

Project No: TM-2404000025P
Report No.: TMWK2404001049KR

FCC ID: WHD-IGMG8224D

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RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART E

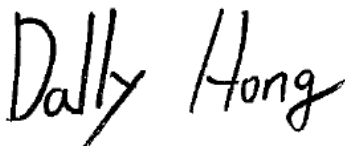
Test Standard	FCC Part 15.407
Product name	Industrial Gateway Router
Brand Name	ORing
Model No.	IGMG-8224D-D5G, IDS-8224D, IGAP-840D, IGR-40D
Test Result	Pass
Statements of Conformity	Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

Approved by:



Dally Hong
Sr. Engineer

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	January 24, 2025	Initial Issue	ALL	Peggy Tsai



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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	ORing Industrial Networking Corp 3F., No. 542-2, Zhongzheng Road, Xindian District, New Taipei City 231, Taiwan (R.O.C)
Manufacturer	ORing Industrial Networking Corp 3F., No. 542-2, Zhongzheng Road, Xindian District, New Taipei City 231, Taiwan (R.O.C)
Equipment	Industrial Gateway Router
Model No.	IGMG-8224D-D5G, IDS-8224D, IGAP-840D, IGR-40D
Model Discrepancy	Difference of the those model number (list on this report) are just for marketing purpose only
Trade Name	ORing
Received Date	April 3, 2024
Date of Test	September 3 ~ October 8, 2024
Power Operation	Powered from Adapter UMEC / UP0451H-12PP I/P: 100-240Vac, 50/60Hz, 2A MAX O/P: 12Vdc, 3.75A
HW Version	V 1.0
SW Version	V 1.0
EUT Serial #	022105D00007

Remark:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. Disclaimer: The variant model numbers / trademarks are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.



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1.2 EUT CHANNEL INFORMATION

Frequency Range	UNII-1	
	IEEE 802.11a	5180 ~ 5240 MHz
	IEEE 802.11n HT20	5180 ~ 5240 MHz
	IEEE 802.11ac VHT20	5180 ~ 5240 MHz
	IEEE 802.11n HT40	5190 ~ 5230 MHz
	IEEE 802.11ac VHT40	5190 ~ 5230 MHz
	IEEE 802.11ac VHT80	5210 MHz
Modulation Type	1. IEEE 802.11a mode: OFDM 2. IEEE 802.11n HT 20 MHz mode: OFDM 3. IEEE 802.11n HT 40 MHz mode: OFDM 4. IEEE 802.11ac VHT 20 MHz mode: OFDM 5. IEEE 802.11ac VHT 40 MHz mode: OFDM 5. IEEE 802.11ac VHT 80 MHz mode: OFDM	

Remark:

1. Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
☐ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☒ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	☐ PIFA ☒ PCB ☐ Dipole ☐ Coils
Antenna Trade / Model	Wanshih Electronic Co., Ltd. / WSS023
Antenna Gain	Chain 0: 1.70 dBi Chain 1: 1.70 dBi
Antenna Connector	N/A

Note:

1. The antenna(s) of the EUT are permanently attached and there are no provisions for connection to an external antenna. So the EUT complies with the requirements of §15.203.



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1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	± 2.21 dB
Channel Bandwidth	± 2.79 dB
RF output power (Spectrum)	± 2.74 dB
Power Spectral density	± 2.74 dB
Radiated Emission_9kHz-30MHz	± 3.492 dB
Radiated Emission_30MHz-200MHz	± 3.62 dB
Radiated Emission_200MHz-1GHz	± 3.899 dB
Radiated Emission_1GHz-6GHz	± 5.063 dB
Radiated Emission_6GHz-18GHz	± 5.122 dB
Radiated Emission_18GHz-26GHz	± 3.032 dB
Radiated Emission_26GHz-40GHz	± 3.271 dB

Remark:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	Ben Yang	-
Radiation	Ray Li 、 Tony Chao	-
RF Conducted	Marco Chan	-

Remark: The lab has been recognized as the FCC accredited lab. under the KDB 974614 D01 and is listed in the FCC public Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309



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1.6 INSTRUMENT CALIBRATION

Conducted_FCC/IC/NCC					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Sensor	Anritsu	MA2411B	1911387	2024-07-19	2025-07-18
Power Meter	Anritsu	ML2496A	2136002	2024-07-19	2025-07-18
EXA Signal Analyzer	Keysight	N9010B	MY55460167	2024-01-03	2025-01-02
Attenuator	Marvelous Microwave Inc	MVE2213-10	08	2023-11-07	2024-11-06
DC Block	Marvelous Microwave Inc	MVE6411	MVE-001	2024-08-08	2025-08-07
Software	Radio Test Software Ver. 21				

966A_Radiated					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Signal Analyzer	KEYSIGHT	N9010A	MY52220817	2024-03-15	2025-03-14
Thermo-Hygro Meter	WISEWIND	1206	D07	2023-12-08	2024-12-07
Active Loop Antenna	SCHWARZBECK	FMZB 1513-60	1513-60-028	2023-12-13	2024-12-12
Bi-Log Antenna	Sunol Sciences	JB3	A030105	2024-07-12	2025-07-11
Preamplifier	EMEC	EM330	060609	2024-02-21	2025-02-20
Cable	Huber+Suhner	104PEA	20995+21000+182330	2024-08-07	2025-08-06
Horn Antenna	ETC	MCTD 1209	DRH13M02003	2023-12-28	2024-12-27
Preamplifier	HP	8449B	3008A00965	2023-12-22	2024-12-21
Cable	EMCI	EMC101G	221213+221011+221012	2023-10-17	2024-10-16
Attenuator	Mini-Circuits	BW-S9W5	BWS9W5-09-966A-01	2024-02-07	2025-02-06
High Pass Filters	Titan Microwave	T04H30001800070S01	22011402-4	2024-06-12	2025-06-13
Horn Antenna	SCHWARZBECK	BBHA9170	1047	2023-12-13	2024-12-12
Pre-Amplifier	EMCI	EMC184045SE	980860	2023-12-12	2024-12-11
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Site Validation	CCS	966A	N/A	2024-08-03	2025-08-02
Software	e3 V9-210616c				

Remark:

- Each piece of equipment is scheduled for calibration once a year.
- N.C.R. = No Calibration Required.



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AC Mains Conduction					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESCI	100064	2024-06-14	2025-06-13
LISN	TESEQ	LN2-16N	22012	2024-02-29	2025-02-27
Cable	Woken	SFL402	185A	2024-07-08	2025-07-07
Software	e3 V6-110812				

Remark:

1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.



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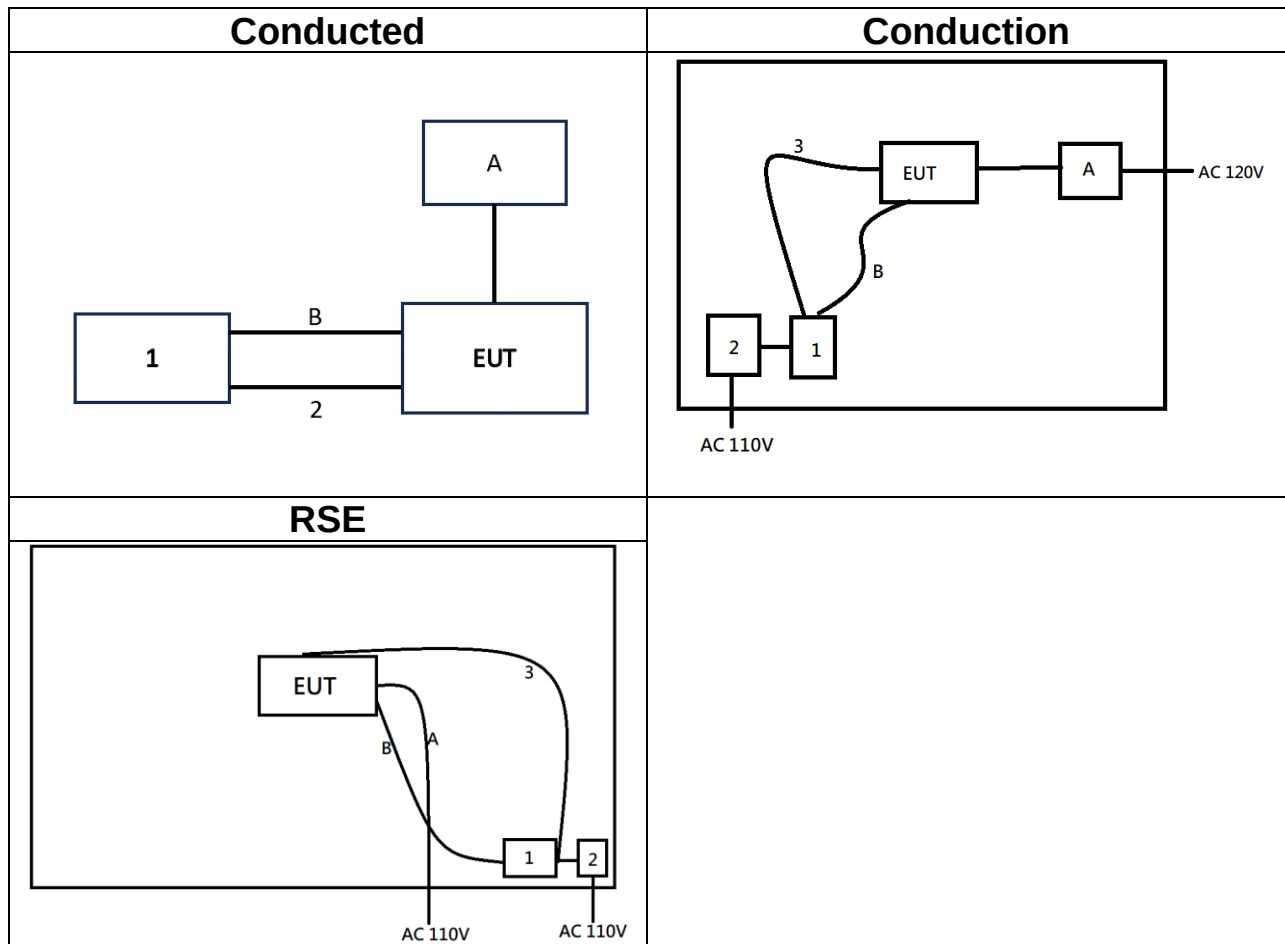
1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC
	N/A					

Support Equipment (Conducted)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(B)	Lenovo	T470	N/A	N/A
2	Lan Cable	RASTO REC4	R-PCC004	N/A	N/A
A	Adapter	UMEC	UP0451H-12PP	N/A	N/A
B	USB to Serial Uart TTL	Silicon Labs	CP2102	N/A	N/A

Support Equipment (RSE & Conduction)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(D)	Lenovo	ThinkPad X260	N/A	N/A
2	Adapter	Lenovo	ADLX45DLC3A	N/A	N/A
3	RJ45	Atake	AC6-FL10	N/A	N/A
A	Adapter	UMEC	UP0451H-12PP	N/A	N/A
B	USB to Serial Uart TTL	Silicon Labs	CP2102	N/A	N/A

1.8 TEST SET UP DIAGRAM



1.9 TEST PROGRAM

The EUT connection corresponds to the surrounding fixture control board.
This EUT uses "TeraTerm" and "QRCT4" software to set the frequency, modulation, and power to allow the sample to continuously transmit.

1.10 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.407, KDB 789033 D02 v02r01, KDB 905462 D02 v02.



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2. TEST SUMMERY

FCC Standard Sec.	Chapter	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207	4.1	AC Conducted Emission	Pass
15.407(a)	4.2	26dB Bandwidth	Pass
15.407(e)	4.2	6dB Bandwidth	Pass
2.1049	4.2	Occupied Bandwidth (99%)	Pass
15.407(a)	4.3	Output Power Measurement	Pass
15.407(a)	4.4	Power Spectral Density	Pass
15.407(b)	4.5	Radiation Band Edge	Pass
15.407(b)	4.5	Radiation Spurious Emission	Pass
15.407(h)	5	Dynamic Frequency Selection	N/A



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3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	1. IEEE 802.11a mode: 6Mbps 2. IEEE 802.11n HT20 mode: MCS0 3. IEEE 802.11n HT40 mode: MCS0 4. IEEE 802.11ac VHT20 mode: MCS0 5. IEEE 802.11ac VHT40 mode: MCS0 6. IEEE 802.11ac VHT80 mode: MCS0																		
Operating Frequency	<table><tr><th></th><th>Mode</th><th>Frequency Range (MHz)</th></tr><tr><td rowspan="6">U-NII-1</td><td>IEEE 802.11a</td><td>5180, 5220, 5240</td></tr><tr><td>IEEE 802.11n HT20</td><td>5180, 5220, 5240</td></tr><tr><td>IEEE 802.11n HT40</td><td>5190, 5230</td></tr><tr><td>IEEE 802.11ac VHT20</td><td>5180, 5220, 5240</td></tr><tr><td>IEEE 802.11ac VHT40</td><td>5190, 5230</td></tr><tr><td>IEEE 802.11ac VHT80</td><td>5210</td></tr></table>				Mode	Frequency Range (MHz)	U-NII-1	IEEE 802.11a	5180, 5220, 5240	IEEE 802.11n HT20	5180, 5220, 5240	IEEE 802.11n HT40	5190, 5230	IEEE 802.11ac VHT20	5180, 5220, 5240	IEEE 802.11ac VHT40	5190, 5230	IEEE 802.11ac VHT80	5210
	Mode	Frequency Range (MHz)																	
U-NII-1	IEEE 802.11a	5180, 5220, 5240																	
	IEEE 802.11n HT20	5180, 5220, 5240																	
	IEEE 802.11n HT40	5190, 5230																	
	IEEE 802.11ac VHT20	5180, 5220, 5240																	
	IEEE 802.11ac VHT40	5190, 5230																	
	IEEE 802.11ac VHT80	5210																	
Operation Transmitter	1. IEEE 802.11a mode: 1T1R(SISO) 2. IEEE 802.11n HT20 mode: 2T2R(MIMO) 3. IEEE 802.11n HT40 mode: 2T2R(MIMO) 4. IEEE 802.11ac VHT20 mode: 2T2R(MIMO) 5. IEEE 802.11ac VHT40 mode: 2T2R(MIMO) 6. IEEE 802.11ac VHT80 mode: 2T2R(MIMO)																		

Remark:

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.



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3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conduction Emission	
Test Condition	AC Power line conduction emission for line and neutral
Power supply Mode	Mode 1: EUT Power by Adapter
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT power by Adapter
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☐ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☒ Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by Adapter
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Remark:

1. The worst mode was record in this test report.
2. AC power line conducted emission were performed the EUT transmit at the highest output power channel as worse case.
3. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(Z-Plane) were recorded in this report



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3.3 EUT DUTY CYCLE

Temperature: 20.1 ~ 24.5°C

Test date:

September 3 ~
October 8, 2024

Humidity: 46 ~ 65% RH

Tested by:

Marco Chan

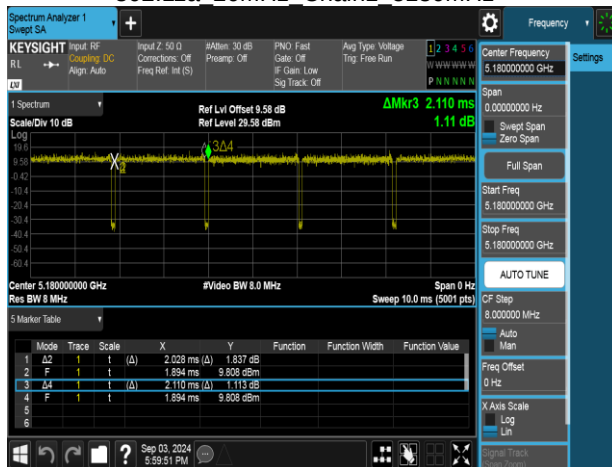
Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	96.11	0.17	0.49	1.00
802.11n_20	98.22	0.08	0.20	0.01
802.11ac_20	88.53	0.53	0.20	1.00
802.11n_40	96.10	0.17	0.41	1.00
802.11ac_40	79.06	1.02	0.41	1.00
802.11ac_80	83.79	0.77	0.30	1.00



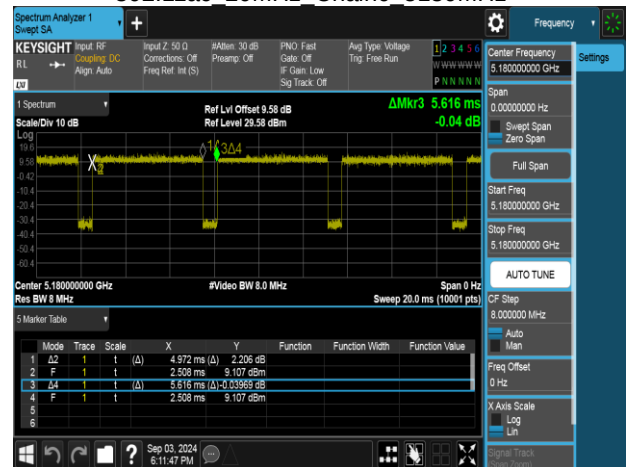
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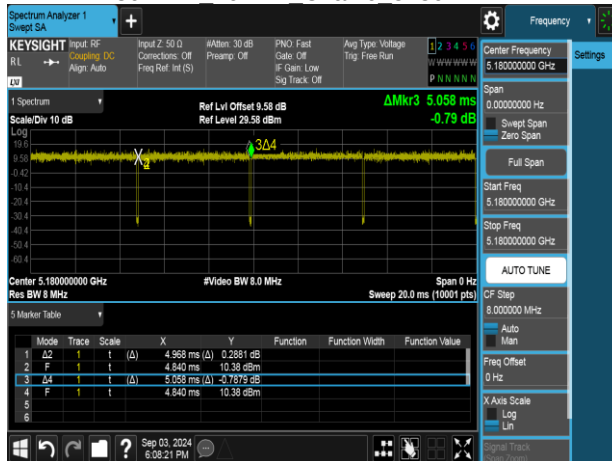
802.11a 20MHz Chain1 5180MHz



802.11ac 20MHz Chain0 5180MHz



802.11n 20MHz Chain0 5180MHz



802.11ac 40MHz Chain0 5190MHz



802.11n 40MHz Chain0 5190MHz



802.11ac 80MHz Chain0 5210MHz



4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

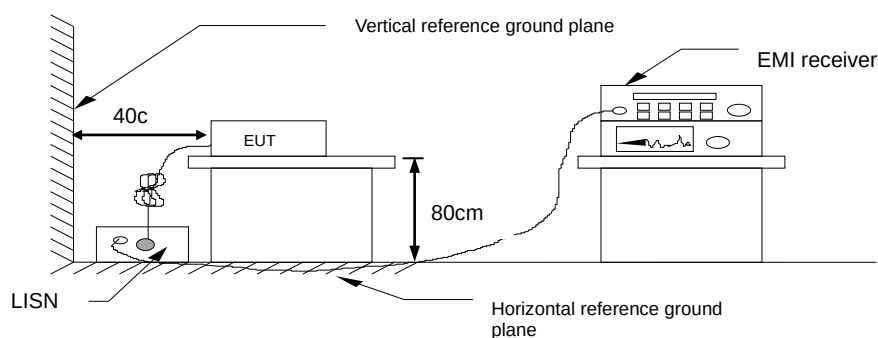
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

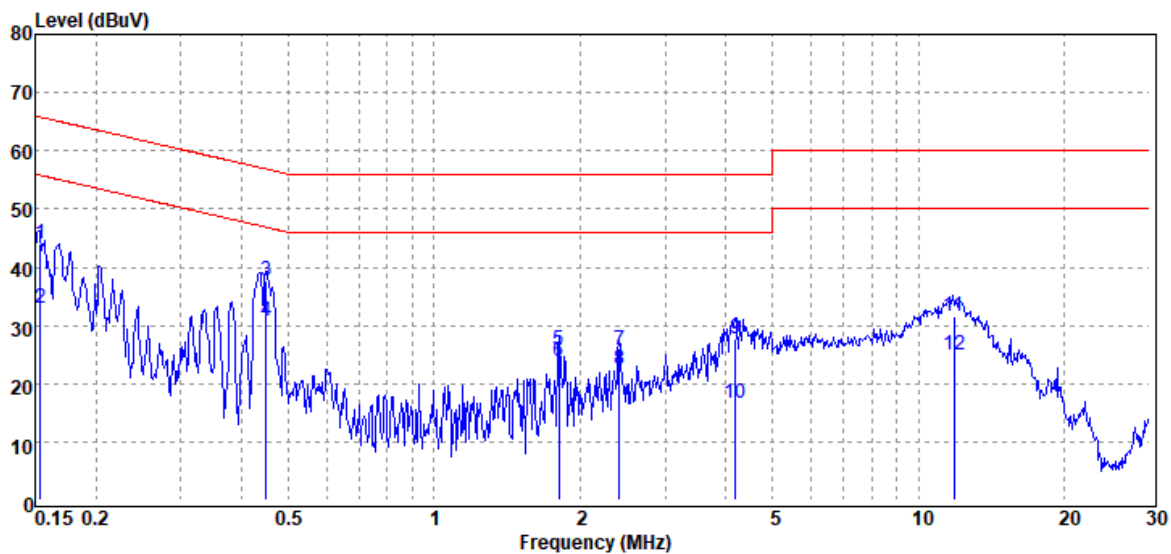
4.1.3 Test Setup



4.1.4 Test Result

Project No : TM-2404000025P
Operation Mode : 5G
Test Chamber : Conduction
Probe : LINE
Note :

Test Date : 2024-09-09
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 120V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.154	QP	43.89	0.14	44.03	65.81	-21.78
0.154	Average	32.71	0.14	32.85	55.81	-22.96
0.450	QP	37.38	0.38	37.76	56.87	-19.11
0.450	Average	30.48	0.38	30.86	46.87	-16.01
1.807	QP	25.68	0.18	25.86	56.00	-30.14
1.807	Average	23.61	0.18	23.79	46.00	-22.21
2.409	QP	25.54	0.20	25.74	56.00	-30.26
2.409	Average	22.18	0.20	22.38	46.00	-23.62
4.182	QP	27.49	0.24	27.73	56.00	-28.27
4.182	Average	16.46	0.24	16.70	46.00	-29.30
11.844	QP	31.28	0.38	31.66	60.00	-28.34
11.844	Average	24.57	0.38	24.95	50.00	-25.05

