TEST REPORT

Report Number: R14176139-E5bV3

Applicant	:	Sony Corporation 1-7-1 Konan Minato-ku Tokyo, 108-0076, Japan
FCC ID	:	PY7-83262V
EUT Description	:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART E

Date Of Issue:
2022-03-28

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400

CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2022-03-16	Initial Issue	Noah Bennett
V2	2022-03-16	Harmonized all antenna descriptors to read as chain 0 and chain 1. Removed FCC from headers. Removed 5.6/5.8 gains from section 9.3	Brian Kiewra
V3	2022-03-28	Addresssed TCB Feedback: Updated Reference report to E5fV2	Noah Bennett

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

TABLE OF CONTENTS

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Sony Corporation
1-7-1 Konan Minato-ku
Tokyo, 108-0076, Japan

EUT DESCRIPTION: GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC

SERIAL NUMBERS: QV770083B8, QV77003RB8, QV770028AQ

SAMPLE RECEIPT DATE: 2022-01-13

DATE TESTED: 2022-02-09 to 2022-03-16

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Complies

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released For
UL LLC. By:

Prepared By:

Jeff Moser
Operations Manager
Consumer Technology Division
UL LLC.

Noah Bennett
Engineer
Consumer Technology Division
UL LLC.

2. TEST RESULT SUMMARY

This report contains data provided by the applicant which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

Note - This report pertains to the 802.11ax mode in the 5.2 and 5.3 band requirements of the EUT.

FCC Clause	Requirement	Result	Comment
See Comment	Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 12.2.
See Comment	26dB BW/99% OBW	Reporting purposes only	Per ANSI C63.10 Sections 6.9.2 and 6.9.3
15.407 (a) (1-2), (h) (1)	Output Power	Pass	None.
15.407 (a) (1-2)	PSD	Pass	None.
15.209, 15.205, 15.407 (b)	Radiated Emissions	Pass	None.
15.207	AC Mains Conducted Emissions	Pass	None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with:

- FCC CFR 47 Part 2
- FCC CFR 47 Part 15
- FCC KDB 662911 D01 v02r01
- FCC KDB 905462 D06 v02
- FCC KDB 789033 D02 v02r01
- KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U_{Lab}
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

Uncertainty figures are valid to a confidence level of 95%.

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC. Note - This report pertains to the 802.11ax mode in the 5.2 and 5.3 GHz band requirements of the EUT.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5.2GHz BAND 802.11 ax MODE 2TX

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.2 GHz band, 2TX			
5180-5240	802.11ax HE20 OFDMA, 242-Tones	13.55	22.65
	802.11ax HE20 OFDMA, 106-Tones	13.49	22.34
	802.11ax HE20 OFDMA, 52-Tones	13.51	22.44
	802.11ax HE20 OFDMA, 26-Tones	11.04	12.71
5190-5230	802.11ax HE40 OFDMA, 484-Tones	13.60	22.91
5210	802.11ax HE80 OFDMA, 996-Tones	11.57	14.35

5.3GHz BAND 802.11 ax MODE 2TX

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.3 GHz band, 2TX			
5260-5320	802.11ax HE20 OFDMA, 242-Tones	13.51	22.44
	802.11ax HE20 OFDMA, 106-Tones	13.62	23.01
	802.11ax HE20 OFDMA, 52-Tones	13.37	21.73
	802.11ax HE20 OFDMA, 26-Tones	10.99	12.56
5270-5310	802.11ax HE40 OFDMA, 484-Tones	13.40	21.88
5290	802.11ax HE80 OFDMA, 996-Tones	12.78	18.97
5250	802.11ax HE160 2x996T	12.01	15.88
	802.11ax HE160 OFDMA, 996-Tones	12.61	18.24
	802.11ax HE160 OFDMA, 484-Tones	12.58	18.11

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The peak antenna(s) gain and type, as provided by the manufacturer' are as follows:

Antenna	Frequency Range (MHz)	Maximum Gain (dBi)
1	5180-5320	2.0
2	5180-5320	-6.4

	Theory of Operation	Antenna	Manufacturer Tolerance	Block Diagram
Chain 0	WLAN Main/Bluetooth #1	WLAN Main/Bluetooth #1	Chain 0	WLAN Main/Bluetooth #1
Chain 1	WLAN Sub/Bluetooth #2	WLAN Sub/Bluetooth #2	Chain 1	WLAN Sub/Bluetooth #2

6.4. SOFTWARE AND FIRMWARE

The firmware version used during testing was 0.428.

6.5. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

Band edge was performed with the EUT set to transmit on low and high channels. Radiated spurious and harmonic emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the worst-case mode/channel based on power and PSD.

For this report, the worst-case Radiated Emissions from 1-18 GHz was found to be HE20 26T, HE20 106T and HE40 484T.

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel/mode with highest output power/PSD as worst-case scenario and can be found in report R14176139-E5fV2.

Worst-case data rates as provided by the client were:

- 802.11ax HE20mode: MCS0 (Nss = 1)
- 802.11ax HE40mode: MCS0 (Nss = 1)
- 802.11ax HE80mode: MCS0 (Nss = 1)
- 802.11ax HE160mode: MCS0 (Nss = 1)

All testing performed in 2Tx mode (NSS=1), where power per chain is equivalent to the 1Tx power on each chain. This allows 2Tx testing to cover all 1Tx testing.

802.11ax modes were determined by the following:

- 802.11ax HE20 26T/52T, 106T, and 242T modes tested.
- 802.11ax HE40 484T mode tested. 26T, 52T, 106T, and 242T modes are covered by the HE 20MHz modes.

- 802.11ax HE80 996T mode tested. 26T, 52T, 106T, 242T, and 484T modes are covered by the HE20 and HE160 modes.
- 802.11ax HE160 484T, 996T, 2x996T modes tested. 26T, 52T, 106T, and 242T modes are covered by the HE 20MHz modes.

Preliminary Investigation scans were completed to compare Full RU Tone modes and Single User Tone modes. It was found that Full RU Tone modes were worst case over Single User in every instance. Therefore, only full tone was testing as it is representative of SU worst case scenario.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	HP	14-dk1003dx	5CG016B4XM	TX2-RTL8821CE
Headphones	Sony	MDR-EX15AP	NA	NA
AC Adapter	Sony	XQZ-UC11-010-236-21	1821W34209742	NA
AC Adapter	Sony	XQZ-UC11-010-236-21	1821W34209856	NA
USB Cable Type C	Sony	XQZ-UB1	NA	NA

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB-C	Non-Shielded	<3m	Connected to Power Supply
2	3.5mm	1	3.5mm Audio	Non-Shielded	<1m	Connected to headphones

TEST SETUP

The EUT is connected to a host laptop computer and configured via test software before the tests. Test software exercised the radio card.

SETUP DIAGRAMS

Please refer to R14176139-EP2 for setup diagrams

7. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 789033 D02 v02r01, Section B.

26 dB Emission BW: KDB 789033 D02 v02r01, Section C.1

Conducted Output Power: KDB 789033 D02 v02r01, Section E.3.b (Method PM-G)

Power Spectral Density: KDB 789033 D02 v02r01, Section F

Unwanted emissions in restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v02r01, Sections G.3 and G.5.

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
	Conducted Room 2				
SA0025	Spectrum Analyzer	Keysight Technologies	N9030A	2021-04-01	2022-04-01
PWM003	RF Power Meter	Keysight Technologies	N1911A	2021-08-30	2022-08-30
PWS006	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	N1921a	2021-12-17	2022-12-17
76023 (EC0225)	Temp/Humid Chamber	Cincinnati Sub-Zero	ZPH-8-3.5-SCT/AC	2021-05-27	2022-05-27
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2021-07-12	2022-07-12
76021	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2021.11.3, 2022.02.16	NA	NA
	Additional Equipment used				
MM0167 (PRE0126458)	True RMS Multimeter	Agilent	U1232A	2021-08-17	2023-08-17

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
206211	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2021-03-11	2022-03-11
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2021-06-29	2022-06-29
	Gain-Loss Chains				
C4-SAC03	Gain-loss string: 1-18GHz	Various	Various	2021-05-07	2022-05-07
	Receiver & Software				
SA0026	Spectrum Analyzer	Agilent	N9030A	2021-07-16	2022-07-16
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-02-15	2023-02-15
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
210642	Environmental Meter	Fisher Scientific	210701942	2021-8-16	2023-08-16

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2021-05-03	2022-05-03
	Gain-Loss Chains				
C2-SAC03	Gain-loss string: 1-18GHz	Various	Various	2021-07-09	2022-07-09
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-10	2022-03-10
SA0020	Spectrum Analyzer	Agilent	E4446A	2021-05-25	2022-05-25
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
s/n 181474409	Environmental Meter	Fisher Scientific	15-077-963	2021-09-27	2022-09-27

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 D01 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11ax HE20 OFDMA, RU size 242T	2.388	2.405	0.993	99.29%	0.00	0.010
802.11ax HE20 OFDMA, RU size 106T	2.184	2.202	0.992	99.18%	0.00	0.010
802.11ax HE20 OFDMA, RU size 52T	2.324	2.342	0.992	99.23%	0.00	0.010
802.11ax HE20 OFDMA, RU size 26T	2.328	2.346	0.992	99.23%	0.00	0.010
802.11ax HE40 OFDMA, RU size 484T	2.383	2.400	0.993	99.29%	0.00	0.010
802.11ax HE80 OFDMA, RU size 996T	2.418	2.435	0.993	99.30%	0.00	0.010
802.11ax HE160 OFDMA, RU size 2x996T	2.419	2.436	0.993	99.30%	0.00	0.010
802.11ax HE160 OFDMA, RU size 996T	2.419	2.436	0.993	99.30%	0.00	0.010
802.11ax HE160 OFDMA, RU size 484T	2.381	2.398	0.993	99.29%	0.00	0.010

