FCC TEST REPORT

Product Name: Hybrid Full-Touch Handheld computer

Trade Mark: TSC

Model No.: X40

Add. Model No.: N/A

Report Number: 26051324502RFC-4

Test Standards: FCC 47 CFR Part 15 Subpart E

FCC ID: VTVX40W1

Test Result: PASS

Date of Issue: October 19, 2026

Prepared for:

TSC Auto ID Technology Co., Ltd.
9F., No. 95, Minquan Rd. Xindian Dist., New Taipei City, Taiwan

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
16/F., Block A, Building 6, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, Guangdong, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Prepared by: David Chen
Senior Project Engineer

Reviewed by: Henry Lu
Team Leader

Approved by: Kevin Liang
Assistant Manager

UnionTrust Laboratories *Cancel*

Date: October 19, 2026

Version

Version No.	Date	Description
V1.0	October 19, 2026	Original

CONTENTS

1. GENERAL INFORMATION 4
   1.1 CLIENT INFORMATION 4
   1.2 EUT INFORMATION 4
      1.2.1 GENERAL DESCRIPTION OF EUT 4
      1.2.2 DESCRIPTION OF ACCESSORIES 4
   1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD 5
   1.4 OTHER INFORMATION 6
   1.5 DESCRIPTION OF SUPPORT UNITS 6
   1.6 TEST LOCATION 6
   1.7 TEST FACILITY 7
   1.8 DEVIATION FROM STANDARDS 7
   1.9 ABNORMALITIES FROM STANDARD CONDITIONS 7
   1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER 7
   1.11 MEASUREMENT UNCERTAINTY 7
2. TEST SUMMARY 8
3. EQUIPMENT LIST 9
4. TEST CONFIGURATION 10
   4.1 ENVIRONMENTAL CONDITIONS FOR TESTING 10
      4.1.1 NORMAL OR EXTREME TEST CONDITIONS 10
      4.1.2 RECORD OF NORMAL ENVIRONMENT AND TEST SAMPLE 10
   4.2 TEST CHANNELS 10
   4.3 EUT TEST STATUS 11
   4.4 PRE-SCAN 14
   4.5 TEST SETUP 15
      4.5.1 FOR RADIATED EMISSIONS TEST SETUP 15
      4.5.2 FOR CONDUCTED EMISSIONS TEST SETUP 16
      4.5.3 FOR CONDUCTED RF TEST SETUP 17
   4.6 SYSTEM TEST CONFIGURATION 17
   4.7 DUTY CYCLE 18
5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION 26
   5.1 REFERENCE DOCUMENTS FOR TESTING 26
   5.2 ANTENNA REQUIREMENT 26
   5.3 26 DB BANDWIDTH 27
   5.4 6 DB BANDWIDTH 125
   5.5 OCCUPIED BANDWIDTH 155
   5.6 MAXIMUM CONDUCTED OUTPUT POWER 283
   5.7 PEAK POWER SPECTRAL DENSITY 288
   5.8 RADIATED EMISSIONS AND BAND EDGE MEASUREMENT 420
   5.9 DYNAMIC FREQUENCY SELECTION 473
   5.10 AC POWER LINE CONDUCTED EMISSION 480

APPENDIX 1 PHOTOS OF TEST SETUP 483
APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS 483

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	TSC Auto ID Technology Co., Ltd.
Address of Applicant:	9F., No. 95, Minquan Rd. Xindian Dist., New Taipei City, Taiwan
Manufacturer:	TSC Auto ID Technology Co., Ltd.
Address of Manufacturer:	9F., No. 95, Minquan Rd. Xindian Dist., New Taipei City, Taiwan

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Hybrid Full-Touch Handheld computer		
Model No.:	X40		
Trade Mark:	TSC		
DUT Stage:	Identical Prototype		
EUT Supports Function: (Provided by the customer)	2.4 GHz ISM Band:	IEEE 802.11b/g/n/ax	
		Bluetooth V5.3	
		2nd BLE	
	U-NII 5 GHz Bands:	5 150 - 5 250 MHz	IEEE 802.11a/n/ac/ax
		5 250 - 5 350 MHz	IEEE 802.11a/n/ac/ax
		5 470 - 5 725 MHz	IEEE 802.11a/n/ac/ax
		5 725 - 5 850 MHz	IEEE 802.11a/n/ac/ax
	U-NII 6 GHz Bands:	5 925 - 6 425 MHz	IEEE 802.11ax
		6 425 - 6 525 MHz	IEEE 802.11ax
		6 525 - 6 875 MHz	IEEE 802.11ax
		6 875 - 7 125 MHz	IEEE 802.11ax
	RFID:	902 - 928 MHz	
	UWB:	6.0-8.5GHz	
	NFC:	13.553 MHz to 13.567 MHz	
Software Version:	R2.00 (Provided by the customer)		
Hardware Version:	REV0.3 (Provided by the customer)		
Sample Received Date:	May 13, 2026		
Sample Tested Date:	May 14, 2026 to June 30, 2026		
Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.			

1.2.2 Description of Accessories

Refer to Report 26051324502EMC-1 for accessories.

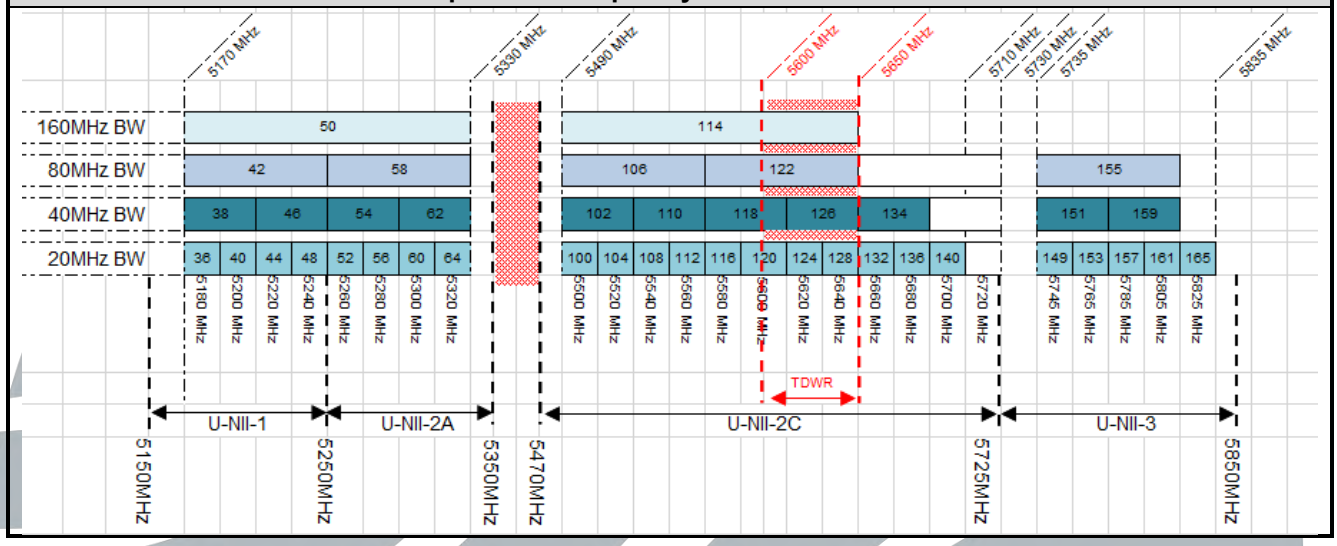
1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Bands:	5150 MHz to 5250 MHz (U-NII-1)				
	5250 MHz to 5350 MHz (U-NII-2A)				
	5470 MHz to 5725 MHz (U-NII-2C)				
	5725 MHz to 5850 MHz (U-NII-3)				
Frequency Ranges:	5180 MHz to 5240 MHz				
	5260 MHz to 5320 MHz				
	5500 MHz to 5700 MHz				
	5 745 MHz to 5 825 MHz				
Support Standards:	IEEE 802.11a/n/ac/ax				
TPC Function:	Not Support				
DFS Operational mode:	Slave without radar Interference detection function				
Type of Modulation:	IEEE 802.11a/n: OFDM (64QAM, 16QAM, QPSK, BPSK)				
	IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)				
	IEEE 802.11ax: ☑ OFDM (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK) ☑ OFDMA (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK)				
Channel Spacing:	IEEE 802.11a/n-HT20/ac-VHT20/ax-HE20: 20 MHz				
	IEEE 802.11n-HT40/ac-VHT40/ax-HE40: 40 MHz				
	IEEE 802.11ac-VHT80/ax-HE80: 80 MHz				
	IEEE 802.11ac-VHT160/ax-HE160: 160 MHz				
Data Rate:	IEEE 802.11a: Up to 54 Mbps				
	IEEE 802.11n: Up to MCS15				
	IEEE 802.11ac-VHT20: Up to MCS8				
	IEEE 802.11ac-VHT40/VHT80/VHT160: Up to MCS9				
	IEEE 802.11ax-HE20/HE40/HE80/HE160: Up to MCS11				
Number of Channels:	5150 MHz to 5350 MHz: 8 for 802.11a/n-HT20/ac-VHT20/ax-HE20 4 for 802.11n-HT40)/ac-VHT40/ax-HE40 2 for 802.11ac-VHT80/ax-HE80 1 for 802.11ac-VHT160/ax-HE160				
	5470 MHz to 5725 MHz: 11 for 802.11a/n-HT20/ac-VHT20/ax-HE20 5 for 802.11n-HT40)/ac-VHT40/ax-HE40 2 for 802.11ac-VHT80/ax-HE80 1 for 802.11ac-VHT160/ax-HE160				
	5725 MHz to 5850 MHz: 5 for IEEE 802.11a/n-HT20/ac-VHT20/ax-HE20 2 for IEEE 802.11n-HT40/ac-VHT40/ax-HE40 1 for IEEE 802.11ac-VHT80/ax-HE80				
Antenna Type: (Provided by the customer)	Antenna 5 (Chain 0)	LDS Antenna			
	Antenna 6 (Chain 1)	LDS Antenna			
Antenna Gain (dBi): (Provided by the customer)	**Antenna**	**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	Antenna 5 (Chain 0)	0.42	0.42	-0.91	-1.12
	Antenna 6 (Chain 1)	0.97	0.97	-0.02	-0.62
Maximum conducted output power (dBm):	**Mode**	**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	IEEE 802.11a:	13.21	13.14	13.22	13.19
	IEEE 802.11n-HT20:	12.73	12.63	12.40	12.61
	IEEE 802.11n-HT40:	12.10	12.07	11.91	11.91
	IEEE 802.11ac-VHT20	12.51	12.41	12.57	12.69
	IEEE 802.11ac-VHT40	12.20	12.19	12.22	12.13

	IEEE 802.11ac-VHT80:	11.90	12.02	12.20	11.90
	IEEE 802.11ac-VHT160:	12.05		11.75	N/A
	IEEE 802.11ax-HE20:	12.11	12.21	12.09	11.96
	IEEE 802.11ax-HE40:	11.97	12.25	12.10	12.13
	IEEE 802.11ax-HE80:	12.24	11.89	11.99	11.82
	IEEE 802.11ax-HE160:	12.10		11.98	N/A
Normal Test Voltage:	3.87 Vdc and/or 120V~60Hz				

1.4 OTHER INFORMATION

Operation Frequency Each of Channel



1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	FCC ID	Supplied by
Notebook	DELL	Inspiron 5409	EX: 13030041123	N/A	UnionTrust
Mouse	DELL	MS116t1	CN-0RWN6P-LO300 -18N-0GVP	N/A	UnionTrust
ROG Rapture Tri-band Gaming Router	ASUS	GT-AXE11000	M3IAJF201746	MSQ-RTAX JF00	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.3 Meter	UnionTrust

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F., Block A, Building 6, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, Guangdong, China
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.7 TEST FACILITY

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

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±3.1 dB
3	Radiated emission 9kHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.6 dB
5	Radiated emission 1GHz-18GHz	± 4.4 dB
6	Radiated emission 18GHz-26GHz	± 4.6 dB
7	Radiated emission 26GHz-40GHz	± 4.6 dB
8	Conducted spurious emissions	± 2.7 dB
9	RF Power, Conducted	± 0.68 dB
10	Occupied Bandwidth	± 1.86 %
11	Radio Frequency	± 6.4 x 10^{-8}
12	Transmission Time	± 0.19 %

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart E Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203 FCC 47 CFR Part 15 Subpart E Section 15.407(a)(1) (2)	N/A	PASS Note 1)
26 dB emission bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(2)(5)	KDB 789033 D02 v02r01 Section C.1	PASS Note 1)
6 dB bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (e)	KDB 789033 D02 v02r01 Section C.2	PASS Note 1)
Occupied Bandwidth	N/A	KDB 789033 D02 v02r01 Section II.D	None; for reporting purposes only. Note 1)
Maximum conducted output power	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v02r01 Section E.3.a (Method PM)	PASS Note 1)
Peak Power Spectral Density	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v02r01 Section F	PASS Note 1)
Radiated Emissions and Band Edge Measurement	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(6) FCC 47 CFR Part 15 Subpart C Section 15.209/205	KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6	PASS Note 1)
Dynamic Frequency Selection	FCC 47 CFR Part 15 Subpart E Section 15.407 (h)	KDB 905462 D03 Client Without DFS New Rules v01r02	PASS Note 1)
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(6) FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2020, Section 6.2.	PASS Note 1)
Duty Cycle	N/A	KDB 789033 D02 v02r01 Section II.B.1	None; for reporting purposes only. Note 1)

Note:
1) This report base on the previous report 26051324500RFC-4 (FCC ID: VTVX40), remove WWAN and GNSS functions. After evaluation, all test data and photos refer to report 26051324500RFC-4 except for spot-checking Maximum conducted output power

Disclaimer and Explanations:
The declared of product specification and data (e.g., antenna gain, RF specification, etc) for EUT presented in the report are provided by the customer, and the customer takes all the responsibilities for the accuracy of product specification.

For Dynamic Frequency Selection

Test Case	Result
Channel Availability Check Time	N/A Note 1)
U-NII Detection Bandwidth	N/A Note 1)
Channel Closing Transmission Time	PASS Note 2)
Channel Move Time	PASS Note 2)
DFS Detection Threshold	N/A Note 1)
Non- Occupancy Period	N/A Note 1)

Note:
1) The EUT is slave, NA In this whole report not applicable.
2) This report base on the previous report 26051324500RFC-4 (FCC ID: VTVX40), remove WWAN and GNSS functions. After evaluation, all test data and photos refer to report 26051324500RFC-4.

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☑	3m SAC	ETS-LINDGREN	3M	Euroshiedpn-CT001270-1317	11-Nov-2023	10-Nov-2026
☑	Receiver	R&S	ESIB26	100114	24-Oct-2025	23-Oct-2026
☑	Spectrum analyzer	ROHDE & SCHWARZ	FSV40-N	101653	20-Mar-2026	19-Mar-2027
☑	Loop Antenna	ETS-LINDGREN	6502	00202525	26-Jan-2026	25-Jan-2027
☑	Broadband Antenna	ETS-LINDGREN	3142E	00201566	26-Oct-2025	25-Oct-2026
☑	6dB Attenuator	Talent	RA6A5-N-18	18103001	26-Oct-2025	25-Oct-2026
☑	Preamplifier	HP	8447F	2805A02960	24-Oct-2025	23-Oct-2026
☑	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	21-Mar-2026	20-Mar-2027
☑	Pre-amplifier	ETS-LINDGREN	00118385	00201874	21-Mar-2026	20-Mar-2027
☑	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	30-Oct-2025	29-Oct-2026
☑	Pre-amplifier	ETS-LINDGREN	00118384	00202652	24-Oct-2025	23-Oct-2026
☑	Band Rejection Filter (5150MHz~5880MHz)	Micro-Tronics	BRM50716	G186	24-Oct-2025	23-Oct-2026
☑	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☑	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☑	LISN	ROHDE & SCHWARZ	ENV216	3560.6550.12	22-Jan-2026	21-Jan-2027
☐	LISN	ETS-Lindgren	3816/2SH	00201088	22-Jan-2026	21-Jan-2027
☑	Receiver	ROHDE & SCHWARZ	ESCI 3	101192	24-Oct-2025	23-Oct-2026
☑	Shielding room	ETS-Lindgren	843	Euroshiedpn-CT001270-1246	25-Oct-2024	24-Oct-2027
☑	Test Software	EZ-EMC	EZ-CON	Software Version: EMC-CON 3A1.1		

RF Conducted Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☑	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	20-Mar-2026	19-Mar-2027
☑	Shielding room	ETS-Lindgren	333	Euroshiedpn-TJ2343-S1608	20-Mar-2026	19-Mar-2029
☑	MXG-B RF Vector Signal Generator	KEYSIGHT	N5182B	MY61350133	20-Mar-2026	19-Mar-2027
☑	Automatic control switch	Tonscend	JS0806-2	24G80620875	N/A	N/A
☑	Test Software	Tonscend	JS1120-3	Software Version: V3.5.39		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage	Relative Humidity (%)
NT/NV	+15 to +35	3.87Vdc and/or 120 Vac	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment and Test Sample

Test Item	Sample No.	Tested by
AC Power Line Conducted Emission	S202605138612-ZJA03/26	Shirley Wu
26 dB emission bandwidth	S202605138612-ZJA15/26	Alan Jia
Maximum conducted output power		
Peak Power Spectral Density		
6 dB bandwidth		
Dynamic Frequency Selection		
Radiated Emissions and Band Edge Measurement	S202605138612-ZJA03/26	Leo Li

Spot-check

Test Item	Sample No.	Tested by
Maximum conducted output power	S202605138612-ZJA08/26	Alan Jia

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11a IEEE 802.11n-HT20 IEEE 802.11ac-VHT20 IEEE 802.11ax-HE20	5150 - 5250 MHz	Channel 36	Channel 40	Channel 48
		5180 MHz	5200 MHz	5240 MHz
	5250 - 5350 MHz	Channel 52	Channel 60	Channel 64
		5260 MHz	5300 MHz	5320 MHz
	5470 - 5725 MHz	Channel 100	Channel 120	Channel 140
		5500 MHz	5600 MHz	5700 MHz
	5725 - 5850 MHz	Channel 149	Channel 157	Channel 165
		5745 MHz	5785 MHz	5825 MHz
IEEE 802.11n-HT40 IEEE 802.11ac-VHT40 IEEE 802.11ax-HE40	5150 - 5250 MHz	Channel 38	--	Channel 46
		5190 MHz	--	5230 MHz
	5250 - 5350 MHz	Channel 54	--	Channel 62
		5270 MHz	--	5310 MHz
	5470 - 5725 MHz	Channel 102	Channel 118	Channel 134
		5510 MHz	5590 MHz	5670 MHz
	5725 - 5850 MHz	Channel 151	--	Channel 159
		5755 MHz	--	5795 MHz
IEEE 802.11ac-VHT80 IEEE 802.11ax-HE80	5150 - 5250 MHz	--	Channel 42	--
		--	5210 MHz	--
	5250 - 5350 MHz	--	Channel 58	--

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
		--	5290 MHz	--
	5470 - 5725 MHz	Channel 106	--	Channel 122
		5530 MHz	--	5610 MHz
	5725 - 5850 MHz	--	Channel 155	--
		--	5775 MHz	--
IEEE 802.11ac-VHT160 IEEE 802.11ax-HE160	5150 - 5350 MHz	Channel 50		
		5250 MHz		
	5470 - 5725 MHz	Channel 114		
		5570 MHz		
	5725 - 5850 MHz			

4.3 EUT TEST STATUS

Mode	Tx/Rx Function	Description
IEEE 802.11a	1Tx/1Rx	1. Keep the EUT in continuously transmitting or receiving with modulation and data rates test single. 2. Keep the equipment in normal operation and achieve a certain throughput.
IEEE 802.11n IEEE 802.11ac IEEE 802.11ax	2Tx/2Rx	

Power Setting (Provided by the customer)				
Test Mode	RU & Index	Freq. [MHz]	Set Power	
			Ant 5 (Chain 0)	Ant 6 (Chain 1)
11A	---	5180	15	18
11A	---	5200	15	18
11A	---	5240	14	17
11A	---	5260	14	16.5
11A	---	5280	14	16
11A	---	5320	15	15
11A	---	5500	13	13
11A	---	5600	12	16
11A	---	5700	12	16
11A	---	5745	13	16
11A	---	5785	14	16
11A	---	5825	14	16
11N20MIMO	---	5180	13.5	13.5
11N20MIMO	---	5200	13	13
11N20MIMO	---	5240	12.5	12.5
11N20MIMO	---	5260	12	12
11N20MIMO	---	5280	12	12
11N20MIMO	---	5320	12	12
11N20MIMO	---	5500	9.5	9.5
11N20MIMO	---	5600	10.5	10.5
11N20MIMO	---	5700	11	11
11N20MIMO	---	5745	11	11
11N20MIMO	---	5785	11.5	11.5
11N20MIMO	---	5825	12	12
11N40MIMO	---	5190	12.5	12.5
11N40MIMO	---	5230	12	12
11N40MIMO	---	5270	11.5	11.5
11N40MIMO	---	5310	11.5	11.5

Power Setting (Provided by the customer)				
Test Mode	RU & Index	Freq. [MHz]	Set Power	
			Ant 5 (Chain 0)	Ant 6 (Chain 1)
11N40MIMO	---	5510	9	9
11N40MIMO	---	5590	9.5	9.5
11N40MIMO	---	5670	10	10
11N40MIMO	---	5755	11	11
11N40MIMO	---	5795	11	11
11AC20MIMO	---	5180	13.5	13.5
11AC20MIMO	---	5200	13	13
11AC20MIMO	---	5240	12	12
11AC20MIMO	---	5260	12	12
11AC20MIMO	---	5280	12	12
11AC20MIMO	---	5320	12	12
11AC20MIMO	---	5500	10	10
11AC20MIMO	---	5600	10.5	10.5
11AC20MIMO	---	5700	11.5	11.5
11AC20MIMO	---	5745	11.5	11.5
11AC20MIMO	---	5785	12	12
11AC20MIMO	---	5825	12	12
11AC40MIMO	---	5190	12.5	12.5
11AC40MIMO	---	5230	12	12
11AC40MIMO	---	5270	11.5	11.5
11AC40MIMO	---	5310	11.5	11.5
11AC40MIMO	---	5510	9	9
11AC40MIMO	---	5590	10	10
11AC40MIMO	---	5670	10.5	10.5
11AC40MIMO	---	5755	11	11
11AC40MIMO	---	5795	11.5	11.5
11AC80MIMO	---	5210	12.5	12.5
11AC80MIMO	---	5290	11.5	11.5
11AC80MIMO	---	5530	10	10
11AC80MIMO	---	5610	10.5	10.5
11AC80MIMO	---	5775	11.5	11.5
11AC160MIMO	---	5250	12	12
11AC160MIMO	---	5570	10	10
11AX20MIMO	FULL/SU	5180	13	13
11AX20MIMO	FULL/SU	5200	12.5	12.5
11AX20MIMO	FULL/SU	5240	12	12
11AX20MIMO	FULL/SU	5260	12	12
11AX20MIMO	FULL/SU	5280	11.5	11.5
11AX20MIMO	FULL/SU	5320	11.5	11.5
11AX20MIMO	FULL/SU	5500	9	9
11AX20MIMO	FULL/SU	5600	10	10
11AX20MIMO	FULL/SU	5700	10.5	10.5
11AX20MIMO	FULL/SU	5745	10.5	10.5
11AX20MIMO	FULL/SU	5785	11	11
11AX20MIMO	FULL/SU	5825	11	11
11AX20MIMO	106RU53	5180	10	10
11AX20MIMO	106RU54	5200	9.5	9.5
11AX20MIMO	106RU54	5240	9	9
11AX20MIMO	106RU53	5260	9	9
11AX20MIMO	106RU54	5280	8.5	8.5
11AX20MIMO	106RU54	5320	8.5	8.5
11AX20MIMO	106RU53	5500	6	6
11AX20MIMO	106RU54	5600	7	7

Power Setting (Provided by the customer)				
Test Mode	RU & Index	Freq. [MHz]	Set Power	
			Ant 5 (Chain 0)	Ant 6 (Chain 1)
11AX20MIMO	106RU54	5700	7.5	7.5
11AX20MIMO	106RU53	5745	7.5	7.5
11AX20MIMO	106RU54	5785	8	8
11AX20MIMO	106RU54	5825	8	8
11AX20MIMO	52RU37	5180	7	7
11AX20MIMO	52RU39	5200	6.5	6.5
11AX20MIMO	52RU40	5240	6	6
11AX20MIMO	52RU37	5260	6	6
11AX20MIMO	52RU39	5280	5.5	5.5
11AX20MIMO	52RU40	5320	5.5	5.5
11AX20MIMO	52RU37	5500	3	3
11AX20MIMO	52RU39	5600	4	4
11AX20MIMO	52RU40	5700	4.5	4.5
11AX20MIMO	52RU37	5745	4.5	4.5
11AX20MIMO	52RU39	5785	5	5
11AX20MIMO	52RU40	5825	5	5
11AX20MIMO	26RU0	5180	4	4
11AX20MIMO	26RU4	5200	3.5	3.5
11AX20MIMO	26RU8	5240	3	3
11AX20MIMO	26RU0	5260	3	3
11AX20MIMO	26RU4	5280	2.5	2.5
11AX20MIMO	26RU8	5320	2.5	2.5
11AX20MIMO	26RU0	5500	0	0
11AX20MIMO	26RU4	5600	1	1
11AX20MIMO	26RU8	5700	1.5	1.5
11AX20MIMO	26RU0	5745	1.5	1.5
11AX20MIMO	26RU4	5785	2	2
11AX20MIMO	26RU8	5825	2	2
11AX40MIMO	FULL/SU	5190	13	13
11AX40MIMO	FULL/SU	5230	12	12
11AX40MIMO	FULL/SU	5270	12	12
11AX40MIMO	FULL/SU	5310	12	12
11AX40MIMO	FULL/SU	5510	9.5	9.5
11AX40MIMO	FULL/SU	5590	10	10
11AX40MIMO	FULL/SU	5670	10.5	10.5
11AX40MIMO	FULL/SU	5755	11	11
11AX40MIMO	FULL/SU	5795	11.5	11.5
11AX80MIMO	FULL/SU	5210	13	13
11AX80MIMO	FULL/SU	5290	11.5	11.5
11AX80MIMO	FULL/SU	5530	10	10
11AX80MIMO	FULL/SU	5610	10.5	10.5
11AX80MIMO	FULL/SU	5775	11.5	11.5
11AX160MIMO	FULL/SU	5250	12	12
11AX160MIMO	FULL/SU	5570	10	10

Test Software (Provided by the customer)
QRCT4

4.4 PRE-SCAN

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below

Mode	Worst-case data rates
IEEE 802.11a	6 Mbps
IEEE 802.11n-HT20	MCS0
IEEE 802.11n-HT40	MCS0
IEEE 802.11ac-VHT20	MCS0
IEEE 802.11ac-VHT40	MCS0
IEEE 802.11ac-VHT80	MCS0
IEEE 802.11ac-VHT160	MCS0
IEEE 802.11ax-HE20	MCS0
IEEE 802.11ax-HE40	MCS0
IEEE 802.11ax-HE80	MCS0
IEEE 802.11ax-HE160	MCS0

