

Project No: TM-2411000242P
Report No.: TMWK2412004343KR

FCC ID: COF-WMBACBM25

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Rev.: 00

RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

(CLASS II PERMISSIVE CHANGE)

| | |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Standard | FCC Part 15.247 |
| 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
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 to main test model name.

1.2 INFORMATION ABOUT THE FHSS CHARACTERISTICS

1.2.1 Pseudorandom Frequency Hopping Sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master; the phase in the hopping sequence is determined by the Bluetooth clock of the master. The channel is divided into time slots where each slot corresponds to an RF hop frequency. Consecutive hops correspond to different RF hop frequencies. The nominal hop rate is 1 600 hops/s.

1.2.2 Equal Hopping Frequency Use

The channels of this system will be used equally over the long-term distribution of the hopsets.

1.2.3 Example of a 79 hopping sequence in data mode:

02, 05, 31, 24, 20, 10, 43, 36, 30, 23, 40, 06, 21, 50, 44, 09, 71, 78, 01, 13, 73, 07, 70, 72, 35, 62, 42, 11, 41, 08, 16, 29, 60, 15, 34, 61, 58, 04, 67, 12, 22, 53, 57, 18, 27, 76, 39, 32, 17, 77, 52, 33, 56, 46, 37, 47, 64, 49, 45, 38, 69, 14, 51, 26, 79, 19, 28, 65, 75, 54, 48, 03, 25, 66, 05, 16, 68, 74, 59, 63, 55

1.2.4 System Receiver Input Bandwidth

Each channel bandwidth is 1MHz.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

1.2.5 Equipment Description

15.247(a)(1) that the Rx input bandwidths shift frequencies in synchronization with the transmitted signals.

15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.

15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection/ hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

1.3 EUT CHANNEL INFORMATION

| | |
|-------------------|------------------------------------------------------------------------------------|
| Frequency Range | 2402MHz-2480MHz |
| Modulation Type | 1. GFSK for BDR-1Mbps 2. $\pi/4$ -DQPSK for EDR-2Mbps 3. 8DPSK for EDR-3Mbps |
| Number of channel | 79 Channels |

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 |

1.4 ANTENNA INFORMATION

| | |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Antenna Specification | <input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/> Dipole <input checked="" type="checkbox"/> Ceramic Chip Antenna |
| Antenna Gain | Gain: 1.59 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.

1.5 MEASUREMENT UNCERTAINTY

| PARAMETER | UNCERTAINTY |
|----------------------------------------------|-------------|
| RF output power (Power Meter + Power sensor) | ± 0.243 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.

1.6 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 public Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309

1.7 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 |
| 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 | SCHWARZBEC K | 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 | Titan Microwave | T04H30001800 070S01 | 22011402-4 | 2024-06-12 | 2025-06-11 |
| Horn Antenna | SCHWARZBEC K | 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.

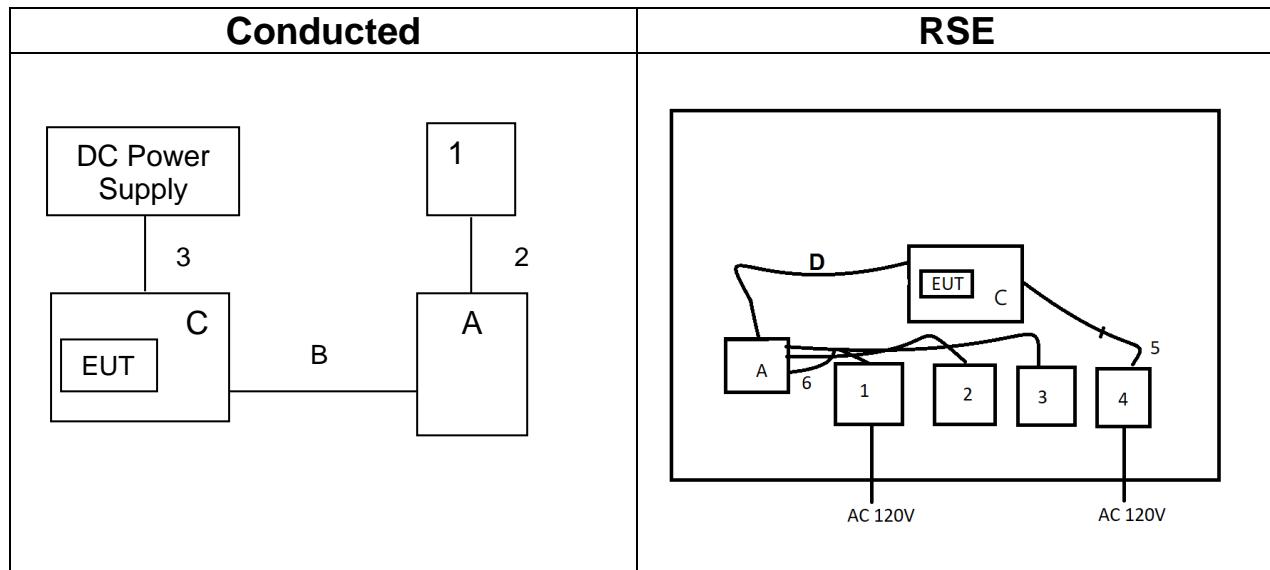
1.8 SUPPORT AND EUT ACCESSORIES EQUIPMENT

| EUT Accessories Equipment | | | | | | |
|---------------------------|-----------|-------|-------|------------|--------|-----|
| No. | Equipment | Brand | Model | Series No. | FCC ID | IC |
| C | 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 | LCD Monitor | Lenovo | A20238FT0 | N/A | N/A | N/A |
| 2 | HDMI Cable | High Speed | E342987 | N/A | N/A | N/A |
| 3 | DC Power Cable | MISUMI | MCR3S-RE | N/A | N/A | N/A |
| A | PC | ASUS | WM-BAC-BM25-FF3 | N/A | N/A | N/A |
| B | Mini to USB Cable | N/A | N/A | N/A | 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 |
| A | PC | ASUS | D320MT | N/A | N/A | N/A |
| B | Test Kit | N/A | N/A | N/A | N/A | N/A |
| D | Mini Usb Cable | N/A | N/A | N/A | N/A | N/A |

1.9 TEST SETUP DIAGRAM



1.10 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 (including frequency hopping mode and Co-Location).

1.11 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 15.247, KDB 558074.

2. TEST SUMMARY

| FCC Standard Section | Report Section | Test Item | Result |
|-------------------------------|----------------|-----------------------------|--------|
| 15.203 | 1.3 | Antenna Requirement | Pass |
| 15.247(b)(1) | 4.1 | Output Power Measurement | Verify |
| 15.247(d) 15.209 15.205 | 4.2 | Radiation Band Edge | Pass |
| 15.247(d) 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 WORST MODE OF OPERATING CONDITION

| | |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operation mode | GFSK for BDR-1Mbps (DH5) $\pi/4$ -DQPSK for 2Mbps (2DH5) 8DPSK for EDR-3Mbps (3DH5) |
| Test Channel Frequencies | GFSK for BDR-1Mbps: 1.Lowest Channel: 2402MHz 2.Middle Channel: 2441MHz 3.Highest Channel: 2480MHz $\pi/4$-DQPSK for 2Mbps: 1.Lowest Channel: 2402MHz 2.Middle Channel: 2441MHz 3.Highest Channel: 2480MHz 8DPSK for EDR-3Mbps: 1.Lowest Channel: 2402MHz 2.Middle Channel: 2441MHz 3.Highest Channel: 2480MHz |

Remark:

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

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 §15.247(a)(1) ,

Peak output power :

FCC

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Average output power : For reporting purposes only.