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

DUTY CYCLE PLOTS

802.11ax HE20 OFDMA, RU size 242T MODE

802.11ax HE20 OFDMA, RU size 106T MODE

802.11ax HE20 OFDMA, RU size 52T MODE

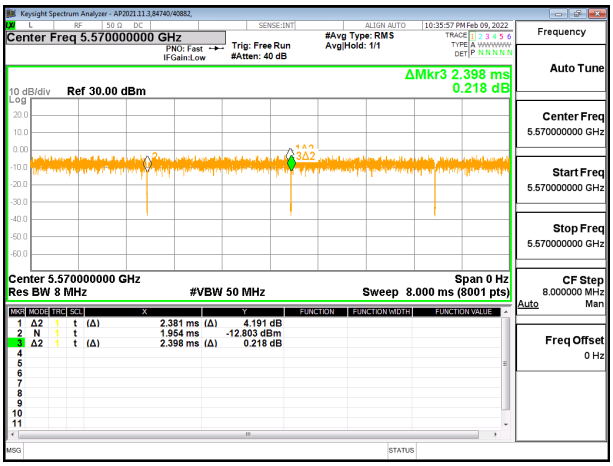
802.11ax HE20 OFDMA, RU size 26T MODE

802.11ax HE40 OFDMA, RU size 484T MODE

802.11ax HE80 OFDMA, RU size 996T MODE

802.11ax HE160 OFDMA, RU size 2x996T MODE

802.11ax HE160 OFDMA, RU size 996T MODE



802.11ax HE160 OFDMA, RU size 484T MODE

INTENTIONALLY LEFT BLANK

9.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

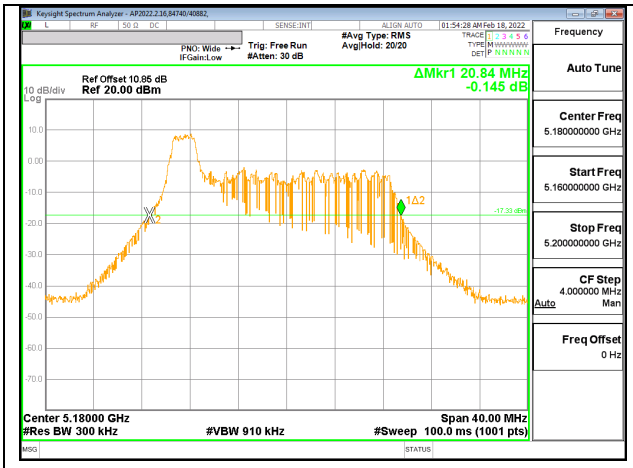
RESULTS

9.2.1. 802.11ax HE20 MODE 2TX IN THE 5.2GHz BAND

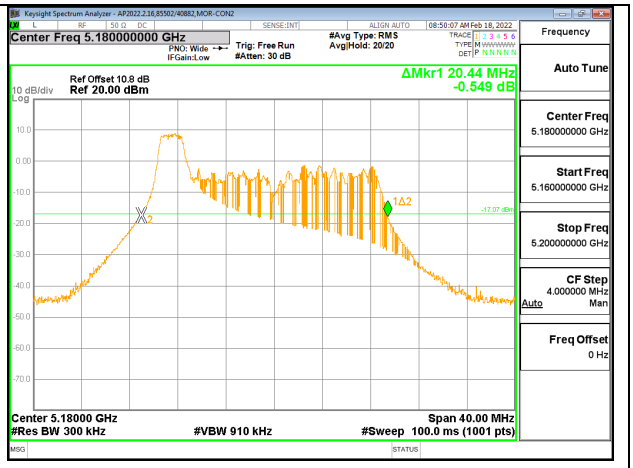
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 26-Tones, RU Index 0

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5180	20.84	20.44

LOW



LOW CHANNEL Chain 0

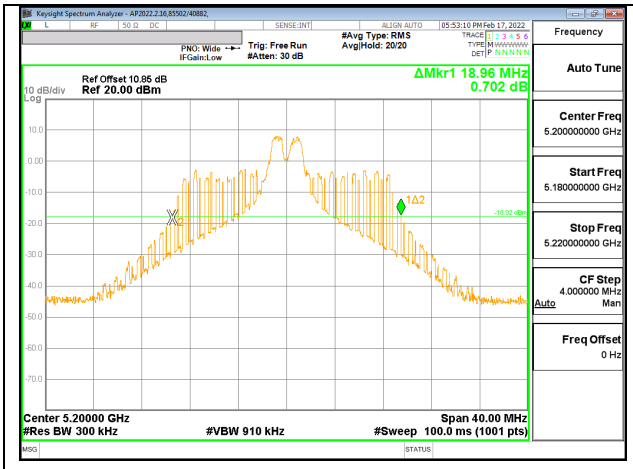


LOW CHANNEL Chain 1

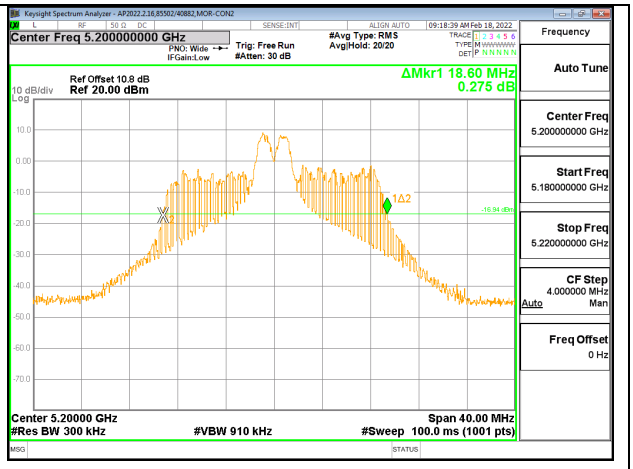
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 26-Tones, RU Index 4

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5200	18.96	18.60

MID



MID CHANNEL Chain 0

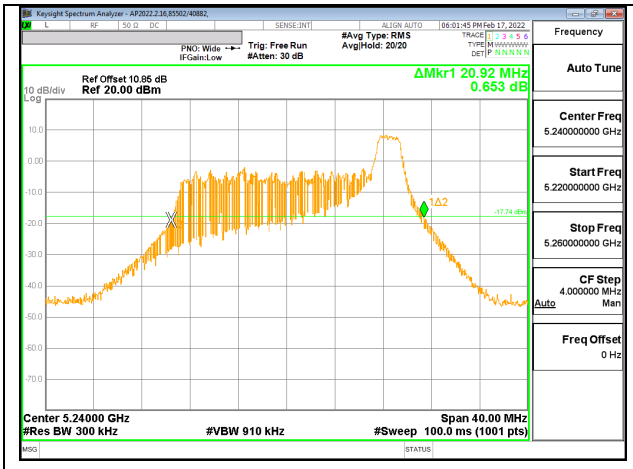


MID CHANNEL Chain 1

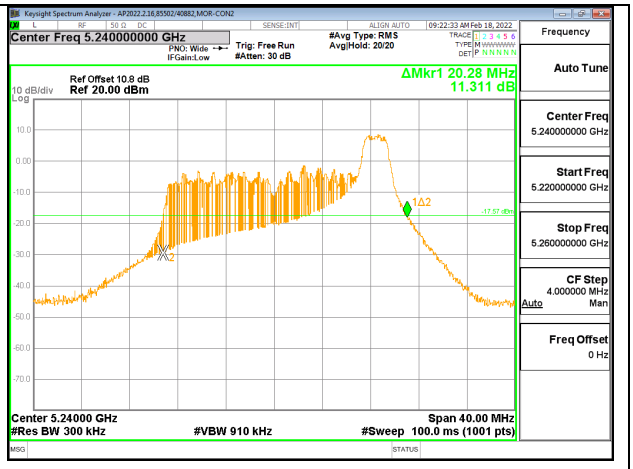
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 26-Tones, RU Index 8

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
High	5240	20.92	20.28

HIGH



HIGH CHANNEL Chain 0

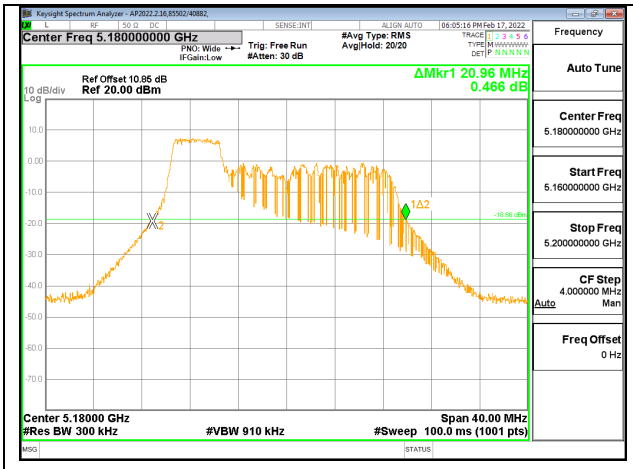


HIGH CHANNEL Chain 1

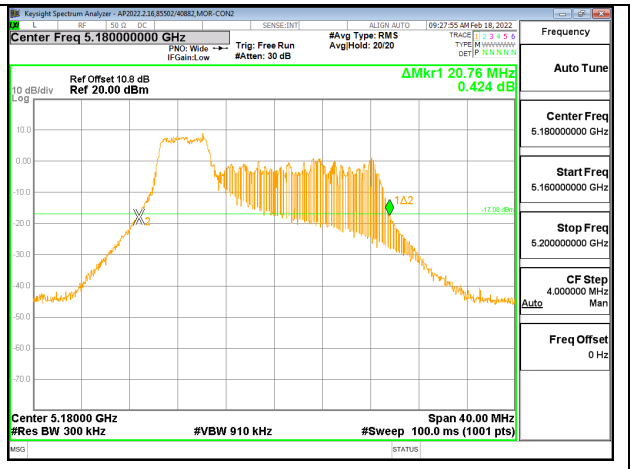
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 52-Tones, RU Index 37

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5180	20.96	20.76

LOW



LOW CHANNEL Chain 0

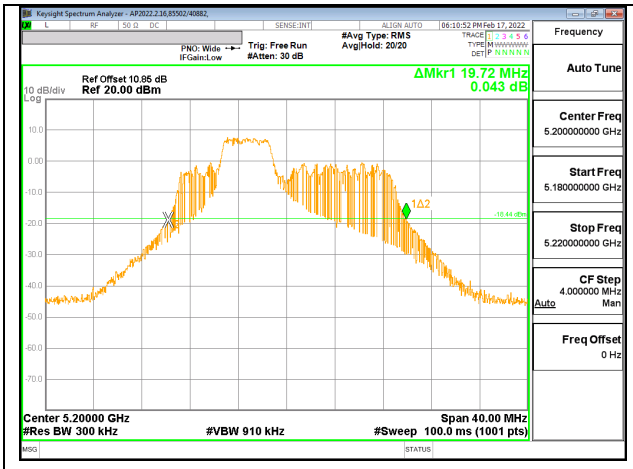


LOW CHANNEL Chain 1

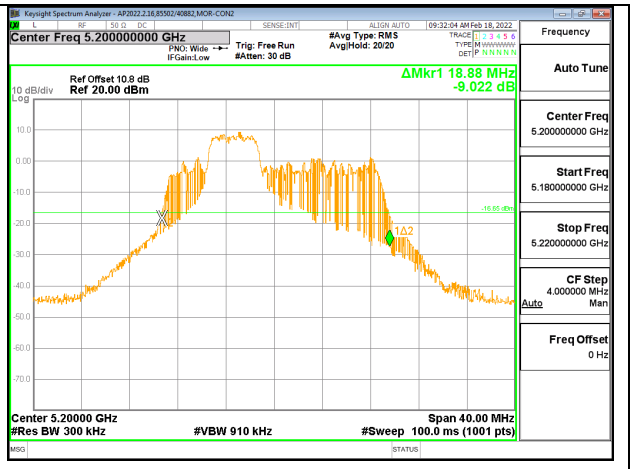
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 52-Tones, RU Index 38

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5200	19.72	18.88

MID



MID CHANNEL Chain 0

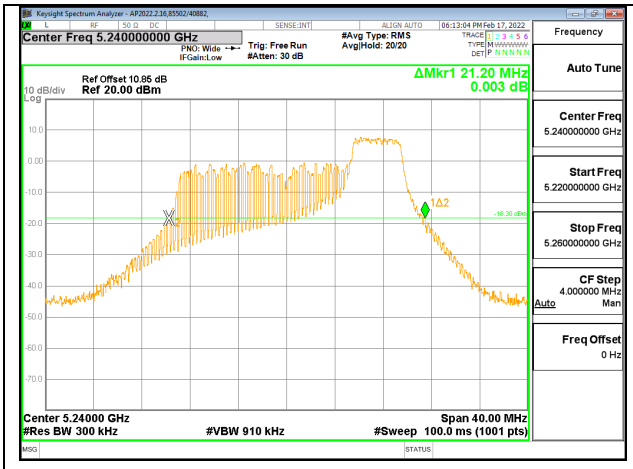


MID CHANNEL Chain 1

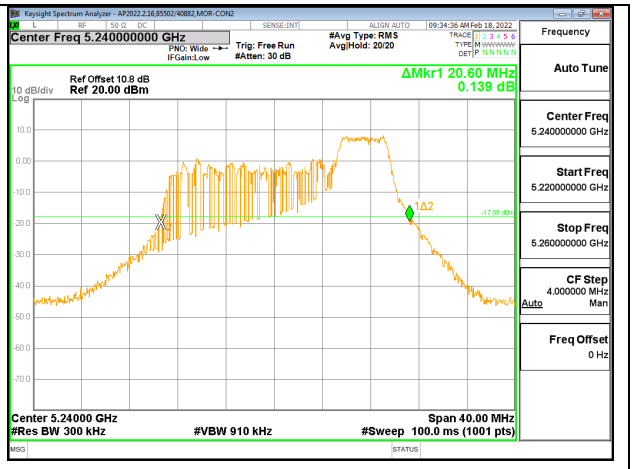
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 52-Tones, RU Index 40

