

Project No: TM-2411000242P
Report No.: TMWK2411004018KR

FCC ID: COF-WMBACBM25

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Rev. 00

RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART E (CLASS II PERMISSIVE CHANGE)

Test Standard	FCC Part 15.407
Product name	802.11a/b/g/n/ac 1x1 + BT 5.0 Module
Brand Name	USI
Model No.	WM-BAC-BM-25-FF4, WM-BAC-BM-25, WM-BAC-BM-25_FF2, WM-BAC-BM-25-FF3
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:

Sehni, Hu

Sehni Hu
Supervisor

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	December 24, 2024	Initial Issue	ALL	Peggy Tsai

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	Universal Global Scientific Industrial Co., Ltd. No. 141, Lane 351, Sec. 1, Taiping Road, Tsaotuen, Nantou County 542007, Taiwan
Manufacturer	Universal Global Scientific Industrial Co., Ltd. No. 141, Lane 351, Sec. 1, Taiping Road, Tsaotuen, Nantou County 542007, Taiwan
Equipment	802.11a/b/g/n/ac 1x1 + BT 5.0 Module
Brand Name	USI
Test model	WM-BAC-BM-25-FF4
Series model	WM-BAC-BM-25, WM-BAC-BM-25_FF2, WM-BAC-BM-25-FF3
Model Discrepancy	WM-BAC-BM-25-FF4, Change Antenna matching.
Received Date	November 15, 2024
Date of Test	November 22 ~ 27, 2024
Power Supply	Power from Power Supply. (DC 3.6V)
HW Version	V30
FW Version	dhd-100.10.65.0
Class II Permissive Change	1. Modify Product Name: 802.11a/b/g/n/ac 1x1 + BT 5.0 Module 2. Add one Model Name: WM-BAC-BM-25-FF4 3. Change Antenna Matching. 4. Update Firmware.

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: Variant information between/among trademarks is provided by the applicant, test results of this report are applicable to the sample EUT received of main test model name.

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
	UNII-2a	
	IEEE 802.11a	5260 ~ 5320 MHz
	IEEE 802.11n HT20	5260 ~ 5320 MHz
	IEEE 802.11ac VHT20	5260 ~ 5320 MHz
	IEEE 802.11n HT40	5270 ~ 5310 MHz
	IEEE 802.11ac VHT40	5270 ~ 5310 MHz
	IEEE 802.11ac VHT80	5290 MHz
	UNII-2c	
	IEEE 802.11a	5500 ~ 5720 MHz
	IEEE 802.11n HT20	5500 ~ 5720 MHz
	IEEE 802.11ac VHT20	5500 ~ 5720 MHz
	IEEE 802.11n HT40	5510 ~ 5710 MHz
	IEEE 802.11ac VHT40	5510 ~ 5710 MHz
	IEEE 802.11ac VHT80	5530 ~ 5690 MHz
	UNII-3	
	IEEE 802.11a	5745 ~ 5825 MHz
	IEEE 802.11n HT20	5745 ~ 5825 MHz
	IEEE 802.11ac VHT20	5745 ~ 5825 MHz
	IEEE 802.11n HT40	5755 ~ 5795 MHz
	IEEE 802.11ac VHT40	5755 ~ 5795 MHz
	IEEE 802.11ac VHT80	5775 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 6. IEEE 802.11ac VHT 80 MHz mode: OFDM	

Remark:

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
<input type="checkbox"/> 1 MHz or less	1	Middle
<input type="checkbox"/> 1 MHz to 10 MHz	2	1 near top and 1 near bottom
<input checked="" type="checkbox"/> More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Specification	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/> Dipole <input checked="" type="checkbox"/> Ceramic Chip Antenna
Antenna Specification	5150~5850: Gain: 2.23 dBi
Brand / Model	YAGEO / ANT3216A063R2455A

Notes:

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.

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
RF output power (Spectrum)	± 2.440 dB
Radiated Emission_9kHz-30MHz	± 3.761 dB
Radiated Emission_30MHz-200MHz	± 3.473 dB
Radiated Emission_200MHz-1GHz	± 3.946 dB
Radiated Emission_1GHz-6GHz	± 4.797 dB
Radiated Emission_6GHz-18GHz	± 4.803 dB
Radiated Emission_18GHz-26GHz	± 3.459 dB
Radiated Emission_26GHz-40GHz	± 3.297 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
Radiation	Tony Chao 、 Ray Li	-
RF Conducted	Jerry Chang	-

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

1.6 INSTRUMENT CALIBRATION

Conducted FCC/IC/NCC (All)					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
PXA Signal Analyzer	Keysight	N9030B	MY62291089	2024-10-04	2025-10-03
Power Sensor	Anritsu	MA2411B	1911386	2024-07-19	2025-07-18
Power Meter	Anritsu	ML2496A	2136002	2024-07-19	2025-07-18
DC Blocks	Marvelous Microwave	MVE6411	MVE-002	2024-08-08	2025-08-07
Attenuator	Marvelous Microwave Inc	MVE2213-10	08	2024-11-07	2025-11-06
DC Power Source	GWINSTEK	SPS-3610	GPE880163	2024-11-06	2025-11-05
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	221011+221012+221213	2024-10-11	2025-10-10
Attenuator	Mini-Circuits	BW-S9W5	BWS9W5-09-966A-01	2024-02-07	2025-02-06
High Pass Filters	MICRO TRONICS	HPM13195	3	2024-01-23	2025-01-22
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:

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

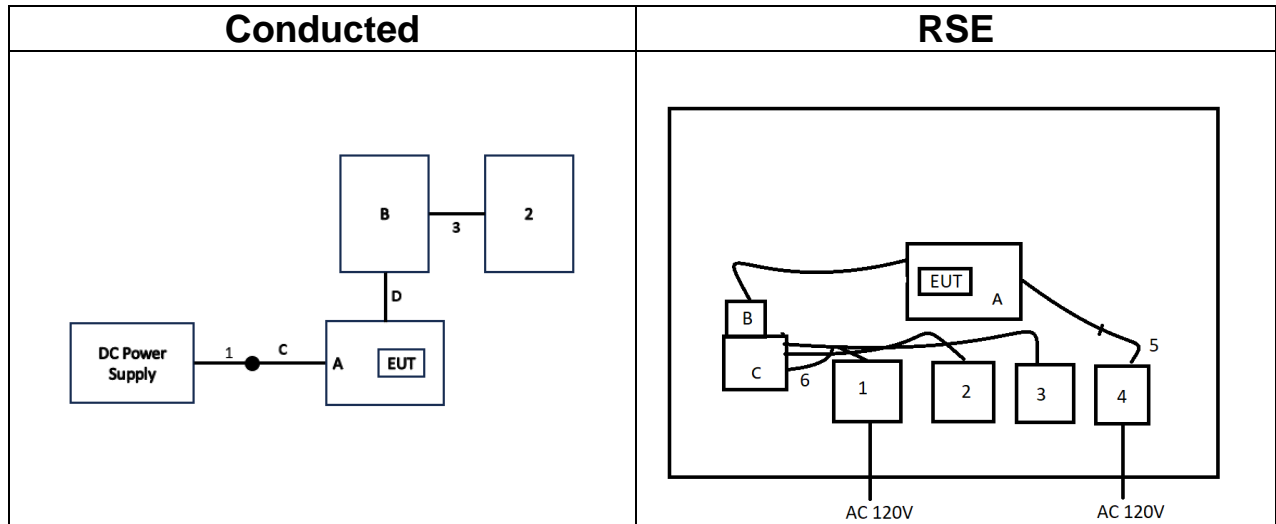
1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

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

Support Equipment (Conducted)						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC
1	DC Power Cable	MISUMI	MCR3S-RE	N/A	N/A	N/A
2	LCD Monitor	Lenovo	A20238FT0	N/A	N/A	N/A
3	HDMI Cable	High Speed	E342987	N/A	N/A	N/A
B	PC	ASUS	WM-BAC-BM25-FF3	N/A	N/A	N/A
C	Test kit	N/A	N/A	N/A	N/A	N/A
D	Test kit	N/A	N/A			

Support Equipment (RSE)						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC
1	Monitor	View sonic	VS16263	N/A	N/A	N/A
2	MOUSE	Lenovo	300 USB	N/A	N/A	N/A
3	KeyBoard	Logitech	K120	N/A	N/A	N/A
4	DC Power Source	GWINSTEK	SPS-3610	GPE880163	N/A	N/A
5	DC Cable	MISUMI	MCR3S-RE	N/A	N/A	N/A
6	HDMI Cable	UGREEN	HD104	N/A	N/A	N/A
B	Test Kit	N/A	N/A	N/A	N/A	N/A
C	PC	ASUS	D320MT	N/A	N/A	N/A

1.8 TEST SETUP DIAGRAM



1.9 TEST PROGRAM

The EUT connection corresponds to the surrounding fixture control board.
This EUT uses setup command 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.