4.1.2 Test Procedure

1. The EUT RF output connected to the power meter 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 Peak output power and Average output power. in the test report.

4.1.3 Test Setup

Refer to section 1.9.

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

Peak & Average output power :

1M BR mode (Peak):

| CH | Freq. (MHz) | Power Setting | Peak Output Power (dBm) | Output Power (mW) | Limit (mW) |
|----|-------------|---------------|-------------------------|-------------------|------------|
| 0 | 2402 | 0 | 9.03 | 7.998 | 1000 |
| 39 | 2441 | 0 | 9.20 | 8.318 | 1000 |
| 78 | 2480 | 0 | 9.41 | 8.730 | 1000 |

1M BR mode (Average):

| CH | Freq. (MHz) | Power Setting | Avg. Output Power (dBm) | Output Power (mW) | Limit (mW) |
|----|-------------|---------------|-------------------------|-------------------|------------|
| 0 | 2402 | 0 | 8.97 | 7.896 | 1000 |
| 39 | 2441 | 0 | 9.13 | 8.192 | 1000 |
| 78 | 2480 | 0 | 9.34 | 8.598 | 1000 |

3M EDR mode (Peak):

| CH | Freq. (MHz) | Power Setting | Peak Output Power (dBm) | Output Power (mW) | Limit (mW) |
|----|-------------|---------------|-------------------------|-------------------|------------|
| 0 | 2402 | 0 | 8.19 | 6.592 | 125 |
| 39 | 2441 | 0 | 7.59 | 5.741 | 125 |
| 78 | 2480 | 0 | 6.90 | 4.898 | 125 |

3M EDR mode (Average):

| CH | Freq. (MHz) | Power Setting | Avg. Output Power (dBm) | Output Power (mW) | Limit (mW) |
|----|-------------|---------------|-------------------------|-------------------|------------|
| 0 | 2402 | 0 | 5.78 | 3.788 | 125 |
| 39 | 2441 | 0 | 5.05 | 3.202 | 125 |
| 78 | 2480 | 0 | 4.30 | 2.694 | 125 |

Note:

1. Avg. output power has been calculated with duty factor.
2. 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 §15.247(d), §15.209 and §15.205,

In any 100 kHz bandwidth outside the authorized frequency band, all harmonic and spurious must be least 20 dB below the highest emission level with the authorized frequency band. Radiation emission which fall in the restricted bands must also follow the FCC section 15.209 as below limit in table.

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) |

Remark:

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

4.2.2 Test Procedure

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 26.5GHz 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*RBW, Sweep = Auto,

Detector = Peak, Trace = Max hold.

(3) Above 1GHz :

- (3.1) For Peak measurement : RBW = 1MHz, VBW \geq 3 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.

