



TEST REPORT

Report Number: R14176139-E5dV2

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:
2022-03-25

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2022-03-16	Initial Issue	B. Kiewra
V2	2022-03-25	Harmonized all antenna descriptors to read as chain 0 and chain 1.	B. Kiewra

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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 NUMBER: QV77002ZAQ, QV770028AQ, QV770019B8, QV77007QB8, QV77003RB8, QV770058B8

SAMPLE RECEIPT DATE: 2022-01-13

DATE TESTED: 2022-02-17 to 2022-03-01

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Refer to Section 2

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. This report must not be used by the client to claim product certification, approval, or endorsement by a2La, NIST, or any agency of the U.S. government.

Approved & Released
For UL LLC By:

Prepared By:



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UL LLC



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Project 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.

FCC Clause	Requirement	Result	Comment
See Comment	Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 12.2.
See Comment	26dB BW		Per ANSI C63.10 Sections 6.9.2
15.407 (a) (2), (h) (1)	Output Power	Compliant	None
15.407 (a) (2)	PSD		
15.209, 15.205, 15.407 (b) (3)	Radiated Emissions		
15.207	AC Mains Conducted Emissions	See Comment	Results report in UL test report R14176139-E5fV1

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 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
<input type="checkbox"/>	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
<input checked="" type="checkbox"/>	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:

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

$$\text{Final Voltage (dBuV)} = \text{Measured Voltage (dBuV)} + \text{Cable Loss (dB)} + \text{Limiter Factor (dB)} + \text{LISN Insertion Loss.}$$

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

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. This test report covers 5.6 UNII Band 802.11ax mode testing

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.6 GHz band, 2TX CDD			
5500-5720	802.11ax HE20 OFDMA, 242-Tones	13.60	22.91
	802.11ax HE20 OFDMA, 106-Tones	13.47	22.23
	802.11ax HE20 OFDMA, 52-Tones	13.56	22.70
	802.11ax HE20 OFDMA, 26-Tones	11.36	13.68
5510-5710	802.11ax HE40 OFDMA, 484-Tones	13.71	23.50
5530-5690	802.11ax HE80 OFDMA, 996-Tones	13.59	22.86
5570	802.11ax HE160 OFDMA, 2x996-Tones	13.55	22.65
	802.11ax HE160 OFDMA, 996-Tones	13.50	22.39
	802.11ax HE160 OFDMA, 484-Tones	13.61	22.96

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:
 The radio utilizes two loop antennas, with the following maximum gains:

Chain	Frequency Range (MHz)	Maximum Gain (dBi)
0	5500-5720	-1
1	5500-5720	-7.6

	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 EUT software installed during testing was conducted: 0.364 and radiated: 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 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
Adapter	Sony	XQZ-UC11-010-236-21	1821W34209742	NA
Adapter	Sony	XQZ-UC11-010-236-21	1821W34209856	NA
USB Cable	Sony	XQZ-UC1	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 setup as a standalone device. 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.

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.
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
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
MM0167 (PRE0126458)	True RMS Multimeter	Agilent	U1232A	2021-08-17	2023-08-17

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

Equipment 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
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
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)

Equipment 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
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

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

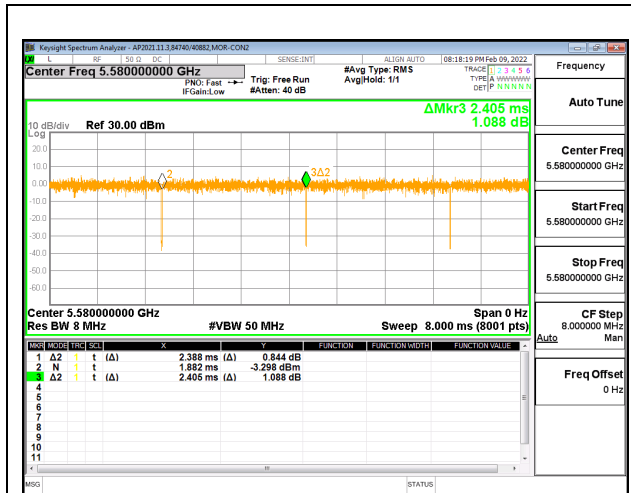
PROCEDURE

KDB 558074 D01 Zero-Span Spectrum Analyzer Method.

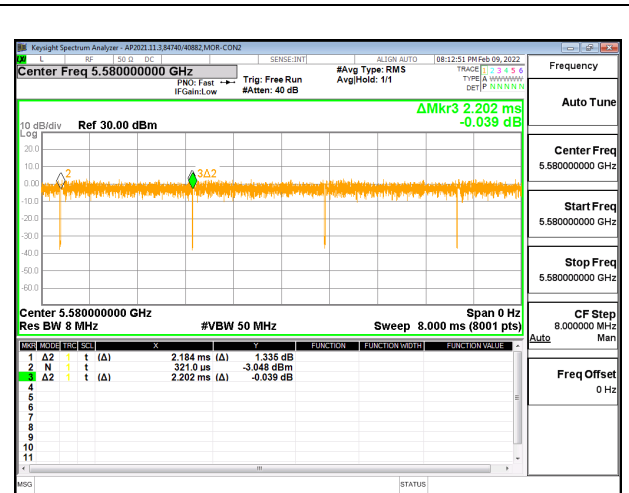
ON TIME AND DUTY CYCLE RESULTS

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

DUTY CYCLE PLOTS



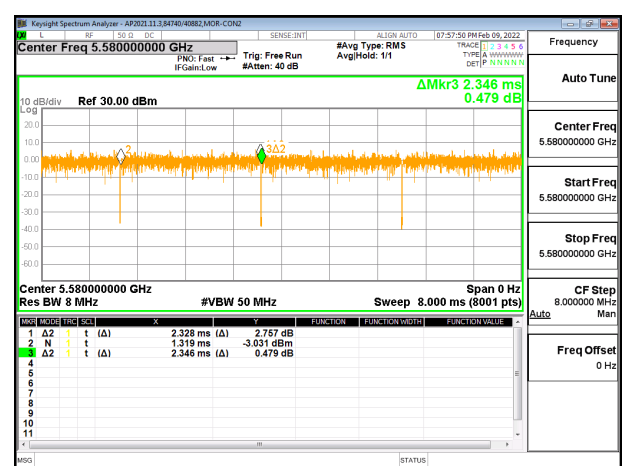
802.11ax HE20 OFDMA, RU 242T MODE



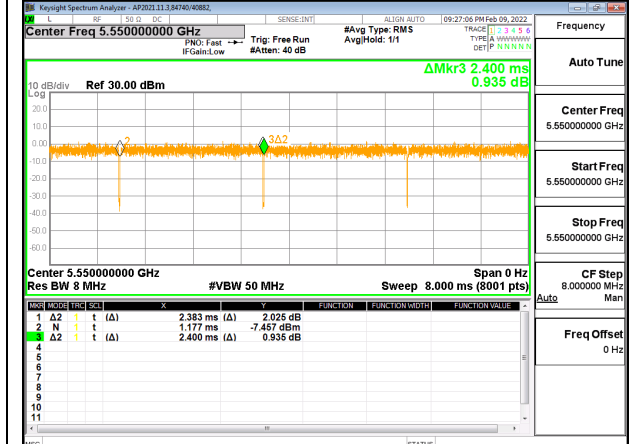
802.11ax HE20 OFDMA, RU size 106T MODE



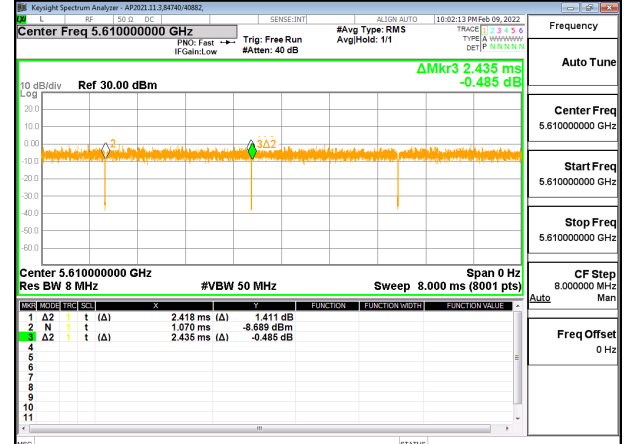
802.11ax HE20 OFDMA, RU size 52T MODE



802.11ax HE20 OFDMA, RU size 26T MODE



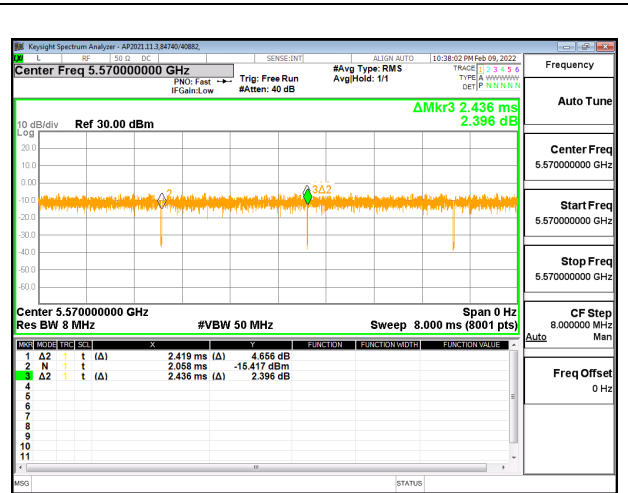
802.11ax HE40 OFDMA, RU size 484T MODE



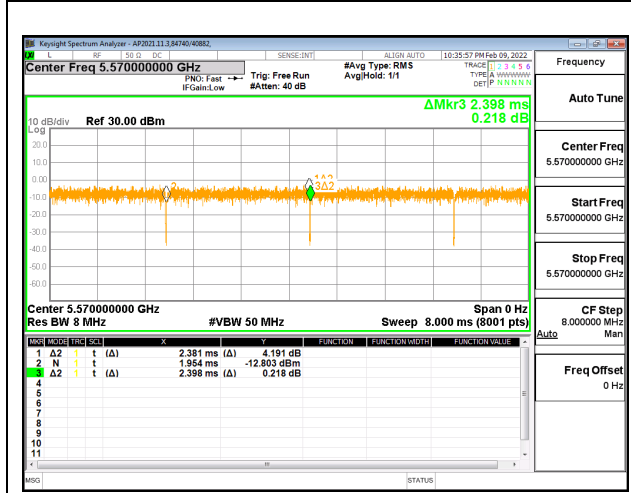
802.11ax HE80 OFDMA, RU size 996T MODE



802.11ax HE160 OFDMA, RU size 996T
 MODE



802.11ax HE160 OFDMA, RU size 2x996T
 MODE



802.11ax HE160 OFDMA, RU size 484T
 MODE

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9.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

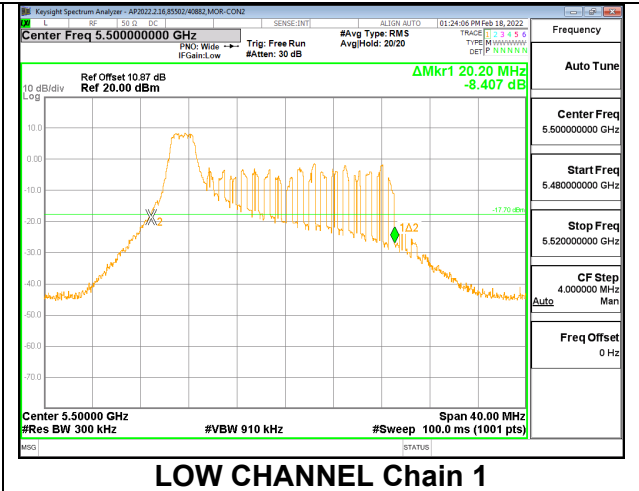
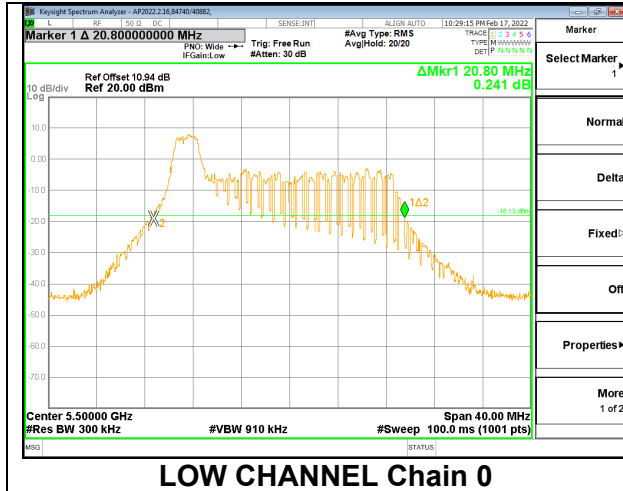
RESULTS