2. TEST SUMMARY

FCC Standard Sec.	Chapter	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.407(a)	4.1	Output Power Measurement	Verify
15.407(b) 15.205	4.2	Radiation Band Edge	Pass
15.407(b) 15.209 15.205	4.2	Radiation Spurious Emission	Pass

Note:

Modified antenna path matching and update FW, but do not modify any RF related parameters. Therefore, the Conducted performance is the same as the quoted modular certification [FCC ID: COF-WMBACBM25, Date of Grant:07/10/2023]. However, worst case model harmonic and band edge radiation performance will be evaluated and will be evaluated to ensure product compliance.

3. DESCRIPTION OF TEST MODES

3.1 THE EUT CHANNEL NUMBER 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><tr><td rowspan="6">U-NII-2a</td><td>IEEE 802.11a</td><td>5260, 5300, 5320</td></tr><tr><td>IEEE 802.11n HT20</td><td>5260, 5300, 5320</td></tr><tr><td>IEEE 802.11n HT40</td><td>5270, 5310</td></tr><tr><td>IEEE 802.11ac VHT20</td><td>5260, 5300, 5320</td></tr><tr><td>IEEE 802.11ac VHT40</td><td>5270, 5310</td></tr><tr><td>IEEE 802.11ac VHT80</td><td>5290</td></tr><tr><td rowspan="6">U-NII-2c</td><td>IEEE 802.11a</td><td>5500, 5580, 5700, 5720</td></tr><tr><td>IEEE 802.11n HT20</td><td>5500, 5580, 5700, 5720</td></tr><tr><td>IEEE 802.11n HT40</td><td>5510, 5550, 5670, 5710</td></tr><tr><td>IEEE 802.11ac VHT20</td><td>5500, 5580, 5700, 5720</td></tr><tr><td>IEEE 802.11ac VHT40</td><td>5510, 5550, 5670, 5710</td></tr><tr><td>IEEE 802.11ac VHT80</td><td>5530, 5610, 5690</td></tr><tr><td rowspan="6">U-NII-3</td><td>IEEE 802.11a</td><td>5745, 5785, 5825</td></tr><tr><td>IEEE 802.11n HT20</td><td>5745, 5785, 5825</td></tr><tr><td>IEEE 802.11n HT40</td><td>5755, 5795</td></tr><tr><td>IEEE 802.11ac VHT20</td><td>5745, 5785, 5825</td></tr><tr><td>IEEE 802.11ac VHT40</td><td>5755, 5795</td></tr><tr><td>IEEE 802.11ac VHT80</td><td>5775</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	U-NII-2a	IEEE 802.11a	5260, 5300, 5320	IEEE 802.11n HT20	5260, 5300, 5320	IEEE 802.11n HT40	5270, 5310	IEEE 802.11ac VHT20	5260, 5300, 5320	IEEE 802.11ac VHT40	5270, 5310	IEEE 802.11ac VHT80	5290	U-NII-2c	IEEE 802.11a	5500, 5580, 5700, 5720	IEEE 802.11n HT20	5500, 5580, 5700, 5720	IEEE 802.11n HT40	5510, 5550, 5670, 5710	IEEE 802.11ac VHT20	5500, 5580, 5700, 5720	IEEE 802.11ac VHT40	5510, 5550, 5670, 5710	IEEE 802.11ac VHT80	5530, 5610, 5690	U-NII-3	IEEE 802.11a	5745, 5785, 5825	IEEE 802.11n HT20	5745, 5785, 5825	IEEE 802.11n HT40	5755, 5795	IEEE 802.11ac VHT20	5745, 5785, 5825	IEEE 802.11ac VHT40	5755, 5795	IEEE 802.11ac VHT80	5775
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Operation Transmitter	1. IEEE 802.11a mode: 1T1R(SISO) 2. IEEE 802.11n HT20 mode: 1T1R(SISO) 3. IEEE 802.11n HT40 mode: 1T1R(SISO) 4. IEEE 802.11ac VHT20 mode: 1T1R(SISO)) 5. IEEE 802.11ac VHT40 mode: 1T1R(SISO) 6. IEEE 802.11ac VHT80 mode: 1T1R(SISO)																																																									

Remark:

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.
2. The system support 802.11a/n ht20/n ht40/ac vht20/40/80, the ht20/ht40 were reduced since the identical parameters with 802.11ac vht20/vht40.
3. The worst-case data rates are determined to be as follows for each mode based upon investigations by evaluation judgment the average power and PSD across all data rates, bandwidths, and modulations.

3.2 THE WORST MODE OF MEASUREMENT

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT power by Power Supply
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Worst Position	<input type="checkbox"/> Placed in fixed position. <input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input checked="" type="checkbox"/> 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 Power Supply
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

Radiated Emission Measurement [Co-Location]	
Test Condition	Radiated Emission [Co-Location]
Power supply Mode	Mode 1: EUT Power by Wi-Fi 2.4G+BT BR Mode 2: EUT Power by Wi-Fi 5G+BT BR
Worst Mode	<input type="checkbox"/> Mode 1 <input checked="" type="checkbox"/> Mode 2

Remark:

1. The worst mode was record in this test report.
2. 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
3. Radiation emission was performed the EUT transmit at the highest output power channel as worse case. The worst case was recorded in this report.

4. TEST RESULT

4.1 OUTPUT POWER MEASUREMENT

4.1.1 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.

UNII-2a and 2c:

the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

UNII-3:

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

UNII-1 Limit	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 24dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [Limit = 24 – (DG – 6)]
UNII-2a/2c Limit	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 24dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [Limit = 24 – (DG – 6)]
UNII-3 Limit	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 30dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [Limit = 30 – (DG – 6)]

4.1.2 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.

4.1.3 Test Setup

Refer to section 1.8.

4.1.4 Test Result

Temperature: 21.2 ~ 23.7°C

Test date: November 22 ~ 25, 2024

Humidity: 54 ~ 58% RH

Tested by: Jerry Chang

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	70	60.53	17.82	23.98	PASS
44	5220	6	76	82.03	19.14	23.98	PASS
48	5240	6	70	62.80	17.98	23.98	PASS
52	5260	6	66	51.99	17.16	23.98	PASS
60	5300	6	59	35.15	15.46	23.98	PASS
64	5320	6	53	27.16	14.34	23.98	PASS
100	5500	6	47	17.90	12.53	23.98	PASS
116	5580	6	60	36.22	15.59	23.98	PASS
140	5700	6	52	22.85	13.59	23.98	PASS
149	5745	6	91	136.44	21.35	30	PASS
157	5785	6	92	139.94	21.46	30	PASS
165	5825	6	93	145.87	21.64	30	PASS

802.11ac_VHT20_Ch0

CH	Frequency (MHz)	Data Rate	Power Setting	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	74	68.44	18.35	23.98	PASS
44	5220	MCS0	79	87.16	19.40	23.98	PASS
48	5240	MCS0	70	58.66	17.68	23.98	PASS
52	5260	MCS0	75	74.53	18.72	23.98	PASS
60	5300	MCS0	71	58.39	17.66	23.98	PASS
64	5320	MCS0	65	44.39	16.47	23.98	PASS
100	5500	MCS0	51	21.15	13.25	23.98	PASS
116	5580	MCS0	57	30.15	14.79	23.98	PASS
140	5700	MCS0	57	29.13	14.64	23.98	PASS
149	5745	MCS0	91	131.02	21.17	30	PASS
157	5785	MCS0	92	134.69	21.29	30	PASS
165	5825	MCS0	93	140.39	21.47	30	PASS

Note:

The Conducted performance is the same as the quoted modular certification [FCC ID: COF-WMBACBM25, Date of Grant: 07/10/2023].