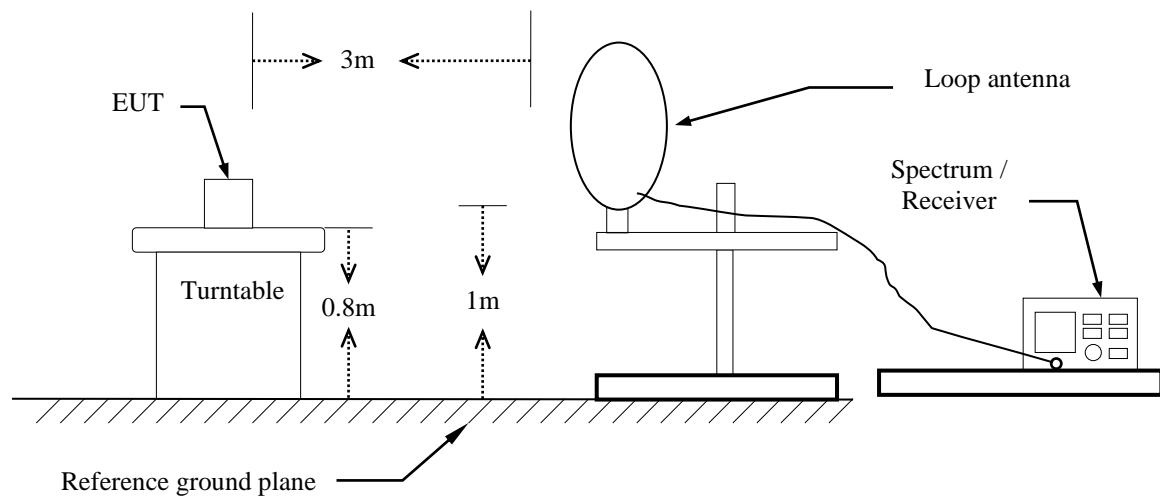
6. Data result

Actual FS=Spectrum Reading Level + Factor

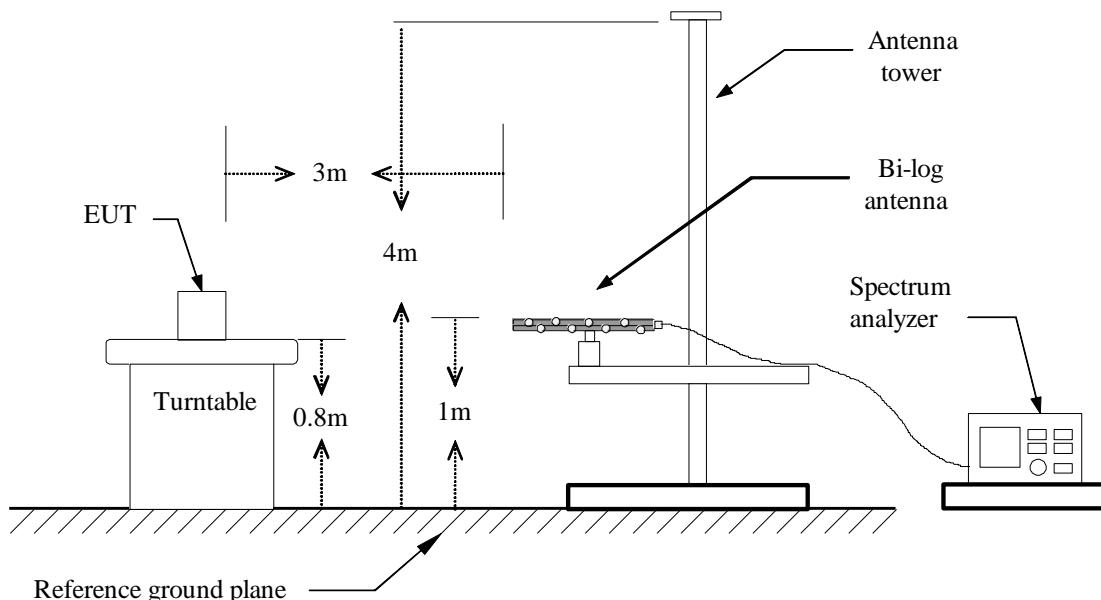
Margin=Actual FS- Limit

4.2.3 Test Setup

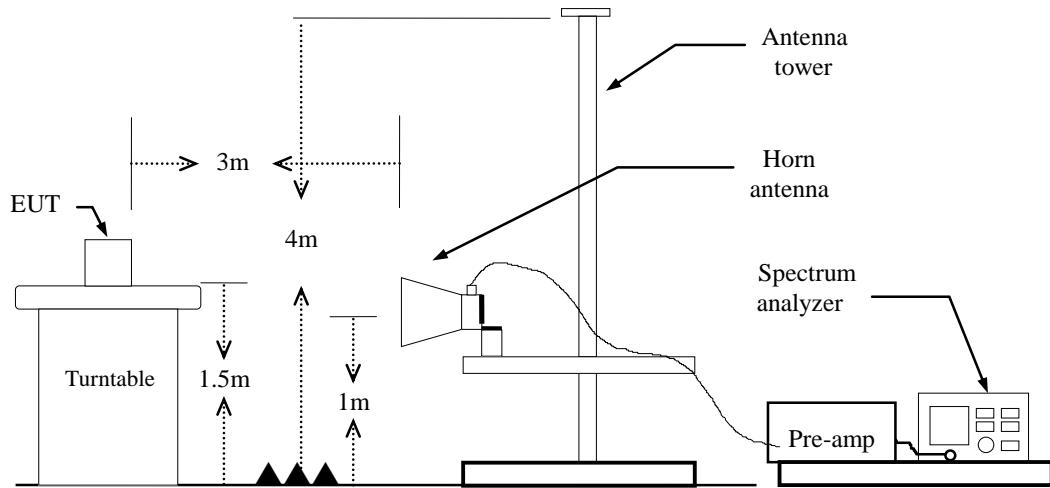
9kHz ~ 30MHz



30MHz ~ 1GHz



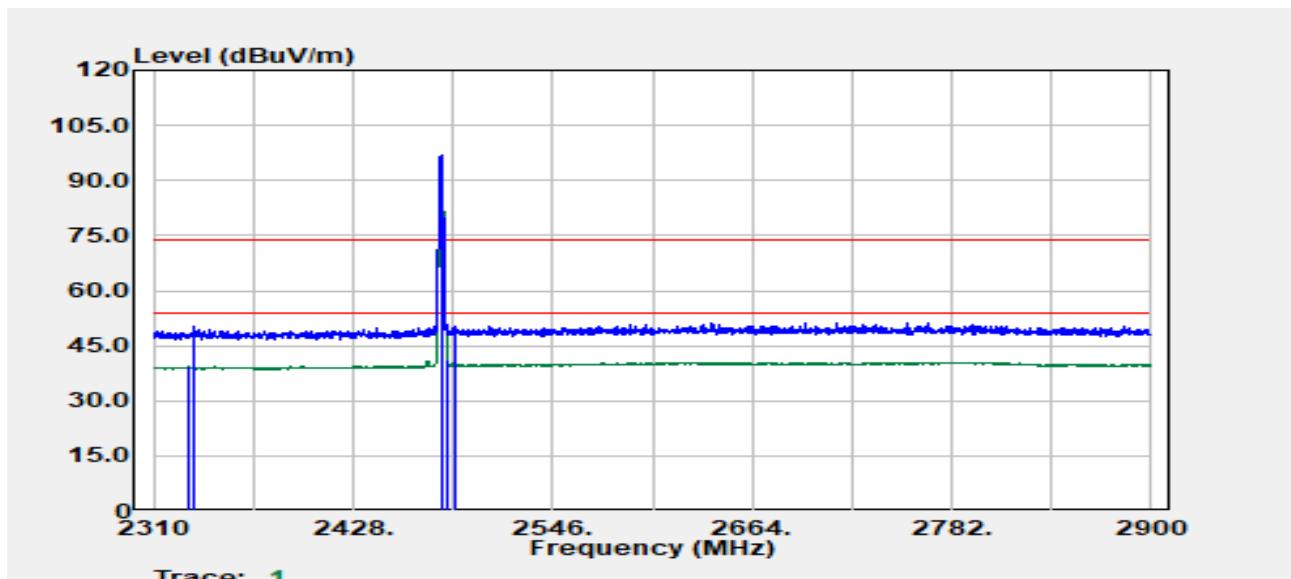
Above 1 GHz



4.2.4 Test Result

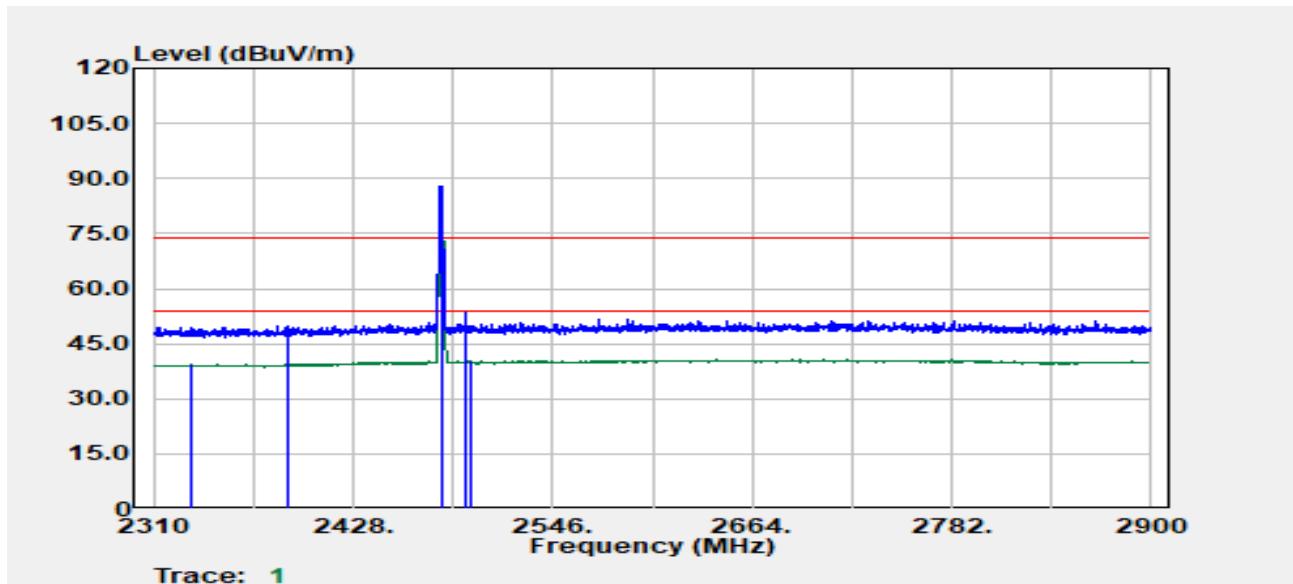
Band Edge Test Data

| | | | |
|----------------|-----------------|--------------|-------------|
| Project No | :TM-2411000242P | Test Date | :2024-11-26 |
| Operation Band | :BT BR | Temp./Humi. | :24.6/60 |
| Frequency | :2480 MHz | Antenna Pol. | :VERTICAL |
| Operation Mode | :Bandedge | Engineer | :Ray Li |
| EUT Pol | :H | Test Chamber | : 966A |
| Setting | :0 | | |