9.2.1. 802.11ax HE20 MODE 2TX IN THE 5.6GHz BAND

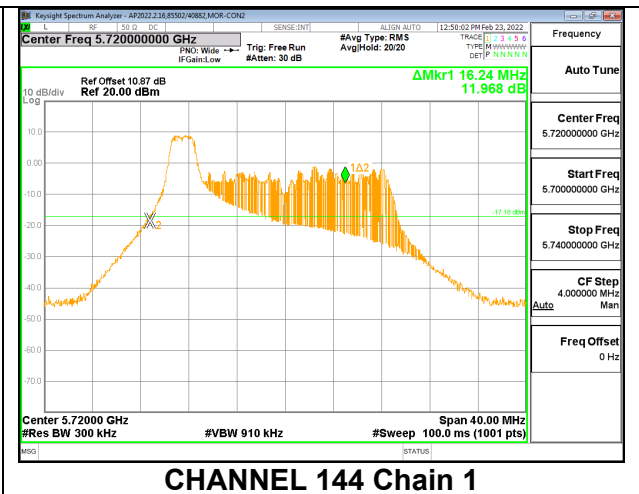
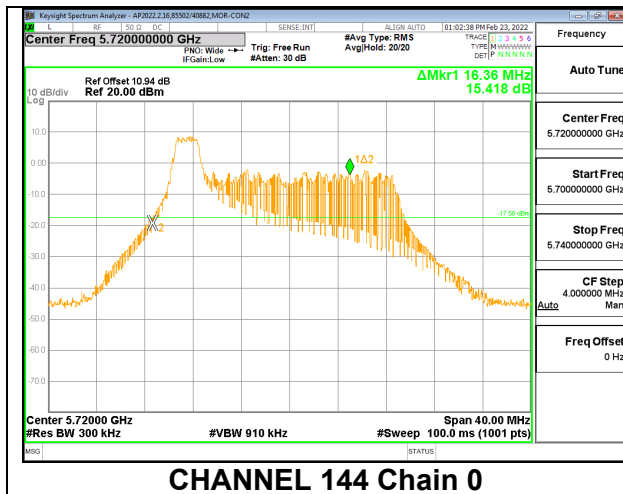
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 26-Tones, RU Index 0

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5500	20.80	20.20
144	5720	16.36	16.24

LOW



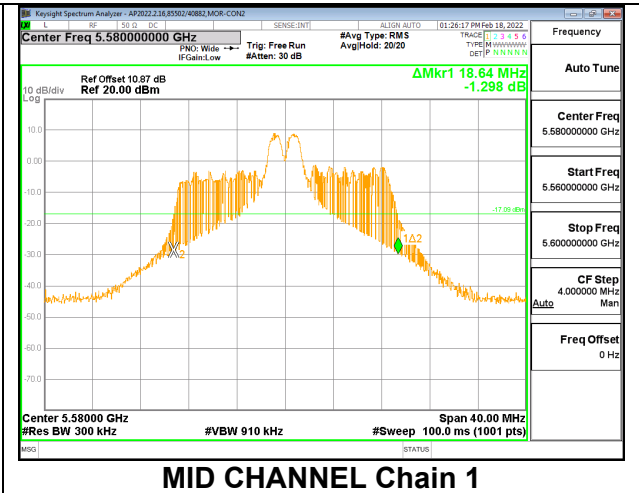
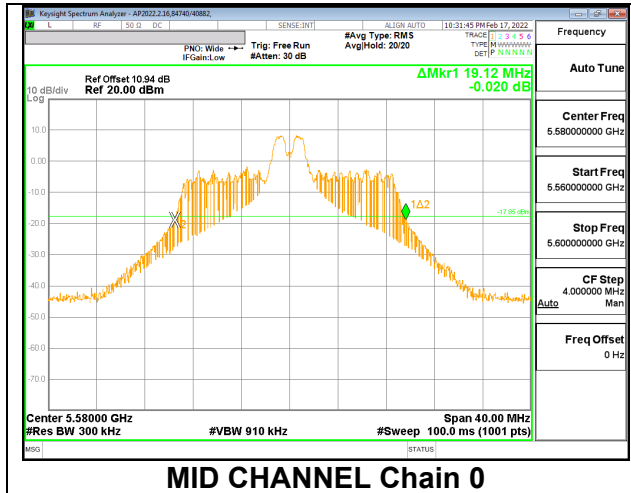
CHANNEL 144



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	5580	19.12	18.64

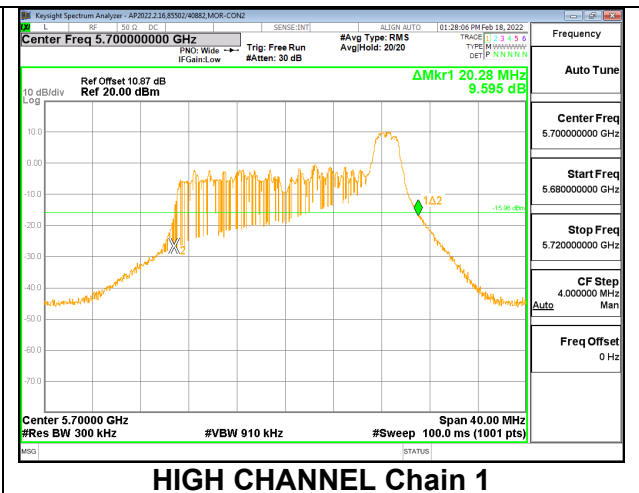
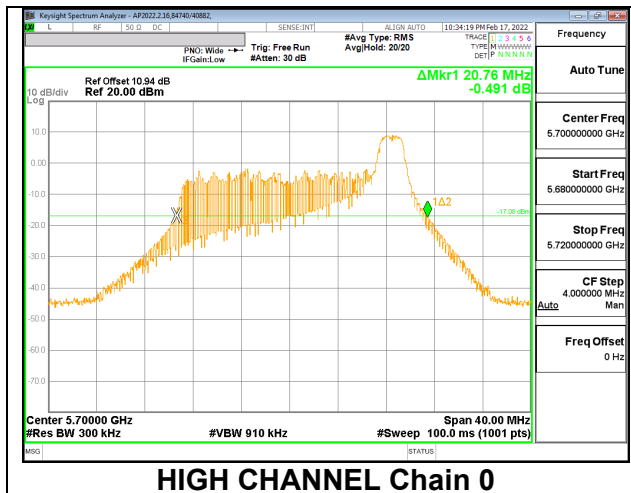
MID



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	5700	20.76	20.28

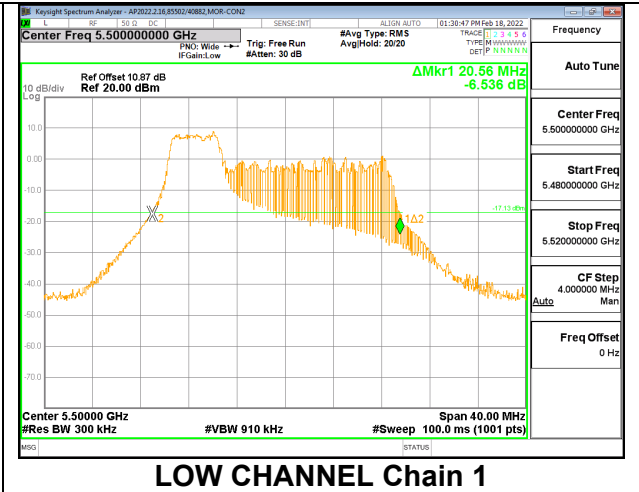
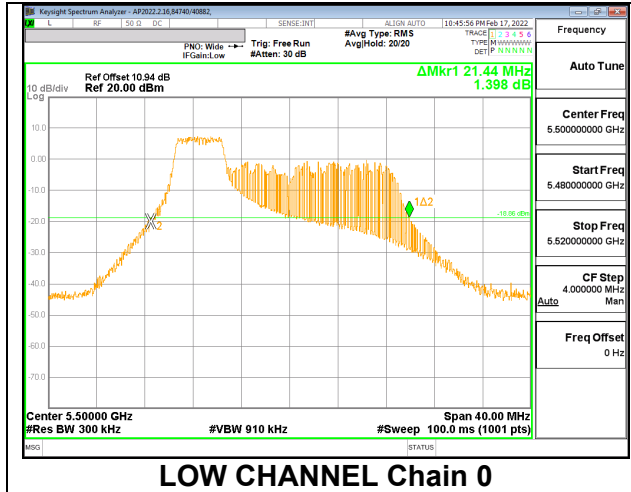
HIGH



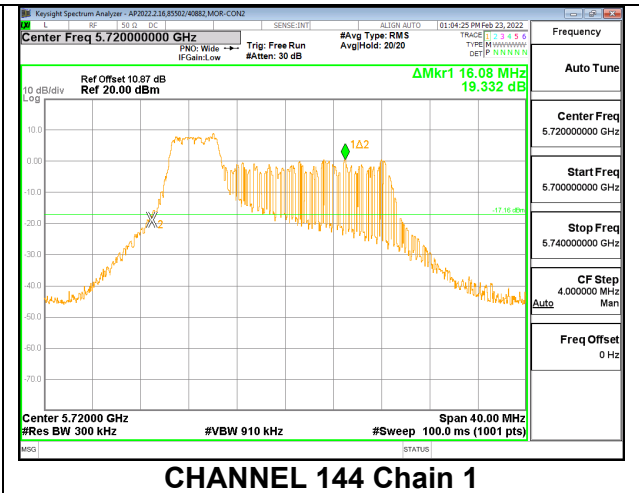
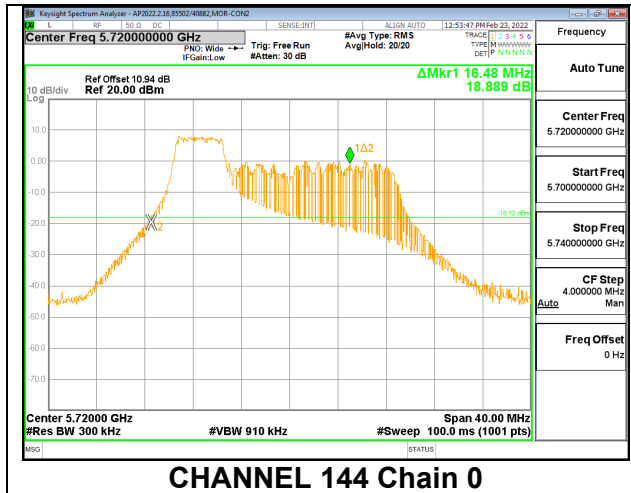
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 52-Tones, RU Index 37

Channel	Frequency (MHz)	26 dB Bandwidth	
		Chain 0 (MHz)	Chain 1 (MHz)
Low	5500	21.44	20.56
144	5720	16.48	16.08

LOW



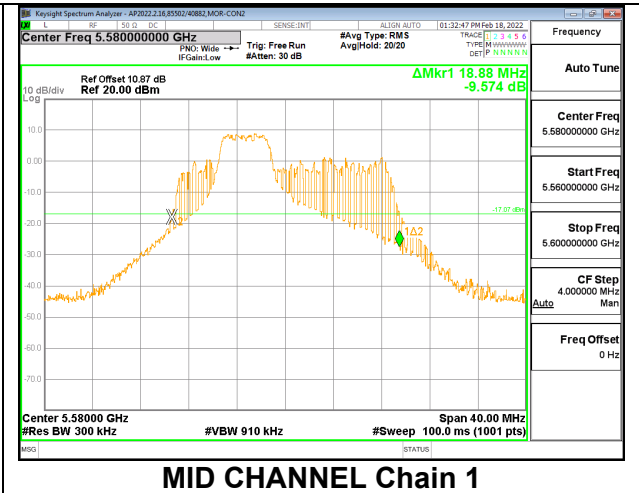
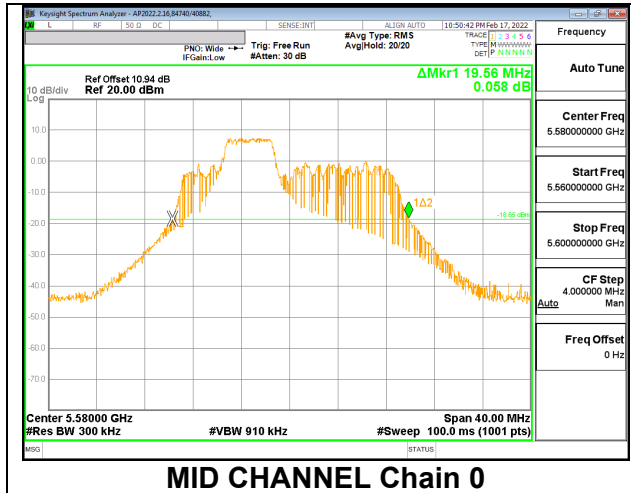
CHANNEL 144



