RF TEST REPORT

For

August Robotics, Inc.
Product Name: TP-Link AC1900 Wireless Gigabit Router
Test Model(s): TL-WDR7650

Report Reference No.	:	**DACE250702014RL001**
FCC ID	:	**2BQ6NTL-WDR7650**
Applicant's Name	:	August Robotics, Inc.
Address	:	3400 W Desert Inn #9, 45, Las Vegas, Nevada 89102, USA
Testing Laboratory	:	Shenzhen DACE Testing Technology Co., Ltd.
Address	:	102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Community, Shiyan Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Test Specification Standard	:	**47 CFR Part 15E**
Date of Receipt	:	July 2, 2025
Date of Test	:	July 2, 2025 to July 19, 2025
Data of Issue	:	July 19, 2025
Result	:	**Pass**

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CHECK

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Apply for company information

Applicant's Name	:	August Robotics, Inc.
Address	:	3400 W Desert Inn #9, 45, Las Vegas, Nevada 89102, USA
Product Name	:	TP-Link AC1900 Wireless Gigabit Router
Test Model(s)	:	TL-WDR7650
Series Model(s)	:	/
Test Specification Standard(s)	:	47 CFR Part 15E

NOTE1:

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

Compiled by:	Supervised by:	Approved by:
Keren Huang	Stone Yin	Tom Chen
Keren Huang / Test Engineer	Stone Yin / Project Engineer	Tom Chen / Manager
July 19, 2025	July 19, 2025	July 19, 2025

Shenzhen DACE Testing Technology Co., Ltd. APPROVED

Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	DACE250702014RL001	July 19, 2025

CONTENTS

1 TEST SUMMARY 6

1.1 TEST STANDARDS 6
1.2 SUMMARY OF TEST RESULT 6

2 GENERAL INFORMATION 7

2.1 CLIENT INFORMATION 7
2.2 DESCRIPTION OF DEVICE (EUT) 7
2.3 DESCRIPTION OF TEST MODES 8
2.4 DESCRIPTION OF SUPPORT UNITS 9
2.5 EQUIPMENTS USED DURING THE TEST 9
2.6 STATEMENT OF THE MEASUREMENT UNCERTAINTY 11
2.7 IDENTIFICATION OF TESTING LABORATORY 11
2.8 ANNOUNCEMENT 11

3 EVALUATION RESULTS (EVALUATION) 12

3.1 ANTENNA REQUIREMENT 12
3.1.1 Conclusion: 12

4 RADIO SPECTRUM MATTER TEST RESULTS (RF) 13

4.1 CONDUCTED EMISSION AT AC POWER LINE 13
4.1.1 E.U.T. Operation: 13
4.1.2 Test Setup Diagram: 13
4.1.3 Test Data: 14
4.2 DUTY CYCLE 16
4.2.1 E.U.T. Operation: 16
4.2.2 Test Setup Diagram: 16
4.2.3 Test Data: 16
4.3 EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH 17
4.3.1 E.U.T. Operation: 18
4.3.2 Test Setup Diagram: 18
4.3.3 Test Data: 18
4.4 MAXIMUM CONDUCTED OUTPUT POWER 19
4.4.1 E.U.T. Operation: 19
4.4.2 Test Setup Diagram: 19
4.4.3 Test Data: 19
4.5 POWER SPECTRAL DENSITY 20
4.5.1 E.U.T. Operation: 20
4.5.2 Test Setup Diagram: 20
4.5.3 Test Data: 20
4.6 BAND EDGE EMISSIONS (RADIATED) 21
4.6.1 E.U.T. Operation: 23
4.6.2 Test Setup Diagram: 23
4.6.3 Test Data: 23
4.7 UNDESIRABLE EMISSION LIMITS (BELOW 1GHZ) 35
4.7.1 E.U.T. Operation: 36
4.7.2 Test Setup Diagram: 37
4.7.3 Test Data: 37
4.8 UNDESIRABLE EMISSION LIMITS (ABOVE 1GHZ) 39
4.8.1 E.U.T. Operation: 41

4.8.2 Test Setup Diagram: 41
4.8.3 Test Data: 41

5 TEST SETUP PHOTOS 48
6 PHOTOS OF THE EUT 50
APPENDIX-5.2G 57

1. -26dB and 99% Emission Bandwidth 57
2. Duty Cycle 98
3. Maximum Conducted Output Power 119
4. Power Spectral Density 141
5. Bandedge 163
6. Spurious Emission 180
7. Frequency Stability 201

APPENDIX-5.8G 206

1. -6dB Emission Bandwidth 206
2. Duty Cycle 227
3. Maximum Conducted Output Power 248
4. Power Spectral Density 270
5. Bandedge 292
6. Spurious Emission 313
7. Frequency Stability 334

1 TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

47 CFR Part 15E: Unlicensed National Information Infrastructure Devices

1.2 Summary of Test Result

Item	Method	Requirement	Result
Antenna requirement	/	Part 15.203	Pass
Conducted Emission at AC power line	ANSI C63.10-2020 section 6.2	47 CFR Part 15.207(a)	Pass
Emission bandwidth and occupied bandwidth	ANSI C63.10-2020, section 6.9 & 12.5 KDB 789033 D02, Clause C.2	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use. 47 CFR Part 15.407(e)	Pass
Maximum conducted output power	ANSI C63.10-2020, section 12.4	47 CFR Part 15.407(a)(1)(ii) 47 CFR Part 15.407(a)(3)(i)	Pass
Power spectral density	ANSI C63.10-2020, section 12.6	47 CFR Part 15.407(a)(1)(ii) 47 CFR Part 15.407(a)(3)(i)	Pass
Band edge emissions (Radiated)	ANSI C63.10-2020, section 12.7.4, 12.7.6, 12.7.7	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)	Pass
Undesirable emission limits (below 1GHz)	ANSI C63.10-2020, section 12.7.4, 12.7.5	47 CFR Part 15.407(b)(9)	Pass
Undesirable emission limits (above 1GHz)	ANSI C63.10-2020, section 12.7.4, 12.7.6, 12.7.7	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)	Pass

Note: 1.N/A -this device(EUT) is not applicable to this testing item
2. RF-conducted test results including cable loss.

2 GENERAL INFORMATION

2.1 Client Information

Applicant's Name : August Robotics, Inc.
Address : 3400 W Desert Inn #9, 45, Las Vegas, Nevada 89102, USA

Manufacturer : Shenzhen August Robotics Technology Co., Ltd.
Address : Suite 316, West Lake Building, 46 Meilin Road, Futian District, Shenzhen, Guangdong, China

2.2 Description of Device (EUT)

Product Name:	TP-Link AC1900 Wireless Gigabit Router
Model/Type reference:	TL-WDR7650
Series Model:	/
Trade Mark:	N/A
Power Supply:	DC12V 1.0A from adapter
Operation Frequency:	802.11a/n(HT20)/ac(HT20)/ax(HE20): U-NII Band 1: 5180MHz to 5240MHz; U-NII Band 3: 5745MHz to 5825MHz; 802.11n(HT40)/ac(HT40)/ax(HE40): U-NII Band 1: 5190MHz to 5230MHz; U-NII Band 3: 5755MHz to 5795MHz; 802.11ac(HT80)/ax(HE80): U-NII Band 1: 5210MHz; U-NII Band 3: 5775MHz
Number of Channels:	802.11a/n(HT20)/ac(HT20)/ax(HE20):U-NII Band 1: 4;U-NII Band 3: 5; 802.11n(HT40)/ac(HT40)/ax(HE40):U-NII Band 1: 2; U-NII Band 3: 2; 802.11ac(HT80)/ax(HE80):U-NII Band 1: 1; U-NII Band 3: 1
Modulation Type:	802.11a: OFDM(BPSK, QPSK, 16QAM, 64QAM); 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM); 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM); 802.11ax: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Antenna Type:	PCB ANTENNA
Antenna Gain:	ANT1&ANT2:1.81dBi
Hardware Version:	TPV0_1
Software Version:	V1.0

Operation Frequency each of channel

802.11a/n(HT20)/ac(VHT20)/ax(HE20)

	U-NII Band 1	U-NII Band 3
Channel	Frequency	Frequency
1	5180 MHz	5745 MHz
2	5200 MHz	5765 MHz
3	5220 MHz	5785 MHz
4	5240 MHz	5805 MHz
5	/	5825 MHz

802.11n(HT40)/ac(VHT40)/ax(HE40)

	U-NII Band 1	U-NII Band 3
Channel	Frequency	Frequency
1	5190 MHz	5755 MHz
2	5230 MHz	5795 MHz

802.11ac(VHT80)/ax(HE80)

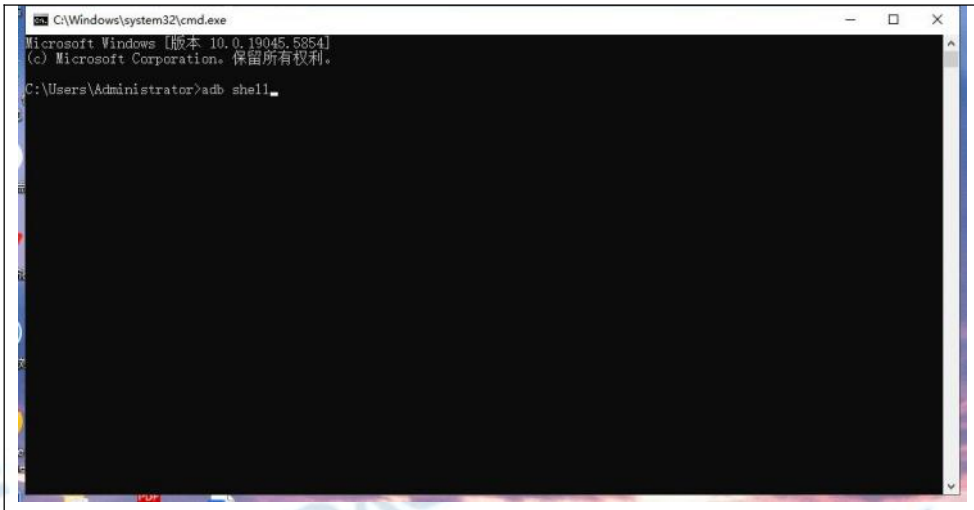
	U-NII Band 1	U-NII Band 3
Channel	Frequency	Frequency
1	5210 MHz	5775 MHz

Note:In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Band	20MHz OBW		40MHz OBW		80MHz OBW	
	U-NII Band 1	U-NII Band 3	U-NII Band 1	U-NII Band 3	U-NII Band 1	U-NII Band 3
Test channel	**Frequency (MHz)**	**Frequency (MHz)**	**Frequency (MHz)**	**Frequency (MHz)**	**Frequency (MHz)**	**Frequency (MHz)**
Lowest channel	5180 MHz	5745 MHz	5190 MHz	5755 MHz	/	/
Middle channel	5200 MHz	5785 MHz	/	/	5210 MHz	5775 MHz
Highest channel	5240 MHz	5825 MHz	5230 MHz	5795 MHz	/	/

2.3 Description of Test Modes

No	**Title**	**Description**
TM1	802.11a mode	Keep the EUT in continuously transmitting mode with 802.11a modulation type at lowest, middle and highest channel. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report.
TM2	802.11n mode	Keep the EUT in continuously transmitting mode with 802.11n modulation type at lowest, middle and highest channel. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.
TM3	802.11ac mode	Keep the EUT in continuously transmitting mode with 802.11ac modulation type at lowest, middle and highest channel. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.
TM4	802.11ax mode	Keep the EUT in continuously transmitting mode with 802.11ax modulation type at lowest, middle and highest channel. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.
Test software		



During testing, the largest possible duty cycle was used.

2.4 Description of Support Units

Title	Manufacturer	Model No.	Serial No.
Adapter	TPlink	T120100-2A3 INPUT:100-240 50/60Hz OUTPUT:12V 1A	/

2.5 Equipments Used During The Test

Conducted Emission at AC power line					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Cable	SCHWARZ BECK	/	/	2025-04-18	2026-04-17
Pulse Limiter	SCHWARZ BECK	VTSD 9561-F Pulse limiter 10dB Attenuation	561-G071	2024-12-06	2025-12-05
50ΩCoaxial Switch	Anritsu	MP59B	M20531	/	/
Test Receiver	Rohde & Schwarz	ESPI TEST RECEIVER	1164.6607K03 -102109-MH	2025-04-25	2026-04-24
L.I.S.N	R&S	ESH3-Z5	831.5518.52	2025-04-18	2026-04-17
L.I.S.N	SCHWARZ BECK	NSLK 8126	05055	2025-04-18	2026-04-17
Pulse Limiter	CYBERTEK	EM5010A	/	2024-09-27	2025-09-26
EMI test software	EZ -EMC	EZ	V1.1.42	/	/

Duty Cycle
Emission bandwidth and occupied bandwidth
Maximum conducted output power
Power spectral density

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RF Test Software	Tachoy Information	RTS-01	V1.0.0	/	/
RF Sensor Unit	Tachoy Information	TR1029-2	000001	/	/
Wideband radio communication tester	R&S	CMW500	113410	2025-04-25	2026-04-24
Vector Signal Generator	Keysight	N5181A	MY50143455	2024-12-06	2025-12-05
Signal Generator	Keysight	N5182A	MY48180415	2024-12-06	2025-12-05
Spectrum Analyzer	Keysight	N9020A	MY53420323	2024-12-06	2025-12-05

Band edge emissions (Radiated)
Undesirable emission limits (below 1GHz)
Undesirable emission limits (above 1GHz)

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test software	Farad	EZ -EMC	V1.1.42	/	/
Positioning Controller	MF	MF-7802	/	/	/
Amplifier(18-40G)	COM-POWER	AH-1840	10100008-1	2024-04-26	2027-04-25
Horn antenna	COM-POWER	AH-1840 (18-40G)	10100008	2024-04-26	2027-04-25
Loop antenna	ZHINAN	ZN30900C	ZN30900C	2025-04-28	2026-04-27
Cable(LF)#2	Schwarzbeck	/	/	2024-12-19	2025-12-18
Cable(LF)#1	Schwarzbeck	/	/	2024-12-19	2025-12-18
Cable(HF)#2	Schwarzbeck	AK9515E	96250	2025-04-25	2026-04-24
Cable(HF)#1	Schwarzbeck	SYV-50-3-1	/	2025-04-25	2026-04-24
Power amplifier(LF)	Schwarzbeck	BBV9743	9743-151	2025-04-29	2026-04-28
Power amplifier(HF)	Schwarzbeck	BBV9718	9718-282	2025-04-29	2026-04-28
Wideband radio communication tester	R&S	CMW500	113410	2025-04-25	2026-04-24
Spectrum Analyzer	R&S	FSP30	1321.3008K40 -101729-jR	2025-04-18	2026-04-17
Test Receiver	R&S	ESCI 3	1166.5950K03 -101431-Jq	2025-04-18	2026-04-17
Horn Antenna	Sunol Sciences	DRH-118	A091114	2025-04-21	2026-04-20
Broadband Antenna	Sunol Sciences	JB6 Antenna	A090414	2024-09-28	2026-09-27

2.6 Statement Of The Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Disturbance (0.15~30MHz)	±3.41dB
Duty cycle	±3.1%
Occupied Bandwidth	±3.63%
RF conducted power	±0.733dB
RF power density	±0.234%
Radiated Emission (Above 1GHz)	±5.46dB
Radiated Emission (Below 1GHz)	±5.79dB
Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

2.7 Identification of Testing Laboratory

Company Name:	Shenzhen DACE Testing Technology Co., Ltd.
Address:	102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Connunity, Shiyan Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Phone Number:	+86-13267178997
Fax Number:	86-755-29113252

Identification of the Responsible Testing Location

Company Name:	Shenzhen DACE Testing Technology Co., Ltd.
Address:	102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Connunity, Shiyan Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Phone Number:	+86-13267178997
Fax Number:	86-755-29113252
FCC Registration Number:	0032847402
Designation Number:	CN1342
Test Firm Registration Number:	778666
A2LA Certificate Number:	6270.01

2.8 Announcement

(1) The test report reference to the report template version v0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) This document may not be altered or revised in any way unless done so by DACE and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

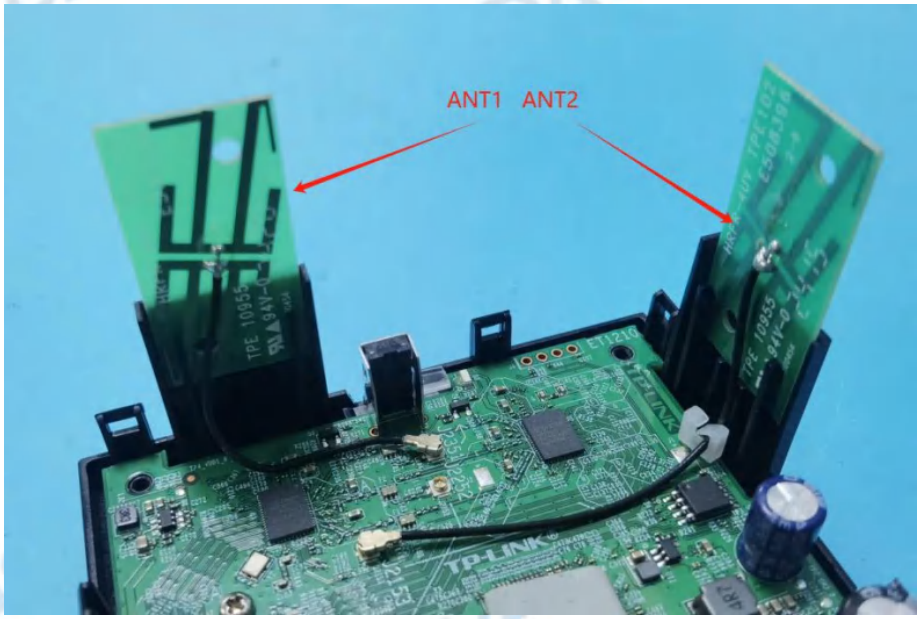
(6) We hereby declare that the laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant. the laboratory is not responsible for the accuracy of the information provided by the client(item 2.2). When the information provided by the customer may affect the effectiveness of the results, the responsibility lies with the customer, and the laboratory does not assume any responsibility.

3 Evaluation Results (Evaluation)

3.1 Antenna requirement

Test Requirement:	Refer to 47 CFR Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.1.1 Conclusion:



4 Radio Spectrum Matter Test Results (RF)

4.1 Conducted Emission at AC power line

Test Requirement:	47 CFR Part 15.207(a)
Test Limit:	

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

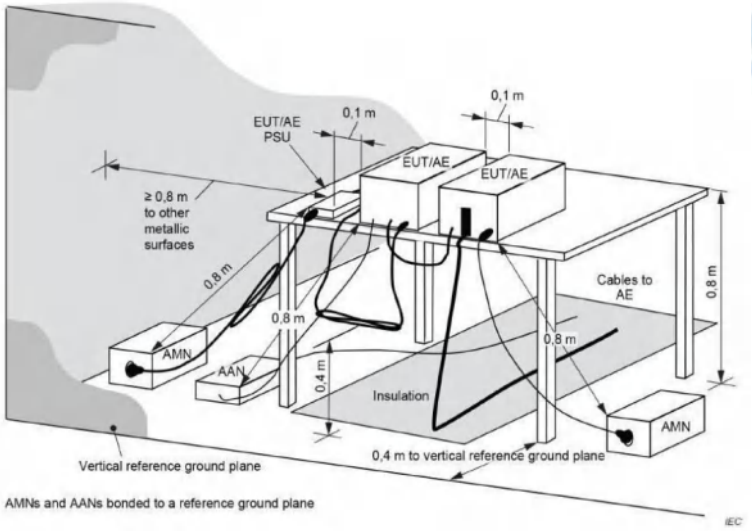
*Decreases with the logarithm of the frequency.

Test Method:	ANSI C63.10-2020 section 6.2

4.1.1 E.U.T. Operation:

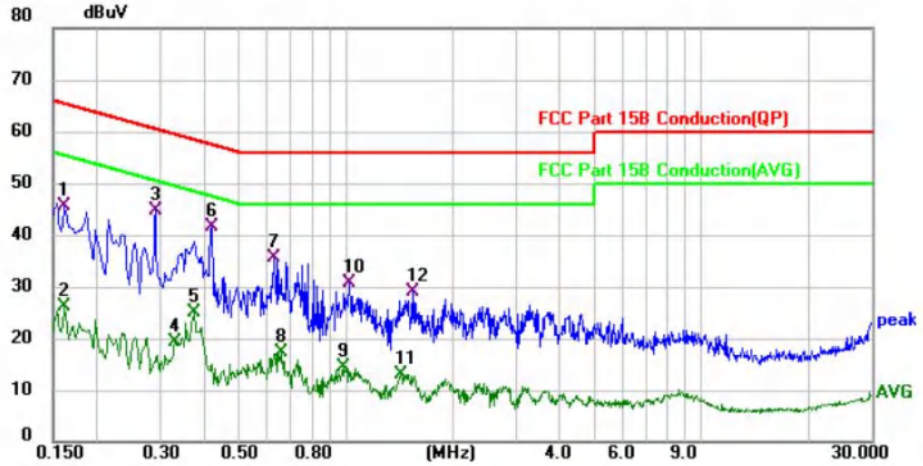
Operating Environment:					
Temperature:	23.6 °C	Humidity:	52 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.1.2 Test Setup Diagram:



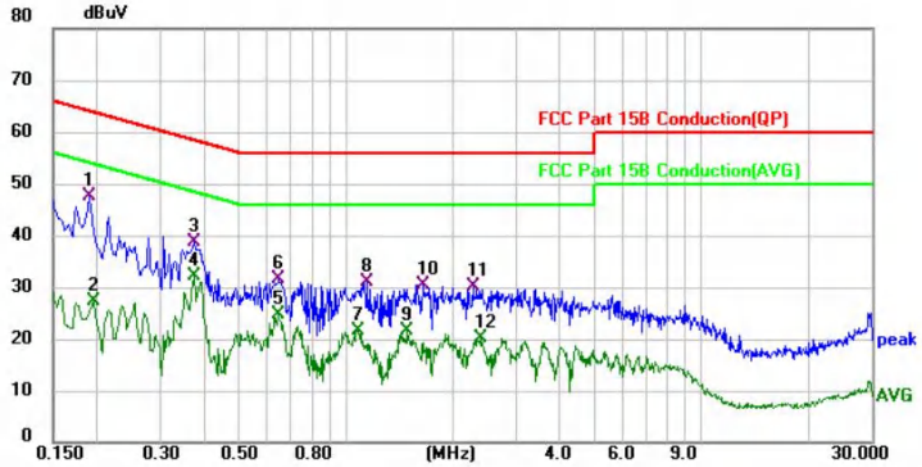
4.1.3 Test Data:

TM1 / Line: Line / Band: 5150-5250 MHz / BW: 20 / CH: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1620	35.57	10.10	45.67	65.36	-19.69	QP	
2		0.1620	16.16	10.10	26.26	55.36	-29.10	AVG	
3	*	0.2900	34.76	10.09	44.85	60.52	-15.67	QP	
4		0.3300	9.21	10.09	19.30	49.45	-30.15	AVG	
5		0.3740	14.93	10.08	25.01	48.41	-23.40	AVG	
6		0.4180	31.40	10.10	41.50	57.49	-15.99	QP	
7		0.6260	25.39	10.10	35.49	56.00	-20.51	QP	
8		0.6540	7.31	10.10	17.41	46.00	-28.59	AVG	
9		0.9860	4.34	10.11	14.45	46.00	-31.55	AVG	
10		1.0220	20.55	10.11	30.66	56.00	-25.34	QP	
11		1.4299	3.06	10.06	13.12	46.00	-32.88	AVG	
12		1.5420	18.94	10.05	28.99	56.00	-27.01	QP	

TM1 / Line: Neutral / Band: 5150-5250 MHz / BW: 20 / CH: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1900	37.46	10.08	47.54	64.04	-16.50	QP	
2		0.1940	17.10	10.08	27.18	53.86	-26.68	AVG	
3		0.3740	28.68	10.07	38.75	58.41	-19.66	QP	
4	*	0.3740	21.96	10.07	32.03	48.41	-16.38	AVG	
5		0.6460	14.60	10.08	24.68	46.00	-21.32	AVG	
6		0.6500	21.47	10.08	31.55	56.00	-24.45	QP	
7		1.0859	11.55	10.07	21.62	46.00	-24.38	AVG	
8		1.1460	20.92	10.07	30.99	56.00	-25.01	QP	
9		1.4940	11.55	10.04	21.59	46.00	-24.41	AVG	
10		1.6540	20.36	10.03	30.39	56.00	-25.61	QP	
11		2.2780	20.06	10.02	30.08	56.00	-25.92	QP	
12		2.3900	10.09	10.02	20.11	46.00	-25.89	AVG	

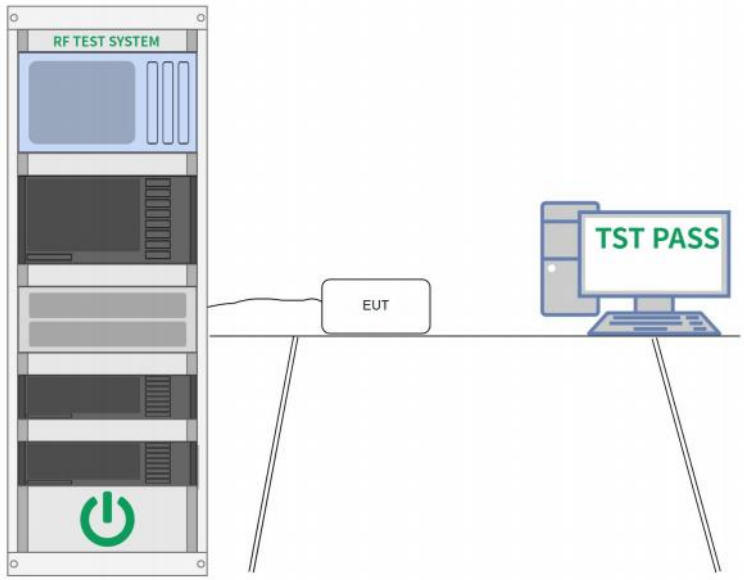
4.2 Duty Cycle

Test Requirement:	All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, T, are required for each tested mode of operation.
Test Limit:	No limits, only for report use.
Test Method:	ANSI C63.10-2020 section 12.2 (b)
Procedure:	i) Set the center frequency of the instrument to the center frequency of the transmission. ii) Set RBW >= EBW if possible; otherwise, set RBW to the largest available value. iii) Set VBW >= RBW. iv) Set detector = peak. v) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T, where T is defined in item a1) of 12.2, and the number of sweep points across duration T exceeds 100.

4.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.6 °C	Humidity:	52 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM1, TM2, TM3, TM4				

4.2.2 Test Setup Diagram:



4.2.3 Test Data:

Please Refer to Appendix for Details.

4.3 Emission bandwidth and occupied bandwidth

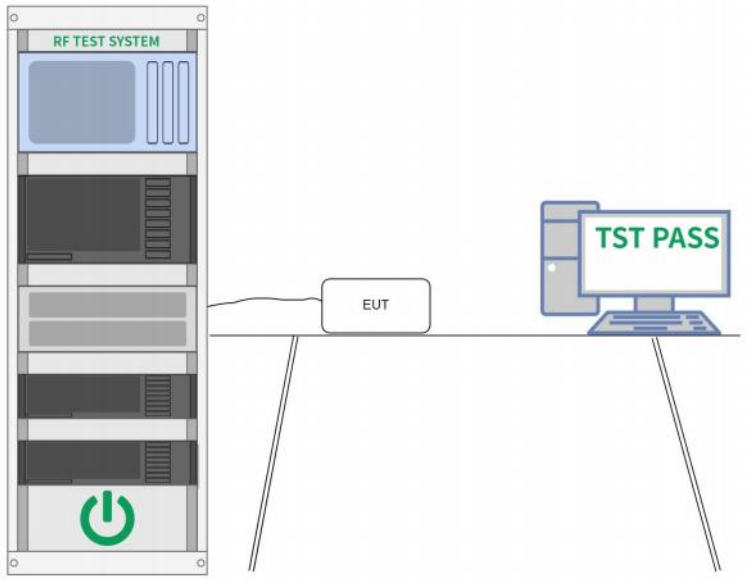
Test Requirement:	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use. U-NII 3, U-NII 4: 47 CFR Part 15.407(e)
Test Limit:	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use. U-NII 3, U-NII 4: Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.
Test Method:	ANSI C63.10-2020, section 6.9 & 12.5 KDB 789033 D02, Clause C.2
Procedure:	Emission bandwidth: a) Set RBW = approximately 1% of the emission bandwidth. b) Set the VBW > RBW. c) Detector = peak. d) Trace mode = max hold. e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%. Occupied bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW,and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth. g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies. h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s). 6 dB emission bandwidth: a) Set RBW = 100 kHz. b) Set the video bandwidth (VBW) ≥ 3 >= RBW. c) Detector = Peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in

	the fundamental emission.