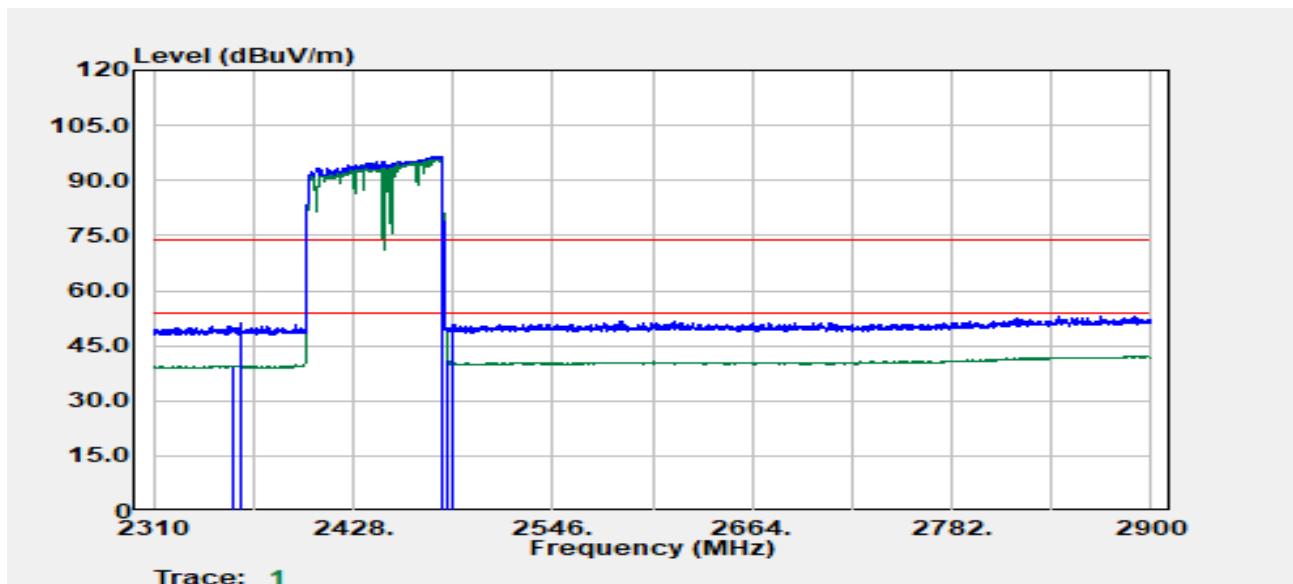
| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 2330.26 | Average | 33.15 | 6.03 | 39.18 | 54.00 | -14.82 |
| 2334.51 | Peak | 44.20 | 6.00 | 50.20 | 74.00 | -23.80 |
| 2480.00 | Peak | 90.21 | 6.51 | 96.73 | -- | -- |
| 2480.00 | Average | 90.15 | 6.51 | 96.66 | -- | -- |
| 2483.57 | Average | 34.82 | 6.56 | 41.38 | 54.00 | -12.62 |
| 2488.33 | Peak | 43.75 | 6.63 | 50.38 | 74.00 | -23.62 |

| | | | |
|----------------|-----------------|--------------|-------------|
| Project No | :TM-2411000242P | Test Date | :2024-11-26 |
| Operation Band | :BT BR | Temp./Humi. | :24.6/60 |
| Frequency | :2480 MHz | Antenna Pol. | :HORIZONTAL |
| Operation Mode | :Bandedge | Engineer | :Ray Li |
| EUT Pol | :H | Test Chamber | : 966A |
| Setting | :0 | | |



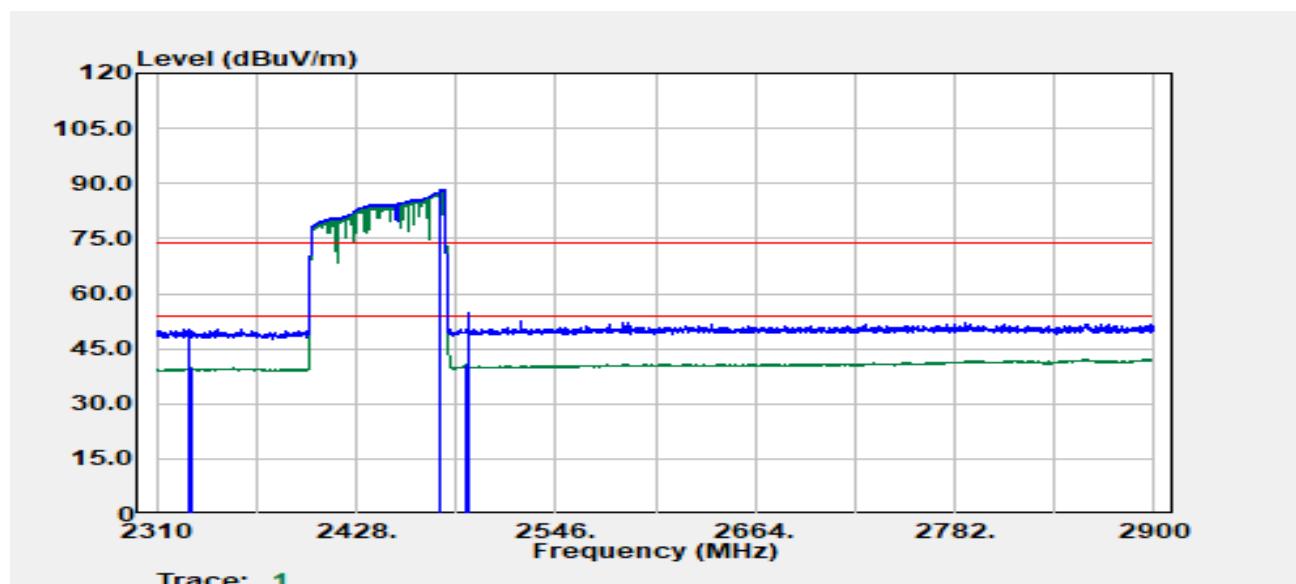
| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 2331.76 | Average | 33.36 | 6.02 | 39.38 | 54.00 | -14.62 |
| 2388.78 | Peak | 43.75 | 6.10 | 49.85 | 74.00 | -24.15 |
| 2480.00 | Peak | 81.39 | 6.51 | 87.90 | -- | -- |
| 2480.00 | Average | 81.33 | 6.51 | 87.84 | -- | -- |
| 2494.08 | Peak | 46.80 | 6.67 | 53.47 | 74.00 | -20.53 |
| 2496.83 | Average | 33.55 | 6.68 | 40.23 | 54.00 | -13.77 |

| | | | |
|----------------|-----------------|--------------|-------------|
| Project No | :TM-2411000242P | Test Date | :2024-11-26 |
| Operation Band | :BT BR | Temp./Humi. | :24.6/60 |
| Frequency | :2402~2480 MHz | Antenna Pol. | :VERTICAL |
| Operation Mode | :Hopping | Engineer | :Ray Li |
| EUT Pol | :H | Test Chamber | : 966A |
| Setting | :0 | | |



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 2357.52 | Average | 33.41 | 6.09 | 39.51 | 54.00 | -14.49 |
| 2361.02 | Peak | 45.19 | 6.08 | 51.28 | 74.00 | -22.72 |
| 2479.82 | Peak | 89.97 | 6.51 | 96.48 | -- | -- |
| 2479.82 | Average | 89.88 | 6.51 | 96.38 | -- | -- |
| 2483.57 | Average | 34.80 | 6.56 | 41.36 | 54.00 | -12.64 |
| 2486.83 | Peak | 44.25 | 6.61 | 50.86 | 74.00 | -23.14 |