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	5580	19.56	18.88

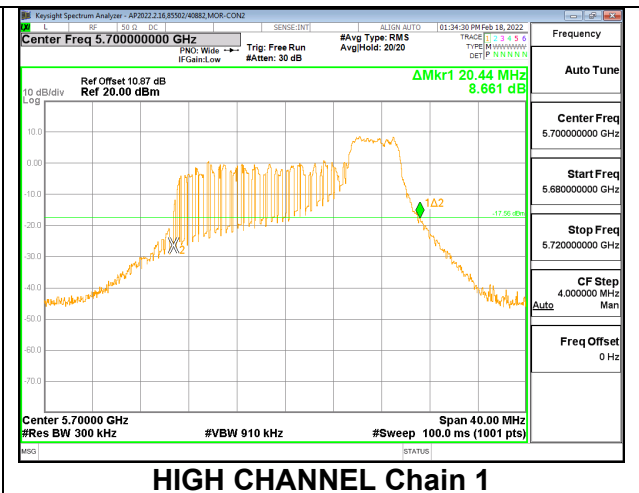
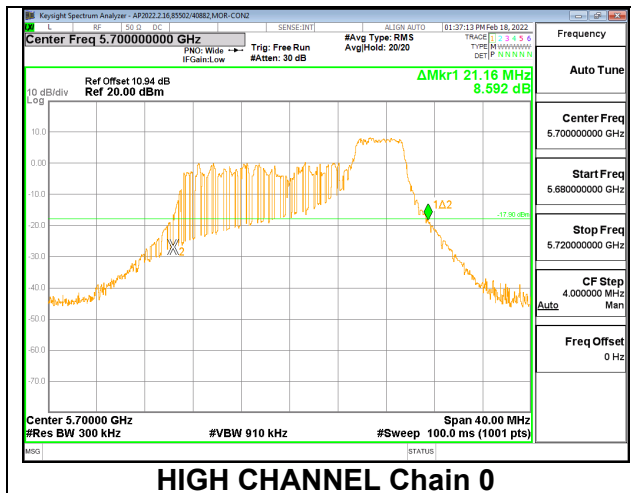
MID



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	5700	21.16	20.44

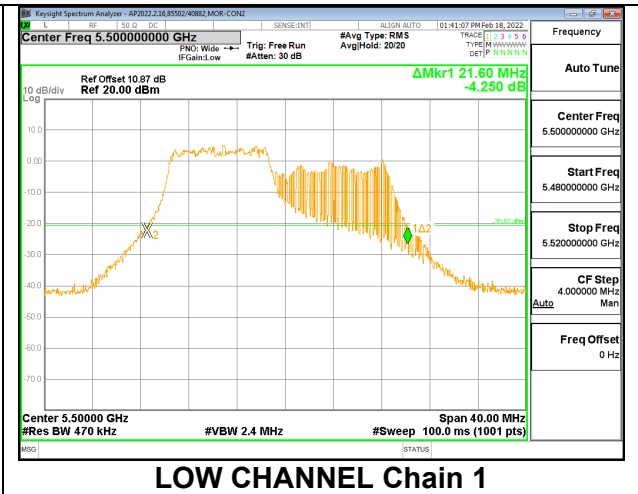
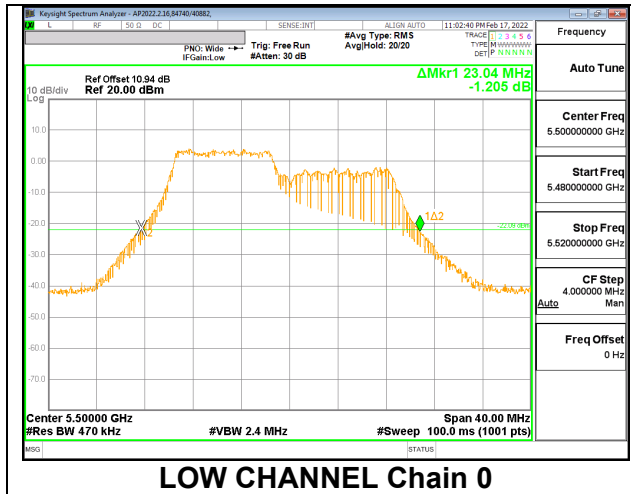
HIGH



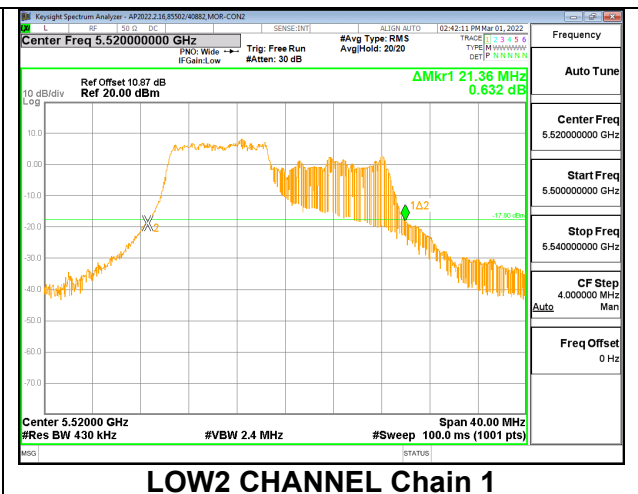
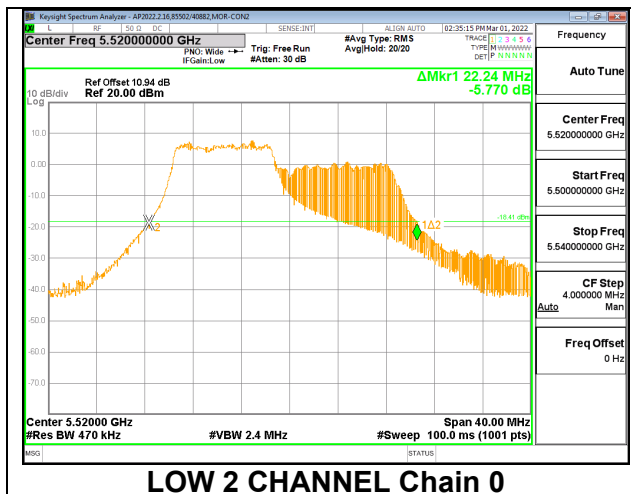
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 106-Tones, RU Index 53

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5500	23.04	21.60
Low	5520	22.24	21.36
Mid	5580	23.12	21.84
144	5720	17.52	17.41

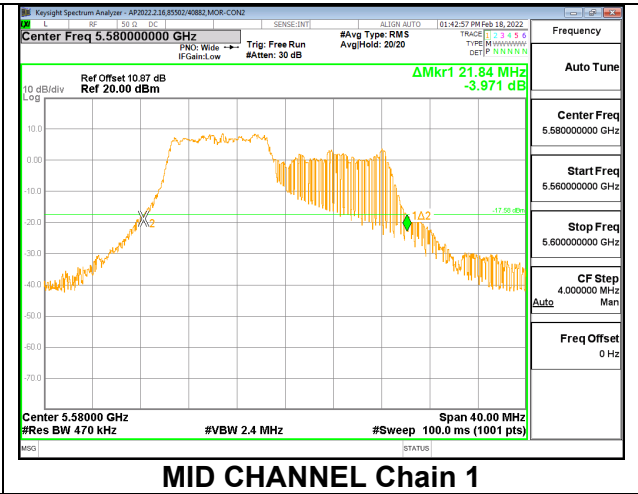
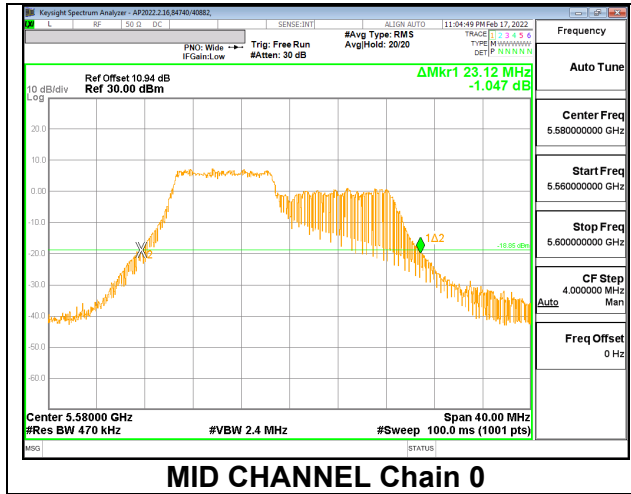
LOW



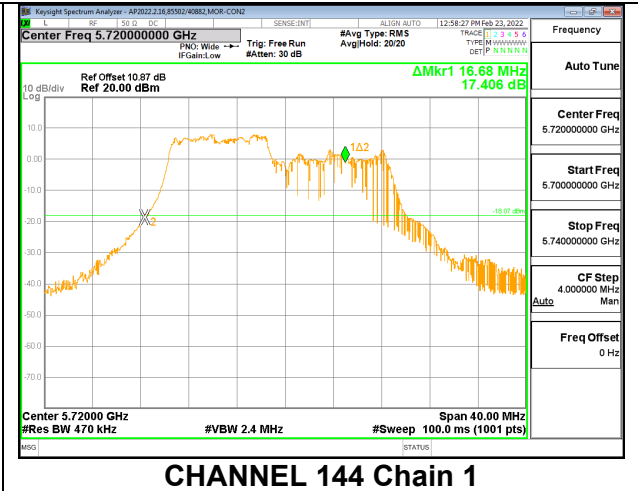
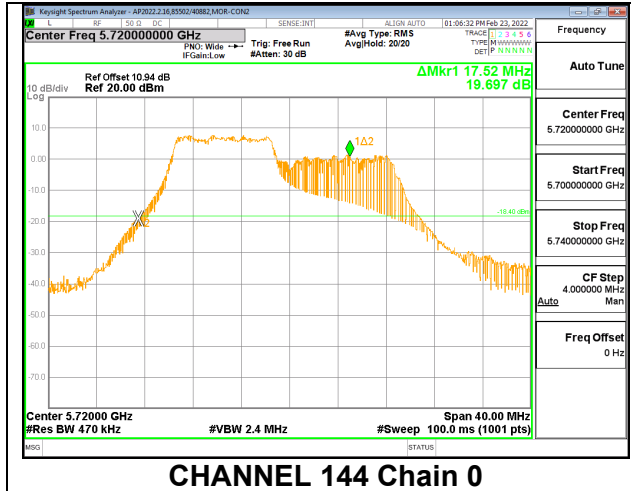
LOW 2



MID



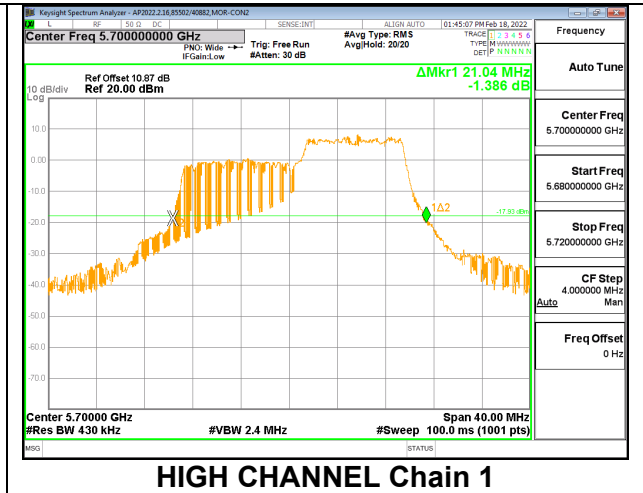
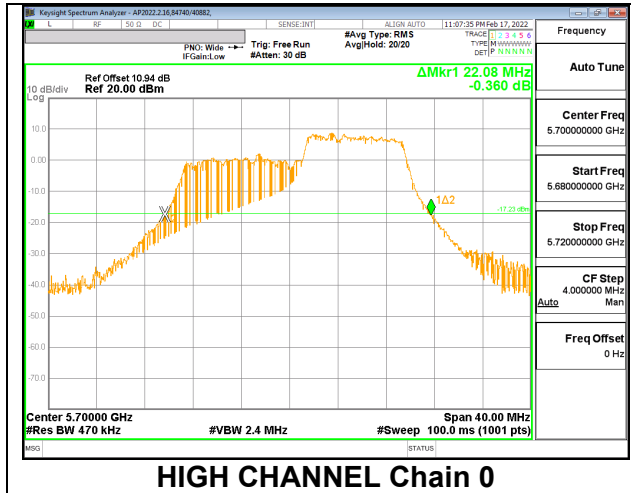
CHANNEL 144