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit

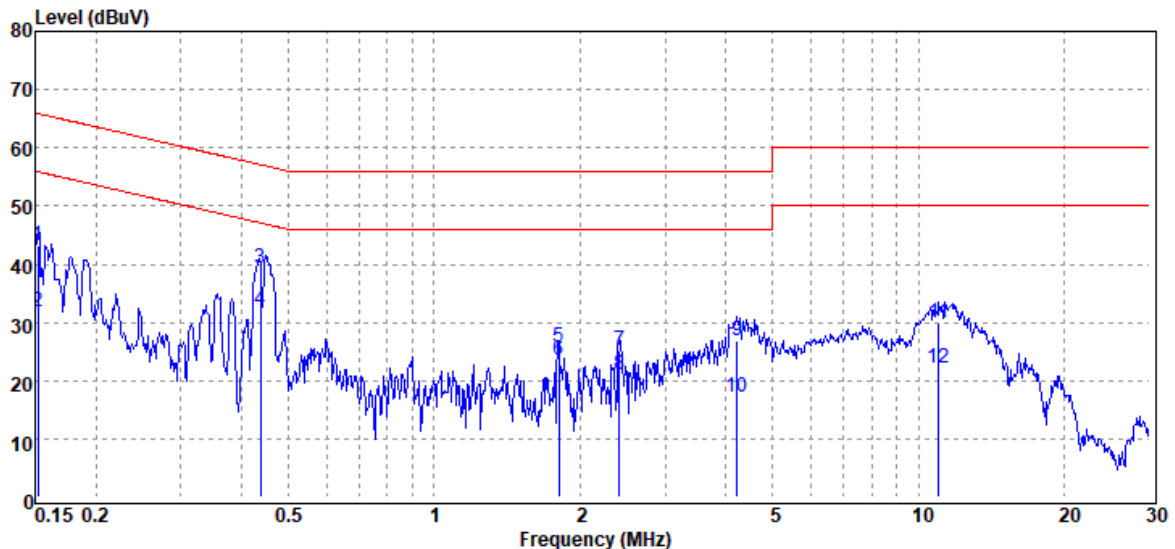


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Project No : TM-2404000025P
Operation Mode : 5G
Test Chamber : Conduction
Probe : NEUTRAL
Note :

Test Date : 2024-09-09
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 120V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.152	QP	43.04	0.12	43.16	65.89	-22.73
0.152	Average	31.79	0.12	31.91	55.89	-23.98
0.437	QP	39.06	0.35	39.41	57.11	-17.70
0.437	Average	31.72	0.35	32.07	47.11	-15.04
1.809	QP	25.67	0.16	25.83	56.00	-30.17
1.809	Average	23.37	0.16	23.53	46.00	-22.47
2.413	QP	25.04	0.18	25.22	56.00	-30.78
2.413	Average	20.91	0.18	21.09	46.00	-24.91
4.221	QP	26.64	0.21	26.85	56.00	-29.15
4.221	Average	17.04	0.21	17.25	46.00	-28.75
11.020	QP	29.47	0.36	29.83	60.00	-30.17
11.020	Average	21.77	0.36	22.13	50.00	-27.87

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit

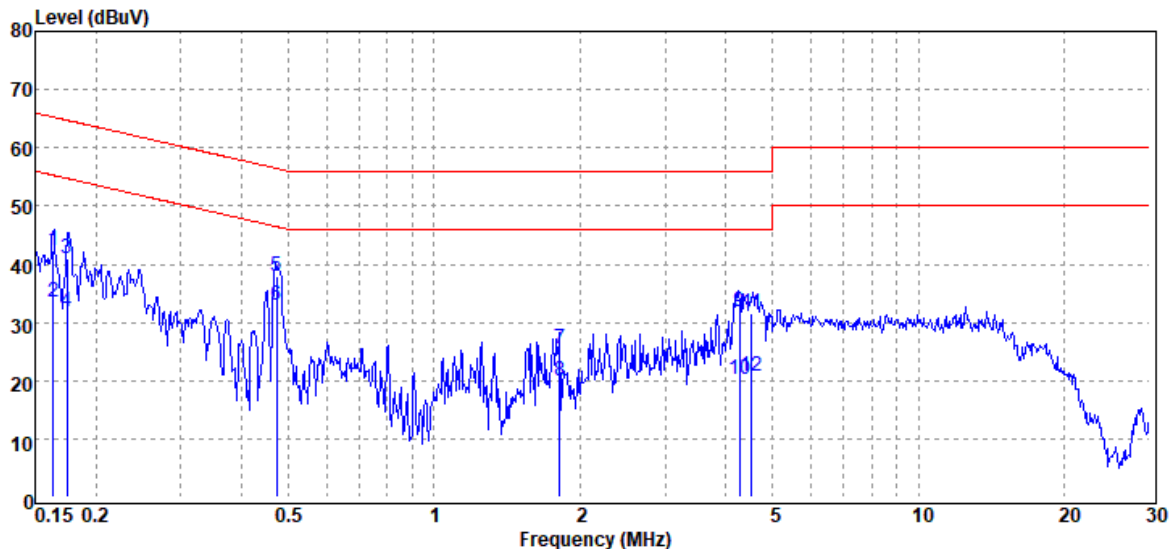


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Project No : TM-2404000025P
Operation Mode : 5G
Test Chamber : Conduction
Probe : LINE
Note :

Test Date : 2024-09-09
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 230V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.164	QP	42.18	0.20	42.38	65.28	-22.90
0.164	Average	33.36	0.20	33.56	55.28	-21.72
0.174	QP	40.73	0.25	40.98	64.75	-23.77
0.174	Average	31.54	0.25	31.79	54.75	-22.96
0.472	QP	37.63	0.38	38.01	56.48	-18.47
0.472	Average	32.49	0.38	32.87	46.48	-13.61
1.813	QP	25.25	0.18	25.43	56.00	-30.57
1.813	Average	19.83	0.18	20.01	46.00	-25.99
4.264	QP	31.68	0.24	31.92	56.00	-24.08
4.264	Average	19.93	0.24	20.17	46.00	-25.83
4.528	QP	31.36	0.26	31.62	56.00	-24.38
4.528	Average	20.46	0.26	20.72	46.00	-25.28

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit

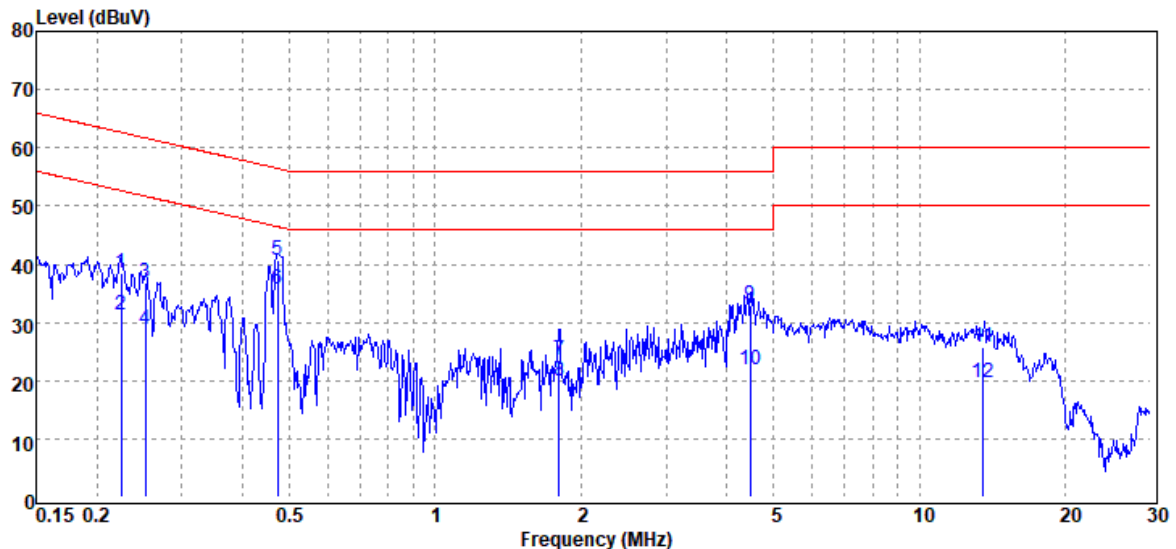


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Project No : TM-2404000025P
Operation Mode : 5G
Test Chamber : Conduction
Probe : NEUTRAL
Note :

Test Date : 2024-09-09
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 230V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.225	QP	38.02	0.36	38.38	62.63	-24.25
0.225	Average	30.86	0.36	31.22	52.63	-21.41
0.252	QP	36.53	0.36	36.89	61.68	-24.79
0.252	Average	28.37	0.36	28.73	51.68	-22.95
0.473	QP	40.21	0.35	40.56	56.47	-15.91
0.473	Average	35.49	0.35	35.84	46.47	-10.63
1.803	QP	23.48	0.16	23.64	56.00	-32.36
1.803	Average	19.87	0.16	20.03	46.00	-25.97
4.470	QP	32.68	0.23	32.91	56.00	-23.09
4.470	Average	21.60	0.23	21.83	46.00	-24.17
13.559	QP	25.40	0.38	25.78	60.00	-34.22
13.559	Average	19.18	0.38	19.56	50.00	-30.44

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit



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4.2 26dB BANDWIDTH, 6dB BANDWIDTH AND OCCUPIED BANDWIDTH(99%)

4.2.1 Test Limit

26 dB Bandwidth : For reporting purposes only.

Occupied Bandwidth(99%) : For reporting purposes only.

4.2.2 Test Procedure

26dB

1. This measurement setting are specified in section D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set RBW: approximately 1% of the emission bandwidth.
3. Set the VBW>RBW.
4. Detoctor = Peak.
5. Trace mode = max hold.
6. Measure the maximum width of the emission that is 26dB down from the peak of the emission. Compare this with the RBW setting of the analyser. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

99%

1. This measurement setting are specified in section D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set center frequency to the nominal EUT channel center frequency.
3. Set span = 1.5 times to 5.0 times the OBW.
4. Set RBW = 1 % to 5% of the OBW.
5. Set VBW $\geq$ 3 xRBW

4.2.3 Test Setup

Refer to section 1.8.



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4.2.4 Test Result

Temperature: 20.1 ~ 24.5°C Test date: September 3 ~ October 8, 2024
Humidity: 46 ~ 65% RH Tested by: Marco Chan

Occupied Bandwidth(99%)

802.11a_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	16.441	12.160
5220	16.424	12.150
5240	16.422	12.150

802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.608	12.460
5220	17.602	12.460
5240	17.585	12.450

802.11n_HT20_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.614	12.460
5220	17.609	12.460
5240	17.616	12.460



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802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.002	15.560
5230	35.998	15.560

802.11n_HT40_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	35.971	15.560
5230	36.028	15.570

802.11ac_VHT80_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.697	18.790

802.11ac_VHT80_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.759	18.790

26 dB Bandwidth

802.11a_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.09	12.810
5220	18.90	12.760
5240	19.01	12.790

802.11a_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.237110	< 5250

802.11n_HT20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.68	12.940
5220	19.77	12.960
5240	19.85	12.980

802.11n_HT20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.812588	< 5250

802.11n_HT20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.84	12.980
5220	19.97	13.000
5240	19.98	13.010

802.11n_HT20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.826447	< 5250



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802.11n_HT40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	38.91	15.900
5230	39.07	15.920

802.11n_HT40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5247.991351	< 5250

802.11n_HT40_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	38.89	15.900
5230	39.05	15.920

802.11n_HT40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.035284	< 5250



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802.11ac_VHT80_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	82.13	19.150

802.11ac_VHT80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.800580	< 5250

802.11ac_VHT80_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	82.14	19.150

802.11ac_VHT80_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.872003	< 5250

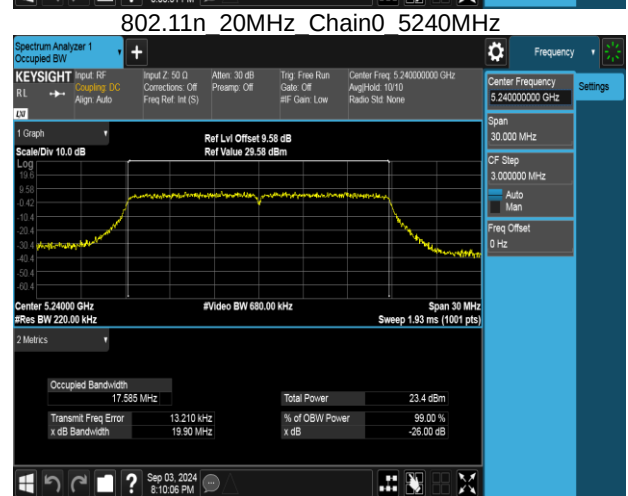
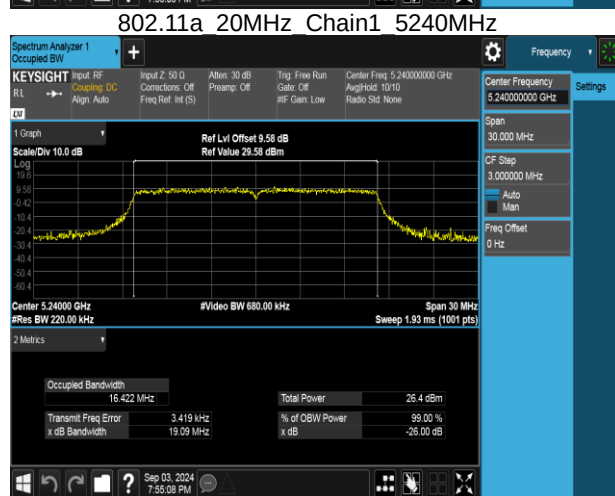
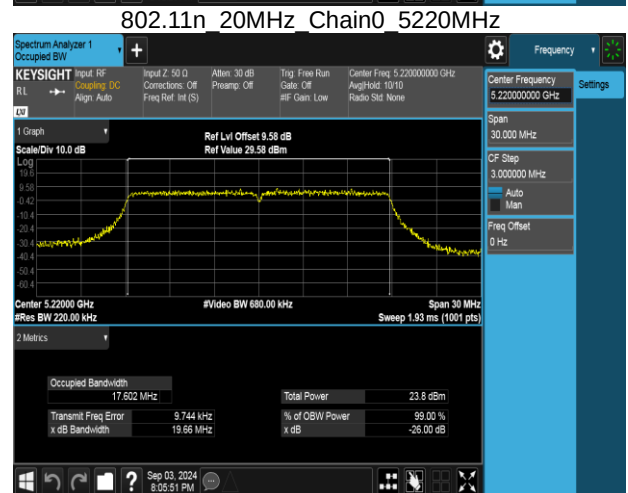
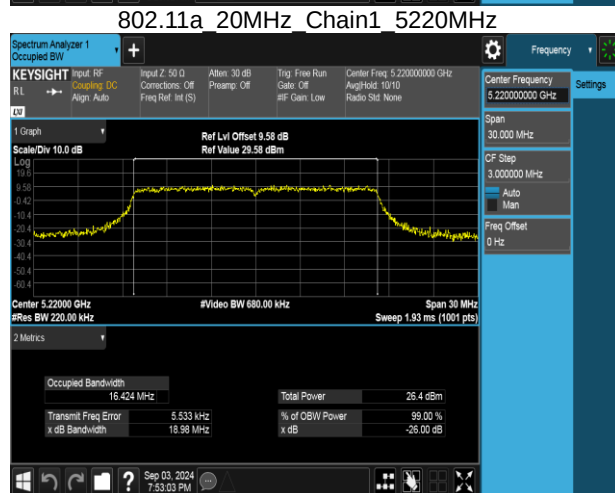
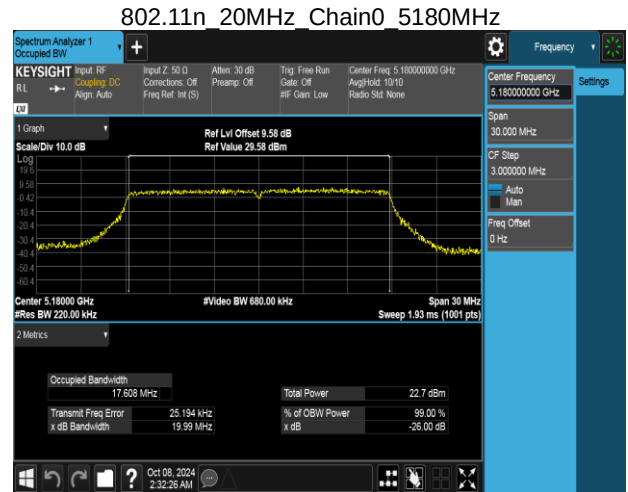
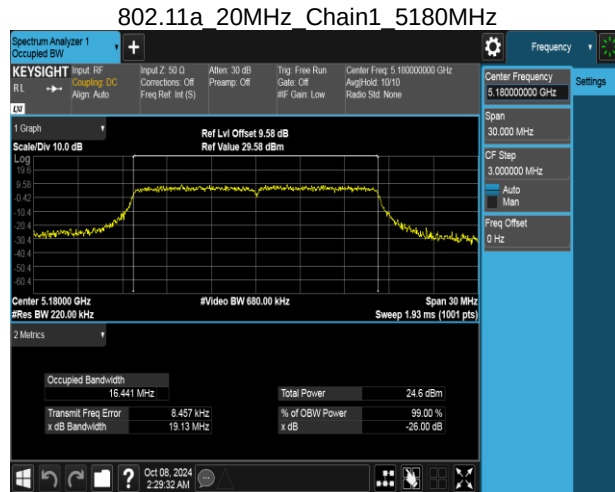


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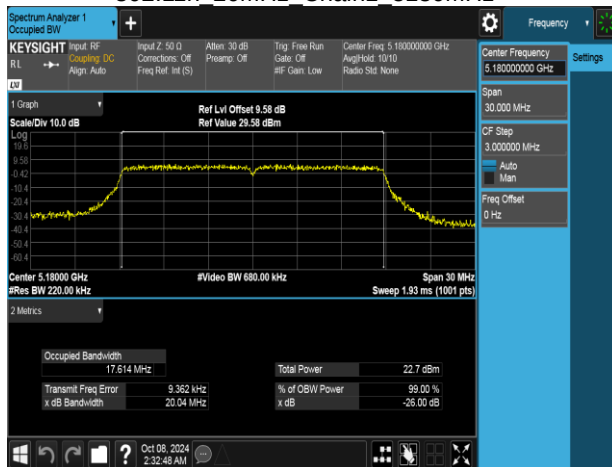
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Test Data

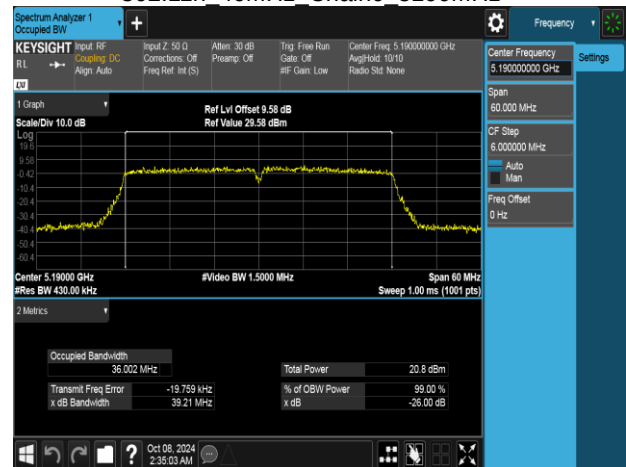
Occupied Bandwidth(99%)



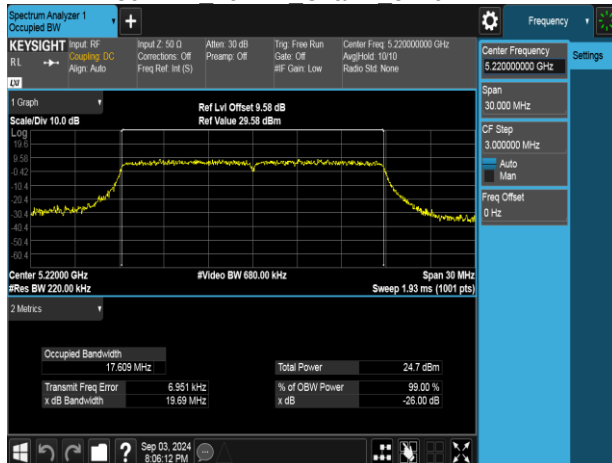
802.11n 20MHz Chain1 5180MHz



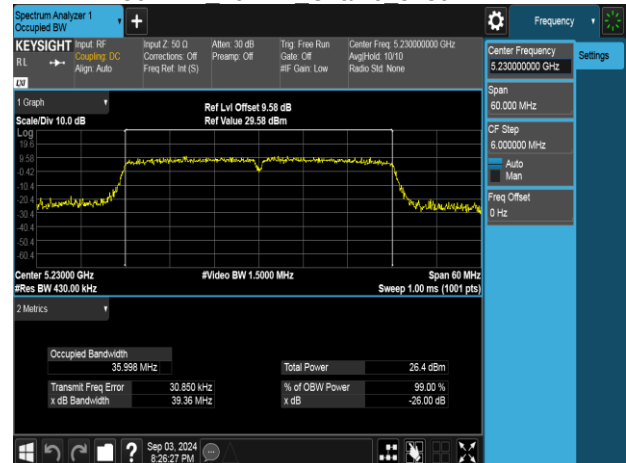
802.11n 40MHz Chain0 5190MHz



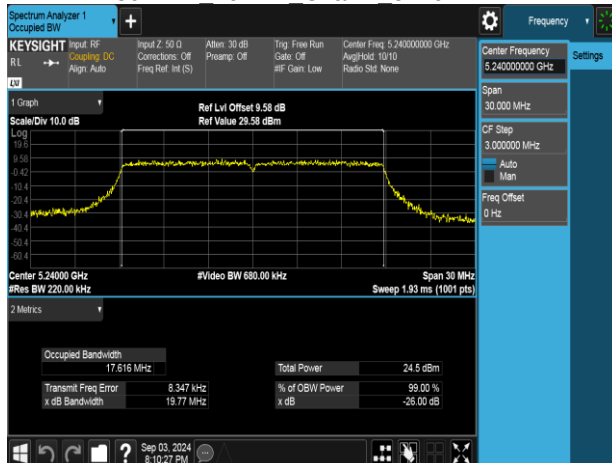
802.11n 20MHz Chain1 5220MHz



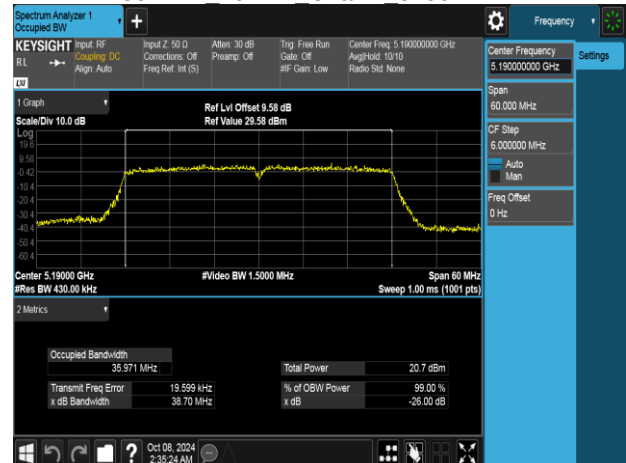
802.11n 40MHz Chain0 5230MHz



802.11n 20MHz Chain1 5240MHz



802.11n 40MHz Chain1 5190MHz

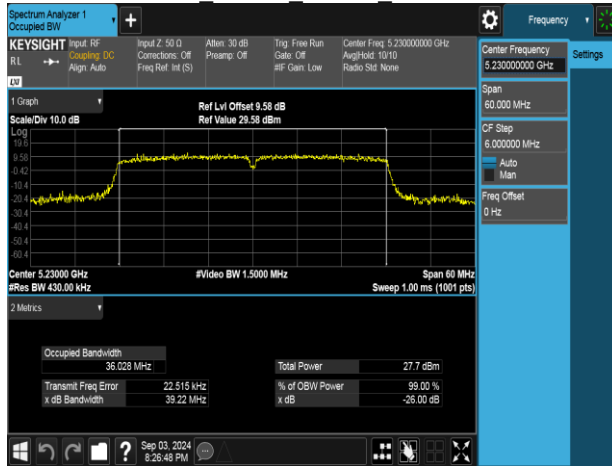




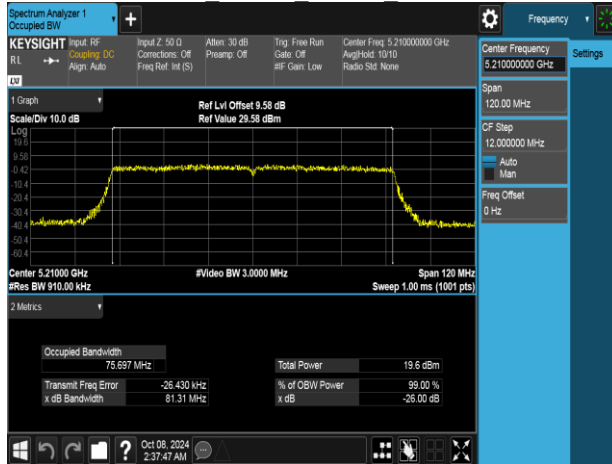
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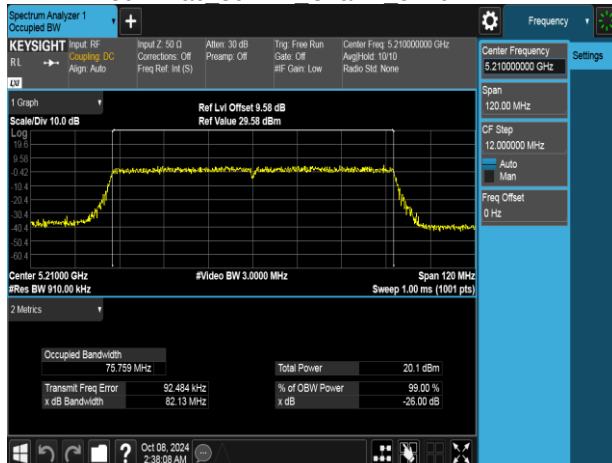
802.11n 40MHz Chain1 5230MHz



