

# TEST REPORT

**Report Number. :** R14641114-E4

**Applicant :** Axon Enterprise Inc.  
17800 N. 85<sup>th</sup> Street  
Scottsdale, AZ 85255

**Model :** AX1037

**FCC ID :** X4GS01506

**IC :** 8803A-S01506

**EUT Description :** Body Worn Camera

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART E: 2023  
ISED RSS-247 ISSUE 2: 2017  
ISED RSS-GEN ISSUE 5 + A1: 2021

**Date Of Issue:**  
2023-06-09

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



## REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2023-03-29	Initial Issue	Charles Moody
V2	2023-05-15	Updated Hardware/Version Information and VHT80 Output Power	Charles Moody
V3	2023-06-09	Updated FCC PSD Limit for VHT80 in the 5.2 Band	Charles Moody
V4	2023-06-19	Revised test configurations in section 6.5. Added DFS section to table in Section 2	B. Kiewra

## TABLE OF CONTENTS

<b>REPORT REVISION HISTORY .....</b>	<b>2</b>
<b>TABLE OF CONTENTS .....</b>	<b>3</b>
<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>6</b>
<b>2. TEST RESULT SUMMARY .....</b>	<b>7</b>
<b>3. TEST METHODOLOGY .....</b>	<b>7</b>
<b>4. FACILITIES AND ACCREDITATION .....</b>	<b>7</b>
<b>5. DECISION RULES AND MEASUREMENT UNCERTAINTY .....</b>	<b>8</b>
5.1. METROLOGICAL TRACEABILITY .....	8
5.2. DECISION RULES.....	8
5.3. MEASUREMENT UNCERTAINTY.....	8
5.4. SAMPLE CALCULATION .....	8
<b>6. EQUIPMENT UNDER TEST .....</b>	<b>9</b>
6.1. EUT DESCRIPTION .....	9
6.2. MAXIMUM OUTPUT POWER.....	9
6.3. DESCRIPTION OF AVAILABLE ANTENNAS.....	10
6.4. SOFTWARE AND FIRMWARE.....	10
6.5. WORST-CASE CONFIGURATION AND MODE.....	10
6.6. DESCRIPTION OF TEST SETUP.....	11
<b>7. MEASUREMENT METHOD.....</b>	<b>12</b>
<b>8. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>13</b>
<b>9. ANTENNA PORT TEST RESULTS .....</b>	<b>16</b>
9.1. ON TIME AND DUTY CYCLE.....	16
9.2. 26 dB BANDWIDTH.....	21
9.2.1. 802.11a MODE IN THE 5.2 GHz BAND.....	22
9.2.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND .....	23
9.2.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND .....	24
9.2.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND .....	25
9.2.5. 802.11a MODE IN THE 5.3 GHz BAND.....	26
9.2.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND .....	27
9.2.7. 802.11n HT40 MODE IN THE 5.3 GHz BAND .....	28
9.2.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND .....	29
9.2.9. 802.11a MODE IN THE 5.6 GHz BAND.....	30
9.2.10. 802.11n HT20 MODE IN THE 5.6 GHz BAND .....	31

9.2.11.	802.11n HT40 MODE IN THE 5.6 GHz BAND .....	32
9.2.12.	802.11ac VHT80 MODE IN THE 5.6 GHz BAND .....	33
9.2.13.	802.11a MODE IN THE 5.8 GHz BAND.....	34
9.2.14.	802.11n HT20 MODE IN THE 5.8 GHz BAND .....	35
9.2.15.	802.11n HT40 MODE IN THE 5.8 GHz BAND .....	36
9.2.16.	802.11ac VHT80 MODE IN THE 5.8 GHz BAND .....	37
<b>9.3.</b>	<b>99% BANDWIDTH.....</b>	<b>38</b>
9.3.1.	802.11a MODE IN THE 5.2 GHz BAND .....	39
9.3.2.	802.11n HT20 MODE IN THE 5.2 GHz BAND .....	40
9.3.3.	802.11n HT40 MODE IN THE 5.2 GHz BAND .....	41
9.3.4.	802.11ac VHT80 MODE IN THE 5.2 GHz BAND .....	42
9.3.5.	802.11a MODE IN THE 5.3 GHz BAND.....	43
9.3.6.	802.11n HT20 MODE IN THE 5.3 GHz BAND .....	44
9.3.7.	802.11n HT40 MODE IN THE 5.3 GHz BAND .....	45
9.3.8.	802.11ac VHT80 MODE IN THE 5.3 GHz BAND .....	46
9.3.9.	802.11a MODE IN THE 5.6 GHz BAND.....	47
9.3.10.	802.11n HT20 MODE IN THE 5.6 GHz BAND .....	48
9.3.11.	802.11n HT40 MODE IN THE 5.6 GHz BAND .....	49
9.3.12.	802.11ac VHT80 MODE IN THE 5.6 GHz BAND .....	50
9.3.13.	802.11a MODE IN THE 5.8 GHz BAND.....	51
9.3.14.	802.11n HT20 MODE IN THE 5.8 GHz BAND .....	52
9.3.15.	802.11n HT40 MODE IN THE 5.8 GHz BAND .....	53
9.3.16.	802.11ac VHT80 MODE IN THE 5.8 GHz BAND .....	54
<b>9.4.</b>	<b>6 dB BANDWIDTH.....</b>	<b>55</b>
9.4.1.	802.11a MODE IN THE 5.8 GHz BAND.....	56
9.4.2.	802.11n HT20 MODE IN THE 5.8 GHz BAND .....	57
9.4.3.	802.11n HT40 MODE IN THE 5.8 GHz BAND .....	58
9.4.4.	802.11ac VHT80 MODE IN THE 5.8 GHz BAND .....	59
<b>9.5.</b>	<b>OUTPUT POWER AND PSD.....</b>	<b>60</b>
9.5.1.	802.11a MODE IN THE 5.2 GHz BAND.....	62
9.5.2.	802.11n HT20 MODE IN THE 5.2 GHz BAND .....	64
9.5.3.	802.11n HT40 MODE IN THE 5.2 GHz BAND .....	66
9.5.4.	802.11ac VHT80 MODE IN THE 5.2 GHz BAND .....	68
9.5.5.	802.11a MODE IN THE 5.3 GHz BAND.....	70
9.5.6.	802.11n HT20 MODE IN THE 5.3 GHz BAND .....	74
9.5.7.	802.11n HT40 MODE IN THE 5.3 GHz BAND .....	78
9.5.8.	802.11ac VHT80 MODE IN THE 5.3 GHz BAND .....	82
9.5.9.	802.11a MODE IN THE 5.6 GHz BAND.....	86
9.5.10.	802.11n HT20 MODE IN THE 5.6 GHz BAND .....	88
9.5.11.	802.11n HT40 MODE IN THE 5.6 GHz BAND .....	90
9.5.12.	802.11ac VHT80 MODE IN THE 5.6 GHz BAND .....	92
9.5.13.	802.11a MODE IN THE 5.8 GHz BAND.....	94
9.5.14.	802.11n HT20 MODE IN THE 5.8 GHz BAND .....	96
9.5.15.	802.11n HT40 MODE IN THE 5.8 GHz BAND .....	98
9.5.16.	802.11ac VHT80 MODE IN THE 5.8 GHz BAND .....	100
<b>10.</b>	<b>RADIATED TEST RESULTS.....</b>	<b>102</b>
10.1.	TRANSMITTER ABOVE 1 GHz.....	104
10.1.1.	TX ABOVE 1 GHz 802.11a MODE IN THE 5.2 GHz BAND .....	104
10.1.2.	TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.2 GHz BAND.....	110

10.1.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.2 GHz BAND..... 112  
10.1.4. TX ABOVE 1 GHz 802.11ac VHT80 MODE IN THE 5.2 GHz BAND ..... 114  
10.1.5. TX ABOVE 1 GHz 802.11a MODE IN THE 5.3 GHz BAND ..... 116  
10.1.6. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.3 GHz BAND..... 122  
10.1.7. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.3 GHz BAND..... 124  
10.1.8. TX ABOVE 1 GHz 802.11ac VHT80 MODE IN THE 5.3 GHz BAND ..... 126  
10.1.9. TX ABOVE 1 GHz 802.11a MODE IN THE 5.6 GHz BAND ..... 128  
10.1.10. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.6 GHz BAND..... 136  
10.1.11. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.6 GHz BAND..... 144  
10.1.12. TX ABOVE 1 GHz 802.11ac VHT80 MODE IN THE 5.6 GHz BAND ..... 150  
10.1.13. TX ABOVE 1 GHz 802.11a MODE IN THE 5.8 GHz BAND ..... 154  
10.1.14. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.8 GHz BAND..... 160  
10.1.15. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.8 GHz BAND..... 164  
10.1.16. TX ABOVE 1 GHz 802.11ac VHT80 MODE IN THE 5.8 GHz BAND ..... 168  
  
10.2. *WORST CASE BELOW 30MHZ*..... 174  
10.3. *WORST CASE BELOW 1 GHZ*..... 176  
10.4. *WORST CASE 18-26 GHZ*..... 178  
10.5. *WORST CASE 26-40 GHZ*..... 180  
  
**11. AC POWER LINE CONDUCTED EMISSIONS.....182**  
    11.1.1. AC Power Line Norm ..... 183  
  
**12. SETUP PHOTOS.....185**

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Axon Enterprise Inc.  
17800 N. 85<sup>th</sup> Street  
Scottsdale, AZ 85255, USA

**EUT DESCRIPTION:** Body Worn Camera

**MODEL:** AX1037

**SERIAL NUMBER:** D01A01381, D01A02481, D01A01401

**SAMPLE RECEIPT DATE:** 2023-03-06

**DATE TESTED:** 2023-03-06 TO 2023-05-12

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Refer to section 2
ISED RSS-247 Issue 2	Refer to section 2
ISED RSS-GEN Issue 5 + A1	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.

Approved & Released For  
UL LLC By:

Prepared By:



---

Michael Antola  
Staff Engineer  
Consumer, Medical, and IT Segment  
UL LLC

---

Charles Moody  
Engineer  
Consumer, Medical, and IT Segment  
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.

Below is a list of the data provided by the customer:

- 1) Antenna gain and type (see section 6.3)
- 2) Cable loss (see section 9.4 and 9.5)

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 12.2.
See Comment	RSS-GEN 6.7	26dB BW/99% OBW	Reporting purposes only	Per ANSI C63.10 Sections 6.9.2 and 6.9.3
15.407 (e)	RSS-247 6.2.4.1	6 dB BW	Complies	None.
15.407 (a) (1-4), (h) (1)	RSS-247 6.2	Output Power		
15.407 (a) (1-3, 5)	RSS-247 6.2	PSD		
15.209, 15.205, 15.407 (b)	RSS-GEN 8.9, 8.10, RSS-247 6.2	Radiated Emissions		
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions		
15.207 (h)(2)	RSS-247 6.3	Dynamic Frequency Selection	See Comment	Results found in test report R14641114-D1

## 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 789033 D02 v02r01,
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013,
- RSS-GEN Issue 5 + A1
- RSS-247 Issue 2

## 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 checked="" type="checkbox"/>	Building 2800 Suite Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A	US0067	27265	825374
<input type="checkbox"/>	Building 12 Laboratory Dr RTP, NC 27709, U.S.A.		2180C	

## 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 <sub>Lab</sub>
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%.

### 5.4. SAMPLE CALCULATION

#### 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 body worn video camera that uses a rechargeable battery back. The EUT contains a BLE, BT, 2.4 WLAN, 5 WLAN, NFC, GNSS, and WWAN radio. This report covers the full testing of the 5WLAN radio.

### 6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum average conducted output power as follows:

#### 5.2 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
<b>5.2 GHz band, 1TX</b>			
5180-5240	802.11a	16.77	47.53
5180-5240	802.11n HT20	16.62	45.92
5190-5230	802.11n HT40	16.32	42.85
5210	802.11ac VHT80	10.53	11.30

#### 5.3 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
<b>5.3 GHz band, 1TX</b>			
5260 - 5320	802.11a	16.87	48.64
5260 - 5320	802.11n HT20	16.69	46.67
5270 - 5310	802.11n HT40	16.42	43.85
5290	802.11ac VHT80	13.21	20.94

#### 5.6 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
<b>5.6 GHz band, 1TX</b>			
5500-5720	802.11a	16.07	40.46
5500-5720	802.11n HT20	15.91	38.99
5510-5710	802.11n HT40	15.53	35.73
5530-5690	802.11ac VHT80	15.04	31.92

**5.8 GHz BAND**

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
<b>5.8 GHz band, 1TX</b>			
5745-5825	802.11a	14.34	27.16
5745-5825	802.11n HT20	14.12	25.82
5755-5795	802.11n HT40	13.94	24.77
5775	802.11ac VHT80	13.27	21.23

**6.3. DESCRIPTION OF AVAILABLE ANTENNAS**

The antenna(s) gain and type, as provided by the manufacturer' are as follows:  
 The radio utilizes a combination loop + IFA antenna, with the following gains:

Frequency Range (MHz)	Antenna Gain (dBi)
5180-5240	1.64
5260-5320	3.22
5500-5700	4.53
5745-5825	1.98

**6.4. SOFTWARE AND FIRMWARE**

The EUT hardware installed during testing was HW v.DVT2  
 The firmware version used during testing was FW v.01.01.NA.01.08

**6.5. WORST-CASE CONFIGURATION AND MODE**

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest average output power as worst-case scenario. This was found to be 11a 18Mbps, 5260 MHz.

Radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, mid, and high channels for the worst case modulation scheme, 11a, as determine by worst-case PSD for the 5.2, 5.3 and 5.6 GHz Band. For the 5.8 GHz Band, VHT80 was additionally ran as it was found to have the highest average output power of the band. Band edge was performed with the EUT set to transmit at the highest power on low and high channels for the largest bandwidth modulation schemes of VHT80, HT40, and HT20.

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

The EUT was tested in four configurations: dock charging, ac adapter charging, connected to POV camera, and battery powered, to find the worst-case emissions configuration Through pretesting, it was determined that charging with the AC adapter was the worst-case radiated and AC line emissions configuration. Therefore, all radiated emissions testing was performed with the EUT charging when connected to the AC adapter.

Worst-case data rates as determined by pre-testing were found to be:

802.11a mode: 18 Mbps  
 802.11n HT20mode: MCS2  
 802.11n HT40mode: MCS0  
 802.11ac VHT80 mode: MCS1

## 6.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	L470	PF0ZV66P	PD98260NG
AC Adapter	Protégé	PG60-100015434-01	NA	NA

### I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	1	1	USB-C	Unshielded	<3m	Connects to AC Adapter

### TEST SETUP

The EUT is connected to a support laptop and configured prior to testing. For final testing, the EUT is disconnected from the support laptop and left connected to the AC Adapter.

### SETUP DIAGRAMS

Please refer to R14641114-EP1 for setup diagrams

## 7. MEASUREMENT METHOD

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

6 dB Emission BW: KDB 789033 D02 v02r01, Section C.2

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

99% Occupied BW: KDB 789033 D02 v02r01, Section D.

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.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, and G.5.

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

## 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.
	<b>Common Equipment</b>				
	<b>Conducted Room 2</b>				
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
PWM002 (PRE0137344)	RF Power Meter	Keysight Technologies	N1911A	2022-07-07	2023-07-07
PWS002	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2022-09-27	2023-09-27
**SA0025	Spectrum Analyzer	Keysight Technologies	N9030A	2022-05-02	2023-05-02
SA0026	Spectrum Analyzer	Keysight	N9030A	2022-08-02	2023-08-02
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
	<b>Additional Equipment used</b>				
226565	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CENTRICRF	C18S2-10	2023-02-16	2024-02-16
CBL101	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz, 39.3", Connectors 2	Carlisle Interconnect Technologies	UFA147A-0-0180- 200200	2023-01-24	2024-01-24

### Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
**CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2022-04-05	2023-04-05
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
LISN003	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250- 25-2-01	2022-08-01	2023-08-01
75141	EMI Test Receiver 9kHz- 7GHz	Rohde & Schwarz	ESCI 7	2022-08-03	2023-08-03
**ATA222	Transient Limiter, 0.009- 100MHz	Electro-Metrics	EM-7600	2022-04-05	2023-04-05
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	<b>Miscellaneous (if needed)</b>				
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2022-09-12	2023-09-12

\*\*NOTE: Testing with this equipment was performed prior to the calibration date expiring. Therefore, at the time of testing, all equipment was in calibration.

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

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	<b>0.009-30MHz</b>				
135144	Active Loop Antenna	ETS-Lindgren	6502	2023-01-17	2024-01-17
	<b>30-1000 MHz</b>				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2022-09-07	2023-09-07
	<b>1-18 GHz</b>				
**206211	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-03-21	2023-03-21
	<b>18-40 GHz</b>				
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-626	2022-07-11	2023-07-11
	<b>Gain-Loss Chains</b>				
**91975	Gain-loss string: 0.009-30MHz	Various	Various	2022-05-10	2023-05-10
**91978	Gain-loss string: 25-1000MHz	Various	Various	2022-05-10	2023-05-10
**91977	Gain-loss string: 1-18GHz	Various	Various	2022-05-10	2023-05-10
**136042	Gain-loss string: 18-40GHz	Various	Various	2022-05-10	2023-05-10
	<b>Receiver &amp; Software</b>				
**197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-03-08	2023-03-31
SA0026	Spectrum Analyzer	Keysight	N9030A	2022-08-02	2023-08-02
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	<b>Additional Equipment used</b>				
200540	Environmental Meter	Fisher Scientific	15-077-963 s/n 181474409	2022-10-05	2023-10-05
207639	10dB, DC-18GHz, 5W	Mini-Circuits	BW-N10W5+	2022-08-11	2023-08-11

\*\*NOTE: Testing with this equipment was performed prior to the calibration date expiring. Therefore, at the time of testing, all equipment was in calibration.

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

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	<b>1-18 GHz</b>				
86408	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-05-24	2023-05-24
	<b>Gain-Loss Chains</b>				
207640	Gain-loss string: 1-18GHz	Various	Various	2022-05-20	2023-05-20
	<b>Receiver &amp; Software</b>				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-02-02	2024-02-02
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	<b>Additional Equipment used</b>				
21642	Environmental Meter	Fisher Scientific	15-077-963 (s/n 210701692)	2021-08-16	2023-08-16

## 9. ANTENNA PORT TEST RESULTS

### 9.1. ON TIME AND DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

#### PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

#### ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Power Averaging Duty Cycle Correction Factor (dB)	Linear Averaging Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
<b>5.2 GHz Band</b>							
802.11a 1TX	0.7035	0.7410	0.949	94.94	0.23	0.45	1.421
802.11n HT20 1TX	0.5073	0.5450	0.931	93.08	0.31	0.62	1.971
802.11n HT40 1TX	0.3396	0.3761	0.903	90.30	0.44	0.89	2.945
802.11ac VHT80 1TX	0.1831	0.2198	0.833	83.30	0.79	1.59	5.461
<b>5.3 GHz Band</b>							
802.11a 1TX	2.0630	2.1010	0.982	98.19	0.00	0.00	0.010
802.11n HT20 1TX	1.9240	1.9610	0.981	98.11	0.00	0.00	0.010
802.11n HT40 1TX	0.9476	0.9844	0.963	96.26	0.17	0.33	1.055
802.11ac VHT80 1TX	0.4635	0.5000	0.927	92.70	0.33	0.66	2.157
<b>5.6 GHz Band</b>							
802.11a 1TX	2.0630	2.1010	0.982	98.19	0.00	0.00	0.010
802.11n HT20 1TX	1.9240	1.9610	0.981	98.11	0.00	0.00	0.010
802.11n HT40 1TX	0.9480	0.9844	0.963	96.30	0.16	0.33	1.055
802.11ac VHT80 1TX	0.4635	0.5003	0.926	92.64	0.33	0.66	2.157
<b>5.8 GHz Band</b>							
802.11a 1TX	0.7038	0.7410	0.950	94.98	0.22	0.45	1.421
802.11n HT20 1TX	0.6678	0.7050	0.947	94.72	0.24	0.47	1.497
802.11n HT40 1TX	0.4918	0.5280	0.931	93.14	0.31	0.62	2.033
802.11ac VHT80 1TX	0.2515	0.2883	0.872	87.24	0.59	1.19	3.976



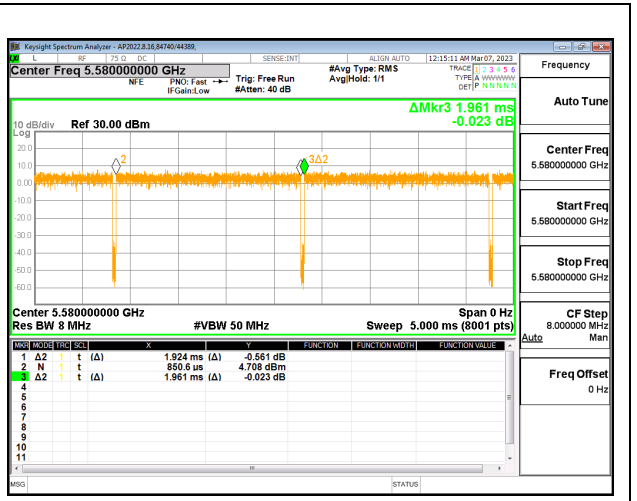
DUTY CYCLE PLOTS



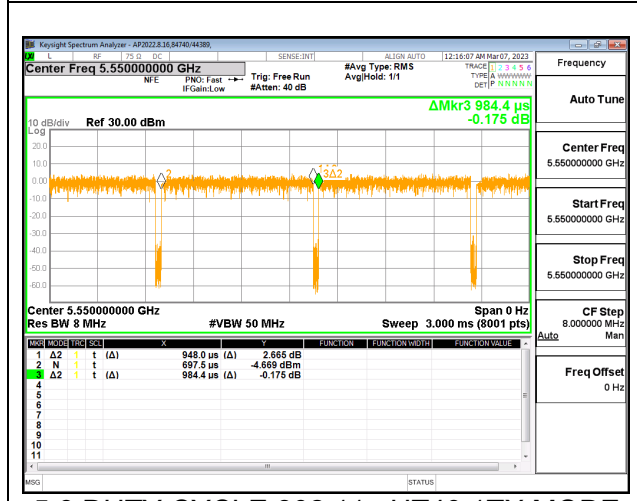




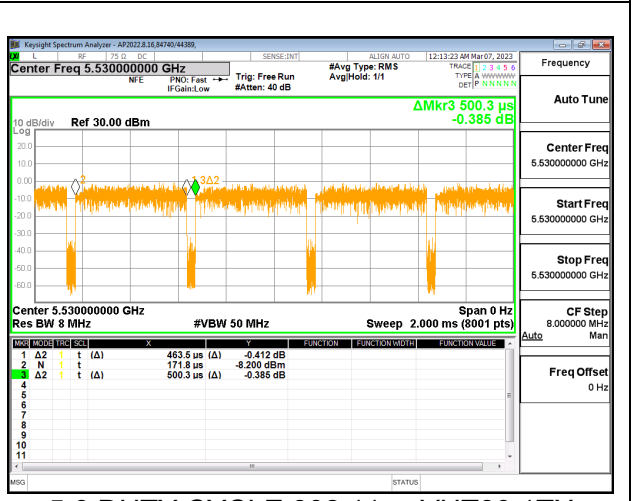
5.6 DUTY CYCLE 802.11a 1TX MODE



5.6 DUTY CYCLE 802.11n HT20 1TX MODE



5.6 DUTY CYCLE 802.11n HT40 1TX MODE



5.6 DUTY CYCLE 802.11ac VHT80 1TX MODE



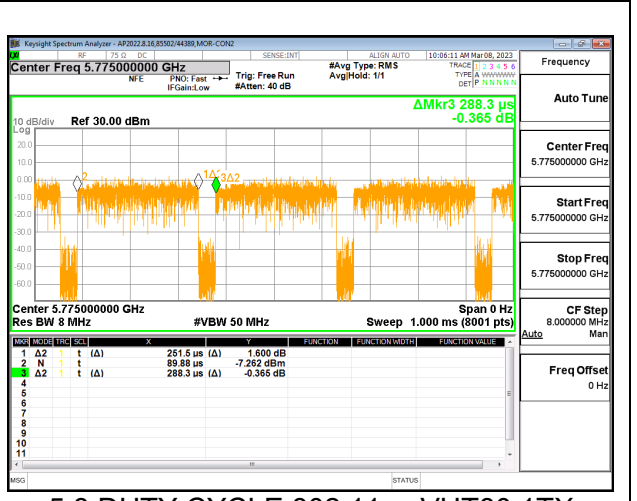
5.8 DUTY CYCLE 802.11a 1TX MODE



5.8 DUTY CYCLE 802.11n HT20 1TX MODE



5.8 DUTY CYCLE 802.11n HT40 1TX MODE



5.8 DUTY CYCLE 802.11ac VHT80 1TX MODE

## 9.2. 26 dB BANDWIDTH

### LIMITS

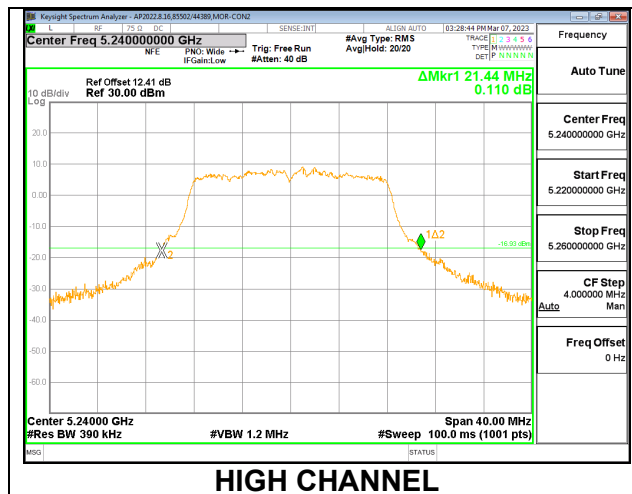
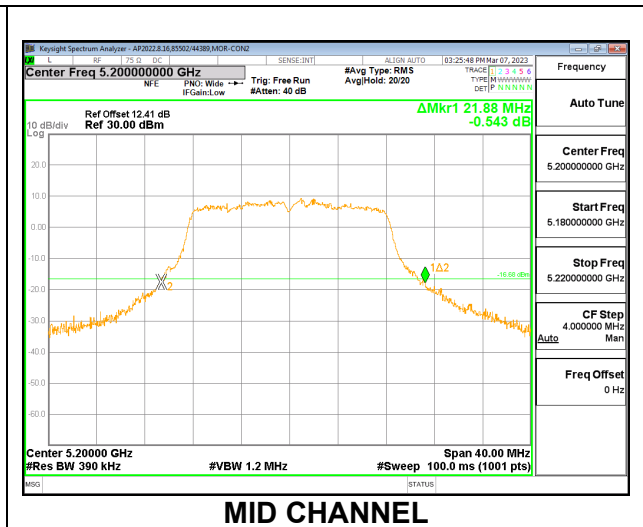
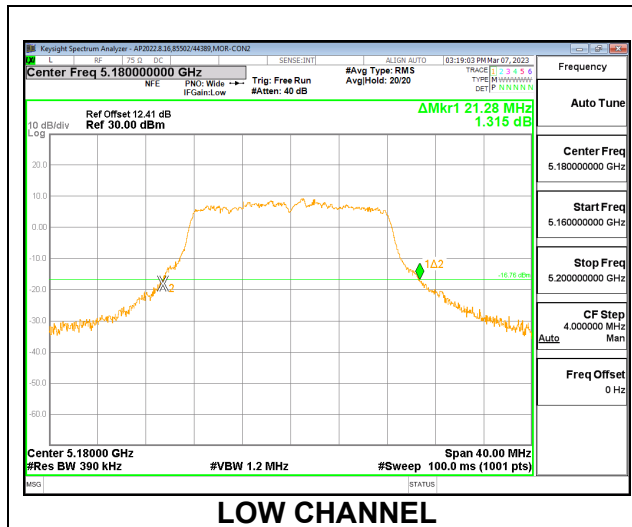
None; for reporting purposes only.