4.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.6 °C	Humidity:	52 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM1, TM2, TM3, TM4				

4.3.2 Test Setup Diagram:



4.3.3 Test Data:

Please Refer to Appendix for Details.

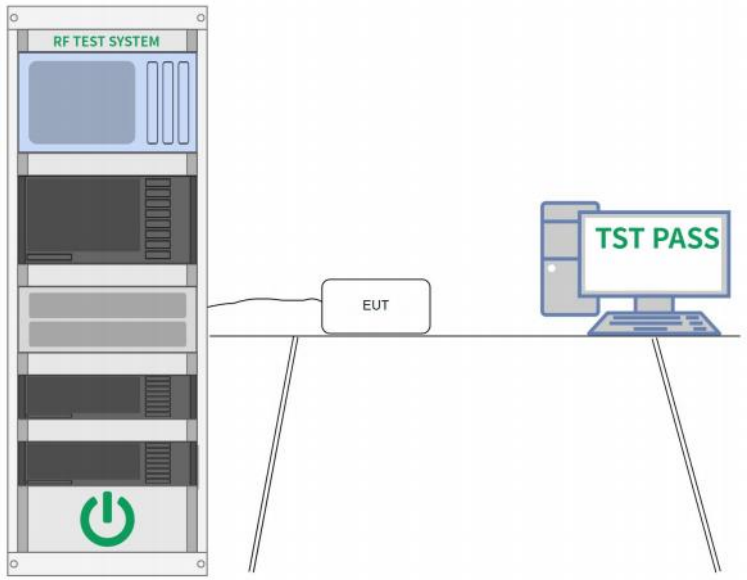
4.4 Maximum conducted output power

Test Requirement:	47 CFR Part 15.407(a)(1)(ii) 47 CFR Part 15.407(a)(3)(i)
Test Limit:	For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
Test Method:	ANSI C63.10-2020, section 12.4
Procedure:	Refer to ANSI C63.10-2020 section 12.4

4.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.6 °C	Humidity:	52 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM1, TM2, TM3, TM4				

4.4.2 Test Setup Diagram:



4.4.3 Test Data:

Please Refer to Appendix for Details.

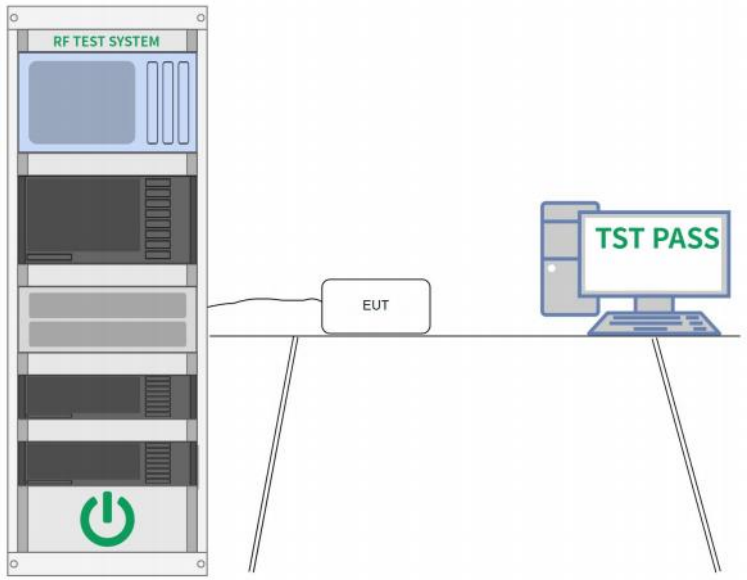
4.5 Power spectral density

Test Requirement:	47 CFR Part 15.407(a)(1)(ii) 47 CFR Part 15.407(a)(3)(i)
Test Limit:	For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For the band 5.725-5.850 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
Test Method:	ANSI C63.10-2020, section 12.6
Procedure:	Refer to ANSI C63.10-2020, section 12.6

4.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.6 °C	Humidity:	52 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM1, TM2, TM3, TM4				

4.5.2 Test Setup Diagram:



4.5.3 Test Data:

Please Refer to Appendix for Details.

4.6 Band edge emissions (Radiated)

Test Requirement:	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)
Test Limit:	For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. For transmitters operating solely in the 5.725-5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1] 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35apply to these measurements.

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Method: ANSI C63.10-2020, section 12.7.4, 12.7.6, 12.7.7

Procedure:

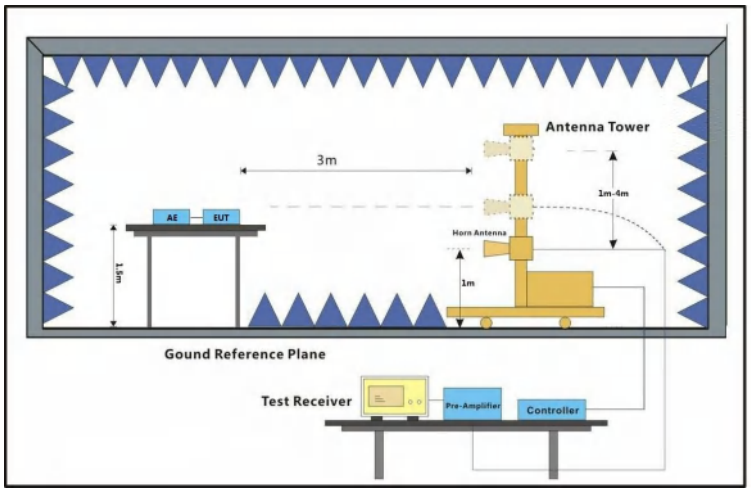
Above 1GHz:
a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
i. Repeat above procedures until all frequencies measured was complete.
Remark:
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower

	than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

4.6.1 E.U.T. Operation:

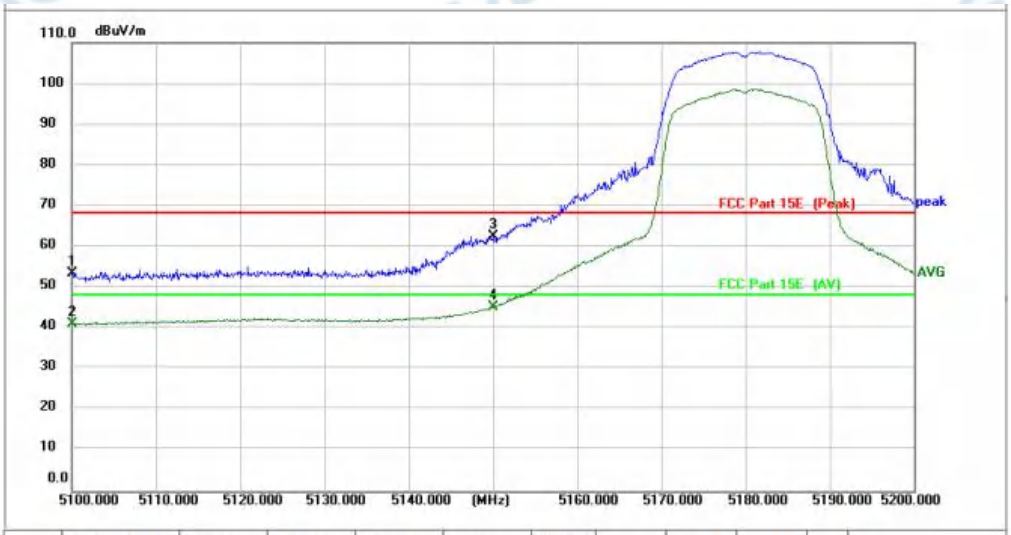
Operating Environment:					
Temperature:	23.6 °C	Humidity:	52 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM3				

4.6.2 Test Setup Diagram:



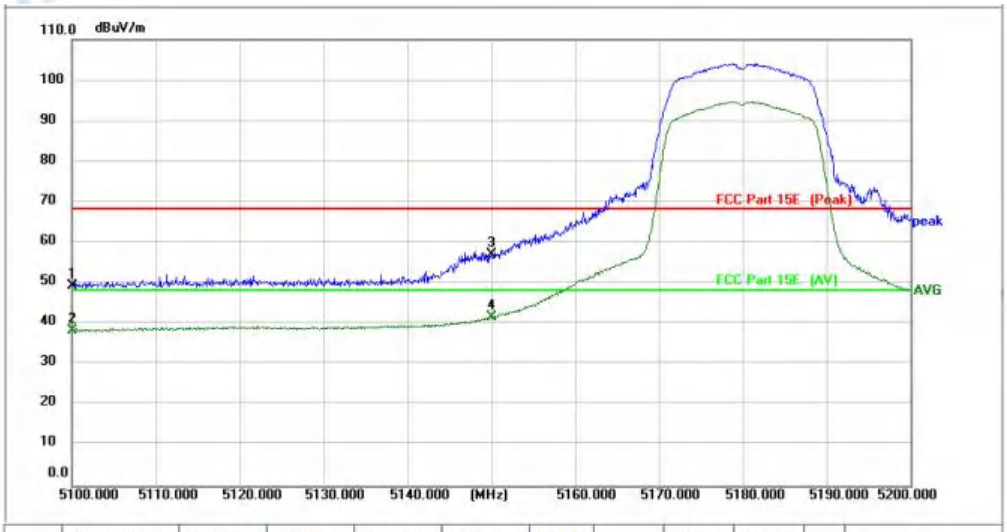
4.6.3 Test Data:

TM3-MIMO / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: L



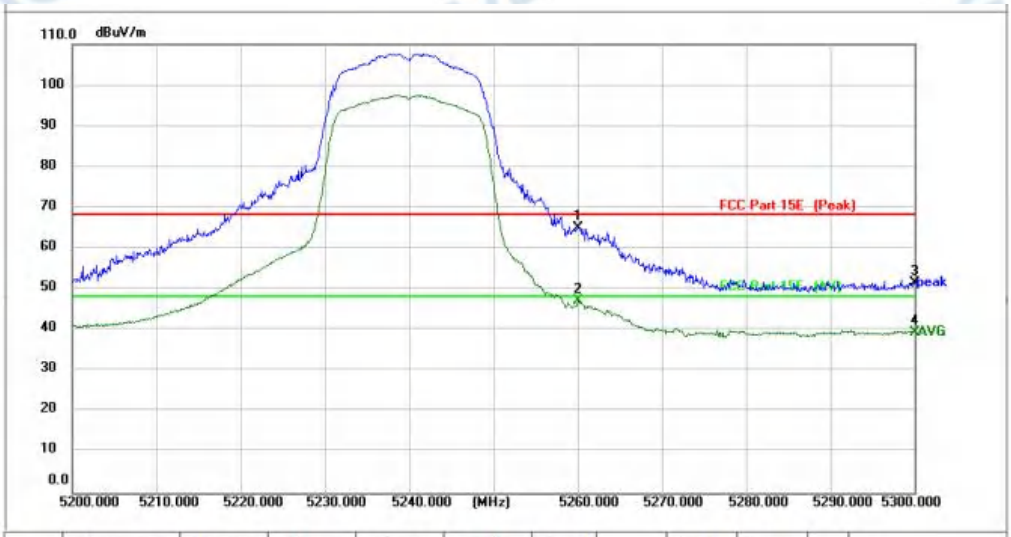
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5100.000	49.23	4.26	53.49	68.20	-14.71	peak	150		P	
2	5100.000	36.90	4.26	41.16	48.20	-7.04	AVG	150		P	
3	5150.000	58.20	4.40	62.60	68.20	-5.60	peak	150		P	
4 *	5150.000	40.93	4.40	45.33	48.20	-2.87	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: L



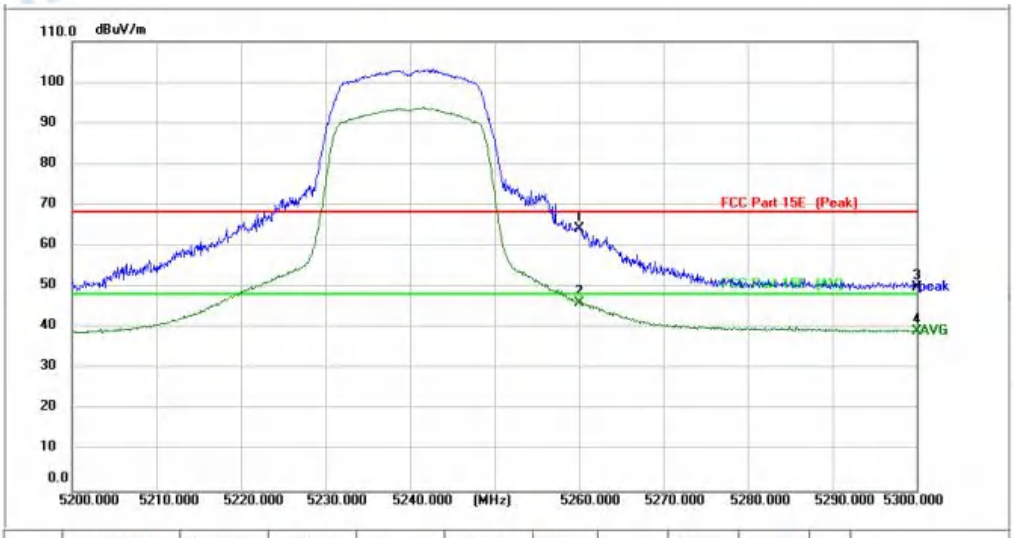
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5100.000	45.16	4.26	49.42	68.20	-18.78	peak	150		P	
2	5100.000	34.23	4.26	38.49	48.20	-9.71	AVG	150		P	
3	5150.000	52.53	4.40	56.93	68.20	-11.27	peak	150		P	
4 *	5150.000	37.26	4.40	41.66	48.20	-6.54	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: H



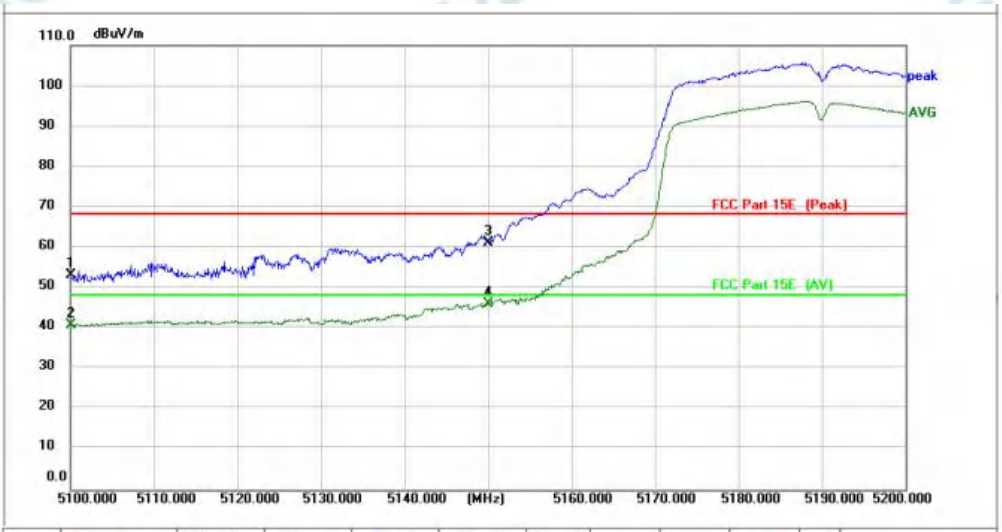
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5260.000	60.40	4.73	65.13	68.20	-3.07	peak	150		P	
2 *	5260.000	42.31	4.73	47.04	48.20	-1.16	AVG	150		P	
3	5300.000	46.64	4.85	51.49	68.20	-16.71	peak	150		P	
4	5300.000	34.67	4.85	39.52	48.20	-8.68	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: H



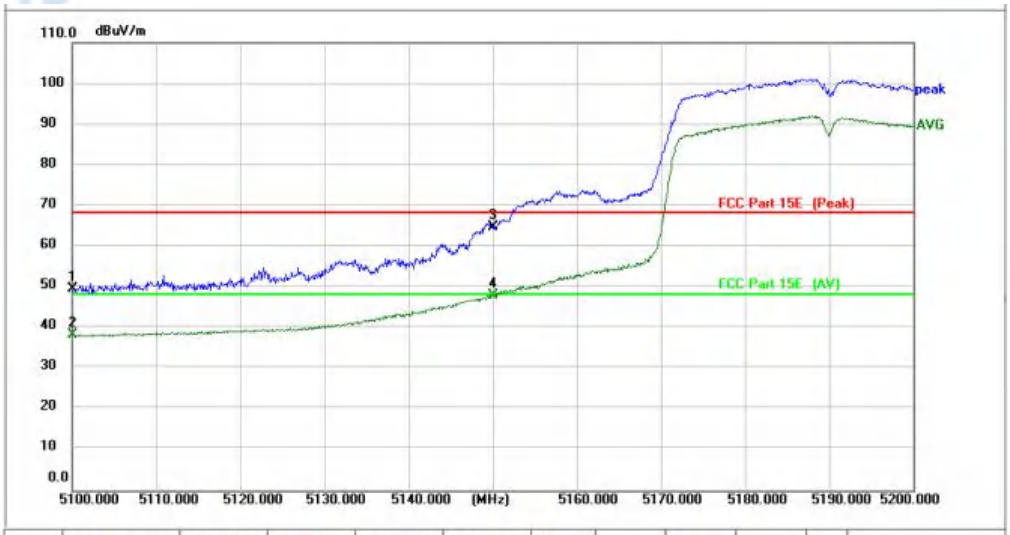
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5260.000	59.49	4.73	64.22	68.20	-3.98	peak	150		P	
2 *	5260.000	41.38	4.73	46.11	48.20	-2.09	AVG	150		P	
3	5300.000	45.12	4.85	49.97	68.20	-18.23	peak	150		P	
4	5300.000	34.41	4.85	39.26	48.20	-8.94	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 40 / CH: L



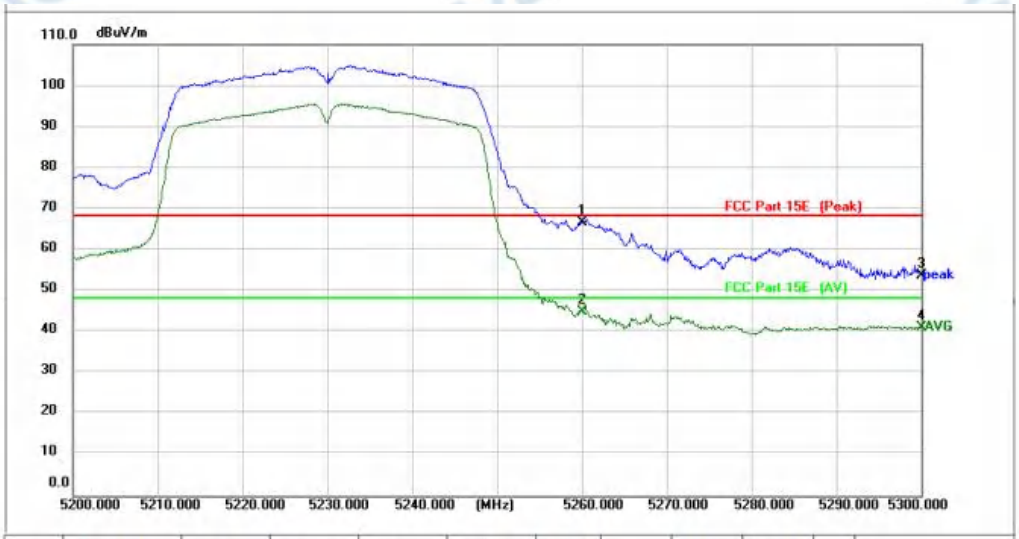
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5100.000	48.88	4.26	53.14	68.20	-15.06	peak	150		P	
2	5100.000	36.69	4.26	40.95	48.20	-7.25	AVG	150		P	
3	5150.000	56.85	4.40	61.25	68.20	-6.95	peak	150		P	
4 *	5150.000	41.72	4.40	46.12	48.20	-2.08	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5150-5250 MHz / BW: 40 / CH: L



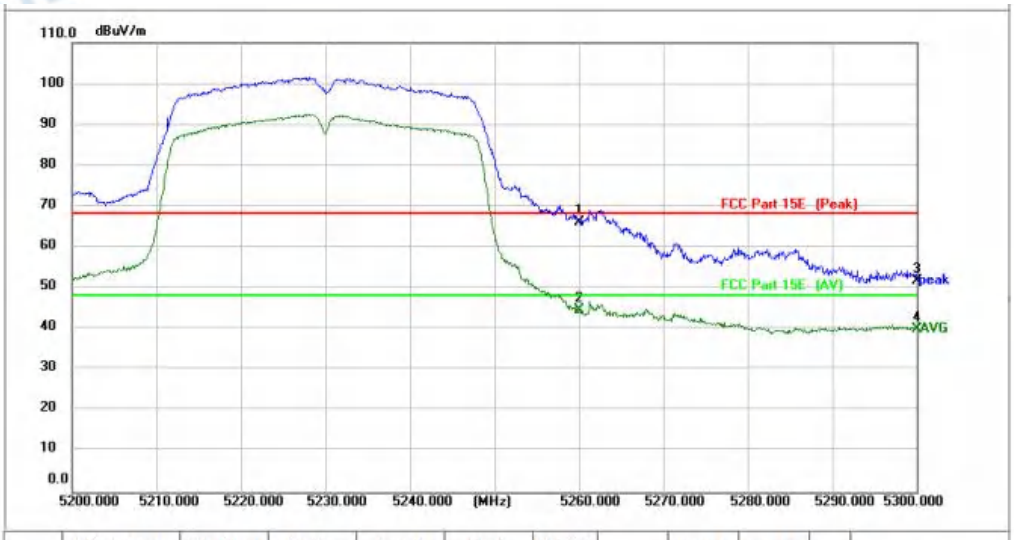
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5100.000	45.44	4.26	49.70	68.20	-18.50	peak	150		P	
2	5100.000	33.97	4.26	38.23	48.20	-9.97	AVG	150		P	
3	5150.000	60.50	4.40	64.90	68.20	-3.30	peak	150		P	
4 *	5150.000	43.71	4.40	48.11	48.20	-0.09	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 40 / CH: H



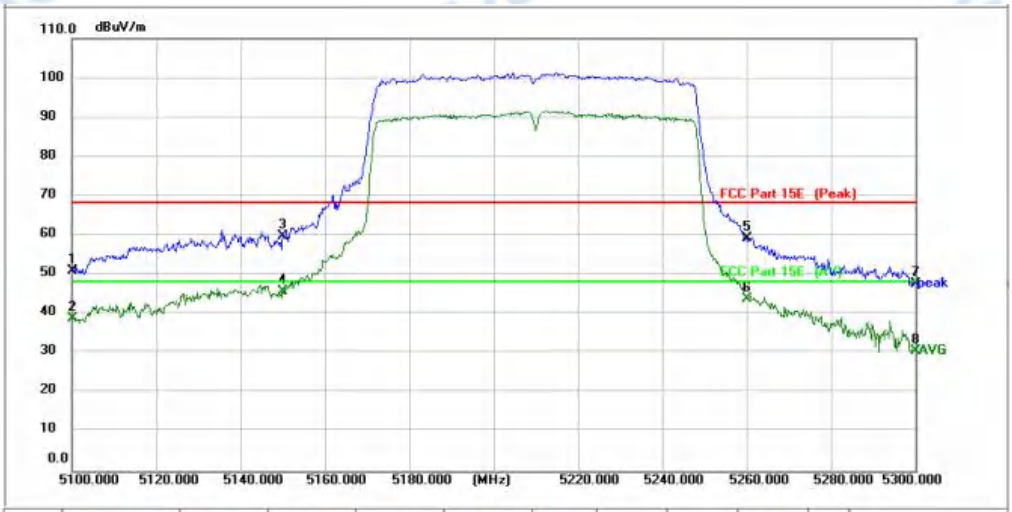
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	5260.000	61.84	4.73	66.57	68.20	-1.63	peak	150		P	
2	5260.000	40.29	4.73	45.02	48.20	-3.18	AVG	150		P	
3	5300.000	49.01	4.85	53.86	68.20	-14.34	peak	150		P	
4	5300.000	36.30	4.85	41.15	48.20	-7.05	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5150-5250 MHz / BW: 40 / CH: H



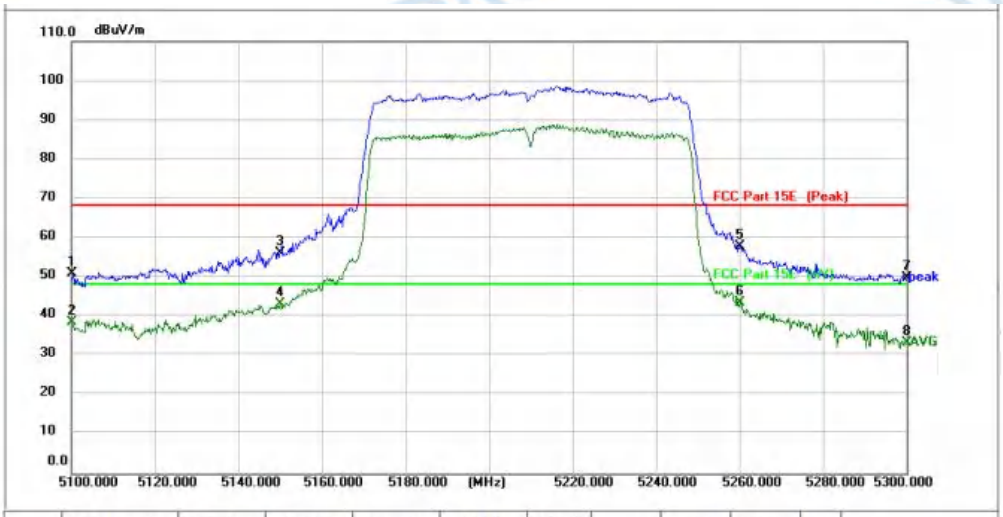
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	5260.000	61.41	4.73	66.14	68.20	-2.06	peak	150		P	
2	5260.000	40.07	4.73	44.80	48.20	-3.40	AVG	150		P	
3	5300.000	47.11	4.85	51.96	68.20	-16.24	peak	150		P	
4	5300.000	35.13	4.85	39.98	48.20	-8.22	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 80



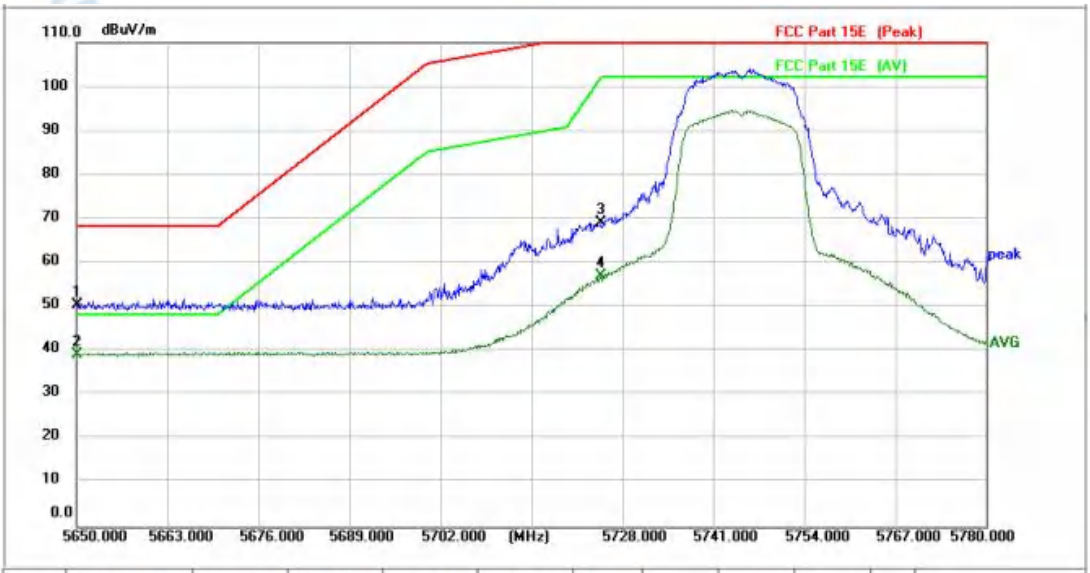
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5100.000	46.81	4.26	51.07	68.20	-17.13	peak	150		P	
2	5100.000	34.59	4.26	38.85	48.20	-9.35	AVG	150		P	
3	5150.000	55.43	4.40	59.83	68.20	-8.37	peak	150		P	
4 *	5150.000	41.45	4.40	45.85	48.20	-2.35	AVG	150		P	
5	5260.000	54.48	4.73	59.21	68.20	-8.99	peak	150		P	
6	5260.000	39.14	4.73	43.87	48.20	-4.33	AVG	150		P	
7	5300.000	42.92	4.85	47.77	68.20	-20.43	peak	150		P	
8	5300.000	25.90	4.85	30.75	48.20	-17.45	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5150-5250 MHz / BW: 80