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

Figure 1. Below 30MHz

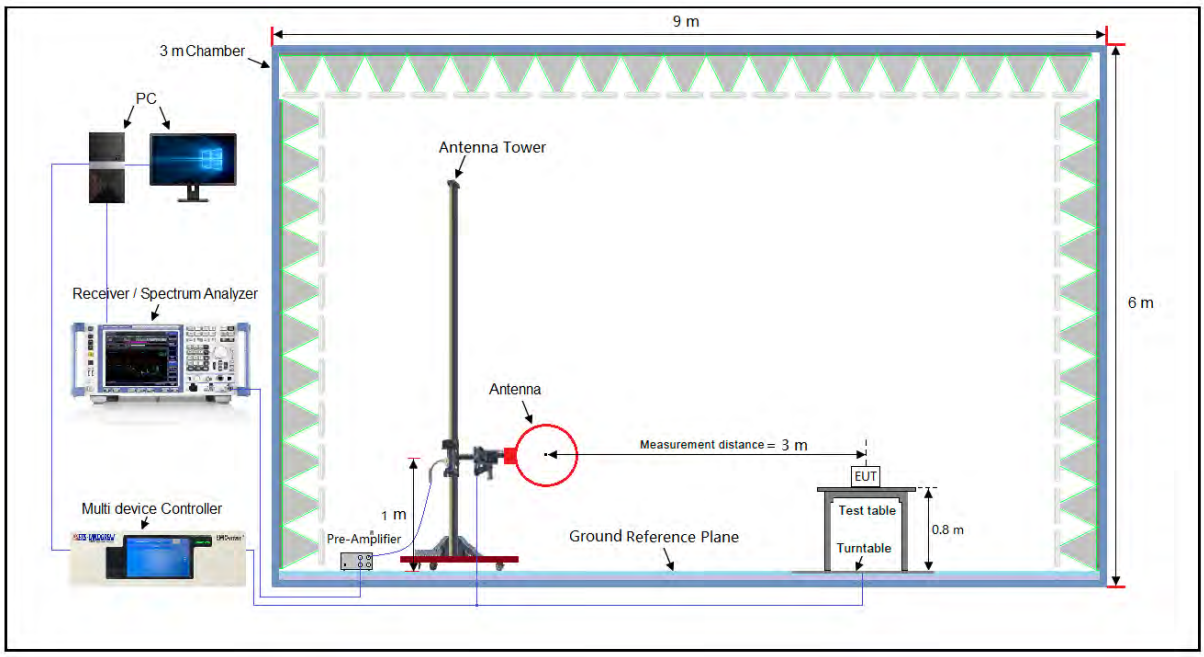


Figure 2. 30MHz to 1GHz

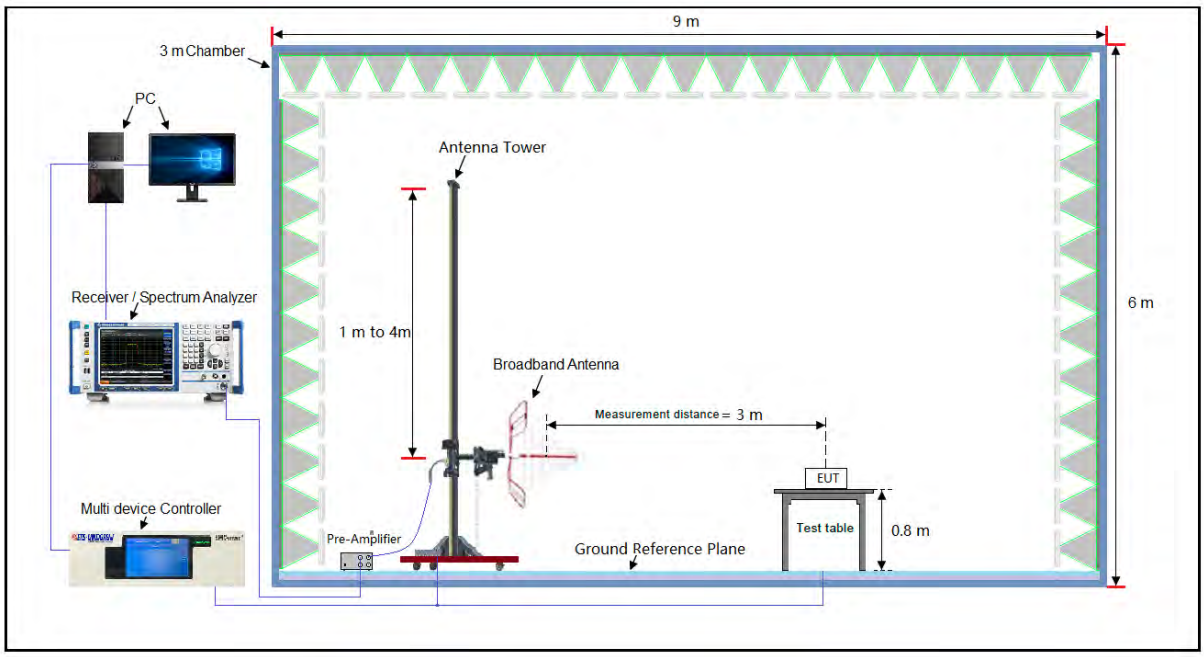
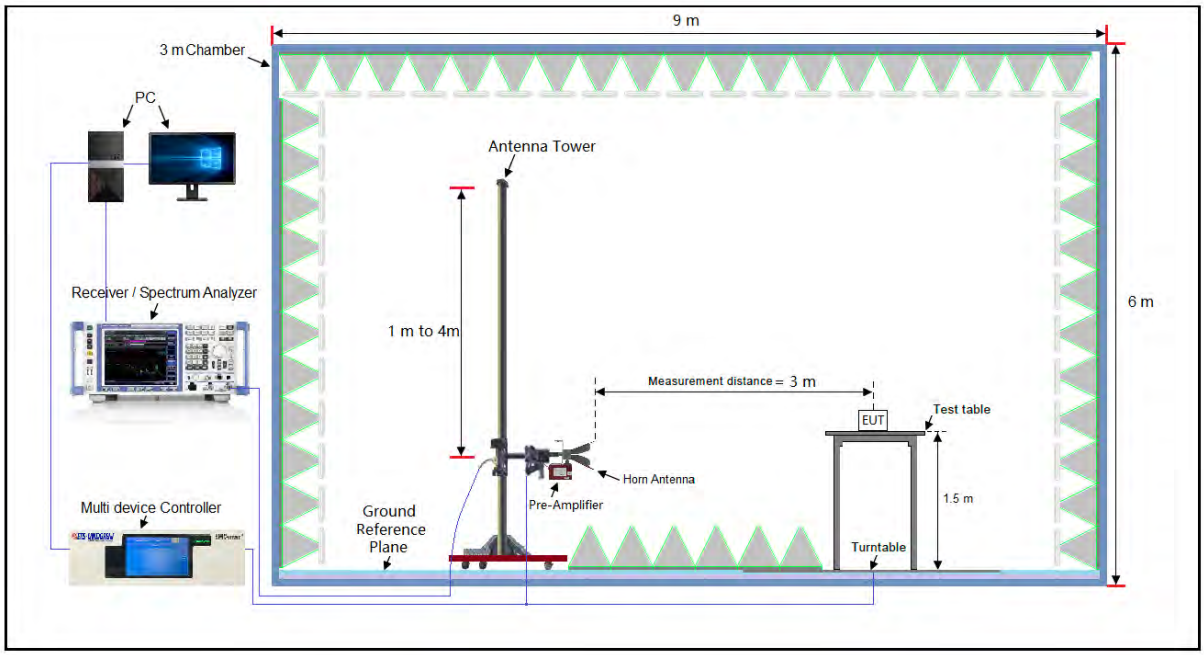
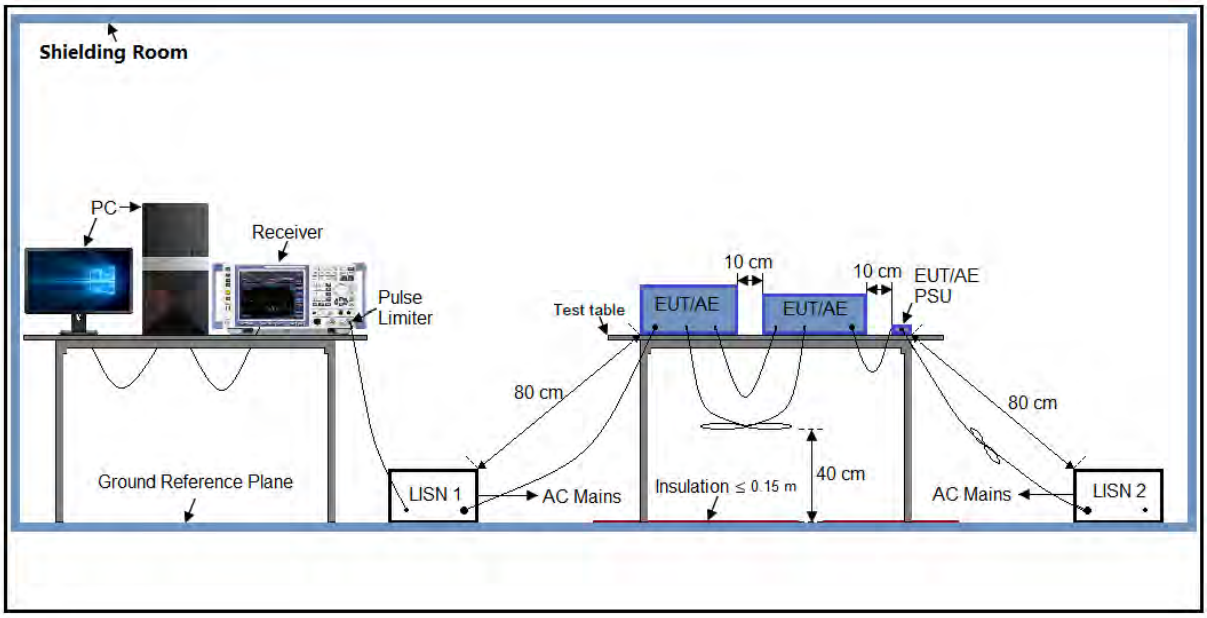


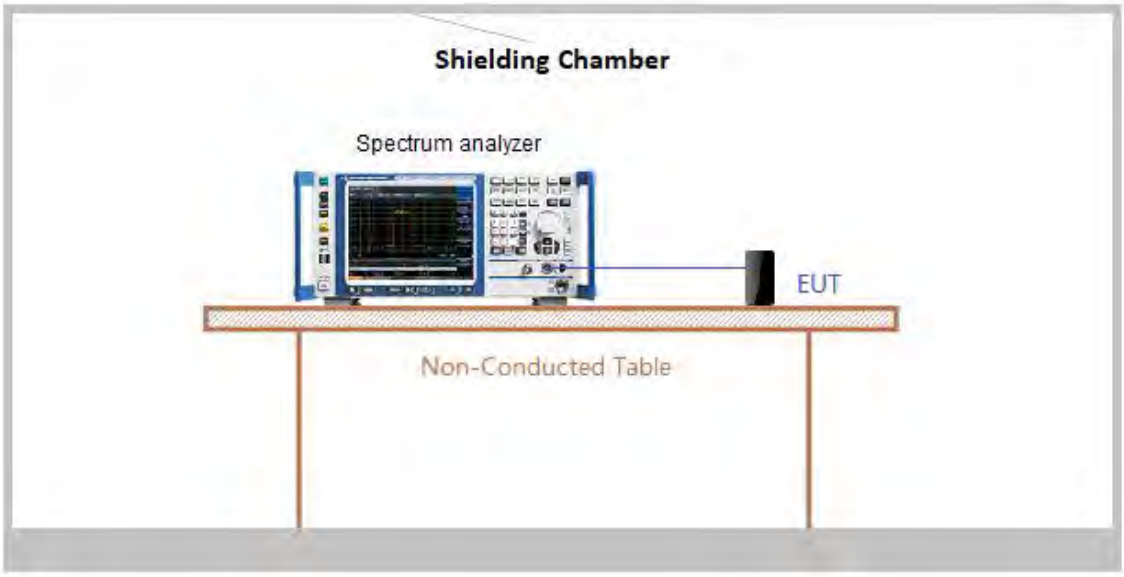
Figure 3. Above 1GHz



4.5.2 For Conducted Emissions test setup



4.5.3 For Conducted RF test setup



Normal Environment

4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a **3.87**V battery. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in orientation.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

With same mode on Full RU, Partial RU and SU, investigation was performed on both band edge and radiated spurious emissions to determine the worst case, and SU mode was determined to be the worst case.

For band edge and radiated spurious emissions, 802.11ac VT20/40 Covered by 802.11n HT20/40.

4.7 DUTY CYCLE

Test Procedure: KDB 789033 D02 v02r01 Section II.B.1

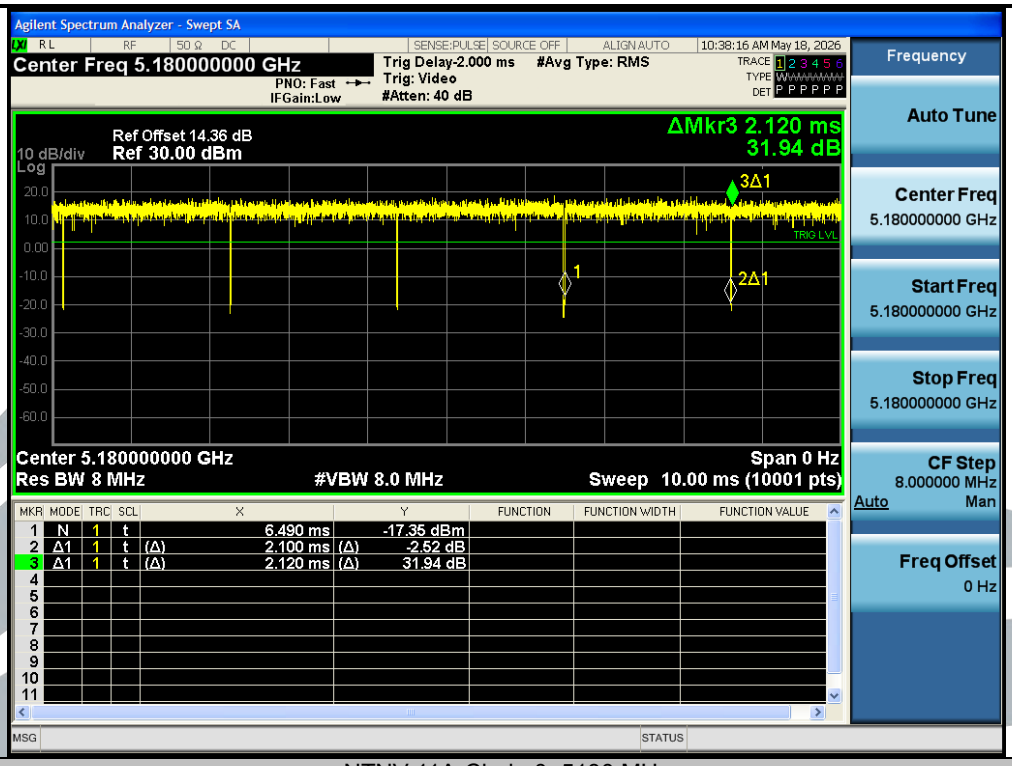
Test Results

Mode	Data Rates	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/T Minimum VBW (kHz)
11A	6 Mbps	2.10	2.12	0.9906	99.06	0.04	0.48
11N20MIMO	MCS 0	5.43	5.45	0.9963	99.63	0.02	0.18
11N40MIMO	MCS 0	5.43	5.45	0.9963	99.63	0.02	0.18
11AC20MIMO	MCS 0	5.43	5.45	0.9963	99.63	0.02	0.18
11AC40MIMO	MCS 0	5.43	5.45	0.9963	99.63	0.02	0.18
11AC80MIMO	MCS 0	5.42	5.44	0.9963	99.63	0.02	0.18
11AC160MIMO	MCS 0	5.43	5.44	0.9982	99.82	0.01	0.18
11AX20MIMO_SU	MCS 0	5.44	5.46	0.9963	99.63	0.02	0.18
11AX40MIMO_SU	MCS 0	5.44	5.46	0.9963	99.63	0.02	0.18
11AX80MIMO_SU	MCS 0	5.44	5.46	0.9963	99.63	0.02	0.18
11AX160MIMO_SU	MCS 0	5.45	5.46	0.9982	99.82	0.01	0.18
11AX20MIMO_26RU	MCS 0	5.08	5.10	0.9961	99.61	0.02	0.20
11AX20MIMO_52RU	MCS 0	5.07	5.09	0.9961	99.61	0.02	0.20
11AX20MIMO_106RU	MCS 0	2.65	2.67	0.9925	99.25	0.03	0.38

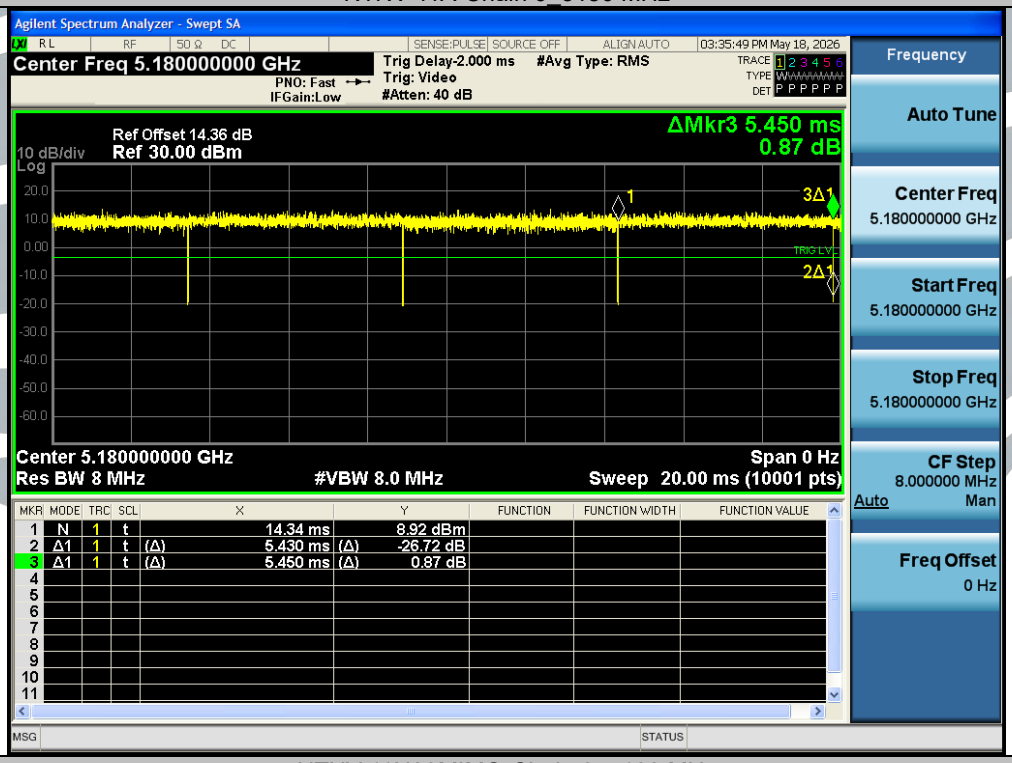
Note:
1). There is same duty cycle factor on 1TX and 2TX
2). There is same duty cycle factor on Chain 0 and Chain 1
3). There is same duty cycle factor on U-NII-1, U-NII-2A, U-NII-2C and U-NII-3

Remark:
1) Duty cycle= On Time/ Period;
2) Duty Cycle factor = 10 * log(1/ Duty cycle);