### RESULTS

### 9.2.1. 802.11a MODE IN THE 5.2 GHz BAND

#### 1TX Antenna 1 MODE

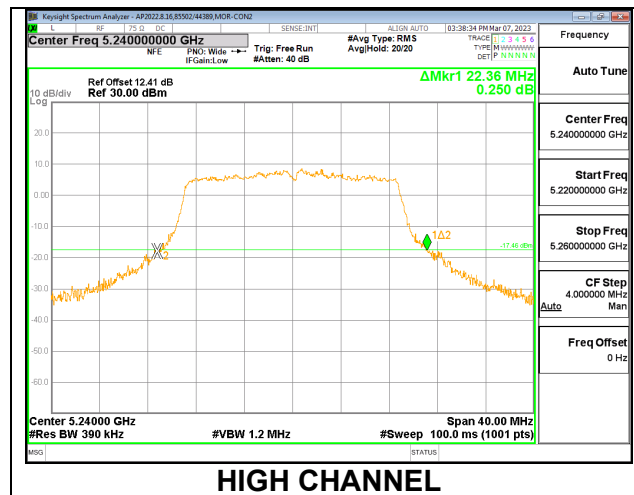
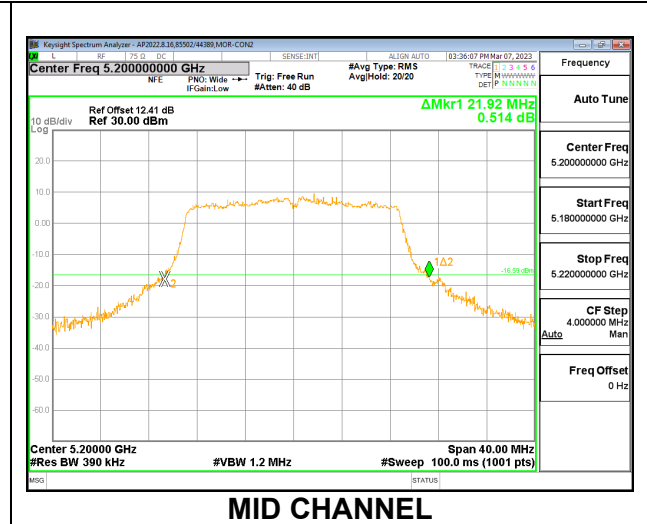
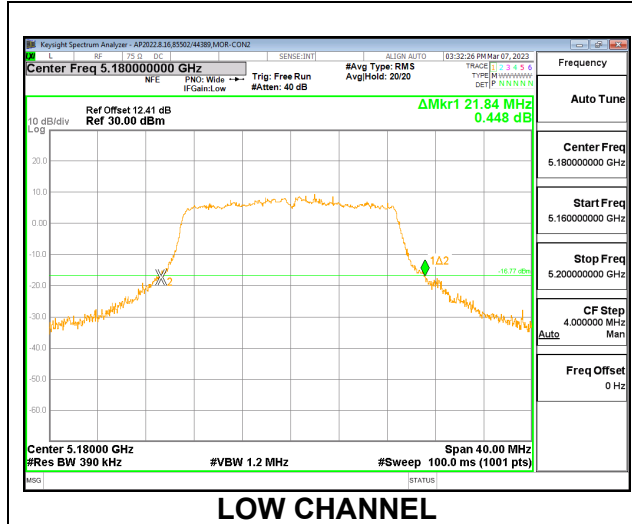
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	21.28
Mid	5200	21.88
High	5240	21.44



### 9.2.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

#### 1TX Antenna 1 MODE

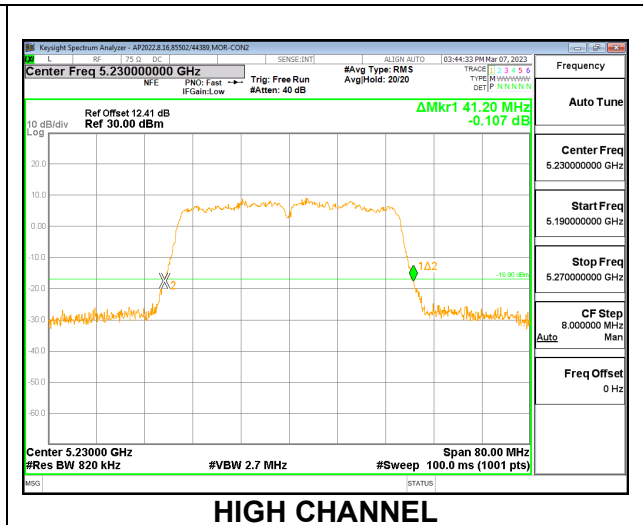
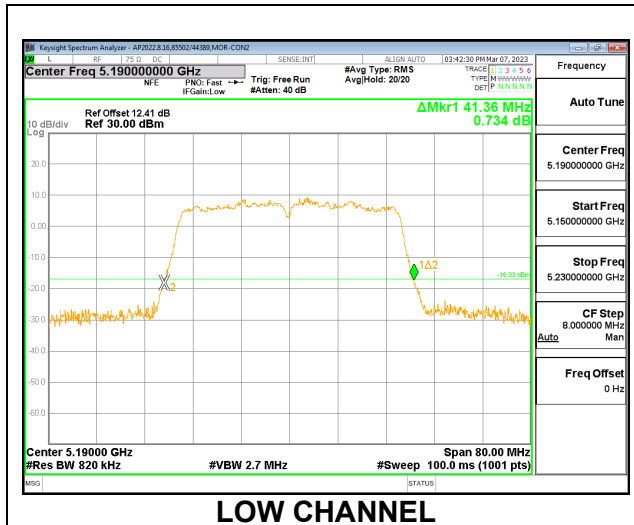
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	21.84
Mid	5200	21.92
High	5240	22.36



### 9.2.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

#### 1TX Antenna 1 MODE

Channel	Frequency	26dB Bandwidth
	(MHz)	(MHz)
Low	5190	41.36
High	5230	41.20

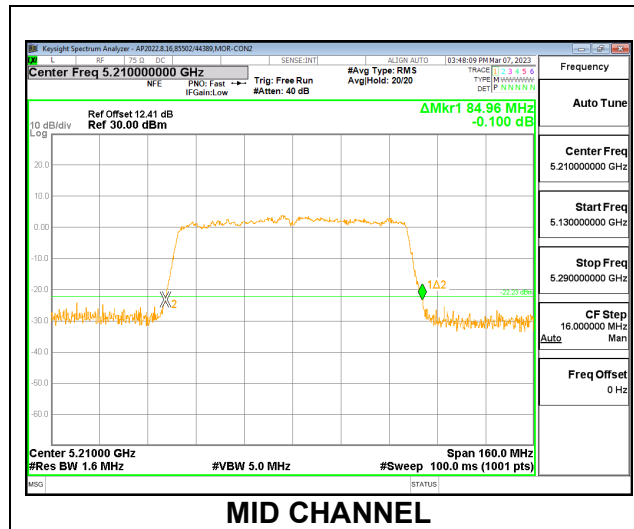




### 9.2.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

#### 1TX Antenna 1 MODE

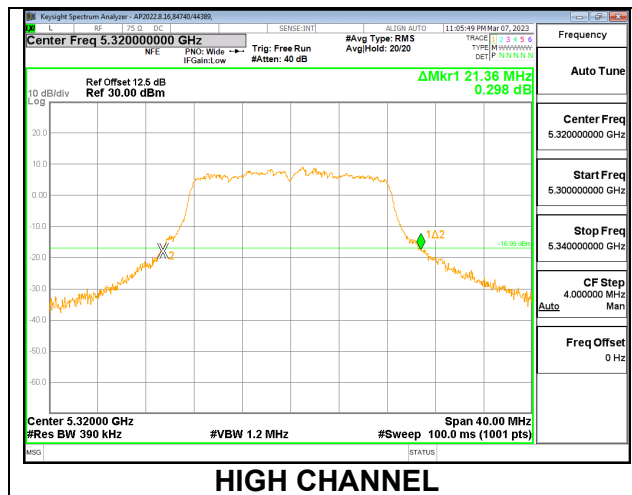
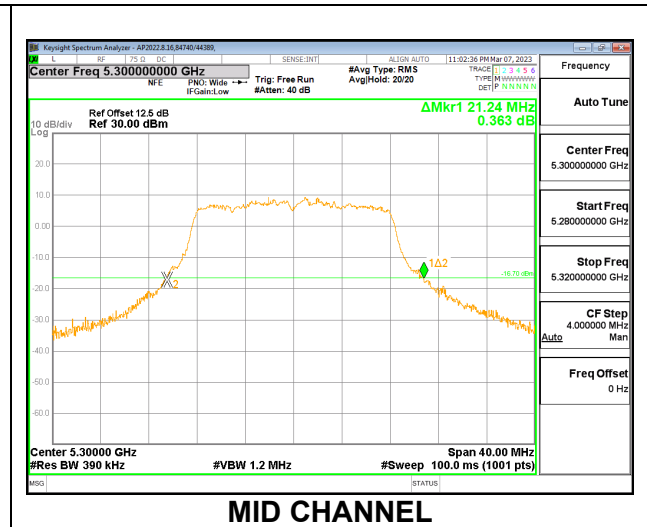
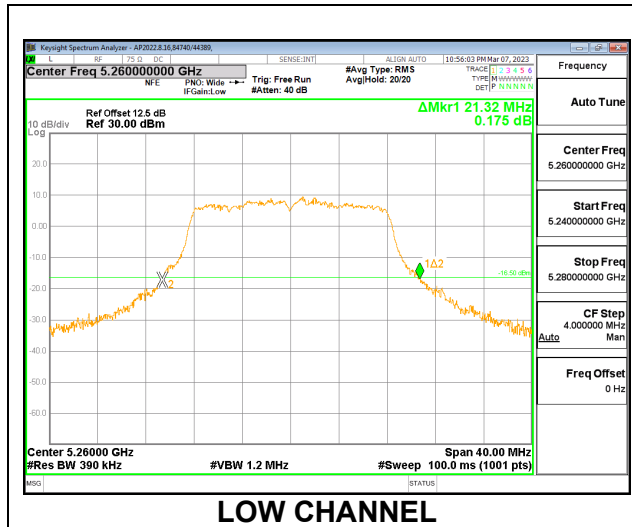
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5210	84.96



