

TEST REPORT

Report Number: 15605547-E3V2

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU
SUWON-SI, GYEONGGI-DO, 16677, KOREA

Model : SM-X620

FCC ID : A3LSMX620

IC : 649E-SMX620

EUT Description : BT/BLE Tablet + DTS/UNII a/b/g/n/ac/ax and Digitizer

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 3
ISED RSS-GEN ISSUE 5 + A1 + A2

Date Of Issue:
2025-03-03

Prepared by:
UL VERIFICATION SERVICES
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888



REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2025-02-25	Initial Issue	---
V2	2025-03-03	Section 9.4.2 & 10.4 Updated	Henry Lau

REVISION HISTORY	2
1. ATTESTATION OF TEST RESULTS	5
2. TEST RESULTS SUMMARY	7
3. TEST METHODOLOGY	7
4. FACILITIES AND ACCREDITATION	7
5. DECISION RULES AND MEASUREMENT UNCERTAINTY	8
5.1. METROLOGICAL TRACEABILITY	8
5.2. DECISION RULES	8
5.3. MEASUREMENT UNCERTAINTY	8
5.4. SAMPLE CALCULATION	9
6. EQUIPMENT UNDER TEST	10
6.1. EUT DESCRIPTION	10
6.2. MAXIMUM OUTPUT POWER	10
6.3. DESCRIPTION OF AVAILABLE ANTENNAS AND CABLE LOSS	10
6.4. WORST-CASE CONFIGURATION AND MODE	11
6.5. DESCRIPTION OF TEST SETUP	12
7. MEASUREMENT METHOD	14
8. TEST AND MEASUREMENT EQUIPMENT	15
9. ANTENNA PORT TEST RESULTS	16
9.1. ON TIME AND DUTY CYCLE	16
9.2. 99% BANDWIDTH	17
9.2.1. 802.11b MODE	18
9.2.2. 802.11g MODE	20
9.2.3. 802.11n HT20 MODE	22
9.3. 6 dB BANDWIDTH	24
9.3.1. 802.11b MODE	24
9.3.2. 802.11g MODE	27
9.3.3. 802.11n HT20 MODE	29
9.4. OUTPUT POWER	31
9.4.1. 802.11b MODE	33
9.4.2. 802.11g MODE	34
9.4.3. 802.11n HT20 MODE	35
9.5. POWER SPECTRAL DENSITY	36
9.5.1. 802.11b MODE	37
9.5.2. 802.11g MODE	39
9.5.3. 802.11n HT20 MODE	41

9.6.	CONDUCTED SPURIOUS EMISSIONS	43
9.6.1.	802.11b MODE	44
9.6.2.	802.11g MODE	48
9.6.3.	802.11n HT20 MODE	52
10.	RADIATED TEST RESULTS	56
10.1.	TRANSMITTER ABOVE 1 GHz	58
10.1.1.	TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND	58
10.1.2.	TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND	76
10.1.3.	TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND	98
10.2.	WORST CASE BELOW 30MHz	120
10.3.	WORST CASE BELOW 1 GHz	122
10.4.	WORST CASE 18-26 GHz	124
11.	AC POWER LINE CONDUCTED EMISSIONS	126
12.	SETUP PHOTOS	129

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU
SUWON-SI, GYEONGGI-DO, 16677, KOREA

EUT DESCRIPTION: BT/BLE Tablet + DTS/UNII a/b/g/n/ac/ax and Digitizer

MODEL: SM-X620

SERIAL NUMBER: Conducted: R32XC0045HM;
Radiated: R32XC0045X8

SAMPLE RECEIPT DATE: 2024-12-13

DATE TESTED: 2024-12-19 TO 2025-02-17

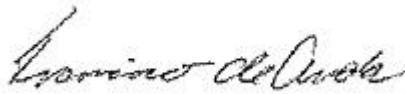
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 3	Complies
ISED RSS-GEN Issue 5 + A1 + A2	Complies

UL Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document.

Approved & Released For
UL Verification Services Inc. By:



Francisco de Anda
Staff Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Gerardo Abrego
Senior Test Engineer
Consumer Technology Division
UL Verification Services Inc.

Reviewed By:



Henry Lau
Senior Project Engineer
Consumer Technology Division
UL Verification Services Inc.

2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for correctly integrating customer-provided data with measurements performed by UL Verification Services Inc.

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 6.3)

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW		None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power		None.
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD		None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions		None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions		None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions		None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with

- FCC CFR 47 Part 2
- FCC CFR 47 Part 15C
- ANSI C63.10-2020
- KDB 558074 D01 15.247 Meas Guidance
- KDB 662911 Measurement of Transmitters with Multiple Output, MIMO
- KDB 414788 D01 Radiated Test Site
- RSS-GEN Issue 5 + A1 + A2
- RSS-247 Issue 3

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☐	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☐	Building 3: 843 Auburn Court, Fremont, CA 94538, USA			
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA			
☐	Building 5: 47670 Kato Rd, Fremont, CA 94538, USA			

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)	141.16 Hz
Occupied Bandwidth	1.22%
Power Spectral Density	2.47 dB
RF Power Measurement Direct Method Using Power Meter	1.3 dB (PK) / 0.45 dB (AV)
Unwanted Emissions, Conducted	1.94 dB
Worst Case Conducted Disturbance, 9kHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9kHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Time Domain Measurements	3.39%
Temperature	0.57°C
Relative Humidity	3.39%
DC Supply Voltages	0.57%

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable
Loss (dB) – Preamp Gain (dB)

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) +
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 BT/BLE Tablet + DTS/UNII a/b/g/n/ac/ax and Digitizer.

This test report addresses the DTS operational legacy modes.

6.2. MAXIMUM OUTPUT POWER

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

2.4GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2Tx			
2412 - 2472	802.11b	20.81	120.50
	802.11g	19.26	84.33
	802.11n HT20 CDD	19.32	85.51

6.3. DESCRIPTION OF AVAILABLE ANTENNAS AND CABLE LOSS

The antenna(s) gain, type and cable loss, are provided by the manufacturer.

Frequency Band (GHz)	Antenna Type	Antenna 1	Antenna 2
		Antenna Gain (dBi)	Antenna Gain (dBi)
2412-2472	Internal	-3.7	-3.5

Cable loss: 0.7dB.

6.4. 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 output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

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

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

802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11n HT20 mode: MCS0

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

SUPPORT TEST EQUIPMENT				
Description	Manufacturer	Model	Serial Number	FCC ID/ DoC
AC Adapter	Samsung	EP-TA800	R37WBAA004BDKA	N/A

I/O CABLES

I/O CABLES (RF CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	SMA Cable	1	SMA	Shielded	1.0	Conducted Switch Box to Spectrum Analyzer
2	Antenna	2	RF	Unshielded	0.2	EUT to Coax cable
3	SMA Cable	2	SMA	Shielded	1.0	Coax Cable to Conducted Switch Box
4	USB-C	1	USB-C	Shielded	1	EUT to AC/DC adapter

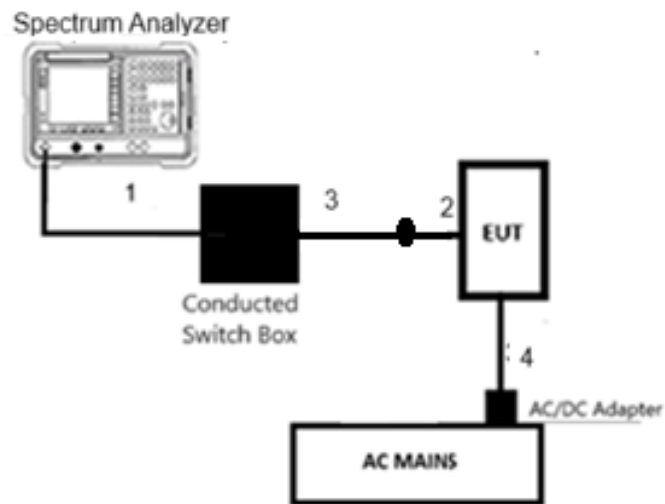
I/O CABLES (RF RADIATED and AC LINE CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB-C	1	USB-C	Shielded	1	EUT to AC/DC Adapter

TEST SETUP

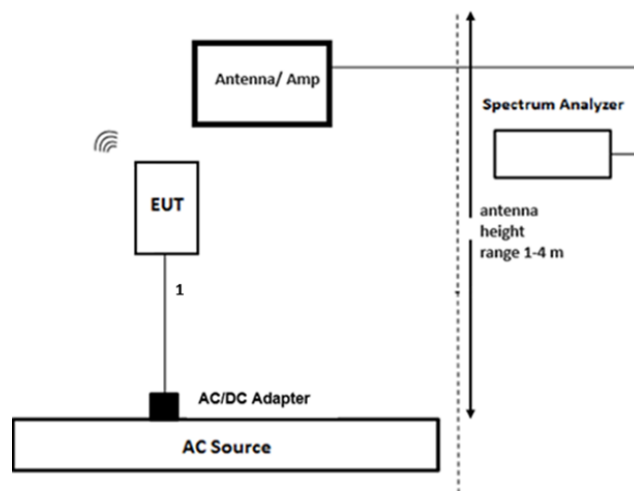
The EUT is a stand-alone device configured and tested in a worst-case setup. Worst case is using Y orientation with ACDC charger attached to the EUT. Test software exercised the radio card.