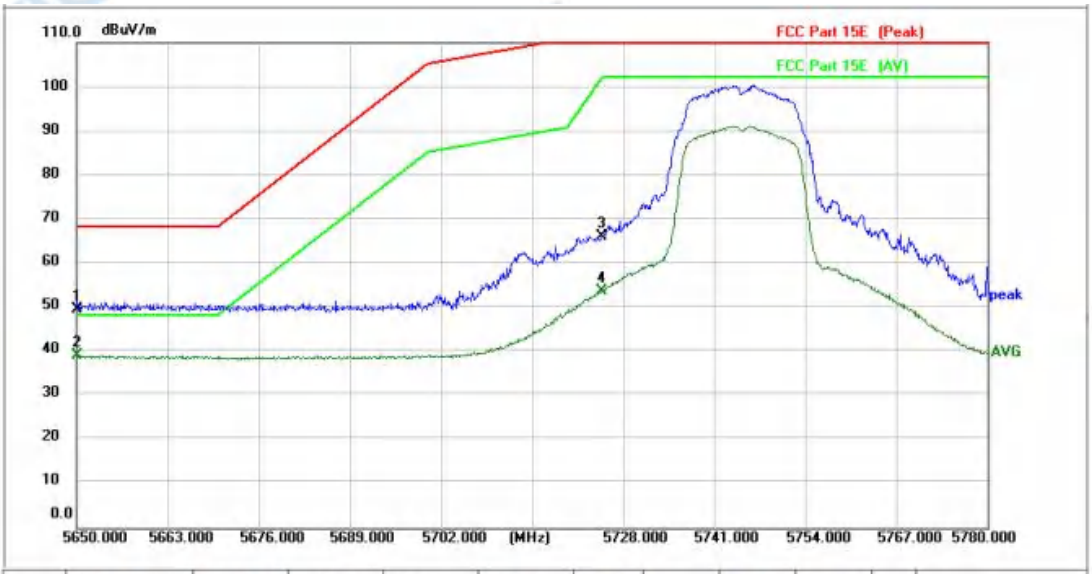
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5100.000	46.70	4.26	50.96	68.20	-17.24	peak	150		P	
2	5100.000	34.50	4.26	38.76	48.20	-9.44	AVG	150		P	
3	5150.000	51.74	4.40	56.14	68.20	-12.06	peak	150		P	
4	5150.000	38.96	4.40	43.36	48.20	-4.84	AVG	150		P	
5	5260.000	53.12	4.73	57.85	68.20	-10.35	peak	150		P	
6 *	5260.000	38.76	4.73	43.49	48.20	-4.71	AVG	150		P	
7	5300.000	45.19	4.85	50.04	68.20	-18.16	peak	150		P	
8	5300.000	28.51	4.85	33.36	48.20	-14.84	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5725-5850 MHz / BW: 20 / CH: L



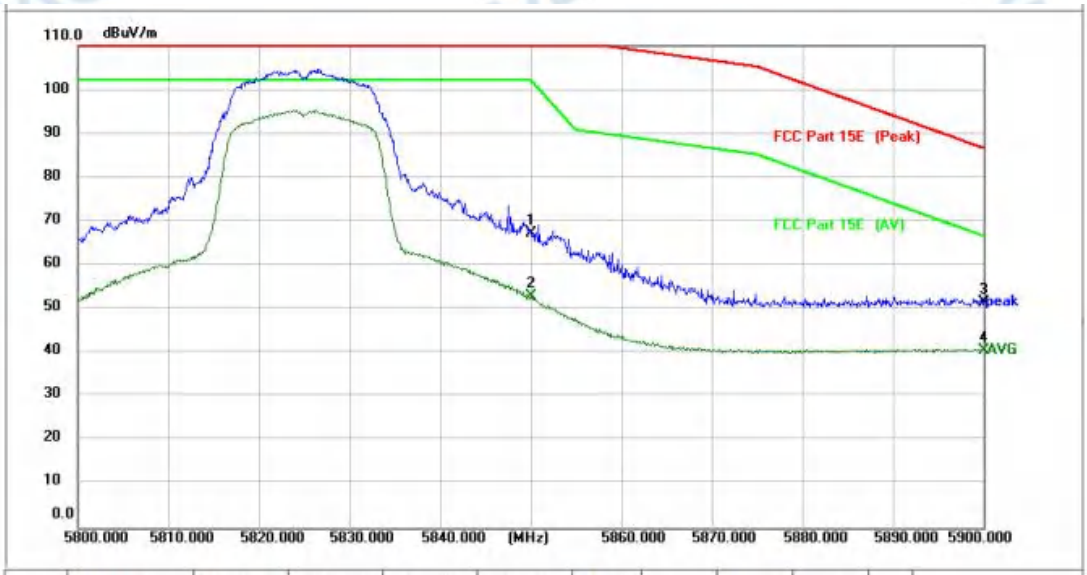
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5650.000	44.59	5.74	50.33	68.20	-17.87	peak	150		P	
2 *	5650.000	33.43	5.74	39.17	48.20	-9.03	AVG	150		P	
3	5725.000	63.28	5.90	69.18	122.20	-53.02	peak	150		P	
4	5725.000	51.14	5.90	57.04	102.20	-45.16	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5725-5850 MHz / BW: 20 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5650.000	44.03	5.74	49.77	68.20	-18.43	peak	150		P	
2 *	5650.000	33.40	5.74	39.14	48.20	-9.06	AVG	150		P	
3	5725.000	60.23	5.90	66.13	122.20	-56.07	peak	150		P	
4	5725.000	47.90	5.90	53.80	102.20	-48.40	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5725-5850 MHz / BW: 20 / CH: H

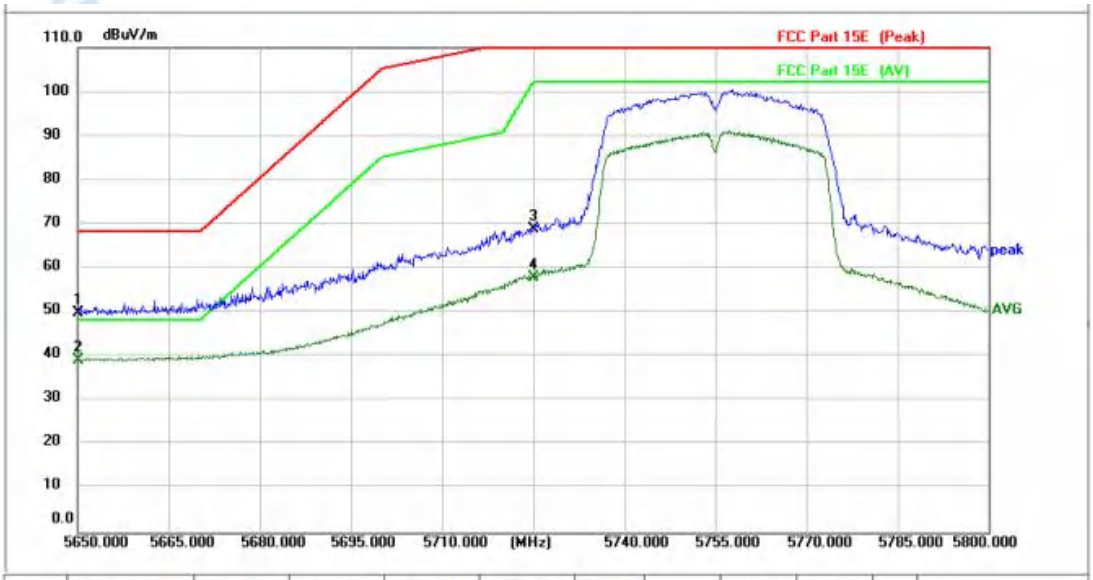


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5850.000	61.09	6.18	67.27	122.20	-54.93	peak	150		P	
2	5850.000	46.73	6.18	52.91	102.20	-49.29	AVG	150		P	
3	5900.000	45.15	6.28	51.43	86.66	-35.23	peak	150		P	
4 *	5900.000	34.42	6.28	40.70	66.66	-25.96	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5725-5850 MHz / BW: 20 / CH: H

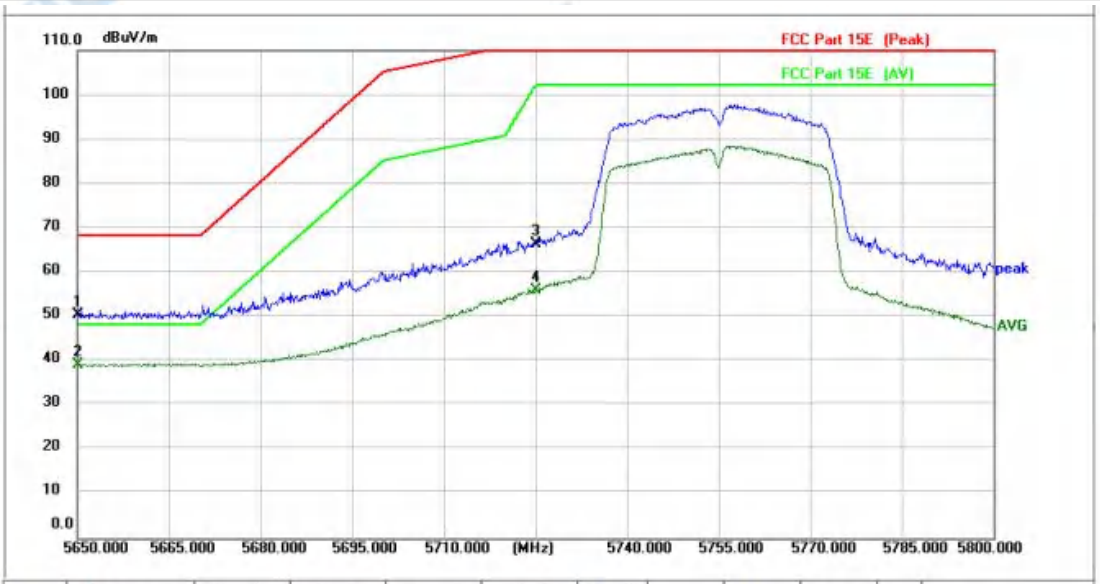
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5850.000	56.33	6.18	62.51	122.20	-59.69	peak	150		P	
2	5850.000	42.12	6.18	48.30	102.20	-53.90	AVG	150		P	
3	5900.000	43.72	6.28	50.00	86.66	-36.66	peak	150		P	
4 *	5900.000	32.56	6.28	38.84	66.66	-27.82	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5725-5850 MHz / BW: 40 / CH: L



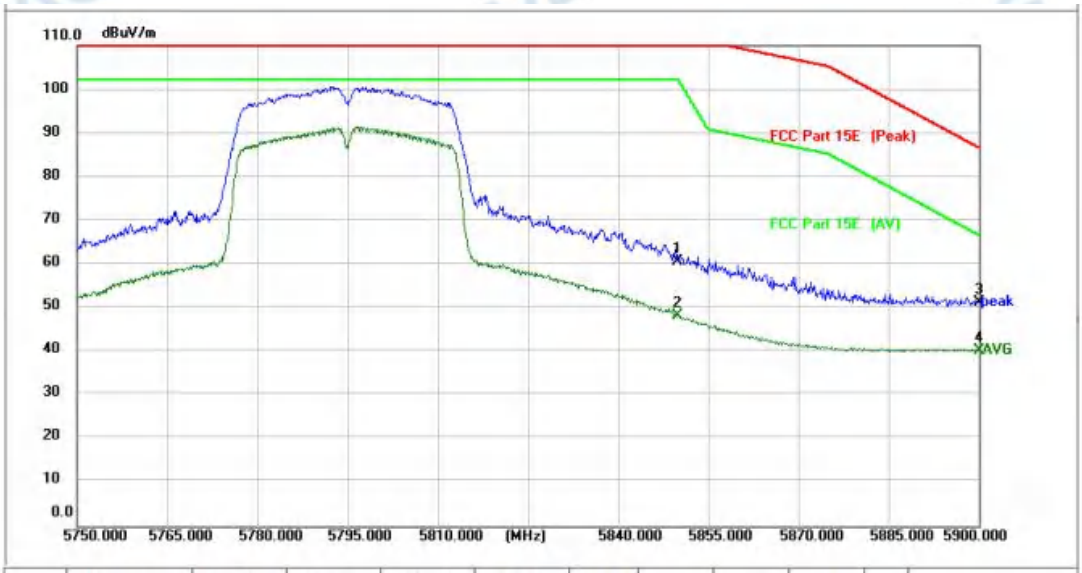
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5650.000	44.31	5.74	50.05	68.20	-18.15	peak	150		P	
2 *	5650.000	33.42	5.74	39.16	48.20	-9.04	AVG	150		P	
3	5725.000	63.04	5.90	68.94	122.20	-53.26	peak	150		P	
4	5725.000	52.09	5.90	57.99	102.20	-44.21	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5725-5850 MHz / BW: 40 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5650.000	44.68	5.74	50.42	68.20	-17.78	peak	150		P	
2 *	5650.000	33.52	5.74	39.26	48.20	-8.94	AVG	150		P	
3	5725.000	60.54	5.90	66.44	122.20	-55.76	peak	150		P	
4	5725.000	50.08	5.90	55.98	102.20	-46.22	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5725-5850 MHz / BW: 40 / CH: H

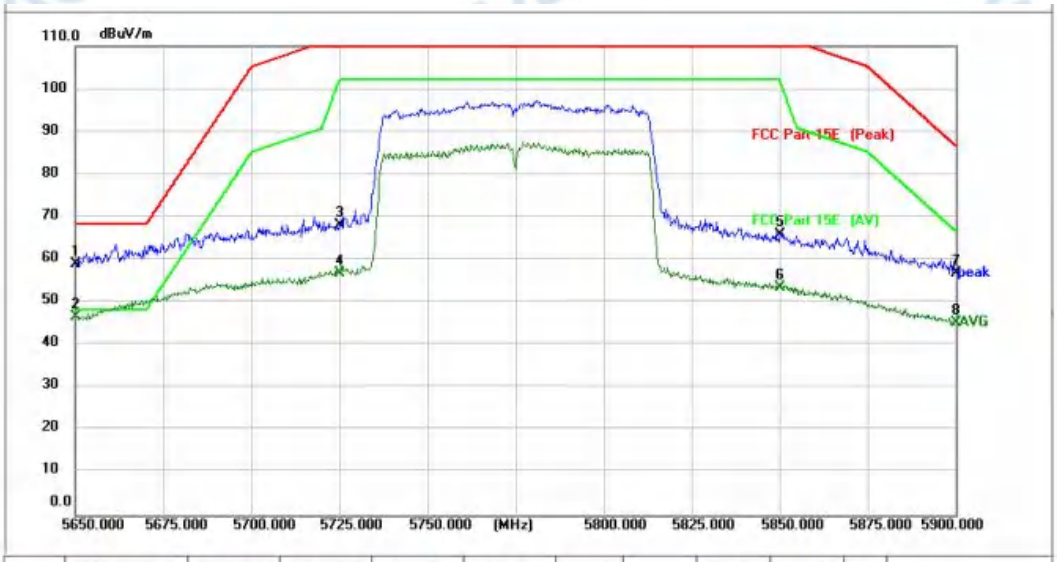


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5850.000	54.45	6.18	60.63	122.20	-61.57	peak	150		P	
2	5850.000	42.07	6.18	48.25	102.20	-53.95	AVG	150		P	
3	5900.000	45.14	6.28	51.42	86.66	-35.24	peak	150		P	
4 *	5900.000	33.92	6.28	40.20	66.66	-26.46	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5725-5850 MHz / BW: 40 / CH: H

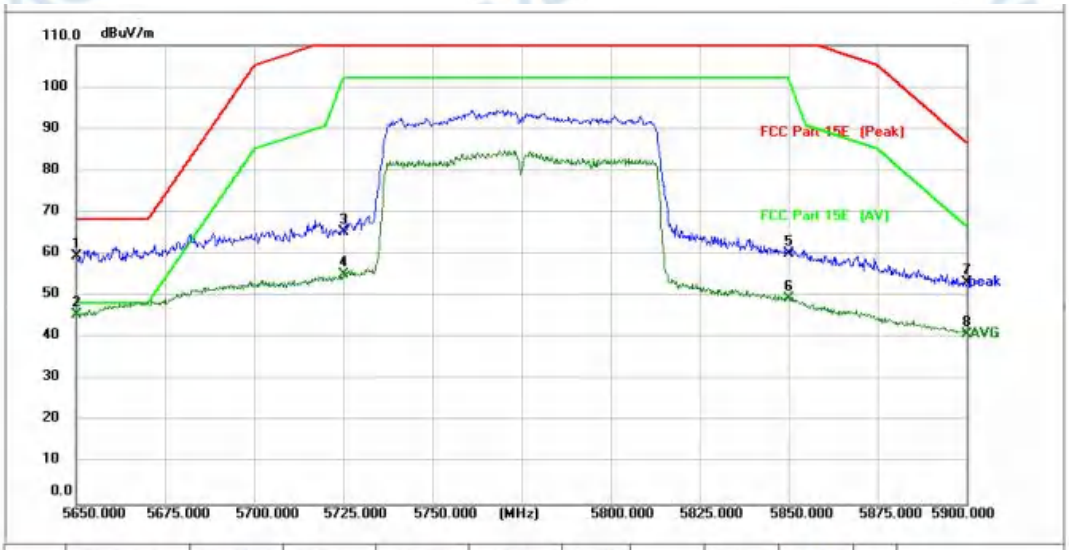
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5850.000	49.79	6.18	55.97	122.20	-66.23	peak	150		P	
2	5850.000	37.90	6.18	44.08	102.20	-58.12	AVG	150		P	
3	5900.000	43.93	6.28	50.21	86.66	-36.45	peak	150		P	
4 *	5900.000	32.56	6.28	38.84	66.66	-27.82	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5725-5850 MHz / BW: 80



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5650.000	53.24	5.74	58.98	68.20	-9.22	peak	150		P	
2 *	5650.000	40.79	5.74	46.53	48.20	-1.67	AVG	150		P	
3	5725.000	62.14	5.90	68.04	122.20	-54.16	peak	150		P	
4	5725.000	50.94	5.90	56.84	102.20	-45.36	AVG	150		P	
5	5850.000	59.55	6.18	65.73	122.20	-56.47	peak	150		P	
6	5850.000	47.31	6.18	53.49	102.20	-48.71	AVG	150		P	
7	5900.000	50.52	6.28	56.80	86.66	-29.86	peak	150		P	
8	5900.000	39.02	6.28	45.30	66.66	-21.36	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5725-5850 MHz / BW: 80



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5650.000	53.72	5.74	59.46	68.20	-8.74	peak	150		P	
2 *	5650.000	39.86	5.74	45.60	48.20	-2.60	AVG	150		P	
3	5725.000	59.49	5.90	65.39	122.20	-56.81	peak	150		P	
4	5725.000	49.11	5.90	55.01	102.20	-47.19	AVG	150		P	
5	5850.000	53.83	6.18	60.01	122.20	-62.19	peak	150		P	
6	5850.000	43.13	6.18	49.31	102.20	-52.89	AVG	150		P	
7	5900.000	47.04	6.28	53.32	86.66	-33.34	peak	150		P	
8	5900.000	34.64	6.28	40.92	66.66	-25.74	AVG	150		P	

Remark:Margin=Level - Limit, Level=Test receiver reading + correction factor

The test software will only record the worst test angle and height, and only the worst case will be recorded in the test report.

4.7 Undesirable emission limits (below 1GHz)

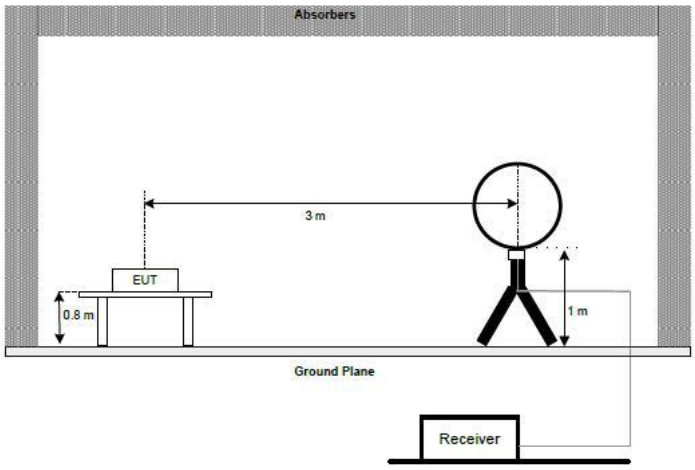
Test Requirement:	47 CFR Part 15.407(b)(9)
Test Limit:	Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table: **Frequency (MHz) / Field strength (microvolts/meter) / Measurement distance (meters)** 0.009-0.490 / 2400/F(kHz) / 300 0.490-1.705 / 24000/F(kHz) / 30 1.705-30.0 / 30 / 30 30-88 / 100 ** / 3 88-216 / 150 ** / 3 216-960 / 200 ** / 3 Above 960 / 500 / 3 ** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
Test Method:	ANSI C63.10-2020, section 12.7.4, 12.7.5
Procedure:	Below 1GHz: a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The

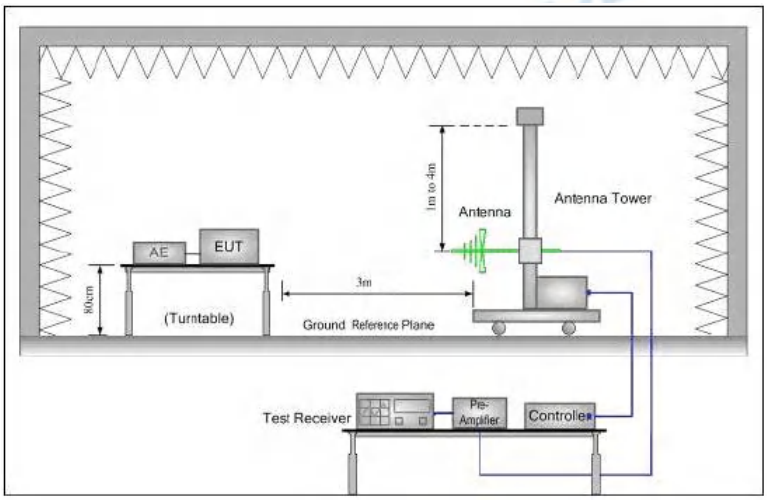
	points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. Above 1GHz: a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

4.7.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.6 °C	Humidity:	52 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM3				

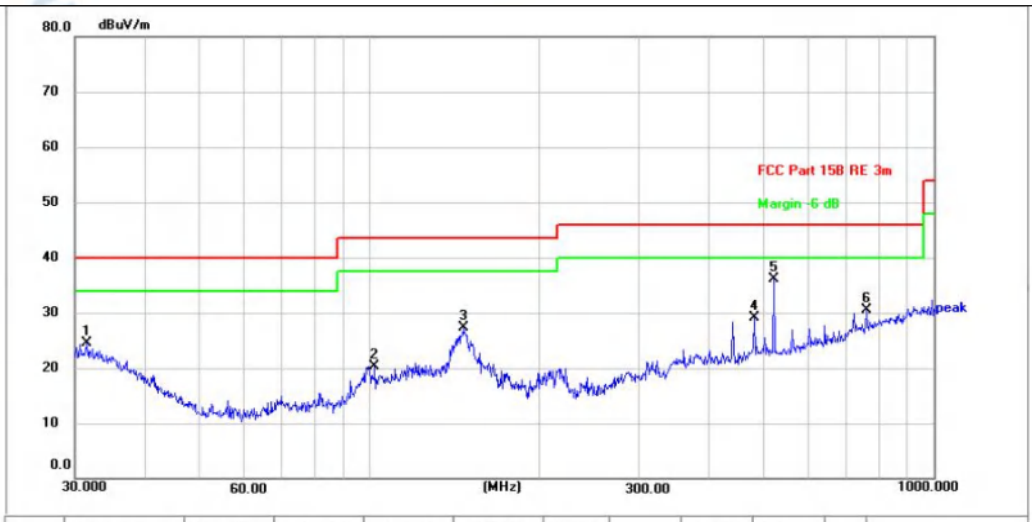
4.7.2 Test Setup Diagram:





4.7.3 Test Data:

TM3 / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	31.5095	27.23	-2.66	24.57	40.00	-15.43	peak	100		P	
2	102.0014	28.99	-8.63	20.36	43.50	-23.14	peak	100		P	
3	146.3735	34.85	-7.50	27.35	43.50	-16.15	peak	100		P	
4	480.5276	32.39	-3.19	29.20	46.00	-16.80	peak	100		P	
5 *	520.8882	39.50	-3.31	36.19	46.00	-9.81	peak	100		P	
6	760.7036	29.16	1.43	30.59	46.00	-15.41	peak	100		P	

TM3 / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	99.1797	42.61	-9.46	33.15	43.50	-10.35	QP			P	
2	120.6991	40.77	-6.81	33.96	43.50	-9.54	QP			P	
3	299.3158	42.48	-8.09	34.39	46.00	-11.61	QP			P	
4	403.2500	37.80	-5.68	32.12	46.00	-13.88	QP			P	
5	520.8882	38.25	-3.29	34.96	46.00	-11.04	QP			P	
6 *	729.3582	41.45	1.05	42.50	46.00	-3.50	QP			P	

Remark:Margin=Level - Limit, Level=Test receiver reading + correction factor

The test software will only record the worst test angle and height, and only the worst case will be recorded in the test report.

4.8 Undesirable emission limits (above 1GHz)

Test Requirement:	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)
Test Limit:	For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. For transmitters operating solely in the 5.725-5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1] 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35apply to these measurements.