### 9.2.5. 802.11a MODE IN THE 5.3 GHz BAND

#### 1TX Antenna 1 MODE

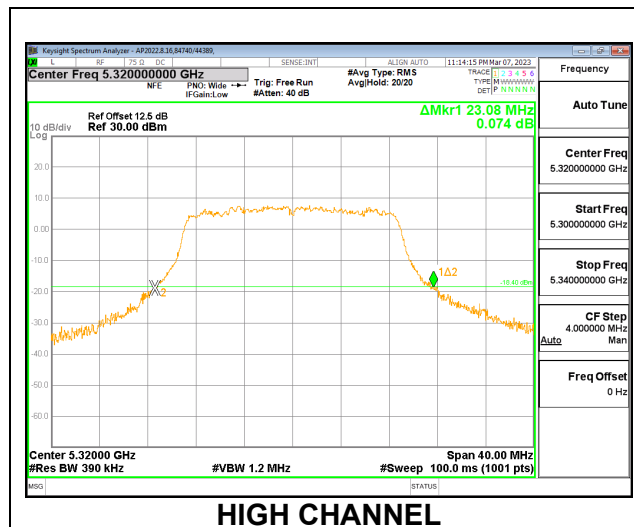
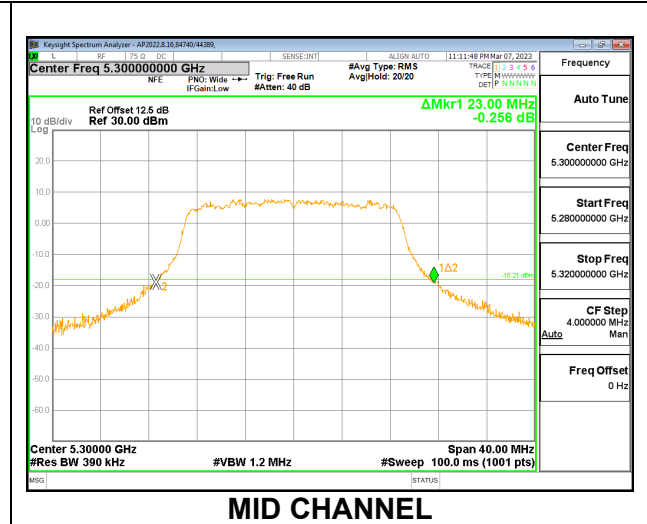
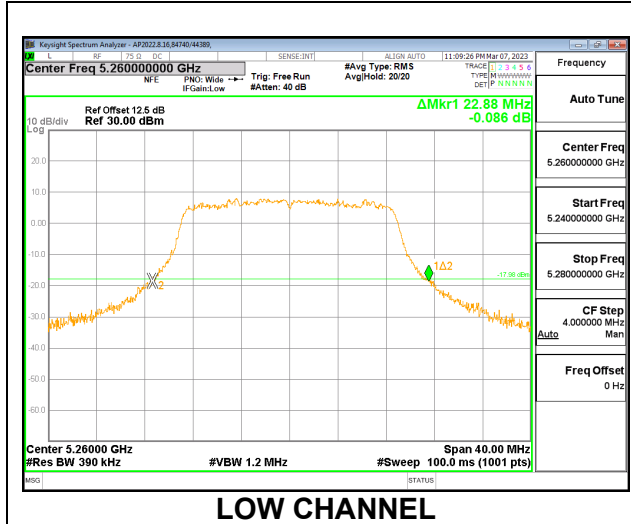
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	21.32
Mid	5300	21.24
High	5320	21.36



### 9.2.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND

#### 1TX Antenna 1 MODE

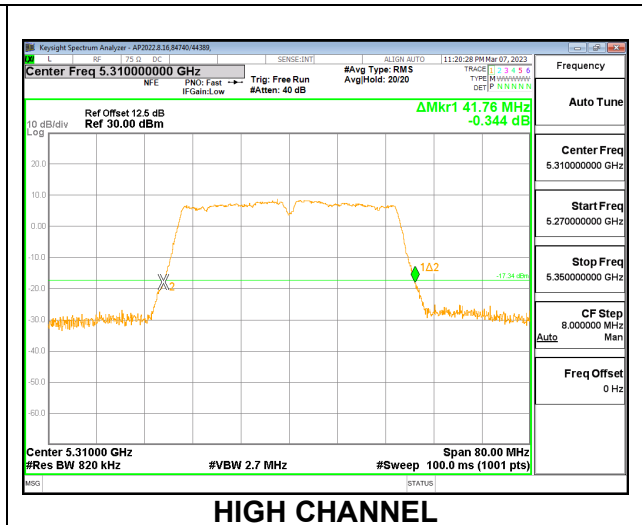
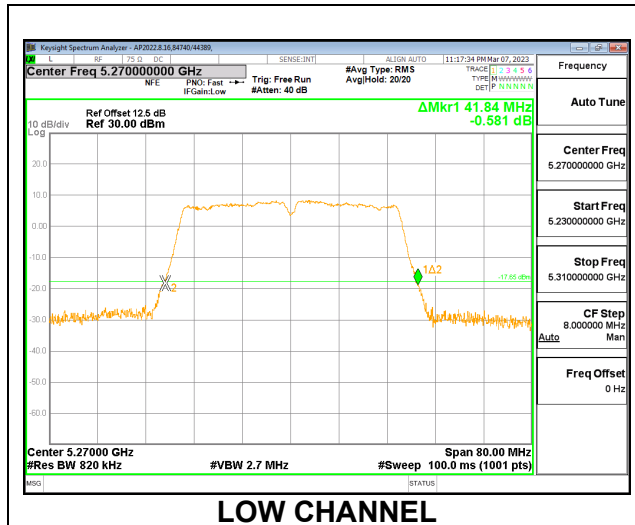
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	22.88
Mid	5300	23.00
High	5320	23.08



### 9.2.7. 802.11n HT40 MODE IN THE 5.3 GHz BAND

#### 1TX Antenna 1 MODE

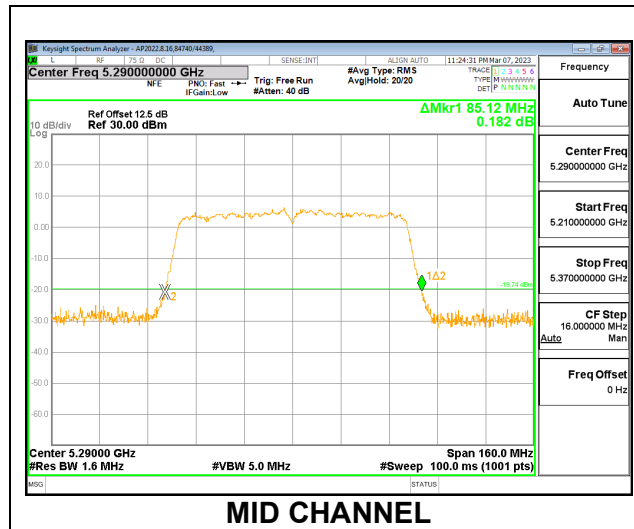
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5270	41.84
High	5310	41.76



### 9.2.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

#### 1TX Antenna 1 MODE

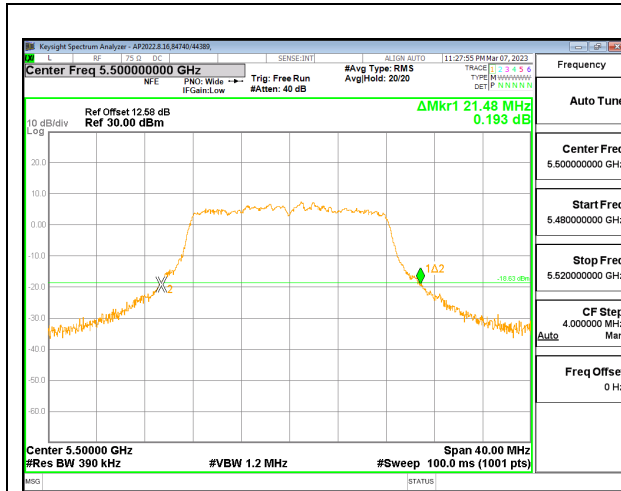
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5290	85.12



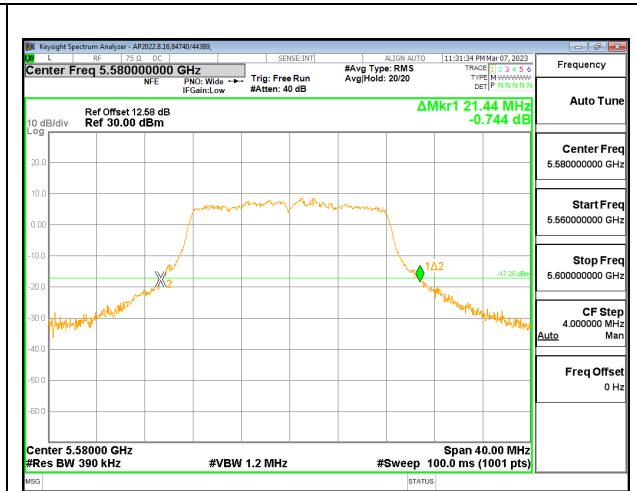
### 9.2.9. 802.11a MODE IN THE 5.6 GHz BAND

#### 1TX Antenna 1 MODE

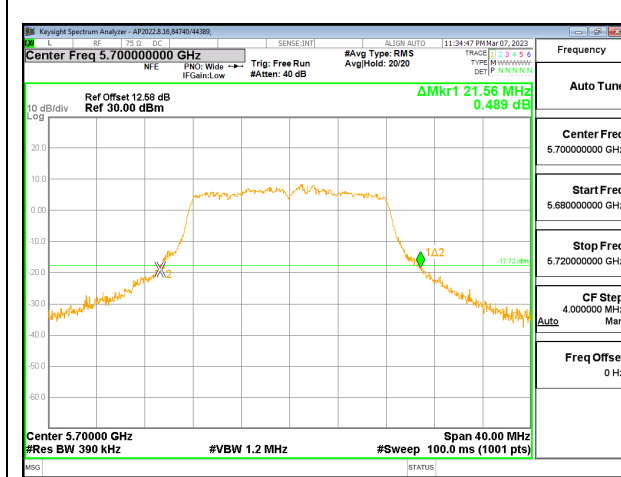
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5500	21.48
Mid	5580	21.44
High	5700	21.56
144	5720	15.64



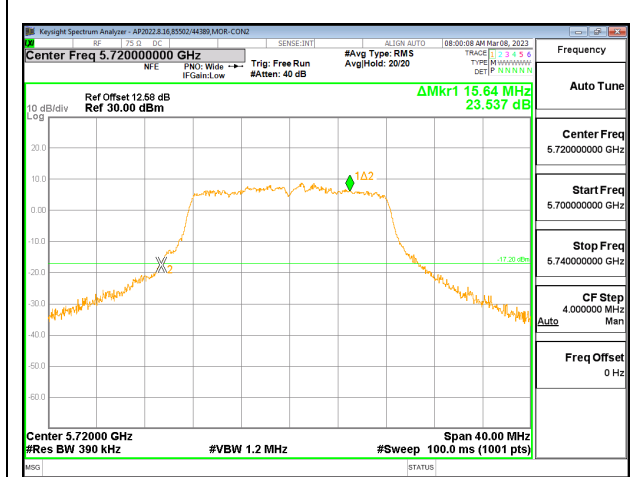
**LOW CHANNEL**



**MID CHANNEL**



**HIGH CHANNEL**

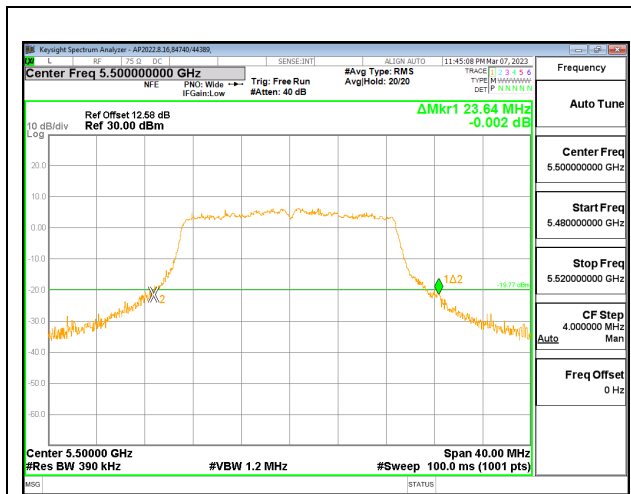


**CHANNEL 144**

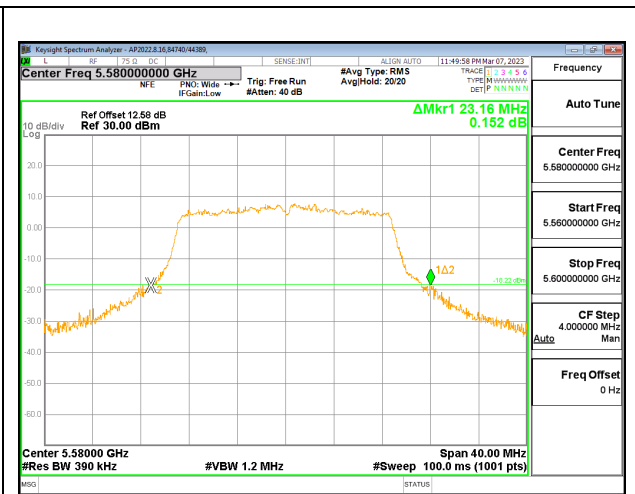
### 9.2.10. 802.11n HT20 MODE IN THE 5.6 GHz BAND

#### 1TX Antenna 1 MODE

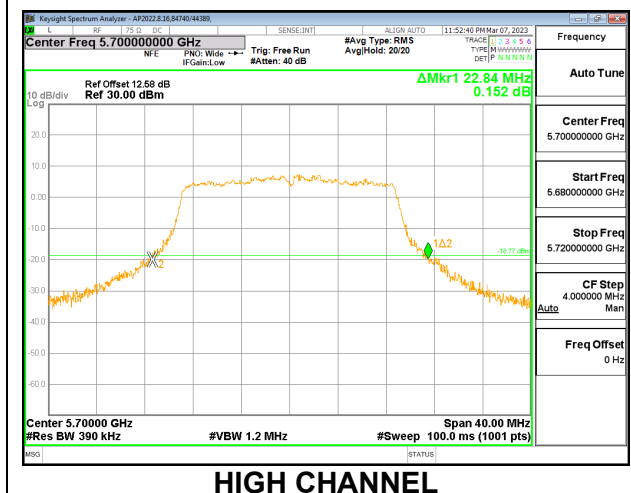
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5500	23.64
Mid	5580	23.16
High	5700	22.84
144	5720	16.30