802.11ac 80MHz Chain0 5210MHz



802.11ac 80MHz Chain1 5210MHz



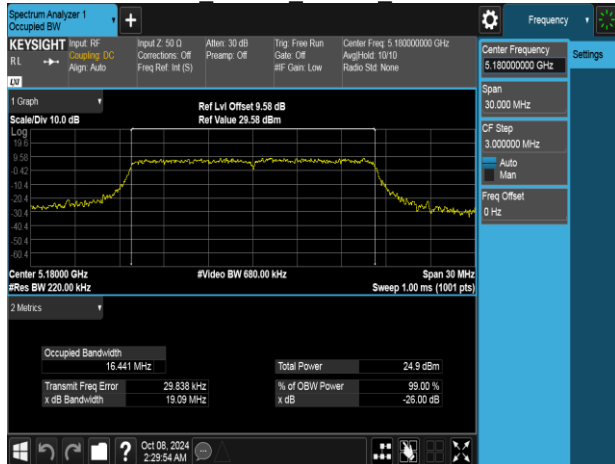


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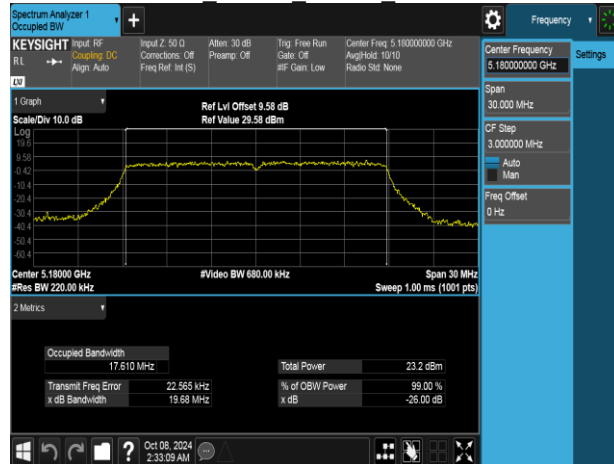
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26 dB Bandwidth

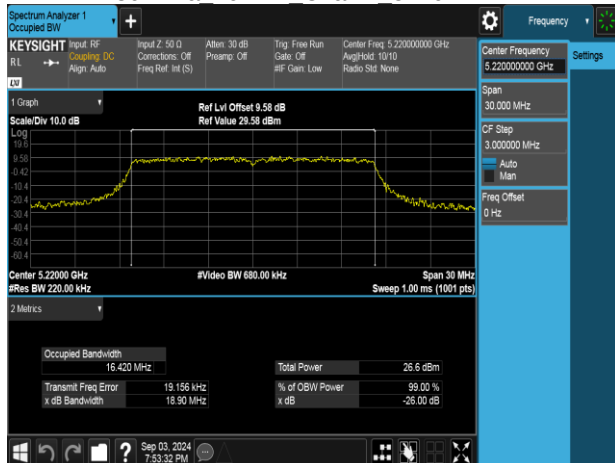
802.11a 20MHz Chain1 5180MHz



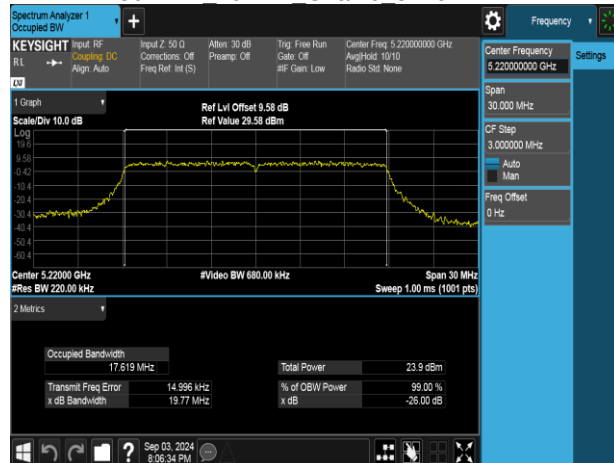
802.11n 20MHz Chain0 5180MHz



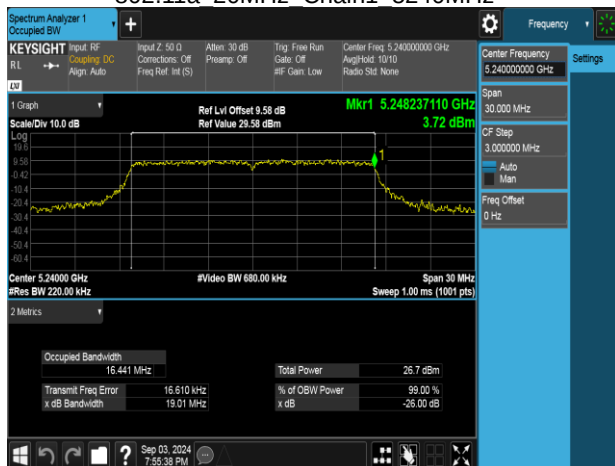
802.11a 20MHz Chain1 5220MHz



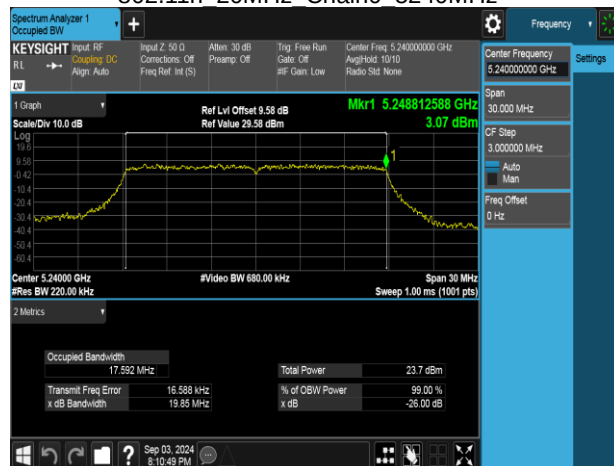
802.11n 20MHz Chain0 5220MHz



802.11a 20MHz Chain1 5240MHz



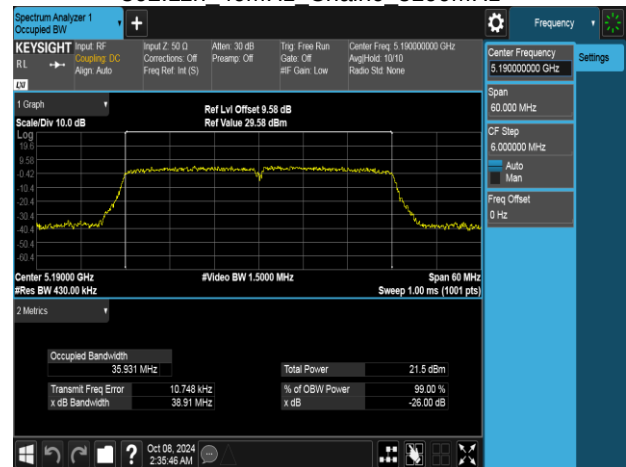
802.11n 20MHz Chain0 5240MHz



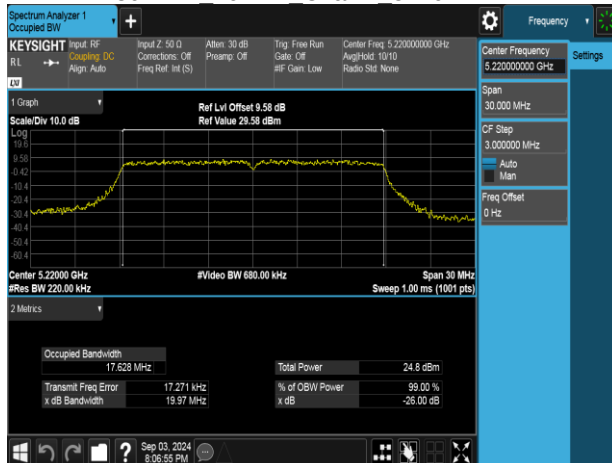
802.11n 20MHz Chain1 5180MHz



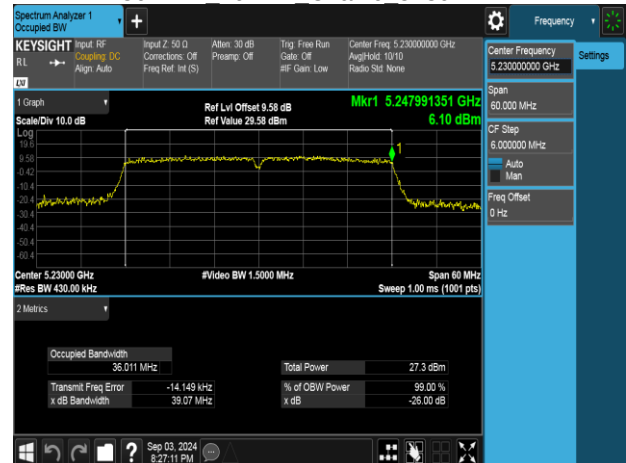
802.11n 40MHz Chain0 5190MHz



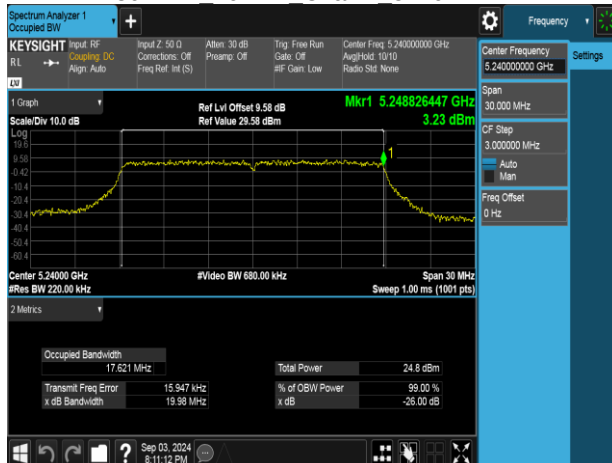
802.11n 20MHz Chain1 5220MHz



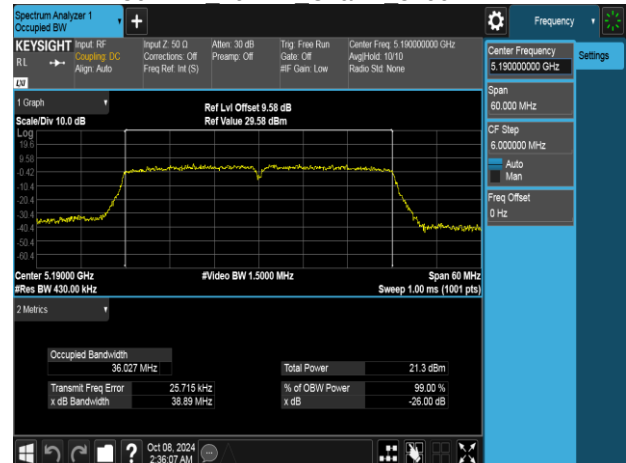
802.11n 40MHz Chain0 5230MHz



802.11n 20MHz Chain1 5240MHz



802.11n 40MHz Chain1 5190MHz

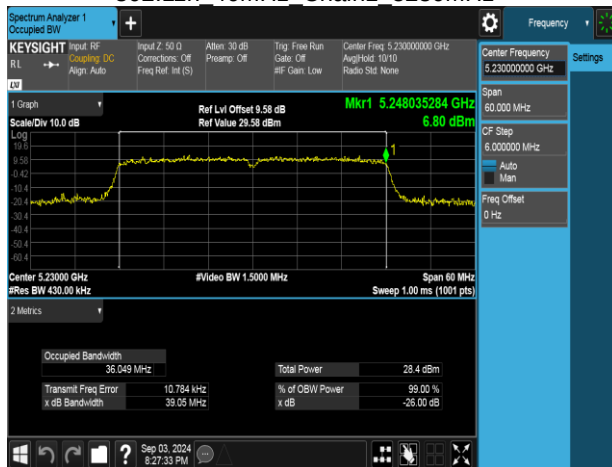




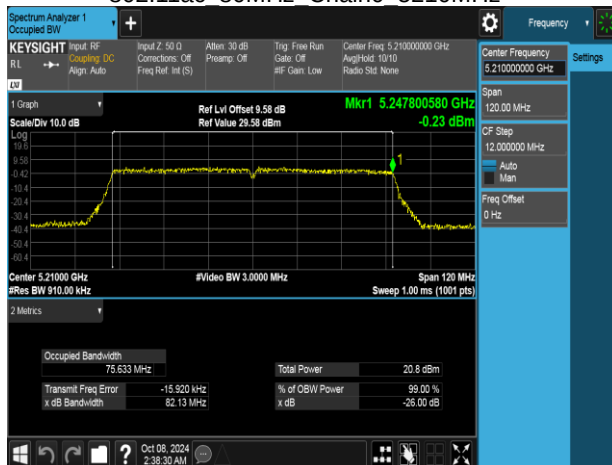
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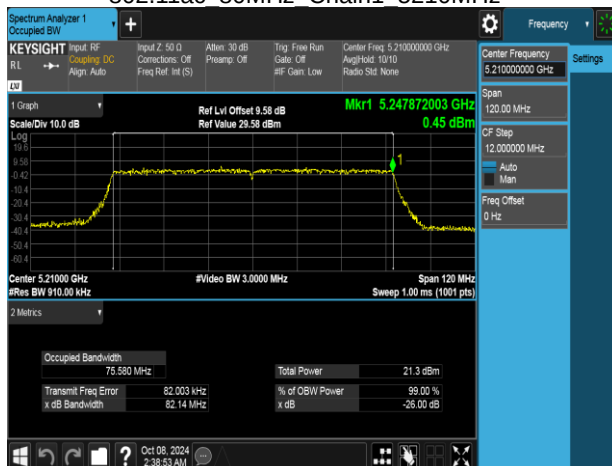
802.11n 40MHz Chain1 5230MHz



802.11ac 80MHz Chain0 5210MHz



802.11ac 80MHz Chain1 5210MHz



4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.407 (a)(1), 15.407(a)(2) and 15.407(a)(3),

UNII-1 :

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

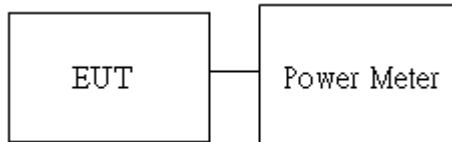
4.3.2 Test Procedure

Test method Refer as KDB 789033 D02, Section E.3.b for BW 20MHz, 40MHz and 80MHz.

1. The EUT RF output connected to the power meter or spectrum by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Average output power. in the test report.

4.3.3 Test Setup

For BW 20MHz ,40MHz and 80MHz





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4.3.4 Test Result

Temperature: 20.1 ~ 24.5°C

Test date: September 3 ~
October 8, 2024

Humidity: 46 ~ 65% RH

Tested by: Marco Chan

Conducted output power :

802.11a_Ch0

CH	Frequency (MHz)	Data Rate	Power Setting	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	21	82.838	19.18	23.98	PASS
44	5220	6	22	92.519	19.66	23.98	PASS
48	5240	6	22	86.742	19.38	23.98	PASS

802.11a_Ch1

CH	Frequency (MHz)	Data Rate	Power Setting	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	21	87.747	19.43	23.98	PASS
44	5220	6	22	113.823	20.56	23.98	PASS
48	5240	6	22	115.407	20.62	23.98	PASS

802.11n_HT20_2TX

CH	Frequency (MHz)	Data Rate	Power Setting	Avg. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
				Ch0	Ch1				
36	5180	MCS0	19	17.45	17.49	111.644	20.48	23.98	PASS
44	5220	MCS0	20	17.70	18.67	132.444	21.22	23.98	PASS
48	5240	MCS0	20	17.40	18.65	128.178	21.08	23.98	PASS

802.11n_HT40_2TX

CH	Frequency (MHz)	Data Rate	Power Setting	Avg. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
				Ch0	Ch1				
38	5190	MCS0	16	14.74	14.78	59.884	17.77	23.98	PASS
46	5230	MCS0	22.5	20.11	21.21	234.844	23.71	23.98	PASS



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802.11ac_VHT20_2TX

CH	Frequency (MHz)	Data Rate	Power Setting	Avg. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
				Ch0	Ch1				
36	5180	MCS0	19	17.38	17.44	110.141	20.42	23.98	PASS
44	5220	MCS0	20	17.74	18.54	130.852	21.17	23.98	PASS
48	5240	MCS0	20	17.50	18.52	127.329	21.05	23.98	PASS

802.11ac_VHT40_2TX

CH	Frequency (MHz)	Data Rate	Power Setting	Avg. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
				Ch0	Ch1				
38	5190	MCS0	16	14.69	14.76	59.373	17.74	23.98	PASS
46	5230	MCS0	22.5	20.14	21.17	234.218	23.70	23.98	PASS

802.11ac_VHT80_2TX

CH	Frequency (MHz)	Data Rate	Power Setting	Avg. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
				Ch0	Ch1				
42	5210	MCS0	15	13.89	14.47	52.457	17.20	23.98	PASS



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4.4 POWER SPECTRAL DENSITY

4.4.1 Test Limit

According to §15.407 (a)(1), 15.407(a)(2) and 15.407(a)(3),

UNII-1 :

FCC: The maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

UNII-1 Limit	☒ Antenna not exceed 6 dBi : 11 dBm/MHz ☐ Antenna with DG greater than 6 dBi : [Limit = 17 – (DG – 6) dBm/MHz]
--------------	---

4.4.2 Test Procedure

Test method Refer as KDB 789033 D02

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. UNII-1, UNII-2a and UNII-2c, SA set RBW = 1MHz, VBW = 3MHz and Detector = RMS, to measurement Power Density.
4. UNII-3, SA set RBW = 500kHz, VBW = 2MHz and Detector = RMS, to measurement Power Density
5. The path loss and Duty Factor were compensated to the results for each measurement by SA.
6. Mark the maximum level.
7. Measure and record the result of power spectral density. in the test report.

4.4.3 Test Setup

Refer to section 1.8.