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	5700	22.08	21.04

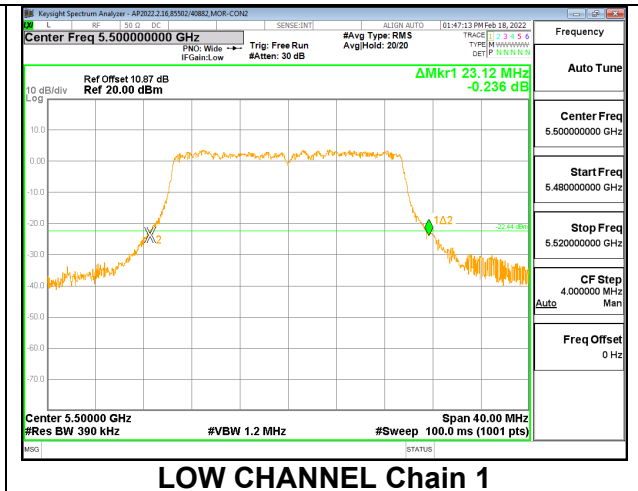
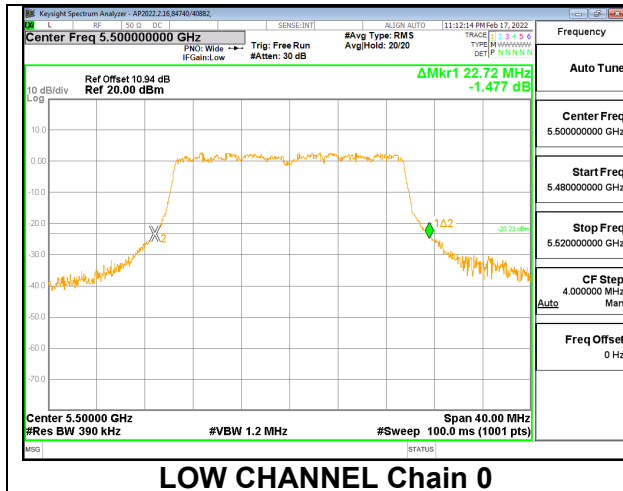
HIGH



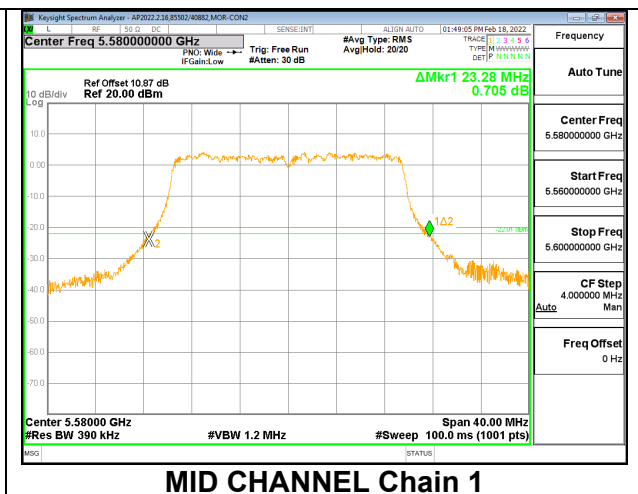
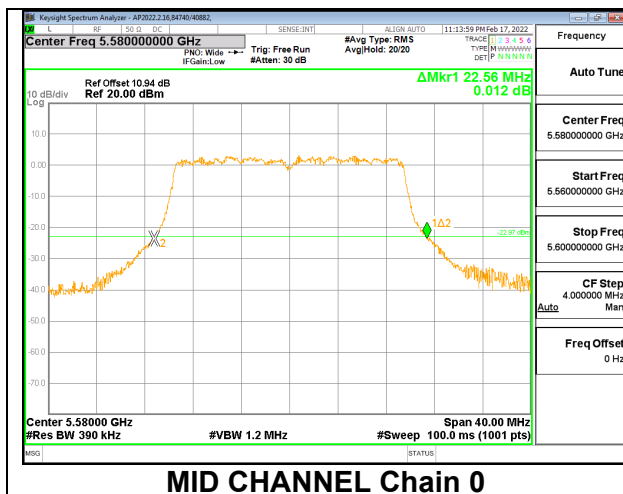
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 242-Tones, RU Index 61

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5500	22.72	23.12
Mid	5580	22.56	23.28
High	5700	22.92	23.16
144	5720	16.48	16.36

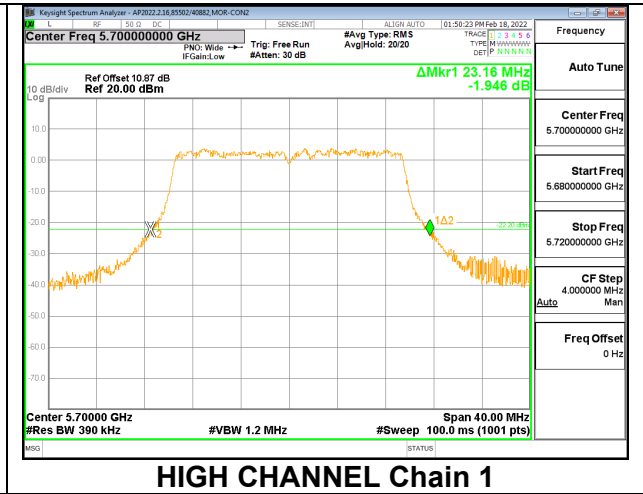
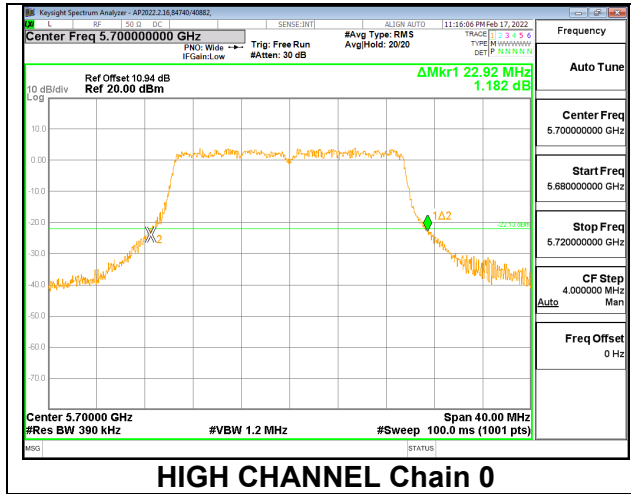
LOW



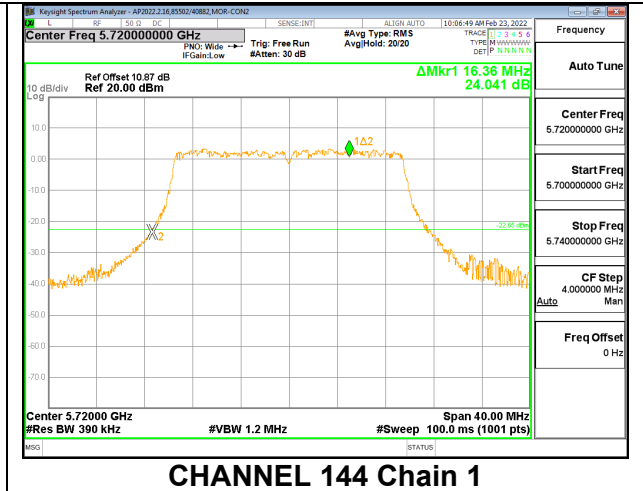
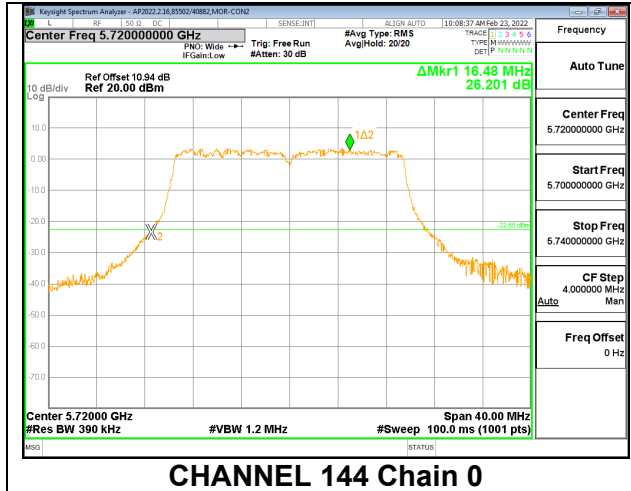
MID



HIGH



CHANNEL 144

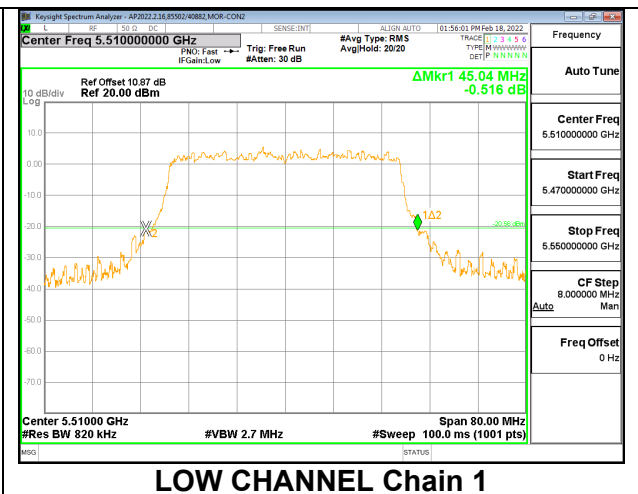
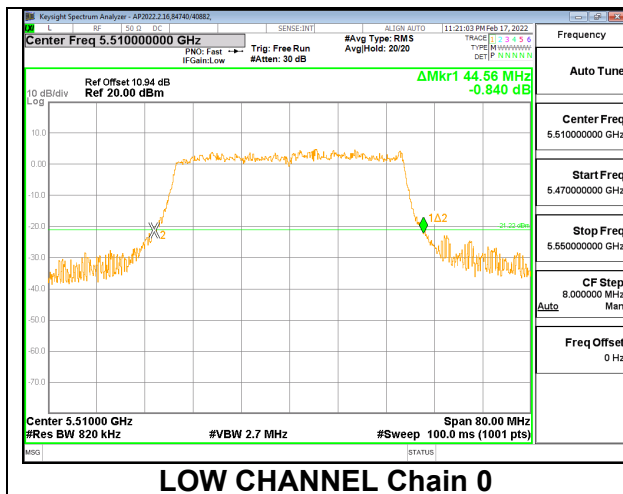


9.2.2. 802.11ax HE40 MODE 2TX IN THE 5.6GHz BAND

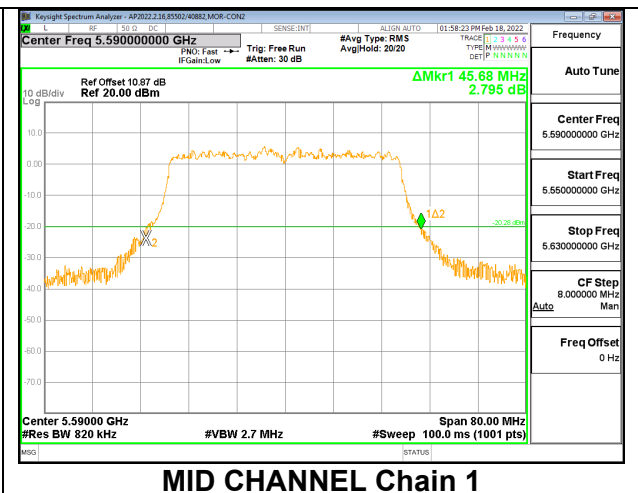
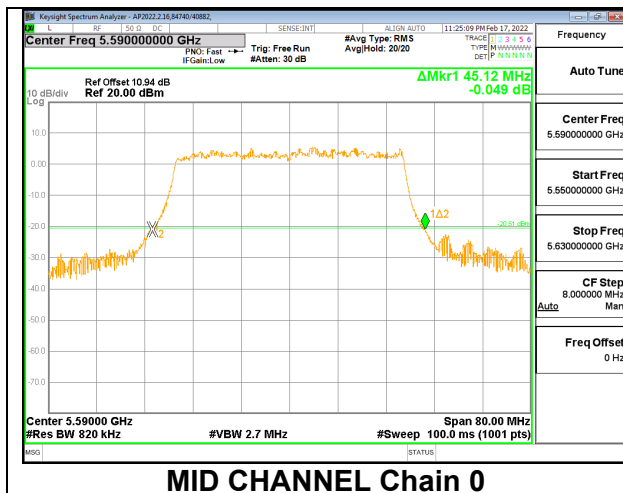
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 484-Tones, RU Index 65

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5510	44.56	45.04
Mid	5590	45.12	45.68
High	5670	45.04	45.68
142	5710	37.48	38.28