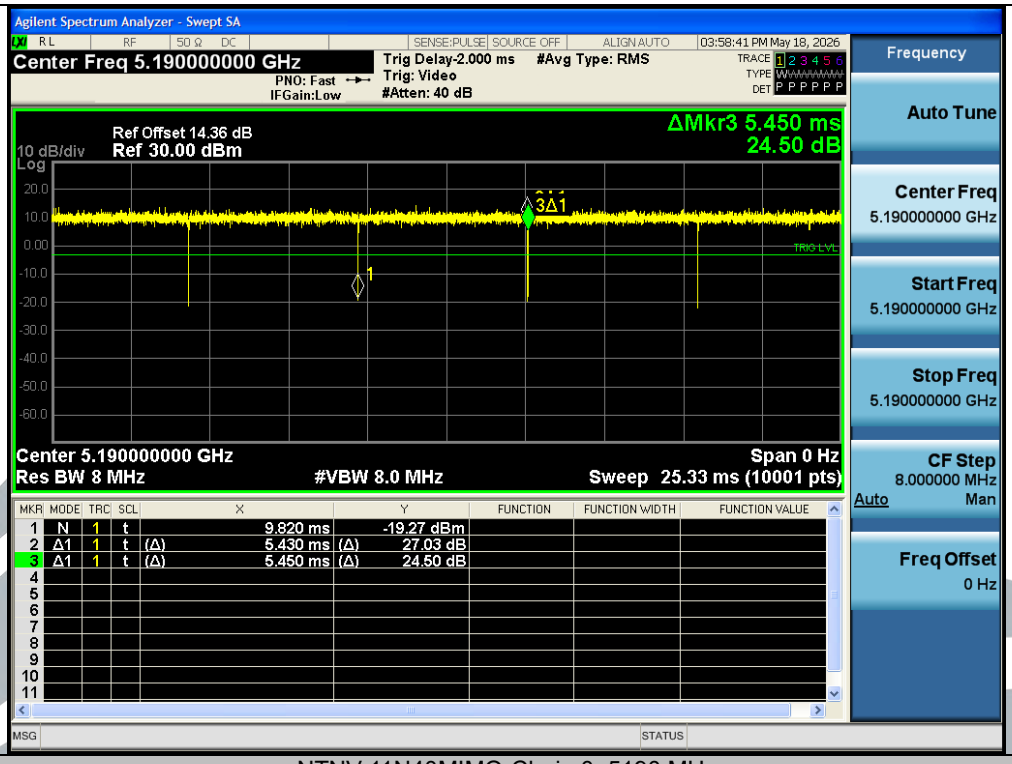
The test plots as follows



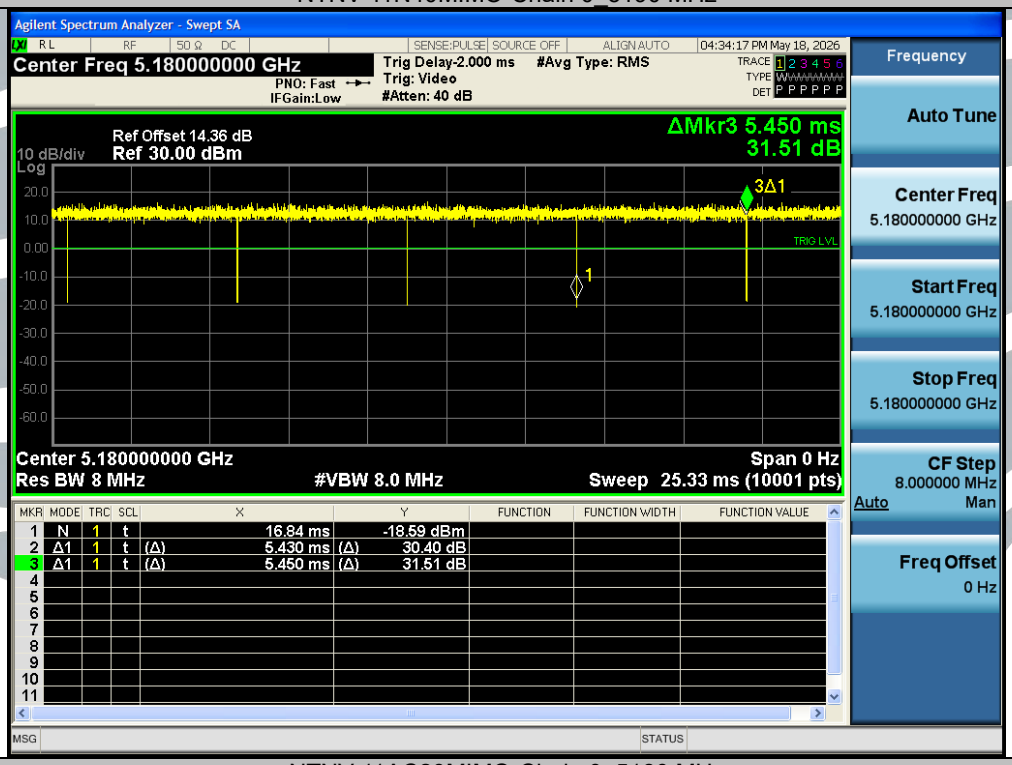
NTNV-11A-Chain 0_5180 MHz



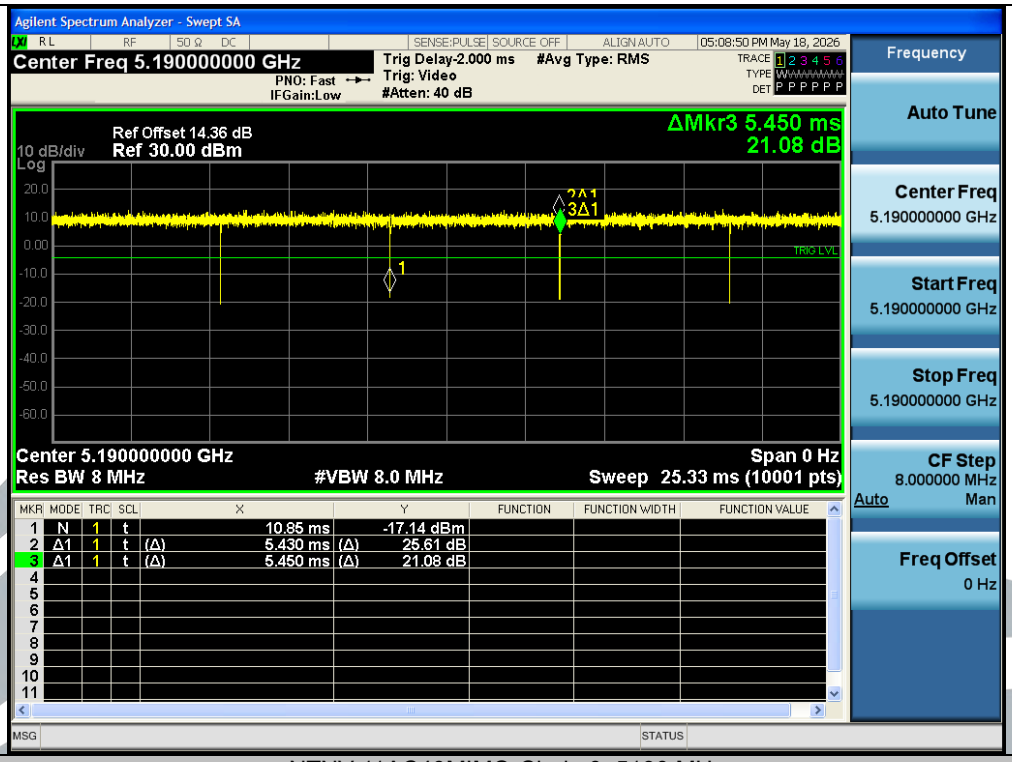
NTNV-11N20MIMO-Chain 0_5180 MHz



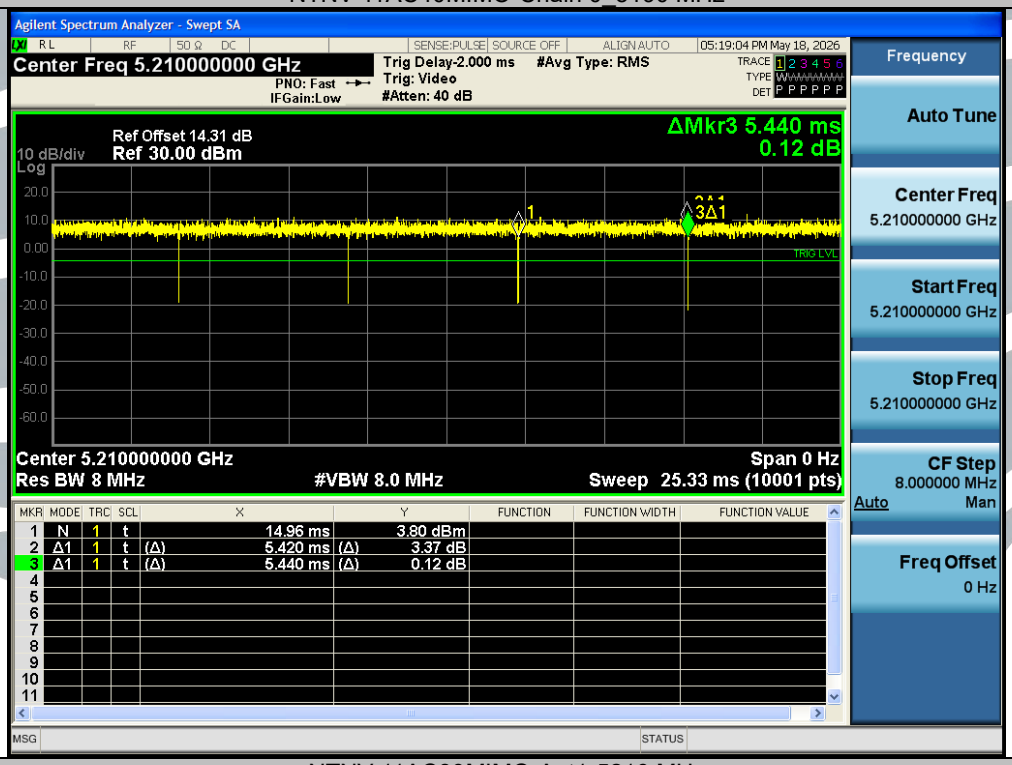
NTNV-11N40MIMO-Chain 0_5190 MHz



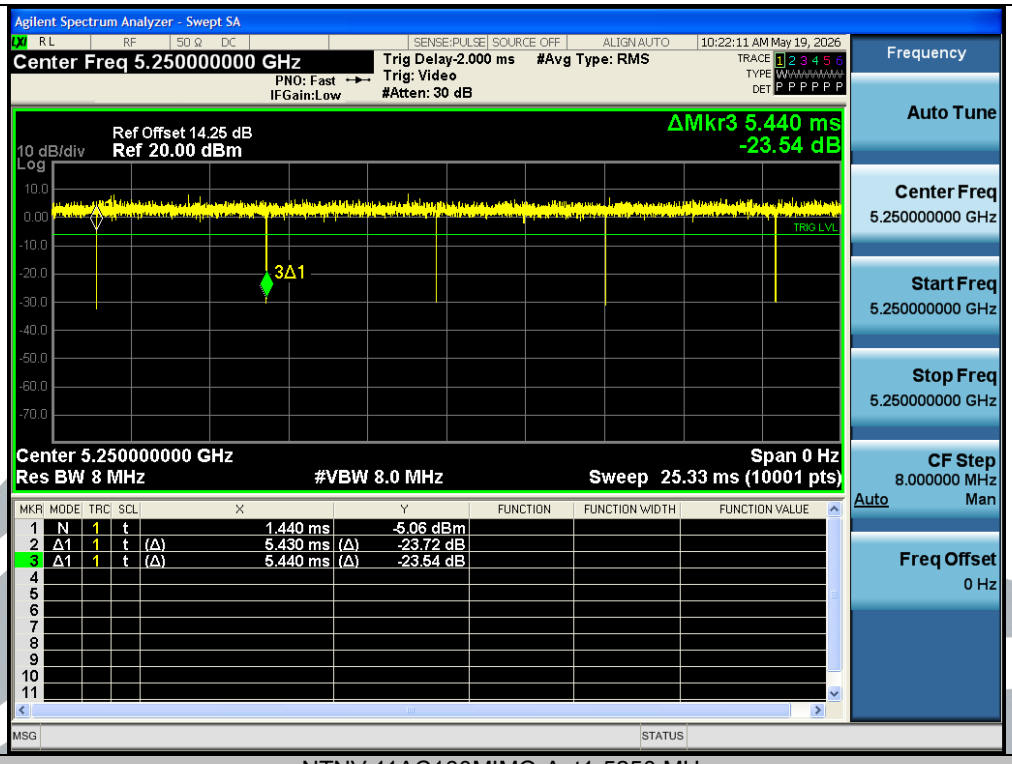
NTNV-11AC20MIMO-Chain 0_5180 MHz



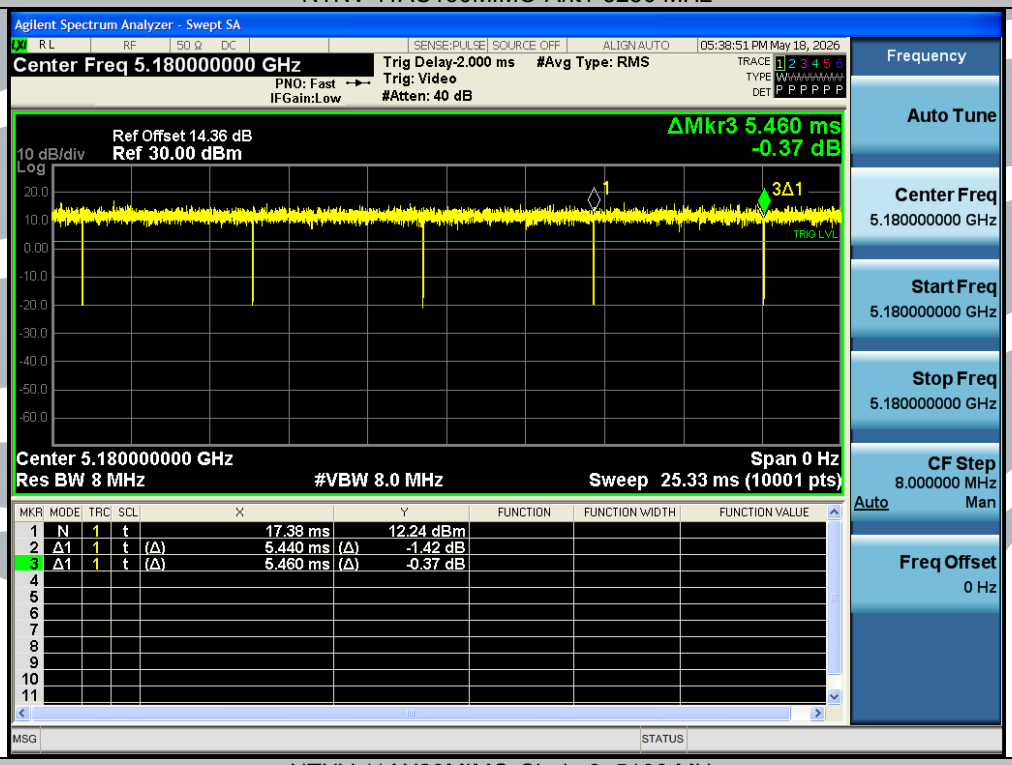
NTNV-11AC40MIMO-Chain 0_5190 MHz



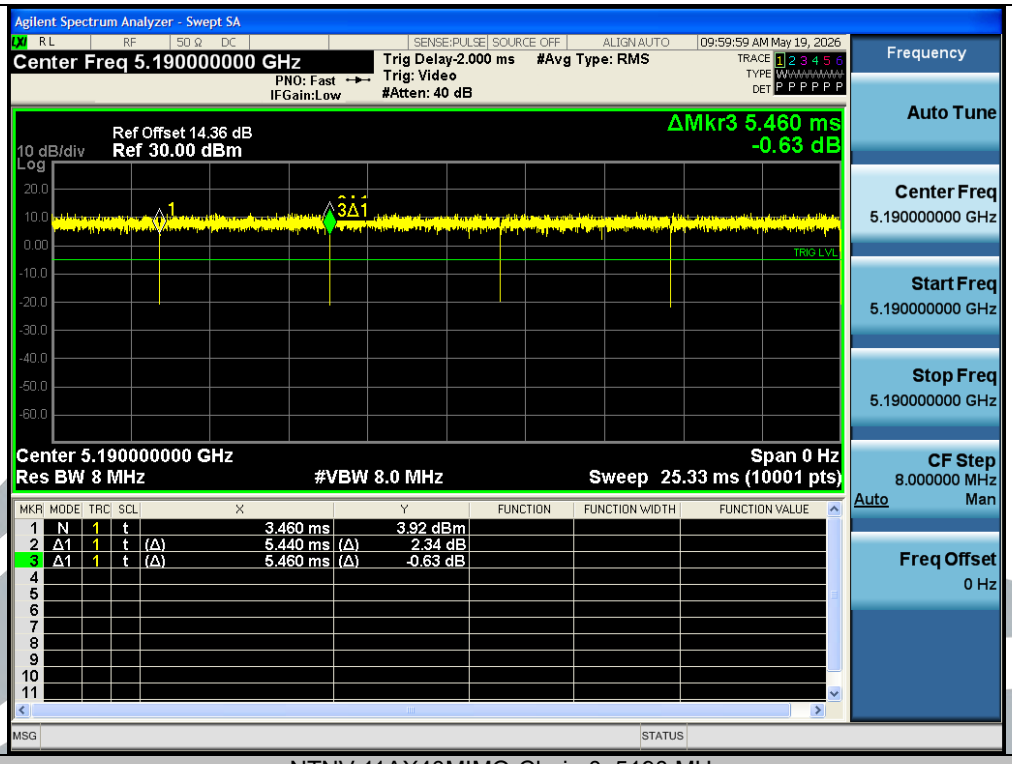
NTNV-11AC80MIMO-Ant1-5210 MHz



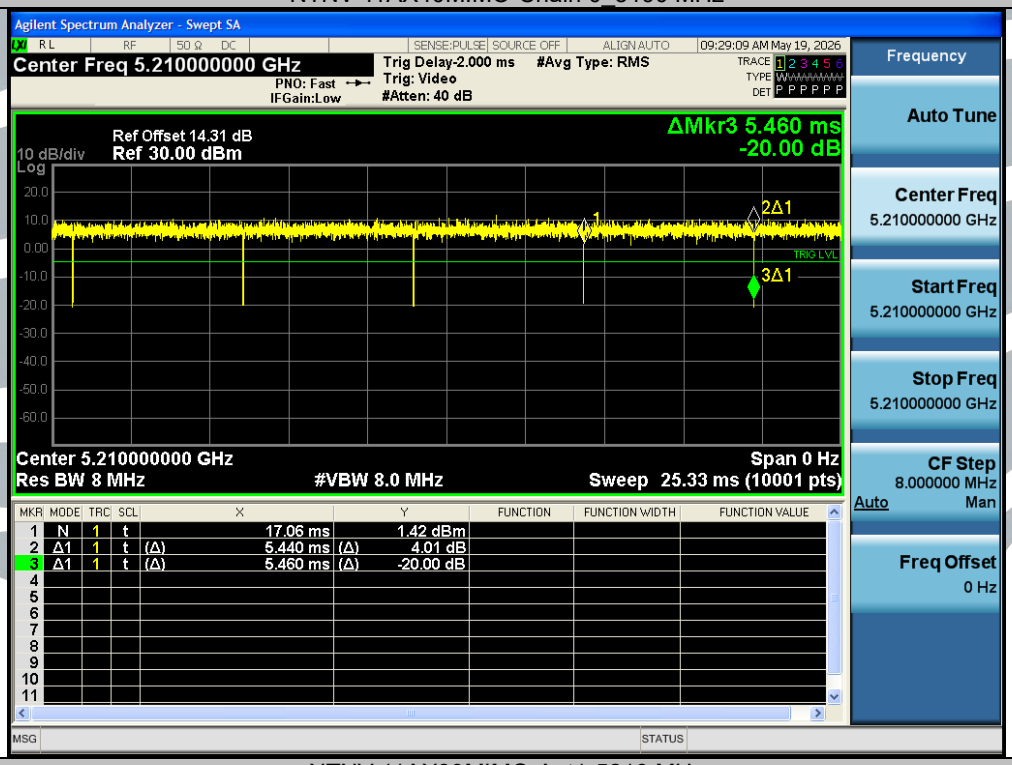
NTNV-11AC160MIMO-Ant1-5250 MHz



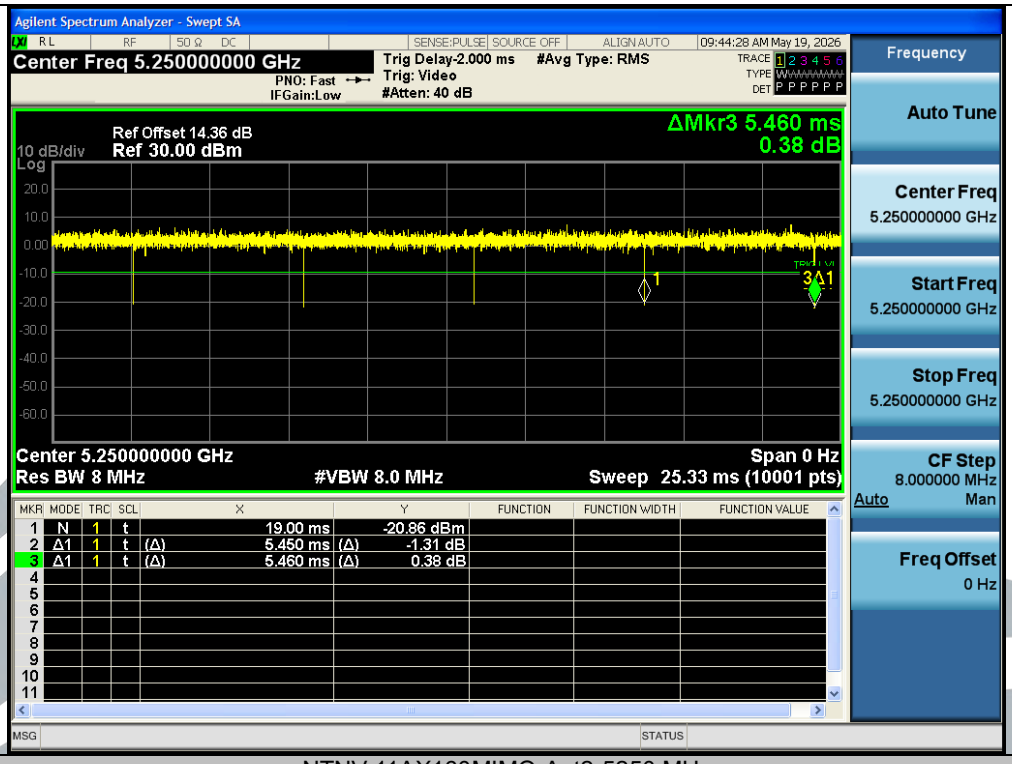
NTNV-11AX20MIMO-Chain 0_5180 MHz



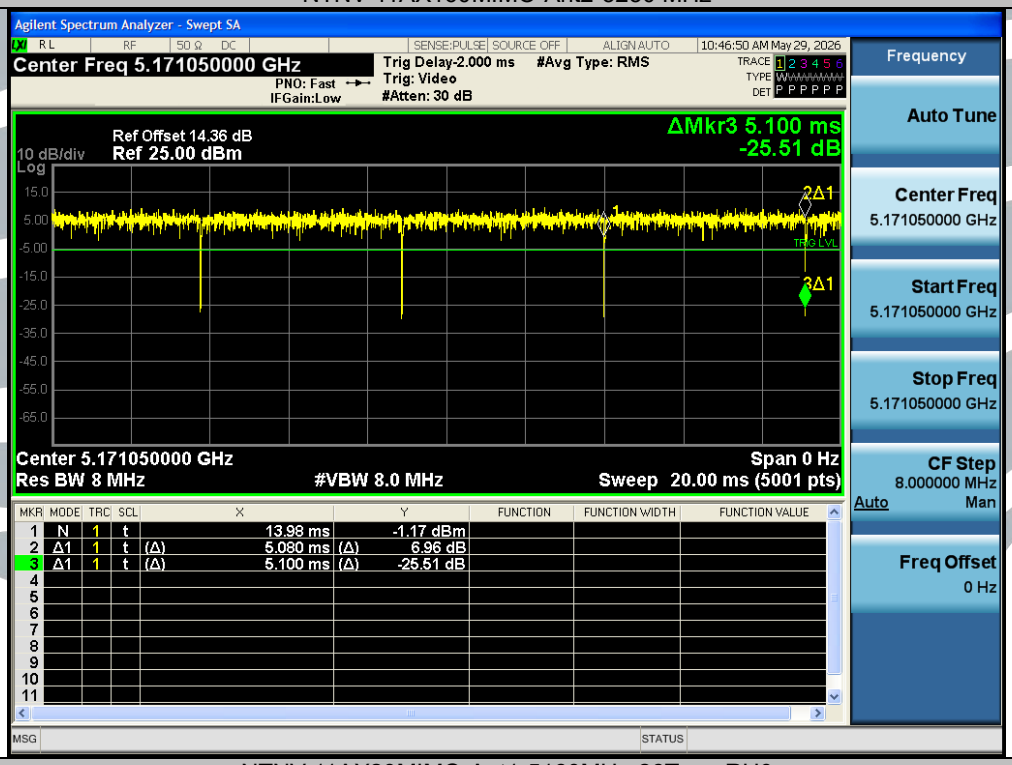
NTNV-11AX40MIMO-Chain 0_5190 MHz



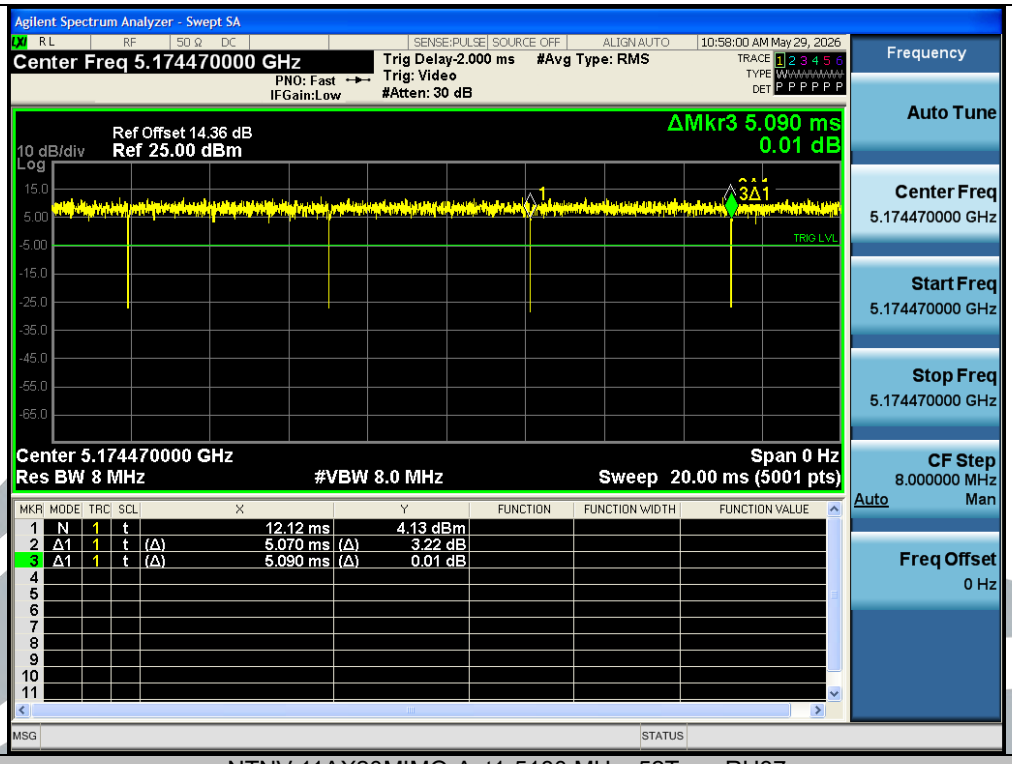
NTNV-11AX80MIMO-Ant1-5210 MHz



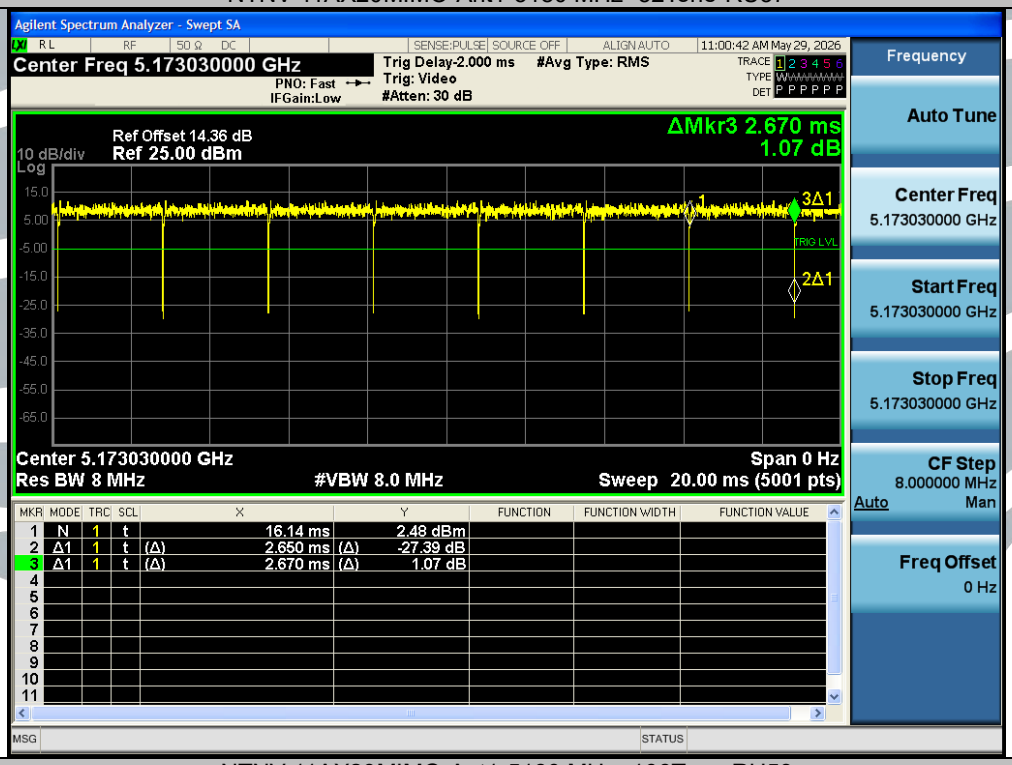
NTNV-11AX160MIMO-Ant2-5250 MHz



NTNV-11AX20MIMO-Ant1-5180MHz-26Tone-RU0



NTNV-11AX20MIMO-Ant1-5180 MHz -52Tone-RU37



NTNV-11AX20MIMO-Ant1-5180 MHz -106Tone-RU53

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2020	American National Standard for Testing Unlicesed Wireless Devices
4	KDB 789033 D02 General UNII Test Procedures New Rules v02r01	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15, subpart E
5	KDB 905462 D06 802.11 Channel Plans New Rules v02	Operation in U-NII bands -802.11 channel PLAN(§15.407)
6	KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02	Compliance measurement procedures for Unlicensed –National Information Infrastructure devices operates in the frequency bands 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz bands incorporating dynamic frequency selection
7	KDB 905462 D03 Client Without DFS New Rules v01r02	U-NII client devices without radar detection capability
8	KDB 484596 Referencing Test Data v03	Test Reductions via Data Referencing

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. **15.407(a)(1) (2) requirement:** The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power and the peak power spectral density shall be reduced by the by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
EUT Antenna:
Both antenna in the interior of the equipment and no consideration of replacement. The transmit signals are correlated with each other, the best case directional gain of the antenna is 3.71dBi (See section 5.6).

5.3 26 DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a) (2)(5)

Test Method: KDB 789033 D02 v02r01 Section C.1

Limit: None; for reporting purposes only.

Test Procedure:

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum analyzer.

Spectrum analyzer according to the following Settings:
a) Set RBW = approximately 1 % of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

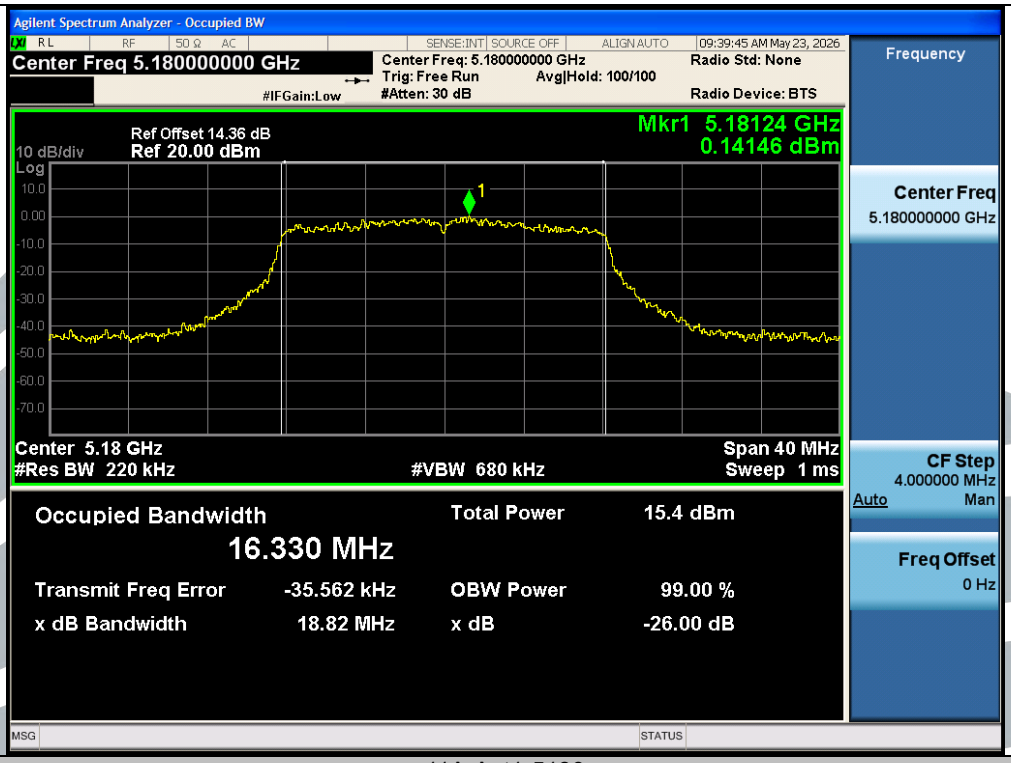
Test Mode: Tx mode

Test Results:

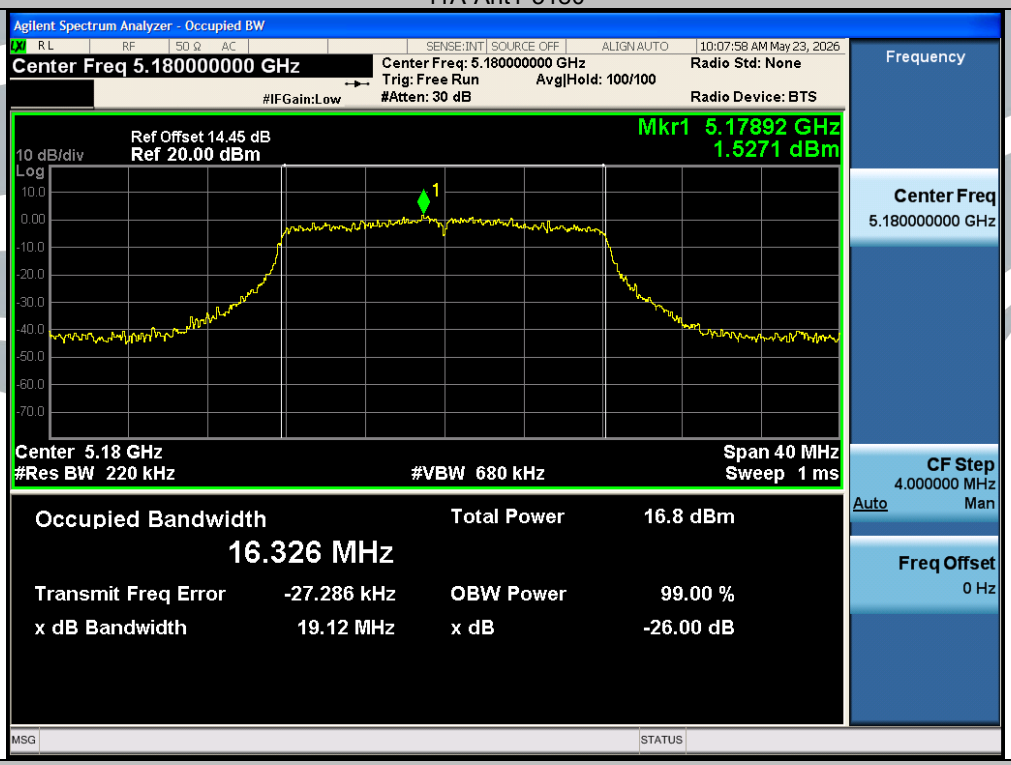
Test Mode	RU&Index	Frequency [MHz]	26db EBW [MHz]	
			Chain 0	Chain 1
11A	--	5180	18.82	19.12
11A	--	5200	19.12	19.12
11A	--	5240	18.95	19.17
11A	--	5260	18.65	18.90
11A	--	5280	18.90	19.01
11A	--	5320	18.63	19.23
11A	--	5500	18.97	19.05
11A	--	5600	18.88	19.12
11A	--	5700	18.81	19.35
11N20MIMO	--	5180	20.41	20.89
11N20MIMO	--	5200	19.83	19.78
11N20MIMO	--	5240	20.35	20.73
11N20MIMO	--	5260	20.39	19.70
11N20MIMO	--	5280	19.84	21.02
11N20MIMO	--	5320	20.42	20.24
11N20MIMO	--	5500	19.90	19.97
11N20MIMO	--	5600	19.72	19.92
11N20MIMO	--	5700	19.84	20.19
11N40MIMO	--	5190	39.68	38.88
11N40MIMO	--	5230	39.44	39.33
11N40MIMO	--	5270	38.81	39.21
11N40MIMO	--	5310	39.36	39.68
11N40MIMO	--	5510	39.25	39.27
11N40MIMO	--	5590	39.33	39.27
11N40MIMO	--	5670	39.49	39.52
11AC20MIMO	--	5180	20.11	20.14
11AC20MIMO	--	5200	19.95	20.62
11AC20MIMO	--	5240	19.71	19.69
11AC20MIMO	--	5260	19.81	20.04
11AC20MIMO	--	5280	20.10	20.24
11AC20MIMO	--	5320	20.00	19.89
11AC20MIMO	--	5500	19.78	20.41
11AC20MIMO	--	5600	20.44	20.20

Test Mode	RU&Index	Frequency [MHz]	26db EBW [MHz]	
			Chain 0	Chain 1
11AC20MIMO	--	5700	20.33	20.46
11AC40MIMO	--	5190	40.00	40.20
11AC40MIMO	--	5230	39.25	39.00
11AC40MIMO	--	5270	39.63	39.07
11AC40MIMO	--	5310	39.36	39.84
11AC40MIMO	--	5510	39.49	38.98
11AC40MIMO	--	5590	39.74	38.91
11AC40MIMO	--	5670	39.80	39.42
11AC80MIMO	--	5210	80.40	79.63
11AC80MIMO	--	5290	80.40	81.96
11AC80MIMO	--	5530	81.08	81.41
11AC80MIMO	--	5610	80.19	79.77
11AC160MIMO	--	5250	162.9	161.9
11AC160MIMO	--	5570	163.1	163.5
11AX20MIMO	SU	5180	20.41	20.75
11AX20MIMO	SU	5200	21.42	20.38
11AX20MIMO	SU	5240	20.56	20.74
11AX20MIMO	SU	5260	20.81	21.11
11AX20MIMO	SU	5280	20.53	20.46
11AX20MIMO	SU	5320	20.62	20.99
11AX20MIMO	SU	5500	20.62	20.45
11AX20MIMO	SU	5600	20.45	20.77
11AX20MIMO	SU	5700	20.26	20.66
11AX40MIMO	SU	5190	39.62	40.13
11AX40MIMO	SU	5230	39.82	39.87
11AX40MIMO	SU	5270	39.73	40.3
11AX40MIMO	SU	5310	39.64	40.17
11AX40MIMO	SU	5510	39.61	39.72
11AX40MIMO	SU	5590	39.74	40.01
11AX40MIMO	SU	5670	40.01	40.00
11AX80MIMO	SU	5210	80.99	80.61
11AX80MIMO	SU	5290	80.62	81.99
11AX80MIMO	SU	5530	81.32	81.43
11AX80MIMO	SU	5610	80.60	80.57
11AX160MIMO	SU	5250	163.8	162.7
11AX160MIMO	SU	5570	163.4	163.6
11AX20MIMO	26RU0	5180	20.81	20.50
11AX20MIMO	52RU37	5180	20.19	21.43
11AX20MIMO	106RU53	5180	22.69	21.80
11AX20MIMO	26RU4	5200	18.84	18.66
11AX20MIMO	52RU39	5200	18.90	18.58
11AX20MIMO	106RU54	5200	22.45	20.65
11AX20MIMO	26RU8	5240	20.32	20.34
11AX20MIMO	52RU40	5240	19.86	20.29
11AX20MIMO	106RU54	5240	22.32	20.70
11AX20MIMO	26RU0	5260	20.75	19.88
11AX20MIMO	52RU37	5260	20.37	20.80
11AX20MIMO	106RU53	5260	21.48	21.07
11AX20MIMO	26RU4	5280	18.32	17.50
11AX20MIMO	52RU39	5280	18.52	17.31
11AX20MIMO	106RU54	5280	20.45	20.31
11AX20MIMO	26RU8	5320	20.60	19.76
11AX20MIMO	52RU40	5320	20.68	20.55
11AX20MIMO	106RU54	5320	21.98	20.54
11AX20MIMO	26RU0	5500	21.10	20.47
11AX20MIMO	52RU37	5500	21.61	20.99
11AX20MIMO	106RU53	5500	21.71	21.01
11AX20MIMO	26RU4	5600	17.66	18.25
11AX20MIMO	52RU39	5600	18.12	18.50
11AX20MIMO	106RU54	5600	22.12	20.51

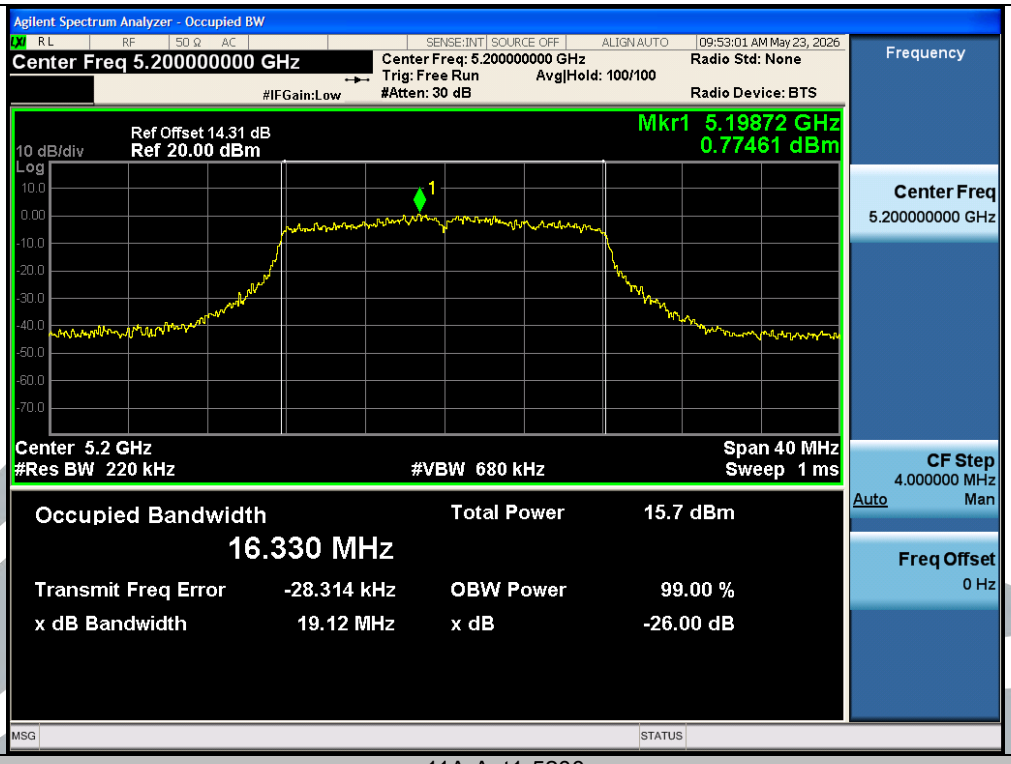
Test Mode	RU&Index	Frequency [MHz]	26db EBW [MHz]	
			Chain 0	Chain 1
11AX20MIMO	26RU8	5700	20.78	20.24
11AX20MIMO	52RU40	5700	20.63	20.25
11AX20MIMO	106RU54	5700	22.44	20.93