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4.4.4 Test Result

Temperature: 20.1 ~ 24.5°C

Test date: September 3 ~
October 8, 2024

Humidity: 46 ~ 65% RH

Tested by: Marco Chan

POWER DENSITY 802.11a MODE					
Frequency (MHz)	Ch1 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)	Limit	Margin (dB)
5180	9.167	0.17	9.34	11.00 dBm/MHz	-1.66
5220	10.660	0.17	10.83	11.00 dBm/MHz	-0.17
5240	10.669	0.17	10.84	11.00 dBm/MHz	-0.16

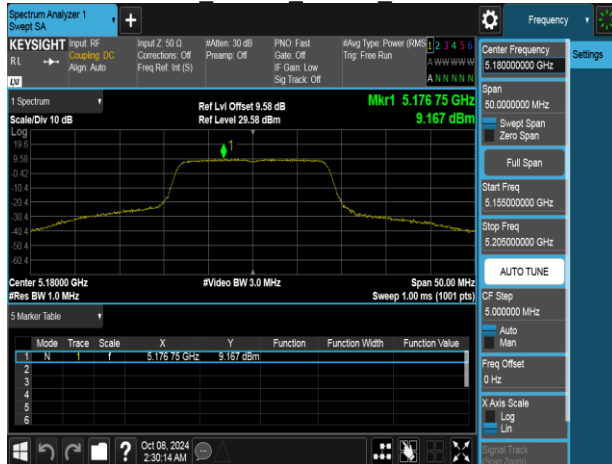
POWER DENSITY 802.11n HT20 MODE						
Frequency (MHz)	Ch0 meas PSD (dBm/MHz)	Ch1 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)	Limit	Margin (dB)
5180	7.527	7.323	0.00	10.44	11.00 dBm/MHz	-0.56
5220	7.509	8.387	0.00	10.98	11.00 dBm/MHz	-0.02
5240	7.625	8.298	0.00	10.98	11.00 dBm/MHz	-0.02

POWER DENSITY 802.11n HT40 MODE						
Frequency (MHz)	Ch0 meas PSD (dBm/MHz)	Ch1 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)	Limit	Margin (dB)
5190	1.963	1.775	0.17	5.05	11.00 dBm/MHz	-5.95
5230	7.155	7.965	0.17	10.76	11.00 dBm/MHz	-0.24

POWER DENSITY 802.11ac VHT80 MODE						
Frequency (MHz)	Ch0 meas PSD (dBm/MHz)	Ch1 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)	Limit	Margin (dB)
5210	-3.474	-3.662	0.77	0.21	11.00 dBm/MHz	-10.79

Test Data

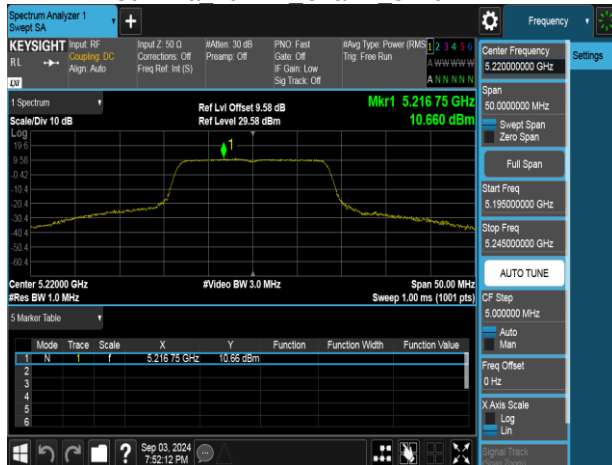
802.11a 20MHz Chain1 5180MHz



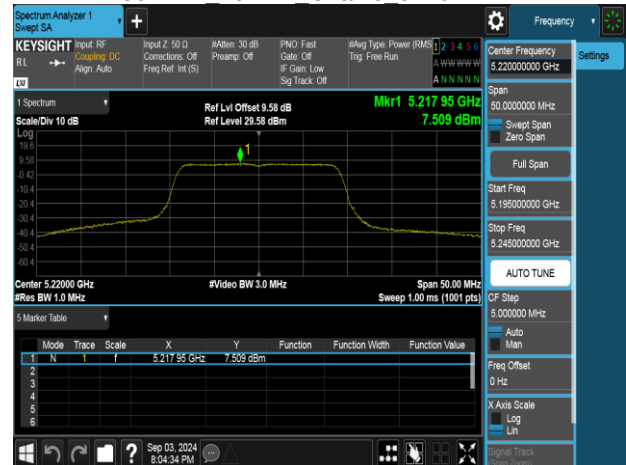
802.11n 20MHz Chain0 5180MHz



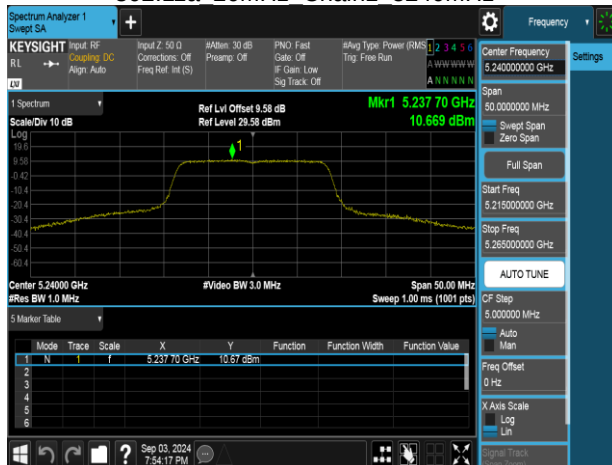
802.11a 20MHz Chain1 5220MHz



802.11n 20MHz Chain0 5220MHz



802.11a 20MHz Chain1 5240MHz



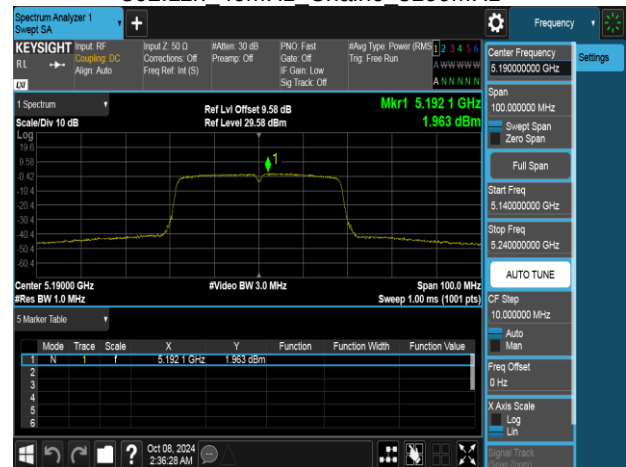
802.11n 20MHz Chain0 5240MHz



802.11n 20MHz Chain1 5180MHz



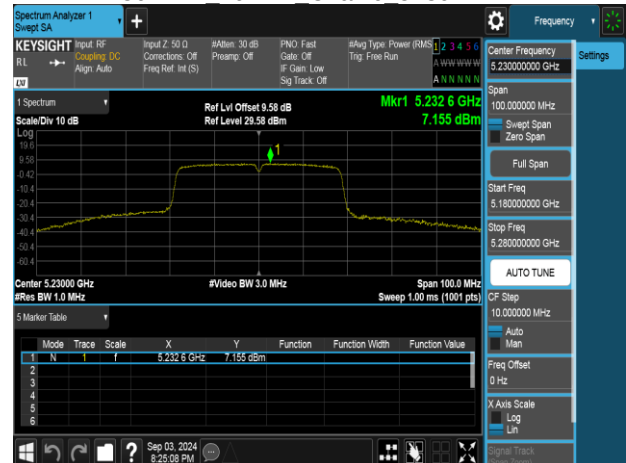
802.11n 40MHz Chain0 5190MHz



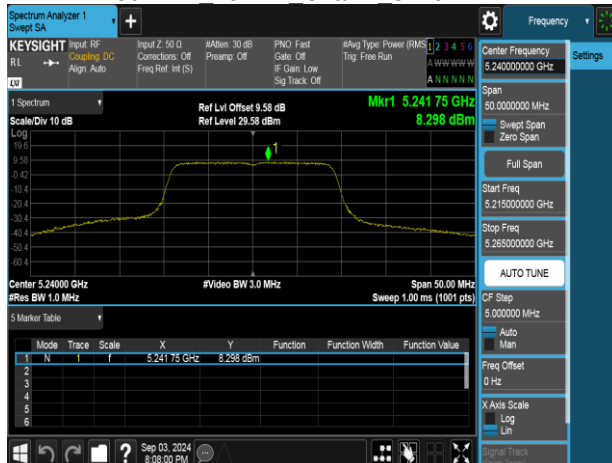
802.11n 20MHz Chain1 5220MHz



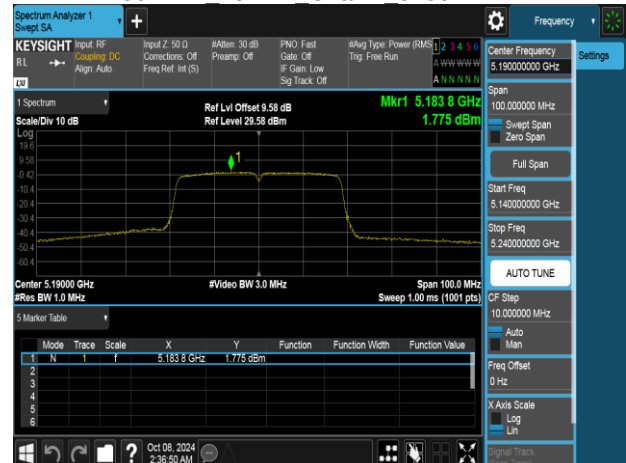
802.11n 40MHz Chain0 5230MHz



802.11n 20MHz Chain1 5240MHz



802.11n 40MHz Chain1 5190MHz





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802.11n 40MHz Chain1 5230MHz



802.11ac 80MHz Chain0 5210MHz



802.11ac 80MHz Chain1 5210MHz





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4.5 RADIATION Bandedge and Spurious Emission

4.5.1 Test Limit

FCC according to §15.407, §15.209 and §15.205,

Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Above 30 MHz

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

UNII-1 :

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.



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4.5.2 Test Procedure

Test method Refer as KDB 789033 D02.

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10: 2013, and the EUT set in a continuous mode.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.
3. Span shall wide enough to full capture the emission measured. The SA from 9kHz to 40GHz set to the low, Mid and High channels with the EUT transmit.
4. No emission found between lowest internal used/generated frequency to 30MHz (9KHz~30MHz)

Radiated emission below 30MHz is measured in a 9m*6m*6m semi-ane choic chamber, the measurements correspond to those obtained at an open-field test site. There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

5. The SA setting following :

(1) Below 30MHz :

(1.1) 9KHz-490KHz : RBW=200Hz / VBW=1kHz / Sweep=AUTO

(1.2) 490KHz-30MHz : RBW=10kHz / VBW=30kHz / Sweep=AUTO

(2) 30MHz to 1GHz : RBW = 100kHz, VBW $\geq 3 \times$ RBW, Sweep = Auto,
Detector = Peak, Trace = Max hold.

(3) Above 1GHz :

(3.1) For Peak measurement : RBW = 1MHz, VBW $\geq 3 \times$ RBW, Sweep = Auto,
Detector = Peak, Trace = Max hold.

(3.2) For Average measurement : RBW = 1MHz, VBW

·If Duty Cycle $\geq 98\%$, VBW=10Hz.

·If Duty Cycle $< 98\%$, VBW=1/T.

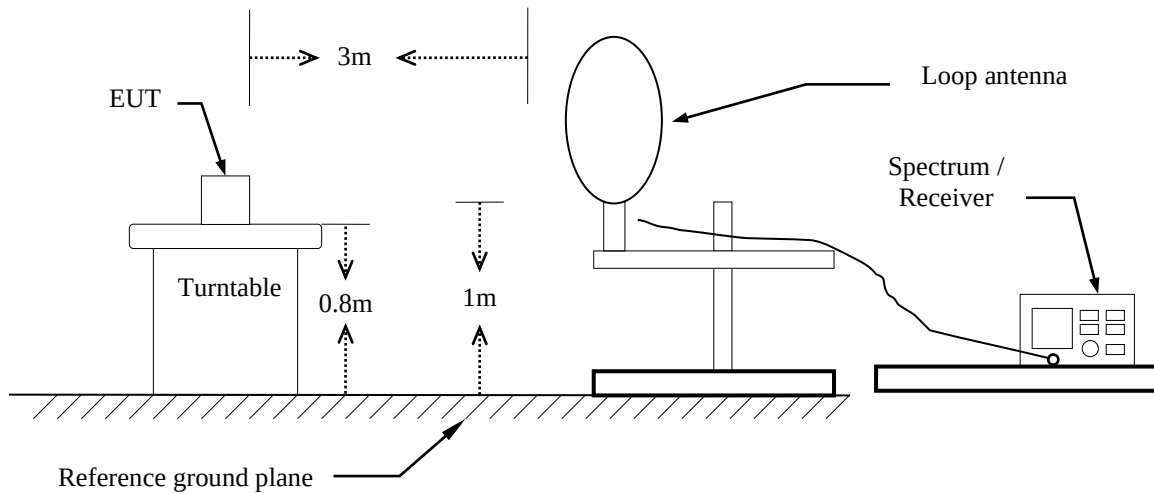
6. Data result :

Actual FS=Spectrum Reading Level + Factor

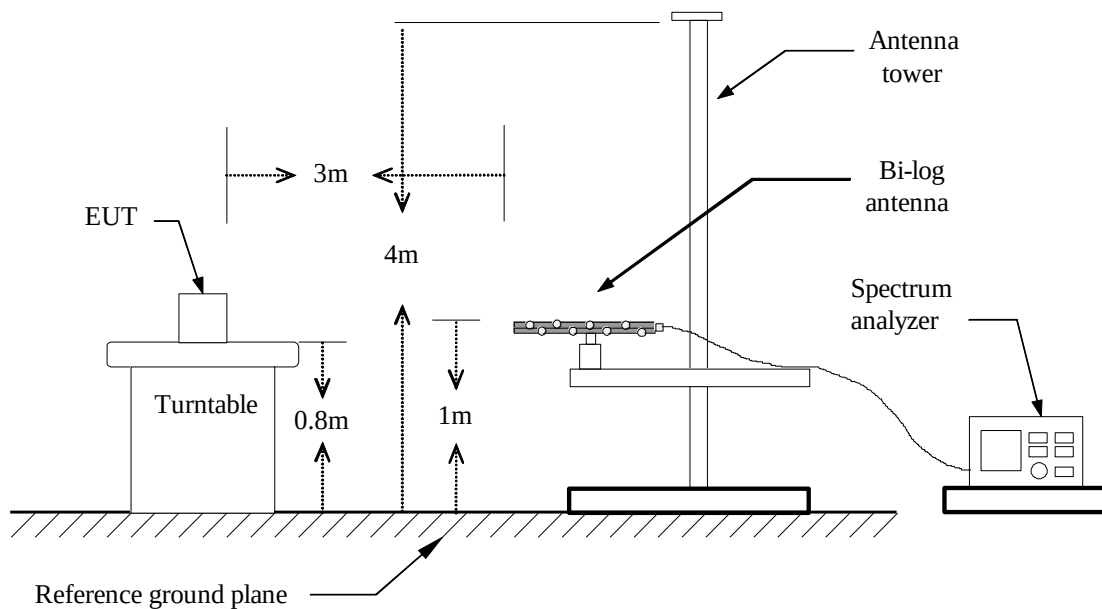
Margin=Actual FS- Limit

4.5.3 Test Setup

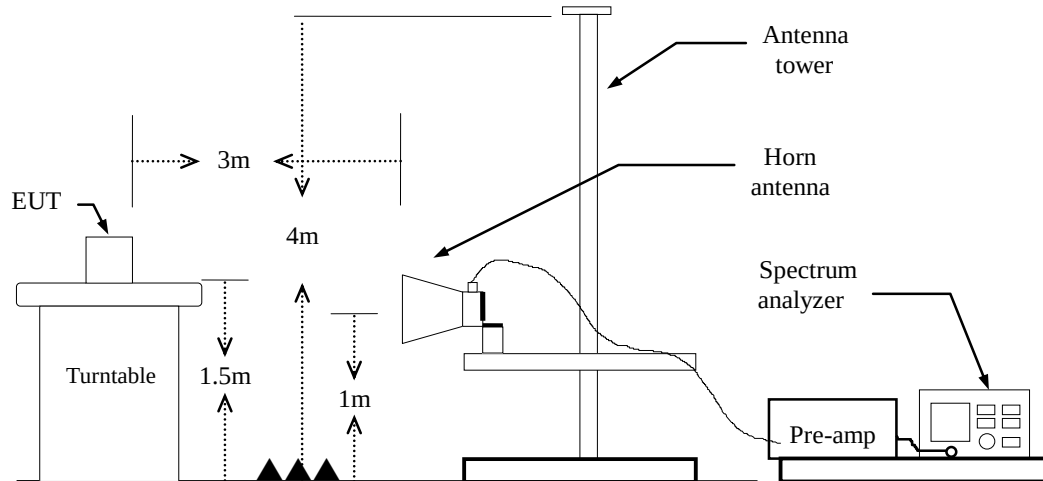
9kHz ~ 30MHz



30MHz ~ 1GHz



Above 1 GHz





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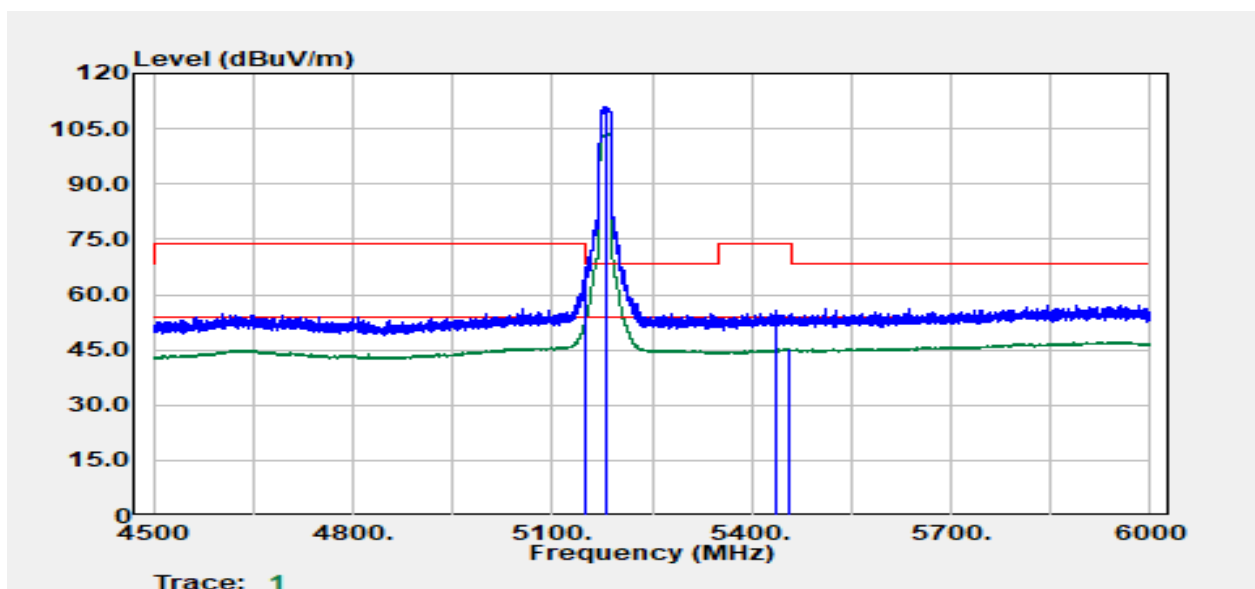
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4.5.4 Test Result

Test Data

Band Edge

Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11a/Band1_CH1	Temp./Humi.	:24.6/57
Frequency	:5180 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:Bandedge	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:21		



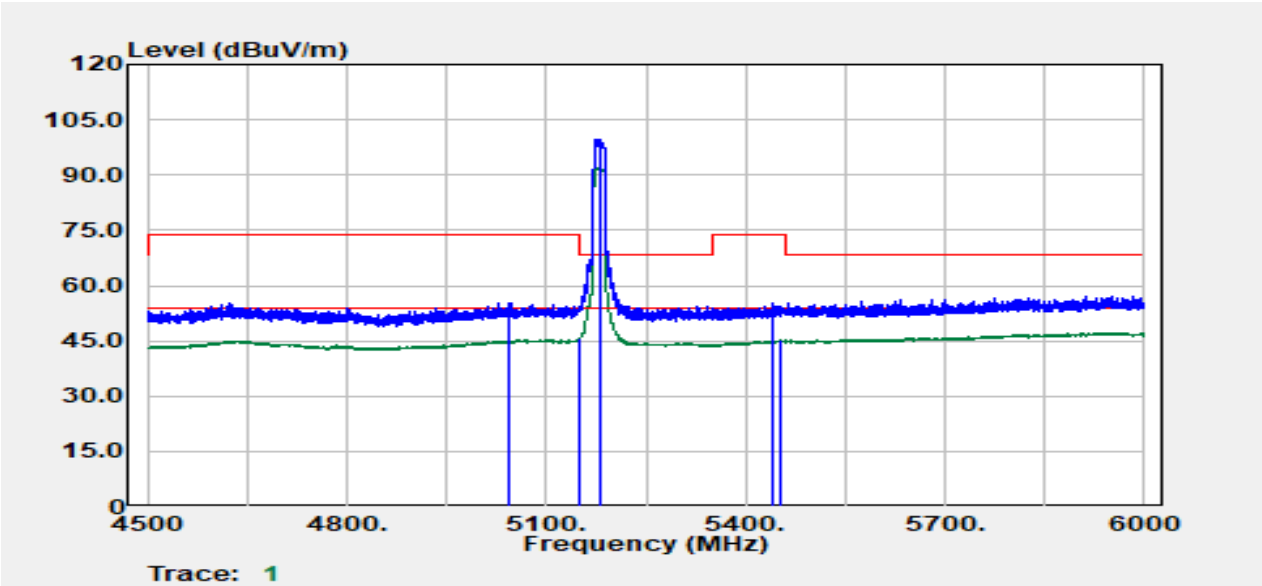
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5149.68	Peak	50.92	13.73	64.65	74.00	-9.35
5149.93	Average	39.22	13.73	52.95	54.00	-1.05
5180.00	Peak	97.28	13.81	111.09	-	-
5180.00	Average	89.73	13.81	103.54	-	-
5434.78	Peak	41.24	14.30	55.54	74.00	-18.46
5457.02	Average	30.85	14.39	45.24	54.00	-8.76



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11a/Band1_CH1	Temp./Humi.	:24.6/57
Frequency	:5180 MHz	Antenna Pol.	:HORIZONTAL
Operation Mode	:Bandedge	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:21		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5043.34	Peak	41.70	13.61	55.31	74.00	-18.69
5150.00	Average	31.89	13.73	45.62	54.00	-8.38
5180.00	Peak	85.92	13.81	99.73	--	--
5180.00	Average	78.21	13.81	92.02	--	--
5441.66	Peak	40.72	14.35	55.07	74.00	-18.93
5452.66	Average	30.67	14.41	45.08	54.00	-8.92

