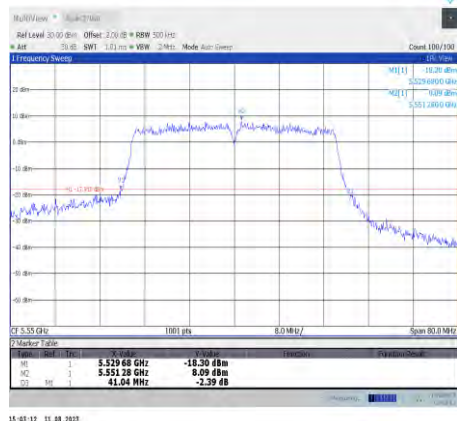
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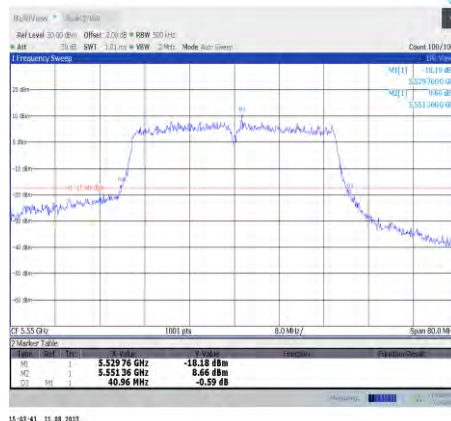
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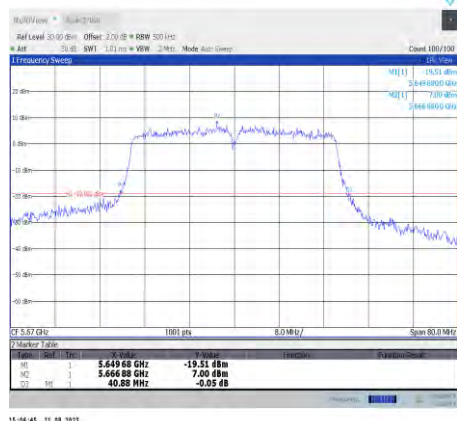
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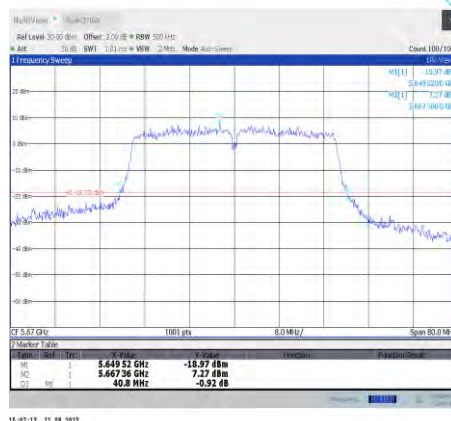
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11ac40MIMO-Ant12-5550



11ac40MIMO-Ant11-5670



11ac40MIMO-Ant12-5670



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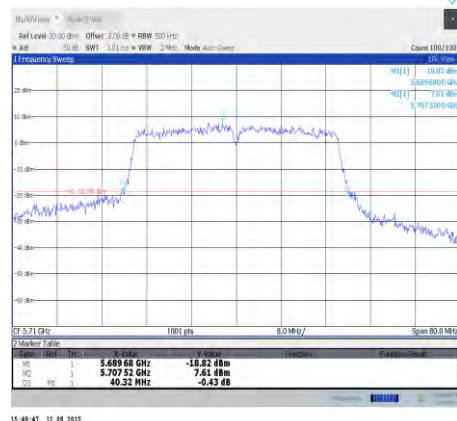
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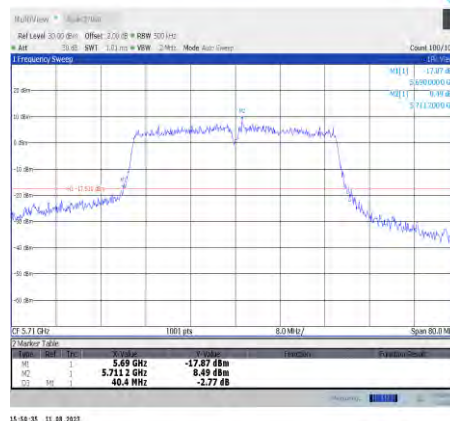
Report No.: SEWM2307000261RG06

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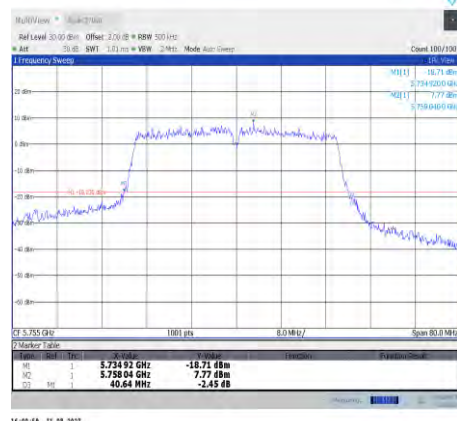
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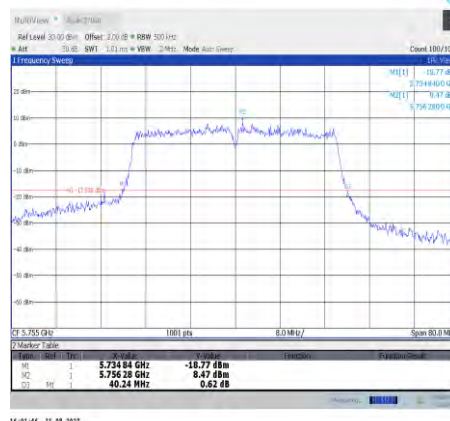
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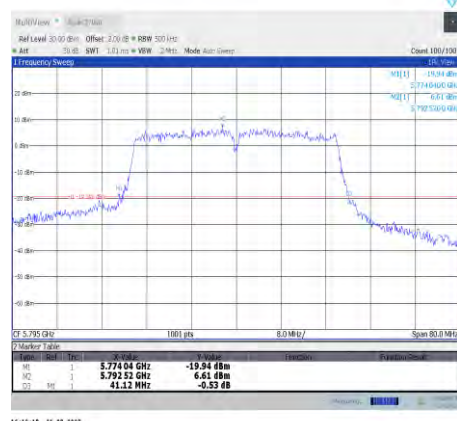
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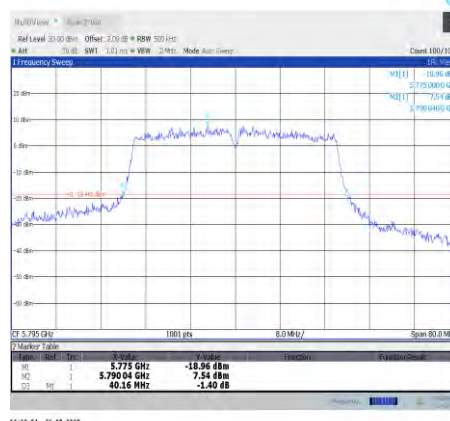
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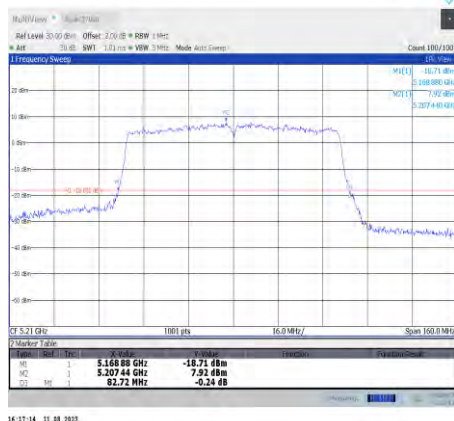
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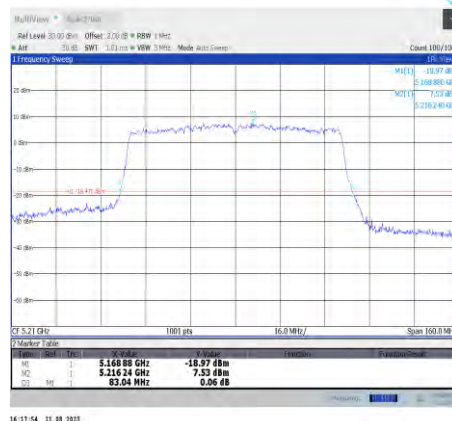
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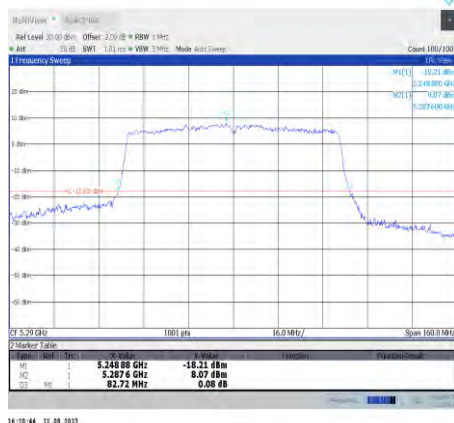
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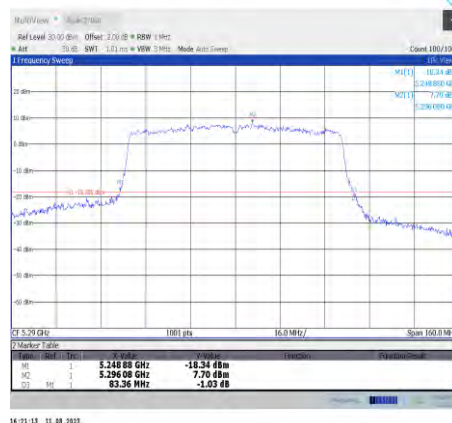
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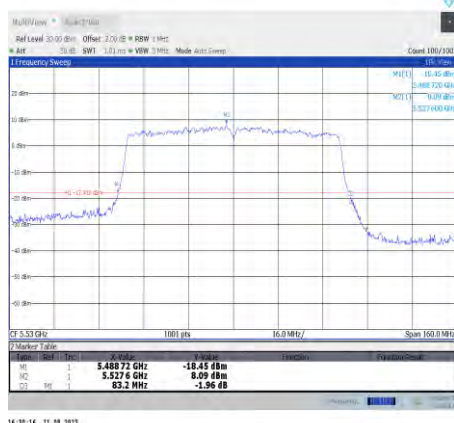
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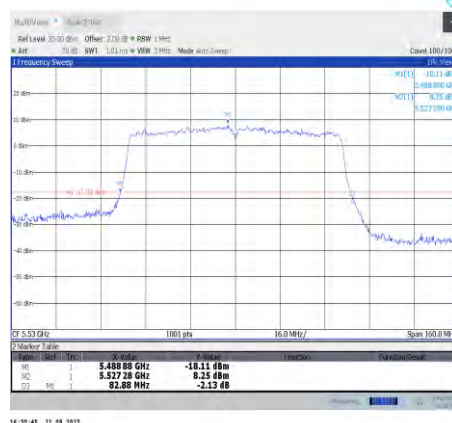
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11ac80MIMO-Ant12-5290