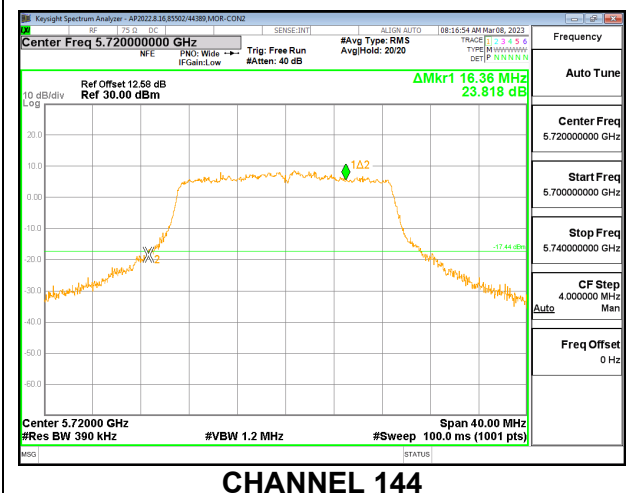
**LOW CHANNEL**



**MID CHANNEL**



**HIGH CHANNEL**

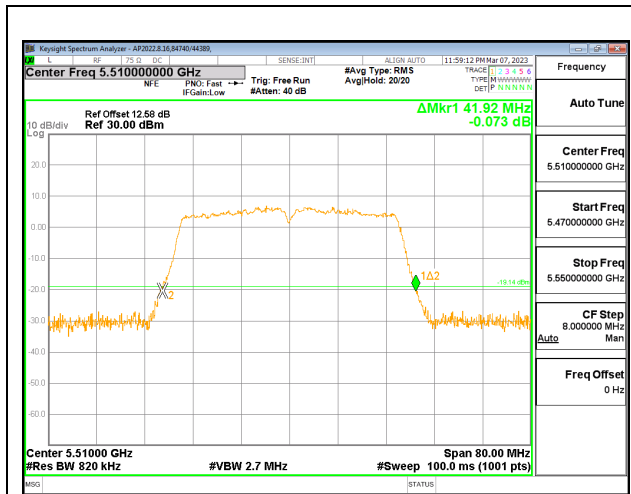


**CHANNEL 144**

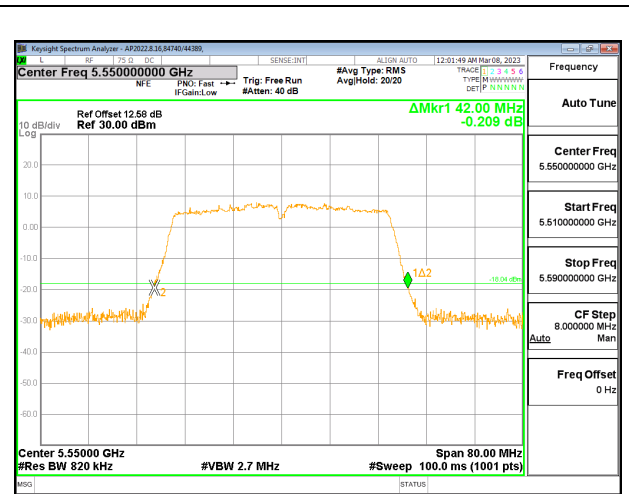
### 9.2.11. 802.11n HT40 MODE IN THE 5.6 GHz BAND

#### 1TX Antenna 1 MODE

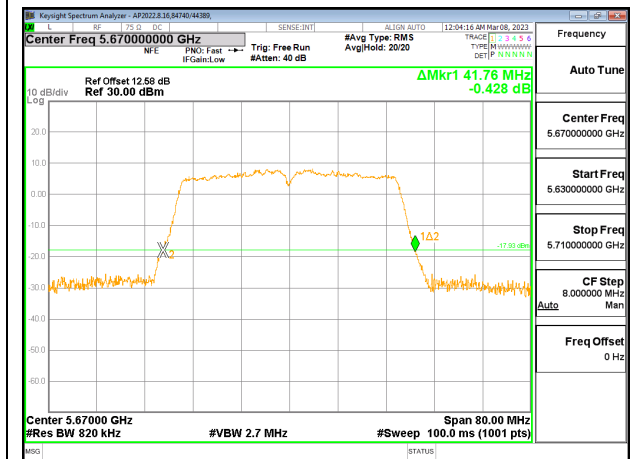
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5510	41.92
Mid	5550	42.00
High	5670	41.76
142	5710	36.12



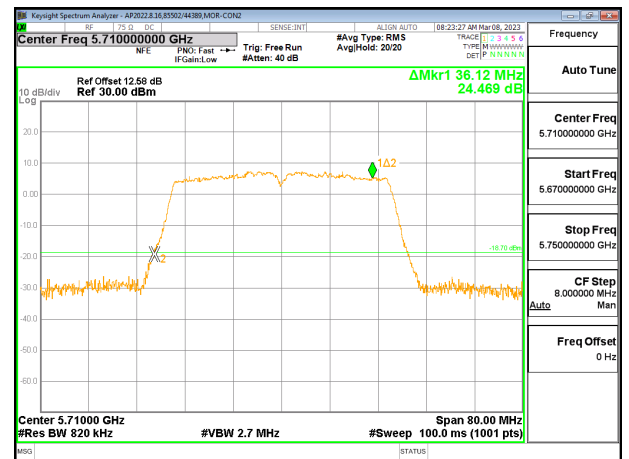
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



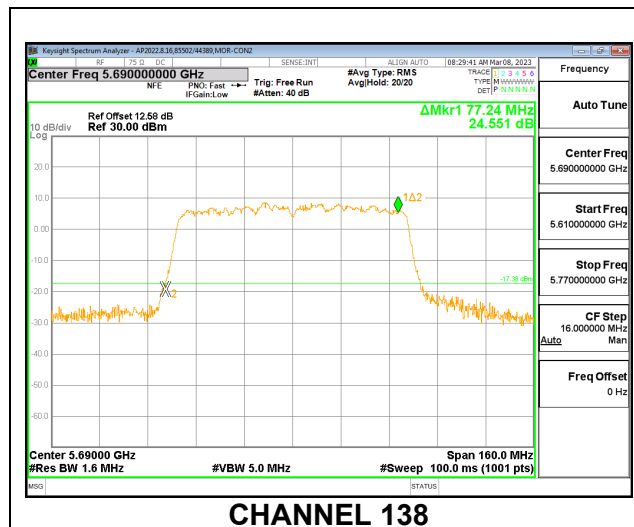
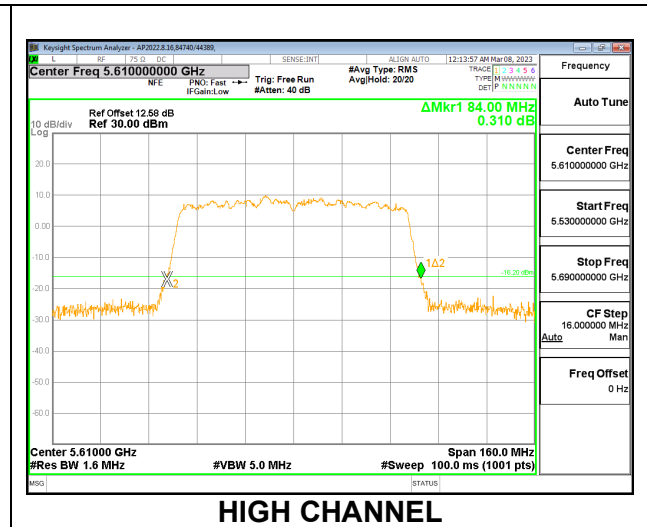
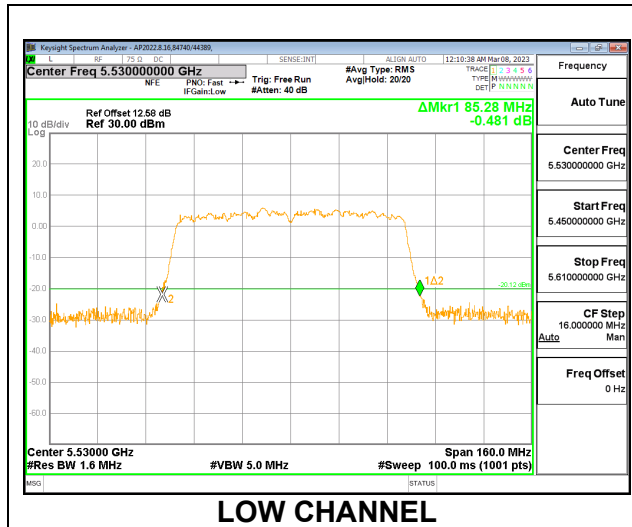
CHANNEL 142



### 9.2.12. 802.11ac VHT80 MODE IN THE 5.6 GHz BAND

#### 1TX Antenna 1 MODE

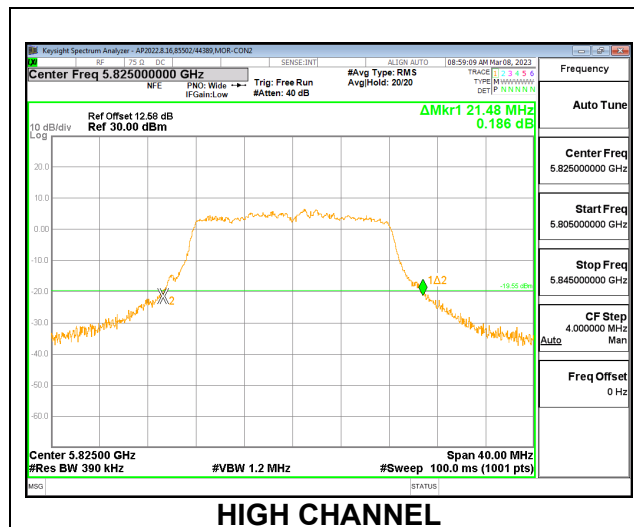
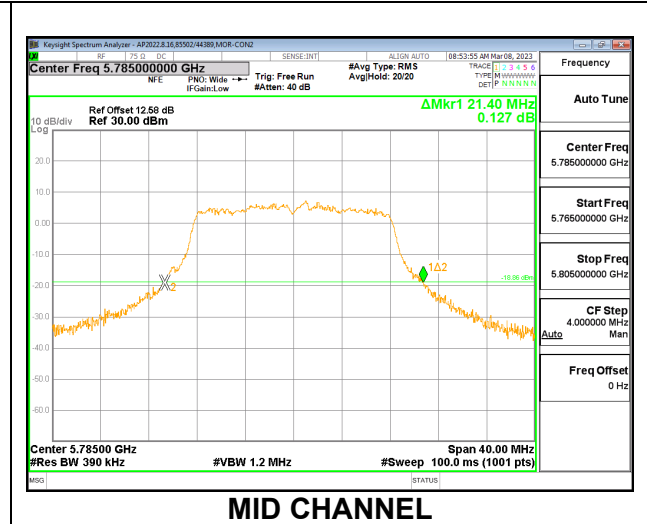
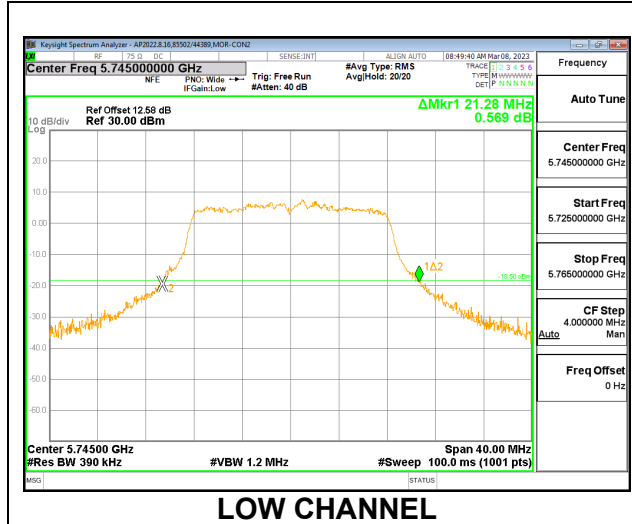
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5530	85.28
High	5610	84.00
138	5690	77.24