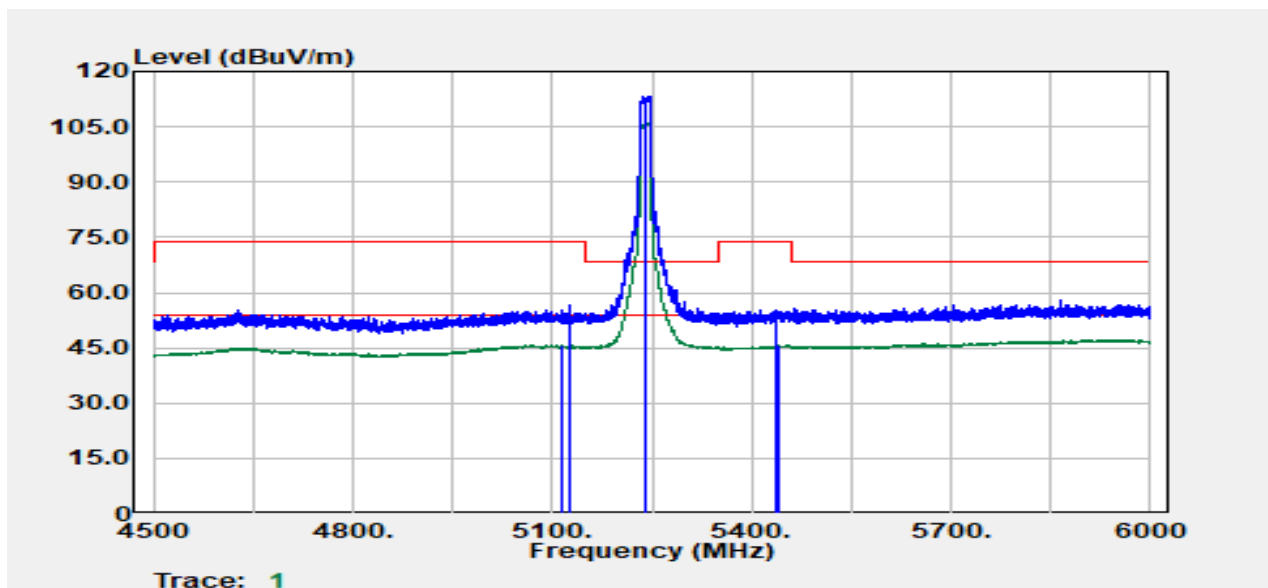


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Project No :TM-2404000025P
Operation Band :802.11a/Band1_CH1
Frequency :5240 MHz
Operation Mode :Bandedge
EUT Pol :H
Setting :22

Test Date :2024-09-13
Temp./Humi. :24.6/57
Antenna Pol. :VERTICAL
Engineer :Ray Li
Test Chamber : 966A



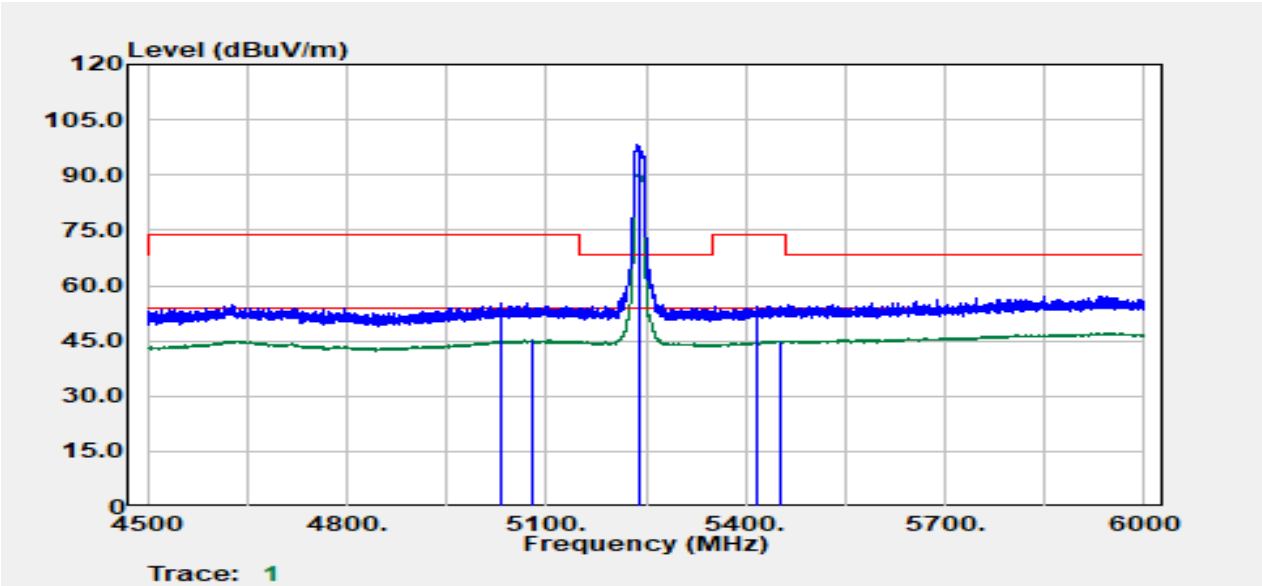
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5113.10	Average	31.88	13.74	45.63	54.00	-8.37
5125.85	Peak	42.94	13.74	56.68	74.00	-17.32
5240.00	Peak	99.46	13.91	113.37	--	--
5240.00	Average	92.04	13.91	105.95	--	--
5434.91	Peak	40.81	14.30	55.11	74.00	-18.89
5439.66	Average	31.60	14.34	45.94	54.00	-8.06



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11a/Band1_CH1	Temp./Humi.	:24.6/57
Frequency	:5240 MHz	Antenna Pol.	:HORIZONTAL
Operation Mode	:Bandedge	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:22		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5032.09	Peak	41.90	13.53	55.43	74.00	-18.57
5079.85	Average	31.41	13.71	45.12	54.00	-8.88
5240.00	Peak	84.30	13.91	98.21	--	--
5240.00	Average	76.29	13.91	90.20	--	--
5415.40	Peak	40.41	14.16	54.56	74.00	-19.44
5452.91	Average	30.62	14.41	45.03	54.00	-8.97

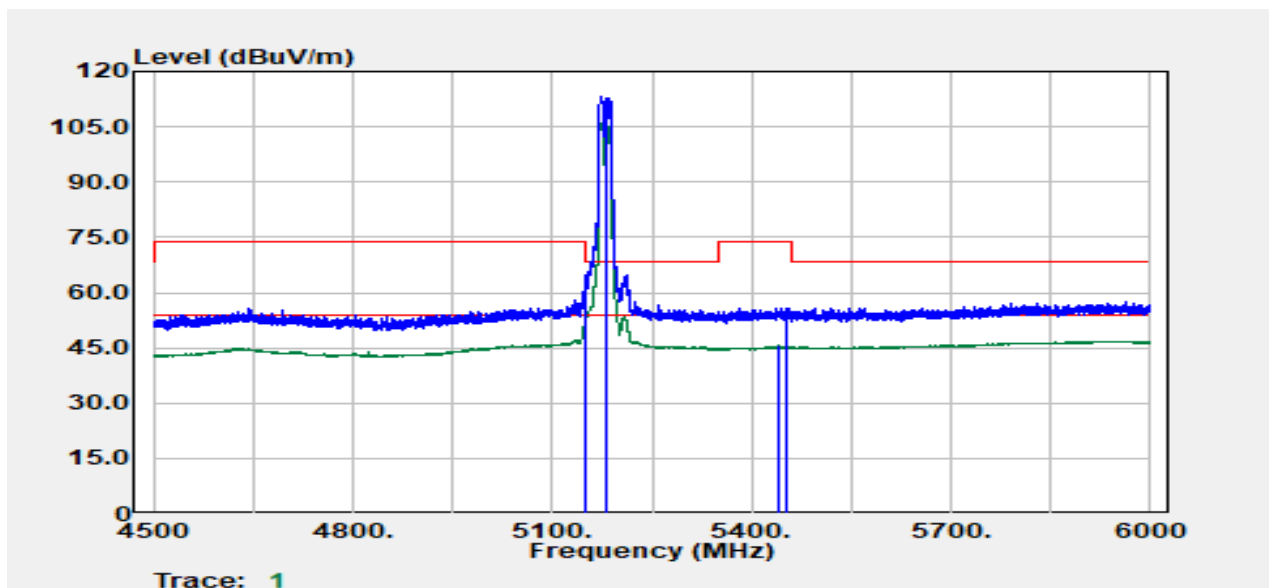


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Project No :TM-2404000025P
Operation Band :802.11n20/Band1
Frequency :5180 MHz
Operation Mode :Bandedge
EUT Pol :H
Setting :19

Test Date :2024-09-13
Temp./Humi. :24.6/57
Antenna Pol. :VERTICAL
Engineer :Ray Li
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5149.61	Peak	49.81	13.73	63.54	74.00	-10.46
5150.00	Average	38.94	13.73	52.67	54.00	-1.33
5180.00	Peak	99.27	13.81	113.07	--	--
5180.00	Average	92.00	13.81	105.80	--	--
5439.91	Average	31.22	14.34	45.56	54.00	-8.44
5452.41	Peak	41.43	14.41	55.84	74.00	-18.16

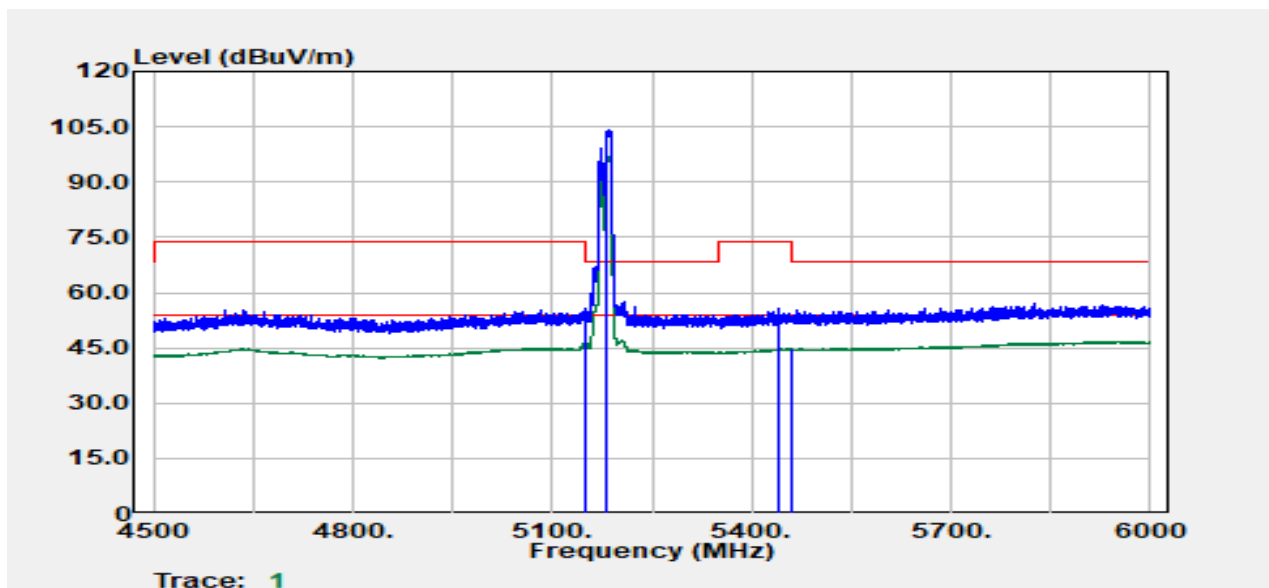


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Project No :TM-2404000025P
Operation Band :802.11n20/Band1
Frequency :5180 MHz
Operation Mode :Bandedge
EUT Pol :H
Setting :19

Test Date :2024-09-13
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Ray Li
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5148.68	Peak	42.05	13.73	55.78	74.00	-18.22
5149.43	Average	32.46	13.73	46.19	54.00	-7.81
5180.00	Peak	90.43	13.81	104.23	--	--
5180.00	Average	82.90	13.81	96.71	--	--
5439.28	Peak	41.14	14.33	55.48	74.00	-18.52
5459.02	Average	30.33	14.39	44.71	54.00	-9.29

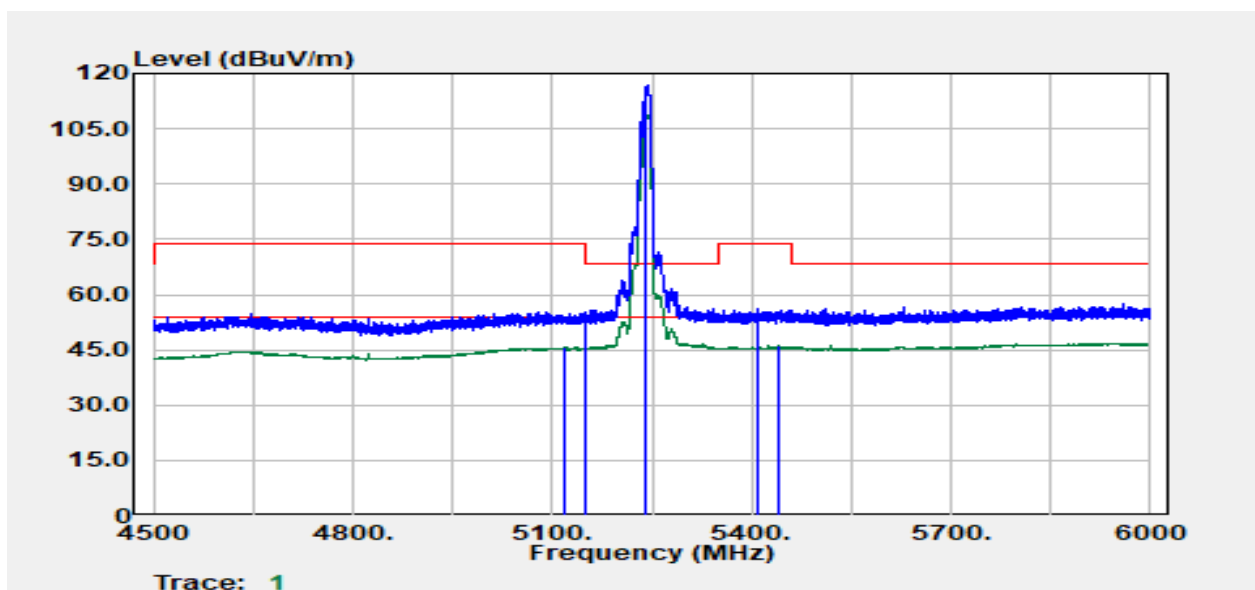


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Project No :TM-2404000025P
Operation Band :802.11n20/Band1
Frequency :5240 MHz
Operation Mode :Bandedge
EUT Pol :H
Setting :20

Test Date :2024-09-13
Temp./Humi. :24.6/57
Antenna Pol. :VERTICAL
Engineer :Ray Li
Test Chamber : 966A



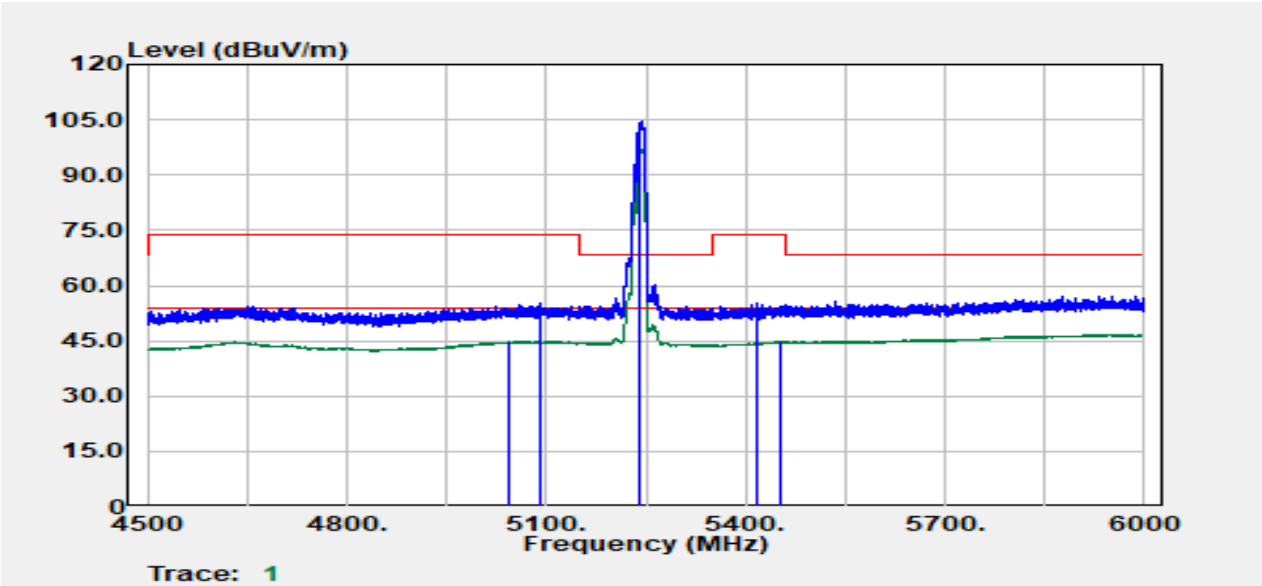
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5120.10	Average	32.13	13.74	45.87	54.00	-8.13
5148.61	Peak	41.67	13.73	55.40	74.00	-18.60
5240.00	Peak	103.10	13.91	117.01	--	--
5240.00	Average	94.62	13.91	108.53	--	--
5410.15	Peak	41.99	14.12	56.11	74.00	-17.89
5440.41	Average	31.81	14.34	46.16	54.00	-7.84



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11n20/Band1	Temp./Humi.	:24.6/57
Frequency	:5240 MHz	Antenna Pol.	:HORIZONTAL
Operation Mode	:Bandedge	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:20		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5043.09	Average	31.11	13.61	44.73	54.00	-9.27
5092.60	Peak	41.33	13.74	55.06	74.00	-18.94
5240.00	Peak	90.76	13.91	104.67	- -	- -
5240.00	Average	83.05	13.91	96.96	- -	- -
5416.40	Peak	40.97	14.16	55.13	74.00	-18.87
5450.66	Average	30.30	14.41	44.71	54.00	-9.29

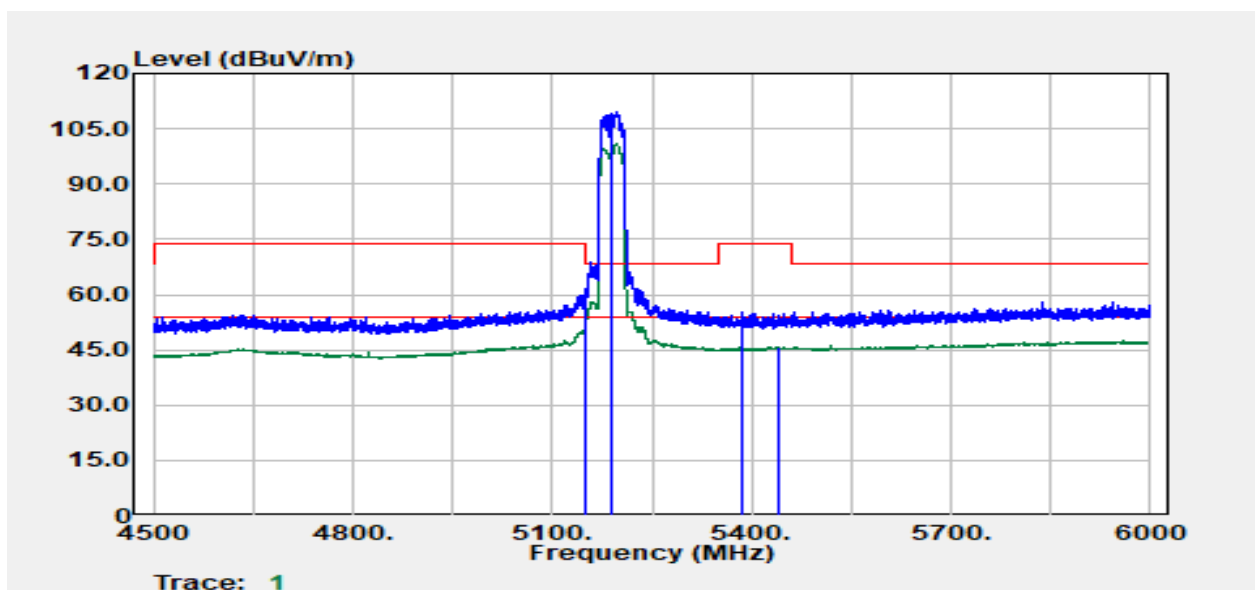


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Project No :TM-2404000025P
Operation Band :802.11n40/Band1
Frequency :5190 MHz
Operation Mode :Bandedge
EUT Pol :H
Setting :16

Test Date :2024-09-13
Temp./Humi. :24.6/57
Antenna Pol. :VERTICAL
Engineer :Ray Li
Test Chamber : 966A



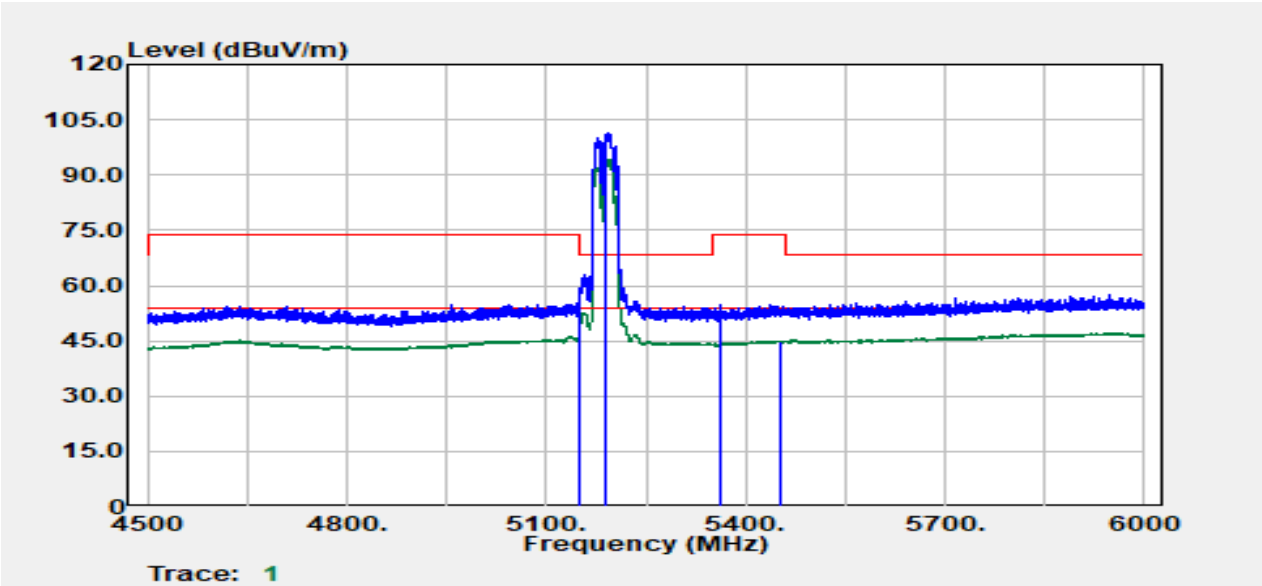
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5149.36	Peak	47.87	13.73	61.60	74.00	-12.40
5150.00	Average	38.45	13.73	52.18	54.00	-1.82
5190.00	Peak	95.77	13.83	109.61	--	--
5190.00	Average	87.07	13.83	100.91	--	--
5385.40	Peak	41.07	14.00	55.07	74.00	-18.93
5439.66	Average	31.48	14.34	45.82	54.00	-8.18



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11n40/Band1	Temp./Humi.	:24.6/57
Frequency	:5190 MHz	Antenna Pol.	:HORIZONTAL
Operation Mode	:Bandedge	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:16		