11ac80MIMO-Ant11-5530



11ac80MIMO-Ant12-5530

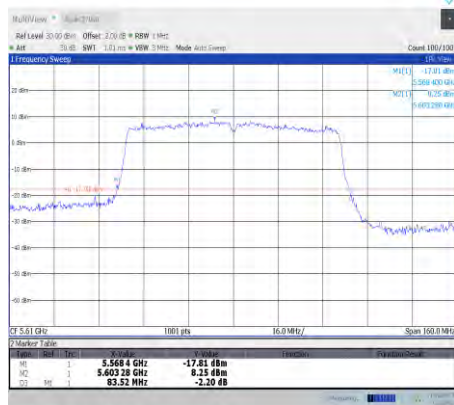




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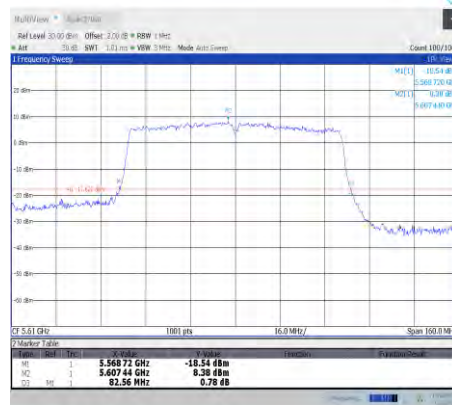
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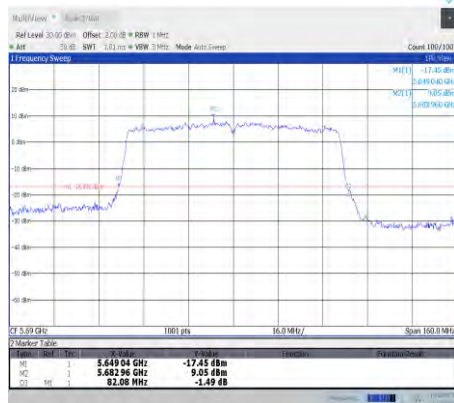
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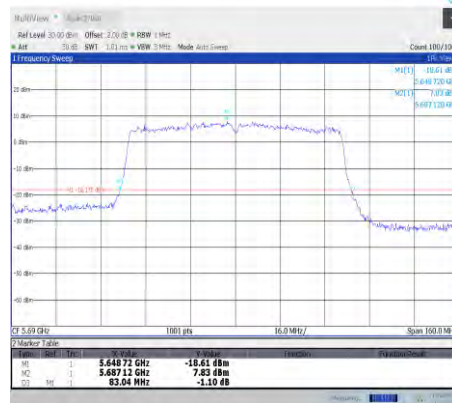
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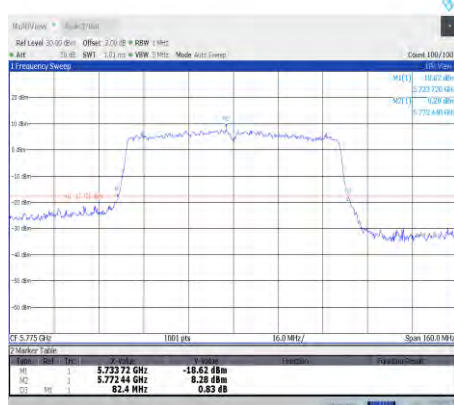
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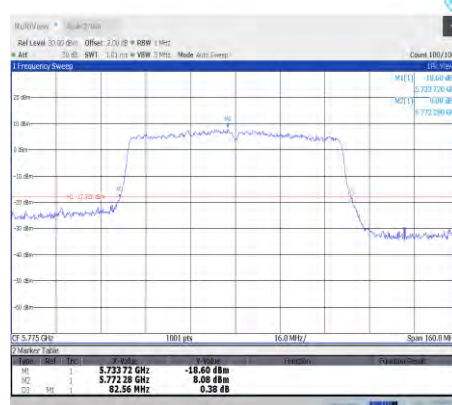
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11ac80MIMO-Ant12-5690