SETUP DIAGRAM

Conducted Configuration



Radiated Configuration/AC Line



7. MEASUREMENT METHOD

Test Item	Test Method
On Time and Duty Cycle	ANSI C63.10 Section 11.6
6 dB BW	ANSI C63.10 Subclause -11.8.1 RBW $\geq$ DTS BW
Output Power	ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)
PSD	ANSI C63.10 Subclause -11.10.5 Method AVGPSD-2
Radiated emissions non-restricted frequency bands	ANSI C63.10 Subclause -11.11
Radiated emissions restricted frequency bands	ANSI C63.10 Subclause -11.12.1
Conducted emissions in restricted frequency bands	ANSI C63.10 Subclause -11.12.2
Band-edge	ANSI C63.10 Subclause -11.12.2.4 Peak Detection, Subclause 11.12.2.5.2 Trace averaging across ON and OFF times DC correction
Radiated Spurious Emissions Below 30MHz	ANSI C63.10 Subclause 6.4
AC Power Line Conducted Emissions	ANSI C63.10, Subclause 6.2

8. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	219908	2025-05-31	2023-05-31
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	219910	2025-05-31	2023-05-31
Antenna, Broadband Hybrid, 30MHz to 1000MHz	Sunol Sciences Corp.	JB1	80293	2025-04-30	2023-04-11
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	170647	2025-03-31	2024-03-25
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	80707	2025-06-30	2024-06-07
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	79834	2025-07-31	2024-07-09
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	222740	2026-09-03	2024-09-23
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	206808	2026-04-30	2024-04-23
RF Filter Box, 1-18GHz	UL-FR1	n/a	171875	2025-03-31	2024-03-23
RF Filter Box, 1-18GHz	UL-FR1	SAC 8 port rf box 1	237579	2025-10-31	2024-10-03
RF Filter Box, 1-18GHz	UL-FR1	n/a	171389	2025-03-31	2024-03-15
RF Filter Box, 1-18GHz	UL-FR1	SAC 8 port rf box 1	197920	2025-03-31	2024-03-30
EMI TEST RECEIVER, with B8 option	Rohde & Schwarz	ESW44	245268	2025-02-28	2024-02-15
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169935	2025-02-28	2024-02-11
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201497	2025-02-28	2024-02-11
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	225688	2025-02-28	2024-02-11
Antenna, Horn 18 to 26.5GHz	A.R.A.	MWH-1826/B	199658	2025-02-28	2024-02-02
Amplifier 18-26.5GHz, +5Vdc, -54dBm P1dB	AMPLICAL	AMP18G26.5-60	234683	2025-05-31	2024-05-13
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	80396	2025-02-28	2024-02-21
Conducted Switch Box	N/A	CSB	245774	2025-05-31	2024-05-16
Power Meter, P-series single channel	Keysight Technologies Inc	N1921A	90391	2025-06-30	2024-06-17
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1911A	90754	2025-01-31*	2024-01-25
AC Line Conducted					
LISN	Fischer Custom Communications, Inc	FCC-LISN-50/250-25-2-01-480V	175765	2026-01-31	2025-01-28
EMI TEST RECEIVER	Rohde & Schwarz	ESR	171646	2025-02-28	2024-02-27
Transient Limiter	TE	TBFL1	207996	2025-09-30	2024-09-24
TEST SOFTWARE					
Description	Manufacturer	Model	Version		
Radiated Software	UL	UL EMC	Ver 2018-06-15, 2023-05-01, 2024-08-15		
Conducted Software	UL	UL EMC	Ver 2022-08-16		
AC Line Conducted Software	UL	UL EMC	Rev 9.5, 2023-03		

*Tests performed within cal date.

9.2. 99% BANDWIDTH

LIMITS

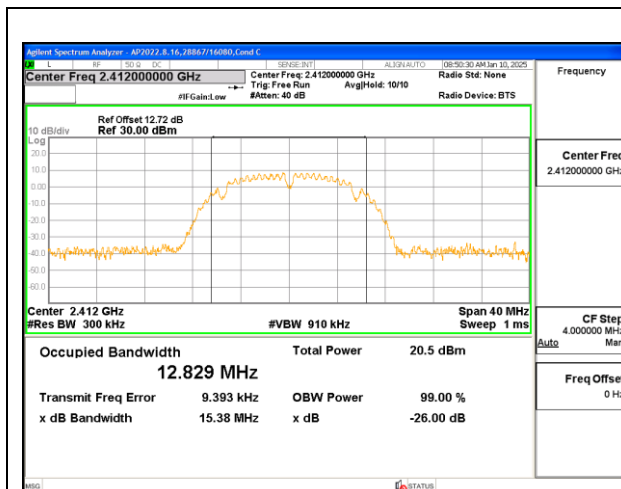
None; for reporting purposes only.

RESULTS

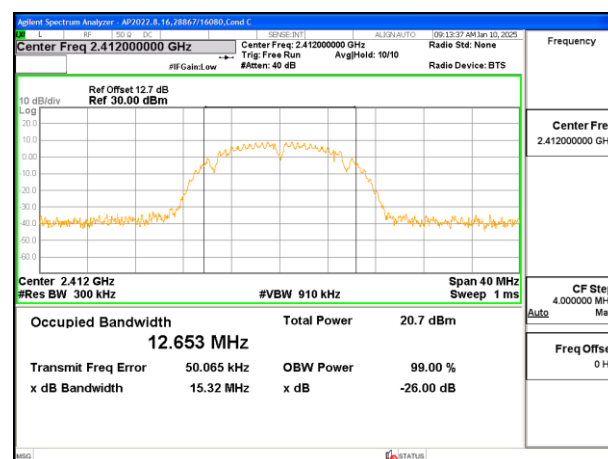
9.2.1. 802.11b MODE

2TX Antenna 1 + Antenna 2 CDD MODE

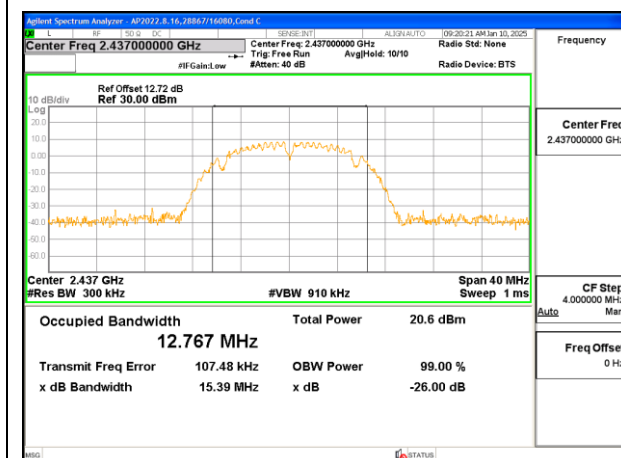
Channel	Frequency (MHz)	99% Bandwidth (MHz) ANT 1	99% Bandwidth (MHz) ANT 2
Low	2412	12.829	12.653
Mid	2437	12.767	12.913
High 11	2462	12.819	12.711
High 12	2467	13.778	13.715
High 13	2472	13.776	13.822