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
High	5240	21.20	20.60

HIGH



HIGH CHANNEL Chain 0

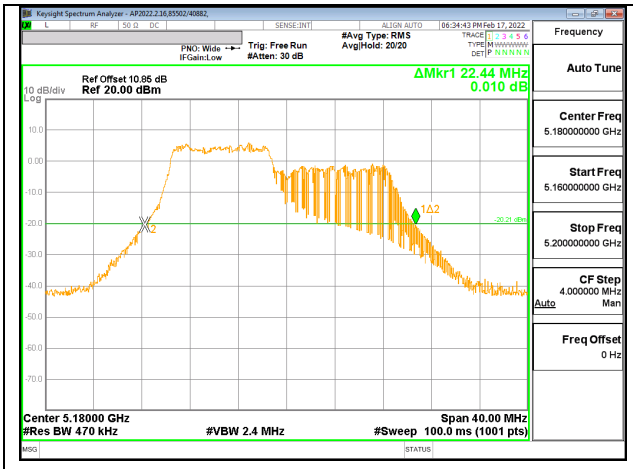


HIGH CHANNEL Chain 1

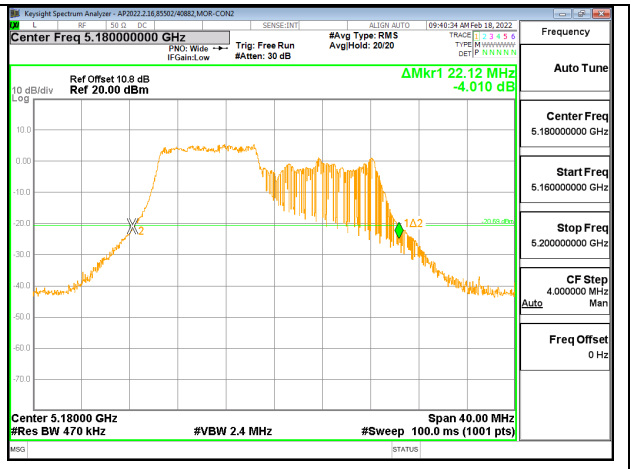
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 106-Tones, RU Index 53

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5180	22.44	22.12
Mid	5200	22.24	22.76

LOW

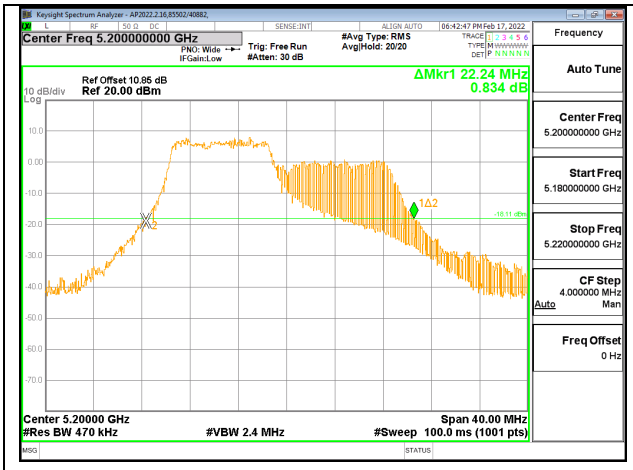


LOW CHANNEL Chain 0

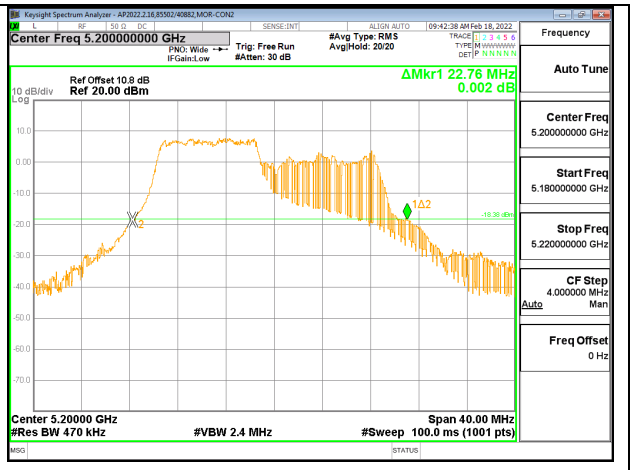


LOW CHANNEL Chain 1

MID



MID CHANNEL Chain 0

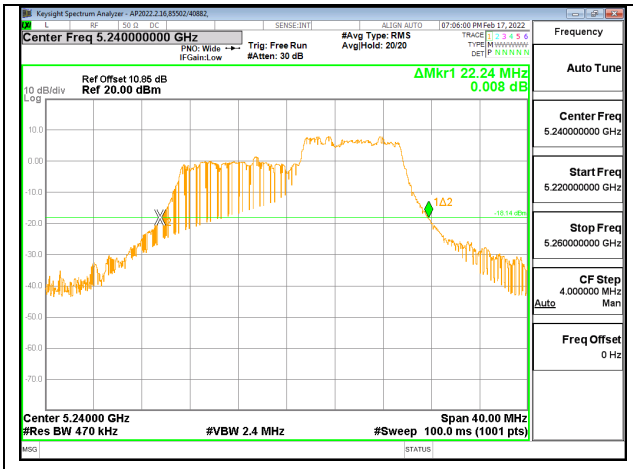


MID CHANNEL Chain 1

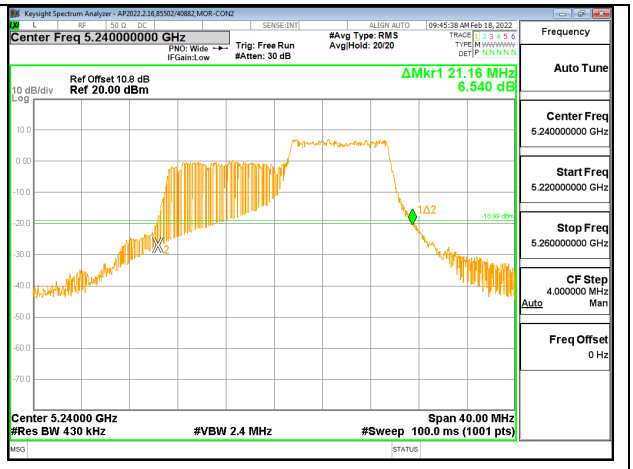
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 106-Tones, RU Index 54

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
High	5240	22.24	21.16

HIGH



HIGH CHANNEL Chain 0

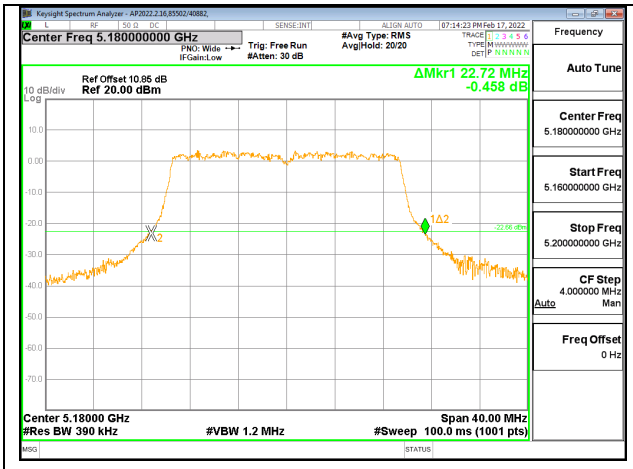


HIGH CHANNEL Chain 1

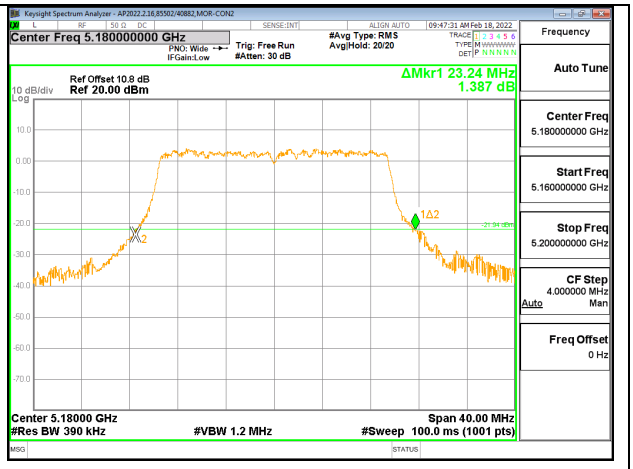
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 242-Tones, RU Index 61

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5180	22.72	23.24
Mid	5200	22.68	23.36
High	5240	22.64	23.08