14-39-42 11.08.2023

11ac80MIMO-Ant11-5775



14-40-29 11.08.2023

11ac80MIMO-Ant12-5775



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## Occupied channel bandwidth Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
11a-CDD	Ant11	5180	16.978	5171.5454	5188.5230	For Report Purpose
11a-CDD	Ant12	5180	16.847	5171.5562	5188.4029	
11a-CDD	Ant11	5220	16.898	5211.4851	5228.3834	
11a-CDD	Ant12	5220	16.81	5211.5458	5228.3559	
11a-CDD	Ant11	5240	16.895	5231.4808	5248.3760	
11a-CDD	Ant12	5240	16.85	5231.5214	5248.3718	
11a-CDD	Ant11	5260	16.938	5251.4793	5268.4178	
11a-CDD	Ant12	5260	16.895	5251.4719	5268.3666	
11a-CDD	Ant11	5300	16.935	5291.4641	5308.3989	
11a-CDD	Ant12	5300	16.783	5291.5805	5308.3635	
11a-CDD	Ant11	5320	16.929	5311.4543	5328.3835	
11a-CDD	Ant12	5320	16.817	5311.5450	5328.3619	
11a-CDD	Ant11	5500	16.938	5491.5091	5508.4475	
11a-CDD	Ant12	5500	16.754	5491.5903	5508.3444	
11a-CDD	Ant11	5580	16.913	5571.5209	5588.4335	
11a-CDD	Ant12	5580	16.768	5571.5808	5588.3490	
11a-CDD	Ant11	5700	16.891	5691.5104	5708.4017	
11a-CDD	Ant12	5700	16.773	5691.5865	5708.3591	
11a-CDD	Ant11	5720	16.949	5711.4625	5728.4110	
11a-CDD	Ant12	5720	16.745	5711.6020	5728.3468	
11a-CDD	Ant11	5720 UNII-2C	13.538	5711.4625	5725	
11a-CDD	Ant12	5720 UNII-2C	13.398	5711.6020	5725	
11a-CDD	Ant11	5720 UNII-3	3.411	5725	5728.4110	
11a-CDD	Ant12	5720 UNII-3	3.347	5725	5728.3468	
11a-CDD	Ant11	5745	16.932	5736.4845	5753.4163	
11a-CDD	Ant12	5745	16.743	5736.5913	5753.3347	
11a-CDD	Ant11	5785	16.962	5776.4545	5793.4167	
11a-CDD	Ant12	5785	16.78	5776.5715	5793.3510	
11a-CDD	Ant11	5825	16.939	5816.4416	5833.3807	
11a-CDD	Ant12	5825	16.783	5816.5714	5833.3546	
11ac20MIMO	Ant11	5180	18.02	5170.9929	5189.0126	
11ac20MIMO	Ant12	5180	18.058	5170.9529	5189.0104	
11ac20MIMO	Ant11	5220	18.121	5210.9386	5229.0594	
11ac20MIMO	Ant12	5220	18.111	5210.9592	5229.0700	
11ac20MIMO	Ant11	5240	18.075	5230.9189	5248.9941	
11ac20MIMO	Ant12	5240	18.111	5230.9522	5249.0633	
11ac20MIMO	Ant11	5260	18.127	5250.9353	5269.0620	
11ac20MIMO	Ant12	5260	18.238	5250.8119	5269.0495	
11ac20MIMO	Ant11	5300	18.096	5290.9313	5309.0274	
11ac20MIMO	Ant12	5300	18.101	5290.9284	5309.0295	
11ac20MIMO	Ant11	5320	18.155	5310.9136	5329.0690	
11ac20MIMO	Ant12	5320	18.258	5310.7799	5329.0376	
11ac20MIMO	Ant11	5500	18.128	5490.9437	5509.0718	
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11ac20MIMO	Ant11	5580	18.093	5570.9216	5589.0143	
11ac20MIMO	Ant12	5580	18.124	5570.8975	5589.0219	
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11ac20MIMO	Ant11	5720 UNII-3	3.971	5725	5728.9713
11ac20MIMO	Ant12	5720 UNII-3	3.975	5725	5728.9754
11ac20MIMO	Ant11	5745	17.996	5735.9611	5753.9571
11ac20MIMO	Ant12	5745	18.016	5735.9665	5753.9821
11ac20MIMO	Ant11	5785	18.005	5775.9744	5793.9789
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11ac20MIMO	Ant12	5825	18.009	5815.9517	5833.9611
11ac40MIMO	Ant11	5190	36.524	5171.7278	5208.2518
11ac40MIMO	Ant12	5190	36.383	5171.7803	5208.1632
11ac40MIMO	Ant11	5230	36.429	5211.7792	5248.2080
11ac40MIMO	Ant12	5230	36.426	5211.7719	5248.1980
11ac40MIMO	Ant11	5270	36.537	5251.6786	5288.2157
11ac40MIMO	Ant12	5270	36.532	5251.6870	5288.2187
11ac40MIMO	Ant11	5310	36.437	5291.7193	5328.1560
11ac40MIMO	Ant12	5310	36.444	5291.7338	5328.1779
11ac40MIMO	Ant11	5510	36.4	5491.7686	5528.1689
11ac40MIMO	Ant12	5510	36.399	5491.7735	5528.1727
11ac40MIMO	Ant11	5550	36.403	5531.7590	5568.1618
11ac40MIMO	Ant12	5550	36.446	5531.6976	5568.1435
11ac40MIMO	Ant11	5670	36.433	5651.7280	5688.1614
11ac40MIMO	Ant12	5670	36.423	5651.7425	5688.1653
11ac40MIMO	Ant11	5710	36.42	5691.7511	5728.1708
11ac40MIMO	Ant12	5710	36.417	5691.7553	5728.1719
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11ac40MIMO	Ant12	5710 UNII-2C	33.245	5691.7553	5725
11ac40MIMO	Ant11	5710 UNII-3	3.171	5725	5728.1708
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11ac40MIMO	Ant11	5755	36.434	5736.7207	5773.1549
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11ac40MIMO	Ant11	5795	36.397	5776.7517	5813.1490
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11ac80MIMO	Ant11	5690 UNII-2C	73.043	5651.9568	5725
11ac80MIMO	Ant12	5690 UNII-2C	73.063	5651.9370	5725
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11ac80MIMO	Ant12	5690 UNII-3	2.933	5725	5727.9328
11ac80MIMO	Ant11	5775	75.969	5736.9367	5812.9062
11ac80MIMO	Ant12	5775	75.956	5736.8961	5812.8526

Remark:

For 802.11n HT20/ac VHT20 and 802.11n HT40/ac VHT40 mode, the whole testing have assessed only, 802.11ac VHT20/40 by referring to their higher output power.



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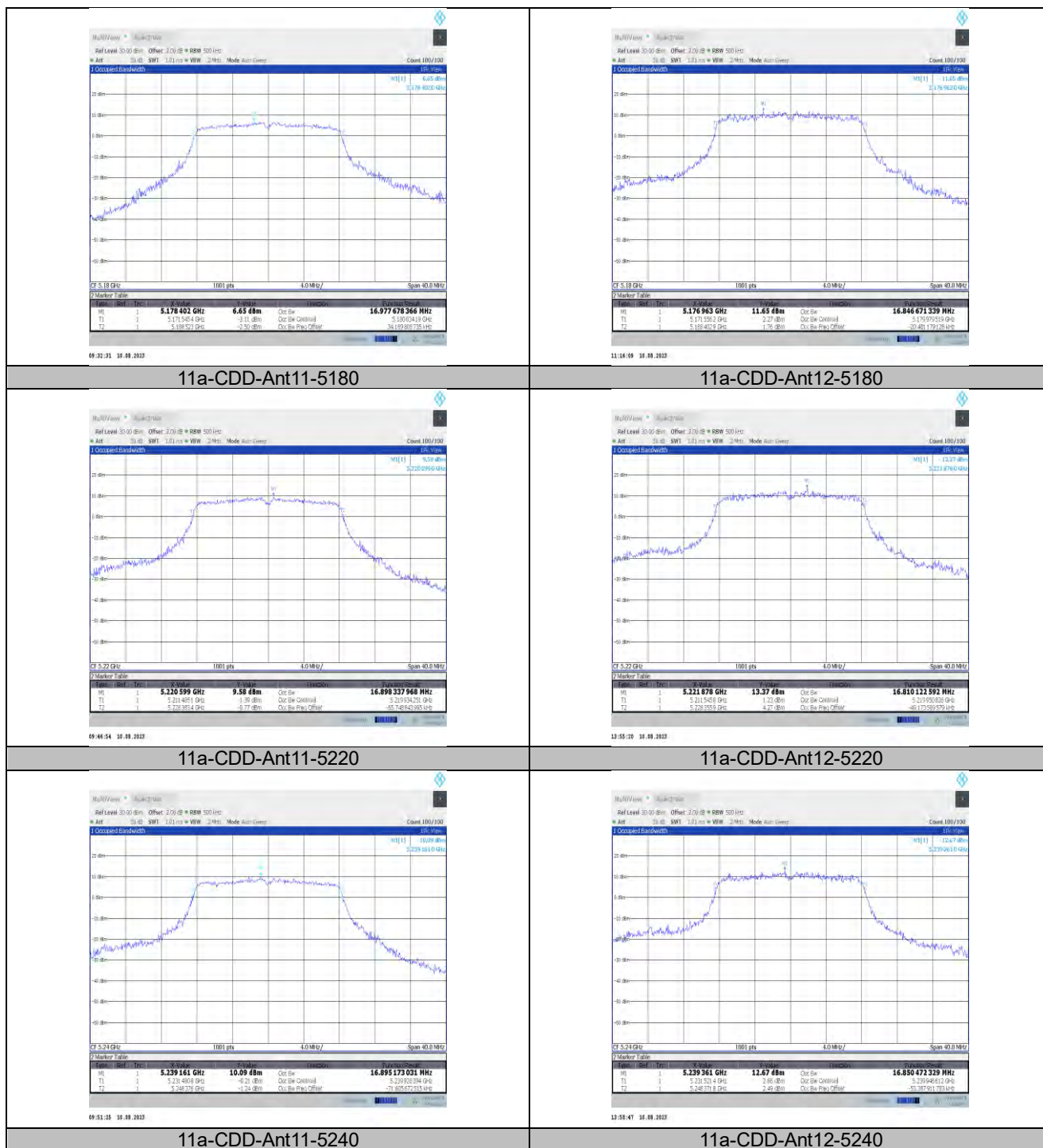
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### Test Graphs



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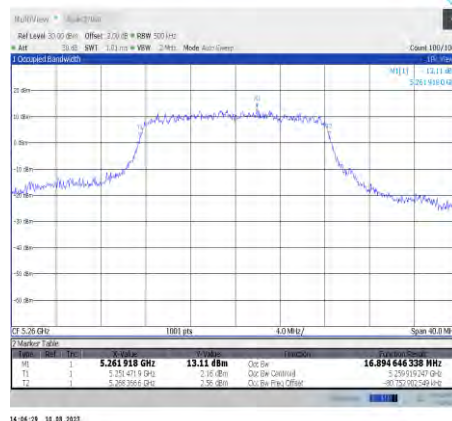
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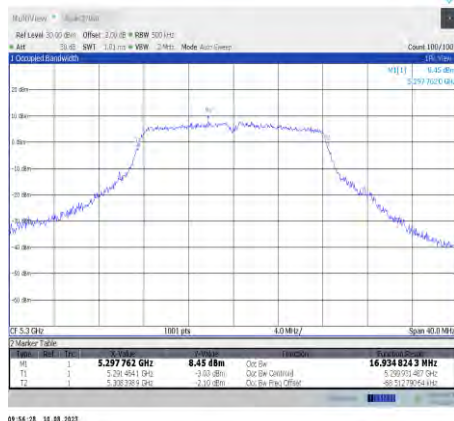