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Method: ANSI C63.10-2020, section 12.7.4, 12.7.6, 12.7.7

Procedure:

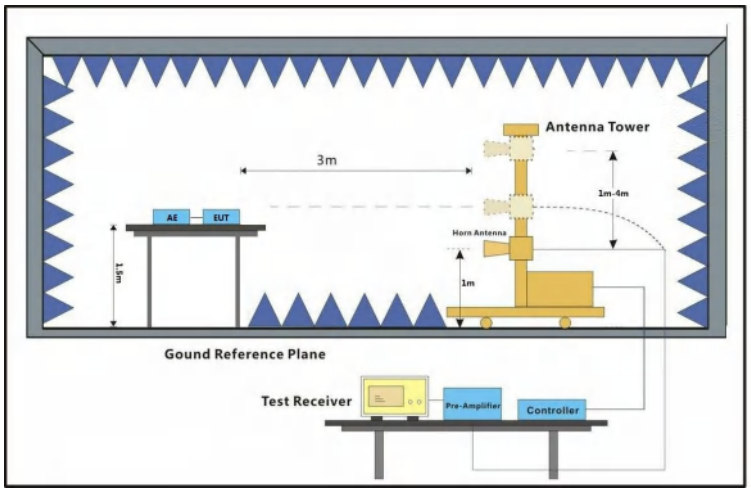
Above 1GHz:
a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
i. Repeat above procedures until all frequencies measured was complete.
Remark:
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower

	than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

4.8.1 E.U.T. Operation:

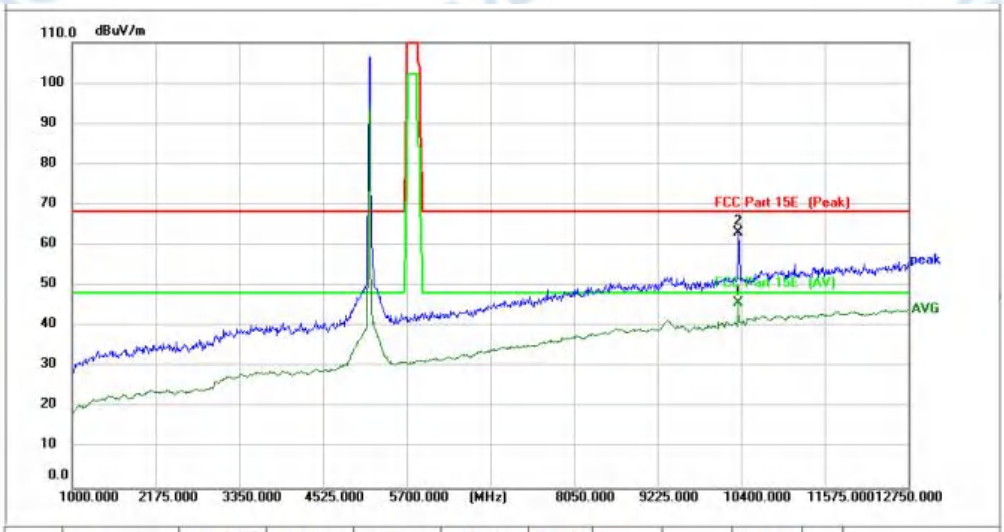
Operating Environment:					
Temperature:	23.6 °C	Humidity:	52 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM3				

4.8.2 Test Setup Diagram:



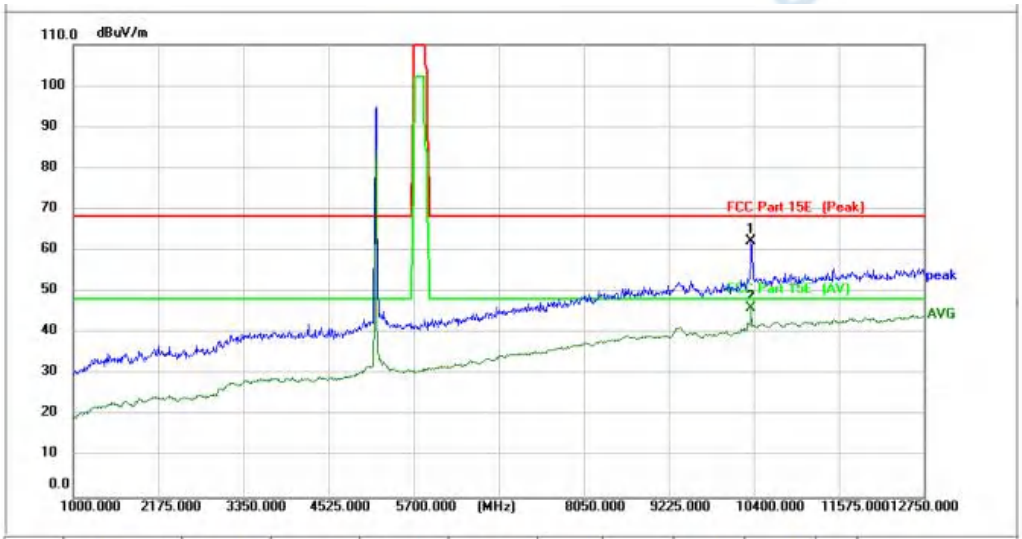
4.8.3 Test Data:

TM3-MIMO / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: L



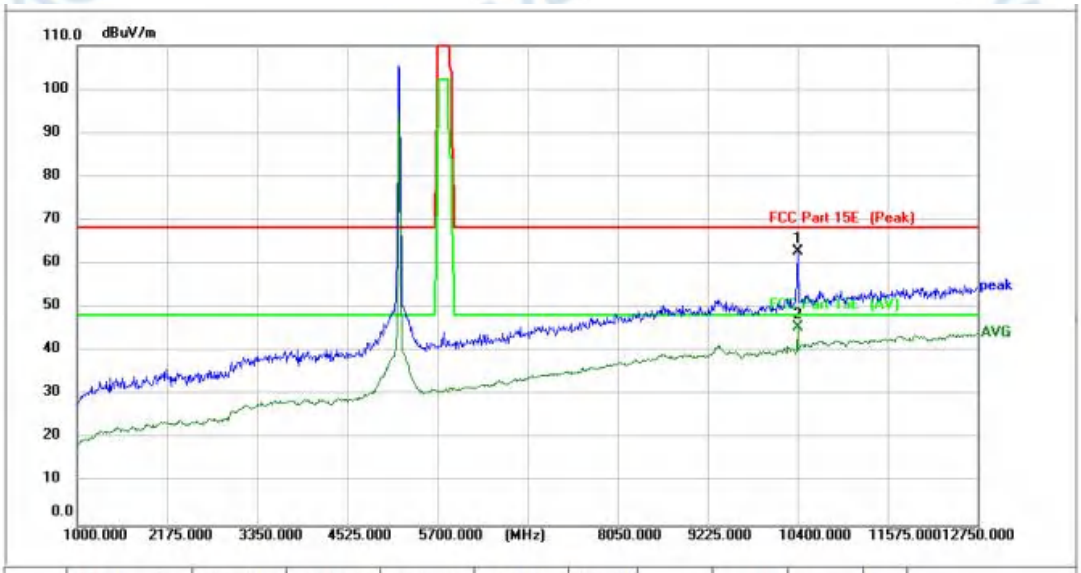
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	10353.000	29.63	16.08	45.71	48.20	-2.49	AVG	150		P	
2	10364.750	47.02	16.13	63.15	68.20	-5.05	peak	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: L



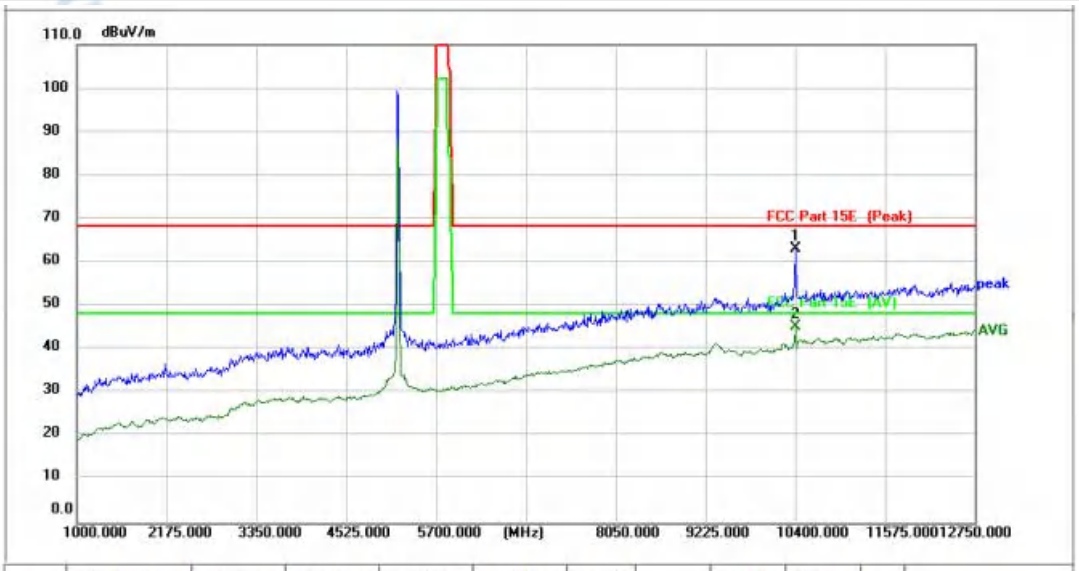
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	10364.750	46.20	16.13	62.33	68.20	-5.87	peak	150		P	
2 *	10364.750	29.93	16.13	46.06	48.20	-2.14	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: M



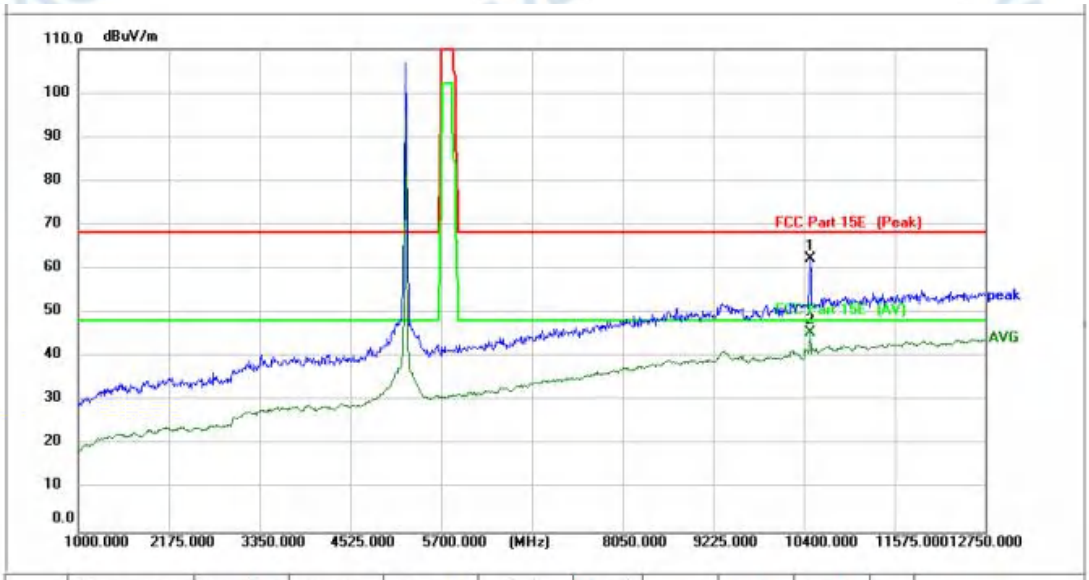
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	10400.000	46.49	16.22	62.71	68.20	-5.49	peak	150		P	
2 *	10400.000	29.24	16.22	45.46	48.20	-2.74	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: M



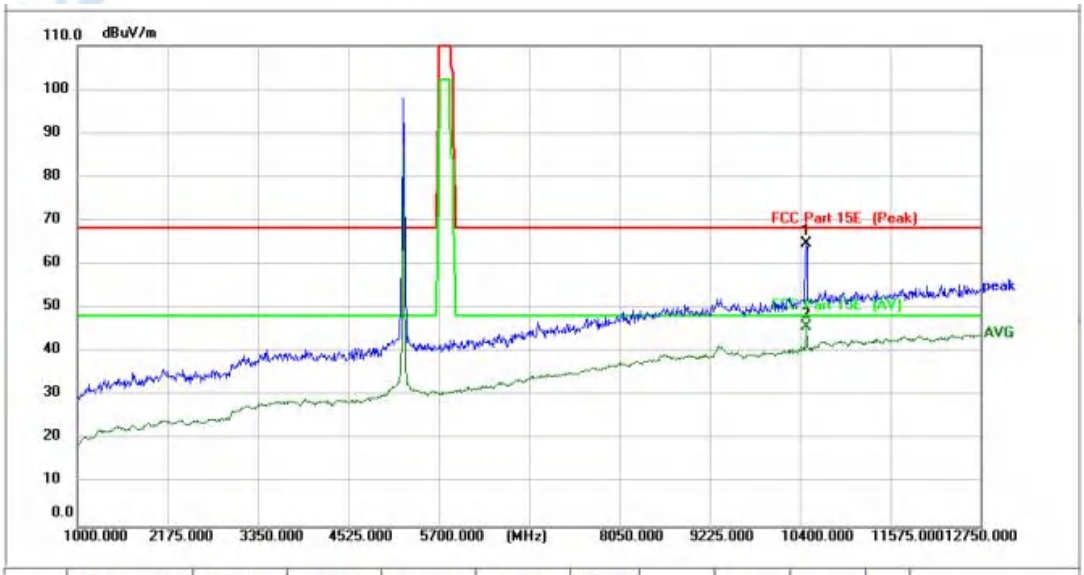
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	10400.000	46.89	16.22	63.11	68.20	-5.09	peak	150		P	
2 *	10400.000	29.10	16.22	45.32	48.20	-2.88	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: H



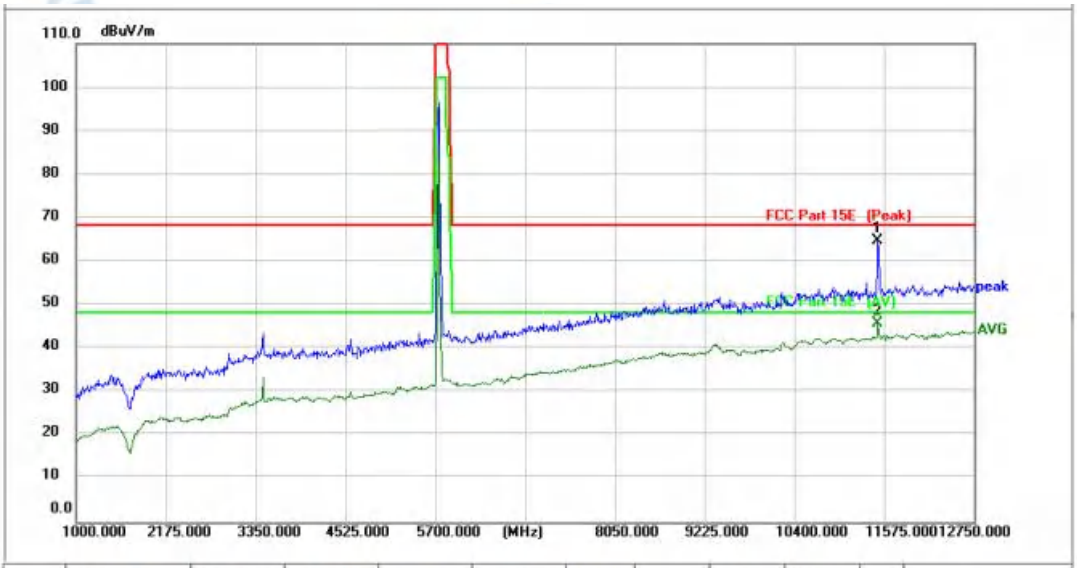
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	10482.250	45.94	16.46	62.40	68.20	-5.80	peak	150		P	
2 *	10482.250	28.98	16.46	45.44	48.20	-2.76	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: H



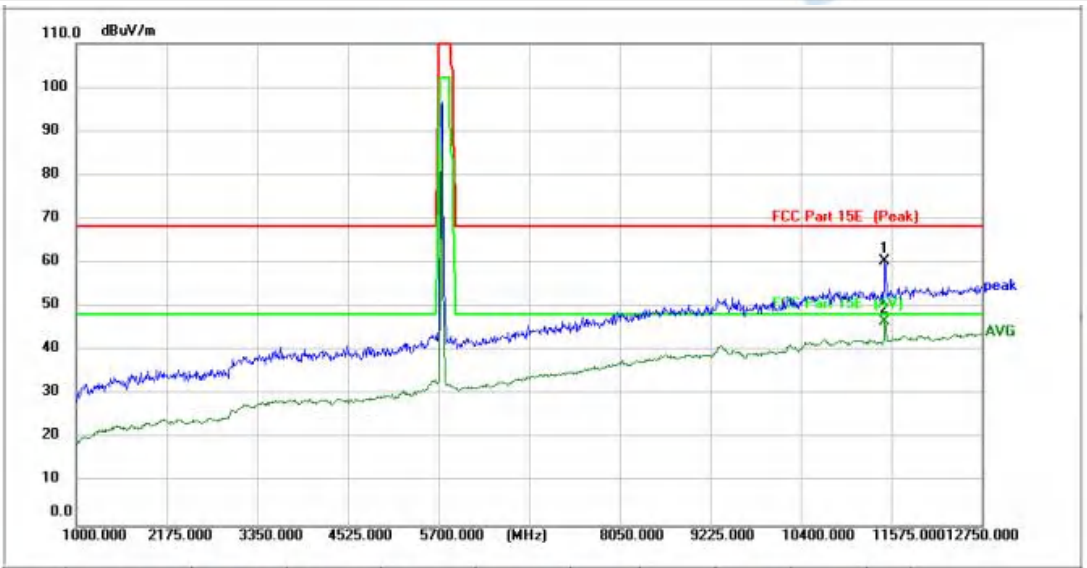
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	10482.250	48.32	16.46	64.78	68.20	-3.42	peak	150		P	
2 *	10482.250	29.27	16.46	45.73	48.20	-2.47	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5725-5850 MHz / BW: 20 / CH: L



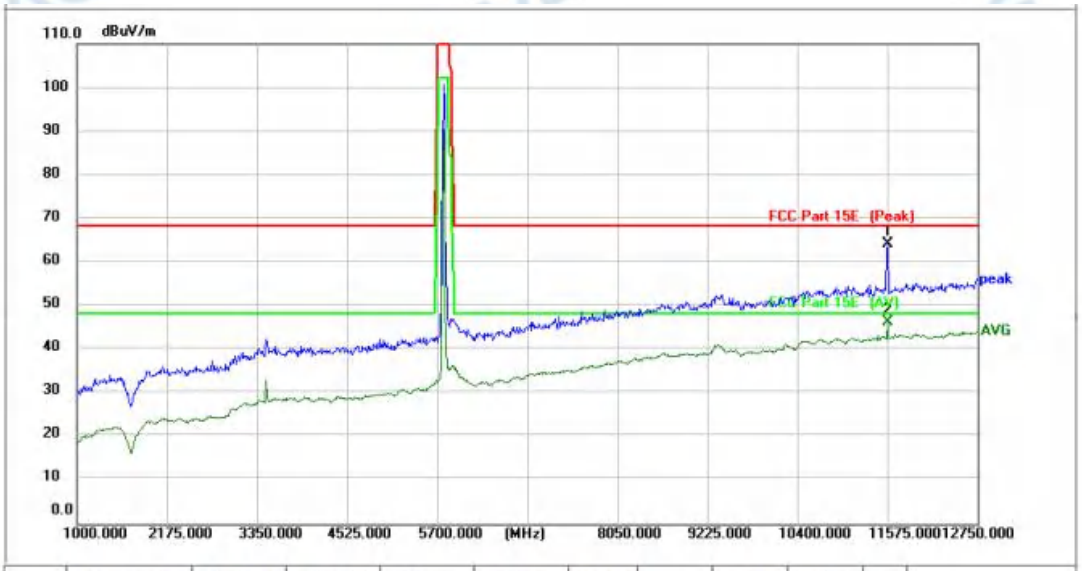
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	11492.750	47.23	17.66	64.89	68.20	-3.31	peak			P	
2 *	11492.750	28.26	17.66	45.92	48.20	-2.28	AVG			P	

TM3-MIMO / Polarization: Vertical / Band: 5725-5850 MHz / BW: 20 / CH: L



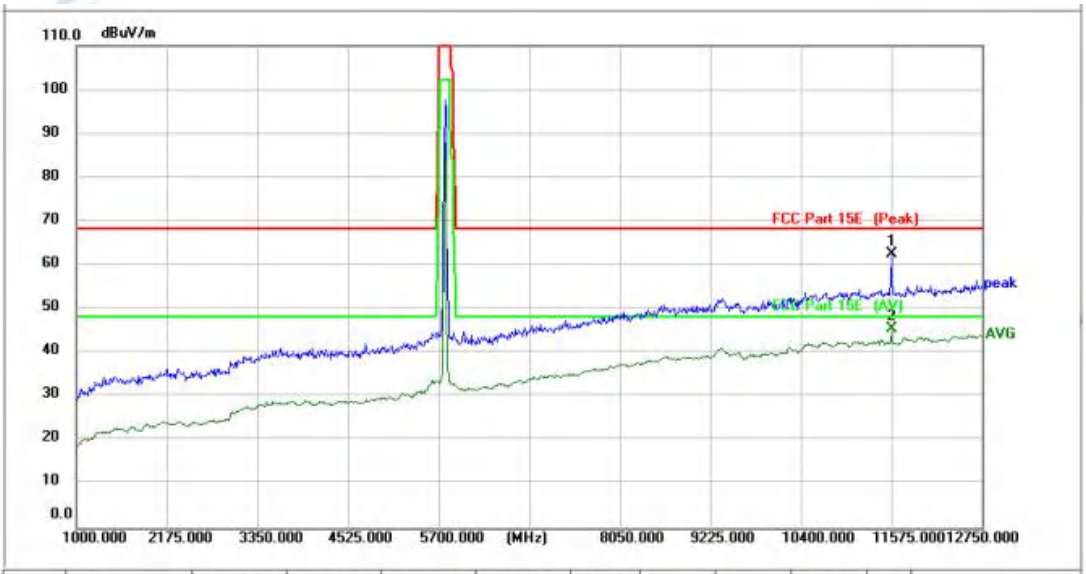
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	11492.750	42.71	17.66	60.37	68.20	-7.83	peak	150		P	
2 *	11492.750	29.02	17.66	46.68	48.20	-1.52	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5725-5850 MHz / BW: 20 / CH: M



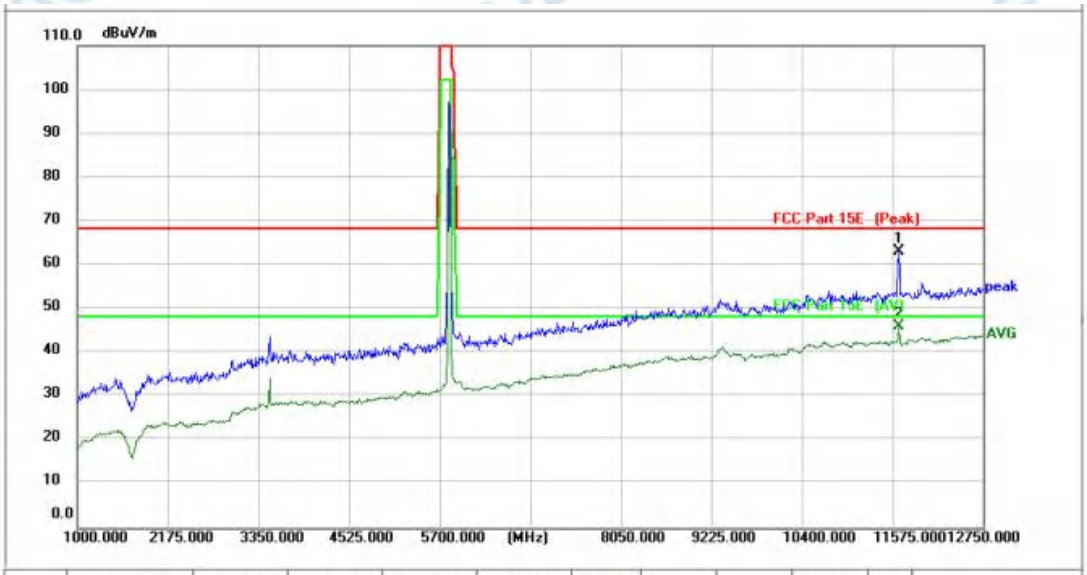
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	11575.000	46.39	17.72	64.11	68.20	-4.09	peak	150		P	
2 *	11575.000	28.50	17.72	46.22	48.20	-1.98	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5725-5850 MHz / BW: 20 / CH: M



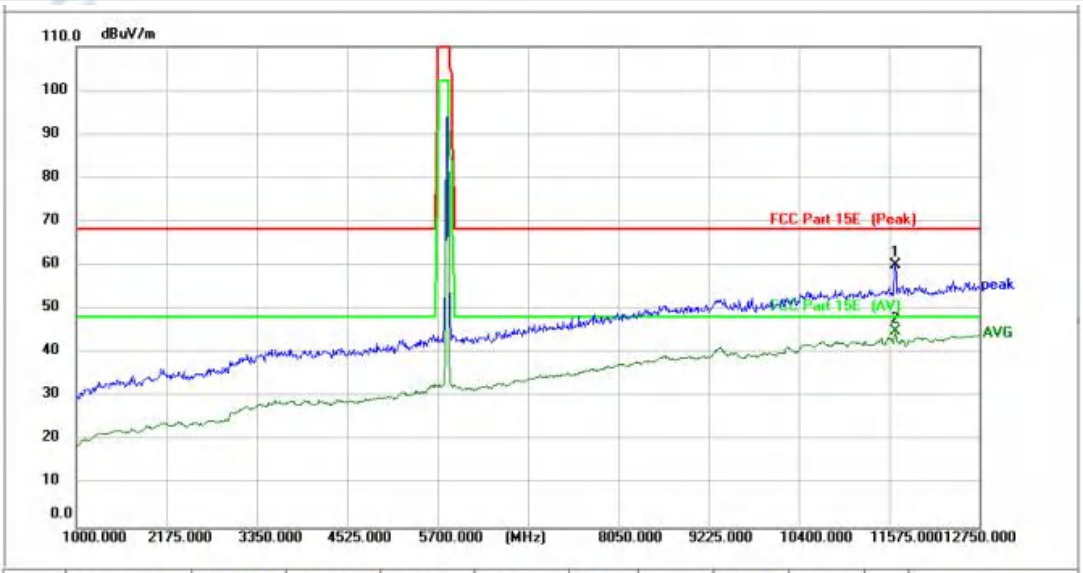
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	11575.000	44.84	17.72	62.56	68.20	-5.64	peak	150		P	
2 *	11575.000	27.71	17.72	45.43	48.20	-2.77	AVG	150		P	

TM3-MIMO / Polarization: Horizontal / Band: 5725-5850 MHz / BW: 20 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	11657.250	45.42	17.77	63.19	68.20	-5.01	peak	150		P	
2 *	11657.250	28.34	17.77	46.11	48.20	-2.09	AVG	150		P	

TM3-MIMO / Polarization: Vertical / Band: 5725-5850 MHz / BW: 20 / CH: H



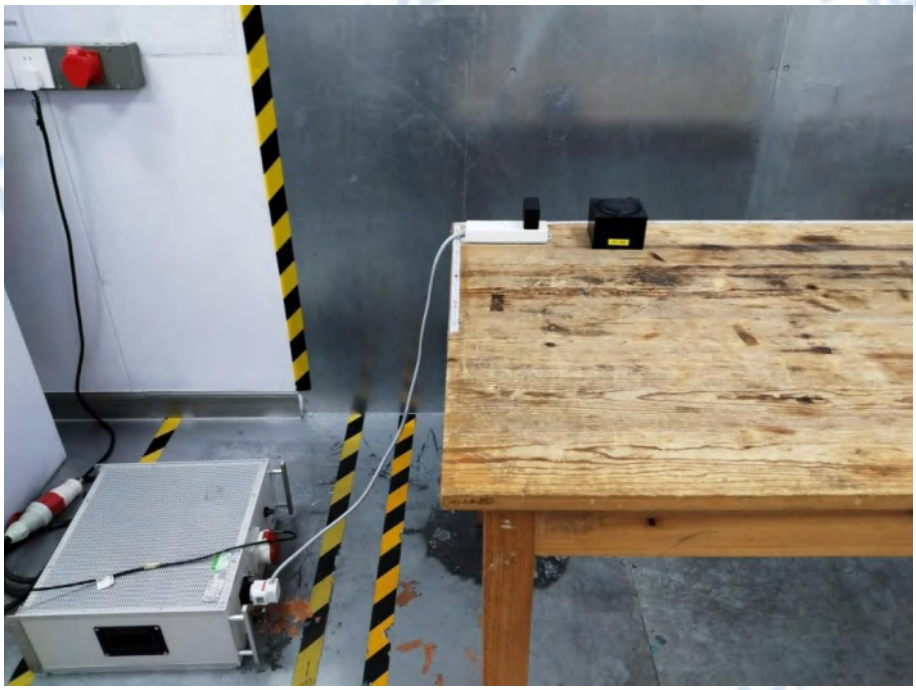
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	11657.250	42.31	17.77	60.08	68.20	-8.12	peak	150		P	
2 *	11657.250	27.25	17.77	45.02	48.20	-3.18	AVG	150		P	

Remark:Margin=Level - Limit, Level=Test receiver reading + correction factor

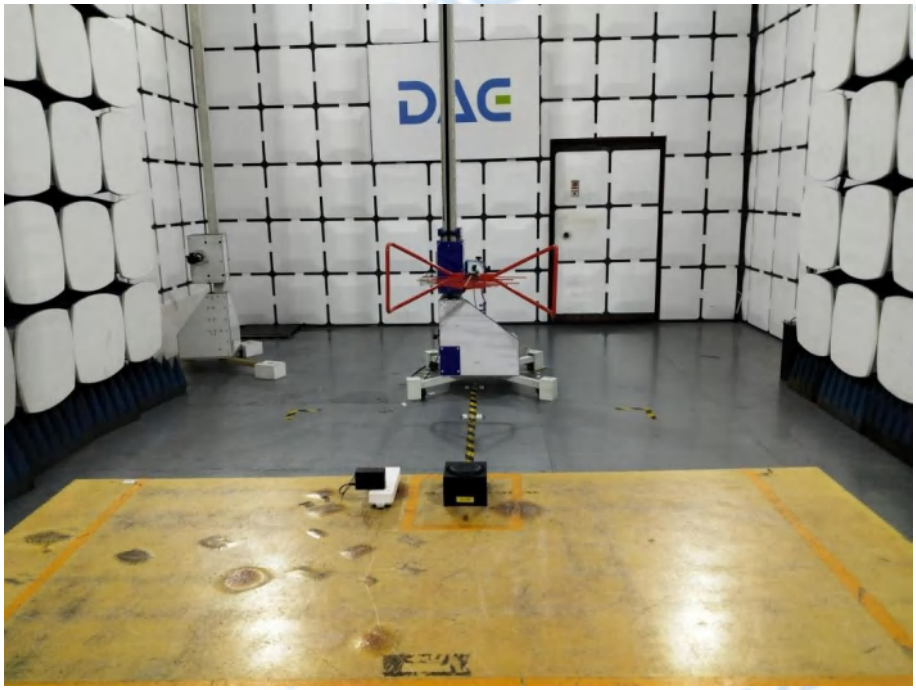
The test software will only record the worst test angle and height, and only the worst case will be recorded in the test report.