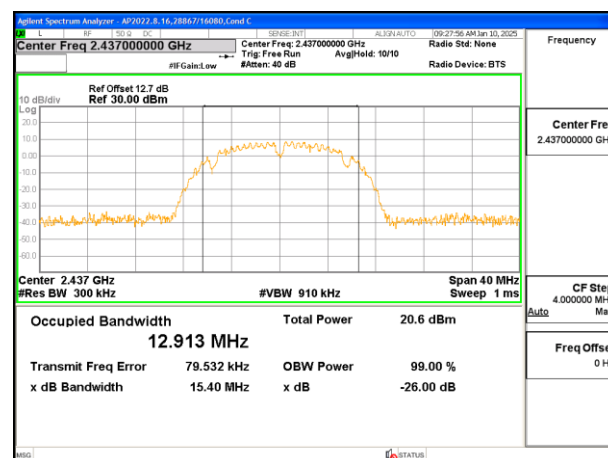
LOW CHANNEL 1 ANTENNA 1



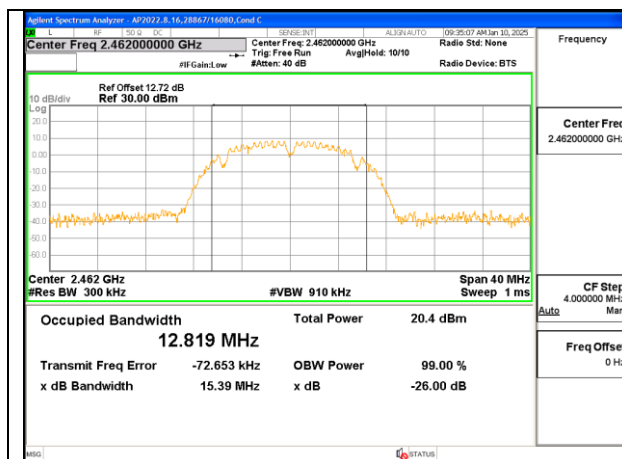
LOW CHANNEL 1 ANTENNA 2



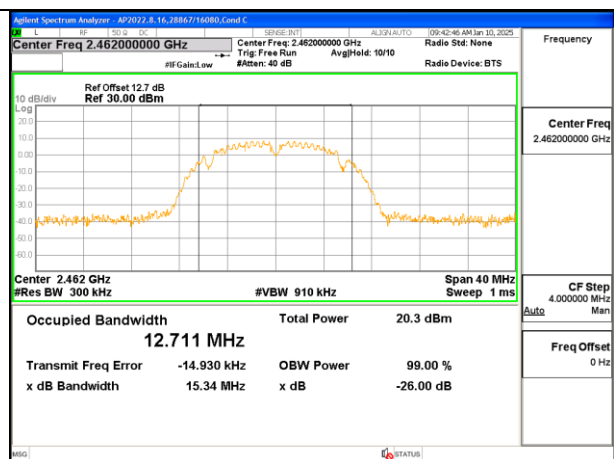
MID CHANNEL 6 ANTENNA 1



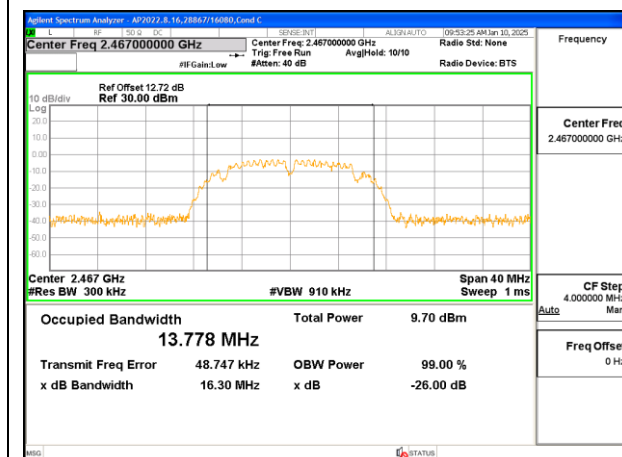
MID CHANNEL 6 ANTENNA 2



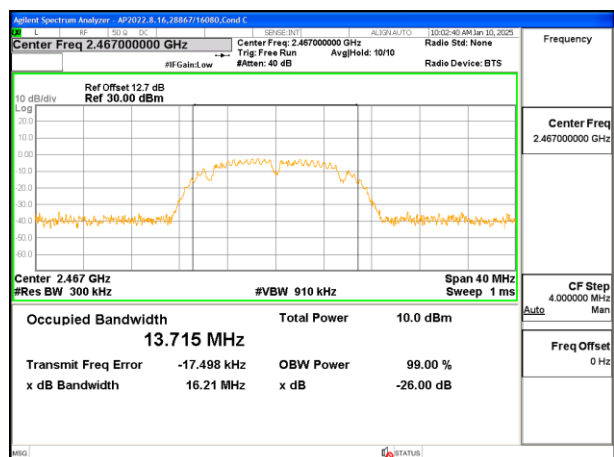
HIGH CHANNEL 11 ANTENNA 1



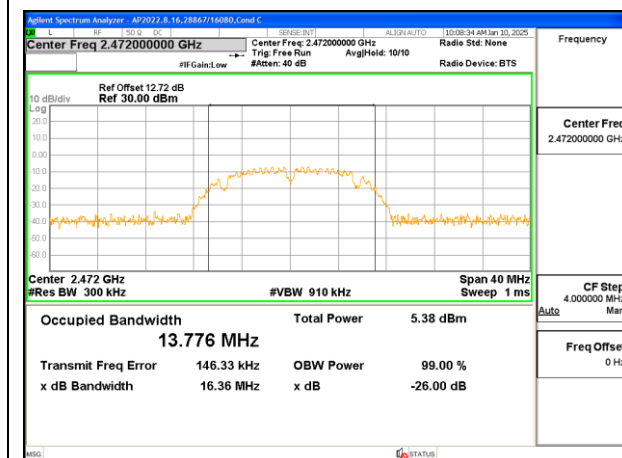
HIGH CHANNEL 11 ANTENNA 2



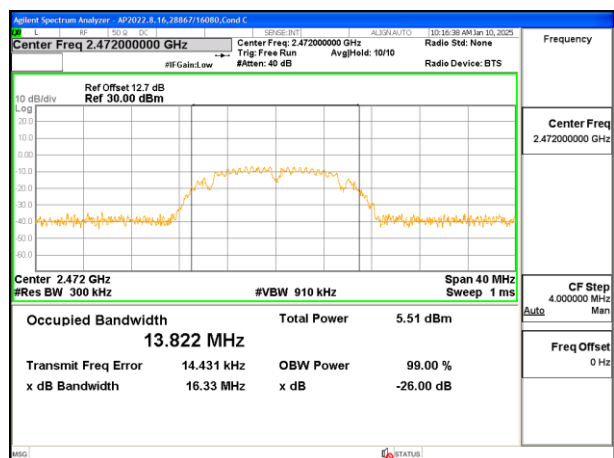
HIGH CHANNEL 12 ANTENNA 1



HIGH CHANNEL 12 ANTENNA 2



HIGH CHANNEL 13 ANTENNA 1

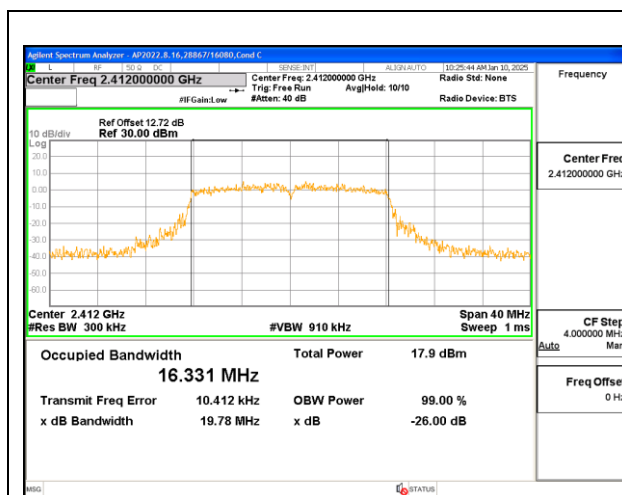


HIGH CHANNEL 13 ANTENNA 2

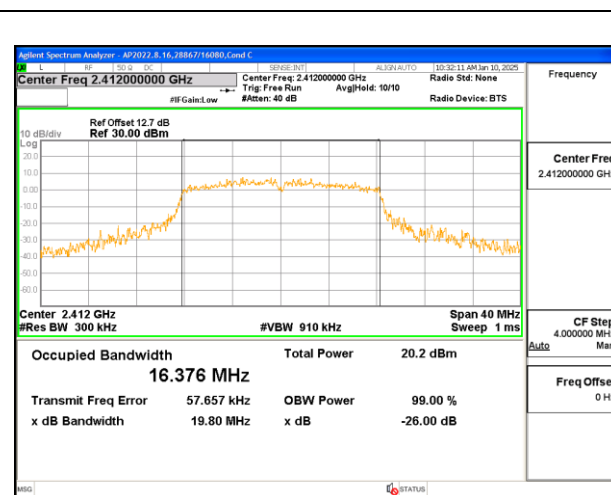
9.2.2. 802.11g MODE

2TX Antenna 1 + Antenna 2 CDD MODE

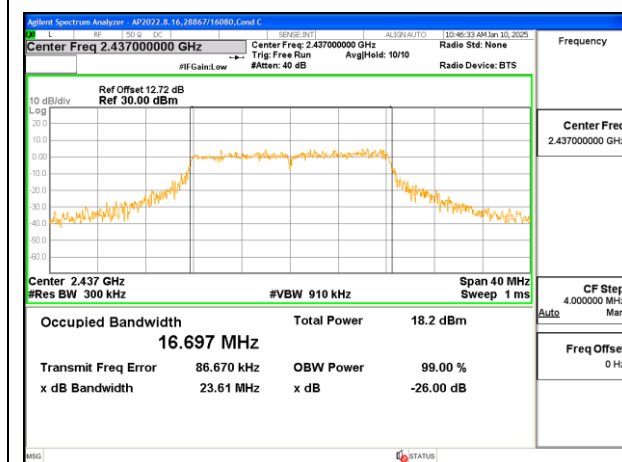
Channel	Frequency (MHz)	99% Bandwidth (MHz) ANT 1	99% Bandwidth (MHz) ANT 2
Low	2412	16.331	16.376
Mid	2437	16.697	16.739
High 11	2462	16.381	16.364
High 12	2467	16.435	16.402
High 13	2472	16.520	16.521