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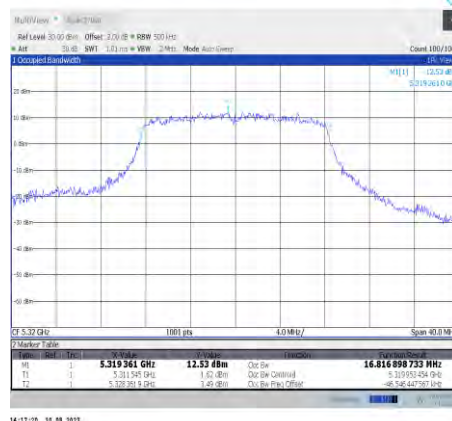
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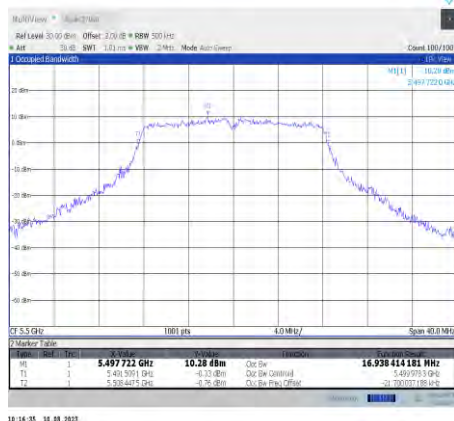
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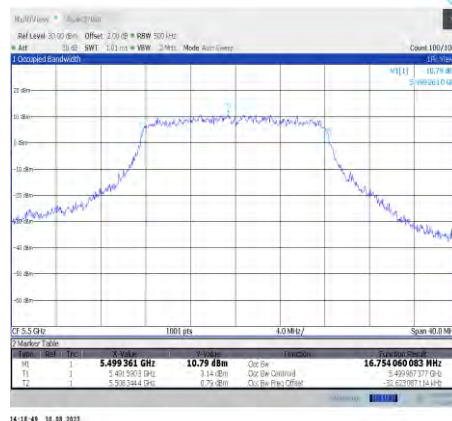
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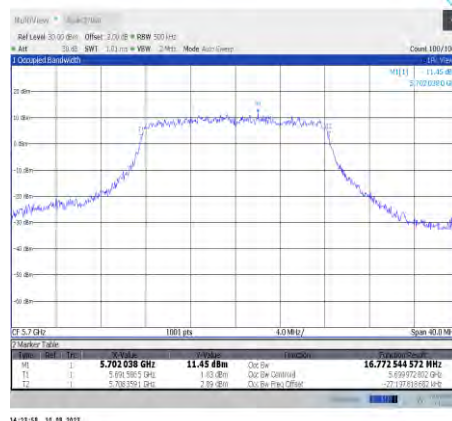
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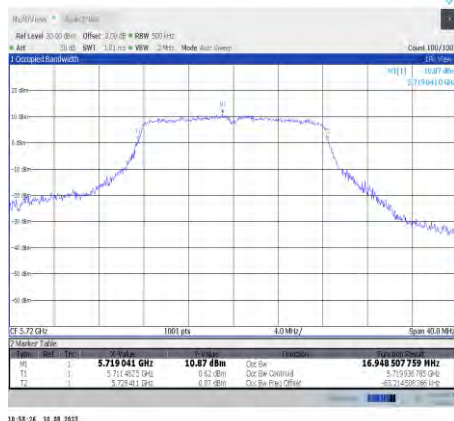