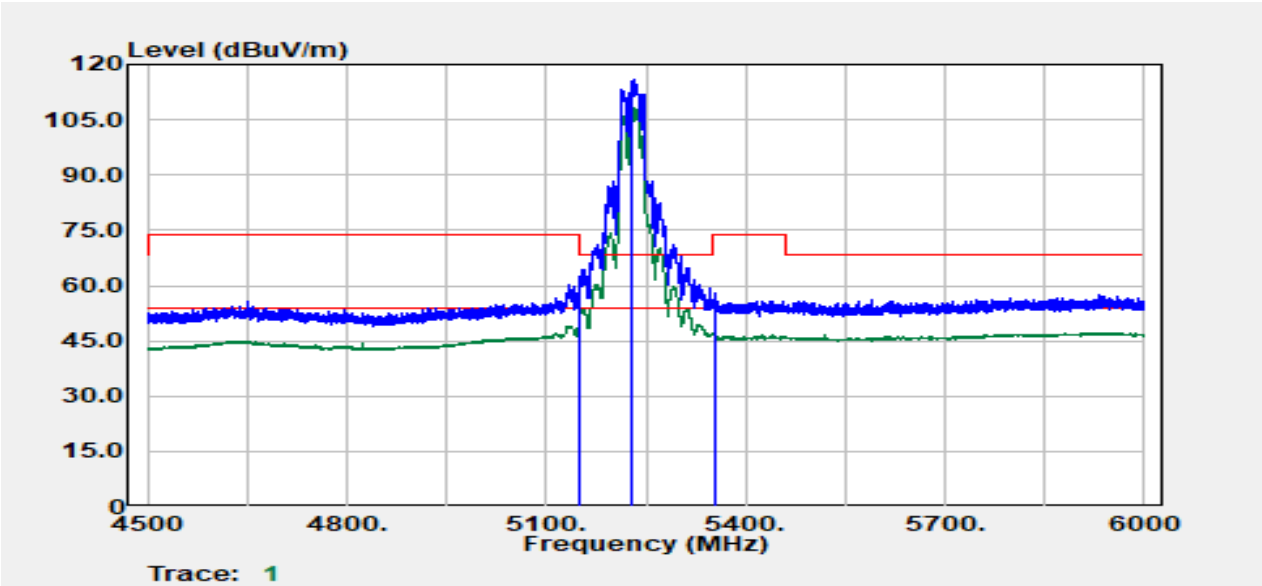
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5149.86	Peak	42.48	13.73	56.21	74.00	-17.79
5150.00	Average	34.41	13.73	48.14	54.00	-5.86
5190.00	Peak	87.64	13.83	101.47	--	--
5190.00	Average	80.22	13.83	94.05	--	--
5361.39	Peak	40.89	13.94	54.84	74.00	-19.16
5451.91	Average	30.61	14.41	45.02	54.00	-8.98



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11n40/Band1	Temp./Humi.	:24.6/57
Frequency	:5230 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:Bandedge	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:22.5		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5149.86	Peak	47.98	13.73	61.71	74.00	-12.29
5150.00	Average	37.22	13.73	50.95	54.00	-3.05
5230.00	Peak	102.00	13.90	115.90	--	--
5230.00	Average	94.37	13.90	108.27	--	--
5352.64	Average	33.08	13.92	47.00	54.00	-7.00
5352.89	Peak	43.87	13.92	57.79	74.00	-16.21

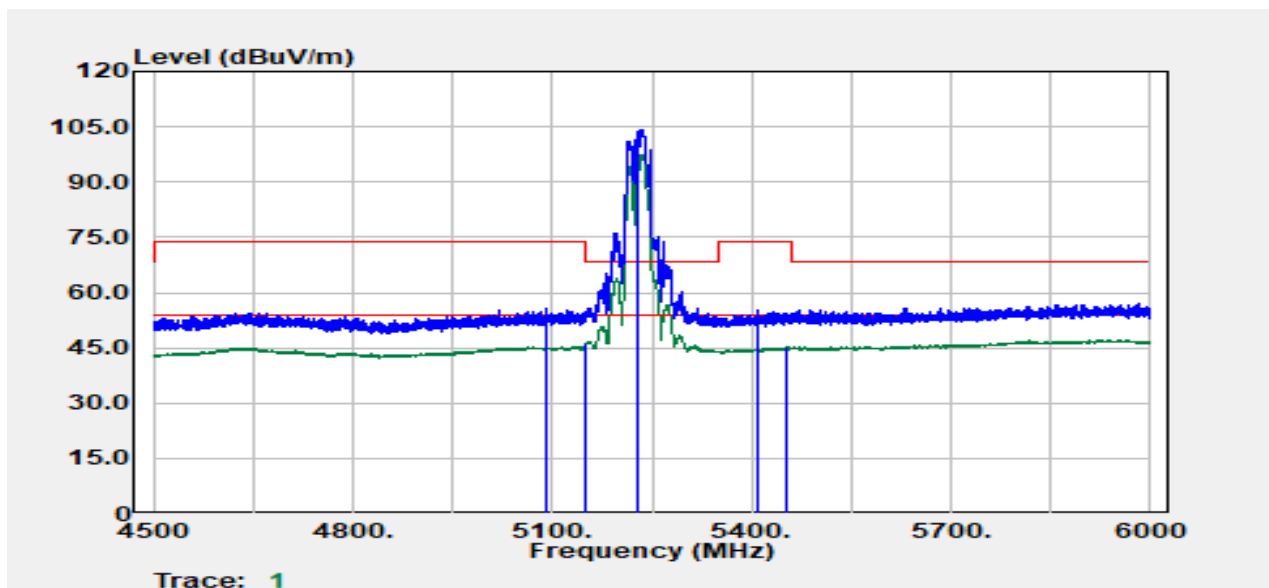


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Project No :TM-2404000025P
Operation Band :802.11n40/Band1
Frequency :5230 MHz
Operation Mode :Bandedge
EUT Pol :H
Setting :22.5

Test Date :2024-09-13
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Ray Li
Test Chamber : 966A



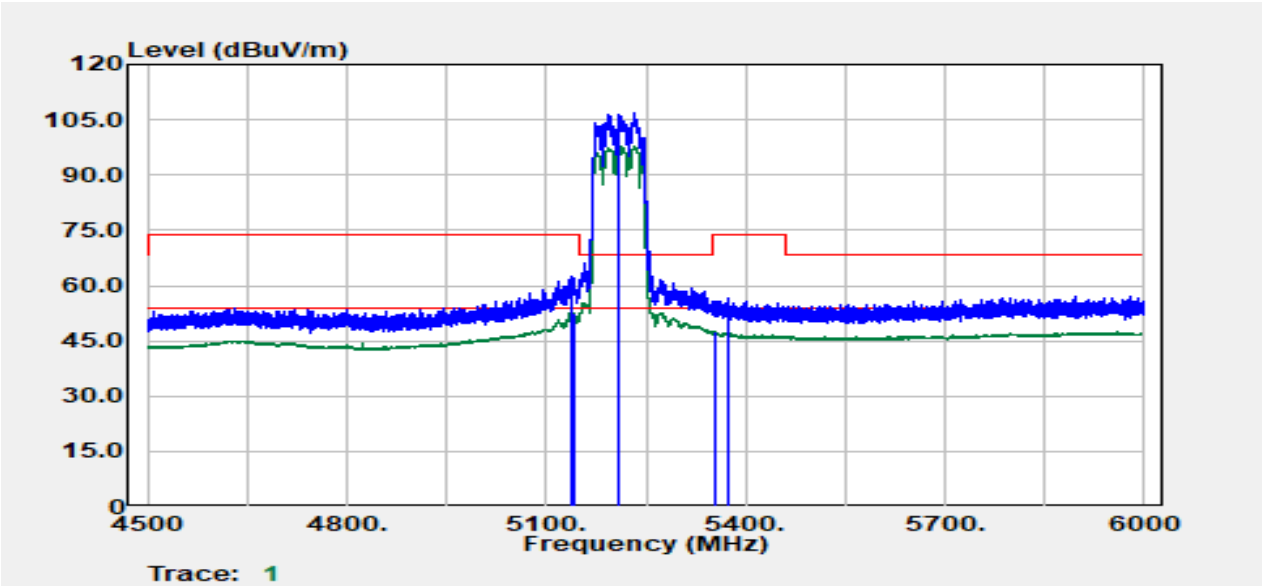
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5090.85	Peak	41.87	13.73	55.60	74.00	-18.40
5150.00	Average	32.29	13.73	46.02	54.00	-7.98
5230.00	Peak	90.46	13.90	104.36	--	--
5230.00	Average	83.61	13.90	97.51	--	--
5408.90	Peak	41.18	14.11	55.29	74.00	-18.71
5451.91	Average	30.91	14.41	45.32	54.00	-8.68



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11ac80/Band1	Temp./Humi.	:24.6/57
Frequency	:5210 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:Bandedge	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:15		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5139.09	Peak	48.91	13.73	62.64	74.00	-11.36
5141.12	Average	38.98	13.73	52.71	54.00	-1.29
5210.00	Peak	92.89	13.87	106.76	-	-
5210.00	Average	83.91	13.87	97.78	-	-
5353.68	Average	33.52	13.92	47.44	54.00	-6.56
5373.27	Peak	42.64	13.97	56.61	74.00	-17.39

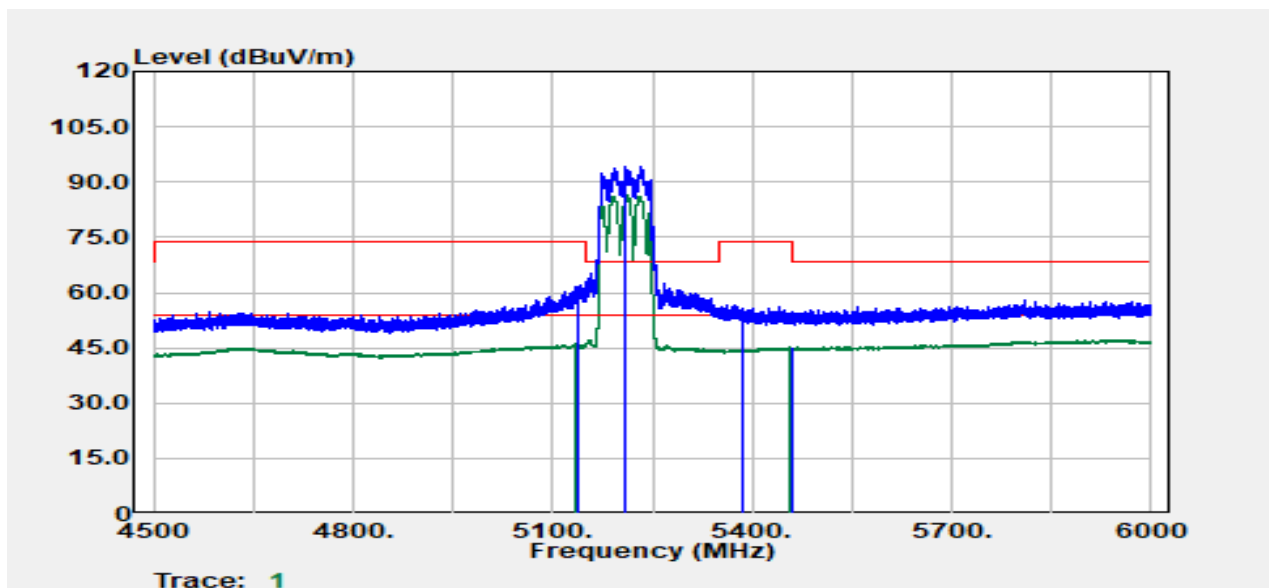


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Project No :TM-2404000025P
Operation Band :802.11ac80/Band1
Frequency :5210 MHz
Operation Mode :Bandedge
EUT Pol :H
Setting :15

Test Date :2024-09-13
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Ray Li
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5136.20	Average	32.40	13.74	46.14	54.00	-7.86
5139.13	Peak	48.13	13.73	61.86	74.00	-12.14
5210.00	Peak	80.73	13.87	94.61	--	--
5210.00	Average	72.36	13.87	86.23	--	--
5385.16	Peak	41.99	14.00	55.99	74.00	-18.01
5460.00	Average	30.73	14.39	45.12	54.00	-8.88

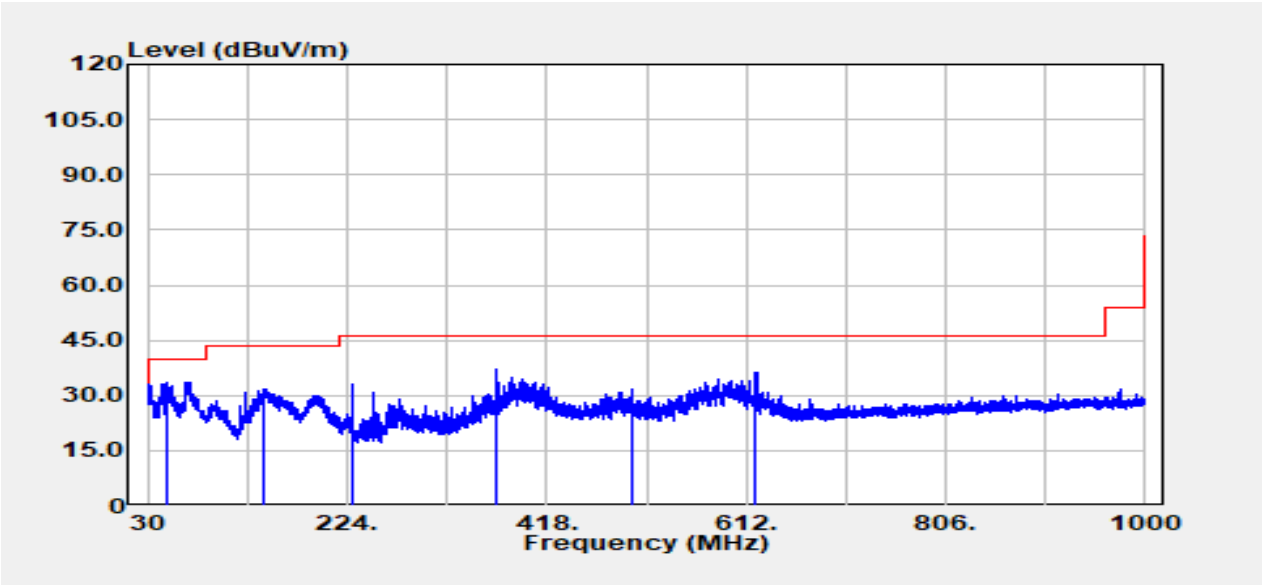


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TX Test Data

Project No	:TM-2404000025P	Test Date	:2024-09-26
Operation Band	:802.11a/Band1_CH1	Temp./Humi.	:24.6/57
Frequency	:5180 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:H	Test Chamber	: 966A
Setting	:		



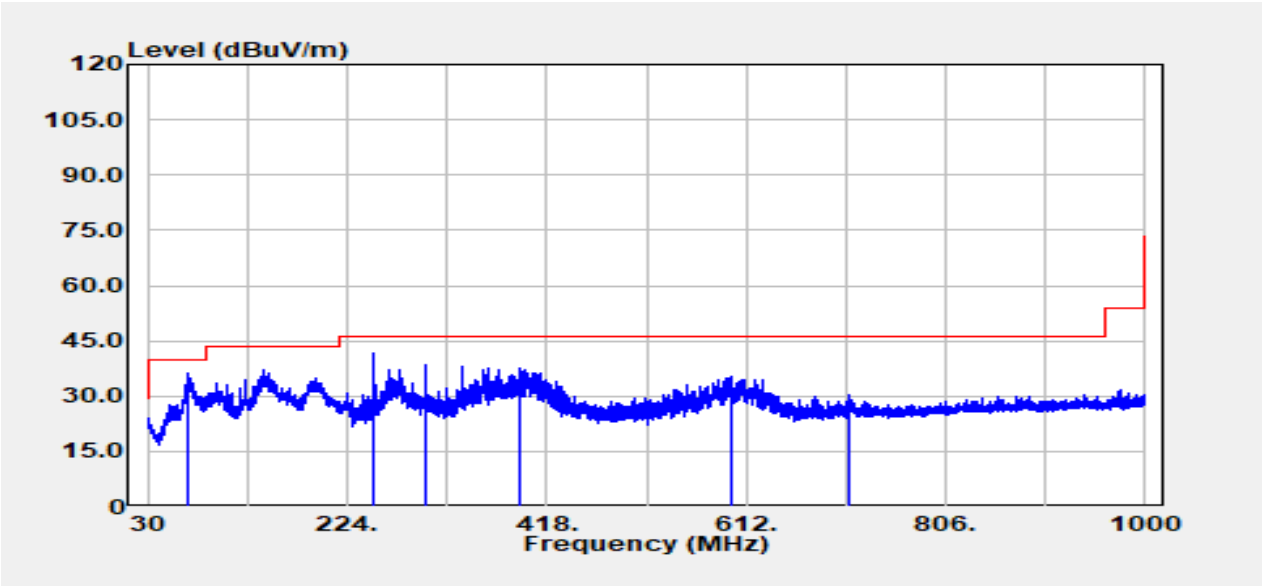
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
49.64	Peak	49.36	-15.66	33.70	40.00	-6.30
143.61	Peak	42.65	-10.79	31.85	43.50	-11.65
228.12	Peak	45.05	-12.18	32.86	46.00	-13.14
369.14	Peak	44.72	-7.69	37.03	46.00	-8.97
499.97	Peak	36.22	-4.40	31.82	46.00	-14.18
621.70	Peak	38.41	-2.13	36.28	46.00	-9.72



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Project No	:TM-2404000025P	Test Date	:2024-09-26
Operation Band	:802.11a/Band1_CH1	Temp./Humi.	:24.6/57
Frequency	:5180 MHz	Antenna Pol.	:HORIZONTAL
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:H	Test Chamber	: 966A
Setting	:		



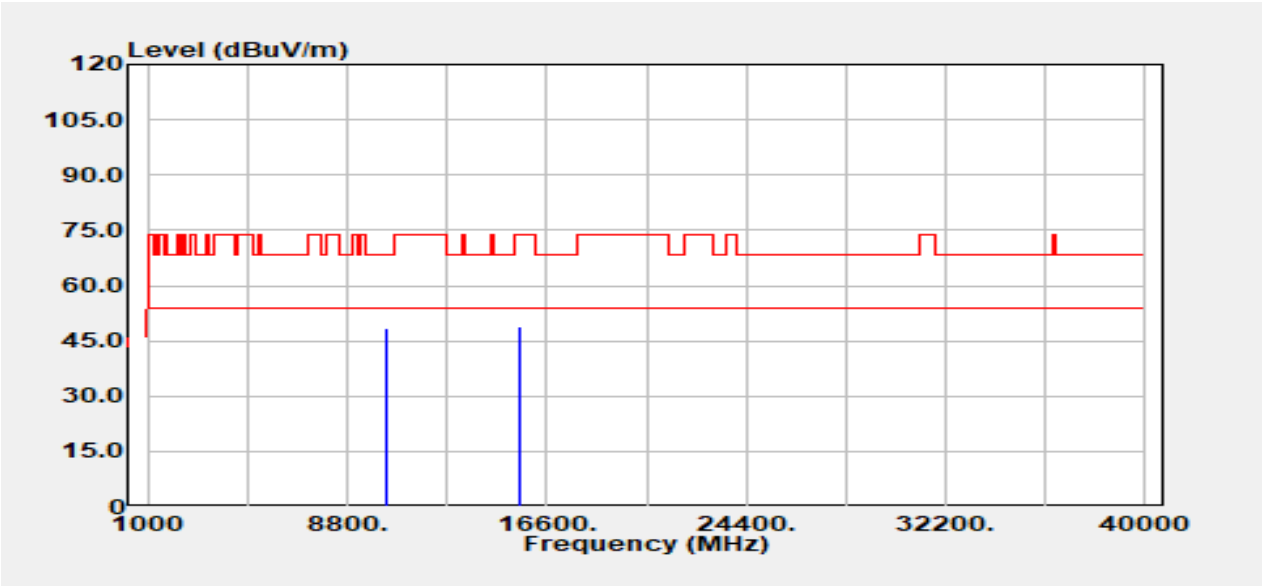
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
69.77	Peak	52.03	-15.84	36.20	40.00	-3.80
250.07	Peak	53.06	-11.41	41.65	46.00	-4.35
300.15	Peak	47.60	-9.33	38.27	46.00	-7.73
393.02	Peak	44.41	-7.00	37.40	46.00	-8.60
597.94	Peak	38.90	-3.46	35.43	46.00	-10.57
711.30	Peak	31.06	-0.83	30.23	46.00	-15.77



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11a/Band1_CH1	Temp./Humi.	:24.6/57
Frequency	:5180 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:21		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10360.00	Peak	35.61	12.85	48.46	68.20	-19.74
15540.00	Peak	33.85	14.87	48.72	74.00	-25.28
15540.00	Average	27.15	14.87	42.02	54.00	-11.98

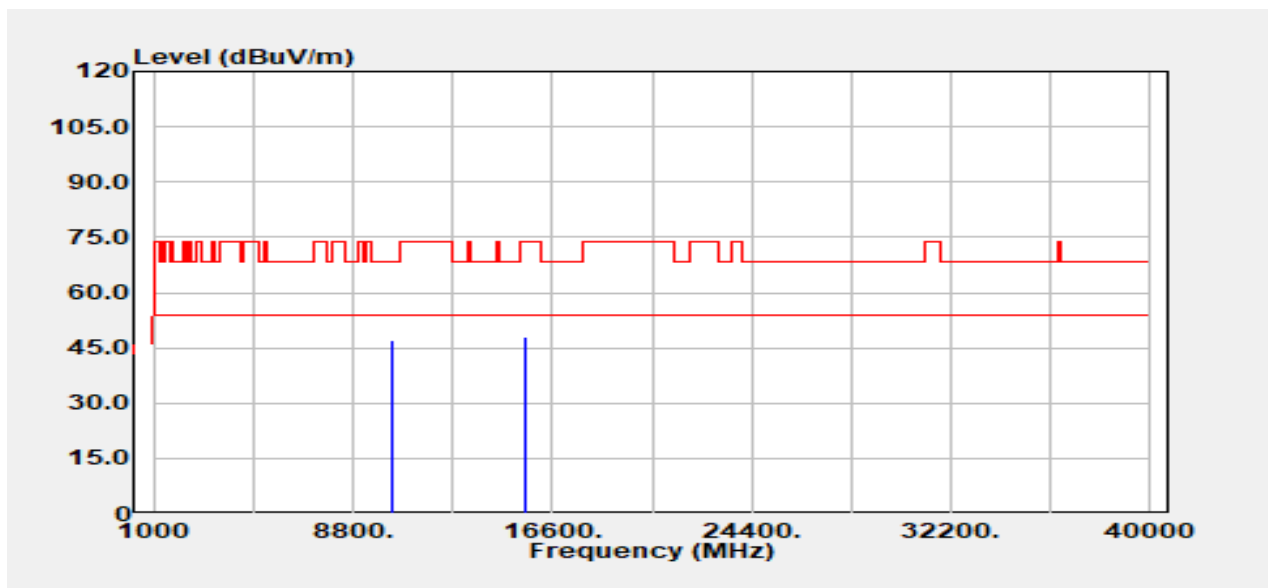


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Project No :TM-2404000025P
Operation Band :802.11a/Band1_CH1
Frequency :5180 MHz
Operation Mode :TX
EUT Pol :H
Setting :21