### 9.2.13. 802.11a MODE IN THE 5.8 GHz BAND

#### 1TX Antenna 1 MODE

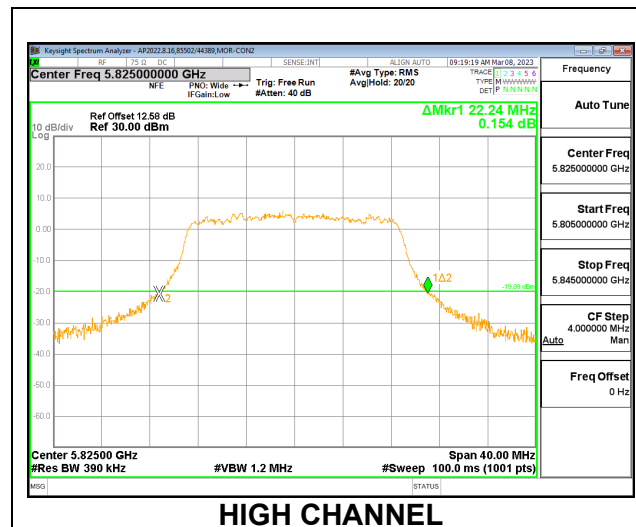
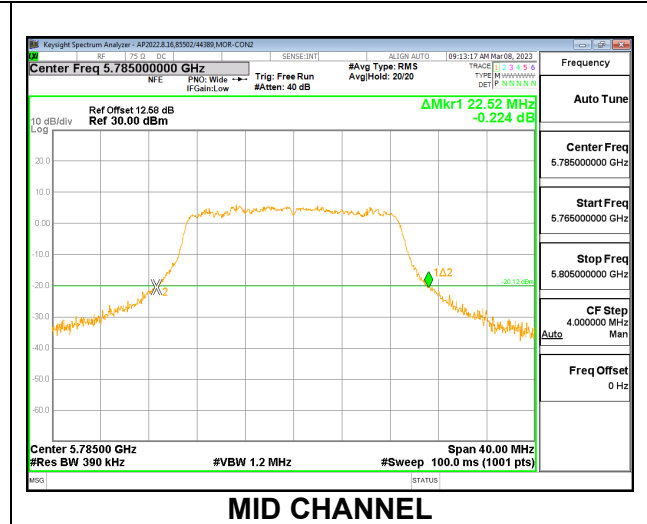
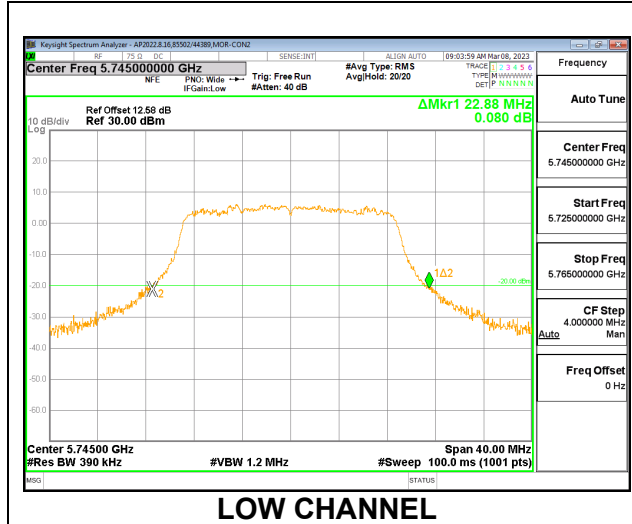
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5745	21.28
Mid	5785	21.40
High	5825	21.48



### 9.2.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

#### 1TX Antenna 1 MODE

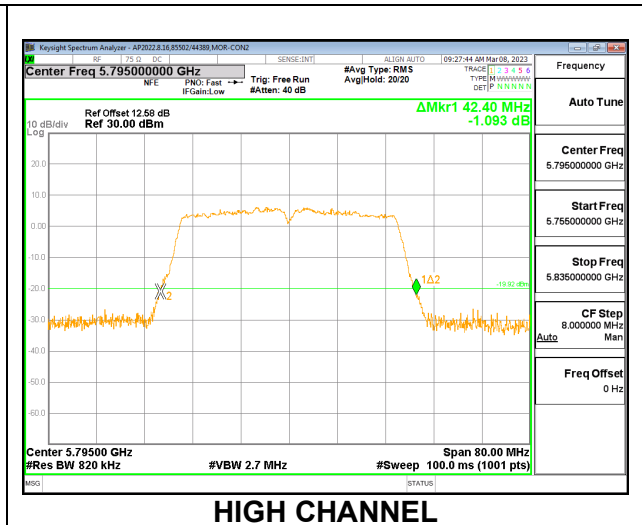
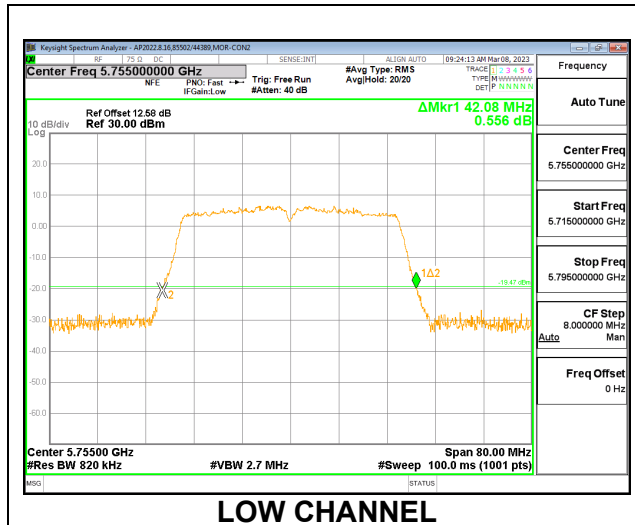
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5745	22.88
Mid	5785	22.52
High	5825	22.24



### 9.2.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

#### 1TX Antenna 1 MODE

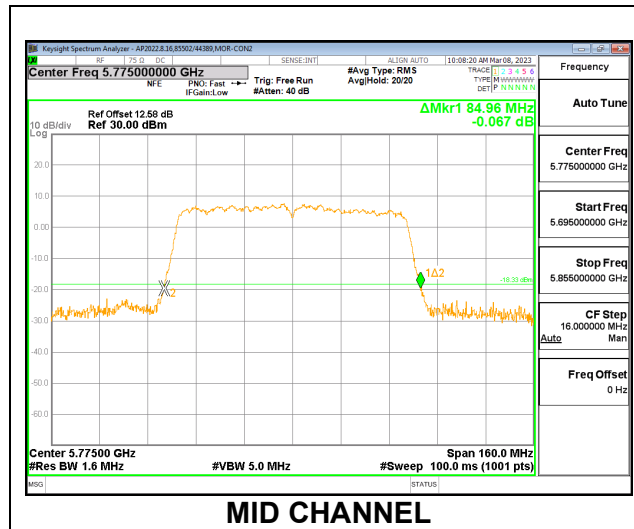
Channel	Frequency	26dB Bandwidth
	(MHz)	(MHz)
Low	5755	42.08
High	5795	42.40



### 9.2.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

#### 1TX Antenna 1 MODE

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5775	84.96



### **9.3. 99% BANDWIDTH**

#### **LIMITS**

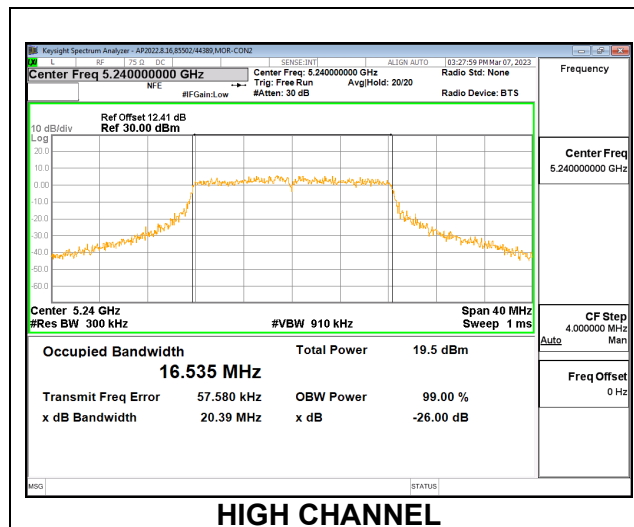
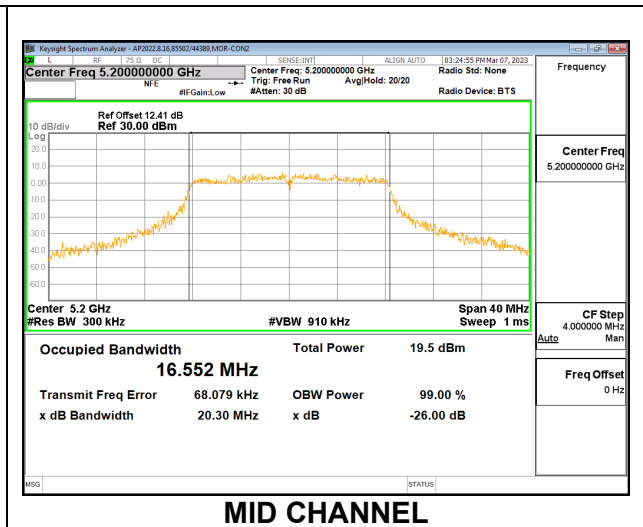
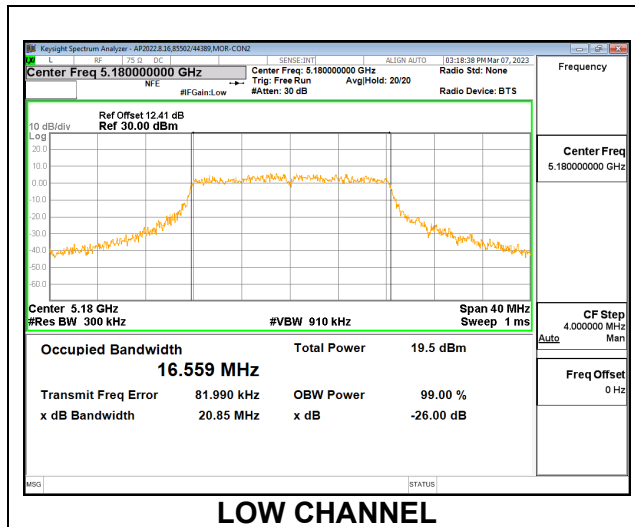
None; for reporting purposes only.

#### **RESULTS**

### 9.3.1. 802.11a MODE IN THE 5.2 GHz BAND

#### 1TX Antenna 1 MODE

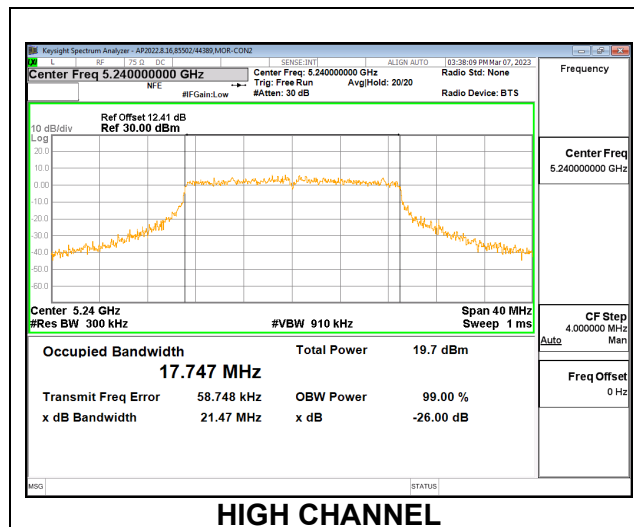
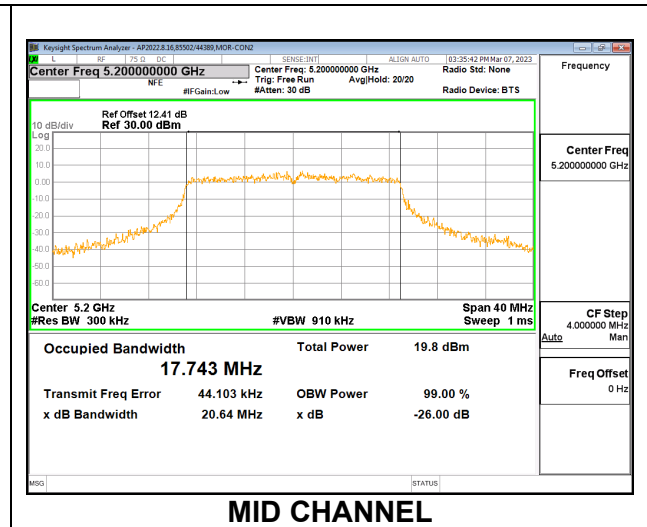
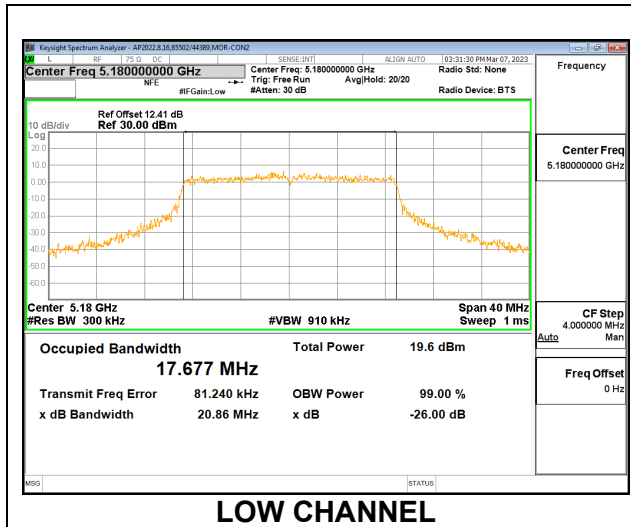
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5180	16.559
Mid	5200	16.552
High	5240	16.535