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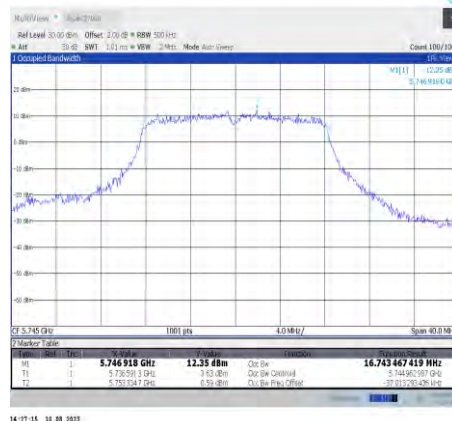
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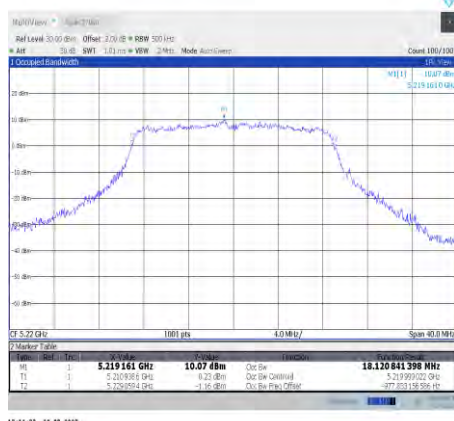
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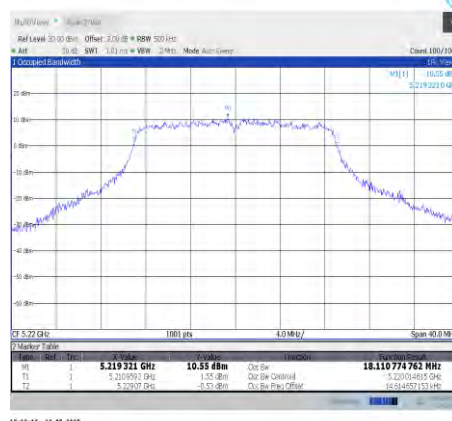
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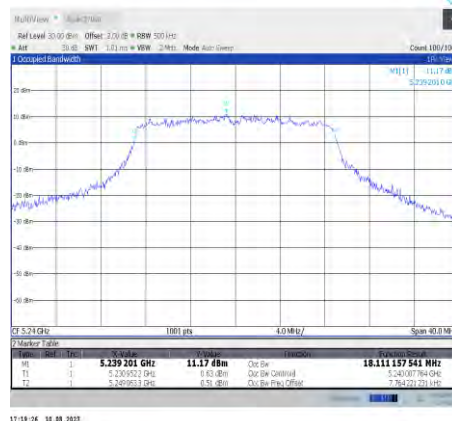
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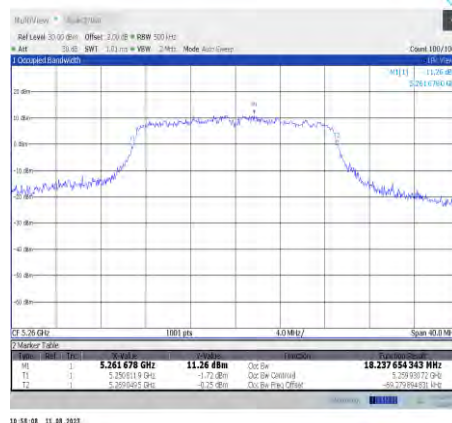
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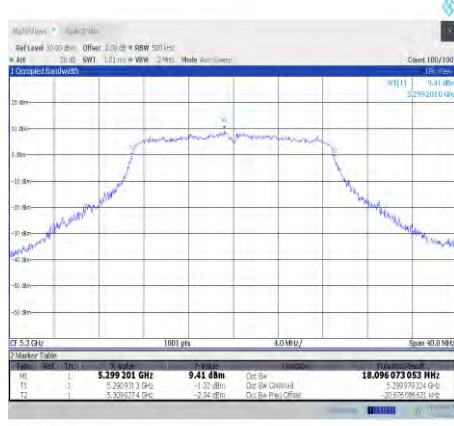
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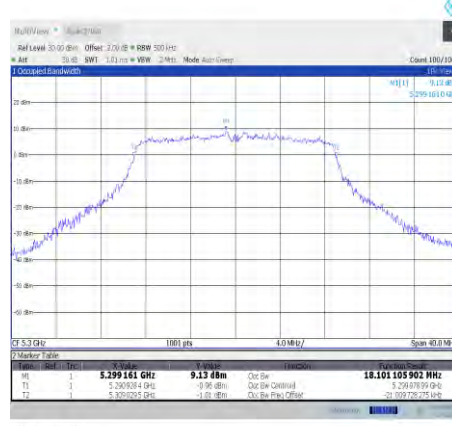
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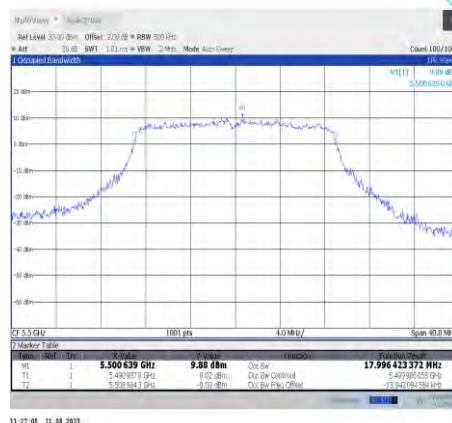
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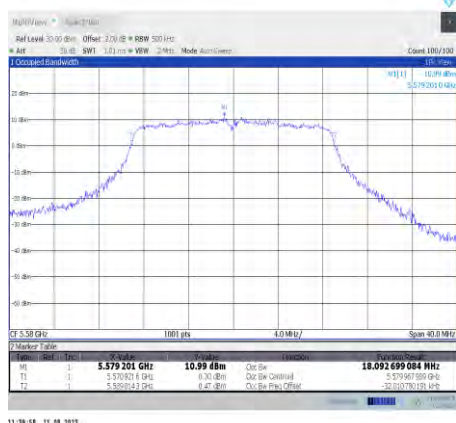
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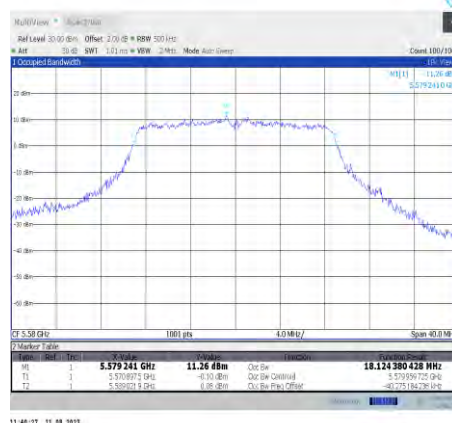
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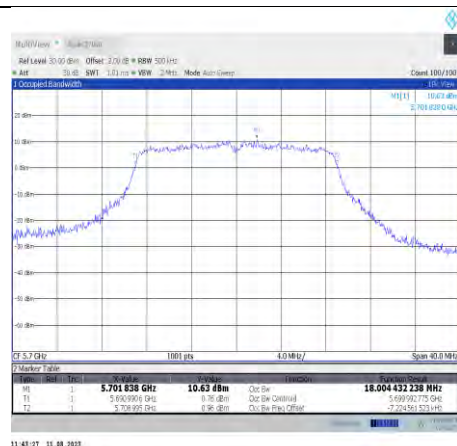
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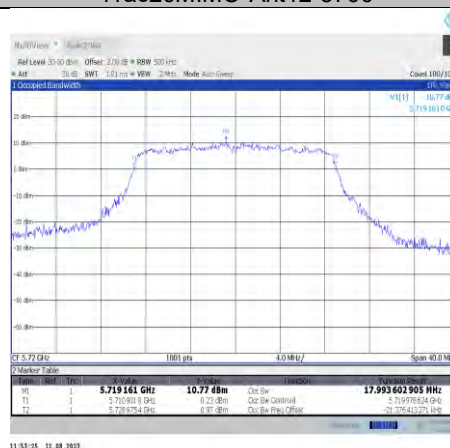
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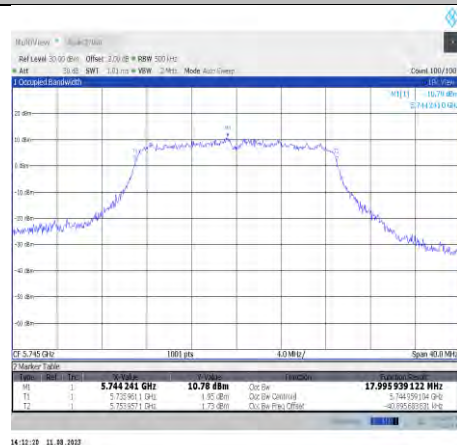
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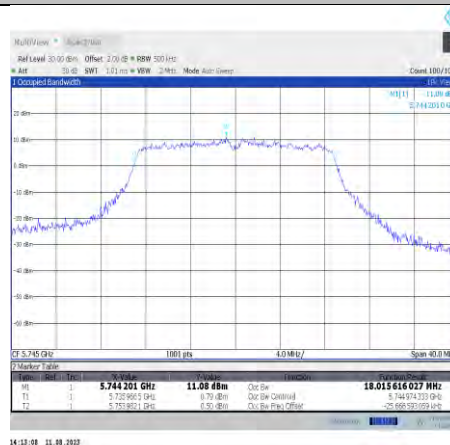
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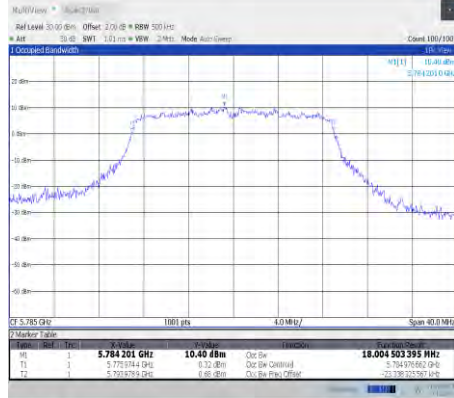
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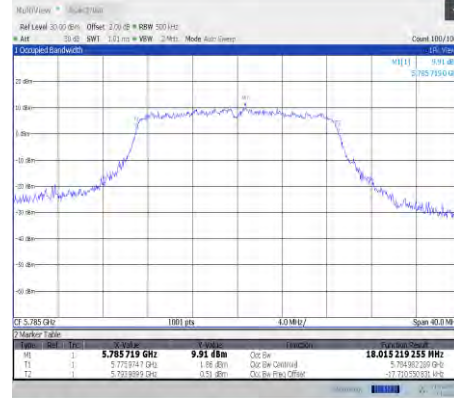
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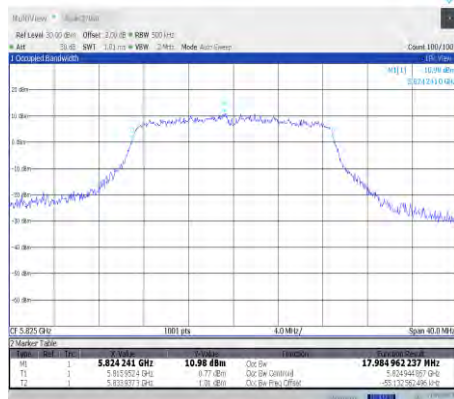
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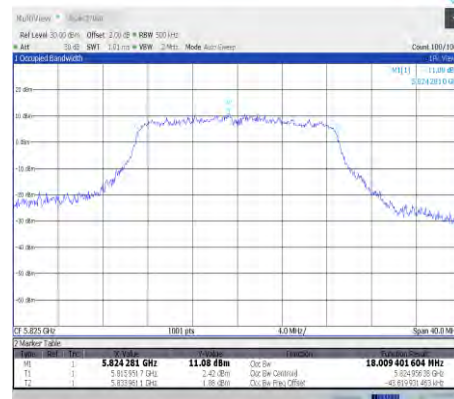
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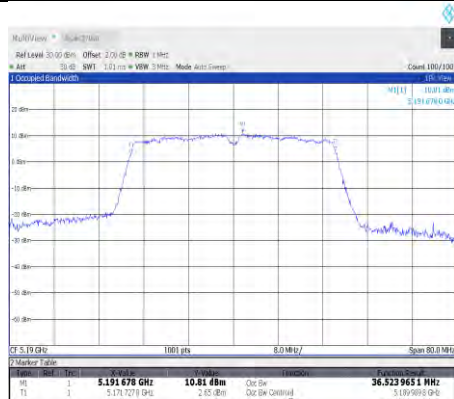
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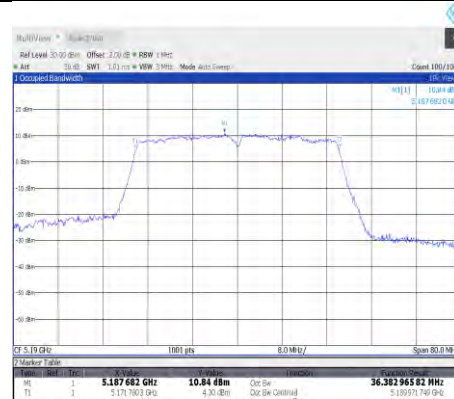
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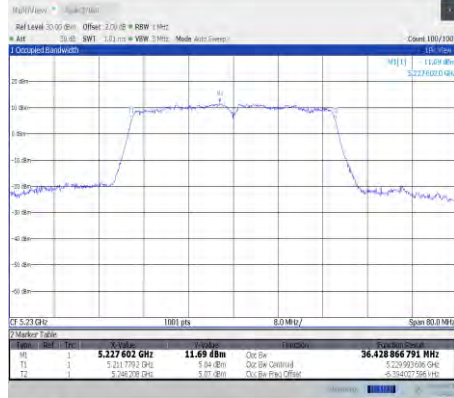
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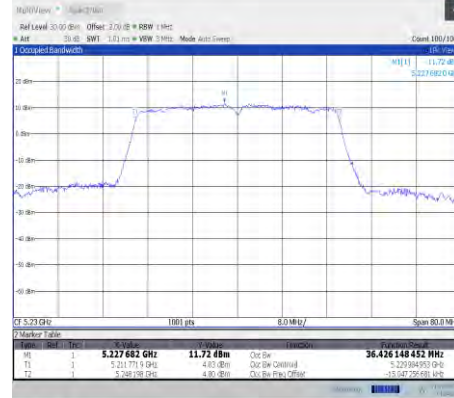
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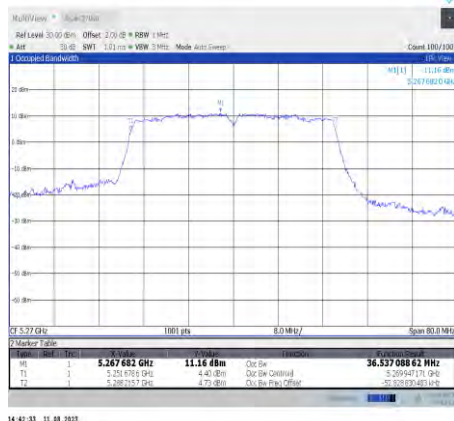