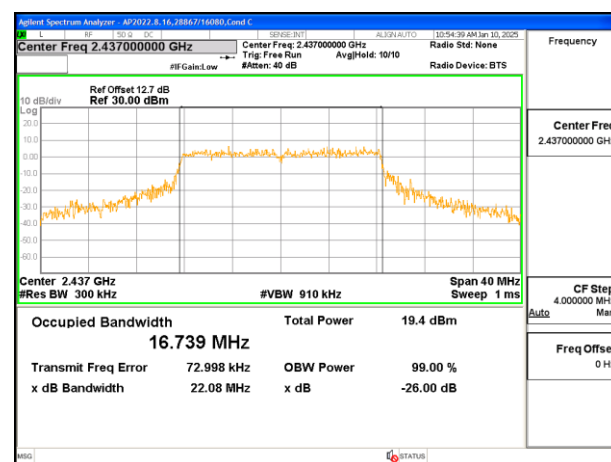
LOW CHANNEL 1 ANTENNA 1



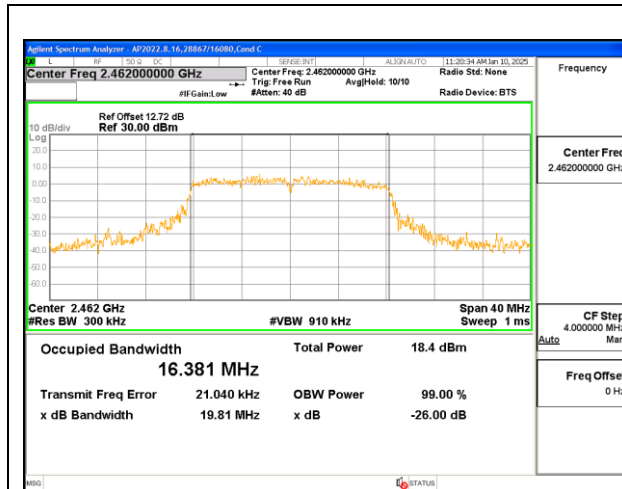
LOW CHANNEL 1 ANTENNA 2



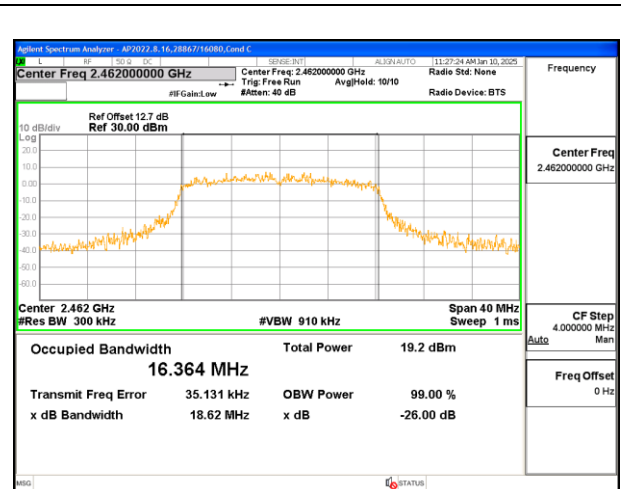
MID CHANNEL 6 ANTENNA 1



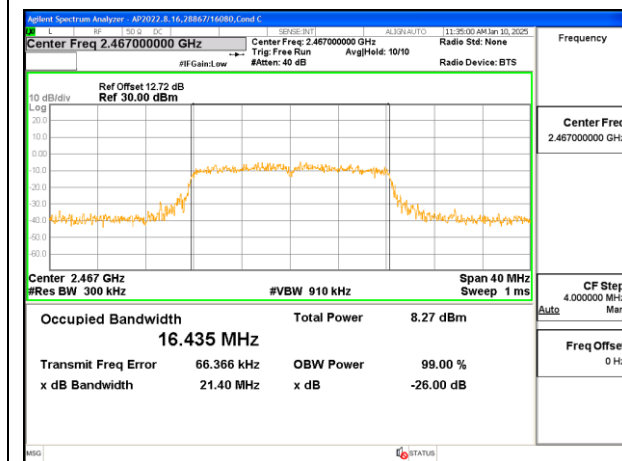
MID CHANNEL 6 ANTENNA 2



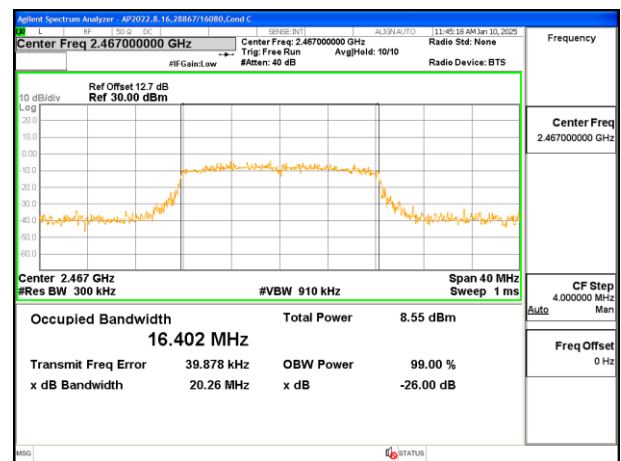
HIGH CHANNEL 11 ANTENNA 1



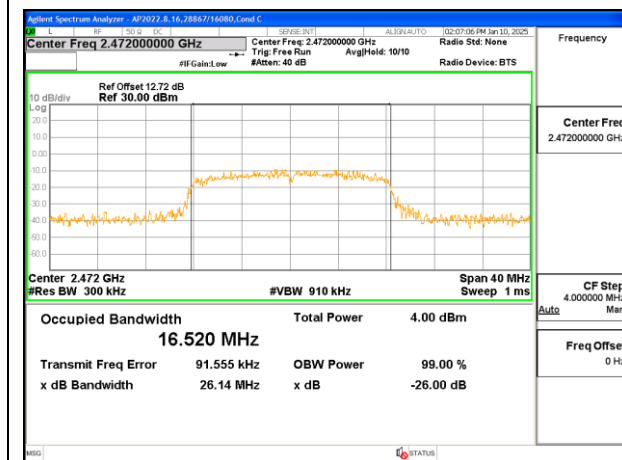
HIGH CHANNEL 11 ANTENNA 2



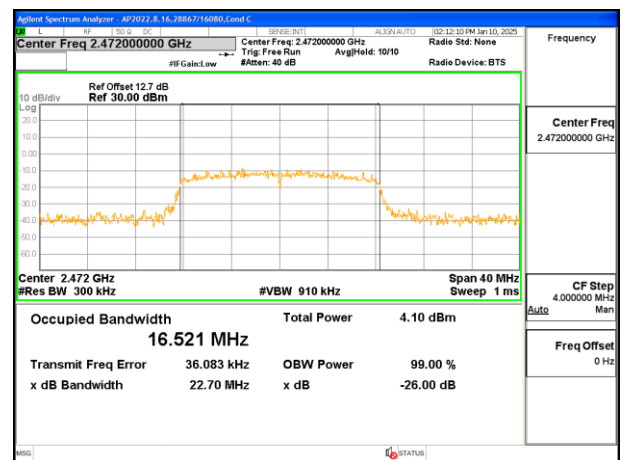
HIGH CHANNEL 12 ANTENNA 1



HIGH CHANNEL 12 ANTENNA 2



HIGH CHANNEL 13 ANTENNA 1

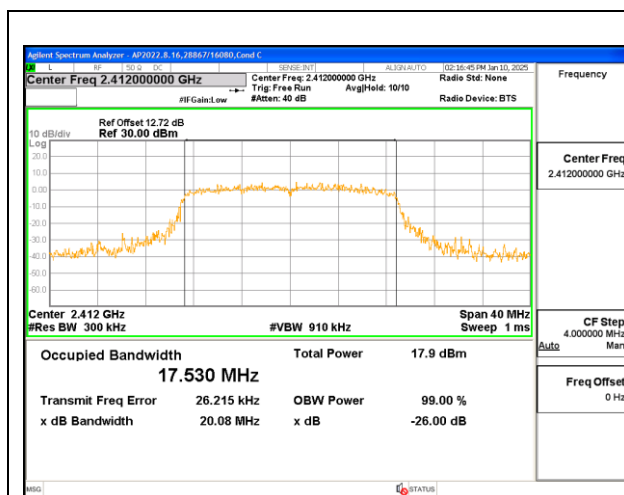


HIGH CHANNEL 13 ANTENNA 2

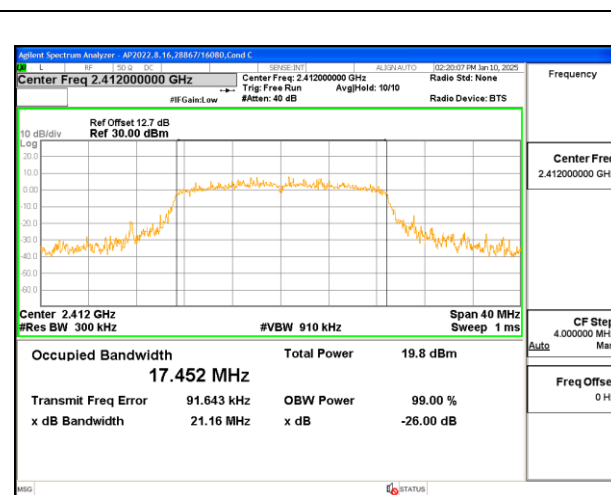
9.2.3. 802.11n HT20 MODE

2TX Antenna 1 + Antenna 2 CDD MODE

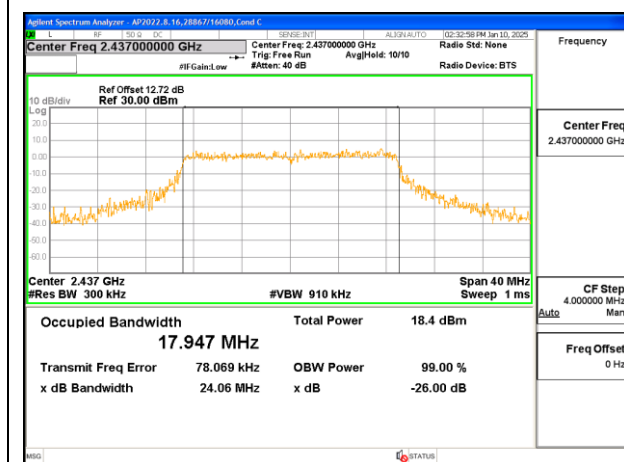
Channel	Frequency (MHz)	99% Bandwidth (MHz) ANT 1	99% Bandwidth (MHz) ANT 2
Low	2412	17.530	17.452
Mid	2437	17.947	17.971
High 11	2462	17.568	17.346
High 12	2467	17.636	17.574
High 13	2472	17.622	17.605



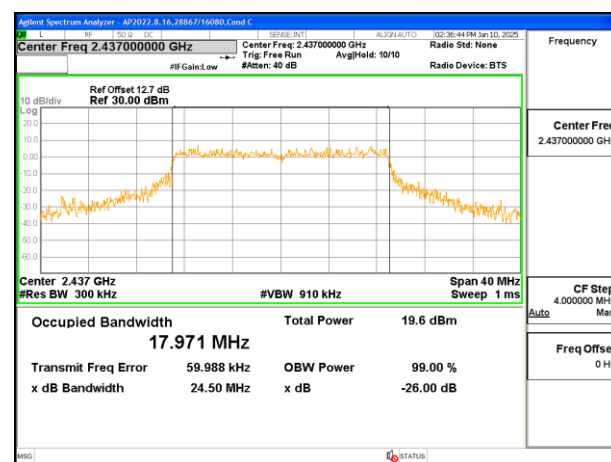
LOW CHANNEL 1 ANTENNA 1



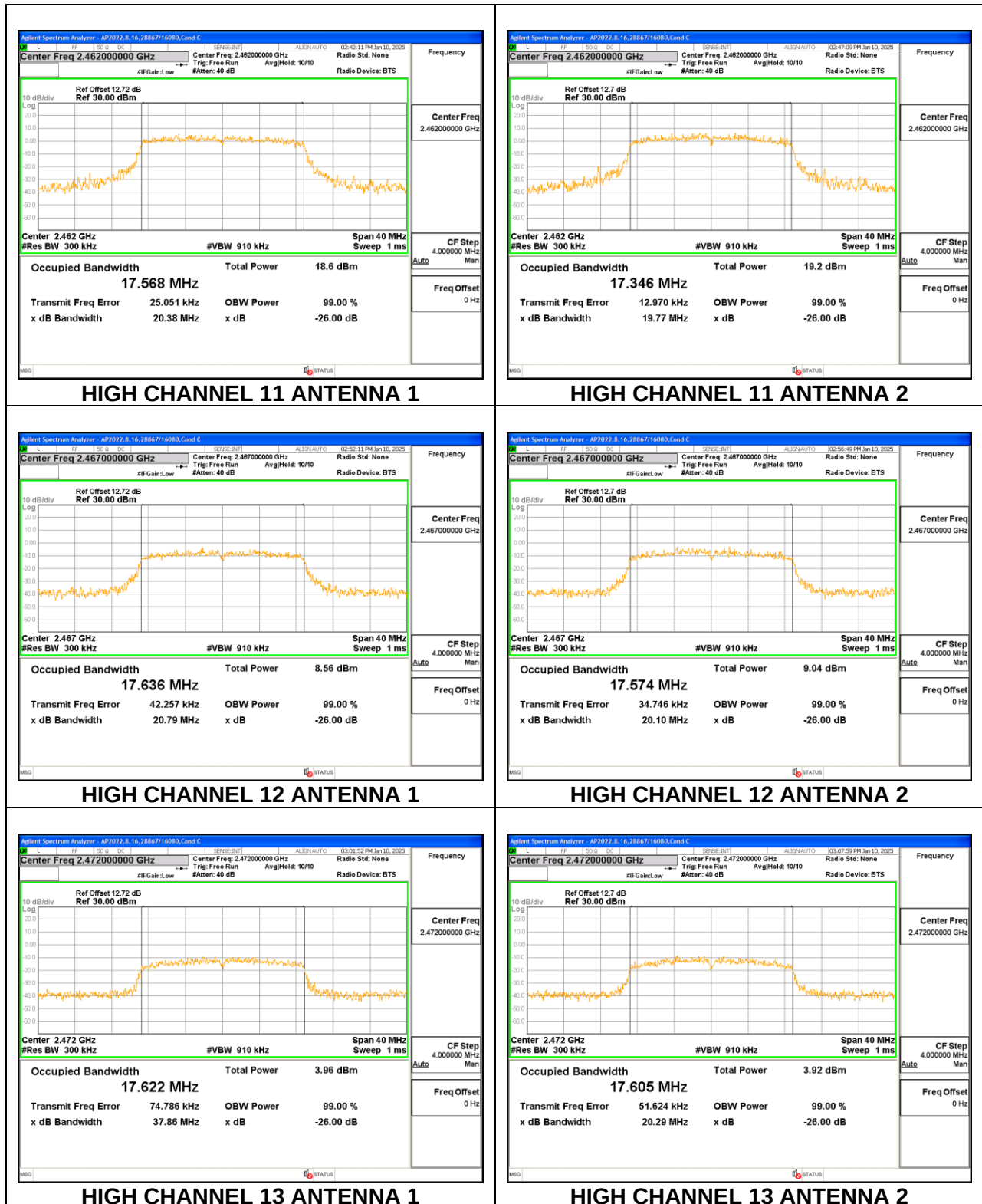
LOW CHANNEL 1 ANTENNA 2



MID CHANNEL 6 ANTENNA 1



MID CHANNEL 6 ANTENNA 2



9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

RSS-247 5.2 (a)