### 9.3.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

#### 1TX Antenna 1 MODE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5180	17.677
Mid	5200	17.743
High	5240	17.747

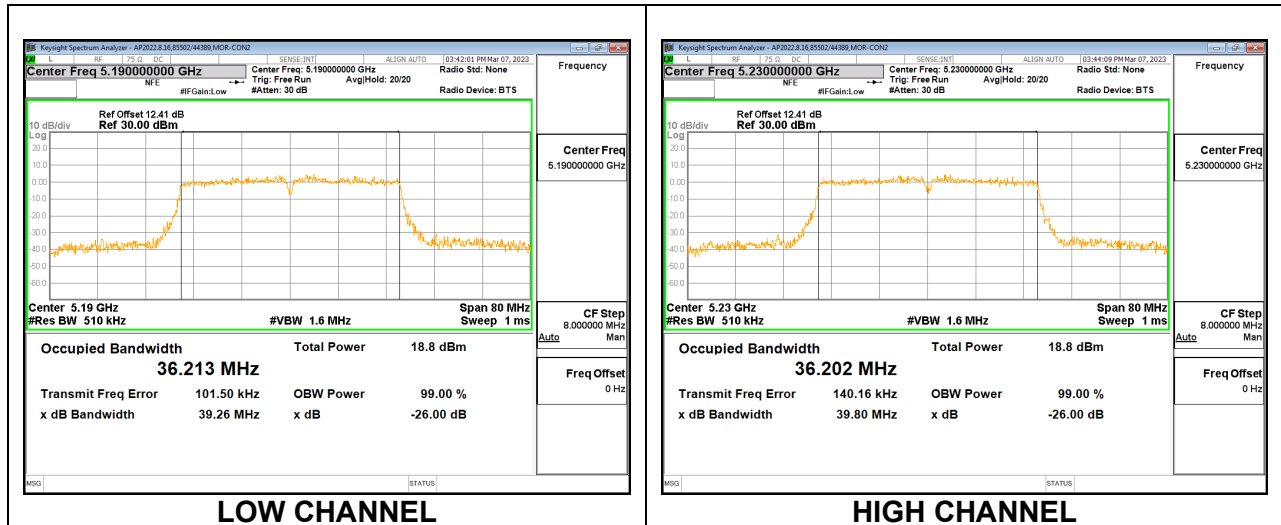




### 9.3.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

#### 1TX Antenna 1 MODE

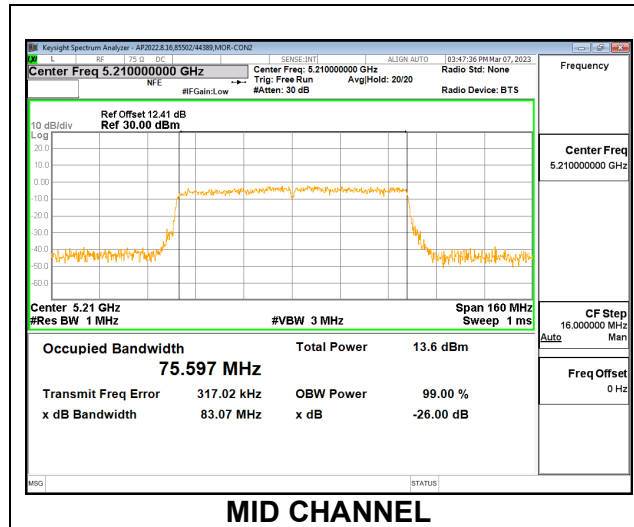
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5190	36.213
High	5230	36.202



### 9.3.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

#### 1TX Antenna 1 MODE

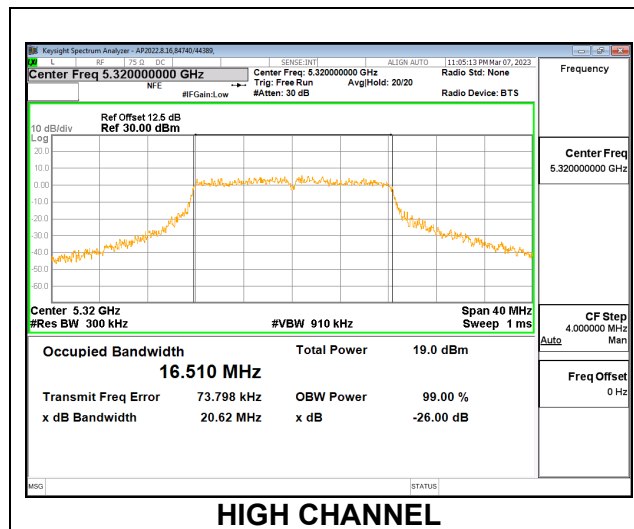
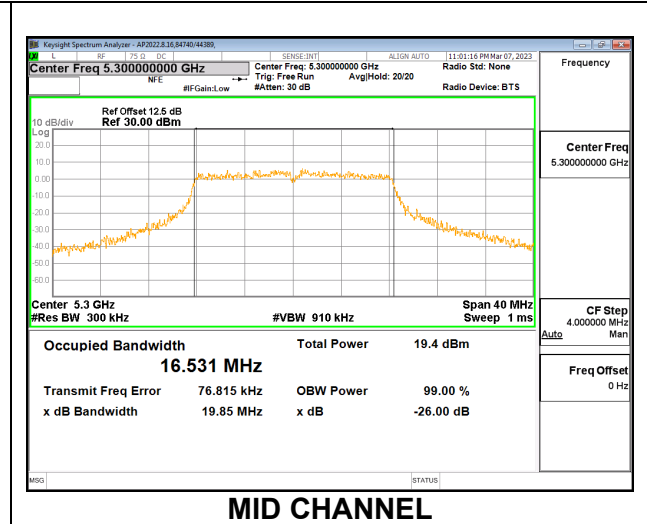
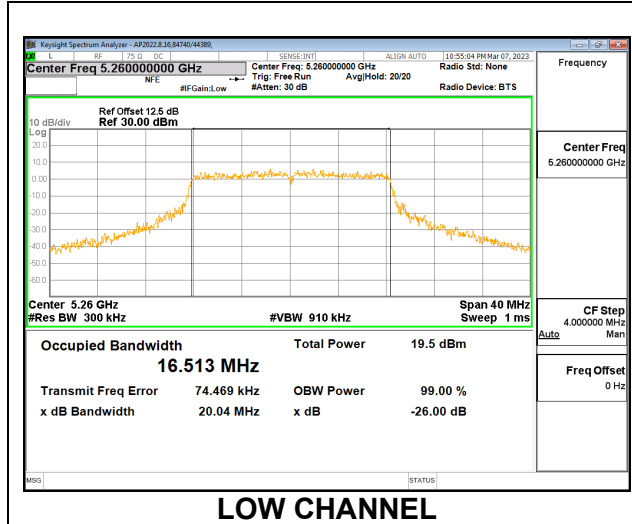
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5210	75.597



### 9.3.5. 802.11a MODE IN THE 5.3 GHz BAND

#### 1TX Antenna 1 MODE

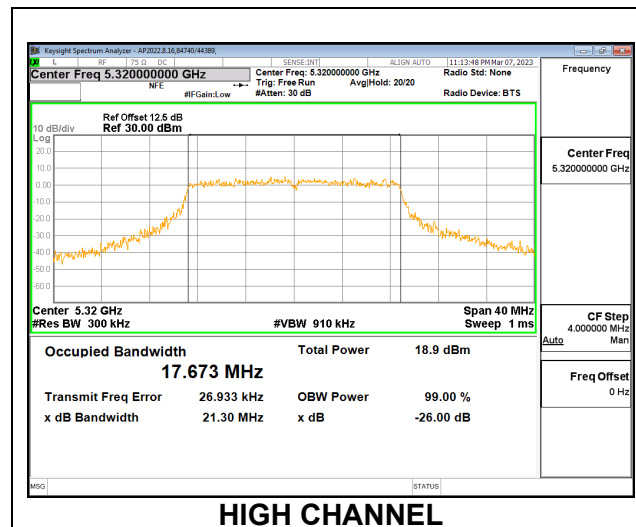
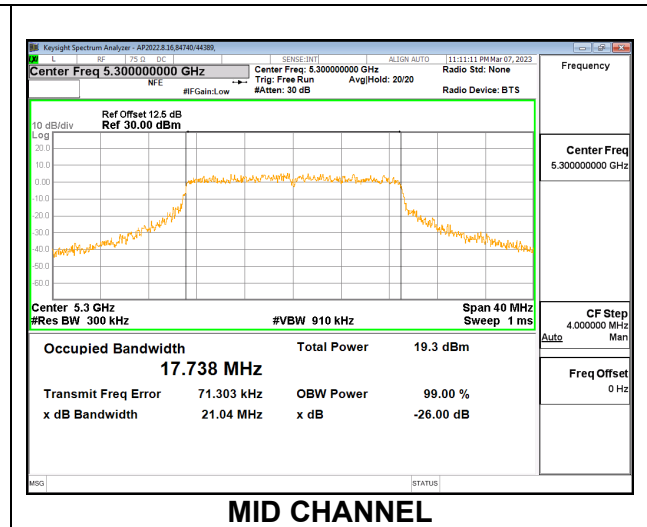
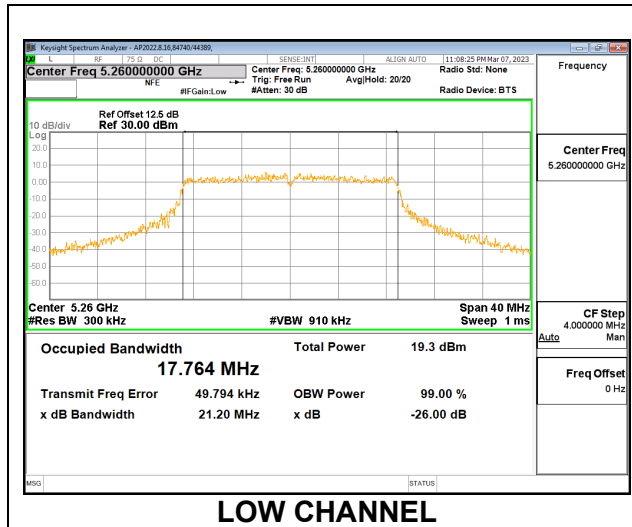
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	16.513
Mid	5300	16.531
High	5320	16.510



### 9.3.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND

#### 1TX Antenna 1 MODE

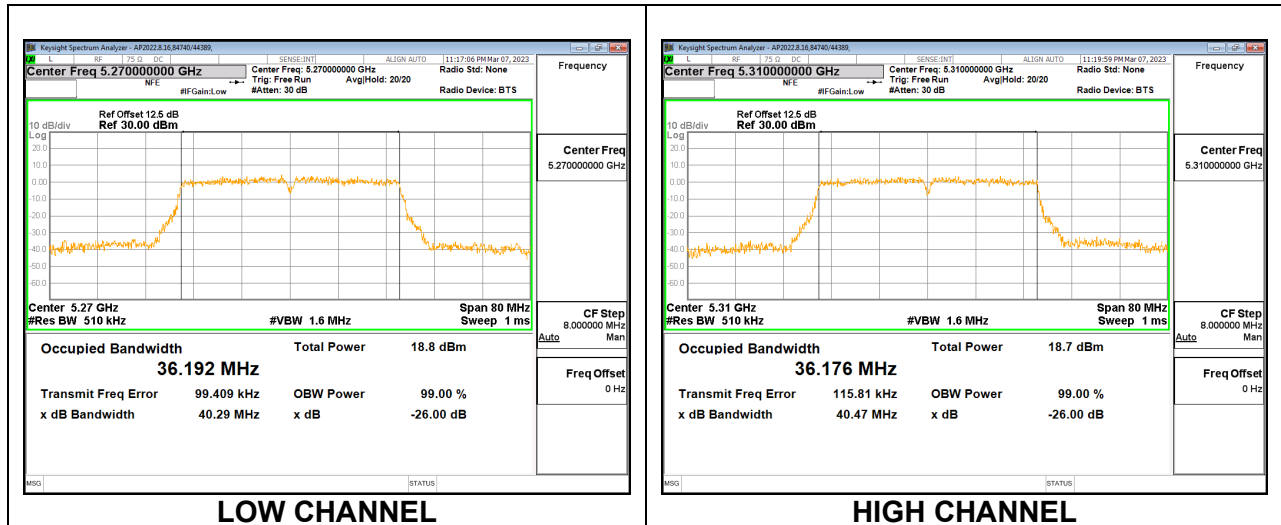
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	17.764
Mid	5300	17.738
High	5320	17.673



### 9.3.7. 802.11n HT40 MODE IN THE 5.3 GHz BAND

#### 1TX Antenna 1 MODE

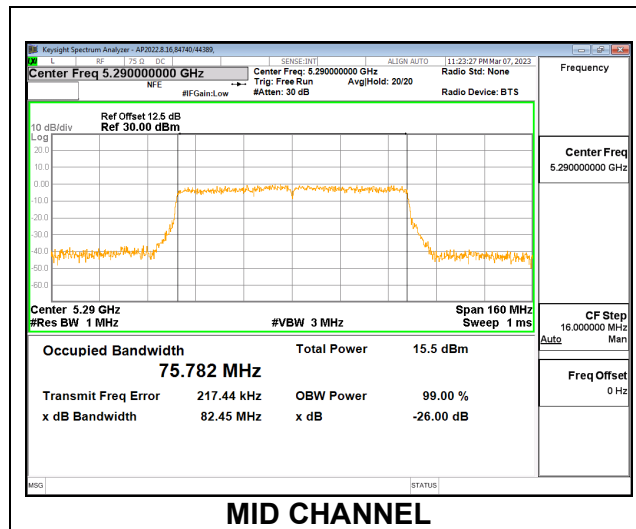
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5270	36.192
High	5310	36.176