802.11ac_VHT40_Ch0

CH	Frequency (MHz)	Data Rate	Power Setting	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	72	59.46	17.74	23.98	PASS
46	5230	MCS0	70	54.35	17.35	23.98	PASS
54	5270	MCS0	78	79.84	19.02	23.98	PASS
62	5310	MCS0	61	35.09	15.45	23.98	PASS
102	5510	MCS0	55	25.95	14.14	23.98	PASS
110	5550	MCS0	80	83.03	19.19	23.98	PASS
134	5670	MCS0	68	42.58	16.29	23.98	PASS
151	5755	MCS0	91	145.28	21.62	30	PASS
159	5795	MCS0	94	144.62	21.60	30	PASS

802.11ac_VHT80_Ch0

CH	Frequency (MHz)	Data Rate	Power Setting	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
42	5210	MCS0	63	36.47	15.62	23.98	PASS
58	5290	MCS0	53	22.54	13.53	23.98	PASS
106	5530	MCS0	45	14.45	11.60	23.98	PASS
122	5610	MCS0	75	58.75	17.69	23.98	PASS
155	5775	MCS0	89	106.41	20.27	30	PASS

Note:

The Conducted performance is the same as the quoted modular certification [FCC ID: COF-WMBACBM25, Date of Grant: 07/10/2023].

4.2 RADIATION Bandedge and Spurious Emission

4.2.1 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.

UNII-2a and 2c :

For transmitters operating in the 5.25-5.35 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 in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

UNII-3:

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.

4.2.2 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 high power 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.

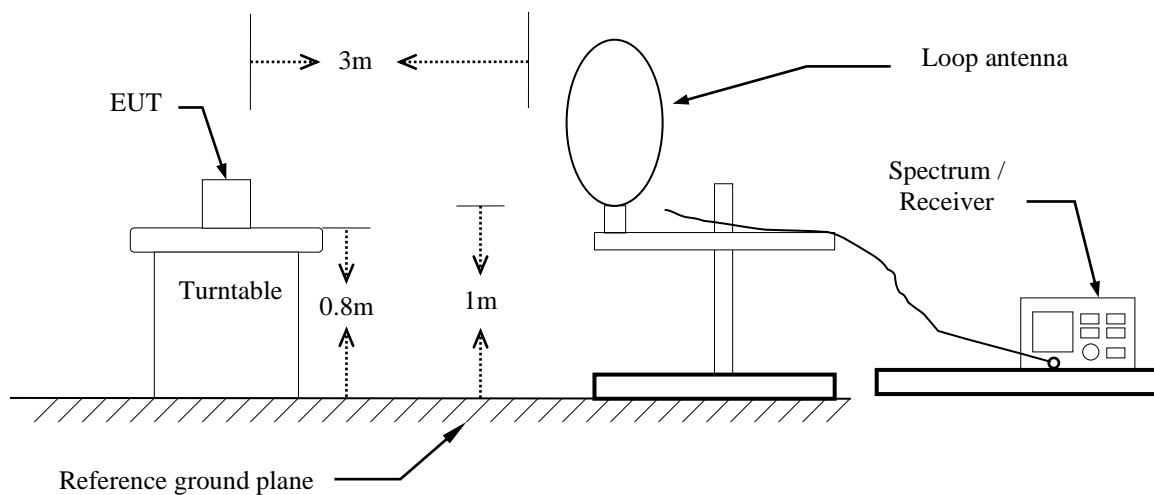
6. Data result :