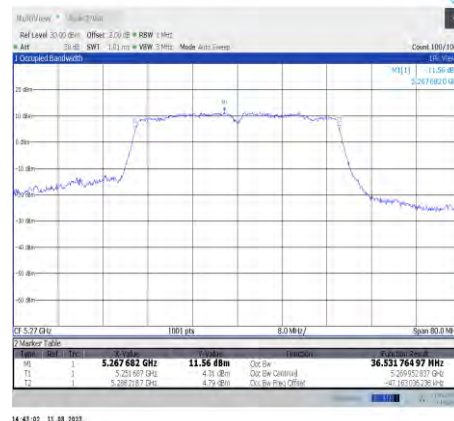
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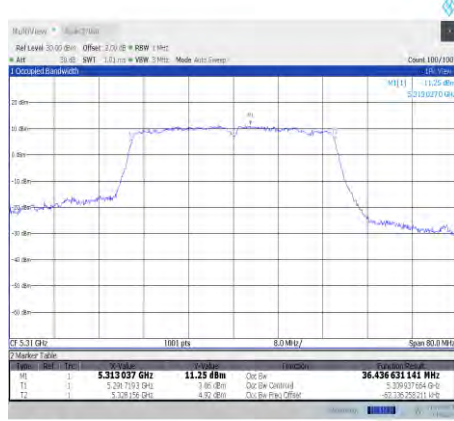
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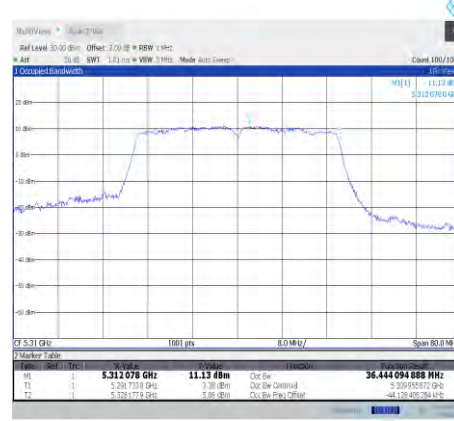
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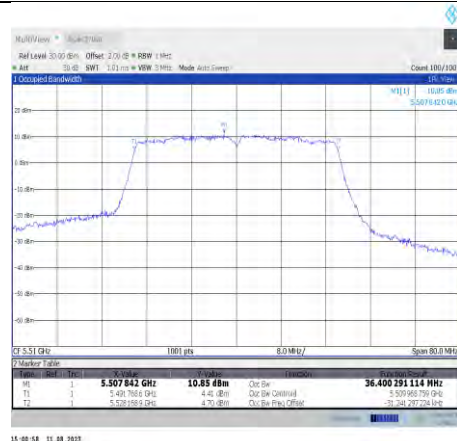
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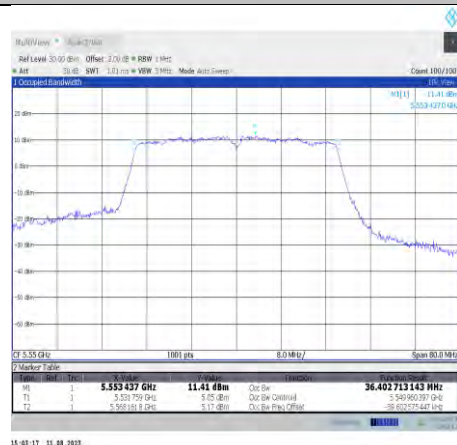




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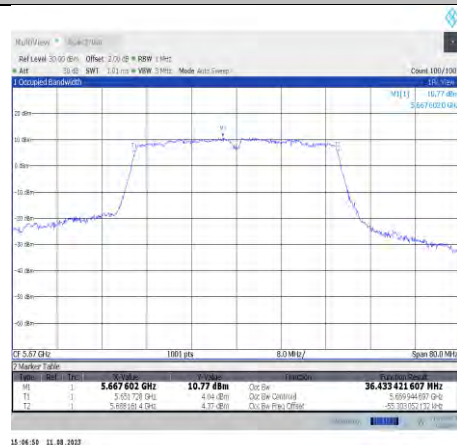
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11ac40MIMO-Ant12-5550



11ac40MIMO-Ant11-5670



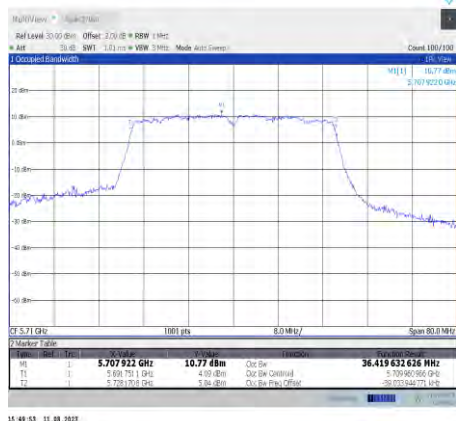
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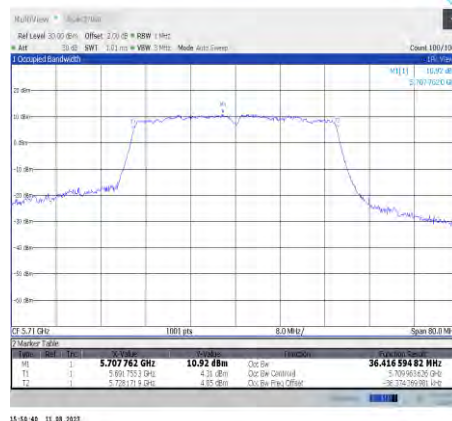
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11ac40MIMO-Ant11-5710



11ac40MIMO-Ant12-5710



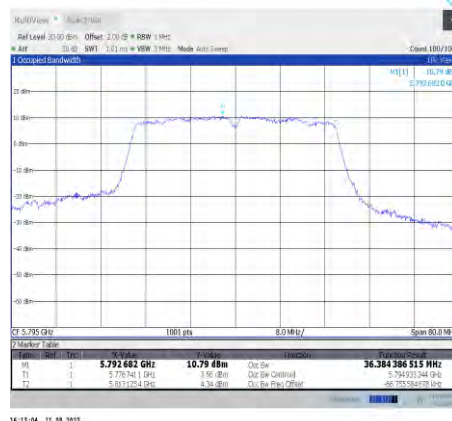
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11ac40MIMO-Ant12-5755



11ac40MIMO-Ant11-5795



11ac40MIMO-Ant12-5795



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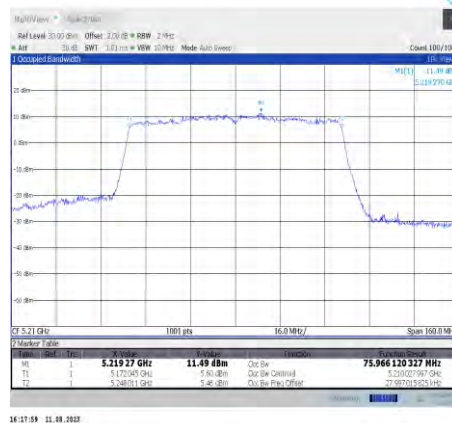
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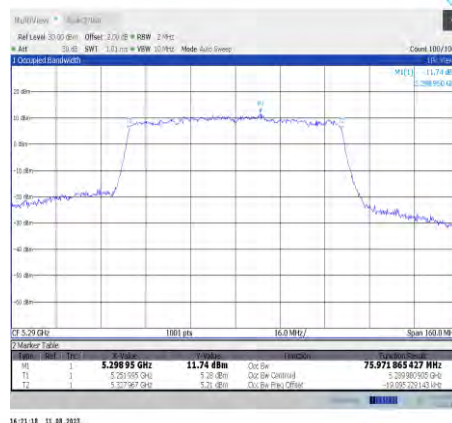
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11ac80MIMO-Ant12-5210