LOW

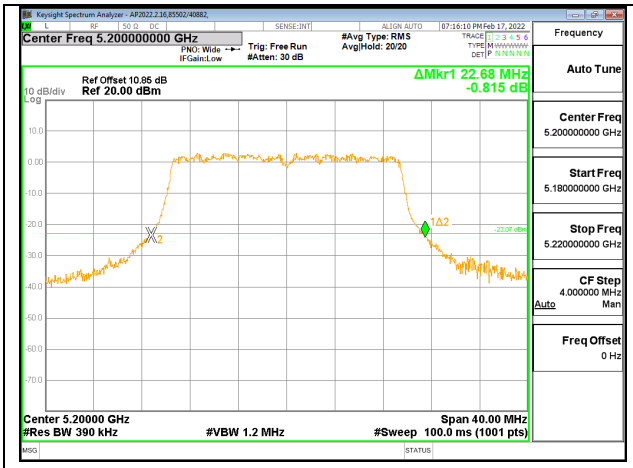


LOW CHANNEL Chain 0



LOW CHANNEL Chain 1

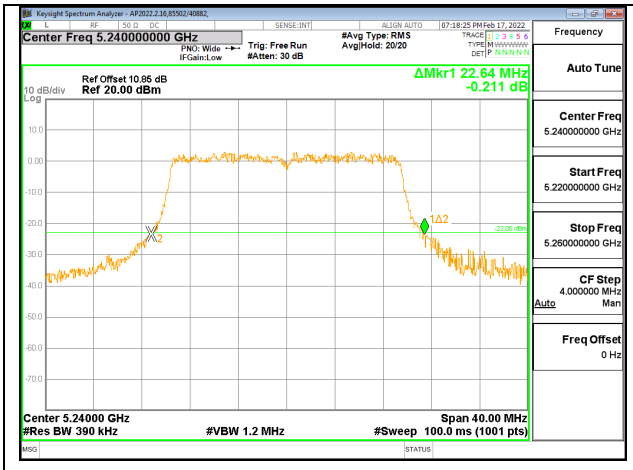
MID



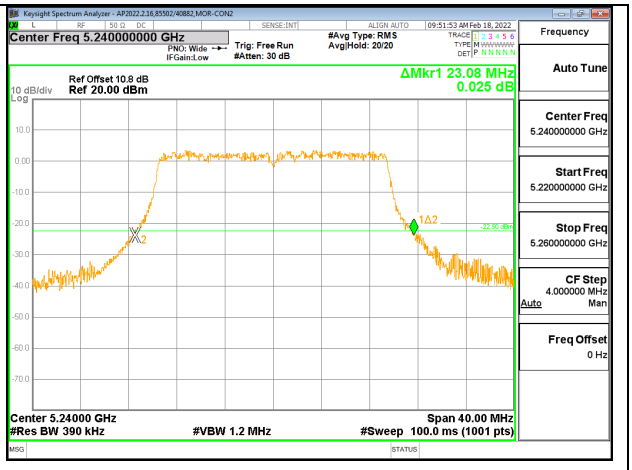
MID CHANNEL Chain 0

MID CHANNEL Chain 1

HIGH



HIGH CHANNEL Chain 0



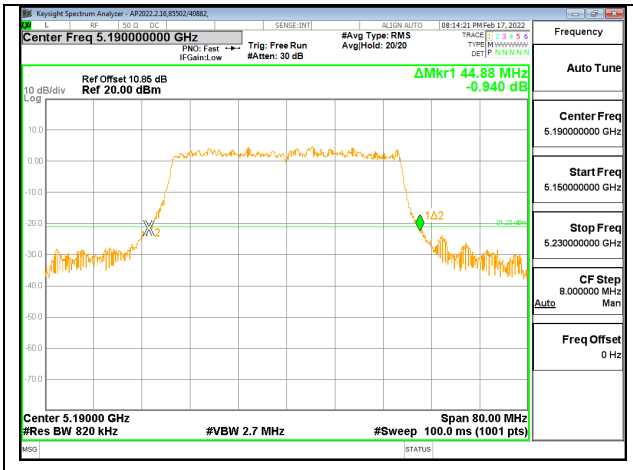
HIGH CHANNEL Chain 1

9.2.2. 802.11ax HE40 MODE 2TX IN THE 5.2GHz BAND

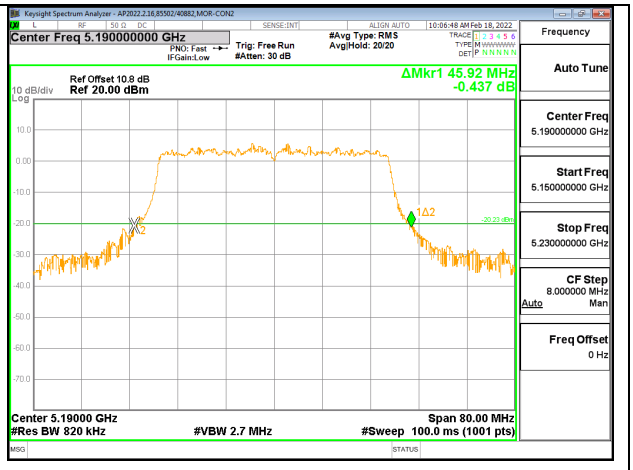
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 484-Tones, RU Index 65

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5190	44.88	45.92
High	5230	44.64	46.00

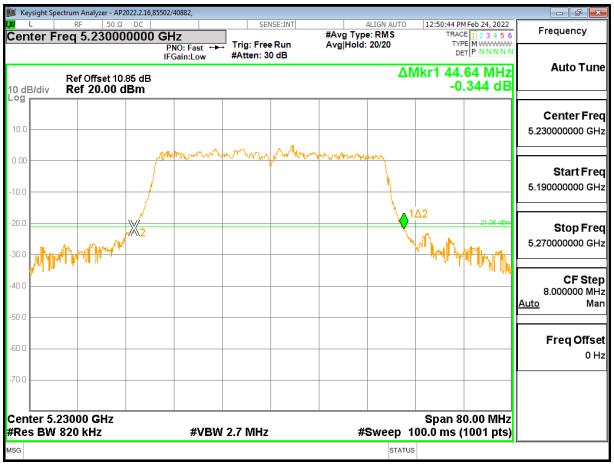
LOW



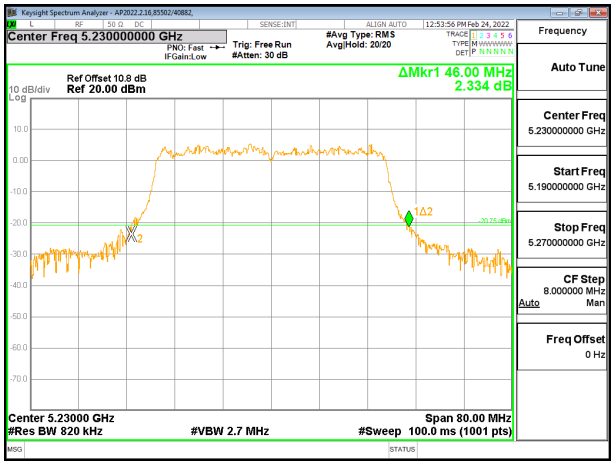
LOW CHANNEL Chain 0



LOW CHANNEL Chain 1



HIGH CHANNEL Chain 0



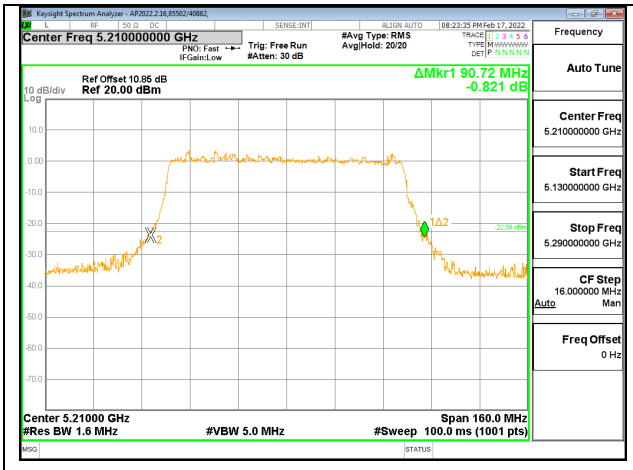
HIG CHANNEL Chain 1

9.2.3. 802.11ax HE80 MODE 2TX IN THE 5.2GHz BAND

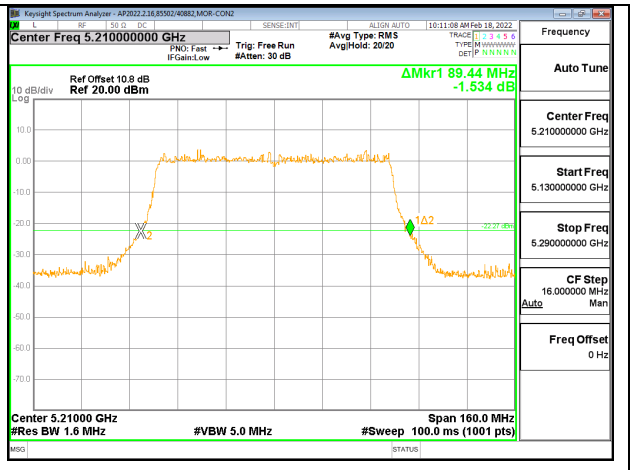
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 996-Tones, RU Index 67

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5210	90.72	89.44

MID



MID CHANNEL Chain 0



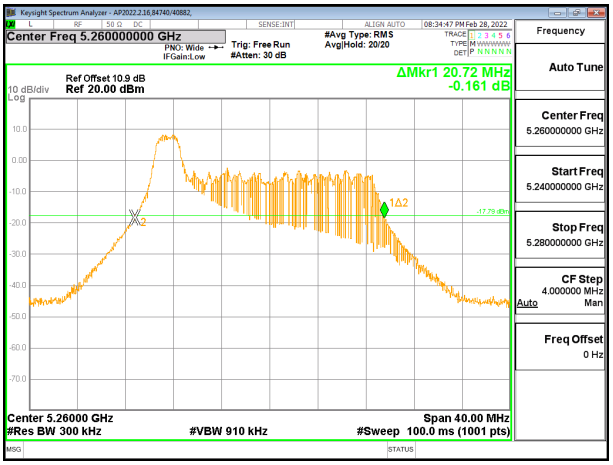
MID CHANNEL Chain 1

9.2.4. 802.11ax HE20 MODE 2TX IN THE 5.3GHz BAND

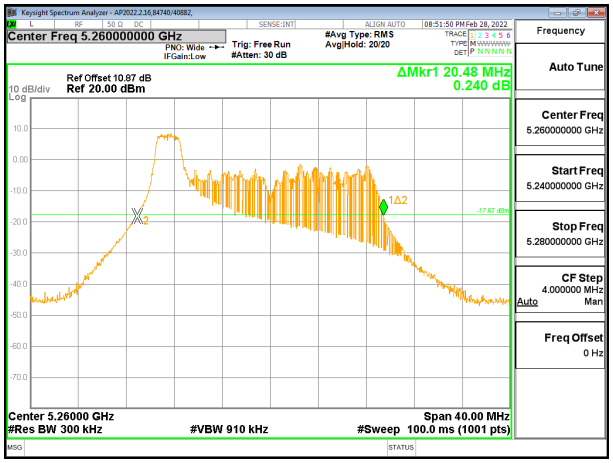
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 26-Tones, RU Index 0

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5260	20.72	20.48

LOW



LOW CHANNEL Chain 0

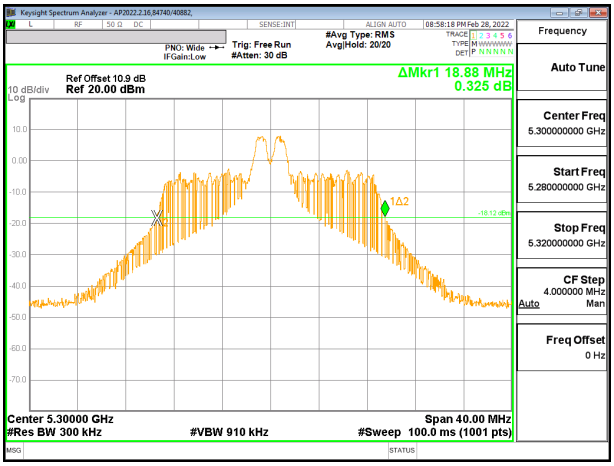


LOW CHANNEL Chain 1

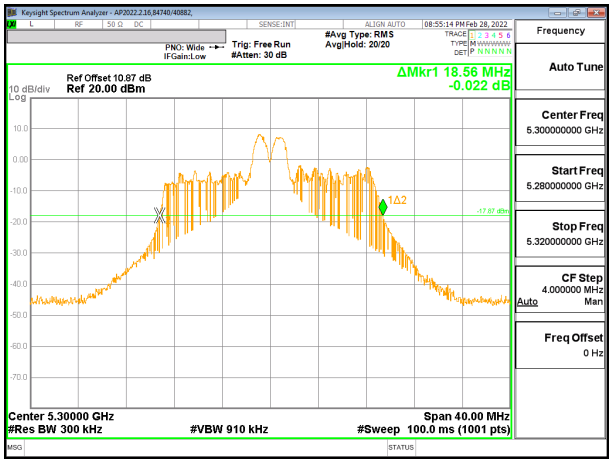
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 26-Tones, RU Index 4