Test Date :2024-09-13
Temp./Humi. :24.6/57
Antenna Pol. :Horizontal
Engineer :Ray Li
Test Chamber : 966A



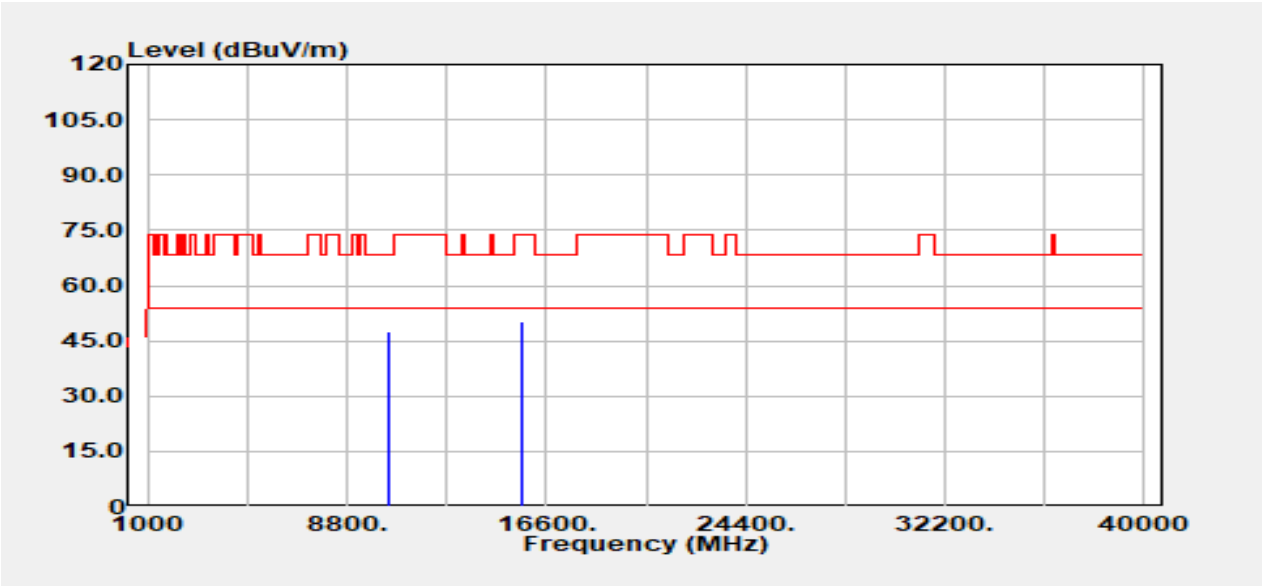
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10360.00	Peak	34.42	12.85	47.27	68.20	-20.93
15540.00	Peak	32.93	14.87	47.81	74.00	-26.19
15540.00	Average	27.10	14.87	41.97	54.00	-12.03



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11a/Band1_CH1	Temp./Humi.	:24.6/57
Frequency	:5220 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:22		



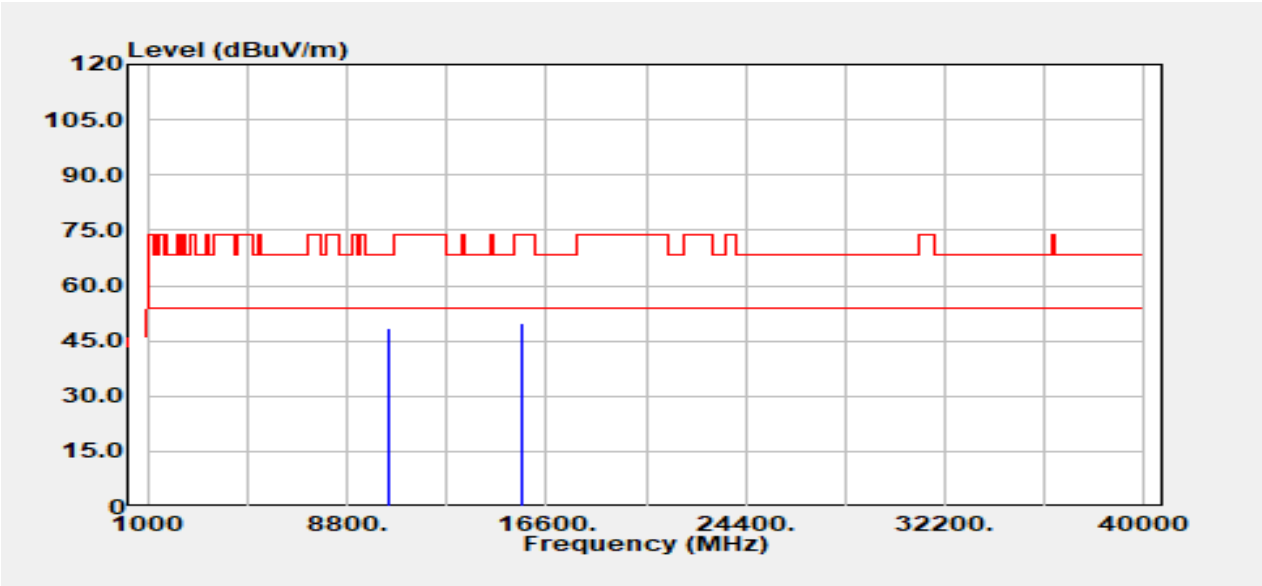
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10440.00	Peak	34.62	12.85	47.47	68.20	-20.73
15660.00	Peak	34.72	15.46	50.18	74.00	-23.82
15660.00	Average	27.26	15.46	42.72	54.00	-11.28



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11a/Band1_CH1	Temp./Humi.	:24.6/57
Frequency	:5220 MHz	Antenna Pol.	:Horizontal
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:22		



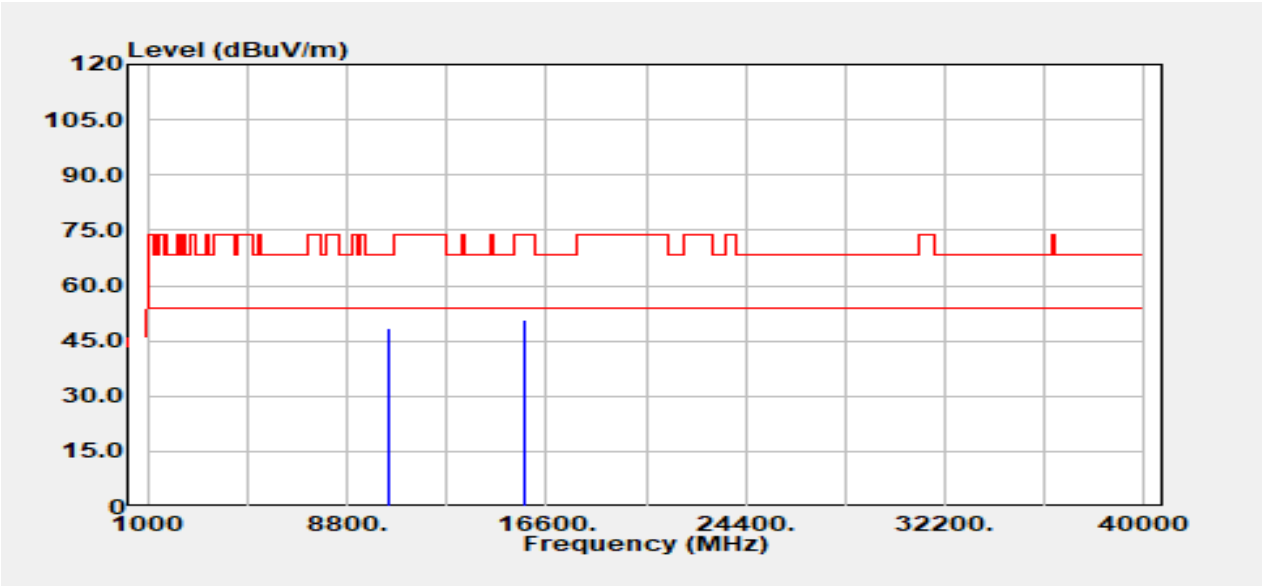
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10440.00	Peak	35.66	12.85	48.51	68.20	-19.69
15660.00	Peak	34.16	15.46	49.62	74.00	-24.38
15660.00	Average	27.44	15.46	42.90	54.00	-11.10



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11a/Band1_CH1	Temp./Humi.	:24.6/57
Frequency	:5240 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:22		



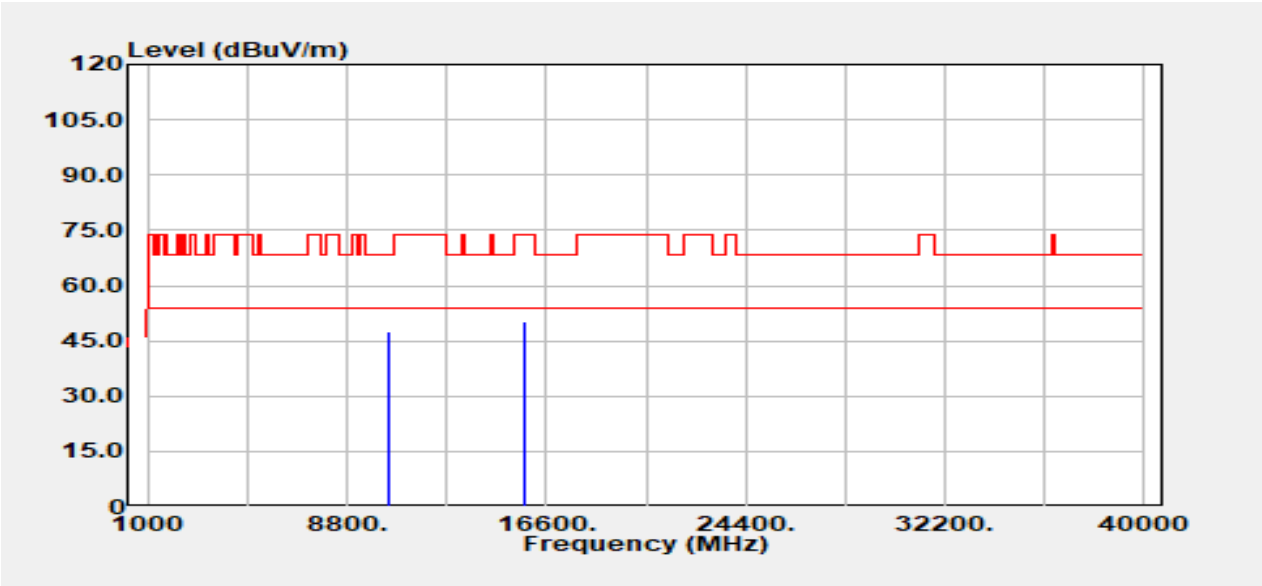
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10480.00	Peak	35.90	12.72	48.62	68.20	-19.58
15720.00	Peak	34.81	15.73	50.54	74.00	-23.46
15720.00	Average	27.65	15.73	43.38	54.00	-10.62



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11a/Band1_CH1	Temp./Humi.	:24.6/57
Frequency	:5240 MHz	Antenna Pol.	:Horizontal
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:22		



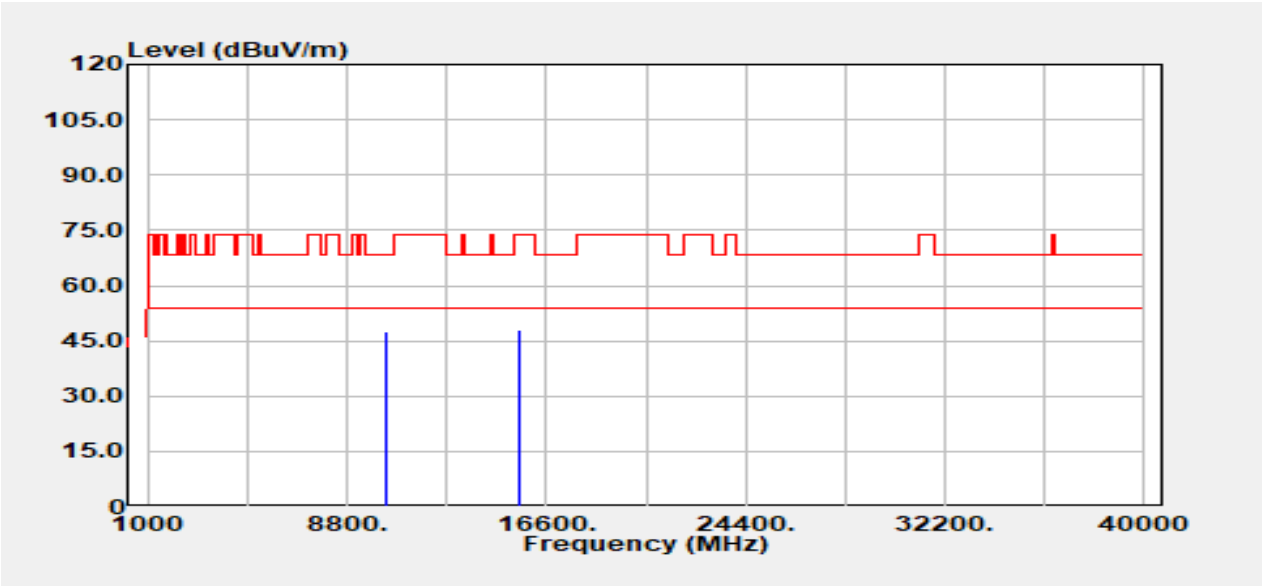
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10480.00	Peak	34.67	12.72	47.39	68.20	-20.81
15720.00	Peak	34.65	15.73	50.37	74.00	-23.63
15720.00	Average	27.72	15.73	43.45	54.00	-10.55



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Project No	:TM-2404000025P	Test Date	:2024-09-13
Operation Band	:802.11n20/Band1	Temp./Humi.	:24.6/57
Frequency	:5180 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:19		



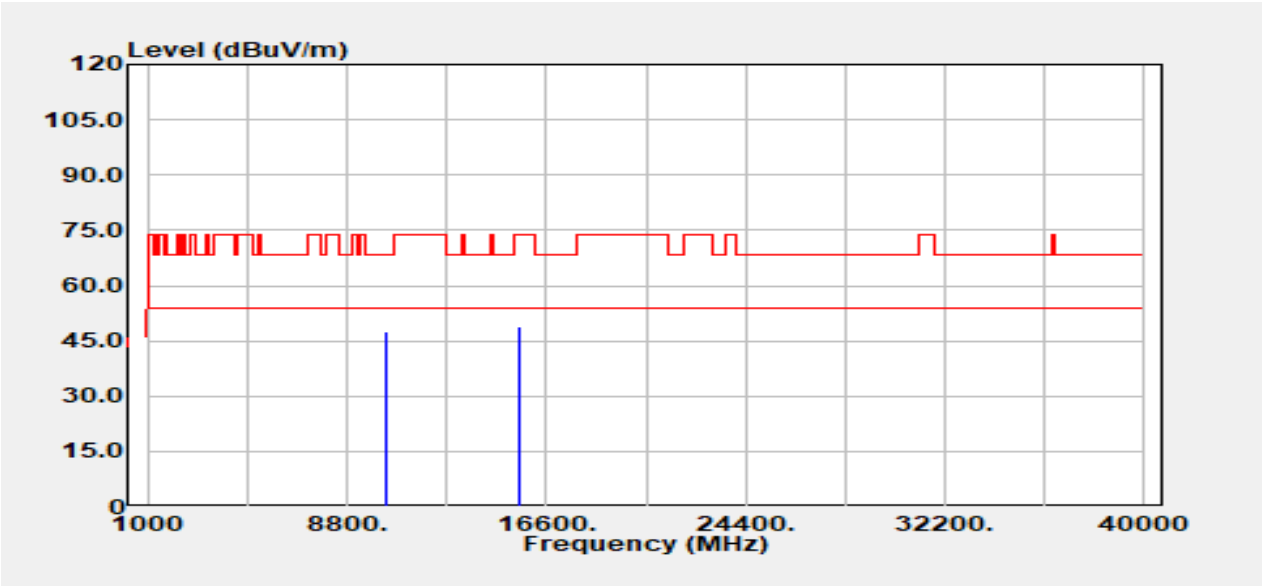
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10360.00	Peak	34.60	12.85	47.44	68.20	-20.76
15540.00	Peak	33.25	14.87	48.13	74.00	-25.87
15540.00	Average	26.98	14.87	41.85	54.00	-12.15



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Project No	:TM-2404000025P	Test Date	:2024-09-14
Operation Band	:802.11n20/Band1	Temp./Humi.	:24.6/57
Frequency	:5180 MHz	Antenna Pol.	:Horizontal
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:19		



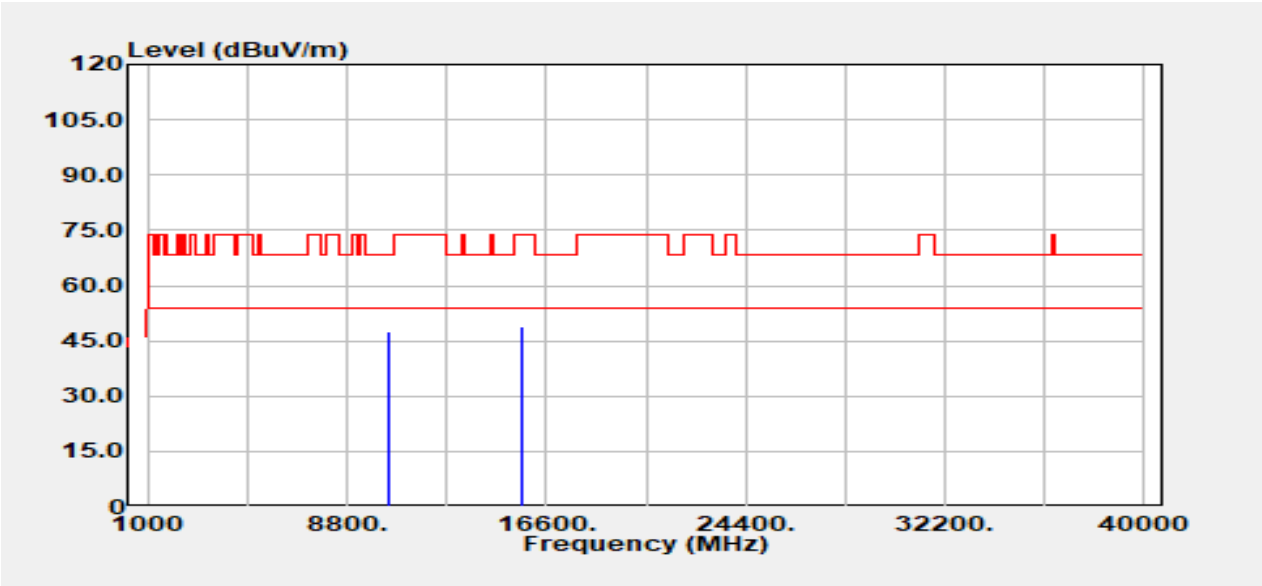
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10360.00	Peak	34.71	12.85	47.56	68.20	-20.64
15540.00	Peak	34.09	14.87	48.96	74.00	-25.04
15540.00	Average	26.81	14.87	41.68	54.00	-12.32



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Project No	:TM-2404000025P	Test Date	:2024-09-14
Operation Band	:802.11n20/Band1	Temp./Humi.	:24.6/57
Frequency	:5220 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:20		



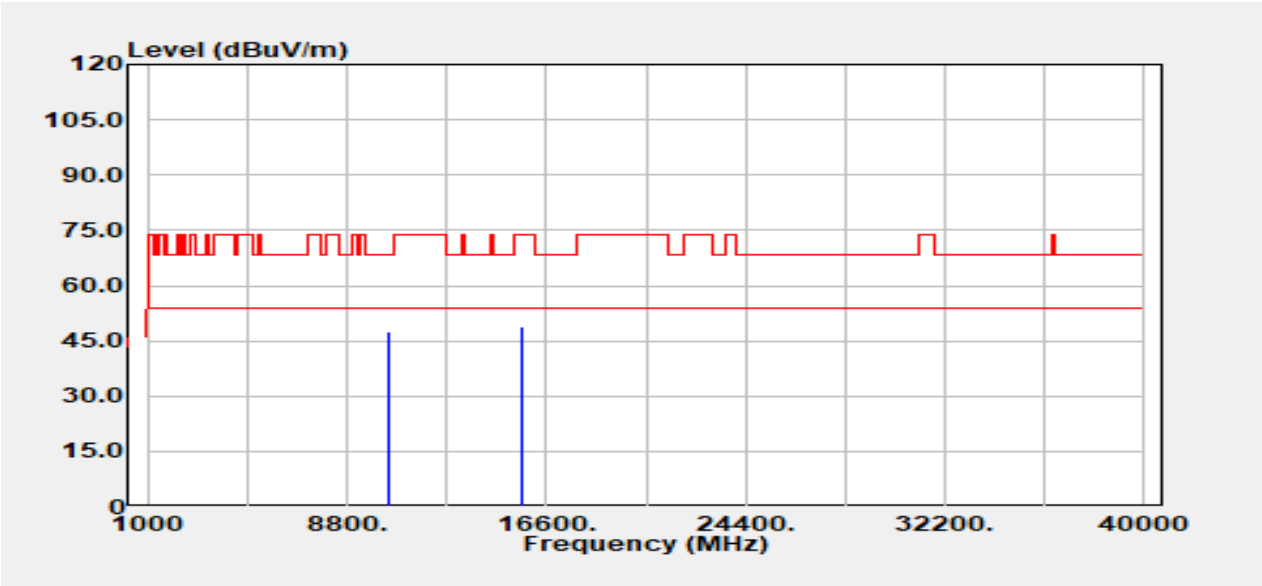
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10440.00	Peak	34.67	12.85	47.52	68.20	-20.68
15660.00	Peak	33.35	15.46	48.81	74.00	-25.19
15660.00	Average	27.11	15.46	42.57	54.00	-11.43