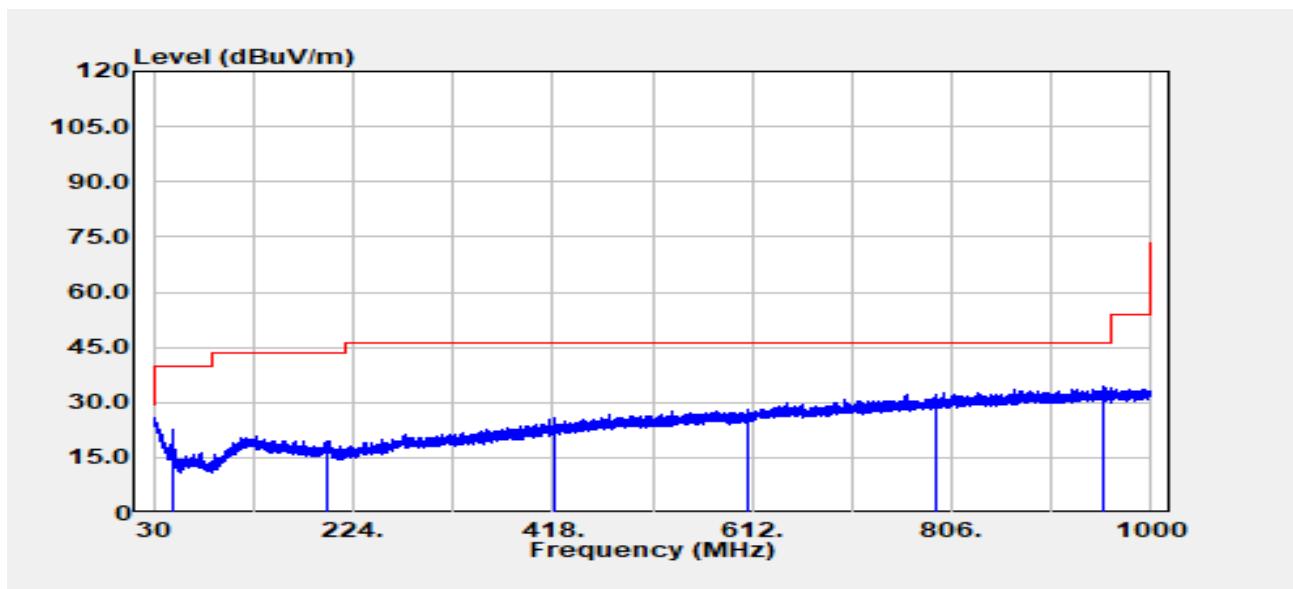
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|----------------|-----------------|--------------|-------------|
| Project No | :TM-2411000242P | Test Date | :2024-11-26 |
| Operation Band | :BT BR | Temp./Humi. | :24.6/60 |
| Frequency | :2402~2480 MHz | Antenna Pol. | :HORIZONTAL |
| Operation Mode | :Hopping | Engineer | :Ray Li |
| EUT Pol | :H | Test Chamber | : 966A |
| Setting | :0 | | |



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 2328.51 | Peak | 44.30 | 6.03 | 50.33 | 74.00 | -23.67 |
| 2331.26 | Average | 33.63 | 6.02 | 39.65 | 54.00 | -14.35 |
| 2478.07 | Peak | 81.89 | 6.47 | 88.36 | -- | -- |
| 2478.07 | Average | 81.61 | 6.47 | 88.08 | -- | -- |
| 2493.33 | Average | 34.05 | 6.66 | 40.71 | 54.00 | -13.29 |
| 2494.58 | Peak | 47.99 | 6.67 | 54.66 | 74.00 | -19.34 |

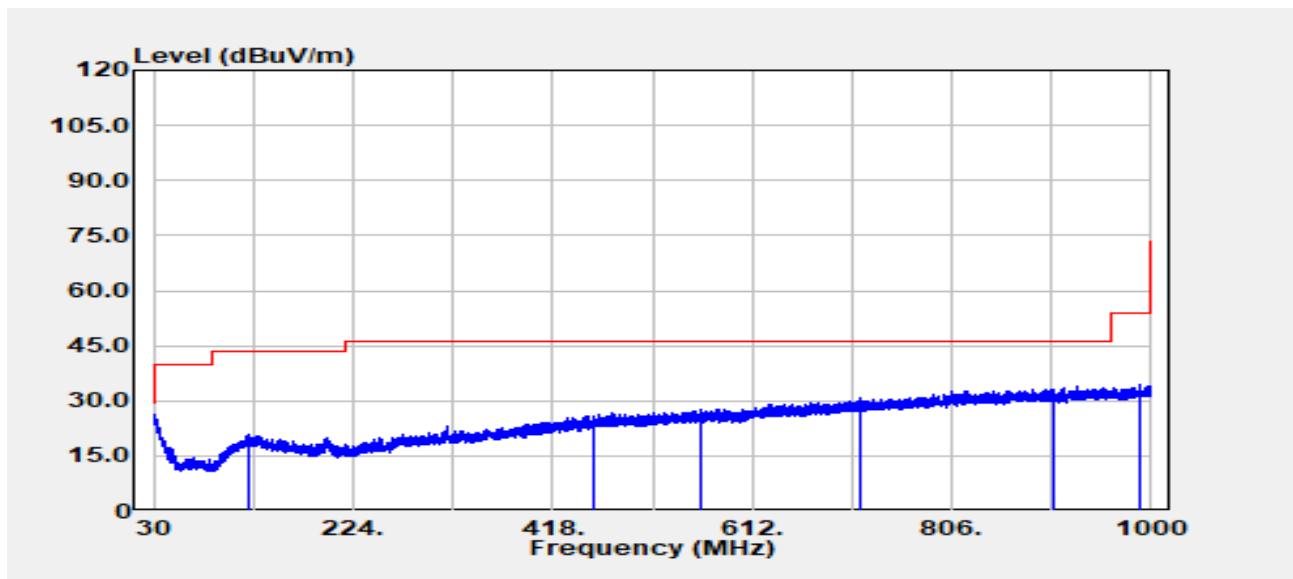
TX Test Data

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



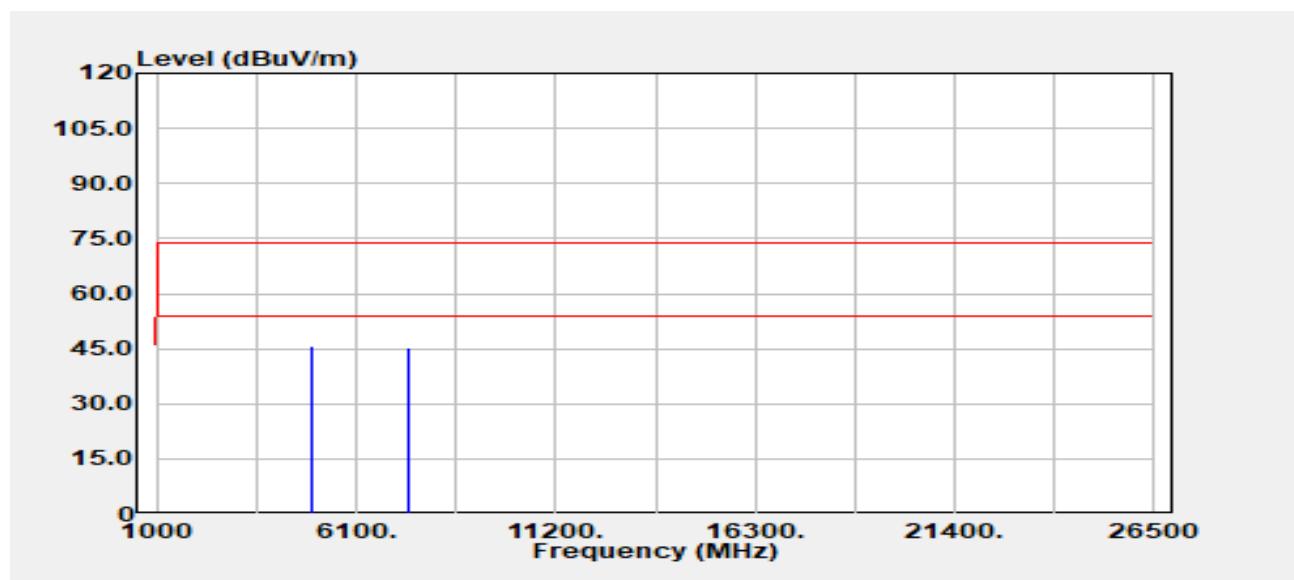
| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 49.30 | Peak | 37.90 | -15.18 | 22.71 | 40.00 | -17.29 |
| 198.20 | Peak | 29.15 | -9.79 | 19.35 | 43.50 | -24.15 |
| 419.20 | Peak | 30.74 | -5.11 | 25.63 | 46.00 | -20.37 |
| 606.50 | Peak | 29.77 | -1.81 | 27.96 | 46.00 | -18.04 |
| 790.00 | Peak | 30.38 | 1.77 | 32.15 | 46.00 | -13.85 |
| 952.50 | Peak | 30.30 | 4.05 | 34.35 | 46.00 | -11.65 |

| | | | |
|----------------|-----------------|--------------|-------------|
| Project No | :TM-2411000242P | Test Date | :2024-11-27 |
| Operation Band | :BT BR | Temp./Humi. | :24.8/57 |
| Frequency | :2480 MHz | Antenna Pol. | :HORIZONTAL |
| Operation Mode | :TX | Engineer | :Tony Chao |
| EUT Pol | :H | Test Chamber | : 966A |
| Setting | : | | |