Actual FS=Spectrum Reading Level + Factor

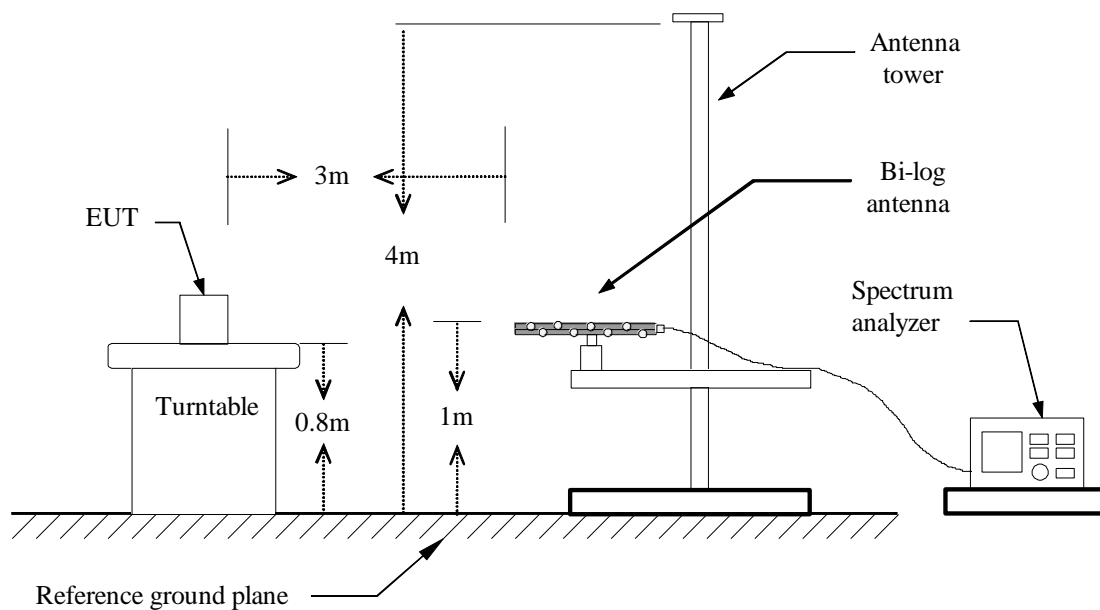
Margin=Actual FS- Limit

4.2.3 Test Setup

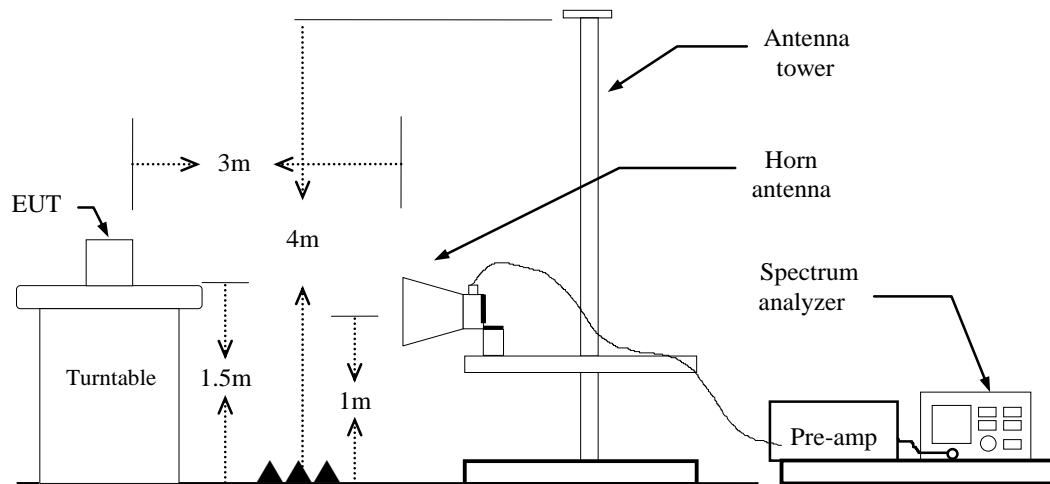
9kHz ~ 30MHz



30MHz ~ 1GHz



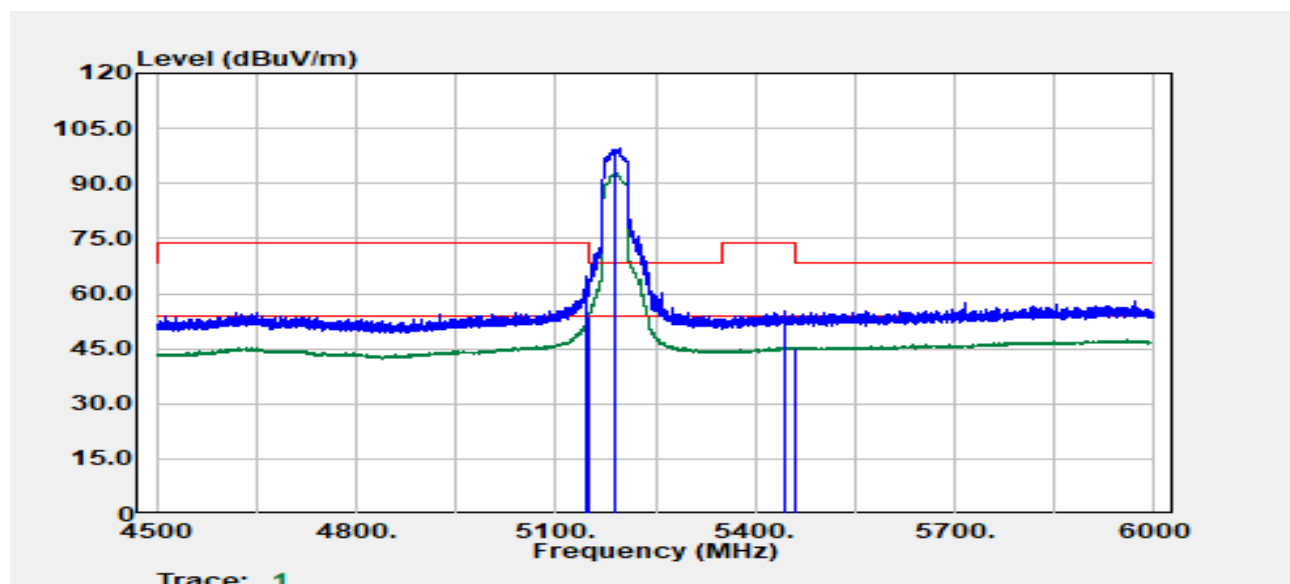
Above 1 GHz



4.2.4 Test Result

Band Edge Test Data

Project No	:TM-2411000242P	Test Date	:2024-11-26
Operation Band	:802.11ac40/Band1	Temp./Humi.	:24.6/60
Frequency	:5190 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:Bandedge	Engineer	:Ray Li
EUT Pol	:H	Test Chamber	: 966A
Setting	:72		



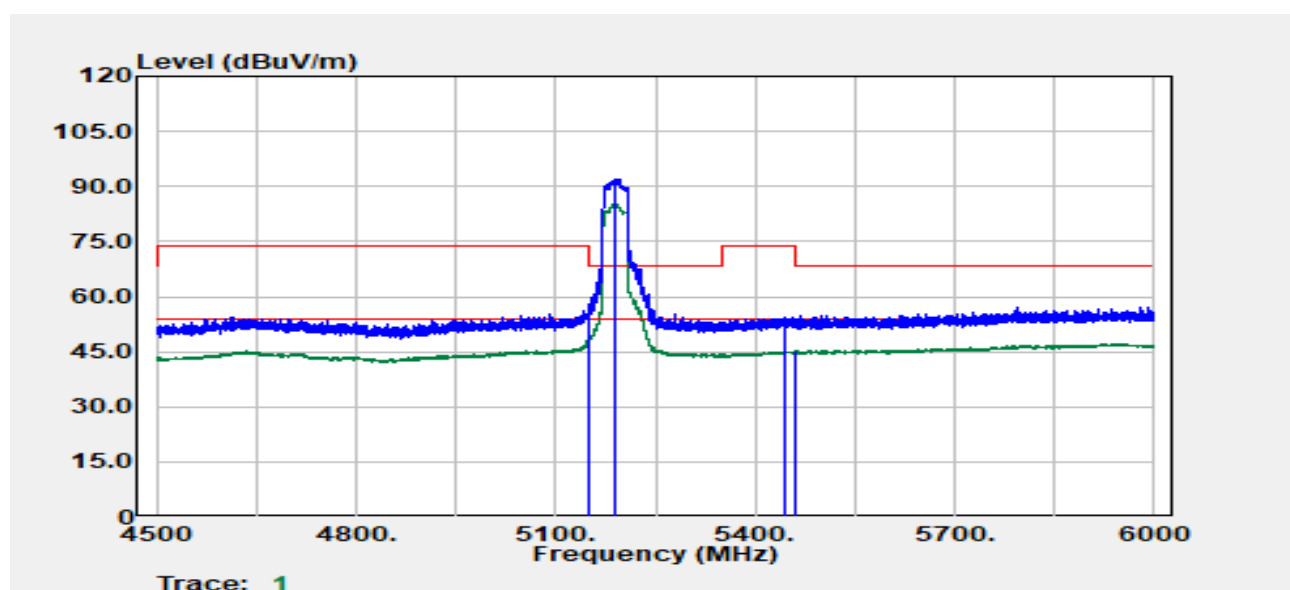
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5146.36	Peak	51.29	13.44	64.72	74.00	-9.28
5149.86	Average	40.34	13.43	53.78	54.00	-0.22
5190.00	Peak	86.23	13.53	99.77	--	--
5190.00	Average	79.21	13.53	92.74	--	--
5444.66	Peak	41.34	14.10	55.44	74.00	-18.56
5459.66	Average	31.34	14.12	45.46	54.00	-8.54

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Project No :TM-2411000242P
Operation Band :802.11ac40/Band1
Frequency :5190 MHz
Operation Mode :Bandedge
EUT Pol :H
Setting :72

Test Date :2024-11-26
Temp./Humi. :24.6/60
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A