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Project No	:TM-2404000025P	Test Date	:2024-09-14
Operation Band	:802.11n20/Band1	Temp./Humi.	:24.6/57
Frequency	:5220 MHz	Antenna Pol.	:Horizontal
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:20		



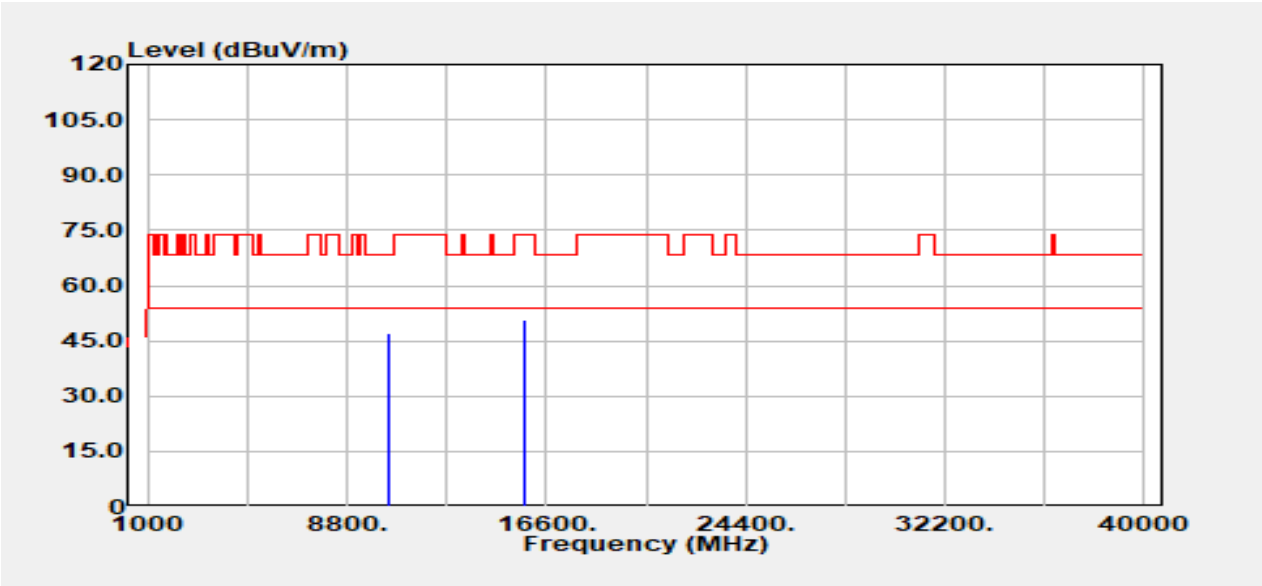
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10440.00	Peak	34.92	12.85	47.77	68.20	-20.43
15660.00	Peak	33.47	15.46	48.93	74.00	-25.07
15660.00	Average	27.18	15.46	42.64	54.00	-11.36



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Project No	:TM-2404000025P	Test Date	:2024-09-14
Operation Band	:802.11n20/Band1	Temp./Humi.	:24.6/57
Frequency	:5240 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:20		



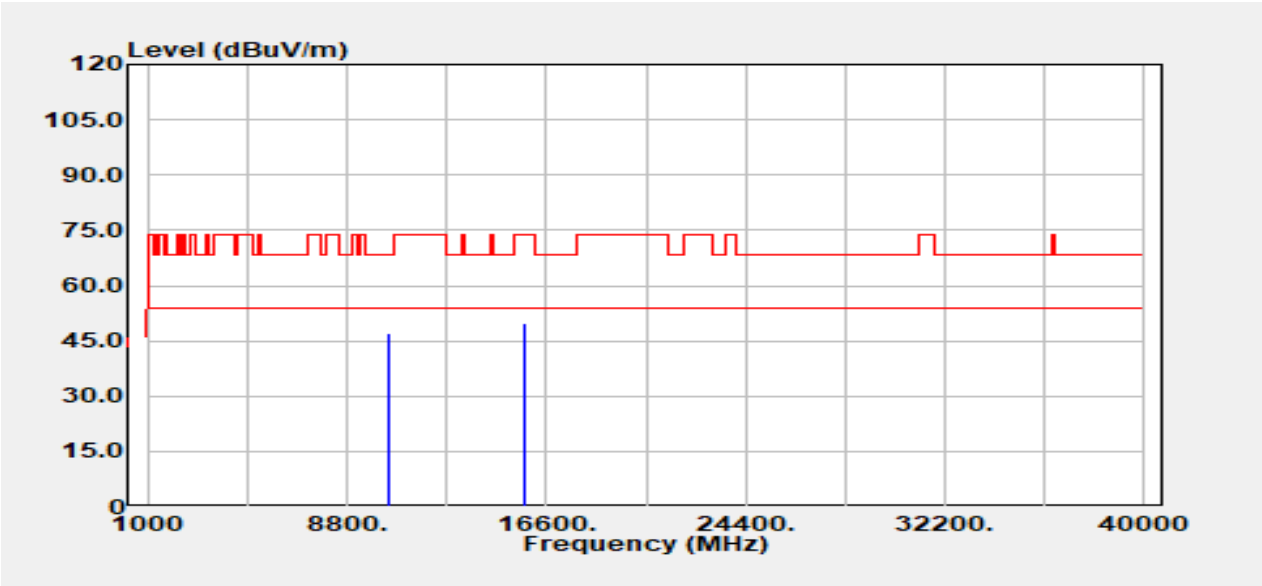
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10480.00	Peak	34.51	12.72	47.24	68.20	-20.96
15720.00	Peak	34.88	15.73	50.60	74.00	-23.40
15720.00	Average	27.43	15.73	43.16	54.00	-10.84



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Project No	:TM-2404000025P	Test Date	:2024-09-14
Operation Band	:802.11n20/Band1	Temp./Humi.	:24.6/57
Frequency	:5240 MHz	Antenna Pol.	:Horizontal
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:20		



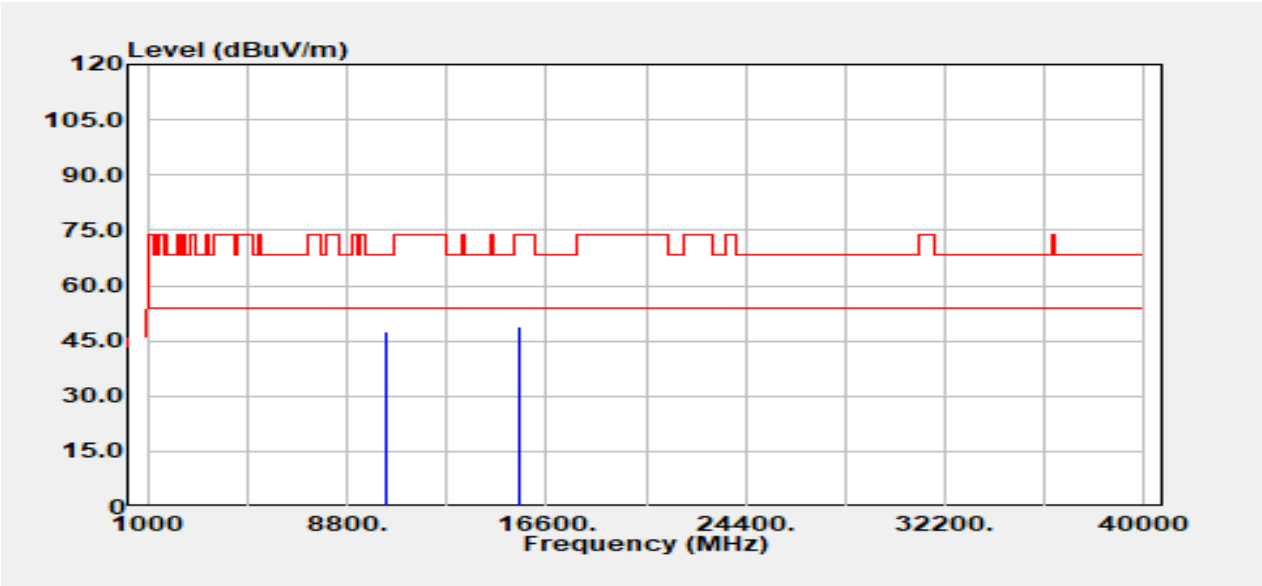
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10480.00	Peak	34.34	12.72	47.07	68.20	-21.13
15720.00	Peak	34.05	15.73	49.77	74.00	-24.23
15720.00	Average	27.35	15.73	43.08	54.00	-10.92



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Project No	:TM-2404000025P	Test Date	:2024-09-14
Operation Band	:802.11n40/Band1	Temp./Humi.	:24.6/57
Frequency	:5190 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:16		



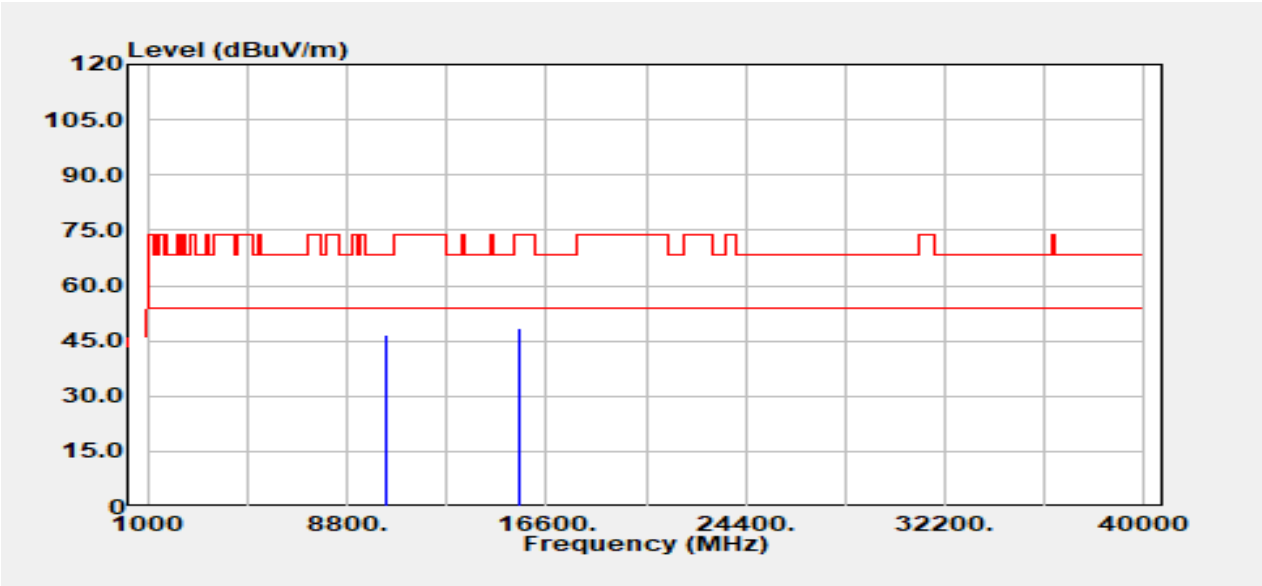
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10380.00	Peak	34.74	12.91	47.65	68.20	-20.55
15570.00	Peak	33.60	15.12	48.72	74.00	-25.28
15570.00	Average	27.09	15.12	42.20	54.00	-11.80



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Project No	:TM-2404000025P	Test Date	:2024-09-14
Operation Band	:802.11n40/Band1	Temp./Humi.	:24.6/57
Frequency	:5190 MHz	Antenna Pol.	:Horizontal
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:16		



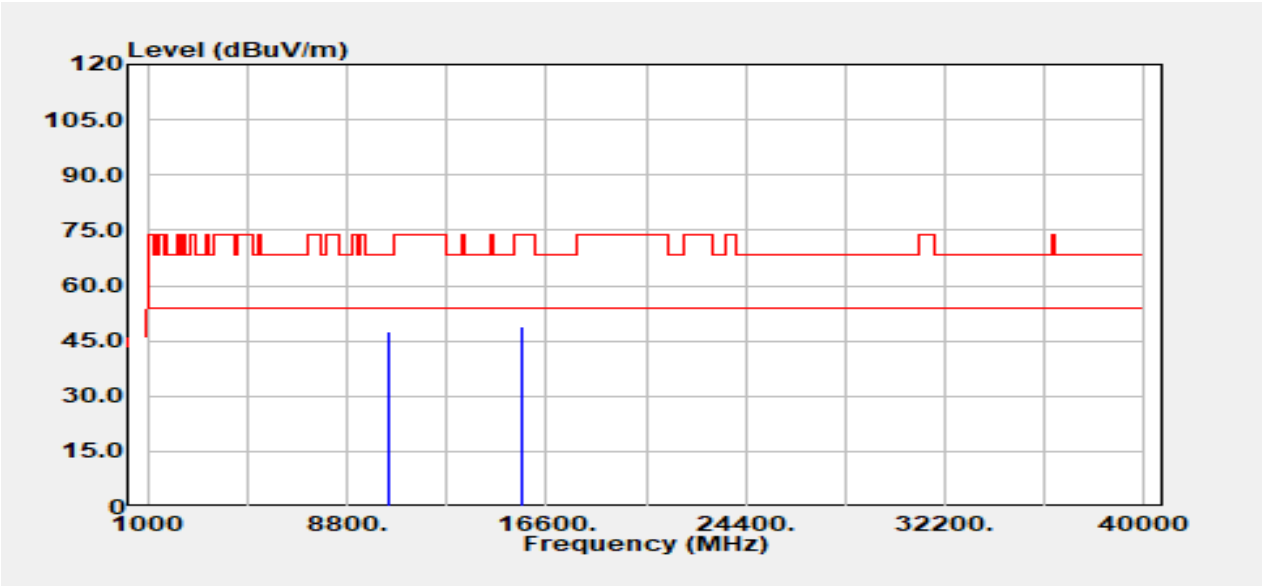
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10380.00	Peak	33.55	12.91	46.46	68.20	-21.74
15570.00	Peak	33.54	15.12	48.66	74.00	-25.34
15570.00	Average	27.02	15.12	42.14	54.00	-11.86



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Project No	:TM-2404000025P	Test Date	:2024-09-14
Operation Band	:802.11n40/Band1	Temp./Humi.	:24.6/57
Frequency	:5230 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:22.5		



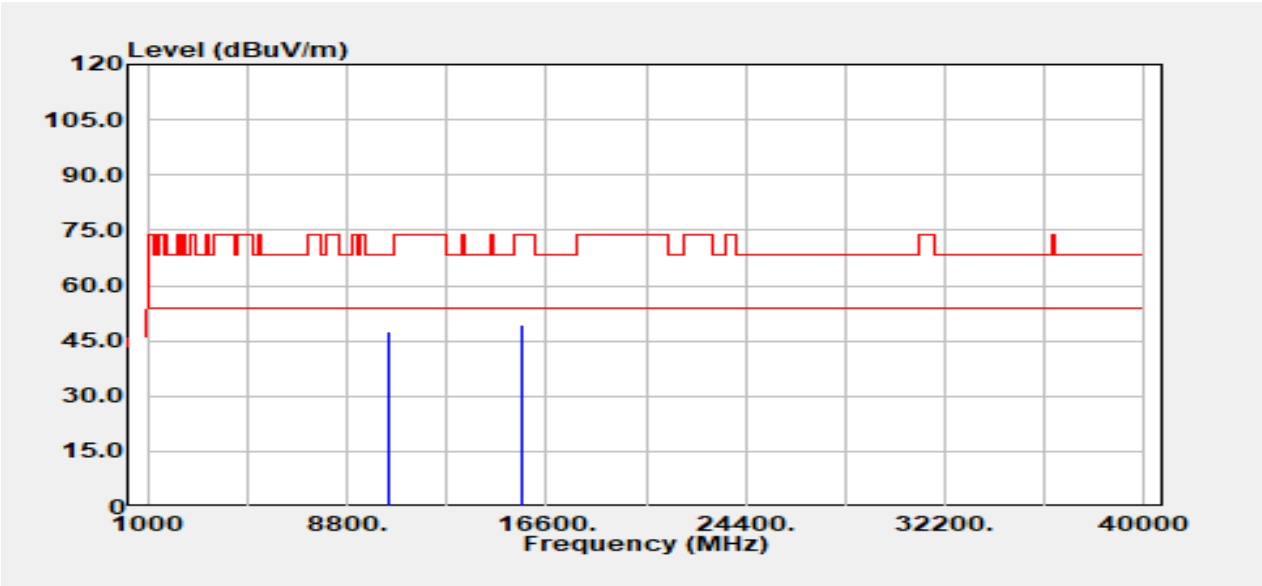
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10460.00	Peak	34.58	12.78	47.36	68.20	-20.84
15690.00	Peak	33.39	15.42	48.80	74.00	-25.20
15690.00	Average	28.17	15.42	43.58	54.00	-10.42



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Project No	:TM-2404000025P	Test Date	:2024-09-14
Operation Band	:802.11n40/Band1	Temp./Humi.	:24.6/57
Frequency	:5230 MHz	Antenna Pol.	:Horizontal
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:22.5		



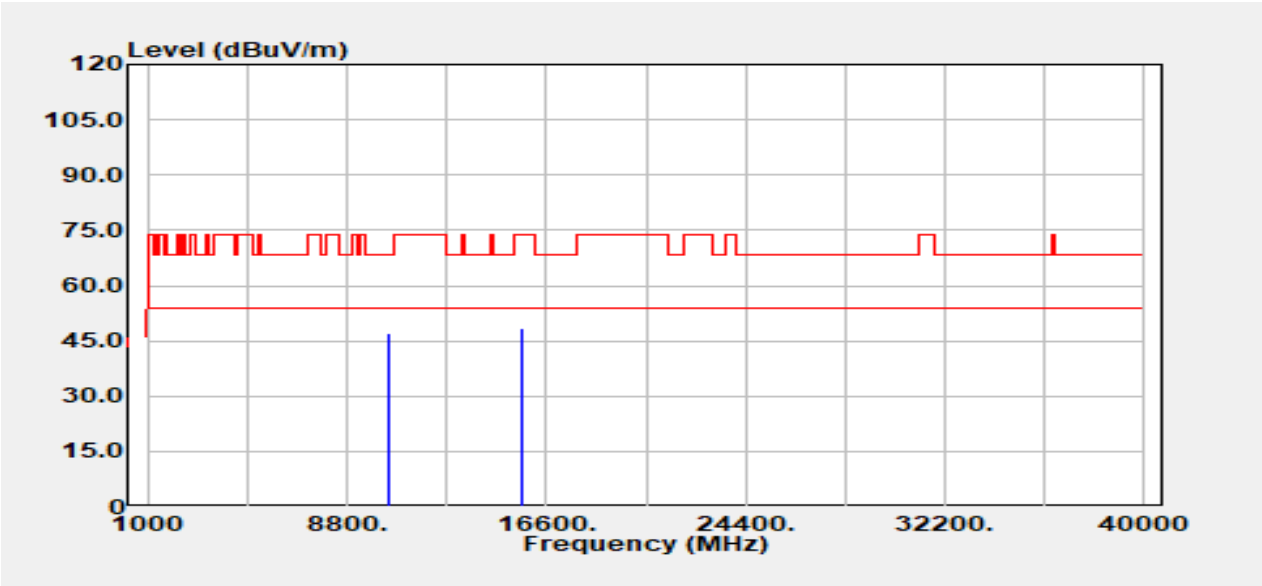
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10460.00	Peak	34.67	12.78	47.45	68.20	-20.75
15690.00	Peak	33.82	15.42	49.24	74.00	-24.76
15690.00	Average	27.80	15.42	43.21	54.00	-10.79



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Project No	:TM-2404000025P	Test Date	:2024-09-14
Operation Band	:802.11ac80/Band1	Temp./Humi.	:24.6/57
Frequency	:5210 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:15		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10420.00	Peak	34.40	12.91	47.31	68.20	-20.89
15630.00	Peak	33.06	15.41	48.47	74.00	-25.53
15630.00	Average	27.22	15.41	42.63	54.00	-11.37

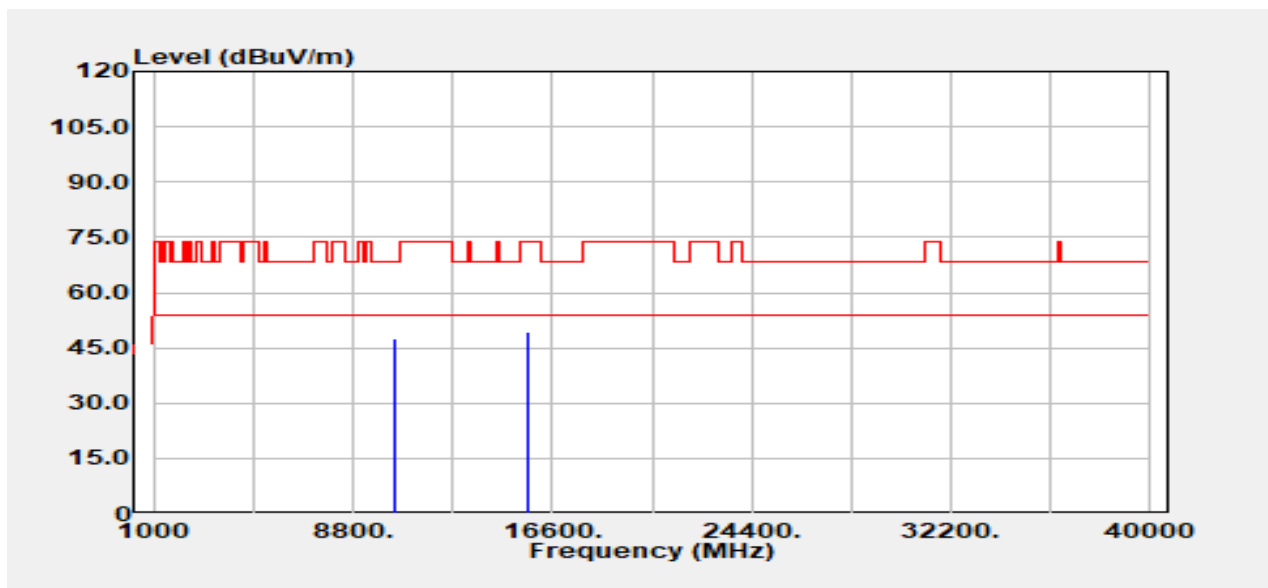


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Project No :TM-2404000025P
Operation Band :802.11ac80/Band1
Frequency :5210 MHz
Operation Mode :TX
EUT Pol :H
Setting :15

Test Date :2024-09-14
Temp./Humi. :24.6/57
Antenna Pol. :Horizontal
Engineer :Ray Li
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
10420.00	Peak	34.51	12.91	47.43	68.20	-20.77
15630.00	Peak	34.12	15.41	49.54	74.00	-24.46
15630.00	Average	27.29	15.41	42.70	54.00	-11.30

--End of Test Report--