5 TEST SETUP PHOTOS

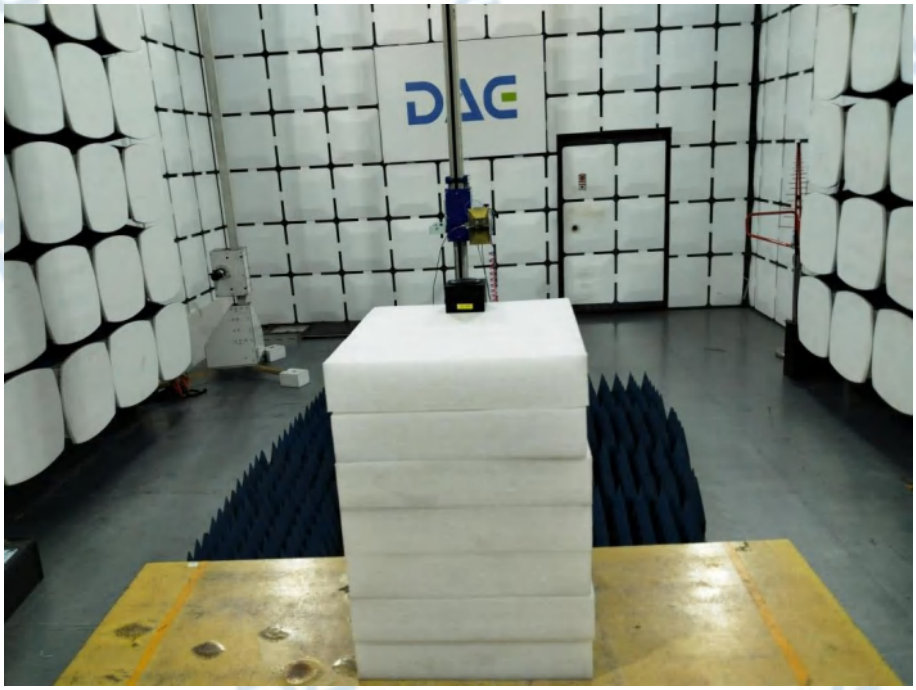
Conducted Emission at AC power line



Undesirable emission limits (below 1GHz)

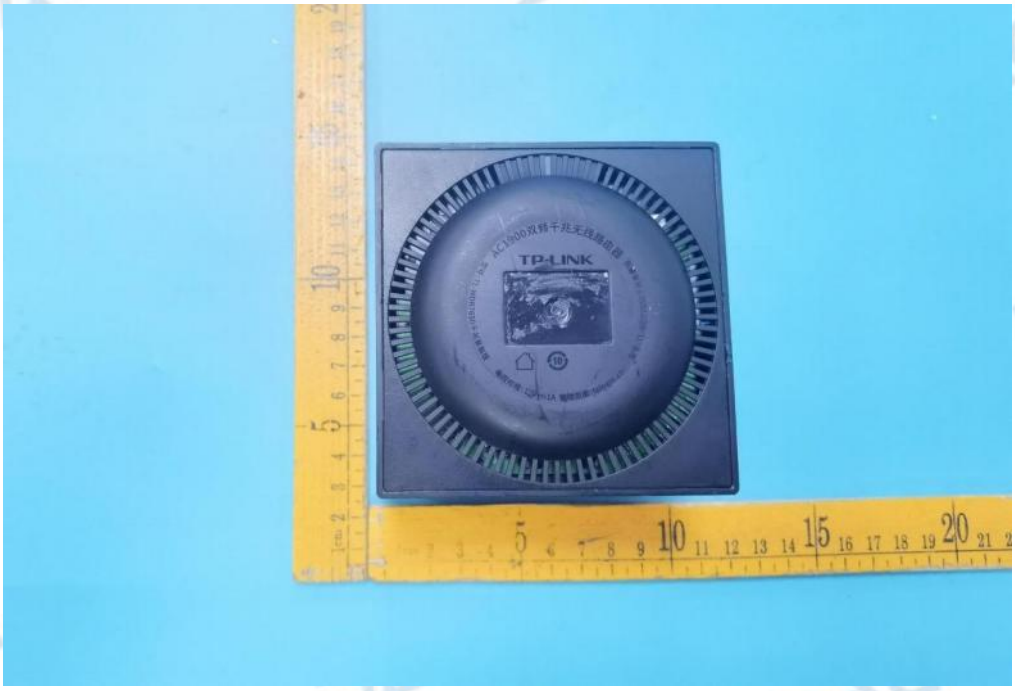


Undesirable emission limits (above 1GHz)

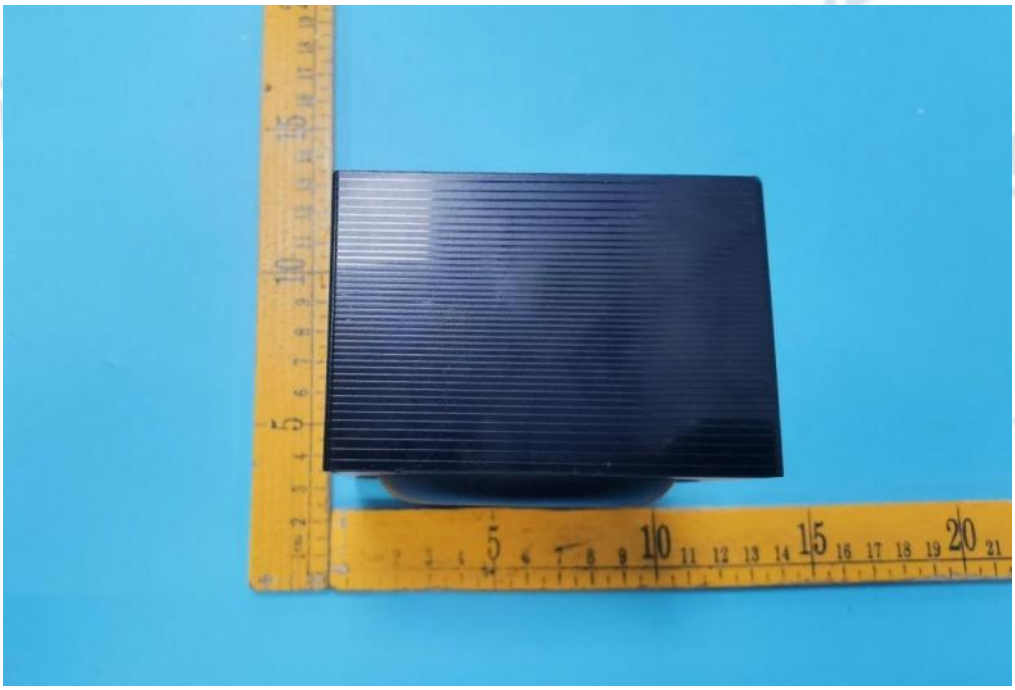


6 PHOTOS OF THE EUT

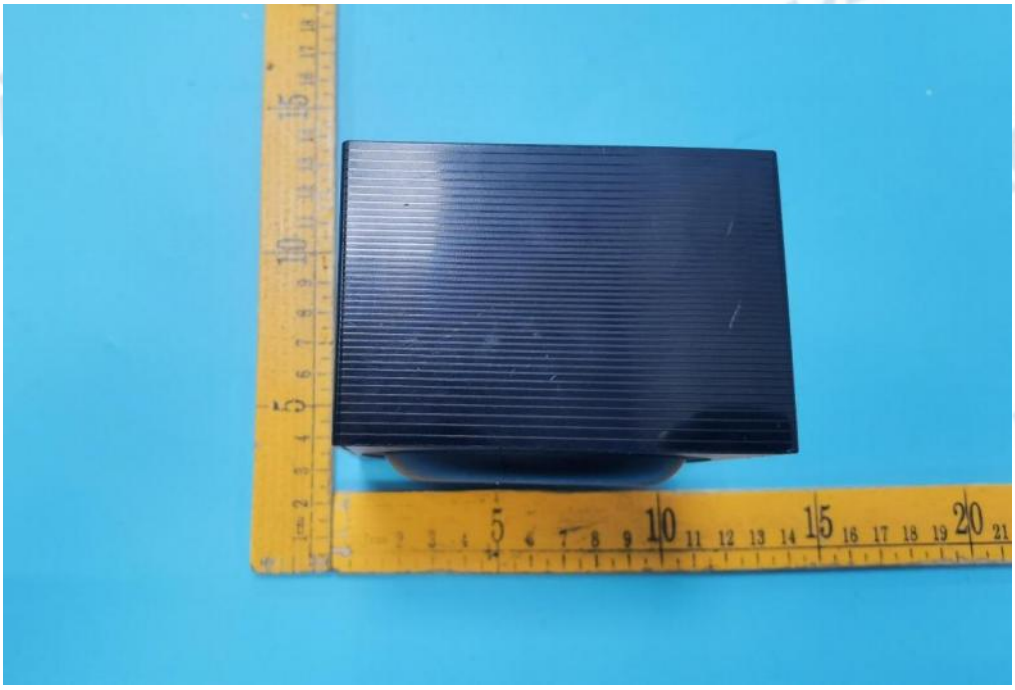
External



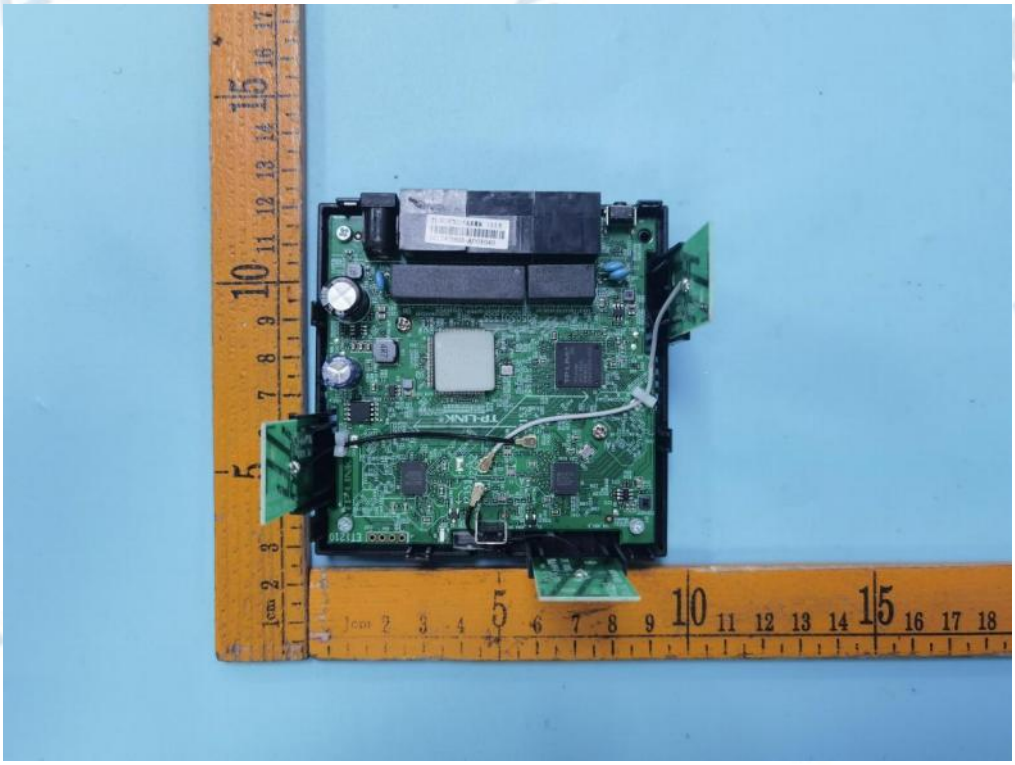
RESET

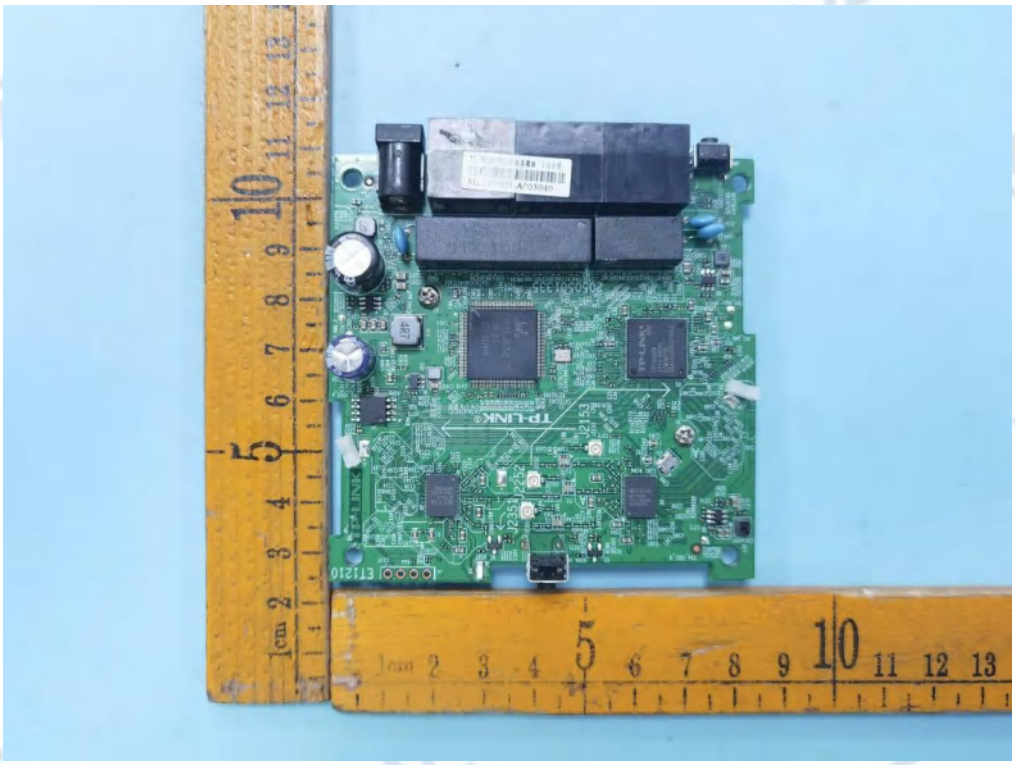


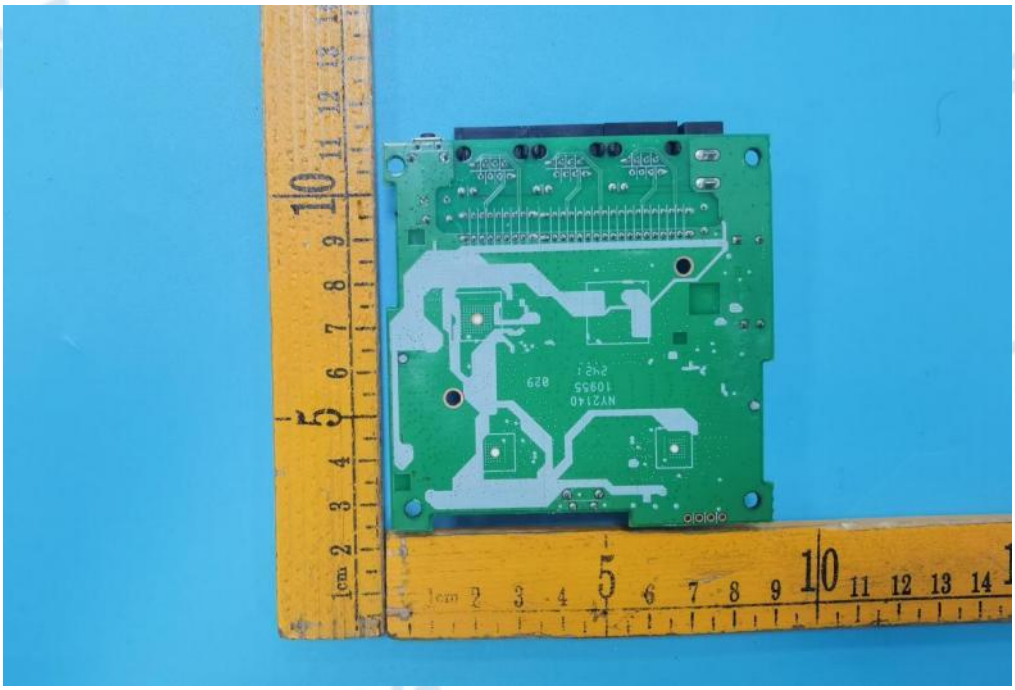
5G-004



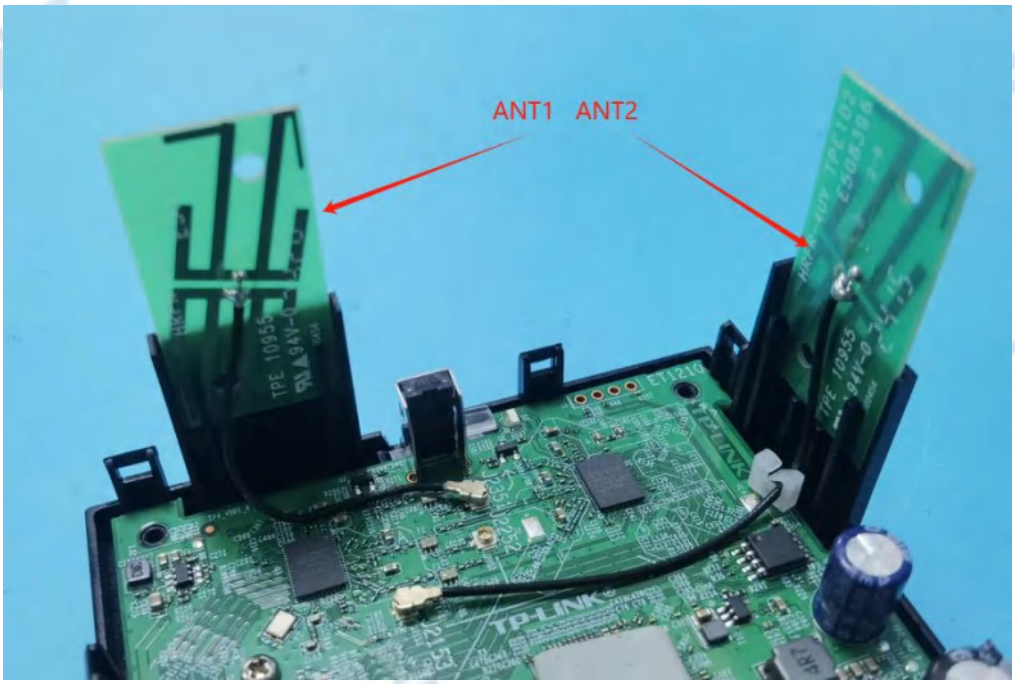
Internal







TP-LINK®
RTL8367S

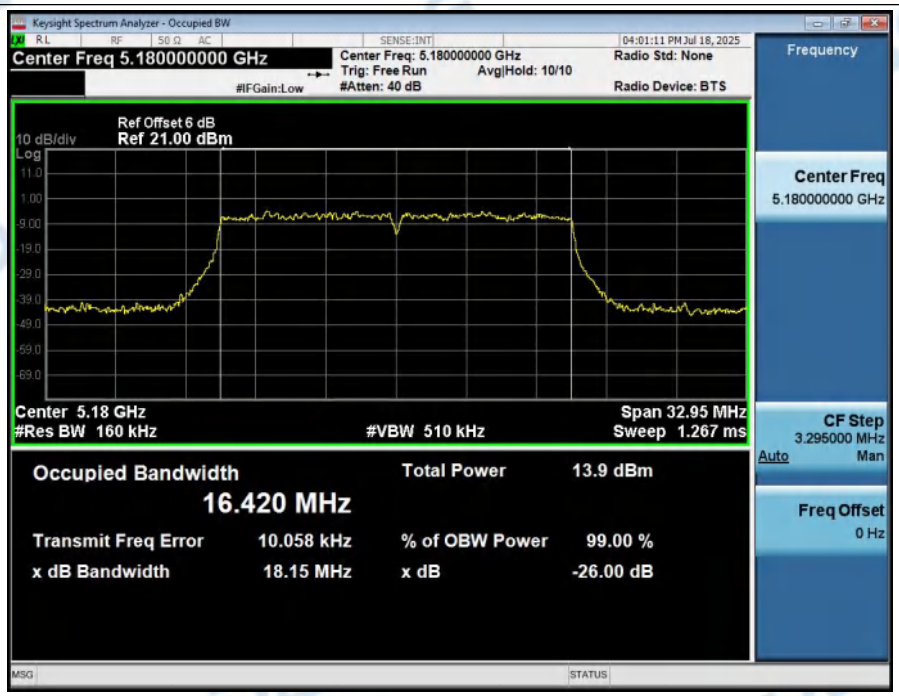

ANT1 ANT2
TP-LINK

Appendix-5.2G

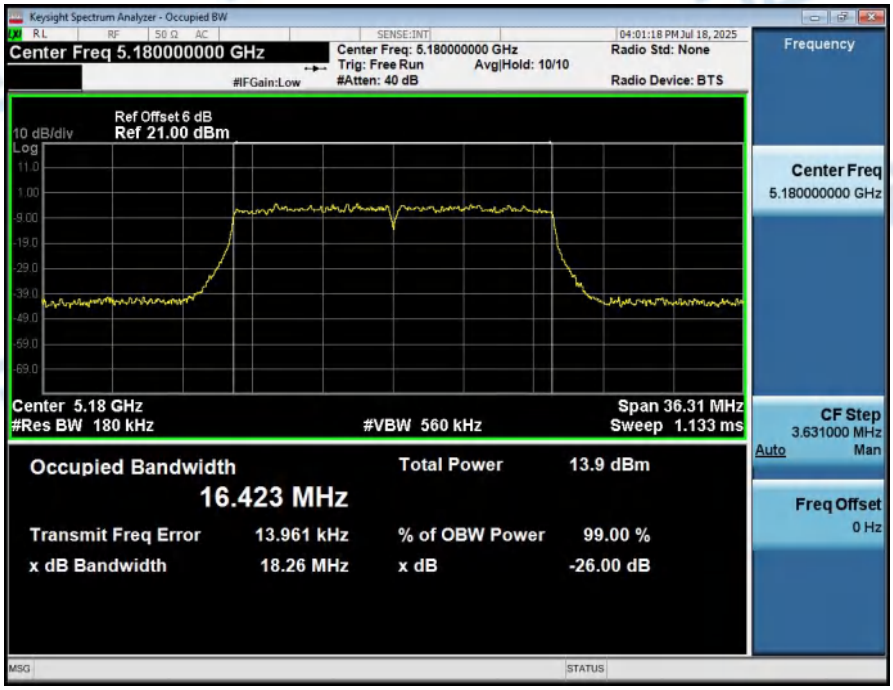
1. -26dB and 99% Emission Bandwidth

Condition	Antenna	Modulation	Frequency(MHz)	-26dB_Emission Bandwidth(MHz)	Occupied Bandwidth(MHz)
NVNT	ANT1	802.11a	5180.00	18.26	16.42
NVNT	ANT1	802.11a	5200.00	18.20	16.43
NVNT	ANT1	802.11a	5240.00	18.13	16.42
NVNT	ANT1	802.11n(HT20)	5180.00	19.32	17.63
NVNT	ANT1	802.11n(HT20)	5200.00	19.36	17.64
NVNT	ANT1	802.11n(HT20)	5240.00	19.33	17.61
NVNT	ANT1	802.11ac(VHT20)	5180.00	19.56	17.58
NVNT	ANT1	802.11ac(VHT20)	5200.00	19.41	17.59
NVNT	ANT1	802.11ac(VHT20)	5240.00	19.59	17.58
NVNT	ANT1	802.11ax(HE20)	5180.00	19.46	17.56
NVNT	ANT1	802.11ax(HE20)	5200.00	19.54	17.56
NVNT	ANT1	802.11ax(HE20)	5240.00	19.38	17.56
NVNT	ANT1	802.11n(HT40)	5190.00	40.88	36.18
NVNT	ANT1	802.11n(HT40)	5230.00	40.42	36.13
NVNT	ANT1	802.11ac(VHT40)	5190.00	41.30	36.08
NVNT	ANT1	802.11ac(VHT40)	5230.00	40.87	36.02
NVNT	ANT1	802.11ax(HE40)	5190.00	41.45	36.12
NVNT	ANT1	802.11ax(HE40)	5230.00	40.70	36.00
NVNT	ANT1	802.11ac(VHT80)	5210.00	81.24	74.87
NVNT	ANT1	802.11ax(HE80)	5210.00	81.13	74.89
NVNT	ANT2	802.11a	5180.00	18.08	16.38
NVNT	ANT2	802.11a	5200.00	18.27	16.42
NVNT	ANT2	802.11a	5240.00	18.13	16.40
NVNT	ANT2	802.11n(HT20)	5180.00	19.57	17.57
NVNT	ANT2	802.11n(HT20)	5200.00	19.40	17.57
NVNT	ANT2	802.11n(HT20)	5240.00	19.50	17.57
NVNT	ANT2	802.11ac(VHT20)	5180.00	19.46	17.57
NVNT	ANT2	802.11ac(VHT20)	5200.00	19.48	17.57
NVNT	ANT2	802.11ac(VHT20)	5240.00	19.42	17.58
NVNT	ANT2	802.11ax(HE20)	5180.00	19.45	17.56
NVNT	ANT2	802.11ax(HE20)	5200.00	19.43	17.56
NVNT	ANT2	802.11ax(HE20)	5240.00	19.42	17.56
NVNT	ANT2	802.11n(HT40)	5190.00	41.03	36.08
NVNT	ANT2	802.11n(HT40)	5230.00	40.91	36.01
NVNT	ANT2	802.11ac(VHT40)	5190.00	41.37	36.05
NVNT	ANT2	802.11ac(VHT40)	5230.00	41.04	36.01
NVNT	ANT2	802.11ax(HE40)	5190.00	41.76	36.07
NVNT	ANT2	802.11ax(HE40)	5230.00	40.94	36.03
NVNT	ANT2	802.11ac(VHT80)	5210.00	80.69	74.71
NVNT	ANT2	802.11ax(HE80)	5210.00	81.36	74.72

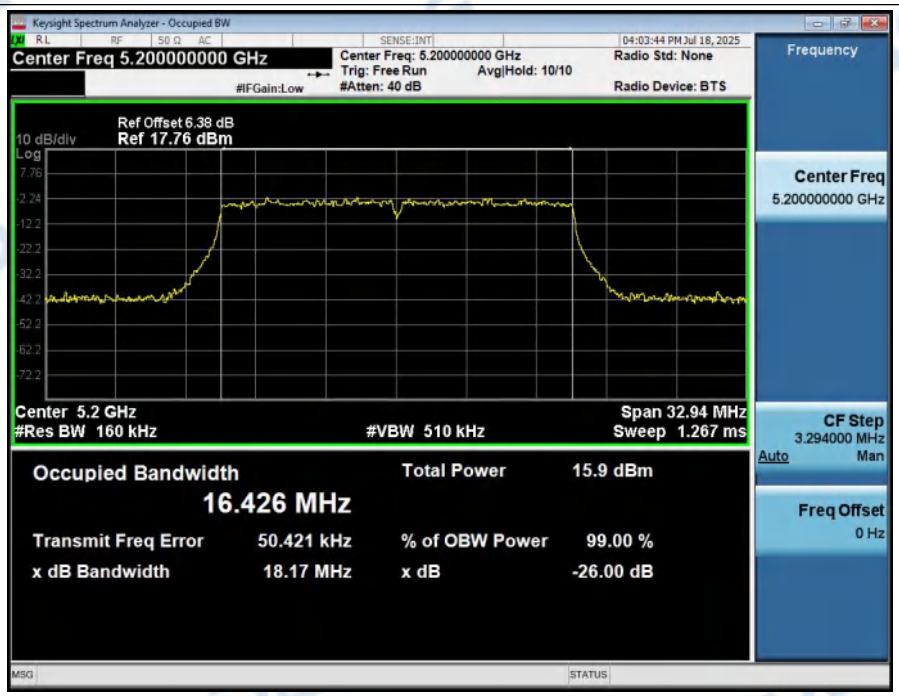
99%_OCB_NVNT_ANT1_802_11a_5180



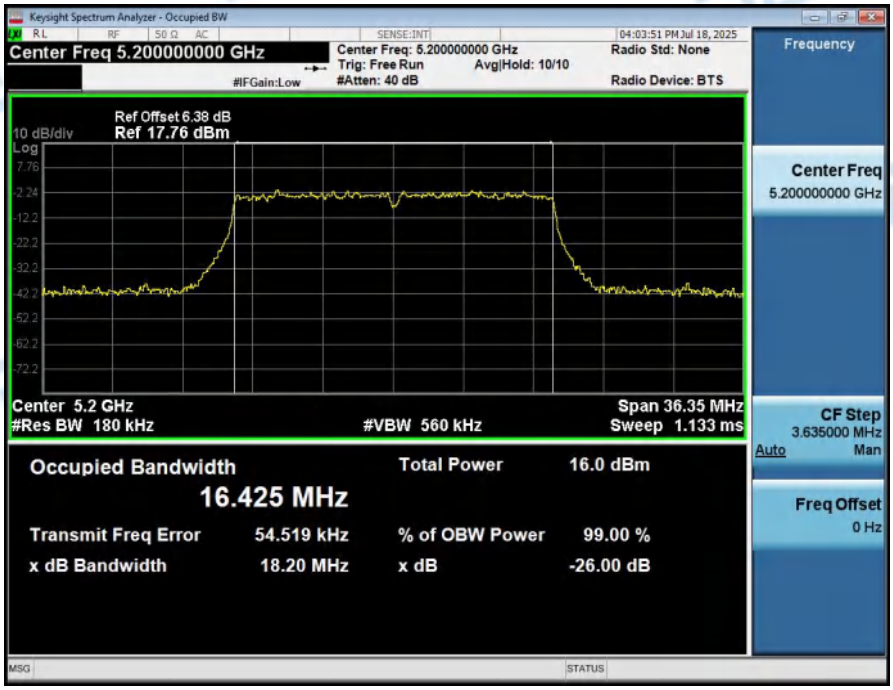
-26BW_NVNT_ANT1_802_11a_5180



99%_OCB_NVNT_ANT1_802_11a_5200



-26BW_NVNT_ANT1_802_11a_5200



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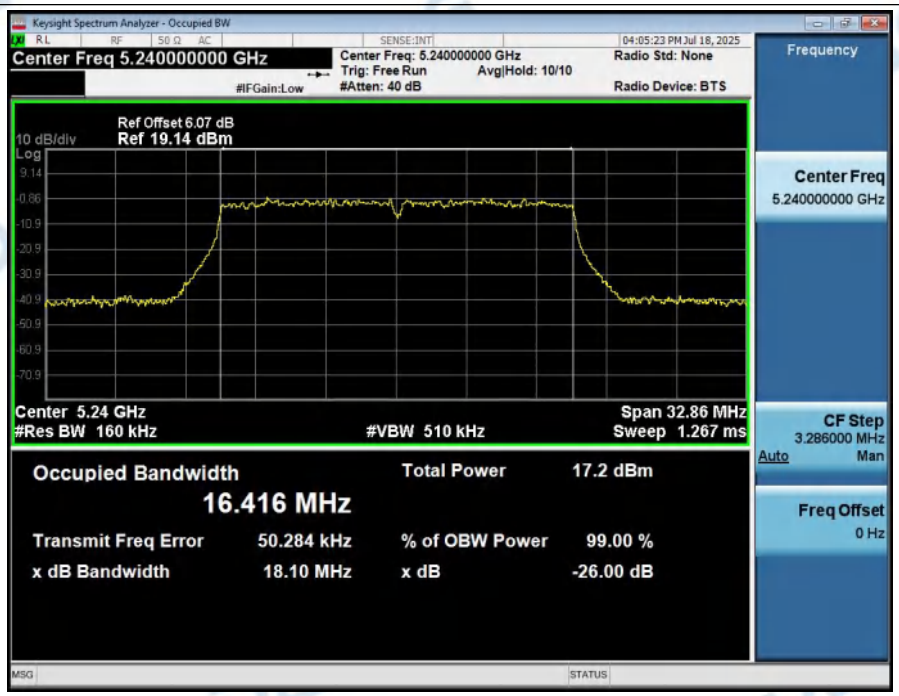