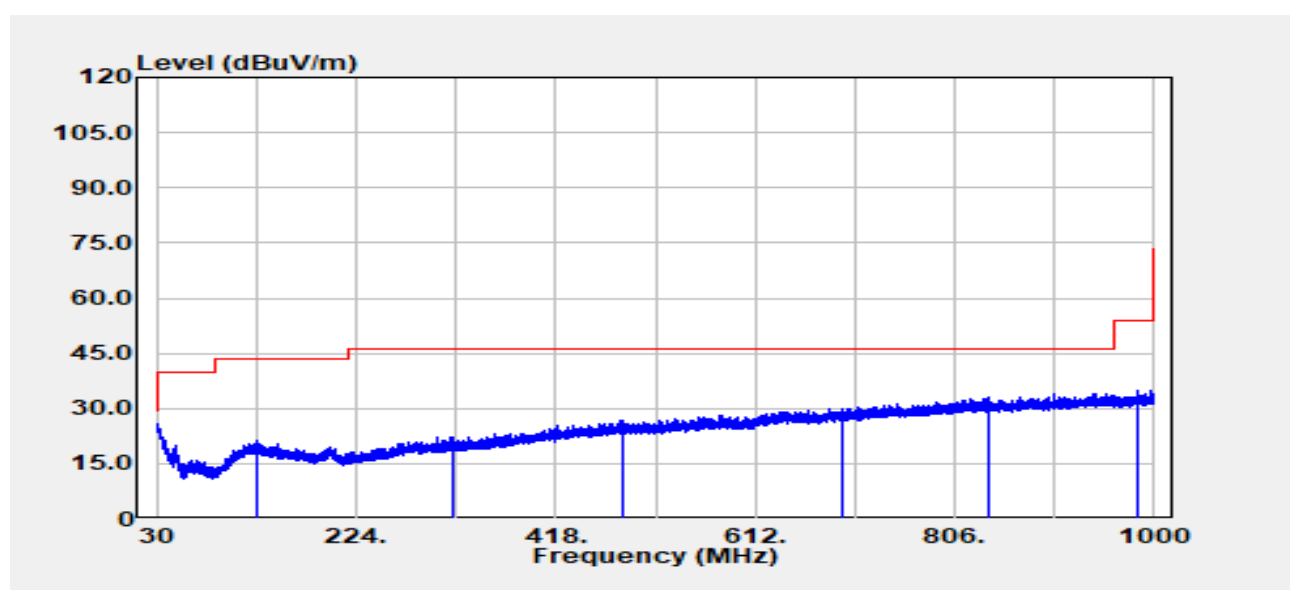
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5148.11	Peak	44.50	13.44	57.93	74.00	-16.07
5150.00	Average	34.71	13.43	48.14	54.00	-5.86
5190.00	Peak	78.49	13.53	92.03	--	--
5190.00	Average	71.79	13.53	85.33	--	--
5445.41	Peak	40.43	14.11	54.54	74.00	-19.46
5459.16	Average	31.06	14.12	45.18	54.00	-8.82

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TX Test Data

Project No	:TM-2411000242P	Test Date	:2024-11-27
Operation Band	:802.11a/Band4	Temp./Humi.	:24.8/57
Frequency	:5825 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:		



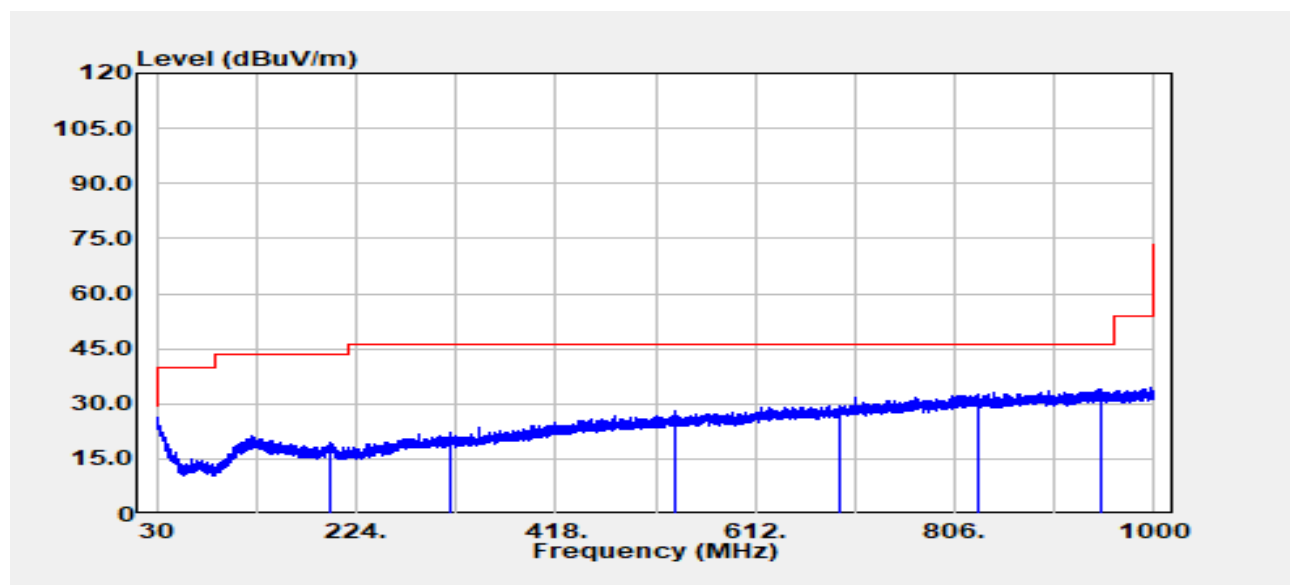
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
126.50	Peak	30.46	-9.01	21.45	43.50	-22.05
319.10	Peak	30.44	-8.09	22.35	46.00	-23.65
483.70	Peak	30.26	-3.43	26.83	46.00	-19.17
697.60	Peak	29.63	0.19	29.82	46.00	-16.18
840.10	Peak	30.39	2.57	32.96	46.00	-13.04
984.60	Peak	30.62	4.38	35.01	54.00	-18.99

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Project No :TM-2411000242P
Operation Band :802.11a/Band4
Frequency :5825 MHz
Operation Mode :TX
EUT Pol :E1
Setting :

Test Date :2024-11-27
Temp./Humi. :24.8/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A



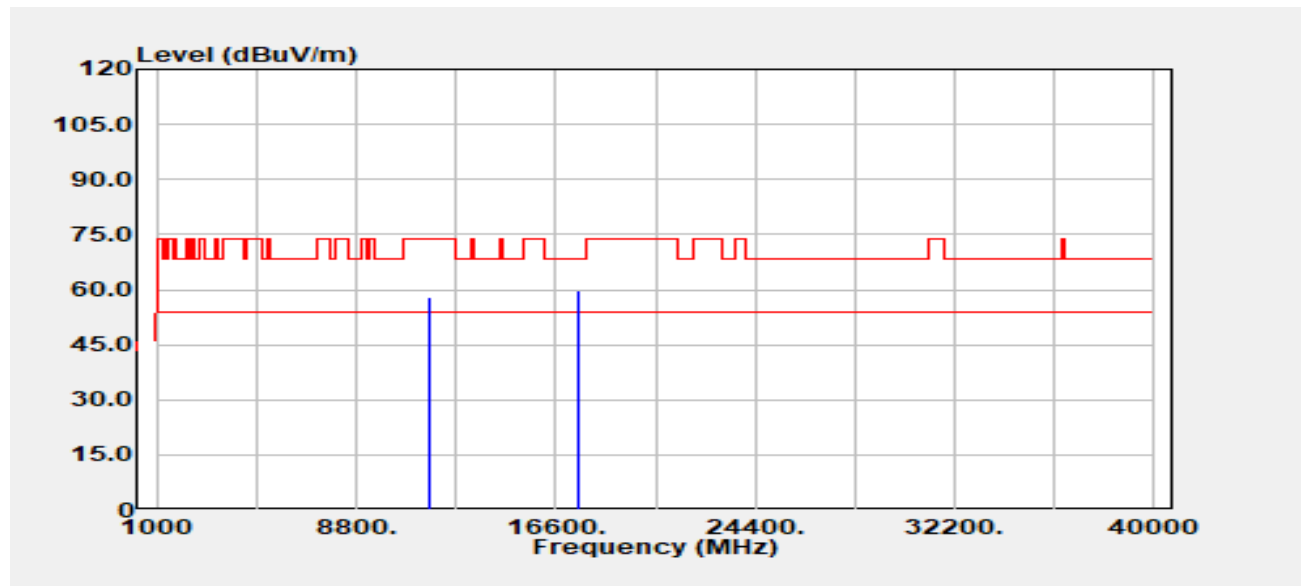
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
198.70	Peak	29.09	-9.69	19.40	43.50	-24.10
315.00	Peak	30.18	-8.03	22.15	46.00	-23.85
533.40	Peak	30.72	-2.75	27.96	46.00	-18.04
694.50	Peak	29.29	0.12	29.41	46.00	-16.59
828.90	Peak	29.90	2.55	32.45	46.00	-13.55
949.10	Peak	29.87	4.08	33.96	46.00	-12.04