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5300	18.88	18.56

MID



MID CHANNEL Chain 0

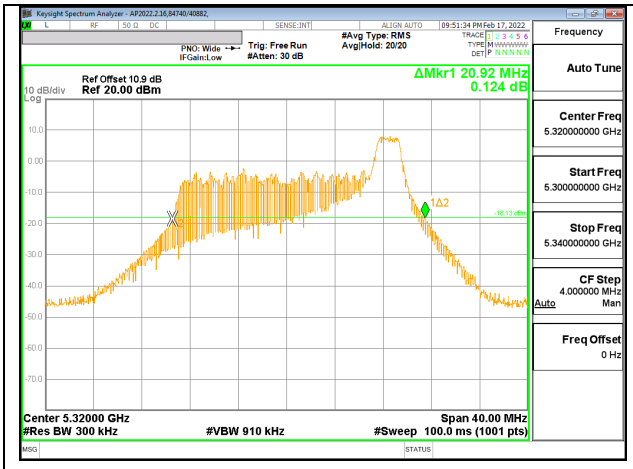


MID CHANNEL Chain 1

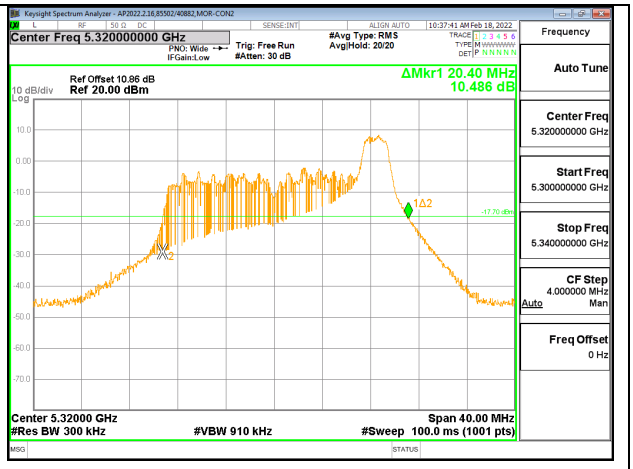
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 26-Tones, RU Index 8

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
High	5320	20.92	20.40

HIGH



HIGH CHANNEL Chain 0

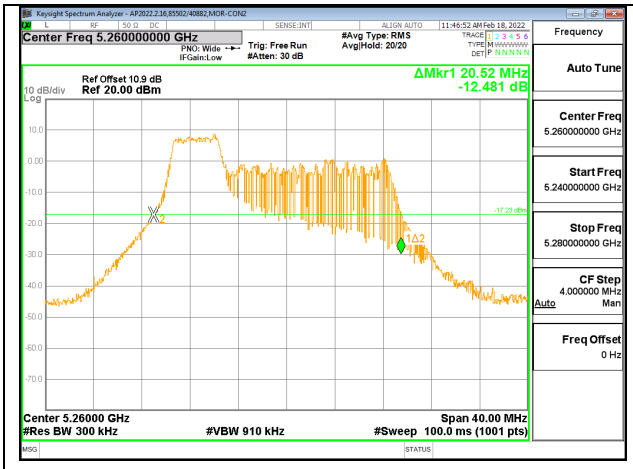


HIGH CHANNEL Chain 1

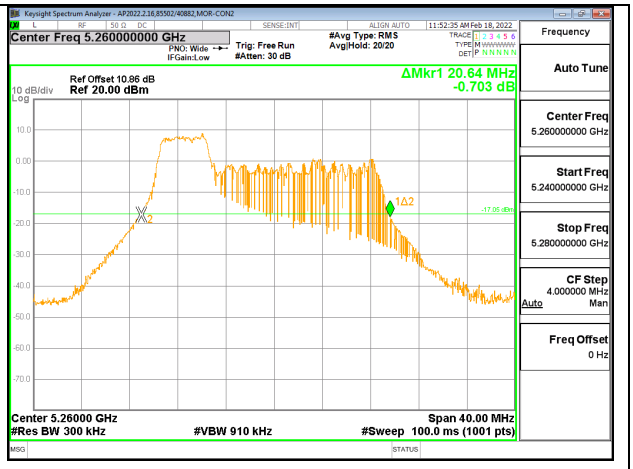
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 52-Tones, RU Index 37

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5260	20.52	20.64

LOW



LOW CHANNEL Chain 0

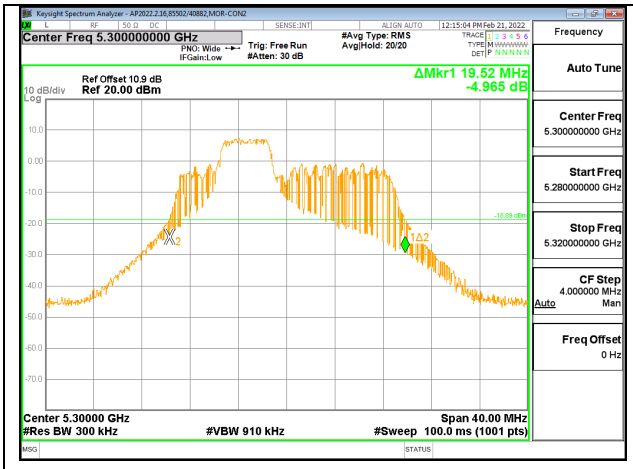


LOW CHANNEL Chain 1

2TX Chain 0 + Chain 1 CDD OFDMA MODE: 52-Tones, RU Index 38

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5300	19.52	19.04

MID



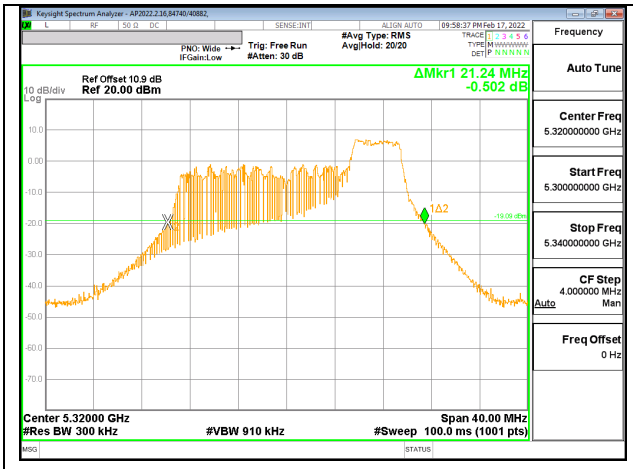
MID CHANNEL Chain 0

MID CHANNEL Chain 1

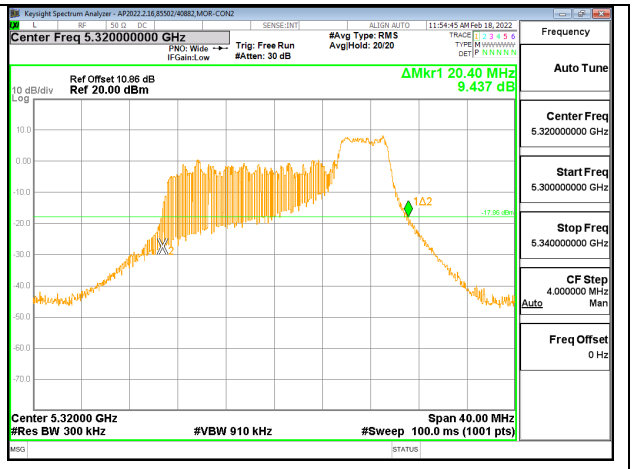
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 52-Tones, RU Index 40

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
High	5320	21.24	20.40

HIGH



HIGH CHANNEL Chain 0

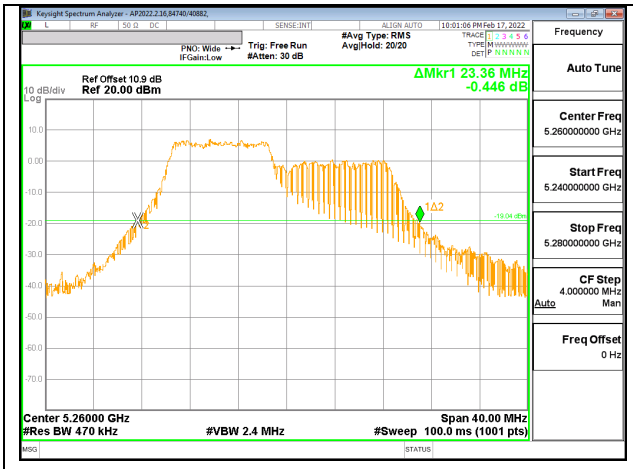


HIGH CHANNEL Chain 1

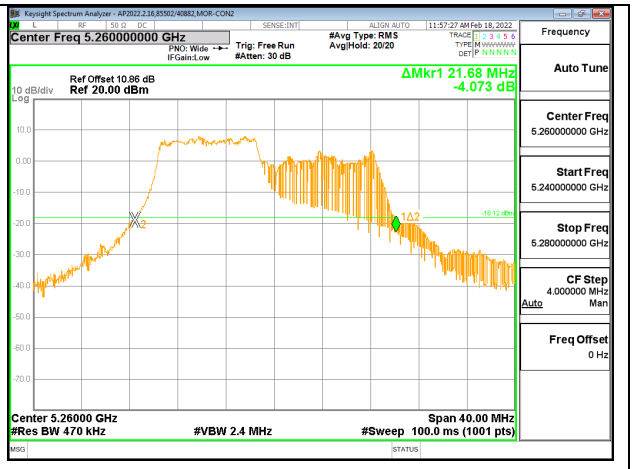
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 106-Tones, RU Index 53

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5260	23.36	21.68
Mid	5300	23.12	21.76

LOW

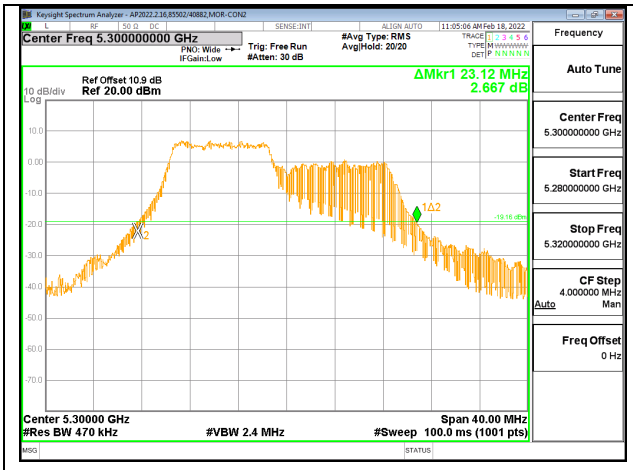


LOW CHANNEL Chain 0

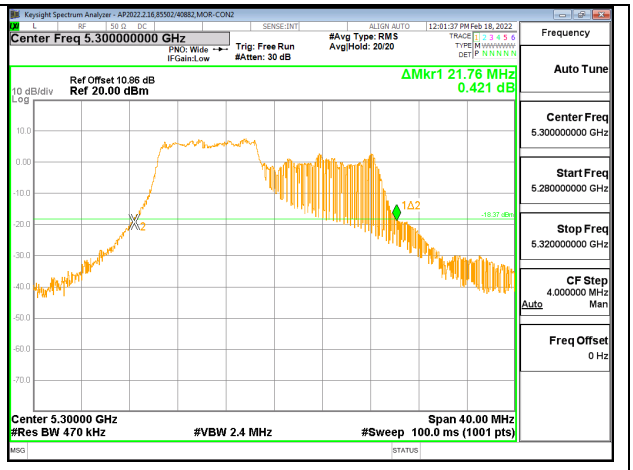


LOW CHANNEL Chain 1

MID



MID CHANNEL Chain 0

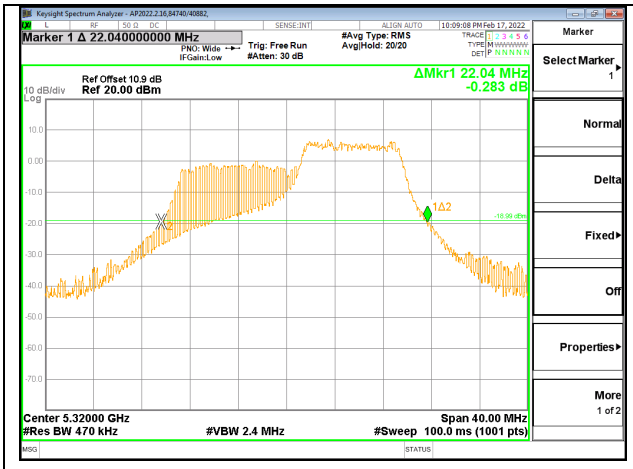


MID CHANNEL Chain 1

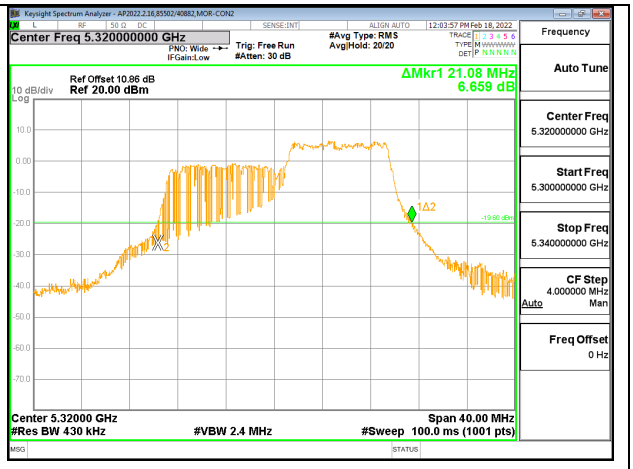
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 106-Tones, RU Index 54