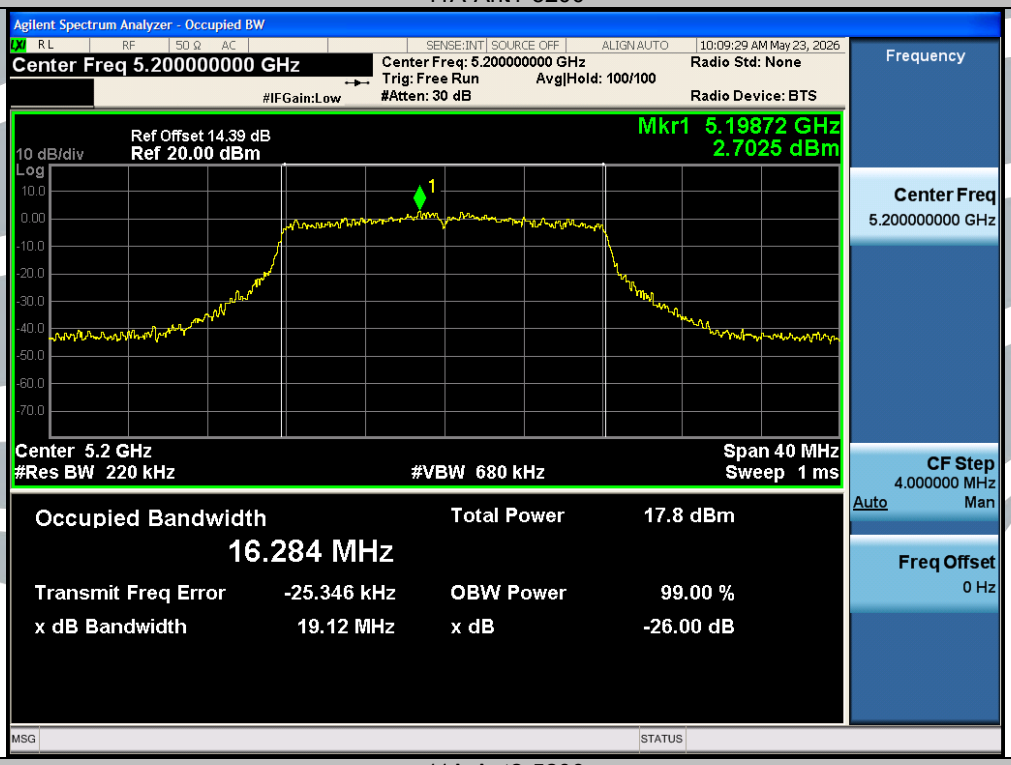
11A-Ant1-5180



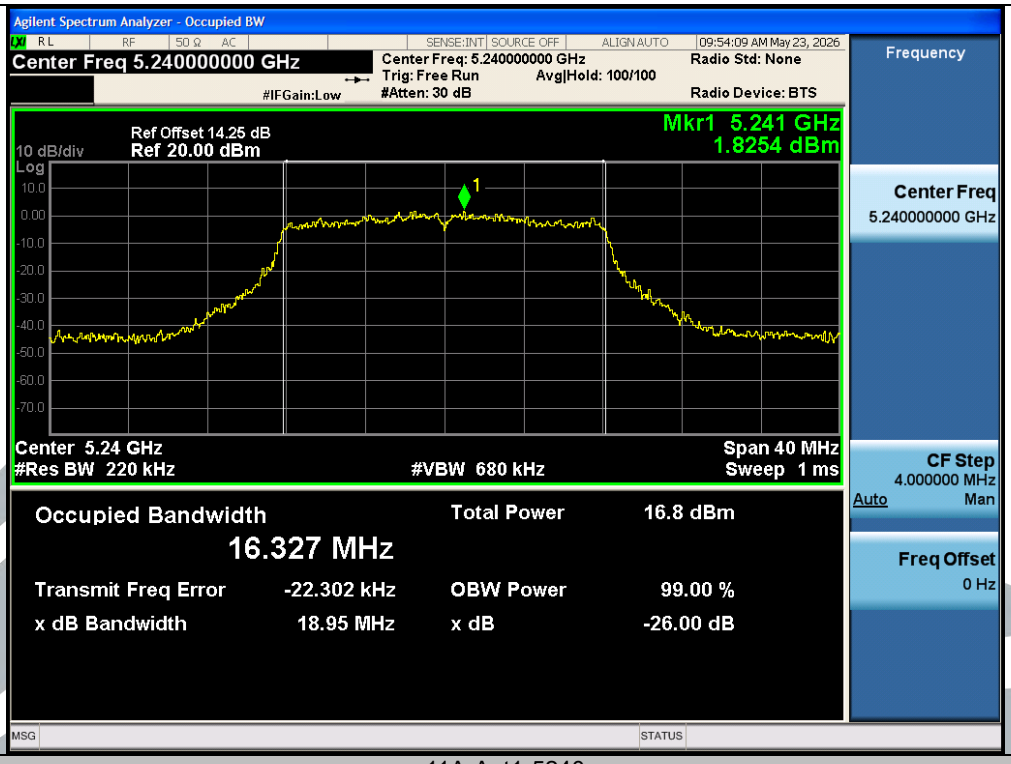
11A-Ant2-5180



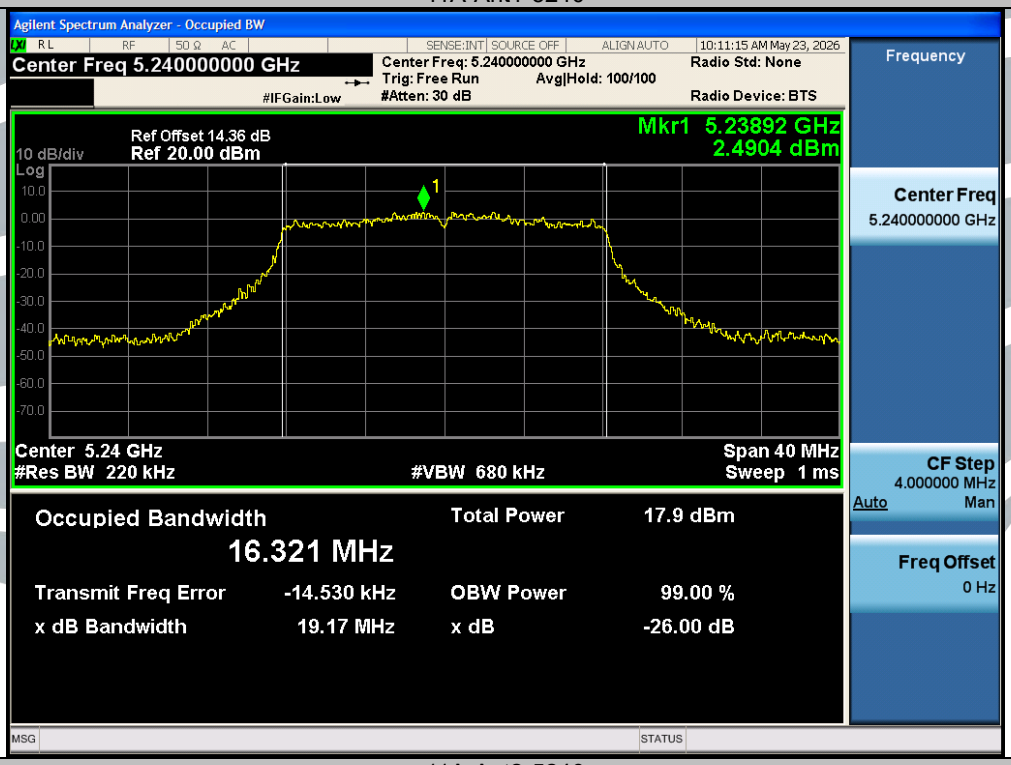
11A-Ant1-5200



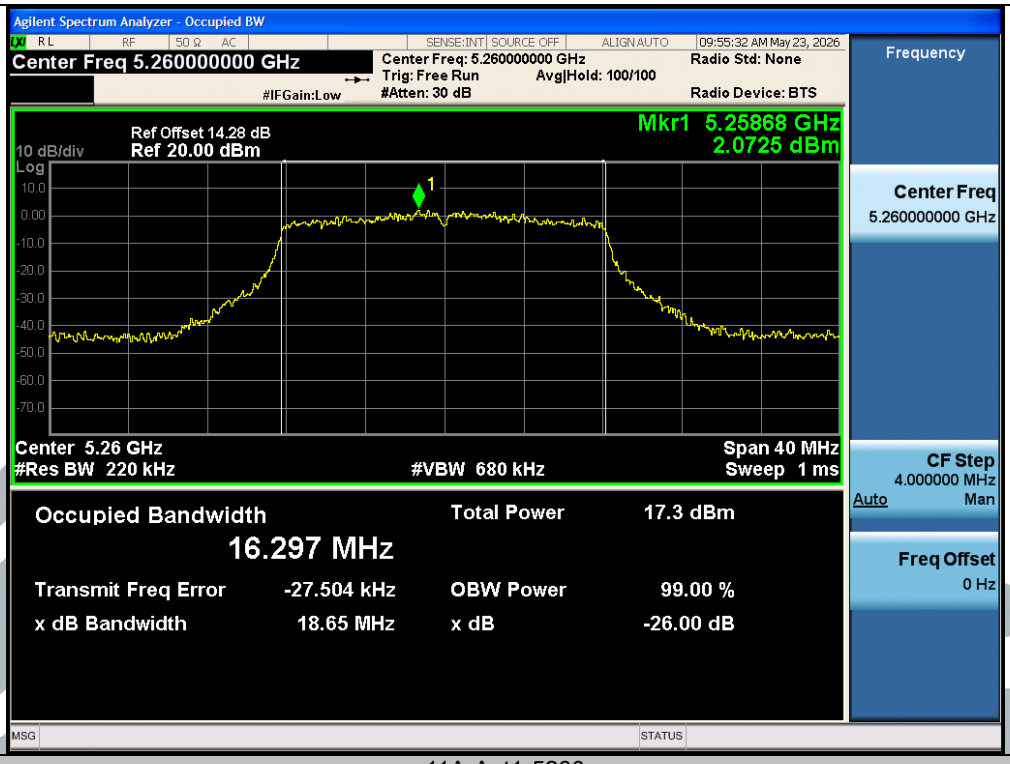
11A-Ant2-5200



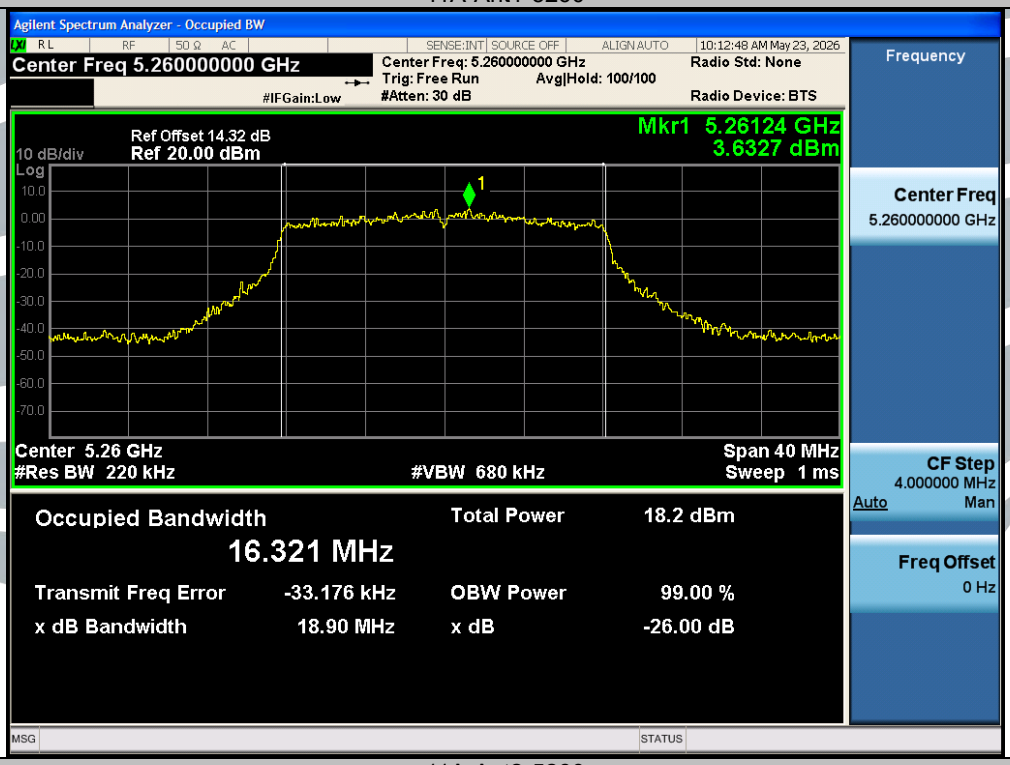
11A-Ant1-5240



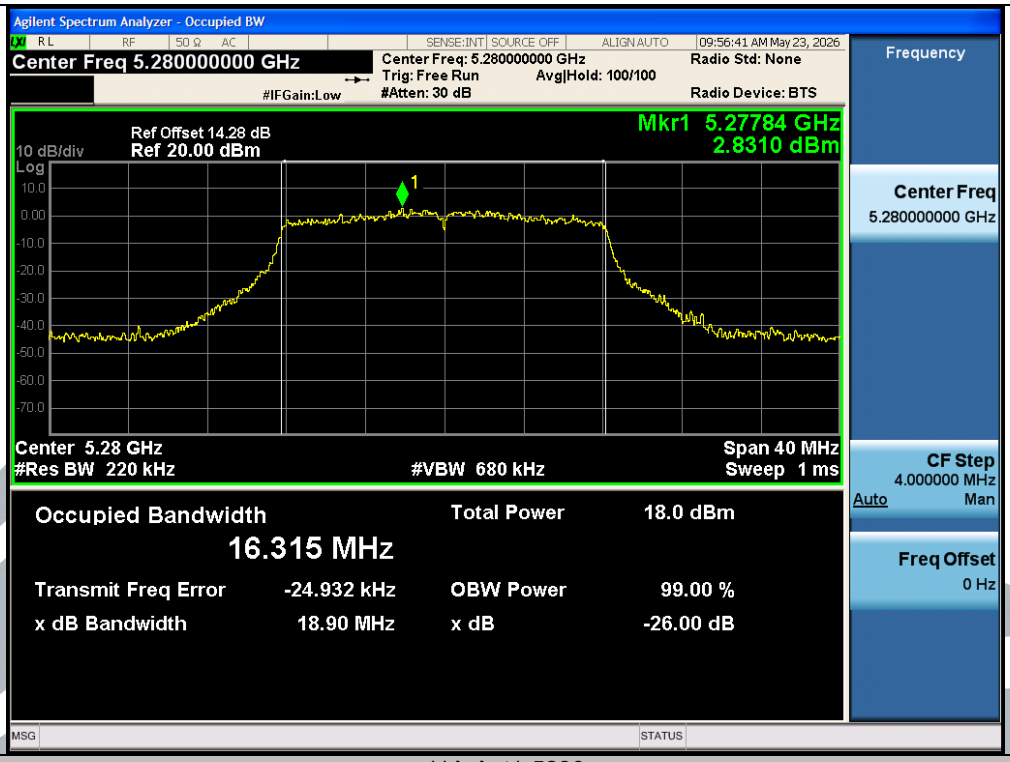
11A-Ant2-5240



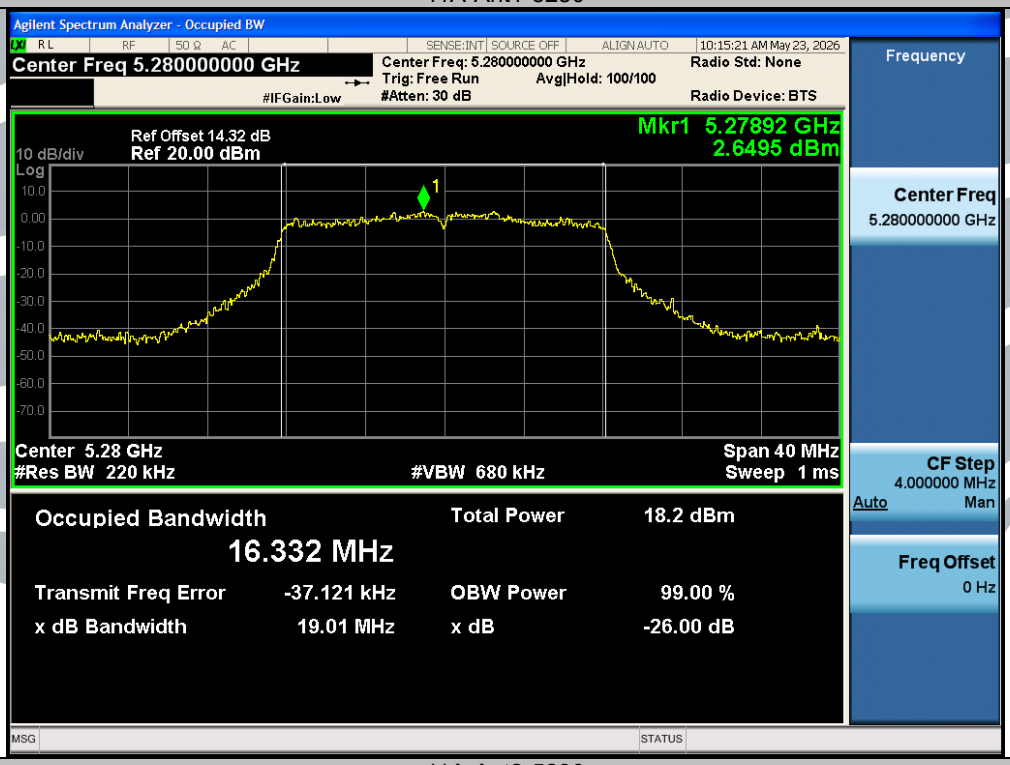
11A-Ant1-5260



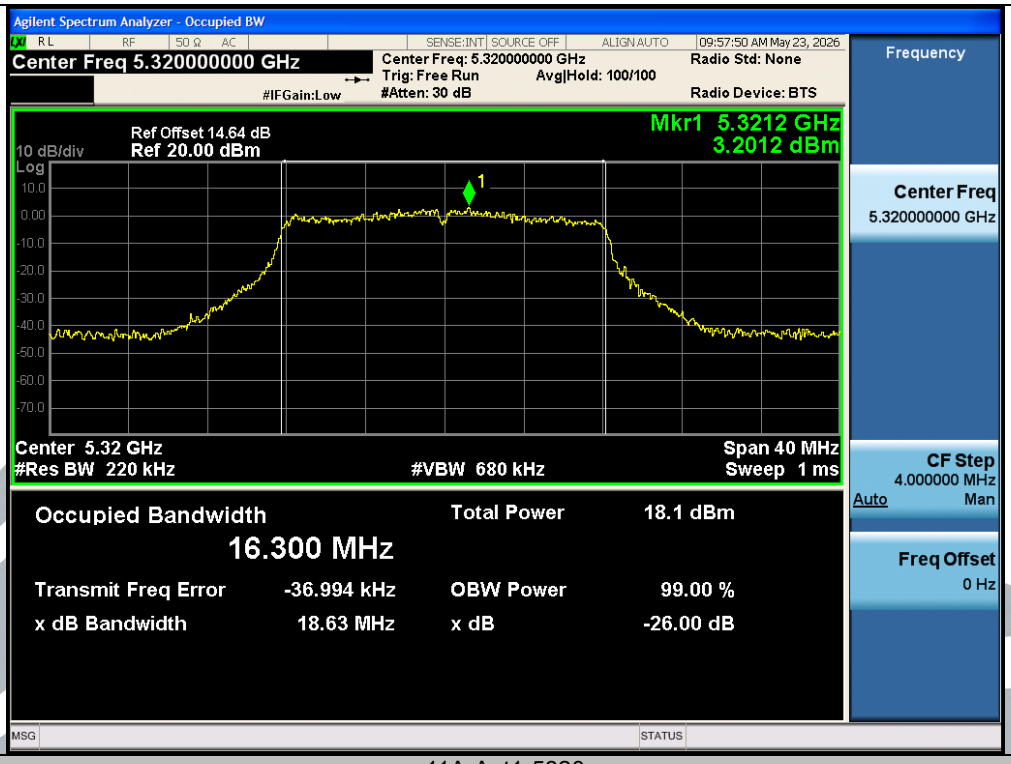
11A-Ant2-5260



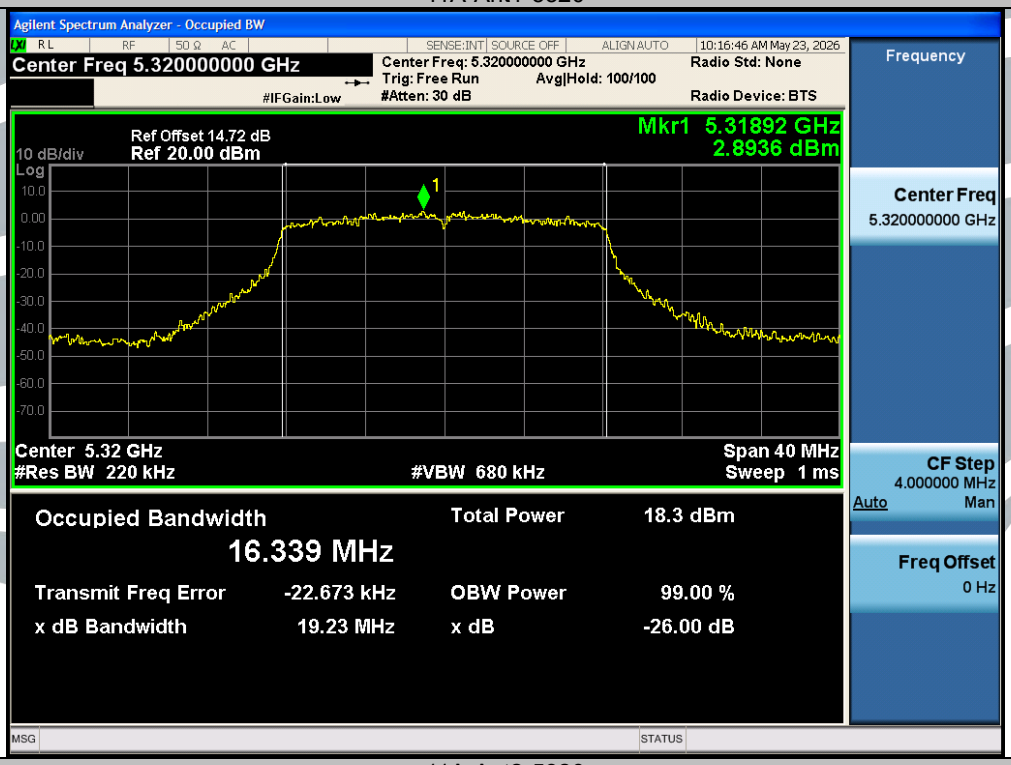
11A-Ant1-5280



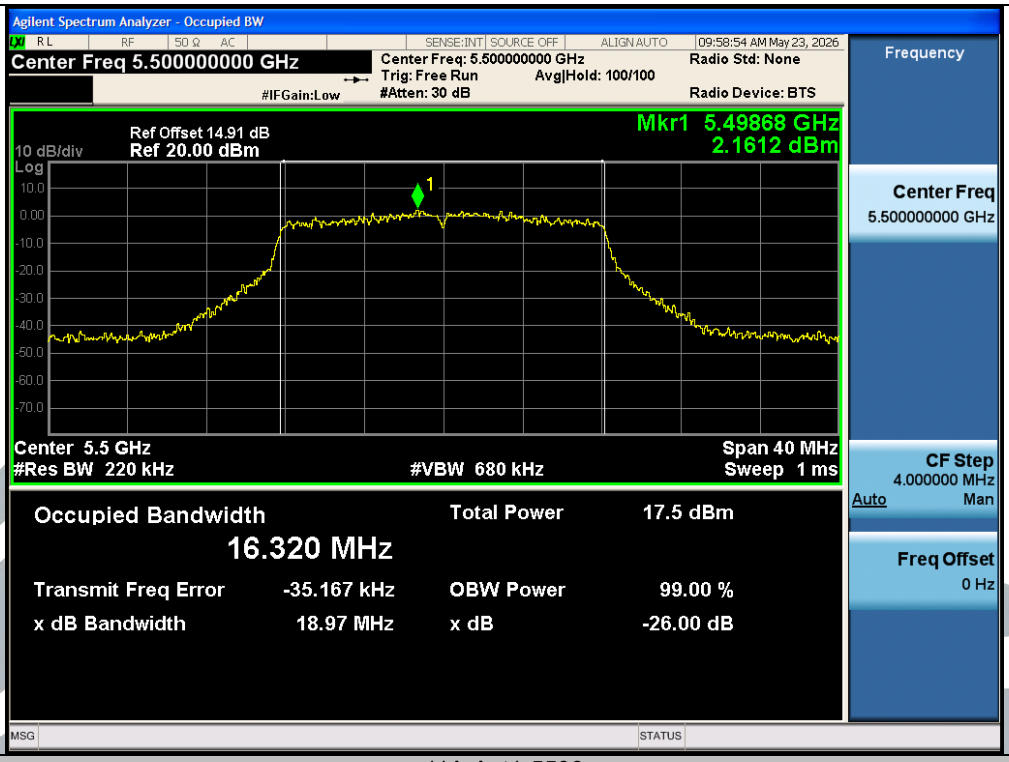
11A-Ant2-5280



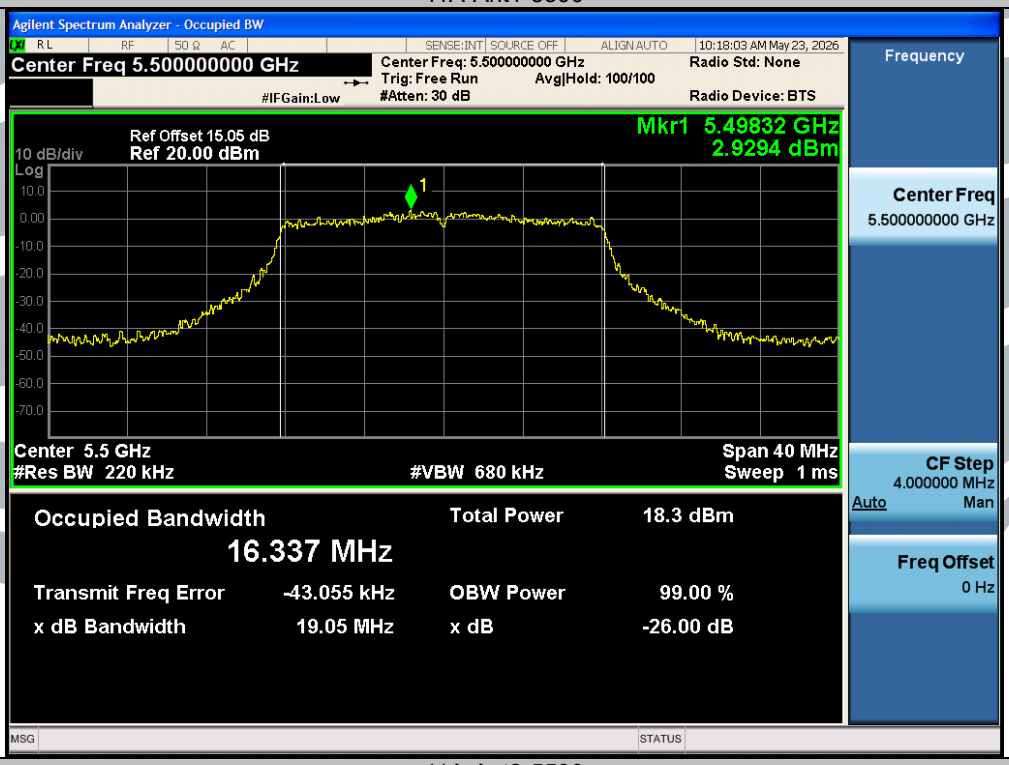
11A-Ant1-5320



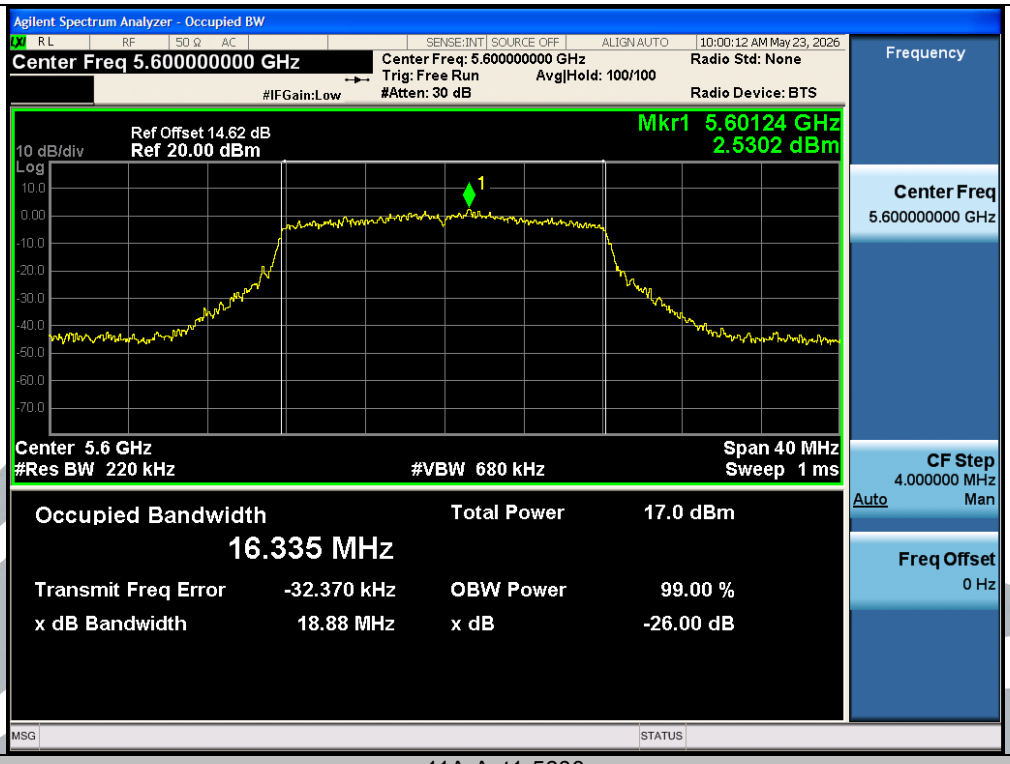
11A-Ant2-5320



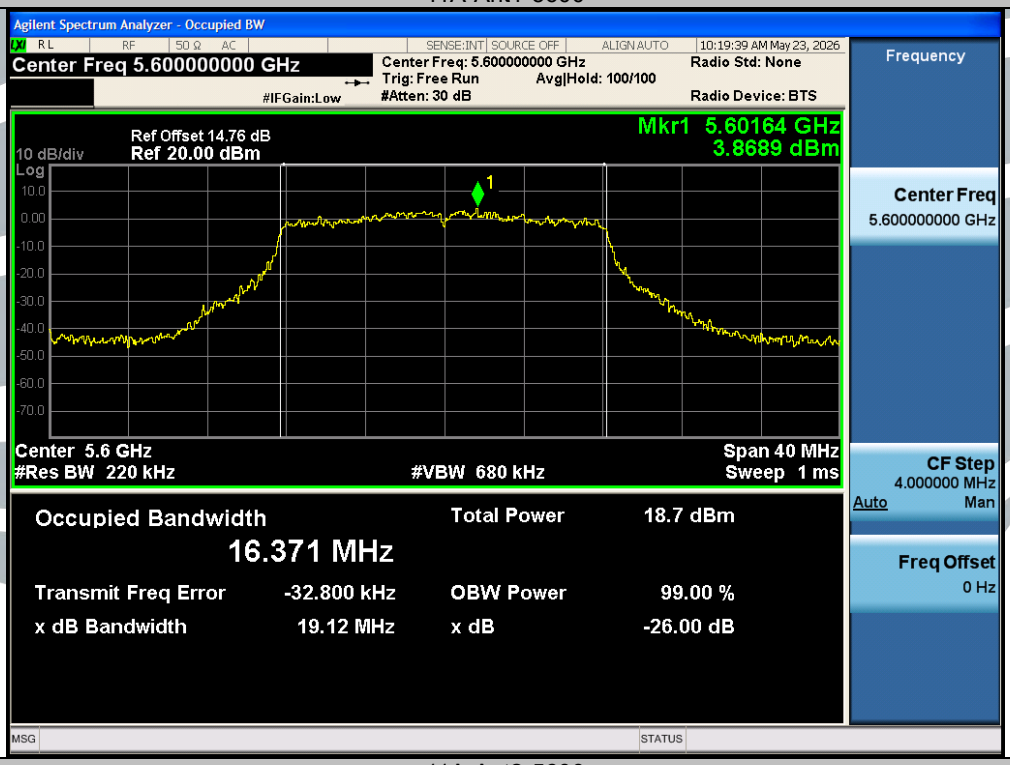
11A-Ant1-5500