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Project No :TM-2411000242P
Operation Band :802.11a/Band4
Frequency :5825 MHz
Operation Mode :TX
EUT Pol :H
Setting :93

Test Date :2024-11-27
Temp./Humi. :24.6/60
Antenna Pol. :Vertical
Engineer :Ray Li
Test Chamber : 966A



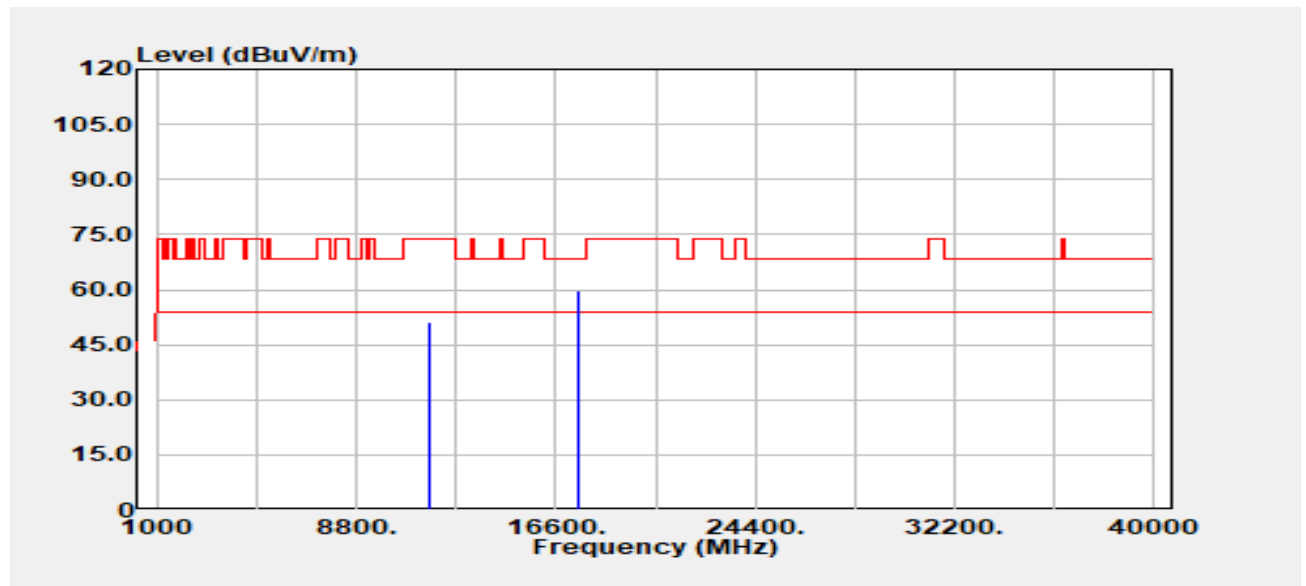
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
11650.00	Peak	44.53	13.59	58.12	74.00	-15.88
11650.00	Average	39.81	13.59	53.40	54.00	-0.60
17475.00	Peak	33.08	26.83	59.91	68.20	-8.29

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Project No :TM-2411000242P
Operation Band :802.11a/Band4
Frequency :5825 MHz
Operation Mode :TX
EUT Pol :H
Setting :93

Test Date :2024-11-26
Temp./Humi. :24.6/60
Antenna Pol. :Horizontal
Engineer :Ray Li
Test Chamber : 966A



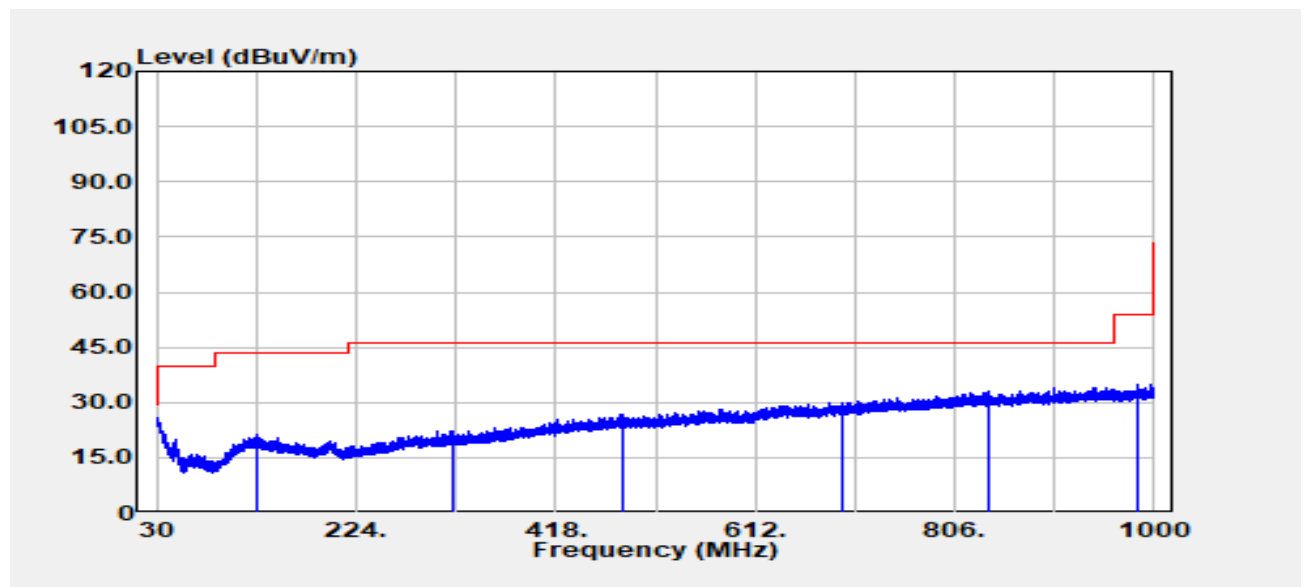
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
11650.00	Peak	33.66	13.59	47.25	74.00	-26.75
11650.00	Average	37.36	13.59	50.95	54.00	-3.05
17475.00	Peak	33.05	26.83	59.89	68.20	-8.31

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Co-location

Project No	:TM-2411000242P	Test Date	:2024-11-27
Operation Band	:802.11a/Band4_BT BR	Temp./Humi.	:24.8/57
Frequency	:5825+2480 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:		