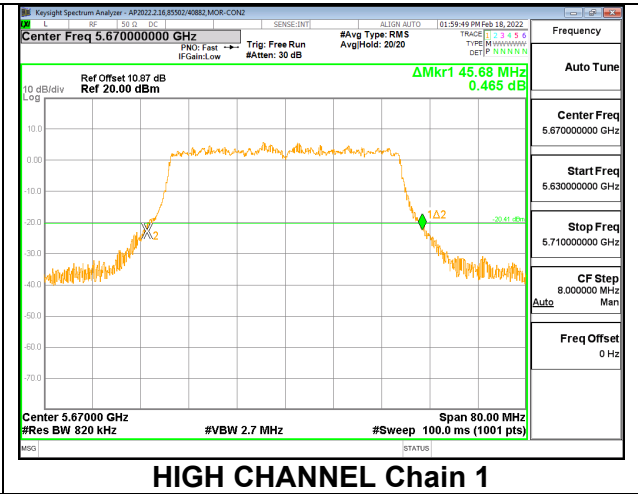
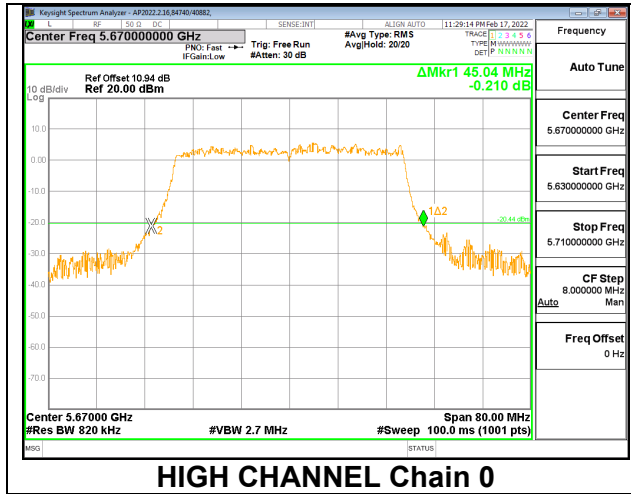
LOW



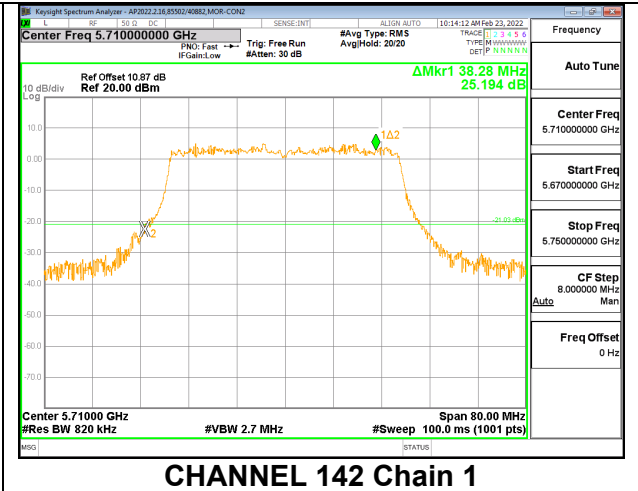
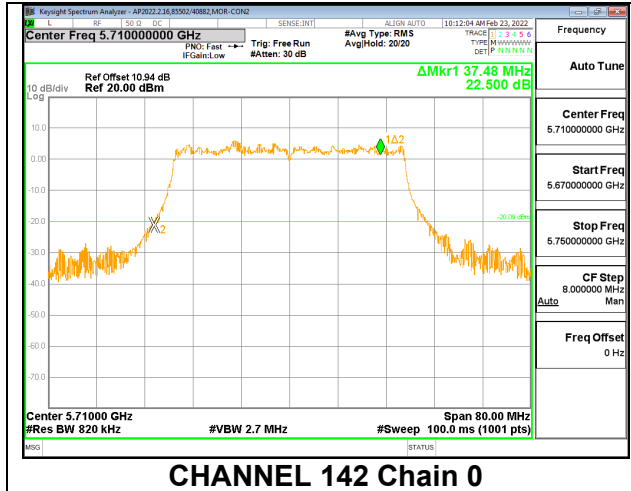
MID



HIGH



CHANNEL 142

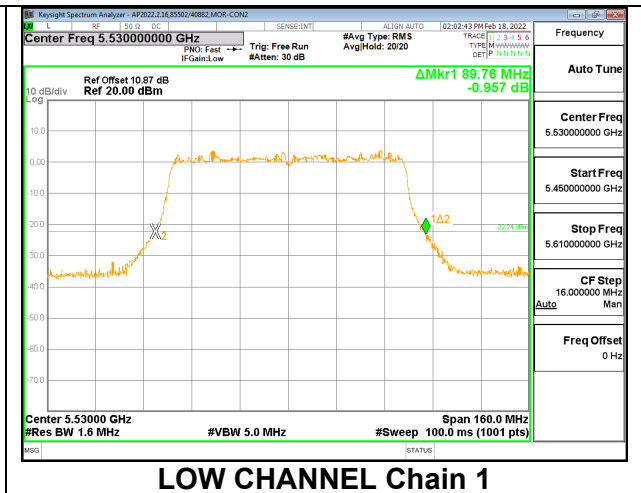
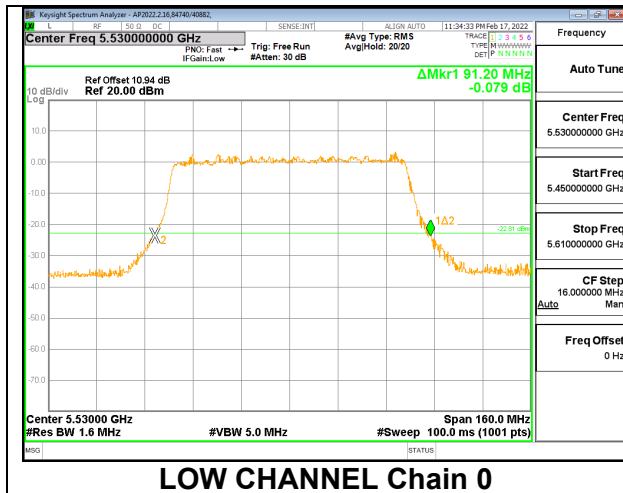


9.2.3. 802.11ax HE80 MODE 2TX IN THE 5.6GHz BAND

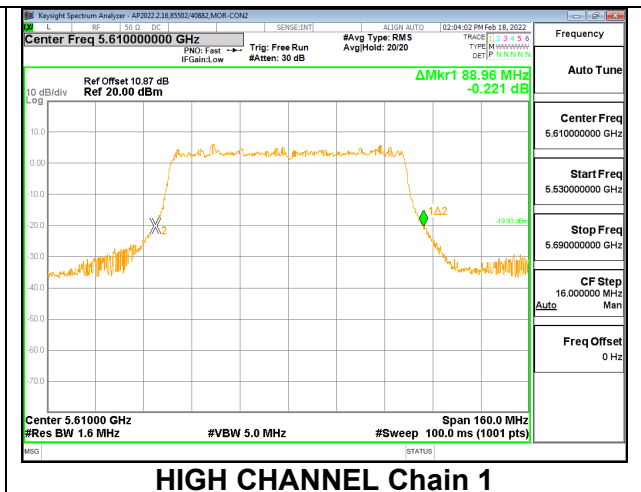
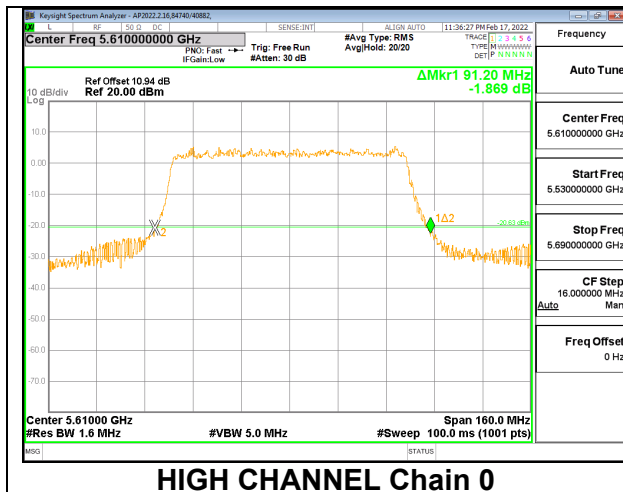
2TX Chain 0 + Chain 1 CDD OFDMA MODE: 996-Tones, RU Index 67

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5530	91.20	89.76
High	5610	91.20	88.96
138	5690	80.92	80.44

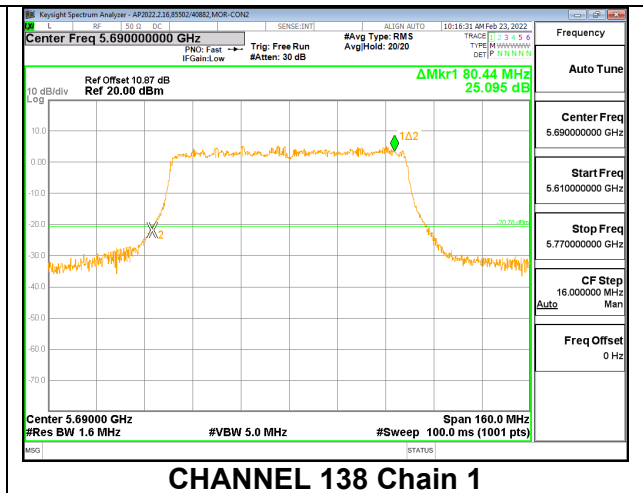
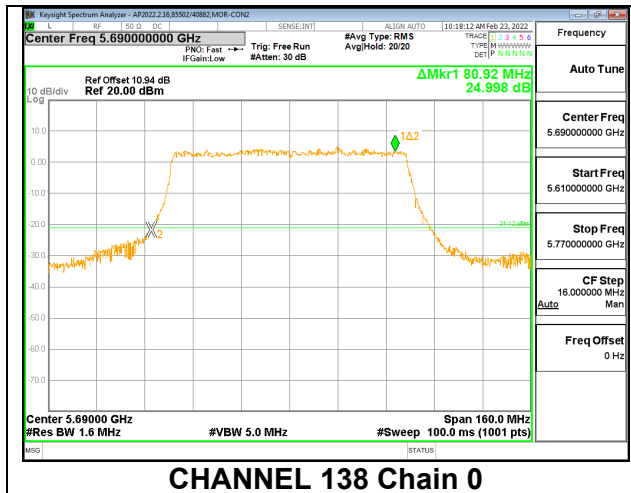
LOW



HIGH



CHANNEL 138

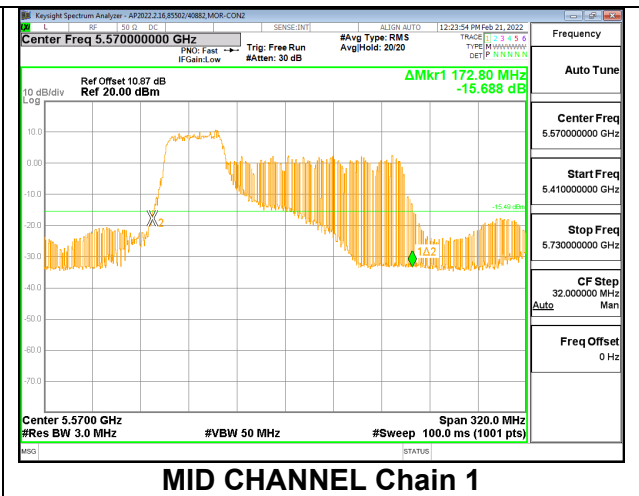
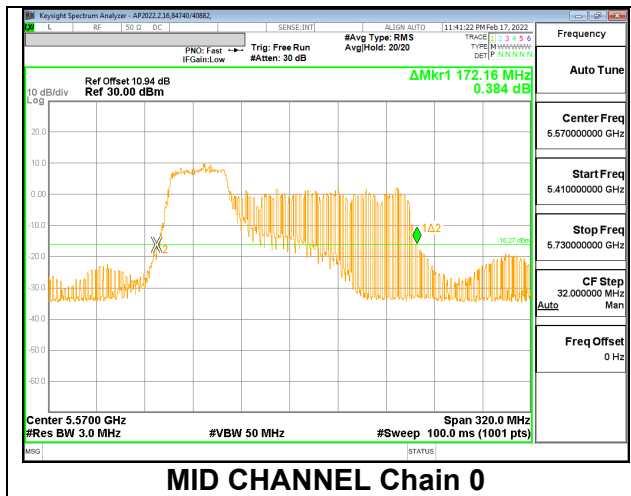