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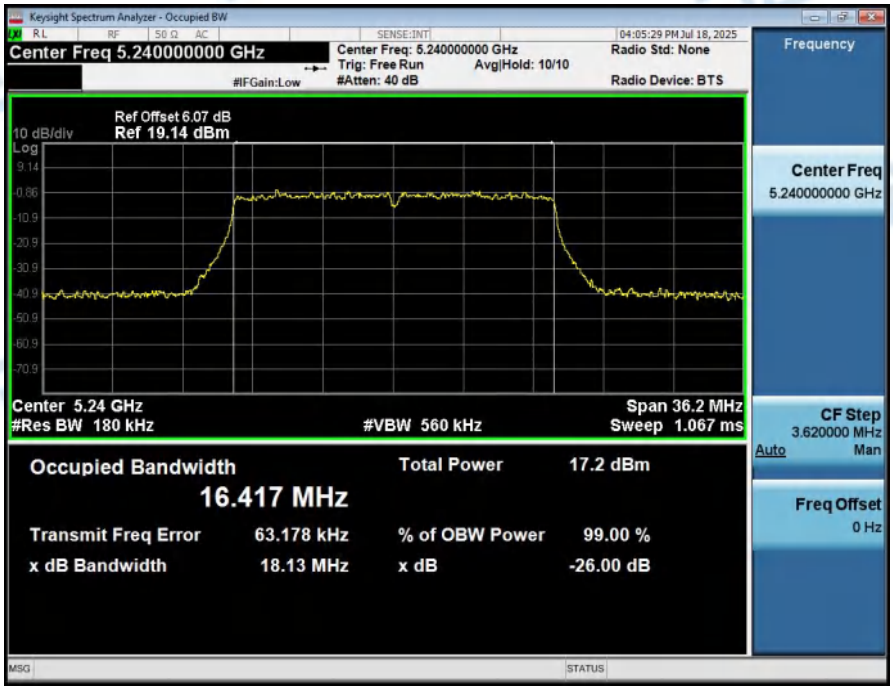

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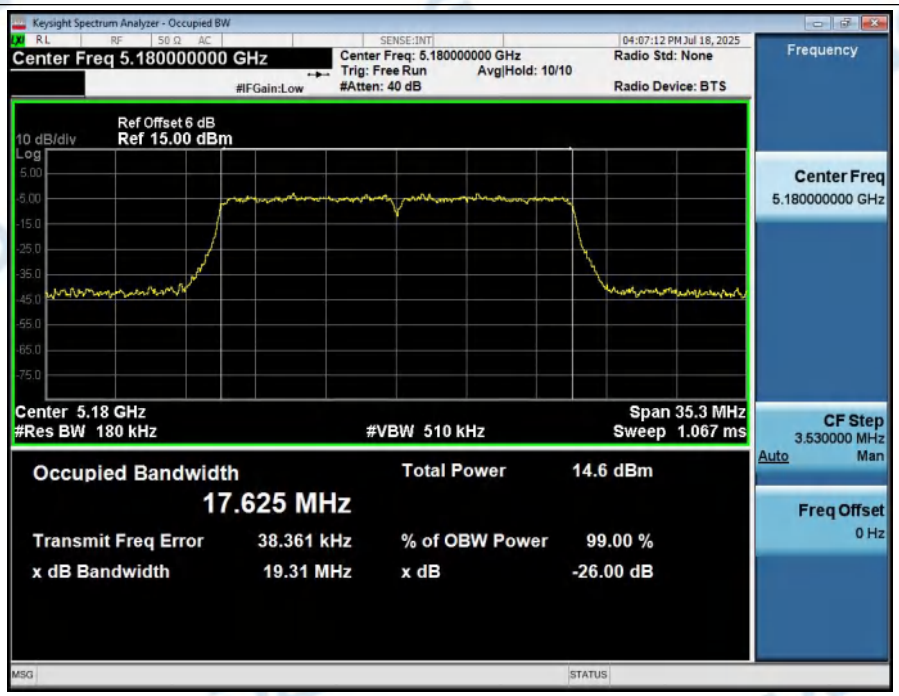

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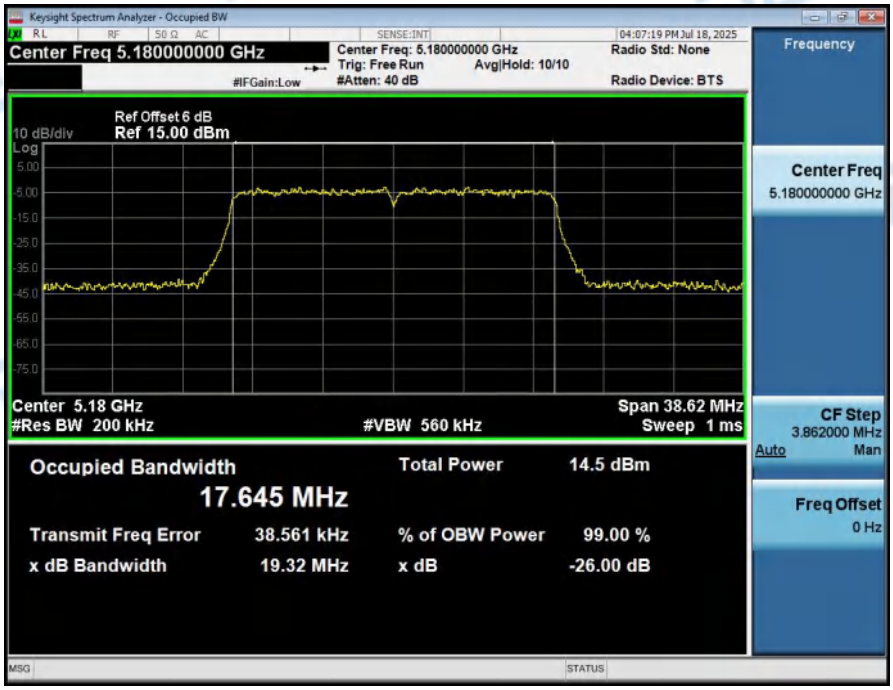

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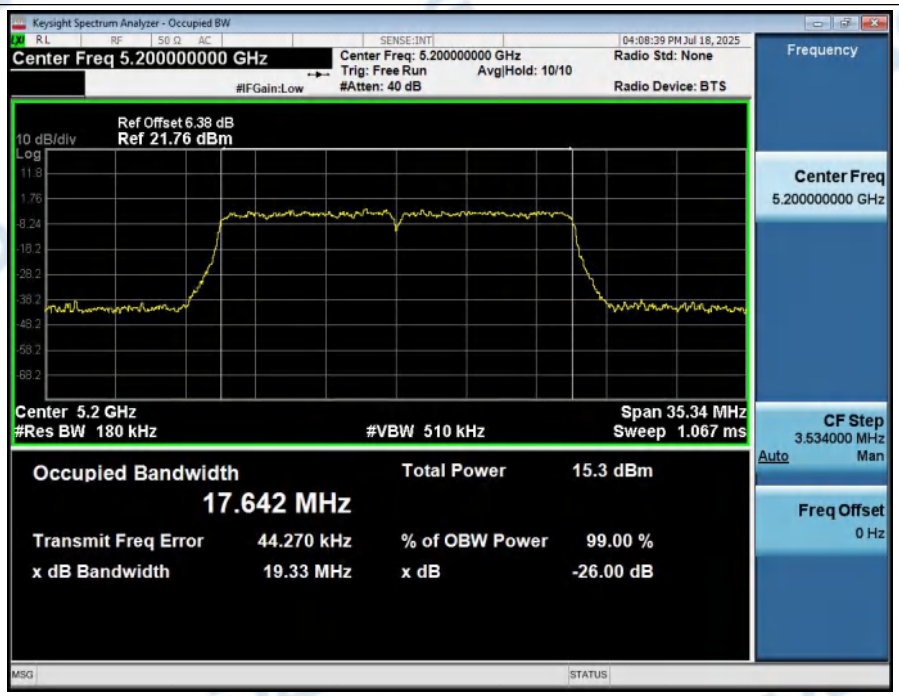

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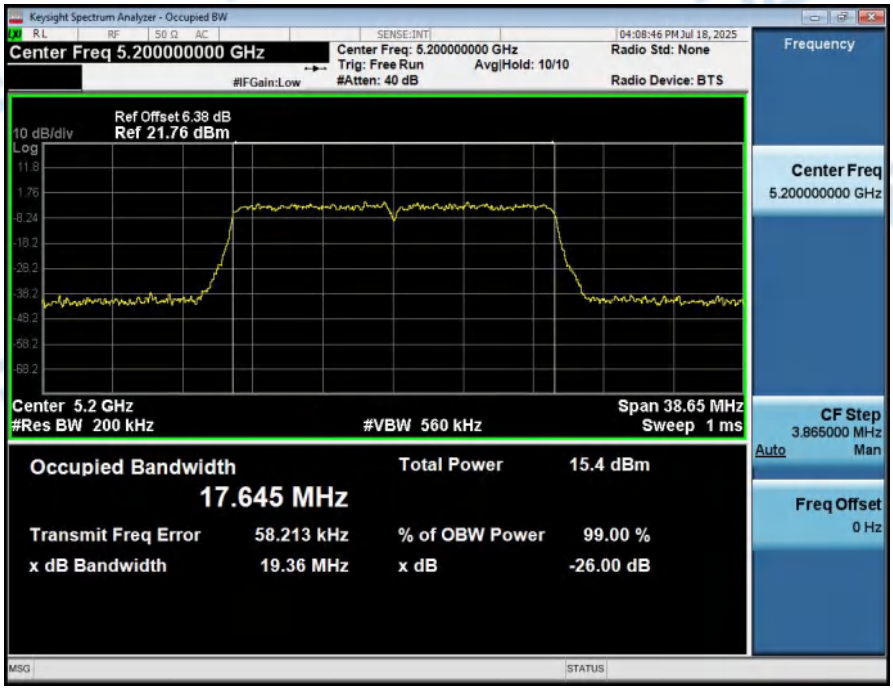

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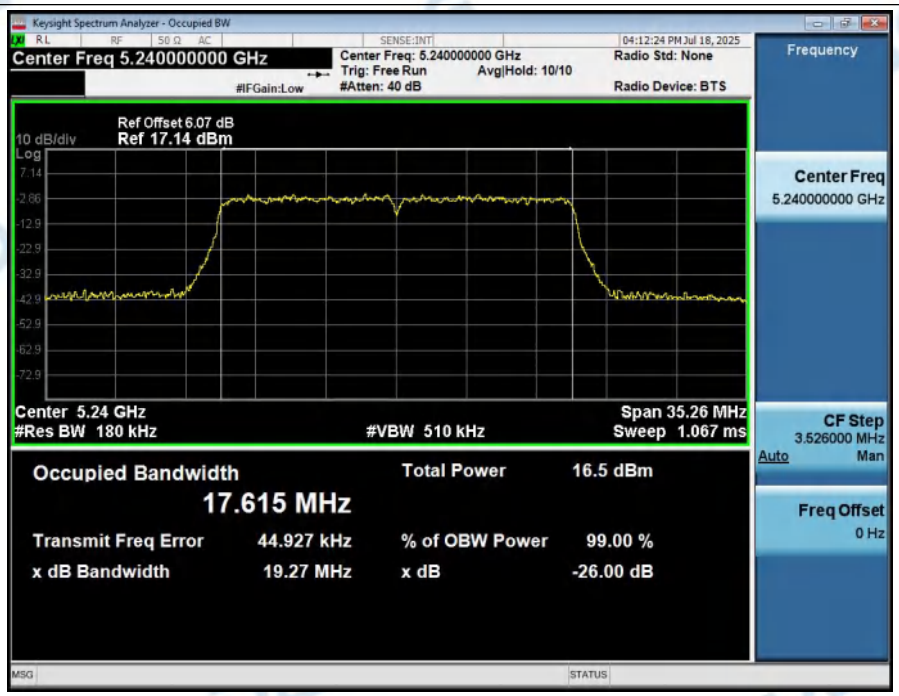

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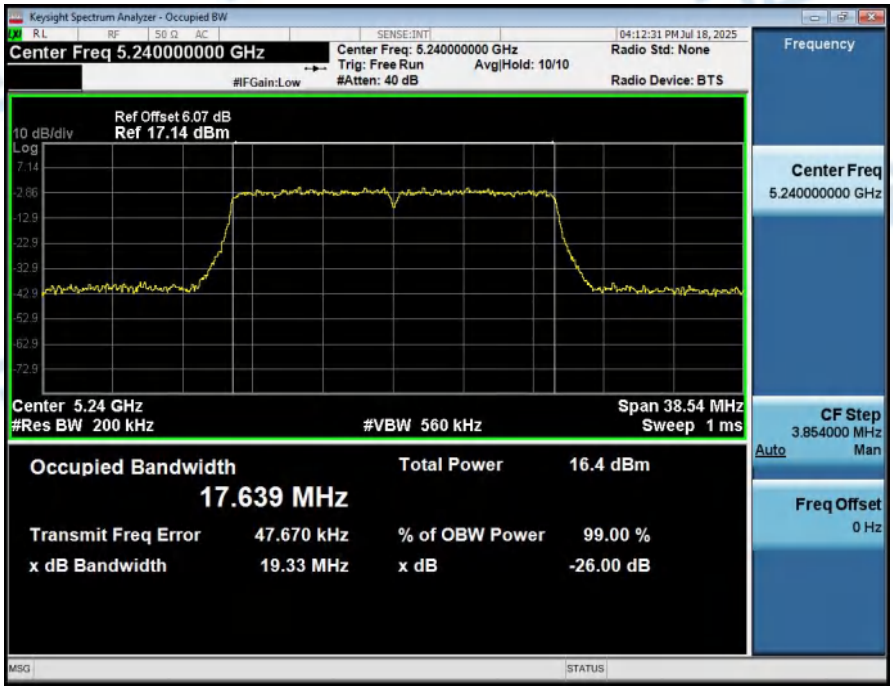

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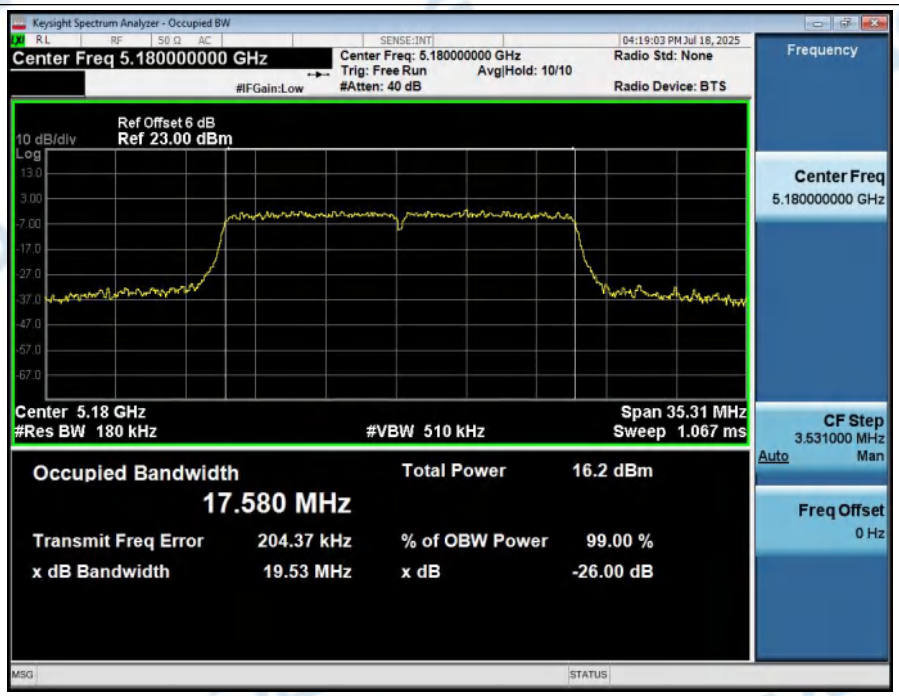

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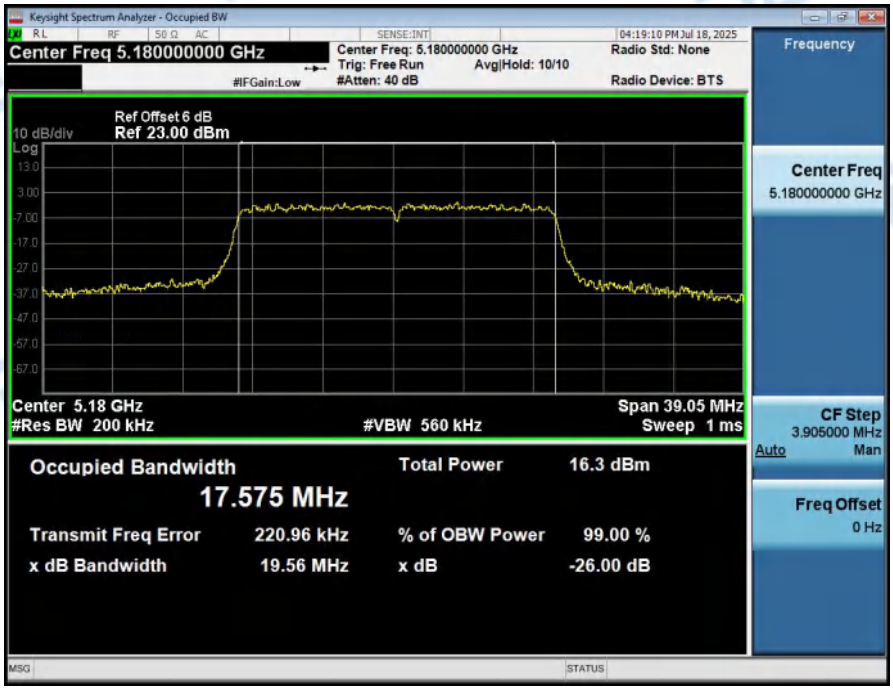

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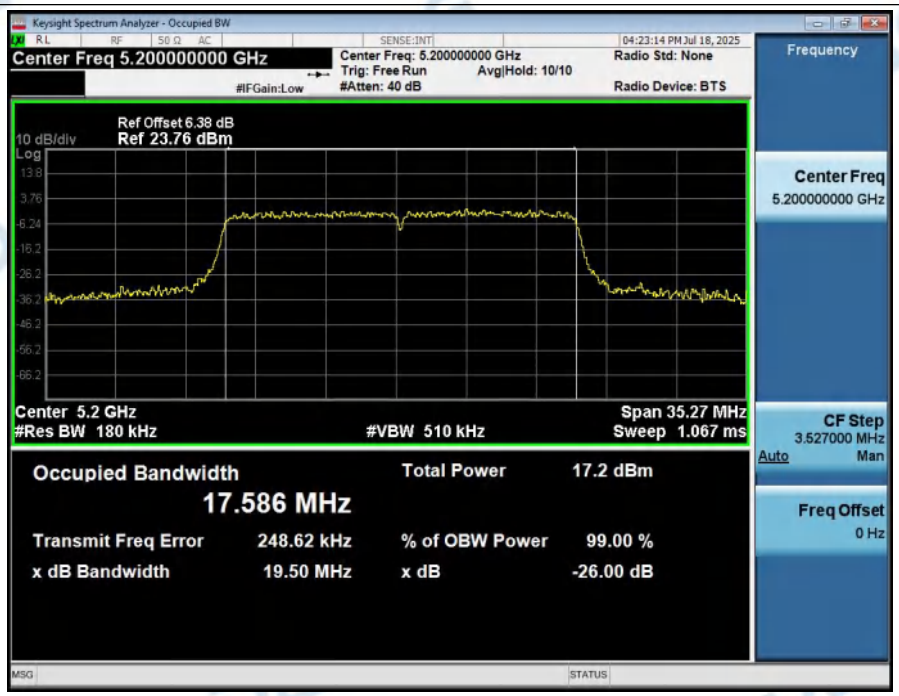

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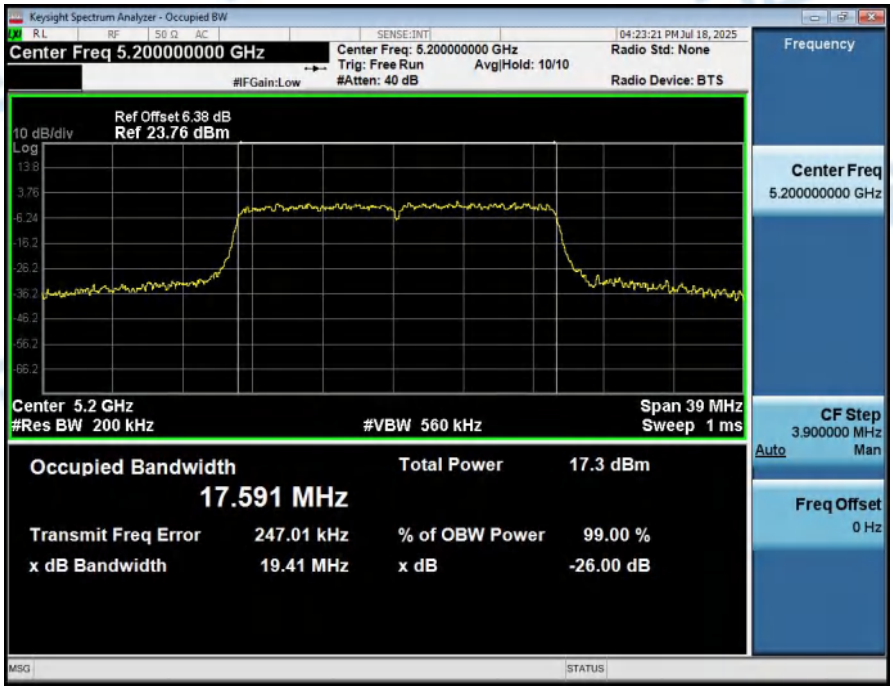

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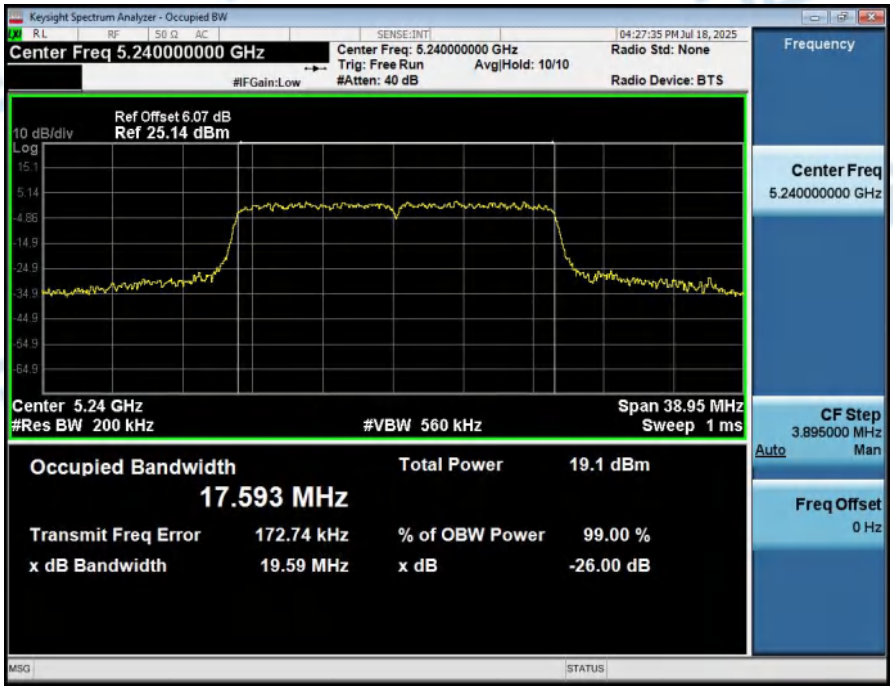

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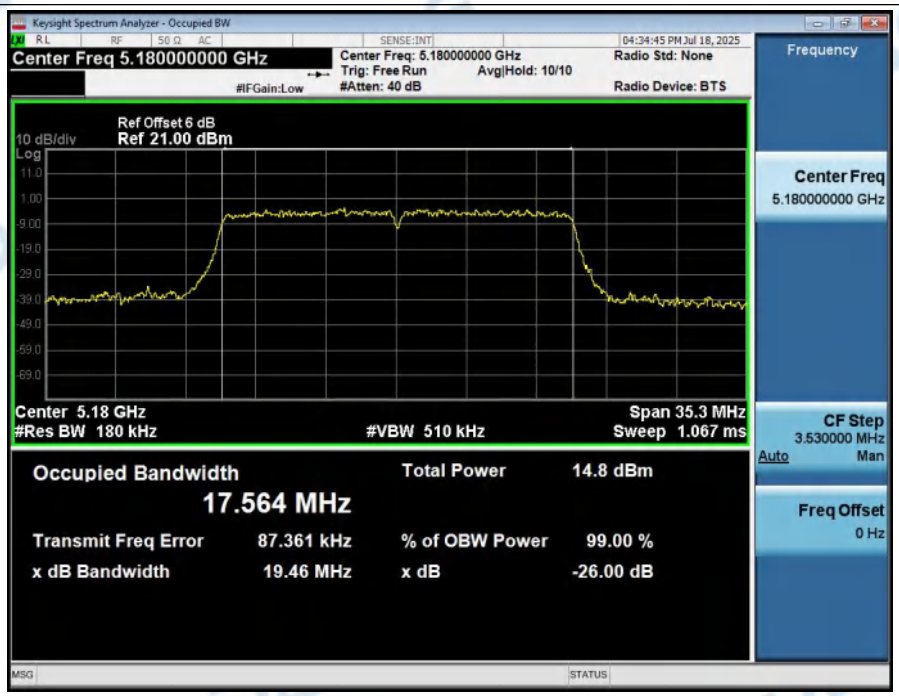