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
High	5320	22.04	21.08

HIGH



HIGH CHANNEL Chain 0

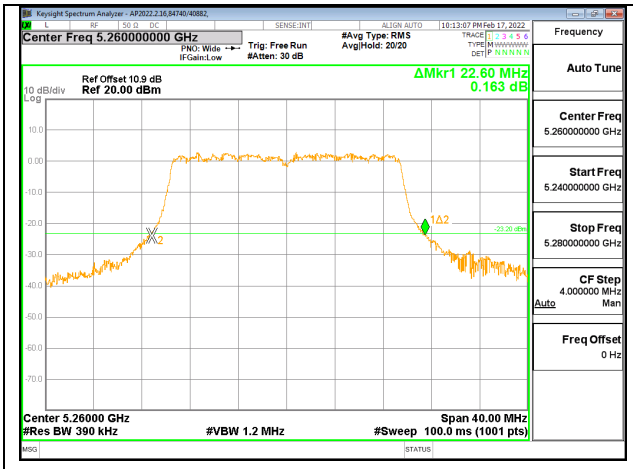


HIGH CHANNEL Chain 1

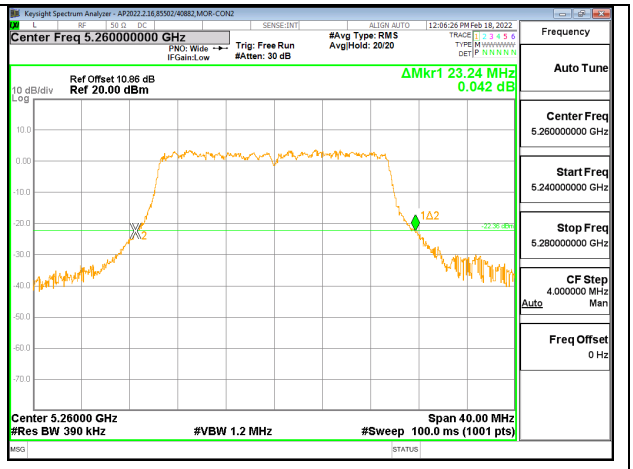
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 242-Tones, RU Index 61

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5260	22.60	23.24
Mid	5300	23.20	23.24
High	5320	22.68	23.28

LOW

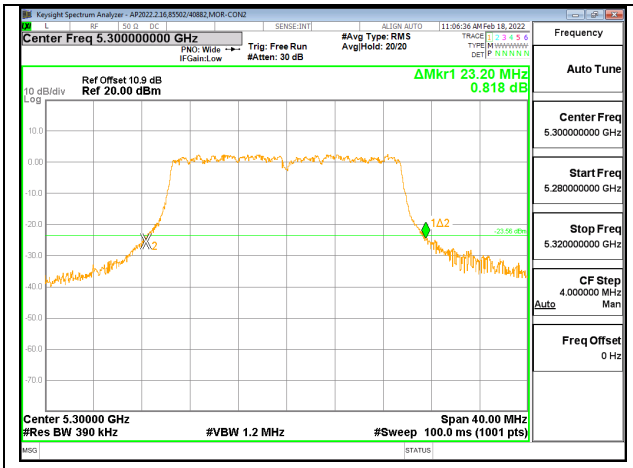


LOW CHANNEL Chain 0

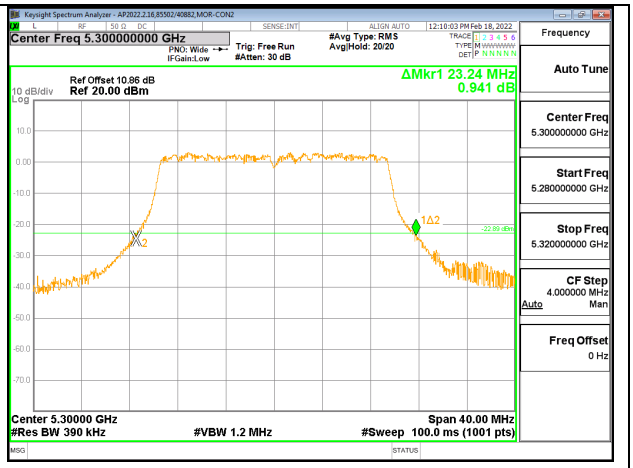


LOW CHANNEL Chain 1

MID

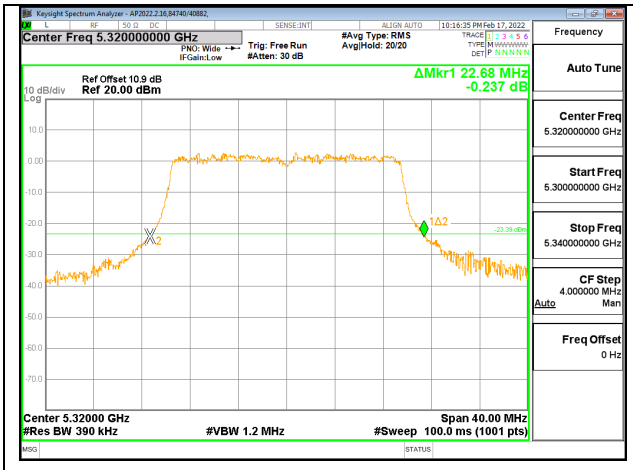


MID CHANNEL Chain 0

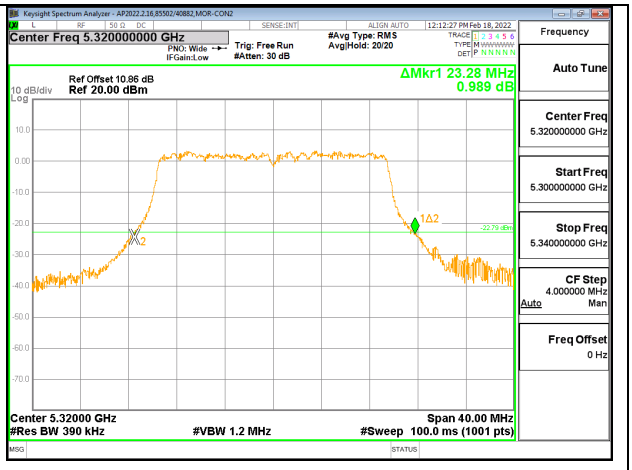


MID CHANNEL Chain 1

HIGH



HIGH CHANNEL Chain 0



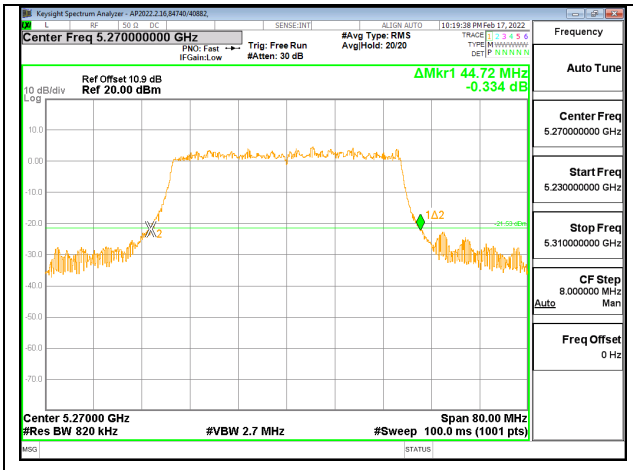
HIGH CHANNEL Chain 1

9.2.5. 802.11ax HE40 MODE 2TX IN THE 5.3GHz BAND

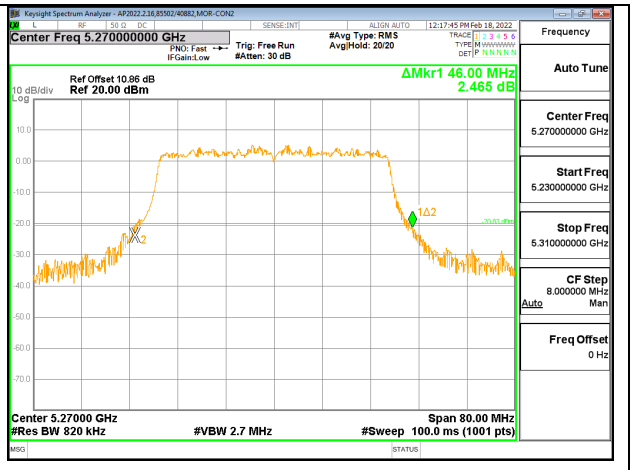
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 484-Tones, RU Index 65

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5270	44.72	46.00
High	5310	45.36	45.84