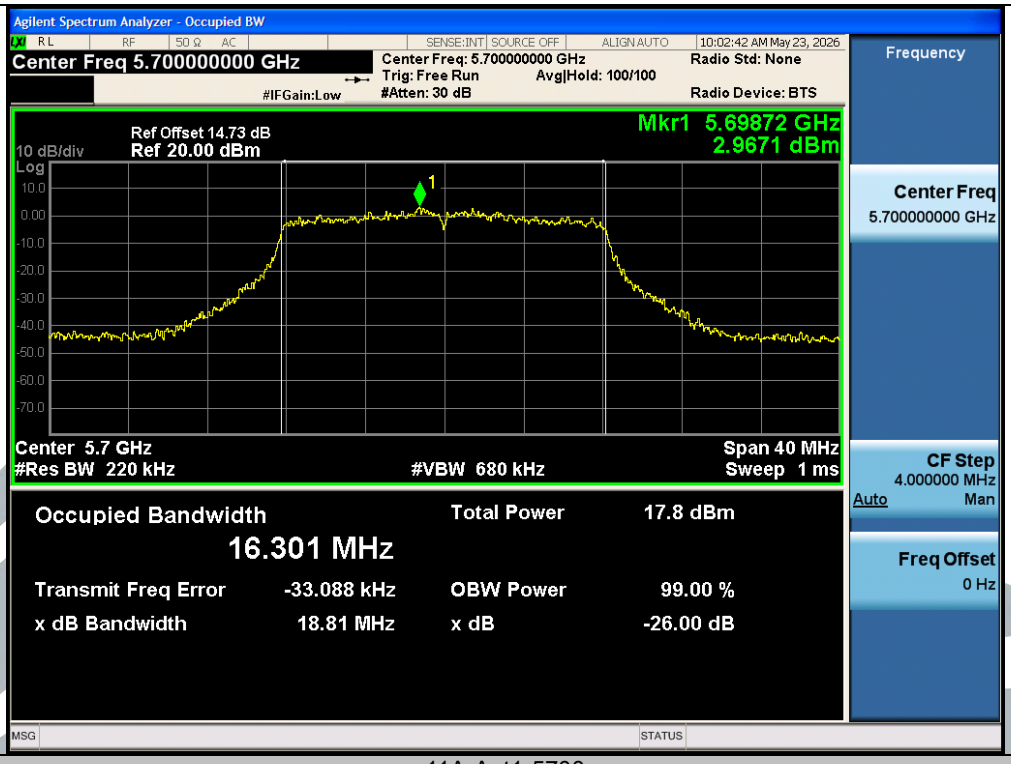
11A-Ant2-5500



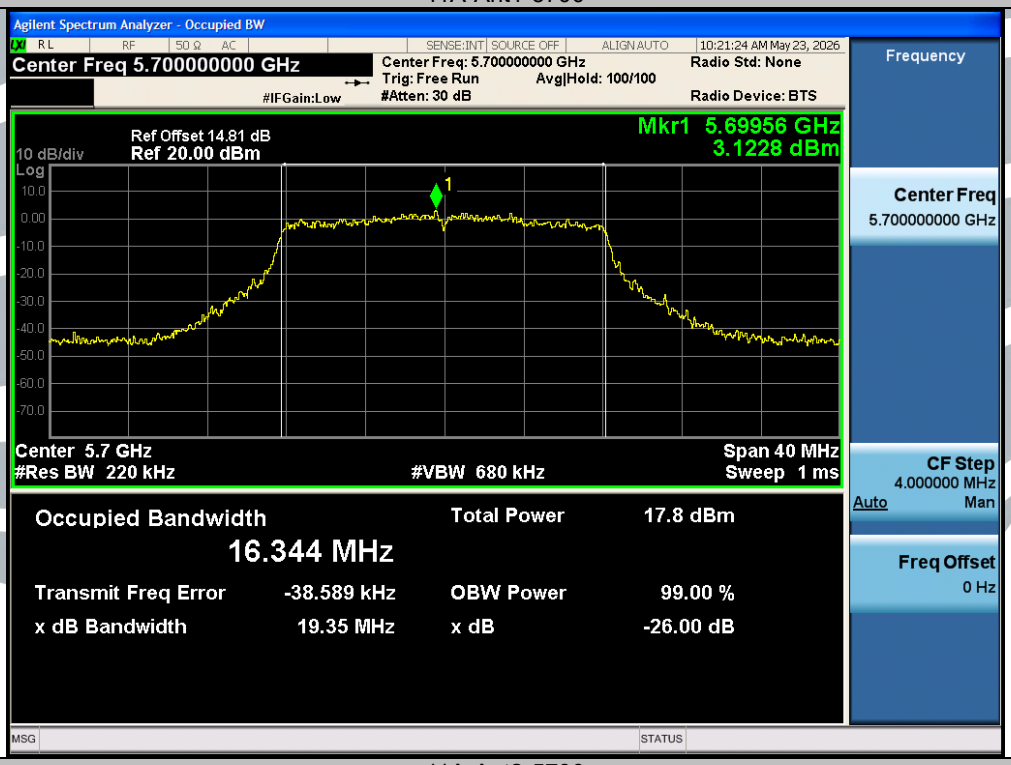
11A-Ant1-5600



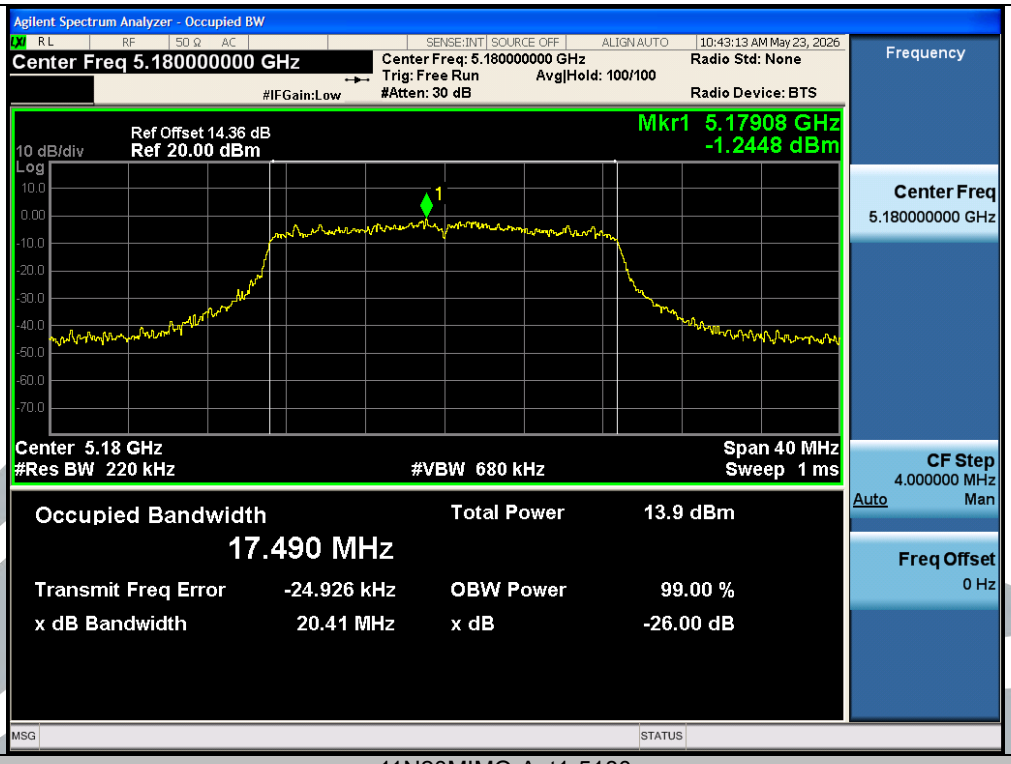
11A-Ant2-5600



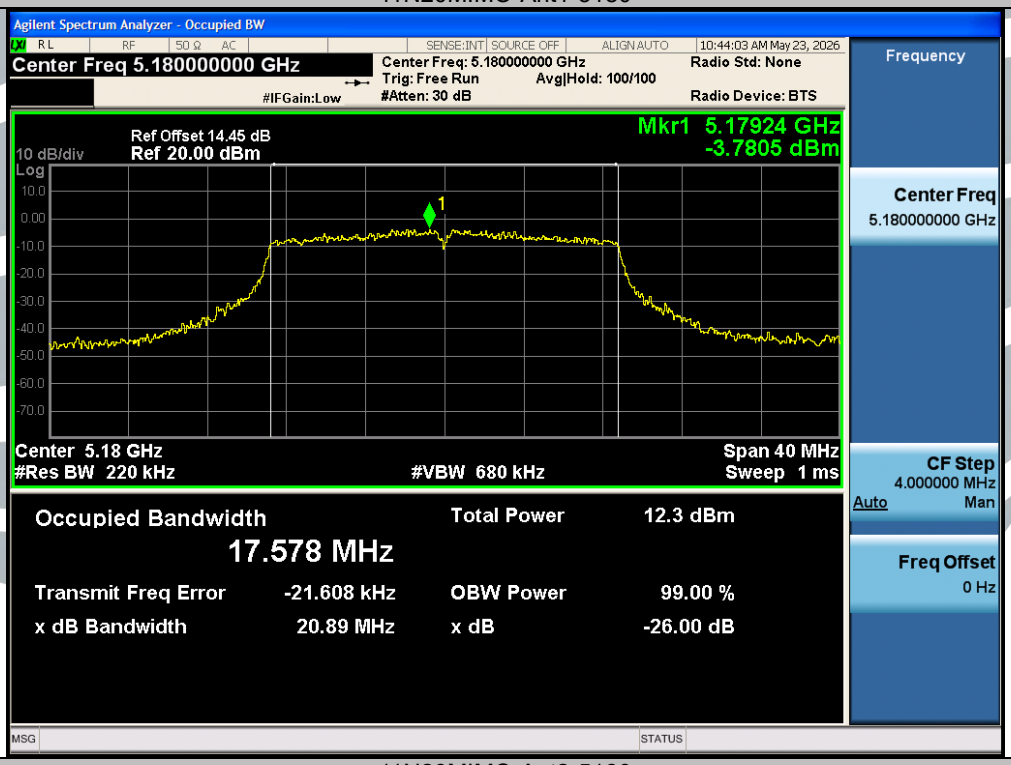
11A-Ant1-5700



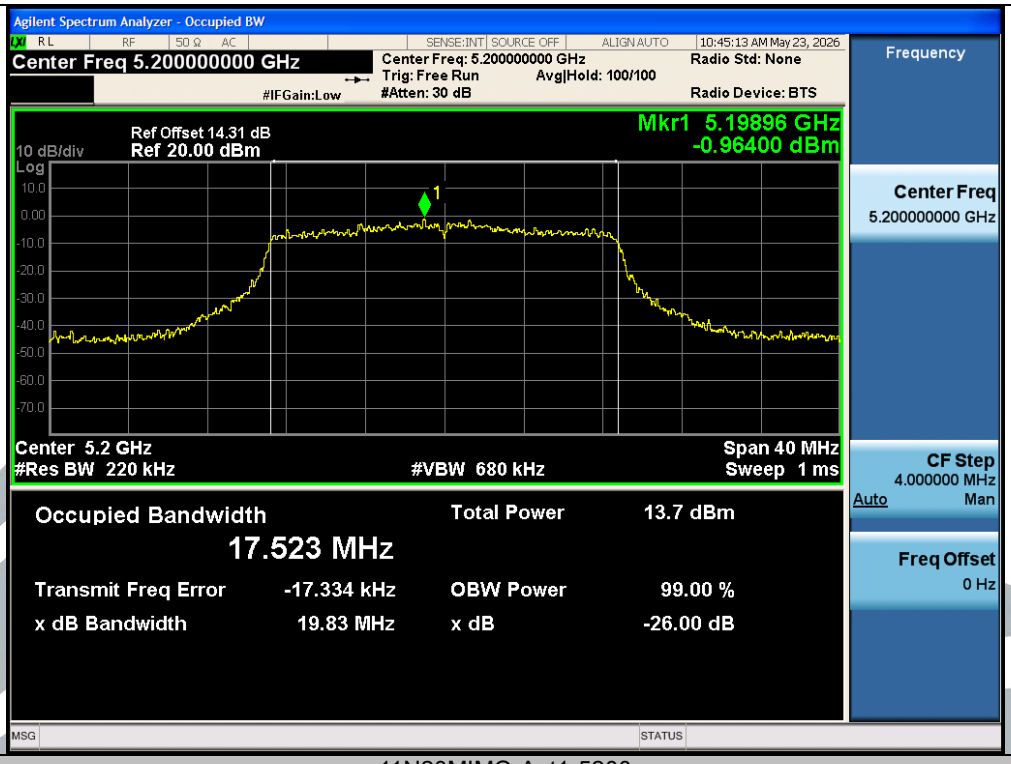
11A-Ant2-5700



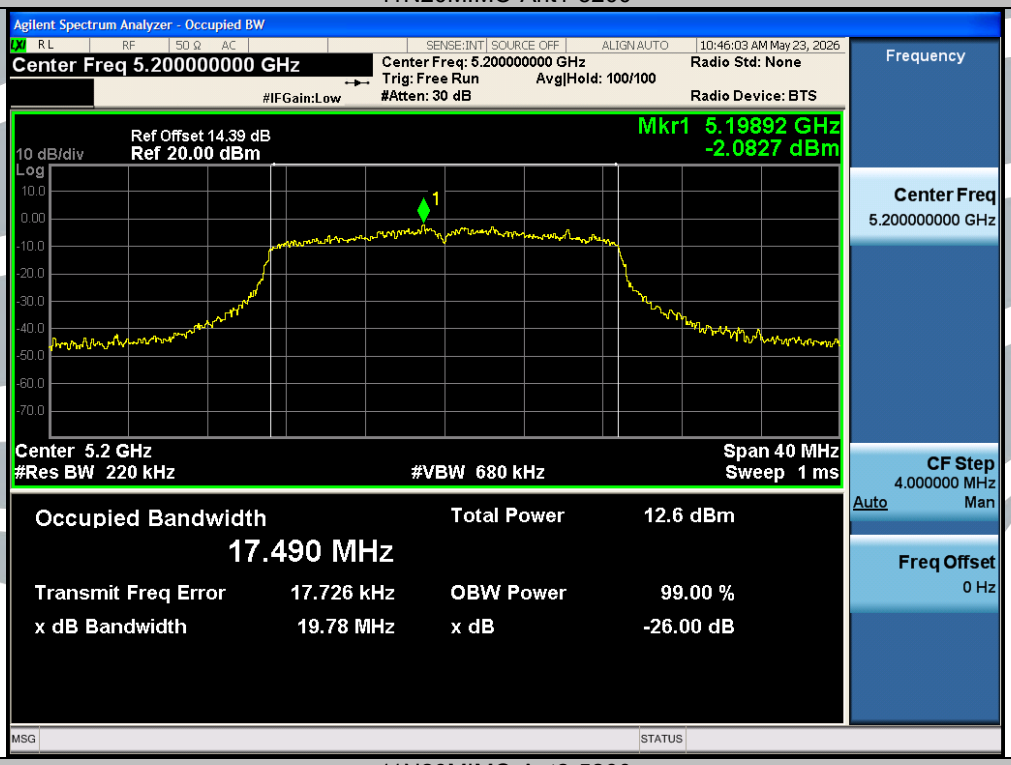
11N20MIMO-Ant1-5180



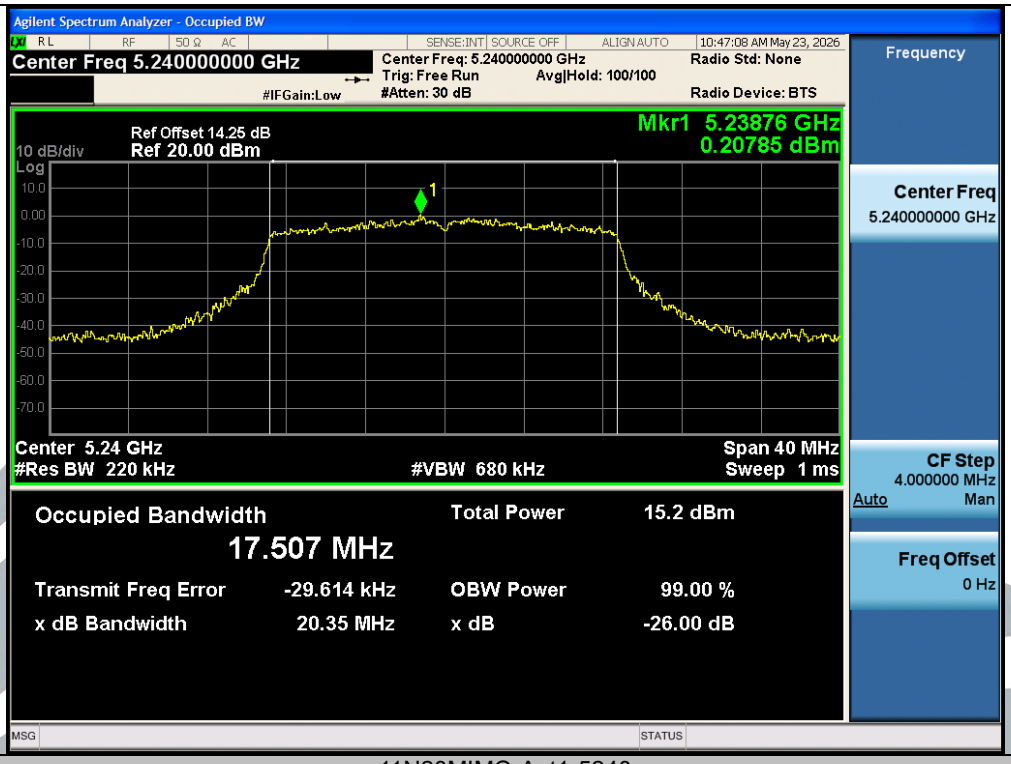
11N20MIMO-Ant2-5180



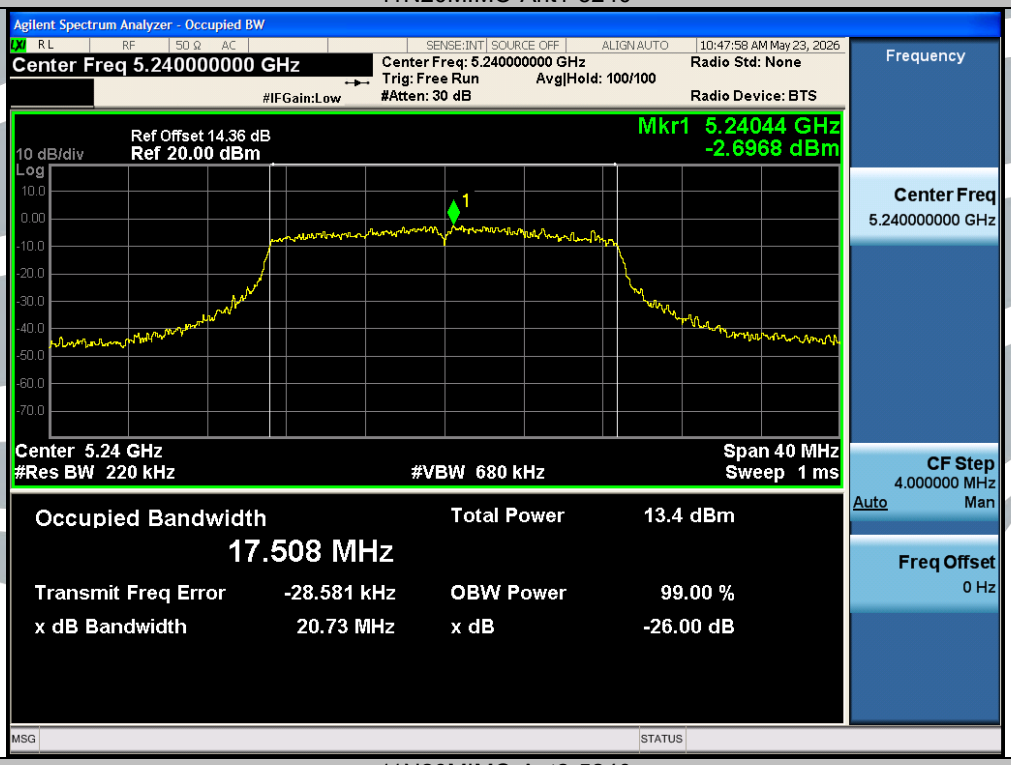
11N20MIMO-Ant1-5200



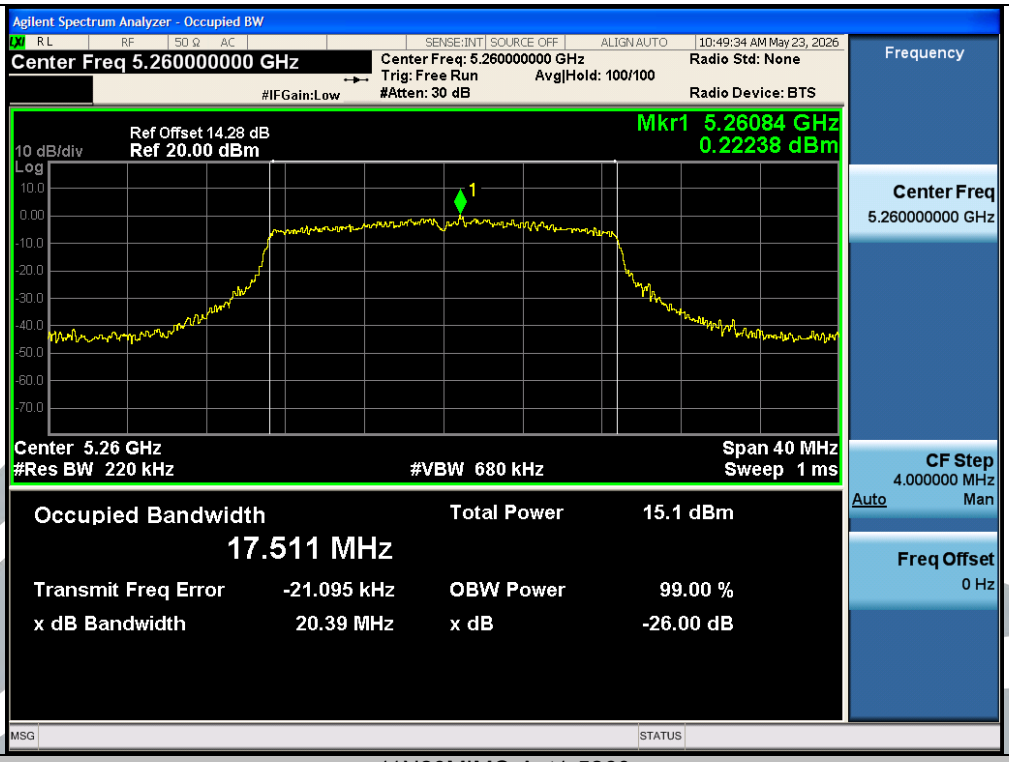
11N20MIMO-Ant2-5200



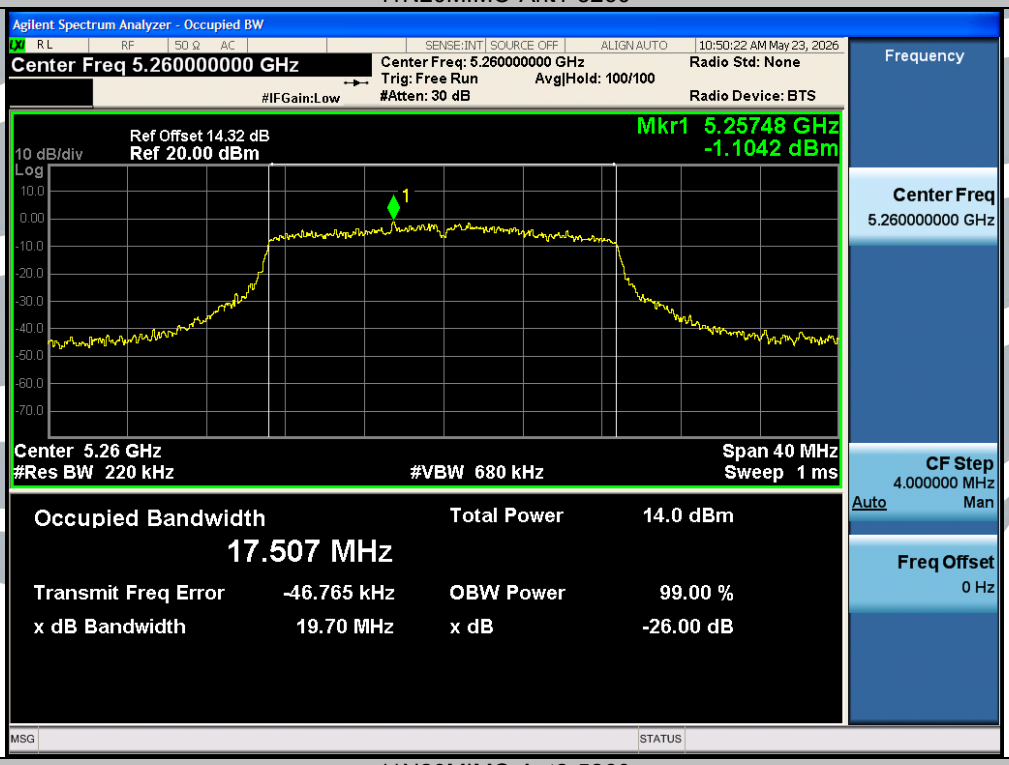
11N20MIMO-Ant1-5240



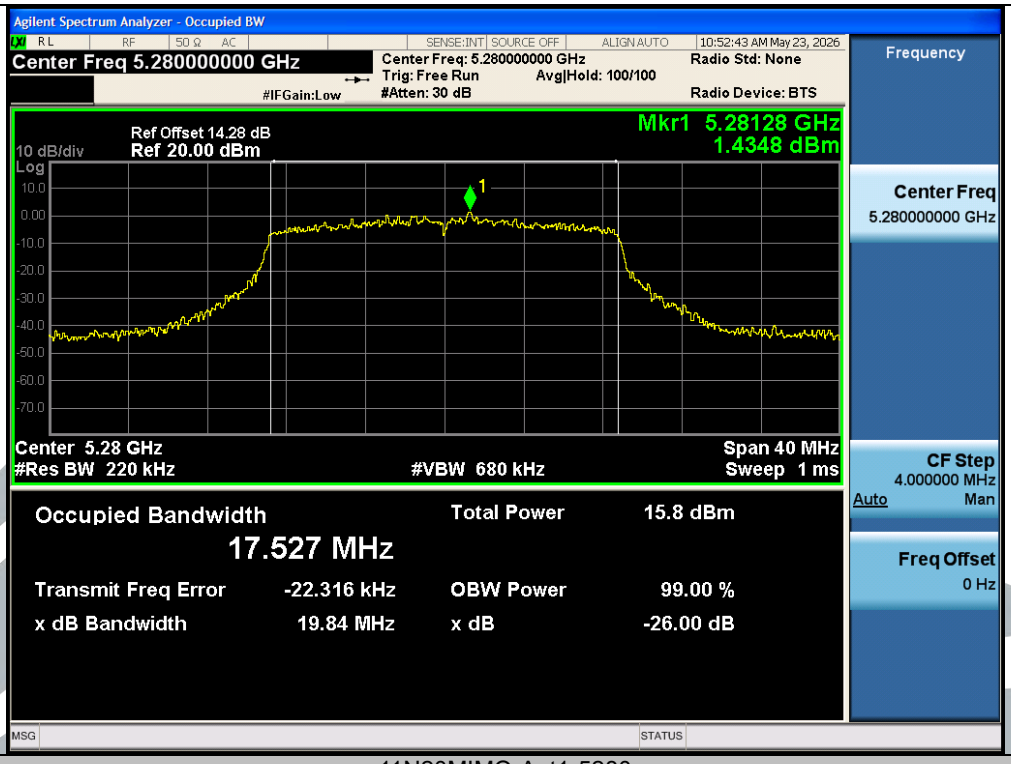
11N20MIMO-Ant2-5240



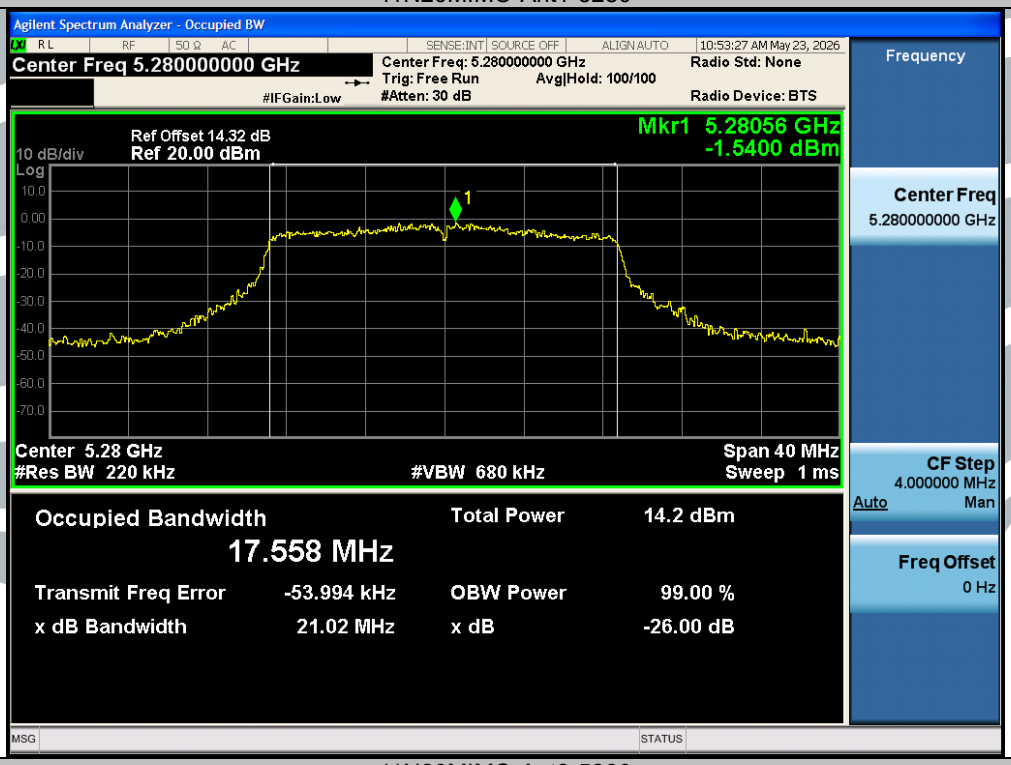
11N20MIMO-Ant1-5260