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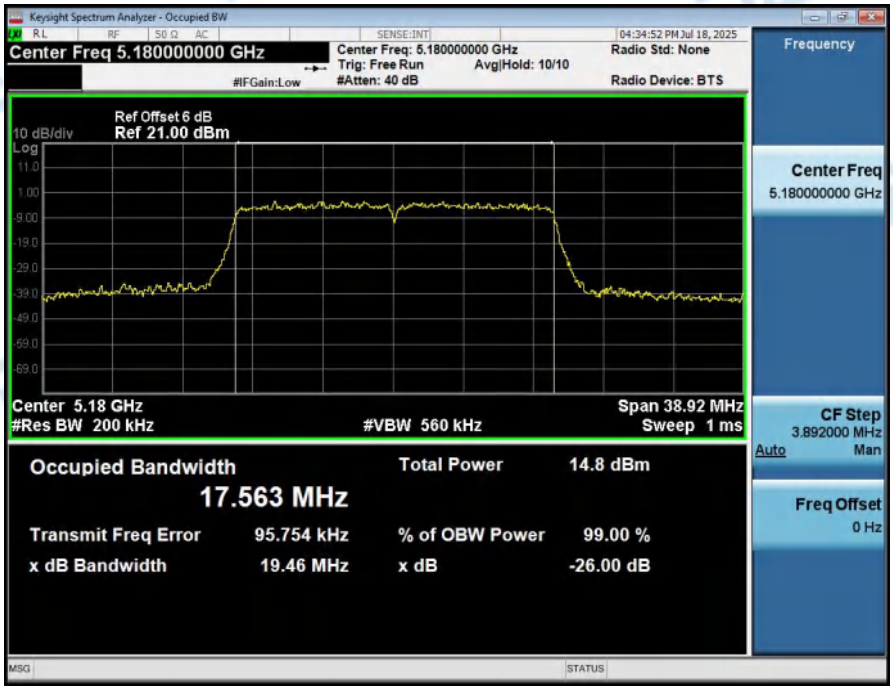

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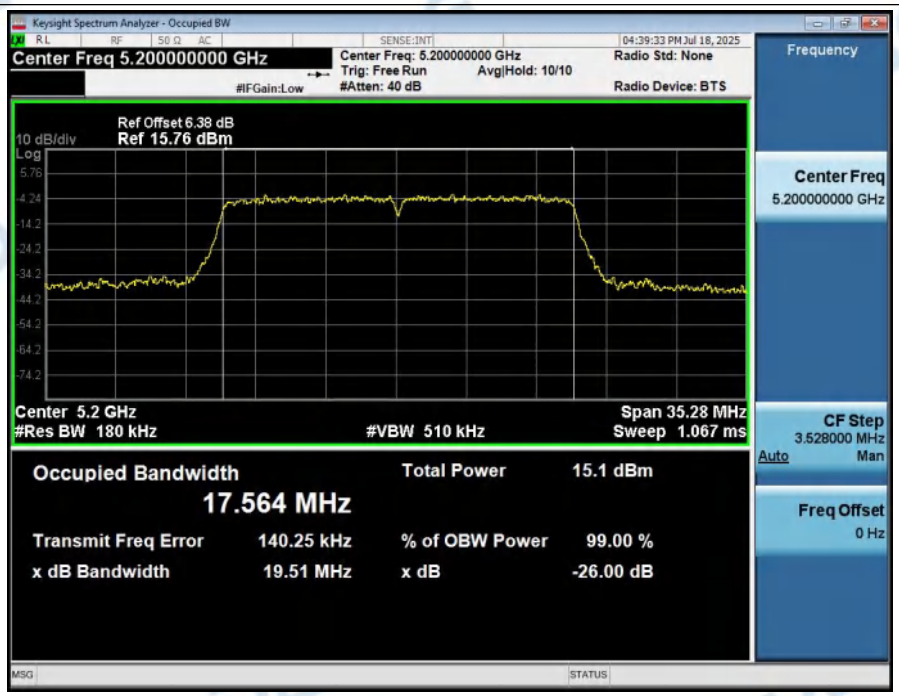

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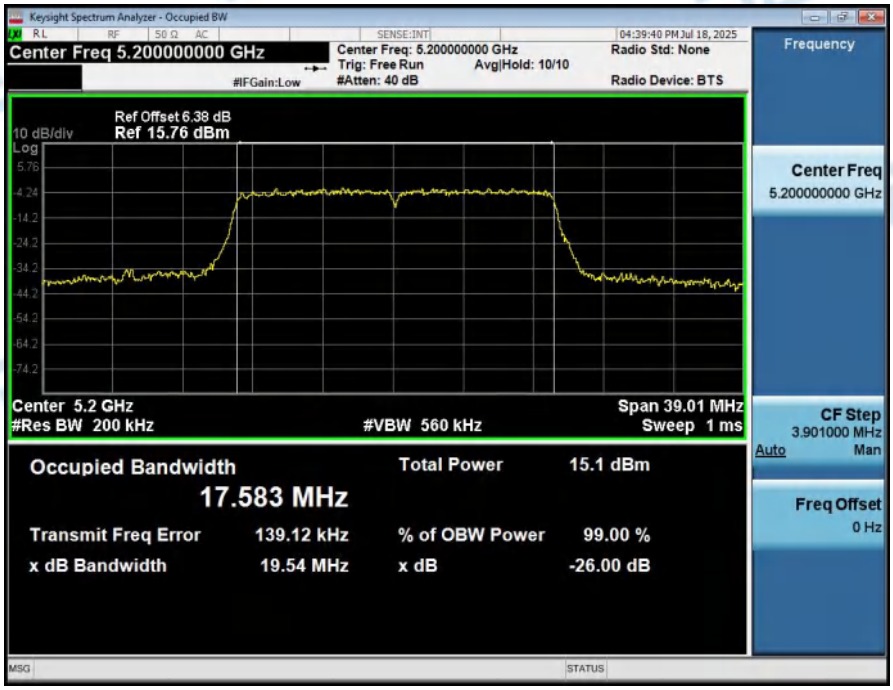

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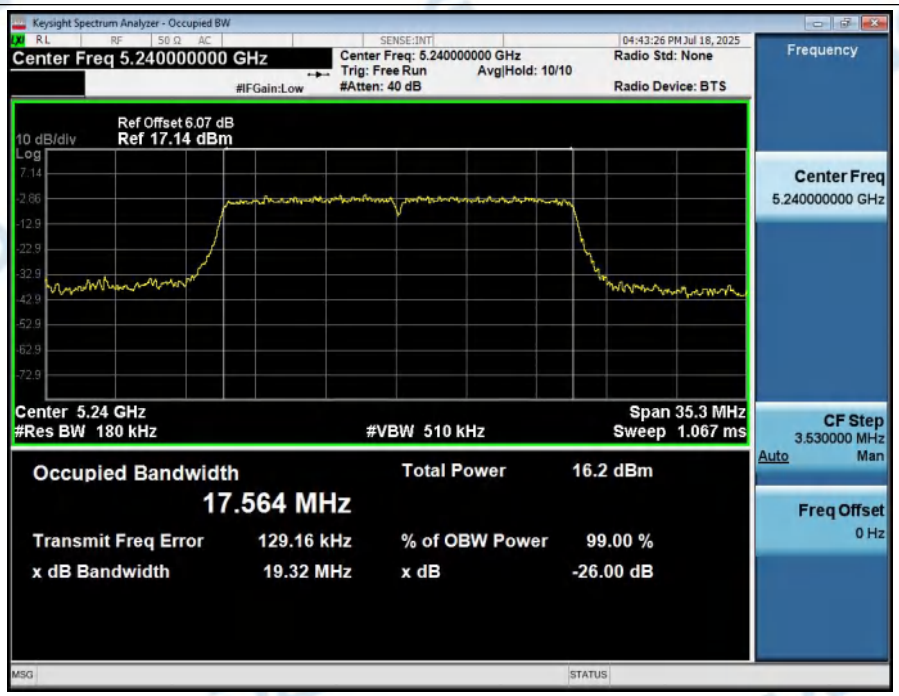

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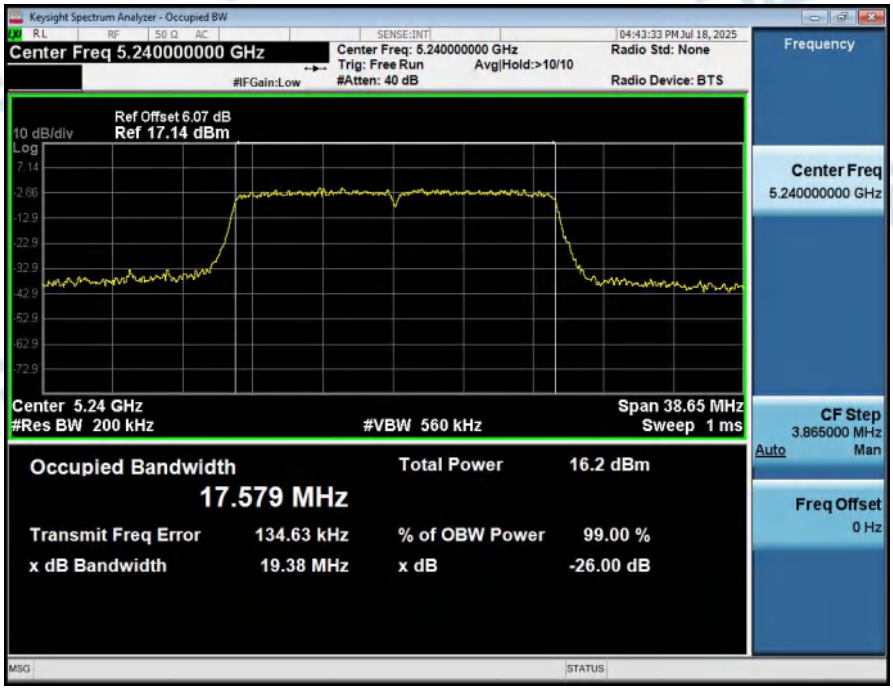

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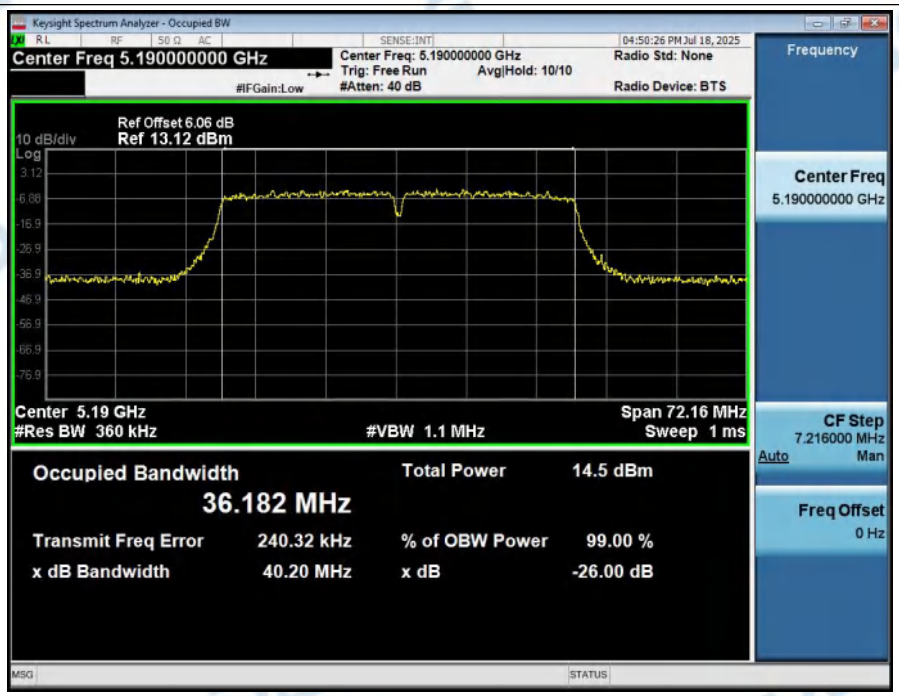

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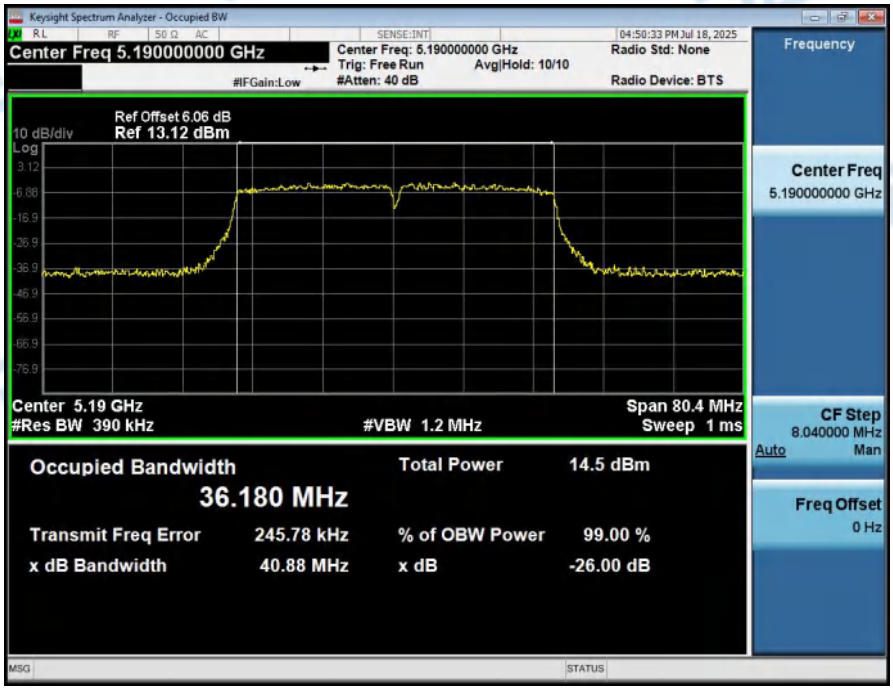

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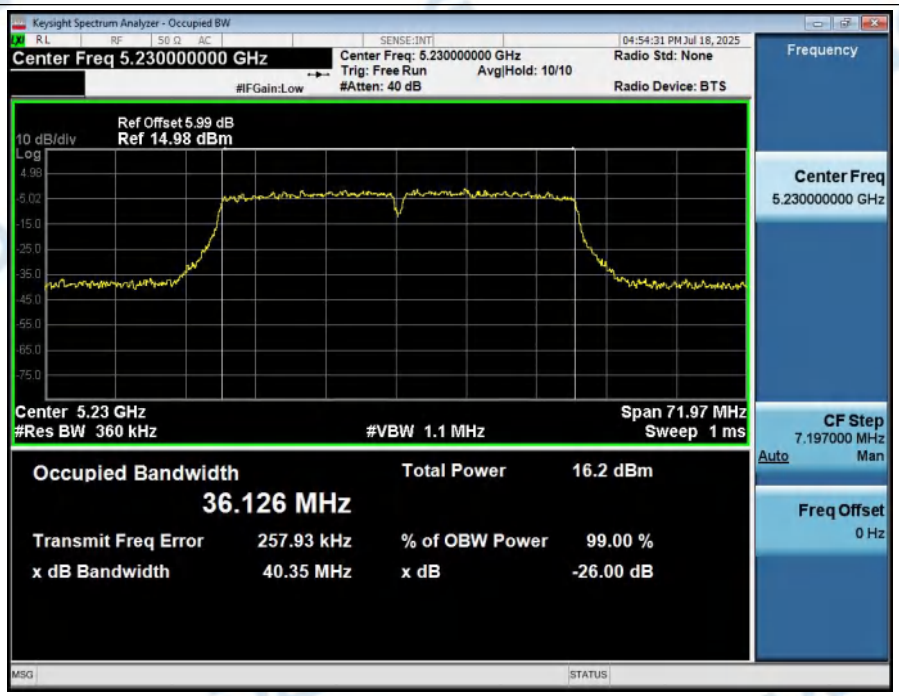

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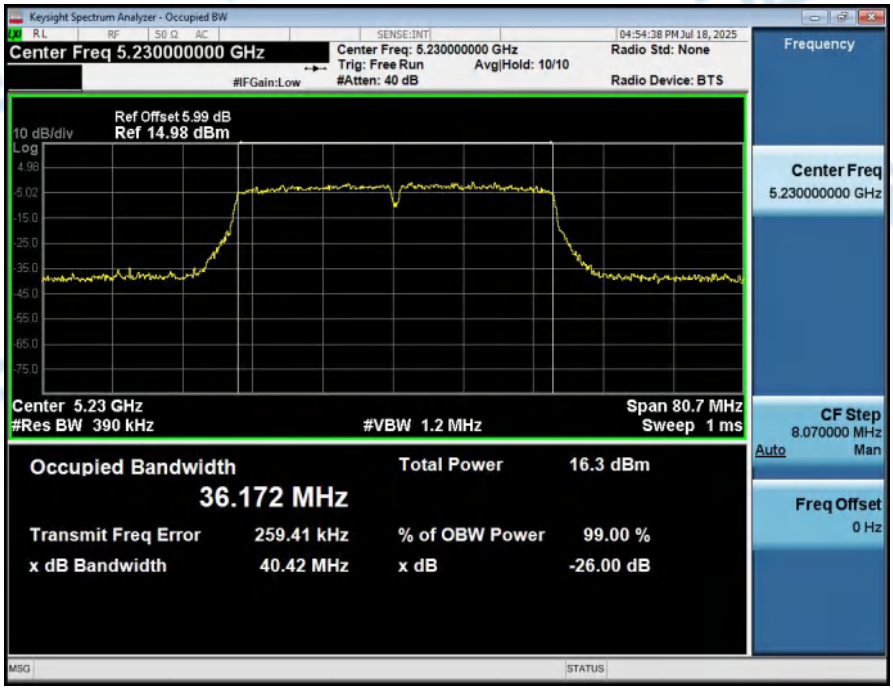

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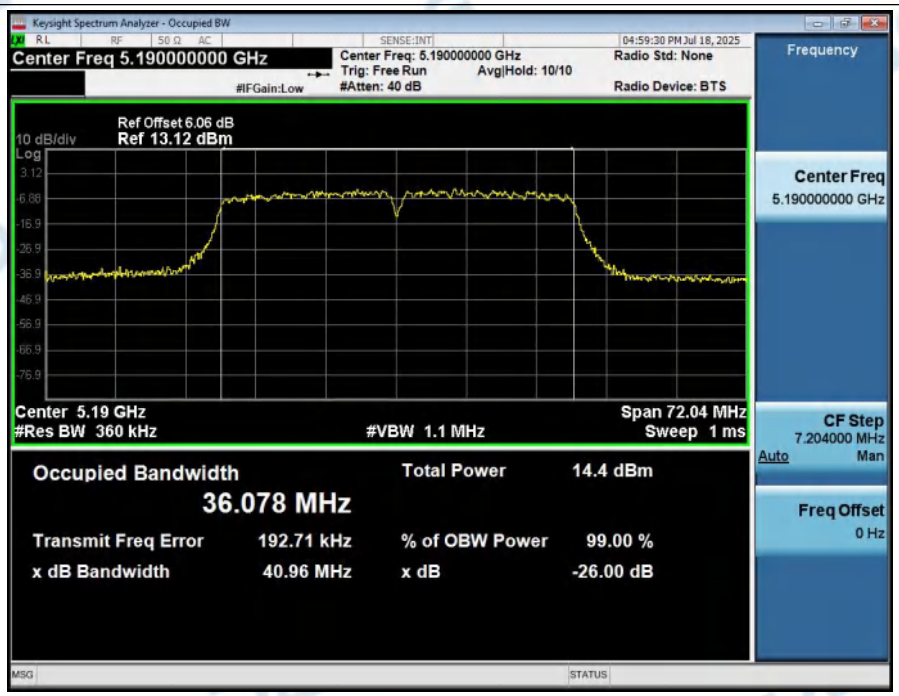

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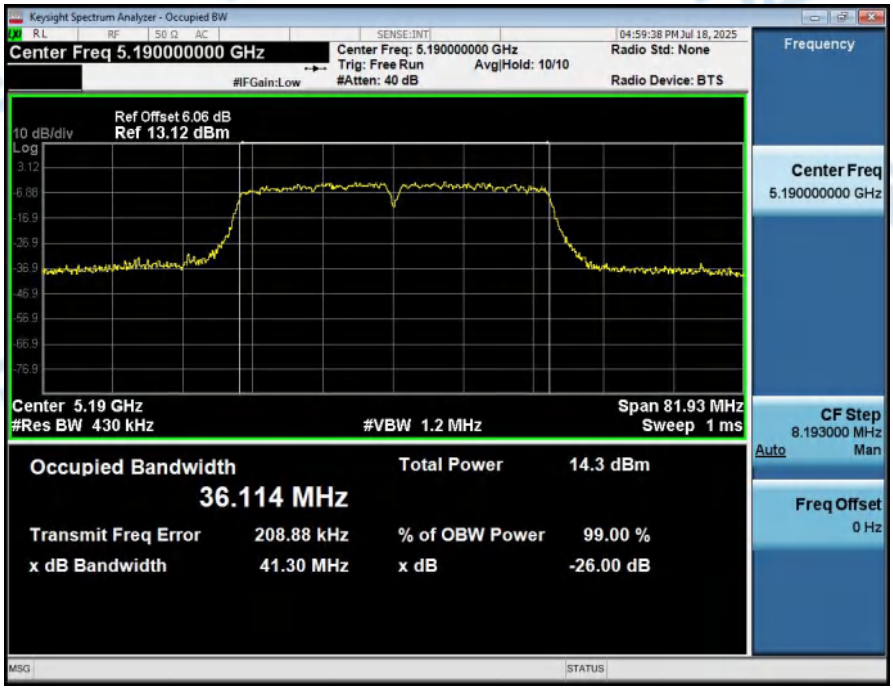

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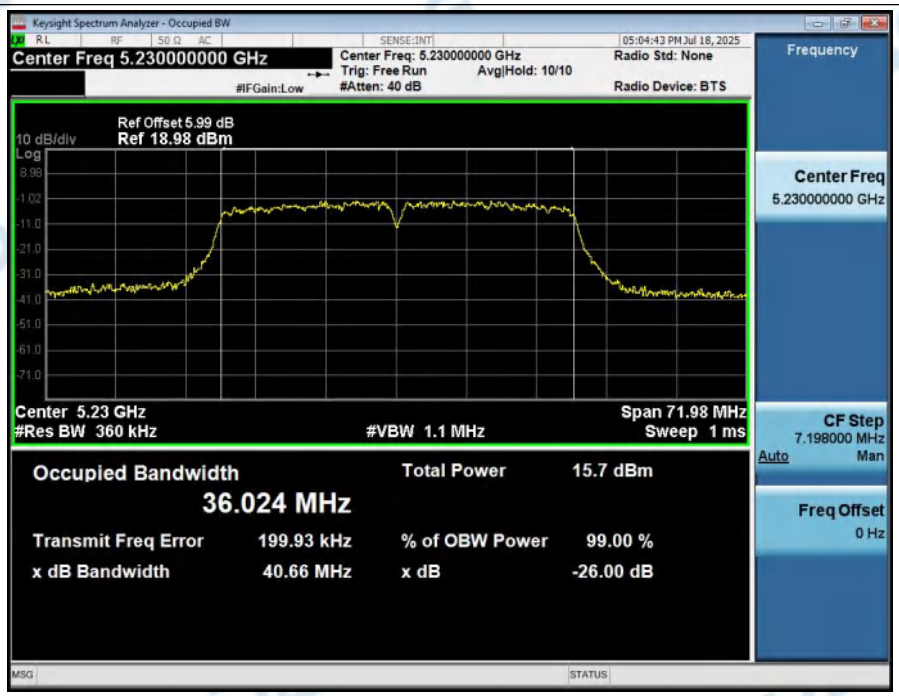

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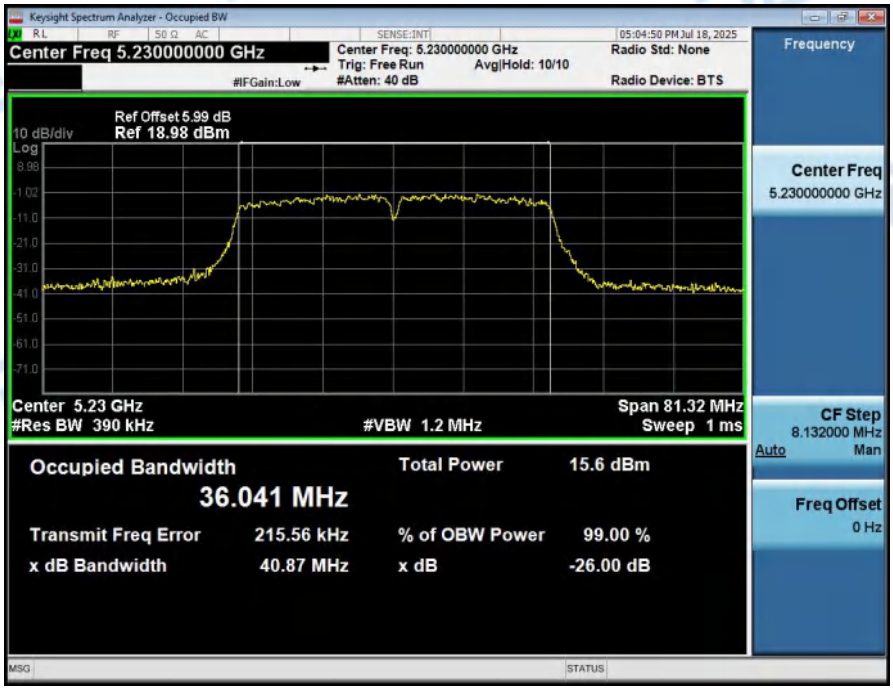

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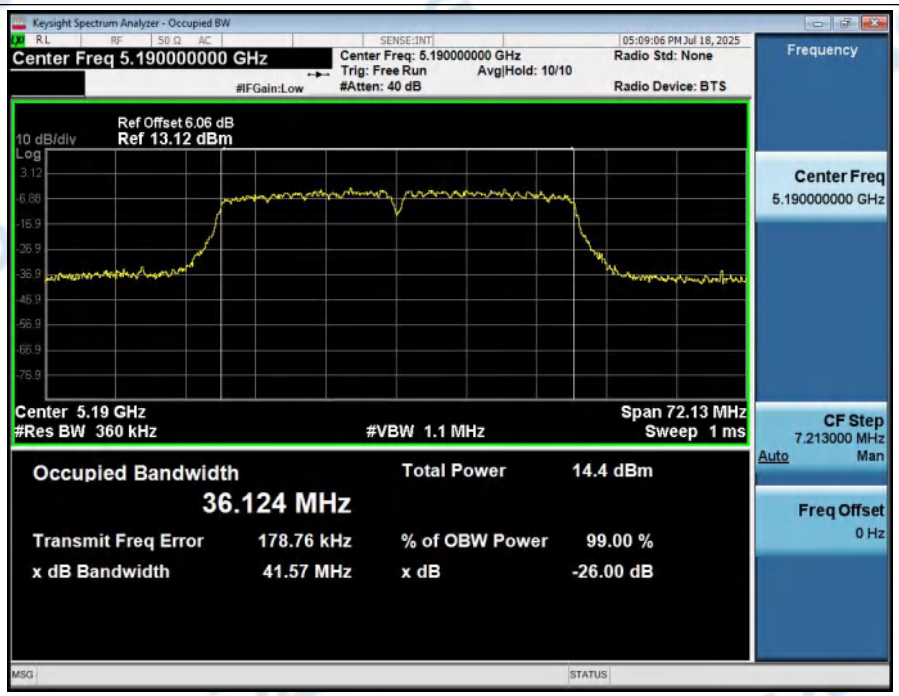

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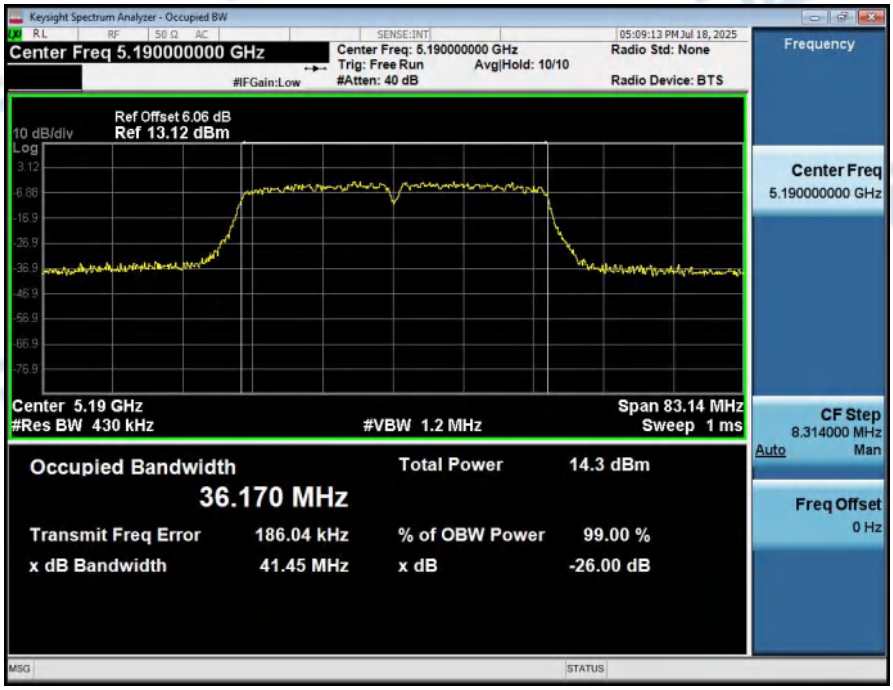