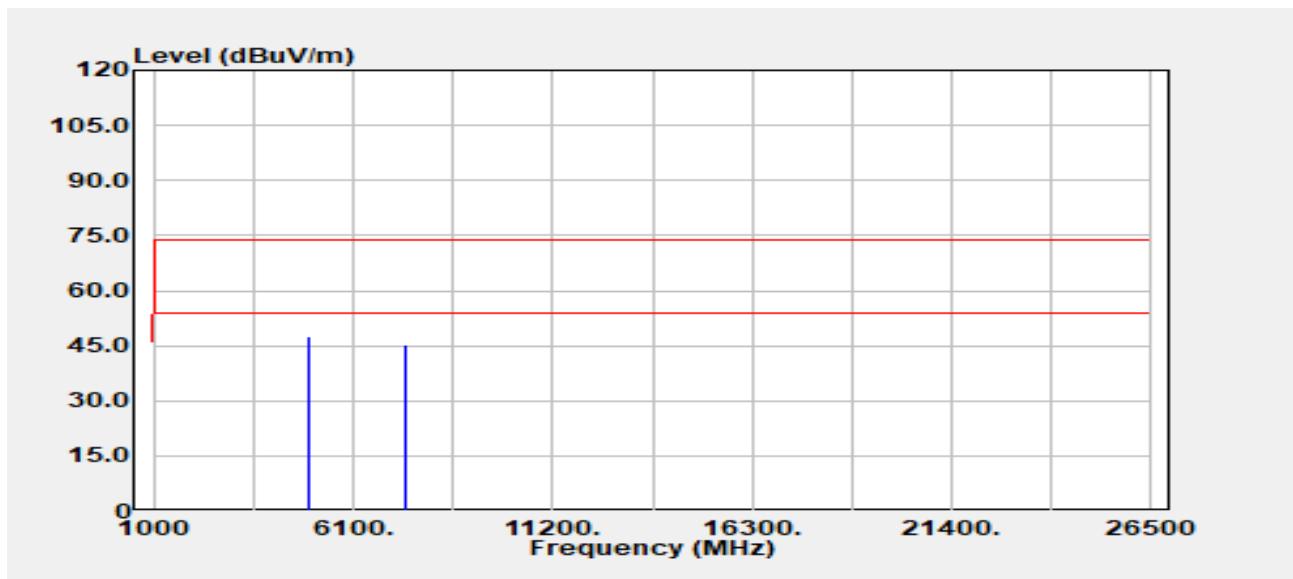
| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 123.30 | Peak | 29.90 | -9.13 | 20.77 | 43.50 | -22.73 |
| 458.70 | Peak | 30.01 | -4.16 | 25.85 | 46.00 | -20.15 |
| 561.40 | Peak | 29.95 | -2.31 | 27.65 | 46.00 | -18.35 |
| 717.00 | Peak | 30.48 | 0.51 | 30.99 | 46.00 | -15.01 |
| 905.20 | Peak | 29.91 | 3.09 | 33.00 | 46.00 | -13.00 |
| 988.90 | Peak | 29.93 | 4.46 | 34.39 | 54.00 | -19.61 |

| | | | |
|----------------|-----------------|--------------|-------------|
| Project No | :TM-2411000242P | Test Date | :2024-11-27 |
| Operation Band | :BT BR | Temp./Humi. | :24.6/60 |
| Frequency | :2480 MHz | Antenna Pol. | :Vertical |
| Operation Mode | :TX | Engineer | :Ray Li |
| EUT Pol | :H | Test Chamber | : 966A |
| Setting | :0 | | |



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 4960.00 | Peak | 42.96 | 2.94 | 45.90 | 74.00 | -28.10 |
| 4960.00 | Average | 41.70 | 2.94 | 44.64 | 54.00 | -9.36 |
| 7440.00 | Peak | 36.55 | 8.71 | 45.26 | 74.00 | -28.74 |
| 7440.00 | Average | 29.27 | 8.71 | 37.98 | 54.00 | -16.02 |

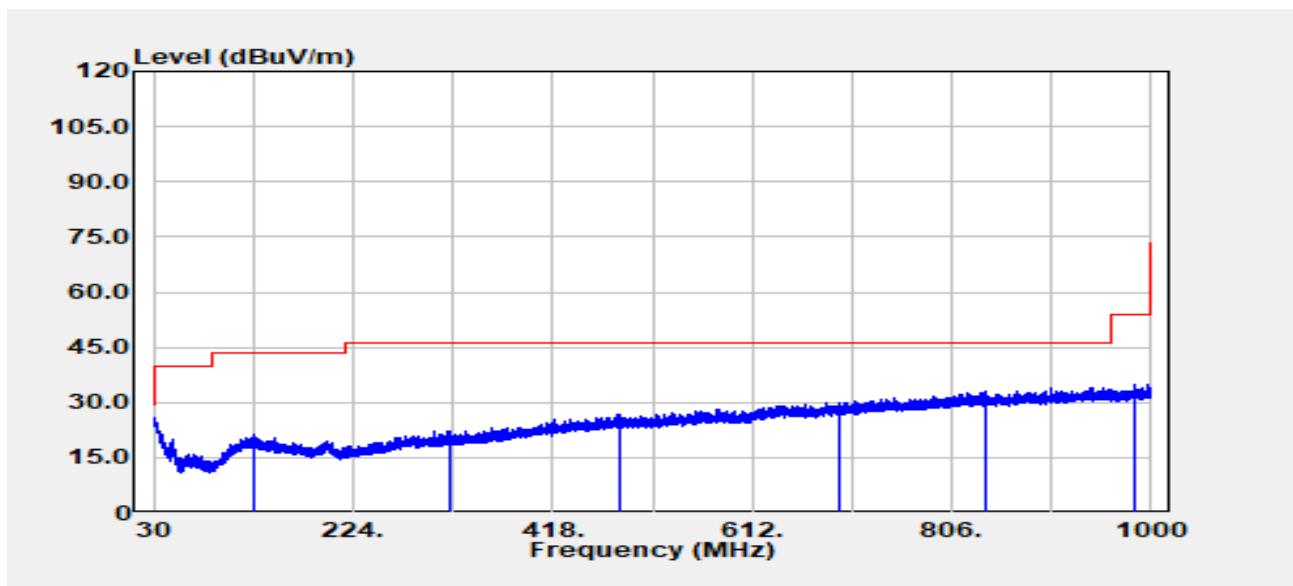
| | | | |
|----------------|-----------------|--------------|-------------|
| Project No | :TM-2411000242P | Test Date | :2024-11-27 |
| Operation Band | :BT BR | Temp./Humi. | :24.6/60 |
| Frequency | :2480 MHz | Antenna Pol. | :Horizontal |
| Operation Mode | :TX | Engineer | :Ray Li |
| EUT Pol | :H | Test Chamber | : 966A |
| Setting | :0 | | |