### 9.3.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

#### 1TX Antenna 1 MODE

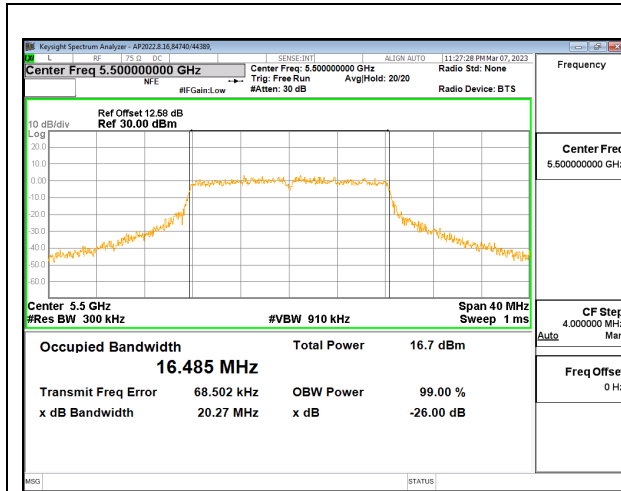
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Mid	5290	75.782



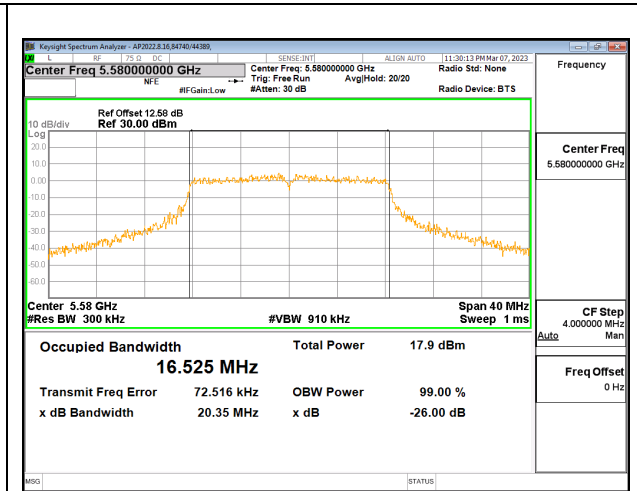
### 9.3.9. 802.11a MODE IN THE 5.6 GHz BAND

#### 1TX Antenna 1 MODE

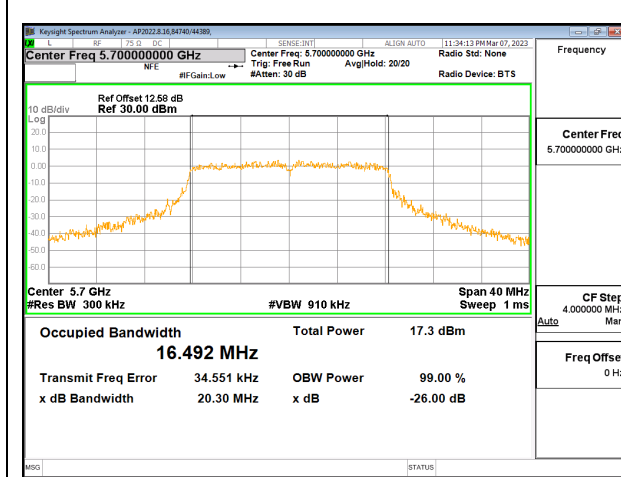
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5500	16.485
Mid	5580	16.525
High	5700	16.492
144	5720	16.528



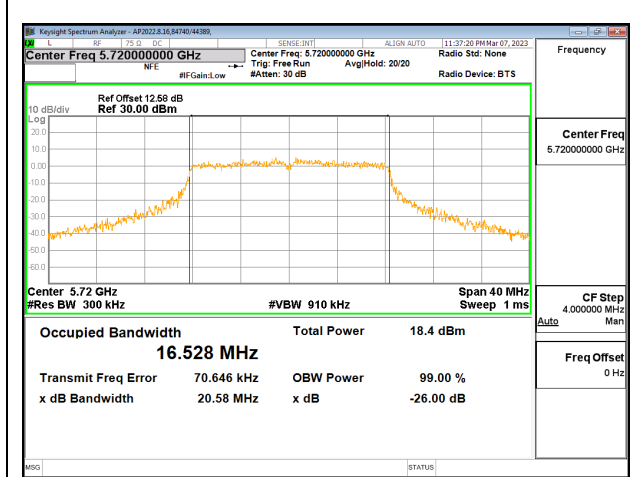
**LOW CHANNEL**



**MID CHANNEL**



**HIGH CHANNEL**

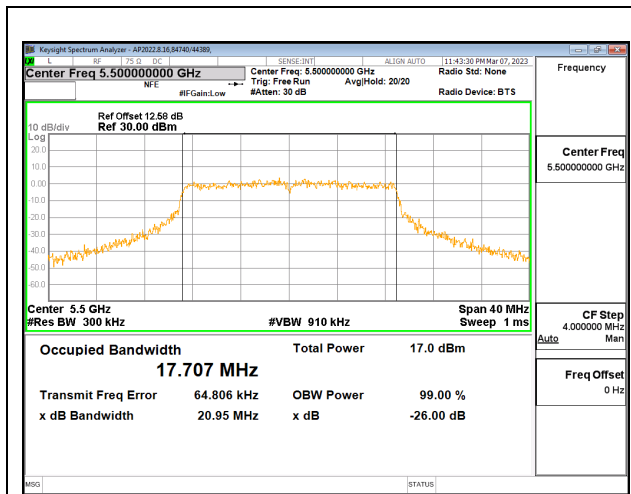


**CHANNEL 144**

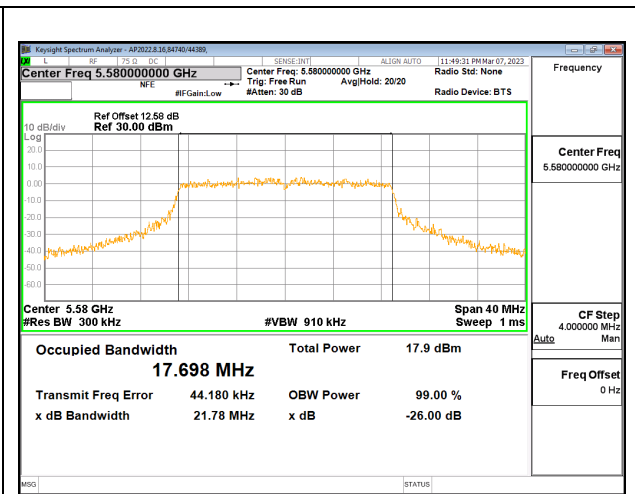
### 9.3.10. 802.11n HT20 MODE IN THE 5.6 GHz BAND

#### 1TX Antenna 1 MODE

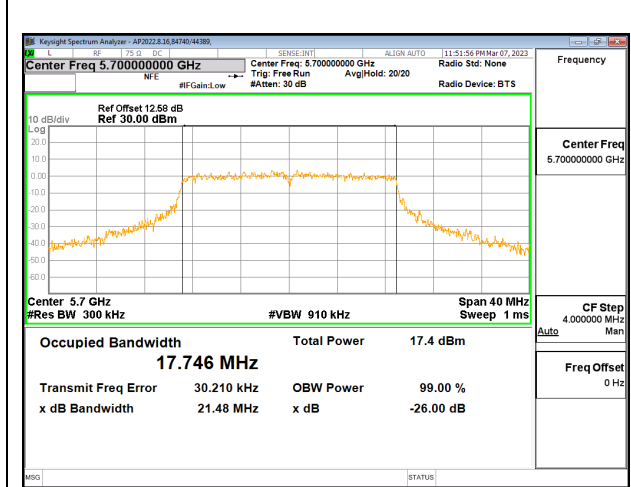
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5500	17.707
Mid	5580	17.698
High	5700	17.746
144	5720	17.696



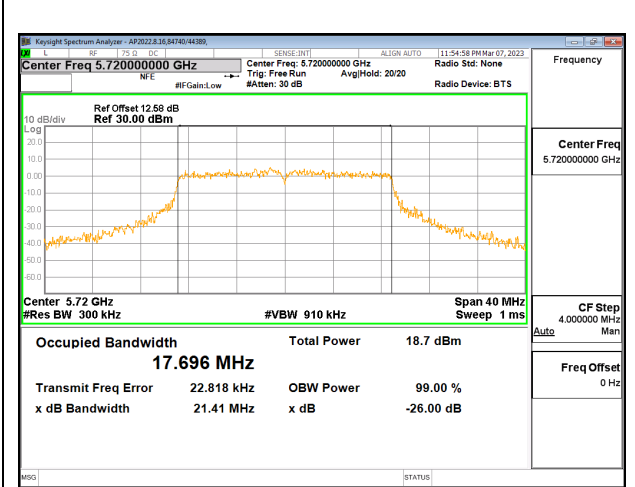
**LOW CHANNEL**



**MID CHANNEL**



**HIGH CHANNEL**



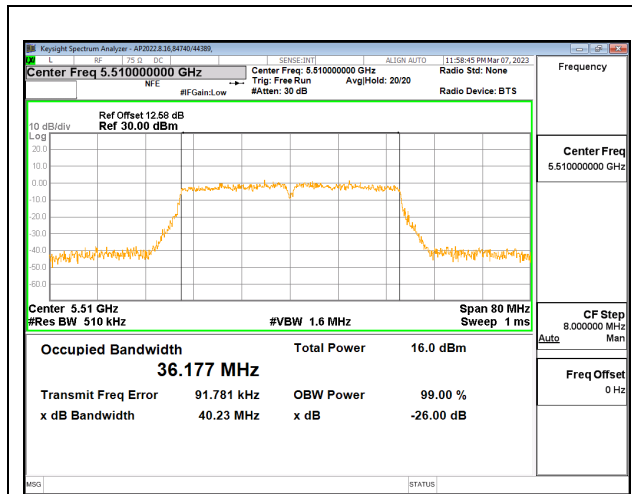
**CHANNEL 144**



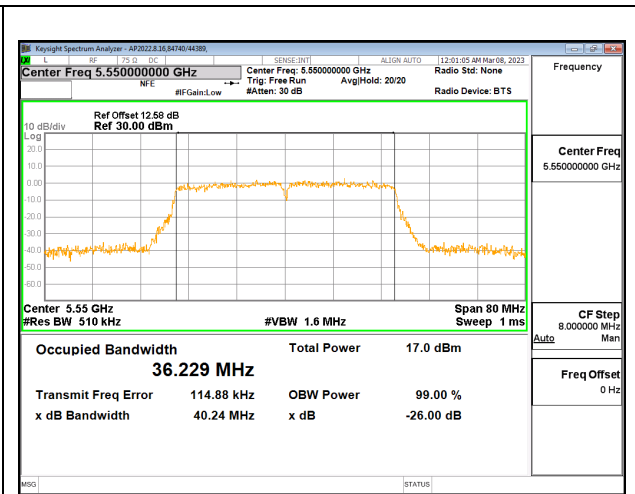
### 9.3.11. 802.11n HT40 MODE IN THE 5.6 GHz BAND

#### 1TX Antenna 1 MODE

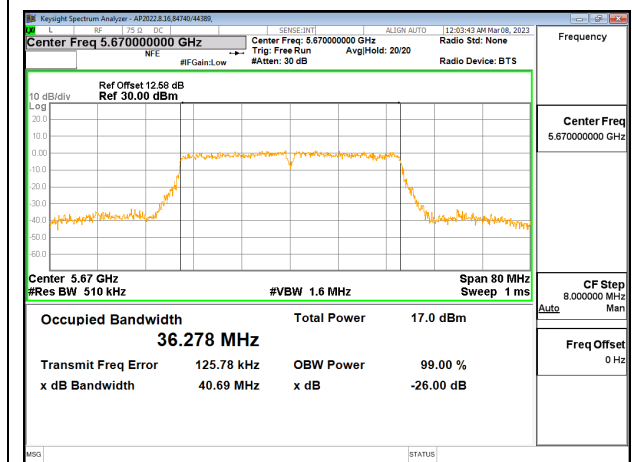
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5510	36.177
Mid	5550	36.229
High	5670	36.278
142	5710	36.212



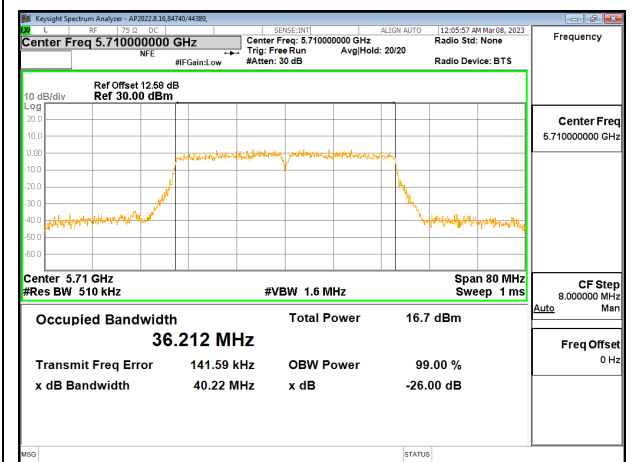
**LOW CHANNEL**



**MID CHANNEL**



**HIGH CHANNEL**



**CHANNEL 142**

### 9.3.12. 802.11ac VHT80 MODE IN THE 5.6 GHz BAND

#### 1TX Antenna 1 MODE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5530	75.850
High	5610	75.785
138	5690	75.992