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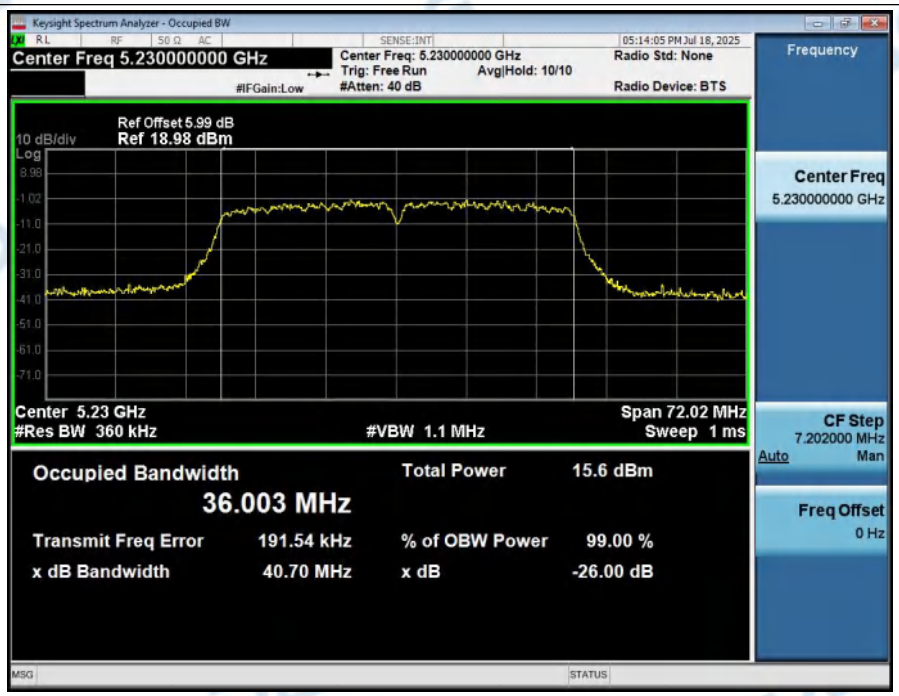

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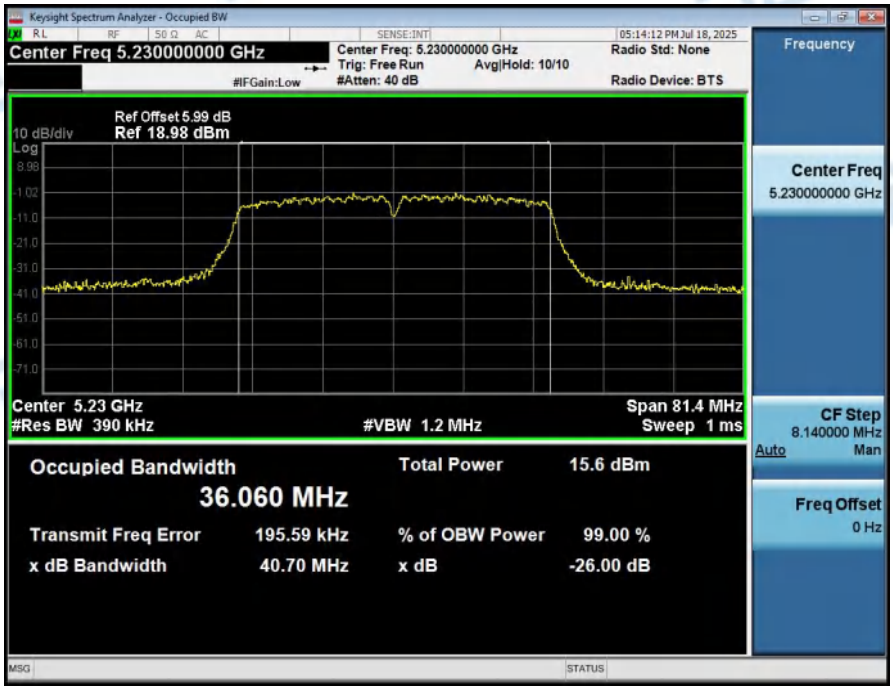

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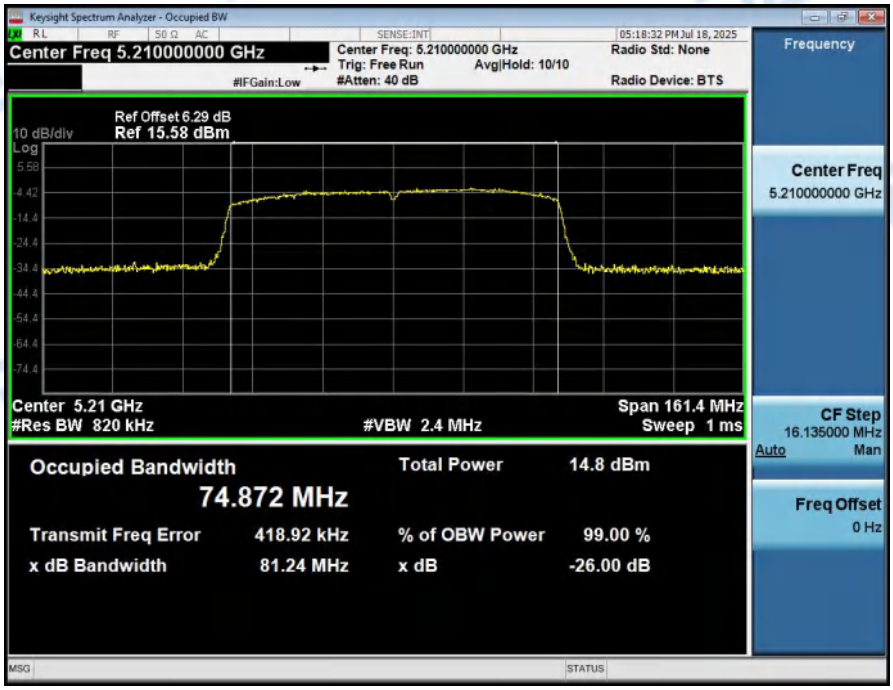

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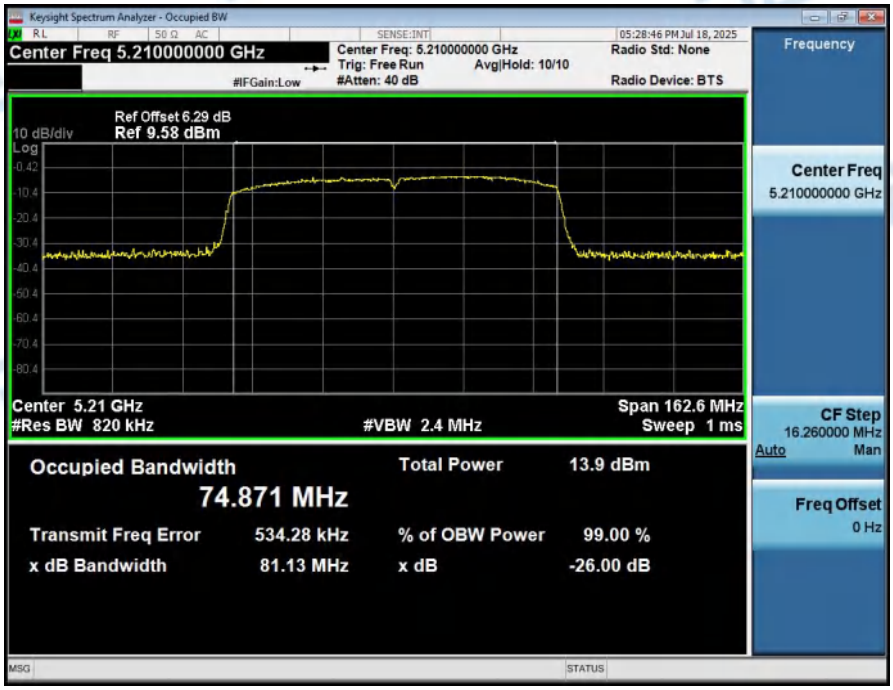

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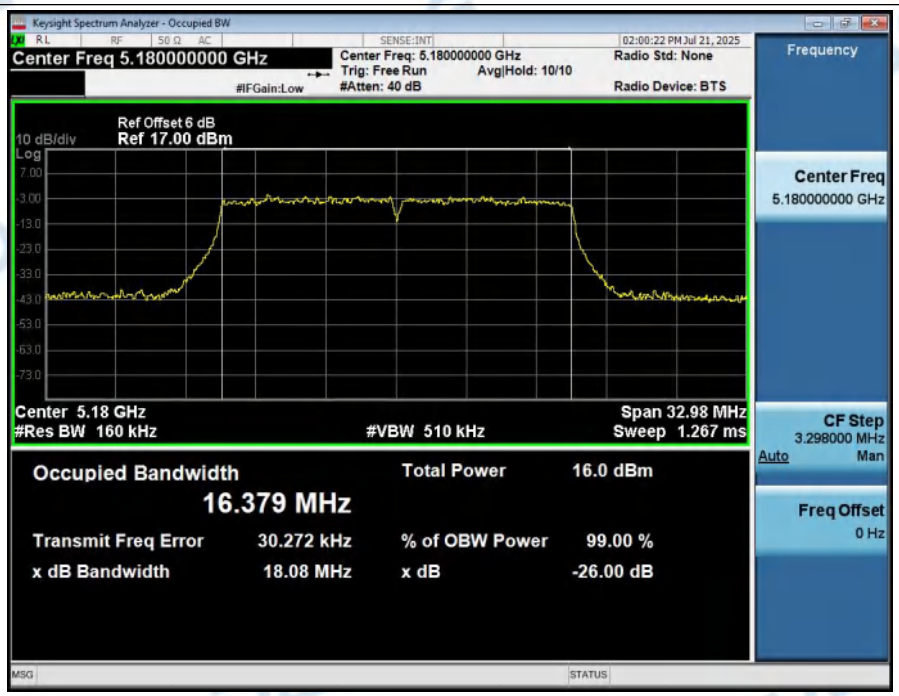

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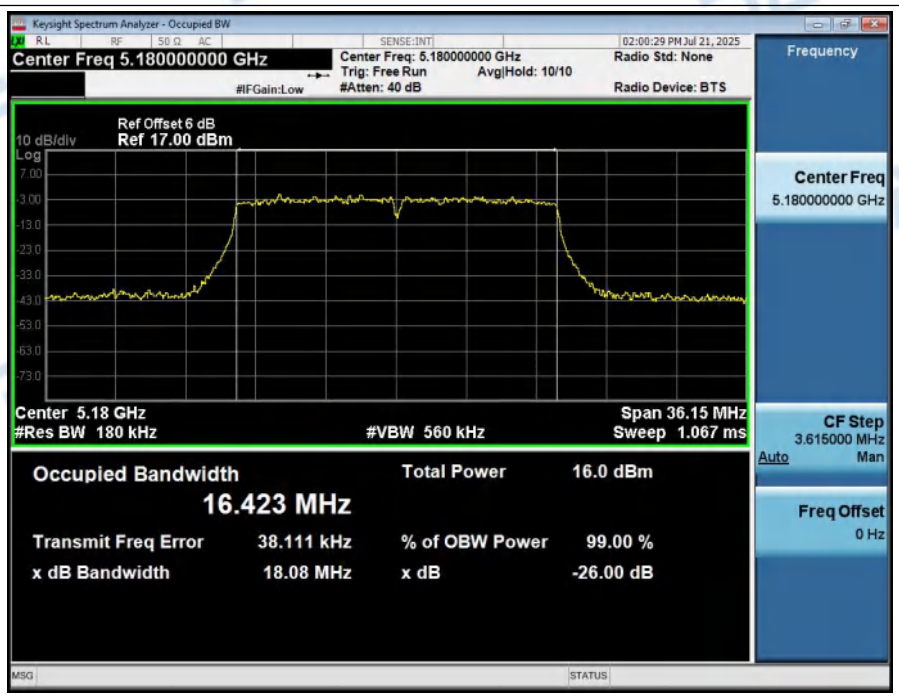

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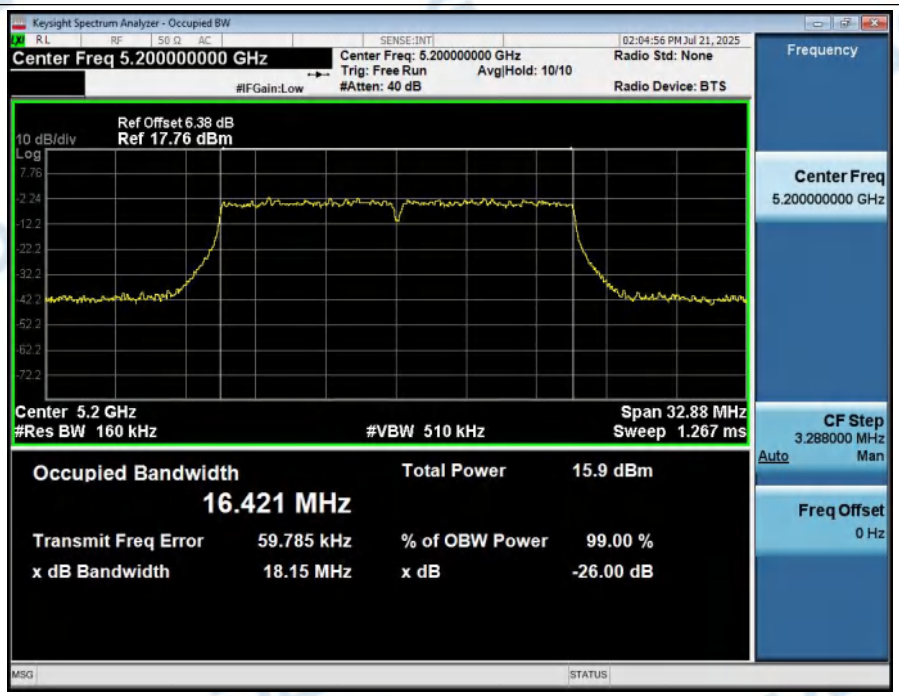

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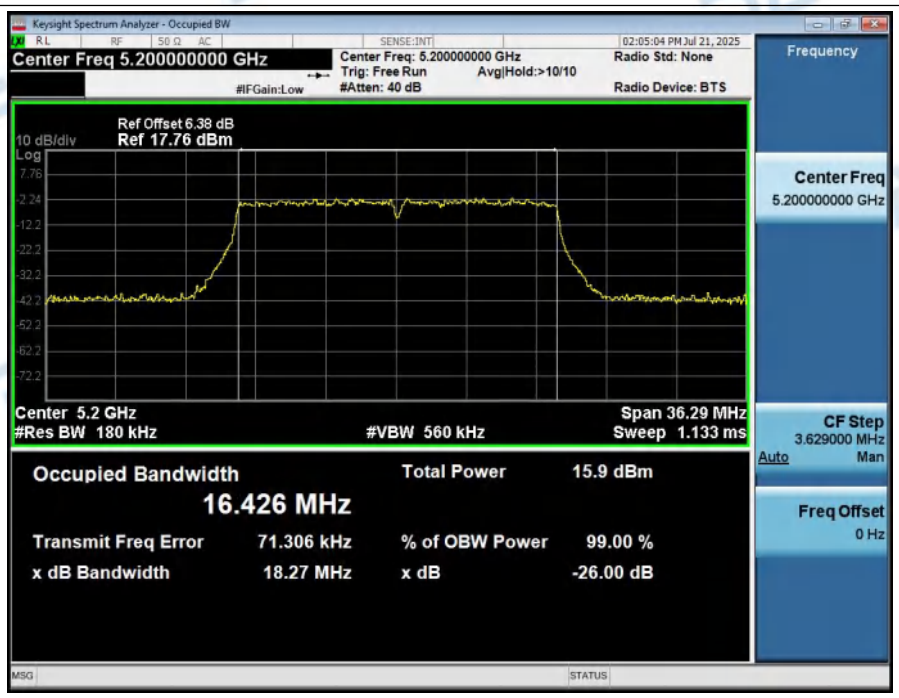

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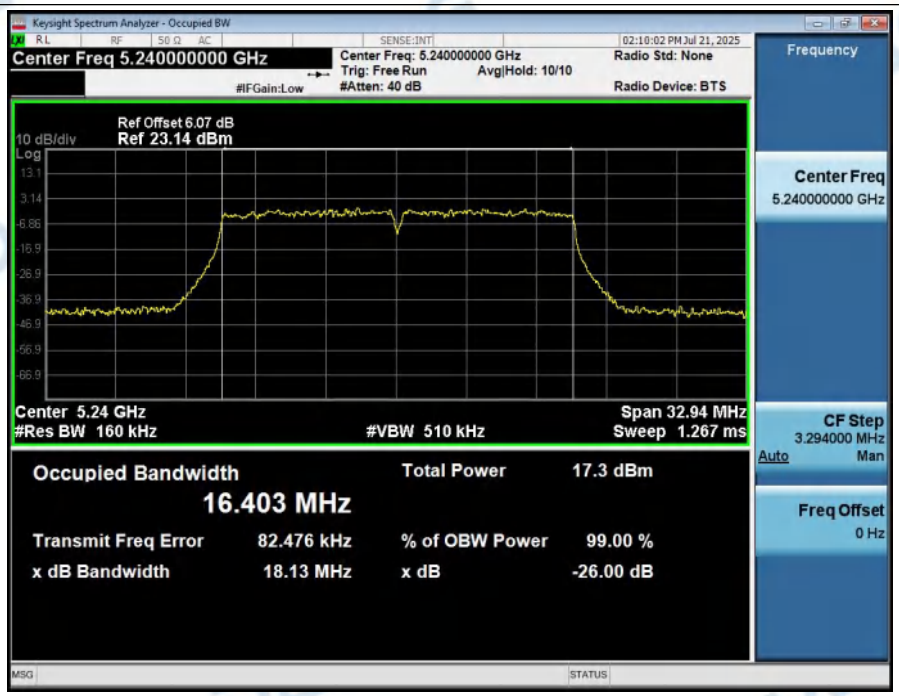

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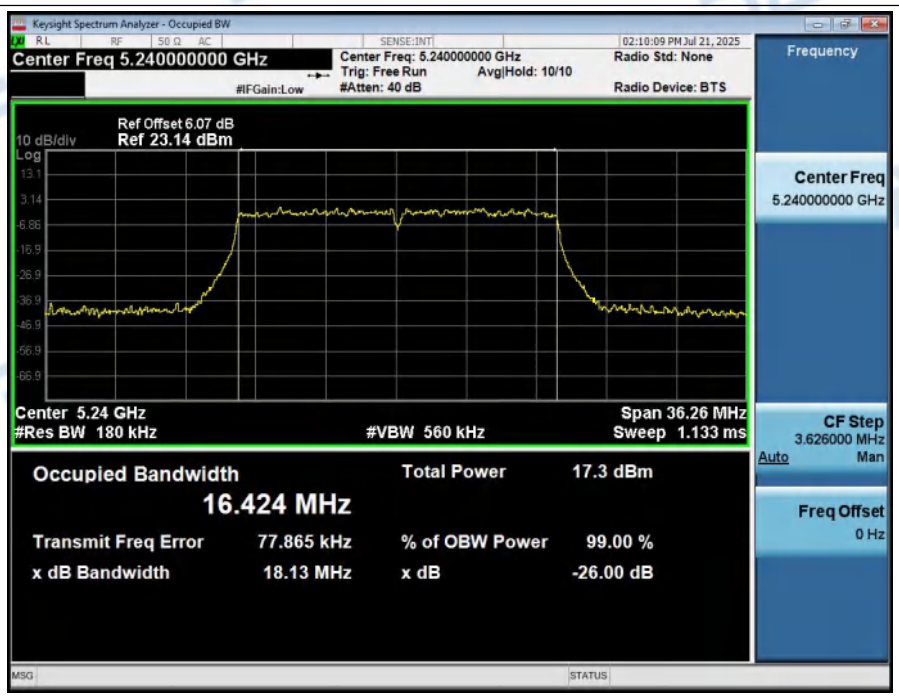

99%_OCB_NVNT_ANT2_802_11n(HT20)_5180

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99%_OCB_NVNT_ANT2_802_11n(HT20)_5200

-26BW_NVNT_ANT2_802_11n(HT20)_5200

99%_OCB_NVNT_ANT2_802_11n(HT20)_5240

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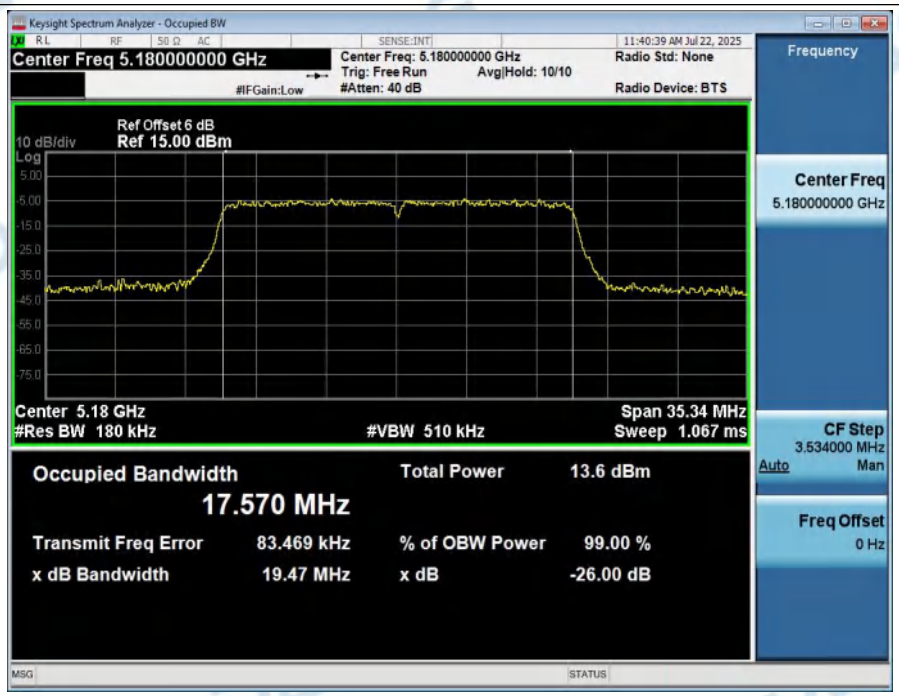

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99%_OCB_NVNT_ANT2_802_11ac(VHT20)_5200

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99%_OCB_NVNT_ANT2_802_11ac(VHT20)_5240

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99%_OCB_NVNT_ANT2_802_11ax(HE20)_5180

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99%_OCB_NVNT_ANT2_802_11ax(HE20)_5200

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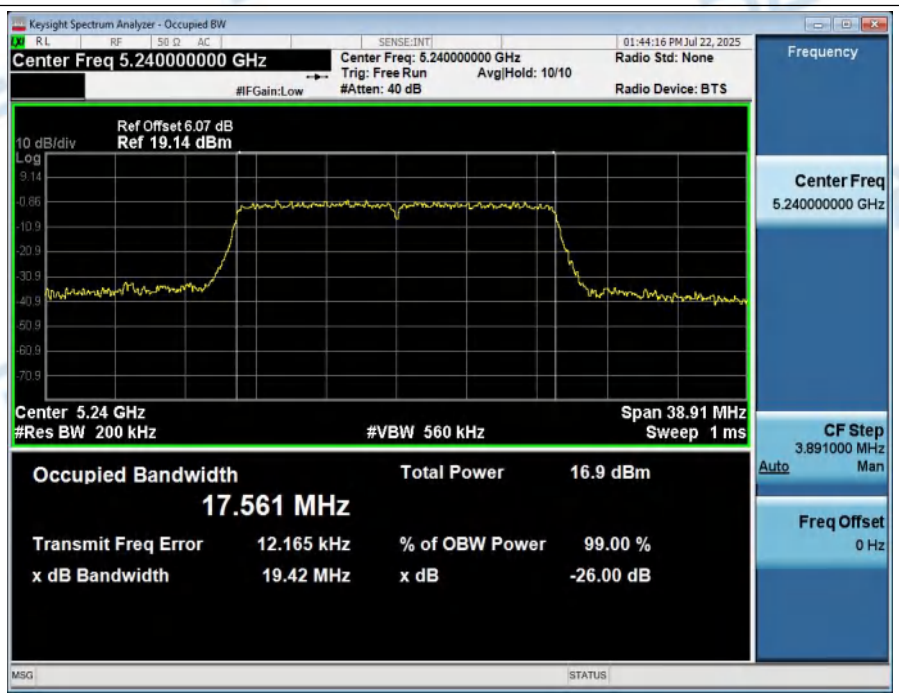

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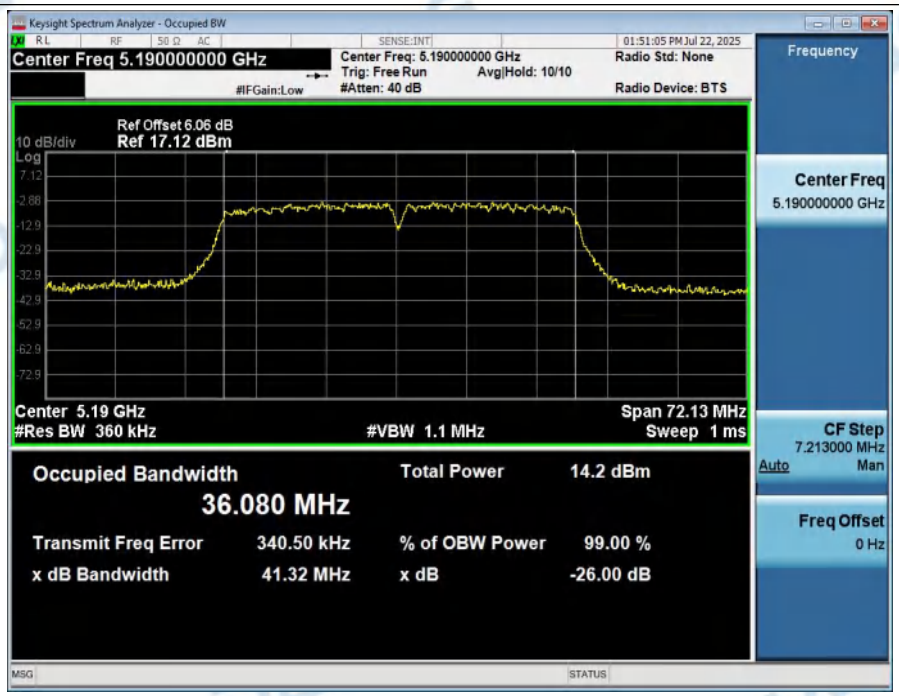
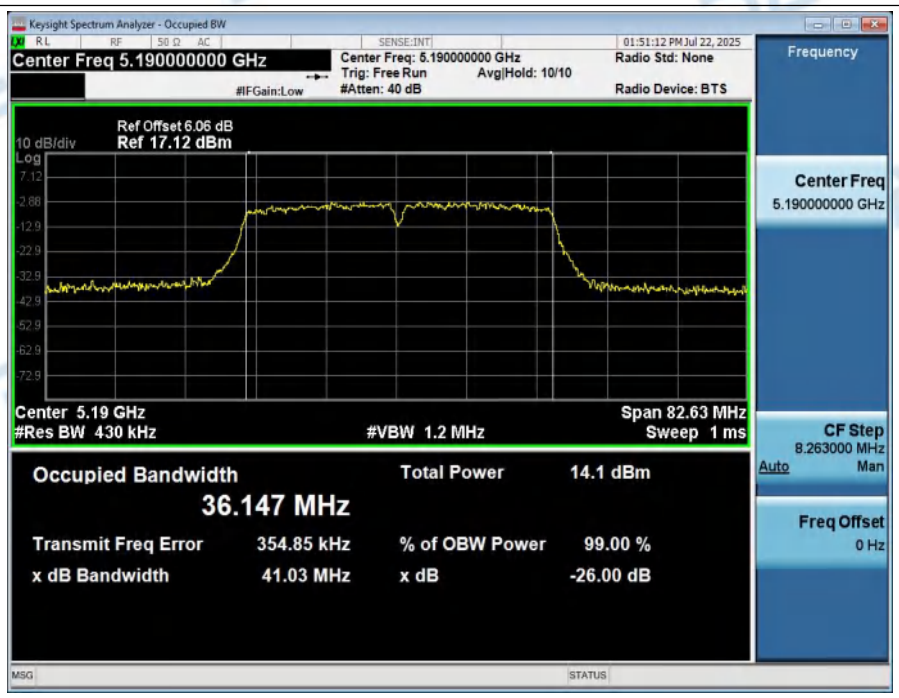
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