9.2.4. 802.11ax HE160 MODE 2TX IN THE 5.6GHz BAND

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	5570	172.16	172.80

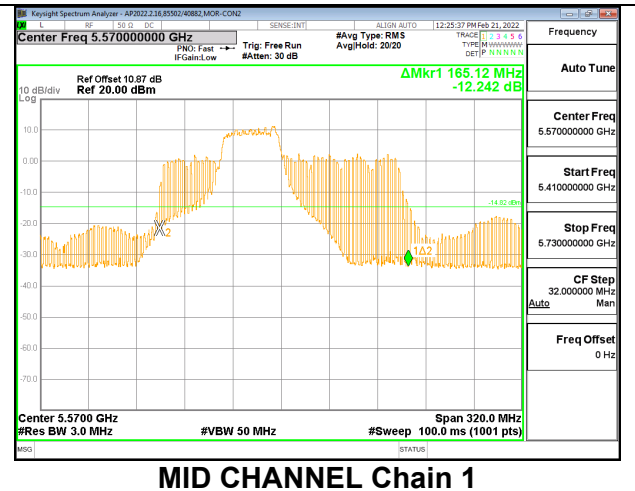
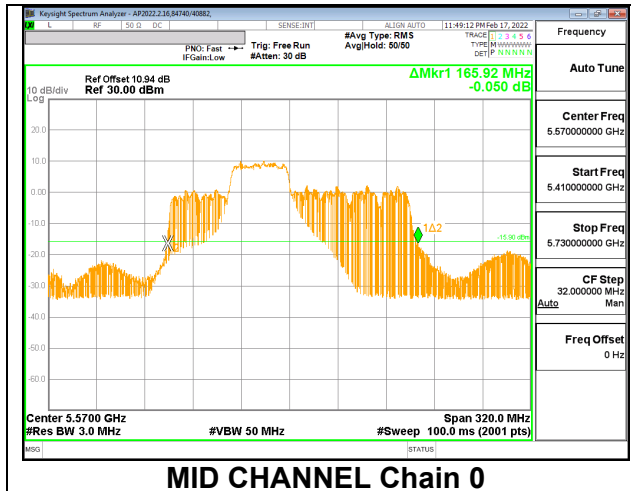
MID



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	5570	165.92	165.12

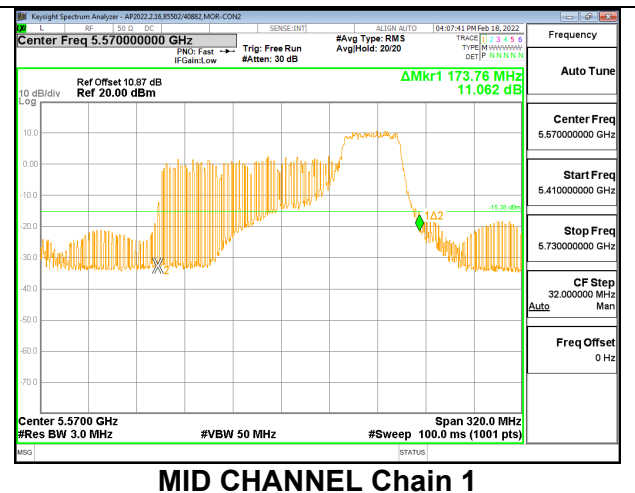
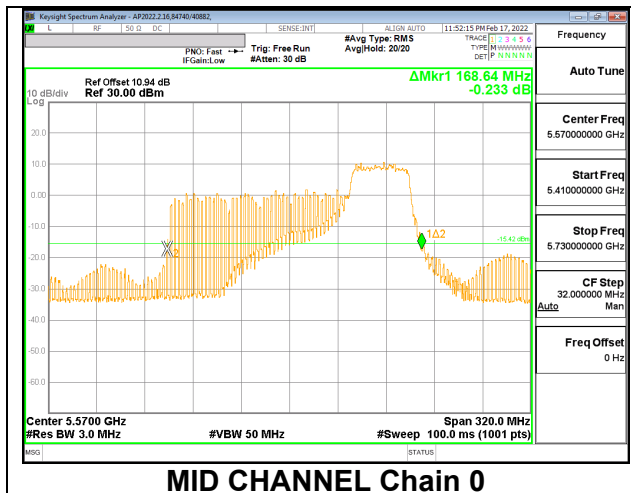
MID



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	5570	168.64	173.76

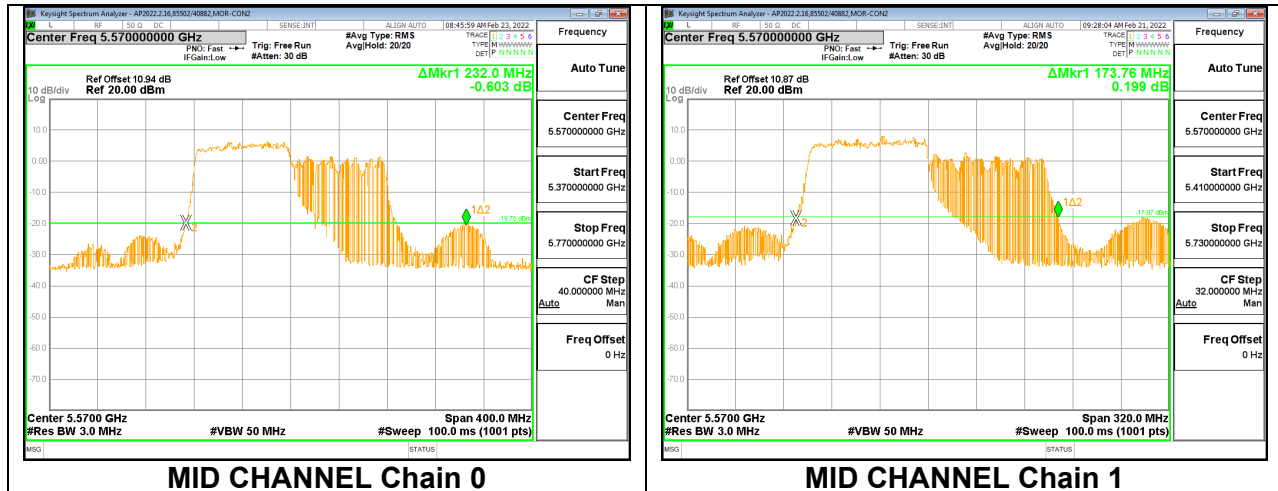
MID



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	5570	232.00	173.76

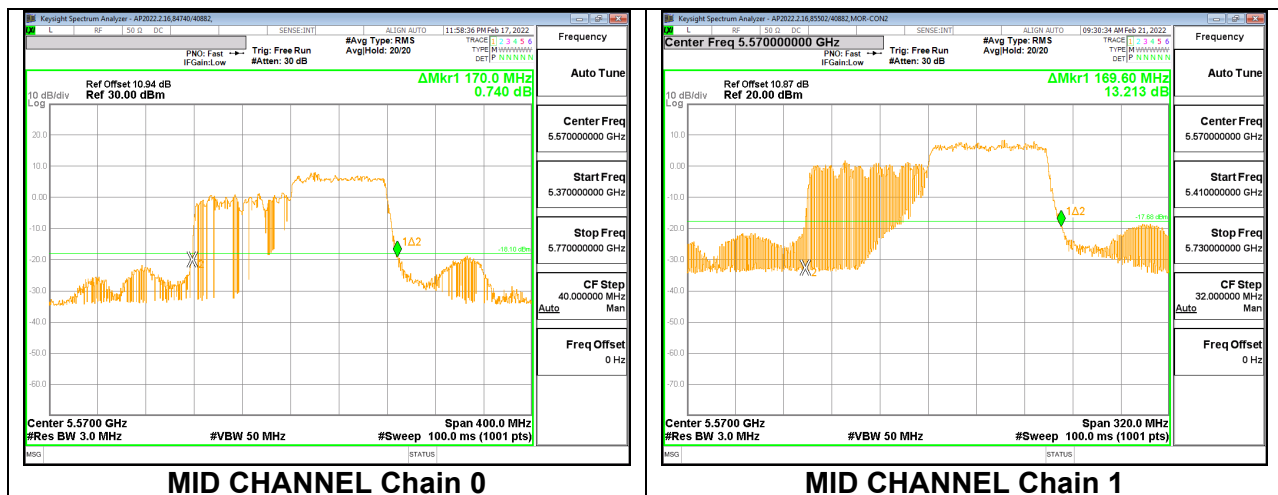
MID



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	5570	170.00	169.60

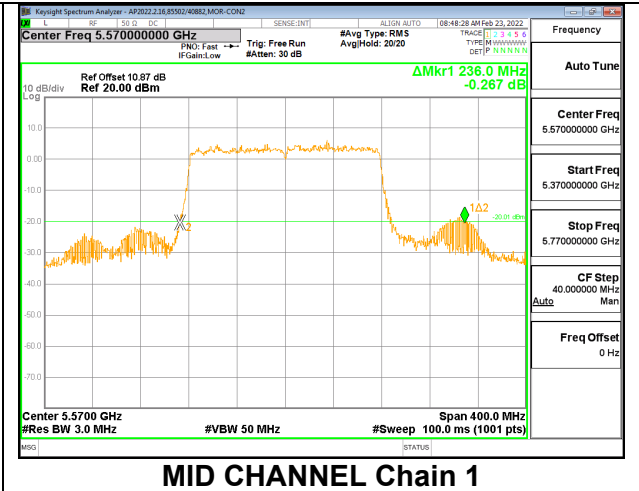
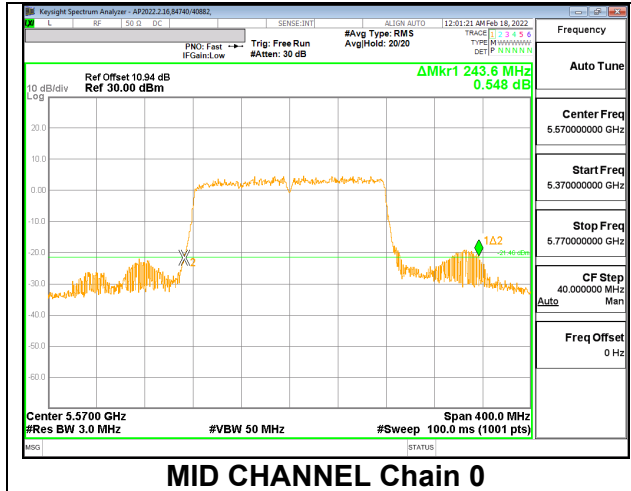
MID



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	5570	243.60	236.00

MID



9.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407

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.

DIRECTIONAL ANTENNA GAIN

2 TX DIRECTIONAL ANTENNA GAIN

Tx chains are uncorrelated for power and correlated for PSD. The directional gains are as follows:

U-NII Band	Ant 1 Antenna Gain (dBi)	Ant 2 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
5.6	-1.00	-7.60	-3.15	-0.68

RESULT

9.3.1. 802.11ax HE20 MODE 2TX IN THE 5.6GHz BAND

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

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 1MHz)
Low	5500	20.20	-3.15	-0.68	24.00	11.00
144	5720	16.24	-3.15	-0.68	23.11	11.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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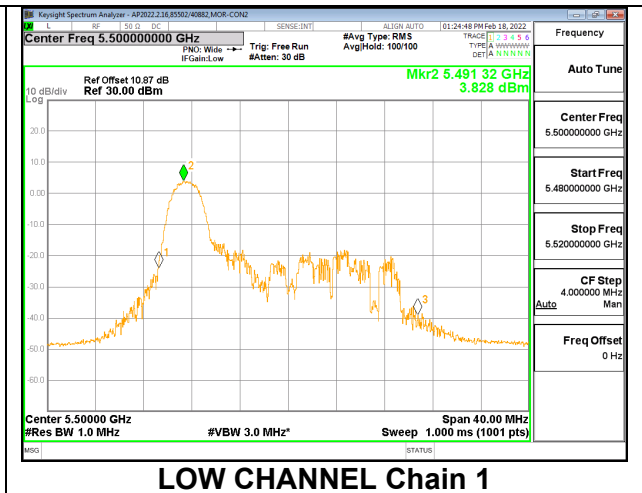
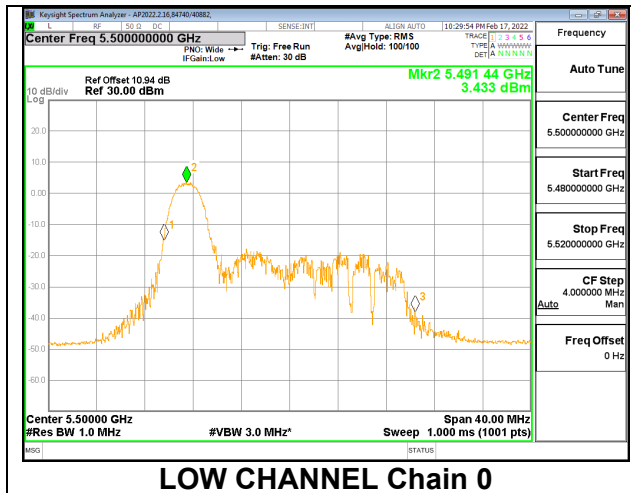
Output Power Results