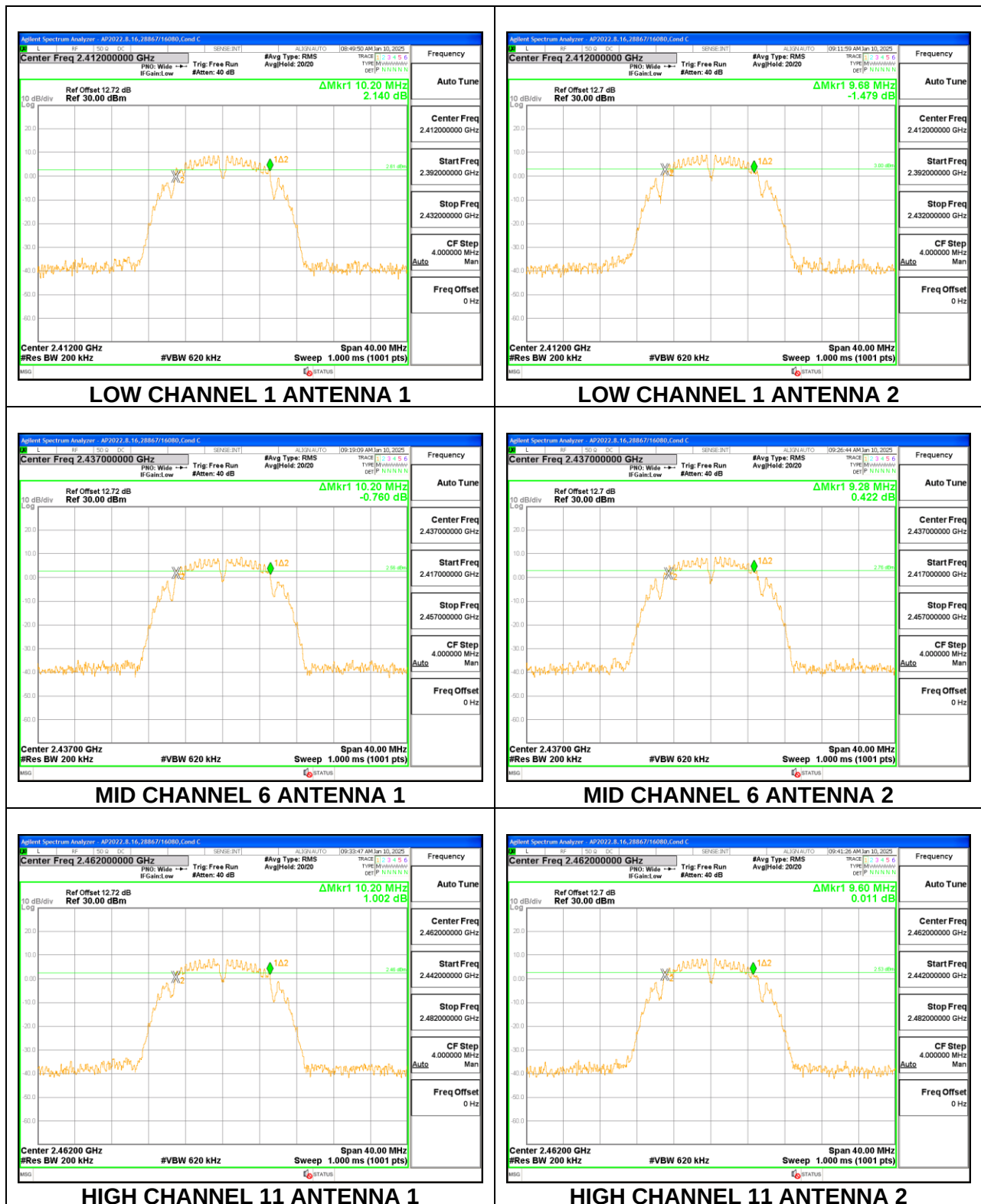
The minimum 6 dB bandwidth shall be at least 500 kHz.

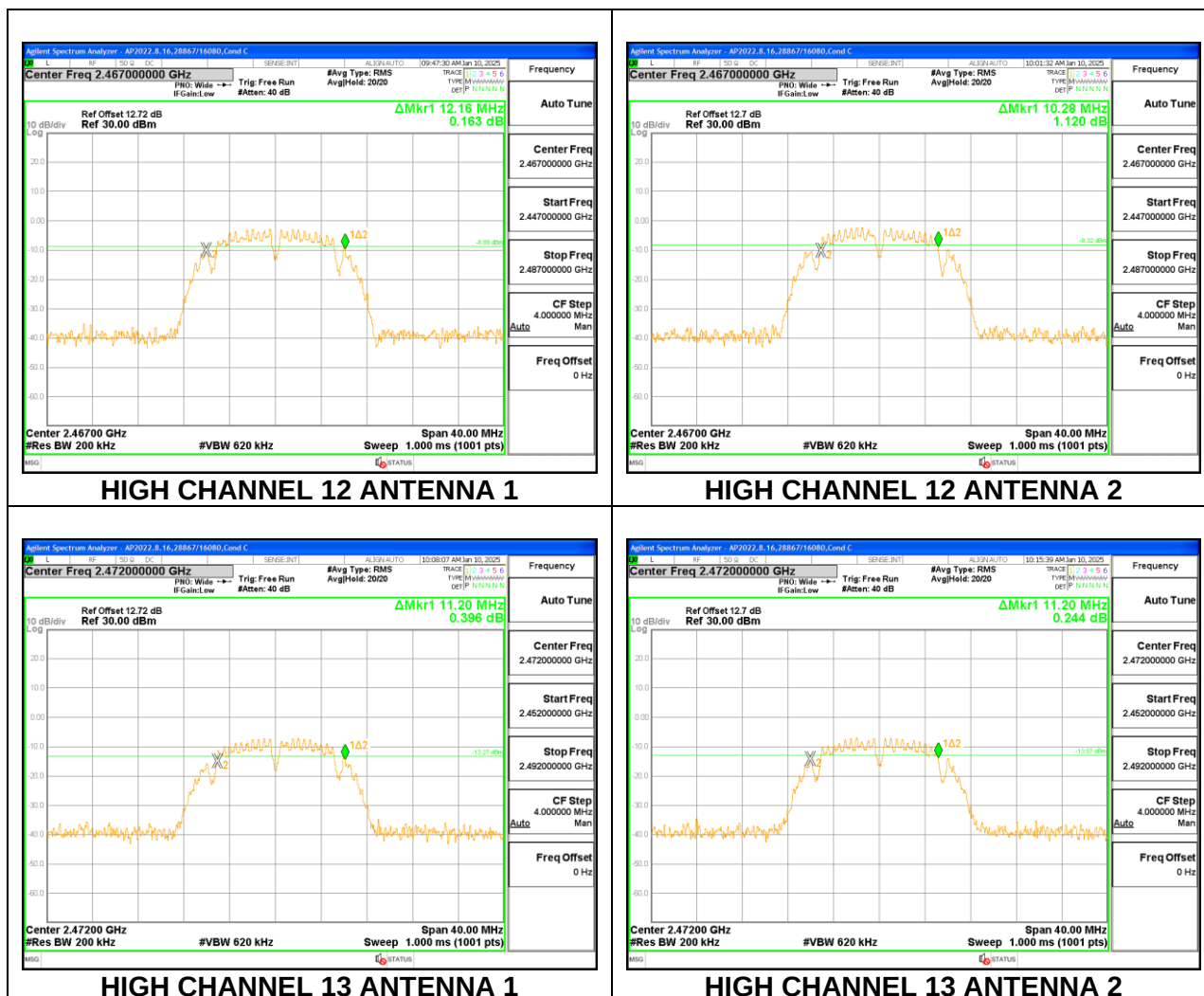
RESULTS

9.3.1. 802.11b MODE

2TX Antenna 1 + Antenna 2 CDD MODE

Channel	Frequency (MHz)	6dB BW(MHz) ANT 1	6dB BW (MHz) ANT 2	Minimum Limit (MHz)
Low	2412	10.2	9.68	0.5
Mid	2437	10.2	9.28	0.5
High 11	2462	10.2	9.6	0.5
High 12	2467	12.16	10.28	0.5
High 13	2472	11.2	11.2	0.5

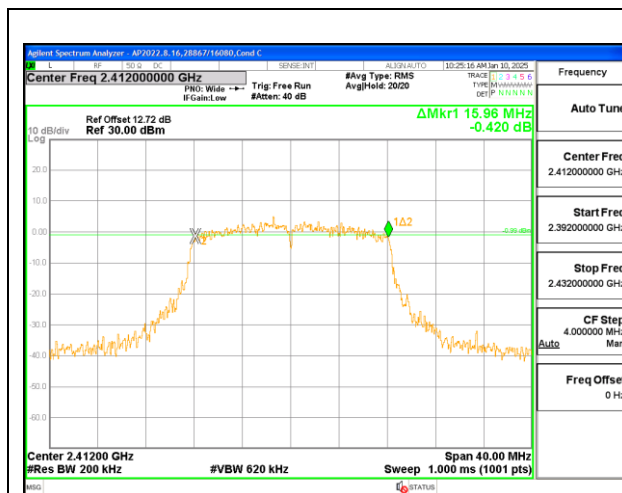




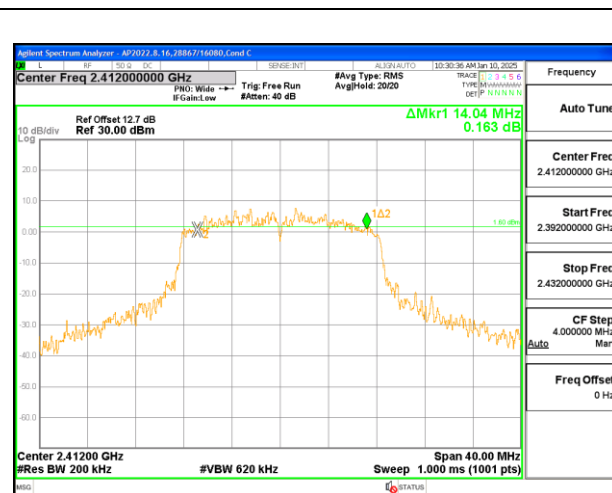
9.3.2. 802.11g MODE

2TX Antenna 1 + Antenna 2 CDD MODE

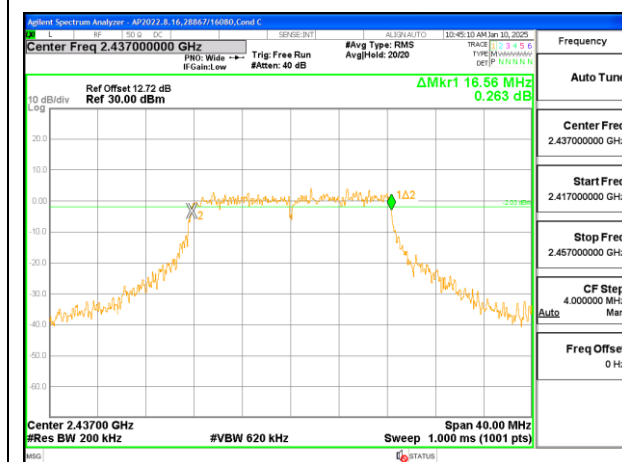
Channel	Frequency (MHz)	6dB BW(MHz) ANT 1	6dB BW (MHz) ANT 2	Minimum Limit (MHz)
Low	2412	15.96	14.04	0.5
Mid	2437	16.56	16.64	0.5
High 11	2462	15.76	15.76	0.5
High 12	2467	16.04	16.28	0.5
High 13	2472	15.24	15.72	0.5