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11ac80MIMO-Ant12-5290



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11ac80MIMO-Ant12-5530

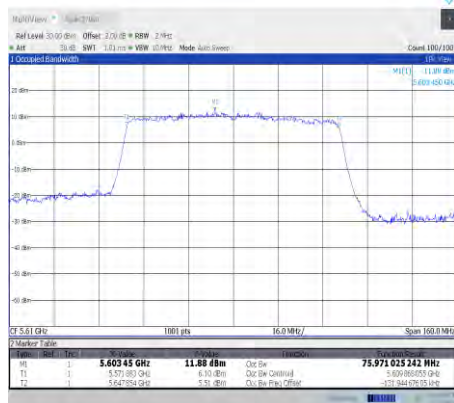


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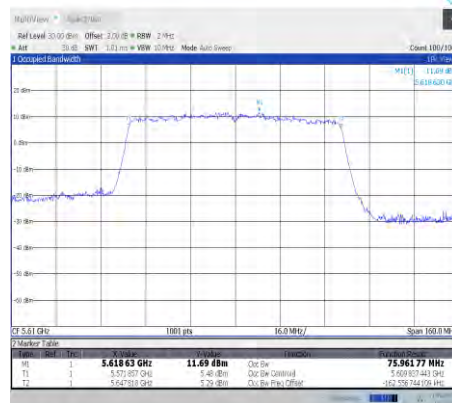
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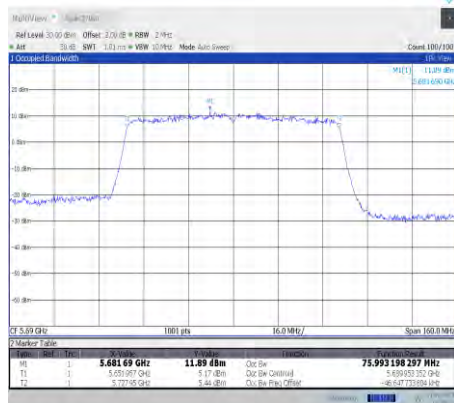
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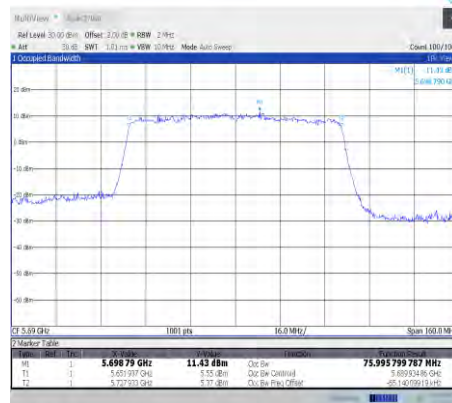
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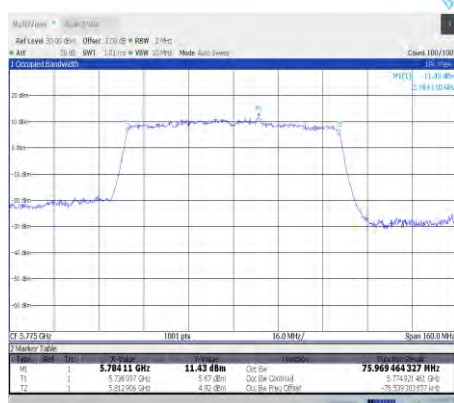
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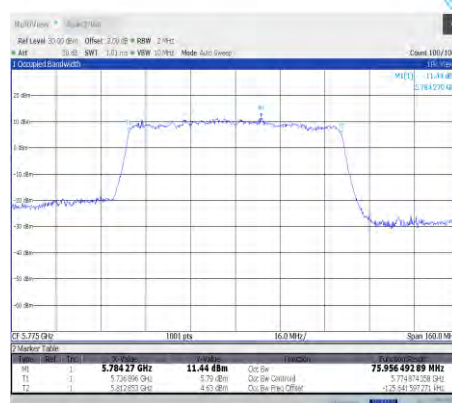
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11ac80MIMO-Ant12-5690



16-39-53 11.09.2023

11ac80MIMO-Ant11-5775



16-40-40 11.09.2023

11ac80MIMO-Ant12-5775



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## 6dB emission bandwidth Test Result B4

TestMode	Antenna	Frequency[MHz]	6dB EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11a-CDD	Ant11	5745	14.36	5737.16	5751.52	≥0.5	PASS
11a-CDD	Ant12	5745	15.36	5737.16	5752.52	≥0.5	PASS
11a-CDD	Ant11	5785	16.36	5776.80	5793.16	≥0.5	PASS
11a-CDD	Ant12	5785	15.52	5777.16	5792.68	≥0.5	PASS
11a-CDD	Ant11	5825	15.40	5817.16	5832.56	≥0.5	PASS
11a-CDD	Ant12	5825	16.40	5816.76	5833.16	≥0.5	PASS
11ac20MIMO	Ant11	5745	16.00	5736.56	5752.56	≥0.5	PASS
11ac20MIMO	Ant12	5745	17.64	5736.16	5753.80	≥0.5	PASS
11ac20MIMO	Ant11	5785	14.76	5778.40	5793.16	≥0.5	PASS
11ac20MIMO	Ant12	5785	14.76	5778.40	5793.16	≥0.5	PASS
11ac20MIMO	Ant11	5825	15.80	5817.32	5833.12	≥0.5	PASS
11ac20MIMO	Ant12	5825	16.00	5816.56	5832.56	≥0.5	PASS
11ac40MIMO	Ant11	5755	36.48	5736.76	5773.24	≥0.5	PASS
11ac40MIMO	Ant12	5755	35.28	5737.32	5772.60	≥0.5	PASS
11ac40MIMO	Ant11	5795	35.28	5777.32	5812.60	≥0.5	PASS
11ac40MIMO	Ant12	5795	35.28	5777.32	5812.60	≥0.5	PASS
11ac80MIMO	Ant11	5775	75.52	5737.24	5812.76	≥0.5	PASS
11ac80MIMO	Ant12	5775	75.52	5737.24	5812.76	≥0.5	PASS

### Remark:

For 802.11n HT20/ac VHT20 and 802.11n HT40/ac VHT40 mode, the whole testing have assessed only, 802.11ac VHT20/40 by referring to their higher output power.



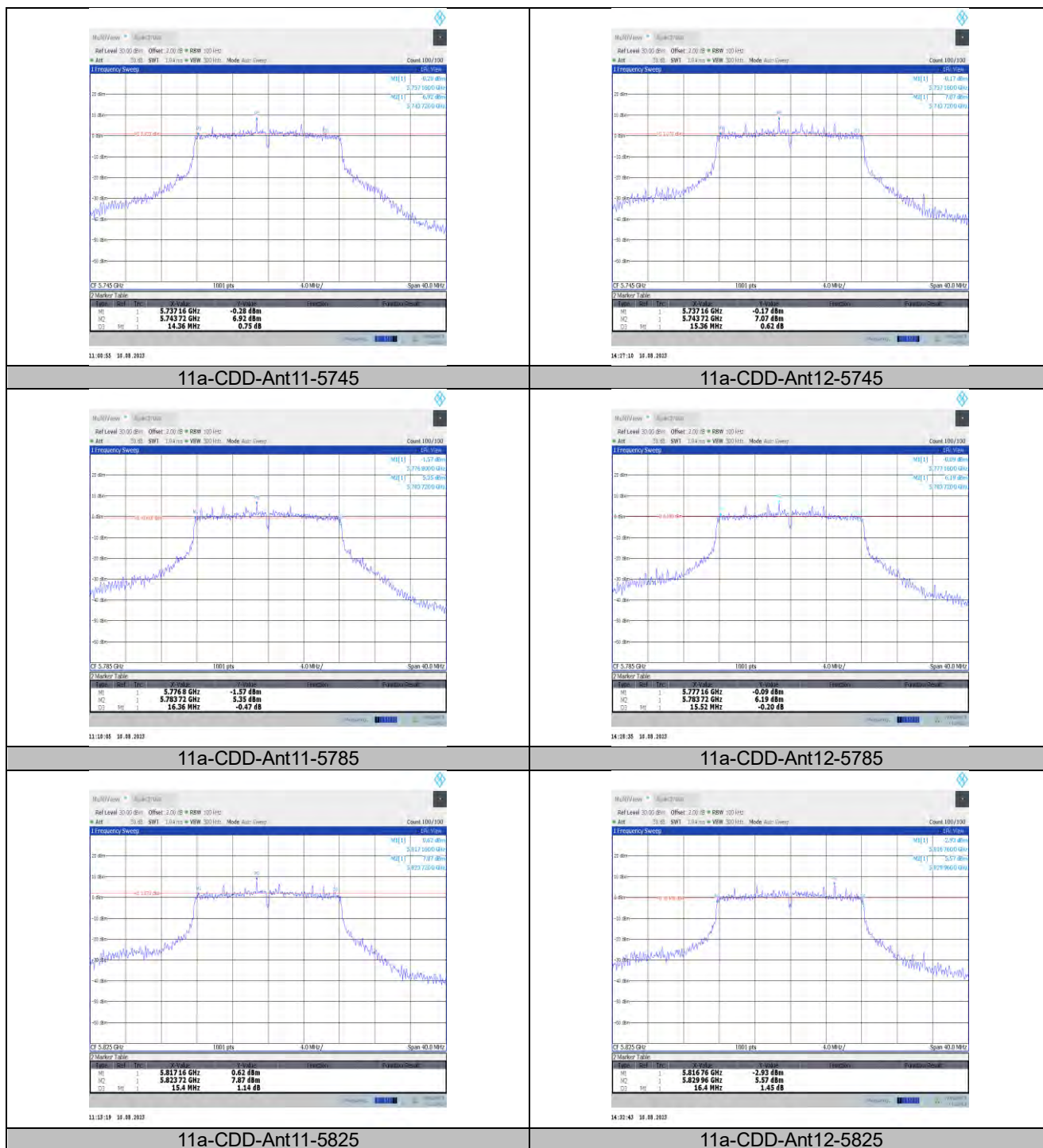
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### Test Graphs B4