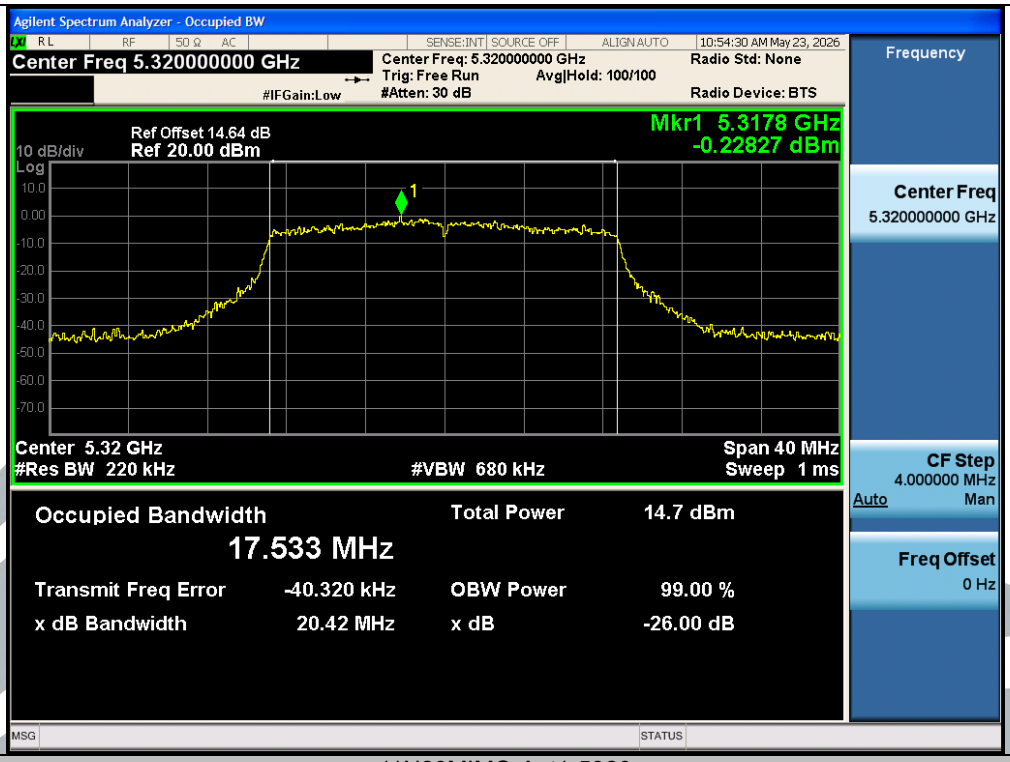
11N20MIMO-Ant2-5260



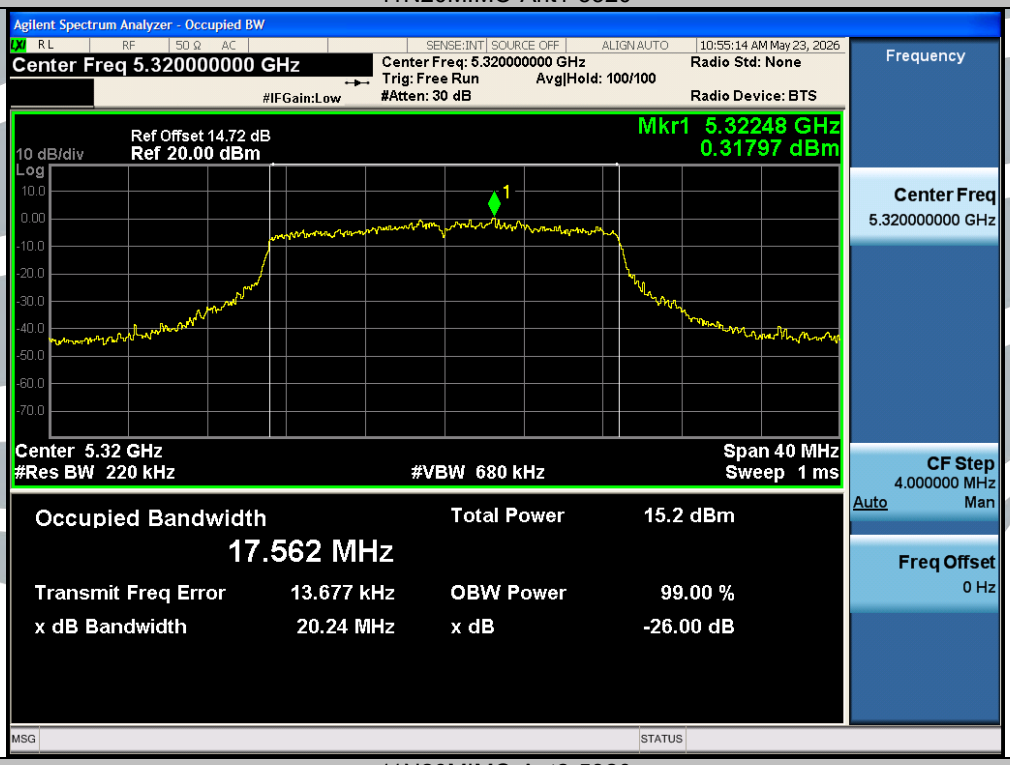
11N20MIMO-Ant1-5280



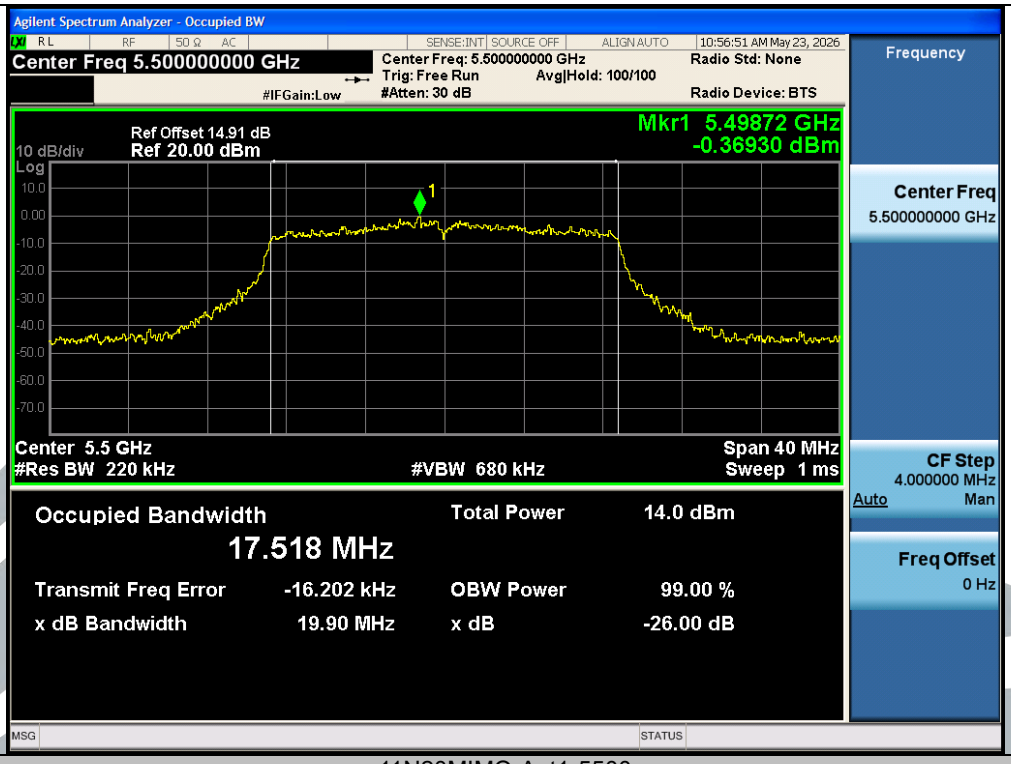
11N20MIMO-Ant2-5280



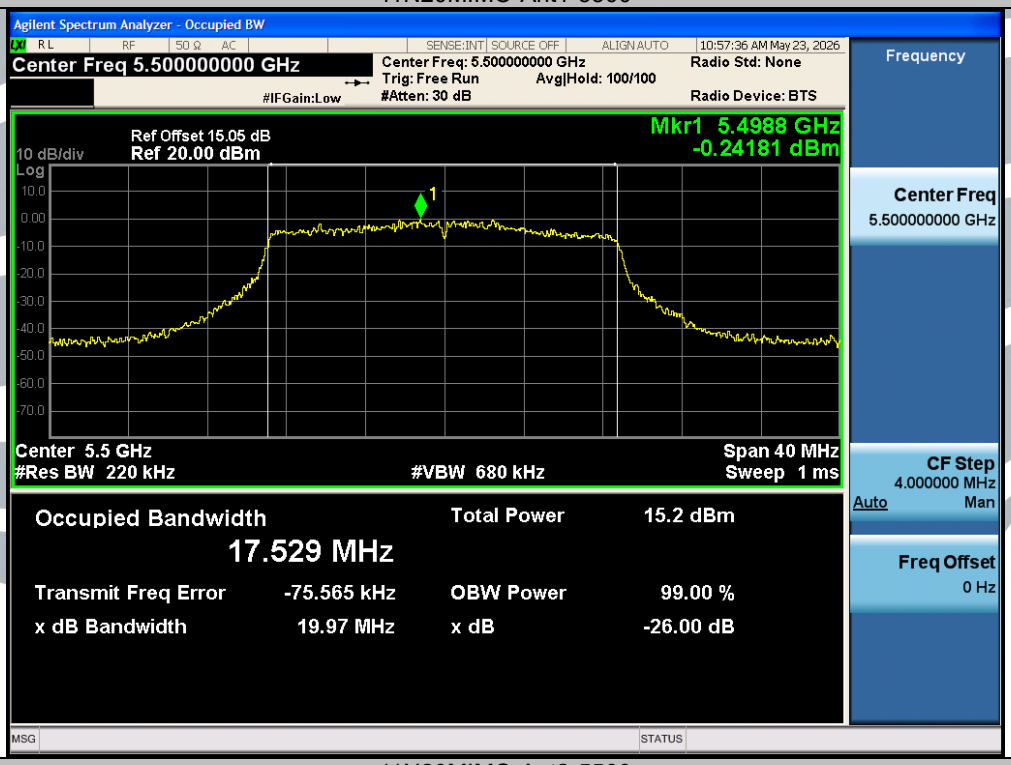
11N20MIMO-Ant1-5320



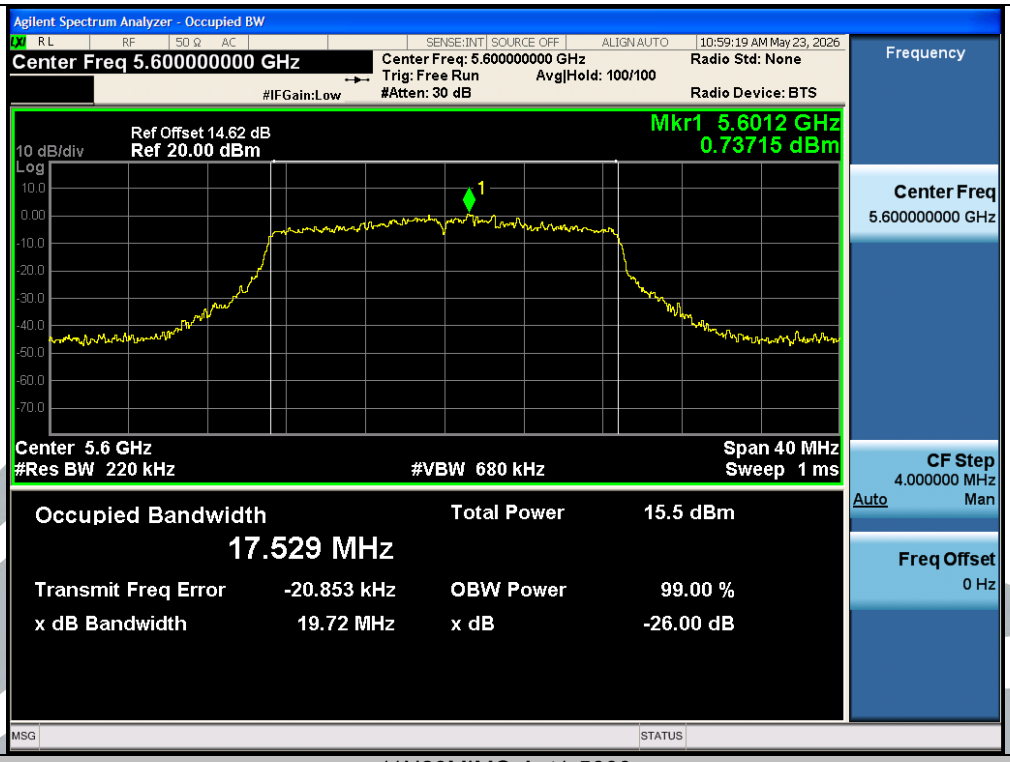
11N20MIMO-Ant2-5320



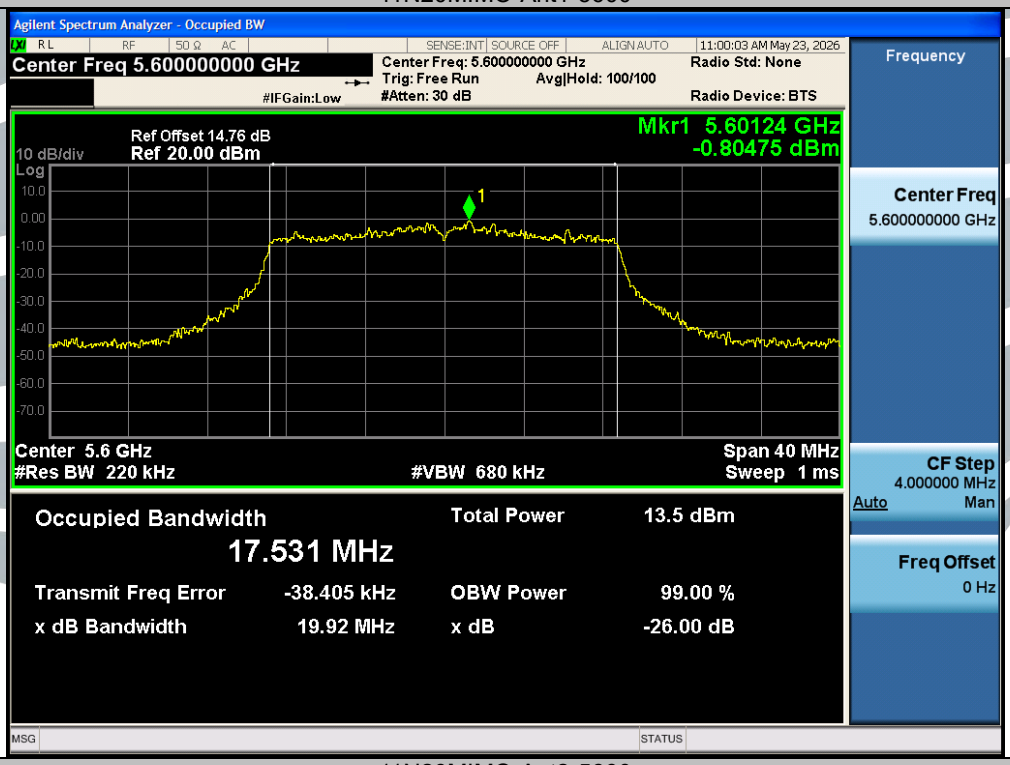
11N20MIMO-Ant1-5500



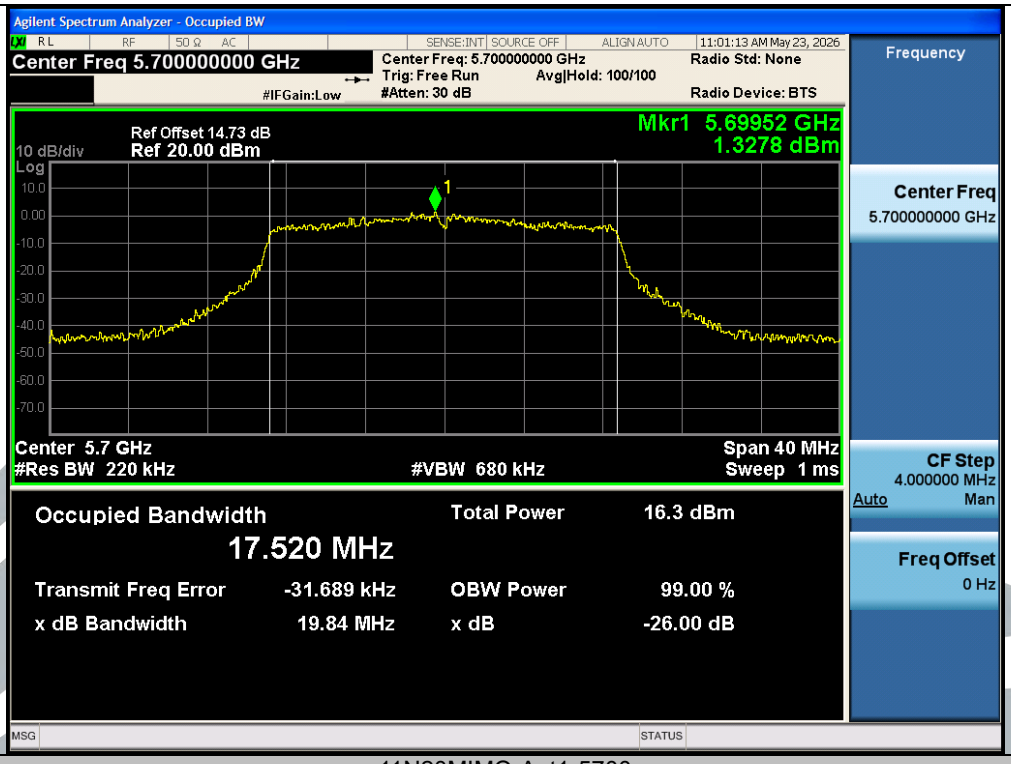
11N20MIMO-Ant2-5500



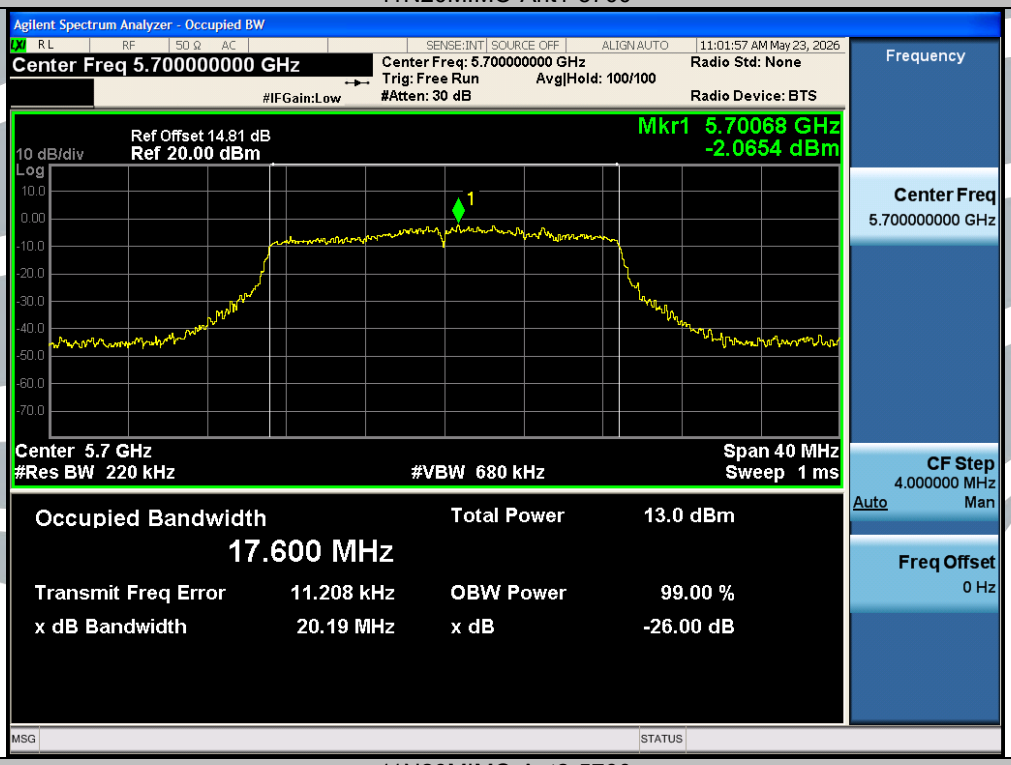
11N20MIMO-Ant1-5600



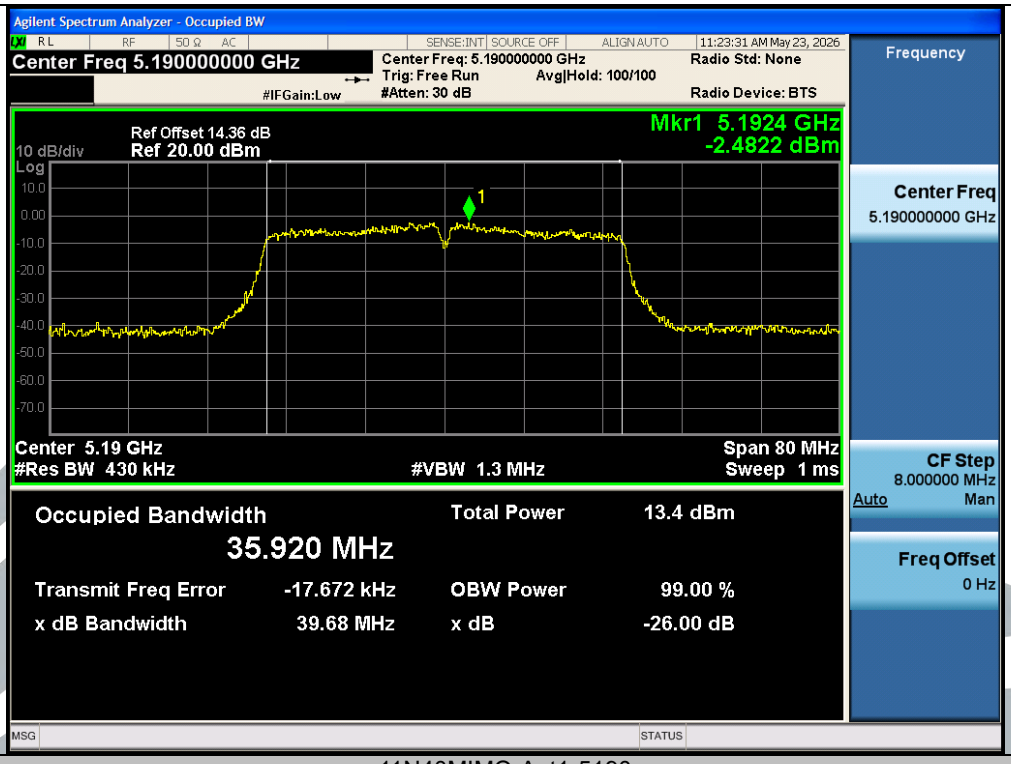
11N20MIMO-Ant2-5600



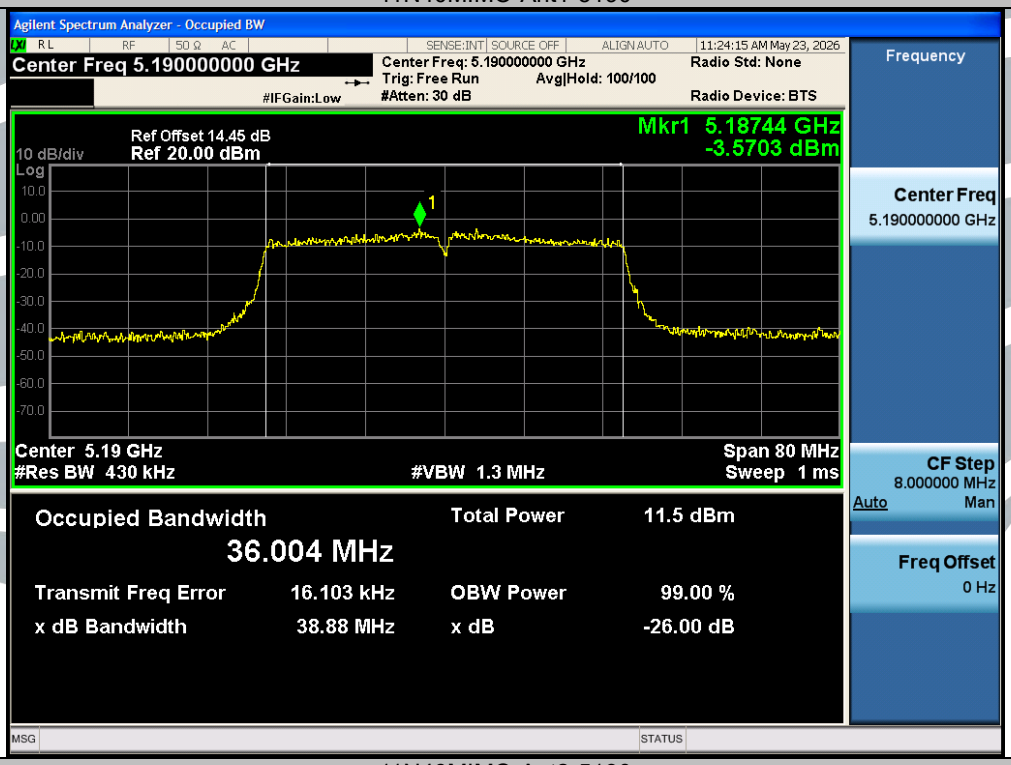
11N20MIMO-Ant1-5700



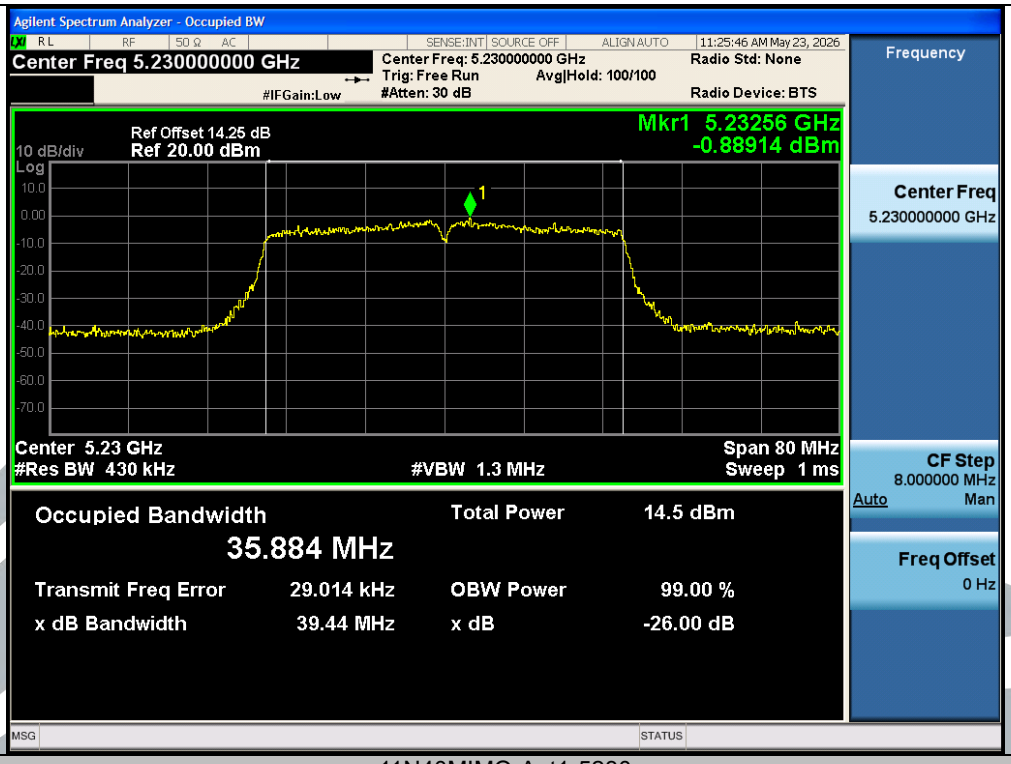
11N20MIMO-Ant2-5700



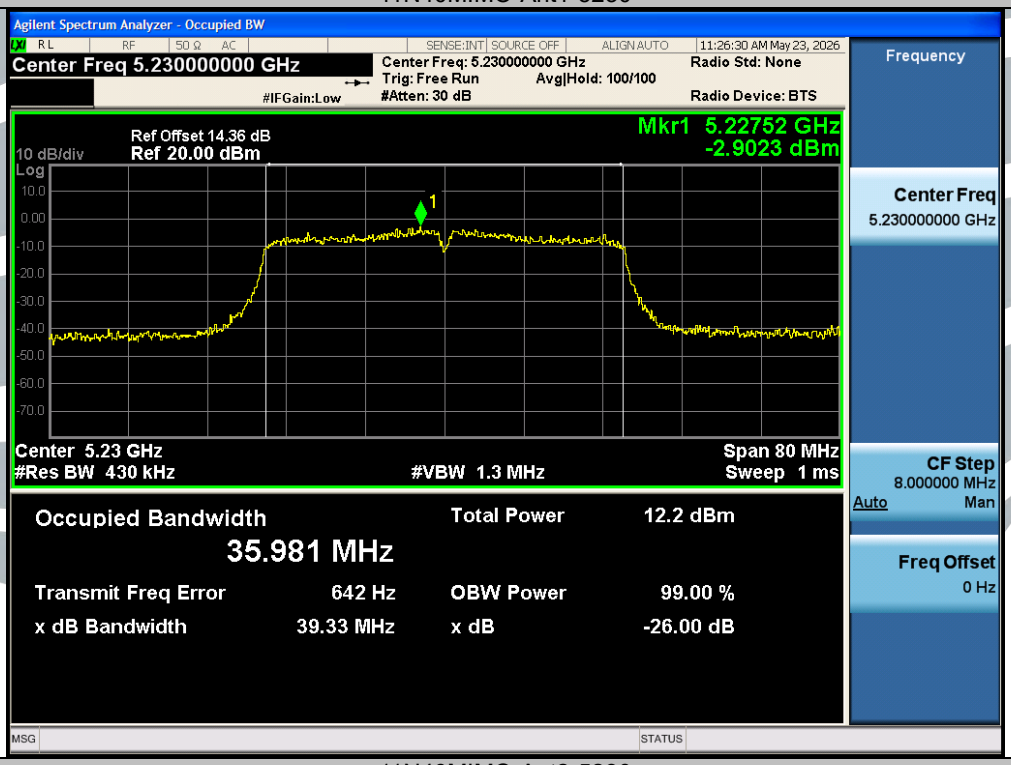