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	5500	7.72	8.18	10.97	24.00	-13.03
144	5720	7.93	7.97	10.96	23.11	-12.15

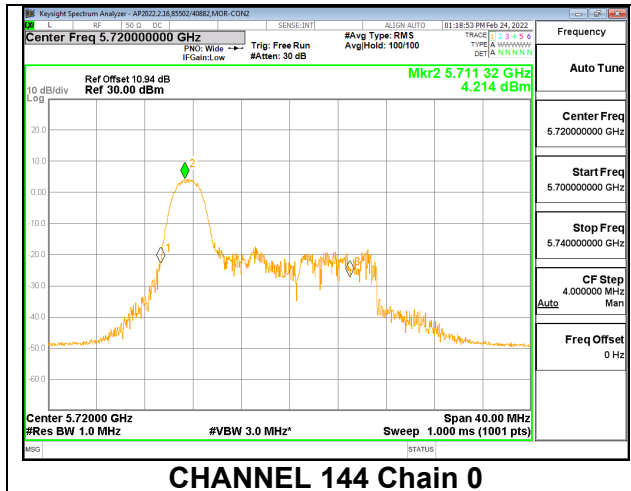
PSD Results

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	5500	3.43	3.83	6.65	11.00	-4.35
144	5720	4.21	4.48	7.36	11.00	-3.64

LOW



CHANNEL 144



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

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 1MHz)
Mid	5580	18.64	-3.15	-0.68	23.70	11.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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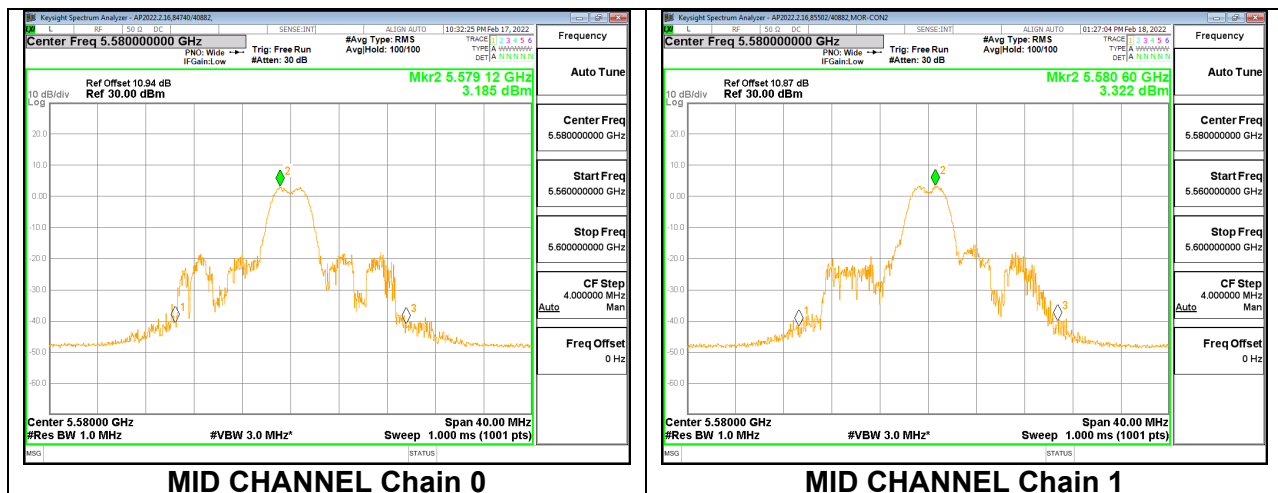
Output Power Results

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	5580	7.95	8.03	11.00	23.70	-12.70

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	5580	3.19	3.32	6.26	11.00	-4.74

MID



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

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 1MHz)
High	5700	20.28	-3.15	-0.68	24.00	11.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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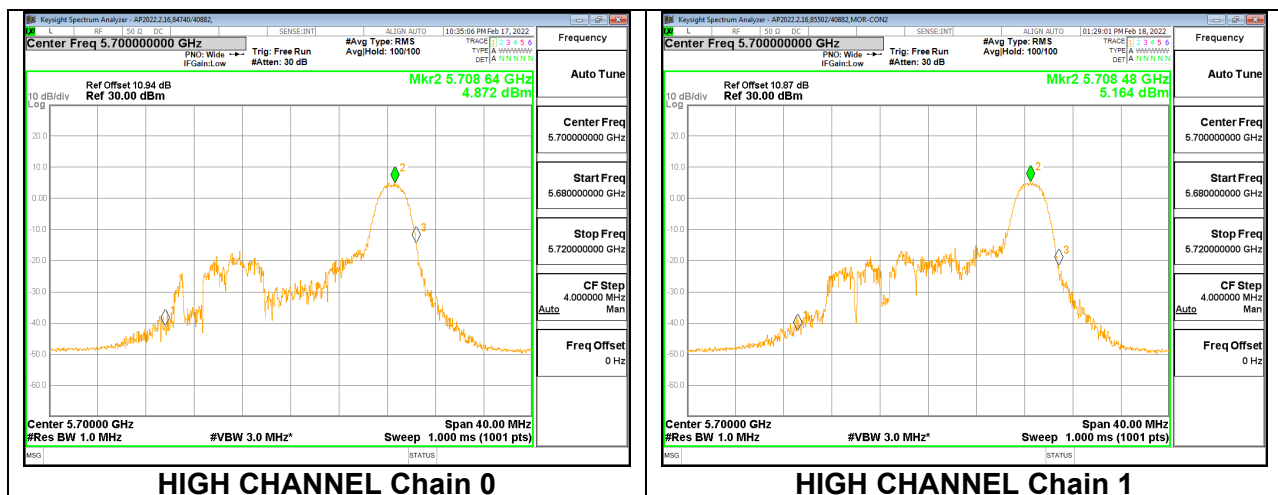
Output Power Results

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	5700	8.20	8.49	11.36	24.00	-12.64

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	5700	4.87	5.16	8.03	11.00	-2.97

HIGH



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

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 1MHz)
Low	5500	20.56	-3.15	-0.68	24.00	11.00
144	5720	16.08	-3.15	-0.68	23.06	11.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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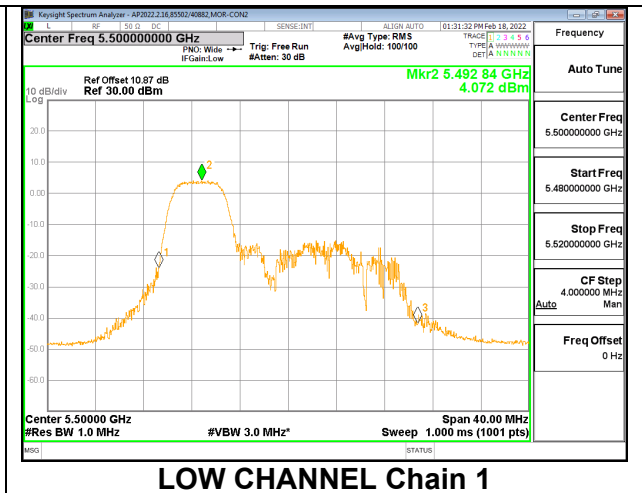
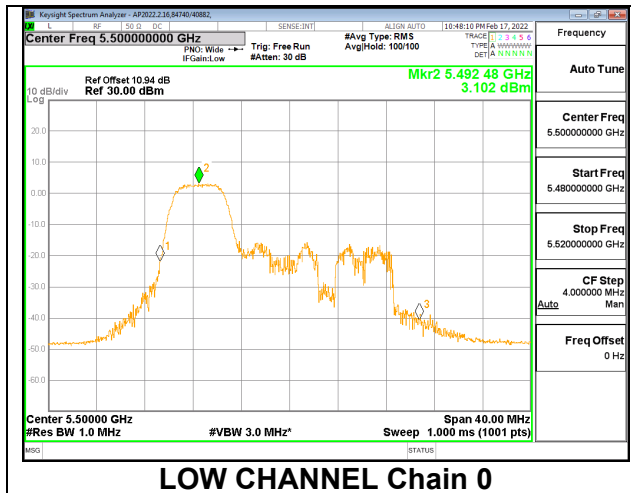
Output Power Results

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	5500	10.20	10.88	13.56	24.00	-10.44
144	5720	10.43	10.19	13.32	23.06	-9.74

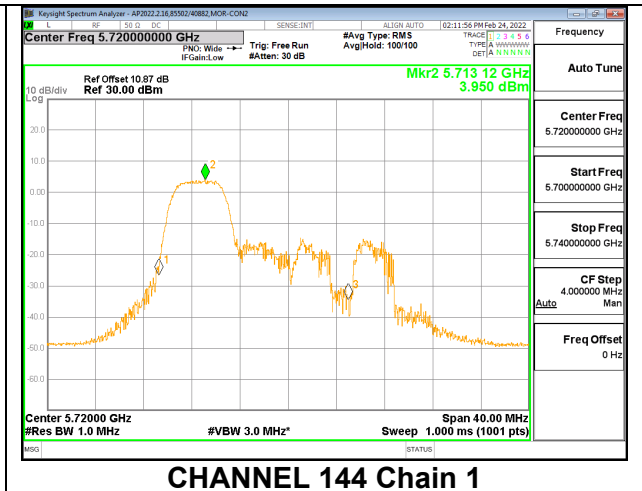
PSD Results

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	5500	3.10	4.07	6.62	11.00	-4.38
144	5720	3.77	3.95	6.87	11.00	-4.13

LOW



CHANNEL 144



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

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
Mid	5580	18.88	-3.15	-0.68	23.76	11.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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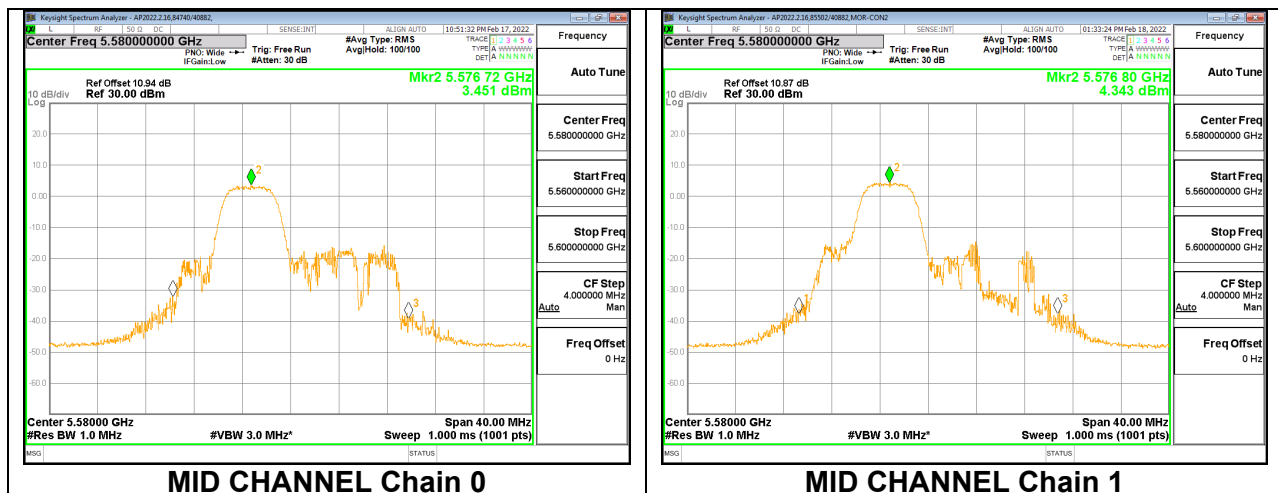
Output Power Results

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	5580	10.01	10.86	13.47	23.76	-10.29

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	5580	3.45	4.34	6.93	11.00	-4.07