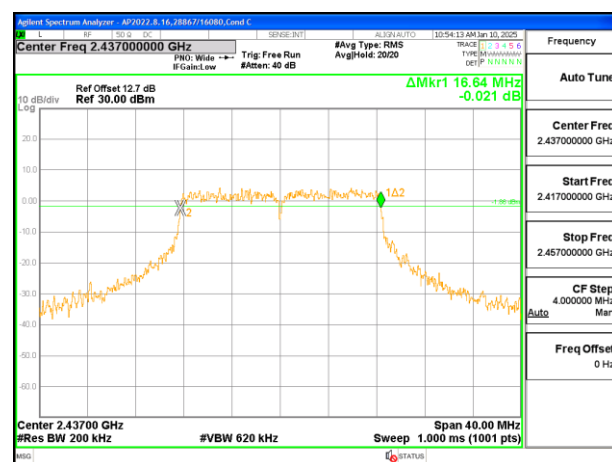
LOW CHANNEL 1 ANTENNA 1



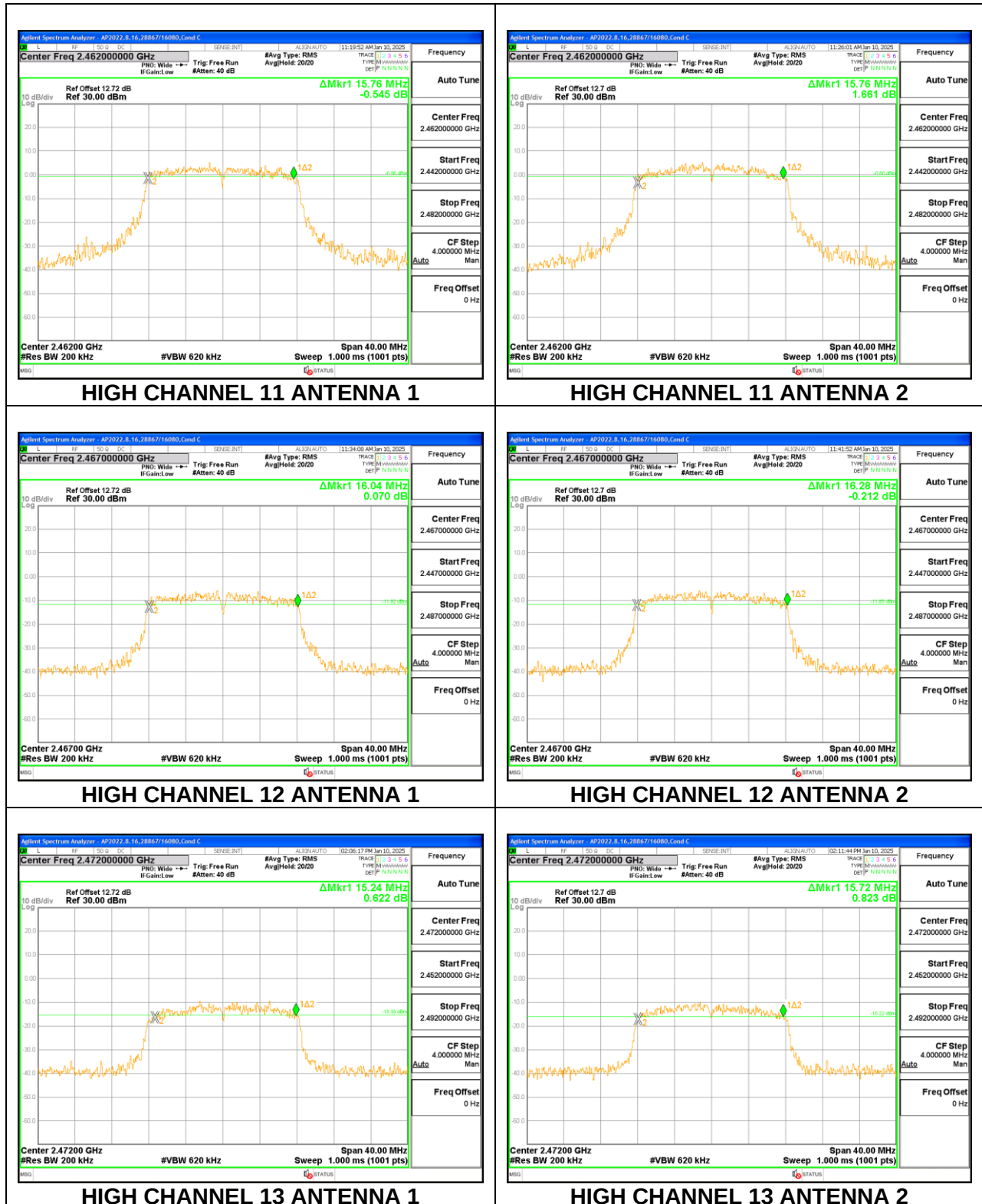
LOW CHANNEL 1 ANTENNA 2



MID CHANNEL 6 ANTENNA 1



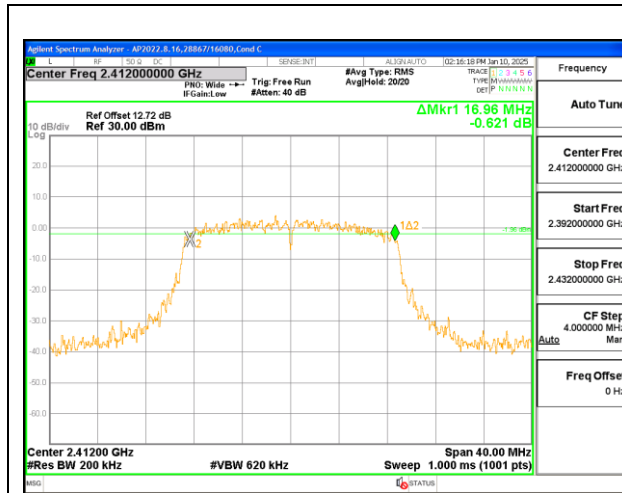
MID CHANNEL 6 ANTENNA 2



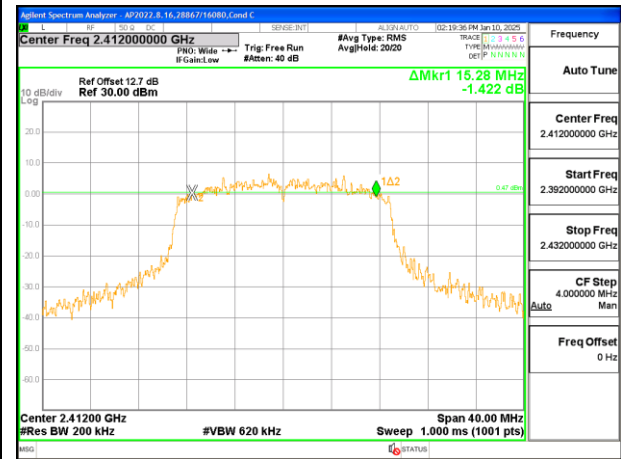
9.3.3. 802.11n HT20 MODE

2TX Antenna 1 + Antenna 2 CDD MODE

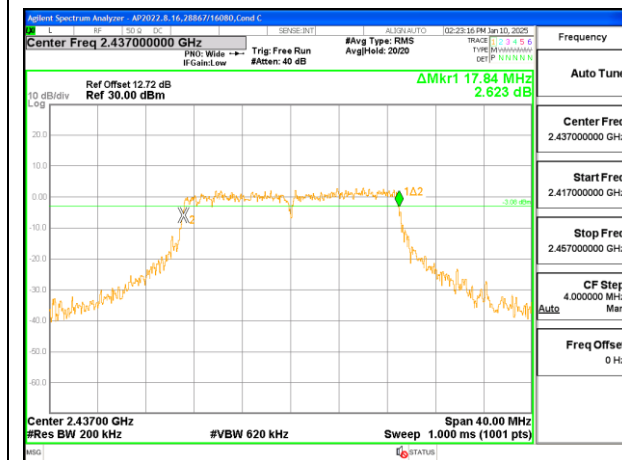
Channel	Frequency (MHz)	6dB BW(MHz) ANT 1	6dB BW (MHz) ANT 2	Minimum Limit (MHz)
Low	2412	16.96	15.28	0.5
Mid	2437	17.84	17.76	0.5
High 11	2462	17.12	15.20	0.5
High 12	2467	17.48	16.68	0.5
High 13	2472	16.44	14.32	0.5