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 4960.00 | Peak | 44.66 | 2.94 | 47.60 | 74.00 | -26.40 |
| 4960.00 | Average | 43.21 | 2.94 | 46.15 | 54.00 | -7.85 |
| 7440.00 | Peak | 36.52 | 8.71 | 45.23 | 74.00 | -28.77 |
| 7440.00 | Average | 29.49 | 8.71 | 38.20 | 54.00 | -15.80 |

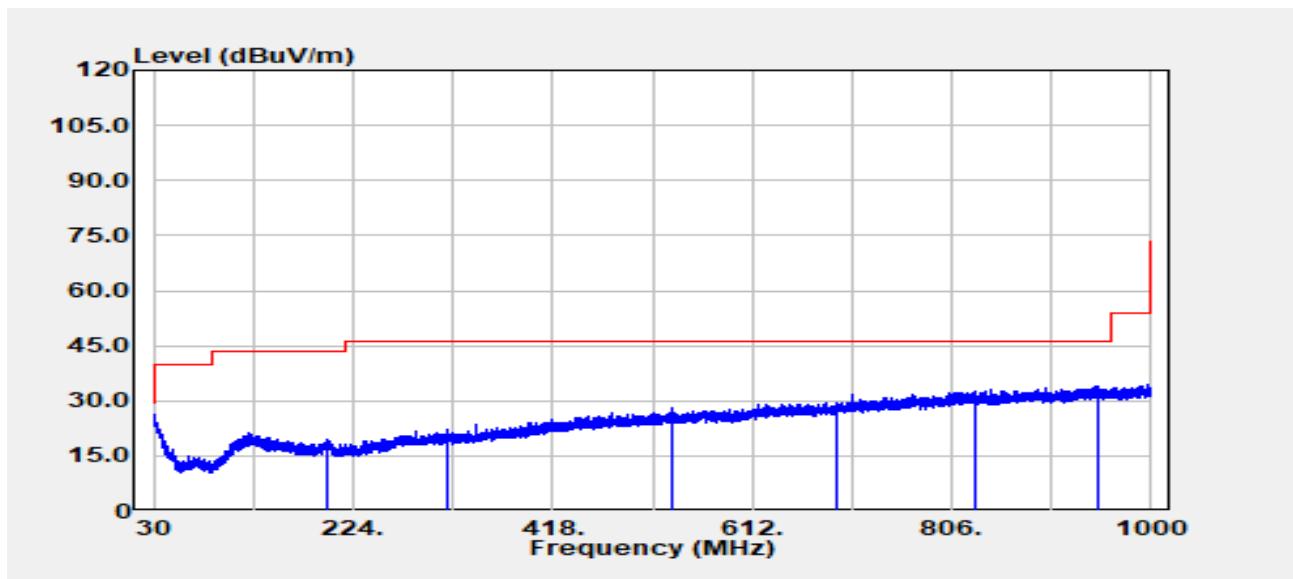
Co-location

| | | | |
|----------------|----------------------|--------------|-------------|
| 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 dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/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 | Test Date | :2024-11-27 |
| Operation Band | :802.11a/Band4_BT BR | Temp./Humi. | :24.8/57 |
| Frequency | :5825+2480 MHz | Antenna Pol. | :HORIZONTAL |
| Operation Mode | :TX | Engineer | :Tony Chao |
| EUT Pol | :E1 | Test Chamber | : 966A |
| Setting | : | | |

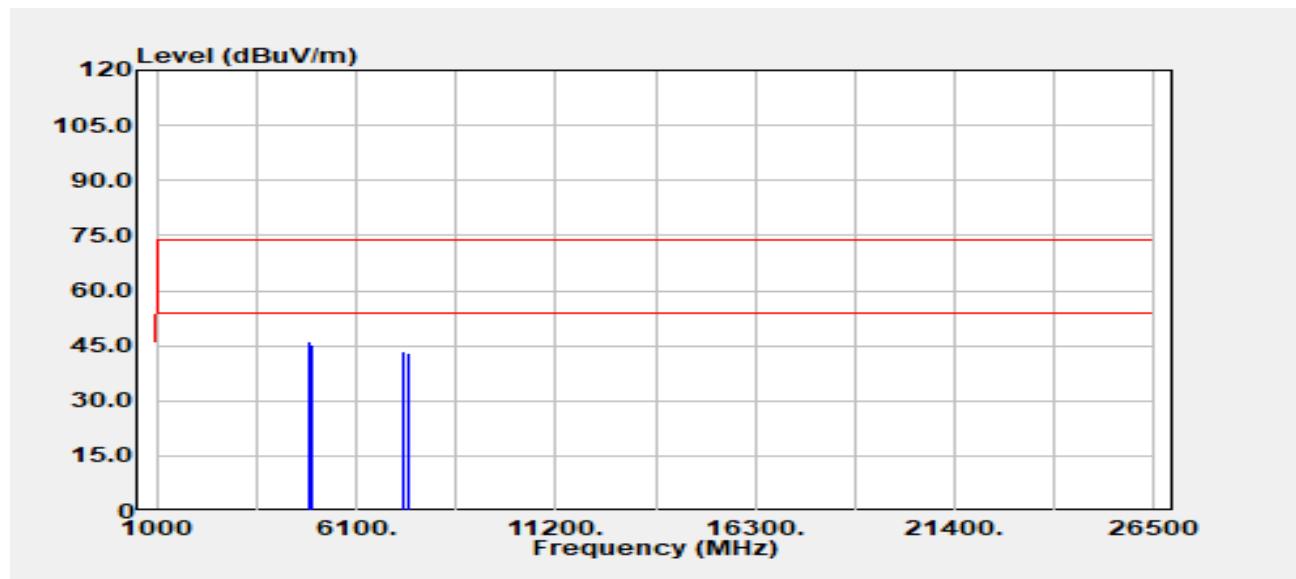


| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 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 | Test Date | :2024-11-27 |
| Operation Band | :802.11n20_BT BR | Temp./Humi. | :24.8/57 |
| Frequency | :2437+2480 MHz | Antenna Pol. | :VERTICAL |
| Operation Mode | :TX | Engineer | :Tony Chao |
| EUT Pol | :H | Test Chamber | : 966A |
| Setting | :85_0 | | |