MID



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

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
High	5700	20.44	-3.15	-0.68	24.00	11.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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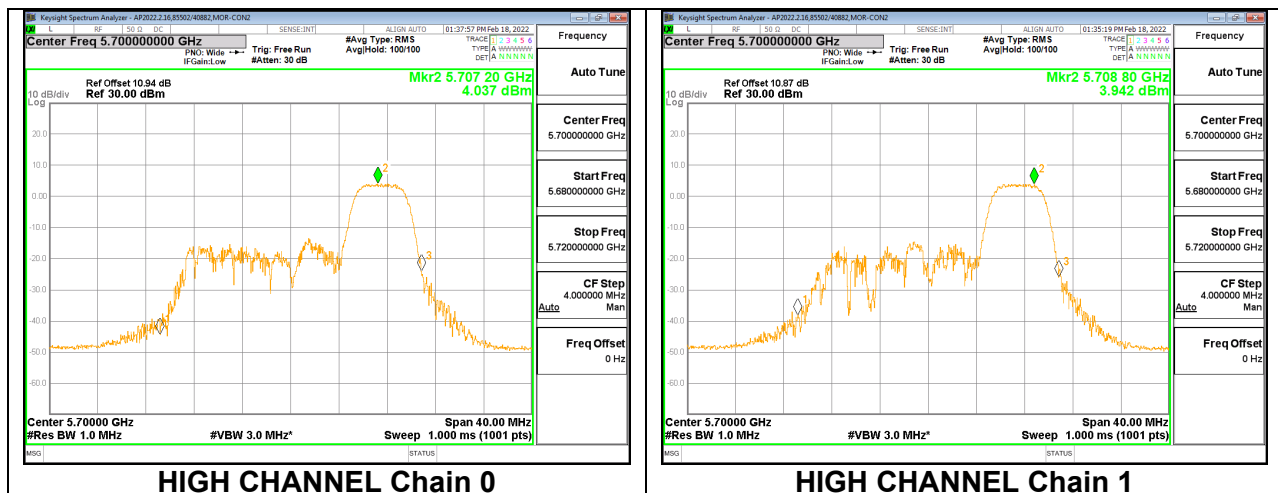
Output Power Results

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	5700	10.54	10.27	13.42	24.00	-10.58

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	5700	4.04	3.94	7.00	11.00	-4.00

HIGH



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

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 1MHz)
Low	5500	21.60	-3.15	-0.68	24.00	11.00
Low 2	5520	21.36	-3.15	-0.68	24.00	11.00
Mid	5580	21.84	-3.15	-0.68	24.00	11.00
144	5720	17.41	-3.15	-0.68	23.41	11.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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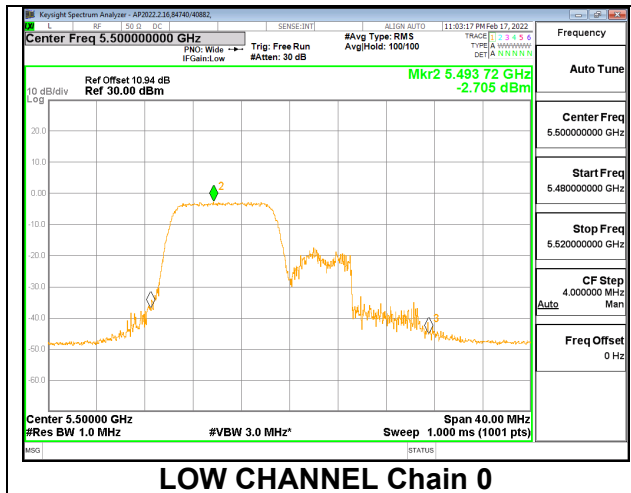
Output Power Results

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	5500	7.26	7.63	10.46	24.00	-13.54
Low 2	5520	10.39	11.04	13.74	24.00	-10.26
Mid	5580	9.95	10.86	13.44	24.00	-10.56
144	5720	10.44	10.16	13.31	23.41	-10.10

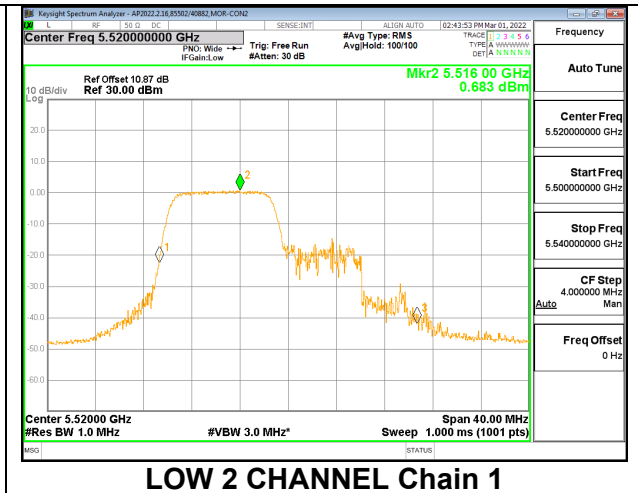
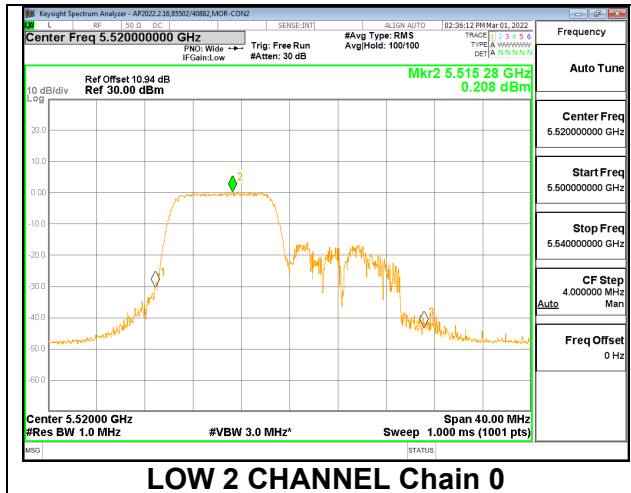
PSD Results

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	5500	-2.71	-2.22	0.56	11.00	-10.44
Low 2	5520	0.21	0.68	3.46	11.00	-7.54
Mid	5580	0.49	1.31	3.93	11.00	-7.07
144	5720	0.99	1.05	4.03	11.00	-6.97

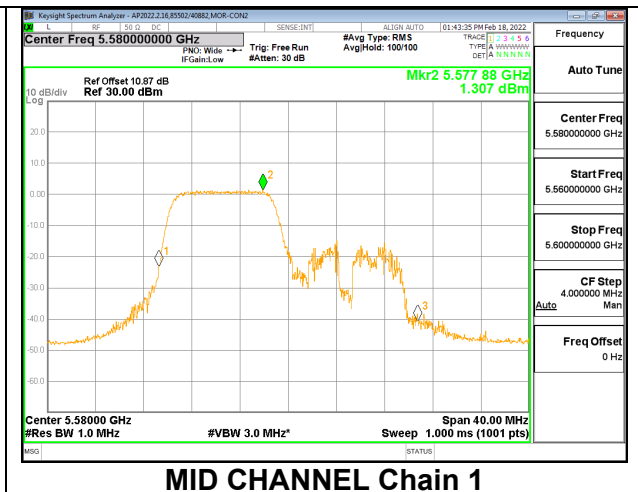
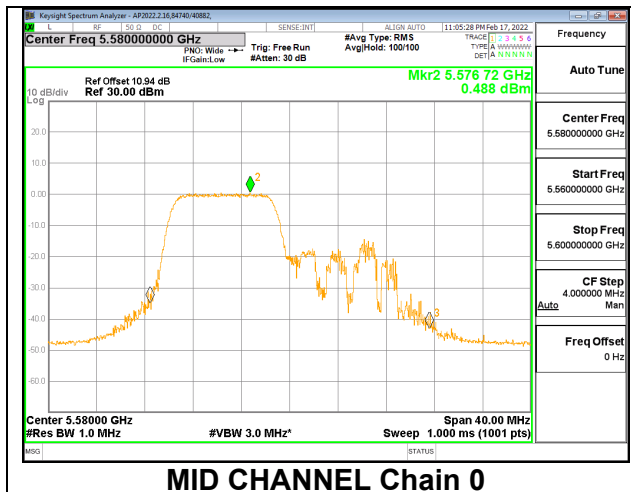
LOW



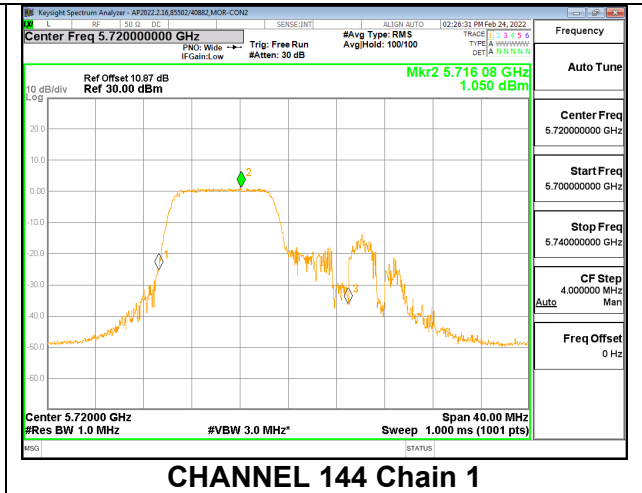
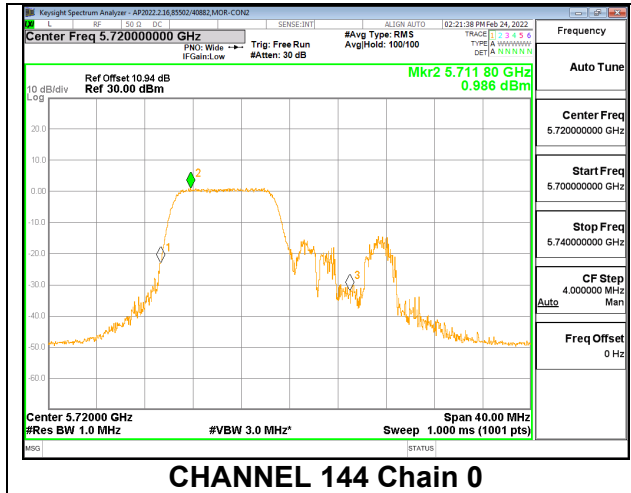
LOW 2



MID



CHANNEL 144



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

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

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 1MHz)
High	5700	21.04	-3.15	-0.68	24.00	11.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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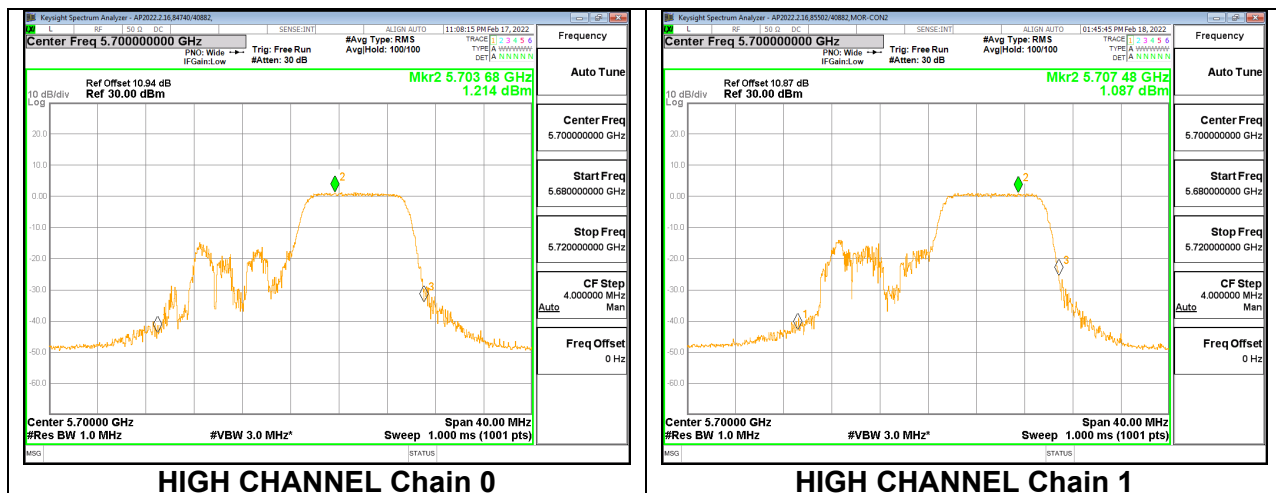
Output Power Results

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	5700	10.59	10.33	13.47	24.00	-10.53

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	5700	1.21	1.09	4.16	11.00	-6.84

HIGH



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

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

Bandwidth, Antenna Gain, and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/ 1MHz)
Low	5500	22.72	-3.15	-0.68	24.00	11.00
Mid	5580	22.56	-3.15	-0.68	24.00	11.00
High	5700	22.92	-3.15	-0.68	24.00	11.00
144	5720	16.36	-3.15	-0.68	23.14	11.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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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	5500	10.31	10.86	13.60	24.00	-10.40
Mid	5580	10.05	10.85	13.48	24.00	-10.52
High	5700	10.55	10.35	13.46	24.00	-10.54
144	5720	10.51	10.28	13.41	23.14	-9.73

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	5500	-3.03	-2.15	0.44	11.00	-10.56
Mid	5580	-3.06	-1.89	0.57	11.00	-10.43
High	5700	-2.24	-2.20	0.79	11.00	-10.21
144	5720	-2.31	-2.33	0.69	11.00	-10.31

Note – HE20 242T was worst-case when compared to HE20 SU. Therefore 242T represented SU.