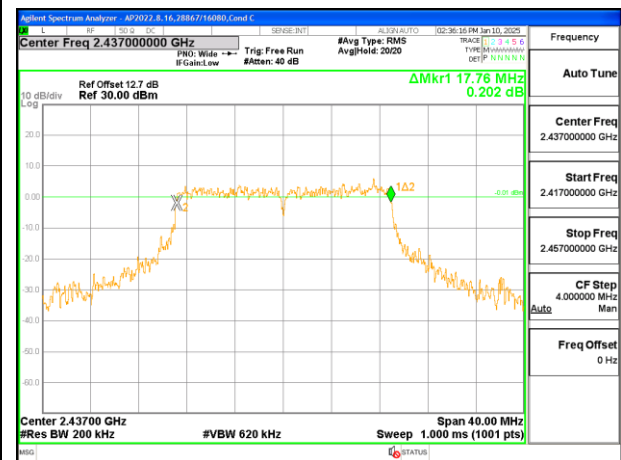
LOW CHANNEL 1 ANTENNA 1



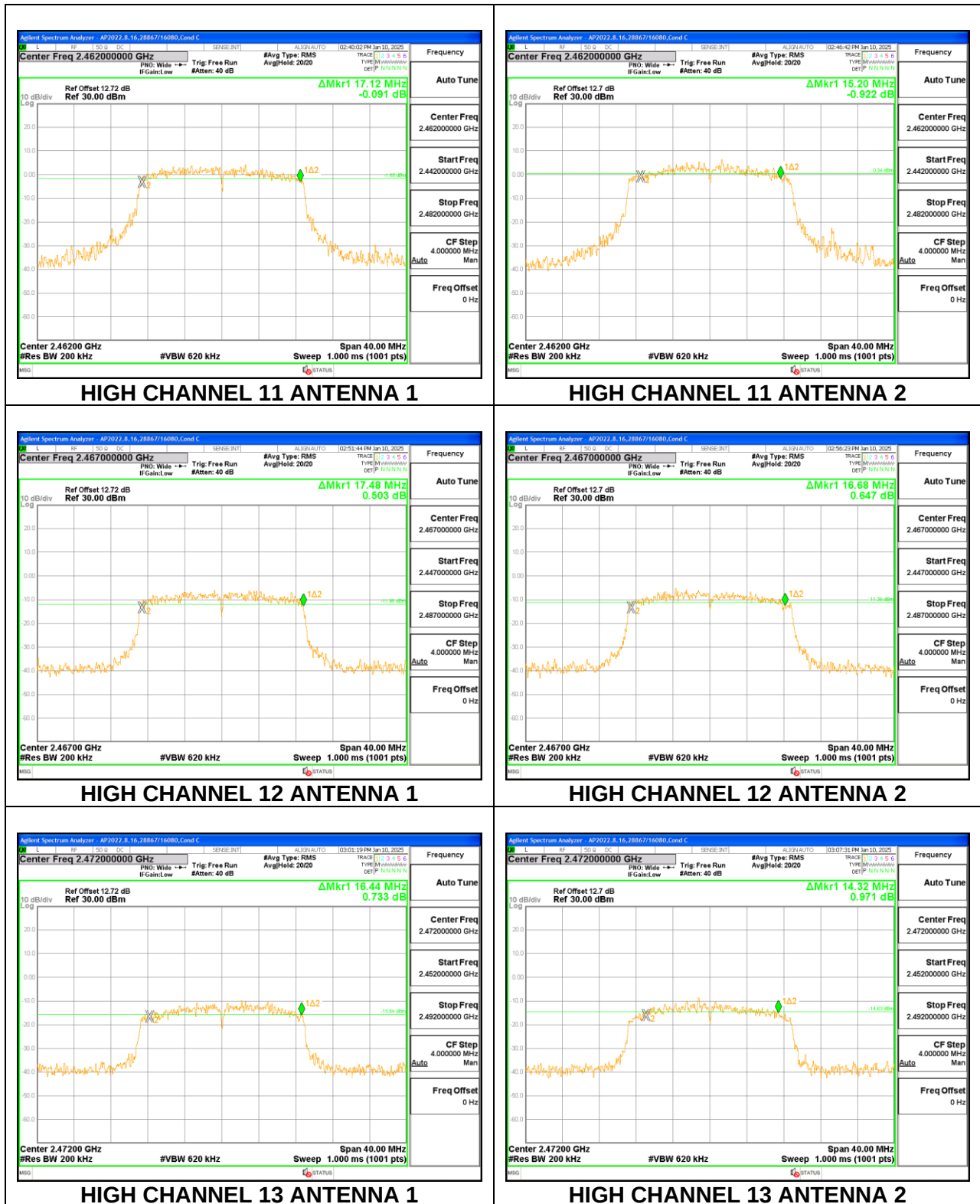
LOW CHANNEL 1 ANTENNA 2



MID CHANNEL 6 ANTENNA 1



MID CHANNEL 6 ANTENNA 2



9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband power sensor. Gated average output power was read directly from power meter.

DIRECTIONAL ANTENNA GAIN

For 2 TX:

Tx chains are uncorrelated for power and correlated for PSD due to the device supporting CDD in all MIMO modes. The directional gains are as follows:

Band (GHz)	Antenna 1 Antenna Gain (dBi)	Antenna 2 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.4	-3.70	-3.50	-3.60	-0.59

DIRECTIONAL GAIN CALCULATION:

ANSI C63.10 section 14.6.3

Uncorrelated directional gain= $10 \cdot \log((10^{(\text{Ant1}/10)} + 10^{(\text{Ant2}/10)})/2)$

Correlated directional Gain= $10 \cdot \log(((10^{(\text{Ant1}/20)} + 10^{(\text{Ant2}/20)})^2/2)$

Sample Calculation:

$Tx0 = -3.7\text{dBi}$, $Tx1 = -3.5\text{dBi}$

Uncorrelated Directional Gain dBi = $10 \log[(10^{(-3.7/10)} + 10^{(-3.5/10)})/2] = -3.6\text{dBi}$

Correlated Antenna gain = $10 \log[((10^{(-3.7/20)} + 10^{(-3.5/20)})^2/2)] = -0.59\text{dBi}$

POWER CALCULATION:

P= measured conducted Avg Power (including cable loss + 10dB attenuator)

2Tx Total MIMO Measured conducted Avg Power (dBm)= $10\log[10^{((P1)/10)} + 10^{((P2)/10)}]$

Sample Calculation g mode MIMO:

2Tx Total MIMO Measured conducted Avg Power (dBm)=

$10\log[10^{((16.13)/10)} + 10^{((16.27)/10)}] = 19.21\text{dBm}$

RESULTS

9.4.1. 802.11b MODE

2TX Antenna 1 + Antenna 2 CDD MODE

Test Engineer:	23522 SI
Test Date:	2024-12-20

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC/ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-3.60	30.00	36	30.00
Mid 6	2437	-3.60	30.00	36	30.00
High 11	2462	-3.60	30.00	36	30.00
High 12	2467	-3.60	30.00	36	30.00
High 13	2472	-3.60	30.00	36	30.00

Results

Channel	Frequency (MHz)	Antenna 1 Measured Power (dBm)	Antenna 2 Measured Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margi (dB)
Low 1	2412	17.63	17.46	20.56	30.00	-9.44
Mid 6	2437	17.80	17.80	20.81	30.00	-9.19
High 11	2462	17.45	17.28	20.38	30.00	-9.62
High 12	2467	5.63	5.59	8.62	30.00	-21.38
High 13	2472	1.96	0.71	4.39	30.00	-25.61

9.4.2. 802.11g MODE

2TX Antenna 1 + Antenna 2 CDD MODE

Test Engineer:	23522 SI
Test Date:	2024-12-20

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC/ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-3.60	30.00	36	30.00
Mid 6	2437	-3.60	30.00	36	30.00
High 10	2457	-3.60	30.00	36	30.00
High 11	2462	-3.60	30.00	36	30.00
High 12	2467	-3.60	30.00	36	30.00
High 13	2472	-3.60	30.00	36	30.00

Results

Channel	Frequency (MHz)	Antenna 1 Measured Power (dBm)	Antenna 2 Measured Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	16.13	16.27	19.21	30.00	-10.79
Mid 6	2437	16.50	15.87	19.21	30.00	-10.79
High 10	2457	15.43	15.44	18.45	30.00	-11.55
High 11	2462	14.07	13.68	16.89	30.00	-13.11
High 12	2467	3.68	2.86	6.30	30.00	-23.70
High 13	2472	-2.49	-2.96	0.29	30.00	-29.71

9.4.3. 802.11n HT20 MODE

2TX Antenna 1 + Antenna 2 CDD MODE

Test Engineer:	23522 SI
Test Date:	2024-12-20

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC/ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-3.60	30.00	36	30.00
Mid 6	2437	-3.60	30.00	36	30.00
High 10	2457	-3.60	30.00	36	30.00
High 11	2462	-3.60	30.00	36	30.00
High 12	2467	-3.60	30.00	36	30.00
High 13	2472	-3.60	30.00	36	30.00

Results

Channel	Frequency (MHz)	Antenna 1 Measured Power (dBm)	Antenna 2 Measured Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margi (dB)
Low 1	2412	16.21	16.41	19.32	30.00	-10.68
Mid 6	2437	16.50	16.04	19.29	30.00	-10.71
High 10	2457	15.43	15.42	18.44	30.00	-11.56
High 11	2462	14.02	13.89	16.97	30.00	-13.03
High 12	2467	3.69	3.04	6.39	30.00	-23.61
High 13	2472	-2.31	-2.96	0.39	30.00	-29.61

9.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

PSD CALCULATION:

PSD= measured PSD (including cable loss + 10dB attenuator)

DCCF= duty cycle correction factor in dB

2Tx Corrected PSD with DCCF (dBm/30kHz)= $10\log[10^{((\text{PSD1}+\text{DCCF})/10)} + 10^{((\text{PSD2}+\text{DCCF})/10)}]$

Sample Calculation g mode MIMO:

2Tx Corrected PSD with DCCF (dBm/30kHz) =

$10\log[10^{((-9.37+0.41)/10)} + 10^{((-7.02+0.41)/10)}] = -4.62\text{dBm/30kHz}$

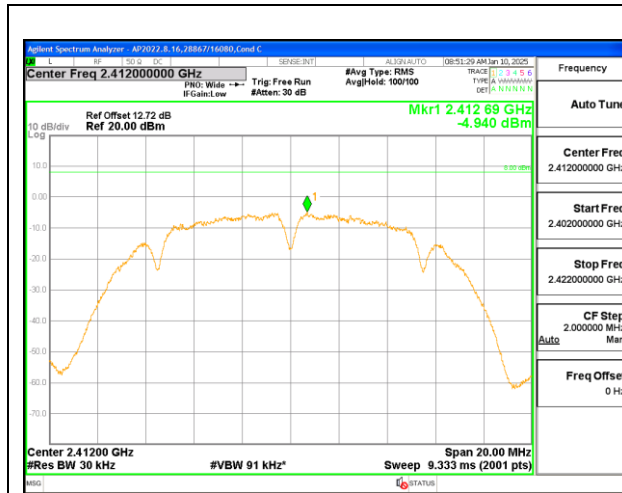
9.5.1. 802.11b MODE

2TX Antenna 1 + Antenna 2 CDD MODE

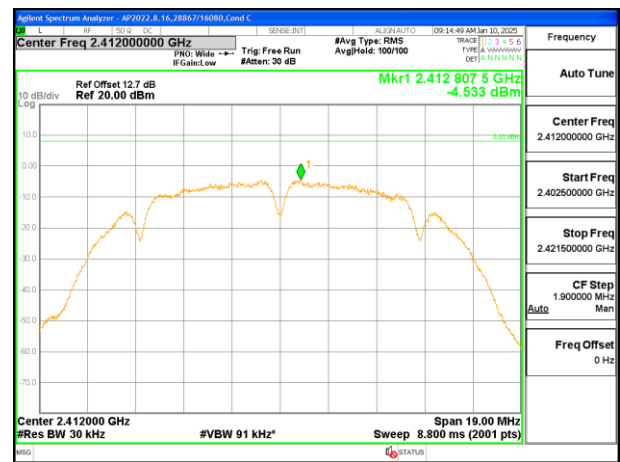
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
--------------------	------	--