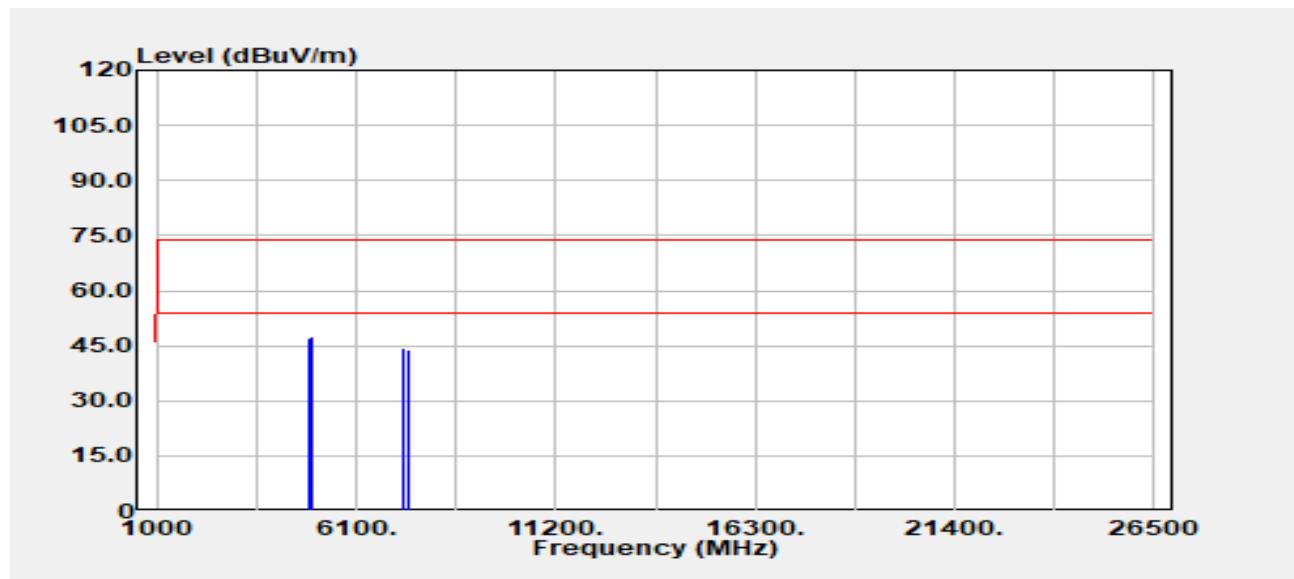


| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 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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Report No.: TMWK2412004343KR

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| | | | |
|----------------|------------------|--------------|-------------|
| Project No | :TM-2411000242P | Test Date | :2024-11-27 |
| Operation Band | :802.11n20_BT BR | Temp./Humi. | :24.8/57 |
| Frequency | :2437+2480 MHz | Antenna Pol. | :HORIZONTAL |
| Operation Mode | :TX | Engineer | :Tony Chao |
| EUT Pol | :H | Test Chamber | : 966A |
| Setting | :85_0 | | |

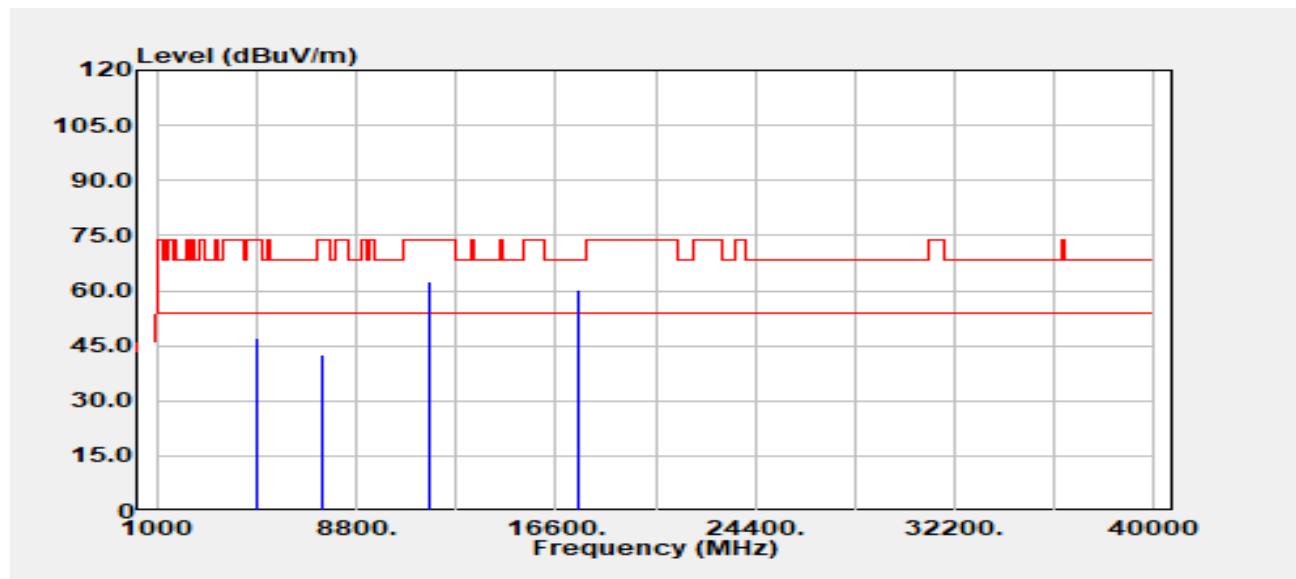


| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 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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Report No.: TMWK2412004343KR

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|----------------|----------------------|--------------|-------------|
| 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 | :93_0 | | |

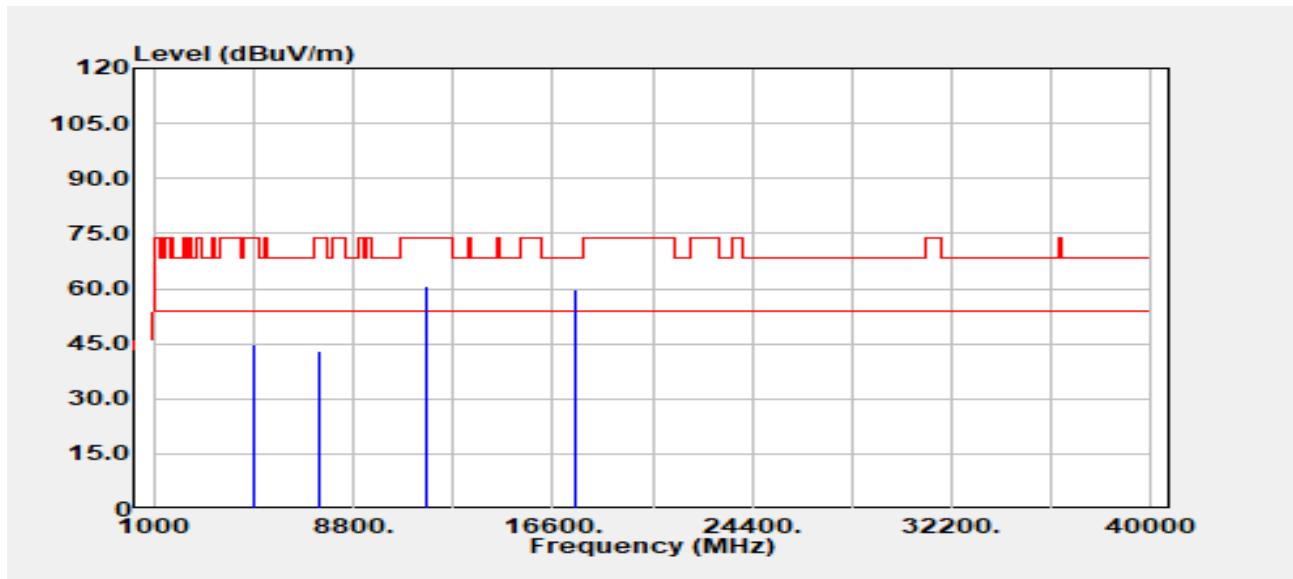


| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/m | Margin dB |
|--------------|------------------------------|--------------------------------------|--------------|------------------------------|-----------------------|--------------|
| 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 | Test Date | :2024-11-27 |
| Operation Band | :802.11a/Band4_BT BR | Temp./Humi. | :24.8/57 |
| Frequency | :5825+2480 MHz | Antenna Pol. | :HORIZONTAL |
| Operation Mode | :TX | Engineer | :Tony Chao |
| EUT Pol | :E1 | Test Chamber | : 966A |
| Setting | :93_0 | | |



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Read Level dB μ V | Factor dB | Actual FS dB μ V/m | Limit dB μ V/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 -