11N40MIMO-Ant1-5190



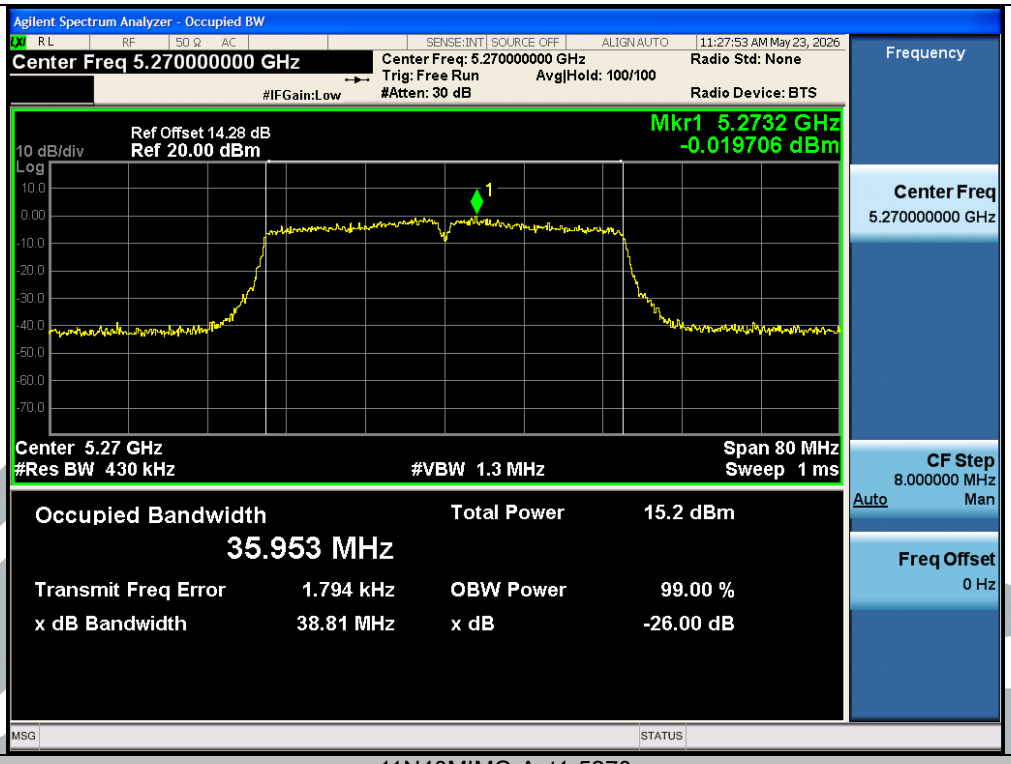
11N40MIMO-Ant2-5190



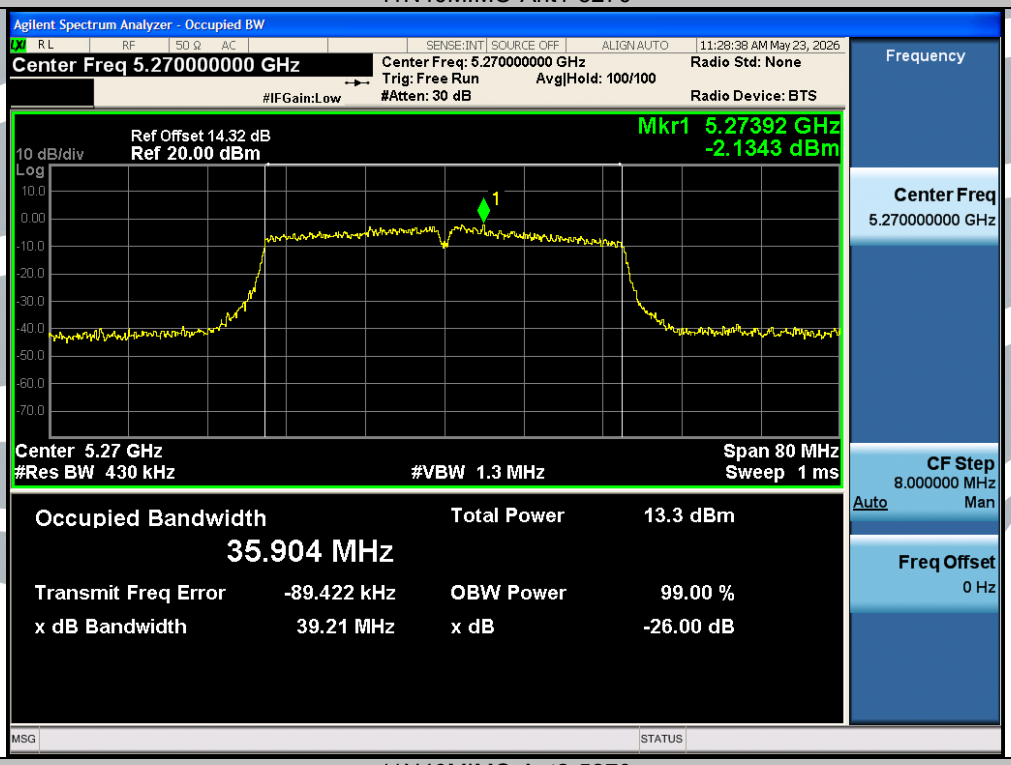
11N40MIMO-Ant1-5230



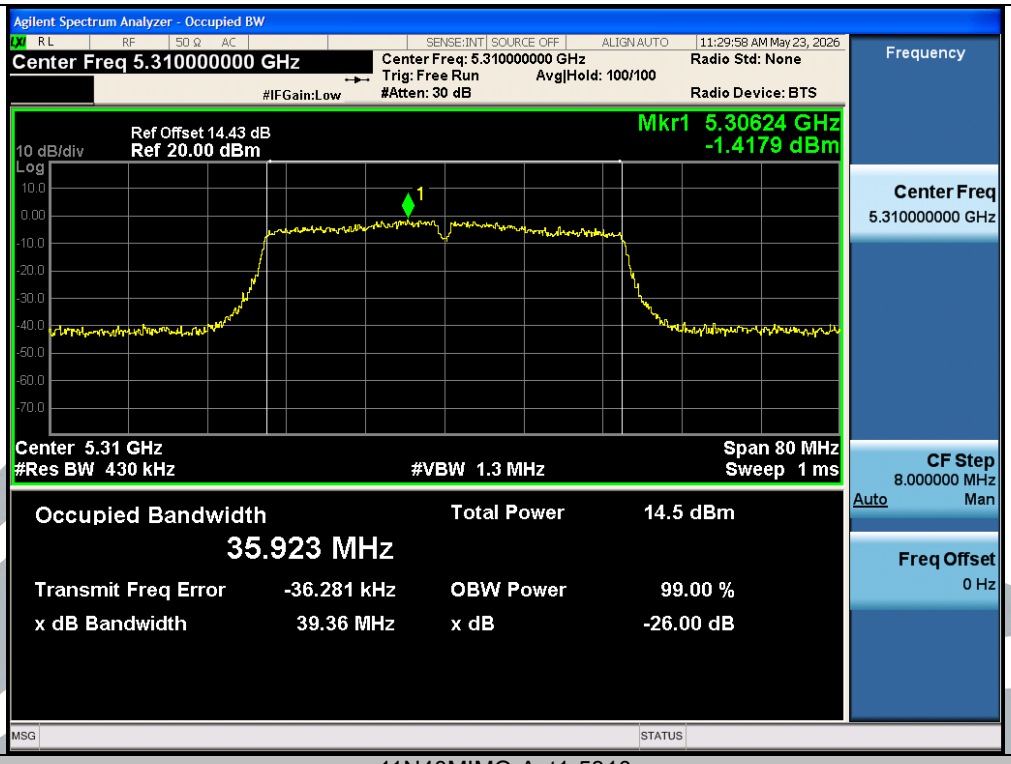
11N40MIMO-Ant2-5230



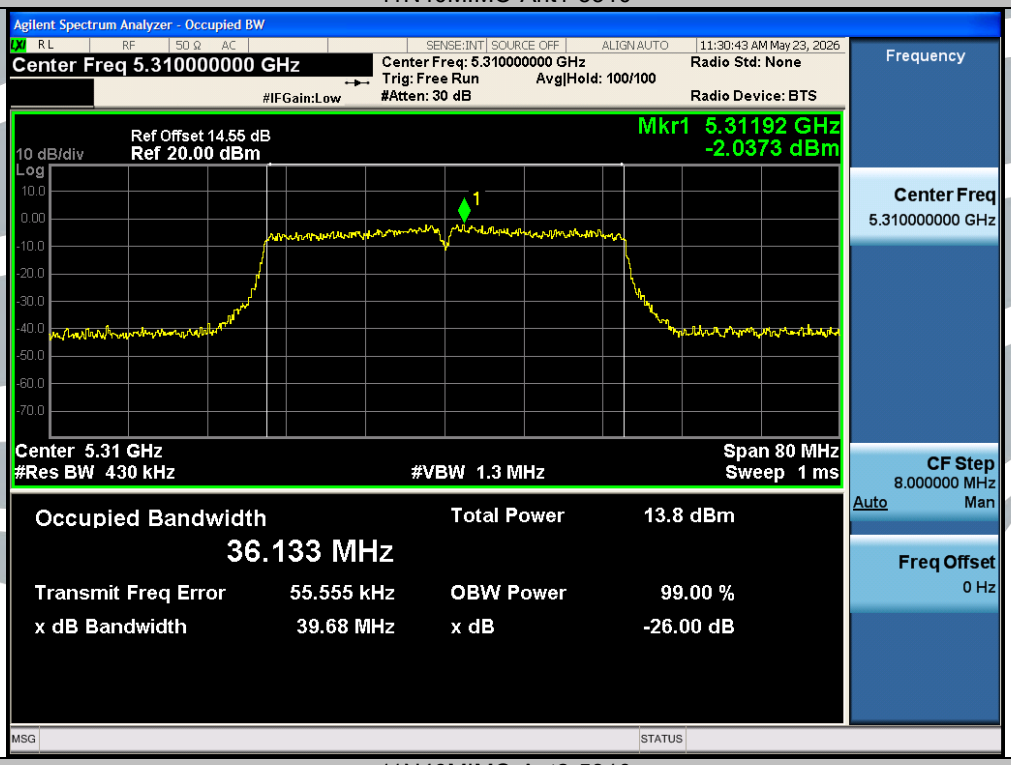
11N40MIMO-Ant1-5270



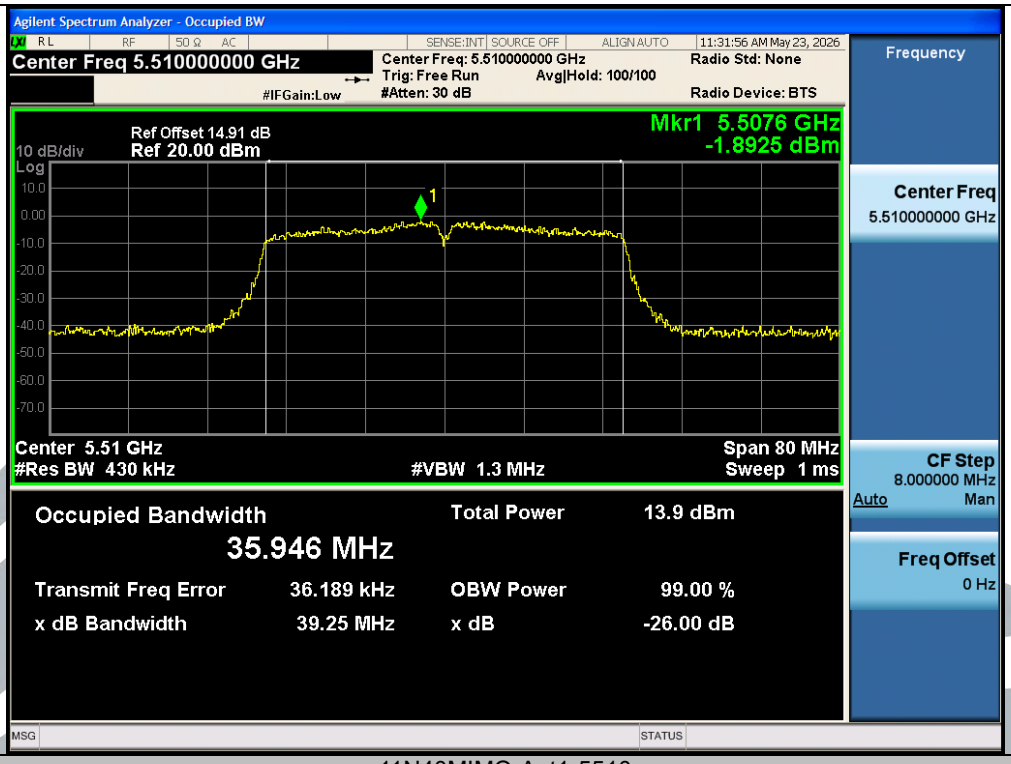
11N40MIMO-Ant2-5270



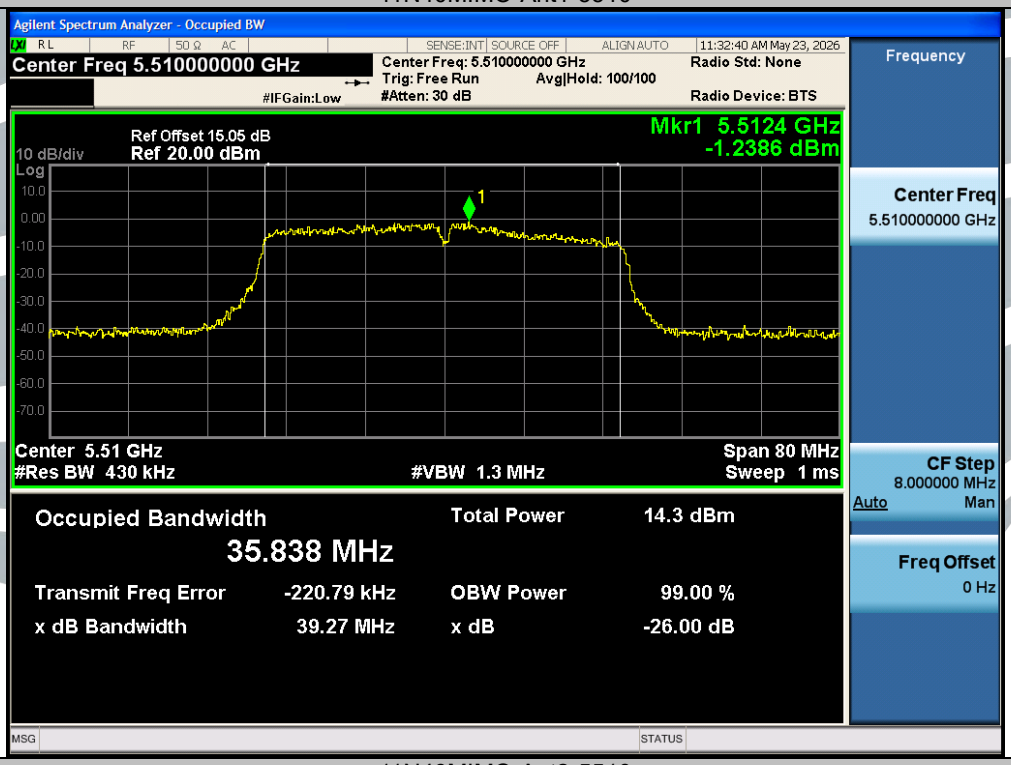
11N40MIMO-Ant1-5310



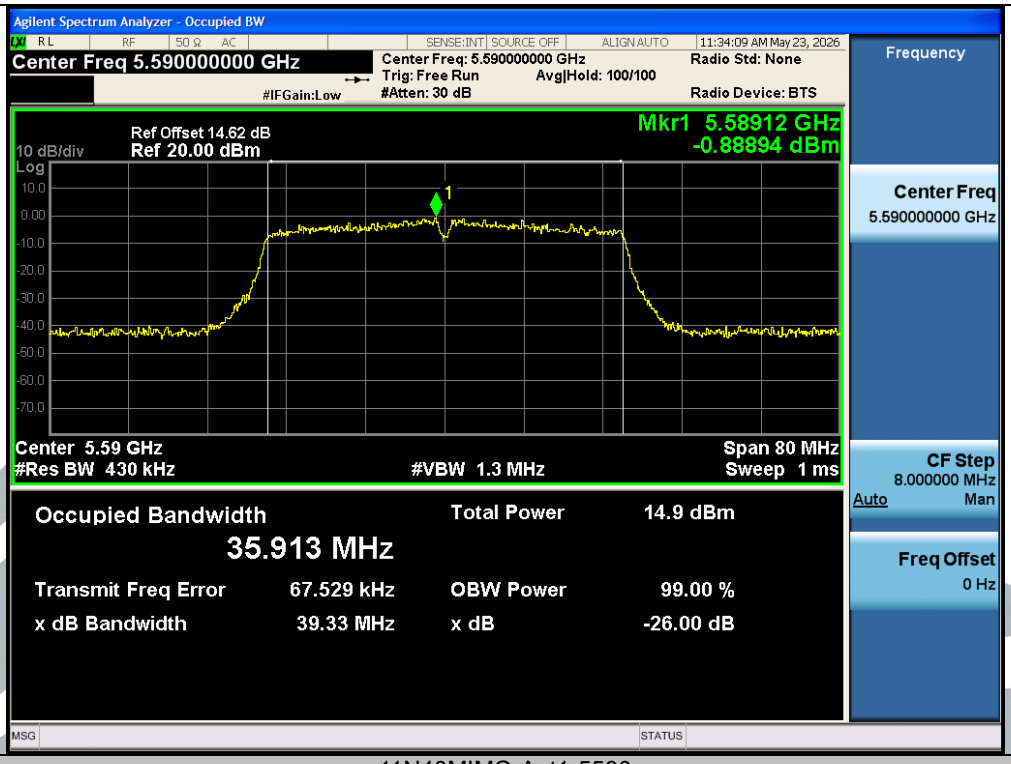
11N40MIMO-Ant2-5310



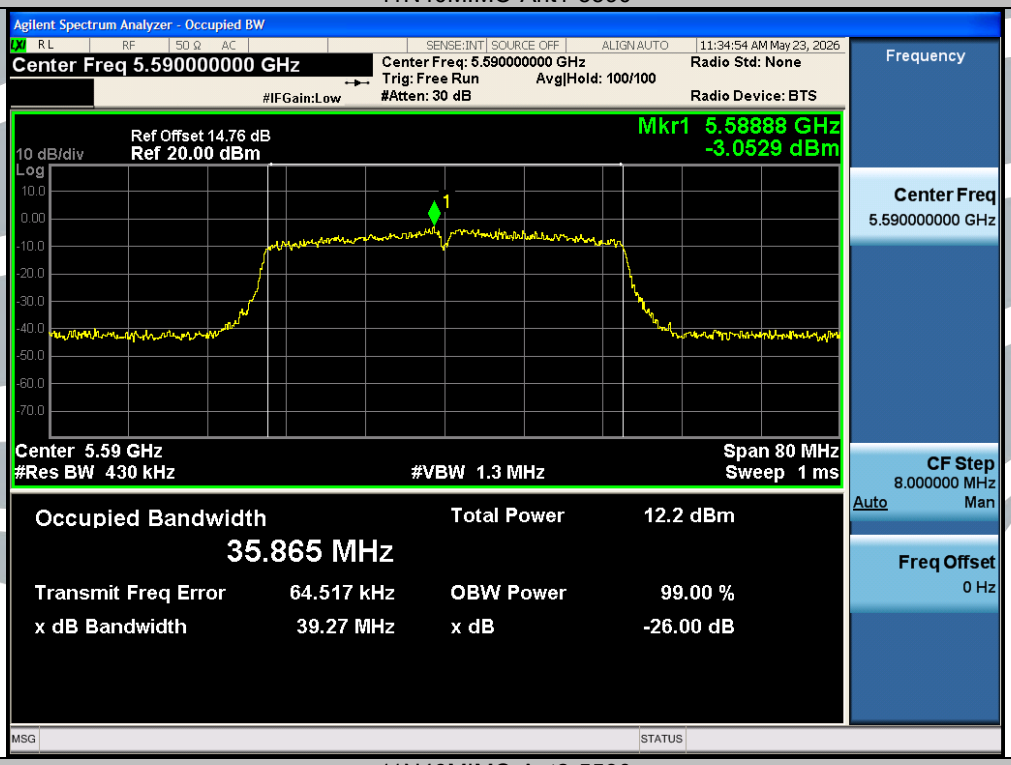
11N40MIMO-Ant1-5510



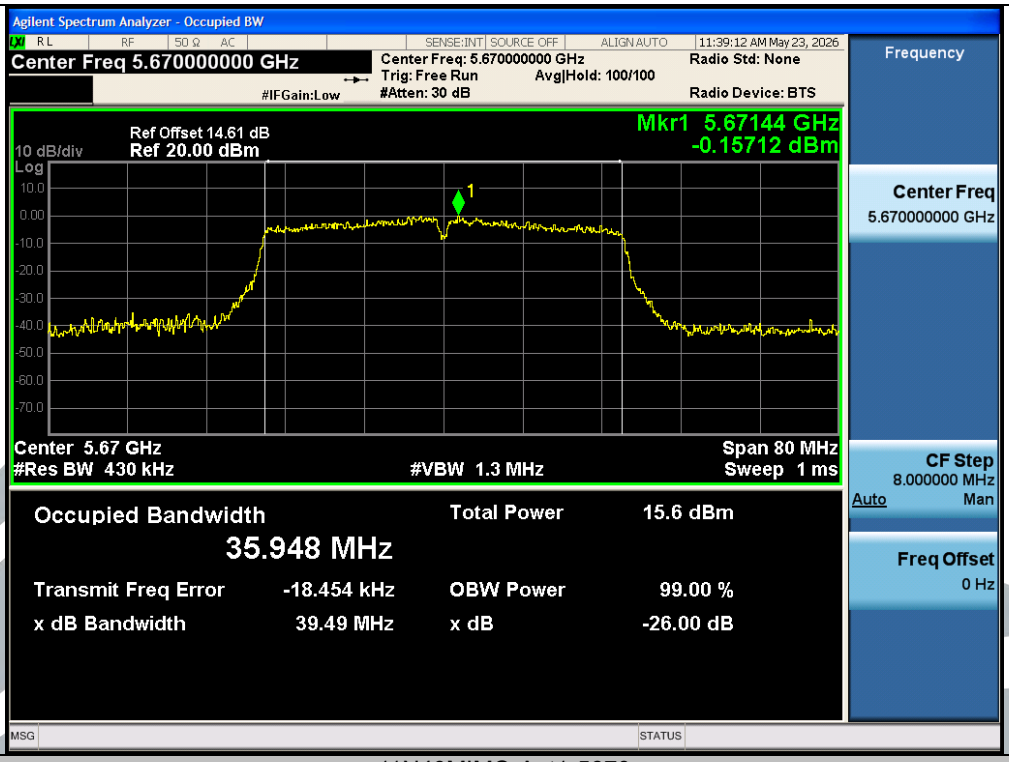
11N40MIMO-Ant2-5510



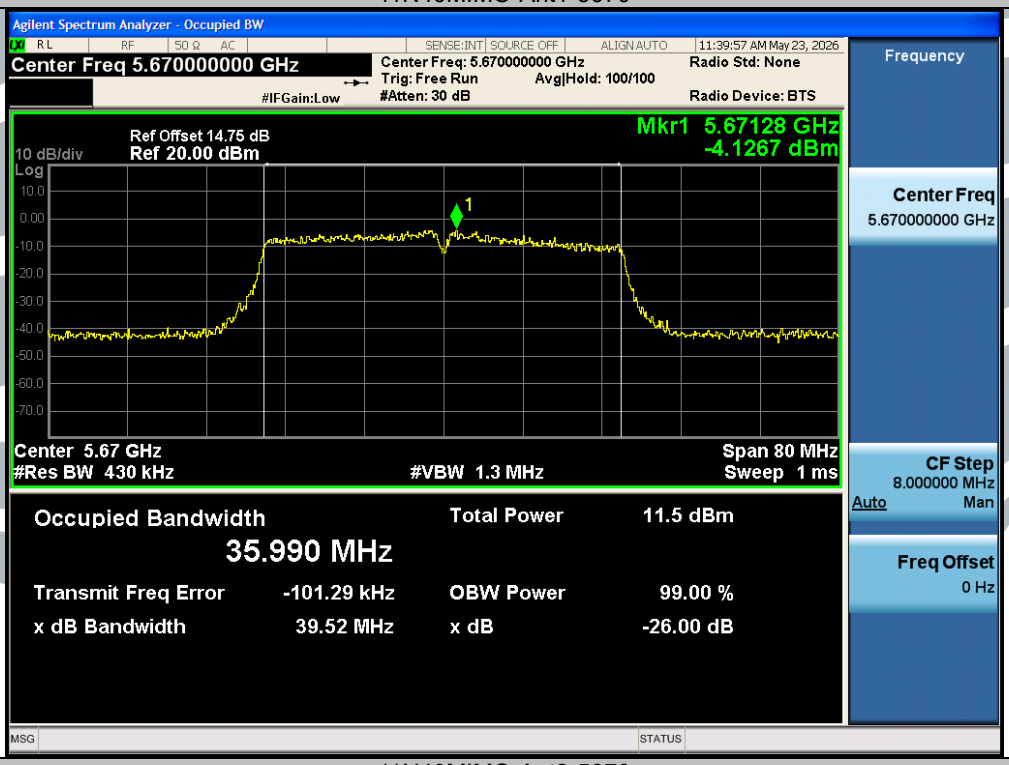
11N40MIMO-Ant1-5590



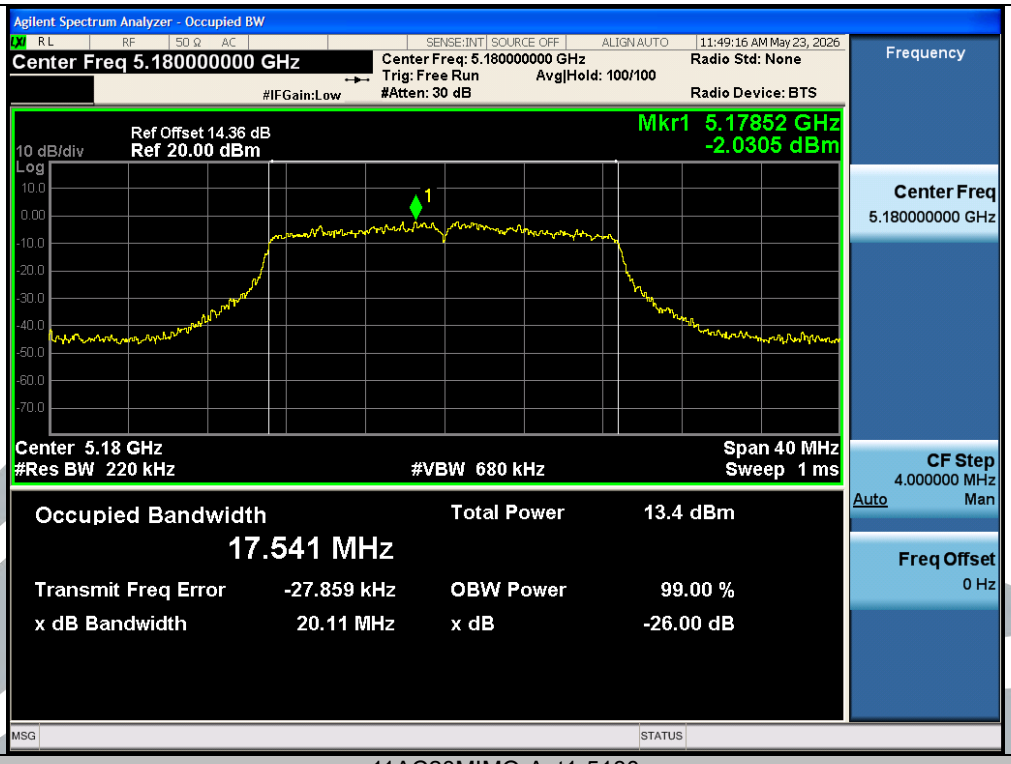
11N40MIMO-Ant2-5590



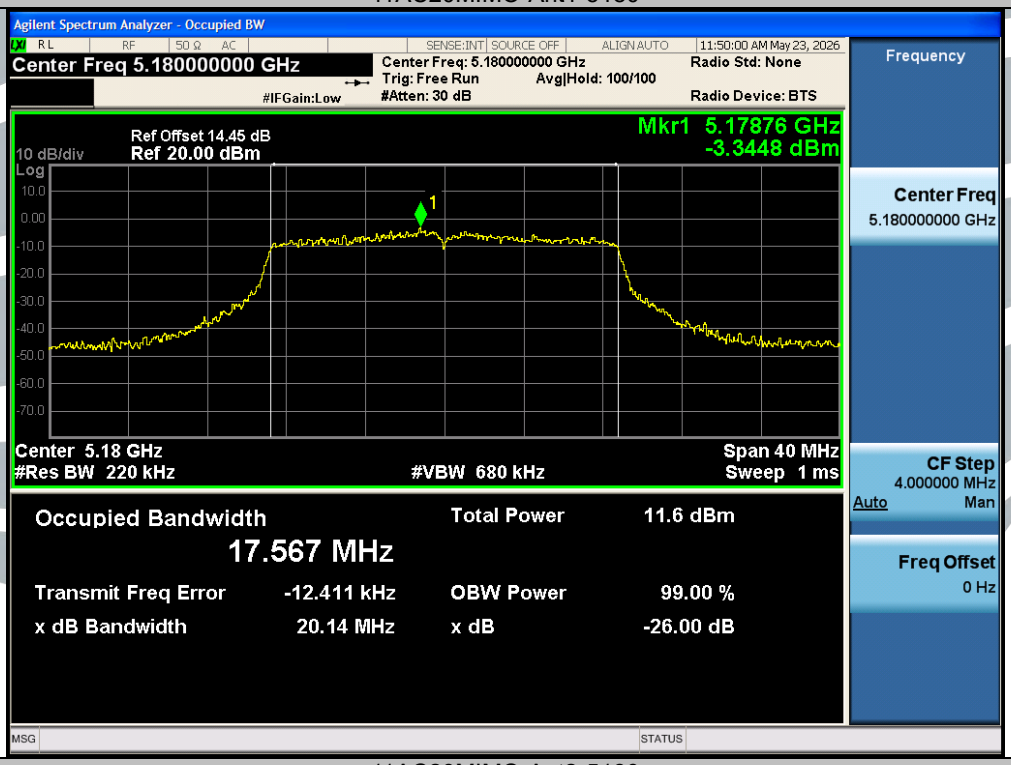