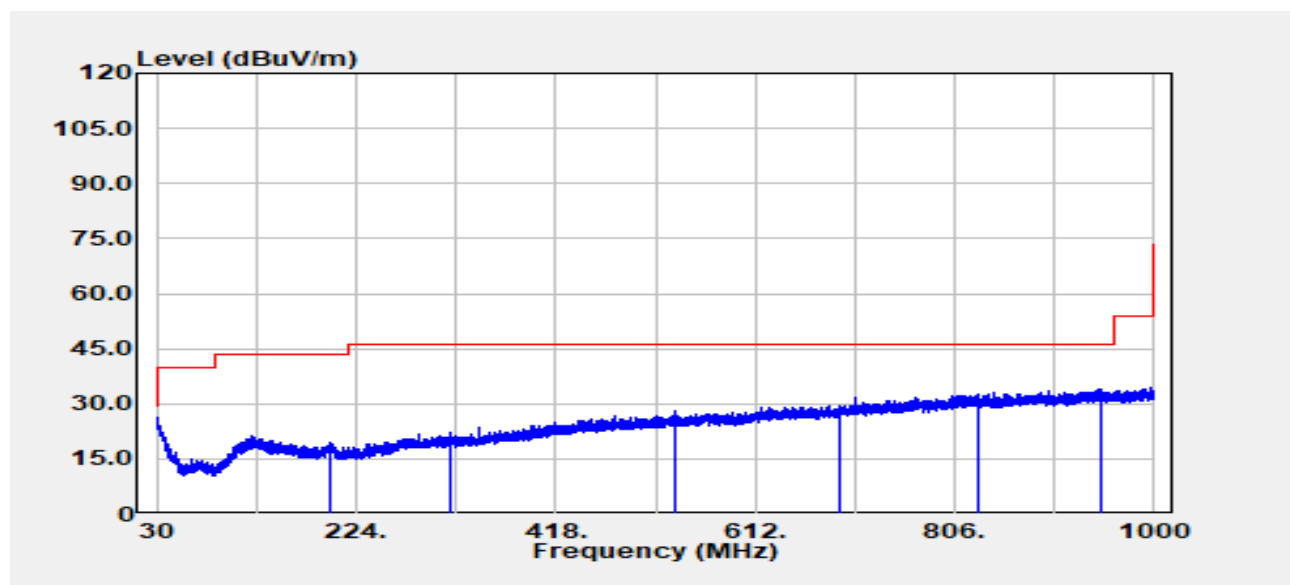
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBUV	Factor dB	Actual FS dBUV/m	Limit dBUV/m	Margin dB
126.50	Peak	30.46	-9.01	21.45	43.50	-22.05
319.10	Peak	30.44	-8.09	22.35	46.00	-23.65
483.70	Peak	30.26	-3.43	26.83	46.00	-19.17
697.60	Peak	29.63	0.19	29.82	46.00	-16.18
840.10	Peak	30.39	2.57	32.96	46.00	-13.04
984.60	Peak	30.62	4.38	35.01	54.00	-18.99

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Project No :TM-2411000242P
Operation Band :802.11a/Band4_BT BR
Frequency :5825+2480 MHz
Operation Mode :TX
EUT Pol :E1
Setting :

Test Date :2024-11-27
Temp./Humi. :24.8/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A



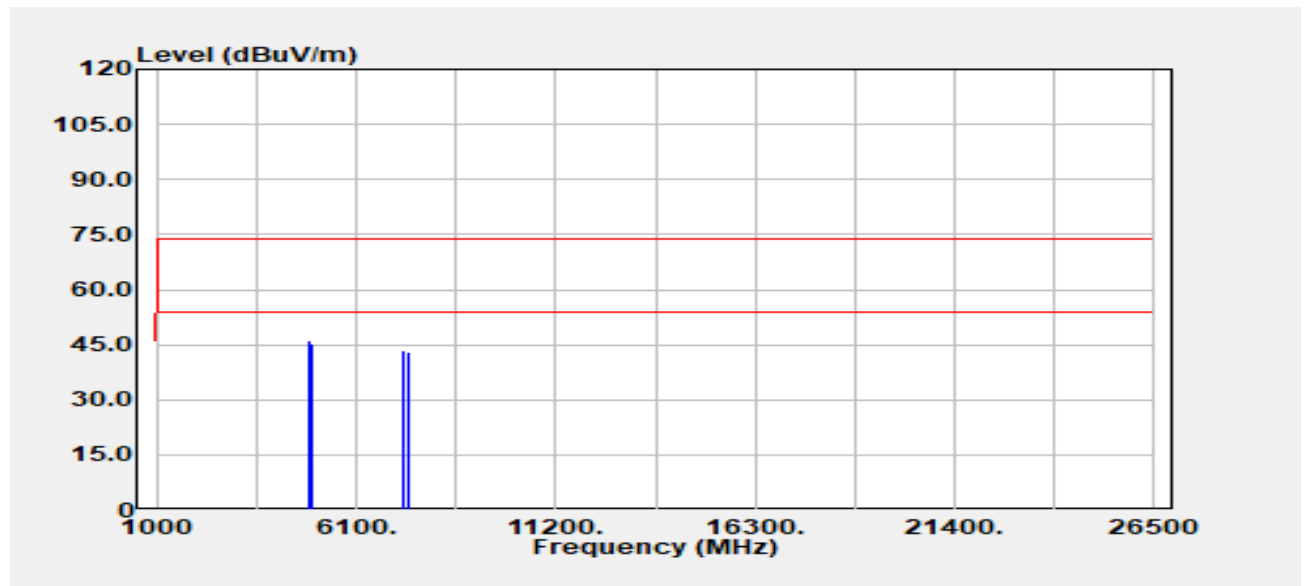
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
198.70	Peak	29.09	-9.69	19.40	43.50	-24.10
315.00	Peak	30.18	-8.03	22.15	46.00	-23.85
533.40	Peak	30.72	-2.75	27.96	46.00	-18.04
694.50	Peak	29.29	0.12	29.41	46.00	-16.59
828.90	Peak	29.90	2.55	32.45	46.00	-13.55
949.10	Peak	29.87	4.08	33.96	46.00	-12.04

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Project No :TM-2411000242P
Operation Band :802.11n20_BT BR
Frequency :2437+2480 MHz
Operation Mode :TX
EUT Pol :H
Setting :85_0

Test Date :2024-11-27
Temp./Humi. :24.8/57
Antenna Pol. :VERTICAL
Engineer :Tony Chao
Test Chamber : 966A



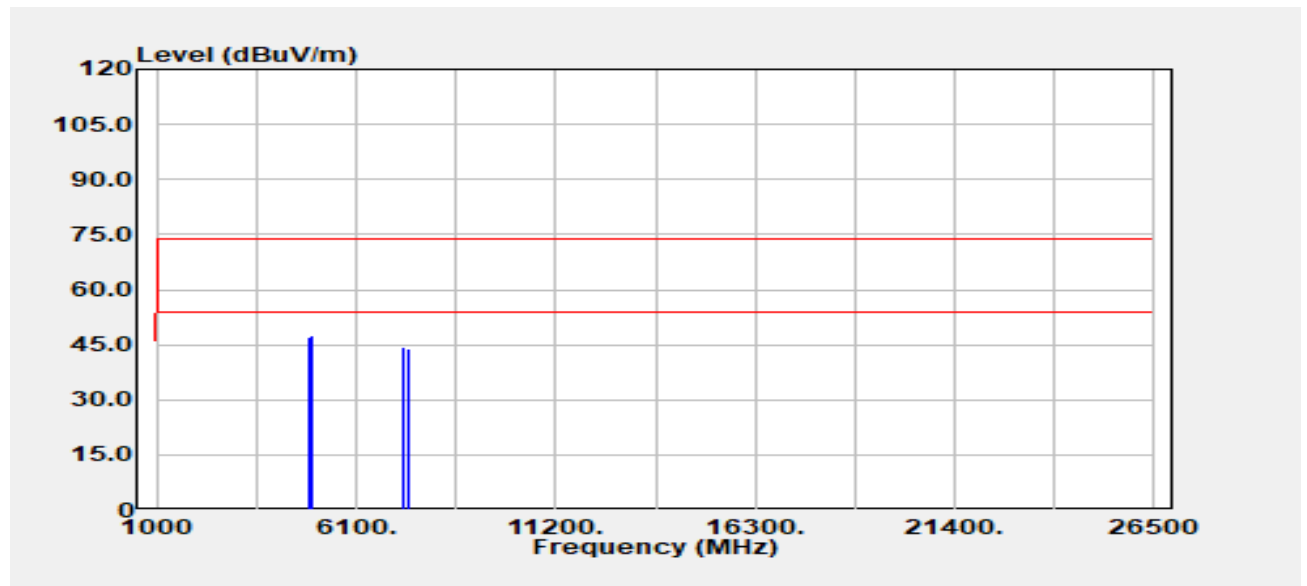
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4874.00	Peak	43.97	2.23	46.20	74.00	-27.80
4874.00	Average	36.74	2.23	38.97	54.00	-15.03
4960.00	Peak	42.28	2.94	45.23	74.00	-28.77
4960.00	Average	38.33	2.94	41.27	54.00	-12.73
7311.00	Peak	35.00	8.70	43.69	74.00	-30.31
7311.00	Average	27.47	8.70	36.16	54.00	-17.84
7440.00	Peak	34.35	8.71	43.06	74.00	-30.94
7440.00	Average	27.60	8.71	36.31	54.00	-17.69