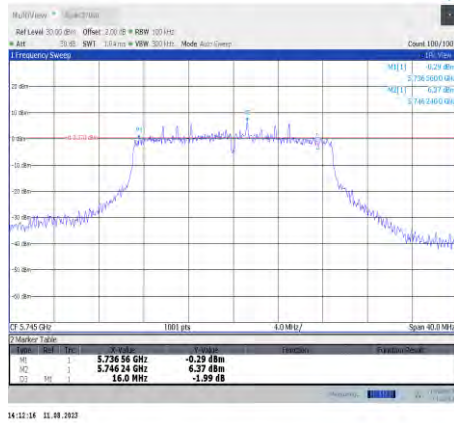




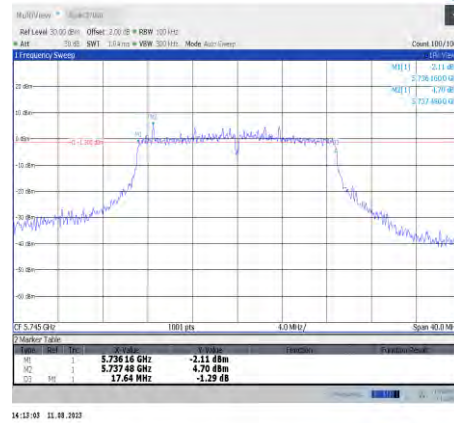
Report No.: SEWM2307000261RG06

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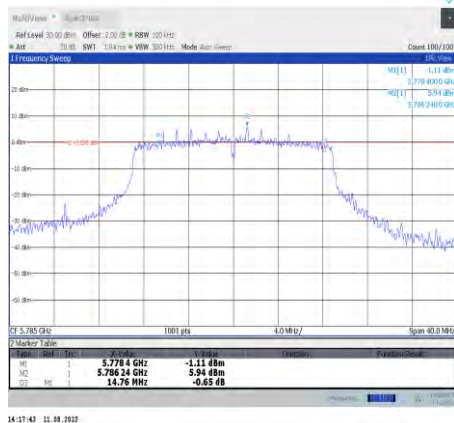
Page: 72 of 279



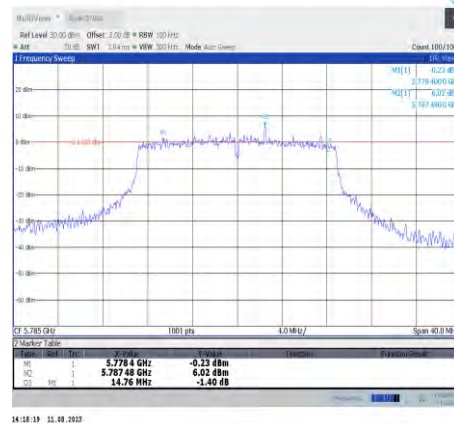
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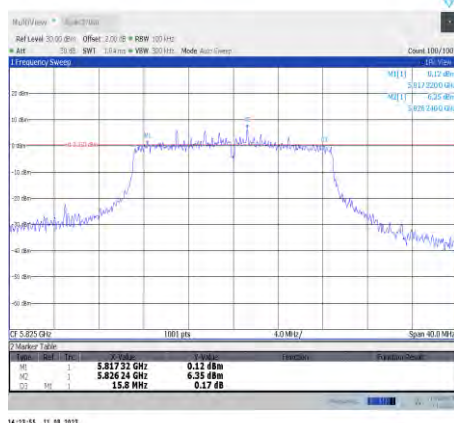
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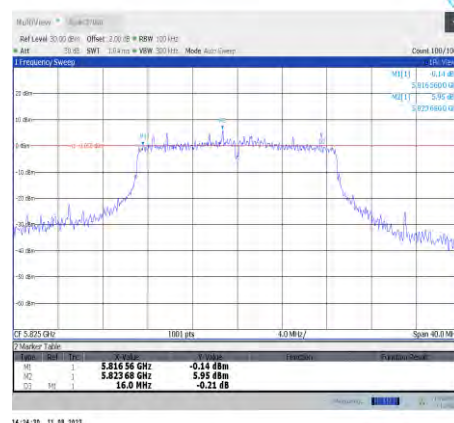
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11ac20MIMO-Ant12-5785



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11ac20MIMO-Ant12-5825



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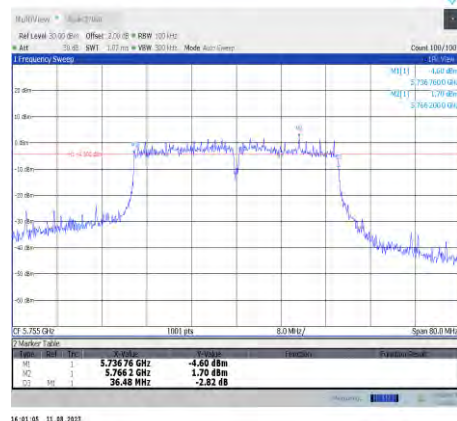
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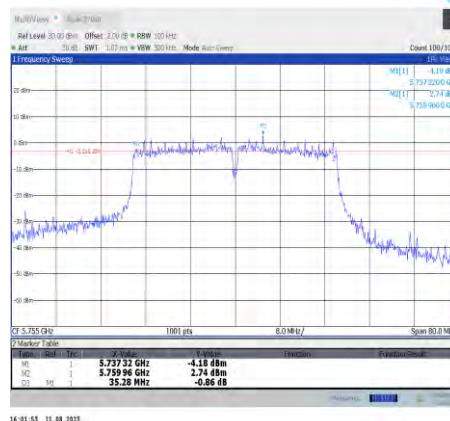
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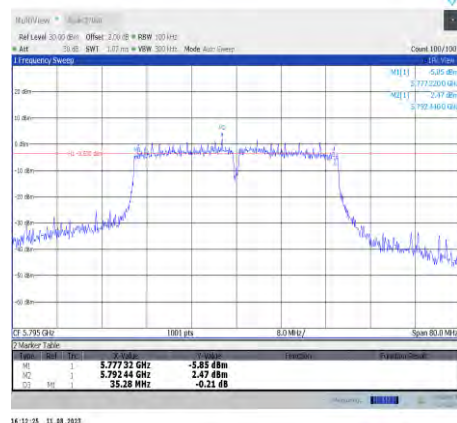
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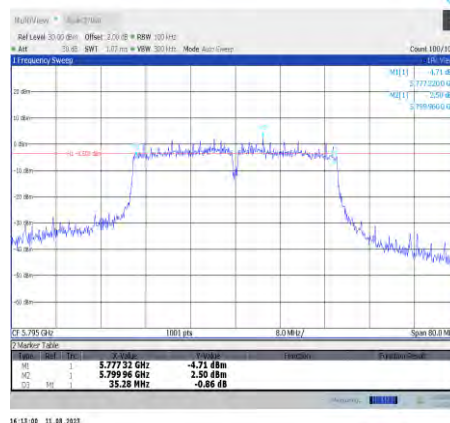
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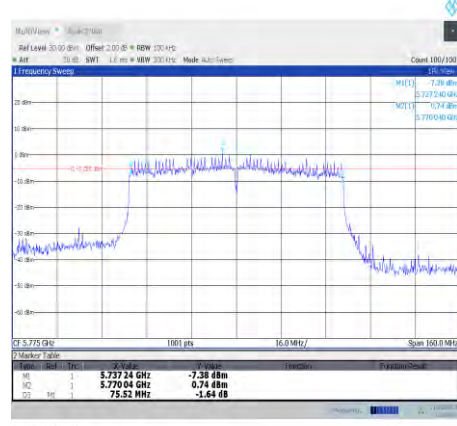
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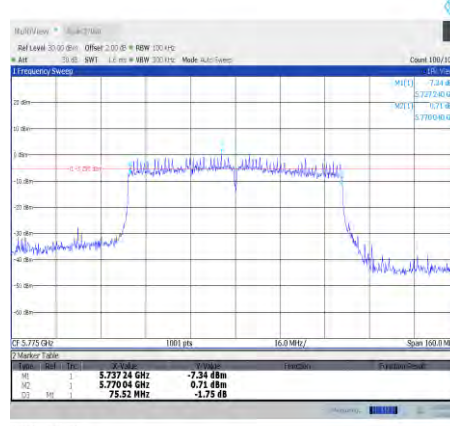
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11ac40MIMO-Ant12-5795



11ac80MIMO-Ant11-5775



11ac80MIMO-Ant12-5775



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