LOW

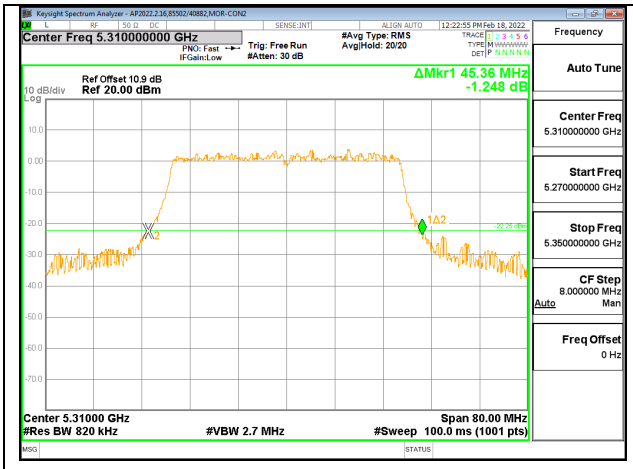


LOW CHANNEL Chain 0

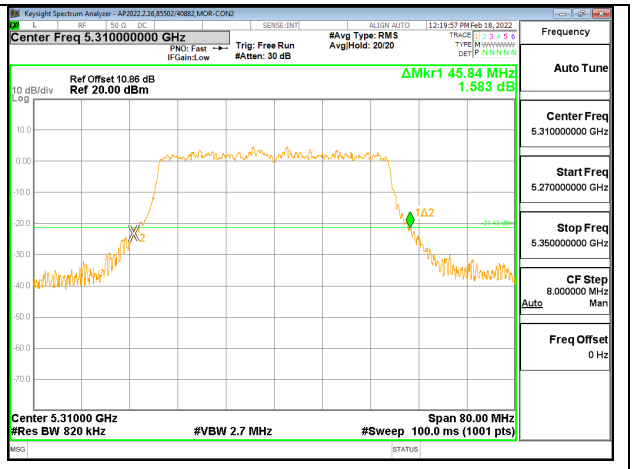


LOW CHANNEL Chain 1

HIGH



HIGH CHANNEL Chain 0



HIGH CHANNEL Chain 1

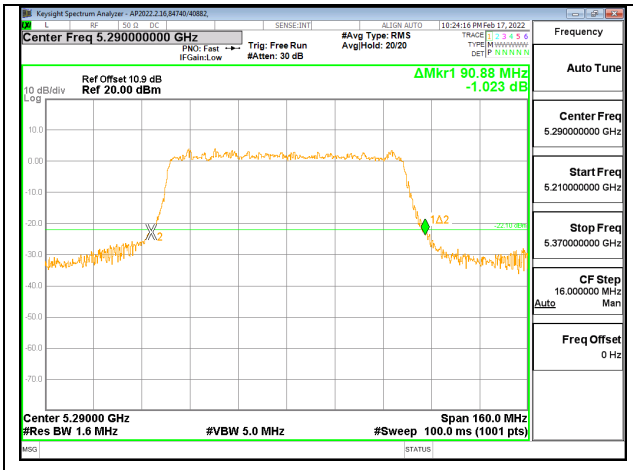
UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

9.2.6. 802.11ax HE80 MODE 2TX IN THE 5.3GHz BAND

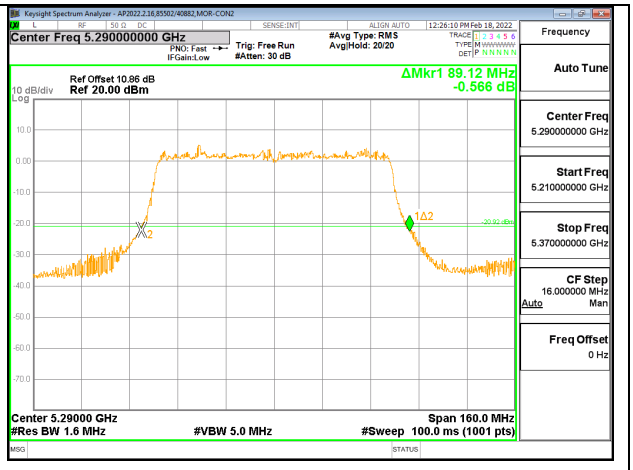
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 996-Tones, RU Index 67

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5290	90.88	89.12

MID



MID CHANNEL Chain 0



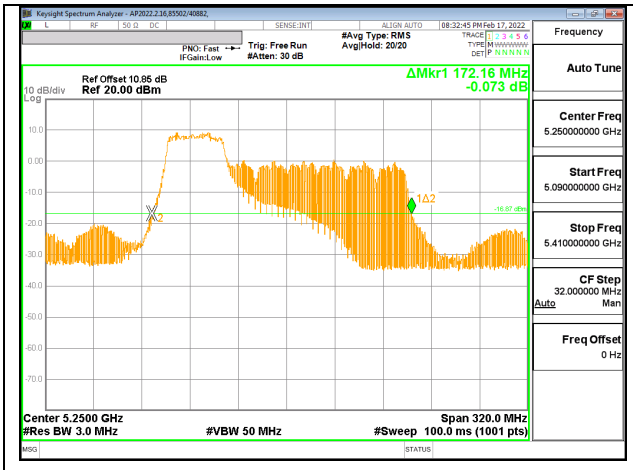
MID CHANNEL Chain 1

9.2.7. 802.11ax HE160 MODE 2TX IN THE 5.2GHz & 5.3GHz BAND

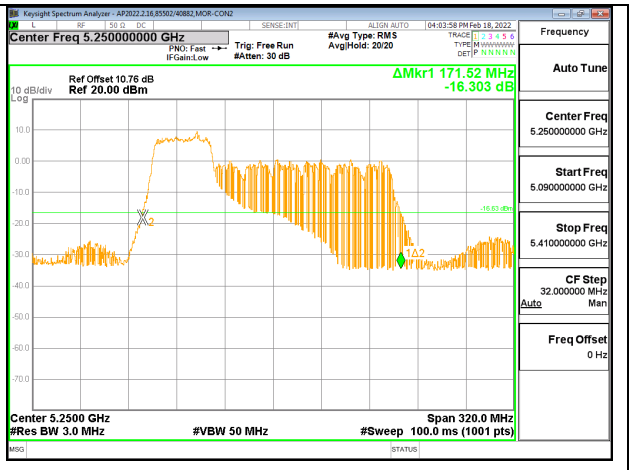
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 484-Tones, RU Index 65

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5250	172.16	171.52

MID



MID CHANNEL Chain 0

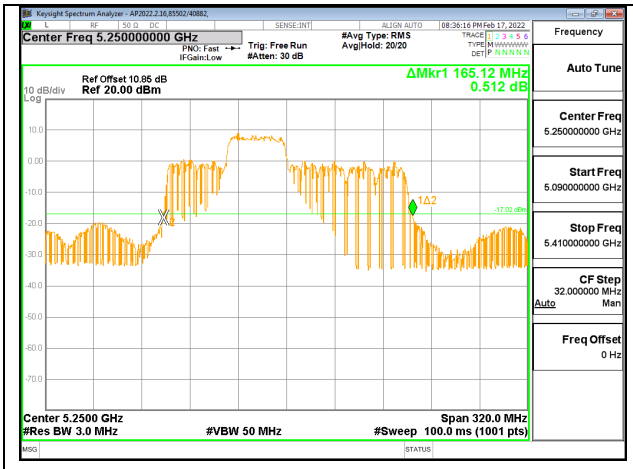


MID CHANNEL Chain 1

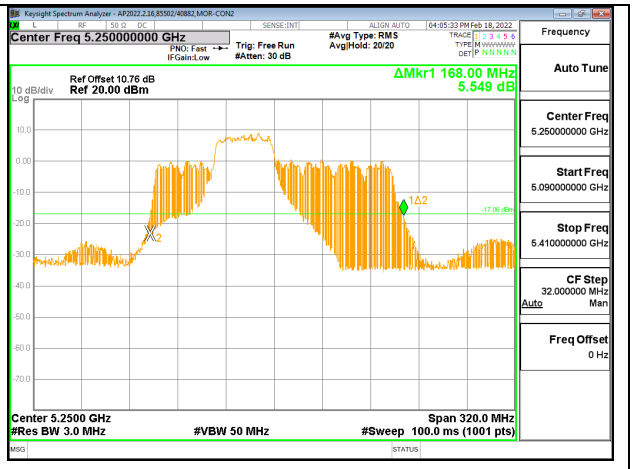
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 484-Tones, RU Index 66

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5250	165.12	168.00

MID



MID CHANNEL Chain 0

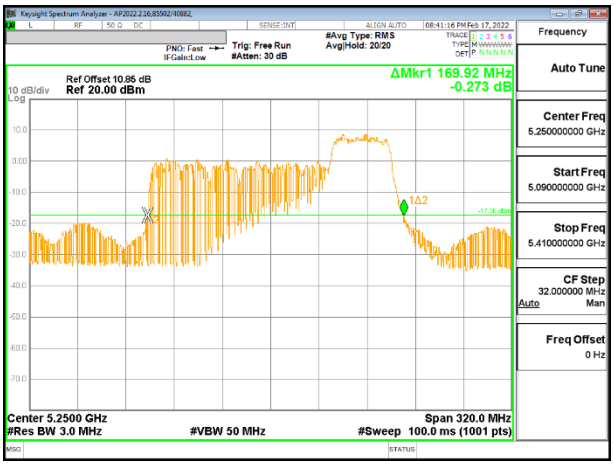


MID CHANNEL Chain 1

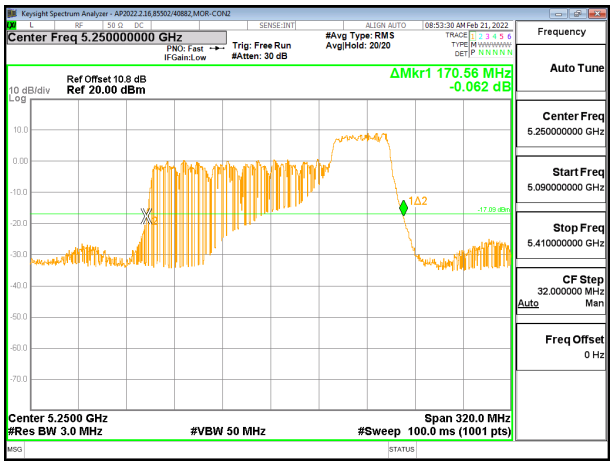
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 484-Tones, RU Index S66

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5250	169.92	170.56

MID



MID CHANNEL Chain 0

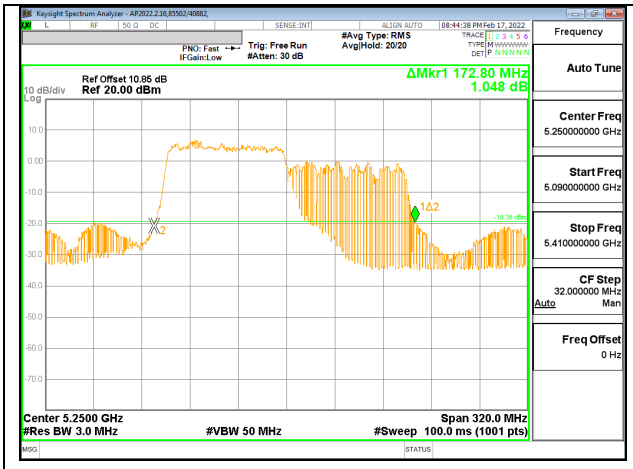


MID CHANNEL Chain 1

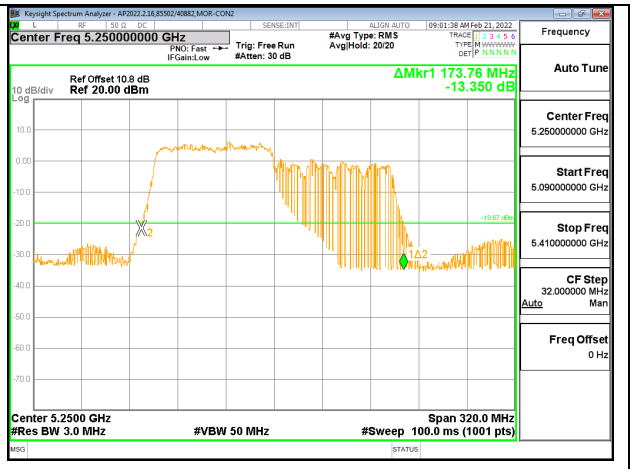
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 996-Tones, RU Index 67