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Project No :TM-2411000242P
Operation Band :802.11n20_BT BR
Frequency :2437+2480 MHz
Operation Mode :TX
EUT Pol :H
Setting :85_0

Test Date :2024-11-27
Temp./Humi. :24.8/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A



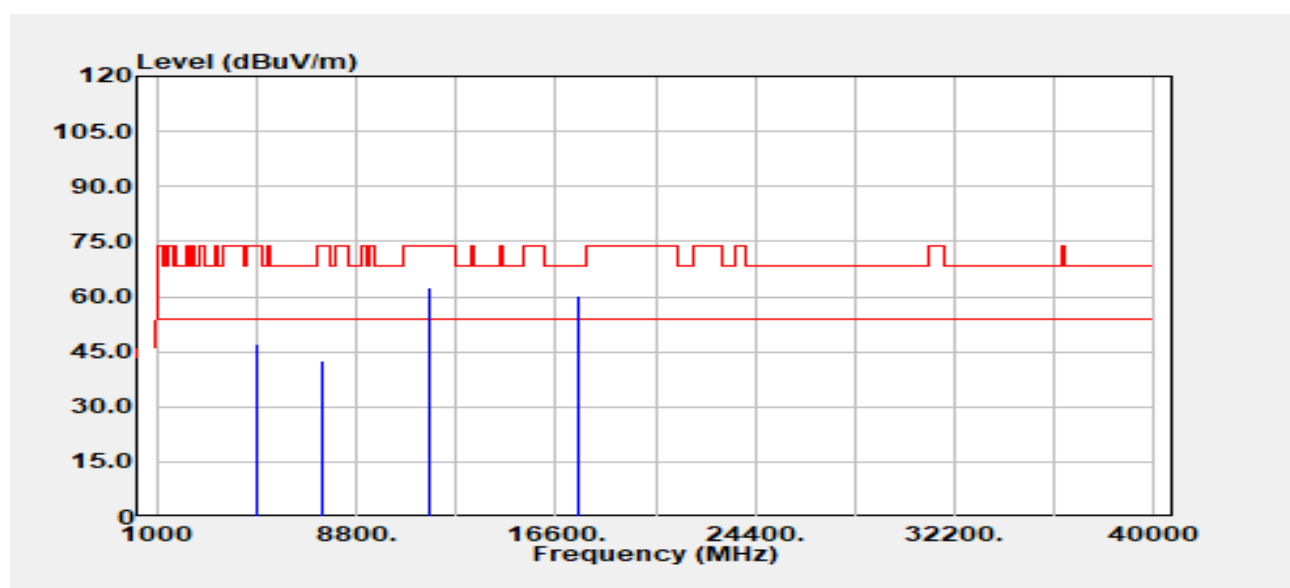
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4874.00	Peak	44.69	2.23	46.92	74.00	-27.08
4874.00	Average	37.77	2.23	40.00	54.00	-14.00
4960.00	Peak	44.79	2.94	47.73	74.00	-26.27
4960.00	Average	41.48	2.94	44.42	54.00	-9.58
7311.00	Peak	35.69	8.70	44.39	74.00	-29.61
7311.00	Average	27.87	8.70	36.57	54.00	-17.43
7440.00	Peak	35.28	8.71	43.99	74.00	-30.01
7440.00	Average	27.94	8.71	36.65	54.00	-17.35

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Project No :TM-2411000242P
Operation Band :802.11a/Band4_BT BR
Frequency :5825+2480 MHz
Operation Mode :TX
EUT Pol :E1
Setting :93_0

Test Date :2024-11-27
Temp./Humi. :24.8/57
Antenna Pol. :VERTICAL
Engineer :Tony Chao
Test Chamber : 966A



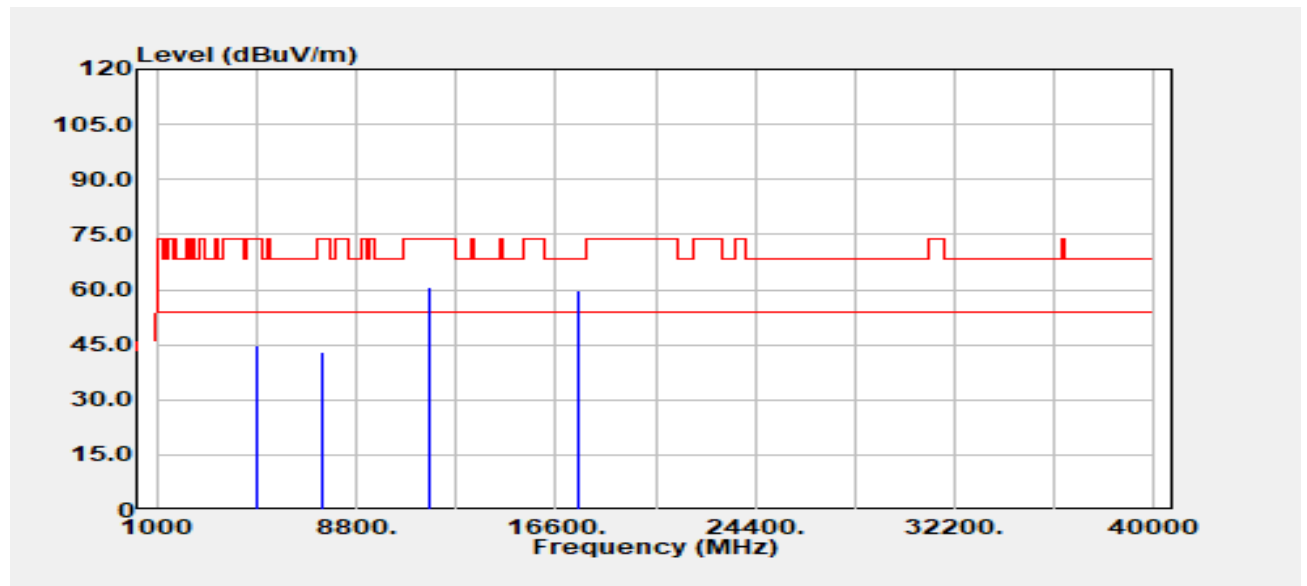
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4960.00	Peak	44.00	2.94	46.94	74.00	-27.06
4960.00	Average	42.16	2.94	45.10	54.00	-8.90
7440.00	Peak	33.70	8.71	42.41	74.00	-31.59
7440.00	Average	27.48	8.71	36.19	54.00	-17.81
11650.00	Peak	48.85	13.59	62.44	74.00	-11.56
11650.00	Average	39.93	13.59	53.52	54.00	-0.48
17475.00	Peak	33.18	26.83	60.01	68.20	-8.19

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Project No :TM-2411000242P
Operation Band :802.11a/Band4_BT BR
Frequency :5825+2480 MHz
Operation Mode :TX
EUT Pol :E1
Setting :93_0

Test Date :2024-11-27
Temp./Humi. :24.8/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
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
4960.00	Peak	41.83	2.94	44.77	74.00	-29.23
4960.00	Average	38.27	2.94	41.21	54.00	-12.79
7440.00	Peak	34.32	8.71	43.03	74.00	-30.97
7440.00	Average	28.06	8.71	36.77	54.00	-17.23
11650.00	Peak	47.30	13.59	60.89	74.00	-13.11
11650.00	Average	39.65	13.59	53.24	54.00	-0.76
17475.00	Peak	32.91	26.83	59.74	68.20	-8.46

- End of Test Report -