11N40MIMO-Ant1-5670



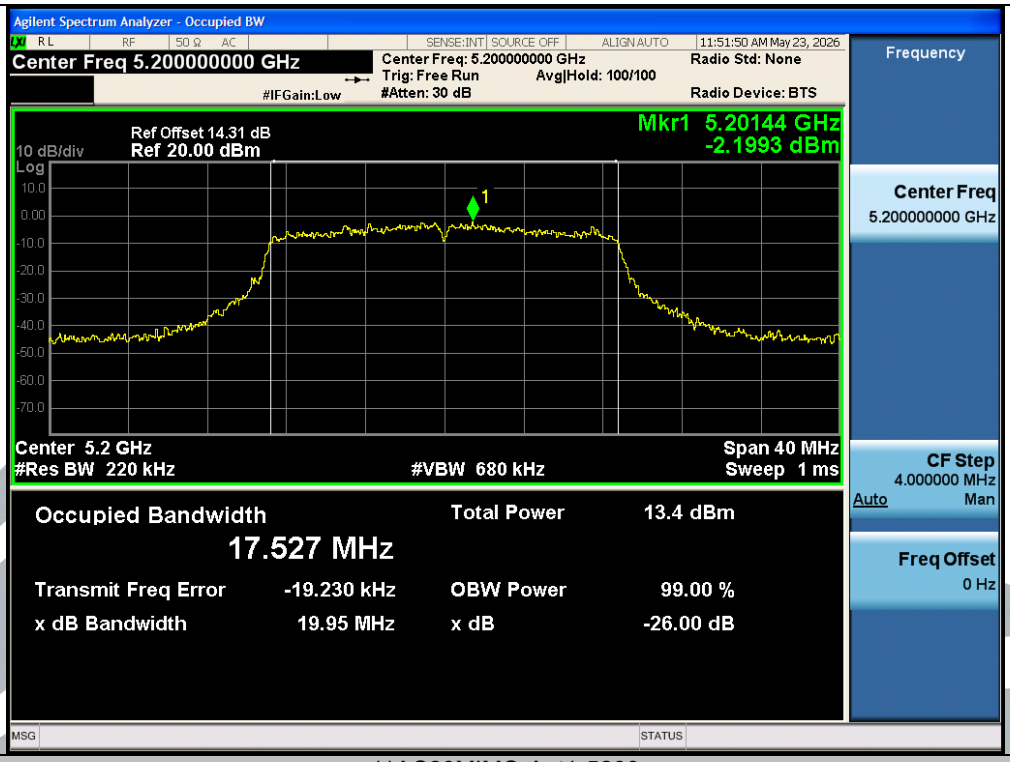
11N40MIMO-Ant2-5670



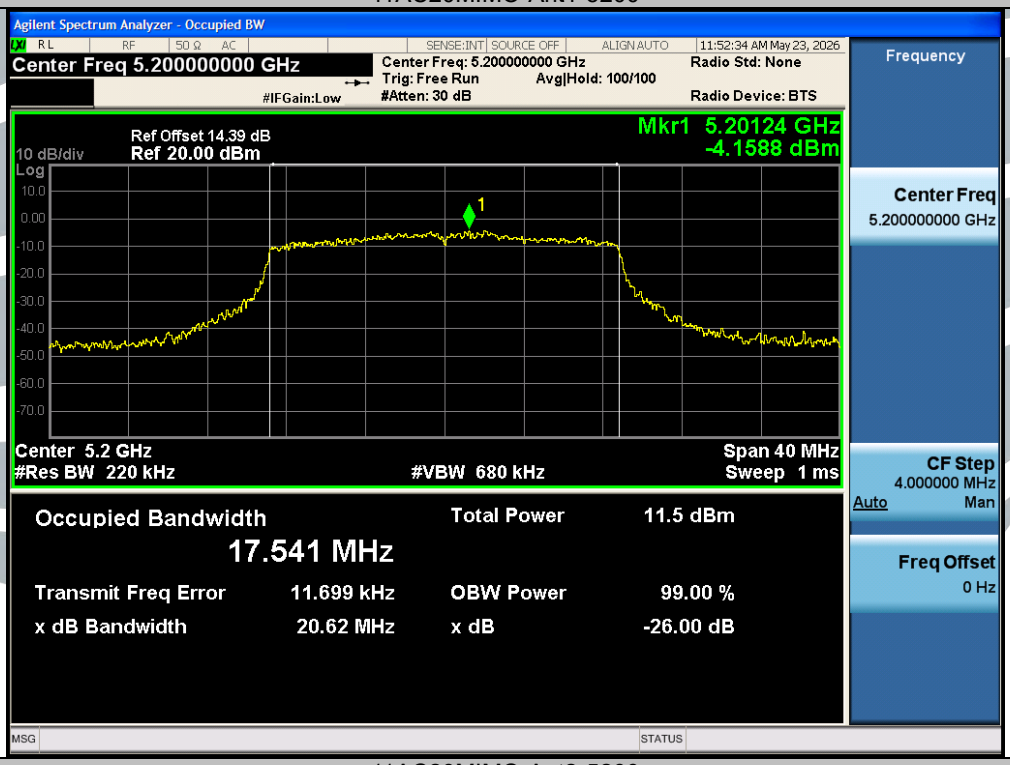
11AC20MIMO-Ant1-5180



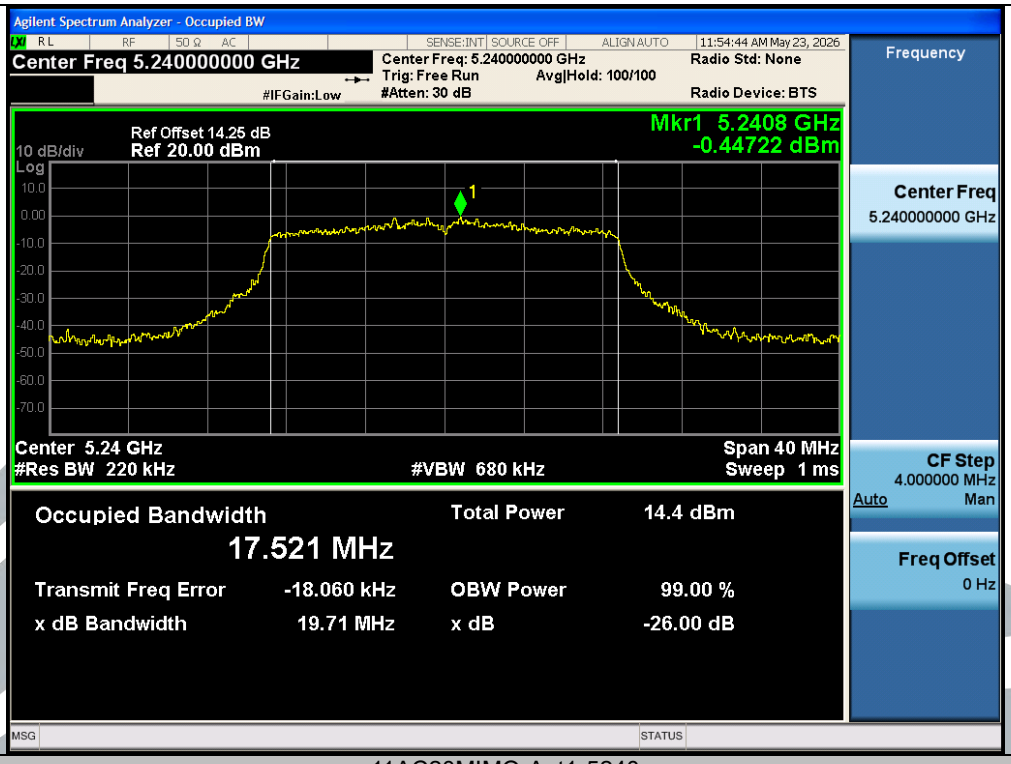
11AC20MIMO-Ant2-5180



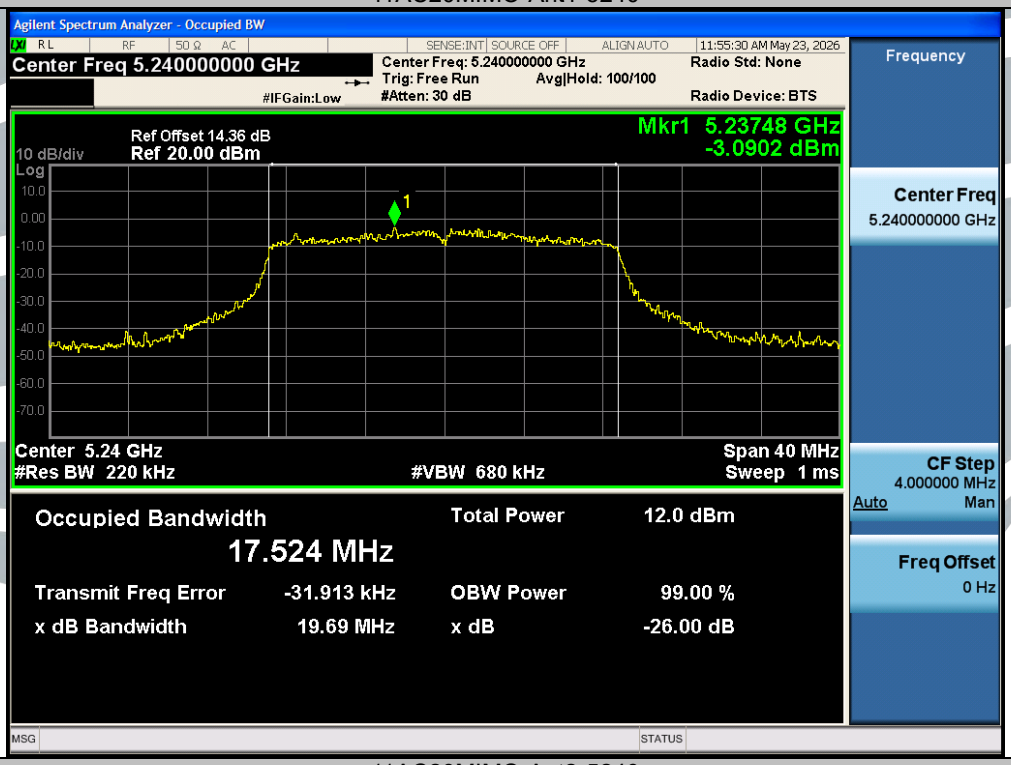
11AC20MIMO-Ant1-5200



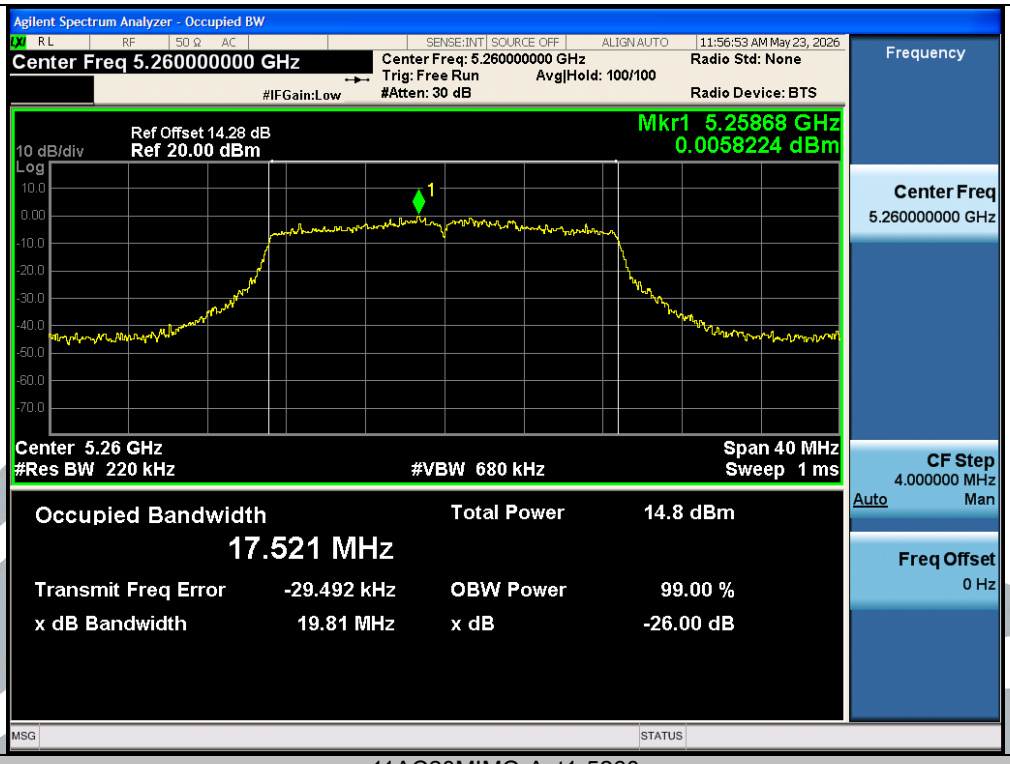
11AC20MIMO-Ant2-5200



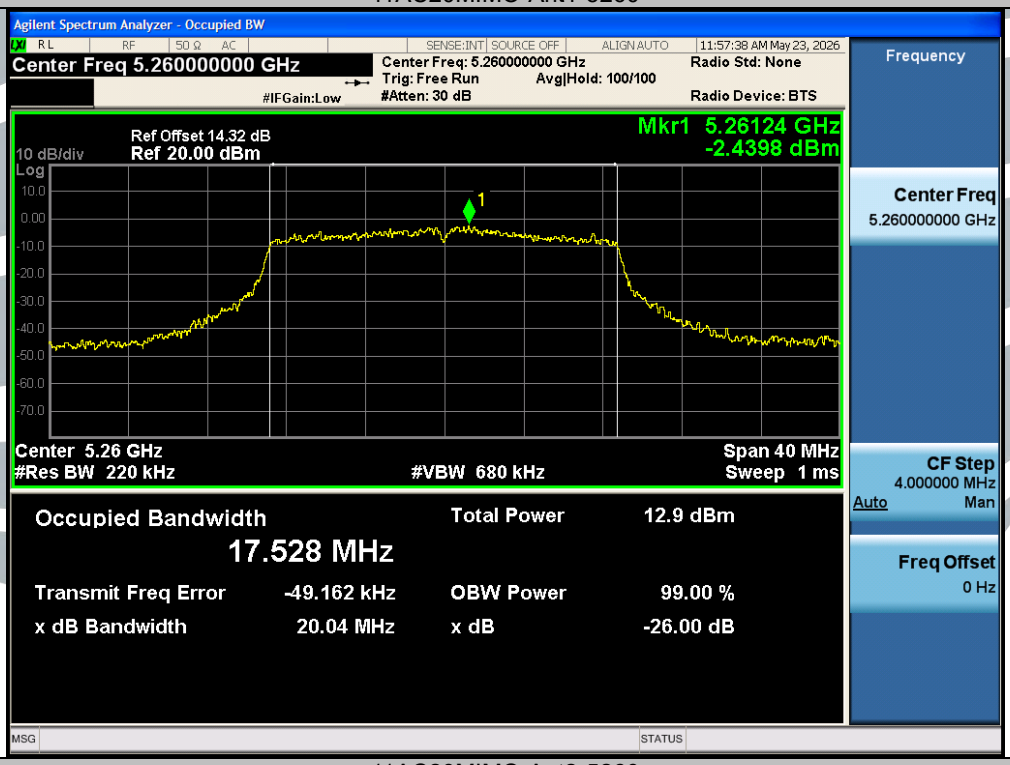
11AC20MIMO-Ant1-5240



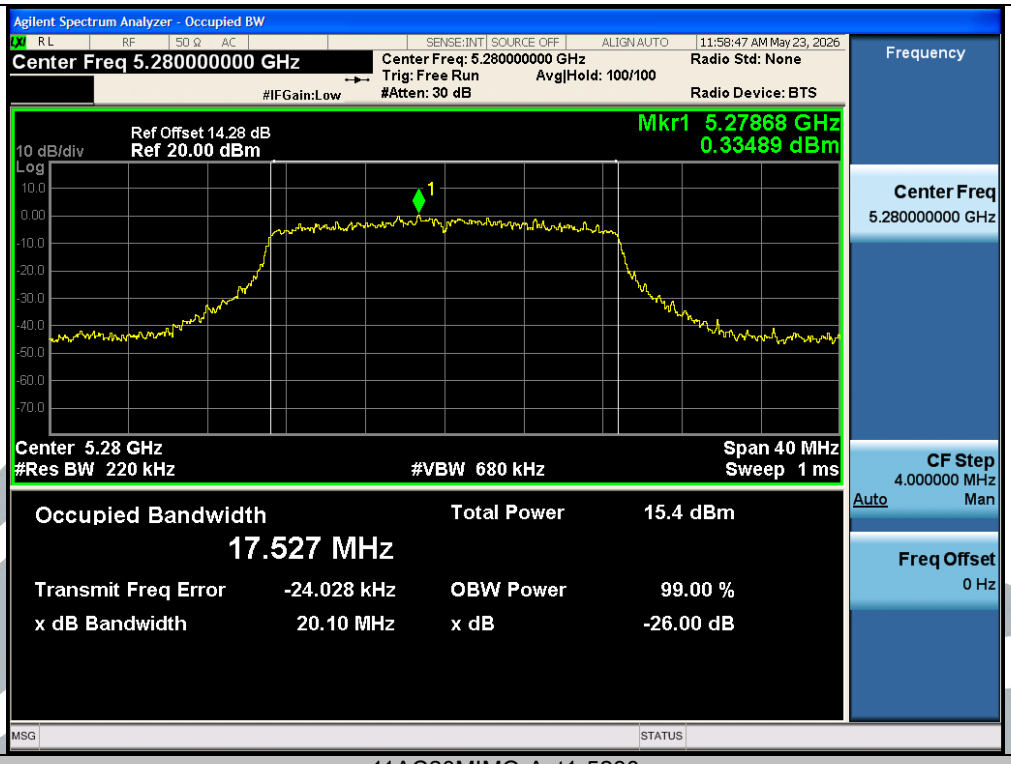
11AC20MIMO-Ant2-5240



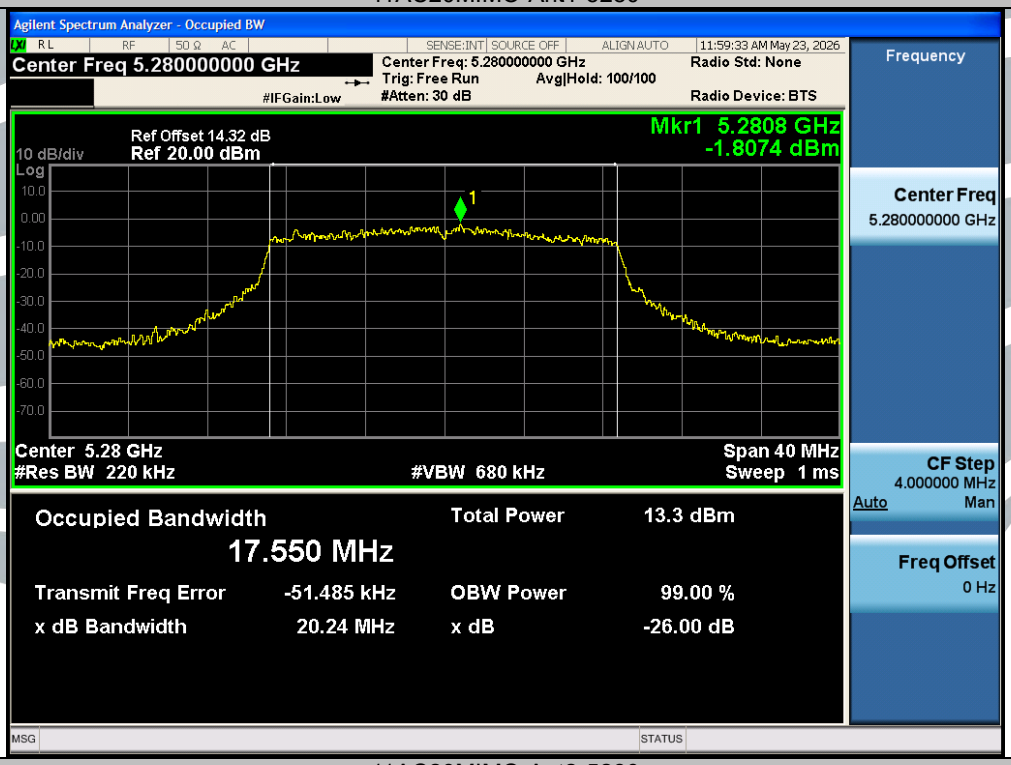
11AC20MIMO-Ant1-5260



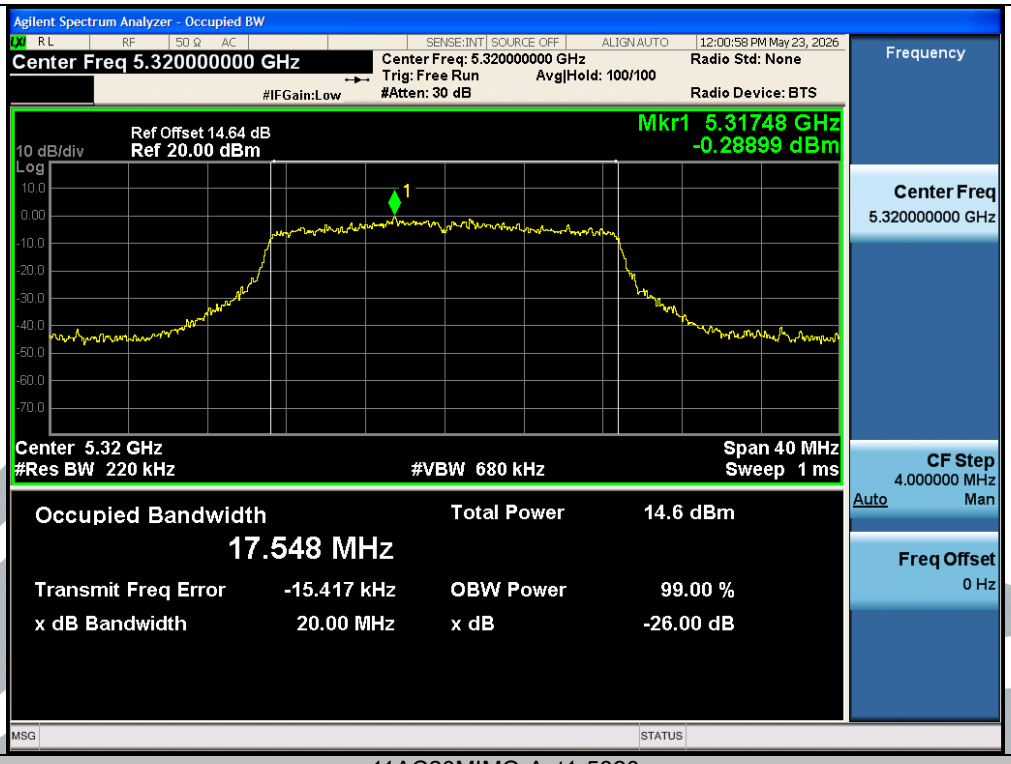
11AC20MIMO-Ant2-5260



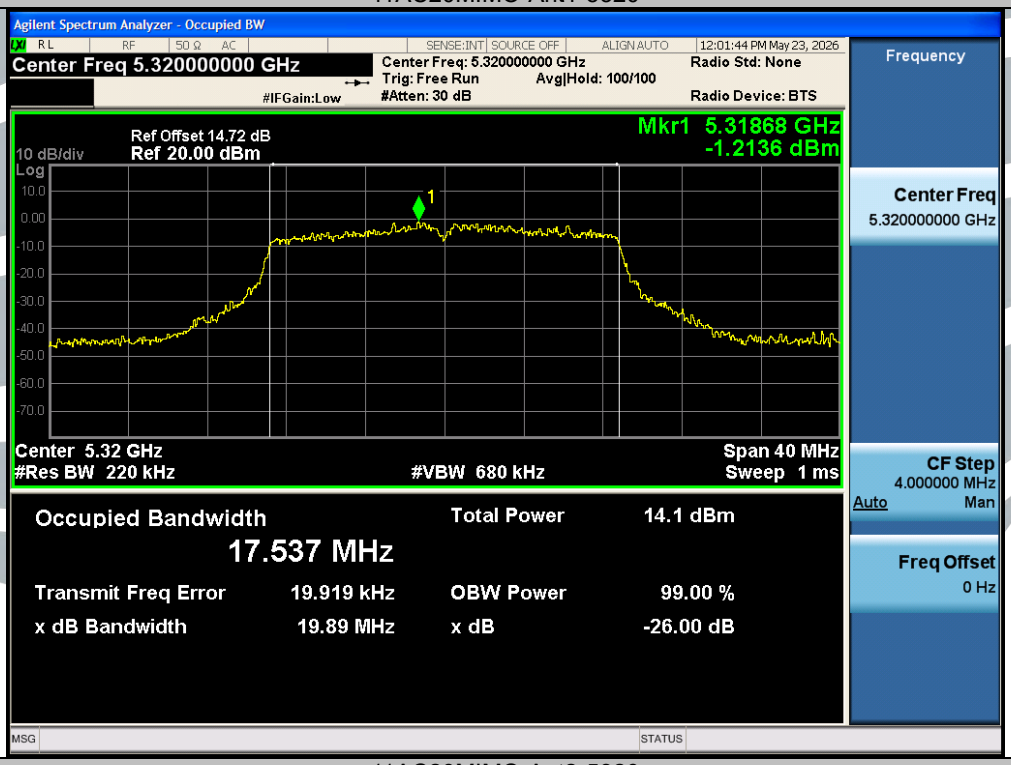
11AC20MIMO-Ant1-5280



11AC20MIMO-Ant2-5280



11AC20MIMO-Ant1-5320



11AC20MIMO-Ant2-5320