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5250	172.80	173.76

MID



MID CHANNEL Chain 0

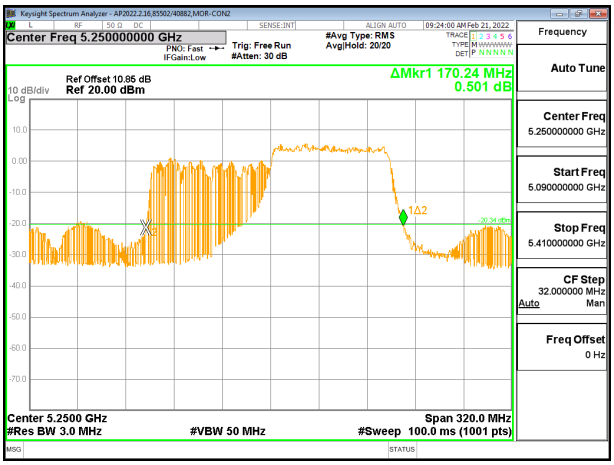


MID CHANNEL Chain 1

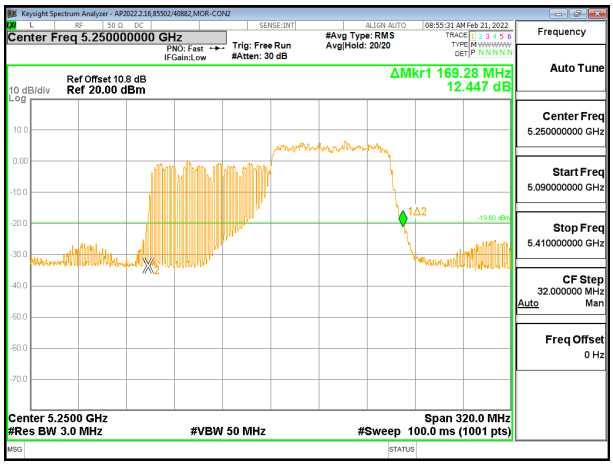
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 996-Tones, RU Index S67

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5250	170.24	169.28

MID



MID CHANNEL Chain 0

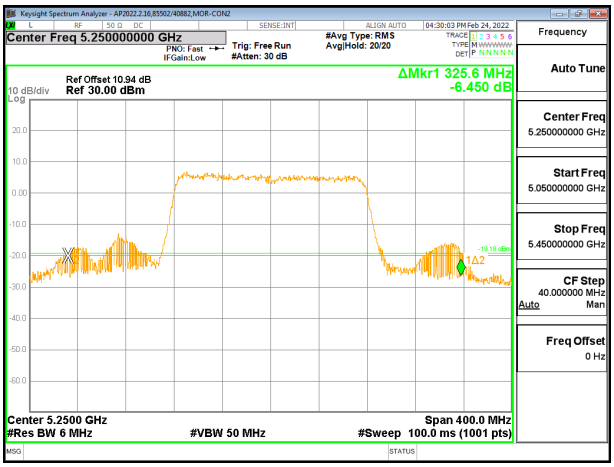


MID CHANNEL Chain 1

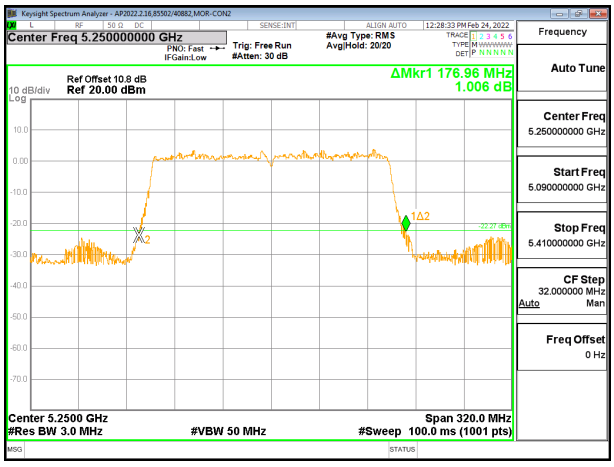
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 2x 996-Tones, Index 68

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	5250	325.60	176.96

MID



MID CHANNEL Chain 0



MID CHANNEL Chain 1

9.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407

Band 5.15–5.25 GHz

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Bands 5.25-5.35 GHz and 5.47-5.725 GHz

The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The measurement method used for output power is KDB 789033 D02 v02r01, Section E.3.b (Method PM-G).

The measurement method used for power spectral density is KDB 789033 D02 v02r01, Section F

DIRECTIONAL ANTENNA GAIN

For 2 TX:
Tx antennas are uncorrelated for power.
Tx antennas are correlated for 11ax PSD.

The directional gains are as follows:

Band (GHz)	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
5.2	2.00	-6.40	-0.42	1.79
5.3	2.00	-6.40	-0.42	1.79

RESULT

9.3.1. 802.11ax HE20 MODE 2TX IN THE 5.2GHz BAND MOBILE

2TX Chain 0 + Chain 1 CDD OFDMA MODE: 26-Tones, RU Index 0

Test Engineer:	84740/40882, 85502/40882
Test Date:	2022-02-17, 2022-02-18

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
Low	5180	-0.42	1.79	24.00	11.00

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	7.91	8.14	11.04	24.00	-12.96

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
Low	5180	4.69	4.73	7.72	11.00	-3.28

LOW

LOW CHANNEL Chain 0

LOW CHANNEL Chain 1

2TX Chain 0 + Chain 1 CDD OFDMA MODE: 26-Tones, RU Index 4

Test Engineer:	84740/40882, 85502/40882
Test Date:	2022-02-17, 2022-02-18

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
Mid	5200	-0.42	1.79	24.00	11.00

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5200	7.80	8.10	10.96	24.00	-13.04

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
Mid	5200	3.68	3.59	6.64	11.00	-4.36

MID

MID CHANNEL Chain 0

MID CHANNEL Chain 1

2TX Chain 0 + Chain 1 CDD OFDMA MODE: 26-Tones, RU Index 8

Test Engineer:	84740/40882, 85502/40882
Test Date:	2022-02-17, 2022-02-18

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
High	5240	-0.42	1.79	24.00	11.00

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

Output Power Results

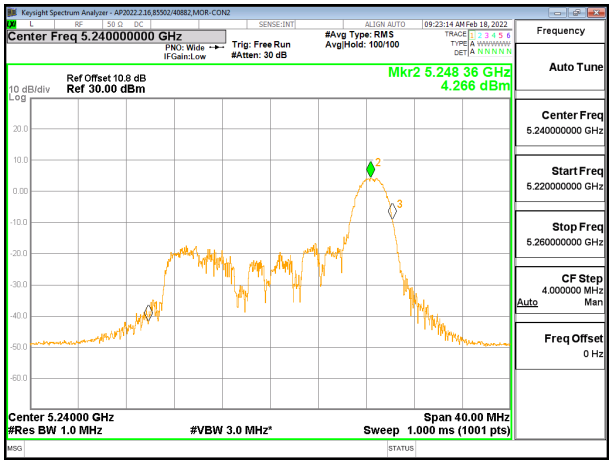
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
High	5240	8.00	7.76	10.89	24.00	-13.11

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
High	5240	4.60	4.27	7.44	11.00	-3.56

HIGH

HIGH CHANNEL Chain 0



HIGH CHANNEL Chain 1

2TX Chain 0 + Chain 1 CDD OFDMA MODE: 52-Tones, RU Index 37

Test Engineer:	84740/40882, 85502/40882
Test Date:	2022-02-17, 2022-02-18

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
Low	5180	-0.42	1.79	24.00	11.00

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

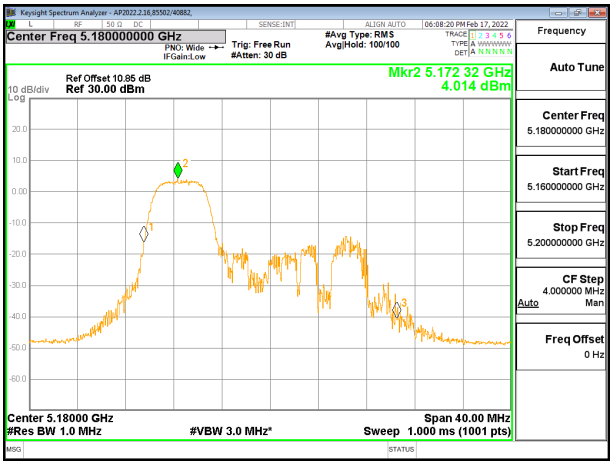
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	9.72	10.27	13.01	24.00	-10.99

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
Low	5180	4.01	4.17	7.10	11.00	-3.90

LOW



LOW CHANNEL Chain 0

LOW CHANNEL Chain 1

2TX Chain 0 + Chain 1 CDD OFDMA MODE: 52-Tones, RU Index 38

Test Engineer:	84740/40882, 85502/40882
Test Date:	2022-02-17, 2022-02-18

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
Mid	5200	-0.42	1.79	24.00	11.00

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

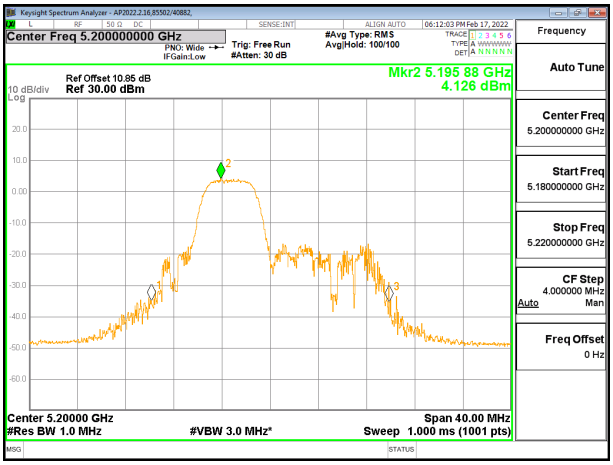
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5200	10.05	10.91	13.51	24.00	-10.49

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
Mid	5200	4.13	4.69	7.43	11.00	-3.57

MID



MID CHANNEL Chain 0

MID CHANNEL Chain 1

2TX Chain 0 + Chain 1 CDD OFDMA MODE: 52-Tones, RU Index 40

Test Engineer:	84740/40882, 85502/40882
Test Date:	2022-02-17, 2022-02-18

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
High	5240	-0.42	1.79	24.00	11.00

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

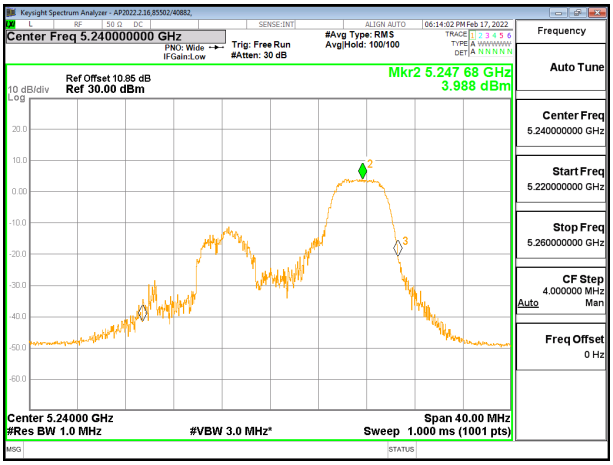
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
High	5240	10.27	10.51	13.40	24.00	-10.60

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
High	5240	3.99	4.31	7.16	11.00	-3.84

HIGH



HIGH CHANNEL Chain 0

HIGH CHANNEL Chain 1

2TX Chain 0 + Chain 1 CDD OFDMA MODE: 106-Tones, RU Index 53

Test Engineer:	84740/40882, 85502/40882
Test Date:	2022-02-17, 2022-02-18

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
Low	5180	-0.42	1.79	24.00	11.00
Mid	5200	-0.42	1.79	24.00	11.00

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd PSD**

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	8.05	8.09	11.08	24.00	-12.92
Mid	5200	10.05	10.85	13.48	24.00	-10.52

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
Low	5180	-0.77	-0.74	2.26	11.00	-8.74
Mid	5200	1.27	1.94	4.63	11.00	-6.37

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400