PSD Results

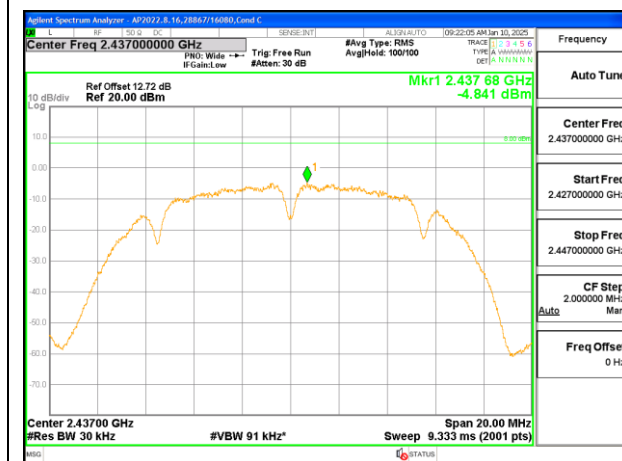
Channel	Frequency (MHz)	Antenna Meas (dBm)	Antenna Meas (dBm)	Total Corr'd PSD (dBm)	Limit (dBm)	Margin (dB)
1	2412	-4.94	-4.53	-1.72	8.0	-9.7
6	2437	-4.84	-4.57	-1.69	8.0	-9.7
11	2462	-4.93	-4.54	-1.72	8.0	-9.7
12	2467	-16.63	-16.34	-13.47	8.0	-21.5
13	2472	-20.30	-20.14	-17.21	8.0	-25.2



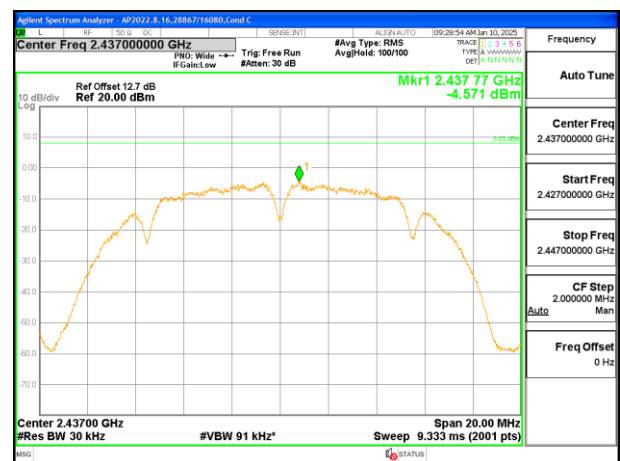
LOW CHANNEL 1 ANTENNA 1



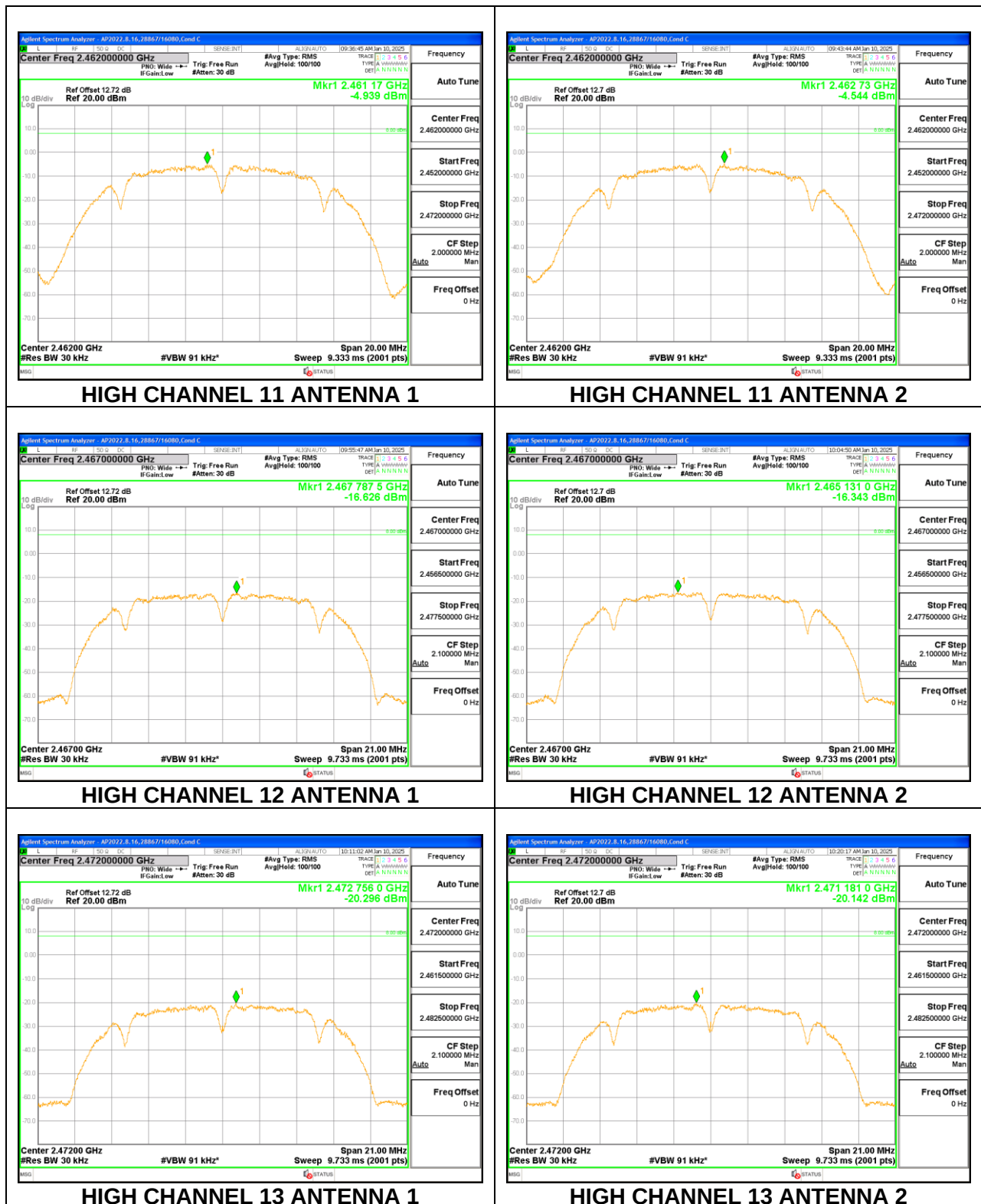
LOW CHANNEL 1 ANTENNA 2



MID CHANNEL 6 ANTENNA 1



MID CHANNEL 6 ANTENNA 2



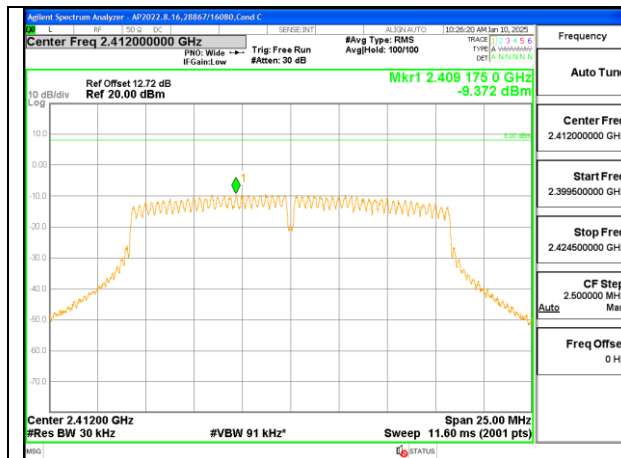
9.5.2. 802.11g MODE

2TX Antenna 1 + Antenna 2 CDD MODE

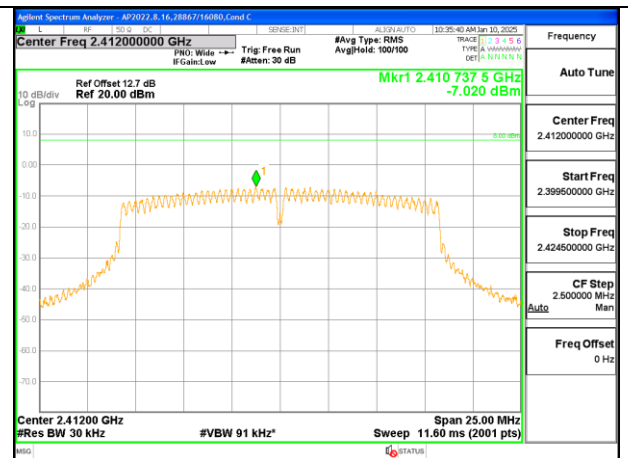
Duty Cycle CF (dB)	0.41	Included in Calculations of Corr'd PSD
--------------------	------	--

PSD Results

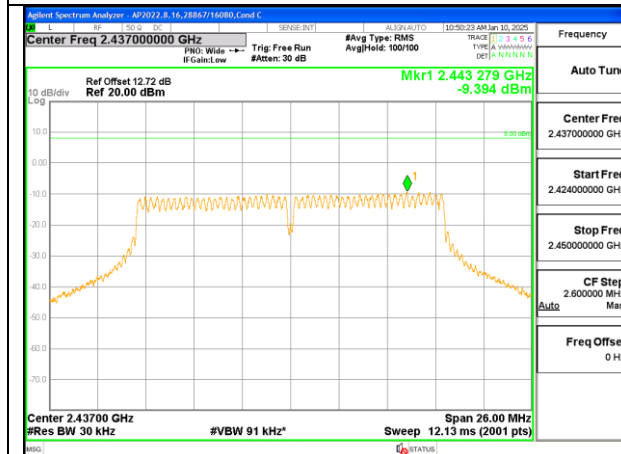
Channel	Frequency (MHz)	Antenna 1 Meas (dBm)	Antenna 2 Meas (dBm)	Total Corr'd PSD (dBm)	Limit (dBm)	Margin (dB)
1	2412	-9.37	-7.02	-4.62	8.0	-12.6
6	2437	-9.39	-8.40	-5.45	8.0	-13.4
10	2457	-8.90	-8.54	-5.30	8.0	-13.3
11	2462	-8.84	-8.14	-5.05	8.0	-13.1
12	2467	-19.27	-18.39	-15.38	8.0	-23.4
13	2472	-23.38	-23.19	-19.86	8.0	-27.9



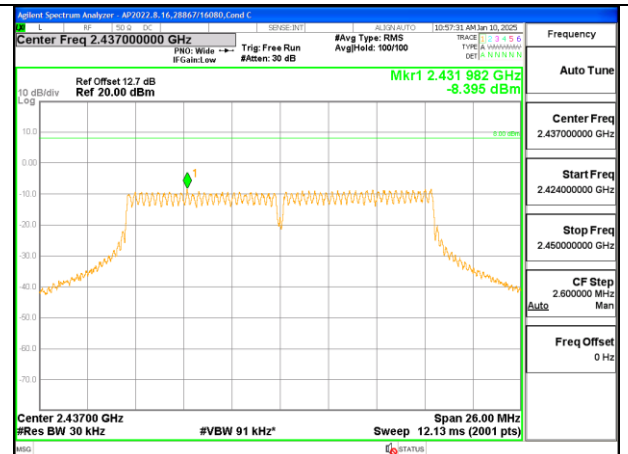
LOW CHANNEL 1 ANTENNA 1



LOW CHANNEL 1 ANTENNA 2



MID CHANNEL 6 ANTENNA 1



MID CHANNEL 6 ANTENNA 2